

**Chevron Environmental Management
Company**

**2012 Soil Vapor Assessment
Report**

Chevron Facility 306450

4351 Old International Airport Road
Anchorage, Alaska

Alaska DEC File No. 2100.26.115

June 19, 2013



A handwritten signature in blue ink, appearing to read "Eric Epple".

Eric Epple
Geologist II

A handwritten signature in blue ink, appearing to read "Greg Montgomery".

Greg Montgomery
Project Manager

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4351 Old International Airport Rd
Anchorage, Alaska
Alaska DEC No. 2100.26.115

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Chevron Environmental Management
Company

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Acronyms and Abbreviations

ADEC	Alaska Department of Environmental Conservation
ARCADIS	ARCADIS U.S., Inc.
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene and xylene
Chevron	Chevron Environmental Management Company
CL	cleanup level
Eurofins/Airtoxics	Eurofins Airtoxics, Ltd.
GRO	gasoline range organics
LCS	laboratory control sample
mL/min	milliliters per minute
QA	quality assurance
report	2012 Soil Vapor Assessment Report
RPD	relative percent difference
the site	former Chevron Facility 306450 located at 4351 Old International Airport Road, Anchorage, Alaska
SVE	soil vapor extraction
UST	underground storage tank
Work Plan	2010 Work Plan for Vapor Intrusion Assessment and Additional Monitoring Well Installation
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
the adjacent property	existing off-site building located at 4510 Old International Airport Road

1. Introduction

On behalf of Chevron Environmental Management Company (Chevron), ARCADIS U.S., Inc. (ARCADIS) has prepared this 2012 Soil Vapor Assessment Report (report) for the former Union Oil Service Station #5057, also known as Chevron Facility 306450 located at 4351 Old International Airport Road, Anchorage, Alaska (the Site). This report summarizes the second round of soil vapor sampling at the existing off-site building located at the adjacent 4510 Old International Airport Road (the Adjacent Property) to assess the vapor intrusion to indoor air pathway on the downgradient property. The work summarized in this report was completed in accordance with the *Alaska Department of Environmental Conservation (ADEC) Draft Vapor Intrusion Guidance for Contaminated Sites* (ADEC 2009), and the *2010 Work Plan for Vapor Intrusion Assessment and Additional Monitoring Well Installation* (ARCADIS, 2010) which was submitted to the ADEC on February 23, 2010 and approved by ADEC in a letter dated August 11, 2010. Soil vapor data was evaluated in accordance with the *ADEC Vapor Intrusion Guidance for Contaminated Sites* (ADEC 2012). The ADEC approval letter is presented in **Appendix A**.

The site and surrounding area, including the adjacent property, are shown on **Figure 1** and **Figure 2**. This work was conducted under the direction of ARCADIS employees who meet the criteria for a “qualified person” under ADEC guidance [18 AAC 75. 990 (100) and 18 AAC 78.995 (118)].

One previous round of soil vapor sampling was performed at the adjacent property and the results are presented in the *2011 Soil Vapor Assessment Report* (ARCADIS, 2011) and summarized in this report. This second round of soil vapor sampling was conducted in May 2012 to evaluate potential temporal variations of volatile constituents in soil vapor.

2. Site Description

Chevron Facility 306450 is located in a commercially developed area near the Ted Stevens Anchorage International Airport Property. The site currently consists of a vacant lot and is located at the intersection of Old International Airport Road and South Aircraft Drive in Anchorage, Alaska (**Figure 1** and **Figure 2**). Surrounding properties include Anchorage International Airport commercial offices and warehouses including the adjacent property located at 4510 Airport Road which is the focus for this soil vapor assessment.

Chevron Facility 306450 operated as a Union Oil service station from 1953 through 1988 when it was decommissioned. At this time all five petroleum underground storage tanks (USTs) with dispenser pumps and three vertical aboveground storage tanks (ASTs) containing petroleum were removed. One remaining UST is owned, and was abandoned in place, by the State of Alaska due to the close proximity to an onsite building. During facility decommissioning activities, approximately 2,800 cubic yards of petroleum hydrocarbon-impacted soil was removed from the site and disposed of. Limitations of the excavation equipment prevented the complete removal of all impacted soils in the former pump island and AST areas. Confirmation soil samples indicated petroleum hydrocarbon-impacted soils remain in place outside the excavation limits.

Constituents of potential concern (COPECs) in soil include gasoline range organics (GRO), diesel range organics (DRO), benzene, ethylbenzene, toluene, xylenes (BTEX, collectively), and naphthalene. A detailed site history and description of previous environmental activities has been presented in the 2011 *Soil Vapor Assessment* (ARCADIS, 2011).

The inferred groundwater flow direction for the second semiannual 2011 monitoring event is to the southwest, and is consistent with historical flow direction towards the south or southwest towards the adjacent property. Current and historical groundwater depth-to-water and elevation data are included in the *Second Semi-Annual 2011 Groundwater Monitoring Report* (ARCADIS, 2012).

3. Initial Soil Vapor Sampling

On June 20, 2011, three soil vapor probes VP-1 and VP-3 were installed with screened vapor probes centered at 5.0, 10.0 and 15.0 feet below ground surface (bgs). Soil vapor probe VP-2 was installed with screened vapor probes centered at 3.5 and 7.5 feet bgs. These soil vapor probe depths were selected to give a vertical gradient of soil vapor concentrations in the vadose zone and above the groundwater table to just below the ground surface. Boring logs for soil vapor probes VP-1, VP-2 and VP-3 are included in **Appendix B**.

Soil vapor sampling of soil vapor probes VP-1, VP-2 and VP-3 was completed on July 21, 2011. There were no detections of analyzed compounds above the respective ADEC target levels (TLs) for shallow and deep soil gas. The shallow and deep soil vapor analytical results are summarized in **Table 1** and on **Figure 3** and **Figure 4**.

4. Second Round of Soil Vapor Sampling

A second round of soil vapor samples were collected from probes VP-1, VP-2 and VP-3 on May 10, 2012 to account for temporal variability seen since the previous round of sampling conducted in July 2011. Soil vapor samples were collected from multi-level soil vapor probes VP-1 (5.0, 10.0 and 15.0 feet bgs), VP-2 (3.5 and 7.5 feet bgs) and VP-3 (5.0, 10.0, 15.0 feet bgs). This section summarizes the sampling procedures and analytical results of the May 2012 soil vapor sampling event.

4.1 Sampling Procedures

Sampling procedures for the May 2012 sampling round were the same as described in the *2011 Soil Vapor Assessment Report* (ARCADIS, 2011). Again, the onsite soil vapor extraction (SVE) system located at the former service station was turned off 48-hours prior to soil vapor probe sampling in order to allow potential concentrations of volatile constituents to return to equilibrium and eliminate potential subsurface vapor influences from the recovery system during soil vapor sampling.

During soil vapor sample collection, the well head and entire sampling train (valves, tubing, fittings, gauges and SUMMA™ canister) were placed in an enclosure. Helium, used as a tracer compound for a leak test for each soil vapor sample collected. Leak testing methods are described below in section 5.1.

Purging consisted of removing approximately three volumes of stagnant soil vapor using a personal sample pump. The purge volume was calculated based on the dimensions of the aboveground gauges, tubing, sampling equipment and below ground tubing.

Following purging, the soil vapor sample was then collected using a 6-liter SUMMA canister with a laboratory-provided flow regulator set to approximately 200 milliliters per minute (mL/min) for a sampling period of approximately 30 minutes. Laboratory-supplied SUMMA canisters were individually tested and certified (100 percent certified) by the laboratory prior to field receipt. Initial and final vacuum gauge readings were taken for each sample and recorded on the soil gas sample collection logs included in **Appendix C**. The laboratory certification documents are included in **Appendix D**.

One duplicate sample was collected in-line with their parent samples via laboratory-supplied duplicate tee fittings. The parent 6-liter SUMMA canisters and the duplicate 6-liter SUMMA canisters were sampled concurrently.

One equipment blank sample was collected by transferring the contents of a laboratory-provided 6-liter pressurized SUMMA canister to an evacuated 6-liter SUMMA canister. Transfer was achieved using a section of Teflon-lined polyethylene tubing from the batch of tubing used during the sampling event.

Two ambient air samples (AMB UP and AMB DOWN) were collected using evacuated 6-liter SUMMA canisters with laboratory-supplied flow controllers set to approximately 200 mL/min. The samples were collected at one location upwind (southwest of soil vapor probe VP-1 at the southwest corner of the off-site property boundary) and one location downwind (north of soil vapor probe VP-1 at the northeast corner of the off-site adjacent property building) of the site to assess any potential background contributions present in ambient air. Ambient air sample locations are presented on Figure 2.

The soil vapor samples and ambient air samples were shipped to Eurofins AirToxics, Ltd. (Eurofins/Airtoxics) in Folsom, California for the following analyses:

- Benzene, Toluene, Ethylbenzene, Total Xylenes (BTEX, collectively), naphthalene and total petroleum hydrocarbons in the gasoline range organics (GRO) by USEPA Method TO-15
- Oxygen, methane, carbon dioxide and helium by ASTM Method D-1946

4.2 Soil Vapor Screening Levels

Soil vapor data were compared to target levels (TLs) presented in Appendix E and Appendix F of the 2009 ADEC *Draft Vapor Intrusion Guidance for Contaminated Sites* (ADEC 2009c) and the 2012 ADEC *Vapor Intrusion Guidance for Contaminated Sites* (ADEC 2012). These TLs are conservative, risk-based screening levels that have been developed by the ADEC using chemical-specific parameters identified in the ADEC's Cleanup Level Guidance. Data in exceedance of these TLs may indicate further evaluation is needed (ADEC 2012). The samples collected from 3.5 and 5.0 feet below ground surface (bgs) were compared to commercial shallow soil gas screening levels. The samples collected from 7.5, 10.0 and 15.0 feet bgs were compared to commercial deep soil gas screening levels.

4.3 Soil Vapor Analytical Results

There were no detections of analyzed compounds above the respective laboratory reporting limits for shallow or deep soil gas for vapor probes VP-1 (5.0, 10.0 and 15.0

feet bgs), VP-2 (3.5 and 7.5 feet bgs) and VP-3 (5.0, 10.0 and 15.0 feet bgs) collected in 2012. Laboratory reporting limits were established below the respective ADEC soil vapor TLs with Eurofins/Airtoxics prior to soil vapor sample collection. Shallow and deep soil vapor analytical results for both the current (May 10, 2012) and previous sampling round (July 21, 2011) are summarized on **Table 1**, **Figure 3** and **Figure 4**. The soil vapor analytical laboratory report from the May 2012 soil vapor sampling event is included in **Appendix E** and the associated ADEC laboratory data review checklist is included in **Appendix F**.

4.4 Fixed Gases and Biodegradation

The presence and concentration of methane, oxygen and carbon dioxide can be indications of biodegradation of volatile organics in the subsurface. Due to low concentrations of volatile organic compounds and carbon dioxide with near atmospheric concentrations of oxygen, the potential for biodegradation of vapors in the vicinity of soil vapor probes VP-1, VP-2 and VP-3 is inconclusive. An attenuation factor from biodegradation is not applied to the results presented in this report. Fixed gas concentrations are included in **Table 2** for both the current (May 10, 2012) and previous sampling round (July 21, 2011) and on **Figure 5**. The fixed gas laboratory report from the May 2012 soil vapor sampling event is included in **Appendix G** and the associated ADEC laboratory data review checklist is included in **Appendix H**.

4.5 Ambient Air Analytical Results

Two ambient air samples (AMB UP and AMB DOWN) were collected during the May 2012 soil vapor sampling event to assess potential background sources present in ambient air. The approximate locations of the ambient air samples are included on **Figure 7**. The upwind ambient air sample (AMB UP) was not analyzed due to airport security removing and potentially tampering with the ambient air sample during collection.

BTEX, naphthalene and GRO were not detected at concentrations above the laboratory reporting limits in the downwind ambient (AMB DOWN) air sample which was collected successfully without incident. There are no screening levels established by ADEC for outdoor ambient air samples. The ambient air analytical data are included in **Table 1** and on **Figure 6**.

5. Soil Vapor Sampling Data Quality Assurance

For data quality assurance (QA) purposes, multiple QA techniques were employed during the May 2011 soil vapor sampling event. A leak test was performed during each soil vapor sample collection period to ensure the integrity of the sampling system and to demonstrate that ambient air was not being permitted into the sampling train or entering the subsurface, potentially biasing the samples. In addition, an equipment blank was submitted during the leak test to assess background contamination due to equipment.

5.1 Leak Test Analytical Results

A leak test was performed at each sampling location with the exception of the ambient air samples and equipment blank. The respective well head and entire sampling train (valves, tubing, fittings, gauges and SUMMA canister) were placed within an enclosure. Helium, used as the tracer compound for the leak test, was then permitted into the enclosure and monitored for concentration stability with a helium detector. Helium concentrations were maintained at approximately 10 to 15 percent for the duration of sampling at each location.

Helium was not detected above the laboratory detection limit in the samples collected from soil vapor probes VP-1 and VP-3. Helium was detected at a concentration of 0.094 percent by volume (%v) in the soil vapor sample collected from soil vapor probe VP-2 at 7.5 feet bgs. The percent leakage was calculated using the following formula:

$$\% \text{ Leakage} = \frac{\text{Helium Concentration in Sample (\%)}}{\text{Helium Concentration in Shroud (\%)}} * 100$$

The estimated percent leakage for the soil vapor sample collected from VP-2 at 7.5 feet bgs was 0.63 to 0.94 %v. The estimated percent leakage for the soil vapor samples collected from VP-1 and VP-3 ranged from less than 0.49 to less than 1.4 %v. According to the ADEC *Draft Vapor Intrusion Guidance for Contaminated Sites* leakage can be considered present when the tracer compound is present in the test sample at more than 10 percent of the source concentration. This indicates that the integrity of the sampling train was maintained throughout sampling and confirms the absence or nominal contribution of atmospheric leakages into the samples. Helium analytical are summarized in **Table 2**.

5.2 Equipment Blank Analytical Results

There were no detections of the analyzed compounds in the equipment blank sample above their respective laboratory reporting limits with the exception of oxygen which was detected at a concentration of 1.5 %v. Analytical results for QA samples are summarized in **Table 1** and **Table 2**.

6. Laboratory Data Quality Assurance Summary

As required by the ADEC (Technical Memorandum 06-002, dated August 20, 2008), ARCADIS completed a laboratory data review checklist for the each of the Eurofins/AirToxics laboratory reports from the May 2012 soil vapor sampling event. The laboratory reports and associated data review checklists are included in **Appendix F** and **Appendix H**, respectively. The following QA summary describes six parameters related to the quality and usability of the data presented in this report.

6.1 Precision

Based on the laboratory control sample (LCS) and LCS duplicate relative percent differences (RPDs), the data meet precision objectives. One soil vapor duplicate sample was collected during the May 2012 soil vapor sampling event. The blind duplicate sample collected from soil vapor probe VP-1 at 15 feet bgs (labeled BD-1) was comparable to the parent sample. One fixed gas/tracer gas duplicate was collected during the May 2012 event. The blind duplicate collected from soil vapor probe VP-1 at 15 feet bgs (labeled BD-1) was comparable to the parent sample. The RPDs for the analyzed compounds were not determined because the compounds were less than the laboratory reporting limits. The laboratory reporting limits for the parent and duplicate sample were the same.

6.2 Accuracy

The data met accuracy objectives as indicated by the LCS, which were within method/laboratory reporting limits. An equipment blank sample was collected during the soil vapor sampling event and the results were less than the laboratory detection limits, with the exceptions detailed in Section 3.2. Data quality or usability does not appear to be affected.

6.3 Representativeness

The data appear to be representative of site conditions and are generally consistent with expected impacts to soil.

6.4 Comparability

These data are reported using the same units and formats as previous monitoring reports to allow for comparison.

6.5 Completeness

The results appear to be valid and usable; thus, the laboratory results have 100 percent completeness.

6.6 Sensitivity

The sensitivity of the analyses was adequate for the samples as the detection limits were less than the ADEC target soil vapor levels for those compounds that were not detected.

7. Management of Assessment-Derived Waste

General waste from soil vapor sampling activities was containerized in onsite plastic trash bags. General waste was taken off site and disposed of through proper disposal procedures.

8. Updated Site Conceptual Model

The site is located in a commercially developed area. Impacted groundwater extends through the middle of the site, westerly from the former tank locations. The environmental impact caused by the release of petroleum hydrocarbons at the site is believed to be limited to groundwater and soil. The current potential receptors are commercial or industrial workers, and site visitors or trespassers.

The future potential receptors include commercial or industrial workers, site visitors, trespassers and construction workers. Other receptors that were considered and were ruled out include potential future residents, farmers or subsistence harvesters, and subsistence consumers. These receptors were excluded because the site is located in a commercial/industrial area of Anchorage.

