ARCADIS
1100 Olive Way, Suite 800
Seattle
Washington 98101
Tel 206.726.4700
Fax 206.325.8218
www.arcadis.com

Mr. Robert Burgess
Alaska Department of Environmental Conservation
610 University Avenue
Fairbanks, Alaska 99709

ENVIRONMENT

Subject:
Fourth Quarter 2015 Remediation System Operations and Maintenance Report
Chevron Facility 306456
328 ½ Illinois Street
Fairbanks, Alaska
ADEC File Number: 102.38.004

Date:
February 4, 2016

Contact:
Greg Montgomery

Phone:
406.449.7001 (x20)

Email:
Greg.Montgomery@arcadis.com

Our ref:
B0045506.0034

Dear Mr.Burgess:

On behalf of Chevron Environmental Management Company (Chevron), ARCADIS U.S., Incorporated (ARCADIS) is submitting this Fourth Quarter 2015 Remediation System Operations and Maintenance (O&M) Report for the former Chevron facility 306456 located at 328 ½ Illinois Street, in Fairbanks, Alaska (the site). The site location and surrounding area are shown on **Figure 1**. Remediation equipment associated with the site consists of an air sparge (AS) and soil vapor extraction (SVE) system.

System installation activities were conducted in 2014 and 2015. A startup testing period was conducted for approximately 10 days in August 2015. These activities are described in the System Installation Report (ARCADIS 2015). Continuous system operation started on September 10, 2015; the system was shut down for winterization on November 10, 2015. This O&M report summarizes the monitoring activities of the AS/SVE system since continuous startup in September 2015, and presents the quarterly SVE effluent sampling results for the fourth quarter of 2015.

Site History

The 3.11-acre site is located at 328 ½ Illinois Street in Fairbanks, Alaska (**Figure 1**). Unocal used the western 1.84 acres of the site to store and dispense fuel between 1952 and 1982, and added the westernmost 1.27 acres to the lease in 1961. Former fuel facilities included two 55,000-gallon and nine 20,000-gallon aboveground storage tanks (ASTs), underground pipelines, pumping facilities, loading docks, and

fuel dispensing pumps located in the southern and south-central areas of the site. Diesel fuel and aviation gas were stored on site.

The Alaska Railroad Corporation (ARRC) leased the westernmost 1.27 acres of the site from 1941 to 1981. The entire site was leased by Interior Leasing from 1982 to 1989 and by CEM Leasing from 1989 to 2001. Petroleum Sales operated the facility from 1982 to 2001. According to the Subsurface Site Investigation – Phase II (GeoEngineers Inc. 2003), and Mr. Phil Tannehill, co-owner of Petroleum Sales, the ASTs were removed in 1993, and the piping and dispensing pumps were removed in 1997.

The site location and surrounding features are depicted on an aerial photograph included on **Figure 2**. Surrounding properties include the former Chevron Facility (#1001430) to the north, former Texaco Facility (#211815) to the northwest, and the Alaska Communication Systems Property to the west. Site features are presented on **Figure 2**.

Remediation System Background

As proposed in the Cleanup Plan (CAP) dated January 15, 2014, Alternative 2, an AS/SVE system was installed at the site to address onsite petroleum hydrocarbon related impacts to soil and groundwater stemming from historical site operations (ARCADIS 2014). Included as part of Alternative 2 were two limited surface soil excavations. Installation activities were split into two phases; Phase 1 was completed in 2014 and Phase 2 was completed in 2015. Phase 1 included utility clearance, borehole and trench clearance, drilling, temporary completion of 14 AS wells and one SVE well, two shallow excavations, and site surveying. Phase 2 included baseline groundwater sampling, permitting, vacuum clearance activities, removal and transport of AS/SVE system from Chevron Facility 92114, trenching and piping activities, well head completion, aboveground system installation, start-up and testing. Details of system installation activities will be submitted under a separate cover.

Existing monitoring wells, GEI-1, GEI-2, GEI-7, GEI-11, and GEI-12 were converted to SVE wells during system construction in 2015. These wells are constructed of 2-inch diameter schedule 40 polyvinyl chloride (PVC) and extend approximately 20-feet below ground surface (bgs), and screened from 10 to 20 feet bgs with 0.020-inch screen. One additional SVE well was installed, SVE-1, and was constructed of 4-inch diameter schedule 40 polyvinyl chloride (PVC) and installed to a depth of 17 feet bgs.

SVE-1 is screened from 7 to 17 feet bgs with 0.020 inch screen. Heat trace has been installed inside the conveyance piping from the treatment system down the length of the well. Heat trace was installed one foot below the maximum depth-to-water (DGW) measurement observed in the area based on historical data.

Fourteen AS wells (AS-1 to AS-14) were installed and constructed out of 2-inch diameter schedule 80 PVC, with 2-feet of 0.020-inch slot schedule 80 PVC above a 2-feet sump at the bottom of the well. Depths of AS wells ranged from approximately 28 to 31-feet bgs. Two to three AS wells were installed near each compliance well. The following lists the AS wells for each operating group:

- Group 1: AS-1, AS-2
- Group 2: AS-3, AS-4, AS-5
- Group 3: AS-6, AS-7, AS-8
- Group 4: AS-9, AS-10, AS-11
- Group 5: AS-12, AS-13, AS-14

Well locations, pipe layout and site details are shown on **Figure 3**. Based on mounding test results, system data indicated that the optimum operational period for sparging on individual wells is approximately one hour. Mounding test details will be submitted under a separate cover.

Methods

Work associated with this O&M report was conducted under the direction of a "qualified person" as defined in ADEC documentation 18 Alaska Administrative Code (AAC) 75.990 (100) and 18 AAC 78.995 (118). Scheduled O&M activities were conducted on a monthly basis during the reporting period. Once a quarter, soil vapor effluent samples were collected from the effluent stack using SUMMA™ canisters. SUMMA™ canister vacuum readings were recorded before and after sampling. Effluent vapor samples were collected during the fourth quarter on October 5, 2015The samples were submitted to Eurofins Lancaster Laboratories (Lancaster) of Lancaster, Pennsylvania for the following chemical analyses:

- GRO by Environmental Protection Agency (EPA) method 25 modified
- BTEX by EPA method 18 modified

To assess remediation system performance, the SVE effluent air flow rate was reported based on output from a flow indicator installed in the effluent header pipe; measurements are displayed on the human-machine interface (HMI) screen on the control panel (located in control room).

Organic vapor concentrations were measured at the effluent stack by a calibrated photoionization detector (PID) during monthly O&M field events for comparison with laboratory data.

GRO recovery rates were calculated based on the SVE system flow rate, the total operational time of the system, and the GRO concentrations detected in effluent samples submitted to Lancaster. If laboratory analysis did not detect concentrations above the laboratory detection limit in the sample, one half the laboratory detection limit was used in the calculation. Net GRO mass recovery is tracked to determine the cumulative mass of GRO removed from the subsurface since system startup.

Remediation System Operation and Performance Results

A startup testing period was conducted for approximately 10 days in August 2015. Results from this testing period are included in the installation report submitted under separate cover. Continuous system operation started on September 10, 2015; fourth quarter O&M visits were conducted to monitor the AS/SVE system on October 2 and November 10, 2015. The system was shut down for winterization on November 10, 2015.

Since the start of continuous operation, the system injection pressure averaged 4.8 pounds per square inch (psi), based on pressure recorded at the heat exchanger inlet. Flow rates in individual sparge wells ranged from 7.5 cubic feet per minute (cfm) to 13 cfm. Air sparge system operational data are summarized in **Tables 1** and **2** and O&M system operational data sheets and field notes are included in **Appendix A**.

During the September 10, 2015 site visit, the system was started for continuous operation; upon departure steady state had not been reached, therefore most pressure and flow rate readings were not recorded. Pressure readings were inconsistent at manifold arms; on a number of occasions no pressure was registered. Based on field observation it appears pressure gauges on the manifold will need repair or replacement; this issue will be addressed prior to startup in spring 2016.

Pressures at the wellheads could not be recorded during site visits from September to November 2015 due to site conditions, either due to lack of daylight or inaccessibility due to the presence of snow.

On October 2, 2015, the system was off on arrival due to a SVE variable frequency drive (VFD) fault. The system was inspected and the VFD was adjusted to clear the alarm and restart the system. The alarm condition was thought to be the result of a potential power surge. The system was found off on November 10, 2015 due to water accumulation in the moisture separator. The water was transferred to waste water drums and treated on-site with granulated activated carbon prior to disposal to ground surface. The system was restarted briefly to collected readings prior to winter shutdown. During this site visit, hairline cracks were observed on SVE legs, GEI-1, GEI-2, GEI-11, and SVE-1. The manifold valve at GEI-7 had been closed upon departure of the October 2, 2015 visit due to water accumulation in the line. Prior to system startup in the spring 2016, these cracks will be repaired. The AS/SVE system was operational for 80% of the reporting period. The total number of hours of operation since continuous system startup on September 10, 2015 is 1,157 hours.

Each arm of the SVE manifold is equipped with vacuum gauge, Dwyer® Flow Sensor (with magnehelic gauge), and sample port. During each site visit, readings are recorded from this instrumentation. PID, lower explosion limit (LEL), and oxygen measurements are taken from the sample port using portable vacuum pump and RKI Eagle multi-gas meter. Field staff cycle through each AS group, and vapor readings are collected from each arm of the manifold. Data sheets from site visits are included in **Appendix G.** Vacuum at the wellheads could not be recorded during site visits from September to November 2015 due to site conditions, either due to lack of daylight or inaccessibility due to the presence of snow.

Table 3 presents readings collected from the SVE manifold; vapor gas readings reported in this table were taken when the AS group in the vicinity was operating unless otherwise noted. The table below summarizes the range of vacuum and PID readings from each SVE well during continuous operation. With the exception of readings collected in September 2015, the values reported were taken when the AS group in the vicinity of the SVE well was operating.

SVE Well ID	PID readings (ppmv)	Manifold Vacuum (in w.c.)	Flow (scfm)
GEI-2	204 to 622	11 to 16	Insufficient data
GEI-11	168 to 452	10 to 17	11.41 to 27.50
SVE-1	331 to 448	9 to 16	Insufficient data
GEI-7	170 to 430	Insufficient data	Insufficient data
GEI-1	523 to 1,1116	11 to 16	25.54 to 27.68

During the October site visit, GEI-7 was shut down upon departure due to water accumulation. It appears the vacuum gauge on the arm of this well was not registering; this may be due to water accumulation within the gauge. Flow rates could not be determined at GEI-7 since due to accumulated water and manifold issues. Gauges on the arm of GEI-7 will be repaired or replaced (as needed) prior to system restart in spring 2016.

For wells GEI-2 and SVE-1, magnehelic gauges did not register consistently due to water accumulation, so data collection was inconsistent. The reason for water accumulation in these manifold arms will be investigated during startup in spring 2016.

As mentioned above, during the November 10, 2015 hairline cracks were observed on all operating SVE legs; at the time of the visit, these wells were GEI-1, GEI-2, GEI-11, and SVE-1. Prior to system startup in the spring 2016, these cracks will be repaired.

SVE Effluent Analytical Results

The effluent air samples collected with SUMMA™ canisters from the SVE effluent stack on October 5, 2015, were submitted for laboratory analysis. Sample collection was after the October 2, 2015 O&M site visit since SUMMA™ canisters were not available due to airline delays. The concentration of GRO from laboratory analysis was 670 parts per million by volume (ppmv) in the effluent sample collected while AS Group 3 was operating. The concentrations of benzene, toluene, and total xylenes were 9 ppmv, 13 ppmv, and 7 ppmv respectively. Ethylene was not detected above the laboratory detection limit of 0.8 ppmv.

SVE effluent analytical results and PID readings are summarized in **Table 4**. SVE effluent PID readings to date are shown on **Figure 4**. System data for SVE wells, including GRO removal rates are summarized in **Table 4**. O&M datasheets and field

notes documenting fourth quarter monitoring activities are included as **Appendix A**. Laboratory reports, chains-of-custody and ADEC data review checklists are included as **Appendix B**. An electronic copy of laboratory data packages is included with this report on the enclosed compact disc.

During continuous operation, the flow rate ranged from approximately 137 to 147 standard cubic feet per minute (scfm), and the average SVE effluent flow rate was 142 scfm. The system vacuum ranged from 22 to 35 inches of water column (in w.c.), with an average vacuum of 28 in w.c.

System flow rates and laboratory analytical effluent data were used to calculate mass removal rates and total mass removed. During continuous operation, the mass recovery rate ranged from approximately 29 to 52 pounds per day (lbs/day), and the average rate was approximately 40 lbs/day. The mass removed during this period was approximately 1,429 pounds (lbs); cumulative mass removed since system startup, including system testing in August 2015, was approximately 1,830 lbs. Cumulative GRO mass removal and mass removal rate is illustrated on **Figure 5**.

