



**PROPOSED UNDERGROUND STORAGE TANK (UST)  
RELEASE CASE CLOSURE EVALUATION SUMMARY**

**LUST Case File #0546.01  
Facility ID # 0-007047  
La Paz County**

**Plantation Mini Mart  
8010 Riverside Drive  
Parker, AZ 85344**

*Background:*

The Site is located at 8010 Riverside Drive in Parker, on the northeast side of Riverside Drive and 97<sup>th</sup> Street, east of the Colorado River. The Site is currently occupied by Stroke's Bar & Grill and operated historically as a gas station and convenience store.

In the 1970s three underground storage tanks (USTs) were abandoned in place on the south side of the property under what is currently the driveway to Plantation Trailer Park. Following discovery of petroleum impacted soil and groundwater at properties adjacent to the Site in the 1980s, Site investigations revealed the presence of petroleum contamination beneath the Site. Following an initial investigation by EMCON Associates (EMCON) in 1994, UST removal activities (4 USTs and associated piping and dispensers) and continued site investigation activities were conducted by AGRA Earth and Environmental (AGRA) from 1994 to 1995. Four tanks were removed on the north side of the Plantation property near the current location of Site monitoring well MW-13. Analysis of soil samples collected beneath the USTs during removal activities indicated a release of an unknown quantity of gasoline, and LUST File #0546.01.

Soil samples collected from beneath the USTs removed from the north side of Plantation Mini Mart were analyzed for Total Petroleum Hydrocarbons (TPH), benzene, ethylbenzene, toluene, and total xylenes (BTEX), and lead. TPH and BTEX were present in nearly all samples collected beneath the USTs in concentrations greater than the applicable ADEQ action level. Lead was detected only beneath the north end of the westernmost UST at a concentration of 6.2 parts per million (ppm). Elevated levels of TPH were also discovered beneath a product line joint along the northeast side of the building and beneath the product dispensers southeast of the mini mart. Lead was present beneath the southern product dispenser at 27 milligrams per kilogram (mg/Kg). Depths at which soils were collected was not provided in the 1995 report prepared by AGRA.

In 1994, a soil vapor survey was conducted by AGRA to assess contaminant concentrations in soil vapor beneath the site. Analytical data results indicated concentrations of TPH at 13,700 µl/L and benzene at 28 µl/L in the vicinity of MW-13, above Arizona clean-up levels at that time. Monitoring wells MW-1 through MW-12 were drilled and installed in February and March of 1996, and MW-13, MW-14 and MW-15 were drilled and installed in June of 2005. Soil samples were collected from the boreholes prior to well installation. Soil analytical data indicated that contaminants of concern were detected at concentrations above Arizona residential soil remediation levels (rSRLs) in the samples collected from MW-7, MW-8 and MW-9 at 15 and 20 feet below ground surface (bgs).

Two Hydropunch™ groundwater surveys were conducted by AGRA in November 1993 and December 1995, respectively. These groundwater investigations indicated widespread presence of

TPH throughout the Site, and concentrations of BTEX in the area of the former UST pit north of the convenience store. Based on the Hydropunch™ survey, it was concluded that two distinct areas of petroleum contamination were present in groundwater beneath the site: at the USTs located north of the convenience store in the vicinity of MW-13, and the abandoned-in-place USTs located along the southwest Site boundary in the current location of MW-8.

All site activities ended in 2009. ADEQ attempted to obtain site access to continue corrective actions. ADEQ took over corrective actions at the site after a financial hardship settlement with the UST owner/operator. The State Lead Unit and its contractor Hydro Geo Chem conducted limited groundwater sampling in 2018. The State Lead Unit contracted with Tetra Tech in 2019 to conduct groundwater and soil vapor sampling.

*Removal or control of the source of contamination:*

A UST system was excavated and removed from the Site in November 1993. Blaes installed and operated a soil-vapor extraction (SVE) / air-sparge / ozone sparge system from September 2008 through January 2009. The system consisted of a total of 14 vapor extraction wells and 40 air/ozone sparge wells. Extracted vapors were processed via an electric catalytic oxidizer unit. From September 29, 2008 to January 27, 2009, the SVE, air-sparge system, and ozone-sparge system ran for 2,590 hours, 2,335 hours, and 2,575 hours respectively. Samples collected from the SVE system indicated that approximately 1,112 pounds of volatile organic compounds (VOCs) were destroyed, equaling approximately 190 gallons of gasoline removed from the Site soil and groundwater. The system was decommissioned and removed from the Site from January to May 2009.

