



ARM Group LLC

Engineers and Scientists

August 19, 2022

Ms. Susan Bull
Oil Control Program
Maryland Department of the Environment
1800 Washington Boulevard, Suite 620
Baltimore, MD 21230

Re: **Quarterly Status Report – August 2022**
MDE Case No. 2013-0321-AA
SMO Fort Meade Shell, SMO-550
2631 Annapolis Road, Hanover, MD
ARM Project No. 190292

Dear Ms. Bull,

This document has been prepared to provide your Department with an update to the groundwater quality monitoring and remediation efforts at the above site. This document includes new data and information collected through July and into August 2022. The monitoring wells were most recently sampled in April and July 2022, and wells have been gauged for the presence of petroleum product on a weekly schedule since the last week of May 2022. The July 2022 sampling event and weekly gauging were completed in response to your Department's direction (May 24, 2022 email and correspondence dated August 16, 2022) prompted by the detection of non-aqueous phase liquid (NAPL or petroleum product) in MW14 during an April 13, 2022 biannual groundwater sampling event. As reported in our Vacuum Truck EFR Summary correspondence, dated May 27, 2022, a vacuum truck enhanced fluid recovery (EFR) event was completed on May 18, 2022. No detectable NAPL accumulations were measured during weekly gauging and visual bailing completed after the May 18 EFR event.

GROUNDWATER OCCURRENCE

As presented in the May 2022 Status Report, and previous submittals, shallow/water table groundwater at the site is measured in two different zones: a perched zone composed of laterally-discontinuous water-bearing zones that are seasonally/precipitation-dependent and a deeper groundwater zone. Groundwater elevations dropped significantly between April 2021 and April 2022, and is believed to be the main reason that NAPL reappeared in MW14, in which groundwater elevations dropped about 4.25 feet between April 2021 and April 2022. The largest drop in groundwater elevations occurred in MW10 with over 10.5 feet difference during the one year period of April 2021 to April 2022. Water levels dropped in MW8 and MW15 at 5.5 and 6 feet during this time. Lesser declines were observed in the remaining wells (MW1, MW4, MW7, MW9, MW12, MW16). Wells within the perched zone include: MW1, MW4, MW7, MW11, MW12 and MW16 with an average depth to groundwater of 26.4 feet below top of casing. Deep zone wells include: MW2, MW8, MW9, MW10 and MW15 with an average depth to water of 35 feet below top of casing.

Water levels in several of the monitoring wells are affected by drainage water from the perched zone and the deeper groundwater zone with the wells screened across/into both zones. Water levels in MW8 were consistent with deeper zone screened wells (e.g., MW9, MW10 and MW15) from mid-2014 (when the well was constructed) into mid-2018. Starting August 2018, water levels in MW8 began to rise and were no longer consistent with water levels in the deeper zone screened wells. Water levels in MW10 deviated from the deeper zone wells starting early-2019 and approached shallower levels (higher elevations) more

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consistent with the perched zone but with relatively significant seasonal/precipitation-dependent fluctuations since 2019. Water levels in the perched wells (noted above) have fluctuated over the years within a much smaller range than the deeper zone wells.

MW14 is screened across/into both the perched and deeper zones. Water levels in MW14 were consistent with the shallow zone wells when the well was originally constructed in April 2013 as a 30 feet-deep well. Per direction of MDE, the well was redrilled/deepened in June 2014 and subsequent water levels in the well were then consistent with the deep zone wells. Beginning early-2014, water levels in MW14 began to rise and by mid-2017 were more consistent with shallow zone wells. Between November 2020 and April 2022, water levels in MW14 dropped about 4.75 feet.

Since the April 2022 groundwater sampling event, and as documented by weekly gauging since late-May 2022, groundwater levels have become shallower, with the largest change in MW10 with over 5.5 feet increase in elevation, and MW14 with about 2.75 feet rise in elevation.

Immediately south of the site is a temporal drainage ditch that flows westerly and is a tributary to the southern-flowing Midway Branch that parallels Rockenbach Road located south of the site, and ultimately passes through Fort George G. Meade. The elevation of this drainage ditch is consistent with the elevation of the perched groundwater zone, and several feet higher than the deeper groundwater zone. Flow of groundwater within the perched groundwater system beneath the site is to the west, consistent with the flow of the temporal stream. Flow in the deeper zone has consistently been to the east/northeast.

GEOLOGIC CROSS SECTION

In response to your Department's August 16, 2022 Site Status Letter, Item # 4 – Geologic Cross Sections, a geologic cross section was included in the Preliminary Subsurface Environmental Assessment Report dated July 3, 2013. A copy of the cross section is provided in Appendix A. In the matter of the geologic cross section, your Department's August 2022 correspondence stated: "Geological cross sections in the east-west and north-south cardinal directions would be helpful to demonstrate the multi-depth impacts at this site. These cross-sections should be provided in each report to support the shallow and deep wells as outlined on the maps and should depict a representative subsurface model with respect to groundwater depth/gradient, subsurface lithology, underground utilities, subsurface structures (e.g., the USTs and piping), and contaminant migration. Further, monitoring of subsurface conditions at this site has been performed for over nine years with regular status reporting including gauging and sampling data and hydrographs, groundwater potentiometric surface and VOC/NAPL plume mappings and detailed descriptions of site conditions and any notable changes. **Please advise the specific need for geologic cross sections for this specific project "in each report," and in consideration of the vast reporting that has been provided to date.**

NAPL OCCURRENCE

During the nine-years of monitoring of groundwater conditions at the site, NAPL has been measured in MW7, MW9 and MW14. NAPL first appeared in MW7 in November 2013 and continued to April 2014 with accumulations up to 3.75 feet thick and averaged 1.17 feet, and when the depth to groundwater ranged from 27.5 to 30 feet below top of casing (e.g., about 214 to 216.5 feet elevation). Beginning April 2014, water levels in MW7 began to rise and by June 2014 were about 26 feet depth (218.3 feet elevation), and since that time have averaged about 2186 feet elevation and within a 2.4 feet-thick range. No NAPL has been observed in MW7 since April 2014. In fact, BTEX and VOC concentrations in MW7 groundwater samples have decreased significantly with near non-detectable Benzene and BTEX concentrations (averaging about 3 µg/l and 5.25 µg/l, respectively, since March 2020. Total VOC concentrations (including 124-Trimethylbenzene and 135-Trimethylbenzene, 124-TMB and 135-TMB) have consistently been below 100 µg/l since early-2019.



NAPL in MW9 first appeared shortly after the well was constructed in April 2013 and continued to be detected up to 1.5” through 2013 with water elevations averaging about 207.7 feet (35.85 feet below top of casing). No NAPL was detected in the well until June 2016 and reappeared at that time and through March 2017 with up to 1.25” thick accumulations and averaged 0.5”; water levels at this time averaged about 207 feet elevation. During the period between early-2014 until June 2016, when no NAPL was detected, water elevations averaged 208.5 feet and were as high as 210.4 feet. Since April 2017, MW9 groundwater elevations have ranged from 206.5 to 210.25 feet with several periods (April 2018, March 2020 and April 2022) where elevations were consistent to low-points when NAPL was previously detected. However, NAPL was not detected during these low-elevation periods. In fact, since April 2017 through April and July 2022 sampling events, Benzene and BTEX concentrations have decreased from about 540 µg/l to 3 µg/l, and 5670 µg/l to 16 µg/l, respectively.

MW14 NAPL was observed at accumulations up to 2.9 feet thick from November 2013 to April 2014. Groundwater elevations during this time of maximum NAPL thicknesses ranged from 215.75 to 217.5 feet and averaged 217 feet. Water levels in April to June 2014 were higher and averaged about 218.7 feet elevation, along with a general lack of measurable NAPL accumulations. Per MDE direction, the well was deepened in June 2014 from about 30.3 to 43.6 feet depth, and a sudden drop in water elevations was measured through the remainder of 2014 averaging about 209.7 feet elevation (or 9 feet lower than observed earlier in the year of 2014 before the well was deepened). No NAPL was detected until October 2014 and was periodically measured into February 2015 with accumulations up to 10” and averaging 2” thick during this time with groundwater elevations in the 209 to 211.25 feet range. No NAPL was measured in MW14 from February 2015 through October 2021. Groundwater elevations during this time progressively increased about 10 feet from 209.3 feet in December 2015 to 219.3 feet in November 2020. From November 2020 into April 2022, MW14 groundwater elevations dropped about 4.75 feet. Since April 13, 2022, MW14 groundwater elevations increased to as much as 217.5 feet in late-June 2022 (about 2.9 feet increase), much of which occurred by May 25, 2022. The EFR event on May 18 combined with quickly rising groundwater has resulted in the disappearance of NAPL from MW14 through the most recent well gauging event of August 9, 2022.

SUMMARY OF GROUNDWATER, NAPL AND PETROLEUM CONCENTRATIONS

Appendix B provides time-series groundwater elevation, NAPL thickness and petroleum (BTEX, VOC, etc) concentration graphs for MW7, MW9 and MW14, as well as hydrographs and concentration time-series graphs for selected site wells. Gauging and sampling data is presented in Appendix C. Appendix D provides July 2022 groundwater elevation, Benzene, BTEX and VOC plume maps. Review of the graphs and data presented in Appendix B and C shows that:

1. MW7
 - a. MW7 NAPL occurrence was dependent on groundwater elevation (appearing during low groundwater elevations, not present during higher elevation periods).
 - b. MW7 concentrations are decreasing and since early-2019 have been significantly low and not representative of a submerged/entrapped NAPL source.
 - c. Benzene, BTEX and VOC concentrations in April and July 2022 were about 1 µg/l, 2.5 µg/l and 30.5 µg/l, respectively (not including about 42.75 µg/l TMBs).
2. MW9
 - a. MW9 NAPL occurrence was dependent on groundwater elevation (historically appearing during low groundwater elevations, not present during higher elevation periods).
 - b. MW9 current groundwater elevations are consistent with the elevations that occurred when NAPL was last observed in the well.
 - c. MW9 concentrations are decreasing and since August-2020 have reduced 1 to 2 orders of magnitude regardless of the fact that groundwater elevations have also dropped during this time (and if NAPL was submerged/entrapped, much higher petroleum concentrations would be expected, but such has



not occurred). Benzene, BTEX and VOC concentrations in April and July 2022 were about 3 µg/l, 16 µg/l and 72 µg/l, respectively (not including 3 to 19 µg/l TMBs).

3. MW14

- a. MW14 NAPL occurrence is dependent on groundwater elevation.
- b. MW14 groundwater elevations ranged over a 10' difference.
- c. After a decline between 2013 through 2017, concentrations in MW14 were relatively consistent from early-2018 to April-2021 with an average of 6 µg/l Benzene, 690 µg/l BTEX and 815 µg/l VOC. From early to mid-2021, groundwater elevations dropped and Benzene, BTEX and VOC concentrations increased with averages of 20 µg/l, 4620 µg/l and 5975 µg/l, respectively. The predominate parameters in the VOC concentration are Ethylbenzene and Xylenes, followed by Naphthalene. Ethylbenzene and Xylene combined represent about 80% of the VOC concentration, and adding in Naphthalene represent about 95% of the VOC concentration.
- d. No NAPL has been detected in MW14 since the April 2022 sampling event.
- e. The Benzene, BTEX and VOC concentrations in April 2022 were 41 µg/l, 10.4 mg/l and 14 mg/l, respectively (not including 11.13 mg/l TMBs).
- f. The Benzene, BTEX and VOC concentrations in July 2022 were 13.3 µg/l, 8 mg/l and 9.7 mg/l, respectively (not including 26.3 mg/l TMBs).

SHALLOW GROUNDWATER ZONE WATER TESTING RESULTS

For at least eight years, MW1, MW4, MW12 and MW16 have contained very low to no detectable VOC concentrations. The other two wells constructed within the shallow water-bearing zone are MW7 (discussed above) and to a lesser extent MW14 (also described above).

- MW1 is located in the northeast and upgradient portion of the site with groundwater predominately from the shallow water-bearing zone.
- MW4 is located hydraulically downgradient and south of the tankfield within the shallow water-bearing zone.
- MW12 is located in the downgradient (southwest) area of the shallow water-bearing zone. The August 2020 and July 2021 sample testing data for MW12 showed the presence of detectable VOCs, contrary to a long history of low to no VOC concentrations. It is believed that the August 2020 and July 2021 results for MW12 are erroneous and a result of sampling error because of incomplete decontamination of sampling equipment between wells. The November 2020, February, April and October 2021, and April, and July 2022 sample-testing data for MW12 are consistent with historical results showing concentrations are otherwise non-detect or below reporting limits.
- MW16 is located proximate to the location of where a Stage-II vapor return line was damaged on the east side of the dispenser islands. MW16 has not contained detectable Benzene concentrations since late-2015 (e.g., over 6 years). During the three years leading into 2022, the Total VOC concentration in MW16 averaged about 6.7 µg/l, much of which is either Methyl Ethyl Ketone (MEK) and/or 1,1,2-Trichloroethane (112-TCA). The April 2022 sample from MW16 contained non-detectable BTEX, MTBE and Naphthalene concentrations, but did contain 1.7 µg/l Bromomethane, 5.6 µg/l MEK and 49.1 µg/l TBA along with 0.51 µg/l Carbon Disulfide, and 0.332 mg/l GRO and 0.92 mg/l DRO. The July 2022 did not contain any detectable VOC concentrations, 0.642 mg/l GRO and 0.61 mg/l DRO.

DEEP GROUNDWATER ZONE WATER TESTING RESULTS

The deeper groundwater zone is represented by groundwater levels in MW2, MW8, MW9, MW10 and MW15.

- More often than not, MW2 (located near MW9 near the southeast edge of the property along Annapolis Road) does not contain enough groundwater for sampling and testing. MW2 was constructed before



December 2012 and before the current monitoring activities began. Groundwater samples were collected from MW2 in June and September 2014 when groundwater elevations were higher (shallower), and showed average concentrations of 210 µg/l Benzene, 3450 µg/l BTEX and 4400 µg/l VOC. A groundwater sample was obtained from MW2 in September 2015 and showed the presence of 240 µg/l Benzene, about 720 µg/l BTEX and 1150 µg/l VOC. The most recent samples obtained from MW2 were in March and June 2019, and contained about 250 µg/l Benzene, 1000 µg/l BTEX and 1222 µg/l Total VOC. As such, concentrations in MW2 “cap water” have remained relatively unchanged between 2015 and 2019.

- Like MW14, MW8 was replaced with a deeper well in June 2014 per direction of MDE (from about 34 feet-deep to 43.5 feet-deep). Before the well was re-drilled (e.g., when it was shallower), it contained only a few inches of groundwater with samples containing about 1400 µg/l Benzene and 13500 µg/l Total VOC. Soon after the well was replaced with a deeper constructed screen section, groundwater samples contained about 15 µg/l Benzene and 570 µg/l Total VOC. Beginning in mid-2018, groundwater levels in MW8 deviated from the deeper zone elevations and became much shallower, but not as shallow as the other shallow zone wells. The water levels in MW8 appear to be a combination of both shallow zone drainage and deeper zone influence. Beginning with the significant drop in groundwater elevations between October 2021 and April 2022, the water levels in MW8 appeared to be more coincident with the deeper zone wells. For the past three years, the groundwater elevation in MW8 has fluctuated within a 6.75 feet thick zone, and samples have contained on average about 3 µg/l Benzene, 254 µg/l BTEX (13.5 to 500 µg/l) and 388 µg/l Total VOC (ranging from 50 to 700 µg/l) and not including 65 to 720 µg/l TMBs. The April and July 2022 samples contained an average of 1.4 µg/l Benzene, 65 µg/l BTEX and 190 µg/l Total VOC (not including about 65 to 200 µg/l TMBs).
- As discussed above, NAPL was observed in MW9 from the time it was constructed in April 2013 and through 2013 with accumulations up to about 1.5”-thick. As groundwater elevations increased, NAPL disappeared and was not detected until mid-2016. NAPL reappeared when groundwater levels were lower from July 2016 through March 2017 with accumulations up to about 1.5”-thick. Starting in March 2017, groundwater levels started to increase (become shallower) and NAPL was no longer detected. Groundwater levels in MW9 approached historical lows by early-2018 without the reappearance of NAPL, which was followed by relatively significant rising groundwater levels through mid-2019, a subsequent decline of about 3 feet into March 2020, a steady rise in elevations into April 2021, followed by 1 foot drop by October 2021. Current groundwater levels in MW9 are about the same as when the well last contained NAPL in mid-2016 and late-2013. Between April 2021 and April 2022, water levels in MW9 have dropped about 1.75 feet, and have since risen about 0.75 feet. Groundwater levels in MW10 and MW15 dropped 10.5 and 6 feet, respectively between April 2021 and April 2022 (compared to 1.75 feet in MW9), and have since risen . Consequently, the water levels in some of the “deeper” wells may be partly a function of perched groundwater draining downward within the screened interval of the wells, and affecting measured depths to groundwater, as well as contributing to the resulting VOC concentrations of samples collected from the “mixed” groundwaters. In August 2013, MW9 contained about 99.5 mg/l Total VOC including 6.5 mg/l Benzene. Concentrations decreased about two orders of magnitude by about early-2018, and have been progressively decreasing with some fluctuations since that time. In early-2020, the VOC concentration contained an average of about 70 µg/l 124-TMB and 14 µg/l 135-TMB, and as of the July 2022 sampling event, 12.0 µg/l 124-TMB and 6.7 µg/l 135-TMB. As of the July 2022 sampling event, MW9 contained 4.5 µg/l Benzene, 27.4 µg/l BTEX, 2.7 µg/l MTBE, 3.6 µg/l Naphthalene and 100.3 µg/l VOC (not including 18.7 µg/l TMBs).
- The water level in MW10 significantly increased (i.e., about 7.5 feet) from fourth quarter 2018 into June 2019, and dropped 8.5 feet into December 2019, rebounded about 9.5 feet into November 2020, and dropped 12.3 feet from November 2020 to April 2022. Since April 2022, water elevations have risen about 4.75 feet and have fluctuated within a 2 feet thick range since April 2022. MW10 had contained



as much as 8.2 mg/l Total VOC and 710 µg/l Benzene. During the year leading into October 2021, the average concentrations were 560 µg/l Total VOC and 70 µg/l Benzene. As of the April and July 2022 sampling events, MW10 contained 118 to 530 µg/l VOC (not including TMBs) and 3 to 20 µg/l Benzene.

- MW15 groundwater levels increased over 5.5 feet from early-2017 to early-2018, then dropped about 3 feet through March 2020, rebounded 4 feet into April 2021, and dropped 6 feet between April 2021 and April 2022. Since April 2022, water levels have risen as much as 1.5 feet, but has averaged about 1 foot higher than the April 2022 elevation. For the two years leading into April 2022, MW15 averaged about 450 µg/l Benzene, 3260 µg/l BTEX and 3545 µg/l VOC (ranging from 715 to 6850 µg/l and not including about 740 µg/l TMBs). The July 2022 sample contained 36 µg/l Benzene, 225 µg/l BTEX and 240 µg/l VOC (not including 106 µg/l TMBs).

SUPPLY WELL TESTING

December 2019 testing (one from the bathroom sink and a second from an outside garden hose spigot) showed the samples contained Toluene (8.7 µg/l in the spigot sample and 10.7 µg/l in the bathroom sink sample), Acetone (1.9 to 2.8 µg/l) and Methylene Chloride (0.85 to 1.1 µg/l), which the latter was also measured in the QA/QC Trip Blank. March 2020 testing showed the bathroom sample with 0.87 µg/l Acetone, but the laboratory control sample contained elevated Acetone recovery, indicating that the Acetone measured in the bathroom sample may be laboratory artifact. The May 2020 sampling event showed that the Bathroom faucet water contained 1.3 µg/l Acetone, while the August 2020 sampling event showed that all VOCs were below detection limits. The November 2020 sampling of the station water well supply showed presence of Acetone (3 µg/l) and Methylene Chloride (0.98 µg/l), but the trip blank contained 4.1 µg/l Acetone and 1.1 µg/l Methylene Chloride. Consequently, the November 2020 detections are presumed to be laboratory artifacts. The April 2021 sample contained 0.78 Methylene Chloride with the Trip Blank containing 1.4 µg/l Methylene Chloride. Subsequent testing has shown the supply well water samples to not contain detectable VOCs.

ACETONE & MEK DETECTIONS

Noted above are the detections of Acetone and MEK in groundwater samples. The presence of both Acetone and MEK can be caused by laboratory artifact. However, review of the laboratory QA/QC shows these compounds were not identified out of standards in control samples. Studies have shown that Acetone and MEK can be produced biologically during the chemical breakdown of 2-butanone (*Acetone and 2-Butanone Creation Associated with Biological and Chemical Remediation of Environmental Contamination; Fowler, Thompson and Muller; Remediation; Wiley Periodicals; Winter 2011, p, 9-28*).

OXYGENATE CONCENTRATIONS

The following oxygenates were included in the tested analytes: tert-Amyl methyl ether (TAME), tert-Butyl Alcohol (TBA), Diethyl ethyl (Ethyl Ether), Ethyl-tert-butyl ether (ETBE), Methyl-tert-butyl ether (MTBE), and Ethanol (on occasion). A summary of oxygenate testing results for the sampling events is presented in Table 1 below.

- TAME
 - Shallow Wells: MW7 (once in August 2020 at 2.2 µg/l)
 - Deep Wells: MW8 (once in February 2021 at 0.43 µg/l), MW9 (as high as 4.9 µg/l in December 2019 and near/below reporting limits since April 2021), MW10 (averaging 3.7 µg/l since February 2021), MW14 (invariably detected) and MW15 (consistently present with average of 7.1 µg/l)
- TBA
 - Shallow Wells: invariably detected



- Deep Wells: MW8 (increasing concentrations since October 2021), MW9 (consistently detected with average of about 90 µg/l), MW10 (usually detected with average of about 11 µg/l), MW14 (invariably detected) and MW15 (consistently detected with average of 33 µg/l)
- MTBE has routinely been included in historical sampling events, and had been detected up to 630 µg/l in the past (in MW9).
 - Shallow Wells: MTBE in shallow zone wells is invariably detected in MW7 with up to 2.7 µg/l in August 2020, but below reporting limits since that time.
 - Deep Wells: Previous to the February 2021 sampling event, the last time MTBE was detected above 20 µg/l in deeper wells was in February 2021 with MW9 containing 30.1 µg/l MTBE, and progressively lower concentrations since that time (e.g., 1.7 µg/l in April 2022 and 2.7 µg/l in July 2022). During the past year and within the deeper zone wells, MTBE has averaged about 4 µg/l.
- Ethanol has been detected invariably in one well, MW15, and below detection limits in all other wells.
- 124-TMB and 135-TMB were not included in sample testing protocols before the March 2020 sampling event, but was included in the March, May and August 2020 sampling events and the April and July 2022 sampling events.
 - Shallow Wells: only MW7 with TMB concentrations; 2020 average 83 µg/l; 2022 average 43 µg/l (e.g., lower concentrations in 2022 compared to 2020)
 - Deep Wells:
 - MW8: 2020 average of 565 µg/l; 2022 average of 132 µg/l (e.g., lower concentrations in 2022 compared to 2020)
 - MW9: 2020 average 108 µg/l; 2022 average 11 µg/l (e.g., lower concentrations in 2022 compared to 2020)
 - MW10: 2020 average 355 µg/l; 2022 average 245 µg/l (e.g., lower concentrations in 2022 compared to 2020)
 - MW15: 2020 average 765 µg/l; 2022 average 385 µg/l (e.g., lower concentrations in 2022 compared to 2020)
 - MW14: 2020 average 572 µg/l; 2022 average 18,720 µg/l (contained NAPL in April 2022)

STATISTICAL REVIEW OF VOC CONCENTRATIONS

Historical reports for this project have included hydrographs and concentration vs. time graphs for selected wells, typically for wells that regularly contained detectable dissolved petroleum concentrations. Concentration vs. time graphs provide a useful method for assessing concentration trends and simultaneous review of dependency on groundwater elevation fluctuations. Per direction of the MDE, Mann-Kendall analyses are performed for each well normally containing more than non-detect concentrations. A copy of the Mann-Kendall analyses is included in Appendix E, and a summary is presented below in Table 2. Per Table 2, and the attached Mann-Kendall database and graphs, Total VOC and Benzene concentrations show a “Decreasing” or “Probably Decreasing” trend in MW4, MW7, MW9 and MW10, as well as MW14 regardless that the well contained NAPL during the April 2022 sampling event. MW2, which has been sampled infrequently when groundwater is shallow, is listed as having a “Stable” trend for Total VOC. Per the July 2022 event, MW8 has “No Trend” (formerly Probably Decreasing) for Total VOC while Benzene continues to be statistically “Probably Decreasing”. MW16, with otherwise very low to no VOCs, has “No Trend”. Since monitoring began, VOC and Benzene concentrations in MW15 show “No Trend”, but since December 2019 VOC and Benzene concentrations are statistically “Decreasing”.

