
May 26, 2023

Mr. Kevin Beery
Utah Department of Environmental Quality
Division of Environmental Response and Remediation
195 North 1950 West
Salt Lake City, Utah 84114-4840

SUBJECT: Corrective Action Alternatives Evaluation/Summary Letter
Bloomington Market
141 W. Bingham Road
St. George, Utah
Facility ID 6000342
UST Release Site MSM
WA MSM-13

Dear Mr. Beery:

This correspondence presents the results of a corrective action alternatives review for the Bloomington Market site located at 141 W. Bingham Road, St. George, Utah (Figure 1). The work was performed on behalf of the Utah Department Environmental Quality, Division of Environmental Response and Remediation (DERR) under Work Assignment MSM-13.

BACKGROUND

The Bloomington Market site is an operating convenience store, gas station, and business complex. Two buildings occupy the site, the southern building houses the convenience store, and the northern building houses offices and commercial operations. Gasoline dispensers are located under a canopy in the eastern portion of the site. Three underground storage tanks (USTs) were located beneath the northeast portion of the canopy, these tanks were closed in place in 2012. New USTs are located south of the store building. A site map showing the locations of the site features is presented as Figure 1.

Between 2010 and 2015, 13 borings (B-1 through B-13) and 11 monitoring wells (B-14 through B-24) were installed by Westech Environmental at the site. Please refer to Figure 1 for the well locations. Soil types encountered were primarily silts and fine sand to approximately 36 feet. Sandy gravel was encountered at approximately 36 feet and extended to approximately 45 feet. Shale bedrock was encountered below the gravel and extended to the depths explored.

In August, September and October, 2017, multi-day free product extraction events were conducted at the site by Westech Environmental. During the extraction events groundwater and free product depths (when present) were measured in each of the existing site monitoring wells (excluding well B-20, which could not be located and was presumed to be destroyed). Wells B-19 through B-22, and well B-24 showed no signs of free product during the extraction events conducted in 2017. Groundwater was measured in these wells at depths ranging from approximately 54 to 59 feet. Free product was consistently observed in wells B-14 through B-18, and well B-23. Free product thicknesses measured in August 2017 ranged from 1.91 feet in B-16 to 8.79 feet in B-23. Subsequent measurements showed decreasing thicknesses between

August and October. The data collected during free product extraction events conducted in 2017 indicated depth to free product ranged from approximately 55 to 58 feet below grade.

On April 14 & 15, 2020, ATC Group Services (ATC) installed four additional monitoring wells (MW-1 through MW-4). Please refer to Figure 1 for the well locations. The monitoring wells were installed to better define the extent of groundwater impacts and to replace B-20.

In 2020, 2021, 2022, and 2023, Atlas (a.k.a ATC) conducted 16 free product extraction events at the site. The free product data collected during the extraction events is present in Table 1, and was provided to the Utah Department of Environmental Quality (UDEQ) in summary reports prepared by Atlas dated July 7, 2020; June 23, 2021; June 3, 2022; and May 8, 2023.

Since Atlas began the extraction events in 2020, free product thickness in B-15 dropped from 9.13 feet in March 2020 to 5.10 feet in January 2023. The free product thickness in B-23 is similar with a decrease from 9.84 feet to 4.24 during the same time period. The effect of the extraction events on B-14 have not been as effective with the free product thickness starting at 4.10 feet and decreasing to 3.85 feet over the same time period.

Review of the historical free product thickness data indicate the extraction events have reduced the product levels in B-14, B-15, and B-23, since Atlas/ATC began the initial event in March 2020, and free product appears to be no longer present in B-17 and B-18. However, the overall effectiveness of the free product extraction efforts since 2022 have not significantly reduced the presence of free product to warrant further vacuum extraction events. Based upon review of the data collected since March 2020, Atlas recommended that a remedial action evaluation be conducted to determine a more effective approach to removing free product from beneath the site.