The adjacent property (4510 Old International Airport Road) is located in a commercially developed area, just south of the site. Soil samples collected during the vapor probe installation did not contain concentrations of the analyzed compounds above their respective ADEC soil CLs. During the July 2011 soil vapor sampling event sample results from shallow and deep soil gas did not exceed their respective ADEC TLs for commercial use, but toluene was present above the reporting limits. The concentrations of toluene exceeded the reporting limits in soil vapor probe VP-1 at 10 feet bgs ($3.0 \mu\text{g}/\text{m}^3$), VP-1 at 15 feet bgs ($5.1 \mu\text{g}/\text{m}^3$) and VP-3 at 10 feet bgs ($18 \mu\text{g}/\text{m}^3$), respectively. GRO was detected above the reporting limits in soil vapor probe VP-3 at 10 feet bgs ($530 \mu\text{g}/\text{m}^3$) and 15 feet bgs ($210 \mu\text{g}/\text{m}^3$), respectively. The remaining concentrations did not exceed their respective reporting limits.

During the May 2012 sampling event, concentrations of constituents in shallow and deep soil vapor did not exceed the respective laboratory reporting limits. The laboratory reporting limits were less than the respective ADEC TLs for shallow and deep soil gas considering commercial usage of the property. A completed ADEC conceptual site model and scoping forms are presented in **Appendix I**.

9. Conclusions

Three multilevel soil vapor probes (VP-1, VP-2 and VP-3) were installed at the adjacent property (4510 Old International Airport Road) in June 2011. Soil vapor probes VP-1, VP-2 and VP-3 were initially sampled in July 2011. Soil vapor samples did not contain concentrations of the analyzed compounds above their respective ADEC TLs for shallow and deep soil gas.

Soil vapor probes VP-1, VP-2 and VP-3 were sampled again in May 2012 to assess potential temporal variations in volatile constituents in soil vapor. There were no detections of analyzed compounds above laboratory detection limits, or ADEC TLs, for shallow or deep soil gas at vapor probes VP-1 (5.0, 10.0 and 15.0 feet bgs), VP-2 (3.5 and 7.5 feet bgs) and VP-3 (5.0, 10.0 and 15.0 feet bgs).

Based on the analytical soil vapor data collected to date (July 2011 and May 2012), concentrations of volatile constituents in soil vapor do not pose an unacceptable health risk to commercial workers in the 4510 Old International Airport Road building, located immediately adjacent to former Chevron Facility 306450. Based on the lack of detected constituents in soil vapor samples, the vapor intrusion to indoor air pathway for this adjacent proper is incomplete. ARCADIS recommends soil vapor probes VP-1, VP-2 and VP-3 be decommissioned by removing the soil vapor probe tubing, caps and well boxes and finishing the area with a concrete patch.

References

Alaska Department of Environmental Conservation. 2009a Cleanup Level Guidance.

Alaska Department of Environmental Conservation. 2009b. 18 AAC 75.355, Tables B1-B2; Register 188, January 2009, and Technical Memorandum 02-

Alaska Department of Environmental Conservation. 2009c. Draft Vapor Intrusion Guidance for Contaminated Sites. Division of Spill Prevention and Response Contaminated Sites Program (E-1, E-2, F-1, F-2), July 2009.

Alaska Department of Environmental Conservation. 2012. Vapor Intrusion Guidance for Contaminated Sites. Division of Spill Prevention and Response Contaminated Sites Program (E-1, E-2, F-1, F-3), October 2012.

ARCADIS U.S., Inc. 2010a. 2010 Work Plan for Vapor Intrusion Assessment and Additional Monitoring Well Installation. September 28.

ARCADIS U.S., Inc. 2011 Soil Vapor Assessment Report, Former Chevron Facility 306450. March 2012.

ARCADIS U.S., Inc. 2011 Second Semi-Annual 2011 Groundwater Monitoring Report, Former Chevron Facility 306450. June 2012.

Tables

Table 1

Soil Vapor Analytical Data
Chevron Facility 306450
4351 Old International Airport Road
Anchorage, Alaska

USEPA Method TO-15								
Vapor Probe	Depth (ft)	Sample Date	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	Total Petroleum Hydrocarbon as Gasoline
2009 ADEC Target Levels for Shallow Soil Gas¹			160	219,000	1,100	4,400	36	NS
2012 ADEC Target Levels for Shallow Soil Gas²			160	219,000	490	4,400	36	NS
VP-1	5.0	07/21/11	<2.5	<3.0	<3.4	<6.8	<16	<160
		05/10/12	<4.4	<5.2	<6.0	<12	<29	<280
VP-2	3.5	07/21/11	<2.5	<2.9	<3.4	<6.8	<16	<160
		05/10/12	<2.5	<2.9	<3.4	<6.8	<16	<160
VP-3	5.0	07/21/11	<2.7	<3.2	<3.7	<7.4	<18	<170
		05/10/12	<2.4	<2.8	<3.2	<6.4	<16	<150
2009 ADEC Target Levels for Deep Soil Gas³			1,600	2,190,000	110,000	44,000	360	NS
2012 ADEC Target Levels for Deep Soil Gas⁴			1,600	2,190,000	4,900	44,000	360	NS
VP-1	10.0	07/21/11	<2.4	3.0	<3.3	<6.6	<16	<160
		05/10/12	<2.5	<2.9	<3.4	<6.8	<16	<160
	15.0	07/21/11	<2.6	5.1	<3.5	<7.0	<17	<160
		07/21/11 ^D	<2.5	<3.0	<3.4	<6.8	<16	<160
		05/10/12	<2.5	<3.0	<3.4	<6.8	<16	<160
		05/10/12 ^D	<2.5	<3.0	<3.4	<6.8	<16	<160
VP-2	7.5	07/21/11	<2.4	<2.9	<3.3	<6.6	<16	<160
		05/10/12	<2.6	<3.0	<3.5	<7.0	<17	<160
VP-3	10.0	07/21/11	<2.5	18	<3.4	5.4	<16	530
		05/10/12	<2.6	<3.0	<3.5	<7.0	<17	<160
	15.0	07/21/11	<2.7	<3.2	<3.6	<7.2	<18	210
		05/10/12	<2.5	<2.9	<3.4	<6.8	<16	<160

Table 1

Soil Vapor Analytical Data
Chevron Facility 306450
4351 Old International Airport Road
Anchorage, Alaska

USEPA Method TO-15								
Vapor Probe	Depth (ft)	Sample Date	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	Total Petroleum Hydrocarbon as Gasoline
Soil Vapor QA/QC Samples								
AMB-UP	--	07/21/11	<2.5	<3.0	<3.4	<6.8	<16	<160
AMB-DOWN	--	07/21/11	<2.5	<2.9	<3.4	<6.8	<16	<160
		05/10/12	<2.5	<3.0	<3.4	<6.8	<16	<160
EQUIP-BLANK	--	07/21/11	<3.2	<3.8	<4.4	<8.8	<21	<200
		05/10/12	<2.9	<3.4	<4.0	<8.0	<19	<190

Notes:

Results are reported in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$)

Depth (ft) = Depth feet below ground surface

Compounds which were not detected above their respective laboratory reporting limit for any of the vapor probe samples are not summarized in this table

Highlighted values indicate an exceedance of the respective ADEC Target Level

Samples are analyzed by USEPA Method TO-15

¹ADEC Target Levels for Shallow Soil Gas (Commercial), Appendix E, *Draft Vapor Intrusion Guidance for Contaminated Sites*, July 2009.

²ADEC Target Levels for Shallow Soil Gas (Commercial). Appendix E. *Vapor Intrusion Guidance for Contaminated Sites*, October 2012

³ADEC Target Levels for Deep Soil Gas (Commercial), Appendix F, *Draft Vapor Intrusion Guidance for Contaminated Sites*, July 2009.

⁴ADEC Target Levels for Deep Soil Gas (Commercial). Appendix F. *Vapor Intrusion Guidance for Contaminated Sites*, October 2012

^DDuplicate of the preceding sample

< = not detected greater than the laboratory reporting limit

"--" = not analyzed/not applicable

NS = no screening level established

AMB-UP = sample taken upwind

AMB-DOWN = sample taken downwind

Table 2

Fixed Gases and Tracer Gas
Chevron Facility 306450
4351 Old International Airport Road
Anchorage, Alaska

			ASTM D-1946					
			Fixed Gases			Tracer Gas		
Sample	Depth (ft)	Sample Date	Methane	Oxygen	Carbon Dioxide	Helium	Appx. Helium Shroud Concentration	ASTM D-1946 Leakage ¹
Shallow Soil Gas								
VP-1	5.0	07/21/11	<0.00016	20	0.51	<0.079	15-25	<0.32 - <0.53
		05/10/12	<0.00028	21	0.13	<0.14	10-15	<0.93 - <1.4
VP-2	3.5	07/21/11	<0.00019	21	0.29	<0.097	10-20	<0.49 - <0.97
		05/10/12	<0.00016	23	0.075	<0.078	10-15	<0.52 - <0.78
VP-3	5.0	07/21/11	<0.00017	20	1.1	<0.086	10-20	<0.43 - <0.86
		05/10/12	<0.00015	22	0.50	<0.074	10-15	<0.49 - <0.74
Deep Soil Gas								
VP-1	10.0	07/21/11	0.00015	21	0.34	<0.076	15-25	<0.30 - <0.51
		05/10/12	<0.00021	23	0.23	<0.10	10-15	<0.67 - <1.0
	15.0	07/21/11	<0.00016	21	0.34	<0.080	15-30	<0.27 - <0.53
		07/21/11 ^D	<0.00016	21	0.35	<0.079	15-30	<0.26 - <0.53
		05/10/12	<0.00016	22	0.32	<0.079	10-15	<0.53 - <0.79
05/10/12 ^D	<0.00016	22	0.32	<0.079	10-15	<0.53 - <0.79		
VP-2	7.5	07/21/11	<0.00018	21	0.30	<0.092	10-20	<0.46 - <0.92
		05/10/12	<0.00016	22	0.080	0.094	10-15	0.63 - 0.94
VP-3	10.0	07/21/11	<0.00016	21	0.83	<0.079	10-20	<0.40 - <0.79
		05/10/12	<0.00016	22	0.58	<0.080	10-15	<0.53 - <0.80
	15.0	07/21/11	<0.00017	20	0.91	<0.084	10-20	<0.42 - <0.84
		05/10/12	<0.00016	22	0.81	<0.078	10-15	<0.52 - <0.78
Soil Vapor QA/QC Sample								
AMB-UP	--	07/21/11	0.00020	22	0.038	<0.079	--	--
AMB-DOWN	--	07/21/11	0.00019	22	0.039	<0.078	--	--
		05/10/12	0.00021	23	0.041	<0.079	--	--
Equipment Blank	--	07/21/11	<0.00020	0.2	<0.020	<0.100	--	--
		05/10/12	<0.00018	1.5	<0.018	<0.092	--	--

Notes:

Results are reported in percentage by volume (%v)

Depth (ft) = Depth feet below ground surface

¹Percent Leakage = (Helium Concentration in Sample) / (Helium Concentration in Shroud) * 100

^DDuplicate of the preceding sample

< = not detected greater than the laboratory reporting limit

"--" = not analyzed

AMB-UP = Sample taken upwind

AMB-DOWN = sample taken downwind

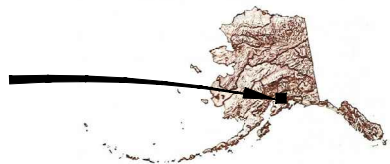
Figures



LEGEND

 GROUNDWATER FLOW DIRECTION

SITE LOCATION



CHEVRON FACILITY #306450
 4351 OLD INTERNATIONAL AIRPORT RD., ANCHORAGE, AK.
2012 SOIL VAPOR INVESTIGATION REPORT

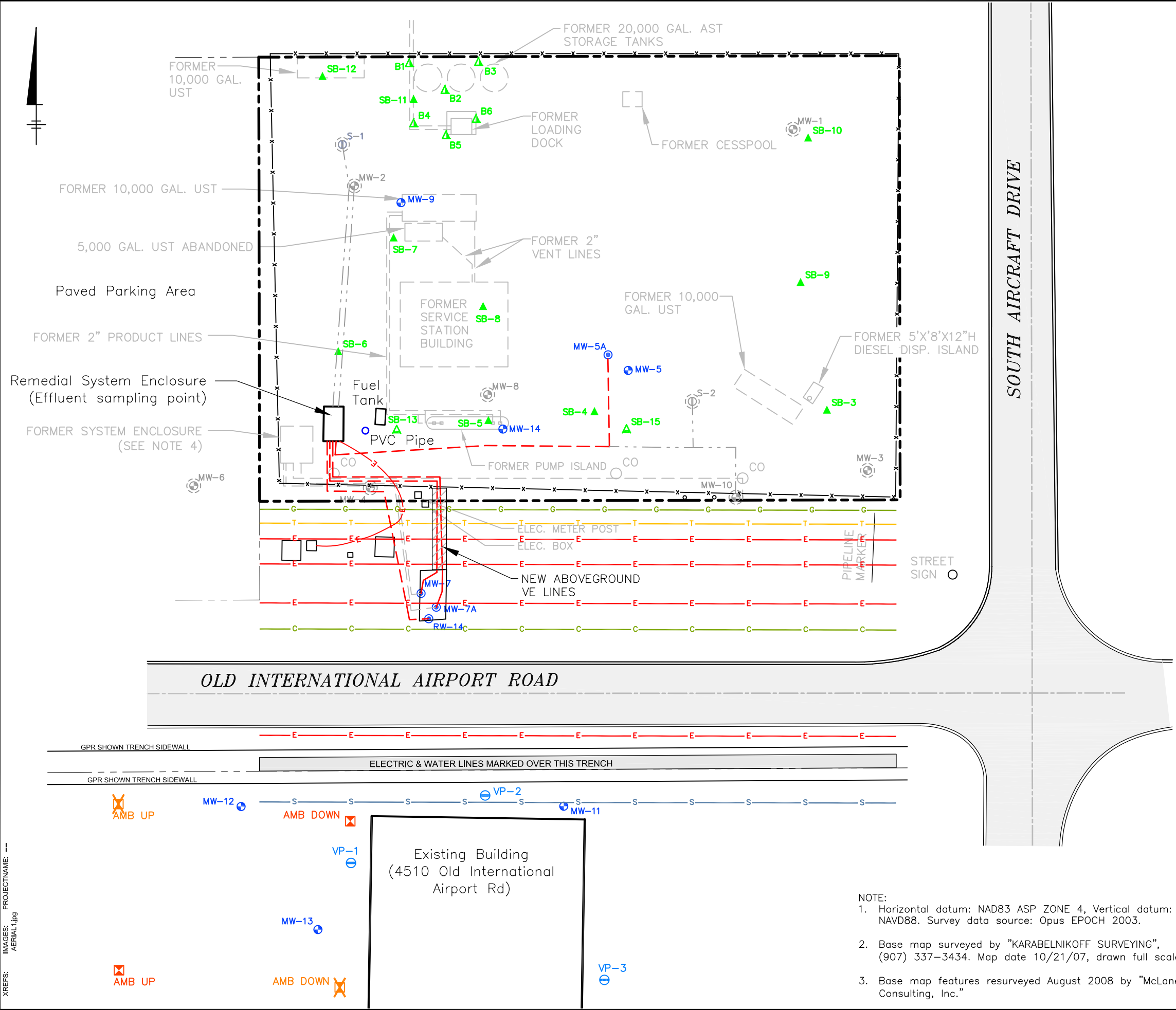
SITE LOCATION MAP



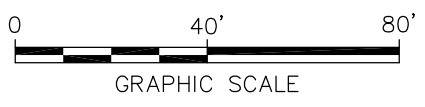
FIGURE

1

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 XREFS: IMAGES: AERIAL1.jpg PROJECTNAME:



- ### LEGEND
- PROPERTY LINE
 - CHAIN LINK FENCE (TYPICAL)
 - GROUNDWATER MONITORING WELL
 - SVE WELL
 - ABANDONED OR DESTROYED WELL
 - ABANDONED AIR SPARGE WELL
 - VES LINE CLEANOUT
 - SOIL BORING (1996)
 - SOIL BORING (2007)
 - SOIL BORING (2008)
 - FORMER BELOW GROUND PRODUCT RECOVERY LINE AND EMERGENCY RETURN LINE (3/8" DIA.)
 - FORMER BELOW GROUND AS/SVE LINE (2" DIA.)
 - BELOW GROUND SVE LINE (2" DIA.)
 - ABOVEGROUND SVE LINE (2" DIA.)
 - AMBIENT AIR SAMPLE LOCATION (07/21/2011)
 - AMBIENT AIR SAMPLE LOCATION (05/10/2012)
 - VAPOR PROBE (VP)
 - VE PROTECTIVE BERM WITH CONDUIT
 - NATURAL GAS LINE
 - TELECOM LINE
 - ELECTRICAL LINE
 - PETROLEUM PIPELINE
 - SEWER LINE



