

REVISED FEASIBLE REMEDIAL ALTERNATIVES ANALYSIS REPORT

PUMP-N-PANTRY #001 PROPERTY

PADEP FACILITY ID #58-13092

USTIF CLAIM #2015-0126(I) & #2017-0021(I)

99 GROW AVENUE

BRIDGEWATER TOWNSHIP, SUSQUEHANNA COUNTY, PENNSYLVANIA

PREPARED FOR

PUMP-N-PANTRY, INC.

754 GROW AVENUE

MONTROSE, PENNSYLVANIA 18801

&

PAUSTIF

PREPARED BY

LABELLA ASSOCIATES, P.C.

1000 DUNHAM DRIVE

SUITE B

DUNMORE, PENNSYLVANIA 18512

(570) 487-1959

LABELLA ASSOCIATES PROJECT NUMBERS: 2171845 & 2171846

AUGUST 31, 2018

Submitted By:

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Martin P. Gilgallon, P.G.  
Regional Environmental Manager  
LaBella Associates, P.C.

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## 1. BACKGROUND

### 1.1 General

LaBella Associates, P.C., on behalf of Pump-n-Pantry, Incorporated, is pleased to present this Revised Feasible Remedial Alternatives Analysis Report in association with the Pump-n-Pantry #001 Property (subject property). The subject property is located at 99 Grow Avenue in Bridgewater Township, Susquehanna County, Pennsylvania. A Site Location Map (Figure 1) depicting the location of the subject property is included in Appendix A. Resumes of key personnel are included as Appendix B to this report.

### 1.2 Purpose of this Revised Feasible Remedial Alternatives Analysis Report

In January 2018, LaBella submitted a Final Site Characterization Report summarizing the activities conducted at the subject property between October 2015 and December 2017. The PADEP received and reviewed the January 2018 SCR and approved the SCR without comment. The SCR included a preliminary review of feasible remedial alternatives. Based on the comparison of potential remedial technologies, LaBella and the project stakeholders selected Oxygen Injection as the most viable remedial alternative to remediate the groundwater contamination at the subject property.

LaBella completed an Oxygen Injection pilot test at the subject property between June 1, 2018 and July 31, 2018. The pilot test activities were completed in accordance with the Pilot Test Work Plan that was submitted on April 25, 2018. Oxygen injection wells and monitoring points were installed during the period of June 11 through June 13, 2018. The treatment system trailer was mobilized to the site and installed during the week of June 25<sup>th</sup> 2018. Oxygen injection via the three (3) injection wells was conducted during the period of June 29 through July 16, 2018. In addition to the monitoring of field parameters (DO, ORP, pH, etc), LaBella collected pre-pilot test and post-pilot test groundwater samples for bioactivity analyses from wells upgradient and within the treatment cell.

The results of the Oxygen Injection pilot test program indicate Oxygen injection is not a viable remedial technology for the subject property. The purpose of this Revised Feasible Remedial Alternatives Analysis Report is to provide a summary of the historical site characterizations activities, to summarize the finding of the Oxygen Injection pilot test and to provide a Revised Feasible Remedial Alternatives Analysis to evaluate which remedial alternative is best suited to address the soil and groundwater contamination present at the subject property. Remedial alternatives were evaluated using eight (8) key considerations, as follows.

- Cost-effectiveness
- Proven performance
- Public & environment protectiveness
- Regulatory compliance
- Reliability
- Practical implementation
- Health & safety
- Effects on public health & the environment

### 1.3 Site Location and Legal Description

The subject property is located at 99 Grow Avenue in Bridgewater Township, Susquehanna County, Pennsylvania. The Leighter Corporation currently owns the subject property. Refer to Appendix A for a Susquehanna County Tax Map (Figure 2) depicting the subject property. The subject property consists of one (1) distinct parcel of land, as summarized in Table 1-1:

**Table 1-1  
Pump-n-Pantry #001  
Summary of Parcel Information**

Parcel Number	Lot Size	Instrument Number
124.15-1,001.00	5.18 acres	201301311

### 1.4 Site Description

The Pump-n-Pantry #001 Property is located at 99 Grow Avenue in Bridgewater Township, Susquehanna County, Pennsylvania. The subject property is developed with one (1) wood-frame office building (~3,600 square feet), one (1) convenience store building (~6,000 square feet), two (2) fuel island dispenser canopies and five (5) associated UST systems situated on 5.18 acres of land. The subject property maintains PADEP Facility ID #58-13092 in association with the current UST systems. The subject property is associated with PADEP Incident Numbers #48572 and #50143. USTIF Claim Numbers #2015-0126(I) and #2017-0021(I) apply to these incidents, respectively. The subject property is provided electricity by Penelec; water service is provided by the Pennsylvania American Water Company; and, sewer service is provided by the Montrose Municipal Authority. The convenience store building is heated via electric heat pumps. The site is located near a surface water drainage divide. The northern most portions of the subject property drain to the north while the majority of the site drains to the southwest. The average elevation of the subject property is 1,650 feet above mean sea level (M.S.L.), as indicated on the U.S.G.S. (7.5 Minute Series) Montrose East, Pennsylvania Quadrangle. Refer to Appendix A for a Site Sketch (Figure 3) and a Site Sketch with Aerial Overlay (Figure 4) depicting the subject property.

### 1.5 Review of Storage Tank Systems

#### 1.5.1 Review of Historical Storage Tank Systems

In 2015, facility-wide upgrade activities were conducted at the subject property. These activities included the construction of the current convenience store building and the installation of the five (5) current UST systems. The historical convenience store building was razed and the historical UST systems were removed once the new store and USTs were in operation. A summary of the historical USTs is provided in Table 1-2, as follows:

**Table 1-2**  
**Pump-n-Pantry #001 Property**  
**Summary of Historical UST Systems**

<b>Tank Number</b>	<b>Capacity (Gallons)</b>	<b>Product</b>	<b>Date of Closure</b>
001	12,000	Gasoline	1996
002	15,000	Gasoline	1996
003	5,000	Kerosene	October 2015
004	5,000	Diesel Fuel	October 2015
005	5,000	Diesel Fuel	October 2015
006	10,000	Gasoline	October 2015
007	15,000	Gasoline	October 2015

No documentation exists in association with the closure of Tank #001 or Tank #002 in 1996. Datom Products of Dunmore, Pennsylvania completed the closure, via removal, of Tank #003 thru Tank #007 at the subject property. Soil and groundwater contamination was detected during the removal activities in association with Tank #004. Datom Products collected a series of soil and groundwater samples as part of the tank closure activities. Subsequent to the review of the analytical data, it was determined that soil contamination, at concentrations exceeding applicable standards, was also associated with Tank #003, Tank #006, Tank #007 and the gasoline dispenser island.

#### 1.5.2 Review of Current Storage Tank Systems

The subject property currently maintains five (5) regulated UST systems. The subject property maintains PADEP Facility ID #58-13092 in association with these UST systems. Tank #008 through Tank #010 are located in a common cavity off the southeastern corner of the convenience store building. Tank #011 and Tank #012 are located in a common cavity to the northeast of the convenience store building. These USTs are reportedly in compliance with respect to corrosion protection, leak detection and spill and overfill prevention. According to PADEP records ([www.depreportingsvcs.state.pa.us](http://www.depreportingsvcs.state.pa.us)), the most recent Facility Operations Inspection was conducted on September 21, 2016. A summary of the current UST systems is provided in Table 1-3, as follows:

**Table 1-3**  
**Pump-n-Pantry #001 Property**  
**Summary of Current UST Systems**

<b>Tank Number</b>	<b>Capacity (Gallons)</b>	<b>Product</b>	<b>Date of Installation</b>
008	20,000	Gasoline	04/16/2015
009	5,000	Gasoline	04/16/2015
010	7,000	Diesel Fuel	04/16/2015
011	20,000	Diesel Fuel	10/29/2015
012	5,000	Diesel Fuel	10/29/2015

#### 1.6 Site Physiography

##### 1.6.1 Regional Bedrock Geology and Hydrogeology

The subject property, in Bridgewater Township, Susquehanna County, Pennsylvania, is located in the Glaciated Low Plateau Section of the Appalachian Plateaus Physiographic Province. According to the Pennsylvania

Geologic Survey (Berg 1980), the bedrock geology characteristic of the subject property is the Devonian Age Catskill Formation. Refer to Appendix A for a Bedrock Geology Map (Figure 5) depicting the subject property.

The Catskill Formation is a complex geologic unit which has been divided into numerous members. However, for the purpose of this investigation, the Catskill will be addressed as an undifferentiated formation. Characteristically, the Catskill Formation is comprised of dark-grayish-red to reddish-brown shale, claystone and siltstone; greenish-gray and dark-grayish-red, fine to medium grained sandstone; and yellowish to greenish-gray, medium to coarse grained sandstone and conglomerate (Geyer 1982). Small amounts of grayish-brown calcareous conglomerate and greenish-gray conglomerate mudstone are present locally. Crossbedding, channeling and cut-and-fill features are typical of the sandstone and conglomerate units. Siltstone predominates in the lower part of the formation.

Hydrologically, the Catskill contains numerous water-bearing sandstones, which in most localities can be reached by wells of moderate depth. Secondary porosity accounts for the majority of the available groundwater. Joints, fractures and bedding plane partings provide a conduit through which groundwater flows within the formation. Most of the wells drilled into the Catskill yield from 5 to 25 gallons per minute, with yields up to and in excess of 100 gallons per minute being reported. The groundwater from the upper part of the Catskill is very soft and low in dissolved mineral matter. Although the groundwater from the lower Catskill is also of good quality, it may in some cases contain greater amounts of dissolved mineral matter. The Catskill Formation is an important source of groundwater throughout Susquehanna County.

Mr. Martin Gilgallon, P.G. of LaBella completed field work to inspect local geological features and collect structural geologic data. Local outcrops of the Catskill Formation were inspected. Structurally, the strike and dip of the bedding features was measured to be 350° / 05°E. As such, the bedrock is fairly planar, as might be expected in the Appalachian Plateau. Two (2) distinct sets of joints were also observed within the area. The primary joint orientation was measured at 020° / 87°E, while the secondary joint orientation is 091° / 89°S. These joint sets are nearly vertical.

#### 1.6.2 Review of Surficial Geology

According to the *Surficial Geology of the Montrose East 7.5 Minute Quadrangle* (Braun 2009), the subject property is underlain by Fill (f). Fill is described as rock fragments and/or soil material; typically in road, railroad, or dam embankments; up to several tens of feet thick. Braun also identifies an abandoned glacial meltwater sluiceway traversing roughly north-south in the immediate location of the subject property. The depth to this feature is not noted on the map or in the text. However, erosion caused by this sluiceway could account for the abrupt lateral change from bedrock to glacial till observed at the subject property. This sluiceway may also influence the flow of shallow groundwater at the site. Refer to Appendix A for a Surficial Geology Map (Figure 6) depicting the subject property.

#### 1.6.3 Site Soils Discussion

According to the United States Department of Agriculture, Soil Survey of Susquehanna County, Pennsylvania (Reber 1973), the soil types associated with the subject property are Cut and Fill land, 0 to 35 percent slopes (Cu); the Lordstown and Oquaga channery silt loam, 12 to 20 percent slopes, moderately eroded (LkC2); and, the Wellsboro channery silt loam, 8 to 15 percent slopes, moderately eroded (WeC2). Refer to Appendix A for a Soil Conservation Survey Map (Figure 7) depicting the subject property.

Cut and Fill land, 0 to 35 percent slopes, consists of areas that have been deeply excavated or filled. They are generally less than 30 acres in size. The largest areas are along highways where soil material has been cut away from hillsides and used as fill in the adjacent low areas. There are also areas of Cut and Fill land along railroads.



A few small areas are in urban developments and in home and industrial building sites. Three small areas of strip mine spoil near Forest City, totaling less than 10 acres, were included in mapping.

The Lordstown series consists of moderately deep well drained soils on nearly level to very steep uplands. They formed in glacial till derived from sandstone, siltstone and shale. Typically, the surface layer is grayish brown channery silt loam approximately 5 inches thick. The subsoil from 5 to 24 inches is yellowish brown friable channery silt loam. The substratum from 26 to 30 inches is grayish brown friable very channery loam. Below 30 inches is thin bedded gray sandstone and siltstone bedrock.

The Wellsboro series consists of deep, moderately well and somewhat poorly drained soils on uplands. They formed in glacial till derived from sandstone, siltstone and shale. Typically, these soils have a dark brown silt loam surface layer 7 inches thick. The subsoil layers from 7 inches to 22 inches are reddish brown, friable silt loam, loam, and channery loam. From 22 inches to 52 inches is a firm fragipan that is dark reddish brown and dusky red gravelly loam. The substratum from 52 inches to 63 inches is dusky red gravelly loam.

#### 1.6.4 Surface and Subsurface Drainage Discussion

The subject property is located within the Susquehanna River Basin. As such, the surface water runoff and the groundwater baseflow generated at the property eventually discharges into the Susquehanna River.

The closest surface water feature to the southwest is an unnamed tributary (UNT) to Pettis Creek, which is located approximately 1,300 feet southwest of the subject property. The UNT to Pettis Creek flows west to its confluence with Pettis Creek. Pettis Creek flows northwest to its confluence with the East Branch of the Wyalusing Creek. The East Branch of Wyalusing Creek flows in a westerly direction to its confluence with Wyalusing Creek. Wyalusing Creek flows in a southwesterly direction to its confluence with the Susquehanna River near Wyalusing, Bradford County, Pennsylvania. The Susquehanna River flows in a generally southerly direction to its confluence with the Chesapeake Bay in Havre De Grace, Maryland.

A review of the Special Protection Waters for Susquehanna and Bradford Counties, as listed in the Pennsylvania State Code Title 25 Chapter 93.9, indicates Snake Creek, the UNT to Pettis Creek, Pettis Creek, the East Branch of Wyalusing Creek, Wyalusing Creek and the Susquehanna River are not classified as High Quality Cold Water Fisheries (HQ-CWF). This classification protects the listed waterways via the application of a variety of strict water quality standards.

A subsurface storm water detention system is located to the southwest of the current gasoline dispensers and USTs in the southwestern portion of the subject property. Storm water generated at the subject property is introduced to the subsurface detention system and allowed to infiltrate into the shallow groundwater aquifer.

#### 1.6.5 Wetlands Discussion

Wetlands are defined in Pennsylvania State Code, Title 25 Chapter 105 *Dam Safety and Waterway Management* rules and regulations as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, and similar areas. Similarly, the PADEP defines a watercourse as “a channel or conveyance of surface water having defined bed and banks, whether natural or artificial, with perennial or intermittent flow” (as found in PA Code, Title 25 *Environmental Protection*, Chapter 105 *Dam Safety and Waterway Management*).

National Wetlands Inventory (NWI) Maps were reviewed as part of this investigation. NWI Maps are prepared by the U.S. Department of the Interior, Fish and Wildlife Service, Office of Biological Services for the National



Wetlands Inventory Program. Wetland areas are identified on the maps based upon the method specified in the Classification of Wetlands and Deep Water Habitats of the United States (An Operational Draft), Cowardin, et al, 1977. A detailed study of the groundwater and historical analysis may result in the revision of the wetland boundaries identified on the NWI maps, which are developed through photographic interpretation. In addition, some small wetland areas or those obscured by dense forests may not be included on this map. The NWI Map (Montrose East, Pennsylvania Quadrangle) identifies the absence of wetland areas at the subject property. Refer to Appendix A for a NWI Map (Figure 8) depicting the study area.

#### 1.7 Surrounding Land Use Investigation

An inspection of the areas surrounding the study area was conducted in order to determine if any obvious signs of potential contamination were present. The study area is located within a well-developed section of Bridgewater Township, Susquehanna County, Pennsylvania. Refer to Appendix A for an Area Map (Figure 9) depicting the subject property. The surrounding land usage is as follows:

- **North:** The subject property is bordered to the north by PA Route 29 (Grow Avenue) and commercial / industrial properties.
- **South:** The subject property is bordered to the south by a PennDOT storm water retention basin and Crossley Road. Commercial properties and a bulk fuel distribution facility are located farther to the south across Crossly Road.
- **East:** The subject property is bordered to the east by residential properties.
- **West:** The subject property is bordered to the west by PA Route 29 (Grow Avenue). Commercial and industrial properties are located farther to the west across PA Route 29.

An inspection of the areas located between the adjacent parcels and the subject property was conducted in order to determine if any obvious signs of potential contamination were present. No evidence of potential environmental impacts from surrounding properties was observed.

## 2. SITE CHARACTERIZATION ACTIVITIES SUMMARY

### 2.1 Release History

According to the PADEP, there are two (2) open incidents at the subject property that need to be resolved. An Incident Identification Map (**Figure 10**) is included in Appendix A. The following summary is provided:

- **Incident #48572:** In 2015, facility-wide upgrade activities were conducted at the subject property. These activities included the construction of the current convenience store building and the installation of the five (5) current UST systems. The historical convenience store building was razed once the current store was in operation and the pre-existing UST systems were closed via removal. In October 2015, Datom Products of Dunmore, Pennsylvania was completing the closure, via removal, of Tank #003 thru Tank #007 at the subject property. Soil and groundwater contamination was detected during the removal activities in association with Tank #004. Datom Products collected a series of soil and groundwater samples as part of the tank closure activities. Subsequent to the review of the analytical data, it was determined that soil contamination, at concentrations exceeding applicable standards, was also associated with Tank #003, Tank #006, Tank #007 and the gasoline dispenser island. The Pennsylvania Underground Storage Tank Indemnification Fund (USTIF) Claim #2015-0126(I) applies to this incident. Note, this Revised Feasible Remedial Alternative Analysis Report has been completed in association with **Incident #48572**.
- **Incident #50143:** On January 31, 2017, a release of gasoline occurred when a passenger vehicle backed over a fuel line during delivery at the gasoline USTs by Rich Tank Lines. This resulted in the release of 250 to 300 gallons of gasoline. On February 6, 2017, Northridge Group, Incorporated (Northridge) completed the excavation of the impacted soil. Soil attainment samples collected from the final excavation indicated that soil contamination has been remediated to applicable cleanup standards. Groundwater was encountered during the February 2017 remedial activities by Northridge. A groundwater sample collected from the final excavation indicated that groundwater contamination, at concentrations exceeding applicable cleanup standards, existed in association with this release. USTIF Claim #2017-0021(I) applies to this incident. With the exception of two (2) additional quarterly groundwater monitoring events, this Revised Feasible Remedial Alternative Analysis Report does not include any proposed activities that are directly associated with **Incident #50143**.

The PADEP drafted Notice of Violation (NOV) letters dated October 23, 2015 and February 7, 2017 regarding Incident #48572 and #50143, respectively. These correspondences required the completion of site characterization activities in accordance with the regulations promulgated under 25 PA Code Chapter 245 for the two (2) open incidents. In accordance with the PADEP correspondence dated February 28, 2017, it was acceptable to combine the site characterization activities for the two (2) open incidents into a single Final Site Characterization Report (FSCR).

### 2.2 Project Parameters

For the purpose of the site characterization activities completed to date, the parameters of concern were limited to a combination of the Unleaded Gasoline, Diesel Fuel / Fuel Oil #2 and Kerosene Parameters specified in the April 1, 1998 PADEP Technical Document: Closure Requirements for Underground Storage Tank Systems, as amended December 15, 2012. The list of the "Project Parameters" is as follows:

- Benzene
- Ethylbenzene
- Cumene (Isopropylbenzene)
- MTBE
- Naphthalene
- Toluene
- Total Xylenes
- 1,2,4-TMB
- 1,3,5-TMB

### 2.3 Determination of Cleanup Standards

To determine the specific MSC for each compound of concern, LaBella followed the outline for determining soil and groundwater MSCs included in Chapter II of the TGM. Specifically, LaBella followed Figure II-5, “Flowchart for Selecting Statewide Health Standard MSCs for Groundwater and Soil”. Assumptions made in following this flowchart include: 1) the soil buffer does not apply in any case; and, 2) equivalency does not apply. The Non-Residential, Used Aquifer (TDS < 2,500) scenario was utilized due the current and anticipated future use of the subject property for non-residential purposes. The Used Aquifer scenario was utilized since a non-use aquifer designation was not pursued as part of the site characterization activities.

### 2.4 Site Characterization Activities and Submittals

In January 2018, LaBella completed a Final Site Characterization Report summarizing the activities conducted at the subject property between October 2015 and December 2017. The PADEP received and reviewed the January 2018 SCR. Approval of the site characterization was received from the PADEP on March 15, 2018. This report indicated quarterly groundwater monitoring would continue at the subject property while a RAP was being prepared and implemented.

The Site Groundwater Investigation was conducted between October 2015 and June 8, 2018. This investigation included the collection and analysis of five (5) groundwater samples from UST excavations, test pits and remedial excavations; the installation of fifteen (15) groundwater monitoring wells; the completion of nine (9) full or partial rounds of groundwater sampling (including the June 7-8, 2018 quarterly event); the interpretation of groundwater elevation and flow data; the transportation and disposal of investigation derived wastes; and, the completion of aquifer testing.

### 2.5 Results of Quarterly Groundwater Monitoring Activities

#### 2.5.1 General

As indicated in the January 2018 Final Site Characterization Report, LaBella has continued groundwater monitoring activities on a quarterly basis. The most recent quarterly groundwater monitoring activities were conducted on June 7-8, 2018. The groundwater monitoring wells sampled as part of these activities are outlined in Table 2-1. Refer to Appendix A for a June 7, 2018 Groundwater Contour Map (Figure 11) that depicts the monitoring well locations.

**Table 2-1**  
**Pump-n-Pantry #001 (Montrose) Property**  
**Groundwater Monitoring Well Locations**

Well #	Location
MW-1	Subject Property
MW-2	Subject Property
MW-3	Subject Property
MW-4	Subject Property
MW-5	Subject Property
MW-6	Subject Property
MW-7	Adjacent Property to NW
MW-8	Adjacent Property to NW
MW-9	Adjacent Property to NW
MW-10	Subject Property
MW-11	Subject Property
MW-12	Subject Property
MW-13	Subject Property
MW-14	Subject Property
MW-15	Subject Property
OW-1	Tank Field Observation Well - Diesel
OW-2	Tank Field Observation Well - Diesel
OW-3	Tank Field Observation Well - Gasoline
OW-4	Tank Field Observation Well - Gasoline
RW-1	Recovery Well - Destroyed

#### 2.5.2 Results of the June 2018 Sampling Activities

The results of the June 7-8, 2018 groundwater sampling program indicate that seven (7) petroleum constituents were detected at concentrations that exceed the respective Statewide Health Standard MSCs. The remaining petroleum constituents were not detected at concentrations that exceed the applicable Statewide Health Standards. Historical groundwater analytical data summary tables are included in Appendix C. Isopleth maps depicting the distribution of contaminants as of June 2018 are included in Appendix D. Refer to Table 2-2 for a Summary of Groundwater Exceedances.

**Table 2-2**  
**Pump-n-Pantry #001 (Montrose) Property**  
**Summary of Groundwater Exceedances (ug/l)**  
**June 2018 Sampling Event**

Location	Parameter	Concentration	Act 2 MSC
MW-2	Benzene	643.0 ug/l	5.0 ug/l
	1,2,4-TMB	336.0 ug/l	62.0 ug/l
MW-3	Benzene	48.4 ug/l	5.0 ug/l
MW-4	Benzene	163.0 ug/l	5.0 ug/l
MW-5	Benzene	98.8 ug/l	5.0 ug/l
MW-15	Benzene	94.4 ug/l	5.0 ug/l
	1,2,4-TMB	746.0 ug/l	62.0 ug/l

### 2.5.3 Temporal Trend Analysis

A temporal trend analysis was performed for key compounds in the shallow monitoring wells that have expressed concentrations in excess of standards. Time-series graphs were prepared for each of the key compounds. These graphs are included in Appendix E. A linear regression best-fit trend line was fit to the time-series data on each graph using the trend line function in MS Excel. The following trends have been identified based on a review of the time-series graphs:

**Table 2-3**  
**Pump-n-Pantry #001 Property**  
**Groundwater Analytical Data – Trend Summary**

Well #	Compound	Trend	Concentration
MW-2	Benzene	Increasing	Above MSC
	MTBE	Increasing	Below MSC
	1,2,4-TMB	Increasing	Above MSC
MW-3	Benzene	Decreasing	Above MSC
MW-4	Benzene	Stable	Above MSC
MW-5	Benzene	Decreasing	Above MSC
	MTBE	Decreasing	Below MSC
	1,2,4-TMB	Decreasing	Below MSC
MW-15	Benzene	Decreasing	Above MSC
	Ethylbenzene	Decreasing	Below MSC
	Naphthalene	Decreasing	Below MSC
	Toluene	Decreasing	Below MSC
	1,2,4-TMB	Decreasing	Above MSC

**Table 2-3 (cont.)**  
**Pump-n-Pantry #001 Property**  
**Groundwater Analytical Data – Trend Summary**

Well #	Compound	Trend	Concentration
OW-4	Benzene	Decreasing	Below MSC
	Ethylbenzene	Decreasing	Below MSC
	Naphthalene	Decreasing	Below MSC
	Toluene	Decreasing	Below MSC
	Xylenes	Decreasing	Below MSC
	1,2,4-TMB	Decreasing	Below MSC
RW-1	Benzene	Decreasing	Below MSC

## 2.6 Review of Soil Investigation Activities

### 2.6.1 General

The potential for soil contamination at the subject property was documented during the UST closure activities in October 2015. Subsequent test boring / soil sampling programs conducted by LaBella have identified soil contamination, in excess of applicable Non-Residential Statewide Health Standards, in the Vadose Zone and Smear Zone underlying the subject property. Refer to Appendix F for the Historical Soil Analytical Data Summary Tables.

### 2.6.2 Discussion on the Vadose Zone Results

The results of the site characterization activities identified soil contamination in excess of standards in the Vadose Zone. The Vadose Zone contamination was generally associated with the historical product dispensers. Seven (7) soil exceedances were documented in the Vadose Zone. Five (5) of the exceedances were excavated during Interim Soil Interim Remedial activities in June 2016. As such, two (2) vadose zone exceedances remain at the subject property. These two (2) exceedances are associated with Incident #48572. No exceedances are currently association with Incident #50143. Refer to Appendix A for a Soil Contamination Distribution Map – Vadose Zone (Figure 12). A summary of the remaining soil exceedances in the Vadoze Zone is provided in Table 2-4, as follows:

**Table 2-4**  
**Pump-n-Pantry #001 Property**  
**Soil Sample Analytical Data (mg/kg)**  
**Summary of Remaining Soil Exceedances – Vadose Zone**

Sample #	Depth	Parameter	Concentration	Act 2 MSC
SS-6	3.0'	Benzene	0.517 mg/kg	0.5 mg/kg
		Naphthalene	60.2 mg/kg	25.0 mg/kg
		1,2,4-TMB	75.0 mg/kg	35.0 mg/kg
		1,3,5-TMB	20.5 mg/kg	9.3 mg/kg
SS-11	3.0'	Naphthalene	27.3 mg/kg	25.0 mg/kg
		1,2,4-TMB	61.9 mg/kg	35.0 mg/kg
		1,3,5-TMB	18.5 mg/kg	9.3 mg/kg

The results of the site characterization activities identified soil contamination in excess of standards in the Smear Zone. The Smear Zone contamination was generally associated with the historical product dispensers. Eleven (11) soil exceedances were documented in the Smear Zone. Seven (7) of the exceedances were excavated during the Interim Soil Remediation Activities in June 2016. As such, four (4) smear zone exceedances remain at the subject property. These exceedances are associated with Incident #48572. No exceedances are currently associated with Incident #50143. Refer to Appendix A for a Soil Contamination Distribution Map – Smear Zone (Figure 13). A summary of the remaining soil exceedances in the Smear Zone is provided in Table 2-5, as follows:

**Table 2-5**  
**Pump-n-Pantry #001 Property**  
**Soil Sample Analytical Data (mg/kg)**  
**Summary of Remaining Soil Exceedances – Smear Zone**

Sample #	Depth	Parameter	Concentration	Act 2 MSC
TB-7B	4.5' – 5.0'	Benzene	2.15 mg/kg	0.5 mg/kg
		Naphthalene	19.9 mg/kg	10.0 mg/kg
		1,2,4-TMB	25.3 mg/kg	6.2 mg/kg
TB-10B	3.0' – 3.5'	Benzene	1.61 mg/kg	0.5 mg/kg
		1,2,4-TMB	28.2 mg/kg	6.2 mg/kg
TB-11B	3.0' – 3.5'	Benzene	1.85 mg/kg	0.5 mg/kg
		1,2,4-TMB	47.5 mg/kg	6.2 mg/kg
MW-8B*	4.0' – 4.5'	1,2,4-TMB	9.08 mg/kg	6.2 mg/kg

In summary, the soil contamination present onsite has been horizontally delineated. Sample MW-8B exhibited smear zone contamination at concentrations exceeding the applicable cleanup standards for 1,2,4-TMB. Soil analytical data associated with sample MW-8A expressed contamination in the vadose zone. Due to the presence of vadose zone contamination at MW-8, LaBella is of the opinion that the smear zone exceedance in sample MW-8B is not related to the subject property. The soil contamination has been vertically delineated to the permanently saturated zone.

This Revised Feasible Remedial Alternative Analysis Report is designed to address the contaminated groundwater present at the subject property. However, the chosen remedial alternative will also address the soil contamination present in the Smear Zone soils. Please note, the Vadose Zone exceedances identified at SS-6 and SS-11 are associated with soil attainment sampling conducted as part of the interim soil remediation activities. A review of the attainment data indicates the 75%-10x Ad Hoc Rule has been satisfied and attainment for the site soils in the vadose zone has been demonstrated. Three (3) residual smear zone exceedances exist outside the June 2016 excavation

## 2.7 Review of Vapor Intrusion Evaluation

LaBella completed a Vapor Intrusion Evaluation as part of the Site Characterization Activities. These activities included the comparison of soil and groundwater contaminant concentrations with applicable screening values and the use of applicable proximity distances at the site. The results of this evaluation indicate there is no potentially complete Soil-Vapor Exposure Pathway or Groundwater-Vapor Exposure Pathway present at the subject property. Therefore, no additional Vapor Intrusion Evaluation or mitigation is warranted at this time.



## 2.8 Contaminant Mass Calculations

Contaminant mass calculations were completed based on existing soil and groundwater data. Refer to Appendix G for a summary of the associated data and assumptions. The following is noted:

- Two (2) Vadose Zone exceedances remain at the subject property. These exceedances are associated with attainment samples collected during June 2016 remediation activities. As indicated in the PADEP-FSCR, the 75%-10x Ad Hoc Rule has been satisfied and attainment for all vadose zone soil has been demonstrated. No contaminant mass calculations are given for vadose zone soils.
- A Smear Zone soil contaminant mass of 65.1 lbs. was determined based on the smear zone data collected as part of the site characterization activities.
- The groundwater contaminant mass was determined based on contamination concentrations present in the shallow groundwater aquifer and plume geometry generated during the most recent groundwater sampling event (June 2018). A groundwater contaminant mass of 18.42 lbs. was calculated.

## 2.9 Interim Remedial Activities

### 2.9.1 Interim Remedial Actions for Soils

Interim soil remedial actions have been conducted at the subject property. These activities were conducted in association with Incident #48572 and Incident #50143. A summary of the soil remedial actions conducted for each incident is provided in the following sections.

#### 2.9.1.1 Incident #48572

Two (2) interim soil remediation events were conducted in association with Incident #48572. These interim soil remediation activities were conducted during the October 2015 UST Closure activities by Datom and the June 2016 Interim Soil Remediation activities by Labella. The following summary is provided:

- A total of 1,432.82 tons of contaminated soil was generated during the October 2015 UST Closure Activities. The contaminated soil was transported to Keystone Sanitary Landfill in Dunmore, Pennsylvania between November 24, 2015 and January 20, 2016. Refer to Attachment Y for the associated soil disposal documentation.
- In March 2016, LaBella completed twenty-seven (27) test borings and collected fifty (50) soil samples to characterize and delineate the residual soil contamination following the October 2015 UST Closure activities. The results of this investigation were utilized to determine the extent of the June 2016 Interim Soil Remediation activities by Labella, as summarized in the following bullet.
- A total of 1,580.77 tons of contaminated soil was generated during the June 2016 Interim Soil Remediation activities. The contaminated soil was transported to Keystone Sanitary Landfill in Dunmore, Pennsylvania between June 17, 2016 and June 27, 2016. Refer to Attachment Y for the associated soil disposal documentation.

The soil attainment samples were collected upon completion of the June 2016 Interim Soil Remediation activities. The attainment sampling was conducted in accordance with the requirements included in 25 PA Code



Chapter 250.707 (Statistical Tests). Specifically, the regulations pertaining to “sites” where there is a release resulting in the excavation of up to 3,000 cubic yards of contaminated soil were followed. Twelve (12) soil samples were collected from the remediation area in accordance with the Systematic Random Sampling Procedures set forth in the Act 2 Technical Guidance Manual. No samples were collected from the base of the excavation due to the presence of bedrock and / or groundwater. A review of the attainment data indicates the 75%-10x Ad Hoc Rule has been satisfied and attainment for the site soils in the vadose zone has been demonstrated. Three (3) residual smear zone exceedances exist outside the June 2016 excavation.

#### 2.9.1.2 Incident #50143

One (1) interim soil remediation event was conducted in association with Incident #50143. These interim soil remediation activities were conducted in February 2017 by Northridge. The following summary is provided:

- A total of 26.06 tons of contaminated soil was excavated by Northridge during the February 2017 interim soil remediation activities.

Upon completion of the February 2017 interim soil remediation activities, Northridge collected a series of five (5) biased soil samples from the final excavation. The analytical results from these samples indicate attainment for the site soils has been demonstrated in this area.

#### 2.9.2 Interim Remedial Actions for Groundwater

Interim groundwater remedial actions have been conducted at the subject property. These activities were conducted in association with Incident #482572 and Incident #50143. A summary of the groundwater remedial actions conducted for each incident is provided in the following sections.

##### 2.9.2.1 Incident #48572

One (1) interim groundwater remediation event was conducted in association with Incident #48572. During the October 2015 UST Closure Activities, a total of 25,300 gallons of petroleum impacted groundwater was pumped by Datom. This water was treated onsite with activated carbon and discharged to the local POTW under permit from the local sewer authority.

##### 2.9.2.2 Incident #50143

One (1) interim groundwater remediation event was conducted in association with Incident #50143. Subsurface impacts at OW-4 were identified during previous sampling events at the subject property. In response, Labella completed one (1) High Vapor Extraction Event (HVE) at OW-4. The HVE event at OW-4 was completed on September 13, 2017. Advanced Oil Recovery of Milford, Pennsylvania provided the vacuum truck and disposal services. During the HVE event, depth to water and vacuum readings were collected at OW-4 and the surrounding monitoring / observation wells. Vacuum readings and PID readings of the air effluent from the vacuum truck were also recorded. The following observations are provided:

- A total of 1,622 gallons of water was extracted from OW-4 over a 7.7 hour period.
- Groundwater at OW-4 was drawn down 0.45' over the 7.7 hour HVE event.
- The vacuum truck operated at an average of 7.6 inches of mercury. This translated to an average of 0.87 inches of mercury at OW-4.

- No vacuum influence was observed in the surrounding monitoring / observations wells.
- PID readings collected from the air effluent of the vacuum truck indicated volatile organic compound (VOC) concentration decreased during the HVE event at OW-4.
- Subsequent sampling of OW-4 indicate groundwater contamination in the vicinity of OW-4 has been remediated to below the statewide health standards.
- Test borings conducted in the vicinity of OW-4 (TB-28 through TB-31) confirmed that soil has not been impacted in the vicinity of OW-4.

### 3. COMPLETION OF THE OXYGEN INJECTION PILOT TEST

#### 3.1 General

As indicated above, oxygen injection was selected as a potential remedial technology based on a review of available remedial technologies. In April 2018, LaBella prepared a Work Plan to complete an Oxygen Injection pilot test at the Montrose Pump-n-Pantry #001 Property. The objective of pilot testing was to evaluate the feasibility of Oxygen Injection as an *in-situ* remedial option, targeting the portions of the site where VOC-impacted soil (i.e. smear zone soils) and/or groundwater are above the applicable Non-Residential, Used Aquifer (TDS <2,500 mg/l) Statewide Health Standards.

#### 3.2 Installation of Pilot Test Injection & Monitoring Points

Between June 11, 2018 and June 13, 2018, LaBella completed the field activities associated with the installation of three (3) Oxygen Injection wells and three (3) monitoring points at the subject property. Drilling services were provided by Odyssey Environmental of Harrisburg, Pennsylvania. The work was completed in association with the planned Oxygen Injection pilot test. Refer to Appendix A for a Pilot Test Point Location Map (Figure 14) depicting the locations of these points.

Prior to the initiation of the drilling activities, each proposed drilling location was cleared via air-knife excavation (i.e. soft dig) technology. Each test point was subsequently completed utilizing a combination of hollow stem auger and air-rotary drilling techniques. Each pilot test point was constructed by lowering one-inch PVC screen and PVC riser into the borehole. A sand pack consisting of #1 silica sand was placed within the screened interval. A bentonite seal, consisting of hydrated bentonite pellets, was placed above the sand pack. Each point was completed with a flush grade manway with locking inner cap. Refer to Appendix H for copies of the Test Boring Logs associated with the test point installations and to Appendix I for the Well Construction Details. A summary of the well construction information is included in Table 3-1, as follows:

**Table 3-1**  
**Pump-n-Pantry #001 Property**  
**Summary of Pilot Test Point Construction Details**

Well ID	Diameter	Screen Size	Screen Interval	Sand Interval
IP-1	1"	0.010 Slot	8.0' – 9.0'	7.0' – 10.0'
IP-2	1"	0.010 Slot	8.0' – 9.0'	7.0' – 10.0'
IP-3	1"	0.010 Slot	8.0' – 9.0'	7.0' – 10.0'
MP-1	1"	0.010 Slot	5.0' – 10.0'	4.0' – 10.0'
MP-2	1"	0.010 Slot	5.0' – 10.0'	4.0' – 10.0'
MP-3	1"	0.010 Slot	5.0' – 10.0'	4.0' – 10.0'

In addition to the three (3) newly installed monitoring points, existing monitoring wells MW-2, MW-3, MW-4 and MW-15 were also used as observation points during pilot testing. MW-6 was utilized as the background well. The wells that were monitored range in distance from approximately 10 to 150 feet from the injection points.

The pilot test was designed to address the groundwater contamination and Smear Zone soil contamination documented in the vicinity of the historical gasoline and diesel fuel dispensers at the subject property. The test points were located as follows:

- Injection Point One (IP-1) through IP-3 were installed approximately 15.0' northeast of MW-2 within the groundwater plume. The injection points were installed along a line roughly perpendicular to Grow Avenue with a spacing of 12.0'.
- Monitoring Point One (MP-1) was installed 10.0' northeast of the injections points within the groundwater plume. This monitoring point was utilized to document influence hydraulically upgradient of the injection points.
- MP-2 and MP-3 were installed 12.0' and 24.0' feet southwest of the injection points within the groundwater plume, respectively. These monitoring points were installed to document influences hydraulically downgradient of the injection points.
- Injection and monitoring points were completed into the zone of saturation. The scope of work associated with the completion of the pilot test point development activities, conducted by LaBella, included the development of the injection and monitoring points utilizing hand-bailing methods. Refer to Appendix K for field notes associated with the pilot test point development activities. In accordance with the provisions of the PADEP's *Groundwater Monitoring Guidance Manual* (December 1, 2001 edition), the drill cuttings were containerized onsite pending transportation and disposal considerations. Groundwater effluent generated during the point test point development was treated on-site with granular activated carbon (GAC) and discharged to the pavement at the subject property.

### 3.3 Completion of the Oxygen Injection Pilot Test

#### 3.3.1 General

In accordance with the Work Plan dated April 25, 2018, LaBella completed pilot testing at the site during the period of June 1 through July 31, 2018. The purpose for the testing was to evaluate oxygen injection as remedial options to address the groundwater and smear zone soil contamination at the subject property.

#### 3.3.2 Baseline Monitoring

On June 28, 2018, baseline monitoring was performed including the collection of readings from the Injection Points (designated IP-1 through IP-3), the Monitoring Points (designated MP-1 through MP-3) and monitoring wells MW-2, MW-3, MW-4, MW-6 and MW-15. The baseline monitoring included measuring dissolved oxygen (DO), oxidation reduction potential (ORP), pH, specific conductance, temperature and water levels. The baseline data is tabulated and presented as Table L-1 in Appendix L.

In addition to the collection of in-situ data, LaBella collected two (2) bacteria samples prior to pilot testing to document bioactivities upgradient and within the treatment cell. The two (2) bacteria samples were sent to Microbial Insights in Knoxville, Tennessee and were analyzed for Toluene Dioxygenase, Phenol Hydroxylase, Toluene Monooxygenase and Total Eubacteria. Prior to startup, LaBella collected bacteria samples to document bioactivity upgradient and within the treatment cell. This data is tabulated and presented as Table M-1 in Appendix M. The laboratory analytical data sheets are also included in Appendix M. A sample log is included in Table 3-2, as follows:

**Table 3-2**  
**Pump-n-Pantry #001 Property**  
**Sample Log – Pre-Pilot Test Bioactivity**

Sample ID	Location	Parameters
1845-0628-MW6	MW-6	Toluene Dioxygenase, Phenol Hydroxylase, Toluene Monooxygenase and Total Eubacteria
1845-0628-MP2	MP-2	Toluene Dioxygenase, Phenol Hydroxylase, Toluene Monooxygenase and Total Eubacteria

### 3.3.3 Completion of Oxygen Injection Pilot Testing

Oxygen injection initiated on June 29, 2018 and was terminated on July 16, 2018. During this period, oxygen was injected into IP-1 through IP-3. The injection cycle included the injection at IP-1 for ten (10) minutes followed by a two (2) hour recharge period. Oxygen was then simultaneously injected into IP-2 and IP-3 for ten (10) minutes followed by a two (2) hour recharge period prior to restarting the cycle at IP-1. The pilot test activities and results are summarized below:

- Prior to startup, LaBella collected background field data. This data is tabulated and presented as Table L-1 in Appendix L.
- Oxygen injection initiated on June 29, 2018. LaBella collected DO and ORP twice per week during operation. This data is tabulated and presented as Table L-1 in Appendix L.
- System O&M was performed as needed. These activities included documenting system pressures, flow rates and oxygen purity. System O&M also included refueling the generator and checking the system for leaks. System O&M notes are summarized in Appendix L as Table L-2. On average IP-1 through IP-3 were injected at 30.5 SCFH, 32.0 SCFH and 26.3 SCFH, respectively. The average oxygen purity was 78.7%.

### 3.3.4 Oxygen Injection System Shutdown

The oxygen injection system was shut down on July 16, 2018. LaBella continued the collection of DO and ORP data following shutdown. DO and ORP data was collected twice during the week the system was shut down and once per week for the following two (2) weeks. On July 18, 2018, LaBella collected two (2) bacteria samples to document bio activity upgradient and within the treatment cell following the oxygen injection activities. The two (2) bacteria samples were sent to Microbial Insights in Knoxville, Tennessee and were analyzed for Toluene Dioxygenase, Phenol Hydroxylase, Toluene Monooxygenase and Total Eubacteria. This data is tabulated and presented as Table M-2 in Appendix M. The laboratory analytical data sheets are also included in Appendix M. A sample log is included in Table 3-3, as follows:

**Table 3-3**  
**Pump-n-Pantry #001 (Montrose) Property**  
**Sample Log – Post-Pilot Test Bioactivity**

<b>Sample ID</b>	<b>Location</b>	<b>Parameters</b>
1845-0718-MW6	MW-6	Toluene Dioxygenase, Phenol Hydroxylase, Toluene Monooxygenase and Total Eubacteria
1845-0718-MP2	MP-2	Toluene Dioxygenase, Phenol Hydroxylase, Toluene Monooxygenase and Total Eubacteria

#### 3.4 Summary

The results of the Oxygen Injection pilot test suggest Oxygen Injection is not a viable remedial option for the subject property. The pilot test failed to increase dissolved oxygen within the treatment cell to the target concentration of 5-10 mg/l. In addition, the samples collected for bio-activity did not strongly indicate increased microbial utilization in the treatment area.

## 4. REVISED FEASIBLE REMEDIAL ALTERNATIVES ANALYSIS

### 4.1 General

The following sections provide a Revised Feasible Remedial Alternatives Analysis to lower the concentrations of target compounds in the smear zone soil and groundwater to demonstrate attainment of the Statewide Health Standard at the subject property.

### 4.2 Project Parameters

For the purpose of this Revised Feasible Remedial Alternatives Analysis, the parameters of concern are limited to a combination of the Unleaded Gasoline, Diesel Fuel / Fuel Oil #2 and Kerosene Parameters specified in the April 1, 1998 PADEP Technical Document: Closure Requirements for Underground Storage Tank Systems, as amended December 15, 2012. The list of the "Project Parameters" is as follows:

- Benzene
- Ethylbenzene
- Cumene (Isopropylbenzene)
- MTBE
- Naphthalene
- Toluene
- Total Xylenes
- 1,2,4-TMB
- 1,3,5-TMB

### 4.3 Selected Remediation Standard

According to Act 2, a remediation cleanup standard can be selected for each media of concern and furthermore for each compound of concern. The four (4) standards provided in Act 2 include the Statewide Health Standard, site-specific standard, background standard and special industrial area provision. Since no onsite migration of contaminants from an offsite source is present, the background standard cannot be attained. In addition, the site does not qualify as a special industrial area. Therefore, the Statewide Health Standards and site-specific standards are viable options for the site.