After the UST system removal, soil and groundwater impacts at the Site were limited to the immediate vicinities of MW-7/MW-8, and MW-13. With the absence of a continuous source and no indication of lateral or vertical migration since the remediation system was decommissioned, the source area is considered to be under control.

*Characterization of the groundwater plume:*

As mentioned earlier, the original monitoring wells were installed in 1996. Blaes Environmental (Blaes) drilled and installed MW-13 in 2005 in the vicinity of the former UST pit north of the convenience store. Monitoring wells MW-16 through MW-18 were installed at an unknown date. Blaes collected groundwater samples from MW-8 in November 2008 and from MW-8 and MW-13 in January 2009 during the period of active remediation. Results from the November 2008 monitoring showed benzene concentrations of 1,400 micrograms per liter (µg/l) in MW-7. Analytical results from the January 2009 monitoring event showed benzene concentrations of 366 µg/l in MW-7 and 6.56 µg/l in MW-13, both above the AWQS of 5 µg/l. No other contaminants of concern were present in groundwater at concentrations greater than their applicable AWQS. No groundwater monitoring occurred between 2009 and 2018.

Hydro Geo Chem conducted limited groundwater monitoring and sampling in February and March 2018 for the State Lead program. MW-8, MW-11, MW-12, MW-15 and MW-18 were the only wells sampled. MW-8 showed 1,2-DCA over AWQS. No other VOCs were reported over AWQS.

Tetra Tech conducted groundwater monitoring and sampling in March 2020, July 2020, November 2020, January 2021 and April 2021. During each event Site wells were low-flow purged until groundwater parameters stabilized to within ten percent of previous readings. All site wells were sampled for VOCs by EPA Method 8260B. During the March 2020 sampling event, analytical results indicated 1,2 DCA concentrations of 6.61  $\mu\text{g/l}$  in MW-8, and benzene concentrations of 7.57  $\mu\text{g/l}$  in MW-13. No other contaminants were present in concentrations greater than the applicable AWQS.

Due to source area well MW-7 being backfilled with sediment thereby limiting sampling capability, on June 18th, 2020 Tetra Tech installed replacement well MW-7R approximately 3 feet north of MW-7. MW-7R was installed to a total depth of 20 ft. bgs. The results of the initial grab sample did not indicate the presence of any contaminants above the applicable AWQS, and subsequent groundwater monitoring supported this.

During the July 2020 sampling event, analytical results indicated concentrations of benzene and 1,2-DCA of 10.2  $\mu\text{g/l}$  and 7.37  $\mu\text{g/l}$ , respectively in MW-8, and concentrations of benzene in MW-13 of 47.2  $\mu\text{g/l}$ .

During the November 2020 sampling event analytical results indicated concentrations of 1,2-DCA of 10.1  $\mu\text{g/l}$  in MW-8 and concentrations of benzene in MW-13 of 10.5  $\mu\text{g/l}$ .

Tetra Tech contracted a licensed surveyor to survey all Site wells in November 2020. Based on previous consultant's figures and groundwater monitoring conducted by Tetra Tech, groundwater at the Site appears to flow to the southwest with a very shallow gradient of approximately 0.01-0.025 feet per foot (ft. /ft.) during the March 2020, July 2020, and November 2020 groundwater sampling events. Groundwater appeared to mound along the southwest edge of the site during the January 2021 monitoring event, with shallow gradient flow direction to the northeast and southwest of the mounded ridge.

During the January 2021 sampling event, analytical results indicated concentrations of 1,2-DCA of 8.79  $\mu\text{g/l}$  in MW-8. During the April 2021 sampling event of select wells, analytical results indicated concentrations of 1,2-DCA of 8.17  $\mu\text{g/l}$  (above the AWQS of 5  $\mu\text{g/l}$ ) in MW-8 and concentrations of benzene in MW-13 of 19.3  $\mu\text{g/l}$  (above the AWQS of 5  $\mu\text{g/l}$ ).