CHEVRON FACILITY #306450
 4351 OLD INTERNATIONAL AIRPORT RD., ANCHORAGE, AK.
2012 SOIL VAPOR INVESTIGATION REPORT

SITE PLAN

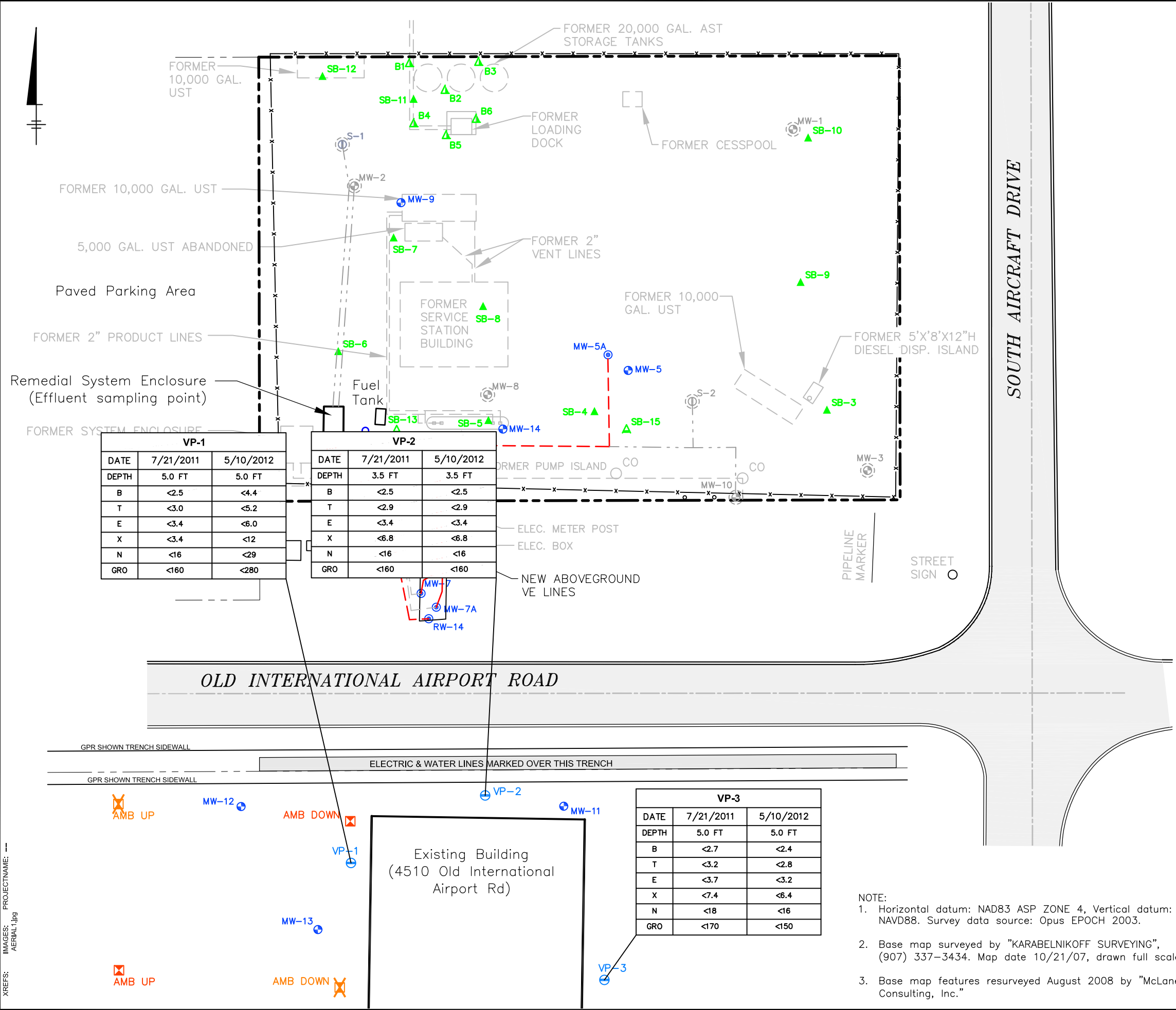


FIGURE
2

- NOTE:
1. Horizontal datum: NAD83 ASP ZONE 4, Vertical datum: NAVD88. Survey data source: Opus EPOCH 2003.
 2. Base map surveyed by "KARABELNIKOFF SURVEYING", (907) 337-3434. Map date 10/21/07, drawn full scale.
 3. Base map features resurveyed August 2008 by "McLane Consulting, Inc."

Existing Building
 (4510 Old International
 Airport Rd)

CITY: (Recd) DIV: (GROUP) (Recd) DB: (Recd) LD: (Opt) PIC: (Opt) PM: (Recd) TM: (Opt) LYR: (Opt) ON: (Off) REF: G:\ENVCAD\TAMPAACT\Chevron\USA\Chevron_306450\0004508801.dwg LAYOUT: 3 SAVER: 6/29/2012 9:55 AM ACADVER: 18.15 (LMS TECH) PAGES: 18 PLT: PLTCTB PLOT: PLOTSTYLETABLE: PLT: FULL.CTB PLOTTED: 6/25/2013 1:12 PM BY: RICHARDS, JIM XREFS: IMAGES: AERIAL1.jpg PROJECTNAME: --



LEGEND

- PROPERTY LINE
- x-x- CHAIN LINK FENCE (TYPICAL)
- ⊕ GROUNDWATER MONITORING WELL
- ⊙ SVE WELL
- ⊙ ABANDONED OR DESTROYED WELL
- ⊙ ABANDONED AIR SPARGE WELL
- VES LINE CLEANOUT
- ▲ SOIL BORING (1996)
- ▲ SOIL BORING (2007)
- ▲ SOIL BORING (2008)
- - - - - FORMER BELOW GROUND PRODUCT RECOVERY LINE AND EMERGENCY RETURN LINE (3/8" DIA.)
- - - - - FORMER BELOW GROUND AS/SVE LINE (2" DIA.)
- - - - - BELOW GROUND SVE LINE (2" DIA.)
- - - - - ABOVEGROUND SVE LINE (2" DIA.)
- ⊗ AMBIENT AIR SAMPLE LOCATION (07/21/2011)
- ⊗ AMBIENT AIR SAMPLE LOCATION (05/10/2012)
- ⊕ VAPOR PROBE (VP)
- ▨ VE PROTECTIVE BERM WITH CONDUIT

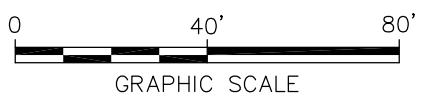
VP-1		
DATE	7/21/2011	5/10/2012
DEPTH	5.0 FT	5.0 FT
B	<2.5	<4.4
T	<3.0	<5.2
E	<3.4	<6.0
X	<3.4	<12
N	<16	<29
GRO	<160	<280

VP-2		
DATE	7/21/2011	5/10/2012
DEPTH	3.5 FT	3.5 FT
B	<2.5	<2.5
T	<2.9	<2.9
E	<3.4	<3.4
X	<6.8	<6.8
N	<16	<16
GRO	<160	<160

VP-3		
DATE	7/21/2011	5/10/2012
DEPTH	5.0 FT	5.0 FT
B	<2.7	<2.4
T	<3.2	<2.8
E	<3.7	<3.2
X	<7.4	<6.4
N	<18	<16
GRO	<170	<150

SAMPLE LOCATION	
DATE	SAMPLE DATE
DEPTH	SAMPLE DEPTH
B	BENZENE
T	TOLUENE
E	ETHYLBENZENE
X	TOTAL XYLENES
N	NAPHTHALENE
GRO	TPH IN THE GASOLINE RANGE ORGANICS

RESULTS REPORTED IN MICROGRAMS PER CUBIC METER (µg/m³)
 TPH - TOTAL PETROLEUM HYDROCARBON



- NOTE:
- Horizontal datum: NAD83 ASP ZONE 4, Vertical datum: NAVD88. Survey data source: Opus EPOCH 2003.
 - Base map surveyed by "KARABELNIKOFF SURVEYING", (907) 337-3434. Map date 10/21/07, drawn full scale.
 - Base map features resurveyed August 2008 by "McLane Consulting, Inc."

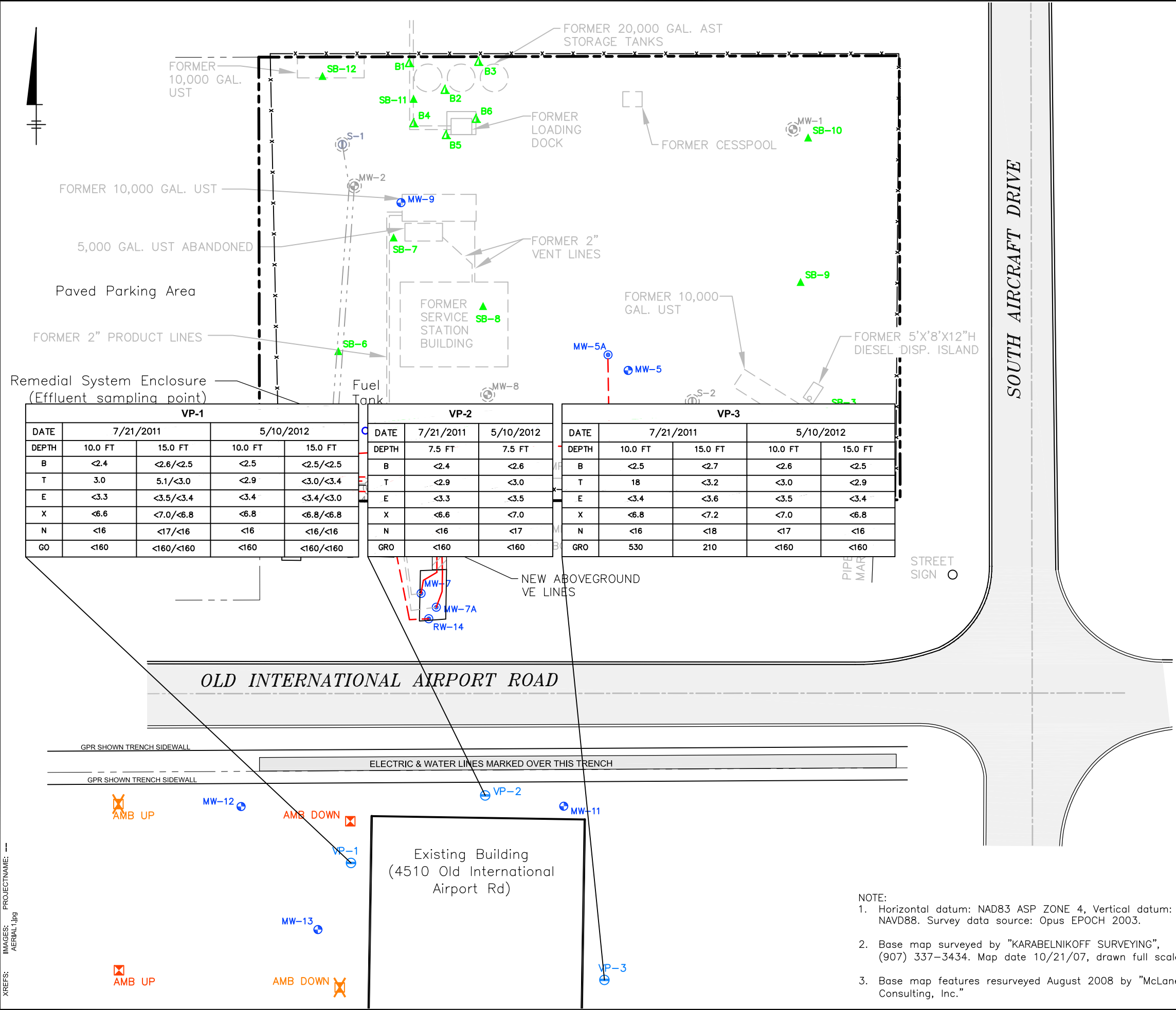
CHEVRON FACILITY #306450
 4351 OLD INTERNATIONAL AIRPORT RD., ANCHORAGE, AK.
2012 SOIL VAPOR INVESTIGATION REPORT

SOIL VAPOR ANALYTICAL SUMMARY - SHALLOW SOIL GAS

ARCADIS

FIGURE **3**

CITY:(Recd) DIV:(GROUP):(Recd) DB:(Recd) LD:(Opt) PIC:(Opt) PNR:(Recd) TMI:(Recd) LYR:(Opt)ON#="OFF"="REF"
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 XREFS: IMAGES: AERIAL.jpg PROJECTNAME: --



LEGEND

- PROPERTY LINE
- CHAIN LINK FENCE (TYPICAL)
- GROUNDWATER MONITORING WELL
- SVE WELL
- ABANDONED OR DESTROYED WELL
- ABANDONED AIR SPARGE WELL
- VES LINE CLEANOUT
- SOIL BORING (1996)
- SOIL BORING (2007)
- SOIL BORING (2008)
- FORMER BELOW GROUND PRODUCT RECOVERY LINE AND EMERGENCY RETURN LINE (3/8" DIA.)
- FORMER BELOW GROUND AS/SVE LINE (2" DIA.)
- BELOW GROUND SVE LINE (2" DIA.)
- ABOVEGROUND SVE LINE (2" DIA.)
- AMBIENT AIR SAMPLE LOCATION (07/21/2011)
- AMBIENT AIR SAMPLE LOCATION (05/10/2012)
- VAPOR PROBE (VP)
- VE PROTECTIVE BERM WITH CONDUIT

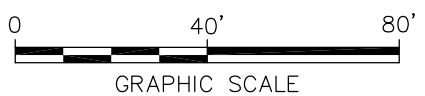
VP-1				
DATE	7/21/2011		5/10/2012	
DEPTH	10.0 FT	15.0 FT	10.0 FT	15.0 FT
B	<2.4	<2.6/<2.5	<2.5	<2.5/<2.5
T	3.0	5.1/<3.0	<2.9	<3.0/<3.4
E	<3.3	<3.5/<3.4	<3.4	<3.4/<3.0
X	<6.6	<7.0/<6.8	<6.8	<6.8/<6.8
N	<16	<17/<16	<16	<16/<16
GO	<160	<160/<160	<160	<160/<160

VP-2		
DATE	7/21/2011	5/10/2012
DEPTH	7.5 FT	7.5 FT
B	<2.4	<2.6
T	<2.9	<3.0
E	<3.3	<3.5
X	<6.6	<7.0
N	<16	<17
GRO	<160	<160

VP-3				
DATE	7/21/2011		5/10/2012	
DEPTH	10.0 FT	15.0 FT	10.0 FT	15.0 FT
B	<2.5	<2.7	<2.6	<2.5
T	18	<3.2	<3.0	<2.9
E	<3.4	<3.6	<3.5	<3.4
X	<6.8	<7.2	<7.0	<6.8
N	<16	<18	<17	<16
GRO	530	210	<160	<160

SAMPLE LOCATION	
DATE	SAMPLE DATE
DEPTH	SAMPLE DEPTH
B	BENZENE
T	TOLUENE
E	ETHYLBENZENE
X	TOTAL XYLENES
N	NAPHTHALENE
GRO	TPH IN THE GASOLINE RANGE ORGANICS

RESULTS REPORTED IN MICROGRAMS PER CUBIC METER (µg/m³)
 TPH - TOTAL PETROLEUM HYDROCARBON
 <2.4/<2.6 = DUPLICATE SAMPLE



OLD INTERNATIONAL AIRPORT ROAD

Existing Building
 (4510 Old International Airport Rd)

