



January 28, 2020

Delivered via Email and FedEx Overnight Delivery

Mr. Jeffery E. Mendenhall
South Carolina Department of Health and Environmental Control
Assessment Section, UST Management Division
Bureau of Land and Waste Management
2600 Bull Street
Columbia, South Carolina 29201



**Subject: Lewis Drive Revised Pumping Plan
Plantation Pipe Line Company
Lewis Drive Remediation Site
Belton, South Carolina
Site ID #18693, "Kinder Morgan Belton Pipeline Release"**

Dear Mr. Mendenhall,

On behalf of Plantation Pipe Line Company (Plantation), Jacobs has prepared this letter summarizing proposed revisions to the monitoring well pumping plan originally documented in the "*Request to pump select monitoring wells*" correspondence dated April 27, 2018.

Three bedrock monitoring wells (MW-12B, MW-15B, and MW-17B) and four, 2-inch diameter residuum monitoring wells (MW-23, MW-34, MW-40, and MW-46) are currently pumped using a "Typhoon" sampling pump, rated for approximately 3 gallons per minute (gpm). The bedrock wells are constructed as open hole, with 6" diameter steel casing keyed into competent bedrock, with borehole diameters of 8.25" to 10.5". Locations of current pumping wells are shown in the attached **Figure 1**, with associated concentrations of BTEX and naphthalene detected in groundwater samples collected from monitoring wells as of March, June, and September 2019. Historical BTEX groundwater analytical trend plots for the pumping wells are shown in **Attachment A**. Well construction details, total purge volumes (December 2019 event) and estimated recovery rates are included in **Table 1**. Except as noted in Attachment A, these wells have been pumped twice quarterly (every six weeks) since August 2018.

As summarized in **Table 1**, total purge volumes and recovery rates vary, with bedrock wells generally producing the highest volumes. The highest recovery rates were measured in MW-46 (78.2 gal/hr) and MW-17B (20.1 gal/hr). With exception of MW-23, the residuum wells pumped dry in less than 10 minutes and produced approximately 25 gallons of water or less, while the bedrock wells could be pumped over 30 minutes and produced approximately 100 gallons or more. Groundwater samples are collected within the borehole or screened interval, shortly after pumping or after the well substantially recharges.

The objective of pumping is to remove contamination from wells containing elevated concentrations (several hundred µg/L or greater) of BTEX, MTBE, or naphthalene that are not under the direct influence of our air sparge systems or may have occurred prior to installation of our air sparge systems.

Proposed Revisions to the Pumping Plan

Revised pumping plan well locations are shown in attached **Figure 2 (Residuum)** and **Figure 3 (Bedrock)**.

Pumping at residuum well MW-23 and bedrock wells MW-12B, MW-15B, and MW-17B will continue at six-week (mid-quarter) intervals. Jacobs recommends adding residuum wells MW-07, MW-11, MW-36, MW-45 and bedrock wells MW-13B and MW-50B to the pumping plan network.

MW-34 and MW-40 are low yield residuum wells which pump dry rapidly (less than 10 minutes) and are slow to recharge (<5 gal/hr), indicating low permeability material and limited connectivity to the aquifer. Accordingly, Jacobs recommends pumping at these wells be discontinued. Jacobs also recommends suspension of pumping at MW-46 until additional data from recent oxidant injection work is collected.

Jacobs will test the pumping at each well to determine a desired pumping rate. Jacobs will maintain a summary of information to use in making changes to the pumping program such as removal information, recovery, and contaminant trends over time. Pumping rates will be monitored, as well as drawdown and recovery rates. The pumping rate for each well will be determined based on field observations. For wells that pump dry or recharge slowly, the removal rate is not relevant. Bedrock wells are likely to have the highest transmissivity and these wells will be pumped gradually to assess drawdown. The objective is to remove impacted water from the well without adversely affecting drawdown nearby. Optimal pumping rates will be established for all wells and adjusted as necessary based on contaminant trends. Additionally, wells to be pumped will be adjusted based on contaminant trends over time.

Purge water will be contained in a portable tank or tote and transferred to one of the onsite (1,500 gallon) poly tanks for disposal. Pumping and water level equipment will be decontaminated between each well in accordance with the Revised Quality Assurance Project Plan (QAPP) dated February 9, 2018.

If you have specific questions about this data transmittal, please call Tom Wiley/Jacobs at (404) 751-5690, or Mr. Jerry Aycock/Plantation at (770) 751-4165.