Appendix F includes a copy of the July 2022 sample testing laboratory report of analysis.



Table 2: Mann-Kendall Statistics								
Well	VOC Concentrations				Benzene Concentrations			
	Coefficient of Variation	Mann-Kendall Statistic	Confidence Factor	Concentration Trend	Coefficient of Variation	Mann-Kendall Statistic	Confidence Factor	Concentration Trend
MW2	0.72	-2	59.2%	STABLE	0.16	3	67.5%	NO TREND
MW4	4.58	-157	98.0%	DECREASING	3.52	-124	94.6%	PROBABLY DECREASING
MW7	2.39	-310	>99.9%	DECREASING	2.72	-153	98.5%	DECREASING
MW8	1.40	-82	85.4%	NO TREND	4.46	-109	92.1%	PROBABLY DECREASING
MW9	2.16	-338	>99.9%	DECREASING	1.96	-263	>99.9%	DECREASING
MW10	1.23	-258	>99.9%	DECREASING	1.22	-246	>99.9%	DECREASING
MW14	2.10	-259	>99.9%	DECREASING	1.42	-295	>99.9%	DECREASING
MW15 (06/2014 to Present)	0.88	35	68.4%	NO TREND	0.89	79	86.5%	NO TREND
MW15 (12/2019 to Present)	0.87	-31	99.2%	DECREASING	0.66	-29	98.7%	DECREASING
MW16	3.40	-26	64.4%	NO TREND	1.21	-68	83.9%	NO TREND

VACUUM TRUCK EFR/REMEDIAL EFFORTS

Vacuum truck EFR events were performed fifteen times between October 2013 and December 2014. Three additional EFR events were performed in June-August 2016, two more in February and July 2017 in response to NAPL and/or elevated concentrations in MW9 and MW15, and three more events in October/November 2017 and January 2018. An additional EFR event was performed on MW14 in May 2022, and will continue on an about monthly schedule until NAPL is no longer detected. Approximately 14550-gallons of impacted groundwater and NAPL were removed to date. The average extraction rate during the 2017-18 events was about 625-gallons of total fluids per event including the February 2017 event that netted only 100-gallons (because of relatively deeper groundwater elevations and inability to use vacuum-extraction beyond about 30 feet-depth). About 784-gallons were removed during the May 18, 2022 EFR event. An estimated 275-gallons of NAPL have been removed by EFR with an additional 50-gallons removed by hand bailing for a total of about 325-gallons of LNAPL removed to date. Appendix G includes a petroleum recovery database and time-series recovery graph. After the May 18, 2022 EFR event, weekly gauging showed that NAPL did not return into MW14, and no future EFR is planned.

UST SYSTEM UPGRADES/UST CLOSURE

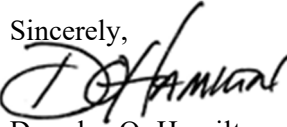
Per SMO, the UST System at the site is scheduled for removal (closure) and replacement beginning o/a September 19, 2022. Several of the existing monitoring wells are located in close proximity to the existing tankfield and may be jeopardized during the tankfield excavation and any planned expansion of the footprint of the tankfield. The wells include shallow zone well MW7, and deep zone wells MW8, MW9 and MW10, as well as four tankfield monitoring pipes (or shallow monitoring wells that do not contain groundwater) TF3, TF5, TF6 and TF13. As such, a pre-construction meeting will be coordinated early September with SMO, the UST contractor (Petroleum Site Works), ARM Group and if required, MDE Oil Control Program (MDE OCP). Pending confirmation of new tankfield dimensions and layout, MDE OCP will be contacted to identify what specific monitoring wells may need to be abandoned, and if any may require replacement after the UST System Closure and site upgrades.

Per MDE direction, the monitoring wells were gauged on a weekly schedule since May 25, 2022. No measurable accumulations were observed during the gauging events, which can be attributed to the May 18 EFR event and quickly rising groundwater elevations (compared to April 2022 groundwater elevations). With a lack of measurable NAPL in any wells for about three months of weekly gauging, and VOC concentrations similar to or less than what has been observed during sampling events within the past year



(before NAPL reappearance in April 2022), we request MDE approval to decrease the groundwater gauging frequency from weekly to monthly. All wells will continue to be sampled quarterly, rather than the formerly requested bi-annual frequency. The next quarterly sampling event will be scheduled for October 2022.

If you have any questions concerning this submittal, please contact us below.

Sincerely,


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Email DHAMILTON@armgroup.net

cc. Steve Stookey, Southern Maryland Oil c/o The Wills Group, 102 Centennial Street, LaPlata, MD 20646



APPENDIX A
GEOLOGIC CROSS SECTION



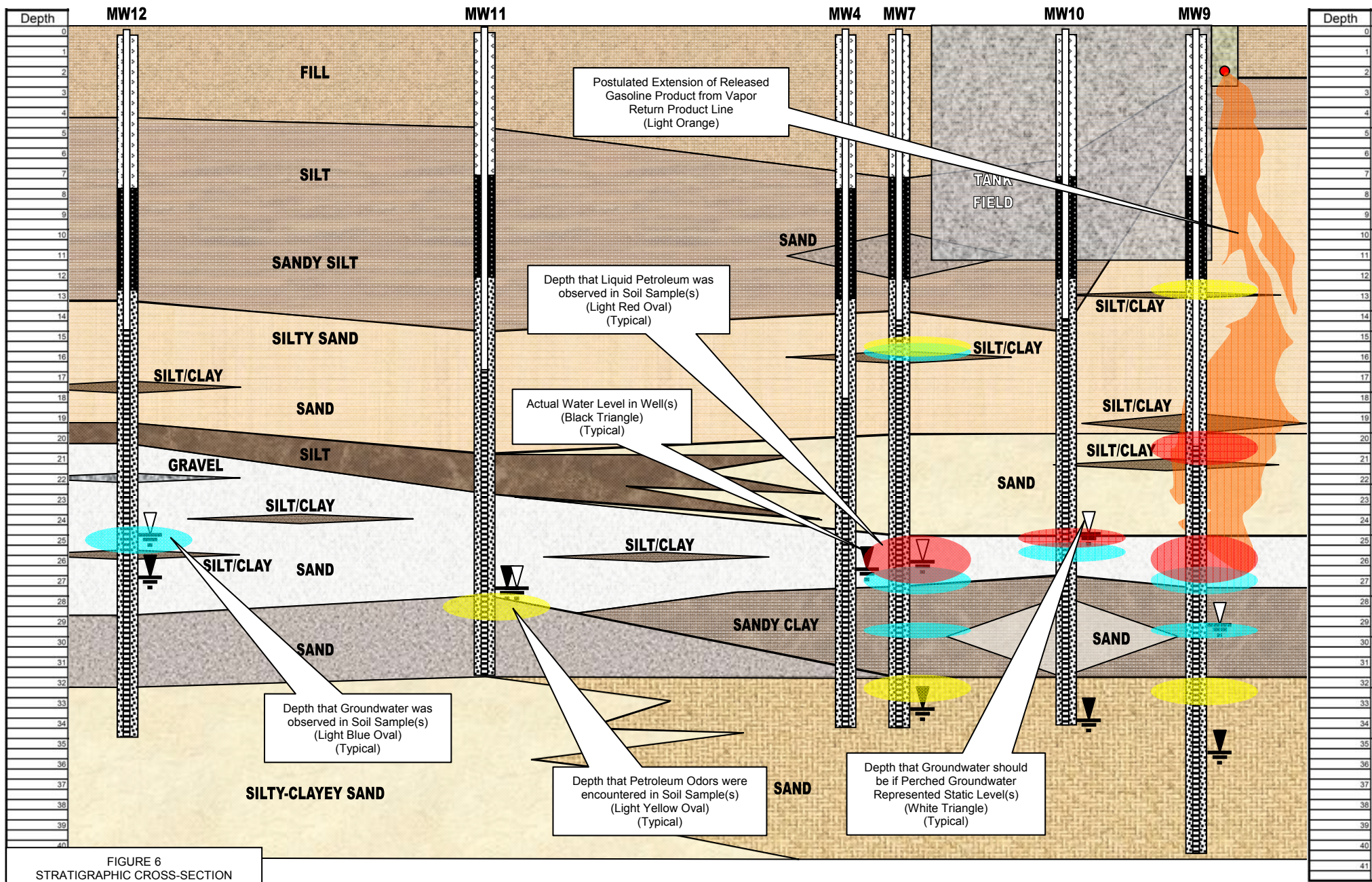
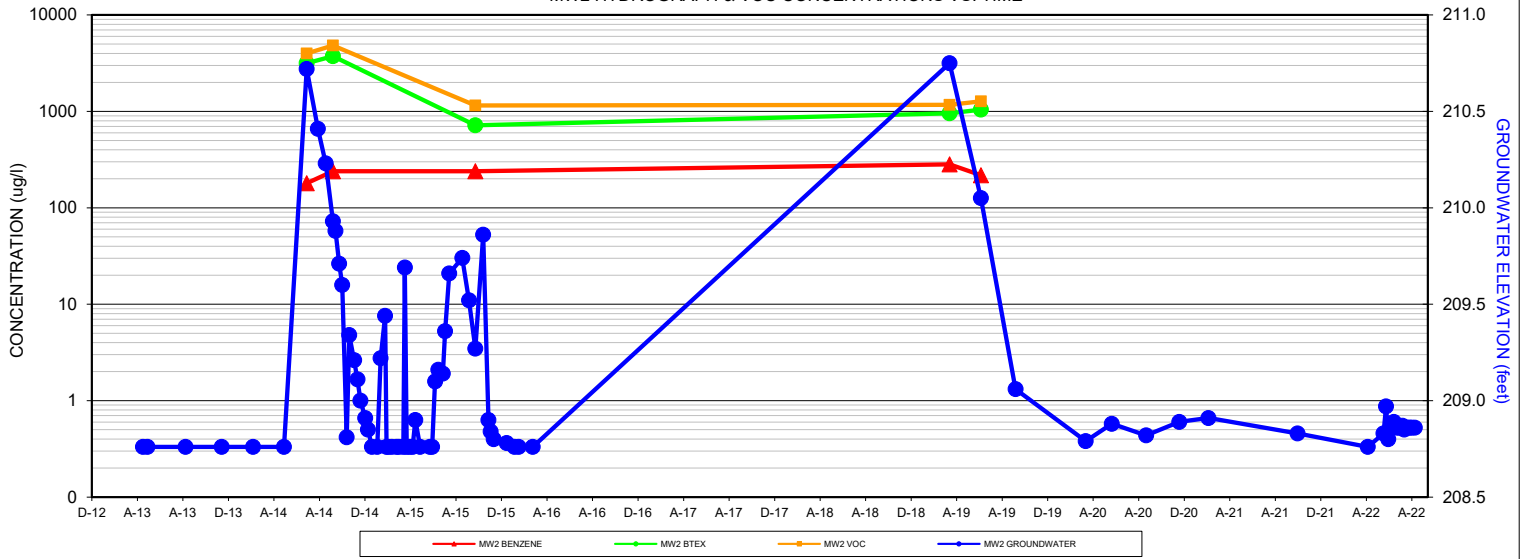


FIGURE 6
STRATIGRAPHIC CROSS-SECTION

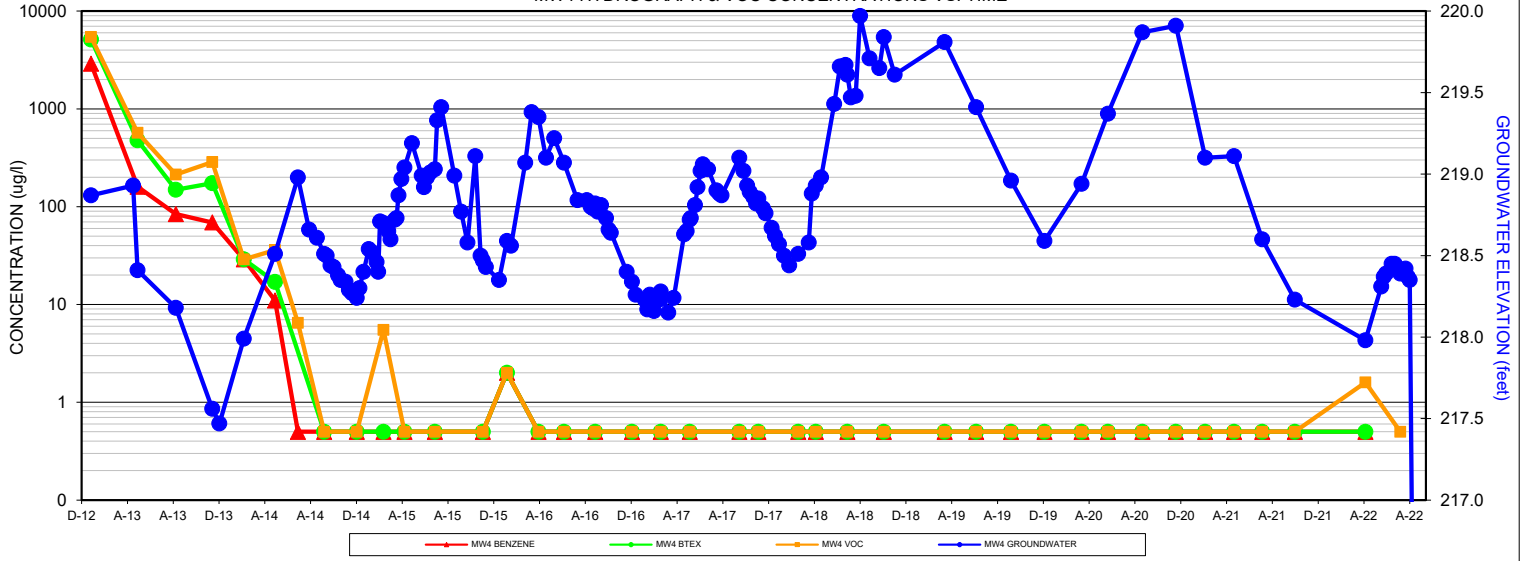
APPENDIX B
TIME-SERIES GRAPHS
HYDROGRAPHS, NAPL & VOC CONCENTRATIONS VS. TIME

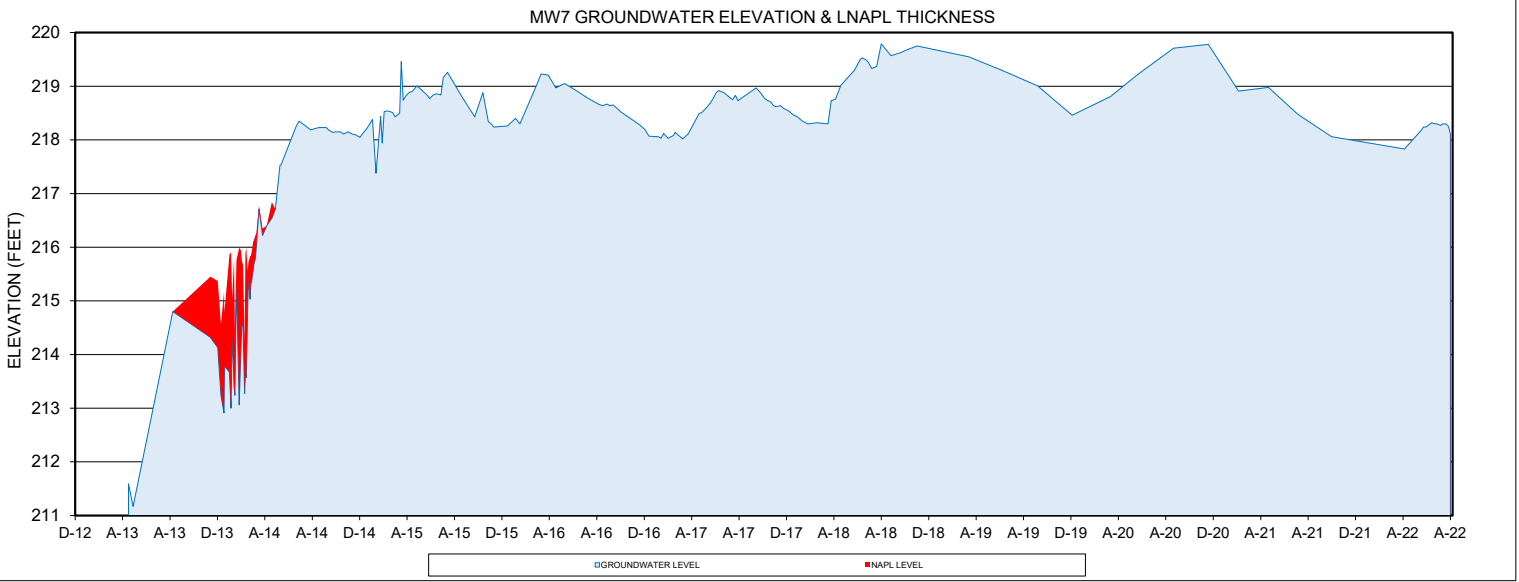
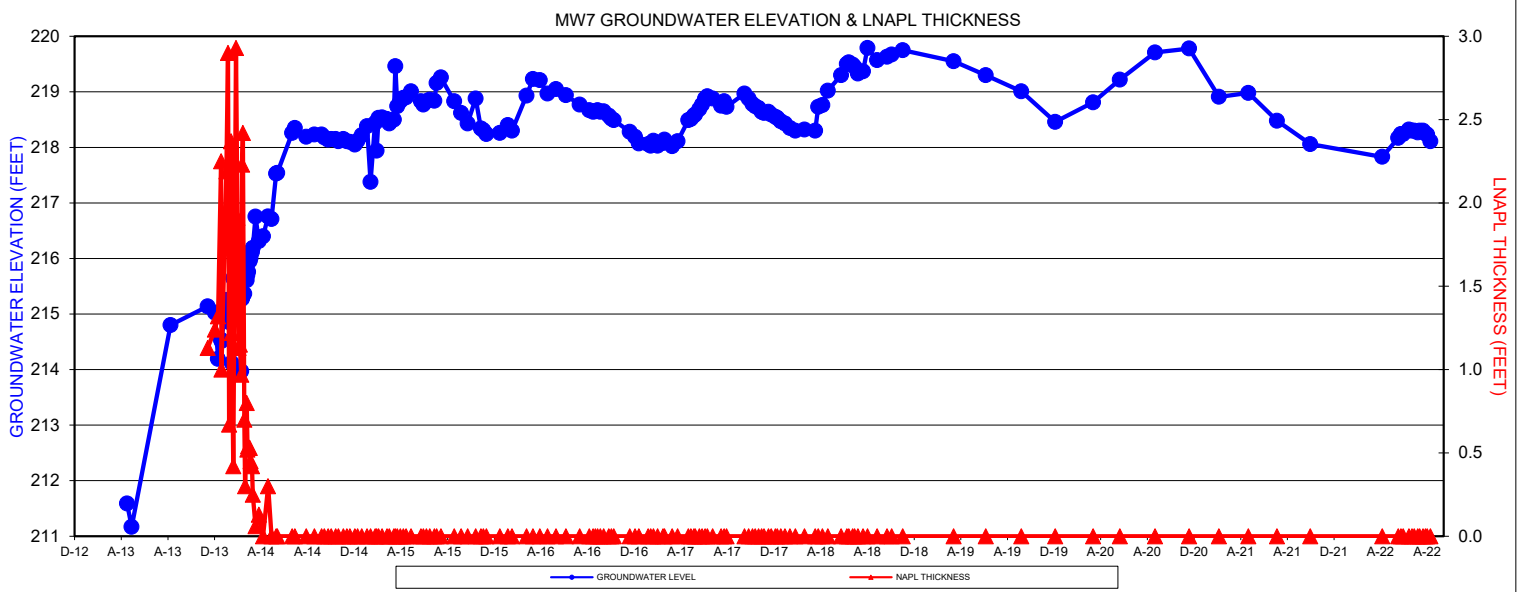
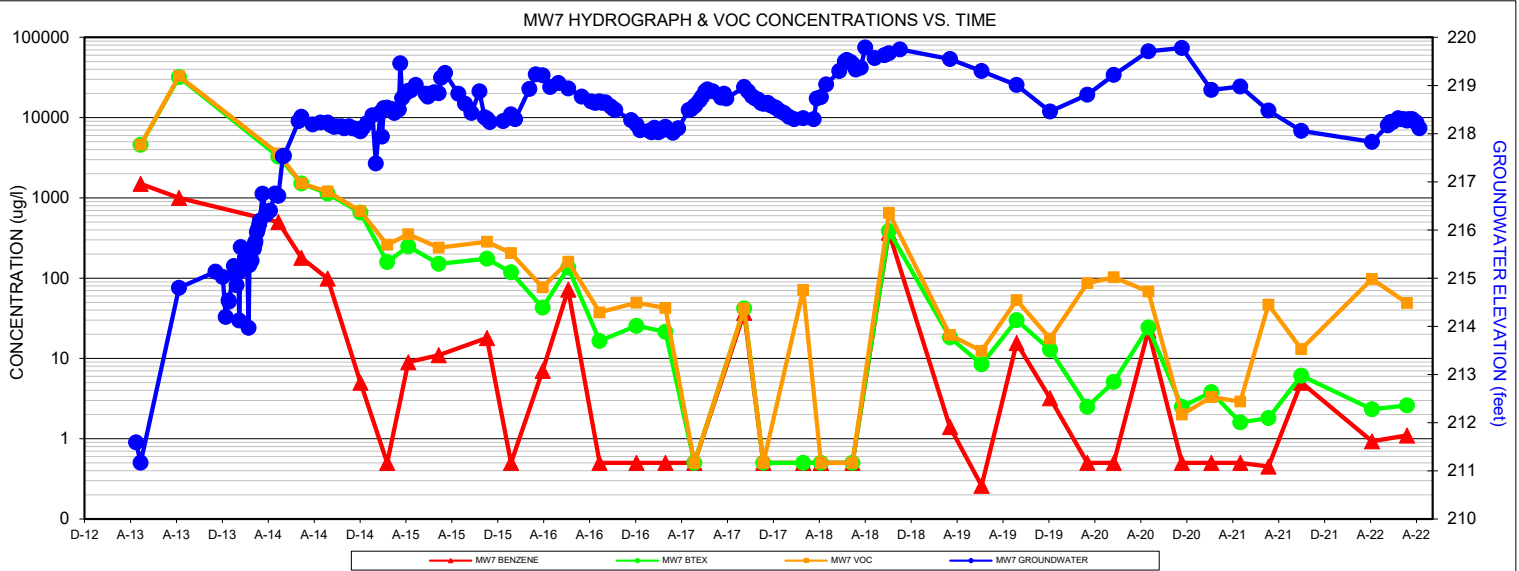