#### *Groundwater plume stability:*

Historical groundwater investigations indicated groundwater plumes in the vicinities of MW-7, MW-8, and MW-13. Monitoring wells MW-7, MW-7R, and MW-8 are located in the vicinity of the previously abandoned-in-place USTs near the southwest Site boundary. Monitoring well MW-13 is located adjacent to the previously removed USTs located north of the former convenience store, now Stroke's Bar and Grill. Contaminants of concern in groundwater beneath the Site have historically been 1,2-DCA and BTEX. Since inception of groundwater monitoring activities in 2005, contamination concentrations in groundwater have decreased below residential AWQS in all Site monitoring wells with the exception of 1,2-DCA at MW-8, and benzene in MW-13.

A statistical analysis of historical contaminant concentrations in groundwater collected from MW-8 and MW-13 was conducted using the Mann-Kendall trend test to determine if the limited groundwater impacts beneath the site are stable and/or decreasing. Analysis including all groundwater monitoring data between 2005 and 2021 indicates that benzene concentrations in MW-13 are decreasing and were below the AWQS in January 2021. An analysis limited to more recent groundwater data collected from 2008 to 2021 indicate that 1,2-DCA concentrations at MW-8 exhibit a stable trend. This data suggests groundwater impacts are minimal, will be limited to the areas near MW-8 and MW-13, are not expected to migrate or expand, and should continue to naturally attenuate over time.

*Natural Attenuation:*

The natural biodegradation of hydrocarbons by indigenous microbes is universal and occurs to varying extents in all subsurface environments. An overall decreasing trend in VOC concentrations in groundwater has been established, which supports that natural attenuation is occurring. Field measurements of temperature, conductivity, oxidation-reduction potential, oxygen, and nitrates and laboratory measurements of ferrous iron, sulfate, and manganese in groundwater were sampled in 2018. In MW-8, dissolved oxygen (DO) concentrations show aerobic conditions like the other monitoring wells at the Site. The last measurement of nitrate in MW-8 (4.9 milligrams per liter [mg/L]) was in the source area (<10 mg/L) indicating depletion of nitrate as an electron acceptor. Ferrous iron was only detected in MW-12 (source area) at 5.4 mg/L, which has dropped since October 2020. As the ferrous iron concentrations drop, aerobic conditions will replace current anaerobic conditions.

Monitored Natural Attenuation parameters collected during the April 2021 groundwater monitoring event as well as groundwater parameters observed during well purging activities suggest an anoxic reducing environment in wells MW-8 and MW-13. At the time of sample collection during the April 2021 event, purge parameters at MW-8 and MW-13 indicated a DO concentration of 0.15 mg/l, and 0.10 mg/l, respectively.

*Threatened or impacted drinking water wells:*

A search of the Arizona Department of Water Resources (ADWR) Well Registry database reported 198 wells registered within one-half mile of the Site. There are 88 monitor/other, 106 non-exempt (100 of them are remediation/monitoring wells), and four exempt wells.

Three exempt groundwater wells were identified in ADWR's records within a quarter mile of the site. Well #55-807142 is registered to Plantation Park, Inc. as a domestic well. According to annual reports filed with the Arizona Corporation Commission, Plantation Park Inc. operated a trailer park, store and bar prior to 1996. Plantation Mobile Home Park located to the west of the site at 8020 Riverside Drive, which has a metered service connection with EPCOR water. EPCOR water also has a metered service connection to the current business located on-site.

The three exempt wells were not sampled by Tetra Tech due to their location either up-gradient or cross-gradient from observed Site groundwater flow, and due to the localized contamination present at the Site. The fourth exempt well is capped and was registered in 2007 to ADEQ as a hydrologic test well.

Of the remaining six non-exempt wells, two are no-longer used and were replaced with well #55-221092. This well is for the Branson RV Park [AZ0415323] which is regulated by ADEQ's Safe Drinking Water program. This water system is only required to analyze for nitrates and coliform. Well #55-52460 is for the La Paz County – Patria Flats Park [AZ0415077] which is regulated by ADEQ's Safe Drinking Water program. This water system is only required to analyze for nitrates and coliform. This park is for day use only. Well #55-629048 is registered to Rancho del Rio. No additional information was found regarding this well.

According to ADWR, any new or replacement well located at or near the LUST site would need to meet the criteria of Arizona Administrative Code R12-15-1302 (B) (3).

*Other exposure pathways:*

The Site is currently occupied by a commercial business, Stroke's Bar and Grill. Within a quarter mile of the Site there are no schools or daycare receptors. The only sensitive receptor is residential within a quarter-mile radius. Residential mobile homes are approximately 130 feet west and approximately 80 feet north of the Site.

