

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

**LUST Case File # 4524.01-.02
Facility ID # 0-000729
Navajo County**

**Jackrabbit Trading Post
3386 Old Highway 66
Joseph City, Arizona 86032**

Background:

The Jackrabbit Trading Post is located at 3386 Route 66 in Joseph City, an unincorporated community located in Navajo County, Arizona. The facility reported a release on July 1996 after discovery of petroleum hydrocarbons in a hand-augured boring. The following year, two 2,000-gallon USTs were removed and replaced with a single 10,000-gallon UST. The initial site characterization in 1997 identified petroleum hydrocarbon contamination in soil and groundwater under the former tank basin, as well as floating liquid hydrocarbons on groundwater, which is present at between 15 and 20 feet below ground surface (bgs). A *Site Characterization Report* was approved in September 1998. A *Corrective Action Plan (CAP)* was approved in April 2000 with soil vapor extraction (SVE) and air sparge (AS) as the remedial method. CAP revisions were approved in April 2008 (for dual phase extraction [DPE]), November 2009 (return to SVE/AS), and in July 2010 (ground water monitoring only). The State Assurance Fund (SAF) ended in June 2010, so corrective actions conducted by the UST owner/operator ended. The UST owner/operator, Jackrabbit Trading Post, was approached in 2012 to enter into the State Lead program to continue corrective actions.

Groundwater monitoring was conducted in 2016. At that time, the groundwater plume extended off site to the west. On-site methyl tert butyl ether (MTBE) concentrations ranged from 3.81 to 2,880 micrograms per liter ($\mu\text{g/L}$), and the off-site concentration at the furthest down gradient well (MW-6) was 116 $\mu\text{g/L}$. Benzene concentrations were elevated in one on-site well RW-3 (1,050 $\mu\text{g/L}$), but the remaining wells on- and off-site were non-detect for benzene. The contractor reported that concentrations of volatile organic compounds (VOCs) in groundwater had decreased significantly between 2009 and 2016, and found evidence that natural attenuation was occurring in the aquifer. A facility meeting was held in September 2016 to discuss the groundwater data and to determine what the next steps at the site should be.

The UST owner/operator entered into the ADEQ's State Lead program in 2019. ADEQ contracted with SCS Engineers (SCS) in August 2019 to conduct additional activities that included drilling and installing groundwater monitoring wells, sampling and analyzing groundwater samples, and conducting a soil vapor survey.

Removal or control of the source of contamination:

SVE and DPE were implemented at the site, and both systems appear to have been shut down when recoveries dropped. Free product recovery was also employed, and subsequent reporting

suggested only a sheen remained in the aquifer after those efforts. The SVE system reportedly began operation in 2001 and removed 574 pounds of petroleum hydrocarbons during that year. The DPE system operated in 2009, and the estimated amount of hydrocarbons removed by the DPE system during that time was 32,212 pounds, or an equivalent of 5,195 gallons of gasoline.

Characterization of the groundwater plume:

On August 19, 2019, non-compliance groundwater samples were collected to obtain an initial screen of groundwater quality due to the extended time (three years) since the last sampling event. Ten of the site wells were located and were measured to evaluate which wells were dry or contained adequate water. Samples were collected from MW-5, MW-6, RW-4, RW-5, and RW-6 with disposable bailers, and without purging the well prior to sampling. Samples were analyzed for VOCs by United States Environmental Protection Agency (EPA) Method 8260B. Sample results showed well RW-5 exceeded the Aquifer Water Quality Standard (AWQS) only for 1, 2-dichlorethane; no other wells exceeded established AWQS.

Currently, MTBE does not have an established AWQS or a federal maximum contaminant level (MCL). ADEQ issued an investigative level (IL) of 20 µg/L, and a Tier 1 remediation level (RL) of 94 µg/L for sites such as this, when an existing drinking water receptor is not affected or is not potentially affected by MTBE. The IL for MTBE was exceeded in all five sampled wells, and the RL was also exceeded in three of these wells.

