ADEQ Arizona Department of Environmental Quality

TECHNICAL SUPPORT DOCUMENT

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

LUST Case File #5437.01
Facility ID #0-006804
Yuma County

Shay Oil Company #6
39880 East Highway 80
Tacna, AZ 85352

***Background*:**

This site is located at 39880 East Hwy 80, Tacna, approximately thirty minutes east of Yuma and lies along Old US Highway 80, approximately 0.25 miles north of Interstate 8. This site has been operating as a gasoline dispensing station since as early as 1976, and is currently a Food Mart with an adjoining Chevron gasoline dispensing station. The site is currently owned by Shay Oil Company.

Two 10,000-gallon underground storage tanks (USTs) containing unleaded gasoline were installed in 1976, and were removed in March 1990, along with a 4,000-gallon regular gasoline UST. A 6,000-gallon unleaded gasoline UST installed in 1984 was removed in March 2004. These tanks were located in the center of the site. In March 2004, the former convenience store, fuel dispenser islands and USTs were demolished and removed from the property. The site was re-developed as a gasoline station and convenience store. The site currently houses three USTs: one 20,000-gallon gasoline tank, one 12,000-gallon gasoline tank and one 12,000-gallon diesel tank, which were installed in June 2004. These replacement tanks are not located in the same location as the former UST basin.

A confirmed release was reported from this facility on December 12, 2004, at the 12,000-gallon gasoline UST (UST#3). A total of ten soil borings were drilled with samples collected and analyzed for benzene, toluene, ethylbenzene and xylenes (BTEX). Petroleum contamination was identified in one of the soil samples, which is when ADEQ assigned Leaking UST # 5437.01 to the facility. However, no map showing sample locations were provided to Shay Oil Company and the sample locations were estimated by the general manager of Shay Oil. Subsequent site investigation work completed from 2006 to 2011 defined the extent of soil and groundwater contamination. The *Site Characterization Report* was approved by ADEQ on April 21, 2011.

A *Corrective Action Plan* (CAP) prepared in 2013, identified the appropriate remedial approach for the site, which consisted of monitoring for the presence of free product and implementing air sparge (AS) and soil vapor extraction (SVE) technology for soil and groundwater remediation.

Removal or Control of the Source of Contamination

The UST system was removed in 2004. On May 8, 2014, free product was detected in well MW-2. Upon detection, a passive free product recovery bailer was re-installed in the well. The free product thickness kept increasing while system repairs were made. In September 2017, 24 inches of product was detected, indicating a recharge of product into the well.

Free product was monitored frequently and ranged from 8 to 24 inches thick throughout 2018 and the first half of 2019. Free product thickness decreased to a range of 0.20 to 2.75 inches during the second half of 2019 through July 2020. A free product thickness of 3 inches was measured on January 14, 2021 and January 21, 2021. Free product was not measured again in MW-2, until April 19, 2021, where a thickness of approximately 8.4 inches (0.70 ft) was recorded.

Three AS wells and four SVE wells were installed in November 2013. The AS/ SVE system was started on January 27, 2014, but shut down soon after, due to the high volatile organic compounds (VOC) concentrations. A catalytic oxidizer (Catox) unit was installed to treat the higher VOC concentrations, and the SVE/Catox system was restarted on April 1, 2015.

The AS system was shut down in July 2017, due to a faulty pump, and was restarted in January 2018. The AS system was shut down in June 2018, due to failure of the reconditioned pump. A new pump was installed, and the AS system came back online in August 2018. The system remained in operation until March 2021.

The September 2018 SVE analytical results indicated an issue with the Catox unit. The system was shut down for the manufacturer to trouble-shoot the problem. After the required changes were made, the system was restarted on November 29, 2018.

In May 2020, three boreholes were drilled onsite to perform PersulfOx® remedial injections in each borehole. Boreholes B-1, B-2 and B-3 were drilled to 35, 30 and 25 ft, respectively, in close proximity to monitoring wells MW-1, MW-2 and MW-3, respectively. A total of 4,573.3 pounds of PersulfOx® were injected amongst the three borings.

The SVE system results from the fourth quarter of 2020, indicated that 36 pounds of VOCs were removed in the three-month period, leaving minimal contamination in the ground.

A meeting was conducted on January 19, 2021 with ADEQ and the consultant, and, based on the system data from 2020, it was decided to pursue closure assessment activities which included shutting down the SVE/ AS on March 31, 2021. During the first quarter of 2021, the inlet and outlet detections were below the reporting limits of the laboratory, and therefore, the mass removed during the last quarter of system operation was not quantifiable.

Characterization of the Groundwater Plume

This site topography is characterized by relatively flat terrain with a gentle slope to the north. The site is underlain by alluvial deposits comprised of sand, silt, gravel and clay. Two significant, laterally extensive deposits are found beneath the site. A silty-clay rich layer which is present from approximately 25 feet below ground surface (ft-bgs) to 50 ft- bgs, and a sand and gravel unit, from approximately 50 ft to at least 95 ft bgs. The uppermost water bearing zone is encountered within the sand and gravel unit.

An *Initial Site Characterization Work Plan* for the facility was approved by ADEQ in December 2005. A total of ten soil borings and 12 monitoring wells were completed at the site between 2006 and 2021. In March 2006, borings B-1 through B-4 were advanced at the site, while B-1 was converted into monitoring well MW-1. Monitoring well MW-1 was installed at a depth of 75 ft below grade.

In June 2008, four additional borings were advanced at the site, with three boreholes being converted to three monitoring wells MW-2, MW-3 and MW-4. On November 17, 2008, an attempt was made to collect groundwater samples from the monitoring well network. Free product was encountered in wells MW-1 (2.0 ft) and MW-2 (1 foot); therefore, no samples were collected from these wells. Samples collected from wells MW-3 and MW-4 had concentrations of VOCs exceeding the Arizona Aquifer Water Quality Standards (AWQS).

In May 2009, step-out borings and monitoring wells MW-5, MW-6 and MW-7 were installed, and sampled on June 2, 2009, in an effort to further characterize the extent of contamination discovered in well MW-2. The newly installed wells had hydrocarbon contamination at concentrations exceeding AWQS.

In March 2011, wells MW-8, MW-9 and MW-10 were installed to the northeast, northwest and south of the Shay Oil site respectively. Groundwater was collected from the newly installed wells and no petroleum hydrocarbon contamination was detected in the samples, thus defining the outer limits of groundwater contamination at the site.

Following the AS/SVE system shut down in March 2021, discussed in the previous sections, two additional monitoring wells (MW-11 and MW-12) were installed in April 2021, to assess the northern and eastern bounds of the contaminant plume.

The groundwater at the site has been monitored since June 2006. The well network is made up of 12 wells. Based on data collected in August 2021, the depth to water ranges between 78.36 and 80.97 ft across the network, while the flow direction is and has historically been towards the northwest.

The current maximum concentrations of contaminants of concern (CoCs) are all below their AWQS, except for methyl tertiary butyl ether (MTBE) and 1,2-Dichloroethane (1,2-DCA) [(460 micrograms/ liter (ug/L) and 17 ug/L), respectively].