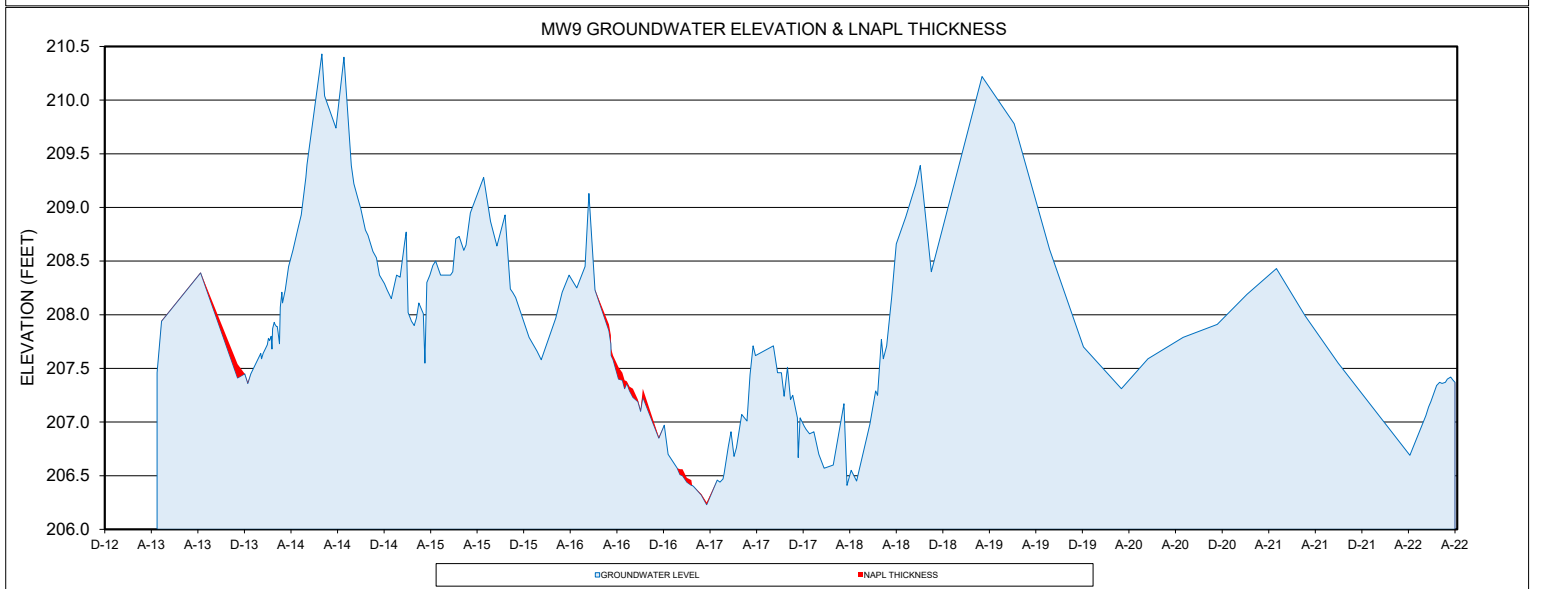
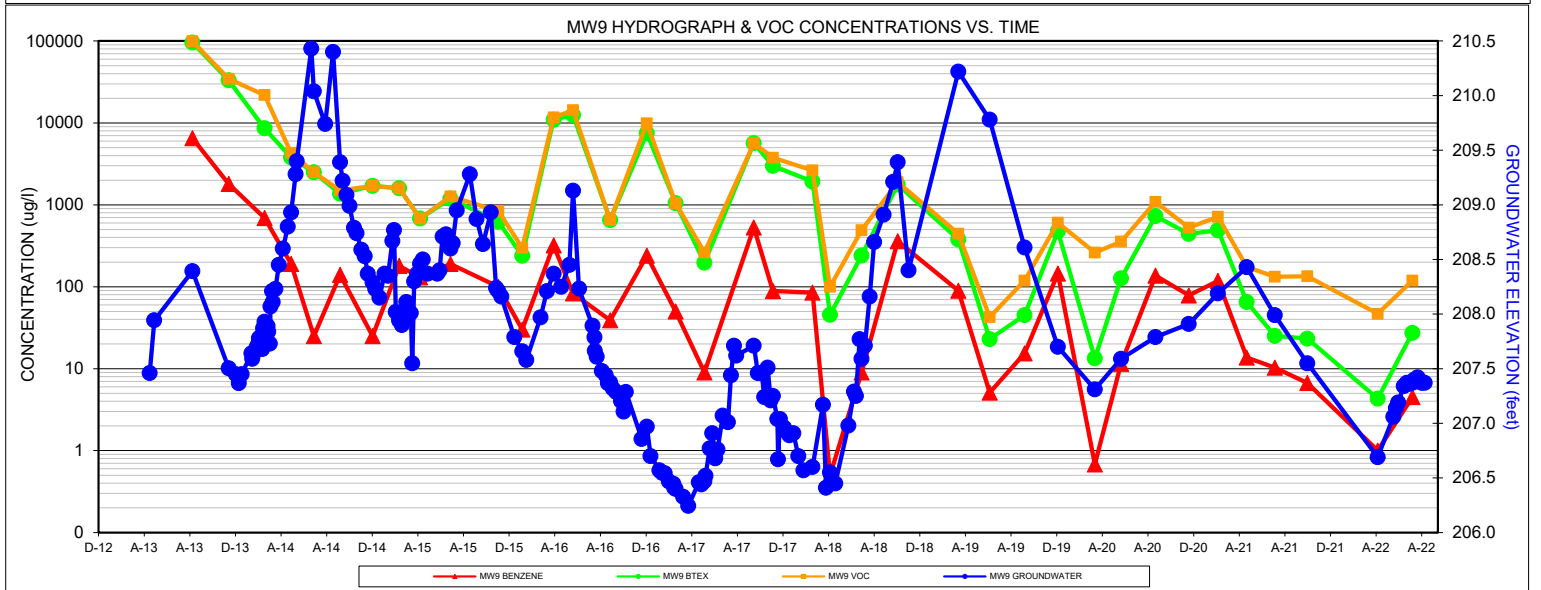
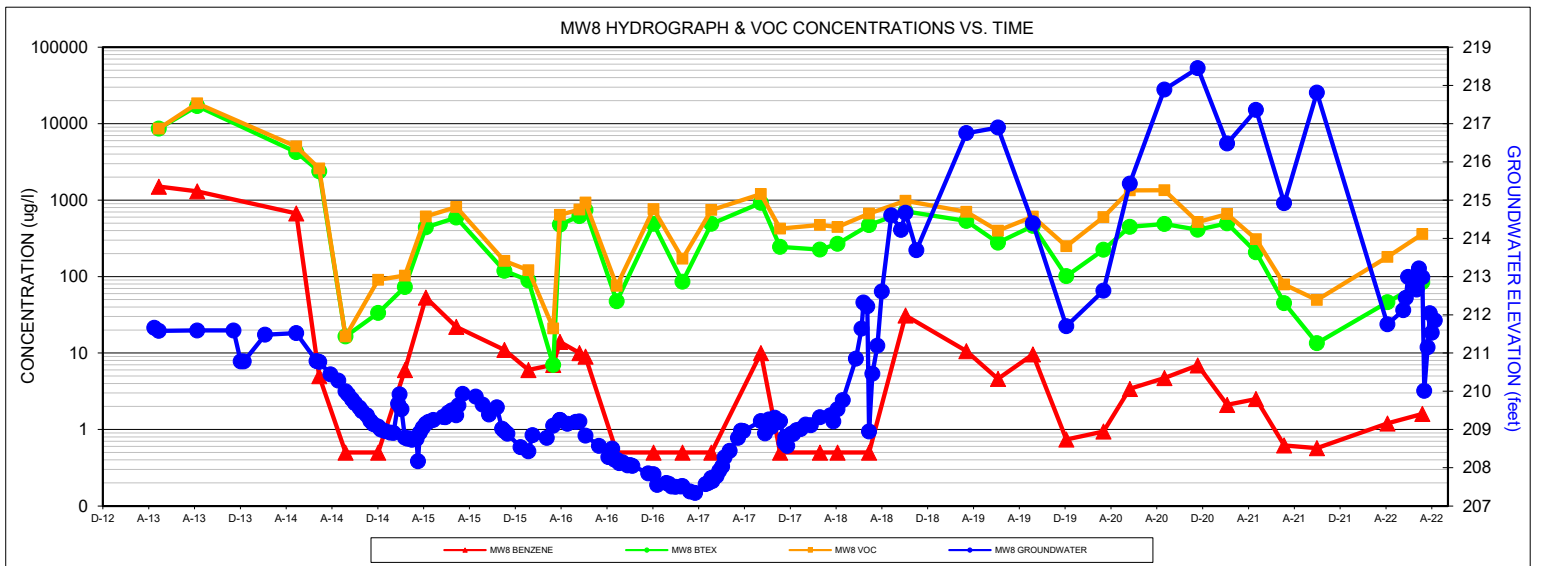
MW2 HYDROGRAPH & VOC CONCENTRATIONS VS. TIME



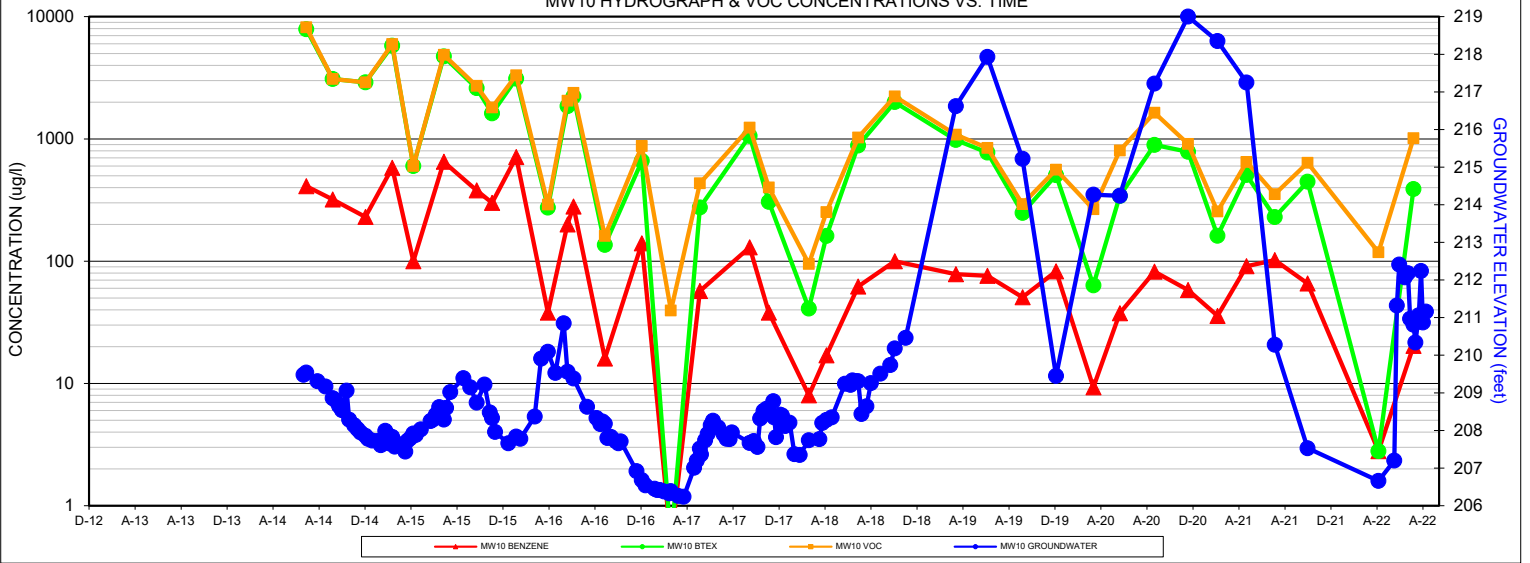
MW4 HYDROGRAPH & VOC CONCENTRATIONS VS. TIME



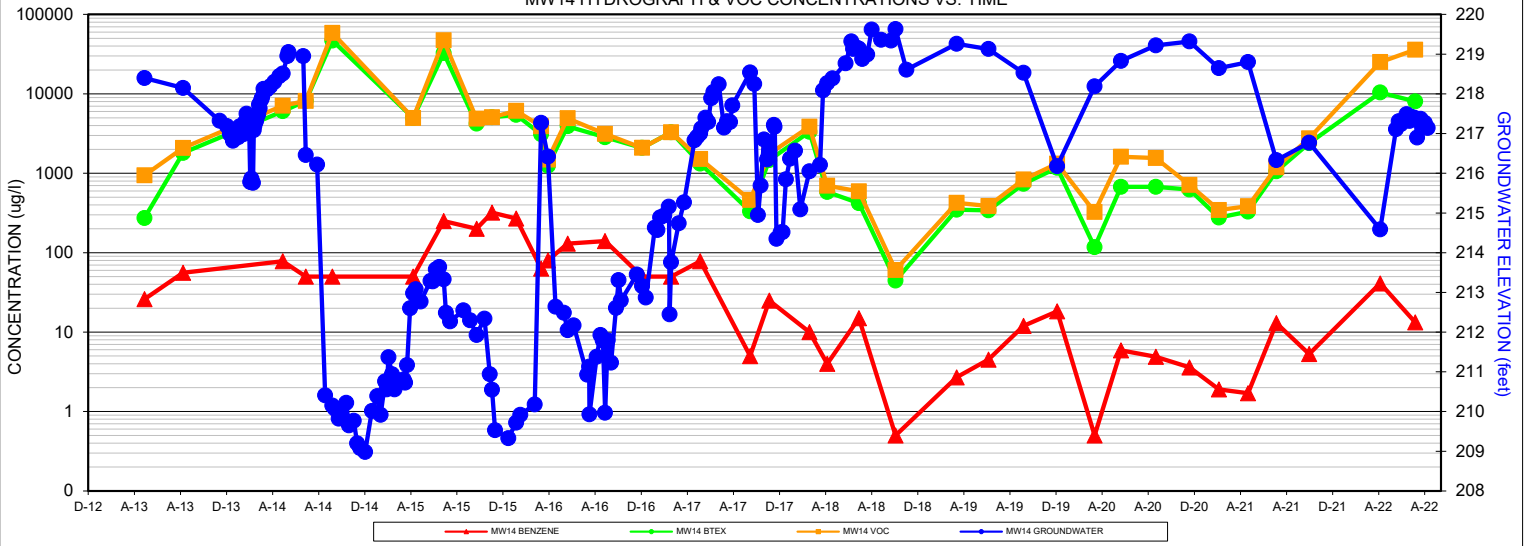




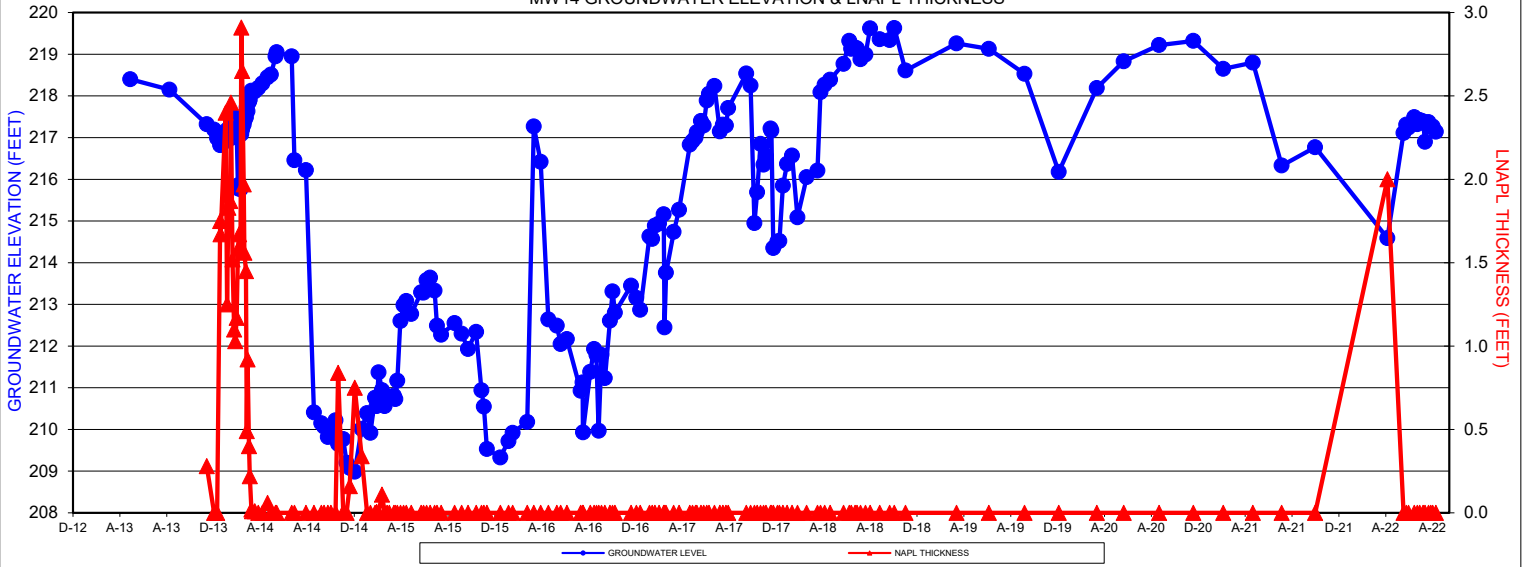
MW10 HYDROGRAPH & VOC CONCENTRATIONS VS. TIME



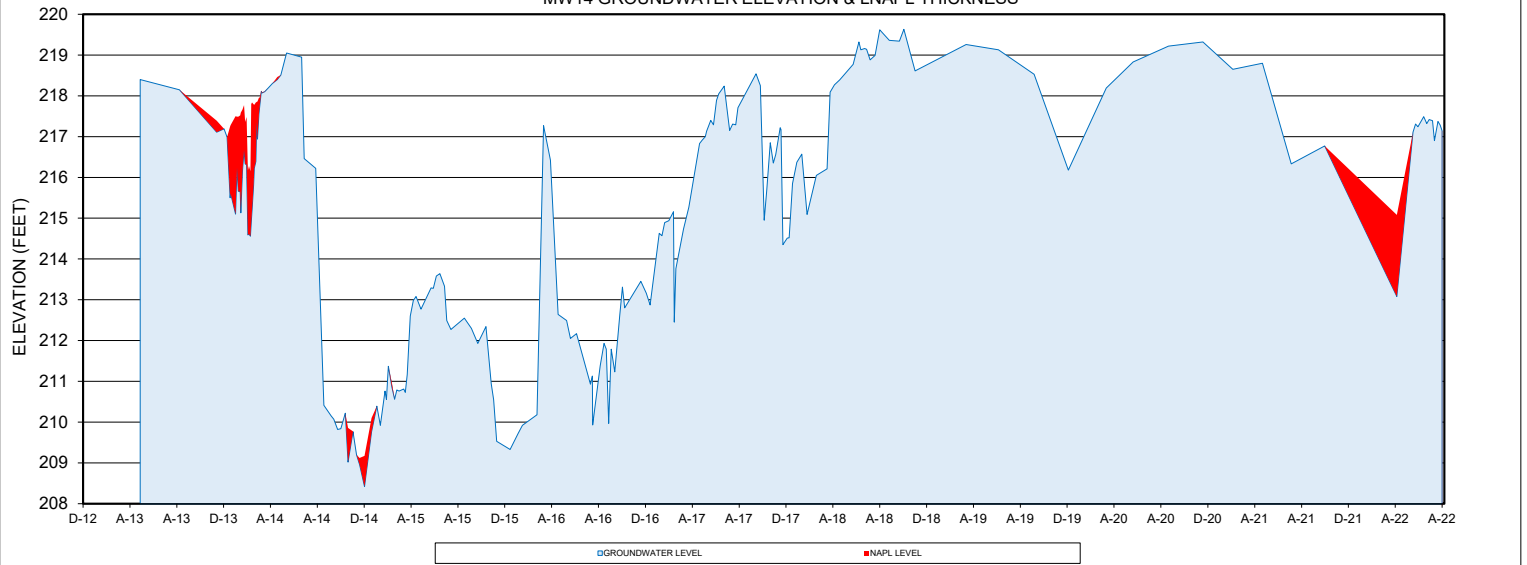
MW14 HYDROGRAPH & VOC CONCENTRATIONS VS. TIME



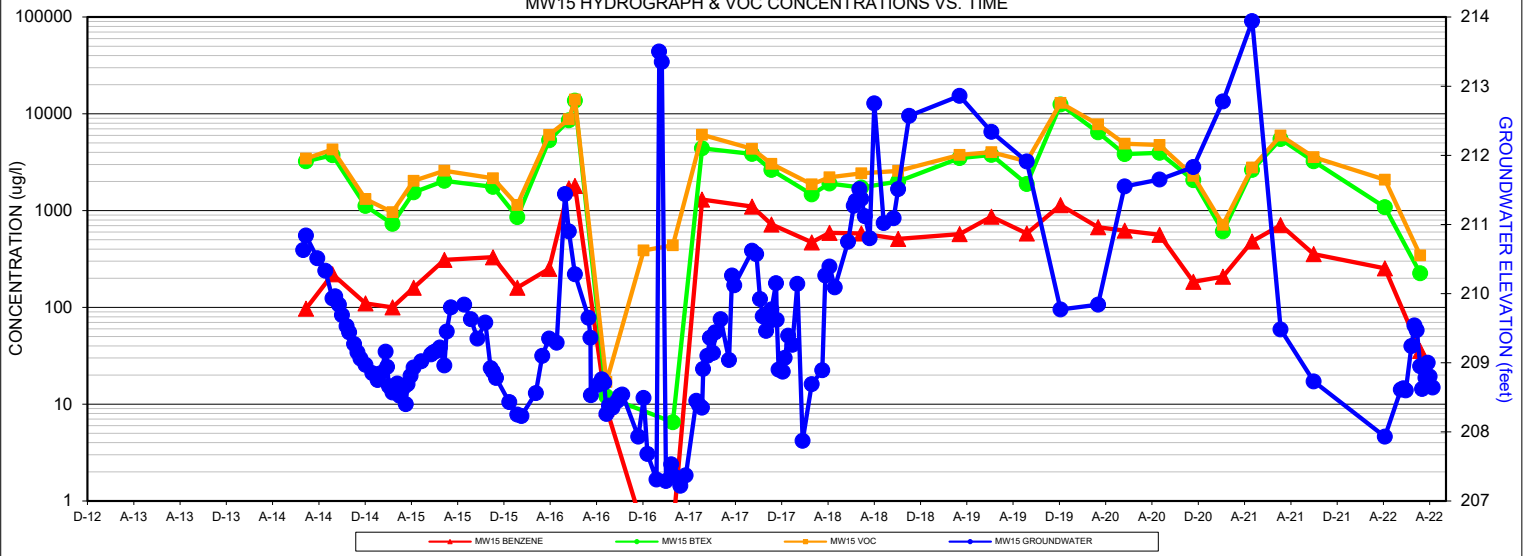
MW14 GROUNDWATER ELEVATION & LNAPL THICKNESS



