

February 26, 2019

Mr. Kris Neidel
Colorado Oil and Gas Conservation Commission (COGCC)
1120 Lincoln Street, Suite 801
Denver, Colorado 80203

**RE: Conceptual Site Model – Supplement to COGCC eForm 27 (Document #402277061)
Andeavor Field Services LLC
Powder Wash North – South Pit Remediation Project
COGCC Remediation #10389
Moffat County, Colorado**

Mr. Neidel:

This Conceptual Site Model (CSM) has been prepared by LT Environmental, Inc. (LTE), on behalf of Andeavor Field Services LLC, a subsidiary of Marathon Logistics (MLPX) as a supplement to the COGCC eForm 27 report document number 402277061. The purpose of this document is to provide comprehensive look at the Powder Wash North – South Pit Remediation Project (Site). This CSM has been developed using data collected during previous site investigations and the most recent site investigation completed in November 2019. A Site Location Map is included as Figure 1.

SITE BACKGROUND

The Site is located 0.77 miles north of the intersection of County Road 4 and County Road 75 in Moffat County, Colorado. The Bureau of Land Management (BLM) is the land manager. The legal description for the Site is described as the tract of land in the southwest quarter of the southeast quarter of Section 29, Township 12 North, Range 97 West of the Sixth Principal Meridian, Moffat County, Colorado.

The Site consists of a natural gas compressor station and two inactive pits on a gravel pad. There is no documented history of the use of the pits. The pits were likely used to contain produced water and fluids related to petroleum-gathering services. Both pits have been filled to grade for assessment and remediation activities. This CSM focuses on the pit located at the south side of the pad.

There have been site characterization activities completed at the Site to evaluate impacts associated with the former pit. Site characterization activities were initiated in 2015 as part of due diligence associated with a divestiture and acquisition action between QEP and Tesoro Logistics. A summary of investigations completed at the Site to date are as follows:

- Preliminary Investigation (November 2015) – Six soil borings were advanced in the area of the pit to depths ranging from 16.5 feet to 32 feet below ground surface (bgs). Direct push drill rig refusal was encountered at the terminus of all borings except PWN-Pit-SE. Soil samples were collected and analyzed for full Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 constituents. Results indicated total petroleum hydrocarbons (TPH), benzene, toluene, benzo(A)pyrene, electrical conductivity (EC), arsenic, and pH exceeded COGCC Table 910-1.

- Site Characterization (October 2018) – Four soil borings were advanced to 32 feet bgs. Seven soil samples were collected: one from SB-01 and two from each of the other three soil borings and submitted for analysis of full COGCC Table 910-1 constituents except for metals. Only one sample was collected from SB-01 due to the lack of observed impact and photoionization detector (PID) response. Laboratory analytical results indicated exceedances of TPH and benzene in five samples, toluene in four samples, ethylbenzene in two samples, total xylenes in three samples, pH in two samples, and EC in one sample. There were no exceedances of polycyclic aromatic hydrocarbons (PAHs) or sodium adsorption ratio (SAR).
- Site Characterization (November 2019) - Four soil borings were advanced to depths ranging from 33.5 feet to 55 feet bgs. Twelve soil samples were collected; three were collected from each soil boring and submitted for full COGCC Table 910-1 constituents for soil. Laboratory analytical results indicated exceedances TPH in four samples, benzene in six samples, toluene, ethylbenzene, and total xylenes in one sample, EC in five samples, and arsenic in all 12 samples due to high natural occurrences in the area. There were no exceedances of PAHs or metals except arsenic. The attached Figure 2 depicts the location of all soil borings and analytical results of the 2018 and 2019 sampling events. Laboratory analytical results are included as an attachment and in Table 2.

SOIL LITHOLOGY

The soil lithology is generally sandy silt from the ground surface to approximately 17 feet bgs. From 17 feet to 31 feet bgs the lithology is dominated by clayey to silty sand. A layer of claystone is present at approximately 31 feet to 38 feet bgs. At approximately 38 feet to 55 feet bgs the lithology is dominated by a fine to medium grained sandstone. There was a general trend of downward fining found across the soil borings. The Soil Boring Logs are included as Attachment 1.

SOIL CONTAMINANT DISTRIBUTION

In November 2019, a total of twelve soil samples were collected and analyzed to characterize the progress of SVE operation and determine the extent of impacted soil remaining above COGCC Table 910-1 Concentration Levels. Of the soil samples submitted from the October 2018 site investigation, hydrocarbon impacts were primarily encountered from 20 feet to 32 feet bgs. One anomalous zone of impact was found from 5 feet to 7 feet bgs in SB-03 during the October 2018 site Investigation. This anomalous zone was identified to be compliant with COGCC Table 910-1 during the November 2019 site investigation.

Soil boring SB-05 was advanced to a depth of 55 feet bgs due to the presence of elevated PID measurements observed at total depth of soil borings SB-02, SB-03, and SB-04. SB-05 was advanced in the middle of the impacted area to determine if impact was present at a depth greater than 35 feet bgs. Three soils samples were collected from SB-05 at depths of 40 feet, 50 feet, and 55 feet bgs. While elevated PID measurements were observed no samples exceeded COGCC Table 910-1 (except arsenic) indicating depth of hydrocarbon impact is limited to the bottom of the claystone layer occurring at 32 feet to 35 feet bgs.

The contaminants of concern (COCs) detected in soil above COGCC Table 910-1 include TPH and BTEX. A summary of soil analytical results is provided as Table 1.

- Four soil samples exceeded the TPH COGCC Table 910-1 concentration of 500 milligrams per kilogram (mg/kg). Two of the soil samples were collected between 20 feet and 22 feet bgs with TPH concentrations ranging from 1,348 mg/kg to 12,051 mg/kg. One of the soil samples was collected between 33 feet and 33.5 feet bgs with a TPH concentration of 7,900 mg/kg. The remaining sample was collected from 35.5 feet to 36.5 feet bgs with a TPH concentration of 1,214 mg/kg.
- Six soil samples exceeded the benzene COGCC Table 910-1 concentration of 0.17 mg/kg ranging from 0.18 mg/kg to 700 mg/kg. Depths of benzene soil exceedances range from 20 feet to 36.5 feet bgs.
- One soil sample exceeded the toluene COGCC Table 910-1 concentration of 85 mg/kg at 350 mg/kg. The depth of the toluene soil exceedance was observed at 32 feet to 33.5 feet bgs.
- One soil sample exceeded the ethylbenzene COGCC Table 910-1 concentration of 100 mg/kg at 470 mg/kg. The depth of the ethylbenzene soil exceedance was observed at 20 feet to 22 feet bgs.
- One soil sample exceeded the total xylenes COGCC Table 910-1 concentration of 175 mg/kg at 310 mg/kg. The depth of the total xylene soil exceedance was observed at 32 feet to 33.5 feet bgs.

SOIL CONTAMINANTS OF CONCERN

Data collected in the previous site Investigations indicate that TPH and BTEX are the primary COCs. There were EC and pH values detected exceeding COGCC Table 910-1, but at a depth greater than 3 feet bgs it is unlikely that these values will negatively affect vegetative growth. The site is an active facility and will be reclaimed following decommissioning of the facility.

Initial sampling results collected on November 6, 2015, indicated soil sample PWN-PIT N Bot exceeded COGCC Table 910-1 for benzo(A)pyrene. However, benzo(A)pyrene was not detected above the COGCC Table 910-1 in any of the soil samples collected during the 2018 or 2019 soil sampling events.

The initial samples collected in November 2015 and the samples collected in November 2019 exceeded COGCC Table 910-1 for arsenic but are within background concentrations for the area.

LTE requests the sampling analytes be reduced to BTEX and TPH during future assessment activities.

MIGRATION PATHWAYS AND RECEPTORS

Migration of contaminants at this site appears to be dominated by vertical movement through the vadose zone. While elevated PIDs were observed at depth in borings the impact above COGCC Table 910-1 has been limited in depth to 35 feet bgs as shown by boring SB-05. The claystone layer at depth has limited the vertical migration of contaminants. No groundwater has been encountered. There are no surface water features, water wells, or occupied buildings within ¼ mile of the Site. The adjacent land use is oil and gas production and rangeland.

