

## PROPOSED LEAKING UST (LUST) CASE CLOSURE

The Arizona Department of Environmental Quality (ADEQ) is considering closure of the following leaking underground storage tank (LUST) cases:

**LUST Case File #: 4769.01-.03**  
**Facility ID # 0-009063**  
**Yavapai County**

**McGuireville Mini-Mart**  
**2105 East Beaver Creek Road**  
**Rimrock, Arizona 86335**

The property is located at 2105 East Beaver Creek Road in Rimrock, Arizona. The site is currently occupied by a convenience store with fuel sales. The underground storage tank (UST) system was reportedly installed in the 1960s. A release of petroleum hydrocarbons was discovered and three LUST releases were assigned in September 1997. LUST release 4769.01 was assigned to the 24,000 gallon gasoline UST, LUST release 4769.02 was assigned to gasoline product piping/north of building and LUST release 4769.03 was assigned to gasoline fuel dispenser piping. LUST release 4769.04 was reported in March 2005 and was closed in August 2008.

The ADEQ State Lead Unit conducted corrective actions between 1999 and 2008. Activities included the advancement of soil borings, a groundwater monitoring and sampling program and active remediation. A soil vapor extraction (SVE) system operated between 2001 and 2002 and remediated the soil contamination to below applicable regulatory standards. The State Lead Unit proposed to use chemical oxidation for remediation of the groundwater. The UST Owner/Operator, Reamax Oil Company, Inc. terminated their agreement with the State Lead Unit in 2008. The Site Characterization Report was approved in December 2009. Corrective actions continued under the direction of the UST Owner/Operator.

The UST Owner/Operator contracted with O&M Inc. in 2012 to continue site activities. These activities included the advancement of shallow soil borings, groundwater remediation, a groundwater monitoring and sampling program and a soil vapor survey.

Historic boring logs indicate that a consolidated silty sandstone at 6-10 feet underlies a clayey sand. Below the silty sandstone is a 3-6 foot clay layer over limestone. Regionally, groundwater flow is southwestward toward the Verde River, which is perennial. Local groundwater flows westerly to southwesterly. The depth to groundwater in October 2016 was between 25 and 38 feet.

Fourteen monitoring wells were installed on and off site. Groundwater data has been collected semi-annually since July 2009. Methyl tertiary butyl ether (MTBE) and benzene have been the only Volatile Organic Compound (VOC) reported over an applicable regulatory standard since 2009. In August 2012 and May 2013 sodium persulfate was used to treat the groundwater. Groundwater sampling in July 2013 indicated that both benzene and MTBE concentrations were reduced in most wells but remained over the applicable regulatory standard in some of the wells.

A site specific risk assessment and detailed file/information search were also completed. MTBE analytical groundwater results in MW-1, MW-3, MW-4 and MW-5 remain above the applicable regulatory standard of 94 µg/L.

Based upon the results of remedial activities and site specific information, the above-referenced LUST site is eligible for alternative LUST closure under Arizona Revised Statutes (A.R.S.) §49-1005(E). Arizona Administrative Code (A.A.C.) R18-12-263.04 allows case closure of a LUST site with groundwater contamination above the Arizona Aquifer Water Quality Standards (AWQS) or Tier 1 Standards. ADEQ has considered the results of a site specific assessment and the rule specific criteria below:

1. *Threatened or impacted drinking water wells:* According to the Arizona Department of Water Resources (ADWR) records, there are no threatened or impacted drinking water wells within ¼ mile of the site. The nearest production well is located to the west of the property and is not used. Well abandonment paperwork was filed in 1997 with ADWR. The well may have been abandoned and not reported to ADWR.
2. *Other exposure pathways:* The deeper contaminated soil was actively remediated by SVE. In 2016, three shallow confirmation soil borings to a depth of 5 feet (or less depending on auger refusal) were installed to evaluate potential dermal contact and ingestion risk from any remaining soil contamination present. The soil samples were analyzed for tetraethyl lead (due to the system install date) as well as VOCs and Polycyclic aromatic hydrocarbons (PAHs). The only chemicals of concern reported over an applicable regulatory standard were 1,2,4 and 1,3,5-trimethylbenzene (TMBs) at CSB-1. CSB-1 is located under concrete near the existing canopy for the dispenser island area. Dermal contact and ingestion are not likely due to the cover material. However, to evaluate for future potential residential use, the TMB contamination present was evaluated by ADEQ for ingestion risk, which presents more risk than dermal contact. Both adult and child risk was evaluated for carcinogenic and non-carcinogenic effects. According to the calculations, there is no unacceptable risk for adult ( $10^{-7}$  and 0.008) and no unacceptable risk for children ( $10^{-6}$  and 0.0037). The vapor intrusion risk to indoor air was determined to be acceptable based on soil vapor data (SV-1) collected and modeled using the Johnson and Ettinger model (on-line screening version) by the contractor. Although the groundwater is not used as potable water, the current maximum contamination concentration of 334 microgram per liter ( $\mu\text{g/L}$ ) of MTBE was used to calculate an adult and child dose. These values were compared against the oral reference dose ( $1.0 \times 10^{-2}$  mg/Kg-day). The calculated adult dose ( $10^{-3}$  mg/Kg-day) and child dose ( $10^{-2}$  mg/Kg-day) represent acceptable risk if the groundwater at the site was potable water. Incidental dermal contact with the groundwater is considered *de minimis* risk. In a ¼ mile receptor survey, there are no sensitive receptors like schools, day care centers or hospitals. Dry Beaver Creek, an ephemeral stream, is the nearest surface water body and is within 500 feet of the property. Dry Beaver Creek wraps around the property from the northeast to the east and then south towards the southwest. Dry Beaver Creek converges with Wet Beaver Creek, a perennial stream, approximately 1 mile from the site. The Beaver Creek flows into the Verde River. Dry Beaver Creek was sampled for VOCs in 2001 and none were detected.
3. *Groundwater plume stability:* Groundwater plume stability is demonstrated by the remaining VOC contamination present over a regulatory standard in groundwater is limited to on site. Groundwater monitoring wells and their respective sampling results at the property boundaries indicate that the plume is delineated and decreasing in areal extent. Dissolved-phase benzene is limited to on site well MW-4R and the historic concentrations are trending downward. Dissolved-phase MTBE is limited to on site wells. The concentrations are

- remaining stable or declining. The depth to groundwater is approximately 25 to 38 feet below the ground surface as of October 2016.
4. *Characterization of the groundwater plume:* Monitoring wells were installed and collection of VOCs samples has taken place since 2000. Dissolved-phase petroleum hydrocarbons have been characterized. VOC concentrations remaining over applicable regulatory standards are limited to four wells out of the twelve remaining wells. The current benzene concentration in the well nearest the source (MW-1) is less than 0.47 µg/L which is down from the highest concentration of 2,700 µg/L in June 2000. The current MTBE concentration in MW-1 is 262 µg/L, down from <5,000 µg/L in June 2000.
  5. *Natural Attenuation:* Benzene degrades faster than MTBE in aerobic groundwater conditions. The most recent field parameters indicate the dissolved oxygen concentrations are well above 0.5 mg/L. The most recent groundwater temperature is higher than temperatures in 2012 based on field notes in the LUST file. These two parameters indicate aerobic degradation is occurring. Overall VOC concentrations are declining, which is another indicator of natural attenuation.
  6. *Removal or control of the source of contamination:* Source control has been completed by the removal of the UST system in 1999. The secondary source of hydrocarbons remaining in soil and groundwater has been effectively removed or reduced through the use of multiple remedial technologies. An SVE system reduced the soil VOC contamination, and injections of sodium persulfate solution reduced the groundwater contamination.
  7. *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.
  8. *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 information: MW-1 (near source)

