

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

LUST Case File #: 1559.01
Facility ID # 0-006512
Coconino County

Corn's Fuel and Tire Service
825 North Navajo Street
Page, Arizona 86040

Background:

The Site operated as a fueling facility from the early 1970s until 1991 under the previous and current owner of the property, who purchased the Site in 1986. Given the age of the fueling facility, leaded gasoline was dispensed. The Site has also served as a tire and automotive repair facility from the early 1970s until the present, although activity after 1992 has been intermittent.

A total of five fuel storage tanks, designated Tank Nos. 1 through 5, were originally registered at the Site. Tank Nos. 1 through 4 were underground storage tanks (USTs) located in three separate pit areas northeast of the service building. Tank No. 5 was an above-ground tank (AST) located east of the service building. Tank Nos. 1, 2, and 4 were used to store gasoline; Tank No. 3 contained diesel fuel; and Tank No. 5 was used to store kerosene.

Issuance of leaking UST Release No. 1559.01 occurred due to observations of hydrocarbons in soil and free product by the City of Page (City) during an excavation of the sewer line along the northwestern edge of the Site in late 1990. The AST (Tank No. 5) was removed in 1986, and the remaining four USTs were decommissioned and subsequently removed in late 1991. The former UST pits were excavated into bedrock at depths of 9 to 17.5 feet. Subsequent investigation activities were conducted by multiple consultants since 1991. The investigations included completing soil borings, sampling soil vapor (SV), installing thirteen monitoring wells (MWs), and conducting multiple groundwater monitoring events.

In April 2017, soil samples were collected from 16 locations in the vicinity of the former tank pits, distribution piping, and dispenser islands. Laboratory analytical results for soil samples reported benzene, 1,2,4-trimethylbenzene (examples of Volatile Organic Compounds [VOCs]), and tetraethyl lead (TEL), an additive in leaded gasoline, detected above Arizona residential Soil Remediation Levels (rSRLs).

On October 24, 2019, Brown and Caldwell (BC) subcontracted Johnson Environmental Technologies to conduct confirmation soil borings using a direct-push drilling rig to advance soil borings to 5 feet below ground surface (bgs) or to bedrock refusal. Soil sampling was conducted to confirm subsurface conditions in areas where TEL exceedances were reported during the 2017 soil excavation event and to confirm soil conditions below the former AST location. Confirmation borings (CB) were conducted at ten locations (CB-1 through CB-10). Soil samples CB-1 through CB-7 were submitted for laboratory analysis of TEL by method 8270 SIM, and soil samples CB-8 through CB-10 were submitted for analysis of VOCs by method 8260B.

Analytical results reported concentrations of TEL below rSRLs in each sample with the exception of sample CB-3 (0.012 milligrams per kilogram [mg/kg]), collected near the sewer utility line northeast of well MW-2. The remaining samples were collected to delineate areas where previous confirmation samples had reported TEL exceedances. The most recent confirmation samples suggest the previous exceedances were anomalous and not indicative of recoverable contamination. Additionally, analytical results for samples CB-8, CB-9, and CB-10 reported VOC concentrations were non-detect at concentrations below rSRLs for the samples at the former AST location.

Removal or control of the source of contamination:

A UST system, piping, and dispensers were excavated and removed from the Site in 1991 by the property owner. Extensive soil excavation was conducted in November 2017 to remove 1,400 tons of soil and replace it with clean fill material.

In September 2018, a 1-month dual-phase extraction (DPE) event was conducted at monitoring wells MW-2, MW-3, and MW-13, and confirmation soil borings and soil vapor samples were collected to evaluate Site conditions. Analytical results reported the presence of TEL in exceedance of the rSRL in the area where several utility lines congregate north of the former fuel dispenser canopy.