The groundwater elevation has decreased with time in each onsite monitoring well. From May 2014 to August 2021, the water level lowered an average of approximately 3 ft in each well. This further exposed the well screen (65-95 ft) in each well.

Groundwater Plume Stability

Constituent trend analysis was performed using the Mann-Kendall model for BTEX, Naphthalene, 1,2-DCA and MTBE. Historical groundwater data from wells MW-1 through MW-7 were used from November 2008 through August 2021. 1,2-DCA showed a mixed trend with wells MW-1 and MW-4, showing a decreasing trend, wells MW-2, MW-5 and MW-7 showing a "stable" trend, while MW-3 and MW-6 showed "no trend". MTBE showed a decreasing trend in MW-1 through MW-4, "no trend in MW-5 and MW-7, and an increasing trend in well MW-6. MW-9 lies downgradient of MW-6 and has never had any detections since its installation in 2011.

Results from the groundwater sampling portion of this investigation indicate that concentrations of petroleum hydrocarbons (including BTEX and Naphthalene) are decreasing over time except for MTBE in wells MW-5 and MW-12. MTBE in MW-6 showed a decrease in concentration between April and August sampling events, however, the Mann-Kendall model still showed an increasing trend for this well. Concentrations of 1,2- DCA are currently above the Arizona AWQS for wells MW-1, MW-2 and MW-5, however the Mann-Kendall model showed a decreasing trend or stable trend for 1,2-DCA in these three wells.

Natural Attenuation

Between September 2015 and August 2021, immediately prior to collecting groundwater samples, water - quality indicator parameters were monitored and recorded to assess the stabilization and quality of the formation water. The pH, temperature, specific conductance, oxidation-reduction potential (ORP), dissolved oxygen (DO), total dissolved solids (TDS), and turbidity levels were monitored.

Natural attenuation parameters were also assessed during the final two groundwater monitoring events. These parameters included Nitrate, Sulfate, Dissolved Iron, Total Manganese and Total Organic Carbon (TOC). The onsite wells were separated into three categories: upgradient wells (MW-7, MW-8, MW-10 and MW-11), impacted wells (MW-1 through MW-6 and MW-12), and downgradient well MW-9.

Impacted wells at the site contained low levels of Nitrate, indicating that it likely is being used as an electron acceptor and that biodegradation is occurring. Sulfate concentrations were also still high in these wells suggesting that background concentrations in groundwater may be high. The downgradient well (MW-9) showed high levels of nitrates and sulfates similar to the upgradient wells which supports the conclusion that biodegradation of remaining hydrocarbons in the source zone (e.g., at impacted wells) is occurring.

Threatened or Impacted Drinking Water Wells

A search on the Arizona Department of Water Resources Well Registry database revealed 20 wells located within a 0.5-mile radius of the site. Twelve of these wells are groundwater monitoring wells. There are five wells listed as 'other' belonging to Shay Oil Company and Southwest Gas Corporation.

Three wells are registered to three private parties as 'exempt' wells and are listed as used for domestic purposes and water production. Well #55-213378 is southwest of the site, well #55-648652 is west of the site, and well #55-541008 is northwest of the site. The ADWR well construction records indicate that these exempt wells draw water from unconsolidated sand and gravel deposits at depths ranging from 140 ft to 200 ft.

The direction of groundwater flow has historically been towards the northwest. The parcel where downgradient exempt well #55-541008 is located is served potable water by Tacna Water Management Company, which was verified by ADEQ on June 1, 2022.

A 'non-exempt' well (#55-802793) owned by the Tacna Water Company (AZ0414018) lies approximately 2,000 ft (0.38 - mile) northwest/ downgradient of the site. This well is 360 ft deep and is screened from 240 ft to 360 ft. The water system was last sampled in February 2022, and is sampled annually. VOCs have not been detected above the laboratory detection limit. Some upgrading of the system has been completed since 1980, including installation of a water intake on the Wellton-Mohawk canal, and installation of water treatment in 2007. The system includes 175 service connections and typically provides water to 135 to 160 customers.

Other Exposure Pathways

Kiwanis Park is located approximately 1,300 ft north (cross gradient) of the site. Two abandoned motels are located approximately 130 to 200 ft downgradient and cross-gradient of the site. The closest surface water body is the Gila River, located approximately 1.5 miles north (cross-gradient) of the site. The Gila River supplies water to canals that transport water to the area for irrigation, and is managed by the Wellton-Mohawk Irrigation and Drainage District. There are no sensitive receptors within 0.25 - mile of the site.

Soil contamination was identified within a small area surrounding the former USTs, at depths between 20 and 60 ft below grade within a very low permeability silty - clay layer. Deeper soil contamination was detected at well location B-5 (MW-2), which is attributable to the former presence of underlying free product; and considered a capillary fringe, or smear zone issue. Soil samples recovered from MW-2 in 2008 and from the SVE and AS wells installed in 2013, showed exceedances of Soil Remediation Levels (SRLs) for BTEX at 40 ft for samples collected from MW-2, and at 30 ft for samples collected from the SVE wells.

To evaluate the potential vapor intrusion risk from the subsurface soil VOC contamination, five soil vapor wells were installed on April 6, 2021 at the site, to a depth of 5 ft. The wells were given

approximately two weeks to equilibrate, and were sampled on April 21, 2021. The soil vapor samples were sent to Airtech Laboratory for analysis of VOCs using EPA Method TO-15. Both field and laboratory QA/QC are acceptable.

NEI compared the results of the soil gas samples to screening levels calculated using the EPA's Vapor Intrusion Screening Level (VISL) calculator. Of the volatiles detected, only chloroform had a reported concentration that exceeded its respective screening level.

Inhalation of vapors from the subsurface is a potentially complete exposure pathway. To address this potential exposure pathway, ADEQ compared the vapor data generated on April 21, 2021, to the EPA Regional Screening Levels for resident air. ADEQ ran the model for the CoCs which had vapor concentrations exceeding $1/10^{th}$ of their respective RSLs. The petroleum compounds benzene and ethylbenzene showed a cumulative cancer risk of $8.53x\ 10^{-8}$, and a hazard quotient lower than 1. The non-petroleum compound chloroform showed a cancer risk of $4.35Ex10^{-7}$, and a hazard quotient lower than 1. These values are lower than the acceptable levels, therefore the inhalation exposure pathway is not complete.

***Requirements of A.R.S. §49-1005(D) and (E)**:*

The results of the groundwater data from the site assure protection of public health, welfare and the environment, to the extent practicable, and allow for the maximum beneficial use of the site, while being reasonable, necessary and cost effective.

