



November 14, 2024

Dave Brazeal  
Dale Hunt  
Director of Operations  
Taproot Energy Partners  
518 17<sup>th</sup> Street, Suite 1800  
Denver, Colorado 80202

Submitted via e-mail to [dhunt@taprootep.com](mailto:dhunt@taprootep.com)

**RE: Confirmation Soil Sampling Following Produce Water Release  
Spill/Release ID Point 482854. Remediation Project # 28120**

Dear Mr. Brazeal and Mr. Hunt,

Environmental Works, Inc. (EWI) is pleased to submit this letter report summarizing the additional investigation activities completed in conjunction with the initial release response on September 5, 2022, and follow-up confirmation sampling completed on September 8<sup>th</sup>, September 12<sup>th</sup>, November 10<sup>th</sup> through 11<sup>th</sup>, 2022, and August 22<sup>nd</sup>, 2024, at the Big Mountain Viper (BMV) Spill/Release Point ID 482854 near Briggsdale, Colorado (the Site). The purpose of this report is to aid with the submission of the Final Form 27 to the Energy and Carbon Management Commission (ECMC) and to satisfy the requirements to achieve Site closure in accordance with ECMC Guidance Rule 913, and 915.b.

### Summary of Work Completed

Following initial excavation activities, EWI mobilized to the Site on September 5, 2022, to direct additional excavation activities and collect initial soil samples from select locations within the primary excavation area immediately following the release. Confirmation sampling of the shallow excavated areas and retention pond were completed on September 8<sup>th</sup> and September 12<sup>th</sup>. Surveying of maximum impacted aerial extent was completed hours after the release by Avery Technical Resources. GPS coordinates, sample names, and sample depths are recorded in Appendix A in accordance with ECMC Guidance Rule 915. Additional excavation and sampling was completed on November 10<sup>th</sup> and 11<sup>th</sup> 2022. The additional excavation was completed to the furthest reasonable extent due to the Site infrastructure and the Site being active. An additional confirmation sampling event on August 22<sup>nd</sup>, 2024, achieved vertical and spatial delineation. Sample locations, the produced water line, excavation extents, and select site features for reference are depicted on Figures 1 and 2.

Based on evaluation of Site survey data, the following samples were recommended in accordance ECMC Guidance Table 915-1:

- 11 sidewall samples (SW1 through SW11) for the primary excavation where the release occurred. Six initial sidewall samples, and 5 following additional excavation on November 10-11, 2022.

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- Two floor samples were collected at two separate depths (FS1 and FS2) for the primary excavation where the release occurred of less than 500 square feet (sq. ft.). The floor samples were collected from the bottom of the excavation (from 7.5-10 feet below ground surface [bgs]) from the area where the highest impacts to soil would be expected, in accordance with ECMC Guidance Rule 915.
- 15 surface samples (SS1 through SS11) were collected from areas within the footprint of shallow impacted soil. Samples were collected from areas where approximately 0.5' of soil were removed. Approximately 25,000 sq ft. of impacted soil was initially observed.
- Three background samples (BS1 through BS3) were collected from soil outside the impacted area representative of native soil conditions.
- Eight step back samples (SB1 through SB8) were collected from around the secondary excavation to complete vertical and spatial delineation requested by ECMC in document

Soil borings for sidewall samples were advanced with a hand auger while the excavations remained open following the initial release. Continuous soil screening for the presence of volatile organic compounds (VOCs) was also conducted on sidewall sample borings using a photoionization detector (PID) to aid in understanding Site conditions. All samples were collected from the areas anticipated to be the most impacted, in accordance with ECMC guidance. Following sampling, soil borings were abandoned with clean soil cuttings and the hand auger was decontaminated between borings.

Samples were immediately placed on ice and delivered to Origins lab a ECMC approved lab for analysis. All samples collected initially were analyzed for the full list of Table 915-1 analytes. Table 1 presents the full analytical results and compares them with the Residential Soil Screening Level Concentrations (RSSLs) listed in Table 915-1. Full Analytical Results are attached as Appendix B. According to ECMC Rule 915 RSSLs will be used with justification for deep groundwater and no determined pathway to groundwater unless otherwise required by the ECMC. Groundwater is located at an estimated 70 feet below ground surface based on topography and nearby well data. Well data backup was attached on previous Form 19 Supplemental reports. To assess groundwater depth in the vicinity of the release, flight augers were advanced 50 ft bgs and a 1" PVC temp well was installed. The test well (TW1) was left open for four hours and did not produce water. The test well was abandoned with soil cuttings prior to leaving site. In addition to the test well, a temporary flooded water regime was observed to the south of the Site (GPS 40.6535861, -103.9729972) at an elevation of 4790.3 ft above sea level, which is roughly 80 ft lower than the Site. Temporary flooded surface water is observed for brief periods throughout the year, but the water table usually lies well below the ground surface for the majority of the year. Step back sample borings were logged and contained gravel at the surface then fine to very fine-grained sands, silts, and clays below. Hydro-excavation was not able to proceed deeper at the release point due to dense consolidated silt present at 9-10', where samples FS1 and FS2 were collected. These fine to very fine-grained materials adequately impede the flow of minor EC/SAR exceedances to groundwater.

EWI believes that RSSLs are appropriate for this site, in accordance with guidance rule 915.a due to previous approval, as well as closure received for the previous release at this facility (Document #403087804). Document #403087804 approved site closure using RSSLs and with limited exceedances of reclamation parameters left in place below the root zone when the extent of soil impacted by reclamation standards was completed to the extent practicable within an active facility.

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A photographic log is attached as Appendix C to aid with the determination that appropriate action was taken to remove impacted material with the goal of achieving Site closure.

## Results

Exceedances of the RSSLs were only observed for reclamation parameters for initial samples collected. Step-out borings collected in August 2024 only exhibited pH above reclamation parameters.

Boron was detected in initial samples at a concentration slightly above the soil suitability for reclamation standard of 2 mg/kg in SW1 (2.04 mg/kg) and SW5 (2.43). Additional excavation surrounding the primary release location was completed on November 10-11, 2022, to address these impacts. Step-out samples SW8 and SW9 still slightly exceeded Table 915 for Boron following the additional excavation activities but were too close to facility infrastructure to continue benching and widening the excavation safely. Subsequent step out borings SB1, SB2, SB3, and SB4 adequately addressed these limited exceedances.

SAR initially exceeded the RSSLs in soil from SS6 and SS11, SW-8, SW-9, SW-10, and SW-11. All sidewall samples (SW) were below the root zone and vertically delineated within the primary excavation. Following the additional excavation completed on 11/10/22 and 11/11/22 limited exceedances for SAR still remained at depth, but are below the primary root zone. Step out borings completed in August 2024 fully delineated any limited SAR impacts. EWI and SWCA have determined limited exceedances remaining at depth should not be a barrier to future plant growth and ultimately Site closure.

Conductivity exceeded the RSSL of 4 mmhos/cm in several initial samples surrounding the primary excavation at a maximum concentration of 10.5 mmhos/cm. Secondary excavations have been completed, and follow-up sampling results displayed lower but still elevated levels in several locations. Due to facility infrastructure, a reclamation plan has been developed to allow limited exceedances to be left in place below the root zone. The highest remaining specific conductivity measurements were observed in samples SW-8 (7.04 mmhos/cm) and SW-9 (6.99 mmhos/cm) at a depth of 6'. Step out borings completed in August 2024 adequately delineated any remaining conductivity exceedances that are to be left in place with the development of a reclamation plan.

Arsenic was detected at concentrations above the RSSL in all soil samples that were analyzed, including the background samples, (8.41 milligrams per kilogram [mg/kg] in BS1 and 6.45 mg/kg in BS2). Concentrations of arsenic can vary significantly within a vertical section of soil due to natural variations within soil types. Although arsenic was elevated in many samples, concentrations were highest in the background sample. The concentrations observed at the Site are similar to elevated arsenic levels found in soils across the state and should not be a barrier to Site closure.

No semi-volatile or volatile compounds were detected in any soil samples above RSSLs. Limited total petroleum hydrocarbon (TPH) compounds were detected above the laboratory reporting limit, but well below the Cleanup Standards. ECMC agreed in correspondence dated 8/19/2024 that concentrations of arsenic observed at the Site were similar to background samples collected, and would not be a barrier to closure.