Date	Benzene AWQS is 5 µg/L	MTBE Tier 1 Standard is 94 µg/L	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Depth to water (Feet)
6/7/2000	2,700	<5,000	--	--	31.98
7/21/2009	340	360	-258.0	0.66	33.86
3/29/2010	3.8	340	-135.8	4.78	27.45
3/31-5/10/2010 ISCO	--	--	--	--	--
5/11/2011	5.5	240	-186.6	32%	29.03
8/27-31/2012 ISCO	--	--	--	--	--
10/17/2013	22.3	255	418	0.48	32.70
10/20/2014	76.6	500	-158	--	34.17
6/1/2015	40.2	337	-103	--	33.60
10/26/2015	21.5	300	-118	--	33.60
6/6/2016	21.5	253	-134	--	33.95
10/27/2016	<0.47	262	-126	2.99	35.80

## Groundwater information: MW-3

Date	MTBE Tier 1 Standard is 94 µg/L	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Depth to water (Feet)
6/7/2000	400	--	--	31.12
7/21/2009	290	-37.4	0.77	32.94
3/29/2010	310	121.3	5.59	26.35
3/31-5/10/2010 ISCO	--	--	--	--
5/11/2011	140	141.0	33.8%	27.75
8/27-31/2012 ISCO	--	--	--	--
10/17/2013	40.6	292	0.00	31.26
10/20/2014	489	49	--	33.59
6/1/2015	287	96	--	32.57
10/26/2015	312	-14	--	32.43
6/6/2016	237	-4	--	33.05
10/27/2016	334/236	92	4.87	35.30

## Groundwater information: MW-4

Date	MTBE Tier 1 Standard is 94 µg/L	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Depth to water (Feet)
6/7/2000	350	--	--	30.31
7/21/2009	100	118.5	0.68	31.68
3/29/2010	73	177.5	5.16	25.72
3/31-5/10/2010 ISCO	--	--	--	--
5/11/2011	130	139.2	36.6%	27.08
8/27-31/2012 ISCO	--	--	--	--
10/17/2013	273	358	0.00	30.56
10/20/2014	339	47	--	31.94
6/1/2015	263	64	--	31.30
10/26/2015	189	53	--	31.55
6/6/2016	207	23	--	31.65
10/27/2016	164	123	4.58	33.60

## Groundwater information: MW-5

Date	MTBE Tier 1 Standard is 94 µg/L	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Depth to water (Feet)
6/7/2000	110	--	--	29.75
7/21/2009	84	208.3	1.66	31.44
3/29/2010	<1	-50.3	6.61	24.59
3/31-5/10/2010 ISCO	--	--	--	--
5/11/2011	6.1	121.0	39.5%	25.97
8/27-31/2012 ISCO	--	--	--	--
10/17/2013	132	256	0.00	30.00
10/20/2014	239	300	--	32.09
6/1/2015	89.3	199	--	31.01
10/26/2015	47	196	--	31.05
6/6/2016	54.5	196	--	31.40
10/27/2016	196	160	5.53	30.90

