

## 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 #5423.01**  
**Facility ID # 0-003208**  
**Maricopa County**

**ExxonMobil Corporation #12034**  
**4438 N. 24<sup>th</sup> Street**  
**Phoenix, Arizona 85016**

The former Mobil Service Station #18613 is located at 4438 N. 24<sup>th</sup> Street in Phoenix which is the southeast corner of 24<sup>th</sup> Street and Campbell Avenue. This former service station is currently inactive but still owned by ExxonMobil. The former UST system was installed in 1984. UST system decommissioning and closure activities were conducted between July 28 and September 17, 2004. The UST closure soil samples collected at 14 feet below ground surface (bgs) were analyzed for volatile organic compounds (VOCs) using EPA Method 8260B. None of the soil samples indicated VOC contamination present over laboratory reporting limits. Additional soil borings were installed as part of a possible sale. Benzene was reported over applicable regulatory standards at 30 feet bgs (4.31 mg/Kg) and at 40 feet bgs (10.2 mg/Kg) at location KB5. This location was located in the former 6,000 gallon UST area. A release was reported to ADEQ based on this soil data. Additional drilling and soil sampling was conducted in November 2004. Soil boring B1 (at location KB5) was drilled to 97 feet bgs and completed as groundwater monitoring well MW1. Benzene contamination was present over the residential Soil Remediation Level (rSRL) in B1 between 30 and 70 feet bgs. Benzene contamination was present over the rSRL at 30 feet bgs in B2 and at 40 feet bgs in B4. A groundwater grab sample was collected during the drilling of MW1 (before the well was completed) and (benzene, toluene, ethylbenzene, xylene) BTEX and (1, 2-dichloroethane) 1,2-DCA concentrations exceeded applicable regulatory standards. Methyl tert butyl ether (MTBE) also exceeded the Tier 1 Corrective Action Standard. Corrective actions including free product removal from MW1 between 2005 and 2009 and the installation of additional monitoring wells was completed in 2006. The Site Characterization Report was approved in 2006, and a Corrective Action Plan (CAP) was requested. In 2007, air sparge (AS) and soil vapor extraction (SVE) wells were installed and an AS/SVE pilot test was conducted in February 2007. The CAP was approved in 2008. ExxonMobil hired Groundwater & Environmental Services, Inc. (GES) to continue corrective actions. The AS/SVE system began operation in June 2010 and ran until June 2015. The system was temporarily turned on in February 2016 for a rebound test. The system has not been in operation since. In-situ chemical oxidation (ISCO) [PersulfOx®] was done at AS2 (up gradient of MW1) three times in 2016. Contamination in soil and groundwater was primarily limited to the nearby source area.

Subsurface soils consist of layers of silts and sandy silts from ground surface to a depth of approximately 60 feet bgs. Alternating layers of well and poorly graded sand of varying thickness appear to a depth of 88 feet bgs. Since 2005, the depth to groundwater has ranged from 69 to 73 feet bgs. The groundwater flow direction is approximately southwest. Post injection groundwater sampling indicated VOC concentrations were reduced to below applicable regulatory standards (in most cases to non-detect) in all wells except MW1.

Current data was provided by GES in the 2017 *Corrective Action Completion Report* dated March 16, 2017. A site specific risk assessment and detailed file/information search were also completed. Benzene and MTBE analytical groundwater results in MW1 remain above applicable regulatory standards.