Soil samples at the Site following the initial excavation exhibited several exceedances of the RSSLs, primarily for reclamation parameters. A secondary excavation was completed around the primary excavation to address the initial exceedances on November 10<sup>th</sup> and 11<sup>th</sup> 2022, however some exceedances for reclamation parameters still remained. Vertical delineation is complete surrounding the

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primary excavation based on clean deeper samples from FS1 and FS2. Spatial delineation has also been completed to the extent practicable. Additional shallow and deep step back soil samples around the excavation were taken on August 29<sup>th</sup>, 2024. SB1 through SB8 had no exceedances in Boron, SAR, and EC. Step back samples did have slightly elevated pH readings (8.32-8.64). Further excavation around the primary excavation is not possible to continue safely due to facility infrastructure.

Based on ECMC comments, EWI collected confirmation soil samples to delineate the vertical and spatial extent of SAR and EC impacts at the site. Vertical and spatial delineation was achieved and is illustrated in Figure 2. Recent analytical results achieving vertical and spatial delineation can be found in Table 2.0. A reclamation plan was previously developed for the Site to address remaining impacts in and around infrastructure, as well as impacts below a feasible depth of excavation.

EWI is requesting Site closure in compliance with Rule 913 and 915.b, request to leave elevated inorganics in situ. Soil samples at the Site exhibited few exceedances of the RSSLs and some exceedances were also observed in the background samples. Additionally, no detections of VOCs were present from PID screening of the soil immediately following the release, or from any subsequent excavation or soil sample collection. If the closure request is approved by the ECMC, Taproot should restore site conditions to the ECMC 1000 series rules, as applicable.

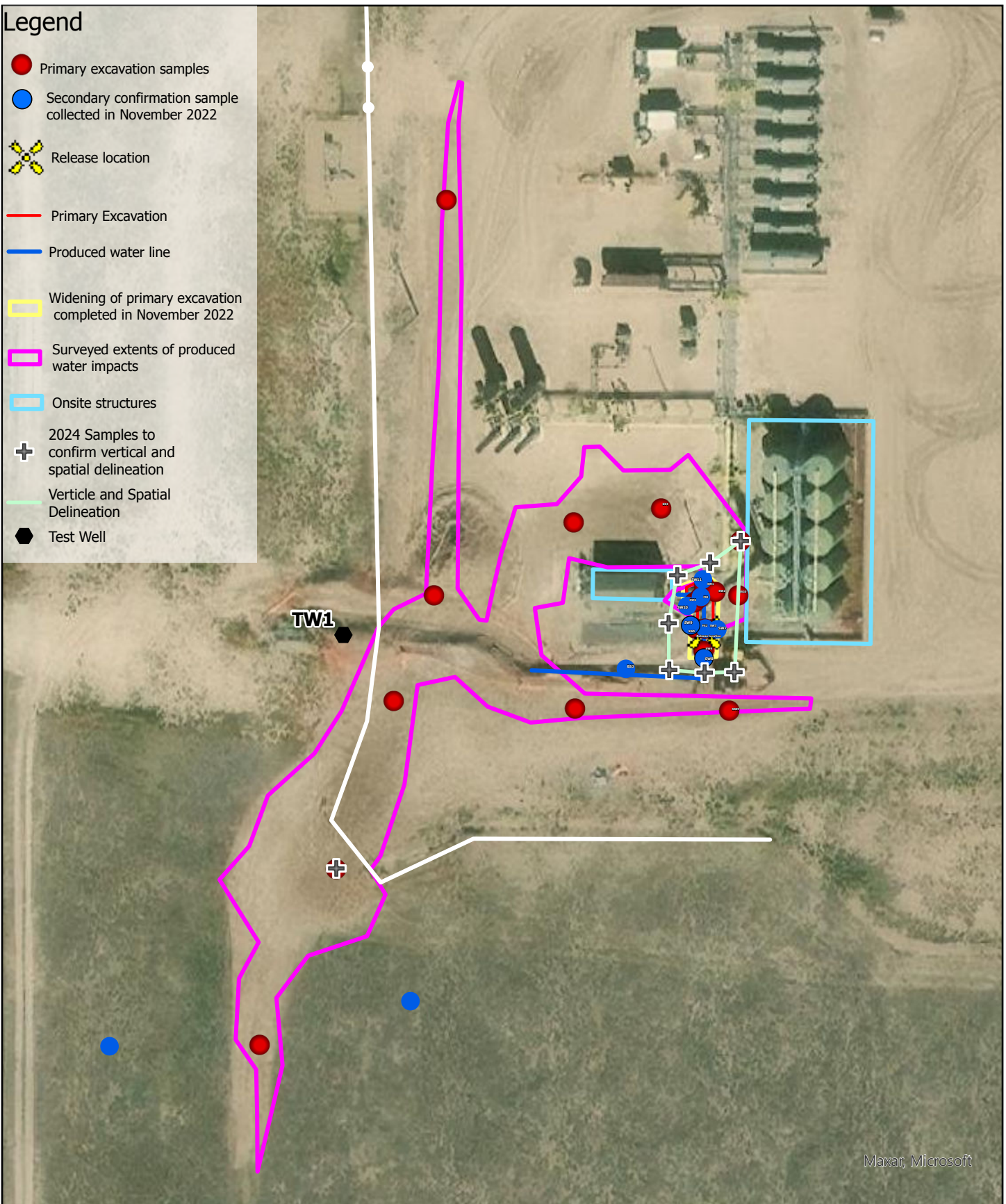
We appreciate the opportunity to provide this letter report to Taproot Energy Partners. Please contact me at 507-475-2825 or [akubat@environmentalworks.com](mailto:akubat@environmentalworks.com) if you have questions or we can be of further service.

Sincerely,

Adam Kubat, P.G.  
Project Manager  
Environmental Works, Inc.

# Legend

- Primary excavation samples
- Secondary confirmation sample collected in November 2022
- Release location
- Primary Excavation
- Produced water line
- Widening of primary excavation completed in November 2022
- Surveyed extents of produced water impacts
- Onsite structures
- + 2024 Samples to confirm vertical and spatial delineation
- Vertical and Spatial Delineation
- Test Well

