DEPARTMENT OF
ECOLOGY
State of Washington

Ione Airport Kwik Stop Groundwater Monitoring

September 2013 – August 2016 Results

March 2017

Publication No. 17-03-005

Publication and contact information

This report is available on the Department of Ecology's website at https://fortress.wa.gov/ecy/publications/SummaryPages/1703005.html.

Data for this project are available at Ecology's Environmental Information Management (EIM) website www.ecy.wa.gov/eim/index.htm. Search Study ID FS32584416.

The Activity Tracker Code for this study is 14-022.

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Ione Airport Kwik Stop Groundwater Monitoring

September 2013 – August 2016 Results

by

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Water Resource Inventory Area (WRIA) and 8-digit Hydrologic Unit Code (HUC) numbers for the study area:

WRIA
- 62

HUC number
- 17010216

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Abstract

In 2013-2016, the Washington State Department of Ecology conducted quarterly groundwater sampling of 33 wells at the Ione Airport Kwik Stop cleanup site. The site consists of multiple commercial, residential, and undeveloped properties that occupy approximately 50 acres in the vicinity of Highway 31, approximately 2 miles south of Ione, Washington. Groundwater beneath the project area is contaminated with gasoline-range petroleum hydrocarbons (GRPH), and benzene, toluene, ethylbenzene, and xylenes (BTEX).

Of the wells sampled during the most recent monitoring event in August 2016, 12 wells (43%) had GRPH concentrations that exceeded the Model Toxics Control Act (MTCA) Method A cleanup level of 800 ug/L. GRPH concentrations in these wells ranged from 1,040 to 28,700 ug/L in August 2016. BTEX constituents were detected at concentrations higher than the applicable MTCA Method A cleanup levels in three of the sampled wells (11%), which are located between the Kwik Stop and the Cabin Grill, a former restaurant located downgradient to the southeast of the Kwik Stop. The most significant groundwater contamination exists in the vicinity of the Kwik Stop and the Cabin Grill. Active remediation is ongoing at the two locations.

Results from Mann-Kendall trend analyses indicate GRPH and BTEX concentrations in groundwater are decreasing across the site. Although decreasing levels of GRPH and BTEX have been observed, there are still areas within the site where groundwater contamination exceeds the applicable cleanup levels and additional monitoring and remediation are needed.

Acknowledgements

The author of this report thanks the following people for their contributions to this study:

- Dave Lauder, Jonathan Rudders, and Bruce Williams of GeoEngineers provided the Quality Assurance Project Plan, Remedial Investigation, Feasibility Study, and quarterly groundwater monitoring reports.
- Katie Hall, Kevin Randall, and Scott Lathen of GeoEngineers conducted quarterly groundwater monitoring.
- Tonya Kauhi of GeoEngineers managed project data.
- Washington State Department of Ecology staff:
  - Manchester Environmental Laboratory analyzed project samples. Special thanks to Nancy Rosenbower, Dolores Montgomery, Bob Carrell, Dean Momohara, and Leon Weiks.
  - Scott Tarbutton, Huckleberry Palmer, and Doug Ladwig helped with the study design.
  - Pam Marti reviewed project reports.
  - Andy Albrecht and Philip Lefler assisted with field work.

Introduction

In 2008, the Washington State Department of Ecology (Ecology) documented a petroleum release occurring at the Airport Kwik Stop, a fueling station and convenience store located in Ione, Washington. Ecology was first notified of the release in April 2008 when the owner of the Cabin Grill, a restaurant located downgradient to the southeast of the Kwik Stop, reported a strong gasoline odor emanating from the water tap. Subsequent investigations identified the presence of petroleum contaminated groundwater from the Airport Kwik Stop to the Cabin Grill, as well as several downgradient domestic water supply wells located along the Pend Oreille River (Figure 1).

The Kwik Stop historically sold gasoline and diesel. Three underground storage tanks (UST) were located on the property and were decommissioned in 1989. The Kwik Stop continued to sell gasoline dispensed from above-ground storage tanks (AST) until the petroleum release was discovered at the premium gasoline pump in 2008. A leaking flex pipe was repaired and returned to service briefly until the Kwik Stop discontinued fuel sales in the fall of 2008 (Lauder, 2013). Ecology conducted investigations related to the monitoring of groundwater contamination and evaluating options for groundwater remediation. The Kwik Stop still operates as a convenience store.

Two remediation units were installed to expedite cleanup in the area. The first Soil Vapor Extraction (SVE) unit was installed at the Kwik Stop in December 2012. A second Soil Vapor Extraction and Air Sparge (SVE/AS) unit was installed near the Cabin Grill in January 2016, and an additional AS unit was installed at the Kwik Stop in November 2016.

Groundwater samples were collected quarterly to determine the extent and magnitude of petroleum contamination present in groundwater beneath the site.

Since the discovery of the Airport Kwik Stop petroleum release in 2008, Ecology's Toxics Cleanup Program (TCP) has been responsible for (1) establishing cleanup standards for petroleum products in soil and groundwater and (2) selecting appropriate cleanup actions to remediate soil and groundwater pursuant to the Model Toxics Control Act (MTCA), Revised Code of Washington (RCW) 70.105D.

Ecology contracted GeoEngineers to conduct a Remedial Investigation (RI) and Feasibility Study (FS) to determine the nature and extent of petroleum contamination in soils and groundwater and to identify environmental receptors and potential routes of exposure. GeoEngineers also conducted quarterly groundwater monitoring at the site from 2010 through 2012. Quarterly groundwater monitoring was continued by Ecology's Environmental Assessment Program (EAP) in 2013 and is ongoing.

Because the Kwik Stop is near multiple domestic water supply wells, this site is a priority for the monitoring and remediation of contaminated groundwater beneath the site.

Site Description

The Airport Kwik Stop cleanup site is a former gas station and convenience store located on the northwest corner of Highway 31 and Greenhouse road near the town of Ione. Also included in the study area are (1) the Cabin Grill property located southeast from the Kwik Stop, (2) vacant properties directly east of the Kwik Stop across Highway 31 and southeast of the Cabin Grill, and (3) several residential properties located to the east and southeast of the Kwik Stop.

The groundwater monitoring network includes 26 monitoring wells and 7 domestic wells. A map of the site area and general groundwater flow direction is shown in Figure 1.

Hydrogeologic Conditions

Subsurface exploration conducted by GeoEngineers during the Remedial Investigation activities of 2010-2012 indicates that the unconfined aquifer beneath the site consists primarily of sand with variable silt, extending to 50 feet below ground surface (bgs) in some places. The upper layer of sand and silt is underlain by low-permeability silt and clay (Lauder, 2013). Review of direct-push and monitoring-well installation logs show that subsurface conditions are relatively homogenous across much of the site.

The aquifer supplies water to the Kwik Stop and Cabin Grill properties, as well as five other residential properties. Depth to groundwater throughout the study area ranged from 14 to 42 feet bgs. The groundwater flow direction is generally east-southeast throughout the study area.

Interpolation of confining bed elevations from direct-push boring logs indicates there is a depression in the confining bed near the Cabin Grill that may partially explain the consistently high GRPH and BTEX contamination near the Cabin Grill.

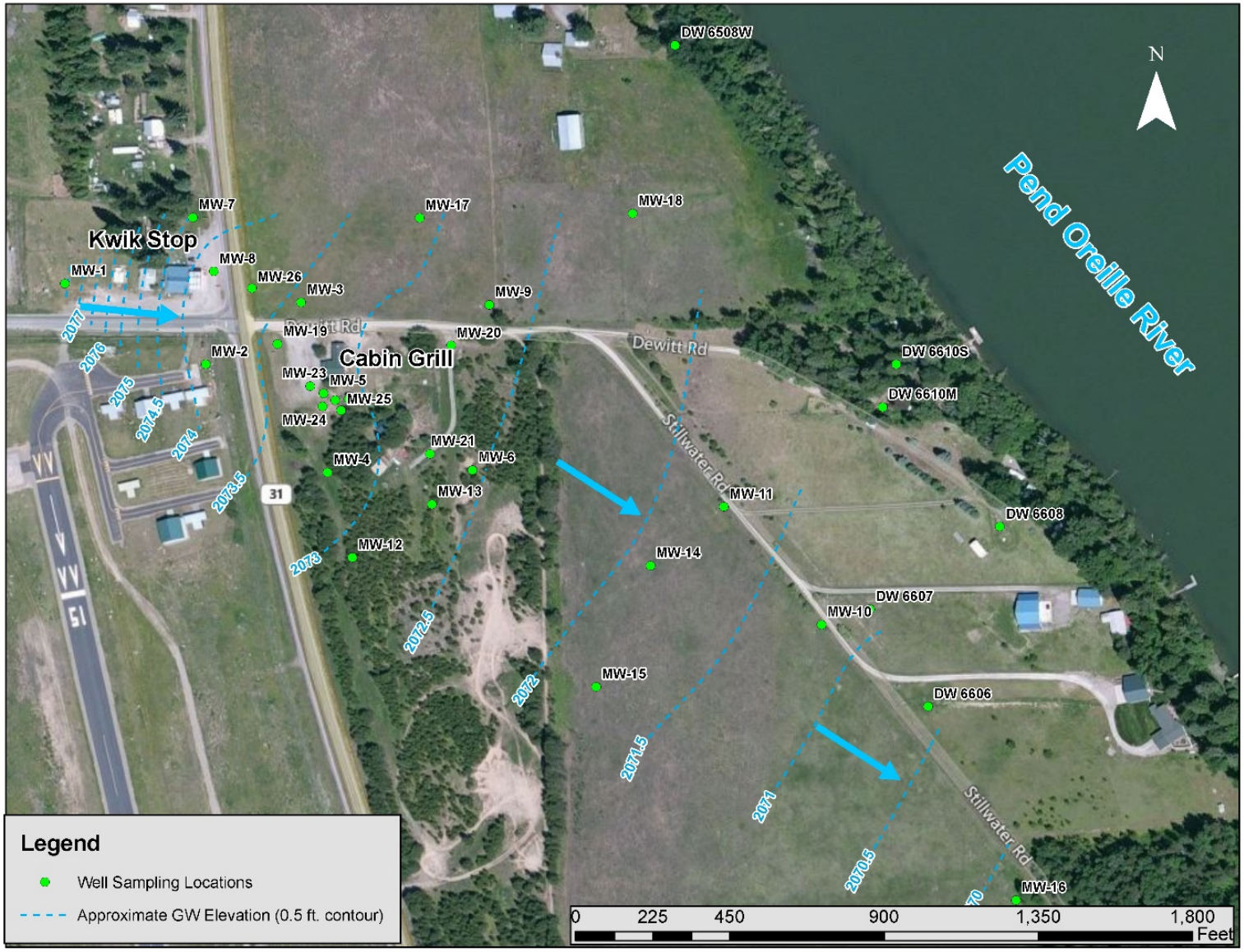

Figure 1. Ione Airport Kwik Stop cleanup site and groundwater flow direction, August 2016.

Methods

Between September 2013 and August 2016, Ecology conducted quarterly groundwater monitoring at the Airport Kwik Stop site. The groundwater monitoring network consists of 26 monitoring wells and 7 domestic wells. Twenty-five of the 33 wells are sampled quarterly. The remaining wells are sampled at annual or semi-annual frequencies because they are located in areas where significant groundwater contamination has not been observed.

The Environmental Information Management database (EIM) Location IDs, their equivalent study aliases, and sampling frequency can be found in Appendix A.

Target analytes for this project are gasoline-range petroleum hydrocarbons (GRPH), and benzene, toluene, ethylbenzene, and xylenes (BTEX). Other analytes of interest include 1,2-dibromoethane (EDB), 1,2-dichloroethane (EDC), naphthalene, and methyl t-butyl ether (MTBE).

Groundwater Monitoring

Quarterly groundwater level measurements and sample collection are conducted to determine the direction of groundwater flow and the extent of dissolved phase petroleum contamination in the shallow groundwater. Study results are compiled in the EIM database.

Procedures for sample collection and handling are outlined in SOP EAP078: Standard Operating Procedures for Purging and Sampling Monitoring Wells (Marti, 2014) and SOP EAP077: Standard Operating Procedures for Purging and Sampling Water Supply Wells (Marti, 2014).

All wells were purged prior to sample collection. Groundwater quality parameters (temperature, specific conductance, pH, dissolved oxygen, and oxidation-reduction potential (ORP)) were measured during the purge period using a Hydrolab© datasonde equipped with a flow-through cell. The monitoring wells were purged until all field parameters stabilized within acceptable criteria. To limit purge waste water, domestic wells were sampled before purge parameters were fully stabilized. Therefore, the groundwater quality purge parameters for domestic wells are estimates. Approximately 5 gallons were purged at each domestic well before sampling.

All monitoring wells were purged and sampled with a portable stainless steel bladder pump. The pump intake was placed within one foot of the static water level in the well. Wells were purged at a rate of 0.5 liters per minute (L/min). The domestic wells were purged and sampled using the hose bib closest to the well pump. For sites that have filtration systems, the “upstream” hose bib was used for sampling.

Samples were collected directly from the pump discharge tubing or hose bib into the appropriate sample containers, then labeled, stored on ice, and transported following MEL chain-of-custody protocols (MEL, 2016).

Field duplicates, equipment blanks, and trip blanks are collected to ensure that Data Quality Objectives (DQO) are met. A data quality assessment can be found in Appendix B.

The bladder pump was decontaminated between each monitoring well in accordance with Ecology's SOP EAP078 (Marti, 2014).

Because purge water collected at the site monitoring wells is contaminated with GRPH and BTEX constituents, purge water is handled according to WAC 173-303-400: Interim Status Facility Standards in the State of Washington, which defines the acceptable waste management practices for hazardous materials.

Laboratory Methods

Samples were submitted to MEL for the analysis of GRPH using method NWTPH-Gx for quantification of petroleum hydrocarbons. BTEX analytes, EDB, EDC, MTBE, and naphthalene were analyzed using EPA method 8260 for volatile organic compounds (VOC).

Statistical Analysis of Analytical Results

Mann-Kendall trend analyses were conducted on datasets with complete quarterly records for gasoline, ethylbenzene, and total xylenes. The data used for the analysis included each well-sampling event. Initial data collection began in the fall of 2010, but the monitoring well network was developed over several years. As a result, the data records for individual wells are not all of the same length. The Mann-Kendall trend analysis is a non-parametric test for trend, meaning that it is not dependent on assumptions of data distributions. The analysis is used to determine whether the median value changes over time.

The test statistic, Kendall's T, is a rank correlation coefficient that measures the degree of concordance or discordance between pairs of data points. T is calculated as the number of concordant pairs, minus the number of discordant pairs, divided by the total number of unique pairs or data points. Values of T close to 1 or -1 are indicators of strong trends, whereas values of T near zero indicate either a weak trend or no trend. The sign of Kendall's T indicates whether there is an increasing trend (+) or a decreasing trend (-). Statistical significance is achieved when a test result is unlikely to occur due to variance in the dataset and the p-value from the analysis is less than the predetermined significance level ($\alpha = 0.05$). The null hypothesis for the Mann-Kendall trend analysis asserts that no trend exists within the dataset. Results from the Mann-Kendall analysis are discussed in subsequent sections.

Results and Discussion

Analytical results from 2013-2016 (Appendix D) monitoring confirm that groundwater beneath the Kwik Stop site is contaminated with dissolved phase GRPH and BTEX compounds. Though decreasing concentrations of GRPH and BTEX have been observed across much of the study area, additional cleanup and monitoring are still needed.

Field Observations

Ecology measured depth-to-water in each monitoring well prior to purging. The end-of-purge pH, temperature, specific conductance, dissolved oxygen, and ORP readings are listed in Appendix D.

A summary of field measurement data can be found in Table 1. The following wells were observed to have a dissolved oxygen content less than 1 mg/L, indicating an anaerobic environment: MW-3, MW-5, MW-6, MW-8, MW-9, MW-10, MW-13, MW-18, MW-20, MW-21, MW-22, MW-26, DW 6508W, DW 6607, DW 6608, and DW 6610S.

During the most recent monitoring event in August 2016, depth-to-water in the monitoring wells ranged from 14.72 feet bgs in MW-10 to 41.62 feet bgs in MW-15. Interpreted groundwater flow direction is to the east-southeast from MW-1 at the western boundary of the site. During the most recent monitoring event in August 2016, the hydraulic gradient within the west portion of the site between MW-1 and MW-8 was relatively steep at 1.3×10^{-2} feet per foot (70.35 feet per mile). Hydraulic gradient within the central portion of the site between MW-2 and MW-14 flattened to 1.3×10^{-3} feet per foot (6.89 feet per mile). Hydraulic gradient within the east portion of the site between MW-14 and MW-16 was slightly steeper at 1.4×10^{-3} feet per foot (7.52 feet per mile). Hydraulic gradient remained relatively constant throughout the monitoring period. Depth to water measurements and groundwater elevations are available in Appendix C.

Groundwater elevation generally increased during fall and winter months as a result of increased precipitation. Long term fluctuations of up to two feet were observed in groundwater elevations across the site over the course of the study.

Between September 2013 and February 2015, free-product thickness in MW-5 ranged from 0.02 feet in September 2013 to 0.41 feet in May 2014. A free-product film ($\leq$ 0.01 ft.) was observed in wells MW-6, MW-8, MW-9, MW-12, MW-21, MW-23, MW-24, and MW-25 during previous monitoring events. Significant quantities of floating free-product have not been observed in any well since February 2015.

Table 1. Summary of stable field measurements at Ione Airport Kwik Stop wells, September 2013 - August 2016.

Parameter	Number of Measurements	Minimum	Maximum	25th Percentile	Median	75th Percentile
pH (Std. Units)	262	6.6	7.8	7.1	7.2	7.3
Temperature (°C)	262	5.3	17.7	8.8	9.8	10.9
Conductivity (uS/cm)	262	234	635	438	473	511
Dissolved Oxygen (mg/L)	261	0.0	10.3	0.6	1.9	4.7
Oxidation Reduction Potential (mV)	219	-158	492	-64	58	202

Analytical Results

Samples collected from site monitoring wells and existing domestic water supply wells during the 2013-2016 monitoring period confirm that GRPH and BTEX contamination is still present at the site. Analytical results are listed in Appendix E.

Airport Kwik Stop (MW-1, MW-2, MW-3, MW-7, MW-8, MW-26)

Wells located near the Kwik Stop continue to have some of the highest GRPH and BTEX concentrations. MW-8, located in the Kwik Stop parking lot near the initial release, consistently has the highest concentrations of GRPH and BTEX compounds (Figure F-6). Concentrations continue to exceed MTCA Method A cleanup levels for GRPH and total xylenes with concentrations of 28,700 ug/L and 4,514 ug/L, respectively. Ethylbenzene also exceeded the cleanup level of 700 ug/L at a concentration of 760 ug/L, a decrease from a maximum concentration of 1,700 ug/L in February 2015.

Contaminant concentrations in MW-7, located to the north of the Airport Kwik Stop parking lot, have been primarily non-detectable. During the most recent monitoring event in August 2016, low-level detections of toluene, ethylbenzene, and o-xylene were observed with concentrations of 0.14, 0.17, and 0.19 ug/L, respectively.

Wells MW-3 and MW-26, located due east from the Airport Kwik Stop across Highway 31, also have elevated concentrations of dissolved-phase petroleum. GRPH and total xylene concentrations in MW-3 (Figure F-1) currently exceed MTCA Method A cleanup levels with concentrations of 8,900 ug/L and 1,293 ug/L, respectively. Ethylbenzene concentrations in MW-3 exceeded the cleanup level in March 2014 with a concentration of 820 ug/L, but have steadily decreased below the cleanup level and were last reported as 241 ug/L in August 2016. MW-26,

installed in August 2016, currently exceeds the cleanup level for GRPH only, with a concentration of 17,700 ug/L (Appendix E).

Benzene was reported as non-detect in samples collected from wells MW-8 and MW-3; however, the method-reporting limits for these wells were above the cleanup level of 5 ug/L.

MW-1, the designated upgradient well, has not been sampled since August 2014 and is assumed to be unaffected by the petroleum release at the Kwik Stop. MW-2, located at the airport to the south of the Kwik Stop was also sampled in August 2014 and was determined to be unaffected by the petroleum release. Neither well had detections of GRPH, BTEX, MTBE, EDB, EDC, or naphthalene during previous monitoring events.

Mann-Kendall tests for trends were conducted on wells with complete quarterly records, the results of which are presented in Appendix G. Statistically significant decreasing trends were observed for GRPH, ethylbenzene, and total xylenes in MW-3. No significant trends were observed in MW-8. Contaminant concentrations in MW-26 were not evaluated due to the limited dataset.

Cabin Grill (MW-4, MW-5, MW-6, MW-12, MW-13, MW-19, MW-20, MW-21, MW-22, MW-23, MW-24, MW-25)

The Cabin Grill property includes the former restaurant and a single family residence located behind the Cabin Grill to the east. This portion of the study area includes:

- Wells in the gravel parking area along Highway 31 (MW-5, MW-22, MW-23, MW- 24, and MW-25).
- The domestic well at the Cabin Grill.
- Four wells to the east of the Cabin Grill near the single family residence (MW-6, MW-13, MW-20, and MW-21).
- Well MW-19 located near the intersection of Highway 31 and Dewitt Rd.
- Wells MW-4 and MW-12 to the south of the Cabin Grill parallel to Highway 31.

(See Figure 2).

Elevated concentrations of petroleum-related contaminants are consistently detected in groundwater samples collected from monitoring wells MW-5, MW-22, MW-23, and MW-25. These wells are located in an area of the project where measurable quantities of free-product have been observed. Over the 2013-2016 monitoring period GRPH concentrations in these wells consistently exceed the MTCA Method A cleanup level with concentration ranges from 23,000 - 14,900 ug/L (MW-5), 20,000 - 10,300 ug/L (MW-22), 12,000 - 3,510 ug/L (MW-23), and 5,400 - 1,050 ug/L (MW-25). MW-24 GRPH and BTEX concentrations have been below applicable cleanup levels since February 2015.

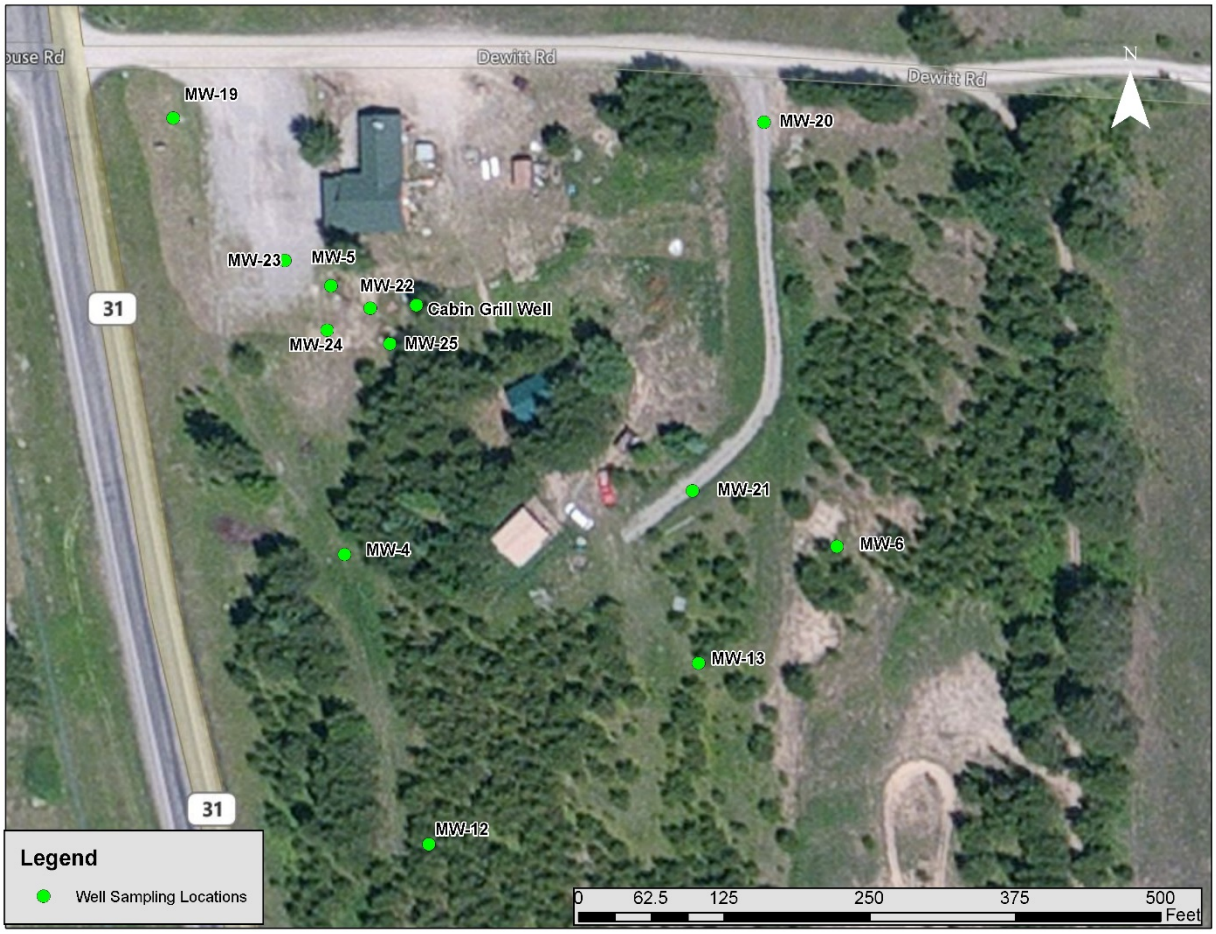

Figure 2. Well sampling locations near the Cabin Grill.

Of the parking area wells, MW-5 (Figure F-3) and MW-22 (Figure F-20) had BTEX concentrations that exceeded the applicable MTCA Method A cleanup levels. Concentrations of m,p-xylene and o-xylene exceeded the cleanup level of 1,000 ug/L during the monitoring period and were last reported above the cleanup level in March 2016 for both wells. Benzene was reported as non-detectable in wells MW-5, MW-22, MW-23, and MW-25; however, the method reporting limits for these wells were either at or above the cleanup level due to dilutions performed at the laboratory during the analysis.

During the 2013–2016 monitoring period, all of the parking area wells had detectable concentrations of naphthalene that ranged from an estimated 0.98 ug/L in MW-24 to 280 ug/L in MW-22. Wells MW-5 and MW-22 had naphthalene concentrations higher than the MTCA Method A cleanup level of 160 ug/L, reaching a maximum concentration of 280 ug/L in February 2015 in MW-22. Currently, naphthalene concentrations exceed the cleanup level in MW-22 only, with a concentration of 165 ug/L in August 2016. MTBE, EDB, and EDC were not detected in these wells.

The domestic well at the Cabin Grill (Figure F-24) continues to have elevated GRPH concentrations. Over the monitoring period, concentrations have consistently exceeded the cleanup level of 1,000 ug/L with a maximum concentration of 5,200 ug/L in August 2015. GRPH concentrations decreased to 981 ug/L in August 2016.

Statistical trend analysis was applied to data from wells MW-22 through MW-25. Although GRPH concentrations in these wells are decreasing, a significant decreasing trend was observed in MW-23 only. Significant decreasing trends were also observed in total xylenes concentrations in wells MW-22 and MW-25. A significant decreasing trend in ethylbenzene concentrations was observed in MW-22. Trends in contaminant concentrations in MW-5 were not evaluated because analytical data from February 2012 to May 2015 were not available due to the presence of free-product in the well. Significant decreasing trends in GRPH, ethylbenzene, and total xylenes concentrations were observed in the domestic well at the Cabin Grill.

GRPH concentrations in MW-19, which is located at the northwest corner of the property were slightly above the cleanup level with a concentration of 1,040 ug/L in August 2016 (Figure F-17). This is an increase from concentrations that were below the cleanup level in August 2014 (290 ug/L) to May 2016 (928 ug/L). The remaining target analytes were either not detected or at concentrations near or below the reporting limit of 1 ug/L. No significant trends were observed in MW-19.

Wells MW-4 and MW-12 are located near the southern boundary of the Cabin Grill property. GRPH was not detected in either of these wells during the 2013-2016 monitoring period. Low level detections of other target analytes have been reported at concentrations near or below the reporting limits in MW-4. MW-12, which is farther downgradient from the source area, continues to have no detectable concentrations of petroleum related contaminants. Wells MW-4 and MW-12 were excluded from the trend analysis due to irregular sampling frequencies and a high proportion of non-detect data.