Three soil samples were collected by EMCON during the November 1993 Hydropunch™ survey. H3-10, H5-10, and H7-10 were collected at a depth of 10 feet bgs northeast, northwest, and southwest respectively of the former UST pit adjacent to the former convenience store. Total Petroleum Hydrocarbons (TPH) and benzene were present in all samples at concentrations exceeding suggested cleanup levels [levels in place prior to the 1997 SRLs]. Toluene and total xylenes were present in H5-10 at concentrations exceeding suggested cleanup levels. Given that these samples were collected from a depth of 10 feet bgs and that groundwater at the Site were approximately 8-8.5 feet bgs during the March 1996 groundwater monitoring event, it is assumed that these soil samples were collected from below groundwater level in saturated soil and are therefore are not representative of the vadose zone beneath the Site.

No known vadose zone impacts have occurred since the decommissioning of the remediation system. Risk of impact to flora or fauna from the release is considered minimal due to the low concentrations of remaining contaminants in the Site groundwater. Additionally, remaining Site contamination in the immediate vicinity of MW-8 is located in a gravel driveway and parking area which is relatively free of biological receptors.

Tetra Tech performed a soil vapor intrusion risk assessment of the Site using groundwater data collected in January 2021 and the U.S. Environmental Protection Agency (EPA) Excel-based tool for the Johnson and Ettinger (J&E) model. The purpose of the risk evaluation was to assess whether detected concentrations of VOCs in groundwater could present a potential vapor intrusion human health risk to future occupants of the Site under a residential land use scenario. The J&E model is a screening-level model that incorporates both convective and diffusive



mechanisms for estimating the transport of contaminant vapors emanating from shallow groundwater into indoor spaces located directly above the source of contamination. The maximum detected concentrations of each COC above AWQS, as identified during groundwater monitoring, were entered into the J&E model.

COCs in soil vapor were assessed for carcinogenic risk and non-carcinogenic hazard, as applicable. The J&E model predicted a cumulative incremental cancer risk of  $2.19 \times 10^{-6}$  for 1,2-DCA in the vicinity of MW-8. The predicted hazard quotient (non-carcinogenic hazard) calculated by the model for MW-8 was  $3.24 \times 10^{-2}$ .

The results of the risk assessment show that all predicted carcinogenic and non-carcinogenic risks to a hypothetical residential receptor at the Site are well below levels of significance for all COCs detected in groundwater (i.e., below an incremental cancer risk of  $1 \times 10^{-6}$  and below a hazard quotient of 1). Additionally, groundwater contamination does not extend beyond the limited source areas which are not located in a residential area.

*Requirements of A.R.S. §49-1005(D) and (E):* The results of the corrective action completed at the site assure protection of public health, welfare and the environment, to the extent practicable, the clean-up activities completed at this site allow for the maximum beneficial use of the site, while being reasonable, necessary and cost effective.

*Other information that is pertinent to the LUST case closure approval:*

The facility and LUST files were reviewed for information regarding prior cleanup activities, prior site uses and operational history of the UST system prior to removal.

Groundwater data tables:

Groundwater data for MW-8 (location of UST closed in place)

Total Depth: 25 feet. Screened 5-25 feet.

Date	Benzene AWQS 5.0 µg/L	1,2-DCA AWQS 5.0 µg/L	Depth to Water (feet)
January 2005	<2.0	<2.0	Not reported
June 2005	<b>13</b>	<b>9.90</b>	8.68
September 2005	<b>6.30</b>	<b>17</b>	8.87
February 2007	<2.00	<b>11</b>	8.79
February 2008	<b>11</b>	<b>20</b>	8.75
May 2008	<b>8.80</b>	<b>&lt;20</b>	8.83
September 2008 SVE/AS/ozone start			
January 2009	<1.0	<1.0	8.8
SVE/AS/ozone end			

July 2010	<b>5.5</b>	<b>23</b>	8.73
No Site Access	---	---	---
February 2018	0.94	<b>12</b>	8.85
March 2018	0.88	<b>7.60</b>	8.85
March 2020	0.52	<b>6.61</b>	10.44
July 2020	<b>10.2</b>	<b>7.37</b>	8.73
November 2020	0.824	<b>10.1</b>	8.86
January 2021	<1.00	<b>8.79</b>	9.07
April 2021	<0.0941	<b>8.17</b>	8.71

Groundwater data for MW-7R (MW-7 filled with sediment) Between MW-8 and MW-13  
Total Depth: 20 feet. Screened 5-20 feet.