CORRECTIVE ACTION ALTERNATIVE EVALUATION

The following corrective action alternatives have been considered or contemplated:

1. A remedial treatment system designed to remove free product only was evaluated as a potential remedial option for this site. Based upon review of the historical groundwater and free product data, it appears the presence of free product and groundwater impacts are limited to a small area near the northern end of the dispenser island canopy. A free product only extraction system would require the installation of a minimum of two recovery wells, and would require the least amount of above ground components. Also, this type of remedial effort would be the least disruptive to the on-going operations at the site.
2. Free product removal with groundwater pump and treat was evaluated as a potential remedial option for the site. This remedial option would require the installation of a minimum of two recovery wells, a free product and groundwater separator, a water stripper tower to strip away the majority of volatile organic compounds (VOCs) remaining in the water treatment stream, and a granular activated carbon vessel to polish off the remaining VOCs before discharge to sanitary sewer system. A groundwater discharge permit would be required for this remedial option and monthly water effluent sampling would be necessary. This approach is more costly than the free product removal only option and would require a significant operation and maintenance (O&M) effort. Given that the area of impact is limited to a smaller area beneath the site, and the cost associated with installation and O&M of a full-scale remediation system, this option is not considered a practical approach to remediating the site.

- Vacuum enhanced total fluids recovery (free product removal with groundwater pump and treat, and vapor extraction with off-gas treatment) was evaluated to remediate groundwater and remove free product. This remedial option would require the installation of a minimum of two recovery wells, a free product and groundwater separator, a stripper tower to strip away the majority of volatile organic compounds remaining in the groundwater, a granular activated carbon vessel to polish off the remaining VOCs in water treatment stream; and finally, a thermal oxidizer to treat off-gas vapors from the remediation system. Discharge permits would be required for the water effluent stream and for off-gas treatment. This approach would be the most costly of the remedial options considered and would require the greatest O&M effort.

A summary of the approximate costs for the remedial alternatives considered in presented below.

Remedial Alternative Summary

TASK	Free Product Extraction Only	Free Product Extraction and Groundwater Pump and Treat	Vacuum Enhanced Total Fluids Extraction (Groundwater, free product, and vapor extraction)
CAP Preparation ¹	\$7,000 – \$8,000	\$9,000 – \$11,000	\$11,000 – \$12,000
Pilot Study Implementation	NA	\$70,000 – 80,000 ²	\$80,000 – 90,000 ²
Final Corrective Action Design	NA	\$2,000 – \$3,000	\$2,000 – \$3,000
CAP Implementation	\$120,000 – \$140,000 ³	\$210,000 – \$240,000 ⁴	\$280,000 – \$300,000 ⁴
Start-up with annual O&M	\$60,000 – \$70,000	\$80,000 – \$90,000	\$95,000 – \$105,000
Total:	\$187,000 - \$218,000	\$371,000 – \$424,000	\$468,000 – \$510,000

Notes:

CAP – Corrective Action Plan NA – Not applicable O&M – Operations and Maintenance

¹ – Includes the remedial system design specifications

² – Includes the installation of one 6" diameter well to 70 feet for the pilot study

³ – Includes the installation of two 6" diameter wells to 70 feet

⁴ – Includes the installation of the second 6" diameter well to 70 feet

The actual diameter and depth of the recovery wells will be determine during the CAP preparation effort.

SELECTED CORRECTIVE ACTION RATIONAL

The selected corrective action is free product extraction only. The corrective action was selected based upon the following criteria:

- The presence of free product and groundwater impacts appears to be limited to a small area north of the dispenser island canopy.
- The product only extraction system would require the least amount of aboveground components, and the installation would be the least disruptive to the on-going operations of the retail petroleum outlet located at the site; and

3. This remedial technology is the most cost effective option compared to the other remedial technologies considered.

Upon approval from the UDEQ of the selected remedial alternative, Atlas will submit a cost estimate along with a signed PST Work Plan Authorization Form to prepare the CAP and remedial system design specifications.

Our services consist of professional opinions and recommendations made in accordance with generally accepted geotechnical and environmental engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied. Should you have any questions, please do not hesitate to call us at (801) 935-4917.