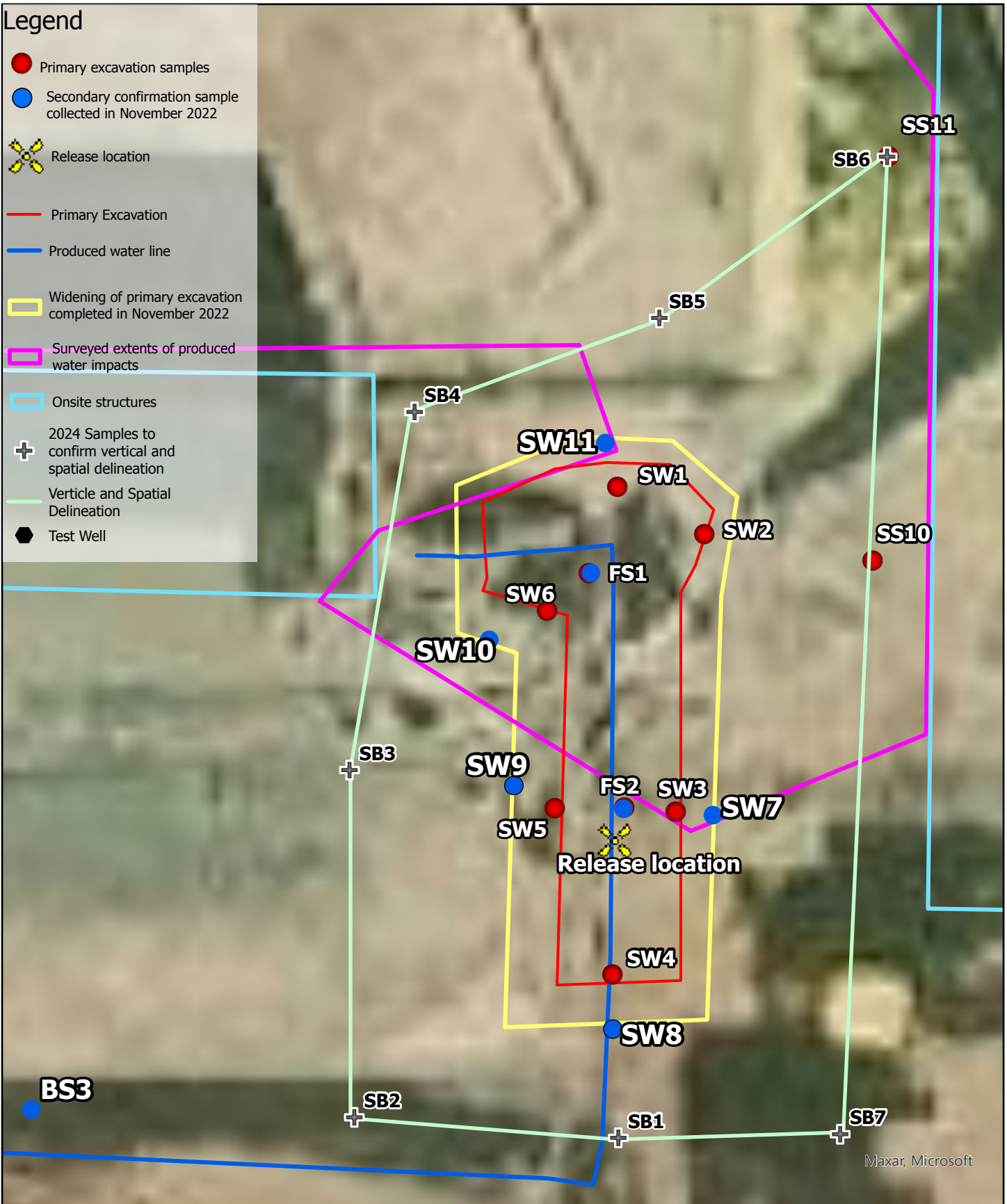


Maxar, Microsoft

Checked By: A. Kubat		Scale 0      55      110 Feet	 <b>ENVIRONMENTAL WORKS</b> Denver Metro Office Location 2770 Industrial Lane Broomfield, CO 80020	Site Layout  Big Mountain Viper Spill/Release Point ID 482854 Near Briggsdale, Colorado	Figure  <span style="font-size: 2em; font-weight: bold;">1.0</span>
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**Legend**

- Primary excavation samples
- Secondary confirmation sample collected in November 2022
- Release location
- Primary Excavation
- Produced water line
- Widening of primary excavation completed in November 2022
- Surveyed extents of produced water impacts
- Onsite structures
- 2024 Samples to confirm vertical and spatial delineation
- Verticle and Spatial Delineation
- Test Well



Maxar, Microsoft

Checked By: A. Kubat		Scale 0    5    10 Feet	 ENVIRONMENTAL WORKS Denver Metro Office Location 2770 Industrial Lane Broomfield, CO 80020	Vertical and Spatial Delineation  Big Mountain Viper Spill/Release Point ID 482854 Near Briggsdale, Colorado	Figure  <span style="font-size: 2em; font-weight: bold;">2.0</span>
EWI #222791 Drawn By: KEF 10/1/2024					