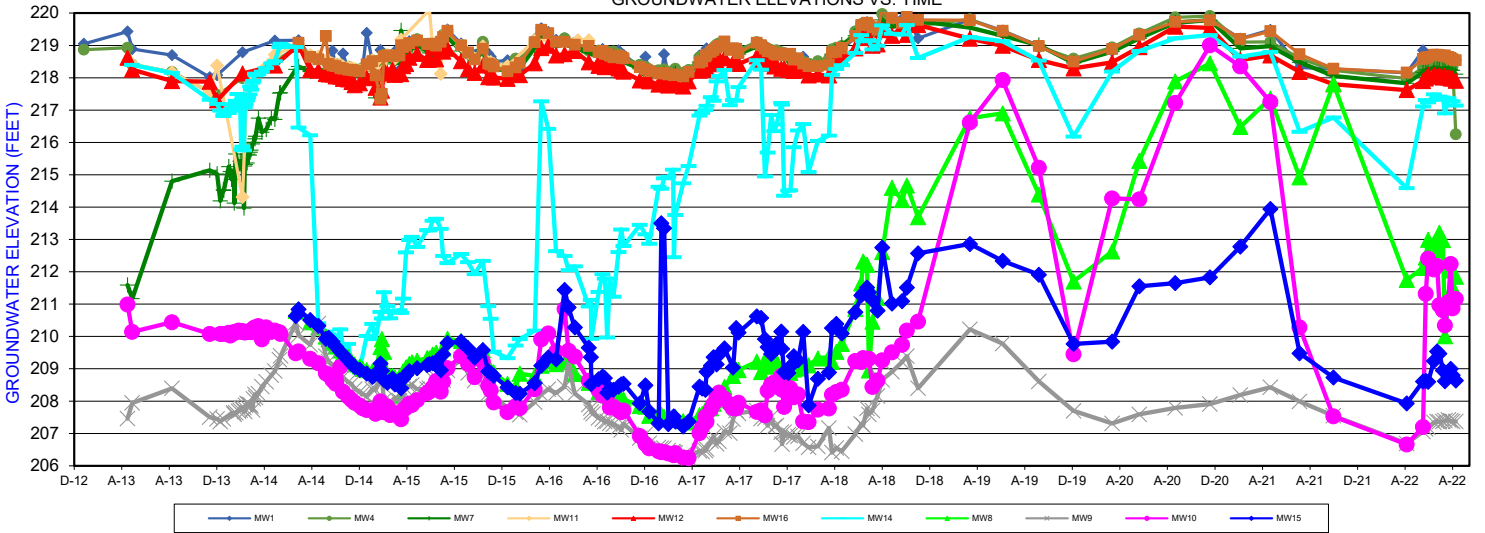
MW14 GROUNDWATER ELEVATION & LNAPL THICKNESS



MW15 HYDROGRAPH & VOC CONCENTRATIONS VS. TIME



GROUNDWATER ELEVATIONS VS. TIME



APPENDIX C
GAUGING & SAMPLING DATABASE



Date	Original LNAPL Thickness	LNAPL Thickness in Bailer (inches)																				
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	Total	Feet	Gal Rem/vd	Cum.		
	11/20/17		Clear	36.14				208.65														
	11/22/17		Clear	35.99				208.80														
	11/27/17		Clear	36.22				208.57														
	12/08/17		Clear	35.90				208.89														
	12/13/17		Clear	35.91				208.88														
	12/22/17		Clear	35.81				208.98														
	01/02/18		Clear	35.78				209.01														
	01/15/18		Clear	35.66				209.13														
	01/29/18		Clear	35.68				209.11														
	02/22/18		Clear	35.47				209.32														
	03/22/18		Clear	35.42				209.37		0.5	<1	15.0	210.0	<5	<5	12.0	17.0	<5	220.0	474.0	1.80	1.10
	03/30/18		Clear	35.58				209.21														
	04/10/18		Clear	35.26				209.53		0.5	<1	38.0	230.0	<5	<5	7.0	9.0	<5	160.0	444.0	1.20	2.30
	04/24/18		Clear	35.02				209.77														
	05/29/18		Clear	33.94				210.85														
	06/13/18		Clear	33.15				211.64														
	06/18/18		Clear	32.47				212.32														
	06/28/18		Clear	32.57				212.22														
	07/03/18		Clear	35.84				208.95		0.5	<1	180.0	290.0	<5	<5	15.0	14.0	17.0	150.0	666.0	5.00	1.60
	07/12/18		Clear	34.33				210.46														
	07/25/18		Clear	33.60				211.19														
	08/06/18		Clear	32.18				212.61														
	08/31/18		Clear	30.19				214.60														
	09/26/18		Clear	30.57				214.22														
	10/08/18		Clear	30.12				214.67		31.0	3.0	300.0	380.0	<5	<5	29.0	37.0	31.0	170.0	981.0	3.90	3.40
	11/06/18		Clear	31.10				213.69														
	03/19/19		Clear	28.04				216.75		10.6	2.5	246.0	272.0	2.7	0.4				157.0	702.4	3.34	2.60
	06/11/19		Clear	27.89				216.90		4.6	0.8	135.0	137.0	<1	<1				120.0	397.4	1.61	2.60
	09/12/19		Clear	30.40				214.39		9.6	0.7	295.0	154.0	0.8	<1				138.0	607.5	2.29	2.20
	12/10/19		Clear	33.09				211.70		0.7	1.4	34.1	63.7	1.3	<1				147.0	248.9	0.68	1.30
	03/18/20		Clear	32.16				212.63		0.9	1.2	62.3	159.0	1.1	<1		7.8	88.4	600.5	1.02	1.30	
	05/27/20		Clear	29.36				215.43		3.4	0.9	227.0	215.0	1.0	<1		27.7	145.0	1339.9	1.43	1.20	
	08/27/20		Clear	26.90				217.89		4.7	0.6	205.0	276.0	1.1	0.4				137.0	1345.5	2.02	1.20
	11/24/20		Clear	26.34				218.45		6.9	1.1	163.0	236.0	3.2	0.4				106.0	517.2	1.20	1.20
	02/10/21		Clear	28.31				216.48		2.1	0.7	194.0	297.0	2.2	0.3				129.0	656.1	1.70	1.10
	04/28/21		Clear	27.43				217.36	0.88	2.5	0.5	93.1	111.0	0.7	<1				90.5	307.9	0.86	1.10
	07/12/21		Clear	29.87				214.92	-2.44	0.6	<1	22.1	21.6	0.7	<1				26.1	78.9	0.97	1.20
	10/07/21		Clear	26.98				217.81	2.89	0.6	<1	3.2	8.6	1.1	<1				12.4	49.5	0.26	1.50
	04/13/22		Clear	33.04				211.75	-6.06	1.2	<1	12.3	32.6	<1	<1				11.9	180.5	0.26	1.50
	05/25/22		Clear	32.67				212.12	0.37													
	06/01/22		Clear	32.35				212.44	0.32													
	06/07/22		Clear	31.80				212.99	0.55													
	06/22/22		Clear	31.91				212.88	-0.11													
	06/30/22		Clear	32.13				212.66	-0.22													
	07/06/22		Clear	31.58				213.21	0.55													
	07/15/22		Clear	31.81				212.98	-0.23	1.6	<1	18.7	64.2	<1	<1				41.3	359.9	0.62	3.30
	07/20/22		Clear	34.78				210.01	-2.97													
	07/29/22		Clear	33.64				211.15	1.14													
	08/04/22		Clear	32.75				212.04	0.89													
	08/09/22		Clear	33.26				211.53	-0.51													
	08/17/22		Clear	32.94				211.85	0.32													

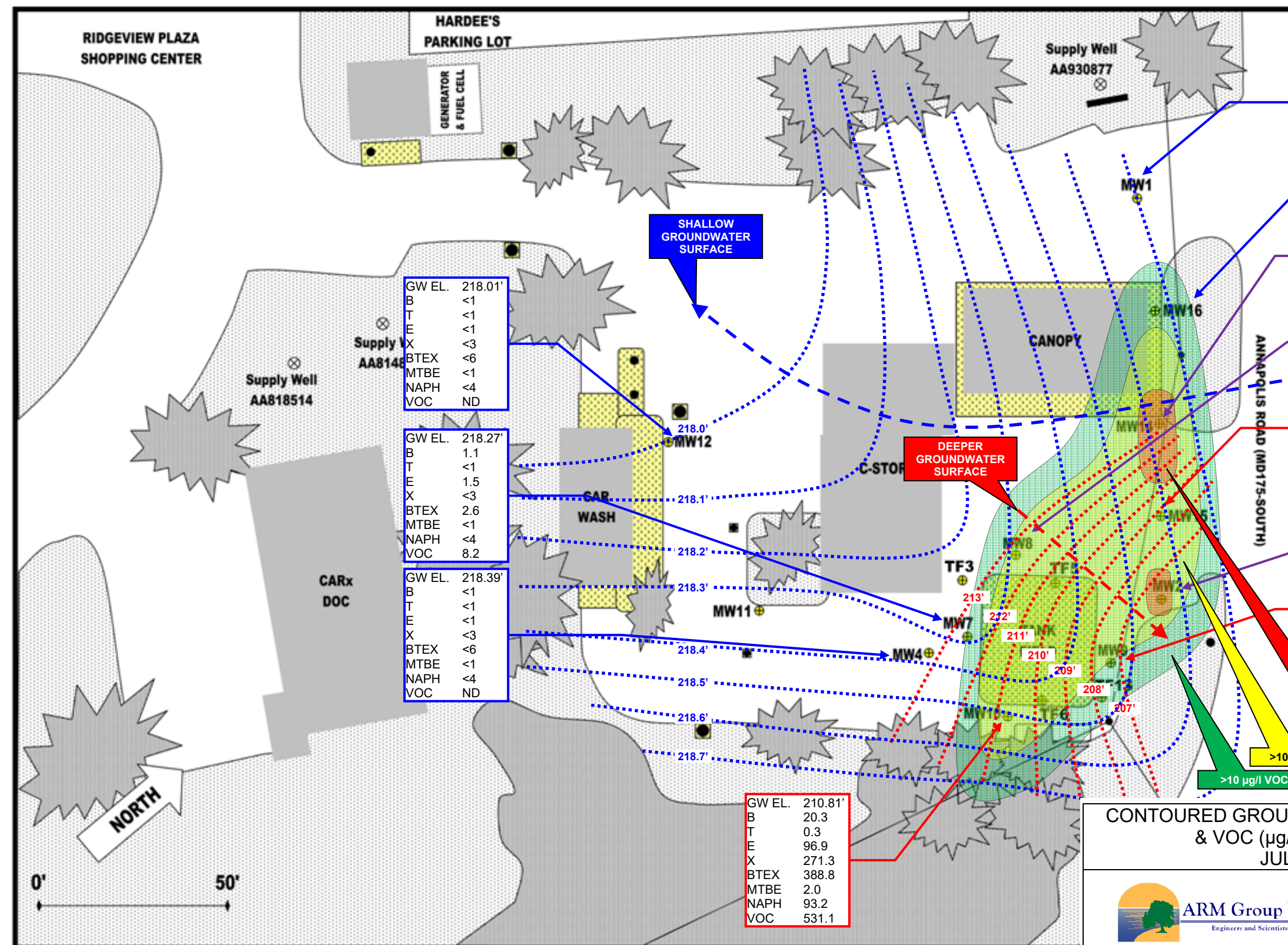
MW8

244.79

43.60

APPENDIX D
GROUNDWATER ELEVATION & VOC PLUME MAPS





GW EL.	218.70'
B	<1
T	<1
E	<1
X	<3
BTEX	<6
MTBE	<1
NAPH	<2
VOC	ND

GW EL.	218.68'
B	<1
T	<1
E	<1
X	<3
BTEX	<6
MTBE	<1
NAPH	<2
VOC	56.9

GW EL.	217.39'
B	13.3
T	14.7
E	5020
X	2989
BTEX	8037
MTBE	5
NAPH	1020
VOC	9705

GW EL.	212.98'
B	1.6
T	<1
E	18.7
X	64.2
BTEX	84.5
MTBE	<1
NAPH	41.3
VOC	159.8

GW EL.	208.95'
B	35.6
T	60.4
E	45.8
X	83.0
BTEX	224.8
MTBE	<1
NAPH	9.6
VOC	238.5

GW EL.	208.87'
Most Recent Data	
B	218
T	10.5
E	626
X	190
BTEX	1045
MTBE	3.9
NAPH	203
VOC	1273

GW EL.	207.37'
B	4.5
T	<1
E	8.5
X	14.4
BTEX	27.4
MTBE	2.7
NAPH	3.6
VOC	100.3

GW EL.	218.01'
B	<1
T	<1
E	<1
X	<3
BTEX	<6
MTBE	<1
NAPH	<4
VOC	ND

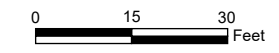
GW EL.	218.27'
B	1.1
T	<1
E	1.5
X	<3
BTEX	2.6
MTBE	<1
NAPH	<4
VOC	8.2

GW EL.	218.39'
B	<1
T	<1
E	<1
X	<3
BTEX	<6
MTBE	<1
NAPH	<4
VOC	ND

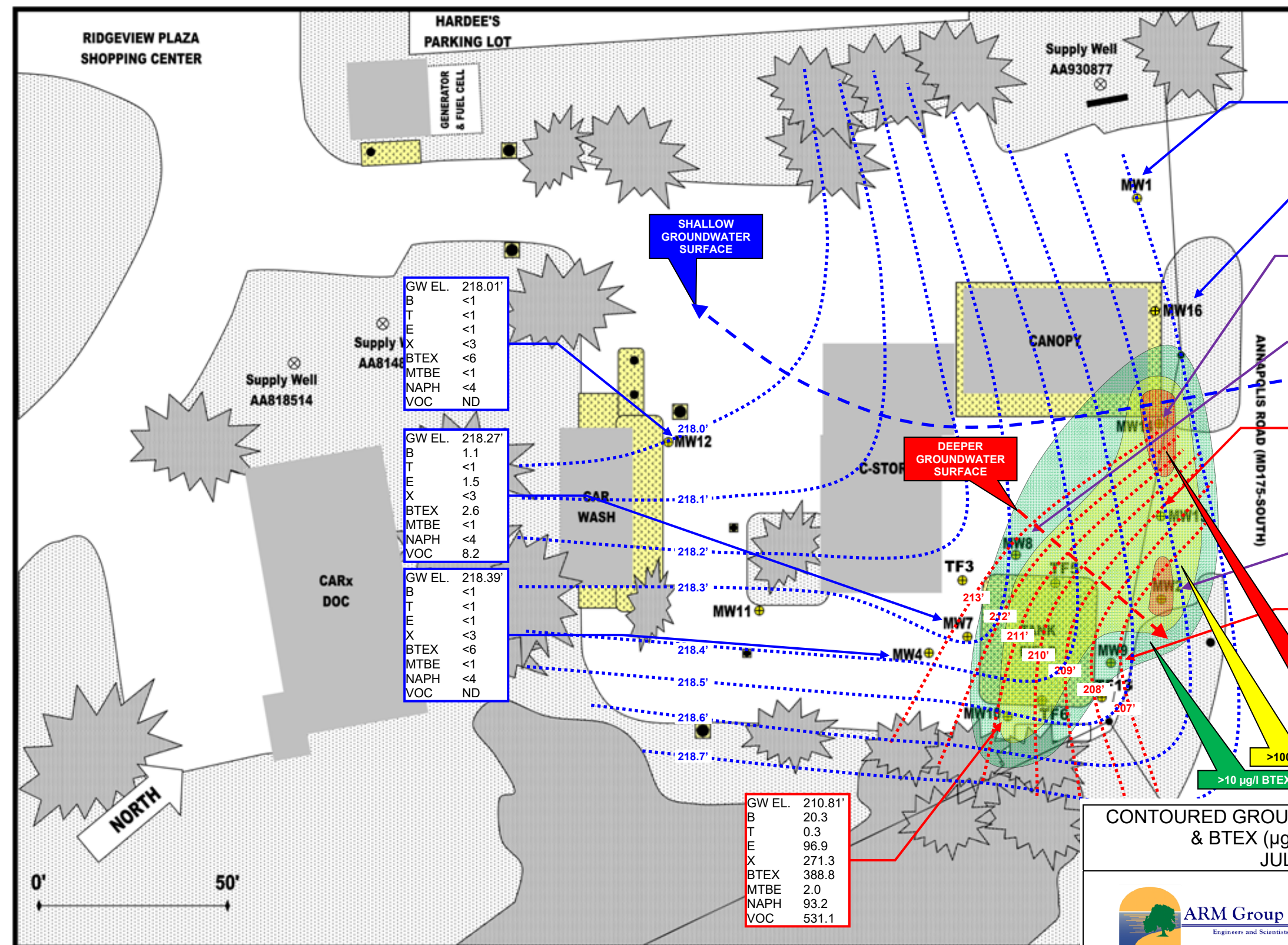
GW EL.	210.81'
B	20.3
T	0.3
E	96.9
X	271.3
BTEX	388.8
MTBE	2.0
NAPH	93.2
VOC	531.1

CONTOURED GROUNDWATER ELEVATIONS & VOC (µg/l) PLUME MAP JULY 2022

FIGURE JUL-22V



SMO FORT MEADE SHELL
 SS-550
 2631 ANNAPOLIS ROAD
 HANOVER, MD
 ARM NO. 190292M



GW EL.	218.70'
B	<1
T	<1
E	<1
X	<3
BTEX	<6
MTBE	<1
NAPH	<2
VOC	ND

GW EL.	218.68'
B	<1
T	<1
E	<1
X	<3
BTEX	<6
MTBE	<1
NAPH	<2
VOC	56.9

GW EL.	217.39'
B	13.3
T	14.7
E	5020
X	2989
BTEX	8037
MTBE	5
NAPH	1020
VOC	9705

GW EL.	212.98'
B	1.6
T	<1
E	18.7
X	64.2
BTEX	84.5
MTBE	<1
NAPH	41.3
VOC	159.8

GW EL.	208.95'
B	35.6
T	60.4
E	45.8
X	83.0
BTEX	224.8
MTBE	<1
NAPH	9.6
VOC	238.5

GW EL.	208.87'
Most Recent Data	
B	218
T	10.5
E	626
X	190
BTEX	1045
MTBE	3.9
NAPH	203
VOC	1273

GW EL.	207.37'
B	4.5
T	<1
E	8.5
X	14.4
BTEX	27.4
MTBE	2.7
NAPH	3.6
VOC	100.3

GW EL.	218.01'
B	<1
T	<1
E	<1
X	<3
BTEX	<6
MTBE	<1
NAPH	<4
VOC	ND

GW EL.	218.27'
B	1.1
T	<1
E	1.5
X	<3
BTEX	2.6
MTBE	<1
NAPH	<4
VOC	8.2

GW EL.	218.39'
B	<1
T	<1
E	<1
X	<3
BTEX	<6
MTBE	<1
NAPH	<4
VOC	ND

GW EL.	210.81'
B	20.3
T	0.3
E	96.9
X	271.3
BTEX	388.8
MTBE	2.0
NAPH	93.2
VOC	531.1

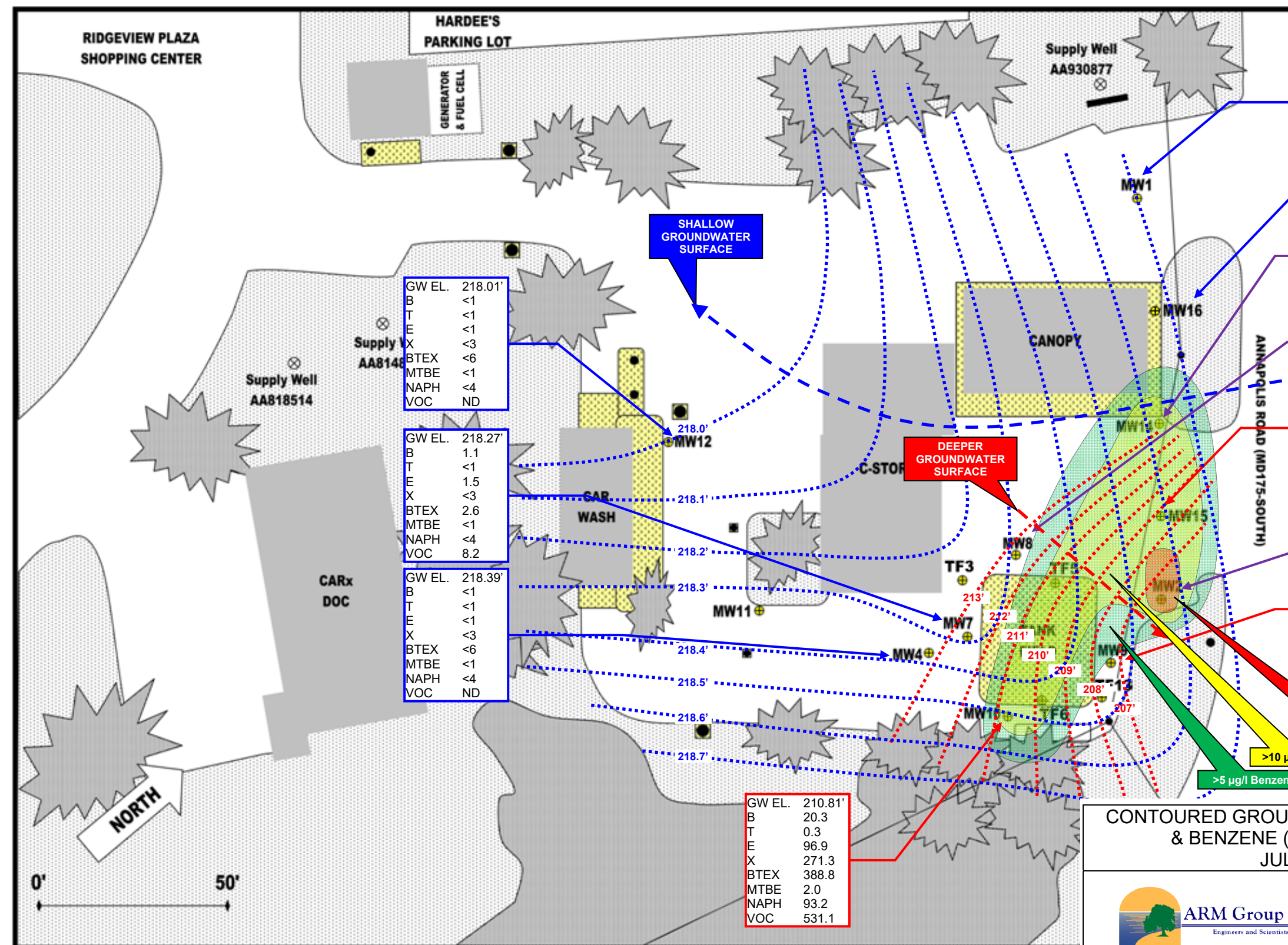
CONTOURED GROUNDWATER ELEVATIONS & BTEX (µg/l) PLUME MAP JULY 2022