Wells surrounding the single family residence to the east of the Cabin Grill (MW-6, MW-20, MW-21) have GRPH concentrations that consistently exceed MTCA Method A cleanup levels. In August 2016, concentrations ranged from 1,540 ug/L in MW-6 (Figure F-4) to 6,350 ug/L in MW-20 (Figure F-18). The exception was MW-13, where none of the target analytes have been detected since February 2016. Although concentrations do not exceed applicable cleanup levels, BTEX concentrations in MW-6, MW-20, and MW-21 continue to be elevated. Toluene has been reported at an estimated concentration range of 0.2 to 28 ug/L, ethylbenzene ranged from 5.65 to 955 ug/L, and total xylenes at approximately 3 to 3,980 ug/L. Benzene has been reported as non-detect due to a higher reporting limit.

Naphthalene concentrations also remain elevated in these wells. August 2016 concentrations ranged from 5.25 ug/L in MW-6 to 142 ug/L in MW-20. Over the monitoring period, naphthalene exceeded the cleanup level of 160 ug/L twice in MW-6 at a concentration of 160 ug/L in February 2015 and at 196 ug/L in May 2016. Overall, MTBE was not detected in the wells east of the Cabin Grill during this monitoring period.

Significant decreasing trends in GRPH and ethylbenzene concentrations have been observed in MW-6. No significant trends were observed in wells MW-20 and MW-21.

Vacant Properties (MW-9, MW-10, MW-11, MW-14, MW-15, MW-16, MW-17, MW-18)

The study area includes three vacant properties that define the north and south boundaries of the monitoring network. Two of the properties are adjacent to one another on the north side of Dewitt Rd. Located on these two properties are wells MW-9, MW-17, and MW-18. Other wells that are located on these properties include MW-3 and MW-26 which were discussed with the Airport Kwik Stop wells due to their close proximity to the petroleum release.

Recent monitoring data indicate that GRPH and BTEX concentrations in MW-9, MW-17, and MW-18 have decreased to below the MTCA Method A cleanup levels. GRPH concentrations in MW-18 (Figure F-16) were last detected above the cleanup level of 800 ug/L in November 2014, with an estimated concentration of 12,000 ug/L. GRPH have since been reported as non-detectable in this well. In February 2015 the GRPH concentration in MW-9 (Figure F-7) was 7,400 ug/L. GRPH concentrations are currently reported as non-detect. The remaining target analytes in wells MW-18 and MW-9 have decreased to concentrations below their associated cleanup levels. MW-17 continues to have no detectable concentrations of petroleum related contaminants. No significant trends were observed in MW-9. Wells MW-17 and MW-18 were excluded from the trend analysis due to a high proportion of non-detects.

The vacant property to the southeast of the Cabin Grill property includes wells MW-10, MW-11, MW-14, MW-15, and MW-16. MW-16, the furthest downgradient well, had benzene concentrations above the MTCA Method A cleanup level of 5 ug/L in 2014 that ranged from 50 ug/L in February to 8.1 ug/L in May. Benzene concentrations in MW-16 have been below the cleanup level since May 2014 (Figure F-14). The remaining target analytes were either not detected or at concentrations near or below their associated reporting limits. MW-16 was not included in the trend analysis.

GRPH concentrations in MW-14 (Figure F-12) exceeded the MTCA Method A cleanup level in August 2015 with a concentration of 3,000 ug/L. In August 2016, GRPH concentrations in MW-14 decreased to 216 ug/L and were below the cleanup level. BTEX concentrations showed a similar increase in August 2015, though none of the concentrations exceeded the applicable cleanup levels. The observed increase and subsequent decrease in GRPH may indicate downgradient movement of the dissolved-phase plume.

GRPH was detected in MW-11 at a concentration of 509 ug/L in September 2013, decreasing to 86 ug/L in May 2016 (Figure F-9). In August 2016, GRPH was reported as non-detect while the remaining target analytes were either not detected or at concentrations near or below their associated reporting limits.

During the 2013-2016 monitoring period, GRPH and BTEX analytes were either not detected or were detected at concentrations near or below their associated reporting limits in MW-10 and MW-15.

Wells MW-10, MW-11, MW-15, and MW-15 were excluded from the trend analysis due to irregular sampling frequencies and non-detects.

Residential Properties

Several residential properties are included in the study area and groundwater monitoring was conducted at each domestic water supply well. These wells included DW 6508W at the northeast corner of the site, and domestic wells DW 6610M, DW 6610S, DW 6608/09, DW 6607, and DW 6606 which are located along the west bank of the Pend Oreille River and define the eastern boundary of the study area.

Domestic well DW 6610M was the only water supply well that had BTEX concentrations above applicable cleanup levels with a maximum benzene concentration of 22 ug/L in May 2014. The reported value for benzene decreased to an estimated concentration of 0.85 ug/L in August 2014. Low level detections of benzene, ethylbenzene, m,p-xylene, and o-xylene have been observed in DW 6607 and were below the applicable reporting limits. MTBE, EDB, EDC, and naphthalene were not detected in any of these wells. Decreasing GRPH concentrations were observed in DW 6607 (Figure F-27).

Results Summary

EDB and EDC were reported as non-detectable in all wells at the site for the duration of the monitoring project. MTBE was detected in wells MW-10, MW-16, MW-17, and MW-21 during the 2013-2016 monitoring period, but none had concentrations that exceeded the MTCA Method A cleanup level of 50 ug/L. Naphthalene was detected at concentrations greater than the cleanup level of 160 ug/L in wells MW-5, MW-8, MW-9, and MW-22. Only MW-22 continues to have concentrations greater than the cleanup level.

The most significant GRPH and BTEX contamination exists in the vicinity of the Airport Kwik Stop and Cabin Grill properties. Many of the wells on these properties still exceed the MTCA Method A cleanup level for GRPH. Currently, only MW-8 at the Kwik Stop and MW-3 across highway 31 from the Kwik Stop have BTEX concentrations that exceed applicable cleanup levels. GRPH and BTEX contamination have been observed in wells downgradient to the southeast of the Cabin Grill property in wells MW-14, MW-15, MW-10, and MW-11, but none of the GRPH or BTEX concentrations exceeded applicable cleanup levels in August 2016.

Conclusions

Analytical results confirm the shallow aquifer beneath the Airport Kwik Stop site is contaminated with GRPH and BTEX compounds. The most significant contamination is in the vicinity of the Airport Kwik Stop and the Cabin Grill. Site maps in Appendix H illustrate the spatial distribution of GRPH and BTEX contamination over the monitoring period.

Timeseries plots (Appendix F) of contaminant concentrations for the duration of the monitoring period, September 2013 – August 2016, and results from the Mann-Kendall trend analysis are evidence that concentrations of GRPH and BTEX in groundwater are decreasing throughout the study area. Though the SVE and SVE/AS remediation systems have been successful at recovering volatile petroleum products from contaminated soils and groundwater, Ecology's Environmental Assessment Program cannot draw conclusions about their overall efficacy because the volume of the petroleum release is unknown. Decreasing concentrations of GRPH and BTEX in groundwater may be partially attributed to natural attenuation in addition to the implementation of remediation technologies.

Recommendations

Results of this study support the following recommendations:

- Continuation of quarterly groundwater monitoring and reporting.
- Continuation of remedial activities at the Airport Kwik Stop and Cabin Grill that may include future use of in-situ chemical oxidation (ISCO).
- Possible adjustment of the quarterly monitoring schedule to reduce monitoring costs.

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WAC 173-303-400: Interim Status Facility Standards in the State of Washington.

Appendices

Appendix A. Well Locations and Monitoring Schedule

Table A-1: Well Locations and Study Aliases.

EIM Location ID	Study Alias	Latitude	Longitude	Sample Frequency
32584416-MW-1	MW-1	48.7143	-117.4147	Water Level Only
2652739-MW-2	MW-2	48.7139	-117.4136	Water Level Only
32584416-MW-3	MW-3	48.7142	-117.4128	Quarter
32584416-MW-4	MW-4	48.7133	-117.4126	Annual
32584416-MW-5	MW-5	48.7138	-117.4126	Quarter
32584416-MW-6	MW-6	48.7134	-117.4114	Quarter
32584416-MW-7	MW-7	48.7147	-117.4137	Quarter
32584416-MW-8	MW-8	48.7144	-117.4135	Quarter
32584416-MW-9	MW-9	48.7142	-117.4113	Quarter
32584416-MW-10	MW-10	48.7125	-117.4086	Annual
32584416-MW-11	MW-11	48.7132	-117.4094	Semi-Annual
32584416-MW-12	MW-12	48.7129	-117.4124	Semi-Annual
32584416-MW-13	MW-13	48.7132	-117.4118	Quarter
32584416-MW-14	MW-14	48.7128	-117.4100	Annual
32584416-MW-15	MW-15	48.7122	-117.4104	Water Level Only[1]
32584416-MW-16	MW-16	48.7111	-117.4071	Quarter
32584416-MW-17	MW-17	48.7147	-117.4119	Quarter
32584416-MW-18	MW-18	48.7147	-117.4102	Quarter
32584416-MW-19	MW-19	48.7140	-117.4130	Quarter
140912030-MW-20	MW-20	48.7140	-117.4116	Quarter
140912030-MW-21	MW-21	48.7134	-117.4118	Quarter
141003030-MW-22	MW-22	48.7137	-117.4125	Quarter
141003030-MW-23	MW-23	48.7138	-117.4127	Quarter
141003030-MW-24	MW-24	48.7137	-117.4126	Quarter
141003030-MW-25	MW-25	48.7137	-117.4125	Quarter
140912030-MW-26	MW-26	48.7143	-117.4132	Quarter[2]
32584416-6714	Cabin Grill Well	48.7137	-117.4124	Quarter
32584416-6508	DW 6508W	48.7156	-117.4098	Quarter
32584416-6606	DW 6606	48.7121	-117.4078	Quarter[3]
32584416-6607	DW 6607	48.7126	-117.4083	Quarter
32584416-6608	DW 6608/09	48.7131	-117.4072	Quarter[3]
32584416-6610M	DW 6610M	48.7137	-117.4082	Quarter[4]
32584416-6610S	DW 6610S	48.7139	-117.4080	Quarter[4]

[1]MW-15 sampled quarterly from September 2013 - August 2014. Sampled again in August 2016.
[2]MW-26 scheduled to be sampled quarterly. Installed in July 2016.
[3]Domestic wells DW 6606 and DW 6608 sampled during May and August monitoring events. Well pumps are turned off during winter months.
[4]Domestic wells at property 6610 sampled sporadically due to limited access to DW 6610M and intermittent pump functionality at DW 6610S.

Appendix B. Data Quality

Laboratory Quality Assurance

Manchester Laboratory follows strict quality assurance protocols to ensure the quality of their analytical results. Instrument calibration was performed by laboratory staff and the calibration was verified via analysis of laboratory standards and blank samples. Laboratory standards and blanks were analyzed at a frequency of about 10%. The results from laboratory quality assurance samples were summarized and included with laboratory reports for each sample collection and submitted to the project manager. Study data were determined to be of good quality and appropriate for use as qualified.

Laboratory case narratives and the accompanying data for this study indicate that the samples were processed and analyzed within appropriate holding times. GRPH and BTEX concentrations for laboratory blank samples consistently fell below the detection limits for all target analytes. The following results were qualified as estimates:

- In February 2014, Continuing Calibration Verification (CCV) results were high for naphthalene and affected results from wells MW-13, MW-16, and domestic well DW 6607. CCV results for naphthalene were high, which affected results from wells MW-3, MW-6, MW-8, MW-9, and MW-18.
- In May 2014, CCV results for naphthalene were low, which affected results for samples from domestic wells DW 6606, DW 6607, and DW 6608. Naphthalene concentrations in these wells were non-detectable.
- In August 2014, CCV results fell outside the acceptable criteria which affected ethylbenzene, m,p-xylene, and naphthalene results for samples collected from MW-6. Also, the Laboratory Control Sample (LCS) results were high for MTBE, which affected results for samples collected from MW-10.
- In November 2014, CCV results were outside the acceptable criteria for naphthalene which affected results for samples collected from MW-3, MW-6, MW-9, and MW-19.
- In August 2015, the surrogate recovery analysis results for VOCs were high which affected results for samples collected from domestic well DW 6608. Surrogate recovery was also high for toluene which affected the toluene result for MW-6.
- In August 2016, surrogate recovery results were high which affected the results for samples collected from MW-7, MW-10, MW-12, MW-13, MW-16, and MW-17. Results for all of these wells were below the MRL.

Field Quality Assurance

To evaluate possible sampling bias and sample corruption during transport, field duplicates, equipment blanks, and trip blanks were collected and submitted to MEL for analysis. Blank samples were prepared using laboratory-grade deionized water and were handled in the same manner as the other samples. All equipment and trip blanks were reported below the detection limits for the analyses with one exception. Trip blanks collected during August 2015 all had low level detections of toluene, possibly due to an oily residue found on the rubber septa of the VOC sample vials that was observed at a later date. Toluene data for the August 2015 sampling event were appropriately qualified as estimates.

Field duplicates were collected during each sampling event for each analysis. Precision for the duplicate pairs is calculated as either a relative percent difference (RPD) for samples with analyte concentrations 5 times the MRL, or absolute value difference for samples with analyte concentrations that were not at least 5 times the MRL. RPD values for field replicates can be found in Table G-1.

During the 2013-2016 monitoring period, four replicate pairs did not meet the measurement quality objectives (MQO) outlined in the QAPP addendum (Tarbutton, 2013). The replicate samples were collected at MW-11 in August 2014 with a calculated RPD for benzene of 42%. The same sample exceeded RPD limits for naphthalene with a calculated RPD of 29%. Two other replicate pairs exceeded RPD limits for GRPH in November 2014 and May 2015. Both sets of replicate samples were collected at the domestic well at the Cabin Grill and had calculated RPD values of 24% and 28%, respectively. These results were appropriately qualified as estimated.

Table B-1: Relative Percent Difference (RPD) values calculated for field replicates.

Laboratory Analyte		GRPH	Benzene	Toluene	Ethylbenzene	m,p-Xylene	o-Xylene	MTBE	Naphthalene	EDB	EDC
Method (Reporting Limit)[1]		NWTPH-Gx (70 µg/L)[2]	EPA 8260 (1 µg/L) 8260 SIM (0.1 µg/L)	EPA 8260 (1 µg/L) 8260 SIM (0.1 µg/L)	EPA 8260 (1 µg/L) 8260 SIM (0.1 µg/L)	EPA 8260 (2 µg/L) 8260 SIM 0.2 µg/L)	EPA 8260 (1 µg/L) 8260 SIM (0.1 µg/L)	EPA 8260 (1 µg/L) 8260 SIM (0.1 µg/L)	EPA 8260 (1 µg/L) 8260 SIM (0.5 µg/L)	EPA 8260 (1 µg/L) 8260 SIM (0.01 µg/L)	EPA 8260 (1 µg/L) 8260 SIM (0.1 µg/L)
Field Replicate RPD Limits[1]		≤ 20%	≤ 20%	≤ 20%	≤ 20%	≤ 20%	≤ 20%	≤ 20%	≤ 20%	≤ 20%	≤ 20%
Site	**Date**	**Relative Percent Difference or Absolute Difference[3]**									
Cabin Grill Well	8/27/2013	0.00	0.00	0.10	8.00	4.65	8.00	0.00	6.45	0.00	0.00
MW-6	9/11/2013	6.50	0.00	0.00	1.23	0.00	0.00	0.00	0.46	0.00	0.00
MW-17	11/5/2013	3.00	7.30	5.29	0.00	16.00	8.70	0.00	0.00	0.00	0.01
Cabin Grill Well	11/6/2013	2.47	0.00	0.08	0.00	0.20	0.40	0.00	0.20	0.00	0.00
MW-11	2/26/2014	10.00	15.38	11.76	16.67	10.91	10.99	0.00	1.00	0.00	0.00
Cabin Grill Well	2/28/2014	2.90	0.00	0.00	0.00	10.00	2.60	0.00	0.00	0.00	0.00
MW-17	5/13/2014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DW 6606	5/14/2014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MW-11	8/11/2014	0.00	42.04	0.04	0.01	0.07	0.01	0.00	28.57	0.00	0.00
DW 6610 Main	8/14/2014	2.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MW-13	11/3/2014	1.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Cabin Grill Well	11/5/2014	24.39	0.00	0.00	0.70	15.38	12.90	0.00	12.56	0.00	0.00
MW-11	2/24/2015	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.00	0.00
DW 6607	2/26/2015	0.00	0.77	0.00	0.02	0.10	0.20	0.00	0.00	0.00	0.00
MW-13	5/12/2015	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cabin Grill Well	5/14/2015	28.57	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00
MW-11	8/4/2015	13.00	0.04	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
DW 6607	8/5/2015	0.00	0.00	0.00	0.41	0.10	0.00	0.00	0.00	0.00	0.00
MW-22	11/5/2015	0.00	0.07	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Cabin Grill Well	11/4/2015	5.88	0.00	0.00	0.00	0.00	3.51	0.00	11.76	0.00	0.00
MW-17	3/1/2016	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cabin Grill Well	3/3/2016	2.17	0.00	0.00	0.00	3.64	1.31	0.00	1.50	0.00	0.00
MW-16	5/10/2016	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cabin Grill Well	5/12/2016	10.39	0.00	0.00	0.99	3.99	0.03	0.00	4.55	0.00	0.00
MW-13	8/16/2016	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cabin Grill Well	8/18/2016	10.63	0.00	0.00	0.02	0.32	0.00	0.00	0.56	0.00	0.00

[1] RPD limits are applicable if concentrations are greater than 5 times the method reporting limit (MRL). For results less than 5 times the MRL, the absolute difference between the sample and replicate must be less than the MRL. MRL may vary depending on dilutions performed by the laboratory during analysis.
[2] Anatek Labs, Inc. method reporting limit = 100 µg/L; Manchester Environmental Laboratory method reporting limit = 70 µg/L.
[3] Shaded cells indicate absolute difference values.

Appendix C. Depth to Water and Groundwater Elevations

Table C-1: Depth to Water Measurements and Groundwater Elevations: Sept 2013 – Aug 2016

Site	Date	Land Surface Elevation (ft.)	Depth to Water[2] (ft.)	Groundwater Elevation[1] (ft.)
32584416-MW-1	9/9/2013	2106.70	28.58	2078.12
	2/24/2014	2106.70	29.43	2077.27
	5/12/2014	2106.70	29.30	2077.40
	8/11/2014	2106.70	29.26	2077.44
	11/3/2014	2106.70	29.45	2077.25
	2/23/2015	2106.70	29.53	2077.17
	5/11/2015	2106.70	29.14	2077.56
	8/7/2015	2106.70	28.10	2077.56
	11/6/2015	2106.70	29.40	2077.30
	2/29/2016	2106.70	29.70	2077.00
	5/9/2016	2106.70	29.36	2077.34
	8/22/2016	2106.70	29.09	2077.61
2652739-MW-2	9/9/2013	2109.62	34.15	2075.47
	2/24/2014	2109.62	35.26	2074.36
	5/12/2014	2109.62	35.43	2074.19
	8/11/2014	2109.62	35.51	2074.11
	11/3/2014	2109.62	35.69	2073.93
	2/23/2015	2109.62	36.09	2073.53
	5/11/2015	2109.62	35.82	2073.80
	8/7/2015	2109.62	35.62	2074.00
	11/6/2015	2109.62	35.85	2073.77
	2/29/2016	2109.62	36.42	2073.20
	5/9/2016	2109.62	36.36	2073.26
	8/22/2016	2109.62	35.84	2073.78
32584416-MW-3	9/12/2013	2110.40	35.36	2075.04
	3/3/2014	2110.40	36.40	2074.00
	5/12/2014	2110.40	36.53	2073.87
	8/14/2014	2110.40	36.65	2073.75
	11/5/2014	2110.40	36.79	2073.61
	2/25/2015	2110.40	37.08	2073.32
	5/12/2015	2110.40	36.93	2073.47
	8/6/2015	2110.40	36.77	2073.63
	11/5/2015	2110.40	36.93	2073.47
	3/4/2016	2110.40	37.46	2072.94
	5/11/2016	2110.40	37.41	2072.99
	8/18/2016	2110.40	36.98	2073.42

Site	Date	Land Surface Elevation (ft.)	Depth to Water[2] (ft.)	Groundwater Elevation[1] (ft.)
32584416-MW-4	9/10/2013	2109.50	34.65	2074.85
	2/26/2014	2109.50	35.66	2073.84
	5/12/2014	2109.50	35.87	2073.63
	8/12/2014	2109.50	35.94	2073.56
	11/5/2014	2109.50	36.11	2073.39
	2/23/2015	2109.50	36.45	2073.05
	5/13/2015	2109.50	36.27	2073.23
	8/5/2015	2109.50	36.10	2073.40
	2/29/2016	2109.50	36.81	2072.69
	5/11/2016	2109.50	36.77	2072.73
	8/15/2016	2109.50	36.32	2073.18
32584416-MW-5	9/12/2013	2109.60	34.75/34.77[3]	2074.85[4]
	11/5/2013	2109.60	34.83/35.09[3]	2074.71[4]
	2/27/2014	2109.60	35.60/36.01[3]	2073.90[4]
	5/12/2014	2109.60	35.80/36.21[3]	2073.70[4]
	8/14/2014	2109.60	35.91/36.29[3]	2073.60[4]
	11/5/2014	2109.60	36.08/36.31[3]	2073.46[4]
	2/25/2015	2109.60	36.41/36.55[3]	2073.16[4]
	5/13/2015	2109.60	36.28	2073.32
	8/6/2015	2109.60	36.10	2073.5
	11/5/2015	2109.60	36.29	2073.31
	3/3/2016	2109.60	36.81	2072.79
	5/12/2016	2109.60	36.76	2072.84
	8/15/2016	2109.60	36.33	2073.27
32584416-MW-6	9/11/2013	2110.60	36.45	2074.15
	2/28/2014	2110.60	37.37	2073.23
	5/14/2014	2110.60	37.53	2073.07[4]
	8/13/2014	2110.60	37.66	2072.94[4]
	11/4/2014	2110.60	37.80	2072.80
	2/24/2015	2110.60	38.00	2072.60[4]
	5/12/2015	2110.60	37.94	2072.66
	8/6/2015	2110.60	37.81	2072.79
	11/4/2015	2110.60	37.97	2072.63
	3/2/2016	2110.60	38.40	2072.20
	5/10/2016	2110.60	38.41	2072.19
	8/18/2016	2110.60	38.05	2072.55
32584416-MW-7	9/9/2013	2109.60	33.91	2075.69
	11/4/2013	2109.60	34.14	2075.46
	2/24/2014	2109.60	34.97	2074.63

Site	Date	Land Surface Elevation (ft.)	Depth to Water[2] (ft.)	Groundwater Elevation[1] (ft.)
	5/12/2014	2109.60	35.09	2074.51
	8/11/2014	2109.60	35.11	2074.49
	11/3/2014	2109.60	35.26	2074.34
	2/23/2015	2109.60	35.45	2074.15
	5/11/2015	2109.60	35.16	2074.44
	8/3/2015	2109.60	35.08	2074.52
	11/2/2015	2109.60	35.26	2074.34
	2/29/2016	2109.60	35.65	2073.95
	5/9/2016	2109.60	35.48	2074.12
	8/15/2016	2109.60	35.16	2074.44
32584416-MW-8	9/12/2013	2109.93	34.49	2075.44
	3/3/2014	2109.93	35.80	2074.13
	5/14/2014	2109.93	35.74	2074.19
	8/14/2014	2109.93	35.85/35.86[3]	2074.08[4]
	11/5/2014	2109.93	36.03	2073.90
	2/27/2015	2109.93	36.36/36.37[3]	2073.57[4]
	5/14/2015	2109.93	36.14	2073.79
	8/7/2015	2109.93	35.96	2073.97
	11/6/2015	2109.93	36.18	2073.75
	3/4/2016	2109.93	36.74	2073.19
	5/12/2016	2109.93	36.65	2073.28
	8/18/2016	2109.93	36.16	2073.77
32584416-MW-9	9/11/2013	2109.60	35.42	2074.18
	2/27/2014	2109.60	36.25	2073.35
	5/13/2014	2109.60	36.41	2073.19
	8/13/2014	2109.60	36.57	2073.03
	11/4/2014	2109.60	36.69/36.70[3]	2072.91[4]
	2/25/2015	2109.60	36.85/36.86[3]	2072.75[4]
	5/12/2015	2109.60	36.86	2072.74
	8/4/2015	2109.60	36.7	2072.9
	11/4/2015	2109.60	36.85	2072.75
	3/1/2016	2109.60	37.16	2072.44
	5/10/2016	2109.60	37.20	2072.40
	8/16/2016	2109.60	36.89	2072.71
32584416-MW-10	9/10/2013	2085.90	13.37	2072.53
	11/4/2013	2085.90	13.53	2072.37
	2/26/2014	2085.90	14.03	2071.87
	5/13/2014	2085.90	14.12	2071.78
	8/12/2014	2085.90	14.35	2071.55

Site	Date	Land Surface Elevation (ft.)	Depth to Water[2] (ft.)	Groundwater Elevation[1] (ft.)
	11/3/2014	2085.90	15.31	2070.59
	2/23/2015	2085.90	15.06	2070.84
	5/12/2015	2085.90	15.34	2070.56
	8/3/2015	2085.90	15.30	2070.60
	2/29/2016	2085.90	15.46	2070.44
	5/10/2016	2085.90	14.90	2071.00
	8/16/2016	2085.90	14.72	2071.18
32584416-MW-11	9/11/2013	2093.60	20.41	2073.19
	11/5/2013	2093.60	20.56	2073.04
	2/26/2014	2093.60	21.11	2072.49
	5/13/2014	2093.60	21.25	2072.35
	8/11/2014	2093.60	21.42	2072.18
	11/4/2014	2093.60	21.56	2072.04
	2/24/2015	2093.60	21.50	2072.10
	5/12/2015	2093.60	21.62	2071.98
	8/4/2015	2093.60	21.56	2072.04
	3/1/2016	2093.60	21.91	2071.69
	5/10/2016	2093.60	22.04	2071.56
	8/16/2016	2093.60	21.83	2071.77
32584416-MW-12	9/10/2013	2109.30	34.70	2074.60
	11/4/2013	2109.30	34.94	2074.36
	2/25/2014	2109.30	35.74	2073.56
	5/12/2014	2109.30	35.92	2073.38
	8/12/2014	2109.30	35.99	2073.31
	11/5/2014	2109.30	36.16	2073.14
	2/23/2015	2109.30	36.49	2072.81
	5/13/2015	2109.30	36.32	2072.98
	8/3/2015	2109.30	36.07	2073.23
	11/3/2015	2109.30	36.32	2072.98
	2/29/2016	2109.30	36.88	2072.42
	5/11/2016	2109.30	36.83	2072.47
	8/15/2016	2109.30	36.38	2072.92
32584416-MW-13	9/11/2013	2109.50	35.21	2074.29
	2/28/2014	2109.50	36.17	2073.33
	5/14/2014	2109.50	36.32/36.33[3]	2073.18[4]
	8/13/2014	2109.50	36.43/36.44[3]	2073.07[4]
	11/3/2014	2109.50	36.59	2072.91
	2/24/2015	2109.50	36.81/36.82[3]	2072.69[4]
	5/12/2015	2109.50	36.73	2072.77
	8/4/2015	2109.50	36.56	2072.94

Site	Date	Land Surface Elevation (ft.)	Depth to Water[2] (ft.)	Groundwater Elevation[1] (ft.)
	11/2/2015	2109.50	36.75	2072.75
	2/29/2016	2109.50	37.23	2072.27
	5/9/2016	2109.50	37.21	2072.29
	8/16/2016	2109.50	36.82	2072.68
32584416-MW-14	9/10/2013	2103.50	30.06	2073.44
	2/26/2014	2103.50	30.89	2072.61
	5/13/2014	2103.50	31.03	2072.47
	8/12/2014	2103.50	31.17	2072.33
	11/5/2014	2103.50	31.33	2072.17
	2/23/2015	2103.50	31.39	2072.11
	5/12/2015	2103.50	31.42	2072.08
	8/4/2015	2103.50	31.34	2072.16
	11/6/2015	2103.50	31.53	2071.97
	2/29/2016	2103.50	31.81	2071.69
	5/10/2016	2103.50	31.89	2071.61
	8/16/2016	2103.50	31.58	2071.92
32584416-MW-15	9/10/2013	2113.40	40.02	2073.38
	11/4/2013	2113.40	40.24	2073.16
	2/25/2014	2113.40	40.95	2072.45
	5/12/2014	2113.40	41.10	2072.30
	8/12/2014	2113.40	41.16	2072.24
	11/5/2014	2113.40	41.38	2072.02
	2/23/2015	2113.40	41.52	2071.88
	5/12/2015	2113.40	41.47	2071.93
	8/4/2015	2113.40	41.32	2072.08
	11/3/2015	2113.40	41.57	2071.83
	2/29/2016	2113.40	41.98	2071.42
	5/10/2016	2113.40	42.02	2071.38
	8/16/2016	2113.40	41.62	2071.78
32584416-MW-16	9/11/2013	2086.00	14.65	2071.35
	11/5/2013	2086.00	14.85	2071.15
	2/27/2014	2086.00	15.50	2070.50
	5/13/2014	2086.00	15.35	2070.65
	8/13/2014	2086.00	15.61	2070.39
	11/4/2014	2086.00	15.85	2070.15
	2/24/2015	2086.00	15.47	2070.53
	5/11/2015	2086.00	15.85	2070.15
	8/3/2015	2086.00	15.87	2070.13
	11/3/2015	2086.00	16.13	2069.87
	3/1/2016	2086.00	16.05	2069.95