Between November 14 and 18, 2019, SCS installed four new groundwater monitoring wells (MW-7 through MW-10). On December 11, 2019, compliance-quality groundwater samples were collected from accessible wells that contained adequate water for sampling. Ten wells were sampled as documented in the groundwater sampling logs. Samples were analyzed for VOCs by EPA Method 8260B and for monitored natural attenuation (MNA) parameters including iron, manganese, nitrate, sulfate, and methane (dissolved oxygen was measured in the field). Sample results showed well MW-5 exceeded the AWQS for benzene; no other wells exceeded established AWQS. The MTBE IL of 20 µg/l was exceeded in four of the wells, and the RL of 94 µg/l was also exceeded in two of these wells, including the down gradient MW-10. The horizontal extent exceeding the IL was defined to the north, east, and south.

On March 31, 2020, compliance-quality groundwater samples were collected from accessible wells that contained adequate water for sampling. Eight wells were sampled as documented in the groundwater sampling logs. None of the sampled wells exceeded AWQS. The MTBE IL of 20 µg/l was exceeded in three of the wells, and the RL of 94 µg/l was also exceeded in two of these wells, of which one is the down gradient MW-10.

On May 12, 2020, SCS installed two additional down gradient monitoring wells to characterize the MTBE plume. Groundwater samples were collected from the two new wells and MW-10 as previously described and documented in field logs. MW-10 exceeded the MTBE IL of 20 µg/l, but the two new down gradient wells were both below the IL; no other compounds were detected above AWQS. The extent of the plume was defined by MW-12.

On June 11, 2020, compliance-quality groundwater samples were collected from accessible wells that contained adequate water for sampling. Eight wells were sampled as documented in the groundwater sampling logs. None of the sampled wells exceeded AWQS. The two down gradient wells MW-11 and MW-12 were again below the MTBE IL of 20 µg/l.

Groundwater is present at a depth of approximately 20 feet bgs and flows to the west. The most recent groundwater monitoring event shows that MTBE remains above the RL of 94 µg/l in two of the on-site monitoring wells, located immediately down gradient (west) of the original source area.

Groundwater plume stability:

A Mann-Kendall constituent trend analysis was run for MTBE in six wells (RW-4, RW-5, RW-6, RW-7, MW-6, and MW-10) that have exceeded the IL of 20 µg/l. MW-5 has also exceeded this level, but because there has not been enough water in the well for sampling, there were not enough recent data points for the trend analysis. To obtain a sufficient number of data points for the other wells, results were also used from groundwater monitoring performed by others, extending back to November 2009.

Three of the wells showed decreasing trends in MTBE concentration, two of the wells were stable, and one well showed an increasing trend. MW-10 is down gradient of the source area, and concentrations in that were stable. RW-7 is a cross-gradient well (located across Route 66) which represents the southern portion of the MTBE plume, and concentrations showed an increasing trend in that well. However, the concentrations of MTBE in RW-7 are below the RL, data indicates that natural attenuation degradation is generally occurring at the site, are there are no threatened drinking water wells located within at least 1-mile south of the site (see below).

Natural Attenuation:

Natural attenuation processes include diffusion, dispersion, sorption, volatilization, and biodegradation. A decreasing trend in VOC concentrations in groundwater has been established, which supports that natural attenuation is occurring. Hydrologic and geochemical data can be used to indirectly demonstrate the type(s) of natural attenuation processes.

Monitored natural attenuation (MNA) sampling was conducted in December 2019 and March 2020. RW-4 is considered the source area well, MW-7 is cross gradient and MW-10 is down gradient. The primary line of evidence for MNA are the decreasing trends in the plume size and concentration. The MNA parameters provide additional support that the geochemical conditions are supportive of MNA. Dissolved oxygen (DO) is present above a 1 mg/L in all three wells. This generally indicates aerobic conditions suitable for degradation, but DO is difficult to measure and not dispositive in itself. Dissolved iron, Fe (II), is not present above 100 µg/L in any of the three wells. This suggests that limited degradation is occurring by reduction of the Fe (III) to Fe (II). Sulfate is reported at similar high concentrations in all three wells. SCS does not consider sulfate reduction a likely mechanism of degradation. These indicators all suggest aerobic degradation is occurring with residual DO available across the site.