Regards,



William M. Waldron, P.E.
Program Manager

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Mary Clair Lyons, Esq., Plantation (Digital, Mary_Lyons@kindermorgan.com)
Richard Morton, Esq., Womble Bond Dickinson, LLP (Digital, ric.morton@wbd-us.com)

Attachments:

Table 1 – Pumping Well Summary
Figure 1 – Pumping Well Layout Map
Figure 2 – Proposed Pumping Well Layout Map (Residuum)
Figure 3 – Proposed Pumping Well Layout Map (Bedrock)
Attachment A – Groundwater Analytical Trends

Table 1 - Pumping Well Summary

Plantation Pipe Line Company

Lewis Drive Remediation Site, Belton, South Carolina

Site ID #18693 "Kinder Morgan Belton Pipeline Release"

Well ID	Measured Depth to Bottom (ft BTOC)	Casing Diameter (in)	Borehole Diameter	Top of Screen or Open Borehole Interval (ft BTOC)	Bottom of Screen or Open Borehole Interval (ft BTOC)	Length of Screen or Open Borehole Interval (ft)	December 2019 Event							Total Pumping Events to date	Number of Pumping Events per Year	Well Pumps Dry?
							Depth to Water (ft BTOC)	Height of Water Column (ft)	Calculated Well Volume (gal)	Pumping Rate (gal/min)	Recovery Rate (gal/hr)	Total Pumping Time (min)	Total Volume Purged (gal)			
MW-12B	43.0	6	8.25	33.0	43.0	10	12.52	30.48	55.79	3.0	2.97 ^a	92	235	3	8	N
MW-15B	82.0	6	10.25	67.9	77.9	10	15.92	66.08	133.30	2.5	3.00	47	120	3	8	Y
MW-17B	27.5	6	8.25	17.0	27.0	10	16.25	11.25	27.54	3 - 3.5	20.1 ^b	30	86.0	11	8	N
MW-23	23.5	2	NA	7.91	22.9	15	6.63	16.87	2.75	3.5	3.90	7	25.8	11	8	N
MW-34	7.86	2	NA	5.36	7.86	2.5	2.10	5.76	0.94	> 1.0 ^c	0.04	1	1.5	11	8	Y
MW-40	13.2	2	NA	7.18	12.2	5.0	2.27	10.91	1.78	2.1	4.40	6	7.5	11	8	Y
MW-46	17.1	2	NA	12.1	17.1	5.0	8.23	8.82	1.44	> 1.5 ^d	78.2 ^e	2	10.3	11	8	Y

Notes:

^a Recharge rate is estimated to be 2.97 gal/min due to the pumping rate of 3.00 gal/min and the drawdown of 0.025 gallons per minute.

^b Recharge rate is estimated to be 20.1 gal/min. A drawdown rate of 0.31 gal/min was observed between the DTW of 16.25 and 21.90 ft bgs. Recovery Rate increased to 0.33 gal/min when DTW reached 21.95 ft bgs. The pumping rate during the drawdown and recharged estimates was maintained at 3.5 gal/min.

^c Pumping rate was estimated to be greater than 1.0 gal/min due to the 0.94 gallon well volume and the well becoming dry within the first minute of pumping.

^d Pumping rate was estimated to be greater than 1.5 gal/min due to the well volume of 1.4 gallons and the well becoming dry within the first minute of pumping.

^e Recharge rate is estimated to be 78.2 gal/min due to full recharge of well within one minute of turning the pump off.



LEGEND

- ★ Release Point
- Pumping Well
- ⊕ Monitoring Well
- ⊞ Bedrock Monitoring Well
- Vertical Bedrock Sparging Well
- Vertical Saprolite Sparging Well
- ◆ Seep Location
- Recovery Well (4-inch diameter)
- △ Recovery Sump
- Recovery Trench Point
- Recovery Trench
- Surface Water Flow Direction
- Horizontal Sparging Well Riser
- Horizontal Sparging Well Screen
- Waterbody
- - - Intermittent Stream
- ▨ Delineated Wetland

NOTES:
 All analyte concentrations in microgram(s) per liter (µg/L). Total Xylenes is the sum of m&p xylenes and o-xylene. MTBE = Methyl Tertiary Butyl Ether. Only detected analytes are shown on map. ND = Groundwater was collected and analyzed, but no analytes were detected above the reported sample quantitation limit. NS = Not sampled during this event. Gray shading indicates the analyte exceeded risk-based screening levels (RBSLs) identified in South Carolina Underground Storage Tank Management Division Programmatic Quality Assurance Program Plan Revision 3.1, Table D1 "RBSLs for Groundwater", February 2016.

Base Map Sources:
 *Environmental Systems Research Institute (Esri) ArcMap World Imagery, 2018. Basemap features are approximate.
 *United States Geological Survey (USGS) National Hydrography Dataset (NHD)

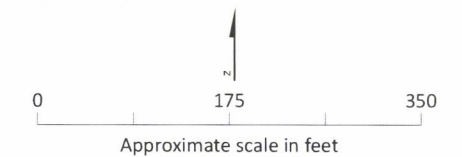


Figure 1. Pumping Well Layout Map
 Lewis Drive Remediation Site
 Belton, South Carolina
 Site ID #18693 "Kinder Morgan Belton Pipeline Release"



LEGEND

- ★ Release Point
- Pumping Well
- ⊕ Residuum Monitoring Well
- Vertical Bedrock Sparging Well
- Vertical Sapolite Sparging Well
- ◆ Seep Location
- Recovery Well (4-inch diameter)
- △ Recovery Sump
- Recovery Trench Point
- Recovery Trench
- Surface Water Flow Direction
- Dissolved Benzene Plume Extent as of September 2019 (µg/L) (Dashed where inferred)
- Waterbody
- - - Intermittent Stream
- ▨ Delineated Wetland