Site	Date	Land Surface Elevation (ft.)	Depth to Water[2] (ft.)	Groundwater Elevation[1] (ft.)
	5/10/2016	2086.00	16.35	2069.65
	8/15/2016	2086.00	16.14	2069.86
32584416-MW-17	9/10/2013	2110.10	35.64	2074.46
	11/5/2013	2110.10	35.81	2074.29
	2/27/2014	2110.10	36.45	2073.65
	5/13/2014	2110.10	36.63	2073.47
	8/12/2014	2110.10	36.76	2073.34
	11/3/2014	2110.10	36.89	2073.21
	2/23/2015	2110.10	37.07	2073.03
	5/11/2015	2110.10	36.97	2073.13
	8/3/2015	2110.10	36.83	2073.27
	11/3/2015	2110.10	36.97	2073.13
	3/1/2016	2110.10	37.35	2072.75
	5/9/2016	2110.10	37.36	2072.74
	8/16/2016	2110.10	37.01	2073.09
32584416-MW-18	9/12/2013	2094.00	20.44	2073.56
	11/5/2013	2094.00	20.57	2073.43
	2/28/2014	2094.00	21.09	2072.91
	5/13/2014	2094.00	21.23	2072.77
	8/13/2014	2094.00	21.43	2072.57
	11/4/2014	2094.00	21.52	2072.48
	2/25/2015	2094.00	21.56	2072.44
	5/11/2015	2094.00	21.58	2072.42
	8/4/2015	2094.00	21.54	2072.46
	11/3/2015	2094.00	21.62	2072.38
	3/1/2016	2094.00	21.81	2072.19
	5/10/2016	2094.00	21.90	2072.10
	8/15/2016	2094.00	21.74	2072.26
32584416-MW-19	9/12/2013	2109.60	34.46	2075.14
	2/27/2014	2109.60	35.50	2074.10
	5/13/2014	2109.60	35.68	2073.92
	8/14/2014	2109.60	35.79	2073.81
	11/4/2014	2109.60	35.94	2073.66
	2/25/2015	2109.60	36.28	2073.32
	5/11/2015	2109.60	36.09	2073.51
	8/5/2015	2109.60	35.91	2073.69
	11/3/2015	2109.60	36.10	2073.50
	3/2/2016	2109.60	36.67	2072.93
	5/10/2016	2109.60	36.58	2073.02
	8/17/2016	2109.60	36.16	2073.44

Site	Date	Land Surface Elevation (ft.)	Depth to Water[2] (ft.)	Groundwater Elevation[1] (ft.)
32584416-MW-20	11/6/2014	2110.25	37.19	2073.06
	2/25/2015	2110.25	37.39	2072.86
	5/12/2015	2110.25	37.32	2072.93
	8/5/2015	2110.25	37.20	2073.05
	11/3/2015	2110.25	37.32	2072.93
	3/2/2016	2110.25	37.72	2072.53
	5/10/2016	2110.25	37.73	2072.52
	8/17/2016	2110.25	37.41	2072.84
32584416-MW-21	11/6/2014	2107.35	34.34/34.35[3]	2073.01[4]
	2/24/2015	2107.35	34.57/34.58[3]	2072.78[4]
	5/12/2015	2107.35	34.51	2072.84
	8/6/2015	2107.35	34.36	2072.99
	11/4/2015	2107.35	34.53	2072.82
	3/2/2016	2107.35	34.97	2072.38
	5/10/2016	2107.35	34.97	2072.38
	8/18/2016	2107.35	34.61	2072.74
32584416-MW-22	11/6/2014	2109.34	35.90	2073.44
	2/26/2015	2109.34	36.19	2073.15
	5/13/2015	2109.34	36.07	2073.27
	8/6/2015	2109.34	35.88	2073.46
	11/5/2015	2109.34	36.09	2073.25
	3/3/2016	2109.34	36.62	2072.72
	5/11/2016	2109.34	36.59	2072.75
	8/17/2016	2109.34	36.16	2073.18
32584416-MW-23	11/7/2014	2109.77	36.18/36.19[3]	2073.59[4]
	2/26/2015	2109.77	36.48/36.49[3]	2073.29[4]
	5/13/2015	2109.77	36.34	2073.43
	8/6/2015	2109.77	36.15	2073.62
	11/5/2015	2109.77	36.34	2073.43
	3/3/2016	2109.77	36.94	2072.83
	5/11/2016	2109.77	36.88	2072.89
	8/17/2016	2109.77	36.43	2073.34
32584416-MW-24	11/6/2014	2109.76	36.26	2073.50
	2/26/2015	2109.76	36.58/36.59[3]	2073.18[4]
	5/13/2015	2109.76	36.42	2073.34
	8/4/2015	2109.76	36.25	2073.51
	11/2/2015	2109.76	36.43	2073.33
	3/2/2016	2109.76	36.98	2072.78
	5/11/2016	2109.76	36.94	2072.82

Site	Date	Land Surface Elevation (ft.)	Depth to Water[2] (ft.)	Groundwater Elevation[1] (ft.)
	8/17/2016	2109.76	36.48	2073.28
32584416-MW-25	11/6/2014	2109.34	35.93	2073.41
	2/26/2015	2109.34	36.23/36.24[3]	2073.11[4]
	5/13/2015	2109.34	36.08	2073.26
	8/5/2015	2109.34	35.91	2073.43
	11/5/2015	2109.34	36.10	2073.24
	3/3/2016	2109.34	36.66	2072.68
	5/11/2016	2109.34	36.61	2072.73
	8/17/2016	2109.34	36.18	2073.16
32584416-MW-26	8/18/2016	2109.44	35.81	2073.63

[1] Elevations are referenced to NAVD88. Top of casing elevation survey performed by Thomas, Dean & Hoskins, Inc. (TD&H).

[2] Depth to water measurements referenced to Land Surface.

[3] Product was measured in this well; measurement reflects depth to product/depth to water.

[4] Groundwater elevation was calculated using the equation: GW = SG x T + IE.

Appendix D. Field Measurement Data

Table D-1: Field Measurement Data collected between September 2013 and August 2016

Site	Date	pH	Specific Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Temperature (°C)	ORP (mV)
32584416-MW-1	9/9/2013	7.36	396.8	7.26	10.61	417
	8/11/2014	7.31	439.3	7.53	11.50	-
2652739-MW-2	9/9/2013	7.35	387.3	7.28	12.17	429
	8/11/2014	7.26	438.8	8.71	12.84	-
32584416-MW-3	9/12/2013	7.02	501.2	0.00	10.64	-78
	3/3/2014	7.31	537.7	0.00	6.83	-87
	8/14/2014	7.21	491.8	1.05	12.45	-
	11/5/2014	7.29	520.1	1.24	9.03	-
	2/25/2015	7.29	600.0	1.71	8.82	-71
	5/12/2015	7.18	593.8	1.89	10.20	-73
	8/6/2015	7.06	504.9	2.43	10.67	-27
	11/5/2015	7.18	558.0	2.31	8.80	-51
	3/4/2016	7.03	605.5	1.26	8.50	-84
	5/11/2016	7.35	634.6	1.26	9.34	-75
	8/18/2016	7.20	607.2	2.14	10.17	-60
32584416-MW-4	9/10/2013	7.31	398.2	4.32	12.48	440
	2/26/2014	7.39	389.8	4.38	7.19	166
	8/12/2014	7.28	407.0	5.34	12.73	-
	8/5/2015	7.09	454.7	7.21	13.38	350
	8/15/2016	7.25	444.0	5.90	11.48	207
32584416-MW-5	5/13/2015	7.20	519.1	0.80	9.51	-87
	8/6/2015	7.06	567.1	0.80	12.15	-79
	11/5/2015	7.27	521	0.72	9.03	-98
	3/3/2016	7.20	509.3	0.38	9.35	-87
	5/12/2016	7.16	565.9	0.45	9.91	-98
	8/17/2016	7.17	533.9	0.62	11.65	-77
32584416-MW-6	9/11/2013	7.14	478.8	0.00	10.48	2
	2/28/2014	7.12	490.6	0.00	7.46	99
	8/13/2014	7.16	563.4	0.87	11.76	-
	11/4/2014	7.22	524.5	0.87	9.04	-
	2/24/2015	7.30	563.0	0.66	8.25	-93
	5/12/2015	7.17	593.7	1.16	9.92	-75
	8/6/2015	7.01	607.4	1.05	10.08	58
	11/4/2015	7.17	564.0	1.06	8.60	-33
	3/2/2016	7.25	528.1	0.49	8.32	-91
	5/10/2016	7.45	579.8	1.97	9.48	-94

Site	Date	pH	Specific Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Temperature (°C)	ORP (mV)
	8/18/2016	7.30	556.9	1.12	11.42	-85
32584416-MW-7	9/9/2013	7.23	413.6	8.44	12.20	446
	11/4/2013	7.16	412.9	8.48	7.90	249
	2/24/2014	7.41	414.2	7.34	5.72	214
	5/12/2014	7.37	428.8	7.66	11.78	157
	8/11/2014	7.31	413.9	6.93	12.60	-
	11/3/2014	7.41	395.2	4.76	8.36	-
	2/23/2015	7.34	457.0	10.26	7.51	157
	5/11/2015	7.12	447.7	9.31	11.24	218
	8/3/2015	7.13	420.1	9.24	11.74	384
	11/2/2015	7.18	434.0	9.91	8.95	376
	2/29/2016	7.22	433.8	10.10	8.47	183
	5/9/2016	7.47	370.2	10.05	8.95	195
	5/9/2016	7.15	422.4	9.24	15.66	205
32584416-MW-8	9/12/2013	7.16	413.9	0.00	15.52	-100
	3/3/2014	7.29	422.0	0.00	7.19	-93
	5/14/2014	7.25	453.1	0.00	11.00	-87
	8/14/2014	7.18	474.7	0.45	16.69	-
	11/5/2014	7.24	508.2	0.00	9.40	-
	2/27/2015	7.18	467.0	0.24	7.37	-108
	5/14/2015	7.17	515.9	0.24	9.86	-95
	8/7/2015	7.05	479.9	0.38	13.53	-69
	11/6/2015	7.13	509.0	0.00	8.73	-106
	3/4/2016	6.98	538.0	0.00	9.22	-81
	5/12/2016	7.03	580.7	0.19	10.35	-65
	8/18/2016	7.10	549.1	0.26	16.53	-79
32584416-MW-9	9/11/2013	6.97	501.9	0.00	10.44	169
	2/27/2014	7.05	439.9	0.00	7.56	204
	8/13/2014	7.05	494.8	0.50	12.06	-
	11/4/2014	7.12	505.9	0.81	9.18	-
	2/25/2015	7.22	520.0	0.47	9.13	-35
	5/12/2015	7.07	503.0	0.46	10.20	0
	8/4/2015	6.88	513.0	0.58	10.54	202
	11/4/2015	7.09	516.0	0.41	8.78	53
	3/1/2016	7.17	477.5	0.20	8.20	-5
	5/10/2016	7.24	490.9	0.35	9.45	24
	8/16/2016	7.14	494.3	0.76	10.91	29
32584416-MW-10	9/10/2013	7.17	447.0	1.91	10.48	428
	11/4/2013	7.11	470.7	0.73	9.58	105

Site	Date	pH	Specific Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Temperature (°C)	ORP (mV)
	2/26/2014	7.30	448.8	0.95	7.68	58
	5/13/2014	7.31	424.4	0.63	7.62	74
	8/12/2014	7.17	429.7	1.78	9.89	-
	8/3/2015	7.02	479.3	1.73	10.52	275
	8/16/2016	7.15	507.0	2.28	9.96	22
32584416-MW-11	9/11/2013	7.34	454.5	3.48	10.26	384
	11/5/2013	7.34	454.4	3.49	9.09	164
	2/26/2014	7.31	473.2	2.91	8.08	251
	5/13/2014	7.35	464.8	2.46	9.91	134
	8/11/2014	7.14	453.4	2.50	10.10	-
	2/24/2015	7.30	442.0	2.73	8.62	70
	8/4/2015	6.97	502.3	2.42	11.26	356
	3/1/2016	7.14	494.3	1.78	8.62	187
	8/16/2016	7.11	515.3	2.28	9.72	114
32584416-MW-12	9/10/2013	7.46	369.8	6.02	10.06	438
	11/4/2013	7.36	391.3	5.94	8.70	265
	2/25/2014	7.38	441.5	6.36	7.68	234
	5/12/2014	7.44	454.1	7.16	9.61	187
	8/12/2014	7.37	396.6	6.01	10.76	-
	2/23/2015	7.46	426.0	6.90	7.63	164
	8/3/2015	7.14	438.2	7.98	11.62	388
	2/29/2016	7.39	437.8	7.61	8.67	176
	8/15/2016	7.33	425.8	8.01	11.38	222
32584416-MW-13	9/11/2013	7.10	548.9	-	16.39	190
	2/28/2014	7.18	487.4	0.00	7.37	149
	8/13/2014	7.22	488.1	1.05	11.18	-
	11/3/2014	7.18	505.9	0.00	8.60	-
	2/24/2015	7.24	517.0	1.28	7.65	-4
	5/12/2015	7.15	552.9	2.01	9.58	8
	8/4/2015	6.96	522.7	2.07	10.41	220
	11/2/2015	7.13	526.0	2.51	8.79	164
	2/29/2016	7.23	480.9	2.75	8.37	10
	5/9/2016	7.37	436.3	2.88	9.19	22
	8/16/2016	7.19	501.9	4.10	10.84	51
32584416-MW-14	9/10/2013	7.31	439.7	2.87	11.08	435
	2/26/2014	7.29	416.6	2.62	7.41	293
	8/12/2014	7.25	477.6	2.22	10.81	-
	8/4/2015	6.98	535.5	1.85	11.03	324
	8/16/2016	7.10	509.2	2.30	10.22	78

Site	Date	pH	Specific Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Temperature (°C)	ORP (mV)
32584416-MW-15	9/10/2013	7.43	383.5	8.63	12.24	398
	11/4/2013	7.33	367.9	8.25	8.71	275
	2/25/2014	7.46	379.1	6.99	7.47	241
	5/12/2014	7.40	401.3	6.64	9.52	194
	8/12/2014	7.35	392.7	6.36	11.98	-
	8/16/2016	7.17	416.7	4.73	10.85	157
32584416-MW-16	9/11/2013	6.89	413.2	4.58	9.39	492
	11/5/2013	6.91	409.4	4.43	9.28	259
	2/27/2014	6.92	410.8	4.36	7.61	320
	5/13/2014	7.11	335.4	5.50	8.42	198
	8/13/2014	7.05	346.0	4.99	9.82	-
	11/4/2014	7.07	352.5	4.66	9.38	-
	2/24/2015	6.97	327.0	5.56	7.18	171
	5/11/2015	6.81	319.1	5.52	9.18	220
	8/3/2015	6.74	339.0	5.06	10.62	411
	11/3/2015	6.90	371.0	4.47	9.69	414
	3/1/2016	6.92	357.1	4.38	7.57	186
	5/10/2016	7.23	333.0	4.70	8.06	189
	8/15/2016	6.58	364.4	4.11	10.76	210
32584416-MW-17	9/10/2013	7.29	476.6	4.44	10.51	446
	11/5/2013	7.18	460.8	4.55	8.20	237
	2/27/2014	7.27	423.8	6.01	7.97	305
	5/13/2014	7.37	457.9	7.49	9.71	190
	8/12/2014	7.28	451.2	8.10	10.36	-
	11/3/2014	7.28	486.3	8.44	8.42	-
	2/23/2015	7.39	488.0	8.81	8.24	174
	5/11/2015	7.15	542.2	9.08	10.36	218
	8/3/2015	7.04	561.0	9.35	12.37	400
	11/3/2015	7.16	537.0	9.39	8.34	417
	3/1/2016	7.30	494.5	8.53	7.72	202
	5/9/2016	7.47	448.1	8.67	8.72	112
	8/16/2016	7.24	463.4	8.36	11.25	184
32584416-MW-18	9/12/2013	7.32	537.2	0.91	10.43	213
	11/5/2013	7.33	482.4	0.00	8.99	121
	2/28/2014	7.35	464.5	0.00	8.06	79
	5/13/2014	7.43	424.5	0.00	9.28	174
	8/13/2014	7.36	473.8	0.83	10.69	-
	11/4/2014	7.29	533.1	0.86	9.35	-
	2/25/2015	7.20	467.5	2.22	8.58	104

Site	Date	pH	Specific Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Temperature (°C)	ORP (mV)
	5/11/2015	7.04	485.6	4.56	9.49	229
	8/4/2015	7.03	446.5	7.49	10.73	384
	11/3/2015	7.19	471.7	7.89	9.46	410
	3/1/2016	7.31	468.0	8.29	8.41	194
	5/10/2016	7.42	444.0	8.61	8.43	217
	8/15/2016	7.31	418.5	9.00	10.04	210
32584416-MW-19	9/12/2013	7.08	518.2	0.00	10.48	95
	2/27/2014	7.16	466.0	1.36	7.74	163
	8/14/2014	7.11	512.2	5.37	11.85	-
	11/4/2014	7.27	480.0	5.19	9.38	-
	2/25/2015	7.35	493.7	4.52	8.11	71
	5/11/2015	7.10	561.7	4.02	10.22	91
	8/5/2015	7.03	486.0	4.82	10.29	244
	11/3/2015	7.16	524.7	4.19	9.40	239
	3/2/2016	7.19	524.0	4.02	8.41	42
	5/10/2016	7.31	233.5	4.37	10.69	51
	8/17/2016	7.15	521.7	3.87	11.37	29
32584416-MW-20	11/6/2014	7.17	499.1	0.00	9.21	-
	2/25/2015	7.30	532.0	0.50	9.61	-59
	5/12/2015	7.20	504.2	0.48	9.59	-43
	8/5/2015	7.03	564.0	0.64	10.41	-3
	11/3/2015	7.16	552.0	0.71	9.01	-7
	3/2/2016	7.29	601.7	0.28	8.91	-97
	5/10/2016	7.36	576.4	0.43	9.93	-75
	8/17/2016	7.22	619.4	0.58	10.81	-102
32584416-MW-21	11/6/2014	7.22	463.7	0.00	9.00	-
	2/24/2015	7.33	553.0	1.05	8.44	-88
	5/12/2015	7.25	560.0	1.24	9.82	-78
	8/6/2015	7.07	506.8	1.86	10.10	26
	11/4/2015	7.28	521.0	1.17	8.64	-66
	3/2/2016	7.32	503.0	0.86	8.74	-93
	5/10/2016	7.42	530.0	0.91	9.59	-92
	8/18/2016	7.26	511.3	1.37	10.94	-89
32584416-MW-22	11/6/2014	7.15	510.3	0.00	9.69	-
	2/26/2015	7.17	556.0	0.41	8.46	-85
	5/13/2015	7.18	502.7	0.45	9.39	-78
	8/6/2015	7.09	493.0	0.43	11.04	-79
	11/5/2015	7.26	524.0	0.00	9.18	-101
	3/3/2016	7.46	406.1	0.49	9.16	-99

Site	Date	pH	Specific Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Temperature (°C)	ORP (mV)
	5/11/2016	7.47	441.5	0.86	10.22	-98
	8/17/2016	7.17	562.3	0.37	11.53	-74
32584416-MW-23	11/7/2014	7.20	474.2	1.73	9.17	-
	2/26/2015	7.14	489.0	1.38	8.54	-57
	5/13/2015	7.08	480.0	1.75	9.42	-46
	8/6/2015	7.04	464.3	1.74	11.33	-31
	11/5/2015	7.23	484.0	1.35	9.29	-63
	3/3/2016	7.26	490.1	0.71	9.62	-97
	5/11/2016	7.38	534.5	1.05	10.21	-92
	8/17/2016	7.20	490.9	1.52	12.23	-78
32584416-MW-24	11/6/2014	7.19	482.1	3.40	9.70	-
	2/26/2015	7.22	468.0	3.24	7.79	13
	5/13/2015	7.20	454.6	5.65	9.26	14
	8/4/2015	7.06	459.2	5.17	14.19	244
	11/2/2015	7.23	458.0	4.27	9.24	173
	3/2/2016	7.31	453.5	2.29	8.93	-20
	5/11/2016	7.38	462.2	2.66	9.98	-8
	8/17/2016	7.10	473.1	4.62	11.51	-2
32584416-MW-25	11/6/2014	7.19	447.2	3.02	9.65	-
	2/26/2015	7.18	464.0	3.07	8.17	49
	5/13/2015	7.01	463.2	3.06	9.20	0
	8/5/2015	7.07	475.1	4.92	10.94	176
	11/5/2015	7.26	458.0	3.31	8.98	-9
	3/3/2016	7.26	454.4	3.09	8.97	-29
	5/11/2016	7.40	461.1	3.19	10.01	-21
	8/17/2016	7.14	482.1	4.91	11.17	-9
32584416-MW-26	8/18/2016	7.13	576.7	0.63	11.61	-66
Cabin Grill Well[1]	5/14/2014	7.29	425.3	0.79	11.40	-18
	8/15/2014	7.32	425.5	1.35	10.83	-
	11/5/2014	7.50	442.4	1.60	11.81	-
	2/27/2015	7.23	460.0	1.30	9.91	-40
	5/14/2015	7.27	462.6	1.26	10.10	-33
	8/5/2015	7.08	477.6	1.58	10.35	113
	11/4/2015	7.32	458.0	1.57	8.79	2
	3/3/2016	7.32	471.2	1.32	10.31	-68
	5/12/2016	7.30	477.2	1.71	10.06	-68
	8/18/2016	7.24	486.3	1.52	12.92	-50
DW 6508W[1]	5/13/2014	7.32	518.1	0.00	10.01	134
	8/14/2014	7.00	488.0	1.13	12.43	-

Site	Date	pH	Specific Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Temperature (°C)	ORP (mV)
	11/5/2014	7.21	471.3	0.00	10.32	-
	2/27/2015	7.08	453.0	2.71	7.99	34
	5/14/2015	7.09	445.1	2.67	8.65	77
	8/5/2015	6.94	444.4	1.82	10.93	225
	11/4/2015	7.17	417.0	1.59	9.99	97
	3/2/2016	7.17	407.5	2.76	7.54	75
	5/11/2016	7.25	418.5	2.10	9.12	14
	8/18/2016	7.06	314.4	0.93	13.24	-48
DW 6606[1]	5/14/2014	6.84	460.9	2.27	13.71	145
	8/14/2014	7.16	363.0	2.92	17.61	-
	5/14/2015	6.82	423.2	3.57	13.26	185
	8/5/2015	6.74	399.1	5.40	15.69	315
	5/11/2016	7.24	394.9	3.77	15.33	118
	8/18/2016	7.02	485.4	3.69	17.67	127
DW 6607[1]	5/14/2014	7.35	411.7	0.00	9.67	-74
	8/14/2014	7.45	465.6	0.10	15.15	-
	11/5/2014	7.76	475.2	0.00	9.45	-
	2/26/2015	7.23	467.0	1.08	5.31	-82
	5/14/2015	7.20	448.1	0.20	10.82	-119
	8/5/2015	7.03	465.3	0.52	14.18	-50
	11/4/2015	7.25	473.0	0.16	11.36	-49
	3/1/2016	7.44	473.5	0.80	10.52	-109
	5/11/2016	7.46	484.4	0.24	11.70	-158
DW 6608/6609[1]	5/14/2014	7.32	421.3	0.00	9.72	39
	8/14/2014	7.20	415.2	0.12	17.33	-
	5/14/2015	7.18	436.7	2.65	10.59	68
	8/5/2015	6.99	449.2	0.17	17.37	-36
	5/11/2016	7.31	455.9	0.15	11.61	-21
	8/18/2016	7.13	511.7	0.23	14.12	-139
DW 6610 Sand[1]	5/12/2014	6.84	575.2	0.00	9.55	-3
	8/14/2014	6.81	509.3	0.54	12.83	-

- No measurement for parameter.

[1] To limit purge waste water, domestic wells were sampled before parameters fully stabilized, therefore values are estimates.

Appendix E. Analytical Data

Table E-1: Analytical Data collected between September 2013 and August 2016.