Threatened or impacted drinking water wells:

SCS conducted a groundwater well inventory for a 1-mile radius from the site. The groundwater well search identified one domestic groundwater well at the Native American Outreach Ministries site located approximately 2,000 feet west of the Jackrabbit Trading Post, and approximately 1,400 feet west of the furthest down gradient monitoring well (MW-12). Imaged records from the Arizona Department of Water Resources (ADWR) for this well show that it is 255 feet deep, and is constructed of steel casing from the ground surface to 200 feet bgs. The report states that casing is not perforated or cut, indicating that the portion of the well open to groundwater is an uncased interval between 200 and 255 feet bgs in the Coconino Sandstone. The reported groundwater depth was 22 feet bgs, indicating that the producing aquifer is confined. Although the depth to water in the residential well is approximately the same as the site monitoring wells, the water occurs in different geologic units and contamination from the subject site is approximately 180 above the producing zone. Therefore, it is unlikely that potential future contamination associated with the subject site would impact this residential well.

The remaining registered wells were monitoring or remediation wells associated with this LUST site.

According to the Joseph City utilities webpage, in 1961, it was decided to take the 3 existing water companies; Smith Water System, Old Town Water Company and W.C. Shelley Water System and turn it into one company that they would call Joseph City Water System. Joseph City Utilities is a regulated public water system (AZ04-09016).

The City operates two wells #55628495 and #55628496, which are located more than 1 mile from the LUST site. The 2019 Consumer Confidence Report is posted on the City's webpage. According to the report, the water system was sampled for VOCs in February 2018, with no detections above laboratory reporting limits.

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

Other exposure pathways:

Between November 12 and 14, 2019, ten soil borings (SB1 through SB10) were drilled in and 3 to evaluate residual soil contamination levels. SB1 was drilled at the release point to 40 feet bgs, and the remaining borings were drilled to the approximate top of groundwater at 20 feet bgs. Borings were drilled with a hollow stem auger, and samples were collected in a sleeved split spoon sampler at five-foot intervals beginning at five feet bgs. Samples were analyzed for VOCs by EPA Method 8260B. Two soil borings exceeded the residential SRL for benzene. SB4 exceeded the SRL at a depth of 20 feet bgs, and SB5 at a depth of 15 feet bgs; no other exceedances were observed above or below these depths.

Four permanent soil vapor probes were installed on November 18, 2019 and sampled on December 11, 2019 to provide ADEQ with data to perform a Tier 3 risk assessment of the inhalation route of exposure to nearby structures and properties. Two additional soil vapor probes were installed on March 31, 2020 at the request of ADEQ.

Six soil vapor samples were collected from locations throughout the source area and between the source area and the site building to evaluate soil vapor risk. The detected VOC concentrations were compared to EPA's recommended health-based Vapor Intrusion Screening Levels (VISLs) for Resident Air. These VISLs are generic screening criteria based on a 1×10^{-6} excess cancer risk and a non-cancer Hazard Quotient of 1 for an estimated indoor air concentration. In accordance with ADEQ guidance, the compounds greater than 10% of the VISLs were subjected to Tier 3 risk screening. The purpose of using 10% of the VISL is to evaluate the combined (additive) risk of multiple compounds. Petroleum and non-petroleum compounds were evaluated separately, as directed by ADEQ.

SCS performed a soil vapor intrusion risk assessment of the Site using soil gas data collected and the 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 soil gas could present a potential vapor intrusion human health risk to future occupants of the Site under a conservative residential land use scenario. Land use at the site is non-residential. The results show the vapor intrusion risk is 2.99×10^{-6} excess cancer risk (high estimate) for the carcinogens and the non-carcinogen Hazard Index is 1.1×10^{-2} , which is well below the threshold of 1.0.

A J&E screening was also performed for MTBE in groundwater, using the highest detected concentration from last year (1,480 $\mu\text{g/l}$ in MW-5, August 2019). The non-carcinogen Hazard Index was calculated at 2.9×10^{-3} .

