

4.0 SOIL VAPOR EXTRACTION PILOT TEST

May 23, 2016, LTE conducted SVE pilot testing activities at the Powder Wash North Compressor Station. A site assessment was conducted in November 2015 with results summarized in the LTE *Production Pit Assessment* report dated December 4, 2015. The soil assessment results are included on Figure 5. The following is a summary of the pilot test, results, and analysis.

4.1 Pilot Testing Description

The objective of the SVE pilot test was to evaluate the effectiveness of the remedial technology to achieve site remediation cleanup goals. SVE pilot testing was conducted to evaluate the flow rate and applied vacuum required to influence the subsurface and cause volatilization of the petroleum hydrocarbons entrained in the soil and to determine specific site design radius of influence (ROI). The pilot testing program was determined based on previously observed geologic conditions, surface conditions, current locations of petroleum hydrocarbon impacts, and other relevant factors. Two SVE screen depths were tested (10 feet to 15 feet bgs and 20 feet to 30 feet bgs) to encourage uniform flow throughout the impacted interval (1 foot to 30 feet bgs).

The petroleum hydrocarbon impacts are generally volatile (relatively high Henry's Constant) and amenable to microbial degradation processes. SVE has been an industry standard, cost effective technology for *in-situ* remediation of petroleum hydrocarbons.

4.2 SVE Test Procedures

All four SVE wells were used as the extraction well at specific periods during the SVE pilot test. A vacuum truck was used to apply a negative pressure to each of the four pilot testing wells. A manifold designed and built by LTE was used to control the vacuum being applied and collect measurements at the extraction well. Observation wells (SVE-PT01, SVE-PT02, SVE-PT03, and SVE-PT04) having screened intervals from 20 feet to 30 feet bgs, 20 feet to 30 feet bgs, 10 feet to 15 feet bgs, and 10 feet to 15 feet bgs, respectively, were used to collect SVE pilot test monitoring data. The SVE well locations are presented on Figure 5. The following list summarizes the steps involved in the SVE pilot test:

1. Measured the distances from the extraction well to each observation well.
2. Collected background VOCs measurements using a PID at the SVE and observation wells.
3. Connected the vacuum truck to the extraction well via a flexible hose and manifold. Slowly opened the valve and monitored the vacuum and flow.
4. Applied a vacuum ranging from approximately 10 inches of water column (wc) to 100 inches wc at the designated SVE well for each test.

5. Collected at least two rounds of stabilized measurements per vacuum/flow rate. Measured the vacuum and the PID headspace at the observation wells. Collected readings 15 minutes apart.
6. Closed the valve to eliminate the vacuum pressure and collected stabilization readings from each observation well.
7. Collected air samples from SVE-PT02 and SVE-PT04 in laboratory-prepared containers and delivered under COC protocol to ALS for analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) and total volatile petroleum hydrocarbons (TVPH).

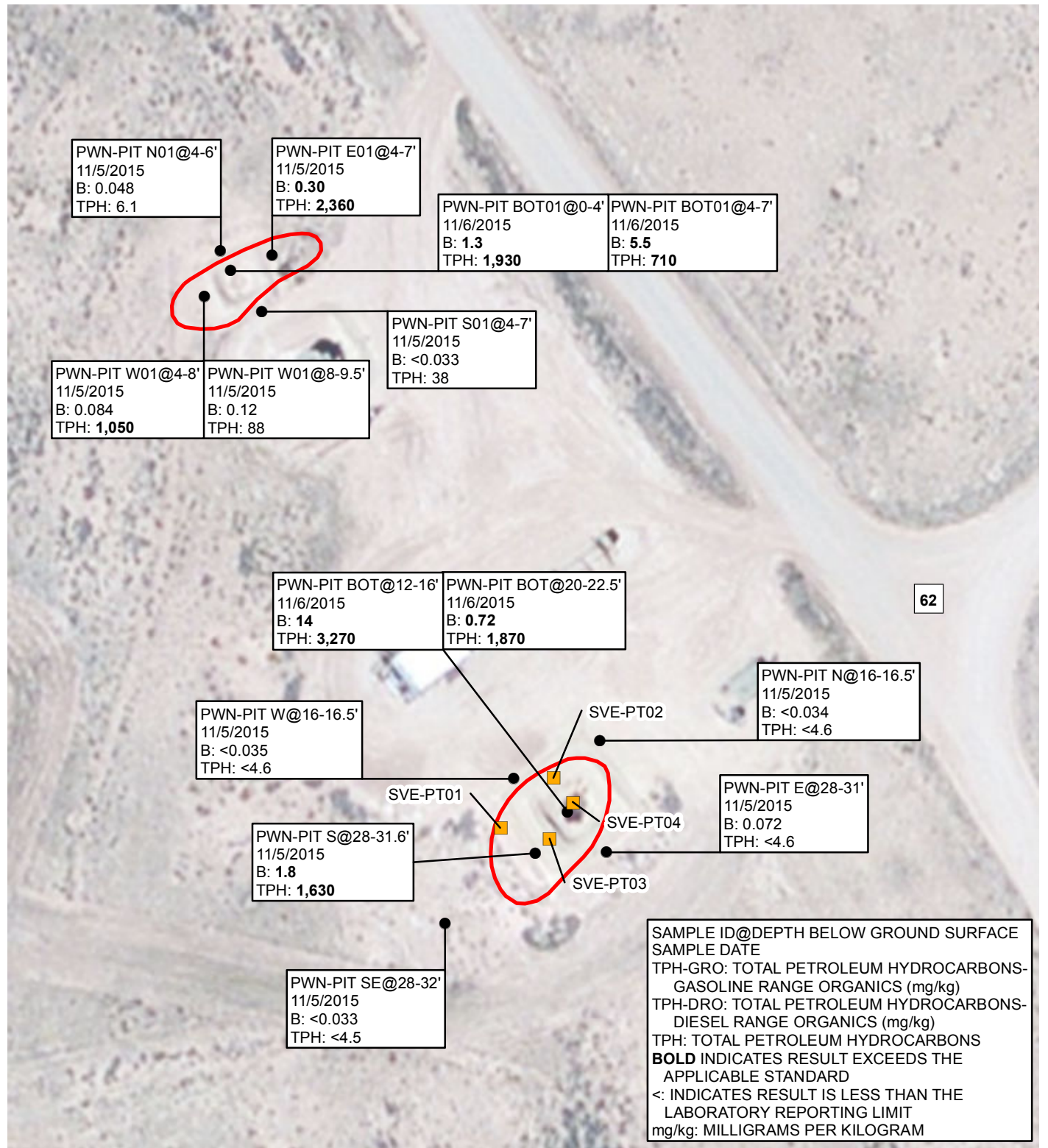
The laboratory analytical report is provided in Appendix A. All test forms and graphs are provided as Appendix B.

