Final

Fort Richardson Operable Unit E Armored Vehicle Maintenance Area Groundwater Monitoring Report December 2008

Prepared for

United States Army, Alaska, Directorate of Public Works

Under Contract to

U.S. Army Corps of Engineers
Contract No. W911KB-08-D-0005,
Task Order 001

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Abbreviations

AAC	*Alaska Administrative Code*
ADEC	Alaska Department of Environmental Conservation
ARAR	applicable or relevant and appropriate requirement
AVMA	Armored Vehicle Maintenance Area
°C	degrees Celsius
CFR	*Code of Federal Regulations*
COC	chemical of concern
CRREL	Cold Regions Research and Engineering Laboratory
DCE	dichloroethene
DPW	U.S. Army Directorate of Public Works
EPA	U.S. Environmental Protection Agency
J	estimated quantity
MCL	maximum contaminant level
mg/L	milligrams per liter
M-K	Mann-Kendall
MS	matrix spike
MSD	matrix spike duplicate
MSL	mean sea level
µg/L	micrograms per liter
OUE	Operable Unit E
PCE	tetrachloroethene
POL	petroleum, oil, and lubricant
RI	remedial investigation
ROD	Record of Decision
TCE	trichloroethene
USACE	U.S. Army Corps of Engineers
VC	vinyl chloride
VOC	volatile organic compound

Executive Summary

This report presents the results of the December 2008 groundwater monitoring event conducted at the Armored Vehicle Maintenance Area (AVMA) of Operable Unit E (OUE), Fort Richardson, Alaska, and a brief summary of historical data trends. The December 2008 monitoring task was completed by Shannon & Wilson for the U.S. Army Directorate of Public Works (DPW) under contract to the U.S. Army Corps of Engineers (USACE) in accordance with the scope of work for Contract W911KB-08-D-0005, Task Order 001.

Ten wells were sampled between December 2 and 5, 2008 at the AVMA, including six wells within the extent of contamination, three downgradient wells, and one cross-gradient background well. Samples were analyzed for volatile organic compounds (VOCs), aluminum, arsenic, and several natural attenuation parameters including iron, manganese, sulfate, methane, and total nitrate/nitrite.

Based on historical and current data, through the December 2008 monitoring event, the following conclusions can be made:

- Tetrachloroethene (PCE) is the chemical of concern (COC) at the AVMA and was detected in five of the six wells within the known extent of contamination at concentrations above the maximum contaminant level (MCL) documented in the OUE Record of Decision (ROD). The extent of PCE contaminated groundwater appears to be stable and contained; samples from the three downgradient wells continue to have trace or non-detect results. The one site well that showed a statistically significant trend (increasing) in the PCE-affected area is well AP-4342. No other trends are apparent from the historical monitoring data.
- The results of biodegradation parameters and the absence of PCE breakdown products continue to suggest that biodegradation of PCE may be limited at the AVMA and that the primary mechanism of natural attenuation at the site continues to be dilution. Monitoring of natural attenuation parameters is required by the ROD. However, for sites where biodegradation is not playing a key role in the attenuation process, monitoring and evaluation of biodegradation parameters provide little value toward the understanding of the site contaminant conditions.

SECTION 1

Introduction

1.1 Project Overview

This report presents the results of the December 2008 groundwater monitoring event conducted at the Armored Vehicle Maintenance Area (AVMA) of Operable Unit E (OUE), Fort Richardson, Alaska (Figure 1-1) and a brief summary of historical data. The purpose of this report is to present the results of groundwater monitoring at the AVMA, completed under the Fort Richardson Groundwater Monitoring Program. The Groundwater Monitoring Program is part of the selected remedy required by the OUE Record of Decision (ROD), which was signed in September 2005. This December 2008 monitoring task was completed by Shannon & Wilson for the U.S. Army Directorate of Public Works (DPW) under contract to the U.S. Army Corps of Engineers (USACE) in accordance with the scope of work for Contract W911KB-08-D-0005, Task Order 001.

This report contains historical data collected at OUE since 2002 for wells included in the December 2008 monitoring event and describes the sampling effort conducted by Shannon & Wilson between December 2 and 5, 2008. Although some groundwater sampling occurred before 2002, the data were not readily available for inclusion in this report. Older data are included in the Fort Richardson Administrative Record and are available from the information repositories at the UAA/APU Consortium Library and the DPW Environmental Resource Department on Fort Richardson. The data presented are compared to cleanup level goals established by the ROD.

1.2 Site Location and Description

Fort Richardson occupies approximately 61,500 acres of land slightly northeast of Anchorage, Alaska (Figure 1-1). This report focuses on the AVMA of OUE, which is located in the western region of the cantonment area of Fort Richardson where an area with soil and groundwater affected by tetrachloroethene (PCE) exists (Figures 1-2 and 1-3). The AVMA was originally identified as a potential source area from historical aerial photographs, which indicated areas of buried debris, drainage ditches near the former vehicle wash area, and other identified ditches; however, data collected during the 2002 remedial investigation (RI) (CH2M HILL, 2004) indicated that these areas were not the source area for the contaminated groundwater in the vicinity of the site. A single main source of groundwater contamination has not been identified. Data collected during the OUE RI strongly suggests that PCE contamination in groundwater at the AVMA likely resulted from vehicle maintenance and laundry operations conducted at Buildings 732 and 726, respectively. Historical data show that PCE was used at the laundry facility and low levels of PCE were detected in soils at the Building 726 site during the Operable Unit E remedial investigation (RI) (ENSR, 1998).

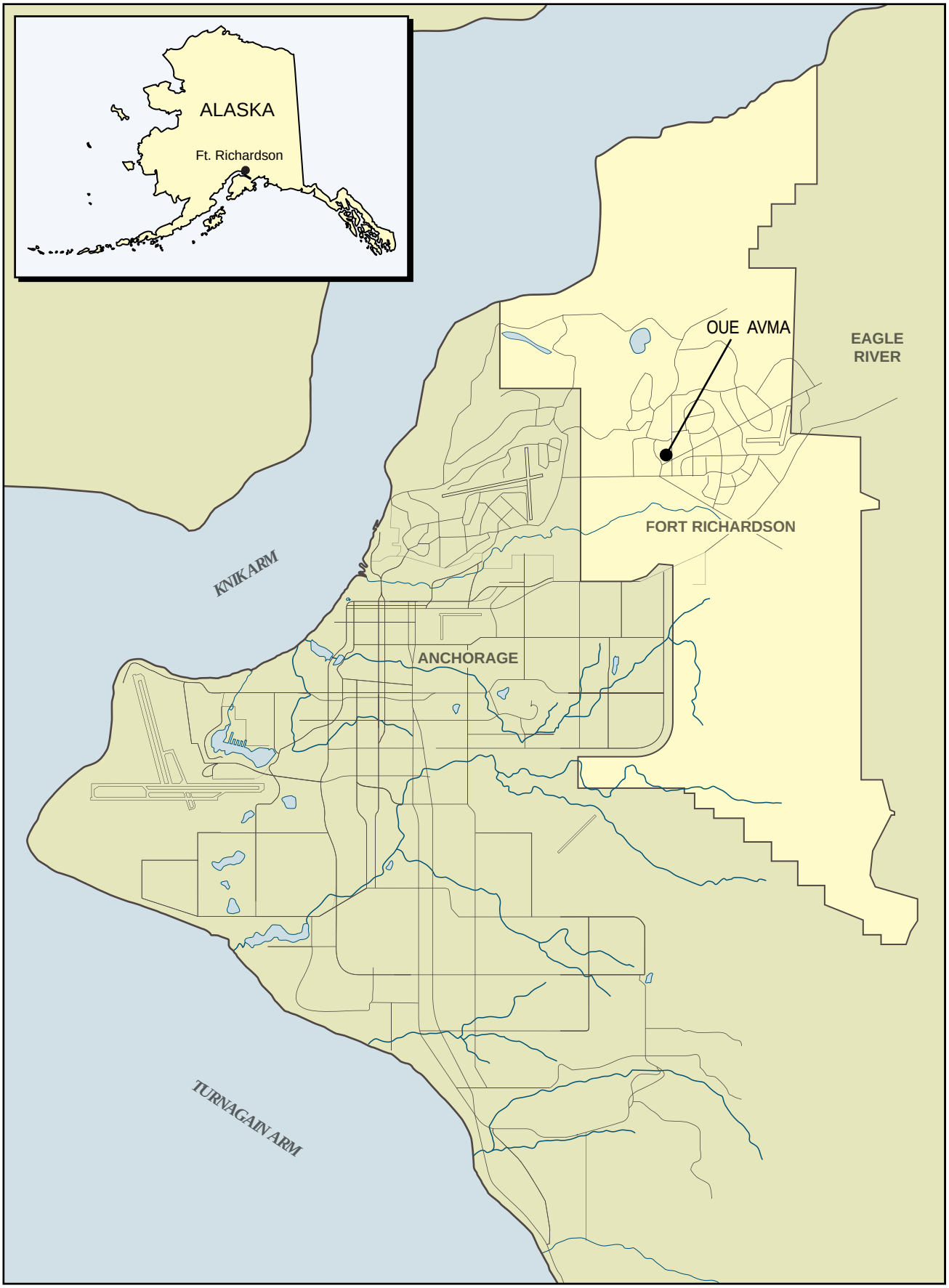
1.3 Geology and Hydrogeology

Fort Richardson is located within the Cook Inlet-Susitna Lowland Section of the Coastal Trough physiographic province of Alaska. The majority of Fort Richardson lies less than 500 feet above mean sea level (MSL), with local relief varying between 50 feet MSL and 250 feet MSL. The geology of Fort Richardson is primarily the result of past glacial events and consists of the Elmendorf moraine, alluvial fans, and glacial outwash deposits. The hydrogeology of Fort Richardson, although extremely variable across the installation, is composed of three primary aquifer systems–a shallow perched (unconfined) system, a locally semi-confined system, and a deeper confined system. The upper confining unit tapers out near the Davis Highway where the shallow perched and locally semi-confined aquifers merge (Figure 1-3). Shallow perched groundwater of limited volume and extent exists in localized areas beneath the AVMA site.

The 10 wells monitored during the December 2008 monitoring event are screened within either the shallow perched system or downgradient of the confluence of the perched and locally semi-confined systems, where the locally semi-confined system becomes unconfined.

1.4 Previous Site Investigations and Site History

Since the 1950s, many investigations and activities have been conducted at the OUE AVMA. These events are summarized in Table 1-1.



North

Not to Scale

Figure 1-1
Location Map, OUE AVMA
Fort Richardson, Alaska

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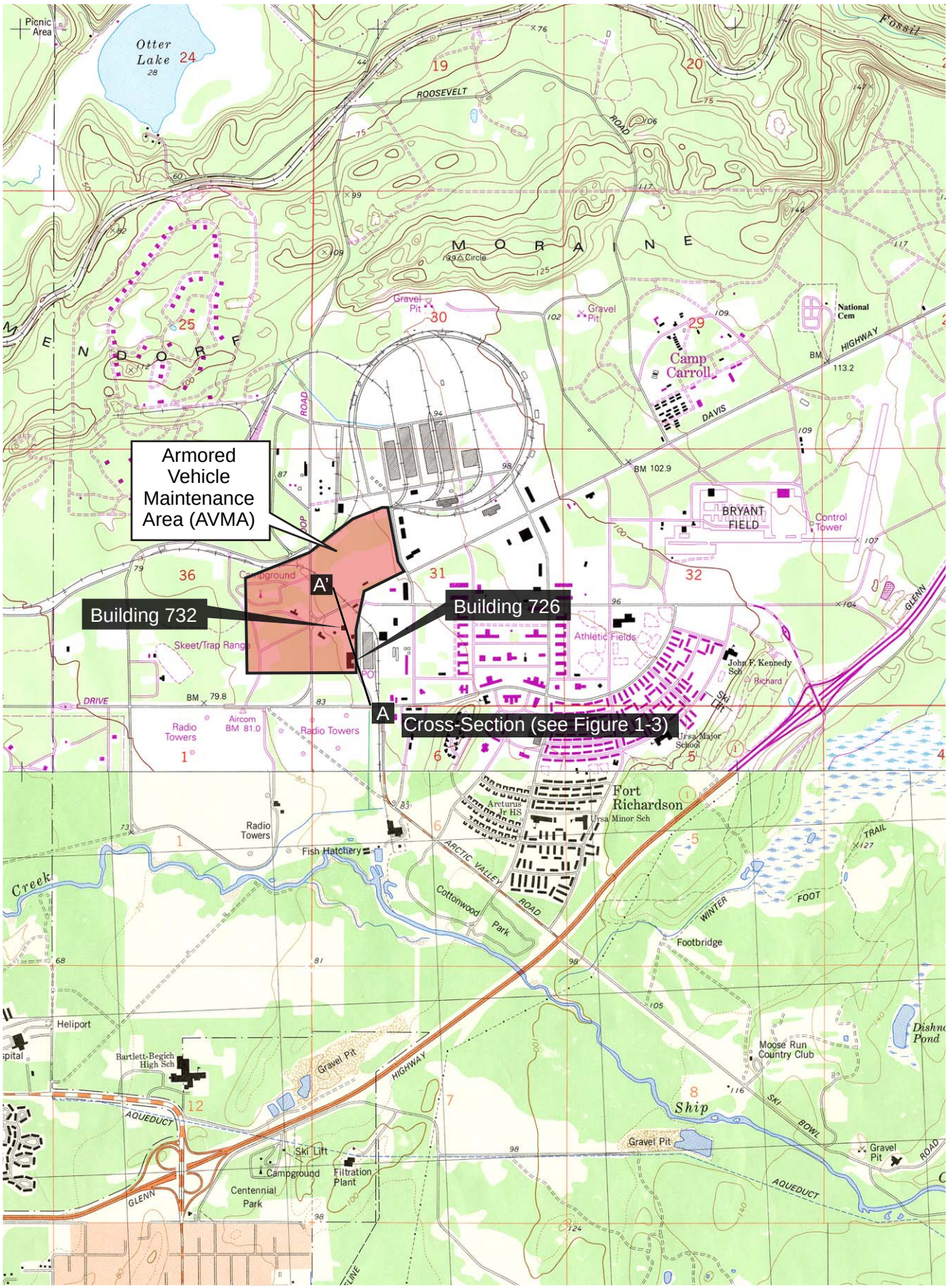
FIGURE 1-1 (BACK)



North

Figure 1-2
Site Locations Map, OUE AVMA
Fort Richardson, Alaska

FIGURE 1-2 (BACK)

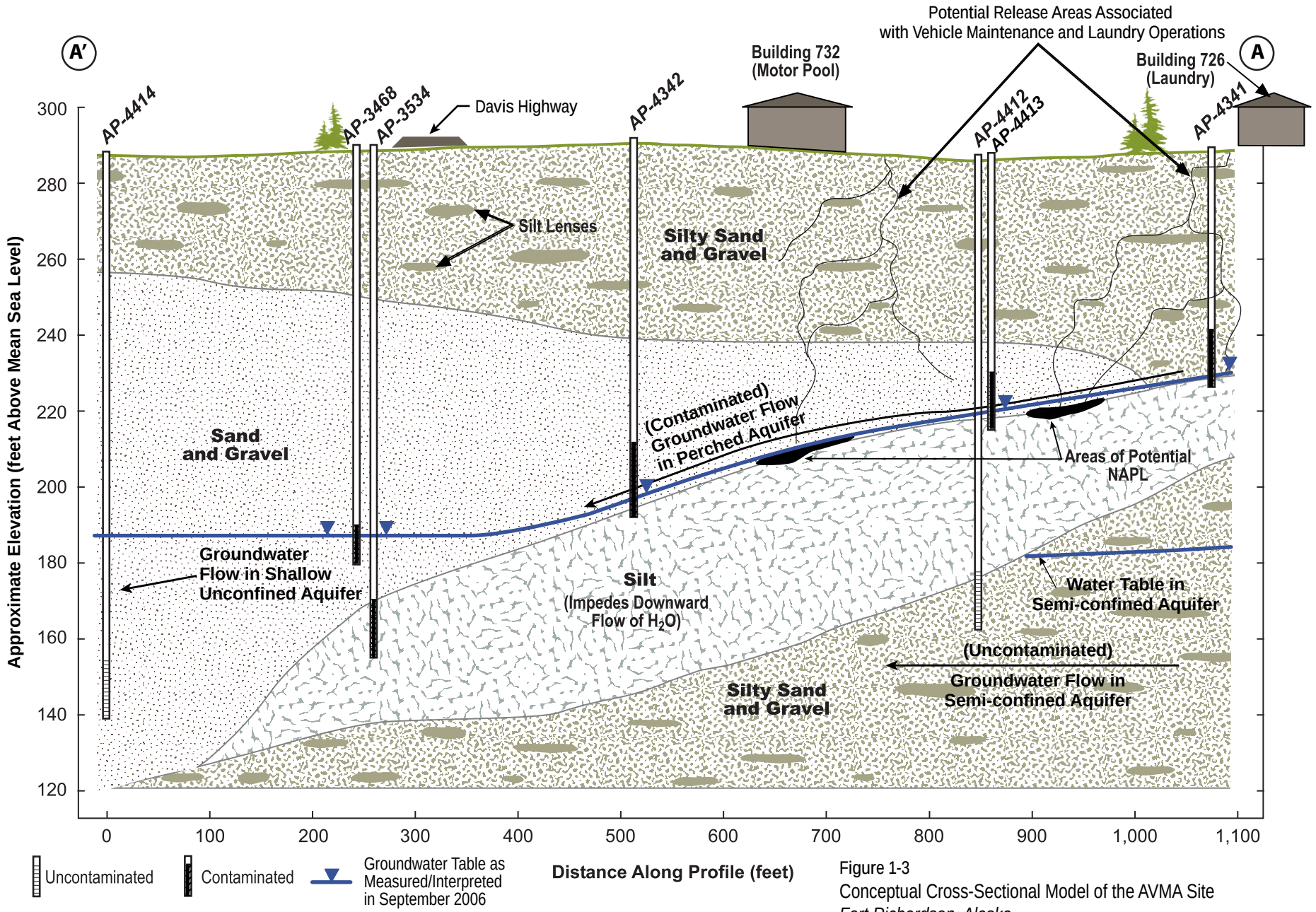


Figure 1-3
Conceptual Cross-Sectional Model of the AVMA Site
Fort Richardson, Alaska

Figure prepared by CH2MHill Consultants. Used with permission of US Army Corps of Engineers.

FIGURE 1-3 (BACK)

TABLE 1-1
Timeline of Past Activities at OUE AVMA

Year	Organization/Company	Activity
1950-1966[a]	Fort Richardson Army Post	Low-level armored vehicle maintenance, oil and other waste material disposal
1990	USACE	Underground storage tank remediation sampling program
1993	Harding Lawson Assoc.	Site assessment at UST location
1994	ENSR	Field investigation
1996	Ecology and Environment Inc.	Background data analysis, soil borings, and groundwater sampling
2000	CRREL	Geophysical investigation
2001	CRREL	Historic aerial photography analysis and geophysical investigation
2001	USACE	Monitoring well installation, soil borings, groundwater sampling
2002-2003	CH2M HILL	Remedial Investigation and Risk Assessment
2003	CH2M HILL	Annual Groundwater Monitoring
2004	CH2M HILL	Feasibility Study
2004-2005	Satori Group Inc.	Annual Groundwater Monitoring
2005	CH2M HILL, Army, ADEC, EPA	Record of Decision signed
2006-2007	CH2M Hill	Semiannual Groundwater Monitoring
2008	Shannon & Wilson	Annual Groundwater Monitoring

[a]It is undetermined when the facility was no longer used as a maintenance area
Source: *Preliminary Site Characterization Report* (CH2M HILL, 2003)

ADEC = Alaska Department of Environmental Conservation
CRREL = Cold Regions Research and Engineering Laboratory
EPA = U.S. Environmental Protection Agency
USACE = U.S. Army Corps of Engineers

SECTION 2

Groundwater Quality Monitoring Program

According to the selected remedy presented in the ROD for the AVMA of OUE (CH2M HILL, 2005), natural attenuation, institutional controls, and groundwater monitoring are the most appropriate and feasible actions for addressing the PCE-affected groundwater at the site. The role of groundwater monitoring is to evaluate the effectiveness of natural attenuation as the appropriate method for reducing contaminant concentrations to levels less than cleanup goals. The current groundwater monitoring schedule, established by the ROD, includes annual monitoring for 4 years (through 2009), with a subsequent reduction in frequency if contaminant levels are declining. Regular monitoring allows detection of trends that could trigger changes to the remediation process for the site or support site closure. Two specific trend benchmarks were established by the ROD:

- Monitoring will be discontinued when at least three subsequent sampling events indicate that chemical of concern (COC) concentrations have consistently dropped below maximum contaminant levels (MCLs).
- If monitoring results for any two consecutive sampling events indicate that contaminant levels are increasing, the U.S. Environmental Protection Agency (EPA), Alaska Department of Environmental Conservation (ADEC) , and U.S. Army will reevaluate the remedy.

2.1 Regulatory Requirements

The ROD established Federal Safe Drinking Water Act (Title 40, Parts 141 and 143, of the *Code of Federal Regulations* [CFR]) and Alaska Drinking Water Regulations ([Title 18, Chapter 80, of the *Alaska Administrative Code* [AAC]) as the sources for applicable or relevant and appropriate requirements (ARARs) for MCLs at OUE. In addition, the ROD identified one COC, PCE, which was detected in OUE groundwater at levels that pose a potential excessive lifetime cancer risk. Table 2-1 includes the COC and other analytes that have been historically detected in samples from one or more wells at concentrations greater than their MCLs. Complete analytical results are available in Appendix B.

2.2 Monitoring Locations

Ten wells were sampled in or near the AVMA during the December 2008 monitoring event. Well locations are provided in Figure 2-1 and include six wells within the area of PCE contamination, three downgradient wells, and one cross-gradient well for background.

TABLE 2-1
OUE Maximum Contaminant Levels

Analyte	Cleanup Levels (µg/L)	
	EPA 40 CFR 141/143	ADEC 18 AAC 80
Chemical of Concern		
Tetrachloroethene (PCE)	5	5
Other Detected Analytes		
Aluminum	50-200	NA
Arsenic	10	10

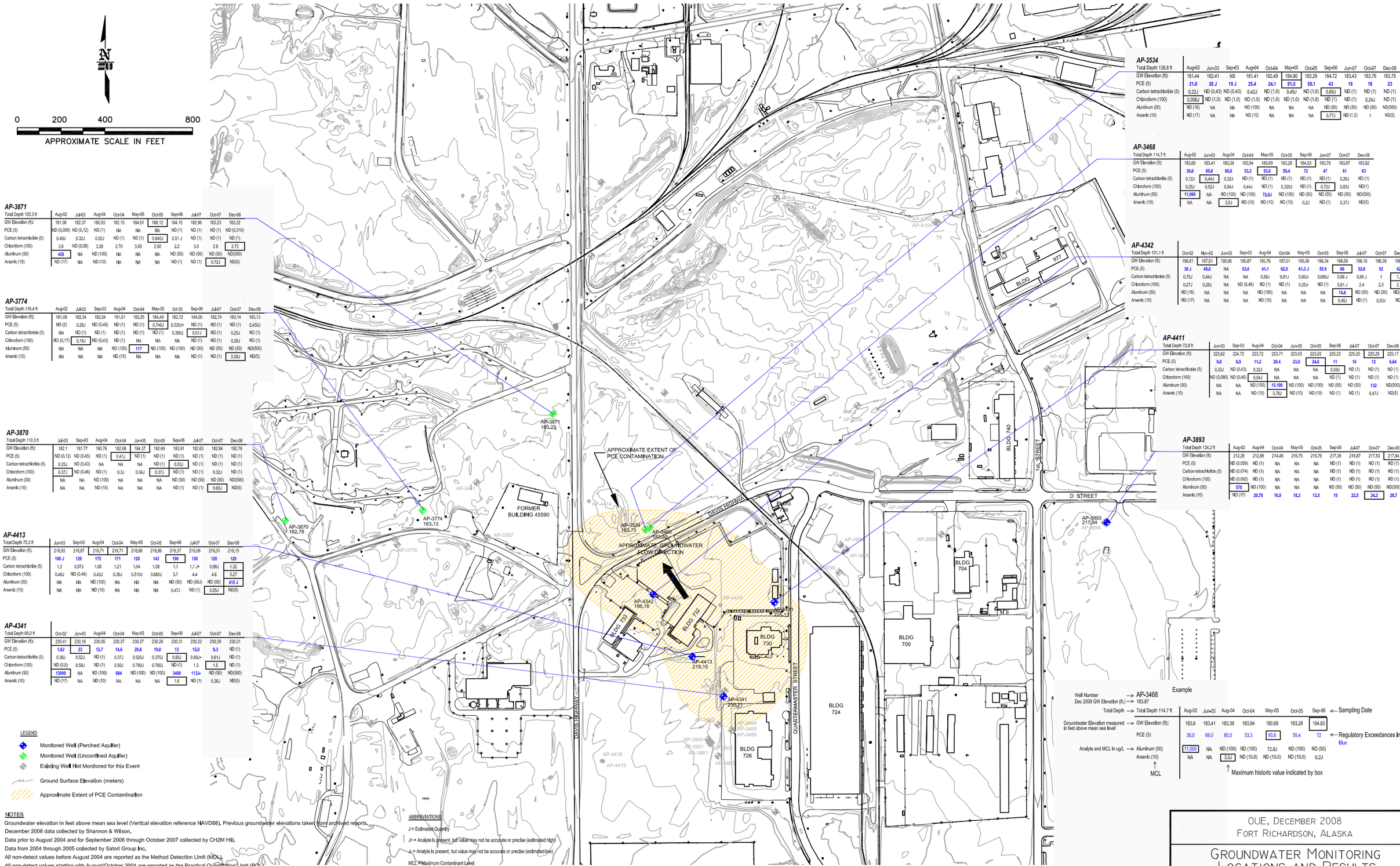
AAC = *Alaska Administrative Code*
ADEC = Alaska Department of Environmental Conservation
CFR = *Code of Federal Regulations*
EPA = U.S. Environmental Protection Agency
µg/L = micrograms per liter
NA = not applicable

2.3 Monitoring Frequency

Well sampling is required annually by the ROD, but is currently being conducted twice per year per Contract W911KB-08-D-0005, Task Order 001, typically in the spring and fall. Depending on weather conditions, site accessibility, and other site activities, sampling dates may differ from year to year.

2.4 Groundwater Monitoring Parameters

Currently, volatile organic compound (VOC) concentrations in groundwater are being monitored for comparison to the ARAR MCLs listed in Table 2-1. In addition, under the current scope of work, groundwater also was evaluated for arsenic, aluminum, and a number of parameters that are indicators of biodegradation, which is a component of the natural attenuation process. The OUE monitoring parameters are identified in Table 2-2. December 2008 groundwater sampling forms and analytical data tables are included in Appendices A and B, respectively.