To demonstrate attainment of the Statewide Health Standard, site soil and groundwater must be remediated to concentrations equivalent to the PADEP Non-Residential, Used Aquifer MSCs. The selection of the site-specific standard requires the elimination of risks associated with elevated target compounds. The elimination of risks cannot be completed without institutional and/or engineering controls placed on the site. The property owner has chosen to demonstrate attainment of the Non-Residential, Used Aquifer (TDS < 2500 mg/l), Statewide Health Standard for the target compounds for the site soil and groundwater.

### 4.4 Monitored Natural Attenuation

Natural subsurface processes such as dilution, volatilization, biodegradation, adsorption, and chemical reactions with subsurface materials are allowed to reduce contaminant concentrations to acceptable levels. Natural attenuation is not a "technology" per se, and there is significant debate among technical experts about its use at hazardous waste sites. Consideration of this option usually requires modeling and evaluation of contaminant degradation rates and pathways and predicting contaminant concentration at downgradient receptor points, especially when the plume is still expanding / migrating. The primary objective of site modeling is to demonstrate that natural processes of contaminant degradation will reduce contaminant concentrations below



regulatory standards or risk-based levels before potential exposure pathways are completed. In addition, long term monitoring must be conducted throughout the process to confirm that degradation is proceeding at rates consistent with meeting cleanup objectives.

Compared with other remediation technologies, natural attenuation has the following advantages:

- Less generation or transfer of remediation wastes;
- Less intrusive as few surface structures are required;
- May be applied to all or part of a given site, depending on site conditions and cleanup objectives;
- Natural attenuation may be used in conjunction with, or as a follow-up to, other (active) remedial measures; and
- Overall cost will likely be lower than active remediation.

Limitations include:

- Data used as input parameters for modeling need to be collected;
- Natural attenuation is not appropriate where imminent site risks are present. For example, it will not immediately address the migration of contaminants beyond the POC;
- Contaminants may migrate before they are degraded;
- Institutional controls may be required, which may not be desirable to the property owner or the owners of adjacent properties;
- Long term monitoring and associated costs;
- Longer time frames may be required to achieve remediation objectives, compared to active remediation;
- The hydrologic and geochemical conditions amenable to natural attenuation may change over time and could result in renewed mobility of previously stabilized contaminants and may adversely impact remedial effectiveness.

The suitability of Monitored Natural Attenuation is low since groundwater contamination has already migrated beyond the POC.

#### 4.5 Excavation or Excavation Coupled with Groundwater Remediation

The excavation of contaminated soil is an ex-situ technology that includes the excavation of the contaminated soils with offsite disposal or treatment at a properly permitted facility. In some instances (usually with larger quantities of contaminated soil), the excavated material is treated onsite. The area of excavation is determined via the review of soil analytical data generated during the site characterization activities, in conjunction with the completion of field screening during the actual excavation process. Soil samples, collected in accordance with PADEP guidelines and regulations, are collected for analysis upon the completion of the excavation activities. The soil sample results are utilized to demonstrate the attainment of a selected cleanup standard. The excavation process would remediate the soils in the Smear Zone (i.e. the periodically saturated soils located above the Permanent Zone of Saturation). The open cavity would allow for the pumping of any impacted groundwater or the application of a remedial solution such as bioremediation solutions, oxygen releasing compounds (ORC) or In-Situ Chemical Oxidation (ISCO). The removal of the contaminated soils would also eliminate the contaminant source material, thereby reducing groundwater contamination over time. The removal of contaminated soils would also eliminate any potentially complete soil-vapor exposure pathway, if present.

Compared with other remediation technologies, soil excavation with groundwater remediation has the following advantages:



- Low construction costs as compared to other technologies;
- Soil contamination is removed rapidly and attainment is demonstrated in a short period of time in the form of laboratory analytical results;
- No need to complete additional test boring program to verify the success of the remediation;
- No engineering costs, capital costs or operation and maintenance costs;
- Site disruption limited depending the extent of the work;
- May be applied to all or part of a given site, depending on site conditions and cleanup objectives;
- Will result in the remediation of the soil without the use of other active technologies.

Limitations include:

- Not applicable to larger sites where in-situ remediation of soil and / or groundwater become more cost effective;
- May not immediately remediate the groundwater to levels below the desired cleanup standards;
- Disruption of contaminated soils and groundwater may result in the limited migration of groundwater contamination away from the source.
- Due to the degree and distribution of groundwater contamination identified, the application of remedial solutions into an excavation cavity would not be sufficient to address the entire groundwater contamination issue.

The suitability of this remedial alternative alone is low since soil contamination is limited to a small portion of the smear zone soils. This remedial alternative alone would not address the contaminated groundwater.

#### 4.6 Soil Vapor Extraction

Soil vapor extraction (SVE) is an in-situ unsaturated (vadose) zone soil remediation technology in which a vacuum is applied to the soil to induce the controlled flow of air and remove volatile and some semivolatile contaminants from the soil. The gas leaving the soil may be treated to recover or destroy the contaminants, depending on local and state air discharge regulations. Vertical extraction vents are typically used at depths of 1.5 meters (5 feet) or greater and have been successfully applied as deep as 91 meters (300 feet). Horizontal extraction vents (installed in trenches or horizontal borings) can be used as warranted by contaminant zone geometry, drill rig access, or other site-specific factors.

Compared with other remediation technologies, soil vapor extraction has the following advantages:

- In-situ remediation, therefore less generation or transfer of remediation wastes (although vapors need to be remediated before discharge to the atmosphere);
- Once the system is installed, little to no disruption of day-to-day site operations;
- May be applied to all or part of a given site, depending on site conditions and cleanup objectives;
- May be used in conjunction with, or as a follow-up to, other remedial measures such as Monitored Natural Attenuation, and;
- May result in the remediation of the shallow groundwater without the use of other active technologies.

Limitations include:

- May not completely remediate the shallow groundwater resulting in the need for additional groundwater remediation activities or a site-specific closure on the groundwater, which is not desired;
- Engineering costs, construction costs, capital costs and operation and maintenance (O&M) costs are generally high;
- Due to the size of the groundwater contaminant plume at the subject property, the high engineering costs, construction costs, capital costs and O&M costs may result in a high unit cost for remediation;
- Need to complete additional test boring program to verify the success of the remediation in soil;
- Longer time frames to achieve remediation objectives for soil, as compared to the excavation option.

The suitability of soil vapor extraction alone is low since soil contamination is limited to a small portion of the smear zone soils. It is probable that soil vapor extraction alone will not adequately remediate the contaminated groundwater present at the site.

#### 4.7 Air Sparging Coupled with Soil Vapor Extraction

Air sparging, which would involve the injection of air to expedite the volatilization of the contaminants, is often associated with soil vapor extraction. In general, the soil vapor extraction system is designed as indicated above. The air sparge points would be installed into the shallow groundwater table, resulting in the injection of air and the remediation of the shallow groundwater contamination in concert with the soil contamination.

Compared with other remediation technologies, air sparging coupled with soil vapor extraction has the following advantages:

- In-situ remediation, therefore less generation or transfer of remediation wastes (although vapors need to be remediated before discharge to the atmosphere);
- Once the system is installed, little to no disruption of day-to-day site operations;
- May be applied to all or part of a given site, depending on site conditions and cleanup objectives;

Limitations include:

- May not completely remediate the shallow groundwater resulting in the need for additional groundwater remediation activities or a site-specific closure on the groundwater, which is not desired;
- Engineering costs, construction costs, capital costs and operation and maintenance (O&M) costs are generally high;
- Due to the size of the groundwater contaminant plume at the subject property, the relatively high engineering costs, construction costs, capital costs and O&M costs will result in a high unit cost for remediation;
- Longer time frames to achieve remediation objectives, as compared to the excavation option.

The suitability of SVE/AS to address the soil and groundwater contamination at the subject property is moderate to high. This technology would address both the soil and groundwater contamination concurrently. In addition, the operation of this system would be feasible despite the presence of physical restrictions such as the gasoline

USTs, lines and dispensers which may limit or prohibit the use of other technologies such as ISCO and soil excavation. A pilot test would be required to further evaluate the suitability of this remedial technology.

#### 4.8 Groundwater Pump and Treat

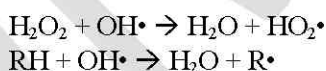
Aboveground treatment of groundwater is generally accomplished by bringing the groundwater to the surface where it can be treated (i.e., pump and treat). The groundwater is then either disposed or discharged to a surface water or POTW under permit. Prior to the discharge into the subsurface, the groundwater must be run through an activated carbon treatment system or air stripper capable of removing the petroleum compounds to non-detect levels.

In addition, remediation by pump and treat is a slow process and cleanup times are often very long. System design, such as pumping rate, is one factor to consider when estimating cleanup times. A system pumping at very low rates may have a very long predicted cleanup time, while one operating at higher rates may have a shorter predicted cleanup time. Also, estimating the cleanup time is difficult and is subject to a large number of uncertainties; typical methods used to calculate cleanup time often result in underestimates because they neglect processes that can add years to the cleanup.

Groundwater pump and treat is generally not suited to geological formations with moderate to low permeability. In general, groundwater pump and treat is generally an inefficient method of groundwater remediation and today is utilized more as a means to hydraulically control the migration of the contaminant plume. Therefore, the suitability of groundwater pump and treat as a remedial option is low at the subject property.

#### 4.9 Chemical Oxidation

The chemical oxidation process involves free radical generation and direct oxidation. The contaminants are treated in-situ and are converted to innocuous and/or naturally occurring compounds (i.e. H<sub>2</sub>O, CO<sub>2</sub>, O<sub>2</sub>, halide ions). As a side benefit, aerobic biodegradation of contaminants can benefit from the increase in dissolved oxygen released through peroxide degradation. The oxidation of contaminants involves a variety of competing reactions as follows (where RH is the contaminant of concern):



Typically, a 5% hydrogen peroxide solution would effectively reduce the contaminant concentrations to levels below the PADEP non-residential used aquifer Statewide Health Standards. In-situ chemical oxidation (ISCO) involves the addition of chemical reagents into groundwater via injection wells. The reagents attack the petroleum contamination by chemical oxidation which breaks the organic compounds down into smaller molecules that are innocuous in nature. The reagents may be hydrogen peroxide or permanganate which are effective oxidizing agents. The process involves free radical generation and direct oxidation. The oxidation process is fast acting, taking several days to a few weeks. The contaminants are treated in situ and are converted to innocuous and/or naturally occurring compounds (i.e. H<sub>2</sub>O, CO<sub>2</sub>, O<sub>2</sub>, halide ions).

The effectiveness of ISCO may be limited by low soil permeability, subsurface heterogeneities, and highly alkaline soils where carbonate ions are free radical scavengers. Low soil permeability may be overcome with the use of hydraulic fracturing of the subsurface geology or an increase in injection point density. The reagent may also be consumed by natural organic matter or by reduced inorganics before effectively treating the contamination of concern. To perform the chemical oxidation, a pH between 2 and 4 is preferable, but not necessary. If necessary, the pH of the groundwater may be lowered by using acetic acid to achieve the desired range.

The potential side effects of ISCO remediation include evolution of gas, increase in temperature, resolubilization of reduced metals and reduction in biomass. Due to a possible increase in pressure, there is a potential for an explosion if the peroxide is added at a concentration greater than 10% by weight. Since there are active gasoline and diesel fuel USTs at the site, the risks associated with the evolution of gas and increased temperature are unacceptable. Therefore, ISCO is not a suitable technology for subject property.

#### 4.10 Enhanced Aerobic Biodegradation - Injection of Oxygen Release Compounds (ORC)

Via the collection of in-situ groundwater data (i.e. DO and ORP), as well as the analysis of intrinsic parameters such as Manganese, Ferrous Iron, Nitrate and Sulfate, LaBella has demonstrated that natural aerobic and anaerobic biodegradation is occurring at the subject property. Aerobic biodegradation will dominate until such time that dissolved oxygen levels are reduced, at which point anaerobic degradation takes over. Enhanced aerobic biodegradation is the practice of adding oxygen (an electron acceptor) to groundwater and/or soil to increase the number and vitality of indigenous microorganisms performing biodegradation. Regenesis of San Clemente, California has developed a proprietary calcium oxy-hydroxide based material, ORC-Advanced™, which releases up to 17% of its weight as molecular oxygen. This release of oxygen is used to accelerate naturally occurring in-situ bioremediation of petroleum hydrocarbons, and certain fuel oxygenates such as MTBE, by indigenous microorganisms in the subsurface. This use of this remedial technique is advantageous for the following reasons:

- Low capital costs when compared to other remedial alternatives since there are no large scale capital equipment costs, no engineering costs and no O&M costs.
- There are no costs associated with completion of bench-scale or pilot-scale testing, nor are any costs associated with the evaluation of system performance such as with groundwater extraction wells or vapor extraction systems.
- Site disruption is minimal. The ORC Advanced™ injection points can be completed within one (1) week, with the release of oxygen occurring over a 9 to 12 month period.
- The use of ORC Advanced™ and enhanced bioremediation has a proven track record in the remediation of hydrocarbon-based contamination.
- There are no ongoing waste streams associated with the use of ORC Advanced™, thereby reducing overall project costs.
- There are no limiting factors associated with the use of ORC Advanced™ in close proximity to USTs, product feed lines or dispensers.

The suitability of enhanced aerobic biodegradation is low to moderate at the subject property.

#### 4.11 Oxygen Injection

The injection of pure oxygen into groundwater using oxygen generators is a patented groundwater remediation process (U.S. Patent No. 5,874,001) developed by Matrix Environmental Technologies, Inc. (Matrix). It is a proven remediation technique for sites in which physical remediation processes (such as air sparging) are no longer effective or efficient, thus a biological process is more favorable. Oxygen injection rapidly enhances the biodegradation of organic contaminants such as petroleum hydrocarbons and most chlorinated solvents biodegradable under aerobic conditions. The system produces 95% oxygen, which is injected at flow rates and pressures to achieve breakout only. The primary mechanisms of oxygen transport are advection and dispersion, the same mechanisms that facilitated contaminant migration. The dissolution of nearly pure oxygen at a controlled rate has resulted in measured dissolved oxygen concentrations up to 40 mg/L. Oxygen injection is suitable for shallow groundwater conditions since there is no generation of hazardous vapors eliminating the need for vapor control. Biodegradation of MTBE and TBA, fuel additives that degrade slowly or not at all under anaerobic conditions, has been optimized at many sites.

Oxygen injection provides a very efficient process to stimulate the aerobic biodegradation of groundwater contaminants and may be applicable to the site. In addition, the use of oxygen injection will not adversely impact the groundwater or any nearby surface waters. Based on the results of the Oxygen Injection pilot test summarized in this report, this technology is not a viable remedial alternative for the subject property.

#### 4.12 Chosen Remedial Alternative for Soil & Groundwater

Based on a comparison of potential remedial technologies, LaBella and the project stakeholders have chosen Air Sparging coupled with Soil Vapor Extraction as the most promising remedial alternative. A pilot test is required to further evaluate the suitability of this remedial technology.

## 5. SIGNATURES

This Revised Feasible Remedial Alternatives Analysis Report was prepared by:

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Martin Gilgallon, P.G.  
Regional Environmental Manager  
LaBella Associates, P.C.  
Pennsylvania Registered Professional  
Geologist No. 000639-G

*"By affixing my seal to this document, I am certifying that the information contained herein is true and correct. I further certify that I am licensed to practice geology in the Commonwealth of Pennsylvania and that it is within my professional area of expertise to verify the correctness of this information".*

## References

The following references were utilized in the preparation of this document:

Berg, T.M., Edmunds, W.E., Geyer, A.R., et al, *Geologic Map of Pennsylvania*, Pennsylvania Topographic and Geologic Survey, Harrisburg, 2<sup>nd</sup> Edition, 1980.

Braun, Duane E., *Surficial Geology of the Montrose East 7.5 Minute Quadrangle*, Pennsylvania Geologic Survey, Harrisburg, Fourth Series, 2009.

Driscoll, F.G., 1986, *Groundwater and Wells* (2nd edition): St. Paul, MN, US; Filter / Johnson Screens, 1089 p.

Geyer, A.R., and Wilshusen, J.P., 1982, *Engineering Characteristics of the Rocks of Pennsylvania*, Pennsylvania Topographic and Geologic Survey, Harrisburg, Environmental Geology Report EG 1, 300 p., (2<sup>nd</sup> Edition).

Reber, Earl J., *Soil Survey of Susquehanna County, Pennsylvania*, United States Department of Agriculture, August 1973.

United States Department of the Interior, Fish and Wildlife Services, National Wetlands Inventory Maps, 7.5-Minute Series, Montrose East, Pennsylvania Quadrangle.

United States Geological Survey, 7.5-Minute Series, Montrose East, Pennsylvania Quadrangle.

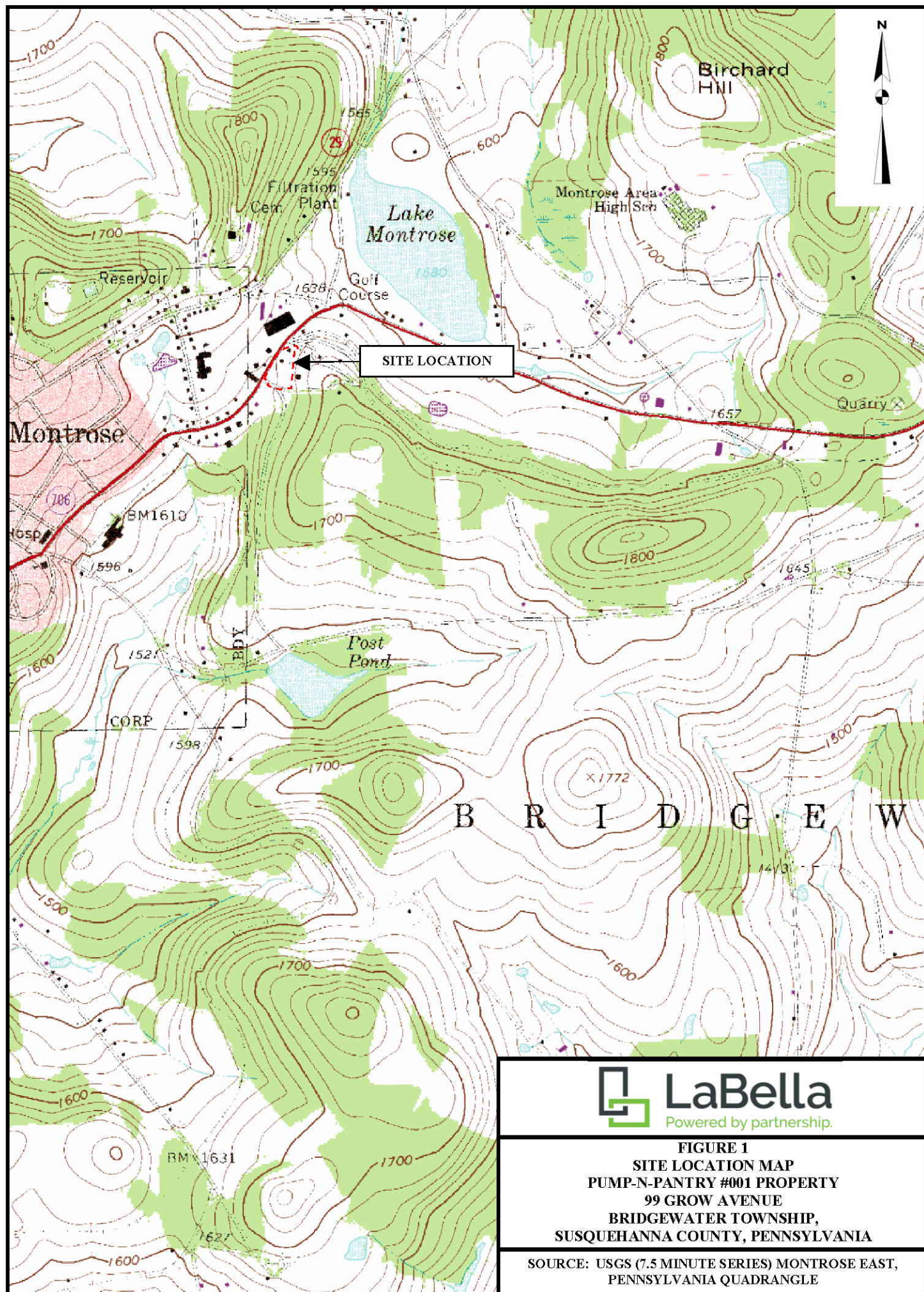
Weight, Willis D., and Sonderegger, John L., *Manual of Applied Hydrogeology*, McGraw-Hill Companies, Incorporated, 2001.

25 Pennsylvania Code, Chapter 105, Dam Safety and Waterway Management, January 1997.

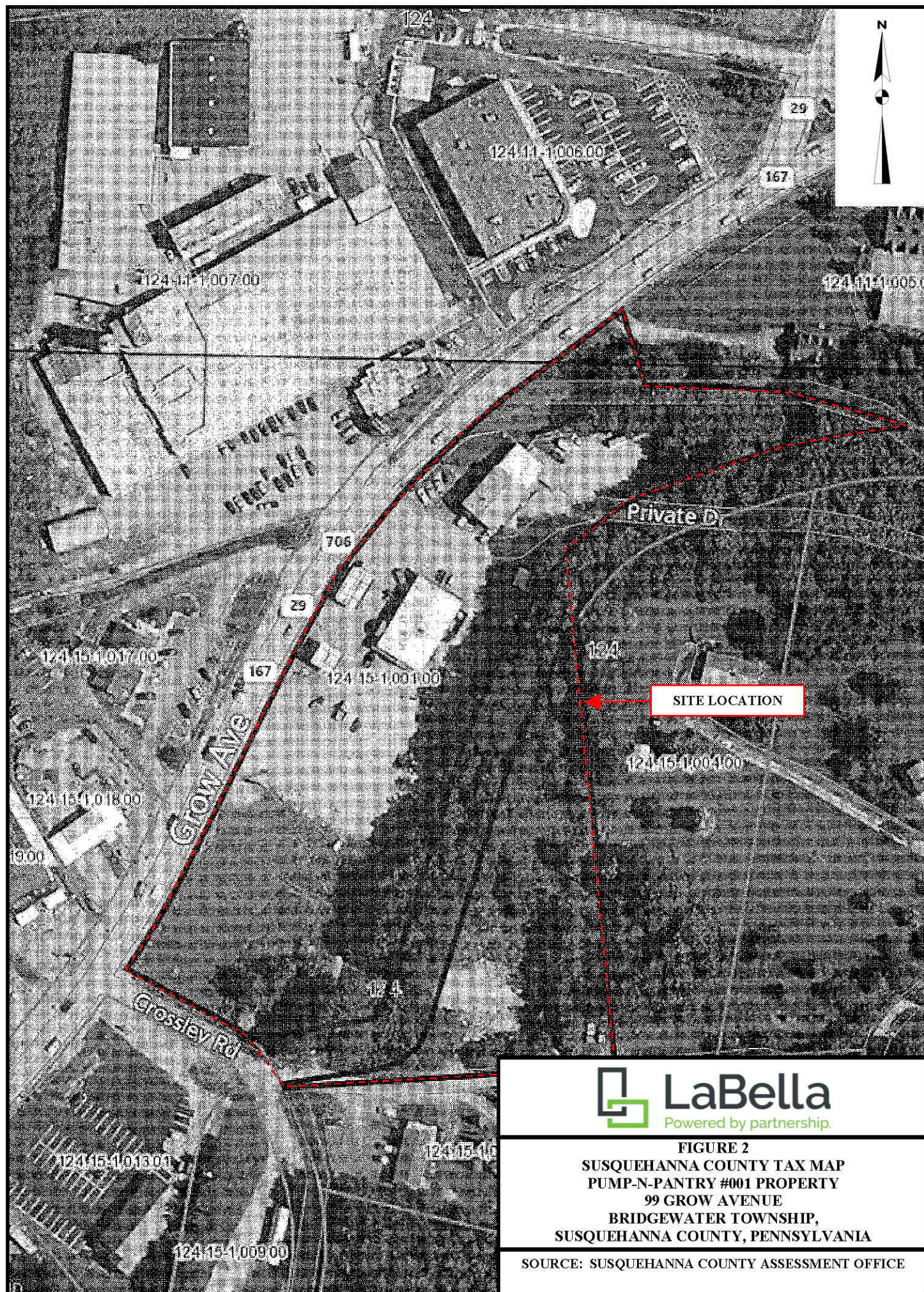
## APPENDIX A

### Site Map and Figures

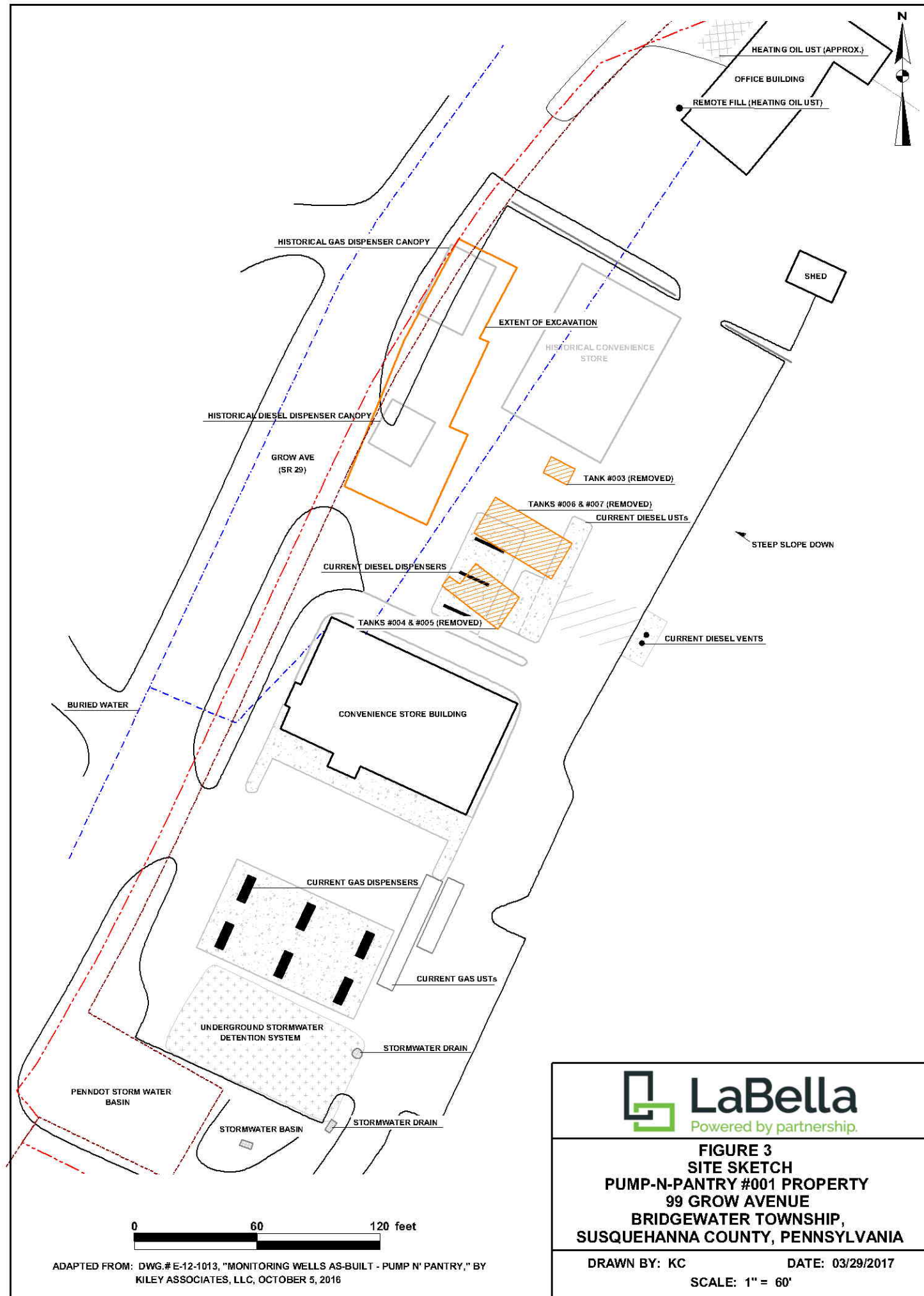






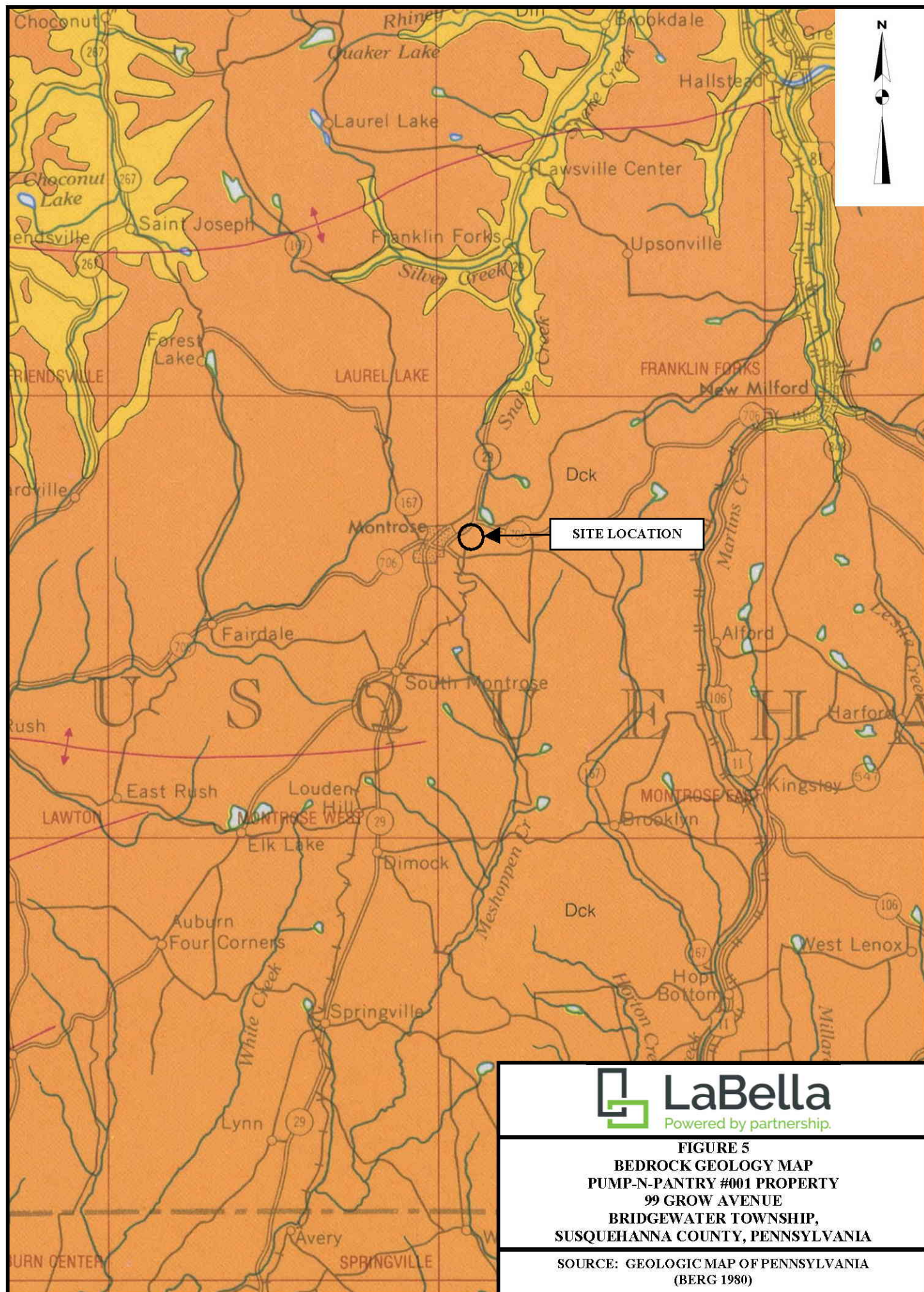




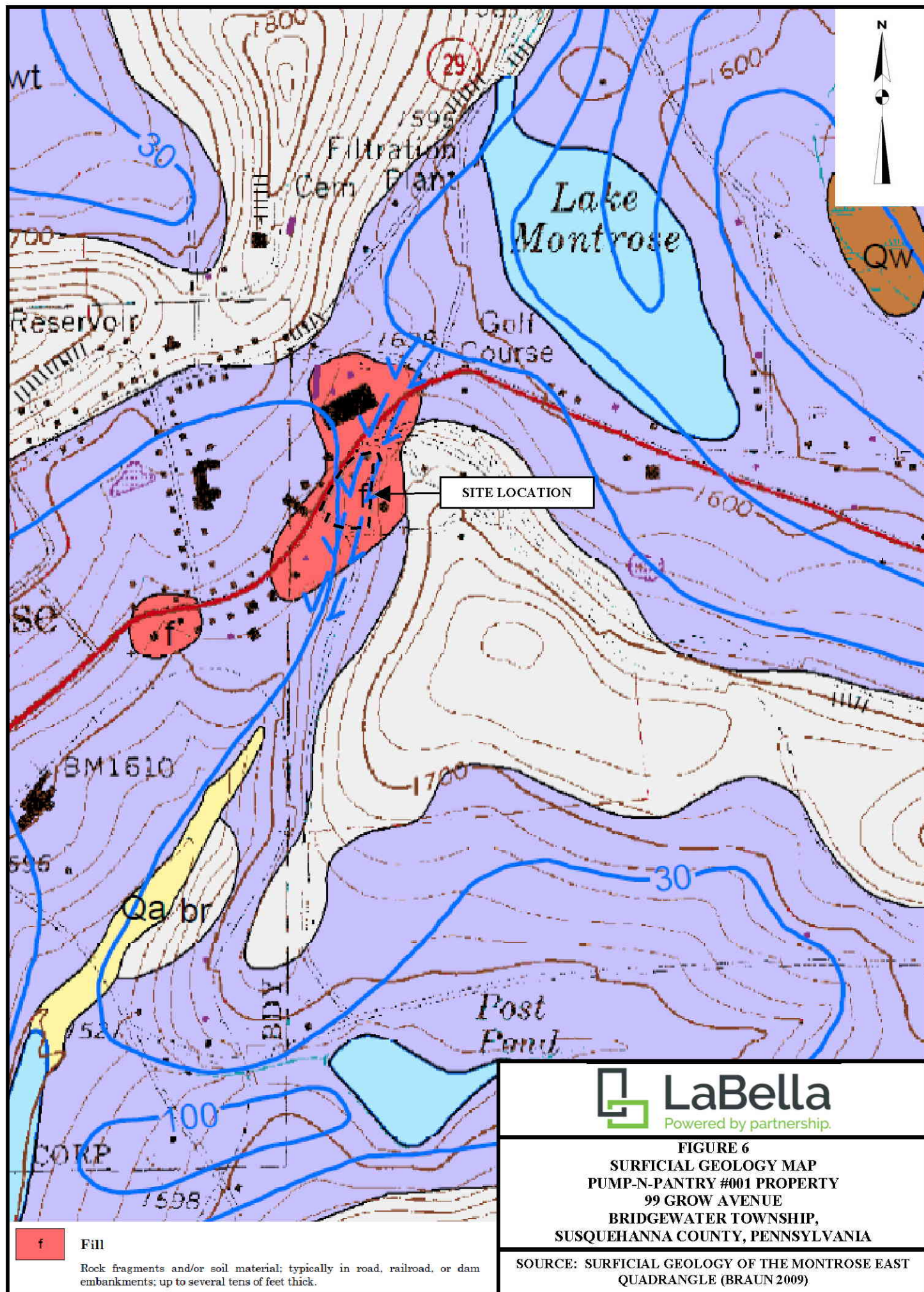








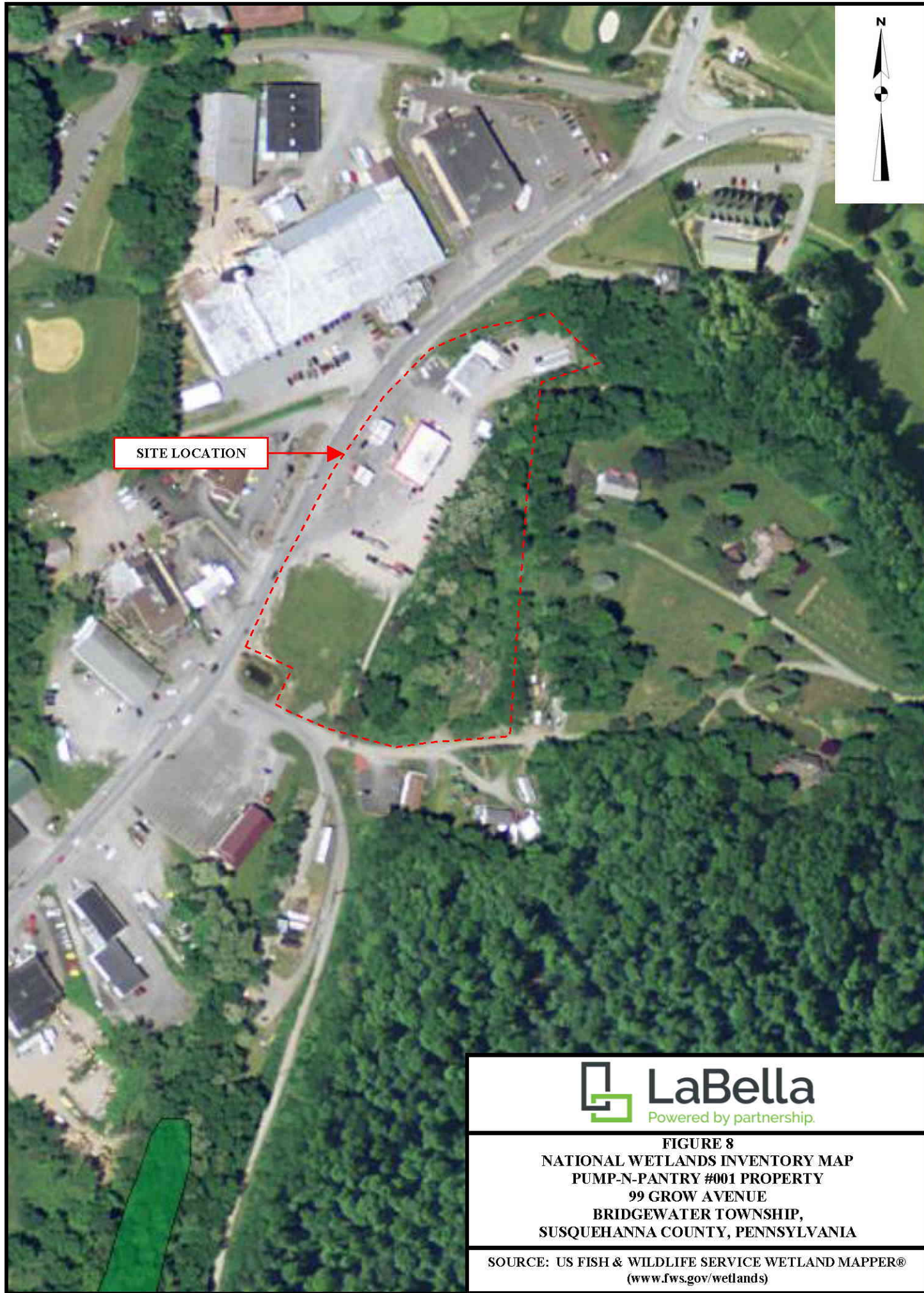












**FIGURE 8**  
**NATIONAL WETLANDS INVENTORY MAP**  
**PUMP-N-PANTRY #001 PROPERTY**  
**99 GROW AVENUE**  
**BRIDGEWATER TOWNSHIP,**  
**SUSQUEHANNA COUNTY, PENNSYLVANIA**

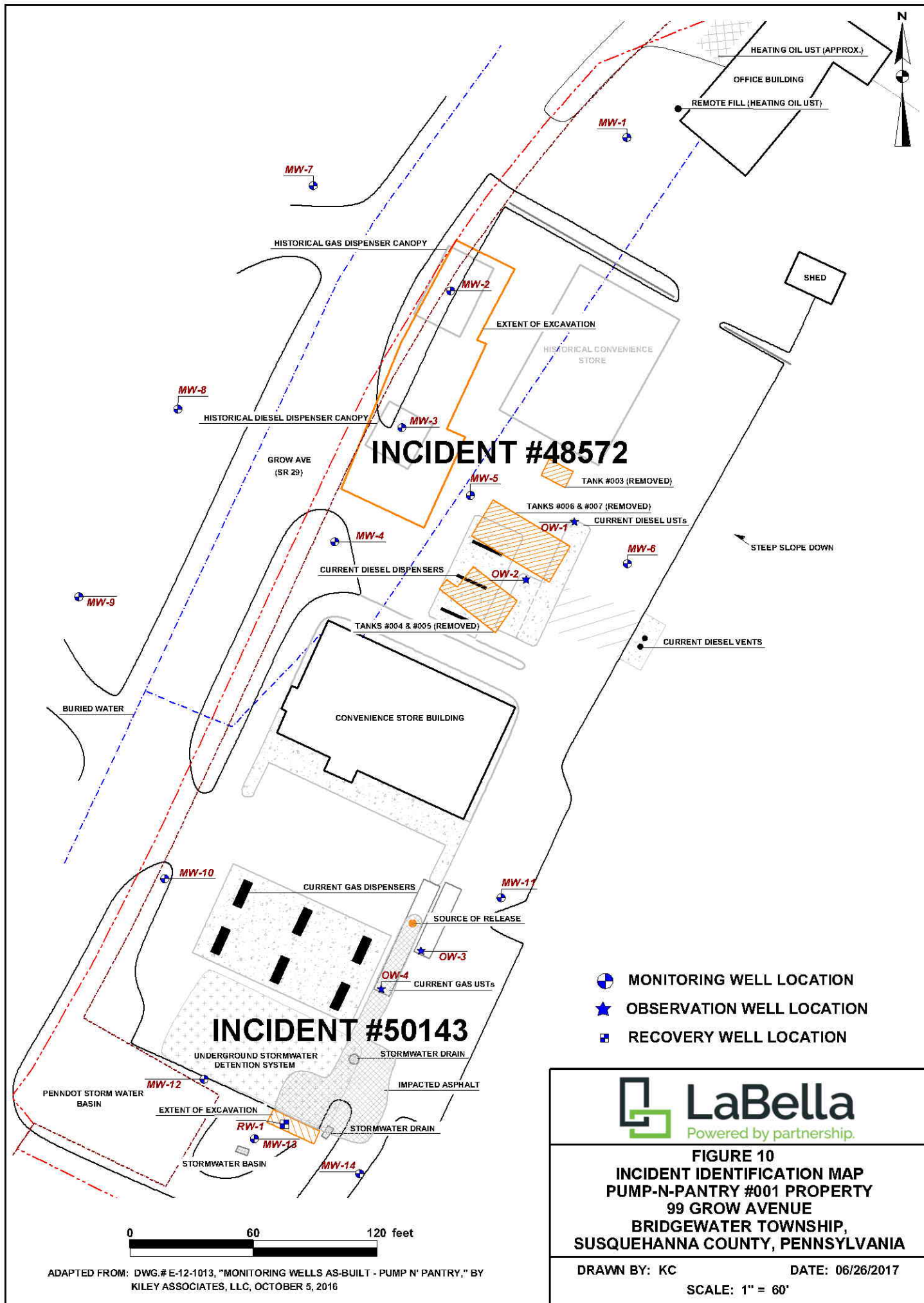
**SOURCE: US FISH & WILDLIFE SERVICE WETLAND MAPPER®**  
**(www.fws.gov/wetlands)**