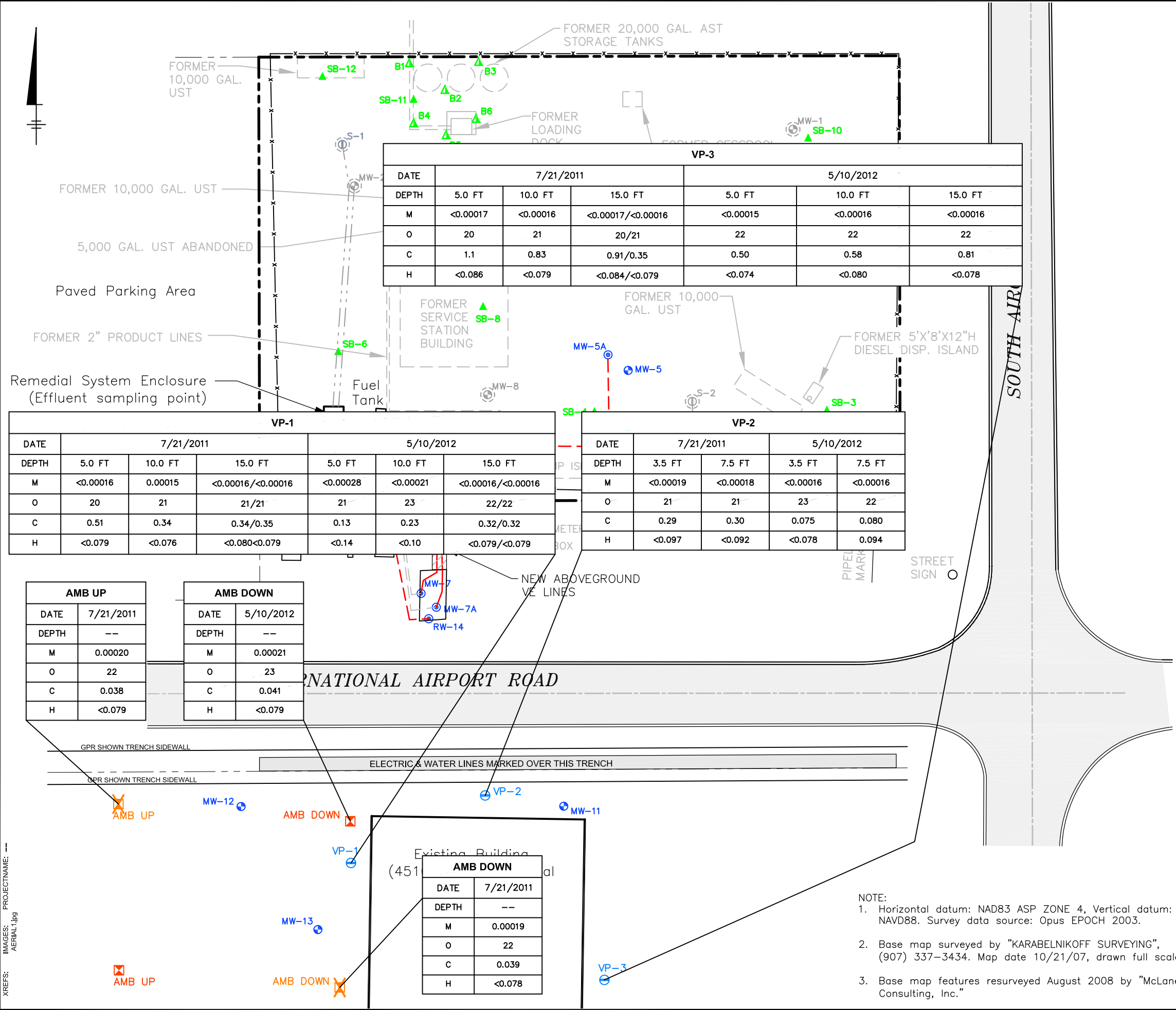
- NOTE:
- Horizontal datum: NAD83 ASP ZONE 4, Vertical datum: NAVD88. Survey data source: Opus EPOCH 2003.
 - Base map surveyed by "KARABELNIKOFF SURVEYING", (907) 337-3434. Map date 10/21/07, drawn full scale.
 - Base map features resurveyed August 2008 by "McLane Consulting, Inc."

CHEVRON FACILITY #306450
 4351 OLD INTERNATIONAL AIRPORT RD., ANCHORAGE, AK.
2012 SOIL VAPOR INVESTIGATION REPORT

SOIL VAPOR ANALYTICAL SUMMARY - DEEP SOIL GAS



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LEGEND

- PROPERTY LINE
- CHAIN LINK FENCE (TYPICAL)
- GROUNDWATER MONITORING WELL
- SVE WELL
- ABANDONED OR DESTROYED WELL
- ABANDONED AIR SPARGE WELL
- VES LINE CLEANOUT
- SOIL BORING (1996)
- SOIL BORING (2007)
- SOIL BORING (2008)
- FORMER BELOW GROUND PRODUCT RECOVERY LINE AND EMERGENCY RETURN LINE (3/8" DIA.)
- FORMER BELOW GROUND AS/SVE LINE (2" DIA.)
- BELOW GROUND SVE LINE (2" DIA.)
- ABOVEGROUND SVE LINE (2" DIA.)
- AMBIENT AIR SAMPLE LOCATION (07/21/2011)
- AMBIENT AIR SAMPLE LOCATION (05/10/2012)
- VAPOR PROBE (VP)
- VE PROTECTIVE BERM WITH CONDUIT

VP-3						
DATE	7/21/2011			5/10/2012		
DEPTH	5.0 FT	10.0 FT	15.0 FT	5.0 FT	10.0 FT	15.0 FT
M	<0.00017	<0.00016	<0.00017/<0.00016	<0.00015	<0.00016	<0.00016
O	20	21	20/21	22	22	22
C	1.1	0.83	0.91/0.35	0.50	0.58	0.81
H	<0.086	<0.079	<0.084/<0.079	<0.074	<0.080	<0.078

VP-1						
DATE	7/21/2011			5/10/2012		
DEPTH	5.0 FT	10.0 FT	15.0 FT	5.0 FT	10.0 FT	15.0 FT
M	<0.00016	0.00015	<0.00016/<0.00016	<0.00028	<0.00021	<0.00016/<0.00016
O	20	21	21/21	21	23	22/22
C	0.51	0.34	0.34/0.35	0.13	0.23	0.32/0.32
H	<0.079	<0.076	<0.080/<0.079	<0.14	<0.10	<0.079/<0.079

VP-2				
DATE	7/21/2011		5/10/2012	
DEPTH	3.5 FT	7.5 FT	3.5 FT	7.5 FT
M	<0.00019	<0.00018	<0.00016	<0.00016
O	21	21	23	22
C	0.29	0.30	0.075	0.080
H	<0.097	<0.092	<0.078	0.094

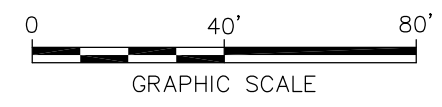
AMB UP	
DATE	7/21/2011
DEPTH	--
M	0.00020
O	22
C	0.038
H	<0.079

AMB DOWN	
DATE	5/10/2012
DEPTH	--
M	0.00021
O	23
C	0.041
H	<0.079

AMB DOWN	
DATE	7/21/2011
DEPTH	--
M	0.00019
O	22
C	0.039
H	<0.078

SAMPLE LOCATION	
DATE	SAMPLE DATE
DEPTH	SAMPLE DEPTH
M	METHANE
O	OXYGEN
C	CARBON DIOXIDE
H	HELIUM

RESULTS REPORTED IN PERCENTAGE BY VOLUME (%V)



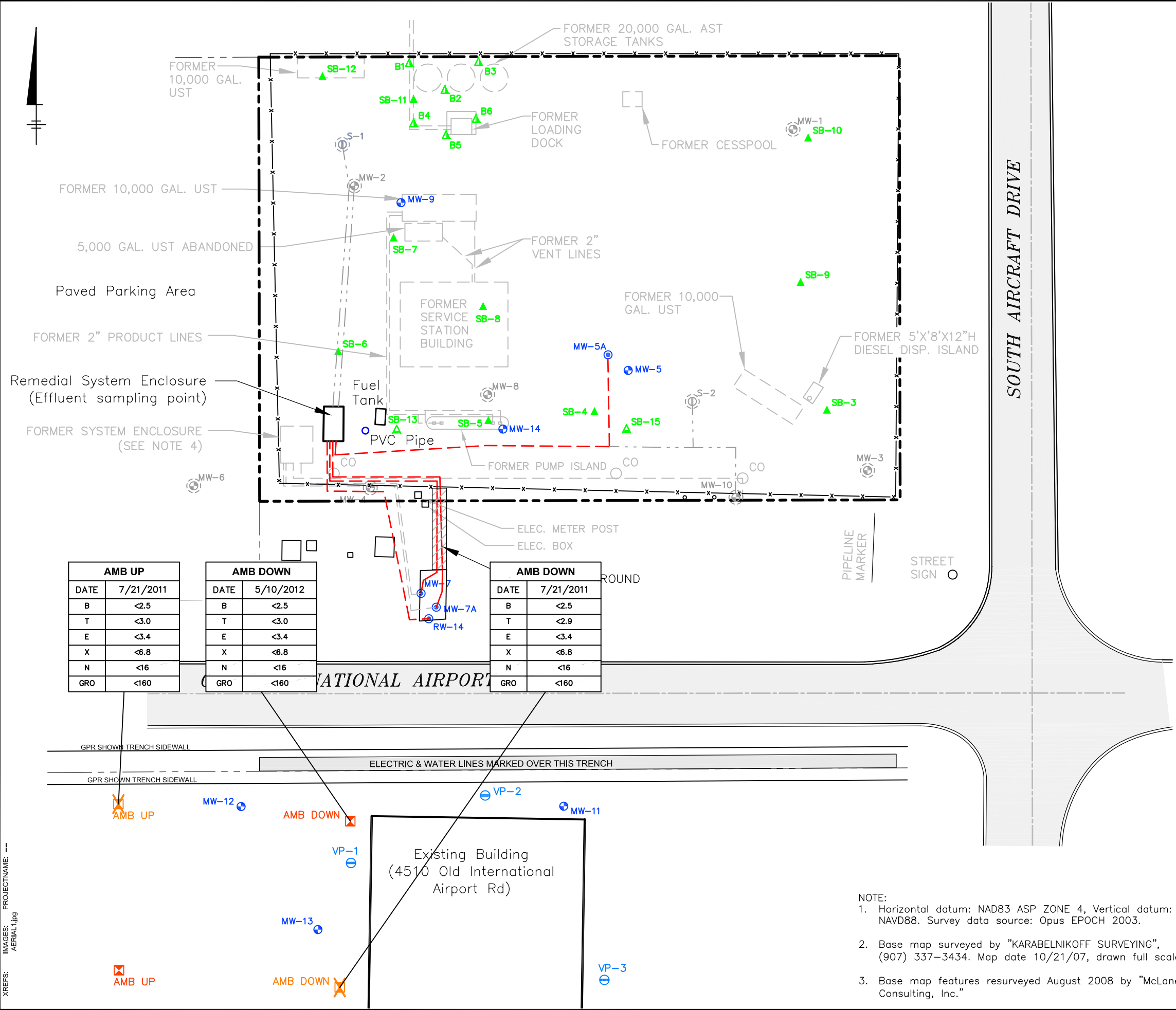
- NOTE:
- Horizontal datum: NAD83 ASP ZONE 4, Vertical datum: NAVD88. Survey data source: Opus EPOCH 2003.
 - Base map surveyed by "KARABELNIKOFF SURVEYING", (907) 337-3434. Map date 10/21/07, drawn full scale.
 - Base map features resurveyed August 2008 by "McLane Consulting, Inc."

CHEVRON FACILITY #306450
 4351 OLD INTERNATIONAL AIRPORT RD., ANCHORAGE, AK.
2012 SOIL VAPOR INVESTIGATION REPORT

**FIXED GASES
 ANALYTICAL SUMMARY MAP**

FIGURE
5

CITY:(Recd) DIV:(GROUP):(Recd) DB:(Recd) LD:(Opt) PIC:(Opt) PM:(Recd) TM:(Recd) LYS:(Opt)ON#:"OFF"REF"
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 XREFS: IMAGES: AERIAL.jpg PROJECTNAME:



AMB UP	
DATE	7/21/2011
B	<2.5
T	<3.0
E	<3.4
X	<6.8
N	<16
GRO	<160

AMB DOWN	
DATE	5/10/2012
B	<2.5
T	<3.0
E	<3.4
X	<6.8
N	<16
GRO	<160

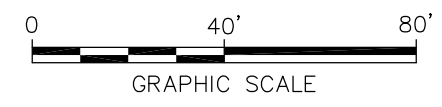
AMB DOWN	
DATE	7/21/2011
B	<2.5
T	<2.9
E	<3.4
X	<6.8
N	<16
GRO	<160

LEGEND

- PROPERTY LINE
- CHAIN LINK FENCE (TYPICAL)
- GROUNDWATER MONITORING WELL
- SVE WELL
- ABANDONED OR DESTROYED WELL
- ABANDONED AIR SPARGE WELL
- VES LINE CLEANOUT
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- SOIL BORING (2008)
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- BELOW GROUND SVE LINE (2" DIA.)
- ABOVEGROUND SVE LINE (2" DIA.)
- AMBIENT AIR SAMPLE LOCATION (07/21/2011)
- AMBIENT AIR SAMPLE LOCATION (05/10/2012)
- VAPOR PROBE (VP)
- VE PROTECTIVE BERM WITH CONDUIT

SAMPLE LOCATION	
DATE	SAMPLE DATE
DEPTH	SAMPLE DEPTH
B	BENZENE
T	TOLUENE
E	ETHYLBENZENE
X	TOTAL XYLENES
N	NAPHTHALENE
GRO	TPH IN THE GASOLINE RANGE ORGANICS

RESULTS REPORTED IN MICROGRAMS PER CUBIC METER (µg/m³)
 TPH - TOTAL PETROLEUM HYDROCARBON



CHEVRON FACILITY #306450
 4351 OLD INTERNATIONAL AIRPORT RD., ANCHORAGE, AK.
2012 SOIL VAPOR INVESTIGATION REPORT

AMBIENT AIR SAMPLES ANALYTICAL SUMMARY MAP



FIGURE
6

- NOTE:
- Horizontal datum: NAD83 ASP ZONE 4, Vertical datum: NAVD88. Survey data source: Opus EPOCH 2003.
 - Base map surveyed by "KARABELNIKOFF SURVEYING", (907) 337-3434. Map date 10/21/07, drawn full scale.
 - Base map features resurveyed August 2008 by "McLane Consulting, Inc."



Appendix A

ADEC Letters

STATE OF ALASKA

SEAN PARNELL, GOVERNOR

555 Cordova Street
Anchorage, AK 99501-2617
Phone: (907) 269-7526
Fax: (907) 269-7649
<http://www.dec.state.ak.us/>

DEPT. OF ENVIRONMENTAL CONSERVATION

DIVISION OF SPILL PREVENTION AND RESPONSE CONTAMINATED SITES PROGRAM

File #2100.26.115

August 11, 2010

Ms. Amy Gilpin
Project Manager, Marketing Business Unit
ChevronTexaco Environmental Management Co.
611 Bollinger Canyon Road
San Ramon, CA 94583

RE: Request for Vapor Intrusion Assessment and Additional Monitoring well for the Former Chevron Facility 306450 (Former Unocal #5057), 4351 Old International Airport Road site

Dear Ms. Gilpin:

Thank you for submitting Arcadis' June 29, 2010 "Vapor Intrusion Pathway Initial Assessment" report for the Former Chevron Facility 306450, 4351 Old International Airport Road site. The report recommends completing the Alaska Department of Environmental Conservation (ADEC) building survey form and installing three multi-level vapor probes outside of the Flowers International, LLC building located downgradient to your site. I concur with those recommendations. I request that an additional monitoring well be installed on the north side of the Flowers International, LLC building approximately 20 to 30 feet east the northwest corner. I request that this monitoring well installation include the collection of field screening and analytical soil samples with analytical soil samples collected at the soil/water interface and the highest field screening depth. I also request that a workplan for conducting the recommended work and the installation of the additional monitoring well be submitted by October 1, 2010.

I look forward to assisting you and your consultant in the timely and cost effective completion of the monitoring and cleanup of the contamination at this site. If you or your consultant has any questions concerning this letter, please contact me at (907) 269-7525.

Sincerely,



Robert Weimer
ADEC Site Project Manager

Cc: Greg Montgomery, Arcadis
Scott Lytle, Ted Stevens Anchorage International Airport
George Lyle, Guess & Rudd

STATE OF ALASKA

**DEPT. OF ENVIRONMENTAL CONSERVATION
DIVISION OF SPILL PREVENTION AND RESPONSE
CONTAMINATED SITES PROGRAM**

SEAN PARNELL, GOVERNOR

555 Cordova Street
Anchorage, AK 99501-2617
Phone: (907) 269-7526
Fax: (907) 269-7649
<http://www.dec.state.ak.us/>

File No: 2100.26.115

February 23, 2011

Ms. Amy Gilpin
Project Manager, Marketing Business Unit
ChevronTexaco Environmental Management Co.
6111 Bollinger Canyon Road
San Ramon, CA 94583

RE: Conditional approval of 2010 Work Plan for Vapor Intrusion Assessment and Additional Monitoring Well Installation for the Former Chevron Facility 306450 (Former Unocal #5057), 4351 Old International Airport Road site

Dear Ms. Gilpin:

Thank you for submitting Arcadis' "2010 Work Plan for Vapor Intrusion Assessment and Additional Monitoring Well Installation" for the Former Chevron Facility 306450, 4351 Old International Airport Road site. The work plan proposes to install and sample three multilevel soil vapor probes and one monitoring well near the downgradient Flowers International, LLC building.