On June 17, 2019, BC subcontracted Blaes Environmental Management, Inc., to conduct a DPE event at monitoring wells MW-1, MW-5, MW-6, and MW-8 to address benzene exceedances in well MW-1 as reported by groundwater samples collected on February 28, 2019, and April 16, 2019. The event consisted of mobilizing a truck-mounted electric-catalytic thermal oxidizer system to simultaneously remove vapors and groundwater from the wells. Hydrocarbon vapors extracted by the system were burned off by passing through the catalytic unit on the truck. Extracted groundwater was separated from the vapors by a knockout tank located on the truck. The DPE event was conducted for 2 weeks beginning June 17, 2019 and ending on July 1, 2019. During the event, BC collected four sets of vapor samples to monitor influent and effluent vapor concentrations in the system. The influent vapor sample collected at startup was the only sample to report detectable concentrations of VOCs. Vapor samples collected during the remainder of the DPE event reported non-detect concentrations.

On January 21, 2020, BC subcontracted Environmental Response, Inc. (ERI), to excavate soil down to bedrock (at approximately 3.5 feet bgs) to address remaining TEL exceedances at the CB-3 location. BC personnel collected six post-excavation soil samples (CX-1 through CX-6) for laboratory analysis of TEL. During the excavation, an unidentified tarpaper pipe was encountered. BC contacted the City to notify them of the unknown pipe. After inspecting the piping, the City determined that the pipe was an abandoned sewer line that was no longer in service. The City gave permission to remove necessary piping to complete the excavation. On January 22, 2020, ERI backfilled the excavation with a clean, AB aggregate, which was compacted to grade. Asphalt will be installed to complete excavation activities once the asphalt plant reopens in the spring. Excavated soil was loaded into haul trucks and transported offsite. A total of 41 tons of excavated material was delivered to Painted Desert Landfill in Joseph City, Arizona for disposal. Laboratory analytical results for post-excavation soil samples reported TEL concentrations below the rSRL for all six samples collected.

Based on remediation work completed to date, soil at the Site has been remediated to below rSRLs.

Characterization of the groundwater plume:

Since September 1992, a total of 13 wells have been installed at the Site to monitor groundwater conditions.

Historical groundwater depths range from approximately 2 to 13 feet bgs. Based on the most recent groundwater monitoring event during January 2020, the groundwater gradient is approximately 0.0078 feet per foot, with a flow direction to the northeast.

The City of Page was constructed on top of a sandstone mesa; thus, the Site is underlain by shallow sandstone hard rock affecting groundwater elevations. Generally, groundwater flows towards the northeast, making well MW-5 the down gradient well and MW-10 the up gradient well. Wells MW-2, MW-3, MW-5, MW-6, MW-7, MW-8, and MW-10 surround the property on the west, north, and east sides. Monitoring wells MW-12 and MW-13 are considered within the source area of the plume (former tank pits and dispenser islands, respectively).

The highest reported benzene concentration at the Site occurred on March 13, 2017, at well MW-11 (4,770 micrograms per liter [$\mu\text{g/L}$]) prior to being destroyed during the soil excavation event in November 2017. During the 2016–2020 monitoring period, benzene concentrations exceeding the Arizona Aquifer Water Quality Standard (AWQS) have been observed in wells MW-1, MW-2, MW-3, MW-4, MW-9, and MW-11. Additionally, 1,2-Dichloroethane [1,2-DCA] concentrations exceeding the AWQS have been reported in wells MW-11 and MW-13. 1,2-DCA is a component of leaded gasoline.

The soil excavation and DPE events have reduced soil and groundwater concentrations to below AWQS in all wells, with the exception of 1,2-DCA in well MW-13. On August 8, 2019, BC field staff completed a compliance groundwater sampling event that included collecting groundwater samples from each of the ten monitoring wells at the Site. Groundwater samples were collected and submitted for laboratory analysis of VOCs. Concentrations of 1,2-DCA exceeded the AWQS in sample MW-13 (41.5 $\mu\text{g/L}$). Additionally, the laboratory reporting limit for 1,2-dibromoethane (EDB) exceeded the Arizona AWQS in all ten samples. EDB was analyzed in 2018 using a lower detection limit method to get below the AWQS, and no EDB was reported over laboratory reporting limits. EDB is a component of leaded gasoline.

The most current groundwater sampling data (January 2020) reports no VOCs exceed the Arizona AWQS in any of the wells with the exception of 1,2-DCA at well MW-13 (5.09 $\mu\text{g/L}$). This data supports that the plume is characterized.