Site	Date	GRPH (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	m,p-Xylene (µg/L)	o-Xylene (µg/L)	MTBE (µg/L)	Naphthalene (µg/L)	EDB (µg/L)	EDC (µg/L)
32584416-MW-1	9/9/2013	100 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	8/11/2014	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
2652739-MW-2	9/9/2013	100 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	8/11/2014	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
32584416-MW-3	9/12/2013	**12100**	25 U	25 U	435	**1200**	**47**	25 U	108	10 U	25 U
	3/3/2014	**9900**	20 U	9.9 J	**820**	**1600**	**23**	20 U	120 J	20 U	20 U
	8/14/2014	**12000**	50 U	50 U	540	**2200**	**230**	50 U	110	50 UJ	50 U
	11/5/2014	**12000 J**	50 U	50 U	310	**1100**	**180**	50 U	99 J	50 U	50 U
	2/25/2015	**10000**	50 U	50 U	350	**970**	**92**	50 U	120	50 U	50 U
	5/12/2015	**8600 J**	50 U	50 U	350	**1200**	**180**	50 U	98	50 U	50 U
	8/6/2015	**7800**	50 U	50 U	270	**1400**	**260**	50 U	65	50 U	50 U
	11/5/2015	**8100**	50 U	50 U	150	620	120	50 U	67	50 U	50 U
	3/4/2016	**9900**	10 U	12	260	**1100**	**120**	10 U	110	10 U	10 U
	5/11/2016	**7900**	50 U	13.4 J	268	**961**	**165**	50 U	97.6	50 U	50 U
	8/18/2016	**8900**	50 U	50 U	241	**1020**	**273**	50 U	98.4	50 U	50 U
32584416-MW-4	9/10/2013	100 U	0.1 U	0.14 B	0.1 U	0.34	0.20	0.1 U	0.5 U	0.01 U	0.1 U
	2/26/2014	70 U	0.1 U	0.06 J	0.03 J	0.17 J	0.18	0.1 U	0.55 U	0.01 U	0.1 U
	8/12/2014	70 U	0.1 U	0.08 J	0.06 J	0.30 B	0.23	0.1 U	0.52 J	0.01 U	0.1 U
	8/5/2015	70 U	0.1 U	0.11 UB	0.1 U	0.22	0.15	0.1 U	0.5 U	0.01 U	0.1 U
	8/15/2016	70 U	0.1 U	0.1 U	0.1 U	0.22	0.5	0.1 U	0.5 U	0.01 U	0.1 U
32584416-MW-5	5/13/2015	**23000 J**	100 U	100 U	630	**4700**	**890**	100 U	**260**	100 U	100 U
	8/6/2015	**18000**	100 U	28 J	330	**2900**	**340**	100 U	**210**	100 U	100 U
	11/5/2015	**17000**	20 U	20 U	290	**2000**	**220**	20 U	**250**	20 U	20 U
	3/3/2016	**27000**	20 U	20 U	140	**1400**	**140**	20 U	**270**	20 U	20 U
	5/12/2016	**19200**	20 U	20 U	47.4	545	27	20 U	**171**	20 U	20 U

Site	Date	GRPH (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	m,p-Xylene (µg/L)	o-Xylene (µg/L)	MTBE (µg/L)	Naphthalene (µg/L)	EDB (µg/L)	EDC (µg/L)
	8/17/2016	**14900**	10 U	10 U	17.1	141	5.73 J	10 U	85.5 J	10 U	10 U
32584416-MW-6	9/11/2013	**1340**	2.5 U	2.5 U	162	5.0 U	2.5 U	2.5 U	9.5	1.0 U	2.5 U
	2/28/2014	**3400**	1 U	2.4	200	51	2.0	1 U	62	1 U	1 U
	8/13/2014	**2600**	0.67 J	3.9	320 J	190 J	2.9 J	1 U	57 J	1 UJ	1 U
	11/4/2014	**2700 J**	20 U	20 U	150	89	20 U	20 U	42 J	20 U	20 U
	2/24/2015	**9700**	100 U	28 J	660	**1800**	**110**	100 U	**160**	100 U	100 U
	5/12/2015	**6400 J**	10 U	2.2 J	510	**1200**	**7.7**	10 U	140	10 U	10 U
	8/6/2015	**900**	5 U	1.6 JB	95	21	3.7 J	5 U	52	5 U	5 U
	11/4/2015	**1400**	1 U	0.16 J	81	53	2.2	1 UJ	39 J	1 U	1 U
	3/2/2016	**8200**	10 U	2 J	380	790	120	10 U	120	10 U	10 U
	5/10/2016	**18800**	10 U	20.1	**955**	**3010**	**969**	10 U	**196**	10 U	10 U
	8/18/2016	**1540**	1 U	1 U	5.65	1.29 J	1 U	1 U	5.25	1 U	1 U
32584416-MW-7	9/9/2013	100 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	11/4/2013	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	2/24/2014	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	5/12/2014	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	8/11/2014	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	11/3/2014	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	2/23/2015	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	5/11/2015	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	8/3/2015	70 U	0.1 U	0.1 UB	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	11/2/2015	70 U	0.1 U	0.1 J	0.1 U	0.2 J	0.07 J	0.1 U	0.5 U	0.01 U	0.1 U
	2/29/2016	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	5/9/2016	70 U	0.1 U	0.12	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	8/15/2016	70 U	0.1 U	0.14	0.17	0.2 U	0.19	0.1 U	0.5 U	0.01 U	0.1 U
32584416-MW-8	9/12/2013	**53300**	100 U	**2580**	**1410**	**5240**	**2390**	100 U	155	40 U	100 U
	3/3/2014	**30000**	20 U	160	**1100**	**5100**	**1800**	20 U	**160 J**	20 U	20 U
	5/14/2014	**26000**	**6.1 J**	84	**1500**	**6600**	**2400**	10 U	**180**	10 U	10 U
	8/14/2014	**10000**	100 U	62 J	**1300**	**6400**	**2100**	100 U	150	100 UJ	100 U

Site	Date	GRPH (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	m,p-Xylene (µg/L)	o-Xylene (µg/L)	MTBE (µg/L)	Naphthalene (µg/L)	EDB (µg/L)	EDC (µg/L)
	11/5/2014	**25000 J**	100 U	100 U	**1200**	**4600**	**1800**	100 U	**160**	100 U	100 U
	2/27/2015	**28000**	50 U	24 J	**1700**	**6700**	**2200**	50 U	**260**	50 U	50 U
	5/14/2015	**24000 J**	50 U	50 U	**1400**	**5900**	**1800**	50 U	**200**	50 U	50 U
	8/7/2015	**24000**	50 U	50 U	**1600**	**6600**	**2500**	50 U	**160**	50 U	50 U
	11/6/2015	**28000**	50 U	50 U	**1500**	**6100**	**1900**	50 U	**210**	50 U	50 U
	3/4/2016	**27000**	50 U	50 U	**1400**	**6100**	**1700**	50 U	**340**	50 U	50 U
	5/12/2016	**23200**	50 U	50 U	**990**	**4490**	**1190**	50 U	**307**	50 U	50 U
	8/18/2016	**28700**	50 U	50 U	**760**	**3740**	**774**	50 U	157	50 U	50 U
32584416-MW-9	9/11/2013	**2580**	5.0 U	5.0 U	354	10.0 U	16	5.0 U	53	2.0 U	5.0 U
	2/27/2014	**2200**	2.9	6.5	380	19	4.4	1 U	55 J	1 U	1 U
	8/13/2014	**2500**	2.5	46	**750**	14	3.6	1 U	38	1 UJ	1 U
	11/4/2014	**6300 J**	20 U	59	660	240	97	20 U	73 J	20 U	20 U
	2/25/2015	**7400**	50 U	230	**1100**	610	330	50 U	120	50 U	50 U
	5/12/2015	730 J	5.5 J	5.2 J	**870**	50 U	25 U	25 U	**220**	25 U	25 U
	8/4/2015	720	1.9 NJ	2.1 J	170	10 U	5 U	5 U	21	5 U	5 U
	11/4/2015	370	0.83 J	0.34 J	15	1.2 J	0.56 J	1 UJ	1.4 J	1 U	1 U
	3/1/2016	83	0.4 J	1 U	0.6 J	1.1 J	1 U	1 U	5 U	1 U	1 U
	5/10/2016	70 U	0.32 J	1 U	0.43 J	2 U	1 U	1 U	1 U	1 U	1 U
	8/16/2016	70 U	1 U	1 U	0.51 J	0.72 J	1 U	1 U	1 U	1 U	1 U
32584416-MW-10	9/10/2013	100 U	0.26	0.1 U	0.1 U	0.2 U	0.1 U	0.12	0.5 U	0.01 U	0.1 U
	11/4/2013	70 U	0.32	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.46 J	0.01 U	0.1 U
	2/26/2014	70 U	0.12	0.1 U	0.1 U	0.2 U	0.1 U	0.11	0.5 U	0.01 U	0.1 U
	5/13/2014	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.11	0.5 U	0.01 U	0.1 U
	8/12/2014	70 U	0.22 J	0.1 U	0.1 U	0.2 U	0.1 U	0.19 J	0.5 U	0.01 U	0.1 U
	8/3/2015	70 U	0.44	0.1 UB	0.1 U	0.2 U	0.1 U	0.15 NJ	0.5 U	0.01 U	0.1 U
	8/16/2016	70 U	0.13	0.14	0.17	0.2 U	0.19	0.24 J	0.5 UJ	0.01 U	0.1 U
32584416-MW-11	9/11/2013	509	0.83	0.18 B	0.1 U	4.2	1.1	0.1 U	51	0.01 U	0.1 U
	11/5/2013	250	0.6	0.1 U	0.1 U	0.57	0.24	0.1 U	41	0.01 U	0.1 U
	2/26/2014	180	1.4	0.72	0.65	2.9	0.96	0.1 U	17	0.01 U	0.1 U

Site	Date	GRPH (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	m,p-Xylene (µg/L)	o-Xylene (µg/L)	MTBE (µg/L)	Naphthalene (µg/L)	EDB (µg/L)	EDC (µg/L)
	5/13/2014	70 U	0.67	0.1 U	0.04 J	1.4	0.28	0.1 U	16	0.01 U	0.1 U
	8/11/2014	70 U	0.95 J	0.16	0.06 J	0.69 B	0.25	0.1 U	8 J	0.01 U	0.1 U
	2/24/2015	70 U	0.28	0.08 J	0.1 U	0.51	0.12	0.1 UJ	0.5 U	0.01 U	0.1 U
	8/4/2015	87	0.43	0.12 UB	0.1 U	0.43	0.14	0.1 U	0.5 U	0.01 U	0.1 U
	3/1/2016	86	0.28	0.1 U	0.1 U	0.23	0.09 J	0.1 U	0.5 U	0.01 U	0.1 U
	8/16/2016	70 U	0.27	0.17	0.19	0.28	0.24	0.1 U	0.5 U	0.01 U	0.1 U
32584416-MW-12	9/10/2013	100 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	11/4/2013	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	2/25/2014	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	5/12/2014	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	8/12/2014	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	2/23/2015	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	8/3/2015	70 U	0.1 U	0.1 UB	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	2/29/2016	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	8/15/2016	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
32584416-MW-13	9/11/2013	**1060**	2.5 U	2.5 U	99	5.0 U	2.5 U	2.5 U	6.6	1.0 U	2.5 U
	2/28/2014	74	1 U	1 U	0.61 J	1.1 J	0.57 J	1 U	1 UJ	1 U	1 U
	8/13/2014	70 U	0.1 U	0.09 J	1.5	0.27 B	0.1	0.1 U	0.46 J	0.01 U	0.1 U
	11/3/2014	71 U	0.1 U	0.05 J	0.06 J	0.17 J	0.05 J	0.1 U	0.5 U	0.01 U	0.1 U
	2/24/2015	70 U	0.1 U	0.06 J	0.06 J	0.11 J	0.06 J	0.1 UJ	0.5 U	0.01 U	0.1 U
	5/12/2015	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	8/4/2015	70 U	0.06 J	0.11 UB	0.14 J	0.17 J	0.1 J	0.1 U	0.5 U	0.01 U	0.1 U
	11/2/2015	70 U	0.1 U	0.08 J	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	2/29/2016	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	5/9/2016	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	8/16/2016	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
32584416-MW-14	9/10/2013	105	0.36	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	2.7	0.01 U	0.1 U
	2/26/2014	70 U	0.56	0.04 J	0.02 J	0.09 J	0.06 J	0.1 U	0.55 U	0.01 U	0.1 U
	8/12/2014	290	1.7 J	0.38	0.06 J	0.61 B	0.36	0.1 U	9.8 J	0.01 U	0.1 U

Site	Date	GRPH (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	m,p-Xylene (µg/L)	o-Xylene (µg/L)	MTBE (µg/L)	Naphthalene (µg/L)	EDB (µg/L)	EDC (µg/L)
	8/4/2015	**3000**	2.6 J	82 J	NAF	160 J	NAF	2 U	23 J	0.2 U	2 U
	8/16/2016	216	0.47	0.15	0.53	0.46	0.23	0.1 U	0.5 U	0.01 U	0.1 U
32584416-MW-15	9/10/2013	100 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	11/4/2013	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	2/25/2014	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	5/12/2014	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	8/12/2014	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	8/16/2016	70 U	0.1 U	0.15	0.17	0.2 U	0.19	0.1 U	0.5 UJ	0.01 U	0.1 U
32584416-MW-16	9/11/2013	100 U	**68**	1.25 U	1.25 U	2.5 U	1.25 U	1.25 U	1.25 U	0.5 U	1.25 U
	11/5/2013	70 U	**67**	1 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U
	2/27/2014	70 U	**60**	1 U	1 U	2 U	1 U	1 U	1 UJ	1 U	1 U
	5/13/2014	70 U	**8.1**	1 U	1 U	2 U	1 U	1 U	2 U	1 U	1 U
	8/13/2014	70 U	0.61 J	0.1 U	0.1 U	0.11 J	0.1 U	0.06 J	0.5 U	0.01 U	0.1 U
	11/4/2014	70 U	0.08 J	0.1 U	0.1 U	0.2 U	0.1 U	0.04 J	0.5 U	0.01 U	0.1 U
	2/24/2015	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 UJ	0.5 U	0.01 U	0.1 U
	5/11/2015	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.04 J	0.5 U	0.01 U	0.1 U
	8/3/2015	70 U	0.12	0.1 UB	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	11/3/2015	70 U	0.27	0.1 U	0.1 U	0.2 U	0.1 U	0.06 J	0.5 U	0.01 U	0.1 U
	3/1/2016	70 U	0.14	0.1 U	0.1 U	0.31	0.09 J	0.1 U	0.5 U	0.01 U	0.1 U
	5/10/2016	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	8/15/2016	70 U	0.18	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 UJ	0.01 U	0.1 U
32584416-MW-17	9/10/2013	70 U	**0.3**	0.1 U	0.1 U	0.2 U	0.1 U	0.06 J	0.5 U	0.01 U	0.1 U
	11/5/2013	70 U	**0.27**	0.1 U	0.1 U	0.2 U	0.1 U	0.06 J	0.5 U	0.01 U	0.1 U
	2/27/2014	70 U	0.27	0.1 U	0.1 U	0.2 U	0.1 U	0.06 J	0.5 U	0.01 U	0.1 U
	5/13/2014	70 U	0.27	0.1 U	0.1 U	0.2 U	0.1 U	0.06 J	0.5 U	0.01 U	0.1 U
	8/12/2014	70 U	0.27	0.1 U	0.1 U	0.2 U	0.1 U	0.06 J	0.5 U	0.01 U	0.1 U
	11/3/2014	70 U	0.27	0.1 U	0.1 U	0.2 U	0.1 U	0.06 J	0.5 U	0.01 U	0.1 U
	2/23/2015	70 U	0.27	0.1 U	0.1 U	0.2 U	0.1 U	0.06 J	0.5 U	0.01 U	0.1 U
	5/11/2015	70 U	0.27	0.1 U	0.1 U	0.2 U	0.1 U	0.06 J	0.5 U	0.01 U	0.1 U

Site	Date	GRPH (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	m,p-Xylene (µg/L)	o-Xylene (µg/L)	MTBE (µg/L)	Naphthalene (µg/L)	EDB (µg/L)	EDC (µg/L)
	8/3/2015	70 U	0.27	0.1 U	0.1 U	0.2 U	0.1 U	0.06 J	0.5 U	0.01 U	0.1 U
	11/3/2015	70 U	0.1 U	0.12	0.07 J	0.23	0.08 J	0.1 U	0.5 U	0.01 U	0.1 U
	3/1/2016	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	5/9/2016	70 U	0.1 U	0.18	0.1 U	0.2 U	0.1 U	0.1 U	0.5 U	0.01 U	0.1 U
	8/16/2016	70 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.1 U	0.5 UJ	0.01 U	0.1 U
32584416-MW-18	9/12/2013	**18700**	**563**	62	534	**1030**	**1790**	50 U	113	20 U	50 U
	11/5/2013	**38000**	**230**	**5000**	**780**	**2000**	**1900**	100 U	140	100 U	100 U
	2/28/2014	**2700**	**25**	15 J	16 J	120	54	20 U	67 J	20 U	20 U
	5/13/2014	70 U	**15**	1.4	1.1	9.6	2.1	1 U	43	1 U	1 U
	8/13/2014	100	**7.7**	0.54 J	1.1	0.87 J	0.63 J	1 U	11	1 UJ	1 U
	11/4/2014	**12000 J**	1.9	1 U	0.75 J	1.1 J	1 U	1 U	2.9	1 U	1 U
	2/25/2015	70 U	0.85 J	1 U	1 U	2 U	1 U	1 U	1.3	1 U	1 U
	5/11/2015	70 U	0.3 J	1 U	1 U	2 U	1 U	1 U	1 UJ	1 U	1 U
	8/4/2015	70 U	0.35 J	1 UB	1 U	2 U	1 U	1 U	1 U	1 U	1 U
	11/3/2015	70 U	1 U	1 U	1 U	2 U	1 U	1 UJ	1 UJ	1 U	1 U
	3/1/2016	70 U	1 U	1 U	1 U	2 U	1 U	1 U	5 U	1 U	1 U
	5/10/2016	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U
	8/15/2016	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U
32584416-MW-19	9/12/2013	**6890**	0.1 U	0.19 B	0.1 U	1.8	0.23	0.1 U	3.2	0.01 U	0.1 U
	2/27/2014	**3600**	0.1 U	0.18	0.1 J	0.74	0.21	0.1 U	1.5	0.01 U	0.1 U
	8/14/2014	290	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 UJ	1 U
	11/4/2014	670 J	1 U	1 U	1 U	1.1 J	1 U	1 U	0.84 J	1 U	1 U
	2/25/2015	610	1 U	1 U	0.58 NJ	1.1 J	1 U	1 U	1 U	1 U	1 U
	5/11/2015	780 J	1 U	1 U	0.45 J	0.91 NJ	0.48 J	1 U	0.78 J	1 U	1 U
	8/5/2015	640	1 U	0.33 JB	0.56 NJ	1.2 J	1 U	1 U	1 U	1 U	1 U
	11/3/2015	620	1 U	1 U	1 J	0.96 J	1 U	1 UJ	1 UJ	1 U	1 U
	3/2/2016	**810**	1 U	1 U	0.53 J	1.1 J	0.54 NJ	1 U	5 U	1 U	1 U
	5/10/2016	**928**	1 U	1 U	0.36 NJ	2 U	1 U	1 U	1 U	1 U	1 U
	8/17/2016	**1040**	1 U	1 U	1 U	0.75 J	1 U	1 U	1 U	1 U	1 U

Site	Date	GRPH (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	m,p-Xylene (µg/L)	o-Xylene (µg/L)	MTBE (µg/L)	Naphthalene (µg/L)	EDB (µg/L)	EDC (µg/L)
32584416-MW-20	11/6/2014	**3700 J**	0.79 J	1 U	43	2.6	0.73 J	1 U	96	1 U	1 U
	2/25/2015	**2600**	2 U	0.82 J	19	4.4	2 U	2 U	43	2 U	2 U
	5/12/2015	**2800 J**	1 U	1 U	150	2.8	0.62 J	1 U	78 J	1 U	1 U
	8/5/2015	**1700**	10 U	10 U	43	11 J	10 U	10 U	45	10 U	10 U
	11/3/2015	**1800**	2 U	0.27 J	20	2.3 J	2 U	2 U	60	2 U	2 U
	3/2/2016	**2100**	5 U	5 U	130	7.9 J	5 U	5 U	44	5 U	5 U
	5/10/2016	**5310**	1.05 NJ	15.1	614	391	8.22	5 U	98.8	5 U	5 U
	8/17/2016	**6350**	10 U	6.85 J	352	435	44.2	10 U	142	10 U	10 U
32584416-MW-21	11/6/2014	**3200 J**	10 U	10 U	150	92	10 U	10 U	55	10 U	10 U
	2/24/2015	**8400**	50 U	14 J	420	**1000**	**120**	50 U	130	50 U	50 U
	5/12/2015	**4000 J**	10 U	10 U	160	210	5.6 J	10 U	78 J	10 U	10 U
	8/6/2015	**1000**	5 U	5 U	67	13	5 U	5 U	21	5 U	5 U
	11/4/2015	**1400**	1 U	0.13 J	NAF	79	24	0.6 J	1 UJ	51 J	1 U
	3/2/2016	**6700**	10 U	10 U	190	350	12	10 U	130	10 U	10 U
	5/10/2016	**5530**	10 U	10 U	191	247	10 U	10 U	95.2	10 U	10 U
	8/18/2016	**3410**	10 U	10 U	58.4	82.5	10 U	10 U	90.5	10 U	10 U
32584416-MW-22	11/6/2014	**18000 J**	20 U	17 J	340	**2000**	**460**	20 U	**190**	20 U	20 U
	2/26/2015	**20000**	20 U	11 J	400	**2500**	**440**	20 U	**280**	20 U	20 U
	5/13/2015	**16000 J**	50 U	50 U	260	**1700**	**280**	50 U	**180**	50 U	50 U
	8/6/2015	**14000**	50 U	50 U	200	**1500**	**180**	50 U	**190**	50 U	50 U
	11/5/2015	**17000**	20 U	20 U	250	**1500**	**180**	20 U	**230**	20 U	20 U
	3/3/2016	**15000**	20 U	20 U	98	**1900**	**260**	20 U	**270**	20 U	20 U
	5/11/2016	**10300**	20 U	20 U	29.3	518	45.6	20 U	**258**	20 U	20 U
	8/17/2016	**14300**	10 U	10 U	14.6	112	7.15 J	10 U	**165**	10 U	10 U
32584416-MW-23	11/7/2014	**12000 J**	10 U	10 U	18	200	25	10 U	47	10 U	10 U
	2/26/2015	**11000**	10 U	10 U	11	62	7.5 J	10 U	32	10 U	10 U
	5/13/2015	**6800 J**	5 U	5 U	4.1 J	21	3 J	5 U	11	5 U	5 U
	8/6/2015	**6200**	10 U	10 U	7.6 J	23	7.1 J	10 U	8.8 J	10 U	10 U
	11/5/2015	**5700**	5 U	5 U	7.1	37	5.2	5 UJ	8.3 J	5 U	5 UJ

Site	Date	GRPH (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	m,p-Xylene (µg/L)	o-Xylene (µg/L)	MTBE (µg/L)	Naphthalene (µg/L)	EDB (µg/L)	EDC (µg/L)
	3/3/2016	**6000**	1 U	1 U	14	90	1.9	1 U	15	1 U	1 U
	5/11/2016	**4900**	5 U	5 U	11	58.9	5 U	5 U	16.4	5 U	5 U
	8/17/2016	**3510**	5 U	5 U	5.85	17.9	5 U	5 U	9.18	5 U	5 U
32584416-MW-24	11/6/2014	**2400 J**	5 U	5 U	7.1	27	5 U	5 U	12	5 U	5 U
	2/26/2015	530	1 U	1 U	0.78 J	1.5 J	1 U	1 U	1.7	1 U	1 U
	5/13/2015	220 J	1 U	1 U	0.53 J	0.98 J	1 U	1 U	0.98 J	1 U	1 U
	8/4/2015	130	5 U	5 UB	5 U	10 U	5 U	5 U	5 U	5 U	5 U
	11/2/2015	280	1 U	1 U	1 U	2 U	1 U	1 UJ	1 UJ	1 U	1 U
	3/2/2016	680	1 U	1 U	0.62 J	1.3 J	1 U	1 U	3.6 J	1 U	1 U
	5/11/2016	297	1 U	1 U	0.38 J	2 U	1 U	1 U	1 U	1 U	1 U
	8/17/2016	571	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U
32584416-MW-25	11/6/2014	**5400 J**	10 U	10 U	66	310	52	10 U	37	10 U	10 U
	2/26/2015	**1800**	2 U	2 U	19	81	7	2 U	11	2 U	2 U
	5/13/2015	**1300 J**	10 U	10 U	26	83	9.2 J	10 U	18	10 U	10 U
	8/5/2015	**1100**	10 U	10 U	21	86	8.8 J	10 U	11	10 U	10 U
	11/5/2015	**1700**	2 U	2 U	19	80	4.5	2 U	12	2 U	2 U
	3/3/2016	**1800**	1 U	1 U	15	56	0.68 J	1 U	17	1 U	1 U
	5/11/2016	**1050**	5 U	5 U	10.4	34.7	5 U	5 U	9.36	5 U	5 U
	8/17/2016	**1290**	2 U	2 U	5.97	21.2	2 U	2 U	9.13	2 U	2 U
32584416-MW-26	8/18/2016	**17700**	1 U	1 U	14.1	62.3	13.4	1 U	18.5	1 U	1 U
Cabin Grill Well	8/27/2013	**1900**	1 U	1.9	12	63	12	1 U	15	1 U	1 U
	11/6/2013	400	1 U	0.57 J	1 U	7.1	3.3	1 U	1.0	1 U	1 U
	2/28/2014	**3400**	1 U	4.9	27	170	39	1 U	39	1 U	1 U
	5/14/2014	**4200**	1 U	19	70	430	120	1 U	47	1 U	1 U
	8/15/2014	**1700**	1 U	0.73 J	3.8	33	4.6	1 U	14	1 UJ	1 U
	11/5/2014	**1800 J**	1 U	1 U	5.5	35	6.6	1 U	11	1 U	1 U
	2/27/2015	**2500**	10 U	10 U	19	110	26	10 UJ	20 J	10 U	10 U
	5/14/2015	**1500 J**	1 U	1 U	2.8	22	2	1 U	9.9 J	1 U	1 U
	8/5/2015	**5200**	10 U	10 U	64	430	69	10 U	64	10 U	10 U

Site	Date	GRPH (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	m,p-Xylene (µg/L)	o-Xylene (µg/L)	MTBE (µg/L)	Naphthalene (µg/L)	EDB (µg/L)	EDC (µg/L)
	11/4/2015	**3300**	10 U	10 U	27	180	28	10 UJ	24 J	10 U	10 U
	3/3/2016	**4100**	10 U	10 U	23	280	7.7 J	10 U	67	10 U	10 U
	5/12/2016	**1460**	1 U	1 U	10.1	71.3	1.19	1 U	22.5	1 U	1 U
	8/18/2016	**971**	1 U	1 U	1.86	7.9	0.54 J	1 U	3.77	1 U	1 U
DW 6508W	8/27/2013	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U
	11/6/2013	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U
	2/26/2014	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U
	5/13/2014	70 U	0.91 J	1 U	1 U	1.5 NJ	0.89 NJ	1 U	2 U	1 U	1 U
	8/14/2014	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 UJ	1 UJ	1 U
	11/5/2014	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U
	2/27/2015	70 U	1 U	1 U	1 U	2 U	1 U	1 UJ	2 UJ	1 U	1 U
	5/14/2015	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 UJ	1 U	1 U
	8/5/2015	70 U	1 U	1 UB	1 U	2 U	1 U	1 U	1 UJ	1 U	1 U
	11/4/2015	70 U	1 U	1 U	1 U	2 U	1 U	1 UJ	1 UJ	1 U	1 U
	3/2/2016	70 U	1 U	1 U	1 U	2 U	1 U	1 U	5 U	1 U	1 U
	5/11/2016	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U
	8/18/2016	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U
DW 6606	8/27/2013	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U
	5/14/2014	70 U	1 U	1 U	1 U	2 U	1 U	1 U	2 UJ	1 U	1 U
	8/14/2014	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 UJ	1 UJ	1 U
	5/14/2015	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 UJ	1 U	1 U
	8/5/2015	70 U	1 U	1 UB	1 U	2 U	1 U	1 U	1 U	1 U	1 U
	5/11/2016	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 UJ	1 U	1 U
	8/18/2016	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U
DW 6607	8/27/2013	70 U	0.96 J	1 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U
	11/6/2013	70 U	1.2	1 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U
	2/26/2014	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 UJ	1 U	1 U
	5/14/2014	70 U	1 UJ	1 UJ	0.75 NJ	1.6 J	1.1 J	1 UJ	2 UJ	1 UJ	1 UJ
	8/14/2014	70 U	3.9	1 U	1 U	2 U	1.8 J	1 U	1 UJ	1 UJ	1 U

Site	Date	GRPH (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	m,p-Xylene (µg/L)	o-Xylene (µg/L)	MTBE (µg/L)	Naphthalene (µg/L)	EDB (µg/L)	EDC (µg/L)
	11/5/2014	70 U	1.2	1 U	0.59 J	1.8 J	3	1 U	1 U	1 U	1 U
	2/26/2015	70 U	1 U	1 U	0.52 J	1.1 J	1.5	1 UJ	2 UJ	1 U	1 U
	5/14/2015	70 U	1 U	1 U	0.53 J	1.3 J	2.2	1 U	1 UJ	1 U	1 U
	8/5/2015	70 U	1 U	1 UB	1 U	1.3 J	1.4	1 U	1 UJ	1 U	1 U
	11/4/2015	70 U	0.16 J	1 U	0.46 J	0.97 J	0.83 J	1 UJ	1 UJ	1 U	1 U
	3/1/2016	70 U	1 U	1 U	0.55 J	1.2 J	1.4	1 U	5 U	1 U	1 U
	5/11/2016	70 U	1 U	1 U	0.41 J	0.34 J	1.29	1 U	1 U	1 U	1 U
DW 6608/6609	8/27/2013	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U
	5/14/2014	70 U	1 U	1 U	1 U	2 U	1 U	1 U	2 UJ	1 U	1 U
	8/14/2014	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 UJ	1 UJ	1 U
	5/14/2015	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 UJ	1 U	1 U
	8/5/2015	70 U	1 UJ	1 UJB	1 UJ	2 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
	5/11/2016	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 UJ	1 U	1 U
	8/18/2016	70 U	1 U	1 U	1 U	2 U	1 U	1 U	1 UJ	1 U	1 U
DW 6610 Main	8/27/2013	70 U	2.1	1 U	1 U	0.78 J	0.38 J	1 U	1 U	1 U	1 U
	5/12/2014	280	**22**	0.65 J	0.77 NJ	1.8 J	1.4	1 U	2 U	1 U	1 U
	8/14/2014	97	0.85 J	1 U	1 U	2 U	1 U	1 U	1 UJ	1 UJ	1 U
DW 6610 Sand	5/12/2014	70 U	0.61 J	1 U	1 U	2 U	1 U	1 U	2 U	1 U	1 U
	8/14/2014	70 U	0.61 J	1 U	1 U	2 U	1 U	1 U	1 UJ	1 UJ	1 U

GRPH: Gasoline range petroleum hydrocarbons
MTBE: Methyl t-butyl ether
EDB: 1,2 Dibromoethane
EDC: 1,2 Dichloroethane
U: Analyte analyzed for but not detected above the report sample quantitation limit.
J: Analyte was positively identified. The reported result is an estimate.
UJ: Analyte not detected above the sample quantitation limit. The reported quantitation limit is approximate.
B: Analyte detected in sample and field blank. Reported result is sample concentration without blank correction.
NJ: Analyte was tentatively identified. The reported result is an estimate.
NAF: Analyte excluded from laboratory analysis
- Not sampled for analyte