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. There are no threatened or impacted supply wells from the groundwater contamination present in MW1. The City of Phoenix obtains the majority of its drinking water from surface water supplied by the Central Arizona Project and the Salt River Project.
2. *Other exposure pathways:* Soil borings GES-2 and GES-4 had VOC contamination that exceeded applicable regulatory standards between 30 and 45 feet bgs (naphthalene) and at 70 feet bgs (BTEX, MTBE, TMBs and naphthalene). The VOC contamination found at 70 feet bgs was considered to represent the smear zone. Given the depth of the VOC contamination, the only complete exposure pathway is inhalation. The bulk of contaminant mass is located near MW1. A decrease in all VOC concentrations is observed from 2009 until the middle of 2012 when an SVE rebound test was done. The vapor intrusion risk to indoor air was determined to be acceptable based on soil vapor data collected and modeled using the Johnson and Ettinger model (on-line screening version) by GES. 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. A church is located north from the site and is where MW6 is located. MW6 has never shown any VOC contamination above laboratory reporting limits since the well was installed in 2006.
3. *Groundwater plume stability:* Groundwater plume stability is demonstrated by the remaining VOC contamination present over a regulatory standard in groundwater is limited to MW1, near the onsite source area. Groundwater monitoring wells and their respective sampling results in the other monitoring wells indicate that the plume is delineated and decreasing in areal extent. MW2 is located approximately 120 feet down gradient from MW1. Since 2010, the benzene concentration has been below laboratory reporting limits, and the MTBE concentration has steadily declined to below laboratory reporting limits. Benzene was detected only once in MW2 in May 2010.
4. *Characterization of the groundwater plume:* Dissolved-phase petroleum hydrocarbons have been characterized. The groundwater flow direction is primarily to the southwest. The depth to groundwater is approximately 70 feet bgs. In August 2004 MW2, MW3 and MW4 were sampled for VOCs by EPA Method 8260B to assess groundwater conditions. MW4 had 29 µg/L of benzene, and 11,400 µg/L of MTBE. To continue characterization, two additional wells were installed in February 2006. MW5 was located east of the easternmost dispenser island, and MW6 was located off site approximately 85 feet north-northwest of MW4. MW5 and MW6 were sampled in March 2006 and no VOCs were reported over laboratory reporting

- limits. Quarterly groundwater sampling occurred between 2004 and 2015. Three rounds of PersulfOx™ injections were done in 2016. Post injection sampling indicated the VOC concentrations were reduced to below AWQS (in most cases to non-detect) in all wells but MW1. In November 2016 all monitoring wells except MW6 were sampled. Four of the five monitoring wells had no contamination present detected over laboratory reporting limits. MW1 showed benzene and MTBE concentrations still exceeded applicable regulatory standards. This well is on site located nearest to the source. The highest benzene concentration was 23,900 µg/L in November 2004 and as of November 2016 is 46.4 µg/L. The highest MTBE concentration was 43,200 µg/L in July 2010 and as of November 2016 is 166 µg/L.
5. *Natural Attenuation:* GES evaluated the natural attenuation of benzene, and MTBE. GES conducted a trend analysis of BTEX and MTBE concentrations in MW1 and MW4 using the GSI Mann-Kendall Toolkit for Constituent Trend Analysis and a Groundwater Spatiotemporal Data Analysis Tool. The bulk of contaminant mass is located near MW1. Since 2012 VOC concentrations have been decreasing with the implementation of improved AS/SVE operations, ISCO remediation, and natural attenuation. The groundwater plume likely will not extend beyond the property line and that natural attenuation is expected to result in the reduction of concentrations with time. GES also collected monitored natural attenuation parameter data in August 2012 which demonstrated that aerobic degradation was occurring at MW1. Anaerobic nitrate and sulfate reducing bacteria are evidenced by the low nitrate and sulfate levels in MW1 as compared to the up gradient well MW5 and the down gradient well MW2.
  6. *Removal or control of the source of contamination:* Source control has been completed by the UST system decommissioning and closure activities that were conducted between July 28 and September 17, 2004. The secondary source of hydrocarbons remaining in soil and groundwater has been effectively removed or reduced through the use of multiple remedial technologies including free product removal and SVE/AS. The soil data collected in 2012 from the four soil borings supports this. Three rounds of PersulfOx® injections were done between July and September 2016 to further reduce groundwater VOC concentrations.
  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 data for MW-1 (source area)