The work plan is approved with the following modification that the water samples for volatiles for the new monitoring well be collected with a bladder pump as you are doing with the other monitoring wells at the site, and that the soil sample collected from the depth of most likely contamination be analyzed for PAHs.

I look forward to assisting you and your consultant in the timely and cost effective completion of the monitoring and cleanup of the contamination at this site. If you or your consultant has any questions concerning this letter, please contact me at (907) 269-7525.

Sincerely,



Robert Weimer
ADEC Site Project Manager

Cc: Greg Montgomery, Arcadis
Scott Lytle, Ted Stevens Anchorage International Airport
George Lyle, Guess & Rudd

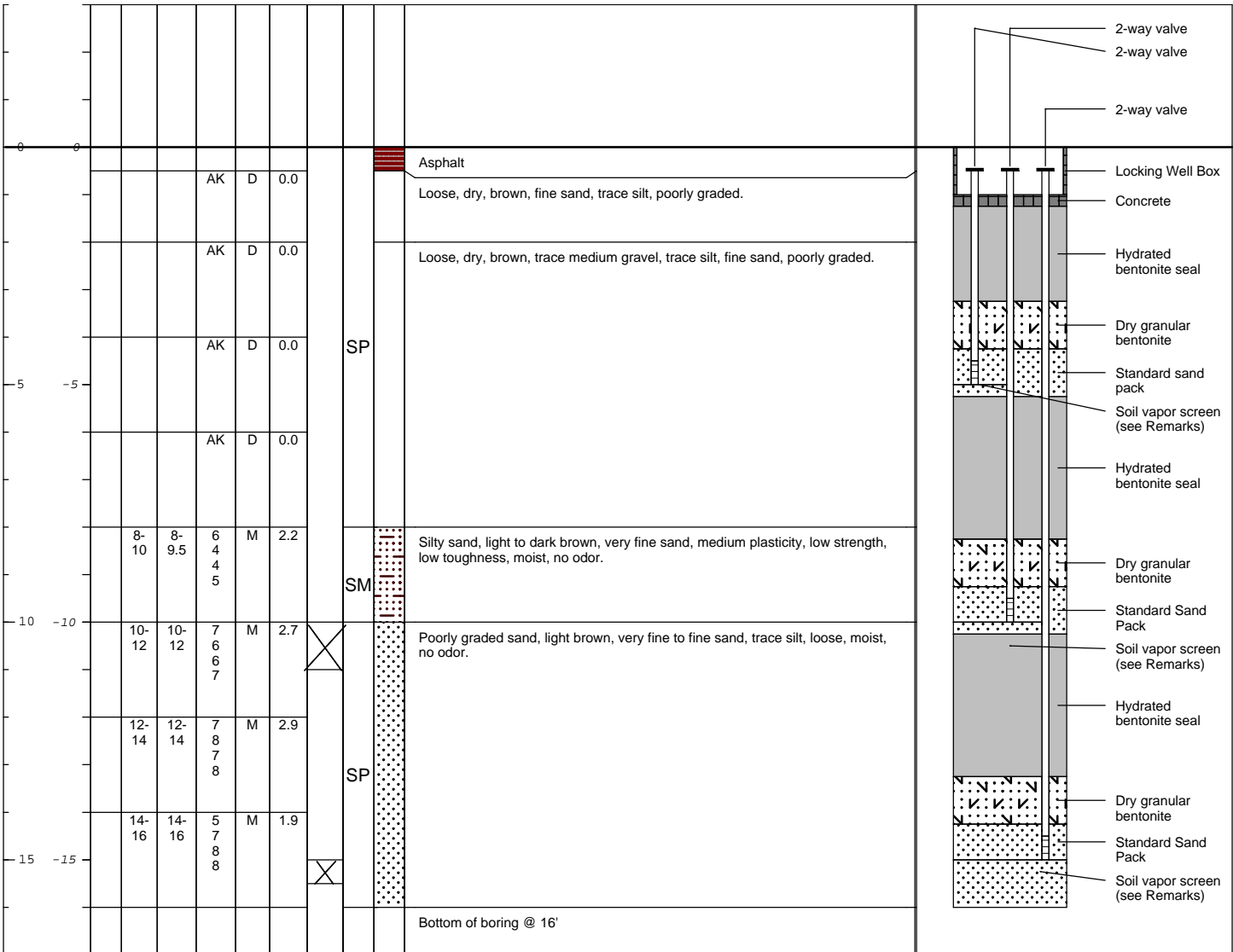



Appendix B

Soil Vapor Probe Boring Logs

Date Start/Finish: 6-20-11 Drilling Company: Driller's Name: Dick Banzhaf Drilling Method: Hollow Stem Auger Auger Size: 10 inch OD Rig Type: Sampling Method: Split Spoon	Northing: NM Easting: NM Casing Elevation: NA Borehole Depth: 16 Surface Elevation: NM Descriptions By: DMB, NA, MLS	Well/Boring ID: VP-1 Client: Chevron EMC Location: 4351 Old International Airport Road Anchorage, Alaska
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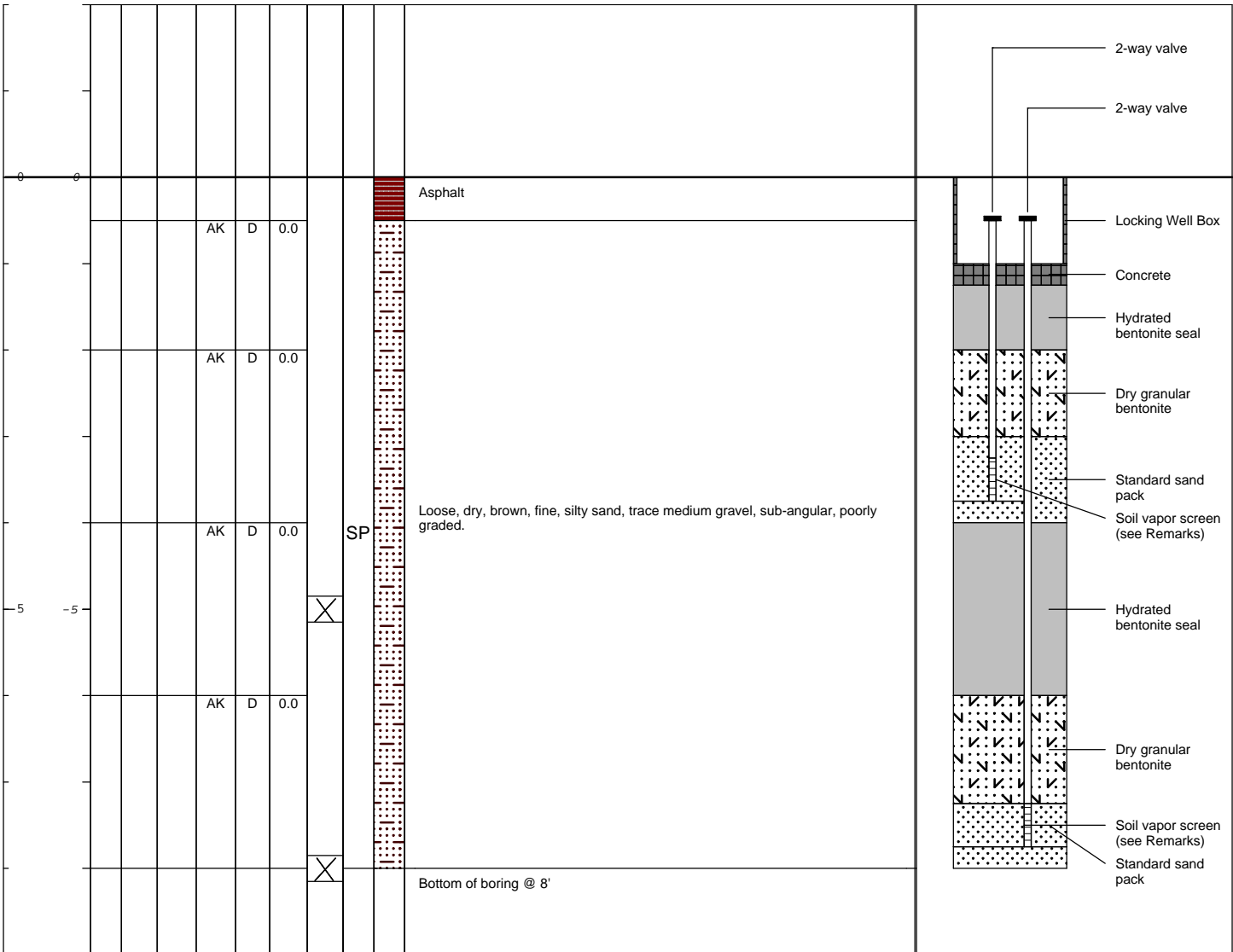
DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	Moisture	PID Headspace (ppm)	Analytical Sample	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
-------	-----------	-------------------	-----------------	-----------------	-------------	----------	---------------------	-------------------	-----------	-----------------	---------------------------	--------------------------



 <i>Infrastructure · Water · Environment · Buildings</i>	Remarks: bgs = below ground surface, AK = Air Knife Analytical samples collected at 10' bgs (VP-1-10'-11') and 15' bgs (VP-1-15'-15.5'). Geotechnical sample collected at 12' bgs (VP-1-12'-12.5'). Soil vapor screen is a 6-inch, 0.375-inch outer diameter stainless steel screen with a stainless steel implant anchor. Soil vapor probes installed at 5' bgs, 10' bgs, and 15' bgs.
--	--

Date Start/Finish: 6-20-11 Drilling Company: Driller's Name: Dick Banzhaf Drilling Method: Hollow Stem Auger Auger Size: 10 inch OD Rig Type: Sampling Method: Split Spoon	Northing: NM Easting: NM Casing Elevation: NA Borehole Depth: 16 Surface Elevation: NM Descriptions By: DMB, NA, MLS	Well/Boring ID: VP-2 Client: Chevron EMC Location: 4351 Old International Airport Road Anchorage, Alaska
---	---	--

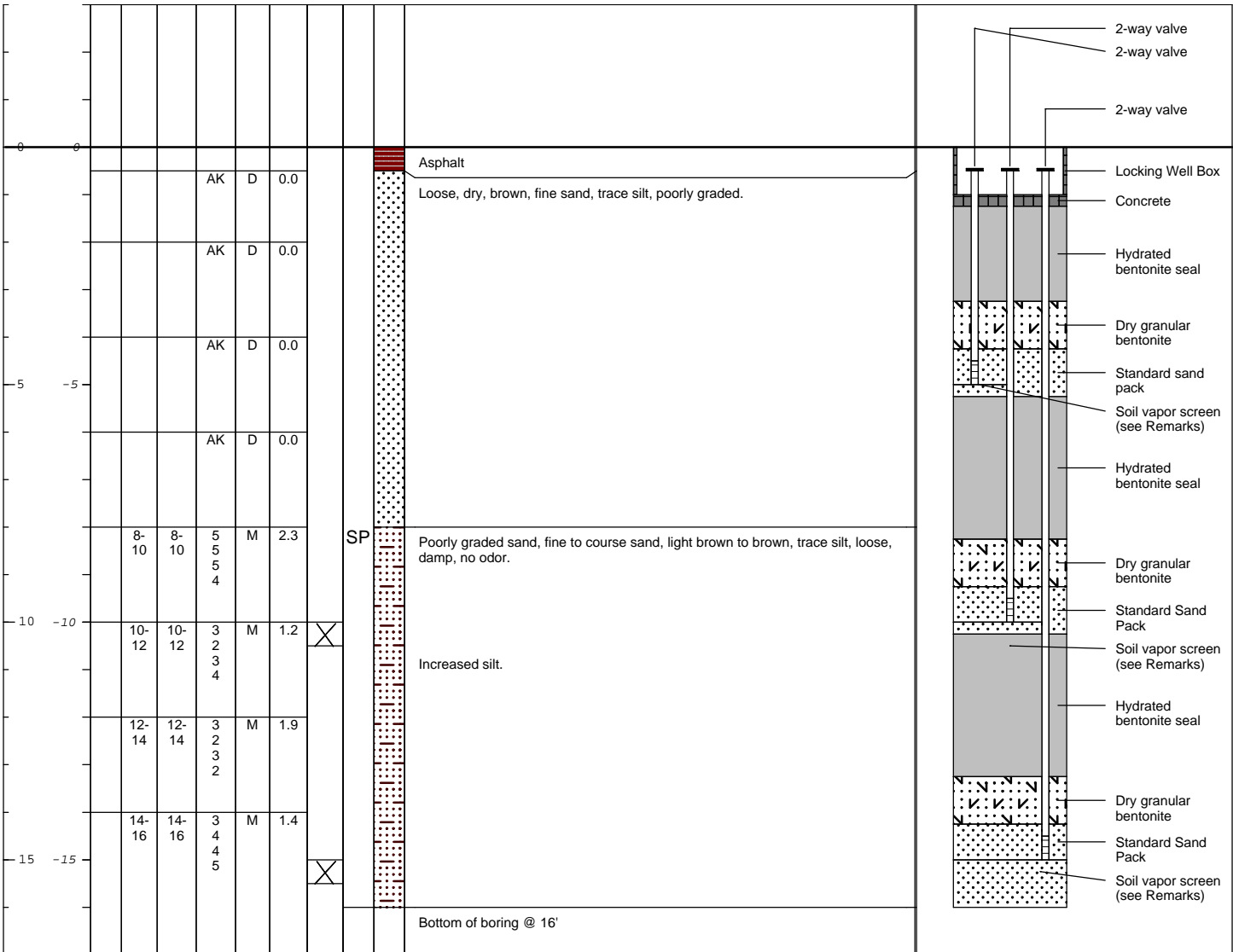
DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	Moisture	PID Headspace (ppm)	Analytical Sample	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
-------	-----------	-------------------	-----------------	-----------------	-------------	----------	---------------------	-------------------	-----------	-----------------	---------------------------	--------------------------




<p>ARCADIS Infrastructure · Water · Environment · Buildings</p>	Remarks: bgs = below ground surface, AK = Air Knife Analytical samples collected from 5.0' bgs (VP-2-Fill-5.0) and 8.0' bgs (VP-2-Fill-8.0). Soil vapor screen is a 6-inch, 0.375-inch outer diameter stainless steel screen with a stainless steel implant anchor. Soil vapor probes installed at 3.5' bgs and 7.5' bgs.
---	---

Date Start/Finish: 6-21-11 Drilling Company: Driller's Name: Dick Banzhaf Drilling Method: Hollow Stem Auger Auger Size: 10 inch OD Rig Type: Sampling Method: Split Spoon	Northing: NM Easting: NM Casing Elevation: NA Borehole Depth: 16 Surface Elevation: NM Descriptions By: DMB, NA, MLS	Well/Boring ID: VP-3 Client: Chevron EMC Location: 4351 Old International Airport Road Anchorage, Alaska
---	---	--

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	Moisture	PID Headspace (ppm)	Analytical Sample	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
-------	-----------	-------------------	-----------------	-----------------	-------------	----------	---------------------	-------------------	-----------	-----------------	---------------------------	--------------------------



 ARCADIS <i>Infrastructure · Water · Environment · Buildings</i>	Remarks: bgs = below ground surface, AK = Air Knife Analytical samples collected at 10' bgs (VP-3-10'-10.5') and 15' bgs (VP-3-15'-15.5)'. Geotechnical sample collected at 10' bgs (VP-3-10'-10.5') and 15' bgs (VP-3-15'-15.5)'. Soil vapor screen is a 6-inch, 0.375-inch outer diameter stainless steel screen with a stainless steel implant anchor. Soil vapor probes installed at 5' bgs, 10' bgs, and 15' bgs.
--	---



Appendix C

Soil Vapor Sampling Logs



CHAIN-OF-CUSTODY RECORD

Sample Transportation Notice

Relinquishing signature on this document indicates that sample is being shipped in compliance with all applicable local, state, federal, national, and international laws, regulations and ordinances of any kind. Air Toxics Limited assumes no liability with respect to the collection, handling or shipping of these samples. Relinquishing signature also indicates agreement to hold harmless, defend, and indemnify Air Toxics Limited against any claim, demand, or action, of any kind, related to the collection, handling, or shipping of samples. D.O.T. Hotline (800) 467-4922.