Liquid-phase hydrocarbons were not detected in any of the monitoring wells during groundwater monitoring events.

Groundwater plume stability:

Groundwater at the Site has been monitored since June 2016 with AWQS exceedances reported at several monitoring wells. Remediation efforts have significantly reduced groundwater impacts

since monitoring began. Well MW-13 was installed to replace well MW-11, which was destroyed during soil excavation (November 2017). Currently, monitoring well MW-13 is the only well exceeding AWQS (1,2-DCA at 5.09 µg/L). Well MW-13 takes several days to recharge after being purged dry during groundwater sampling events.

The GSI Mann-Kendall Toolkit (Microsoft Excel based software) was used to analyze the time series water quality using the Mann-Kendall statistical method to quantitatively determine whether there is an increasing, decreasing, or stable trend or no trend is apparent. Mann-Kendall analysis results report that 1,2-DCA in well MW-13 shows a stable trend in the source area.

Currently the only AWQS exceedance at the Site is 1,2-DCA. BC evaluated existing concentrations using the EPA's BIOSCREEN Natural Attenuation Decision Support System, version 1.4, 1997 (BIOSCREEN) modeling software. VOC data from the most recent groundwater sampling event (January 2020) was used. At no point during the 10-year simulation period does VOC concentrations exceed AWQS more than 10 feet down gradient from the source area. The parcel boundary is approximately 50 feet from well MW-13.

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.

The primary line of evidence for natural attenuation is decreasing contaminant concentration trends. Based on a review of groundwater analytical data and results of the Mann-Kendall Toolkit, a decreasing trend of concentrations in groundwater is well documented in all wells.

Since 1,2-DCA is a chlorinated constituent, the first-order decay model in BIOSCREEN was applied. Using a half-life estimate of 15 years for 1,2-DCA, the model predicts the concentration will decline below Arizona AWQS within 10 years and will not exceed the AWQS more than 10 feet down gradient of well MW-13.

The secondary line of evidence is hydrogeologic and geochemical data that can be used to demonstrate indirectly the type(s) of natural attenuation processes active at the Site. Monitored Natural Attenuation parameters were sampled on August 29–30, 2018. Nitrate concentrations within the remediated plume are low (<1 milligram per liter [mg/L]), and nitrate concentrations outside the remediated plume area are greater (>3 mg/L). Wells MW-2 and MW-3 are located next to the sewer line and utility trench, which may contribute to the higher methane levels. Additionally, dissolved oxygen (DO) concentrations were collected routinely, most recently in January 2020. DO concentrations across the Site have generally ranged between <1 mg/L and over 12 mg/L. DO concentrations at well MW-7, MW-8, and MW-13 report the highest DO concentrations (>6 mg/L). The low concentrations of nitrate in the source area indicate depletion of nitrate as an electron acceptor in the source area. However, elevated nitrate remains in down gradient groundwater. The absence of methane in multiple wells at the Site indicates that methanogenic fermentation is not a major process within this groundwater plume.

Threatened or impacted drinking water wells:

BC conducted a query of the Arizona Department of Water Quality (ADWR) Wells 55 database to evaluate the possibility of contamination in registered wells near the Site. The query included registry numbers, cadastral locations, ownership information, and well use for wells located within one-half mile of the Site. The query reports that 139 total wells are registered within one-half mile of the Site. Of the wells queried, 4 wells are listed as cancelled or abandoned, and the remaining 135 wells are listed for environmental use. None of the wells queried are registered for drinking water production or domestic use.

The City of Page operates a regulated public water system (AZ04-03017) which pumps water from the Colorado River-Lake Powell. According to the most recently posted Consumer Confidence Report (2018) on the City's webpage, in March 2018 there were no detections of VOCs in samples collected from the distribution system. The Page Utility Enterprises Water Distribution Division operates the Water Treatment Plant maintains an adequate supply of water for the citizens of Page and maintains full compliance with the ADEQ. The Water Treatment Plant treats all water for the City of Page.