Date	Benzene AWQS is 5 µg/L	MTBE Tier 1 Standard is 94 µg/L	Toluene AWQS is 1,000 µg/L	Ethylbenzene AWQS is 700 µg/L	Xylene AWQS is 10,000 µg/L	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Depth to water (feet)
11/2004	23,900	710	45,000	3,850	23,500			74.00
2005-2008 not sampled due to free product	--	--	--	--	--	--	--	various
10/22/2009	439	904	12,240	343	4,490			71.06
7/12/2010*	1,980	43,200	16,200	1,720	20,300			70.04
9/22/2011	540	11,000	410	<100	1,000			70.75
2/21/2012	30.2	865	32	<10	79			70.52
8/1/2013*	1,550	9,330	3,790	129	4600			73.15
8/21/2014*	1,320	23,000	1,800	180	8280			74.38
4/15/2015*	339	8,290	1,490	<50	7960			72.40
8/6/2015	289	3,930	63	147	857			75.43
6/15/2016	67	57.5	27.1	164	140	-24	0.31	76.75
7/2016 ISCO	--	--	--	--	--	--	--	--
8/2016 ISCO	--	--	--	--	--	--	--	--
9/2016 ISCO	--	--	--	--	--	--	--	--
11/14/2016	46.4	166	8.49	25.4	41	-104	1.01	77.29

Contamination is trapped in the smear zone

\*Sample not purged

Site specific information concerning this closure is available for review during normal business hours at the ADEQ Records Center <http://azdeq.gov/records-center>, 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 **April 25, 2017 and ending May 25, 2017**. Comments should be submitted in writing to the Arizona Department of Environmental Quality, Waste Programs Division, and Attention: Debi Goodwin, 1110 W. Washington Street, Phoenix, AZ 85007.

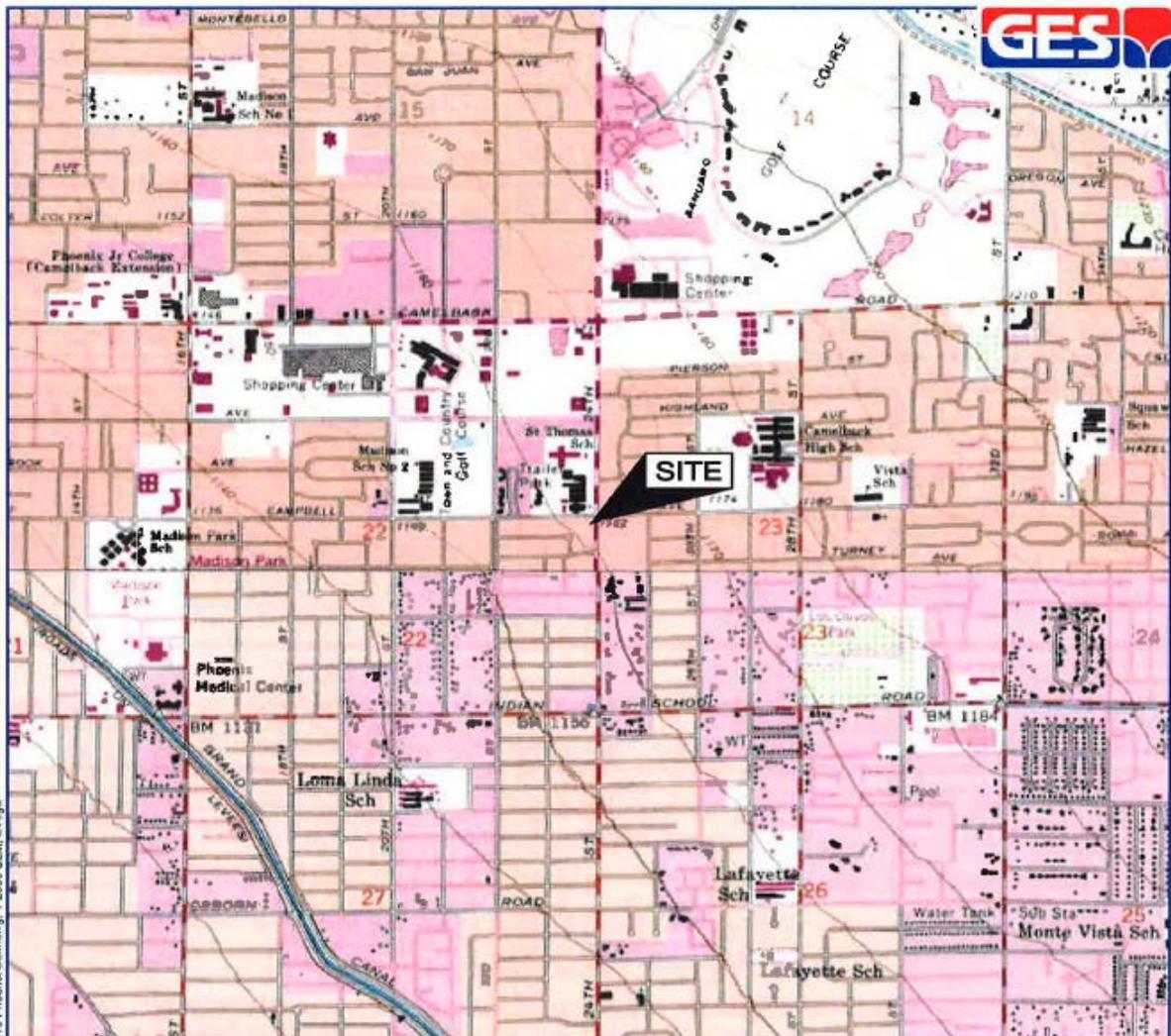
If sufficient public interest is demonstrated during the public comment period, ADEQ will announce and hold a public meeting. ADEQ will respond to written comments following the public comment period. For more information on this notice, please contact Debi Goodwin at (602) 771-4453 or [dg1@azdeq.gov](mailto:dg1@azdeq.gov).