FIGURE JUL-22BTEX



SMO FORT MEADE SHELL
 SS-550
 2631 ANNAPOLIS ROAD
 HANOVER, MD
 ARM NO. 190292M





GW EL.	218.70'
B	<1
T	<1
E	<1
X	<3
BTEX	<6
MTBE	<1
NAPH	<2
VOC	ND

GW EL.	218.68'
B	<1
T	<1
E	<1
X	<3
BTEX	<6
MTBE	<1
NAPH	<2
VOC	56.9

GW EL.	217.39'
B	13.3
T	14.7
E	5020
X	2989
BTEX	8037
MTBE	5
NAPH	1020
VOC	9705

GW EL.	212.98'
B	1.6
T	<1
E	18.7
X	64.2
BTEX	84.5
MTBE	<1
NAPH	41.3
VOC	159.8

GW EL.	208.95'
B	35.6
T	60.4
E	45.8
X	83.0
BTEX	224.8
MTBE	<1
NAPH	9.6
VOC	238.5

GW EL.	208.87'
Most Recent Data	
B	218
T	10.5
E	626
X	190
BTEX	1045
MTBE	3.9
NAPH	203
VOC	1273

GW EL.	207.37'
B	4.5
T	<1
E	8.5
X	14.4
BTEX	27.4
MTBE	2.7
NAPH	3.6
VOC	100.3

GW EL.	210.81'
B	20.3
T	0.3
E	96.9
X	271.3
BTEX	388.8
MTBE	2.0
NAPH	93.2
VOC	531.1

CONTOURED GROUNDWATER ELEVATIONS & BENZENE (µg/l) PLUME MAP
JULY 2022

FIGURE
JUL-22B



SMO FORT MEADE SHELL
SS-550
2631 ANNAPOLIS ROAD
HANOVER, MD
ARM NO. 190292M

APPENDIX E
MANN-KENDALL ANALYSES & GRAPHS



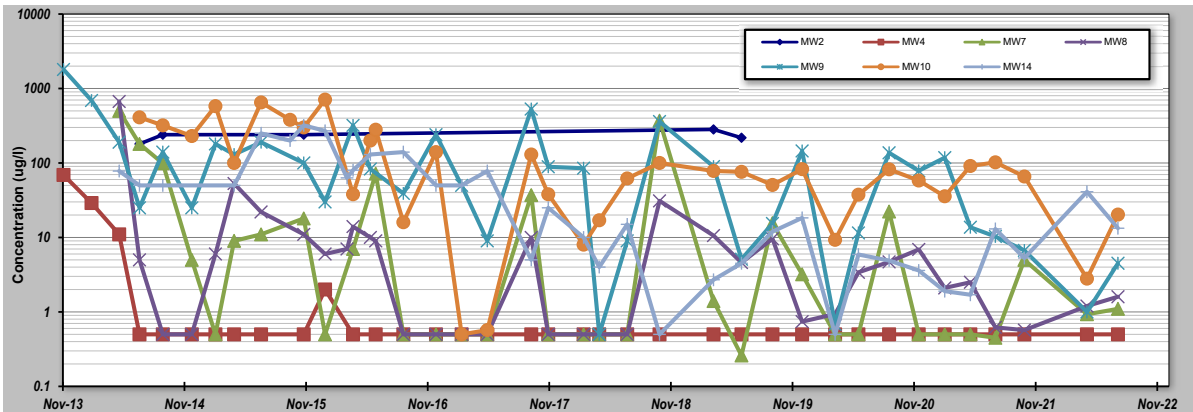
GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date:	Job ID: 190292M
Facility Name: SMO Hanover	Constituent: BENZENE
Conducted By: Doug Hamilton/ARM Group	Concentration Units: ug/l

Sampling Point ID:	MW2	MW4	MW7	MW8	MW9	MW10	MW14
--------------------	------------	------------	------------	------------	------------	-------------	-------------

Sampling Event	Sampling Date	BENZENE CONCENTRATION (ug/l)						
		MW2	MW4	MW7	MW8	MW9	MW10	MW14
1	14-Nov-13		69			1800		
2	6-Feb-14		29			690		
3	30-Apr-14		11	500	670	190		78
4	30-Jun-14	180	0.5	180	5	25	410	50
5	8-Sep-14	240	0.5	99	0.5	140	320	50
6	4-Dec-14		0.5	5	0.5	25	230	
7	13-Feb-15		0.5	0.5	6	180	580	
8	10-Apr-15		0.5	9	53	130	100	50
9	30-Jun-15		0.5	11	22	190	650	250
10	25-Sep-15						380	200
11	5-Nov-15	240	0.5	18	11	100	300	320
12	8-Jan-16		2	0.5	6	30	710	270
13	14-Mar-16				7			63
14	1-Apr-16		0.5	7	14	320	38	80
15	23-May-16				10	83	200	130
16	8-Jun-16		0.5	72	9		280	
17	30-Aug-16		0.5	0.5	0.5	39	16	140
18	6-Dec-16		0.5	0.5	0.5	240	140	50
19	21-Feb-17		0.5	0.5	0.5	50	0.5	50
20	9-May-17		0.5	0.5	0.5	9	0.57	78
21	18-Sep-17		0.5	37	10	530	130	5
22	8-Nov-17		0.5	0.5	0.5	89	38	25
23	22-Feb-18		0.5	0.5	0.5	85	8	10
24	10-Apr-18		0.5	0.5	0.5	0.5	17	4
25	3-Jul-18		0.5	0.5	0.5	9	62	15
26	8-Oct-18		0.5	370	31	360	100	0.5
27	19-Mar-19	282	0.5	1.4	10.6	89.5	78.2	2.7
28	11-Jun-19	218	0.5	0.26	4.6	5.1	76	4.5
29	12-Sep-19		0.5	15.6	9.6	15.4	50.7	12
30	10-Dec-19		0.5	3.2	0.74	145	82.6	18.3
31	18-Mar-20		0.5	0.5	0.94	0.68	9.3	0.5
32	27-May-20		0.5	0.5	3.4	11.5	37.5	5.9
33	27-Aug-20		0.5	22.3	4.7	137	82.1	4.9
34	24-Nov-20		0.5	0.5	6.9	78.5	58.1	3.6
35	10-Feb-21		0.5	0.5	2.1	118	35.7	1.9
36	28-Apr-21		0.5	0.5	2.5	13.7	91.1	1.7
37	12-Jul-21		0.5	0.45	0.62	10.3	102	13
38	7-Oct-21		0.5	5	0.57	6.7	65.8	5.3
39	13-Apr-22		0.5	0.93	1.2	1	2.8	41.1
40	15-Jul-22		0.5	1.1	1.6	4.5	20.3	13.3

Coefficient of Variation:	0.16	3.52	2.72	4.46	1.96	1.22	1.42
Mann-Kendall Statistic (S):	3	-124	-153	-109	-263	-246	-295
Confidence Factor:	67.5%	94.6%	98.5%	92.1%	>99.9%	>99.9%	>99.9%
Concentration Trend:	No Trend	Prob. Decreasing	Decreasing	Prob. Decreasing	Decreasing	Decreasing	Decreasing



- Notes:**
- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
 - Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
 - Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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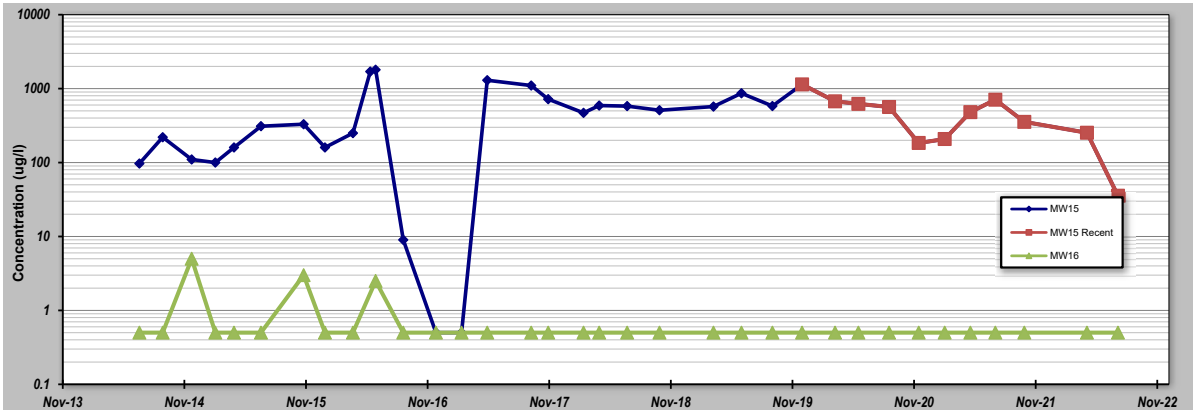
GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date:	Job ID: 190292M
Facility Name: SMO Hanover	Constituent: BENZENE
Conducted By: Doug Hamilton/ARM Group	Concentration Units: ug/l

Sampling Point ID:	MW15	MW15 Recent	MW16			
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Sampling Event	Sampling Date	BENZENE CONCENTRATION (ug/l)					
		MW15	MW15 Recent	MW16			
1	30-Jun-14	97		0.5			
2	8-Sep-14	220		0.5			
3	4-Dec-14	110		5			
4	13-Feb-15	100		0.5			
5	10-Apr-15	160		0.5			
6	30-Jun-15	310		0.5			
7	5-Nov-15	330		3			
8	8-Jan-16	160		0.5			
9	1-Apr-16	250		0.5			
10	23-May-16	1700					
11	8-Jun-16	1800		2.5			
12	30-Aug-16	9		0.5			
13	6-Dec-16	0.5		0.5			
14	21-Feb-17	0.5		0.5			
15	9-May-17	1300		0.5			
16	18-Sep-17	1100		0.5			
17	8-Nov-17	720		0.5			
18	22-Feb-18	470		0.5			
19	10-Apr-18	590		0.5			
20	3-Jul-18	580		0.5			
21	8-Oct-18	510		0.5			
22	19-Mar-19	572		0.5			
23	11-Jun-19	865		0.5			
24	12-Sep-19	581		0.5			
25	10-Dec-19	1140	1140	0.5			
26	18-Mar-20	673	673	0.5			
27	27-May-20	622	622	0.5			
28	27-Aug-20	564	564	0.5			
29	24-Nov-20	184	184	0.5			
30	10-Feb-21	208	208	0.5			
31	28-Apr-21	481	481	0.5			
32	12-Jul-21	708	708	0.5			
33	7-Oct-21	355	355	0.5			
34	13-Apr-22	253	253	0.5			
35	15-Jul-22	35.6	35.6	0.5			
36							
37							
38							
39							
40							

Coefficient of Variation:	0.89	0.66	1.21
Mann-Kendall Statistic (S):	79	-29	-68
Confidence Factor:	86.5%	98.7%	83.9%
Concentration Trend:	No Trend	Decreasing	No Trend



- Notes:**
- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
 - Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
 - Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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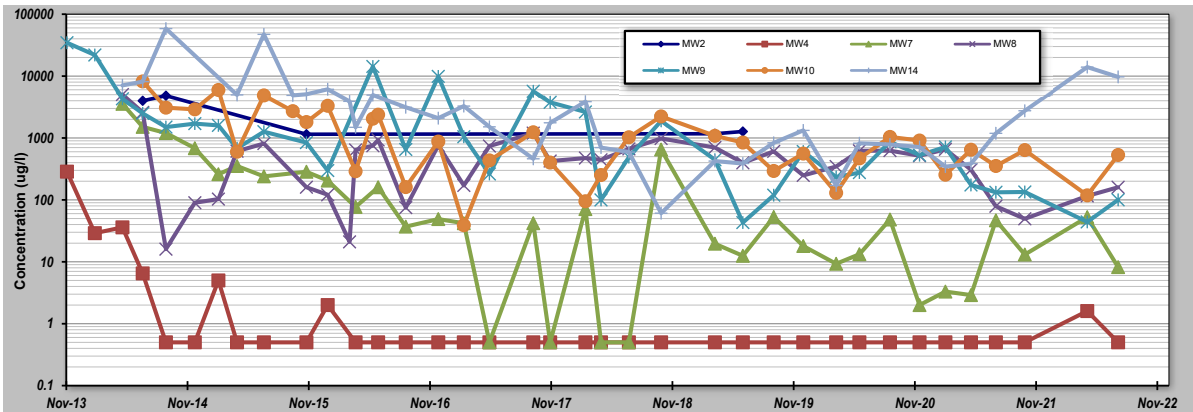
GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date:	Job ID: 190292M
Facility Name: SMO Hanover	Constituent: VOC
Conducted By: Doug Hamilton/ARM Group	Concentration Units: ug/l

Sampling Point ID:	MW2	MW4	MW7	MW8	MW9	MW10	MW14
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Sampling Event	Sampling Date	VOC CONCENTRATION (ug/l)						
		MW2	MW4	MW7	MW8	MW9	MW10	MW14
1	14-Nov-13		286			34598		
2	6-Feb-14		29			21894		
3	30-Apr-14		36	3564	5026	4297		7088
4	30-Jun-14	3989	6.5	1512	2595	2495	8190	8150
5	8-Sep-14	4823	0.5	1202	16	1500	3090	58500
6	4-Dec-14		0.5	684	90	1705	2900	
7	13-Feb-15		5	260	103	1596	5960	
8	10-Apr-15		0.5	353	611	681	600	4960
9	30-Jun-15		0.5	240	813	1265	4870	47190
10	25-Sep-15						2712	4872
11	5-Nov-15	1151	0.5	285	160	843	1807	5080
12	8-Jan-16		2	205	121	298	3310	6110
13	14-Mar-16				21			3902
14	1-Apr-16		0.5	77	641		290	1486
15	23-May-16				752	14283	2050	4930
16	8-Jun-16		0.5	160	930		2380	
17	30-Aug-16		0.5	37	75	652	161	3136
18	6-Dec-16		0.5	49	761	9900	875	2090
19	21-Feb-17		0.5	42	171	1050	39	3280
20	9-May-17		0.5	0.5	742	262	434	1513
21	18-Sep-17		0.5	42	1198	5670	1236	461
22	8-Nov-17		0.5	0.5	424	3769	401	1756
23	22-Feb-18		0.5	71	474	2633	95	3860
24	10-Apr-18		0.5	0.5	444	100	252	699
25	3-Jul-18		0.5	0.5	666	490	1026	593
26	8-Oct-18		0.5	651	981	1890	2228	61
27	19-Mar-19	1171	0.5	19.6	702	445	1084	424
28	11-Jun-19	1273	0.5	12.5	397	43	844	387
29	12-Sep-19		0.5	53	608	119	293	835
30	10-Dec-19		0.5	18	249	605	560	1326
31	18-Mar-20		0.5	9.3	346	234	130	171
32	27-May-20		0.5	13.27	621	276	468	821
33	27-Aug-20		0.5	48.2	625	871	1040	787
34	24-Nov-20		0.5	2	517	527	910	714
35	10-Feb-21		0.5	3.3	656	717	255	345
36	28-Apr-21		0.5	2.9	307	174	647	385
37	12-Jul-21		0.5	46.8	78.9	132.6	353	1188
38	7-Oct-21		0.5	13.1	49.5	134.2	637	2749
39	13-Apr-22		1.6	52.7	115.8	44.1	118.4	13979
40	15-Jul-22		0.5	8.2	159.78	100.3	531	9705

Coefficient of Variation:	0.72	4.58	2.39	1.40	2.16	1.23	2.10
Mann-Kendall Statistic (S):	-2	-157	-310	-82	-338	-258	-259
Confidence Factor:	59.2%	98.0%	>99.9%	85.4%	>99.9%	>99.9%	>99.9%
Concentration Trend:	Stable	Decreasing	Decreasing	No Trend	Decreasing	Decreasing	Decreasing



- Notes:**
- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
 - Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
 - Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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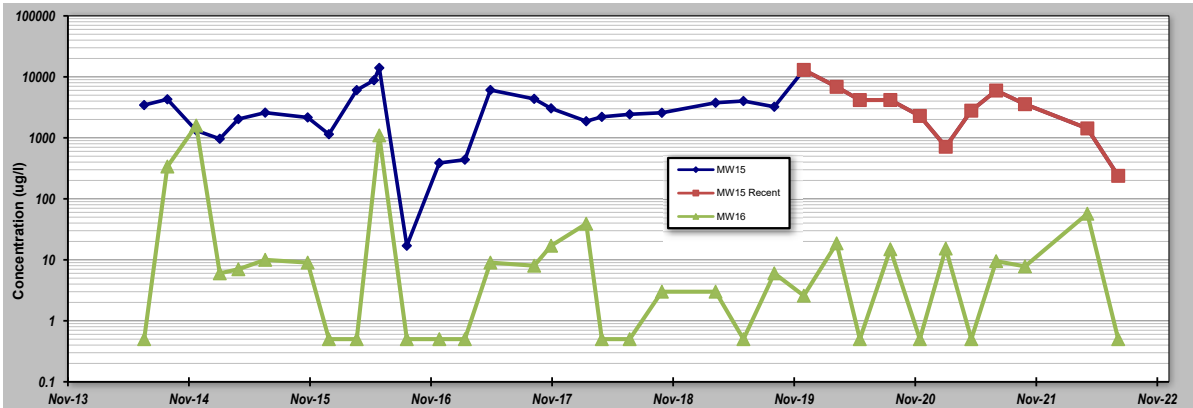
GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date:	Job ID: 190292M
Facility Name: SMO Hanover	Constituent: VOC
Conducted By: Doug Hamilton/ARM Group	Concentration Units: ug/l

Sampling Point ID:	MW15	MW15 Recent	MW16			
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Sampling Event	Sampling Date	VOC CONCENTRATION (ug/l)					
		MW15	MW15 Recent	MW16			
1	30-Jun-14	3447		0.5			
2	8-Sep-14	4283		338			
3	4-Dec-14	1318		1590			
4	13-Feb-15	964		6			
5	10-Apr-15	2031		7			
6	30-Jun-15	2586		10			
7	5-Nov-15	2158		9			
8	8-Jan-16	1144		0.5			
9	1-Apr-16	6053		0.5			
10	23-May-16	8792					
11	8-Jun-16	14023		1096			
12	30-Aug-16	17		0.5			
13	6-Dec-16	387		0.5			
14	21-Feb-17	438		0.5			
15	9-May-17	6079		9			
16	18-Sep-17	4350		8			
17	8-Nov-17	3039		17			
18	22-Feb-18	1871		39			
19	10-Apr-18	2207		0.5			
20	3-Jul-18	2429		0.5			
21	8-Oct-18	2574		3			
22	19-Mar-19	3760		3			
23	11-Jun-19	4015		0.5			
24	12-Sep-19	3230		6			
25	10-Dec-19	12987	12987	2.58			
26	18-Mar-20	6849	6849	18.6			
27	27-May-20	4158	4158	0.5			
28	27-Aug-20	4166	4166	14.9			
29	24-Nov-20	2285	2285	0.5			
30	10-Feb-21	714	714	15.3			
31	28-Apr-21	2788	2788	0.5			
32	12-Jul-21	5960	5960	9.5			
33	7-Oct-21	3563	3563	7.8			
34	13-Apr-22	1425	1425	56.9			
35	15-Jul-22	238	238	0.5			
36							
37							
38							
39							
40							

Coefficient of Variation:	0.88	0.87	3.40
Mann-Kendall Statistic (S):	35	-31	-26
Confidence Factor:	68.4%	99.2%	64.4%
Concentration Trend:	No Trend	Decreasing	No Trend



- Notes:**
- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
 - Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
 - Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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APPENDIX F
LABORATORY REPORT OF ANALYSIS
JULY 2022





Pace Analytical Services, LLC
 1638 Roseytown Road - Suites 2,3,4
 Greensburg, PA 15601
 (724)850-5600

April 27, 2022

Mr. Doug Hamilton
 ARM Group Inc.
 9175 Guilford Road
 Suite 310
 Columbia, MD 21046

RE: Project: 190292-2
 Pace Project No.: 30481175

Dear Mr. Hamilton:

Enclosed are the analytical results for sample(s) received by the laboratory on April 14, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Long Island
- Pace Analytical Services - Greensburg

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Skyler C. Richmond
 skyler.richmond@pacelabs.com
 (724)850-5600
 Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
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 Greensburg, PA 15601
 (724)850-5600

CERTIFICATIONS

Project: 190292-2
 Pace Project No.: 30481175

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
 ANAB DOD-ELAP Rad Accreditation #: L2417
 Alabama Certification #: 41590
 Arizona Certification #: AZ0734
 Arkansas Certification
 California Certification #: 04222CA
 Colorado Certification #: PA01547
 Connecticut Certification #: PH-0694
 Delaware Certification
 EPA Region 4 DW Rad
 Florida/TNI Certification #: E87683
 Georgia Certification #: C040
 Florida: Cert E871149 SEKS WET
 Guam Certification
 Hawaii Certification
 Idaho Certification
 Illinois Certification
 Indiana Certification
 Iowa Certification #: 391
 Kansas/TNI Certification #: E-10358
 Kentucky Certification #: KY90133
 KY WW Permit #: KY0098221
 KY WW Permit #: KY0000221
 Louisiana DHH/TNI Certification #: LA180012
 Louisiana DEQ/TNI Certification #: 4086
 Maine Certification #: 2017020
 Maryland Certification #: 308
 Massachusetts Certification #: M-PA1457
 Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
 Montana Certification #: Cert0082
 Nebraska Certification #: NE-OS-29-14
 Nevada Certification #: PA014572018-1
 New Hampshire/TNI Certification #: 297617
 New Jersey/TNI Certification #: PA051
 New Mexico Certification #: PA01457
 New York/TNI Certification #: 10888
 North Carolina Certification #: 42706
 North Dakota Certification #: R-190
 Ohio EPA Rad Approval: #41249
 Oregon/TNI Certification #: PA200002-010
 Pennsylvania/TNI Certification #: 65-00282
 Puerto Rico Certification #: PA01457
 Rhode Island Certification #: 65-00282
 South Dakota Certification
 Tennessee Certification #: 02867
 Texas/TNI Certification #: T104704188-17-3
 Utah/TNI Certification #: PA014572017-9
 USDA Soil Permit #: P330-17-00091
 Vermont Dept. of Health: ID# VT-0282
 Virgin Island/PADEP Certification
 Virginia/VELAP Certification #: 460198
 Washington Certification #: C868
 West Virginia DEP Certification #: 143
 West Virginia DHHR Certification #: 9964C
 Wisconsin Approve List for Rad
 Wyoming Certification #: 8TMS-L

Pace Analytical Services Long Island

575 Broad Hollow Rd, Melville, NY 11747
 Connecticut Certification #: PH-0435
 Delaware Certification # NY 10478
 Maryland Certification #: 208
 Massachusetts Certification #: M-NY026
 New Hampshire Certification #: 2987

New Jersey Certification #: NY158
 New York Certification #: 10478 Primary Accrediting Body
 Pennsylvania Certification #: 68-00350
 Rhode Island Certification #: LAO00340
 Virginia Certification # 460302

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Greensburg, PA 15601
(724)850-5600

SAMPLE SUMMARY

Project: 190292-2
Pace Project No.: 30481175

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30481175001	MW-12	Water	04/13/22 09:15	04/14/22 22:45
30481175002	MW-1	Water	04/13/22 09:40	04/14/22 22:45
30481175003	MW-16	Water	04/13/22 10:15	04/14/22 22:45
30481175004	MW-4	Water	04/13/22 10:35	04/14/22 22:45
30481175005	MW-7	Water	04/13/22 11:00	04/14/22 22:45
30481175006	MW-8	Water	04/13/22 11:35	04/14/22 22:45
30481175007	MW-9	Water	04/13/22 12:10	04/14/22 22:45
30481175008	MW-10	Water	04/13/22 13:10	04/14/22 22:45
30481175009	MW-14	Water	04/13/22 13:50	04/14/22 22:45
30481175010	MW-15	Water	04/13/22 14:45	04/14/22 22:45
30481175011	OWW	Drinking Water	04/13/22 13:00	04/14/22 22:45
30481175012	Trip Blank	Water	04/13/22 00:01	04/14/22 22:45

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Greensburg, PA 15601
(724)850-5600

SAMPLE ANALYTE COUNT

Project: 190292-2
Pace Project No.: 30481175

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30481175001	MW-12	EPA 8015D	SEL	2	PASI-PA
		EPA 5030/8015B	LEL	2	PASI-PA
30481175002	MW-1	EPA 8260B	LEL	56	PASI-PA
		EPA 8015D	SEL	2	PASI-PA
30481175003	MW-16	EPA 5030/8015B	LEL	2	PASI-PA
		EPA 8260B	LEL	56	PASI-PA
30481175004	MW-4	EPA 8015D	SEL	2	PASI-PA
		EPA 5030/8015B	LEL	2	PASI-PA
30481175005	MW-7	EPA 8260B	LEL	56	PASI-PA
		EPA 8015D	SEL	2	PASI-PA
30481175006	MW-8	EPA 5030/8015B	LEL	2	PASI-PA
		EPA 8260B	LEL	56	PASI-PA
30481175007	MW-9	EPA 8015D	SEL	2	PASI-PA
		EPA 5030/8015B	LEL	2	PASI-PA
30481175008	MW-10	EPA 8260B	LEL	56	PASI-PA
		EPA 8015D	SEL	2	PASI-PA
30481175009	MW-14	EPA 5030/8015B	LEL	2	PASI-PA
		EPA 8260B	LEL	56	PASI-PA
30481175010	MW-15	EPA 8015D	SEL	2	PASI-PA
		EPA 5030/8015B	LEL	2	PASI-PA
30481175011	OWW	EPA 8260B	LEL	56	PASI-PA
		EPA 524.2	KGG	61	PASI-MV
30481175012	Trip Blank	EPA 8260B	LEL	56	PASI-PA

PASI-MV = Pace Analytical Services - Long Island
PASI-PA = Pace Analytical Services - Greensburg

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Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: 190292-2
Pace Project No.: 30481175

Date: April 27, 2022

MW-10 (Lab ID: 30481175008)

- 8260: Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

MW-15 (Lab ID: 30481175010)

- The pH of the vial used for GRO analysis was 5.