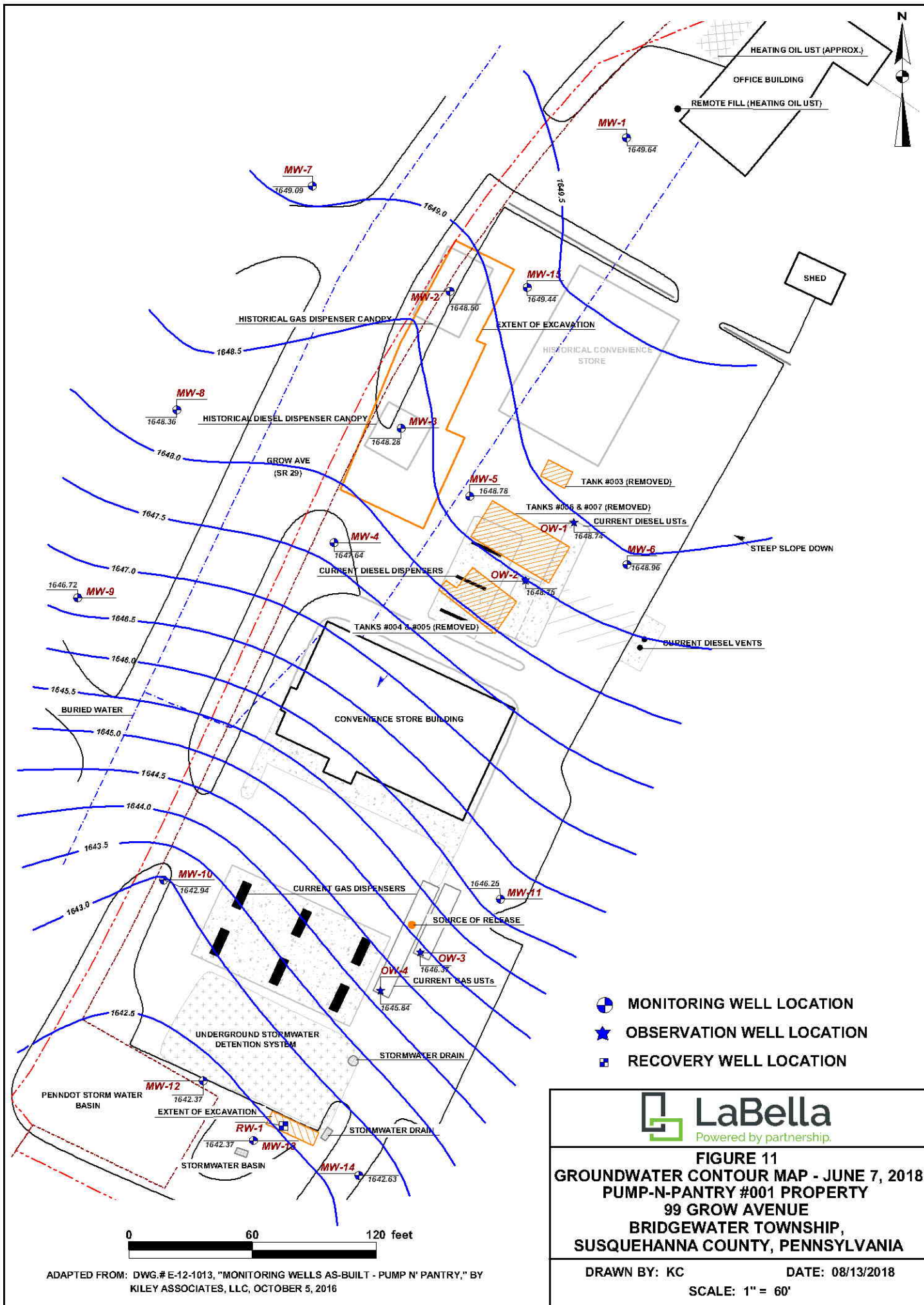


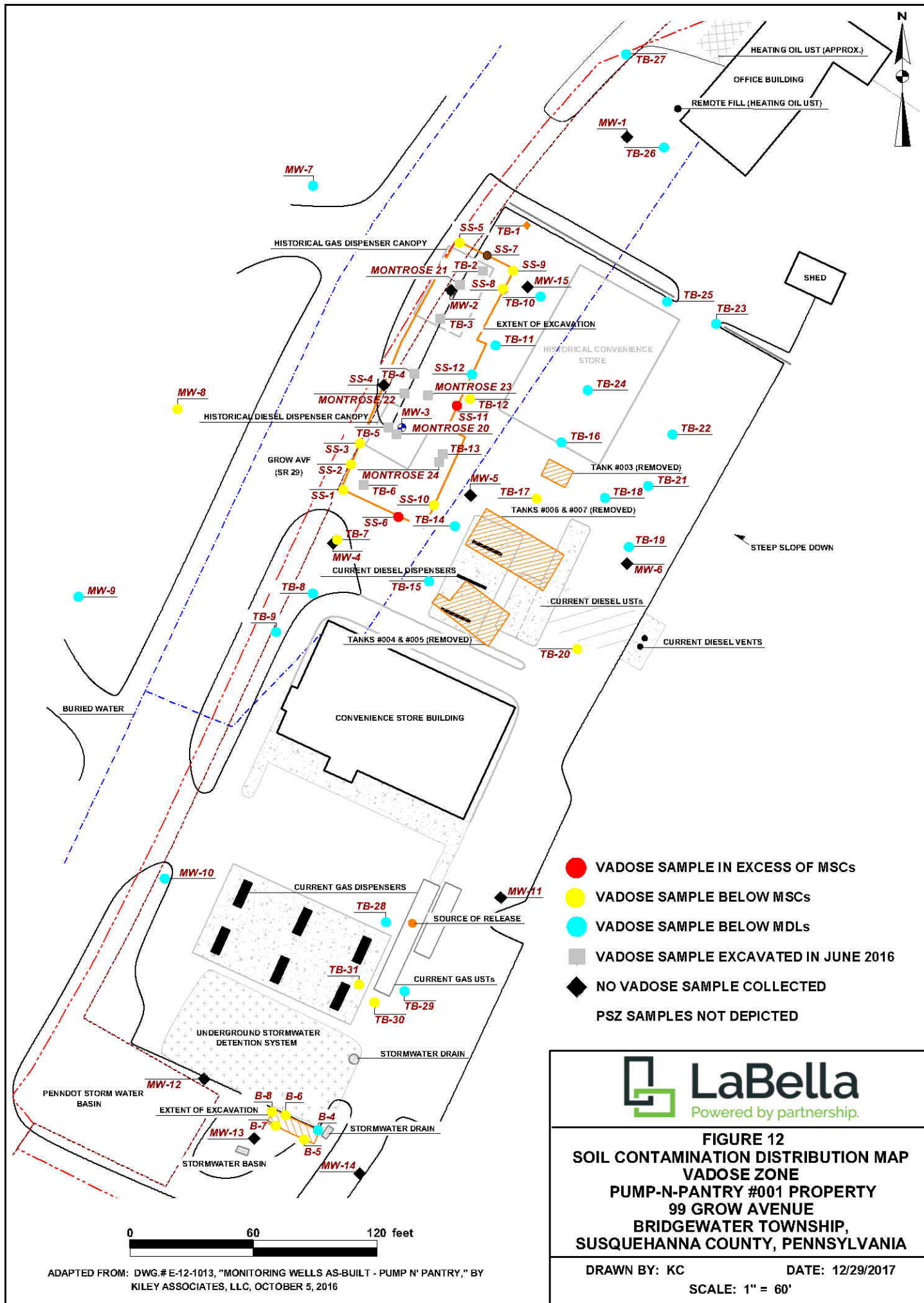
**FIGURE 9**  
**AREA MAP**  
**PUMP-N-PANTRY #001 PROPERTY**  
**99 GROW AVENUE**  
**BRIDGEWATER TOWNSHIP,**  
**SUSQUEHANNA COUNTY, PENNSYLVANIA**

SOURCE: GOOGLE EARTH®  
([www.google.com/earth](http://www.google.com/earth))

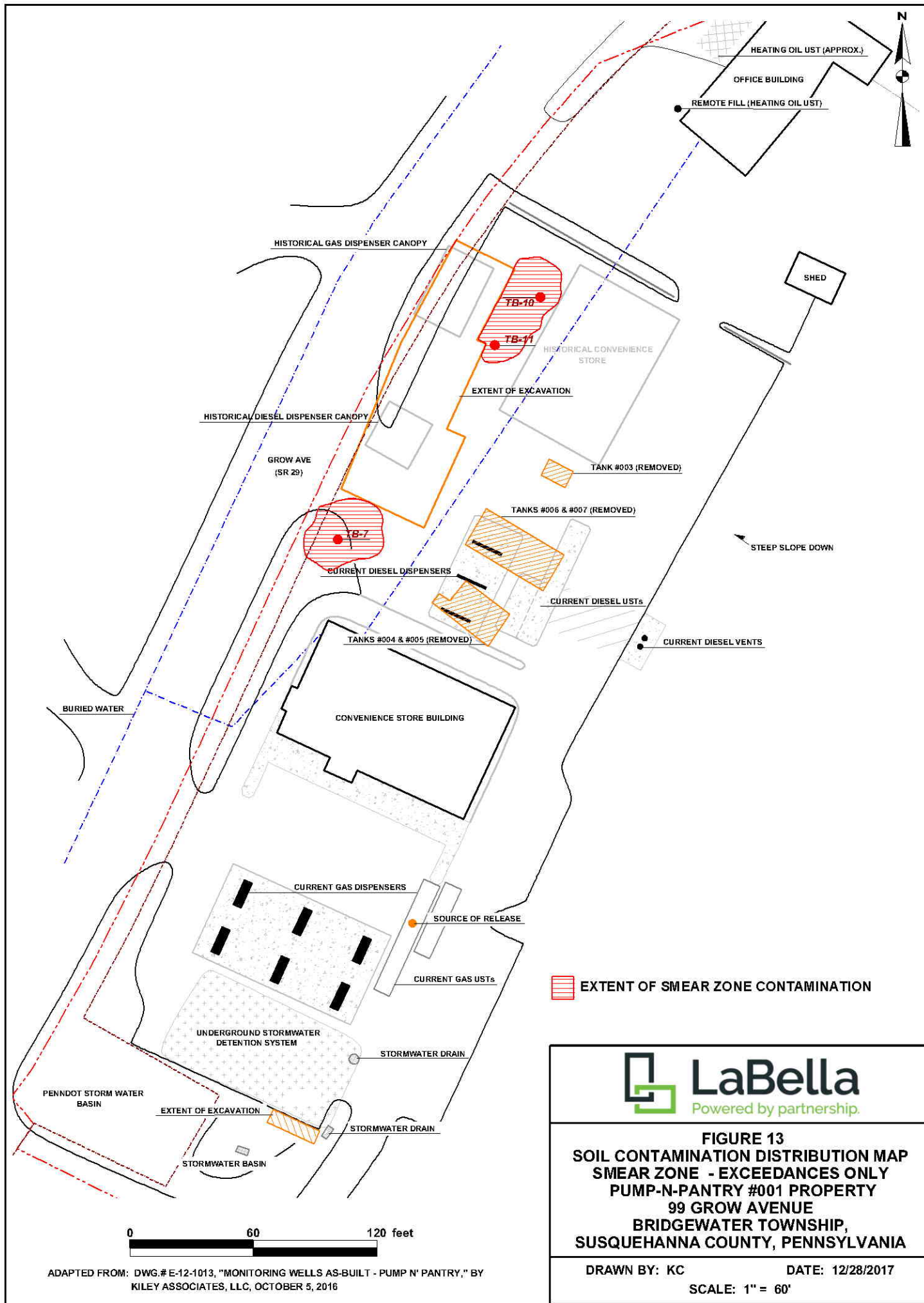


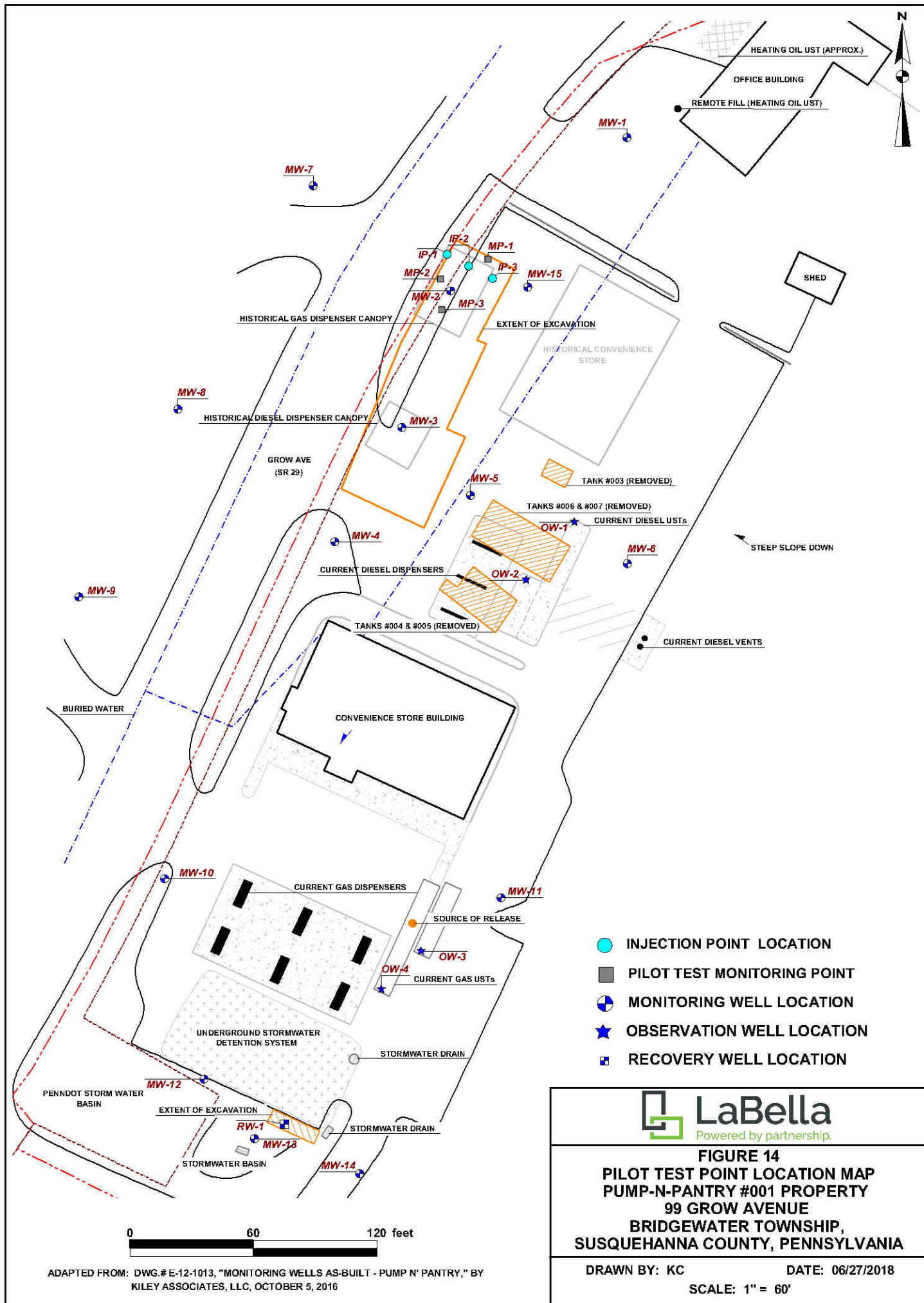














## APPENDIX B

### LaBella Associates Representative Resumes



## KEVIN CUCURA

### Environmental Analyst

Kevin has twelve years of experience in site assessments, site remediation, water quality and natural resource monitoring and management. He has worked on numerous environmental remediation/restoration projects. He has also served as Site Supervisor for underground storage tank removals, assessments, soil boring/monitoring well installations and sampling programs.

#### EDUCATION

**B.A. – Environmental Geology,  
Lock Haven University**

#### CERTIFICATIONS/ REGISTRATIONS

**ASTM: Phase I and Phase II  
Environmental Site Assessments  
for Commercial Real Estate**

**Pennsylvania Department  
of Environmental Protection  
Certified UST Installer**

**OSHA 1910.120 Hazardous Waste  
Site Training: 40 Hour**

#### **Lackawanna River 2000 Program - Lackawanna River Basin in Northeast PA**

Kevin was Project Manager for this project which was an EPA funded watershed reclamation project involving acid mine drainage (AMD) and combined sewer overflows (CSO) identification and remediation, non-point source pollution control method applications, riverbank restoration, and water quality monitoring.

#### **US Army Corps of Engineer: Lackawanna River watershed - Northeast PA**

Kevin was Project Manager for a US Army Corps of Engineers funded project, aimed at assessing tributaries and their confluences in the upper Lackawanna River watershed in Northeast Pennsylvania. The project involved quantifying metal concentrations (Aluminum, Total Iron, Ferrous Iron and Manganese) versus flow and monitoring water quality in the Lackawanna River and its tributaries.

#### **Additional experience includes:**

Hazardous Waste  
Characterization And Remediation  
Phase I And Phase II  
Environmental Site Assessment

Test Borings And Monitoring

Well Installation Oversight And  
Sampling

Underground Storage Tank  
Compliance

Closure, Release Investigations

Watershed Monitoring

Remote And Real-Time Field  
Instrumentation Operation And  
Data Acquisition

GPS Surveying

Environmental Data Collection  
And Management

#### **Scott Fuel Stop, Inc: Scott Fuel Stop Property - Scott Township, PA**

Served as PADEP Certified Tank Handler (PADEP UMR 5585) during the removal of the diesel fuel supply lines and dispensers at the site. Roles included project planning, PADEP coordination, oversight of field activities, sample collection, determining applicable cleanup standards and final report preparation.

#### **Pump-n-Pantry, Inc.: Pump-n- Pantry #002 Property - Great Bend Township, PA**

Currently serving as project manager during ongoing site characterization and interim remedial activities

at the site. Roles include client coordination, PADEP coordination, subcontractor coordination, obtaining access to off-site properties, mapping/data presentation and report preparation.

**Community Bank, NA: Phillips Road Property - Springville, PA**

Served as project manager and site supervisor during the removal of a buried oil-water separator at the site. Roles included project planning, subcontractor coordination, oversight of field activities, sample collection, determining applicable cleanup standards, contaminated soil disposal and final report preparation.





COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
Bureau of Environmental Cleanup and Brownfields  
Division of Storage Tanks  
P.O. Box 8763  
Harrisburg, PA 17105-8763



## Company Certification Certificate

This certification authorizes the below named company to employ certified installers and inspectors to perform certified activities on storage tanks regulated pursuant to the Storage Tank and Spill Prevention Act (35 P.S. Section 6021.101 et seq.). Individuals performing tank handling, tightness testing or inspection activities must also be certified by DEP in the appropriate certification category.

## LABELLA ASSOCIATES P.C.

Certification Number      1875  
DEP Client ID Number      301801

Expiration Date:      January 25, 2021

*Anne Toth*

Anne Toth, Chief  
Certification Unit



# COMMONWEALTH OF PENNSYLVANIA

## DEPARTMENT OF ENVIRONMENTAL PROTECTION



BUREAU OF ENVIRONMENTAL CLEANUP AND BROWNFIELDS  
DIVISION OF STORAGE TANKS  
P.O. BOX 8763  
HARRISBURG, PENNSYLVANIA 17105-8763



**pennsylvania**  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

THIS CERTIFICATION AUTHORIZES THE BELOW NAMED INDIVIDUAL TO CONDUCT TANK HANDLING OR INSPECTION ACTIVITIES PURSUANT TO THE STORAGE TANK AND SPILL PREVENTION ACT, AND DEPARTMENT REGULATIONS AT TITLE 25 PA CODE CHAPTER 245 IN THE SPECIFIC CATEGORIES SHOWN.

CATEGORIES	ISSUE DATE(S)	EXPIRATION DATE(S)
UMR *****	08/24/2010	08/24/2019
*****	*****	*****
*****	*****	*****
*****	*****	*****
*****	*****	*****
*****	*****	*****

*Anne Toth*

Anne Toth, Chief  
Certification Unit

ISSUED TO KEVIN M CUCURA

DEP CLIENT ID NUMBER 275081

CERTIFICATION NUMBER 5585

### WARNING

Special security measures are incorporated into this Certification Certificate and Identification Card. Any attempt to alter the information on these documents may be a violation of Pennsylvania law, including but not limited to 18 Pa. C.S.A. 4104 (relating to tampering with records or identification) and 18 Pa. C.S.A. 4911 (relating to tampering with public records and information).

Certified Companies employing the certified individual shown above may make a Photo Copy of the Certification Certificate for company records. The original certification documents shall be retained by the certified individual to whom they are issued unless otherwise directed by the Department.

### IMPORTANT INSTRUCTIONS

Carefully detach the Identification (ID) Card along perforated edges. Sign the ID Card on the reverse side and carry the ID Card at all times when performing certified activities. You must present (display) the ID Card upon request.

The ID Card may be covered or laminated with a clear plastic material (**after signing**) to protect it from deterioration.

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION  
DIVISION OF STORAGE TANKS

INSTALLER/INSPECTOR CERTIFICATION NUMBER: 5585

ISSUED TO: KEVIN M CUCURA

CATEGORIES EXPIRATION DATE(S)

UMR *****	08/24/2019
*****	*****
*****	*****
*****	*****
*****	*****
*****	*****





## MARTIN GILGALLON

### Regional Environmental Manager

Marty is our Regional Manager in Scranton, PA and has 28 years of experience in the environmental field, specializing in environmental assessment, water quality and waste stream treatment evaluation, site characterization, subsurface investigations, and remedial design/action. Marty has worked with a variety of clients including energy and utility clients, development corporations, and commercial and residential developers throughout the Mid-Atlantic region.

#### PG

Professional Geologist, PA

#### EDUCATION

B.S. - Geosciences, Penn State University, 1987

#### ORGANIZATIONS

Association of Groundwater Scientists and Engineers.

National Groundwater Association

The Geological Society of America

Lackawanna River Corridor Association

#### CERTIFICATIONS/ REGISTRATIONS

Commonwealth of Pennsylvania Registered Professional Geologist

Pennsylvania Department of Environmental Protection Certified UST Installer

OSHA 1910.120 Hazardous Waste Site Training: 40 Hour and Annual 8 Hour

#### Lackawanna Watershed 2000 Program - Lackawanna River Basin in Northeastern PA

Marty served as Project Manager for this program on the Lackawanna River Basin in Northeastern Pennsylvania. He previously served as Project Manager under the Strategic Environmental Research and Development Program (SERDP) in conjunction with the completion of watershed studies on the Lackawanna River Basin and the Winters Run River Basin at the Aberdeen Proving Ground in Harford County, Maryland. The associated Scopes of Work included:

Completion of the mapping of each basin utilizing GPS and GIS technologies.

Generation of channel morphology data utilizing traditional surveying methods.

Collection of wet chemistries to determine baseline chemical characteristics of each river system.

Collection of water quality data utilizing in-situ real-time data collection equipment pursuant to the development of the prototypes.

Pilot demonstrations for an environmental Monitoring and Management System (EMMS) under SERDP.

In each investigation, the real-time data was collected from the field stations utilizing cellular telephone technologies and downloaded, via modem, to a central data collection laboratory at the National Institute for Environmental Renewal (NIER) located in Mayfield, Lackawanna County, Pennsylvania.

As Project Manager, his responsibilities also included coordination with officials of the Army Environmental Center at the Aberdeen Proving Ground; completion of the collection of atmospheric data with field representatives of the Waterways Experimental Station (WES) in Vicksburg, Mississippi; and coordination with local, county and state regulators and authorities.

#### Site Characterization

Marty conducted evaluations of Publicly Owned Treatment Works (POTW) effluent characterization protocols relative to compliance with PA Clean Streams and US EPA Clean Water Act requirements, as they apply

to receiving water limitations on quantities, rates, and concentrations of chemical and physical constituents.

**Dye Tracer Studies**

Marty also designed and implemented Dye Tracer studies for a variety of commercial and industrial clients, in order to determine the configuration of both sanitary and industrial piping systems. As part of a Design Study relative to a Groundwater Pump and Treat System, he evaluated the capability of a private Sewage Treatment Plant to process treated discharges from a hydrocarbon-contaminated wastestream. In support of Permit Applications for encroachments into wetlands, he prepared environmental assessment documentation regarding wetland aerial extent, value, function, adverse impacts and adverse environmental effect.

**Project Hydrogeologist**

As Project Hydrogeologist, Marty was responsible for the assessment of hydrologic and geologic conditions pertaining to project performance. Projects of note include the initiation and supervision of release investigations in conjunction with failed underground storage tank (UST) systems at numerous sites and UST Closures. These projects typically include the development of test boring and monitoring well networks and soil and groundwater sampling programs in order to discern migration pathways and the extent of potential contamination present at a facility. Marty's responsibilities included the design and implementation of remedial action plans to address soil and groundwater contamination; associated coordination with regulatory

agencies; and the preparation of UST Closure Reports. Remedial action projects include: the design and implementation of vacuum extraction and remediation systems to address petroleum contaminated soil and groundwater; and pump and treat remedial systems to address petroleum impacted groundwater in deep, bedrock aquifers.

**Environmental Assessments**

As Project Manager for environmental assessments and site characterizations, responsibilities included the preparation of and adherence to site specific health and safety plans, performance of background reviews and field investigations, oversight of field technicians, data review, and reporting. Projects of note include: the remedial investigation/feasibility study of a 120 acre industrial facility contaminated with various petroleum hydrocarbons, volatile organics and PCBs; hydrogeological study and quarterly monitoring of an abandoned industrial site contaminated with 1,1,1 Trichloroethane; geophysical documents review; and Phase I and Phase II environmental site assessments of commercial and industrial facilities.

**Geologist**

As Staff Geologist, Marty's duties included the design of groundwater monitoring systems for landfills and UST systems. Marty was responsible for the installation of test borings and construction of groundwater monitoring wells, and the development and implementation of soil and aqueous sampling programs. He was also responsible for environmental site assessments

and geotechnical investigations in conjunction with building design and construction, and report preparation. Projects of note include the hydrogeological investigation including project and client coordination for a US Environmental Protection Agency Superfund Site in New Jersey; and numerous geologic investigations for both government agencies and private corporations.



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<u>CATEGORIES</u>	<u>ISSUE DATE(S)</u>	<u>EXPIRATION DATE(S)</u>
UMR *****	05/07/2012	05/07/2021
*****	*****	*****
*****	*****	*****
*****	*****	*****
*****	*****	*****
*****	*****	*****

Anne Toth, Chief  
Certification Unit

ISSUED TO MARTIN P GILGALLON  
DEP CLIENT ID NUMBER 181651  
CERTIFICATION NUMBER 4294

**Commonwealth of Pennsylvania**  
**Department of State**  
**Bureau of Professional and Occupational Affairs**  
**PO BOX 2649 Harrisburg PA 17105-2649**

18 0062841

**License Type**  
**Professional Geologist**

**MARTIN PATRICK GILGALLON**  
**18 Old Mill Road**  
**Jermyn PA 18433**



**License Status**  
**Active**

**Initial License Date**  
**05/02/1994**

**Expiration Date**  
**09/30/2019**

**License Number**  
**PG000639G**

*[Handwritten signature]*

Commissioner of Professional and Occupational Affairs

*[Handwritten signature]*  
 Signature

## APPENDIX C

### Historical Groundwater Analytical Summary Table

09/13/18

Table C-1  
Site Characterization Activities  
Pump-n-Party #001 Property  
Summary of Groundwater Analytical Data (ug/l)  
Groundwater Monitoring Wells

Well Number	Date Sampled	Well Head Elevation (feet)	Depth to Groundwater (feet)*	Relative Groundwater Elevation (feet)	Product Thickness (feet)	Remediation Status	Benzene (ug/L)	Ethylbenzene (ug/L)	Cumene (ug/L)	MTBE (ug/L)	Naphthalene (ug/L)	Toluene (ug/L)	Xylenes (ug/L)	1,2,4-TMB (ug/L)	1,3,5-TMB (ug/L)
							5.0	700.0	3,500.0	20.0	100.0	1,000.0	10,000.0	62.0	1,200.0
MW-1  Screened Interval: 3.64' - 20.64' Total Depth: 20.64'	10/19/2016	1654.16	15.22	1638.94	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	11/30/2016	1654.16	4.51	1649.65	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	2/22/2017	1654.16	3.24	1650.92	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	5/12/2017	1654.16	4.52	1649.64	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	7/24/2017	1654.16	2.29	1651.87	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	11/2/2017	1654.16	3.74	1650.42	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	12/5/2017	1654.16	5.12	1649.04	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	3/20/2018	1654.16	3.48	1650.68	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	6/8/2018	1654.16	4.52	1648.64	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
MW-2  Screened Interval: 3.66' - 20.66' Total Depth: 20.66'	10/19/2016	1653.72	5.40	1648.32	0.00	Characterization	273	140	9.5	3.5	40.5	9.4	140	171	<1.0
	11/30/2016	1653.72	5.03	1648.69	0.00	Characterization	935	494	14.4	7.4	39.8	10.8	310	227	<5.0
	2/22/2017	1653.72	4.66	1649.06	0.00	Characterization	349	412	17.0	<5.0	50.5	19.5	275	250	<5.0
	5/22/2017	1653.72	5.07	1648.65	0.00	Characterization	612	659	27.2	<5.0	43.2	21.0	430	429	<5.0
	7/24/2017	1653.72	4.77	1648.95	0.00	Characterization	68.8	48.4	2.3	34.4	3.4	5.7	7.4	12.9	<1.0
	11/3/2017	1653.72	5.25	1648.47	0.00	Characterization	516	422	18.5	23.1	55.0	125	296	195	<1.0
	12/5/2017	1653.72	5.28	1648.44	0.00	Characterization	756	543	25.7	8.3	52.6	248	389	324	<1.0
	3/21/2018	1653.72	4.74	1648.98	0.00	Characterization	246	205	10.8	<5.0	21.1	24.2	151	161	<5.0
	6/8/2018	1653.72	5.22	1648.50	0.00	Characterization	643	625	50.2	8.8	77.8	89.8	565	338	<5.0
MW-3  Screened Interval: 3.16' - 20.16' Total Depth: 20.16'	10/19/2016	1652.92	5.20	1647.72	0.00	Characterization	180	295	30.6	7.7	28.1	4.1	3.6	7.9	<1.0
	11/30/2016	1652.92	4.57	1648.35	0.00	Characterization	110	296	18.4	10.5	20.3	<5.0	<15.0	7.9	<5.0
	2/22/2017	1652.92	3.45	1649.47	0.00	Characterization	86.8	287	16.4	6.8	27.9	10.5	57.7	26.7	<5.0
	5/22/2017	1652.92	4.54	1648.38	0.00	Characterization	122	374	23.0	<5.0	21.8	9.5	68.1	57.6	<5.0
	7/25/2017	1652.92	4.21	1648.71	0.00	Characterization	35.9	105	7.2	<1.0	2.3	<1.0	<3.0	<1.0	<1.0
	11/3/2017	1652.92	4.52	1648.40	0.00	Characterization	44.3	57.6	14.0	<1.0	<2.0	1.3	<3.0	<1.0	<1.0
	12/5/2017	1652.92	4.79	1648.13	0.00	Characterization	45.2	73.6	13.3	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	3/21/2018	1652.92	4.45	1648.47	0.00	Characterization	38.1	117	8.5	12.5	<2.0	3.6	7.9	<1.0	<1.0
	6/8/2018	1652.92	4.64	1648.28	0.00	Characterization	48.4	83.1	14.0	<1.0	5.4	3.0	<3.0	2.3	<1.0

NM Not Measured  
MTBE Methyl Tert Butyl Ether  
1,2,4-TMB 1,2,4-Trimethylbenzene  
1,3,5-TMB 1,3,5-Trimethylbenzene

NS Not Sampled  
NA Not Applicable  
E Estimated Value

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer TDS &lt;2,500 mg/l setting

Shaded values indicate Act 2 Statewide Health Standard exceedances

Notes:

- 1) Screened Interval and Total Depth measurements from grade
- 2) Well Head Elevation and Depth to Groundwater measured from Top of Casing



09/13/18

Table C-1  
Site Characterization Activities  
Pump-n-Party #001 Property  
Summary of Groundwater Analytical Data (ug/l)  
Groundwater Monitoring Wells

Well Number	Date Sampled	Well Head Elevation (feet)	Depth to Groundwater (feet)*	Relative Groundwater Elevation (feet)	Product Thickness (feet)	Remediation Status	Benzene (ug/L)	Ethylbenzene (ug/L)	Cumene (ug/L)	MTBE (ug/L)	Naphthalene (ug/L)	Toluene (ug/L)	Xylenes (ug/L)	1,2,4-TMB (ug/L)	1,3,5-TMB (ug/L)
MW4  Screened Interval: 3.35' - 15.35' Total Depth: 15.35'	10/19/2016	1651.31	4.20	1647.11	0.00	Characterization	5.0	700.0	3,500.0	20.0	100.0	1,000.0	10,000.0	62.0	1,200.0
	11/30/2016	1651.31	3.40	1647.91	0.00	Characterization	214	176	25.1	4.9	14.3	17.5	50.6	25.8	<1.0
	2/22/2017	1651.31	3.40	1647.91	0.00	Characterization	282	179	20.4	<5.0	10.6	23.2	58.0	20.6	<5.0
	5/22/2017	1651.31	3.47	1647.84	0.00	Characterization	268	176	18.6	5.8	17.7	17.8	55.0	14.4	<5.0
	7/29/2017	1651.31	3.11	1648.20	0.00	Characterization	320	251	32.6	<5.0	16.6	21.0	58.0	27.1	<5.0
	11/3/2017	1651.31	3.51	1647.80	0.00	Characterization	267	176	20.8	<5.0	14.2	25.0	84.5	22.3	<5.0
	11/3/2017	1651.31	3.51	1647.80	0.00	Characterization	534	197	25.4	<5.0	26.0	42.6	108.0	17.5	<5.0
	12/9/2017	1651.31	3.80	1647.51	0.00	Characterization	324	180	23.8	<5.0	22.8	26.8	74.7	25.5	<5.0
	3/21/2018	1651.31	3.32	1647.99	0.00	Characterization	317	280	25.2	<5.0	13.7	36.8	65.0	28.3	<5.0
	6/8/2018	1651.31	3.67	1647.64	0.00	Characterization	163	132	24.6	<5.0	18.9	14.6	37.4	18.2	<5.0
MW5  Screened Interval: 3.32' - 20.32' Total Depth: 20.32'	10/19/2016	1652.33	4.64	1647.69	0.00	Characterization	173	104	9.6	26.4	20.3	7.7	57.2	132	20.8
	11/30/2016	1652.33	3.38	1648.95	0.00	Characterization	219	288	28.7	24.1	135	9.4	56.6	161	<1.0
	2/22/2017	1652.33	3.30	1649.03	0.00	Characterization	116	196	21.9	12.4	53.0	5.4	53.2	136	<1.0
	5/22/2017	1652.33	3.31	1649.02	0.00	Characterization	133	200	20.0	<5.0	23.0	<5.0	33.9	84.9	<5.0
	7/29/2017	1652.33	3.06	1649.27	0.00	Characterization	144	168	25.8	7.9	27.0	5.1	16.3	34.4	<1.0
	11/3/2017	1652.33	3.36	1648.97	0.00	Characterization	196	223	28.7	14.8	29.1	11.4	33.2	42.5	<1.0
	12/9/2017	1652.33	3.82	1648.51	0.00	Characterization	172	201	26.5	10.6	30.5	9.3	21.6	63.5	<5.0
	3/21/2018	1652.33	3.35	1648.98	0.00	Characterization	102	183	22.4	10.4	40.5	7.2	26.7	82.4	<5.0
	6/8/2018	1652.33	3.55	1648.78	0.00	Characterization	88.8	124	20.9	5.3	<10.0	<5.0	<15.0	18.5	<5.0
MW6  Screened Interval: 3.46' - 20.46' Total Depth: 20.46'	10/19/2016	1653.95	6.18	1647.77	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	11/30/2016	1653.95	4.63	1649.32	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	2/22/2017	1653.95	4.21	1649.74	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	5/1/2017	1653.95	4.50	1649.45	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	7/29/2017	1653.95	3.05	1650.90	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	11/3/2017	1653.95	4.48	1649.47	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	12/9/2017	1653.95	5.35	1648.60	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	3/21/2018	1653.95	4.51	1649.44	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	6/8/2018	1653.95	4.99	1648.96	0.00	Characterization	1.1	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0

NM Not Measured  
MTBE Methyl Tert Butyl Ether  
1,2,4-TMB 1,2,4-Trimethylbenzene  
1,3,5-TMB 1,3,5-Trimethylbenzene

NS Not Sampled  
NA Not Applicable  
E Estimated Value

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer TDS &lt;2,500 mg/l setting

Shaded values indicate Act 2 Statewide Health Standard exceedances

Notes:

- 1) Screened Interval and Total Depth measurements from grade
- 2) Well Head Elevation and Depth to Groundwater measured from Top of Casing

09/13/18

**Table C-1**  
**Site Characterization Activities**  
**Pump-n-Party #001 Property**  
**Summary of Groundwater Analytical Data (ug/l)**  
**Groundwater Monitoring Wells**

Well Number	Date Sampled	Well Head Elevation (feet)	Depth to Groundwater (feet)*	Relative Groundwater Elevation (feet)	Product Thickness (feet)	Remediation Status	Benzene (ug/L)	Ethylbenzene (ug/L)	Cumene (ug/L)	MTBE (ug/L)	Naphthalene (ug/L)	Toluene (ug/L)	Xylenes (ug/L)	1,2,4-TMB (ug/L)	1,3,5-TMB (ug/L)
							5.0	700.0	3,500.0	20.0	100.0	1,000.0	10,000.0	62.0	1,200.0
<b>MW7</b>  <b>Screened Interval: 3.35' - 15.35'</b> <b>Total Depth: 15.35'</b>	10/19/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/30/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/22/2017	1653.00	3.62	1649.38	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	5/22/2017	1653.00	3.82	1649.18	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	7/29/2017	1653.00	3.10	1649.90	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	11/3/2017	1653.00	3.87	1649.13	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	12/4/2017	1653.00	4.10	1648.90	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	3/20/2018	1653.00	3.63	1649.37	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	6/7/2018	1653.00	3.91	1649.09	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
<b>MW8</b>  <b>Screened Interval: 3.32' - 20.32'</b> <b>Total Depth: 20.32'</b>	10/19/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/30/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/22/2017	1653.13	4.46	1648.67	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	5/22/2017	1653.13	4.43	1648.70	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	7/24/2017	1653.13	3.81	1649.32	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	11/2/2017	1653.13	4.83	1648.30	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	12/4/2017	1653.13	5.11	1648.02	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	3/20/2018	1653.13	4.51	1648.62	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	6/7/2018	1653.13	4.77	1648.36	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
<b>MW9</b>  <b>Screened Interval: 3.46' - 20.46'</b> <b>Total Depth: 20.46'</b>	10/19/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/30/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/22/2017	1651.75	4.66	1647.09	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	5/22/2017	1651.75	4.83	1646.92	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	7/24/2017	1651.75	3.96	1647.79	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	11/2/2017	1651.75	5.01	1646.74	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	12/4/2017	1651.75	5.28	1646.47	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	3/20/2018	1651.75	5.28	1646.47	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	6/7/2018	1651.75	5.03	1646.72	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0

**NM**  
**MTBE**  
**1,2,4-TMB**  
**1,3,5-TMB**

Not Measured  
Methyl Tert Butyl Ether  
1,2,4-Trimethylbenzene  
1,3,5-Trimethylbenzene

**NS**  
**NA**  
**E**

Not Sampled  
Not Applicable  
Estimated Value

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer TDS <2,500 mg/l setting

Shaded values indicate Act 2 Statewide Health Standard exceedances

Notes:

- 1) Screened Interval and Total Depth measurements from grade
- 2) Well Head Elevation and Depth to Groundwater measured from Top of Casing

09/13/18

Table C-1  
Site Characterization Activities  
Pump-n-Party #001 Property  
Summary of Groundwater Analytical Data (ug/l)  
Groundwater Monitoring Wells

Well Number	Date Sampled	Well Head Elevation (feet)	Depth to Groundwater (feet)*	Relative Groundwater Elevation (feet)	Product Thickness (feet)	Remediation Status	Benzene (ug/L)	Ethylbenzene (ug/L)	Cumene (ug/L)	MTBE (ug/L)	Naphthalene (ug/L)	Toluene (ug/L)	Xylenes (ug/L)	1,2,4-TMB (ug/L)	1,3,5-TMB (ug/L)
							5.0	700.0	3,500.0	20.0	100.0	1,000.0	10,000.0	62.0	1,200.0
MW-10  Screened Interval: 3.35' - 15.35' Total Depth: 15.35'	10/19/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/30/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/22/2017	1648.98	5.66	1643.32	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	5/22/2017	1648.98	5.82	1643.16	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	7/29/2017	1648.98	4.98	1644.00	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	11/2/2017	1648.98	5.77	1643.21	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	12/4/2017	1648.98	6.11	1642.87	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	3/21/2018	1648.98	5.81	1643.17	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	6/7/2018	1648.98	6.04	1642.94	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
MW-11  Screened Interval: 3.32' - 20.32' Total Depth: 20.32'	10/19/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/30/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/22/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/1/2017	1650.45	3.91	1646.54	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	7/29/2017	1650.45	2.80	1647.65	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	11/2/2017	1650.45	3.92	1646.53	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	12/4/2017	1650.45	4.18	1646.27	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	3/21/2018	1650.45	3.99	1646.46	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	6/7/2018	1650.45	4.20	1646.25	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
MW-12  Screened Interval: 3.46' - 20.46' Total Depth: 20.46'	10/19/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/30/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/22/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/2/2017	1648.39	5.89	1642.51	0.00	Characterization	4.3	<1.0	<1.0	<1.0	<2.0	1.5	<3.0	<1.0	<1.0
	7/29/2017	1648.39	5.07	1643.32	0.00	Characterization	1.3	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	11/2/2017	1648.39	5.81	1642.58	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	12/4/2017	1648.39	6.12	1642.27	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	3/21/2018	1648.39	5.64	1642.75	0.00	Characterization	<2.3	<3.4	<2.2	<3.3	4.0J	<2.3	<6.6	3.5J	<2.0
	6/7/2018	1648.39	6.02	1642.37	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0

NM Not Measured  
MTBE Methyl Tert Butyl Ether  
1,2,4-TMB 1,2,4-Trimethylbenzene  
1,3,5-TMB 1,3,5-Trimethylbenzene

NS Not Sampled  
NA Not Applicable  
J Estimated Value

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer TDS &lt;2,500 mg/l setting

Notes:

Shaded values indicate Act 2 Statewide Health Standard exceedances

1.) Screened Interval and Total Depth measurements from grade

2.) Well Head Elevation and Depth to Groundwater measured from Top of Casing

Note: MW-12 data from 3/21/18 reported to the MDL; all others reported to the RDL



09/13/18

**Table C-1**  
**Site Characterization Activities**  
**Pump-n-Party #001 Property**  
**Summary of Groundwater Analytical Data (ug/l)**  
**Groundwater Monitoring Wells**

Well Number	Date Sampled	Well Head Elevation (feet)	Depth to Groundwater (feet)*	Relative Groundwater Elevation (feet)	Product Thickness (feet)	Remediation Status	Benzene (ug/L)	Ethylbenzene (ug/L)	Cumene (ug/L)	MTBE (ug/L)	Naphthalene (ug/L)	Toluene (ug/L)	Xylenes (ug/L)	1,2,4-TMB (ug/L)	1,3,5-TMB (ug/L)
							5.0	700.0	3,500.0	20.0	100.0	1,000.0	10,000.0	62.0	1,200.0
<b>MW-13</b>  <b>Screened Interval: 3.32' - 20.32'</b> <b>Total Depth: 20.32'</b>	10/19/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/30/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/22/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/1/2017	1645.56	3.14	1642.42	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	7/29/2017	1645.56	2.49	1643.07	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	11/2/2017	1645.56	3.10	1642.46	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	1/24/2017	1645.56	3.37	1642.19	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	3/21/2018	1645.56	2.97	1642.59	0.00	Characterization	<1.2	<1.7	<1.1	<1.7	<b>8.4J</b>	<1.2	<3.3	<b>4.5J</b>	<b>1.7J</b>
	8/7/2018	1645.56	3.19	1642.37	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
<b>MW-14</b>  <b>Screened Interval: 3.46' - 20.46'</b> <b>Total Depth: 20.46'</b>	10/19/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/30/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/22/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/1/2017	1647.34	4.25	1643.09	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	7/29/2017	1647.34	3.33	1644.01	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	11/2/2017	1647.34	4.44	1642.90	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	1/24/2017	1647.34	4.77	1642.57	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	3/21/2018	1647.34	4.25	1643.09	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	8/7/2018	1647.34	4.71	1642.63	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
<b>MW-15</b>  <b>Screened Interval: 2.60' - 19.60'</b> <b>Total Depth: 19.60'</b>	10/19/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/30/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/22/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/1/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/29/2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/2/2017	1654.07	4.47	1649.60	0.00	Characterization	552	1240	176	<5.0	179	2420	3950	987	172
	1/24/2017	1654.07	5.11	1648.96	0.00	Characterization	458	1170	186	<5.0	139	1730	3150	990	157
	3/20/2018	1654.07	3.67	1650.40	0.00	Characterization	50.0	440	75.1	<5.0	39.7	137	360	705	<5.0
	6/8/2018	1654.07	4.63	1649.44	0.00	Characterization	94.4	405	90.5	<5.0	54.4	71.8	288	746	76.6

NM Not Measured  
MTBE Methyl Tert Butyl Ether  
1,2,4-TMB 1,2,4-Trimethylbenzene  
1,3,5-TMB 1,3,5-Trimethylbenzene

NS Not Sampled  
NA Not Applicable  
J Estimated Value

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer TDS &lt;2,500 mg/l setting

Shaded values indicate Act 2 Statewide Health Standard exceedances

Notes:

- 1.) Screened Interval and Total Depth measurements from grade
- 2.) Well Head Elevation and Depth to Groundwater measured from Top of Casing

**Note: MW-13 data from 3/21/18 reported to the MDL; all others reported to the RDL**

09/13/18

Table C-1  
Site Characterization Activities  
Pump-n-Party #001 Property  
Summary of Groundwater Analytical Data (ug/l)  
Groundwater Monitoring Wells