Sincerely,

ATLAS



Jim Coletta, P.G.
Branch Manager
Utah Certified Petroleum Consultant

JC/BA

Cc: Mr. Sean Julian, Bloomington Market Chevron & Taco Time

FIGURES



ATLAS

● = Monitoring Well

Approximate Scale: 1 inch = 50 feet

358 South 700 East, B518
 Salt Lake City, Utah 84102
 (801) 935-4917

FIGURE 1 - SITE MAP

**Bloomington Market
 141 Brigham Road
 St. George, Utah 84790**

PROJECT NO: 271EM00748

SOURCE: Google Earth

REVIEWED BY: JC

DRAWN BY: JC

DATE: 05/23

FILE:

TABLES

TABLE 1
SUMMARY OF FREE PRODUCT EXTRACTION EVENTS
BLOOMINGTON MARKET
141 W. BRIGHAM ROAD
ST. GEORGE, UTAH

WELL I.D. TOC ^[1]	DATE MM/DD/YY	DTW (feet)	GW Elev. (feet)	FP Depth (feet)	FPT (feet)
B-14 100.00	3/12/20 - Start	58.90	44.18	54.80	4.10
	3/13/20 - End	56.69	43.31	NP	0.00
	4/21/20- Start	58.68	44.49	54.45	4.23
	4/22/20 - End	58.65	41.36	56.64	0.01
	5/28/20 - Start	59.09	43.66	55.43	3.66
	5/29/20 - End	54.56	45.44	NP	0.00
	6/29/20 - Start	58.19	43.00	56.61	1.58
	6/30/20 - End	59.46	40.54	NP	0.00
	12/01/20 - Start	58.98	44.23	54.70	4.28
	12/02/20 - End	59.16	40.84	NP	0.00
	2/24/21 - Start	59.10	42.81	56.55	2.55
	2/25/21 - End	57.82	42.21	57.78	0.04
	3/30/21 -Start	57.80	42.36	57.59	0.21
	3/31/21 - End	62.49	37.51	NP	0.00
	5/11/21 - Start	57.36	42.84	57.10	0.26
	5/12/21 - End	59.69	40.31	NP	0.00
	02/14/22 - Start	58.75	44.03	55.05	3.70
	02/15/22 - End	59.22	40.78	NP	0.00
	03/21/22 - Start	59.06	43.61	55.50	3.56
	03/22/22 - End	58.72	41.28	NP	0.00
	04/18/22 - Start	57.05	43.05	56.92	0.13
	04/19/22 - End	61.44	38.56	NP	0.00
	05/24/22 - Start	56.70	43.50	56.44	0.26
	05/25/22 End	59.87	40.13	NP	0.00
	01/17/23 - Start	59.00	43.89	55.15	3.85
	01/18/23 - End	59.05	40.95	NP	0.00
	02/16/23 - Start	57.45	43.67	56.05	1.49
	02-17-23 - End	57.88	42.12	NP	0.00
	03/28/23 - Start	56.40	44.55	55.14	1.26
	03/29/23 - End	57.45	42.55	NP	0.00
04/25/23 - Start	56.95	44.70	54.75	2.20	
04/26/23 - End	56.79	43.21	NP	0.00	
B-15 99.54	3/12/20 - Start	62.54	43.85	53.41	9.13
	3/13/20 - End	57.98	41.56	NP	0.00
	4/21/20- Start	55.49	44.53	54.85	0.64
	4/22/20 - End	58.39	41.15	NP	0.00
	5/28/20 - Start	56.28	43.70	55.69	0.59
	5/29/20 - End	58.44	41.10	NP	0.00
	6/29/20 - Start	56.79	43.07	56.37	0.42
	6/30/20 - End	59.19	40.35	NP	0.00
	12/01/20 - Start	61.50	43.98	53.58	7.92
	12/02/20 - End	58.08	41.46	NP	0.00
	02/24/21 - Start	57.70	42.82	56.40	1.30
	02/25/21 - End	57.20	42.47	57.03	0.17
	3/30/21 -Start	57.30	42.39	57.10	0.20
	3/31/21 - End	60.19	39.35	NP	0.00
	5/11/21 - Start	57.10	42.86	56.54	0.56
	5/12/21 - End	57.35	42.19	NP	0.00
02/14/22 - Start	58.65	43.82	54.74	3.91	
02/15/22 - End	58.30	41.24	NP	0.00	