NOTES:

1. Total Xylenes is the sum of m&p xylenes and o-xylene.
2. MTBE = Methyl Tertiary Butyl Ether
3. 1,2-DCA = 1,2-dichloroethane
4. Analyte concentration in microgram(s) per liter (µg/L)
5. Only detected analytes are shown on map.
6. ND = Groundwater was collected and analyzed, but no analytes were detected above the reported sample quantitation limit.
7. NS = Not scheduled to be sampled for this event
8. NS-FP = Sample not collected due to the presence of free product in the well
9. NS-PS = Sample not collected due to product sheen observed in well
10. NS-IW = Sample not collected due to insufficient volume of water in well

Gray shading indicates the analyte exceeded risk-based screening levels (RBSLs) identified in South Carolina Underground Storage Tank Management Division Programmatic Quality Assurance Program Plan Revision 3.1, Table D1 "RBSLs for Groundwater", February 2016.

Base Map Sources:

- *Environmental Systems Research Institute (Esri)
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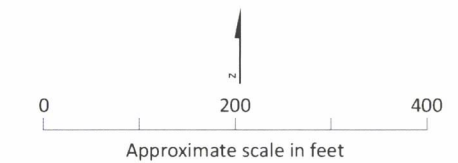


Figure 2. Proposed Pumping Well Layout Map (Residuum)
 Lewis Drive Remediation Site
 Belton, South Carolina
 Site ID #18693 "Kinder Morgan Belton Pipeline Release"



LEGEND

- ★ Release Point
- Pumping Well
- Bedrock Monitoring Well
- Vertical Bedrock Sparging Well
- Vertical Saporlite Sparging Well
- ◆ Seep Location
- Recovery Well (4-inch diameter)
- △ Recovery Sump
- Recovery Trench Point
- Recovery Trench
- Surface Water Flow Direction
- Horizontal Sparging Well Riser
- Horizontal Sparging Well Screen
- Waterbody
- - - Intermittent Stream
- ▨ Delineated Wetland

NOTES:
 All analyte concentrations in microgram(s) per liter (µg/L).
 Total Xylenes is the sum of m&p xylenes and o-xylene.
 MTBE = Methyl Tertiary Butyl Ether
 Only detected analytes are shown on map.
 ND = Groundwater was collected and analyzed, but no analytes were detected above the reported sample quantitation limit.
 NS = Not sampled during this event.
 Gray shading indicates the analyte exceeded risk-based screening levels (RBSLs) identified in South Carolina Underground Storage Tank Management Division Programmatic Quality Assurance Program Plan Revision 3.1, Table D1 "RBSLs for Groundwater", February 2016.

Base Map Sources:
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 *United States Geological Survey (USGS) National Hydrography Dataset (NHD)

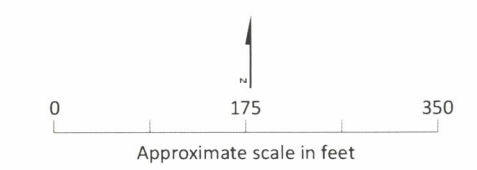
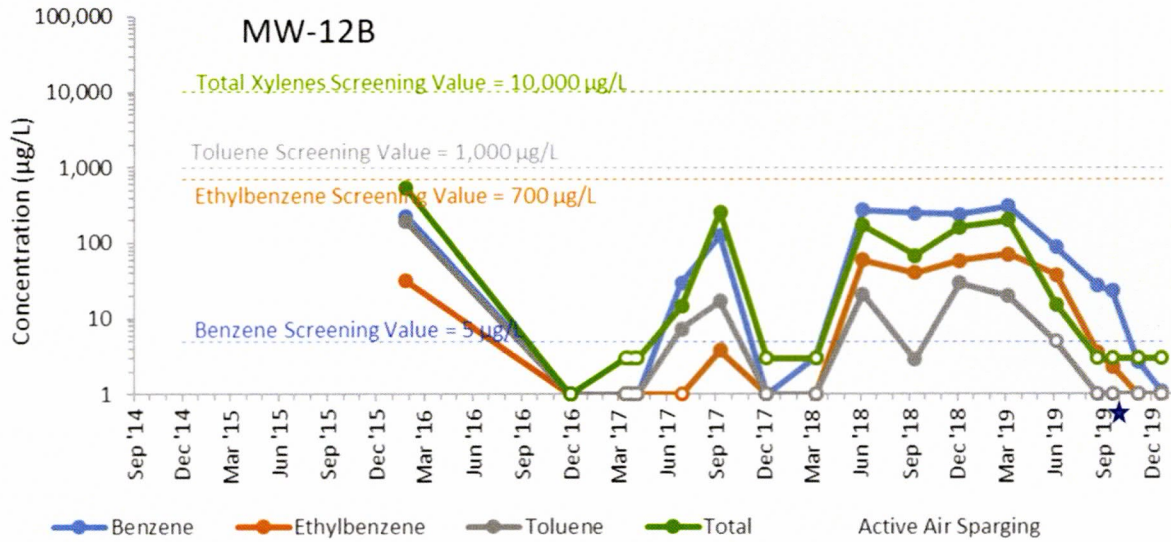