180 BLUE RAVINE ROAD, SUITE B
 FOLSOM, CA 95630
 (916) 985-1000 FAX (916) 985-1020

Page 1 of 2

Project Manager: Greg Montgomery (ARCADIS)

Collected by: (Print and Sign) Eric Epple

Company: ARCADIS Email: eric.epple@arcadis-us.com

Address: 2300 East Burke Ave City: Seattle State: WA Zip: 98102

Phone: 206-726-4755 Fax: _____

Project Info:

P.O. # 80645508

Project # 80645508

Project Name: Cherem 50-C456

Turn Around Time:

Normal

Rush

Lab Use Only

Pressurized by: _____

Date: _____

Pressurization Gas: _____

specify: N He

Lab I.D.	Field Sample I.D. (Location)	Flow Controller ID	Can #	Date of Collection	Time of Collection Start/End	Analysis Requested	Canister Pressure/Vacuum		
							Initial	Final	Receipt (psi)
	VP-1-5	100466	36031	05/10/12	1032/1120	TO-15 + ASTM (dist below)	-29	-5	
	VP-1-10	100512	24229	05/10/12	1032/1118		-29.5	-5	
	VP-1-15	100451	5722	05/10/12	1033/1120		-21	-5	
	VP-2-3.5	20147	33151	05/10/12	1204/1250		-28.5	-4.5	
	VP-2-7.5	110108	3539	05/10/12	1204/1251		-28	-4	
	AMB-DOWN	100448	34238	05/10/12	1345/1430		-30	-5	
	VP-3-5	20894	908	05/10/12	1425/1514		-30	-4	
	VP-3-10	40910	946	05/10/12	1426/1515		-28.5	-5.5	
	VP-3-15	84544	94305	05/10/12	1426/1516		-29.5	-4.5	
	Equipment Blank	100209	34280	05/10/12	1544/1557	TO-15 + ASTM (dist below)	-30	-4	

Relinquished by: (signature) Eric Epple Date/Time 05/11/12

Received by: (signature) _____ Date/Time 05/10/12

Notes: TDAS? BTEX, Naphthalenes, TPHg

Relinquished by: (signature) _____ Date/Time @ 1445

Received by: (signature) _____ Date/Time _____

Relinquished by: (signature) _____ Date/Time _____

Received by: (signature) _____ Date/Time _____

ASTM-1946! Oxygens, Carbon Dioxide, Methane, Helium

Lab Use Only	Shipper Name	Air Bill #	Temp (°C)	Condition	Custody Seals Intact?	Work Order #
					Yes No None	



CHAIN-OF-CUSTODY RECORD

Sample Transportation Notice
Relinquishing signature on this document indicates that sample is being shipped in compliance with all applicable local, state, federal, national, and international laws, regulations and ordinances of any kind.

180 BLUE RAVINE ROAD, SUITE B
FOLSOM, CA 95630
(916) 985-1000 FAX (916) 985-1020

Project Manager Guey Montgomery (ARCADIS)
Collected by: (Print and Sign) Eric Epple
Company ARCADIS
Address 2300 Eastlake Ave. E. City Seattle State WA Zip 98102
Phone 206-726-4755 Fax

Project Info:
Project # B00455-08
Project Name Chevron 30-6450

Turn Around Time:
Normal
Rush
Lab Use Only
Pressurized by:
Date:
Pressurization Gas: N He

Table with columns: Lab I.D., Field Sample I.D. (Location), Flow Controller ID, Can #, Date of Collection, Time of Collection, Analysis Requested, Canister Pressure/Vacuum (Initial, Final, Receipt, Final (psi)). Includes handwritten entry 'BD-1' and a large scribble.

Relinquished by: (signature) Date/Time
Received by: (signature) Date/Time

Notes:
TO-15? BTEX, Naphthalenes, TPH
ASTM-1996? Oxygen, Carbon Dioxide, Methane, Helium.

Lab Use Only
Shipper Name
Air Bill #
Temp (C)
Condition
Custody Seals Intact? Yes No None
Work Order #



Appendix D

Laboratory Certification Documents



Air Toxics

Media Certification Report

Canister Number: 6L#3539 w/SGM#100108

Can#: 84544-3539

Date : 05/02/12 0:03

Data File: 9050126sim.d

www.airtoxics.com
1-800-985-5955

Name	CAS	Conc.	Units
Ethyl Benzene	100-41-4	ND	ppbv
m,p-Xylene	108-38-3	ND	ppbv
Toluene	108-88-3	ND	ppbv
Benzene	71-43-2	ND	ppbv
Naphthalene	91-20-3	ND	ppbv
o-Xylene	95-47-6	ND	ppbv
1,2-Dichloroethane-d4	17060-07-0	87.00	% Recovery
Toluene-d8	2037-26-5	99.00	% Recovery
4-Bromofluorobenzene	460-00-4	105.00	% Recovery

Media Certification Report

Canister Number: 6L#94305 w/SGM#100240

Can#: 84544-94305

Date : 05/01/12 22:46

Data File: 9050124sim.d

www.airtoxics.com
1-800-985-5955

Name	CAS	Conc.	Units
Ethyl Benzene	100-41-4	ND	ppbv
m,p-Xylene	108-38-3	ND	ppbv
Toluene	108-88-3	ND	ppbv
Benzene	71-43-2	ND	ppbv
Naphthalene	91-20-3	ND	ppbv
o-Xylene	95-47-6	ND	ppbv
1,2-Dichloroethane-d4	17060-07-0	78.00	% Recovery
Toluene-d8	2037-26-5	101.00	% Recovery
4-Bromofluorobenzene	460-00-4	127.00	% Recovery



Air Toxics

Media Certification Report

Canister Number: 6L#946 w/SGM#40910

Can#: 84544-946

Date : 05/01/12 20:51

Data File: 9050121sim.d

www.airtoxics.com
1-800-985-5955

Name	CAS	Conc.	Units
Ethyl Benzene	100-41-4	ND	ppbv
m,p-Xylene	108-38-3	ND	ppbv
Toluene	108-88-3	ND	ppbv
Benzene	71-43-2	ND	ppbv
Naphthalene	91-20-3	ND	ppbv
o-Xylene	95-47-6	ND	ppbv
1,2-Dichloroethane-d4	17060-07-0	89.00	% Recovery
Toluene-d8	2037-26-5	101.00	% Recovery
4-Bromofluorobenzene	460-00-4	126.00	% Recovery



Air Toxics

Media Certification Report

Canister Number: 6L#25277 w/SGM#20890

Can#: 84544-25277

Date : 05/02/12 0:41

Data File: 9050127sim.d

www.airtoxics.com
1-800-985-5955

Name	CAS	Conc.	Units
Ethyl Benzene	100-41-4	ND	ppbv
m,p-Xylene	108-38-3	ND	ppbv
Toluene	108-88-3	ND	ppbv
Benzene	71-43-2	ND	ppbv
Naphthalene	91-20-3	ND	ppbv
o-Xylene	95-47-6	ND	ppbv
1,2-Dichloroethane-d4	17060-07-0	100.00	% Recovery
Toluene-d8	2037-26-5	105.00	% Recovery
4-Bromofluorobenzene	460-00-4	115.00	% Recovery

Media Certification Report

Canister Number: 6L#36031 w/SGM#100466

Can#: 84544-36031

Date : 05/01/12 23:03

Data File: i050122sim.d

www.airtoxics.com
1-800-985-5955

Name	CAS	Conc.	Units
Ethyl Benzene	100-41-4	ND	ppbv
m,p-Xylene	108-38-3	ND	ppbv
Toluene	108-88-3	ND	ppbv
Benzene	71-43-2	ND	ppbv
Naphthalene	91-20-3	ND	ppbv
o-Xylene	95-47-6	ND	ppbv
1,2-Dichloroethane-d4	17060-07-0	100.00	% Recovery
Toluene-d8	2037-26-5	121.00	% Recovery
4-Bromofluorobenzene	460-00-4	100.00	% Recovery

Media Certification Report

Canister Number: 6L#5722 w/SGM#100451

Can#: 84544-5722

Date : 05/01/12 23:24

Data File: 9050125sim.d

www.airtoxics.com
1-800-985-5955

Name	CAS	Conc.	Units
Ethyl Benzene	100-41-4	ND	ppbv
m,p-Xylene	108-38-3	ND	ppbv
Toluene	108-88-3	ND	ppbv
Benzene	71-43-2	ND	ppbv
Naphthalene	91-20-3	ND	ppbv
o-Xylene	95-47-6	ND	ppbv
1,2-Dichloroethane-d4	17060-07-0	85.00	% Recovery
Toluene-d8	2037-26-5	103.00	% Recovery
4-Bromofluorobenzene	460-00-4	110.00	% Recovery

Media Certification Report

Canister Number: 6L#5620 w/SGM#20923

Can#: 84544-5620

Date : 05/01/12 22:22

Data File: i050121sim.d

www.airtoxics.com
1-800-985-5955

Name	CAS	Conc.	Units
Ethyl Benzene	100-41-4	ND	ppbv
m,p-Xylene	108-38-3	ND	ppbv
Toluene	108-88-3	ND	ppbv
Benzene	71-43-2	ND	ppbv
Naphthalene	91-20-3	ND	ppbv
o-Xylene	95-47-6	ND	ppbv
1,2-Dichloroethane-d4	17060-07-0	89.00	% Recovery
Toluene-d8	2037-26-5	116.00	% Recovery
4-Bromofluorobenzene	460-00-4	107.00	% Recovery



Appendix E

Soil Vapor Laboratory Report

6/1/2012
Mr. Eric Epple
Arcadis U.S., Inc.
2300 Eastlake Avenue East
Ste 200
Seattle WA 98102

Project Name: Chevron 30-C450
Project #: B0045508
Workorder #: 1205413A

Dear Mr. Eric Epple

The following report includes the data for the above referenced project for sample(s) received on 5/18/2012 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for your air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Kelly Buettner at 916-985-1000 if you have any questions regarding the data in this report.

Regards,




Kelly Buettner
Project Manager

WORK ORDER #: 1205413A

Work Order Summary

CLIENT:	Mr. Eric Epple Arcadis U.S., Inc. 2300 Eastlake Avenue East Ste 200 Seattle, WA 98102	BILL TO:	Accounts Payable Arcadis U.S., Inc. 630 Plaza Drive Suite 600 Highlands Ranch, CO 80129
PHONE:	206-726-4728	P.O. #	B0045508-ATL-WA-July2011
FAX:	206-325-8218	PROJECT #	B0045508 Chevron 30-C450
DATE RECEIVED:	05/18/2012	CONTACT:	Kelly Buettner
DATE COMPLETED:	06/01/2012		

<u>FRACTION #</u>	<u>NAME</u>	<u>TEST</u>	<u>RECEIPT VAC./PRES.</u>	<u>FINAL PRESSURE</u>
01A	VP-1-5	Modified TO-15	4.0 "Hg	5 psi
02A	VP-1-10	Modified TO-15	4.0 "Hg	5 psi
03A	VP-1-15	Modified TO-15	4.5 "Hg	5 psi
04A	VP-2-3.5	Modified TO-15	4.0 "Hg	5 psi
05A	VP-2-7.5	Modified TO-15	5.0 "Hg	5 psi
06A	AMB-DOWN	Modified TO-15	4.5 "Hg	5 psi
07A	VP-3-5	Modified TO-15	3.0 "Hg	5 psi
08A	VP-3-10	Modified TO-15	5.0 "Hg	5 psi
09A	VP-3-15	Modified TO-15	4.0 "Hg	5 psi
10A	Equipment Blank	Modified TO-15	8.0 "Hg	5 psi
11A	BD-1	Modified TO-15	4.5 "Hg	5 psi
12A	Lab Blank	Modified TO-15	NA	NA
13A	CCV	Modified TO-15	NA	NA
14A	LCS	Modified TO-15	NA	NA
14AA	LCSD	Modified TO-15	NA	NA

CERTIFIED BY: 
 Laboratory Director

DATE: 06/01/12

Certification numbers: AZ Licensure AZ0719, CA NELAP - 02110CA, LA NELAP - 02089,
 NY NELAP - 11291, TX NELAP - T104704434-11-3, UT NELAP -CA009332011-1, WA NELAP - C935
 Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
 Accreditation number: E87680, Effective date: 07/01/11 , Expiration date: 06/30/12.
 Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards
 This report shall not be reproduced, except in full, without the written approval of Eurofins | Air Toxics, Inc.

LABORATORY NARRATIVE
EPA Method TO-15
Arcadis U.S., Inc.
Workorder# 1205413A

Eleven 6 Liter Summa Canister (100% Certified) samples were received on May 18, 2012. The laboratory performed analysis via EPA Method TO-15 using GC/MS in the full scan mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Receiving Notes

The Chain of Custody (COC) information for sample VP-2-3.5 did not match the information on the canister with regard to canister identification. The client was notified of the discrepancy and the information on the canister was used to process and report the sample.

Analytical Notes

A single point calibration for TPH referenced to Gasoline was performed for each daily analytical batch. Recovery is reported as 100% in the associated results for each CCV.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV and/or LCS.

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

**Summary of Detected Compounds
EPA METHOD TO-15 GC/MS FULL SCAN**

Client Sample ID: VP-1-5

Lab ID#: 1205413A-01A

No Detections Were Found.

Client Sample ID: VP-1-10

Lab ID#: 1205413A-02A

No Detections Were Found.

Client Sample ID: VP-1-15

Lab ID#: 1205413A-03A

No Detections Were Found.

Client Sample ID: VP-2-3.5

Lab ID#: 1205413A-04A

No Detections Were Found.

Client Sample ID: VP-2-7.5

Lab ID#: 1205413A-05A

No Detections Were Found.

Client Sample ID: AMB-DOWN

Lab ID#: 1205413A-06A

No Detections Were Found.

Client Sample ID: VP-3-5

Lab ID#: 1205413A-07A

No Detections Were Found.

Client Sample ID: VP-3-10

Lab ID#: 1205413A-08A

No Detections Were Found.

Client Sample ID: VP-3-15

Lab ID#: 1205413A-09A

**Summary of Detected Compounds
EPA METHOD TO-15 GC/MS FULL SCAN**

Client Sample ID: VP-3-15

Lab ID#: 1205413A-09A

No Detections Were Found.

Client Sample ID: Equipment Blank

Lab ID#: 1205413A-10A

No Detections Were Found.

Client Sample ID: BD-1

Lab ID#: 1205413A-11A

No Detections Were Found.



Air Toxics

Client Sample ID: VP-1-5

Lab ID#: 1205413A-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	j052310	Date of Collection:	5/10/12 11:20:00 AM
Dil. Factor:	2.78	Date of Analysis:	5/23/12 12:45 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	1.4	Not Detected	4.4	Not Detected
Ethyl Benzene	1.4	Not Detected	6.0	Not Detected
Toluene	1.4	Not Detected	5.2	Not Detected
m,p-Xylene	1.4	Not Detected	6.0	Not Detected
o-Xylene	1.4	Not Detected	6.0	Not Detected
Naphthalene	5.6	Not Detected	29	Not Detected
TPH ref. to Gasoline (MW=100)	70	Not Detected	280	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	103	70-130
4-Bromofluorobenzene	88	70-130

Client Sample ID: VP-1-10

Lab ID#: 1205413A-02A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	j052311	Date of Collection:	5/10/12 11:18:00 AM
Dil. Factor:	1.55	Date of Analysis:	5/23/12 01:09 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	0.78	Not Detected	2.5	Not Detected
Ethyl Benzene	0.78	Not Detected	3.4	Not Detected
Toluene	0.78	Not Detected	2.9	Not Detected
m,p-Xylene	0.78	Not Detected	3.4	Not Detected
o-Xylene	0.78	Not Detected	3.4	Not Detected
Naphthalene	3.1	Not Detected	16	Not Detected
TPH ref. to Gasoline (MW=100)	39	Not Detected	160	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	97	70-130
Toluene-d8	105	70-130
4-Bromofluorobenzene	88	70-130



Client Sample ID: VP-1-15

Lab ID#: 1205413A-03A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	j052312	Date of Collection:	5/10/12 11:20:00 AM
Dil. Factor:	1.58	Date of Analysis:	5/23/12 01:33 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	0.79	Not Detected	2.5	Not Detected
Ethyl Benzene	0.79	Not Detected	3.4	Not Detected
Toluene	0.79	Not Detected	3.0	Not Detected
m,p-Xylene	0.79	Not Detected	3.4	Not Detected
o-Xylene	0.79	Not Detected	3.4	Not Detected
Naphthalene	3.2	Not Detected	16	Not Detected
TPH ref. to Gasoline (MW=100)	40	Not Detected	160	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	96	70-130
Toluene-d8	104	70-130
4-Bromofluorobenzene	89	70-130