REMEDIATION

Remediation activities commenced in April 2016, with the installation of four SVE wells. A pilot test was conducted on the four pilot test wells on May 23, 2016. The SVE pilot test was successful and indicated SVE is a viable remediation method. Results of the pilot test indicated two additional SVE wells were needed to ensure remediation system influence throughout the impacted area. The two additional SVE wells were installed in July 2017.

The SVE system consists of a 5-horsepower blower directly powered by a 6-kiloWatt (kW) solar array, operating 10 to 14 hours daily. The SVE system began operation on July 19, 2017. A Form 27 Remediation Work Plan (Document Number: 401768268) was submitted by LTE and approved by the COGCC. During the October 2018 assessment, shallow staining was observed at 5 feet to 7 feet bgs in soil boring SB-03. This observance led to installation of a seventh SVE well to influence the shallow impacts observed. The well was connected to the SVE system in October 2018.

The SVE system is effectively remediating hydrocarbons in the soil vadose zone. Figure 2 shows the results of soil sampling completed in October 2018 and November 2019 to evaluate remedial performance. A soil sample collected in October 2018 from the impacted zone of SB-01 identified concentrations of TPH and BTEX below COGCC 910-1 standards. Soil boring SB-01 was advanced proximal to SVE05 indicating successful remediation of the vadose zone in the southern area of the closed pit. The soil sample collected in November 2019, at soil boring SB-03 from 5 feet to 7 feet bgs indicated successful remediation of the shallow impact previously identified during the October 2018 site investigation. Soil samples have indicated reductions in TPH in soil boring SB-02 at 30 feet to 32 feet bgs.

During the November 2019 assessment four additional SVE wells were installed to ensure influence in the observed impacted zones (SVE08 through SVE11). Upon receipt of the results three new wells were chosen for operation (SVE08, SVE09, and SVE10). During the January 2020 site visit SVE system operations were optimized to include SVE02, SVE08, SVE09, and SVE10 for continued remediation of the identified impacts.

As of February 14, 2020, the SVE system is estimated to have cumulatively removed 6.9 tons of total volatile petroleum hydrocarbons. The exhaust of the SVE system has been sampled monthly since July 2017 for BTEX and Total Volatile Petroleum Hydrocarbons (TVPH). The laboratory analytical results from July 2017 to February 2020 are compiled in Table 2 with total flow and associated PID measurements. SVE emission estimates are graphed on the attached Figure 3. The site is in compliance with applicable Colorado Department of Health and Environment (CDPHE) Air Pollution Emission Notice (APEN) permitting. The January 2020 air sample indicated increased removal of petroleum hydrocarbons at a rate of 2.9 pounds per hour and the February 2020 air sample indicated a mass removal rate of 0.67 pounds per hour. Air emissions will continue to be monitored on a monthly basis and system optimization will continue to occur.

SUMMARY

The historical pit operated for an unknown period of time. As part of the approved remedial plan, an SVE system has been in operation since 2017 and has remediated a portion of the source into compliance with COGCC Table 910-1. Additional SVE wells began operation in January 2020 and additional SVE operation

is recommended. The SVE remediation system will continue to operate using these newly installed wells until mass removal rates reach asymptotic conditions. Once asymptotic conditions are met confirmation soil samples will be collected through additional site investigation activities.

LTE on behalf of MLPX requests that inorganics (EC, SAR, and pH), metals, and PAHs be removed from analyte list moving forward under Remediation Number 10398.

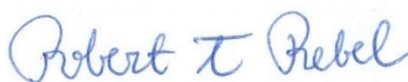
LTE appreciates the opportunity to present this report on behalf of MLPX. If you have any questions or comments, please contact us at (303)548-5097.

Sincerely,

LT ENVIRONMENTAL, INC.



Dustin Held
Project Geologist



Rob Rebel, PE
Senior Engineer

Attachments:

Figure 1 – Site Location Map

Figure 2 – Soil Analytical Results

Figure 3 – SVE System Emissions Estimate

Table 1 – Soil Analytical Results

Table 2 – Emissions Estimate Summary

Attachment 1 – Soil Boring Logs

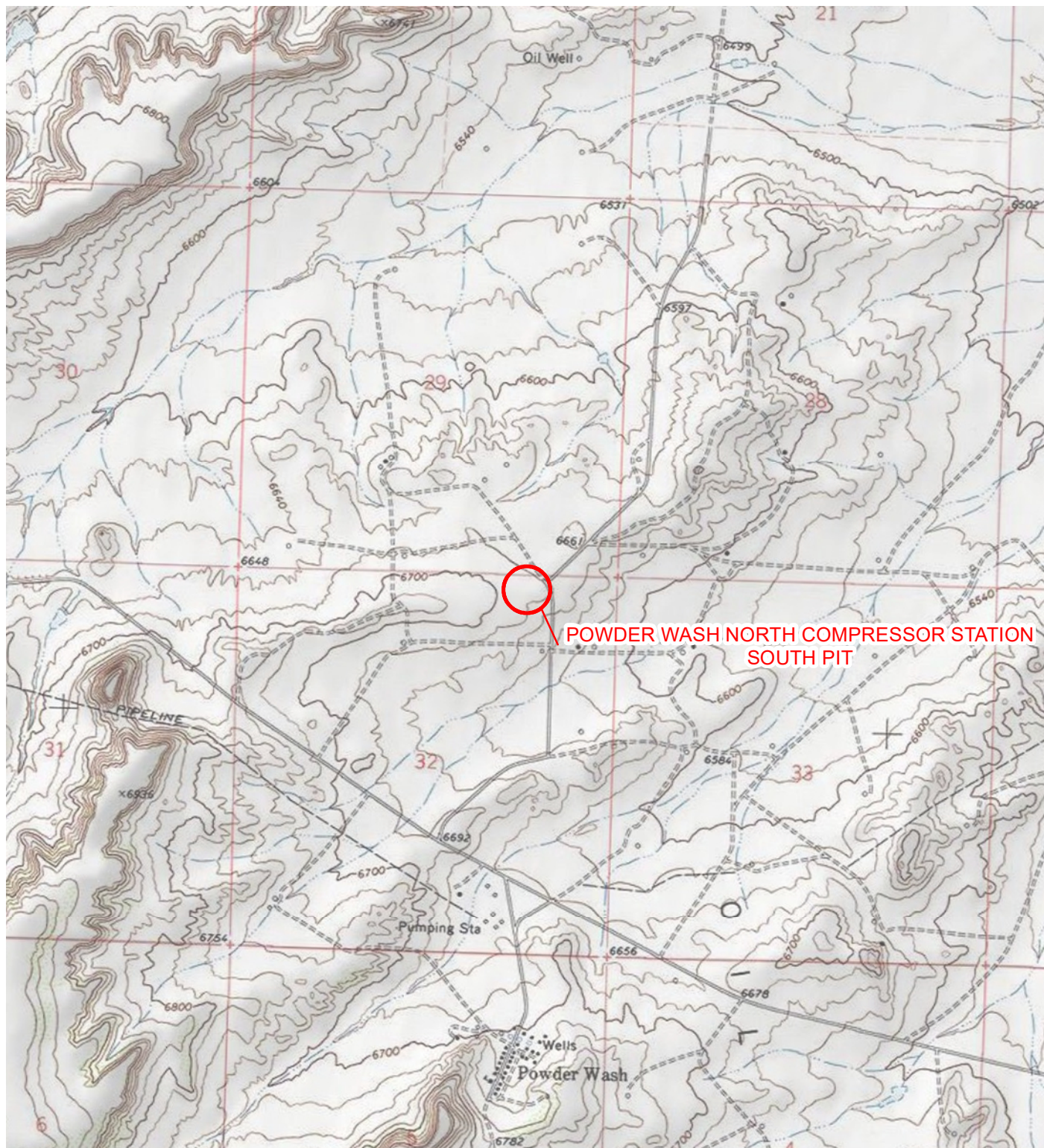


IMAGE COURTESY OF ESRI/USGS

LEGEND

○ SITE LOCATION

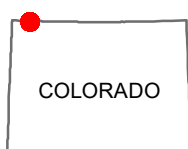
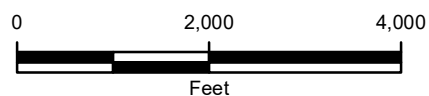


FIGURE 1
SITE LOCATION MAP
POWDER WASH NORTH COMPRESSOR STATION SOUTH PIT
NENE SEC 32-T12N-R97W
MOFFAT COUNTY, COLORADO
ANDEAVOR FIELD SERVICES LLC