Well Number	Date Sampled	Well Head Elevation (feet)	Depth to Groundwater (feet)*	Relative Groundwater Elevation (feet)	Product Thickness (feet)	Remediation Status	Benzene (ug/L)	Ethylbenzene (ug/L)	Cumene (ug/L)	MTBE (ug/L)	Naphthalene (ug/L)	Toluene (ug/L)	Xylenes (ug/L)	1,2,4-TMB (ug/L)	1,3,5-TMB (ug/L)
							5.0	700.0	3,500.0	20.0	100.0	1,000.0	10,000.0	62.0	1,200.0
OW-1  Screened Interval: 3.80' - 13.35' Total Depth: 13.35'	10/19/2016	1653.44	5.74	1647.70	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	11/30/2016	1653.44	4.50	1648.94	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	2/22/2017	1653.44	3.38	1650.06	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	5/12/2017	1653.44	4.44	1649.00	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	7/24/2017	1653.44	4.18	1649.26	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	11/2/2017	1653.44	4.49	1648.95	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	12/4/2017	1653.44	4.96	1648.48	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	3/20/2018	1653.44	4.56	1648.88	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	6/8/2018	1653.44	4.70	1648.74	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
OW-2  Screened Interval: 3.84' - 12.59' Total Depth: 12.59'	10/19/2016	1652.39	4.70	1647.69	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	11/30/2016	1652.39	3.44	1649.95	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	2/22/2017	1652.39	4.42	1647.97	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	5/12/2017	1652.39	3.39	1649.00	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	7/24/2017	1652.39	3.13	1649.26	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	11/2/2017	1652.39	3.41	1648.98	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	12/4/2017	1652.39	3.88	1648.51	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	3/20/2018	1652.39	3.50	1648.89	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	6/8/2018	1652.39	3.64	1648.75	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0

NM  
MTBE  
1,2,4-TMB  
1,3,5-TMB

Not Measured  
Methyl Tert Butyl Ether  
1,2,4-Trimethylbenzene  
1,3,5-Trimethylbenzene

NS  
NA  
E

Not Sampled  
Not Applicable  
Estimated Value

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer TDS <2,500 mg/l setting

Shaded values indicate Act 2 Statewide Health Standard exceedances

Notes:

- 1.) Screened Interval and Total Depth measurements from grade
- 2.) Well Head Elevation and Depth to Groundwater measured from Top of Casing

09/13/18

Table C-1  
Site Characterization Activities  
Pump-n-Party #001 Property  
Summary of Groundwater Analytical Data (ug/l)  
Groundwater Monitoring Wells

Well Number	Date Sampled	Well Head Elevation (feet)	Depth to Groundwater (feet)*	Relative Groundwater Elevation (feet)	Product Thickness (feet)	Remediation Status	Benzene (ug/L)	Ethylbenzene (ug/L)	Cumene (ug/l)	MTBE (ug/L)	Naphthalene (ug/L)	Toluene (ug/L)	Xylenes (ug/L)	1,2,4-TMB (ug/L)	1,3,5-TMB (ug/L)
OW-3	NA	NA	NA	NA	NA	NA	5.0	700.0	3,500.0	20.0	100.0	1,000.0	10,000.0	62.0	1,200.0
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/1/2017	1650.70	4.03	1646.67	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	1.3	3.8	<1.0	<1.0
	7/24/2017	1650.70	3.56	1647.14	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	5.0	<1.0	<1.0
	11/2/2017	1650.70	4.26	1646.44	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	1/9/2017	1650.70	4.39	1646.31	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	3/20/2018	1650.70	4.20	1646.50	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	6/8/2018	1650.70	4.33	1646.37	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
OW-4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/1/2017	1649.74	3.63	1646.11	0.00	Characterization	158	827	32.4	3.4	82.5	4800	5260	816	166
	7/24/2017	1649.74	3.14	1646.60	0.00	Characterization	43.9	601.0	64.2	1.4	140	1360	11100	2340	763
	11/2/2017	1649.74	3.82	1645.92	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	3.2	1.9	<1.0
	1/24/2017	1649.74	3.96	1645.78	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	3/20/2018	1649.74	3.75	1645.99	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0
	6/8/2018	1649.74	3.90	1645.84	0.00	Characterization	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<1.0

NM  
MTBE  
1,2,4-TMB  
1,3,5-TMB

Not Measured  
Methyl Tert Butyl Ether  
1,2,4-Trimethylbenzene  
1,3,5-Trimethylbenzene

NS  
NA  
E

Not Sampled  
Not Applicable  
Estimated Value

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer TDS <2,500 mg/l setting

Shaded values indicate Act 2 Statewide Health Standard exceedances

Notes:

- 1.) Screened Interval and Total Depth measurements from grade
- 2.) Well Head Elevation and Depth to Groundwater measured from Top of Casing

[illegible]

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer TDS <2,500 mg/l setting

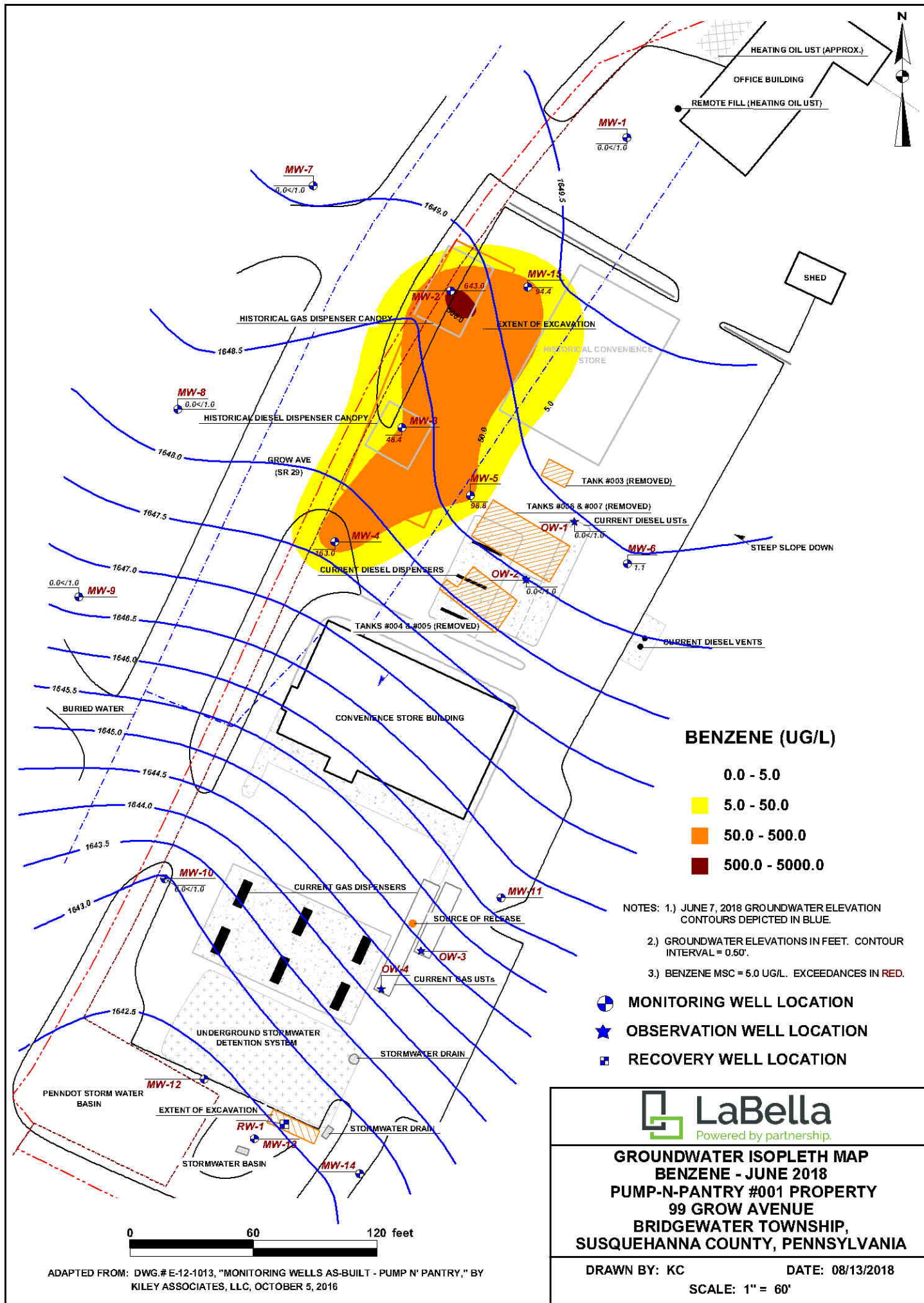
Shaded values indicate Act 2 Statewide Health Standard exceedances

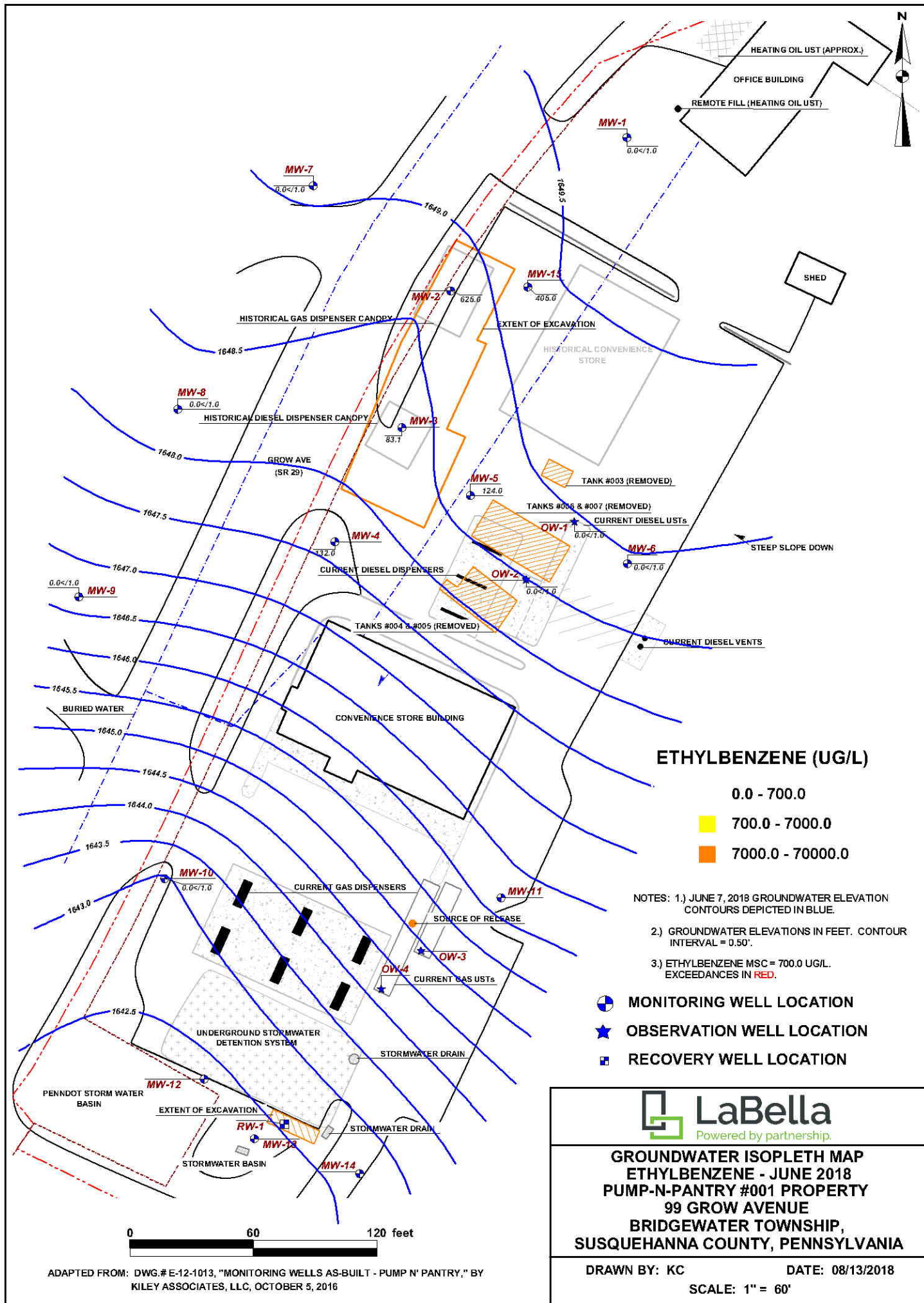
1.) Screened Interval and Total Depth measurements from grade  
2.) Well Head Elevation and Depth to Groundwater measured from Top of Casing

## APPENDIX D

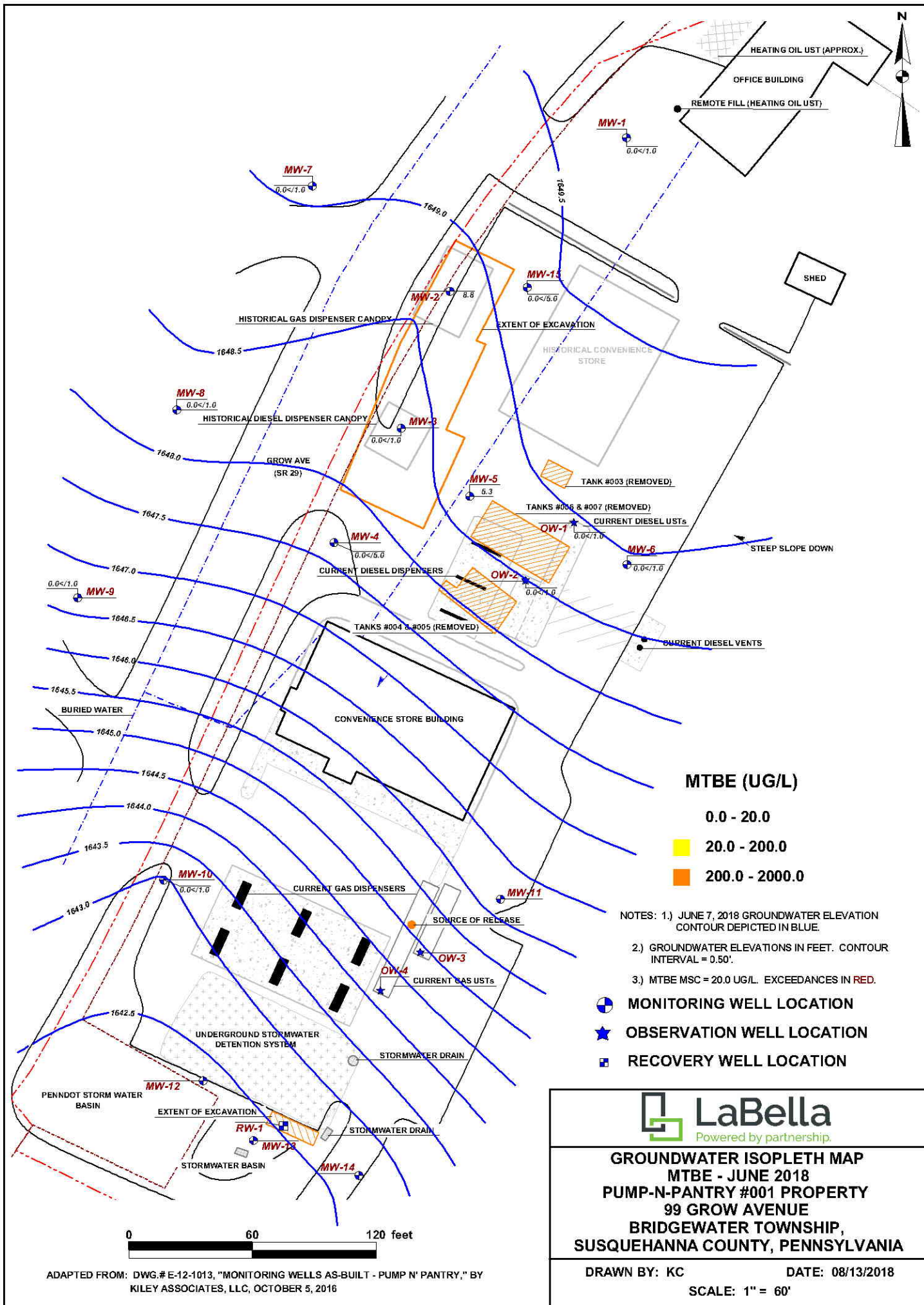
### Groundwater Isopleths

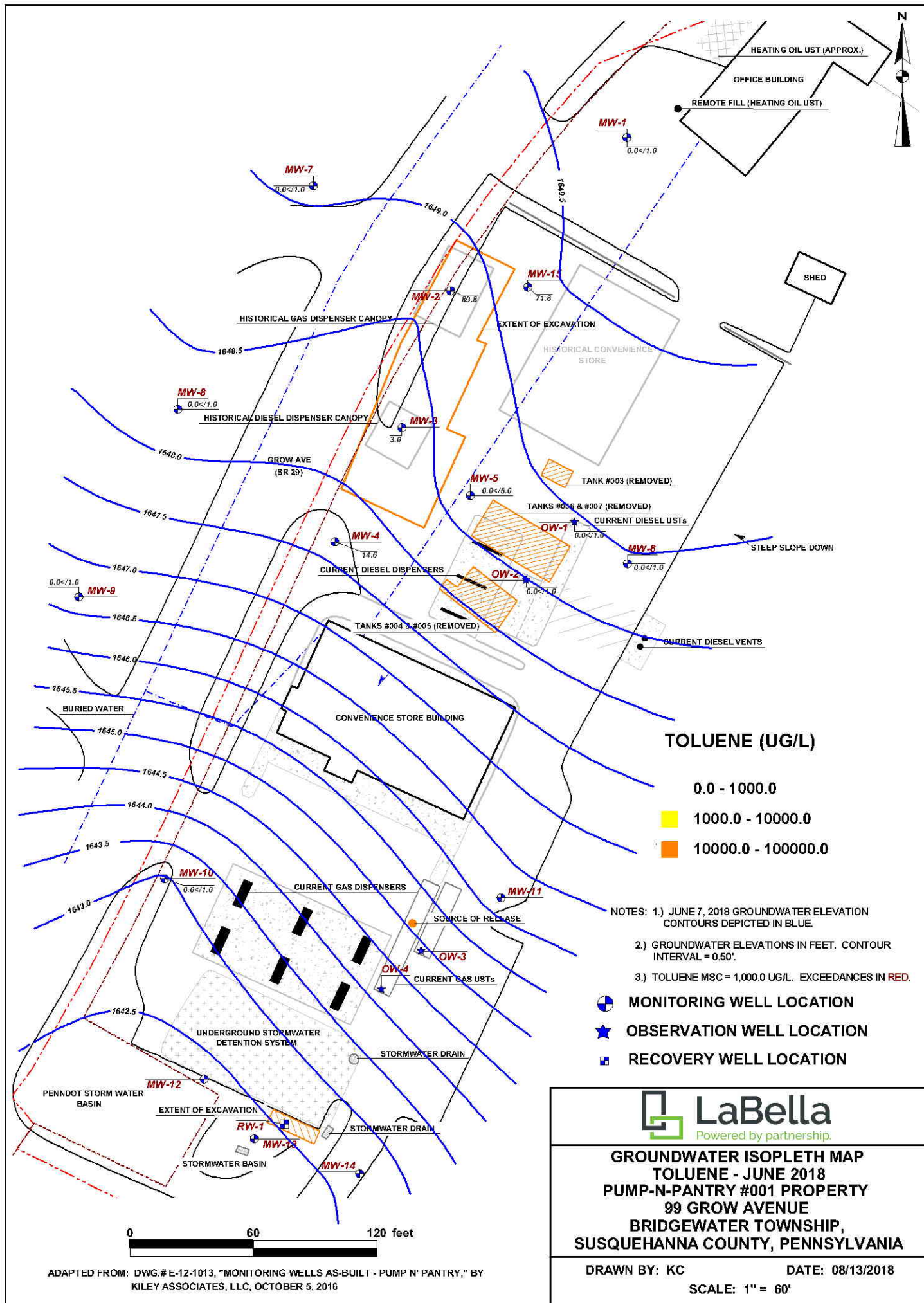




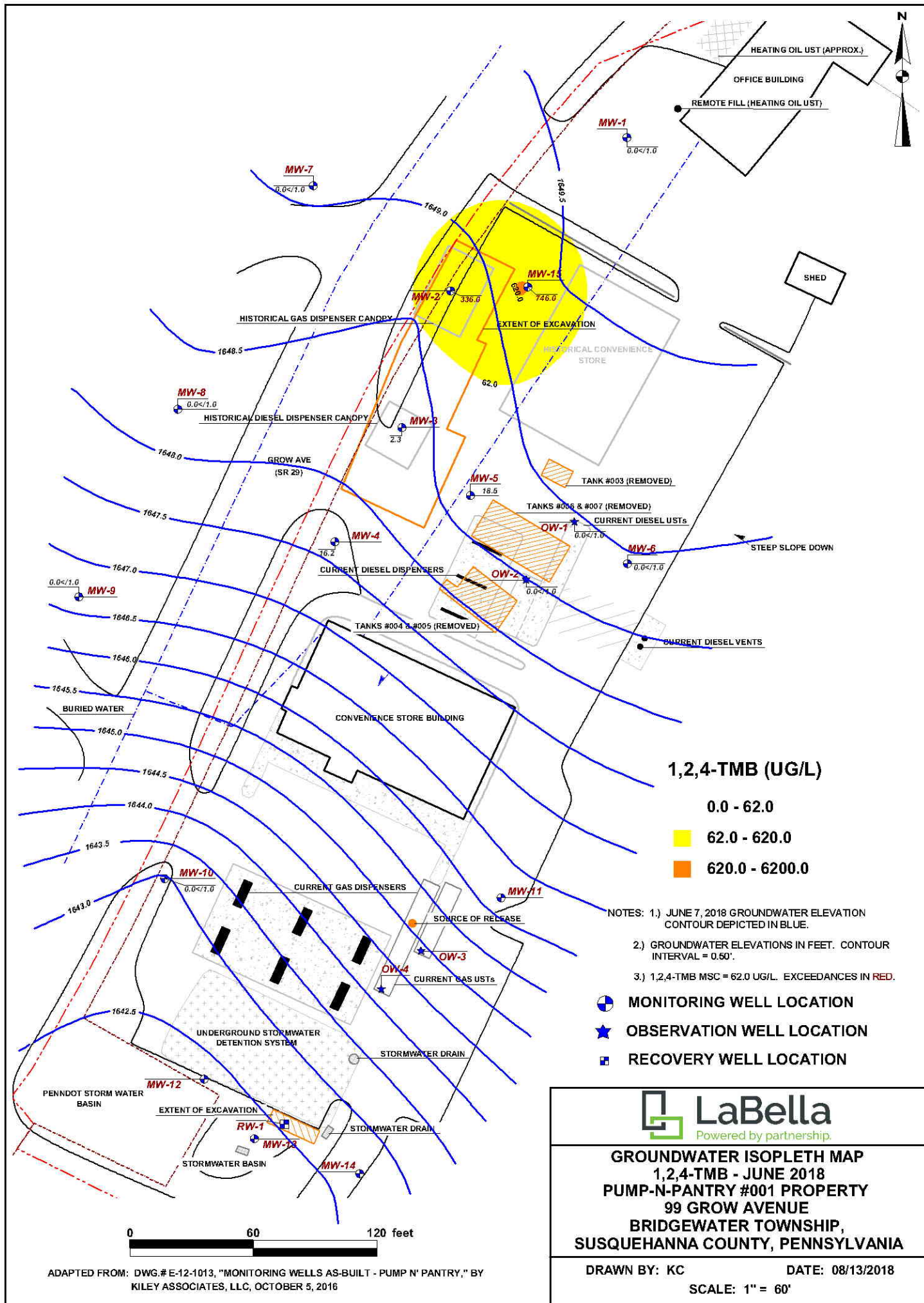








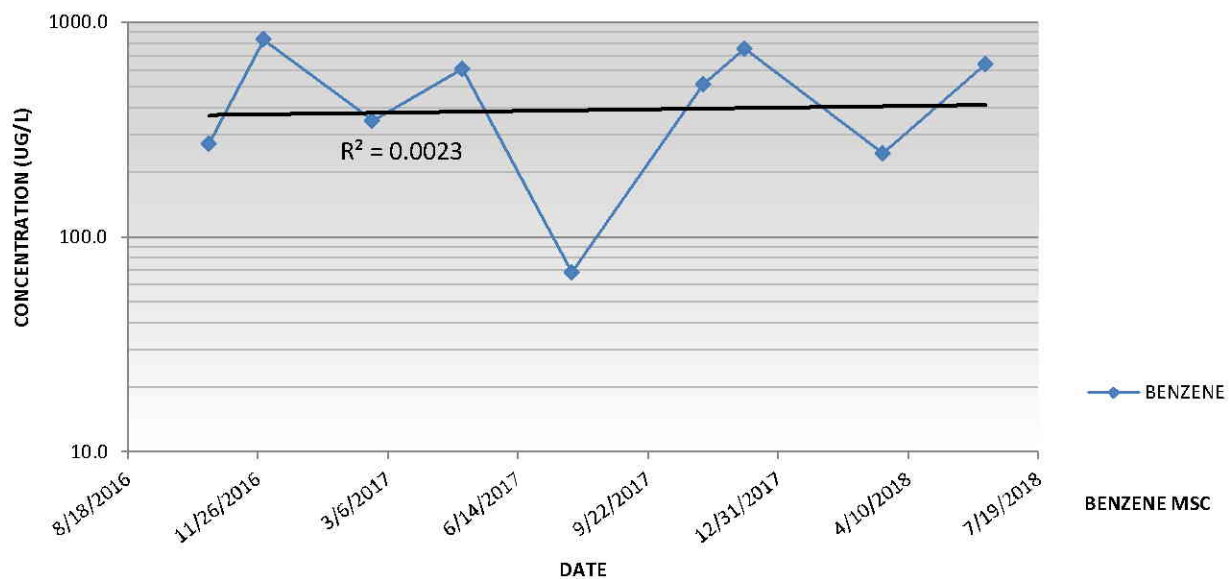




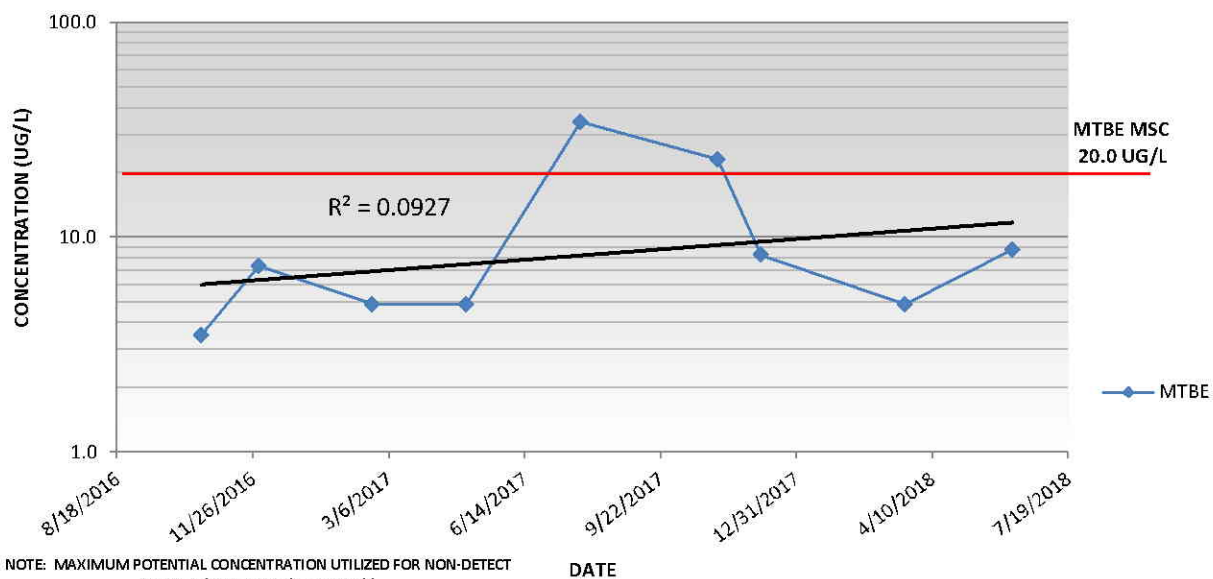
## APPENDIX E

### Groundwater Temporal Trend Analysis

**MW-2  
BENZENE VS TIME**



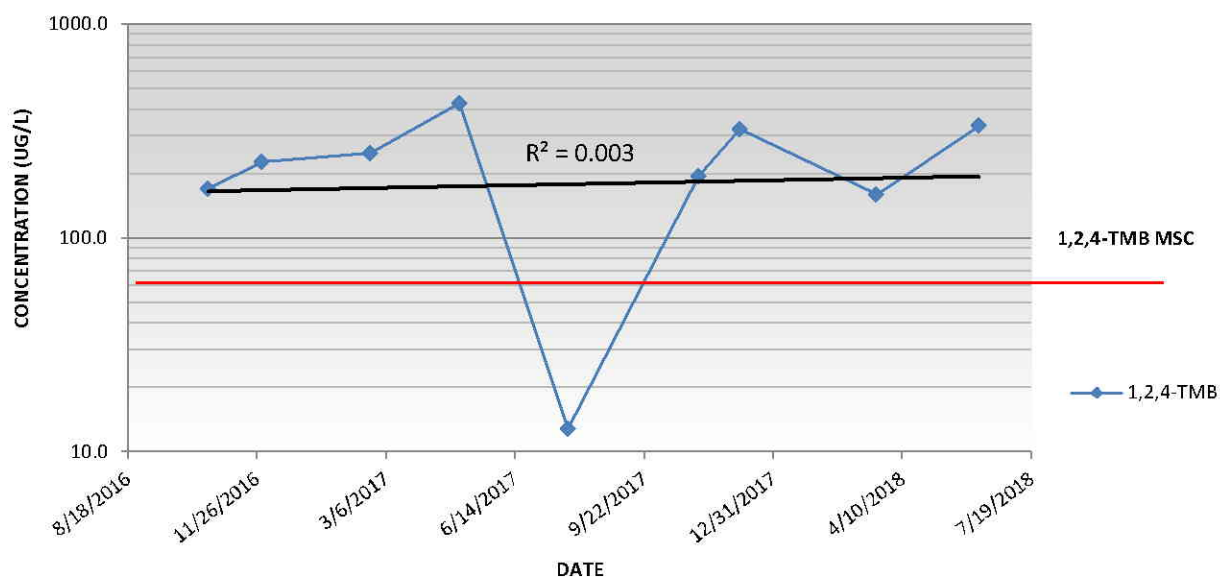
**MW-2  
MTBE VS TIME**



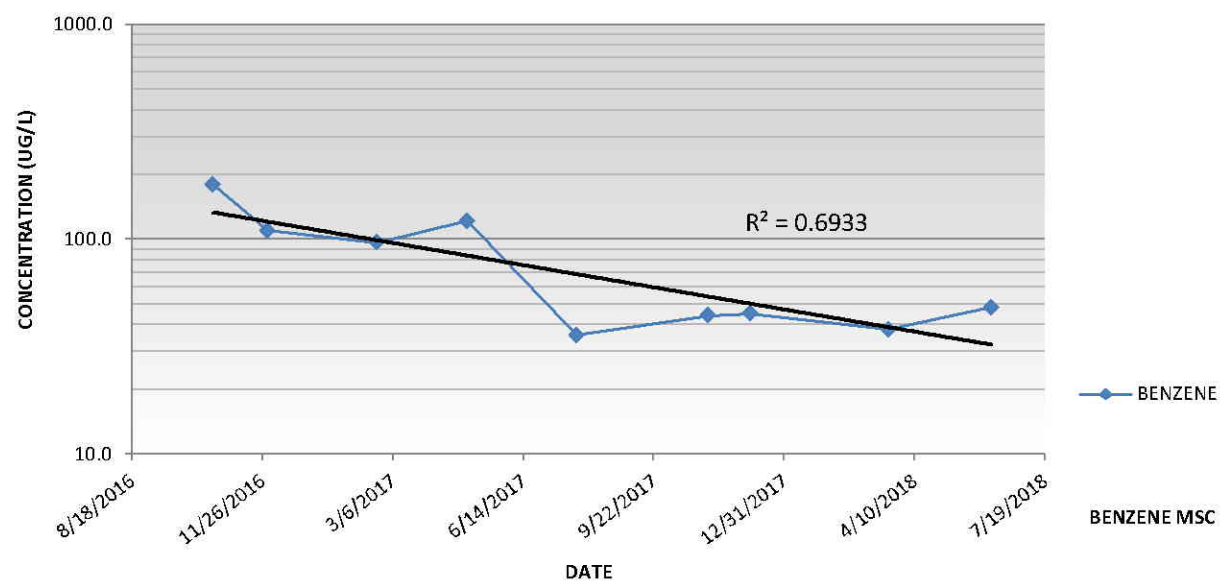
NOTE: MAXIMUM POTENTIAL CONCENTRATION UTILIZED FOR NON-DETECT RESULTS (I.E. <5.0 UG/L = 4.9 UG/L)