Appendix F. Timeseries Plots of GRPH and BTEX

Figure F-1: Timeseries plot of GRPH and BTEX concentrations in MW-3

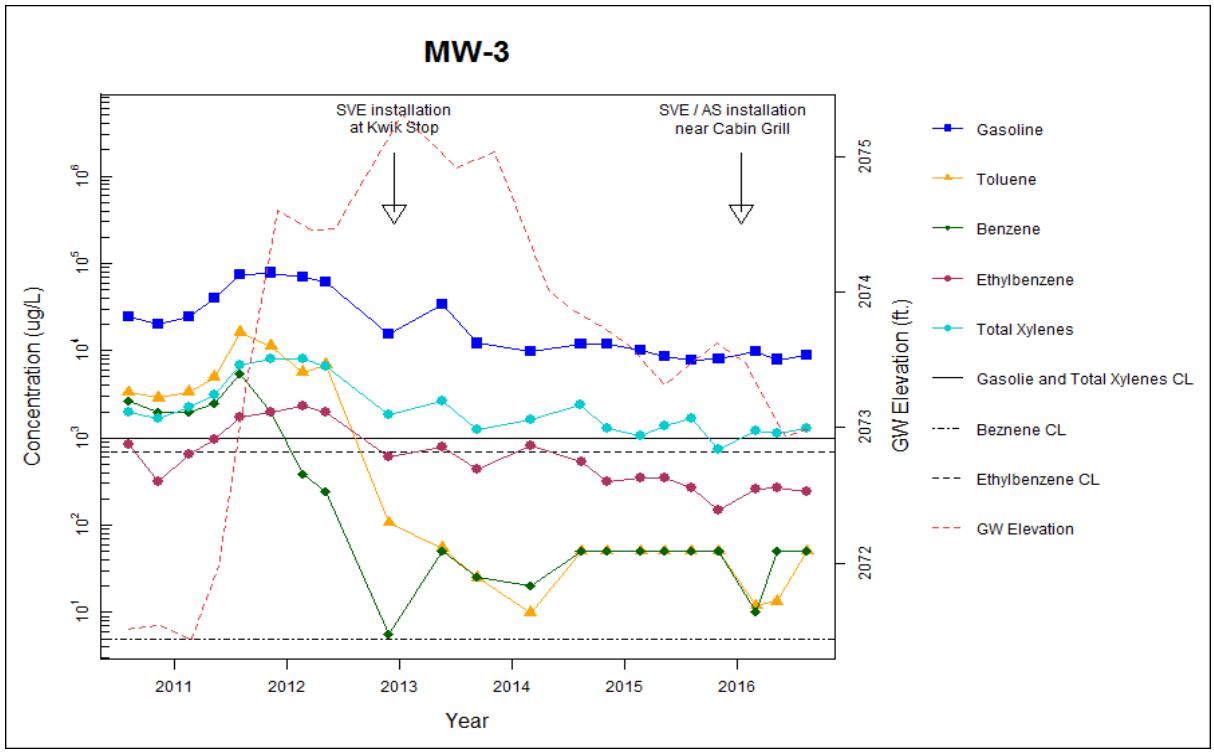


Figure F-2: Timeseries plot of GRPH and BTEX concentrations in MW-4

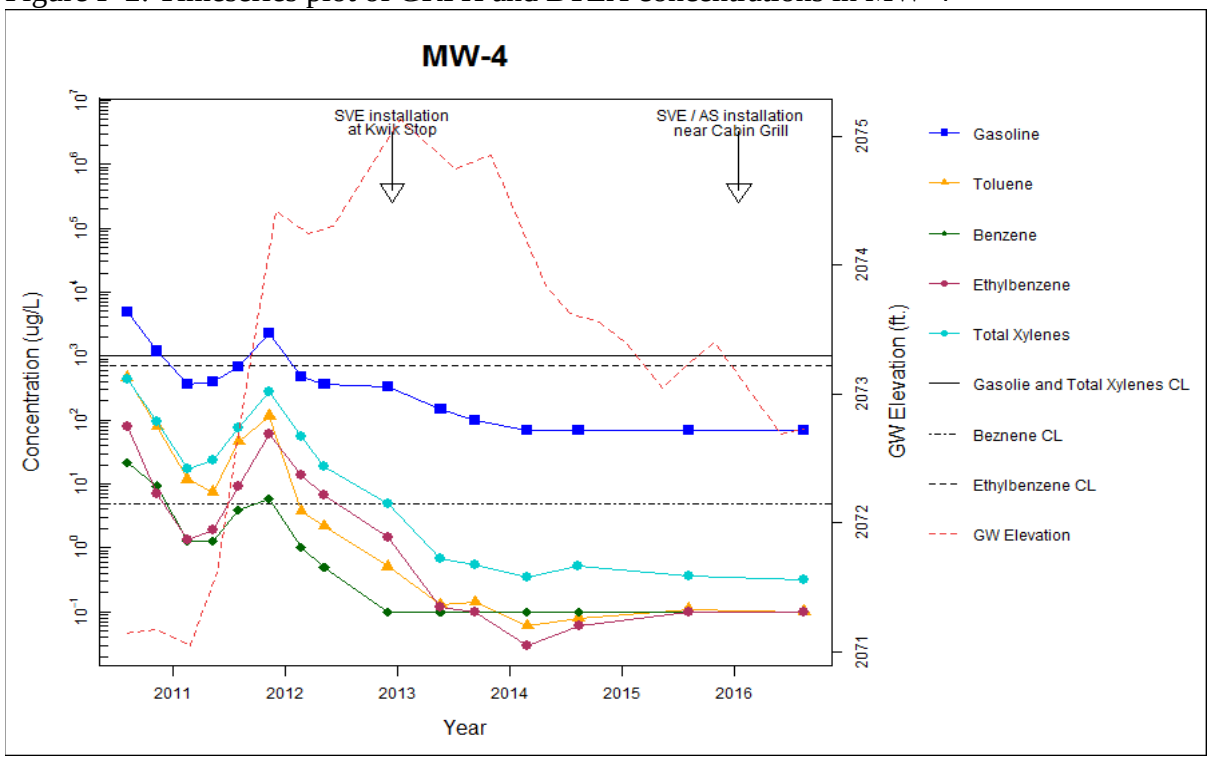


Figure F-3: Timeseries plot of GRPH and BTEX concentrations in MW-5

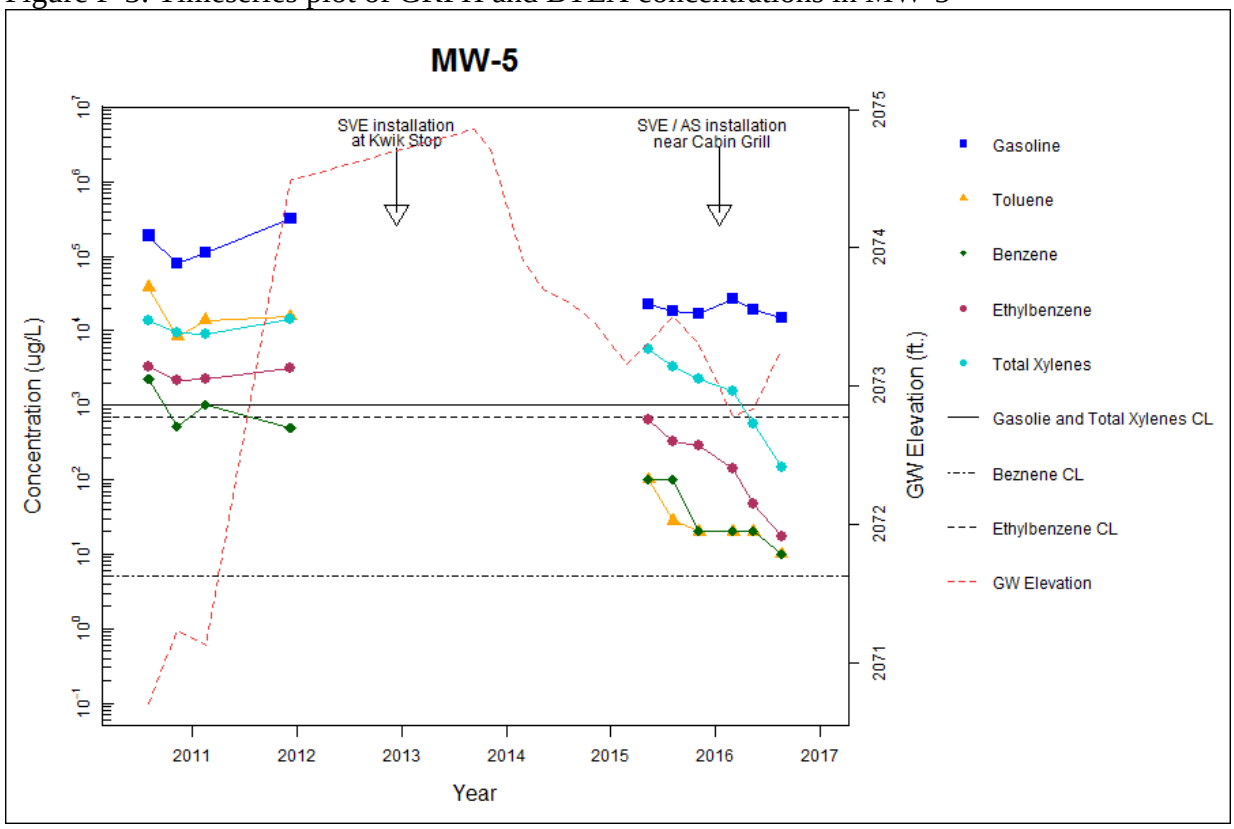


Figure F-4: Timeseries plot of GRPH and BTEX concentrations in MW-6

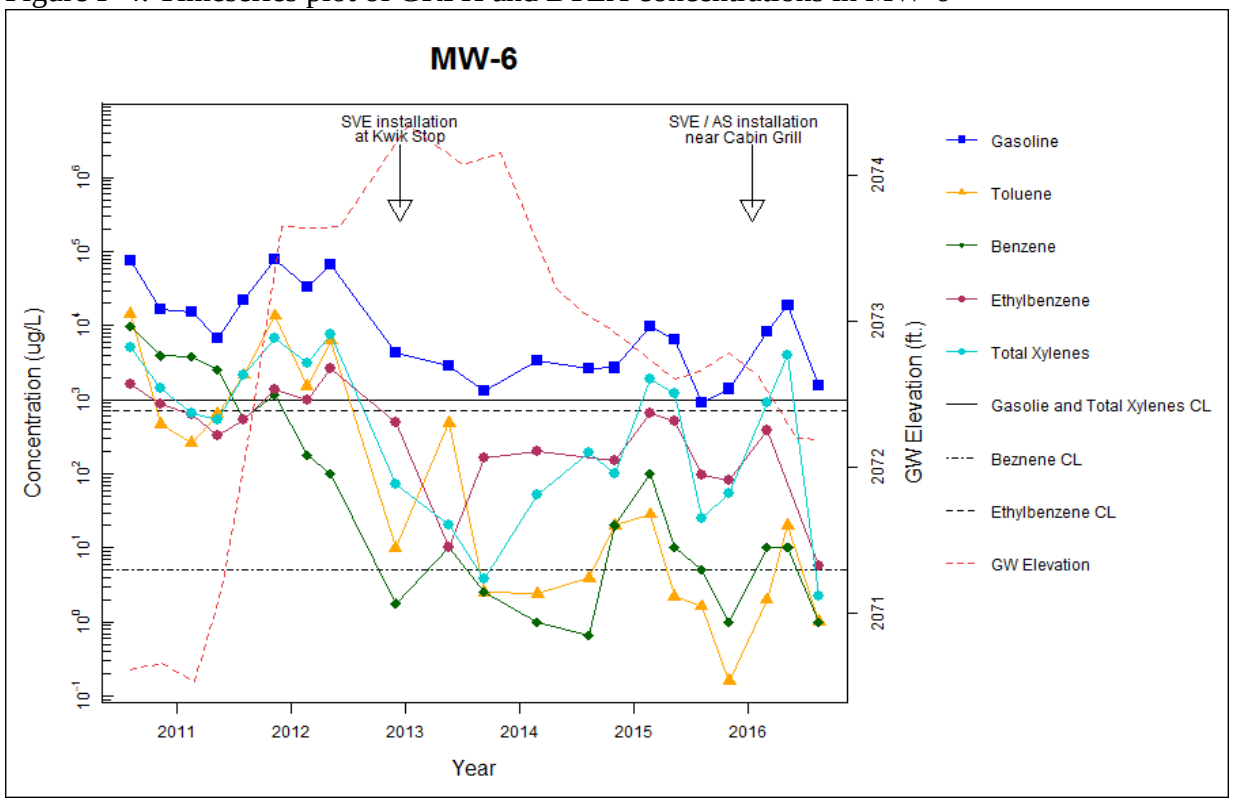


Figure F-5: Timeseries plot of GRPH and BTEX concentrations in MW-7

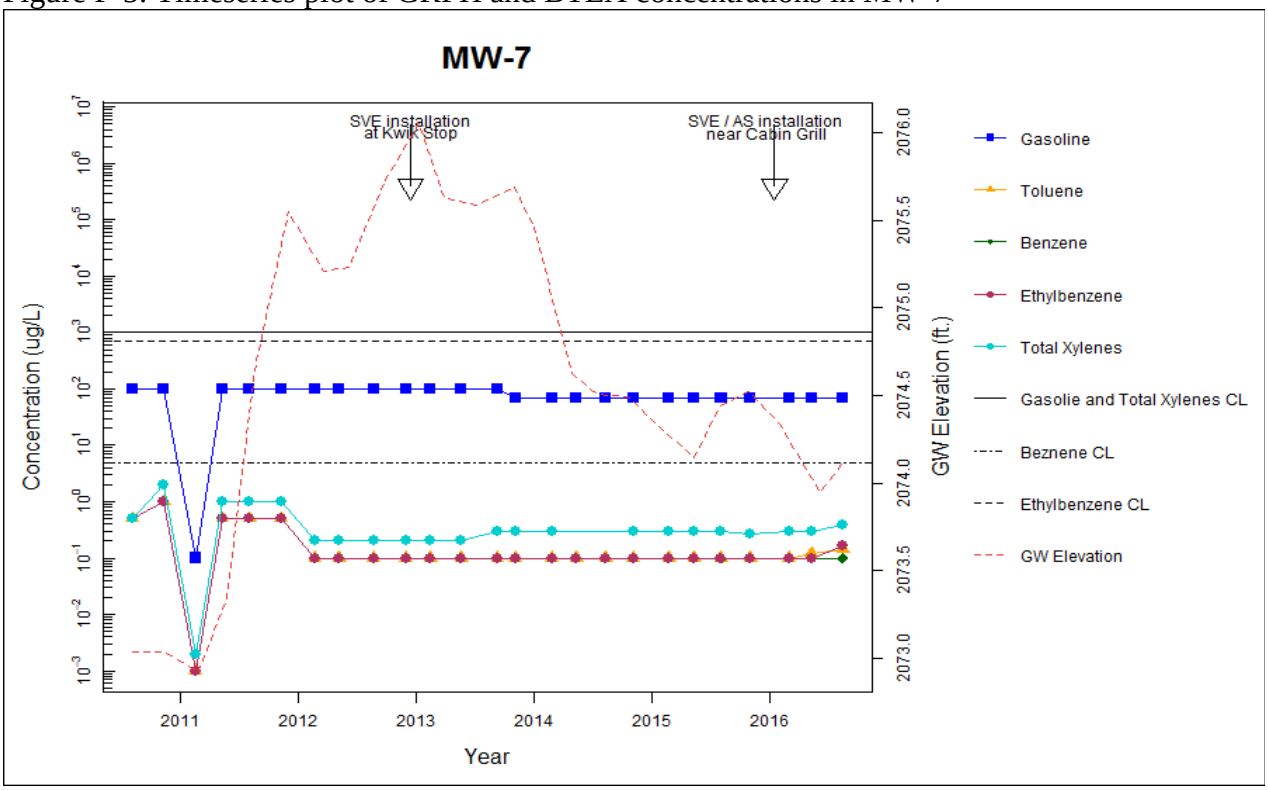


Figure F-6: Timeseries plot of GRPH and BTEX concentrations in MW-8

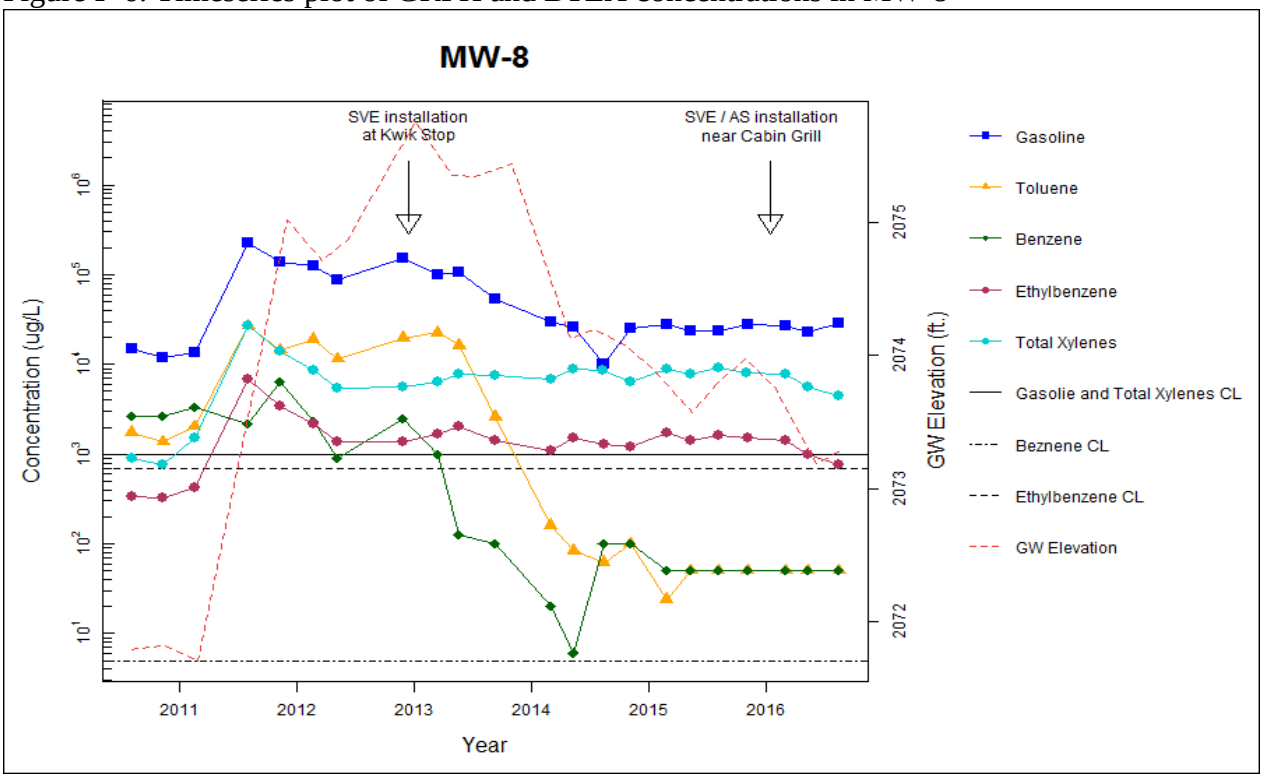


Figure F-7: Timeseries plot of GRPH and BTEX concentrations in MW-9

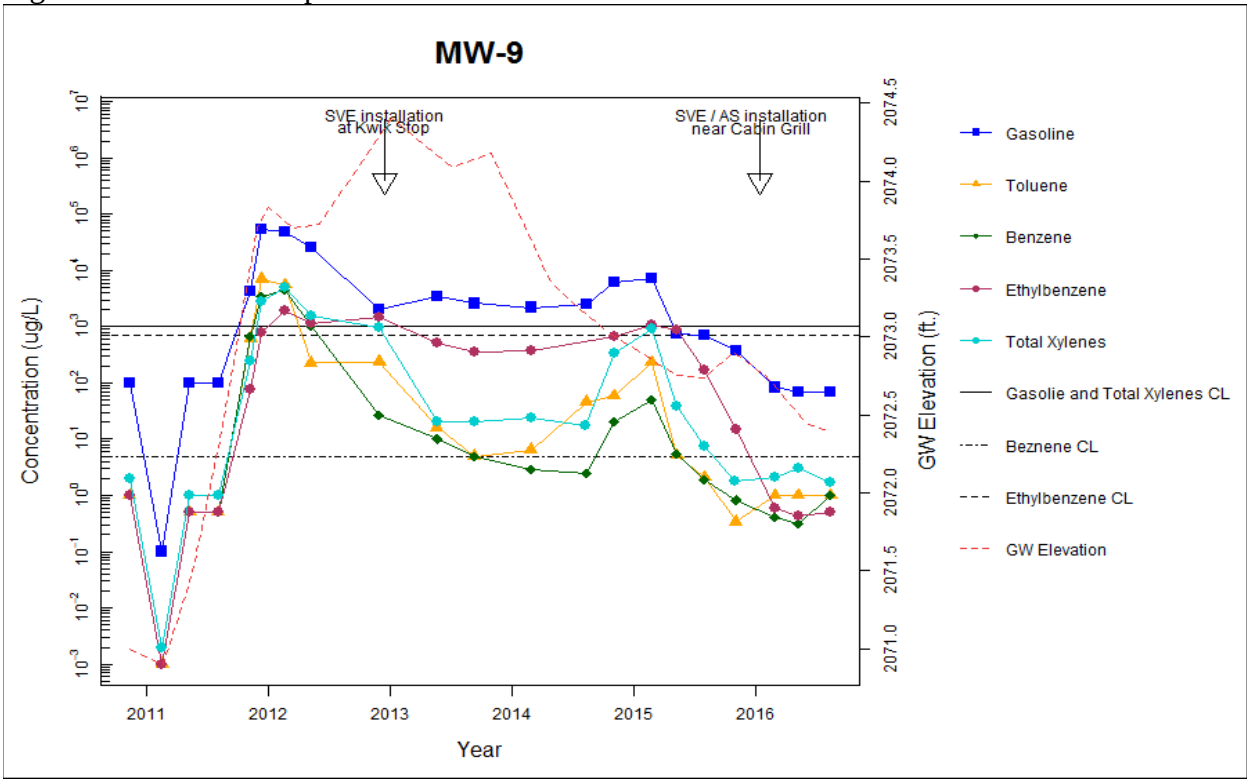


Figure F-8: Timeseries plot of GRPH and BTEX concentrations in MW-10

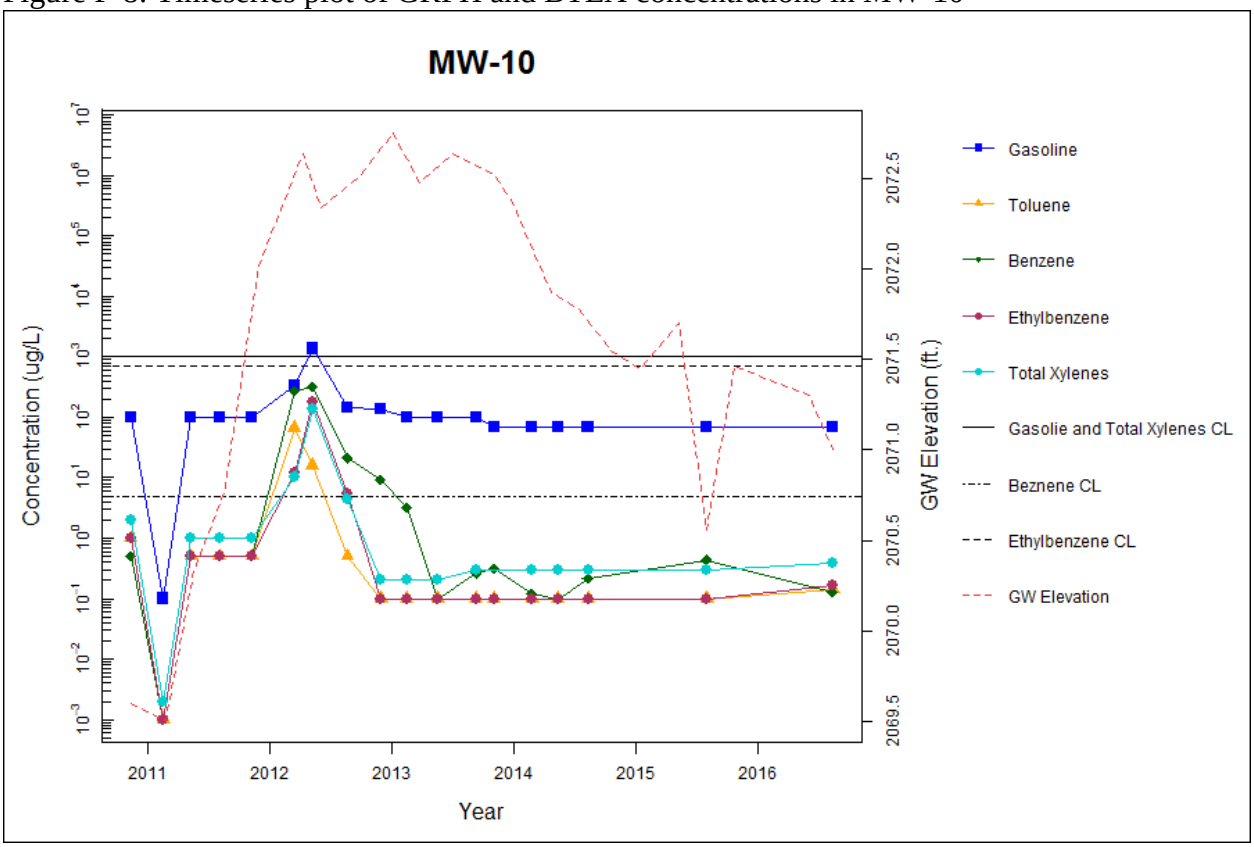


Figure F-9: Timeseries plot of GRPH and BTEX concentrations in MW-11

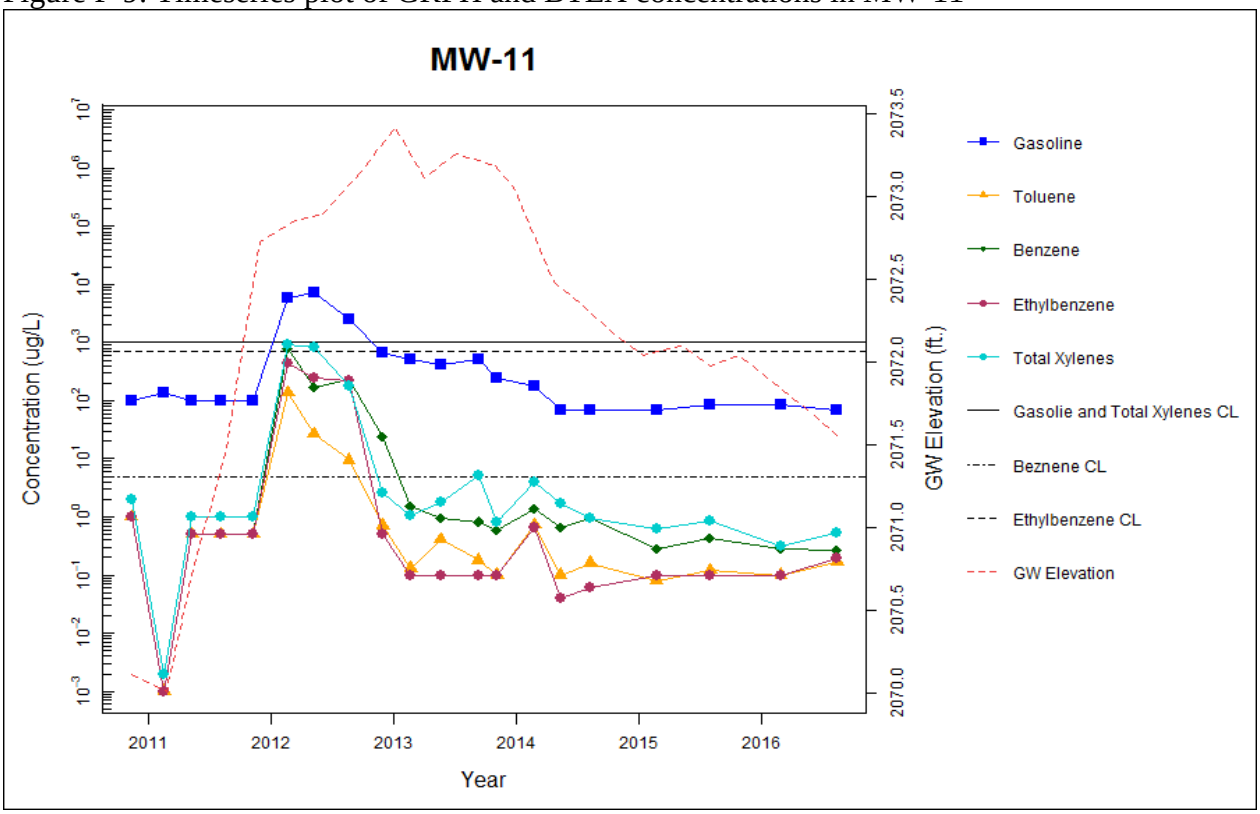