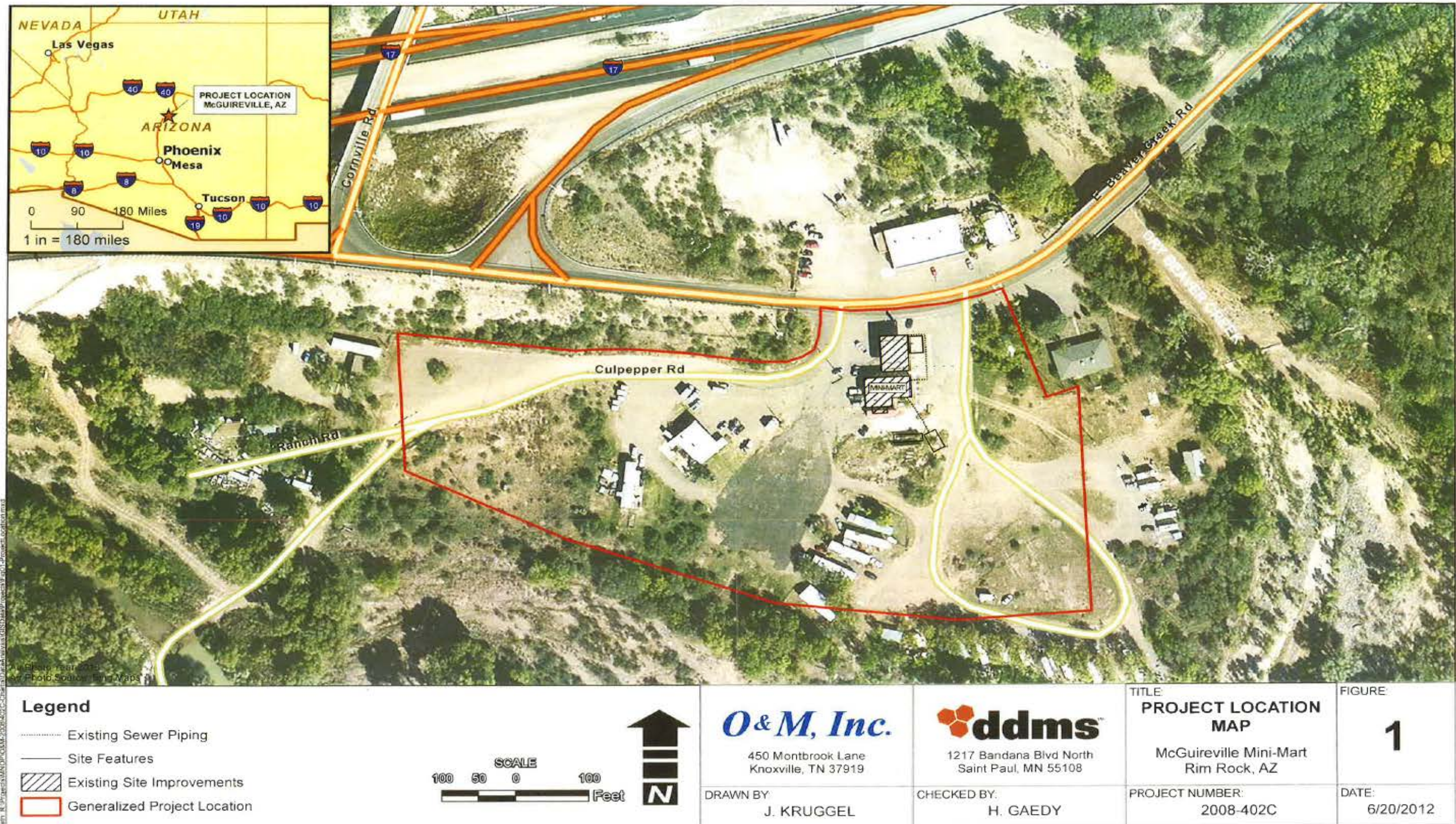
Site specific information concerning this closure is available for review during normal business hours at the ADEQ Records Center <http://www.azdeq.gov/function/assistance/records.html>, 1110 W. Washington St., Suite 140, Phoenix, AZ 85007. ADEQ welcomes comments on the proposed LUST case closure. Please call the Records Center at 602-771-4380 to schedule an appointment. A 30-day public comment period is in effect commencing **March 21, 2017 and ending April 21, 2017**. Comments should be submitted in writing to the Arizona Department of Environmental Quality, Waste Programs Division, and Attention: Scott Goodwin, 1110 W. Washington Street, Phoenix, AZ 85007.

If sufficient public interest is demonstrated during the public comment period, ADEQ will announce and hold a public meeting. ADEQ will respond to written comments following the public comment period. For more information on this notice, please contact Scott Goodwin at (602) 771-4452 or at [sdg@azdeq.gov](mailto:sdg@azdeq.gov).

Copies of the cited statutes and rules can be found at: <http://www.azleg.gov/ArizonaRevisedStatutes.asp?Title=49>, and [http://www.azsos.gov/public\\_services/Title\\_18/18-12.htm](http://www.azsos.gov/public_services/Title_18/18-12.htm)

ADEQ will take reasonable measures to provide access to department services to individuals with limited ability to speak, write, or understand English and/or to those with disabilities. Requests for language interpretation services or for disability accommodations must be made at least 48 hours in advance by contacting: 7-1-1 for TDD; (602) 771-2215 for Disability Accessibility; or Ian Bingham, Title VI Nondiscrimination Coordinator at (602) 771-4322 or [idb@azdeq.gov](mailto:idb@azdeq.gov).