4.3 Results and Conclusions

Pilot test data indicates that SVE is a viable technology to remediate the Powder Wash North pits. The introduction of a vacuum into the subsurface enhanced volatilization of the petroleum hydrocarbons throughout the impacted soil. SVE vacuum influences were observed in all wells during each test except an observable influence in SVE-PT02 during the SVE-PT01 and SVE-PT03 tests. Alternatively, when a vacuum was applied to SVE-PT02, observations were observed in SVE-PT01 and SVE-PT03. The geologic setting is likely the cause of why SVE-PT01 and PVE-PT03 were not able to influence the area surrounding SVE-PT02. SVE-PT02 is located in a thicker clay layer, which can propagate influence/air movement from more permeable areas under a higher vacuum, but when a vacuum is applied outside the thicker clay layer, the air flow moves from the more permeable surrounding area instead of the clay. The lack of influence from outside the clay layer can be overcome with installation and operation of additional wells located inside the clay layer. The geologic setting is illustrated on Figures 6 and 7.

An effective SVE ROI of 30 feet was graphically estimated from a plot of the observed vacuum response versus the distance from the applied vacuum. Influence of greater than 0.1 inches wc were observed during the four tests via vacuum and flow rates ranging from 40 inches wc at 6 standard cubic feet per minute (scfm) to 60 inches wc at 20 scfm.

FIGURES



LEGEND

- SOIL BORING
- SOIL VAPOR EXTRACTION WELL (4/25/2016)
- ESTIMATED AREA OF TPH IMPACT

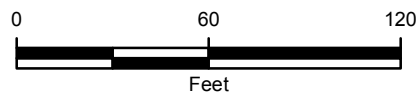
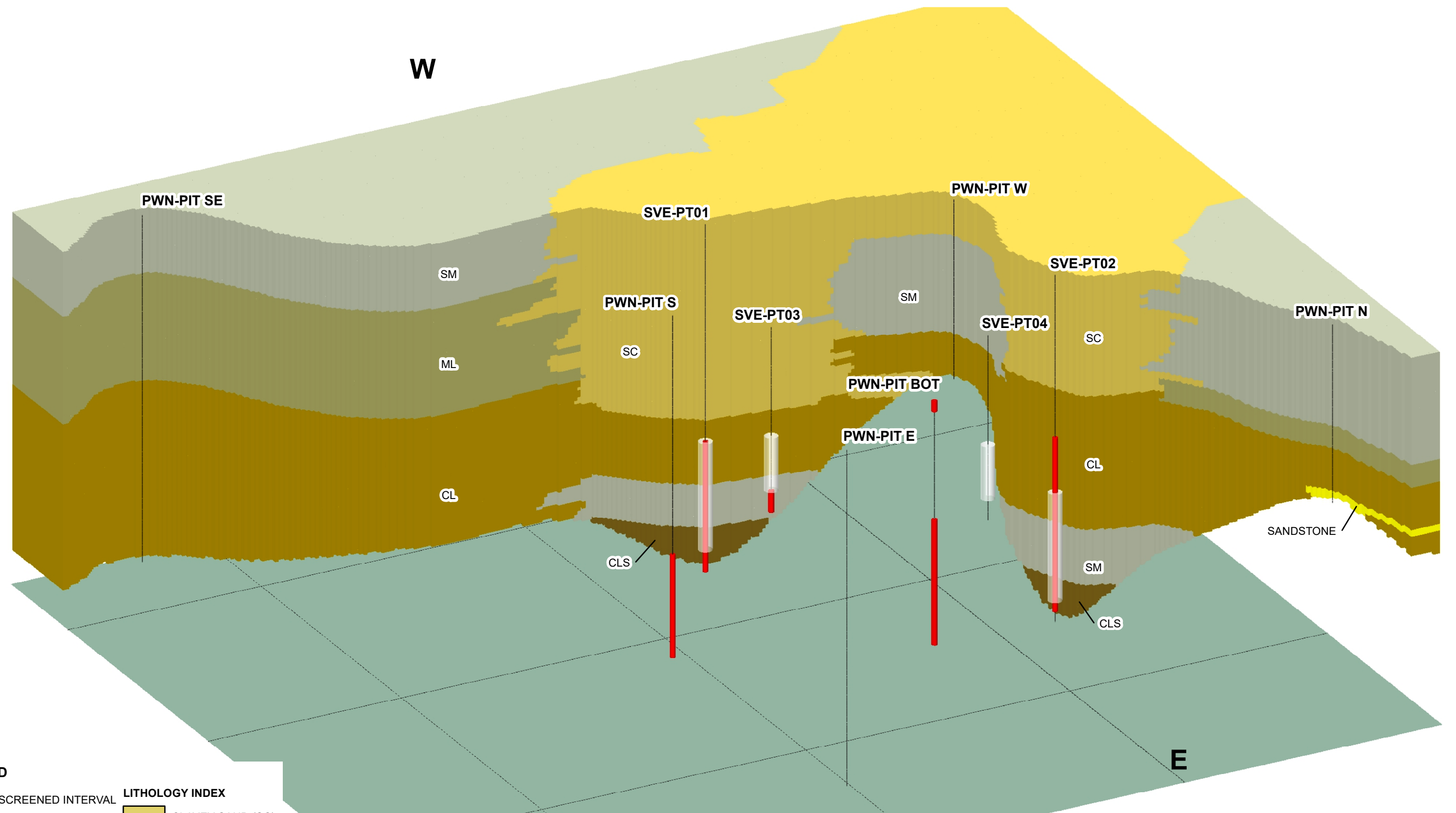