Figure F-10: Timeseries plot of GRPH and BTEX concentrations in MW-11

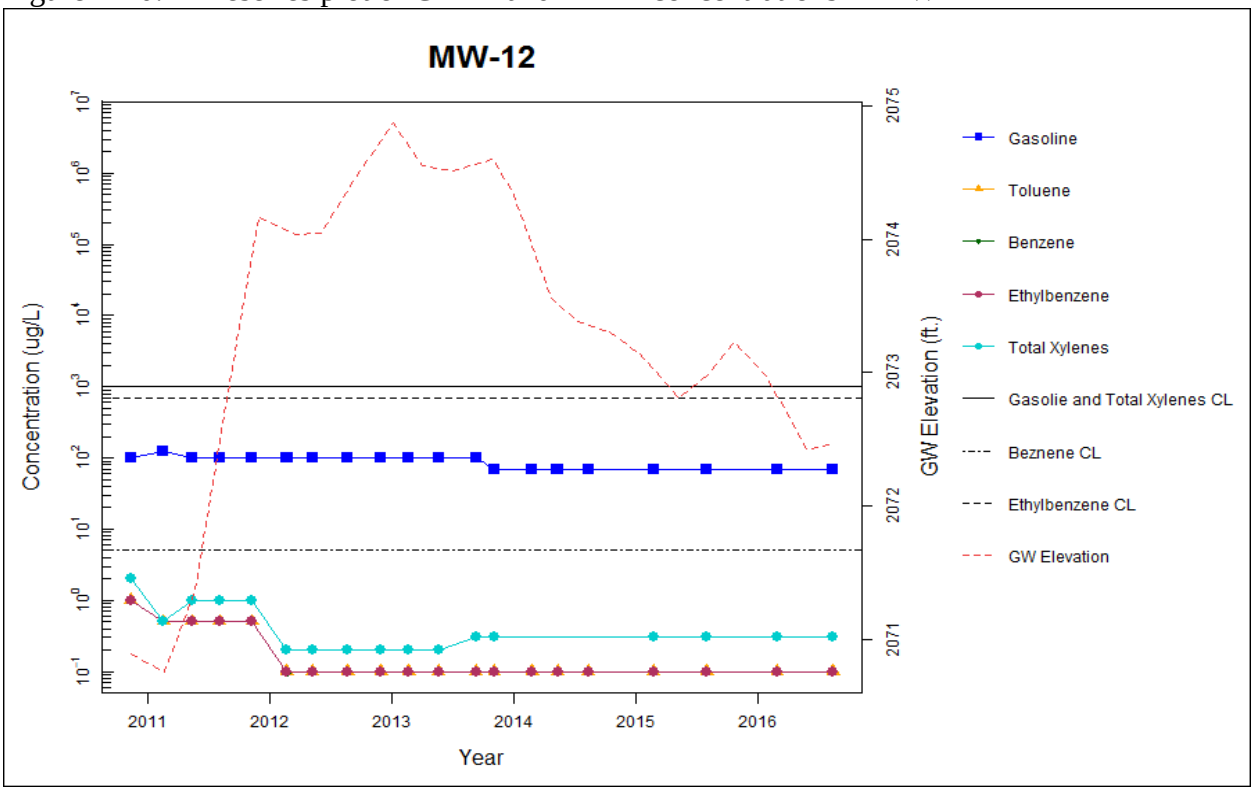


Figure F-11: Timeseries plot of GRPH and BTEX concentrations in MW-13

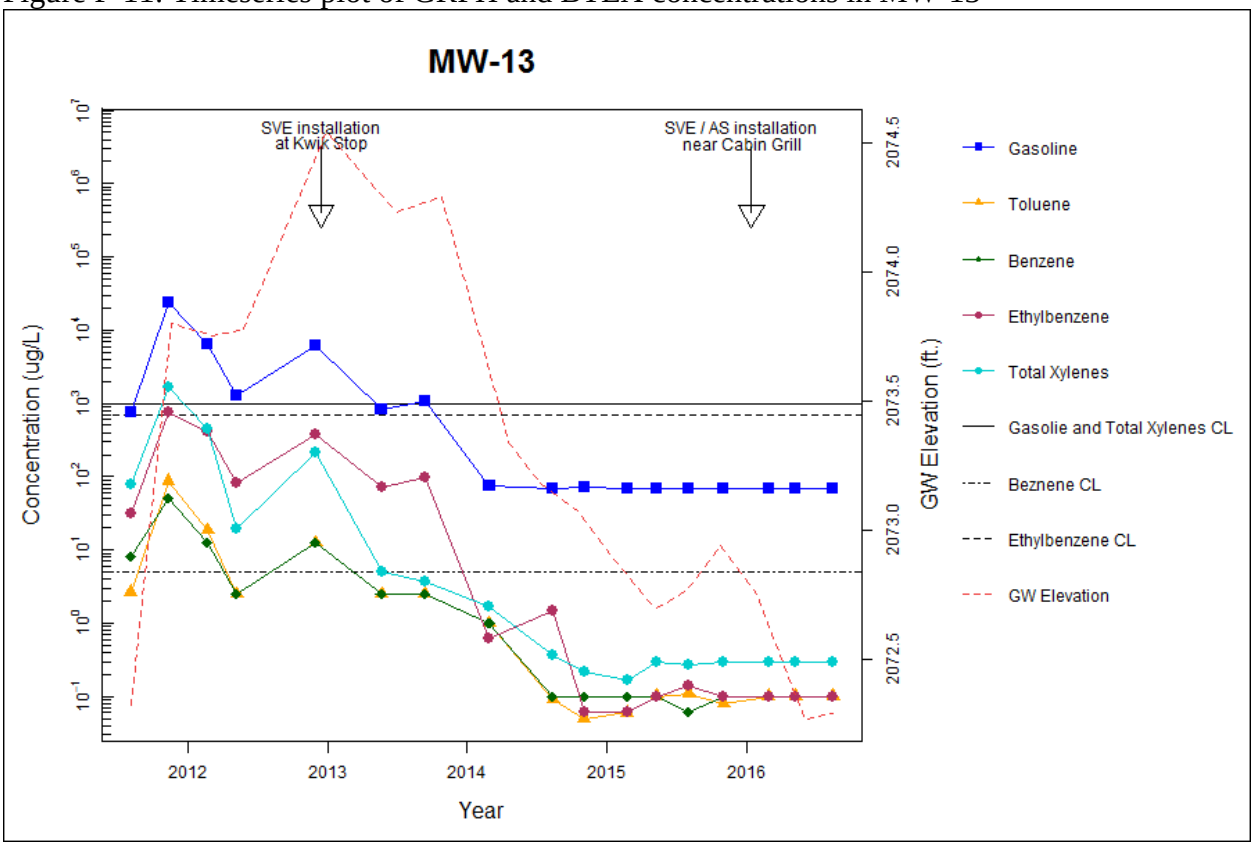


Figure F-12: Timeseries plot of GRPH and BTEX concentrations in MW-14

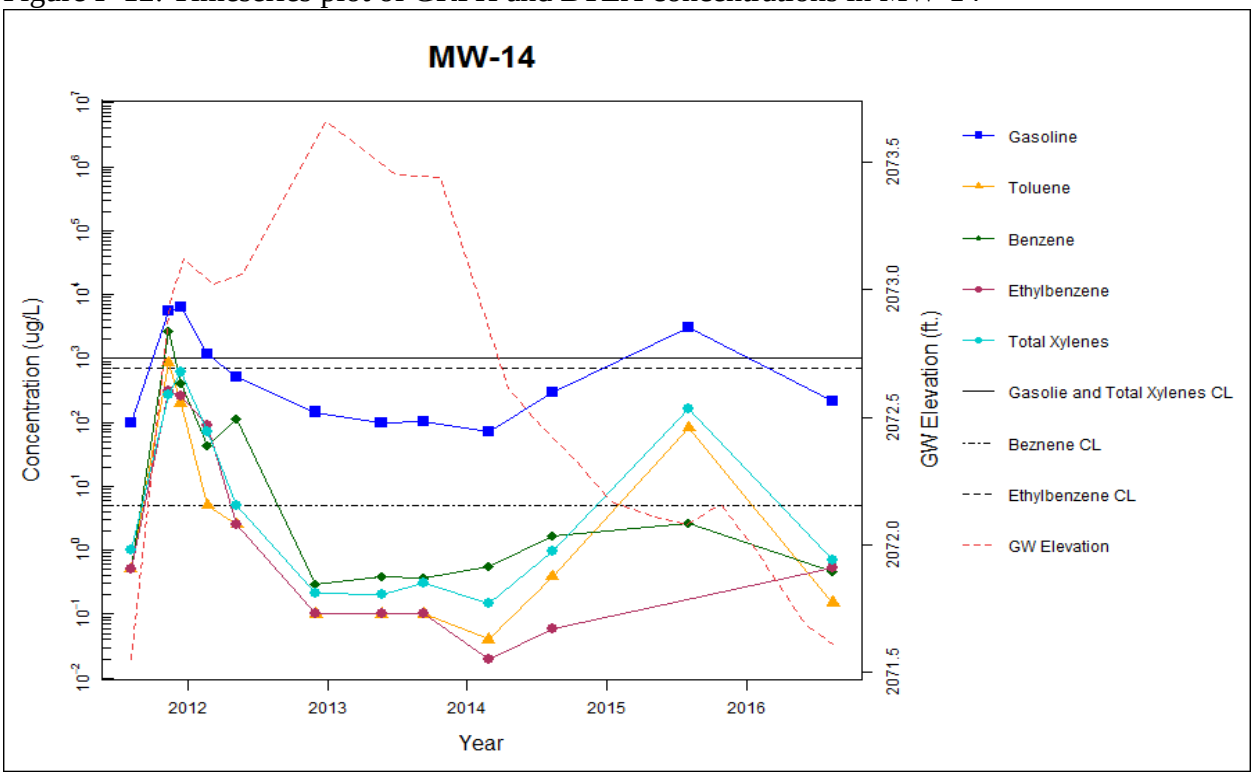


Figure F-13: Timeseries plot of GRPH and BTEX concentrations in MW-15

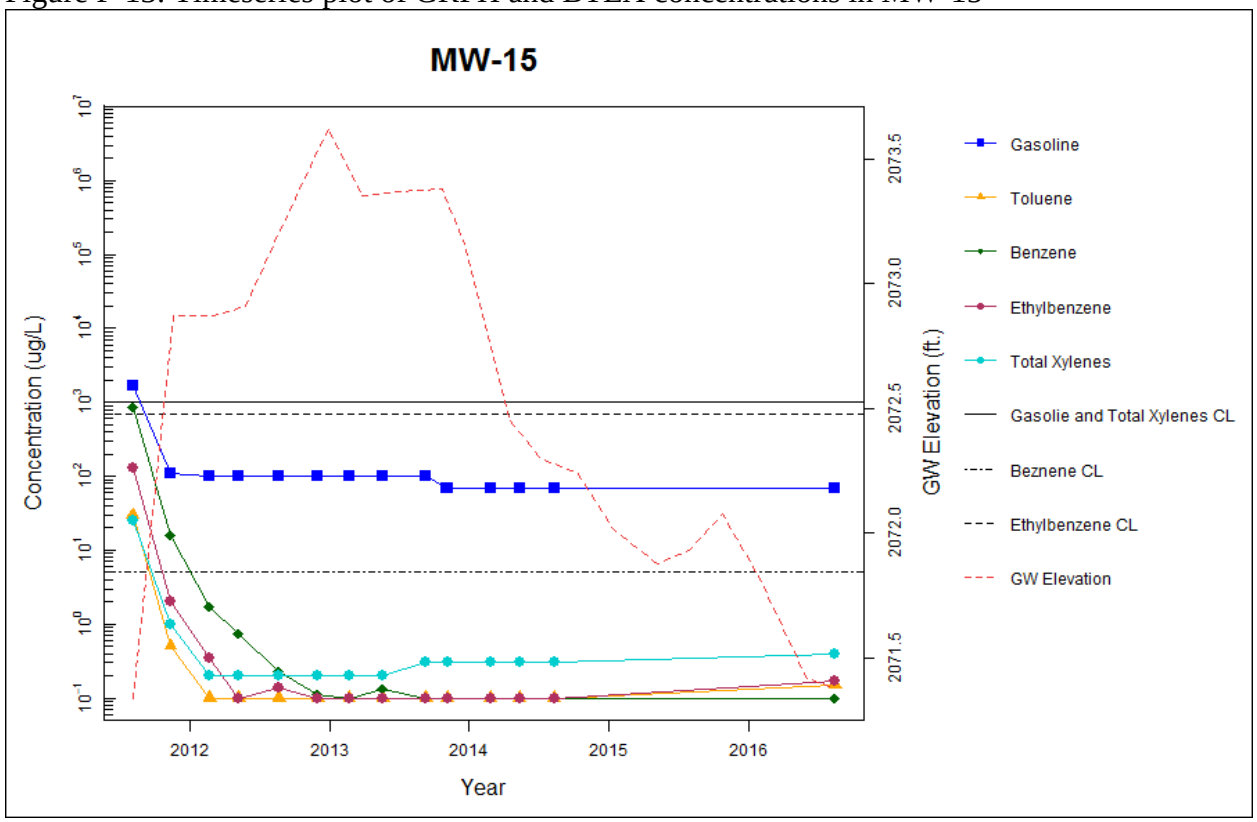


Figure F-14: Timeseries plot of GRPH and BTEX concentrations in MW-16

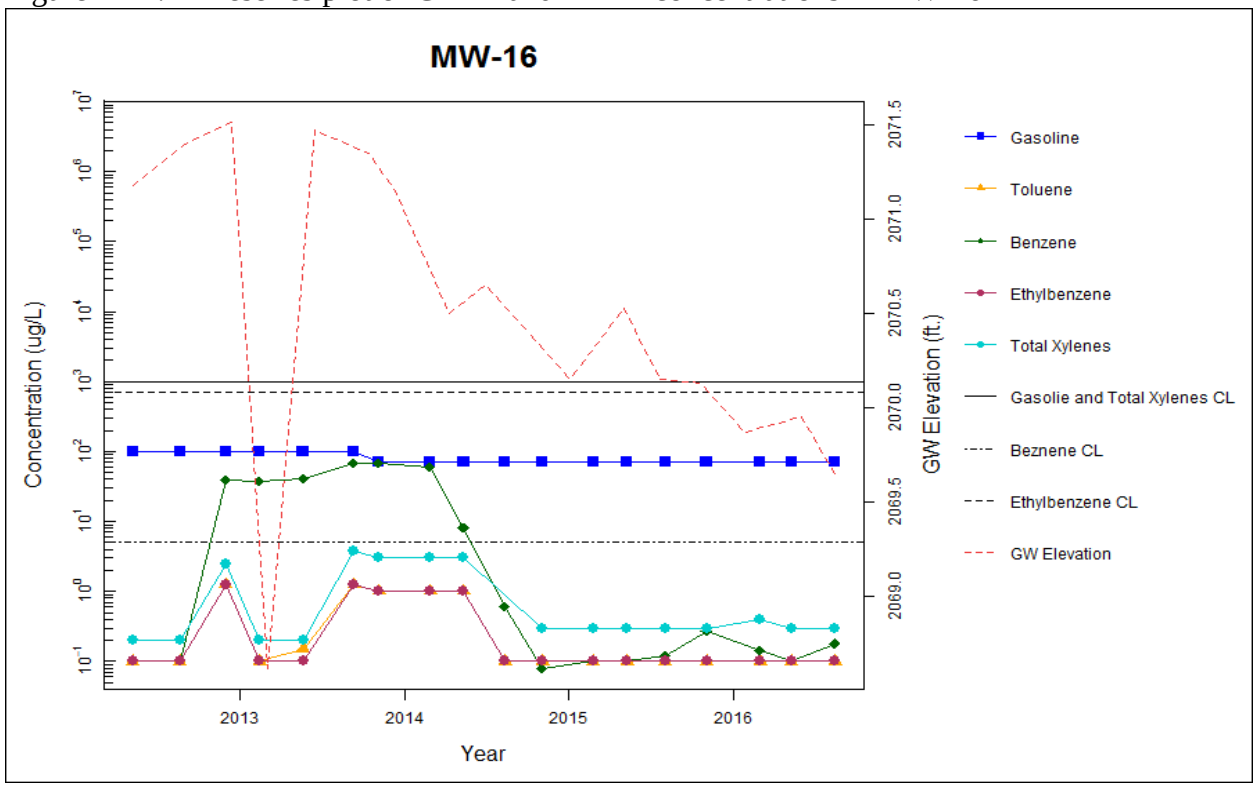


Figure F-15: Timeseries plot of GRPH and BTEX concentrations in MW-17

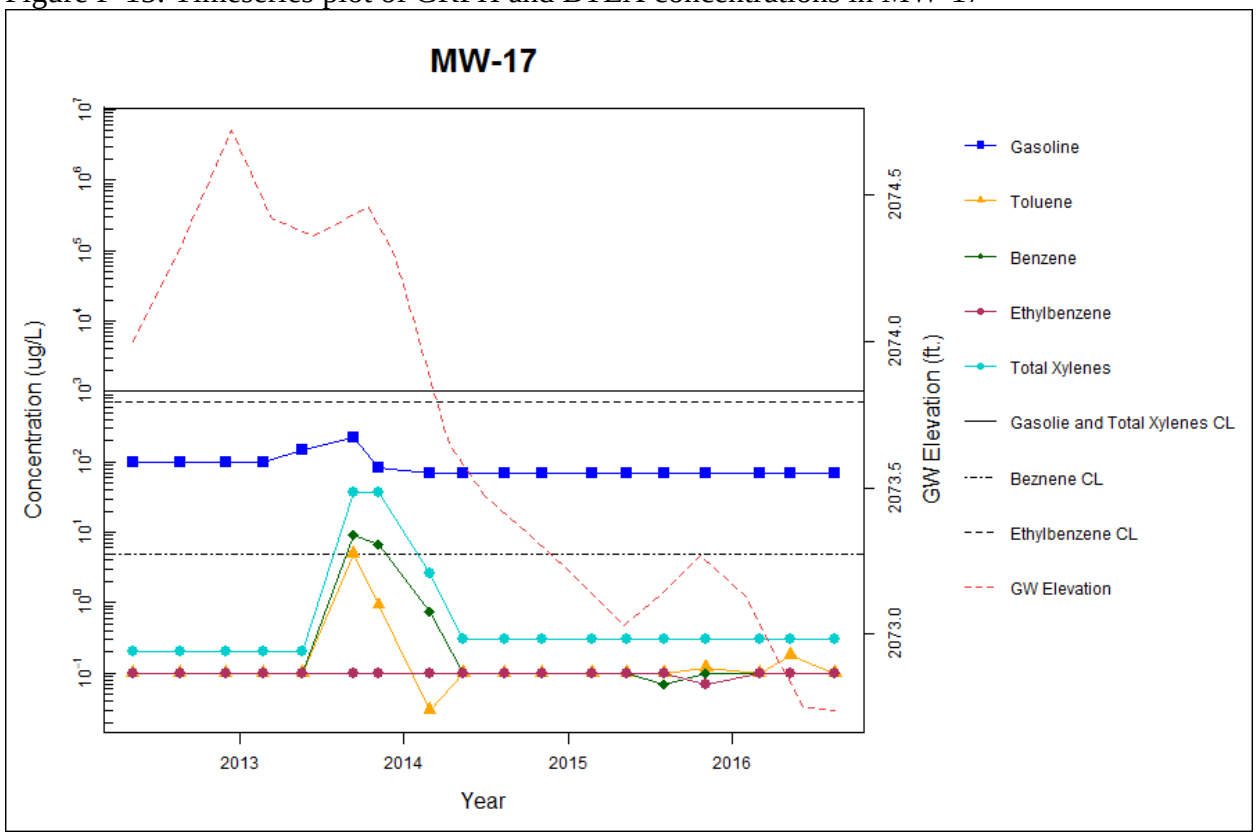


Figure F-16: Timeseries plot of GRPH and BTEX concentrations in MW-18

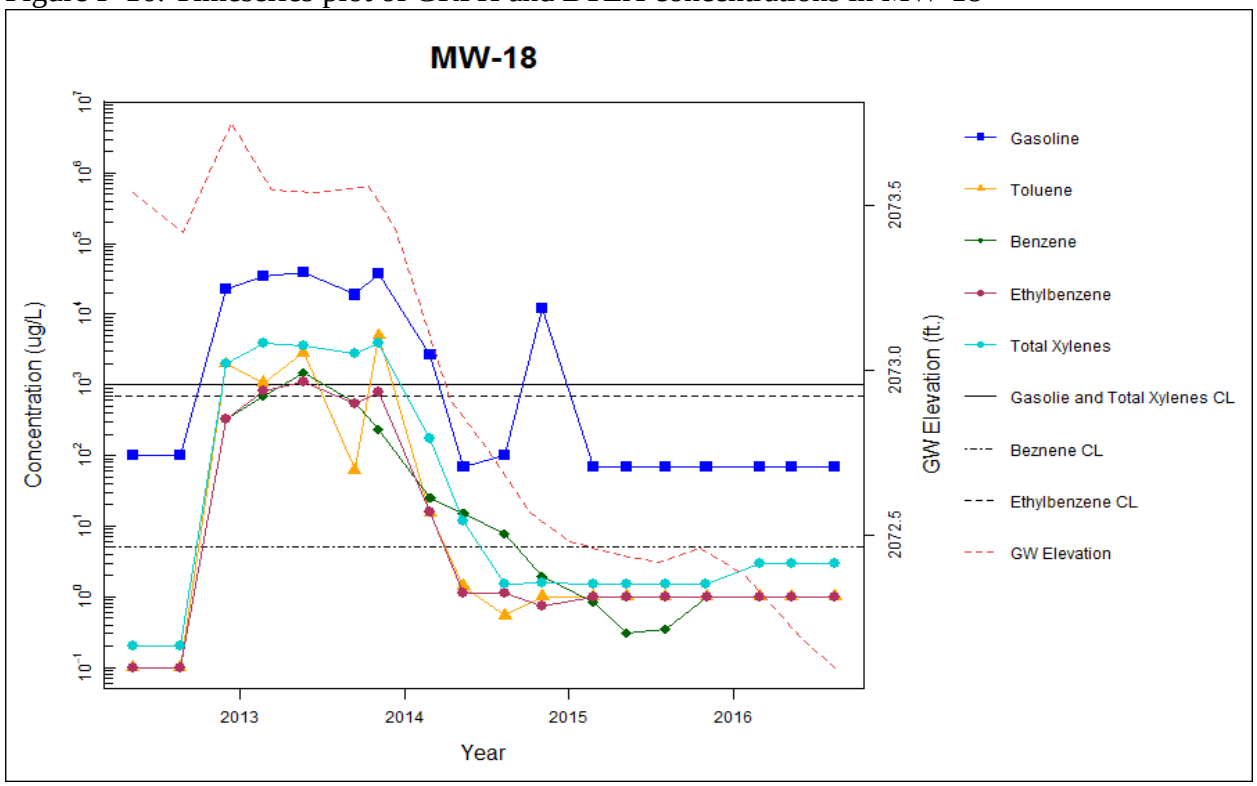


Figure F-17: Timeseries plot of GRPH and BTEX concentrations in MW-19

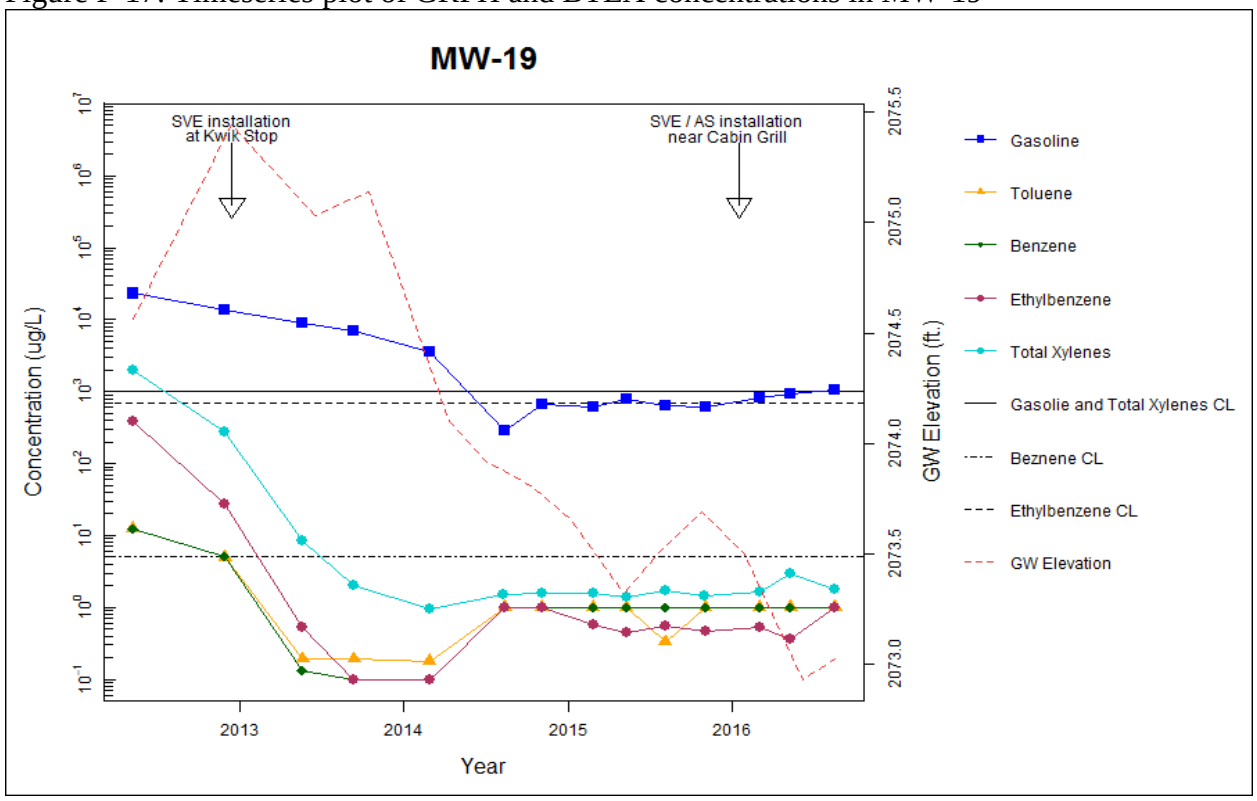


Figure F-18: Timeseries plot of GRPH and BTEX concentrations in MW-20

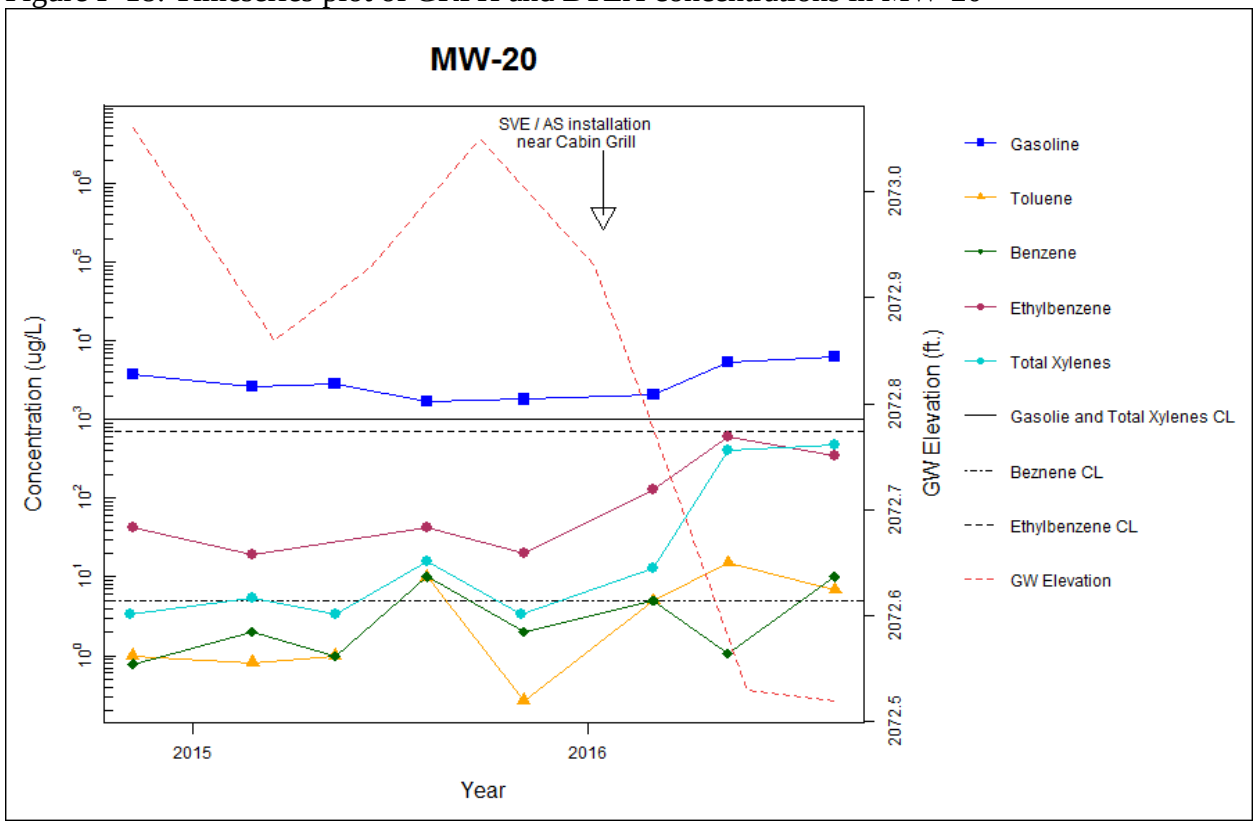