Date	Benzene AWQS 5.0 µg/L	1,2-DCA AWQS 5.0 µg/L	Depth to Water (feet)
June 2020	<1.00	<1.00	9.29
July 2020	<0.094	<0.082	9.25
November 2020	<1.00	<1.00	9.8
January 2021	<1.00	<1.00	10.68
April 2021	<0.0941	<0.0819	9.28

Groundwater data for MW-17 (cross to up gradient of MW-8; cross to down gradient of MW-13)  
Total Depth: 20 feet. Screened 5-20 feet.

Date	Benzene AWQS 5.0 µg/L	1,2-DCA AWQS 5.0 µg/L	Depth to Water (feet)
February 2007	3	3.00	9.62
February 2008	<b>16</b>	1.80	9.53
May 2008	<b>19</b>	2.30	9.57
August 2008	<b>25</b>	<2.0	9.58
September 2008 SVE/AS/ozone start			
January 2009	<1.0	<1.0	9.63
January 2009 SVE/AS/ozone end			
July 2010	<1.0	<1.0	Not reported
No Site Access	---	---	---
March 2020	<1.00	<1.00	9.29
July 2020	1.33	<0.082	9.34
November 2020	0.26	<1.00	9.79
January 2021	0.138	<1.00	10.77
April 2021	0.15	<0.0819	9.53

Groundwater data for MW-16 (up gradient of MW-8)  
Total Depth: unknown. Screened interval unknown

Date	Benzene AWQS 5.0 µg/L	1,2-DCA AWQS 5.0 µg/L	Depth to Water (feet)
February 2007	1000	<20	9.25
February 2008	1600	28	9.06
May 2008	4.10	<2.0	9.61
September 2008	24	<2.0	Not reported
September 2008 SVE/AS/ozone start			
November 2008	2.8	<2.0	Not reported
January 2009	<10	<10	7.84
January 2009 SVE/AS/ozone end			
No Site Access	---	---	---
April 2020-April 2021			DRY

Groundwater data for MW-3 (cross gradient of MW-8)  
Total Depth: 20 feet. Screened 5-20 feet.

Date	Benzene AWQS 5.0 µg/L	1,2-DCA AWQS 5.0 µg/L	Depth to Water (feet)
February 2008	<1.00	<2.00	9.15
May 2008	<1.00	<2.00	9.28
September 2008 SVE/AS/ozone start			
January 2009 SVE/AS/ozone end			
No Site Access	---	---	---
March 2020	<1.00	<1.00	9.05
July 2020	<0.094	<0.082	9.13
November 2020	<1.00	<1.00	9.47
January 2021	<1.00	<1.00	9.56

Groundwater data for MW-11 (down gradient of MW-8)  
Total Depth: 25 feet. Screened 5-25 feet.

Date	Benzene AWQS 5.0 µg/L	1,2-DCA AWQS 5.0 µg/L	Depth to Water (feet)
February 2007	<2.00	<2.00	8.45
February 2008	<1.00	<2.00	8.41
May 2008	<2.00	<2.00	8.44
August 2008	<2.00	<2.00	8.39



September 2008 SVE/AS/ozone			
January 2009 SVE/AS/ozone end			
No Site Access	---	---	---
February 2018	<1.00	<1.00	8.45
March 2018	<1.00	<1.00	8.45
March 2020	<1.00	<1.00	8.29
July 2020	<0.094	<0.082	8.32
November 2020	<1.00	<1.00	8.60
January 2021	<1.00	<1.00	9.68
April 2021	<0.0941	<0.0819	8.34

Groundwater data for MW-12 (cross gradient of MW-8)  
Total Depth: 20 feet. Screened 5-20 feet.