Other information that is pertinent to the Leaking UST case closure approval:

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

Groundwater data tables:

1,2-DCA – 1,2-Dichloroethane
MTBE – Methyl Tert Butyl Ether
NA – Not available
AWQS – Arizona Aquifer Water Quality Standards
Ft = feet
µg/l = micrograms per liter
U = analyte not detected at or above the laboratory method reporting limit
MW-8 and MW-9 have never had any detections above Arizona AWQS

Well No.	Date	Depth to Ground Water (ft)	1,2-DCA (µg/L)	MTBE (µg/L)
AWQS/ Tier 1 Corrective Action Standard (µg/L)			**5.0**	**94**
MW-1 Screen (65 to 95)' Source	10/26/2006	NA	-	**1400**
	11/17/2008	NA	**FREE PRODUCT IN WELL**	
	11/9/2011	NA		
	11/5/2012	NA	**76**	**5,200**
	12/18/2013	NA	**130**	**1,100**
	11/19/2014	79.99	**41**	**820**
	12/2/2015	78.39	**100**	**450**
	11/29/2016	79.00	**62**	**410**
	11/16/2017	79.19	**130**	**250**
	12/13/2018	79.74	**39**	**170**
	11/7/2019	79.82	**59**	**160**
	11/10/2020	80.21	**42**	**120**
	8/19/2021	80.97	**13**	47

Well No.	Date	Depth to Ground Water (ft)	Benzene (µg/L)	1,2-DCA (µg/L)	MTBE (µg/L)
AWQS/ Tier 1 Corrective Action Standard (µg/L)			**5.0**	**5.0**	**94**
MW-2 Screen (65 to 95)' Source	11/17/2008	NA	**FREE PRODUCT IN WELL**		
	11/9/2011	NA			
	11/5/2012	NA	**1,400**	ND	**5,200**
	2/21/2013	NA	**FREE PRODUCT IN WELL**		
	10/7/2013	NA	**2,200**	**22**	**2,800**
	2014-2015	NA	**FREE PRODUCT IN WELL**		
	3/2/2016	78.45	**1,200**	**100**	**290**
	6/1/2016 - 3/6/2019	NA	**FREE PRODUCT IN WELL**		
	6/27/2019	79.75	**800**	**7.5**	77
	7/16/2020	NA	**9.6**	1.7	4.0
	8/19/2021	80.66	3.4	**6**	25

Well No.	Date	Depth to Ground Water (ft)	1,2-DCA (µg/L)	MTBE (µg/L)
AWQS/ Tier 1 Corrective Action Standard (µg/L)			**5.0**	**94**
MW-3 Screen (65 to 95)' Upgradient	11/17/2008	NA	ND	**1,100**
	6/2/2009	NA	**FREE PRODUCT IN WELL**	
	11/9/2011	NA	**99**	ND
	11/5/2012	NA	**50**	**1,600**
	2/21/2013	NA	**37**	**1,500**
	2/27/2014	NA	**44**	**2,000**
	3/3/2015	77.90	**56**	**640**
	3/2/2016	78.32	**65**	**530**
	2/13/2017	78.33	**68**	**470**
	2/13/2018	79.19	**89**	**560**
	3/6/2019	79.49	**80**	**440**
	2/5/2020	79.60	**30**	84
	8/19/2021	80.77	2	14

Well No.	Date	Depth to Ground Water (ft)	1,2-DCA (µg/L)	MTBE (µg/L)
AWQS/ Tier 1 Corrective Action Standard (µg/L)			**5.0**	**94**
MW-4 Screen (65 to 95)' Downgradient of Source	11/17/2008	NA	ND	**470**
	6/2/2009	NA	**FREE PRODUCT IN WELL**	
	11/9/2011	NA		
	11/5/2012	NA	**53**	**290**
	8/14/2013	NA	**39**	**230**
	8/13/2014	77.63	**36**	**190**
	9/15/2015	77.93	**17**	75
	8/31/2016	78.45	**56**	**470**
	8/3/2017	78.79	**110**	**580**
	9/5/2018	79.62	**33**	**350**
	8/20/2019	79.63	**5.5**	**120**
	7/16/2020	80.14	**13**	**170**
	8/19/2021	80.72	3.3	51

Well No.	Date	Depth to Ground Water (ft)	1,2-DCA (µg/L)	MTBE (µg/L)
AWQS/ Tier 1 Corrective Action Standard (µg/L)			**5.0**	**94**
MW-5 Screen (65 to 95)' Crossgradient	11/17/2008	NA	**FREE PRODUCT IN WELL**	
	6/2/2009	NA	3.2	**160**
	11/9/2011	NA	ND	**100**
	11/5/2012	NA	ND	**450**
	10/7/2013	NA	**20**	**430**
	8/13/2014	76.99	**41**	**1,300**
	9/15/2015	77.35	**72**	**1,900**
	8/31/2016	77.80	**84**	**2,200**
	8/3/2017	76.10	**44**	**1,600**
	12/13/2018	78.77	**18**	26
	11/7/2019	79.03	**14**	**110**
	11/10/2020	79.47	**27**	**210**
	8/19/2021	79.93	**17**	**460**

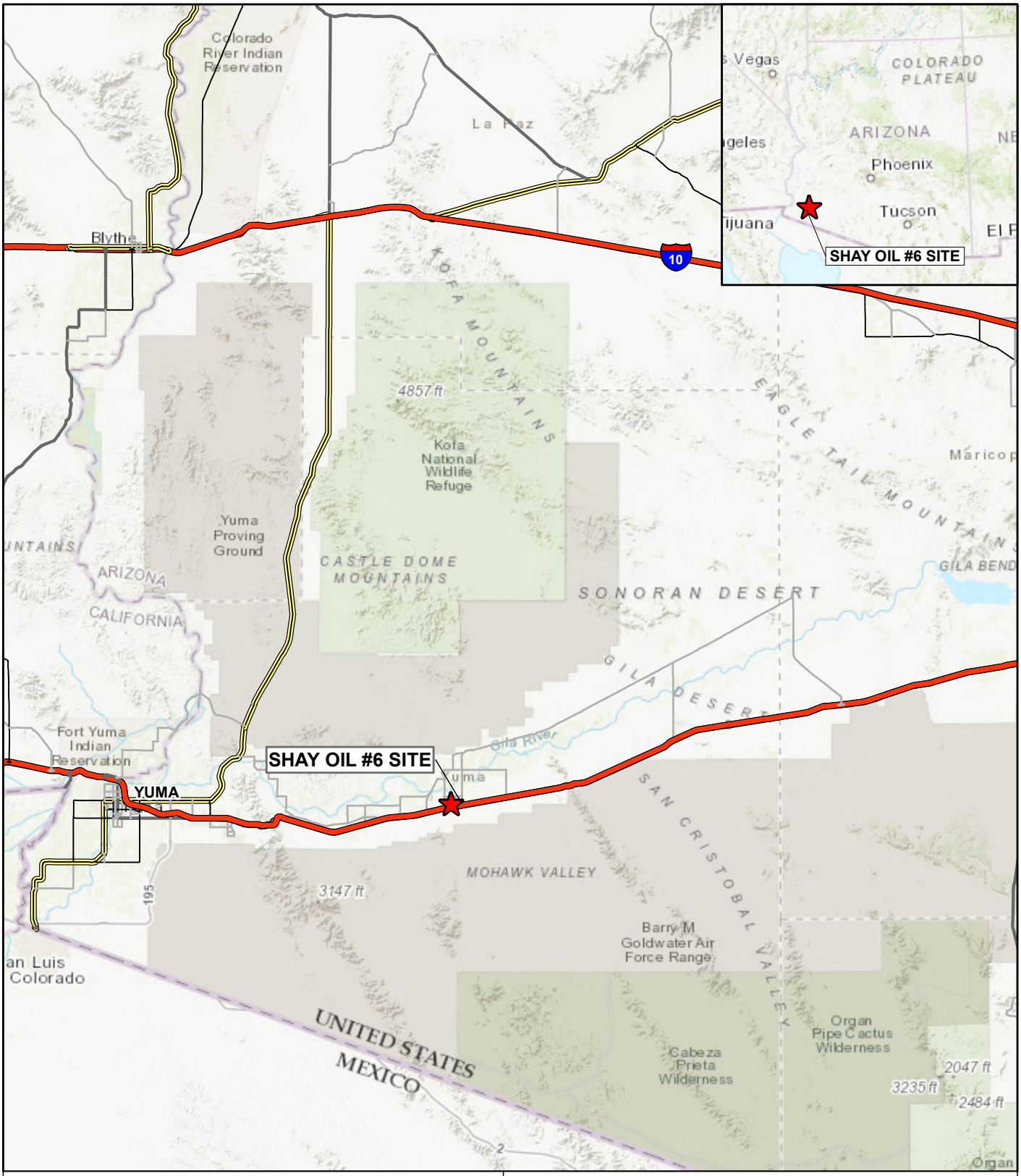
Well No.	Date	Depth to Ground Water (ft)	1,2-DCA (µg/L)	MTBE (µg/L)
AWQS/ Tier 1 Corrective Action Standard (µg/L)			**5.0**	**94**
MW-6 Screen (65 to 95)' Downgradient of MW-4	11/17/2008	NA	**FREE PRODUCT IN WELL**	
	6/2/2009	NA	**36**	**120**
	11/9/2011	NA	ND	11
	11/5/2012	NA	3.4	9.8
	8/14/2013	NA	ND	23
	8/13/2014	75.64	**15**	**100**
	9/15/2015	75.96	**32**	**180**
	8/31/2016	76.51	**10**	78
	8/3/2017	76.90	**8.3**	**130**
	9/5/2018	77.42	**46**	**570**
	8/20/2019	77.69	**17**	**280**
	7/16/2020	78.17	**44**	**450**
	8/19/2021	79.93	1.4	**47**

