2110.38.007

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October 7, 2008

Mr. Robert Weimer
Alaska Department of Environmental Conservation
555 Cordova Street
Anchorage, Alaska 99501

Re: **Subsurface Investigation and Well Installation Report**
Former Chevron-branded Service Station 9-2609
Mile 79 Seward Highway
Portage, Alaska
File ID: 2110.38.007
ADEC Hazard ID: 2007
CRA Project No. 620911

Dear Mr. Weimer:

Conestoga-Rovers & Associates (CRA) is submitting this *2008 Subsurface Investigation and Well Installation Report* to the Alaska Department of Environmental Conservation (ADEC) on behalf of Chevron Environmental Management Company (Chevron) for the site referenced above. The investigation objective was to vertically and horizontally define the extent of hydrocarbons in soil and groundwater near former monitoring well MW-13. The site background, investigation details, and conclusions are presented below.

SITE BACKGROUND

Site Description: The site is a former Texaco-branded service station located at Mile 79 along the southbound lane of Seward Highway in Portage, Alaska (Figure 1). The site operated as a Chevron-branded service station from 1971 until 1979. The site is referenced as Chevron service station 9-2609 and ADEC File ID: 2110.38.007. Former site facilities consisted of two 10,000 gallon underground storage tanks (UST) and one 3,000 gallon UST. The UST's and associated underground piping were removed in 1980. Four USTs, 2 log cribs, a dispenser island, product piping, and septic tank were removed in 2000. The site is currently vacant with the exception of a small kiosk formerly used as an ice cream stand (Figure 2).

Hydrogeology: The site is located in south central Alaska, at the eastern-most extent of the Turnagain Arm between Twenty Mile River and Portage Creek. No major principal aquifer system underlies the site, however the southern/southeastern extend of the Cook Inlet Aquifer System is slightly northwest/west of the site. The Cook Inlet Aquifer System consists of boulders, cobbles, and unconsolidated gravels, sands, silts, and clays deposited by glacial, alluvial, and colluvial processes. Historical static groundwater levels have ranged between approximately 1.31 and 11.21 feet (ft) below ground surface (bgs) with a groundwater flow direction to the

southwest. The Cook Inlet and Turnagain Arm tidal influence can be as great as 37 ft and produce groundwater fluctuations in site monitoring wells.

Regional Geology: The site stratigraphy consists of Cretaceous to Upper Jurassic slate greywacke, argillite, conglomerate, and volcanic units beneath the surface sediments. Soil underlying the site primarily consists of sandy gravel with silt lenses to the total explored depth of 18 ft bgs.

ENVIRONMENTAL HISTORY

1993 Site Assessment: In 1993, eight borings were advanced as part of an investigation for the Alaska Department of Transportation. Five borings were advanced onsite and three borings were advanced offsite. Petroleum hydrocarbons were detected in collected soil samples from all borings.

1995 Well Installation: Three groundwater monitoring wells were installed in 1995. Initial groundwater samples collected contained a maximum concentration of diesel range organics (DRO) of 8.4 milligrams per Liter (mg/L).

1998 Subsurface Investigation and Well Installation: Eleven soil borings were advanced during a 1998 subsurface investigation to delineate the lateral extent of petroleum hydrocarbons in the soil and groundwater. Five of these borings were completed as monitoring wells. The maximum concentration of DRO in collected soil samples was 5,970 milligrams per kilogram (mg/kg). The maximum concentration of gasoline range organics (GRO) in collected soil samples was 2,490 mg/kg. Benzene concentrations ranged from 8.09 to 2.89 mg/kg.

2000 UST Removal and Excavation: Approximately 3,500 cubic yards of soil was excavated and removed from the site in 2000. Four USTs, two log cribs, a dispenser island, associated product piping, and a septic tank were excavated at this time. DRO was detected in collected soil samples ranging from 7.73 to 34.4 mg/kg. The maximum concentration of detected GRO in collected soil samples was 464 mg/kg. Four additional groundwater monitoring wells were installed in 2001 to further asses the extent of petroleum hydrocarbons in groundwater. Long-term groundwater monitoring and sampling has been conducted at the site since 1995. The ADEC approved suspension of sampling activities on monitoring wells MW-1, MW-4, MW-8, and MW-10 on September 6, 2006. Eight monitoring wells are currently monitored and sampled on a semiannual basis.

INVESTIGATION DETAILS

Soil Boring Location and Well Installation Rationale

CRA advanced soil borings CB-1 through CB-6 and installed monitoring well MW-14 to further assess the vertical and horizontal extent of hydrocarbons in soil and groundwater discovered during the 2000 remedial excavation. Soil samples were collected outside the 2000 excavations (Figure 3) near areas of previously detected hydrocarbons. Groundwater monitoring well MW-13 had previously not been located and was presumed to have been destroyed during snow removal. However, MW-13 was found west of its mapped location and had been buried by surface sediments. Monitoring well MW-14 was installed in the proposed location for MW-13R to assess groundwater quality near the source area.

Soil Boring and Well Installation

CRA conducted all activities in accordance with the ADEC's *Monitoring Well Design and Construction for Investigation of Contaminated Sites, February 2008* and CRA's Chevron approved *Health and Safety Plan* and *Journey Management Plan*. Details of the soil borings and well installation are presented below.

Drilling Date: June 2, 2008

CRA Personnel: Siobhan Fackelman, Andrew Ellsmore, and Nick Greco conducted all fieldwork.

Drilling Company: Discovery Drilling of Anchorage, Alaska (Discovery).

Site Health and Safety Plan: CRA prepared a site health and safety plan to inform site workers of known hazards and to provide health and safety guidance. The plans were on-site at all times during field work and signed daily by all site workers.

Soil Borings: Soil borings CB-1 through CB-6 were drilled to first encountered groundwater or below the depth of previous soil borings (Figure 2). Soil was continuously logged and field screened by a trained geologist and Alaska Qualified Person during drilling. Soil boring logs are presented as Attachment A. CRA's standard operating procedures for soil borings are presented as Attachment B.

Well Installation: One soil boring was advanced to 18 ft bgs and completed as groundwater monitoring well MW-14. Department of Natural Resources water well log is

presented as Attachment C. CRA's standard operating procedures for monitoring well installation are presented as Attachment D.

Subsurface Utility Clearance: Alaska Digline was notified prior to drilling to clear boring locations with utility companies. A private utility locator used ground penetrating radar (GPR) to locate underground structures at each boring location. Each boring was also manually cleared to 1 ft bgs. The GPR site plans are presented as Attachment E.

Drilling Method: Soil borings were advanced to first encountered groundwater or below the depth of previous soil borings using a CME 75 drill rig equipped with 8-inch outer diameter hollow-stem augers. Soil samples were collected with a 2 ft core barrel advanced by a 300 pound slide hammer at approximately 5 ft intervals between 5 ft bgs and 17 ft bgs.

Well Construction: Monitoring well MW-14 was constructed of 2-inch diameter, schedule 40 PVC pipe with 0.020-inch screen and clean #10/20 silica sand. The well is screened from 2 ft bgs to 17 ft bgs. The well was set in a flush mount and graded with concrete.

Site Stratigraphy: Subsurface sediments consisted primarily of gravel fill at the surface transitioning to well-graded gravel with sand to approximately 5 ft bgs. The gravel is underlain by silt and sand layers to the total explored depth of 18 ft bgs.

Soil Screening: Soil samples were screened for petroleum hydrocarbon constituents using a photo ionization detector (PID). Soil samples were submitted for laboratory analyses based on PID screening results.

Laboratory Analyses: The collected soil samples, equipment blank, and trip blanks were analyzed for one or more of the following analyses:

- Gasoline range organics by Alaska Series Method AK101,
- Diesel range organics by Alaska Series Method AK102, and
- Benzene, ethylbenzene, toluene, and xylenes (BTEX) by Environmental Protection Agency (EPA) Method 8021B.

Soil Disposal: Soil cuttings were temporarily stored in 55-gallon Department of Transportation approved drums on-site awaiting ADEC disposal approval. The ADEC approved

disposal in a letter dated August 4, 2008. Statewide Petroleum transported the drums to Alaska Soil Recycling for disposal on August 25, 2008.

Well Development: CRA personnel developed groundwater monitoring well MW-14 on June 4, 2008 by agitating the water column for approximately ten minutes with a surge block, followed by purging to remove silt and draw in formation water. Well development forms are presented as Attachment F. CRA's standard operating procedures for well development are presented as Attachment G.

Soil Sampling Results

Laboratory Analytical Results: No DRO, GRO, or BTEX were detected above *ADEC Method II – Soil Cleanup Levels* in samples collected from soil borings CB-4 and CB-5. No DRO or GRO was detected above ADEC cleanup levels in samples collected from soil borings CB-2, CB-3, or MW-14-17.5. The maximum DRO concentration was 3,900 milligrams per kilogram (mg/kg) (CB-6-5). GRO was detected in soil samples collected from borings CB-1-7.0, CB-1-10.0, CB-6-5.0, and MW-14-10.0 at concentrations ranging from 760 mg/kg to 3,800 mg/kg. The maximum detected benzene concentration was 2.20 mg/kg (CB-1-10.0). Soil analytical results are summarized in Table 1. Petroleum hydrocarbon concentrations are presented in Figure 2. The laboratory analytical report is presented as Attachment H. The ADEC laboratory data review and checklist is presented as Attachment I.

CONCLUSIONS

- The soil stratigraphy at the former Chevron-branded service station consists of fill material underlain by well-graded gravel with sand to 5 ft bgs underlain by sand with silt and clay to the total explored depth of 18 ft bgs. This data is consistent with previous investigations.

- No petroleum hydrocarbon constituents were detected above ADEC Method II soil cleanup levels in samples from soil borings CB-4 and CB-5, indicating the extent of hydrocarbons is vertically and horizontally delineated northeast and southwest of the former dispenser island and former tanks # 1, 2, and 3.

- The vertical extent of hydrocarbons north of the former dispenser island was defined in boring/well MW-10 at approximately 15-17 ft bgs. Soil sample MW-14-10 contained 340 mg/kg GRO and 3,800 mg/kg, exceeding ADEC cleanup levels. Soil samples collected from MW-14 at 17.5 contained no DRO, GRO or BTEX above Method II soil clean up levels.

- Soil boring CB-6 was advanced near former log crib locations #1 and # 2. Soil sample CB-6-5 contained the maximum detected DRO concentration (3,900 mg/kg) and 760 mg/kg GRO. Hydrocarbons in soil may extend north of the former log cribs, but are vertically defined to approximately 6 ft bgs by Secor's September 2000 soil sample S-15-6.

- Boring CB-1, advanced southeast of former tank # 4 and September 2000 soil sample S-12, contained GRO and benzene above Method II soil clean up levels at 10 ft bgs. Hydrocarbons may be present south of the 2000 excavation limits.

- Boring CB-2, advanced east and south of September 2000 soil samples S-10 and S-5, respectively, contained no DRO or GRO above Method II cleanup levels. The extent of GRO and DRO is horizontally and vertically defined to the southern extent south of the former UST cavity and 2000 excavation limits.

- The laboratory detection limits for benzene were above ADEC data quality objectives and above Method II levels in soil samples collected from CB-2 and CB-6. Based on GRO and DRO concentrations in CB-6-5, benzene may be present above Method II cleanup levels near former log crib # 2.