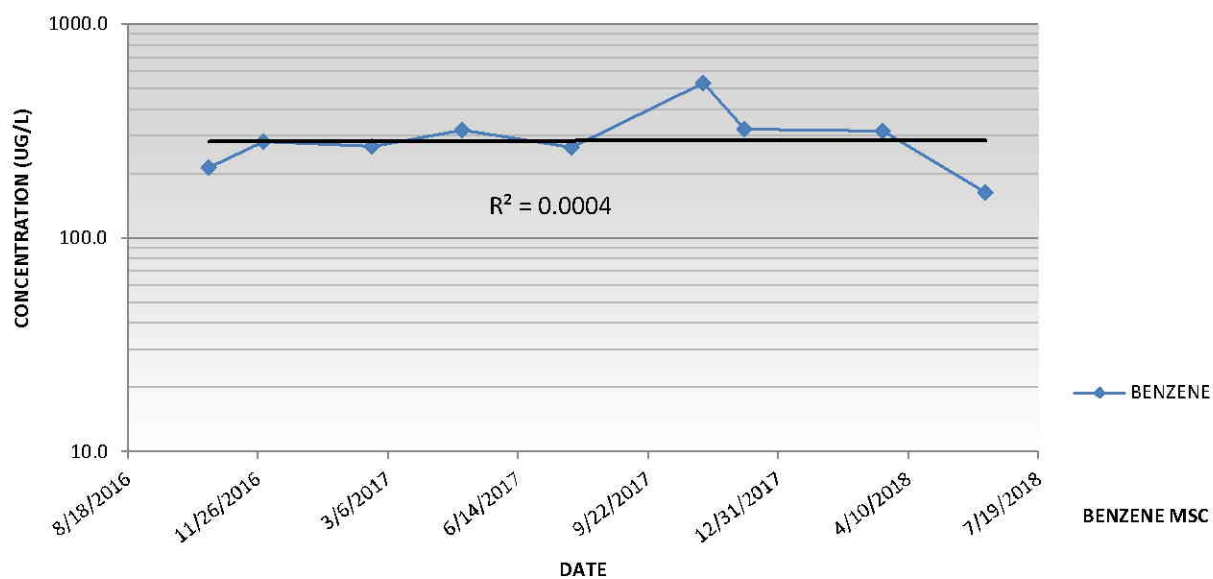
**MW-2**  
**1,2,4-TMB VS TIME**



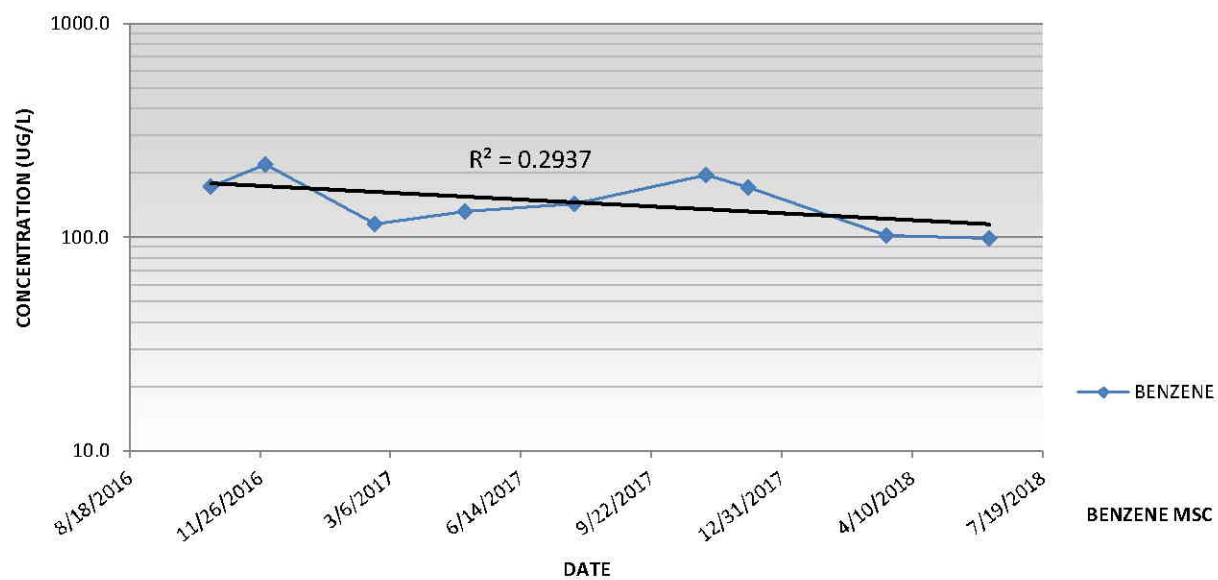
**MW-3**  
**BENZENE VS TIME**



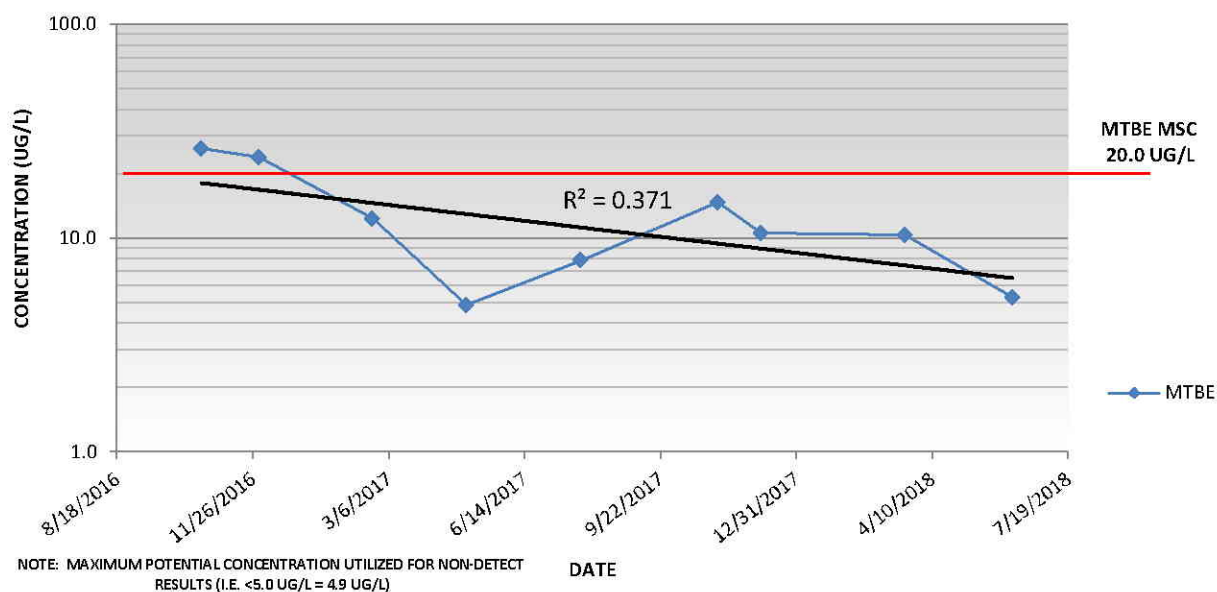
**MW-4  
BENZENE VS TIME**



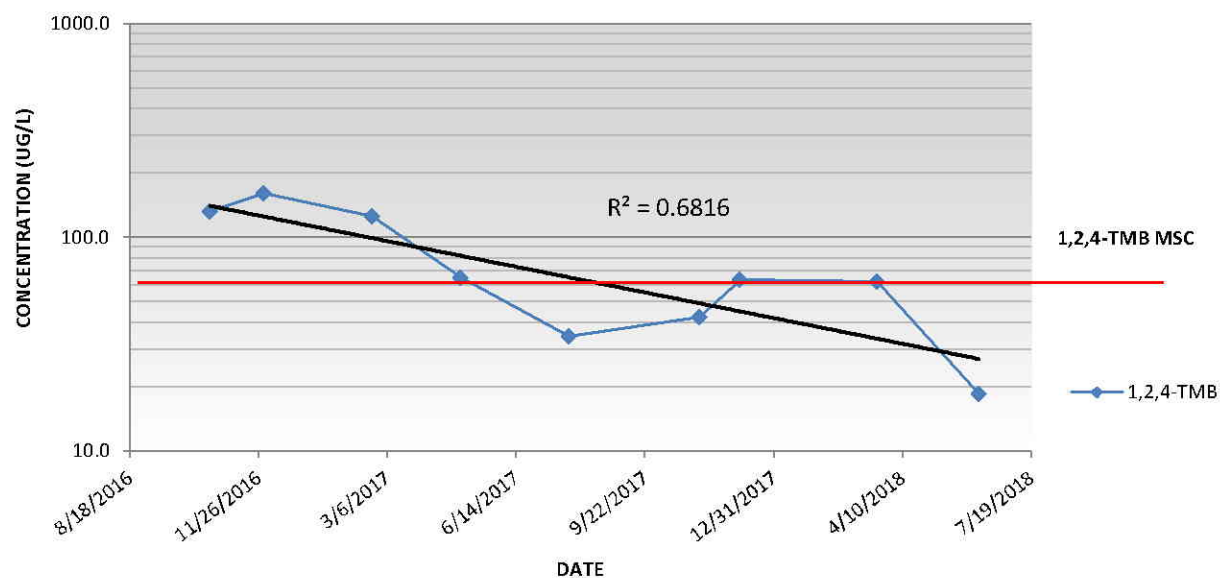
**MW-5  
BENZENE VS TIME**



### MW-5 MTBE VS TIME

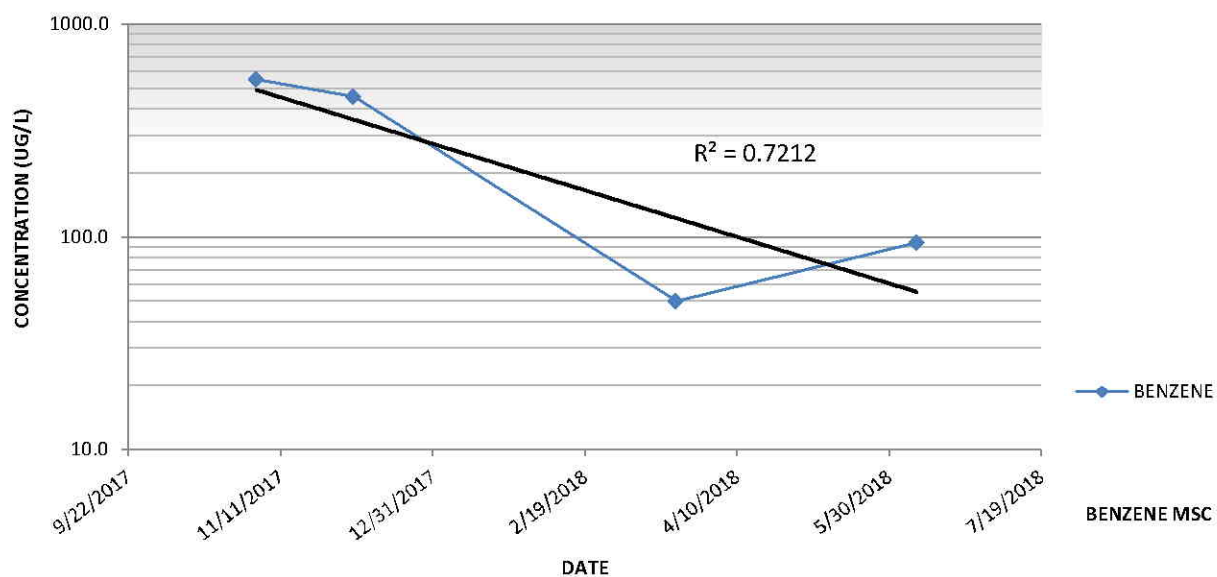


### MW-5 1,2,4-TMB VS TIME

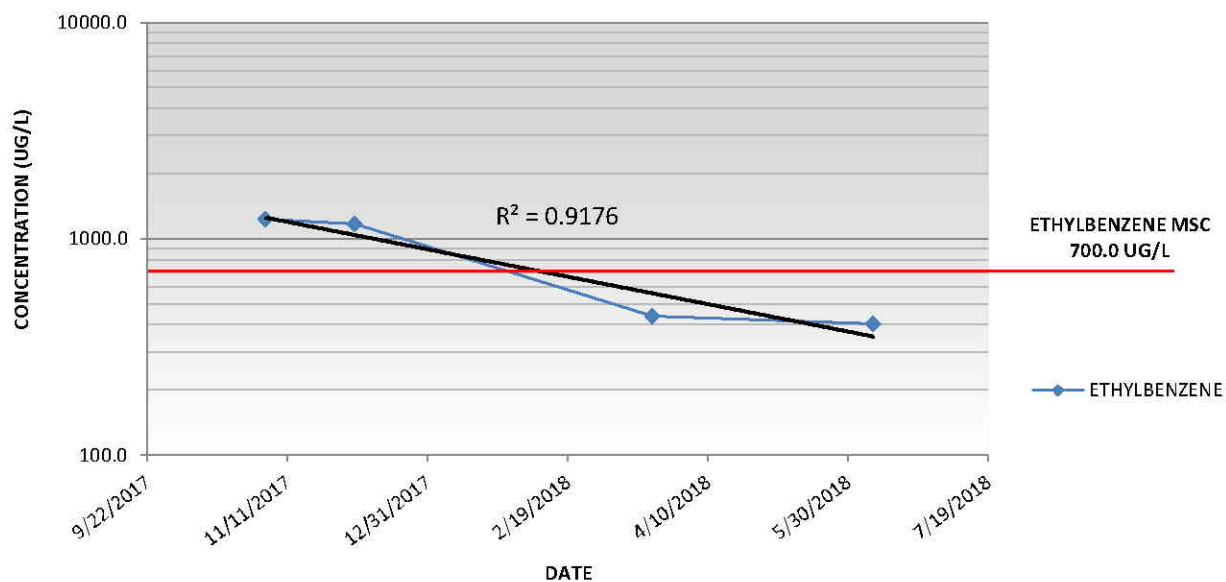




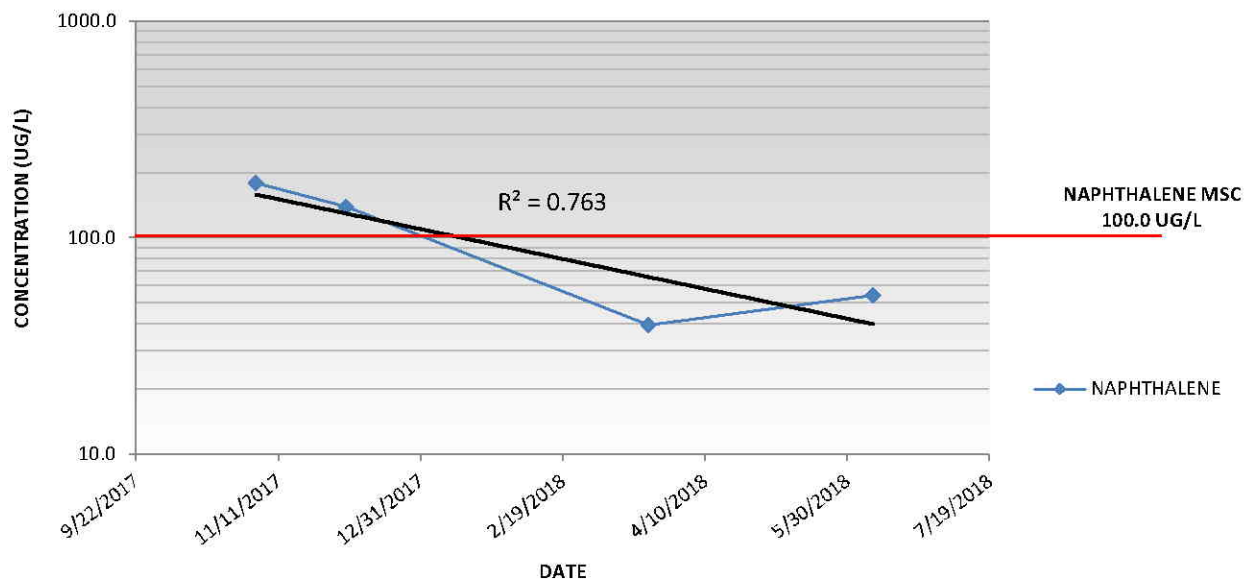
MW-15  
BENZENE VS TIME



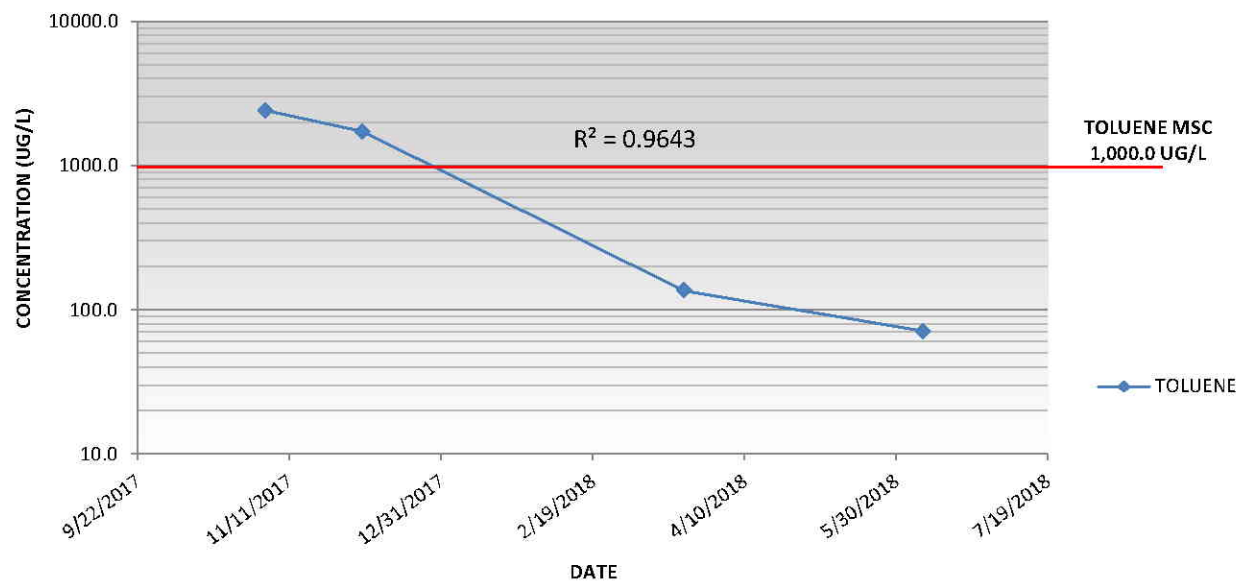
MW-15  
ETHYLBENZENE VS TIME



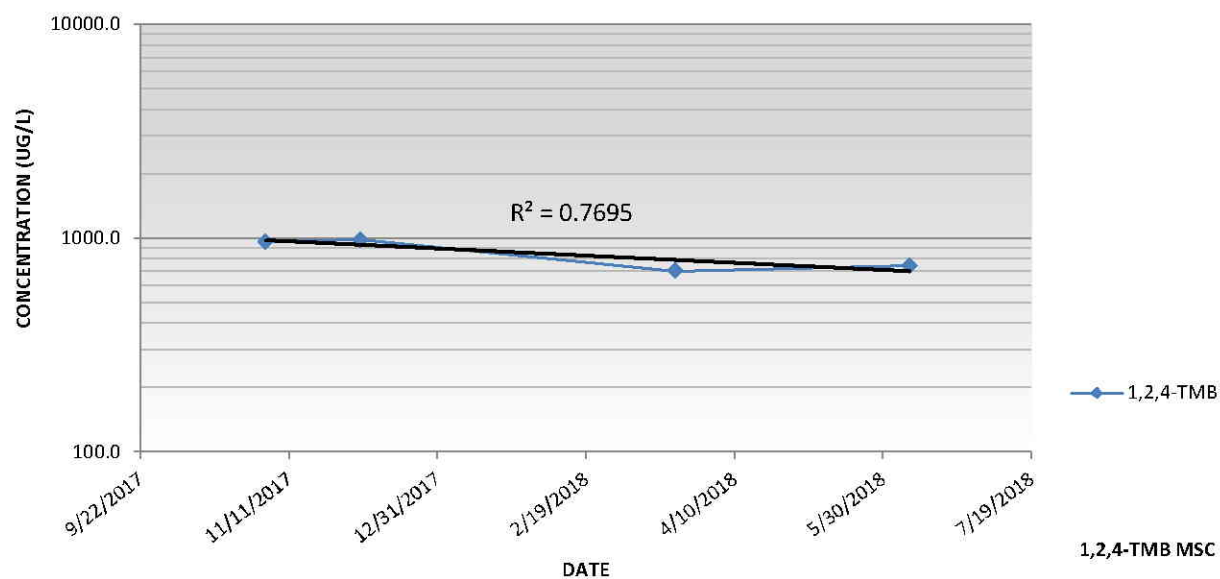
MW-15  
NAPHTHALENE VS TIME



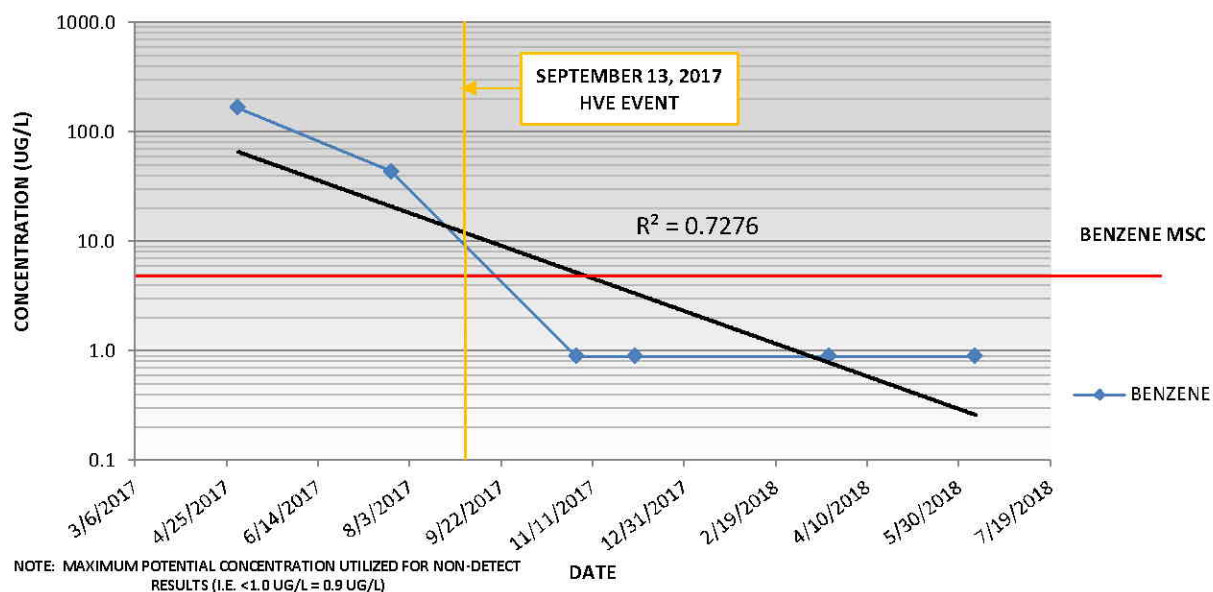
MW-15  
TOLUENE VS TIME



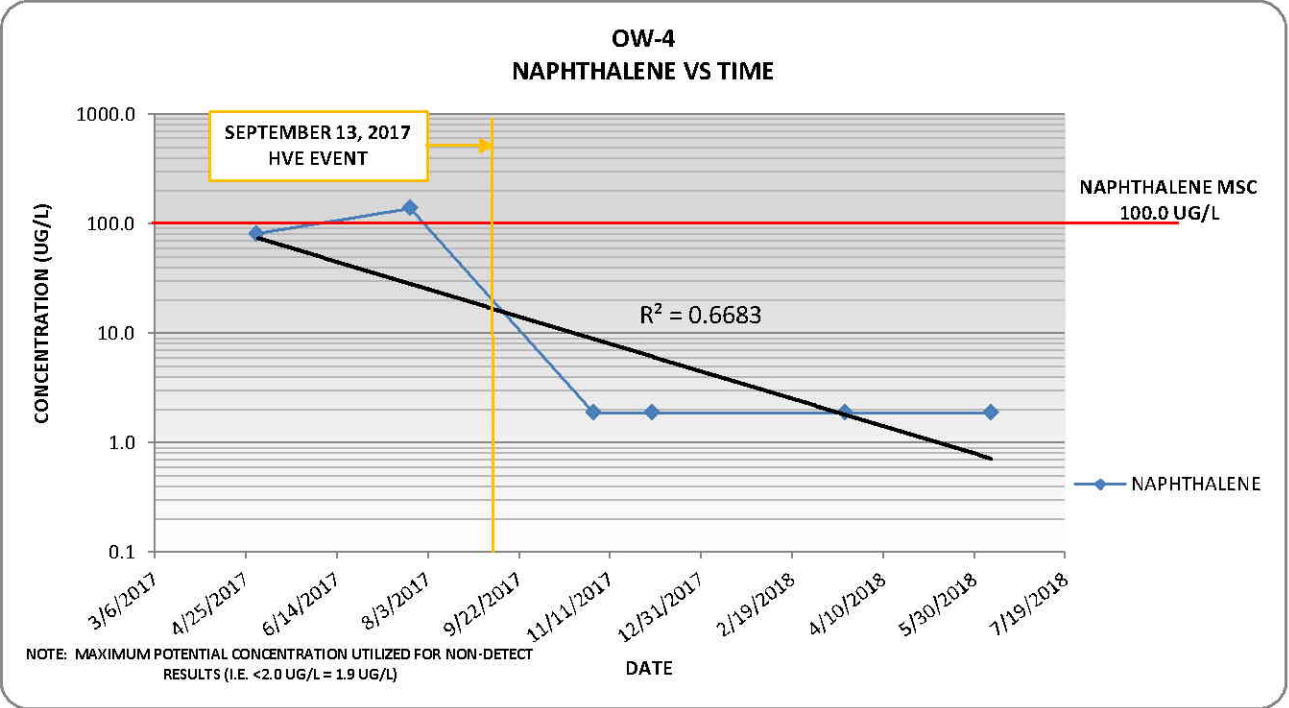
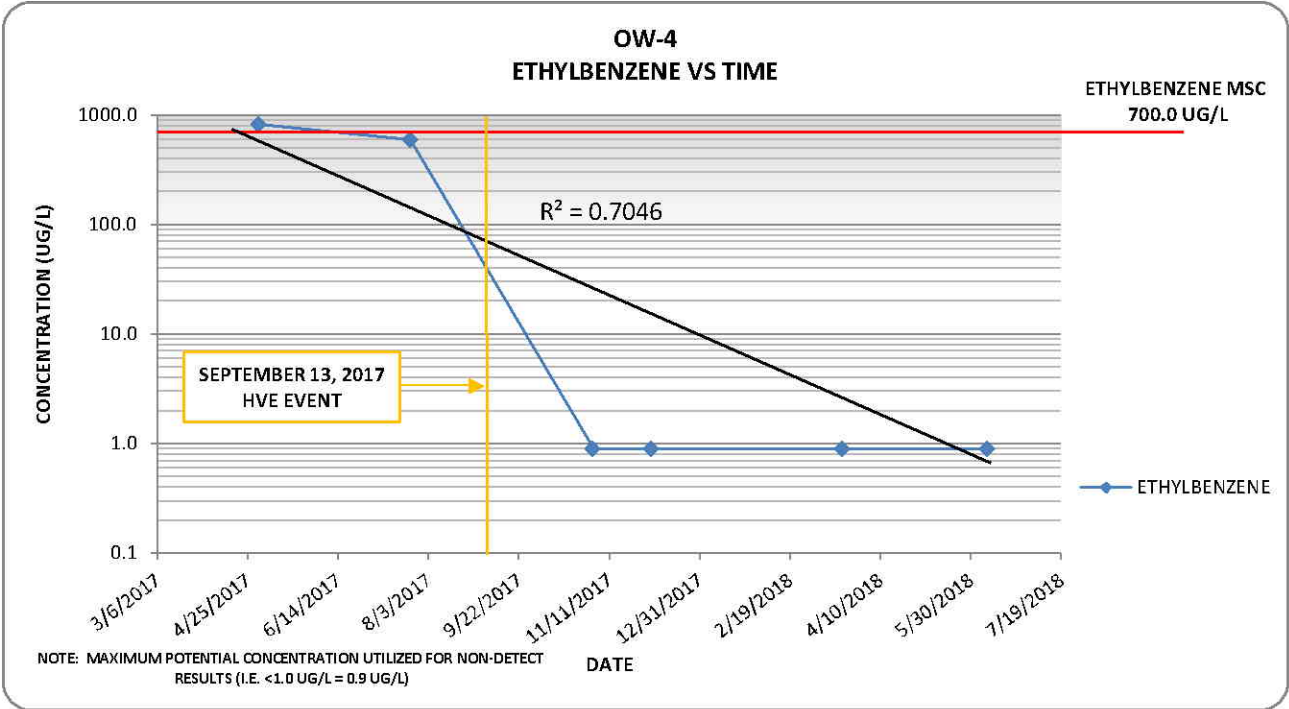
### MW-15 1,2,4-TMB VS TIME



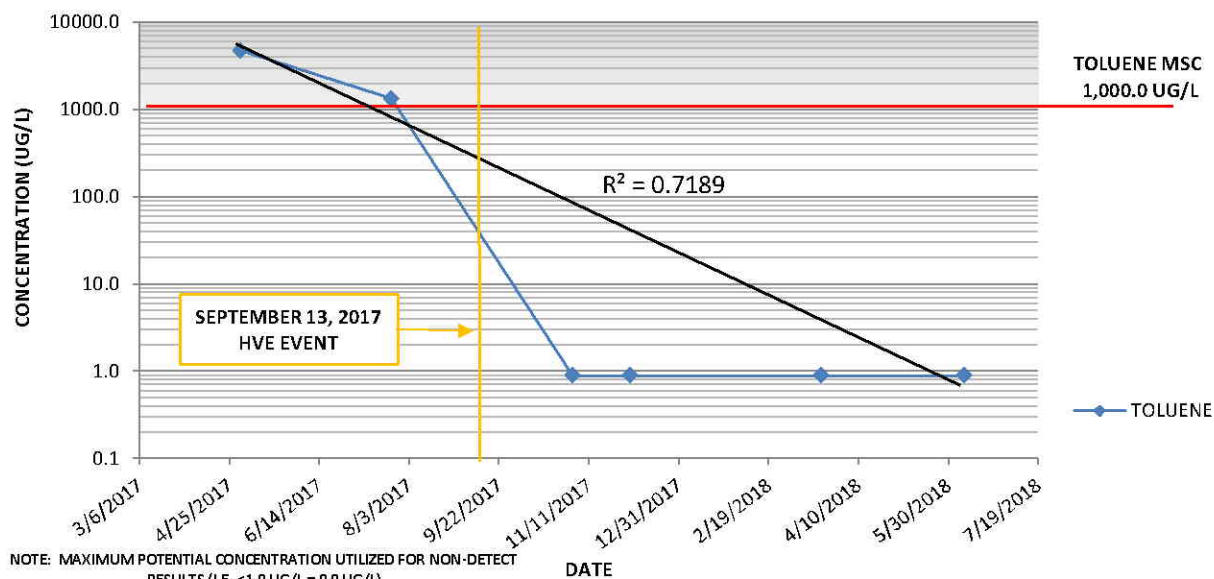
### OW-4 BENZENE VS TIME



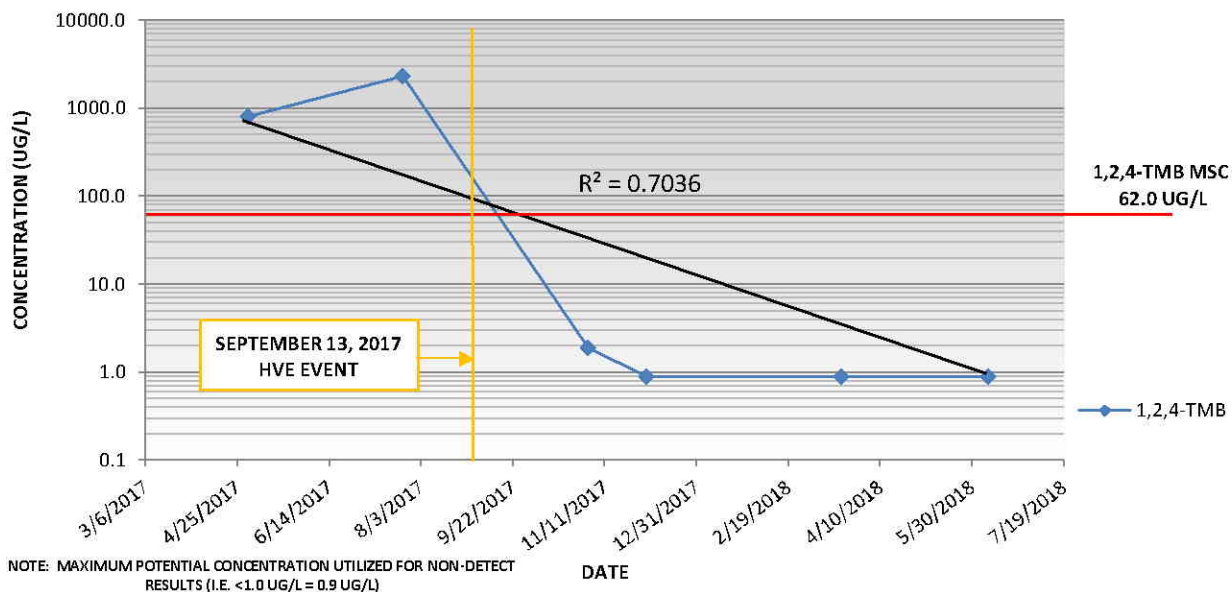




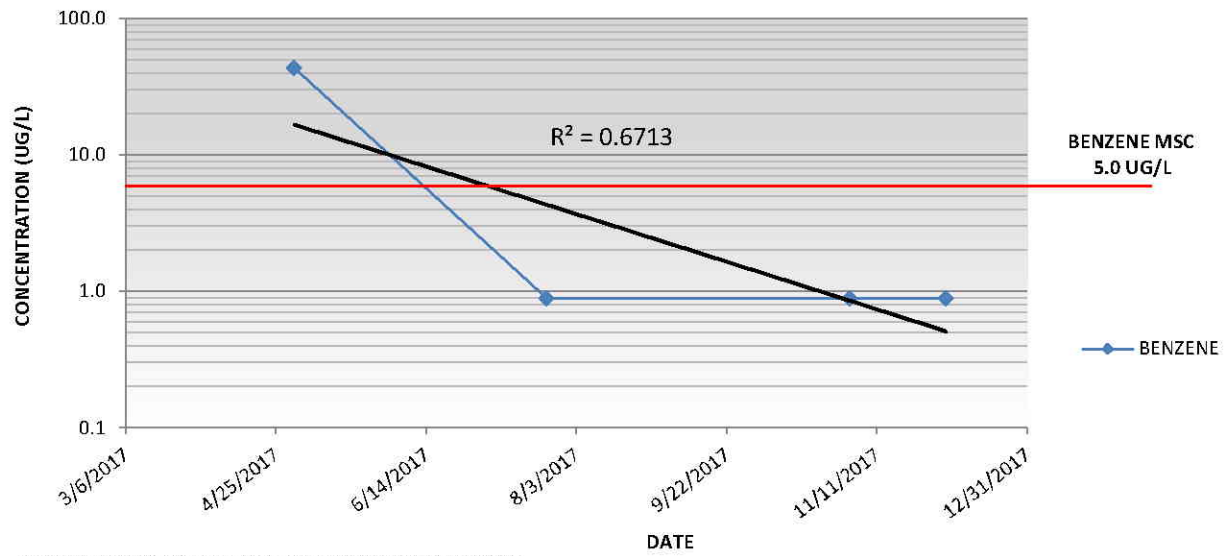
### OW-4 TOLUENE VS TIME



### OW-4 1,2,4-TMB VS TIME



RW-1  
BENZENE VS TIME



NOTE: MAXIMUM POTENTIAL CONCENTRATION UTILIZED FOR NON-DETECT  
RESULTS (I.E. <1.0 UG/L = 0.9 UG/L)



## APPENDIX F


### Historical Soil Analytical Summary Tables


08/30/18


**Table F-1**  
**UST Closure Activities**  
**Pump-n-Pantry #001 Property**  
**Summary of Soil Analytical Data (mg/kg)**

Parameter	Montrose 16	Montrose 17	Montrose 18	Montrose 19	Montrose 20	SHS MSC*	SHS MSC**	SHS MSC***
Sample Location	T-006 & T-007	T-003	T-003	T-003	Diesel Pump			
Depth	11.0' - 12.0'	11.0' - 12.0'	11.0' - 12.0'	11.0' - 12.0'	4.0'			
Condition	PSZ	PSZ	PSZ	PSZ	Smear			
% Moisture	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported			
Sample Date	10/22/2015	10/22/2015	10/22/2015	10/22/2015	10/22/2015			
Benzene	0.41	0.36	0.61	0.92	<0.025	0.5	0.5	0.5
Toluene	<0.025	<0.025	<0.025	<0.400	0.1	100	100	100
Ethylbenzene	<0.025	0.026	0.51	0.66	1.8	70	70	70
Xylenes (Total)	<0.075	<0.075	1.7	1.7	2.3	1,000.00	1,000.00	1,000.00
Isopropylbenzene (Cumene)	<0.025	0.38	<0.025	0.6	1.0	2,500	2,500	350
MTBE	<0.050	<0.050	<0.050	<0.050	<0.050	2	2	2
Naphthalene	0.885	1.0	0.73	2.6	<6.3	25	25	10
1,2,4-Trimethylbenzene	<0.025	<0.600	0.72	0.5	<6.3	35	35	6.2
1,3,5-Trimethylbenzene	<0.025	0.047	<0.025	<0.400	4.7	210	210	120

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer setting

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 0' - 2' \*

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 2' - 15' \*\*

 Shaded values indicate Act 2 SHS exceedances - Saturated Zone 2' - 15' \*\*\*

**Condition:**

Vadose: Vadose Zone - Unsaturated MSCs Apply

Smear: Zone of Groundwater Saturation (Smear Zone) - Saturated MSCs Apply


PSZ: Permanently Saturated Zone - Groundwater Issue - No Soil MSCs Apply


08/30/18


**Table F-1**  
**UST Closure Activities**  
**Pump-n-Pantry #001 Property**  
**Summary of Soil Analytical Data (mg/kg)**

Parameter	Montrose 21	Montrose 22	Montrose 23	Montrose 24	Montrose 25	SHS MSC*	SHS MSC**	SHS MSC***
Sample Location	Gas Pump	Piping	Piping	Piping	Soil Pile			
Depth	4.0'	4.0'	4.0'	4.0'	NA			
Condition	Smear	Smear	Smear	Smear	NA			
% Moisture	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported			
Sample Date	10/22/2015	10/22/2015	10/22/2015	10/22/2015	10/22/2015			
Benzene	<0.025	<0.025	<0.025	<0.025	<0.025	0.5	0.5	0.5
Toluene	0.9	1.8	<0.025	<0.025	<0.025	100	100	100
Ethylbenzene	17.0	5.0	<0.025	<0.025	<0.025	70	70	70
Xylenes (Total)	100.0	46.0	<0.075	<0.075	<0.075	1,000.00	1,000.00	1,000.00
Isopropylbenzene (Cumene)	3.0	2.2	<0.025	<0.025	<0.025	2,500	2,500	350
MTBE	<0.050	<0.050	<0.050	<0.050	<0.050	2	2	2
Naphthalene	15.0	7.3	0.044	0.35	<0.025	25	25	10
1,2,4-Trimethylbenzene	110.0	71.0	0.045	0.600	<0.025	35	35	6.2
1,3,5-Trimethylbenzene	33.0	20.0	0.32	0.037	<0.025	210	210	120

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer setting

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 0' - 2' \*

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 2' - 15' \*\*

 Shaded values indicate Act 2 SHS exceedances - Saturated Zone 2' - 15' \*\*\*

**Condition:**

Vadose: Vadose Zone - Unsaturated MSCs Apply

Smear: Zone of Groundwater Saturation (Smear Zone) - Saturated MSCs Apply

PSZ: Permanently Saturated Zone - Groundwater Issue - No Soil MSCs Apply





08/30/18


**Table F-1**  
**Site Characterization Activities**  
**Pump-n-Pantry #001 Property**  
**Summary of Soil Analytical Data (mg/kg)**

Parameter	TB-1A	TB-1B	TB-2A	TB-2B	TB-3A	SHS MSC*	SHS MSC**	SHS MSC***
<b>Sample Location</b>	<b>TB-1</b>	<b>TB-1</b>	<b>TB-2</b>	<b>TB-2</b>	<b>TB-3</b>			
<b>Depth</b>	<b>2.0' - 3.0'</b>	<b>5.0' - 6.0'</b>	<b>1.5' - 2.5'</b>	<b>5.0' - 6.0'</b>	<b>1.5' - 2.5'</b>			
<b>Condition</b>	<b>Vadose</b>	<b>Smear</b>	<b>Vadose</b>	<b>Smear</b>	<b>Vadose</b>			
<b>% Moisture</b>	<b>15.8%</b>	<b>8.9%</b>	<b>10.4%</b>	<b>8.5%</b>	<b>12.6%</b>			
<b>Sample Date</b>	<b>3/29/2016</b>	<b>3/29/2016</b>	<b>3/29/2016</b>	<b>3/29/2016</b>	<b>3/29/2016</b>			
Benzene	<0.0494	<0.034	0.583	0.281	3.08	0.5	0.5	0.5
Toluene	<0.0494	<0.034	1.78	3.51	19.2	100	100	100
Ethylbenzene	<0.0494	<0.034	1.88	12.9	32.4	70	70	70
Xylenes (Total)	<0.148	<0.102	4.8	59.8	384.0	1,000.00	1,000.00	1,000.00
Isopropylbenzene (Cumene)	<0.0494	<0.034	0.161	1.380	5.62	2,500	2,500	350
MTBE	<0.0494	<0.034	<0.0382	<0.149	<0.242	2	2	2
Naphthalene	<0.0988	<0.0679	2.49	5.32	60.5	25	25	10
1,2,4-Trimethylbenzene	<0.0988	<0.034	19.9	40.0	562.0	35	35	6.2
1,3,5-Trimethylbenzene	<0.0494	<0.034	1.71	11.3	246.0	210	210	120

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer setting

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 0' - 2' \*

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 2' - 15' \*\*

 Shaded values indicate Act 2 SHS exceedances - Saturated Zone 2' - 15' \*\*\*

**Condition:**

Vadose: Vadose Zone - Unsaturated MSCs Apply

Smear: Zone of Groundwater Saturation (Smear Zone) - Saturated MSCs Apply


PSZ: Permanently Saturated Zone - Groundwater Issue - No Soil MSCs Apply


08/30/18


**Table F-1**  
**Site Characterization Activities**  
**Pump-n-Pantry #001 Property**  
**Summary of Soil Analytical Data (mg/kg)**

Parameter	TB-3B	TB-4A	TB-4B	TB-5A	TB-5B	SHS MSC*	SHS MSC**	SHS MSC***
Sample Location	TB-3	TB-4	TB-4	TB-5	TB-5			
Depth	5.0' - 6.0'	2.0' - 3.0'	5.0' - 6.0'	1.0' - 2.0'	4.5' - 5.0'			
Condition	Smear	Vadose	Smear	Vadose	Smear			
% Moisture	4.9%	5.2%	7.2%	10.4%	12.5%			
Sample Date	3/29/2016	3/29/2016	3/29/2016	3/29/2016	3/29/2016			
Benzene	<0.0424	0.093	0.977	1.41	1.03	0.5	0.5	0.5
Toluene	0.0473	<0.0309	0.6	0.0413	<0.167	100	100	100
Ethylbenzene	1.19	0.332	25.1	3.54	23.4	70	70	70
Xylenes (Total)	1.67	0.944	16.0	1.25	1.17	1,000.00	1,000.00	1,000.00
Isopropylbenzene (Cumene)	0.234	0.0365	2.86	0.246	3.81	2,500	2,500	350
MTBE	<0.0424	<0.0309	<0.0135	<0.0340	<0.167	2	2	2
Naphthalene	1.12	0.0874	10.4	0.183	9.26	25	25	10
1,2,4-Trimethylbenzene	8.19	0.658	57.4	2.1	7.55	35	35	6.2
1,3,5-Trimethylbenzene	2.5	0.239	15.6	1.18	18.8	210	210	120

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer setting

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 0' - 2' \*

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 2' - 15' \*\*

 Shaded values indicate Act 2 SHS exceedances - Saturated Zone 2' - 15' \*\*\*

**Condition:**

Vadose: Vadose Zone - Unsaturated MSCs Apply

Smear: Zone of Groundwater Saturation (Smear Zone) - Saturated MSCs Apply


PSZ: Permanently Saturated Zone - Groundwater Issue - No Soil MSCs Apply

08/30/18

**Table F-1**  
**Site Characterization Activities**  
**Pump-n-Pantry #001 Property**  
**Summary of Soil Analytical Data (mg/kg)**

Parameter	TB-6A	TB-6B	TB-7A	TB-7B	TB-8A	SHS MSC*	SHS MSC**	SHS MSC***
<b>Sample Location</b>	<b>TB-6</b>	<b>TB-6</b>	<b>TB-7</b>	<b>TB-7</b>	<b>TB-8</b>			
<b>Depth</b>	<b>2.5' - 3.5'</b>	<b>5.0' - 6.0'</b>	<b>2.0' - 3.0'</b>	<b>4.5' - 5.0'</b>	<b>2.0' - 3.0'</b>			
<b>Condition</b>	<b>Vadose</b>	<b>Smear</b>	<b>Vadose</b>	<b>Smear</b>	<b>Vadose</b>			
<b>% Moisture</b>	<b>8.7%</b>	<b>11.9%</b>	<b>15.6%</b>	<b>9.4%</b>	<b>6.6%</b>			
<b>Sample Date</b>	<b>3/29/2016</b>	<b>3/29/2016</b>	<b>3/29/2016</b>	<b>3/29/2016</b>	<b>3/29/2016</b>			
<b>Benzene</b>	1.05	<0.150	0.200	2.15	<0.158	0.5	0.5	0.5
<b>Toluene</b>	5.63	<0.150	<0.0390	0.767	<0.158	100	100	100
<b>Ethylbenzene</b>	35.5	2.59	0.118	35.7	<0.158	70	70	70
<b>Xylenes (Total)</b>	106.0	0.771	<0.117	10.1	<0.474	1,000.00	1,000.00	1,000.00
<b>Isopropylbenzene (Cumene)</b>	5.67	0.594	<0.0390	6.42	<0.158	2,500	2,500	350
<b>MTBE</b>	<0.146	<0.150	<0.0390	<0.329	<0.158	2	2	2
<b>Naphthalene</b>	18.7	1.97	<0.0780	19.9	<0.316	25	25	10
<b>1,2,4-Trimethylbenzene</b>	126.0	5.53	0.122	25.3	<0.316	35	35	6.2
<b>1,3,5-Trimethylbenzene</b>	41.2	3.5	0.0631	36.0	<0.158	210	210	120

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer setting

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 0' - 2' \*

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 2' - 15' \*\*

 Shaded values indicate Act 2 SHS exceedances - Saturated Zone 2' - 15' \*\*\*

**Condition:**

Vadose: Vadose Zone - Unsaturated MSCs Apply

Smear: Zone of Groundwater Saturation (Smear Zone) - Saturated MSCs Apply


PSZ: Permanently Saturated Zone - Groundwater Issue - No Soil MSCs Apply


08/30/18


**Table F-1**  
**Site Characterization Activities**  
**Pump-n-Pantry #001 Property**  
**Summary of Soil Analytical Data (mg/kg)**

Parameter	TB-8B	TB-9A	TB-9B	TB-10A	TB-10B	SHS MSC*	SHS MSC**	SHS MSC***
<b>Sample Location</b>	<b>TB-8</b>	<b>TB-9</b>	<b>TB-9</b>	<b>TB-10</b>	<b>TB-10</b>			
<b>Depth</b>	<b>4.5' - 5.0'</b>	<b>2.0' - 3.0'</b>	<b>4.5' - 5.0'</b>	<b>1.0' - 2.0'</b>	<b>3.0' - 3.5'</b>			
<b>Condition</b>	<b>Smear</b>	<b>Vadose</b>	<b>Smear</b>	<b>Vadose</b>	<b>Smear</b>			
<b>% Moisture</b>	<b>13.5%</b>	<b>6.8%</b>	<b>9.9%</b>	<b>15.9%</b>	<b>16.1%</b>			
<b>Sample Date</b>	<b>3/29/2016</b>	<b>3/29/2016</b>	<b>3/29/2016</b>	<b>3/29/2016</b>	<b>3/29/2016</b>			
<b>Benzene</b>	<0.236	<0.175	<0.158	<0.291	1.61	0.5	0.5	0.5
<b>Toluene</b>	<0.236	<0.175	<0.158	<0.291	33.0	100	100	100
<b>Ethylbenzene</b>	0.285	<0.175	<0.158	<0.291	12.0	70	70	70
<b>Xylenes (Total)</b>	<0.707	<0.524	<0.473	<0.873	56.5	1,000.00	1,000.00	1,000.00
<b>Isopropylbenzene (Cumene)</b>	2.84	<0.175	<0.158	<0.291	8.44	2,500	2,500	350
<b>MTBE</b>	<0.236	<0.175	<0.158	<0.291	<0.513	2	2	2
<b>Naphthalene</b>	4.35	<0.349	<0.315	<0.582	1.51	25	25	10
<b>1,2,4-Trimethylbenzene</b>	<0.471	<0.349	<0.315	<0.582	28.2	35	35	6.2
<b>1,3,5-Trimethylbenzene</b>	<0.236	<0.175	<0.158	<0.291	8.1	210	210	120

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer setting

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 0' - 2' \*

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 2' - 15' \*\*

 Shaded values indicate Act 2 SHS exceedances - Saturated Zone 2' - 15' \*\*\*

**Condition:**

Vadose: Vadose Zone - Unsaturated MSCs Apply

Smear: Zone of Groundwater Saturation (Smear Zone) - Saturated MSCs Apply

PSZ: Permanently Saturated Zone - Groundwater Issue - No Soil MSCs Apply





08/30/18


**Table F-1**  
**Site Characterization Activities**  
**Pump-n-Pantry #001 Property**  
**Summary of Soil Analytical Data (mg/kg)**

Parameter	TB-11A	TB-11B	TB-12A	TB-12B	TB-13A	SHS MSC*	SHS MSC**	SHS MSC***
<b>Sample Location</b>	<b>TB-11</b>	<b>TB-11</b>	<b>TB-12</b>	<b>TB-12</b>	<b>TB-13</b>			
<b>Depth</b>	<b>1.0' - 2.0'</b>	<b>3.0' - 3.5'</b>	<b>1.0' - 2.0'</b>	<b>3.0' - 3.5'</b>	<b>1.0' - 2.0'</b>			
<b>Condition</b>	<b>Vadose</b>	<b>Smear</b>	<b>Vadose</b>	<b>Smear</b>	<b>Vadose</b>			
<b>% Moisture</b>	<b>15.8%</b>	<b>6.7%</b>	<b>5.2%</b>	<b>2.5%</b>	<b>6.8%</b>			
<b>Sample Date</b>	<b>3/29/2016</b>	<b>3/29/2016</b>	<b>3/29/2016</b>	<b>3/29/2016</b>	<b>3/29/2016</b>			
<b>Benzene</b>	<0.183	1.85	<0.0330	<0.172	5.34	0.5	0.5	0.5
<b>Toluene</b>	<0.183	66.7	0.0438	<0.172	17.6	100	100	100
<b>Ethylbenzene</b>	<0.183	28.9	<0.0330	<0.172	80.4	70	70	70
<b>Xylenes (Total)</b>	<0.548	143.0	0.101	<0.517	285.0	1,000.00	1,000.00	1,000.00
<b>Isopropylbenzene (Cumene)</b>	<0.183	18.4	<0.0330	<0.172	15.7	2,500	2,500	350
<b>MTBE</b>	<0.183	<0.319	<0.0330	<0.172	<1.610	2	2	2
<b>Naphthalene</b>	<0.366	2.58	<0.0659	<0.345	72.4	25	25	10
<b>1,2,4-Trimethylbenzene</b>	<0.366	47.5	<0.0330	<0.345	349.0	35	35	6.2
<b>1,3,5-Trimethylbenzene</b>	<0.183	15.1	0.0407	<0.172	127.0	210	210	120

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer setting

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 0' - 2' \*

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 2' - 15' \*\*

 Shaded values indicate Act 2 SHS exceedances - Saturated Zone 2' - 15' \*\*\*

**Condition:**

Vadose: Vadose Zone - Unsaturated MSCs Apply

Smear: Zone of Groundwater Saturation (Smear Zone) - Saturated MSCs Apply


PSZ: Permanently Saturated Zone - Groundwater Issue - No Soil MSCs Apply


08/30/18


**Table F-1**  
**Site Characterization Activities**  
**Pump-n-Pantry #001 Property**  
**Summary of Soil Analytical Data (mg/kg)**

Parameter	TB-13B	TB-14A	TB-14B	TB-15A	TB-15B	SHS MSC*	SHS MSC**	SHS MSC***
<b>Sample Location</b>	<b>TB-13</b>	<b>TB-14</b>	<b>TB-14</b>	<b>TB-15</b>	<b>TB-15</b>			
<b>Depth</b>	<b>5.0' - 6.0'</b>	<b>2.0' - 3.0'</b>	<b>5.0' - 6.0'</b>	<b>2.0' - 3.0'</b>	<b>5.0' - 6.0'</b>			
<b>Condition</b>	<b>Smear</b>	<b>Vadose</b>	<b>Smear</b>	<b>Vadose</b>	<b>Smear</b>			
<b>% Moisture</b>	<b>20.8%</b>	<b>10.7%</b>	<b>20.4%</b>	<b>12.1%</b>	<b>10.9%</b>			
<b>Sample Date</b>	<b>3/29/2016</b>	<b>3/30/2016</b>	<b>3/30/2016</b>	<b>3/30/2016</b>	<b>3/30/2016</b>			
<b>Benzene</b>	1.13	<0.0323	0.0492	<0.0316	<0.0335	0.5	0.5	0.5
<b>Toluene</b>	1.72	<0.0323	<0.0389	<0.0316	<0.0335	100	100	100
<b>Ethylbenzene</b>	23.6	<0.0323	<0.0389	<0.0316	<0.0335	70	70	70
<b>Xylenes (Total)</b>	41.5	<0.0969	<0.117	<0.0947	<0.100	1,000.00	1,000.00	1,000.00
<b>Isopropylbenzene (Cumene)</b>	5.2	<0.0323	<0.0389	<0.0316	<0.0335	2,500	2,500	350
<b>MTBE</b>	<0.352	<0.0323	<0.0389	<0.0316	<0.0335	2	2	2
<b>Naphthalene</b>	14.8	<0.0646	<0.0778	<0.0631	<0.0670	25	25	10
<b>1,2,4-Trimethylbenzene</b>	101.0	<0.0323	<0.0389	<0.0316	<0.0335	35	35	6.2
<b>1,3,5-Trimethylbenzene</b>	35.5	<0.0323	<0.0389	<0.0316	<0.0335	210	210	120

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer setting

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 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 2' - 15' \*\*

 Shaded values indicate Act 2 SHS exceedances - Saturated Zone 2' - 15' \*\*\*

**Condition:**

Vadose: Vadose Zone - Unsaturated MSCs Apply

Smear: Zone of Groundwater Saturation (Smear Zone) - Saturated MSCs Apply


PSZ: Permanently Saturated Zone - Groundwater Issue - No Soil MSCs Apply


08/30/18


**Table F-1**  
**Site Characterization Activities**  
**Pump-n-Pantry #001 Property**  
**Summary of Soil Analytical Data (mg/kg)**

Parameter	TB-16A	TB-16B	TB-17A	TB-17B	TB-18A	SHS MSC*	SHS MSC**	SHS MSC***
<b>Sample Location</b>	<b>TB-16</b>	<b>TB-16</b>	<b>TB-17</b>	<b>TB-17</b>	<b>TB-18</b>			
<b>Depth</b>	<b>2.0' - 3.0'</b>	<b>3.0' - 4.0'</b>	<b>2.0' - 3.0'</b>	<b>5.0' - 6.0'</b>	<b>1.0' - 2.0'</b>			
<b>Condition</b>	<b>Vadose</b>	<b>Smear</b>	<b>Vadose</b>	<b>Smear</b>	<b>Vadose</b>			
<b>% Moisture</b>	<b>9.0%</b>	<b>10.1%</b>	<b>7.3%</b>	<b>11.3%</b>	<b>4.8%</b>			
<b>Sample Date</b>	<b>3/29/2016</b>	<b>3/29/2016</b>	<b>3/29/2016</b>	<b>3/29/2016</b>	<b>3/30/2016</b>			
Benzene	<0.0343	<0.154	<0.163	<0.148	<0.0367	0.5	0.5	0.5
Toluene	<0.0343	<0.154	0.361	<0.148	<0.0367	100	100	100
Ethylbenzene	<0.0343	<0.154	<0.163	<0.148	<0.0367	70	70	70
Xylenes (Total)	<0.103	<0.462	<0.490	<0.445	<0.110	1,000.00	1,000.00	1,000.00
Isopropylbenzene (Cumene)	<0.0343	<0.154	<0.163	<0.148	<0.0367	2,500	2,500	350
MTBE	<0.0343	<0.154	<0.163	<0.148	<0.0367	2	2	2
Naphthalene	<0.0687	<0.308	<0.327	<0.297	<0.0735	25	25	10
1,2,4-Trimethylbenzene	<0.0343	<0.308	<0.327	0.370	<0.0367	35	35	6.2
1,3,5-Trimethylbenzene	<0.0343	<0.154	<0.163	<0.148	<0.0367	210	210	120