IMAGE COURTESY OF ESRI



FIGURE 5
 SITE MAP
 POWDER WASH NORTH COMPRESSOR STATION
 NENE SEC 32-T12N-R97W
 MOFFAT COUNTY, COLORADO
 TESORO LOGISTICS LP





LEGEND



SCREENED INTERVAL

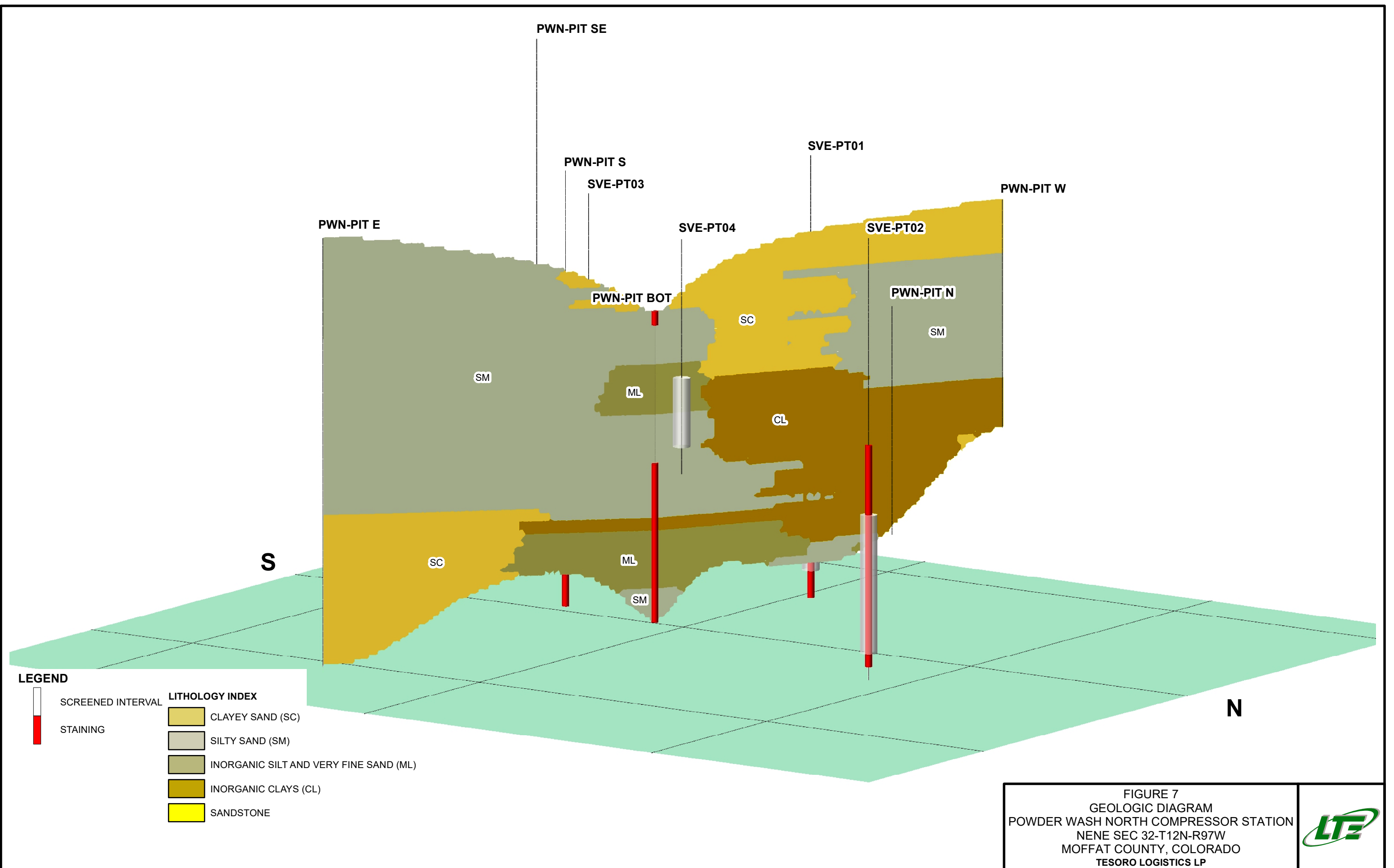
STAINING

LITHOLOGY INDEX

- CLAYEY SAND (SC)
- SILTY SAND (SM)
- INORGANIC SILT AND VERY FINE SAND (ML)
- INORGANIC CLAYS (CL)
- SANDSTONE
- CLAYSTONE (CLS)

FIGURE 6
GEOLOGIC DIAGRAM
POWDER WASH NORTH COMPRESSOR STATION
NENE SEC 32-T12N-R97W
MOFFAT COUNTY, COLORADO
TESORO LOGISTICS LP





APPENDIX A
LABORATORY ANALYTICAL REPORTS





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LABORATORY REPORT

June 9, 2016

Rob Rebel
LT Environmental, Inc.
820 Megan Ave., Unit B
Rifle, CO 81650

RE: Powder Wash North / 044715005

Dear Rob:

Enclosed are the results of the samples submitted to our laboratory on May 25, 2016. For your reference, these analyses have been assigned our service request number P1602666.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

ALS | Environmental



Sue Anderson
By Sue Anderson at 9:29 am, Jun 09, 2016

Sue Anderson
Project Manager



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Client: LT Environmental, Inc.
Project: Powder Wash North / 044715005

Service Request No: P1602666

CASE NARRATIVE

The samples were received intact under chain of custody on May 25, 2016 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Total Petroleum Hydrocarbons as Gasoline Analysis

The samples were analyzed for total petroleum hydrocarbons (TPH) as gasoline per modified EPA Method TO-3 using a gas chromatograph equipped with a flame ionization detector (FID). This procedure is described in laboratory SOP VOA-TPHG_TO3. This method is included on the laboratory's DoD-ELAP scope of accreditation, however it is not part of the NELAP or AIHA-LAP accreditation.