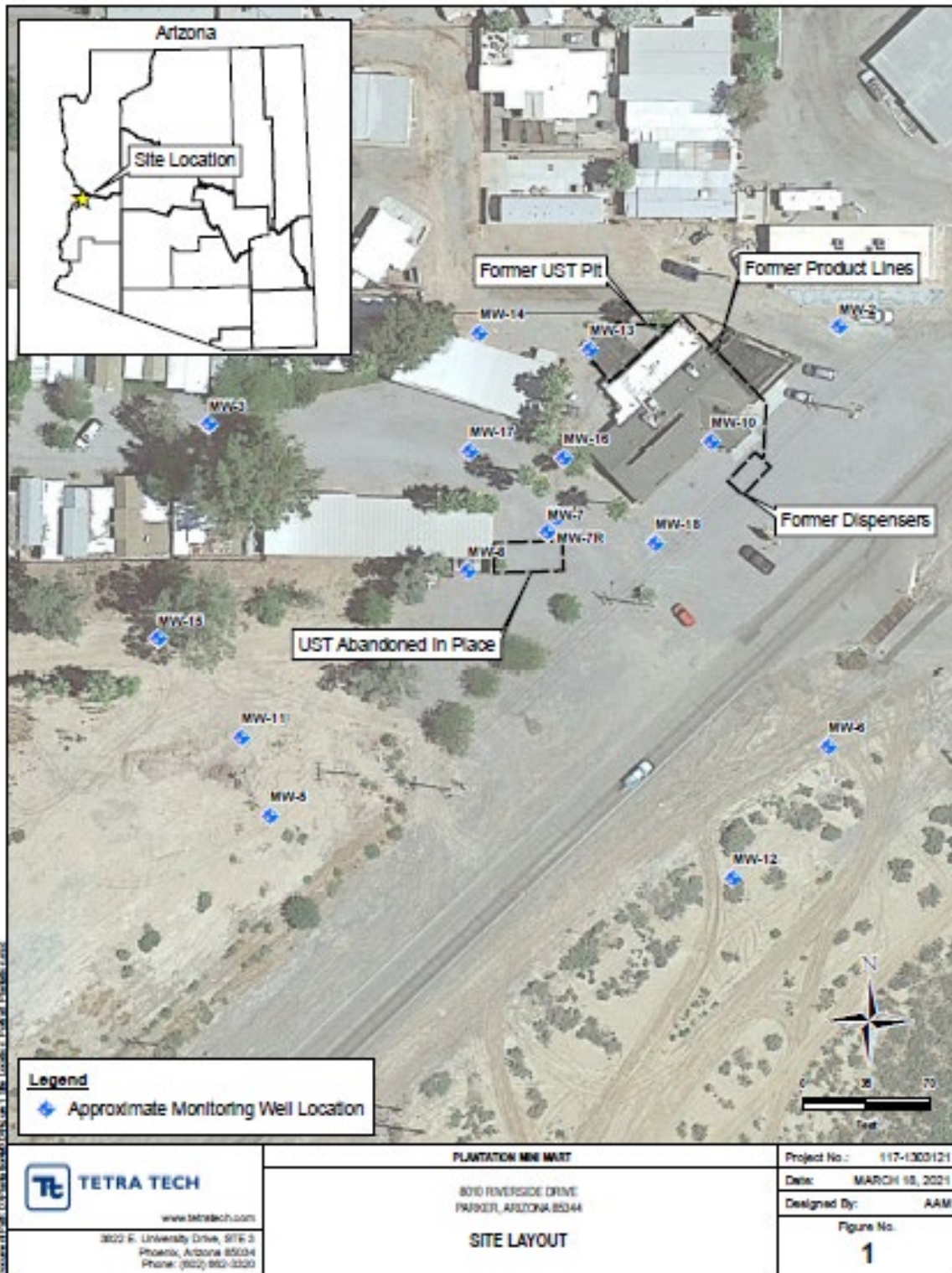
Date	Benzene AWQS 5.0 µg/L	1,2-DCA AWQS 5.0 µg/L	Depth to Water (feet)
February 2008	Not reported	Not reported	8.69
May 2008	Not reported	Not reported	8.70
September 2008 SVE/AS/ozone start			
January 2009 SVE/AS/ozone end			
No Site Access			
February 2018	<1.00	<1.00	8.84
March 2018	<1.00	<1.00	8.77
March 2020	<1.00	<1.00	7.78
July 2020	<0.094	<0.082	8.94
November 2020	<1.00	<1.00	9.12
January 2021	<1.00	<1.00	9.61
April 2021	<0.0941	<0.0819	8.72