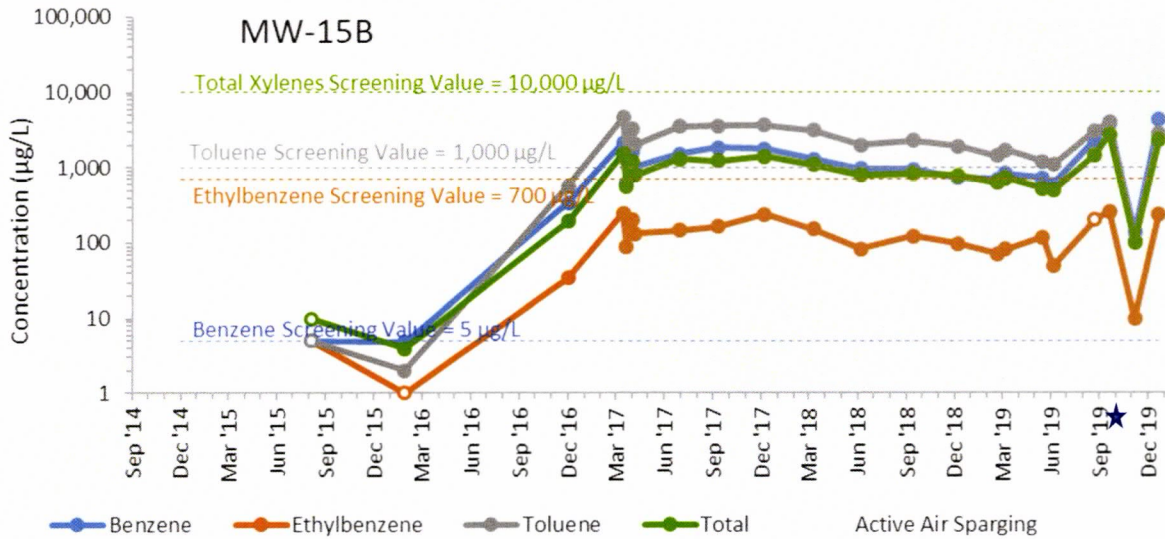
Figure 3. Proposed Pumping Well Layout Map (Bedrock)
 Lewis Drive Remediation Site
 Belton, South Carolina
 Site ID #18693 "Kinder Morgan Belton Pipeline Release"

Bedrock Wells



Note: Open circles denote that the compound was not detected; non-detects are plotted at the reporting limit.

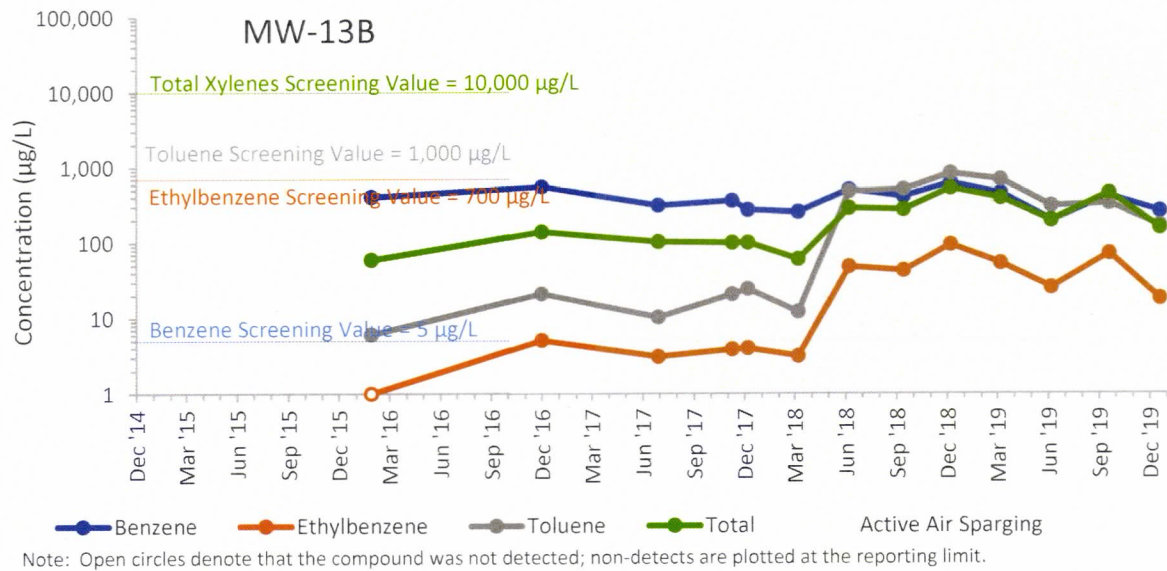
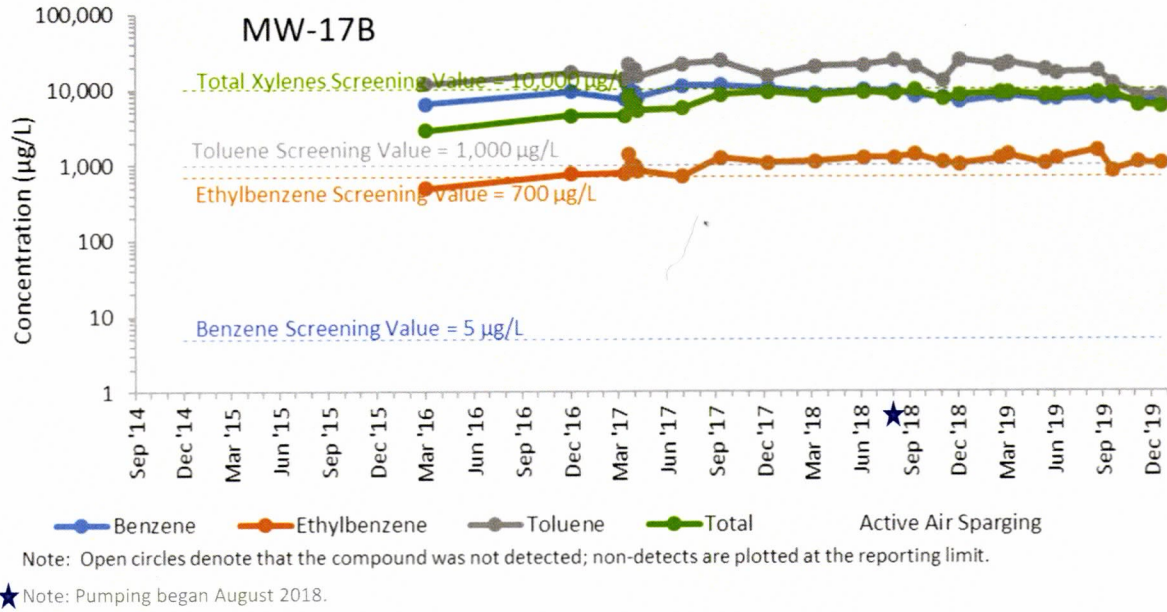
★ Note: Pumping began October 2019.