AP-3871

Total Depth 120.3 ft	Aug-02	Jul-03	Aug-04	Oct-04	May-05	Oct-05	Sep-06	Jul-07	Oct-07	Dec-08
GW Elevation (ft):	181.08	182.37	180.93	182.15	184.51	188.12	184.15	182.96	183.23	183.22
PCE (5)	ND (0.059)	ND (0,12)	ND (1)	NA	NA	NA	ND (1)	ND (1)	ND (1)	ND (0,310)
Carbon tetrachloride (5)	0.49J	0.32J	0.52J	ND (1)	ND (1)	0.840J	0.51 J	ND (1)	ND (1)	ND (1)
Chloroform (100)	3.6	ND (0,08)	3.26	2.70	3.00	2.92	2.2	3.0	2.8	3.73
Aluminum (50)	420	NA	ND (100)	NA	NA	NA	ND (50)	ND (50)	ND (50)	ND(500)
Arsenic (10)	ND (17)	NA	ND (10)	NA	NA	NA	ND (1)	ND (1)	0.72J	ND(5)

AP-3774

Total Depth 116.4 ft	Aug-02	Jul-03	Sep-03	Aug-04	Oct-04	May-05	Oct 05	Sep-06	Jul-07	Oct-07	Dec-08
GW Elevation (ft):	181.09	182.34	182.04	181.01	182.25	184.49	182.72	184.00	182.74	183.14	183.13
PCE (5)	ND (2)	0.26J	ND (0,46)	ND (1)	ND (1)	0.740J	0.330J+	ND (1)	ND (1)	ND (1)	0.450J
Carbon tetrachloride (5)	NA	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	0.390J	0.51J	ND (1)	0.25J	ND (1)
Chloroform (100)	ND (0,17)	0.18J	ND (0,43)	ND (1)	NA	NA	NA	NA	ND (1)	0.26J	ND (1)
Aluminum (50)	NA	NA	NA	ND (100)	117	ND (100)	ND (100)	ND (50)	ND (50)	ND (50)	ND(500)
Arsenic (10)	NA	NA	NA	ND (10)	NA	NA	NA	ND (1)	ND (1)	0.59J	ND(5)

AP-3870

Total Depth 110.3 ft	Jul-03	Sep-03	Aug-04	Oct-04	Jun-05	Oct-05	Sep-06	Jul-07	Oct-07	Dec-08
GW Elevation (ft):	182.1	181.77	180.76	182.08	184.37	182.69	183.91	182.63	182.84	182.78
PCE (5)	ND (0,12)	ND (0.45)	ND (1)	0.41J	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)
Carbon tetrachloride (5)	0.25J	ND (0,43)	NA	NA	NA	ND (1)	0.53J	ND (1)	ND (1)	ND (1)
Chloroform (100)	0.37J	ND (0,46)	ND (1)	0.3J	0.34J	0.37J	ND (1)	ND (1)	0.32J	ND (1)
Aluminum (50)	NA	NA	ND (100)	NA	NA	NA	ND (50)	ND (50)	ND (50)	ND(500)
Arsenic (10)	NA	NA	ND (10)	NA	NA	NA	ND (1)	ND (1)	0.65J	ND(5)

AP-4413

Total Depth 75.3 ft	Jun-03	Sep-03	Aug-04	Oct-04	May-05	Oct-05	Sep-06	Jul-07	Oct-07	Dec-08
GW Elevation (ft):	218,93	218,87	219,71	219,71	218,66	218,86	219,37	219,08	219,31	219,15
PCE (5)	100 J	120	175	171	120	143	190	150	120	120
Carbon tetrachloride (5)	1,3	0,97J	1,06	1,21	1,04	1,08	1,1	1,1 J+	0,98J	1,32
Chloroform (100)	0,48J	ND (0,46)	0,42J	0,38J	0,510J	0,660J	3,7	4,4	4,6	5,27
Aluminum (50)	NA	NA	ND (100)	NA	NA	NA	ND (50)	ND (50J)	ND (50)	415 J
Arsenic (10)	NA	NA	ND (10)	NA	NA	NA	0,47J	ND (1)	0,55J	ND(5)

AP-4341

Total Depth 68.0 ft	Oct-02	Jun-03	Aug-04	Oct-04	May-05	Oct-05	Sep-06	Jul-07	Oct-07	Dec-08
GW Elevation (ft):	230.41	230.16	230.05	230.37	230.27	230.26	230.31	230.22	230.29	230.21
PCE (5)	1.8J	23	12.7	14.6	20.8	19.0	13	12.0	9.3	ND (1)
Carbon tetrachloride (5)	0.38J	0.52J	ND (1)	0.37J	0.520J	0.370J	0.65J	0.69J+	0.61J	ND (1)
Chloroform (100)	ND (0.5)	0.58J	ND (1)	0.50J	0.780J	0.760J	ND (1)	1.3	1.5	ND (1)
Aluminum (50)	13000	NA	ND (100)	684	ND (100)	ND (100)	3400	113J-	ND (50)	ND(500)
Arsenic (10)	ND (17)	NA	ND (10)	NA	NA	NA	1.6	ND (1)	0.26J	ND(5)

AP-3534

Total Depth 138.8 ft	Aug-02	Jun-03	Sep-03	Aug-04	Oct-04	May-05	Oct-05	Sep-06	Jun-07	Oct-07	Dec-08
GW Elevation (ft):	181.44	182.41	NS	181.41	182.49	184.90	183.29	184.72	183.43	183.76	183.75
PCE (5)	21.0	28 J	19 J	25.4	24.1	81.5	59.1	43	18	18	23
Carbon tetrachloride (5)	0.22J	ND (0,43)	ND (0,43)	0.42J	ND (1,0)	0.49J	ND (1,0)	0.69J	ND (1)	ND (1)	ND (1)
Chloroform (100)	0.056J	ND (1,0)	ND (1,0)	ND (1,0)	ND (1,0)	ND (1,0)	ND (1,0)	ND (1)	ND (1)	0.24J	ND (1)
Aluminum (50)	ND (16)	NA	NA	ND (100)	NA	NA	NA	ND (50)	ND (50)	ND (50)	ND(500)
Arsenic (10)	ND (17)	NA	NA	ND (10)	NA	NA	NA	0.77J	ND (1.2)	1	ND(5)

AP-3468

Total Depth 114.7 ft	Aug-02	Jun-03	Aug-04	Oct-04	May-05	Oct-05	Sep-06	Jun-07	Oct-07	Dec-08
GW Elevation (ft):	183.60	183.41	183.39	183.94	180.69	183.28	184.63	183.76	183.87	183.82
PCE (5)	30.0	69.0	60.0	53.3	93.6	59.4	72	47	61	63
Carbon tetrachloride (5)	0.12J	0.44J	0.32J	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	0.26J	ND (1)
Chloroform (100)	0.35J	0.52J	0.54J	0.44J	ND (1)	0.320J	ND (1)	0.72J	0.83J	ND(1)
Aluminum (50)	11,000	NA	ND (100)	ND (100)	72.8J	ND (100)	ND (50)	ND (50)	ND (50)	ND(500)
Arsenic (10)	NA	NA	3.5J	ND (10)	ND (10)	ND (10)	0.2J	ND (1)	0.37J	ND(5)

AP-4342

Total Depth 101.1 ft	Oct-02	Nov-02	Jun-03	Sep-03	Aug-04	Oct-04	May-05	Oct-05	Sep-06	Jul-07	Oct-07	Dec-08
GW Elevation (ft):	196.61	197.51	195.95	195.87	195.76	197.01	195.56	196.34	196.59	196.10	196.39	196.16
PCE (5)	38 J	49.0	NA	53.0	41.1	62.5	61.3 J	55.9	66	52.0	52	62.9
Carbon tetrachloride (5)	0.75J	0.44J	NA	NA	0.58J	0.91J	0.90J-	0.680J	0.98 J	0.95 J	1	1.29
Chloroform (100)	0.27J	0.28J	NA	ND (0.46)	ND (1)	ND (1)	0.35J-	ND (1)	0.81 J	2.4	2.3	2.74
Aluminum (50)	ND (16)	NA	NA	NA	ND (100)	NA	NA	NA	74.6	ND (50)	ND (50)	ND(500)
Arsenic (10)	ND (17)	NA	NA	NA	ND (10)	NA	NA	NA	0.46J	ND (1)	0.53J	ND(5)

AP-4411

Total Depth 72,8 ft	Jun-03	Sep-03	Aug-04	Oct-04	Jun-05	Oct-05	Sep-06	Jul-07	Oct-07	Dec-08
GW Elevation (ft):	223,62	224.72	223,72	223,71	223,03	223,03	225,23	225,20	225,29	225,17
PCE (5)	9,8	8,9	11,2	20,4	23,9	24,6	11	10	12	6,64
Carbon tetrachloride (5)	0,33J	ND (0,43)	0,32J	NA	NA	NA	0,59J	ND (1)	ND (1)	ND (1)
Chloroform (100)	ND (0,080)	ND (0,46)	0,54J	NA	NA	NA	ND (1)	ND (1)	ND (1)	ND (1)
Aluminum (50)	NA	NA	ND (100)	15,100	ND (100)	ND (100)	ND (50)	ND (50)	132	ND(500)
Arsenic (10)	NA	NA	ND (10)	3,78J	ND (10)	ND (10)	ND (1)	ND (1)	0,47J	ND(5)

AP-3893

Total Depth 124,2 ft	Aug-02	Aug-04	Oct-04	May-05	Oct-05	Sep-06	Jul-07	Oct-07	Dec-08
GW Elevation (ft):	212,26	212,88	214,49	216,75	215,76	217,38	216,87	217,83	217,84
PCE (5)	ND (0.059)	ND (1)	NA	NA	NA	ND (1)	ND (1)	ND (1)	ND (1)
Carbon tetrachloride (5)	ND (0.074)	ND (1)	NA	NA	NA	ND (1)	ND (1)	ND (1)	ND (1)
Chloroform (100)	ND (0.092)	ND (1)	NA	NA	NA	ND (1)	ND (1)	ND (1)	ND (1)
Aluminum (50)	570	ND (100)	NA	NA	NA	ND (50)	ND (50)	ND (50)	ND(500)
Arsenic (10)	ND (17)	20.70	16.9	18.3	13.5	19	22.5	24.2	20.7

LEGEND

- Monitored Well (Perched Aquifer)
- Monitored Well (Unconfined Aquifer)
- Existing Well Not Monitored for this Event
- Ground Surface Elevation (meters)
- Approximate Extent of PCE Contamination

NOTES

Groundwater elevation in feet above mean sea level (Vertical elevation reference NAVD88). Previous groundwater elevations taken from archived reports.
December 2008 data collected by Shannon & Wilson.
Data prior to August 2004 and for September 2006 through October 2007 collected by CH2M Hill.
Data from 2004 through 2005 collected by Sator Group Inc.
All non-detect values before August 2004 are reported as the Method Detection Limit (MDL).
All non-detect values starting with August/October 2004 are reported as the Practical Quantitation Limit (PQL)
All concentrations are measured in µg/L.
Exceedances compared against EPA 40 CFR 141/143,and ADEC 18AAC80.
Regulatory Exceedances In Blue.
Maximum values are indicated by a box.
August/October 2002 metals data is for total metals with the exception of well AP-4342, which is dissolved metals.

ABBREVIATIONS

J = Estimated Quantity
J+ = Analyte is present, but value may not be accurate or precise (estimated high)
J- = Analyte is present, but value may not be accurate or precise (estimated low)
MCL = Maximum Contaminant Level
NA = Not Available
ND = No Analyte Detected
PCE = Tetrachloroethene

Example

Well Number	→ AP-3468						
Dec 2008 GW Elevation (ft.)	→ 183,87						
Total Depth	→ Total Depth 114,7 ft	Aug-02	Jun-03	Aug-04	Oct-04	May-05	Oct-05	Sep-06 ← Sampling Date
Groundwater Elevation measured in feet above mean sea level	→ GW Elevation (ft):	183,6	183,41	183,39	183,94	180,69	183,28	184,63
	PCE (5)	30,0	69,0	60,0	53,3	93,6	59,4	72 ← Regulatory Exceedances in Blue
Analyte and MCL In ug/L	→ Aluminum (50)	11,000	NA	ND (100)	ND (100)	72,8J	ND (100)	ND (50)
	Arsenic (10)	NA	NA	3,5J	ND (10,0)	ND (10,0)	ND (10,0)	0,2J
	↑ MCL			↑ Maximum historic value indicated by box				

OUE, DECEMBER 2008
FORT RICHARDSON, ALASKA

GROUNDWATER MONITORING LOCATIONS AND RESULTS

DECEMBER 2010 32-1-17261-741

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

FIG. 2-1

FIGURE 2-1 BACK

TABLE 2-2
Groundwater Quality Monitoring Parameters

Purging Parameters[a]	**Equipment**
Water level	Water-level indicator
Conductivity	Calibrated YSI 556 field meter
Temperature	Calibrated YSI 556 field meter
Dissolved oxygen	Calibrated YSI 556 field meter
pH	Calibrated YSI 556 field meter
Oxidation Reduction Potential (ORP)	Calibrated YSI 556 field meter
Turbidity	Calibrated Hach Turbidimeter
Parameters	**Analytical Method**
Volatile organic compounds	SW8260
Sulfate	EPA 300.0
Nitrate/nitrite	SW9056
Light gases (methane)	RSK 175
Dissolved metals (aluminum, arsenic, iron, and manganese)	SW6020

[a]Analyzed in the field at the time of sample collection

SECTION 3

Field Activities

3.1 Groundwater Elevations

Table 3-1 provides the depths to water, groundwater elevations, and the aquifers sampled. Measurements were taken on December 2, 2008. As discussed in Section 1.3, the ten wells sampled during the December 2008 monitoring event were screened within either the shallow perched system or downgradient of the confluence of the perched and locally semi-confined systems where the locally semi-confined system becomes unconfined (Figure 1-3).

TABLE 3-1
Monitoring Well Information Summary and December 2008 Groundwater Conditions

Monitoring Well	Total Well Depth (ft)[a, b]	Top of Casing Elevation (ft)[C]	Depth to Water (ft)[a]	Groundwater Elevation (feet above mean sea level)[C]	Aquifer Sampled
AP-3468	114.7	293.38	109.56	183.82	Shallow, unconfined
AP-3534	138.8	293.05	109.30	183.75	Shallow, unconfined
AP-3774	116.4	289.46	106.33	183.13	Shallow, unconfined
AP-3870	110.3	281.92	99.14	182.78	Shallow, unconfined
AP-3871	120.3	293.46	110.24	183.22	Shallow, unconfined
AP-3893	124.2	307.49	89.65	217.84	Perched
AP-4341	68.0	294.23	64.02	230.21	Perched
AP-4342	101.1	293.36	97.20	196.16	Perched
AP-4411	72.8	292.82	67.65	225.17	Perched
AP-4413	75.3	291.36	72.21	219.15	Perched

[a]All depths are provided in feet below top of casing.
[b]Total well depths were measured during the December 2008 water level survey of OUE wells.
[C]Top of casing elevations used in groundwater elevation calculation from 2003 well survey except AP-3870, which has been back-calculated from the *Fort Richardson Operable Unit E Armored Vehicle Maintenance Area Spring 2007 Groundwater Monitoring Report* (CH2M HILL, 2007a).

3.2 Groundwater Sample Collection

Groundwater samples were collected using low-flow techniques in accordance with procedures outlined in the CH2M HILL *Quality Assurance Program Plan* (2002), *Supplemental Quality Assurance Project Plan for Fort Richardson Groundwater Sampling at Operable Unit B, Operable Unit E, and Building 762* (CH2M HILL 2007c), *Sampling and Analysis Plan for*

Groundwater Monitoring at Fort Richardson Operable Unit B, Operable Unit E, and Building 762 (CH2M HILL, 2007b), and *Sampling and Analysis Plan Technical Memorandum, Groundwater Monitoring Fort Richardson, Alaska* (Shannon & Wilson, 2008) whenever possible. During this sampling event, eight of the ten wells were sampled using the low-flow method. Depth to water stability could not be achieved for Wells AP-4341 and AP-4411 during purging; therefore, these wells were purged dry three times. Wells AP-4341 and AP-4411 were allowed to recharge to at least 80 percent of pre-purge volume between purge cycles and prior to sampling.

3.3 Quality Assurance and Quality Control

Four types of quality assurance samples were collected to ensure data quality: trip blanks, equipment blanks, field duplicates, and matrix spike (MS)/matrix spike duplicate (MSD). For this sampling event, one field duplicate, one MS/MSD sample set, four equipment blanks and trip blanks were submitted to the laboratory for analysis. The analytical Data Quality Evaluation Report and ADEC Laboratory Data Review Checklists are included in Appendix B.

3.4 Investigation-Derived Waste Handling and Disposal

All water generated from well purging and equipment decontamination was collected in a 55-gallon drum and transported to the environmental staging facility located at the petroleum, oil, and lubricants (POL)/dewatering facility near the corner of Warehouse Street and Loop Road for treatment and disposal.

SECTION 4

Results

This section discusses the analytical results for each analysis completed.

4.1 Analytical Methods

The parameters listed in Table 2-2 are divided into the following categories for discussion:

- VOCs
- Dissolved metals (aluminum and arsenic)
- Biodegradation parameters
  - Dissolved oxygen
  - Sulfate
  - Nitrate/nitrite
  - Methane
  - Dissolved metals (iron and manganese)

Figure 2-1 presents historical results for the COCs included in Table 2-1 for groundwater underlying the AVMA. Groundwater elevations and concentrations of carbon tetrachloride and chloroform are also included in Figure 2-1. The following subsections summarize the analytical results for each category of analysis. Complete validated analytical laboratory results are provided in Appendix B-2, and raw analytical data packages have been included electronically.

4.2 Analytical Results

4.2.1 Volatile Organic Compounds

VOCs detected during sampling of the 10 wells in December 2008 are as follows:

- PCE was detected in samples from six wells (AP-3468, AP-3534, AP-3774, AP-4342, AP-4411, and AP-4413) with concentrations ranging from 0.450 J micrograms per liter (µg/L) in AP-3774 to 120 µg/L in AP-4413 (Figure 2-1). Each PCE detection was above the MCL (except AP-3774) and occurred in wells that have histories of PCE contamination. Three of these wells (AP-4342, AP-4411, and AP-4413) are screened across the perched aquifer, directly below the AVMA. Three wells (AP-3468, AP-3534, an d AP-3774) are screened downgradient from these three wells, at the confluence, or downgradient, of the perched aquifer system and the locally semi-confined system (Figure 1-3). PCE was not detected in two of the wells located downgradient of the extent of contamination, AP-3870 and AP-3871; the cross-gradient well, AP-3893; or AP-4341. Well AP-4341 is located in the estimated PCE contamination plume and has had detections of PCE during each of the previous nine sampling events conducted at the site.

- Biodegradation of PCE in groundwater sometimes occurs naturally by the process of reductive dechlorination and produces intermediate daughter products including trichloroethene (TCE), 1,1-dichloroethene (DCE), cis- and trans-dichloroethene (cis-DCE/trans-DCE), and vinyl chloride (VC). None of these PCE degradation daughter products were detected in the wells sampled during the December 2008 sampling event.
- Carbon tetrachloride was detected in two wells (AP-4342 and AP-4413) at concentrations of 1.29 µg/L and 1.32 µg/L, respectively. Both tetrachloride concentrations detected were below the MCL of 5 µg/L and occurred in wells that have histories of carbon tetrachloride detections. Both of these wells are screened across the perched aquifer, directly below the AVMA.
- Chloroform was detected in three of the ten on-site wells, with concentrations ranging from 2.74 µg/L (AP-4342) to 5.27 µg/L (AP-4413); all below the ADEC MCL in 18 AAC 75 of 100 µg/L .
- Acetone was detected at a concentration of 3.94 J µg/L in the sample from Well AP-4411, which is less than the ADEC MCL in 18 AAC 75 of 33,000 µg/L.

4.2.2 Biodegradation Parameters

The evaluation of geochemical parameters provides a brief look at indicators of biodegradation of chlorinated compounds (such as PCE) to determine whether they provide weight-of-evidence support for the existence of possible biodegradation pathways at the AVMA. These pathways could be an effective route of natural attenuation for PCE under certain biochemical conditions, namely anaerobic environments in the presence of petroleum products. During the 2002-2003 RI (CH2M HILL, 2004), petroleum compounds, including diesel-range organics, residual-range organics, and gasoline-range organics, were detected sporadically at low levels within the extent of contamination. These compounds are no longer monitored at the AVMA.

The following evaluation is based on a comparison of geochemical concentrations within the extent of contamination, which includes wellsAP-3468, AP-3534, AP-4341, AP-4342, AP-4411, and AP-4413, and with the cross-gradient background well AP-3893. Relative to background conditions, dissolved oxygen, nitrate, and sulfate concentrations are expected to be lower; dissolved iron, dissolved manganese, and methane are expected to be higher, within the extent of contamination if biodegradation is occurring. The following sections provide an evaluation of the geochemical results.

Dissolved Oxygen

Dissolved oxygen is the most energetically favorable electron acceptor for biodegradation and is used strictly under aerobic conditions. However, for PCE biodegradation to occur anaerobic conditions must exist and a less energetically favorable electron acceptor must be utilized (i.e. nitrate/nitrate, dissolved iron, or manganese). Dissolved oxygen is detrimental to the strictly anaerobic bacteria that are responsible for reductive dechlorination of longer-chain chlorinated compounds such as PCE; thus, anaerobic or anoxic conditions (dissolved oxygen concentrations less than 2 milligrams per liter [mg/L]) are required for PCE biodegradation. The presence of petroleum hydrocarbons also benefits this process. The lowest detected dissolved oxygen concentration detected in an AVMA monitoring well was

1.27 mg/L, which was recorded in background well AP-3893. Dissolved oxygen concentrations within the area of contaminated groundwater ranged from 6.88 to 11.39 mg/L, which indicates that the plume is aerobic.

Complete dissolved oxygen results are included on the Water Sampling Logs in Appendix A.

Total Nitrate/Nitrite

Following dissolved oxygen, nitrate is the second most energetically favorable electron acceptor and can be utilized by facultative anaerobic bacteria. Standard laboratory analysis for nitrate includes analysis of the total nitrate and nitrite due to the short reaction life of nitrite which chemically converts to nitrate rapidly under natural conditions. As a result, nitrite concentrations are typically very low or non-detect in groundwater.

Conditions at the AVMA are currently aerobic; as a result, evidence of denitrification in nitrate levels was not expected. Nitrate was detected in all wells but one (AP-3893) at concentrations ranging from 0.75 to 3.22 mg/L. Nitrate was not detected in background well AP-3893. Nitrite was not detected in the samples. Because the ratios of nitrate vs. nitrite are necessary to determine if denitrification is taking place, these results do not provide support that nitrate/nitrite play a key role in in-situ biodegradation at this site.

Dissolved Iron and Manganese

Sample AP-4413 had a dissolved iron concentration of 684 J µg/L during the December 2008 AVMA sampling event. Each of the remaining project samples did not have detections of dissolved iron. There is no clear pattern of iron being used as an electron acceptor evident at the site.

Dissolved manganese was detected in each of the plume wells (with the exception of Well AP-3534) at concentrations between 2.37 µg/L and 26.3 µg/L and in non-plume wells at concentrations between 1.86 J µg/L and 6.92 µg/L. Background well AP-3893 had the highest concentration at the site of 42.3 µg/L.

These results indicate that biodegradation is not occurring through the anaerobic iron and manganese reduction pathways.

Sulfate

Sulfate was detected in all 10 wells, and concentrations ranged from 21 mg/L to an estimated 39 mg/L. The concentration in background well AP-3893 was the lowest at the site. In general, sulfate concentrations across the area of contaminated groundwater ranged from 23 to a 29 mg/L. These results indicate that sulfate is not being utilized as an electron acceptor for in-situ biodegradation within the area of contaminated groundwater.

Methane

Methane was not detected in any wells during the December 2008 AVMA sampling event. This finding strongly indicates that the anaerobic biodegradation pathway of methanogenesis is not occurring.

4.2.3 Dissolved Aluminum and Arsenic

Dissolved aluminum and arsenic were detected as follows:

- Aluminum was detected in one well (AP-4413) at a concentration of 415 J µg/L.
- Arsenic was only detected in background well AP-3893 at a concentration of 20.7 µg/L.

Table 4-1 summarizes the contaminants found in OUE groundwater that exceed MCLs.

TABLE 4-1
Contaminants that Exceed MCLs and Their Locations at the AVMA, October 2007

Contaminant	Cleanup Level[a] (µg/L)	Exceedance Locations
PCE	5	AP-3468 (63.3 µg/L), AP-3534 (22.8 µg/L), AP-4342 (62.9 µg/L), AP-4411 (6.6 µg/L), AP-4413 (120 µg/L)
Aluminum	50	AP-4413 (415 J µg/L)
Arsenic[b]	10	AP-3893 (20.7 µg/L)

[a]Cleanup levels from 18 AAC 80 and 40 CFR 141/143.
[b]Arsenic levels are believed to be attributable to natural sources.

µg/L = micrograms per liter

4.3 Analysis of Trends

4.3.1 PCE

To examine trends in PCE concentrations I n wells within the approximate extent of PCE contamination (Figure 2-1), past results are presented graphically for individual wells AP-3468, AP-3534, AP-4341, AP-4342, AP-4411, and AP-4413 in Figure 4-1.

Available historic data for these six wells includes 6 to 7 years of results. To date, PCE concentrations have tended to oscillate within two standard deviations of the mean for each well, with very few exceptions. Overall increasing or decreasing trends are not definitively apparent. Individual well concentrations throughout the area have varied by anywhere from less than 1 to more than 90 µg/L between events. The most recent results appear to fall within the normal range of variability. One exception is that for the first time PCE was not detected in the sample from AP-4341. Definitive trends in PCE concentrations at the AVMA may become apparent over time as monitoring continues and more data are collected.

A Mann-Kendall (M-K) statistical analysis was performed to help statistically identify PCE concentration trends at the AVMA in wells within the extent of contamination. M-K analysis is designed to indicate whether an increasing or decreasing trend is present, and to give a percentage that represents the statistical confidence interval of the increase or decrease. A confidence interval of 90 percent or above is considered a "significant" indication that a trend exists; however, it does not indicate the magnitude of the increase or decrease.