Well No.	Date	Depth to Ground Water (ft)	1,2-DCA (µg/L)	MTBE (µg/L)
AWQS/ Tier 1 Corrective Action Standard (µg/L)			**5.0**	**94**
MW-11 Screen (65 - 95)' Crossgradient	4/19/2021	NA	0.5 U	0.5 U
	8/18/2021	80.41	0.5 U	5.20
MW-12 Screen (65 - 95)' Crossgradient	4/19/2021	NA	3	41
	8/18/2021	79.00	**6.3**	**99**

Well No.	Date	Depth to Ground Water (ft)	1,2-DCA (µg/L)	MTBE (µg/L)
AWQS/ Tier 1 Corrective Action Standard (µg/L)			**5.0**	**94**
MW-7 Screen (65 to 95)' Upgradient	11/17/2008	NA	**FREE PRODUCT IN WELL**	
	6/2/2009	NA	**9.7**	**310**
	11/9/2011	NA	ND	7.7
	values below AWQS from 11/9/2011 through 6/22/2015			
	6/22/2015	78.08	ND	35
	9/15/2015	78.14	ND	**110**
	12/2/2015	78.30	ND	90
	9/19/2016	78.57	**6.1**	**100**
	11/29/2016	78.82	2.0 U	48
	2/13/2017	78.38	2.0 U	24
	1/0/1900	78.92	1.7	51
	8/3/2017	78.98	**11**	**150**
	11/16/2017	79.10	**8.1**	**140**
	2/13/2018	79.25	**5.3**	**110**
	5/9/2018	79.26	4.0	**100**
	9/5/2018	79.50	0.77	36
	12/13/2018	79.59	0.5 U	0.87
	11/7/2019	79.90	0.5 U	17.00
	11/10/2020	80.29	0.5 U	9.60
	8/19/2021	80.68	0.5 U	5.20

MW-8 is located cross gradient of MW-5.
MW-8 has never had any detections above laboratory reporting limits since it was first sampled in November 2011.

MW-9 is the furthest downgradient well.
MW-9 has never had any detections above laboratory reporting limits since it was first sampled in November 2011.



Legend

★ Site Location

0 7.5 15 30 Miles

N

Service Layer Credits: ESRI Online Streaming Service 2021

SITE LOCATION MAP
SHAY OIL #6 SITE
TACNA, ARIZONA

NEI Project No:	021-0036
Date	April 2022
Drawn By:	CB
Reviewed By:	BC

Nicklaus Engineering, Inc.

Figure 1

Legend

- Freeway or Other Major Road
- Important Local Road
- Water Production Well
- Site Location

0 375 750 1,500 Feet

Service Layer Credits: ESRI Online Streaming Service 2021
Imagery Date: August 2019