Volatile Organic Compound Analysis

The samples were analyzed for volatile organic compounds in accordance with EPA Method TO-15 from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition (EPA/625/R-96/010b), January, 1999. This procedure is described in laboratory SOP VOA-TO15. The analytical system was comprised of a gas chromatograph/mass spectrometer (GC/MS) interfaced to a whole-air preconcentrator. According to the method, the use of Tedlar bags is considered a method modification. This method is included on the laboratory's NELAP and DoD-ELAP scope of accreditation, however it is not part of the AIHA-LAP accreditation. Any analytes flagged with an X are not included on the NELAP or DoD-ELAP accreditation.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.



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ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
AIHA	http://www.aihaaccreditedlabs.org	101661
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0694
DoD ELAP	http://www.pjlabs.com/search-accredited-labs	L15-398
Florida DOH (NELAP)	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E871020
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm	2014025
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	977273
New Jersey DEP (NELAP)	http://www.nj.gov/dep/oqa/	CA009
New York DOH (NELAP)	http://www.wadsworth.org/labcert/elap/elap.html	11221
Oregon PHD (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	4068-003
Pennsylvania DEP	http://www.depweb.state.pa.us/labs	68-03307 (Registration)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704413-15-6
Utah DOH (NELAP)	http://www.health.utah.gov/lab/labimp/certification/index.html	CA01627201 5-5
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C946

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

ALS ENVIRONMENTAL

DETAIL SUMMARY REPORT

Client: LT Environmental, Inc.
Project ID: Powder Wash North / 044715005

Service Request: P1602666

Date Received: 5/25/2016
Time Received: 09:35

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	TO-3 Modified - TPHG Bag	TO-15 Modified - VOC Bags
SVE-PT04	P1602666-001	Air	5/23/2016	15:30	X	X
SVE-PT02	P1602666-002	Air	5/23/2016	16:45	X	X



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Air - Chain of Custody Record & Analytical Service Request

Page 1 of 1

Company Name & Address (Reporting Information) W Environmental Inc 870 Megan Ave, Unit B Brea, CA 92620 Project Manager Bob Rebel Phone (203) 702-5558 Email Address for Result Reporting rebel@wenv.com, rebel@wenv.com, rebel@wenv.com		Requested Turnaround Time In Business Days (Surcharges) please circle 1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10 Day (Standard)		CAS Project No. P1602606			
Project Name Powder Wash North		Analysis Method/Analytes		Comments e.g. Actual Preservative or specific instructions			
Project Number 044719005							
P.O. # / Billing Information Accounts Payable - epel@wenv.com		Sampler (Print & Sign) Dustin Heid					
Laboratory ID Number	Date Collected	Time Collected	Sample Type (Air/Tube/Solid)	Canister ID (Bar code # - AC, SC, etc.)	Flow Controller (Bar code - FC #)	Sample Volume	
①	5/23/10	1530	Air			1L	
②	5/23/10	1645	Air			1L	
Report Tier Levels - please select							
Tier I - (Results/Default if not specified)							
Tier II (Results + QC) <input checked="" type="checkbox"/>							
Tier III (Data Validation Package) 10% Surcharge							
Tier V (client specified)							
EDD required Yes / No							
Type:							
EDD Units:							
Relinquished by: (Signature)		Date: 5/24/10	Time: 1514	Received by: (Signature)		Date: 5-24-10	Time: 1514
Relinquished by: (Signature)		Date: 5-24-10	Time: 1700	Received by: (Signature)		Date: 5/24/10	Time: 0935
Relinquished by: (Signature)		Date:	Time:	Received by: (Signature)		Date:	Time:
Cooler / Blank Temperature °C							

ALS Environmental Sample Acceptance Check Form

Client: LT Environmental, Inc. Work order: P1602666
 Project: Powder Wash North / 044715005
 Sample(s) received on: 5/25/16 Date opened: 5/25/16 by: KKELPE

Note: This form is used for all samples received by ALS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

- | | Yes | No | N/A |
|-----------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------|-------------------------------------|
| 1 Were sample containers properly marked with client sample ID? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2 Did sample containers arrive in good condition? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3 Were chain-of-custody papers used and filled out? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4 Did sample container labels and/or tags agree with custody papers? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5 Was sample volume received adequate for analysis? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6 Are samples within specified holding times? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 Was proper temperature (thermal preservation) of cooler at receipt adhered to? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 8 Were custody seals on outside of cooler/Box/Container? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Location of seal(s)? <u>sealing box</u> Sealing Lid? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Were signature and date included? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Were seals intact? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 Do containers have appropriate preservation , according to method/SOP or Client specified information? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Is there a client indication that the submitted samples are pH preserved? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Were VOA vials checked for presence/absence of air bubbles? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Does the client/method/SOP require that the analyst check the sample pH and <u>if necessary</u> alter it? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 10 Tubes: Are the tubes capped and intact? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 11 Badges: Are the badges properly capped and intact? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Are dual bed badges separated and individually capped and intact? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1602666-001.01	1.0 L Tedlar Bag					
P1602666-002.01	1.0 L Tedlar Bag					

Explain any discrepancies: (include lab sample ID numbers): _____

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: LT Environmental, Inc.
Client Project ID: Powder Wash North / 044715005

ALS Project ID: P1602666

Total Petroleum Hydrocarbons (TPH) as Gasoline

Test Code: EPA TO-3 Modified
Instrument ID: HP 5890 II/GC19/FID
Analyst: Adam McAfee
Sampling Media: 1.0 L Tedlar Bag(s)
Test Notes:

Date(s) Collected: 5/23/16
Date Received: 5/25/16
Date Analyzed: 5/25/16

Client Sample ID	ALS Sample ID	Injection Volume ml(s)	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
SVE-PT04	P1602666-001	1.0	4,600	18	1,300	5.1	
SVE-PT02	P1602666-002	1.0	1,100	18	320	5.1	
Method Blank	P160525-MB	1.0	ND	18	ND	5.1	

Parts Per Million results are based on a Molecular Weight of 86.18.