Figure F-19: Timeseries plot of GRPH and BTEX concentrations in MW-21

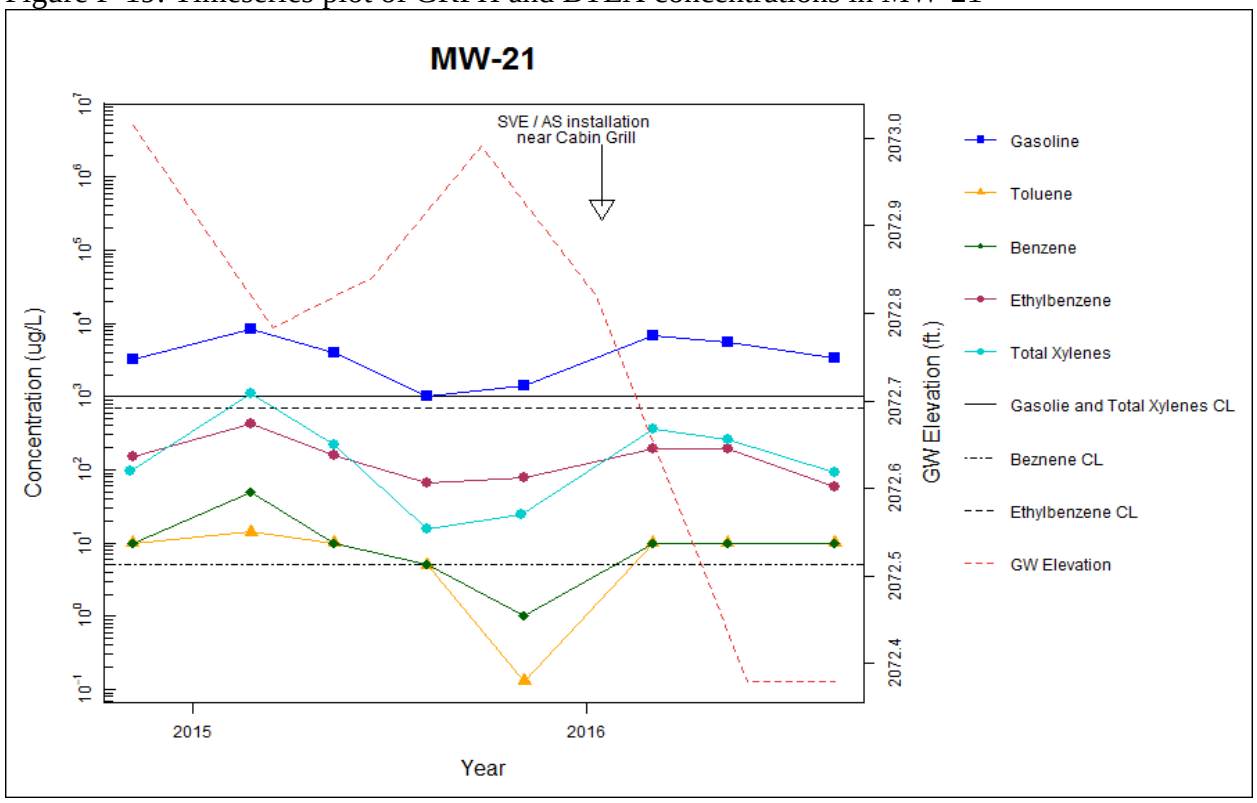


Figure F-20: Timeseries plot of GRPH and BTEX concentrations in MW-22

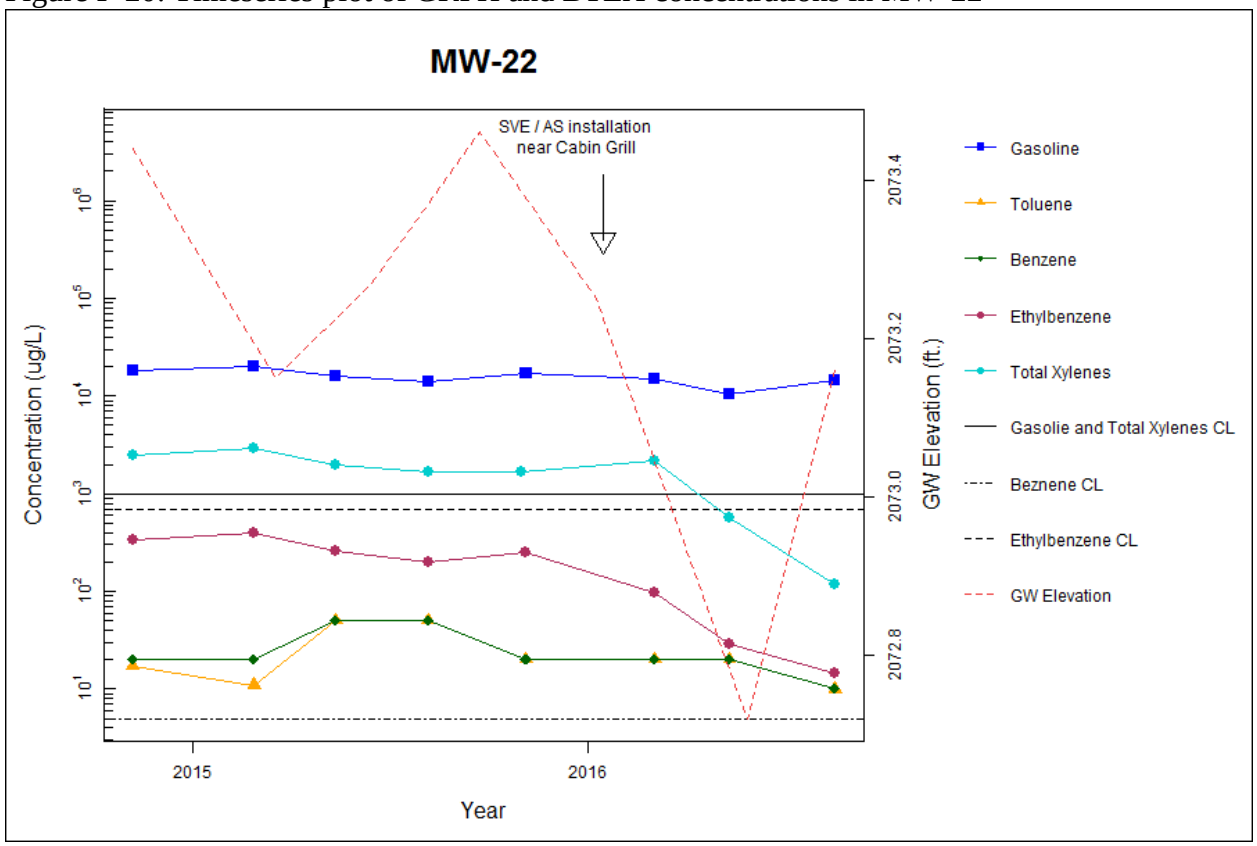


Figure F-21: Timeseries plot of GRPH and BTEX concentrations in MW-23

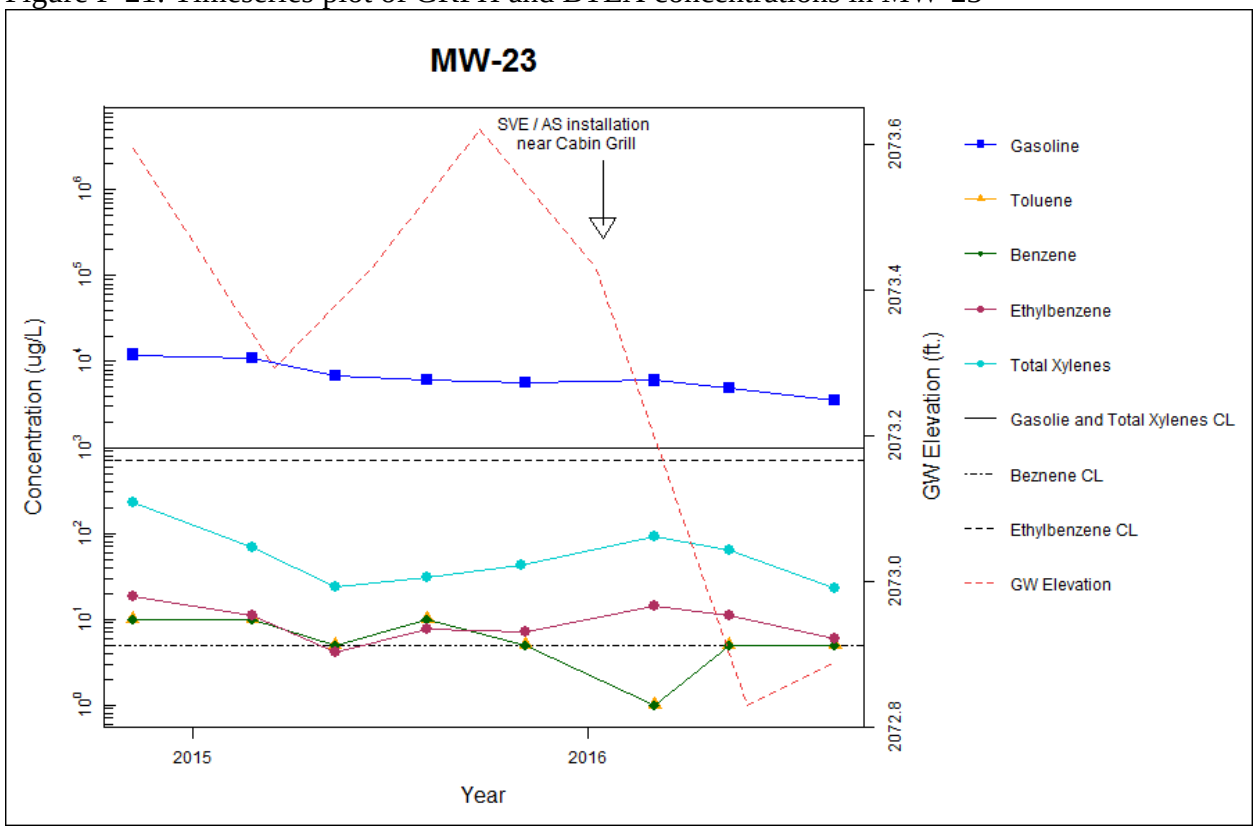


Figure F-22: Timeseries plot of GRPH and BTEX concentrations in MW-24

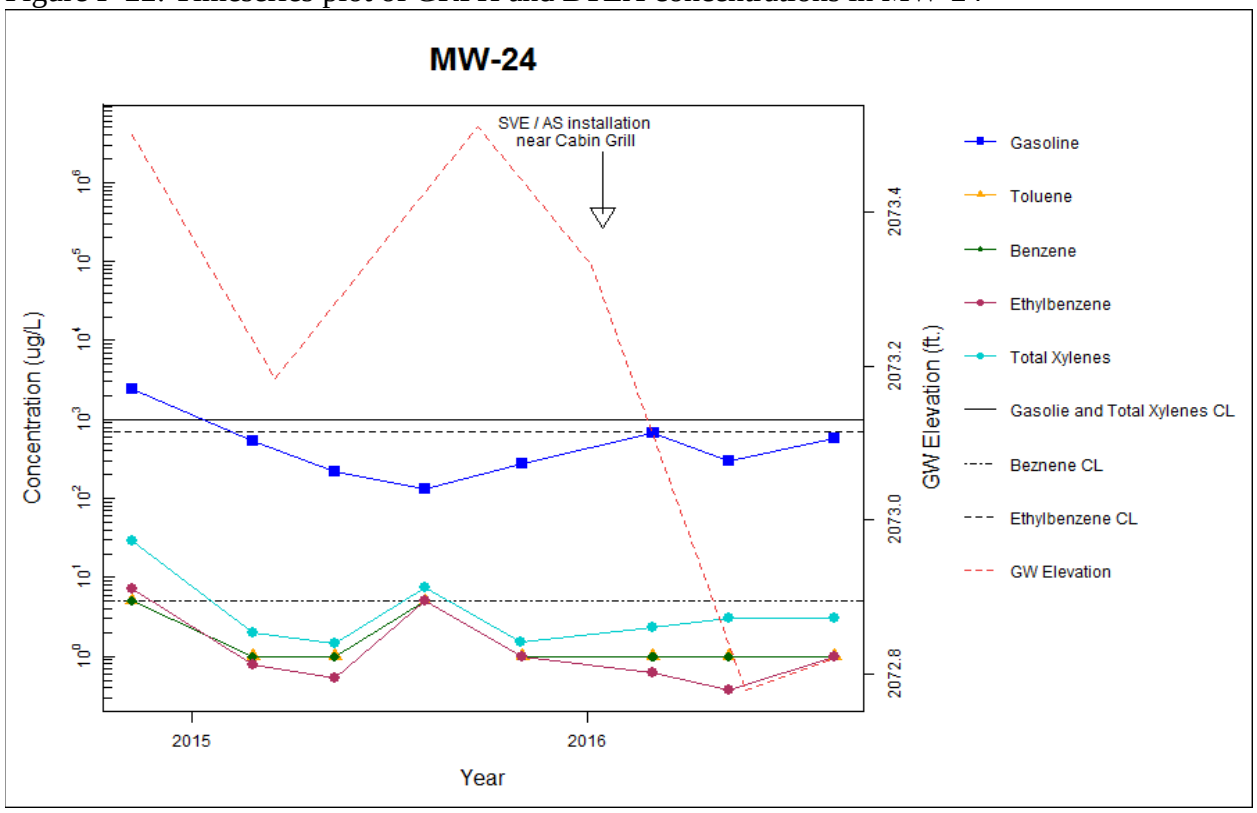


Figure F-23: Timeseries plot of GRPH and BTEX concentrations in MW-25

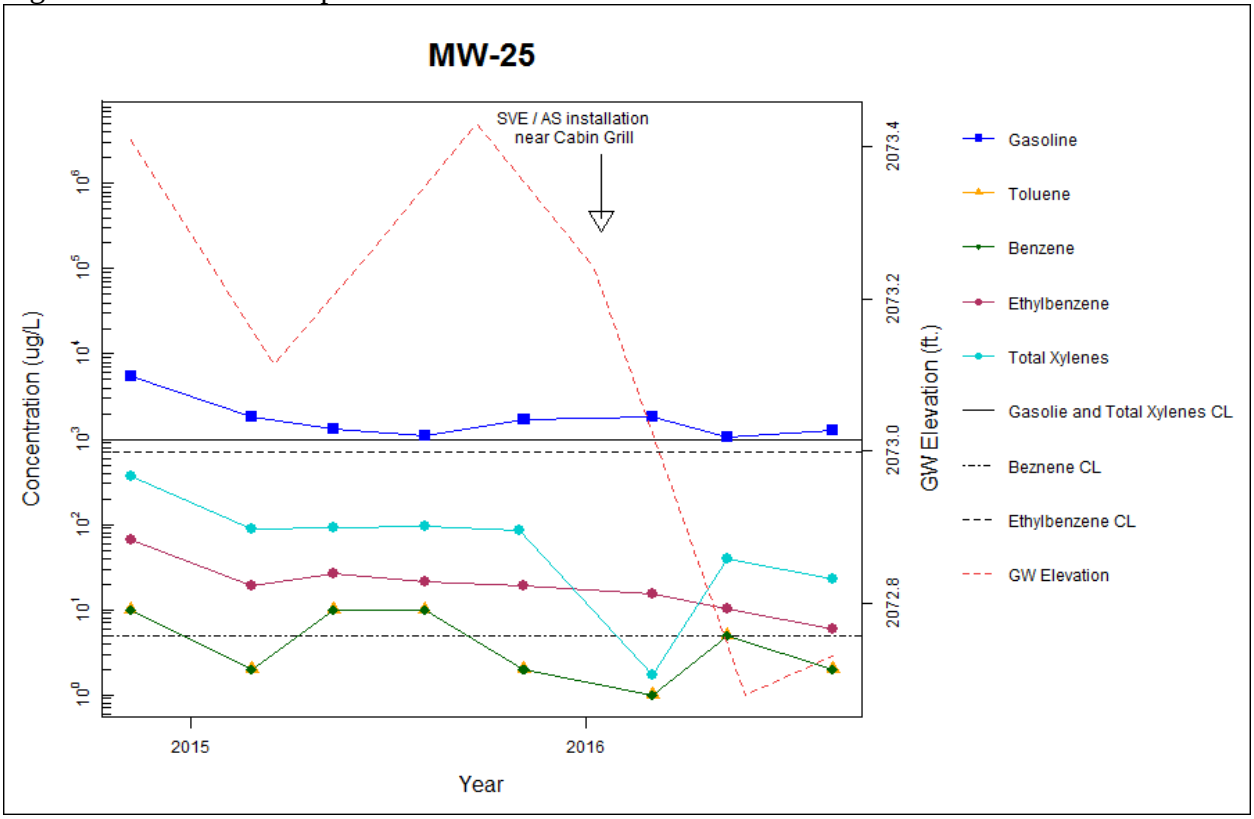


Figure F-24: Timeseries plot of GRPH and BTEX concentrations in the Cabin Grill Well

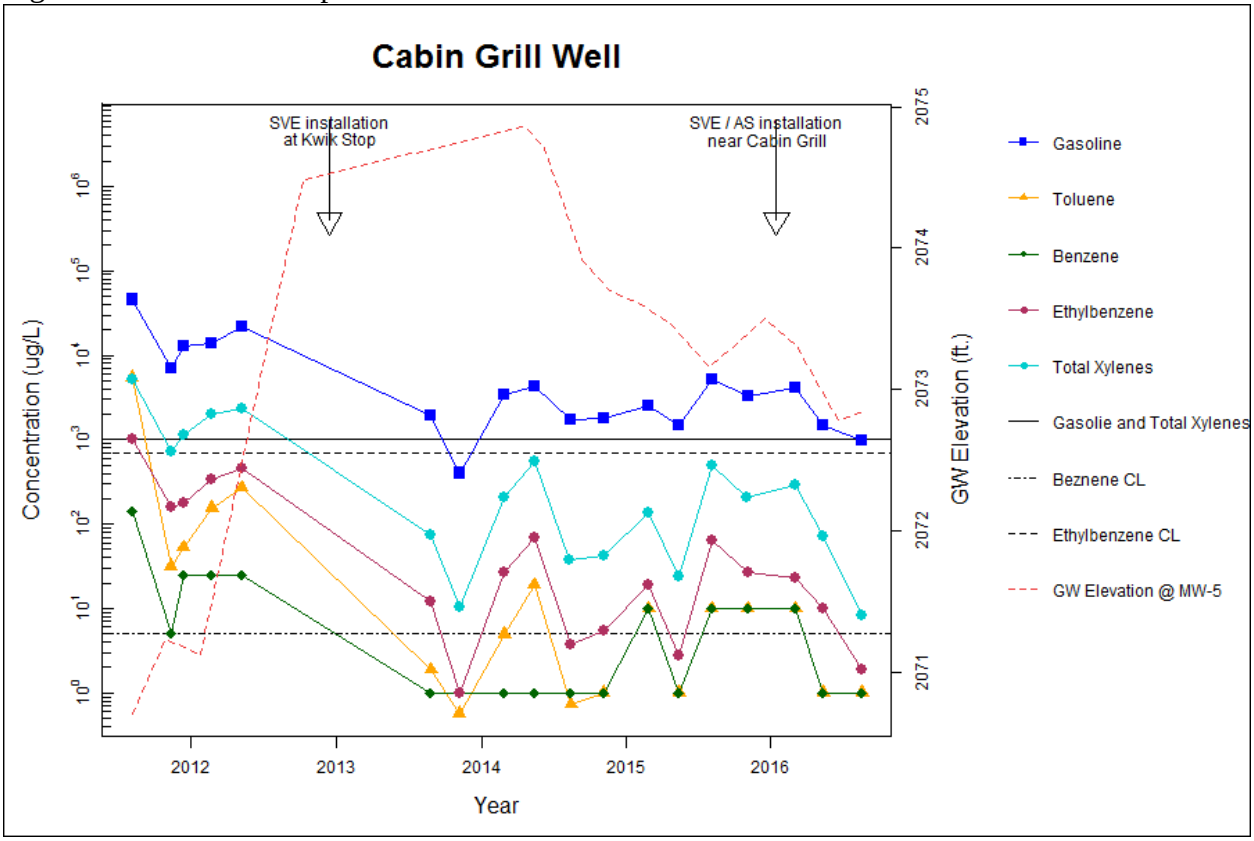


Figure F-25: Timeseries plot of GRPH and BTEX concentrations in domestic well DW 6508W

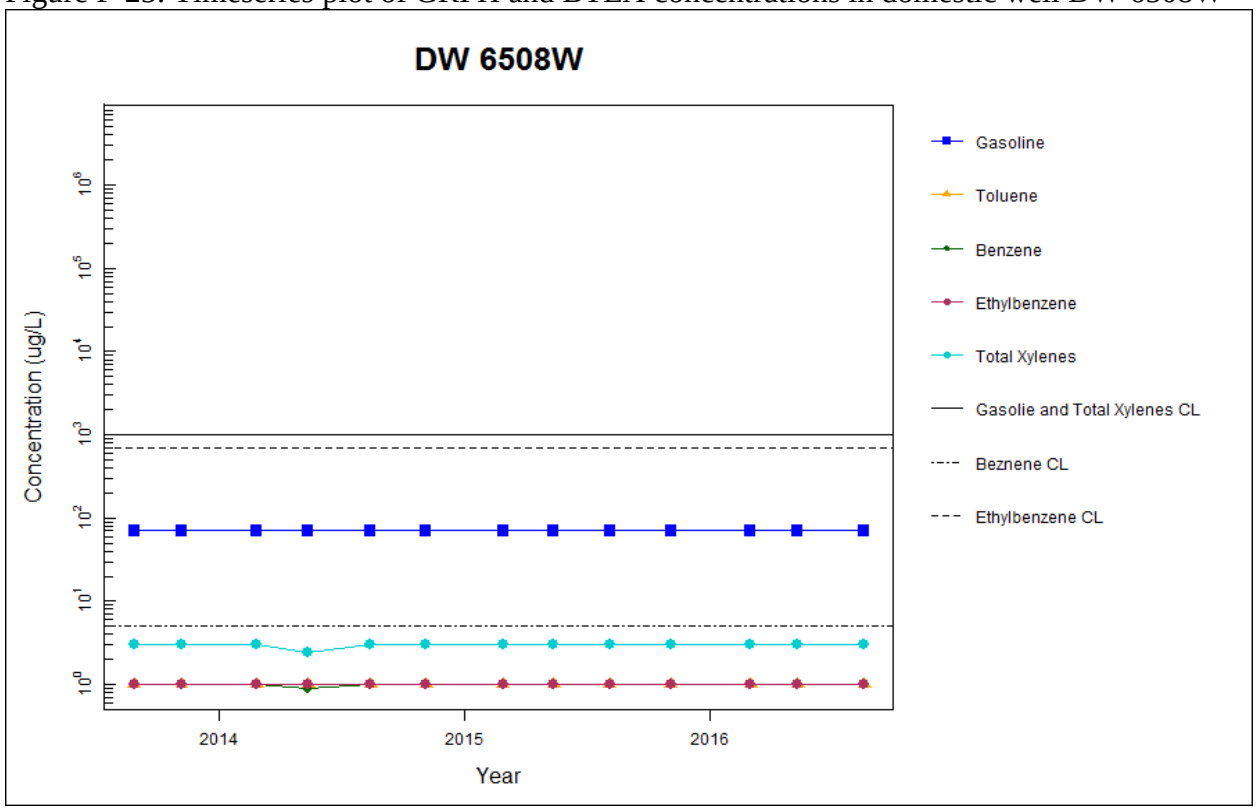


Figure F-26: Timeseries plot of GRPH and BTEX concentrations in domestic well DW 6606

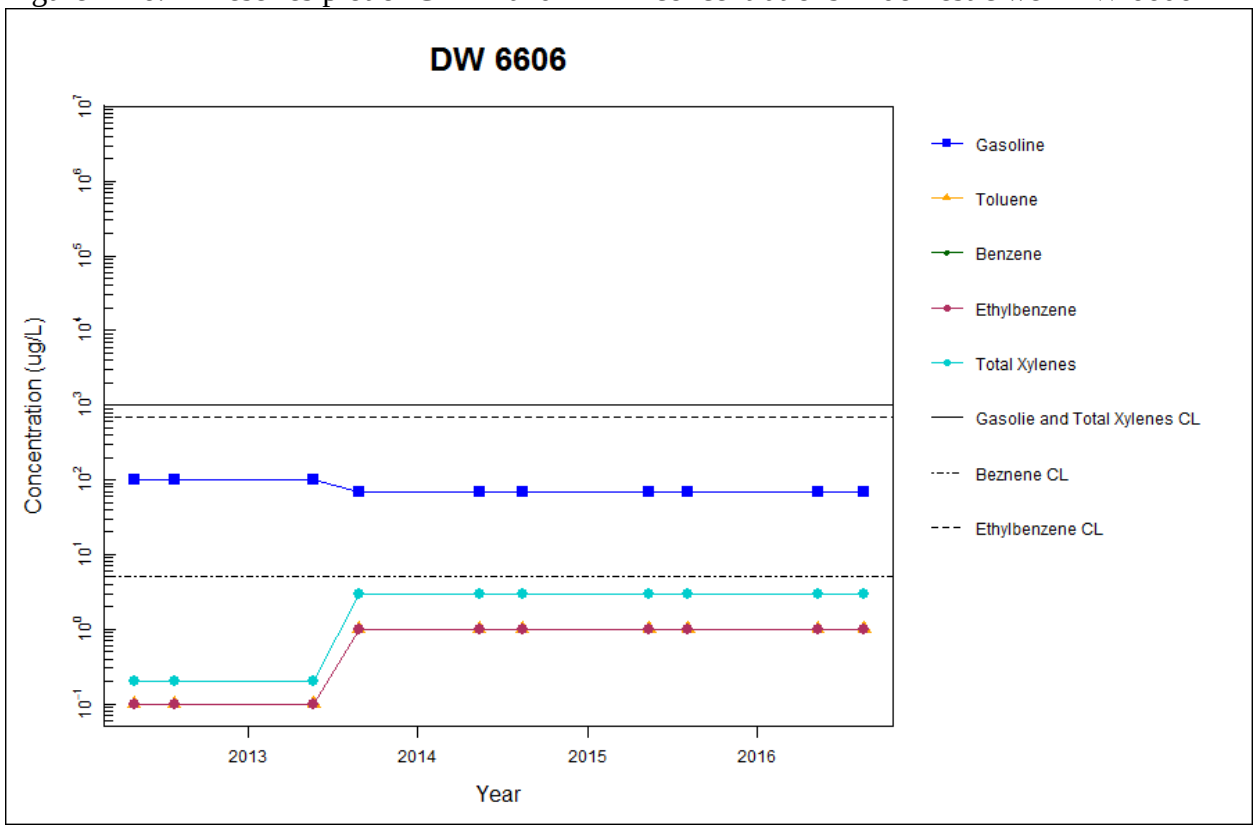


Figure F-27: Timeseries plot of GRPH and BTEX concentrations in domestic well DW 6607