Figure 4-1: PCE Concentration Trends for Wells within the Extent of Contamination

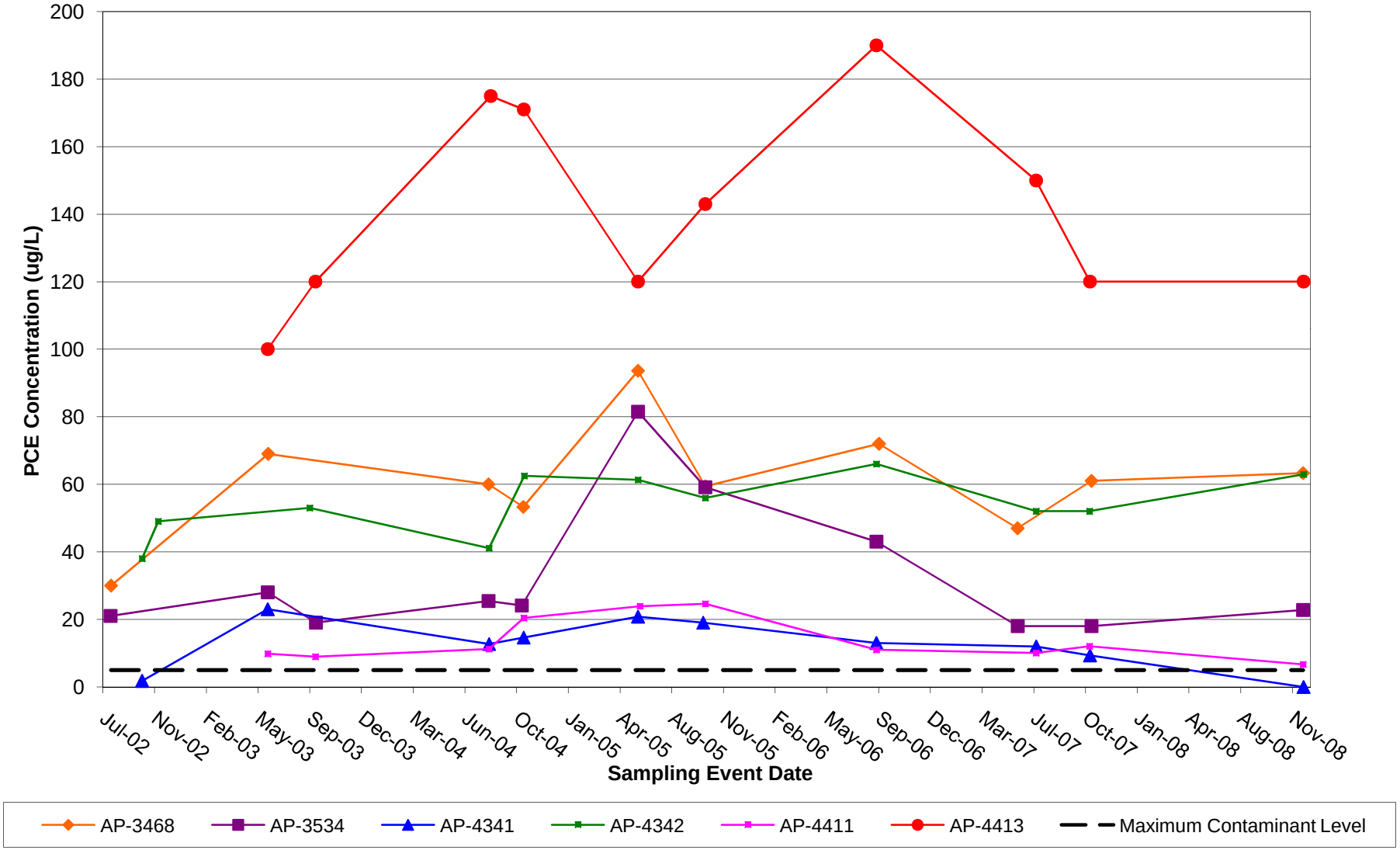


FIGURE 4-1 BACK

According to the M-K analysis, an increasing PCE concentration trend exists at well AP-4342. None of the results for the five other wells within the extent of contamination show a significant trend for PCE. The October 2007 (CH2M Hill, 2007d) report presented that well AP-4342 did not show a statistically significant increasing trend in PCE concentration; however, with additional datum from the December 2008 sampling event, a statistically significant increase in PCE concentration is present in well AP-4342.

The use of a "seasonal" version of the M-K analysis was also considered. This version of M-K analysis is useful in identifying trends when seasonal variations (often related to fluctuations in groundwater levels) are affecting concentrations. At the AVMA, however, groundwater elevations are not highly variable and do not show strong seasonal variations. In addition, sampling has not been conducted on a consistent seasonal schedule, which makes sorting results into "seasons" difficult. As a result, the use of a seasonal M-K analysis was determined to not be useful at this site.

Samples from the three downgradient wells (AP-3774, AP-3870, and AP-3871) and cross-gradient well AP-3893 have historically produced PCE results ranging from non-detect to occasional low-level concentrations that are less than the MCL of 5 µg/L. Except for the concentration detected in well AP-3774 (0.450 J µg/L), PCE was not detected in the 3 downgradient and 1 cross-gradient wells. These data suggest that the extent of contamination continues to remain relatively unchanged.

4.3.2 Other Detected VOCs

VOC breakdown products (TCE, DCE, cis-DCE, trans-DCE, and VC) of PCE biodegradation were not detected, indicating that these compounds do not exist in the AVMA wells within the extent of PCE contamination. This continued trend suggests that biodegradation is not occurring through reductive dechlorination pathways.

The other detected VOCs, including carbon tetrachloride and chloroform, continue to exist in AVMA wells both within and outside the extent of PCE contamination. These analytes are frequently detected at concentrations less than established MCLs and tend to fluctuate between non-detect and several µg/L (see Figure 2-1). These compounds are not breakdown products of PCE and appear to exist at the site independently from PCE contamination. Chloroform is a daughter product of anaerobic carbon tetrachloride degradation, which suggests that anaerobic degradation of carbon tetrachloride may be occurring on site. No significant increasing or decreasing trends are evident for these compounds.

4.3.3 Dissolved Aluminum

Available historical aluminum results are shown in Figure 2-1. Historical aluminum levels at OUE have sporadically exceeded the MCL of 50 µg/L at 8 of the 10 wells. Results from the December 2008 sampling event included one estimated exceedance at well AP-4413. Dramatic differences in concentrations often exist from year to year within individual wells. For example, overall results from well AP-4411 have ranged from non-detect to 15,100 µg/L. These differences in observed results may be the outcome of some of the earlier sampling results being reported as total metals results; whereas more recent results (2004 to the present) have been reported as only dissolved metals. The aluminum concentrations in the AVMA wells is currently considered to be representative of background levels.

4.3.4 Dissolved Arsenic

Arsenic levels are also believed to be the result of natural background levels in the area. These detections continue to remain less than the MCL (10 µg/L) within the area of PCE contamination. The highest levels of arsenic are consistently found in cross-gradient well AP-3893, where they range from 13.5 µg/L to 24.2 µg/L, which may indicate that these concentrations represent background levels.

4.3.5 Biodegradation Parameters

Natural attenuation parameter results for dissolved oxygen, iron, methane, sulfate, and nitrate/nitrite were similar to previous results (CH2M HILL, 2006; CH2M HILL, 2007a, CH2M HILL 2007d). It has been determined that the concentrations of these parameters, along with the lack of PCE daughter products and historically low presence of petroleum products, suggest that biodegradation is not a major component of natural attenuation at the site. The primary natural attenuation pathway for PCE at the AVMA is considered to be dilution.

SECTION 5

Conclusions

Conclusions based on historical and current data through the December 2008 monitoring event are as follows:

- PCE is the only established COC for OUE AVMA. The area of the extent of PCE contamination appears to be stable and contained; samples from the three downgradient wells continue to have non-detect or trace results. No significant increasing or decreasing trends in the PCE-affected area are statistically apparent from the historical monitoring data, except well AP-4342, which has shown a concentration increase with the addition of the December 2008 datum. For the first time PCE was not detected in the sample from AP-4341, which is located within the groundwater contamination plume.
- The results of biodegradation parameters and the near-absence of PCE breakdown products continue to suggest that biodegradation of PCE may be limited at the AVMA and that the primary mechanism of natural attenuation at the site continues to be dilution. For sites where biodegradation is not playing a key role in the attenuation process, monitoring and evaluation of biodegradation parameters provides very little value towards the understanding of the site contaminant conditions. Detected concentrations of other VOCs (such as chloroform), which are considered to be independent of the PCE contamination, continue to exist at low levels (below MCLs) and do not demonstrate increasing or decreasing trends.
- Results of dissolved aluminum at well AP-4413 exceeded MCLs in December 2008. The source of aluminum, which is detected sporadically in some of the OUE AVMA wells, is currently believed to be natural (background).
- Arsenic levels in groundwater at the AVMA remain below MCLs within the area of PCE-affected groundwater and are believed to be associated with natural sources. The only MCL exceedance for arsenic continues to be from cross-gradient well AP-3893.

SECTION 6

References

CH2M HILL. 2008. *Fort Richardson Operable Unit E, Armored Vehicle Maintenance Area, Groundwater Monitoring Report, October 2007*.

CH2M HILL. 2007a. *Fort Richardson Operable Unit E, Armored Vehicle Maintenance Area, Spring 2007 Groundwater Monitoring Report*.

CH2M HILL. 2007b. *Sampling and Analysis Plan for Groundwater Monitoring at Fort Richardson Operable Unit B, Operable Unit E, and Building 762.*

CH2M HILL. 2007c. *Supplemental Quality Assurance Project Plan for Fort Richardson Groundwater Sampling at Operable Unit B, Operable Unit E, and Building 762*.

CH2M HILL. 2007d. *Fort Richardson Operable Unit E, Armored Vehicle Maintenance Area, October 2007 Groundwater Monitoring Report*.

CH2M HILL. 2005, August. *Final Record of Decision, Operable Unit E, Fort Richardson, Anchorage, Alaska.*

CH2M HILL. 2004, April. *Remedial Investigation Report, Operable Unit E, Fort Richardson, Alaska.*

CH2M HILL. 2003. *Preliminary Site Characterization Report.*

CH2M HILL. 2002. *Quality Assurance Program Plan, Fort Richardson, Anchorage, Alaska.*

ENSR. 1998. *Final RI/FS Operable Unit D, Fort Richardson, Alaska.* Vol. Ia, Ecological Risk Assessment.

Shannon & Wilson, Inc. 2008. *Sampling and Analysis Plan Technical Memorandum, Groundwater Monitoring, Fort Richardson, Alaska*

State of Alaska Department of Environmental Conservation, 2006, *18 AAC 80, Drinking Water*.

United States Environmental Protection Agency, 2001, *40 CFR Part 141, National Primary Drinking Water Regulations.*

United States Environmental Protection Agency, 2001, *40 CFR Part 142, National Secondary Drinking Water Regulations.*

Appendix A
Field Data Collection Forms

Appendix A1
Water Sampling Logs

Shannon & Wilson, Inc.

WATER SAMPLING LOG

Overcast ~25°F (12/4/08)

Job No: 32-1-~~17162~~ 17201 Location: Fort Richardson, Alaska Weather: Overcast ~0°F (12/2/08)

Site: OUF Well No.: AP-346'8

Date: 12/4/08 Time Started: 1948 Time Completed: 1930

WELL INSPECTION OBSERVATIONS

Pad Condition (cracked, heaved, subsided): Good

Casing Condition (bent, dented, paint condition: Good

Well Identification (labeled with well numbers): Yes

Well locking cap and lock present: Yes ☑ No ☐ Notes: Cap cracked

Field Screening with PID: 0.0

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 11:45 Date of Depth Measurement: 12/2/08

Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other:

Diameter of Casing: 2" ~~4"~~ Well Screen Interval: unknown

Total Depth of Well Below MP: 114.72 Product Thickness, if noted: none

Depth-to-Water (DTW) Below MP: 109.56 / 109.42

Water Column in Well: 5.24 / 5.28 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16 / 0.16

Gallons in Well: 0.84 / 0.85 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 12/4/08 Time Started: 1813 Time Completed: 1923

Four Well Volumes: 3.4 (Gallons in Well x 4)

Gallons Purged: 3.4 Depth of Pump Placement: 116.20

Maximum Drawdown: 109.75 Pump Rate: 23% 30 Hz

Well Purged Dry: Yes ☐ No ☒ (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (gal/min):	Drawdown (feet):	Temp: (°C)	Sp. Cond.: (mS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (ntu)
1823	0.5	0.17	0.5	7.90	571	9.44	7.05	69.7	766
1825	0.7	0.17	0.26	7.78	571	9.26	7.03	76.7	525
1828	0.9	0.22	0.21	7.76	577	8.96	7.02	79.3	394
1832	1.1	0.22	0.20	7.81	578	8.90	7.00	73.3	270
1835	1.3	0.22	0.20	8.20	570	8.72	7.01	73.4	186
1839	1.5	0.22	0.20	8.48	577	8.93	7.00	72.5	149
1843	1.7	0.22	0.20	8.54	579	8.92	7.02	63.9	113

SAMPLING DATA

Odor: none Color: Slt turbid Brown

Sample Designation: ODFROAMA-11 Time / Date: 1918 ; 12/4/08

QC Sample Designation: — Time / Date: —

Evacuation Method: Grundfos Submersible Pump / Other:

Sampling Method: Grundfos Submersible Pump / Other:

Remarks: DTW = 109.42' @ 1801 12/4/08

Ned to Add 3+ 3 feet of tubing

Sampling Personnel: Shayla Swedlund + JCE Trainees

WELL CASING VOLUMES (GAL/FT): 2" = 0.16 4" = 0.65

ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

Time	Gallons	Pump Rate	Drawdown	Temp	Cond	DO	pH	ORP	Turbidity
1848	1.9	0.22	0.20	9.11	579	9.04	7.01	61.4	84.8
1851	2.1	0.22	0.20	9.27	573	8.92	7.02	59.0	62.3
1854	2.3	0.22	0.20	9.20	578	8.89	6.99	57.1	50.6
1857	2.5	0.22	0.20	9.21	573	8.87	7.00	59.5	41.4
1905	2.7	0.26	0.20	8.77	576	8.83	7.07	54.9	39.1
1908	2.9	0.26	0.20	8.97	579	8.70	7.04	53.1	29.5
1912	3.1	0.26	0.20	8.43	577	8.56	7.05	52.4	22.8

32-1-17261

December 4, 2008

Well AP-3468-OLE

Shannon & Wilson, Inc.

WATER SAMPLING LOG

Forecast ~25°F (12/4/08)

Job No: 32-1-~~17162~~ 17261 Location: Fort Richardson, Alaska Weather: Overcast ~20°F (12/2/08

Site: OE Well No.: MW-3534

Date: 12/4/08 Time Started: 1332 Time Completed: 747

WELL INSPECTION OBSERVATIONS

Pad Condition (cracked, heaved, subsided): Good

Casing Condition (bent, dented, paint condition): Good

Well Identification (labeled with well numbers): Yes

Well locking cap and lock present: Yes ☐ No ☒ Notes: No cap *

Field Screening with PID: 0.0 ppm

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 11:40 Date of Depth Measurement: 12/2/08

Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other:

Diameter of Casing: 2" Well Screen Interval: unknown

Total Depth of Well Below MP: 138.75' Product Thickness, if noted: none

Depth-to-Water (DTW) Below MP: 109.30'

Water Column in Well: 29.45 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 4.71 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 12/4/08 Time Started: 1250 Time Completed: 1725

Four Well Volumes: 18.84 (Gallons in Well x 4)

Gallons Purged: 12.3 Depth of Pump Placement: 133.75

Maximum Drawdown: 109.63 Pump Rate: 241.70

Well Purged Dry: Yes ☐ No ☒ (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (~~gal~~/min):	Drawdown (feet):	Temp: (°C)	Sp. Cond.: (mS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (ntu)
1309	1.5	0.5	0	6.11	371	9.55	11.74	-88.0	132
1320	2.7	0.5	5	9.63	369	4.89	13.06	-76.3	334
1603	3.9	0.5	5	5.50	348	5.35	7.35	202.5	15.26
1611	5.1	0.5	5	7.47	348	4.85	6.99	157.8	3.26
1619	6.3	0.5	0	9.79	350	4.57	7.46	141.1	1.28
1627	7.5	0.5	0	10.28	340	8.56	7.54	125.7	1.43
1637	8.7	0.5	0	10.46	288	1.86	7.52	120.3	0.76
1647	9.9	0.5	5	10.32	196	7.28	7.53	112.2	0.71
1657	11.1	0.5	0	10.30	178	7.15	7.53	101.2	1.03

SAMPLING DATA

Odor: None Color: Clear; colorless

Sample Designation: CBFRCAWA-10 Time / Date: 1708 / 12/4/08

QC Sample Designation: MS/MSD - CBFRCAWA-11 Time / Date: 1712 / 12/4/08

Evacuation Method: Grundfos Submersible Pump / Other:

Sampling Method: Grundfos Submersible Pump / Other:

Remarks: pH probe readings were unusual, took inside cab of truck to warm/dry moisture off to avoid freeze YSI - restarted @ 1557; 3.7 gal purged up to this point

Sampling Personnel: Shayla Swedlund + Jeff Thomas

WELL CASING VOLUMES (GAL/FT): 2" = 0.16 4" = 0.65

ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

* Placed new cap on well 12/4/08

Time	Gallons	Pump Rate	Drawdown	Temp	Cond	DO	pH	ORP	Turb
1706	12.3	0.5	0	10.80	177	6.88	7.54	99.8	0.60

32-1-17261
12/4/08
Well MP-3534-OVE

Shannon & Wilson, Inc.

WATER SAMPLING LOG

15°F overcast (Sampling - 12/3/08)

Job No: 32-1-~~17162~~ 17261 Location: Fort Richardson, Alaska Weather: 5°F Overcast (DTW - 12/2/08)

Site: OUE Well No.: AP-3774

Date: 12/3/08 Time Started: 954 Time Completed: 1150

WELL INSPECTION OBSERVATIONS

Pad Condition (cracked, heaved, subsided): good

Casing Condition (bent, dented, paint condition: good

Well Identification (labeled with well numbers): yes

Well locking cap and lock present: Yes ☑ No ☐ Notes:

Field Screening with PID: 0.0 ppm

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 1020 Date of Depth Measurement: 12/2/08

Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other:

Diameter of Casing: 2" Well Screen Interval: unknown

Total Depth of Well Below MP: 116.40' Product Thickness, if noted: none

Depth-to-Water (DTW) Below MP: 106.33'

Water Column in Well: 10.07 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 1.61 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 12/3/08 Time Started: 959 Time Completed: 1050

Four Well Volumes: 6.44 (Gallons in Well x 4)

Gallons Purged: 4.0 Depth of Pump Placement: 111.40

Maximum Drawdown: 106.66' Pump Rate: 0-3 240.6 Hz

Well Purged Dry: Yes ☐ No ☐ (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (gal/min):	Drawdown (feet):	Temp: (°C)	Sp. Cond.: (mS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (ntu)
1015	0.5	0.3	0	5.03	0.499	6.64	6.95	220.8	89.4
1022	1	0.3	0	7.08	0.491	5.91	7.02	131.1	73.2
1028	1.5	0.3	0	9.61	0.490	5.21	7.03	109.5	60.2
1030	2.0	0.3	0	10.56	0.491	4.97	7.04	105.8	62.2
1033	2.3	0.3	0	11.11	0.492	4.80	7.05	100.4	56.5
1036	2.7	0.3	0	11.15	0.492	4.66	7.05	92.9	52.9
1040	3.3	0.3	0	11.02	0.492	4.61	7.05	86.6	46.6
1044	3.6	0.3	0	11.00	0.491	4.57	7.05	82.3	41.4
1048	4.0	0.3	0	11.00	0.491	4.52	7.05	79.4	55.6

SAMPLING DATA

Odor: none Color: clear, colorless

Sample Designation: C8FROAWA-04 Time / Date: 1050 ; 12/3/08

QC Sample Designation: none Time / Date: —

Evacuation Method: Grundfos Submersible Pump / Other:

Sampling Method: Grundfos Submersible Pump / Other:

Remarks: unknown flow - Swinging fin pump

Sampling Personnel: Shayla Swedlund + Joe Thomas

WELL CASING VOLUMES (GAL/FT): 2" = 0.16 4" = 0.65

ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

Shannon & Wilson, Inc.

WATER SAMPLING LOG

Job No: 32-1-~~17162~~17261 Location: Fort Richardson, Alaska Weather: 15°F, Overcast
Site: QUE Well No.: AF-3870
Date: 12/2/08 Time Started: 1405 Time Completed: 17:00

WELL INSPECTION OBSERVATIONS

Pad Condition (cracked, heaved, subsided): Good
Casing Condition (bent, dented, paint condition: Good
Well Identification (labeled with well numbers): Yes
Well locking cap and lock present: Yes ☒ No ☐ Notes: Bladder pump present - no padlock.
Field Screening with PID: 1.6 (ppm)

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 1405 Date of Depth Measurement: 12/2/08
Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other:
Diameter of Casing: 2" Well Screen Interval: Unknown
Total Depth of Well Below MP: 110.25 Product Thickness, if noted: None
Depth-to-Water (DTW) Below MP: 99.14
Water Column in Well: 11.11 (Total Depth of Well Below MP - DTW Below MP)
Gallons per foot: 0.16
Gallons in Well: 1.78 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 12/2/08 Time Started: ~~1405~~ 1556 Time Completed: 17:00
Four Well Volumes: 7.12 (Gallons in Well x 4)
Gallons Purged: 7.1 Depth of Pump Placement: 105' below MP
Maximum Drawdown: 99.47' Pump Rate: 225.8 Hz
Well Purged Dry: Yes ☐ No ☒ (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (gal/min):	Drawdown (feet):	Temp: (°C)	Sp. Cond.: (mS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (ntu)
1524	0.4	0.2	0	5.23	0.516	7.09	7.22	247	193
1531	0.6	0.2	0	6.02	0.515	7.52	7.19	73.4	126
1537	1.2	0.2	0	6.24	0.515	6.95	7.19	64.9	98.7
1544	1.7	0.2	0	9.26	0.516	6.12	7.20	64.5	74.5
1551	2.1	0.2	0	11.17	0.523	5.94	7.22	62.1	63.6
1557	2.5	0.2	0	12.14	0.523	5.65	7.21	64.3	55.7
1604	3.0	0.2	0	12.21	0.523	5.63	7.22	64.2	42.0
1612	3.6	0.2	0	12.31	0.524	5.49	7.22	62.7	39.7
1620	4.1	0.2	0	12.34	0.524	5.50	7.23	62.1	25.8
1628	4.8	0.2	0	12.36	0.524	5.32	7.21	62.2	24.0

Odor:

SAMPLING DATA

Sample Designation: QSFROAWA-01 Color:
QC Sample Designation: Time / Date: 12/2/08
Evacuation Method: Grundfos Submersible Pump / Other: Time / Date:
Sampling Method: Grundfos Submersible Pump / Other:
Remarks: No measurable product - pump at 105' below MP
Sampling Personnel: Shayla Swedlund & Joe Thomas

WELL CASING VOLUMES (GAL/FT): 2" = 0.16 4" = 0.65
ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

1632	5.2	0.2	0	12.18	0.525	5.50	7.22	62.0	29.7
~~1638~~ 1639	5.6	0.2	0	12.15	0.526	5.44	7.23	61.5	19.7

Time	Gallons	Pump Rate	Drawdown	Temp	Sp. Cond	DO	pH	ORP	Turb
16 44	6.0	0.2	0	12.14	0.523	5.44	7.21	62.6	16.2
1650	6.4	0.2	0	12.19	0.523	5.41	7.22	63.0	14.1
1657	7.1	0.2	0	12.15°	0.525	5.40	7.72	49	12.3

Well AP-3870

12/2/08 - OUE

32-1-17261

Shannon & Wilson, Inc.

WATER SAMPLING LOG

20°F overcast (12/3/08)

Job No: 32-1-~~17162~~ 17261 Location: Fort Richardson, Alaska Weather: 5°F FORECAST (12/2/08)

Site: OVE Well No.: AP-3871

Date: 12/3/08 Time Started: 1205 Time Completed: 1441

WELL INSPECTION OBSERVATIONS

Pad Condition (cracked, heaved, subsided): good

Casing Condition (bent, dented, paint condition): good

Well Identification (labeled with well numbers): yes

Well locking cap and lock present: Yes ☒ No ☐ Notes:

Field Screening with PID: 0.2

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 1042 Date of Depth Measurement: 12/2/08

Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other:

Diameter of Casing: 2" Well Screen Interval: unknown

Total Depth of Well Below MP: 120.30 Product Thickness, if noted: none

* Depth-to-Water (DTW) Below MP: 110.24 / 110.15

Water Column in Well: 10.06 / 10.15 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16 / 0.16

Gallons in Well: 1.61 / 1.62 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 12/3/08 Time Started: 1248 Time Completed: 1412

Four Well Volumes: 6.48 (Gallons in Well x 4)

Gallons Purged: 6.5 Depth of Pump Placement: 115.3'

Maximum Drawdown: 110.46 Pump Rate: 236.4 Hz

Well Purged Dry: Yes ☐ No ☐ (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (gal/min):	Drawdown (feet):	Temp: (°C)	Sp. Cond.: (mS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (ntu)
1258	0.4	0.3	0	5.65	412	16.0	7.31	158.6	146
1302	0.8	0.3	0	6.08	409	9.72	7.32	127.2	109
1306	1.2	0.3	0	7.20	407	7.66	7.41	109.6	80.1
1310	1.6	0.3	0	8.69	407	7.15	7.33	91.7	66.0
1314	2.0	0.3	0	9.83	408	6.86	7.34	79.7	48.5
1318	2.4	0.3	0	11.28	409	6.55	7.34	71.1	34.7
1322	2.8	0.3	0	11.61	410	6.40	7.34	68.3	26.4
1326	3.2	0.3	0	11.74	410	6.27	7.34	66.8	21.2
1337	3.8	0.3	0	11.91	410	6.14	7.33	65.3	16.3

SAMPLING DATA

Odor: none Color: clear - colorless

Sample Designation: COFRDAWA-05 Time / Date: 1405 12/3/08

QC Sample Designation: none Time / Date:

Evacuation Method: Grundfos Submersible Pump / Other:

Sampling Method: Grundfos Submersible Pump / Other:

* Remarks: DTW = 110.15 @ 1244 12/3/08

Sampling Personnel: JBT + SIS

WELL CASING VOLUMES (GAL/FT): 2" = 0.16 4" = 0.65

ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

1338	4.2	0.3	0	12.05	409	4.03	7.32	64.7	13.9
1343	4.6	0.3	0	12.11	410	3.75	7.33	63.5	10.8

Time	Gal	Pump Rate	Feet drawdown	Temp	Cond.	DO	pH	ORP	Turb.
13 48	5.0	0.3	0	11.08°	410	6.03	7.33	72.1	9.04
13 53	5.4	0.3	0	10.52	410	6.06	7.31	75.2	7.50
13 57	5.9	0.5	0	10.00	410	6.14	7.30	76.2	6.56
14 01	6.2	0.3	0	9.73	409	6.02	7.30	57.3	5.90
1405 - collected analytical									
	6.5	0.3	0	9.62	409	6.08	7.30	76.0	6.10

Well AP-3871

12/3/08 - OVE

32-1-17261

Shannon & Wilson, Inc.

WATER SAMPLING LOG

20°F Overcast (12/3/08)

Job No: ~~32-1-17162~~ 17201 Location: Fort Richardson, Alaska Weather: 5°F Overcast (12/2/08)

Site: OVE Well No.: AP-3893

Date: 12/3/08 Time Started: 1455 Time Completed: 1840

WELL INSPECTION OBSERVATIONS

Pad Condition (cracked, heaved, subsided): Good

Casing Condition (bent, dented, paint condition: Good

Well Identification (labeled with well numbers): Yes

Well locking cap and lock present: Yes ☒ No ☐ Notes:

Field Screening with PID: 0.1 ppm

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 1108 Date of Depth Measurement: 12.2.08

Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other:

Diameter of Casing: 2" Well Screen Interval: unknown

Total Depth of Well Below MP: 124.15' Product Thickness, if noted: none

*Depth-to-Water (DTW) Below MP: 89.65/89.55

Water Column in Well: 34.50' (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16 / 0.16

Gallons in Well: 5.52/5.53 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 12/3/08 Time Started: 1518 Time Completed: 1913

Four Well Volumes: 22.08 / 22.12 (Gallons in Well x 4)

Gallons Purged: 14.0 Depth of Pump Placement: 119.15'

Maximum Drawdown: ~~89.22~~ 89.88 Pump Rate: 218.1

Well Purged Dry: Yes ☐ No ☒ (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (gal/min):	Drawdown (feet):	Temp: (°C)	Sp. Cond.: (mS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (ntu)
1543	1.4	0.28	89.80 0.14	7.11	305	2.08	8.02	-59.5	15.7
1557	2.8	0.28	0.14	8.78	303	2.15	8.02	-43.8	13.1
1611	4.2	0.28	0.13	9.07	304	2.17	8.06	-45.7	9.9
1626	5.6	0.28	0.12	9.51	305	1.74	8.07	-48.5	3.46
1640	7.0	0.28	0.10	9.45	302	1.62	8.05	-64.7	2.55
1654	8.4	0.28	0.10	9.12	304	1.50	8.02	-63.5	3.13
1708	9.8	0.28	0.10	9.98	303	1.49	8.06	-95.2	9.74
1722	11.2	0.28	0.10	10.09	301	1.15	8.01	-114.0	6.98

SAMPLING DATA

Odor: none Color:

Sample Designation: 08FROAWA-06 Time / Date: 1755 12/3/08

QC Sample Designation: none Time / Date: - -

Evacuation Method: Grundfos Submersible Pump / Other:

Sampling Method: Grundfos Submersible Pump / Other:

*Remarks: DTW 89.55' @ 1513 12/3/08

Sampling Personnel: Shayla Swedlund & Joe Thomas

WELL CASING VOLUMES (GAL/FT): 2" = 0.16 4" = 0.65

ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

Time	Gal	Rate	Drawdown	Temp	Cond	~~pH~~ DO	pH	ORP	Turb.
1736	12.6	0.28	0.10	10.06	301	NM	8.03	-115.1	3.60
1750	14.0	0.28	0.10	10.08	301	1.27	8.07	-118.7	1.64

WELL AP-389B

12/3/08 - OVE

32-1-17261

Shannon & Wilson, Inc.