The sensitive receptor map search identified a church/outreach ministry facility (Native American Outreach Ministries) located approximately 2,000 feet west of the Jackrabbit Trading Post, and approximately 1,400 feet west of the furthest down gradient monitoring well (MW-12). This monitoring well showed MTBE below the IL in June 2020.

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:

MW-1 (source area) well destroyed
 MW-1R installed and went dry in 2010
 Total Depth: 27 feet. Screened: 5-25 feet.

Date	Benzene AWQS is 5.0 µg/L	MTBE Tier 1 Corrective Action Standard is 94 µg/L	Depth to Water (feet)
October 1997	40,000	Not analyzed	15.89
January 1998	26,000	Not analyzed	17.48
April 1998	13,000	Not analyzed	18.55
July 1998	41,000	Not analyzed	16.63
July 1999	---	---	16.7

RW-4 (source area)
 Total Depth: 32 feet. Screened 10-30 feet.

Date	Benzene AWQS is 5.0 µg/L	MTBE Tier 1 Corrective Action Standard is 94 µg/L	Depth to Water (feet)
May 2007	4,700	7,000	18.83
2009 DPE remediation			
August 2009	180	1,500	19.45
November 2009	82	3,900	19.51
June 2010 SAF ended	<20	2,600	19.59
January 2011	<20	1,100	19.42
No data collected			
August 2019	<1.00	61.4	22.23
December 2019	<1.00	8.84	22.09
March 2020	<1.00	19.6	21.75
June 2020 (TD is 25.04 ft.)	<1.00	37.6	21.57

RW-5 (to the west of the source area)
 Total Depth: 32 feet. Screened 10-30 feet.

Date	Benzene AWQS is 5.0 µg/L	MTBE Tier 1 Corrective Action Standard is 94 µg/L	Depth to Water (feet)
May 2007	2,700	3,900	19.31
2008 DPE remediation			
August 2009	6.2	750	19.88
November 2009	<50	750	20.00
June 2010 SAF ended	<100	11,000	20.07
September 2010	640	<100	20.24

January 2011	<100	6,900	19.91
No data collected			
August 2019	<1.00	1480	22.69
December 2019	<1.00	567	22.52
March 2020	<1.00	355	22.21
June 2020 (TD is 26 ft.)	<1.00	154	22.53

RW-6 (down gradient; on-site)
Total Depth: 32 feet. Screened 10-30 feet.

Date	Benzene AWQS is 5.0 µg/L	MTBE Tier 1 Corrective Action Standard is 94 µg/L	Depth to Water (feet)
May 2007	260	2,200	18.24
2008 DPE			
August 2009	<1.0	1.2	19.93
November 2009	<1.0	100	19.92
June 2010 SAF ended	<5.0	1,400	19.98
January 2011	<20	720	19.83
No data collected			
August 2019	<1.00	669	22.62
December 2019	<1.00	344	22.45
March 2020	<1.00	544	22.11
June 2020 (TD 28 ft.)	<1.00	543	22.43

MW-6 (down gradient of RW-6; off-site)
Total Depth: 35 feet. Screened: 15-35 feet estimated.

Date	Benzene AWQS is 5 µg/L	MTBE Tier 1 Corrective Action Standard is 94 µg/L	Depth to Water (feet)
May 2007	<1.0	190	17.17
August 2009	<1.0	130	17.75
November 2009	<1.0	160	17.83
September 2010	<0.5	150	18.08
January 2011	<5.0	330	17.73
No month identified 2016	<1.0	116	Not found
August 2019	<1.00	31.2	20.44
December 2019	<1.00	25.9	20.30
March 2020	<1.00	14.3	19.98
June 2020 (TD 27 ft.)	<1.00	10.3	20.30

MW-10 (down gradient of MW-6; off-site)
Total Depth: 35 feet. Screened 15-35 feet.