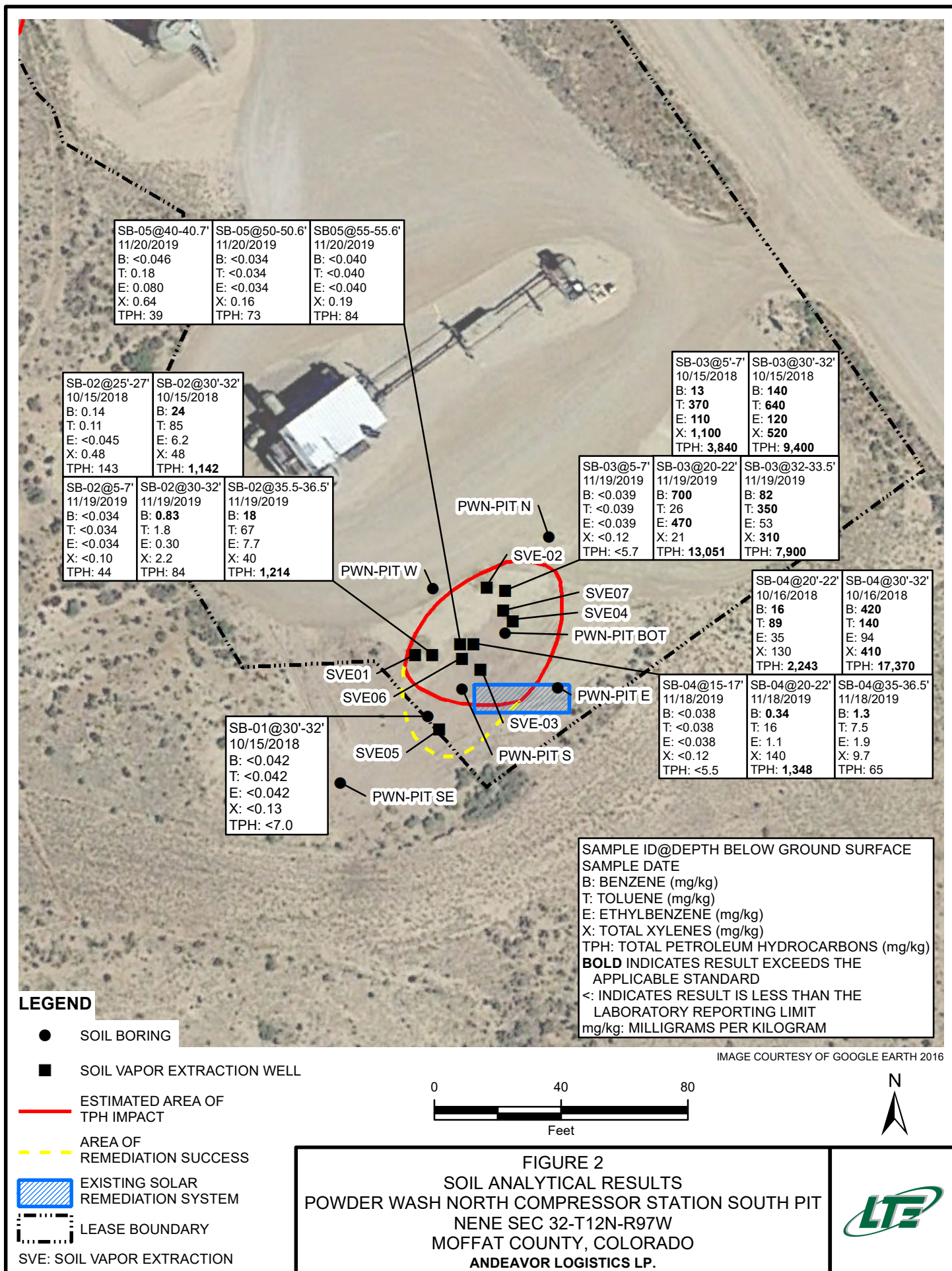


FIGURE 3
SVE SYSTEM EMISSIONS ESTIMATE

POWDER WASH NORTH COMPRESSOR STATION - SOUTH PIT
MOFFAT COUNTY, COLORADO
ANDEAVOR FIELD SERVICES LLC

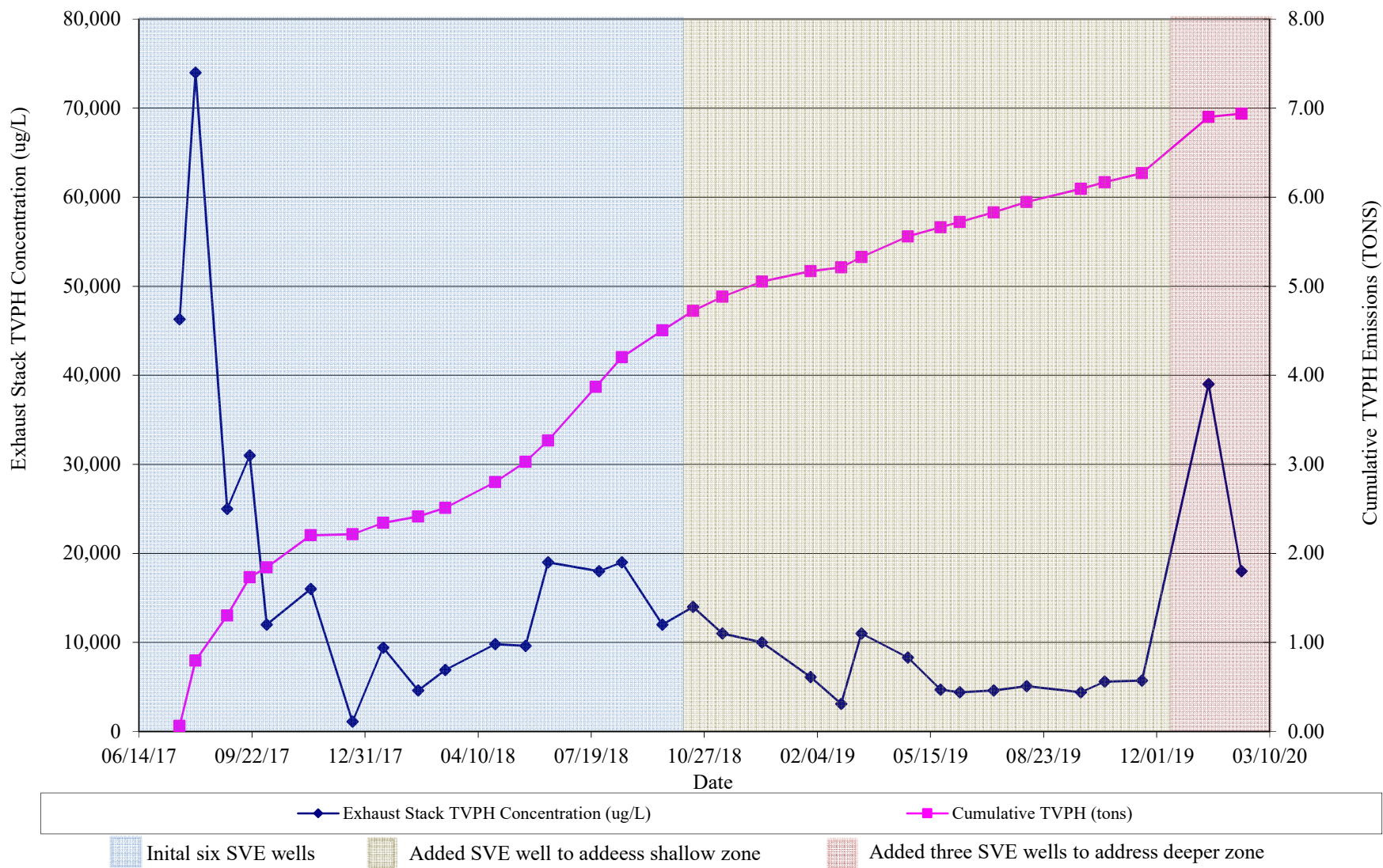


TABLE 1
SOIL ANALYTICAL RESULTS

POWDER WASH NORTH COMPRESSOR STATION SOUTH PIT
MOFFAT COUNTY, COLORADO
ANDEAVOR FIELD SERVICES LLC

PARAMETER	COGCC CONCENTRATION LEVELS	UNITS	PWN - PIT E	PWN - PIT N	PWN - PIT W	PWN - PIT S	PWN - PIT SE	PWN - PIT BOT	PWN - PIT BOT
Sample Date			11/5/2015	11/5/2015	11/5/2015	11/5/2015	11/5/2015	11/6/2015	11/6/2015
Sample Type			Confirmation	Confirmation	Confirmation	Confirmation	Confirmation	Confirmation	Confirmation
Sample Range Depth		feet	28-31	16-16.5	16-16.5	28-31.6	28-32	12-16	20-22.5
Arsenic	0.39	mg/kg	9.7	2.3	2.9	4.0	7.5	6.0	2.9
Barium	15,000	mg/kg	43	47	45	49	80	100	30
Cadmium	70	mg/kg	1.4	<0.81	0.83	<0.74	<0.88	<0.88	1.1
Chromium (III)	120,000	mg/kg	3.7	13	19	13	19	18	5.5
Chromium (VI)	23	mg/kg	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.0
Copper	3,100	mg/kg	12	9.0	19	13	19	17	5.3
Lead	400	mg/kg	25	9.9	12	17	13	21	14
Mercury	23	mg/kg	<0.014	<0.015	0.024	<0.015	<0.014	<0.014	<0.013
Nickel	1,600	mg/kg	16	8.5	18	12	14	13	16
Selenium	390	mg/kg	1.8	1.1	<0.82	1.3	1.1	1.4	0.95
Silver	390	mg/kg	<0.45	<0.41	<0.41	<0.37	<0.44	<0.44	<0.39
Zinc	23,000	mg/kg	71	39	84	75	56	60	45
EC	4.0	mmhos/cm	3.7	3.6	7.5	4.2	1.9	4.1	5.4
pH	6 - 9	SU	7.5	8.1	7.6	5.6	7.7	7.6	7.1
SAR	12	unitless	4.9	5.7	4.4	4.0	2.9	0.14	0.30
TPH-GRO		mg/kg	<2.8	<2.8	<2.9	1,400	<2.8	2,700	1,500
TPH-DRO		mg/kg	<4.6	<4.6	<4.6	230	<4.5	570	370
TPH	500	mg/kg	<4.6	<4.6	<4.6	1,630	<4.5	3,270	1,870
Benzene	0.17	mg/kg	0.072	<0.034	<0.035	1.8	<0.033	14	0.72
Toluene	85	mg/kg	0.16	0.096	0.16	24	0.060	110	26
Ethylbenzene	100	mg/kg	<0.034	<0.034	<0.035	3.8	<0.033	15	8.6
Total Xylenes	175	mg/kg	<0.10	<0.10	<0.10	30	<0.10	74	44
Acenaphthene	1,000	mg/kg	<0.0074	<0.0073	<0.0074	<0.0075	<0.0073	0.013	<0.0073
Anthracene	1,000	mg/kg	<0.0074	<0.0073	<0.0074	<0.0075	<0.0073	0.028	<0.0073
Benzo(A)anthracene	0.22	mg/kg	<0.0074	<0.0073	<0.0074	<0.0075	<0.0073	0.031	<0.0073
Benzo(B)fluoranthene	0.22	mg/kg	<0.0074	<0.0073	<0.0074	<0.0075	<0.0073	0.045	<0.0073
Benzo(K)fluoranthene	2.2	mg/kg	<0.0074	<0.0073	<0.0074	<0.0075	<0.0073	0.016	<0.0073
Benzo(A)pyrene	0.022	mg/kg	<0.0074	<0.0073	<0.0074	<0.0075	<0.0073	0.034	<0.0073
Chrysene	22	mg/kg	<0.0074	<0.0073	<0.0074	<0.0075	<0.0073	0.041	<0.0073
Dibenzo(A,H)anthracene	0.022	mg/kg	<0.0074	<0.0073	<0.0074	<0.0075	<0.0073	<0.0075	<0.0073
Fluoranthene	1,000	mg/kg	<0.0074	<0.0073	<0.0074	<0.0075	<0.0073	0.099	<0.0073
Fluorene	1,000	mg/kg	<0.0074	<0.0073	<0.0074	<0.0075	<0.0073	0.025	<0.0073
Indeno(1,2,3,C,D)pyrene	0.22	mg/kg	<0.0074	<0.0073	<0.0074	<0.0075	<0.0073	0.025	<0.0073
Naphthalene	23	mg/kg	<0.0074	<0.0073	<0.0074	<0.0075	<0.0073	0.031	0.028
Pyrene	1,000	mg/kg	<0.0074	<0.0073	<0.0074	<0.0075	<0.0073	0.092	<0.0073

NOTES:

< - less than the stated reporting limit

NA - not analyzed

BOLD - indicates result exceeds the COGCC concentration level

COGCC - Colorado Oil and Gas Conservation Commission

EC- electrical conductivity

mg/kg - milligrams per kilogram

mmhos/cm - millimhos per centimeter

SAR - Sodium Adsorption Ratio

SU - standard unit

TPH-GRO - total petroleum hydrocarbons-gasoline range organics

TPH-DRO - total petroleum hydrocarbons-diesel range organics

TPH - combination of TPH-GRO and TPH-DRO



TABLE 1
SOIL ANALYTICAL RESULTS

POWDER WASH NORTH COMPRESSOR STATION SOUTH PIT
MOFFAT COUNTY, COLORADO
ANDEAVOR FIELD SERVICES LLC

PARAMETER	COGCC CONCENTRATION LEVELS	UNITS	SB-01@30'-32'	SB-02@25'-27'	SB-02@30'-32'	SB-03@5'-7'	SB-03@30'-32'	SB-04@20'-22'	SB-04@30'-32'	SB-02@5-7'	SB-02@30-32'	SB-02@35.5-36.5'
Sample Date			10/15/2018	10/15/2018	10/15/2018	10/15/2018	10/15/2018	10/16/2018	10/16/2018	11/19/2019	11/19/2019	11/19/2019
Sample Type			Confirmation	Confirmation	Confirmation	Confirmation	Confirmation	Confirmation	Confirmation	Confirmation	Confirmation	Confirmation
Sample Range Depth		feet	30-32	25-27	30-32	5-7	30-32	20-22	30-32	5-7	30-32	35.5-36.5
Arsenic	0.39	mg/kg	NA	NA	NA	NA	NA	NA	NA	5.6	4.8	4.0
Barium	15,000	mg/kg	NA	NA	NA	NA	NA	NA	NA	49	47	30
Cadmium	70	mg/kg	NA	NA	NA	NA	NA	NA	NA	0.38	1.3	7.7
Chromium (III)	120,000	mg/kg	NA	NA	NA	NA	NA	NA	NA	5.8	16	9.2
Chromium (VI)	23	mg/kg	NA	NA	NA	NA	NA	NA	NA	<1.1	<1.3	<1.3
Copper	3,100	mg/kg	NA	NA	NA	NA	NA	NA	NA	6.5	33	10
Lead	400	mg/kg	NA	NA	NA	NA	NA	NA	NA	15	16	12
Mercury	23	mg/kg	NA	NA	NA	NA	NA	NA	NA	<0.018	0.044	0.11
Nickel	1,600	mg/kg	NA	NA	NA	NA	NA	NA	NA	6.7	18	18
Selenium	390	mg/kg	NA	NA	NA	NA	NA	NA	NA	1.3	1.6	0.80
Silver	390	mg/kg	NA	NA	NA	NA	NA	NA	NA	<0.36	<0.44	<0.45
Zinc	23,000	mg/kg	NA	NA	NA	NA	NA	NA	NA	23	220	67
EC	4.0	mmhos/cm	1.9	1.6	3.2	1.9	3.9	4.9	1.1	0.51	4.7	4.7
pH	6 - 9	SU	7.03	5.01	4.34	7.03	5.49	8.11	8.26	8.16	4.35	7.17
SAR	12	unitless	2.8	4.4	1.6	0.29	0.94	0.20	0.86	0.34	0.62	0.57
TPH-GRO		mg/kg	<7.0	95	1,100	3,600	9,200	2,200	17,000	44	57	1,200
TPH-DRO		mg/kg	<6.0	48	42	240	200	43	370	<5.1	27	14
TPH	500	mg/kg	<7.0	143	1,142	3,840	9,400	2,243	17,370	44	84	1,214
Benzene	0.17	mg/kg	<0.042	0.14	24	13	140	16	420	<0.034	0.83	18
Toluene	85	mg/kg	<0.042	0.11	85	370	640	89	140	<0.034	1.8	67
Ethylbenzene	100	mg/kg	<0.042	<0.045	6.2	110	120	35	94	<0.034	0.30	7.7
Total Xylenes	175	mg/kg	<0.13	0.48	48	1,100	520	130	410	<0.10	2.2	40
Acenaphthene	1,000	mg/kg	<0.040	<0.042	<0.0082	<0.0078	<0.0074	<0.0080	<0.0076	<0.0044	<0.0052	<0.0054
Anthracene	1,000	mg/kg	<0.040	<0.042	<0.0082	<0.0078	<0.0074	<0.0080	<0.0076	<0.0044	<0.0052	<0.0054
Benzo(A)anthracene	0.22	mg/kg	<0.040	<0.042	<0.0082	<0.0078	<0.0074	0.0096	<0.0076	<0.0044	<0.0052	<0.0054
Benzo(B)fluoranthene	0.22	mg/kg	<0.040	<0.042	<0.0082	<0.0078	<0.0074	<0.0080	<0.0076	<0.0044	<0.0052	<0.0054
Benzo(K)fluoranthene	2.2	mg/kg	<0.040	<0.042	<0.0082	<0.0078	<0.0074	<0.0080	<0.0076	<0.0044	<0.0052	<0.0054
Benzo(A)pyrene	0.022	mg/kg	<0.040	<0.042	<0.0082	<0.0078	<0.0074	<0.0080	<0.0076	<0.0044	<0.0052	<0.0054
Chrysene	22	mg/kg	<0.040	<0.042	<0.0082	<0.0078	<0.0074	<0.0080	<0.0076	<0.0044	<0.0052	<0.0054
Dibenzo(A,H)anthracene	0.022	mg/kg	<0.040	<0.042	<0.0082	<0.0078	<0.0074	<0.0080	<0.0076	<0.0044	<0.0052	<0.0054
Fluoranthene	1,000	mg/kg	<0.040	<0.042	0.0091	<0.0078	<0.0074	0.018	<0.0076	<0.0044	<0.0052	<0.0054
Fluorene	1,000	mg/kg	<0.040	<0.042	<0.0082	<0.0078	<0.0074	<0.0080	<0.0076	<0.0044	<0.0052	<0.0054
Indeno(1,2,3,C,D)pyrene	0.22	mg/kg	<0.040	<0.042	<0.0082	<0.0078	<0.0074	<0.0080	<0.0076	<0.0044	<0.0052	<0.0054
Naphthalene	23	mg/kg	<0.040	0.23	0.094	0.69	0.85	<0.0080	0.87	<0.0044	0.024	0.12