Table 1. Summary of Analytical Results

Station Name	CAS Number	Units	Residential Soil Screening Level Concentrations	BS1	BS2	BS3	FS1	FS1	FS2	FS2	SS1	SS2	SS3	SS4	SS5	SS6	SS6
Sample Date				9/8/22	9/8/22	11/10/22	9/12/22	11/11/22	9/12/22	11/10/22	9/8/22	9/8/22	9/8/22	9/8/22	9/8/22	9/8/22	11/10/22
Sample Depth				0 - 0.5 ft	0 - 0.5 ft	6 - 6.5 ft	9 - 9.5 ft	10 ft	7.5 - 8 ft	9 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	1 ft
<b>Metals</b>																	
ARSENIC	7440-38-2	mg/kg	0.68	<b>8.41</b>	<b>6.45</b>	<b>3.03</b>	<b>6.15</b>	<b>1.56</b>	<b>8.69</b>	<b>3.17</b>	<b>1.91</b>	<b>2.51</b>	<b>2.89</b>	<b>2.69</b>	<b>5.86</b>	<b>4.98</b>	<b>4.45</b>
BARIUM	7440-39-3	mg/kg	15,000	<b>463</b>	<b>596</b>	<b>90.9</b>	<b>227</b>	<b>82.1</b>	<b>63.2</b>	<b>46.4</b>	<b>72.7</b>	<b>161</b>	<b>61.8</b>	<b>81.5</b>	<b>529</b>	<b>551</b>	<b>522</b>
CADMIUM	7440-43-9	mg/kg	71	<b>0.356</b>	<b>0.392</b>	<b>0.334</b>	<b>0.293</b>	<b>0.395</b>	<b>0.611</b>	<b>0.182</b>	<0.0878	<b>0.0985</b>	<0.0869	<b>0.129</b>	<b>0.328</b>	<b>0.29</b>	<b>0.283</b>
CHROMIUM	7440-47-3	mg/kg	0.3	<0.511	<0.50	<0.244	<0.50	<0.244	<0.506	<0.252	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.22
COPPER	7440-50-8	mg/kg	3,100	<b>16.7</b>	<b>17.5</b>	<b>9.96</b>	<b>10.7</b>	<b>9.16</b>	<b>11.3</b>	<b>10.3</b>	<8.78	<8.64	<8.69	<9.31	<b>13.9</b>	<b>13.7</b>	<b>13.8</b>
LEAD	7439-92-1	mg/kg	400	<b>17.3</b>	<b>20.2</b>	<b>11.7</b>	<b>11.7</b>	<b>12.0</b>	<b>11.3</b>	<b>14.7</b>	<8.78	<8.64	<8.69	<9.31	<b>22.4</b>	<b>13.1</b>	<b>28.9</b>
NICKEL	7440-02-0	mg/kg	1,500	<b>14.7</b>	<b>15.7</b>	<9.67	<b>10.3</b>	<9.05	<8.90	<9.51	<8.78	<8.64	<8.69	<9.31	<b>11</b>	<b>10.5</b>	<b>11.4</b>
SELENIUM	7782-49-2	mg/kg	390	<b>0.301</b>	0.234	<b>0.195</b>	<b>0.264</b>	<b>0.095</b>	<b>0.544</b>	<b>0.186</b>	<0.0878	<0.0864	<0.0869	<b>0.16</b>	<b>0.3</b>	<b>0.243</b>	<b>0.274</b>
SILVER	7440-22-4	mg/kg	390	<0.0940	<0.0940	<0.0967	<0.0917	<0.0905	<0.0890	<0.0951	<0.0878	<0.0864	<0.0869	<0.0931	<0.0961	<0.0763	<0.0947
ZINC	7440-66-6	mg/kg	23,000	<94.0	<94.0	<96.7	<91.7	<90.5	<89.0	<95.1	<87.8	<86.4	<86.9	<93.1	<96.1	<76.3	<94.7
<b>VOCs</b>																	
BENZENE	71-43-2	mg/kg	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NS	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NS
ETHYLBENZENE	100-41-4	mg/kg	5.8	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NS	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NS
TOLUENE	108-88-3	mg/kg	490	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NS	<0.002	<0.002	<0.002	<0.002	<0.002	<b>0.00232</b>	NS
XYLENES, TOTAL	1330-20-7	mg/kg	58	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NS	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NS
1,2,4-TRIMETHYLBENZENE	95-63-6	mg/kg	30	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NS	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NS
1,3,5-TRIMETHYLBENZENE	108-67-8	mg/kg	27	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NS	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NS
<b>Semi-VOCs</b>																	
1-METHYLNAPHTHALENE	90-12-0	mg/kg	18	<0.00067	<0.00335	<b>0.00141</b>	<b>0.271</b>	<0.00109	<b>0.000652</b>	NS	<0.00067	<b>0.00161</b>	<0.00067	<b>0.000858</b>	<0.00067	<0.00067	NS
2-METHYLNAPHTHALENE	91-57-6	mg/kg	24	<0.00067	<0.00335	<b>0.00234</b>	<b>0.149</b>	<0.00194	<0.00067	NS	<0.00067	<b>0.00108</b>	<0.00067	<b>0.000671</b>	<0.00067	<0.00067	NS
ACENAPHTHENE	83-32-9	mg/kg	360	<0.00067	<0.00335	<0.000304	<b>0.0126</b>	<0.000304	<0.00067	NS	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	NS
ANTHRACENE	120-12-7	mg/kg	1,800	<0.00067	<0.00335	<0.000334	<b>0.0049</b>	<0.000334	<0.00067	NS	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	NS
BENZO(A)ANTHRACENE	56-55-3	mg/kg	1.1	<0.00067	<0.00335	<0.000493	<b>0.00258</b>	<0.000493	<0.00067	NS	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	NS
BENZO(A)PYRENE	50-32-8	mg/kg	0.11	<0.00067	<0.00335	<0.000468	<0.00067	<0.000468	<0.00067	NS	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	NS
BENZO(B)FLUORANTHENE	205-99-2	mg/kg	1.1	<0.00067	<0.00335	<0.000585	<0.00067	<0.000585	<0.00067	NS	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	NS
BENZO(K)FLUORANTHENE	207-08-9	mg/kg	11	<0.00067	<0.00335	<0.000437	<0.00067	<0.000437	<0.00067	NS	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	NS
CHRYSENE	218-01-9	mg/kg	110	<0.00067	<0.00335	<0.000624	<b>0.0158</b>	<0.000624	<0.00067	NS	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	NS
DIBENZ(A,H)ANTHRACENE	53-70-3	mg/kg	0.11	<0.00067	<0.00335	<0.000614	<0.00067	<0.000614	<0.00067	NS	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	NS
FLUORANTHENE	206-44-0	mg/kg	240	<0.00067	<0.00335	<0.000394	<0.00067	<0.000394	<0.00067	NS	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	NS
FLUORENE	86-73-7	mg/kg	240	<0.00067	<0.00335	<b>0.00152</b>	<b>0.0478</b>	<0.000286	<0.00067	NS	<0.00067	<b>0.000413</b>	<0.00067	<0.00067	<0.00067	<0.00067	NS
INDENO(1,2,3-CD)PYRENE	193-39-5	mg/kg	1.1	<0.00067	<0.00335	<0.000627	<0.00067	<0.000627	<0.00067	NS	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	NS
NAPHTHALENE	91-20-3	mg/kg	2	<0.00067	<0.00335	<0.00145	<b>0.0143</b>	<0.00145	<0.00067	NS	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	NS
PYRENE	129-00-0	mg/kg	180	<0.00067	<0.00335	<0.000643	<b>0.00735</b>	<0.000643	<0.00067	NS	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	NS
<b>TPH**</b>																	
TPH (low fraction)	8006-61-9	mg/kg	500	<0.2	<0.2		<0.2	<0.2	<0.2	NS	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	NS
C10-C28 DIESEL RANGE	NA	mg/kg	500	<25	<25	<25	<b>205</b>	<25	<25	NS	<25	<25	<25	<25	<25	<25	NS
C28-C40 RESIDUAL RANGE ORGANICS	NA	mg/kg	500	<100	<100	<100	<100	<100	<100	NS	<100	<100	<100	<100	<100	<100	NS
<b>Soil Suitability for Reclamation**</b>																	
BORON	7440-42-8	mg/l	2	<b>0.453</b>	<b>0.487</b>	<b>1.37</b>	<b>0.708</b>	<b>0.241</b>	<b>1.29</b>	<b>0.618</b>	<b>0.482</b>	<b>0.617</b>	<b>0.502</b>	<b>0.66</b>	<b>0.67</b>	<b>1.25</b>	<b>0.558</b>
PH	NA	s.u.	6 - 8.3	<b>8.2</b>	<b>8.21</b>	<b>8.15</b>	<b>7.92</b>	<b>8.00</b>	<b>7.87</b>	<b>7.96</b>	<b>8.27</b>	<b>8.07</b>	<b>7.99</b>	<b>8.02</b>	<b>7.8</b>	<b>7.99</b>	<b>7.74</b>
SODIUM ADSORPTION RATIO	NA	NA	6	<b>0.0793</b>	<b>0.0957</b>	<b>5.35</b>	<b>6.48</b>	<b>5.74</b>	<b>9.69</b>	<b>5.21</b>	<b>3.22</b>	<b>1.9</b>	<b>1.78</b>	<b>3.28</b>	<b>1.51</b>	<b>9.73</b>	<b>2.31</b>
SPECIFIC CONDUCTANCE	NA	mmhos/cm	4	<b>0.264</b>	<b>0.270</b>	<b>1.75</b>	<b>3.97</b>	<b>2.12</b>	<b>6.21</b>	<b>2.12</b>	<b>0.424</b>	<b>0.779</b>	<b>0.942</b>	<b>1.15</b>	<b>2.09</b>	<b>5.73</b>	<b>4.60</b>

**NOTES:**

Boldface type indicates the analyte was detected above the reporting limit.

Highlighted text indicates an exceedance of either the protection of groundwater soil screening level or residential soil screening level.

\*\* Where RSSL or protection of groundwater screening level is not present, Table 915-1 Cleanup Concentrations are used.

-- No standard established.

NA Not applicable.

NS Not sampled.

BS indicates a background sample collected from unaffected soil nearby.

FS indicates a sample collected from the floor of an excavation.

SS indicates a surface sample collected from the area of shallow excavation with limited impact from produced water.

SW indicates a sample collected from the sidewall of an excavation.

Sample has been removed during subsequent site activities.

Taproot Rockies Midstream  
Big Mountain Viper Produced Water Release  
Remediation Project Number 28120  
Briggsdale, Colorado