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

Client: LT Environmental, Inc.
Client Sample ID: Lab Control Sample
Client Project ID: Powder Wash North / 044715005

ALS Project ID: P1602666
ALS Sample ID: P160525-LCS

Test Code: EPA TO-3 Modified
Instrument ID: HP 5890 II/GC19/FID
Analyst: Adam McAfee
Sampling Media: 1.0 L Tedlar Bag
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 5/25/16
Volume(s) Analyzed: NA ml(s)

Compound	Spike Amount mg/m ³	Result mg/m ³	% Recovery	ALS	Data Qualifier
				Acceptance Limits	
TPH as Gasoline	7,310	7,210	99	77-136	

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: LT Environmental, Inc.
Client Sample ID: SVE-PT04
Client Project ID: Powder Wash North / 044715005

ALS Project ID: P1602666
 ALS Sample ID: P1602666-001

Test Code: EPA TO-15 Modified
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9
Analyst: Wida Ang
Sample Type: 1.0 L Tedlar Bag
Test Notes:

Date Collected: 5/23/16
Date Received: 5/25/16
Date Analyzed: 5/25/16
Volume(s) Analyzed: 0.00030 Liter(s)

CAS #	Compound	Result µg/m ³	MRL µg/m ³	Result ppbV	MRL ppbV	Data Qualifier
71-43-2	Benzene	260,000	1,700	82,000	520	
108-88-3	Toluene	200,000	1,700	53,000	440	
100-41-4	Ethylbenzene	2,500	1,700	580	380	
179601-23-1	m,p-Xylenes	7,300	3,300	1,700	770	
95-47-6	o-Xylene	ND	1,700	ND	380	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: LT Environmental, Inc.
Client Sample ID: SVE-PT02
Client Project ID: Powder Wash North / 044715005

ALS Project ID: P1602666
 ALS Sample ID: P1602666-002

Test Code: EPA TO-15 Modified
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9
Analyst: Wida Ang
Sample Type: 1.0 L Tedlar Bag
Test Notes:

Date Collected: 5/23/16
Date Received: 5/25/16
Date Analyzed: 5/25/16
Volume(s) Analyzed: 0.00060 Liter(s)

CAS #	Compound	Result µg/m ³	MRL µg/m ³	Result ppbV	MRL ppbV	Data Qualifier
71-43-2	Benzene	61,000	830	19,000	260	
108-88-3	Toluene	57,000	830	15,000	220	
100-41-4	Ethylbenzene	1,500	830	340	190	
179601-23-1	m,p-Xylenes	4,200	1,700	980	380	
95-47-6	o-Xylene	ND	830	ND	190	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: LT Environmental, Inc.

Client Sample ID: Method Blank

Client Project ID: Powder Wash North / 044715005

ALS Project ID: P1602666

ALS Sample ID: P160525-MB

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Wida Ang

Sample Type: 1.0 L Tedlar Bag

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 5/25/16

Volume(s) Analyzed: 1.00 Liter(s)

CAS #	Compound	Result µg/m ³	MRL µg/m ³	Result ppbV	MRL ppbV	Data Qualifier
71-43-2	Benzene	ND	0.50	ND	0.16	
108-88-3	Toluene	ND	0.50	ND	0.13	
100-41-4	Ethylbenzene	ND	0.50	ND	0.12	
179601-23-1	m,p-Xylenes	ND	1.0	ND	0.23	
95-47-6	o-Xylene	ND	0.50	ND	0.12	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

SURROGATE SPIKE RECOVERY RESULTS

Page 1 of 1

Client: LT Environmental, Inc.
Client Project ID: Powder Wash North / 044715005

ALS Project ID: P1602666

Test Code: EPA TO-15 Modified
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9
Analyst: Wida Ang
Sample Type: 1.0 L Tedlar Bag(s)
Test Notes:

Date(s) Collected: 5/23/16
Date(s) Received: 5/25/16
Date(s) Analyzed: 5/25/16

Client Sample ID	ALS Sample ID	1,2-Dichloroethane-d4	Toluene-d8	Bromofluorobenzene	Acceptance Limits	Data Qualifier
		Percent Recovered	Percent Recovered	Percent Recovered		
Method Blank	P160525-MB	100	100	109	70-130	
Lab Control Sample	P160525-LCS	98	99	113	70-130	
SVE-PT04	P1602666-001	97	99	112	70-130	
SVE-PT02	P1602666-002	97	100	113	70-130	

Surrogate percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly from the on-column percent recovery.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

Client: LT Environmental, Inc.

Client Sample ID: Lab Control Sample

Client Project ID: Powder Wash North / 044715005

ALS Project ID: P1602666

ALS Sample ID: P160525-LCS

Test Code: EPA TO-15 Modified

Date Collected: NA

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Date Received: NA

Analyst: Wida Ang

Date Analyzed: 5/25/16

Sample Type: 1.0 L Tedlar Bag

Volume(s) Analyzed: 0.125 Liter(s)

Test Notes:

CAS #	Compound	Spike Amount µg/m ³	Result µg/m ³	% Recovery	ALS	Data Qualifier
					Acceptance Limits	
71-43-2	Benzene	226	164	73	61-110	
108-88-3	Toluene	218	178	82	67-117	
100-41-4	Ethylbenzene	218	191	88	69-123	
179601-23-1	m,p-Xylenes	428	378	88	67-125	
95-47-6	o-Xylene	210	184	88	67-124	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

APPENDIX B
PILOT TEST DATA



SOIL VAPOR EXTRACTION PILOT TEST

LOCATION - Podwer Wash North

Date : 5/23/2016

SVE well dia -

2"