ADEQ tomará medidas razonables para proveer acceso a los servicios del departamento para personas con capacidad limitada para hablar, escribir o entender Inglés y / o para las personas con discapacidad. Las solicitudes de servicios de interpretación del lenguaje o de alojamiento de discapacidad deben hacerse por lo menos 48 horas de antelación poniéndose en contacto con Ian Bingham, Title VI Nondiscrimination Coordinator al (602) 771-4322 o [idb@azdeq.gov](mailto:idb@azdeq.gov).





- NOTES:**
1. Analyte concentrations in ug/L
  2. White result = MTBE
  3. Yellow result = Benzene
  4. < Not Detected At or Above MRL
  5. Benzene AWQS = 5 ug/L
  6. MTBE AWQS = 20 ug/L
  7. Results AWQS are BOLD

MW-X  
/ **AWQS**

**Legend**

- Existing Air Inject Well
- Existing Air Sparge Well
- Existing Monitoring Well
- Existing Observation Well
- Existing SVE/Monitoring Well
- Existing Private Potable Water Well
- Interpolated October 2016 MTBE Isocontour (ug/L)
- Inferred October 2016 MTBE Isocontour (ug/L)
- Interpolated October 2016 Benzene Isocontour (ug/L)
- Inferred October 2016 Benzene Isocontour (ug/L)



<p><b>O&amp;M, Inc.</b></p> <p>450 Montbrook Lane Knoxville, TN 37919</p>	<p><b>ddms</b></p> <p>1217 Bandana Blvd North Saint Paul, MN 55108</p>	<p><b>OCTOBER 2016 MTBE AND BENZENE ISOCONTOUR CONCENTRATION MAP</b></p> <p>McGuireville Mini-Mart Rim Rock, AZ</p>	<p>FIGURE: <b>4</b></p>
		<p>DRAWN BY: H. GAEDY</p>	<p>CHECKED BY: D. FUERST</p>

**ADEQ**  **Memorandum**  
Arizona Department  
of Environmental Quality

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**Date:** March 3, 2017  
**To:** LUST File  
**From:** Debi Goodwin, Sr. Risk Assessor  
UST-LUST Section  
**Subject:** Tier 3 Risk Assessment  
McGuireville Mini-Mart  
Facility No. 0-009063 LUST No. 4769.01, .02, .03

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**Background**

The property is located at 2105 East Beaver Creek Road in Rimrock, AZ. The site is currently occupied by a convenience store with fuel sales. The UST system was reportedly installed in the mid to late 1960s. In January 1999, the UST, associated piping and the dispensers were removed. A release of petroleum hydrocarbons (BTEX and MTBE) was discovered and three LUST releases were assigned. LUST release 4769.04 was reported in March 2005 and was closed in August 2008.

The State Lead Unit conducted site activities between 1999 and 2008 on behalf of the UST Owner/Operator, Reamax Oil Company, Inc. These activities included the advancement of soil borings, a groundwater monitoring and sampling program and active remediation. An SVE system operated between 2001 and 2002 and remediated the soil contamination to below applicable regulatory standards. The next step in remediation was to use chemical oxidation for the groundwater. The UST Owner/Operator terminated their corrective action agreement with the State Lead Unit in 2008. The Site Characterization Report was approved in December 2009. Corrective actions continued under the direction of the UST Owner/Operator.

The UST Owner/Operator most recently contracted with O&M Inc. in 2012 to continue site activities. These activities included the advancement of shallow soil borings, groundwater remediation, a groundwater monitoring and sampling program and a soil vapor survey.

**Purpose**

Current data provided in the *Periodic Site Status Report* received January 27, 2017, and all other available site information has been used by ADEQ to determine whether remaining levels of contaminants at the site are adequately protective of human health and the environment.