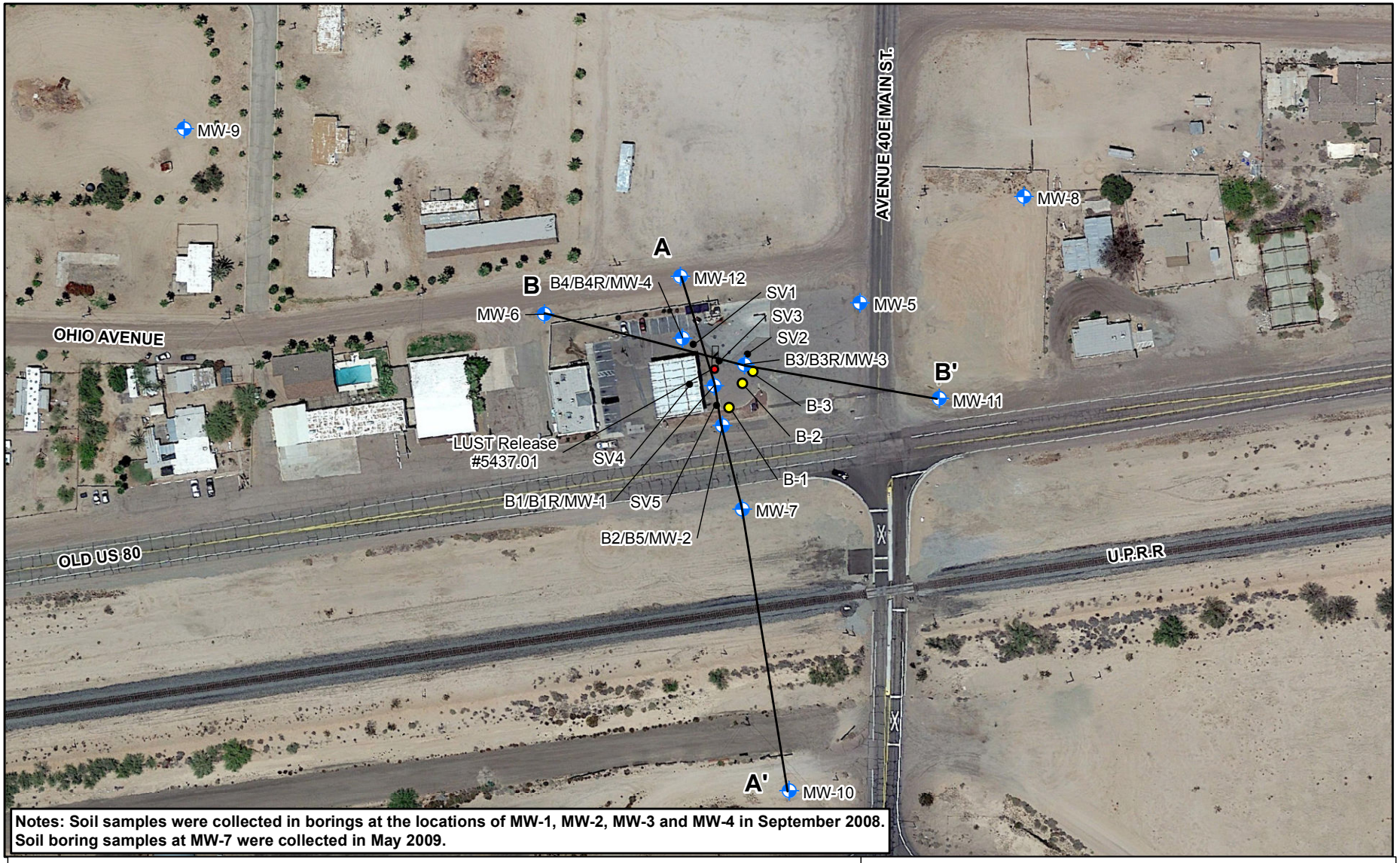
N

SITE VICINITY MAP
SHAY OIL #6 SITE
TACNA, ARIZONA

NEI Project No:	021-0036
Date	April 2022
Drawn By:	CB
Reviewed By:	BC

Nicklaus Engineering, Inc.

Figure 2



Legend

- LUST Release Point
- Monitoring Well
- Soil Vapor Sample
- Persulfox Injection Boring
- Former UST

0 50 100 200 Feet

Service Layer Credits: Google Earth, 2016

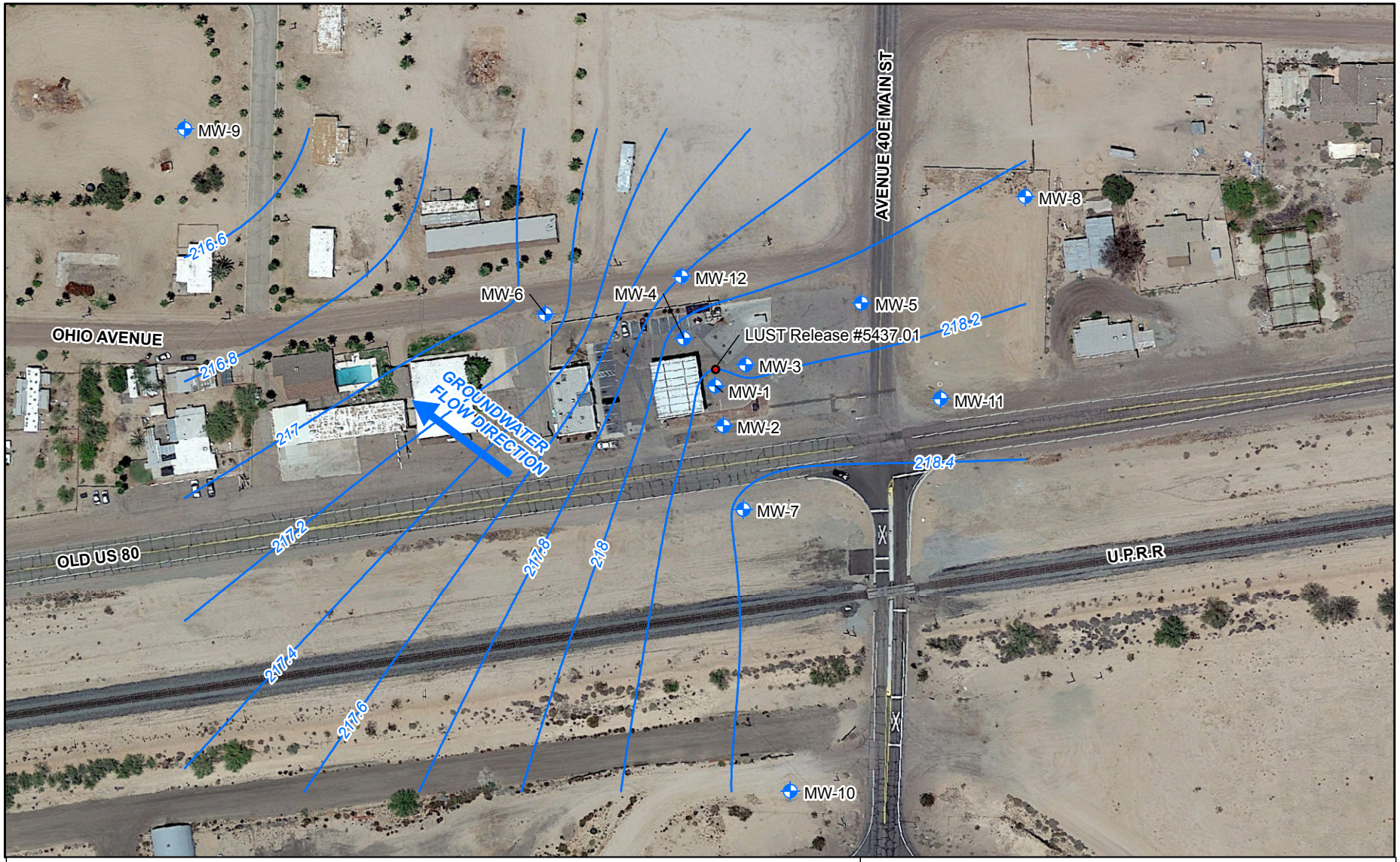
N

SITE FEATURES MAP
SHAY OIL #6 SITE
TACNA, ARIZONA

NEI Project No:	021-0036
Date	April 2022
Drawn By:	CB
Reviewed By:	BC

Nicklaus Engineering, Inc.