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:

In general, property use within one-half mile of the Site is a mixed use of retail/commercial and residential. Potential receptors include workers near contaminated soil and occupants of the surrounding buildings. However as stated previously, soil across most of the parcel has been excavated down to bedrock, thereby eliminating the potential for soil ingestion and direct contact. Any potentially impacted soil remaining at the Site would exist beneath paved areas associated with North Navajo Drive and on-site buildings, thereby limiting the potential for exposure.

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 the 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 representing source area, up gradient, and down gradient conditions:

MW-10 (up gradient well installed 5/16)
Total Depth: 15 feet. Screened 2-15 feet.

Date	Benzene AWQS is 5.0 µg/L	1,2-DCA AWQS is 5.0 µg/L	Depth to Water (feet)
May 2016	0.705	1.17	12.58
March 2017	<1.0	<1.0	5.35
March 2018	<0.1	<0.1	5.98
August 2018	<0.1	<0.1	2.87
September-October 2018 DPE event			
November 2018	<0.185	<0.283	9.54
February 2019	<0.185	<0.283	3.00
June 2019 DPE event			
August 2019	4.37	<0.361	4.08
January 2020	<0.331	<0.361	5.83

MW-12 (UST basin; well installed 2/18 to replace MW-9 which was destroyed during source area excavation in 12/17)

Total Depth: 15 feet. Screened 2-15 feet.

Date	Benzene AWQS is 5.0 µg/L	1,2-DCA AWQS is 5.0 µg/L	Depth to Water (feet)
March 2018	<0.1	1.51	11.39
August 2018	<0.1	<0.1	7.85
September-October 2018 DPE event			
November 2018	<0.1	<0.1	7.24
February 2019	<0.185	<0.283	6.19
June 2019 DPE event			
August 2019	<0.331	<0.361	3.90
January 2020	<0.331	<0.361	5.39

MW-13 (well installed 2/18 to replace MW-11 which was destroyed during source area excavation in 12/17)

Total Depth: 15 feet. Screened 2-15 feet.

Date	Benzene AWQS is 5.0 µg/L	1,2-DCA AWQS is 5.0 µg/L	Depth to Water (feet)
March 2018	1.86	19.6	12.56
August 2018	<0.1	17.6	2.05
September-October 2018 DPE event			
November 2018	Not sampled	Not sampled	15.40* well did not recover after purging

February 2019	<0.185	4.69	14.77
June 2019 DPE event			
August 2019	<0.331	41.8	2.45
January 2020	<0.331	5.09	6.23

MW-5 (down gradient well installed 5/3/16)
Total Depth: 15 feet. Screened 1-15 feet.

Date	Benzene AWQS is 5.0 µg/L	1,2-DCA AWQS is 5.0 µg/L	Depth to Water (feet)
May 2016	<1.0	<1.0	11.99
March 2017	<1.0	<1.0	2.43
March 2018	<0.1/<0.1	<0.1/<0.1	2.63
August 2018	<0.1	<0.1	1.68
September-October 2018 DPE event			
November 2018	<0.925	<1.42	3.34
February 2019	<0.185	<0.283	0.60
June 2019 DPE event			
August 2019	<0.331	<0.361	2.25
January 2020	<0.331	<0.361	2.91