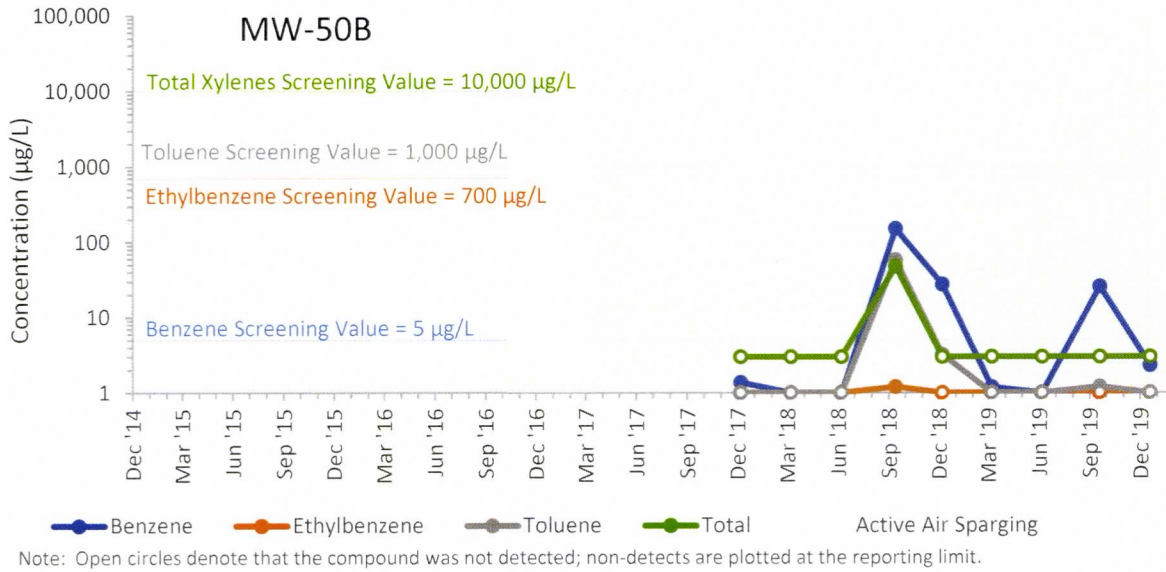
Note: Open circles denote that the compound was not detected; non-detects are plotted at the reporting limit.

★ Note: Pumping began October 2019.