CLOSING

We appreciate the opportunity to work with Chevron and the ADEC on this project. Alaska Qualified Personnel in accordance with *18 Alaska Administrative Code (AAC) 75, Article 3 and 18 AAC 78, Article 2, 6, and 9,* conducted and/or supervised all project work. Please call John Riggi at (303) 433-3650 with any questions regarding this report.

Sincerely,
Conestoga-Rovers & Associates

Siobhan Fackelman,
Staff Geologist

John Riggi, P.G.
Senior Project Geologist

Figures: 1 – Vicinity Map
2 – CRA Soil Sample Results
3 – Secor Soil Sample Results

Table: 1 – Soil Analytical Results

Attachments: A – Soil Boring Logs
B – Standard Operating Procedures for Soil Borings
C – Department of Natural Resources Water Well Log
D – Standard Operating Procedures for Monitoring Well Installation
E – Ground Penetrating Radar Site Plans
F – Well Development Forms
G – Standard Operating Procedures for Well Development
H – Lancaster Laboratory Analytical Report
I – ADEC Laboratory Data Review and Checklist

cc: Mr. Greg Barton, Chevron Environmental Management Company, 6111 Bollinger Canyon Road, Room 3620, San Ramon, California 94583

Mr. Robert A. Hall, Esq., P.O. Box 871906, Wasilla, Alaska 99687

Conestoga-Rovers & Associates

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REFERENCES

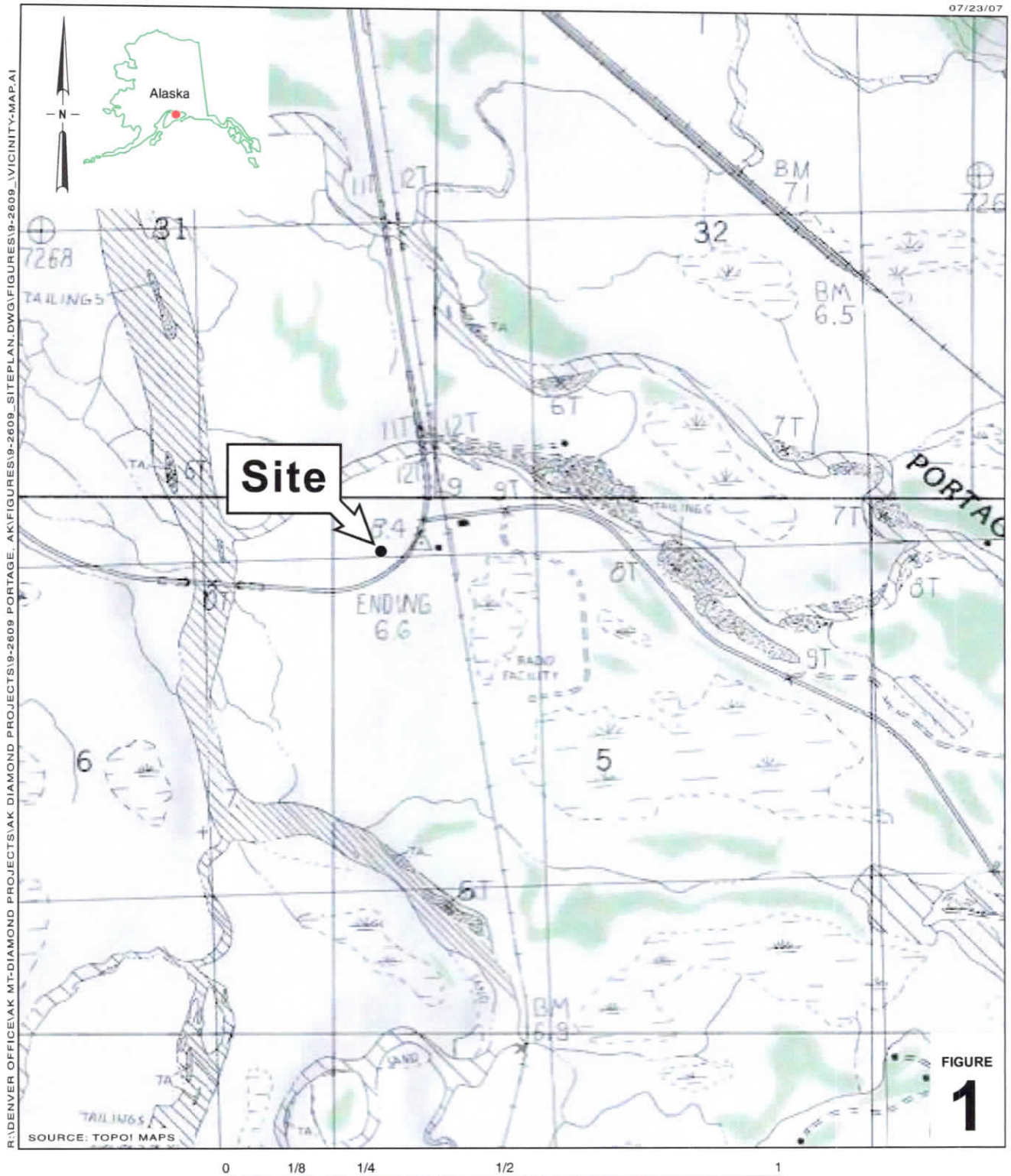
Secor International Incorporated, *Excavation of USTs and Petroleum Impacted Soils,* Chevron Service Station # 9-2609, Mile 79 Seward Highway, Portage, Alaska, April 17, 2002.

United States Geological Survey, *Ground Water Atlas of the United States Segment 13,* James A. Miller, R. L. Whitehead, Stephen B. Gingerich, Delwyn S. Oki, and Perry G. Olcott, 1999.

United States Geological Survey, *Geologic Map of Alaska*, Complied by Helen M. Belkman, 1980.

Alaska Department of Environmental Conservation Underground Storage Tanks Procedures Manual, Guidance for Treatment of Petroleum-Contaminated Soil and Groundwater and Standard Sampling Procedures, November 7, 2002.

Alaska Department of Environmental Conservation Recommended Practices for Monitoring Well Design, Installation and Decommissioning, February 2008.



Former Chevron Station 9-2609

Seward Highway Mile 79

Portage, Alaska

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Vicinity Map

09/19/08

Soil Boring Location Map

EXPLANATION

MW-1	Monitoring well location
MW-2	Destroyed well location
CB-1	Soil boring location
DRO	Diesel Range Organics
GRO	Gasoline Range Organics
	Concentrations are in mg/kg

CB-5	
Depth	7.0'
GRO (mg/kg)	4.70
DRO (mg/kg)	49.0
Benzene (mg/kg)	0.02

CB-6	
Depth	5.0'
GRO (mg/kg)	760
DRO (mg/kg)	3,900
Benzene (mg/kg)	<0.1

MW-14		
Depth	10.0'	17.5'
GRO (mg/kg)	3,800	14.0
DRO (mg/kg)	340	4.6
Benzene (mg/kg)	<5.0	0.02

CB-4	
Depth	6.0'
GRO (mg/kg)	1.3
DRO (mg/kg)	100.0
Benzene (mg/kg)	0.007

CB-2	
Depth	10.0'
GRO (mg/kg)	24.0
DRO (mg/kg)	8.0
Benzene (mg/kg)	<1.0

CB-3	
Depth	9.0'
GRO (mg/kg)	73.0
DRO (mg/kg)	7.9
Benzene (mg/kg)	0.08

CB-1		
Depth	7.0'	10.0'
GRO (mg/kg)	2,000	1,700
DRO (mg/kg)	160	260
Benzene (mg/kg)	<5.0	2.20

MW-3, MW-6, MW-7, MW-13, MW-14, MW-5, MW-12, MW-1, CB-3, CB-5, CB-6, former crib 2, former crib 1, former tank 1, former tank 3, former tank 2, Former Service Station (1963), Former Service Station (1978), former dispenser island, CB-4, Ice Cream Hut, former tank 4, MW-9, former UST pit, MW-2, CB-1, CB-2, MW-11, MW-8, MW-10, MW-4, SEWARD HIGHWAY, SEWARD, ANCHORAGE

N

0 25 50 100

Scale (ft)

Basemap modified from drawing provided by SECOR

FIGURE

2

Former Chevron Station 9-2609

Seward Highway Mile 79

Portage, Alaska

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09/19/08

Soil Sample Results
(SECOR Excavation and Samples)
August through September 2000

EXPLANATION

- MW-1 — Monitoring well location
- MW-2 — Destroyed well location
- CB-1 — Soil boring location
- S-1 — Soil sample location
- Area of excavation
- NA — Not Analyzed

S-16	
Depth	5.0'
GRO (mg/kg)	3.23
DRO (mg/kg)	49.1
Benzene (mg/kg)	<0.00994

CB-6	
Depth	5.0'
Benzene (mg/kg)	<0.1

DRO 4000
GRO 760
14'-16'

S-15		
Depth	4.0'	6.0'
GRO (mg/kg)	10.1	7.09
DRO (mg/kg)	514	109
Benzene (mg/kg)	<0.00913	<0.0159

CB-5	
Depth	7.0'
DRO (mg/kg)	4.70

S-4		
Depth	6.0'	8.0'
GRO (mg/kg)	11	300
DRO (mg/kg)	699	121
Benzene (mg/kg)	0.03	0.54

former crib 2
former crib 1
10'-12'
10'-12'

S-14	
Depth	5.0'
GRO (mg/kg)	312
DRO (mg/kg)	100
Benzene (mg/kg)	0.642

S-17	
Depth	5.0'
GRO (mg/kg)	3.25
DRO (mg/kg)	155
Benzene (mg/kg)	<0.0123

MW-7

MW-14		
Depth	10.0'	17.5'
GRO (mg/kg)	~~350~~ NA	14.00
DRO (mg/kg)	~~380~~ NA	4.6
Benzene (mg/kg)	<5.0	NA

former tank 1
4'-6'
MW-13
former tank 3
6'-8'
former tank 2
Former Service Station (1963)

S-3		
Depth	5.0'	7.0'
GRO (mg/kg)	870	1,200
DRO (mg/kg)	1,150	1,070
Benzene (mg/kg)	1.4	2.2

S-1	
Depth	6.0'
GRO (mg/kg)	<5
DRO (mg/kg)	<10
Benzene (mg/kg)	<0.02

Former Service Station (1978)
10'-12'

S-13		
Depth	5.0'	7.0'
GRO (mg/kg)	1,090	1,490
DRO (mg/kg)	370	298
Benzene (mg/kg)	3.93	4.99

MW-12
6'-8'
former dispenser island
MW-14
MW-5

S-7	
Depth	6.0'
GRO (mg/kg)	41
DRO (mg/kg)	64
Benzene (mg/kg)	0.05

CB-4	
Depth	6.0'
GRO (mg/kg)	1.30
DRO (mg/kg)	100.0
Benzene (mg/kg)	0.007

S-2		
Depth	6.0'	8.0'
GRO (mg/kg)	1,500	930
DRO (mg/kg)	461	957
Benzene (mg/kg)	5.4	0.71

CB-3	
Depth	9.0'
GRO (mg/kg)	73.0
DRO (mg/kg)	7.9
Benzene (mg/kg)	0.08

S-12	
Depth	5.0'
GRO (mg/kg)	7,090
DRO (mg/kg)	752
Benzene (mg/kg)	32.9

Ice Cream Hut
4'-6'
former tank 4
6'-8'

S-8		
Depth	5.0'	7.0'
GRO (mg/kg)	<2.72	7.16
DRO (mg/kg)	59.6	<13.0
Benzene (mg/kg)	<0.0136	<0.0297