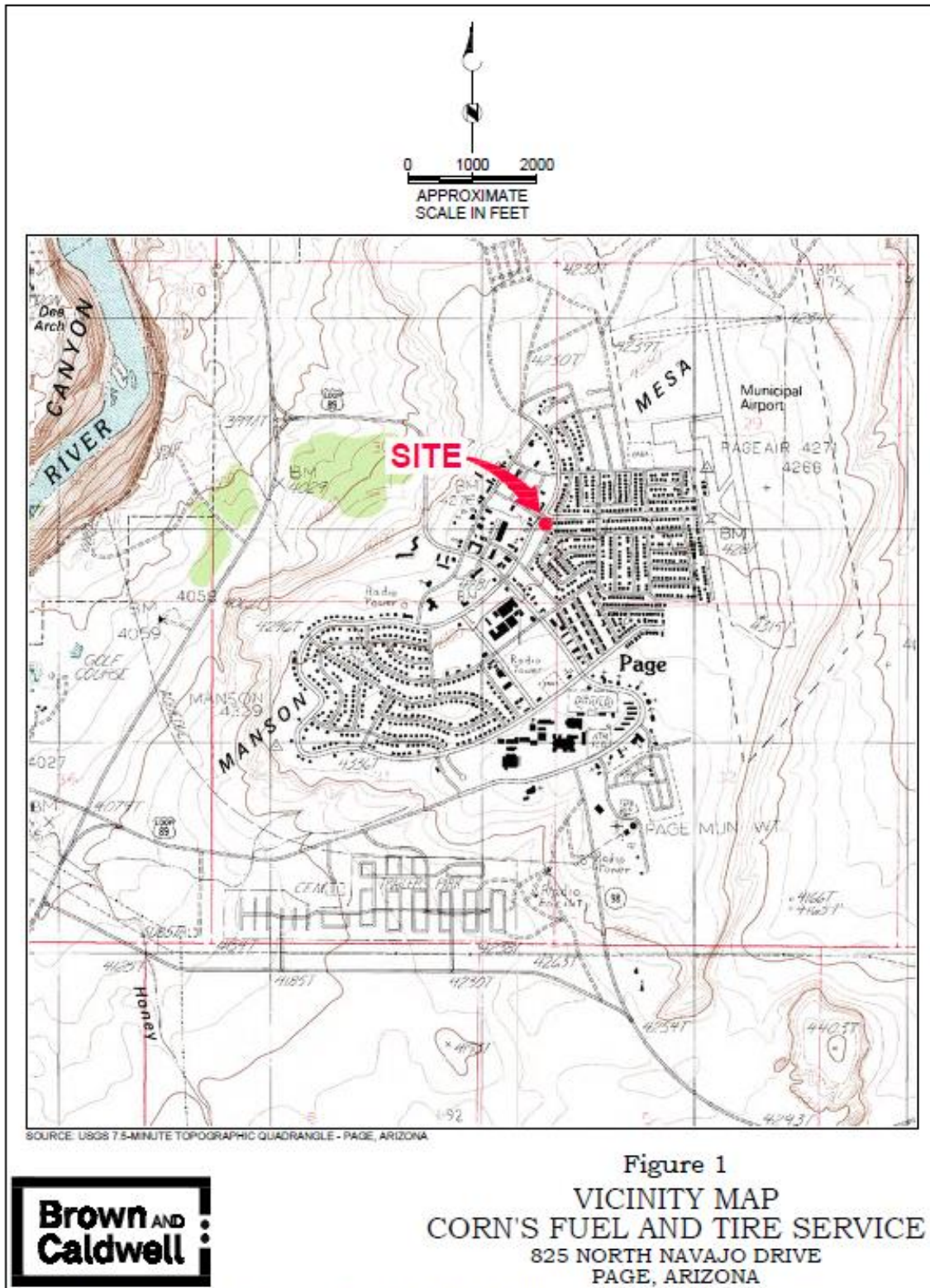
MW-6 (cross gradient perimeter well installed 5/3/16)
Total Depth: 15 feet. Screened 2-15 feet.

Date	Benzene AWQS is 5.0 µg/L	1,2-DCA AWQS is 5.0 µg/L	Depth to Water (feet)
May 2016	<1.0	<1.0	5.40
March 2017	<1.0	<1.0	3.79
March 2018	<0.1	<0.1	3.80
August 2018	<0.1	<0.1	2.80
September-October 2018 DPE event			
November 2018	<0.1	<0.1	5.41
February 2019	<0.185	<0.283	3.17
June 2019 DPE event			
August 2019	0.339	<0.361	2.80
January 2020	<0.331	<0.361	4.98