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Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: 190292-2
Pace Project No.: 30481175

Method: EPA 8015D
Description: 8015D TPH Reduced Volume
Client: ARM Group Inc.-Columbia
Date: April 27, 2022

General Information:

10 samples were analyzed for EPA 8015D by Pace Analytical Services Greensburg. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3510C with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Surrogates:

All surrogates were within QC limits with any exceptions noted below.

QC Batch: 498034

S4: Surrogate recovery not evaluated against control limits due to sample dilution.

- MW-14 (Lab ID: 30481175009)
 - o-Terphenyl (S)
- MW-15 (Lab ID: 30481175010)
 - o-Terphenyl (S)
- MW-7 (Lab ID: 30481175005)
 - o-Terphenyl (S)
- MW-8 (Lab ID: 30481175006)
 - o-Terphenyl (S)

SR: Surrogate recovery was below laboratory control limits. Results may be biased low.

- MW-10 (Lab ID: 30481175008)
 - o-Terphenyl (S)

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

REPORT OF LABORATORY ANALYSIS

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Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: 190292-2
Pace Project No.: 30481175

Method: EPA 8015D
Description: 8015D TPH Reduced Volume
Client: ARM Group Inc.-Columbia
Date: April 27, 2022

QC Batch: 498034
A matrix spike/matrix spike duplicate was not performed due to insufficient sample volume.

Additional Comments:

Analyte Comments:

QC Batch: 498034

- P2: Re-extraction or re-analysis could not be performed due to insufficient sample amount.
- MW-10 (Lab ID: 30481175008)
 - o-Terphenyl (S)

REPORT OF LABORATORY ANALYSIS

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Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: 190292-2
Pace Project No.: 30481175

Method: EPA 5030/8015B
Description: Gasoline Range Organics
Client: ARM Group Inc.-Columbia
Date: April 27, 2022

General Information:

10 samples were analyzed for EPA 5030/8015B by Pace Analytical Services Greensburg. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Surrogates:

All surrogates were within QC limits with any exceptions noted below.

QC Batch: 499048

S0: Surrogate recovery outside laboratory control limits.

- MW-15 (Lab ID: 30481175010)
- 4-Bromofluorobenzene (S)

ST: Surrogate recovery was above laboratory control limits. Results may be biased high.

- MW-14 (Lab ID: 30481175009)
- 4-Bromofluorobenzene (S)

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: 190292-2
Pace Project No.: 30481175

Method: EPA 524.2
Description: 524.2 MSV
Client: ARM Group Inc.-Columbia
Date: April 27, 2022

General Information:
1 sample was analyzed for EPA 524.2 by Pace Analytical Services Long Island. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

QC Batch: 253351
L1: Analyte recovery in the laboratory control sample (LCS) was above QC limits. Results for this analyte in associated samples may be biased high.
• LCS (Lab ID: 1279904)
• Methyl-tert-butyl ether

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: 190292-2
Pace Project No.: 30481175

Method: EPA 8260B
Description: 8260B MSV
Client: ARM Group Inc.-Columbia
Date: April 27, 2022

General Information:
11 samples were analyzed for EPA 8260B by Pace Analytical Services Greensburg. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

QC Batch: 499412
B: Analyte was detected in the associated method blank.
• BLANK for HBN 499412 [MSV/6032 (Lab ID: 2417144)
• Bromomethane

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 499412
A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30481175001
ML: Matrix spike recovery and/or matrix spike duplicate recovery was below laboratory control limits. Result may be biased low.
• MS (Lab ID: 2417146)
• Bromomethane
• MSD (Lab ID: 2417147)
• Bromomethane

Additional Comments:

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PROJECT NARRATIVE

Project: 190292-2
Pace Project No.: 30481175

Method: EPA 8260B
Description: 8260B MSV
Client: ARM Group Inc.-Columbia
Date: April 27, 2022

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: 190292-2
Pace Project No.: 30481175

Table with columns: Parameters, Results, Units, Report Limit, MDL, DF, Prepared, Analyzed, CAS No., Qual. Includes sections for 8015D TPH and 8260B MSV.

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ANALYTICAL RESULTS

Project: 190292-2
Pace Project No.: 30481175

Table with columns: Parameters, Results, Units, Report Limit, MDL, DF, Prepared, Analyzed, CAS No., Qual. Includes section for 8260B MSV.

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ANALYTICAL RESULTS

Project: 190292-2
Pace Project No.: 30481175

Sample: MW-14 Lab ID: 30481175009 Collected: 04/13/22 13:50 Received: 04/14/22 22:45 Matrix: Water

Table with columns: Parameters, Results, Units, Report Limit, MDL, DF, Prepared, Analyzed, CAS No., Qual. Includes sections for 8015D TPH, Gasoline Range Organics, and 8260B MSV.

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ANALYTICAL RESULTS

Project: 190292-2
Pace Project No.: 30481175

Sample: MW-14 Lab ID: 30481175009 Collected: 04/13/22 13:50 Received: 04/14/22 22:45 Matrix: Water

Table with columns: Parameters, Results, Units, Report Limit, MDL, DF, Prepared, Analyzed, CAS No., Qual. Includes section for 8260B MSV.

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ANALYTICAL RESULTS

Project: 190292-2
Pace Project No.: 30481175

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
8260B MSV									
Analytical Method: EPA 8260B									
Pace Analytical Services - Greensburg									
Acetone	10.0 U	ug/L	10.0	5.6	1	04/22/22 15:06	67-64-1		
tert-Amylmethyl ether	1.0 U	ug/L	1.0	0.27	1	04/22/22 15:06	994-05-8		
Benzene	1.0 U	ug/L	1.0	0.34	1	04/22/22 15:06	71-43-2		
Bromochloromethane	1.0 U	ug/L	1.0	0.48	1	04/22/22 15:06	74-97-5		
Bromodichloromethane	1.0 U	ug/L	1.0	0.35	1	04/22/22 15:06	75-27-4		
Bromoform	1.0 U	ug/L	1.0	0.56	1	04/22/22 15:06	75-25-2		
Bromomethane	2.2	ug/L	1.0	0.73	1	04/22/22 15:06	74-83-9		B
TOTAL BTEX	6.0 U	ug/L	6.0	2.4	1	04/22/22 15:06			
2-Butanone (MEK)	10.0 U	ug/L	10.0	1.5	1	04/22/22 15:06	78-93-3		
tert-Butyl Alcohol	5.0 U	ug/L	5.0	4.3	1	04/22/22 15:06	75-65-0		
Carbon disulfide	1.0 U	ug/L	1.0	0.32	1	04/22/22 15:06	75-15-0		
Carbon tetrachloride	1.0 U	ug/L	1.0	0.44	1	04/22/22 15:06	56-23-5		
Chlorobenzene	1.0 U	ug/L	1.0	0.26	1	04/22/22 15:06	108-90-7		
Chloroethane	1.0 U	ug/L	1.0	0.64	1	04/22/22 15:06	75-00-3		
Chloroform	1.0 U	ug/L	1.0	0.39	1	04/22/22 15:06	67-66-3		
Chloromethane	1.0 U	ug/L	1.0	0.40	1	04/22/22 15:06	74-87-3		
Dibromochloromethane	1.0 U	ug/L	1.0	0.43	1	04/22/22 15:06	124-48-1		
1,2-Dichlorobenzene	1.0 U	ug/L	1.0	0.38	1	04/22/22 15:06	95-50-1		
1,3-Dichlorobenzene	1.0 U	ug/L	1.0	0.45	1	04/22/22 15:06	541-73-1		
1,4-Dichlorobenzene	1.0 U	ug/L	1.0	0.48	1	04/22/22 15:06	106-46-7		
1,1-Dichloroethane	1.0 U	ug/L	1.0	0.24	1	04/22/22 15:06	75-34-3		
1,2-Dichloroethane	1.0 U	ug/L	1.0	0.33	1	04/22/22 15:06	107-06-2		
1,2-Dichloroethane (Total)	2.0 U	ug/L	2.0	0.66	1	04/22/22 15:06	540-59-0		
1,1-Dichloroethene	1.0 U	ug/L	1.0	0.24	1	04/22/22 15:06	75-35-4		
cis-1,2-Dichloroethene	1.0 U	ug/L	1.0	0.38	1	04/22/22 15:06	156-59-2		
trans-1,2-Dichloroethene	1.0 U	ug/L	1.0	0.28	1	04/22/22 15:06	156-60-5		
1,2-Dichloropropane	1.0 U	ug/L	1.0	0.28	1	04/22/22 15:06	78-87-5		
cis-1,3-Dichloropropene	1.0 U	ug/L	1.0	0.29	1	04/22/22 15:06	10061-01-5		
trans-1,3-Dichloropropene	1.0 U	ug/L	1.0	0.32	1	04/22/22 15:06	10061-02-6		
Diethyl ether (Ethyl ether)	1.0 U	ug/L	1.0	0.35	1	04/22/22 15:06	60-29-7		
Ethanol	200 U	ug/L	200	73.5	1	04/22/22 15:06	64-17-5		
Ethylbenzene	1.0 U	ug/L	1.0	0.40	1	04/22/22 15:06	100-41-4		
Ethyl-tert-butyl ether	1.0 U	ug/L	1.0	0.29	1	04/22/22 15:06	637-92-3		
2-Hexanone	10.0 U	ug/L	10.0	0.58	1	04/22/22 15:06	591-78-6		
Methylene Chloride	1.0 U	ug/L	1.0	0.64	1	04/22/22 15:06	75-09-2		
4-Methyl-2-pentanone (MIBK)	10.0 U	ug/L	10.0	0.42	1	04/22/22 15:06	108-10-1		
Methyl-tert-butyl ether	1.0 U	ug/L	1.0	0.25	1	04/22/22 15:06	1634-04-4		
Naphthalene	2.0 U	ug/L	2.0	0.82	1	04/22/22 15:06	91-20-3		
Styrene	1.0 U	ug/L	1.0	0.33	1	04/22/22 15:06	100-42-5		
1,1,2,2-Tetrachloroethane	1.0 U	ug/L	1.0	0.47	1	04/22/22 15:06	79-34-5		
Tetrachloroethene	1.0 U	ug/L	1.0	0.39	1	04/22/22 15:06	127-18-4		
Toluene	1.0 U	ug/L	1.0	0.32	1	04/22/22 15:06	108-88-3		
1,2,4-Trichlorobenzene	1.0 U	ug/L	1.0	0.73	1	04/22/22 15:06	120-82-1		
1,1,1-Trichloroethane	1.0 U	ug/L	1.0	0.38	1	04/22/22 15:06	71-55-6		
1,1,2-Trichloroethane	1.0 U	ug/L	1.0	0.33	1	04/22/22 15:06	79-00-5		

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ANALYTICAL RESULTS

Project: 190292-2
Pace Project No.: 30481175

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
8260B MSV									
Analytical Method: EPA 8260B									
Pace Analytical Services - Greensburg									
Trichloroethene	1.0 U	ug/L	1.0	0.29	1	04/22/22 15:06	79-01-6		
1,2,4-Trimethylbenzene	1.0 U	ug/L	1.0	0.63	1	04/22/22 15:06	95-63-6		
1,3,5-Trimethylbenzene	1.0 U	ug/L	1.0	0.45	1	04/22/22 15:06	108-67-8		
Vinyl chloride	1.0 U	ug/L	1.0	0.29	1	04/22/22 15:06	75-01-4		
Xylene (Total)	3.0 U	ug/L	3.0	1.4	1	04/22/22 15:06	1330-20-7		
m&p-Xylene	2.0 U	ug/L	2.0	0.94	1	04/22/22 15:06	179601-23-1		
o-Xylene	1.0 U	ug/L	1.0	0.41	1	04/22/22 15:06	95-47-6		
Surrogates									
4-Bromofluorobenzene (S)	102	%	70-130		1	04/22/22 15:06	460-00-4		
1,2-Dichloroethane-d4 (S)	98	%	70-130		1	04/22/22 15:06	17060-07-0		
Toluene-d8 (S)	99	%	70-130		1	04/22/22 15:06	2037-26-5		
Dibromofluoromethane (S)	101	%	70-130		1	04/22/22 15:06	1868-53-7		

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QUALITY CONTROL DATA

Project: 190292-2
Pace Project No.: 30481175

QC Batch: 499048 Analysis Method: EPA 5030/8015B
QC Batch Method: EPA 5030/8015B Analysis Description: Gasoline Range Organics
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 30481175001, 30481175002, 30481175003, 30481175004, 30481175005, 30481175006, 30481175007, 30481175008, 30481175009, 30481175010

METHOD BLANK: 2415378 Matrix: Water
Associated Lab Samples: 30481175001, 30481175002, 30481175003, 30481175004, 30481175005, 30481175006, 30481175007, 30481175008, 30481175009, 30481175010

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
TPH (C06-C10)	ug/L	200 U	200	98.0	04/21/22 14:01	
4-Bromofluorobenzene (S)	%	99	70-130		04/21/22 14:01	

LABORATORY CONTROL SAMPLE: 2415379

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
TPH (C06-C10)	ug/L	1000	1200	120	55-125	
4-Bromofluorobenzene (S)	%			86	70-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2415380 2415381

Parameter	Units	30481175001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
TPH (C06-C10)	ug/L	200 U	1000	1000	829	896	81	88	42-123	8	25	
4-Bromofluorobenzene (S)	%						91	90	70-130			

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QUALITY CONTROL DATA

Project: 190292-2
Pace Project No.: 30481175

QC Batch: 253351 Analysis Method: EPA 524.2
QC Batch Method: EPA 524.2 Analysis Description: 524.2 MSV
Laboratory: Pace Analytical Services - Long Island
Associated Lab Samples: 30481175011

METHOD BLANK: 1279903 Matrix: Water
Associated Lab Samples: 30481175011

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	0.50 U	0.50	0.31	04/21/22 16:49	
1,1,1-Trichloroethane	ug/L	0.50 U	0.50	0.14	04/21/22 16:49	
1,1,2,2-Tetrachloroethane	ug/L	0.50 U	0.50	0.24	04/21/22 16:49	
1,1,2-Trichloroethane	ug/L	0.50 U	0.50	0.21	04/21/22 16:49	
1,1-Dichloroethane	ug/L	0.50 U	0.50	0.19	04/21/22 16:49	
1,1-Dichloroethene	ug/L	0.50 U	0.50	0.16	04/21/22 16:49	
1,1-Dichloropropene	ug/L	0.50 U	0.50	0.18	04/21/22 16:49	
1,2,3-Trichlorobenzene	ug/L	0.50 U	0.50	0.28	04/21/22 16:49	
1,2,3-Trichloropropane	ug/L	0.50 U	0.50	0.50	04/21/22 16:49	
1,2,4-Trichlorobenzene	ug/L	0.50 U	0.50	0.14	04/21/22 16:49	
1,2,4-Trimethylbenzene	ug/L	0.50 U	0.50	0.21	04/21/22 16:49	
1,2-Dichlorobenzene	ug/L	0.50 U	0.50	0.20	04/21/22 16:49	
1,2-Dichloroethane	ug/L	0.50 U	0.50	0.19	04/21/22 16:49	
1,2-Dichloropropane	ug/L	0.50 U	0.50	0.19	04/21/22 16:49	
1,3,5-Trimethylbenzene	ug/L	0.50 U	0.50	0.22	04/21/22 16:49	
1,3-Dichlorobenzene	ug/L	0.50 U	0.50	0.24	04/21/22 16:49	
1,3-Dichloropropane	ug/L	0.50 U	0.50	0.24	04/21/22 16:49	
1,4-Dichlorobenzene	ug/L	0.50 U	0.50	0.14	04/21/22 16:49	
2,2-Dichloropropane	ug/L	0.50 U	0.50	0.21	04/21/22 16:49	
2-Chlorotoluene	ug/L	0.50 U	0.50	0.20	04/21/22 16:49	
4-Chlorotoluene	ug/L	0.50 U	0.50	0.15	04/21/22 16:49	
Benzene	ug/L	0.50 U	0.50	0.15	04/21/22 16:49	
Bromobenzene	ug/L	0.50 U	0.50	0.20	04/21/22 16:49	
Bromochloromethane	ug/L	0.50 U	0.50	0.24	04/21/22 16:49	
Bromodichloromethane	ug/L	0.50 U	0.50	0.25	04/21/22 16:49	
Bromoform	ug/L	0.50 U	0.50	0.30	04/21/22 16:49	
Bromomethane	ug/L	0.50 U	0.50	0.43	04/21/22 16:49	
Carbon tetrachloride	ug/L	0.50 U	0.50	0.26	04/21/22 16:49	
Chlorobenzene	ug/L	0.50 U	0.50	0.17	04/21/22 16:49	
Chloroethane	ug/L	0.50 U	0.50	0.34	04/21/22 16:49	
Chloroform	ug/L	0.50 U	0.50	0.21	04/21/22 16:49	
Chloromethane	ug/L	0.50 U	0.50	0.38	04/21/22 16:49	
cis-1,2-Dichloroethene	ug/L	0.50 U	0.50	0.27	04/21/22 16:49	
cis-1,3-Dichloropropene	ug/L	0.50 U	0.50	0.21	04/21/22 16:49	
Dibromochloromethane	ug/L	0.50 U	0.50	0.23	04/21/22 16:49	
Dibromomethane	ug/L	0.50 U	0.50	0.30	04/21/22 16:49	
Dichlorodifluoromethane	ug/L	0.50 U	0.50	0.21	04/21/22 16:49	
Ethylbenzene	ug/L	0.50 U	0.50	0.22	04/21/22 16:49	
Hexachloro-1,3-butadiene	ug/L	0.50 U	0.50	0.16	04/21/22 16:49	
Isopropylbenzene (Cumene)	ug/L	0.50 U	0.50	0.14	04/21/22 16:49	

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QUALITY CONTROL DATA

Project: 190292-2
Pace Project No.: 30481175

METHOD BLANK: 1279903 Matrix: Water
Associated Lab Samples: 30481175011

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
m&p-Xylene	ug/L	0.50 U	0.50	0.20	04/21/22 16:49	
Methyl-tert-butyl ether	ug/L	0.50 U	0.50	0.20	04/21/22 16:49	
Methylene Chloride	ug/L	0.50 U	0.50	0.31	04/21/22 16:49	
n-Butylbenzene	ug/L	0.50 U	0.50	0.18	04/21/22 16:49	
n-Propylbenzene	ug/L	0.50 U	0.50	0.14	04/21/22 16:49	
o-Xylene	ug/L	0.50 U	0.50	0.21	04/21/22 16:49	
p-Isopropyltoluene	ug/L	0.50 U	0.50	0.18	04/21/22 16:49	
sec-Butylbenzene	ug/L	0.50 U	0.50	0.19	04/21/22 16:49	
Styrene	ug/L	0.50 U	0.50	0.14	04/21/22 16:49	
tert-Butylbenzene	ug/L	0.50 U	0.50	0.16	04/21/22 16:49	
Tetrachloroethene	ug/L	0.50 U	0.50	0.15	04/21/22 16:49	
Toluene	ug/L	0.50 U	0.50	0.17	04/21/22 16:49	
Total Trihalomethanes (Calc.)	ug/L	0.50 U	0.50	0.21	04/21/22 16:49	
trans-1,2-Dichloroethene	ug/L	0.50 U	0.50	0.28	04/21/22 16:49	
trans-1,3-Dichloropropene	ug/L	0.50 U	0.50	0.13	04/21/22 16:49	
Trichloroethene	ug/L	0.50 U	0.50	0.36	04/21/22 16:49	
Trichlorofluoromethane	ug/L	0.50 U	0.50	0.17	04/21/22 16:49	
Vinyl chloride	ug/L	0.50 U	0.50	0.16	04/21/22 16:49	
Xylene (Total)	ug/L	0.50 U	0.50	0.071	04/21/22 16:49	
1,2-Dichlorobenzene-d4 (S)	%	101	70-130		04/21/22 16:49	
4-Bromofluorobenzene (S)	%	96	70-130		04/21/22 16:49	

LABORATORY CONTROL SAMPLE: 1279904

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	10	10.6	106	70-130	
1,1,1-Trichloroethane	ug/L	10	10.8	108	70-130	
1,1,2,2-Tetrachloroethane	ug/L	10	11.7	117	70-130	
1,1,2-Trichloroethane	ug/L	10	11.4	114	70-130	
1,1-Dichloroethane	ug/L	10	11.1	111	70-130	
1,1-Dichloroethene	ug/L	10	10.4	104	70-130	
1,1-Dichloropropene	ug/L	10	11.2	112	70-130	
1,2,3-Trichlorobenzene	ug/L	10	11.1	111	70-130	
1,2,3-Trichloropropane	ug/L	10	11.3	113	70-130	
1,2,4-Trichlorobenzene	ug/L	10	11.1	111	70-130	
1,2,4-Trimethylbenzene	ug/L	10	11.5	115	70-130	
1,2-Dichlorobenzene	ug/L	10	11.9	119	70-130	
1,2-Dichloroethane	ug/L	10	10.9	109	70-130	
1,2-Dichloropropane	ug/L	10	10.9	109	70-130	
1,3,5-Trimethylbenzene	ug/L	10	11.0	110	70-130	
1,3-Dichlorobenzene	ug/L	10	11.6	116	70-130	
1,3-Dichloropropane	ug/L	10	11.0	110	70-130	
1,4-Dichlorobenzene	ug/L	10	11.9	119	70-130	
2,2-Dichloropropane	ug/L	10	10.7	107	70-130	