10'-12'
MW-9
MW-2
former USTs

CB-1		
Depth	7.0'	10.0'
GRO (mg/kg)	~~2320~~ 220	~~1480~~ NA
DRO (mg/kg)	~~2,260~~ 270	260
Benzene (mg/kg)	2.10	2.20

SEWARD HIGHWAY

S-9		
Depth	5.0'	7.0'
GRO (mg/kg)	84.9	7.34
DRO (mg/kg)	<10.3	<13.1
Benzene (mg/kg)	0.178	<0.0133

S-5	
Depth	5.0'
GRO (mg/kg)	640
DRO (mg/kg)	358
Benzene (mg/kg)	3.2

MW-11

MW-8

N

0 10 20 40
Scale (ft)

S-6	
Depth	4.0'
GRO (mg/kg)	2,600
DRO (mg/kg)	770
Benzene (mg/kg)	13

S-10		
Depth	5.0'	7.0'
GRO (mg/kg)	2,550	79.8
DRO (mg/kg)	219	<12.9
Benzene (mg/kg)	10.1	0.209

CB-2	
Depth	10.0'
GRO (mg/kg)	24.0
DRO (mg/kg)	8.0
Benzene (mg/kg)	<1.0

S-11		
Depth	5.0'	8.0'
GRO (mg/kg)	2,670	104
DRO (mg/kg)	505	40.9
Benzene (mg/kg)	12.2	0.258

Basemap modified from drawing provided by SECOR

FIGURE
3

Former Chevron Station 9-2609
Seward Highway Mile 79
Portage, Alaska

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R:\DENVER OFFICE\AK MT-DIAMOND PROJECTS\AK DIAMOND PROJECTS\9-2609 PORTAGE, AK\FIGURES\9-2609_SAMPLES.DWG

Table 1. **Soil Analytical Results** - Chevron-branded Service Station 9-2609, Mile 79 Seward Highway, Portage, Alaska

Sample ID	Date Sampled	Sample Depth (ft bgs)	DRO	GRO	Benzene	Toluene	Ethylbenzene	Xylenes
			Concentration in mg/kg					
MW-14-10.0	6/2/2008	10.0	**340**	**3,800**	<5.0	**73**	**45**	**270**
MW-14-17.5	6/2/2008	17.5	4.6	14	**0.02**	0.2	0.5	2.8
CB-1-7.0	6/2/2008	7.0	160	**2000**	<5.0	2.0	**7.5**	44
CB-1-7.0 (d)	6/2/2008	7.0	220	**2200**	<5.0	2.1	**8.2**	48
CB-1-10.0	6/2/2008	10.0	260	**1700**	**2.2**	1.7	**7.5**	44
CB-2-10.0	6/2/2008	10.0	38	**820**	<1.0	0.8	**11**	65
CB-3-9.0	6/2/2008	9.0	7.9	73	**0.08**	0.3	0.6	3.2
CB-4-6.0	6/2/2008	6.0	100	1.3	0.007	0.04	<0.005	0.1
CB-5-7.0	6/2/2008	7.0	49	4.7	0.02	0.09	0.02	0.1
CB-6-5.0	6/17/2008	5.0	**3900**	**760**	<0.1	0.3	1.6	8.3
CB-6-5.0(d)	6/17/2008	5.0	**4,000**	**640**	<0.1	0.2	1.3	7.3
EB-1*	6/2/2008	--	<0.023	<0.01	<0.001	<0.001	<0.001	<0.002
EB-1*	6/17/2008	--	0.024	<0.01	<0.001	<0.001	<0.001	<0.002
Trip Blank (w)*	6/2/2008	--	--	<0.01	<0.001	<0.001	<0.001	<0.002
Trip Blank (m)*	6/2/2008	--	--	<0.5	<0.005	<0.005	<0.005	<0.02
Trip Blank*	6/17/2008	--	--	<0.01	<0.001	<0.001	<0.001	<0.002
ADEC Method II Soil Cleanup Levels**			**300**	**250**	**0.02**	**5.4**	**5.5**	**78**

Abbreviations and Methods:

DRO = Diesel range organics by Alaska Series Method AK102
GRO = Gasoline range organics by Alaska Series Method AK101
BTEX = Benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8021B
ft bgs = Feet below ground surface
mg/kg = Milligrams per kilogram
<x = Constituent not detected above x milligrams per kilogram
ND = Not detected above laboratory limits
-- = Not analyzed / applicable
(d) = Duplicate sample
(m) = Methanol trip blank
(w) = Water trip blank
ADEC = Alaska Department of Environmental Conservation
EPA = Environmental Protection Agency
* = Concentrations in milligrams per liter
** = Levels established in ADEC Method II - Soil Cleanup Levels, Tables B1 and B2, Under 40-Inch Zone, Migration to Groundwater (ADEC, 18 AAC 75.341)

I:\Denver\Alaska Diamond Projects\9-2609 Portage, AK\Reports\SSI (June 2008)\[9-2609 Soil Table 7-2008 - Draft.xls]Soil

ATTACHMENT A

Soil Boring Logs

Conestoga-Rovers & Associates
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BORING/ WELL LOG

CLIENT NAME	Chevron EMC	**BORING/WELL NAME**	CB-1
JOB/SITE NAME	9-2609	**DRILLING STARTED**	02-Jun-08
LOCATION	Mile 79 Seward Highway, Portage, Alaska	**DRILLING COMPLETED**	02-Jun-08
PROJECT NUMBER	620911	**WELL DEVELOPMENT DATE (YIELD)**	NA
DRILLER	Discovery Drilling- Dick B	**GROUND SURFACE ELEVATION**	NA
DRILLING METHOD	Hollow-stem auger	**TOP OF CASING ELEVATION**	NA
BORING DIAMETER	8-inch	**SCREENED INTERVALS**	NA
LOGGED BY	Siobhan Fackelman	**DEPTH TO WATER (First Encountered)**	11.0 fbg (02-Jun-08) ▽
REVIEWED BY	John Riggi P.G. 7262	**DEPTH TO WATER (Static)**	NA ▼
REMARKS	Manually cleared to 1 ft after GPR survey. Borings were continuously logged to 7 ft bgs.		

PID (ppm)	BLOW COUNTS	SAMPLE ID	EXTENT	DEPTH (fbg)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH (fbg)	WELL DIAGRAM
					GW		**Well-graded GRAVEL with sand:** Olive grey; moist; 65% gravel: medium to coarse, subrounded; 35% sand: fine to coarse; high permeability.		Sand Pack
	9			5				5.0	
	12				SW		**Well-graded SAND with silt:** Olive grey; moist; 80% sand: fine to coarse; 20% silt; moderate permeability; odor; ~8-10 ft wood and organic material.		
1047	10	CB-1- 7.0						7.0	Bentonite Chips
	10								
	2			10					
	2						**SILT with clay:** Dark grey; wet; 90% silt; 10% clay; moderate plasticity; stong odor; sheen and staining. ▽		
	2				ML				
762	1							12.0	Bottom of Boring @ 12 fbg

WELL LOG (PID) DENVER C:\DOCUME~1\WERNER\DESKTOP\9-2609 GINT 6.2.08.GPJ DEFAULT.GDT 9/23/08

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Denver, CO 80211
Telephone: 303-433-3650
Fax: 303-433-3974

BORING/ WELL LOG

CLIENT NAME	Chevron EMC	**BORING/WELL NAME**	CB-2
JOB/SITE NAME	9-2609	**DRILLING STARTED**	02-Jun-08
LOCATION	Mile 79 Seward Highway, Portage, Alaska	**DRILLING COMPLETED**	02-Jun-08
PROJECT NUMBER	620911	**WELL DEVELOPMENT DATE (YIELD)**	NA
DRILLER	Discovery Drilling- Dick B	**GROUND SURFACE ELEVATION**	NA
DRILLING METHOD	Hollow-stem auger	**TOP OF CASING ELEVATION**	NA
BORING DIAMETER	8-inch	**SCREENED INTERVALS**	NA
LOGGED BY	Siobhan Fackelman	**DEPTH TO WATER (First Encountered)**	11.0 fbg (02-Jun-08) ▽
REVIEWED BY	John Riggi P.G. 7262	**DEPTH TO WATER (Static)**	NA ▼
REMARKS	Manually cleared to 1 ft after GPR survey. Borings were continuously logged to 7 ft bgs.		

PID (ppm)	BLOW COUNTS	SAMPLE ID	EXTENT	DEPTH (fbg)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH (fbg)	WELL DIAGRAM
					GW		**Well-graded GRAVEL with sand:** Olive grey; moist; 65% gravel: medium to coarse, subrounded; 35% sand: fine to coarse; high permeability.		Sand Pack
	20 15 23 17			5	SW		**Well-graded SAND with silt and gravel:** Olive grey; moist; 75% sand: fine to coarse; 15% gravel: medium to coarse, subrounded; 10% by volume cobbles up to 5 inches; 10% silt; moderate permeability.	5.0 7.0	Bentonite Chips
429	1 2 3 4	CB-2- 10.0		10	ML		**SILT with sand:** Dark grey; wet; 80% silt; 20% sand: fine to medium; moderate plasticity; sheen and staining. ▽	12.0	Bottom of Boring @ 12 fbg

WELL LOG (PID) DENVER C:\DOCUME~1\WERNER\DESKTOP\9-2609 GINT 6.2.08.GPJ DEFAULT.GDT 9/23/08

Conestoga-Rovers & Associates
2828 North Speer Boulevard, Suite 140
Denver, CO 80211
Telephone: 303-433-3650
Fax: 303-433-3974

BORING/ WELL LOG

CLIENT NAME	Chevron EMC	**BORING/WELL NAME**	CB-3
JOB/SITE NAME	9-2609	**DRILLING STARTED**	02-Jun-08
LOCATION	Mile 79 Seward Highway, Portage, Alaska	**DRILLING COMPLETED**	02-Jun-08
PROJECT NUMBER	620911	**WELL DEVELOPMENT DATE (YIELD)**	NA
DRILLER	Discovery Drilling- Dick B	**GROUND SURFACE ELEVATION**	NA
DRILLING METHOD	Hollow-stem auger	**TOP OF CASING ELEVATION**	NA
BORING DIAMETER	8-inch	**SCREENED INTERVALS**	NA
LOGGED BY	Siobhan Fackelman	**DEPTH TO WATER (First Encountered)**	9.0 fbg (02-Jun-08) ▽
REVIEWED BY	John Riggi P.G. 7262	**DEPTH TO WATER (Static)**	NA ▼
REMARKS	Manually cleared to 1 ft after GPR survey. Borings were continuously logged to 11 ft bgs.		