Date	Benzene AWQS is 5 µg/L	MTBE Tier 1 Corrective Action Standard is 94 µg/L	Depth to Water (feet)
December 2019	<1.00	24.8	21.32
March 2020	<1.00	23.4	21.06
May 2020	<1.00	25	21.03
June 2020	<1.00	20.6	21.33

MW-11 (down gradient of MW-10; off-site)
Total Depth: 40 feet. Screened: 25-40 feet.

Date	Benzene AWQS is 5 µg/L	MTBE Tier 1 Corrective Action Standard is 94 µg/L	Depth to Water (feet)
May 2020	<1.00	4.15	19.73
June 2020	<1.00	<1.00	19.92

MW-12 (down gradient of MW-11; off-site)
Total Depth: 33 feet. Screened: 15-30 feet.

Date	Benzene AWQS is 5 µg/L	MTBE Tier 1 Corrective Action Standard is 94 µg/L	Depth to Water (feet)
May 2020	<1.00	17	20.10
June 2020	<1.00	16	20.27

MW-7 (up gradient of source)
Total depth 40 feet. Screened 20-40 feet.

Date	Benzene AWQS is 5 µg/L	MTBE Tier 1 Corrective Action Standard is 94 µg/L	Depth to Water (feet)
December 2019	<1.00	<1.00	18.23
March 2020	<1.00	<1.00	17.59
June 2020	<1.00	<1.00	17.93

RW-7 (cross-gradient across Route 66)
Total depth 32 feet. Screened: 15-32 feet estimated)

Date	Benzene AWQS is 5.0 µg/L	MTBE Tier 1 Corrective Action Standard is 94 µg/L	Depth to Water (feet)
May 2007	220	<10	17.32
August 2009	<1.0	1.8	17.92

November 2009	<1.0	1.3	18.00
January 2011	---	---	17.87
No data collected			
December 2019	<1.00	11.7	20.57
March 2020	<1.00	15.3	20.28
June 2020 (TD 28 ft.)	<1.00	34.3	20.57

MW-9 (cross-gradient; on-site)
Total Depth: 35 feet. Screened: 5-35 feet.

Date	Benzene AWQS is 5.0 µg/L	MTBE Tier 1 Corrective Action Standard is 94 µg/L	Depth to Water (feet)
December 2019	<1.00	3.81	21.78
March 2020	<1.00	2.3	21.46
June 2020	<1.00	0.919	21.78