Laboratory Data Quality Assurance Summary

As required by ADEC (Technical Memorandum, March, 2009), ARCADIS completed laboratory data review checklists for the Eurofins laboratory reports from the fourth quarter 2015 O&M event. The following quality assurance (QA) summary describes six parameters, related to the quality and usability of the data presented in this report.

1. Precision - Based on the laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) relative percent differences, the data meet precision objectives.

2. Accuracy - The data meet accuracy objectives as indicated by the laboratory quality control samples, which were within method/laboratory limits.

3. Representativeness - The data appear to be representative of site conditions and are generally consistent with expected effluent results.

4. Comparability – Results are comparable to previous laboratory methods, reported units, and analytical results.

5. Completeness - The results appear to be valid and usable, and thus, the laboratory results have 100% completeness.

6. Sensitivity - The sensitivity of the analyses was adequate for the samples.

Summary and Conclusions

In 2014 and 2015 system installation activities were conducted at the site as described in 2014 CAP (ARCADIS 2014). A startup testing period was conducted for approximately 10 days in August 2015, and results from this period are described in the System Installation Report that will be submitted under separate cover. Continuous system operation started on September 10, 2015; the system was shut down for winterization on November 10, 2015.

System flow rates and laboratory analytical effluent data were used to calculate mass removal rates and total mass removed. During continuous operation, the mass recovery rate average rate was approximately 40 lbs/day. The mass removed during this period was approximately 1,429 lbs; cumulative mass removed since system startup, was approximately 1,830 lbs.

The AS/SVE system was operational for approximately 80% of the planned operational period since continuous startup on September 2015 The system was shutdown for the winter on November 10, 2015. Prior to system startup in the spring 2016, the system will be inspected and any repairs will be made. The system was successful at removing mass from the subsurface and ARCADIS recommends restarting the system in the spring.

If you have any questions or require additional information, please contact Greg Montgomery at 406.449.7001 (x20).

Sincerely,

ARCADIS

Arti Patel
AFS Task Leader 6

Greg Montgomery
Senior Scientist

Copies:
Mr. Dan Carrier, Chevron EMC, Brea, California
Mr.Russell Grandel, ARRC, Anchorage, Alaska
Mr. Mervin Gilbertson, Big State Logistics, Fairbanks, Alaska

References

GeoEngineers Inc. 2003. Subsurface Site Investigation – Phase II. Former Unocal Bulk Plant 306456. October 31.

ARCADIS. 2014. Cleanup Plan, Former Unocal #306456, Fairbanks, Alaska. January 15.

ARCADIS. 2015 DRAFT System Installation Report. Former Unocal Bulk Plant 306456. December 31.

Attachments:

Tables:
Table 1 – Air Sparge Header Data
Table 2 – Air Sparge Well Data
Table 3 – Soil Vapor Extraction Manifold Data
Table 4 – Air Sparge/Soil Vapor Extraction Analytical Data and Mass Recovery

Figures:
Figure 1 – Site Location Map
Figure 2 – Site Map
Figure 3 – Treatment Area Layout
Figure 4 – Effluent GRO and BTEX Concentrations
Figure 5 – GRO Mass Removal

Appendix:
Appendix A – O&M Datasheets and Field Notes
Appendix B – Laboratory Analytical Report, Chain-of-Custody and Data Checklist

Tables

TABLE 1 Air Sparge Header Data
Former Chevron Facility 306456
328 1/2 Illinois Street Fairbanks, AK

Date and Time	Notes	Compressor Hour Meter (hours)	System Differential Pressure (in w.c.)[1]	System Flow Rate (scfm)[1]	Heat Exchanger Inlet Temperature (°F)	Heat Exchanger Outlet Temperature (°F)	Compressor Discharge Pressure - before heat exchanger (psi)	Compressor Discharge Pressure - after heat exchanger (psi)
8/15/2015 7:00		33	NR	NC	175.00	82.00	5.5	10.5
8/16/2015 12:50		53	NR	NC	15.00	77.00	0	3
8/17/15 2:20		71	0.40	26.0	81.00	0.00	NR	6.00
9/10/15 19:05	2	257	0.20	14.3	146.00	80.00	4.00	0.00
10/2/15 12:30		703	0.60	30.5	140.00	54.00	5.00	6.50
11/10/15 10:30		1414	NR	NR	125.00	36.00	5.50	5.00

Notes
in w.c. = inches of water column
scfm = standard cubic feet per minute
°F = degrees Fahrenheit
psi = pounds per square inch
NR = Not recorded
NC = not calculated
1. AS Flowrate calculated based on observed system differenential pressure. Formula listed below.

Any Gas

$$Q\ (SCFM) = 128.8 \times K \times D^2 \times \sqrt{\frac{P \times \Delta P}{(T + 460) \times S_s}}$$

Technical Notations

The following notations apply:

ΔP = Differential pressure expressed in inches of water column
Q = Flow expressed in GPM, SCFM, or PPH as shown in equation
K = Flow coefficient— See values tabulated on Pg. 3.
D = Inside diameter of line size expressed in inches.

P = Static Line pressure (psia)
T = Temperature in degrees Fahrenheit (plus 460 = °Rankine)
p = Density of medium in pounds per square foot
S_f = Sp Gr at flowing conditions
S_s = Sp Gr at 60°F (15.6°C)

2. No pressure register at gauge downstream of heat exchanger. Field personnel recommended replacement.

TABLE 2 Air Sparge Well Data
Former Chevron Facility 306456
328 1/2 Illinois Street Fairbanks, AK

		AS-01					AS-02				
		AS Valve Position	AS Pressure	Wellhead pressure	AS Flow	Comments	AS Valve Position	AS Pressure	Wellhead pressure	AS Flow	Comments
mm/dd/yy hh:mm	Notes	open/closed	psi	psi	cfm	Well Status	open/closed	psi	psi	cfm	Well Status
8/15/15 7:00		Open	2.00	5.00	14.50		Open	2.00	5.00	14.50	
8/17/15 2:20		Open	0.00	5.00	11.00		Open	0.00	5.00	16.00	
9/10/15 19:10	1,2,3	NR	NR	NR	NR		NR	NR	NR	NR	
10/2/15 12:30	3	Open	0.00	NR	13.00		Open	0.00	NR	13.00	
11/10/15 10:30	3	Open	1.70	NR	13.00		Open	1.50	NR	12.00	

Notes

NR = not recorded
1. System off upon arrival. Parameters not recorded since steady state not reached.
2. Pressure not registering on pressure gauges. Field techincian recommends replacing.

TABLE 2 Air Sparge Well Data
Former Chevron Facility 306456
328 1/2 Illinois Street Fairbanks, AK

		AS-03					AS-04					AS-05				
		AS Valve Position	AS Pressure	Wellhead pressure	AS Flow	Comments	AS Valve Position	AS Pressure	Wellhead pressure	AS Flow	Comments	AS Valve Position	AS Pressure	Wellhead pressure	AS Flow	Comments
mm/dd/yy hh:mm	Notes	open/closed	psi	psi	cfm	Well Status	open/closed	psi	psi	cfm	Well Status	open/closed	psi	psi	cfm	Well Status
8/15/15 7:00		Open	0.00	4.00	12.00		Open	0.00	4.00	12.00		Open	0.00	4.00	12.00	
8/17/15 2:20		Open	0.00	4.00	9.00		Open	0.00	5.00	8.50		Open	0.00	4.00	9.00	
9/10/15 19:10	1,2,3	NR	NR	NR	NR		NR	NR	NR	NR		NR	NR	NR	NR	
10/2/15 12:30	3	Open	0.00	NR	11.00		Open	0.00	NR	11.00		Open	0.00	NR	11.00	
11/10/15 10:30	3	Open	0.00	NR	10.50		Open	0.00	NR	11.00		Open	0.00	NR	10.00	

Notes

NR = not recorded
1. System off upon arrival. Paramet
2. Pressure not registering on press

TABLE 2 Air Sparge Well Data
Former Chevron Facility 306456
328 1/2 Illinois Street Fairbanks, AK

		AS-06					AS-07					AS-08				
		AS Valve Position	AS Pressure	Wellhead pressure	AS Flow	Comments	AS Valve Position	AS Pressure	Wellhead pressure	AS Flow	Comments	AS Valve Position	AS Pressure	Wellhead pressure	AS Flow	Comments
mm/dd/yy hh:mm	Notes	open/closed	psi	psi	cfm	Well Status	open/closed	psi	psi	cfm	Well Status	open/closed	psi	psi	cfm	Well Status
8/15/15 7:00		Open	1.50	3.00	13.00		Open	2.00	4.00	12.00		Open	3.50	4.00	12.00	
8/17/15 2:20		Open	0.00	6.00	8.50		Open	0.00	6.00	8.00		Open	1.20	6.00	9.50	
9/10/15 19:10	1,2,3	NR	NR	NR	NR		NR	NR	NR	NR		NR	NR	NR	NR	
10/2/15 12:30	3	Open	0.00	NR	10.00		Open	0.00	NR	10.00		Open	0.00	NR	10.00	
11/10/15 10:30	3	Open	2.00	NR	7.50		Open	2.00	NR	9.50		Open	4.00	NR	11.50	

Notes

NR = not recorded
1. System off upon arrival. Paramet
2. Pressure not registering on press

TABLE 2 Air Sparge Well Data
Former Chevron Facility 306456
328 1/2 Illinois Street Fairbanks, AK

		AS-09					AS-10					AS-11				
		AS Valve Position	AS Pressure	Wellhead pressure	AS Flow	Comments	AS Valve Position	AS Pressure	Wellhead pressure	AS Flow	Comments	AS Valve Position	AS Pressure	Wellhead pressure	AS Flow	Comments
mm/dd/yy hh:mm	Notes	open/closed	psi	psi	cfm	Well Status	open/closed	psi	psi	cfm	Well Status	open/closed	psi	psi	cfm	Well Status
8/15/15 7:00		Open	1.50	5.00	12.00		Open	0.00	4.00	12.00		Open	0.00	4.00	12.00	
8/17/15 2:20		Open	0.00	4.00	8.50		Open	0.00	4.00	9.00		Open	0.00	4.00	7.50	
9/10/15 19:10	1,2,3	NR	NR	NR	9.00		NR	NR	NR	9.00		NR	NR	NR	9.00	
10/2/15 12:30	3	Open	0.00	NR	10.00		Open	0.00	NR	10.00		Open	0.00	NR	12.00	
11/10/15 10:30	3	Open	3.00	NR	9.50		Open	2.00	NR	9.00		Open	2.00	NR	Broken	

Notes

NR = not recorded
1. System off upon arrival. Paramet
2. Pressure not registering on press

TABLE 2 Air Sparge Well Data
Former Chevron Facility 306456
328 1/2 Illinois Street Fairbanks, AK

		AS-12					AS-13					AS-14				
		AS Valve Position	AS Pressure	Wellhead pressure	AS Flow	Comments	AS Valve Position	AS Pressure	Wellhead pressure	AS Flow	Comments	AS Valve Position	AS Pressure	Wellhead pressure	AS Flow	Comments
mm/dd/yy hh:mm	Notes	open/closed	psi	psi	cfm	Well Status	open/closed	psi	psi	cfm	Well Status	open/closed	psi	psi	cfm	Well Status
8/15/15 7:00		Open	0.00	5.00	12.00		Open	0.00	5.00	12.00		Open	6.00	5.00	12.00	
8/17/15 2:20		Open	0.00	4.00	8.50		Open	0.00	4.00	8.50		Open	4.20	5.00	8.50	
9/10/15 19:10	1,2,3	NR	NR	NR	NR		NR	NR	NR	NR		NR	NR	NR	NR	
10/2/15 12:30	3	Open	0.00	NR	10.50		Open	0.00	NR	10.00		Open	0.00	NR	10.00	
11/10/15 10:30	3	Open	0.00	NR	11.00		Open	0.50	NR	9.50		Open	7.80	NR	9.50	

Notes

NR = not recorded
1. System off upon arrival. Paramet
2. Pressure not registering on press

TABLE 3 Soil Vapor Extraction Manifold Data
Former Chevron Facility 306456
328 ½ Illinois Street Fairbanks, Alaska