PID (ppm)	BLOW COUNTS	SAMPLE ID	EXTENT	DEPTH (fbg)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH (fbg)	WELL DIAGRAM
					GW		**Well-graded GRAVEL with sand:** Olive grey; moist; 65% gravel: medium to coarse, subrounded; 35% sand: fine to coarse; high permeability.	5.0	Sand Pack
18.2	12 10 10			5	SW		**Well-graded SAND with silt:** Olive grey; moist; 80% sand: fine to coarse; 20% silt; moderate permeability.	7.0	Bentonite Chips
105	11 11 12 11 11	CB-3- 7.0		10	SW		**Well-graded SAND with silt:** Dark grey; moist; 80% sand: fine to coarse; 20% silt; moderate permeability; odor, sheen, and staining. ▽	11.0	Bottom of Boring @ 11 fbg

WELL LOG (PID) DENVER C:\DOCUME~1\MWERNER\DESKTOP\9-2609 GINT 6.2.08.GPJ DEFAULT.GDT 9/23/08

Conestoga-Rovers & Associates
2828 North Speer Boulevard, Suite 140
Denver, CO 80211
Telephone: 303-433-3650
Fax: 303-433-3974

BORING/ WELL LOG

CLIENT NAME	Chevron EMC	**BORING/WELL NAME**	CB-4
JOB/SITE NAME	9-2609	**DRILLING STARTED**	02-Jun-08
LOCATION	Mile 79 Seward Highway, Portage, Alaska	**DRILLING COMPLETED**	02-Jun-08
PROJECT NUMBER	620911	**WELL DEVELOPMENT DATE (YIELD)**	NA
DRILLER	Discovery Drilling- Dick B	**GROUND SURFACE ELEVATION**	NA
DRILLING METHOD	Hollow-stem auger	**TOP OF CASING ELEVATION**	NA
BORING DIAMETER	8-inch	**SCREENED INTERVALS**	NA
LOGGED BY	Siobhan Fackelman	**DEPTH TO WATER (First Encountered)**	6.0 fbg (02-Jun-08)
REVIEWED BY	John Riggi P.G. 7262	**DEPTH TO WATER (Static)**	NA
REMARKS	Manually cleared to 1 ft after GPR survey. Borings were continuously logged to 6 ft bgs.		

PID (ppm)	BLOW COUNTS	SAMPLE ID	EXTENT	DEPTH (fbg)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH (fbg)
					GW		**Well-graded GRAVEL with sand**:Olive grey; moist; 65% gravel: medium to coarse, subrounded; 35% sand: fine to coarse; high permeability; low plasticity.	
	6			5				5.0
	8				SW		**Well-graded SAND with silt**:Olive grey; wet; 80% sand: fine to coarse; 20% silt; moderate permeability.	
	6							
17.1	5	CB-4- 7.0						7.0
							SILT with sand: Dark grey; wet; 80% silt; 20% sand; moderate plasticity; sheen and staining.	
				10	ML			11.0

WELL DIAGRAM: Sand Pack; Bentonite Chips; Bottom of Boring @ 11 fbg

WELL LOG (PID) DENVER C:\DOCUME~1\WERNER\DESKTOP\9-2609 GINT 6.2.08.GPJ DEFAULT.GDT 9/23/08

Conestoga-Rovers & Associates
2828 North Speer Boulevard, Suite 140
Denver, CO 80211
Telephone: 303-433-3650
Fax: 303-433-3974

BORING/ WELL LOG

CLIENT NAME	Chevron EMC	**BORING/WELL NAME**	CB-5
JOB/SITE NAME	9-2609	**DRILLING STARTED**	02-Jun-08
LOCATION	Mile 79 Seward Highway, Portage, Alaska	**DRILLING COMPLETED**	02-Jun-08
PROJECT NUMBER	620911	**WELL DEVELOPMENT DATE (YIELD)**	NA
DRILLER	Discovery Drilling- Dick B	**GROUND SURFACE ELEVATION**	NA
DRILLING METHOD	Hollow-stem auger	**TOP OF CASING ELEVATION**	NA
BORING DIAMETER	8-inch	**SCREENED INTERVALS**	NA
LOGGED BY	Siobhan Fackelman	**DEPTH TO WATER (First Encountered)**	7.0 fbg (02-Jun-08) ▽
REVIEWED BY	John Riggi P.G. 7262	**DEPTH TO WATER (Static)**	NA ▼
REMARKS	Manually cleared to 1 ft after GPR survey. Borings were continuously logged to 8 ft bgs.		

PID (ppm)	BLOW COUNTS	SAMPLE ID	EXTENT	DEPTH (fbg)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH (fbg)	WELL DIAGRAM
					GW		**Well-graded GRAVEL with sand:** Olive grey; moist; 65% gravel: medium to coarse, subrounded; 35% sand: fine to coarse; high permeability.		Sand Pack
	15			5				5.0	Bentonite Chips
1.7	16	CB-5- 6.5			SW		**Well-graded SAND:** Light brown; moist; fine to coarse; 20% by volume cobbles up to 4 inches; moderate permeability.		
								7.0 ▽	
					SW		**Well-graded SAND with gravel:** Dark grey; wet; 80% sand: fine to medium; 20% gravel: medium to coarse, subrounded; moderate permeability.	8.0	Bottom of Boring @ 8 fbg

WELL LOG (PID) DENVER C:\DOCUME~1\MWERNER\DESKTOP\9-2609 GINT 6.2.08.GPJ DEFAULT.GDT 9/23/08

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2828 North Speer Boulevard, Suite 140
Denver, CO 80211
Telephone: 303-433-3650
Fax: 303-433-3974

BORING/ WELL LOG

CLIENT NAME	Chevron EMC	**BORING/WELL NAME**	CB-6
JOB/SITE NAME	9-2609	**DRILLING STARTED**	17-Jun-08
LOCATION	Mile 79 Seward Highway, Portage, Alaska	**DRILLING COMPLETED**	17-Jun-08
PROJECT NUMBER	620911	**WELL DEVELOPMENT DATE (YIELD)**	NA
DRILLER	Discovery Drilling- Dick B	**GROUND SURFACE ELEVATION**	NA
DRILLING METHOD	Hollow-stem auger	**TOP OF CASING ELEVATION**	NA
BORING DIAMETER	8-inch	**SCREENED INTERVALS**	NA
LOGGED BY	Siobhan Fackelman	**DEPTH TO WATER (First Encountered)**	4.5 fbg (17-Jun-08) ▽
REVIEWED BY	John Riggi P.G. 7262	**DEPTH TO WATER (Static)**	NA ▼
REMARKS	Manually cleared to 1 ft after GPR survey. Borings were continuously logged to 5 ft bgs.		

PID (ppm)	BLOW COUNTS	SAMPLE ID	EXTENT	DEPTH (fbg)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH (fbg)	WELL DIAGRAM
					GW		**Well-graded GRAVEL with sand:** Olive grey; moist; 65% gravel: medium to coarse, subrounded; 35% sand: fine to coarse; high permeability.	2.0	Sand Pack
	5 4				SW		**Well-graded SAND with gravel:** Dark grey; wet; 80% sand: fine to coarse; 20% gravel: medium to coarse, subrounded; high permeability; sheen and staining; organic material.		Bentonite Chips
	4							4.0	
703	4	CB-6- 5.0		5	ML		**SILT with sand:** Dark grey; wet; 80% silt; 20% sand: fine to medium, subangular; moderate plasticity; sheen and staining, strong odor. ▽	5.0	Bottom of Boring @ 5 fbg

WELL LOG (PID) DENVER C:\DOCUME~1\MWERNER\DESKTOP\9-2609 GINT 6.2.08.GPJ DEFAULT.GDT 9/23/08

Conestoga-Rovers & Associates
2828 North Speer Boulevard, Suite 140
Denver, CO 80211
Telephone: 303-433-3650
Fax: 303-433-3974

BORING/ WELL LOG

CLIENT NAME	Chevron EMC	**BORING/WELL NAME**	MW-14
JOB/SITE NAME	9-2609	**DRILLING STARTED**	02-Jun-08
LOCATION	Mile 79 Seward Highway, Portage, Alaska	**DRILLING COMPLETED**	02-Jun-08
PROJECT NUMBER	620911	**WELL DEVELOPMENT DATE (YIELD)**	04-Jun-08 (18)
DRILLER	Discovery Drilling- Dick B	**GROUND SURFACE ELEVATION**	NA
DRILLING METHOD	Hollow-stem auger	**TOP OF CASING ELEVATION**	NA
BORING DIAMETER	8-inch	**SCREENED INTERVALS**	5 to 20 fbg
LOGGED BY	Siobhan Fackelman	**DEPTH TO WATER (First Encountered)**	NA
REVIEWED BY	John Riggi P.G. 7262	**DEPTH TO WATER (Static)**	NA

REMARKS Manually cleared to 1 ft after GPR survey. Borings were continuously logged to 18 ft bgs. Sediment wet at 18 ft bgs.

PID (ppm)	BLOW COUNTS	SAMPLE ID	EXTENT	DEPTH (fbg)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH (fbg)
	10						**Well-graded GRAVEL with sand**:Olive grey; moist; 65% gravel: medium to coarse, subrounded; 35% sand: fine to coarse; high permeability.	
	14							
	14							
	18							
10.9	15							
	10							
	15							
	17							
12.9	15				GW			
	21							
	24			5				
	25							
35.4	13							
	19							
	21							
	13							8.0
886	6	MW-13 R-7.5					**SILT with clay**: Dark grey; wet; 80% silt; 20% clay; moderate plasticity; sheen and staining; at ~9ft wood and organic material.	
	7							
	3							
	3							
542	2			10				
	2							
	2							
	3							
48.2	3							
	3				ML			
	2							
89.2	3							
	3			15				
	2							
	4							
	4							
	4							
	4							
75.9	5	MW-13 R-18.0						18.0
				20				

WELL DIAGRAM: Flush-grade well box; Concrete; Sand Pack; Bentonite Chips; Sand Pack; 2-diam., 0.020 Slotted Schedule 40 PVC; Bottom of Boring @ 20 fbg

WELL LOG (PID) DENVER C:\DOCUME~1\MWERNER\DESKTOP\9-2609 GINT 6.2.08.GPJ DEFAULT.GDT 9/23/08

ATTACHMENT B

Standard Operating Procedures for Soil Borings

CONESTOGA-ROVERS
& ASSOCIATES

STANDARD FIELD PROCEDURES FOR SOIL BORINGS

This document describes Conestoga-Rovers & Associates' standard field methods for drilling and sampling soil borings. These procedures are designed to comply with Federal, State and local regulatory guidelines. Specific field procedures are summarized below.

Objectives

Soil samples are collected to characterize subsurface lithology, assess whether the soils exhibit obvious hydrocarbon or other compound vapor odor or staining, estimate groundwater depth and quality and to submit samples for chemical analysis.

Soil Classification/Logging

All soil samples are classified according to the Unified Soil Classification System by a trained geologist or engineer working under the supervision of an Alaska Qualified Person (AQP). The following soil properties are noted for each soil sample:

- Principal and secondary grain size category (i.e. sand, silt, clay or gravel),
- Approximate percentage of each grain size category,
- Color,
- Approximate water or product saturation percentage,
- Observed odor and/or discoloration,
- Other significant observations (i.e. cementation, presence of marker horizons, mineralogy), and
- Estimated permeability.

Soil Boring and Sampling

Soil borings are typically drilled using hollow-stem augers or hydraulic push technologies. Prior to drilling, the first 8 ft of the boring are cleared using an air or water knife and vacuum extraction. This minimizes the potential for impacting utilities.

At least one and one half feet of the soil column is collected for every five ft of drilled depth. Additional soil samples are collected near the water table and at lithologic changes. Samples are collected using lined split-barrel or equivalent samplers driven into undisturbed sediments beyond the bottom of the borehole. The vertical location of each soil sample is determined by measuring the distance from the middle of the soil sample tube to the end of the drive rod used to advance the split barrel sampler. All sample depths use the ground surface immediately adjacent to the boring as a datum. The horizontal location of each boring is measured in the field from an onsite permanent reference using a measuring wheel or tape measure.

Drilling and sampling equipment is decontaminated per Alaska Department of Environmental Conservation regulations prior to drilling and between borings to prevent cross-contamination. Sampling equipment is washed between samples with trisodium phosphate or an equivalent EPA-approved detergent.