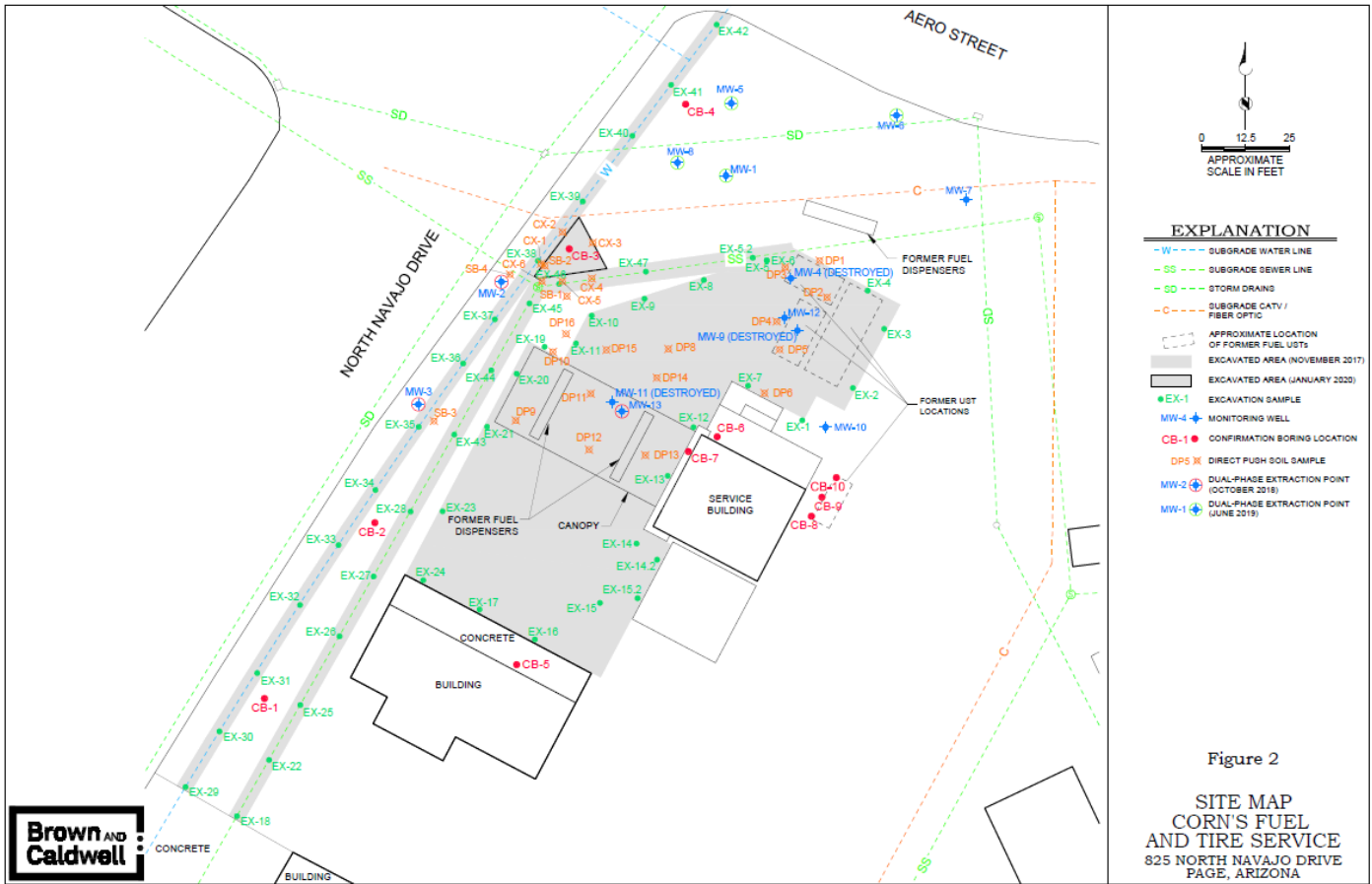
MW-7 (cross gradient perimeter well installed 5/3/16)
Total Depth: 15 feet. Screened 2-15 feet.