Date and Time	SVE well ID	Comments	SVE Valve Position	Wellhead Vacuum	Manifold Vacuum	Manifold Differential Pressure	SVE Flow (at manifold) - see note 1	AS Group in Operation	SVE Conc. (PID) - See Notes 2, 3	SVE Conc. (LEL) - See Notes 2, 3	Mass Removal Rate
mm/dd/yy hh:mm	SVE well ID	Well Status	% open	in H_2O	in H_2O	in H_2O	scfm		ppmv	%	lbs/day
8/15/15 7:00	GEI-2	Open	NR	18	26	1.4	59.65	2	856	5	16.29
8/15/15 7:00	GEI-11	Open	NR	14	19	0.4	32.18	1	602	5	6.18
8/15/15 7:00	SVE-1	Open	NR	4	22	1.6	64.11	4	792	12	16.20
8/15/15 7:00	GEI-7	Open	NR	21	20	0.75	44.01	5	476	13	6.68
8/15/15 7:00	GEI-1	Open	NR	14	21	0.9	48.14	3	816	25	12.53
8/16/15 12:50	GEI-2	Open	NR	16	26	1.1	52.88	2	NR	NR	NC
8/16/15 12:50	GEI-11	Open	NR	14	20	0.57	38.36	1	NR	NR	NC
8/16/15 12:50	SVE-1	Open	NR	6	21	1.7	66.17	4	NR	NR	NC
8/16/15 12:50	GEI-7	Open	NR	5	19	2.3	77.16	5	NR	NR	NC
8/16/15 12:50	GEI-1	Open	NR	17	22	1.1	53.15	3	NR	NR	NC
8/17/15 2:20	GEI-2	Open	NR	10	15	0.42	33.14	2	794	4	8.39
8/17/15 2:20	GEI-11	Open	NR	14	20	0.56	38.02	1	736	5	8.93
8/17/15 2:20	SVE-1	Open	NR	14	18	1.35	59.19	4	716	5	13.52
8/17/15 2:20	GEI-7	Open	NR	10	16	0.60	39.56	5	470	4	5.93
8/17/15 2:20	GEI-1	Open	NR	10	13	0.60	39.71	3	952	16	12.06
9/10/15 19:10	GEI-2	4, 5, Open	12	NR	11	0.20	22.99	4	622	2	4.56
9/10/15 19:10	GEI-11	4, 5, Open	35	NR	10	0.20	23.02	4	452	2	3.32
9/10/15 19:10	SVE-1	4, Open	25	NR	9	0.60	39.91	4	448	4	5.70
9/10/15 19:10	GEI-7	4, 5,6 , Open	6	NR	NR	NR	NC	4	430	1	NC
9/10/15 19:10	GEI-1	4, 5, Open	20	NR	11	0.25	25.70	4	1116	10	9.15
10/2/15 12:30	GEI-2	7, Open	12	NR	16	NR	NC	2	212	2	NC
10/2/15 12:30	GEI-11	Open	35	NR	16	0.29	27.50	1	451	5	3.96
10/2/15 12:30	SVE-1	7, Open	25	NR	16	NR	NC	4	355	5	NC
10/2/15 12:30	GEI-7	8, Closed	0	--	--	--	--	--	--	--	--
10/2/15 12:30	GEI-1	Open	20	NR	11	0.29	27.68	3	649	6	5.73
11/10/15 10:30	GEI-2	9, 10, Open	12	NR	14	0.10	16.19	2	204	1	NC
11/10/15 10:30	GEI-11	9, 10, Open	35	NR	17	0.05	11.41	1	168	1	0.61
11/10/15 10:30	SVE-1	7, 9, 10, Open	25	NR	16	NR	NC	4	331	1	NC
11/10/15 10:30	GEI-7	9, Open	6	NR	0	-- see note 5	NC	5	170	0	NC
11/10/15 10:30	GEI-1	9, 10, Open	20	NR	16	0.25	25.54	3	528	1	4.30

Notes
NR = Not recorded
NC = Not calculated.
-- = Not applicable
1. For each manifold arm, flowrate in calculated standard cubic feet per minute (SCFM) per applicable Dwyer Flow Sensor Calculations (Bulletin F-50). Based on pipe diamter K= 0.64.
Temperature at manifold is not record; for calculation assumed = 60oF since SVE piping is equipped with heat trace.

. Any Gas

$$Q\ (SCFM) = 128.8 \times K \times D^2 \times \sqrt{\frac{P \times \Delta P}{(T + 460) \times S_s}}$$

Technical Notations

The following notations apply:

ΔP = Differential pressure expressed in inches of water column
Q = Flow expressed in GPM, SCFM, or PPH as shown in equation
K = Flow coefficient— See values tabulated on Pg. 3.
D = Inside diameter of line size expressed in inches.

P = Static Line pressure (psia)
T = Temperature in degrees Fahrenheit (plus 460 = °Rankine)
p = Density of medium in pounds per square foot
S_f = Sp Gr at flowing conditions
S_s = Sp Gr at 60°F (15.6°C)

2. If possible, reading that is reported is when AS zone in the vicinity is operating. Readings from other wells can be found on field data sheets.
GEI-11 = AS Group 1 (AS-1, AS-2)
GEI-2 = AS Group 2 (AS-3, AS-4, AS-5)
GEI-1 = AS Group 3 (AS-6, AS-7, AS-8)
SVE-1 = AS Group 4 (AS-9, AS-10, AS-11)
GEI-7 = AS Group 5 (AS-12, AS-13, AS-14)
3. GRO Recovery (lb/day) = Effluent (ppmv) * (change hours (hr))* Flow (scfm) * 3.19E-4 (lb-day/ft^3/min)
4. Vaccuum at wellhead could not be measured due to site contraints (lack of daylight or snow).
5. Due to time constraints, vapor gas readings were collected only during operation of AS group 4.
6. Magnehelic and vacuum gauges on arm of GEI-7 did not appear to be registering; no measurement recorded.
7. Reading at magnehelic gauge not collected at because its full of water or not registering. For future site visits, additional flow rates measurements will be taken using a handheld anemometer.
8. GEI-7 manifold valve closed upon depature due to water accumulation.
9. System down on arrival; started up briefly to collect readings and shutdown upon departure for the winter.
10. Hairline crack observed on arms of all wells except GEI-7 downstream of gate valve. System was shutdown upon departure. Prior to system startup in the Spring 2016, these cracks will be repaired, or since the unit is

TABLE 4 Air Sparge/Soil Vapor Extraction Analytical Data and Mass Recovery
Former Chevron Facility 306456
328 ½ Illinois Street Fairbanks, Alaska

Date and Time Sampled	Hour Meter Reading	Hours of Operation During Period	Pre-Blower Vacuum	Flow Rate	Benzene[1]	Toluene[1]	Ethylbenzene[1]	Total Xylenes[1]	GRO[2]	Post-Blower Conc. (PID)	GRO Recovery Rate	Net GRO Removed	Cumulative GRO Recovery	Notes
		(hours)	in H_2O	(scfm)	(ppmv)	(ppmv)	(ppmv)	(ppmv)	(ppmv)	ppmv - see note 1	(lbs/day)	(lbs)	(lbs)	
8/15/2015 7:00	40	NC	33	--	--	--	--	--	--	796	--	NC	NC	1
8/16/2015 12:50	60	20.00	27.5	--	--	--	--	--	--	NR	--	NC	NC	1,2
8/17/15 14:20	75	15.00	47.50	142.67	15	32	2 J	16	1100	776	50.06	NC	NC	1
9/10/15 19:10	262	187.00	26.00	146.96	--	--	--	--	--	532	51.57	401.8	401.8	
10/2/15 12:30	708	446.00	22.00	140.95	9	13	<0.8	7	670	524	30.12	559.8	961.6	3
11/10/15 10:30	1419	711.00	35.00	137.21	--	--	--	--	--	374	29.33	868.8	1830.4	4

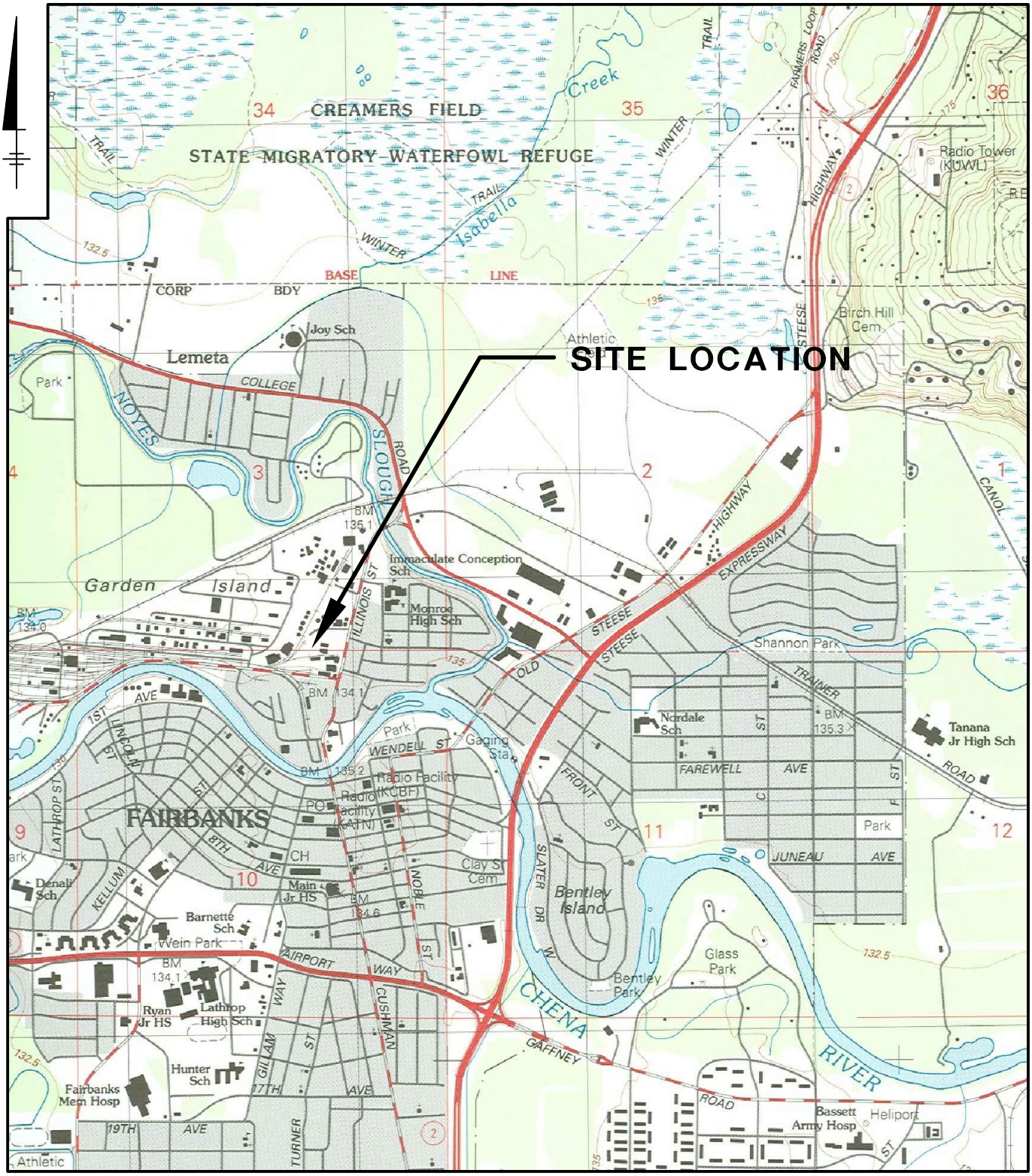
TABLE 4 EXPLANATIONS

REPORTING PERIOD: **9/10/15 - 11/10/15**
POUNDS REMOVED TO DATE: **1,830**
PERIOD POUNDS REMOVED: **1429**
PERIOD AVERAGE FLOW RATE (SCFM): **141.7**
PERIOD OPERATIONAL HOURS: **1157.0** **(from the start of continuous operation on 9/10/15)**
PERIOD PERCENT OPERATIONAL: **80%**

Assumptions:
a) One-half the detection limit is used for calculations when concentrations are less than the laboratory detection limits
b) GRO Recovery (lb) = Effluent (ppmv) * (change hours (hr))* Flow (scfm) * 1.33E-5 (lb-hr/ft^3/min)
c) Cumulative GRO Recovery = Sum of GRO Recovery
d) Molecular weight of GRO (hexane) is approximately 86 grams per mole (g/mol)

Notes:
NC = Not Calculated
-- = Not Available
[1] Analyzed by EPA method 18 modified.
[2] Analyzed by EPA method 25 modified.
1. System testing period. Continuous startup intitiated on September 10, 2015.
2.Brief system visit to check system is still operating and collecting readings from manifolds and control panels.
3. Due to airline delays, Summa cannisters were not available during October 2, 2015 site visit. Sampling was conducted on October 5, 2015.
4. All operating SVE legs at manifold have cracks at bushing just above valve (except GEI-7). Per field technician (M. MacDaniel) cracks are visible and leaks are audible. Prior to system startup in the Spring 2016, these cracks will be repaired, or since the unit is equipped with 10 SVE manifold arms, conveyance piping will be reconnected to undamaged arms not used during 2015.