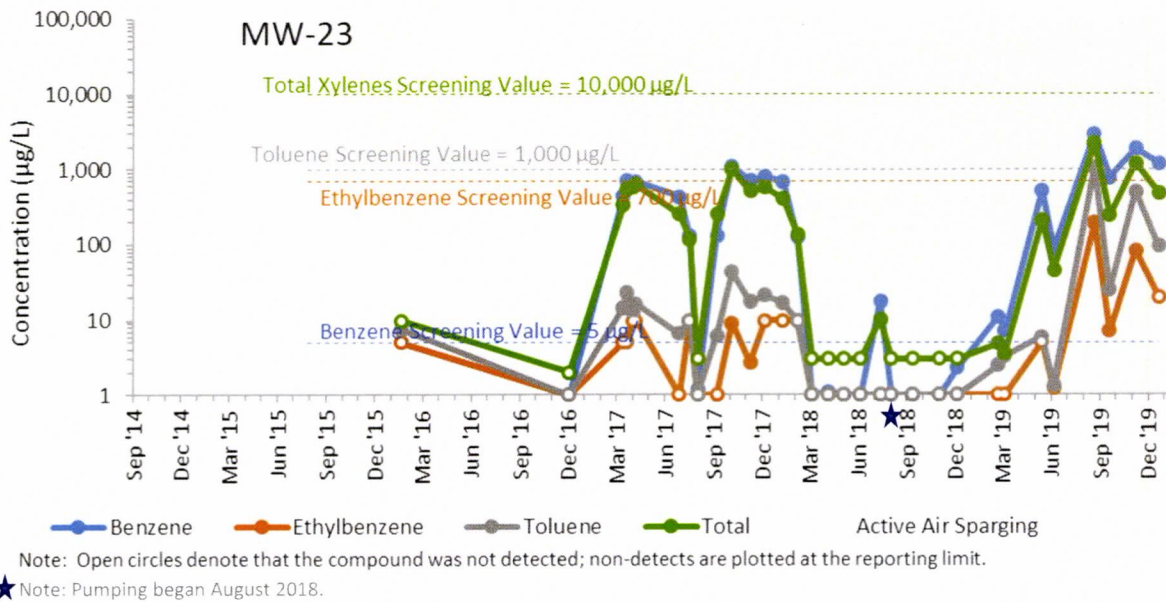
Attachment A – Groundwater Analytical Trends



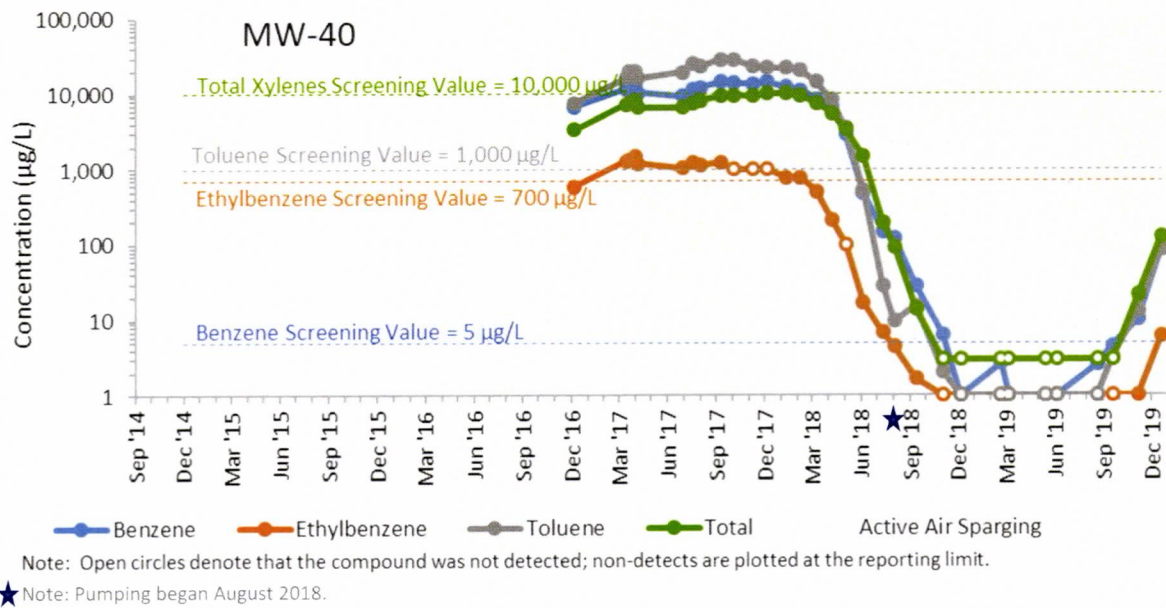
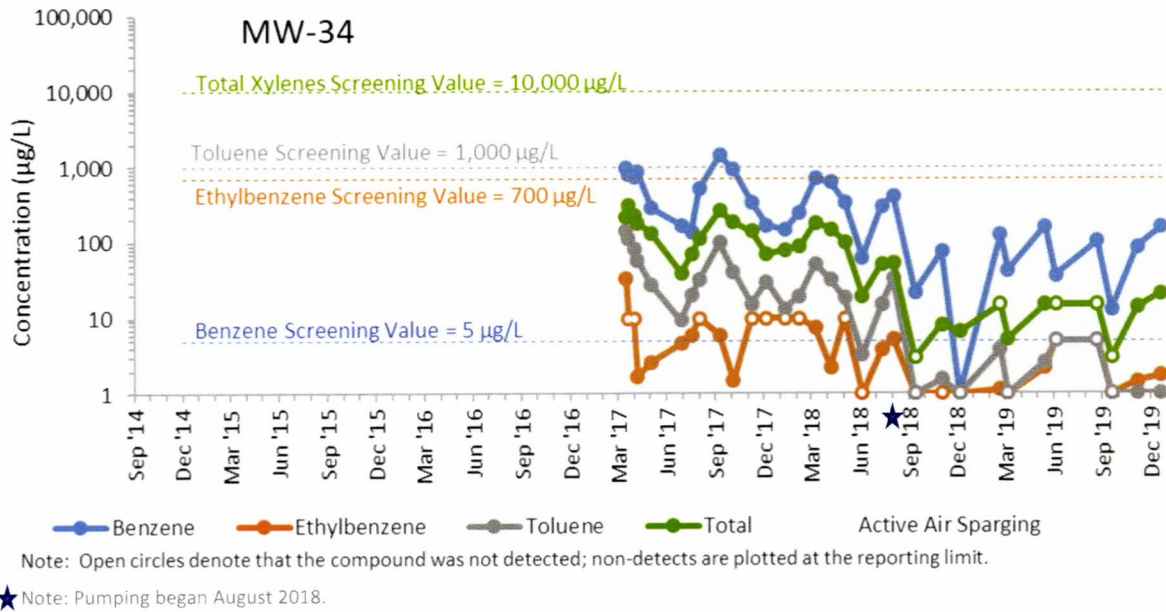
Attachment A – Groundwater Analytical Trends