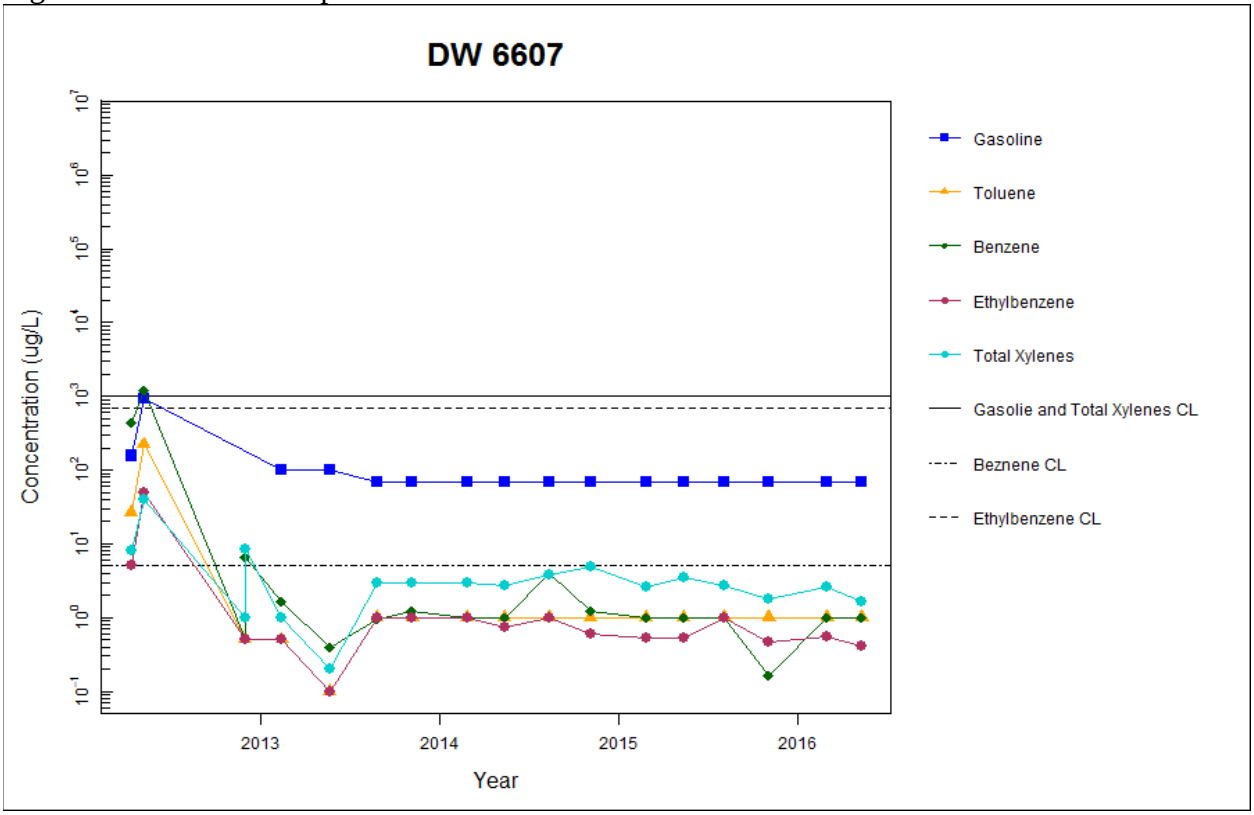


Figure F-28: Timeseries plot of GRPH and BTEX concentrations in domestic well DW 6608

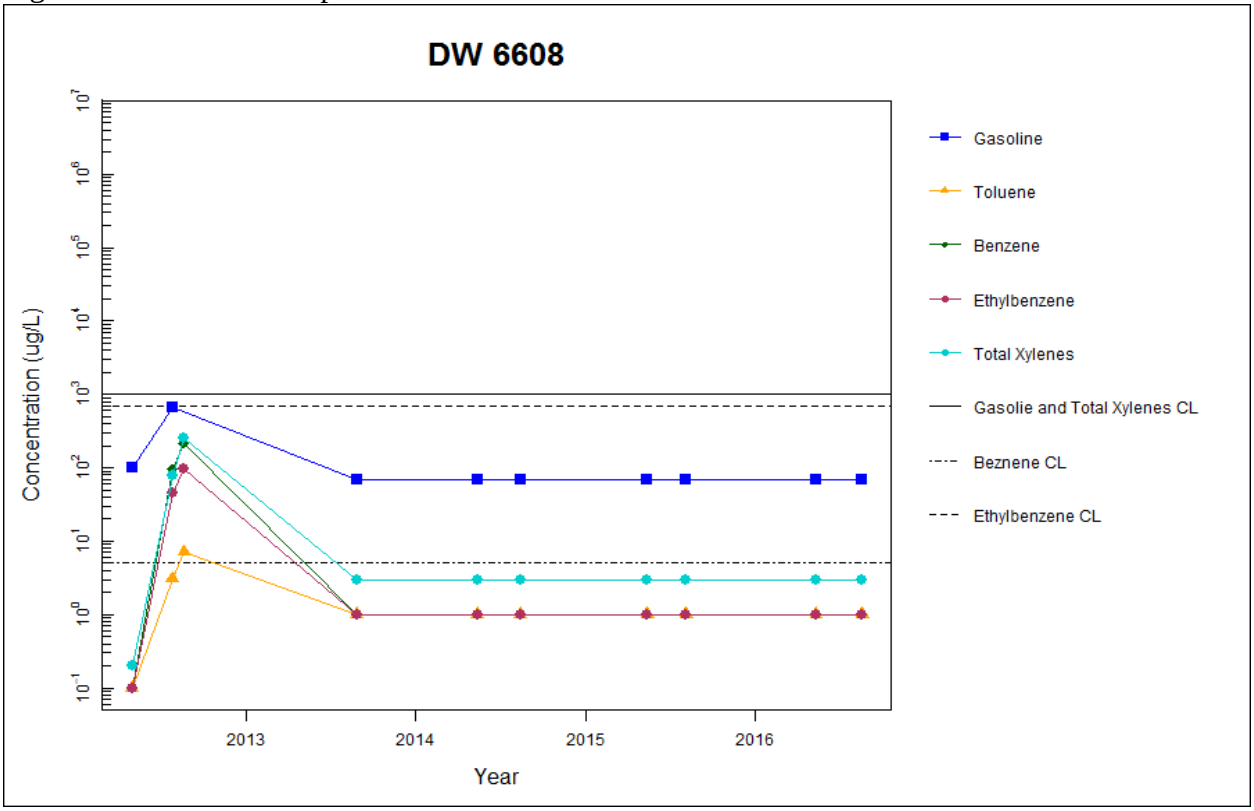


Figure F-29: Timeseries plot of GRPH and BTEX concentrations in domestic well DW 6610M

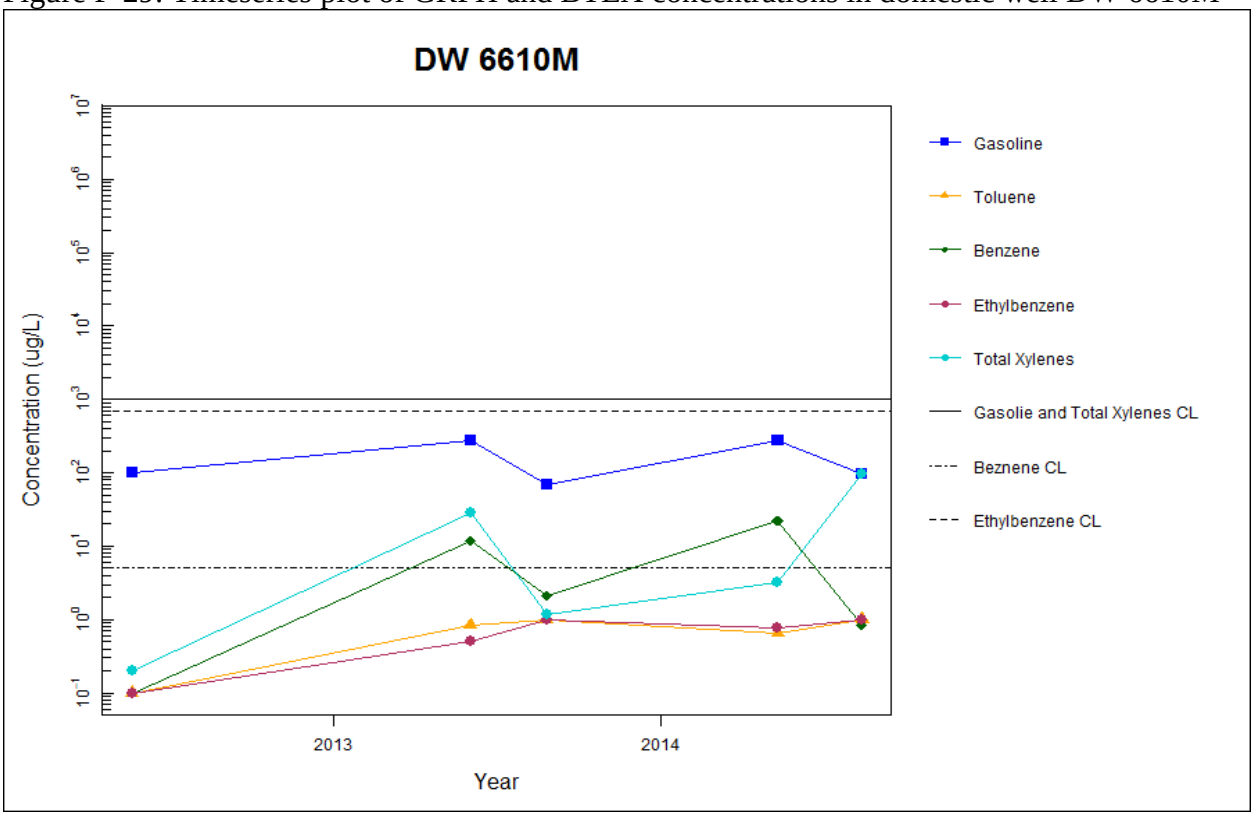
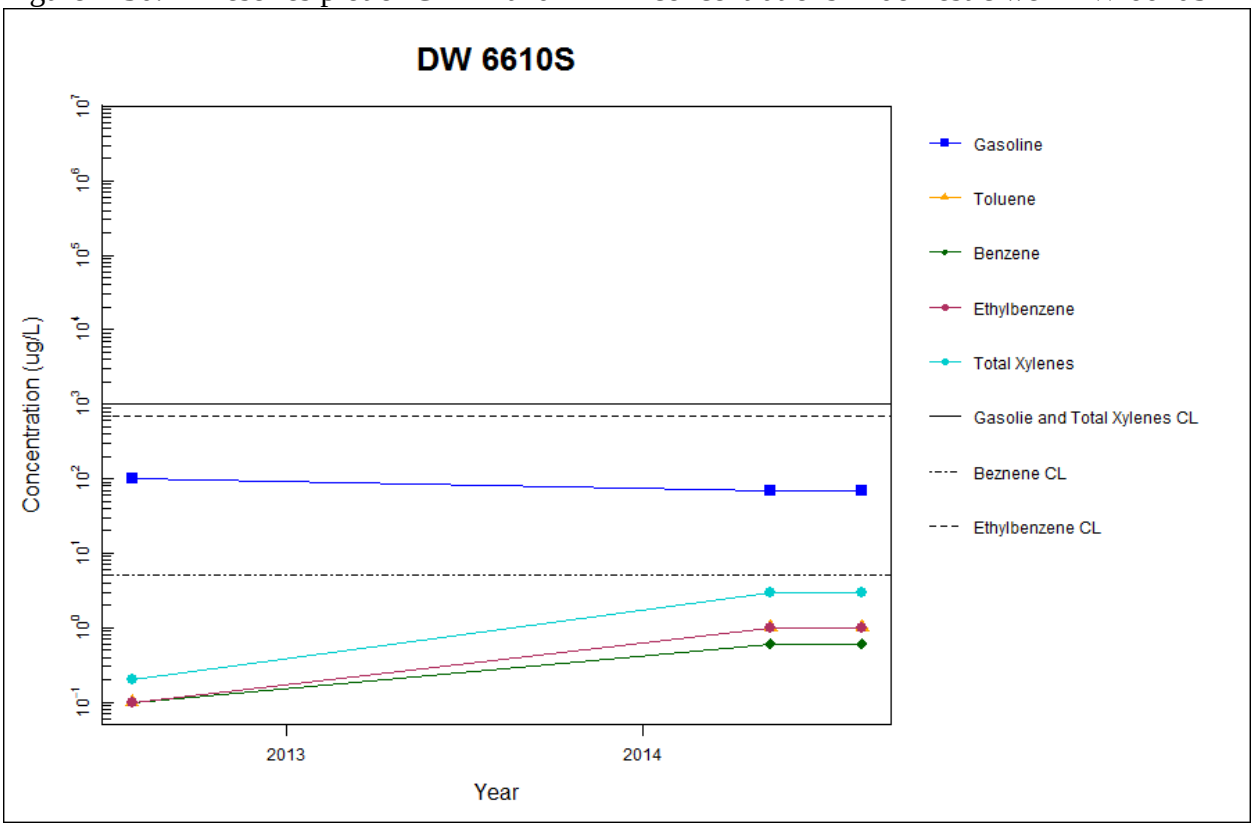


Figure F-30: Timeseries plot of GRPH and BTEX concentrations in domestic well DW 6610S



Appendix G. Mann-Kendall Trend Analysis Results

Table G-1: Results from the Mann-Kendal Trend Analysis

Study Alias	Parameter	Kendall's T	p-value (α = 0.05)	Trend Direction
MW-3	Gasoline	-0.627	0.0001	Decreasing
	Ethylbenzene	-0.549	0.0004	Decreasing
	Total Xylenes	-0.477	0.0021	Decreasing
MW-6	Gasoline	-0.404	0.0051	Decreasing
	Ethylbenzene	-0.48	0.0034	Decreasing
	Total Xylenes	-0.279	0.0593	No Trend
MW-8	Gasoline	-0.278	0.0681	No Trend
	Ethylbenzene	-0.135	0.3829	No Trend
	Total Xylenes	0.067	0.6724	No Trend
MW-9	Gasoline	-0.132	0.4117	No Trend
	Ethylbenzene	0.0336	0.8559	No Trend
	Total Xylenes	-0.017	0.9325	No Trend
MW-17	Gasoline	-0.654	0.0003	Decreasing
	Ethylbenzene	-0.216	0.3351	No Trend
	Total Xylenes	0.274	0.161	No Trend
MW-18	Gasoline	-0.542	0.0036	Decreasing
	Ethylbenzene	-0.284	0.1262	No Trend
	Total Xylenes	-0.171	0.3558	No Trend
MW-19	Gasoline	-0.341	0.1005	No Trend
	Ethylbenzene	-0.226	0.2941	No Trend
	Total Xylenes	-0.199	0.3513	No Trend
MW-20	Gasoline	0.214	0.5362	No Trend
	Ethylbenzene	0.586	0.0947	No Trend
	Total Xylenes	0.571	0.0635	No Trend
MW-21	Gasoline	0	1	No Trend
	Ethylbenzene	-0.143	0.7105	No Trend
	Total Xylenes	-0.071	0.9015	No Trend
MW-22	Gasoline	-0.535	0.0592	No Trend
	Ethylbenzene	-0.857	0.0044	Decreasing
	Total Xylenes	-0.691	0.0248	Decreasing
MW-23	Gasoline	-0.929	0.002	Decreasing
	Ethylbenzene	-0.255	0.4544	No Trend
	Total Xylenes	-0.286	0.3865	No Trend
MW-24	Gasoline	0	1	No Trend
	Ethylbenzene	-0.327	0.31857	No Trend
	Total Xylenes	0.036	1	No Trend
MW-25	Gasoline	-0.473	0.1346	No Trend
	Ethylbenzene	-0.837	0.006	Decreasing
	Total Xylenes	-0.643	0.0354	Decreasing
Cabin Grill Well	Gasoline	-0.361	0.0105	Decreasing
	Ethylbenzene	-0.433	0.0137	Decreasing
	Total Xylenes	-0.474	0.0051	Decreasing

Appendix H. Spatial Distribution of GRPH and BTEX in Groundwater

Figure H-1: GRPH and BTEX distribution during November 2014 monitoring event

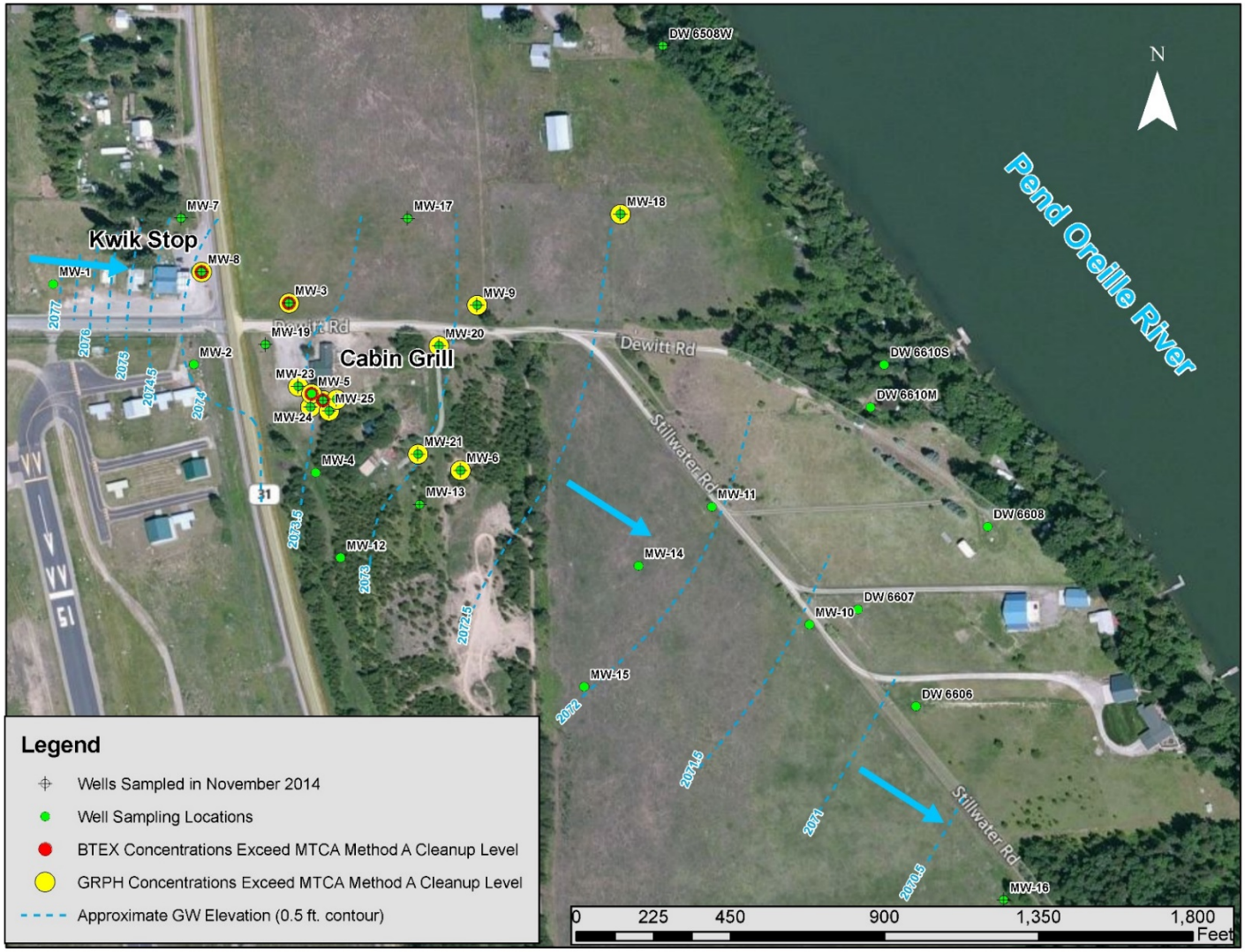


Figure H-2: GRPH and BTEX distribution during August 2015 monitoring event

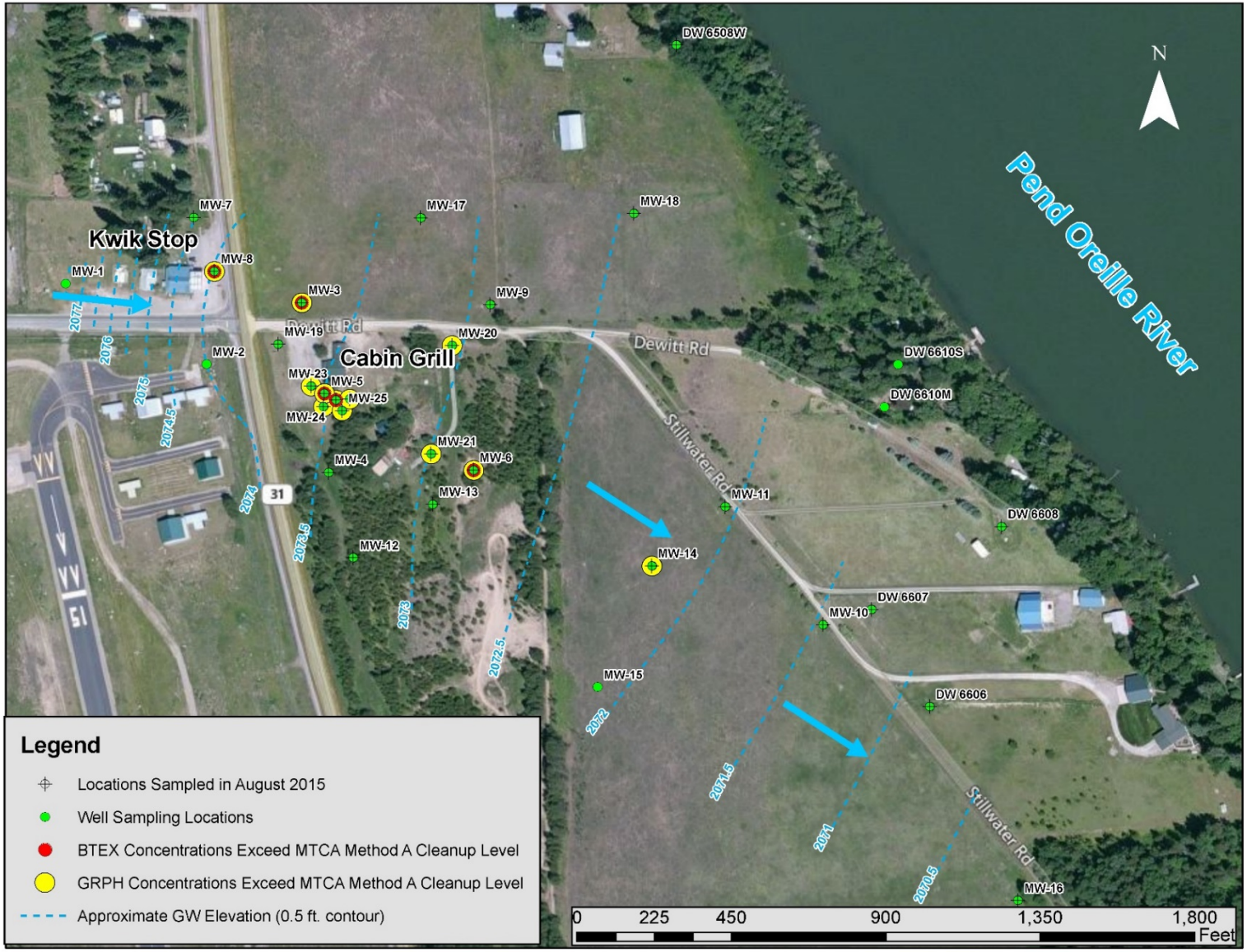
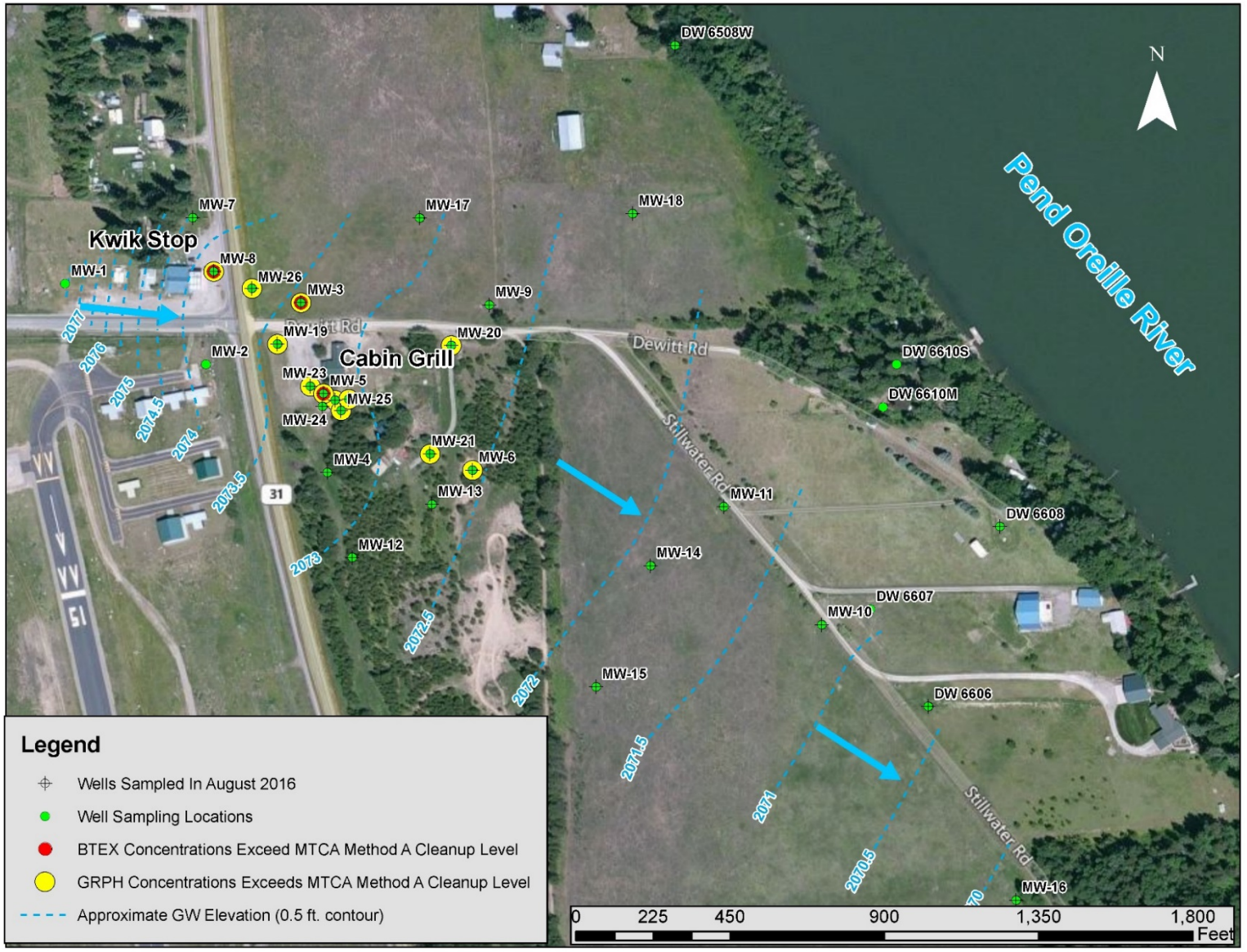


Figure H-3: GRPH and BTEX distribution during August 2016 monitoring event



Appendix I. Glossary, Acronyms, and Abbreviations

Glossary

Analyte: Water quality constituent being measured (parameter).

Dissolved oxygen: A measure of the amount of oxygen dissolved in water.

Groundwater: Water in the subsurface that saturates the rocks and sediment in which it occurs. The upper surface of groundwater saturation is commonly termed the water table.

Method Detection Limit: This definition for detection was first formally advanced in 40CFR 136, October 26, 1984 edition. MDL is defined there as the minimum concentration of an analyte that, in a given matrix and with a specific method, has a 99% probability of being identified, and reported to be greater than zero. (Federal Register, October 26, 1984).

Method Reporting limit: The minimum value of the calibration range. Analyte detections between the method detection limit and the reporting limit are reported as having estimated concentrations.

Parameter: Water quality constituent being measured (analyte). A physical, chemical, or biological property whose values determine environmental characteristics or behavior.

pH: A measure of the acidity or alkalinity of water. A low pH value (0 to 7) indicates that an acidic condition is present, while a high pH (7 to 14) indicates a basic or alkaline condition. A pH of 7 is considered to be neutral. Since the pH scale is logarithmic, a water sample with a pH of 8 is ten times more basic than one with a pH of 7.

Specific conductance: A measure of water's ability to conduct an electrical current. Specific conductance is related to the concentration and charge of dissolved ions in water.

Unconfined aquifer: An aquifer containing water that is not under pressure; the water level in a well is the same as the water table outside the well.

Acronyms and Abbreviations

AS	Air Sparge
AST	Above-ground Storage Tank
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
DQO	Data Quality Objective
EAP	Environmental Assessment Program
Ecology	Washington State Department of Ecology
EDB	1,2-dibromoethane
EDC	1,2-dichloroethane
EIM	Environmental Information Management database
FS	Feasibility Study
GRPH	Gasoline-Range Petroleum Hydrocarbons
ISCO	In-situ Chemical Oxidation

L/min	Liters per minute
MEL	Manchester Environmental Laboratory
MTBE	methyl t-butyl ether
MTCA	Model Toxics Control Act
MW	Monitoring Well
ORP	Oxidation-reduction potential
QC	Quality Control
RI	Remedial Investigation
RPD	Relative percent difference
SOP	Standard operating procedures
SVE	Soil Vapor Extraction
TCP	Toxics Cleanup Program
UST	Underground Storage Tank
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compounds
WAC	Washington Administrative Code
WRIA	Water Resource Inventory Area

Units of Measurement

°C	degrees centigrade
bgs	below ground surface
ft	feet
mg/L	milligrams per liter
mV	millivolts
S.U.	standard units
ug/L	micrograms per liter (parts per billion)
uS/cm	microsiemens per centimeter