Pyrene	1,000	mg/kg	<0.040	<0.042	<0.0082	<0.0078	<0.0074	0.018	<0.0076	<0.0044	<0.0052	<0.0054

NOTES:
< - less than the stated reporting limit
NA - not analyzed
BOLD - indicates result exceeds the COGCC concentration level
COGCC - Colorado Oil and Gas Conservation Commission
EC- electrical conductivity
mg/kg - milligrams per kilogram
mmhos/cm - millimhos per centimeter
SAR - Sodium Adsorption Ratio
SU - standard unit
TPH-GRO - total petroleum hydrocarbons-gasoline range organics
TPH-DRO - total petroleum hydrocarbons-diesel range organics
TPH - combination of TPH-GRO and TPH-DRO



TABLE 1
SOIL ANALYTICAL RESULTS

POWDER WASH NORTH COMPRESSOR STATION SOUTH PIT
MOFFAT COUNTY, COLORADO
ANDEAVOR FIELD SERVICES LLC

PARAMETER	COGCC CONCENTRATION LEVELS	UNITS	SB-03@5-7'	SB-03@20-22'	SB-03@32-33.5'	SB-04@15-17'	SB-04@20-22'	SB-04@35-36.5'	SB-05@40-40.7	SB-05@50-50.6	SB-05@55-55.6
Sample Date			11/19/2019	11/19/2019	11/19/2019	11/18/2019	11/18/2019	11/19/2019	11/20/2019	11/20/2019	11/20/2019
Sample Type			Confirmation	Confirmation	Confirmation	Confirmation	Confirmation	Confirmation	Confirmation	Confirmation	Confirmation
Sample Range Depth		feet	5-7	20-22	32-33.5	15-17	20-22	35-36.5	40-40.7	50-50.6	55-55.6
Arsenic	0.39	mg/kg	6.3	1.0	12	4.7	4.7	3.5	3.1	11	6.0
Barium	15,000	mg/kg	47	34	44	47	82	22	52	24	30
Cadmium	70	mg/kg	0.37	0.55	<1.8	0.36	3.1	2.5	0.30	0.22	0.80
Chromium (III)	120,000	mg/kg	5.9	5.5	19	6.3	7.5	11	12	6.6	9.6
Chromium (VI)	23	mg/kg	<1.2	<1.2	<1.2	<1.1	<1.2	<1.2	<1.3	<1.1	<1.1
Copper	3,100	mg/kg	6.6	8.4	31	5.9	8.4	4.5	4.5	3.1	6.8
Lead	400	mg/kg	15	6.2	35	11	22	9.4	7.8	5.0	8.4
Mercury	23	mg/kg	<0.023	<0.023	0.040	<0.020	<0.023	0.023	<0.021	<0.021	<0.021
Nickel	1,600	mg/kg	7.1	4.9	39	6.2	41	11	8.0	3.7	7.4
Selenium	390	mg/kg	1.4	1.1	5.8	1.0	1.2	0.51	<0.52	0.98	4.4
Silver	390	mg/kg	ND	<0.47	<4.6	<0.36	<0.40	<0.40	<0.52	<0.39	<0.39
Zinc	23,000	mg/kg	24	37	150	24	58	62	34	18	34
EC	4.0	mmhos/cm	4.7	1.4	4.9	1.8	1.4	4.7	0.22	0.24	0.26
pH	6 - 9	SU	7.73	7.78	7.37	7.48	6.71	7.55	7.43	6.80	6.46
SAR	12	unitless	0.18	3.2	0.71	0.099	0.31	0.73	1.9	1.7	1.8
TPH-GRO		mg/kg	<4.9	13,000	7,800	<5.3	1,300	65	28	36	55
TPH-DRO		mg/kg	<5.7	51	100	<5.5	48	ND	11	37	29
TPH	500	mg/kg	<5.7	13,051	7,900	<5.5	1,348	65	39	73	84
Benzene	0.17	mg/kg	<0.039	700	82	<0.038	0.34	1.3	<0.046	<0.034	<0.040
Toluene	85	mg/kg	<0.039	26	350	<0.038	16	7.5	0.18	<0.034	<0.040
Ethylbenzene	100	mg/kg	<0.039	470	53	<0.038	1.1	1.9	0.080	<0.034	<0.040
Total Xylenes	175	mg/kg	<0.12	21	310	<0.12	140	9.7	0.64	0.16	0.19
Acenaphthene	1,000	mg/kg	<0.0047	<0.0050	<0.0050	<0.0046	<0.0049	<0.015	<0.0051	<0.0044	<0.012
Anthracene	1,000	mg/kg	<0.0047	<0.0050	<0.0050	<0.0046	<0.0049	<0.015	<0.0051	<0.0044	<0.012
Benzo(A)anthracene	0.22	mg/kg	<0.0047	<0.0050	<0.0050	<0.0046	<0.0049	0.047	<0.0051	<0.0044	<0.012
Benzo(B)fluoranthene	0.22	mg/kg	<0.0047	<0.0050	<0.0050	<0.0046	<0.0049	0.020	<0.0051	<0.0044	<0.012
Benzo(K)fluoranthene	2.2	mg/kg	<0.0047	<0.0050	<0.0050	<0.0046	<0.0049	<0.015	<0.0051	<0.0044	<0.012
Benzo(A)pyrene	0.022	mg/kg	<0.0047	<0.0050	<0.0050	<0.0046	<0.0049	<0.015	<0.0051	<0.0044	<0.012
Chrysene	22	mg/kg	<0.0047	<0.0050	<0.0050	<0.0046	<0.0049	<0.015	<0.0051	<0.0044	<0.012
Dibenzo(A,H)anthracene	0.022	mg/kg	<0.0047	<0.0050	<0.0050	<0.0046	<0.0049	<0.015	<0.0051	<0.0044	<0.012
Fluoranthene	1,000	mg/kg	<0.0047	0.0055	<0.0050	<0.0046	<0.0049	<0.015	<0.0051	<0.0044	<0.012
Fluorene	1,000	mg/kg	<0.0047	<0.0050	<0.0050	<0.0046	<0.0049	<0.015	<0.0051	<0.0044	<0.012
Indeno(1,2,3,C,D)pyrene	0.22	mg/kg	<0.0047	<0.0050	<0.0050	<0.0046	<0.0049	0.021	<0.0051	<0.0044	<0.012
Naphthalene	23	mg/kg	<0.0047	0.099	0.34	<0.0046	<0.0049	0.023	<0.0051	<0.0044	<0.012
Pyrene	1,000	mg/kg	<0.0047	<0.0050	<0.0050	<0.0046	<0.0049	<0.015	<0.0051	<0.0044	<0.012