Figure 3



Legend

- LUST Release Point
- Monitoring Well
- Groundwater Flow Direction
- Groundwater Elevation (ft amsl)

0 50 100 200 Feet

Service Layer Credits: Google Earth, 2016

N

GROUNDWATER FLOW MAP
SHAY OIL #6 SITE
TACNA, ARIZONA

NEI Project No:	021-0036
Date	April 2022
Drawn By:	CB
Reviewed By:	BC

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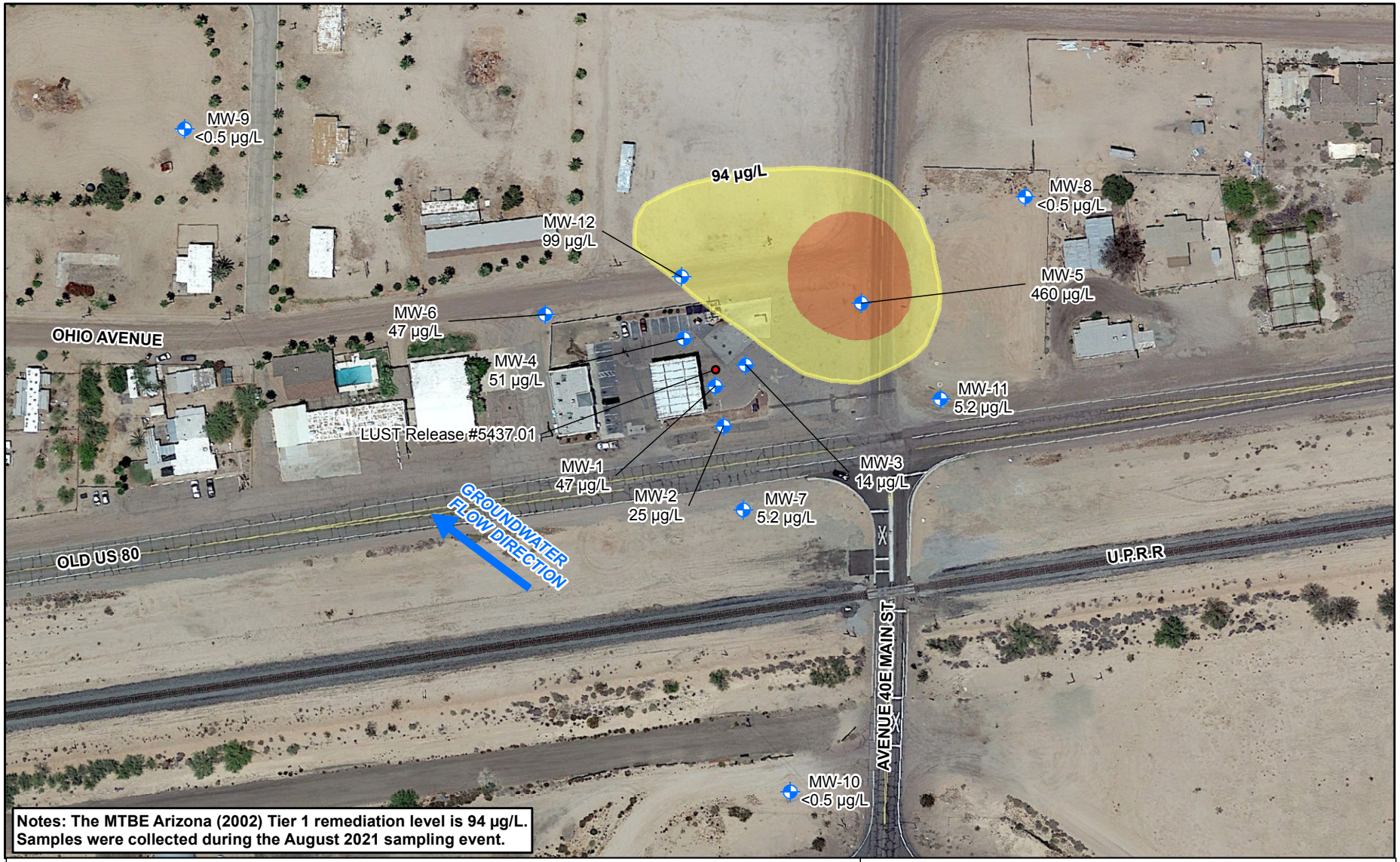
Figure 6



Legend

- LUST Release Point
- Monitoring Well
- Groundwater Flow Direction
- MTBE Tier 1 Remediation Level (94 µg/L)

MTBE Concentration (µg/L)

- >94 to 200
- >200 (max = 460)

N

0 50 100 200 Feet

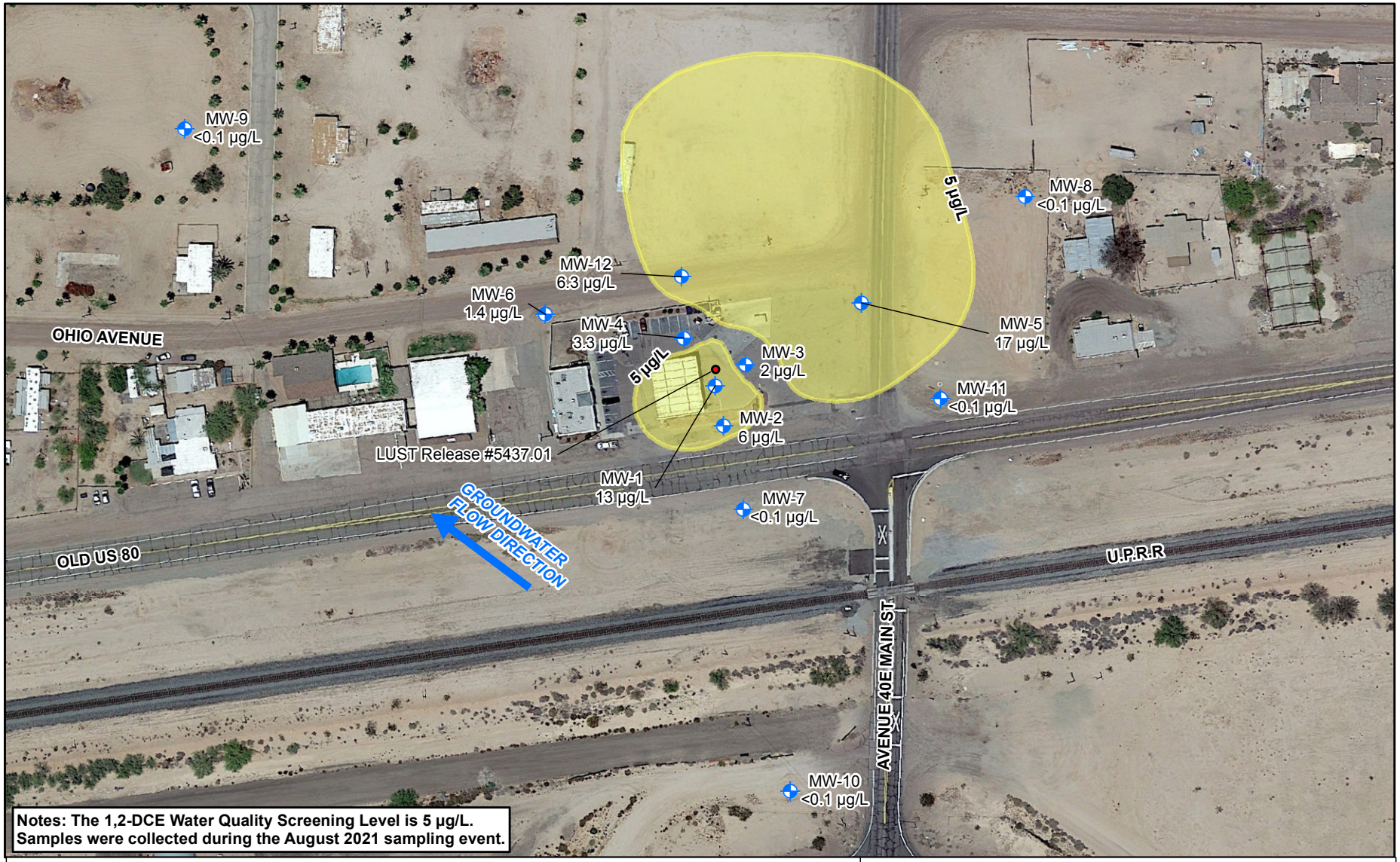
Service Layer Credits: Google Earth, 2016

MTBE CONCENTRATION MAP
AUGUST 2021
SHAY OIL #6 SITE
TACNA, ARIZONA

NEI Project No:	021-0036
Date	April 2022
Drawn By:	CB
Reviewed By:	BC

Nicklaus Engineering, Inc.