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 [ldb@azdeq.gov](mailto:ldb@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).



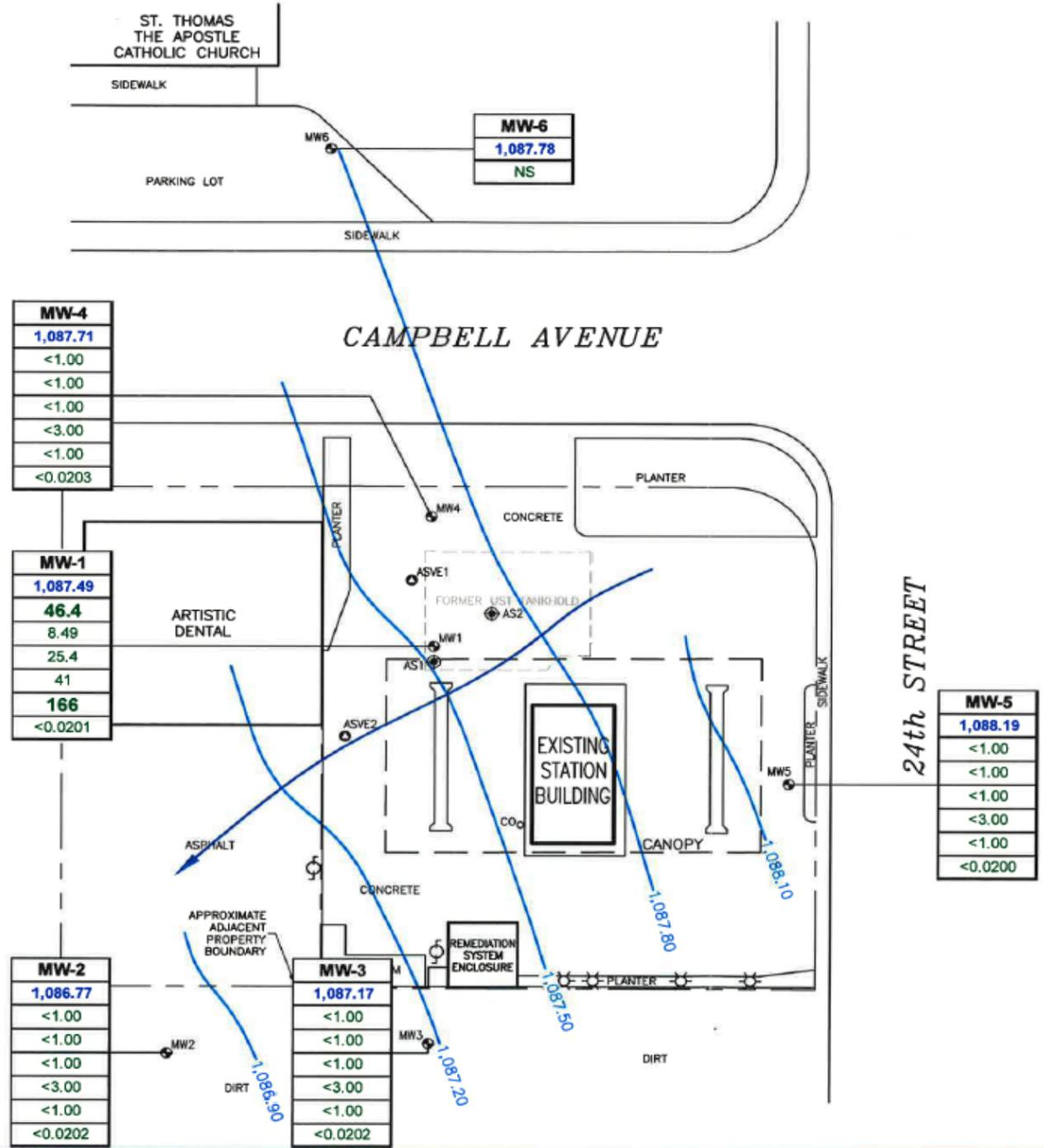
M:\Graphics\3200-Phoenix\ExxonMobil\18-613 Phoenix SLM.dwg, 1-2000 SLM, EV\ega