Figures



SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE: FAIRBANKS (D-2) SE, AK., 1992, FAIRBANKS NORTH STAR BOROUGH, SECTION: 3, TOWNSHIP: 1S, RANGE: 1W

0 2000' 4000'

APPROXIMATE GRAPHIC SCALE

FORMER UNOCAL BULK TERMINAL 306456
328.5 ILLINOIS ST., FAIRBANKS, ALASKA
4Q2015 O&M REPORT

SITE LOCATION MAP

ARCADIS Design & Consultancy for natural and built assets

FIGURE 1

LEGEND

○ Unocal Monitoring Well (GEI) (K)

NOTES:

1. The coordinate system is a local grid. Elevations are State of Alaska TBM "X" NE bolt of fire hydrant on the south side of Phillips Field Road between Illinois Street and Driveway Street. Elevation is 446.59'.
2. Property boundary and well locations provided by "McLane Consulting, Inc.", Field Work Date October 9, 2014.

0 120' 240'

APPROXIMATE GRAPHIC SCALE

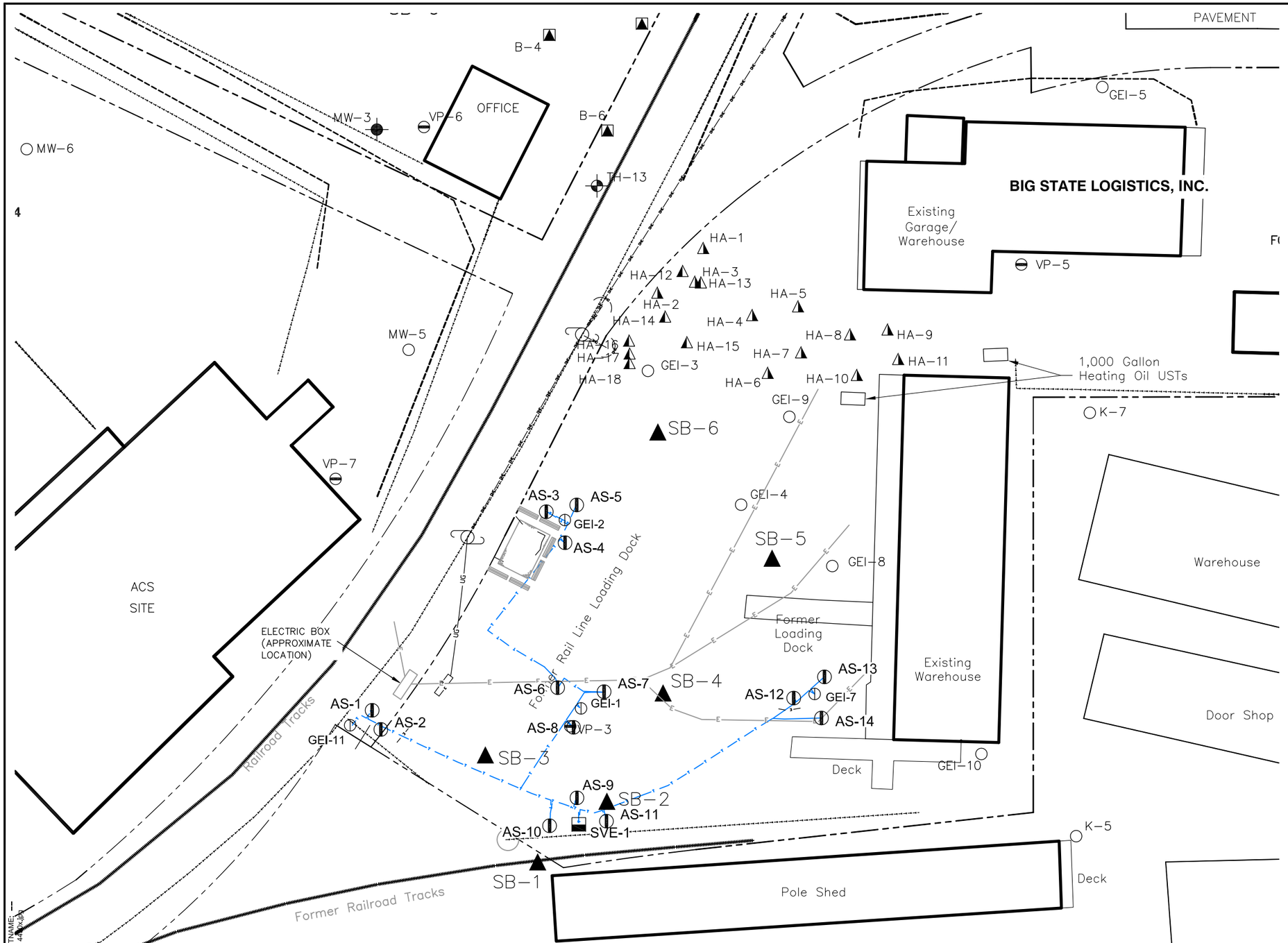
FORMER UNOCAL BULK TERMINAL 306456
328.5 ILLINOIS ST., FAIRBANKS, ALASKA
4Q2015 O&M REPORT

SITE MAP

ARCADIS Design & Consultancy for natural and built assets

FIGURE **2**

CITY:TMA-A, FL DIV/GROUP:85 DB:JAR LD:(Opt) PIC:(Opt) PM:M.Strickler TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\TAMPA\ACT\Chevron\USA\FAIR Site\Chevron 306456\B00455062016\0224 GWR02\O&M REPORT\B00455062016\0224 GWR02O&M REPORTB00455062016-33-01-801.dwg LAYOUT: 2 SAVED: 1/8/2016 10:11 AM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 1/8/2016 10:12 AM BY:
RICHARDS, JIM
XREFS: IMAGES: PROJECTNAME: ----
X01_FAIR Hi-Def_2004-Aerial-FAIR.jpg
143138 NO STAMP



LEGEND

- CHEVRON MONITORING WELL (TH)
- TEXACO MONITORING WELL (AR)
- UNOCAL MONITORING WELL (GEI) (K)
- VAPOR PROBE (VP)
- SOIL BORING
- SOIL BORING (2011)
- HAND AUGER (2012)
- HAND AUGER (2014)
- AS WELL
- SVE WELL (SEE NOTE 1)
- SVE WELL
- EXISTING UNOCAL BUILDING
- FORMER UNOCAL BUILDING
- EXISTING POWER POLE
- PIPE TRENCH (SEE NOTE 6)
- REMEDIATION COMPOUND FENCE
- RAILROAD
- FENCE LINE
- UNDERGROUND ELECTRICAL UTILITY (APPROXIMATE)
- UNDERGROUND ELECTRICAL UTILITY
- OVERHEAD ELECTRIC UTILITY

NOTES:

1. MONITORING WELLS GEI-1, GEI-2, GEI-7 AND GE-11 WILL BE USED AS SVE WELLS.
2. ROI = RADIUS OF INFLUENCE.
3. PROPOSED AS WELL ROI IS 20'.
4. PROPOSED SVE WELL ROI IS 40'.
5. ELECTRICAL BOX, POWER POLE, OVERHEAD LINES, RAILROAD, FENCING, AS AND SVE WELLS AND TRENCHING WERE SURVEYED NOVEMBER 2014 BY MCLANE.
6. PIPE TRENCH WAS VACUUMED CLEARED IN OCTOBER 2014.

0 50' 100'