NOTES:

< - less than the stated reporting limit

NA - not analyzed

BOLD - indicates result exceeds the COGCC concentration level

COGCC - Colorado Oil and Gas Conservation Commission

EC- electrical conductivity

mg/kg - milligrams per kilogram

mmhos/cm - millimhos per centimeter

SAR - Sodium Adsorption Ratio

SU - standard unit

TPH-GRO - total petroleum hydrocarbons-gasoline range organics

TPH-DRO - total petroleum hydrocarbons-diesel range organics

TPH - combination of TPH-GRO and TPH-DRO



TABLE 2

**EMISSIONS ESTIMATE SUMMARY
POWDER WASH NORTH COMPRESSOR STATION - SOUTH PIT
MOFFAT COUNTY, COLORADO
ANDEAVOR FIELD SERVICES LLC**

Sample Information and Lab Analysis								
Date	Total Flow (cf)	Delta Flow (cf)	Benzene (ug/l)	Toluene (ug/l)	Ethyl Benzene (ug/l)	Xylenes (ug/l)	VOCs TVPH (ug/l)	PID (ppm)
07/20/17	43,200	43,200	5,660	6,470	156	1,257.3	46,300	2,141
08/03/17	361,800	318,600	870	1,500	62	270	74,000	2,500
08/31/17	1,011,600	649,800	400	920	70	315	25,000	2,196
09/20/17	1,454,400	442,800	130	270	12	60	31,000	1,936
10/05/17	1,755,000	300,600	430	870	56	277	12,000	1,408
11/13/17	2,476,800	721,800	260	550	44	265	16,000	1,267
12/20/17	2,817,000	340,200	25	40	3.1	18.1	1,100	157
01/16/18	3,254,400	437,400	170	260	19	116	9,400	1,053
02/16/18	3,754,800	500,400	160	200	12	68	4,600	1,005
03/12/18	4,195,800	441,000	220	360	17	91	6,900	1,003
04/25/18	5,146,200	950,400	190	270	18	100	9,800	891
05/22/18	5,904,000	757,800	210	300	16	89	9,600	996
06/11/18	6,310,800	406,800	300	400	23	131	19,000	1,146
07/26/18	7,385,400	1,074,600	290	290	14	79	18,000	1,078
08/15/18	7,945,200	559,800	270	330	10	54.9	19,000	1,168
09/20/18	8,753,400	808,200	340	400	23	133	12,000	993
10/17/18	9,255,600	502,200	310	480	20	121	14,000	1,103
11/12/18	9,721,800	466,200	220	350	17	119	11,000	1,047
12/17/18	10,263,600	541,800	260	310	14	78	10,000	1,148
01/29/19	10,882,800	619,200	72	110	7.3	42.6	6,100	440
02/25/19	11,309,400	426,600	80	96	5.7	34.1	3,100	416.4
03/15/19	11,649,600	340,200	280	280	9.9	50.1	11,000	995
04/25/19	12,546,000	896,400	160	200	12	69.0	8,300	729
05/24/19	13,244,400	698,400	110	140	7.4	35.9	4,700	563
06/10/19	13,676,400	432,000	93	120	6	33.7	4,400	642
07/10/19	14,437,800	761,400	130	170	8.5	50.4	4,600	385
08/08/19	15,159,600	721,800	110	150	7.5	46.2	5,100	525
09/25/19	16,246,800	1,087,200	90	170	6	36.9	4,400	517
10/16/19	16,664,400	417,600	160	280	11	73.0	5,600	673
11/18/19	17,236,800	572,400	120	190	12	75.0	5,700	728
01/16/20	17,757,600	520,800	930	640	23	123.0	39,000	2,858
02/14/20	17,823,600	66,000	390	530	24	110.0	18,000	1,767



TABLE 2

**EMISSIONS ESTIMATE SUMMARY
POWDER WASH NORTH COMPRESSOR STATION - SOUTH PIT
MOFFAT COUNTY, COLORADO
ANDEAVOR FIELD SERVICES LLC**

Emission Calculations						
Date	Flow Rate (cfm)	Benzene (lb/hr)	Toluene (lb/hr)	Ethyl Benzene (lb/hr)	Xylenes (lb/hr)	VOCs TVPH (lb/hr)
07/20/17	30	0.64	0.73	0.02	0.14	5.19
08/03/17	30	0.10	0.17	0.01	0.03	8.30
08/31/17	30	0.04	0.10	0.01	0.04	2.81
09/20/17	30	0.0146	0.0303	0.0013	0.0067	3.48
10/05/17	30	0.0482	0.0976	0.0063	0.0311	1.35
11/13/17	30	0.0292	0.0617	0.0049	0.0297	1.80
12/20/17	30	0.0028	0.0045	0.0003	0.0020	0.12
01/16/18	30	0.0191	0.0292	0.0021	0.0130	1.05
02/16/18	30	0.0180	0.0224	0.0013	0.0076	0.52
03/12/18	30	0.0247	0.0404	0.0019	0.0102	0.77
04/25/18	30	0.0213	0.0303	0.0020	0.0112	1.10
05/22/18	30	0.0236	0.0337	0.0018	0.0100	1.08
06/11/18	30	0.0337	0.0449	0.0026	0.0147	2.13
07/23/18	30	0.0325	0.0325	0.0016	0.0089	2.02
08/15/18	30	0.0303	0.0370	0.0011	0.0062	2.13
09/20/18	30	0.0381	0.0449	0.0026	0.0149	1.35
10/17/18	30	0.0348	0.0539	0.0022	0.0136	1.57
11/12/18	30	0.0247	0.0393	0.0019	0.0134	1.23
12/17/18	30	0.0292	0.0348	0.0016	0.0088	1.12
01/29/19	30	0.0081	0.0123	0.0008	0.0048	0.68
02/25/19	30	0.0090	0.0108	0.0006	0.0038	0.35
03/15/19	30	0.0314	0.0314	0.0011	0.0056	1.23
04/25/19	30	0.0180	0.0224	0.0013	0.0077	0.93
05/24/19	30	0.0123	0.0157	0.0008	0.0040	0.53
06/10/19	30	0.0104	0.0135	0.0007	0.0038	0.49
07/10/19	30	0.0146	0.0191	0.0010	0.0057	0.52
08/08/19	30	0.0123	0.0168	0.0008	0.0052	0.57
09/25/19	30	0.0101	0.0191	0.0007	0.0041	0.49
10/16/19	30	0.0180	0.0314	0.0012	0.0082	0.63
11/18/19	30	0.0135	0.0213	0.0013	0.0084	0.64
01/16/20	20	0.0696	0.0479	0.0017	0.0092	2.92
02/14/20	10	0.0146	0.0198	0.0009	0.0041	0.67



TABLE 2

**EMISSIONS ESTIMATE SUMMARY
POWDER WASH NORTH COMPRESSOR STATION - SOUTH PIT
MOFFAT COUNTY, COLORADO
ANDEAVOR FIELD SERVICES LLC**