**Risk Assessment**

**Soil**

In 2016, three shallow confirmation soil borings (CSB-1, 2,3) were drilled to 5 feet (or less depending on auger refusal) to evaluate potential dermal contact and ingestion risk from any remaining soil contamination present. The soil samples were analyzed for the full VOC list, PAHs and tetraethyl lead (due to the system install date). CSB-1 had TMB contamination over applicable regulatory standards at 5 feet (the depth of auger refusal). 1,2,4-TMB was reported at 59.8 mg/Kg above the residential soil remediation level of 52 mg/Kg and 1,3,5-TMB was reported at 23.7 mg/Kg, above the residential soil remediation level of 21 mg/Kg. CSB-1 is located under concrete near the existing canopy for the dispenser island area. There is no inhalation risk from this contamination due to the cover and soil vapor point SV-1 data also demonstrates acceptable risk. Dermal contact and ingestion are not likely due to the cover material. The TMB contamination present was evaluated by ADEQ for ingestion



risk, which presents more risk than dermal contact. Both adult and child risk was evaluated for carcinogenic and non-carcinogenic effects. According to the calculations, there is no unacceptable risk for adult ( $9.34 \times 10^{-7}$  and 0.008) and no unacceptable risk for children ( $3.7 \times 10^{-6}$  and 0.0037).

Historic boring logs indicate that a consolidated silty sandstone at 6-10 feet underlies a clayey sand. Below the silty sandstone is a 3-6 foot clay layer over limestone.

#### Groundwater

Regionally, groundwater flow is southwestward toward the Verde River, which is perennial. Local groundwater flows westerly to southwesterly depending on the season and surface water flow in Dry Beaver Creek. The depth to groundwater in October 2016 was between 25 and 38 feet bgs.

Historic groundwater data shows that benzene concentrations were the highest in MW-1 (source well) at 2,700  $\mu\text{g/L}$  in June 2000, and MTBE concentrations were the highest in MW-1 at  $<5,000 \mu\text{g/L}$ . It appears that the groundwater concentrations are influenced by seasonal groundwater elevation changes.

Groundwater data has been collected semi-annually since July 2009. MTBE and benzene has been the only VOC reported over an applicable regulatory standard since 2009. In August 2012, a sodium persulfate solution was injected into eight points. A second injection was done in May 2013. Post injection sampling in July 2013 indicated the benzene concentrations were reduced in most wells but remained over the applicable regulatory standard. MTBE concentrations were reduced, but still remained over the applicable regulatory standard.

Twelve wells were sampled in June 2016. The samples were analyzed for VOCs, PAHs, and EDB. Sampling results showed MTBE concentrations that exceeded the applicable Tier 1 Standard in MW-1, MW-3, MW-4, and MW-5. All of these wells are on site. In October 2016, the wells were sampled again. MTBE was reported over Tier 1 Standard in the same wells, but with a downward concentration trend in all but MW-5. The Tier 1 Standard for MTBE is 94  $\mu\text{g/L}$ . The benzene concentration in MW-1 was 21.5  $\mu\text{g/L}$  in June, but non-detect above 0.47  $\mu\text{g/L}$  in October. The data set for the wells does cover any potential seasonal variations in groundwater elevation, and the MTBE concentrations are mostly decreasing. The VOC contamination will continue to degrade under aerobic groundwater conditions which is indicated by the dissolve oxygen (DO) concentration exceeding 0.5  $\text{mg/L}$ .

The closest supply well was identified as the Womack well in the submittal which is located to the west of the site. According to the submittal no one occupies the residence, so the well is not used. Upon review of additional information in the ADWR database, ADEQ found out that the well now has a different owner. Well abandonment papers were filed with ADWR in 1997, however, if the well was abandoned it is not documented in the database. There are a total of seven registered wells (other than monitoring wells) listed within  $\frac{1}{4}$  mile of the site. There are no threatened or impacted supply wells from the MTBE contamination.