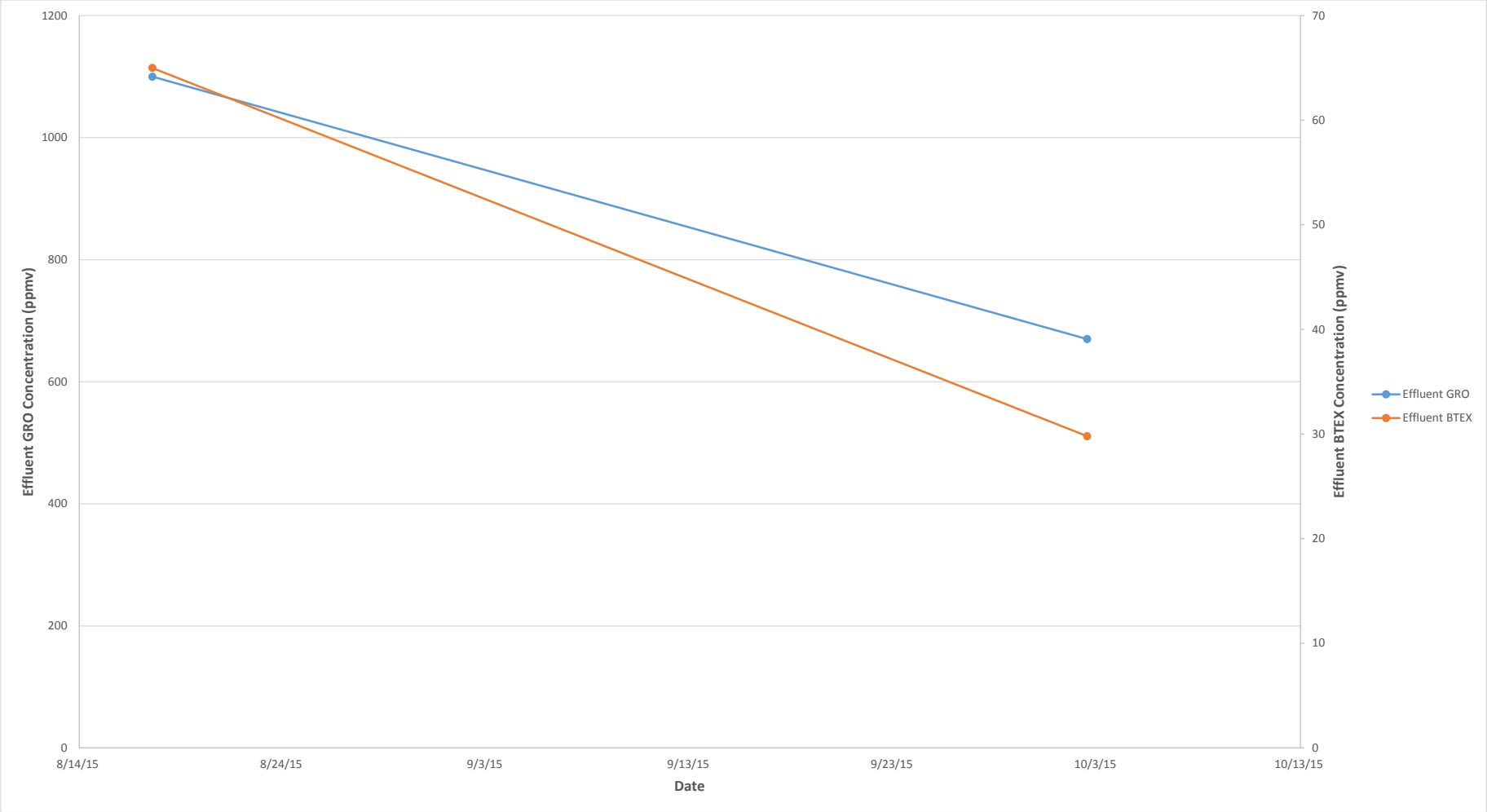
GRAPHIC SCALE

FORMER UNOCAL BULK TERMINAL 306456
328.5 ILLINOIS ST., FAIRBANKS, ALASKA
4Q2015 O&M REPORT

TREATMENT AREA LAYOUT

ARCADIS Design & Consultancy for natural and built assets

FIGURE 3



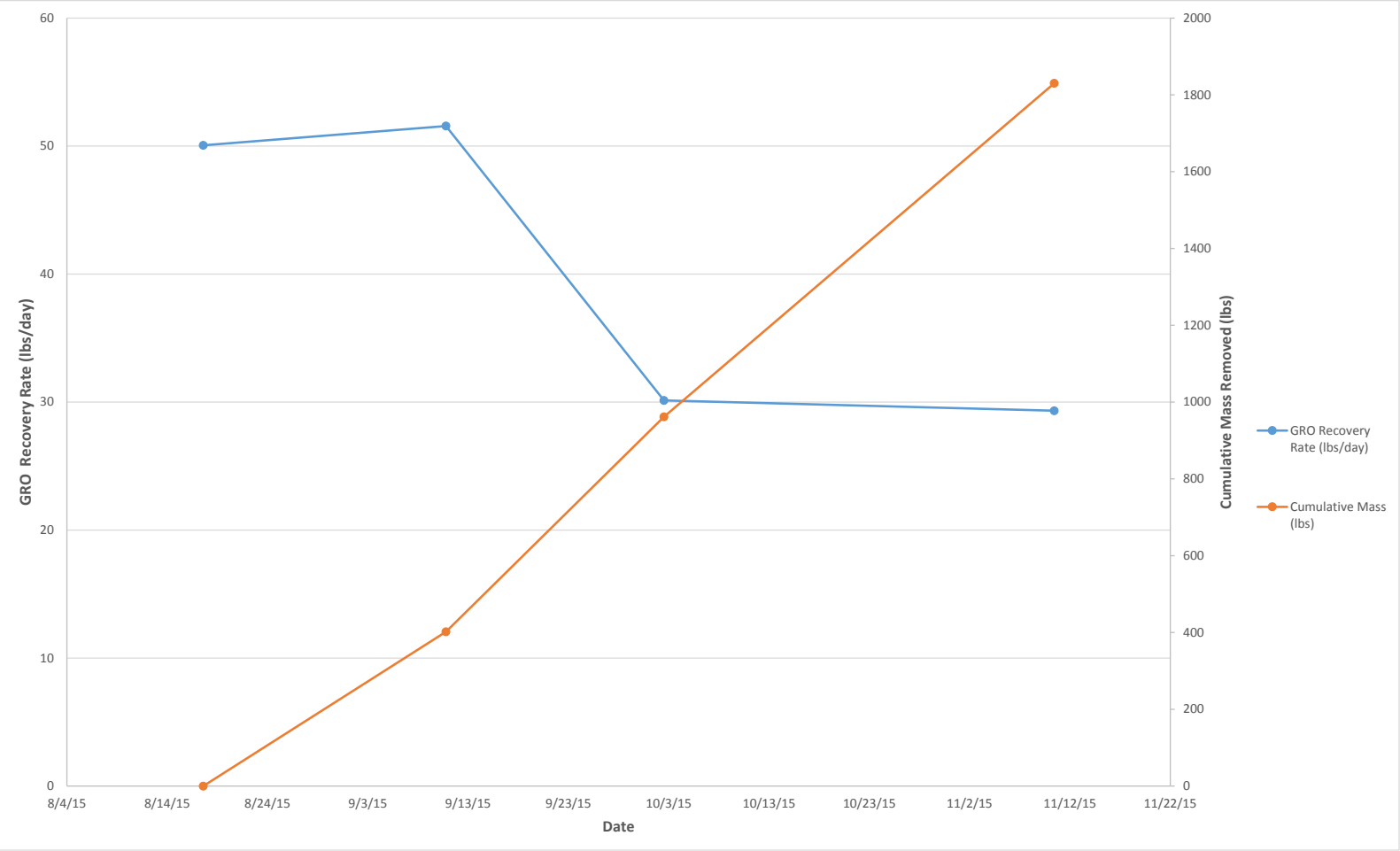
Notes:
GRO = Gasoline range organics
BTEX = Benzene, toluene, ethylbenzene and total xylenes
ppmv = parts per million by volume

CHEVRON FACILITY #306450
328 ½ Illinois Street, in Fairbanks, Alaska

EFFLUENT GRO AND BTEX CONCENTRATIONS

ARCADIS

FIGURE 4



Notes:
GRO = Gasoline range organics
lbs = pounds

CHEVRON FACILITY #306456
328 ½ Illinois Street, Fairbanks, Alaska

GRO MASS REMOVAL

ARCADIS

FIGURE 5

Appendix A
O&M Datasheets and Field Notes

306456 Data Sheet

Date: 9.10.15

SVE/AS SYSTEM
Field Data Sheet

PART A: GENERAL INFORMATION

1. Site Location: 306456 - FAIR Unocal 328 1/2 Illinois Street, Fairbanks, AK
2. Date & Time: 09.10.15 / 1910
3. Technician: David Beaudoin
4. Outside Ambient Temperature 55°F / Sunny

SVE Blower: FPZ Model K10MS
Elecrical Power: 3 Φ 230 volt
AS Compressor: Busch Rotary Claw
Model #: MM-1142 BP

5. Meter Base Reading 2050 kwh
6. SVE System up/down upon arrival? UP / (DOWN)
7. AS System up/down upon arrival? UP / (DOWN)
8. Heat Exchanger up/down upon arrival? UP / (DOWN)

PSSR Completed
System Restarted @ 1907

9. Knockout Drum on Site: Full _____ Half Full _____ Empty ✓

Notes:

10. AMBIENT BACKGROUND DATA		Target
CH_4 (%)	0	0
O_2 (%)	20.5	20.9
CO_2 (%)	0	0
PID (ppm)	0	0
LEL	0	0

11. Field Instruments Used: RKI Eagle Last Calibrated: 09.10.15

12. ALARM CODES			
		Alarm Status	Comments/Corrective Action?
LAH-101	level alarm high (Knockout)		
LAHH-101	Level switch high high (KO)		
LAHH-102	level switch high high Moinsture Separator		Secondary containment switch
LEL-101	LEL meter High.		
VIT-101	vacuum switch low		
TSH-101	temp switch high (SVE blower)		
TSH-301	temp switch high (air sparge blower)		

Notes: Add the Following Alarms - (4) E-Stop Alarms - Control Room Low Temp.
- H.E. High Temp Discharge - Control High Temp.
- Equipment Room Low Temp - Equipment Room High Temp

PART B: SVE SYSTEM DATA

13. Hour Meter Reading: SVE 262 At Time: 0705

14. SVE Header Data

Flow Data	P&ID symbol (Figure 4)	Arrival	Departure	Target Values
Dillution Valve (% open) (7 full turns to 100% open)	See PID	~28%	—	0 to 5
Exhaust Temperature (degrees F)	TI-101	88°F	89°F	60 to 90
Total Flow, after dilution valve on HMI (SCFM)	FIT-102	162.94	—	50 to 150
System Vacuum ("WC)	VI-102	37	—	10 to 30
Exhaust Stack Pressure ("WC)	PI-101	1 in WC	1	0 to 5 percent
Moisture Separator ("WC)	VI-101	-26	-26	10 to 30
Variable Frequency Drive Setting	Not Shown	(% / ~~mHz~~ Hz):	(% / ~~mHz~~ Hz):	0 to 75

30%
28 Hz
18.2 Amps

Date: 9.10.15

PART C: SVE WELL DATA SHEET

15. Individual SVE Well Differential Pressures and Vacuum - Arrival and Departure Conditions

Well ID	Arrival Differential Pressure ("WC)	Anemometer Reading	Departure Differential Pressure ("WC)	Arrival Vacuum ("wc)		Departure Vacuum ("wc)	Comments	Manifold Gate Valve % open
P&ID symbol	FI-101 to FI-106	—	—	VI-101 to VI-106		—	—	—
GEI-2	0.2	Not	Measured	11		11	—	12
GEI-11	0.2	"	"	10		10	—	35
SVE-1	0.6	"	"	9		9	—	25
GEI-7	*	"	"	—		—	"	6
GEI-1	0.25	"	"	11		11	—	20
Target Values	0.05 to 30	—	—	10 to 30		—	—	

Exhaust stack is 3" and SVE wells are 2" diameter

* Not Measured Diff Pressure Gauge & line Needed (0 to 1.0 in WC)

16. Vapor extraction gas data

Group 1 operating - AS-1, AS-2; GEI-11

Well ID	LEL (%)	Oxygen (%)	PID (ppmv)	Well head Vac (inWC)
GEI-2	Not Gassed			
GEI-11				
SVE-1				
GEI-7				
GEI-1				
Effluent				
Target	0.0	20.9	0 to 200	

Group 2 operating -AS-3, AS-4, AS-5; GEI-2

Well ID	LEL (%)	Oxygen (%)	PID (ppmv)	Well head Vac (inWC)
GEI-2	Not Gassed			
GEI-11				
SVE-1				
GEI-7				
GEI-1				
Effluent				
Target	0.0	20.9	0 to 200	

Group 3 operating - AS-6, AS-7, AS-8; GEI-1

Well ID	LEL (%)	Oxygen (%)	PID (ppmv)	Well head Vac (inWC)
GEI-2				
GEI-11				
SVE-1	Not Gassed			
GEI-7				
GEI-1				
Effluent				
Target	0.0	20.9	0 to 200	

Group 4 operating -AS-9, AS-10, AS-11; SVE-1

Well ID	LEL (%)	Oxygen (%)	PID (ppmv)	Well head Vac (inWC)
GEI-2	2	9.0	622	*
GEI-11	2	10.5	452	
SVE-1	4	11.3	448	
GEI-7	1	1.4	430	
GEI-1	10	3.5	1,116	
Effluent	3	10.9	532	
Target	0.0	20.9	0 to 200	

* Not Measured - No well head Vac assembly on site - There is NOW DGB 09.10.15 2280

Group 5 operating -AS-12, AS-13, AS-14; GEI-7

Well ID	LEL (%)	Oxygen (%)	PID (ppmv)	Well head Vac (inWC)
GEI-2				
GEI-11				
SVE-1	Not Gassed			
GEI-7				
GEI-1				
Effluent				
Target	0.0	20.9	0 to 200	

17. SUMMA SAMPLE INFORMATION

Effluent Sample ID:
Summa Canister #:
Date & Time:
Initial Vac (inHg):
Final Vac (inHg):
AS Group in Operation:

Not Sampled

Date: 9.10.15

Part D: AS HEADER DATA SHEET

18. Hour Meter Readings

Hour Meter Reading	HH:~~MM~~	Time
AS Compressor:	257	19:05
AS Heat Exchanger:	234	19:05

19. AS Group Status

Group ID	Wells	Changes
Group #1	AS-1, AS-2	Need Solenoid Valve IDs Somewhere
Group #2	AS-3, AS-4, AS-5	
Group #3	AS-6, AS-7, AS-8	
Group #4	AS-9, AS-10, AS-11	
Group #5	AS-12, AS-13, AS-14	

20. AS Header Information

Flow Data	P&ID Symbol	Arrival		Departure		Target	Comments
Total AS Flow ("WC)	FI-301	System Down		0.2 in WC			Late Post a Calc.
Variable Frequency Drive Setting		(% / ~~mHz~~): 66%/35.4		(% / ~~mHz~~): 66%/35.4			
Temp - upstream of heat exchanger (deg F)	TI-201	140		146			—
Temp - downstream of heat exchanger (deg F)	TI-301	72		80			—
		~~@ HMI~~	@ gauge	~~@ HMI~~	@ gauge		
System Pressure (PSI) - before Heat Exch.	PI-201	*	4	*	4	5 to 15	
System Pressure (PSI) - after Heat Exch.	PI-301	*	0≠	*	0	5 to 15	
System Pressure (PSI) - after Heat Exch Z1						5 to 15	
System Pressure (PSI) - after Heat Exch Z2						5 to 15	
System Pressure (PSI) - after Heat Exch Z3						5 to 15	
System Pressure (PSI) - after Heat Exch Z4						5 to 15	
System Pressure (PSI) - after Heat Exch Z5						5 to 15	

Notes: Complete Gauge Inspection * No HMI Gauging Installed / ≠ Late replace Pressure Gauge

21. AS Wells Arrival Conditions:

Air Sparge Well	Pressure (PSI)	Wellhead Pressure (PSI)	Flow (CFM)	Hours	Air Sparge Well	Pressure (PSI)	Wellhead Pressure (PSI)	Flow (CFM)	Hours
P&ID	PI-302 to 310	Quick connect	rotameters			PI-311 to 318	Quick connect	rotameters	
AS-1	**	*	≠	NR	AS-10	**	*	9	NR
AS-2	↓	↓	≠	NR	AS-11	↓	↓	9	NR
AS-3	↓	↓	≠	NR	AS-12	↓	↓	≠	NR
AS-4	↓	↓	≠	NR	AS-13	↓	↓	≠	NR
AS-5	↓	↓	≠	NR	AS-14	↓	↓	≠	NR
AS-6	↓	↓	≠	NR		5 to 10	5 to 10	10 to 15	
AS-7	↓	↓	≠	NR					
AS-8	↓	↓	≠	NR					
AS-9	↓	↓	9	NR					
Target	5 to 10	5 to 10	10 to 15						

Notes: NR - Not Recorded - System just started up / * Not Gauged - Need More Lug Light
** - Need to replace Gauges 0-15 PSI — the pressure is not registering
≠ Need to post Solenoid Valve IDs for each AS Well — speed up Cycling through AS Boxes

22. AS Wells Departure Conditions:

Air Sparge Well	Pressure (PSI)	Wellhead Pressure (PSI)	Flow (CFM)	Hours	Air Sparge Well	Pressure (PSI)	Wellhead Pressure (PSI)	Flow (CFM)	Hours
P&ID	PI-302 to 310	Quick connect	rotameters			PI-311 to 318	Quick connect	rotameters	
AS-1					AS-10				
AS-2	Not Gauged				AS-11				
AS-3					AS-12	Not Gauged			
AS-4					AS-13				
AS-5		Gauge			AS-14				
AS-6						5 to 10	5 to 10	10 to 15	
AS-7									
AS-8									
AS-9									
Target	5 to 10	5 to 10	10 to 15						

Notes:

Date: 9.10.15

PART F: MAINTENANCE RECORD

MONTHLY

	Yes	No	Action
Any leaks?		✓	
Any rattles?		✓	
Excessive noise?		✓	
Indicator lights out?		✓	
Abnormal wear & tear?		✓	
Blower oil low?		✓	
Heat trace circuit breakers all on?		N/A	Always On - Self Activating @ Cold Temp
Any faulty gauges?	✓		AS Manifold - Pre & Post HE Pressure Gauge
Other?	—	—	→ replace w/ 1/4" M NPT 0-15 PSI Gauge

QUARTERLY

	Yes	No	Date Last Performed	Action
Air sparge compressor oil changed?		✓	?	
Linkage and bearings greased?		✓	?	
Inspected/cleaned flow gauges?		✓	?	Inspected
Air sparge intake filter changed?		✓	?	Inspected
SVE intake filter changed?		✓	?	Inspected
Dilution value intake filter changed?		✓	?	Inspected

PART G: TREATMENT COMPOUND

MONTHLY	Yes	No	Action
Fence/Gate inspected?	✓		
Doors/Locks inspected?	✓		
Emergency sign posted?	✓		
Fire extingurisher on site?	✓		
Other?	—	—	

PART H: ADDITIONAL COMMENTS

Give details of system status upon arrival: Down - ~~Arrived~~ FD&C FFSR Inspection - Incomplete

PART G: PLANNED ACTIVITIES FOR NEXT TRIP

- Replace Gauges
- Gauge SVE Manifold Conc & Flow w/ all (5) AS Zones Cycled
- Compare Pressure & Vac Losses between AS/SVE wells heads and respective Manifolds.