SCS ENGINEERS

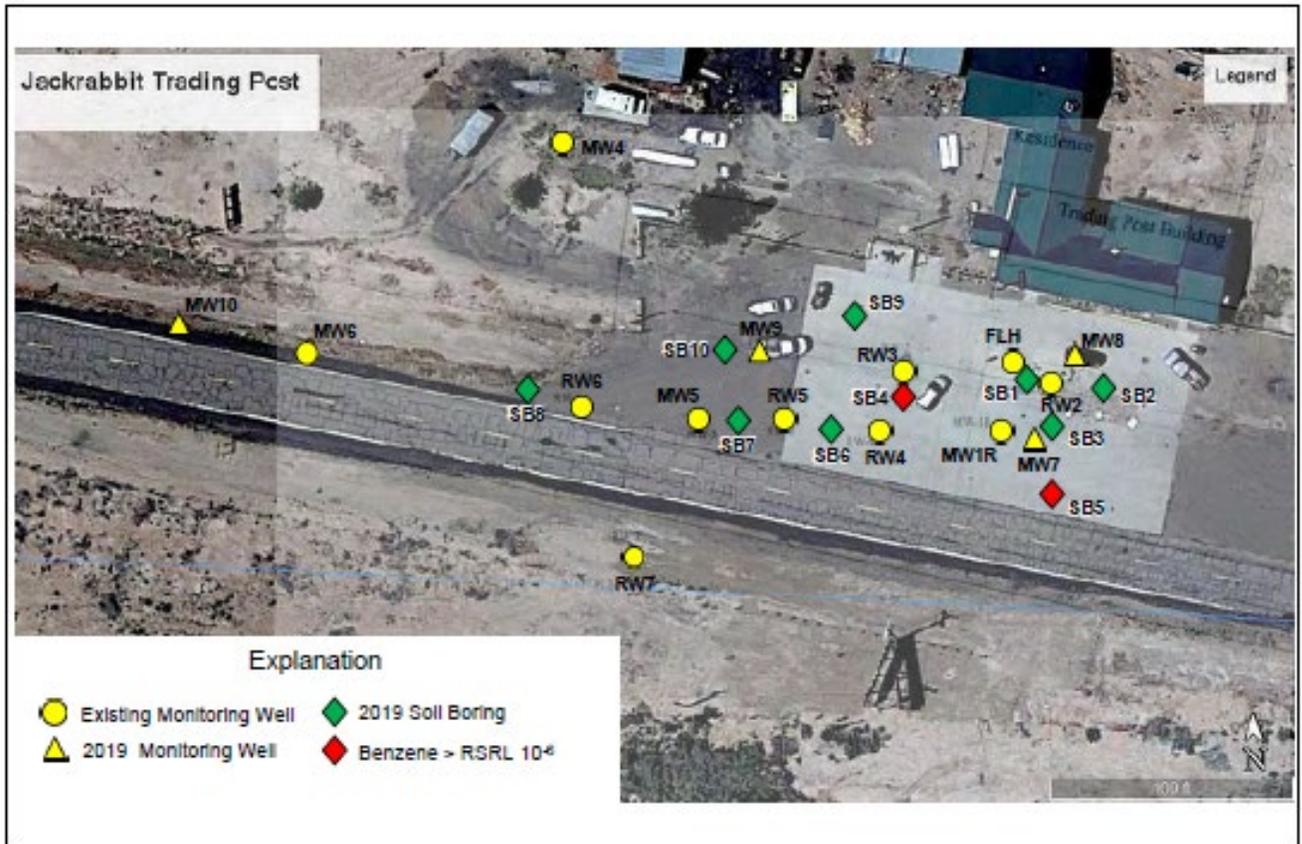


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Jackrabbit Trading Post
3386 Historic Route 66
Joseph City, Arizona