WATER SAMPLING LOG

Job No: 32-1-~~17162~~ 17261 Location: Fort Richardson, Alaska Weather: Overcast ~0°F (12/4/08) Sl. windy Overcast; ~25°F (12/4/08)

Site: QUE Well No.: AP-4341

Date: 12/4/08 Time Started: 755 Time Completed: 10:00

WELL INSPECTION OBSERVATIONS

Pad Condition (cracked, heaved, subsided): Good

Casing Condition (bent, dented, paint condition: Good

Well Identification (labeled with well numbers): yes

Well locking cap and lock present: Yes ☒ No ☐ Notes:

Field Screening with PID: 0.0

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 1124 Date of Depth Measurement: 12/2/08

Measuring Point (MP): ~~Top of PVC Casing~~ / Top of Steel Protective Casing / Other:

Diameter of Casing: 2" Well Screen Interval: Unknown

Total Depth of Well Below MP: 67.96 Product Thickness, if noted: NONE

*Depth-to-Water (DTW) Below MP: 64.02 / 63.84

Water Column in Well: 3.94 / 4.12 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16 / 0.16

Gallons in Well: 0.63 / 0.66 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 12/4/08 Time Started: 851 Time Completed: 940

Four Well Volumes: 2.64 (Gallons in Well x 4)

Gallons Purged: < 0.1 Depth of Pump Placement: 67.00

Maximum Drawdown: 64.17 Pump Rate: 320.8 Hz

Well Purged Dry: Yes ☒ No ☐ (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (gal/min):	Drawdown (feet):	Temp: (°C)	Sp. Cond.: (mS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (ntu)
not enough volume purged to collect these parameters									
4/5/08 826	0.1	bailed	Dry	8.54	512	9.28	7.39	163.5	>1000

SAMPLING DATA

Odor: — Color: —

Sample Designation: — Time / Date: 12/5/08 ; 1305

QC Sample Designation: — Time / Date:

Evacuation Method: Grundfos Submersible Pump / Other: and Bailer (Disp.)

Sampling Method: Grundfos Submersible Pump / Other: Disp. Bailer

Remarks: *DTW on 12/4/08 @ 829 = 63.84'; Purged ~2 Tbls of water before went dry - lowered well, still did not get water - let recover for 20 min, still could not get more than 2 Tbl of water before went dry

Sampling Personnel: Shasta Swedlund & Joe Thomas

WELL CASING VOLUMES (GAL/FT): 2" = 0.16 4" = 0.65

ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

Shannon & Wilson, Inc.

WELL PURGED DRY LOG

day of sampling
Overcast 30°F (12/5/08)
Overcast ~ 50°F (12/2/08

Job No: 32-1-17261 Location: Fort Richardson, Alaska Weather:
Area: OUE Well No.: AP-434
Date: 12/4/08 Time Started: 755 Time Completed: 1000

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 1124 Date of Depth Measurement: 12/2/08
Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other:
Diameter of Casing: 2" Well Screen Interval: Unknown
Total Depth of Well Below MP: 67.96 Product Thickness, if noted: None
Depth-to-Water (DTW) Below MP: 64.02 / 63.84
Water Column in Well: 3.94 / 4.12 (Total Depth of Well Below MP - DTW Below MP)
Gallons per foot: 0.16 / 0.16
Gallons in Well: 0.63 / 0.66 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 12/3/08, 12/4/08, 12/5/08 Time Started: Time Completed:
80% Recovery Water Column: 3.15 (Water Column in Well x 0.8)
80% Recovery DTW: 64.03 (Initial DTW + (Water Col. – 80% Recovery Water Col.)
12/5/08 @ 1256

Purging	Time Well Purged Dry	Time Well Was 80% Recovered	Initial/After DTW	Pump Rate
1	810 12/4/08	—	63.84/	320.8
2	845 12/4/08	35 min.	63.20/	320.8
3	820 12/5/08	1 day, 23 hrs 54 min	63.17/ 63.18	Bailed

SAMPLING DATA

Odor: Color:
Sample Designation: OUFRCAWA-18 Time / Date: 1305 / 12/5/08
QC Sample Designation: — Time / Date:

Evacuation Method: Grundfos Submersible Pump / Other:
Sampling Method: Grundfos Submersible Pump / Other: Bailer - Disposable

Remarks:

Sampling Personnel: Shayla Swedlund + Joe Thomas

WELL CASING VOLUMES (GAL/FT): 2" = 0.16 4" = 0.65
ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

Shannon & Wilson, Inc.

WATER SAMPLING LOG

30°F; overcast (12/3/08)

Job No: 32-1-~~17162~~ 17261 Location: Fort Richardson, Alaska Weather: 5°F; Overcast (12/2/08)

Site: OUE Well No.: AP-4342

Date: 12/5/08 Time Started: 838 Time Completed: 1042

WELL INSPECTION OBSERVATIONS

Pad Condition (cracked, heaved, subsided): Good

Casing Condition (bent, dented, paint condition): Good

Well Identification (labeled with well numbers): Yes

Well locking cap and lock present: Yes ☒ No ☐ Notes:

Field Screening with PID: 0.0

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 1209 Date of Depth Measurement: 12/2/08

Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other:

Diameter of Casing: 2" Well Screen Interval: unknown

Total Depth of Well Below MP: 101.10 Product Thickness, if noted: none

Depth-to-Water (DTW) Below MP: 97.20

Water Column in Well: 3.90 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 0.62 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 12/5/08 Time Started: 859 Time Completed: 1021

Four Well Volumes: 2.48 (Gallons in Well x 4)

Gallons Purged: 2.50 Depth of Pump Placement: 99.10

Maximum Drawdown: 97.53 Pump Rate: 223.20 Hz

Well Purged Dry: Yes ☐ No ☑ (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (gal/min):	Drawdown (feet):	Temp: (°C)	Sp. Cond.: (mS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (ntu)
932	0.60	~~0.15~~ 0.12	0.10	9.16	409	8.54	7.40	93.8	71000
935	0.75	0.12	0.10	9.10	409	8.37	7.38	93.9	>1000
941	0.90	0.12	0.10	7.69	408	8.76	7.30	112.4	71000
952	1.05	0.12	0.10	8.40	405	8.54	7.33	107.0	71000
954	1.20	0.12	0.10	9.26	401	8.36	7.34	105.2	71000
956	1.35	0.12	0.10	10.10	403	8.34	7.34	105.6	71000
959	1.5	0.12	0.10	11.11	402	8.44	7.34	105.8	71000

SAMPLING DATA

Odor: None Color: Turkish Gray

Sample Designation: OUEFRCAWA-15 Time / Date: 12/5/08 1014

QC Sample Designation: ~~OUEFRCAWA-16~~ Time / Date: ~~12/5/08; 1018~~ -55 - instead use extra samples for MS/MSD QC sample

Evacuation Method: Grundfos Submersible Pump / Other:

Sampling Method: Grundfos Submersible Pump / Other:

Remarks: Pump/Generator swapping - reset control box 2 x s; Took apart generator to check oil + gas levels - OK

Sampling Personnel: Shayla Swedlund + Joe Thomas

WELL CASING VOLUMES (GAL/FT): 2" = 0.16 4" = 0.65

ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

Time	Gallons	Pump	Drawdown	Temp	Cond	DO	pH	ORP	Turb
1000	1.65	~~0.20~~ 0.12	0.10	11.50	404	8.51	7.34	107.2	777
1003	1.80	0.12	0.10	11.58	406	8.41	7.33	108.4	593
1005	1.95	0.12	0.10	11.51	407	8.39	7.33	109.9	459
1008	2.10	0.12	0.10	11.54	407	8.27	7.32	112.2	285
1010	2.25	0.12	0.10	12.01	404	8.19	7.30	113.7	182
1013	2.4	0.12	0.10	12.80	403	8.04	7.29	114.8	138
1014	2.5	0.12	0.10	13.13	403	8.05	7.29	115.3	

HTRW Task Order 001, Contract W911KB-08-D-0005

Shannon & Wilson, Inc.

WATER SAMPLING LOG

Job No: 32-1-~~17162~~ 17261 Location: Fort Richardson, Alaska Weather: Overcast ~25°F (12/4/08) Overcast ~5°F (12/2/08)

Site: OOE Well No.: AP-4441

Date: 12/4/08 Time Started: 1009 Time Completed: 1203

WELL INSPECTION OBSERVATIONS

Pad Condition (cracked, heaved, subsided): No lock

Casing Condition (bent, dented, paint condition: Bentonite heaved ~15" above casing

Well Identification (labeled with well numbers): No labeling

Well locking cap and lock present: Yes ☐ No ☑ Notes:

Field Screening with PID: 0.0 ppm

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 12:45 Date of Depth Measurement: 12/2/08

Measuring Point (MP): (Top of PVC Casing) / Top of Steel Protective Casing / Other:

Diameter of Casing: 2" Well Screen Interval: Unknown

Total Depth of Well Below MP: 72.80 Product Thickness, if noted: none

*Depth-to-Water (DTW) Below MP: 67.65' / 67.55

Water Column in Well: 5.15 / 5.25 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16 / 0.16

Gallons in Well: 0.82 / 0.84 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 12/4/08 Time Started: 1027 Time Completed: 1140

Four Well Volumes: 3.36 (Gallons in Well x 4)

Gallons Purged: 6.0 Depth of Pump Placement: ~~70.0~~ 71.30

Maximum Drawdown: 67.88 Pump Rate: 194.7

Well Purged Dry: Yes ☒ No ☒ (If yes, use Well Purged Dry Log) — correct

Too much drawdown initially - adjusted speed to minimal rate

Time:	Gallons:	Pump Rate (gal/min):	Drawdown (feet):	Temp: (°C)	Sp. Cond.: (mS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (ntu)
1044	~~6.0~~ 7.0	0.1	2.55	4.84	695	11.70	7.36	477.9	>1000
1051	0.90	0.1	2.55	4.71	695	10.04	7.39	462.1	>1,000
1130	1.6	0.1	0.57 ~~2.55~~	10.84	679	11.39	7.55	323.6	815

SAMPLING DATA

Odor: none Color: turbid, brown

Sample Designation: 08FROAWA-09 Time / Date: 12/4/08 ; 1130

QC Sample Designation: —— Time / Date: ——

Evacuation Method: (Grundfos Submersible Pump) / Other:

Sampling Method: (Grundfos Submersible Pump) / Other:

Remarks: DTW 67.55 @1026; Purged dry @ 1100 (1.3gal), recovered for 5min + purged dry again @ 1110 @ 1.4 gal

Sampling Personnel: Shayla Swedlund + Joe Thomas

WELL CASING VOLUMES (GAL/FT): 2" = 0.16 4" = 0.65

ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

recovered to 68.12' - collected sample.

Shannon & Wilson, Inc.

WATER SAMPLING LOG

(forecast) ~30°F (12/5/08)

Job No: 32-1-~~17162~~ 17261 Location: Fort Richardson, Alaska Weather: forecast ~5°F (12/2/08)

Site: OUE Well No.: MP-~~44~~-13

Date: 12/5/08 Time Started: 1044 Time Completed: 1210

WELL INSPECTION OBSERVATIONS

Pad Condition (cracked, heaved, subsided): good

Casing Condition (bent, dented, paint condition): good

Well Identification (labeled with well numbers): yes

Well locking cap and lock present: Yes ☒ No ☐ Notes:

Field Screening with PID: 0.0

INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 1221 Date of Depth Measurement: 12/2/08

Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other:

Diameter of Casing: 2" Well Screen Interval: unknown

Total Depth of Well Below MP: 75.30 Product Thickness, if noted: none

Depth-to-Water (DTW) Below MP: 72.21

Water Column in Well: 3.09 (Total Depth of Well Below MP - DTW Below MP)

Gallons per foot: 0.16

Gallons in Well: 0.49 (Water Column in Well x Gallons per foot)

PURGING DATA

Date Purged: 12/5/08 Time Started: 1100 Time Completed: 1150

Four Well Volumes: 1.96 (Gallons in Well x 4)

Gallons Purged: 2.0 L Depth of Pump Placement: 74.00

Maximum Drawdown: 12.54 Pump Rate: 220.00

Well Purged Dry: Yes ☐ No ☒ (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (gal/min):	Drawdown (feet):	Temp: (°C)	Sp. Cond.: (mS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (ntu)
1109	0.2	0.20	0.02	4.69	455	11.75	9.10	247.6	>1000
1111	0.4	0.20	0.00	5.79	451	11.79	8.86	224.9	>1000
1113	0.5	0.20	0.00	6.17	450	11.70	9.14	218.3	>1000
1115	0.6	0.20	0.00	6.60	450	11.35	9.45	212.4	>1000
1117	0.8	0.20	0.00	7.55	457	11.02	9.47	205.0	775
1119	0.9	0.20	0.00	7.97	460	10.86	9.39	201.7	617
1121	1.0	0.20	0.00	8.66	460	10.56	9.32	199.0	501

SAMPLING DATA

Odor: none Color: sl. turbid gray

Sample Designation: 08FRDAWA-16 Time / Date: 12/5/08

QC Sample Designation: — Time / Date: —

Evacuation Method: Grundfos Submersible Pump / Other:

Sampling Method: Grundfos Submersible Pump / Other:

Remarks:

Sampling Personnel: Shayla Swedlund + Joe Thomas

WELL CASING VOLUMES (GAL/FT): 2" = 0.16 4" = 0.65

ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

Time	Gallons	Purge Rate	Drawdown	Temp	Cond	DO	pH	ORP	Turb
1122	1.2	0.20	0.00	9.62	457	10.39	9.32	194.2	329
1124	1.3	0.20	0.00	10.23	458	10.27	9.26	191.5	284
1130	1.4	0.12	0.00	9.82	460	10.81	9.15	186.5	467
1132	1.5	0.12	0.00	10.06	460	10.59	9.14	185.2	592
1134	1.6	0.12	0.00	10.93	459	10.32	8.97	184.0	642
1136	1.7	0.12	0.00	11.56	459	10.19	8.88	182.7	578
1138	1.8	0.12	0.00	13.60	455	9.75	8.64	180.1	367
1140	2.0	0.12	0.00	13.52	456	9.55	8.60	179.7	277

Pump & motor running

Appendix A2
Field Log

Shannon+Wilson
Book 1
Operable Unit E
12/2/08-

"Rite in the Rain"®
ALL-WEATHER
JOURNAL
No. 390

Fort Richardson GW
Monitoring

Task Order 001

W 911KB-08-D-0005

NPDL 09-006

CONTENTS

Field Equipment

PAGE	REFERENCE	DATE

YSI 556 (TT Rental) ← Pre-Dec 4
Post Dec 4 → 03G0568 A0 ; 04D5945AC
Grundfos Control Box (TT Rental)
H0603200115
PID (SCW) 580 B OVM
580 - V - 35593 - 250
Solonist Interface Meter (TT)
Model 122
122 006551-1
Water Level Indicator (TT)
WLM-08 52008 TW
Grundfos Pump Model (TT)
A 1A106003 P1 0622 0003
Type: MP1-2-A-B-G-7V

Dick Nenahlo - 441-5289(c) 384-3295
ENSR - David Britch - 748-9045
Combo for wells/locks = 0911
Combo for IDW = 2711

28008

"Rite in the Rain"®
ALL-WEATHER WRITING PAPER

ALL-WEATHER
HORIZONTAL LINE BOOK

Name

Address

Phone

Project

This book is printed on "Rite in the Rain" All-Weather Writing Paper - A unique paper created to shed water and enhance the written image. It is widely used throughout the world for recording critical field data in all kinds of weather. For best results, use a pencil or an all-weather pen.

Specifications for this Book

Page Pattern		Cover Options	
Full Page	Right Page	Polydura Cover	Fabrikoid Cover
Lined	Ruled	Item No. 358	Item No. 359

December 2, 2008
Weather – Cold -5°F; overcast
Personnel – Shayla Swedlund and Joe Thomas - S+W
PPE – Nitrile gloves, steel toe, safety glasses
Field Instruments –
PID, Product Level, Water Level
Grundfos, YSI 556, Turbidimeter

Collected Samples

08FROAWA-01 → AP-3870
@1657 12/2/08
Primary Sample
08FROAWA-02 → Equipment Rinsate
@1726 12/2/08
08FROAWA-03 - Trip Blank
@1740 - 12/2/08

IDW

7.1 gallons purgewater from Well AP-3870
- decon water accidently tipped over @ Well AP-3810 site
in 1 DUE-01 DRUM

Dec 2, 2008

730 - Arrive @ office - pack up gear
815 - Talk to Hollydar about sampling name schema - call Joe
845 - Pick up Joe from home
946 - Arrive @ Well AP-3870
950 - Dick Navarro called to check if were been to IDW site – when place IDW in drums make note of how much volume placed + attach to Ziplock onto drum
956 - Calibrate PID - calibration result = 101.4 ppm
1005 - Take DTW/Product msmt @ Well AP-3870
- Bladder pump present in well
- Well Condition - good
- PID - 1.6 ppm DTW 99.14', no prod
1020 - Collect DTW/Product @ Well AP-3774
- Well Condition good
- PID - 0.1 ppm DTW = 106.33', no prod
1042 - Collect DTW/Product Msmt @ Well AP-3871 - well condition good
PID = 0.2 ppm, DTW = 110.24', no prod.

Dec. 2, 2008

1108 - Collect DTW/Product from Well AP-3893
Well condition - good
PID = 0.1 ppm, DTW = 89.65, NO Product

1124 Collect DTW/Product from Well AP-4341
Well Condition - good
PID = 0 ppm DTW = 64.02', no product

1140 - Collect DTW / Product Well AP-3534
Well condition - no cap
PID = 0.0 DTW = 109.30, no prod

1145 Collected DTW / Prod from Well AP=3468
Well condition - cap is cracked
PID = 0.0 ppm DTW = 109.56', no prod

1148 - David Britch - ENSR stops to give us his card / contact
cell # 748-9045

1150 - Hayden calls to check-in

1208 - Collect DTW/Product in Well AP-4342
Well condition — good
PID = 0.0 DTW = 97.20' NO Product
PID reading 7000 ppm. Turned off - recalibrated

Dec 2, 2008

1213 - Called Richard Nanahlo
441-5289-cell
384-3295 - work
Well AP-4411 - E of Bldg 732
- left msg on his office line - cell is turned off.

1223 - Go inside Bldg 732 — talked to Rick Brooks - shop supervisor to let us into locked fence area for well AP-4411

1245 - Collect DTW/Product ~~from Well~~ Well AP-4411 - flush.
well condition — Bentonite frozen / heaved ~1" above TOC - well cap does not connect/close. - no lock

→ Bldg 724

1255 - Go to Env. Resources Dept to warm up, have lunch, use bathroom - get hot chocolate

1320 - Drive to Well AP-3870
- calculate well volume → calibrate YSI

1405 - Begin sampling / purging Well AP-3870

1657 - Collect Sample 08FRDAWA-01 from AP-3870
- 1657 12/2/08 - Primary

Dec 2, 2008

1700 - Begin ~~decon~~ SS decon sample materials

1726 - Collect sample Equipment 08FROAWA-02 - Rinsate Sample

1757 - Leave AP-3870 site to go drop off IDW

1810 - Drop off IDW @ POL-De-Watering Facility

1813 - Call from Haydar checking in

1815 - Leave POL De-Watering Site Leave For Rich

1443 - get call from Dick to check if IDW area is cleared - he will check to verify

1845 - Drop off Joe @ home

1900 - Back @ office - demob

~~1930~~ 1945 - Leave office

~~12~~ SS

End - Dec. 2, 2008
Shayla Swedlund

December 3, 2008

~~0645 Arrive @ office~~

Weather - 20°F overcast

Personnel - Shayla Swedlund-e
Joe Thomas - SPW

PPE - nitrile gloves, steel toe, Safety Glass

Field Instruments - Water Level, Grundfos YSI 556, Turbidimeter

Collected Samples

08FROAWA-04 - well AP-3774 @ 1050 12/3/08

08FROAWA-05 Well AP-3871 @ 1405 12/3/08

08FROAWA-06 - Well AP-3893 @ 1755 12/3/08

08FROAWA-07 - ~~Well AP~~ SS Rinsate Sample @ 1825

08FROAWA-08 - Trip Blank @ 1830

IDW

- Purgewater - AP-3774 = 4.0 gallons
- AP-3871 = 6.5 gallons
- AP-3893 = 14.0 gallons

Decon/Rinse H_2O = 9.0 gallons
In Drum QUE-01

December 3, 2008

645 - Arrive @ office, mob gear, Fill out COC for yesterdays samples.
830 - Pick up Joe @ his home
940 - Get call from Haydar - asked about approp. Nitrate/Nitrite preservative - none or H_2SO_4
959 - Arrive at Fort Rich.
912 - Arrive at Well AP-3774 and set up; calibrate YSI
959 - Begin purging well AP-3774
1005 - Get call from Haydar - H_2SO_4 Nalgenes are for Nitrate/Nitrite - but not to be used because not same method/hold time - use non-preserved Nalgenes
1050 - Collect Sample 08FROAWA-04
→ inconsistent purging of the well — "surging" state
1150 - leave Well AP-3774
Take lunch
1205 - Arrive at Well AP-3871 set up

December 3, 2008

1210 - Randy @ S&W called - cooler at SGS - needed to circle "S&W - Anchorage" on COC
1210 - Police pull over to see if we have vehicle problems
1248 - Start purging well AP-3871
1405 - Collect Sample 08FROAWA-05
1412 - Demob/decon - complete sampling
1441 - Leave AP-3871 area
1453 - At AP-3893 (Well) - set up
1518 - Begin purging Well AP-3893
DTW different from yesterday
DTW 89.55 @ 1513, 12/3/08
DTW 89.65 @ 1108 12/2/08
1755 - Collect Sample 08FROAWA-06
1813 - Finish purging, decon
1825 - Collect Sample 08FROAWA-07 - Rinsate
1840 - Leave Well AP-3893 area and go to drop off IDW
1846 - Arrive @ POL Dewatering Facility - transfer IDW into onsite drum using 5-gal buckets

(9) 17261-SS

Dec 3, 2008

1902 - Leave POJ De-Watering Facility - lock up - head home

1908 - Off/Leave Fort Rich

1925 - Drop off Joe @ home

1950 - Arrive @ office - Check in w/ Randy Hessong - demob

2000 - Discuss/update Randy w/ project + go over COC

2040 - demob, fill out COC make copies of field notes

2145 - Leave office

End of Dec 3, 2008

Shayla Swedlund

17261-SS (10)

December 4, 2008

Weather - Overcast 25° F

Personnel - Shayla Swedlund & Joe Thomas - S+W

PPE - Nitrile gloves, steel toe boots, Safety Glasses

Field Instruments - Water Level, Gundtrs, YSI 556, Turbidimeter

Collected Samples

08FROAWA-14 - Trip Blank @ 1946

08FROAWA-09 - Well AP-4411 @ 1130

08FROAWA-10 - Well AP-3534 @ 1708 Duplicate of well AP-3534

08FROAWA-11 - ~~MS/MSD~~ QC Sample from well AP-3534 @ 1712

08FROAWA-12 - Well AP-3468 @ 1918

08FROAWA-13 - Rinsate Sample @ 1944

IDW - Purgewater - to Drum OUE-02

AP-4341 = 0.1 gal

AP-4411 = 6.0 gal

AP-3534 = 12.3 gal

AP-3468 = 3.4 gal

Rinse/Decon Water = 9.5 gal

December 4, 2008

615 - Arrive @ office; finish COC, take up cooler, mob

715 - Leave to pick up Joe @ his home

730 - Pick up Joe - leave for Fort Rich; he calibrated YSI @ 700

750 - Arrive @ Fort Rich - long line to get in

755 - Arrive @ well AP-4341 set up

831 - Begin purging - set pump to >300 Hz (more than the deeper wells) - still no water. bumped up to 320.8 Hz - gush of water ~2 Tbls, went dry - Pulled out Grundfos to check if pump issue + allow well to recover ~ 20 min; purged ~2 Tbls before drying again. (gush of very turbid Brown water)

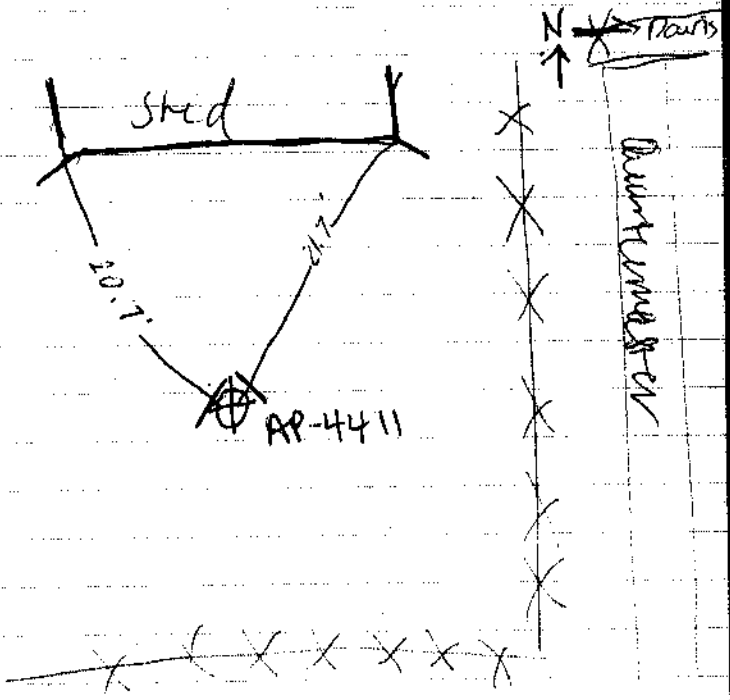
940 - Call Handan @ Shannon Wilson Tucker - go ahead + move to another well

December 4, 2008

940 - Begin decon + packing up to go to next well

1000 - Leave well AP-4341 Area

1009 - Arrive @ well AP-4411 - gate is open



1027 - Begin purging Well AP-4411 too fast rate - began @ 0.4 L/min to 0.2 L/min - too much drawdown - 2.55' reduced it to 0.1 L/min

December 4, 2008

1100 - Well AP-4411 purged dry let recovere ~5 min and continued to purge

1110 - Purged dry, Well AP-4411

1130 - Collect Sample 08FROAWA-09 from Well AP-4411 - well recovered to 68.12' btoc