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REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL DATA

Project: 190292-2
Pace Project No.: 30481175

LABORATORY CONTROL SAMPLE: 1279904

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2-Chlorotoluene	ug/L	10	11.2	112	70-130	
4-Chlorotoluene	ug/L	10	11.7	117	70-130	
Benzene	ug/L	10	11.1	111	70-130	
Bromobenzene	ug/L	10	11.6	116	70-130	
Bromochloromethane	ug/L	10	11.3	113	70-130	
Bromodichloromethane	ug/L	10	10.4	104	70-130	
Bromofom	ug/L	10	10.5	105	70-130	
Bromomethane	ug/L	10	9.7	97	70-130	
Carbon tetrachloride	ug/L	10	10.4	104	70-130	
Chlorobenzene	ug/L	10	11.5	115	70-130	
Chloroethane	ug/L	10	9.7	97	70-130	
Chloroform	ug/L	10	11.1	111	70-130	
Chloromethane	ug/L	10	10.9	109	70-130	
cis-1,2-Dichloroethene	ug/L	10	10.5	105	70-130	
cis-1,3-Dichloropropene	ug/L	10	10.7	107	70-130	
Dibromochloromethane	ug/L	10	11.0	110	70-130	
Dibromomethane	ug/L	10	11.0	110	70-130	
Dichlorodifluoromethane	ug/L	10	9.6	96	70-130	
Ethylbenzene	ug/L	10	11.3	113	70-130	
Hexachloro-1,3-butadiene	ug/L	10	11.1	111	70-130	
Isopropylbenzene (Cumene)	ug/L	10	11.6	116	70-130	
m&p-Xylene	ug/L	20	22.1	110	70-130	
Methyl-tert-butyl ether	ug/L	10	15.3	153	70-130 L1	
Methylene Chloride	ug/L	10	10.3	103	70-130	
n-Butylbenzene	ug/L	10	11.6	116	70-130	
n-Propylbenzene	ug/L	10	11.3	113	70-130	
o-Xylene	ug/L	10	11.4	114	70-130	
p-Isopropyltoluene	ug/L	10	11.2	112	70-130	
sec-Butylbenzene	ug/L	10	11.4	114	70-130	
Styrene	ug/L	10	11.5	115	70-130	
tert-Butylbenzene	ug/L	10	11.6	116	70-130	
Tetrachloroethene	ug/L	10	10.8	108	70-130	
Toluene	ug/L	10	11.1	111	70-130	
Total Trihalomethanes (Calc.)	ug/L		43.0			
trans-1,2-Dichloroethene	ug/L	10	11.6	116	70-130	
trans-1,3-Dichloropropene	ug/L	10	11.0	110	70-130	
Trichloroethene	ug/L	10	10.8	108	70-130	
Trichlorofluoromethane	ug/L	10	11.2	112	70-130	
Vinyl chloride	ug/L	10	10.2	102	70-130	
Xylene (Total)	ug/L	30	33.5	112	70-130	
1,2-Dichlorobenzene-d4 (S)	%				111	70-130
4-Bromofluorobenzene (S)	%				101	70-130

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Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL DATA

Project: 190292-2
Pace Project No.: 30481175

SAMPLE DUPLICATE: 1280433

Parameter	Units	70211589001 Result	Dup Result	RPD	Max RPD	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	<0.50	0.50 U		20	
1,1,1-Trichloroethane	ug/L	<0.50	0.50 U		20	
1,1,2,2-Tetrachloroethane	ug/L	<0.50	0.50 U		20	
1,1,2-Trichloroethane	ug/L	<0.50	0.50 U		20	
1,1-Dichloroethane	ug/L	<0.50	0.50 U		20	
1,1-Dichloroethane	ug/L	<0.50	0.50 U		20	
1,1-Dichloropropene	ug/L	<0.50	0.50 U		20	
1,2,3-Trichlorobenzene	ug/L	<0.50	0.50 U		20	
1,2,3-Trichloropropane	ug/L	<0.50	0.50 U		20	
1,2,4-Trichlorobenzene	ug/L	<0.50	0.50 U		20	
1,2,4-Trimethylbenzene	ug/L	<0.50	0.50 U		20	
1,2-Dichlorobenzene	ug/L	<0.50	0.50 U		20	
1,2-Dichloroethane	ug/L	<0.50	0.50 U		20	
1,2-Dichloropropane	ug/L	<0.50	0.50 U		20	
1,3,5-Trimethylbenzene	ug/L	<0.50	0.50 U		20	
1,3-Dichlorobenzene	ug/L	<0.50	0.50 U		20	
1,3-Dichloropropane	ug/L	<0.50	0.50 U		20	
1,4-Dichlorobenzene	ug/L	<0.50	0.50 U		20	
2,2-Dichloropropane	ug/L	<0.50	0.50 U		20	
2-Chlorotoluene	ug/L	<0.50	0.50 U		20	
4-Chlorotoluene	ug/L	<0.50	0.50 U		20	
Benzene	ug/L	<0.50	0.50 U		20	
Bromobenzene	ug/L	<0.50	0.50 U		20	
Bromochloromethane	ug/L	<0.50	0.50 U		20	
Bromodichloromethane	ug/L	<0.50	0.50 U		20	
Bromoform	ug/L	<0.50	0.50 U		20	
Bromomethane	ug/L	<0.50	0.50 U		20	
Carbon tetrachloride	ug/L	<0.50	0.50 U		20	
Chlorobenzene	ug/L	<0.50	0.50 U		20	
Chloroethane	ug/L	<0.50	0.50 U		20	
Chloroform	ug/L	<0.50	0.50 U		20	
Chloromethane	ug/L	<0.50	0.50 U		20	
cis-1,2-Dichloroethene	ug/L	<0.50	0.50 U		20	
cis-1,3-Dichloropropene	ug/L	<0.50	0.50 U		20	
Dibromochloromethane	ug/L	<0.50	0.50 U		20	
Dibromomethane	ug/L	<0.50	0.50 U		20	
Dichlorodifluoromethane	ug/L	<0.50	0.50 U		20	
Ethylbenzene	ug/L	<0.50	0.50 U		20	
Hexachloro-1,3-butadiene	ug/L	<0.50	0.50 U		20	
Isopropylbenzene (Cumene)	ug/L	<0.50	0.50 U		20	
m&p-Xylene	ug/L	<0.50	0.50 U		20	
Methyl-tert-butyl ether	ug/L	0.76	0.71	6	20	
Methylene Chloride	ug/L	<0.50	0.50 U		20	
n-Butylbenzene	ug/L	<0.50	0.50 U		20	
n-Propylbenzene	ug/L	<0.50	0.50 U		20	
o-Xylene	ug/L	<0.50	0.50 U		20	
p-Isopropyltoluene	ug/L	<0.50	0.50 U		20	

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Pace Analytical Services, LLC
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Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL DATA

Project: 190292-2
Pace Project No.: 30481175

SAMPLE DUPLICATE: 1280433

Parameter	Units	70211589001 Result	Dup Result	RPD	Max RPD	Qualifiers
sec-Butylbenzene	ug/L	<0.50	0.50 U		20	
Styrene	ug/L	<0.50	0.50 U		20	
tert-Butylbenzene	ug/L	<0.50	0.50 U		20	
Tetrachloroethene	ug/L	96.0	84.9	12	20	
Toluene	ug/L	<0.50	0.50 U		20	
Total Trihalomethanes (Calc.)	ug/L	<0.50	0.50 U		20	
trans-1,2-Dichloroethene	ug/L	<0.50	0.50 U		20	
trans-1,3-Dichloropropene	ug/L	<0.50	0.50 U		20	
Trichloroethene	ug/L	1.5	1.3	11	20	
Trichlorofluoromethane	ug/L	<0.50	0.50 U		20	
Vinyl chloride	ug/L	<0.50	0.50 U		20	
Xylene (Total)	ug/L	<0.50	0.50 U		20	
1,2-Dichlorobenzene-d4 (S)	%	104	102		20	
4-Bromofluorobenzene (S)	%	97	95		20	

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(724)850-5600

QUALITY CONTROL DATA

Project: 190292-2
Pace Project No.: 30481175

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2417146 2417147

Parameter	Units	2417146		2417147		MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
		30481175001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result							
Xylene (Total)	ug/L	3.0 U	60	60	58.0	56.7	97	95	63-135	2	30	
1,2-Dichloroethane-d4 (S)	%						100	99	70-130			
4-Bromofluorobenzene (S)	%						98	102	70-130			
Dibromofluoromethane (S)	%						104	101	70-130			
Toluene-d8 (S)	%						99	99	70-130			

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(724)850-5600

QUALITY CONTROL DATA

Project: 190292-2
Pace Project No.: 30481175

QC Batch: 498034 Analysis Method: EPA 8015D
QC Batch Method: EPA 3510C Analysis Description: EPA 8015D TPH RV
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 30481175001, 30481175002, 30481175003, 30481175004, 30481175005, 30481175006, 30481175007, 30481175008, 30481175009, 30481175010

METHOD BLANK: 2410675 Matrix: Water
Associated Lab Samples: 30481175001, 30481175002, 30481175003, 30481175004, 30481175005, 30481175006, 30481175007, 30481175008, 30481175009, 30481175010

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
TPH (C10-C28)	mg/L	0.10 U	0.10	0.069	04/21/22 23:13	
o-Terphenyl (S)	%	71	25-105		04/21/22 23:13	

LABORATORY CONTROL SAMPLE: 2410676

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
TPH (C10-C28)	mg/L	1	0.83	83	46-110	
o-Terphenyl (S)	%			66	25-105	

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Greensburg, PA 15601
(724)850-5600

QUALIFIERS

Project: 190292-2
Pace Project No.: 30481175

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.
 ND - Not Detected at or above adjusted reporting limit.
 TNTC - Too Numerous To Count
 J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.
 MDL - Adjusted Method Detection Limit.
 PQL - Practical Quantitation Limit.
 RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.
 S - Surrogate
 1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.
 Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.
 LCS(D) - Laboratory Control Sample (Duplicate)
 MS(D) - Matrix Spike (Duplicate)
 DUP - Sample Duplicate
 RPD - Relative Percent Difference
 NC - Not Calculable.
 SG - Silica Gel - Clean-Up
 U - Indicates the compound was analyzed for, but not detected.
 N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.
 Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.
 Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.
 TNI - The NELAC Institute.

SAMPLE QUALIFIERS

Sample: 30481175008
 [1] 8260: Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
 Sample: 30481175010
 [1] The pH of the vial used for GRO analysis was 5.

BATCH QUALIFIERS

Batch: 498034
 [M5] A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

ANALYTE QUALIFIERS

B Analyte was detected in the associated method blank.
 L1 Analyte recovery in the laboratory control sample (LCS) was above QC limits. Results for this analyte in associated samples may be biased high.
 ML Matrix spike recovery and/or matrix spike duplicate recovery was below laboratory control limits. Result may be biased low.
 P2 Re-extraction or re-analysis could not be performed due to insufficient sample amount.
 S0 Surrogate recovery outside laboratory control limits.
 S4 Surrogate recovery not evaluated against control limits due to sample dilution.

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Greensburg, PA 15601
(724)850-5600

QUALIFIERS

Project: 190292-2
Pace Project No.: 30481175

ANALYTE QUALIFIERS

SR Surrogate recovery was below laboratory control limits. Results may be biased low.
 ST Surrogate recovery was above laboratory control limits. Results may be biased high.

REPORT OF LABORATORY ANALYSIS

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Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 190292-2
Pace Project No.: 30481175

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30481175001	MW-12	EPA 3510C	498034	EPA 8015D	498176
30481175002	MW-1	EPA 3510C	498034	EPA 8015D	498176
30481175003	MW-16	EPA 3510C	498034	EPA 8015D	498176
30481175004	MW-4	EPA 3510C	498034	EPA 8015D	498176
30481175005	MW-7	EPA 3510C	498034	EPA 8015D	498176
30481175006	MW-8	EPA 3510C	498034	EPA 8015D	498176
30481175007	MW-9	EPA 3510C	498034	EPA 8015D	498176
30481175008	MW-10	EPA 3510C	498034	EPA 8015D	498176
30481175009	MW-14	EPA 3510C	498034	EPA 8015D	498176
30481175010	MW-15	EPA 3510C	498034	EPA 8015D	498176
30481175001	MW-12	EPA 5030/8015B	499048		
30481175002	MW-1	EPA 5030/8015B	499048		
30481175003	MW-16	EPA 5030/8015B	499048		
30481175004	MW-4	EPA 5030/8015B	499048		
30481175005	MW-7	EPA 5030/8015B	499048		
30481175006	MW-8	EPA 5030/8015B	499048		
30481175007	MW-9	EPA 5030/8015B	499048		
30481175008	MW-10	EPA 5030/8015B	499048		
30481175009	MW-14	EPA 5030/8015B	499048		
30481175010	MW-15	EPA 5030/8015B	499048		
30481175011	OWW	EPA 524.2	253351		
30481175001	MW-12	EPA 8260B	499412		
30481175002	MW-1	EPA 8260B	499412		
30481175003	MW-16	EPA 8260B	499412		
30481175004	MW-4	EPA 8260B	499412		
30481175005	MW-7	EPA 8260B	499412		
30481175006	MW-8	EPA 8260B	499412		
30481175007	MW-9	EPA 8260B	499412		
30481175008	MW-10	EPA 8260B	499412		
30481175009	MW-14	EPA 8260B	499412		
30481175010	MW-15	EPA 8260B	499412		
30481175012	Trip Blank	EPA 8260B	499412		

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Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

April 25, 2022

Skyler Richmond
PACE-PA

RE: Project: 30481175
Pace Project No.: 70211477

Dear Skyler Richmond:

Enclosed are the analytical results for sample(s) received by the laboratory on April 19, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:
• Pace Analytical Services - Melville

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Elizabeth Harrison for
Catherine M. Gierbolini
catherine.gierbolini@pacelabs.com
(631)694-3040
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
 575 Broad Hollow Road
 Melville, NY 11747
 (631)694-3040

CERTIFICATIONS

Project: 30481175
 Pace Project No.: 70211477

Pace Analytical Services Long Island

575 Broad Hollow Rd, Melville, NY 11747
 Connecticut Certification #: PH-0435
 Delaware Certification # NY 10478
 Maryland Certification #: 208
 Massachusetts Certification #: M-NY026
 New Hampshire Certification #: 2987

New Jersey Certification #: NY158
 New York Certification #: 10478 Primary Accrediting Body
 Pennsylvania Certification #: 68-00350
 Rhode Island Certification #: LAO00340
 Virginia Certification # 460302

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Pace Analytical Services, LLC
 575 Broad Hollow Road
 Melville, NY 11747
 (631)694-3040

SAMPLE SUMMARY

Project: 30481175
 Pace Project No.: 70211477

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30481175011	OWW	Drinking Water	04/13/22 13:00	04/19/22 10:30

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(631)694-3040

SAMPLE ANALYTE COUNT

Project: 30481175
Pace Project No.: 70211477

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30481175011	OWW	EPA 524.2	KGG	61

PACE-MV = Pace Analytical Services - Melville

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ANALYTICAL RESULTS

Project: 30481175
Pace Project No.: 70211477

Sample: OWW Lab ID: 30481175011 Collected: 04/13/22 13:00 Received: 04/19/22 10:30 Matrix: Drinking Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
524.2 MSV								
Analytical Method: EPA 524.2								
Pace Analytical Services - Melville								
Benzene	0.50 U	ug/L	0.50	1		04/21/22 19:06	71-43-2	
Bromobenzene	0.50 U	ug/L	0.50	1		04/21/22 19:06	108-86-1	
Bromochloromethane	0.50 U	ug/L	0.50	1		04/21/22 19:06	74-97-5	
Bromodichloromethane	0.50 U	ug/L	0.50	1		04/21/22 19:06	75-27-4	
Bromofom	0.50 U	ug/L	0.50	1		04/21/22 19:06	75-25-2	
Bromomethane	0.50 U	ug/L	0.50	1		04/21/22 19:06	74-83-9	
n-Butylbenzene	0.50 U	ug/L	0.50	1		04/21/22 19:06	104-51-8	
sec-Butylbenzene	0.50 U	ug/L	0.50	1		04/21/22 19:06	135-98-8	
tert-Butylbenzene	0.50 U	ug/L	0.50	1		04/21/22 19:06	98-06-6	
Carbon tetrachloride	0.50 U	ug/L	0.50	1		04/21/22 19:06	56-23-5	
Chlorobenzene	0.50 U	ug/L	0.50	1		04/21/22 19:06	108-90-7	
Chloroethane	0.50 U	ug/L	0.50	1		04/21/22 19:06	75-00-3	
Chloroform	0.50 U	ug/L	0.50	1		04/21/22 19:06	67-66-3	
Chloromethane	0.50 U	ug/L	0.50	1		04/21/22 19:06	74-87-3	
2-Chlorotoluene	0.50 U	ug/L	0.50	1		04/21/22 19:06	95-49-8	
4-Chlorotoluene	0.50 U	ug/L	0.50	1		04/21/22 19:06	106-43-4	
Dibromochloromethane	0.50 U	ug/L	0.50	1		04/21/22 19:06	124-48-1	
Dibromomethane	0.50 U	ug/L	0.50	1		04/21/22 19:06	74-95-3	
1,2-Dichlorobenzene	0.50 U	ug/L	0.50	1		04/21/22 19:06	95-50-1	
1,3-Dichlorobenzene	0.50 U	ug/L	0.50	1		04/21/22 19:06	541-73-1	
1,4-Dichlorobenzene	0.50 U	ug/L	0.50	1		04/21/22 19:06	106-46-7	
Dichlorodifluoromethane	0.50 U	ug/L	0.50	1		04/21/22 19:06	75-71-8	
1,1-Dichloroethane	0.50 U	ug/L	0.50	1		04/21/22 19:06	75-34-3	
1,2-Dichloroethane	0.50 U	ug/L	0.50	1		04/21/22 19:06	107-06-2	
1,1-Dichloroethene	0.50 U	ug/L	0.50	1		04/21/22 19:06	75-35-4	
cis-1,2-Dichloroethene	0.50 U	ug/L	0.50	1		04/21/22 19:06	156-59-2	
trans-1,2-Dichloroethene	0.50 U	ug/L	0.50	1		04/21/22 19:06	156-60-5	
1,2-Dichloropropane	0.50 U	ug/L	0.50	1		04/21/22 19:06	78-87-5	
1,3-Dichloropropane	0.50 U	ug/L	0.50	1		04/21/22 19:06	142-28-9	
2,2-Dichloropropane	0.50 U	ug/L	0.50	1		04/21/22 19:06	594-20-7	
1,1-Dichloropropene	0.50 U	ug/L	0.50	1		04/21/22 19:06	563-58-6	
cis-1,3-Dichloropropene	0.50 U	ug/L	0.50	1		04/21/22 19:06	10061-01-5	
trans-1,3-Dichloropropene	0.50 U	ug/L	0.50	1		04/21/22 19:06	10061-02-6	
Ethylbenzene	0.50 U	ug/L	0.50	1		04/21/22 19:06	100-41-4	
Hexachloro-1,3-butadiene	0.50 U	ug/L	0.50	1		04/21/22 19:06	87-68-3	
Isopropylbenzene (Cumene)	0.50 U	ug/L	0.50	1		04/21/22 19:06	98-82-8	
p-Isopropyltoluene	0.50 U	ug/L	0.50	1		04/21/22 19:06	99-87-6	
Methylene Chloride	0.50 U	ug/L	0.50	1		04/21/22 19:06	75-09-2	
Methyl-tert-butyl ether	0.50 U	ug/L	0.50	1		04/21/22 19:06	1634-04-4	L1
n-Propylbenzene	0.50 U	ug/L	0.50	1		04/21/22 19:06	103-65-1	
Styrene	0.50 U	ug/L	0.50	1		04/21/22 19:06	100-42-5	
1,1,1,2-Tetrachloroethane	0.50 U	ug/L	0.50	1		04/21/22 19:06	630-20-6	
1,1,2,2-Tetrachloroethane	0.50 U	ug/L	0.50	1		04/21/22 19:06	79-34-5	
Tetrachloroethene	0.50 U	ug/L	0.50	1		04/21/22 19:06	127-18-4	
Toluene	0.50 U	ug/L	0.50	1		04/21/22 19:06	108-88-3	
Total Trihalomethanes (Calc.)	0.50 U	ug/L	0.50	1		04/21/22 19:06		

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

ANALYTICAL RESULTS

Project: 30481175

Pace Project No.: 70211477

Sample: **OWW** Lab ID: **30481175011** Collected: 04/13/22 13:00 Received: 04/19/22 10:30 Matrix: Drinking Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Analytical Method: EPA 524.2								
Pace Analytical Services - Melville								
1,2,3-Trichlorobenzene	0.50 U	ug/L	0.50	1	04/21/22 19:06	87-61-6		
1,2,4-Trichlorobenzene	0.50 U	ug/L	0.50	1	04/21/22 19:06	120-82-1		
1,1,1-Trichloroethane	0.50 U	ug/L	0.50	1	04/21/22 19:06	71-55-6		
1,1,2-Trichloroethane	0.50 U	ug/L	0.50	1	04/21/22 19:06	79-00-5		
Trichloroethene	0.50 U	ug/L	0.50	1	04/21/22 19:06	79-01-6		
Trichlorofluoromethane	0.50 U	ug/L	0.50	1	04/21/22 19:06	75-69-4		
1,2,3-Trichloropropane	0.50 U	ug/L	0.50	1	04/21/22 19:06	96-18-4		
1,2,4-Trimethylbenzene	0.50 U	ug/L	0.50	1	04/21/22 19:06	95-63-6		
1,3,5-Trimethylbenzene	0.50 U	ug/L	0.50	1	04/21/22 19:06	108-67-8		
Vinyl chloride	0.50 U	ug/L	0.50	1	04/21/22 19:06	75-01-4		
Xylene (Total)	0.50 U	ug/L	0.50	1	04/21/22 19:06	1330-20-7		
m&p-Xylene	0.50 U	ug/L	0.50	1	04/21/22 19:06	179601-23-1		
o-Xylene	0.50 U	ug/L	0.50	1	04/21/22 19:06	95-47-6		
Surrogates								
1,2-Dichlorobenzene-d4 (S)	98	%	70-130	1	04/21/22 19:06	2199-69-1		
4-Bromofluorobenzene (S)	95	%	70-130	1	04/21/22 19:06	460-00-4		

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QUALITY CONTROL DATA

Project: 30481175

Pace Project No.: 70211477

QC Batch: 253351 Analysis Method: EPA 524.2
QC Batch Method: EPA 524.2 Analysis Description: 524.2 MSV
Laboratory: Pace Analytical Services - Melville