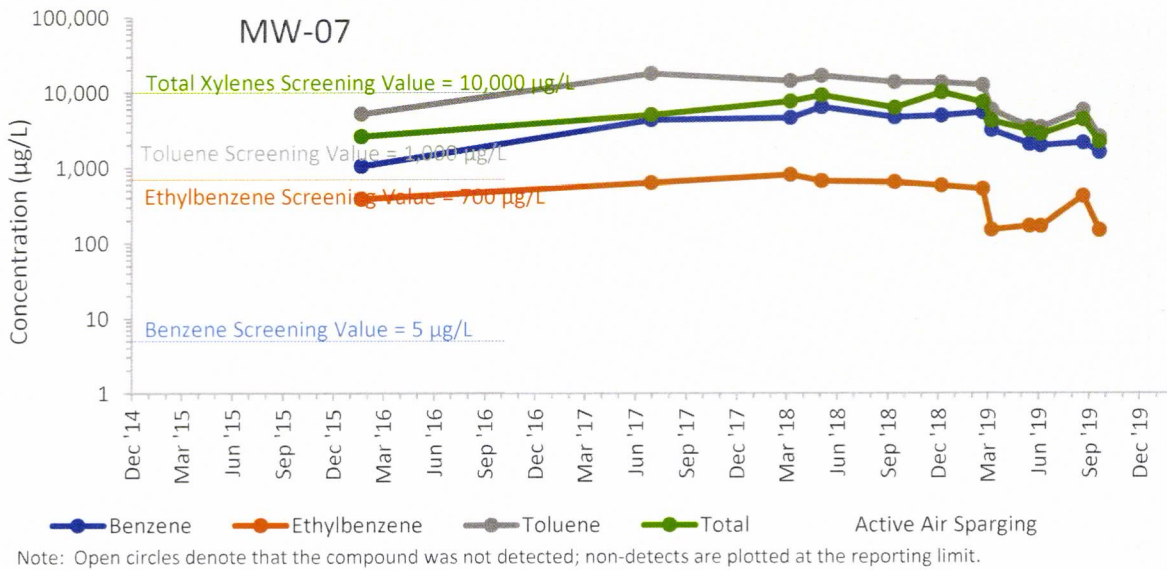
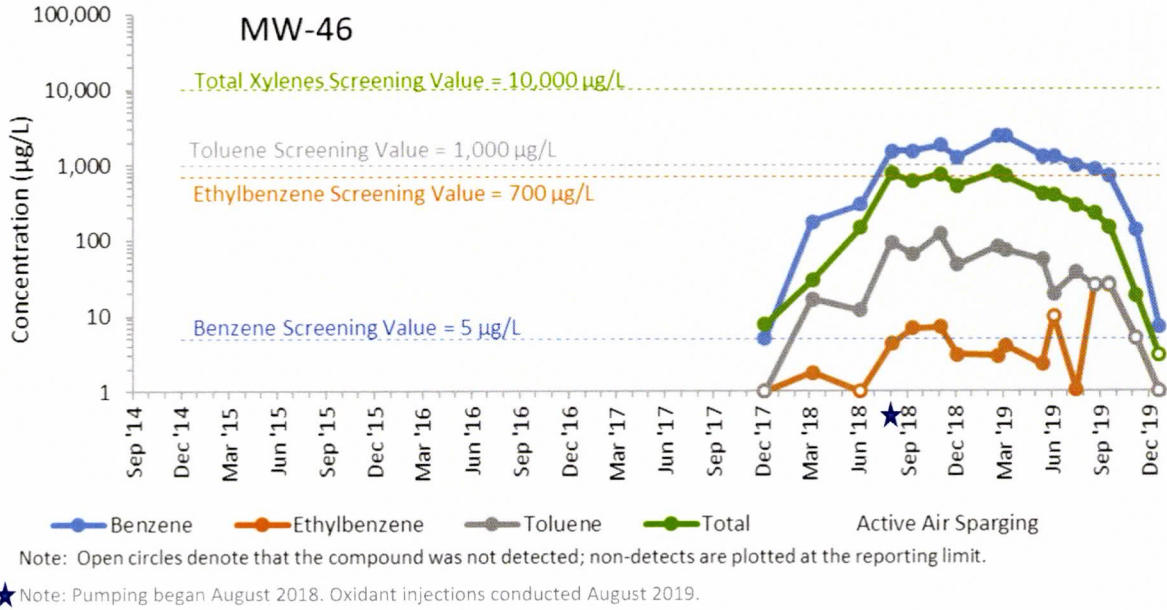
Residuum Wells