Air Toxics

Client Sample ID: VP-2-3.5

Lab ID#: 1205413A-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	j052313	Date of Collection:	5/10/12 12:50:00 PM
Dil. Factor:	1.55	Date of Analysis:	5/23/12 02:10 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	0.78	Not Detected	2.5	Not Detected
Ethyl Benzene	0.78	Not Detected	3.4	Not Detected
Toluene	0.78	Not Detected	2.9	Not Detected
m,p-Xylene	0.78	Not Detected	3.4	Not Detected
o-Xylene	0.78	Not Detected	3.4	Not Detected
Naphthalene	3.1	Not Detected	16	Not Detected
TPH ref. to Gasoline (MW=100)	39	Not Detected	160	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	104	70-130
4-Bromofluorobenzene	88	70-130



Air Toxics

Client Sample ID: VP-2-7.5

Lab ID#: 1205413A-05A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	j052314	Date of Collection:	5/10/12 12:51:00 PM
Dil. Factor:	1.61	Date of Analysis:	5/23/12 02:39 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	0.80	Not Detected	2.6	Not Detected
Ethyl Benzene	0.80	Not Detected	3.5	Not Detected
Toluene	0.80	Not Detected	3.0	Not Detected
m,p-Xylene	0.80	Not Detected	3.5	Not Detected
o-Xylene	0.80	Not Detected	3.5	Not Detected
Naphthalene	3.2	Not Detected	17	Not Detected
TPH ref. to Gasoline (MW=100)	40	Not Detected	160	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	105	70-130
4-Bromofluorobenzene	88	70-130



Air Toxics

Client Sample ID: AMB-DOWN

Lab ID#: 1205413A-06A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	j052317	Date of Collection:	5/10/12 2:30:00 PM
Dil. Factor:	1.58	Date of Analysis:	5/23/12 04:17 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	0.79	Not Detected	2.5	Not Detected
Ethyl Benzene	0.79	Not Detected	3.4	Not Detected
Toluene	0.79	Not Detected	3.0	Not Detected
m,p-Xylene	0.79	Not Detected	3.4	Not Detected
o-Xylene	0.79	Not Detected	3.4	Not Detected
Naphthalene	3.2	Not Detected	16	Not Detected
TPH ref. to Gasoline (MW=100)	40	Not Detected	160	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	97	70-130
Toluene-d8	105	70-130
4-Bromofluorobenzene	86	70-130



Air Toxics

Client Sample ID: VP-3-5

Lab ID#: 1205413A-07A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	j052318	Date of Collection:	5/10/12 3:14:00 PM
Dil. Factor:	1.49	Date of Analysis:	5/23/12 04:40 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	0.74	Not Detected	2.4	Not Detected
Ethyl Benzene	0.74	Not Detected	3.2	Not Detected
Toluene	0.74	Not Detected	2.8	Not Detected
m,p-Xylene	0.74	Not Detected	3.2	Not Detected
o-Xylene	0.74	Not Detected	3.2	Not Detected
Naphthalene	3.0	Not Detected	16	Not Detected
TPH ref. to Gasoline (MW=100)	37	Not Detected	150	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	97	70-130
Toluene-d8	104	70-130
4-Bromofluorobenzene	88	70-130



Air Toxics

Client Sample ID: VP-3-10

Lab ID#: 1205413A-08A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	j052319	Date of Collection:	5/10/12 3:15:00 PM
Dil. Factor:	1.61	Date of Analysis:	5/23/12 05:06 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	0.80	Not Detected	2.6	Not Detected
Ethyl Benzene	0.80	Not Detected	3.5	Not Detected
Toluene	0.80	Not Detected	3.0	Not Detected
m,p-Xylene	0.80	Not Detected	3.5	Not Detected
o-Xylene	0.80	Not Detected	3.5	Not Detected
Naphthalene	3.2	Not Detected	17	Not Detected
TPH ref. to Gasoline (MW=100)	40	Not Detected	160	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	105	70-130
4-Bromofluorobenzene	87	70-130



Air Toxics

Client Sample ID: VP-3-15

Lab ID#: 1205413A-09A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	j052320	Date of Collection:	5/10/12 3:16:00 PM
Dil. Factor:	1.55	Date of Analysis:	5/23/12 05:31 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	0.78	Not Detected	2.5	Not Detected
Ethyl Benzene	0.78	Not Detected	3.4	Not Detected
Toluene	0.78	Not Detected	2.9	Not Detected
m,p-Xylene	0.78	Not Detected	3.4	Not Detected
o-Xylene	0.78	Not Detected	3.4	Not Detected
Naphthalene	3.1	Not Detected	16	Not Detected
TPH ref. to Gasoline (MW=100)	39	Not Detected	160	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	104	70-130
4-Bromofluorobenzene	88	70-130

Client Sample ID: Equipment Blank

Lab ID#: 1205413A-10A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	j052321	Date of Collection:	5/10/12 3:57:00 PM
Dil. Factor:	1.83	Date of Analysis:	5/23/12 06:07 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	0.92	Not Detected	2.9	Not Detected
Ethyl Benzene	0.92	Not Detected	4.0	Not Detected
Toluene	0.92	Not Detected	3.4	Not Detected
m,p-Xylene	0.92	Not Detected	4.0	Not Detected
o-Xylene	0.92	Not Detected	4.0	Not Detected
Naphthalene	3.7	Not Detected	19	Not Detected
TPH ref. to Gasoline (MW=100)	46	Not Detected	190	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	105	70-130
4-Bromofluorobenzene	87	70-130



Air Toxics

Client Sample ID: BD-1

Lab ID#: 1205413A-11A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	j052322	Date of Collection:	5/10/12
Dil. Factor:	1.58	Date of Analysis:	5/23/12 06:39 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	0.79	Not Detected	2.5	Not Detected
Ethyl Benzene	0.79	Not Detected	3.4	Not Detected
Toluene	0.79	Not Detected	3.0	Not Detected
m,p-Xylene	0.79	Not Detected	3.4	Not Detected
o-Xylene	0.79	Not Detected	3.4	Not Detected
Naphthalene	3.2	Not Detected	16	Not Detected
TPH ref. to Gasoline (MW=100)	40	Not Detected	160	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	104	70-130
4-Bromofluorobenzene	86	70-130

Client Sample ID: Lab Blank

Lab ID#: 1205413A-12A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	j052307	Date of Collection:	NA
Dil. Factor:	1.00	Date of Analysis:	5/23/12 10:24 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	0.50	Not Detected	1.6	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
Naphthalene	2.0	Not Detected	10	Not Detected
TPH ref. to Gasoline (MW=100)	25	Not Detected	100	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	104	70-130
4-Bromofluorobenzene	89	70-130



Air Toxics

Client Sample ID: CCV

Lab ID#: 1205413A-13A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	j052302	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 5/23/12 07:57 AM

Compound	%Recovery
Benzene	99
Ethyl Benzene	108
Toluene	110
m,p-Xylene	106
o-Xylene	108
Naphthalene	111
TPH ref. to Gasoline (MW=100)	100

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	111	70-130
4-Bromofluorobenzene	92	70-130



Air Toxics

Client Sample ID: LCS

Lab ID#: 1205413A-14A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	j052303	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 5/23/12 08:31 AM

Compound	%Recovery
Benzene	106
Ethyl Benzene	112
Toluene	114
m,p-Xylene	113
o-Xylene	114
Naphthalene	83
TPH ref. to Gasoline (MW=100)	Not Spiked

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	110	70-130
4-Bromofluorobenzene	91	70-130



Air Toxics

Client Sample ID: LCSD

Lab ID#: 1205413A-14AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	j052304	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 5/23/12 08:50 AM

Compound	%Recovery
Benzene	105
Ethyl Benzene	112
Toluene	115
m,p-Xylene	111
o-Xylene	113
Naphthalene	88
TPH ref. to Gasoline (MW=100)	Not Spiked

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	111	70-130
4-Bromofluorobenzene	92	70-130



Appendix F

Soil Vapor ADEC Laboratory Data
Review Checklist

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

Laboratory Data Review Checklist for Air Samples

Completed by:

Title: Date:

CS Report Name: Report Date:

Consultant Firm:

Laboratory Name: Laboratory Report Number:

DEC File Number: DEC Haz ID:

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:

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:

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

Comments:

4. Case Narrative

- a. Is there a case narrative and is it understandable?
 Yes No N/A (Please explain.)

Comments:

- 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:

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:

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:

- 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:

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

Comments:

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:

- v. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?
 Yes No N/A (Please explain.)

Comments:

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

Comments:

c. Surrogates

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

Yes No N/A (Please explain.)

Comments:

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:

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:

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

Comments:

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:

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

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

Where R_1 = Sample Concentration
 R_2 = Field Duplicate Concentration

- Yes No N/A (Please explain.)

Comments:

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

Comments:

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

- Yes No N/A (Please explain.)

Comments:

- i. Were all results less than the PQL?

- Yes No N/A (Please explain.)

Comments:

- ii. If above PQL, what samples are affected?

Comments:

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

Comments:

7. Other Data Flags/Qualifiers

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

- Yes No N/A (Please explain.)

Comments:



Appendix G

Fixed Gases Laboratory Report

6/1/2012

Mr. Eric Epple
Arcadis U.S., Inc.
2300 Eastlake Avenue East
Ste 200
Seattle WA 98102

Project Name: Chevron 30-C450
Project #: B0045508
Workorder #: 1205413B

Dear Mr. Eric Epple

The following report includes the data for the above referenced project for sample(s) received on 5/18/2012 at Air Toxics Ltd.

The data and associated QC analyzed by Modified ASTM D-1946 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for your air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Kelly Buettner at 916-985-1000 if you have any questions regarding the data in this report.

Regards,




Kelly Buettner
Project Manager

WORK ORDER #: 1205413B

Work Order Summary

CLIENT:	Mr. Eric Epple Arcadis U.S., Inc. 2300 Eastlake Avenue East Ste 200 Seattle, WA 98102	BILL TO:	Accounts Payable Arcadis U.S., Inc. 630 Plaza Drive Suite 600 Highlands Ranch, CO 80129
PHONE:	206-726-4728	P.O. #	B0045508-ATL-WA-July2011
FAX:	206-325-8218	PROJECT #	B0045508 Chevron 30-C450
DATE RECEIVED:	05/18/2012	CONTACT:	Kelly Buettner
DATE COMPLETED:	06/01/2012		

<u>FRACTION #</u>	<u>NAME</u>	<u>TEST</u>	<u>RECEIPT VAC./PRES.</u>	<u>FINAL PRESSURE</u>
01A	VP-1-5	Modified ASTM D-1946	4.0 "Hg	5 psi
02A	VP-1-10	Modified ASTM D-1946	4.0 "Hg	5 psi
03A	VP-1-15	Modified ASTM D-1946	4.5 "Hg	5 psi
04A	VP-2-3.5	Modified ASTM D-1946	4.0 "Hg	5 psi
05A	VP-2-7.5	Modified ASTM D-1946	5.0 "Hg	5 psi
06A	AMB-DOWN	Modified ASTM D-1946	4.5 "Hg	5 psi
07A	VP-3-5	Modified ASTM D-1946	3.0 "Hg	5 psi
08A	VP-3-10	Modified ASTM D-1946	5.0 "Hg	5 psi
09A	VP-3-15	Modified ASTM D-1946	4.0 "Hg	5 psi
10A	Equipment Blank	Modified ASTM D-1946	8.0 "Hg	5 psi
11A	BD-1	Modified ASTM D-1946	4.5 "Hg	5 psi
12A	Lab Blank	Modified ASTM D-1946	NA	NA
12B	Lab Blank	Modified ASTM D-1946	NA	NA
13A	LCS	Modified ASTM D-1946	NA	NA
13AA	LCSD	Modified ASTM D-1946	NA	NA

CERTIFIED BY: 
 Laboratory Director

DATE: 06/01/12

Certification numbers: AZ Licensure AZ0719, CA NELAP - 02110CA, LA NELAP - 02089,
 NY NELAP - 11291, TX NELAP - T104704434-11-3, UT NELAP -CA009332011-1, WA NELAP - C935
 Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
 Accreditation number: E87680, Effective date: 07/01/11 , Expiration date: 06/30/12.

Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards
 This report shall not be reproduced, except in full, without the written approval of Eurofins | Air Toxics, Inc.

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
 (916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified ASTM D-1946
Arcadis U.S., Inc.
Workorder# 1205413B

Eleven 6 Liter Summa Canister (100% Certified) samples were received on May 18, 2012. The laboratory performed analysis via Modified ASTM Method D-1946 for Methane and fixed gases in air using GC/FID or GC/TCD. The method involves direct injection of 1.0 mL of sample.

On the analytical column employed for this analysis, Oxygen coelutes with Argon. The corresponding peak is quantitated as Oxygen.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

<i>Requirement</i>	<i>ASTM D-1946</i>	<i>ATL Modifications</i>
Calibration	A single point calibration is performed using a reference standard closely matching the composition of the unknown.	A 3-point calibration curve is performed. Quantitation is based on a daily calibration standard which may or may not resemble the composition of the associated samples.
Reference Standard	The composition of any reference standard must be known to within 0.01 mol % for any component.	The standards used by ATL are blended to a $\geq 95\%$ accuracy.
Sample Injection Volume	Components whose concentrations are in excess of 5 % should not be analyzed by using sample volumes greater than 0.5 mL.	The sample container is connected directly to a fixed volume sample loop of 1.0 mL on the GC. Linear range is defined by the calibration curve. Bags are loaded by vacuum.
Normalization	Normalize the mole percent values by multiplying each value by 100 and dividing by the sum of the original values. The sum of the original values should not differ from 100% by more than 1.0%.	Results are not normalized. The sum of the reported values can differ from 100% by as much as 15%, either due to analytical variability or an unusual sample matrix.
Precision	Precision requirements established at each concentration level.	Duplicates should agree within 25% RPD for detections $> 5 X$'s the RL.

Receiving Notes

The Chain of Custody (COC) information for sample VP-2-3.5 did not match the information on the canister with regard to canister identification. The client was notified of the discrepancy and the

information on the canister was used to process and report the sample.

Analytical Notes

There were no analytical discrepancies.

Definition of Data Qualifying Flags

Seven qualifiers may have been used on the data analysis sheets and indicate as follows:

B - Compound present in laboratory blank greater than reporting limit.

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the detection limit.

M - Reported value may be biased due to apparent matrix interferences.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

**Summary of Detected Compounds
NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946**

Client Sample ID: VP-1-5

Lab ID#: 1205413B-01A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.28	21
Carbon Dioxide	0.028	0.13

Client Sample ID: VP-1-10

Lab ID#: 1205413B-02A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.21	23
Carbon Dioxide	0.021	0.23

Client Sample ID: VP-1-15

Lab ID#: 1205413B-03A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.16	22
Carbon Dioxide	0.016	0.32

Client Sample ID: VP-2-3.5

Lab ID#: 1205413B-04A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.16	23
Carbon Dioxide	0.016	0.075

Client Sample ID: VP-2-7.5

Lab ID#: 1205413B-05A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.16	22
Carbon Dioxide	0.016	0.080
Helium	0.080	0.094

Summary of Detected Compounds
NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

Client Sample ID: AMB-DOWN

Lab ID#: 1205413B-06A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.16	23
Methane	0.00016	0.00021
Carbon Dioxide	0.016	0.041

Client Sample ID: VP-3-5

Lab ID#: 1205413B-07A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.15	22
Carbon Dioxide	0.015	0.50

Client Sample ID: VP-3-10

Lab ID#: 1205413B-08A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.16	22
Carbon Dioxide	0.016	0.58

Client Sample ID: VP-3-15

Lab ID#: 1205413B-09A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.16	22
Carbon Dioxide	0.016	0.81

Client Sample ID: Equipment Blank

Lab ID#: 1205413B-10A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.18	1.5

Summary of Detected Compounds
NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

Client Sample ID: BD-1

Lab ID#: 1205413B-11A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.16	22
Carbon Dioxide	0.016	0.32



Air Toxics

Client Sample ID: VP-1-5

Lab ID#: 1205413B-01A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9052905	Date of Collection:	5/10/12 11:20:00 AM
Dil. Factor:	2.78	Date of Analysis:	5/29/12 09:17 AM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.28	21
Methane	0.00028	Not Detected
Carbon Dioxide	0.028	0.13
Helium	0.14	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)



Air Toxics

Client Sample ID: VP-1-10

Lab ID#: 1205413B-02A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9052919	Date of Collection:	5/10/12 11:18:00 AM
Dil. Factor:	2.08	Date of Analysis:	5/29/12 04:00 PM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.21	23
Methane	0.00021	Not Detected
Carbon Dioxide	0.021	0.23
Helium	0.10	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)



Air Toxics

Client Sample ID: VP-1-15

Lab ID#: 1205413B-03A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9052906	Date of Collection:	5/10/12 11:20:00 AM
Dil. Factor:	1.58	Date of Analysis:	5/29/12 09:40 AM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.16	22
Methane	0.00016	Not Detected
Carbon Dioxide	0.016	0.32
Helium	0.079	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)