10/02/2015 CEMC 306456 Oct 2015
FAIR Parcel O&M
328.5 Illinois Street
Fairbanks, Alaska

0800 Arrive @ Anchorage International Airport.
0925 Depart Anchorage
1030 Arrive in Fairbanks - Inspect Rental Car
1050 pick up rental Car - depart to Storage Unit
load up detectors, Tools & PPE
1120 Mobilize to Fairbanks Office - attempt to locate
Summa Sanples, Canisters Ordered from
Eurofin Laboratories - Contact Greg Montgomery
11:30 Mobilize to Gold Streak Pickup ???
equipment
1145 Mobilize to Site
Complete PTW - Calibrate RKI Eagle 2
Review JSAs, HASP, Scope
1200 System down upon arrival
- VFD Fault 1 on the SVE blower tripped
- Inspected System - reset VFD fault
- Restarted the System
- Adjusted AS & SVE VFD settings
- Adjusted the AS Zone Timer
- Adjusted the AS & SVE manifold
valve settings during System
gauging
1445 Complete System Gauging & O&M
Mobilize to ??
1515 Arrive @ Airport - return rental Car
1620 Depart Fairbanks
1720 Arrive in Anchorage
- Working w/ airline to get Summas back
1820 - Finally Got Summas
- Depart for Anchorage Office
1900 - Finish Scanning JSAs & Notes

DCT

SVE/AS SYSTEM
Field Data Sheet

PART A: GENERAL INFORMATION

1. Site Location: 306456 - FAIR Unocal 328 1/2 Illinois Street, Fairbanks, AK
2. Date & Time: 1230 @ 10/02/15
3. Technician: David Brandin
4. Outside Ambient Temperature: 30°F / cloudy

SVE Blower: FPZ Model K10MS
Elecrical Power: 3 Φ 230 volt

AS Compressor: Busch Rotary Claw
Model #: MM-1142 BP

5. Meter Base Reading: 5243 kwh
6. SVE System up/down upon arrival? UP / (DOWN)
7. AS System up/down upon arrival? UP / (DOWN)
8. Heat Exchanger up/down upon arrival? UP / (DOWN)

System Restarted @ ~12:40

9. Knockout Drum on Site: Full _____ Half Full _____ Empty ✓

10. AMBIENT BACKGROUND DATA		Target
CH_4 (%)	0	0
O_2 (%)	20.9	20.9
CO_2 (%)	0	0
PID (ppm)	0	0
LEL	0	0

11. Field Instruments Used: RKI Eagle — Last Calibrated: 10/02/2015
Last Calibrated: _____
Last Calibrated: _____

12. ALARM CODES			
		Alarm Status	Comments/Corrective Action?
LAH-101	level switch high (Knockout)	~~Y~~	~~Pumped out water, lowered flow at GEI-7~~
LAHH-101	Level switch high high (KO)	~~Y~~	N
LAHH-102	level switch high high Moinsture Separator	N	
LEL-101	LEL meter High.	N	
VIT-101	vacuum switch low	N	
TSH-101	temp switch high (SVE blower)	N	
TSH-301	temp switch high (air sparge blower)	N	

all ok

Notes:
SVE VFD Fault 1 indicated upon arrival - reset & then restarted system — Restarted @ ~12:40

PART B: SVE SYSTEM DATA

13. Hour Meter Reading: SVE 708 At Time: 12:55

14. SVE Header Data

Flow Data	P&ID symbol (Figure 4)	Arrival	Departure	Target Values
Dillution Valve (% open) (7 full turns to 100% open)	See PID	~4.2	~4.2	0 to 5
Exhaust Temperature (degrees F)	TI-101	~~149~~ 68	68	60 to 90
Total Flow, after dilution valve on HMI (SCFM)	FIT-102	149	149	50 to 150
System Vacuum ("WC)	VI-102	22	22	10 to 30
Exhaust Stack Pressure ('WC)	PI-101	0	0	0 to 5 percent
Moisture Separator ("WC)	VI-101	22	22	10 to 30
Variable Frequency Drive Setting	Not shown	25%	25%	0 to 75

PART C: SVE WELL DATA SHEET

Anemometer Not Measured

15. Individual SVE Well Differential Pressures and Vacuum - Arrival and Departure Conditions

Well ID	Arrival Differential Pressure ("WC)	Departure Differential Pressure ("WC)	Arrival Vacuum ("wc)	Departure Vacuum ("wc)	Manifold Valve (% Open)	Comments
P&ID symbol	FI-101 to FI-106		VI-101 to VI-106			
GEI-2	Gauge - Full of H2O	NM	22	~~20~~	100	
GEI-11	0.29	NM	16	16	100	
SVE-1	~~X~~	NM	16	16	100	
GEI-7	—	NM	16	0	~~40~~	0
GEI-1	0.29	NM	16	16	100	
Target Values	0.05 to 30		10 to 30			

Exhaust stack is 3" and SVE wells are 2" diameter

* Gauge Not Registering any value

16. Vapor extraction gas data

Group 1 operating - AS-1, AS-2; GEI-11

Well ID	LEL (%)	Oxygen (%)	PID (ppmv)	Well head Vac (inWC)
GEI-2	6	17.6	385	–
GEI-11	5	18.1	451	NM
SVE-1	5	17.8	390	–
GEI-7	—	—	—	–
GEI-1	5	15.9	645	–
Effluent	~~7~~	16.8	524	–
Target	0.0	20.9	0 to 200	

Group 2 operating -AS-3, AS-4, AS-5; GEI-2

Well ID	LEL (%)	Oxygen (%)	PID (ppmv)	Well head Vac (inWC)
GEI-2	2	17.1	212	NM
GEI-11	3	18.1	298	–
SVE-1	3	~~20.1~~	240	–
GEI-7	3	14.9	180	–
GEI-1	1	15.4	~~482~~	–
Effluent	2	16.7	240	–
Target	0.0	20.9	0 to 200	

17.0

587 ppm

Group 3 operating - AS-6, AS-7, AS-8; GEI-1

Well ID	LEL (%)	Oxygen (%)	PID (ppmv)	Well head Vac (inWC)
GEI-2	7	17.0	436	–
GEI-11	5	17.8	507	–
SVE-1	6	17.2	468	–
GEI-7	—	—	—	–
GEI-1	~~6~~	14.9	619	NM
Effluent	7	16.3	575	–
Target	0.0	20.9	0 to 200	

Group 4 operating -AS-9, AS-10, AS-11; SVE-1

Well ID	LEL (%)	Oxygen (%)	PID (ppmv)	Well head Vac (inWC)
GEI-2	7	17.2	449	–
GEI-11	5	18	460	–
SVE-1	5	18	355	NM
GEI-7	—	—	—	–
GEI-1	5	17.4	349	–
Effluent	7	17	330	–
Target	0.0	20.9	0 to 200	

Group 5 operating -AS-12, AS-13, AS-14; GEI-7

Well ID	LEL (%)	Oxygen (%)	PID (ppmv)	Well head Vac (inWC)
GEI-2	~~5~~	19	259	–
GEI-11	4	19.2	240	–
SVE-1	4	18.9	265	–
GEI-7	—	—	—	~~NM~~
GEI-1				–
Effluent	5	18	333	–
Target	0.0	20.9	0 to 200	

* From Manifold - Not Well
† Not Gauged

17. SUMMA SAMPLE INFORMATION

Effluent Sample ID:
Summa Canister #:
Date & Time:
Initial Vac (inHg):
Final Vac (inHg):
AS Group in Operation:

Not Sampled @

Summas to be collected 10/05/15

Part D: AS HEADER DATA SHEET

18. Hour Meter Readings

Hour Meter Reading		Time
AS Compressor:	703	12 55
AS Heat Exchanger:	690	1255

19. AS Group Status

Group ID	Associated AS - Wells	Corresponding Solenoid Valve IDs	Changes
Group #1	AS-1, AS-2	309 308	
Group #2	AS-3, AS-4, AS-5	307, 306, 305	
Group #3	AS-6, AS-7, AS-8	304, 303, 302	
Group #4	AS-9, AS-10, AS-11	317, 316, 315	
Group #5	AS-12, AS-13, AS-14	314, 313, 312	

20. AS Header Information

Flow Data	P&ID Symbol	Arrival		Departure		Target
Total AS Flow ("WC)	FI-301	0.6		0.6		—
Variable Frequency Drive Setting		75% 37.9 Hz 25.4 A		Same		—
Temp - upstream of heat exchanger (deg F)	TI-201	140		140		—
Temp - downstream of heat exchanger (deg F)	TI-301	54		54		—
System Pressure (PSI) - before Heat Exch.	PI-201	5		5		—
System Pressure (PSI) - after Heat Exch.	PI-301	@ HMI	@ gauge 6.5	@ HMI	@ gauge	5 to 15

PART E: AS WELL DATA SHEET

21. AS Wells Arrival Conditions:

Air Sparge Well	Manifold Gate Valve % Open	Pressure (PSI)	Wellhead Pressure (PSI) (Not * Measured)	Flow (CFM)	Hours	Air Sparge Well	Pressure (PSI)	Wellhead Pressure (PSI) (Not * Measured)	Flow (CFM)	Hours	Loop
P&ID		PI-302 to 310	Quick connect	rotameters			PI-311 to 318	Quick connect	rotameters		
AS-1	20	0	NM	13	—	AS-10	0	NM	10	—	2.5%
AS-2	20	0		13	—	AS-11	0		12	—	100 %
AS-3	20	0		11	—	AS-12	0		10.5	—	100
AS-4	80	0		11	—	AS-13	0		10	—	100
AS-5	30	0		11	—	AS-14	8.5 psi		10	—	80
AS-6	20	0		10	—		5 to 10	5 to 10	10 to 15		
AS-7	15	0		10	—						
AS-8	100	0		10	—						
AS-9	100	0		10	—						
Target		5 to 10	5 to 10	10 to 15							

22. AS Wells Departure Conditions:

Air Sparge Well	Manifold Gate Valve % Open	Pressure (PSI)	Wellhead Pressure (PSI) (Not * Measured)	Flow (CFM)	Hours	Air Sparge Well	Pressure (PSI)	Wellhead Pressure (PSI) (Not * Measured)	Flow (CFM)	Hours	Loop
P&ID	—	PI-302 to 310	Quick connect	rotameters			PI-311 to 318	Quick connect	rotameters		
AS-1	20	0	NM	13	—	AS-10	0	NM	10	—	2.5
AS-2	22	0		13	—	AS-11	0		12	—	100
AS-3	20	0		11	—	AS-12	0		10.5	—	100
AS-4	80	0		11	—	AS-13	0		10	—	100
AS-5	30	0		11	—	AS-14			10	—	80
AS-6	20	0		10	—		5 to 10	5 to 10	10 to 15		
AS-7	15	0		10	—						
AS-8	100	0		10	—						
AS-9	100	0		10	—						
Target		5 to 10	5 to 10	10 to 15							

* Well heads buried in snow - Need to replace Manifold Pressure gauges w/ lower graduation - current gauges register Zero PSI
- Well head pressures serve no leak testing comparitive purpose @ this time 10/02/15 DGT

PART F: MAINTENANCE RECORD

MONTHLY

	Yes	No	Action
Any leaks?	✓		Manifold MS-1 Rotameter
Any rattles?		✓	
Excessive noise?		✓	
Indicator lights out?		✓	
Abnormal wear & tear?		✓	
Blower oil low?		✓	
Heat trace circuit breakers all on?	✓		
Any faulty gauges?		✓	SVE VFD Fault 1 upon arrival
Other?	—	—	GET-2 mag gauge Full of H2O

QUARTERLY

	Yes	No	Date Last Performed	Action
Air sparge compressor oil changed?		✓	—	checked - level good/clean
Linkage and bearings greased?		✓	—	—
Inspected/cleaned flow gauges?	✓		—	inspected,
Air sparge intake filter changed?		✓	—	inspected/cleaned
SVE intake filter changed?		✓	—	inspected
Dilution value intake filter changed?		✓	—	inspected

PART G: TREATMENT COMPOUND

MONTHLY	Yes	No	Action
Fence/Gate inspected?	✓		Good
Doors/Locks inspected?	✓		Good
Emergency sign posted?	✓		Good
Fire extingurisher on site?	✓		Good
Other?			Good

PART H: ADDITIONAL COMMENTS

Give details of system status upon arrival: System down upon Arrival SVE VFD Fault 1 inspected - reset/inspected/restarted System

PART G: PLANNED ACTIVITIES FOR NEXT TRIP

Summa Sample collection from Effluent - Shut down System for 25415 GWM - to be restarted after Gw Sampling is complete

11/10/15 CEME 306456 / Fair Unocal
728.5 Illinois St. / Fairbanks, AK
November O&M System Shutdown

Personnel: M. MacDaniel
Weather: 7F, Cloudy, SNOW ~1'

9:00 Arrive on site. Conduct H+S tailgate. Reviewed SOW, review hazards, completed H+S documents.
9:20 System down. KO / moisture separator High high switch engaged. Mobilized off-site to pick up GAC bucket. and other supplies from storage unit
10:30 Return to site and begin pumping out water from KO and running through GAC.