Tons emitted over total operating time									
Date	Total Operational Hours	Delta Hours	Benzene (tons)	Toluene (tons)	Ethyl Benzene (tons)	Xylenes (tons)	TVPH (tons)	Cumulative TVPH (tons)	12 Month Rolling Throughput (tons)
07/19/17					Startup				
07/20/17	24	24.0	0.0076	0.0087	0.0002	0.0017	0.0623	0.0623	0.1
08/03/17	201	177.0	0.0086	0.0149	0.0006	0.0027	0.7348	0.7972	0.8
08/31/17	562	361.0	0.0081	0.0186	0.0014	0.0064	0.5063	1.3035	1.3
09/20/17	808	246.0	0.0018	0.0037	0.0002	0.0008	0.4278	1.7313	1.7
10/05/17	975	167.0	0.0040	0.0082	0.0005	0.0026	0.1124	1.8437	1.8
11/13/17	1,376	401.0	0.0058	0.0124	0.0010	0.0060	0.3599	2.2037	2.2
12/20/17	1,565	189.0	0.0003	0.0004	0.0000	0.0002	0.0117	2.2153	2.2
01/16/18	1,808	243.0	0.0023	0.0035	0.0003	0.0016	0.1281	2.3435	2.3
02/16/18	2,086	278.0	0.0025	0.0031	0.0002	0.0011	0.0717	2.4152	2.4
03/12/18	2,331	245.0	0.0030	0.0049	0.0002	0.0013	0.0948	2.5101	2.5
04/25/18	2,859	528.0	0.0056	0.0080	0.0005	0.0030	0.2903	2.8004	2.8
05/22/18	3,280	421.0	0.0050	0.0071	0.0004	0.0021	0.2267	3.0271	3.0
06/11/18	3,506	226.0	0.0038	0.0051	0.0003	0.0017	0.2409	3.2680	3.3
07/23/18	4,103	597.0	0.0097	0.0097	0.0005	0.0026	0.6029	3.8709	3.9
08/15/18	4,414	311.0	0.0047	0.0058	0.0002	0.0010	0.3315	4.2024	3.4
09/20/18	4,863	449.0	0.0086	0.0101	0.0006	0.0034	0.3023	4.5046	3.2
10/17/18	5,142	279.0	0.0049	0.0075	0.0003	0.0019	0.2191	4.7238	2.9
11/12/18	5,401	259.0	0.0032	0.0051	0.0002	0.0017	0.1598	4.8836	2.7
12/17/18	5,702	301.0	0.0044	0.0052	0.0002	0.0013	0.1689	5.0525	2.8
01/29/19	6,046	344.0	0.0014	0.0021	0.0001	0.0008	0.1177	5.1702	2.8
02/25/19	6,283	237.0	0.0011	0.0013	0.0001	0.0005	0.0412	5.2114	2.8
03/15/19	6,472	189.0	0.0030	0.0030	0.0001	0.0005	0.1166	5.3280	2.8
04/25/19	6,970	498.0	0.0045	0.0056	0.0003	0.0019	0.2319	5.5599	2.8
05/24/19	7,358	388.0	0.0024	0.0030	0.0002	0.0008	0.1023	5.6622	2.6
06/10/19	7,598	240.0	0.0013	0.0016	0.0001	0.0005	0.0592	5.7215	2.5
07/10/19	8,021	423.0	0.0031	0.0040	0.0002	0.0012	0.1092	5.8306	2.0
08/08/19	8,422	401.0	0.0025	0.0034	0.0002	0.0010	0.1147	5.9454	1.7
09/25/19	9,026	604.0	0.0030	0.0058	0.0002	0.0013	0.1491	6.0945	1.6
10/16/19	9,258	232.0	0.0021	0.0036	0.0001	0.0010	0.0729	6.1674	1.4
11/18/19	9,576	318.0	0.0021	0.0034	0.0002	0.0013	0.1017	6.2690	1.4
01/16/20	10,010	434.0	0.0151	0.0104	0.0004	0.0020	0.6330	6.9021	1.7
02/14/20	10,120	110.0	0.0008	0.0011	0.0000	0.0002	0.0370	6.9391	1.7
		Sum	0.136	0.190	0.010	0.056	6.939		

NOTES:

cf - cubic feet

ug/l - micrograms per liter

VOCs - volatile organic compounds

TVPH - total volatile petroleum hydrocarbons

cfm - cubic feet per minute

lb/hr - pounds per hour

lbs - pounds

PID - photo-ionization detector

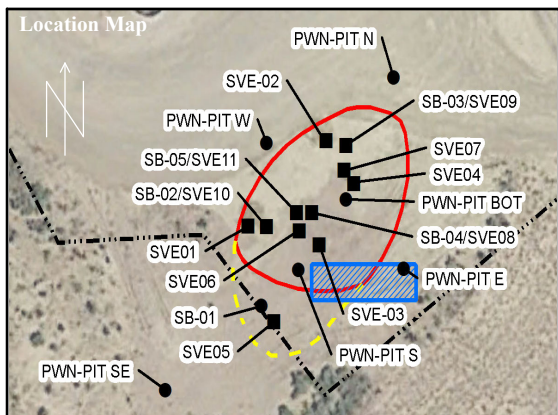
ppm - part per million

Effluent exhaust sample not collected in December 2019 due to hazardous road conditions.

Flow on 1/16/20 decreased due to frozen lines due to condensation







Compliance • Engineering • Remediation
LT Environmental, Inc.
4600 W. 60th Avenue
Arvada, Colorado 80003

BORING LOG/MONITORING WELL COMPLETION DIAGRAM

PROJECT NAME: Powder Wash North CS South Pit

PROJECT NO.: 095819001

LOGGED BY: Dustin Held

BORING/WELL ID.: SB-02/SVE10

SAMPLE MTHD: Split Spoon

COMPLETION DATE: 11/19/2019

DRILL MTHD: Hollow Stem Auger

TD (ft bgs): 36.5'

DRILLED BY: Dakota Drilling

DTW (ft bgs): NA

DETECTOR: MiniRAE 3000

SCREEN SLOT: 0.010

FILTER PACK: 10/20 Silica Sand

CASING LENGTH: 25'

ANNULUS SEAL: Bentonite Chips

SCREEN LENGTH: 5'

SURFACE SEAL: NA

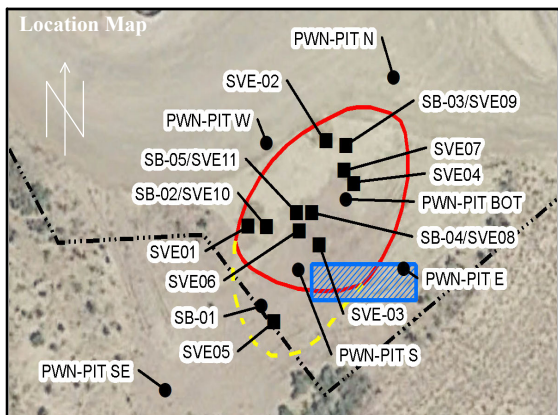
HOLE DIAMETER.: 8"

WELL DIAMETER: 2"

CASING TYPE: SCH. 40 PVC

SCREEN TYPE: SCH. 40 PVC

PID (ppm)	Staining	Moisture Content	Sample ID	Recovery (ft/ft)	Depth (ft)	USCS	USCS Graphic	Lithology Description	Well Construction
					0				
84.9		Moist	SB-02 @ 5'-7'	100%	5	ML		ML: 5'-7' - brown, SANDY SILT, med. gr. sand, low plasticity, non-uniform, no staining or hydrocarbon odor	
5.7		Moist		100%	10	ML		ML: 10'-12' - Same as above (SAA)	
3.9		Moist		100%	15	ML		ML: 15'-17' - SAA	
								ML: 20'-22' - SAA, white brown, few clays, no staining or hydrocarbon odor	
10.5		Moist		100%	20	ML			
557		Moist		100%	25	ML		ML: 25'-27' - SAA, few clays, no staining, hydrocarbon odor	
								CLS: 30'-32' - grey-brown, CLAYSTONE, hard, thick, calcite nodules, no staining, hydrocarbon odor	
1500		Dry	SB-02 @ 30'-32'	100%	30	CLS			
759		Moist		100%		CLS		CLS: 32'-34' - SAA, purple-grey @ 32.5', hydrocarbon odor	
1580				100%		CLS		CLS: 34'-35.5' - SAA, hydrocarbon odor	
1337		Dry	SB-02 @ 35.5'-36.5'	70%	35	CLS		CLS: 35.5'-36.5' - SAA, hydrocarbon odor	



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4600 W. 60th Avenue
Arvada, Colorado 80003