SOURCE: USGS 7.5 MINUTE SERIES  
 TOP: TOPOGRAPHIC QUADRANGLE 1982  
 SUNNYSLOPE, ARIZONA  
 CONTOUR INTERVAL = 20'  
 BOTTOM: TOPOGRAPHIC QUADRANGLE 1982  
 PHOENIX, ARIZONA  
 CONTOUR INTERVAL = 10'  
 TOWNSHIP - 19N  
 RANGE - 15E  
 SECTION - 23



QUADRANGLE LOCATION

DRAFTED BY: E.V. (N.J.)	<b>SITE LOCATION MAP</b>		
CHECKED BY: B.B.	<b>EXXONMOBIL CORPORATION FORMER MOBIL STATION #18-613 4438 NORTH 24th STREET PHOENIX, ARIZONA</b>		
REVIEWED BY: E.Z.	<b>Groundwater &amp; Environmental Services, Inc. 4050 EAST COTTON CENTER BLVD., BLDG 7, SUITE 71, PHOENIX, AZ 85040</b>		
NORTH 	SCALE IN FEET 	DATE 11-5-12	FIGURE 1



- LEGEND**
- APPROXIMATE PROPERTY BOUNDARY
  - ☐ DISPENSER ISLAND
  - ⊕ UTILITY POLE
  - ⊙ LIGHT POLE
  - CLEAN OUT
  - ⊙ MONITORING WELL
  - ⊙ AIR SPARGE/SOIL VAPOR EXTRACTION WELL
  - ⊙ AIR SPARGE WELL
  - APPROXIMATE GROUNDWATER GRADIENT (feet/foot)
  - ~ LINE OF EQUAL GROUNDWATER ELEVATION; (FEET ABOVE MEAN SEA LEVEL)
- | Well ID | Groundwater Elevation (feet) | Benzene (ug/L) | Toluene (ug/L) | Ethylbenzene (ug/L) | Total Xylenes (ug/L) | MTBE (ug/L) | 1,2-DBA (ug/L) |
|---------|------------------------------|----------------|----------------|---------------------|----------------------|-------------|----------------|
| MW-1    | 1,087.49                     | 46.4           | 8.49           | 25.4                | 41                   | 166         | <0.0201        |
- ug/L MICROGRAMS PER LITER
  - MTBE METHYL *tert*-BUTYL ETHER
  - 1,2-DBA 1,2-DIBROMOETHANE (EDB)
  - <# WHERE AN ANALYTE IS NOT DETECTED A METHOD REPORTING LIMIT IS GIVEN
  - AWQS AQUIFER WATER QUALITY STANDARD
  - NS NOT SAMPLED
  - 1,086.90 GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)
  - BOLD** ANALYTE CONCENTRATION ABOVE AQUIFER WATER QUALITY STANDARDS (AWQS)