1200 completed filtering water through GAC. Re-started system. Began Collecting O&M parameters. See field form.

1445 Completed Collecting O&M parameters. (Left site to purchase batteries for RKI-Eagle)
1750 Shut-System down.
1500 Mobilized off-site for tools to open clean-outs for pump-out.
1535 Returned to site Removed water from Clean-outs, filtered through GAC.

1600 Lowered thermostat in Process room to 50F, Lowered Heater in Control Room to 55F. Heat trace left on. System (AS/SVE/Heat Ex) Manually shut-down. All wells ~~on~~ on AS put into the closed position and left in manual. SVE and AS Dilution valves closed. Pressure relieved from AS compressor.

Note: SVE Manifold showing cracks above valve on each well (Except Vei-7). Documented with photos.
1700 Completed O&M and shut-down activities. Mobilized off-site

SVE/AS SYSTEM
Field Data Sheet

PART A: GENERAL INFORMATION

1. Site Location: 306456 - FAIR Unocal 328 1/2 Illinois Street, Fairbanks, AK
2. Date & Time: 11/10/15 @ 10:30
3. Technician: Michael MacDonald
4. Outside Ambient Temperature: 7°F

SVE Blower: FPZ Model K10MS
Elecrical Power: 3 Φ 230 volt

AS Compressor: Busch Rotary Claw
Model #: MM-1142 BP

5. Meter Base Reading: 8621 kwh
6. SVE System up/down upon arrival? UP / DOWN
7. AS System up/down upon arrival? UP / DOWN
8. Heat Exchanger up/down upon arrival? UP / DOWN

9. Knockout Drum on Site: Full _____ Half Full X Empty _____

10. AMBIENT BACKGROUND DATA		Target
CH_4 (%)	0	0
O_2 (%)	20.9	20.9
CO_2 (%)	0	0
PID (ppm)	0	0
LEL	0	0

11. Field Instruments Used: RKI Eagle II Last Calibrated: 11/9/15

12. ALARM CODES			
		Alarm Status	Comments/Corrective Action?
LAH-101	level switch high (Knockout)	Y	Pumped out water, lowered flow at GEI-7
LAHH-101	Level switch high high (KO)	Y	Engaged
LAHH-102	level switch high high Moinsture Separator	~~N~~ Y	Engaged during pump-out
LEL-101	LEL meter High.	N	
VIT-101	vacuum switch low	N	
TSH-101	temp switch high (SVE blower)	N	
TSH-301	temp switch high (air sparge blower)	N	

Notes:

PART B: SVE SYSTEM DATA

13. Hour Meter Reading: SVE 1419 At Time: 12:07

14. SVE Header Data

Flow Data	P&ID symbol (Figure 4)	Arrival	Departure	Target Values
Dillution Valve (% open) (7 full turns to 100% open)	See PID	~28%		0 to 5
Exhaust Temperature (degrees F)	TI-101	63		60 to 90
Total Flow, after dilution valve on HMI (SCFM)	FIT-102	148.7		50 to 150
System Vacuum ("WC)	VI-102	35	SHUT DOWN	10 to 30
Exhaust Stack Pressure ('WC)	PI-101	1		0 to 5 percent
Moisture Separator ("WC)	VI-101	-15		10 to 30
Variable Frequency Drive Setting	Not shown	24.3 Hz 12.0 A 24.9 %		0 to 75

PART C: SVE WELL DATA SHEET

15. Individual SVE Well Differential Pressures and Vacuum - Arrival and Departure Conditions

Well ID	Arrival Differential Pressure ("WC)	Departure Differential Pressure ("WC)	Arrival Vacuum ("wc)	Departure Vacuum ("wc)	Manifold Valve (% Open)	Comments
P&ID symbol	FI-101 to FI-106		VI-101 to VI-106			
GEI-2	0.1		14		12	
GEI-11	0.05		17		35	
SVE-1	** 0		16		25	
GEI-7	* –	SHUT DOWN	0	SHUT-DOWN	6	
GEI-1	0.25		16		20	
Target Values	0.05 to 30		10 to 30			

Exhaust stack is 3" and SVE wells are 2" diameter

** Significant crack on SVE PVC. * No Mag gauge.

16. Vapor extraction gas data

Group 1 operating - AS-1, AS-2; GEI-11

Well ID	LEL (%)	Oxygen (%)	PID (ppmv)	Well head Vac (inWC)
GEI-2	1	15.3	114	--
GEI-11	1	17.6	168	
SVE-1	1	17.3	170	--
GEI-7	1	20.0	172	--
GEI-1	1	14.1	344	--
Effluent	2	16.1	374	--
Target	0.0	20.9	0 to 200	

Group 2 operating -AS-3, AS-4, AS-5; GEI-2

Well ID	LEL (%)	Oxygen (%)	PID (ppmv)	Well head Vac (inWC)
GEI-2	1	16.3	204	
GEI-11	1	17.8	202	--
SVE-1	1	~~18~~ 17.0	242	--
GEI-7	1	20.3	228	--
GEI-1	1	14.4	415	--
Effluent	2	15.1	502	--
Target	0.0	20.9	0 to 200	

Group 3 operating - AS-6, AS-7, AS-8; GEI-1

Well ID	LEL (%)	Oxygen (%)	PID (ppmv)	Well head Vac (inWC)
GEI-2	1	16.8	226	--
GEI-11	1	16.9	286	--
SVE-1	1	17.2	266	--
GEI-7	1	20.5	252	--
GEI-1	1	12.8	528	
Effluent	2	16.3	541	--
Target	0.0	20.9	0 to 200	

Group 4 operating -AS-9, AS-10, AS-11; SVE-1

Well ID	LEL (%)		Oxygen (%)		PID (ppmv)	Well head Vac (inWC)	
GEI-2	1	5	16.9	15.5	~~836~~	–	→ 240
GEI-11	1	4	17.4	15.8	~~740~~	–	→ 296
SVE-1	1	5	16.7	13.9	~~716~~	–	→ 331
GEI-7	1	4	20.7	15.9	~~466~~	–	→ 256
GEI-1	3	16	~~13~~ 12.1	11.5	~~1038~~	–	→ 536
Effluent	3	6	15.2	14.7	~~796~~	–	→ 562
Target	0.0		20.9		0 to 200		

Group 5 operating -AS-12, AS-13, AS-14; GEI-7

Well ID	LEL (%)	Oxygen (%)	PID (ppmv)	Well head Vac (inWC)
GEI-2	1	15.2	158	--
GEI-11	0	16.0	176	--
SVE-1	1	16.1	166	--
GEI-7	0	20.3	170	
GEI-1	1	14.3	326	--
Effluent	2	14.5	426	--
Target	0.0	20.9	0 to 200	

Note: All SVE legs @ manifold have cracks at bushing just above valve. (Except GEI-7). Significant cracks are visible, and leaks are audible.

17. SUMMA SAMPLE INFORMATION

Effluent Sample ID:
Summa Canister #:
Date & Time: @
Initial Vac (inHg):
Final Vac (inHg): NA
AS Group in Operation:

Part D: AS HEADER DATA SHEET

18. Hour Meter Readings

Hour Meter Reading		Time
AS Compressor:	1414	12:08
AS Heat Exchanger:	1401	12:08

19. AS Group Status

Group ID	Associated AS - Wells	Corresponding Solenoid Valve IDs	Changes
Group #1	AS-1, AS-2		
Group #2	AS-3, AS-4, AS-5		
Group #3	AS-6, AS-7, AS-8		
Group #4	AS-9, AS-10, AS-11	AS-11 Rotameter damaged	
Group #5	AS-12, AS-13, AS-14		

20. AS Header Information

Flow Data	P&ID Symbol	Arrival		Departure		Target
Total AS Flow ("WC)	FI-301	0 (System down)				
Variable Frequency Drive Setting		59.3% 37.9Hz				
Temp - upstream of heat exchanger (deg F)	TI-201	125				
Temp - downstream of heat exchanger (deg F)	TI-301	36				
System Pressure (PSI) - before Heat Exch.	PI-201	5.5				
System Pressure (PSI) - after Heat Exch.	PI-301	6 @ HMI	5 @ gauge	@ HMI	@ gauge	5 to 15

SHUT DOWN

PART E: AS WELL DATA SHEET

21. AS Wells Arrival Conditions:

Air Sparge Well	Pressure (PSI)	Wellhead Pressure (PSI)	Flow (CFM)	Hours	Air Sparge Well	Pressure (PSI)	Wellhead Pressure (PSI)	Flow (CFM)	Hours
P&ID	PI-302 to 310	Quick connect	rotameters			PI-311 to 318	Quick connect	rotameters	
AS-1	~1.7	NC	13	433	AS-10	2	NC	9	407
AS-2	1.5		12	391	AS-11	2		*NA	427
AS-3	~0		10.5	388	AS-12	~0		11	391
AS-4	~0		11	388	AS-13	~0.5		9.5	413
AS-5	~0		10	391	AS-14	7.8		9.5	414
AS-6	2		7.5	393					
AS-7	2		9.5	393					
AS-8	4		11.5	392					
AS-9	~~3~~		9.5	408					
Target	5 to 10	5 to 10	10 to 15			5 to 10	5 to 10	10 to 15	

NC: Not Collected due to snow and ICE.

*Broken

22. AS Wells Departure Conditions:

Air Sparge Well	Pressure (PSI)	Wellhead Pressure (PSI)	Flow (CFM)	Hours	Air Sparge Well	Pressure (PSI)	Wellhead Pressure (PSI)	Flow (CFM)	Hours
P&ID	PI-302 to 310	Quick connect	rotameters			PI-311 to 318	Quick connect	rotameters	
AS-1					AS-10				
AS-2					AS-11				
AS-3					AS-12				
AS-4					AS-13				
AS-5					AS-14				
AS-6									
AS-7									
AS-8									
AS-9									
Target	5 to 10	5 to 10	10 to 15			5 to 10	5 to 10	10 to 15	

← SHUT - DOWN →

PART F: MAINTENANCE RECORD

MONTHLY

	Yes	No	Action
Any leaks?	✓		
Any rattles?		✓	
Excessive noise?		✓	
Indicator lights out?		✓	
Abnormal wear & tear?	✓		Cracked SVE line.
Blower oil low?		✓	
Heat trace circuit breakers all on?		N/A	Always on
Any faulty gauges?	✓		AS-manifold pressure gauges + Mag Gauges.
Other?	–	–	

QUARTERLY

	Yes	No	Date Last Performed	Action
Air sparge compressor oil changed?		✓		
Linkage and bearings greased?		✓		
Inspected/cleaned flow gauges?		✓		
Air sparge intake filter changed?		✓		
SVE intake filter changed?		✓		
Dilution value intake filter changed?		✓		

PART G: TREATMENT COMPOUND

MONTHLY	Yes	No	Action
Fence/Gate inspected?	✓		
Doors/Locks inspected?	✓		
Emergency sign posted?	✓		
Fire extingurisher on site?	✓		
Other?	–	–	

PART H: ADDITIONAL COMMENTS

Give details of system status upon arrival: System down. KO high-high shut-down engaged. SVE lines at manifold cracked.