Figure 8



Legend

- LUST Release Point
- Monitoring Well
- Groundwater Flow Direction

1,2-DCE Concentration (µg/L)

- >5 (max = 17)

N

0 50 100 200 Feet

Service Layer Credits: Google Earth, 2016

1,2-DICHLOROETHANE CONCENTRATION MAP
AUGUST 2021
SHAY OIL #6 SITE
TACNA, ARIZONA

NEI Project No:	021-0036
Date	April 2022
Drawn By:	CB
Reviewed By:	BC

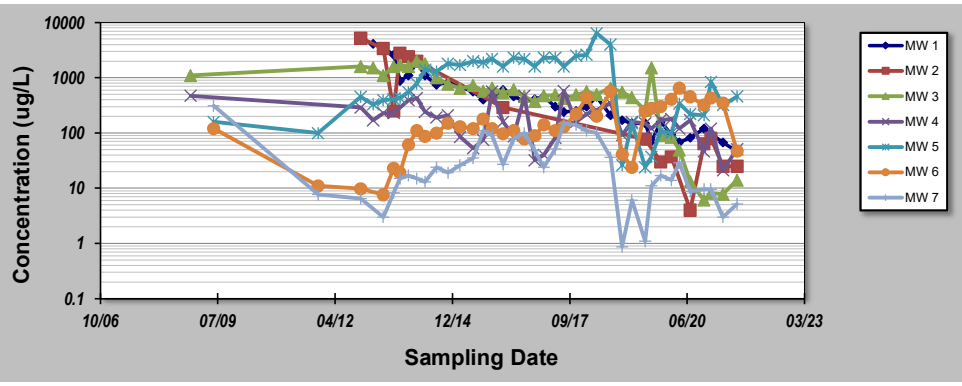
Nicklaus Engineering, Inc.

Figure 9

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	March 24, 2021	Job ID:	021-0036, Shay Tacna UST Site
Facility Name:	Shay Oil Co. #6 (0-006804), LUST 5437.01	Constituent:	MTBE
Conducted By:	Brian White	Concentration Units:	ug/L

Sampling Point ID:	MW 1	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7
Sampling Event	Sampling Date	MTBE CONCENTRATION (ug/L)						
1	11/17/08			1,100	470			
2	06/02/09					160	120	310
3	11/09/11					100	11	7.7
4	11/05/12	5,200	5,200	1,600	290	450	9.8	6.5
5	02/21/13	4,100		1,500	170	330		
6	05/16/13	3,500	3,400	1,100	230	390	7.6	3.0
7	08/14/13	2,600	250	1,600	230	410	23	8.2
8	10/07/13	880	2,800	1,700		430	19	15
9	12/18/13	1,100	2,400	1,600	390	550	61	17
10	02/27/14	1,900	2,000	2,000	430	790	110	15
11	05/08/14	1,100		1,800	240	1,400	87	13
12	08/13/14	750		1,000	190	1,300	100	24
13	11/19/14	820		770	210	1,800	150	19
14	03/03/15			640	85	1,700	130	26
15	06/22/15	560		730	53	2,000	120	35
16	09/15/15	400		570	75	1,900	180	110
17	12/02/15	450		650	560	2,200	120	90
18	03/02/16	600	290	530	160	1,600	97	27
19	06/01/16	460		610	87	2,300	110	79
20	08/31/16	380		460	470	2,200	78	100
21	11/29/16	410		370	32	1,600	89	48
22	02/13/17	460		470	40	2,300	140	24
23	05/22/17	300		490	82	2,300	110	51
24	08/03/17	240		420	580	1,600	130	150
25	11/16/17	250		490	160	2,500	220	140
26	02/13/18	300		560	220	2,600	440	110
27	05/09/18	450		500	260	6,400	200	100
28	09/05/18	210		650	350	4,000	570	36
29	12/13/18	170		550	92	26	41	0.87
30	03/06/19	150		440	160	150	24	6.1
31	06/27/19	150	77	260	150	24	250	1.1
32	08/20/19	71		1,500	120	37	280	11
33	11/07/19	160	30	90	170	110	300	17
34	02/05/20	93	37	84	180	99	410	14
35	04/13/20	68		49	120	340	650	29
36	07/16/20	82	4.0	13	170	220	450	8.7
37	11/10/20	120	64	6.1	46	210	320	9.6
38	01/07/21	97	80	8.1	120	840	430	9.6
39	04/20/21	67	25	7.8	21	320	350	3.0
40	08/19/21	47	25	14	51	460	47	5.2
Coefficient of Variation:		1.51	1.48	0.82	0.74	1.05	0.89	1.37
Mann-Kendall Statistic (S):		-543	-74	-486	-205	54	360	-44
Confidence Factor:		>99.9%	>99.9%	>99.9%	99.7%	73.8%	>99.9%	70.5%
Concentration Trend:		Decreasing	Decreasing	Decreasing	Decreasing	No Trend	Increasing	No Trend



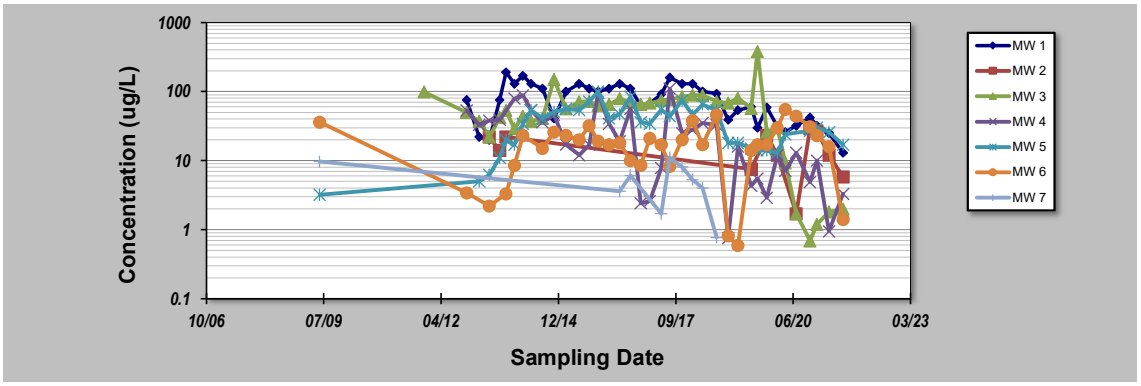
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	September 24, 2021	Job ID:	021-0036, Shay Tacna UST Site
Facility Name:	Shay Oil Co. #6 (0-006804), LUST 5437.01	Constituent:	1,2-Dichloroethane
Conducted By:	Brian White	Concentration Units:	ug/L