DRAFTED BY:	GROUNDWATER MONITORING MAP NOVEMBER 14, 2016		
CHECKED BY:	EXXONMOBIL CORPORATION FORMER MOBIL STATION #18-613 4438 NORTH 24th STREET PHOENIX, ARIZONA		
REVIEWED BY:	Groundwater & Environmental Services, Inc. 4050 EAST COTTON CENTER BLVD., BLDG 7, SUITE 71, PHOENIX, AZ 85040		
NORTH	SCALE IN FEET	DATE	FIGURE
		12-22-16	5

SOURCE: ERI, SEPTEMBER 2008.

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

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**Date:** April 3, 2017  
**To:** LUST File  
**From:** Debi Goodwin, Sr. Risk Assessor  
UST-LUST Section  
**Subject:** Tier 3 Risk Assessment  
Former Mobil Service Station #18613  
Facility No. 0-003208 LUST No. 5423.01

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**Background**

The former Mobil Service Station #18613 is located at 4438 N. 24<sup>th</sup> Street in Phoenix which is the southeast corner of 24<sup>th</sup> Street and Campbell Avenue. This former service station is currently inactive but still owned by ExxonMobil. The former UST system was installed in 1984. UST system decommissioning and closure activities were conducted between July 28 and September 17, 2004. The UST closure soil samples collected at 14 feet bgs were analyzed for VOCs using EPA Method 8260B. None of the soil samples indicated VOC contamination present over laboratory reporting limits. Additional soil borings were installed as part of a possible sale. Benzene was reported over applicable regulatory standards at 30 feet bgs (4.31 mg/Kg) and at 40 feet bgs (10.2 mg/Kg) at location KB5. This location was located in the former 6,000 gallon UST area. A release was reported to ADEQ based on this soil data. Additional drilling and soil sampling was conducted in November 2004. Soil boring B1 (at location KB5) was drilled to 97 feet bgs and completed as groundwater monitoring well MW1. Benzene contamination was present over the rSRL in B1 between 30 and 70 feet bgs. Benzene contamination was present over the rSRL at 30 feet bgs in B2 and at 40 feet bgs in B4. A groundwater grab sample was collected during the drilling of MW1 (before the well was completed) and BTEX and 1,2-DCA concentrations exceeded AWQS<sup>1</sup>. MTBE also exceeded the Tier 1 Corrective Action Standard. Corrective actions including free product removal from MW1 between 2005 and 2009 and the installation of MW2-MW5 on site and MW6 off site was completed in 2006. The Site Characterization Report was approved in 2006, and a CAP was requested. In 2007, AS and SVE wells were installed and an AS/SVE pilot test was conducted in February 2007. The CAP was approved in 2008. Free product was last observed in MW1 in 2009. ExxonMobil hired Groundwater & Environmental Services, Inc. (GES) to continue corrective actions. The AS/SVE system began operation in June 2010 and ran until June 2015. The system was temporarily turned on in February 2016 for a rebound test. The system has not been in operation since. In-situ chemical oxidation (ISCO) was done at AS2 (up gradient of MW1) three times in 2016. Contamination in soil and groundwater was primarily limited to the nearby source area.

**Purpose**

Current data provided by GES in the 2017 *Corrective Action Completion Report* dated March 16, 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**

Subsurface soils consist of layers of silts and sandy silts from ground surface to a depth of approximately 60 feet bgs. Alternating layers of well and poorly graded sand of varying thickness appear to a depth of 88 feet bgs. Since 2005, the depth to groundwater has ranged from 69 to 73 feet bgs. In 2012, GES installed four confirmation soil borings in areas that exhibited VOC contamination concentrations that exceeded applicable

rSRLs and GPLs. GES-2 and GES-4 exceeded applicable regulatory standards between 30 and 45 feet bgs (naphthalene) and at 70 feet bgs (BTEX, MTBE, TMBs and naphthalene). The VOC contamination found at 70 feet bgs was considered to represent the smear zone. Given the depth of the VOC contamination, the only complete exposure pathway is inhalation. The bulk of contaminant mass is located near MW1. A decrease in all CoC concentrations is observed from 2009 until the middle of 2012 when an SVE rebound test was done.