1140 - Finish purging - demob + decant. equipment

1203 - Leave Well AP-4411 area go to bathroom in ~~Hall~~ is Build 724

1213 - Leave for Wells AP-3534 + 3468 area - eat lunch in vehicle

1232 - Arrive @ site of Wells AP-3534 + AP-3468 - set up for Well AP-3534

1250 - Begin purging Well AP-3534

1310 - Talk to Randy Hessong (S+W) (he called) - Make sure to
- # all pages of field log, include job #, + my initials on each page
- Go back to Well AP-4341 + sample w/Bailer

1315 - Joe says pH is around 11 + 13 SU - need to re-calibrate YSI (7.44 SU last event)

Dec 4, 2008

1320 - Stopped purging to re-calibrate YSI

1338 - YSI reading 7.0 pH soln as 11.2 su - decided to warm up instrument in car to dry out

1345 - Call Randy - he suggested drying out ~~are~~ end - opened it up - dry

1351 - Call TT - asked Tom what else we can do - he suggested
- warming it up
- drying it out
- checking w/standard
→ all were done
→ agreed to get new YSI which courier will deliver to ~~Fo~~ Rich entrance

1545 - Call Les (courier) at 242-2578 - he is exiting hwy - Joe Leaves to switch old YSI to new YSI

1551 - Joe back - check YSI (which Tom said was calibrated today) - calibration OK

(15) 17261-SS

Dec 4, 2008

1557 - Begin purging Well AP-3534
1708 - Collect Sample
08FROAWA-10 from Well AP-3534
1712 - Collect ~~MS/MSD~~ Sample
from Well AP-3534 ~~Duplicate~~
08FROAWA-11 well
1725 - Finish purging, decan; replace cap
1748 - Set up for Well AP-3468
1813 - Start purging well AP-3468
1918 - Collect Sample
08FROAWA-12 from Well AP-3468
1923 - Finish sampling Well AP-3468
1930 - Demob / Pack up / DeGOWN
1944 - Collect Rinsate Sample
08FROAWA-13
2000 - Leave Well AP-3468 area
2003 - Arrive to drop off IDW @
POL De-Watering Facility
Transfer Water (IDW) to
Drum OVE-02
2030 - Leave POL Dewatering Facility
2055 - Drop off Joe at his home
2105 - Arrive at Office - Demob,
COC; check in w/ Hayden
2230 - Leave Office

End of December 4, 2008
Shayla Swedlund

17261-SS (16)

December 5, 2008

Weather - Overcast ~30°F
Personnel - Joe Thomas, Shayla
Swedlund - Field; Randy Hessong - QC
PPE - Nitrile gloves, safety glasses,
steel toe boots
Field Instruments - DTW Instrument,
YSI 556, Grundfos,
Disp Bailer 1.6", Turbidimeter

Collected Samples

08FROAWA-15 - Well AP-4342 @ 1014
→ taken addtl samples for MS/MSD
08FROAWA-16 - Well AP-4413 @ 1140

08FROAWA-17 - ~~Well~~ SS Rinsate Sample
@ 1219
08FROAWA-18 Well AP-4341 @ 1305

08FROAWA-19 - Trip Blank @ 1310
↳ Missing -

IDW

Well AP-4341 = 0.7 gal
Well AP-4413 - ~~2.0~~ 2.0 gal
Well AP-4342 = 2.5 gal
Rinsewater/Decon = 9 gal

December 5, 2008

600 - Arrive @ office, pack up, copy field forms + log field book

730 - Pick up Joe @ his home. He calibrated YSI this morning

810 - Arrive @ Fort Rich — go to Well AP-4341 which purged dry yesterday

826 -- Well AP-4341 purged dry after one well volume — collected water quality parameters

835 - Leave Well AP-4341 to stabilize/recharge and head to Well AP-4342

838 - At AP-4342 area, setup

859 - Begin purging Well AP-4342 - Generator surging - control box re-setting itself — took SC checked oil + gas and it was OK

1014 - Collect Sample 08FR0AWA-15 from Well AP-4342 - collected additional set for MS/MSD QC samples

1021 - Finish sampling + decon equipment

1042 - Leave Well AP-4342 Area

1044 - Arrive @ Well AP-4413 set up

Dec 5, 2008

1100 - Begin purging Well AP-4413 - surging well - stops flow — turn off controller + start again to get flow going

1140 - Collect Sample 08FR0AWA-16 from Well AP-4413

1150 - Finish sampling Well AP-4413; decon

1210 - Decon on-site - set up for Rinsate Sample

1219 - Collect Sample 08FR0AWA-17 Rinsate Sample

1245 - Meet Randy @ Enviro Building - Randy will QC sampling of Well AP-4341

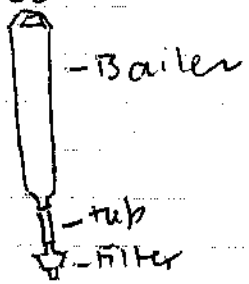
1247 - Arrived @ Well AP-4341 area

1256 - Collected DTW from Well AP-4341 = 64.03' - recovered sufficiently >80/85% to sample

1305 - Collected Sample using disp Bailer 08FR0AWA-18 from Well AP-4341

~~1310 - Finish~~ essy used piece of teflon tubing placed inside the bottom of the bailer that was connected to filter to sample dissolved metals

Dec 5, 2008



1318 - Finish sampling + decon
1335 - Leave well AP-4341 area to go to POL Dewatering Facility
1339 - Arrive @ POL Dewatering Facility to drop off IDW
- Note to Self - contact David Britch to see if he has more drums for IDW purgewater
1358 - Leave POL Dewatering Facility lock up
1430 - Arrive back at office
1530 - unpack; fill out COC, labels
→ notice no trip blank in cooler
1600 - Have meeting w/ S+W Matt Henry, Hayden Tucker, Randy Hessong, Shayla Swedlund, Joe Thomas to see how to streamline project

Dec. 5, 2008
1630 - Randy calls Michael Utley - USACE chemist to see how to handle trip blank (lack of)
→ submit samples + note variation
1650 - Shayla - Submits samples to SGS

End of Dec. 5, 2008
Shayla Swedlund

Appendix B
Chemical Data Quality Review

Appendix B1
Data Quality Evaluation Report

Fort Richardson Operable Unit E Groundwater Monitoring December 2008 Data Quality Evaluation Report

Introduction

This Data Quality Evaluation (DQE) assesses the quality of analytical results for water samples collected as part of ongoing groundwater monitoring at Operable Unit E (OUE; Armored Vehicle Maintenance Area), Fort Richardson, Alaska. We used data quality objectives (DQOs) and criteria presented in CH2M HILL's November 2002 Quality Assurance Program Plan (QAPP) as well as internal laboratory quality-control limits for this assessment.

This report presents a summary of data-quality issues and anomalies identified in our review that may affect the use of the results for ongoing groundwater monitoring.

Analytical Results

We collected a total of 10 project samples and one field-duplicate sample from 10 wells within OUE. We also collected one equipment-blank sample (EB) per day and, with one exception, delivered trip-blank samples (TBs) with coolers containing samples for analysis of volatile organic compounds (VOCs). We hand-delivered the samples to the SGS Environmental Services, Inc. (SGS) Anchorage laboratory in four sample delivery groups (SDGs): SGS work orders 108696, 1086519, 1086543, and 1086564. The samples were analyzed for the analytes listed in Table 1 by the methods shown:

Table 1
OUE Groundwater Analyses

Parameter	Method	Laboratory
Volatile Organic Compounds (VOC)	SW8260B	SGS Anchorage
Dissolved metals (aluminum, arsenic, iron, manganese)	SW6020	SGS Anchorage
Nitrite, nitrate, and sulfate	SW9056	SGS Anchorage
Dissolved methane	RSK 175	SGS Wilmington

SGS transferred samples for methane analysis to their Wilmington, NC laboratory by overnight carrier.

As part of this DQE, we reviewed: (1) sample handling information, including chain-of-custody (COC) documentation, holding-time compliance, and sample receipt forms; (2) calibration information presented in the laboratory case narratives; (3) analytical sensitivity, including comparison of practical quantitation limits (PQLs) to DQOs and examination of field blank and method blank results; (4) accuracy, as assessed by laboratory control sample (LCS) and LCS duplicate (LCSD), matrix spike (MS) and MS duplicate (MSD), and surrogate recoveries; and (5)

precision, as assessed by relative percent difference between LCS/LCSD, MS/MSD, and project sample/field duplicate results.

We validated analytical results, when affected by data-quality issues identified above, with data flags defined in the QAPP. We present the flagged results in Table 2; where multiple data flags were assigned for different data quality issues, the most conservative flag was designated as the final data flag for that result.

The data flags used are defined below:

- J = Analyte was present but the reported value may not be accurate or precise (estimated).
- J+ = Analyte was present but the reported value may not be accurate or precise (biased high).
- J- = Analyte was present but the reported value may not be accurate or precise (biased low).
- R = The result was rejected as unusable due to analytical deficiencies.
- U = Analyte was not detected at the specified reporting limit.
- UJ = Analyte was not detected and the specified reporting limit may not be accurate or precise (estimated).

Findings

We present a summary of our data-quality review below, and present flagged results in Table 2. We included the Alaska Department of Environmental Conservation laboratory data-review checklists for each SDG in Appendix B-3.

Sample Handling

We reviewed sample-receipt forms and COC documentation as we received it from SGS. Holding-time compliance was assessed upon receipt of the Level II laboratory reports.

Sample Condition

Temperature blank and cooler temperatures were within the acceptable range (2 °C to 6 °C) with the following exceptions: cooler temperature was low (1.5 °C) for SDG 1086519 and temperature blank and cooler temperatures were low (-0.1 °C and 0.1 °C, respectively) for SDG 1086543. No ice was observed in the samples, so results were not affected by the low temperatures.

Chain of Custody

COC seals were absent from the coolers containing water samples for methane analysis that were shipped from SGS Anchorage to SGS Wilmington; we were therefore unable to determine if custody was breached during transportation between the two laboratories. We did not place COC seals on coolers we hand-delivered to the Anchorage SGS laboratory, since samples were in our custody until delivery.

Holding Times

Holding-time criteria were met, with the exception of the nitrate, nitrite, and sulfate holding times for SDGs 1086543 and 1086564. The results were flagged J as estimated (with sulfate flagged J- to indicate low bias), and the reporting limits flagged UJ. Nitrate/nitrite results were not flagged J- as we cannot determine the direction of potential bias to nitrate/nitrite results (due to the potential for oxidation *or* reduction over time).

Calibration

No calibration anomalies affecting data quality were identified in the laboratory case narratives.

Analytical Sensitivity

PQLs were compared to the reporting-limit objectives in the QAPP, and blank samples were checked to determine if water samples were contaminated from laboratory practices, cross-contamination from other samples, or sampling equipment.

Practical Quantitation Limits

PQLs were within the reporting limit objectives specified in the QAPP.

Method Blanks

Method blanks (MBs) were analyzed for every preparation/analysis batch. MB results were below method detection limits (MDLs) and PQLs, with one exception. Trichloroethylene (TCE) was detected between the MDL and PQL in the VOC method blank in SDG 1086564; TCE was not detected in project samples, so results were not affected.

Field Blanks

Trip blanks were transported in coolers containing VOC samples, equipment blanks were collected at the required frequency (one per day), and results were below MDLs, with the following exceptions.

Nitrite was detected between the MDL and PQL in the equipment blank for SDG 1086519; nitrite was not detected in project samples, so results were not affected.

Chloroform was detected between the MDL and PQL in the equipment blank (EB) for SDG 1086543; the chloroform result for sample *08FROAWA-12* (1.04 µg/L) was less than 5x the estimated concentration (0.450 µg/L, J) in the EB (*08FROAWA-13*), and therefore may be attributable to contamination from sampling equipment. Chloroform in this sample was qualified as not detected and the result flagged "U" at the detected concentration.

No trip blank was present in the cooler for SDG 1086564; VOC results in the samples for this SDG are possibly attributable to contamination of sample vials from an outside source. This QC anomaly is not addressed in the QAPP, and it is not appropriate to qualify the data as estimated, biased, or non-detect. However, it is important to note, so the VOC data in question are flagged in the analytical results table with a dagger (†). Toluene was detected between the MDL and PQL in the EB for the same SDG; toluene was not detected in project samples, so the results were not affected by this QC anomaly.

Accuracy

We reviewed the analyte recovery information for QC samples and surrogate spikes to assess the accuracy of the analyses. LCS/LCSDs were reported for VOCs; LCSs and MS/MSDs were reported for metals; LCSs and undigested bench spikes and/or sample duplicates were reported for nitrate, nitrite, and sulfate; and LCS/LCSDs and MS/MSDs were reported for methane.

Laboratory Control Samples

LCS and LCSD analyte recoveries were within the laboratory control limits, with the exception of the LCSD recovery of naphthalene, which was recovered above the control limits (biased high) in SDG 1086496. Naphthalene was not detected in the project samples for this delivery group, so the results were not affected.

Matrix Spike Samples

Matrix spike samples provide information about the laboratory's ability to recover analytes from the actual sample matrix, thus providing a measure of matrix effects. We designated sample *08FROAWA-15* for MS/MSD analysis (the project, or billable, MS/MSD). The laboratory also analyzed internal MS/MSDs, spiking other project samples. MS/MSD analyte recoveries were within laboratory control limits in all cases.

Surrogates

Surrogates were added to all project and QC samples for VOC analysis. Surrogate recoveries were within laboratory control limits, with the exception of 4-bromofluorobenzene (biased high) in sample *08FROAWA-18*; analytes corresponding to the surrogate were not detected in the sample, so results were not affected.

Precision

We assessed precision by calculating relative percent difference (RPD; the difference between the original and duplicate results divided by the mean of the two) for LCS/LCSD, MS/MSD, and project-sample/field-duplicate pairs. LCS/LCSD and MS/MSD RPDs were within laboratory control limits in all cases. Field duplicate RPDs were within DQOs from the QAPP, where calculable. We assessed the precision of the nitrite, nitrate, and sulfate analysis by calculating RPD between project sample and undigested duplicate, or the MS/MSD (where available). RPDs were within laboratory control limits, where calculable. In SDGs 1086496 and 1086519, the laboratory did not report duplicate or MS/MSD information for nitrite or nitrate (but did for sulfate); in these cases, we were unable to evaluate the analytical precision of the nitrite/nitrate results. We identified these results in the analytical results table with a double dagger (‡). The field-duplicate RPD (0% for nitrate) indicated adquate overall precision, so these results were not qualified as estimates.

Overall Assessment

To conclude our data review, we evaluated whether the quality of the analytical results was sufficient for the purposes of the project and whether data completeness goals were achieved.

No data were rejected as unusable, and completeness objectives were met. The data are accurate, precise, and representative, as qualified by the following data flags resulting from the QC anomalies described above.

We summarize the key findings of our data quality review below:

1. Methane samples transferred by SGS from their Anchorage laboratory to their Wilimington laboratory were lacking COC seals; we cannot determine if custody was breached or sample integrity was compromised during sample transit.
2. Nitrate, nitrite, and sulfate holding-times were exceeded in two of four SDGs; nitrate, nitrite, and sulfate results for these samples (approximately 60 percent of total samples) were qualified as estimates.
3. The chloroform result for one VOC sample was qualified as not detected due to an equipment blank detection.
4. VOC results for the three project samples and the equipment blank in SDG 1086564 are in question due to lack of a trip-blank sample; this is noted in data tables and the data are flagged with a dagger (†).
5. We were unable to assess the precision of nitrate, nitrite, and sulfate results for two of four SDGs (approximately 40 percent of total samples); these results were identified in the data table with a double dagger (‡).

In general, the precision and accuracy of the data met the goals specified in the QAPP, and the data are of sufficient quality for the purposes of groundwater monitoring.

Table 2
Validation Flags

Sample ID	Method	Analyte	Final Result	PQL	Units	Final Flag	Reason
08FROAWA-09	SW9056	Nitrate	3220		µg/L	J	HT Exceeded
08FROAWA-09	SW9056	Nitrite		100	µg/L	UJ	HT Exceeded
08FROAWA-09	SW9056	Sulfate	24800		µg/L	J-	HT Exceeded
08FROAWA-10	SW9056	Nitrate	1230		µg/L	J	HT Exceeded
08FROAWA-10	SW9056	Nitrite		100	µg/L	UJ	HT Exceeded
08FROAWA-10	SW9056	Sulfate	24100		µg/L	J-	HT Exceeded
08FROAWA-11	SW9056	Nitrate	1230		µg/L	J	HT Exceeded
08FROAWA-11	SW9056	Nitrite		100	µg/L	UJ	HT Exceeded
08FROAWA-11	SW9056	Sulfate	24300		µg/L	J-	HT Exceeded
08FROAWA-12	SW9056	Nitrate	1980		µg/L	J	HT Exceeded
08FROAWA-12	SW9056	Nitrite		100	µg/L	UJ	HT Exceeded
08FROAWA-12	SW9056	Sulfate	23700		µg/L	J-	HT Exceeded
08FROAWA-12	SW8260B	Chloroform		1.04	µg/L	U	EB Detection
08FROAWA-13	SW9056	Nitrate		100	µg/L	UJ	HT Exceeded
08FROAWA-13	SW9056	Nitrite		100	µg/L	UJ	HT Exceeded
08FROAWA-13	SW9056	Sulfate	42		µg/L	J-	HT Exceeded
08FROAWA-15	SW9056	Nitrate	1920		µg/L	J	HT Exceeded
08FROAWA-15	SW9056	Nitrite		100	µg/L	UJ	HT Exceeded
08FROAWA-15	SW9056	Sulfate	26800		µg/L	J-	HT Exceeded
08FROAWA-16	SW9056	Nitrate	1860		µg/L	J	HT Exceeded
08FROAWA-16	SW9056	Nitrite		100	µg/L	UJ	HT Exceeded
08FROAWA-16	SW9056	Sulfate	28900		µg/L	J-	HT Exceeded
08FROAWA-17	SW9056	Nitrate		100	µg/L	UJ	HT Exceeded
08FROAWA-17	SW9056	Nitrite		100	µg/L	UJ	HT Exceeded
08FROAWA-17	SW9056	Sulfate		100	µg/L	UJ	HT Exceeded
08FROAWA-18	SW9056	Nitrate	2500		µg/L	J	HT Exceeded
08FROAWA-18	SW9056	Nitrite	.	100	µg/L	UJ	HT Exceeded
08FROAWA-18	SW9056	Sulfate	22600		µg/L	J-	HT Exceeded

Notes:

µg/L	micrograms per liter
HT	holding time
EB	equipment blank
J	analyte was present but the reported value may not be accurate or precise (estimated)
J-	analyte was present but the reported value may not be accurate or precise (biased low)
UJ	analyte was not detected and the specified reporting limit may not be accurate or precise (estimated)
U	analyte was not detected at the specified reporting limit

Appendix B2
Validated Analytical Results

Location	Sample Type	Sample Date	Sample ID	Method	Analyte	Final Result	Final Validation Flag	PQL	MDL	Units
AP3870	PS	2-Dec-08	08FROAWA-01	9056A	Nitrate-N	1110	‡	100	31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	9056A	Nitrite-N	ND		100	31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	9056A	Sulfate	24000		100	31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	RSK-175	Methane	ND		7.2	2.28	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW6020	Aluminum	ND		500	150	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW6020	Arsenic	ND		5	1.5	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW6020	Iron	ND		1000	310	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW6020	Manganese	2.04		2	0.62	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	1,1,1,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	1,1,1-Trichloroethane	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	1,1,2,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	1,1,2-Trichloroethane	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	1,1-Dichloroethane	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	1,1-Dichloroethene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	1,1-Dichloropropene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	1,2,3-Trichlorobenzene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	1,2,3-Trichloropropane	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	1,2,4-Trichlorobenzene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	1,2,4-Trimethylbenzene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	1,2-Dibromo-3-chloropropane	ND		2	0.62	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	1,2-Dibromoethane	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	1,2-Dichlorobenzene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	1,2-Dichloroethane	ND		0.5	0.15	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	1,2-Dichloropropane	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	1,3,5-Trimethylbenzene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	1,3-Dichlorobenzene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	1,3-Dichloropropane	ND		0.4	0.12	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	1,4-Dichlorobenzene	ND		0.5	0.15	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	2,2-Dichloropropane	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	2-Butanone (MEK)	ND		10	3.1	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	2-Chlorotoluene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	2-Hexanone	ND		10	3.1	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	4-Chlorotoluene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	4-Isopropyltoluene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	4-Methyl-2-pentanone (MIBK)	ND		10	3.1	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Acetone	ND		10	3.1	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Benzene	ND		0.4	0.12	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Bromobenzene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Bromochloromethane	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Bromodichloromethane	ND		0.5	0.15	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Bromoform	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Bromomethane	ND		3	0.94	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Carbon disulfide	ND		2	0.62	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Carbon tetrachloride	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Chlorobenzene	ND		0.5	0.15	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Chloroethane	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Chloroform	ND		1	0.3	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Chloromethane	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	cis-1,2-Dichloroethene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	cis-1,3-Dichloropropene	ND		0.5	0.15	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Dibromochloromethane	ND		0.5	0.15	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Dibromomethane	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Dichlorodifluoromethane	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Ethylbenzene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Hexachlorobutadiene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Isopropylbenzene (Cumene)	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Methylene chloride	ND		5	1	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Methyl-t-butyl ether	ND		5	1.5	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Naphthalene	ND		2	0.62	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	n-Butylbenzene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	n-Propylbenzene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	o-Xylene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	P & M -Xylene	ND		2	0.62	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	sec-Butylbenzene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Styrene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	tert-Butylbenzene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Tetrachloroethene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Toluene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	trans-1,2-Dichloroethene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	trans-1,3-Dichloropropene	ND		1	0.31	µg/L

Location	Sample Type	Sample Date	Sample ID	Method	Analyte	Final Result	Final Validation Flag	PQL	MDL	Units
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Trichloroethene	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Trichlorofluoromethane	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Vinyl chloride	ND		1	0.31	µg/L
AP3870	PS	2-Dec-08	08FROAWA-01	SW8260B	Xylenes (total)	ND		2	1	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	9056A	Nitrate-N	1180	‡	100	31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	9056A	Nitrite-N	ND		100	31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	9056A	Sulfate	24600		100	31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	RSK-175	Methane	ND		7.2	2.28	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW6020	Aluminum	ND		500	150	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW6020	Arsenic	ND		5	1.5	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW6020	Iron	ND		1000	310	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW6020	Manganese	6.92		2	0.62	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	1,1,1,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	1,1,1-Trichloroethane	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	1,1,2,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	1,1,2-Trichloroethane	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	1,1-Dichloroethane	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	1,1-Dichloroethene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	1,1-Dichloropropene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	1,2,3-Trichlorobenzene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	1,2,3-Trichloropropane	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	1,2,4-Trichlorobenzene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	1,2,4-Trimethylbenzene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	1,2-Dibromo-3-chloropropane	ND		2	0.62	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	1,2-Dibromoethane	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	1,2-Dichlorobenzene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	1,2-Dichloroethane	ND		0.5	0.15	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	1,2-Dichloropropane	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	1,3,5-Trimethylbenzene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	1,3-Dichlorobenzene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	1,3-Dichloropropane	ND		0.4	0.12	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	1,4-Dichlorobenzene	ND		0.5	0.15	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	2,2-Dichloropropane	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	2-Butanone (MEK)	ND		10	3.1	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	2-Chlorotoluene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	2-Hexanone	ND		10	3.1	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	4-Chlorotoluene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	4-Isopropyltoluene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	4-Methyl-2-pentanone (MIBK)	ND		10	3.1	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Acetone	ND		10	3.1	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Benzene	ND		0.4	0.12	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Bromobenzene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Bromochloromethane	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Bromodichloromethane	ND		0.5	0.15	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Bromoform	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Bromomethane	ND		3	0.94	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Carbon disulfide	ND		2	0.62	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Carbon tetrachloride	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Chlorobenzene	ND		0.5	0.15	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Chloroethane	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Chloroform	ND		1	0.3	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Chloromethane	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	cis-1,2-Dichloroethene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	cis-1,3-Dichloropropene	ND		0.5	0.15	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Dibromochloromethane	ND		0.5	0.15	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Dibromomethane	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Dichlorodifluoromethane	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Ethylbenzene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Hexachlorobutadiene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Isopropylbenzene (Cumene)	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Methylene chloride	ND		5	1	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Methyl-t-butyl ether	ND		5	1.5	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Naphthalene	ND		2	0.62	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	n-Butylbenzene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	n-Propylbenzene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	o-Xylene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	P & M -Xylene	ND		2	0.62	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	sec-Butylbenzene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Styrene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	tert-Butylbenzene	ND		1	0.31	µg/L

Location	Sample Type	Sample Date	Sample ID	Method	Analyte	Final Result	Final Validation Flag	PQL	MDL	Units
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Tetrachloroethene	0.45	J	1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Toluene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	trans-1,2-Dichloroethene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	trans-1,3-Dichloropropene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Trichloroethene	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Trichlorofluoromethane	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Vinyl chloride	ND		1	0.31	µg/L
AP3774	PS	3-Dec-08	08FROAWA-04	SW8260B	Xylenes (total)	ND		2	1	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	9056A	Nitrate-N	751		100	31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	9056A	Nitrite-N	ND		100	31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	9056A	Sulfate	38800		100	31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	RSK-175	Methane	ND		7.2	2.28	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW6020	Aluminum	ND		500	150	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW6020	Arsenic	ND		5	1.5	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW6020	Iron	ND		1000	310	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW6020	Manganese	1.86	J	2	0.62	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	1,1,1,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	1,1,1-Trichloroethane	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	1,1,2,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	1,1,2-Trichloroethane	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	1,1-Dichloroethane	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	1,1-Dichloroethene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	1,1-Dichloropropene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	1,2,3-Trichlorobenzene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	1,2,3-Trichloropropane	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	1,2,4-Trichlorobenzene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	1,2,4-Trimethylbenzene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	1,2-Dibromo-3-chloropropane	ND		2	0.62	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	1,2-Dibromoethane	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	1,2-Dichlorobenzene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	1,2-Dichloroethane	ND		0.5	0.15	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	1,2-Dichloropropane	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	1,3,5-Trimethylbenzene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	1,3-Dichlorobenzene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	1,3-Dichloropropane	ND		0.4	0.12	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	1,4-Dichlorobenzene	ND		0.5	0.15	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	2,2-Dichloropropane	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	2-Butanone (MEK)	ND		10	3.1	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	2-Chlorotoluene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	2-Hexanone	ND		10	3.1	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	4-Chlorotoluene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	4-Isopropyltoluene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	4-Methyl-2-pentanone (MIBK)	ND		10	3.1	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Acetone	ND		10	3.1	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Benzene	ND		0.4	0.12	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Bromobenzene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Bromochloromethane	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Bromodichloromethane	ND		0.5	0.15	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Bromoform	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Bromomethane	ND		3	0.94	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Carbon disulfide	ND		2	0.62	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Carbon tetrachloride	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Chlorobenzene	ND		0.5	0.15	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Chloroethane	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Chloroform	3.73		1	0.3	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Chloromethane	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	cis-1,2-Dichloroethene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	cis-1,3-Dichloropropene	ND		0.5	0.15	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Dibromochloromethane	ND		0.5	0.15	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Dibromomethane	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Dichlorodifluoromethane	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Ethylbenzene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Hexachlorobutadiene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Isopropylbenzene (Cumene)	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Methylene chloride	ND		5	1	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Methyl-t-butyl ether	ND		5	1.5	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Naphthalene	ND		2	0.62	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	n-Butylbenzene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	n-Propylbenzene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	o-Xylene	ND		1	0.31	µg/L