Air Sampled Collected: No

Extraction Test Well SVE-PT01												
Pilot Test Extraction Well							Observation Wells			Observation Wells		
Time (mins)	Wellhead Vacuum (in. wc)	Anemometer		Pitot Tube		PID at Stack (ppm)	SVE-PT02	SVE-PT04	SVE-PT03	SVE-PT02	SVE-PT04	SVE-PT03
		Well Velocity (fpm)	Well Flow (cfm)	Vacuum (in.wc)	Well Flow (cfm)		Distance From Test Well (feet)			Distance From Test Well (feet)		
							29	33	24	29	33	24
							Vacuum (in. wc)			PID Measurement (ppm)		
0	0.0	0	0	0.00	0	0.2	0.00	0.00	0.00	884.8	2139	285.0
10	10	80	2	0.00	0	1240	0.01	0.06	0.07	773.1	2275	150.6
20	20	190	4	0.01	5	797	0.01	0.10	0.15	512.2	231.5	2.2
30	20	140	3	0.01	5	1249	0.005	0.12	0.16	280	289.9	2.0
40	30	400	9	0.02	7	125.3	0.02	0.15	0.24	91.5	69.6	1.9
50	30	640	14	0.01	5	931.9	0.01	0.15	0.24	121.2	75.1	0.6
60	40	255	6	0.01	5	1378.0	0.01	0.2	0.31	138.6	43.4	0.6
70	40	279	6	0.01	5	1286	0.01	0.21	0.31	83.5	126.4	1.0
80	50	365	8	0.01	5	769.8	0.01	0.22	0.35	99.1	49.7	0.5
85	50	380	8	0.02	7	1044	0.005	0.24	0.39	61.2	18.8	0.6
90	60	575	13	0.02	7	354.3	0.00	0.26	0.42	91.2	25.5	0.3
95	60	400	9	0.01	5	296.1	0.005	0.29	0.42	66.8	28.3	0.3
100	70	575	13	0.025	8	177	0.00	0.33	0.50	61.2	27.3	0.3
105	70	570	12	0.03	8	321	0.005	0.34	0.50	56.7	41.5	0.2

Notes:

ND - not detected

in. wc - inches of water column

ppm - parts per million

PID - photoionization detector

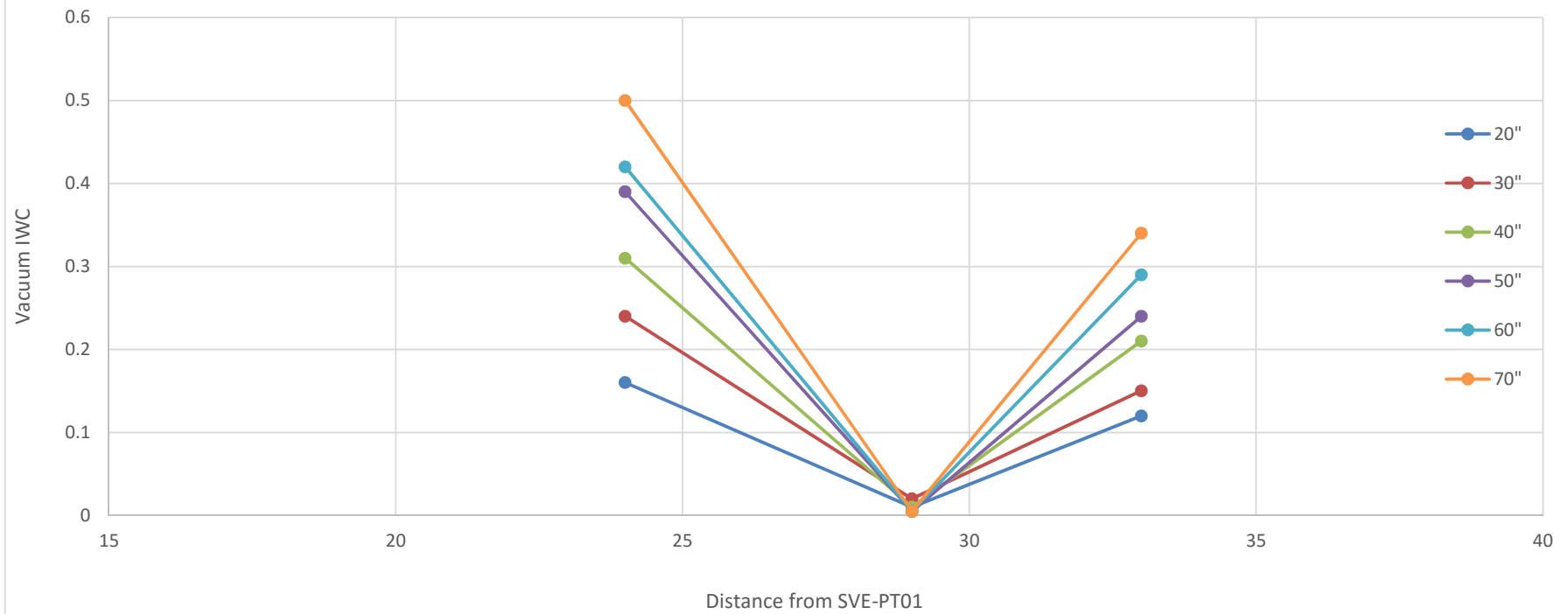
fpm - feet per minute

acfm - actual cubic feet per minute

NM - not measured



SVE-PTO1
SVE Vacuum vs. Distance



SOIL VAPOR EXTRACTION PILOT TEST

LOCATION - Podwer Wash North

Date : 5/23/2016

SVE well dia -

2"

Air Sample Collected: Yes @ 1645

Extraction Test Well SVE-PT02												
Pilot Test Extraction Well							Observation Wells			Observation Wells		
Time (mins)	Wellhead Vacuum (in. wc)	Anemometer		Pitot Tube		PID at Stack (ppm)	SVE-PT01	SVE-PT03	SVE-PT04	SVE-PT01	SVE-PT03	SVE-PT04
		Well Velocity (fpm)	Well Flow (cfm)	Vacuum (in. wc)	Well Flow (cfm)		Distance From Test Well (feet)			Distance From Test Well (feet)		
							29	29	16	29	29	16
							Vacuum (in. wc)			PID Measurement (ppm)		
0	0.0	0	0	0.00	0	1784	0.00	0.00	0.00	13.2	4.7	33.2
15	20	340	7	0.01	5	910.8	0.00	0.01	0.03	23.8	1.7	15.5
20	20	345	8	0.01	5	914.6	0.00	0.01	0.04	21.6	1.8	9.4
25	60	360	8	0.015	6	465.5	0.03	0.05	0.13	8.3	1.6	7.8
30	60	340	7	0.015	6	NM	0.05	0.05	0.13	9.3	0.5	7.9
35	100	650	14	0.05	11	NM	0.07	0.10	0.30	2.8	0.4	0.9
40	100	705	15	0.06	12	NM	0.15	0.15	0.40	2.5	0.2	0.1