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer setting

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 0' - 2' \*

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 2' - 15' \*\*

 Shaded values indicate Act 2 SHS exceedances - Saturated Zone 2' - 15' \*\*\*

**Condition:**

Vadose: Vadose Zone - Unsaturated MSCs Apply

Smear: Zone of Groundwater Saturation (Smear Zone) - Saturated MSCs Apply


PSZ: Permanently Saturated Zone - Groundwater Issue - No Soil MSCs Apply


08/30/18

**Table F-1**  
**Site Characterization Activities**  
**Pump-n-Pantry #001 Property**  
**Summary of Soil Analytical Data (mg/kg)**

Parameter	TB-18B	TB-19A	TB-19B	TB-20A	TB-20B	SHS MSC*	SHS MSC**	SHS MSC***
<b>Sample Location</b>	<b>TB-18</b>	<b>TB-19</b>	<b>TB-19</b>	<b>TB-20</b>	<b>TB-20</b>			
<b>Depth</b>	<b>2.0' - 3.0'</b>	<b>1.0' - 2.0'</b>	<b>2.0' - 3.0'</b>	<b>1.0' - 2.0'</b>	<b>2.0' - 3.0'</b>			
<b>Condition</b>	<b>Smear</b>	<b>Vadose</b>	<b>Smear</b>	<b>Vadose</b>	<b>Smear</b>			
<b>% Moisture</b>	<b>9.8%</b>	<b>4.7%</b>	<b>6.0%</b>	<b>6.2%</b>	<b>12.9%</b>			
<b>Sample Date</b>	<b>3/30/2016</b>	<b>3/30/2016</b>	<b>3/30/2016</b>	<b>3/30/2016</b>	<b>3/30/2016</b>			
Benzene	<0.0314	<0.0333	<0.164	<0.164	<0.0328	0.5	0.5	0.5
Toluene	<0.0314	<0.0333	<0.164	<0.164	<0.0328	100	100	100
Ethylbenzene	<0.0314	<0.0333	<0.164	<0.164	<0.0328	70	70	70
Xylenes (Total)	<0.0941	<0.100	<0.491	<0.492	<0.0985	1,000.00	1,000.00	1,000.00
Isopropylbenzene (Cumene)	<0.0314	<0.0333	0.214	0.543	<0.0328	2,500	2,500	350
MTBE	<0.0314	<0.0333	<0.164	<0.164	<0.0328	2	2	2
Naphthalene	<0.0627	<0.0667	<0.328	2.63	<0.0656	25	25	10
1,2,4-Trimethylbenzene	<0.0314	<0.0333	0.88	<0.164	<0.0328	35	35	6.2
1,3,5-Trimethylbenzene	<0.0314	<0.0333	<0.164	<0.164	<0.0328	210	210	120

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer setting

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 0' - 2' \*

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 2' - 15' \*\*

 Shaded values indicate Act 2 SHS exceedances - Saturated Zone 2' - 15' \*\*\*

**Condition:**

Vadose: Vadose Zone - Unsaturated MSCs Apply

Smear: Zone of Groundwater Saturation (Smear Zone) - Saturated MSCs Apply

PSZ: Permanently Saturated Zone - Groundwater Issue - No Soil MSCs Apply




08/30/18

**Table F-1**  
**Site Characterization Activities**  
**Pump-n-Pantry #001 Property**  
**Summary of Soil Analytical Data (mg/kg)**

Parameter	TB-21	TB-22	TB-23	TB-24	TB-25A	SHS MSC*	SHS MSC**	SHS MSC***
<b>Sample Location</b>	<b>TB-21</b>	<b>TB-22</b>	<b>TB-23</b>	<b>TB-24</b>	<b>TB-25</b>			
<b>Depth</b>	<b>1.0' - 2.0'</b>	<b>1.5' - 2.5'</b>	<b>1.5' - 2.5'</b>	<b>0.5' - 1.5'</b>	<b>1.0' - 2.0'</b>			
<b>Condition</b>	<b>Vadose</b>	<b>Vadose</b>	<b>Vadose</b>	<b>Vadose</b>	<b>Vadose</b>			
<b>% Moisture</b>	<b>5.4%</b>	<b>3.9%</b>	<b>6.2%</b>	<b>6.2%</b>	<b>11.4%</b>			
<b>Sample Date</b>	<b>3/30/2016</b>	<b>3/30/2016</b>	<b>3/30/2016</b>	<b>3/30/2016</b>	<b>3/30/2016</b>			
<b>Benzene</b>	<0.0352	<0.0318	<0.0327	<0.0341	<0.0555	0.5	0.5	0.5
<b>Toluene</b>	<0.0352	<0.0318	<0.0327	<0.0341	<0.0555	100	100	100
<b>Ethylbenzene</b>	<0.0352	<0.0318	<0.0327	<0.0341	<0.0555	70	70	70
<b>Xylenes (Total)</b>	<0.106	<0.0954	<0.0980	<0.102	<0.167	1,000.00	1,000.00	1,000.00
<b>Isopropylbenzene (Cumene)</b>	<0.0352	<0.0318	<0.0327	<0.0341	<0.0555	2,500	2,500	350
<b>MTBE</b>	<0.0352	<0.0318	<0.0327	<0.0341	<0.0555	2	2	2
<b>Naphthalene</b>	<0.0704	<0.0636	<0.0653	<0.0682	<0.111	25	25	10
<b>1,2,4-Trimethylbenzene</b>	<0.0352	<0.0318	<0.0327	<0.0341	<0.0555	35	35	6.2
<b>1,3,5-Trimethylbenzene</b>	<0.0352	<0.0318	<0.0327	<0.0341	<0.0555	210	210	120

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer setting

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 0' - 2' \*

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 2' - 15' \*\*

 Shaded values indicate Act 2 SHS exceedances - Saturated Zone 2' - 15' \*\*\*

**Condition:**

Vadose: Vadose Zone - Unsaturated MSCs Apply

Smear: Zone of Groundwater Saturation (Smear Zone) - Saturated MSCs Apply


PSZ: Permanently Saturated Zone - Groundwater Issue - No Soil MSCs Apply


08/30/18


**Table F-1**  
**Site Characterization Activities**  
**Pump-n-Pantry #001 Property**  
**Summary of Soil Analytical Data (mg/kg)**

Parameter	TB-25B	TB-26A	TB-26B	TB-27A	TB-27B	SHS MSC*	SHS MSC**	SHS MSC***
<b>Sample Location</b>	<b>TB-25</b>	<b>TB-26</b>	<b>TB-26</b>	<b>TB-27</b>	<b>TB-27</b>			
<b>Depth</b>	<b>2.5' - 3.5'</b>	<b>2.0' - 3.0'</b>	<b>3.5' - 4.5'</b>	<b>2.0' - 3.0'</b>	<b>5.0' - 6.0'</b>			
<b>Condition</b>	<b>Smear</b>	<b>Vadose</b>	<b>Smear</b>	<b>Vadose</b>	<b>Smear</b>			
<b>% Moisture</b>	<b>9.2%</b>	<b>12.9%</b>	<b>6.4%</b>	<b>14.6%</b>	<b>22.9%</b>			
<b>Sample Date</b>	<b>3/30/2016</b>	<b>3/30/2016</b>	<b>3/30/2016</b>	<b>3/30/2016</b>	<b>3/30/2016</b>			
<b>Benzene</b>	<0.0491	<0.0500	<0.0462	<0.0550	<0.386	0.5	0.5	0.5
<b>Toluene</b>	<0.0491	<0.0500	<0.0462	<0.0550	<0.386	100	100	100
<b>Ethylbenzene</b>	<0.0491	<0.0500	<0.0462	<0.0550	<0.386	70	70	70
<b>Xylenes (Total)</b>	<0.147	<0.150	<0.139	<0.165	<0.116	1,000.00	1,000.00	1,000.00
<b>Isopropylbenzene (Cumene)</b>	<0.0491	<0.0500	<0.0462	<0.0550	<0.386	2,500	2,500	350
<b>MTBE</b>	<0.0491	<0.0500	<0.0462	<0.0550	<0.386	2	2	2
<b>Naphthalene</b>	<0.0982	<0.100	<0.0924	<0.110	<0.0772	25	25	10
<b>1,2,4-Trimethylbenzene</b>	<0.0491	<0.0500	<0.0462	<0.0550	<0.386	35	35	6.2
<b>1,3,5-Trimethylbenzene</b>	<0.0491	<0.0500	<0.0462	<0.0550	<0.386	210	210	120

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer setting

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 0' - 2' \*

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 2' - 15' \*\*

 Shaded values indicate Act 2 SHS exceedances - Saturated Zone 2' - 15' \*\*\*

**Condition:**

Vadose: Vadose Zone - Unsaturated MSCs Apply

Smear: Zone of Groundwater Saturation (Smear Zone) - Saturated MSCs Apply


PSZ: Permanently Saturated Zone - Groundwater Issue - No Soil MSCs Apply


08/30/18


**Table F-1**  
**Site Characterization Activities**  
**Pump-n-Pantry #001 Property**  
**Summary of Soil Analytical Data (mg/kg)**

Parameter	MW-7A	MW-8A	MW-8B	MW-9A	MW-9B	SHS MSC*	SHS MSC**	SHS MSC***
<b>Sample Location</b>	<b>MW-7</b>	<b>MW-8</b>	<b>MW-8</b>	<b>MW-9</b>	<b>MW-9</b>			
<b>Depth</b>	<b>2.0' - 3.0'</b>	<b>2.0' - 3.0'</b>	<b>4.0' - 4.5'</b>	<b>2.0' - 3.0'</b>	<b>4.0' - 5.0'</b>			
<b>Condition</b>	<b>Vadose</b>	<b>Vadose</b>	<b>Smear</b>	<b>Vadose</b>	<b>Smear</b>			
<b>% Moisture</b>	<b>14.1%</b>	<b>7.3%</b>	<b>12.0%</b>	<b>13.9%</b>	<b>16.9%</b>			
<b>Sample Date</b>	<b>2/6/2017</b>	<b>2/6/2017</b>	<b>2/6/2017</b>	<b>2/6/2017</b>	<b>2/6/2017</b>			
<b>Benzene</b>	<0.0451	<0.0427	0.308	<0.0371	<0.0394	0.5	0.5	0.5
<b>Toluene</b>	<0.0451	0.0951	0.107	<0.0371	<0.0394	100	100	100
<b>Ethylbenzene</b>	<0.0451	0.0683	2.46	<0.0371	<0.0394	70	70	70
<b>Xylenes (Total)</b>	<0.135	0.204	1.75	<0.111	<0.118	1,000.00	1,000.00	1,000.00
<b>Isopropylbenzene (Cumene)</b>	<0.0451	<0.0427	0.968	<0.0371	<0.0394	2,500	2,500	350
<b>MTBE</b>	<0.0451	<0.0427	<0.0426	<0.0371	<0.0394	2	2	2
<b>Naphthalene</b>	<0.0903	0.107	2.68	<0.0742	<0.0789	25	25	10
<b>1,2,4-Trimethylbenzene</b>	<0.0451	0.0809	9.08	<0.0371	<0.0394	35	35	6.2
<b>1,3,5-Trimethylbenzene</b>	<0.0451	<0.0427	4.42	<0.0371	<0.0394	210	210	120

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer setting

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 0' - 2' \*

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 2' - 15' \*\*

 Shaded values indicate Act 2 SHS exceedances - Saturated Zone 2' - 15' \*\*\*

**Condition:**

Vadose: Vadose Zone - Unsaturated MSCs Apply

Smear: Zone of Groundwater Saturation (Smear Zone) - Saturated MSCs Apply


PSZ: Permanently Saturated Zone - Groundwater Issue - No Soil MSCs Apply


08/30/18


**Table F-1**  
**Site Characterization Activities**  
**Pump-n-Pantry #001 Property**  
**Summary of Soil Analytical Data (mg/kg)**

Parameter	MW-10A	MW-10B	SHS MSC*	SHS MSC**	SHS MSC***
<b>Sample Location</b>	<b>MW-10</b>	<b>MW-10</b>			
<b>Depth</b>	<b>2.0' - 3.0'</b>	<b>4.0' - 5.0'</b>			
<b>Condition</b>	<b>Vadose</b>	<b>Smear</b>			
<b>% Moisture</b>	<b>23.3%</b>	<b>33.3%</b>			
<b>Sample Date</b>	<b>2/6/2017</b>	<b>2/6/2017</b>			
<b>Benzene</b>	<0.0496	<0.0599	0.5	0.5	0.5
<b>Toluene</b>	<0.0496	<0.0599	100	100	100
<b>Ethylbenzene</b>	<0.0496	<0.0599	70	70	70
<b>Xylenes (Total)</b>	<0.149	<0.180	1,000.00	1,000.00	1,000.00
<b>Isopropylbenzene (Cumene)</b>	<0.0496	<0.0599	2,500	2,500	350
<b>MTBE</b>	<0.0496	<0.0599	2	2	2
<b>Naphthalene</b>	<0.0992	<0.120	25	25	10
<b>1,2,4-Trimethylbenzene</b>	<0.0496	<0.0599	35	35	6.2
<b>1,3,5-Trimethylbenzene</b>	<0.0496	<0.0599	210	210	120

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer setting

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 0' - 2' \*

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 2' - 15' \*\*

 Shaded values indicate Act 2 SHS exceedances - Saturated Zone 2' - 15' \*\*\*

**Condition:**

Vadose: Vadose Zone - Unsaturated MSCs Apply

Smear: Zone of Groundwater Saturation (Smear Zone) - Saturated MSCs Apply

PSZ: Permanently Saturated Zone - Groundwater Issue - No Soil MSCs Apply





08/30/18


**Table F-1**  
**Northridge Attainment Data**  
**Pump-n-Pantry #001 Property**  
**Summary of Soil Analytical Data (mg/kg)**

Parameter	B-4	B-5	B-6	B-7	B-8	SHS MSC*	SHS MSC**	SHS MSC***
<b>Sample Location</b>	<b>B-4</b>	<b>B-4</b>	<b>B-4</b>	<b>B-4</b>	<b>B-4</b>			
<b>Depth</b>	<b>Unkown</b>	<b>Unkown</b>	<b>Unkown</b>	<b>Unkown</b>	<b>Unkown</b>			
<b>Condition</b>	<b>Biased</b>	<b>Biased</b>	<b>Biased</b>	<b>Biased</b>	<b>Biased</b>			
<b>% Moisture</b>	<b>9.4%</b>	<b>12.1%</b>	<b>12.0%</b>	<b>10.1%</b>	<b>7.1%</b>			
<b>Sample Date</b>	<b>2/6/2017</b>	<b>2/6/2017</b>	<b>2/6/2017</b>	<b>2/6/2017</b>	<b>2/6/2017</b>			
<b>Benzene</b>	<0.0023	0.0033	0.0023	0.0087	0.0967	0.5	0.5	0.5
<b>Toluene</b>	<0.0056	0.0163	<0.0032	<0.0061	0.0417	100	100	100
<b>Ethylbenzene</b>	<0.0056	<0.0041	<0.0032	<0.0061	<0.0045	70	70	70
<b>Xylenes (Total)</b>	<0.0113	0.0155	<0.0064	<0.0122	<0.0089	1,000.00	1,000.00	1,000.00
<b>Isopropylbenzene (Cumene)</b>	<0.0056	<0.0041	<0.0032	<0.0061	<0.0045	2,500	2,500	350
<b>MTBE</b>	<0.0056	<0.0041	<0.0032	<0.0061	<0.0045	2	2	2
<b>Naphthalene</b>	<0.0056	<0.0041	<0.0032	<0.0061	<0.0045	25	25	10
<b>1,2,4-Trimethylbenzene</b>	<0.0056	<0.0041	<0.0032	<0.0061	<0.0045	35	35	6.2
<b>1,3,5-Trimethylbenzene</b>	<0.0056	<0.0041	<0.0032	<0.0061	<0.0045	210	210	120

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer setting

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 0' - 2' \*

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 2' - 15' \*\*

 Shaded values indicate Act 2 SHS exceedances - Saturated Zone 2' - 15' \*\*\*

**Condition:**

Vadose: Vadose Zone - Unsaturated MSCs Apply

Smear: Zone of Groundwater Saturation (Smear Zone) - Saturated MSCs Apply


PSZ: Permanently Saturated Zone - Groundwater Issue - No Soil MSCs Apply


08/30/18


**Table F-1**  
**Site Characterization Activities**  
**Pump-n-Pantry #001 Property**  
**Summary of Soil Analytical Data (mg/kg)**

Parameter	TB-28A	TB-28B	TB-29A	TB-29B	TB-30A	SHS MSC*	SHS MSC**	SHS MSC***
<b>Sample Location</b>	<b>TB-28</b>	<b>TB-28</b>	<b>TB-29</b>	<b>TB-29</b>	<b>TB-30</b>			
<b>Depth</b>	<b>2.0' - 2.5'</b>	<b>4.5' 5.0'</b>	<b>2.0' - 2.5'</b>	<b>4.0' - 4.5'</b>	<b>2.0' - 2.5'</b>			
<b>Condition</b>	<b>Vadose</b>	<b>Smear</b>	<b>Vadose</b>	<b>Smear</b>	<b>Vadose</b>			
<b>% Moisture</b>	<b>9.4%</b>	<b>12.1%</b>	<b>12.0%</b>	<b>10.1%</b>	<b>7.1%</b>			
<b>Sample Date</b>	<b>9/12/2017</b>	<b>9/12/2017</b>	<b>9/12/2017</b>	<b>9/12/2017</b>	<b>9/12/2017</b>			
<b>Benzene</b>	<0.0354	<0.0348	<0.0380	<0.0300	<0.0471	0.5	0.5	0.5
<b>Toluene</b>	<0.0354	<0.0348	<0.0380	<0.0300	<b>0.279</b>	100	100	100
<b>Ethylbenzene</b>	<0.0354	<0.0348	<0.0380	<0.0300	<b>0.0746</b>	70	70	70
<b>Xylenes (Total)</b>	<0.106	<0.104	<0.114	<0.0899	<b>0.378</b>	1,000.00	1,000.00	1,000.00
<b>Isopropylbenzene (Cumene)</b>	<0.0354	<0.0348	<0.0380	<0.0300	<0.0471	2,500	2,500	350
<b>MTBE</b>	<0.0354	<0.0348	<0.0380	<0.0300	<0.0471	2	2	2
<b>Naphthalene</b>	<0.0708	<0.0695	<0.0760	<0.0600	<b>0.382</b>	25	25	10
<b>1,2,4-Trimethylbenzene</b>	<0.0354	<0.0348	<0.0380	<0.0300	<b>0.192</b>	35	35	6.2
<b>1,3,5-Trimethylbenzene</b>	<0.0354	<0.0348	<0.0380	<0.0300	<b>0.126</b>	210	210	120

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer setting

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 0' - 2' \*

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 2' - 15' \*\*

 Shaded values indicate Act 2 SHS exceedances - Saturated Zone 2' - 15' \*\*\*

**Condition:**

Vadose: Vadose Zone - Unsaturated MSCs Apply

Smear: Zone of Groundwater Saturation (Smear Zone) - Saturated MSCs Apply


PSZ: Permanently Saturated Zone - Groundwater Issue - No Soil MSCs Apply


08/30/18


**Table F-1**  
**Site Characterization Activities**  
**Pump-n-Pantry #001 Property**  
**Summary of Soil Analytical Data (mg/kg)**

Parameter	TB-30B	TB-31A	TB-31B	SHS MSC*	SHS MSC**	SHS MSC***
<b>Sample Location</b>	<b>TB-30</b>	<b>TB-31</b>	<b>TB-31</b>			
<b>Depth</b>	<b>4.0' - 4.5'</b>	<b>2.0' - 2.5'</b>	<b>4.0' - 4.5'</b>			
<b>Condition</b>	<b>Smear</b>	<b>Vadose</b>	<b>Smear</b>			
<b>% Moisture</b>	<b>6.6%</b>	<b>5.3%</b>	<b>8.3%</b>			
<b>Sample Date</b>	<b>9/12/2017</b>	<b>9/12/2017</b>	<b>9/12/2017</b>			
<b>Benzene</b>	<b>0.0299</b>	<b>0.092</b>	<b>0.0436</b>	0.5	0.5	0.5
<b>Toluene</b>	<b>0.0829</b>	<b>1.66</b>	<b>0.805</b>	100	100	100
<b>Ethylbenzene</b>	<b>&lt;0.0264</b>	<b>0.322</b>	<b>0.208</b>	70	70	70
<b>Xylenes (Total)</b>	<b>&lt;0.0792</b>	<b>2.38</b>	<b>2.26</b>	1,000.00	1,000.00	1,000.00
<b>Isopropylbenzene (Cumene)</b>	<b>&lt;0.0264</b>	<b>&lt;0.0344</b>	<b>&lt;0.0301</b>	2,500	2,500	350
<b>MTBE</b>	<b>&lt;0.0264</b>	<b>&lt;0.0344</b>	<b>&lt;0.0301</b>	2	2	2
<b>Naphthalene</b>	<b>&lt;0.0528</b>	<b>&lt;0.0688</b>	<b>&lt;0.0603</b>	25	25	10
<b>1,2,4-Trimethylbenzene</b>	<b>&lt;0.0264</b>	<b>0.487</b>	<b>0.747</b>	35	35	6.2
<b>1,3,5-Trimethylbenzene</b>	<b>&lt;0.0264</b>	<b>0.608</b>	<b>0.432</b>	210	210	120

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer setting

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 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 2' - 15' \*\*

 Shaded values indicate Act 2 SHS exceedances - Saturated Zone 2' - 15' \*\*\*

**Condition:**

Vadose: Vadose Zone - Unsaturated MSCs Apply

Smear: Zone of Groundwater Saturation (Smear Zone) - Saturated MSCs Apply


PSZ: Permanently Saturated Zone - Groundwater Issue - No Soil MSCs Apply

08/30/18

**Table F-1**  
**Soil Attainment Sampling Program**  
**Pump-n-Pantry #001 Property**  
**Summary of Soil Analytical Data (mg/kg)**

Parameter	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6	SHS MSC*	SHS MSC**	SHS MSC***
Sample Location	Sidewall	Sidewall	Sidewall	Sidewall	Sidewall	Sidewall			
Depth	3.9	2.3	2.0	5.4	0.4	4.2			
Condition	Vadose	Vadose	Vadose	Smear	Vadose	Vadose			
% Moisture	9.8%	1.8%	4.6%	9.5%	17.5%	1.0%			
Sample Date	6/27/2016	6/27/2016	6/27/2016	6/27/2016	6/27/2016	6/27/2016			
Benzene	0.0318	<0.0339	<0.0467	<0.0347	0.386	0.517	0.5	0.5	0.5
Ethylbenzene	0.13	0.0504	<0.0467	0.26	1.49	9.440	70	70	70
Isopropylbenzene (Cumene)	<0.0312	<0.0339	<0.0467	0.0675	0.137	1.630	2,500	2,500	350
MTBE	<0.0312	<0.0339	<0.0467	<0.0347	<0.0496	<0.412	2	2	2
Naphthalene	<0.0937	<0.102	<0.140	3.08	0.759	60.2	25	25	10
Toluene	<0.0312	0.0383	<0.0467	0.0895	0.89	9.05	100	100	100
Total Xylenes	<0.0937	<0.102	<0.140	1.77	3.17	57.5	1,000	1,000	1,000
1,2,4-Trimethylbenzene	<0.0312	<0.0339	<0.0467	4.27	2.43	75.0	35	35	6.2
1,3,5-Trimethylbenzene	<0.0312	<0.0339	<0.0467	1.13	0.245	20.5	9.3	9.3	5.3

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer setting

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 0' - 2' \*

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 2' - 15' \*\*

 Shaded values indicate Act 2 SHS exceedances - Saturated Zone 2' - 15' \*\*\*

**Condition:**

Vadose: Vadose Zone - Unsaturated MSCs Apply

Smear: Zone of Groundwater Saturation (Smear Zone) - Saturated MSCs Apply

PSZ: Permanently Saturated Zone - Groundwater Issue - No Soil MSCs Apply



08/30/18

**Table F-1**  
**Soil Attainment Sampling Program**  
**Pump-n-Pantry #001 Property**  
**Summary of Soil Analytical Data (mg/kg)**

Parameter	SS-7	SS-8	SS-9	SS-10	SS-11	SS-12	SHS MSC*	SHS MSC**	SHS MSC***
Sample Location	Sidewall	Sidewall	Sidewall	Sidewall	Sidewall	Sidewall			
Depth	5.0	2.2	2.4	0.9	3.0	2.7			
Condition	Smear	Vadose	Vadose	Vadose	Vadose	Vadose			
% Moisture	14.7%	11.5%	14.4%	3.0%	1.8%	7.8%			
Sample Date	6/27/2016	6/27/2016	6/27/2016	6/27/2016	6/27/2016	6/27/2016			
Benzene	<0.0441	0.246	0.345	<0.0425	0.364	<0.0451	0.5	0.5	0.5
Ethylbenzene	<0.0441	4.39	0.395	0.0513	7.29	<0.0451	70	70	70
Isopropylbenzene (Cumene)	<0.0441	1.76	0.148	<0.0425	0.971	<0.0451	2,500	2,500	350
MTBE	<0.0441	<0.0429	<0.0485	<0.0425	<0.216	<0.0451	2	2	2
Naphthalene	<0.0883	1.01	0.124	0.138	27.3	<0.0902	25	25	10
Toluene	<0.0441	3.36	0.944	0.0478	<0.216	<0.0451	100	100	100
Total Xylenes	<0.132	12.9	0.867	0.212	37.7	<0.135	1,000	1,000	1,000
1,2,4-Trimethylbenzene	<0.0441	16.7	0.333	0.0977	61.9	<0.0451	35	35	6.2
1,3,5-Trimethylbenzene	<0.0441	<0.0429	0.122	0.0764	18.5	<0.0451	9.3	9.3	5.3

PA Act 2 Statewide Health Standards for Non-Residential Used Aquifer setting

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 0' - 2' \*

 Shaded values indicate Act 2 SHS exceedances - Unsaturated Zone 2' - 15' \*\*

 Shaded values indicate Act 2 SHS exceedances - Saturated Zone 2' - 15' \*\*\*

**Condition:**

Vadose: Vadose Zone - Unsaturated MSCs Apply

Smear: Zone of Groundwater Saturation (Smear Zone) - Saturated MSCs Apply

PSZ: Permanently Saturated Zone - Groundwater Issue - No Soil MSCs Apply

## APPENDIX G

### Contaminant Mass Calculations for Soil and Groundwater

## GROUNDWATER DATA (ug/l):

Well ID	Date	Benzene	Ethylbenzene	Cumene	MTBE	Naphthalene	Toluene	Total Xylenes	1,2,4-TMB	1,3,5-TMB	Total	Average	
MW-2	11/3/2017	516.0	422.0	18.5	23.1	55.0	125.0	286.0	195.0	4.9	1646	1822	ug/L
	12/5/2017	756.0	543.0	25.7	8.3	52.6	248.0	389.0	324.0	4.9	2352		
	3/21/2018	246.0	265.0	10.8	4.9	21.1	24.2	151.0	161.0	4.9	889		
	6/8/2018	643.0	625.0	50.2	8.8	77.8	89.8	565.0	336.0	4.9	2401		
MW-15	11/3/2017	552.0	1240	176.0	4.9	179.0	2420	3950	967.0	172	9661	5324	ug/L
	12/5/2017	458.0	1170	186.0	4.9	139.0	1730	3150	990	157	7985		
	3/21/2018	50.0	440.0	75.1	4.9	39.7	137	360	705	4.9	1817		
	6/8/2018	94.4	405.0	90.5	4.9	54.4	71.8	288	746.0	76.6	1832		
AVERAGE TOTAL VOC CONCENTRATION												3573	ug/L

## SOIL DATA (mg/kg)

	TB-7B	TB-10B	TB-11B										
Benzene	2.15	1.61	1.85										
Ethylbenzene	35.7	12.0	28.9										
Cumene	6.42	8.44	18.4										
MTBE	0.328	0.512	0.318										
Naphthalene	19.9	1.51	2.58										
Toluene	0.767	33.0	66.7										
Total Xylenes	10.1	56.5	143.0										
1,2,4-TMB	25.3	28.2	47.5										
1,3,5-TMB	36.0	8.1	15.1										
TOTAL VOCs	136.7	149.9	324.3										
Average	203.6												

## GROUNDWATER PLUME

plume depth	15.5 ft	Plume dimensions determined via June 2018 Isopleths
plume width	96 ft	
plume length	185 ft	
porosity	0.3	
conversion factor	28.3168 L/ft3	
MW-2 conc.	1822 ug/L	
MW-15 conc.	3573 ug/L	
mass in plume (MW-2)	4260 g	9.39 lb.
mass in plume (average)	8354 g	18.42 lb.

## SOIL PLUME

plume depth	1 ft	0.3 m
plume width	40 ft	12.2 m
plume length	100 ft	30.5 m
density	1280 kg/m3	*assumed density of loam
TB-11B conc.	324.3 mg/kg	
Average conc.	203.6 mg/kg	
mass in plume (TB-11B)	47025 g	103.7 lb.
mass in plume (average)	29522 g	65.1 lb.

## APPENDIX H

### Test Boring Logs – Pilot Test Points



# TEST BORING LOG

TIME LOG	Begin	Finish	Depth	S.W.L.	TOC/GL
Soft Dig	13:26	13:47	3.5'	Elevation TOC	Surface
Geoprobe	14:30	15:10	10.0'		

## LaBella Associates, P.C.

## TEST BORING LOG

Project: Pump-n-Pantry #001 Property				Soft Dig: 06/11/2018		Drilling 06/12/2018	
Client: Pump-n-Pantry, Inc.				Date Started: 06/11/2018		06/12/2018	
Purpose: Oxygen Injection Pilot Test				Date Finished: 06/11/2018		06/12/2018	
Contractor: Odyssey Environmental				Boring Number: IP-2			
Driller: Jake Shaffer				Job Number: 2171845			
Inspector: Kevin Cucura				Sheet: 1 of 1			
TIME LOG		Begin	Finish	Depth	S.W.L.	TOC/GL	
Soft Dig		12:10	12:45	3.0'	Elevation TOC	Surface	
Geoprobe		15:30	16:03	10.0'			
Dept (feet)	Sample No's	PID (ppm)	Field Assessment Log	Lithologic Description	Notes		
---				0.0' - 5.0'	Mulch Surface		
1---		0.0		Soft dig to 3.0'; modified fill to 1.0', change to shot rock (large angular sandstone) to 5.0'	Moist / Wet Auger 0.0' - 4.0' (8" Diameter Borehole)		
2---		0.0					
3---		0.0					
4---		0.0	Choppy 4.0' - 5.0'		Air Rotary 4.0' - 10.0' (6" Diameter Borehole)		
5---		--	Hard / Steady	5.0' - 10.0'			
6---		--	5.0' - 10.0'	Gray sandstone			
7---		--	Odors 5.0' - 10.0'				
8---		--	Rod Change 6.0'				
9---		--	Wet				
10---		--					
11---							
12---							
13---							
14---							
15---							
16---							
17---							
18---							
19---							
---							

Log Approved By:  
Martin Gilgallon, P.G.



LaBella Associates, P.C.				TEST BORING LOG			
Project: Pump-n-Pantry #001 Property				Soft Dig: 06/11/2018		Drilling: 06/12/2018	
Client: Pump-n-Pantry, Inc.				Date Started: 06/11/2018		Date Finished: 06/12/2018	
Purpose: Oxygen Injection Pilot Test							
Contractor: Odyssey Environmental				Boring Number: IP-3			
Driller: Jake Shaffer				Job Number: 2171845			
Inspector: Kevin Cucura				Sheet: 1 of 1			
TIME LOG		Begin	Finish	Depth	S.W.L.	TOC/GL	
Soft Dig		11:00	11:40	3.0'	Elevation TOC	Surface	
Geoprobe		12:20	13:00	10.0'			
Dept (feet)	Sample No's	PID (ppm)	Field Assessment Log	Lithologic Description	Notes		
---				0.0' - 5.0'	Asphalt Surface		
1---		0.0		Soft dig to 3.0'; modified fill to 1.0', change to shot rock (large angular sandstone) to 5.0'	8" Thick		
2---		0.0			Dry		
3---		0.0			Auger 0.0' - 4.0' (8" Diameter Borehole)		
4---		0.0	Choppy 4.0' - 5.0'		Air Rotary 4.0' - 10.0' (6" Diameter Borehole)		
5---		--	Hard / Steady	5.0' - 10.0'			
6---		--	5.0' - 6.0'	Gray sandstone			
7---		--	Rod Change 6.0'				
8---		--	Dry				
9---		--	Water & Odor				
10---		--	8.0' - 10.0'				
11---							
12---							
13---							
14---							
15---							
16---							
17---							
18---							
19---							
---							
				Log Approved By:			
				Martin Gilgallon, P.G.			

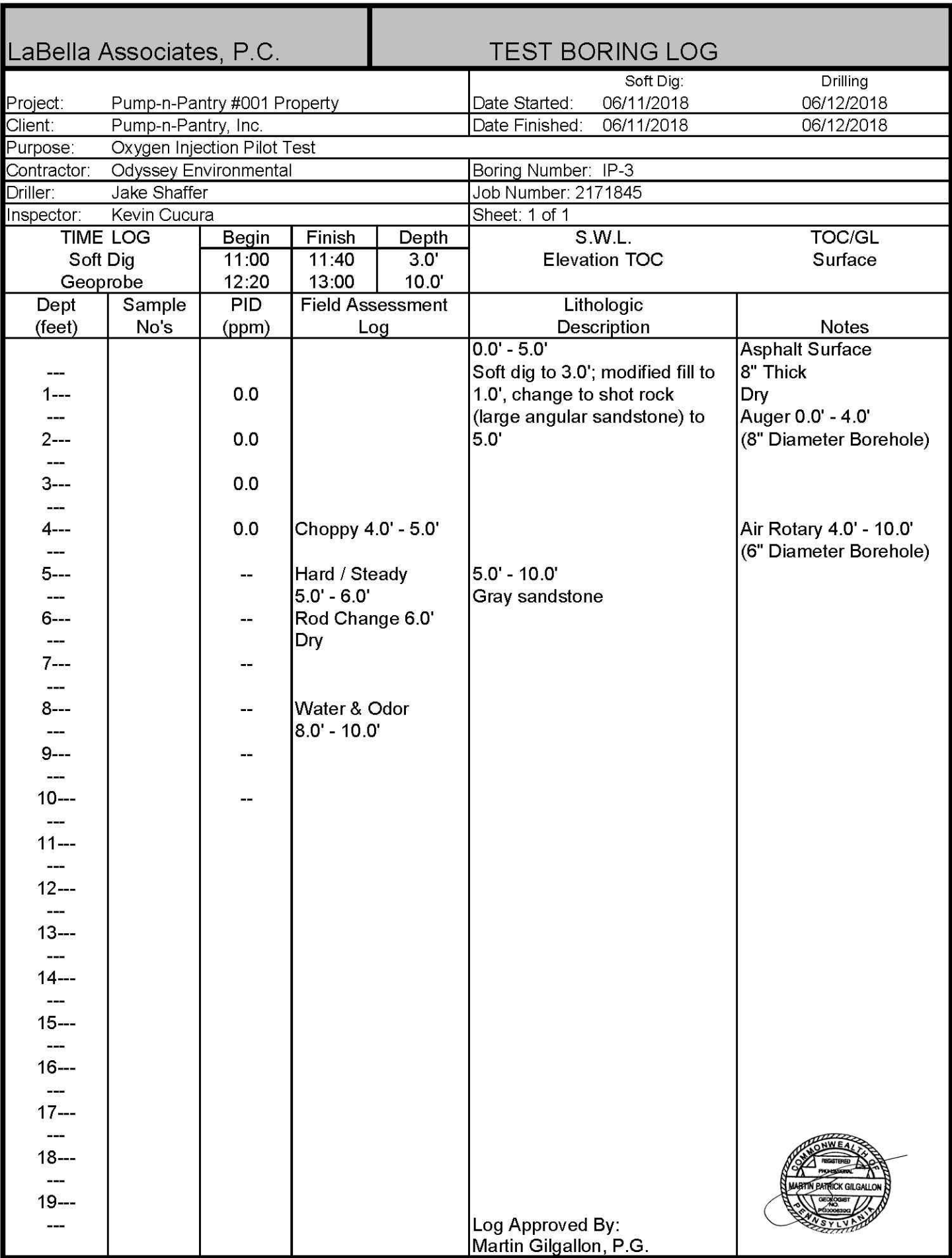
LaBella Associates, P.C.				TEST BORING LOG			
Project: Pump-n-Pantry #001 Property				Soft Dig:		Drilling	
Client: Pump-n-Pantry, Inc.				Date Started: 06/11/2018		06/12/2018	
Purpose: Oxygen Injection Pilot Test				Date Finished: 06/11/2018		06/12/2018	
Contractor: Odyssey Environmental				Boring Number: IP-3			
Driller: Jake Shaffer				Job Number: 2171845			
Inspector: Kevin Cucura				Sheet: 1 of 1			
TIME LOG		Begin	Finish	Depth	S.W.L.	TOC/GL	
Soft Dig		11:00	11:40	3.0'	Elevation TOC	Surface	
Geoprobe		12:20	13:00	10.0'			
Dept (feet)	Sample No's	PID (ppm)	Field Assessment Log	Lithologic Description	Notes		
---				0.0' - 5.0'	Asphalt Surface		
1---		0.0		Soft dig to 3.0'; modified fill to 1.0', change to shot rock (large angular sandstone) to 5.0'	8" Thick		
2---		0.0			Dry		
3---		0.0			Auger 0.0' - 4.0' (8" Diameter Borehole)		
4---		0.0	Choppy 4.0' - 5.0'		Air Rotary 4.0' - 10.0' (6" Diameter Borehole)		
5---		--	Hard / Steady	5.0' - 10.0'			
6---		--	5.0' - 6.0'	Gray sandstone			
7---		--	Rod Change 6.0'				
8---		--	Dry				
9---		--	Water & Odor				
10---		--	8.0' - 10.0'				
11---							
12---							
13---							
14---							
15---							
16---							
17---							
18---							
19---							
---							
				Log Approved By:			
				Martin Gilgallon, P.G.			

LaBella Associates, P.C.				TEST BORING LOG			
Project: Pump-n-Pantry #001 Property				Soft Dig:		Drilling	
Client: Pump-n-Pantry, Inc.				Date Started: 06/11/2018		06/12/2018	
Purpose: Oxygen Injection Pilot Test				Date Finished: 06/11/2018		06/12/2018	
Contractor: Odyssey Environmental				Boring Number: IP-3			
Driller: Jake Shaffer				Job Number: 2171845			
Inspector: Kevin Cucura				Sheet: 1 of 1			
TIME LOG		Begin	Finish	Depth	S.W.L.	TOC/GL	
Soft Dig		11:00	11:40	3.0'	Elevation TOC	Surface	
Geoprobe		12:20	13:00	10.0'			
Dept (feet)	Sample No's	PID (ppm)	Field Assessment Log	Lithologic Description	Notes		
---				0.0' - 5.0'	Asphalt Surface		
1---		0.0		Soft dig to 3.0'; modified fill to 1.0', change to shot rock (large angular sandstone) to 5.0'	8" Thick		
2---		0.0			Dry		
3---		0.0			Auger 0.0' - 4.0' (8" Diameter Borehole)		
4---		0.0	Choppy 4.0' - 5.0'		Air Rotary 4.0' - 10.0' (6" Diameter Borehole)		
5---		--	Hard / Steady	5.0' - 10.0'			
6---		--	5.0' - 6.0'	Gray sandstone			
7---		--	Rod Change 6.0'				
8---		--	Dry				
9---		--	Water & Odor				
10---		--	8.0' - 10.0'				
11---							
12---							
13---							
14---							
15---							
16---							
17---							
18---							
19---							
---							
				Log Approved By:			
				Martin Gilgallon, P.G.			

LaBella Associates, P.C.				TEST BORING LOG			
Project: Pump-n-Pantry #001 Property				Soft Dig: 06/11/2018		Drilling: 06/12/2018	
Client: Pump-n-Pantry, Inc.				Date Started: 06/11/2018		Date Finished: 06/12/2018	
Purpose: Oxygen Injection Pilot Test							
Contractor: Odyssey Environmental				Boring Number: IP-3			
Driller: Jake Shaffer				Job Number: 2171845			
Inspector: Kevin Cucura				Sheet: 1 of 1			
TIME LOG		Begin	Finish	Depth	S.W.L.	TOC/GL	
Soft Dig		11:00	11:40	3.0'	Elevation TOC	Surface	
Geoprobe		12:20	13:00	10.0'			
Dept (feet)	Sample No's	PID (ppm)	Field Assessment Log	Lithologic Description	Notes		
---				0.0' - 5.0'	Asphalt Surface		
1---		0.0		Soft dig to 3.0'; modified fill to 1.0', change to shot rock (large angular sandstone) to 5.0'	8" Thick		
2---		0.0			Dry		
3---		0.0			Auger 0.0' - 4.0' (8" Diameter Borehole)		
4---		0.0	Choppy 4.0' - 5.0'		Air Rotary 4.0' - 10.0' (6" Diameter Borehole)		
5---		--	Hard / Steady	5.0' - 10.0'			
6---		--	5.0' - 6.0'	Gray sandstone			
7---		--	Rod Change 6.0'				
8---		--	Dry				
9---		--	Water & Odor				
10---		--	8.0' - 10.0'				
11---							
12---							
13---							
14---							
15---							
16---							
17---							
18---							
19---							
---							
				Log Approved By:			
				Martin Gilgallon, P.G.			

LaBella Associates, P.C.				TEST BORING LOG			
Project: Pump-n-Pantry #001 Property				Soft Dig: 06/11/2018		Drilling: 06/12/2018	
Client: Pump-n-Pantry, Inc.				Date Started: 06/11/2018		Date Finished: 06/12/2018	
Purpose: Oxygen Injection Pilot Test							
Contractor: Odyssey Environmental				Boring Number: IP-3			
Driller: Jake Shaffer				Job Number: 2171845			
Inspector: Kevin Cucura				Sheet: 1 of 1			
TIME LOG		Begin	Finish	Depth	S.W.L.	TOC/GL	
Soft Dig		11:00	11:40	3.0'	Elevation TOC	Surface	
Geoprobe		12:20	13:00	10.0'			
Dept (feet)	Sample No's	PID (ppm)	Field Assessment Log	Lithologic Description	Notes		
---				0.0' - 5.0'	Asphalt Surface		
1---		0.0		Soft dig to 3.0'; modified fill to 1.0', change to shot rock (large angular sandstone) to 5.0'	8" Thick		
2---		0.0			Dry		
3---		0.0			Auger 0.0' - 4.0' (8" Diameter Borehole)		
4---		0.0	Choppy 4.0' - 5.0'		Air Rotary 4.0' - 10.0' (6" Diameter Borehole)		
5---		--	Hard / Steady	5.0' - 10.0'			
6---		--	5.0' - 6.0'	Gray sandstone			
7---		--	Rod Change 6.0'				
8---		--	Dry				
9---		--	Water & Odor				
10---		--	8.0' - 10.0'				
11---							
12---							
13---							
14---							
15---							
16---							
17---							
18---							
19---							
---							
				Log Approved By:			
				Martin Gilgallon, P.G.			

LaBella Associates, P.C.				TEST BORING LOG			
Project: Pump-n-Pantry #001 Property				Soft Dig: 06/11/2018		Drilling: 06/12/2018	
Client: Pump-n-Pantry, Inc.				Date Started: 06/11/2018		Date Finished: 06/12/2018	
Purpose: Oxygen Injection Pilot Test							
Contractor: Odyssey Environmental				Boring Number: IP-3			
Driller: Jake Shaffer				Job Number: 2171845			
Inspector: Kevin Cucura				Sheet: 1 of 1			
TIME LOG		Begin	Finish	Depth	S.W.L.	TOC/GL	
Soft Dig		11:00	11:40	3.0'	Elevation TOC	Surface	
Geoprobe		12:20	13:00	10.0'			
Dept (feet)	Sample No's	PID (ppm)	Field Assessment Log	Lithologic Description	Notes		
---				0.0' - 5.0'	Asphalt Surface		
1---		0.0		Soft dig to 3.0'; modified fill to 1.0', change to shot rock (large angular sandstone) to 5.0'	8" Thick		
2---		0.0			Dry		
3---		0.0			Auger 0.0' - 4.0' (8" Diameter Borehole)		
4---		0.0	Choppy 4.0' - 5.0'		Air Rotary 4.0' - 10.0' (6" Diameter Borehole)		
5---		--	Hard / Steady	5.0' - 10.0'			
6---		--	5.0' - 6.0'	Gray sandstone			
7---		--	Rod Change 6.0'				
8---		--	Dry				
9---		--	Water & Odor				
10---		--	8.0' - 10.0'				
11---							
12---							
13---							
14---							
15---							
16---							
17---							
18---							
19---							
---							
				Log Approved By:			
				Martin Gilgallon, P.G.			