Location	Sample Type	Sample Date	Sample ID	Method	Analyte	Final Result	Final Validation Flag	PQL	MDL	Units
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	P & M -Xylene	ND		2	0.62	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	sec-Butylbenzene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Styrene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	tert-Butylbenzene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Tetrachloroethene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Toluene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	trans-1,2-Dichloroethene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	trans-1,3-Dichloropropene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Trichloroethene	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Trichlorofluoromethane	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Vinyl chloride	ND		1	0.31	µg/L
AP3871	PS	3-Dec-08	08FROAWA-05	SW8260B	Xylenes (total)	ND		2	1	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	9056A	Nitrate-N	ND		100	31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	9056A	Nitrite-N	ND		100	31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	9056A	Sulfate	20600		100	31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	RSK-175	Methane	ND		7.2	2.28	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW6020	Aluminum	ND		500	150	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW6020	Arsenic	20.7		5	1.5	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW6020	Iron	ND		1000	310	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW6020	Manganese	42.3		2	0.62	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	1,1,1,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	1,1,1-Trichloroethane	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	1,1,2,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	1,1,2-Trichloroethane	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	1,1-Dichloroethane	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	1,1-Dichloroethene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	1,1-Dichloropropene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	1,2,3-Trichlorobenzene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	1,2,3-Trichloropropane	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	1,2,4-Trichlorobenzene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	1,2,4-Trimethylbenzene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	1,2-Dibromo-3-chloropropane	ND		2	0.62	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	1,2-Dibromoethane	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	1,2-Dichlorobenzene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	1,2-Dichloroethane	ND		0.5	0.15	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	1,2-Dichloropropane	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	1,3,5-Trimethylbenzene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	1,3-Dichlorobenzene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	1,3-Dichloropropane	ND		0.4	0.12	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	1,4-Dichlorobenzene	ND		0.5	0.15	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	2,2-Dichloropropane	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	2-Butanone (MEK)	ND		10	3.1	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	2-Chlorotoluene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	2-Hexanone	ND		10	3.1	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	4-Chlorotoluene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	4-Isopropyltoluene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	4-Methyl-2-pentanone (MIBK)	ND		10	3.1	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Acetone	ND		10	3.1	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Benzene	ND		0.4	0.12	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Bromobenzene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Bromochloromethane	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Bromodichloromethane	ND		0.5	0.15	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Bromoform	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Bromomethane	ND		3	0.94	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Carbon disulfide	ND		2	0.62	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Carbon tetrachloride	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Chlorobenzene	ND		0.5	0.15	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Chloroethane	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Chloroform	ND		1	0.3	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Chloromethane	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	cis-1,2-Dichloroethene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	cis-1,3-Dichloropropene	ND		0.5	0.15	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Dibromochloromethane	ND		0.5	0.15	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Dibromomethane	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Dichlorodifluoromethane	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Ethylbenzene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Hexachlorobutadiene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Isopropylbenzene (Cumene)	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Methylene chloride	ND		5	1	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Methyl-t-butyl ether	ND		5	1.5	µg/L

Location	Sample Type	Sample Date	Sample ID	Method	Analyte	Final Result	Final Validation Flag	PQL	MDL	Units
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Naphthalene	ND		2	0.62	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	n-Butylbenzene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	n-Propylbenzene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	o-Xylene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	P & M -Xylene	ND		2	0.62	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	sec-Butylbenzene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Styrene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	tert-Butylbenzene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Tetrachloroethene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Toluene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	trans-1,2-Dichloroethene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	trans-1,3-Dichloropropene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Trichloroethene	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Trichlorofluoromethane	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Vinyl chloride	ND		1	0.31	µg/L
AP3893	PS	3-Dec-08	08FROAWA-06	SW8260B	Xylenes (total)	ND		2	1	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	9056A	Nitrate-N	3220	J	100	31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	9056A	Nitrite-N	ND	UJ	100	31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	9056A	Sulfate	24800		100	31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	RSK-175	Methane	ND		7.2	2.28	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW6020	Aluminum	ND		500	150	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW6020	Arsenic	ND		5	1.5	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW6020	Iron	ND		1000	310	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW6020	Manganese	4.17		2	0.62	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	1,1,1,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	1,1,1-Trichloroethane	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	1,1,2,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	1,1,2-Trichloroethane	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	1,1-Dichloroethane	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	1,1-Dichloroethene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	1,1-Dichloropropene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	1,2,3-Trichlorobenzene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	1,2,3-Trichloropropane	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	1,2,4-Trichlorobenzene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	1,2,4-Trimethylbenzene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	1,2-Dibromo-3-chloropropane	ND		2	0.62	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	1,2-Dibromoethane	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	1,2-Dichlorobenzene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	1,2-Dichloroethane	ND		0.5	0.15	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	1,2-Dichloropropane	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	1,3,5-Trimethylbenzene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	1,3-Dichlorobenzene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	1,3-Dichloropropane	ND		0.4	0.12	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	1,4-Dichlorobenzene	ND		0.5	0.15	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	2,2-Dichloropropane	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	2-Butanone (MEK)	ND		10	3.1	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	2-Chlorotoluene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	2-Hexanone	ND		10	3.1	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	4-Chlorotoluene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	4-Isopropyltoluene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	4-Methyl-2-pentanone (MIBK)	ND		10	3.1	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Acetone	3.94	J	10	3.1	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Benzene	ND		0.4	0.12	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Bromobenzene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Bromochloromethane	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Bromodichloromethane	ND		0.5	0.15	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Bromoform	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Bromomethane	ND		3	0.94	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Carbon disulfide	ND		2	0.62	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Carbon tetrachloride	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Chlorobenzene	ND		0.5	0.15	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Chloroethane	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Chloroform	ND		1	0.3	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Chloromethane	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	cis-1,2-Dichloroethene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	cis-1,3-Dichloropropene	ND		0.5	0.15	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Dibromochloromethane	ND		0.5	0.15	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Dibromomethane	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Dichlorodifluoromethane	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Ethylbenzene	ND		1	0.31	µg/L

Location	Sample Type	Sample Date	Sample ID	Method	Analyte	Final Result	Final Validation Flag	PQL	MDL	Units
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Hexachlorobutadiene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Isopropylbenzene (Cumene)	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Methylene chloride	ND		5	1	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Methyl-t-butyl ether	ND		5	1.5	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Naphthalene	ND		2	0.62	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	n-Butylbenzene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	n-Propylbenzene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	o-Xylene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	P & M -Xylene	ND		2	0.62	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	sec-Butylbenzene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Styrene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	tert-Butylbenzene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Tetrachloroethene	6.64		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Toluene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	trans-1,2-Dichloroethene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	trans-1,3-Dichloropropene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Trichloroethene	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Trichlorofluoromethane	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Vinyl chloride	ND		1	0.31	µg/L
AP4411	PS	4-Dec-08	08FROAWA-09	SW8260B	Xylenes (total)	ND		2	1	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	9056A	Nitrate-N	1230	J	100	31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	9056A	Nitrite-N	ND	UJ	100	31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	9056A	Sulfate	24100		100	31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	RSK-175	Methane	ND		7.2	2.28	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW6020	Aluminum	ND		500	150	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW6020	Arsenic	ND		5	1.5	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW6020	Iron	ND		1000	310	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW6020	Manganese	ND		2	0.62	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	1,1,1,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	1,1,1-Trichloroethane	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	1,1,2,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	1,1,2-Trichloroethane	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	1,1-Dichloroethane	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	1,1-Dichloroethene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	1,1-Dichloropropene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	1,2,3-Trichlorobenzene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	1,2,3-Trichloropropane	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	1,2,4-Trichlorobenzene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	1,2,4-Trimethylbenzene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	1,2-Dibromo-3-chloropropane	ND		2	0.62	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	1,2-Dibromoethane	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	1,2-Dichlorobenzene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	1,2-Dichloroethane	ND		0.5	0.15	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	1,2-Dichloropropane	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	1,3,5-Trimethylbenzene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	1,3-Dichlorobenzene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	1,3-Dichloropropane	ND		0.4	0.12	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	1,4-Dichlorobenzene	ND		0.5	0.15	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	2,2-Dichloropropane	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	2-Butanone (MEK)	ND		10	3.1	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	2-Chlorotoluene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	2-Hexanone	ND		10	3.1	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	4-Chlorotoluene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	4-Isopropyltoluene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	4-Methyl-2-pentanone (MIBK)	ND		10	3.1	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Acetone	ND		10	3.1	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Benzene	ND		0.4	0.12	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Bromobenzene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Bromochloromethane	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Bromodichloromethane	ND		0.5	0.15	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Bromoform	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Bromomethane	ND		3	0.94	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Carbon disulfide	ND		2	0.62	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Carbon tetrachloride	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Chlorobenzene	ND		0.5	0.15	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Chloroethane	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Chloroform	ND		1	0.3	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Chloromethane	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	cis-1,2-Dichloroethene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	cis-1,3-Dichloropropene	ND		0.5	0.15	µg/L

Location	Sample Type	Sample Date	Sample ID	Method	Analyte	Final Result	Final Validation Flag	PQL	MDL	Units
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Dibromochloromethane	ND		0.5	0.15	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Dibromomethane	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Dichlorodifluoromethane	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Ethylbenzene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Hexachlorobutadiene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Isopropylbenzene (Cumene)	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Methylene chloride	ND		5	1	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Methyl-t-butyl ether	ND		5	1.5	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Naphthalene	ND		2	0.62	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	n-Butylbenzene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	n-Propylbenzene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	o-Xylene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	P & M -Xylene	ND		2	0.62	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	sec-Butylbenzene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Styrene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	tert-Butylbenzene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Tetrachloroethene	22.8		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Toluene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	trans-1,2-Dichloroethene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	trans-1,3-Dichloropropene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Trichloroethene	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Trichlorofluoromethane	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Vinyl chloride	ND		1	0.31	µg/L
AP3534	PS	4-Dec-08	08FROAWA-10	SW8260B	Xylenes (total)	ND		2	1	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	9056A	Nitrate-N	1230	J	100	31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	9056A	Nitrite-N	ND	UJ	100	31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	9056A	Sulfate	24300		100	31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	RSK-175	Methane	ND		7.2	2.28	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW6020	Aluminum	ND		500	150	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW6020	Arsenic	ND		5	1.5	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW6020	Iron	ND		1000	310	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW6020	Manganese	ND		2	0.62	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	1,1,1,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	1,1,1-Trichloroethane	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	1,1,2,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	1,1,2-Trichloroethane	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	1,1-Dichloroethane	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	1,1-Dichloroethene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	1,1-Dichloropropene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	1,2,3-Trichlorobenzene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	1,2,3-Trichloropropane	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	1,2,4-Trichlorobenzene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	1,2,4-Trimethylbenzene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	1,2-Dibromo-3-chloropropane	ND		2	0.62	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	1,2-Dibromoethane	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	1,2-Dichlorobenzene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	1,2-Dichloroethane	ND		0.5	0.15	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	1,2-Dichloropropane	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	1,3,5-Trimethylbenzene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	1,3-Dichlorobenzene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	1,3-Dichloropropane	ND		0.4	0.12	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	1,4-Dichlorobenzene	ND		0.5	0.15	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	2,2-Dichloropropane	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	2-Butanone (MEK)	ND		10	3.1	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	2-Chlorotoluene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	2-Hexanone	ND		10	3.1	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	4-Chlorotoluene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	4-Isopropyltoluene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	4-Methyl-2-pentanone (MIBK)	ND		10	3.1	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Acetone	ND		10	3.1	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Benzene	ND		0.4	0.12	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Bromobenzene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Bromochloromethane	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Bromodichloromethane	ND		0.5	0.15	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Bromoform	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Bromomethane	ND		3	0.94	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Carbon disulfide	ND		2	0.62	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Carbon tetrachloride	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Chlorobenzene	ND		0.5	0.15	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Chloroethane	ND		1	0.31	µg/L

Location	Sample Type	Sample Date	Sample ID	Method	Analyte	Final Result	Final Validation Flag	PQL	MDL	Units
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Chloroform	ND		1	0.3	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Chloromethane	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	cis-1,2-Dichloroethene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	cis-1,3-Dichloropropene	ND		0.5	0.15	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Dibromochloromethane	ND		0.5	0.15	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Dibromomethane	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Dichlorodifluoromethane	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Ethylbenzene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Hexachlorobutadiene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Isopropylbenzene (Cumene)	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Methylene chloride	ND		5	1	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Methyl-t-butyl ether	ND		5	1.5	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Naphthalene	ND		2	0.62	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	n-Butylbenzene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	n-Propylbenzene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	o-Xylene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	P & M -Xylene	ND		2	0.62	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	sec-Butylbenzene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Styrene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	tert-Butylbenzene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Tetrachloroethene	23.2		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Toluene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	trans-1,2-Dichloroethene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	trans-1,3-Dichloropropene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Trichloroethene	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Trichlorofluoromethane	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Vinyl chloride	ND		1	0.31	µg/L
AP9534	FD	4-Dec-08	08FROAWA-11	SW8260B	Xylenes (total)	ND		2	1	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	9056A	Nitrate-N	1980	J	100	31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	9056A	Nitrite-N	ND	UJ	100	31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	9056A	Sulfate	23700		100	31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	RSK-175	Methane	ND		7.2	2.28	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW6020	Aluminum	ND		500	150	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW6020	Arsenic	ND		5	1.5	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW6020	Iron	ND		1000	310	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW6020	Manganese	5.27		2	0.62	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	1,1,1,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	1,1,1-Trichloroethane	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	1,1,2,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	1,1,2-Trichloroethane	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	1,1-Dichloroethane	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	1,1-Dichloroethene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	1,1-Dichloropropene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	1,2,3-Trichlorobenzene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	1,2,3-Trichloropropane	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	1,2,4-Trichlorobenzene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	1,2,4-Trimethylbenzene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	1,2-Dibromo-3-chloropropane	ND		2	0.62	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	1,2-Dibromoethane	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	1,2-Dichlorobenzene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	1,2-Dichloroethane	ND		0.5	0.15	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	1,2-Dichloropropane	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	1,3,5-Trimethylbenzene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	1,3-Dichlorobenzene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	1,3-Dichloropropane	ND		0.4	0.12	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	1,4-Dichlorobenzene	ND		0.5	0.15	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	2,2-Dichloropropane	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	2-Butanone (MEK)	ND		10	3.1	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	2-Chlorotoluene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	2-Hexanone	ND		10	3.1	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	4-Chlorotoluene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	4-Isopropyltoluene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	4-Methyl-2-pentanone (MIBK)	ND		10	3.1	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Acetone	ND		10	3.1	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Benzene	ND		0.4	0.12	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Bromobenzene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Bromochloromethane	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Bromodichloromethane	ND		0.5	0.15	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Bromoform	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Bromomethane	ND		3	0.94	µg/L

Location	Sample Type	Sample Date	Sample ID	Method	Analyte	Final Result	Final Validation Flag	PQL	MDL	Units
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Carbon disulfide	ND		2	0.62	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Carbon tetrachloride	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Chlorobenzene	ND		0.5	0.15	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Chloroethane	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Chloroform	ND	U	1.04	0.3	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Chloromethane	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	cis-1,2-Dichloroethene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	cis-1,3-Dichloropropene	ND		0.5	0.15	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Dibromochloromethane	ND		0.5	0.15	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Dibromomethane	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Dichlorodifluoromethane	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Ethylbenzene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Hexachlorobutadiene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Isopropylbenzene (Cumene)	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Methylene chloride	ND		5	1	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Methyl-t-butyl ether	ND		5	1.5	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Naphthalene	ND		2	0.62	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	n-Butylbenzene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	n-Propylbenzene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	o-Xylene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	P & M -Xylene	ND		2	0.62	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	sec-Butylbenzene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Styrene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	tert-Butylbenzene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Tetrachloroethene	63.3		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Toluene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	trans-1,2-Dichloroethene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	trans-1,3-Dichloropropene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Trichloroethene	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Trichlorofluoromethane	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Vinyl chloride	ND		1	0.31	µg/L
AP3468	PS	4-Dec-08	08FROAWA-12	SW8260B	Xylenes (total)	ND		2	1	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	9056A	Nitrate-N	1920	J	100	31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	9056A	Nitrite-N	ND	UJ	100	31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	9056A	Sulfate	26800		100	31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	RSK-175	Methane	ND		7.2	2.28	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW6020	Aluminum	ND		500	150	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW6020	Arsenic	ND		5	1.5	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW6020	Iron	ND		1000	310	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW6020	Manganese	2.37		2	0.62	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	1,1,1,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	1,1,1-Trichloroethane	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	1,1,2,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	1,1,2-Trichloroethane	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	1,1-Dichloroethane	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	1,1-Dichloroethene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	1,1-Dichloropropene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	1,2,3-Trichlorobenzene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	1,2,3-Trichloropropane	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	1,2,4-Trichlorobenzene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	1,2,4-Trimethylbenzene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	1,2-Dibromo-3-chloropropane	ND		2	0.62	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	1,2-Dibromoethane	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	1,2-Dichlorobenzene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	1,2-Dichloroethane	ND		0.5	0.15	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	1,2-Dichloropropane	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	1,3,5-Trimethylbenzene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	1,3-Dichlorobenzene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	1,3-Dichloropropane	ND		0.4	0.12	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	1,4-Dichlorobenzene	ND		0.5	0.15	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	2,2-Dichloropropane	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	2-Butanone (MEK)	ND		10	3.1	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	2-Chlorotoluene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	2-Hexanone	ND		10	3.1	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	4-Chlorotoluene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	4-Isopropyltoluene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	4-Methyl-2-pentanone (MIBK)	ND		10	3.1	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Acetone	ND		10	3.1	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Benzene	ND		0.4	0.12	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Bromobenzene	ND		1	0.31	µg/L

Location	Sample Type	Sample Date	Sample ID	Method	Analyte	Final Result	Final Validation Flag	PQL	MDL	Units
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Bromochloromethane	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Bromodichloromethane	ND		0.5	0.15	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Bromoform	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Bromomethane	ND		3	0.94	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Carbon disulfide	ND		2	0.62	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Carbon tetrachloride	1.29	†	1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Chlorobenzene	ND		0.5	0.15	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Chloroethane	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Chloroform	2.74	†	1	0.3	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Chloromethane	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	cis-1,2-Dichloroethene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	cis-1,3-Dichloropropene	ND		0.5	0.15	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Dibromochloromethane	ND		0.5	0.15	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Dibromomethane	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Dichlorodifluoromethane	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Ethylbenzene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Hexachlorobutadiene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Isopropylbenzene (Cumene)	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Methylene chloride	ND		5	1	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Methyl-t-butyl ether	ND		5	1.5	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Naphthalene	ND		2	0.62	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	n-Butylbenzene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	n-Propylbenzene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	o-Xylene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	P & M -Xylene	ND		2	0.62	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	sec-Butylbenzene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Styrene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	tert-Butylbenzene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Tetrachloroethene	62.9	†	10	3.1	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Toluene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	trans-1,2-Dichloroethene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	trans-1,3-Dichloropropene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Trichloroethene	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Trichlorofluoromethane	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Vinyl chloride	ND		1	0.31	µg/L
AP4342	PS	5-Dec-08	08FROAWA-15	SW8260B	Xylenes (total)	ND		2	1	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	9056A	Nitrate-N	1860	J	100	31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	9056A	Nitrite-N	ND	UJ	100	31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	9056A	Sulfate	28900		100	31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	RSK-175	Methane	ND		7.2	2.28	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW6020	Aluminum	415	J	500	150	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW6020	Arsenic	ND		5	1.5	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW6020	Iron	684	J	1000	310	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW6020	Manganese	26.3		2	0.62	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	1,1,1,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	1,1,1-Trichloroethane	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	1,1,2,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	1,1,2-Trichloroethane	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	1,1-Dichloroethane	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	1,1-Dichloroethene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	1,1-Dichloropropene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	1,2,3-Trichlorobenzene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	1,2,3-Trichloropropane	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	1,2,4-Trichlorobenzene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	1,2,4-Trimethylbenzene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	1,2-Dibromo-3-chloropropane	ND		2	0.62	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	1,2-Dibromoethane	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	1,2-Dichlorobenzene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	1,2-Dichloroethane	ND		0.5	0.15	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	1,2-Dichloropropane	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	1,3,5-Trimethylbenzene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	1,3-Dichlorobenzene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	1,3-Dichloropropane	ND		0.4	0.12	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	1,4-Dichlorobenzene	ND		0.5	0.15	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	2,2-Dichloropropane	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	2-Butanone (MEK)	ND		10	3.1	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	2-Chlorotoluene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	2-Hexanone	ND		10	3.1	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	4-Chlorotoluene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	4-Isopropyltoluene	ND		1	0.31	µg/L

Location	Sample Type	Sample Date	Sample ID	Method	Analyte	Final Result	Final Validation Flag	PQL	MDL	Units
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	4-Methyl-2-pentanone (MIBK)	ND		10	3.1	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Acetone	ND		10	3.1	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Benzene	ND		0.4	0.12	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Bromobenzene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Bromochloromethane	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Bromodichloromethane	ND		0.5	0.15	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Bromoform	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Bromomethane	ND		3	0.94	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Carbon disulfide	ND		2	0.62	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Carbon tetrachloride	1.32	†	1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Chlorobenzene	ND		0.5	0.15	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Chloroethane	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Chloroform	5.27	†	1	0.3	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Chloromethane	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	cis-1,2-Dichloroethene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	cis-1,3-Dichloropropene	ND		0.5	0.15	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Dibromochloromethane	ND		0.5	0.15	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Dibromomethane	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Dichlorodifluoromethane	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Ethylbenzene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Hexachlorobutadiene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Isopropylbenzene (Cumene)	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Methylene chloride	ND		5	1	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Methyl-t-butyl ether	ND		5	1.5	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Naphthalene	ND		2	0.62	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	n-Butylbenzene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	n-Propylbenzene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	o-Xylene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	P & M -Xylene	ND		2	0.62	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	sec-Butylbenzene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Styrene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	tert-Butylbenzene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Tetrachloroethene	120		10	3.1	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Toluene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	trans-1,2-Dichloroethene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	trans-1,3-Dichloropropene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Trichloroethene	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Trichlorofluoromethane	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Vinyl chloride	ND		1	0.31	µg/L
AP4413	PS	5-Dec-08	08FROAWA-16	SW8260B	Xylenes (total)	ND		2	1	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	9056A	Nitrate-N	2500	J	100	31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	9056A	Nitrite-N	ND	UJ	100	31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	9056A	Sulfate	22600		100	31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	RSK-175	Methane	ND		7.2	2.28	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW6020	Aluminum	ND		500	150	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW6020	Arsenic	ND		5	1.5	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW6020	Iron	ND		1000	310	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW6020	Manganese	4.19		2	0.62	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	1,1,1,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	1,1,1-Trichloroethane	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	1,1,2,2-Tetrachloroethane	ND		0.5	0.15	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	1,1,2-Trichloroethane	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	1,1-Dichloroethane	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	1,1-Dichloroethene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	1,1-Dichloropropene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	1,2,3-Trichlorobenzene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	1,2,3-Trichloropropane	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	1,2,4-Trichlorobenzene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	1,2,4-Trimethylbenzene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	1,2-Dibromo-3-chloropropane	ND		2	0.62	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	1,2-Dibromoethane	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	1,2-Dichlorobenzene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	1,2-Dichloroethane	ND		0.5	0.15	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	1,2-Dichloropropane	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	1,3,5-Trimethylbenzene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	1,3-Dichlorobenzene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	1,3-Dichloropropane	ND		0.4	0.12	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	1,4-Dichlorobenzene	ND		0.5	0.15	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	2,2-Dichloropropane	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	2-Butanone (MEK)	ND		10	3.1	µg/L

Location	Sample Type	Sample Date	Sample ID	Method	Analyte	Final Result	Final Validation Flag	PQL	MDL	Units
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	2-Chlorotoluene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	2-Hexanone	ND		10	3.1	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	4-Chlorotoluene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	4-Isopropyltoluene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	4-Methyl-2-pentanone (MIBK)	ND		10	3.1	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Acetone	ND		10	3.1	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Benzene	ND		0.4	0.12	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Bromobenzene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Bromochloromethane	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Bromodichloromethane	ND		0.5	0.15	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Bromoform	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Bromomethane	ND		3	0.94	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Carbon disulfide	ND		2	0.62	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Carbon tetrachloride	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Chlorobenzene	ND		0.5	0.15	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Chloroethane	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Chloroform	ND		1	0.3	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Chloromethane	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	cis-1,2-Dichloroethene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	cis-1,3-Dichloropropene	ND		0.5	0.15	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Dibromochloromethane	ND		0.5	0.15	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Dibromomethane	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Dichlorodifluoromethane	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Ethylbenzene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Hexachlorobutadiene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Isopropylbenzene (Cumene)	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Methylene chloride	ND		5	1	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Methyl-t-butyl ether	ND		5	1.5	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Naphthalene	ND		2	0.62	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	n-Butylbenzene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	n-Propylbenzene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	o-Xylene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	P & M -Xylene	ND		2	0.62	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	sec-Butylbenzene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Styrene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	tert-Butylbenzene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Tetrachloroethene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Toluene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	trans-1,2-Dichloroethene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	trans-1,3-Dichloropropene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Trichloroethene	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Trichlorofluoromethane	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Vinyl chloride	ND		1	0.31	µg/L
AP4341	PS	5-Dec-08	08FROAWA-18	SW8260B	Xylenes (total)	ND		2	1	µg/L

Notes:

µg/L	micrograms per liter
mg/L	milligrams per liter
ND	analyte not detected above PQL
PQL	practical quantitation limit
MDL	method detection limt
PS	project sample
FD	field duplicate
J	analyte was present but the reported value may not be accurate or precise (estimated)
J+	analyte was present but the reported value may not be accurate or precise (biased high)
J-	analyte was present but the reported value may not be accurate or precise (biased low)
UJ	analyte was not detected and the specified reporting limit may not be accurate or precise (estimated)
U	analyte was not detected at the specified reporting limit
†	trip blank was not submitted to lab in associated cooler; source of sample contamination not certain.
‡	unable to assess the precision

Appendix B3
ADEC Laboratory Data Review Checklists

SGS Work Order Number: 1086496

LABORATORY DATA REVIEW CHECKLIST

(**NOTE**: **NA** = not applicable)

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses? **Yes / No**

b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS-approved? **Yes / No / NA**
Note: ADEC certification is not required for methane analysis.