Notes:

ND - not detected

in. wc - inches of water column

ppm - parts per million

PID - photoionization detector

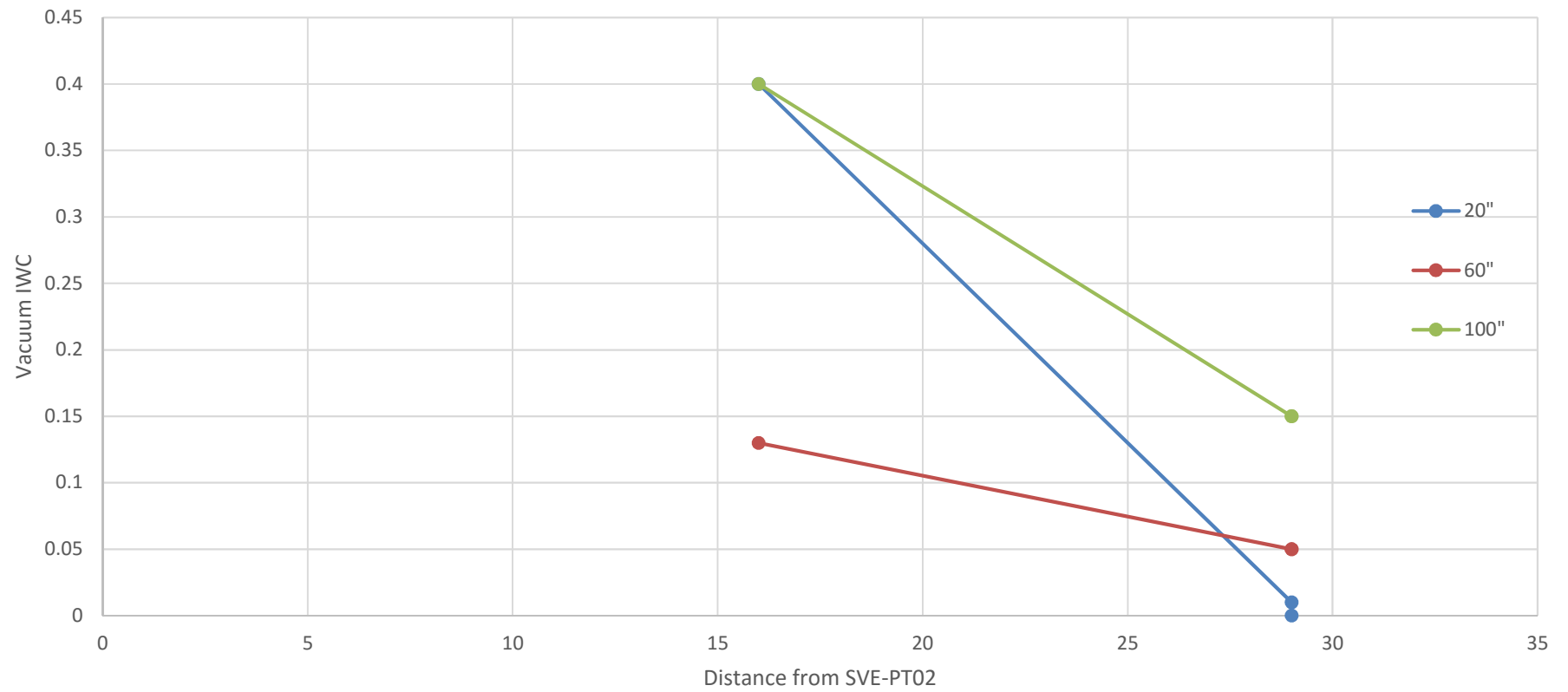
fpm - feet per minute

acfm - actual cubic feet per minute

NM - not measured



SVE-PT02
SVE Vacuum vs. Distance



SOIL VAPOR EXTRACTION PILOT TEST

LOCATION - Podwer Wash North

Date : 5/23/2016

SVE well dia -

2"

Air Sample Collected: No

Extraction Test Well SVE-PT03												
Pilot Test Extraction Well							Observation Wells			Observation Wells		
Time (mins)	Wellhead Vacuum (in. wc)	Anemometer		Pitot Tube		PID at Stack (ppm)	SVE-PT04	SVE-PT02	SVE-PT01	SVE-PT04	SVE-PT02	SVE-PT01
		Well Velocity (fpm)	Well Flow (cfm)	Vacuum (in.wc)	Well Flow (cfm)		Distance From Test Well (feet)			Distance From Test Well (feet)		
							20	29	24	20	29	24
							Vacuum (in. wc)			PID Measurement (ppm)		
0	0.0	0	0	0.00	0	0.04	0.00	0.00	0.00	104	172.8	75.2
15	20	76	2	0.00	0	344.5	0.06	0.00	0.02	29.5	132.8	124.7
20	20	100	2	0.01	5	447.4	0.04	0.00	0.02	150.6	118.2	53.3
25	30	680	15	0.01	5	131.1	0.09	0.00	0.06	96.4	76.7	66.7
30	30	170	4	0.01	5	31.6	0.10	0.00	0.04	73.1	84.9	59.4
35	50	131	3	0.01	5	138.5	0.16	0.00	0.09	27.1	78.7	95.6
40	50	130	3	0.01	5	66.5	0.18	0.00	0.10	25.8	81.3	21.2
45	70	290	6	0.01	5	84.6	0.32	0.00	0.24	26.7	86.2	0.6
50	70	265	6	0.01	5	NM	0.42	0.005	0.26	18	63.4	0.1
55	80	455	10	0.02	7	NM	0.58	0.005	0.35	13.7	85.6	1.9
60	80	410	9	0.02	7	NM	0.60	0.005	0.38	9.5	71.3	0.3
65	100	595	13	0.07	13	NM	0.82	0.01	0.60	6.4	56.3	1.3
70	100	630	14	0.07	13	NM	1.00	0.01	0.60	6.3	44.5	0.2