BORING LOG/MONITORING WELL COMPLETION DIAGRAM

PROJECT NAME: Powder Wash North CS South Pit

PROJECT NO.: 095819001

BORING/WELL ID.: SB-03/SVE09

COMPLETION DATE: 11/19/2019

TD (ft bgs): 33.5'

DTW (ft bgs): NA

SCREEN SLOT: 0.010

CASING LENGTH: 20'

SCREEN LENGTH: 10'

LOGGED BY: Dustin Held

SAMPLE MTHD: Split Spoon

DRILL MTHD: Hollow Stem Auger

DRILLED BY: Dakota Drilling

DETECTOR: MiniRAE 3000

FILTER PACK: 10/20 Silica Sand

ANNULUS SEAL: Bentonite Chips

SURFACE SEAL: NA

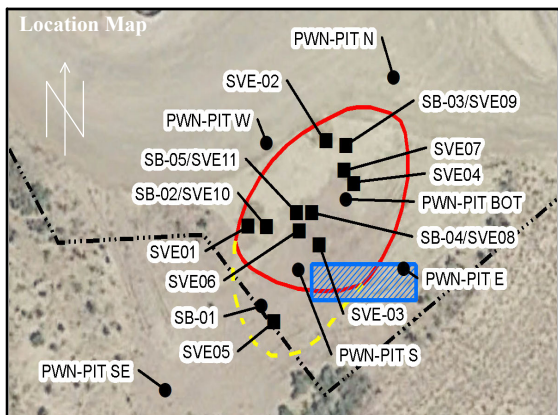
HOLE DIAMETER.: 8"

WELL DIAMETER: 2"

CASING TYPE: SCH. 40 PVC

SCREEN TYPE: SCH. 40 PVC

PID (ppm)	Staining	Moisture Content	Sample ID	Recovery (ft/ft)	Depth (ft)	USCS	USCS Graphic	Lithology Description	Well Construction
					0				
14.2		Moist	SB-03 @ 5'-7'	100%	5	ML		ML: 5'-7' - brown, SANDY SILT, med. gr. sand, low plasticity, uniform, no staining or hydrocarbon odor	
35.9		Moist		100%	10	ML		ML: 10'-12' - Same as above (SAA)	
60.2		Moist		100%	15	ML		ML: 15'-17' - SAA, hydrocarbon odor	
								SC: 20'-21' - grey, CLAY, some fine gr. sand, low plasticity, uniform, staining and hydrocarbon odor	
1657		Moist	SB-03 @ 20'- 22'	100%	20	SC		ML: 21'-22' - brown SANDY SILT, fine gr. sands, uniform, non-plastic, no staining, hydrocarbon odor	
						ML			
1628		Dry		100%	25	ML		ML: 25'-27' - white-red, SANDY SILT, fine gr. sands, oxides, uniform, non-plastic, no staining, hydrocarbon odor	
892		Moist	SB-03 @ 32'- 33.5'	100%	30	CLS		CLS: 30'-32' - grey, CLAYSTONE, hard, thick, calcite nodules, no staining, hydrocarbon odor	
1470		Dry		100%		CLS		CLS: 32'-33.5' - SAA, purple-grey, hydrocarbon odor	
					35				



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BORING LOG/MONITORING WELL COMPLETION DIAGRAM

PROJECT NAME: Powder Wash North CS South Pit

PROJECT NO.: 095819001

LOGGED BY: Dustin Held

BORING/WELL ID.: SB-04/SVE08

SAMPLE MTHD: Split Spoon

COMPLETION DATE: 11/18/2019

DRILL MTHD: Hollow Stem Auger

TD (ft bgs): 35'

DRILLED BY: Dakota Drilling

DTW (ft bgs): NA

DETECTOR: MiniRAE 3000

SCREEN SLOT: 0.010

FILTER PACK: 10/20 Silica Sand

CASING LENGTH: 21'

ANNULUS SEAL: Bentonite Chips

SCREEN LENGTH: 10'

SURFACE SEAL: NA

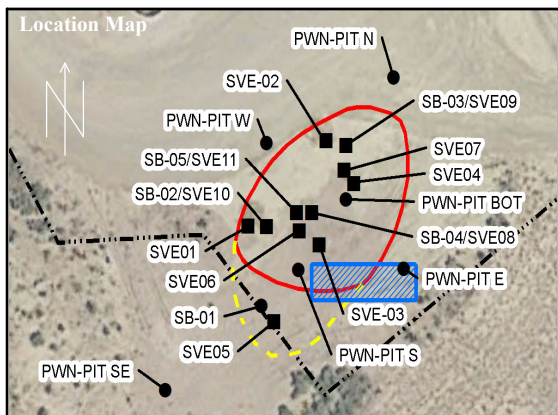
HOLE DIAMETER.: 8"

WELL DIAMETER: 2"

CASING TYPE: SCH. 40 PVC

SCREEN TYPE: SCH. 40 PVC

PID (ppm)	Staining	Moisture Content	Sample ID	Recovery (ft/ft)	Depth (ft)	USCS	USCS Graphic	Lithology Description	Well Construction
0.2		Moist		100%	5	ML		ML: 5'-7' - brown, SANDY SILT, medium to fine gr. sand, low plasticity, uniform, no staining or hydrocarbon odor	
0.8		Moist		100%	10	ML		ML: 10'-12' - Same as above (SAA)	
565.2		Moist	SB-04 @ 15'-17'	100%	15	ML		ML: 15'-17' - SAA, black staining and hydrocarbon odor at 15-15.5' bgs	
1700		Moist	SB-04 @ 20'-22'	100%	20	ML		ML: 20'-22' - SAA, no staining, hydrocarbon odor	
846		Moist		100%	25	ML		ML: 25'-27' - white to red, SANDY SILT, fine gr. sand, non-plastic, plasticity, oxidized, uniform, no staining, hydrocarbon odor	
1348		Moist		100%	30	CLS		CLS: 30'-31.5' - SAA,	
1244		Dry		100%	32	CLS		CLS: 31.5'-32' - grey, CLAYSTONE, hard, no staining, hydrocarbon odor	
1750		Dry	SB-04 @ 35'-36.5'	100%	35	CLS		CLS: 33'-34.5' - purple-grey, CLAYSTONE, hard, no staining, hydrocarbon odor	
					36	CLS		CLS: 35'-36.5' - grey, CLAYSTONE, hard, no staining, hydrocarbon odor, med. gr. sand @ 36.2-26.5' bgs	
					40				



Compliance • Engineering • Remediation
LT Environmental, Inc.
4600 W. 60th Avenue
Arvada, Colorado 80003

BORING LOG/MONITORING WELL COMPLETION DIAGRAM

PROJECT NAME: Powder Wash North CS South Pit

PROJECT NO.: 095819001

BORING/WELL ID.: SB-05/SVE11

COMPLETION DATE: 11/20/2019

LOGGED BY: Dustin Held

SAMPLE MTHD: Split Spoon

DRILL MTHD: Hollow Stem Auger

DRILLED BY: Dakota Drilling

DETECTOR: MiniRAE 3000

FILTER PACK: 10/20 Silica Sand

ANNULUS SEAL: Bentonite Chips

SURFACE SEAL: NA

HOLE DIAMETER.: 8"

WELL DIAMETER: 2"

CASING TYPE: SCH. 40 PVC

SCREEN TYPE: SCH. 40 PVC

PID (ppm)	Staining	Moisture Content	Sample ID	Recovery (ft/ft)	Depth (ft)	USCS	USCS Graphic	Lithology Description	Well Construction
					0			0-40' - Soil boring not logged.	
					5				
					10				
					15				
					20				
					25				
					30				
					35				
1934	Dry		SB-05 @ 40'- 40.7'	75%	40	Sandstone		Sandstone: 40'-40.7' - white-red, SANDSTONE, fine-med. gr. sand, hard, competent, oxides, uniform, no staining, hydrocarbon odor	
1775	Dry			75%	45	Sandstone		Sandstone: 45'-45.6' - Same as above (SAA), hydrocarbon odor	
1475	Dry		SB-05 @ 50'- 50.6'	75%	50	Sandstone		Sandstone: 50'-50.6' - SAA, hydrocarbon odor	
1877	Dry		SB-05 @ 55'- 55.6'	75%	55	Sandstone		Sandstone: 55'-55.6' - SAA, hydrocarbon odor	
					60				