2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?
Yes / No Note: COC seals were absent from the cooler of methane samples sent to SGS's Wilmington NC laboratory.

b. Were the correct analyses requested? **Yes / No Note: Ethane and ethene were requested on the COC form; these analytes were not in the SAP for Operable Unit E, so their results were not reported.**

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?
Yes / No

b. Sample preservation acceptable - acidified waters, MeOH-preserved VOC soil (GRO, BTEX, VOCs, etc.)? **Yes / No**

c. Sample condition documented - broken, leaking (soil MeOH), zero headspace (VOC vials)? **NA / Yes / No**

d. If there were any discrepancies, were they documented (e.g., incorrect sample containers/preservation, sample temperatures outside range, insufficient sample size, missing samples)? **NA / Yes / No**

e. Data quality or usability affected? **Yes** (explain) / **No**

4. Case Narrative

a. Present and understandable? **Yes / No (explain)**

b. Discrepancies, errors or QC failures noted by the lab? **NA / Yes / No (explain)**

c. Were all corrective actions documented? **NA / Yes / No (explain)** **Note: No corrective action was required.**

d. Is there an effect on data quality/usability, according to the case narrative? **NA / No / Yes (explain)**

5. Sample Results

a. Correct analyses performed/reported as requested on COC? **Yes / No (explain)**

b. All applicable holding times met? **Yes / No**

c. All soils reported on a dry-weight basis? **NA / Yes / No**

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project? **Yes / No** (explain only for non-detects with elevated PQLs) **Note: 1,2,3-Trichloropropane and ethylene dibromide PQLs were above their respective ADEC Table C groundwater cleanup levels; the PQLs met the reporting limit objectives specified in the QAPP, and these analytes are not a focus of this project, so data usability is not affected.**

e. Data quality or usability affected? **No / Yes (explain)**

6. QC Samples

a. Method Blank

i. Is at least one method blank (MB) reported per matrix, analysis, and 20 samples? **Yes / No**
ii. Are all method blank results less than PQL? **Yes / No**
iii. If MB above PQL, what samples are affected?

iv. Do the affected sample(s) have data flags? **Yes / No / NA**

If so, are the data flags clearly defined? **Yes / No / NA**

v. Are data quality or usability affected? **No** (i.e., MB data are acceptable) / **Yes** (Explain)

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics - Is at least one LCS/LCSD reported per matrix, analysis, and 20 samples? **NA / Yes / No**

ii. Metals/Inorganics - Is at least one LCS and one sample duplicate reported per matrix, analysis and 20 samples? **NA / Yes / No** **Note: A LCS and a MS/MSD were reported for the metals analysis. A LCS was reported for nitrate, nitrite, and sulfate, and an undigested duplicate and undigested bench spike were reported for sulfate.**

iii. Accuracy – Are all percent recoveries (%R) reported and within method or laboratory limits or project-specified DQOs? [*AK petroleum methods %R < 20%; other analyses, refer to lab QC pages*] **Yes / No** (explain) **Note: LCSD recovery of naphthalene was high; naphthalene was not detected in project samples, so results were not affected.**

iv. Precision – Are all relative percent differences (RPDs) reported and less than method or laboratory limits, or project-specified DQOs? **Yes / No** (explain)

v. If %R or RPD is outside of acceptable limits, what samples are affected? **NA** or **list**

vi. Do the affected samples(s) have data flags? **NA /Yes / No (explain)**

If so, are the data flags clearly defined?

vii. Is the data quality or usability affected? **NA / Yes / No** (explain). **Note: We cannot calculate the analytical precision of the nitrate/nitrite results. Does not affect data quality for project purposes**

c. Surrogates - Organics Only

i. Are surrogate recoveries reported for organic analyses, including field, QC and laboratory samples? **Yes / No**

ii. Accuracy – Are all percent recoveries (%R) reported and within method or laboratory limits or project-specified DQOs? **Yes / No**

iii. Do the sample results with failed surrogate recoveries have data flags? **NA /Yes / No (explain)**

If so, are the data flags clearly defined? **Yes / No / NA**

iv. Is the data quality or usability affected? **No** or **explain**.

d. Trip Blank (volatiles only)

i. Is at least one trip blank (TB) reported per matrix, analysis and cooler? **NA / Yes / No**
Note: Sample *08FROAWA-03* was the trip blank for VOCs.

ii. Are TB results less than PQLs? **NA / Yes / No**

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iii. If TB is above the PQL, what samples are affected? **NA** or **list samples**

iv. Is the data quality or usability affected? **No** or **explain**.

e. Field Duplicate

i. Was at least one field duplicate submitted per matrix, analysis and 10 project samples? **Yes / No Note: OUE field duplicate pair was *08FROAWA-10/08FROAWA-11*, analyzed in work order 1086543.**

ii. Were the field duplicates submitted blind to the lab? **Yes / No / NA**

iii. Precision – Are all relative percent differences (RPDs) less than specified DQOs (recommended: 30% for nitrate, nitrite, and sulfate. QAPP: 15% for VOCs) ? **Yes / No / NA**

iv. Is the data quality or usability affected? **No / Yes** (explain)

f. Decontamination or Equipment Blank (if applicable)

Not Applicable or…

Note: Sample *08FROAWA-02* was the equipment blank.

i. Are all results less than the PQL? **Yes / No**

ii. If results are above PQL, what samples are affected? **NA** or **list**

iii. Is the data quality or usability affected? **No** or **Explain**.

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab-specific, etc.)

Not applicable or …

a. Are they defined and appropriate? **Yes / No**

Completed by: Rodney Guritz
Title: Environmental Chemist **Date:** December 19, 2008
Consultant Firm: Shannon & Wilson, Inc.
CS Report Name: Fort Richardson Operable Unit E Armored Vehicle Maintenance Area Groundwater Monitoring
Laboratory Report Date: December 18, 2008
Laboratory Name: SGS Environmental Services, Inc.

SGS Work Order Number: 1086496

Laboratory Report Numbers: 1086496

ADEC File Number: 2102.38.005

SGS Work Order Number: 1086519

LABORATORY DATA REVIEW CHECKLIST

(**NOTE**: **NA** = not applicable)

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses? **Yes / No**

b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS-approved? **Yes / No / NA**
Note: ADEC certification is not required for methane analysis.

2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?
Yes / No Note: COC seals were absent from the cooler of methane samples sent to SGS's Wilmington NC laboratory.

b. Were the correct analyses requested? **Yes / No Note: Ethane and ethene were requested on the COC form; these analytes were not in the SAP for Operable Unit E, so their results were not reported.**

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?
Yes / No Note: Cooler temperature was 1.5 °C upon delivery; temperature blank was in the acceptable range, and no ice was observed in the samples, so data quality was not affected.

b. Sample preservation acceptable - acidified waters, MeOH-preserved VOC soil (GRO, BTEX, VOCs, etc.)? **Yes / No**

c. Sample condition documented - broken, leaking (soil MeOH), zero headspace (VOC vials)? **NA / Yes / No**

d. If there were any discrepancies, were they documented (e.g., incorrect sample containers/preservation, sample temperatures outside range, insufficient sample size, missing samples)? **NA / Yes / No**

e. Data quality or usability affected? **Yes** (explain) / **No**

4. Case Narrative

a. Present and understandable? **Yes / No (explain)**

b. Discrepancies, errors or QC failures noted by the lab? **NA / Yes / No (explain)**

c. Were all corrective actions documented? **NA / Yes / No (explain)**

d. Is there an effect on data quality/usability, according to the case narrative? **NA / No / Yes (explain)**

5. Sample Results

a. Correct analyses performed/reported as requested on COC? **Yes / No (explain)**

b. All applicable holding times met? **Yes / No**

c. All soils reported on a dry-weight basis? **NA / Yes / No**

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project? **Yes / No** (explain only for non-detects with elevated PQLs) **Note: 1,2,3-Trichloropropane and ethylene dibromide PQLs were above their respective ADEC Table C groundwater cleanup levels; however, the PQLs met the reporting limit objectives specified in the QAPP, and these analytes are not a focus of this project, so data usability is not affected.**

e. Data quality or usability affected? **No / Yes (explain)**

6. QC Samples

a. Method Blank

i. Is at least one method blank (MB) reported per matrix, analysis, and 20 samples? **Yes / No**
ii. Are all method blank results less than PQL? **Yes / No**
iii. If MB above PQL, what samples are affected?

iv. Do the affected sample(s) have data flags? **Yes / No / NA**

If so, are the data flags clearly defined? **Yes / No / NA**

v. Are data quality or usability affected? **No** (i.e., MB data are acceptable) / **Yes** (Explain)

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics - Is at least one LCS/LCSD reported per matrix, analysis, and 20 samples?

NA / Yes / No Note: A LCS/LCSD and a MS/MSD were reported for the methane analysis.

ii. Metals/Inorganics - Is at least one LCS and one sample duplicate reported per matrix, analysis and 20 samples? **NA / Yes / No Note: A LCS and a MS/MSD were reported for the metals analysis. A LCS, an undigested duplicate, and a bench spike were reported for the sulfate analysis. A LCS was reported for nitrate and nitrite, but no sample duplicates were.**

iii. Accuracy – Are all percent recoveries (%R) reported and within method or laboratory limits or project-specified DQOs? [*AK petroleum methods %R < 20%; other analyses, refer to lab QC pages*] **Yes / No** (explain)

iv. Precision – Are all relative percent differences (RPDs) reported and less than method or laboratory limits, or project-specified DQOs? **Yes / No** (explain) **Note: RPDs were not calculated for the metals MS/MSD on the laboratory report, but our RPD calculations were within DQOs.**

v. If %R or RPD is outside of acceptable limits, what samples are affected? **NA** or **list**

vi. Do the affected samples(s) have data flags? **NA /Yes / No (explain)**

If so, are the data flags clearly defined?

vii. Is the data quality or usability affected? **No** or **explain** **Note: We cannot assess the analytical precision of the nitrate/nitrite results. Data quality not affected for project purposes.**

c. Surrogates - Organics Only

i. Are surrogate recoveries reported for organic analyses, including field, QC and laboratory samples? **Yes / No**

ii. Accuracy – Are all percent recoveries (%R) reported and within method or laboratory limits or project-specified DQOs? **Yes / No**

iii. Do the sample results with failed surrogate recoveries have data flags? **NA /Yes / No (explain)**

If so, are the data flags clearly defined? **Yes / No / NA**

iv. Is the data quality or usability affected? **No** or **explain**.

d. Trip Blank (volatiles only)

i. Is at least one trip blank (TB) reported per matrix, analysis and cooler? **NA / Yes / No**
Note: Sample 08FROAWA-08 was the trip blank for VOCs.

ii. Are TB results less than PQLs? **NA / Yes / No**

iii. If TB is above the PQL, what samples are affected? **NA** or **list samples**

iv. Is the data quality or usability affected? **No** or **explain**.

e. Field Duplicate

i. Was at least one field duplicate submitted per matrix, analysis and 10 project samples?
Yes / No Note: OUE field duplicate pair was 08FROAWA-10/08FROAWA-11, analyzed in work order 1086543.

ii. Were the field duplicates submitted blind to the lab? **Yes / No / NA**

iii. Precision – Are all relative percent differences (RPDs) less than specified DQOs (recommended: 30% for nitrate, nitrite, and sulfate. QAPP: 15% for VOCs) ? **Yes / No / NA**

iv. Is the data quality or usability affected? **No / Yes** (explain)

f. Decontamination or Equipment Blank (if applicable)

Not Applicable or…

Note: Sample 08FROAWA-07 was the equipment blank.

i. Are all results less than the PQL? **Yes / No Note: Nitrite was detected between the MDL and the PQL.**

ii. If results are above PQL, what samples are affected? **NA** or **list Note: Nitrite was not detected in project samples.**

iii. Is the data quality or usability affected? **No** or **Explain**.

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab-specific, etc.)

Not applicable or …

a. Are they defined and appropriate? **Yes / No**

SGS Work Order Number: 1086519

Completed by: Rodney Guritz
Title: Environmental Chemist **Date:** January 7, 2009
Consultant Firm: Shannon & Wilson, Inc.
CS Report Name: Fort Richardson Operable Unit E Armored Vehicle Maintenance Area Groundwater Monitoring
Laboratory Report Date: December 31, 2008
Laboratory Name: SGS Environmental Services, Inc.
Laboratory Report Number: 1086519

ADEC File Number: 2102.38.005

SGS Work Order Number: 1086543

LABORATORY DATA REVIEW CHECKLIST

(**NOTE**: **NA** = not applicable)

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses? **Yes / No**

b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS-approved? **Yes / No / NA**
Note: ADEC certification not required for methane analysis.

2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?
Yes / No Note: COC seals were absent from the cooler of methane samples sent to SGS's Wilmington NC laboratory.

b. Were the correct analyses requested? **Yes / No Note: Ethane and ethene were requested on the COC form; these analytes were not in the SAP for Operable Unit E, so their results were not reported.**

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?
Yes / No Note: The temperature blank was at -0.1 °C and the cooler was at 0.1 °C upon deliver. No ice was observed in samples, so results were not affected.

b. Sample preservation acceptable - acidified waters, MeOH-preserved VOC soil (GRO, BTEX, VOCs, etc.)? **Yes / No**

c. Sample condition documented - broken, leaking (soil MeOH), zero headspace (VOC vials)? **NA / Yes / No**

d. If there were any discrepancies, were they documented (e.g., incorrect sample containers/preservation, sample temperatures outside range, insufficient sample size, missing samples)? **NA / Yes / No**

e. Data quality or usability affected? **Yes** (explain) / **No**

4. Case Narrative

a. Present and understandable? **Yes / No (explain)**

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b. Discrepancies, errors or QC failures noted by the lab? **NA / Yes / No (explain)**

c. Were all corrective actions documented? **NA / Yes / No (explain)** **Note: No corrective action was required.**

d. Is there an effect on data quality/usability, according to the case narrative? **NA / No / Yes (explain)**

5. Sample Results

a. Correct analyses performed/reported as requested on COC? **Yes / No (explain)**

b. All applicable holding times met? **Yes / No** **Note: Nitrate, nitrite, and sulfate hold time was exceeded by 1 day for all samples.**

c. All soils reported on a dry-weight basis? **NA / Yes / No**

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project? **Yes / No** (explain only for non-detects with elevated PQLs) **Note: 1,2,3-Trichloropropane and ethylene dibromide PQLs were above their respective ADEC Table C groundwater cleanup levels; however, the PQLs met the reporting limit objectives specified in the QAPP, and these analytes are not a focus of this project, so data usability is not affected**.

e. Data quality or usability affected? **No / Yes (explain)** **Note: Nitrate, nitrite, and sulfate results may be biased due to exceeded hold time; results are flagged as estimates (J).**

6. QC Samples

a. Method Blank

i. Is at least one method blank (MB) reported per matrix, analysis, and 20 samples? **Yes / No**
ii. Are all method blank results less than PQL? **Yes / No**
iii. If MB above PQL, what samples are affected?

iv. Do the affected sample(s) have data flags? **Yes / No / NA**

If so, are the data flags clearly defined? **Yes / No / NA**

v. Are data quality or usability affected? **No** (i.e., MB data are acceptable) / **Yes** (Explain)

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics - Is at least one LCS/LCSD reported per matrix, analysis, and 20 samples? **NA / Yes / No**

ii. Metals/Inorganics - Is at least one LCS and one sample duplicate reported per matrix, analysis and 20 samples? **NA / Yes / No Note: A LCS and a MS/MSD were reported for the metals analysis, while a LCS and an undigested duplicate and a MS/MSD were reported for nitrate, nitrite, and sulfate analysis.**

iii. Accuracy – Are all percent recoveries (%R) reported and within method or laboratory limits or project-specified DQOs? [*AK petroleum methods %R < 20%; other analyses, refer to lab QC pages*] **Yes / No** (explain)

iv. Precision – Are all relative percent differences (RPDs) reported and less than method or laboratory limits, or project-specified DQOs? **Yes / No** (explain)

v. If %R or RPD is outside of acceptable limits, what samples are affected? **NA** or **list**

vi. Do the affected samples(s) have data flags? **NA /Yes / No (explain)**

If so, are the data flags clearly defined?

vii. Is the data quality or usability affected? **No** or **explain**.

c. Surrogates - Organics Only

i. Are surrogate recoveries reported for organic analyses, including field, QC and laboratory samples? **Yes / No**

ii. Accuracy – Are all percent recoveries (%R) reported and within method or laboratory limits or project-specified DQOs? **Yes / No**

iii. Do the sample results with failed surrogate recoveries have data flags? **NA /Yes / No (explain)**

If so, are the data flags clearly defined? **Yes / No / NA**

iv. Is the data quality or usability affected? **No** or **explain**.

d. Trip Blank (volatiles only)

i. Is at least one trip blank (TB) reported per matrix, analysis and cooler? **NA / Yes / No**
Note: Sample *08FROAWA-14* was the trip blank for VOCs.

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ii. Are TB results less than PQLs? **NA / Yes / No**

iii. If TB is above the PQL, what samples are affected? **NA** or **list samples**

iv. Is the data quality or usability affected? **No** or **explain**.

e. Field Duplicate

i. Was at least one field duplicate submitted per matrix, analysis and 10 project samples? **Yes / No Note: OUE field duplicate pair was *08FROAWA-10/08FROAWA-11*.**

ii. Were the field duplicates submitted blind to the lab? **Yes / No / NA**

iii. Precision – Are all relative percent differences (RPDs) less than specified DQOs (recommended: 30% for nitrate, nitrite, and sulfate. QAPP: 15% for VOCs) ? **Yes / No / NA**

iv. Is the data quality or usability affected? **No / Yes** (explain)

f. Decontamination or Equipment Blank (if applicable)

Not Applicable or…

Note: Sample *08FROAWA-13* was the equipment blank.

i. Are all results less than the PQL? **Yes / No Note: Chloroform was detected between the MDL and the PQL in the EB.**

ii. If results are above PQL, what samples are affected? **NA** or **list: *08FROAWA-12***

iii. Is the data quality or usability affected? Explain. **Note: Chloroform (a common lab contaminant) was detected at 1.04 µg/L in sample *08FROAWA-12*; this is less than 10x the EB detection, so this result may be attributable to contamination from sampling equipment.**

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab-specific, etc.)

Not applicable or …

a. Are they defined and appropriate? **Yes / No**

SGS Work Order Number: 1086543

Completed by: Rodney Guritz
Title: Environmental Chemist **Date:** January 4, 2009
Consultant Firm: Shannon & Wilson, Inc.
CS Report Name: Fort Richardson Operable Unit E Armored Vehicle Maintenance Area Groundwater Monitoring
Laboratory Report Date: December 29, 2008
Laboratory Name: SGS Environmental Services, Inc.
Laboratory Report Numbers: 1086543

ADEC File Number: 2102.38.005

SGS Work Order Number: 1086564

LABORATORY DATA REVIEW CHECKLIST

(**NOTE**: **NA** = not applicable)

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses? **Yes / No**

b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS-approved? **Yes / No / NA**
Note: ADEC certification not required for methane analysis.

2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?
Yes / No Note: There were no COC seals on the coolers delivered to SGS Anchorage, since they were hand-delivered in person by the sampler. COC seals were absent from the cooler of methane samples sent to SGS's Wilmington NC laboratory.

b. Were the correct analyses requested? **Yes / No Note: Ethane and ethene were requested on the COC form; these analytes were not in the SAP for Operable Unit E, so their results were not reported.**

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?
Yes / No

b. Sample preservation acceptable - acidified waters, MeOH-preserved VOC soil (GRO, BTEX, VOCs, etc.)? **Yes / No**

c. Sample condition documented - broken, leaking (soil MeOH), zero headspace (VOC vials)? **NA / Yes / No**

d. If there were any discrepancies, were they documented (e.g., incorrect sample containers/preservation, sample temperatures outside range, insufficient sample size, missing samples)? **NA / Yes / No Note: No trip blank was submitted with the VOC samples.**

e. Data quality or usability affected? **Yes** (explain) / **No Note: See trip blank section below.**

SGS Work Order Number: 1086564

4. Case Narrative

a. Present and understandable? **Yes / No (explain)**

b. Discrepancies, errors or QC failures noted by the lab? **NA / Yes / No (explain)**

c. Were all corrective actions documented? **NA / Yes / No (explain)** **Note: No corrective action was required.**

d. Is there an effect on data quality/usability, according to the case narrative? **NA / No / Yes (explain)**

5. Sample Results

a. Correct analyses performed/reported as requested on COC? **Yes / No (explain)**

b. All applicable holding times met? **Yes / No** **Note: Nitrate, nitrite, and sulfate hold time was exceeded by 1 day for all samples.**

c. All soils reported on a dry-weight basis? **NA / Yes / No**

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project? **Yes / No** (explain only for non-detects with elevated PQLs) **Note: 1,2,3-Trichloropropane and ethylene dibromide PQLs were above their respective ADEC Table C groundwater cleanup levels; however, the PQLs met the reporting limit objectives specified in the QAPP, and these analytes are not a focus of this project, so data usability is not affected**.

e. Data quality or usability affected? **No / Yes (explain)** **Note: Nitrate, nitrite, and sulfate results may be biased due to exceeded hold time; results are flagged as estimates (J).**

6. QC Samples

a. Method Blank

i. Is at least one method blank (MB) reported per matrix, analysis, and 20 samples? **Yes / No**
ii. Are all method blank results less than PQL? **Yes / No** **Note: Trichloroethylene (TCE) was detected between the MDL and PQL in the VOC MB.**
iii. If MB above PQL, what samples are affected?
Note: TCE was not detected in project samples.

iv. Do the affected sample(s) have data flags? **Yes / No / NA**

If so, are the data flags clearly defined? **Yes / No / NA**

v. Are data quality or usability affected? **No** (i.e., MB data are acceptable) / **Yes** (Explain)

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics - Is at least one LCS/LCSD reported per matrix, analysis, and 20 samples? **NA / Yes / No Note: A project (billable) MS/MSD was also reported.**

ii. Metals/Inorganics - Is at least one LCS and one sample duplicate reported per matrix, analysis and 20 samples? **NA / Yes / No Note: A LCS and a project (billable) MS/MSD were reported for the metals analysis, while a LCS, an undigested duplicate, and a project (billable) MS/MSD were reported for nitrate, nitrite, and sulfate analysis.**

iii. Accuracy – Are all percent recoveries (%R) reported and within method or laboratory limits or project-specified DQOs? [*AK petroleum methods %R < 20%; other analyses, refer to lab QC pages*] **Yes / No** (explain)

iv. Precision – Are all relative percent differences (RPDs) reported and less than method or laboratory limits, or project-specified DQOs? **Yes / No** (explain)

v. If %R or RPD is outside of acceptable limits, what samples are affected? **NA** or **list**

vi. Do the affected samples(s) have data flags? **NA /Yes / No (explain)**

If so, are the data flags clearly defined?

vii. Is the data quality or usability affected? **No** or **explain**.

c. Surrogates - Organics Only

i. Are surrogate recoveries reported for organic analyses, including field, QC and laboratory samples? **Yes / No**

ii. Accuracy – Are all percent recoveries (%R) reported and within method or laboratory limits or project-specified DQOs? **Yes / No Note: Recovery of 4-BFB was high for sample *08FROAWA-18*; associated analytes were not detected, so results were unaffected.**

iii. Do the sample results with failed surrogate recoveries have data flags? **NA /Yes / No (explain)**

If so, are the data flags clearly defined? **Yes / No / NA**

iv. Is the data quality or usability affected? **No** or **explain**.

SGS Work Order Number: 1086564

d. Trip Blank (volatiles only)

i. Is at least one trip blank (TB) reported per matrix, analysis and cooler? **NA / Yes / No**

ii. Are TB results less than PQLs? **NA / Yes / No**

iii. If TB is above the PQL, what samples are affected? **NA** or **list samples**

iv. Is the data quality or usability affected? **No** or **explain**. **Note: We cannot determine whether VOCs detected in project samples are attributable to contamination occurring in transport or sample handling.**

e. Field Duplicate

i. Was at least one field duplicate submitted per matrix, analysis and 10 project samples? **Yes / No Note: OUE field duplicate pair was 08FROAWA-10/08FROAWA-11, analyzed in work order 1086543.**

ii. Were the field duplicates submitted blind to the lab? **Yes / No / NA**

iii. Precision – Are all relative percent differences (RPDs) less than specified DQOs (recommended: 30% for nitrate, nitrite, and sulfate. QAPP: 15% for VOCs) ? **Yes / No / NA**

iv. Is the data quality or usability affected? **No / Yes** (explain)

f. Decontamination or Equipment Blank (if applicable)

Not Applicable or…

Note: Sample *08FROAWA-17* was the equipment blank.

i. Are all results less than the PQL? **Yes / No Note: Toluene was detected between the MDL and the PQL in the EB, at an estimated concentration of 0.460 µg/L.**

ii. If results are above PQL, what samples are affected? **NA** or **list Note: Toluene was not detected in associated project samples.**

iii. Is the data quality or usability affected? **No** or **Explain**.

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab-specific, etc.)

Not applicable or …

a. Are they defined and appropriate? **Yes / No**

Completed by: Rodney Guritz
Title: Environmental Chemist **Date:** January 4, 2009
Consultant Firm: Shannon & Wilson, Inc.
CS Report Name: Fort Richardson Operable Unit E Armored Vehicle Maintenance Area Groundwater Monitoring
Laboratory Report Date: December 29, 2008
Laboratory Name: SGS Environmental Services, Inc.
Laboratory Report Numbers: 1086564

ADEC File Number: 2102.38.005

Appendix B4
Sample Receipts and Chain-of-Custody Forms (Raw Data Packages electronic file only)

1086496

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

400 N. 34th Street, Suite 100, Seattle, WA 98103, (206) 632-8020
2355 Hill Road, Fairbanks, AK 99709, (907) 479-0600
2255 S.W. Canyon Road, Portland, OR 97201-2498, (503) 223-6147
2043 Westport Center Drive, St. Louis, MO 63146-3564, (314) 699-9660
5430 Fairbanks Street, Suite 3, Anchorage, AK 99518, (907) 561-2120
1200 17th Street, Suite 1024, Denver, Co 80202, (303) 825-3800
303 Wellsian Way, Richland, WA 99352, (509) 946-6309

CHAIN-OF-CUSTODY RECORD

Cooler #1

Page 1 of 1

Attn: Heidi SGS

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	VOCs - EPA 8260B (VOA - HCl)	Methane, Ethane, Ethene - RSK-175 (VOA - HCl)	Dissolved Fe, Mn (Filtered - HNO3)	Alkalinity (HOLD)	Sulfate - SW9056 (Nalgene - Unpres)	Nitrate/Nitrite SW9056 (Nalgene - H2SO4) *		Total Number of Containers	Remarks/Matrix
08FROAWA-01	① A-I	1657	12/2/08		X	X	X	X	X	X	X		~~9~~ 8	WATER (Field Filtered Metals)
08FROAWA-02	② A-I	1726	12/2/08		X	X	X	X	X	X	X		~~9~~ 8	
08FROAWA-03	③ A-C	1740	12/2/08		X	X							1	
											SHORT HOLDING			

Project Information		Sample Receipt	
Project Number:	32-1-17261	Total Number of Containers	1
Project Name:	Fort Rich GW	COC Seals/Intact? Y/N/NA	Y
Contact:	Shayla Swedlund	Received Good Cond./Cold	Y
Ongoing Project?	Yes ☒ No ☐	Delivery Method:	
Sampler:	Shayla Swedlund	(attach shipping bill, if any)	

Instructions
Requested Turnaround Time: Standard
Special Instructions: Corps Project
* Use Unpreserved 60ml from Sulfate for Nitrate/Nitrite

Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report
Yellow - w/shipment - for consignee files
Pink - Shannon & Wilson Job File

dis carried to Shannon & Wilson Job File 12/3

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature:	Signature:	Signature:
Time: 730	Time:	Time:
Printed Name: SHAYLA SWEDLUND	Printed Name:	Printed Name:
Date: 12/3/08	Date:	Date:
Company: Shannon + Wilson	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature:	Signature:	Signature:
Time:	Time:	Time: 1110
Printed Name:	Printed Name:	Printed Name: JAMES NOLAN
Date:	Date:	Date: 12-3-08
Company:	Company:	Company: SGS LACM

F-19-91/UR

69d TB = 7.1 C = 3.0

No. 28642

SGS

SAMPLE RECEIPT FORM

SGS WO#: 1086496

Yes	No	NA		
✓			Are samples **RUSH**, priority or *w/in 72 hrs* of (hold time)?	**TAT (circle one):** (Standard) -or- Rush
✓			If yes, have you done *e-mail ALERT notification*?	**Received Date:** 12.3.08
	✓		Are samples *within 24 hrs.* of **hold time** or **due date**?	**Received Time:** 1110
		✓	If yes, have you also *spoken with* supervisor?	Is **date/time conversion** necessary? NO
		✓	Archiving bottles (if req'd): Are they properly marked?	# of hours to AK Local Time:
	✓		Are there any **problems**? PM Notified?	**Thermometer ID:** 69d
✓			Were samples preserved correctly and pH verified?	
		✓	If this is for PWS, provide **PWSID.**	
	✓		Will courier charges apply?	
			Method of payment?	
✓			Data package required? (Level: 1 / 2 / 3 / 4)	
			Notes:	
✓			Is this a DoD project? (USACE, Navy, AFCEE)	

Cooler ID	Temp Blank	Cooler Temp
1	3.1 °C	3.0 °C
	°C	°C
	°C	°C
	°C	°C
	°C	°C

Note: Temperature readings include thermometer correction factors

Delivery method (circle all that apply): (Client)
Alert Courier / UPS / FedEx / USPS / DHL / AA Goldstreak / NAC / ERA / PenAir / Carlile/ Lynden / SGS / Other:

Airbill #

Additional Sample Remarks: (✓if applicable)

- Extra Sample Volume?
- Limited Sample Volume?
- MeOH field preserved for volatiles?
- ✓ Field-filtered for dissolved
- Lab-filtered for dissolved
- ✓ Ref Lab required? METHANEX
- Foreign Soil?