Sampling Point ID:	MW 1	MW 2	MW 3	MW 4	MW 5	MW 6	MW 7
Sampling Event	Sampling Date	1,2-DICHLOROETHANE CONCENTRATION (ug/L)						
1	11/17/08							
2	06/02/09					3.2	36	9.7
3	11/09/11			99				
4	11/05/12	76		50	53		3.4	
5	02/21/13	22		37	33	5.0		
6	05/16/13	20	22	22	38	6.2	2.2	
7	08/14/13	76	14	42	39	11		
8	10/07/13	190	22	53		20	3.3	
9	12/18/13	130		29	79	17	8.5	
10	02/27/14	170		44	88	34	23	
11	05/08/14	130		37	54	54		
12	08/13/14	110		41	36	41	15	
13	11/19/14	41		150	46	51	26	
14	03/03/15	100		56	17	56	23	
15	06/22/15	130		71	12	54	20	
16	09/15/15	110		72	17	72	32	
17	12/02/15	100		63	96	100	19	
18	03/02/16	110		65	34	41	17	
19	06/01/16	130		79	19	47	18	3.6
20	08/31/16	110		70	56	84	10	6.1
21	11/29/16	62		65	2.4	36	8.5	
22	02/13/17	67		68	2.6	34	21	
23	05/22/17	92		74	7.8	55	17	1.7
24	08/03/17	160		77	110	44	8.3	11
25	11/16/17	130		84	25	74	20	8.1
26	02/13/18	130		89	28	46	38	5.3
27	05/09/18	100		88	35	65	17	4.0
28	09/05/18	93		72	33	54	46	0.77
29	12/13/18	39		68	0.75	18	0.81	
30	03/06/19	54		80	16	18	0.59	
31	06/27/19	60	7.5	57	4.3	15	14	
32	08/20/19	30		380	5.5	14	17	
33	11/07/19	59	23	26	2.9	14	17	
34	02/05/20	31	12	30	12	13	30	
35	04/13/20	26		9.3	7.1	24	55	
36	07/16/20	32	1.7	1.7	13		44	
37	11/10/20	42	29	0.69	4.9	27	31	
38	01/07/21	32	27	1.2	10	30	23	
39	04/20/21	25	12	1.80	0.9	26	16	
40	08/19/21	13	5.8	2	3	17	1.4	
Coefficient of Variation:		0.58	0.57	1.00	0.98	0.65	0.69	0.63
Mann-Kendall Statistic (S):		-256	-7	-45	-291	-8	48	-12
Confidence Factor:		>99.9%	67.6%	70.9%	>99.9%	53.8%	74.7%	87.0%
Concentration Trend:		Decreasing	Stable	No Trend	Decreasing	Stable	No Trend	Stable



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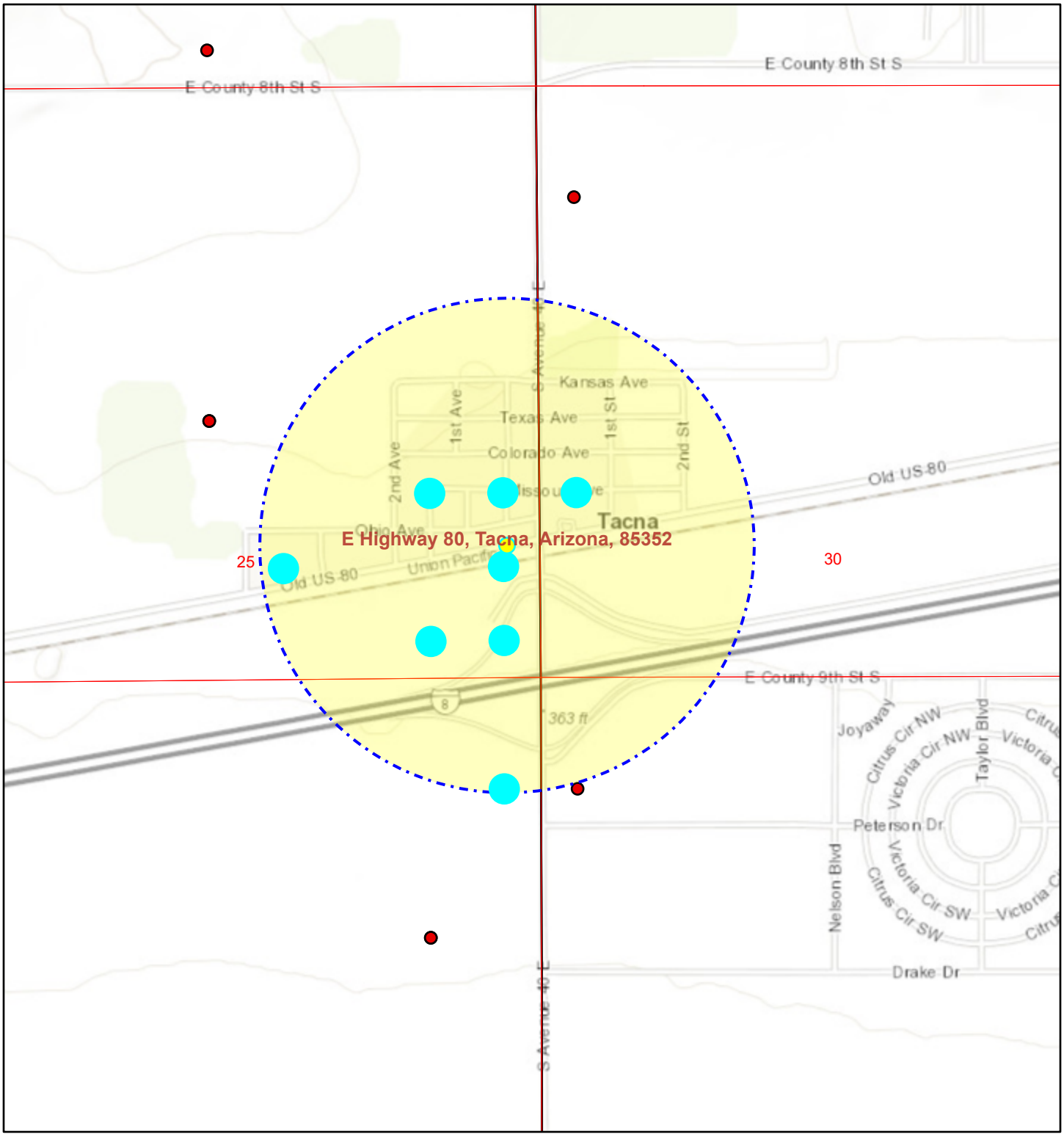
Registry of Wells in AZ (0.5 miles)



May 5, 2022

1:18,056

0 0.13 0.25 0.5 mi

0 0.2 0.4 0.8 km

- Well_Registry
- Section
- Township
- County

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community