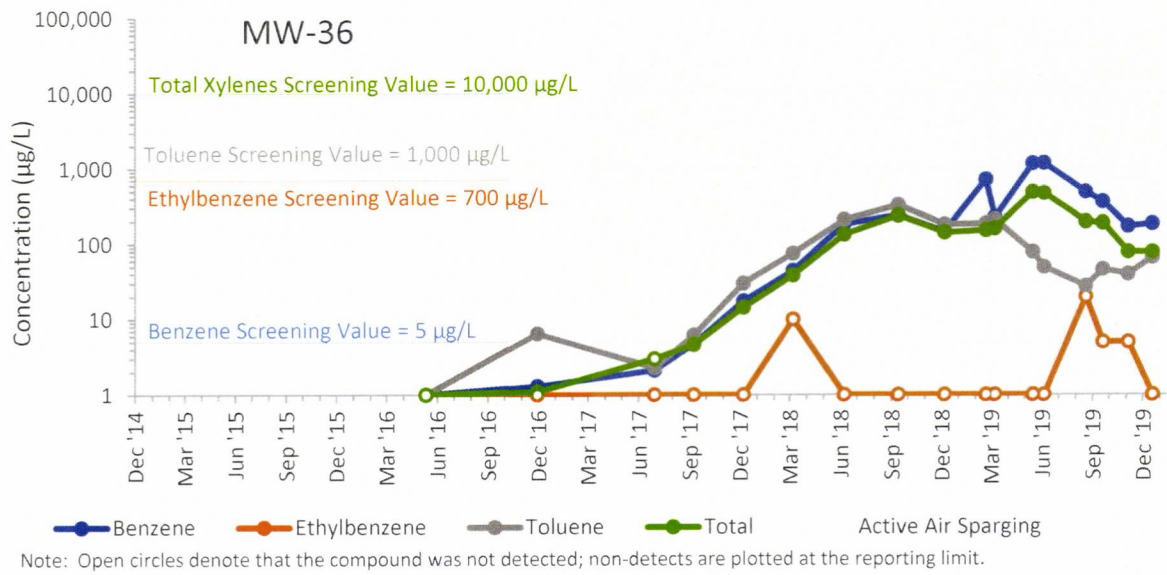
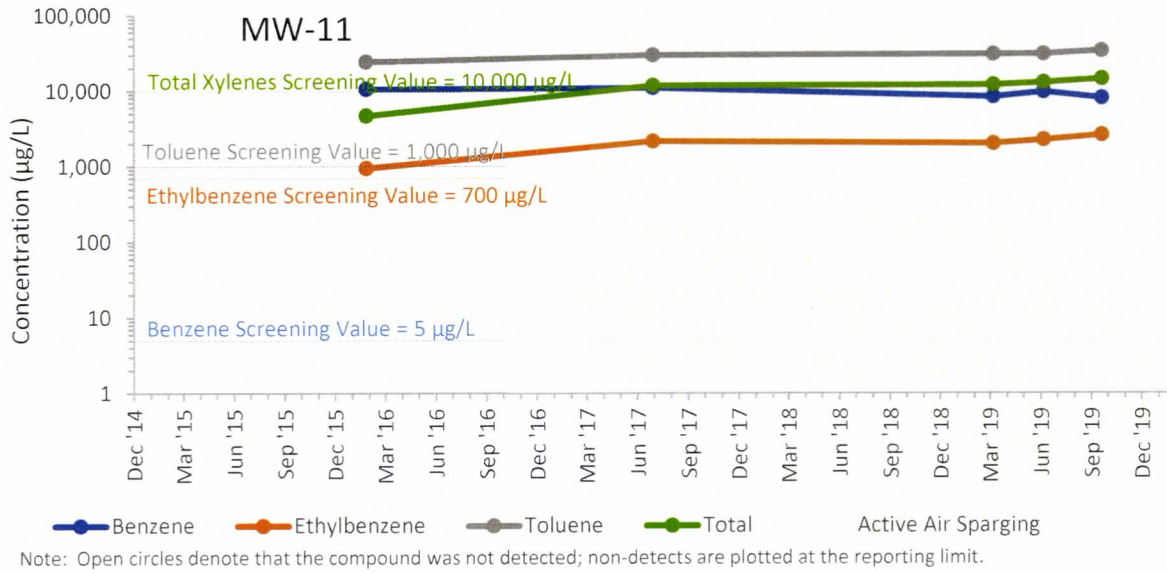
Attachment A – Groundwater Analytical Trends



Attachment A – Groundwater Analytical Trends



Attachment A – Groundwater Analytical Trends



Attachment A – Groundwater Analytical Trends