This section must be filled out for DoD projects (USACE, Navy, AFCEE)

Yes	No	
✓		Is received temperature 4 ± 2°C? Exceptions: Samples/Analyses Affected:
	NA	If temperature(s) <0 °C, were containers ice-free? N/A. *Notify PM immediately of any ice in samples.*
	✓	Was there an airbill? *(Note # above in the right hand column)*
✓		Was cooler sealed with custody seals? #/ where: 2 FRONT & BACK FOR LIM
✓		Were seal(s) intact upon arrival?
✓		Was there a COC with cooler?
✓		Was COC sealed in plastic bag & taped inside lid of cooler?
✓		Was the COC filled out properly?
✓		Did the COC indicate USACE / Navy / AFCEE project?
✓		Did the COC and samples correspond?
✓		Were all sample packed to prevent breakage? Packing material: BUBBLE WRAP
✓		Were all samples unbroken and clearly labeled?
✓		Were all samples sealed in separate plastic bags?
✓		Were all VOCs free of headspace and/or MeOH preserved?
✓		Were correct container / sample sizes submitted?
✓		Is sample condition good?
✓		Was copy of CoC, SRF, and custody seals given to PM to fax?

This section must be filled if problems are found.

Yes	No	
		Was client notified of problems?

Individual contacted:
Via: Phone / Fax / Email (*circle one*)
Date/Time:
Reason for contact:

Change Order Required?
SGS Contact:

Notes:

Completed by (sign): (print): JAMES ROCCAFF

Login proof (check one): waived ____ required ____ performed by:

SGS

SAMPLE RECEIPT FORM (page 2)

SGS WO#: 1086496

#	Container ID	Matrix	Test	QC	TB	Container Volume: 1 L	500 mL	250 mL	125 mL	60 mL	40 mL	8oz (250 mL)	4oz (125 mL)	Other	Container Type: AG	CG	HDPE	Nalgene	Cubie	Coli	Septa	Other	Preservative: None	HCl	HNO_3	H_2SO_4	MeOH	$Na_2S_2O_3$	NaOH	Other
1,2	A-C	1	VOC 8260								6				✓						✓			✓						
	D-F		METHANE ETHANE ASK								6				✓						✓			✓						
	G		NO_2 NO_3							2								✓					✓							
	H		Cl SO_4							2								✓					✓							
	I		Diss Metals					2									✓								✓					
3	A-C	1	VOC 8260		✓						3				✓						✓			✓						

Bottle Totals			2		4	15			

Completed by: [signature] Date: 12.3.08

Form # F004r16 revised 03/10/08

1086496

SGS Environmental

CUSTODY SEAL Cooler #1b

Signature: _____ Date/Time: 12/3/08; 730

SGS Environmental

CUSTODY SEAL Cooler #1a

Signature: _____ Date/Time: 12/3/08; 730

1086519

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

303 Wellsian Way
Richland, WA 99352
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(907) 561-2120

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

1200 17th Street, Suite 1024
Denver, Co 80202
(303) 825-3800

Laboratory SGS
Attn: Heidi Geri

Page 1 of 1

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	VOC - EPA 8260B (HCl - VOAs)	Methane, Ethane, Ethene - RSK-175 (HCl - VOAs)	Dissolved Fe, Mn by SW6020 (HNO3 - HDPE)	Sulfate - SW9056 (No Pres - Nalgene)	Nitrate/Nitrite SW9056 (No Pres - Nalgene)		Total Number of Containers	Remarks/Matrix
08FROAWA-04	1 A-I	1050	12/3/08		X	X	X	X	X	X		9	WATER; Field Filtered
08FROAWA-05	2	1405	12/3/08		X	X	X	X	X	X		9	WATER; Field Filtered
08FROAWA-06	3	1755	12/3/08		X	X	X	X	X	X		9	WATER; Field Filtered
08FROAWA-07	4	1825	12/3/08		X	X	X	X	X	X		9	WATER; Field Filtered
08FROAWA-08	5 A-C	1830	12/3/08		X	X						3	WATER

SHORT HOLDING

Project Information		Sample Receipt	
Project Number:	32-1-17261	Total Number of Containers	
Project Name:	Fort Rich	COC Seals/Intact? Y/N/NA	
Contact:	Shayla Swedlund	Received Good Cond./Cold	
Ongoing Project?	Yes ☒ No ☐	Delivery Method:	
Sampler:	Shayla Swedlund + Joe Thomas	(attach shipping bill, if any)	

Instructions	
Requested Turnaround Time:	Standard
Special Instructions:	USACE/Corps Project Cooler #2 Contract W911KB-08-D-0005 Task Order 001; NPDL09-006

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 0620	Signature: Time:	Signature: Time:
Printed Name: Shayla Swedlund Date: 12/4/08	Printed Name: Date:	Printed Name: Date:
Company: Shannon + Wilson	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time:	Signature: Time:	Signature: Time: 1040
Printed Name: Date:	Printed Name: Date:	Printed Name: Date: 12-4-08
Company:	Company:	Company: SGS ARCH

Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report
Yellow - w/shipment - for consignee files
Pink - Shannon & Wilson - Job File

F-19-91/UR

99d TB = 2.0
C = 1.5

No. 28643

1086519

SGS

SAMPLE RECEIPT FORM

SGS WO#:

Yes	No	NA	
✓	✓		Are samples **RUSH**, priority or *w/in 72 hrs* of hold time?
✓			If yes, have you done *e-mail ALERT notification*?
✓			Are samples *within 24 hrs.* of **hold time** or **due date**?
✓			If yes, have you also *spoken with* supervisor?
		✓	Archiving bottles (if req'd): Are they properly marked?
	✓		Are there any **problems**? PM Notified?
✓			Were samples preserved correctly and pH verified?
		✓	If this is for PWS, provide **PWSID.**
	✓		Will courier charges apply?
			Method of payment?
✓			Data package required? (Level: 1 / 2 / 3 / 4)
			Notes:
✓			Is this a DoD project? (USACE, Navy, AFCEE)

TAT (circle one): (Standard) -or- Rush

Received Date: 12.4.08

Received Time: 1040

Is **date/time conversion** necessary? NO

# of hours to AK Local Time:

Thermometer ID: 89d

Cooler ID	Temp Blank	Cooler Temp
1	2.0 °C	1.5 °C
	°C	°C
	°C	°C
	°C	°C
	°C	°C

Note: Temperature readings include thermometer correction factors

Delivery method (circle all that apply): (Client)

Alert Courier / UPS / FedEx / USPS / DHL / AA Goldstreak / NAC / ERA / PenAir / Carlile/ Lynden / SGS / Other:

Airbill #

Additional Sample Remarks: *(√if applicable)*

- Extra Sample Volume?
- Limited Sample Volume?
- MeOH field preserved for volatiles?
- Field-filtered for dissolved
- Lab-filtered for dissolved
- ✓ Ref Lab required? METHANE RISKS
- Foreign Soil?

This section must be filled out for DoD projects (USACE, Navy, AFCEE)

Yes	No		
	✓	Is received temperature 4 ± 2°C?	Exceptions: SEE ABOVE — Samples/Analyses Affected:
	NA	If temperature(s) <0 °C, were containers ice-free? N/A	*Notify PM immediately of any ice in samples.*
	✓	Was there an airbill?	*(Note # above in the right hand column)*
✓		Was cooler sealed with custody seals?	#'s where: 2 FRONT & BACK TO LID
✓		Were seal(s) intact upon arrival?	
✓		Was there a COC with cooler?	
✓		Was COC sealed in plastic bag & taped inside lid of cooler?	
✓		Was the COC filled out properly?	
✓		Did the COC indicate USACE / Navy / AFCEE project?	
✓		Did the COC and samples correspond?	
✓		Were all sample packed to prevent breakage?	Packing material: BUBBLE WRAP
✓		Were all samples unbroken and clearly labeled?	
✓		Were all samples sealed in separate plastic bags?	
✓		Were all VOCs free of headspace and/or MeOH preserved?	
✓		Were correct container / sample sizes submitted?	
✓		Is sample condition good?	
✓		Was copy of CoC, SRF, and custody seals given to PM to fax?	

This section must be filled if problems are found.

Yes	No	
✓		Was client notified of problems?

Individual contacted: Haydar

Via: (Phone) / Fax / Email *(circle one)*

Date/Time: 12:22 12-4-08

Reason for contact: Low Temps. OK

Change Order Required? NO

SGS Contact: QA

Notes: Cooler Temp Out-of Range Cold. No Ice in Sample OK

Completed by (sign): (print): JAMES DOCHERTY

Login proof (check one): waived ____ required ____ performed by:

1086519

SGS

SAMPLE RECEIPT FORM (page 2)

SGS WO#:

#	Container ID	Matrix	Test	QC	TB	Container Volume: 1 L	500 mL	250 mL	125 mL	60 mL	40 mL	8oz (250 mL)	4oz (125 mL)	Other	Container Type: AG	CG	HDPE	Nalgene	Cubie	Coli	Septa	Other	Preservative: None	HCl	HNO_3	H_2SO_4	MeOH	$Na_2S_2O_3$	NaOH	Other
1-4	A-C	1	VOC								12				L						L			L						
	D-F		METHANOL ASK175								12				L						L			L						
	G		NO_2 NO_2							4								L					L							
	H		SO_4							4								L					L							
	I		Diss Fe Hg Ac Ag					4									L								L					
5	A-C	1	VOC		L						3				L						L			L						

Bottle Totals			4		8	27			

Completed by: _____ Date: 12-4-08

Form # F004r16 revised 03/10/08

1086543

CHAIN-OF-CUSTODY REC

Page 1 of 1

SGS

Attn: Heidi Geri

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

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Anchorage, AK 99518
(907) 561-2120

1200 17th Street, Suite 1024
Denver, Co 80202
(303) 825-3800

303 Wellsian Way
Richland, WA 99352
(509) 946-6309

SHORT HOLDING

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	VOCs (EPA 8260B) VOAs - HCl	Methane, Ethane, Ethene (RSK-175) VOAs - HCl	Dissolved Fe, Mn (SW 6020) Al (SW 6020) HDPE - HNO3	Sulfate, NO3 (SW 9056) NO2 Nonane - NO PRS			Total Number of Containers	Remarks/Matrix (Metals to WL 12/5/08)
08FROAWA-09	① A-H	1130	12/4/08		X	X	X	X	X			8	WATER; Field-filtered
08FROAWA-10	②	1708	12/4/08		X	X	X	X	X			8	Water; Field filtered
08FROAWA-11	③	1712	12/4/08		X	X	X	X	X			8	Water; Field Filtered;
08FROAWA-12	④	1918	12/4/08		X	X	X	X	X			8	Water; Field Filtered
08FROAWA-13	⑤	1944	12/4/08		X	X	X	X	X			8	Water; Field Filtered
08FROAWA-14	⑥ A-C (TB)	1946	12/4/08		X	X						3	Water

Project Information		Sample Receipt	
Project Number:	32-1-17261	Total Number of Containers	
Project Name:	Fort Richardson	COC Seals/Intact? Y/N/NA	
Contact:	Shayla Swedlund	Received Good Cond./Cold	
Ongoing Project?	Yes ☒ No ☐	Delivery Method:	
Sampler:	Shayla Swedlund + Joe Thomas	(attach shipping bill, if any)	

Instructions	
Requested Turnaround Time:	Standard
Special Instructions:	USACE/CORPS Task Order 001 CONTRACT W911KB-08-D-0005 NPDLS-09-005
COOLER # 03	

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 645	Signature: Time:	Signature: Time:
Printed Name: Shayla Swedlund Date: 12/5/08	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time:	Signature: Time:	Signature: Time: 1140
Printed Name: Date:	Printed Name: Date:	Printed Name: James Donohue Date: 12-5-08
Company:	Company:	Company:

Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report
Yellow - w/shipment - for consignee files
Pink - Shannon & Wilson - Job File

F-19-91/UR

69a TB = -01 - NO ICE
C = 0-1

No. 29095

1086543

SGS

SAMPLE RECEIPT FORM

SGS WO#:

Yes	No	NA		
✓			Are samples **RUSH**, priority or *w/in 72 hrs* of hold time?	**TAT (circle one):** Standard -or- Rush
✓			If yes, have you done *e-mail ALERT notification*?	**Received Date:** 12.5.08
✓			Are samples *within 24 hrs.* of **hold time** or **due date**?	**Received Time:** 1140
✓			If yes, have you also *spoken with* supervisor?	Is **date/time conversion** necessary? NO
		✓	Archiving bottles (if req'd): Are they properly marked?	# of hours to AK Local Time: —
		✓	Are there any **problems**? PM Notified?	**Thermometer ID:** G9d
✓			Were samples preserved correctly and ~~pH verified~~?	
		✓	If this is for PWS, provide **PWSID.**	
	✓		Will courier charges apply?	
			Method of payment?	
✓			Data package required? (Level: 1 / 2 / 3 / 4)	
			Notes:	
✓			Is this a DoD project? (USACE, Navy, AFCEE)	

Cooler ID	Temp Blank	Cooler Temp
1	-0.1 °C	0.1 °C
	°C	°C
	°C	°C
	°C	°C
	°C	°C

Note: Temperature readings include thermometer correction factors

Delivery method (circle all that apply): Client / Alert Courier / UPS / FedEx / USPS / DHL / AA Goldstreak / NAC / ERA / PenAir / Carlile/ Lynden / SGS / Other: _____

Airbill # _____

Additional Sample Remarks: *(√if applicable)*

_____ Extra Sample Volume?
_____ Limited Sample Volume?
_____ MeOH field preserved for volatiles?
_____ Field-filtered for dissolved _____
_____ Lab-filtered for dissolved _____
✓ Ref Lab required? METHANE
_____ Foreign Soil?

This section must be filled out for DoD projects (USACE, Navy, AFCEE)

Yes	No		
	✓	Is received temperature 4 ± 2°C?	Exceptions: / Samples/Analyses Affected:
	N/A	If temperature(s) <0 °C, were containers ice-free? N/A	*Notify PM immediately of any ice in samples.*
	✓	Was there an airbill?	*(Note # above in the right hand column)*
✓		Was cooler sealed with custody seals?	# / where: TWO FRONT & BACK FOR LIM
✓		Were seal(s) intact upon arrival?	
✓		Was there a COC with cooler?	
✓		Was COC sealed in plastic bag & taped inside lid of cooler?	
✓		Was the COC filled out properly?	
✓		Did the COC indicate USACE / Navy / AFCEE project?	
✓		Did the COC and samples correspond?	
✓		Were all sample packed to prevent breakage?	Packing material: BUBBLE WRAP
✓		Were all samples unbroken and clearly labeled?	
✓		Were all samples sealed in separate plastic bags?	
✓		Were all VOCs free of headspace and/or MeOH preserved?	
✓		Were correct container / sample sizes submitted?	
✓		Is sample condition good?	
✓		Was copy of CoC, SRF, and custody seals given to PM to fax?	

This section must be filled if problems are found.

Yes	No	
		Was client notified of problems?

Individual contacted: _____
Via: Phone / Fax / Email (*circle one*)
Date/Time: _____
Reason for contact: _____

Change Order Required? _____
SGS Contact: _____

Notes: _____

Completed by (sign): _____ (print): JAMES NOCHETTI

Login proof (check one): waived ✓ required ____ performed by: _____

1086543

SGS

SAMPLE RECEIPT FORM (page 2)

SGS WO#:

#	Container ID	Matrix	Test	QC	TB	Container Volume: 1 L	500 mL	250 mL	125 mL	60 mL	40 mL	8oz (250 mL)	4oz (125 mL)	Other	Container Type: AG	CG	HDPE	Nalgene	Cubie	Coli	Septa	Other	Preservative: None	HCl	HNO_3	H_2SO_4	MeOH	$Na_2S_2O_3$	NaOH	Other
1-5	A-C	1	VOC 8260								15				L						L			L						
	D-F		METHANE RSK 175								15				L						L			L						
	G		NO2,NO3, SO4							5								V					V							
	H		Diss Fe, Al, As					5									V						V		V					
6	A-C	1	VOC		V						3				L						1			L						
Bottle Totals								5		5	33																			

Completed by: _____ Date: 12-5-05

Form # F004r16 revised 03/10/08

1086543

SGS Environmental

CUSTODY SEAL - Cooler Ø3B

Signature: _____ Date/Time: 12/5/08; 645

SGS Environmental

CUSTODY SEAL - Cooler Ø3A

Signature: _____ Date/Time: 12/5/08; 645

Geri, Heidi (Anchorage)

From: Jon Lindstrom [JEL@shanwil.com]
Sent: Friday, December 05, 2008 4:26 PM
To: Geri, Heidi (Anchorage); Haydar Turker; Rodney Guritz; Randy Hessong
Subject: Re: Low Cooler Temps

Please proceed with the analyses.
Regards,
Jon

Jon E. Lindstrom, Ph.D.
Environmental Chemist
Associate
Shannon & Wilson, Inc.
2355 Hill Rd.
Fairbanks, AK 99709-5244
Telephone: (907) 479-0600
Fax: (907) 479-5691

>>> "Geri, Heidi (Anchorage)" <Heidi.Geri@sgs.com> 12/5/2008 4:23 PM >>>

Hi,

1086543_08FROAWA-09 cooler temps are low, but there was no ice present in any of the samples. I will proceed with analyses unless I hear otherwise.

Please contact me to confirm.

Thank you,
Heidi

Heidi Geri
SGS Environmental Services Inc.
Alaska Division Project Manager
200 West Potter Drive
Anchorage, Alaska 99518
Phone: (907) 562-2343
Direct: (907) 550-3211
Fax: (907) 561-5301

Geri, Heidi (Anchorage)

From: Randy Hessong [RTH@shanwil.com]
Sent: Friday, December 05, 2008 4:47 PM
To: Geri, Heidi (Anchorage); Haydar Turker; Jon Lindstrom; Rodney Guritz
Subject: Re: Low Cooler Temps

Hi Heidi,
Proceed with the analysis. Fresh ice packs had been placed in the cooler a little before I delivered it.

Randy Hessong
Shannon & Wilson, Inc.
(907) 561-2120
RTH@shanwil.com

>>> "Geri, Heidi (Anchorage)" <Heidi.Geri@sgs.com> 12/5/2008 4:23 PM >>>

Hi,

1086543_08FROAWA-09 cooler temps are low, but there was no ice present in any of the samples. I will proceed with analyses unless I hear otherwise.

Please contact me to confirm.

Thank you,

Heidi

Heidi Geri

SGS Environmental Services Inc.

Alaska Division Project Manager

200 West Potter Drive

Anchorage, Alaska 99518

Phone: (907) 562-2343

Direct: (907) 550-3211

Fax: (907) 561-5301

1086564

SHORT HOLDING

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2043 Westport Center Drive
St. Louis, MO 63146-3564
~~(314) 899-9660~~

303 Wellsian Way
Richland, WA 99352
(509) 946-6309

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Fairbanks, AK 99709
(907) 479-0600

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

1200 17th Street, Suite 1024
Denver, Co 80202
(303) 825-3800

Laboratory: ~~ATL~~
Attn: Heidi Geri

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	VOC (EPA 8260B) VOAs - HCl	Methane, Ethane, Ethene (RSK-175) VOAs - HCl	Diss. Al, As, Fe, Mn (SW6020) HDPE - HNO3	Sulfate (SW9056) Nitrate/Nitrite (SW9056) Nitrate - NaHSO4			Total Number of Containers	Remarks/Matrix
08FROAWA-15	① 1-H ② 1-G ③ 1-G ④ 1-	1018	12/5/08		X	X	X	X	X			16	Please run MS/MSD on this smpl. Water; Metals Field Filtered
08FROAWA-16	⑤ 1-H	1140	↓		X	X	X	X	X			8	Water; Metals Field Filtered
08FROAWA-17	⑥ ↓	1219			X	X	X	X	X			8	↓
08FROAWA-18	⑦ ↓	1305			X	X	X	X	X			8	↓
~~08FROAWA-19~~		~~1310~~	↓		X	X						3	~~Water~~ SS 12/5/08

Project Information		Sample Receipt	
Project Number:	32-1-17261	Total Number of Containers	
Project Name:	Fort Richardson	COC Seals/Intact? Y/N/NA	
Contact:	Shayla Swedlund	Received Good Cond./Cold	
Ongoing Project?	Yes ☒ No ☐	Delivery Method:	
Sampler:	Shayla Swedlund + Joe Thomas	(attach shipping bill, if any)	

Instructions	
Requested Turnaround Time:	Standard
Special Instructions:	USACE/Corps Task Order 001 Contract W911KB-08-D-0005 NPDLS-09-005 COOLER #04

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 1650	Signature: Time:	Signature: Time:
Printed Name: Shayla Swedlund Date: 12/5/08	Printed Name: Date:	Printed Name: Date:
Company: Shannon + Wilson	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time:	Signature: Time:	Signature: Time: 1650
Printed Name: Date:	Printed Name: Date:	Printed Name: Date: 12-5-08
Company:	Company:	Company: SGS MTL

Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report
Yellow - w/shipment - for consignee files
Pink - Shannon & Wilson - Job File

F-19-91/UR

6d2 TP = 5.4 C = 5.6

No. 29106

1086564

SGS

SAMPLE RECEIPT FORM

SGS WO#: _____

Yes	No	NA		
✓			Are samples **RUSH**, priority or *w/in 72 hrs* of hold time?	
✓			If yes, have you done *e-mail ALERT notification*?	
	✓		Are samples *within 24 hrs.* of **hold time** or **due date**?	
		✓	If yes, have you also *spoken with* supervisor?	
		✓	Archiving bottles (if req'd): Are they properly marked?	
	✓		Are there any **problems**? PM Notified?	
✓			Were samples preserved correctly and ~~pH verified~~?	
		✓	If this is for PWS, provide **PWSID.**	
	✓		Will courier charges apply?	
			Method of payment?	
✓			Data package required? (Level: 1 / 2 / 3 / 4)	
			Notes:	
✓			Is this a DoD project? (USACE, Navy, AFCEE)	

TAT (circle one): (Standard) -or- Rush

Received Date: 12.5.08

Received Time: 1650

Is **date/time conversion** necessary? NO

# of hours to AK Local Time: _____

Thermometer ID: 69d

Cooler ID	Temp Blank	Cooler Temp
1	5.4 °C	5.6 °C
	°C	°C
	°C	°C
	°C	°C
	°C	°C

Note: Temperature readings include thermometer correction factors

Delivery method (circle all that apply): (Client) / Alert Courier / UPS / FedEx / USPS / DHL / AA Goldstreak / NAC / ERA / PenAir / Carlile/ Lynden / SGS / Other: _____

Airbill # _____

Additional Sample Remarks: (✓if applicable)

_____ Extra Sample Volume?

_____ Limited Sample Volume?

_____ MeOH field preserved for volatiles?

_____ Field-filtered for dissolved_____

_____ Lab-filtered for dissolved_____

✓ Ref Lab required? METHANE

_____ Foreign Soil?

This section must be filled out for DoD projects (USACE, Navy, AFCEE)

Yes	No	
✓		Is received temperature 4 ± 2°C? Exceptions: _____ Samples/Analyses Affected: _____
	NA	If temperature(s) <0 °C, were containers ice-free? N/A *Notify PM immediately of any ice in samples.*
	✓	Was there an airbill? *(Note # above in the right hand column)*
✓	✓	Was cooler sealed with custody seals? # / where: _____
	NA	Were seal(s) intact upon arrival?
✓		Was there a COC with cooler?
	✓	Was COC sealed in plastic bag & taped inside lid of cooler?
✓		Was the COC filled out properly?
✓		Did the COC indicate USACE / Navy / AFCEE project?
✓		Did the COC and samples correspond?
✓		Were all sample packed to prevent breakage? Packing material: BUBBLE WRAP
✓		Were all samples unbroken and clearly labeled?
✓		Were all samples sealed in separate plastic bags?
✓		Were all VOCs free of headspace and/or MeOH preserved?
✓		Were correct container / sample sizes submitted?
✓		Is sample condition good?
✓		Was copy of CoC, SRF, and custody seals given to PM to fax?

This section must be filled if problems are found.

Yes **No**

____ ____ Was client notified of problems?

Individual contacted: _____

Via: Phone / Fax / Email (*circle one*)

Date/Time: _____

Reason for contact: _____

Change Order Required? _____

SGS Contact: _____

Notes: NO TRIP BLANK SUBMITTED WITH SAMPLES JSK

Completed by (sign): _____ (print): JAMES DOGGETT

Login proof (check one): waived ____ required ____ performed by: _____

1086564

SGS

SAMPLE RECEIPT FORM (page 2)

SGS WO#:

#	Container ID	Matrix	Test	QC	TB	Container Volume: 1 L	500 mL	250 mL	125 mL	60 mL	40 mL	8oz (250 mL)	4oz (125 mL)	Other	Container Type: AG	CG	HDPE	Nalgene	Cubie	Coli	Septa	Other	Preservative: None	HCl	HNO_3	H_2SO_4	MeOH	$Na_2S_2O_3$	NaOH	Other
1	A,B	1	VOC								2				✓						✓			✓						
	C,D		METHANE RSK 175								2				✓						✓			✓						
	E		NO_2 NO_3							1								✓					✓							
	F		SO_4							1								✓					✓							
	G		Diss Metals					1									✓								✓					
	H		EXTRA VOC					1									✓								✓					
2	A,B		VOC	HS							2				✓						✓			✓						
	C,D		METHANE RSK 175	HS							2				✓						✓			✓						
	E		NO_2 NO_3	HS							5	J	A	1E																
	F		SO_4	HS							↓	↓	↓	1F																
	G		Diss Metals	HS							↓	↓	↓	1G																
3	A,B		VOC	HSD							2				✓						✓			✓						
	C,D		METHANE RSK 175	HSD							2				✓						✓			✓						
	E		Diss Metals	HSD				1			5	J	A	1G			✓								✓					
4	A		NO_2, NO_3	DUP							↓	↓	↓	1E																
	B		SO_4	DUP							↓	↓	↓	1F																
5-7	A-C	1	VOC								9				✓						✓			✓						
	D-F		METHANE								9				✓						✓			✓						
	G		NO_2 NO_3 SO_4							3								✓					✓							
	H		Diss Metals					3									✓								✓					

Bottle Totals			6		5	30			

Completed by: _____ Date: 10-5-08

Form # F004r16 revised 03/10/08

Appendix B5
COELT (electronic file only)