Figure 1
Site Location

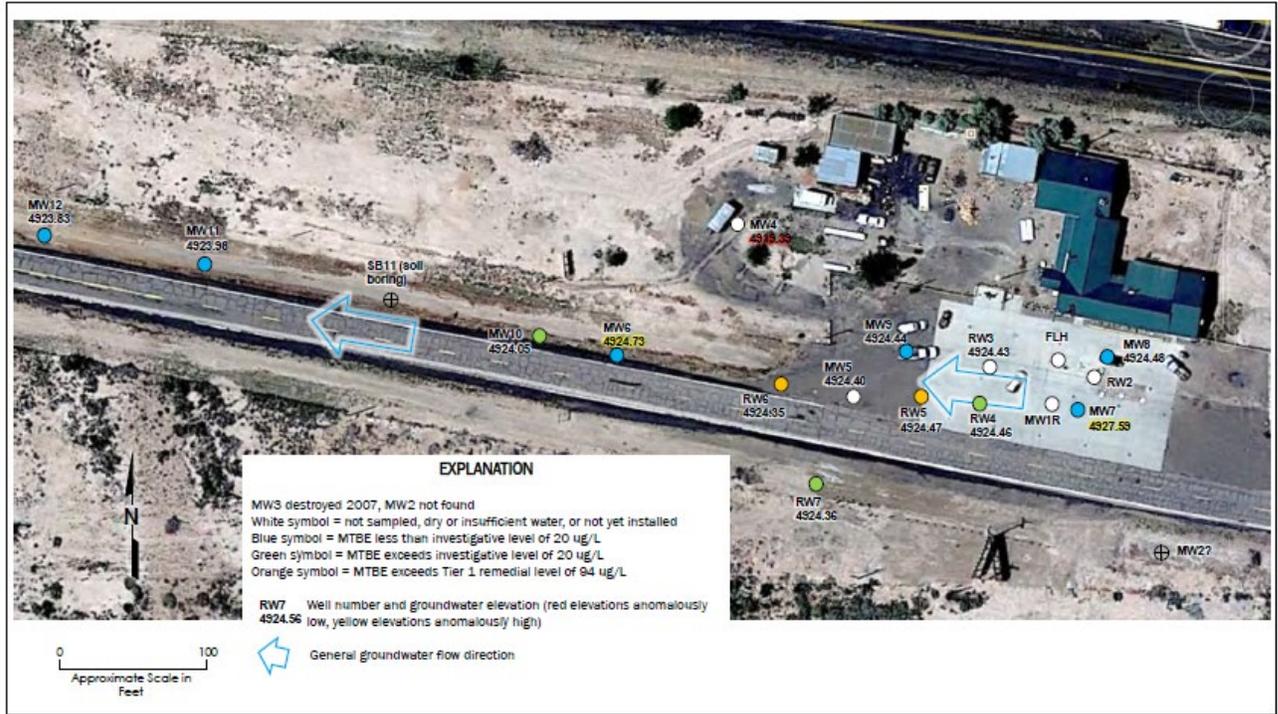
SCS ENGINEERS



ADEQ
Jackrabbit Trading Post
Joseph City, AZ

Figure 3
Soil Boring Results
November 2019

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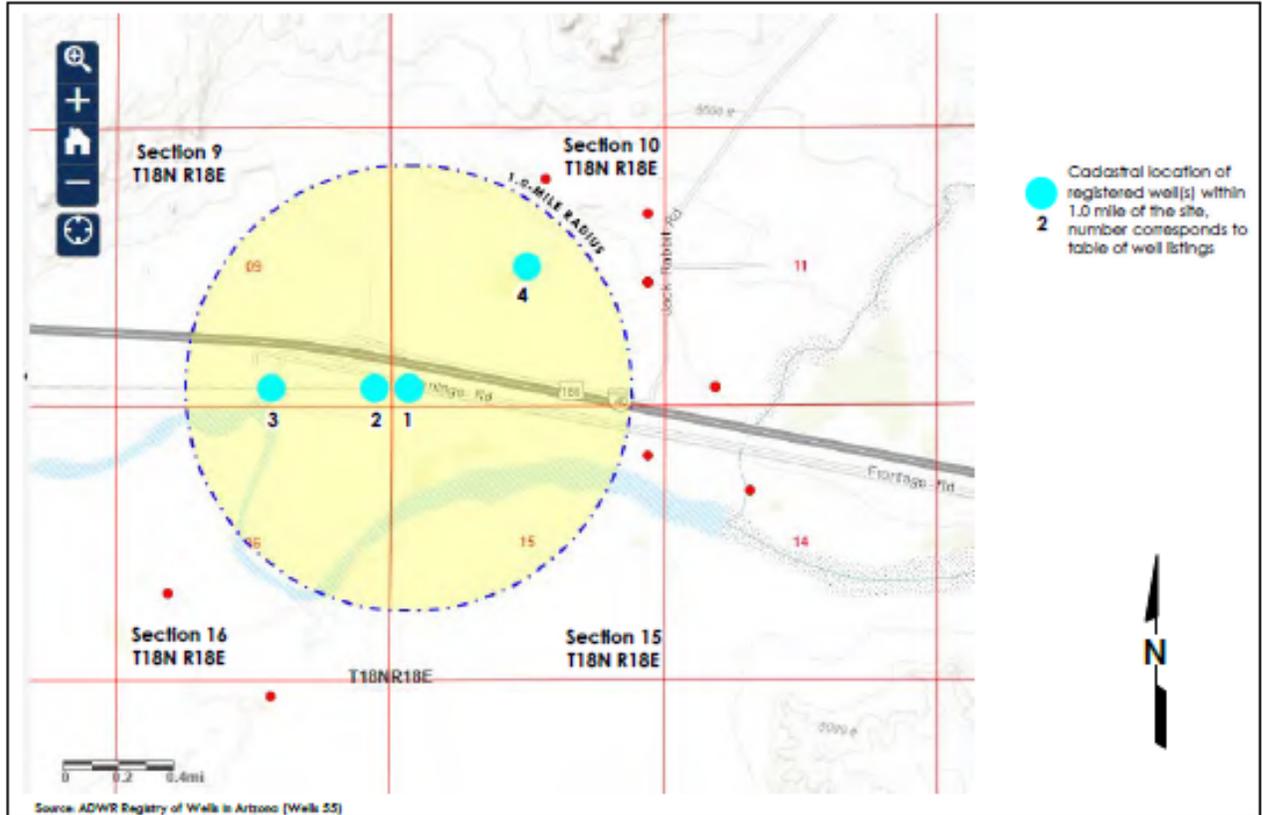