Station Name	Residential Soil Screening Level Concentrations	SS7	SS7	SS8	SS9	SS10	SS10	SS11	SS11	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
Sample Date		9/8/22	11/10/22	9/8/22	9/8/22	9/12/22	11/10/22	9/12/22	11/10/22	9/12/22	9/12/22	9/12/22	9/12/22	9/12/22	9/12/22	11/10/22	11/10/22
Sample Depth		0 - 0.5 ft	1 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	2 ft	0 - 0.5 ft	2 ft	6 - 6.5 ft	6 - 6.5 ft	6 - 6.5 ft	7.5 - 8 ft	6 - 6.5 ft	6 - 6.5 ft	6 ft	7.5 ft
<b>Metals</b>																	
ARSENIC	0.68	<b>4.71</b>	<b>4.72</b>	<b>5.52</b>	<b>2.35</b>	<b>4.98</b>	<b>6.14</b>	<b>5.08</b>	<b>5.74</b>	<b>3.6</b>	<b>2.8</b>	<b>4.17</b>	<b>1.99</b>	<b>2.33</b>	<b>2.24</b>	<b>3.13</b>	<b>4.36</b>
BARIUM	15,000	<b>377</b>	<b>334</b>	<b>528</b>	<b>48.1</b>	<b>343</b>	<b>512</b>	<b>366</b>	<b>510</b>	<b>211</b>	<b>223</b>	<b>264</b>	<b>137</b>	<b>102</b>	<b>110</b>	<b>386</b>	<b>237</b>
CADMIUM	71	<b>0.268</b>	<b>0.306</b>	<b>0.269</b>	<b>0.0938</b>	<b>0.399</b>	<b>0.251</b>	<b>0.276</b>	<b>0.252</b>	<b>0.249</b>	<b>0.599</b>	<b>0.289</b>	<b>0.211</b>	<b>0.216</b>	<b>0.461</b>	<b>0.210</b>	<b>0.220</b>
CHROMIUM	0.3	<0.514	<1.26	<0.50	<0.52	<2.51	<0.246	<2.54	<0.488	<0.51	<0.515	<0.502	<0.513	<0.503	<0.51	<0.244	<0.467
COPPER	3,100	<b>12.6</b>	<b>14.1</b>	<b>11.3</b>	<9.29	<b>13.5</b>	<b>12.8</b>	<b>13.3</b>	<b>12.2</b>	<9.51	<9.39	<b>10.9</b>	<b>10.9</b>	<b>9.47</b>	<b>9.34</b>	<b>10.5</b>	<b>11.8</b>
LEAD	400	<b>11.1</b>	<b>13.4</b>	<b>10.6</b>	<9.29	<b>12.4</b>	<b>18.4</b>	<b>15.4</b>	<b>13.1</b>	<b>17.8</b>	<b>12.2</b>	<b>12.6</b>	<b>12</b>	<b>12.7</b>	<b>13</b>	<b>12.9</b>	<b>12.8</b>
NICKEL	1,500	<b>11</b>	<b>11.8</b>	<b>9.58</b>	<9.29	<b>11.1</b>	<b>11.6</b>	<b>11.7</b>	<b>10.9</b>	<9.51	<9.39	<b>10.3</b>	<b>13.1</b>	<8.83	<8.66	<b>9.64</b>	<b>10.6</b>
SELENIUM	390	<b>0.23</b>	<b>0.335</b>	<b>0.252</b>	<0.0929	<b>0.207</b>	<b>0.298</b>	<b>0.32</b>	<b>0.296</b>	<b>0.235</b>	<b>0.181</b>	<b>0.146</b>	<b>0.136</b>	<b>0.173</b>	<b>0.221</b>	<b>0.311</b>	<b>0.260</b>
SILVER	390	<0.0897	<0.0921	<0.0926	<0.0929	<b>0.156</b>	<0.0964	<0.0898	<0.0974	<0.0951	<0.0939	<0.0801	<0.0867	<0.0883	<0.0866	<0.0945	<0.0862
ZINC	23,000	<89.7	<92.1	<92.6	<92.9	<93.9	<96.4	<89.8	<97.4	<95.1	<93.9	<80.1	<86.7	<88.3	<86.6	<94.5	<86.2
<b>VOCs</b>																	
BENZENE	1.2	<0.002	NS	<0.002	<0.002	<0.002	NS	<0.002	NS	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NS
ETHYLBENZENE	5.8	<0.002	NS	<0.002	<0.002	<0.002	NS	<0.002	NS	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NS
TOLUENE	490	<0.002	NS	<0.002	<0.002	<0.002	NS	<0.002	NS	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NS
XYLENES, TOTAL	58	<0.002	NS	<0.002	<0.002	<0.002	NS	<0.002	NS	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NS
1,2,4-TRIMETHYLBENZENE	30	<0.002	NS	<0.002	<0.002	<0.002	NS	<0.002	NS	<0.002	<0.002	<b>0.0187</b>	<0.002	<0.002	<0.002	<0.002	NS
1,3,5-TRIMETHYLBENZENE	27	<0.002	NS	<0.002	<0.002	<0.002	NS	<0.002	NS	<0.002	<0.002	<b>0.00434</b>	<0.002	<0.002	<0.002	<0.002	NS
<b>Semi-VOCs</b>																	
1-METHYLNAPHTHALENE	18	<0.00067	NS	<0.00067	<0.00067	<b>0.00131</b>	NS	<0.00067	NS	<b>0.000631</b>	<0.00067	<b>1.56</b>	<b>0.000563</b>	<0.00067	<0.00067	<0.00109	NS
2-METHYLNAPHTHALENE	24	<0.00067	NS	<0.00067	<0.00067	<0.00067	NS	<0.00067	NS	<b>0.000707</b>	<0.00067	<b>0.455</b>	<0.00067	<0.00067	<0.00067	<0.00194	NS
ACENAPHTHENE	360	<0.00067	NS	<0.00067	<0.00067	<0.00067	NS	<0.00067	NS	<0.00067	<0.00067	<b>0.0454</b>	<0.00067	<0.00067	<0.00067	<0.000304	NS
ANTHRACENE	1,800	<0.00067	NS	<0.00067	<0.00067	<0.00067	NS	<0.00067	NS	<0.00067	<0.00067	<b>0.0191</b>	<0.00067	<0.00067	<0.00067	<0.000334	NS
BENZO(A)ANTHRACENE	1.1	<0.00067	NS	<0.00067	<0.00067	<0.00067	NS	<0.00067	NS	<0.00067	<0.00067	<b>0.0073</b>	<0.00067	<0.00067	<0.00067	<0.000493	NS
BENZO(A)PYRENE	0.11	<0.00067	NS	<0.00067	<0.00067	<0.00067	NS	<0.00067	NS	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.000468	NS
BENZO(B)FLUORANTHENE	1.1	<0.00067	NS	<0.00067	<0.00067	<0.00067	NS	<0.00067	NS	<0.00067	<0.00067	<b>0.0081</b>	<0.00067	<0.00067	<0.00067	<0.000585	NS
BENZO(K)FLUORANTHENE	11	<0.00067	NS	<0.00067	<0.00067	<0.00067	NS	<0.00067	NS	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.000437	NS
CHRYSENE	110	<0.00067	NS	<0.00067	<0.00067	<0.00067	NS	<0.00067	NS	<0.00067	<0.00067	<b>0.0873</b>	<0.00067	<0.00067	<0.00067	<0.000624	NS
DIBENZ(A,H)ANTHRACENE	0.11	<0.00067	NS	<0.00067	<0.00067	<0.00067	NS	<0.00067	NS	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.000614	NS
FLUORANTHENE	240	<0.00067	NS	<0.00067	<0.00067	<0.00067	NS	<0.00067	NS	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.000394	NS
FLUORENE	240	<0.00067	NS	<0.00067	<0.00067	<0.00067	NS	<0.00067	NS	<0.00067	<0.00067	<b>0.217</b>	<0.00067	<0.00067	<0.00067	<0.000286	NS
INDENO(1,2,3-CD)PYRENE	1.1	<0.00067	NS	<0.00067	<0.00067	<0.00067	NS	<0.00067	NS	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.00067	<0.000627	NS
NAPHTHALENE	2	<0.00067	NS	<0.00067	<0.00067	<0.00067	NS	<0.00067	NS	<0.00067	<0.00067	<b>0.0703</b>	<0.00067	<0.00067	<0.00067	<0.00145	NS
PYRENE	180	<0.00067	NS	<0.00067	<0.00067	<0.00067	NS	<0.00067	NS	<0.00067	<0.00067	<b>0.0506</b>	<0.00067	<0.00067	<0.00067	<0.000643	NS
<b>TPH**</b>																	
TPH (low fraction)	500	<0.2	NS	<0.2	<0.2	<0.2	NS	<0.2	NS	<0.2	<0.2	<b>0.382</b>	<0.2	<0.2	<0.2	<0.2	NS
C10-C28 DIESEL RANGE	500	<25	NS	<25	<25	<25	NS	<25	NS	<25	<25	<b>39.9</b>	<25	<25	<25	<25	NS
C28-C40 RESIDUAL RANGE ORGANICS	500	<100	NS	<100	<100	<100	NS	<100	NS	<100	<100	<100	<100	<100	<100	<100	NS
<b>Soil Suitability for Reclamation**</b>																	
BORON	2	<b>1.54</b>	<b>0.573</b>	<b>1.3</b>	<b>0.61</b>	<b>0.989</b>	<b>0.701</b>	<b>11.4</b>	<b>0.987</b>	<b>2.04</b>	<b>0.94</b>	<b>1.37</b>	<b>0.529</b>	<b>2.43</b>	<b>1.14</b>	<b>0.909</b>	<b>4.09</b>
PH	6 - 8.3	<b>7.77</b>	<b>7.80</b>	<b>8.07</b>	<b>8.1</b>	<b>7.71</b>	<b>8.37</b>	<b>8.12</b>	<b>8.16</b>	<b>7.96</b>	<b>7.94</b>	<b>7.9</b>	<b>7.96</b>	<b>7.9</b>	<b>7.91</b>	<b>8.03</b>	<b>7.94</b>
SODIUM ADSORPTION RATIO	6	<b>7.47</b>	<b>1.74</b>	<b>5.44</b>	<b>1.47</b>	<b>6.66</b>	<b>5.76</b>	<b>34.8</b>	<b>6.67</b>	<b>9.78</b>	<b>5.73</b>	<b>17.9</b>	<b>6.43</b>	<b>10.7</b>	<b>6.54</b>	<b>5.65</b>	<b>15.8</b>
SPECIFIC CONDUCTANCE	4	<b>6.12</b>	<b>3.78</b>	<b>2.01</b>	<b>0.647</b>	<b>8.28</b>	<b>0.806</b>	<b>10.5</b>	<b>1.98</b>	<b>4.39</b>	<b>3.26</b>	<b>8.34</b>	<b>2.84</b>	<b>6.98</b>	<b>5.83</b>	<b>1.98</b>	<b>7.04</b>

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Highlighted text indicates an exceedance of either the protection of groundwater soil screening level or residential soil screening level.