Associated Lab Samples: 30481175011

METHOD BLANK: 1279903 Matrix: Water

Associated Lab Samples: 30481175011

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	0.50 U	0.50	04/21/22 16:49	
1,1,1-Trichloroethane	ug/L	0.50 U	0.50	04/21/22 16:49	
1,1,2,2-Tetrachloroethane	ug/L	0.50 U	0.50	04/21/22 16:49	
1,1,2-Trichloroethane	ug/L	0.50 U	0.50	04/21/22 16:49	
1,1-Dichloroethane	ug/L	0.50 U	0.50	04/21/22 16:49	
1,1-Dichloroethene	ug/L	0.50 U	0.50	04/21/22 16:49	
1,1-Dichloropropene	ug/L	0.50 U	0.50	04/21/22 16:49	
1,2,3-Trichlorobenzene	ug/L	0.50 U	0.50	04/21/22 16:49	
1,2,3-Trichloropropane	ug/L	0.50 U	0.50	04/21/22 16:49	
1,2,4-Trichlorobenzene	ug/L	0.50 U	0.50	04/21/22 16:49	
1,2,4-Trimethylbenzene	ug/L	0.50 U	0.50	04/21/22 16:49	
1,2-Dichlorobenzene	ug/L	0.50 U	0.50	04/21/22 16:49	
1,2-Dichloroethane	ug/L	0.50 U	0.50	04/21/22 16:49	
1,2-Dichloropropane	ug/L	0.50 U	0.50	04/21/22 16:49	
1,3,5-Trimethylbenzene	ug/L	0.50 U	0.50	04/21/22 16:49	
1,3-Dichlorobenzene	ug/L	0.50 U	0.50	04/21/22 16:49	
1,3-Dichloropropane	ug/L	0.50 U	0.50	04/21/22 16:49	
1,4-Dichlorobenzene	ug/L	0.50 U	0.50	04/21/22 16:49	
2,2-Dichloropropane	ug/L	0.50 U	0.50	04/21/22 16:49	
2-Chlorotoluene	ug/L	0.50 U	0.50	04/21/22 16:49	
4-Chlorotoluene	ug/L	0.50 U	0.50	04/21/22 16:49	
Benzene	ug/L	0.50 U	0.50	04/21/22 16:49	
Bromobenzene	ug/L	0.50 U	0.50	04/21/22 16:49	
Bromochloromethane	ug/L	0.50 U	0.50	04/21/22 16:49	
Bromodichloromethane	ug/L	0.50 U	0.50	04/21/22 16:49	
Bromoform	ug/L	0.50 U	0.50	04/21/22 16:49	
Bromomethane	ug/L	0.50 U	0.50	04/21/22 16:49	
Carbon tetrachloride	ug/L	0.50 U	0.50	04/21/22 16:49	
Chlorobenzene	ug/L	0.50 U	0.50	04/21/22 16:49	
Chloroethane	ug/L	0.50 U	0.50	04/21/22 16:49	
Chloroform	ug/L	0.50 U	0.50	04/21/22 16:49	
Chloromethane	ug/L	0.50 U	0.50	04/21/22 16:49	
cis-1,2-Dichloroethene	ug/L	0.50 U	0.50	04/21/22 16:49	
cis-1,3-Dichloropropene	ug/L	0.50 U	0.50	04/21/22 16:49	
Dibromochloromethane	ug/L	0.50 U	0.50	04/21/22 16:49	
Dibromomethane	ug/L	0.50 U	0.50	04/21/22 16:49	
Dichlorodifluoromethane	ug/L	0.50 U	0.50	04/21/22 16:49	
Ethylbenzene	ug/L	0.50 U	0.50	04/21/22 16:49	
Hexachloro-1,3-butadiene	ug/L	0.50 U	0.50	04/21/22 16:49	
Isopropylbenzene (Cumene)	ug/L	0.50 U	0.50	04/21/22 16:49	

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QUALITY CONTROL DATA

Project: 30481175
Pace Project No.: 70211477

METHOD BLANK: 1279903 Matrix: Water
Associated Lab Samples: 30481175011

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
m&p-Xylene	ug/L	0.50 U	0.50	04/21/22 16:49	
Methyl-tert-butyl ether	ug/L	0.50 U	0.50	04/21/22 16:49	
Methylene Chloride	ug/L	0.50 U	0.50	04/21/22 16:49	
n-Butylbenzene	ug/L	0.50 U	0.50	04/21/22 16:49	
n-Propylbenzene	ug/L	0.50 U	0.50	04/21/22 16:49	
o-Xylene	ug/L	0.50 U	0.50	04/21/22 16:49	
p-Isopropyltoluene	ug/L	0.50 U	0.50	04/21/22 16:49	
sec-Butylbenzene	ug/L	0.50 U	0.50	04/21/22 16:49	
Styrene	ug/L	0.50 U	0.50	04/21/22 16:49	
tert-Butylbenzene	ug/L	0.50 U	0.50	04/21/22 16:49	
Tetrachloroethene	ug/L	0.50 U	0.50	04/21/22 16:49	
Toluene	ug/L	0.50 U	0.50	04/21/22 16:49	
Total Trihalomethanes (Calc.)	ug/L	0.50 U	0.50	04/21/22 16:49	
trans-1,2-Dichloroethene	ug/L	0.50 U	0.50	04/21/22 16:49	
trans-1,3-Dichloropropene	ug/L	0.50 U	0.50	04/21/22 16:49	
Trichloroethene	ug/L	0.50 U	0.50	04/21/22 16:49	
Trichlorofluoromethane	ug/L	0.50 U	0.50	04/21/22 16:49	
Vinyl chloride	ug/L	0.50 U	0.50	04/21/22 16:49	
Xylene (Total)	ug/L	0.50 U	0.50	04/21/22 16:49	
1,2-Dichlorobenzene-d4 (S)	%	101	70-130	04/21/22 16:49	
4-Bromofluorobenzene (S)	%	96	70-130	04/21/22 16:49	

LABORATORY CONTROL SAMPLE: 1279904

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	10	10.6	106	70-130	
1,1,1-Trichloroethane	ug/L	10	10.8	108	70-130	
1,1,2,2-Tetrachloroethane	ug/L	10	11.7	117	70-130	
1,1,2-Trichloroethane	ug/L	10	11.4	114	70-130	
1,1-Dichloroethane	ug/L	10	11.1	111	70-130	
1,1-Dichloroethene	ug/L	10	10.4	104	70-130	
1,1-Dichloropropene	ug/L	10	11.2	112	70-130	
1,2,3-Trichlorobenzene	ug/L	10	11.1	111	70-130	
1,2,3-Trichloropropane	ug/L	10	11.3	113	70-130	
1,2,4-Trichlorobenzene	ug/L	10	11.1	111	70-130	
1,2,4-Trimethylbenzene	ug/L	10	11.5	115	70-130	
1,2-Dichlorobenzene	ug/L	10	11.9	119	70-130	
1,2-Dichloroethane	ug/L	10	10.9	109	70-130	
1,2-Dichloropropane	ug/L	10	10.9	109	70-130	
1,3,5-Trimethylbenzene	ug/L	10	11.0	110	70-130	
1,3-Dichlorobenzene	ug/L	10	11.6	116	70-130	
1,3-Dichloropropane	ug/L	10	11.0	110	70-130	
1,4-Dichlorobenzene	ug/L	10	11.9	119	70-130	
2,2-Dichloropropane	ug/L	10	10.7	107	70-130	

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(631)694-3040

QUALITY CONTROL DATA

Project: 30481175
Pace Project No.: 70211477

LABORATORY CONTROL SAMPLE: 1279904

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2-Chlorotoluene	ug/L	10	11.2	112	70-130	
4-Chlorotoluene	ug/L	10	11.7	117	70-130	
Benzene	ug/L	10	11.1	111	70-130	
Bromobenzene	ug/L	10	11.6	116	70-130	
Bromochloromethane	ug/L	10	11.3	113	70-130	
Bromodichloromethane	ug/L	10	10.4	104	70-130	
Bromoform	ug/L	10	10.5	105	70-130	
Bromomethane	ug/L	10	9.7	97	70-130	
Carbon tetrachloride	ug/L	10	10.4	104	70-130	
Chlorobenzene	ug/L	10	11.5	115	70-130	
Chloroethane	ug/L	10	9.7	97	70-130	
Chloroform	ug/L	10	11.1	111	70-130	
Chloromethane	ug/L	10	10.9	109	70-130	
cis-1,2-Dichloroethene	ug/L	10	10.5	105	70-130	
cis-1,3-Dichloropropene	ug/L	10	10.7	107	70-130	
Dibromochloromethane	ug/L	10	11.0	110	70-130	
Dibromomethane	ug/L	10	11.0	110	70-130	
Dichlorodifluoromethane	ug/L	10	9.6	96	70-130	
Ethylbenzene	ug/L	10	11.3	113	70-130	
Hexachloro-1,3-butadiene	ug/L	10	11.1	111	70-130	
Isopropylbenzene (Cumene)	ug/L	10	11.6	116	70-130	
m&p-Xylene	ug/L	20	22.1	110	70-130	
Methyl-tert-butyl ether	ug/L	10	15.3	153	70-130 L1	
Methylene Chloride	ug/L	10	10.3	103	70-130	
n-Butylbenzene	ug/L	10	11.6	116	70-130	
n-Propylbenzene	ug/L	10	11.3	113	70-130	
o-Xylene	ug/L	10	11.4	114	70-130	
p-Isopropyltoluene	ug/L	10	11.2	112	70-130	
sec-Butylbenzene	ug/L	10	11.4	114	70-130	
Styrene	ug/L	10	11.5	115	70-130	
tert-Butylbenzene	ug/L	10	11.6	116	70-130	
Tetrachloroethene	ug/L	10	10.8	108	70-130	
Toluene	ug/L	10	11.1	111	70-130	
Total Trihalomethanes (Calc.)	ug/L		43.0			
trans-1,2-Dichloroethene	ug/L	10	11.6	116	70-130	
trans-1,3-Dichloropropene	ug/L	10	11.0	110	70-130	
Trichloroethene	ug/L	10	10.8	108	70-130	
Trichlorofluoromethane	ug/L	10	11.2	112	70-130	
Vinyl chloride	ug/L	10	10.2	102	70-130	
Xylene (Total)	ug/L	30	33.5	112	70-130	
1,2-Dichlorobenzene-d4 (S)	%			111	70-130	
4-Bromofluorobenzene (S)	%			101	70-130	

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QUALITY CONTROL DATA

Project: 30481175
Pace Project No.: 70211477

SAMPLE DUPLICATE: 1280433

Parameter	Units	70211589001 Result	Dup Result	RPD	Max RPD	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	<0.50	0.50 U		20	
1,1,1-Trichloroethane	ug/L	<0.50	0.50 U		20	
1,1,2,2-Tetrachloroethane	ug/L	<0.50	0.50 U		20	
1,1,2-Trichloroethane	ug/L	<0.50	0.50 U		20	
1,1-Dichloroethane	ug/L	<0.50	0.50 U		20	
1,1-Dichloroethane	ug/L	<0.50	0.50 U		20	
1,1-Dichloropropene	ug/L	<0.50	0.50 U		20	
1,2,3-Trichlorobenzene	ug/L	<0.50	0.50 U		20	
1,2,3-Trichloropropane	ug/L	<0.50	0.50 U		20	
1,2,4-Trichlorobenzene	ug/L	<0.50	0.50 U		20	
1,2,4-Trimethylbenzene	ug/L	<0.50	0.50 U		20	
1,2-Dichlorobenzene	ug/L	<0.50	0.50 U		20	
1,2-Dichloroethane	ug/L	<0.50	0.50 U		20	
1,2-Dichloropropane	ug/L	<0.50	0.50 U		20	
1,3,5-Trimethylbenzene	ug/L	<0.50	0.50 U		20	
1,3-Dichlorobenzene	ug/L	<0.50	0.50 U		20	
1,3-Dichloropropane	ug/L	<0.50	0.50 U		20	
1,4-Dichlorobenzene	ug/L	<0.50	0.50 U		20	
2,2-Dichloropropane	ug/L	<0.50	0.50 U		20	
2-Chlorotoluene	ug/L	<0.50	0.50 U		20	
4-Chlorotoluene	ug/L	<0.50	0.50 U		20	
Benzene	ug/L	<0.50	0.50 U		20	
Bromobenzene	ug/L	<0.50	0.50 U		20	
Bromochloromethane	ug/L	<0.50	0.50 U		20	
Bromodichloromethane	ug/L	<0.50	0.50 U		20	
Bromoform	ug/L	<0.50	0.50 U		20	
Bromomethane	ug/L	<0.50	0.50 U		20	
Carbon tetrachloride	ug/L	<0.50	0.50 U		20	
Chlorobenzene	ug/L	<0.50	0.50 U		20	
Chloroethane	ug/L	<0.50	0.50 U		20	
Chloroform	ug/L	<0.50	0.50 U		20	
Chloromethane	ug/L	<0.50	0.50 U		20	
cis-1,2-Dichloroethene	ug/L	<0.50	0.50 U		20	
cis-1,3-Dichloropropene	ug/L	<0.50	0.50 U		20	
Dibromochloromethane	ug/L	<0.50	0.50 U		20	
Dibromomethane	ug/L	<0.50	0.50 U		20	
Dichlorodifluoromethane	ug/L	<0.50	0.50 U		20	
Ethylbenzene	ug/L	<0.50	0.50 U		20	
Hexachloro-1,3-butadiene	ug/L	<0.50	0.50 U		20	
Isopropylbenzene (Cumene)	ug/L	<0.50	0.50 U		20	
m&p-Xylene	ug/L	<0.50	0.50 U		20	
Methyl-tert-butyl ether	ug/L	0.76	0.71	6	20	
Methylene Chloride	ug/L	<0.50	0.50 U		20	
n-Butylbenzene	ug/L	<0.50	0.50 U		20	
n-Propylbenzene	ug/L	<0.50	0.50 U		20	
o-Xylene	ug/L	<0.50	0.50 U		20	
p-Isopropyltoluene	ug/L	<0.50	0.50 U		20	

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QUALITY CONTROL DATA

Project: 30481175
Pace Project No.: 70211477

SAMPLE DUPLICATE: 1280433

Parameter	Units	70211589001 Result	Dup Result	RPD	Max RPD	Qualifiers
sec-Butylbenzene	ug/L	<0.50	0.50 U		20	
Styrene	ug/L	<0.50	0.50 U		20	
tert-Butylbenzene	ug/L	<0.50	0.50 U		20	
Tetrachloroethene	ug/L	96.0	84.9	12	20	
Toluene	ug/L	<0.50	0.50 U		20	
Total Trihalomethanes (Calc.)	ug/L	<0.50	0.50 U		20	
trans-1,2-Dichloroethene	ug/L	<0.50	0.50 U		20	
trans-1,3-Dichloropropene	ug/L	<0.50	0.50 U		20	
Trichloroethene	ug/L	1.5	1.3	11	20	
Trichlorofluoromethane	ug/L	<0.50	0.50 U		20	
Vinyl chloride	ug/L	<0.50	0.50 U		20	
Xylene (Total)	ug/L	<0.50	0.50 U		20	
1,2-Dichlorobenzene-d4 (S)	%	104	102		20	
4-Bromofluorobenzene (S)	%	97	95		20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Date: 04/25/2022 06:31 PM



Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALIFIERS

Project: 30481175
Pace Project No.: 70211477

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.
 ND - Not Detected at or above adjusted reporting limit.
 TNTC - Too Numerous To Count
 J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.
 MDL - Adjusted Method Detection Limit.
 PQL - Practical Quantitation Limit.
 RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.
 S - Surrogate
 1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.
 Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.
 LCS(D) - Laboratory Control Sample (Duplicate)
 MS(D) - Matrix Spike (Duplicate)
 DUP - Sample Duplicate
 RPD - Relative Percent Difference
 NC - Not Calculable.
 SG - Silica Gel - Clean-Up
 U - Indicates the compound was analyzed for, but not detected.
 N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.
 Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.
 Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.
 TNI - The NELAC Institute.

ANALYTE QUALIFIERS

L1 Analyte recovery in the laboratory control sample (LCS) was above QC limits. Results for this analyte in associated samples may be biased high.

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 30481175
Pace Project No.: 70211477

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30481175011	OWW	EPA 524.2	253351		

REPORT OF LABORATORY ANALYSIS

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Date: 04/25/2022 06:31 PM



Sample Condition Upon Receipt

WO#: 70211477

Client Name: Pace - PA

Proj

PM: CMG Due Date: 04/22/22

CLIENT: PACE-PA

Courier: Fed UPS USPS Client Commercial Pace Other

Tracking #: 8167 5344 4099 4612

Custody Seal on Cooler/Box Present: Yes No N/A

Packing Material: Bubble Wrap Bubble Bags Ziploc None Other

Thermometer Used: TH091

Correction Factor: ± 0.1 Cooler Temperature Corrected(°C): 0.4

Temperature Blank Present: Yes No

Type of Ice: Wet Blue None

Samples on ice, cooling process has begun

Date/Time 5035A kits placed in freezer

Temp should be above freezing to 6.0°C

USDA Regulated Soil N/A, water sample

Date and Initials of person examining contents: KW H19/22

Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX, or VA (check map)? Yes No

Did samples originate from a foreign source including Hawaii and Puerto Rico? Yes No

If Yes to either question, fill out a Regulated Soil Checklist (F-LI-C-010) and include with SCUR/COC paperwork

		COMMENTS:
Chain of Custody Present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	1.
Chain of Custody Filled Out:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	2.
Chain of Custody Relinquished:	<input type="checkbox"/> Yes <input type="checkbox"/> No	3.
Sampler Name & Signature on COC:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	4.
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	5.
Short Hold Time Analysis (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	6.
Rush Turn Around Time Requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	7.
Sufficient Volume: (Triple volume provided for)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	8.
Correct Containers Used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	9.
-Pace Containers Used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Containers Intact:	<input type="checkbox"/> Yes <input type="checkbox"/> No	10.
Filtered volume received for Dissolved tests	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	11. Note if sediment is visible in the dissolved container.
Sample Labels match COC:	<input type="checkbox"/> Yes <input type="checkbox"/> No	12.
-Includes date/time/ID/ Matrix: SL, WT, DIL		
All containers needing preservation have been checked?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	13. <input type="checkbox"/> HNO ₃ <input type="checkbox"/> H ₂ SO ₄ <input type="checkbox"/> NaOH <input type="checkbox"/> HCl
pH paper Lot #		Sample #
All containers needing preservation are found to be in compliance with method recommendation?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
(HNO ₃ , H ₂ SO ₄ , HCl, NaOH-9 Sulfide, NAOH-12 Cyanide)		
Exceptions: VOA, Coliform, TOC/DOC, Oil and Grease, DRO/8015 (water).		Initial when completed: Lot # of added preservative: Date/Time preservative added:
Per Method, VOA pH is checked after analysis		
Samples checked for dechlorination:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	14.
KI starch test strips Lot #		Positive for Res. Chlorine? Y N
Residual chlorine strips Lot #		
SM 4500 CN samples checked for sulfide?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	15. Positive for Sulfide? Y N
Lead Acetate Strips Lot #		
Headspace in VOA Vials (>6mm):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	16.
Trip Blank Present:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	17.
Trip Blank Custody Seals Present	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Pace Trip Blank Lot # (if applicable):		

Field Data Required? Y / N

Date/Time:

Client Notification/ Resolution:

Person Contacted:

Comments/ Resolution:

WO#: 30481175

CHAIN-OF-CUSTODY Analytical Request Document

Company: ARM GROUP LLC
 Billing Information: ARM GROUP INC
 1129 WEST GOVERNOR ROAD
 HERSHEY, PA 17033

Address: ARM GROUP LLC
 9175 GUILFORD ROAD, STE 310
 COLUMBIA MD 21046

Report To: DOUG HAMILTON
 dhilton@armgroup.net

Site Collection Info/Address:
 SMO-550
 2631 Annapolis Road
 Hanover, MD

State: MD County/City: ANNE ARUNDEL Time Zone Collected: 0900-1500 EDT

Customer Project Name/Number: 190292-2

Phone: 443-255-1633 Site/Facility ID: SMO-550/Hanover MD Compliance Monitoring? [X] Yes [] No

Collected By (Print): *Lower Peter* Purchase Order #: 190292-2 DW PWS ID #: DW Location Code:

Collected By (Signature): *[Signature]* Turnaround Date Required: NORMAL Immediately Packed on Ice: [X] Yes [] No

Sample Disposal: [] Return [] Same Day [] Next Day Field Filtered (if applicable): [] Yes [X] No

* Matrix Codes (insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Time	Composite End Date	Time	Res Cl	# of Ctns	VOC+OXYGENATES INCLUDING ETHANOL, 1,2,4-TMB & 1,3,5-TMB BY EPA 8260	GRO 8015	IDRO 8015	VOC + OXYGENATES 524-2
MW-12	GW	G	4/13/2022	9:15				7	X	X	X	
MW-1	GW	G	4/13/2022	9:40				7	X	X	X	
MW-16	GW	G	4/13/2022	10:15				7	X	X	X	
MW-4	GW	G	4/13/2022	10:35				7	X	X	X	
MW-7	GW	G	4/13/2022	11:00				7	X	X	X	
MW-8	GW	G	4/13/2022	11:35				7	X	X	X	
MW-9	GW	G	4/13/2022	12:10				7	X	X	X	
MW-10	GW	G	4/13/2022	13:10				7	X	X	X	
MW-14	GW	G	4/13/2022	13:50				7	X	X	X	
MW-15	GW	G	4/13/2022	14:45				7	X	X	X	
DWW	DW	G	4/13/2022	13:00				3			X	

Customer Remarks / Special Conditions / Possible Hazards: Type of Ice Used: Wet Blue Dry None SHORT HOLDS PRESENT (<72 hours): Y N N/A

Packing Material Used: Radchem sample(s) screened (<500 ppm): Y N NA Samples received via: FEDEX UPS Client Courier Pace Courier

Relinquished by/Company (Signature): *[Signature] / ARM* Date/Time: 04/12/22 Received by/Company (Signature): *[Signature]* Date/Time: 04/14/22 MDD Table #: MUS 415-22

Relinquished by/Company (Signature): *[Signature] / PACE* Date/Time: 04/12/22 17:40 Received by/Company (Signature): *[Signature]* Date/Time: 4/14/22 17:45

Relinquished by/Company (Signature): *[Signature] / RDS HACE* Date/Time: 4/14/22 22:45 Received by/Company (Signature): *[Signature]* Date/Time: 4-14-22 22:45

LAB USE ONLY: Lab Sample # / Comments: 001, 002, 003, 004, 005, 006, 007, 008, 009, 010, 011, 012-13

Internal Transfer Chain of Custody



Samples Pre-Logged into eCOC.

State Of Origin: MD
Cert. Needed: Yes No
Owner Received Date: 4/14/2022



Workorder: 30481175 Workorder Name: 190292-2

Results Requested By: 4/22/2022

Report To	Subcontract To	Requested Analysis
Skyler C, Richmond Pace Analytical Pittsburgh 1638 Roseytown Road Suites 2,3,4 Greensburg, PA 15601 Phone (724)850-5600	Pace Analytical Melville 575 Broad Hollow Road Melville, NY 11747 Phone (631)694-3040	524 VOC

WO#: 70211477

Item	Sample ID	Sample Type	Collect Date/Time	Lab ID	Matrix	HCL	LAB USE ONLY
1	DWW	PS	4/13/2022 13:00	30481175011	Drinking	1	X
2							
3							
4							
5							

Comments

Transfers	Released By	Date/Time	Received By	Date/Time
1	<i>[Signature]</i>	4/14/22 16:41	<i>[Signature]</i>	4/19/22 16:30
2				
3				

Cooler Temperature on Receipt 0.3 °C Custody Seal Y or N Received on Ice Y or N Samples Intact Y or N

***In order to maintain client confidentiality, location/name of the sampling site, sampler's name and signature may not be provided on this COC document. This chain of custody is considered complete as is since this information is available in the owner laboratory.

APPENDIX G
PETROLEUM RECOVERY GRAPH & DATABASE