Date	Benzene AWQS is 5.0 µg/L	1,2-DCA AWQS is 5.0 µg/L	Depth to Water (feet)
May 2016	<0.001	<1.0	7.83
March 2017	<1.0	<1.0	5.87
March 2018	<0.1	<0.1	7.40

August 2018	<0.1	<0.1	6.02
September-October 2018 DPE event			
November 2018	<0.1	<0.1	6.16
February 2019	<0.185	<0.283	4.16
June 2019 DPE event			
August 2019	<0.331	<0.361	4.50
January 2020	<0.331	<0.361	6.90

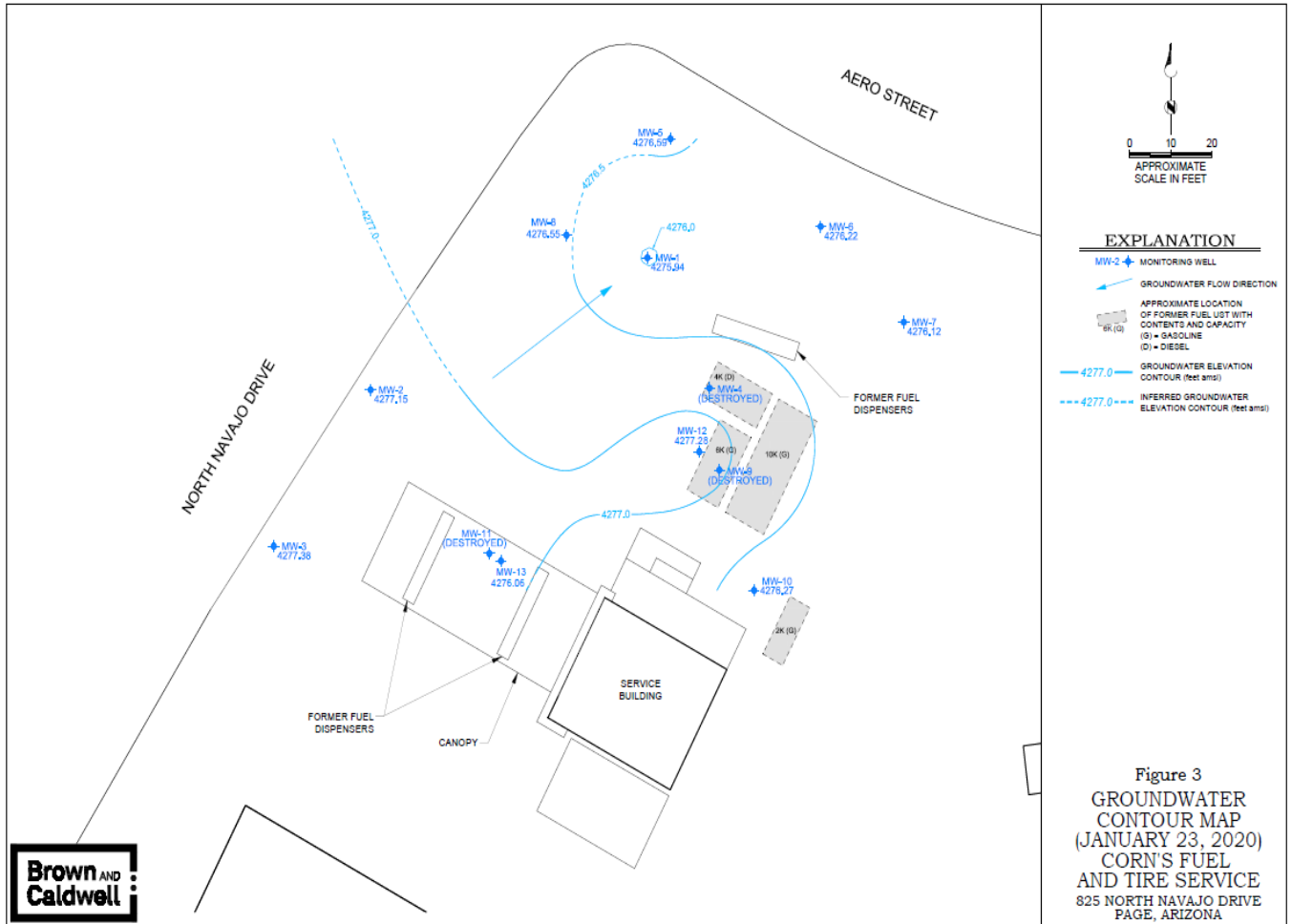


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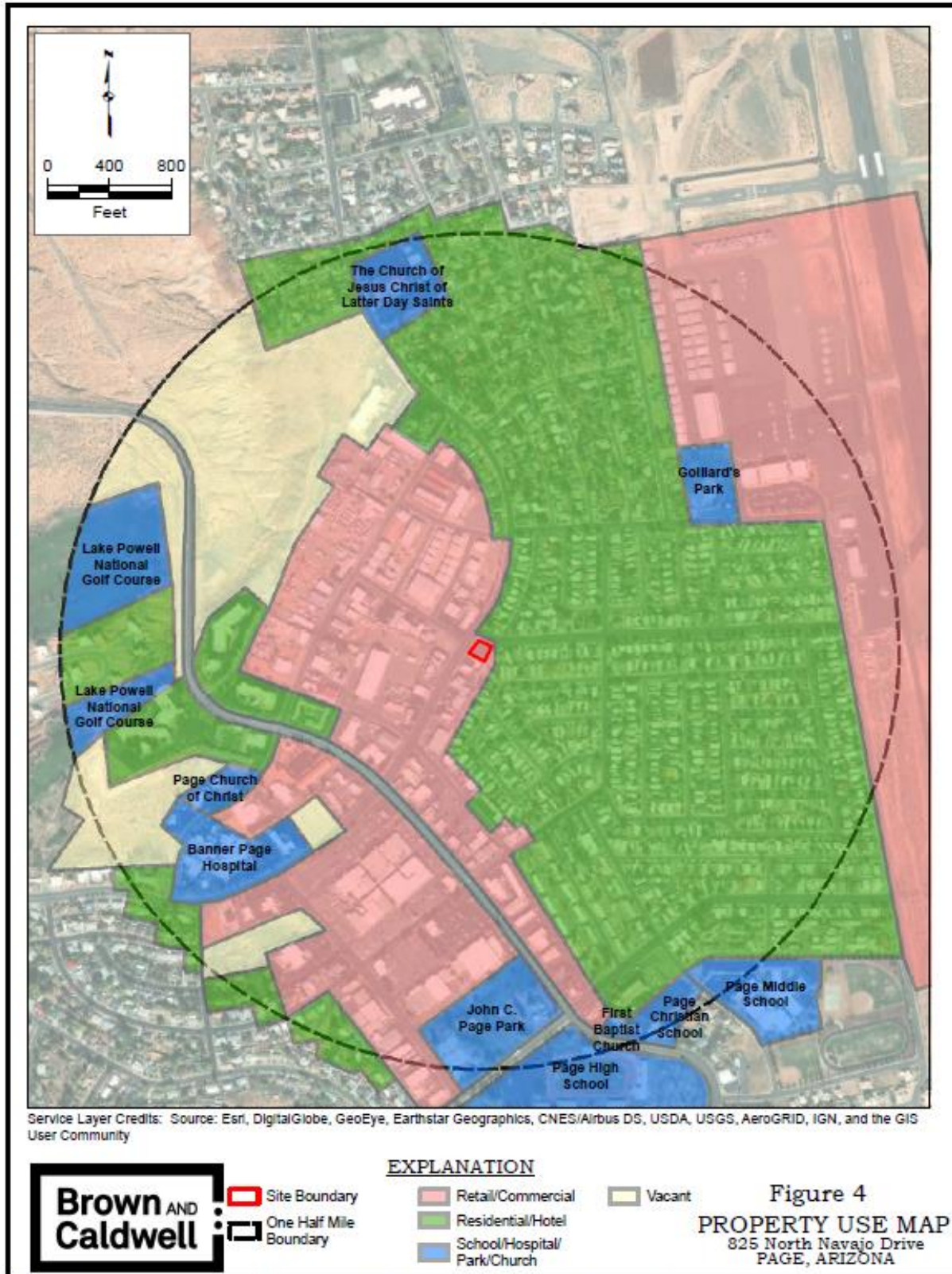
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