LaBella Associates, P.C.				TEST BORING LOG			
Project: Pump-n-Pantry #001 Property				Soft Dig:		Drilling	
Client: Pump-n-Pantry, Inc.				Date Started: 06/11/2018		06/12/2018	
Purpose: Oxygen Injection Pilot Test				Date Finished: 06/11/2018		06/12/2018	
Contractor: Odyssey Environmental				Boring Number: MP-1			
Driller: Jake Shaffer				Job Number: 2171845			
Inspector: Kevin Cucura				Sheet: 1 of 1			
<b>TIME LOG</b>		<b>Begin</b>	<b>Finish</b>	<b>Depth</b>	<b>S.W.L.</b>	<b>TOC/GL</b>	
Soft Dig		11:45	12:06	3.0'	Elevation TOC	Surface	
Geoprobe		13:20	14:00	10.0'			
<b>Dept (feet)</b>	<b>Sample No's</b>	<b>PID (ppm)</b>	<b>Field Assessment Log</b>		<b>Lithologic Description</b>	<b>Notes</b>	
---					0.0' - 5.0'	Asphalt Surface	
1---		0.0			Soft dig to 3.0'; modified fill to	8" Thick	
2---		0.0			1.0', change to shot rock	Dry	
3---		0.0			(large angular sandstone) to	Auger 0.0' - 4.0'	
4---		0.0			4.5', change to gray sandstone	(8" Diameter Borehole)	
5---		--	Choppy 4.0' - 4.5'				
6---		--	Hard / Steady				
7---		--	4.5' - 10.0'		5.0' - 10.0'	Air Rotary 4.0' - 10.0'	
8---		--	Rod Change 6.0'		Gray sandstone	(6" Diameter Borehole)	
9---		--	Odor / Wet				
10---		--	6.0' - 10.0'				
11---							
12---							
13---							
14---							
15---							
16---							
17---							
18---							
19---							
---							
					Log Approved By: Martin Gilgallon, P.G.		

LaBella Associates, P.C.				TEST BORING LOG			
Project: Pump-n-Pantry #001 Property				Soft Dig: 06/11/2018		Drilling 06/12/2018	
Client: Pump-n-Pantry, Inc.				Date Started: 06/11/2018		06/12/2018	
Purpose: Oxygen Injection Pilot Test				Date Finished: 06/11/2018		06/12/2018	
Contractor: Odyssey Environmental				Boring Number: MP-1			
Driller: Jake Shaffer				Job Number: 2171845			
Inspector: Kevin Cucura				Sheet: 1 of 1			
TIME LOG		Begin	Finish	Depth	S.W.L.	TOC/GL	
Soft Dig		11:45	12:06	3.0'	Elevation TOC	Surface	
Geoprobe		13:20	14:00	10.0'			
Dept (feet)	Sample No's	PID (ppm)	Field Assessment Log	Lithologic Description	Notes		
---				0.0' - 5.0'	Asphalt Surface		
1---		0.0		Soft dig to 3.0'; modified fill to 1.0', change to shot rock (large angular sandstone) to 4.5', change to gray sandstone to 5.0'	8" Thick Dry Auger 0.0' - 4.0' (8" Diameter Borehole)		
2---		0.0					
3---		0.0					
4---		0.0	Choppy 4.0' - 4.5'		Air Rotary 4.0' - 10.0' (6" Diameter Borehole)		
5---		--	Hard / Steady 4.5' - 10.0'	5.0' - 10.0'			
6---		--	Rod Change 6.0'	Gray sandstone			
7---		--	Odor / Wet 6.0' - 10.0'				
8---		--					
9---		--					
10---		--					
11---							
12---							
13---							
14---							
15---							
16---							
17---							
18---							
19---							
---							
				Log Approved By:			
				Martin Gilgallon, P.G.			

LaBella Associates, P.C.				TEST BORING LOG			
Project: Pump-n-Pantry #001 Property				Soft Dig: 06/11/2018		Drilling 06/12/2018	
Client: Pump-n-Pantry, Inc.				Date Started: 06/11/2018		06/12/2018	
Purpose: Oxygen Injection Pilot Test				Date Finished: 06/11/2018		06/12/2018	
Contractor: Odyssey Environmental				Boring Number: MP-1			
Driller: Jake Shaffer				Job Number: 2171845			
Inspector: Kevin Cucura				Sheet: 1 of 1			
TIME LOG		Begin	Finish	Depth	S.W.L.	TOC/GL	
Soft Dig		11:45	12:06	3.0'	Elevation TOC	Surface	
Geoprobe		13:20	14:00	10.0'			
Dept (feet)	Sample No's	PID (ppm)	Field Assessment Log	Lithologic Description	Notes		
---				0.0' - 5.0'	Asphalt Surface		
1---		0.0		Soft dig to 3.0'; modified fill to 1.0', change to shot rock (large angular sandstone) to 4.5', change to gray sandstone to 5.0'	8" Thick Dry Auger 0.0' - 4.0' (8" Diameter Borehole)		
2---		0.0					
3---		0.0					
4---		0.0	Choppy 4.0' - 4.5'		Air Rotary 4.0' - 10.0' (6" Diameter Borehole)		
5---		--	Hard / Steady 4.5' - 10.0'	5.0' - 10.0'			
6---		--	Rod Change 6.0'	Gray sandstone			
7---		--	Odor / Wet 6.0' - 10.0'				
8---		--					
9---		--					
10---		--					
11---							
12---							
13---							
14---							
15---							
16---							
17---							
18---							
19---							
---							
				Log Approved By:			
				Martin Gilgallon, P.G.			

LaBella Associates, P.C.				TEST BORING LOG			
Project: Pump-n-Pantry #001 Property				Soft Dig: 06/11/2018		Drilling 06/12/2018	
Client: Pump-n-Pantry, Inc.				Date Started: 06/11/2018		06/12/2018	
Purpose: Oxygen Injection Pilot Test				Date Finished: 06/11/2018		06/12/2018	
Contractor: Odyssey Environmental				Boring Number: MP-1			
Driller: Jake Shaffer				Job Number: 2171845			
Inspector: Kevin Cucura				Sheet: 1 of 1			
TIME LOG		Begin	Finish	Depth	S.W.L.	TOC/GL	
Soft Dig		11:45	12:06	3.0'	Elevation TOC	Surface	
Geoprobe		13:20	14:00	10.0'			
Dept (feet)	Sample No's	PID (ppm)	Field Assessment Log	Lithologic Description	Notes		
---				0.0' - 5.0'	Asphalt Surface		
1---		0.0		Soft dig to 3.0'; modified fill to 1.0', change to shot rock (large angular sandstone) to 4.5', change to gray sandstone to 5.0'	8" Thick Dry Auger 0.0' - 4.0' (8" Diameter Borehole)		
2---		0.0					
3---		0.0					
4---		0.0	Choppy 4.0' - 4.5'		Air Rotary 4.0' - 10.0' (6" Diameter Borehole)		
5---		--	Hard / Steady 4.5' - 10.0'	5.0' - 10.0'			
6---		--	Rod Change 6.0'	Gray sandstone			
7---		--	Odor / Wet 6.0' - 10.0'				
8---		--					
9---		--					
10---		--					
11---							
12---							
13---							
14---							
15---							
16---							
17---							
18---							
19---							
---							
				Log Approved By:			
				Martin Gilgallon, P.G.			

LaBella Associates, P.C.				TEST BORING LOG			
Project: Pump-n-Pantry #001 Property				Soft Dig:		Drilling	
Client: Pump-n-Pantry, Inc.				Date Started: 06/11/2018		06/12/2018	
Purpose: Oxygen Injection Pilot Test				Date Finished: 06/11/2018		06/12/2018	
Contractor: Odyssey Environmental				Boring Number: MP-1			
Driller: Jake Shaffer				Job Number: 2171845			
Inspector: Kevin Cucura				Sheet: 1 of 1			
<b>TIME LOG</b>		<b>Begin</b>	<b>Finish</b>	<b>Depth</b>	<b>S.W.L.</b>	<b>TOC/GL</b>	
Soft Dig		11:45	12:06	3.0'	Elevation TOC	Surface	
Geoprobe		13:20	14:00	10.0'			
<b>Dept (feet)</b>	<b>Sample No's</b>	<b>PID (ppm)</b>	<b>Field Assessment Log</b>		<b>Lithologic Description</b>	<b>Notes</b>	
---					0.0' - 5.0'	Asphalt Surface	
1---		0.0			Soft dig to 3.0'; modified fill to	8" Thick	
2---		0.0			1.0', change to shot rock	Dry	
3---		0.0			(large angular sandstone) to	Auger 0.0' - 4.0'	
4---		0.0			4.5', change to gray sandstone	(8" Diameter Borehole)	
5---		--	Choppy 4.0' - 4.5'			Air Rotary 4.0' - 10.0'	
6---		--	Hard / Steady			(6" Diameter Borehole)	
7---		--	4.5' - 10.0'		5.0' - 10.0'		
8---		--	Rod Change 6.0'		Gray sandstone		
9---		--	Odor / Wet				
10---		--	6.0' - 10.0'				
11---							
12---							
13---							
14---							
15---							
16---							
17---							
18---							
19---							
---							
					Log Approved By: Martin Gilgallon, P.G.		



# TEST BORING LOG

LaBella Associates, P.C.

## TEST BORING LOG

Project: Pump-n-Pantry #001 Property		Soft Dig: 06/11/2018		Drilling 06/12/2018	
Client: Pump-n-Pantry, Inc.		Date Started: 06/11/2018		06/12/2018	
Purpose: Oxygen Injection Pilot Test		Date Finished: 06/11/2018		06/12/2018	
Contractor: Odyssey Environmental			Boring Number: MP-3		
Driller: Jake Shaffer			Job Number: 2171845		
Inspector: Kevin Cucura			Sheet: 1 of 1		
TIME LOG		Begin	Finish	Depth	
Soft Dig		14:35	15:00	3.0'	
Geoprobe		10:00	10:40	10.0'	
S.W.L.				TOC/GL	
Elevation TOC				Surface	
Dept (feet)	Sample No's	PID (ppm)	Field Assessment Log	Lithologic Description	Notes
---				0.0' - 5.0'	Mulch Surface
1---		0.0		Soft dig to 3.0'; modified fill to 1.0', change to shot rock (large angular sandstone) to 5.0'	Damp / Moist Auger 0.0' - 4.0' (8" Diameter Borehole)
2---		0.0			
3---		0.0			
4---		0.0	Choppy 4.0' - 5.0'		
5---		--	Odors 4.0' - 10.0'		
6---		--	Hard / Steady 5.0' - 10.0'	5.0' - 10.0'	
7---		--	Rod Change 6.0'	Gray sandstone	
8---		--	Wet		
9---		--			
10---		--			
11---					
12---					
13---					
14---					
15---					
16---					
17---					
18---					
19---					
---					

Log Approved By:  
Martin Gilgallon, P.G.



## APPENDIX I

### Well Construction Details – Pilot Test Points



DEPTH	ELEV.
0.00'	1,653.90'
0.30'	1,653.60'
1.00'	1,652.90'
4.00'	1,649.90'
7.00'	1,646.90'
8.00'	1,645.90'
9.00'	1,644.90'
10.00'	1,643.90'
10.00'	1,643.90'

FLUSH GRADE MANHOLE W /  
LOCKING CAP

TOP SEAL: CONCRETE COLLAR

RISER: 1" DIAMETER SCH 40 PVC

IMPERMIABLE SEAL: BENTONITE /  
CEMENT GROUT

DRILL HOLE: 8.0" DIAMETER

DRILL HOLE: 6.0" DIAMETER

SAND PACK: NO. 1 MORIE

WELL SCREEN: 1" SCH 40 PVC  
0.010 SLOT

1" DIAMETER SOLID PVC SUMP

BT BORING TERMINATION

NOT TO SCALE

NOT TO SCALE

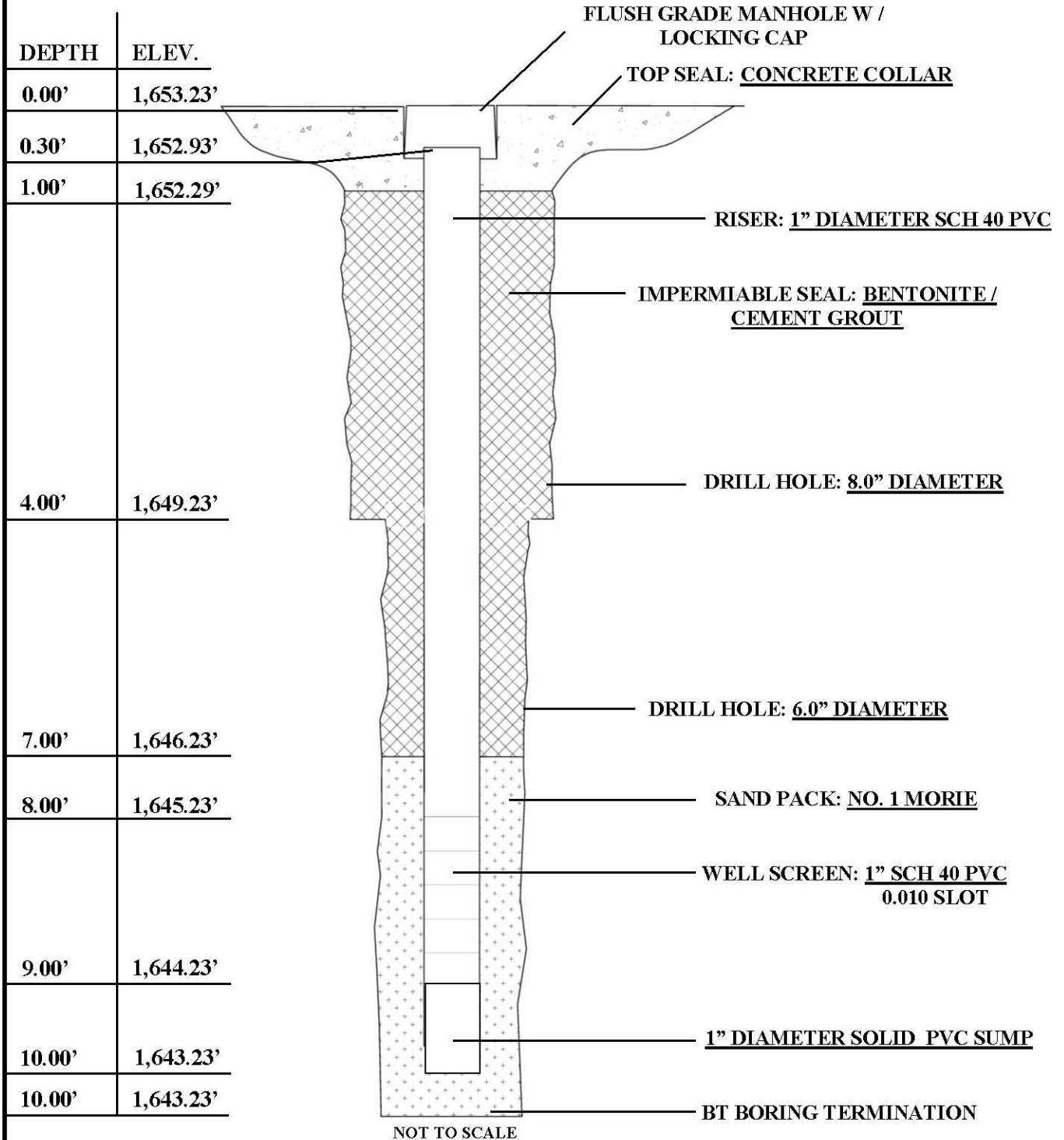
**OXYGEN INJECTION PILOT TEST  
PUMP-N-PANTRY #001 PROPERTY  
INJECTION POINT 1**





**LaBella**  
Powered by partnership.

## MONITORING WELL CONSTRUCTION DETAIL

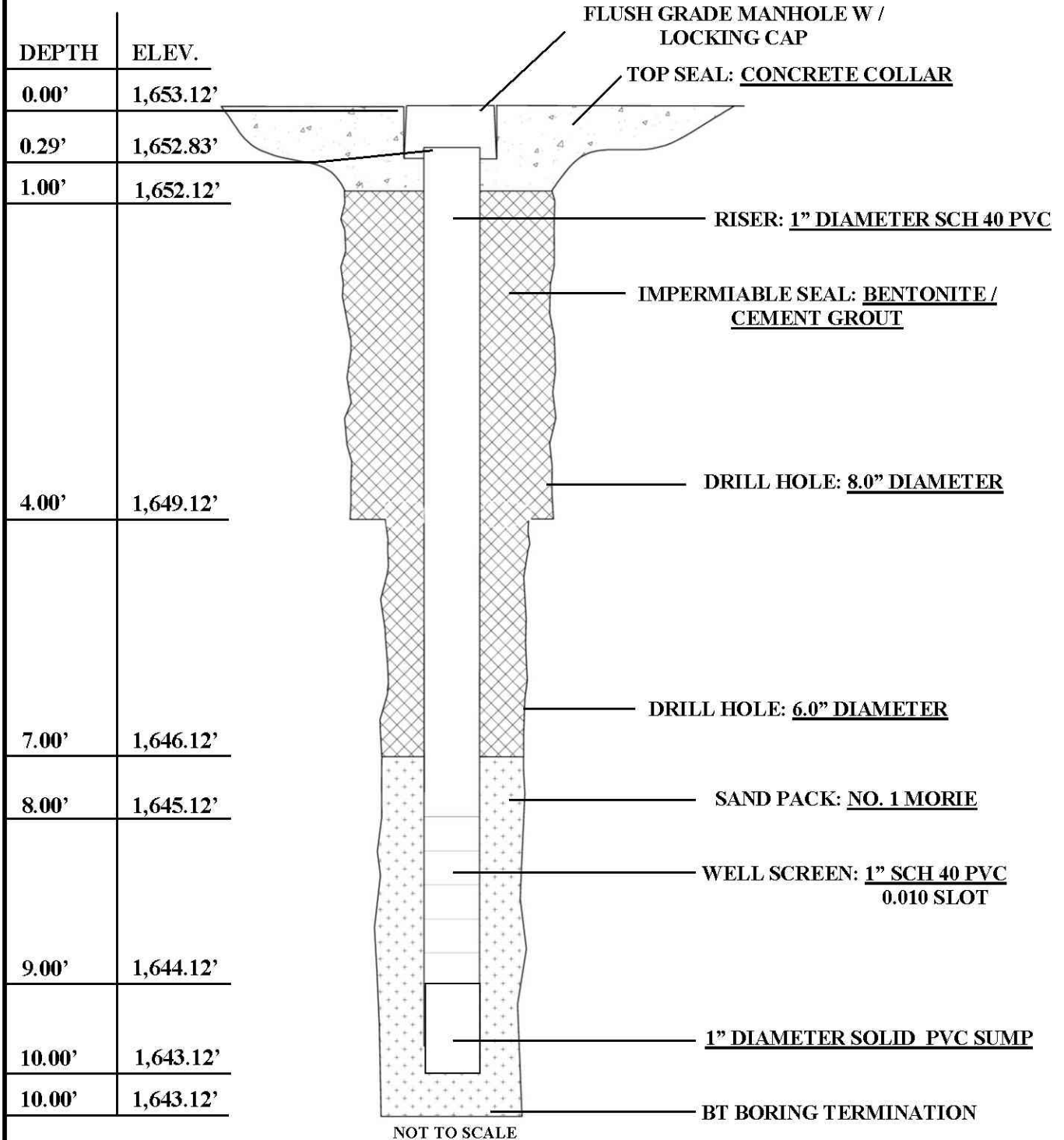


**OXYGEN INJECTION PILOT TEST  
PUMP-N-PANTRY #001 PROPERTY  
INJECTION POINT 2**



**LaBella**  
Powered by partnership.

## MONITORING WELL CONSTRUCTION DETAIL

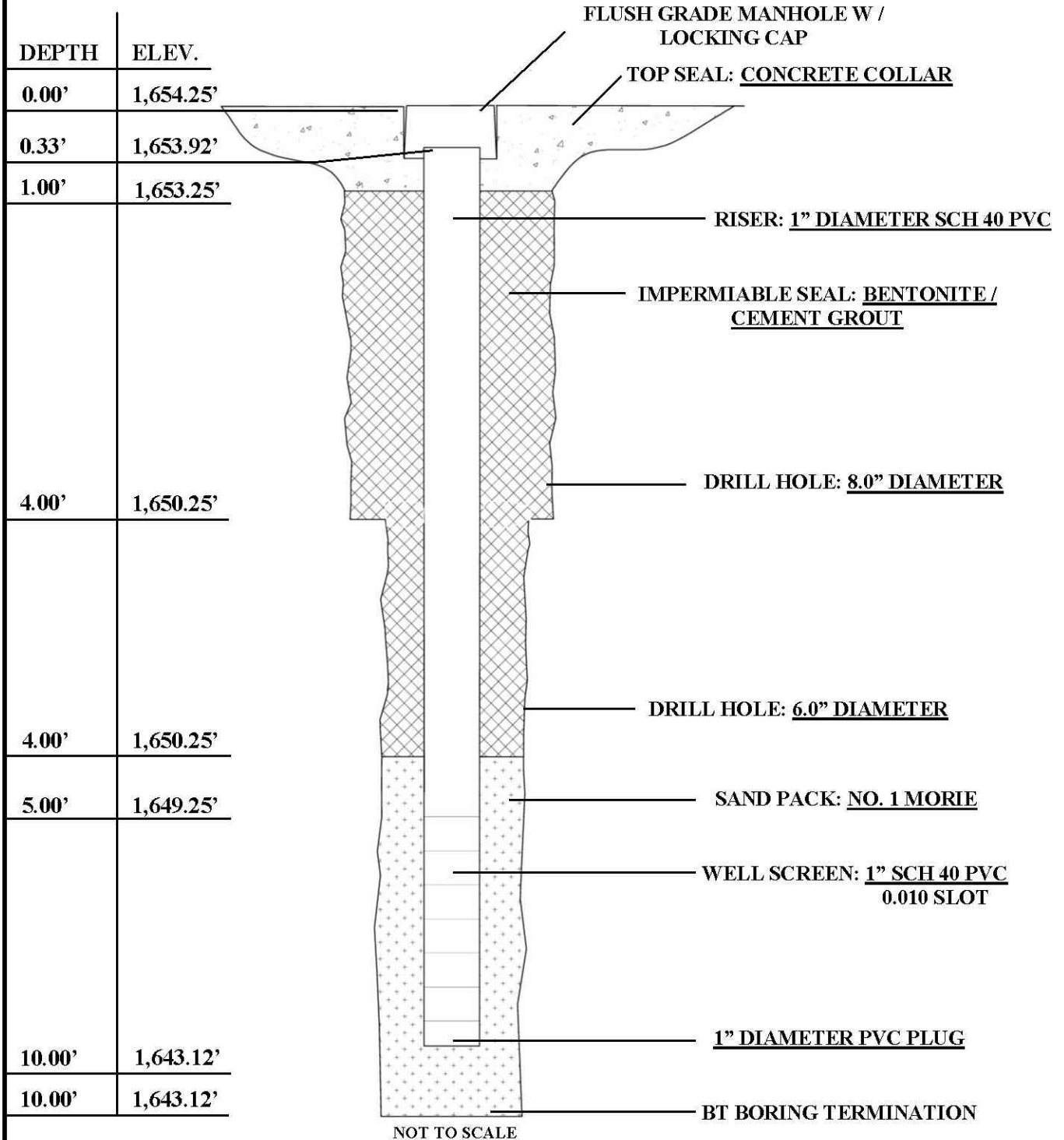


**OXYGEN INJECTION PILOT TEST  
PUMP-N-PANTRY #001 PROPERTY  
INJECTION POINT 3**



**LaBella**  
Powered by partnership.

## MONITORING WELL CONSTRUCTION DETAIL

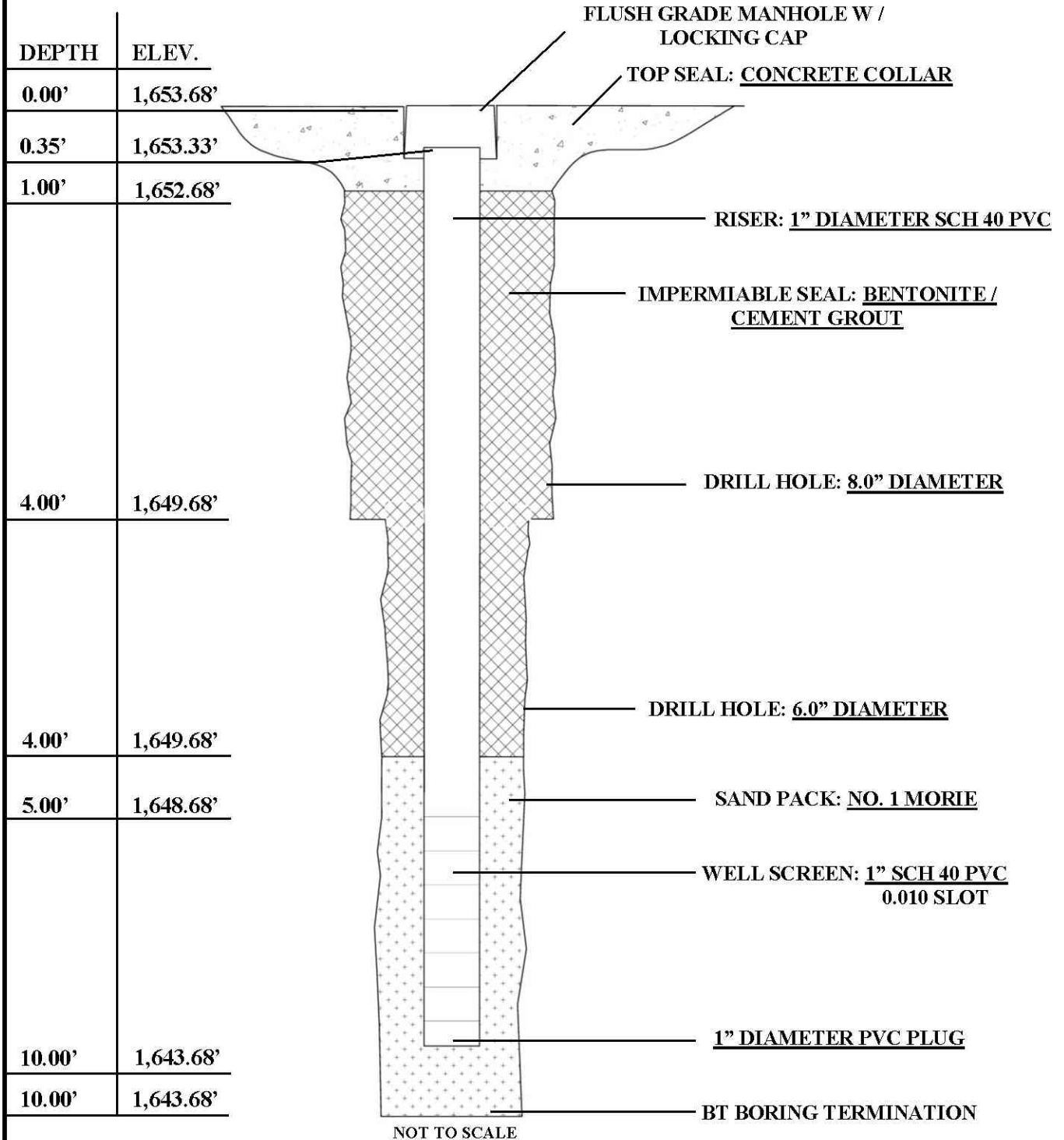


**OXYGEN INJECTION PILOT TEST  
PUMP-N-PANTRY #001 PROPERTY  
MONITORING POINT 1**



**LaBella**  
Powered by partnership.

## MONITORING WELL CONSTRUCTION DETAIL



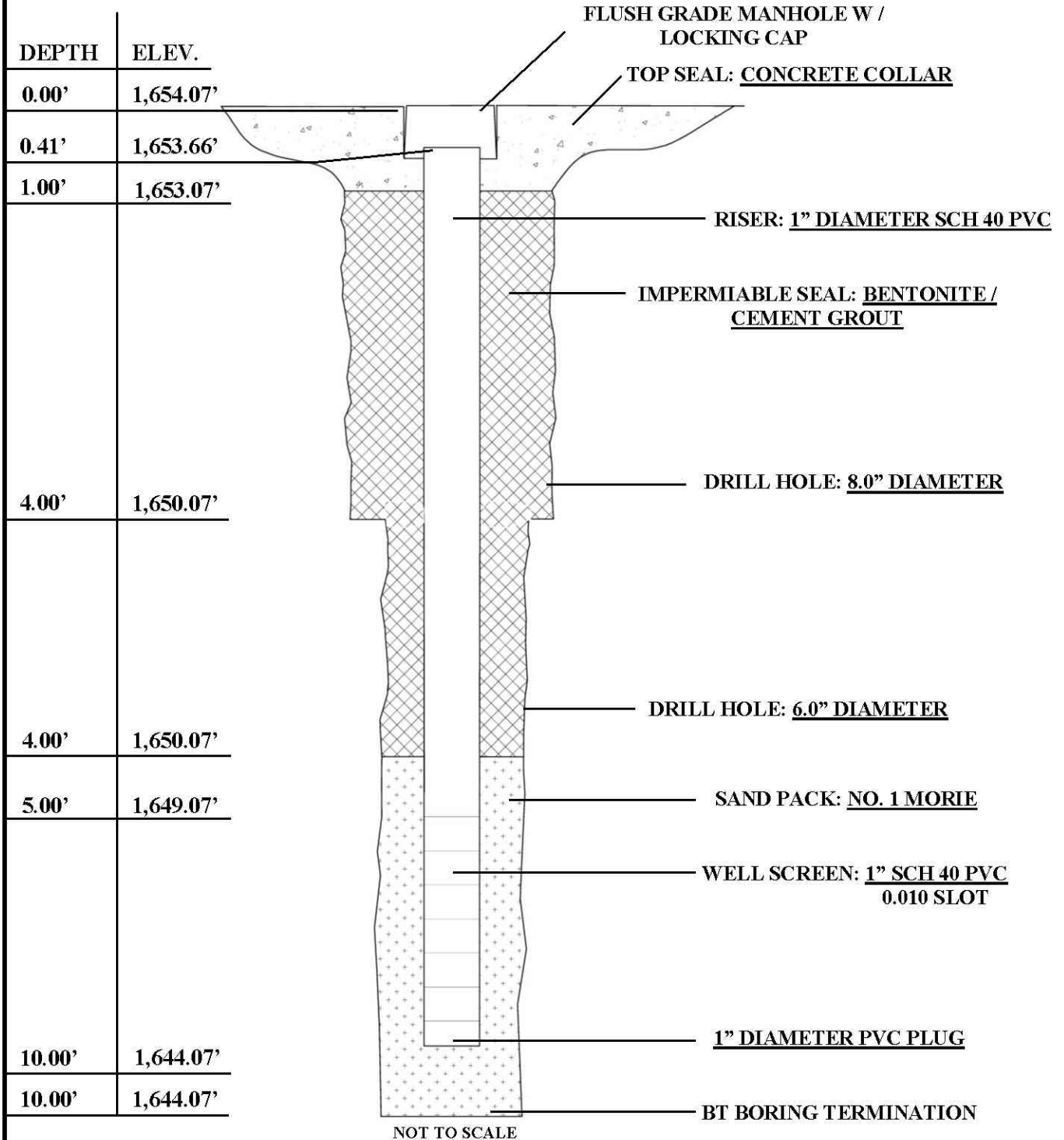
**OXYGEN INJECTION PILOT TEST  
PUMP-N-PANTRY #001 PROPERTY  
MONITORING POINT 2**





**LaBella**  
Powered by partnership.

## MONITORING WELL CONSTRUCTION DETAIL



**OXYGEN INJECTION PILOT TEST  
PUMP-N-PANTRY #001 PROPERTY  
MONITORING POINT 3**

## APPENDIX J

### Field Notes – Pilot Test Point Development

## Field Notes

TO: File

FROM: Kevin Cucura

DATE: June 26, 2018

PROJECT: Pump-n-Pantry #001 / Oxygen Injection Pilot Test

PROJECT NUMBER: 2171845

SUBJECT: Pilot Test Point Development Activities

0900: Arrived onsite and initiated site activities with the collection of static water levels from the three (3) Injection Points (IP-1 through IP-3) and three (3) Monitoring Points (MP-1 through MP-3) installed at the subject property as a part of the Oxygen Injection Pilot Test. The purpose of the field activities was to develop the Pilot Test Points installed at the subject property between June 11, 2018 and June 13, 2018. The general well information is as follows:

**Table 1**  
**General Well Information**

Well #	S.W.L. (Feet)	Total Depth (Feet)	1 Volume (Gallons)	10 Volumes (Gallons)	Purged (Gallons)
IP-1	5.70	10.00	0.13	1.3	0.75
IP-2	6.24	10.00	0.11	1.1	0.75
IP-3	6.06	10.00	0.12	1.2	0.50
MP-1	6.08	10.00	0.12	1.2	0.50
MP-2	5.80	10.00	0.13	1.3	0.75
MP-3	6.16	10.00	0.12	1.2	0.75

**IP-1:** A total of 0.75 gallons was extracted from IP-1 utilizing a disposable hand bailer. The well was surged for five (5) minutes prior to extracting any groundwater. The groundwater effluent was extremely silty at the beginning of development and silty upon completion. Recharge was good. Odorous and visual (sheen) indications of potential contamination were observed.

**IP-2:** A total of 0.75 gallons was extracted from IP-2 utilizing a disposable hand bailer. The well was surged for five (5) minutes prior to extracting any groundwater. The groundwater effluent was extremely silty at the beginning of development and silty upon completion. Recharge was good. Odorous and visual (sheen) indications of potential contamination were observed.

**IP-3:** A total of 0.50 gallons was extracted from IP-3 utilizing a disposable hand bailer. The well was surged for five (5) minutes prior to extracting any groundwater. The groundwater effluent was extremely silty at the beginning of development and silty upon completion. The well was evacuated several times. Recharge was fair. Odorous indications of potential contamination were observed. No visual indications of potential contamination were observed.

**MP-1:** A total of 0.50 gallons was extracted from MP-1 utilizing a disposable hand bailer. The well was surged for five (5) minutes prior to extracting any groundwater. The groundwater effluent was extremely silty at the beginning of development and silty upon completion. The well was evacuated several times. Recharge was fair. Odorous indications of potential contamination were observed. No visual indications of potential contamination were observed.

**MP-2:** A total of 0.75 gallons was extracted from MP-2 utilizing a disposable hand bailer. The well was surged for five (5) minutes prior to extracting any groundwater. The groundwater effluent was extremely silty at the beginning of development and silty upon completion. Recharge was good. Odorous and visual (sheen) indications of potential contamination were observed.

**MP-3:** A total of 0.75 gallons was extracted from MP-3 utilizing a disposable hand bailer. The well was surged for five (5) minutes prior to extracting any groundwater. The groundwater effluent was extremely silty at the beginning of development and silty upon completion. Recharge was good. Odorous and visual (sheen) indications of potential contamination were observed.

Offsite: 1500

KC / kc



## APPENDIX K

### Pilot Test Field Data Summary Table

08/31/18

**Table K-1**  
**Oxygen Injection Pilot Test**  
**Pump-n-Treat /M1 Property**  
**Summary of In-Situ Groundwater Data**

Well Number	Date Sampled	Well Head Elevation (feet)	Depth to Groundwater (feet)	Relative Groundwater Elevation (feet)	Product Thickness (feet)	Remediation Status	D.O. (mg/L)	O.R.P. (mV)
<b>MW-2</b>	10/19/2016	1653.72	5.40	1648.32	0.00	Characterization	0.38	-49.0
	11/30/2016	1653.72	5.03	1648.69	0.00	Characterization	0.36	-97.0
	2/22/2017	1653.72	4.86	1649.06	0.00	Characterization	0.31	-63.00
	5/2/2017	1653.72	5.07	1648.65	0.00	Characterization	0.59	-75.0
	7/25/2017	1653.72	4.77	1648.95	0.00	Characterization	0.29	-41.0
	11/13/2017	1653.72	5.25	1648.47	0.00	Characterization	0.31	-80.0
	12/5/2017	1653.72	5.28	1648.44	0.00	Characterization	0.37	-102.0
	3/21/2018	1653.72	4.74	1648.98	0.00	Characterization	0.29	-79.0
	6/8/2018	1653.72	5.22	1648.50	0.00	Characterization	0.00	-79.0
	6/29/2018	1653.72	4.97	1648.75	0.00	Remediation	0.51	-10.0
	7/3/2018	1653.72	5.00	1648.72	0.00	Remediation	0.48	-132.0
	7/6/2018	1653.72	5.01	1648.71	0.00	Remediation	0.77	-199.9
	7/11/2018	1653.72	5.09	1648.63	0.00	Remediation	0.68	-147.8
	7/13/2018	1653.72	5.09	1648.63	0.00	Remediation	0.55	-123.6
	7/16/2018	1653.72	5.00	1648.72	0.00	Remediation	0.64	-154.8
	7/18/2018	1653.72	5.02	1648.70	0.00	Remediation	0.29	-126.7
	7/24/2018	1653.72	4.58	1649.14	0.00	Remediation	4.30	-27.0
	7/31/2018	1653.72	4.90	1648.82	0.00	Remediation	0.48	-122.0
<b>MW-3</b>	10/19/2016	1652.92	5.20	1647.72	0.00	Characterization	0.38	-68.0
	11/30/2016	1652.92	4.57	1648.35	0.00	Characterization	0.37	-19.0
	2/22/2017	1652.92	3.45	1649.47	0.00	Characterization	0.28	-87.00
	5/2/2017	1652.92	4.54	1648.38	0.00	Characterization	0.30	-83.0
	7/25/2017	1652.92	4.21	1648.71	0.00	Characterization	0.28	-108.0
	11/13/2017	1652.92	4.52	1648.40	0.00	Characterization	0.35	-116.0
	12/5/2017	1652.92	4.79	1648.13	0.00	Characterization	0.35	-109.0
	3/21/2018	1652.92	4.45	1648.47	0.00	Characterization	0.08	-83.0
	6/8/2018	1652.92	4.64	1648.28	0.00	Characterization	0.00	-88.0
	6/29/2018	1652.92	4.35	1648.57	0.00	Remediation	0.12	-84.0
	7/3/2018	1652.92	4.44	1648.48	0.00	Remediation	0.42	-101.3
	7/6/2018	1652.92	4.38	1648.54	0.00	Remediation	0.70	-130.1
	7/11/2018	1652.92	4.47	1648.45	0.00	Remediation	0.62	-113.9
	7/13/2018	1652.92	4.46	1648.46	0.00	Remediation	0.74	-77.7
	7/16/2018	1652.92	4.41	1648.51	0.00	Remediation	0.71	-124.7
	7/18/2018	1652.92	4.46	1648.46	0.00	Remediation	0.33	-86.6
	7/24/2018	1652.92	4.27	1648.65	0.00	Remediation	0.46	-83.0
	7/31/2018	1652.92	4.40	1648.52	0.00	Remediation	0.54	-114.0
<b>MW-4</b>	10/19/2016	1651.31	4.20	1647.11	0.00	Characterization	0.44	-88.0
	11/30/2016	1651.31	3.40	1647.91	0.00	Characterization	0.49	-83.0
	2/22/2017	1651.31	3.40	1647.91	0.00	Characterization	0.31	-110.0
	5/2/2017	1651.31	3.47	1647.84	0.00	Characterization	0.31	-103.0
	7/25/2017	1651.31	3.11	1648.20	0.00	Characterization	0.27	-128.0
	11/13/2017	1651.31	3.51	1647.80	0.00	Characterization	0.40	-107.0
	12/5/2017	1651.31	3.80	1647.51	0.00	Characterization	0.37	-125.0
	3/21/2018	1651.31	3.32	1647.99	0.00	Characterization	0.13	-115.0
	6/8/2018	1651.31	3.67	1647.64	0.00	Characterization	0.10	-114.0
	6/29/2018	1651.31	3.30	1648.01	0.00	Remediation	0.02	-84.0
	7/3/2018	1651.31	3.47	1647.84	0.00	Remediation	0.60	-105.5
	7/6/2018	1651.31	3.47	1647.84	0.00	Remediation	0.66	-159.0
	7/11/2018	1651.31	3.25	1647.76	0.00	Remediation	1.17	-146.4
	7/13/2018	1651.31	3.67	1647.74	0.00	Remediation	0.49	-146.5
	7/16/2018	1651.31	3.50	1647.81	0.00	Remediation	0.58	-141.2
	7/18/2018	1651.31	3.56	1647.75	0.00	Remediation	0.40	-92.4
	7/24/2018	1651.31	3.28	1648.03	0.00	Remediation	0.47	-85.0
	7/31/2018	1651.31	3.45	1647.86	0.00	Remediation	3.16	-131.0

NM Not Measured  
NS Not Sampled  
NA Not Applicable

08/31/18

**Table K-1**  
**Oxygen Injection Pilot Test**  
**Pump-n-Purity #001 Property**  
**Summary of In-Situ Groundwater Data**

Well Number	Date Sampled	Well Head Elevation (feet)	Depth to Groundwater (feet)	Relative Groundwater Elevation (feet)	Product Thickness (feet)	Remediation Status	D.O. (mg/L)	O.R.P. (mV)
<b>MW-6</b>	10/19/2016	1653.95	6.18	1647.77	0.00	Characterization	0.91	-172.0
	11/30/2016	1653.95	4.63	1649.32	0.00	Characterization	3.61	211.0
	2/22/2017	1653.95	4.21	1649.74	0.00	Characterization	5.41	248.0
	5/1/2017	1653.95	4.50	1649.45	0.00	Characterization	3.24	208.0
	7/25/2017	1653.95	3.05	1650.90	0.00	Characterization	3.67	232.0
	11/2/2017	1653.95	4.49	1649.47	0.00	Characterization	2.37	153.0
	12/5/2017	1653.95	5.35	1648.60	0.00	Characterization	2.93	271.0
	3/21/2018	1653.95	4.51	1649.44	0.00	Characterization	2.63	-108.0
	6/8/2018	1653.95	4.99	1648.96	0.00	Characterization	3.05	70.0
	6/29/2018	1653.95	4.16	1649.79	0.00	Remediation	2.62	253.0
	7/2/2018	1653.95	4.50	1649.45	0.00	Remediation	3.53	385.0
	7/6/2018	1653.95	4.70	1649.25	0.00	Remediation	3.87	362.4
	7/11/2018	1653.95	5.15	1648.80	0.00	Remediation	3.48	131.9
	7/13/2018	1653.95	5.31	1648.64	0.00	Remediation	1.15	91.5
	7/16/2018	1653.95	5.31	1648.64	0.00	Remediation	2.29	169.3
	7/18/2018	1653.95	5.39	1648.56	0.00	Remediation	0.87	87.7
	7/24/2018	1653.95	4.76	1649.19	0.00	Remediation	1.18	223.0
	7/31/2018	1653.95	4.54	1649.41	0.00	Remediation	4.02	194.0
	10/19/2016	NA	NA	NA	NA	NA	NA	NA
	11/30/2016	NA	NA	NA	NA	NA	NA	NA
	2/22/2017	NA	NA	NA	NA	NA	NA	NA
	5/2/2017	NA	NA	NA	NA	NA	NA	NA
	7/25/2017	NA	NA	NA	NA	NA	NA	NA
	11/2/2017	1654.07	4.47	1649.60	0.00	Characterization	0.39	-84.0
	12/5/2017	1654.07	5.11	1649.86	0.00	Characterization	0.35	-112.0
	3/20/2018	1654.07	3.67	1650.40	0.00	Characterization	0.00	-56.0
	6/8/2018	1654.07	4.63	1649.44	0.00	Characterization	0.00	-131.0
	7/6/2018	1654.07	4.59	1649.48	0.00	Remediation	3.53	-239.5
	7/11/2018	1654.07	4.78	1649.29	0.00	Remediation	0.42	-228.4
	7/13/2018	1654.07	4.53	1649.42	0.00	Remediation	0.39	-219.5
	7/16/2018	1654.07	5.09	1648.98	0.00	Remediation	0.36	-190.8
	7/18/2018	1654.07	4.86	1649.21	0.00	Remediation	0.25	-198.8
	7/24/2018	1654.07	3.73	1650.34	0.00	Remediation	0.39	-131.0
<b>MW-15</b>	10/19/2016	NA	NA	NA	NA	NA	NA	NA
	11/30/2016	NA	NA	NA	NA	NA	NA	NA
	2/22/2017	NA	NA	NA	NA	NA	NA	NA
	5/2/2017	NA	NA	NA	NA	NA	NA	NA
	7/25/2017	NA	NA	NA	NA	NA	NA	NA
	11/2/2017	NA	NA	NA	NA	NA	NA	NA
	12/5/2017	NA	NA	NA	NA	NA	NA	NA
	3/20/2018	NA	NA	NA	NA	NA	NA	NA
	6/8/2018	NA	NA	NA	NA	NA	NA	NA
	6/29/2018	1653.92	4.70	1649.22	0.00	Remediation	0.18	-100.0
	7/3/2018	1653.92	4.93	1648.99	0.00	Remediation	0.66	-161.4
	7/6/2018	1653.92	4.66	1649.29	0.00	Remediation	0.99	-192.6
	7/11/2018	1653.92	5.00	1648.92	0.00	Remediation	0.61	-142.4
	7/13/2018	1653.92	5.01	1648.91	0.00	Remediation	0.38	-185.6
	7/16/2018	1653.92	4.96	1648.96	0.00	Remediation	0.72	-81.9
	7/18/2018	1653.92	4.97	1648.95	0.00	Remediation	0.29	-99.8
	7/24/2018	1653.92	4.50	1649.42	0.00	Remediation	0.61	-74.0
	7/31/2018	1653.92	4.82	1649.10	0.00	Remediation	0.37	-164.0
	10/19/2016	NA	NA	NA	NA	NA	NA	NA
	11/30/2016	NA	NA	NA	NA	NA	NA	NA
	2/22/2017	NA	NA	NA	NA	NA	NA	NA
	5/2/2017	NA	NA	NA	NA	NA	NA	NA
	7/25/2017	NA	NA	NA	NA	NA	NA	NA
	11/2/2017	NA	NA	NA	NA	NA	NA	NA
	12/5/2017	NA	NA	NA	NA	NA	NA	NA
	3/20/2018	NA	NA	NA	NA	NA	NA	NA
	6/8/2018	NA	NA	NA	NA	NA	NA	NA
<b>MP-1</b>	10/19/2016	NA	NA	NA	NA	NA	NA	NA
	11/30/2016	NA	NA	NA	NA	NA	NA	NA
	2/22/2017	NA	NA	NA	NA	NA	NA	NA
	5/2/2017	NA	NA	NA	NA	NA	NA	NA
	7/25/2017	NA	NA	NA	NA	NA	NA	NA
	11/2/2017	NA	NA	NA	NA	NA	NA	NA
	12/5/2017	NA	NA	NA	NA	NA	NA	NA
	3/20/2018	NA	NA	NA	NA	NA	NA	NA
	6/8/2018	NA	NA	NA	NA	NA	NA	NA
	6/29/2018	1653.92	4.70	1649.22	0.00	Remediation	0.18	-100.0
	7/3/2018	1653.92	4.93	1648.99	0.00	Remediation	0.66	-161.4
	7/6/2018	1653.92	4.66	1649.29	0.00	Remediation	0.99	-192.6
	7/11/2018	1653.92	5.00	1648.92	0.00	Remediation	0.61	-142.4
	7/13/2018	1653.92	5.01	1648.91	0.00	Remediation	0.38	-185.6
	7/16/2018	1653.92	4.96	1648.96	0.00	Remediation	0.72	-81.9
	7/18/2018	1653.92	4.97	1648.95	0.00	Remediation	0.29	-99.8
	7/24/2018	1653.92	4.50	1649.42	0.00	Remediation	0.61	-74.0
	7/31/2018	1653.92	4.82	1649.10	0.00	Remediation	0.37	-164.0