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& ASSOCIATES

Sample Storage, Handling and Transport

Single use plastic sterile-scoops are used to transfer approximately 20 to 40 grams of soil sample from the split-spoon sampler to 4 oz. amber glass jars with Teflon lined screw cap lids containing methanol preservative such that the entire vial of methanol covers the matrix. Soil samples are labeled and stored at or below 4°C on either crushed or dry ice, depending upon local regulations. Samples are transported under chain-of-custody to a State-certified analytic laboratory.

Field Screening

The some of the remaining soil from the split-spoon sampler is collected in a plastic bag and set aside to allow hydrocarbons to volatilize from the soil. After ten to fifteen minutes, a portable photoionization detector (PID) measures volatile hydrocarbon vapor concentrations in the bag headspace, extracting the vapor through a slit in the bag. PID measurements are used along with the field observations, odors, stratigraphy and groundwater depth to select soil samples for analysis.

Water Sampling

Water samples, if they are collected from the boring, are collected from the open borehole using bailers. The groundwater samples are decanted into the appropriate containers supplied by the analytic laboratory. Samples are labeled, placed in protective foam sleeves, stored on crushed ice at or below 4°C, and transported under chain-of-custody to the laboratory.

Duplicates and Blanks

Blind duplicate water samples are collected at a rate of one blind sample for every 10 soil samples. Laboratory-supplied trip blanks accompany samples collected for all sampling programs to check for cross-contamination caused by sample handling and transport. These trip blanks are analyzed if the internal laboratory QA/QC blanks contain the suspected field contaminants. An equipment blank may also be analyzed if non-dedicated sampling equipment is used.

10/7/08

F:\TEMPLATE\SOPs\Hand Auger Borings.doc

ATTACHMENT C

Department of Natural Resources Water Well Log

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF MINING, LAND & WATER
WATER WELL LOG

Drilling Started: 6 / 2 / 2008, Completed: 6 / 2 / 2008

City/Borough:	Subdivision:	BLOCK	LOT	Property Owner Name & Address:
				Robert Hall Mile 79 Seward Highway, Portage, Alaska

Meridian Seward Township 8N Range 3W Section 5, ____ 1/4 of ____ 1/4 of ____ 1/4 of ____ 1/4

BOREHOLE DATA: (from ground surface) Material: Type, Color & wetness	Depth From	Depth To
Well-graded GRAVEL with sand; olive	0 ft	8 ft
SILT with clay; dark grey; wet	8 ft	20 ft
MW-14		

Drilling method: ☐ Air rotary, ☐ Cable tool ☒ Other Hollow-stem
Well use: ☐ Public supply, ☐ Domestic, ☒ Other Environmental

Depth of hole: 20 ft, Casing stickup: ____ ft
Casing type: PVC Thickness ____ inches
Casing diameter: 2 inches Casing depth 20 ft
Liner type: ____ Diameter: ____ inches Depth: ____ ft
Note:

Static water (from top of casing): 8 ft on 6 / 18 / 2008
Pumping level & yield: ____ feet after ____ hours at ____ gpm
Recovery rate: ____ gpm, Method of testing: ____
Development method: Purge and surge Duration: ____

Well intake opening type: ☐ Open end ☐ Open hole, Other ☐
☒ Screened; Start: 5 ft, Stopped 20 ft
Screen type: 0.020 Slot/mesh size ____
☐ Perforated; Start: ____ ft, Stopped ____ ft
Start: ____ ft, Stopped ____ ft
Gravel packed ☐ Yes ☒ No From 3 ft to 20 ft
Note: #10/20 Sand Pack

Grout type: Bentonite Volume ____
Depth; from 2 ft, to 3 ft

Pump intake depth: ____ ft
Pump size ____ hp Brand name ____

Was well disinfected upon completion? ☐ Yes ☐ No
Method of disinfection:

Driller comments/ disclaimers: Well installation

Well driller name: Dick Banzhof
Company name: Discovery Drilling
Mailing address: 11341 Olive Lane
City: Anchorage State: AK Zip 99501
Phone number: (907) 344 - 6431

Drillers signature:
Date: ____/____/____

Alaska state law requires that a copy of this well log be forwarded to the Department of Natural Resources within 45 days (AK statutes 38.05.020, 38.05.035, 41.08.020, 46.15.020 and AK regulations 11 AAC 93.140). Faxes are acceptable.

Alaska DNR, Division of Mining, Land and Water,
550 W 7th Avenue, Suite 1020
Anchorage, AK 99501-3562

Phone (907)269-8639 and fax (907)269-8947

If the well is within city limits, the City of Anchorage requires that a copy of this well log be forwarded to the city within 60 days and another copy of this log be forwarded to the owner of the property, on which the well is located, within 30 days.

City Permit Number: ____
Date of Issue: ____/____/____

Parcel Identification Number: ____-____-____

Is well located at approved permit location? Yes ☐ or No ☐

ATTACHMENT D

Standard Operating Procedures for Monitoring Well Installation

CONESTOGA-ROVERS
& ASSOCIATES

STANDARD FIELD PROCEDURES FOR MONITORING WELL INSTALLATION

This document presents standard field methods for drilling and sampling soil borings and installing, developing and sampling groundwater monitoring wells. These procedures are designed to comply with Federal, State and local regulatory guidelines. Specific field procedures are summarized below.

DRILLING AND SAMPLING

Objectives

Soil samples are collected to characterize subsurface lithology, assess whether the soils exhibit obvious hydrocarbon or other compound vapor or staining, and to collect samples for analysis at a State-certified laboratory. All borings are logged using the Unified Soil Classification System by a trained geologist working under the supervision of an ADEC Qualified Person.

Soil Boring and Sampling

Soil borings are typically drilled using hollow-stem augers or direct-push technologies such as the Geoprobe®. Prior to drilling, the first 8 feet (ft) of the boring are cleared using an air or water knife and vacuum extraction. This minimizes the potential for impacting utilities.

Soil samples are collected at least every 5 ft to characterize the subsurface sediments and for possible chemical analysis. Additional soil samples are collected near the water table and at lithologic changes. Samples are collected using lined split-barrel or equivalent samplers driven into undisturbed sediments at the bottom of the borehole.

Drilling and sampling equipment is decontaminated per Alaska Department of Environmental Conservation regulations prior to drilling and between borings to prevent cross-contamination. Sampling equipment is washed between samples with trisodium phosphate or an equivalent EPA-approved detergent.

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& ASSOCIATES

Sample Analysis

Single use plastic sterile-scoops are used to transfer approximately 20 to 40 grams of soil sample from the hand-auger bucket to 4 oz. amber glass jars with Teflon lined screw cap lids containing methanol preservative such that the entire vial of methanol covers the matrix. Soil samples are labeled and stored at or below 4°C on either crushed or dry ice, depending upon local regulations. Samples are transported under chain-of-custody to a State-certified analytic laboratory.

Field Screening

One of the remaining tubes is partially emptied leaving about one-third of the soil in the tube. The tube is capped with plastic end caps and set aside to allow hydrocarbons to volatilize from the soil. After ten to fifteen minutes, a portable volatile vapor analyzer measures volatile hydrocarbon vapor concentrations in the tube headspace, extracting the vapor through a slit in the cap. Volatile vapor analyzer measurements are used along with the field observations, odors, stratigraphy and groundwater depth to select soil samples for analysis.

Water Sampling

Water samples, if they are collected from the boring, are either collected using a driven Hydropunch® type sampler or are collected from the open borehole using bailers. The groundwater samples are decanted into the appropriate containers supplied by the analytic laboratory. Samples are labeled, placed in protective foam sleeves, stored on crushed ice at or below 4°C, and transported under chain-of-custody to the laboratory. Laboratory-supplied trip blanks accompany the samples and are analyzed to check for cross-contamination. An equipment blank may be analyzed if non-dedicated sampling equipment is used.

MONITORING WELL INSTALLATION, DEVELOPMENT AND SAMPLING

Well Construction and Surveying

Groundwater monitoring wells are installed to monitor groundwater quality and determine the groundwater elevation, flow direction and gradient. Well depths and screen lengths are based on groundwater depth, occurrence of hydrocarbons or other compounds in the borehole, stratigraphy and State and local regulatory guidelines. Well screens typically extend 10 to 15 fee below and 5 feet above the static water level at the time of drilling. However, the well screen will generally not extend into or through a clay layer that is at least three feet thick.

CONESTOGA-ROVERS
& ASSOCIATES

Well casing and screen are flush-threaded, Schedule 40 PVC. Screen slot size varies according to the sediments screened, but slots are generally 0.010 or 0.020 inches wide. Rinsed and graded sand occupies the annular space between the boring and the well screen to about one to two feet above the well screen. A two feet thick hydrated bentonite seal separates the sand from the overlying sanitary surface seal composed of Portland type I,II cement.

Well-heads are secured by locking well-caps inside traffic-rated vaults finished flush with the ground surface. A stovepipe may be installed between the well-head and the vault cap for additional security.

The well top-of-casing elevation is surveyed with respect to mean sea level and the well is surveyed for horizontal location with respect to an onsite or nearby offsite landmark.

Well Development

Wells are generally developed using a combination of groundwater surging and extraction. Surging agitates the groundwater and dislodges fine sediments from the sand pack. After about ten minutes of surging, groundwater is extracted from the well using bailing, pumping and/or reverse air-lifting through an eductor pipe to remove the sediments from the well. Surging and extraction continue until at least ten well-casing volumes of groundwater are extracted and the sediment volume in the groundwater is negligible. This process usually occurs prior to installing the sanitary surface seal to ensure sand pack stabilization. If development occurs after surface seal installation, then development occurs 24 to 72 hours after seal installation to ensure that the Portland cement has set up correctly.

All equipment is steam-cleaned prior to use and air used for air-lifting is filtered to prevent oil entrained in the compressed air from entering the well. Wells that are developed using air-lift evacuation are not sampled until at least 24 hours after they are developed.

Groundwater Sampling

Depending on local regulatory guidelines, three to four well-casing volumes of groundwater are purged prior to sampling. Purging continues until groundwater pH, conductivity, and temperature have stabilized. Groundwater samples are collected using bailers or pumps and are decanted into the appropriate containers supplied by the analytic laboratory. Samples are labeled, placed in protective foam sleeves, stored on crushed ice at or below 4°C, and transported under chain-of-custody to the laboratory. Laboratory-supplied trip blanks accompany the samples and are analyzed to check for cross-contamination. An equipment blank may be analyzed if non-dedicated sampling equipment is used.