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NA Not applicable.

NS Not sampled.

BS indicates a background sample collected from unaffected soil nearby.

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SW indicates a sample collected from the sidewall of an excavation.

Sample has been removed during subsequent site activities.

Taproot Rockies Midstream  
Big Mountain Viper Produced Water Release  
Remediation Project Number 28120  
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Station Name	Residential Soil Screening Level Concentrations	SW9	SW10	SW11	Backfill	SB1-4	SB1-7	SB2-4	SB2-6	SB3-4	SB3-7	SB4-4	SB4-7	SB5-4	SB5-5	SB6-2	SB6-4	SB7-4	SB8-2	SB8-4
Sample Date		11/10/22	11/10/22	11/11/22	11/10/2022	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024
Sample Depth		6 ft	6 ft	6 ft		4 ft	7 ft	4 ft	6 ft	4 ft	7 ft	4 FT	7 ft	4 ft	5 ft	2 ft	4 ft	4 ft	2 ft	4 ft
<b>Metals</b>																				
ARSENIC	0.68	<b>3.26</b>	<b>1.89</b>	<b>3.75</b>	<b>6.18</b>	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
BARIUM	15,000	<b>160</b>	<b>117</b>	<b>229</b>	<b>573</b>	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
CADMIUM	71	<b>0.216</b>	<b>0.583</b>	<b>0.258</b>	<b>0.272</b>	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
CHROMIUM	0.3	<0.244	<0.249	<0.492	<0.488	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
COPPER	3,100	<b>11.0</b>	<9.50	<b>11.1</b>	<b>14.1</b>	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
LEAD	400	<b>12.8</b>	<b>13.1</b>	<b>13.7</b>	<b>16.6</b>	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
NICKEL	1,500	<9.35	<9.50	<b>10.0</b>	<b>12.5</b>	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SELENIUM	390	<b>0.196</b>	<b>0.106</b>	<b>0.217</b>	<b>0.294</b>	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SILVER	390	<0.0935	<0.095	<0.0962	<0.0941	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ZINC	23,000	<93.5		<96.2	<94.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
<b>VOCs</b>																				
BENZENE	1.2	NS	NS	NS	<0.002	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ETHYLBENZENE	5.8	NS	NS	NS	<0.002	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
TOLUENE	490	NS	NS	NS	<0.002	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
XYLENES, TOTAL	58	NS	NS	NS	<0.002	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,2,4-TRIMETHYLBENZENE	30	NS	NS	NS	<0.002	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,3,5-TRIMETHYLBENZENE	27	NS	NS	NS	<0.002	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
<b>Semi-VOCs</b>																				
1-METHYLNAPHTHALENE	18	NS	NS	NS	<0.00109	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-METHYLNAPHTHALENE	24	NS	NS	NS	<0.00194	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ACENAPHTHENE	360	NS	NS	NS	<0.000304	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ANTHRACENE	1,800	NS	NS	NS	<0.000334	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
BENZO(A)ANTHRACENE	1.1	NS	NS	NS	<0.000493	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
BENZO(A)PYRENE	0.11	NS	NS	NS	<0.000468	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
BENZO(B)FLUORANTHENE	1.1	NS	NS	NS	<0.000585	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
BENZO(K)FLUORANTHENE	11	NS	NS	NS	<0.000437	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
CHRYSENE	110	NS	NS	NS	<0.000624	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
DIBENZ(A,H)ANTHRACENE	0.11	NS	NS	NS	<0.000614	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
FLUORANTHENE	240	NS	NS	NS	<0.000394	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
FLUORENE	240	NS	NS	NS	<0.000286	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
INDENO(1,2,3-CD)PYRENE	1.1	NS	NS	NS	<0.000627	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
NAPHTHALENE	2	NS	NS	NS	<0.00145	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
PYRENE	180	NS	NS	NS	<0.000643	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
<b>TPH**</b>																				
TPH (low fraction)	500	NS	NS	NS	<0.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
C10-C28 DIESEL RANGE	500	NS	NS	NS	<25	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
C28-C40 RESIDUAL RANGE ORGANICS	500	NS	NS	NS	<100	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
<b>Soil Suitability for Reclamation**</b>																				
BORON	2	<b>5.40</b>	<b>0.812</b>	<b>1.96</b>	<b>0.856</b>	<b>0.333</b>	<b>0.338</b>	<b>1.47</b>	<b>0.648</b>	<b>1.16</b>	<b>0.456</b>	<b>1.4</b>	<b>0.687</b>	<b>1.65</b>	<b>1.2</b>	<b>0.629</b>	<b>1.58</b>	<b>0.984</b>	<b>0.491</b>	<b>1.46</b>
PH	6 - 8.3	<b>7.90</b>	<b>8.00</b>	<b>7.70</b>	<b>8.24</b>	<b>8.32</b>	<b>8.33</b>	<b>8.29</b>	<b>8.32</b>	<b>8.42</b>	<b>8.19</b>	<b>8.25</b>	<b>8.2</b>	<b>8.39</b>	<b>8.14</b>	<b>8.31</b>	<b>8.15</b>	<b>8.55</b>	<b>8.64</b>	<b>8.52</b>
SODIUM ADSORPTION RATIO	6	<b>17.8</b>	<b>8.65</b>	<b>8.03</b>	<b>3.69</b>	<b>2.32</b>	<b>5.19</b>	<b>5.27</b>	<b>5.12</b>	<b>4.9</b>	<b>4.88</b>	<b>4.93</b>	<b>4.74</b>	<b>5.15</b>	<b>4.45</b>	<b>5.47</b>	<b>5.87</b>	<b>5.53</b>	<b>1.96</b>	<b>3.08</b>
SPECIFIC CONDUCTANCE	4	<b>6.99</b>	<b>3.55</b>	<b>2.21</b>	<b>1.23</b>	<b>0.959</b>	<b>1.4</b>	<b>2.09</b>	<b>1.77</b>	<b>0.827</b>	<b>1.99</b>	<b>1.76</b>	<b>2.22</b>	<b>2.4</b>	<b>3.21</b>	<b>2.29</b>	<b>3.59</b>	<b>1.15</b>	<b>0.431</b>	<b>0.594</b>

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Sample has been removed during subsequent investigations

Taproot Rockies Midstream  
Big Mountain Viper Produced Water Release  
Remediation Project Number 28120  
Briggsdale, Colorado