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ADEQ
Jackrabbit Trading Post
Joseph City, AZ

Figure 8
Groundwater Monitoring Results
June 9, 2020

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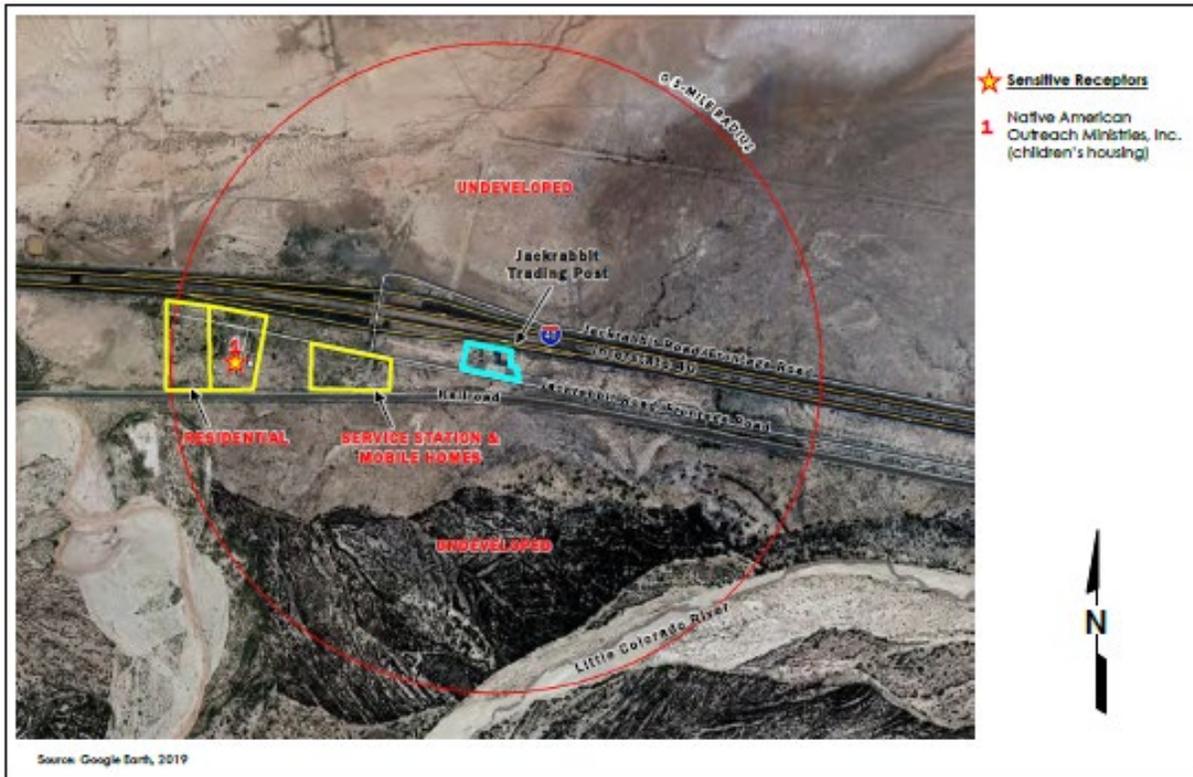


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Jackrabbit Trading Post
3386 Historic Route 66
Joseph City, Arizona

Registered Well Listings
Within 1.0 Mile of Site

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01219201.00

Jackrabbit Trading Post
 3386 Historic Route 66
 Joseph City, Arizona

Receptors Within
 0.5 Mile of Site