In a  $\frac{1}{4}$  mile receptor survey, there are no sensitive receptors like schools, day care centers or hospitals. Dry Beaver Creek, an ephemeral stream, is the nearest surface water body. Dry Beaver Creek wraps around the property from the northeast to the east and then south towards the southwest. Dry Beaver Creek flows into Wet Beaver Creek, a perennial stream, approximately 1 mile from the site. Dry Beaver Creek was sampled for VOCs in 2001 and none were detected.

Although the groundwater is not used as potable water, the current maximum contamination concentration of 334  $\mu\text{g/L}$  was used to calculate an adult and child dose. These values were compared against the oral reference dose ( $1.0 \times 10^{-2} \text{ mg/Kg-day}$ ). The calculated adult dose ( $10^{-3} \text{ mg/Kg-day}$ ) and child dose ( $10^{-2} \text{ mg/Kg-day}$ ) represent acceptable risk if the groundwater at the site was potable water. Incidental dermal contact with the groundwater is considered *de minimis* risk.

#### Soil Vapor

To evaluate the potential inhalation risk from the subsurface soil contamination, five temporary soil vapor probes were installed in June 2016. SV-1 was placed near CSB-1. The soil vapor samples were analyzed for VOCs by EPA Method TO-15 (did include the ADHS approved additional 31 compounds dated November 2011) and fixed gases. Laboratory quality assurance (QA) and field QA measures are adequate for risk assessment data quality objectives.

O & M, Inc. conducted the risk assessment. The maximum concentrations of chemicals were modeled for both the excess lifetime cancer risk value (ELCR) and the hazard index (HI) or non-carcinogenic health hazard. The soil vapor data was modeled using the EPA on-line screening version of the Johnson and Ettinger (J&E) model. The maximum concentrations of VOCs were modeled. Typical residential parameters were used in the model. It is noted that the most current toxicity information as listed in the EPA Regional Screening Level resident air tables was used in the model. Table 4 presented the analytes evaluated. ADEQ noted that not all of the relevant petroleum related CoCs were modeled. The interpretation was that there is no unacceptable risk posed by any remaining VOC contamination in the soil.

ADEQ guidance is that chemicals are eliminated from inclusion in the risk assessment if they are not present at levels above 1/10th of the EPA Regional Screening Level resident air table dated November 2016, levels below the laboratory reporting limit, were a common laboratory contaminant and found at levels less than 5 times the concentration found in the field (equipment) blank, or if insufficient toxicity data is available or the chemical is not listed in the chemical pull down list. The risk assessment should include an evaluation of the compounds of concern (CoCs) associated with the fuel release and a separate evaluation of any non-petroleum related compounds. Each group's risk numbers should be totaled to determine cumulative risk from each source. The High Indoor Air Prediction for the J&E Simulation Results is used as the first comparison for a conservative approach. The indoor air exchange rate used was  $0.25 \text{ hr}^{-1}$ , the model's default value, whereas ADEQ generally uses  $0.5 \text{ hr}^{-1}$  to account for indoor heating and cooling systems.

ADEQ concurs that there is no unacceptable inhalation risk from any potentially remaining VOC contamination in the soil.

#### Conclusions and Recommendations

A.A.C. R-18-7-206(D) and A.A.C. R-18-12-263.01 allow for a site specific risk assessment. Under A.A.C. R-18-7-206(D), multiple contaminants, multiple pathways of exposure, uncertainty of exposure and sensitive populations are evaluated as part of a site specific risk assessment. Any residual petroleum related soil contamination that may be present is in the subsurface, so there isn't a risk posed by the dermal contact or ingestion exposure routes. The soil vapor survey demonstrates the inhalation exposure route shows an acceptable risk to the existing building or to any future residential construction over the release area. The groundwater data collected in October 2016 does show MTBE contamination present over an applicable regulatory standard. There are no sensitive receptors impacted by the remaining contamination present in the subsurface soils or the groundwater.

Based on the data collected, it is recommended that LUST release 4769.01-.03 be closed under A.A.C. R-18-12-263.04.

If you have any questions regarding this memo, please contact me at (602) 771-4453 or [dg1@azdeq.gov](mailto:dg1@azdeq.gov).