**Table 2. 2024 Delineation and Confirmation Sample Results**

Station Name	CAS Number	Units	Residential Soil Screening Level Concentrations	SB1	SB1	SB2	SB2	SB3	SB3	SB4	SB4	SB5	SB5	SB6	SB6	SB7	SB8	SB8
Sample Date				8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024	8/29/2024
Sample Depth				4 ft	7 ft	4 ft	6 ft	4 ft	7 ft	4 FT	7 ft	4 ft	5 ft	2 ft	4 ft	4 ft	2 ft	4 ft
<b>Metals</b>																		
CALCIUM	7440-70-2	mg/l		<b>3.28</b>	<b>3.32</b>	<b>6.99</b>	<b>5.58</b>	<b>1.54</b>	<b>5.91</b>	<b>4.57</b>	<b>7.51</b>	<b>8.83</b>	<b>15.6</b>	<b>5.83</b>	<b>14.2</b>	<b>2.35</b>	<b>1.6</b>	<b>1.54</b>
MAGNESIUM	7439-95-4	mg/l		<b>0.95</b>	<b>0.831</b>	<b>1.57</b>	<b>1.24</b>	ND	<b>1.34</b>	<b>0.941</b>	<b>1.51</b>	<b>1.74</b>	<b>2.9</b>	<b>1.23</b>	<b>3.01</b>	ND	ND	ND
SODIUM	7440-23-5	mg/l		<b>3.37</b>	<b>7.48</b>	<b>10.9</b>	<b>9.44</b>	<b>4.73</b>	<b>9.3</b>	<b>8.19</b>	<b>10.1</b>	<b>11.8</b>	<b>13.5</b>	<b>10.3</b>	<b>17.2</b>	<b>6.67</b>	<b>1.89</b>	<b>2.94</b>
<b>Soil Suitability for Reclamation**</b>																		
BORON	7440-42-8	mg/l	2	<b>0.333</b>	<b>0.338</b>	<b>1.47</b>	<b>0.648</b>	<b>1.16</b>	<b>0.456</b>	<b>1.40</b>	<b>0.687</b>	<b>1.65</b>	<b>1.20</b>	<b>0.629</b>	<b>1.58</b>	<b>0.984</b>	<b>0.491</b>	<b>1.46</b>
PH	NA	s.u.	6 - 8.3	<b>8.32</b>	<b>8.33</b>	<b>8.29</b>	<b>8.32</b>	<b>8.42</b>	<b>8.19</b>	<b>8.25</b>	<b>8.2</b>	<b>8.39</b>	<b>8.14</b>	<b>8.31</b>	<b>8.15</b>	<b>8.55</b>	<b>8.64</b>	<b>8.52</b>
SODIUM ADSORPTION RATIO	NA	NA	6	<b>2.32</b>	<b>5.19</b>	<b>5.27</b>	<b>5.12</b>	<b>4.9</b>	<b>4.88</b>	<b>4.93</b>	<b>4.74</b>	<b>5.15</b>	<b>4.45</b>	<b>5.47</b>	<b>5.87</b>	<b>5.53</b>	<b>1.96</b>	<b>3.08</b>
SPECIFIC CONDUCTANCE	NA	mmhos/cm	4	<b>0.959</b>	<b>1.4</b>	<b>2.09</b>	<b>1.77</b>	<b>0.827</b>	<b>1.99</b>	<b>1.76</b>	<b>2.22</b>	<b>2.4</b>	<b>3.21</b>	<b>2.29</b>	<b>3.59</b>	<b>1.15</b>	<b>0.431</b>	<b>0.594</b>

**NOTES:**

Boldface type indicates the analyte was detected above the reporting limit.

Highlighted text indicates an exceedance of either the protection of groundwater soil screening level or residential soil screening level.

\*\* Where RSSL or protection of groundwater screening level is not present, Table 915-1 Cleanup Concentrations are used.

-- No standard established.

NA Not applicable.

NS Not sampled.

BS indicates a background sample collected from unaffected soil nearby.

FS indicates a sample collected from the floor of an excavation.

SS indicates a surface sample collected from the area of shallow excavation with limited impact from produced water.

SW indicates a sample collected from the sidewall of an excavation.

**Appendix A - Pintail Lateral Soil Sampling Locations**

**Taproot Energy Partners**

**Facility ID 467382, Spill/Release ID 28120**

**Briggsdale, Colorado**

<b>Point</b>	<b>Sample Depth (ft)</b>	<b>PID (ppm)</b>	<b>Elevation (a)</b>	<b>Latitude, Longitude (NAD83)</b>
BS1	0.0-0.5	NA	4872.38	40.660526, -103.990441
BS2	0.0-0.5	NA	4870.56	40.660463, -103.991008
FS1	9.0-9.5	16.0	4876.00	40.661104, -103.989896
FS2	7.5-8.0	5.0	4869.13	40.661059, -103.989888
SS1	0.0-0.5	NA	4874.89	40.661671, -103.990374
SS2	0.0-0.5	NA	4874.55	40.661106, -103.990397
SS3	0.0-0.5	NA	4875.31	40.661210, -103.990134
SS4	0.0-0.5	NA	4875.05	40.661230, -103.989970
SS5	0.0-0.5	NA	4873.93	40.660955, -103.990473
SS6	0.0-0.5	NA	4872.29	40.660715, -103.990582
SS7	0.0-0.5	NA	4871.08	40.660464, -103.990726
SS8	0.0-0.5	NA	4874.76	40.660945, -103.990131
SS9	0.0-0.5	NA	4874.92	40.660942, -103.989842
SS10	0.0-0.5	0.0	4876.35	40.661106, -103.989825
SS11	0.0-0.5	0.0	4876.42	40.661183, -103.989821
SW1	6.0-6.5	1.0	4870.09	40.661120, -103.989889
SW2	6.0-6.5	0.0	4870.09	40.661111, -103.989867
SW3	6.0-6.5	0.0	4870.26	40.661058, -103.989874
SW4	7.5-8.0	5.0	4868.51	40.661027, -103.989890
SW5	6.0-6.5	3.5	4870.21	40.661059, -103.989905
SW6	6.0-6.5	1.0	4868.32	40.661096, -103.989907
SW7	6.0-6.5	0.0	4870.26	40.661057, -103.989865
SW8	7.5-8.0	0.0	4868.51	40.661016, -103.989891
SW9	6.0-6.5	0.0	4870.21	40.661063, -103.989916
SW10	6.0-6.5	0.0	4868.32	40.661091, -103.989921
SW11	6.0-6.5	0.0	4870.09	40.661128, -103.989892
SB1	4.0-4.5, 7.0-7.5	0.0	4871*	40.660995, -103.989890
SB2	4.0-4.5, 6.0-6.5	0.0	4871*	40.660999, -103.989956
SB3	4.0-4.5, 7.0-7.5	0.0	4872*	40.661073, -103.989955
SB4	4.0-4.5, 7.0-7.5	0.0	4872*	40.661133, -103.989940
SB5	4.0-4.5	0.0	4872*	40.661153, -103.989878
SB6	2.0-2.5, 4.0-4.5	0.0	4872*	40.661183, -103.989821
SB7	4.0-4.5	0.0	4871*	40.660996, -103.989833
SB8	2.0-2.5, 4.0-4.5	0.0	4867*	40.660720, -103.990577

(a) Ground surface elevation, feet above mean sea level.

BS background sample

FS primary excavation floor sample

SS surface sample

SW primary excavation sidewall sample

SB step back sample

NA Not Assesed. PID readings not assessed for shallow surface samples.

\*Elevation estimates based on Latitude and Longitude

Taproot – Big Mountain Viper Pad – Produced Water Release

**Photo: 1**

**Description:**

Initial site conditions on 9/5 looking east.



**Photo: 2**

**Description:**

Initial site conditions looking southwest.



Taproot – Big Mountain Viper Pad – Produced Water Release

**Photo: 3**

**Description:**

Initial site conditions looking south.



**Photo: 4**

**Description:**

Release location.



Taproot – Big Mountain Viper Pad – Produced Water Release

**Photo: 5**

**Description:**

The outlined impacted area of the adjacent property to the southwest.



**Photo: 6**

**Description:**

Liquid Vac Truck Operator working to remove free liquids.



Taproot – Big Mountain Viper Pad – Produced Water Release

**Photo: 7**

**Description:**

Hydro excavator working in the primary excavation area to locate the pipeline failure.