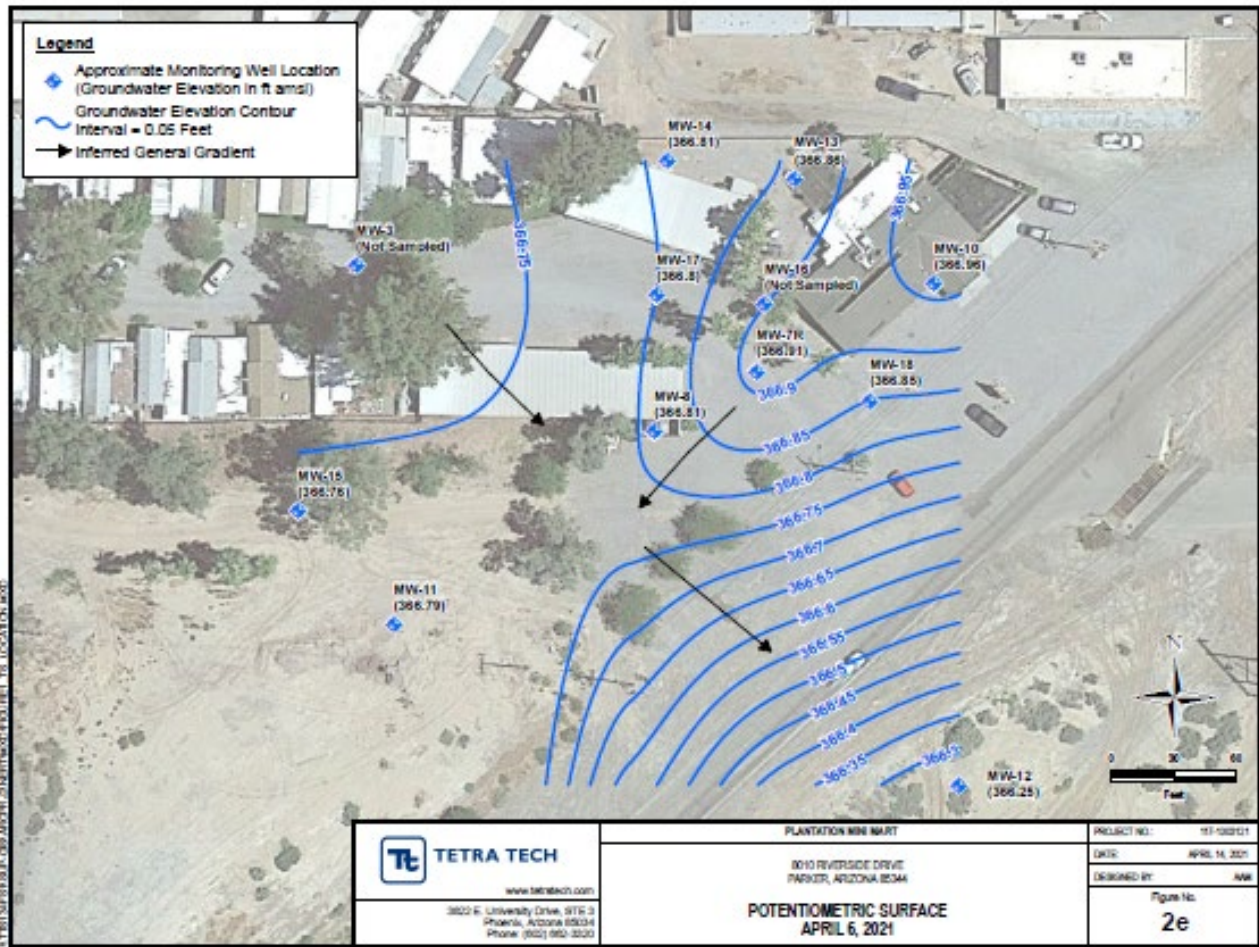
Groundwater data for MW-13 (former USTs)  
Total Depth: 20 feet. Screened 5-20 feet.

Date	Benzene AWQS 5.0 µg/L	1,2-DCA AWQS 5.0 µg/L	Depth to Water (feet)
June 2005	2500	<40	9.19
September 2005	950	<20	9.48
February 2007	250	<20	9.33
February 2008	300	<10	9.25
May 2008	400	<20	9.32
August 2008	190	<10	9.47
September 2008			

SVE/AS/ozone start			
January 2009	<b>6.56</b>	<1.00	9.11
January 2009 SVE/AS/ozone end			
No Site Access			
March 2020	<b>7.57</b>	<1.00	9.29
July 2020	<b>47.2</b>	<0.082	9.51
August 2020	<b>67.6</b>	<1.00	9.48
August 2020	<b>5.4</b>	<1.00	9.75 (PDB)
November 2020	<b>10.5/10.7</b>	<1.00/<1.00	9.84
January 2021	4.48	<1.00	11.76
April 2021	<b>19.3</b>	<0.0819	9.61