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& ASSOCIATES

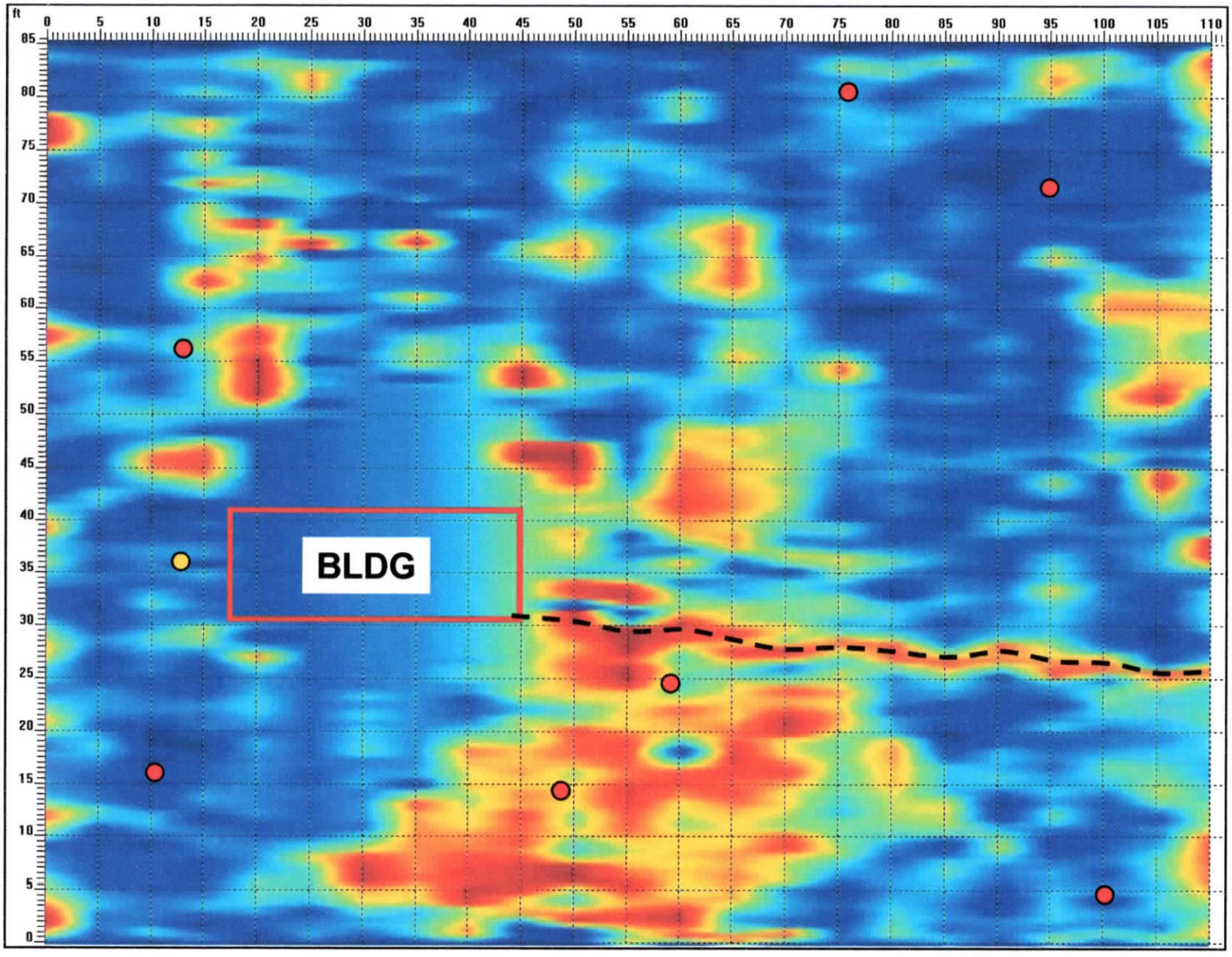
Waste Handling and Disposal

Soil cuttings from drilling activities are usually stockpiled onsite and covered by plastic sheeting. At least three individual soil samples are collected from the stockpiles and composited at the analytic laboratory. The composite sample is analyzed for the same constituents analyzed in the borehole samples in addition to any analytes required by the receiving disposal facility. Soil cuttings are transported by licensed waste haulers and disposed in secure, licensed facilities based on the composite analytic results.

Groundwater removed during development and sampling is typically stored onsite in sealed 55-gallon drums. Each drum is labeled with the drum number, date of generation, suspected contents, generator identification and consultant contact. Upon receipt of analytic results, the water is either pumped out using a vacuum truck for transport to a licensed waste treatment/disposal facility or the individual drums are picked up and transported to the waste facility where the drum contents are removed and appropriately disposed.

ATTACHMENT E

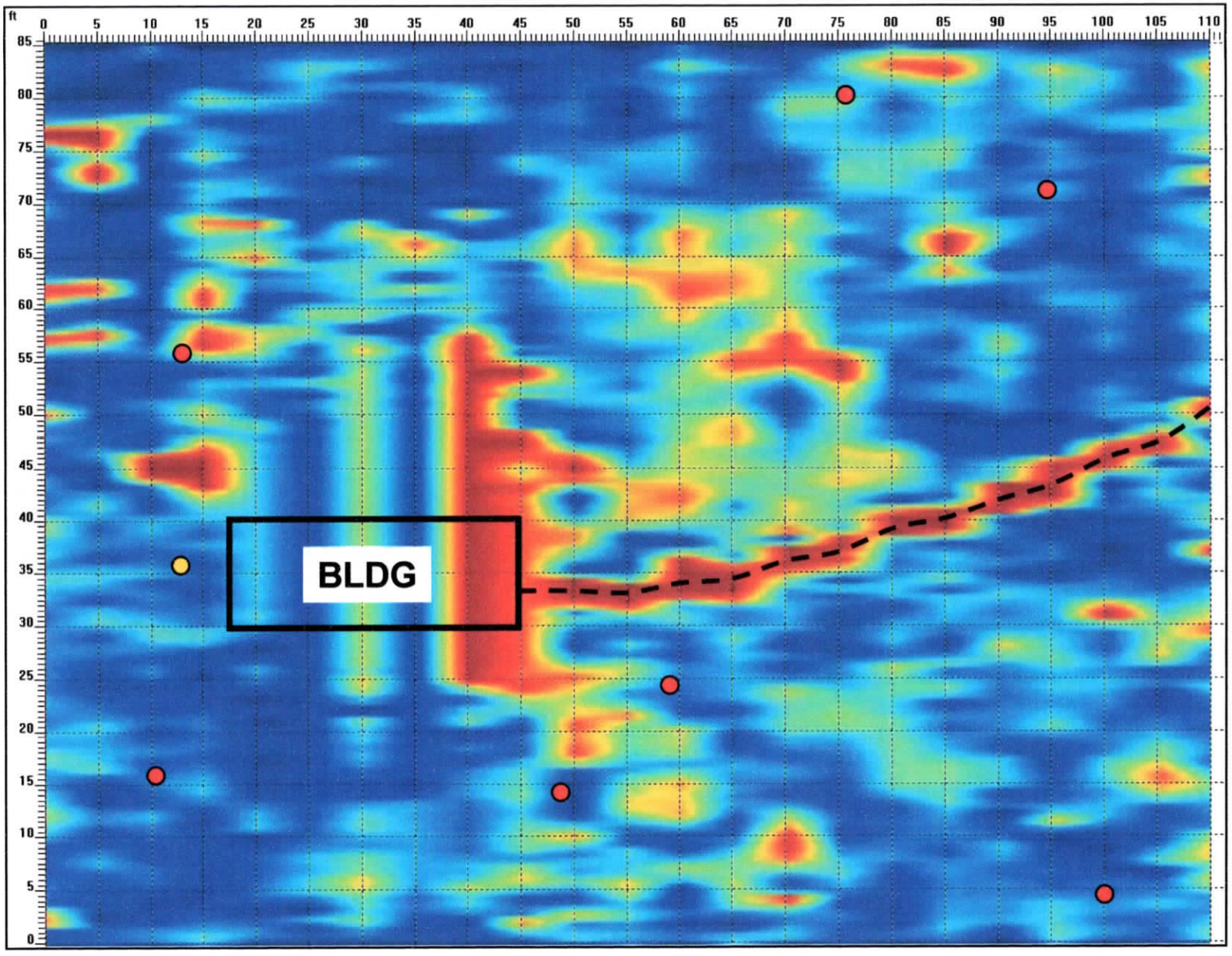
Ground Penetrating Radar Site Plans



GeoTek Alaska, Inc.

2.051 ft. to 2.461 ft.

Proposed Drilling Location
Monitoring Well Location



GeoTek Alaska, Inc.

3.281 ft. to 3.691 ft.

Proposed Drilling Location
Monitoring Well Location

ATTACHMENT F

Well Development Forms

CONESTOGA-ROVERS & ASSOCIATES

WELL DEVELOPMENT FORM

Project Name: 9-2609	CRA Mgr: Riggi	Well ID: MW-13R
Project Number: 620911	Date: 6/4/08	Well Yield: ———
Site Address: mile 79 Seward Hwy Girdwood, AK	Development Method: bailer	Well Diameter: 2"
		Technician(s): EP/SL
Initial Depth to Water: 6.92	Total Well Depth: 17.30	Water Column Height: 10.38
Volume/ft: 0.16	1 Casing Volume: 1.66	10 Casing Volumes: 16.6
Purging Device: bailer	Did Well Dewater?: NO	Total Gallons Purged: ~18.0

1 Casing Volume = Water column height x Volume/ ft.

Well Diam.	Volume/ft (gallons)
2"	0.16
4"	0.65
6"	1.47

Time	Activity	Water Depth	Gallons Purged	Comments
1114				* DTW taken post purge
1115	Surge	—	—	
1124	Purge	9.81	~4.5	grey silt
1132	SURGE	—	—	
1142	Purge	9.24	~4.5	
1154	SURGE	—	—	
1204	purge	9.16	~4.5	
1217	SURGE	—	—	
1228	Purge	—	~4.5	
		DTB: 18.25		
		DTW: 12.33		

ATTACHMENT G

Standard Operating Procedures for Well Development

CONESTOGA-ROVERS
& ASSOCIATES

STANDARD FIELD PROCEDURES FOR MONITORING WELL DEVELOPMENT

This document presents standard field methods for developing groundwater monitoring wells. These procedures are designed to comply with Federal, State and local regulatory guidelines. Specific field procedures are summarized below.

MONITORING WELL DEVELOPMENT

Objectives

Monitoring well development objectives include removal of sediments that may have accumulated in the water column during drilling operations, stabilize the filter pack and formation materials opposite the well screen, and ensure the well produces water free of suspended solids. All development activities are conducted by a trained geologist working under the supervision of an Alaska Qualified Personnel in accordance with *18 Alaska Administrative Code (AAC) 75, Article 3 and 18 AAC 78, Article 2, 6, and 9*. Monitoring wells are developed no less than 24 hours post-installation as to allow the well seals and grout to set.

Well Development

Wells are developed using a combination of groundwater surging and purging. Surging includes the entire submerged portion of the screened interval with the use of surge blocks, bailers, or other equipment that frequently and repeatedly reverses the flow of water through the well screen. It is important that surging activities be started slowly and be increased in vigor as to free the fine particles from the sand pack, allowing them to be drawn into the water column, settling the coarser particles around the well screen and enhancing contact with the aquifer.

Purging is accomplished with the use of a bailer, submersible pump, or other equipment that adequately extracts groundwater from the water column. Development consists of a cycle of surging for several minutes followed by several minutes of purging to remove the fine sediments collecting in the well. This cycle is repeated for a minimum of 30 minutes. Purging continues until 10 well volumes of groundwater are removed or the extracted groundwater is free of suspended solids.

In the event the well is purged dry, an alternate development method is used. Following purging the well dry, one well casing volume of potable water is added to the well. The well is then surged vigorously for 10 minutes and purged dry again to complete the process. Additional water may be added to the well as necessary to properly develop the well, but should only be done as a

CONESTOGA-ROVERS
& ASSOCIATES

last resort. If the well does recover, continued development should occur only with formation water.