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BLOOMINGTON MARKET
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WELL I.D. TOC ^[1]	DATE MM/DD/YY	DTW (feet)	GW Elev. (feet)	FP Depth (feet)	FPT (feet)
B-15 Cont.	03/21/22 - Start	56.41	43.66	55.71	0.70
	03/22/22 - End	57.87	41.67	NP	0.00
	04/18/22 - Start	56.70	43.07	56.39	0.31
	04/19/22 - End	59.50	40.04	NP	0.00
	05/24/22 - Start	56.31	43.51	55.94	0.37
	05/25/22 End	59.10	40.45	59.09	0.01
	01/17/23 - Start	59.60	43.77	54.50	5.10
	01/18/23 - End	58.00	41.54	NP	0.00
	02/16/23 - Start	56.25	43.61	55.82	0.43
	02-17-23 - End	57.21	42.33	NP	0.00
	03/28/23 - Start	55.29	44.55	54.89	0.40
	03/29/23 - End	57.39	42.15	NP	0.00
	04/25/23 - Start	55.00	44.76	54.71	0.29
	04/26/23 - End	56.11	43.43	NP	0.00
B-23 99.79	3/12/20 - Start	63.09	44.08	53.25	9.84
	3/13/20 - End	58.16	41.63	NP	0.00
	4/21/20- Start	55.09	44.99	54.70	0.39
	4/22/20 - End	63.55	36.25	63.54	0.01
	5/28/20 - Start	56.58	43.95	55.59	0.99
	5/29/20 - End	60.78	39.01	NP	0.00
	6/29/20 - Start	57.20	43.30	56.25	0.95
	6/30/20 - End	60.65	39.14	NP	0.00
	12/01/20 - Start	56.45	43.68	56.00	0.45
	12/02/20 - End	60.87	38.92	NP	0.00
	2/24/21 - Start	58.94	43.05	56.01	2.93
	2/25/21 - End	57.70	42.20	57.55	0.15
	3/30/21 -Start	57.71	42.58	57.05	0.66
	3/31/21 - End	58.17	41.62	NP	0.00
	5/11/21 - Start	57.18	43.05	56.60	0.58
	5/12/21 - End	62.19	37.60	NP	0.00
	02/14/22 - Start	59.18	44.11	54.51	4.67
	02/15/22 - End	58.25	41.54	NP	0.00
	03/21/22 - Start	56.62	43.82	55.75	0.87
	03/22/22 - End	59.26	40.54	59.25	0.01
	04/18/22 - Start	57.05	43.23	56.40	0.65
	04/19/22 - End	60.80	38.99	NP	0.00
	05/24/22 - Start	56.24	43.74	55.99	0.25
	05/25/22 End	62.26	43.57	62.24	0.02
	01/17/23 - Start	59.14	43.83	54.90	4.24
	01/18/23 - End	61.26	38.54	61.25	0.01
	02/16/23 - Start	56.95	43.55	56.01	0.94
	02-17-23 - End	58.19	41.60	NP	0.00
	03/28/23 - Start	55.85	44.88	54.68	1.25
	03/29/23 - End	58.66	41.13	NP	0.00
	04/25/23 - Start	55.04	44.89	54.85	0.19
04/26/23 - End	56.79	43.00	NP	0.00	

Notes:

^[1] = Values represent surrogate elevations and do not reflect mean sea-level elevations. An arbitrary elevation of 100 feet was established for the top of well casing (TOC) for B-14. Other well elevations are relative to B-14. TOC survey was conducted by ATC on 04/15/20.

DTW = Depth to Water

FPT = Free Product thickness

GW Ele. = Groundwater Elevation

FP Depth = Depth to free product