#### Soil Vapor

To evaluate the potential inhalation risk from the subsurface soil contamination four shallow (5 feet) temporary soil vapor probes were installed on February 7, 2017. The soil vapor samples were analyzed for VOCs by EPA Method TO-15 (did include the ADHS approved additional 31 compounds dated November 2011). Laboratory quality assurance (QA) and field QA measures are adequate for risk assessment data quality objectives.

A risk assessment was performed by GES. 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 May 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 generally includes an evaluation of the compounds of concern (CoCs) associated with the fuel release and a separate evaluation of any non-petroleum related compounds. The only CoCs were petroleum related (BTE, naphthalene and 1,2,4-TMB).

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 forward calculation. Typical residential parameters were used in the model. The indoor air exchange rate used was  $0.25 \text{ hr}^{-1}$  which is the model's default value and the soil type was loam. The High Indoor Air Prediction for the J&E simulation Results is used as the first comparison for a conservative approach. The ELCR was  $3.71 \times 10^{-7}$  and the HI was  $2 \times 10^{-4}$ . These values demonstrate no unacceptable risk posed by any remaining VOC contamination in the soil.

#### Groundwater

The groundwater flow direction is primarily to the southwest. The depth to groundwater is approximately 70 feet bgs. Historic groundwater data shows VOC contamination present over applicable regulatory standards. In August 2004 MW2, MW3 and MW4 were sampled for VOCs by EPA Method 8260B. MW4 had  $29 \mu\text{g/L}$  of benzene, and  $11,400 \mu\text{g/L}$  of MTBE. To continue characterization, two additional wells were installed in February 2006. MW5 was located east of the easternmost dispenser island, and MW6 was located off site approximately 85 feet north-northwest of MW4. MW5 and MW6 were sampled in March 2006 and no VOCs were reported over laboratory reporting limits. Quarterly groundwater sampling occurred between 2004 and 2015. In November 2012, MW1 was sampled and CoC concentrations had greatly increased since the August 2012 sampling event. The benzene concentration increased from  $37.4 \mu\text{g/L}$  to  $1,120 \mu\text{g/L}$ . GES determined the increase in concentration was due to AS1 becoming blocked and the CoCs moved into MW1.

Three rounds of PersulfOx® injections were done in AS2 during July, August and September 2016. Post injection sampling from November 2016 indicated the VOC concentrations were reduced to below AWQS (in most cases to non-detect) in all wells but MW1. Only benzene at  $46.4 \mu\text{g/L}$  and MTBE at  $166 \mu\text{g/L}$  were present in MW1 over applicable regulatory standards.

GES conducted a trend analysis of BTEX and MTBE concentrations in MW1 and MW4 using the GSI Mann-Kendall Toolkit for Constituent Trend Analysis and a Groundwater Spatiotemporal Data Analysis Tool. CoC concentrations increased after the SVE rebound test. Since 2012 CoC concentrations have been decreasing with the implementation of improved AS/SVE operations, ISCO remediation, and natural attenuation.

In a ¼ mile receptor survey, there are no private potable or non-potable wells nor any public drinking water wells. There are no sensitive receptors like schools, day care centers or hospitals within ¼ mile. A church is located north and up gradient from the site where MW6 is located. MW6 has never shown any VOC contamination above laboratory reporting limits since 2006. There are no threatened or impacted supply wells from the groundwater contamination present in MW1. The City of Phoenix obtains the majority of its drinking water from surface water supplied by the Central Arizona Project and the Salt River Project. A commercial office is located on an adjacent property to the west, and private residences are located in the vicinity.

**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 November 2016 does show VOC 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 5423.01 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 [dgl@azdeq.gov](mailto:dgl@azdeq.gov).