Groundwater Sampling

Following completion of well development activities, groundwater samples are collected for characterization using disposable bailers or the effluent portion of the pumping apparatus and decanted into the appropriate containers supplied by the analytical laboratory. Samples are labeled, placed in protective foam sleeves, stored on ice or other approved artificial cooling substance at $4^{\circ} \pm 2\ ^{\circ}C$, and transported under chain-of-custody to the laboratory. Laboratory-supplied trip blanks accompany the samples per matrix, analysis, and cooler and are analyzed to check for cross-contamination. A duplicate sample is collected and submitted per matrix, analysis, and 10 project samples for quality assurance purposes. An equipment blank will be submitted for analysis if non-dedicated sampling equipment is used.

Waste Handling and Disposal

Groundwater removed during development is typically stored onsite in sealed 55-gallon steel drums. Each drum is labeled with the drum number, date of generation, suspected contents, generator identification, and consultant contact. Upon receipt of analytical results, the water is either pumped out using a vacuum truck for transport or the individual drums are picked up and transported by licensed waste haulers to a licensed waste treatment/disposal facility where the drum contents are removed and appropriately disposed.

ATTACHMENT H

Lancaster Laboratory Analytical Report

ATTACHMENT I

ADEC Laboratory Data Review Checklist

CONESTOGA-ROVERS & ASSOCIATES

2055 Niagara Falls Blvd., Suite #3
Niagara Falls, New York 14304
Telephone: (716) 297-6150 Fax: (716) 297-2265
www.CRAworld.com

MEMORANDUM

TO: ADEC

REF. NO.: 620911

FROM: Susan Scrocchi

DATE: September 29, 2008

CC: John Riggi

Send via E-Mail and U.S. Mail

RE: QA/QC Review
ChevronTexaco Site # 9-2609
Job #AKA60
June 2008

INTRODUCTION

Soil samples were submitted to Lancaster Laboratory, located in Lancaster, Pennsylvania. Samples were analyzed for the methods requested on the Chain of Custody.

A Type III data package was received from the laboratory. The final results and supporting quality assurance/quality control (QA/QC) data were reviewed. Evaluation of the data was based on information obtained from the Chain of Custody forms, finished report forms, blank data, and spike recoveries.

QA/QC REVIEW

All samples were prepared and/or analyzed within the required holding times. All samples were properly preserved and maintained at 4°C (±2°C).

All samples and blanks were spiked with surrogate compounds prior to sample preparation and/or analysis in accordance with the organic methods. All surrogate spike recoveries met the associated method criteria indicating adequate analytical efficiency with some exceptions. Due to necessary sample dilutions, some of the BTEX and GRO recoveries were below the acceptable criteria. Usability or reliability of the data would not have been impacted based on necessary dilutions. All associated data was judged to be acceptable.

Method blanks were prepared and analyzed with the samples for all parameters. All blank results were non-detect for the analytes of interest.

Laboratory control samples (LCS) were analyzed for all parameters in duplicate. All recoveries were within required control limits showing adequate analytical accuracy and precision.

A matrix spike/matrix spike duplicate (MS/MSD) was prepared and analyzed for DRO using sample MW-13R-10.0. The recoveries could not be assessed due to the sample concentration being significantly greater than the added spike amount. Analytical accuracy and precision was judged to be acceptable based on the LCS/LCSD recoveries.

Trip blanks were collected and analyzed with the investigative samples for volatiles. All trip blank results were non-detect for the compounds of interest. An equipment blank was submitted for all parameters and all results were non-detect indicating that no compounds of interest were introduced to the samples during collection, storage and/or analytical procedures.

A field duplicated was collected and submitted blind to the laboratory. The sample ID was CB-1-7.0 and its duplicate was DUP-1. A comparison of the results showed good analytical and sampling precision.

CONCLUSION

Based on the QA/QC review, the data submitted were judged to be acceptable for use without qualification.

CONESTOGA-ROVERS & ASSOCIATES

2055 Niagara Falls Blvd., Suite #3
Niagara Falls, New York 14304
Telephone: (716) 297-6150 Fax: (716) 297-2265
www.CRAworld.com

MEMORANDUM

TO: ADEC

REF. NO.: 620911

FROM: Susan Scrocchi

DATE: September 29, 2008

CC: John Riggi

Send via E-Mail and U.S. Mail

RE: **QA/QC Review**
ChevronTexaco Site # 9-2609
Job #AKA66
June 2008

INTRODUCTION

Soil and groundwater samples were submitted to Lancaster Laboratory, located in Lancaster, Pennsylvania. Samples were analyzed for the methods requested on the Chain of Custody.

A Type III data package was received from the laboratory. The final results and supporting quality assurance/quality control (QA/QC) data were reviewed. Evaluation of the data was based on information obtained from the Chain of Custody forms, finished report forms, blank data, and spike recoveries.

QA/QC REVIEW

All samples were prepared and/or analyzed within the required holding times. All water samples were properly preserved and maintained at 4°C (±2°C). Soil samples were received at elevated temperatures (9.8°C - 12.5°C). All sample results were judged to be acceptable.

All samples and blanks were spiked with surrogate compounds prior to sample preparation and/or analysis in accordance with the organic methods. All surrogate spike recoveries met the associated method criteria indicating adequate analytical efficiency with some exceptions. Due to necessary sample dilutions, some of the soil BTEX and GRO recoveries were below the acceptable criteria. Usability or reliability of the data would not have been impacted based on necessary dilutions. All associated data was judged to be acceptable.

Method blanks were prepared and analyzed with the samples for all parameters. All blank results were non-detect for the analytes of interest.

Laboratory control samples (LCS) were analyzed for all parameters in duplicate. All recoveries were within required control limits showing adequate analytical accuracy and precision with the exception of the TPH-D recoveries. The acceptable range is 75 - 125% and the observed recoveries were 70% and 69%. The samples were re-extracted with similar results. The original analyses were reported. The DRO results should be considered estimated based on the implied low bias.

Matrix spikes were not performed on the samples collected during this event.

Trip blanks were collected and analyzed with the investigative samples for volatiles. All trip blank results were non-detect for the compounds of interest. An equipment blank was submitted for all parameters and all results were non-detect with the exception of DRO present at 0.024mg/L. Sample MW-7 had a DRO concentration of 0.045mg/L. Based on the sample result being similar to the blank result, the sample should be considered non-detect for DRO at a limit of 0.045mg/L.

A field duplicated was collected and submitted blind to the laboratory. The sample ID was CB-6-5.0 and its duplicate was DUP-1. A comparison of the results showed good analytical and sampling precision.

CONCLUSION

Based on the QA/QC review, the data submitted were judged to be acceptable for use with the qualifications noted.

Laboratory Data Review Checklist

Completed by:	Susan Scrocchi
Title:	Project Chemist
Date:	September 28, 2008
CS Report Name:	Subsurface Investigation and Well Installation Report
Report Date:	July 02, 2008
Consultant Firm:	Conestoga-Rovers & Associates, Inc.
Laboratory Name:	Lancaster Laboratory
Laboratory Report Number:	SDG #AKA60
ADEC File Number:	2110.38.007
ADEC RecKey Number:	1994210103801

1. Laboratory

   a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

   (•) Yes ( ) No Comments:

   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 Comments:

   NA

2. Chain of Custody (COC)

   a. COC information completed, signed, and dated (including released/received by)?

   (•) Yes ( ) No Comments:

b. Correct analyses requested?

(•) Yes ( ) No Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?

(•) Yes ( ) No Comments:

b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

(•) Yes ( ) No Comments:

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

(•) Yes ( ) No Comments:

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

( ) Yes ( ) No Comments:

NA

e. Data quality or usability affected? Explain.

Comments:

No

4. Case Narrative

a. Present and understandable?

(•) Yes ( ) No Comments:

b. Discrepancies, errors or QC failures identified by the lab?

(•) Yes ( ) No Comments:

c. Were all corrective actions documented?

(•) Yes ( ) No Comments:

d. What is the effect on data quality/usability according to the case narrative?

Comments:

Due to matrix interferences, the presence and/or concentration of some benzene results could not be determined.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

(•) Yes ( ) No Comments:

b. All applicable holding times met?

(•) Yes ( ) No Comments:

c. All soils reported on a dry weight basis?

(•) Yes ( ) No Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

( ) Yes (•) No Comments:

Some benzene PQLs were elevated due to interferences.

e. Data quality or usability affected? Explain.

Comments:

The presence and/or concentration of benzene could not be determined for some samples.

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

(•) Yes ( ) No Comments:

ii. All method blank results less than PQL?

(•) Yes ( ) No Comments:

iii. If above PQL, what samples are affected?

Comments:

NA

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

( ) Yes ( ) No Comments:

NA

v. Data quality or usability affected? Explain.

Comments:

NA

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

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

(•) Yes ( ) No Comments:

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

( ) Yes ( ) No Comments:

NA

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

(•) Yes ( ) No Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

(•) Yes ( ) No Comments:

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

Comments:

NA

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

( ) Yes ( ) No Comments:

NA

vii. Data quality or usability affected? Explain.

Comments:

NA

c. Surrogates – Organics Only

i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?

(•) Yes ( ) No Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

( ) Yes (•) No Comments:

Soil samples required dilutions for BTEX and TPH-G resulting in low surrogate recoveries.

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

○ Yes ◉ No Comments:

iv. Data quality or usability affected? Explain.

Comments:

Results judged to be acceptable. Outlyers were due dilutions not analytical problems.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and cooler?

◉ Yes ○ No Comments:

ii. All results less than PQL?

◉ Yes ○ No Comments:

iii. If above PQL, what samples are affected?

Comments:

NA

iv. Data quality or usability affected? Explain.

Comments:

NA

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

◉ Yes ○ No Comments:

ii. Submitted blind to lab?

◉ Yes ○ No Comments:

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil)

$$RPD\ (\%) = \text{Absolute value of: } \frac{(R_1-R_2)}{((R_1+R_2)/2)} \times 100$$

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

(•) Yes ( ) No Comments:

iv. Data quality or usability affected? Explain.

Comments:

NA

f. Decontamination or Equipment Blank (if applicable)

(•) Yes ( ) No ( ) Not Applicable

i. All results less than PQL?

(•) Yes ( ) No Comments:

ii. If above PQL, what samples are affected?

Comments:

NA

iii. Data quality or usability affected? Explain.

Comments:

NA

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

a. Defined and appropriate?

( ) Yes ( ) No Comments:

NA

Laboratory Data Review Checklist

Completed by:	Susan Scrocchi
Title:	Project Chemist
Date:	September 28, 2008
CS Report Name:	Subsurface Investigation and Well Installation Report
Report Date:	July 14, 2008
Consultant Firm:	Conestoga-Rovers & Associates, Inc.
Laboratory Name:	Lancaster Laboratory
Laboratory Report Number:	SDG #AKA66
ADEC File Number:	2110.38.007
ADEC RecKey Number:	1994210103801

1. Laboratory

   a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

   (•) Yes ( ) No Comments:

   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 Comments:

   NA

2. Chain of Custody (COC)

   a. COC information completed, signed, and dated (including released/received by)?

   (•) Yes ( ) No Comments:

b. Correct analyses requested?

◉ Yes ○ No Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?

○ Yes ◉ No Comments:

The soil samples and equipment blank were received at 9.8-12.5 deg C.

b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

◉ Yes ○ No Comments:

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

◉ Yes ○ No Comments:

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

○ Yes ○ No Comments:

NA

e. Data quality or usability affected? Explain.

Comments:

No

4. Case Narrative

a. Present and understandable?

◉ Yes ○ No Comments:

b. Discrepancies, errors or QC failures identified by the lab?