NM Not Measured  
NS Not Sampled  
NA Not Applicable

08/31/18

**Table K-1**  
**Oxygen Injection Pilot Test**  
**Pump-n-Purity #001 Property**  
**Summary of In-Situ Groundwater Data**

Well Number	Date Sampled	Well Head Elevation (feet)	Depth to Groundwater (feet)	Relative Groundwater Elevation (feet)	Product Thickness (feet)	Remediation Status	D.O. (mg/L)	O.R.P. (mV)
MP-2	10/19/2016	NA	NA	NA	NA	NA	NA	NA
	11/30/2016	NA	NA	NA	NA	NA	NA	NA
	2/22/2017	NA	NA	NA	NA	NA	NA	NA
	5/2/2017	NA	NA	NA	NA	NA	NA	NA
	7/25/2017	NA	NA	NA	NA	NA	NA	NA
	11/1/2017	NA	NA	NA	NA	NA	NA	NA
	12/4/2017	NA	NA	NA	NA	NA	NA	NA
	3/20/2018	NA	NA	NA	NA	NA	NA	NA
	6/7/2018	NA	NA	NA	NA	NA	NA	NA
	6/29/2018	1653.33	4.91	1649.42	0.00	Remediation	0.53	-95.0
	7/3/2018	1653.33	5.41	1647.92	0.00	Remediation	0.40	-147.1
	7/6/2018	1653.33	5.37	1647.96	0.00	Remediation	0.73	-180.2
	7/11/2018	1653.33	5.48	1647.85	0.00	Remediation	0.43	-147.8
	7/13/2018	1653.33	5.48	1647.85	0.00	Remediation	0.65	-145.3
	7/16/2018	1653.33	5.35	1647.98	0.00	Remediation	0.28	-162.0
	7/18/2018	1653.33	5.45	1647.88	0.00	Remediation	0.24	-139.3
	7/24/2018	1653.33	4.98	1648.35	0.00	Remediation	0.84	-51.0
	7/31/2018	1653.33	5.30	1648.03	0.00	Remediation	0.42	-126.0
MP-3	10/19/2016	NA	NA	NA	NA	NA	NA	NA
	11/30/2016	NA	NA	NA	NA	NA	NA	NA
	2/22/2017	NA	NA	NA	NA	NA	NA	NA
	5/2/2017	NA	NA	NA	NA	NA	NA	NA
	7/24/2017	NA	NA	NA	NA	NA	NA	NA
	11/2/2017	NA	NA	NA	NA	NA	NA	NA
	12/4/2017	NA	NA	NA	NA	NA	NA	NA
	3/20/2018	NA	NA	NA	NA	NA	NA	NA
	6/7/2018	NA	NA	NA	NA	NA	NA	NA
	6/29/2018	1653.66	5.01	1648.65	0.00	Remediation	0.00	-95.0
	7/3/2018	1653.66	5.09	1648.57	0.00	Remediation	0.32	-143.9
	7/6/2018	1653.66	5.04	1648.62	0.00	Remediation	0.67	-174.9
	7/11/2018	1653.66	5.14	1648.52	0.00	Remediation	0.42	-151.8
	7/13/2018	1653.66	5.10	1648.56	0.00	Remediation	0.63	-110.8
	7/16/2018	1653.66	5.04	1648.62	0.00	Remediation	0.47	-143.9
	7/18/2018	1653.66	5.11	1648.55	0.00	Remediation	0.26	-107.7
	7/24/2018	1653.66	4.65	1649.01	0.00	Remediation	0.38	-37.0
	7/31/2018	1653.66	4.98	1648.68	0.00	Remediation	0.53	-123.0
IP-1	10/19/2016	NA	NA	NA	NA	NA	NA	NA
	11/30/2016	NA	NA	NA	NA	NA	NA	NA
	2/22/2017	NA	NA	NA	NA	NA	NA	NA
	5/2/2017	NA	NA	NA	NA	NA	NA	NA
	7/24/2017	NA	NA	NA	NA	NA	NA	NA
	11/2/2017	NA	NA	NA	NA	NA	NA	NA
	12/4/2017	NA	NA	NA	NA	NA	NA	NA
	3/20/2018	NA	NA	NA	NA	NA	NA	NA
	6/7/2018	NA	NA	NA	NA	NA	NA	NA
	6/29/2018	1653.90	NM	NA	NM	Remediation	NM	NM
	7/3/2018	1653.90	NM	NA	NM	Remediation	NM	NM
	7/6/2018	1653.90	6.41	1647.49	0.00	Remediation	0.83	-130.3
	7/11/2018	1653.90	6.26	1647.64	0.00	Remediation	1.65	9.9
	7/13/2018	1653.90	6.29	1647.62	0.00	Remediation	2.00	-13.5
	7/16/2018	1653.80	6.32	1647.28	0.00	Remediation	0.79	-98.6
	7/18/2018	1653.80	5.31	1648.29	0.00	Remediation	0.42	-50.6
	7/27/2018	1653.80	4.79	1648.81	0.00	Remediation	0.52	-57.0
	7/31/2018	1653.80	5.12	1648.48	0.00	Remediation	0.44	-132.0

NM Not Measured  
NS Not Sampled  
NA Not Applicable



08/31/18

**Table K-1**  
**Oxygen Injection Pilot Test**  
**Pump-n-Pantry #001 Property**  
**Summary of In-Situ Groundwater Data**

[illegible]

NM	Not Measured
NS	Not Sampled
NA	Not Applicable

Table K-2  
Pump-n-Pantry #001 Property  
Oxygen Injection Pilot Test  
System O&M

Date / Time	IP-1 Flow Rate (SCFH)	IP-2 Flow Rate (SCFH)	IP-3 Flow Rate (SCFH)	Receiver Pressure (PSI)	Output Pressure (PSI)	Leaks?	O2 Purity (%)	O2 System Hours	Refuel Generator?	Generator Hours	Notes / Observations
6/26/2018 / 1300	0.0	0.0	0.0	20.0	20.0	No	--	35643.8	No	--	Started system for the first time and allowed pressure to build before starting timers for injection points.
06/26/2018 / 1430	0.0	0.0	0.0	40.0	20.0	No	77.8	--	Yes	--	Bump check IP-1, IP-2 and IP-3. All points have good flow and maintain 30 SCFH. Shut down system.
6/29/2018 / 1150	30.0	30.0	30.0	45.0	20.0	Yes	79.0	35647.9 @ 0830	Yes	--	System started at 0830 and allowed to build pressure. Leak observed at flow gauge for receiver tank (Matrix to send replacement). Reconfigure points to timers. IP-1 = Timer 1. IP-2 and IP-3 = Timer 2. Timer 2 = broken (Matrix to send replacement). Generator should run for 2.5 days based on refuel volume. Timers set to inject at IP-1 for ten (10) minutes, recharge for 1 hr 50 min, inject at IP-2 and IP-3 for ten (10) minutes, recharge for 1 hr 50 min and restart cycle. Start injecting at 1150.
07/03/2018 / 1210	29.0	50.0	25.0	52.0	20.0	Yes	NM	--	No	--	Bump check IP-1, IP-2 and IP-3. Adjust all points to 30 SCFH.
07/03/2018 / 1505	30.0	30.0	30.0	50.0	20.0	No	80.0	--	Yes	--	Replace leaking flow gauge at receiver tank. Check for leaks (no leaks). Bump check inject points (all 30 SCFH) and refuel generator.

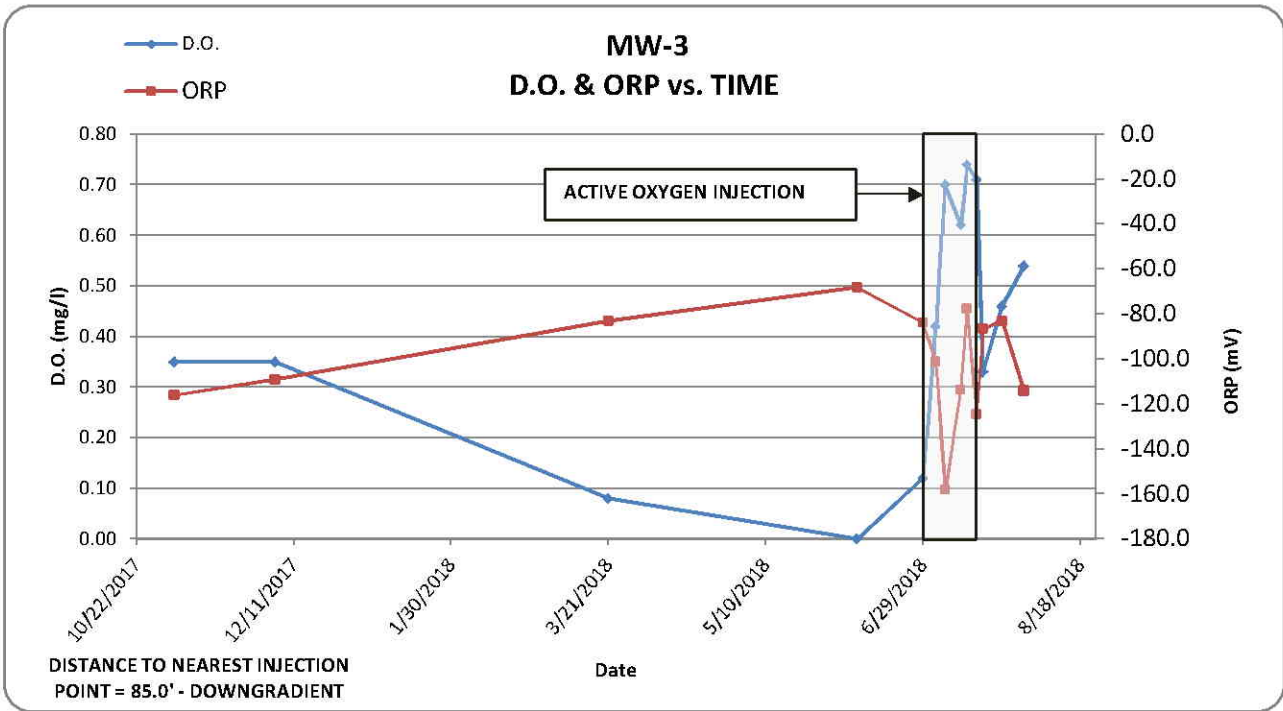
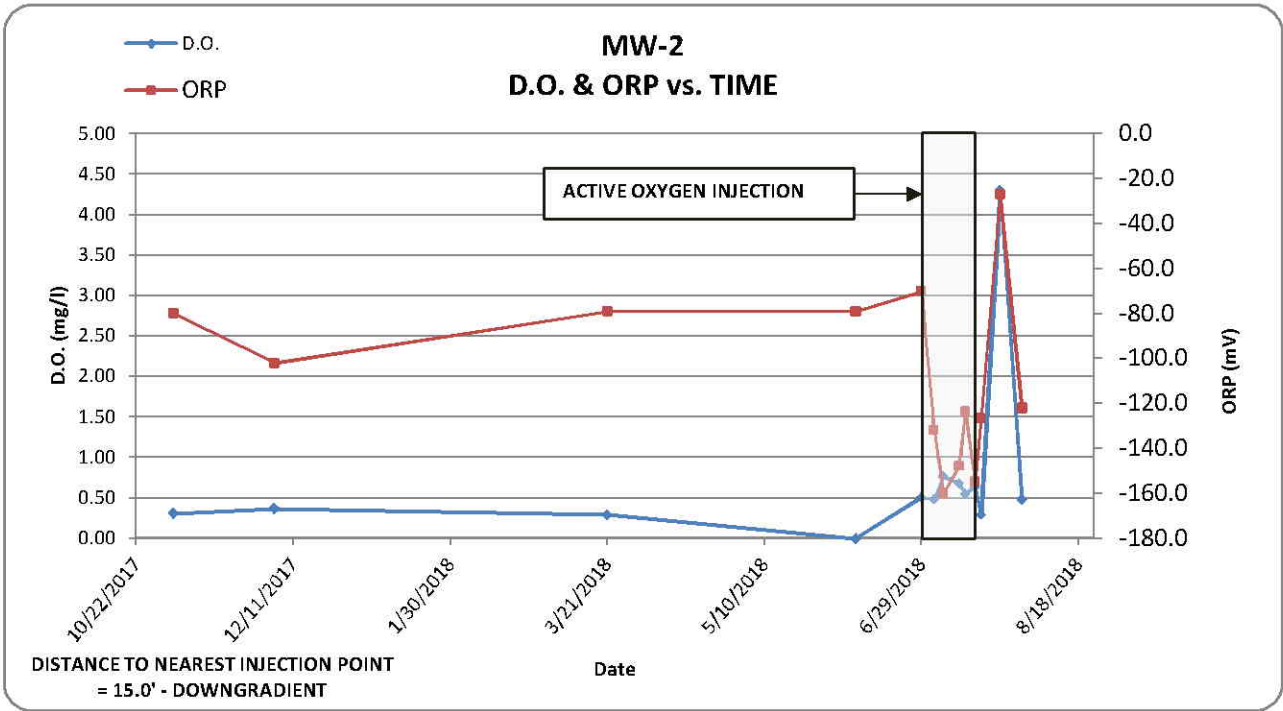
Table K-2  
Pump-n-Pantry #001 Property  
Oxygen Injection Pilot Test  
System O&M

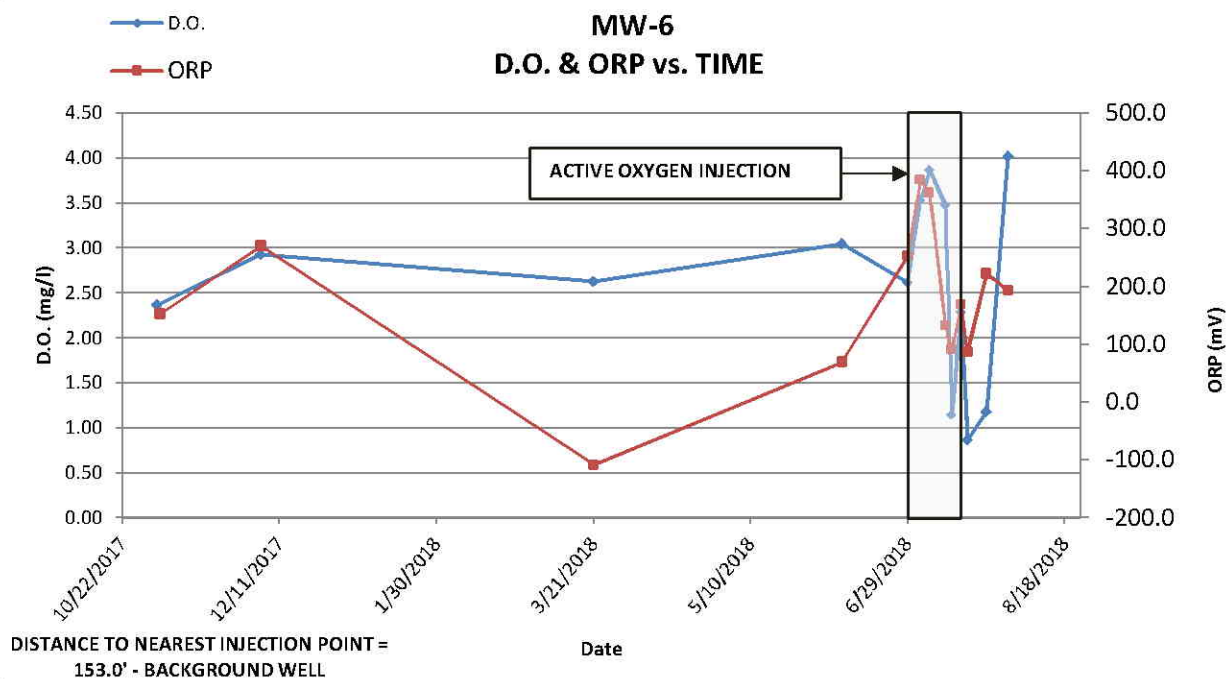
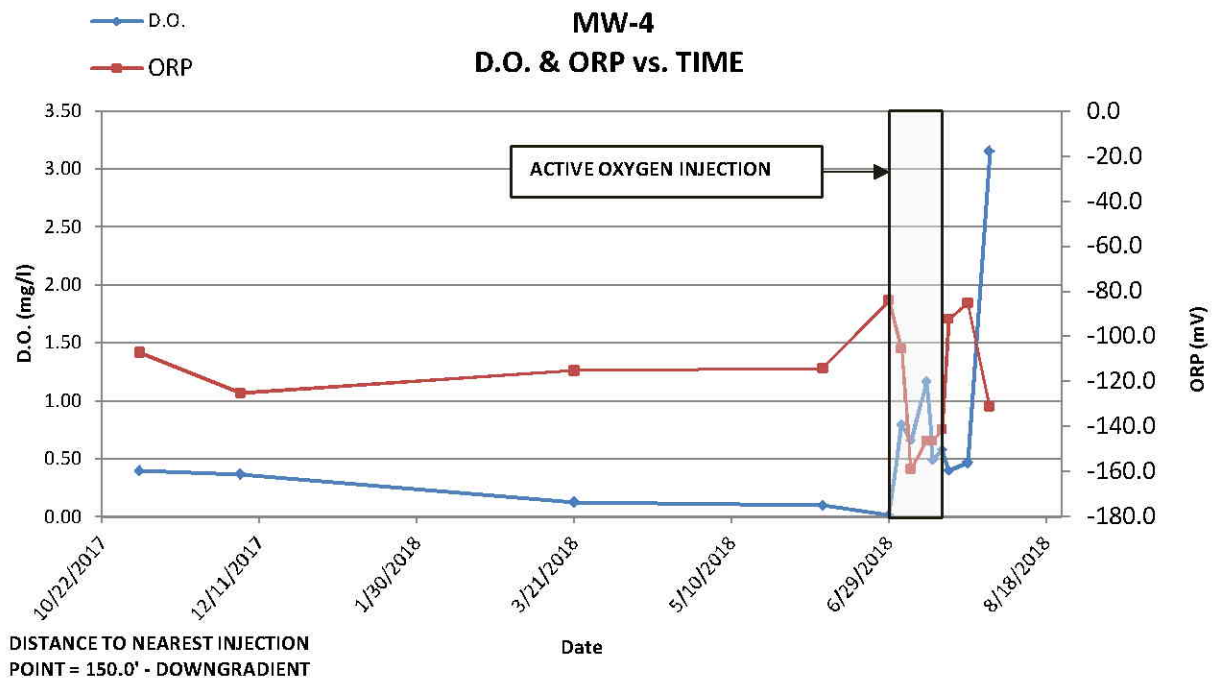
Date / Time	IP-1 Flow Rate (SCFH)	IP-2 Flow Rate (SCFH)	IP-3 Flow Rate (SCFH)	Receiver Pressure (PSI)	Output Pressure (PSI)	Leaks?	O2 Purity (%)	O2 System Hours	Refuel Generator?	Generator Hours	Notes / Observations
07/06/2018 / 1200	0.0	0.0	0.0	0.0	0.0	No	NM	35753.5	No	NM	Unit off upon arrival. "AirSEP" tripped. Restarted.
07/06/2018 / 1519	40.0	40.0	20.0	50.0	22.0	No	81.3	35756.7	Yes	6215.0	Set all IP's to 30 SCFH. Called Matrix, no answer. Fixed AirSEP issue.
07/08/2018 / 1740	30.0	20.0	20.0	61.0	19.0	No	83.1	35771.2	Yes	6265.5	Unit running on arrival. Bump checked IP's. Refueled generator.
07/11/2018 / 0836	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	Unit running on arrival. Bump checked IP's. Refueled generator.
07/11/2018 / 1200	30.0	30.0	30.0	21.0	No	75.2	35771.2	Yes	6330.9	6330.9	Bump checked IP's. Set to 30 SCFH. Refueled generator.

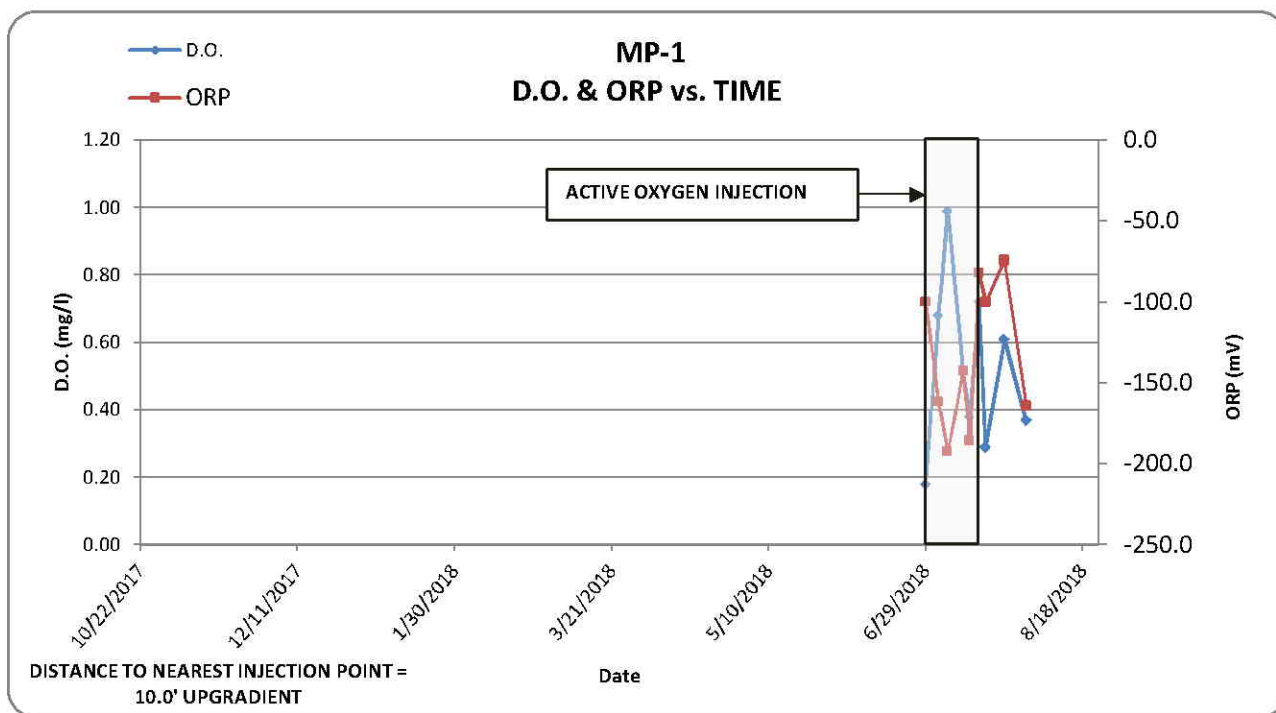
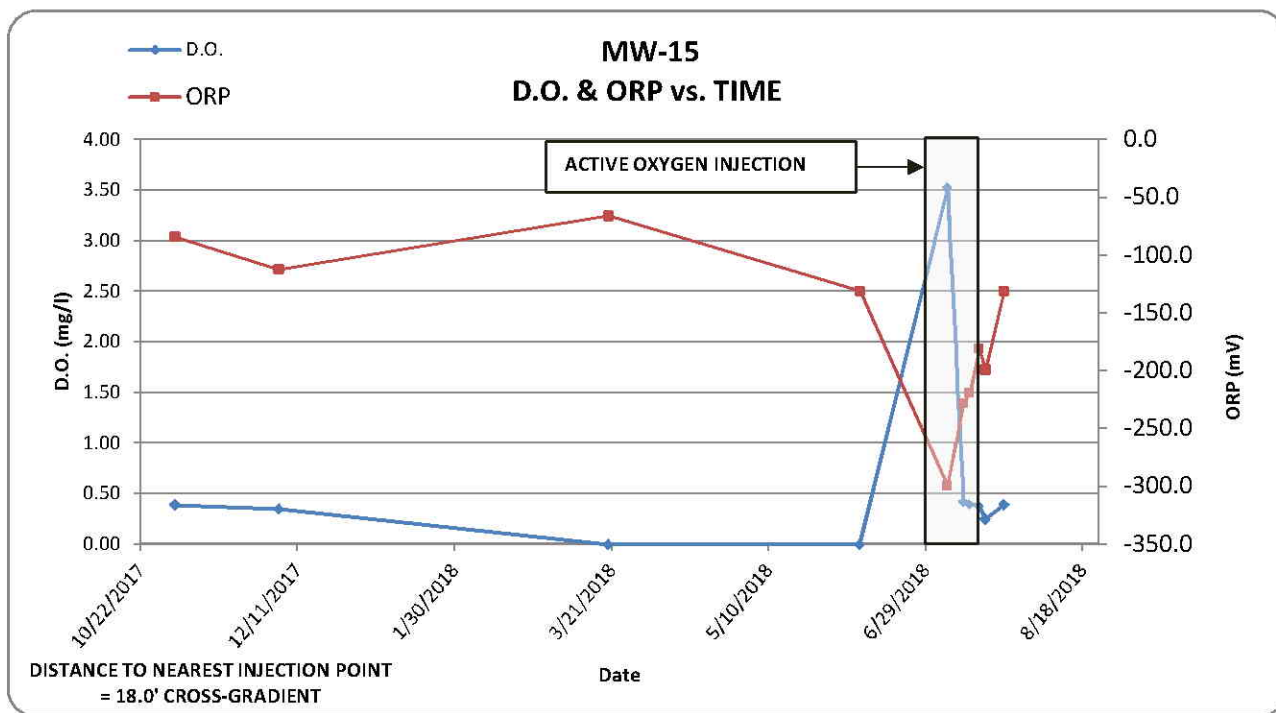
**Table K-2**  
**Pump-n-Pantry #001 Property**  
**Oxygen Injection Pilot Test**  
**System O&M**

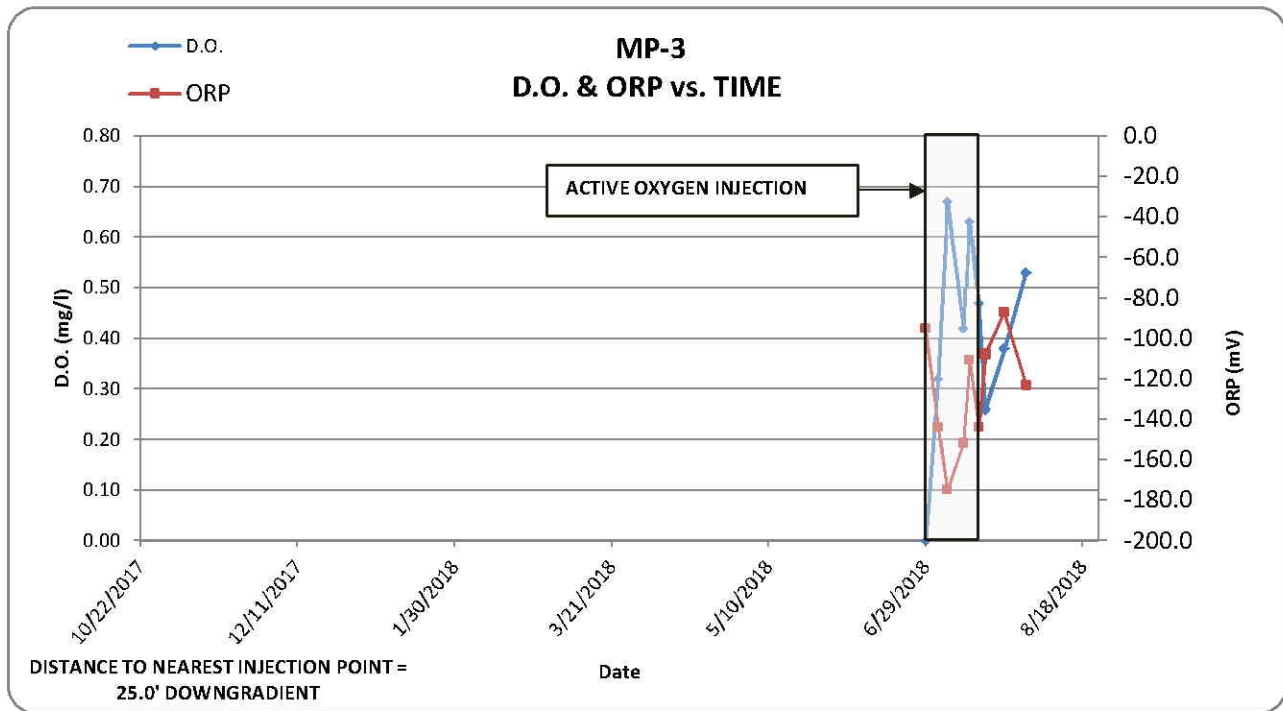
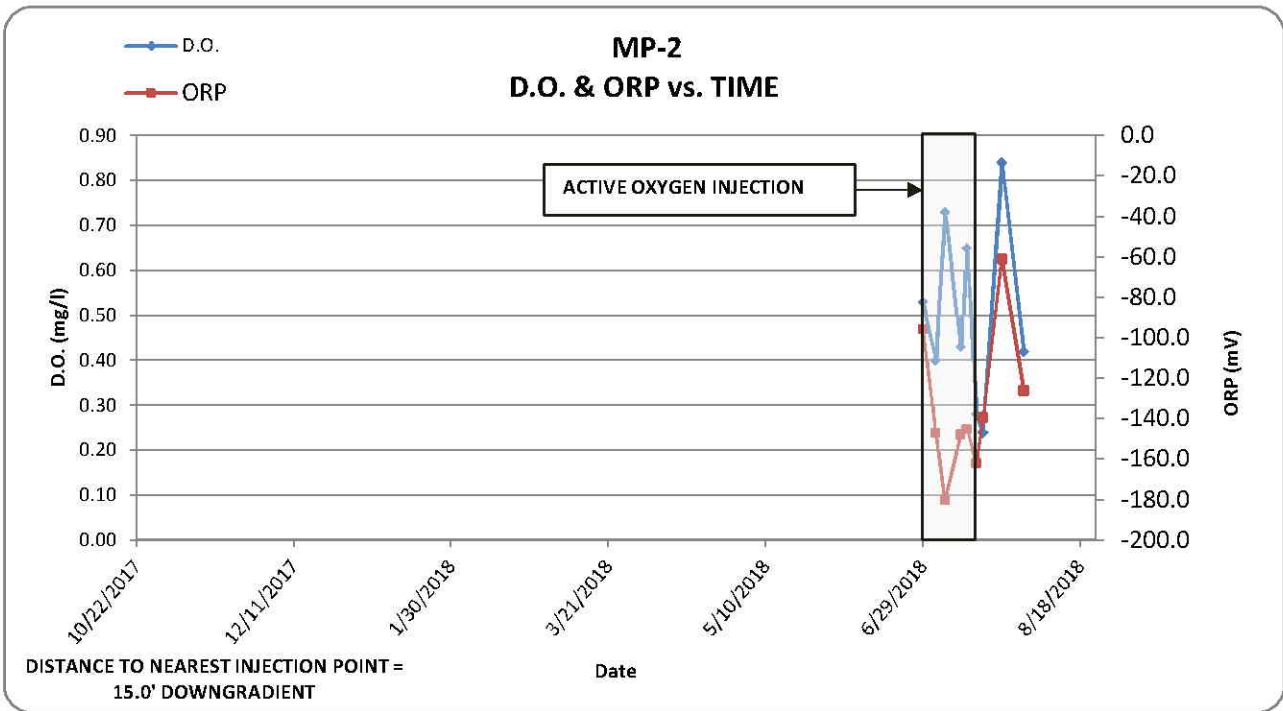
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## APPENDIX L

Pilot Test Bioactivity Analytical Summary Tables

&

Laboratory Analytical Data Sheets

08/31/18

**Table L-1**  
**Oxygen Injection Pilot Test**  
**Pump-n-Pantry #001 Property**  
**Summary of Bioactivity Analytical Data**

[illegible]



10515 Research Drive  
Knoxville, TN 37932  
Phone: (865) 573-8188  
Fax: (865) 573-8133

**Client:** Marty Gilgallon  
LaBella Associates, P.C.  
1000 Dunham Dr  
Suite B  
Dunmore, PA 18512

**Phone:** 570-904-6205

**Fax:**

**Identifier:** 128PF

**Date Rec:** 06/29/2018

**Report Date:** 07/10/2018

**Client Project #:** 2171845

**Client Project Name:** Pump-N-Pantry #001

**Purchase Order #:**

**Analysis Requested:** CENSUS

**Reviewed By:**

A handwritten signature in black ink, appearing to read 'Joann Spem', written over a light blue rectangular background.

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**MICROBIAL INSIGHTS, INC.**

10515 Research Dr., Knoxville, TN 37932  
Tel. (865) 573-8188 Fax. (865) 573-8133

**CENSUS**

**Client:** LaBella Associates, P.C.  
**Project:** Pump-N-Pantry #001

**MI Project Number:** 128PF  
**Date Received:** 06/29/2018

**Sample Information**

<b>Client Sample ID:</b>	<b>1845-0628-MW6</b>	<b>1845-0628-MP2</b>
<b>Sample Date:</b>	06/28/2018	06/28/2018
<b>Units:</b>	cells/mL	cells/mL
<b>Analyst/Reviewer:</b>	JS	JS

**Functional Genes**

Toluene Dioxygenase	TOD	<1.28E+01	<3.23E+01
Phenol Hydroxylase	PHE	1.54E+02	2.18E+04
Toluene Monooxygenase	RMO	2.33E+02	8.70E+03

**Phylogenetic Group**

Total Eubacteria	EBAC	2.80E+05	1.15E+06
------------------	------	----------	----------

**Legend:**

NA = Not Analyzed    NS = Not Sampled    J = Estimated gene copies below PQL but above LQL    I = Inhibited  
< = Result not detected

# Quality Assurance/Quality Control Data

Samples Received 6/29/2018

Component	Date Prepared	Date Analyzed	Arrival Temperature	Positive Control	Extraction Blank	Negative Control
EBAC	06/29/2018	07/10/2018	1 °C	99%	non-detect	non-detect
PHE	06/29/2018	07/10/2018	1 °C	100%	non-detect	non-detect
RMO	06/29/2018	07/10/2018	1 °C	100%	non-detect	non-detect
TOD	06/29/2018	07/10/2018	1 °C	106%	non-detect	non-detect



**INVOICE TO:** (For invoices paid by a third party it is imperative that all information be provided)

Name: MARTIN Gilgallon  
Company: LABELLA ASSOCIATES, PC  
Address: 1000 DUNHAM DRIVE  
SUITE B  
DUNMORE PA 18512  
email: MR.gilgallon@labellapc.com  
Phone: 570-487-1959  
Fax: 570-487-1961

Project Manager: Maethy G. Gallon  
Project Name: Pump-N-Pankey #001  
Project No.: 2171845

Report Type: ☒ Standard (default) ☐ Microbial Insights Level III raw data

EDD type: ☒ Microbial Insights Standard (default) ☐ All other

Please contact us with any questions about the analyses or filling out the COC at (865) 573-8188 (9:00 am to 5:00 pm EST, M-F). After hours email: [customerservice@microbe.com](mailto:customerservice@microbe.com)

Name: Mr Martin Gilgallon  
Company: LAGIVA ASSOCIATES, PC  
Address: 1000 DUNHAM DRIVE  
Suite B  
DUNMORE PA 19512  
email: Mgilgallon@lagivalpc.com  
Phone: 570-487-1959  
Fax: 570-487-1961

Purchase Order No. \_\_\_\_\_  
Subcontract No. 2171845 KC  
MI Quote No. Q2018419.0002

☐ Microbial Insights Level IV (25% surcharge)

Specify EDD Type:

☐ EDDs (5% surcharge)

pm to 5:00 pm EST, M-F). After hours email: [customerservice@microbe.com](mailto:customerservice@microbe.com)



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Knoxville, TN 37932  
865-573-8188

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Please Check One:

**XX** More samples to follow

☐ No Additional Samples☐ Historical Interpretive (35%)☐ Comprehensive Interpretive(15%)☐ Microbial Insights Level IV (25% surcharge)☐ Microbial Insights Level III raw data(15% surcharge)

Report Type: ☒ Standard (default)

Report Type:

## Report

[illegible]

Kevin Cozura

Date 06-28-18/1530

Received by. KC 1530

Date \_\_\_\_\_

076 8/5/8 940

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is for which MI will not be liable. 8/31/5366 0743

\* additional cost and sample preservation are associated with RNA samples.

\*Saturday delivery: See sampling protocol for alternate shipping address.



10515 Research Drive  
Knoxville, TN 37932  
Phone: (865) 573-8188  
Fax: (865) 573-8133

**Client:** Marty Gilgallon  
LaBella Associates, P.C.  
1000 Dunham Dr  
Suite B  
Dunmore, PA 18512

**Phone:** 570-904-6205

**Fax:**

**Identifier:** 060PG

**Date Rec:** 07/20/2018

**Report Date:** 07/24/2018

**Client Project #:** 2171845

**Client Project Name:** Pump-N-Pantry #001

**Purchase Order #:**

**Analysis Requested:** CENSUS

**Reviewed By:**

A handwritten signature in black ink, appearing to read 'Joann Spem', written over a light blue rectangular background.

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10515 Research Dr., Knoxville, TN 37932  
Tel. (865) 573-8188 Fax. (865) 573-8133

**CENSUS**

**Client:** LaBella Associates, P.C.  
**Project:** Pump-N-Pantry #001

**MI Project Number:** 060PG  
**Date Received:** 07/20/2018

**Sample Information**

<b>Client Sample ID:</b>	<b>1845-0718-MW6</b>	<b>1845-0718-MP2</b>
<b>Sample Date:</b>	07/18/2018	07/18/2018
<b>Units:</b>	cells/mL	cells/mL
<b>Analyst/Reviewer:</b>	JS	JS

**Functional Genes**

Toluene Dioxygenase	TOD	3.15E+02	<5.00E+00
Phenol Hydroxylase	PHE	8.16E+02	5.64E+04
Toluene Monooxygenase	RMO	9.65E+02	3.42E+04

**Phylogenetic Group**

Total Eubacteria	EBAC	6.56E+05	2.53E+06
------------------	------	----------	----------

**Legend:**

NA = Not Analyzed    NS = Not Sampled    J = Estimated gene copies below PQL but above LQL    I = Inhibited  
< = Result not detected

# Quality Assurance/Quality Control Data

Samples Received 7/20/2018

Component	Date Prepared	Date Analyzed	Arrival Temperature	Positive Control	Extraction Blank	Negative Control
EBAC	07/20/2018	07/24/2018	0 °C	99%	non-detect	non-detect
TOD	07/20/2018	07/24/2018	0 °C	100%	non-detect	non-detect
PHE	07/20/2018	07/24/2018	0 °C	100%	non-detect	non-detect
RMO	07/20/2018	07/24/2018	0 °C	100%	non-detect	non-detect



## REPORT TO:

Name: Martin Gilgallon  
 Company: LaBella Associates, PC  
 Address: 1000 Dunham Drive  
 Suite B  
 Dunmore, PA 18512  
 email: mgilgallon@labellapc.com  
 Phone: 570-487-1959  
 Fax: 570-487-1961

## Project Manager:

Project Name: Pump-N-Pantry #601  
 Project No.: 2171845

## Report Type:

## EDD type:

☒ Standard (default) ☐ Microbial Insights Level III raw data (15% surcharge) ☐ Microbial Insights Level IV (25% surcharge) ☐ Comprehensive Interpretive (15%) ☐ Historical Interpretive (35%)  
☒ Microbial Insights Standard (default) ☐ All other available EDDs (5% surcharge) Specify EDD Type: \_\_\_\_\_  
 Please contact us with any questions about the analyses or filling out the COC at (865) 573-8188 (9:00 am to 5:00 pm EST, M-F). After hours email: customerservice@microbe.com

## INVOICE TO: (For Invoices paid by a third party it is imperative that all information be provided)

Name: Martin Gilgallon  
 Company: LaBella Associates, PC  
 Address: 1000 Dunham Drive  
 Suite B  
 Dunmore, PA 18512  
 email: mgilgallon@labellapc.com  
 Phone: 570-487-1959  
 Fax: 570-487-1961

## Purchase Order No.

## Subcontract No.

## MI Quote No.

## Please Check One:

☐ More samples to follow☒ No Additional Samples

10515 Research Dr  
 Knoxville, TN 37932  
 865-573-8188

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Sample Information			Analyses		CENSUS: Please select the target organism/gene																													
MI ID (Laboratory Use Only)	Sample Name	Date Sampled	Time Sampled	Matrix	Total Number of Containers	PLFA	NGS	QuantArray Chlor	QuantArray Petro	DHC (Dehalococoides)	DHC Functional genes (bvc, bce, vcr)	DHBt (Dehalobacter)	DHG (Dehalogenimonas)	DSM (Desulfurimonas)	DSB (Desulfobacterium)	EBAC (Total)	SRB (Sulfate Reducing Bacteria-APS)	MGN (Methanogens)	MOB (Methanotrophs)	SMMO	DNF (Denitrifiers-nitS and nitK)	AMO (ammonia oxidizing bacteria)	PM1 (MTBE aerobic)	RMO (Toluene Monooxygenase)	RDEG (Toluene Monooxygenase)	PHE (Phenol Hydroxylase)	NAH (Naphthalene-aerobic)	BSSA (Toluene/Xylene-Aerobic)	add. qPCR:	RNA (Expression Option)	Other:	Other:		
060PG1	1845-0718-MW16	7/18/18	1013	GW	1																													
2	1845-0718-MP2	7/18/18	1245	GW	1																													

## Relinquished by:

## Date

## Received by:

## Date

Chris Spencer/LaBella 7-19-18  
 Jeff Dan 7/20/18

Failure to provide sufficient and/or correct information regarding reporting, invoicing & analyses requested information may result in delays for which MI will not be liable.

It is vital that chain of custody is filled out correctly & that all relative information is provided. Shipped Via FedEx

8131 5366 0651

\* additional cost and sample preservation are associated with RNA samples.

\*\*Saturday delivery: See sampling protocol for alternate shipping address.