Notes:

ND - not detected

in. wc - inches of water column

ppm - parts per million

PID - photoionization detector

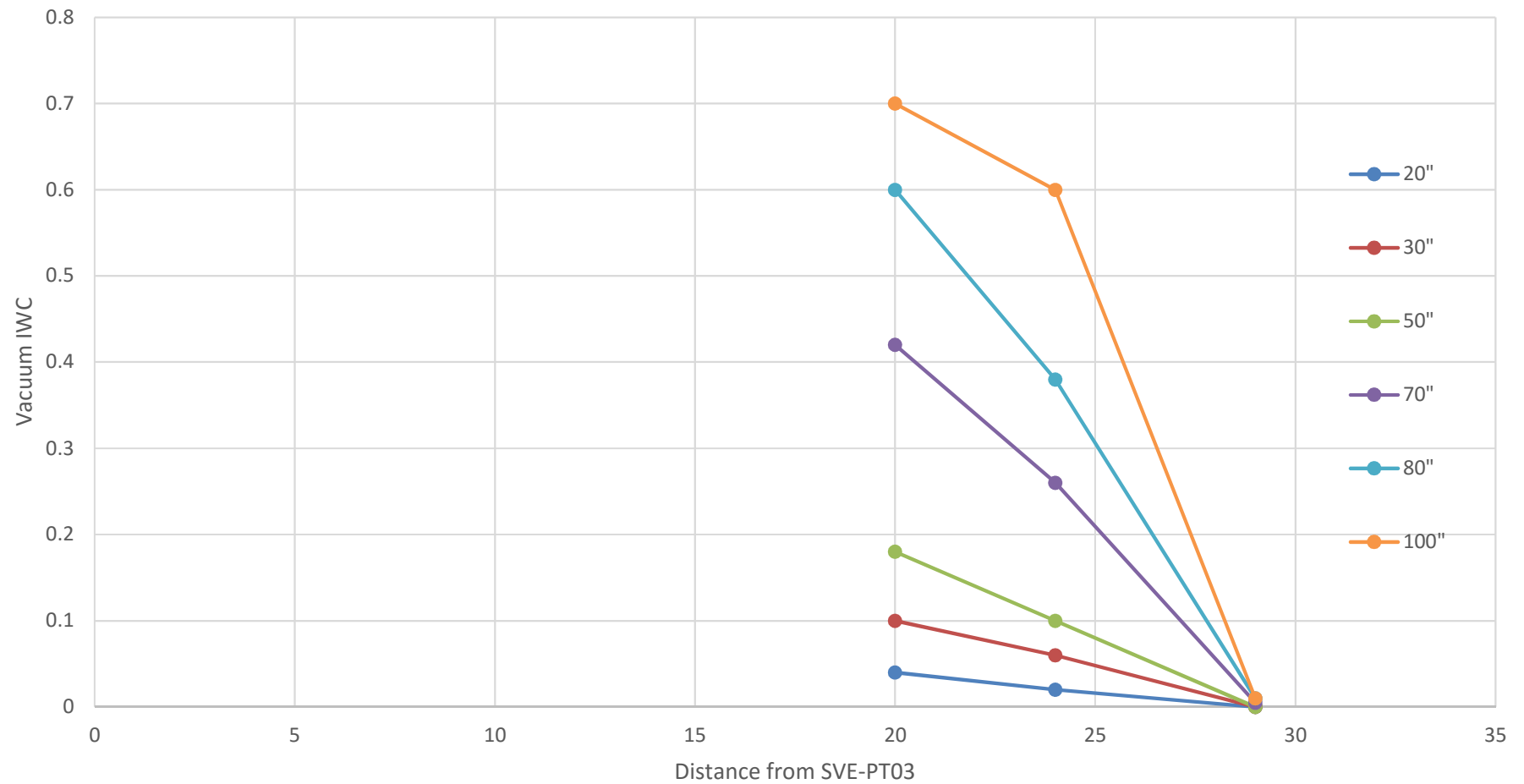
fpm - feet per minute

acfm - actual cubic feet per minute

NM - not measured



SVE-PT03
SVE Vacuum vs. Distance



SOIL VAPOR EXTRACTION PILOT TEST

LOCATION - Podwer Wash North

Date : 5/23/2016

SVE well dia -

2"

Air Sample Collected: Yes @ 1530

Extraction Test Well SVE-PT04												
Pilot Test Extraction Well							Observation Wells			Observation Wells		
Time (mins)	Wellhead Vacuum (in. wc)	Anemometer		Pitot Tube		PID at Stack (ppm)	SVE-PT02	SVE-PT01	SVE-PT03	SVE-PT02	SVE-PT01	SVE-PT03
		Well Velocity (fpm)	Well Flow (cfm)	Vacuum (in.wc)	Well Flow (cfm)		Distance From Test Well (feet)			Distance From Test Well (feet)		
							15.5	33	20	15.5	33	20
							Vacuum (in. wc)			PID Measurement (ppm)		
0	0.0	0	0	0.00	0	27.4	0.00	0.00	0.00	57.4	1.8	0.0
15	20	150	3	0.00	0	2557	0.00	0.08	0.24	77.8	6.2	1.1
20	20	235	5	0.00	0	2745	0.00	0.07	0.24	51.6	6.3	0.5
25	60	1020	22	0.11	16	NM	0.03	0.33	1.25	444.8	0.3	0.0
30	60	1010	22	0.11	16	NM	0.025	0.52	1.50	40.1	1	0.0
35	100	1410	31	0.35	28	NM	0.050	0.68	2.20	27.3	0.1	0.0
40	100	1370	30	0.35	28	NM	0.07	0.82	2.50	21	0.0	0.0

Notes:

ND - not detected

in. wc - inches of water column

ppm - parts per million

PID - photoionization detector

fpm - feet per minute

acfm - actual cubic feet per minute

NM - not measured



SVE-PT04
SVE Vacuum vs. Distance