Air Toxics

Client Sample ID: VP-2-3.5

Lab ID#: 1205413B-04A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9052907	Date of Collection:	5/10/12 12:50:00 PM
Dil. Factor:	1.55	Date of Analysis:	5/29/12 10:05 AM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.16	23
Methane	0.00016	Not Detected
Carbon Dioxide	0.016	0.075
Helium	0.078	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)



Air Toxics

Client Sample ID: VP-2-7.5

Lab ID#: 1205413B-05A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9052908	Date of Collection:	5/10/12 12:51:00 PM
Dil. Factor:	1.61	Date of Analysis:	5/29/12 10:28 AM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.16	22
Methane	0.00016	Not Detected
Carbon Dioxide	0.016	0.080
Helium	0.080	0.094

Container Type: 6 Liter Summa Canister (100% Certified)



Air Toxics

Client Sample ID: AMB-DOWN

Lab ID#: 1205413B-06A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9052909	Date of Collection:	5/10/12 2:30:00 PM
Dil. Factor:	1.58	Date of Analysis:	5/29/12 10:51 AM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.16	23
Methane	0.00016	0.00021
Carbon Dioxide	0.016	0.041
Helium	0.079	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)



Air Toxics

Client Sample ID: VP-3-5

Lab ID#: 1205413B-07A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9052910	Date of Collection:	5/10/12 3:14:00 PM
Dil. Factor:	1.49	Date of Analysis:	5/29/12 11:17 AM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.15	22
Methane	0.00015	Not Detected
Carbon Dioxide	0.015	0.50
Helium	0.074	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)



Air Toxics

Client Sample ID: VP-3-10

Lab ID#: 1205413B-08A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9052911	Date of Collection:	5/10/12 3:15:00 PM
Dil. Factor:	1.61	Date of Analysis:	5/29/12 11:41 AM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.16	22
Methane	0.00016	Not Detected
Carbon Dioxide	0.016	0.58
Helium	0.080	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)



Air Toxics

Client Sample ID: VP-3-15

Lab ID#: 1205413B-09A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9052912	Date of Collection:	5/10/12 3:16:00 PM
Dil. Factor:	1.55	Date of Analysis:	5/29/12 12:11 PM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.16	22
Methane	0.00016	Not Detected
Carbon Dioxide	0.016	0.81
Helium	0.078	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)



Air Toxics

Client Sample ID: Equipment Blank

Lab ID#: 1205413B-10A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9052913	Date of Collection:	5/10/12 3:57:00 PM
Dil. Factor:	1.83	Date of Analysis:	5/29/12 12:36 PM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.18	1.5
Methane	0.00018	Not Detected
Carbon Dioxide	0.018	Not Detected
Helium	0.092	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)



Air Toxics

Client Sample ID: BD-1

Lab ID#: 1205413B-11A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9052914	Date of Collection:	5/10/12
Dil. Factor:	1.58	Date of Analysis:	5/29/12 01:37 PM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.16	22
Methane	0.00016	Not Detected
Carbon Dioxide	0.016	0.32
Helium	0.079	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)



Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1205413B-12A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9052904	Date of Collection:	NA
Dil. Factor:	1.00	Date of Analysis:	5/29/12 08:48 AM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.10	Not Detected
Methane	0.00010	Not Detected
Carbon Dioxide	0.010	Not Detected

Container Type: NA - Not Applicable



Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1205413B-12B

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9052903b	Date of Collection:	NA
Dil. Factor:	1.00	Date of Analysis:	5/29/12 08:26 AM

Compound	Rpt. Limit (%)	Amount (%)
Helium	0.050	Not Detected

Container Type: NA - Not Applicable



Air Toxics

Client Sample ID: LCS

Lab ID#: 1205413B-13A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9052902	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 5/29/12 07:56 AM

Compound	%Recovery
Oxygen	101
Methane	96
Carbon Dioxide	99
Helium	107

Container Type: NA - Not Applicable



Air Toxics

Client Sample ID: LCSD

Lab ID#: 1205413B-13AA

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9052925	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 5/29/12 06:39 PM

Compound	%Recovery
Oxygen	101
Methane	96
Carbon Dioxide	99
Helium	108

Container Type: NA - Not Applicable



Appendix H

Fixed Gases ADEC Laboratory Data
Review Checklist

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

Laboratory Data Review Checklist for Air Samples

Completed by:

Title: Date:

CS Report Name: Report Date:

Consultant Firm:

Laboratory Name: Laboratory Report Number:

DEC File Number: DEC Haz ID:

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:

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:

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

Comments:

4. Case Narrative

- a. Is there a case narrative and is it understandable?

Yes No N/A (Please explain.)

Comments:

- 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:

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:

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:

- 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:

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

Comments:

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:

- v. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?
 Yes No N/A (Please explain.)

Comments:

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

Comments:

c. Surrogates

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

Yes No N/A (Please explain.)

Comments:

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:

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:

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

Comments:

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:

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

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

Where R_1 = Sample Concentration
 R_2 = Field Duplicate Concentration

Yes No N/A (Please explain.)

Comments:

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

Comments:

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

Yes No N/A (Please explain.)

Comments:

- i. Were all results less than the PQL?

Yes No N/A (Please explain.)

Comments:

- ii. If above PQL, what samples are affected?

Comments:

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

Comments:

7. Other Data Flags/Qualifiers

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

Yes No N/A (Please explain.)

Comments:



Appendix I

ADEC Conceptual Site Model

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: Former Chevron Facility 306450 (Anchorage Airport)
4351 Old International Airport Road

Completed By: Eric Epple
 Date Completed: 06/21/2012

Instructions: Follow the numbered directions below. Do not consider contaminant concentrations or engineering/land use controls when describing pathways.

(1) Media	(2) Transport Mechanisms
<input type="checkbox"/> Surface Soil (0-2 ft bgs)	<input type="checkbox"/> Direct release to surface soil <i>check soil</i> <input type="checkbox"/> Migration to subsurface <i>check soil</i> <input type="checkbox"/> Migration to groundwater <i>check groundwater</i> <input type="checkbox"/> Volatilization <i>check air</i> <input type="checkbox"/> Runoff or erosion <i>check surface water</i> <input type="checkbox"/> Uptake by plants or animals <i>check biota</i> <input type="checkbox"/> Other (list):
<input type="checkbox"/> Subsurface Soil (2-15 ft bgs)	<input type="checkbox"/> Direct release to subsurface soil <i>check soil</i> <input type="checkbox"/> Migration to groundwater <i>check groundwater</i> <input type="checkbox"/> Volatilization <i>check air</i> <input type="checkbox"/> Uptake by plants or animals <i>check biota</i> <input type="checkbox"/> Other (list):
<input type="checkbox"/> Ground-water	<input type="checkbox"/> Direct release to groundwater <i>check groundwater</i> <input type="checkbox"/> Volatilization <i>check air</i> <input type="checkbox"/> Flow to surface water body <i>check surface water</i> <input type="checkbox"/> Flow to sediment <i>check sediment</i> <input type="checkbox"/> Uptake by plants or animals <i>check biota</i> <input type="checkbox"/> Other (list):
<input type="checkbox"/> Surface Water	<input type="checkbox"/> Direct release to surface water <i>check surface water</i> <input type="checkbox"/> Volatilization <i>check air</i> <input type="checkbox"/> Sedimentation <i>check sediment</i> <input type="checkbox"/> Uptake by plants or animals <i>check biota</i> <input type="checkbox"/> Other (list):
<input type="checkbox"/> Sediment	<input type="checkbox"/> Direct release to sediment <i>check sediment</i> <input type="checkbox"/> Resuspension, runoff, or erosion <i>check surface water</i> <input type="checkbox"/> Uptake by plants or animals <i>check biota</i> <input type="checkbox"/> Other (list):

(3) Exposure Media	(4) Exposure Pathway/Route	(5) Current & Future Receptors						
		Identify the receptors potentially affected by each exposure pathway: Enter "C" for current receptors, "F" for future receptors, "C/F" for both current and future receptors, or "I" for insignificant exposure.						
		Residents (adults or children)	Commercial or industrial workers	Site visitors, trespassers, or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other
<input type="checkbox"/> soil	<input type="checkbox"/> Incidental Soil Ingestion <input type="checkbox"/> Dermal Absorption of Contaminants from Soil <input type="checkbox"/> Inhalation of Fugitive Dust		C/F	C/F	C/F			
<input type="checkbox"/> groundwater	<input type="checkbox"/> Ingestion of Groundwater <input type="checkbox"/> Dermal Absorption of Contaminants in Groundwater <input type="checkbox"/> Inhalation of Volatile Compounds in Tap Water		C/F	C/F	C/F			
<input type="checkbox"/> air	<input type="checkbox"/> Inhalation of Outdoor Air <input type="checkbox"/> Inhalation of Indoor Air <input type="checkbox"/> Inhalation of Fugitive Dust							
<input type="checkbox"/> surface water	<input type="checkbox"/> Ingestion of Surface Water <input type="checkbox"/> Dermal Absorption of Contaminants in Surface Water <input type="checkbox"/> Inhalation of Volatile Compounds in Tap Water							
<input type="checkbox"/> sediment	<input type="checkbox"/> Direct Contact with Sediment							
<input type="checkbox"/> biota	<input type="checkbox"/> Ingestion of Wild or Farmed Foods							

Human Health Conceptual Site Model Scoping Form

Site Name:

File Number:

Completed by:

Introduction

The form should be used to reach agreement with the Alaska Department of Environmental Conservation (DEC) about which exposure pathways should be further investigated during site characterization. From this information, summary text about the CSM and a graphic depicting exposure pathways should be submitted with the site characterization work plan and updated as needed in later reports.

General Instructions: Follow the italicized instructions in each section below.

1. General Information:

Sources (check potential sources at the site)

- | | |
|---|---|
| <input checked="" type="checkbox"/> USTs | <input type="checkbox"/> Vehicles |
| <input checked="" type="checkbox"/> ASTs | <input type="checkbox"/> Landfills |
| <input checked="" type="checkbox"/> Dispensers/fuel loading racks | <input type="checkbox"/> Transformers |
| <input type="checkbox"/> Drums | <input type="checkbox"/> Other: <input type="text" value=""/> |

Release Mechanisms (check potential release mechanisms at the site)

- | | |
|--|---|
| <input checked="" type="checkbox"/> Spills | <input type="checkbox"/> Direct discharge |
| <input checked="" type="checkbox"/> Leaks | <input type="checkbox"/> Burning |
| | <input type="checkbox"/> Other: <input type="text" value=""/> |

Impacted Media (check potentially-impacted media at the site)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Surface soil (0-2 feet bgs*) | <input type="checkbox"/> Groundwater |
| <input checked="" type="checkbox"/> Subsurface soil (>2 feet bgs) | <input type="checkbox"/> Surface water |
| <input type="checkbox"/> Air | <input type="checkbox"/> Biota |
| <input type="checkbox"/> Sediment | <input type="checkbox"/> Other: <input type="text" value=""/> |

Receptors (check receptors that could be affected by contamination at the site)

- | | |
|--|---|
| <input type="checkbox"/> Residents (adult or child) | <input type="checkbox"/> Site visitor |
| <input checked="" type="checkbox"/> Commercial or industrial worker | <input type="checkbox"/> Trespasser |
| <input checked="" type="checkbox"/> Construction worker | <input type="checkbox"/> Recreational user |
| <input type="checkbox"/> Subsistence harvester (i.e. gathers wild foods) | <input type="checkbox"/> Farmer |
| <input type="checkbox"/> Subsistence consumer (i.e. eats wild foods) | <input type="checkbox"/> Other: <input type="text" value=""/> |

* bgs - below ground surface

2. Exposure Pathways: (The answers to the following questions will identify complete exposure pathways at the site. Check each box where the answer to the question is "yes".)

a) Direct Contact -

1. Incidental Soil Ingestion

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site-specific basis.)

If the box is checked, label this pathway complete:

Comments:

2. Dermal Absorption of Contaminants from Soil

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.)

Can the soil contaminants permeate the skin (see Appendix B in the guidance document)?

If both boxes are checked, label this pathway complete:

Comments:

b) Ingestion -

1. Ingestion of Groundwater

Have contaminants been detected or are they expected to be detected in the groundwater, or are contaminants expected to migrate to groundwater in the future?

Could the potentially affected groundwater be used as a current or future drinking water source? Please note, only leave the box unchecked if DEC has determined the groundwater is not a currently or reasonably expected future source of drinking water according to 18 AAC 75.350.

If both boxes are checked, label this pathway complete:

Comments:

2. Ingestion of Surface Water

Have contaminants been detected or are they expected to be detected in surface water, or are contaminants expected to migrate to surface water in the future?

Could potentially affected surface water bodies be used, currently or in the future, as a drinking water source? Consider both public water systems and private use (i.e., during residential, recreational or subsistence activities).

If both boxes are checked, label this pathway complete:

Comments:

3. Ingestion of Wild and Farmed Foods

Is the site in an area that is used or reasonably could be used for hunting, fishing, or harvesting of wild or farmed foods?

Do the site contaminants have the potential to bioaccumulate (see Appendix C in the guidance document)?

Are site contaminants located where they would have the potential to be taken up into biota? (i.e. soil within the root zone for plants or burrowing depth for animals, in groundwater that could be connected to surface water, etc.)

If all of the boxes are checked, label this pathway complete:

Comments:

c) Inhalation-

1. Inhalation of Outdoor Air

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.)

Are the contaminants in soil volatile (see Appendix D in the guidance document)?

If both boxes are checked, label this pathway complete:

Comments:

2. Inhalation of Indoor Air

Are occupied buildings on the site or reasonably expected to be occupied or placed on the site in an area that could be affected by contaminant vapors? (within 30 horizontal or vertical feet of petroleum contaminated soil or groundwater; within 100 feet of non-petroleum contaminated soil or groundwater; or subject to "preferential pathways," which promote easy airflow like utility conduits or rock fractures)

Are volatile compounds present in soil or groundwater (see Appendix D in the guidance document)?

If both boxes are checked, label this pathway complete:

Comments:

3. **Additional Exposure Pathways:** (Although there are no definitive questions provided in this section, these exposure pathways should also be considered at each site. Use the guidelines provided below to determine if further evaluation of each pathway is warranted.)

Dermal Exposure to Contaminants in Groundwater and Surface Water

Dermal exposure to contaminants in groundwater and surface water may be a complete pathway if:

- o Climate permits recreational use of waters for swimming.
- o Climate permits exposure to groundwater during activities, such as construction.
- o Groundwater or surface water is used for household purposes, such as bathing or cleaning.

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are assumed to be protective of this pathway.

Check the box if further evaluation of this pathway is needed:

Comments:

0±-B° ° ·½¼ »

Inhalation of Volatile Compounds in Tap Water

Inhalation of volatile compounds in tap water may be a complete pathway if:

- o The contaminated water is used for indoor household purposes such as showering, laundering, and dish washing.
- o The contaminants of concern are volatile (common volatile contaminants are listed in Appendix D in the guidance document.)

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are assumed to be protective of this pathway.

Check the box if further evaluation of this pathway is needed:

Comments:

0±-B° ° ·½¼ »

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

- o Nonvolatile compounds are found in the top 2 centimeters of soil. The top 2 centimeters of soil are likely to be dispersed in the wind as dust particles.
- o Dust particles are less than 10 micrometers (Particulate Matter - PM₁₀). Particles of this size are called respirable particles and can reach the pulmonary parts of the lungs when inhaled.
- o Chromium is present in soil that can be dispersed as dust particles of any size.

Generally, DEC direct contact soil cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway because it is assumed most dust particles are incidentally ingested instead of inhaled to the lower lungs. The inhalation pathway only needs to be evaluated when very small dust particles are present (e.g., along a dirt roadway or where dusts are a nuisance). This is not true in the case of chromium. Site specific cleanup levels will need to be calculated in the event that inhalation of dust containing chromium is a complete pathway at a site.

Check the box if further evaluation of this pathway is needed:

Comments:

0±-B°°·½¼»

Direct Contact with Sediment

This pathway involves people's hands being exposed to sediment, such as during some recreational, subsistence, or industrial activity. People then incidentally ingest sediment from normal hand-to-mouth activities. In addition, dermal absorption of contaminants may be of concern if the the contaminants are able to permeate the skin (see Appendix B in the guidance document). This type of exposure should be investigated if:

- o Climate permits recreational activities around sediment.
- o The community has identified subsistence or recreational activities that would result in exposure to the sediment, such as clam digging.

Generally, DEC direct contact soil cleanup levels in 18 AAC 75, Table B1, are assumed to be protective of direct contact with sediment.

Check the box if further evaluation of this pathway is needed:

Comments:

0±-B°°·½¼»

4. Other Comments (Provide other comments as necessary to support the information provided in this form.)

[Empty box for providing other comments]