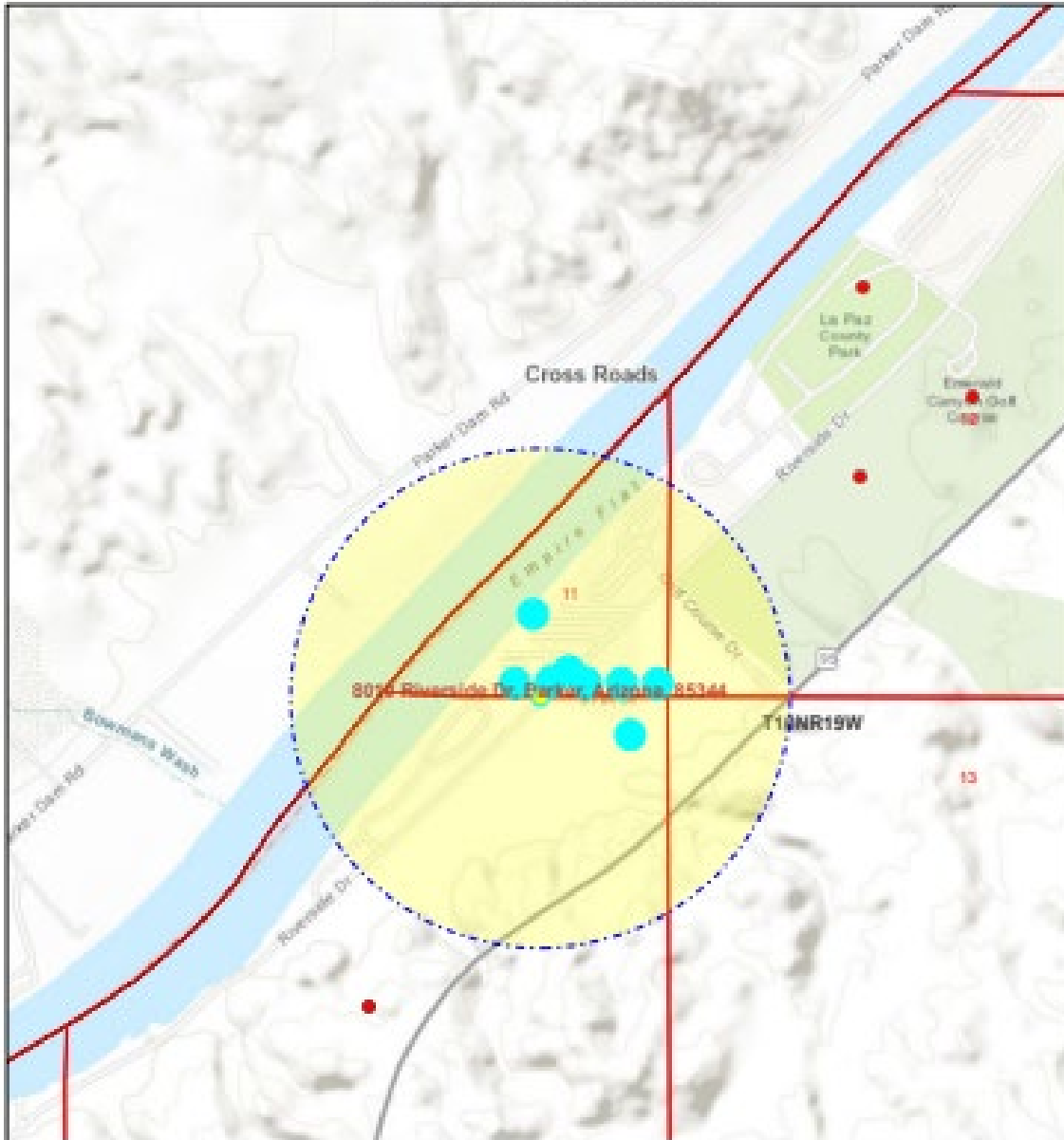
Note: Construction data was only available for MW-7R. Other information is estimated based on field notes.







### Plantation Mini Mart



April 28, 2021

- Well Registry
- Section
- Township
- County



Bureau of Land Management, Inc. HERR, GARRIS, SCREIBERT P, LEGG,  
BETHWA, EPA, USGS

Arizona Department of Water Resources