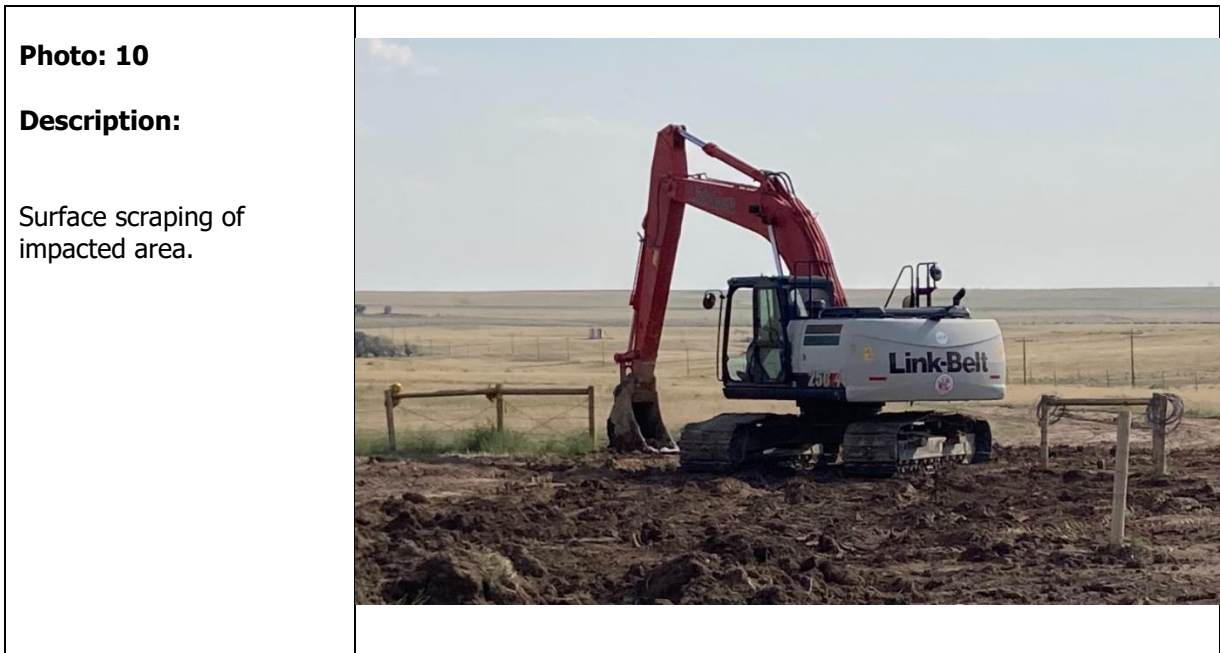
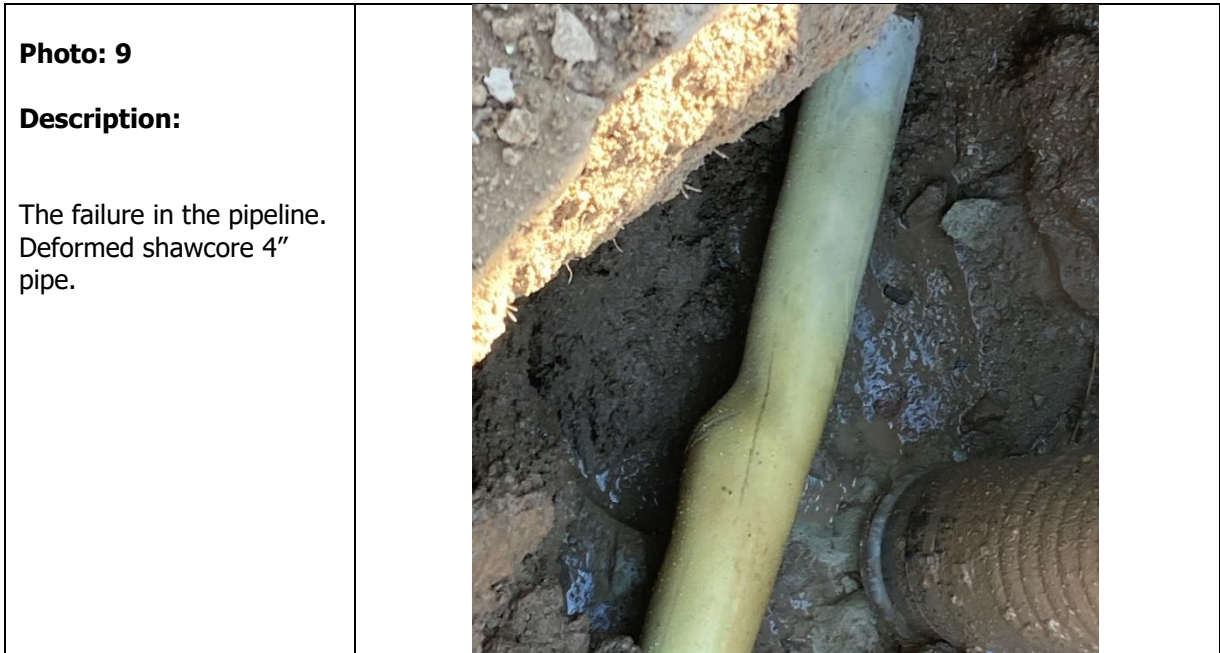
**Photo: 8**

**Description:**

Locating the failure in the pipeline.



Taproot – Big Mountain Viper Pad – Produced Water Release



Taproot – Big Mountain Viper Pad – Produced Water Release

**Photo: 11**

**Description:**

Surface scrapping of impacted area to remove visible wet soil.



**Photo: 12**

**Description:**

Loading impacted soil for disposal.



Taproot – Big Mountain Viper Pad – Produced Water Release

**Photo: 13**

**Description:**

Primary excavation area after exposing failed pipeline. View looking north.



**Photo: 14**

**Description:**

Secondary excavation area after surface scrape looking west.



Taproot – Big Mountain Viper Pad – Produced Water Release

**Photo: 15**

**Description:**

Secondary excavation area after surface scrape, looking east.



**Photo: 16**

**Description:**

Secondary excavation area after surface scrape looking north.



Taproot – Big Mountain Viper Pad – Produced Water Release

**Photo: 17**

**Description:**

Adjacent property after surface scrape.



**Photo: 18**

**Description:**

Replaced line with stainless steel pipe. View looking north.



**Photo: 19**

**Description:**

Area of surface impacts to the east of the primary excavation. Hand digging and hydroexcavation performed until no observed impacts. View looking north.



Taproot – Big Mountain Viper Pad – Produced Water Release

**Photo: 20**

**Description:**

Widening of primary excavation completed on 11/10/22 and 11/11/22. Secondary sidewall samples collected.



**Photo: 21**

**Description:**

Widening of primary excavation completed on 11/10/22 and 11/11/22. Existing infrastructure hindering further excavation.



Taproot – Big Mountain Viper Pad – Produced Water Release

**Photo: 22**

**Description:**

Current site conditions August 2024, with locate flags and proposed soil boring location stakes.



**Photo: 23**

**Description:**

EWI's Direct Push (DPT) rig arriving onsite.



Taproot – Big Mountain Viper Pad – Produced Water Release

**Photo: 24**

**Description:**

EWI personnel hand auguring SB7 for spatial delineation of limited inorganic exceedances.



**Photo: 25**

**Description:**

EWI's DPT rig preparing to mobilize offsite.



**Photo: 26**

**Description:**

Test Well (TW1) bore hole drilled to 50' with 1" PVC well material set. Well was dry after 4 hours. Auger cuttings were dry, fine grained silt and clay. Water or evidence for water within 50' depth was not observed.



**Photo: 27**

**Description:**

Surface water located southeast of the Site from a temporary flooded water regime in a notable drainage located ~80' lower in elevation from the release location. The water table is typically located much lower than the surface in temporarily flooded water regimes.



Taproot Energy Partners  
 Big Mountain Viper - Water Level Backup  
 Spill/Release ID 482854  
 Remediation Project Number 28120

Permit	Distance From Site (Ft)	Latitude	Longitude	Use1	Aquifer1	Permit Issued	WellDepth	Top PerfCasing	Bottom PerfCasing	Static WL	Ground Surface Elevation
16117	4300	40.6672	-104.0036	Stock	Unnamed	1963	180	0	145	150	4,880
71170	5012	40.6548	-103.9738	Stock	Unnamed	1973	87	53	87	20	4,840
283720	5160	40.6572	-104.008	Stock	Unnamed	1950	70	NA	NA	NA	4,840
193131	5180	40.6628	-103.9714	Stock	Unnamed	1996	240	160	220	93	4,830



Summary: Taproot's Big Mountain Viper Release Site is located at approximately 4875' elevation. Nearby monitoring wells indicate the local alluvial aquifer is located between 70-100+ feet below ground surface. Nearby well 71170 indicates a shallow static water level, but this well is located approximately 35' lower in elevation, and is likely from old groundwater elevation data. Additional evidence for deep groundwater at the Site is the absence of water observed in a 50' boring installed at the Site in August 2024.