◉ Yes ○ No Comments:

c. Were all corrective actions documented?

(•) Yes ( ) No Comments:

d. What is the effect on data quality/usability according to the case narrative?

Comments:

Due to matrix interferences, the presence and/or concentration of some benzene results could not be determined.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

(•) Yes ( ) No Comments:

b. All applicable holding times met?

(•) Yes ( ) No Comments:

c. All soils reported on a dry weight basis?

(•) Yes ( ) No Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

( ) Yes (•) No Comments:

Some benzene PQLs were elevated due to interferences.

e. Data quality or usability affected? Explain.

Comments:

The presence and/or concentration of benzene could not be determined for some samples.

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

(•) Yes ( ) No Comments:

ii. All method blank results less than PQL?

(•) Yes ( ) No Comments:

iii. If above PQL, what samples are affected?

Comments:

NA

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

( ) Yes ( ) No Comments:

NA

v. Data quality or usability affected? Explain.

Comments:

NA

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

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

(•) Yes ( ) No Comments:

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

( ) Yes ( ) No Comments:

NA

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

○ Yes ◉ No Comments:

TPH-D LCS/LCSD recoveries were low (70 and 69%).

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

◉ Yes ○ No Comments:

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

Comments:

NA

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

◉ Yes ○ No Comments:

vii. Data quality or usability affected? Explain.

Comments:

Associated sample results may be biased low for TPH-D.

c. Surrogates – Organics Only

i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?

◉ Yes ○ No Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

○ Yes ◉ No Comments:

Soil samples required dilutions for BTEX and TPH-G resulting in low surrogate recoveries.

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

○ Yes ◉ No Comments:

iv. Data quality or usability affected? Explain.

Comments:

Results judged to be acceptable. Outlyers were due dilutions not analytical problems.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and cooler?

◉ Yes ○ No Comments:

ii. All results less than PQL?

◉ Yes ○ No Comments:

iii. If above PQL, what samples are affected?

Comments:

NA

iv. Data quality or usability affected? Explain.

Comments:

NA

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

◉ Yes ○ No Comments:

ii. Submitted blind to lab?

◉ Yes ○ No Comments:

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil)

RPD (%) = Absolute value of: $\frac{(R_1-R_2)}{((R_1+R_2)/2)} \times 100$

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

(•) Yes ( ) No Comments:

iv. Data quality or usability affected? Explain.

Comments:

NA

f. Decontamination or Equipment Blank (if applicable)

(•) Yes ( ) No ( ) Not Applicable

i. All results less than PQL?

( ) Yes (•) No Comments:

TPH-D observed at 0.024 mg/L (PQL = 0.023mg/L)

ii. If above PQL, what samples are affected?

Comments:

TPH-D result for sample MW-7 was 0.045mg/L. All other TPH-D results were signifacantly greater than the blank result.

iii. Data quality or usability affected? Explain.

Comments:

the TPH-D result for MW-7 may be a false positive.

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

a. Defined and appropriate?

( ) Yes ( ) No Comments:

NA

2110.38.007

Laboratory Data Review Checklist

Completed by:	Susan Scrocchi
Title:	Project Chemist
Date:	September 28, 2008
CS Report Name:	Subsurface Investigation and Well Installation Report
Report Date:	July 02, 2008
Consultant Firm:	Conestoga-Rovers & Associates, Inc.
Laboratory Name:	Lancaster Laboratory
Laboratory Report Number:	SDG #AKA60
ADEC File Number:	2110.38.007
ADEC RecKey Number:	1994210103801

1. Laboratory

   a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

   (•) Yes ( ) No Comments:

   Lancaster Labs

   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 Comments:

   NA

2. Chain of Custody (COC)

   a. COC information completed, signed, and dated (including released/received by)?

   (•) Yes ( ) No Comments:

b. Correct analyses requested?

(•) Yes ( ) No Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?

(•) Yes ( ) No Comments:

b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

(•) Yes ( ) No Comments:

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

(•) Yes ( ) No Comments:

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

( ) Yes ( ) No Comments:

NA

e. Data quality or usability affected? Explain.

Comments:

No

4. Case Narrative

a. Present and understandable?

(•) Yes ( ) No Comments:

b. Discrepancies, errors or QC failures identified by the lab?

(•) Yes ( ) No Comments:

c. Were all corrective actions documented?

(•) Yes ( ) No Comments:

d. What is the effect on data quality/usability according to the case narrative?

Comments:

Due to matrix interferences, the presence and/or concentration of some benzene results could not be determined. + DRO

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

(•) Yes ( ) No Comments:

b. All applicable holding times met?

(•) Yes ( ) No Comments:

Re-extracted DRO outside holding time

c. All soils reported on a dry weight basis?

(•) Yes ( ) No Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

( ) Yes (•) No Comments:

Some benzene PQLs were elevated due to interferences. + DRO outside QC limits

e. Data quality or usability affected? Explain.

Comments:

The presence and/or concentration of benzene could not be determined for some samples.

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

(•) Yes ( ) No Comments:

ii. All method blank results less than PQL?

(•) Yes ( ) No Comments:

iii. If above PQL, what samples are affected?

Comments:

NA

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

( ) Yes ( ) No Comments:

NA

v. Data quality or usability affected? Explain.

Comments:

~~NA~~ NO

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

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

(•) Yes ( ) No Comments:

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

( ) Yes ( ) No Comments:

NA

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

(•) Yes ( ) No Comments:

DRO

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

(•) Yes ( ) No Comments:

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

Comments:

NA DRO

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

( ) Yes ( ) No Comments:

NA

vii. Data quality or usability affected? Explain.

Comments:

NA DRO

c. Surrogates – Organics Only

i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?

(•) Yes ( ) No Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

( ) Yes (•) No Comments:

Soil samples required dilutions for BTEX and TPH-G resulting in low surrogate recoveries.

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

○ Yes ● No Comments:

iv. Data ~~quality or usability~~ affected? Explain.

Comments:

Did it meet cleanup level

~~Results judged to be acceptable.~~ ~~Outlyers~~ were due dilutions not analytical problems.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and cooler?

● Yes ○ No Comments:

ii. All results less than PQL?

● Yes ○ No Comments:

iii. If above PQL, what samples are affected?

Comments:

NA

iv. Data quality or usability affected? Explain.

Comments:

~~NA~~ NO

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

● Yes ○ No Comments:

ii. Submitted blind to lab?

● Yes ○ No Comments:

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil)

RPD (%) = Absolute value of: $\frac{(R_1-R_2)}{((R_1+R_2)/2)} \times 100$

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

(•) Yes ( ) No Comments:

iv. Data quality or usability affected? Explain.

Comments:

NA ND

f. Decontamination or Equipment Blank (if applicable)

( ) Yes ( ) No (•) Not Applicable

i. All results less than PQL?

( ) Yes ( ) No Comments:

NA

ii. If above PQL, what samples are affected?

Comments:

NA

iii. Data quality or usability affected? Explain.

Comments:

NA ND

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

a. Defined and appropriate?

( ) Yes ( ) No Comments:

NA

Checked by Robert Weimer - AOEC
1/21/09

2110.38.007

Laboratory Data Review Checklist

Completed by:	Susan Scrocchi
Title:	Project Chemist
Date:	September 28, 2008
CS Report Name:	Subsurface Investigation and Well Installation Report
Report Date:	July 14, 2008
Consultant Firm:	Conestoga-Rovers & Associates, Inc.
Laboratory Name:	Lancaster Laboratory
Laboratory Report Number:	SDG #AKA66
ADEC File Number:	2110.38.007
ADEC RecKey Number:	1994210103801

1. Laboratory

   a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

   (•) Yes ( ) No Comments:

   Lancaster Labs

   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 Comments:

   NA

2. Chain of Custody (COC)

   a. COC information completed, signed, and dated (including released/received by)?

   (•) Yes ( ) No Comments:

b. Correct analyses requested?

(•) Yes ( ) No Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?

( ) Yes (•) No Comments:

The soil samples and equipment blank were received at 9.8-12.5 deg C. Cooler #2

b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

(•) Yes ( ) No Comments:

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

(•) Yes ( ) No Comments:

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

( ) Yes ( ) No Comments:

~~NA~~ 3 Broken Vials EB-1, MW-2, ED-1

e. Data quality or usability affected? Explain.

Comments:

~~No~~ Yes, Temp. over limits in Cooler #2

4. Case Narrative

a. Present and understandable?

(•) Yes ( ) No Comments:

b. Discrepancies, errors or QC failures identified by the lab?

(•) Yes ( ) No Comments:

c. Were all corrective actions documented?

(•) Yes ( ) No Comments:

d. What is the effect on data quality/usability according to the case narrative?

Comments:

Due to matrix interferences, the presence and/or concentration of some benzene results could not be determined.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

(•) Yes ( ) No Comments:

b. All applicable holding times met?

(•) Yes ( ) No Comments:

c. All soils reported on a dry weight basis?

(•) Yes ( ) No Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

( ) Yes (•) No Comments:

Some benzene PQLs were elevated due to interferences.

e. Data quality or usability affected? Explain.

Comments:

The presence and/or concentration of benzene could not be determined for some samples.

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

(•) Yes ( ) No Comments:

ii. All method blank results less than PQL?

(•) Yes ( ) No Comments:

iii. If above PQL, what samples are affected?

Comments:

NA

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

( ) Yes ( ) No Comments:

NA

v. Data quality or usability affected? Explain.

Comments:

NA No

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

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

(•) Yes ( ) No Comments:

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

( ) Yes ( ) No Comments:

NA

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

○ Yes ◉ No Comments:

TPH-D LCS/LCSD recoveries were low (70 and 69%).

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

◉ Yes ○ No Comments:

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

Comments:

NA

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

◉ Yes ○ No Comments:

vii. Data quality or usability affected? Explain.

Comments:

Associated sample results may be biased low for TPH-D.

c. Surrogates – Organics Only

i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?

◉ Yes ○ No Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

○ Yes ◉ No Comments:

Soil samples required dilutions for BTEX and TPH-G resulting in low surrogate recoveries.

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

○ Yes ◉ No Comments:

iv. Data quality or usability affected? Explain.

Comments: Detection limit over cleanup levels

Results judged to be acceptable. Outlyers were due dilutions not analytical problems.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and cooler?

◉ Yes ○ No Comments:

ii. All results less than PQL?

◉ Yes ○ No Comments:

iii. If above PQL, what samples are affected?

Comments:

NA

iv. Data quality or usability affected? Explain.

Comments:

NA ND

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

◉ Yes ○ No Comments:

ii. Submitted blind to lab?

◉ Yes ○ No Comments:

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil)

RPD (%) = Absolute value of: $\frac{(R_1-R_2)}{((R_1+R_2)/2)} \times 100$

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

(•) Yes ( ) No Comments:

iv. Data quality or usability affected? Explain.

Comments:

NA ND

f. Decontamination or Equipment Blank (if applicable)

(•) Yes ( ) No ( ) Not Applicable

i. All results less than PQL?

( ) Yes (•) No Comments:

TPH-D observed at 0.024 mg/L (PQL = 0.023mg/L)

ii. If above PQL, what samples are affected?

Comments:

TPH-D result for sample MW-7 was 0.045mg/L. All other TPH-D results were signifacantly greater than the blank result.

iii. Data quality or usability affected? Explain.

Comments:

the TPH-D result for MW-7 may be a false positive.

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

a. Defined and appropriate?

(•) Yes ( ) No Comments:

NA

Checked by Robert Weimer - ADEC 1/21/09