PART G: PLANNED ACTIVITIES FOR NEXT TRIP

- Repair SVE lines. Investigated cause. (water in lines?)
- Replace gauges.

Appendix B
Laboratory Analytical Reports, Chains-of-Custody and Data Checklists

ANALYTICAL RESULTS

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

Chevron
L4310
6001 Bollinger Canyon Road
San Ramon CA 94583

October 27, 2015

Project: 306456

Submittal Date: 10/14/2015
Group Number: 1600647
SDG: LSU82
PO Number: 0015177219
Release Number: CARRIER
State of Sample Origin: AK

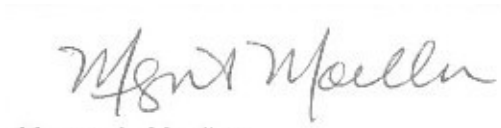
Client Sample Description	Lancaster Labs (LL) #
Effluent-A-100715 Summa Grab Air	8087770

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Regulatory agencies do not accredit laboratories for all methods, analytes, and matrices. Our scopes of accreditation can be viewed at http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/ .

ELECTRONIC COPY TO	Arcadis	Attn: Tammy Parise
ELECTRONIC COPY TO	Arcadis	Attn: Greg Montgomery
ELECTRONIC COPY TO	Arcadis	Attn: David Beaudoin
ELECTRONIC COPY TO	ARCADIS	Attn: Michael MacDaniel

Respectfully Submitted,



Megan A. Moeller
Senior Specialist

(717) 556-7261

Sample Description: **Effluent-A-100715 Summa Grab Air**
Facility# 306456 SUMMA CAN# 1000
328.5 Illinois St - Fairbanks, AK

LL Sample # AQ 8087770
LL Group # 1600647
Account # 11964

Project Name: 306456

Collected: 10/07/2015 15:50 by DB

Submitted: 10/14/2015 10:40
Reported: 10/27/2015 16:50

Chevron
L4310
6001 Bollinger Canyon Road
San Ramon CA 94583

ISFEF SDG#: LSU82-01

CAT No.	Analysis Name	CAS Number	Final Result	MDL	Final Result	MDL	DF
Volatiles in Air	**EPA 18 mod/EPA 25 mod**		ppm(v)	ppm(v)	mg/m3	mg/m3	
07090	Benzene	71-43-2	9	1	30	3	2
07090	C2-C10 Hydrocarbons as hexane	n.a.	670	10	2,400	35	2
07090	Ethylbenzene	100-41-4	N.D.	0.8	N.D.	3	2
07090	Toluene	108-88-3	13	2	50	6	2
07090	Xylene (total)	1330-20-7	7	0.7	30	3	2

MDL = Method Detection Limit

General Sample Comments

State of Alaska Lab Certification No. UST-061

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07090	BTEX/C2-C10 Hydrocarbons	EPA 18 mod/EPA 25 mod	1	M1528730AA	10/14/2015 19:27	Alexander D Sechrist	2

Quality Control Summary

Client Name: Chevron Group Number: 1600647
Reported: 10/27/2015 16:50

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: M1528730AA	Sample number(s): 8087770							
Benzene	N.D.	0.5	ppm(v)	87	85	75-111	3	30
C2-C10 Hydrocarbons as hexane	N.D.	5.	ppm(v)					
Ethylbenzene	N.D.	0.4	ppm(v)	97	92	59-159	5	30
Toluene	N.D.	0.8	ppm(v)	101	98	77-143	2	30
Xylene (total)	N.D.	0.7	ppm(v)	97	91	70-134	6	30

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Summa Canister Field Test Data/Chain of Custody

eurofins | Lancaster Laboratories Environmental

For Eurofins Lancaster Laboratories Environmental use only
Acct. # 11964 Group # 1600647 Sample # 8087770 Bottle Order (SCR) # _____
Instructions on reverse side correspond with circled numbers.

(1) Client Information

Client: Chevron
Account #:
Project Name/#: FAIR Unocal
Project Manager: Greg Montgomery
P.O. #: ARCADIS
Sampler: D. Beaudoin
Quote #:
Name of state where samples were collected: Alaska

(3) Turnaround Time Requested (TAT) (circle one)

Standard | Rush (specify) _____

(4) Data Package Required?

Yes | No

(5) EDD Required?

Yes | No

	Temperature (F) Start	Temperature (F) Stop	Pressure ("Hg) Start	Pressure ("Hg) Stop
Ambient				
Maximum				
Minimum				

(6) Analyses Requested

EPA TO - 15 | EPA 18 ☐ MTBE ☒ BTEX | EPA 25 (select range below) | Helium as tracer | O2/CO2 | Library Search

(2) Sample Identification	Start Date/Time (24-hour clock)	Stop Date/Time (24-hour clock)	Canister Pressure in Field ("Hg) (Start)	Canister Pressure in Field ("Hg) (Stop)	Interior Temp. (F) (Start)	Interior Temp. (F) (Stop)	Flow Reg. ID	Can ID	Can Size (L)	Controller Flowrate (mL/min)	EPA TO - 15	EPA 18 MTBE/BTEX	EPA 25	Helium as tracer	O2/CO2	Library Search
								554	1							
Effluent-A-100715	1550	1550	-24.5	-4.5	65	65	—	1000	1	—		X	X			

(7) Instructions/QC Requirements & Comments

EPA 25 (check one)
☐ C1 - C4 ☒ C2 - C10
☐ C1 - C10 ☐ C4 - C10 (GRO)
☐ C2 - C4

Canisters Shipped by:	Date/Time:	Canisters Received by:	Date/Time:	Relinquished by:	Date/Time:	Received by:	Date/Time: (8)
[illegible] 11:21	10-5-15	[signature]	10/6/15	0900			
Relinquished by:	Date/Time:	Received by:	Date/Time:	Relinquished by:	Date/Time:	Received by:	Date/Time:
Relinquished by:	Date/Time:	Received by:	Date/Time:	Relinquished by:	Date/Time:	Received by: [signature]	Date/Time: 10/9/15 1040

eurofins | Lancaster Laboratories Environmental

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
µg	microgram(s)	**mg**	milligram(s)
mL	milliliter(s)	**L**	liter(s)
m3	cubic meter(s)	**µL**	microliter(s)
		pg/L	picogram/liter

< less than

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Laboratory Data Qualifiers:

B - Analyte detected in the blank
C - Result confirmed by reanalysis
E - Concentration exceeds the calibration range
J (or G, I, X) - estimated value ≥ the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P - Concentration difference between the primary and confirmation column >40%. The lower result is reported.
U - Analyte was not detected at the value indicated
V - Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference…

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

Contaminated Sites Program
Spill Prevention and Response Division
Alaska Department of Environmental Conservation

Laboratory Data Review Checklist for Air Samples

Completed by:	Rachelle Borne		
Title:	Field Tech 6	Date:	November 3, 2015
CS Report Name:	306456/FAIR Unocal O&M	Report Date:	October 27, 2015
Consultant Firm:	ARCADIS U.S., Inc		
Laboratory Name:	Eurofins Lancaster Laboratories Environmental	Laboratory Report Number:	1600647
DEC File Number:	102.38.004	DEC Haz ID:	1989310912101

1. Laboratory
   a. Did a NELAP-certified laboratory receive and perform all of the submitted sample analyses?
      ☑ Yes ☐ No ☐ N/A (Please explain.)

      Comments:

   b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses NELAP-approved?
      ☐ Yes ☐ No ☑ N/A (Please explain.)

      Comments:

      No analysis was sub-contracted.

2. Chain of Custody (COC)
   a. Was the COC information completed, signed and dated (including released/received by)?
      ☑ Yes ☐ No ☐ N/A (Please explain.)

      Comments:

   b. Was the correct analyses requested?
      ☑ Yes ☐ No ☐ N/A (Please explain.)

      Comments:

3. Laboratory Sample Receipt Documentation
   a. Was the sample condition documented? Were samples collected in gas-tight, opaque/dark Summa canisters or other DEC-approved containers? Was the canister vacuum/pressure checked, recorded upon receipt and were there no open valves?
      ☑ Yes ☐ No ☐ N/A (Please explain.)

   Comments:

   b. If there were any discrepancies, were they documented? Examples include incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, canister not holding a vacuum, etc.
      ☐ Yes ☐ No ☑ N/A (Please explain.)

   Comments:

   No discrepancies were noted.

   c. Was the data quality or usability affected? (Please explain.)

   Comments:

   Data quality/usability was not affected.

4. Case Narrative
   a. Is there a case narrative and is it understandable?
      ☐ Yes ☑ No ☐ N/A (Please explain.)

   Comments:

   There was no case narrative included in the report.

   b. Were there any discrepancies, errors or QC failures identified by the lab?
      ☐ Yes ☑ No ☐ N/A (Please explain.)

   Comments:

   c. Were all corrective actions documented?
      ☐ Yes ☐ No ☑ N/A (Please explain.)

   Comments:

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

   Comments:

   Data quality/usability was not affected.

5. Samples Results
   a. Was the correct analyses performed/reported as requested on COC?
      ☑ Yes ☐ No ☐ N/A (Please explain.)

   Comments:

   b. Were the samples analyzed within 30 days of collection or within the time required by the method?
      ☑ Yes ☐ No ☐ N/A (Please explain.)

   Comments:

   c. Are the reported PQLs less than the Target Screening Level or the minimum required detection level for the project?
      ☑ Yes ☐ No ☐ N/A (Please explain.)

   Comments:

   d. Was the data quality or usability affected?

   Comments:

   Data quality/usability was not affected.

6. QC Samples
   a. Method Blank
      i. Was one method blank reported per analysis and 20 samples?
      ☑ Yes ☐ No ☐ N/A (Please explain.)

   Comments:

      ii. Were all method blank results less than PQL?
      ☑ Yes ☐ No ☐ N/A (Please explain.)

   Comments:

      iii. If above PQL, what samples are affected?

   Comments:

   N/A.

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

☐ Yes ☐ No ☑ N/A (Please explain.)

Comments:

No data was affected.

v. Was the data quality or usability affected? (Please explain.)

Comments:

Data quality/usability was not affected.

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

i. Was there one LCS/LCSD or one LCS and a sample/sample duplicate pair reported per analysis and 20 samples?

☑ Yes ☐ No ☐ N/A (Please explain.)

Comments:

ii. Accuracy – Were all percent recoveries (%R) reported and within method or laboratory limits? What were the project specified DQOs, if applicable?

☑ Yes ☐ No ☐ N/A (Please explain.)

Comments:

iii. Precision – Were all relative percent differences (RPD) reported and were they less than method or laboratory limits? What were the project-specified DQOs, if applicable.

☑ Yes ☐ No ☐ N/A (Please explain.)

Comments:

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

Comments:

NA. No samples were affected.

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

☐ Yes ☐ No ☑ N/A (Please explain.)

Comments:

No samples were affected.

vi. Is the data quality or usability affected? (Please explain.)

Comments:

Data quality/usability was not afffected.

c. Surrogates

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

☐ Yes ☐ No ☑ N/A (Please explain.)

Comments:

No surrogates are reported for air sample analysis.

ii. Accuracy – Are all percent recoveries (%R) reported and within method or laboratory limits? What were the project-specified DQOs, if applicable?

☐ Yes ☐ No ☑ N/A (Please explain.)

Comments:

No surrogate recoveries were reported.

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

☐ Yes ☐ No ☑ N/A (Please explain.)

Comments:

No surrogates recoveries reported for air sample analysis.

iv. Was the data quality or usability affected? (Please explain.)

Comments:

Data quality/usability was not affected.

d. Field Duplicate

i. Was one field duplicate submitted per analysis and 10 type (soil gas, indoor air, etc.) samples?

☐ Yes ☑ No ☐ N/A (Please explain.)

Comments:

ii. Were they or was it submitted blind to the lab?

☐ Yes ☐ No ☑ N/A (Please explain.)

Comments:

No field duplicate was submitted for air sample analysis.

iii. Precision – Were all relative percent differences (RPD) less than the specified DQOs? (Recommended: 25 %)

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 ☑N/A (Please explain.)

Comments:

No field duplicate was submitted for air sample analysis.

iv. Was the data quality or usability affected? (Please explain.)

Comments:

Data quality/usability was not affected.

e. Field Blank (If not used, explain why.)

☐Yes ☐No ☑N/A (Please explain.)

Comments:

No field blank sample was submitted for air sample analysis.

i. Were all results less than the PQL?

☐Yes ☐No ☑N/A (Please explain.)

Comments:

No field blank sample was submitted for air sample analysis.

ii. If above PQL, what samples are affected?

Comments:

NA

iii. Was the data quality or usability affected? (Please explain.)

Comments:

Data quality/usability was not affected.

7. Other Data Flags/Qualifiers

a. Were other data flags/qualifiers defined and appropriate?

☐Yes ☐No ☑N/A (Please explain.)

Comments: