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NATURAL GAS DELIVERY

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August 1, 2019

Electronically submitted

Mr. Rick Cobb
Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, IL 62702

SUBJECT: Peoples Gas Manlove Natural Gas Storage Field
Groundwater Management Zone Application

Dear Mr. Cobb:

Attached is the Groundwater Management Zone ("GMZ") Application for the Manlove Natural Gas Storage Field ("Manlove Field"). Manlove Field is located near Fisher, Illinois and is owned and operated by The Peoples Gas Light and Coke Company ("Peoples Gas").

By submittal of this application, Peoples Gas requests that a GMZ be established pursuant to 35 IAC §620.250, as a three-dimensional region containing groundwater that is being managed to mitigate a release of stored natural gas from the Manlove Field.

This application follows the Illinois EPA GMZ application guidelines and includes information about completed and proposed remedial actions. Also noted in this application is the use of fate and transport modeling, and other techniques, to assess the potential for supplemental measures, including additional gas relief wells.

Please contact me with any questions or if you need additional information about this GMZ application (David.Lee@wecenergygroup.com (414) 221-2158).

Sincerely,

David M. Lee, P.E.
Director – Water Quality
WEC Energy Group – Business Services

IEPA-DIVISION OF RECORDS MANAGEMENT
RELEASABLE
FEBRUARY 16, 2022
REVIEWER
MED

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Mr. Chuck Gunnarson, Illinois EPA
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Mr. Brian Navarrete, Illinois Attorney General's Office

Exhibit 1

GROUNDWATER MANAGEMENT ZONE APPLICATION FOR THE MANLOVE GAS STORAGE FIELD

Champaign County, Illinois

Issued: 31 July 2019

Prepared for: Peoples Gas Light and Coke Company

PEOPLES GAS®

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ACRONYMS AND ABBREVIATIONS

ASTM	American Society for Testing and Materials
DI-IRMS	Dual-Inlet Isotope Ratio Mass Spectrometry
EPA	Environmental Protection Agency
EVS	Environmental visualization software
ft	Feet
GC-C-IRMS	Gas Chromatography- Combustion- Isotope Ratio Mass Spectrometry
GC-FID	Gas Chromatography with Flame Ionization Detector
GC-TCD	Gas Chromatography with Thermal Conductivity Detector
GMZ	Groundwater Management Zone
GSI	GSI Environmental Inc.
IAC	Illinois Administrative Code
IEPA	Illinois Environmental Protection Agency
IDPH	Illinois Department of Public Health
ISGS	Illinois State Geological Survey
ISWS	Illinois State Water Survey
LEL	Lower explosive limit
mg/L	milligram per liter
MAROS	Monitoring and Remediation Optimization System
MC2	L.McCord #2 Withdrawal well
NPDES	National Pollutant Discharge Elimination System
PRI	Prairie Research Institute
OBG	O'Brien & Gere
PCB	Polychlorinated byphenyl
POC	Point of Compliance
Ppm	parts per million
Psig	pounds per square inch gauge
SAP	Sampling and Analysis Plan

GROUNDWATER MANAGEMENT ZONE APPLICATION FOR THE MANLOVE GAS STORAGE FIELD

1.0 INTRODUCTION

This Groundwater Management Zone Application has been prepared in support of the Manlove Gas Storage Field (Manlove Field), which is owned and operated by The Peoples Gas Light and Coke Company (Peoples Gas).

By submittal of this application, Peoples Gas requests that a Groundwater Management Zone (GMZ) be established pursuant to 35 IAC §620.250, as a three-dimensional region containing groundwater that is being managed to mitigate a release of stored natural gas from the Manlove Field.

The GMZ will surround the area that has occurrences of elevated thermogenic gas related to this release and will extend vertically through the groundwater-bearing strata of the Mahomet Aquifer and shallower glacial deposits to the top of the underlying bedrock. A description and map of the proposed horizontal boundaries for the GMZ are provided in Appendix A.

2.0 GENERAL INFORMATION REGARDING THE MANLOVE FIELD

The Manlove Field is located in Champaign County, Illinois (Figure 1) at the following address:

Manlove Gas Storage Field
230 County Road 2800 North
Fisher, Illinois 61843

Relevant regulatory identification numbers for the Manlove Field are as follows:

Primary SIC Code is 4922
IEPA Bureau of Air ID No. 019813AAA
NPDES Permit No. IL0069248

The Manlove Field is an underground natural gas storage field located near the Village of Fisher, Illinois. The Manlove Field contains 153 injection-withdrawal wells and an underground gas storage field with a working gas capacity of approximately 36.5 billion cubic feet of gas per year, located beneath 27,500 contiguous acres of predominantly rural and agricultural land. Natural gas is stored at the Manlove Field at a depth of approximately 4,000 feet below surface, in the Mount Simon Formation sandstone. The Manlove Field stores natural gas purchased during summer months, when prices are traditionally lower, for delivery to homes during the heating season when prices are traditionally higher. The gas supply from the Manlove Field is sufficient to heat more than 320,000 homes a year.

The GMZ is proposed for the Mahomet Aquifer and overlying shallow water-bearing sands located within the areal extent of natural gas migration from a release discovered at the L. McCord No. 2 withdrawal well, as detailed in Section 6.0 below.

3.0 GEOLOGIC AND HYDROGEOLOGIC SETTING

The varied and complex regional geology surrounding the Manlove Field has been evaluated by the Illinois State Geological Survey (ISGS) and other entities within the Prairie Research Institute (PRI). In addition, soil borings advanced by GSI Environmental Inc. (GSI) and O'Brien & Gere (OBG, part of Ramboll Group) have provided subsurface information specific to the area of the McCord No. 2 well.

The Manlove Field lies in a bedrock valley that that has been filled by Quaternary-aged unconsolidated deposits during geologically recent glaciations (Sanderson and Zewde 1976). These unconsolidated deposits overlie bedrock, are generally 200 to 300 feet in thickness (Stumpf 2018), and comprise the following from ground surface downward:

- **Wisconsin Episode Glacial Deposits:** Glacial till containing predominantly sand and silt, (includes, most notably, the Batestown Member of the Lemont Formation and the Tiskilwa Formation) (Stumpf 2018). These deposits can contain scattered and localized water-bearing sands that are used for water supply in some areas of Champaign County.
- **Illinois Episode Glacial Deposits:** Glacial outwash or till containing predominantly sand and gravel interbedded with silt and clay (includes, most notably, the Vandalia Member of the Glasford Formation and the Pearl Formation) (Sanderson and Zewde 1976; Stumpf 2018). The sand strata in this zone are water-bearing and widely used for water supply in the vicinity of the Manlove Field. The Vandalia Member is locally considered an aquifer, and the Pearl Formation is often considered to be a portion of the regional Mahomet Aquifer described below.
- **Pre-Illinois Episode Glacial Deposits:** These deposits are members of the Banner formation, which is described as glacial till, containing beds of sand, silt, and gravel (Sanderson and Zewde 1976, Stumpf 2018). Most notably, this includes the sands and gravels of the Mahomet Sand Member that comprises the Mahomet Aquifer (Stumpf and Dey 2012). The Mahomet Aquifer is a highly productive aquifer both locally and regionally, and is classified as containing Class I: Potable Resource Groundwater pursuant to 35 IAC §620.201.

Cross-sections of unconsolidated deposits above bedrock in the area of the Manlove Field, as presented in Stumpf 2018, are shown in Appendix B. In the vicinity of the McCord No. 2 well, there is no evidence that shallow glacial sands in the Wisconsian glacial deposits are extensively used for water supply. Wells screened in these shallow glacial sands would typically have total depths of less than 100 ft.

The Vandalia and Mahomet Aquifers, however, are extensively used for domestic, commercial, and agricultural water supply in this area. Based on interpretations of available hydrogeologic data, the Vandalia and Mahomet Aquifers appear to be physically connected and in hydraulic communication, although the pattern of interconnection is complex and varies locally. The variability in the thickness and continuity of low- and high-permeability strata over short distances can contribute to non-uniform fluid (including gas) migration throughout this profile.

4.0 RELEASE DESCRIPTION

4.1 Source of Natural Gas Release

On 6 December 2016, Peoples Gas detected a leak (the "Gas Release") from the gas withdrawal well L. McCord No. 2 ("MC2"), when gas bubbles were observed rising out of standing water near the well. Peoples Gas reported the Gas Release to the Illinois Commerce Commission and other federal and state agencies, as required under state and federal regulations. MC2 is one of the 153 injection/withdrawal wells in the Manlove Field, is located at 40.27749 N. latitude and 88.38961 W. longitude (Figure 2), and was used exclusively for withdrawal.

The recorded wellhead pressures at the time of the discovery of the Gas Release ranged from 270 to 289 pounds per square inch gauge (psig). A subsequent root cause study commissioned by Peoples Gas (EN Engineering, June 2017) identified corrosion to the production tubing above the production packer (i.e., the sealing device that prevents gas from moving in an uncontrolled manner up the production casing). This study also identified evidence that similar corrosion was affecting MC2's production casing.

Based on this study, the Gas Release was likely caused by losses of integrity to the tubing and casing strings of the well caused by corrosion.

4.2 Chemical Constituents Released to Groundwater

Natural gas released from MC2 is primarily comprised of methane (approximately 94% by volume), with less than 4% comprised of higher molecular weight hydrocarbons including ethane, propane, butane, pentane, and hexane, and approximately 2% carbon dioxide and nitrogen. The Illinois Environmental Protection Agency (IEPA) contends that the thermogenic source of methane from MC2 represent "contaminants" as that term is defined in 35 IAC §620.110.

5.0 SITE INVESTIGATION

5.1 Investigation of Source of Release

MC2 was initially identified as the source of the natural gas release based on the presence of gas bubbling in the area surrounding the wellhead. This was confirmed by the subsequent engineering study of MC2 downhole conditions (EN Engineering, June 2017). No other injection/production wells have been identified as potential sources of natural gas release to shallow groundwater in this area.

5.2 Groundwater Investigation to Delineate Thermogenic Gas Impacts

To date, 85 residential and municipal water supply wells have been sampled and tested to characterize potential groundwater impacts by the natural gas release from MC2. Groundwater samples have been analyzed for:

- Dissolved gas concentrations (by GC-FID)
- Molecular composition (by GC-FID and GC-TCD) and isotopic composition (by DI-IRMS or GC-C-IRMS) of the gas to distinguish thermogenic gas sourced from the MC2 release from the microbial gas naturally present in the aquifer.
- Water quality parameters, as follows:

  - Metals (antimony, arsenic, barium, beryllium, cadmium, chromium, iron, manganese, nickel, sodium, selenium, thallium, zinc) (EPA 600 4.1.4)
  - Nitrite (as N) (ASTM 4500-NO2 B)
  - Nitrate (as N) (EPA 600 353.2)
  - Fluoride (ASTM 4500-F C)
  - Cyanide (EPA 335.4)
  - Total Coliform and Other Bacteria (ASTM 9222B Membrane Filter)
  - Sulfate (EPA 300.0)
  - Volatile and Semivolatile Organic Compounds (EPA 524.2, EPA 525.2, EPA 504.1)
  - Diquat (EPA 549.2), PCBs (EPA 505), Carbamates (EPA 531.1), Glyphosate (EPA 547), Endothall (EPA 548.1), and Herbicides (EPA 548.1)

Not all samples were analyzed for all three of these categories of laboratory analyses.

Site investigative activities completed by Peoples Gas include:

- A search for water supply wells within the vicinity of MC2, after the Gas Release was identified.
- Request for access to the wells for sampling from the well owners.
- Performance of sampling at wells where access was granted.
- Performance of repeat sampling at selected wells.
- Performance of additional sampling in response to specific well owner requests.

In addition, Peoples Gas has performed investigative work to better characterize and understand the shallow geology and hydrogeology, particularly of the Mahomet Aquifer. Specific actions include:

- Drilling of 3 gas relief wells (RW-1 through RW-3) screened within gas bearing sands. A drillers log was developed for each of the three relief wells (Appendix C).
- Performance of a pumping test at one of the relief wells to support calculation of the hydraulic conductivity and transmissivity of the gas-bearing sand screened by that well.
- Drilling of four stratigraphic borings (BH-1 through BH-4) penetrating fully through the overburden to shallow bedrock. Borings were stratigraphically logged and field screened for the presence of methane (Appendix D).
- Evaluation of drillers logs for nearby supply and monitoring wells for use in mapping the three-dimensional shallow geology.

Locations of stratigraphic borings, gas relief wells, and water supply wells used in this evaluation are shown in Figure 3.

IEPA has also performed sampling of water supply wells in the MC2 area. The data from this sampling work, where available, have been included in the dataset accompanying this GMZ application.

5.3 Groundwater Monitoring Network and Sampling Protocols

The groundwater monitoring network consists of public and private water supply wells and gas relief wells in the vicinity of MC2. To date, 85 wells have been sampled, some of them on multiple occasions, providing test results for a total of 133 groundwater samples (Table 1). Locations of sampled wells are shown on Figure 4.

At each well location, the water samples were generally collected from the point of use, such as a garden hose spigot, after a period of pumping the well. Dissolved gas samples were collected using an IsoFlask container provided by Isotech Laboratories. Water quality samples were collected in the laboratory-provided containers. Dissolved gas samples were analyzed by Isotech Laboratories in Champaign, Illinois. Water quality samples were analyzed by Teklab Environmental Laboratory in Collinsville, Illinois and American Water in Belleville, Illinois.

The initial period of well testing began in 2016, shortly after the release was identified. Subsequent to this initial testing, wells have been monitored at the well owner's request and on an as-needed basis (e.g., to confirm functionality of gas-water separators installed by Peoples Gas at certain households as an early protective measure).

5.4 Groundwater Monitoring Results

Elevated levels of dissolved methane have been observed for decades in groundwater throughout Central Illinois. This dissolved methane consists of microbial gas formed by CO_2 reduction (i.e., "glacial gas" or "drift gas", as it is commonly present in glacial drift). The natural presence of this microbial methane is a well-documented condition in the Mahomet and other shallow aquifers in the region and throughout the state of Illinois (e.g., Hackley *et al.* 2010, Sanderson and Zewde 1976). Levels of this naturally occurring microbial gas have been measured in excess of 60 mg/L (Table 1).

Thermogenic gas, which is the type of gas stored in the Manlove Field and associated with the release from MC2, is distinct from microbial gas. Microbial gas is produced by natural processes, specifically the decomposition of organic material by microorganisms in the subsurface.

Thermogenic gas is also produced by natural processes, but is formed by the abiotic breakdown of organic material under high temperatures and pressures at depth.

MC2 gas has been observed in a limited number of water supply wells in an area proximate to MC2. These wells are typically located within 5000 feet of MC2 and lie primarily along an elongate area extending generally to the northwest and southeast from MC2.

The overall extent of dissolved MC2 gas, in terms of migration distance from MC2, has remained generally stable following the 2016 release discovery. Although there have been some new wells where MC2 gas has been identified during this period, these wells are all within the previously observed areal extent of MC2 gas migration. This suggests that the discovery of MC2 gas at these new locations is likely related to internal stabilization of the existing MC2 thermogenic gas, rather than continuing outward migration.

Dissolved gas monitoring results as of 1 July 2019 are tabulated in Table 1, which provides the following information:

- Well owner
- Well coordinates or other location information
- Date of sampling
- Dissolved methane, ethane, and propane concentrations

Figure 4 shows the most recent dissolved gas test results at each sampling location and distinguishes between those wells containing predominantly microbial gas vs. predominantly MC2 thermogenic gas, as indicated by molecular and/or isotopic composition (data provided in Appendix F). Of note, many samples exhibited levels of methane and other hydrocarbons that were too low to enable discrimination between microbial and thermogenic gas. These are also shown on Figure 4.

These data also indicate that there is an area of dissolved thermogenic methane that is not related to the MC2 gas release, located approximately 2.5 miles to the southwest of MC2. This is related to gas storage testing done by Peoples Gas in the early 1960s and is not addressed as part of this GMZ.

6.0 GROUNDWATER MANAGEMENT ZONE BOUNDARIES

The boundaries of the proposed GMZ are defined as follows:

- **Upper Boundary:** Upper contact of saturated sand and gravel units (i.e., water-bearing sands) within the shallow unconsolidated sediments. This would generally be equivalent to the Mahomet and Vidalia Aquifers, although as noted above, these two units are extensively interconnected in this area.
- **Lower Boundary:** Upper surface of bedrock that underlies the Mahomet Aquifer.
- **Horizontal Boundary:** The boundary of the area where MC2 methane was estimated to be present in excess of 1 mg/L (based on existing groundwater data)

Figure 5 shows the horizontal boundary of the proposed GMZ.

The horizontal boundary of the GMZ (i.e., the area bounding the occurrence of 1 mg/L MC2 gas) is based upon the observed levels of dissolved and free gas in the Mahomet and other shallow sands, as enhanced by a 3D kriging[1] analysis of the site dissolved and free gas distribution. The resulting distribution of methane in the subsurface was overlain onto the kriged stratigraphic interpretation using Environmental Visualization Software (EVS). This visualization utilized available data on:

- MC2 dissolved gas in water supply wells (Table 1);
- Free gas within the headspace of the gas relief wells RW-1 through RW-3 (Table 3);
- Methane field screening measurements from the stratigraphic borings BH-1 through BH-4 (Table 3); and
- Lithologic and stratigraphic data from existing wells and the stratigraphic borings (Appendices C, D, and E).

The free gas and field screening measurements were converted to dissolved gas equivalent concentrations for visualization purposes. Specifically, methane concentrations above 5,000 ppm (i.e., 10% of the methane lower explosive limit [LEL] of 50,000 ppm) were considered to represent a dissolved methane concentration of 28 mg/L (i.e., the solubility of methane in water at 1 atm).

Appendix A provides a discussion of the 3D kriging/visualization, as well as multiple views extracted from the 3D visualization output.

[1] Kriging is geostatistical technique used to estimate the spatial distribution of parameters from 3D data in order to estimate the shape and volume of subsurface features. This process is discussed in more detail in Appendix A.

7.0 COMPLETED AND PROPOSED REMEDIAL ACTIONS

7.1 Applicable Remedial Criteria

Based on impacts to the Mahomet Aquifer and the degree of interconnection between the Mahomet and shallower water-bearing sands, this GMZ application considers Class I Potable Resource Groundwater Quality Standards to be applicable to all affected groundwater within the proposed GMZ. Applicable state regulations (35 IAC §620.410), however, do not provide specific standards for methane or the related hydrocarbons.

In order to identify an appropriate water quality standard for dissolved methane GSI has reviewed technical literature and regulatory guidance for existing standards. No state or federal standards for dissolved methane exist. The U.S. Department of the Interior (Eltschlager *et al.,* 2001) recommends:

- **No action:** below 10 mg/L dissolved methane.
- **Action level for warning/investigation:** 10 mg/L dissolved methane.
- **Action level for mitigation measures:** 28 mg/L dissolved methane. Note that this is the solubility of methane in water under atmospheric conditions. Such measures may include venting of well, gas-water separation, and others.

In addition, the Illinois Environmental Protection Agency allows for the use of an asymptotic pattern of stability as a water quality standard or remedy goal. Based on this, the proposed water quality standards/remedy goals for this proposed GMZ are:

- Below 10 mg/L of dissolved MC2 thermogenic gas, or
- A time-series trend of dissolved methane concentrations demonstrating an asymptotic pattern of stability (i.e., an asymptotic state) at a concentration at or above 10 mg/L. An asymptotic state is defined as a stable concentration trend, as established by a Mann-Kendall trend analysis (utilizing MAROS software) of four or more consecutive sampling events.

In addition to monitoring for concentration stability or decline over time, the perimeter of the GMZ will be monitored by a system of sentinel wells to confirm that the area of the MC2 thermogenic gas is not expanding. The Points of Compliance to demonstrate completion of the remediation program are described in Section 8 below.

7.2 Description of Remedial Actions

7.2.1 Remedial Measures Implemented to Date in GMZ Area

The following remedy elements have been or are being implemented by Peoples Gas as of the date of submittal of this GMZ application:

1.) Source Control

- MC2 was shut in and taken out of service promptly once the release was identified.
- The lower damaged section of the MC2 casing was cemented to prevent further gas discharge to the shallow aquifers.

- MC2 was perforated at 290 to 300 ft depth and vented to relieve subsurface gas pressures in the shallow strata; this venting is still on-going. The vented gas is presently burned in a combustor, rather than vented to the atmosphere.
- Other wells in the field have been programmatically evaluated for potential integrity loss and preventative maintenance conducted as necessary to further reduce the potential for future gas releases.
- The well workover program has been accelerated and major maintenance to all 153 injection-withdrawal wells will be completed by the end of 2019.

2.) Monitoring and Residential Control Measures

- Although methane is not toxic, and no health hazards exist, bottled water was voluntarily provided throughout the impacted area to accepting households.
- Passive vents (e.g., vented well caps) were installed at selected water supply wells to ensure gas does not accumulate within the well casing.
- Gas-water separators were installed at selected water supply wells to reduce dissolved gas concentrations within potable water.
- Methane detectors were installed to warn of potentially flammable conditions within structures proximal to or supplied with potable water from affected water supply wells.
- The relevant state agencies were provided with information on the release and impacted area.

Table 4 lists the locations where vented well caps, gas-water separators, and methane detectors were offered and implemented.

3.) Aquifer Remediation

- Three gas relief wells (RW-1 through -3) were installed with plans to be used to reduce local methane accumulation within the Mahomet and other shallow sands.
- These wells were screened across the uppermost portion of a saturated sand expected to contain dissolved gas.
- Due to regulatory issues related to air emissions, however, these relief wells have not yet been put into service.

The locations of these wells are shown on Figure 3, and construction logs are provided in Appendix C.

7.2.2 Additional Remedial Measures Proposed for the GMZ

Future remedial measures will be constrained primarily by the stability of methane in this setting, the overall volume of water at issue, and the complexity of the shallow hydrogeology in the vicinity of MC2. Groundwater in the shallow aquifers is present under methanogenic conditions, which accounts for the widespread occurrence of microbial methane naturally found in these aquifers. Under such conditions, the MC2 methane will be quite stable, and unlikely to quickly degrade over time.

In addition, impacts from the Gas Release extend over a mile from the MC2 source, and dissolved methane may be present throughout the shallow aquifers within the GMZ. Moreover, this water is present in groundwater within a hydrogeologic regime that exhibits interconnections between multiple water-bearing strata.

Notwithstanding these challenges, the overarching objectives for future remedial measures selected are to:

- Ensure that hazards do not arise for local groundwater users.
- Reduce the amount of MC2 methane in the shallow aquifers, to the extent practicable. This objective must also be balanced by an objective to minimize waste of shallow groundwater, which is a valuable natural resource.

To attain these overall objectives, the following additional remedial measures will be implemented to achieve the applicable remediation criteria for the GMZ:

1.) **Further Source Control:** MC2 will continue to be used for venting purposes. When this venting is no longer effective, as demonstrated by wellbore pressures declining to near atmospheric levels, the well will be permanently abandoned.

2.) Further Monitoring and Residential Control

a. Passive vents (i.e., vented well caps or other appropriate venting to comply with Title 77 IAC §920.40i) will be offered at all locations within the GMZ that exhibit methane concentrations ≥10 mg/L either presently or at any time over the first five years of GMZ implementation, regardless of the origin of gas.

b. The following monitoring and residential control measures will be offered at locations that exhibit MC2 thermogenic methane concentrations ≥10 mg/L, either presently or at a future date:

   - Gas-water separators to reduce dissolved gas concentrations within potable water.
   - Methane detectors to warn of potentially flammable conditions within structures proximal to or supplied with potable water.

c. Notification of all local licensed well drillers of the potential presence of natural gas in the shallow subsurface within the GMZ.

d. Coordination with the IDPH regarding the presence and extent of natural gas within the GMZ for purposes of future well permitting by that agency.

3.) Further Aquifer Remediation

a. Up to three existing relief wells (RW-1 through -3) will be pumped and concurrently vented to relieve localized gas accumulations within the Mahomet Aquifer and other shallow sands. Water discharge and air emissions permits will be sought for this work from appropriate state regulatory agencies. If treatment is required for compliant discharge of water or emission of vented gas, this will be implemented pursuant to normal regulatory processes.

b. Passive venting of gas from domestic and municipal wells as described above. In combination with the relief wells, these domestic and municipal wells will comprise a network of approximately 15 to 20 wells that will vent thermogenic gas from the aquifer via vented well caps and/or other appropriate well vents. Given that the MC2 source has been terminated, the continual venting of gas from these wells will assist in reducing the mass of methane present within the GMZ over time, at least to some degree.

c. The network of relief wells and passively vented wells will be maintained and managed to stabilize and reduce MC2 gas concentrations in the aquifer. Ongoing groundwater monitoring will be used to support decisions regarding modifications this network, subject to IEPA concurrence.

4.) **Groundwater Monitoring Program:** Aquifer conditions will be monitored over time as described below to track the continued stability or diminution of MC2 methane in groundwater. This monitoring program will include:

a. A sampling and analysis plan (SAP) will be developed describing sample collection and analysis methods. It will be submitted to IEPA for review and approval.

b. All water supply wells located within the proposed GMZ area will be sampled initially subject to well owner permission and well functionality.

c. Based on the results of the initial sampling, wells will be selected for ongoing monitoring. Wells selected will include:

- All wells exhibiting >10 mg/L MC2 thermogenic methane (as identified through molecular and/or isotopic composition).
- Selected wells that contain less than 10 mg/L MC2 thermogenic methane, or contain microbial gas, but are present at locations that are useful for monitoring any potential outward migration of MC2 gas ("sentinel wells"). A minimum of 10 wells will be selected for this purpose, subject to IEPA concurrence.
- Monitoring will be conducted quarterly during the first year of remedy implementation, and on a semi-annual basis thereafter until remedial goals are attained.

d. The monitoring program will be reviewed and revised as necessary, subject to IEPA concurrence, every 3 years. This will be based on concentration versus time trends of dissolved methane in monitored wells.

5.) **Other Measures:** In addition to the remedy elements described above, other supplemental remedial measures will be evaluated for possible implementation. This evaluation may include the use of fate and transport modeling or other techniques to assess the potential effects of the measures on the amount, concentration, and/or extent of methane in the shallow subsurface. Those measures considered to be practicable and likely effective will be proposed by Peoples Gas and will be subject to approval by IEPA. Possible supplemental measures may include additional gas relief wells.

7.3 Effectiveness of Remedial Actions to Terminate Release

The source control measures described above have effectively terminated the release of gas from MC2. In addition, the venting at MC2 has removed higher pressure source gas from the subsurface and prevented migration into the aquifer.

7.4 Operation and Maintenance of Remedial Actions

Venting and combustion of gas from MC2 is being performed on an ongoing basis. Available data on pre-treatment and post-treatment dissolved gas concentrations related to gas-water separators are provided in Table 5. Note that Peoples Gas may replace existing gas-water separators with an improved model designed to achieve higher gas removal efficiencies than the existing separators, in the event that an existing separator is unable to achieve post-treatment

levels below 10 mg/L at a particular location. These improved models will also be used for any new gas-water separator installations, once approved by IDPH.

7.5 Schedule for Completion of Remediation

The projected schedule for the various remedial elements described in Section 7.1 above is provided in Table 6. Please note that proposed timelines may be affected by issues outside the control of Peoples Gas, such as obtaining access to privately-owned wells.

7.6 Permits obtained from IEPA for Remediation

A permit from the IEPA National NPDES program was issued on November 21, 2017 (IEPA Permit No. 2017-EN-62689-1). This permit allows continuous pumping of groundwater from the existing gas relief wells to tanks that would allow the methane to vent and the tank overflow to drain to the surrounding land. This remediation activity also requires a "ROSS" (Registration of Smaller Sources) application be submitted to the IEPA to permit emissions from the gas relief wells. The ROSS application will be sent to the IEPA following submittal of this GMZ application.

7.7 Actions Taken Following Completion of Remedy

After remedial criteria have been attained at the POC, as described in Section 8.0 below, the remedy will be considered complete. In this event, post-remediation monitoring will be performed for an additional three years to confirm that dissolved methane concentrations continue to be stable or decline. If post-remediation monitoring confirms these conditions, the GMZ will be terminated.

If concentrations exhibit a pattern of rebound at the point of compliance (POC), GMZ remedy measures will be resumed in the affected area (area subject to IEPA concurrence) until the remedial objectives are once again achieved at the designated points of compliance.

Note that all gas-water separators installed by Peoples Gas as a part of the GMZ remedy will be maintained at that household until MC2 methane levels stabilize below 10 mg/L in the subject well. This continued maintenance will not terminate upon termination of the GMZ.

7.8 Adequacy of Control Measures

Source Control: The venting of MC2 has removed in excess of 76.6 million cubic feet of natural gas from the subsurface, and is therefore presumed to have reduced gas pressures in the area surrounding the release. Although continued venting will have diminishing impact given that pressures have dropped to near-ambient levels in the vicinity of the MC2 well, ongoing venting will serve to further attenuate the source.

Monitoring and Residential Control Measures: The use of passive well venting, methane monitors, and gas-water separators will mitigate the potential for a flammable atmosphere to occur within any structures that overlie the wellhead or are supplied by the well water.

Aquifer Remediation: Use of gas relief wells and passively vented wells will serve to reduce the amount of MC2 methane in the aquifer by targeting the areas of higher concentrations. Monitoring of aquifer conditions over time will serve to track stability or diminution of dissolved methane in the aquifer, as well as maintaining current information on well water users within the GMZ.

As noted above, other measures will be evaluated for possible addition to the aquifer remediation program, subject to IEPA concurrence. If such measures are identified, their proposed use will include a discussion of their anticipated effectiveness.

7.9 Future Activities and/or Modifications to GMZ

Peoples Gas has proposed a program that will protect local water supply well users, monitor groundwater conditions to confirm MC2 methane stability or decline in groundwater, and continue to reduce the amount of methane present in the subsurface. Portions of this program are already in place or being implemented at this time. The anticipated schedule for the remainder of the GMZ program and remedy implementation is summarized in Table 6.

8.0 POINT OF COMPLIANCE (POC)

The effectiveness of the remedial measures for achieving the remedial objectives will be measured at the POC, which will correspond to two sets of wells from which groundwater samples will be collected on a regular basis, until remediation criteria are achieved, as follows:

1.) **Perimeter Sentinel Wells:** Existing water supply and/or monitoring wells located around the perimeter of the GMZ to detect expansion of MC2 thermogenic methane. At these selected well locations, a confirmed detection of MC2 thermogenic gas in excess of 10 mg/L will trigger the need for investigation of possible expansion of area of MC2 methane in groundwater and associated response measures, if needed.

2.) **Point-of-Use Wells Within the GMZ:** Water supply and/or monitoring wells located within the GMZ to measure compliance with the groundwater remediation criteria, as defined in Section 7.1 above. At these locations, water samples will be collected from the point-of-use of selected water supply wells and/or from selected monitoring wells to confirm compliance with a maximum 10 mg/L concentration of MC2 thermogenic gas or an asymptotic concentration trend at levels above 10 mg/L of MC2 thermogenic gas.

The trend of concentrations vs time for each monitoring parameter will be established at each POC well using the Mann-Kendall statistical trend analysis (e.g., using USEPA MAROS program or the Mann-Kendall Toolkit), based on 4 or more sampling events. An asymptotic concentration trend will be defined as non-increasing concentration trend via the Mann-Kendall analysis.

The number and locations of POC wells will be proposed following completion of an initial round of sampling and testing of all accessible water supply wells located within the GMZ, as described in Section 7.2.2, Item 4, above. On this basis, up to 10 water supply wells located near the perimeter of the GMZ and containing less than 1 mg/L MC2 thermogenic gas will be selected as perimeter sentinel wells. In addition, up to 30 wells located within the 10 mg/L boundary will be selected to track the reduction of MC2 thermogenic methane concentrations over time.

Please note that Peoples Gas is proposing certain sampling activities for water supply wells that exhibit dissolved methane concentrations below the proposed action level of 10 mg/L MC2 thermogenic gas. These are:

- The installation of passive well vents on all supply wells within the GMZ that exhibit 10 mg/L or more dissolved methane, regardless of source.
- Initial sampling of all water supply wells within the GMZ (subject to owner permission and well functionality), regardless of their methane concentration history.

9.0 REFERENCES

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TABLES

TABLE 1
DISSOLVED GAS DATA
Manlove Gas Storage Field
Champaign County, Illinois

Location ID	Sample Date	Sample ID	X_coord (UTM 16N)	Y_coord (UTM 16N)	Final Classification (Based on Consideration of Notes)	Other Thermogenic Gas Source (1960s)	Assumptions Re. Thermogenic/Microbial Mixing and Effect of Oxidation	Methane mg/L	Ethane mg/L	Propane mg/L
[redacted]	10/11/2017	101117[redacted]	382789	4458185	Unknown Source[1]			0.097	<0.0002	<0.0003
[redacted]	10/17/2017	101717[redacted]	387134	4462772	Predominantly Microbial			5	<0.0002	<0.0003
[redacted]	11/3/2017	110317[redacted]	384406.6984	4453795.653	Unknown Source[1]			0.0034	<0.0002	<0.0003
[redacted]	10/10/2017	101017[redacted]	381827	4458219	Unknown Source[1]			0.00047	<0.0002	<0.0003
[redacted]	3/11/2019	031119[redacted]	381827	4458219	Unknown Source[1]			0.0003	<0.0002	<0.0003
[redacted]	6/25/2018	062518[redacted]	377057.4298	4458839.75	Predominantly Microbial			7.5	0.00041	<0.0003
[redacted]	10/11/2017	101117[redacted]	381203	4458419	Minor Thermogenic Component		Assume minor	0.54	0.0017	<0.0003
[redacted]	3/11/2019	031119[redacted]	381203	4458419	Minor Thermogenic Component		Assume minor	0.6	0.0024	0.001
[redacted]	6/28/2017	062817[redacted]	378994	4459457	Predominantly Microbial			1.3	<0.0002	0.0005
[redacted]	11/3/2017	110317[redacted]	383443.9923	4455054.223	Unknown Source[1]			0.03	<0.0002	<0.0003
[redacted]	10/12/2017	101217[redacted]	381321	4461559	Predominantly Microbial			0.38	<0.0002	<0.0003
[redacted]	1/31/2018	013118[redacted]	379445.1528	4456713.623	Thermogenic	Other	δ^{13}C-C1 and δD-C1	0.43	<0.0002	<0.0003
[redacted]	10/17/2017	101717[redacted]	382737	4455261	Unknown Source[1]			0.0075	<0.0002	<0.0003
[redacted]	10/17/2017	101717[redacted]	382573	4455392	Unknown Source[1]			0.023	<0.0002	<0.0003
[redacted]	5/30/2019	053019[redacted]	--	--	Thermogenic	Other		6.9	0.08	<0.0003
[redacted]	10/30/2017	103017[redacted]	381768	4457793	Unknown Source[1]			0.028	<0.0002	<0.0003
[redacted]	3/14/2019	031419[redacted]	381768	4457793	Predominantly Microbial			0.46	<0.0002	<0.0003
[redacted]	4/10/2018	4A	381704	4458451	Thermogenic			4	0.17	0.011
[redacted]	4/5/2018	040518[redacted]	382796.5689	4455017.958	Unknown Source[1]			0.029	<0.0002	<0.0002
[redacted]	10/10/2017	101017[redacted]	381836	4458392	Unknown Source[1]			0.00056	<0.0002	<0.0003
[redacted]	3/11/2019	031119[redacted]	381836	4458392	Unknown Source[1]			0.014	<0.0002	<0.0003
[redacted]	10/25/2017	102517[redacted]	382971	4458292	Predominantly Microbial			0.23	<0.0002	<0.0003
[redacted]	10/11/2017	101117[redacted]	381895	4457615	Predominantly Microbial			1.2	<0.0002	<0.0002
[redacted]	3/15/2017	031517[redacted]	381921	4458215	Thermogenic			5	0.2	0.012
[redacted]	7/12/2017	071217[redacted]	381921	4458215	Thermogenic			11	0.061	0.0011
[redacted]	8/8/2017	080817[redacted]	381921	4458215	Thermogenic			62	3.4	0.17
[redacted]	4/10/2018	2A	381921	4458215	Thermogenic			75	4.5	0.29
[redacted]	3/27/2019	A Before	381921	4458215	Thermogenic			77	4.5	0.42
[redacted]	1/4/2018	010418[redacted]	378485.6565	4452412.066	Unknown Source[1]			0.075	<0.0002	<0.0002
Fisher, Village of	10/20/2017	102017VF-40038	--	--	Unknown Source[1]			0.019	<0.0002	<0.0003
Fisher, Village of, 40039	10/20/2017	102017VF-40039	--	--	Unknown Source[1]			0.016	<0.0002	<0.0003
Fisher, Village of, Transfer Pump	10/20/2017	102017VF-TP	--	--	Unknown Source[1]			0.0018	<0.0002	<0.0002
[redacted]	3/11/2019	031119[redacted]	382374.8055	4456349.795	Thermogenic			0.0019	0.00042	0.00087
[redacted]	2/20/2017	22017	381570	4459988	Predominantly Microbial			9.7	<0.0002	0.00064
[redacted]	3/21/2017	032117[redacted]	381570	4459988	Thermogenic			84	5.3	0.36
[redacted]	6/15/2017	061517[redacted]	381570	4459988	Thermogenic			85	5.5	0.38
[redacted]	4/10/2018	3A	381570	4459988	Thermogenic			92	3.7	0.14
[redacted]	8/28/2017	082817[redacted]	375819.9365	4461527.773	Predominantly Microbial			14	0.0002	<0.0003

Notes:

1) [1] Levels of methane and other hydrocarbons were too low to allow discrimination between microbial vs. thermogenic gas.
2) Samples analyzed at Isotech Laboratories, Champaign Illinois.
3) < = Compound not detected at the Method Detection Limit (MDL).
4) -- = No data, mg/L = milligrams per liter.

TABLE 1
DISSOLVED GAS DATA
Manlove Gas Storage Field
Champaign County, Illinois

Location ID	Sample Date	Sample ID	X_coord (UTM 16N)	Y_coord (UTM 16N)	Final Classification (Based on Consideration of Notes)	Other Thermogenic Gas Source (1960s)	Assumptions Re. Thermogenic/Microbial Mixing and Effect of Oxidation	Methane mg/L	Ethane mg/L	Propane mg/L
[redacted]	10/25/2017	102517[redacted]	380821	4467847	Predominantly Microbial			5.9	0.00061	<0.0003
[redacted]	10/11/2017	101117[redacted]	381110	4457623	Predominantly Microbial			1.6	<0.0002	<0.0003
[redacted]	10/11/2017	101117[redacted]	382270	4459968	Predominantly Microbial			0.23	<0.0002	<0.0003
[redacted]	10/24/2017	102417[redacted]	382786	4458245	Unknown Source[1]			0.056	<0.0002	<0.0003
[redacted]	10/12/2017	101217[redacted]	380601	4457875	Predominantly Microbial			2.3	<0.0002	<0.0003
[redacted]	11/22/2017	112217[redacted]	383570.09	4457537.879	Unknown Source[1]			0.061	<0.0002	<0.0003
[redacted]	11/20/2017	112017[redacted]	383489.0233	4461186.278	Unknown Source[1]			0.039	<0.0002	<0.0003
[redacted]	10/24/2017	102417[redacted]	380554	4459957	Minor Thermogenic Component		Assume minor	2.5	0.024	<0.0003
[redacted]	11/16/2017	111617[redacted]	382298.9463	4456074.586	Unknown Source[1]			0.012	<0.0002	<0.0003
[redacted]	1/5/2018	010518[redacted]	378957.0782	4456511.013	Thermogenic	Other		9.5	0.2	<0.0003
[redacted]	11/17/2017	111717[redacted]	382346.783	4456204.253	Unknown Source[1]			0.0094	<0.0002	<0.0003
[redacted]	11/2/2017	110217[redacted]	378191	4455190	Thermogenic	Other		4.2	0.82	<0.0003
[redacted]	10/17/2017	101717[redacted]	381816	4457653	Predominantly Microbial			1.7	<0.0002	<0.0003
[redacted]	8/28/2017	082817[redacted]	376936	4455146	Minor Thermogenic Component	Other	Likely contains a	4.4	0.0079	<0.0003
[redacted]	11/17/2017	111717[redacted]	381986.5047	4456836.033	Unknown Source[1]			0.055	<0.0002	<0.0003
[redacted]	3/15/2017	031517[redacted]	381905	4458377	Thermogenic			58	4.5	0.1
[redacted]	3/27/2019	B Before	381905	4458377	Thermogenic			56	4.1	0.24
[redacted]	10/23/2017	102317[redacted]	367248	4446214	Predominantly Microbial			60	0.0011	<0.0003
[redacted]	1/24/2019	012419[redacted]	376407.9043	4464207.514	Predominantly Microbial			27	0.0012	<0.0003
[redacted]	10/12/2017	101217[redacted]	381511	4457577	Predominantly Microbial			1.7	<0.0002	<0.0003
[redacted]	12/21/2017	122117[redacted]	378430.3725	4455114.655	Thermogenic	Other		9.5	0.94	0.0058
[redacted]	4/26/2017	042617[redacted]	382013	4458341	Unknown Source[1]			0.0008	<0.0002	<0.0003
[redacted]	10/30/2017	103017[redacted]	382013	4458341	Thermogenic			1.1	0.035	<0.0003
[redacted]	4/4/2019	040419[redacted]	382013	4458341	Thermogenic			2.9	0.16	0.0021
[redacted]	11/2/2017	110217[redacted]	377998	4455194	Thermogenic	Other		17	1.2	0.0059
[redacted]	12/20/2017	122017[redacted]	374501.7657	4455148.134	Predominantly Microbial			29	0.0011	<0.0003
[redacted]	6/25/2018	062518[redacted]	377403.4391	4459832.721	Predominantly Microbial			4.9	0.0002	<0.0003
[redacted]	10/17/2017	101717[redacted]	379488	4461732	Predominantly Microbial			1.4	<0.0002	<0.0003
[redacted]	10/17/2017	101717[redacted]	370823	4457652	Minor Thermogenic Component	Other	Assume minor	0.99	0.0073	<0.0003
Mahomet, Village of, 6" Raw Water Line Port	10/16/2017	101617 VM Pre	381609.4117	4457937.901	Unknown Source[1]			0.019	<0.0002	<0.0003
Mahomet, Village of, 6" Raw Water Line Port	3/11/2019	031119VMpre	381609.4117	4457937.901	Unknown Source[1]			0.019	<0.0002	<0.0003
Mahomet, Village of, Faucet in Shop	10/16/2017	101617 VM Post	381601.7114	4457768.495	Unknown Source[1]			0.00064	<0.0002	<0.0003
Mahomet, Village of, Faucet in Shop	3/11/2019	031119VMpost	381601.7114	4457768.495	Unknown Source[1]			0.00094	<0.0002	<0.0003
[redacted]	12/8/2017	120817[redacted]	377970.0633	4449710.923	Unknown Source[1]			0.018	0.0002	0.0002
[redacted]	10/12/2017	101217[redacted]	378206	4458361	Predominantly Microbial			4.5	<0.0002	<0.0003
[redacted]	11/2/2017	110217[redacted]	384162.4251	4455479.743	Unknown Source[1]			0.027	0.0002	<0.0003
[redacted]	10/26/2017	102617[redacted]	380075	4466410	Predominantly Microbial			12	0.00063	<0.0003
[redacted]n	10/11/2017	101117[redacted]	381352	4457926	Unknown Source[1]			0.003	<0.0002	<0.0003
[redacted]	3/11/2019	031119[redacted]	381352	4457926	Unknown Source[1]			0.0033	<0.0002	<0.0003
[redacted]	10/12/2017	101217[redacted]	381697	4457618	Unknown Source[1]			0.0072	<0.0002	<0.0003
[redacted]	11/17/2017	111717[redacted]	382272.9799	4456606.584	Unknown Source[1]			0.00084	<0.0002	<0.0003
[redacted]	1/3/2018	010318[redacted]	382115.0482	4462848.64	Predominantly Microbial			2.9	0.0002	<0.0003
[redacted]	11/3/2017	110317[redacted]	397980.5969	4467913.838	Predominantly Microbial			58	0.0016	<0.0002
[redacted]	10/11/2017	101117[redacted]	382009	4458235	Predominantly Microbial			2.2	0.00055	<0.0003

Notes:

1) [1] Levels of methane and other hydrocarbons were too low to allow discrimination between microbial vs. thermogenic gas.
2) Samples analyzed at Isotech Laboratories, Champaign Illinois.
3) < = Compound not detected at the Method Detection Limit (MDL).
4) -- = No data, mg/L = milligrams per liter.

TABLE 1
DISSOLVED GAS DATA
Manlove Gas Storage Field
Champaign County, Illinois

Location ID	Sample Date	Sample ID	X_coord (UTM 16N)	Y_coord (UTM 16N)	Final Classification (Based on Consideration of Notes)	Other Thermogenic Gas Source (1960s)	Assumptions Re. Thermogenic/Microbial Mixing and Effect of Oxidation	Methane mg/L	Ethane mg/L	Propane mg/L
[redacted]	7/24/2018	072418[redacted]	382009	4458235	Predominantly Microbial			2.6	0.001	<0.0003
[redacted]	3/11/2019	031119[redacted]	382009	4458235	Predominantly Microbial			2.4	0.0002	<0.0003
[redacted]	11/15/2018	111518[redacted]	381331	4458038	Unknown Source[1]			0.0013	<0.0002	<0.0002
[redacted]	7/19/2017	071917[redacted]	382287	4461242	Predominantly Microbial			12	0.0002	<0.0002
[redacted]	10/18/2017	101817[redacted]	383511	4457867	Unknown Source[1]			0.063	<0.0002	<0.0003
[redacted]	11/16/2017	111617[redacted]	378436.7614	4461667.953	Predominantly Microbial			2.9	0.0002	<0.0003
[redacted]	6/26/2018	062618[redacted]	378436.7614	4461667.953	Predominantly Microbial		Extraordinarily positive δD-	0.8	<0.0002	<0.0003
[redacted]	11/3/2017	110317[redacted]	383816.5535	4455359.602	Unknown Source[1]			0.018	<0.0002	<0.0003
[redacted]	5/6/2017	050617[redacted]	381661	4458483	Predominantly Microbial			1.7	<0.0002	<0.0003
[redacted]	3/1/2019	030119[redacted]-A	381661	4458483	Thermogenic		Most recent samples are	29	0.00072	<0.0003
[redacted]	11/20/2017	112017[redacted]	382374	4458350	Unknown Source[1]			0.033	0.0002	<0.0003
[redacted]))	11/3/2017	110317[redacted]	382304	4458346	Thermogenic			0.7	0.0021	<0.0003
[redacted])	3/11/2019	031119[redacted]	382304	4458346	Thermogenic			8.5	0.27	0.014
[redacted]	11/7/2017	110717[redacted]	379054.47	4457991.242	Minor Thermogenic Component		Assume minor	3.6	0.044	0.052
[redacted]	10/30/2018	103018[redacted]	379054.47	4457991.242	Unknown Source[1]			0.088	<0.0002	<0.0002
[redacted]	11/17/2017	111717[redacted]	379088.2968	4450620.081	Unknown Source[1]			0.026	<0.0002	<0.0003
[redacted]	10/16/2017	101617[redacted]	381547	4457845	Predominantly Microbial			2.3	0.0004	<0.0003
[redacted]	1/22/2018	012218[redacted]	368363.4199	4456874.087	Predominantly Microbial			56	0.0019	0.0016
[redacted]	5/7/2018	050718[redacted]	368363.4199	4456874.087	Predominantly Microbial			63	0.0012	<0.0002
[redacted]	8/28/2017	082817[redacted]	379795	4455189	Unknown Source[1]			0.075	0.0002	<0.0003
[redacted]	10/9/2018	100918[redacted]-A	379795	4455189	Unknown Source[1]			0.079	<0.0002	<0.0003
[redacted]	10/9/2018	100918[redacted]-B	379795	4455189	Unknown Source[1]			0.086	<0.0002	<0.0003
[redacted]	9/22/2017	092217[redacted]	378955	4455448	Thermogenic	Other		15	1.3	0.038
[redacted]	7/10/2018	071018[redacted]-A	378955	4455448	Thermogenic	Other		17	1.3	0.032
[redacted]	7/10/2018	071018[redacted]-B	378955	4455448	Thermogenic	Other		17	1.3	0.032
[redacted]	7/10/2018	071018[redacted]-C	378955	4455448	Thermogenic	Other		17	1.3	0.031
[redacted]	11/26/2018	[redacted]-112618	--	--	Thermogenic	Other		25	1.8	0.22
Unknown 1A	4/10/2018	1A	--	--	Thermogenic			72	5.6	1.3
[redacted]	11/16/2017	111617[redacted]	379316.0655	4459983.453	Predominantly Microbial			2.2	<0.0002	<0.0003
[redacted]	3/27/2019	C Before	382721	4459137	Thermogenic			33	2.5	0.17
[redacted]	10/25/2017	102517[redacted]	--	--	Predominantly Microbial			7.1	0.0002	<0.0003
Water District, Sangamon Valley, 3/4" Well line	10/18/2017	101817SVW-4	--	--	Predominantly Microbial			0.57	<0.0002	<0.0003
Water District, Sangamon Valley, Lab sink finished water	10/18/2017	101817SV-F	--	--	Unknown Source[1]			0.049	<0.0002	<0.0003
Water District, Sangamon Valley, Lab sink well water	10/18/2017	101817SVW-1	--	--	Predominantly Microbial			0.36	<0.0002	<0.0003
Water District, Sangamon Valley, Well Hydrant	10/18/2017	101817SVW-3	--	--	Predominantly Microbial			0.15	<0.0002	<0.0003
[redacted]	3/22/2017	032217[redacted]	382000	4458600	Predominantly Microbial			1.8	<0.0002	<0.0002
[redacted]	11/8/2017	110817[redacted]	382000	4458600	Predominantly Microbial			2.1	0.0002	<0.0003
[redacted]	3/14/2019	031419[redacted]	382000	4458600	Thermogenic		Most recent sample is	15	0.05	<0.0003
[redacted]	6/13/2019	061319[redacted]	382000	4458600	Thermogenic			31	0.069	<0.0003
[redacted]	10/25/2017	102517[redacted]	373401	4456855	Predominantly Microbial			44	0.0011	<0.0002
[redacted]	8/28/2017	082817[redacted]	384755	4453938	Unknown Source[1]			0.0012	<0.0002	<0.0003
[redacted]	10/26/2017	102617[redacted]	380692	4462950	Predominantly Microbial			3	<0.0002	<0.0003
[redacted]	10/11/2017	101117[redacted]	381730	4457903	Predominantly Microbial			2	<0.0002	<0.0003
[redacted]	3/11/2019	031119[redacted]	381730	4457903	Predominantly Microbial			3.5	<0.0002	<0.0003

Notes:

1) [1] Levels of methane and other hydrocarbons were too low to allow discrimination between microbial vs. thermogenic gas.
2) Samples analyzed at Isotech Laboratories, Champaign Illinois.
3) < = Compound not detected at the Method Detection Limit (MDL).
4) -- = No data, mg/L = milligrams per liter.

TABLE 2
GROUNDWATER QUALITY DATA
Manlove Gas Storage Field
Champaign County, Illinois

				Matrix:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
				Location ID:	050217FC	060617JD	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
				X Coordinate (UTM 16N):	--	--	381921	381570	381905	382287	382287
				Y Coordinate (UTM 16N):	--	--	4458215	4459988	4458377	4461242	4461242
				Sample ID:	050217FC	060617JD	031717[redacted]	032117[redacted]	041117[redacted]	021617[redacted]	032217[redacted]
				Sample Date:	5/2/2017	6/6/2017	3/17/2017	3/21/2017	4/11/2017	2/16/2017	3/22/2017
Lab	**Analyte Type**	**Method**	**Analyte**	**Units**							
Teklab	WQP	E200.7	Barium	mg/L	0.0767	0.109	0.106	0.0009 J	0.0783	0.111	--
Teklab	WQP	E200.7	Beryllium	mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	--
Teklab	WQP	E200.7	Cadmium	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--
Teklab	WQP	E200.7	Chromium	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	--
Teklab	WQP	E200.7	Iron	mg/L	1.84	3.56	1.38	0.0289	2.28	4.56	--
Teklab	WQP	E200.7	Manganese	mg/L	0.184	0.0309	0.0425	0.0007 J	0.165	0.0447	--
Teklab	WQP	E200.7	Nickel	mg/L	0.0022 J	<0.002	<0.002	<0.002	<0.002	<0.002	--
Teklab	WQP	E200.7	Sodium	mg/L	27.2	17.7	23.1	178	7.7	28.9	--
Teklab	WQP	E200.7	Zinc	mg/L	0.026	0.259	0.0128	0.0107	0.0128	0.0709	--
Teklab	WQP	E200.8	Antimony	mg/L	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	--
Teklab	WQP	E200.8	Arsenic	mg/L	<0.002	<0.0025	0.0031 J	0.0034 J	<0.002	0.0439	0.0506
Teklab	WQP	E200.8	Selenium	mg/L	<0.0009	<0.0009	<0.0009	<0.0009	<0.0009	<0.0009	--
Teklab	WQP	E200.8	Thallium	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	--
Teklab	WQP	E245.1	Mercury	mg/L	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	--
Teklab	WQP	E335.4 R1.0 TCN (Aqueous)	Cyanide	mg/L	<0.004	<0.16	<0.004	<0.004	<0.004	<0.004	--
Teklab	WQP	E353.2	Nitrogen, Nitrate (as N)	mg/L	<0.01	<0.01	<0.01	0.14	<0.01	<0.01	--
Teklab	WQP	M4500-F C	Fluoride	mg/L	0.09 J	0.36	0.39	0.41	0.16	0.37	--
Teklab	WQP	M4500-NO2 B	Nitrogen, Nitrite (as N)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	--
Teklab	WQP	M9222 B	Other Bacteria	CFU/100ml	0	--	0	0 H	0 H	132 H	--
Teklab	WQP	M9222 B	Total Coliform	CFU/100ml	0	--	0	0 H	0 H	0	--
American Water	Anions	EPA 300.0	Sulfate	mg/L	61.4	124.1	<0.5	<0.5	63.2	<0.5	--
American Water	Carbamates	EPA 531.1	3-Hydroxycarbofuran	ug/L	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	--
American Water	Carbamates	EPA 531.1	Aldicarb	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Carbamates	EPA 531.1	Aldicarb Sulfone	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Carbamates	EPA 531.1	Aldicarb Sulfoxide	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Carbamates	EPA 531.1	Carbaryl (Sevin)	ug/L	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	--
American Water	Carbamates	EPA 531.1	Carbofuran	ug/L	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	--
American Water	Carbamates	EPA 531.1	Methiocarb	ug/L	<4	<4	<4	<4	<4	<4	--
American Water	Carbamates	EPA 531.1	Methomyl	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Carbamates	EPA 531.1	Oxamyl (Vydate)	ug/L	<2	<2	<2	<2	<2	<2	--
American Water	Diquat	EPA 549.2	Diquat	ug/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	--
American Water	Endothall	EPA 548.1	Endothall	ug/L	<9	<9	<9	<9	<9	<9	--
American Water	Glyphosate	EPA 547	Glyphosate	ug/L	<6	<6	<6	<6	<6	<6	--
American Water	Herbicides	EPA 515.3	2,4,5-T	ug/L	<1	<1	<1	<1	<1	<1	--
American Water	Herbicides	EPA 515.3	2,4,5-TP (Silvex)	ug/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	--
American Water	Herbicides	EPA 515.3	2,4'-D	ug/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--
American Water	Herbicides	EPA 515.3	2,4-DB	ug/L	<1	<1	<1	<1	<1	<1	--

Notes:
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Manlove Gas Storage Field
Champaign County, Illinois

				Matrix:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
				Location ID:	050217FC	060617JD	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
				X Coordinate (UTM 16N):	--	--	381921	381570	381905	382287	382287
				Y Coordinate (UTM 16N):	--	--	4458215	4459988	4458377	4461242	4461242
				Sample ID:	050217FC	060617JD	031717[redacted]	032117[redacted]	041117[redacted]	021617[redacted]	032217[redacted]
				Sample Date:	5/2/2017	6/6/2017	3/17/2017	3/21/2017	4/11/2017	2/16/2017	3/22/2017
Lab	**Analyte Type**	**Method**	**Analyte**	**Units**							
American Water	Herbicides	EPA 515.3	3,5-Dichlorobenzoic acid	ug/L	<1	<1	<1	<1	<1	<1	--
American Water	Herbicides	EPA 515.3	Acifluorfen	ug/L	<1	<1	<1	<1	<1	<1	--
American Water	Herbicides	EPA 515.3	Bentazon	ug/L	<2	<2	<2	<2	<2	<2	--
American Water	Herbicides	EPA 515.3	Dacthal	ug/L	<1	<1	<1	<1	<1	<1	--
American Water	Herbicides	EPA 515.3	Dalapon	ug/L	<1	<1	<1	<1	<1	<1	--
American Water	Herbicides	EPA 515.3	Dicamba	ug/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	--
American Water	Herbicides	EPA 515.3	Dichloroprop	ug/L	<1	<1	<1	<1	<1	<1	--
American Water	Herbicides	EPA 515.3	Dinoseb	ug/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	--
American Water	Herbicides	EPA 515.3	Pentachlorophenol	ug/L	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	--
American Water	Herbicides	EPA 515.3	Picloram	ug/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--
American Water	PCBs	EPA 505	Aroclor-1016	ug/L	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	--
American Water	PCBs	EPA 505	Aroclor-1221	ug/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	--
American Water	PCBs	EPA 505	Aroclor-1232	ug/L	<0.23	<0.23	<0.23	<0.23	<0.23	<0.23	--
American Water	PCBs	EPA 505	Aroclor-1242	ug/L	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	--
American Water	PCBs	EPA 505	Aroclor-1248	ug/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--
American Water	PCBs	EPA 505	Aroclor-1254	ug/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--
American Water	PCBs	EPA 505	Aroclor-1260	ug/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	--
American Water	PCBs	EPA 505	Technical Chlordane	ug/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--
American Water	PCBs	EPA 505	Total PCBs	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	PCBs	EPA 505	Toxaphene	ug/L	<1	<1	<1	<1	<1	<1	--
American Water	Semivolatiles	EPA 504.1	1,2-Dibromo-3-chloropropane	ug/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	--
American Water	Semivolatiles	EPA 504.1	1,2-Dibromoethane (EDB)	ug/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	--
American Water	Semivolatiles	EPA 525.2	4,4'-DDT	ug/L	<1	<1	<1	<1	<1	<1	--
American Water	Semivolatiles	EPA 525.2	Alachlor	ug/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	--
American Water	Semivolatiles	EPA 525.2	Aldrin	ug/L	<0.075	<0.075	<0.075	<0.075	<0.075	<0.075	--
American Water	Semivolatiles	EPA 525.2	Atrazine (Aatrex)	ug/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--
American Water	Semivolatiles	EPA 525.2	Benzo(a)pyrene	ug/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	--
American Water	Semivolatiles	EPA 525.2	Butachlor	ug/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--
American Water	Semivolatiles	EPA 525.2	Di(2-ethylhexyl)adipate	ug/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	--
American Water	Semivolatiles	EPA 525.2	Di(2-Ethylhexyl)phthalate	ug/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	--
American Water	Semivolatiles	EPA 525.2	Dieldrin	ug/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--
American Water	Semivolatiles	EPA 525.2	Endrin	ug/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	--
American Water	Semivolatiles	EPA 525.2	gamma-BHC (Lindane)	ug/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	--
American Water	Semivolatiles	EPA 525.2	Heptachlor	ug/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	--
American Water	Semivolatiles	EPA 525.2	Heptachlor epoxide	ug/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	--
American Water	Semivolatiles	EPA 525.2	Hexachlorobenzene	ug/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--
American Water	Semivolatiles	EPA 525.2	Hexachlorocyclopentadiene	ug/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--
American Water	Semivolatiles	EPA 525.2	Methoxychlor	ug/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--

Notes:
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				Matrix:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
				Location ID:	050217FC	060617JD	[redacted],	[redacted]	[redacted]	[redacted]	[redacted]
				X Coordinate (UTM 16N):	--	--	381921	381570	381905	382287	382287
				Y Coordinate (UTM 16N):	--	--	4458215	4459988	4458377	4461242	4461242
				Sample ID:	050217FC	060617JD	031717[redacted]	032117[redacted]	041117[redacted]	021617[redacted]	032217[redacted]
				Sample Date:	5/2/2017	6/6/2017	3/17/2017	3/21/2017	4/11/2017	2/16/2017	3/22/2017
Lab	**Analyte Type**	**Method**	**Analyte**	**Units**							
American Water	Semivolatiles	EPA 525.2	Metolachlor	ug/L	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	--
American Water	Semivolatiles	EPA 525.2	Metribuzin	ug/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	--
American Water	Semivolatiles	EPA 525.2	Molinate	ug/L	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	--
American Water	Semivolatiles	EPA 525.2	Propachlor	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Semivolatiles	EPA 525.2	Simazine (Princep)	ug/L	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	--
American Water	Semivolatiles	EPA 525.2	Thiobencarb	ug/L	<1	<1	<1	<1	<1	<1	--
American Water	Volatiles	EPA 524.2	1,1,1,2-Tetrachloroethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	1,1,1-Trichloroethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	1,1,2,2-Tetrachloroethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	1,1,2-Trichloroethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	1,1-Dichloroethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	1,1-Dichloroethene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	1,1-Dichloropropene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	1,2,3-Trichlorobenzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	1,2,3-Trichloropropane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	1,2,4-Trichlorobenzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	1,2,4-Trimethylbenzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	1,2-Dichlorobenzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	1,2-Dichloroethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	1,2-Dichloropropane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	1,3,5-Trimethylbenzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	1,3-Dichlorobenzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	1,3-Dichloropropane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	1,3-Dichloropropene (total)	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	1,4-Dichlorobenzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	2,2-Dichloropropane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	2-Butanone (MEK)	ug/L	<5	<5	<5	<5	<5	<5	--
American Water	Volatiles	EPA 524.2	2-Chlorotoluene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	2-Hexanone	ug/L	<5	<5	<5	<5	<5	<5	--
American Water	Volatiles	EPA 524.2	4-Chlorotoluene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	4-Isopropyltoluene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	4-Methyl-2-pentanone (MIBK)	ug/L	<5	<5	<5	<5	<5	<5	--
American Water	Volatiles	EPA 524.2	Benzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Bromobenzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Bromochloromethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Bromodichloromethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Bromoform	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Bromomethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--

Notes:
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Lab	**Analyte Type**	**Method**	**Analyte**	**Units**							
American Water	Volatiles	EPA 524.2	Carbon tetrachloride	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Chlorobenzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Chloroethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Chloroform	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Chloromethane	ug/L	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	cis-1,2-Dichloroethene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	cis-1,3-Dichloropropene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Dibromochloromethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Dibromomethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Dichlorodifluoromethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Ethyl Benzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Hexachlorobutadiene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Isopropylbenzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	m,p-Xylene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Methyl tert-Butyl ether (MTBE)	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Methylene chloride	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Naphthalene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	n-Butylbenzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	n-Propylbenzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	o-Xylene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	sec-Butylbenzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Styrene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	tert-Amyl methyl ether (TAME)	ug/L	<3	<3	<3	<3	<3	<3	--
American Water	Volatiles	EPA 524.2	tert-Butyl ethyl ether (TBEE)	ug/L	<3	<3	<3	<3	<3	<3	--
American Water	Volatiles	EPA 524.2	tert-Butylbenzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Tetrachloroethene (PCE)	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Toluene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	trans-1,2-Dichloroethene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	trans-1,3-Dichloropropene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Trichloroethene (TCE)	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Trichlorofluoromethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Trichlorotrifluoroethane	ug/L	<3	<3	<3	<3	<3	<3	--
American Water	Volatiles	EPA 524.2	Vinyl chloride	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
American Water	Volatiles	EPA 524.2	Xylene (total)	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--

Notes:
1) Water quality data analyzed at Teklab Environmental Laboratory in Collinsville, Illinois. All other data analyzed at American Water in Belleville, Illinois.
2) < = Compound not detected at the Method Detection Limit (MDL).
3) J = Result is between the MDL and the Reporting Limit (RL) and is an estimate.
4) -- = No data, ug/L = micrograms per liter.

TABLE 3
FIELD SCREENING METHANE DATA FROM GAS RELIEF WELLS AND STRATIGRAPHIC BORINGS
Manlove Gas Storage Field
Champaign County, Illinois

GSI ENVIRONMENTAL

Gas Relief Well or Stratigraphic Boring ID	X_coord (UTM 16N)	Y_coord (UTM 16N)	Ground Surface Elevation (ft MSL)	Top Elevation (ft MSL)	Bottom Elevation (ft MSL)	Top Depth (ft BGS)	Bottom Depth (ft BGS)	Methane (ppmv)
RW-1	967224.3298	1313885.455	738	652.522228	651.522228	85	86	900,000
RW-2	967245.4672	1316701.501	742	656.719797	655.719797	85	86	70,000
RW-3	968745.3228	1312698.456	709	624.468533	623.468533	85	86	300,000
BH-1	970249.9379	1316580.191	738.374079	734.374079	684.374079	4	54	
BH-1	970249.9379	1316580.191	738.374079	684.374079	683.874079	54	54.5	
BH-1	970249.9379	1316580.191	738.374079	683.874079	683.374079	54.5	55	3
BH-1	970249.9379	1316580.191	738.374079	683.374079	682.374079	55	56	3
BH-1	970249.9379	1316580.191	738.374079	682.374079	681.374079	56	57	3
BH-1	970249.9379	1316580.191	738.374079	681.374079	680.374079	57	58	2
BH-1	970249.9379	1316580.191	738.374079	680.374079	679.374079	58	59	2
BH-1	970249.9379	1316580.191	738.374079	679.374079	678.874079	59	59.5	2
BH-1	970249.9379	1316580.191	738.374079	678.874079	678.374079	59.5	60	495
BH-1	970249.9379	1316580.191	738.374079	678.374079	677.374079	60	61	495
BH-1	970249.9379	1316580.191	738.374079	677.374079	676.374079	61	62	495
BH-1	970249.9379	1316580.191	738.374079	676.374079	675.374079	62	63	4
BH-1	970249.9379	1316580.191	738.374079	675.374079	674.374079	63	64	4
BH-1	970249.9379	1316580.191	738.374079	674.374079	634.374079	64	104	
BH-1	970249.9379	1316580.191	738.374079	634.374079	633.374079	104	105	
BH-1	970249.9379	1316580.191	738.374079	633.374079	632.374079	105	106	3
BH-1	970249.9379	1316580.191	738.374079	632.374079	631.374079	106	107	3
BH-1	970249.9379	1316580.191	738.374079	631.374079	600.374079	107	138	
BH-1	970249.9379	1316580.191	738.374079	600.374079	599.374079	138	139	
BH-1	970249.9379	1316580.191	738.374079	599.374079	598.374079	139	140	1
BH-1	970249.9379	1316580.191	738.374079	598.374079	597.374079	140	141	1
BH-1	970249.9379	1316580.191	738.374079	597.374079	588.374079	141	150	
BH-1	970249.9379	1316580.191	738.374079	588.374079	587.374079	150	151	
BH-1	970249.9379	1316580.191	738.374079	587.374079	586.374079	151	152	3
BH-1	970249.9379	1316580.191	738.374079	586.374079	585.374079	152	153	3
BH-1	970249.9379	1316580.191	738.374079	585.374079	558.374079	153	180	
BH-1	970249.9379	1316580.191	738.374079	558.374079	557.374079	180	181	
BH-1	970249.9379	1316580.191	738.374079	557.374079	556.374079	181	182	125
BH-1	970249.9379	1316580.191	738.374079	556.374079	555.374079	182	183	125
BH-1	970249.9379	1316580.191	738.374079	555.374079	534.374079	183	204	
BH-1	970249.9379	1316580.191	738.374079	534.374079	533.874079	204	204.5	
BH-1	970249.9379	1316580.191	738.374079	533.874079	532.374079	204.5	206	3
BH-1	970249.9379	1316580.191	738.374079	532.374079	531.374079	206	207	3
BH-1	970249.9379	1316580.191	738.374079	531.374079	530.374079	207	208	4
BH-1	970249.9379	1316580.191	738.374079	530.374079	529.374079	208	209	4
BH-1	970249.9379	1316580.191	738.374079	529.374079	527.374079	209	211	35
BH-1	970249.9379	1316580.191	738.374079	527.374079	526.374079	211	212	35
BH-1	970249.9379	1316580.191	738.374079	526.374079	522.374079	212	216	5
BH-1	970249.9379	1316580.191	738.374079	522.374079	521.374079	216	217	5
BH-1	970249.9379	1316580.191	738.374079	521.374079	518.374079	217	220	
BH-1	970249.9379	1316580.191	738.374079	518.374079	517.374079	220	221	
BH-1	970249.9379	1316580.191	738.374079	517.374079	515.374079	221	223	35
BH-1	970249.9379	1316580.191	738.374079	515.374079	514.374079	223	224	35
BH-1	970249.9379	1316580.191	738.374079	514.374079	513.374079	224	225	45
BH-1	970249.9379	1316580.191	738.374079	513.374079	512.374079	225	226	45
BH-1	970249.9379	1316580.191	738.374079	512.374079	511.374079	226	227	3
BH-1	970249.9379	1316580.191	738.374079	511.374079	510.374079	227	228	3
BH-1	970249.9379	1316580.191	738.374079	510.374079	508.374079	228	230	2
BH-1	970249.9379	1316580.191	738.374079	508.374079	507.374079	230	231	2
BH-1	970249.9379	1316580.191	738.374079	507.374079	506.374079	231	232	45
BH-1	970249.9379	1316580.191	738.374079	506.374079	496.374079	232	242	
BH-1	970249.9379	1316580.191	738.374079	496.374079	495.874079	242	242.5	
BH-2	968509.5165	1309956.628	737.577	733.577	732.577	4	5	
BH-2	968509.5165	1309956.628	737.577	732.577	731.577	5	6	
BH-2	968509.5165	1309956.628	737.577	731.577	730.577	6	7	
BH-2	968509.5165	1309956.628	737.577	730.577	729.577	7	8	39
BH-2	968509.5165	1309956.628	737.577	729.577	728.577	8	9	39
BH-2	968509.5165	1309956.628	737.577	728.577	727.577	9	10	39
BH-2	968509.5165	1309956.628	737.577	727.577	726.577	10	11	38
BH-2	968509.5165	1309956.628	737.577	726.577	725.577	11	12	34
BH-2	968509.5165	1309956.628	737.577	725.577	724.577	12	13	34
BH-2	968509.5165	1309956.628	737.577	724.577	723.577	13	14	33
BH-2	968509.5165	1309956.628	737.577	723.577	722.577	14	15	33
BH-2	968509.5165	1309956.628	737.577	722.577	721.577	15	16	2

Notes:
1) Field screening measurements conducted using a PID or Multi-Gas Monitor, ppmv = parts per million by volume
2) ft MSL = feet above Mean Sea Level; ft BGS = feet below ground surface.

TABLE 3
FIELD SCREENING METHANE DATA FROM GAS RELIEF WELLS AND STRATIGRAPHIC BORINGS
Manlove Gas Storage Field
Champaign County, Illinois

Gas Relief Well or Stratigraphic Boring ID	X_coord (UTM 16N)	Y_coord (UTM 16N)	Ground Surface Elevation (ft MSL)	Top Elevation (ft MSL)	Bottom Elevation (ft MSL)	Top Depth (ft BGS)	Bottom Depth (ft BGS)	Methane (ppmv)
BH-2	968509.5165	1309956.628	737.577	721.577	720.577	16	17	2
BH-2	968509.5165	1309956.628	737.577	720.577	719.577	17	18	22
BH-2	968509.5165	1309956.628	737.577	719.577	718.577	18	19	22
BH-2	968509.5165	1309956.628	737.577	718.577	717.577	19	20	22
BH-2	968509.5165	1309956.628	737.577	717.577	716.577	20	21	9
BH-2	968509.5165	1309956.628	737.577	716.577	715.577	21	22	9
BH-2	968509.5165	1309956.628	737.577	715.577	714.577	22	23	3
BH-2	968509.5165	1309956.628	737.577	714.577	713.577	23	24	3
BH-2	968509.5165	1309956.628	737.577	713.577	712.577	24	25	3
BH-2	968509.5165	1309956.628	737.577	712.577	711.577	25	26	38
BH-2	968509.5165	1309956.628	737.577	711.577	710.577	26	27	38
BH-2	968509.5165	1309956.628	737.577	710.577	709.577	27	28	81
BH-2	968509.5165	1309956.628	737.577	709.577	708.577	28	29	81
BH-2	968509.5165	1309956.628	737.577	708.577	707.577	29	30	271
BH-2	968509.5165	1309956.628	737.577	707.577	706.577	30	31	271
BH-2	968509.5165	1309956.628	737.577	706.577	705.577	31	32	271
BH-2	968509.5165	1309956.628	737.577	705.577	704.577	32	33	11
BH-2	968509.5165	1309956.628	737.577	704.577	703.577	33	34	12
BH-2	968509.5165	1309956.628	737.577	703.577	702.577	34	35	12
BH-2	968509.5165	1309956.628	737.577	702.577	701.577	35	36	43
BH-2	968509.5165	1309956.628	737.577	701.577	700.577	36	37	43
BH-2	968509.5165	1309956.628	737.577	700.577	699.577	37	38	324
BH-2	968509.5165	1309956.628	737.577	699.577	698.577	38	39	324
BH-2	968509.5165	1309956.628	737.577	698.577	697.577	39	40	324
BH-2	968509.5165	1309956.628	737.577	697.577	696.577	40	41	1,366
BH-2	968509.5165	1309956.628	737.577	696.577	695.577	41	42	2,855
BH-2	968509.5165	1309956.628	737.577	695.577	694.577	42	43	2,855
BH-2	968509.5165	1309956.628	737.577	694.577	693.577	43	44	522
BH-2	968509.5165	1309956.628	737.577	693.577	692.577	44	45	2,973
BH-2	968509.5165	1309956.628	737.577	692.577	691.577	45	46	2,973
BH-2	968509.5165	1309956.628	737.577	691.577	690.577	46	47	1,846
BH-2	968509.5165	1309956.628	737.577	690.577	689.577	47	48	836
BH-2	968509.5165	1309956.628	737.577	689.577	688.577	48	49	836
BH-2	968509.5165	1309956.628	737.577	688.577	687.577	49	50	3,317
BH-2	968509.5165	1309956.628	737.577	687.577	686.577	50	51	1,447
BH-2	968509.5165	1309956.628	737.577	686.577	685.577	51	52	1,447
BH-2	968509.5165	1309956.628	737.577	685.577	684.577	52	53	1,119
BH-2	968509.5165	1309956.628	737.577	684.577	683.577	53	54	1,119
BH-2	968509.5165	1309956.628	737.577	683.577	682.577	54	55	1,119
BH-2	968509.5165	1309956.628	737.577	682.577	681.577	55	56	65
BH-2	968509.5165	1309956.628	737.577	681.577	680.577	56	57	65
BH-2	968509.5165	1309956.628	737.577	680.577	679.577	57	58	1,455
BH-2	968509.5165	1309956.628	737.577	679.577	678.577	58	59	1,455
BH-2	968509.5165	1309956.628	737.577	678.577	677.577	59	60	2,873
BH-2	968509.5165	1309956.628	737.577	677.577	676.577	60	61	2,873
BH-2	968509.5165	1309956.628	737.577	676.577	675.577	61	62	2,873
BH-2	968509.5165	1309956.628	737.577	675.577	674.577	62	63	91
BH-2	968509.5165	1309956.628	737.577	674.577	673.577	63	64	91
BH-2	968509.5165	1309956.628	737.577	673.577	672.577	64	65	91
BH-2	968509.5165	1309956.628	737.577	672.577	671.577	65	66	497
BH-2	968509.5165	1309956.628	737.577	671.577	670.577	66	67	497
BH-2	968509.5165	1309956.628	737.577	670.577	669.577	67	68	164
BH-2	968509.5165	1309956.628	737.577	669.577	668.577	68	69	164
BH-2	968509.5165	1309956.628	737.577	668.577	667.577	69	70	73
BH-2	968509.5165	1309956.628	737.577	667.577	666.577	70	71	73
BH-2	968509.5165	1309956.628	737.577	666.577	665.577	71	72	4,577
BH-2	968509.5165	1309956.628	737.577	665.577	664.577	72	73	4,577
BH-2	968509.5165	1309956.628	737.577	664.577	663.577	73	74	3,118
BH-2	968509.5165	1309956.628	737.577	663.577	662.577	74	75	255
BH-2	968509.5165	1309956.628	737.577	662.577	661.577	75	76	255
BH-2	968509.5165	1309956.628	737.577	661.577	660.577	76	77	255
BH-2	968509.5165	1309956.628	737.577	660.577	659.577	77	78	161
BH-2	968509.5165	1309956.628	737.577	659.577	658.577	78	79	161
BH-2	968509.5165	1309956.628	737.577	658.577	657.577	79	80	161
BH-2	968509.5165	1309956.628	737.577	657.577	656.577	80	81	157
BH-2	968509.5165	1309956.628	737.577	656.577	655.577	81	82	157
BH-2	968509.5165	1309956.628	737.577	655.577	654.577	82	83	141

Notes:
1) Field screening measurements conducted using a PID or Multi-Gas Monitor, ppmv = parts per million by volume
2) ft MSL = feet above Mean Sea Level; ft BGS = feet below ground surface.

TABLE 3
FIELD SCREENING METHANE DATA FROM GAS RELIEF WELLS AND STRATIGRAPHIC BORINGS
Manlove Gas Storage Field
Champaign County, Illinois

Gas Relief Well or Stratigraphic Boring ID	X_coord (UTM 16N)	Y_coord (UTM 16N)	Ground Surface Elevation (ft MSL)	Top Elevation (ft MSL)	Bottom Elevation (ft MSL)	Top Depth (ft BGS)	Bottom Depth (ft BGS)	Methane (ppmv)
BH-2	968509.5165	1309956.628	737.577	654.577	653.577	83	84	141
BH-2	968509.5165	1309956.628	737.577	653.577	653.077	84	84.5	141
BH-2	968509.5165	1309956.628	737.577	653.077	651.577	84.5	86	297
BH-2	968509.5165	1309956.628	737.577	651.577	650.577	86	87	297
BH-2	968509.5165	1309956.628	737.577	650.577	648.577	87	89	12
BH-2	968509.5165	1309956.628	737.577	648.577	647.577	89	90	12
BH-2	968509.5165	1309956.628	737.577	647.577	645.577	90	92	191
BH-2	968509.5165	1309956.628	737.577	645.577	644.577	92	93	191
BH-2	968509.5165	1309956.628	737.577	644.577	642.577	93	95	48
BH-2	968509.5165	1309956.628	737.577	642.577	641.577	95	96	48
BH-2	968509.5165	1309956.628	737.577	641.577	639.577	96	98	281
BH-2	968509.5165	1309956.628	737.577	639.577	639.077	98	98.5	281
BH-2	968509.5165	1309956.628	737.577	639.077	636.577	98.5	101	95
BH-2	968509.5165	1309956.628	737.577	636.577	635.577	101	102	95
BH-2	968509.5165	1309956.628	737.577	635.577	633.577	102	104	1,713
BH-2	968509.5165	1309956.628	737.577	633.577	631.577	104	106	1,357
BH-2	968509.5165	1309956.628	737.577	631.577	630.577	106	107	1,357
BH-2	968509.5165	1309956.628	737.577	630.577	628.577	107	109	27
BH-2	968509.5165	1309956.628	737.577	628.577	627.577	109	110	27
BH-2	968509.5165	1309956.628	737.577	627.577	626.577	110	111	613
BH-2	968509.5165	1309956.628	737.577	626.577	625.577	111	112	613
BH-2	968509.5165	1309956.628	737.577	625.577	621.577	112	116	658
BH-2	968509.5165	1309956.628	737.577	621.577	620.577	116	117	658
BH-2	968509.5165	1309956.628	737.577	620.577	617.577	117	120	937
BH-2	968509.5165	1309956.628	737.577	617.577	616.577	120	121	937
BH-2	968509.5165	1309956.628	737.577	616.577	614.577	121	123	528
BH-2	968509.5165	1309956.628	737.577	614.577	613.577	123	124	528
BH-2	968509.5165	1309956.628	737.577	613.577	612.577	124	125	688
BH-2	968509.5165	1309956.628	737.577	612.577	611.577	125	126	688
BH-2	968509.5165	1309956.628	737.577	611.577	610.077	126	127.5	688
BH-2	968509.5165	1309956.628	737.577	610.077	608.577	127.5	129	348
BH-2	968509.5165	1309956.628	737.577	608.577	607.577	129	130	348
BH-2	968509.5165	1309956.628	737.577	607.577	606.577	130	131	517
BH-2	968509.5165	1309956.628	737.577	606.577	605.577	131	132	517
BH-2	968509.5165	1309956.628	737.577	605.577	603.577	132	134	1,697
BH-2	968509.5165	1309956.628	737.577	603.577	602.577	134	135	1,697
BH-2	968509.5165	1309956.628	737.577	602.577	599.577	135	138	1,393
BH-2	968509.5165	1309956.628	737.577	599.577	598.577	138	139	1,393
BH-2	968509.5165	1309956.628	737.577	598.577	594.577	139	143	1,187
BH-2	968509.5165	1309956.628	737.577	594.577	593.577	143	144	1,187
BH-2	968509.5165	1309956.628	737.577	593.577	591.577	144	146	837
BH-2	968509.5165	1309956.628	737.577	591.577	590.577	146	147	837
BH-2	968509.5165	1309956.628	737.577	590.577	589.577	147	148	1,317
BH-2	968509.5165	1309956.628	737.577	589.577	588.577	148	149	1,317
BH-2	968509.5165	1309956.628	737.577	588.577	585.577	149	152	481
BH-2	968509.5165	1309956.628	737.577	585.577	584.577	152	153	481
BH-2	968509.5165	1309956.628	737.577	584.577	581.577	153	156	3,451
BH-2	968509.5165	1309956.628	737.577	581.577	580.577	156	157	3,451
BH-2	968509.5165	1309956.628	737.577	580.577	577.577	157	160	2,776
BH-2	968509.5165	1309956.628	737.577	577.577	576.577	160	161	2,776
BH-2	968509.5165	1309956.628	737.577	576.577	574.577	161	163	2,869
BH-2	968509.5165	1309956.628	737.577	574.577	573.577	163	164	2,869
BH-2	968509.5165	1309956.628	737.577	573.577	571.577	164	166	2,815
BH-2	968509.5165	1309956.628	737.577	571.577	570.577	166	167	2,815
BH-2	968509.5165	1309956.628	737.577	570.577	567.577	167	170	615
BH-2	968509.5165	1309956.628	737.577	567.577	566.577	170	171	615
BH-2	968509.5165	1309956.628	737.577	566.577	564.577	171	173	1,649
BH-2	968509.5165	1309956.628	737.577	564.577	563.577	173	174	1,649
BH-2	968509.5165	1309956.628	737.577	563.577	561.577	174	176	1,917
BH-2	968509.5165	1309956.628	737.577	561.577	560.577	176	177	1,917
BH-2	968509.5165	1309956.628	737.577	560.577	558.577	177	179	1,138
BH-2	968509.5165	1309956.628	737.577	558.577	557.577	179	180	1,138
BH-2	968509.5165	1309956.628	737.577	557.577	555.577	180	182	2,874
BH-2	968509.5165	1309956.628	737.577	555.577	554.577	182	183	2,874
BH-2	968509.5165	1309956.628	738	554.577	551.577	183	186	6,443
BH-2	968509.5165	1309956.628	738	551.577	550.577	186	187	6,443
BH-2	968509.5165	1309956.628	737.577	550.577	549.577	187	188	254

Notes:
1) Field screening measurements conducted using a PID or Multi-Gas Monitor, ppmv = parts per million by volume
2) ft MSL = feet above Mean Sea Level; ft BGS = feet below ground surface.

TABLE 3
FIELD SCREENING METHANE DATA FROM GAS RELIEF WELLS AND STRATIGRAPHIC BORINGS
Manlove Gas Storage Field
Champaign County, Illinois

Gas Relief Well or Stratigraphic Boring ID	X_coord (UTM 16N)	Y_coord (UTM 16N)	Ground Surface Elevation (ft MSL)	Top Elevation (ft MSL)	Bottom Elevation (ft MSL)	Top Depth (ft BGS)	Bottom Depth (ft BGS)	Methane (ppmv)
BH-2	968509.5165	1309956.628	737.577	549.577	548.577	188	189	254
BH-2	968509.5165	1309956.628	737.577	548.577	545.577	189	192	167
BH-2	968509.5165	1309956.628	737.577	545.577	544.577	192	193	167
BH-2	968509.5165	1309956.628	737.577	544.577	541.577	193	196	448
BH-2	968509.5165	1309956.628	737.577	541.577	540.577	196	197	448
BH-2	968509.5165	1309956.628	737.577	540.577	536.577	197	201	148
BH-2	968509.5165	1309956.628	737.577	536.577	535.577	201	202	148
BH-2	968509.5165	1309956.628	737.577	535.577	531.577	202	206	299
BH-2	968509.5165	1309956.628	737.577	531.577	530.577	206	207	299
BH-2	968509.5165	1309956.628	738	530.577	528.577	207	209	5,483
BH-2	968509.5165	1309956.628	738	528.577	527.577	209	210	5,483
BH-2	968509.5165	1309956.628	737.577	527.577	526.577	210	211	188
BH-2	968509.5165	1309956.628	737.577	526.577	525.577	211	212	188
BH-2	968509.5165	1309956.628	737.577	525.577	523.577	212	214	2,254
BH-2	968509.5165	1309956.628	737.577	523.577	522.577	214	215	2,254
BH-2	968509.5165	1309956.628	737.577	522.577	520.577	215	217	3,863
BH-2	968509.5165	1309956.628	737.577	520.577	519.577	217	218	3,863
BH-2	968509.5165	1309956.628	737.577	519.577	516.577	218	221	3,132
BH-2	968509.5165	1309956.628	737.577	516.577	515.577	221	222	3,132
BH-2	968509.5165	1309956.628	737.577	515.577	514.577	222	223	2,118
BH-2	968509.5165	1309956.628	737.577	514.577	513.577	223	224	2,118
BH-2	968509.5165	1309956.628	737.577	513.577	511.577	224	226	1,974
BH-2	968509.5165	1309956.628	737.577	511.577	510.577	226	227	1,974
BH-2	968509.5165	1309956.628	737.577	510.577	501.577	227	236	
BH-2	968509.5165	1309956.628	737.577	501.577	500.577	236	237	
BH-2	968509.5165	1309956.628	737.577	500.577	499.577	237	238	14
BH-2	968509.5165	1309956.628	737.577	499.577	498.577	238	239	14
BH-2	968509.5165	1309956.628	738	498.577	497.577	239	240	9,563
BH-2	968509.5165	1309956.628	738	497.577	496.577	240	241	9,563
BH-2	968509.5165	1309956.628	738	496.577	495.577	241	242	9,563
BH-2	968509.5165	1309956.628	738	495.577	495.077	242	242.5	9,563
BH-3	967141.871	1311857.273	727.219843	723.219843	722.219843	4	5	
BH-3	967141.871	1311857.273	727.219843	722.219843	721.219843	5	6	
BH-3	967141.871	1311857.273	727.219843	721.219843	720.219843	6	7	
BH-3	967141.871	1311857.273	727.219843	720.219843	719.219843	7	8	
BH-3	967141.871	1311857.273	727.219843	719.219843	718.219843	8	9	
BH-3	967141.871	1311857.273	727.219843	718.219843	717.219843	9	10	
BH-3	967141.871	1311857.273	727.219843	717.219843	716.219843	10	11	
BH-3	967141.871	1311857.273	727.219843	716.219843	715.219843	11	12	
BH-3	967141.871	1311857.273	727.219843	715.219843	714.219843	12	13	
BH-3	967141.871	1311857.273	727.219843	714.219843	713.219843	13	14	
BH-3	967141.871	1311857.273	727.219843	713.219843	712.219843	14	15	
BH-3	967141.871	1311857.273	727.219843	712.219843	711.219843	15	16	
BH-3	967141.871	1311857.273	727.219843	711.219843	710.219843	16	17	
BH-3	967141.871	1311857.273	727.219843	710.219843	707.219843	17	20	
BH-3	967141.871	1311857.273	727.219843	707.219843	706.219843	20	21	
BH-3	967141.871	1311857.273	727.219843	706.219843	705.219843	21	22	
BH-3	967141.871	1311857.273	727.219843	705.219843	704.219843	22	23	
BH-3	967141.871	1311857.273	727.219843	704.219843	703.219843	23	24	
BH-3	967141.871	1311857.273	727.219843	703.219843	702.219843	24	25	27
BH-3	967141.871	1311857.273	727.219843	702.219843	701.219843	25	26	27
BH-3	967141.871	1311857.273	727.219843	701.219843	700.219843	26	27	27
BH-3	967141.871	1311857.273	727.219843	700.219843	699.219843	27	28	134
BH-3	967141.871	1311857.273	727.219843	699.219843	698.219843	28	29	134
BH-3	967141.871	1311857.273	727.219843	698.219843	697.219843	29	30	134
BH-3	967141.871	1311857.273	727.219843	697.219843	696.219843	30	31	413
BH-3	967141.871	1311857.273	727.219843	696.219843	695.219843	31	32	33
BH-3	967141.871	1311857.273	727.219843	695.219843	694.719843	32	32.5	33
BH-3	967141.871	1311857.273	727.219843	694.719843	694.219843	32.5	33	59
BH-3	967141.871	1311857.273	727.219843	694.219843	693.219843	33	34	59
BH-3	967141.871	1311857.273	727.219843	693.219843	692.219843	34	35	168
BH-3	967141.871	1311857.273	727.219843	692.219843	691.219843	35	36	168
BH-3	967141.871	1311857.273	727.219843	691.219843	690.219843	36	37	168
BH-3	967141.871	1311857.273	727.219843	690.219843	689.219843	37	38	78
BH-3	967141.871	1311857.273	727.219843	689.219843	688.219843	38	39	197
BH-3	967141.871	1311857.273	727.219843	688.219843	687.219843	39	40	197
BH-3	967141.871	1311857.273	727.219843	687.219843	686.719843	40	40.5	197

Notes:
1) Field screening measurements conducted using a PID or Multi-Gas Monitor, ppmv = parts per million by volume
2) ft MSL = feet above Mean Sea Level; ft BGS = feet below ground surface.

TABLE 3
FIELD SCREENING METHANE DATA FROM GAS RELIEF WELLS AND STRATIGRAPHIC BORINGS
Manlove Gas Storage Field
Champaign County, Illinois

Gas Relief Well or Stratigraphic Boring ID	X_coord (UTM 16N)	Y_coord (UTM 16N)	Ground Surface Elevation (ft MSL)	Top Elevation (ft MSL)	Bottom Elevation (ft MSL)	Top Depth (ft BGS)	Bottom Depth (ft BGS)	Methane (ppmv)
BH-3	967141.871	1311857.273	727.219843	686.719843	686.219843	40.5	41	595
BH-3	967141.871	1311857.273	727.219843	686.219843	685.219843	41	42	595
BH-3	967141.871	1311857.273	727.219843	685.219843	684.719843	42	42.5	595
BH-3	967141.871	1311857.273	727	684.719843	684.219843	42.5	43	22,589
BH-3	967141.871	1311857.273	727	684.219843	683.219843	43	44	22,589
BH-3	967141.871	1311857.273	727	683.219843	682.719843	44	44.5	22,589
BH-3	967141.871	1311857.273	727	682.719843	681.219843	44.5	46	9,525
BH-3	967141.871	1311857.273	727	681.219843	680.219843	46	47	9,525
BH-3	967141.871	1311857.273	727.219843	680.219843	679.219843	47	48	1,935
BH-3	967141.871	1311857.273	727.219843	679.219843	678.219843	48	49	1,935
BH-3	967141.871	1311857.273	727.219843	678.219843	677.219843	49	50	1,935
BH-3	967141.871	1311857.273	727	677.219843	676.219843	50	51	9,185
BH-3	967141.871	1311857.273	727	676.219843	675.219843	51	52	9,185
BH-3	967141.871	1311857.273	727.219843	675.219843	674.219843	52	53	32
BH-3	967141.871	1311857.273	727.219843	674.219843	673.219843	53	54	32
BH-3	967141.871	1311857.273	727.219843	673.219843	672.219843	54	55	32
BH-3	967141.871	1311857.273	727.219843	672.219843	671.219843	55	56	289
BH-3	967141.871	1311857.273	727.219843	671.219843	670.219843	56	57	289
BH-3	967141.871	1311857.273	727.219843	670.219843	669.219843	57	58	192
BH-3	967141.871	1311857.273	727.219843	669.219843	668.219843	58	59	192
BH-3	967141.871	1311857.273	727.219843	668.219843	667.219843	59	60	192
BH-3	967141.871	1311857.273	727.219843	667.219843	666.219843	60	61	245
BH-3	967141.871	1311857.273	727.219843	666.219843	665.219843	61	62	245
BH-3	967141.871	1311857.273	727.219843	665.219843	664.719843	62	62.5	245
BH-3	967141.871	1311857.273	727.219843	664.719843	664.219843	62.5	63	35
BH-3	967141.871	1311857.273	727.219843	664.219843	663.219843	63	64	35
BH-3	967141.871	1311857.273	727.219843	663.219843	662.219843	64	65	35
BH-3	967141.871	1311857.273	727.219843	662.219843	661.219843	65	66	13
BH-3	967141.871	1311857.273	727.219843	661.219843	660.219843	66	67	13
BH-3	967141.871	1311857.273	727.219843	660.219843	659.219843	67	68	119
BH-3	967141.871	1311857.273	727.219843	659.219843	658.719843	68	68.5	119
BH-3	967141.871	1311857.273	727.219843	658.719843	658.219843	68.5	69	147
BH-3	967141.871	1311857.273	727.219843	658.219843	657.219843	69	70	147
BH-3	967141.871	1311857.273	727.219843	657.219843	656.219843	70	71	147
BH-3	967141.871	1311857.273	727.219843	656.219843	655.219843	71	72	147
BH-3	967141.871	1311857.273	727.219843	655.219843	654.219843	72	73	187
BH-3	967141.871	1311857.273	727.219843	654.219843	653.219843	73	74	187
BH-3	967141.871	1311857.273	727.219843	653.219843	652.219843	74	75	187
BH-3	967141.871	1311857.273	727.219843	652.219843	651.219843	75	76	148
BH-3	967141.871	1311857.273	727.219843	651.219843	650.219843	76	77	148
BH-3	967141.871	1311857.273	727.219843	650.219843	649.219843	77	78	413
BH-3	967141.871	1311857.273	727.219843	649.219843	648.219843	78	79	413
BH-3	967141.871	1311857.273	727.219843	648.219843	647.219843	79	80	1,189
BH-3	967141.871	1311857.273	727.219843	647.219843	646.219843	80	81	1,189
BH-3	967141.871	1311857.273	727.219843	646.219843	645.219843	81	82	1,189
BH-3	967141.871	1311857.273	727.219843	645.219843	644.219843	82	83	1,133
BH-3	967141.871	1311857.273	727.219843	644.219843	643.219843	83	84	1,133
BH-3	967141.871	1311857.273	727.219843	643.219843	642.219843	84	85	1,438
BH-3	967141.871	1311857.273	727.219843	642.219843	641.219843	85	86	1,438
BH-3	967141.871	1311857.273	727.219843	641.219843	640.219843	86	87	1,438
BH-3	967141.871	1311857.273	727.219843	640.219843	639.219843	87	88	195
BH-3	967141.871	1311857.273	727.219843	639.219843	638.219843	88	89	1
BH-3	967141.871	1311857.273	727.219843	638.219843	637.219843	89	90	1
BH-3	967141.871	1311857.273	727.219843	637.219843	636.219843	90	91	257
BH-3	967141.871	1311857.273	727.219843	636.219843	635.219843	91	92	257
BH-3	967141.871	1311857.273	727.219843	635.219843	634.719843	92	92.5	257
BH-3	967141.871	1311857.273	727.219843	634.719843	634.219843	92.5	93	351
BH-3	967141.871	1311857.273	727.219843	634.219843	633.219843	93	94	351
BH-3	967141.871	1311857.273	727.219843	633.219843	632.219843	94	95	351
BH-3	967141.871	1311857.273	727.219843	632.219843	631.719843	95	95.5	351
BH-3	967141.871	1311857.273	727.219843	631.719843	631.219843	95.5	96	721
BH-3	967141.871	1311857.273	727.219843	631.219843	630.219843	96	97	721
BH-3	967141.871	1311857.273	727.219843	630.219843	629.219843	97	98	721
BH-3	967141.871	1311857.273	727.219843	629.219843	628.219843	98	99	54
BH-3	967141.871	1311857.273	727.219843	628.219843	627.219843	99	100	54
BH-3	967141.871	1311857.273	727.219843	627.219843	626.219843	100	101	146
BH-3	967141.871	1311857.273	727.219843	626.219843	625.219843	101	102	146

Notes:
1) Field screening measurements conducted using a PID or Multi-Gas Monitor, ppmv = parts per million by volume
2) ft MSL = feet above Mean Sea Level; ft BGS = feet below ground surface.

TABLE 3
FIELD SCREENING METHANE DATA FROM GAS RELIEF WELLS AND STRATIGRAPHIC BORINGS
Manlove Gas Storage Field
Champaign County, Illinois

Gas Relief Well or Stratigraphic Boring ID	X_coord (UTM 16N)	Y_coord (UTM 16N)	Ground Surface Elevation (ft MSL)	Top Elevation (ft MSL)	Bottom Elevation (ft MSL)	Top Depth (ft BGS)	Bottom Depth (ft BGS)	Methane (ppmv)
BH-3	967141.871	1311857.273	727.219843	625.219843	624.219843	102	103	146
BH-3	967141.871	1311857.273	727.219843	624.219843	623.219843	103	104	1,535
BH-3	967141.871	1311857.273	727.219843	623.219843	622.719843	104	104.5	1,535
BH-3	967141.871	1311857.273	727.219843	622.719843	622.219843	104.5	105	736
BH-3	967141.871	1311857.273	727.219843	622.219843	621.219843	105	106	736
BH-3	967141.871	1311857.273	727.219843	621.219843	620.219843	106	107	736
BH-3	967141.871	1311857.273	727.219843	620.219843	619.219843	107	108	529
BH-3	967141.871	1311857.273	727.219843	619.219843	618.219843	108	109	529
BH-3	967141.871	1311857.273	727.219843	618.219843	617.219843	109	110	76
BH-3	967141.871	1311857.273	727.219843	617.219843	616.219843	110	111	76
BH-3	967141.871	1311857.273	727.219843	616.219843	615.219843	111	112	76
BH-3	967141.871	1311857.273	727.219843	615.219843	614.219843	112	113	337
BH-3	967141.871	1311857.273	727.219843	614.219843	613.219843	113	114	337
BH-3	967141.871	1311857.273	727.219843	613.219843	612.219843	114	115	337
BH-3	967141.871	1311857.273	727.219843	612.219843	611.719843	115	115.5	337
BH-3	967141.871	1311857.273	727.219843	611.719843	611.219843	115.5	116	774
BH-3	967141.871	1311857.273	727.219843	611.219843	610.219843	116	117	774
BH-3	967141.871	1311857.273	727.219843	610.219843	609.219843	117	118	774
BH-3	967141.871	1311857.273	727.219843	609.219843	608.219843	118	119	159
BH-3	967141.871	1311857.273	727.219843	608.219843	607.219843	119	120	159
BH-3	967141.871	1311857.273	727.219843	607.219843	606.219843	120	121	159
BH-3	967141.871	1311857.273	727.219843	606.219843	605.219843	121	122	159
BH-3	967141.871	1311857.273	727.219843	605.219843	604.219843	122	123	186
BH-3	967141.871	1311857.273	727.219843	604.219843	603.219843	123	124	186
BH-3	967141.871	1311857.273	727.219843	603.219843	602.719843	124	124.5	186
BH-3	967141.871	1311857.273	727.219843	602.719843	602.219843	124.5	125	834
BH-3	967141.871	1311857.273	727.219843	602.219843	601.219843	125	126	834
BH-3	967141.871	1311857.273	727.219843	601.219843	600.219843	126	127	834
BH-3	967141.871	1311857.273	727.219843	600.219843	599.219843	127	128	1
BH-3	967141.871	1311857.273	727.219843	599.219843	598.219843	128	129	1
BH-3	967141.871	1311857.273	727.219843	598.219843	597.219843	129	130	1
BH-3	967141.871	1311857.273	727.219843	597.219843	596.219843	130	131	351
BH-3	967141.871	1311857.273	727.219843	596.219843	595.219843	131	132	351
BH-3	967141.871	1311857.273	727.219843	595.219843	594.219843	132	133	351
BH-3	967141.871	1311857.273	727.219843	594.219843	593.219843	133	134	751
BH-3	967141.871	1311857.273	727.219843	593.219843	592.219843	134	135	751
BH-3	967141.871	1311857.273	727.219843	592.219843	591.219843	135	136	751
BH-3	967141.871	1311857.273	727.219843	591.219843	590.219843	136	137	882
BH-3	967141.871	1311857.273	727.219843	590.219843	589.219843	137	138	882
BH-3	967141.871	1311857.273	727.219843	589.219843	588.219843	138	139	925
BH-3	967141.871	1311857.273	727.219843	588.219843	587.219843	139	140	925
BH-3	967141.871	1311857.273	727.219843	587.219843	586.219843	140	141	925
BH-3	967141.871	1311857.273	727.219843	586.219843	585.219843	141	142	925
BH-3	967141.871	1311857.273	727.219843	585.219843	584.219843	142	143	42
BH-3	967141.871	1311857.273	727.219843	584.219843	583.219843	143	144	42
BH-3	967141.871	1311857.273	727.219843	583.219843	582.219843	144	145	584
BH-3	967141.871	1311857.273	727.219843	582.219843	581.219843	145	146	584
BH-3	967141.871	1311857.273	727.219843	581.219843	580.219843	146	147	584
BH-3	967141.871	1311857.273	727.219843	580.219843	579.219843	147	148	189
BH-3	967141.871	1311857.273	727.219843	579.219843	578.219843	148	149	533
BH-3	967141.871	1311857.273	727.219843	578.219843	577.219843	149	150	53
BH-3	967141.871	1311857.273	727.219843	577.219843	576.219843	150	151	533
BH-3	967141.871	1311857.273	727.219843	576.219843	575.219843	151	152	595
BH-3	967141.871	1311857.273	727.219843	575.219843	574.719843	152	152.5	595
BH-3	967141.871	1311857.273	727.219843	574.719843	574.219843	152.5	153	1,559
BH-3	967141.871	1311857.273	727.219843	574.219843	573.219843	153	154	1,559
BH-3	967141.871	1311857.273	727.219843	573.219843	572.219843	154	155	1,559
BH-3	967141.871	1311857.273	727.219843	572.219843	571.219843	155	156	1,559
BH-3	967141.871	1311857.273	727.219843	571.219843	570.719843	156	156.5	1,559
BH-3	967141.871	1311857.273	727.219843	570.719843	570.219843	156.5	157	1,974
BH-3	967141.871	1311857.273	727.219843	570.219843	569.219843	157	158	1,974
BH-3	967141.871	1311857.273	727.219843	569.219843	568.219843	158	159	1,974
BH-3	967141.871	1311857.273	727.219843	568.219843	567.219843	159	160	1,643
BH-3	967141.871	1311857.273	727.219843	567.219843	566.219843	160	161	1,643
BH-3	967141.871	1311857.273	727.219843	566.219843	565.219843	161	162	1,643
BH-3	967141.871	1311857.273	727.219843	565.219843	564.719843	162	162.5	1,643
BH-3	967141.871	1311857.273	727.219843	564.719843	564.219843	162.5	163	44

Notes:
1) Field screening measurements conducted using a PID or Multi-Gas Monitor, ppmv = parts per million by volume
2) ft MSL = feet above Mean Sea Level; ft BGS = feet below ground surface.

TABLE 3
FIELD SCREENING METHANE DATA FROM GAS RELIEF WELLS AND STRATIGRAPHIC BORINGS
Manlove Gas Storage Field
Champaign County, Illinois

Gas Relief Well or Stratigraphic Boring ID	X_coord (UTM 16N)	Y_coord (UTM 16N)	Ground Surface Elevation (ft MSL)	Top Elevation (ft MSL)	Bottom Elevation (ft MSL)	Top Depth (ft BGS)	Bottom Depth (ft BGS)	Methane (ppmv)
BH-3	967141.871	1311857.273	727.219843	564.219843	563.219843	163	164	44
BH-3	967141.871	1311857.273	727.219843	563.219843	562.719843	164	164.5	44
BH-3	967141.871	1311857.273	727.219843	562.719843	562.219843	164.5	165	588
BH-3	967141.871	1311857.273	727.219843	562.219843	561.219843	165	166	588
BH-3	967141.871	1311857.273	727.219843	561.219843	560.219843	166	167	588
BH-3	967141.871	1311857.273	727.219843	560.219843	559.219843	167	168	
BH-3	967141.871	1311857.273	727.219843	559.219843	558.219843	168	169	
BH-3	967141.871	1311857.273	727.219843	558.219843	557.219843	169	170	
BH-3	967141.871	1311857.273	727.219843	557.219843	556.219843	170	171	
BH-3	967141.871	1311857.273	727.219843	556.219843	555.219843	171	172	741
BH-3	967141.871	1311857.273	727.219843	555.219843	554.219843	172	173	741
BH-3	967141.871	1311857.273	727.219843	554.219843	553.219843	173	174	741
BH-3	967141.871	1311857.273	727.219843	553.219843	552.219843	174	175	178
BH-3	967141.871	1311857.273	727.219843	552.219843	551.219843	175	176	178
BH-3	967141.871	1311857.273	727.219843	551.219843	550.719843	176	176.5	178
BH-3	967141.871	1311857.273	727.219843	550.719843	550.219843	176.5	177	276
BH-3	967141.871	1311857.273	727.219843	550.219843	549.219843	177	178	276
BH-3	967141.871	1311857.273	727.219843	549.219843	548.719843	178	178.5	276
BH-3	967141.871	1311857.273	727.219843	548.719843	548.219843	178.5	179	279
BH-3	967141.871	1311857.273	727.219843	548.219843	547.219843	179	180	279
BH-3	967141.871	1311857.273	727.219843	547.219843	546.219843	180	181	12
BH-3	967141.871	1311857.273	727.219843	546.219843	545.219843	181	182	127
BH-3	967141.871	1311857.273	727.219843	545.219843	544.719843	182	182.5	12
BH-3	967141.871	1311857.273	727.219843	544.719843	544.219843	182.5	183	7
BH-3	967141.871	1311857.273	727.219843	544.219843	543.219843	183	184	183
BH-3	967141.871	1311857.273	727.219843	543.219843	542.719843	184	184.5	7
BH-3	967141.871	1311857.273	727.219843	542.719843	541.219843	184.5	186	183
BH-3	967141.871	1311857.273	727.219843	541.219843	540.219843	186	187	183
BH-3	967141.871	1311857.273	727.219843	540.219843	539.219843	187	188	
BH-3	967141.871	1311857.273	727.219843	539.219843	538.719843	188	188.5	
BH-3	967141.871	1311857.273	727.219843	538.719843	538.219843	188.5	189	169
BH-3	967141.871	1311857.273	727.219843	538.219843	537.219843	189	190	169
BH-3	967141.871	1311857.273	727.219843	537.219843	536.219843	190	191	169
BH-3	967141.871	1311857.273	727.219843	536.219843	535.219843	191	192	265
BH-3	967141.871	1311857.273	727.219843	535.219843	534.219843	192	193	265
BH-3	967141.871	1311857.273	727.219843	534.219843	533.719843	193	193.5	265
BH-3	967141.871	1311857.273	727.219843	533.719843	533.219843	193.5	194	669
BH-3	967141.871	1311857.273	727.219843	533.219843	532.219843	194	195	669
BH-3	967141.871	1311857.273	727.219843	532.219843	531.219843	195	196	669
BH-3	967141.871	1311857.273	727.219843	531.219843	529.719843	196	197.5	669
BH-3	967141.871	1311857.273	727.219843	529.719843	529.219843	197.5	198	439
BH-3	967141.871	1311857.273	727.219843	529.219843	528.219843	198	199	439
BH-3	967141.871	1311857.273	727.219843	528.219843	527.219843	199	200	62
BH-3	967141.871	1311857.273	727.219843	527.219843	526.219843	200	201	62
BH-3	967141.871	1311857.273	727.219843	526.219843	525.219843	201	202	62
BH-3	967141.871	1311857.273	727.219843	525.219843	524.219843	202	203	164
BH-3	967141.871	1311857.273	727.219843	524.219843	523.719843	203	203.5	164
BH-3	967141.871	1311857.273	727.219843	523.719843	523.219843	203.5	204	474
BH-3	967141.871	1311857.273	727.219843	523.219843	522.219843	204	205	474
BH-3	967141.871	1311857.273	727.219843	522.219843	521.719843	205	205.5	474
BH-3	967141.871	1311857.273	727.219843	521.719843	521.219843	205.5	206	365
BH-3	967141.871	1311857.273	727.219843	521.219843	520.219843	206	207	365
BH-3	967141.871	1311857.273	727.219843	520.219843	519.219843	207	208	732
BH-3	967141.871	1311857.273	727.219843	519.219843	518.219843	208	209	732
BH-3	967141.871	1311857.273	727.219843	518.219843	517.219843	209	210	124
BH-3	967141.871	1311857.273	727.219843	517.219843	516.219843	210	211	124
BH-3	967141.871	1311857.273	727.219843	516.219843	515.219843	211	212	124
BH-3	967141.871	1311857.273	727.219843	515.219843	514.219843	212	213	319
BH-3	967141.871	1311857.273	727.219843	514.219843	513.219843	213	214	319
BH-3	967141.871	1311857.273	727.219843	513.219843	512.719843	214	214.5	319
BH-4	965927.4597	1315243.33	738.568416	734.568416	733.568416	4	5	
BH-4	965927.4597	1315243.33	738.568416	733.568416	732.568416	5	6	
BH-4	965927.4597	1315243.33	738.568416	732.568416	727.568416	6	11	
BH-4	965927.4597	1315243.33	738.568416	727.568416	726.568416	11	12	454
BH-4	965927.4597	1315243.33	738.568416	726.568416	725.568416	12	13	454
BH-4	965927.4597	1315243.33	738.568416	725.568416	725.068416	13	13.5	454
BH-4	965927.4597	1315243.33	738.568416	725.068416	724.568416	13.5	14	158

Notes:
1) Field screening measurements conducted using a PID or Multi-Gas Monitor, ppmv = parts per million by volume
2) ft MSL = feet above Mean Sea Level; ft BGS = feet below ground surface.

TABLE 3
FIELD SCREENING METHANE DATA FROM GAS RELIEF WELLS AND STRATIGRAPHIC BORINGS
Manlove Gas Storage Field
Champaign County, Illinois

Gas Relief Well or Stratigraphic Boring ID	X_coord (UTM 16N)	Y_coord (UTM 16N)	Ground Surface Elevation (ft MSL)	Top Elevation (ft MSL)	Bottom Elevation (ft MSL)	Top Depth (ft BGS)	Bottom Depth (ft BGS)	Methane (ppmv)
BH-4	965927.4597	1315243.33	738.568416	724.568416	722.568416	14	16	158
BH-4	965927.4597	1315243.33	738.568416	722.568416	721.568416	16	17	158
BH-4	965927.4597	1315243.33	738.568416	721.568416	710.568416	17	28	
BH-4	965927.4597	1315243.33	738.568416	710.568416	709.568416	28	29	
BH-4	965927.4597	1315243.33	738.568416	709.568416	707.568416	29	31	121
BH-4	965927.4597	1315243.33	738.568416	707.568416	707.068416	31	31.5	121
BH-4	965927.4597	1315243.33	738.568416	707.068416	706.568416	31.5	32	1,641
BH-4	965927.4597	1315243.33	738.568416	706.568416	705.568416	32	33	1,641
BH-4	965927.4597	1315243.33	738.568416	705.568416	704.568416	33	34	1,714
BH-4	965927.4597	1315243.33	738.568416	704.568416	703.568416	34	35	714
BH-4	965927.4597	1315243.33	738.568416	703.568416	702.568416	35	36	722
BH-4	965927.4597	1315243.33	738.568416	702.568416	701.568416	36	37	236
BH-4	965927.4597	1315243.33	738.568416	701.568416	700.568416	37	38	
BH-4	965927.4597	1315243.33	738.568416	700.568416	700.068416	38	38.5	
BH-4	965927.4597	1315243.33	738.568416	700.068416	699.568416	38.5	39	184
BH-4	965927.4597	1315243.33	738.568416	699.568416	698.568416	39	40	184
BH-4	965927.4597	1315243.33	738.568416	698.568416	697.568416	40	41	725
BH-4	965927.4597	1315243.33	738.568416	697.568416	696.568416	41	42	725
BH-4	965927.4597	1315243.33	738.568416	696.568416	695.568416	42	43	1,317
BH-4	965927.4597	1315243.33	738.568416	695.568416	694.568416	43	44	1,317
BH-4	965927.4597	1315243.33	738.568416	694.568416	693.568416	44	45	412
BH-4	965927.4597	1315243.33	738.568416	693.568416	692.568416	45	46	412
BH-4	965927.4597	1315243.33	738.568416	692.568416	691.568416	46	47	99
BH-4	965927.4597	1315243.33	738.568416	691.568416	689.568416	47	49	129
BH-4	965927.4597	1315243.33	738.568416	689.568416	689.068416	49	49.5	129
BH-4	965927.4597	1315243.33	738.568416	689.068416	687.568416	49.5	51	217
BH-4	965927.4597	1315243.33	738.568416	687.568416	686.568416	51	52	217
BH-4	965927.4597	1315243.33	738.568416	686.568416	684.568416	52	54	141
BH-4	965927.4597	1315243.33	738.568416	684.568416	684.068416	54	54.5	141
BH-4	965927.4597	1315243.33	738.568416	684.068416	682.568416	54.5	56	1,499
BH-4	965927.4597	1315243.33	738.568416	682.568416	681.568416	56	57	1,499
BH-4	965927.4597	1315243.33	738.568416	681.568416	680.568416	57	58	51
BH-4	965927.4597	1315243.33	738.568416	680.568416	679.568416	58	59	51
BH-4	965927.4597	1315243.33	738.568416	679.568416	677.568416	59	61	3,289
BH-4	965927.4597	1315243.33	738.568416	677.568416	677.068416	61	61.5	3,289
BH-4	965927.4597	1315243.33	738.568416	677.068416	675.568416	61.5	63	1,883
BH-4	965927.4597	1315243.33	738.568416	675.568416	674.568416	63	64	1,883
BH-4	965927.4597	1315243.33	738.568416	674.568416	672.568416	64	66	2,444
BH-4	965927.4597	1315243.33	738.568416	672.568416	671.568416	66	67	2,444
BH-4	965927.4597	1315243.33	739	671.568416	669.568416	67	69	39,237
BH-4	965927.4597	1315243.33	739	669.568416	669.068416	69	69.5	39,237
BH-4	965927.4597	1315243.33	738.568416	669.068416	667.568416	69.5	71	
BH-4	965927.4597	1315243.33	738.568416	667.568416	666.568416	71	72	
BH-4	965927.4597	1315243.33	738.568416	666.568416	664.568416	72	74	398
BH-4	965927.4597	1315243.33	738.568416	664.568416	664.068416	74	74.5	398
BH-4	965927.4597	1315243.33	738.568416	664.068416	662.568416	74.5	76	597
BH-4	965927.4597	1315243.33	738.568416	662.568416	661.568416	76	77	597
BH-4	965927.4597	1315243.33	738.568416	661.568416	658.568416	77	80	1,955
BH-4	965927.4597	1315243.33	738.568416	658.568416	658.068416	80	80.5	1,955
BH-4	965927.4597	1315243.33	738.568416	658.068416	656.568416	80.5	82	749
BH-4	965927.4597	1315243.33	738.568416	656.568416	655.568416	82	83	749
BH-4	965927.4597	1315243.33	738.568416	655.568416	654.568416	83	84	2,889
BH-4	965927.4597	1315243.33	738.568416	654.568416	653.568416	84	85	2,889
BH-4	965927.4597	1315243.33	739	653.568416	652.568416	85	86	6,517
BH-4	965927.4597	1315243.33	739	652.568416	651.568416	86	87	6,517
BH-4	965927.4597	1315243.33	738.568416	651.568416	648.568416	87	90	5
BH-4	965927.4597	1315243.33	738.568416	648.568416	648.068416	90	90.5	5
BH-4	965927.4597	1315243.33	738.568416	648.068416	646.568416	90.5	92	2,971
BH-4	965927.4597	1315243.33	738.568416	646.568416	646.068416	92	92.5	2,971
BH-4	965927.4597	1315243.33	738.568416	646.068416	644.568416	92.5	94	5
BH-4	965927.4597	1315243.33	738.568416	644.568416	643.568416	94	95	5
BH-4	965927.4597	1315243.33	739	643.568416	642.568416	95	96	5,299
BH-4	965927.4597	1315243.33	739	642.568416	642.068416	96	96.5	5,299
BH-4	965927.4597	1315243.33	738.568416	642.068416	640.568416	96.5	98	769
BH-4	965927.4597	1315243.33	738.568416	640.568416	639.568416	98	99	769
BH-4	965927.4597	1315243.33	738.568416	639.568416	638.568416	99	100	1,167
BH-4	965927.4597	1315243.33	738.568416	638.568416	637.568416	100	101	1,167

Notes:
1) Field screening measurements conducted using a PID or Multi-Gas Monitor, ppmv = parts per million by volume
2) ft MSL = feet above Mean Sea Level; ft BGS = feet below ground surface.

TABLE 3
FIELD SCREENING METHANE DATA FROM GAS RELIEF WELLS AND STRATIGRAPHIC BORINGS
Manlove Gas Storage Field
Champaign County, Illinois

Gas Relief Well or Stratigraphic Boring ID	X_coord (UTM 16N)	Y_coord (UTM 16N)	Ground Surface Elevation (ft MSL)	Top Elevation (ft MSL)	Bottom Elevation (ft MSL)	Top Depth (ft BGS)	Bottom Depth (ft BGS)	Methane (ppmv)
BH-4	965927.4597	1315243.33	738.568416	637.568416	636.568416	101	102	3,225
BH-4	965927.4597	1315243.33	738.568416	636.568416	636.068416	102	102.5	3,225
BH-4	965927.4597	1315243.33	738.568416	636.068416	635.568416	102.5	103	6
BH-4	965927.4597	1315243.33	738.568416	635.568416	634.568416	103	104	6
BH-4	965927.4597	1315243.33	738.568416	634.568416	633.568416	104	105	189
BH-4	965927.4597	1315243.33	738.568416	633.568416	632.568416	105	106	76
BH-4	965927.4597	1315243.33	738.568416	632.568416	631.568416	106	107	76
BH-4	965927.4597	1315243.33	738.568416	631.568416	630.568416	107	108	2,579
BH-4	965927.4597	1315243.33	738.568416	630.568416	629.568416	108	109	2,579
BH-4	965927.4597	1315243.33	738.568416	629.568416	627.568416	109	111	159
BH-4	965927.4597	1315243.33	738.568416	627.568416	626.568416	111	112	159
BH-4	965927.4597	1315243.33	738.568416	626.568416	625.568416	112	113	1,735
BH-4	965927.4597	1315243.33	738.568416	625.568416	624.568416	113	114	1,735
BH-4	965927.4597	1315243.33	738.568416	624.568416	622.568416	114	116	516
BH-4	965927.4597	1315243.33	738.568416	622.568416	621.568416	116	117	516
BH-4	965927.4597	1315243.33	738.568416	621.568416	620.568416	117	118	714
BH-4	965927.4597	1315243.33	738.568416	620.568416	619.568416	118	119	714
BH-4	965927.4597	1315243.33	738.568416	619.568416	618.568416	119	120	96
BH-4	965927.4597	1315243.33	738.568416	618.568416	617.568416	120	121	96
BH-4	965927.4597	1315243.33	738.568416	617.568416	616.568416	121	122	96
BH-4	965927.4597	1315243.33	738.568416	616.568416	615.568416	122	123	528
BH-4	965927.4597	1315243.33	738.568416	615.568416	614.568416	123	124	528
BH-4	965927.4597	1315243.33	738.568416	614.568416	612.568416	124	126	1,112
BH-4	965927.4597	1315243.33	738.568416	612.568416	611.568416	126	127	1,112
BH-4	965927.4597	1315243.33	738.568416	611.568416	610.568416	127	128	222
BH-4	965927.4597	1315243.33	738.568416	610.568416	610.068416	128	128.5	222
BH-4	965927.4597	1315243.33	738.568416	610.068416	607.568416	128.5	131	211
BH-4	965927.4597	1315243.33	738.568416	607.568416	607.068416	131	131.5	211
BH-4	965927.4597	1315243.33	738.568416	607.068416	605.568416	131.5	133	179
BH-4	965927.4597	1315243.33	738.568416	605.568416	604.568416	133	134	179
BH-4	965927.4597	1315243.33	738.568416	604.568416	602.568416	134	136	237
BH-4	965927.4597	1315243.33	738.568416	602.568416	601.568416	136	137	237
BH-4	965927.4597	1315243.33	738.568416	601.568416	599.568416	137	139	126
BH-4	965927.4597	1315243.33	738.568416	599.568416	599.068416	139	139.5	126
BH-4	965927.4597	1315243.33	738.568416	599.068416	598.568416	139.5	140	132
BH-4	965927.4597	1315243.33	738.568416	598.568416	597.568416	140	141	132
BH-4	965927.4597	1315243.33	738.568416	597.568416	596.568416	141	142	132
BH-4	965927.4597	1315243.33	738.568416	596.568416	596.068416	142	142.5	132
BH-4	965927.4597	1315243.33	738.568416	596.068416	594.568416	142.5	144	263
BH-4	965927.4597	1315243.33	738.568416	594.568416	593.568416	144	145	263
BH-4	965927.4597	1315243.33	738.568416	593.568416	592.568416	145	146	649
BH-4	965927.4597	1315243.33	738.568416	592.568416	591.568416	146	147	649
BH-4	965927.4597	1315243.33	738.568416	591.568416	588.568416	147	150	29
BH-4	965927.4597	1315243.33	738.568416	588.568416	582.568416	150	156	29
BH-4	965927.4597	1315243.33	738.568416	582.568416	581.568416	156	157	75
BH-4	965927.4597	1315243.33	738.568416	581.568416	581.068416	157	157.5	75
BH-4	965927.4597	1315243.33	738.568416	581.068416	579.568416	157.5	159	141
BH-4	965927.4597	1315243.33	738.568416	579.568416	578.568416	159	160	141
BH-4	965927.4597	1315243.33	738.568416	578.568416	577.568416	160	161	1
BH-4	965927.4597	1315243.33	738.568416	577.568416	576.568416	161	162	1
BH-4	965927.4597	1315243.33	738.568416	576.568416	574.568416	162	164	158
BH-4	965927.4597	1315243.33	738.568416	574.568416	574.068416	164	164.5	158
BH-4	965927.4597	1315243.33	738.568416	574.068416	572.568416	164.5	166	1
BH-4	965927.4597	1315243.33	738.568416	572.568416	571.568416	166	167	1
BH-4	965927.4597	1315243.33	738.568416	571.568416	568.568416	167	170	3,521
BH-4	965927.4597	1315243.33	738.568416	568.568416	568.068416	170	170.5	3,521
BH-4	965927.4597	1315243.33	739	568.068416	566.568416	170.5	172	14,599
BH-4	965927.4597	1315243.33	739	566.568416	566.068416	172	172.5	14,599
BH-4	965927.4597	1315243.33	739	566.068416	564.568416	172.5	174	5,937
BH-4	965927.4597	1315243.33	739	564.568416	563.568416	174	175	5,937
BH-4	965927.4597	1315243.33	738.568416	563.568416	561.568416	175	177	11
BH-4	965927.4597	1315243.33	738.568416	561.568416	560.568416	177	178	11
BH-4	965927.4597	1315243.33	738.568416	560.568416	559.568416	178	179	382
BH-4	965927.4597	1315243.33	738.568416	559.568416	558.568416	179	180	382
BH-4	965927.4597	1315243.33	738.568416	558.568416	556.568416	180	182	824
BH-4	965927.4597	1315243.33	738.568416	556.568416	555.568416	182	183	824
BH-4	965927.4597	1315243.33	738.568416	555.568416	554.568416	183	184	138

Notes:
1) Field screening measurements conducted using a PID or Multi-Gas Monitor, ppmv = parts per million by volume
2) ft MSL = feet above Mean Sea Level; ft BGS = feet below ground surface.

TABLE 3
FIELD SCREENING METHANE DATA FROM GAS RELIEF WELLS AND STRATIGRAPHIC BORINGS
Manlove Gas Storage Field
Champaign County, Illinois

Gas Relief Well or Stratigraphic Boring ID	X_coord (UTM 16N)	Y_coord (UTM 16N)	Ground Surface Elevation (ft MSL)	Top Elevation (ft MSL)	Bottom Elevation (ft MSL)	Top Depth (ft BGS)	Bottom Depth (ft BGS)	Methane (ppmv)
BH-4	965927.4597	1315243.33	738.568416	554.568416	553.568416	184	185	138
BH-4	965927.4597	1315243.33	738.568416	553.568416	552.568416	185	186	661
BH-4	965927.4597	1315243.33	738.568416	552.568416	551.568416	186	187	661
BH-4	965927.4597	1315243.33	738.568416	551.568416	549.568416	187	189	131
BH-4	965927.4597	1315243.33	738.568416	549.568416	548.568416	189	190	131
BH-4	965927.4597	1315243.33	738.568416	548.568416	545.568416	190	193	712
BH-4	965927.4597	1315243.33	738.568416	545.568416	545.068416	193	193.5	712
BH-4	965927.4597	1315243.33	738.568416	545.068416	542.568416	193.5	196	645
BH-4	965927.4597	1315243.33	738.568416	542.568416	542.068416	196	196.5	645
BH-4	965927.4597	1315243.33	738.568416	542.068416	540.568416	196.5	198	959
BH-4	965927.4597	1315243.33	738.568416	540.568416	539.568416	198	199	959
BH-4	965927.4597	1315243.33	738.568416	539.568416	538.568416	199	200	952
BH-4	965927.4597	1315243.33	738.568416	538.568416	537.568416	200	201	952
BH-4	965927.4597	1315243.33	738.568416	537.568416	535.568416	201	203	952
BH-4	965927.4597	1315243.33	738.568416	535.568416	535.068416	203	203.5	952
BH-4	965927.4597	1315243.33	738.568416	535.068416	532.568416	203.5	206	119
BH-4	965927.4597	1315243.33	738.568416	532.568416	531.568416	206	207	119
BH-4	965927.4597	1315243.33	738.568416	531.568416	529.568416	207	209	1,289
BH-4	965927.4597	1315243.33	738.568416	529.568416	528.568416	209	210	1,289
BH-4	965927.4597	1315243.33	738.568416	528.568416	525.568416	210	213	739
BH-4	965927.4597	1315243.33	738.568416	525.568416	525.068416	213	213.5	739
BH-4	965927.4597	1315243.33	738.568416	525.068416	522.568416	213.5	216	337
BH-4	965927.4597	1315243.33	738.568416	522.568416	521.568416	216	217	337
BH-4	965927.4597	1315243.33	738.568416	521.568416	519.568416	217	219	1,174
BH-4	965927.4597	1315243.33	738.568416	519.568416	519.068416	219	219.5	1,174

Notes:
1) Field screening measurements conducted using a PID or Multi-Gas Monitor, ppmv = parts per million by volume
2) ft MSL = feet above Mean Sea Level; ft BGS = feet below ground surface.

TABLE 5
GAS-WATER SEPARATOR TESTING DATA
Manlove Gas Storage Field
Champaign County, Illinois

						Methane	Ethane	Propane
Location ID	Sample Date	Sample ID	Before/After Separator	X_coord (UTM 16N)	Y_coord (UTM 16N)	mg/L	mg/L	mg/L
[redacted]	4/10/2018	4A	Before	381704	4458451	4	0.17	0.011
	4/10/2018	4B	After	381704	4458451	2.3	0.11	0.01
	4/10/2018	2A	Before	381921	4458215	75	4.5	0.29
	4/10/2018	2B	After	381921	4458215	16	1.2	0.082
	3/27/2019	A Before	Before	381921	4458215	77	4.5	0.42
ric	3/27/2019	A After	After	381921	4458215	11	0.84	0.082
	4/10/2018	3A	Before	381570	4459988	92	3.7	0.14
	4/10/2018	3B	After	381570	4459988	11	0.6	0.022
	3/27/2019	B Before	Before	381905	4458377	56	4.1	0.24
	3/27/2019	B After	After	381905	4458377	16	1.4	0.085
orge	3/1/2019	030119[redacted]-A	Before	381661	4458483	29	0.00072	<0.0003
orge	3/1/2019	030119[redacted]-B	After	381661	4458483	26	0.00053	<0.0004
	3/27/2019	C Before	Before	382721	4459137	33	2.5	0.17
	3/27/2019	C After	After	382721	4459137	16	1.3	0.099
Unknown 1A	4/10/2018	1A	Before	--	--	72	5.6	1.3
Unknown 1B	4/10/2018	1B	After	--	--	24	1.9	0.3

Notes:
1) Samples analyzed at Isotech Laboratories, Champaign Illinois.
2) < = Compound not detected at the Method Detection Limit (MDL).
3) -- = No data, mg/L = milligrams per liter.

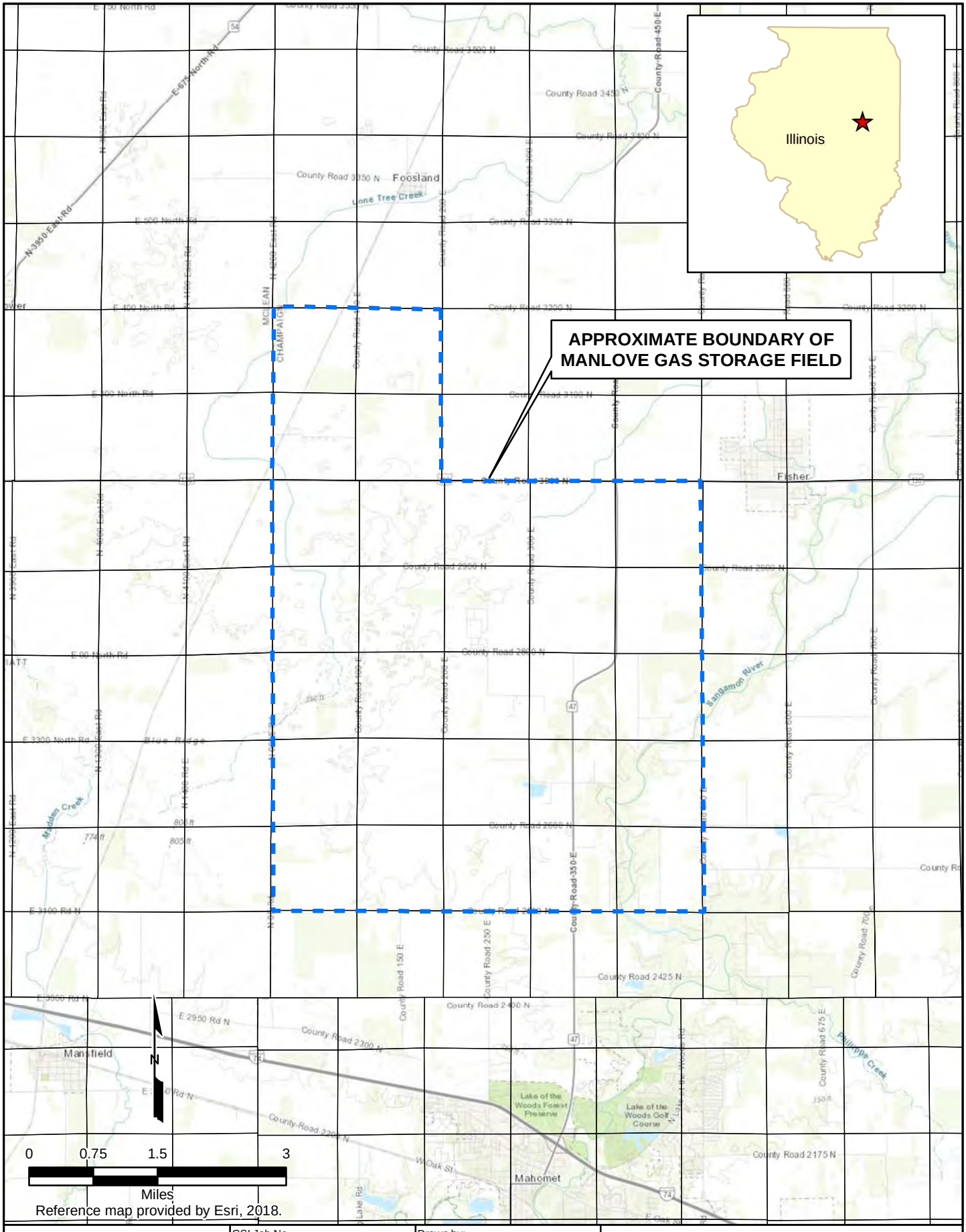
GSI ENVIRONMENTAL

TABLE 6
SCHEDULE FOR IMPLEMENTATION OF REMEDIAL ELEMENTS
Manlove Gas Storage Field
Champaign County, Illinois

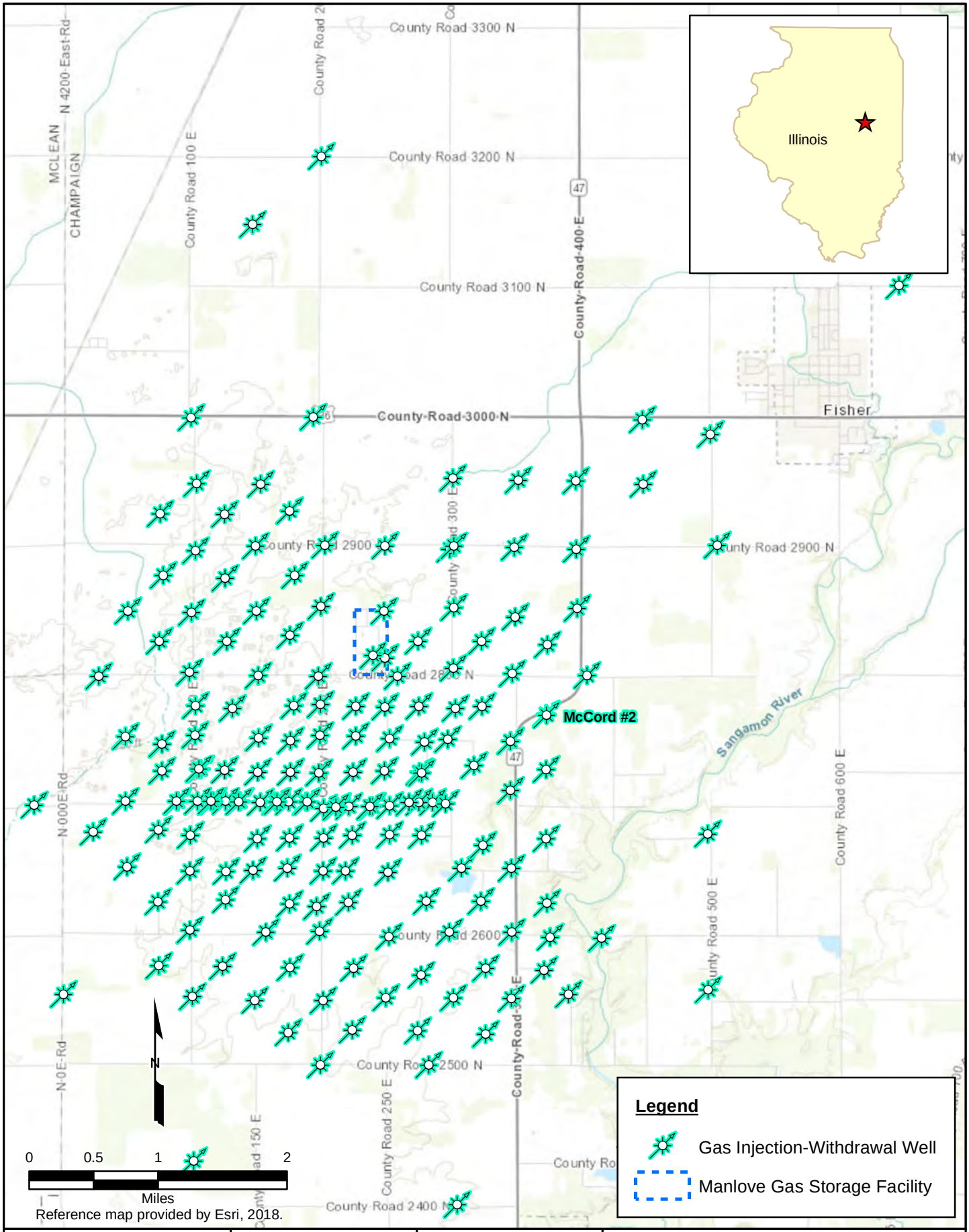
Quarters from Start of IEPA Approval of GMZ Application

	Year 1				Year 2				Year 3			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1) Initial Sampling of All Water Wells within the GMZ												
1.1 Identification of all water wells within the GMZ (previously or not yet sampled)	■											
1.2 Sampling of water wells within GMZ		■	■									
1.3 Data evaluation and compilation			■	■								
1.4 Deliverable: report of initial sampling results; proposed list of wells to be regularly monitored per the GMZ				■								
2) Regular Monitoring of Selected Water Wells within the GMZ												
2.1 Quarterly sampling					■	■	■	■				
2.2 Semi-annual sampling										■		■
3) Further Source Control												
3.1 Continued use of MC2 for venting purposes	■	■	■	■	■	■	■	■				
4) Ongoing Monitoring and Residential Control Measures												
4.1 Installation of passive vents at all wells within the GMZ exhibiting >10 mg/L methane	■	■	■	■	■							
4.2 Installation of gas-water separators at location with >10 mg/L MC2 thermogenic methane	■	■	■	■	■							
4.3 Performance testing of installed gas-water separators (quarterly during the first year, semi-annually thereafter)	■	■	■	■	■	■	■	■		■		■
4.4 Installation of methane alarms within structures (if present) at locations with >10 mg/L MC2 thermogenic methane	■	■	■	■	■							
4.5 Notification of local licensed well drillers regarding possible presence of gas in subsurface	■											
4.6 Coordination with IDPH regarding the extent of natural gas	■											
5) Further Aquifer Remediation												
5.1 Testing of existing gas relief wells	■											
5.2 Permitting of existing gas relief wells, if found to produce gas, and construction of any necessary system components		■	■	■								
5.3 Active venting of existing gas relief wells				■	■	■	■	■	■	■	■	■
5.4 Modeling of potential additional gas relief wells and proposal to IEPA, if applicable.			■	■								

FIGURES



GSI ENVIRONMENTAL	GSI Job No. 4827	Drawn by: AV	**LOCATION OF MANLOVE GAS STORAGE FIELD**
	Issued: 31-Jul-2019	Chk'd by: LJM	
	Revised:	Aprv'd by: MPH	
	Map ID: 006_01	**FIGURE 1**	Champaign County, Illinois

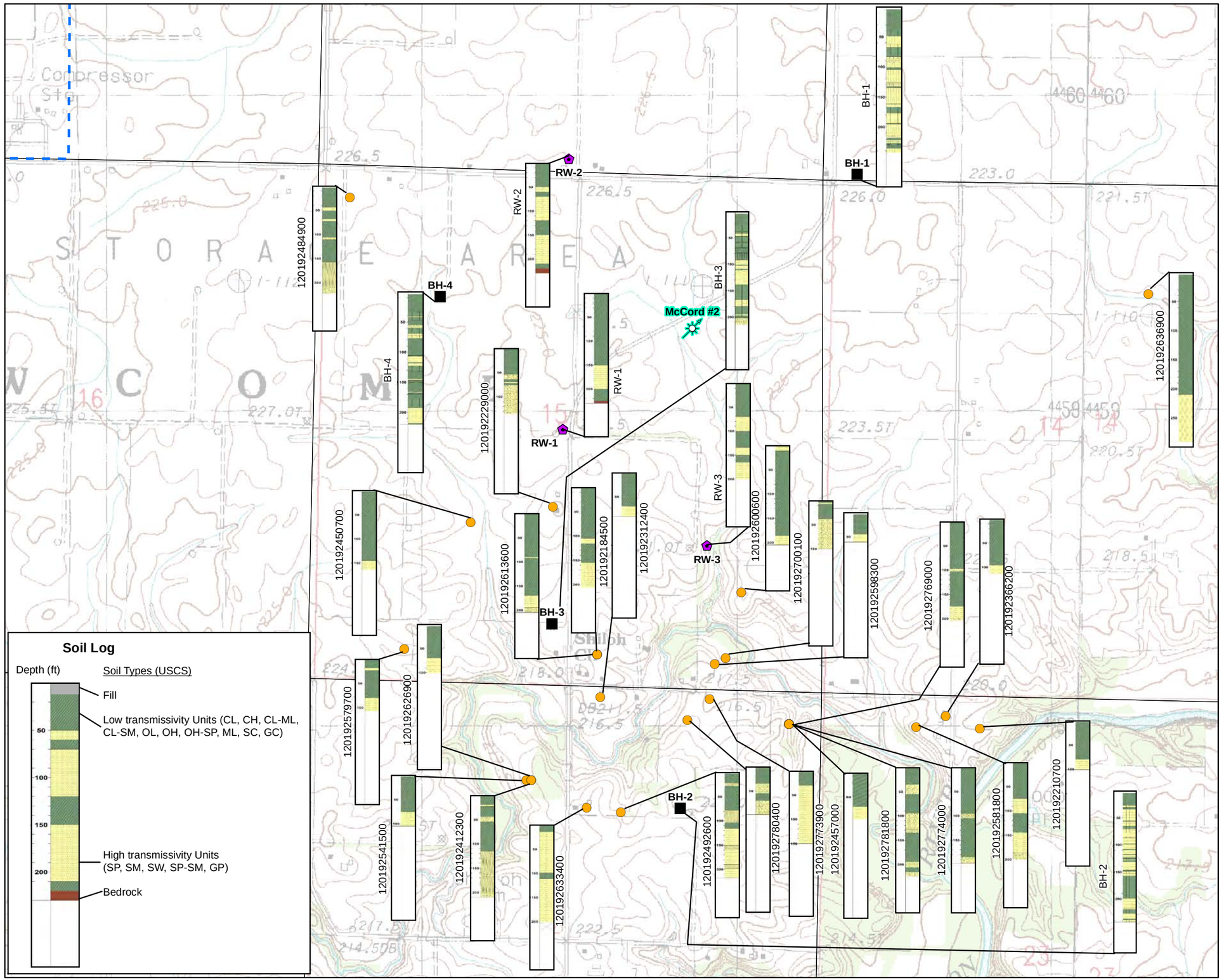


GSI ENVIRONMENTAL

GSI Job No.	4827	Drawn by:	AV
Issued:	31-Jul-2019	Chk'd by:	LJM
Revised:		Aprv'd by:	MPH
Map ID:	006_02	**FIGURE 2**	

LOCATIONS OF INJECTION-WITHDRAWAL WELLS WITHIN THE MANLOVE GAS STORAGE FIELD

Champaign County, Illinois



LEGEND

- Gas Injection-Withdrawal Well
- Gas Relief Well
- Stratigraphic Boring (December 2018)
- Water Supply or Monitoring Well with Drillers Log
- Manlove Gas Storage Facility

120192636900 - Water Supply or Monitoring Well Name

Note

Basemap provided by Esri ArcGIS Online, 2018.

Scale (Feet)
0 500 1,000

Projected Coordinate System
Datum: NAD 1983
UTM Zone 16 North

GSI ENVIRONMENTAL

LOCATION OF STRATIGRAPHIC BORINGS, GAS RELIEF WELLS, AND WATER WELLS WITH DRILLERS LOGS

Champaign County, Illinois

GSI Job No. 4827	Drawn By: AV
Issued: 31-Jul-2019	Chk'd By: LJM
Map ID: **006_03**	Appv'd By: MPH

FIGURE 3

WOOD CREEK ROAD

1400 E

3300 N

2800 N

2700 N

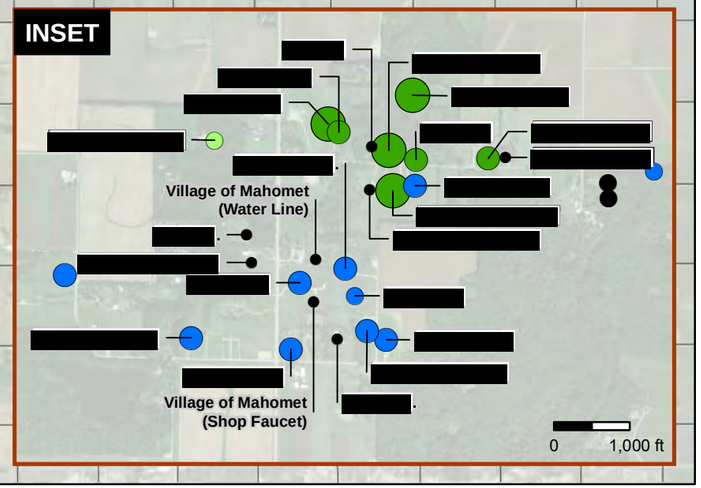
CHM-96A

CHAM-08-09A

McCord #2

CHAM-08-06

INSET



LEGEND

- USGS Monitoring Well with Water Level Anomaly
- Gas Injection-Withdrawal Well

Gas Characterization

- Strong Thermogenic Component
- Minor Thermogenic Component
- Microbial
- Insufficient Data to Characterize Source

Dissolved Methane Concentration (mg/L)

- < 0.05 mg/L
- 0.05 to < 1 mg/L
- 1 to < 10 mg/L
- 10 mg/L to < 28 mg/L
- ≥ 28 mg/L

Notes

1) Dissolved gas concentrations for the [redacted], M&E wells are estimated.
2) Basemap provided by Esri ArcGIS Online, 2018.
3) mg/L = micrograms per liter

Scale (Feet)
0 5,000 10,000

Projected Coordinate System
Datum: NAD 1983
UTM Zone 16 North

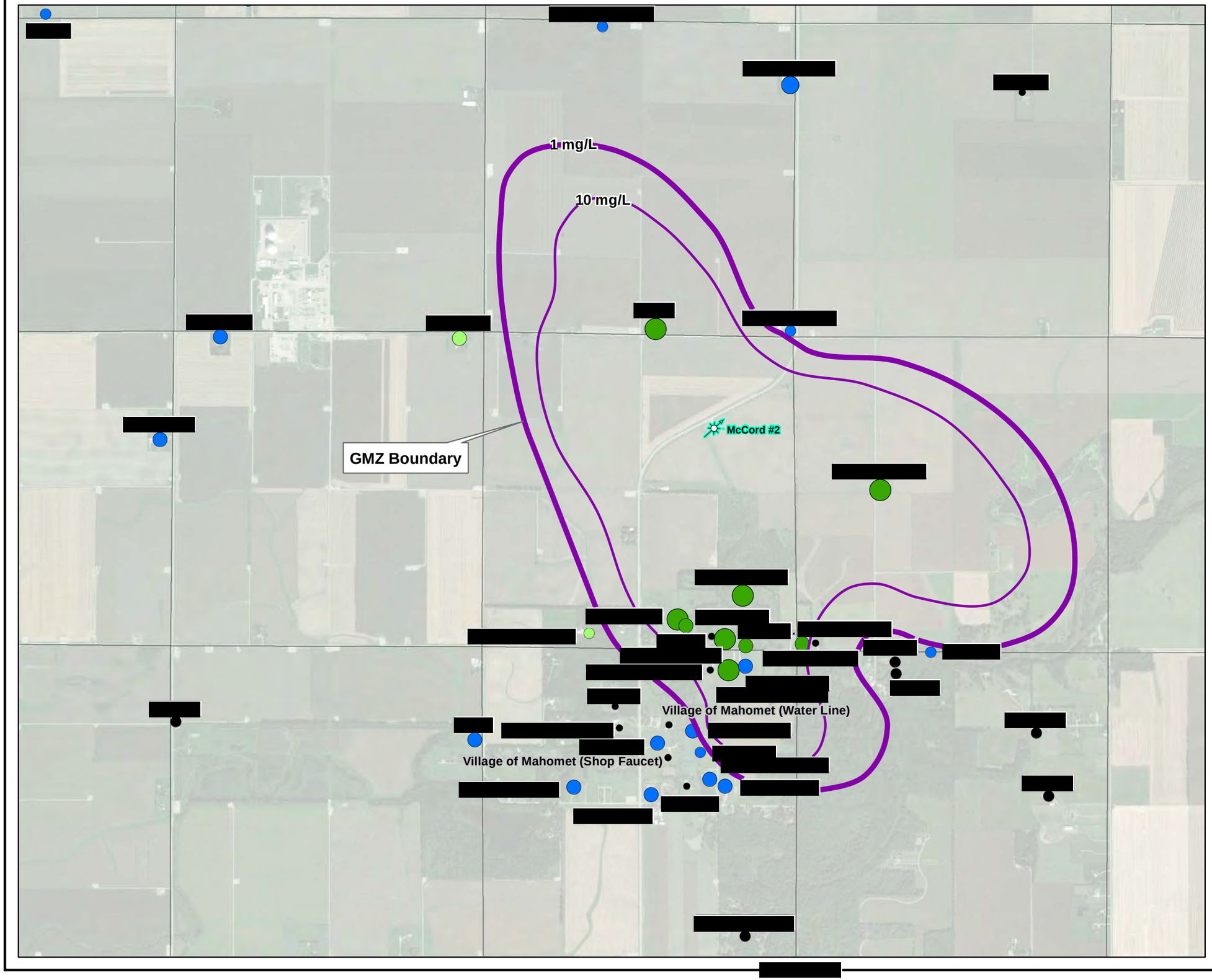
GSI ENVIRONMENTAL

GROUNDWATER SAMPLING RESULTS

Champaign County, Illinois

GSI Job No. 4827	Drawn By: AV
Issued: 31-Jul-2019	Chk'd By: LJM
Map ID: **006_04**	Appv'd By: MPH

FIGURE 5



LEGEND

- USGS Monitoring Well with Water Level Anomaly
- Gas Injection-Withdrawal Well

Gas Charaterization

- Strong Thermogenic Component
- Minor Thermogenic Component
- Predominantly Microbial
- Insufficient Data to Characterize Source

Dissolved Methane Concentration (mg/L)

- < 0.05 mg/L
- 0.05 to < 1 mg/L
- 1 to < 10 mg/L
- 10 mg/L to < 28 mg/L
- ≥ 28 mg/L

- 1 mg/L McCord #2 Thermogenic Gas
- 10 mg/L McCord #2 Thermogenic Gas

Notes

1) Dissolved gas concentrations for the Clark and Wallace, M&E wells are estimated.
2) Basemap provided by Esri ArcGIS Online, 2018.

Scale (Feet)
0 800 1,600

Projected Coordinate System
Datum: NAD 1983
UTM Zone 16 North

GSI ENVIRONMENTAL

HORIZONTAL BOUNDARY OF PROPOSED GROUNDWATER MANAGEMENT ZONE

Champaign County, Illinois

GSI Job No. 4827	Drawn By: AV
Issued: 31-Jul-2019	Chk'd By: LJM
Map ID: **006_04**	Appv'd By: MPH

FIGURE 5

Appendices

Appendix A: Delineation of Groundwater Management Zone Boundaries
Appendix B: Cross-Sections in Area of Manlove Gas Storage Field
Appendix C: Gas Relief Well Construction Logs (RW-1 through RW-3)
Appendix D: Stratigraphic Boring Report (BH-1 through BH-4)
Appendix E: Drillers Logs for Water Supply and Monitoring Wells Used in 3D Visualization
Appendix F: Molecular and Isotopic Gas Data

Appendix A: Delineation of Groundwater Management Zone Boundaries

APPENDIX A: DELINEATION OF GROUNDWATER MANAGEMENT ZONE BOUNDARIES

Groundwater Management Zone Application
Manlove Gas Storage Field

1.0 OVERVIEW

A 3D visualization of available stratigraphic/lithologic data and methane concentration data has been developed to facilitate a better understanding of:

1.) The subsurface geology of the unconsolidated sediments overlying bedrock in the area of the Manlove Field Natural Gas Storage Facility (the "Facility"); and

2.) The extent of thermogenic gas migration horizontally and vertically in the subsurface from the McCord No. 2 ("MC2") well.

This appendix presents the methods and results of the 3D visualization.

2.0 DATA UTILIZED IN 3D VISUALIZATION

2.1 Subsurface Geology

Visualization of the subsurface geology utilized stratigraphic and lithologic data from the following sources:

- 25 drillers logs from water supply and monitoring wells located within the area of MC2 (obtained from the ILWATER database).
- Four stratigraphic borings (BH-1 through BH-4) advanced by Peoples Gas in December 2018.
- Three gas relief wells (RW-1 through RW-3) installed by Peoples Gas in January 2018.

Stratigraphic and lithologic data are provided in Appendices C, D, and E, and locations of stratigraphic borings, gas relief wells, and wells where drillers logs were used are shown in Figure 3.

2.2 Methane Concentration Data

The extent of MC2 methane migration is based on the following dissolved and free gas data:

- **Dissolved Gas Data from Water Supply Wells:** The visualization utilized dissolved methane concentrations of the most recent groundwater test result at each water supply well. Because the objective of the 3D visualization is to predict and depict the extent of MC2 gas migration, only the concentration of MC2 thermogenic methane at each location was utilized. Specifically, concentrations of microbial gas or of thermogenic gas from the other source to the southwest of MC2 were not considered. The source of natural gas (microbial versus thermogenic) was characterized using molecular and isotopic data from analyses by Isotech Laboratories. All available dissolved gas data, as well as the characterization of gas origin, are provided on Table 1. The full suite of available molecular and isotopic data is also provided in Appendix F.

- **Gas Relief Well Headspace Concentrations:** The visualization utilized the maximum methane concentration observed in the headspaces of the three gas relief wells (RW-1 through RW-3) during testing of those wells in November 2018.

- **Field Screening Gas Data from Stratigraphic Borings:** The visualization utilized methane concentration data from field screening of the stratigraphic borings BH-1 through BH-4 at one-foot increments.

Methane concentration data from the gas relief wells and stratigraphic borings are tabulated in Table 3 of the GMZ Application. Since these were based on field measurements, isotopic and/or additional molecular data were not available for these sources. As a conservative measure, however, free gas and field screening measurements from these locations were assumed to entirely represent MC2 thermogenic gas.

The free gas and field screening measurements were converted to dissolved gas equivalent concentrations for visualization purposes. In this way, all of the data utilized by the visualization were in terms of a single unit of measure (mg/L). Specifically, methane concentrations above 5,000 parts per million by volume (ppmV) (i.e., 10% of the methane lower explosive limit [LEL]) were considered to represent a dissolved methane concentration of 28 mg/L (i.e., the solubility of methane in water at 1 atm).

3.0 KRIGING METHODS

Kriging is a geostatistical technique used to estimate the spatial distribution of parameters from 3D data in order to estimate the shape and volume of subsurface features. This can include geology, such as the shape and interconnection of a water-bearing sand, or environmental impacts, such as the shape and extent of a groundwater contaminant plume.

More specifically, kriging utilizes the statistical characteristics among the parameter values at measured points in space (i.e., the spatial correlation structure) to model the variation of these parameters in the subsurface, generating the statistical distribution of the output parameter value for each point in space. It also can provide a measure of the uncertainty in the predictions.

For the purposes of the 3D visualization, kriging was used to estimate the 3D distribution of strata in the subsurface (based on available lithologic data). In addition, kriging was used to evaluate the uncertainty in the interpreted horizontal extent of the thermogenic MC2 migration (i.e., the initial interpretation of the 1 mg/L and 10 mg/L MC2 methane contours), and incorporate that uncertainty in the final determination of the horizontal extent of the GMZ, as detailed below:

1.) As an initial approximation, the outline of the thermogenic MC2 methane extent in the shallow subsurface was delineated by interpreting the locations of the 1 mg/L and 10 mg/L contours based on the most recent monitoring data.

2.) The difference between these interpreted contours (in 3-dimensions) and the actual data was then computed using the publicly available statistical computing program “R” (version 3.5.3). This difference was used to develop a variogram, or function, describing the spatial deviation between the interpreted contour and the actual data.

3.) Using this variogram, the maximum potential deviation in methane concentration from each interpreted contour (i.e., the maximum possible variance) was estimated. Then the 75th percentile of this maximum estimated variance was added to each interpreted contour. The 75th percentile variance is routinely used in estimations of this type.

This produced 1 mg/L and 10 mg/L thermogenic MC2 contours that are conservative estimates of the actual methane distribution; that is, they represent the interpreted distribution of methane in the subsurface, based on actual data, plus 75% of the maximum uncertainty in each value.

4.0 VISUALIZATION

Visualization of the kriging was completed in the Earth Volumetric Studio (EVS) Software (version 2019.6.0). EVS is an analysis and visualization tool that enables the creation, evaluation, and customization of 3D volumetric modeling.

4.1 Groundwater Management Zone Boundaries

The horizontal extent of the Groundwater Management Zone (GMZ) corresponds to the boundary of the area where MC2 thermogenic methane was estimated to be present in excess of 1 mg/L (based on geostatistical evaluation of existing groundwater concentration data). The horizontal boundary of the GMZ is shown on Figure 5. The GMZ is bounded vertically by the upper surface of bedrock that underlies the Mahomet Aquifer (lower boundary) and the upper contact of saturated sand gravel units within unconsolidated sediments (upper boundary).

4.2 Visualization Output

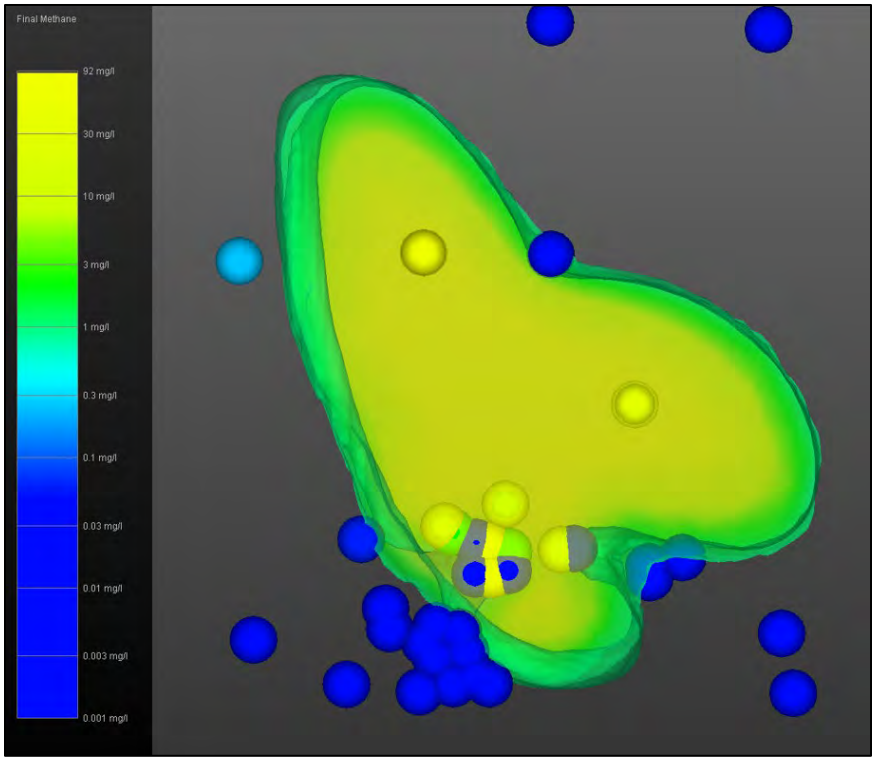


Illustration A. Plan view of 1 mg/L methane contour.

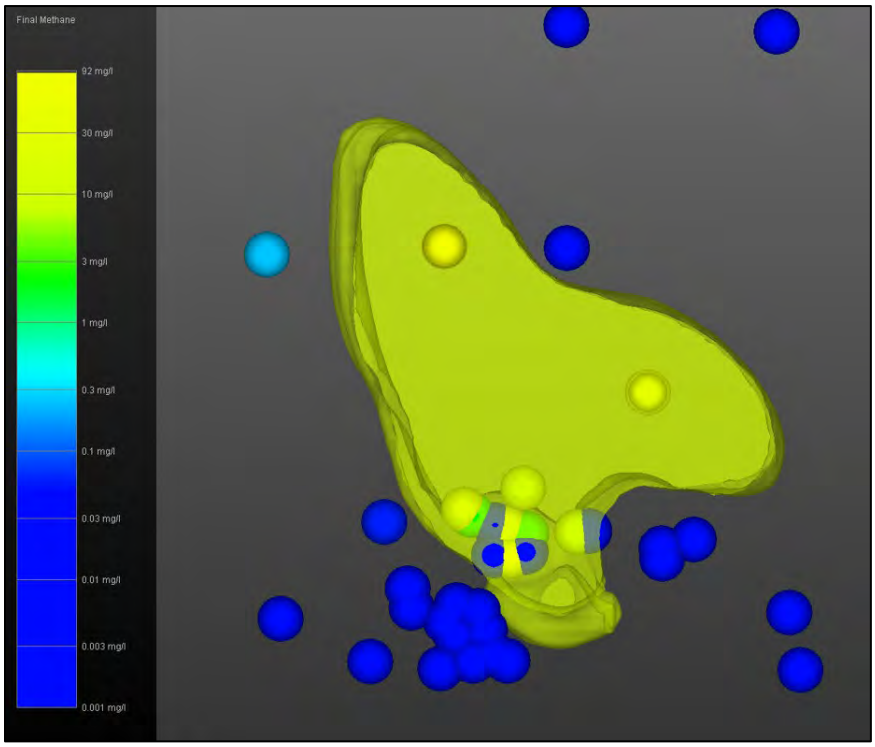


Illustration B. Plan view of 10 mg/L methane contour.

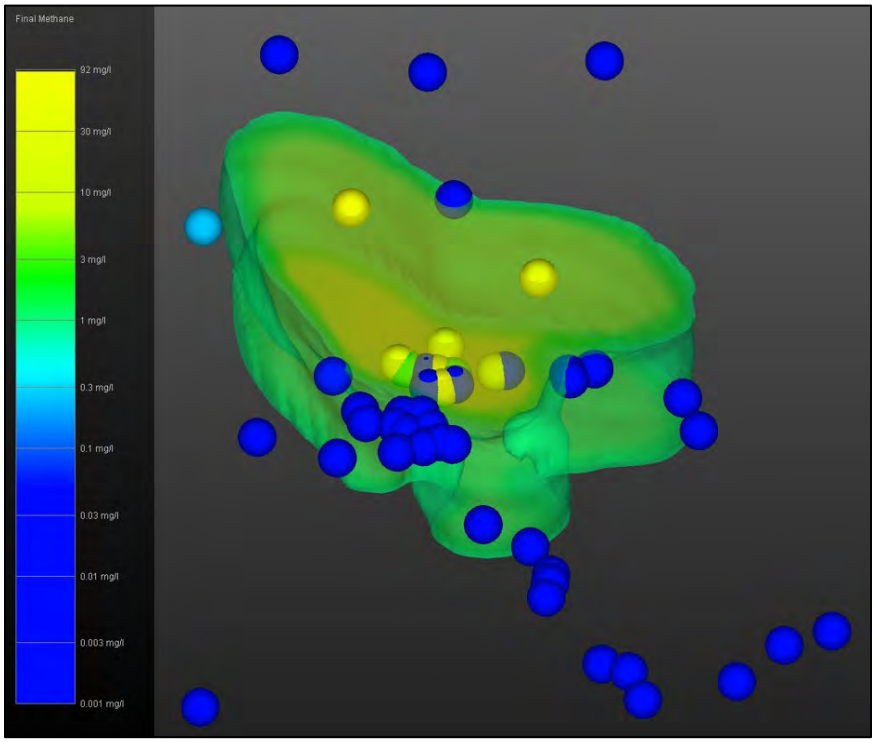


Illustration C. 3D visualization of 1 mg/L methane contour.

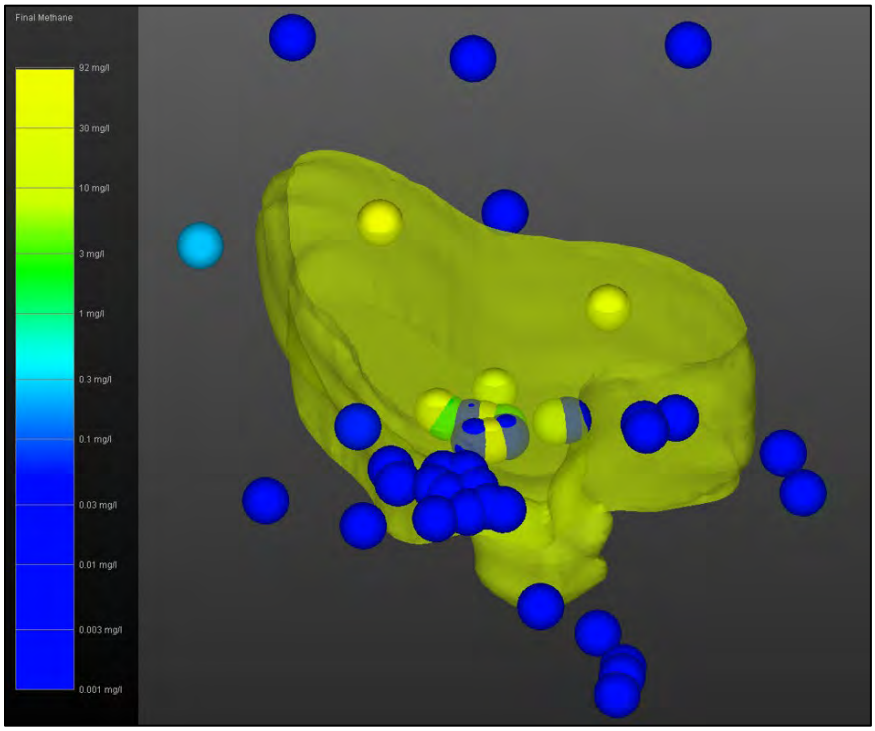


Illustration D. 3D visualization of 10 mg/L methane contour.

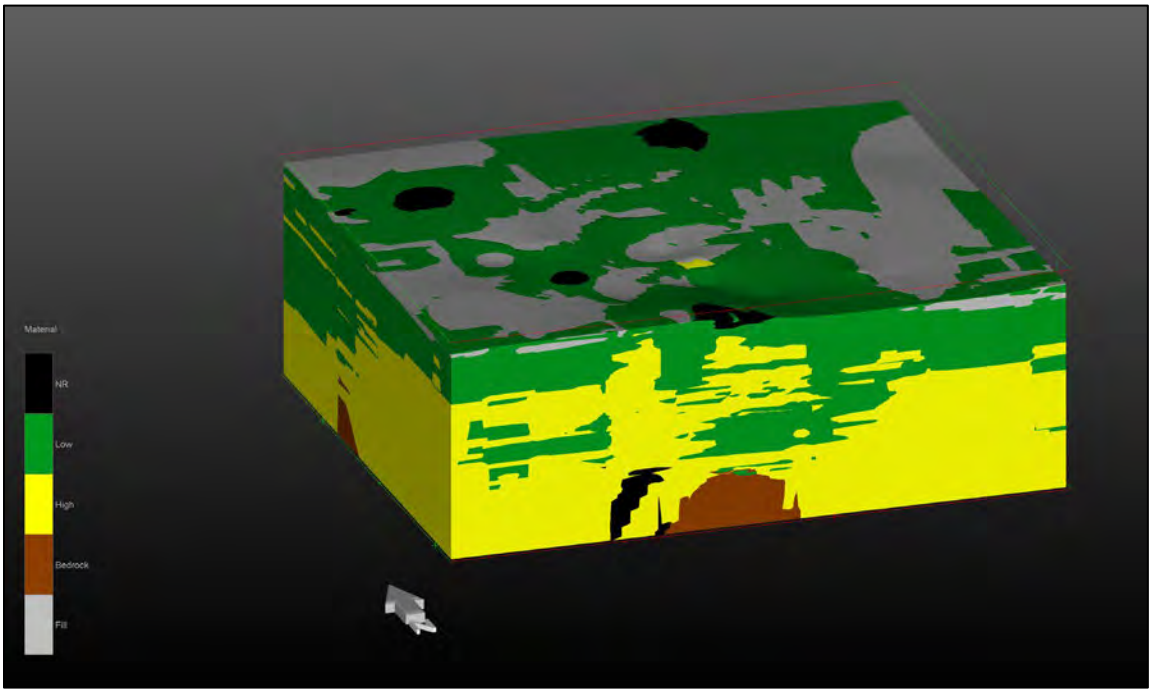


Illustration E. 3D visualization (block diagram) of unconsolidated deposits

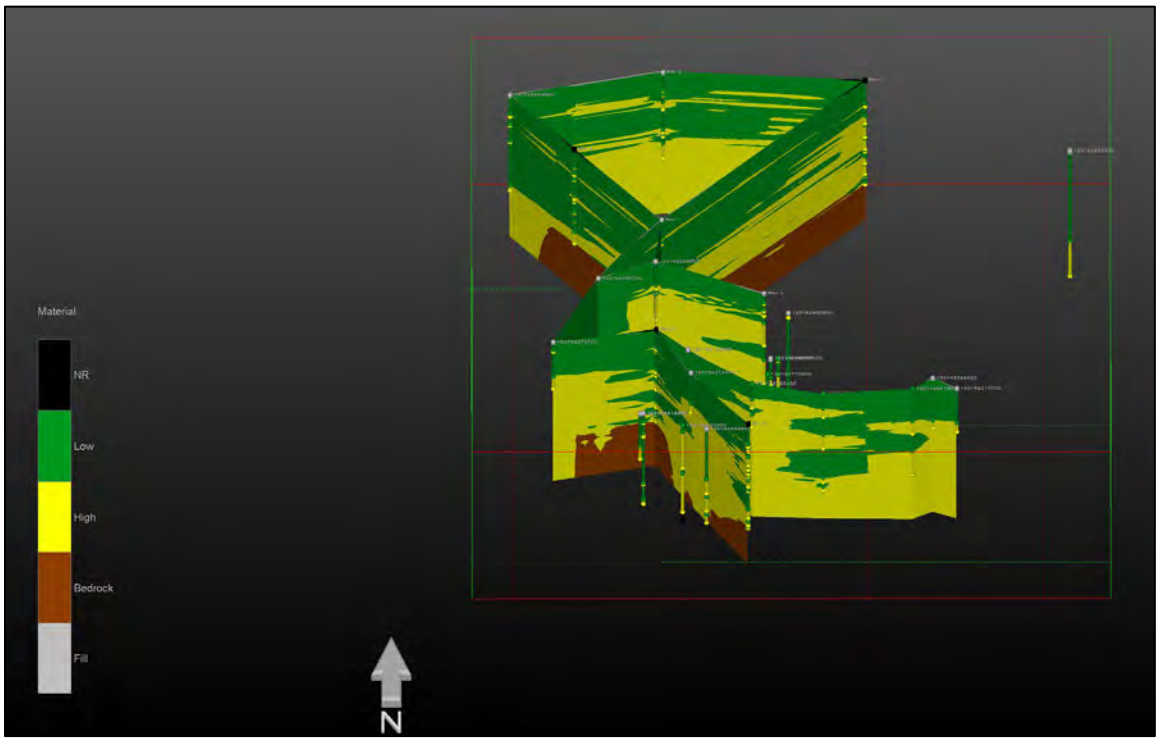


Illustration F: Transects of block diagram

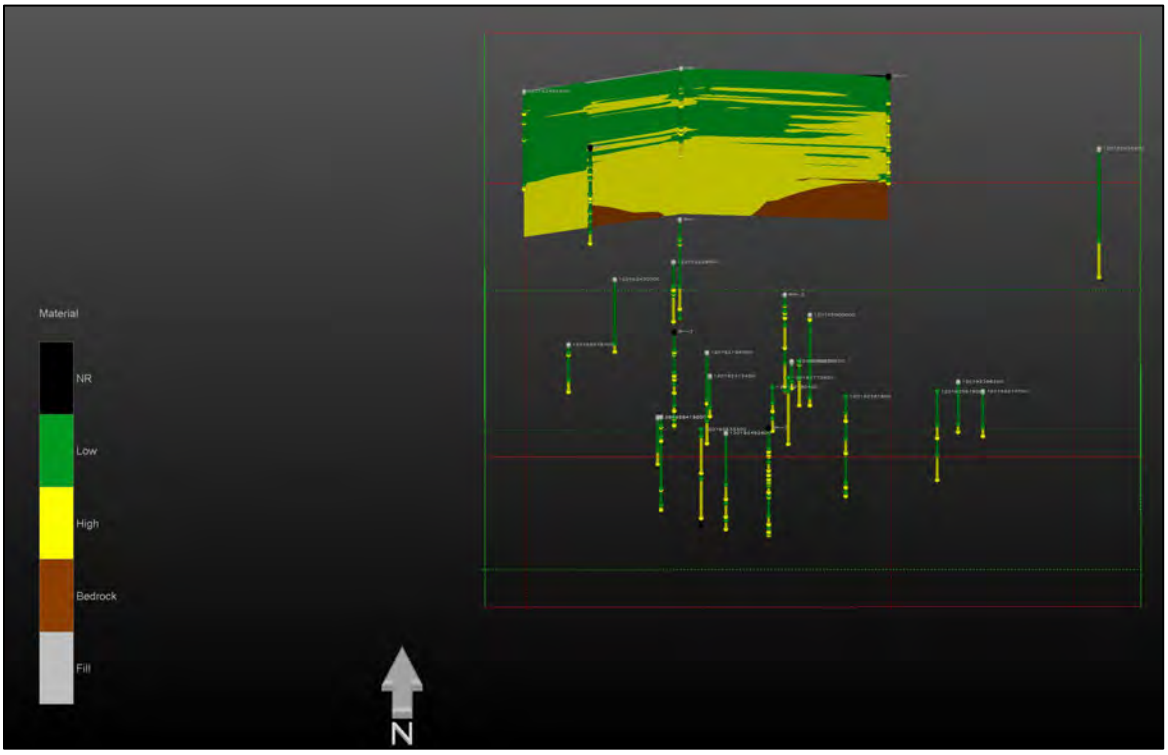


Illustration G: Transect A-A'

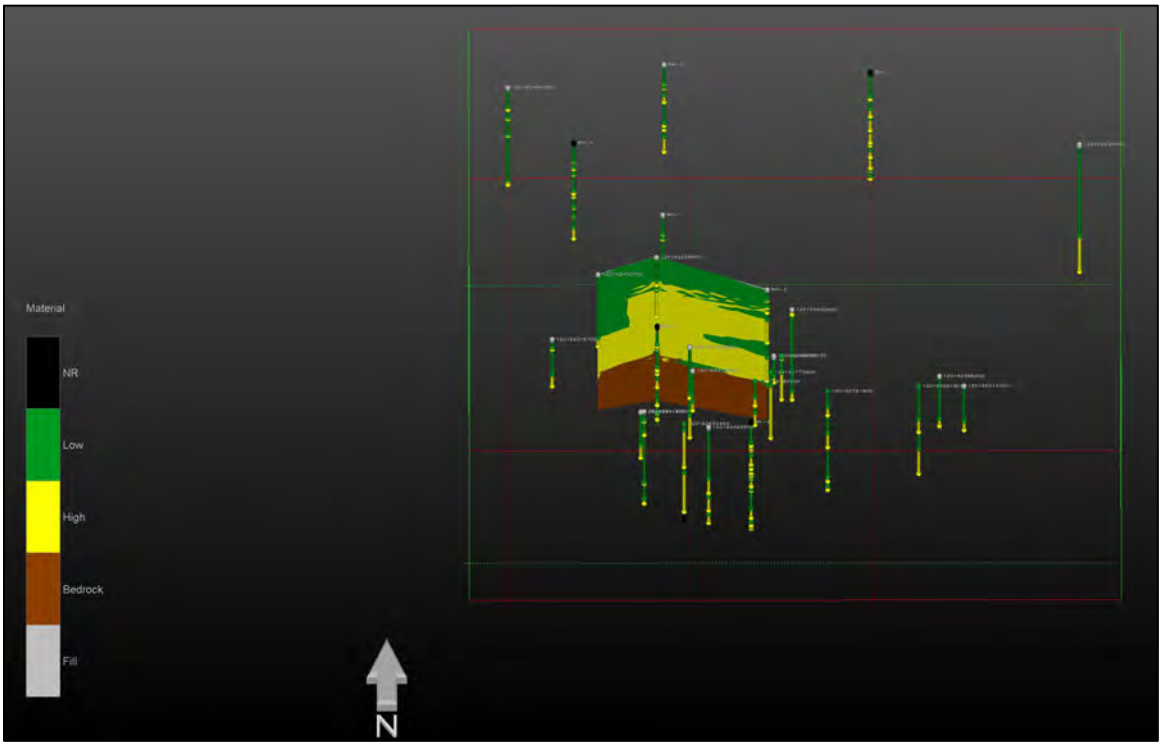


Illustration H: Transect B-B'

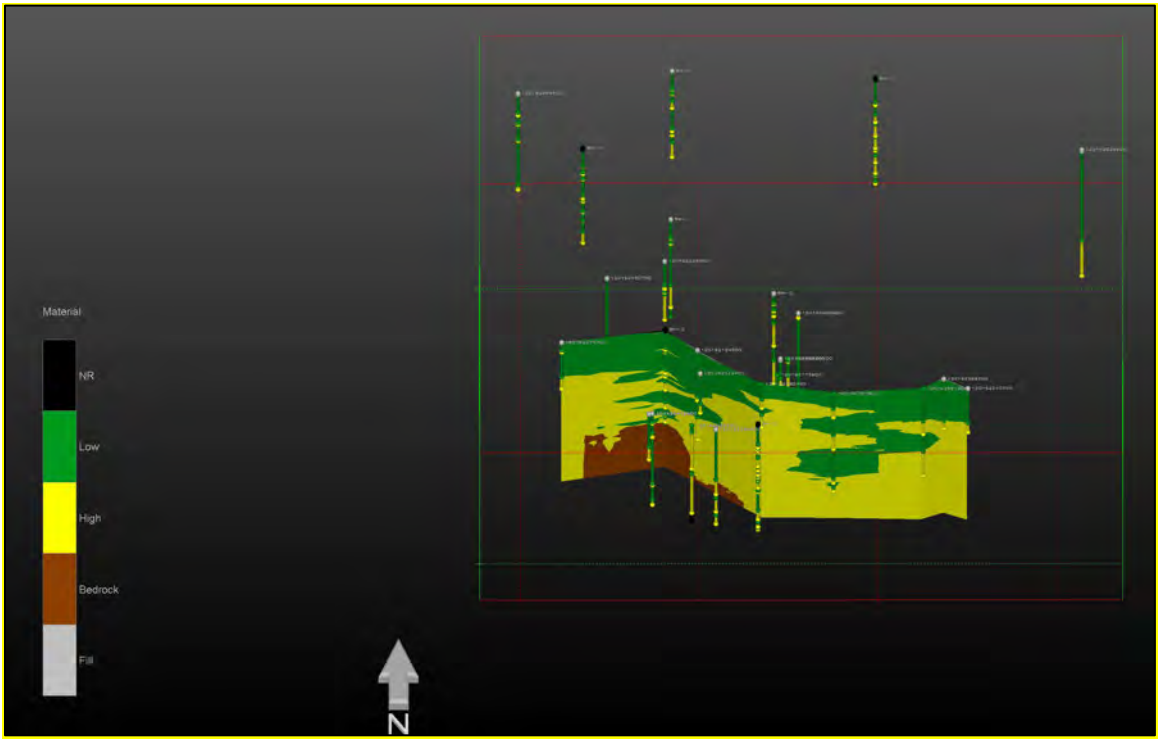


Illustration I: Transect C-C'

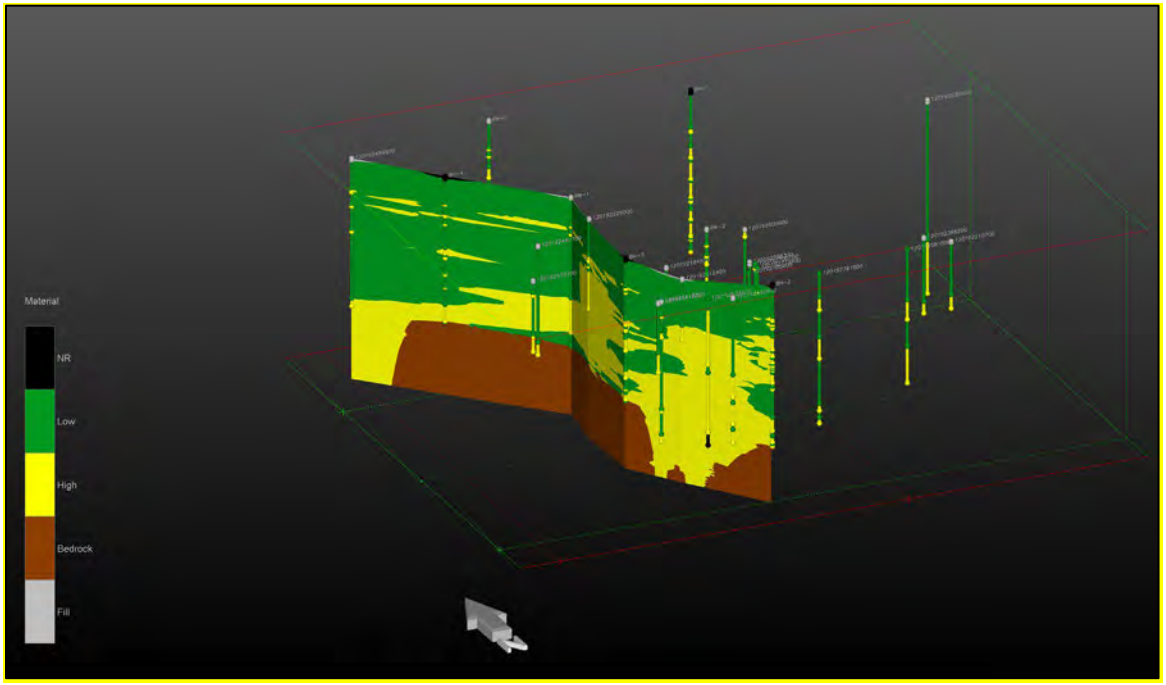


Illustration J: Transect D-D'

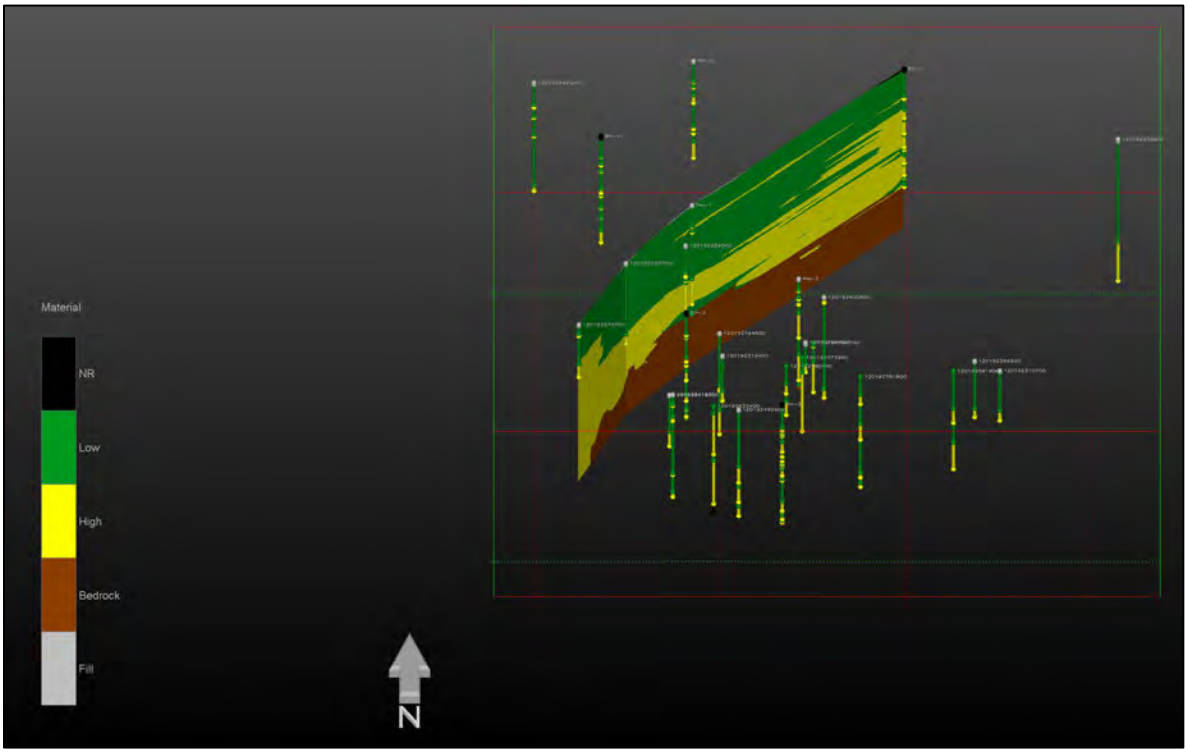


Illustration K: Transect E-E'

GSI Job No.: 4827
Issued: 31 July 2019

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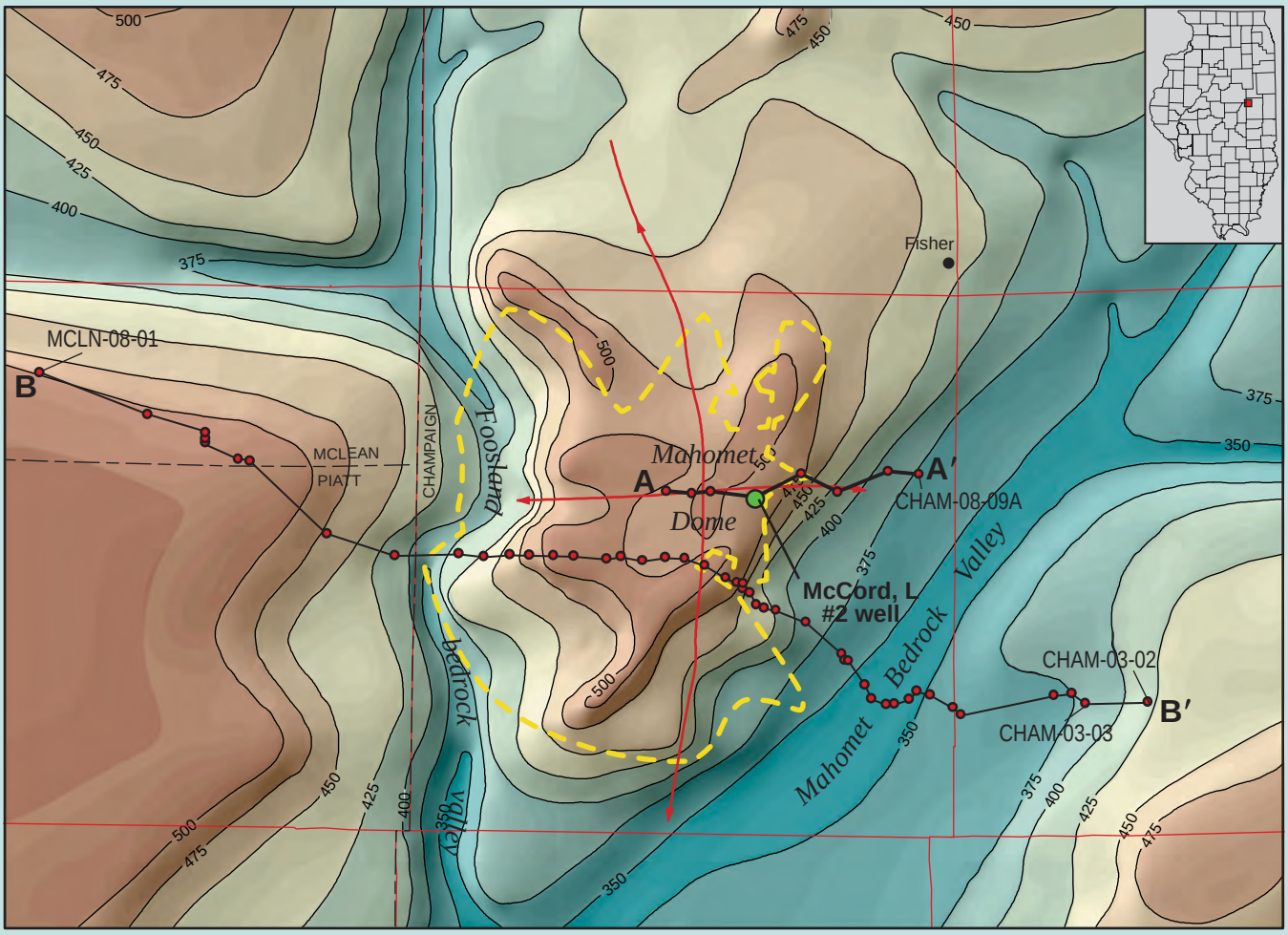
Appendix B: Cross-Sections in Area of Manlove Gas Storage Field

Illinois State Geologic Survey Special Report 6 2018
Andrew J. Stumpf

Geologic Cross Sections of Quaternary Deposits Across the Manlove Gas Storage Field Area, Champaign County, Illinois

Andrew J. Stumpf



Special Report 6 2018

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Front cover: *Area of northwest Champaign County depicting the topography of the bedrock surface across the Mahomet Dome, Mahomet Bedrock Valley, tributary bedrock valleys, and adjacent bedrock uplands. Also shown is the extent of the Manlove gas storage field area (dashed yellow line) and lines of geologic cross sections (see Figure 1 in text).*

Geologic Cross Sections of Quaternary Deposits Across the Manlove Gas Storage Field Area, Champaign County, Illinois

Andrew J. Stumpf

Special Report 6 2018

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Suggested citation:
Stumpf, A.J., 2018, Geologic cross sections of Quaternary deposits across the Manlove gas storage field area, Champaign County, Illinois: Illinois State Geological Survey, Special Report 6, 7 p.; 2 plates.

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OVERVIEW

This report was written by the Illinois State Geological Survey (ISGS) to assist the Prairie Research Institute's Natural Gas Working Group (NGWG), the Illinois Environment Protection Agency (IEPA), and other stakeholder groups involved in studying the Manlove gas storage field gain a better understanding of the shallow subsurface geology in northwestern Champaign County. Interpretations made about the surface and subsurface geology are based on a conceptual geological model developed by Stumpf and Atkinson (2015) and Stumpf and Dey (2012). Their model is based on new studies of the Mahomet aquifer in the Champaign County area between 2007 and 2012 and previous lithostratigraphic classifications published by Hansel and Johnson (1996), Kempton et al. (1991), Willman and Frye (1970), and Willman et al. (1975).

The cross sections depict the geologic materials encountered between the land surface and the buried bedrock surface along transects A–A′ and B–B′ (Plates 1 and 2). Limited detailed information exists on sequences of Quaternary clayey till and deposits of glacial sand, gravel, and silt across the gas storage field area that were formed during multiple periods of glacial and postglacial deposition and erosion. These cross sections are the first detailed representations of the Quaternary deposits across the Mahomet Dome, the structure in which the Manlove gas storage field is developed.

The cross sections were made by correlating lithologic units interpreted from the geologic and geophysical logs

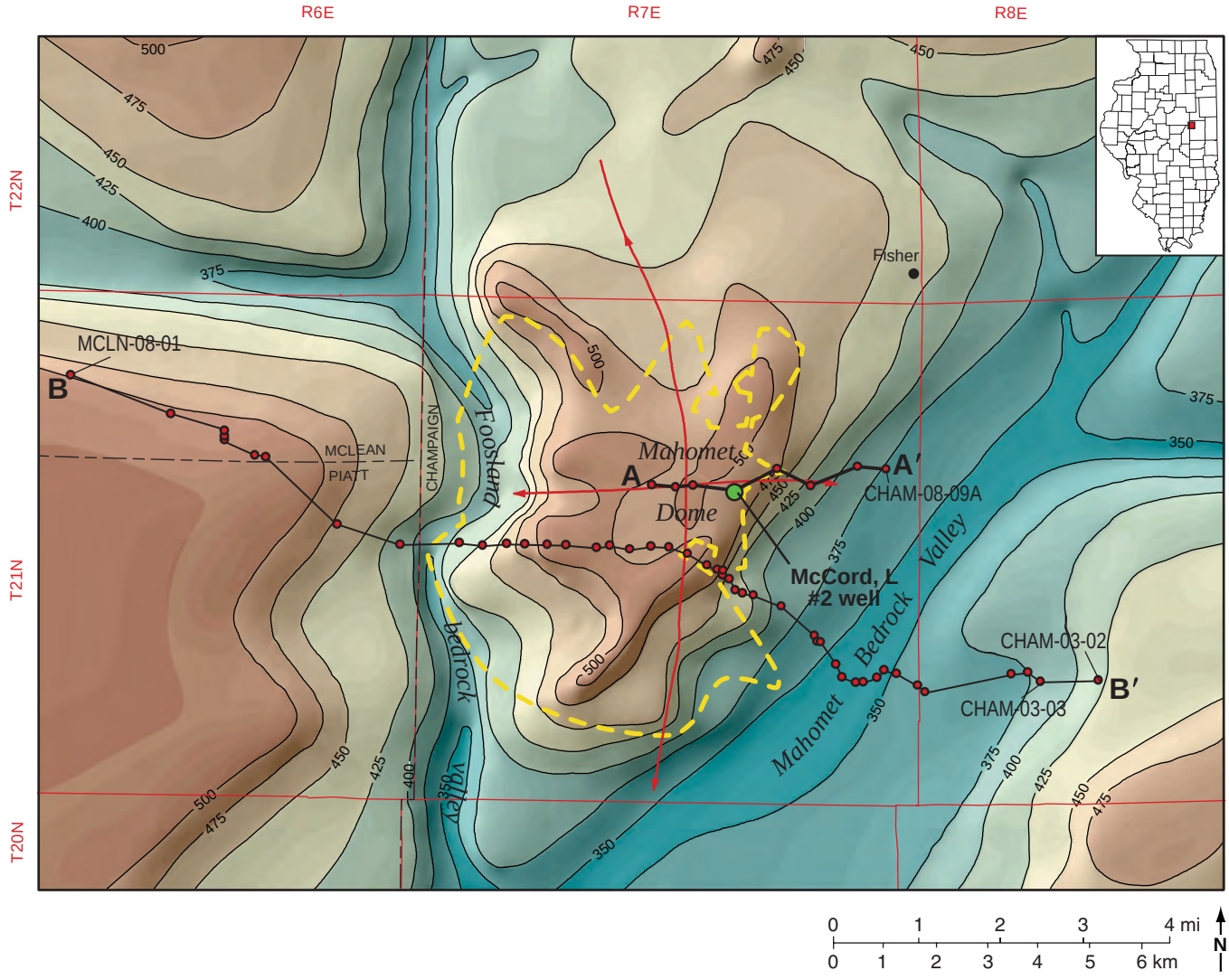

Figure 1 Location of geologic cross sections across the Manlove gas storage field area. The cross section lines lie over a shaded relief map depicting the topography of the bedrock surface (data from Nelson, Bedrock geology of Champaign County, Illinois, ISGS Bulletin in preparation). Borehole locations are shown by the red dots, and those drilled by the ISGS are labeled (e.g., CHAM-03-03). The McCord, L #2 injection well (green dot) is also labeled. The Manlove gas storage field area is delineated by the dashed yellow line. The extent of the Mahomet Dome is delineated by the red arrows.

for water wells, natural gas injection/extraction wells, and coal and petroleum exploration test borings. These data are correlated with the geology and geophysical logs from four continuously cored stratigraphic borings completed by the ISGS and geophysical logs from two other water wells. These boreholes are located between 1 and 5 miles of the Manlove gas storage field (Plates 1 and 2). A customized tool for the ESRI ArcMap software programmed by the ISGS (Carrell 2015) was used to generate georeferenced cross sections from the lithologic data. Polygons for each geologic unit were outlined in ArcMap, but shapefiles of the cross sections were later imported into Adobe Illustrator (version CC 2015.3.1) for graphical editing using the MAPublisher plug-in by Avenza Systems Inc. (version 9.8). In Adobe Illustrator, the polygons were closed and symbolized, line segments smoothed, and surrounding elements added to create a standardized layout for publication.

In assembling the cross sections, it was necessary to undertake additional analysis to move point locations closer to the corresponding wellhead, specifically water wells located without a global positioning system (GPS). Prior to 2012, water wells were typically located by township, range, and section, the legal location, using the Illinois Public Land Survey System (PLSS). For constructing the cross sections, county tax parcel data (e.g., Champaign County GIS Consortium (http://www.maps.ccgisc.org) and public aerial and ground-based photography (e.g., Google Maps, https://www.google.com/maps) were used to obtain the most accurate point locations. The updated coordinates were added to the ISGS wells and borings database, which contains the records of wells drilled in the State of Illinois.

The boreholes labeled on the cross sections are cataloged in the ISGS wells and borings database by the API well number, which is a "unique, permanent, numeric identifier assigned for identification purposes to a well" (American Petroleum Institute 1979). The ISGS also assigns the API number to geological data collected at point locations (e.g., field outcrops, geophysical soundings, shallow excavations, etc.). The 12-digit number consists of four parts (in this order): the state code (2 numeric digits), the county code (3 numeric digits), the unique well code (5 numeric digits), and whether the original hole has been redrilled, sidetracked, or directionally extended. The county code is sequentially assigned to borings as they are added to the repository. On the ILWATER (http://www.isgs.illinois.edu/ilwater) and ILOIL (http://maps.isgs.illinois.edu/ILOIL/) websites, the API well number can be searched under the FIND tab.

GUIDANCE FOR USE

1. General Information/Citation

- **a. Title—**Geologic cross sections of Quaternary deposits across the Manlove gas storage field area
- **b. Project Citation—**Data request from the Prairie Research Institute's Natural Gas Working Group (NGWG) and the Illinois Environmental Protection Agency (IEPA), and provided to other stakeholder groups involved in studying the Manlove gas storage field.
- **c. Suggested Citation—**Stumpf, A.J., 2018, Geologic cross sections of Quaternary deposits across the Manlove gas storage field area, Champaign County, Illinois: Illinois State Geological Survey, Special Report 6, 7 p.; 2 plates.
- **d. Overview—**See Overview section beginning on page 1.
- **e. Topic—**Geologic mapping, Quaternary geology
- **f. Keywords—**Glacial geology, Quaternary, Mahomet aquifer, Manlove gas storage field
- **g. Publication—**April 9, 2018
- **h. Author/Originator/Publisher—**
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2. Metadata

- **a. Contacts—**
  - i. Same as author noted above
- **b. Constraints—**Nondisclosure
  - i. **Terms of Use**—The ISGS should be contacted in advance to arrange ISGS review of planned presentations and publications using these data. Data usage must be approved in advance of presentation and publication. As appropriate, at least one ISGS project member should be included as a co-author in the publication(s) that use these data.
  - ii. **Disclaimer**—This information was prepared as an account of work conducted by a unit of the University of Illinois. Neither the University of Illinois nor any unit thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. The views and opinions of authors expressed herein do not necessarily state or reflect those of the University of Illinois or any agency thereof.
  - iii. **Status**—Final analysis of the data has not been published, and as such, this data set is provisional and subject to change. Data have undergone standard project quality control review.

3. Resource

- **a. Format** (digital/Adobe Systems Portable Document Format [PDF] file)
- **b. Start Date—**March 8, 2018

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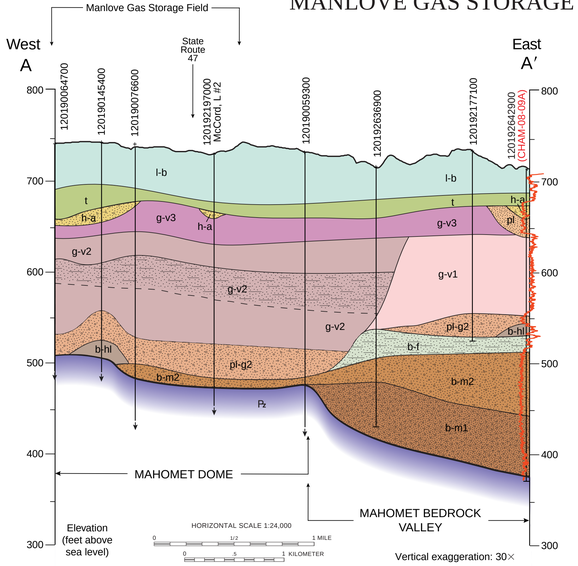
University of Illinois at Urbana-Champaign

GEOLOGIC CROSS SECTIONS OF QUATERNARY DEPOSITS ACROSS THE MANLOVE GAS STORAGE FIELD AREA, CHAMPAIGN COUNTY, ILLINOIS

Andrew J. Stumpf



Suggested citation:
Stumpf, A.J., 2018, Geologic cross sections of Quaternary deposits across the Manlove gas storage field area, Champaign County, Illinois: Illinois State Geological Survey, Special Report 6, 7 p.; 2 plates.

Legend for Cross Sections

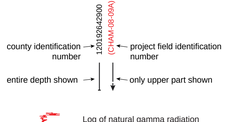
Geologic materials

- Sand and gravel, pebbly
- Sand and gravel
- Mainly sand; may contain some gravel or silt
- Fine sand, silt, and clay
- Diamicton

Unit contacts

- Contact
- Contact (inferred)

Borehole Information



Note:
The locations of cross sections A–A′ and B–B′ are shown in Figure 1. The borings on the cross sections are labelled with the API number or county identification number, and field identification number (in parentheses). The 12-digit API number on file at ISGS Geological Records Unit references records in the ISGS wells and borings database. The geologic and geophysical logs are available from ISGS websites ILWATER (http://www.isgs.illinois.edu/ilwater) and ILOIL (http://www.isgs.illinois.edu/illinois-oil-and-gas-resources-interactive-map).

QUATERNARY DEPOSITS

Description[1,2]	Unit	Interpretation
HUDSON EPISODE (~14,600 years before present (B.P.) to today)		
Sand, silt, clay, and gravel; massive to stratified; locally oxidized; poorly sorted; contains beds of organic material; up to 15 feet thick	Cahokia Formation c	**Alluvium (stream deposits)** mapped in floodplains along creeks and drainageways and in fan-shaped deposits where streams emerge from the moraines onto lower gradient slopes
WISCONSIN EPISODE (~23,000–14,600 years B.P.)		
Sand and gravel; contains some beds of silt and pebbles; brown to yellowish brown; calcareous; well to poorly sorted; up to 25 feet thick	Henry Formation h	**Glaciofluvial sediment (outwash)** deposited by glacial meltwater in streams and rivers that flowed from ice margins
Diamicton; sandy loam to silt loam; gray to brown; calcareous; contains beds of sand, silt, and gravel; 30 to 100 feet thick	Batestown Member, Lemont Formation l-b	**Till and associated sediment** derived directly from glacial ice
Diamicton; loam; grayish brown to reddish gray; calcareous; very stiff; 10 to 65 feet thick	Tiskilwa Formation t	**Till and associated sediment** derived directly from glacial ice; in the subsurface directly underlies the Batestown Member
Sand and gravel with silt; contains pebbles and cobbles; brown to grayish brown; calcareous; well to poorly sorted; 5 to 35 feet thick	Ashmore Tongue, Henry Formation h-a	**Glaciofluvial sediment (outwash)** deposited by glacial meltwater in streams and rivers that flowed from an advancing ice margin; not consistently differentiable from underlying sand and gravel correlated to the Pearl Formation
ILLINOIS EPISODE (~190,000–130,000 years B.P.)		
Fine to coarse sand with gravel; yellowish brown to grayish brown; calcite-cemented in places; incised into the Vandalia Member and older units; upper part contains weathered sand and gravel with silt and clay assigned to the Sangamon Geosol; 5 to 80 feet thick	Pearl Formation pl	**Glaciofluvial sediment (outwash)** deposited by glacial meltwater in streams and rivers that flowed from ice margins; inset into the Vandalia Member (upper unit), Glasford Formation; contains the Sangamon Geosol in the upper part except where eroded
Diamicton, sand and gravel, and silt and clay; interstratified; includes sediments previously assigned to the Berry Clay, Hagerstown, Radnor and Toulon Members, or Roby Silt Member; upper part contains weathered silty to clayey materials assigned to the Sangamon Geosol; 10 to 70 feet thick	Vandalia Member, Glasford Formation upper unit g-v3	**Proglacial and ice-contact sediment** deposited by glacial meltwater or sediment gravity flows (debris flows) along ice margins; contains the Sangamon Geosol in the upper part except where eroded
Diamicton, with layers of sand and gravel and silt and clay; diamicton is loam textured and is less compacted than lower unit (g-v1); includes sediments previously assigned to the Berry Clay, Radnor, Toulon Members, or Roby Silt Member; 25 to 175 feet thick	Vandalia Member, Glasford Formation middle unit g-v2	**Subglacial and ice-contact sediment** derived directly from glacial ice or deposited by glacial meltwater; deposition is interpreted to have occurred within an area of fast-flowing ice, possibly an ice stream and associated with the deglacial phase of the Illinois Episode glaciation
Diamicton; silt loam to loam; grayish brown; calcareous; contains beds of sand, silt, and gravel; hard; 10 to 100 feet thick	Vandalia Member, Glasford Formation lower unit g-v1	**Till and associated sediment** derived directly from glacial ice; overlain by deposits that accumulated along ice margins; nearly continuous deposit
Sand and gravel; pebbly; grayish brown; contains some beds of silt or diamicton; calcareous; well to moderately well sorted; 5 to 70 feet thick	Pearl Formation Grigg Member upper / lower units pl-g2 pl-g1	**Glaciofluvial sediment** deposited in front of advancing ice margins; include sediment deposited by outflows from lakes ponded behind ice margins; over the Mahomet Bedrock Valley (MBV), units are difficult to distinguish from the Mahomet Sand Member when intervening older till and lake sediment are absent; includes deposits of sand and gravel (pl-g1) outside the MBV
PRE-ILLINOIS EPISODE (~1,200,000–430,000 years B.P)		
Diamicton; loam; reddish brown to grayish brown; calcareous; contains beds of sand, silt, or gravel; hard; upper part weathered in profile of Yarmouth Geosol; 5 to 45 feet thick	Hillery Member, Banner Formation b-hl	**Till and associated sediment** derived directly from glacial ice; may contain Yarmouth Geosol weathering profile in the upper 10 feet (typically truncated)
Diamicton; loam to silt loam; grayish brown to light olive brown; calcareous; contains beds of sand, silt, or gravel; contains numerous clasts of the local bedrock; hard; ~20 feet thick	Harmattan Member, Banner Formation b-hm	**Till and associated sediment** derived directly from glacial ice
Sand, diamicton, and silt; sandy loam to silty clay loam; very dark gray to greenish gray; leached to weakly calcareous; may contain humus, peat, wood, and/or fossil snails; hard; 5 to 30 feet thick	Fisher member, Banner Formation b-f	**Fluvial or lacustrine sediment** deposited on a former floodplain of a river flowing in the MBV; the land surface was poorly drained and occasionally covered by overbank deposits or slope wash
Sand and gravel; brown to grayish brown; contains some beds of silt; calcareous; well to moderately well sorted; 10 to 90 feet thick	Mahomet Sand Member, Banner Formation, upper unit b-m2	**Glaciofluvial sediment (outwash)** deposited in the MBV by glacial meltwater flowing from a retreating ice margin located northeast of the area
Diamicton; sandy loam to clay loam; brown to pinkish gray; calcareous; contains intervals of sand and gravel or silt and clay; hard; ~40 feet thick	West Lebanon Member Banner Formation b-wl	**Till and associated sediment** derived directly from glacial ice flowing into the area from a northern or eastern ice source
Sand and gravel; pebbly to cobbly; brown; locally contains beds of silt or diamicton; calcareous; well to moderately well sorted; 5 to 100 feet thick	Mahomet Sand Member, Banner Formation, lower unit b-m1	**Glaciofluvial sediment (outwash)** deposited in the MBV by glacial meltwater flowing from an advancing ice margin located northeast of the area
PRE-ILLINOIS EPISODE AND OLDER		
Shale, siltstone, limestone and dolomite; upper part is soft, fissile, and fractured; locally contains siderite nodules, plant macrofossils, and slickensides	Pennsylvanian, Mississippian, Devonian, Silurian bedrock Pz	**Bedrock;** includes strata having a marine or terrestrial origin; its upper surface is undulating or irregular (including valleys and uplands) shaped by multiple cycles of erosion

[1] The materials mapped at the land surface may be overlain by 1 to 5 feet of wind-deposited silt (loess).
[2] The lithostratigraphy is modified after Stumpf and Atkinson (2015) and Stumpf and Dey (2012) and includes units from classification systems published by Hansel and Johnson (1996), Kempton et al. (1991), Willman and Frye (1970), and Willman et al. (1975).

Geology by Andrew J. Stumpf, Illinois State Geological Survey.

Digital cartography by Jennifer E. Carrell, Illinois State Geological Survey.

ILLINOIS
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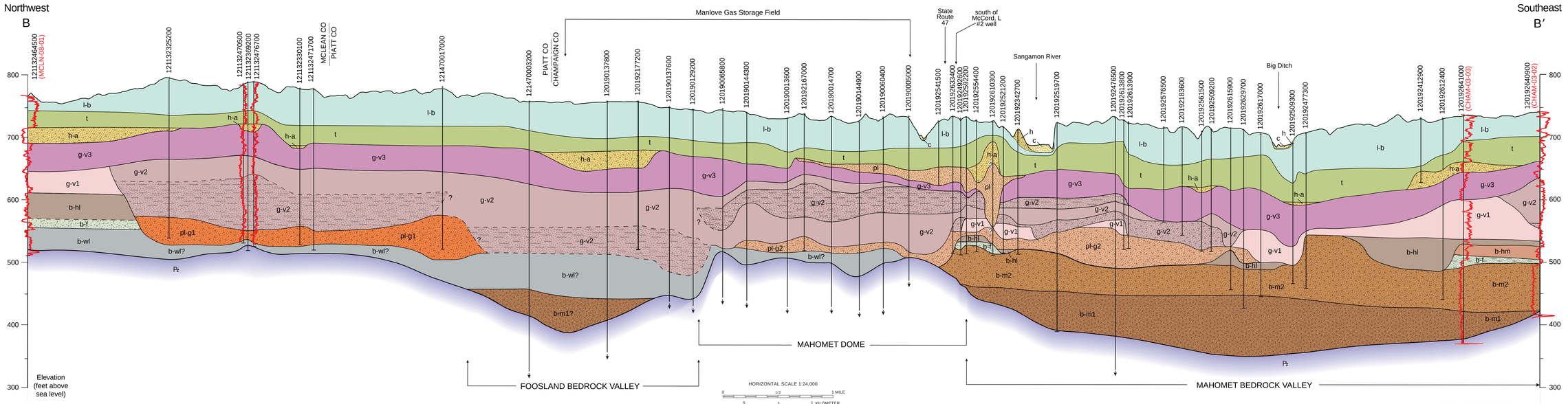
ILLINOIS STATE GEOLOGICAL SURVEY
Prairie Research Institute
University of Illinois at Urbana-Champaign



Suggested citation:
Stumpf, A.J., 2018, Geologic cross sections of Quaternary deposits across the Manlove gas storage field area, Champaign County, Illinois: Illinois State Geological Survey, Special Report 6, 7 p.; 2 plates.

Appendix C: Gas Relief Well Construction Logs (RW-1 through RW-3)

Well Construction Report

COMPLETE WITHIN 30 DAYS OF WELL COMPLETION AND SEND TO THE APPROPRIATE HEALTH DEPARTMENT.

1. Type of Well: a: **Driven** Well: Casing diam. ____ in Depth ____ ft.

b. **Bored** Well: Buried Slab Yes No

Hole Diameter: ____ in. to ____ ft.; ____ in. to ____ ft.; ____ in. to ____ ft.;

c. **Drilled** **PVC** casing Formation packer set at depth of ____ ft.

Hole Diameter: ____ in. to ____ ft.; ____ in. to ____ ft.; ____ in. to ____ ft.;

Type of Grout	# of Bags	Grout Weight	From (ft.)	To(ft.)	Tremie Depth (ft.)

d. Drilled Well ☑ **Steel:** Casing --- Mechanically Driven ☐ Yes ☑ No

Hole Diameter: 10 in. to 60 ft.; 4 in. to 150 ft.; ____ in. to ____ ft.;

Type of Grout	# of Bags	Grout Weight	From (ft.)	To(ft.)	Tremie Depth (ft.)
Cement	42		0	140	140

e. Well finished within: ☑ Unconsolidated ☐ Bedrock

f. Kind of Gravel Sand Pack Grain Size/Supplier # From (ft.) To(ft.)

Muscatine	30	140	154

2. Well Use: ☐ Domestic ☐ Irrigation ☐ Commercial ☐ Livestock ☐ Monitoring ☑ Other Gas Relief

3. Date Well Completed: 1/18/18 Well Disinfected ☑ Yes ☐ No

Driller's estimated Well yield ____ GPM

4. Date of Permanent Pump Installed ____

5. Pump Capacity ____ GPM Set at (depth) ____ ft.

6. Pitless Adapter Model and Manufacturer: ____

7. Well Cap Type and Manufacturer: ____

8. Pressure Tank: Working Cycle ____ gals Captive Air ☐ Yes ☐ No

9. Pump System Disinfected: ☐ Yes ☐ No

10. Name of Pump Company: ____

11. Pump Installer: ____ License # ____

12. ____ License # ____

Licensed Pump Contractor Signature ____

Illinois Department of Public Health
Division of Environmental Health

525 W. Jefferson Street
Springfield, IL 62761

Do Not write on these lines

IMPORTANT NOTICE: This State Agency is requesting disclosure of information that is necessary to accomplish the statutory purpose as outlined under Public Act85-0863. DISCLOSURE OF THIS INFORMATION IS MANDATORY. This Form has been approved by the Forms Management Center.

Date 01/18/18

GEOLOGICAL AND WATER SURVEY WELL RECORD

13. Property Owner Peoples Gas Light & Coke Co. Well No. 1

14. Driller Danny Northrip License # ____

15. Name of Drilling Co. Kickapoo Drilling Company LLC

16. Permit No 19-77-17 Date Issued 10/05/17

17. Date Drilling Started 12/21/17

18. Well SITE Address 292-348 CO RD 2800th N

19. Township Name Newcomb Land ID # ____

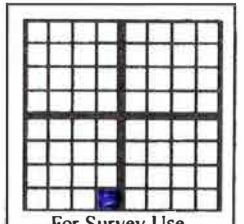
20. Subdivision Name ____ Lot # ____

21. Location: a County Champaign

b. Township No. 21 N Range 7 E Section 10.5a

c. SE Quarter SE Quarter SW Quarter

d. coordinates: ____ Site Elevation ____ ft. (msl)


For Survey Use

22. Casings, Liners *, Screen Information

Diam. (in)	Material	Joint	Slot Size	From (ft.)	To (ft.)
10	Steel	Threaded		+.5	60
4	Steel	Threaded		+1	150
4	Stainless Steel	Threaded	20	150	154

(*) ____

(List reason for liner, type of upper and lower seals installed)

23. Water from at a depth of ft. to ft.

a. static water level ____ ft. below casing which is ____ in. above ground

b. pumping level is ____ ft. pumping ____ GPM after pumping for ____ hours

24. Earth Materials Passed Through From (ft.) To (ft.)

(If DRY HOLE, fill out log and indicate how hole was sealed)

25. Licensed Water Well Contractor Signature ____

102-002243
License Number

KICKAPOO DRILLING COMPANY
405 W. Main
Downs, Illinois 61736
Ph: (309) 378-4003
F: (309) 378-4099

Well Log For Well #1 Peoples Gas

0	2	Top Soil
2	11	Tan Clay
11	36	Gray Clay
36	42	Tan Clay
42	44	Gravel
44	52	Gray Clay
52	56	Gravel
56	151	Gray Clay w/ Streaks of Gravel
151	162	Sand/Gravel 80/20
162	169	Sand (Tight)
169	192	Sand/Gravel 80/20
192	203	Sand/Gravel 60/40
203	224	Gray Clay (Sandy)
224	-	Rock

Well Construction Report

COMPLETE WITHIN 30 DAYS OF WELL COMPLETION AND SEND TO THE APPROPRIATE HEALTH DEPARTMENT.

1. Type of Well: a: **Driven** Well: Casing diam. _____ in Depth _____ ft.

b. **Bored** Well: Buried Slab Yes No

Hole Diameter: _____ in. to _____ ft.; _____ in. to _____ ft.; _____ in. to _____ ft.;

c. **Drilled** **PVC** casing Formation packer set at depth of _____ ft.

Hole Diameter: _____ in. to _____ ft.; _____ in. to _____ ft.; _____ in. to _____ ft.;

Type of Grout	# of Bags	Grout Weight	From (ft.)	To(ft.)	Tremie Depth (ft.)

d. Drilled Well ☑ **Steel:** Casing --- Mechanically Driven ☐ Yes ☑ No

Hole Diameter: 10 in. to 60 ft.; 4 in. to 163 ft.; _____ in. to _____ ft.;

Type of Grout	# of Bags	Grout Weight	From (ft.)	To(ft.)	Tremie Depth (ft.)
Cement	72		0	153	153

e. Well finished within: ☑ Unconsolidated ☐ Bedrock

f. Kind of Gravel Sand Pack

Grain Size/Supplier #	From (ft.)	To(ft.)
Muscatine	30	153	163

2. Well Use: ☐ Domestic ☐ Irrigation ☐ Commercial ☐ Livestock ☐ Monitoring ☑ Other Gas Relief

3. Date Well Completed: 1/9/18 Well Disinfected ☑ Yes ☐ No

Driller's estimated Well yield _____ GPM

4. Date of Permanent Pump Installed _____

5. Pump Capacity _____ GPM Set at (depth) _____ ft.

6. Pitless Adapter Model and Manufacturer: _____

7. Well Cap Type and Manufacturer: _____

8. Pressure Tank: Working Cycle _____ gals Captive Air ☐ Yes ☐ No

9. Pump System Disinfected: ☐ Yes ☐ No

10. Name of Pump Company: _____

11. Pump Installer: _____ License # _____

12. _____ License # _____

Licensed Pump Contractor Signature

Illinois Department of Public Health
Division of Environmental Health

525 W. Jefferson Street
Springfield, IL 62761

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Date 01/09/18

GEOLOGICAL AND WATER SURVEY WELL RECORD

13. Property Owner Peoples Gas Light & Coke Co. Well No. 2

14. Driller Danny Northrip License # _____

15. Name of Drilling Co. Kickapoo Drilling Company LLC

16. Permit No 19-78-17 Date Issued 10/05/17

17. Date Drilling Started 12/22/17

18. Well SITE Address 2700-2754 CR 350 E

19. Township Name Newcomb Land ID # _____

20. Subdivision Name _____ Lot # _____

21. Location: a County Champaign

b. Township No. 21 N Range 7 E Section 15.3c

c. SE Quarter NW Quarter SE Quarter

d. coordinates: _____ Site Elevation _____ ft. (msl)

For Survey Use

22. Casings, Liners *, Screen Information

Diam. (in)	Material	Joint	Slot Size	From (ft.)	To (ft.)
10	Steel	Threaded		+.5	60
4	Steel	Threaded		+1	163
4	Stainless Steel	Threaded	20	163	167

(*) _____

(List reason for liner, type of upper and lower seals installed)

23. Water from

at a depth of	ft. to	ft.

a. static water level _____ ft. below casing which is _____ in. above ground

b. pumping level is _____ ft. pumping _____ GPM after pumping for _____ hours

24. Earth Materials Passed Through

	From (ft.)	To (ft.)

(If DRY HOLE, fill out log and indicate how hole was sealed)

Dan Drayton

25. Licensed Water Well Contractor Signature

102-002243

License Number

KICKAPOO DRILLING COMPANY
405 W. Main
Downs, Illinois 61736
Ph: (309) 378-4003
F: (309) 378-4099

Well Log For Well #2 Peoples Gas

0	2	Top Soil
2	14	Tan Clay
14	38	Gray Clay
38	41	Tan Clay
41	43	Gravel
43	51	Gray Clay
51	54	Gravel
54	69	Gray Clay
69	78	Gravel
78	82	Sand/Gravel
82	86	Gravel
86	132	Gray Clay
132	140	Sand
140	142	Yellow Clay
142	149	Sand/Gravel
149	164	Gray Clay
164	199	Sand

Well Construction Report

COMPLETE WITHIN 30 DAYS OF WELL COMPLETION AND SEND TO THE APPROPRIATE HEALTH DEPARTMENT.

1. Type of Well: a: **Driven** Well: Casing diam. ____ in Depth ____ ft.

b. **Bored** Well: Buried Slab Yes No

Hole Diameter: ____ in. to ____ ft.; ____ in. to ____ ft.; ____ in. to ____ ft.;

c. **Drilled** PVC casing Formation packer set at depth of ____ ft.

Hole Diameter: ____ in. to ____ ft.; ____ in. to ____ ft.; ____ in. to ____ ft.;

Type of Grout	# of Bags	Grout Weight	From (ft.)	To(ft.)	Tremie Depth (ft.)

d. Drilled Well [✓] **Steel:** Casing --- Mechanically Driven [ ] Yes [✓] No

Hole Diameter: 4 in. to 153 ft.; 10 in. to 60 ft.; ____ in. to ____ ft.;

Type of Grout	# of Bags	Grout Weight	From (ft.)	To(ft.)	Tremie Depth (ft.)
Cement	74		0	143	143

e. Well finished within: [✓] Unconsolidated [ ] Bedrock

f. Kind of Gravel Sand Pack

Grain Size/Supplier #	From (ft.)	To(ft.)
Muscatine 30	143	163

2. Well Use: [ ] Domestic [ ] Irrigation [ ] Commercial [ ] Livestock [ ] Monitoring [✓] Other Gas Relief

3. Date Well Completed: 1/22/18 Well Disinfected [✓] Yes [ ] No

Driller's estimated Well yield ____ GPM

4. Date of Permanent Pump Installed ____

5. Pump Capacity ____ GPM Set at (depth) ____ ft.

6. Pitless Adapter Model and Manufacturer: ____

7. Well Cap Type and Manufacturer: ____

8. Pressure Tank: Working Cycle ____ gals Captive Air [ ] Yes [ ] No

9. Pump System Disinfected: [ ] Yes [ ] No

10. Name of Pump Company: ____

11. Pump Installer: ____ License # ____

12. ____ License # ____

Licensed Pump Contractor Signature

Illinois Department of Public Health
Division of Environmental Health

525 W. Jefferson Street
Springfield, IL 62761

Do Not write on these lines

IMPORTANT NOTICE: This State Agency is requesting disclosure of information that is necessary to accomplish the statutory purpose as outlined under Public Act85-0863. DISCLOSURE OF THIS INFORMATION IS MANDATORY. This Form has been approved by the Forms Management Center.

Date 01/22/18

GEOLOGICAL AND WATER SURVEY WELL RECORD

13. Property Owner Peoples Gas Light & Coke Co. Well No. 3

14. Driller Danny Northrip License # ____

15. Name of Drilling Co. Kickapoo Drilling Company LLC

16. Permit No 19-79-17 Date Issued 10/05/17

17. Date Drilling Started 01/10/18

18. Well SITE Address 2701-2755 CR 350 E

19. Township Name Newcomb Land ID # ____

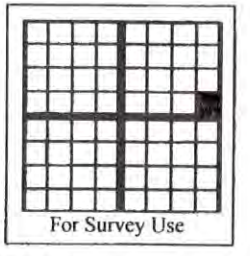
20. Subdivision Name ____ Lot # ____

21. Location: a County Champaign

b. Township No. 21 N Range 7 E Section 15.1e

c. SE Quarter SE Quarter NW Quarter

d. coordinates: ____ Site Elevation ____ ft. (msl)


For Survey Use

22. Casings, Liners *, Screen Information

Diam. (in)	Material	Joint	Slot Size	From (ft.)	To (ft.)
10	Steel	Threaded		+1	153
4	Steel	Threaded		+.5	60
4	Stainless Steel	Threaded	20	153	157

(*) ____

(List reason for liner, type of upper and lower seals installed)

23. Water from ____ at a depth of ____ ft. to ____ ft.

a. static water level ____ ft. below casing which is ____ in. above ground

b. pumping level is ____ ft. pumping ____ GPM after pumping for ____ hours

24. Earth Materials Passed Through

	From (ft.)	To (ft.)

(If DRY HOLE, fill out log and indicate how hole was sealed)

25. Licensed Water Well Contractor Signature ____ 102-002243 License Number

KICKAPOO DRILLING COMPANY
405 W. Main
Downs, Illinois 61736
Ph: (309) 378-4003
F: (309) 378-4099

Well Log For Well #3 Peoples Gas

0	2	Top Soil
2	12	Yellow Clay
12	22	Gray Clay
22	25	Sand/Gravel
25	37	Gray Clay
37	42	Sand/Gravel
42	44	Gray Clay
44	53	Sand/Gravel
53	69	Gray Clay
69	83	Sand/Gravel 80/20
83	121	Sand/Gravel 60/40
121	143	Gray Clay
143	154	Tan Clay
154	164	Sand (loose)
164	176	Sand (tight)
176	194	Sand (loose)
194	208	Sand/Gravel 70/30
208	217	Gray Clay
217	222	Limestone

Appendix D: Stratigraphic Boring Report (BH-1 through BH-4)

Prepared by: OBG, 2018

Attachment A

Stratigraphic Boring Locations

1/24/2019 3:48:31 PM JohnsoST

Y:\Mapping\Projects\6\69036\MXD\Attachment A_Stratigraphic Boring Locations.mxd

STRATIGRAPHIC BORING LOCATION

SECTION LINE

2018 MANLOVE FIELD INVESTIGATION
MANLOVE GAS STORAGE FIELD
FISHER, ILLINOIS

N

0 500 1,000 2,000

Feet

STRATIGRAPHIC BORING LOCATIONS

O'BRIEN & GERE ENGINEERS, INC.

Attachment B

Soil Boring Logs

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SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Manlove	N/A	M-BH-1

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Scott Parkes Cascade Environmental	11/30/2018	12/1/2018	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
N/A	N/A	738.84 Feet (Site)	7/6 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane 970,245.32 N, 1,316,538.72 E E /W
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
Feet ☐N ☐S Feet ☐E ☐W

Facility ID	County	State	Civil Town/City/ or Village
N/A	Champaign	Illinois	Fisher

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	LEL(%)	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 AUGER	48 48		0	0 - 4' Hand augered per client safety requirements (soil not observed).										
			1											
			2											
			3											
			4											
2 CS	36 48		5	4 - 12.5' **SILTY CLAY** CL/ML, soft to stiff, brown or yellowish brown (10YR 5/3 or 5/4), trace rounded gravel and course sand, medium to low plasticity.	CL/ML			0	0.5					7 inch diameter borehole (4-47')
			6					0	1.5					
			7					0	2					
3 CS	120 150		8					0	2					
			9					0	2					
			10	10' Moist to dry, very stiff.				0	2.5					
			11					0	3					
			12					0	3					

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm	
	OBG, part of Ramboll 234 W. Florida St., Fifth Floor, Milwaukee, WI 53204	Tel: (414) 837-3607 Fax: (414) 837-3608

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Boring Number M-BH-1

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	LEL(%)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			12											
			13	12.5 - 34' **SILTY CLAY** CL/ML, moist, very stiff to stiff, very dark gray (10YR 3/1), medium to low plasticity, (Till - Diamicton).				0	3					
								0	3.5					
			14											
								0	3.25					
			15											
								0	3.25					
			16											
								0	3.5					
4 CS	120 150		17											
								0	2.5					
			18											
								0	2.5					
			19											
								0	1.5					
			20											
								0	1.5					
			21											
								0	1.5					
			22		CL/ML									
								0	1.5					
			23											
								0	1.5					
			24											
								0	1.5					
			25											
								0	1.5					
			26											
								0	1.5					
5 CS	120 151.2		27	27' Hard.										
								0	4					
			28											
								0	4					
			29											
								0	2					
			30	30' Moist, silt content increasing, low plasticity.										
								0	1.25					
			31											
								0	1.5					
			32											

OBG
Part of Ramboll

Boring Number M-BH-1

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	LEL(%)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			33	12.5 - 34' **SILTY CLAY** CL/ML, moist, very stiff to stiff, very dark gray (10YR 3/1), medium to low plasticity, (Till - Diamicton). *(continued)*	CL/ML			0	2.5					
			34					0	2.5					
			35	34 - 39.5' **SILTY CLAY WITH SAND** (CL/ML)S, moist to dry, very stiff to hard, dark gray to very dark gray (10YR 4/1 to 10YR 3/1), little gravel and coarse sand clasts, low plasticity, (Till - Diamicton).				0	3					
			36					0	4.5					Compressive strength exceeds 4.5 (35-37')
6 CS	120 144		37		(CL/ML)S			0	4.5					
			38					0	4					
			39					0	4					
			40	39.5 - 49' **SANDY SILT:** s(ML), moist to dry, hard, yellowish brown (10YR 5/4), little subrounded gravel and coarse sand clasts, some oxidation present, till matrix shows signs of cementation, (Till - Diamicton).				0	4.5					Compressive strength exceeds 4.5 (39-47')
			41					0	4.5					
			42					0	4.5					
			43					0	4.5					
			44					0	4.5					
			45		s(ML)			0	4.5					
			46					0	4.5					
			47					0	4.5					
7 CS	120 153.6		48					0	4.5					6 inch diameter borehole (47-243')
			49					0	4.5					Compressive strength exceeds 4.5 (47-49')
			50	49 - 54.5' **SANDY SILT:** s(ML), dry, loose to very loose, light olive brown (2.5Y 5/4), little coarse sand and gravel, no cementation.				0						
			51		s(ML)			0						
			52					0						

OBG
Part of Ramboll

Boring Number M-BH-1

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	LEL(%)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			53	49 - 54.5' **SANDY SILT:** s(ML), dry, loose to very loose, light olive brown (2.5Y 5/4), little coarse sand and gravel, no cementation. *(continued)*	s(ML)			0						
			54					0						
								0						
			55	54.5 - 57' **SILTY SAND:** SM, loose to very loose, fine to medium, olive yellow (2.5Y 6/6), little rounded gravel and coarse sand.				6						
			56		SM			6						
			57					6						
8 CS	120 152.4		58	57 - 62' **POORLY-GRADED SAND WITH SILT:** SP-SM, loose, light olive brown (2.5Y 5/6), fine sand, grading to sandy silt, trace to little gravel.				6						
			59					4						M-BH-1(58-59') - Geotechnical Sample Gas Rover CH4 Reading: 274 PPM (59-60')
			60		SP-SM			4						
			61					99						
			62					99						
			63	62 - 67.5' **SANDY SILT:** s(ML), dry, loose, yellowish brown (10YR 5/6), little clay, little to few gravel at 66-67'.				8						Gas Rover CH4 Reading: 612 PPM (62-63')
			64					8						
			65		s(ML)			0						
			66					0						
			67					0						
9 CS	120 144		68	67.5 - 73.5' **SILT:** ML, moist, hard, light olive brown (2.5Y 5/4), little gravel and coarse sand clasts, sandy in some intervals, 67-69' - heavily oxidized, (Till - Diamicton).				0	4.5					Compressive strength exceeds 4.5 (67.5 - 77')
			69					0	4.5					
			70	70' - 73.5' Few gravel and coarse sand clasts.	ML			0	4.5					
			71					0	4.5					
			72					0	4.5					

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Boring Number M-BH-1

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	LEL(%)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			73	67.5 - 73.5' **SILT:** ML, moist, hard, light olive brown (2.5Y 5/4), little gravel and coarse sand clasts, sandy in some intervals, 67-69' - heavily oxidized, (Till - Diamicton). *(continued)*	ML			0	4.5					
			74	73.5 - 83' **SILT:** ML, moist, hard, gray (2.5Y 5/1), little to trace coarse sand and fine gravel clasts, (Till - Diamicton).				0	4.5					
			75					0	4.5					
			76					0	4.5					
			77					0	4.5					
10 CS	120 132		78	77' Dark gray (2.5Y 4/1), little coarse sand and gravel clasts, (Till - Diamicton).	ML			0	4.5					Compressive strength exceeds 4.5 (77-83')
			79					0	4.5					
			80					0	4.5					
			81					0	4.5					
			82					0	4.5					
			83					0	4.5					
			84	83 - 93.4' **WELL-GRADED SAND:** SW, wet, loose, dark gray (2.5Y 4/1), few gravel.				0						
			85	85' - 87' Light olive brown (2.5Y 5/3).				0						
			86					0						
			87					0						
11 CS	120 111.6		88		SW			0						
			89					0						
			90					0						
			91					0						
			92					0						

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Boring Number M-BH-1

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	LEL(%)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			93	83 - 93.4' **WELL-GRADED SAND:** SW, wet, loose, dark gray (2.5Y 4/1), few gravel. *(continued)*	SW			0						
			94	93.4 - 101' **POORLY-GRADED SAND WITH GRAVEL:** (SP)g, moist to wet, loose, dark gray (2.5Y 4/1), fine sand.				0						
			95					0						
			96					0						
12 CS	240 255.6		97		(SP)g			0						
			98					0						
			99					0						
			100					0						
			101					0						
			102	101 - 104.5' **SILT:** ML, moist, hard, gray (10YR 4/1), little sand.				0	4.5					Compressive strength exceeds 4.5 (101-104.5')
			103	102.5' - 5 inch sand layer.	ML			0	4.5					
			104					0	4.5					
			105	104.5 - 127' **POORLY-GRADED SAND:** SP, moist to wet, loose, dark gray (10YR 4/1), fine to medium, trace gravel, trace silt.				6						
			106					6						
			107					6						
			108		SP			0						
			109					0						
			110					0						
			111					0						M-BH-1(111-112') - Geotechnical Sample
			112					0						

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Boring Number M-BH-1

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	LEL(%)	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			113	104.5 - 127' **POORLY-GRADED SAND:** SP, moist to wet, loose, dark gray (10YR 4/1), fine to medium, trace gravel, trace silt. *(continued)*				0						
			114					0						
			115					0						
			116					0						
			117					0						
13 CS	240 258			117' Moist to wet, very loose, light olive brown (2.5Y 5/3), little coarse sand, trace gravel.										
			118					0						
			119					0						
			120		SP			0						
			121					0						
			122	122' Olive brown (2.5Y 4/3).				0						
			123					0						
			124					0						
			125					0						
			126					0						
			127					0						
			128	127 - 133' **WELL-GRADED SAND WITH GRAVEL:** (SW)g, wet, loose, olive brown (2.5Y 4/3).				0						
			129					0						
			130		(SW)g			0						
			131					0						
			132					0						

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Boring Number M-BH-1

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	LEL(%)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			133	127 - 133' **WELL-GRADED SAND WITH GRAVEL:** (SW)g, wet, loose, olive brown (2.5Y 4/3). *(continued)*	(SW)g			0						
			134	133 - 135' **SANDY SILT:** s(ML), moist, very stiff, light brownish gray (2.5Y 6/2), low plasticity.	s(ML)			0	2.5					
			135					0	2.5					
			136	135 - 161' **POORLY-GRADED SAND:** SP, wet, loose, grayish brown (2.5Y 5/2), medium to fine-grained, no cementation.				0						
14 CS	240 240		137					0						
			138					0						
			139					0						
			140					0						
			141					0						
			142					0						
			143					0						
			144		SP			0						
			145					0						
			146					0						
			147					0						
			148					0						
			149					0						
			150					0						
			151					0						
			152					6						

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Boring Number M-BH-1

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	LEL (%)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			153	135 - 161' **POORLY-GRADED SAND:** SP, wet, loose, grayish brown (2.5Y 5/2), medium to fine-grained, no cementation. *(continued)*				6						
			154					0						
			155					0						
			156					0						
15 CS	240 252		157		SP			0						
			158					0						
			159					0						
			160					0						
			161					0						
				161 - 162' **SILTY CLAY** CL/ML, hard, olive brown (2.5Y 4/3).	CL/ML			0	4.5					Compressive strength exceeds 4.5
			162	162 - 167' **POORLY-GRADED SAND:** SP, wet, grayish brown (2.5Y 5/2), fine-grained.				0						
			163					0						
			164					0						
			165		SP			0						
			166					0						
			167					0						
				167 - 177' **SILT:** ML, moist, hard, gray (2.5Y 5/1).				0	4.5					Compressive strength exceeds 4.5 (167-172')
			168	168' Hard, gray (2.5Y 5/1) little clay.				0	4.5					
			169					0	4.5					
			170		ML			0	4.5					
			171					0	4.5					
			172					0	4.5					

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Boring Number M-BH-1

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	LEL(%)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			173	167 - 177' **SILT:** ML, moist, hard, gray (2.5Y 5/1). *(continued)* 172.5' Very stiff to stiff.				0	2.5					
			174					0	2					
			175		ML			0	2					
			176					0	1.5					
			177					0	1.5					
16 CS	240 235.2		178	177 - 194' **SILTY SAND:** SM, wet, very loose, gray (2.5Y 5/1 or 5/2).				0						
			179					0						
			180					0						
			181					0						
			182					25						
			183					25						
			184					0						
			185		SM			0						
			186					0						
			187					0						
			188					0						
			189					0						
			190					0						
			191					0						
			192					0						

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Boring Number M-BH-1

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	LEL(%)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			193	177 - 194' **SILTY SAND:** SM, wet, very loose, gray (2.5Y 5/1 or 5/2). *(continued)*	SM			0						
			194					0						
				194 - 195.4' **SILT:** ML, wet, hard, gray (2.5Y 5/1).	ML			0	3.5					
			195					0	4.5					Compressive strength exceeds 4.5
			196	195.4 - 214' **POORLY-GRADED SAND:** SP, wet, loose, grayish brown (10YR 5/2), medium-grained grading to fine-grained, trace silt, no gravel present.				0						
17 CS	240 276		197					0						
			198	198' Grayish brown (2.5Y 5/2).				0						
			199					0						
			200	200' Fine-grained sand.				0						M-BH-1(200 - 201') - Geotechnical Sample
			201					0						
			202					0						
			203					0						
			204		SP			0						
			205					6						
			206					6						
			207					6						
			208					8						
			209					8						
			210					7						
			211					7						
			212					7						

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Boring Number M-BH-1

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	LEL(%)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			213	195.4 - 214' **POORLY-GRADED SAND:** SP, wet, loose, grayish brown (10YR 5/2), medium-grained grading to fine-grained, trace silt, no gravel present. *(continued)*	SP			10						
			214					10						
			215	214 - 218.5' **WELL-GRADED SAND WITH GRAVEL:** SW, wet, loose, grayish brown (2.5Y 5/2), little to few gravel (rounded).	SW			10						
			216					10						
18 CS	240 246		217					10						
			218					0						
			219	218.5 - 222' **SILTY CLAY WITH SAND** (CL/ML)S, moist, hard, dark gray (10YR 4/1), little gravel and coarse sand clasts, (Till - Diamicton).	(CL/ML)S			0	4.5					Compressive strength exceeds 4.5 (218.5-222')
			220					0	4.5					
			221	220.5' Silty loam.				0	4.5					
			222					7	4.5					
			223	222 - 224' **POORLY-GRADED SAND:** SP, loose, dark gray (10YR 4/1), little gravel.	SP			7						
			224					7						
			225	224 - 227' **SANDY SILT:** s(ML), moist, hard, dark gray (10YR 4/1), few gravel and coarse sand clasts (subrounded), (Till - Diamicton).	s(ML)			9	4.5					Compressive strength exceeds 4.5 (224-228')
			226					9	4.5					
			227					6	4.5					
			228	227 - 228.5' **SILT:** ML, dry, hard, gray with varves of organic silt (dark brown), varving more prevalent with depth.	ML			6	4.5 1					
			229	228.5 - 231' **ORGANIC SILT:** OL, dark brown.				4	3.5 4.5					Compressive strength exceeds 4.5
			230	229' Dry, dark brown, possible peat unit, oxidizes with exposure to air.	OL			4	3.5					
			231					4	3.5					
			232	231 - 232' **ORGANIC CLAY:** OH, dry, hard, dark brown.	OH			9	4.5					Compressive

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Boring Number M-BH-1

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	LEL(%)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			232	232 - 235' **ORGANIC CLAY:** OH, moist, hard, gray to very dark grayish brown (2/5Y 5/1 to 3/2), interbedded layers of gray silt, fine sand, and dry dark grayish brown organic-rich clay, disturbed varving structures present.				0	3.5					strength exceeds 4.5
			233					0	3.5					
			234		OH			0	3.5					
			235					0	3.5					
				235 - 236' **ORGANIC CLAY WITH SAND:** (OH)s, interedding of OH and SP.	(OH)s			0	0					
			236	236 - 243' **POORLY-GRADED SAND:** SP, moist, very loose, grayish brown (10YR 5/2), trace gravel, no cementation.				0						
19 CS	72 96		237					0						
			238	238' Shell fragments.				0						
			239					0						
			240		SP			0						
			241					0						
			242					0						
			243					0						
				243' End of boring - Bedrock Encountered (Limestone).										

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SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Manlove	N/A	M-BH-2

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Scott Parkes — Cascade Environmental	12/4/2018	12/12/2018	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
N/A	N/A	737.54 Feet (Site)	7/6 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane 968,608.92 N, 1,309,873.83 E E /W
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
Feet ☐N ☐S Feet ☐E ☐W

Facility ID	County	State	Civil Town/City/ or Village
N/A	Champaign	Illinois	FISHER

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 AUGER	48 48		0	0 - 4' Moist, hand augered, safety requirements, soil not observed.										
			1											
			2											
			3											
			4	4 - 27' **SILTY CLAY** CL/ML, moist, very stiff to stiff, brown (10YR 4/3), medium to low plasticity, (Till - Damicton).				0	4					7" diameter borehole (4-77')
2 CS	36 62.4		5					0	1					
			6					0	3					
			7					0	3.5					
3 CS	120 144		8		CL/ML			39	2					
			9					39	3.5					
			10	10' Moist, very stiff, dark gray (2.5Y 4/1), low to medium plasticity.				39	2.25					
			11					38	2					
			12					34	3.5					

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm OBG, part of Ramboll
234 W. Florida St., Fifth Floor, Milwaukee, WI 53204
Tel: (414) 837-3607
Fax: (414) 837-3608

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Boring Number M-BH-2

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			13	4 - 27' **SILTY CLAY** CL/ML, moist, very stiff to stiff, brown (10YR 4/3), medium to low plasticity, (Till - Damicton). *(continued)* 13' - 17' Stiff, moist.				34	3.75					
			14					33	2					
			15					33	2					
			16					20	1.75					
			17					20	1.5					
4 CS	120 132			17' Moist, trace subangular gravel (fine) and coarse sand clasts.				22	1.5					
			18					22	1					
			19					22	1					
			20		CL/ML			9	1					
			21					9	1					
			22	22' Moist, stiff, gray (2.5Y 5/1).				30	2					
			23					30	1.5					
			24					30	1					
			25					38	1					
			26					38	1					
			27	27 - 31' **SANDY SILT:** s(ML), moist, stiff, gray (10YR 5/1), little clay, little to few fine gravel clasts, (Till - Diamicton).				81	1.75					
5 CS	120 144		28					81	1.75					
			29		s(ML)			271	1.75					
			30					271	1.75					
			31	31 - 34' **CLAYEY SILT** ML/CL, moist, stiff, dark grayish brown (2.5Y 5/2), low plasticity, little to tace coarse sand and gravel clasts, (Till - Diamicton).	ML/CL			271	2					
			32											

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Boring Number M-BH-2

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			33	31 - 34' **CLAYEY SILT** ML/CL, moist, stiff, dark grayish brown (2.5Y 5/2), low plasticity, little to tace coarse sand and gravel clasts, (Till - Diamicton). *(continued)*	ML/CL			110	2					
			34					120	1.25					
			35	34 - 47' **SANDY SILT:** s(ML), moist, hard, gray (2.5 Y 5/2), well cemented, little to trace gravel and coarse sand clasts [2-45mm], (Till - Diamicton).				120	4.5					Compressive strength exceeds 4.5 (34-47')
			36					43	4.5					
			37					43	4.5					
6 CS	120 150		38	37' Moist to dry, hard, grayish brown to dark grayish brown (2.5YR 5/2 to 4/2), trace coarse sand and gravel clasts, (Till - Diamicton).				324	4.5					Quartzite Cobble recovered at 37' bgs
			39					324	4.5					
			40					324	4.5					
			41		s(ML)			1366	4.5					
			42					2855	4.5					
			43	42' - 46' Moist to dry.				2855	4.5					
			44					522	4.5					
			45					2973	4.5					
			46					2973	4.5					
			47					1846	4.5					
7 CS	120 141.6		48	47 - 54' **SILTY SAND:** SM, dry, loose, brownish yellow (10YR 6/6), fine, no cementation, some gravel and coarse sand, poorly graded to well graded.				836						
			49					836						
			50		SM			3317						
			51	50.5' Dry, loose, light yellowish brown (10YR 6/4), gravelly.				3317						
			52					3317						
								1447						
								1447						

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Boring Number M-BH-2

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			53	47 - 54' **SILTY SAND:** SM, dry, loose, brownish yellow (10YR 6/6), fine, no cementation, some gravel and coarse sand, poorly graded to well graded. *(continued)* 52' Dry, loose, brownish yellow (10YR 6/6).	SM			1119						
			54					1119						
				54 - 55' dry, fine sand and silt (sand/silt), intergrading.				1119						
			55	55 - 56.5' **SILT:** ML, moist, stiff, yellowish brown (10YR 5/6).	ML			650	1.5					
			56					650	2.5					
8 CS	120 129.6		57	56.5 - 57.5' **POORLY-GRADED SAND:** SP, wet, loose, medium-grained.	SP			1455						
			58	57.5 - 61.5' **SILTY SAND:** SM, dry, very loose, yellowish brown (10YR 5/6), fine-grained, gravelly in some intervals, poorly graded, grades to fine sand.	SM			1455						
			59					1455						
			60					2873						
			61					2873						M-BH-2(60-61') - Geotechnical Sample
				61.5 - 62' **SILT:** ML, dry, cohesive silt layer.	ML			2873						
			62	62 - 65.5' **SILTY SAND:** SM, same as above.	SM			901						
			63					901						
			64					901						
			65					497						
			66	65.5 - 67' **SILT:** ML, moist, stiff, brownish yellow to gray (10YR 6/6 to 10YR 5/1), **varving structures present, dark brown organic silt varves between gray silt**.	ML			497	1.5					
								497	1.5					
9 CS	120 146.4		67	67 - 77' **SANDY SILT:** s(ML), dry, hard, brown, little fine gravel clasts, (Till - Diamicton).	s(ML)			1064	4.5					Compressive strength exceeds 4.5 (67-77')
			68					1064	4.5					
			69					730	4.5					
			70					730	4.5					
			71	70.5' Dark grayish brown, little clay.				4577	4.5					
			72											

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Boring Number M-BH-2

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			73	67 - 77' **SANDY SILT:** s(ML), dry, hard, brown, little fine gravel clasts, (Till - Diamicton). *(continued)*				4577	4.5					
			74					2118	4.5					
			75	74' - 75' Cemented sand in fractures - interesting turquoise color, possible marker bed..	s(ML)			255	4.5					
			76	76' Increasing clay content.				255	4.5					
			77					255	4.5					
10 CS	120 135.6		78	77 - 81' **POORLY-GRADED SAND WITH SILT:** SP, moist to wet, hard, light olive brown (2.5Y 5/2), little silt, trace medium to coarse sand and fine gravel clasts, (Till - Diamicton).	SP			161	4.5					6" diameter borehole (77-243') Compressive strength exceeds 4.5
			79					161	4					
			80					161	4					
			81					157						
			82	81 - 85' **SANDY ELASTIC SILT WITH GRAVEL:** SP, moist to wet, medium dense to loose, dark grayish brown to grayish brown (10 YR 4/2 to 5/2), fine-grained.				157						
			83		SP			141						
			84					141						
			85					141						
			86	85 - 87' **SILTY SAND:** SM, wet, loose to medium dense, dark grayish brown to olive brown (2.5Y 4/2 to 4/3).	SM			297						
			87					297						
11 CS	240 230.4		88	87 - 108' **POORLY-GRADED SAND:** SP, wet, very loose, grayish brown (2.5Y 5/2), medium-grained, trace to little coarse sand, trace fine gravel.				120						Begin drilling in 20' advancements, End 10' advancements
			89					120						
			90		SP			120						
			91					191						
			92					191						

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Boring Number M-BH-2

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			93	87 - 108' **POORLY-GRADED SAND:** SP, wet, very loose, grayish brown (2.5Y 5/2), medium-grained, trace to little coarse sand, trace fine gravel. *(continued)*				191						
			94					480						
			95					480						
			96					480						
			97					281						
			98					281						
			99	98 - 99' **SILT:** ML, dense layer of silt interbedded with clay.	ML			281	2.5					
			100		SP			95	2.5					
			101					95						
			102					95						
			103					1713						
			104					1713						
			105					1357						
			106					1357						
			107					1357						
12 CS	240 240		108					270						
			109	108 - 109.5' **CLAYEY SILT** ML/CL, moist, very stiff, light gray to olive brown, clay varving, medium to low plascity.	ML/CL			270	3.5					
			110	109.5 - 117.8' **POORLY-GRADED SAND:** SP, moist to wet, grayish brown (10YR 5/2), trace gravel and coarse sand.				270	3.5					
			111		SP			613						
			112					613						

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Boring Number M-BH-2

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			113	109.5 - 117.8' **POORLY-GRADED SAND:** SP, moist to wet, grayish brown (10YR 5/2), trace gravel and coarse sand. *(continued)*				658						
			114					658						
			115		SP			658						
			116					658						
			117					658						
			118					937						
				117.8 - 119' **ORGANIC CLAY:** OH, moist, light gray clay silt with olive brown OH varving, high plasticity clay and silt.	OH			937	4.5					Compressive strength exceeds 4.5 (117.8-119')
			119					937	4.5					
			120	119 - 123' **POORLY-GRADED SAND:** SP, medium sand.				937						
			121		SP			937						
			122					528						
			123					528						
				123 - 124' **SILT:** ML, moist, very stiff, light gray, low plasticity.	ML			528	3					
			124	124 - 125' **POORLY-GRADED SAND:** SP, medium sand.	SP			688						
			125	125 - 127.5' **SILT:** ML, moist, stiff, gray, little clay.				688	3					
			126		ML			688	3.25					
13 CS	240 228		127											
			128	127.5 - 129' **POORLY-GRADED SAND:** SP, moist to wet, very loose, grayish brown (10YR 5/2), poorly graded.	SP			348	3					
			129					348						
			130	129 - 132' **SILT:** ML, moist, gray, low plasticity, some clay near top, sandier with depth.				348	4					
			131		ML			517	4					
			132					517	4					

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Boring Number M-BH-2

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			132	132 - 147' **POORLY-GRADED SAND:** SP, wet, very loose, grayish brown (10YR 5/2), fine to medium, trace fine gravel and coarse sand.				1697						
			133					1697						
			134					1697						
			135					1393						
			136					1393						
			137					1393						
			138					1393						
			139					1187						
			140		SP			1187						
			141					1187						
			142					1187						
			143					1187						
			144					837						
			145					837						
			146					837						
14 CS	240 267.6		147	147 - 148' **SILT:** ML, moist, very stiff, gray (10YR 5/1), clayey, low plasticity.	ML			1317	4					
			148	148 - 149' Interbedding of yellowish brown (10YR 5/4) silt and clay, two inch thick bands of clay.				1317	4					
			149	149 - 152.4' **SANDY SILT:** s(ML), wet, dense, grayish brown (10YR 5/2), fine, no gravel.				4810						
			150		s(ML)			4810						
			151					4810						M-BH-2(151
			152											

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Boring Number M-BH-2

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
														- 152') - Geotechnical Sample
			153	152.4 - 153' Interbedding of yellowish brown (10YR 5/4) silt and clay.				4810	4					
				153 - 157' **POORLY-GRADED SAND:** SP, moist to wet, loose, little silt, dark brown streaks at 156-158'.				3451						
			154											
								3451						
			155		SP									
								3451						
			156											
								3451						
			157											
				157 - 162' **SILT AND SAND:** moist, light yellowish brown (2.5Y 6/2 to 6/3), SILT (ML) interbedded with fine SAND (SP), strong organic odor throughout.				2776	3.5					
			158					2776	4					
			159	159' Oxidation streaking.										
								2776	3.75					
			160											
								2776	4					
			161											
								2869	4					
			162	162 - 187' **SILT:** ML, moist, very stiff to hard, light olive brown (2.5Y 6/4 or 5/4), oxidation throughout, non-plastic to low plasticity. Note: pristine uniform silt.				2869	4.5					Compressive strength exceeds 4.5
			163					2869	4					
			164											
								2815	4.5					Compressive strength exceeds 4.5
			165	165' - 167' Mottled oxidation throughout.										
								2815	4					
			166											
								2815	4					
15 CS	240		167	167' Very stiff to hard, light yellowish brown (2.5Y 6/4).	ML									
								615	4.5					Compressive strength exceeds 4.5 (167-171')
			168											
								615	4.5					
			169											
								615	4.5					
			170											
								615	4.5					
			171											
								1649	4					
			172											

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Boring Number M-BH-2

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				162 - 187' **SILT:** ML, moist, very stiff to hard, light olive brown (2.5Y 6/4 or 5/4), oxidation throughout, non-plastic to low plasticity. Note: pristine uniform silt. *(continued)*				1649	4.25					
			173											
								1649	4.5					Compressive strength exceeds 4.5
			174											
								1917	4					
			175											
								1917	4					
			176											
								1917	4					
			177											
								1138	4					
			178											
								1138	4					
			179											
					ML			1138	4					
			180											
								2874	4					
			181											
								2874	4					
			182											
								2874	4					
			183	183' Light brownish gray (10YR 6/2).										
								6443	4					
			184											
								6443	4					
			185											
								6443	3.5					
			186											
								6443	3.5					
16 CS	240 216		187	187 - 199' **SILT:** ML, wet, very stiff to hard, grayish brown (10YR 5/2), non plastic to low plasticity.										
								254	3.75					
			188											
								254	4					
			189											
					ML			167	4.25					
			190											
								167	4					
			191											
								167	4					
			192											

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Boring Number M-BH-2

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			193	187 - 199' **SILT:** ML, wet, very stiff to hard, grayish brown (10YR 5/2), non plastic to low plasticity. *(continued)*				167	4.5					Compressive strength exceeds 4.5 (192-194')
			194					448	4.5					
			195					448	4					
			196	196' - 199' Little clay.	ML			448	4					
			197					448	4					
			198					1048	4					
			199					1048	4.25					
			200	199 - 207' **POORLY-GRADED SAND:** SP, moist, very loose, grayish brown (10YR 5/2), fine to medium.				1048						
			201					1048						
			202					1048						
			203		SP			2099						
			204					2099						
			205					2099						
			206					2099						
			207					2099						
17 CS	240		208	207 - 217' **POORLY-GRADED SAND:** SP, moist to wet, very loose, dark gray (10YR 4/1), fine to medium, trace fine gravel.				5483						
			209					5483						
			210		SP			5483						
			211					188						
			212					188						

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Boring Number M-BH-2

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			213	207 - 217' **POORLY-GRADED SAND:** SP, moist to wet, very loose, dark gray (10YR 4/1), fine to medium, trace fine gravel. *(continued)*				2254						
			214					2254						
			215		SP			2254						
			216					3863						
			217					3863						
			218	217 - 219.5' **WELL-GRADED SAND WITH GRAVEL:** (SW)g, moist, very loose, dark grayish brown, trace cobble fragments.	(SW)g			3863						
			219					3132						
			220	219.5 - 227' **SILT:** ML, moist, dark grayish brown, loam, mainly silt, little clasts of coarse sand and gravel (angular), (Till - Diamicton).				3132 3132	4.5					Compressive strength exceeds 4.5 (219.5-227')
			221					3132	4.5					
			222					3132	4.5					
			223					2118	4.5					
			224		ML			2118	4.5					
			225	225' - 226' Increasing sand content.				1947	4.5					
			226					1974	4.5					
			227					1974	4.5					
18 CS	192		228	227 - 237' **POORLY-GRADED SAND:** SP, *loose, material was lost after core bag ripped during transfer from drill pipe. Material fell into drilling mud bin and therefore could not be described or screened, 10' of sample material was lost.										
			229											
			230		SP									
			231											
			232											

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Boring Number M-BH-2

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			233	227 - 237' **POORLY-GRADED SAND:** SP, *loose, *(continued)*	SP									
			234											
			235											
			236											
			237											
			238	237 - 239' **ORGANIC SILT:** OL, moist, hard, dark grayish brown (10YR 4/1 to 4/2), low plasticity.	OL			140 140	4.5 4.5					Compressive strength exceeds 4.5 (237-239')
			239											
			240	239 - 243' **SILTY SAND:** SM, moist, loose to very dense, gray to light gray (2.5Y 6/1 to 7/1), fine-grained.	SM			9563						
			241					9563						M-BH-2(240 - 241') - Geotechnical Sample
			242					9563						
			243					9563						
				243' End of boring after encountering limestone bedrock.										

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SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Manlove	N/A	M-BH-3

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Scott Parkes — Cascade Environmental	12/13/2018	12/14/2018	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
N/A	N/A	727.41 Feet (Site)	7/6 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane 967,153.93 N, 1,311,813.85 E E /W
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location ☐N ☐S Feet ☐E ☐W Feet

Facility ID	County	State	Civil Town/City/ or Village
N/A	Champaign	Illinois	N/A

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 AUGER	48 48		0	0 - 4' Hand augered per client safety requirements, soil not observed.										
			1											
			2											
			3											
			4											
2 CS	48 36		5	4 - 17' **SILTY CLAY** CL/ML, moist, soft to stiff, yellowish brown to light gray, silty clay to sandy clay, low to medium plasticity, trace fine gravel, mottled throughout, (USDA - Loam).	CL/ML			0	1					7" diameter borehole (4-47')
			6					0	3.5					
			7					0	3.5					
3 CS	153.6 120		8					0	3					
			9					0	3					
			10					0	3					
			11					0	3					
			12	11' Moist, hard to stiff, dark gray (10YR 4/1 to 4/1), few coarse sand and fine gravel clasts, (Till - Diamicton).				0	4.5					Compressive

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature
Firm OBG, part of Ramboll
234 W. Florida St., Fifth Floor, Milwaukee, WI 53204
Tel: (414) 837-3607
Fax: (414) 837-3608

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Boring Number M-BH-3

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				4 - 17' **SILTY CLAY** CL/ML *(continued)*										
			13					0	4.5					strength exceeds 4.5 (11-14.5')
								0	4.5					
			14	14' - 17' Dark gray to dark brownish gray.										
					CL/ML			0	4.5					
			15						3					
								0	3.25					
			16											
								0	3.25					
4 CS	156 120		17	17 - 26' **SILTY CLAY WITH SAND** (CL/ML)S, dark gray (10YR 4/1), (Till - Diamicton).										
			18											
			19											
			20											
			21					0	4.5					Compressive strength exceeds 4.5 (20-41.5')
					(CL/ML)S			0	4.5					
			22											
								0	4.5					
			23											
								0	4.5					
			24											
								270	4.5					
			25											
								270	4.5					
			26	26 - 37' **SANDY SILT:** s(ML), moist, hard, dark brownish gray to dark brown, with clay, trace coarse sand and gravel clasts, low plasticity, (Till - Diamicton).										
								270	4.5					
5 CS	960		27											
								134	4.5					
			28											
								134	4.5					
			29		s(ML)									
								134	4.5					
			30											
								413	4.5					
			31											
								33	4.5					
			32											

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Boring Number M-BH-3

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			33	26 - 37' **SANDY SILT:** s(ML), moist, hard, dark brownish gray to dark brown, with clay, trace coarse sand and gravel clasts, low plasticity, (Till - Diamicton). *(continued)*				33 509	4.5					
			34					509	4.5					
			35		s(ML)			168	4.5					
			36					168	4.5					
			37					168	4.5					
			38	37 - 38.5' **CLAYEY SILT:** ML/CL, moist, hard, dark gray (10YR 4/1), with sand, trace to few coarse sand clasts (subrounded), low plasticity to non-plastic, (Till - Diamicton).	ML/CL			708	4.5					
			39	38.5 - 41.5' **SANDY SILT:** s(ML), moist, hard, brown to yellowish brown (10YR 5/3 to 5/6), little clay, oxidation mottling throughout, clasts - 10% coarse sand (subrounded), (Till - Diamicton).				1907	4.5					
			40		s(ML)			1907	4.5					
			41	40.5' - 41.5' Gravelly.				1907	4.5					
			42	41.5 - 47' **SILTY SAND:** SM, moist to dry, yellowish brown (10YR 6/6 to 5/6), fine, interbedded with gray silt, loose to dense in silt intervals, oxidation throughout.				5905 5905	4.5					
			43					5905 22587						
			44		SM			22587						
			45	45' Yellowish brown (10YR 5/4) silt bed.				22587 9525						
			46					9525						
			47					9525						
			48	47 - 49.5' **SANDY SILT:** s(ML), moist, hard, clasts - few gravel and cobbles >100 mm, oxidation mottling present, (Till - Diamicton).	s(ML)			1935	4.5					6" diameter borehole (47-215') Compressive strength exceeds 4.5 (47-49.5')
			49					1935	4.5					
			50	49.5 - 52' **SILTY SAND WITH GRAVEL:** (SM)g, dry to moist, loose to dense, few silt, some gravel, cobbles present, well graded.				1935 9185	4.5 2					
			51		(SM)g			9185						
			52					9185						M-BH-3(51-52')

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Boring Number M-BH-3

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			52	52 - 69' **SILT:** ML, moist, very stiff, light olive brown (2.5Y 5/4), no sand or gravel, poorly graded, oxidation streaking throughout.	ML			3020	3.5					- Geotechnical Sample
			53					3020	3.5					
			54	54' Moist, stiff to very stiff, gray (10 YR 5/1), no sand or gravel, grading to SILT with clay, medium stiff, medium plasticity.				3020	3.5					
			55					289	3.25					
			56					289						
			57					192	3					
			58		(ML)c			192	3					
			59					192	3					
			60	60' Moist, very stiff to hard, gray (10YR 4/1), little clay, medium plasticity.	ML			245	4.5					Compressive strength exceeds 4.5 (60-63')
			61					245	4.5					
			62					245	4.5					
			63	63' - 66' Medium stiff, low plasticity.				305						
			64					305	3					
			65					305	3					
			66					130	3					
			67	67' Start of soft, very dark grayish brown (10YR 3/2) varving structures.				130	3					
			68					119	1					
			69	69 - 72' **SILTY CLAY** CL/ML, very soft, dark gray (10YR 4/1), grading to clayey sand.				119	1					
			70		CL/ML			147						
			71					147	1					
			72					147	1					

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Boring Number M-BH-3

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			73	72 - 76.5' **SILTY CLAY WITH SAND** (CL/ML)S, dark gray (10YR 4/1), little coarse sand and gravel (fine) clasts, trace limestone and chert, (Till - Diamicton).	(CL/ML)S			187	4					
			74					187	4					
			75					187	4					
			76					148	4					
			77	76.5 - 77.5' **SILT:** ML, gray, with disturbed varving structures - varves of brown organic silt.	ML			148	4					
			78	77.5 - 78' **SANDY LEAN CLAY WITH GRAVEL:** s(CL)g, moist, soft.	s(CL)g			413	4					
				78 - 79' **SILT:** ML, gray to brown, varved.	ML			413	1					
			79	79 - 80' **SANDY LEAN CLAY WITH GRAVEL:** s(CL)g.	s(CL)g			1189	1					
			80	80 - 83' **ORGANIC SILT:** OL, moist, hard, gray (10YR 5/1), brown varving throughout, varves - very dark grayish brown (10YR 3/2), low to medium plasticity.	OL			1189	4.5					Compressive strength exceeds 4.5 (80-92')
			81					1189	4.5					
			82					1133	4.5					
			83	83 - 83.5' **PEAT (AMORPHOUS):** PT.	PT									
			84	83.5 - 84' **ORGANIC SILT:** OL, hard, dark brown, organic silt and clay.	OL			1133	4.5					
				84 - 84.5' **WOOD:** WOOD, 6-inch wood chunk.	WOOD									
			85	84.5 - 89.5' **ORGANIC SILT:** OL, dark brown to dark gray (10YR 3/3 to 4/1).	OL			1438	4.5					
			86					1438	4.5					
			87	86.75' - 87' Medium sand layer. 87' Moist, very stiff to hard, very dark grayish brown (10YR 3/2), little clay, medium plasticity.				1438	4.5					
			88					195	4.5					
			89					100	4.5					
			90	89.5 - 91.5' **SANDY SILT WITH GRAVEL:** s(ML)g, dark grayish brown (10YR 4/2).				100	4.5					
			91	90.5' 30% turquoise colored gravel; Gley2 4/3. *Marker bed.	s(ML)g			257	4.5					
			92		g(SW)			257	4.5					

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Boring Number M-BH-3

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			91	91.5 - 93' **GRAVELLY WELL-GRADED SAND** g(SW), wet,very loose, gray, little silt, shells present, blueish gray, Water table at 91.5'. *(continued)*	g(SW)			257						
			93	93 - 101' **POORLY-GRADED SAND:** SP, Wet, very loose, medium, dark gray (10YR 4/1), trace gravel, little silt.				351						
			94					351						
			95	95' Moist to wet, dense to loose, fine, gray to grayish brown (10YR 5/1 to 5/2), trace silt.				351						
			96					351 721						
			97		SP			721						
			98					721						
			99					504						
			100					504						
			101					1046						
			102	101 - 103' **SILT:** ML, moist to wet, hard, gray (2.5Y 5/1), trace fine sand, no plasticity, seam of 2.5Y silt at 101.5', 1 inch sand seam at 102', seam of light olive brown (2.5Y 5/3) silt at 102.8'.	ML			1046	4.5					Compressive strength exceeds 4.5 (101-103')
			103					1046	4.5					
			104	103 - 109' **POORLY-GRADED SAND:** SP, moist, very loose, fine, grayish brown (2.5Y 5/2), little silt.				1535						M-BH-3(103-104') - Geotechnical Sample
			105					1535 736						
			106	105' Medium to coarse, grayish brown (2.5Y 5/2), little silt, trace gravel in some intervals.	SP			736						
6 CS	259.2 240		107	107' - 109' Increasing silt content.				736						
			108					529						
			109					529						
			110	109 - 111.5' **SILT:** ML, moist, hard to very stiff, dark gray (2.5Y 4/1).	ML			760	4.5					Compressive strength exceeds 4.5 (109-111.5')
			111					760	4.5					
			112		s(ML)			760	4.5					

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Boring Number M-BH-3

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			113	111.5 - 119' **SANDY SILT:** s(ML), firm to hard, graysih brown to light olive brown (2.5Y 5/2 to 5/3), silt to silt with sand, sandy intervals throughout, oxidation streaks between 111.5' - 117', very oxidized between 117' - 119'. *(continued)*				337	4					
			114					337	4					
			115					337	4					
			116		s(ML)			337 774	4					
			117					774	4					
			118					774	4					
			119					1590	4					
			120	119 - 139' **POORLY-GRADED SAND:** SP, very loose, medium, grayish brown or light olive brown (2.5Y 5/2 or 5/3), trace fine gravel.				1590	4					
			121					1590						
			122	122' Low to no silt.				1590						
			123					1086						
			124					1086						
			125					1086 834						
			126	126' Light olive brown (2.5Y 5/3), fine to medium.	SP			834						
7 CS	264 120		127					834						
			128					100						
			129					100						
			130	130' - 139' Dense to loose.				100						
			131					351						
			132					351						

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Boring Number M-BH-3

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			133	119 - 139' **POORLY-GRADED SAND:** SP, very loose, medium, grayish brown or light olive brown (2.5Y 5/2 or 5/3), trace fine gravel. *(continued)*				351						
			134					751						
			135					751						
			136		SP			751						
8 CS	264 120		137					882						
			138					882						
			139					925						
			140	139 - 141' **CLAYEY SILT** ML/CL, moist to wet, hard, light olive brown (2.5Y 5/3 to 5/4), clayey silt or silt with clay, low plasticity. 140' Wet, soft, light olive brown (2.5Y 5/3 to 5/4).	ML/CL			925	4.5					Compressive strength exceeds 4.5
			141					925	1					
			142	141 - 167' **SILT:** ML, wet, soft to hard, light olive brown (2.5Y 5/4), clay interbedded from 141' - 143'.				925	4.5					Compressive strength exceeds 4.5 (141-145')
			143					402	4.5					
			144					402	4.5					
			145					584	4.5					
			146					584	1					
			147		ML			584	1					
9 CS	266.4 240		148					189	4					
			149					533	4					
			150	149' - 150' Oxidation mottling - reddish brown.				533	3.5					
			151					533	3.5					
			152					595	2					

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Boring Number M-BH-3

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			153	141 - 167' **SILT:** ML, wet, soft to hard, light olive brown (2.5Y 5/4), clay interbedded from 141' - 143'. *(continued)* 152' - 156' Trace fine gravel.				595 1559	2					
			154					1559	2					
			155					1559	2.5					
			156					1559	2.5					
			157					1559 1974	2.5					
			158					1974	2.25					
			159					1974	2					
			160	160' Hard.	ML			1643	3					
			161					1643	4					
			162					1643	4					
			163	163' Color changes to grayish brown to gray (2.5Y 5/2 or 6/1), low plasticity.				1643 440	4					
			164					440	4					
			165					440 588	4					
			166					588	3.5					
			167					588	3.5					
10 CS	279.6 240		168	167 - 180' **POORLY-GRADED SAND WITH SILT:** SP-SM, wet, medium dense to loose, very fine, gray to grayish brown (2.5Y 5/1 to 5/2), [grading between loose silty fine sand and sandy silt].	SP-SM			0						
			169					0						
			170					0						
			171					0						
			172					741						

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Boring Number M-BH-3

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			173	167 - 180' **POORLY-GRADED SAND WITH SILT:** SP-SM, wet, medium dense to loose, very fine, gray to grayish brown (2.5Y 5/1 to 5/2), [grading between loose silty fine sand and sandy silt]. *(continued)*	SP-SM			741						
			174					741						
			175					178						
			176					178						
			177					178 276						
			178					276						
			179					276 279						
			180					279						
			181	180 - 185' **CLAYEY SILT** ML/CL, very stiff, gray (10YR 5/1 or 2.5Y 5/1), medium plasticity.	ML/CL			120	4					
			182					120	4					
			183					120 70	4					
			184					70	4					
			185					70	4					
			186	185 - 195' **SILT:** ML, wet, hard to soft, gray (2.5Y 5/1), trace to no clay, faint dark brown streaking - possibly varving.	ML			183	4.5					Compressive strength exceeds 4.5 (185-187')
			187					183	4.5					
11 CS	240 240		188					0	1					
			189					0 169	1					
			190					169	1					
			191					169	1					
			192					265	1					

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Boring Number M-BH-3

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			193	185 - 195' **SILT:** ML, wet, hard to soft, gray (2.5Y 5/1), trace to no clay, faint dark brown streaking - possibly varving. *(continued)*				265	1					
					ML			265	1					
			194					669						
								669	1					
			195											
				195 - 197' **SILTY SAND:** SM, wet, loose, very fine, gray (2.5Y 5/1).				669	1					
			196		SM									
								669	1					
			197											
				197 - 202' **CLAYEY SILT** ML/CL, wet, hard, gray (2.5Y 5/1), low plasticity.				439	4.5					Compressive strength exceeds 4.5 (197-201')
			198											
								439	4.5					
			199											
					ML/CL			602	4.5					
			200	200' Medium stiff.										
								602	4.5					
			201											
								602	3					
			202	202 - 212.5' **WELL-GRADED SAND WITH GRAVEL:** (SW)g, moist to wet, loose, dark gray (2.5Y 4/1), gravel (24%) at 10-25 mm (subrounded).				1064						M-BH-3(202-203') - Geotechnical Sample
			203											
								1064						
			204					474						
								474						
			205											
								474						
			206					365						
								365						
12 CS	120 120		207	207' Less gravel.	(SW)g									
								732						
			208											
								732						
			209											
								1204						
			210	210' - 211' Cobbly.										
								1204						
			211											
								1204						
			212											

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Boring Number M-BH-3

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			213	212.5 - 215' **SILTY CLAY** CL/ML, moist, hard, dark gray (2.5Y 4/1), trace coarse sand clasts, (Till - Diamicton).	CL/ML			3019	4.5					Compressive strength exceeds 4.5 (212.5-215')
			214					3019	4.5					
			215					3019	4.5					
				215' End of boring - encountered limestone bedrock.										

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SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Manlove	N/A	M-BH-4

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Scott Parkes — Cascade Environmental	12/18/2018	12/19/2018	Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
N/A	Feet (Site)	739.81 Feet (Site)	7.5 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane 965,969.97 N, 1,315,295.70 E E /W
1/4 of 1/4 of Section , T N, R
Lat ° ' "
Long ° ' "
Local Grid Location
Feet ☐N ☐S Feet ☐E ☐W

Facility ID	County	State	Civil Town/City/ or Village
N/A	Champaign	Illinois	FISHER

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 AUGER	48 48		0	0 - 4' Hand augered per client safety requirements - soil not observed.										
2 CS	72 72		4	4 - 5' **SILTY CLAY** CL/ML, moist, stiff, very dark grayish brown (2/5Y 3/2), (organic-rich topsoil), medium plasticity.	CL/ML			0	3					7" diameter borehole (4-47')
			5	5 - 33' **SILTY CLAY** CL/ML, moist, hard, light olive brown (2.5Y 5/3), trace to little fine gravel and coarse sand clasts, medium to high plasticity, <5% clasts, (Till - Diamicton).				0	4.5					Compressive strength exceeds 4.5 (5-17')
			6					0	4.5					
3 CS	120 134.4		7						4.5					7' - 11': Core bag ripped during transfer, therefore did not screen for CH4.
			8						4.5					
			9		CL/ML				4.5					
			10						4.5					
			11						4.5					
			12	11.5' Moist, hard, gray (2.5Y 4/1 to 5/1), medium				454	4.5					

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature
Firm OBG, part of Ramboll
234 W. Florida St., Fifth Floor, Milwaukee, WI 53204
Tel: (414) 837-3607
Fax: (414) 837-3608

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Boring Number M-BH-4

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
				plasticity, little sand and fine gravel clasts (subrounded), (Till - Diamicton). *(continued)*				454	4.5					
			13					454	4.5					
			14					158						
			15					158	4.5					
			16					158	4.5					
			17					158	4.5					
4 CS	120 144							0	3					
			18											
			19	18.5' Moist to dry, grayish brown to brown (2.5Y 5/1 to 5/2), medium plasticity, (Till - Diamicton).				0	2.5					
			20	20' - 23' Moist, little coarse and gravel clasts, stiff.				0	2					
			21					0	2					
			22		CL/ML			0	2					
			23	23' - 27' Increasing clasts of gravel and sand (coarse), hard.				0	2					
			24					0	4					
			25					0	4					
			26	26' Cobble recovered in core.				0	2					
			27					0	2					
5 CS	120 150							0	2					
			28					0	2					
			29					121	2					
			30					121	2					
			31					121	2					
			32											

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Boring Number M-BH-4

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			33		CL/ML			1641 1641	2					
			34	33 - 36' **SILT:** ML, moist, hard, dark brownish gray (10YR 4/1 or 4/2), little clay, low plasticity, cemented, trace clasts, (Till - Diamicton).	ML			1714 174	4.5 4.5					Compressive strength exceeds 4.5 (33-41')
			35					722	4.5					
			36											
6 CS	120 147.6		37	36 - 41' **SILT WITH SAND:** (ML)s, moist, gray to dark gray (10YR 5/1 to 4/1), with clay, low plasticity, (Till - Diamicton).				236	4.5					
			38					0	4.5					
			39		(ML)s			0 184	4.5					
			40					184	4.5					
			41					725	4.5					
			42	41 - 42.5' **SILTY SAND:** SM, moist, grayish brown to reddish brown.	SM			725						
			43	42.5 - 47.5' **SANDY SILT:** s(ML), moist, hard, dark grayish brown (2.5Y 4/1), cemented, clasts - trace gravel and coarse sand, (Till - Diamicton).				1317	4.5					Compressive strength exceeds 4.5 (42.5-55')
			44					1317	4.5					
			45		s(ML)			412	4.5					
			46					412	4.5					
			47					99	4.5					
7 CS	120 144		48	47.5 - 55' **SILTY CLAY** CL/ML, moist, hard, gray (2.5Y 5/1), some sand, cemented, clasts - 5 to 10% coarse sand and gravel, (Till - Diamicton).				129	4.5					6" diameter borehole (47-220')
			49					129	4.5					
			50		CL/ML			129 217	4.5					
			51					217	4.5					
			52					217	4.5					

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Boring Number M-BH-4

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			53	47.5 - 55' **SILTY CLAY** CL/ML, moist, hard, gray (2.5Y 5/1), some sand, cemented, clasts - 5 to 10% coarse sand and gravel, (Till - Diamicton). *(continued)*	CL/ML			141	4.5					
			54					141	4.5					
			55					141	4.5					
				55 - 60' **WELL-GRADED SAND WITH GRAVEL:** (SW)g, moist, very loose, gray (2.5Y 5/1), gravelly medium sand to well graded sand with gravel.				1499						
			56					1499						M-BH-4 (55-56') - Geotechnical Sample
			57					1499						
8 CS	120 138				(SW)g									
			58					501						
			59					501						
			60					3289						
				60 - 69.5' **SANDY SILT:** s(ML), moist to dry, hard, dark gray to gray (2.5Y 4/1 to 5/1), little clay and sand, 5 - 10% clasts coarse sand and gravel, (Till - Diamicton).				3289	4.5					Compressive strength exceeds 4.5 (60-69.5')
			61					3289	4.5					
			62					1883						
			63					1883	4.5					
			64					1883	4.5					
			65	65' - 67' Very hard, more cementation, darker.	s(ML)			2444	4.5					
			66					2444	4.5					
			67					2444	4.5					
9 CS	120 132			67' 20% clasts.										M-BH-4 (67.5-68.5') - Geotechnical Sample
			68	67.5' SANDY SILT WITH SOME CLAY: s(ML)c, dry fine sand.				39237	4.5					
			69	69' Limestone boulder or cobble in core (pulverized).				39237	4.5					
			70	69.5 - 72' **POORLY-GRADED SAND:** SP, moist, dense, gray (2.5Y 5/1 to 5/2), medium, interbedded with gray silt.				39237 0	4.5					
			71		SP			0						
			72					0						

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Boring Number M-BH-4

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			72	72 - 77' **SANDY SILT:** s(ML), moist, dark gray (2.5Y 4/1), (Till - Diamicton).				398	4.5					Compressive strength exceeds 4.5 (72-77')
			73											
				73.5' - 74.5' Gravelly.				398	4.5					
			74											
					s(ML)			398	4.5					
			75					597						
								597	4.5					
			76											
								597	4.5					
			77											
10 CS	216 264			77 - 87' **SILTY CLAY:** CL/ML, dry to moist, dark gray (2.5Y 4/1), clasts - 10% coarse sand and gravel, (Till - Diamicton).				1955						
			78											
								1955	4.5					Compressive strength exceeds 4.5 (78-107')
			79											
								1955	4.5					
			80	80' - 87' Hard.										
								1955	4.5					
			81					7409						
								7409	4.5					
			82		CL/ML									
								7409	4.5					
			83											
								2889	4.5					
			84											
								2889	4.5					
			85											
								6517	4.5					
			86											
								6517	4.5					
			87											
				87 - 92.5' **CLAYEY SAND:** SC, moist, hard, dark reddish brown to dark gray, fine grained, with some silt, mottled gray to brown, oxidized mottles throughout, some intervals cemented.					4.5					Gas Rover CH4 range exceeded (87-90.5') M-BH-4 (88.5 - 89.5') - Geotechnical Sample
			88											
									4.5					
			89											
					SC				4.5					
			90											
									4.5					
			91					2971						
								2971	4.5					
			92											

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Boring Number M-BH-4

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			92											
			93	92.5 - 104' **SILTY CLAY** CL/ML, moist, hard, olive brown (2.5Y 4/2 or 4/3), medium to high plasticity, (Till - Diamicton), clasts - trace coarse sand (subrounded), oxidized from 94' - 97'.				2971	4.5					Gas Rover CH4 range exceeded (92.5-95')
			94						4.5					
			95						4.5					
11 CS	144 252		96					5297	4.5					
			97					5297 769	4.5					
			98	97' Moist, dark gray to very dark gray (10YR 4/1 to 3/1), 5% clasts of coarse sand and fine gravel, no oxidation, (Till - Diamicton).	CL/ML			769	4.5					
			99					769	4.5					
			100					1167	4.5					
			101					1167	4.5					
			102					3225	4.5					
			103					3225 600	4.5					
			104					600	4.5					
			105	104 - 105.5' **SANDY LEAN CLAY:** s(CL), moist, hard, <5% clasts, (Till - Diamicton).	s(CL)			189	4.5					
			106	105.5 - 107' **ORGANIC CLAY:** OH, moist, hard, very dark grayish brown (10YR 3/1 or 3/2)), high plasticity, no gravel or clasts.	OH			76	4.5					
			107					76	4.5					
12 CS	240 255.6		108	107 - 117' **POORLY-GRADED SAND:** SP, moist, loose, grayish brown (2.5Y 5/2), fine to medium, trace shell fragments, "Beach Sand".				2579						
			109					2579						
			110		SP			1509						
			111					1509						
			112					1509						

OBG
Part of Ramboll

Boring Number M-BH-4

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			113	107 - 117' **POORLY-GRADED SAND:** SP, moist, loose, grayish brown (2.5Y 5/2), fine to medium, trace shell fragments, "Beach Sand". *(continued)*				1735						
			114					1735						
			115	114' - 117' Medium sand.	SP			516						
			116					516						
			117					516						
			118	117 - 118' **SILT:** ML, moist, medium stiff, grayish brown (2.5Y 5/2), silt to clayey silt.	ML			714	3					
			119	118 - 118.5' **ORGANIC SILT:** OL, dark brown varving structures throughout.	OL			714	3					
				118.5 - 119.5' **POORLY-GRADED SAND WITH SILT:** SP-SM, wet, dense to medium dense, fine.	SP-SM									
			120	119.5 - 121.75' **POORLY-GRADED SAND:** SP, wet, loose, medium, trace gravel and coarse sand.				960						
			121		SP			960						
			122					960						
				121.75 - 123' **POORLY-GRADED SAND WITH SILT:** SP-SM, wet, medium dense, fine.	SP-SM			528						
			123	123 - 132' **SANDY SILT:** s(ML), wet, gray or grayish brown (2.5Y 5/1 or 5/2), little clay.				528	2.5					
			124					1112	2.5					
			125					1112	2.5					
			126					1112	2.5					
13 CS	240 276		127											
			128		s(ML)			222						
			129					222 211						
			130					211						
			131					211						
			132					211						

OBG
Part of Ramboll

Boring Number M-BH-4

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			132	132 - 144.5' **SILT:** ML, wet, grayish brown to light olive brown (2.5Y 5/2 or 5/4), varying amounts of clay, oxidation throughout, medium to low plasticity.				179						
								179						
			133											
								179						
			134											
								237						
			135											
								237						
			136											
								237						
			137	137' - 139.5' Purplish brown/gray (5 YR 5/1).										
								126						
			138		ML									
								126						
			139											
								126						
			140					132						
								132						
			141											
								132						
			142											
								132						
			143					263						
								263						
			144											
				144.5 - 146.5' **POORLY-GRADED SAND:** SP, wet, loose, reddish brown, medium, oxidation throughout.				263						
			145		SP									
								649						
			146											
				146.5 - 147' **SILT:** ML, moist, dense, grayish brown (2.5Y 5/2), no oxidation, low plasticity.	ML			649						
14 CS	240 288		147	147 - 148' **POORLY-GRADED SAND:** SP, met, light olive brown (2.5Y 5/3), medium, oxidized, interbedded with clay.	SP			290						
			148	148 - 151' **ORGANIC CLAY:** OH, moist, hard, gray or purplish gray (5YR 5/1 or 4/1).				290	4.5					Compressive strength exceeds 4.5 (148-151')
			149		OH									
								290	4.5					
			150											
								290	4.5					
			151	151 - 157.5' Gray (5YR 5/1), interbedding of fine SP, CH, and ML.										
			152											

OBG
Part of Ramboll

Boring Number M-BH-4

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			151	151 - 157.5' Gray (5YR 5/1), interbedding of fine SP, CH, and ML. *(continued)*					4.5					Compressive strength exceeds 4.5
			153											
			154		SP/CH/ML				4.5					Compressive strength exceeds 4.5
			155											
			156						4.5					Compressive strength exceeds 4.5
			157					75						
				157.5 - 162' **CLAYEY SILT: ML/CL**, wet, gray (2.5Y 5/1), with beds of high plasticity hard clay.				75						
			158					141						
			159					141	4.5					Compressive strength exceeds 4.5 (158-160')
			160		ML/CL			141	4.5					
			161					100						
			162					100						
				162 - 165' **SILT:** ML, wet.				158						
			163											
			164		ML			158						
			165					158						
				165 - 166' **ORGANIC CLAY:** OH, gray to dark gray (5YR 5/1 to 4/1).				100						
			166		OH			100	4.5					Compressive strength exceeds 4.5
				166 - 167' **POORLY-GRADED SAND:** SP, wet, dark gray to gray (5YR 4/1 to 5/1), fine.	SP			100						
15 CS	240		167	167 - 170' **ORGANIC CLAY:** OH, gray (2.5Y 5/1), no gravel or clasts.										
			168					3521	3.5					
			169		OH			3521	3.5					
			170					3521	3.5					
				170 - 191' **SILT:** ML, wet, soft, gray (2.5Y 5/1), with little clay.				3521	1					
			171		ML			14599						
			172					14599	1					M-BH-4

OBG
Part of Ramboll

Boring Number M-BH-4

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			170	170 - 191' **SILT:** ML, wet, soft, gray (2.5Y 5/1), with little clay. *(continued)*				14599	1					(171-172') - Geotechnical Sample
			173					5937						
								5937	1					
			174											
								5937	1					
			175											
								1100	1					
			176											
								1100	3					
			177											
								1100	3					
			178											
								382	3					
			179											
								382	3					
			180	180' Gray to dark gray (2.5Y 5/1 to 4/1).										
								824	3.25					
			181											
					ML			824	3.25					
			182											
								824	1.5					
			183											
								1038	1.5					
			184											
								1038	1.5					
			185											
								661	1.5					
			186											
								661	1.5					
16 CS	240 201		187											
								131	2					
			188											
								131	2					
			189											
								131	2					
			190											
								712	2					
			191	191 - 192.5' **CLAYEY SILT** ML/CL, wet, soft.										
					ML/CL			712	1					
			192											

OBG
Part of Ramboll

Boring Number M-BH-4

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			191	191 - 192.5' **CLAYEY SILT** ML/CL, wet, soft. *(continued)*										
			192	192.5 - 218.5' **POORLY-GRADED SAND:** SP, moist to wet, loose, gray to dark gray (2.5Y 5/1 to 4/1), fine to medium grained, trace silt, trace shell fragments.				712	1					
			193					712						
			194					645						
			195					645						
			196					645						
			197					645 959						
			198					959						
			199					959						
			200	200' Dark gray (2.5Y 4/1), fine in some intervals.				959						
			201					982						
			202		SP			952						
			203					952						
			204					952 1019						
			205					1019						M-BH-4 (204 - 205') - Geotechnical Sample
			206					1019						
17 CS	156 147.6		207					1019						
			208					1289						
			209					1289						
			210					1289						
			211					739						
			212					739						

OBG
Part of Ramboll

Boring Number M-BH-4

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Methane (ppm)	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			213	192.5 - 218.5' **POORLY-GRADED SAND:** SP, moist to wet, loose, gray to dark gray (2.5Y 5/1 to 4/1), fine to medium grained, trace silt, trace shell fragments. *(continued)*	SP			739 739 3307 3307 3307 3307 1174						
			214											
			215											
			216											
			217											
			218											
			219	218.5 - 220' **SANDY LEAN CLAY:** s(CL), moist, very hard, gray (2.5Y 5/1 to 6/1) trace clasts of coarse sand (rounded), (Till - Diamicton).	s(CL)			1174 1174	4.5 4.5					Compressive strength exceeds 4.5 (218.5-220')
			220	220' End of boring - contacted limestone bedrock.										

Attachment C

Methane/LEL Meter Calibration Forms

Four Gas Meter Manufacturer/Model: RAE SYSTEMS / QRAE 3

Serial Number: FA03169

Gases: LEL (methane), O_2, CO_2, H_2S

Calibration Gas Lot Number/Expiration Date: GBH - 413-18-11 / 7-31-19

Date of Calibration or Check	Staff ID	Calibration Gas and Concentrations	Calibration Gas Reading	Within +/_ 10% (yes or no)	Comments
11/30/18	AFH / JDR	CO: 50 ppm	50 ppm	yes	CAL @ 0900
		H_2S: 10 ppm	10 ppm	yes	
		CH_4: 50% LEL	49%	yes	
		O_2: 18%	18%	yes	
12/1/18	AFH/JDR	CO : 50 ppm	50 ppm	yes	CAL @ 0800
		H_2S 10 ppm	10 ppm	yes	
		CH_4 50% LEL	50%	yes	
		O_2 18%	18%	yes	
12/11/18	AFH/JDR	CO 50 ppm	50 ppm	yes	CAL @ 0850
		H_2S 10 ppm	10 ppm	yes	
		CH_4 50 LEL	50%	yes	
		O_2 18%	17.8%	yes	
12/12/18	AFH/JDR	CO 50 ppm	49 ppm	yes	CAL @ 1800
		H_2S 10 ppm	10 ppm	yes	
		CH_4 50% LEL	50%	yes	
		O_2 18%	17.9%	yes	
12/13/18	AFH/JDR	CO 50 ppm	50 ppm	yes	CAL @ 1430
		H_2S 10 ppm	10 ppm	yes	
		CH_4 50% LEL	50%	yes	
		O_2 18%	18 %	yes	
12/14/18	AFH/JDR	CO 50 ppm	50 ppm	yes	CAL @ 0830
		H_2S 10 ppm	10 ppm	yes	
		CH_4 50% LEL	50 %	yes	
		O_2 18%	18 %	yes	

Four Gas Meter Manufacturer/Model: RAE SYSTEMS / QRAE 3

Serial Number: FAD 3169

Gases: LEL (methane), O_2, CO_2, H_2S

Calibration Gas Lot Number/Expiration Date: GB4 413-18-11 / 7-31-19

Date of Calibration or Check	Staff ID	Calibration Gas and Concentrations	Calibration Gas Reading	Within +/_ 10% (yes or no)	Comments
12/18/18	AFH/JDR	CO : 50ppm	49ppm	yes	CAL @1330
		H_2S : 10ppm	10ppm	yes	
		CH_4 : 50% LEL	50% LEL	yes	
		O_2 : 18%	18%	yes	
12/19/18	AFH/JDR	CO : 50ppm	50 ppm	yes	CAL @ 0730
		H_2S : 10ppm	10 ppm	yes	
		CH_4 : 50% LEL	50 % LEL	yes	
		O_2 : 18%	18%	yes	
12/4/18	AFH / JDR	CO : 50ppm	48ppm	yes	CAL @ 1000
		H_2S : 10ppm	10ppm	yes	
		CH_4 : 50% LEL	50% LEL	yes	
		O_2 : 18%	17.3%	yes	

Four Gas Meter Manufacturer/Model: RAE Systems / QRAE 3

Serial Number: FA02523

Gases: LEL (methane), O_2, CO_2, H_2S

Calibration Gas Lot Number/Expiration Date: GBH-413-18-11/7-31-19

Date of Calibration or Check	Staff ID	Calibration Gas and Concentrations	Calibration Gas Reading	Within +/_ 10% (yes or no)	Comments
11/30/18	AFH/JDR	CO : 50ppm	50	yes	CAL @ 0905
		H_2S : 10ppm	10	yes	
		CH_4 : 50% LEL	49.2	yes	
		O_2 : 18%	18%	yes	
12/1/18	AFH/JDR	CO : 50 ppm	50	yes	CAL @ 1805
		H_2S : 10ppm	10	yes	
		CH_4 : 50%	50	yes	
		O_2 : 18%	18	yes	
12/11/18	AFH/JDR	CO 50ppm	49%	yes	CAL @ 0845
		H_2S 10ppm	10ppm	yes	
		CH_4 50% LEL	50% LEL	yes	
		O_2 18%	18	yes	
12/12/18	AFH/JDR	CO 50 ppm	49%	yes	CALIBRATED @ 0800
		H_2S 10ppm	10 ppm	yes	
		CH_4 50% LEL	50	yes	
		O_2 18%	18	yes	
12/13/18	AFH/JDR	CO 50 ppm	50	yes	CAL @ 1436
		H_2S 10ppm	10	yes	
		CH_4 50% LEL	50	yes	
		O_2 18%	18	yes	
12/14/18	AFH/JDR	CO 50ppm	50	yes	CAL @ 0833
		H_2S 10ppm	10	yes	
		CH_4 50% LEL	50	yes	
		O_2 18%	18	yes	

Four Gas Meter Manufacturer/Model: RAE SYSTEMS / QRAE 3

Serial Number: FAO 2523

Gases: LEL (methane), O_2, CO_2, H_2S

Calibration Gas Lot Number/Expiration Date: GBH-413-18-11/7-31-19

Date of Calibration or Check	Staff ID	Calibration Gas and Concentrations	Calibration Gas Reading	Within +/_ 10% (yes or no)	Comments
12/18/18	AFH/JDR	CO 50 ppm	49	yes	CAL @ 1333
		H_2S 10 ppm	10	yes	
		CH_4 50% LEL	50	yes	
		O_2 18%	17.5	yes	
12/19/18	AFH/JDR	CO 50 ppm	50	yes	CAL @ 0735
		H_2S 10 ppm	10	yes	
		CH_4 50% LEL	50	yes	
		O_2 18%	17.8	yes	
12/4/18	AFH/JDR	CO 50 ppm	50	yes	CAL @ 1010
		H_2S 10 ppm	10	yes	
		CH_4 50% LEL	50	yes	
		O_2 18%	18	yes	
		CO			
		H_2S			
		CH_4			
		O_2			
		CO			
		H_2S			
		CH_4			
		O_2			
		CO			
		H_2S			
		CH_4			
		O_2			

Four Gas Meter Manufacturer/Model: BASCOM-TURNER / GAS ROVER

Serial Number: 1126-402128

Gases: LEL (methane), O_2, CO_2, H_2S

Calibration Gas Lot Number/Expiration Date: 18-6607 / 5/28/2020

Date of Calibration or Check	Staff ID	Calibration Gas and Concentrations	Calibration Gas Reading	Within +/_ 10% (yes or no)	Comments
11/30/18	AFH/JDR	CO 100ppm	n/a	pass	Bump TEST — 0900
		CH_4 25%	n/a	pass	Bump TEST — 0900
		O_2/N_2 20.9%	n/a	pass	Bump TEST — 0900
		—	—	~~pass~~ AFH 11/30/18	
12/1/18	AFH/JDR	CO 100ppm	n/a	pass	Bump @ 0830
		CH_4 25%	n/a	pass	" "
		O_2/N_2 20.9%	n/a	pass	" "
		—	—	—	
12/4/18	AFH/JDR	CO 100ppm	n/a	pass	Bump @ 1008
		CH_4 25%	n/a	pass	" "
		O_2/N_2 20.9%	n/a	pass	" "
		—	—	—	
12/11/18	AFH/JDR	CO 100ppm	n/a	pass	Bump @ 0857
		CH_4 25%	n/a	pass	" "
		O_2/N_2 20.9%	n/a	pass	" "
		—	—	—	" "
12/12/18	AFH/JDR	CO 100ppm	n/a	pass	Bump @ [redacted] 0740
		CH_4 25%	n/a	pass	" "
		O_2/N_2 20.9%	n/a	pass	" "
		—	—	—	" "
12/13/18	AFH/JDR	CO 100ppm	n/a	pass	Bump @ 1415
		CH_4 25%	n/a	pass	" "
		O_2/N_2 20.9%	n/a	pass	" "
		—	—	—	" "

Four Gas Meter Manufacturer/Model: BASCOM-TURNER / GAS ROVER

Serial Number: 1126-402128

Gases: LEL (methane), O_2, CO_2, H_2S

Calibration Gas Lot Number/Expiration Date: 18-6607 / 5/28/2020

Date of Calibration or Check	Staff ID	Calibration Gas and Concentrations	Calibration Gas Reading	Within +/_ 10% (yes or no)	Comments
12/14/18	AFH/JDR	CO 100ppm	n/a	pass	Bump - 0820
		CH_4 25%LEL	n/a	pass	" "
		O_2/N_2 20.9	n/a	pass	" "
		—	—	—	—
12/18/18	AFH/JDR	CO 100ppm	n/a	pass	Bump @ 1325
		CH_4 25%	n/a	pass	" "
		O_2/N_2 20.9%	n/a	pass	" "
		—	—	—	
12/19/18	AFH/JDR	CO 100ppm	n/a	pass	Bump @ 0720
		CH_4 25%	n/a	pass	" "
		O_2/N_2 20.9%	n/a	pass	" "
		—	—	—	—

Attachment D

Methane/LEL Screening Forms

M-BH-1

OBG Methane Monitoring Field Sheet (Near Borehole)

Weather Conditions

Staff ID: JDR/AFH Date: 11/30/16

Barometric Pressure (in-Mercury): 29.98 Temperature (°F): 45

Location of Weather Station: CHAMPAIGN Time of Weather: 1200

Instrument Used to Collect Readings: QRAE 3/FA0553 & GAS ROVER

Date of Last Instrument Calibration/ Who Calibrated It: 11/30/16 / AFH

Readings

Reading Location (In Relation to Borehole)	Wind Direction	Orientation (UW, DW, CW)	Time	% LEL	% O_2	GAS ROVER Methane (ppm)	Other:	Other:	Other: Drilling Depth Interval (Feet BGS)	
1'W 3'Ap. MW TRN	N	~~CW~~ DW	957	0	20.9	0			ADVANCE ~~4-7~~	4-7
	N	~~CW~~ DW	959	0	20.9	0			RET ~~5-4~~	4-7
	N	~~CW~~ DW	1002	0	20.9	0			ADV. ~~4-5~~	7-17
	N	DW	1022	0	20.9	0			RET ~~5-4~~	7-17
	N		1031	0	20.9	0			ADV	17-27
	N		1034	0	20.9	0			RET	17-27
	N		1037	0	20.9	0			ADV	27-37
	N		1046	0	20.9	0			RET	27-37
	N		1056	0	20.9	0			ADV	37-47
	N		1113	0	20.9	0			RET	37-47
	N		1150	0	20.9	0			ADV	47-57
	N		1154	0	20.9	0			RET	47-57
	WNW	DW	1415	0	20.9	0			ADV	57-67
	WNW		1420	0	20.9	0			RET	57-67
	WNW		1430	0	20.9	0			ADV	67-77
	WNW		1443	0	20.9	11			RET	67-77
	WNW		1455	0	20.9	0			ADV	77-87
	WNW		1510	0	20.9	0			RET	77-87
	WNW		1515	0	20.9	0			ADV	87-97
	WNW		1522	0	20.9	0			RET	87-97
	WNW		1528	0	20.9	0			ADV	97-107
	WNW		1535	0	20.9	0			RET	97-107
	WNW		1545	0	20.9	0			ADV	107-117
	WNW		1557	0	20.9	0			RET	107-117

SPIKE LASTED ~ 10 SEC

note: % Lower Explosive Limit is % of 5% Methane

file

M - BH - 1

OBG Methane Monitoring Field Sheet (Near Borehole)

Weather Conditions

Staff ID: DR Date: 12/1/18

Barometric Pressure (in-Mercury): 29.51 Temperature (°F): 47

Location of Weather Station: CHAMPAIGN Time of Weather: 0900

Instrument Used to Collect Readings: QRAE 3 & GAS ROVER

Date of Last Instrument Calibration/ Who Calibrated it: 12/1/18 / AFH

Readings									
Reading Location (In Relation to Borehole)	Wind Direction	Orientation (UW, DW, CW)	Time	% LEL	% O_2	GAS ROVER Methane (ppm)	Other:	Other:	Other: Drilling Depth Interval (Feet BGS)
MUD TRAY	WSW	DW	0922	0	20.9	0			ADV. 117-137'
		DW	0936	0	20.9	0			RET. 117-137'
			0952	0	20.9	0			ADV 137-157'
			1001	0	20.9	0			RET 137-157'
			1017	0	20.9	0			ADV 157-177
			1037	0	20.9	0			RET 157-177
			1050	0	20.9	0			ADV 177-197
			1120	0	20.9	0			RET 177-197
			1150	0	20.9	0			ADV 197-217
			1220	0	20.9	0			RET 197-217
			1251	0	20.9	0			ADV 217-237
			1310	0	20.9	0			RET 217-237
			1349	0	20.9	0			ADV 237-247
			1357	0	20.9	0			RET 237-247

6% LEL WHEN THEY ~~STARTED~~ PUSHED ONE PIPE BACK INTO HOLE 0% WHEN ADVANCING

note: % Lower Explosive Limit is % of 5% Methane

file

M-BH-1

OBG Methane Monitoring Field Sheet (Work Area Breathing Zone)

Staff ID: JDR/AFH Date: 11/30/18

Weather Conditions

Barometric Pressure (in-Mercury): 29.98 Temperature (°F): 45

Location of Weather Station: CHAMPAIGN Time of Weather: 1200

Instrument Used to Collect Readings: QRAE3 / FA03169

Date of Last Instrument Calibration/ Who Calibrated it: 11/30/18 / AFH

Readings

Reading Location (In Relation to OBG Work Area)	Wind Direction	Orientation (UW, DW, CW)	Time	% LEL	% O_2	Methane (ppm)	Other:	Other:	Other:
N 20'	N	UW	900	0	20.9				
↓	N	UW	1000	0	20.9				
	N	UW	1100	0	20.9				
	N	UW	1200	0	20.9				
	N	UW	1300	0	20.9				
	WNW	UW	1400	0	20.9				
	WNW	UW	1500	0	20.9				
↓	WNW	UW	1600	0	20.9				

note: % Lower Explosive Limit is % of 5% Methane

file

M-BH-1

OBG Methane Monitoring Field Sheet (Work Area Breathing Zone)

Staff ID: JDR Date: 12/1/18

Weather Conditions

Barometric Pressure (in-Mercury): 29.57 Temperature (°F): 47

Location of Weather Station: CHAMPAIGN Time of Weather: 0900

Instrument Used to Collect Readings: QRAE 3 / FA03169

Date of Last Instrument Calibration/ Who Calibrated it: 12/1/18 AFH

Readings

Reading Location (In Relation to OBG Work Area)	Wind Direction	Orientation (UW, DW, CW)	Time	% LEL	% O_2	Methane (ppm)	Other:	Other:	Other:
20' N	WSW	DW	0900	0	20.9				
			1000	0	20.9				
			1100	0	20.9				
			1200	0	20.9				
			1300	0	20.9				
			1400	0	20.9				

note: % Lower Explosive Limit is % of 5% Methane

file

1ST Mon.

M-BH-2

OBG Methane Monitoring Field Sheet (Near Borehole)

Staff ID: JDL Date: 12/8/16

Weather Conditions

Barometric Pressure (in-Mercury): 30.24 Temperature (°F): 32

Location of Weather Station: RANTOUL Time of Weather: 1000

Instrument Used to Collect Readings: F40316

Date of Last Instrument Calibration/ Who Calibrated it: 12/4 AFH

Readings							Other:	Other:	Other:
Reading Location (In Relation to Borehole)	Wind Direction	Orientation (UW, DW, CW)	Time	% LEL	% O_2	Methane (ppm)			Drilling Depth Interval (Feet BGS)
W 1'	NW	UW	1047	0	20.9	0			ADV 4-7'
			1049	0	20.9	0			RET 4-7'
			1054	0	20.9	0			ADV 7-17'
			1102	0	20.9	0			RET 7-17'
			1109	0	20.9	0			ADV 17-27
			1112	0	20.9	0			RET 17-27
			1124	0	20.9	0			ADV 27-37
			1132	0	20.9	13			RET 27-37
			1142	0	20.9	0			ADV 37-47
			1158	0	20.9	12			RET 37-47
			1410	0	20.9	0			ADV 47-57
			1422	0	20.9	17			RET 47-57
			1432	0	20.9	0			ADV 57-67
		1550	~~1445~~	0	20.9	0			RET 57-67

note: % Lower Explosive Limit is % of 5% Methane

file

M-BH-2

OBG Methane Monitoring Field Sheet (Near Borehole)

Staff ID: JDR Date: 12/11/18

Weather Conditions

Barometric Pressure (in-Mercury): 30.12 Temperature (°F): 32

Location of Weather Station: FISHER Time of Weather: 1000

Instrument Used to Collect Readings: QRAE 3 FA 02523

Date of Last Instrument Calibration/ Who Calibrated it: 12/11/18 JDR

Readings									
Reading Location (In Relation to Borehole)	Wind Direction	Orientation (UW, DW, CW)	Time	% LEL	% O_2	Methane (ppm)	Other:	Other:	Other: Drilling Depth Interval (Feet BGS)
1' W	SW	UW	1030	0%	20.9%	0			ADV 77 - 87
			1035	0	20.9	0			RET 77 - 87
			1045	0	20.9	0			ADV 87 - 107
			1102	0	20.9	0			RET 87 - 107
			1112	0	20.9	0			ADV 107 - 127
			1130	0	20.9	0			RET 107 - 127
			1140	0	20.9	0			ADV 127 - 147
			1154	0	20.9	0			RET 127 - 147
			1308	0	20.9	0			ADV 147 - 167
			1331	0	20.9	0			RET 147 - 167
			1335	0	20.9	0			ADV 167 - 187
			1403	0	20.9	0			RET 167 - 187
			1424	0	20.9	0			ADV 187 - 207
			1440	0	20.9	0			RET 187 - 207
			1507	0	20.9	0			ADV 207 - 227
			1535	0	20.9	0			RET 207 - 227

note: % Lower Explosive Limit is % of 5% Methane

file

M_BH-2

OBG Methane Monitoring Field Sheet (Near Borehole)

Weather Conditions

Staff ID: JDR Date: 12/12/18

Barometric Pressure (in-Mercury): 29.83 Temperature (°F): 37

Location of Weather Station: RANTOUL Time of Weather: 0830

Instrument Used to Collect Readings: QRAE 3 FA02523

Date of Last Instrument Calibration/ Who Calibrated it: JDR 12/12/18

Readings

Reading Location (In Relation to Borehole)	Wind Direction	Orientation (UW, DW, CW)	Time	% LEL	% O_2	Methane (ppm)	Other:	Other:	Other: Drilling Depth Interval (Feet BGS)
1' W	SW	UW	0830	0	20.7	0			ADV 227-247
			0920	0	21.7	0			REV 227-247
									~~ADV~~ JDR
									~~REV~~ JDR

note: % Lower Explosive Limit is % of 5% Methane

file

M-BH-2

OBG Methane Monitoring Field Sheet (Work Area Breathing Zone)

Staff ID: JPR Date: 12/4/18

Weather Conditions

Barometric Pressure (in-Mercury): 30.24 Temperature (°F): 32

Location of Weather Station: RANTOUL Time of Weather: 1000

Instrument Used to Collect Readings: QRAE 3 FA02523

Date of Last Instrument Calibration/ Who Calibrated it: 12/4 AFH

Readings							Other:	Other:	Other:
Reading Location (In Relation to OBG Work Area)	Wind Direction	Orientation (UW, DW, CW)	Time	% LEL	% O_2	Methane (ppm)			
N 20'	NW	UW	1000	0	20.9	0			
			1100	0	20.9	0			
			1200	0	20.9	0			
			1300	0	20.9	0			
			1400	0	20.9	0			

note: % Lower Explosive Limit is % of 5% Methane

file

M-BH-2

OBG Methane Monitoring Field Sheet (Work Area Breathing Zone)

Staff ID: JDR Date: 12/11/18

Weather Conditions

Barometric Pressure (in-Mercury): 30.12 Temperature (°F): 37

Location of Weather Station: Fisher Time of Weather: 1000

Instrument Used to Collect Readings: QRAE 3 FA03139

Date of Last Instrument Calibration/ Who Calibrated it: 12/11/18 AFH

Readings Reading Location (In Relation to OBG Work Area)	Wind Direction	Orientation (UW, DW, CW)	Time	% LEL	% O_2	Methane (ppm)	Other:	Other:	Other:
40' SW	SW	UW	1000	0	20.9	0			
			1100	0	20.9	0			
			1200	0	20.9	0			
			1300	0	20.9	0			
			1400	0	20.9	0			
			1500	0	20.9	0			
			1600	0	20.9	0			

note: % Lower Explosive Limit is % of 5% Methane

file

M-BH-2

OBG Methane Monitoring Field Sheet ~~(Near Borehole)~~ WORK AREA

Weather Conditions

Staff ID: JDR

Date: 12/12/18

Barometric Pressure (in-Mercury): 29.93

Temperature (°F): 37

Location of Weather Station: RANTOUL

Time of Weather: 0830

Instrument Used to Collect Readings: QRAE 3 FA03139

Date of Last Instrument Calibration/ Who Calibrated it: AFH 12/12/18

Readings

Reading Location (In Relation to Borehole)	Wind Direction	Orientation (UW, DW, CW)	Time	% LEL	% O_2	Methane (ppm)	Other:	Other:	Other: Drilling Depth Interval (Feet BGS)
40' W	~~SW~~ W	UW	0800	0	20.9	0			
			0900	0	20.9	0			
			1000	0	20.9	0			

note: % Lower Explosive Limit is % of 5% Methane

file

M-BH-3

OBG Methane Monitoring Field Sheet (Near Borehole)

Staff ID: JDR Date: 12/13/18

Weather Conditions

Barometric Pressure (in-Mercury): 29.95 Temperature (°F): 45

Location of Weather Station: RANTOUL Time of Weather: 1500

Instrument Used to Collect Readings: QRAE 3 FA02523

Date of Last Instrument Calibration/ Who Calibrated it: 12/13/18

Readings									
Reading Location (In Relation to Borehole)	Wind Direction	Orientation (UW, DW, CW)	Time	% LEL	% O_2	Methane (ppm)	Other:	Other:	Other: Drilling Depth Interval (Feet BGS)
3' NW	E	DW	1501	0	20.9	0			ADV 3-7
			1503	0	20.9	0			RET 3-7
			1504	0	20.9	0			ADV 7-17
			1510	0	20.9	0			RET 7-17
			1515	0	20.9	0			ADV 17-27
			1526	0	20.9	0			RET 17-27
			1527	0	20.9	0			ADV 27-37
			1533	0	20.9	0			ADV 27-37

note: % Lower Explosive Limit is % of 5% Methane

file

M-BH-3

OBG Methane Monitoring Field Sheet (Near Borehole)

Weather Conditions Staff ID: JDC Date: 12/14/18

Barometric Pressure (in-Mercury): 30.13

Location of Weather Station: RANTOUL

Temperature (°F): 42

Time of Weather: 0800

Instrument Used to Collect Readings: QRAE 3 · FA02523

Date of Last Instrument Calibration/ Who Calibrated it: 12/14/18

Readings									
Reading Location (In Relation to Borehole)	Wind Direction	Orientation (UW, DW, CW)	Time	% LEL	% O_2	Methane (ppm)	Other:	Other:	Other: Drilling Depth Interval (Feet BGS)
1' N	NNE	UW	0836	0	20.9	0			ADV 37-47
			0837	0	20.9	0			~~ADV~~ RET 37-47
			0851	0	20.9	0			ADV 47-57
			0904	0	20.9	0			RET 47-57
			0917	0	20.9	0			ADV 57-67
			0923	0	20.9	0			RET 57-67
			0931	0	20.9	0			ADV 67-87
			0954	0	20.9	0			RET 67-87
			1006	0	20.9	0			ADV 87-107
			1019	0	20.9	0			RET 87-107
			1045	0	20.9	0			~~RET~~ ADV 107-127
			1050	0	20.9	0			RET 107-127
			1104	0	20.9	0			ADV ~~107-127~~ 127-147
			1124	0	20.9	0			RET ~~107-127~~ 127-147
			1241	0	20.9	0			ADV 147-167
			1305	0	20.9	0			RET 147-167
			1322	0	20.9	0			ADV 167-187
			1344	0	20.9	0			RET 167-187
			1415	0	20.9	0			ADV 187-207
			1440	0	20.9	0			RET 187-207
			1455	0	20.9	0			ADV 207-220
			1515	0	20.9	0			RET 207-220

note: % Lower Explosive Limit is % of 5% Methane

file

M-BH-3

OBG Methane Monitoring Field Sheet (~~Near Borehole~~) WORK AREA

Staff ID: JDR

Date: 12/13/18

Weather Conditions

Barometric Pressure (in-Mercury): 29.95

Temperature (°F): 45

Location of Weather Station: RANTOUL

Time of Weather: 1500

Instrument Used to Collect Readings: QRAE 3 FA03169

Date of Last Instrument Calibration/ Who Calibrated it: 12/13/18 JDR

Readings

Reading Location (In Relation to Borehole)	Wind Direction	Orientation (UW, DW, CW)	Time	% LEL	% O_2	Methane (ppm)	Other:	Other:	Other: Drilling Depth Interval (Feet BGS)
20' NW	E	DW	1500	0	20.9	0			
			1600	0	20.9	0			

note: % Lower Explosive Limit is % of 5% Methane

file

M-BH-3

OBG Methane Monitoring Field Sheet ~~(Near Borehole)~~ LOCK ALEX

Weather Conditions

Staff ID: IOR Date: 12/14/18

Barometric Pressure (in-Mercury): 30.13

Location of Weather Station: RANTOUL

Temperature (°F): 42

Time of Weather: 0800

Instrument Used to Collect Readings: QUE 3 FA0316

Date of Last Instrument Calibration/ Who Calibrated it: 12/4/18

Readings									
Reading Location (In Relation to Borehole)	Wind Direction	Orientation (UW, DW, CW)	Time	% LEL	% O_2	Methane (ppm)	Other:	Other:	Other: Drilling Depth Interval (Feet BGS)
10' S	NNE	DW	0830	0	20.9	0			
			0900	0	20.9	0			
			1000	0	20.9	0			
			1100	0	20.9	0			
			1200	0	20.9	0			
			1300	0	20.9	0			
			1400	0	20.9	0			
			1500	0	20.9	0			
			1600	0	20.9	0			

note: % Lower Explosive Limit is % of 5% Methane

file

M-BH-4

OBG Methane Monitoring Field Sheet (Near Borehole)

Weather Conditions

Staff ID: JDR Date: 12/19/18

Barometric Pressure (in-Mercury): 29.94 Temperature (°F): 34

Location of Weather Station: RANTOUL Time of Weather: 0745

Instrument Used to Collect Readings: QRAE 3 FAD2513

Date of Last Instrument Calibration/ Who Calibrated it: 12/19/18 JDR

Readings									
Reading Location (In Relation to Borehole)	Wind Direction	Orientation (UW, DW, CW)	Time	% LEL	% O_2	Methane (ppm)	Other:	Other:	Other: Drilling Depth Interval (Feet BGS)
1' W	SSE	DW	0820	0	20.9	0			ADV 47-57
			0830	0	20.9	0			RET 47-57
			0842	0	20.9	0			ADV 57-67
			0902	0	20.9	0			RET 57-67
			0927	0	20.9	0			ADV 67-77
			0945	0	20.9	0			RET 67-77
			0951	0	20.9	0			ADV 77-95
			1001	0	20.9	0			RET 77-95
			1016	0	20.9	0			ADV 95-107
			1102	0	20.9	0			RET 95-107
			1283	0	20.9	0			ADV 107-127
			1252	0	20.9	0			RET 107-127
			1302	0	20.9	0			ADV 127-147
			1315	0	20.9	0			RET 127-147
			1325	0	20.9	0			ADV 147-167
			1345	0	20.9	0			RET 147-167
			1355	0	20.9	0			ADV 167-187
			1415	0	20.9	0			RET ~~ADV~~ 167-187
			1450	0	20.9	0			ADV 187-207
			1509	0	20.9	0			RET ~~ADV~~ 187-207
			1515	0	20.9	0			ADV 207-227
			1530	0	20.9	0			RET 207-227

note: % Lower Explosive Limit is % of 5% Methane

file

M-BH-4

OBG Methane Monitoring Field Sheet ~~(Near Borehole)~~ WORK ZONE *

Weather Conditions

Staff ID: JDL

Date: 12/14/18

Barometric Pressure (in-Mercury): 29.94

Temperature (°F): 34

Location of Weather Station: RUNTOUL

Time of Weather: 0745

Instrument Used to Collect Readings: QRAE 3 FA03169

Date of Last Instrument Calibration/ Who Calibrated it: 12/14/18 JDR

Readings									
Reading Location (In Relation to Borehole)	Wind Direction	Orientation (UW, DW, CW)	Time	% LEL	% O_2	Methane (ppm)	Other:	Other:	Other: Drilling Depth Interval (Feet BGS)
30' W	SSE	CW	0800	0	20.9	0			
			0900	0	20.9	0			
			1000	0	20.9	0			
			1100	0	20.9	0			
			1200	0	20.9	0			
			1300	0	20.9	0			
			1400	0	20.9	0			
			1500	0	20.9	0			
			1600	0	20.9	0			

note: % Lower Explosive Limit is % of 5% Methane

file

M-BH-4

OBG Methane Monitoring Field Sheet (Near Borehole)

Weather Conditions

Staff ID: JDC Date: 12/14/18

Barometric Pressure (in-Mercury): 30.14 Temperature (°F): 45

Location of Weather Station: RANTOUL Time of Weather: 1500

Instrument Used to Collect Readings: QRAE 3 FA02523

Date of Last Instrument Calibration/ Who Calibrated it: 12/18/18 JDC

Readings

Reading Location (In Relation to Borehole)	Wind Direction	Orientation (UW, DW, CW)	Time	% LEL	% O_2	Methane (ppm)	Other:	Other:	Other: Drilling Depth Interval (Feet BGS)
1' W	~~NNW~~ S	CW	1509	0	20.9	0			ADV 4-7'
			1511	0	20.9	0			RET 4-7'
			1513	0	20.9	0			ADV 7-17'
			1518	0	20.9	0			RET 7-17'
			1523	0	20.9	0			ADV 17-27
			1533	0	20.9	0			RET 17-27
			1546	0	20.9	0			ADV 27-37
			1551	0	20.9	0			RET 27-37
			1559	0	20.9	0			ADV 37-47
			1622	0	20.9	0			RET 37-47

note: % Lower Explosive Limit is % of 5% Methane

file

WORK ZONE

M-BH-4

OBG Methane Monitoring Field Sheet (Near Borehole)

Staff ID: JDR

Date: 12/18/13

Weather Conditions

Barometric Pressure (in-Mercury): 30.14

Temperature (°F): 40

Location of Weather Station: RANTOUL

Time of Weather: 1500

Instrument Used to Collect Readings: QRAE 3 FA03169

Date of Last Instrument Calibration/ Who Calibrated it: 12/18/13 JDR

Readings

Reading Location (In Relation to Borehole)	Wind Direction	Orientation (UW, DW, CW)	Time	% LEL	% O_2	Methane (ppm)	Other:	Other:	Other: Drilling Depth Interval (Feet BGS)
40' W	S	CW	1500	0	20.9	0			
			1600	0	20.9	0			

note: % Lower Explosive Limit is % of 5% Methane

file

Attachment E

Photographic Log

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
1	11/30/18

DESCRIPTION

Sonic drill rig setup at M-BH-1 (facing east).

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
2	11/30/18

DESCRIPTION

Active drilling at M-BH-1 (facing east).

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
3	11/30/18

DESCRIPTION

M-BH-1 core sample interval from 57 to 62' bgs. A geotechnical sample was collected from 58 – 59' bgs.

Note: depth increases from right to left.

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
4	11/30/18

DESCRIPTION

M-BH-1 core interval from 107 - 112' bgs. A geotechnical sample was collected from 111 – 112' bgs.

Note: depth increases from right to left.

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
5	12/1/18

DESCRIPTION

M-BH-1 core interval from 197 – 202' bgs. A geotechnical sample was collected from 200 – 201' bgs.

Note: depth increases from left to right.

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
6	12/3/18

DESCRIPTION

Baker Hughes conducting a geophysical survey at M-BH-1 (facing northeast).

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
7	12/5/18

DESCRIPTION

Grout samples collected during grouting operations at M-BH-1. Photo was taken after the seven batch samples were allowed a minimum of 24 hours to cure.

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
8	12/3/18

DESCRIPTION

Active drilling at M-BH-2 (facing east).

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
9	12/4/18

DESCRIPTION

M-BH-2 core interval at 57 – 62' bgs. A geotechnical sample was collected from 60 - 61' bgs.

Note: depth increases from left to right.

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
10	12/11/18

DESCRIPTION

M-BH-2 core interval at 147 – 152' bgs. A geotechnical sample was collected from 151 - 152' bgs.

Note: depth increases from left to right.

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	60936

PHOTO NO.	DATE:
11	12/1/18

DESCRIPTION

M-BH-2 core interval at 237 - 243' bgs. A geotechnical sample was collected from 240 – 241' bgs.

Note: depth increases from right to left.

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
12	12/12/18

DESCRIPTION

Baker Hughes conducting a geophysical survey at M-BH-2 (facing northeast).

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	60936

PHOTO NO.	DATE:
13	12/18/18

DESCRIPTION

Grout samples collected during grouting operations at M-BH-2. Photo was taken after the eight batch samples were allowed a minimum of 24 hours to cure.

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
14	12/20/18

DESCRIPTION

M-BH-2 drilling location following completion of drilling and grouting.

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
15	12/1/18

DESCRIPTION

Active drilling activities at M-BH-3 (facing east).

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
16	12/14/18

DESCRIPTION

M-BH-3 core interval at 47 - 52' bgs. A geotechnical sample was collected from 51 - 52' bgs.

Note: depth increases from left to right.

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
17	12/14/18

DESCRIPTION

M-BH-3 core interval at 102 – 107' bgs. A geotechnical sample was collected from 103 – 104' bgs.

Note: depth increases from left to right.

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
18	12/3/18

DESCRIPTION

M-BH-3 core interval at 202 – 207' bgs. A geotechnical sample was collected from 202 – 203' bgs.

Note: depth increases from left to right.

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
19	12/18/18

DESCRIPTION

Baker Hughes conducting a geophysical survey at M-BH-3 (facing east).

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
20	12/19/18

DESCRIPTION

Grout samples collected during grouting operations at M-BH-3. Photo was taken after the seven batch samples were allowed a minimum of 24 hours to cure.

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
21	12/20/18

DESCRIPTION

M-BH-3 drilling area after drilling/grouting completed (facing southwest).

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
22	12/19/18

DESCRIPTION

Active drilling operations at M-BH-4 (facing east).

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
23	12/19/18

DESCRIPTION

View of core sample from M-BH-4. Interval pictured: 67 – 72' bgs. Geotechnical sample collected from 67.5 – 68.5' bgs.

Note: depth increases from right to left.

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
24	12/19/18

DESCRIPTION

M-BH-4 core interval at 86 – 90.5' bgs. A geotechnical sample was collected from 88.5 – 89.5' bgs.

Note: depth increases from right to left.

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
25	12/19/18

DESCRIPTION

M-BH-4 core interval at 167 - 172' bgs. A geotechnical sample was collected from 171 – 172' bgs.

Note: depth increases from left to right.

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
26	12/19/18

DESCRIPTION

M-BH-4 core interval at 202 - 207' bgs. A geotechnical sample was collected from 204 - 205' bgs.

Note: depth increases from right to left.

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
27	12/20/18

DESCRIPTION

M-BH-4 drill site after completion of drilling and grouting (facing south).

Photo taken by OBG.

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
PGL	Manlove Natural Gas Storage Facility	69036

PHOTO NO.	DATE:
28	12/21/18

DESCRIPTION

Grout samples collected during grouting operations at M-BH-4. Photo was taken after the seven batch samples were allowed a minimum of 24 hours to cure.

Photo taken by OBG.

Attachment F

Geophysics Survey Results

M-BH-1

BAKER HUGHES a GE company

GAMMA RAY NEUTRON

FILE NO:

API NO:

COMPANY PEOPLES GAS LIGHT & COKE CO.
WELL McCORD #3
FIELD MANLOVE
COUNTY CHAMPAIGN STATE ILLINOIS

Version

LOCATION:

SEC N/A TWP N/A RGE N/A

OTHER SERVICES

PERMANENT DATUM G.L. ELEVATION N/A
LOG MEASURED FROM D.F. 4 FT ABOVE P.D.
DRILL. MEAS. FROM N/A

ELEVATIONS:
KB N/A
DF N/A
GL N/A

DATE		03-Dec-2018			
RUN	TRIP	1	1		
SERVICE ORDER		US146292J			
DEPTH DRILLER		240 FT			
DEPTH LOGGER		238 FT			
BOTTOM LOGGED INTERVAL		237 FT			
TOP LOGGED INTERVAL		0 FT			
TIME STARTED		10:00			
TIME FINISHED		11:00			
OPERATOR RIG TIME		1 HR			
TYPE OF FLUID IN HOLE		WATER / GEL			
FLUID DENSITY		N/A			
FLUID SALINITY		N/A			
FLUID LEVEL		FULL			
LOGGED CEMENT TOP		N/A			
WELLHEAD PRESSURE		0 PSI			
MAXIMUM HOLE DEVIATION		N/A			
NOMINAL LOGGING SPEED		30 F/MN			
MAX. RECORDED TEMP.		N/A			
REFERENCE LOG		N/A			
REFERENCE LOG DATE		N/A			
EQUIP. NO.	LOCATION	9780	OLNEY, IL		
RECORDED BY		JESSE GINDER			
WITNESSED BY		MR. ANDREW HARDWICK			

IN MAKING INTERPRETATIONS OF LOGS OUR EMPLOYEES WILL GIVE THE CUSTOMER THE BENEFIT OF THEIR BEST JUDGEMENT. BUT SINCE ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENTS, WE CANNOT, AND WE DO NOT GUARANTEE THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATION. WE SHALL NOT BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COST, DAMAGES, OR EXPENSES WHATSOEVER INCURRED OR SUSTAINED BY THE CUSTOMER RESULTING FROM ANY INTERPRETATION MADE BY ANY OF OUR EMPLOYEES.

CASING RECORD

SIZE	WEIGHT	GRADE	FROM	TO
7 IN			0 FT	50 FT
6 IN			0 FT	240 FT

BOREHOLE RECORD

BIT SIZE	FROM	TO

REMARKS

RUN 1 TRIP 1: THANK YOU FOR CHOOSING

EQUIPMENT DATA

RUN	TRIP	TOOL	SERIES NO.	SERIAL NO.	POSITION
1	1	GRN	2461XA	11971396	FREE

MAIN LOG

ECLIPS 7.0w PC-ECLIPS General Release Rel 7.0w Fri Jun 09 11:02:06 Central Daylight Time 2017
Patches: 4

Plotted: Mon Dec 03 11:28:07 2018

PARAMETER AND FILTER SUMMARY REPORT

FILE: C:\dat1a\PEOPLES\MCCORD_3\p310b02.prm
LOGGING MODE: DEPTH DIRECTION: UP
TOP DEPTH: -4.750 ft BOTTOM DEPTH: 241.000 ft

SYMMETRIC FILTER

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
GR	FILTER ()	medium (1)		TOP	BOTTOM
DIELECTRIC	FILTER ()	medium (1)		"	"

CCL PROCESSING

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
CCL FLOOR	CCL FLOOR	0.00		TOP	BOTTOM
CCL BASELINE	SET CCL BASELINE			"	"

CURVE DESCRIPTION REPORT

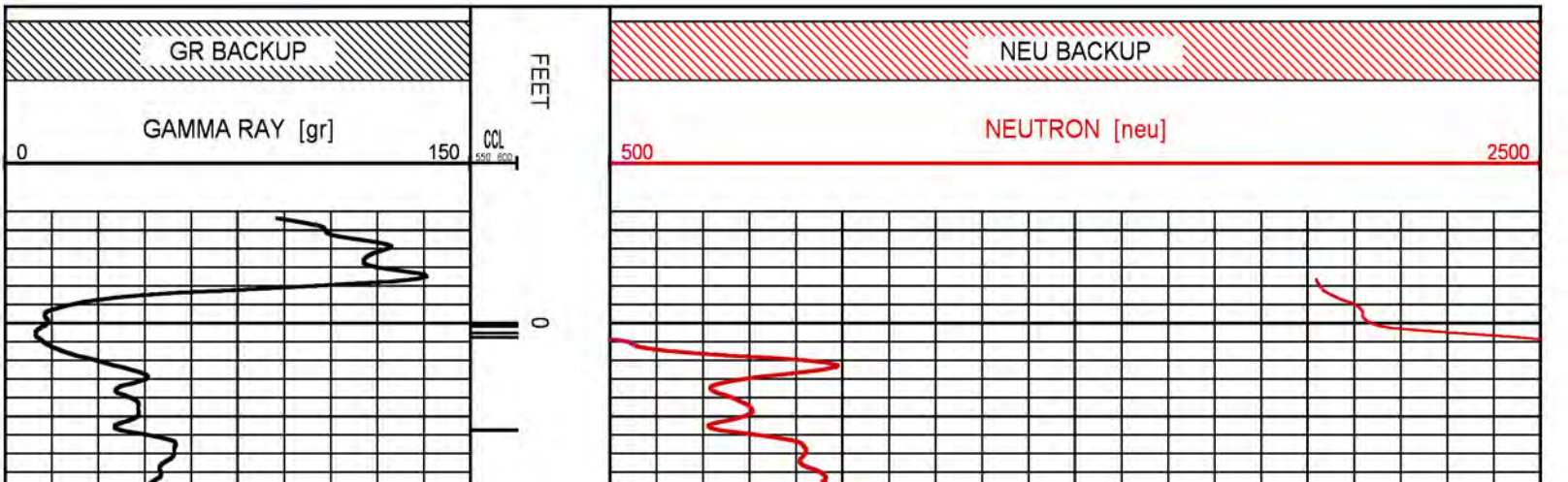
CURVE NAME	CREATION DATE	CURVE DESCRIPTION
F1:CCL	N/A	CASING COLLAR LOCATOR
F1:GR	N/A	GAMMA RAY
F1:NEU	N/A	SINGLE DETECTOR NEUTRON

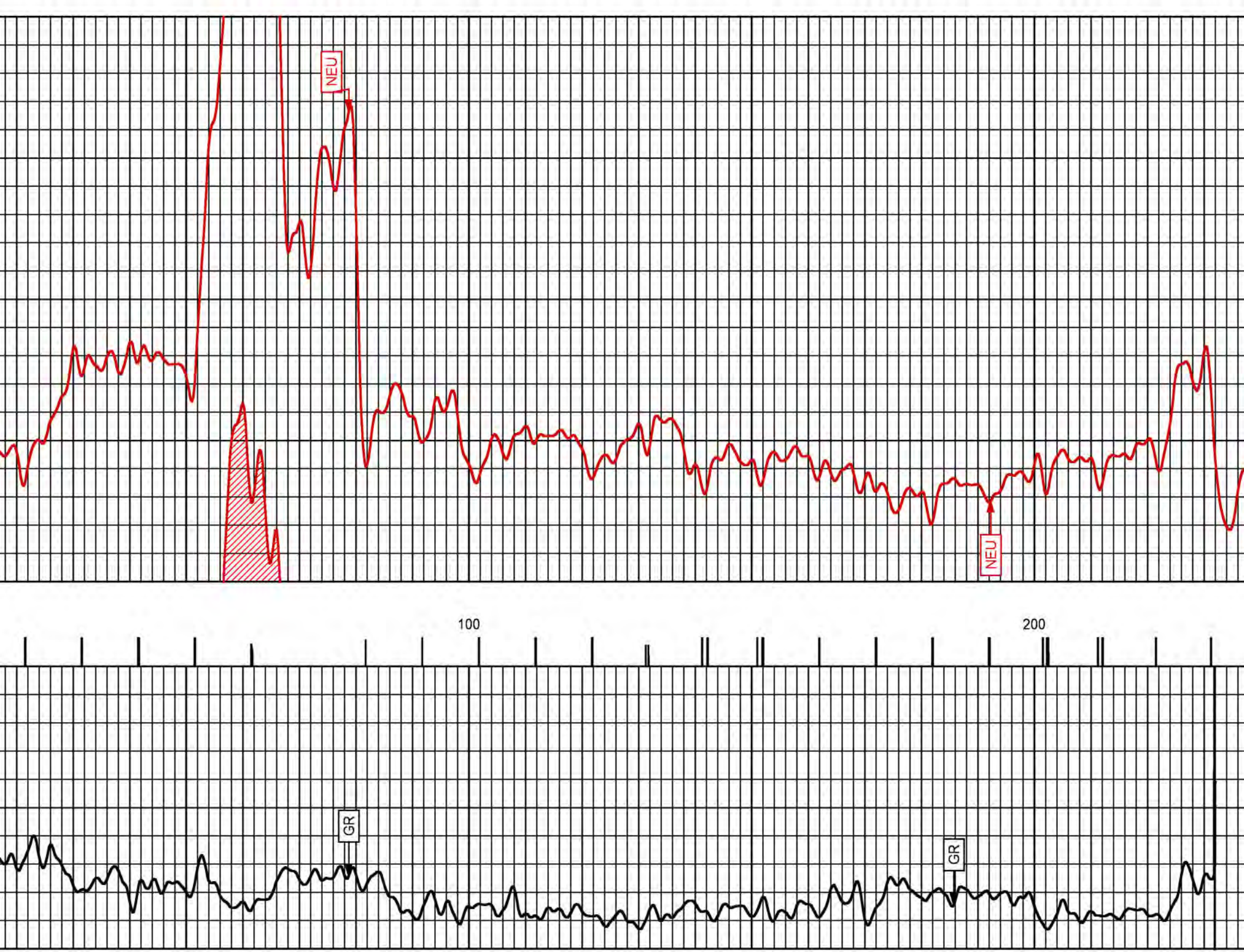
CURVE MEASURE POINT OFFSET

CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)
CCL	-3.75	GR	-7.75	NEU	-1.25		

Presentation : BHUGHES-18202:C:\dat1a\PEOPLES\MCCORD_3\MAIN.fvpdf [5"/100' Scale]
Plot Interval : -11.25 - 238.5 Feet

Data File 1 : F1 : BHUGHES-18202:C:\dat1a\PEOPLES\MCCORD_3\MAIN.xtf
Created On : N/A
Company : PEOPLES GAS LIGHT & COKE CO.
Well : McCORD #3
Field : MANLOVE
File Interval : -11.25 - 241 Feet
OCT : p310b




NEU
NEU
100
200
GR
GR

REPEAT LOG

ECLIPS 7.0w PC-ECLIPS General Release Rel 7.0w Fri Jun 09 11:02:06 Central Daylight Time 2017
Patches: 4

Plotted: Mon Dec 03 11:27:19 2018

PARAMETER AND FILTER SUMMARY REPORT

FILE: C:\dat1a\PEOPLES\MCCORD_3\p310b01.prm
LOGGING MODE: DEPTH DIRECTION: UP
TOP DEPTH: -1.000 ft BOTTOM DEPTH: 240.000 ft

SYMMETRIC FILTER

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
GR	FILTER ()	medium (1)		TOP	BOTTOM
DIELECTRIC	FILTER ()	medium (1)		"	"

CCL PROCESSING

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
CCL FLOOR	CCL FLOOR	0.00		TOP	BOTTOM
CCL BASELINE	SET CCL BASELINE			"	"

CURVE DESCRIPTION REPORT

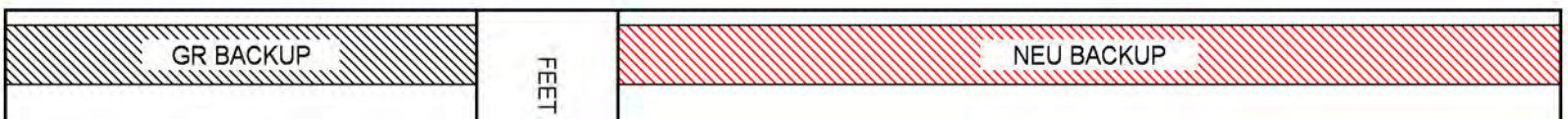
CURVE NAME	CREATION DATE	CURVE DESCRIPTION
F1:CCL	N/A	CASING COLLAR LOCATOR
F1:GR	N/A	GAMMA RAY
F1:NEU	N/A	SINGLE DETECTOR NEUTRON

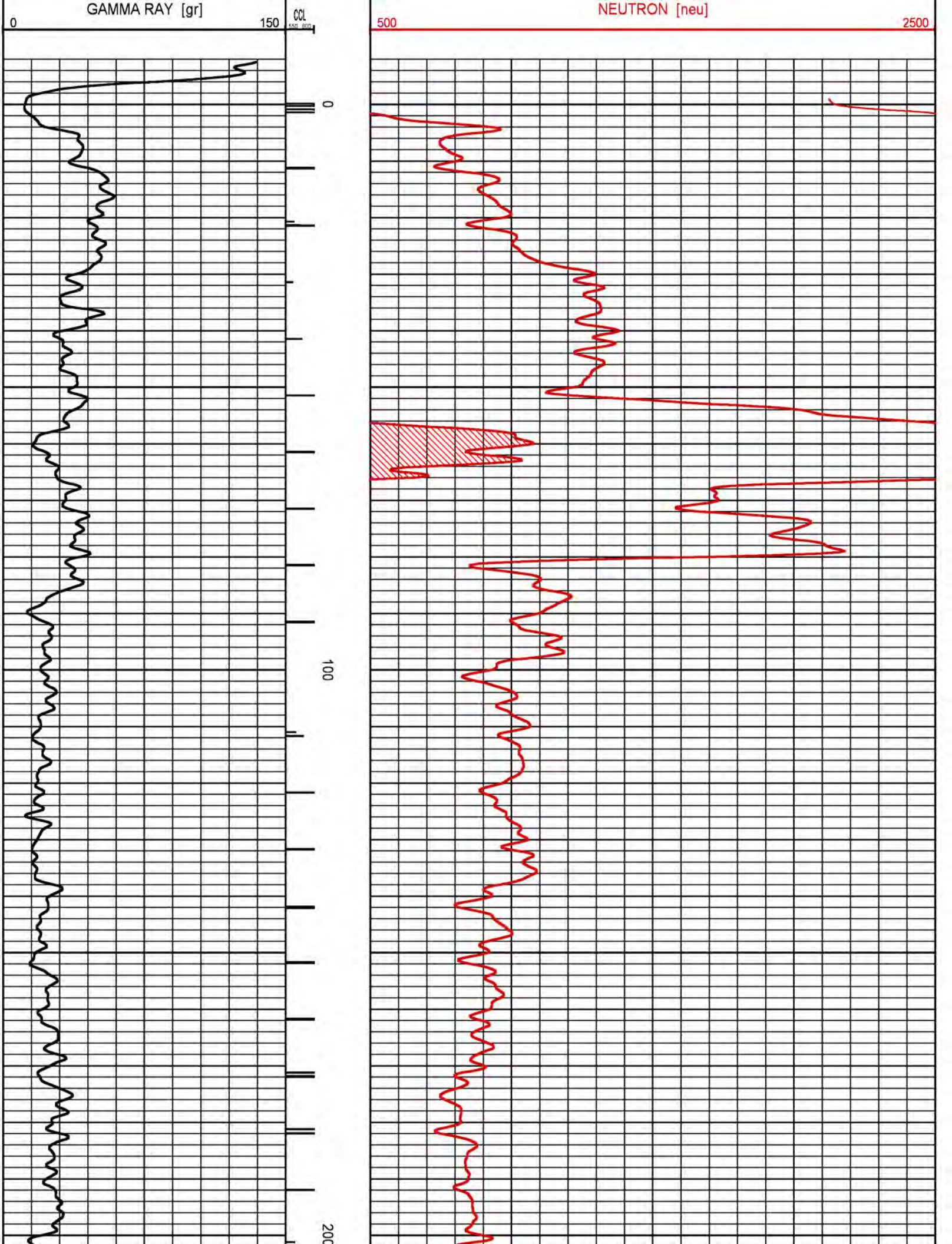
CURVE MEASURE POINT OFFSET

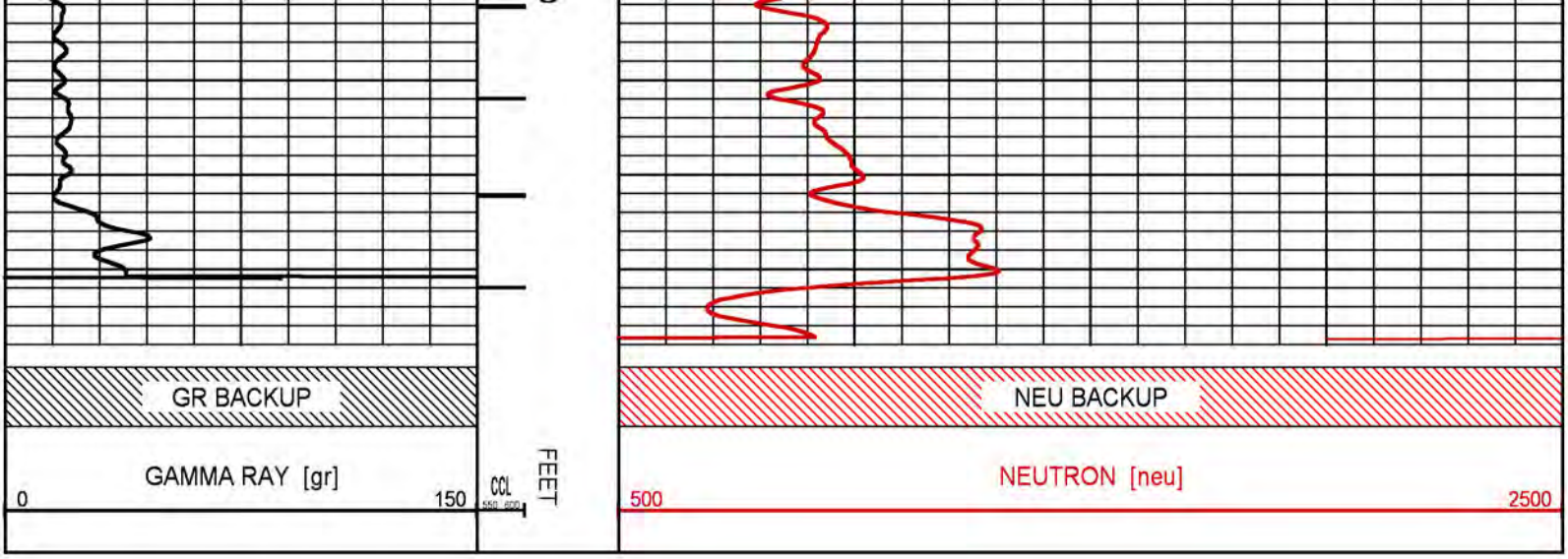
CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)
CCL	-3.75	GR	-7.75	NEU	-1.25		

Presentation : BHUGHES-18202:C:\dat1a\PEOPLES\MCCORD_3\OLNEYGRN+REPEAT.fvpdf [5"/100' Scale]
Plot Interval : -7.5 - 237.5 Feet

Data File 1 : F1 : BHUGHES-18202:C:\dat1a\PEOPLES\MCCORD_3\REPEAT.xtf
Created On : N/A
Company : PEOPLES GAS LIGHT & COKE CO.
Well : McCORD #3
Field : MANLOVE
File Interval : -7.5 - 240 Feet
OCT : p310b




GAMMA RAY [gr]
0
150
CCL
0
100
200
NEUTRON [neu]
500
2500



CALIBRATION / VERIFICATION SUMMARY

Source File: C:\dat1a\PEOPLES\MCCORD_3\p310b.tp1

GR PRIMARY CALIBRATION SUMMARY

TOOL #: 2461NA 11971396 DATE/TIME PERFORMED: Tue Nov 27 14:18:04 2018

UNIT #: 9745 OLNEY CALB JIG #: 4702NK DA-407

	BACKGROUND (cts)	CALBRTR ON (cts)	CR DIFF (cts/s)	MULT	BACKGROUND (gAPI)	CALBRTR ON (gAPI)	CALBRTR (gAPI)
GR	19.20	129.20	110.0	1.682	32.29	217.29	185

GR PRIMARY VERIFICATION SUMMARY

TOOL #: 2461NA 11971396 DATE/TIME PERFORMED: Tue Nov 27 14:20:57 2018

UNIT #: 9745 OLNEY CALB JIG #: 4702NK DA-407

	BACKGROUND (cts)	CALBRTR ON (cts)	CR DIFF (cts/s)	MULT	BACKGROUND (gAPI)	CALBRTR ON (gAPI)	CALBRTR (gAPI)
GR	17.33	130.13	112.8	1.640	28.43	213.43	185

NEU PRIMARY CALIBRATION SUMMARY

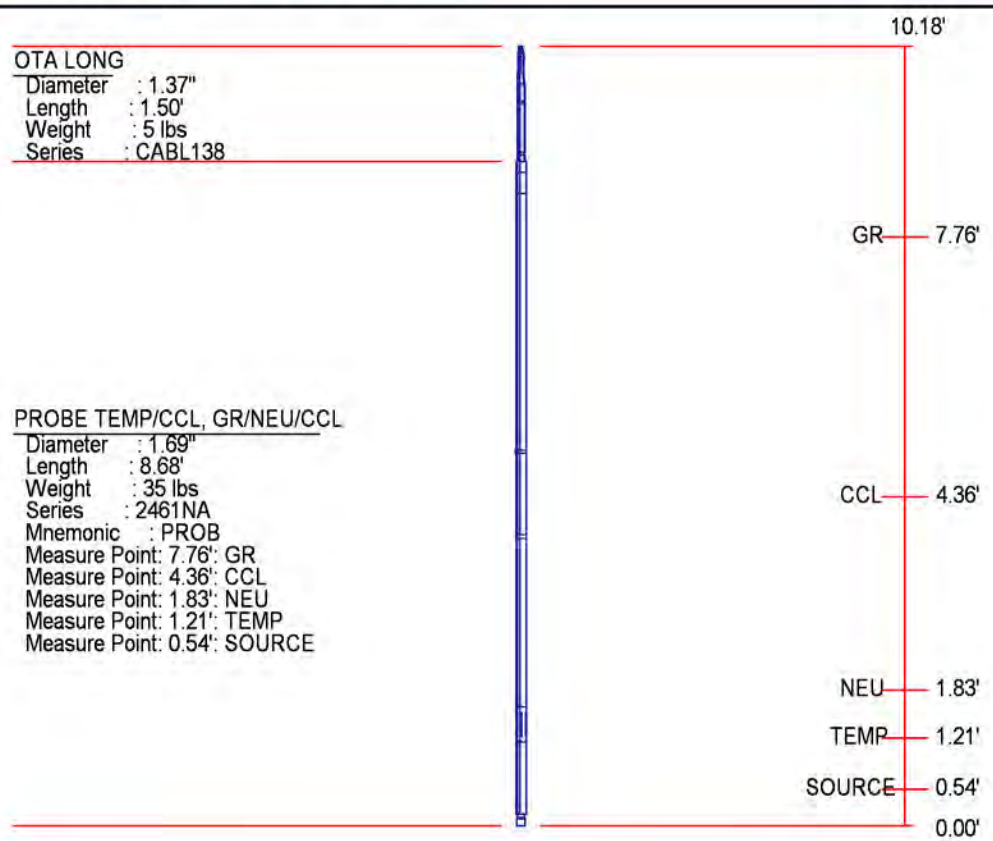
TOOL #: 2461NA 11971396 DATE/TIME PERFORMED: Tue Nov 27 14:37:54 2018

UNIT #: 9745 OLNEY CALIBRATOR #: 2424ZZ 10274334

	Bushing Up (cts)	Bushing Down (cts)	Mult	Bushing Up (nAPI)	Bushing Down (nAPI)	API Diff (nAPI)
NEU	590.25	1524.57	0.85	499.07	1289.07	790.00

INSTRUMENT CONFIGURATION

Source File: C:\cls2\OLNEY TOOL DIAGRAM\2461GRN-tdg.meta



TOTAL LENGTH: 10.18'
TOTAL WEIGHT: 40 lbs
MAX DIAMETER: 0'1.69"

BAKER HUGHES a GE company

COMPANY PEOPLES GAS LIGHT & COKE CO.
WELL McCORD #3
FIELD MANLOVE
COUNTY CHAMPAIGN STATE ILLINOIS

FILE NO:
API NO:

LOCATION:

ELEVATIONS:
KB N/A
DF N/A

	SEC N/A TWP N/A RGE N/A	GL N/A
		DATE 03-Dec-2018

M-BH-2

BAKER HUGHES a GE company

FOLIPS

FILE NO:

API NO:

COMPANY PEOPLES ENERGY
WELL KUHNS #3
FIELD MANLOVE
COUNTY CHAMPAIGN STATE ILLINOIS

Version

LOCATION:
NA

SEC NA TWP NA RGE NA

OTHER SERVICES
NA

PERMANENT DATUM GL ELEVATION 0 FT
LOG MEASURED FROM GL NA ABOVE P.D.
DRILL. MEAS. FROM NA

ELEVATIONS:
KB NA
DF NA
GL NA

DATE		12-Dec-2018			
RUN	TRIP	1	1		
SERVICE ORDER		US146812J			
DEPTH DRILLER		247 FT			
DEPTH LOGGER		247 FT			
BOTTOM LOGGED INTERVAL		247 FT			
TOP LOGGED INTERVAL		0 FT			
TIME STARTED		13:30 Hrs			
TIME FINISHED		15:00			
OPERATOR RIG TIME		1.5 Hrs			
TYPE OF FLUID IN HOLE		WATER			
FLUID DENSITY		NA			
FLUID SALINITY		NA			
FLUID LEVEL		NA			
LOGGED CEMENT TOP		NA			
WELLHEAD PRESSURE		0 PSI			
MAXIMUM HOLE DEVIATION		0 DEG			
NOMINAL LOGGING SPEED		30 FPM			
MAX. RECORDED TEMP.		47.2 DEGF			
REFERENCE LOG		NA			
REFERENCE LOG DATE		NA			
EQUIP. NO.	LOCATION	4265	OLNEY IL		
RECORDED BY		Mustapha Bello			
WITNESSED BY		Austin Waggoner			

CASING RECORD

SIZE	WEIGHT	GRADE	FROM	TO
6 IN			0 FT	247 FT

BOREHOLE RECORD

BIT SIZE	FROM	TO
NA	NA	NA

PERFORATION RECORD

PERFORATION TYPE	POSITION	PHASING	SPACING	DENSITY	FROM	TO

REMARKS

RUN 1 TRIP 1: Crew Mustapha, Olu, Brad, Nathan, Johny and Jerry
Tool ran free

EQUIPMENT DATA

RUN	TRIP	TOOL	SERIES NO.	SERIAL NO.	POSITION
1	1	GR	2461NA	10264043	FREE

1	1	GR	2461NA	10264043	FREE
1	1	CCL	2461NA	10264043	FREE
1	1	NEU	2461NA	10264043	FREE

MAIN LOG

ECLIPS 7.0w PC-ECLIPS General Release Rel 7.0w Fri Jun 09 11:02:06 Central Daylight Time 2017
Patches: 4

Plotted: Wed Dec 12 14:45:16 2018

PARAMETER AND FILTER SUMMARY REPORT

FILE: C:\dat1a\PEOPLES_GAS\MANLOVE\KUHNS_1\p310b01.prm
LOGGING MODE: DEPTH DIRECTION: DOWN
TOP DEPTH: -4.000 ft BOTTOM DEPTH: 248.500 ft

SYMMETRIC FILTER

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
GR	FILTER ()	medium (1)		TOP	BOTTOM
TEMP	FILTER ()	medium (1)		"	"
DIELECTRIC	FILTER ()	medium (1)		"	"

CURVE DESCRIPTION REPORT

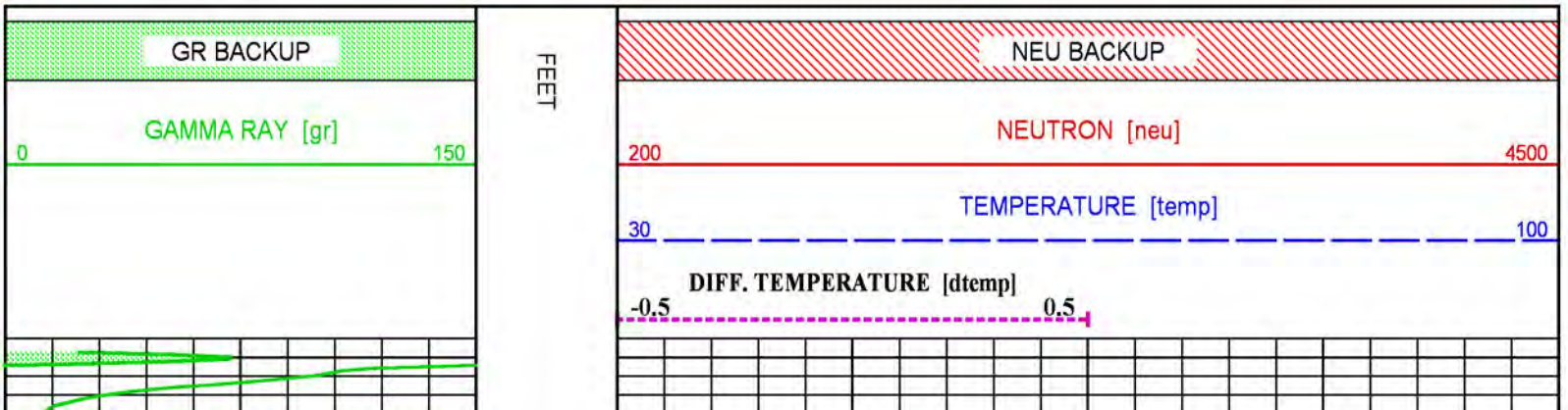
CURVE NAME	CREATION DATE	CURVE DESCRIPTION
F1:DTEMP	N/A	DIFFERENTIAL TEMPERATURE
F1:GR	N/A	GAMMA RAY
F1:NEU	N/A	SINGLE DETECTOR NEUTRON
F1:TEMP	N/A	TEMPERATURE

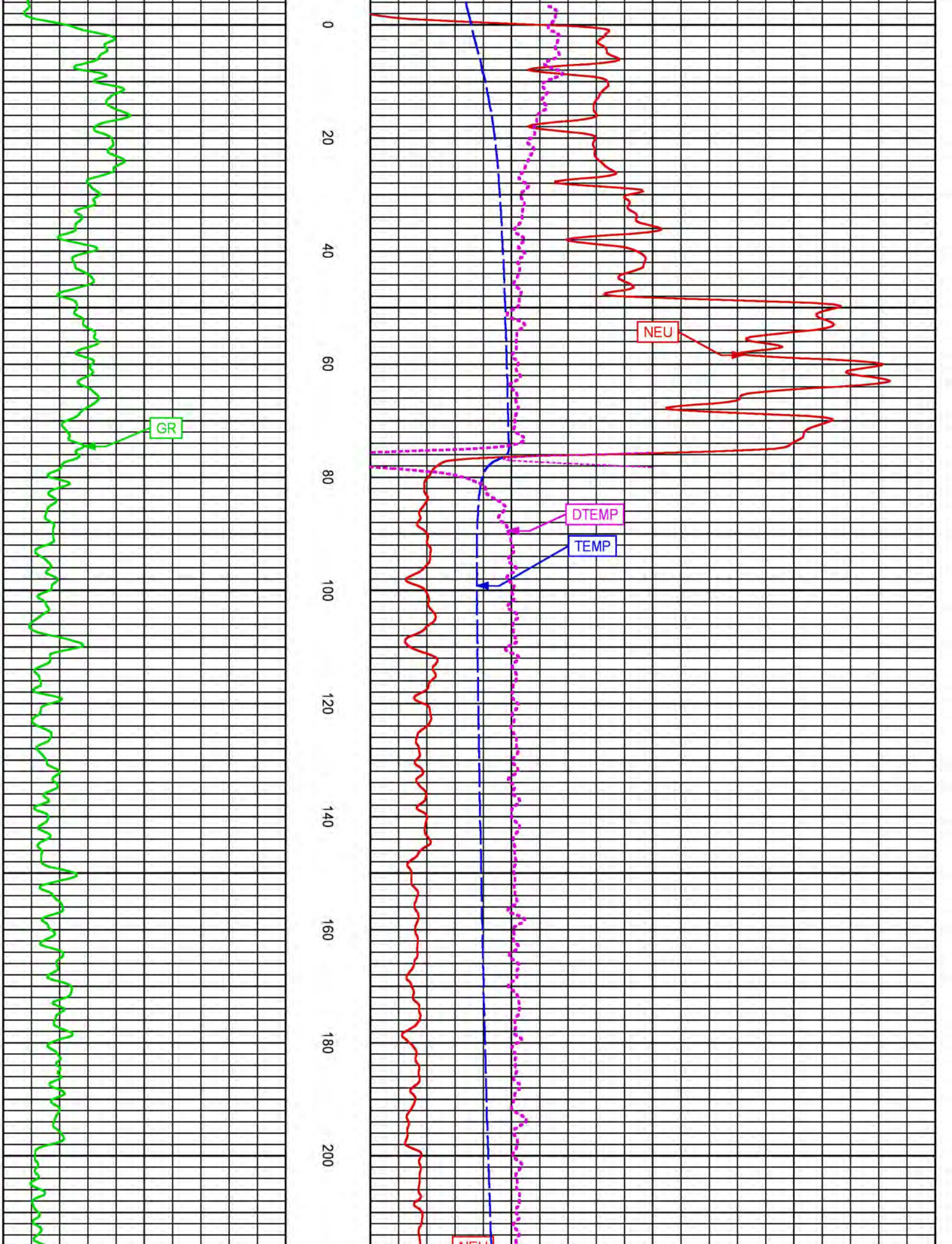
CURVE MEASURE POINT OFFSET

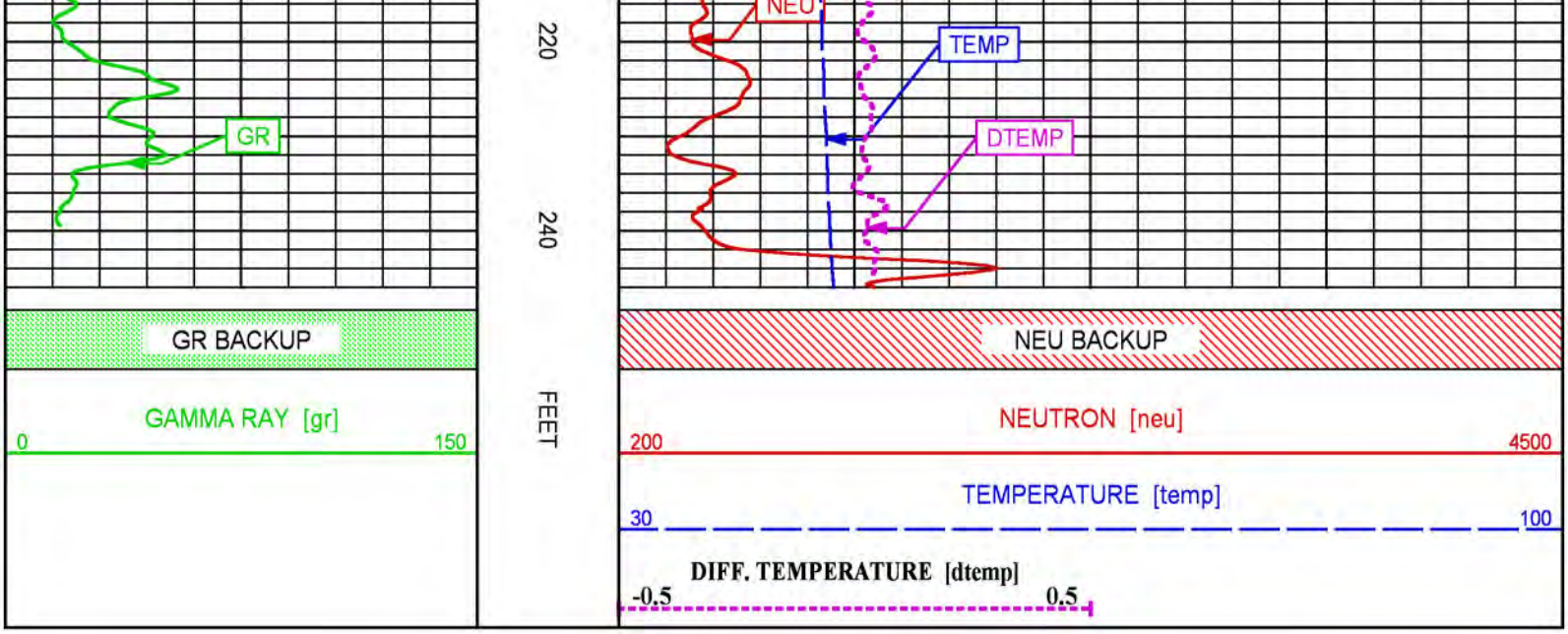
CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)
DTEMP	-1.25	GR	-7.75	NEU	-1.25	TEMP	-1.25

Presentation : BAKER-56628:C:\dat1a\PEOPLES_GAS\MANLOVE\KUHNS_1\Main Pass.fvpdf [5"/100' Scale]
Plot Interval : -10.5 - 247.25 Feet

Data File 1 : F1 : BAKER-56628:C:\dat1a\PEOPLES_GAS\MANLOVE\KUHNS_1\p310b01.aff
Created On : N/A
Company : PEOPLES ENERGY
Well : KUHNS #3
Field : MANLOVE
File Interval : -10.5 - 248.5 Feet
OCT : p310b




GR
NEU
DTEMP
TEMP
0
20
40
60
80
100
120
140
160
180
200



REPEAT LOG

ECLIPS 7.0w PC-ECLIPS General Release Rel 7.0w Fri Jun 09 11:02:06 Central Daylight Time 2017
Patches: 4

Plotted: Wed Dec 12 14:46:19 2018

PARAMETER AND FILTER SUMMARY REPORT

FILE: C:\dat1a\PEOPLES_GAS\MANLOVE\KUHNS_1\p310b02.prm
LOGGING MODE: DEPTH DIRECTION: UP
TOP DEPTH: -3.000 ft BOTTOM DEPTH: 248.703 ft

SYMMETRIC FILTER

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
GR	FILTER ()	medium (1)		TOP	BOTTOM
TEMP	FILTER ()	medium (1)		"	"
DIELECTRIC	FILTER ()	medium (1)		"	"

CURVE DESCRIPTION REPORT

CURVE NAME	CREATION DATE	CURVE DESCRIPTION
F1:DTEMP	N/A	DIFFERENTIAL TEMPERATURE
F1:GR	N/A	GAMMA RAY
F1:NEU	N/A	SINGLE DETECTOR NEUTRON
F1:TEMP	N/A	TEMPERATURE

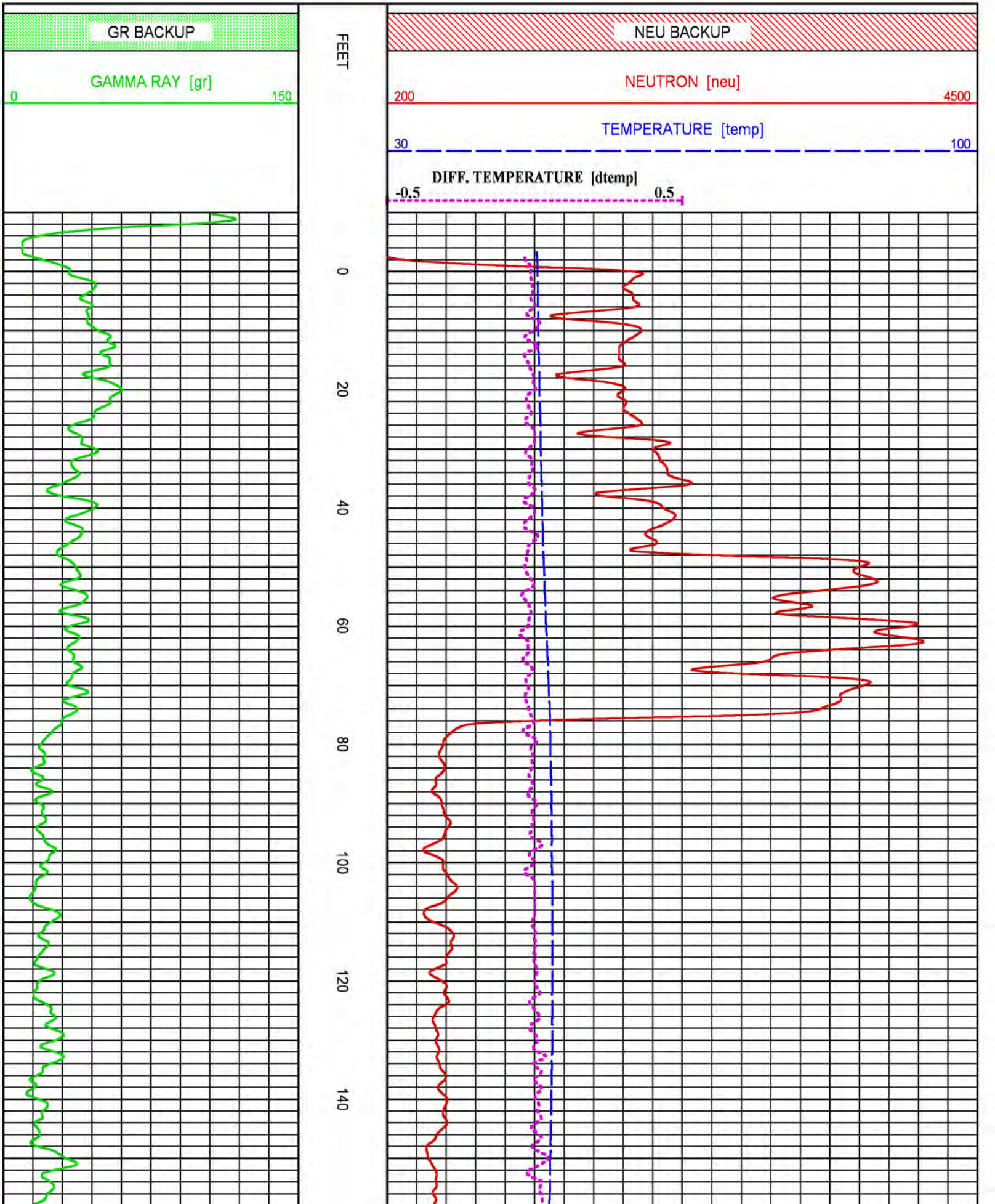
CURVE MEASURE POINT OFFSET

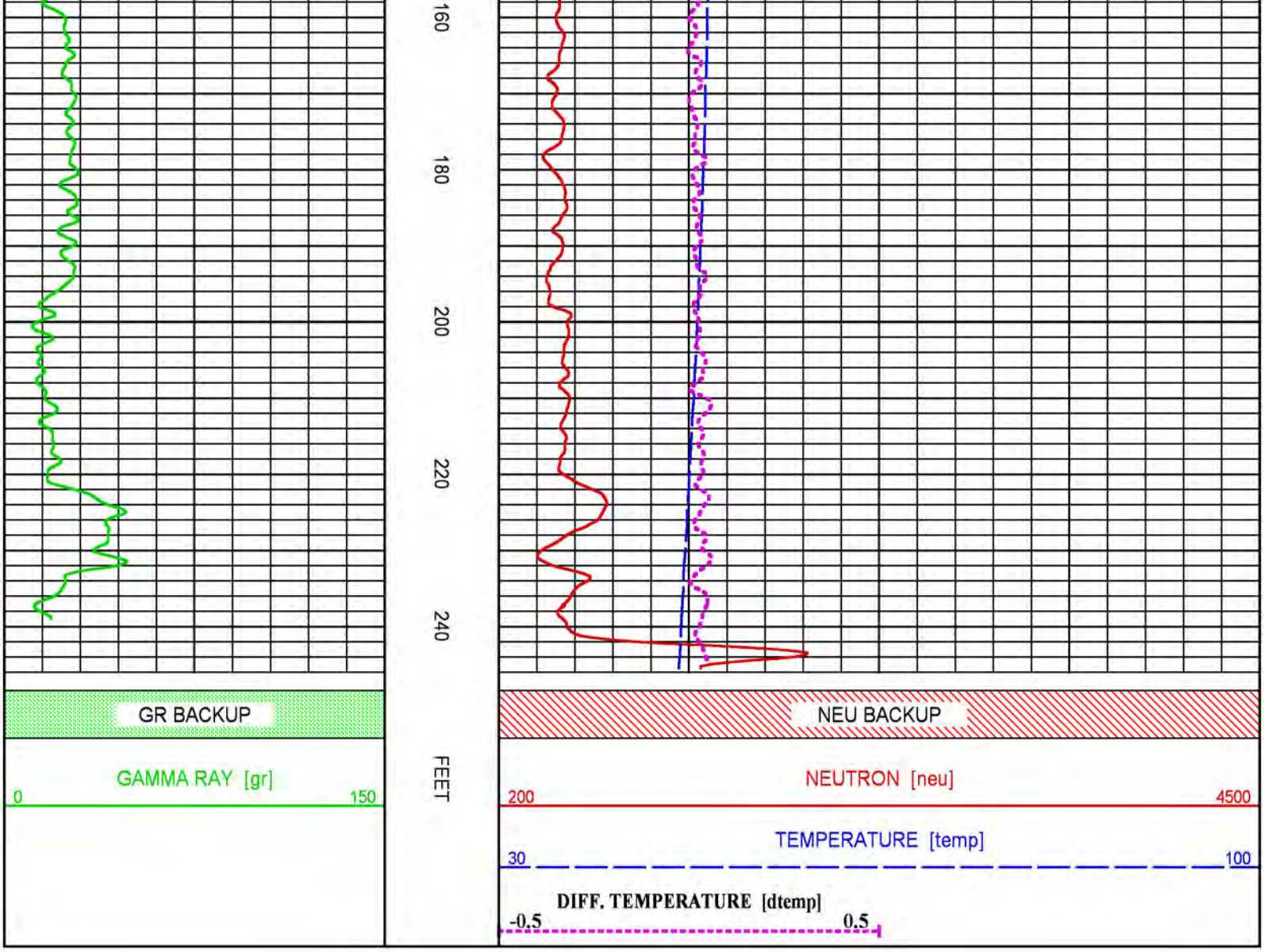
CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)
DTEMP	-1.25	GR	-7.75	NEU	-1.25	TEMP	-1.25

Presentation : BAKER-56628:C:\dat1a\PEOPLES_GAS\MANLOVE\KUHNS_1\Repeat Pass.fvpdf [5"/100' Scale]
Plot Interval : -9.75 - 246.75 Feet

Data File 1 : F1 : BAKER-56628:C:\dat1a\PEOPLES_GAS\MANLOVE\KUHNS_1\p310b02.aff
Created On : N/A

Company : PEOPLES ENERGY
Well : KUHNS #3
Field : MANLOVE
File Interval : -9.75 - 248 Feet
OCT : p310b





CALIBRATION / VERIFICATION SUMMARY

Source File: C:\dat1a\PEOPLES_GAS\MANLOVE\KUHNS_1\p310b~.tp1

GR PRIMARY CALIBRATION SUMMARY

TOOL #: 2461NA 10264043

DATE/TIME PERFORMED: Wed Sep 05 09:25:27 2018

UNIT #: CHANGE ME

CALB JIG #: 4702NK DA407

	BACKGROUND (cts)	CALBRTR ON (cts)	CR DIFF (cts/s)	MULT	BACKGROUND (gAPI)	CALBRTR ON (gAPI)	CALBRTR (gAPI)
GR	24.22	140.36	116.1	1.593	38.59	223.59	185

NEU PRIMARY CALIBRATION SUMMARY

TOOL #: 2461NA 10264043 DATE/TIME PERFORMED: Wed Sep 05 09:31:37 2018

UNIT #: CHANGE ME CALIBRATOR #: 2424ZZ 10274334

	Bushing Up (cts)	Bushing Down (cts)	Mult	Bushing Up (nAPI)	Bushing Down (nAPI)	API Diff (nAPI)
NEU	773.92	1940.07	0.68	524.29	1314.29	790.00

TEMP PRIMARY CALIBRATION SUMMARY

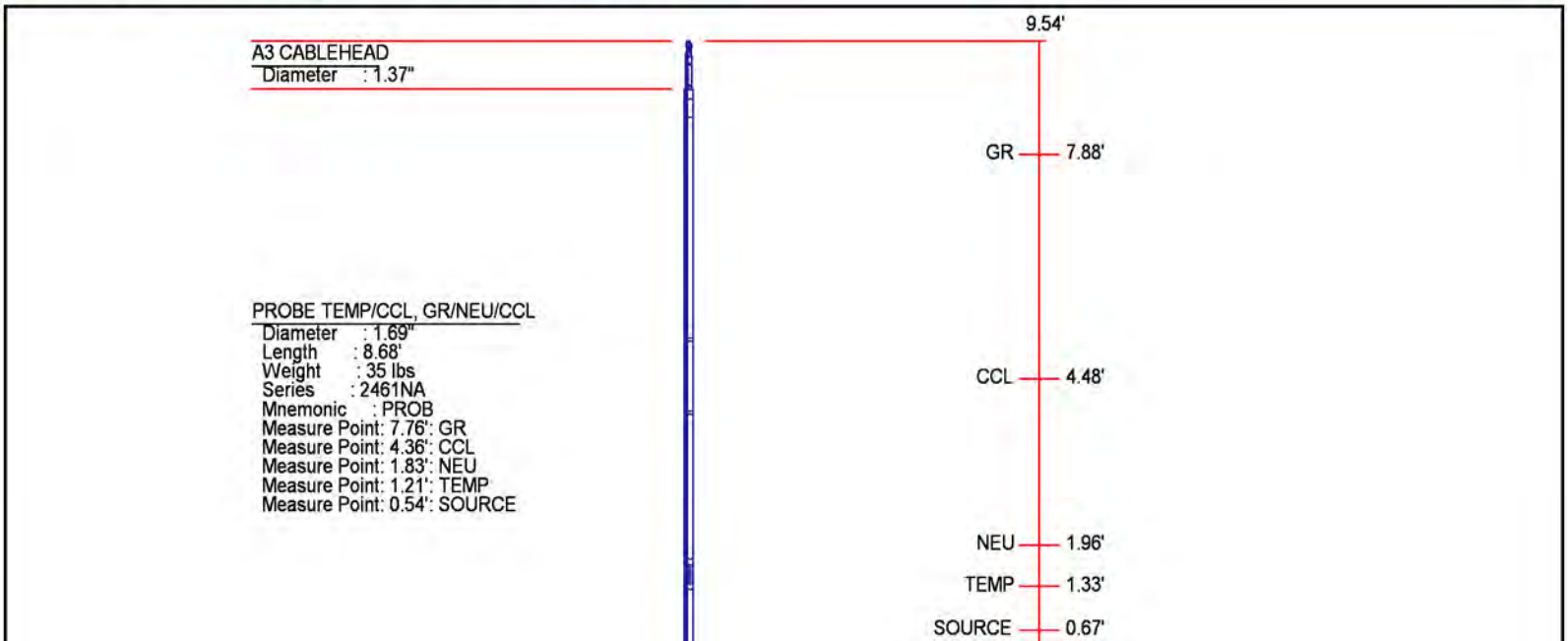
TOOL #: 2461NA 10264043 DATE/TIME PERFORMED: Mon Jul 30 13:11:04 2018

UNIT #: OLNEY 4363

	T(0)	T(1)	T(2)	T(3)
Corr Coeff for Temp	0.000000E+00	1.000000E-01	0.000000E+00	0.000000E+00

INSTRUMENT CONFIGURATION

Source File: C:\dat1a\PEOPLES_GAS\MANLOVE\KUHNS_1\p310b~-tdg.meta



BULL PLUG 1 11/16

TOTAL LENGTH: 9.54'
TOTAL WEIGHT: 38 lbs
MAX DIAMETER: 0'1.69"

BAKER HUGHES a GE company

ECLIPS

COMPANY	PEOPLES ENERGY		FILE NO:
WELL	KUHNS #3		
FIELD	MANLOVE		API NO:
COUNTY	CHAMPAIGN	STATE ILLINOIS	
LOCATION: NA		ELEVATIONS: KB NA, DF NA, GL NA	
SEC NA	TWP NA	RGE NA	DATE 12-Dec-2018

M-BH-3

BAKER HUGHES a GE company

GAMMA RAY LOG
NEUTRON LOG

FILE NO:

API NO: NA

COMPANY PEOPLES GAS LIGHT & COKE CO
WELL WISEGARVER TEST HOLE
FIELD MANLOVE
COUNTY CHAMPAIGN STATE ILLINOIS

Version

LOCATION:
M-BH-#3
(NEAR WISEGARVER #3)
SEC NA TWP NA RGE NA

OTHER SERVICES
TEMP

PERMANENT DATUM GL ELEVATION NA
LOG MEASURED FROM GL 0 FT ABOVE P.D.
DRILL. MEAS. FROM GL

ELEVATIONS:
KB NA
DF NA
GL NA

DATE		18-DEC-2018			
RUN	TRIP	1	1		
SERVICE ORDER		146950			
DEPTH DRILLER		220 FT			
DEPTH LOGGER		219 FT			
BOTTOM LOGGED INTERVAL		219 FT			
TOP LOGGED INTERVAL		0 FT			
TIME STARTED		08:00			
TIME FINISHED		08:30			
OPERATOR RIG TIME		0.5 HRS			
TYPE OF FLUID IN HOLE		WATER			
FLUID DENSITY		NA			
FLUID SALINITY		NA			
FLUID LEVEL		85 FT			
LOGGED CEMENT TOP		NA			
WELLHEAD PRESSURE		0 PSI			
MAXIMUM HOLE DEVIATION		NA			
NOMINAL LOGGING SPEED		30 F/MN			
MAX. RECORDED TEMP.		19 DEGF			
REFERENCE LOG		NA			
REFERENCE LOG DATE		NA			
EQUIP. NO.	LOCATION	9752	MT PLEASANT		
RECORDED BY		H. JASINSKI			
WITNESSED BY		AUSTIN WAGGONER			

REMARKS

RUN 1 TRIP 1: CREW: JASINSKI, WILSON, SCHIAVO
RIG: BA CRANE
SURFACE TEMP 20 DEGF

EQUIPMENT DATA

RUN	TRIP	TOOL	SERIES NO.	SERIAL NO.	POSITION
1	1	GRN TEMP	2461NA	14576705	FREE

MAIN LOG

ECLIPS 7.0wu1 PC-ECLIPS General Release Rel 7.0w Update 1 Wed Jul 25 15:19:34 Central Daylight Time 2018

Plotted: Tue Dec 18 09:24:12 2018

PARAMETER AND FILTER SUMMARY REPORT

FILE: C:\dat1a\PEOPLES\WISEGARVER_TEST_HOLE\p310b01.prm
LOGGING MODE: DEPTH DIRECTION: DOWN
TOP DEPTH: 10.000 ft BOTTOM DEPTH: 221.000 ft

SYMMETRIC FILTER

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
DIELECTRIC	FILTER ()	medium (1)		TOP	BOTTOM

CCL PROCESSING

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
CCL FLOOR	CCL FLOOR	0.00		TOP	BOTTOM
CCL BASELINE	SET CCL BASELINE			"	"

CURVE DESCRIPTION REPORT

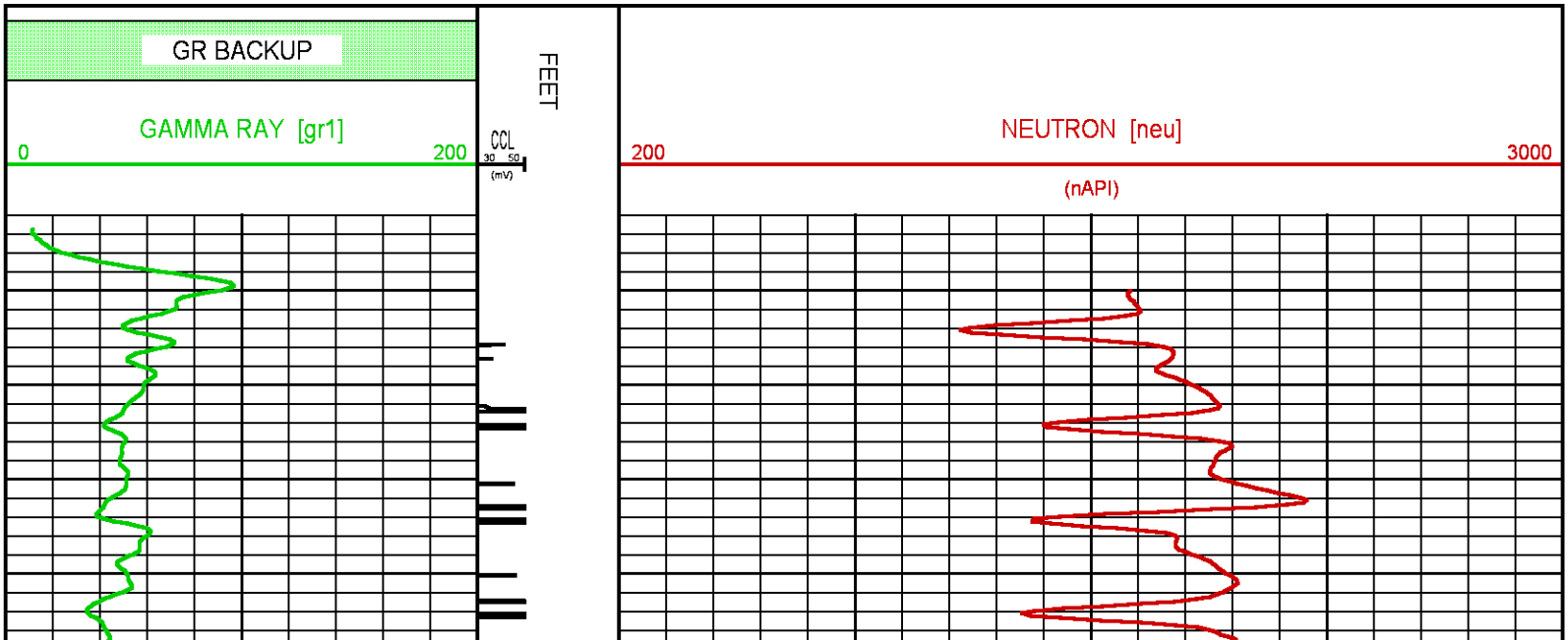
CURVE NAME	CREATION DATE	CURVE DESCRIPTION
F1:CCL	Dec 18 09:01:53 2018	CASING COLLAR LOCATOR
F1:GR1	Dec 18 09:19:32 2018	GAMMA RAY 1
F1:NEU	Dec 18 09:01:53 2018	SINGLE DETECTOR NEUTRON

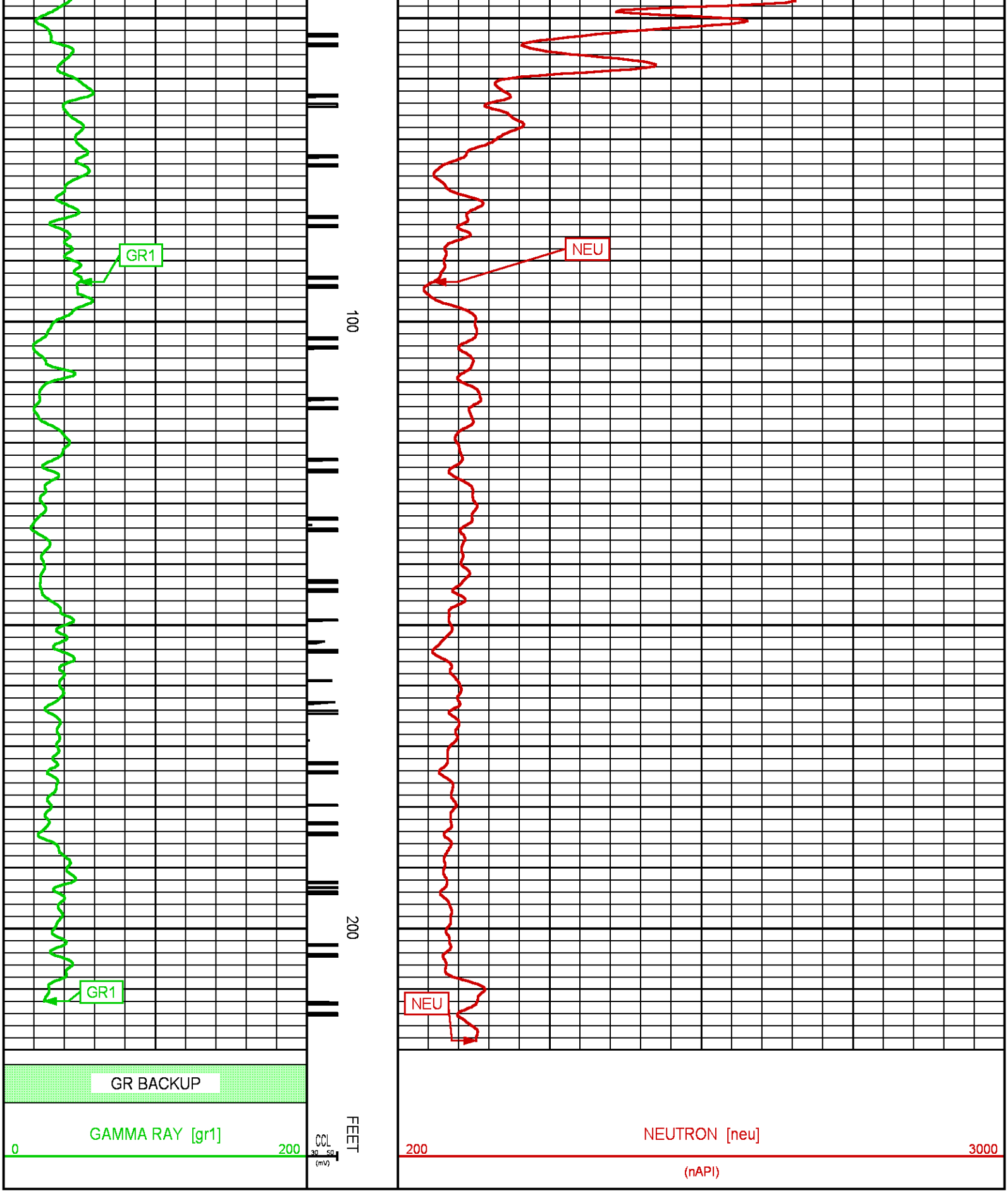
CURVE MEASURE POINT OFFSET

CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)
CCL	-4.50	GR1	0.00	NEU	-1.25		

Presentation : BAKER-56631:C:\dat1a\PEOPLES\WISEGARVER_TEST_HOLE\GRN_MAINGRNT.fvpdf [5"/100' Scale]
Plot Interval : 3.5 - 219.75 Feet

Data File 1 : F1 : BAKER-56631:C:\dat1a\PEOPLES\WISEGARVER_TEST_HOLE\MAINGRNT.xtf
Created On : Dec 18 09:01:53 2018
Company : PEOPLES GAS LIGHT & COKE CO
Well : WISEGARVER TEST HOLE
Field : MANLOVE
File Interval : 3.5 - 221 Feet
OCT : p310b




GR1
GR1
NEU
NEU
100
200
GR BACKUP
GAMMA RAY [gr1]
0
200
CCL
30 50
(mV)
FEET
NEUTRON [neu]
200
3000
(nAPI)

REPEAT LOG

ECLIPS 7.0wu1 PC-ECLIPS General Release Rel 7.0w Update 1 Wed Jul 25 15:19:34 Central Daylight Time 2018

Plotted: Tue Dec 18 09:22:29 2018

PARAMETER AND FILTER SUMMARY REPORT

FILE: C:\dat1a\PEOPLES\WISEGARVER_TEST_HOLE\p310b02.prm
LOGGING MODE: DEPTH DIRECTION: UP
TOP DEPTH: 1.500 ft BOTTOM DEPTH: 221.000 ft

SYMMETRIC FILTER

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
DIELECTRIC	FILTER ()	medium (1)		TOP	BOTTOM

CCL PROCESSING

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
CCL FLOOR	CCL FLOOR	0.00		TOP	BOTTOM
CCL BASELINE	SET CCL BASELINE			"	"

CURVE DESCRIPTION REPORT

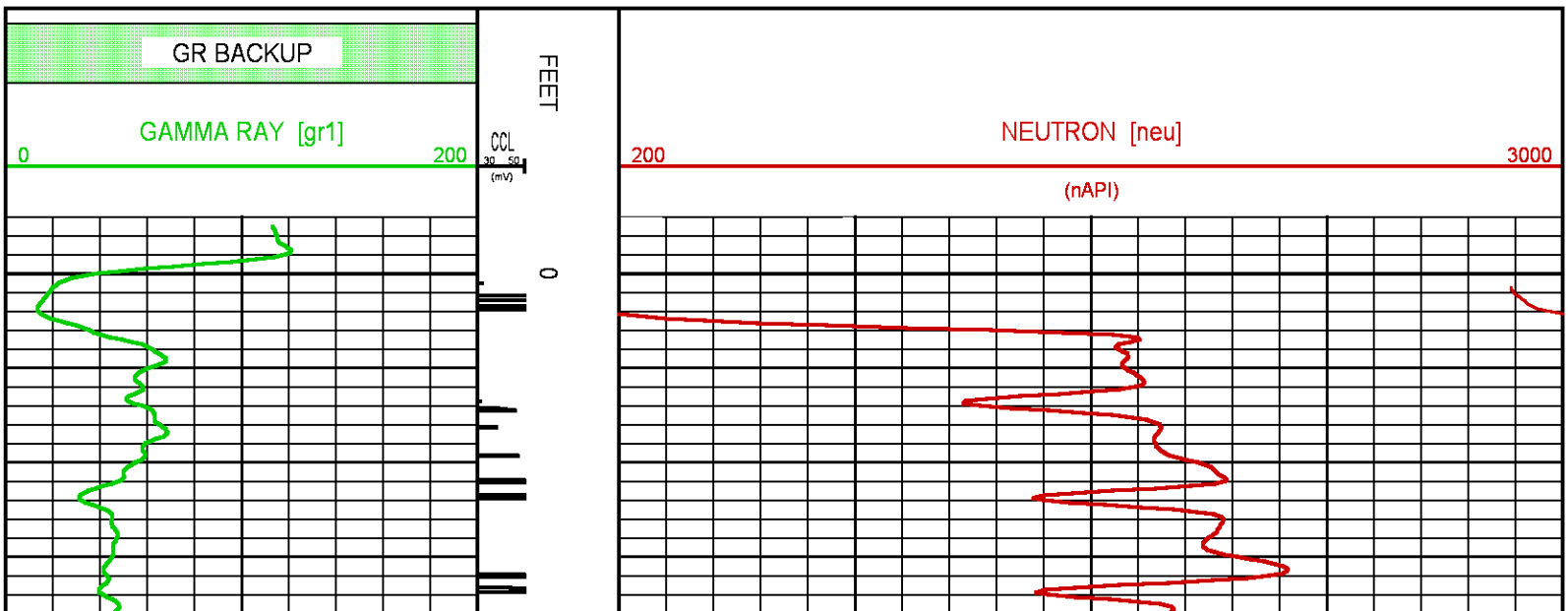
CURVE NAME	CREATION DATE	CURVE DESCRIPTION
F1:CCL	Dec 18 09:09:26 2018	CASING COLLAR LOCATOR
F1:GR1	Dec 18 09:19:51 2018	GAMMA RAY 1
F1:NEU	Dec 18 09:09:26 2018	SINGLE DETECTOR NEUTRON

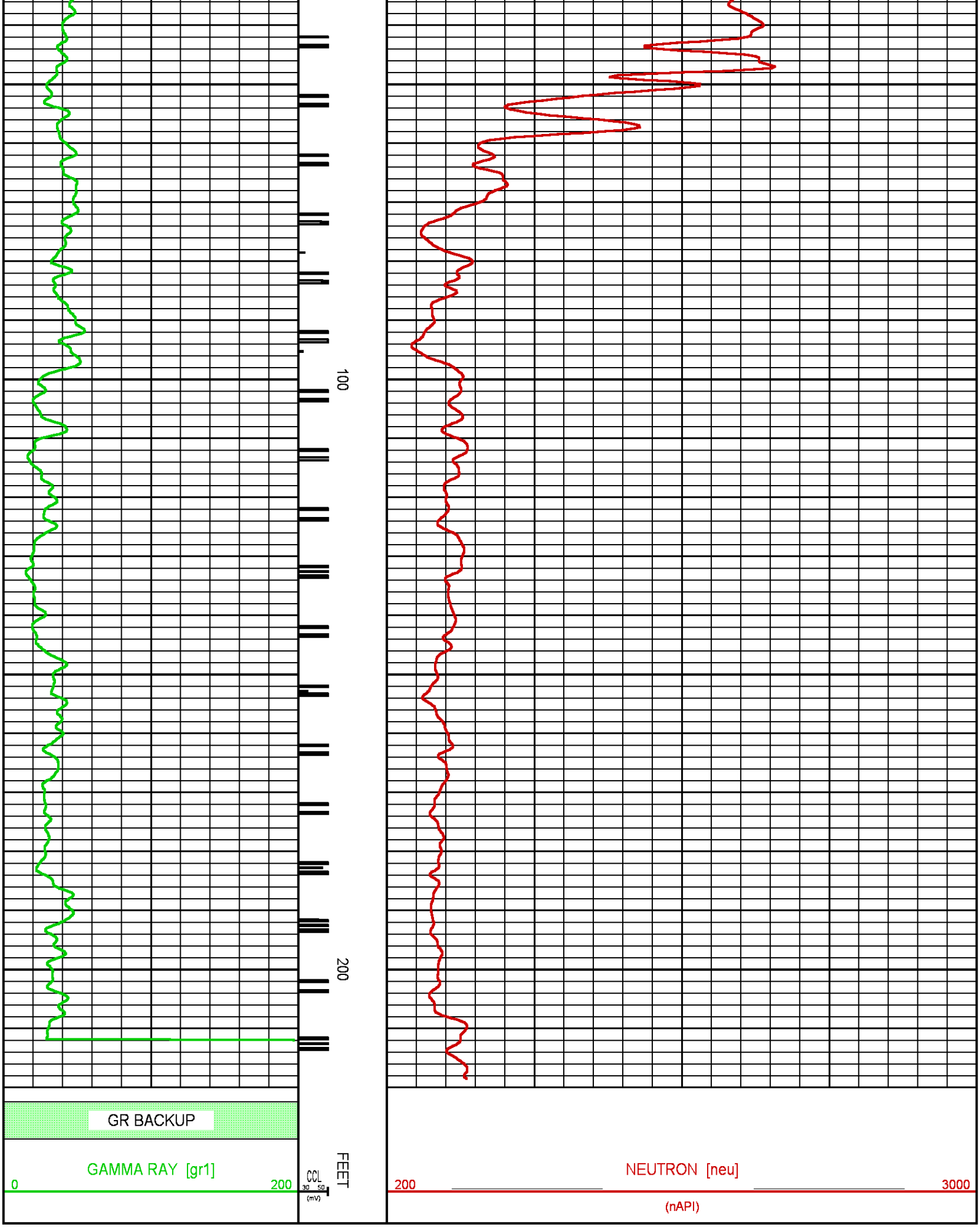
CURVE MEASURE POINT OFFSET

CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)
CCL	-4.50	GR1	0.00	NEU	-1.25		

Presentation : BAKER-56631:C:\dat1a\PEOPLES\WISEGARVER_TEST_HOLE\GRN_+RPTGRNT.fvpdf [5"/100' Scale]
Plot Interval : -5 - 219.75 Feet

Data File 1 : F1 : BAKER-56631:C:\dat1a\PEOPLES\WISEGARVER_TEST_HOLE\RPTGRNT.xtf
Created On : Dec 18 09:09:26 2018
Company : PEOPLES GAS LIGHT & COKE CO
Well : WISEGARVER TEST HOLE
Field : MANLOVE
File Interval : -5 - 221 Feet
OCT : p310b




100
200
FEET
GR BACKUP
GAMMA RAY [gr1]
0
200
CCL
30 50
(mV)
NEUTRON [neu]
200
3000
(nAPI)

CALIBRATION / VERIFICATION SUMMARY

Source File: C:\dat1a\PEOPLES\WISEGARVER_TEST_HOLE\p310b.tp1

GR PRIMARY CALIBRATION SUMMARY

TOOL #: 2461NA 14576705 DATE/TIME PERFORMED: Wed Dec 05 09:27:52 2018

UNIT #: 4505 9752 CALB JIG #: 4702NK DA-444

	BACKGROUND (cts)	CALBRTR ON (cts)	CR DIFF (cts/s)	MULT	BACKGROUND (gAPI)	CALBRTR ON (gAPI)	CALBRTR (gAPI)
GR	57.04	230.91	173.9	0.920	52.49	212.49	160

NEU PRIMARY CALIBRATION SUMMARY

TOOL #: 2461NA 14576705 DATE/TIME PERFORMED: Wed Dec 05 09:35:23 2018

UNIT #: 4505 9752 CALIBRATOR #: 2424ZZ STOVEPIPE

	Bushing Up (cts)	Bushing Down (cts)	Mult	Bushing Up (nAPI)	Bushing Down (nAPI)	API Diff (nAPI)
NEU	598.00	2153.77	0.51	303.66	1093.66	790.00

BAKER HUGHES a GE company

FOLIPS

COMPANY PEOPLES GAS LIGHT & COKE CO

WELL WISEGARVER TEST HOLE

FIELD MANLOVE

COUNTY CHAMPAIGN STATE ILLINOIS

FILE NO:

API NO: NA

LOCATION:

M-BH-#3
(NEAR WISEGARVER #3)

SEC NA TWP NA RGE NA

ELEVATIONS:

KB NA
DF NA
GL NA

DATE 18-DEC-2018

Attachment G

Geotechnical Analysis Results

GESTRA Engineering, Inc
191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

Laboratory Test Results of Mechanical Analysis of Soil or Aggregate

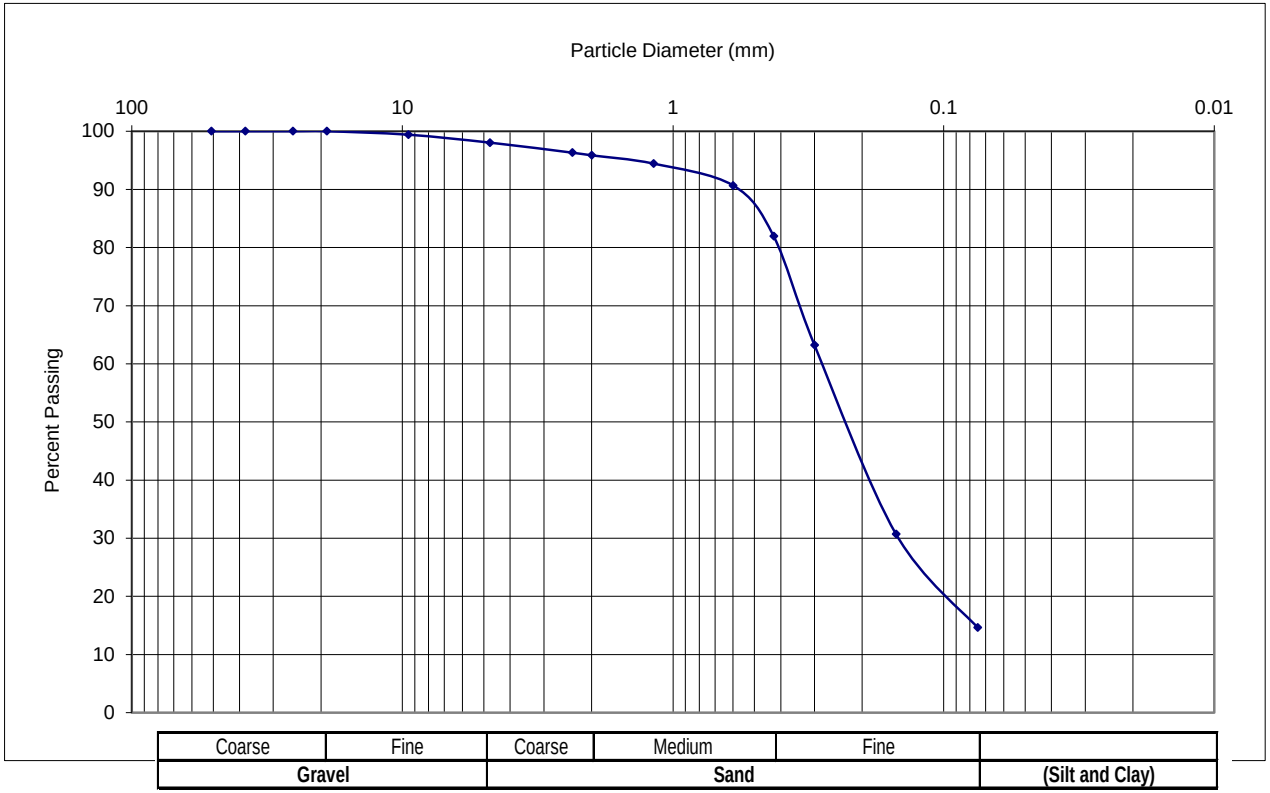
Project Name:	Manlove Field Litigation Support	Date:	January 4, 2019
Project Number:	18390-40	Reported To:	OBG
Project Location:	Champaign Co., IL		
ASTM Designation:	**C136, D422**		

Sample Information

Type of Sample:	Bag	Sample Number:	M-BH-1
Boring Number:		Depth of Sample:	58'-59'

Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2	50.8	100.0
1 1/2	38.1	100.0
1	25.4	100.0
3/4	19.05	100.0
3/8	9.525	99.4
#4	4.75	98.0
#8	2.36	96.3
#10	2	95.9
#16	1.18	94.4
#30	0.6	90.7
#40	0.425	82.0
#50	0.3	63.2
#100	0.15	30.7
#200	0.075	14.7



Moisture Content 4.4 %

Remarks: Gravel 2.0 % Sand 83.3 %
Passing #200 Sieve (Silt & Clay) 14.7 %

Performed by: B. Bills

Reviewed by: Jeff Bruesewitz P.G.
GESTRA Engineering, Inc.

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Milwaukee, WI 53207
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Laboratory Test Results of Mechanical Analysis of Soil or Aggregate

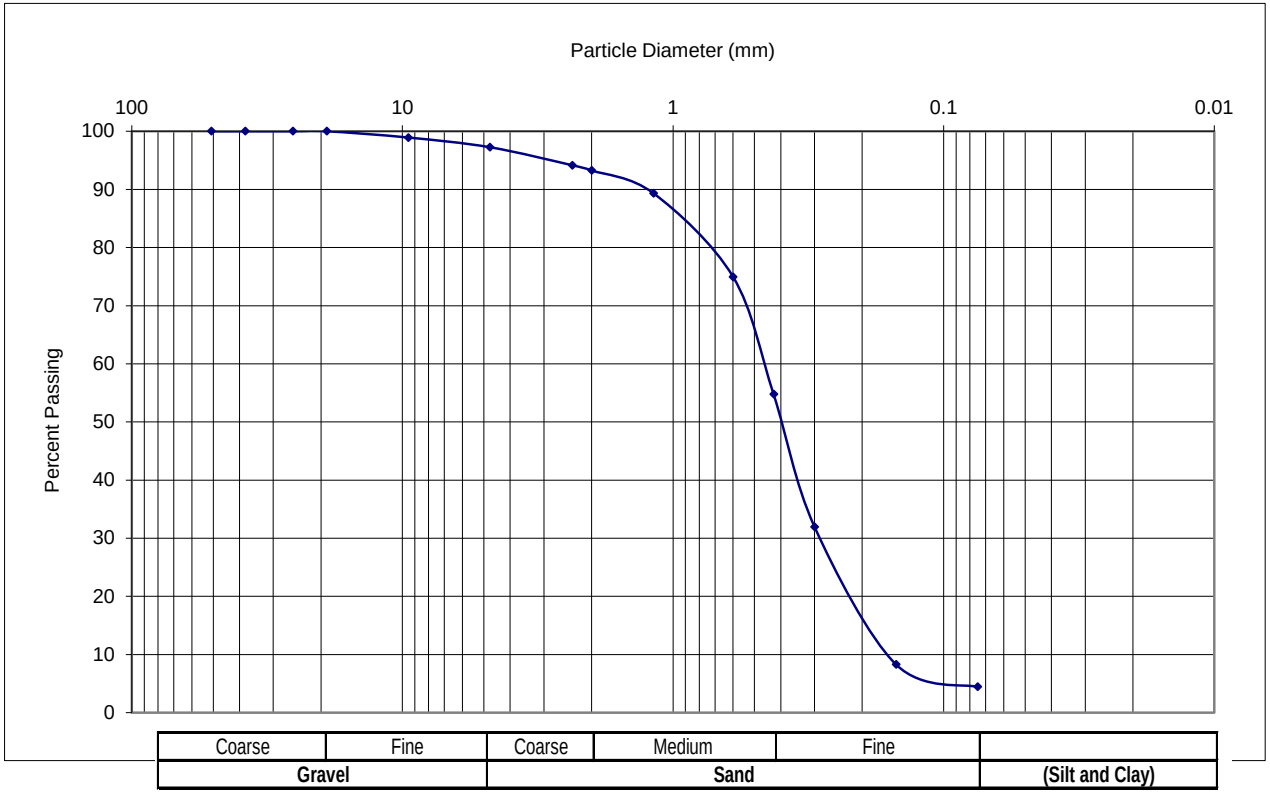
Project Name:	Manlove Field Litigation Support	Date:	January 4, 2019
Project Number:	18390-40	Reported To:	OBG
Project Location:	Champaign Co., IL		
ASTM Designation:	**C136, D422**		

Sample Information

Type of Sample:	Bag	Sample Number:	M-BH-1
Boring Number:		Depth of Sample:	111'-112'

Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2	50.8	100.0
1 1/2	38.1	100.0
1	25.4	100.0
3/4	19.05	100.0
3/8	9.525	98.9
#4	4.75	97.3
#8	2.36	94.2
#10	2	93.3
#16	1.18	89.3
#30	0.6	75.0
#40	0.425	54.7
#50	0.3	32.0
#100	0.15	8.3
#200	0.075	4.4



Moisture Content 15.0 %

Remarks: Gravel 2.7 % Sand 92.9 %
Passing #200 Sieve (Silt & Clay) 4.4 %

Performed by: B. Bills

Reviewed by: Jeff Bruesewitz P.G.
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191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

Laboratory Test Results of Mechanical Analysis of Soil or Aggregate

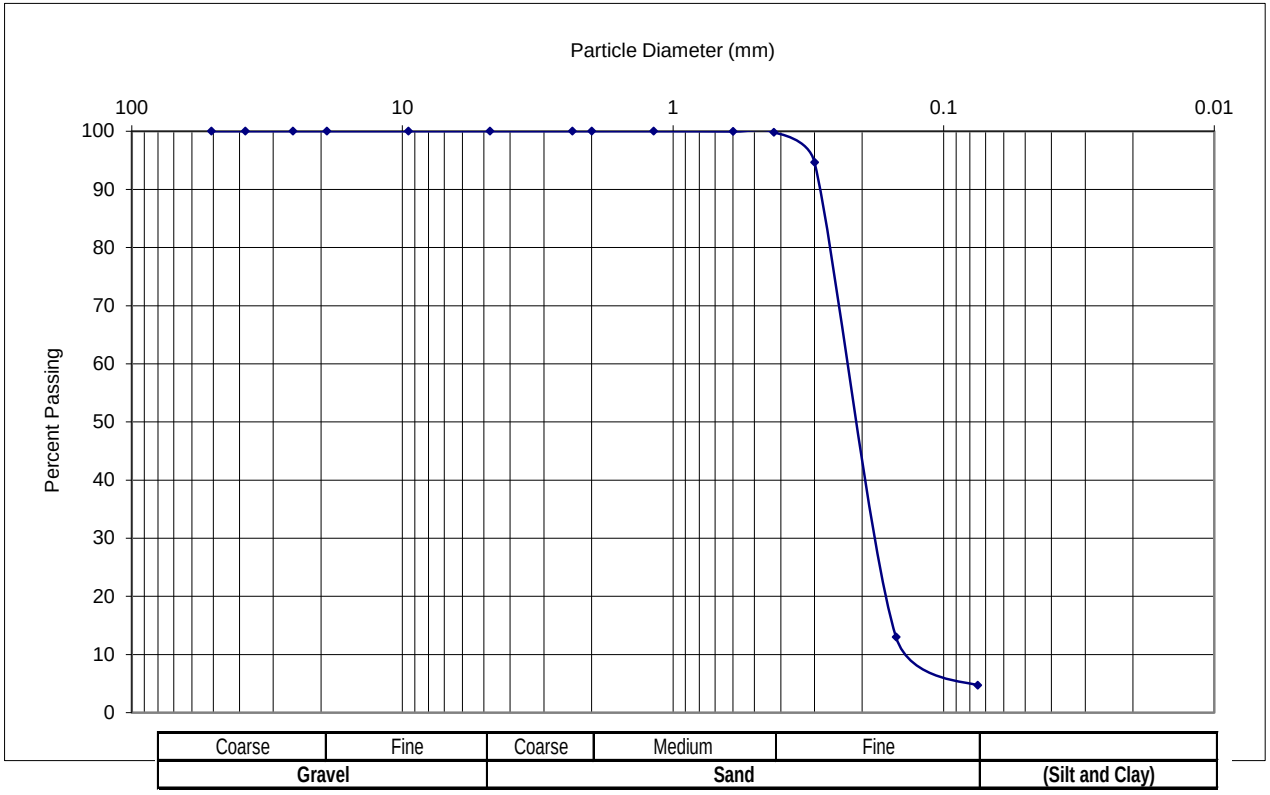
Project Name:	Manlove Field Litigation Support	Date:	January 4, 2019
Project Number:	18390-40	Reported To:	OBG
Project Location:	Champaign Co., IL		
ASTM Designation:	**C136, D422**		

Sample Information

Type of Sample:	Bag	Sample Number:	M-BH-1
Boring Number:		Depth of Sample:	200'-201'

Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2	50.8	100.0
1 1/2	38.1	100.0
1	25.4	100.0
3/4	19.05	100.0
3/8	9.525	100.0
#4	4.75	100.0
#8	2.36	100.0
#10	2	100.0
#16	1.18	100.0
#30	0.6	100.0
#40	0.425	99.8
#50	0.3	94.6
#100	0.15	13.0
#200	0.075	4.7



Moisture Content 19.8 %

Remarks: Gravel 0.0 % Sand 95.3 %
Passing #200 Sieve (Silt & Clay) 4.7 %

Performed by: B. Bills

Reviewed by: Jeff Bruesewitz P.G.
GESTRA Engineering, Inc.

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Milwaukee, WI 53207
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Laboratory Test Results of Mechanical Analysis of Soil or Aggregate

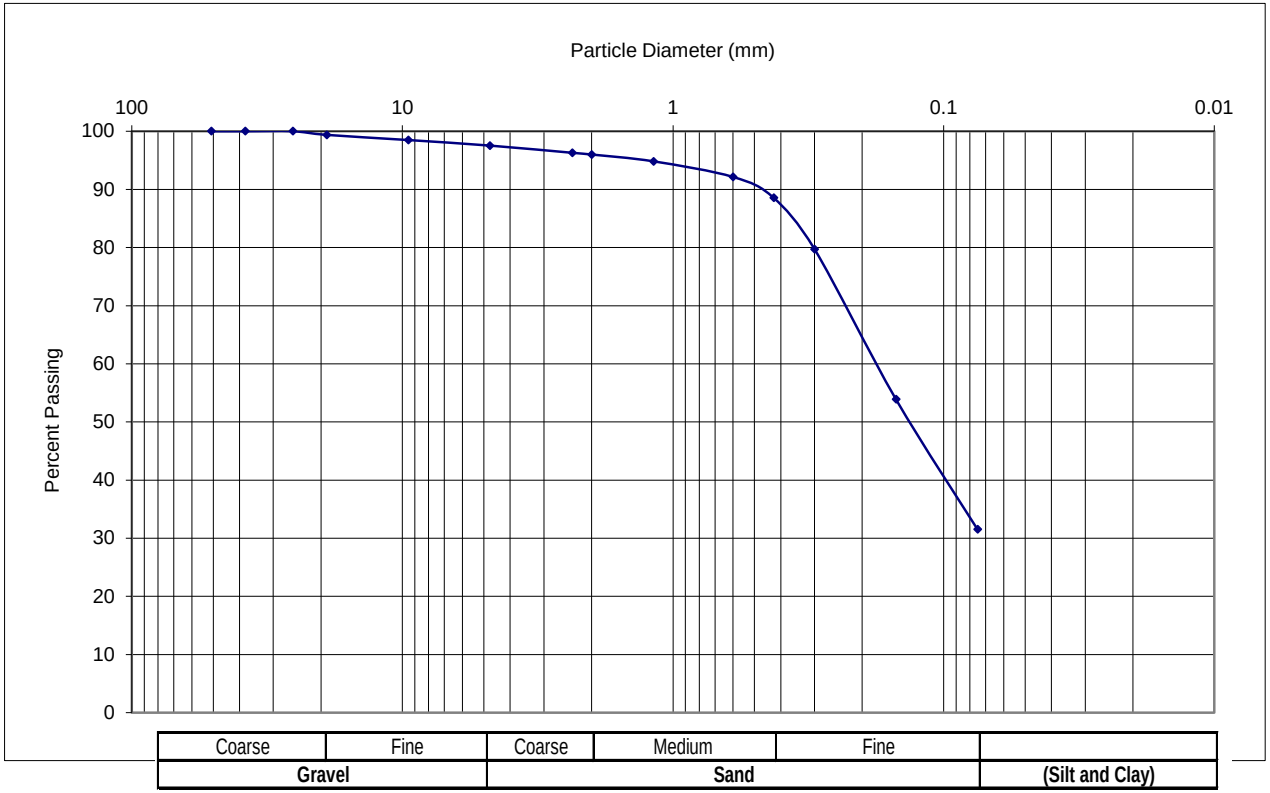
Project Name:	Manlove Field Litigation Support	Date:	January 4, 2019
Project Number:	18390-40	Reported To:	OBG
Project Location:	Champaign Co., IL		
ASTM Designation:	**C136, D422**		

Sample Information

Type of Sample:	Bag	Sample Number:	M-BH-2
Boring Number:		Depth of Sample:	60'-61'

Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2	50.8	100.0
1 1/2	38.1	100.0
1	25.4	100.0
3/4	19.05	99.4
3/8	9.525	98.5
#4	4.75	97.5
#8	2.36	96.3
#10	2	96.0
#16	1.18	94.8
#30	0.6	92.1
#40	0.425	88.6
#50	0.3	79.7
#100	0.15	53.9
#200	0.075	31.5



Moisture Content 4.1 %

Remarks: Gravel 2.5 % Sand 66.0 %
Passing #200 Sieve (Silt & Clay) 31.5 %

Performed by: B. Bills

Reviewed by: Jeff Bruesewitz P.G.
GESTRA Engineering, Inc.

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191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

Laboratory Test Results of Mechanical Analysis of Soil or Aggregate

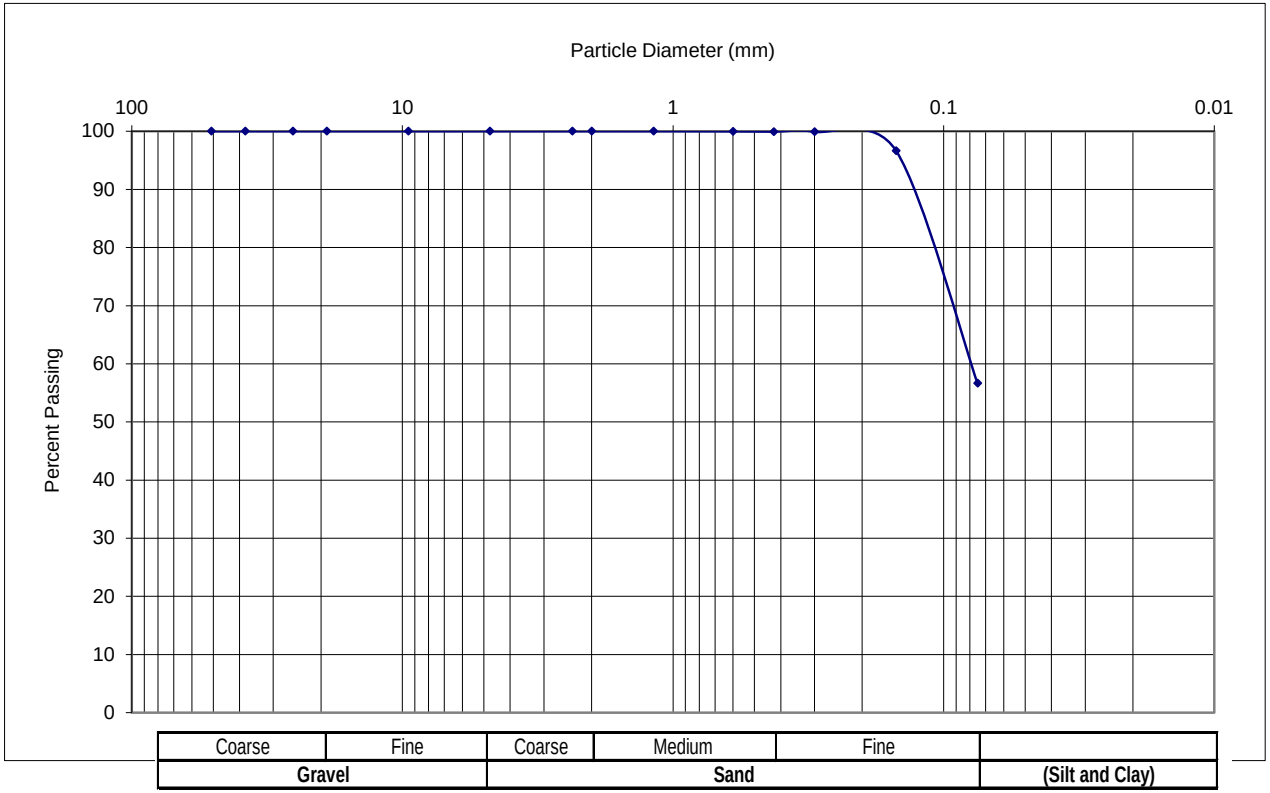
Project Name:	Manlove Field Litigation Support	Date:	January 4, 2019
Project Number:	18390-40	Reported To:	OBG
Project Location:	Champaign Co., IL		
ASTM Designation:	**C136, D422**		

Sample Information

Type of Sample:	Bag	Sample Number:	M-BH-2
Boring Number:		Depth of Sample:	151'-152'

Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2	50.8	100.0
1 1/2	38.1	100.0
1	25.4	100.0
3/4	19.05	100.0
3/8	9.525	100.0
#4	4.75	100.0
#8	2.36	100.0
#10	2	100.0
#16	1.18	100.0
#30	0.6	100.0
#40	0.425	99.9
#50	0.3	99.9
#100	0.15	96.7
#200	0.075	56.6



Moisture Content 21.3 %

Remarks: Gravel 0.0 % Sand 43.4 %
Passing #200 Sieve (Silt & Clay) 56.6 %

Performed by: B. Bills

Reviewed by: Jeff Bruesewitz P.G.
GESTRA Engineering, Inc.

GESTRA Engineering, Inc
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Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

Laboratory Test Results of Mechanical Analysis of Soil or Aggregate

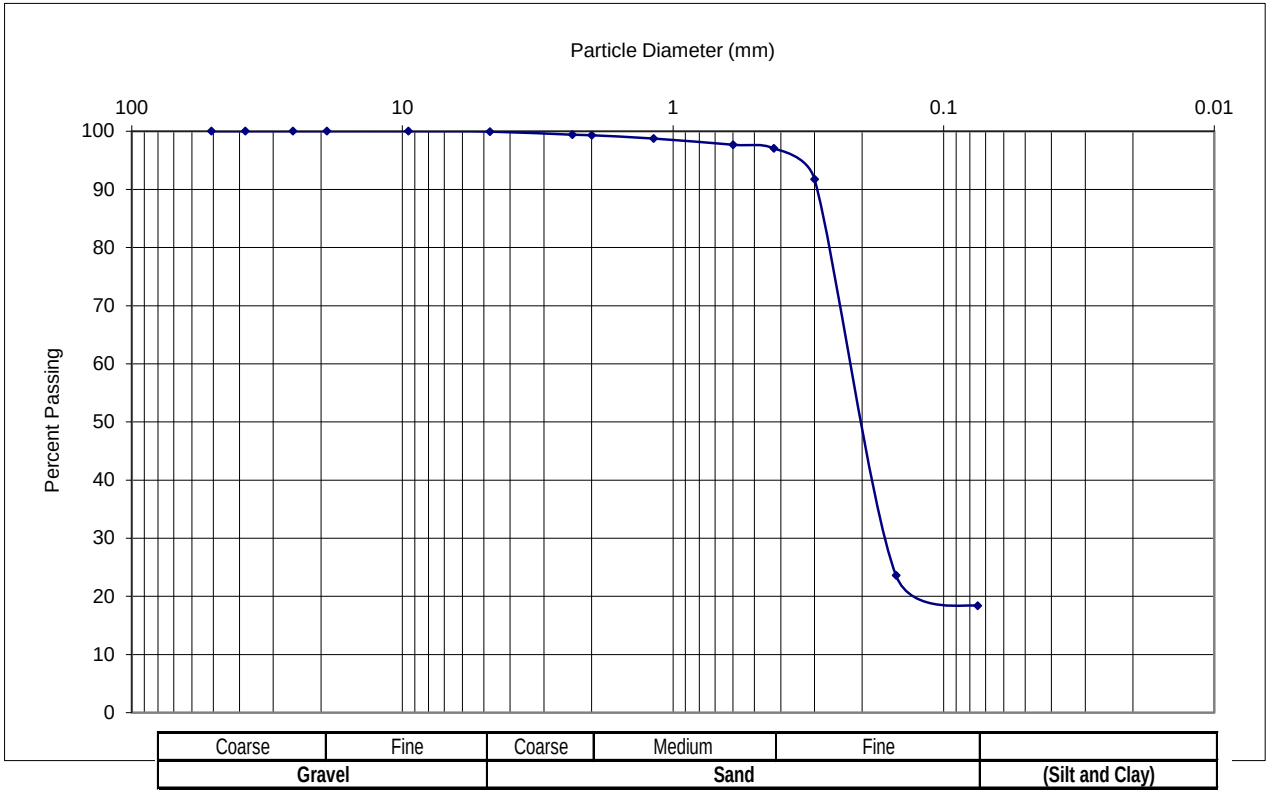
Project Name:	Manlove Field Litigation Support	Date:	January 4, 2019
Project Number:	18390-40	Reported To:	OBG
Project Location:	Champaign Co., IL		
ASTM Designation:	**C136, D422**		

Sample Information

Type of Sample:	Bag	Sample Number:	M-BH-2
Boring Number:		Depth of Sample:	240'-241'

Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2	50.8	100.0
1 1/2	38.1	100.0
1	25.4	100.0
3/4	19.05	100.0
3/8	9.525	100.0
#4	4.75	99.9
#8	2.36	99.4
#10	2	99.3
#16	1.18	98.7
#30	0.6	97.7
#40	0.425	97.1
#50	0.3	91.7
#100	0.15	23.6
#200	0.075	18.4



Moisture Content 10.4 %

Remarks: Gravel 0.1 % Sand 81.5 %
Passing #200 Sieve (Silt & Clay) 18.4 %

Performed by: B. Bills

Reviewed by: Jeff Bruesewitz P.G.
GESTRA Engineering, Inc.

GESTRA Engineering, Inc
191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

Laboratory Test Results of Mechanical Analysis of Soil or Aggregate

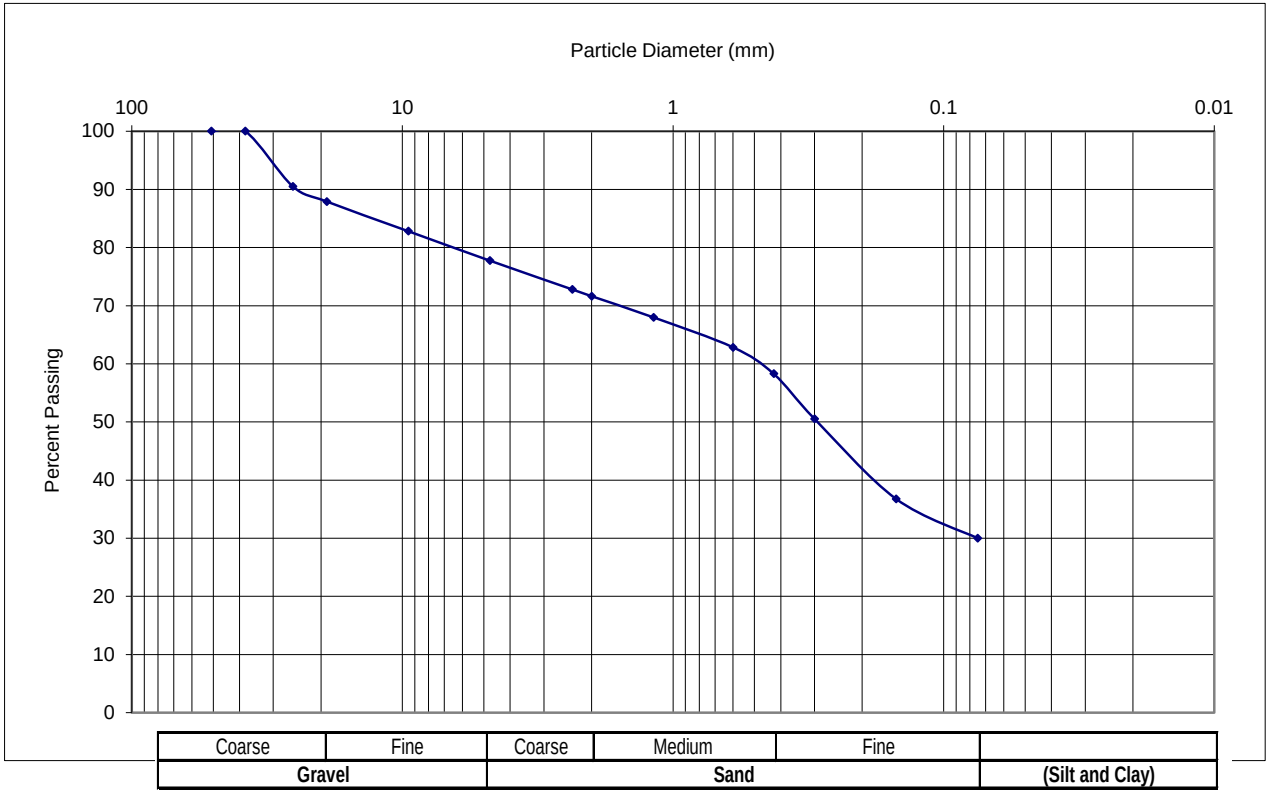
Project Name:	Manlove Field Litigation Support	Date:	January 2, 2019
Project Number:	18390-40	Reported To:	OBG
Project Location:	Champaign Co., IL		
ASTM Designation:	**C136, D422**		

Sample Information

Type of Sample:	Bag	Sample Number:	M-BH-3
Boring Number:		Depth of Sample:	51'-52'

Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2	50.8	100.0
1 1/2	38.1	100.0
1	25.4	90.5
3/4	19.05	87.9
3/8	9.525	82.8
#4	4.75	77.7
#8	2.36	72.8
#10	2	71.6
#16	1.18	68.0
#30	0.6	62.8
#40	0.425	58.3
#50	0.3	50.5
#100	0.15	36.8
#200	0.075	30.0



Moisture Content 6.6 %

Remarks: Gravel 22.3 % Sand 47.7 %
Passing #200 Sieve (Silt & Clay) 30.0 %

Performed by: B. Bills

Reviewed by: Jeff Bruesewitz P.G.
GESTRA Engineering, Inc.

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Milwaukee, WI 53207
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Laboratory Test Results of Mechanical Analysis of Soil or Aggregate

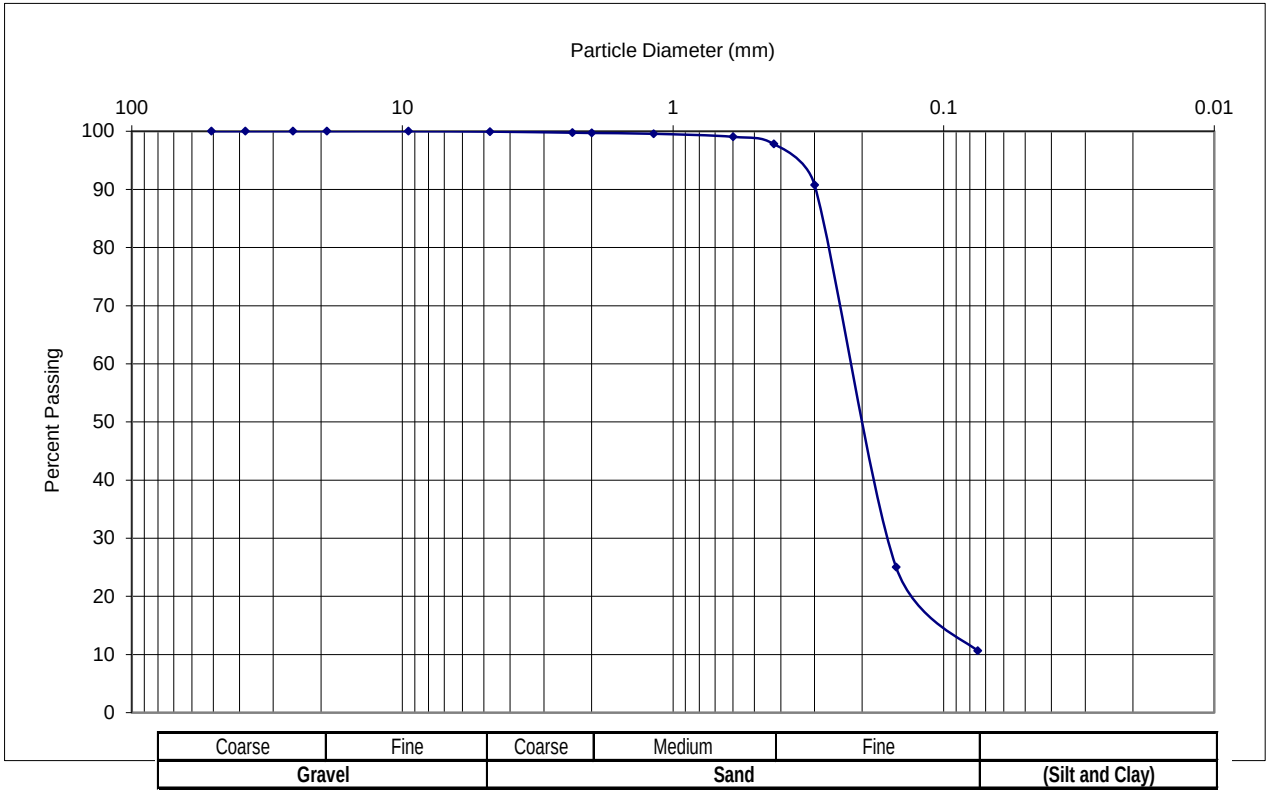
Project Name:	Manlove Field Litigation Support	Date:	January 4, 2019
Project Number:	18390-40	Reported To:	OBG
Project Location:	Champaign Co., IL		
ASTM Designation:	**C136, D422**		

Sample Information

Type of Sample:	Bag	Sample Number:	M-BH-3
Boring Number:		Depth of Sample:	103'-104'

Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2	50.8	100.0
1 1/2	38.1	100.0
1	25.4	100.0
3/4	19.05	100.0
3/8	9.525	100.0
#4	4.75	99.9
#8	2.36	99.7
#10	2	99.7
#16	1.18	99.6
#30	0.6	99.0
#40	0.425	97.8
#50	0.3	90.8
#100	0.15	25.1
#200	0.075	10.6



Moisture Content 17.0 %

Remarks: Gravel 0.1 % Sand 89.3 %
Passing #200 Sieve (Silt & Clay) 10.6 %

Performed by: B. Bills

Reviewed by: Jeff Bruesewitz P.G.
GESTRA Engineering, Inc.

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191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

Laboratory Test Results of Mechanical Analysis of Soil or Aggregate

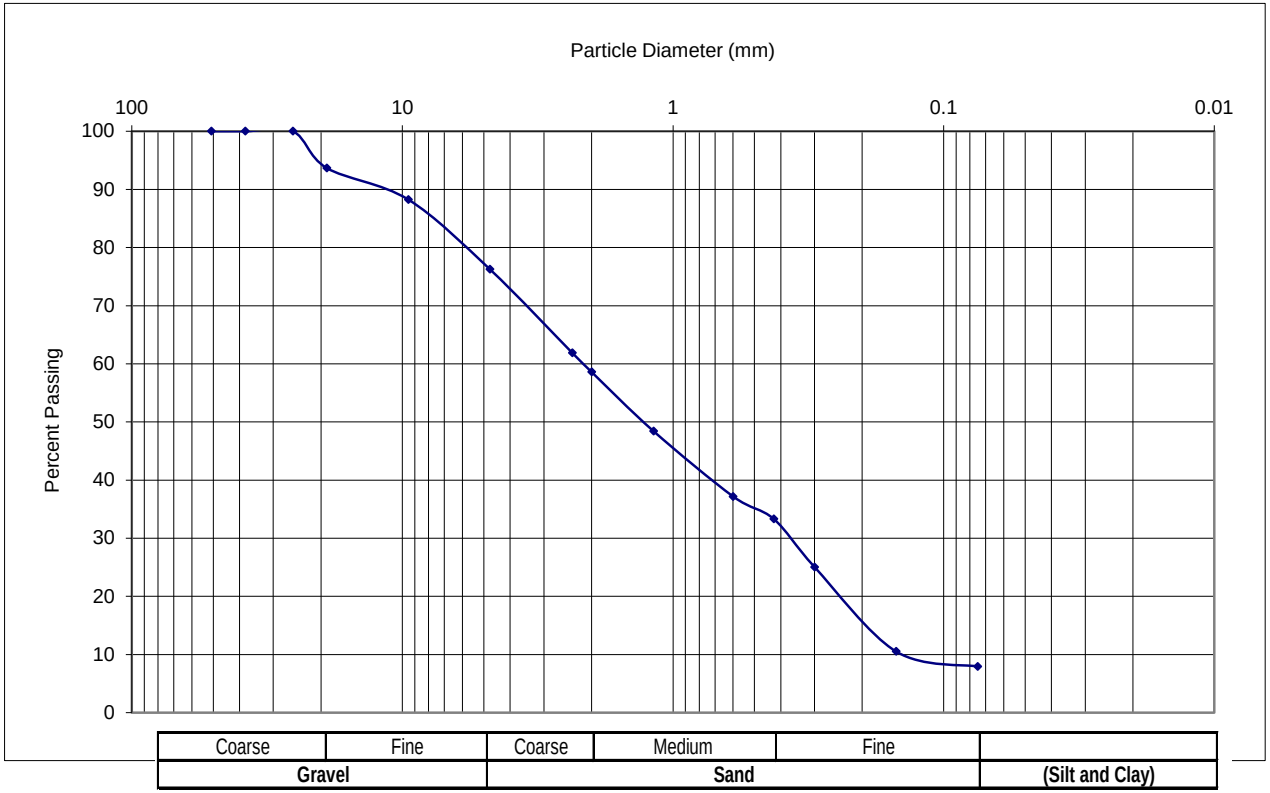
Project Name:	Manlove Field Litigation Support	Date:	January 2, 2019
Project Number:	18390-40	Reported To:	OBG
Project Location:	Champaign Co., IL		
ASTM Designation:	**C136, D422**		

Sample Information

Type of Sample:	Bag	Sample Number:	M-BH-3
Boring Number:		Depth of Sample:	202'-203'

Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2	50.8	100.0
1 1/2	38.1	100.0
1	25.4	100.0
3/4	19.05	93.7
3/8	9.525	88.3
#4	4.75	76.3
#8	2.36	61.9
#10	2	58.6
#16	1.18	48.4
#30	0.6	37.2
#40	0.425	33.3
#50	0.3	25.1
#100	0.15	10.5
#200	0.075	7.9



Moisture Content 8.2 %

Remarks: Gravel 23.7 % Sand 68.4 %
Passing #200 Sieve (Silt & Clay) 7.9 %

Performed by: B. Bills

Reviewed by: Jeff Bruesewitz P.G.
GESTRA Engineering, Inc.

GESTRA Engineering, Inc
191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

Laboratory Test Results of Mechanical Analysis of Soil or Aggregate

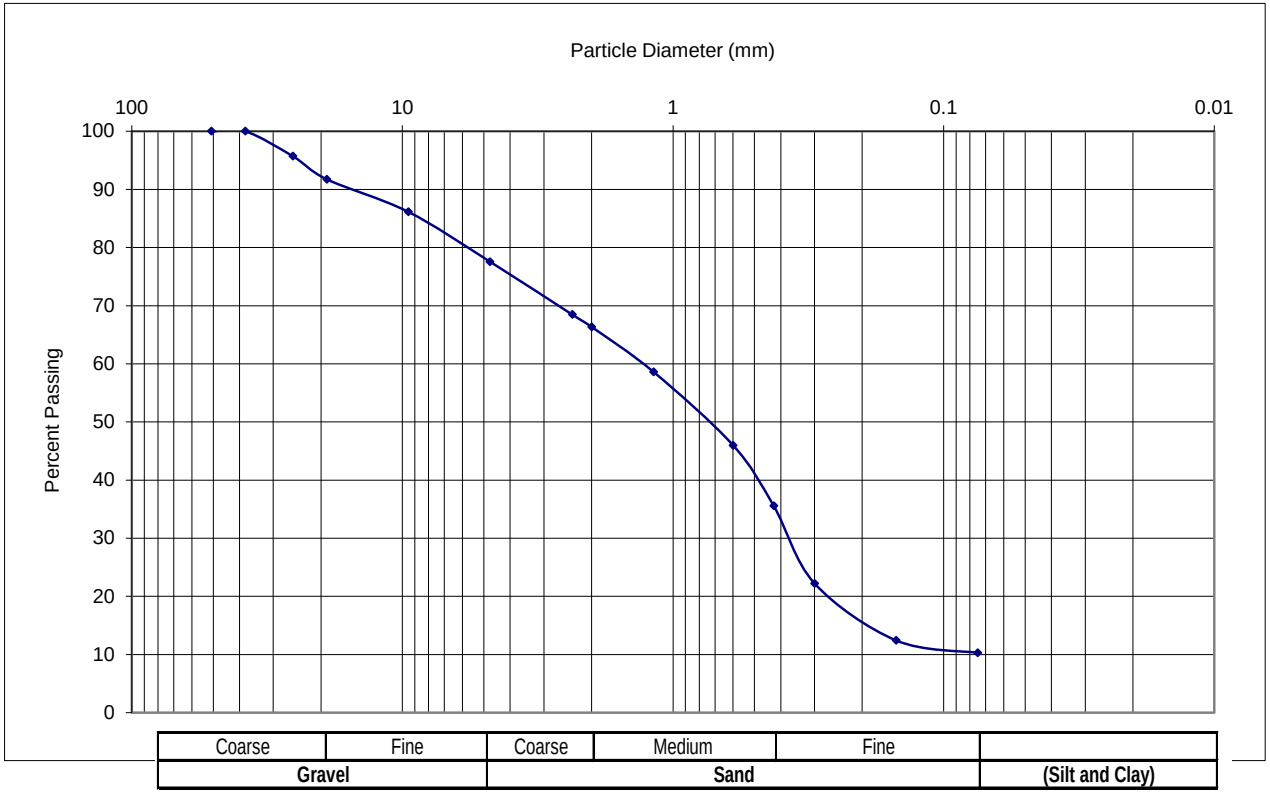
Project Name:	Manlove Field Litigation Support	Date:	December 28, 2018
Project Number:	18390-40	Reported To:	OBG
Project Location:	Champaign Co., IL		
ASTM Designation:	**C136, D422**		

Sample Information

Type of Sample:	Bag	Sample Number:	MBH-4
Boring Number:		Depth of Sample:	55'-56'

Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2	50.8	100.0
1 1/2	38.1	100.0
1	25.4	95.7
3/4	19.05	91.7
3/8	9.525	86.2
#4	4.75	77.6
#8	2.36	68.5
#10	2	66.3
#16	1.18	58.6
#30	0.6	46.0
#40	0.425	35.6
#50	0.3	22.2
#100	0.15	12.4
#200	0.075	10.3



Moisture Content 6.3 %

Remarks: Gravel 22.4 % Sand 67.3 %
Passing #200 Sieve (Silt & Clay) 10.3 %

Performed by: B. Bills

Reviewed by: Jeff Bruesewitz P.G.
GESTRA Engineering, Inc.

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191 W. Edgerton Ave
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Laboratory Test Results of Mechanical Analysis of Soil or Aggregate

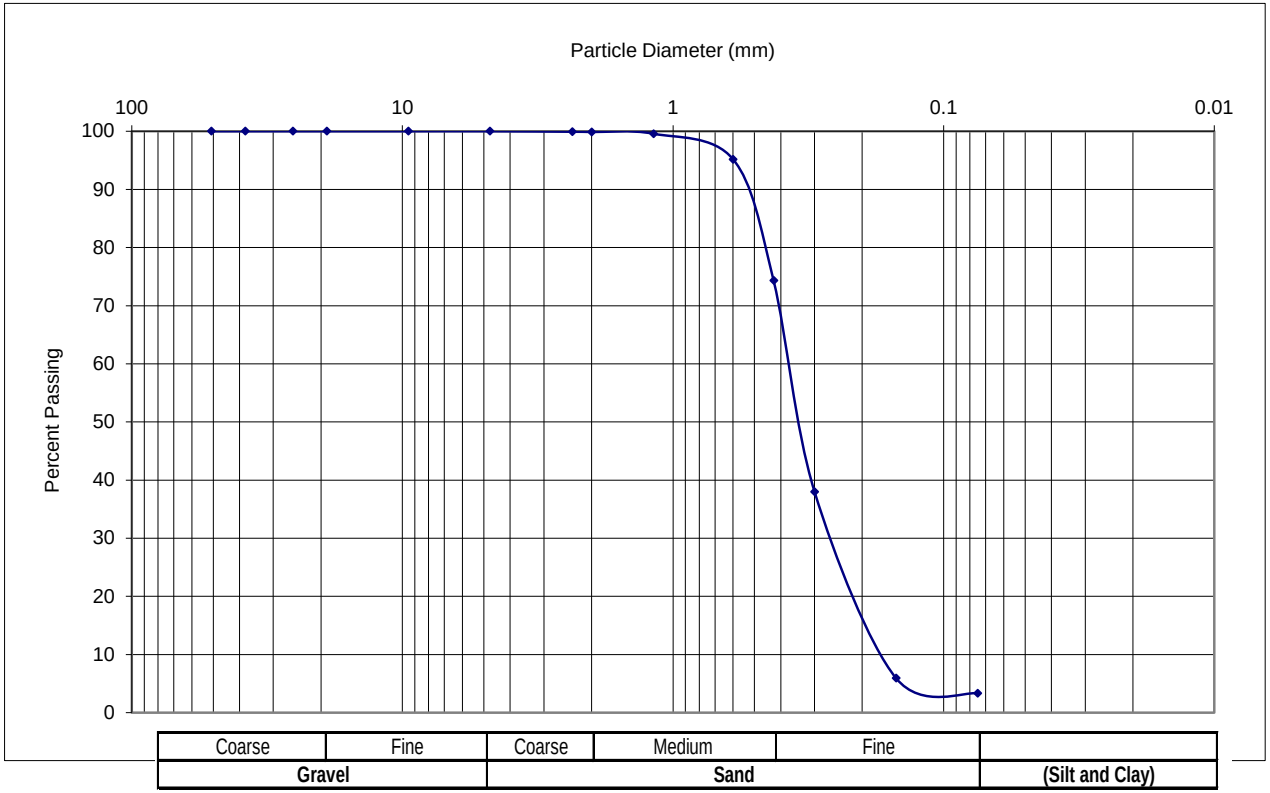
Project Name:	Manlove Field Litigation Support	Date:	December 26, 2018
Project Number:	18390-40	Reported To:	OBG
Project Location:	Champaign Co., IL		
ASTM Designation:	**C136, D422**		

Sample Information

Type of Sample:	Bag	Sample Number:	M-BH-4
Boring Number:		Depth of Sample:	204'-2050'

Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2	50.8	100.0
1 1/2	38.1	100.0
1	25.4	100.0
3/4	19.05	100.0
3/8	9.525	100.0
#4	4.75	100.0
#8	2.36	99.9
#10	2	99.9
#16	1.18	99.6
#30	0.6	95.2
#40	0.425	74.3
#50	0.3	38.0
#100	0.15	5.9
#200	0.075	3.3



Moisture Content 18.3 %

Remarks: Gravel 0.0 % Sand 96.7 %
Passing #200 Sieve (Silt & Clay) 3.3 %

Performed by: B. Bills

Reviewed by: Jeff Bruesewitz P.G.
GESTRA Engineering, Inc.

GESTRA Engineering, Inc
191 W. Edgerton Ave
Milwaukee, WI 53207
Phone: (414) 933-7444; Fax: (414) 933-7844

Laboratory Test Results of
Mechanical Analysis & Hydrometer of Soil or Aggregate

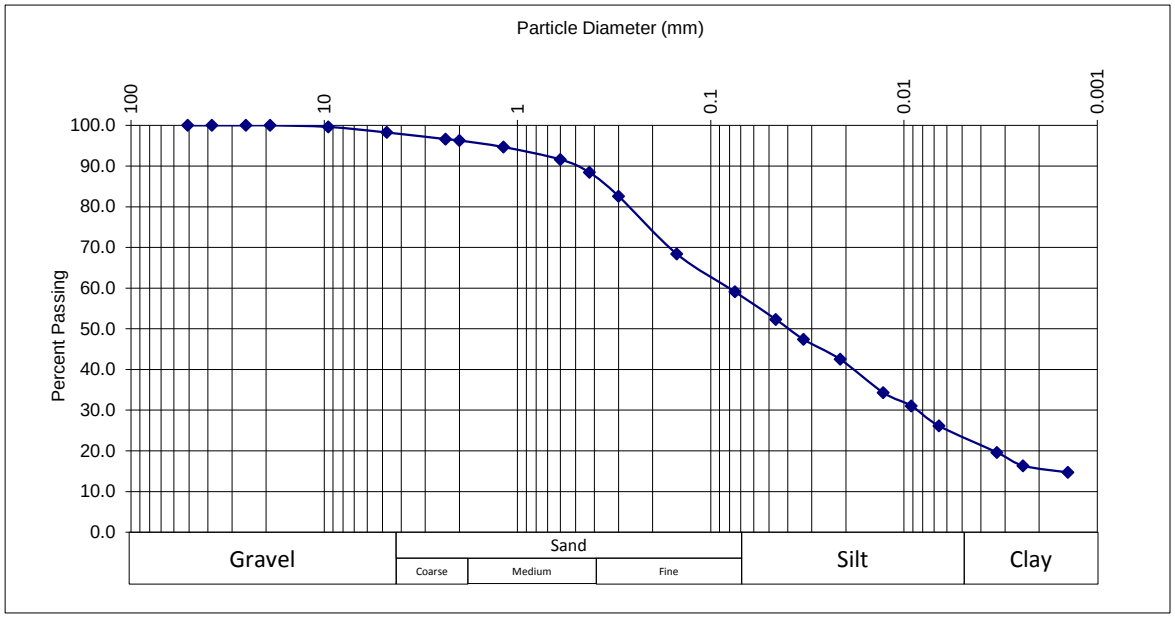
Project Name:	Manlove Field Litigation Support	Date:	January 2, 2019
Project Number:	1839-40	Reported To:	OBG
Project Location:	Champaign Co., IL		
ASTM Designation:	**D422**		

Sample Information

Type of Sample:	Bag	Sample Number:	MBH-4
Boring Number:	0	Depth of Sample:	67.5'-68.5'

Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2 in.	50.800	100
1 1/2 in.	38.100	100
1 in.	25.400	100
3/4 in.	19.050	100
3/8 in.	9.525	99.6
#4	4.750	98.3
#8	2.360	96.6
#10	2.000	96.3
#16	1.180	94.7
#30	0.600	91.6
#40	0.425	88.4
#50	0.300	82.6
#100	0.150	68.4
#200	0.075	59.1



Graph of size distrubution based on AASHTO Classification

Remarks:						
	Gravel	1.7	%	Sand	39.2	%
	Fines	59.1	%			

Reviewed by: Jeff Bruesewitz P.G.
GESTRA Engineering, Inc.

Performed by: B. Bills

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Laboratory Test Results of
Mechanical Analysis & Hydrometer of Soil or Aggregate

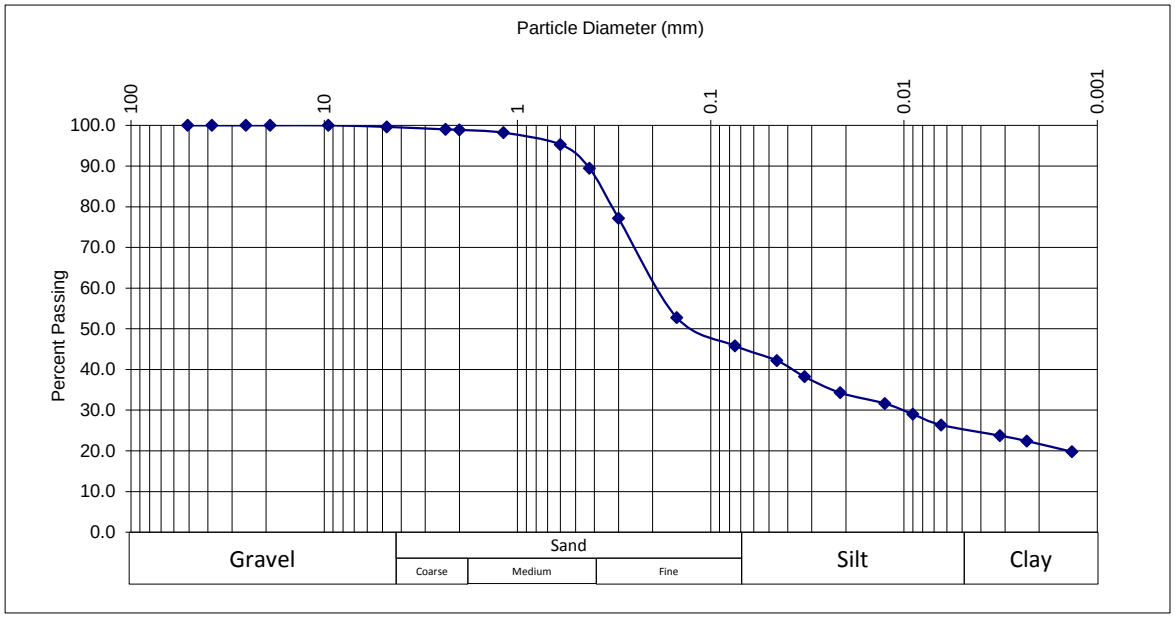
Project Name:	Manlove Field Litigation Support	Date:	January 2, 2019
Project Number:	18390-40	Reported To:	OBG
Project Location:	Champaign Co., IL		
ASTM Designation:	**D422**		

Sample Information

Type of Sample:	Bag	Sample Number:	M-BH-4
Boring Number:		Depth of Sample:	88.5'-89.5'

Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2 in.	50.800	100
1 1/2 in.	38.100	100
1 in.	25.400	100
3/4 in.	19.050	100
3/8 in.	9.525	100.0
#4	4.750	99.6
#8	2.360	99.0
#10	2.000	98.9
#16	1.180	98.2
#30	0.600	95.3
#40	0.425	89.5
#50	0.300	77.1
#100	0.150	52.8
#200	0.075	45.8



Graph of size distrubution based on AASHTO Classification

Remarks:						
	Gravel	0.4	%	Sand	53.8	%
	Fines	45.8	%			

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Performed by: B. Bills

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Laboratory Test Results of
Mechanical Analysis & Hydrometer of Soil or Aggregate

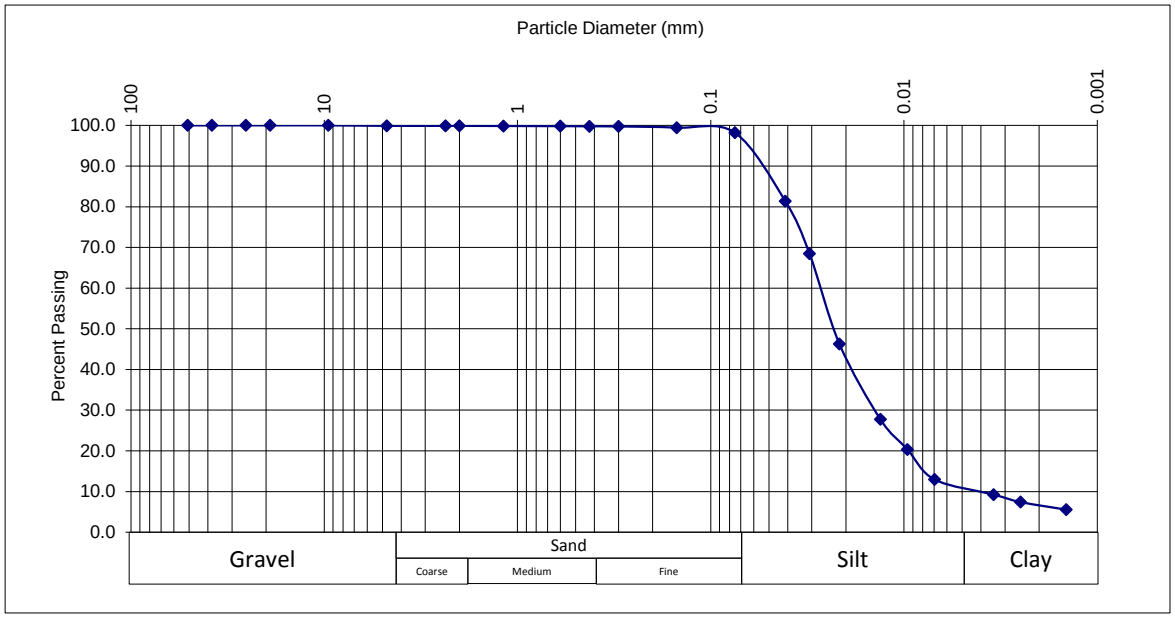
Project Name:	Manlove Field Litigation Support	Date:	January 2, 2019
Project Number:	18390-40	Reported To:	OBG
Project Location:	Champaign Co., IL		
ASTM Designation:	**D422**		

Sample Information

Type of Sample:	Bag	Sample Number:	M-BH-4
Boring Number:		Depth of Sample:	171'-172'

Mechanical Analysis Data

Sieve	Sieve Opening (mm)	Percent Passing (%)
2 in.	50.800	100
1 1/2 in.	38.100	100
1 in.	25.400	100
3/4 in.	19.050	100
3/8 in.	9.525	100.0
#4	4.750	99.9
#8	2.360	99.9
#10	2.000	99.9
#16	1.180	99.8
#30	0.600	99.8
#40	0.425	99.8
#50	0.300	99.7
#100	0.150	99.4
#200	0.075	98.2



Graph of size distrubution based on AASHTO Classification

Remarks:						
	Gravel	0.1	%	Sand	1.7	%
	Fines	98.2	%			

Reviewed by: Jeff Bruesewitz P.G.
GESTRA Engineering, Inc.

Performed by: B. Bills

Appendix E: Drillers Logs for Water Supply and Monitoring Wells Used in 3D Visualization

Stratigraphic Units in Drillers Logs

USCS	Description
BR	Bedrock
Fill	Fill
CL	Clay of low plasticity
CH	Clay of high plasticity
CL-ML	Clay with silt
CL-SM	Clay with silty sand
OL	Organic silt
OH	Organic clay
OH-SP	Organic clay with poorly graded sand
ML	Silt
SC	Clayey sand
GC	Clayey gravel
SP	Poorly graded sand
SM	Silty sand
SW	Well-graded and, fine to coarse sand
SP-SM	Poorly graded sand with silty sand
GP	Poorly graded gravel
NR	No recovery

Notes:

1) USCS = Unified Soil Classification System

API Well Number:
120192184500

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	2	Fill	Fill
2	106	CL	Low
106	116	SP	High
116	155	CL	Low
155	206	SP	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192210700

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	2	Fill	Fill
2	80	CL	Low
80	101	SP	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192229000

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	2	Fill	Fill
2	54	CL	Low
54	64	GP	High
64	69	CL	Low
69	72	SP	High
72	76	CL	Low
76	135	SW	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192312400

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	2	Fill	Fill
2	70	CL	Low
70	91	SP	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192366200

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	2	Fill	Fill
2	96	CL	Low
96	114	SP	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192412300

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	1	Fill	Fill
1	19	CL	Low
19	23	SW	High
23	44	CL	Low
44	54	SW	High
54	116	CL	Low
116	161	SC	Low
161	165	SW	High
165	199	SC	Low
199	210	SW	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192450700

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	2	Fill	Fill
2	11	CL	Low
11	145	CL	Low
145	164	SP	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192457000

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	2	Fill	Fill
2	70	CL	Low
70	96	SP	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192484900

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	3	Fill	Fill
3	44	CL	Low
44	51	SP	High
51	68	CL	Low
68	72	SP	High
72	106	CL	Low
106	110	SW	High
110	158	CL	Low
158	210	SC	Low
210	222	SW	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192492600

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	2	Fill	Fill
2	22	CL	Low
22	28	SC	Low
28	78	CL	Low
78	104	SC	Low
104	116	CL	Low
116	150	SP	High
150	158	SC	Low
158	190	SP	High
190	198	SC	Low
198	218	SP	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192541500

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	2	Fill	Fill
2	75	CL	Low
75	105	SP	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192579700

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	2	Fill	Fill
2	18	CL	Low
18	23	SP	High
23	80	CL	Low
80	107	SP	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192581800

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	75	CL	Low
75	105	SP	High
105	145	CL	Low
145	185	SP	High
185	200	SW	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192598300

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	4	Fill	Fill
4	45	CL	Low
45	61	SP	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192600600

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	1	Fill	Fill
1	11	SP	High
11	186	CL	Low
186	205	SP	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192613600

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	90	CL	Low
90	92	SP	High
92	170	CL	Low
170	195	SP	High
195	205	SW	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192626900

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	4	Fill	Fill
4	70	CL	Low
70	101	SP	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192633400

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	14	CL	Low
14	99	SP	High
99	111	CL	Low
111	201	SP	High
201	220	NR	Not Applicable

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192636900

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	4	Fill	Fill
4	210	CL	Low
210	291	SP	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192700100

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	4	CL	Low
4	7	GP	High
7	38	CL	Low
38	100	GP	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192769000

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	98	CL	Low
98	103	GP	High
103	175	CL	Low
175	198	SP	High
198	204	GP	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192773900

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	30	CL	Low
30	150	SP	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192774000

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	96	CL	Low
96	105	GC	Low
105	185	CL	Low
185	198	SW	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192780400

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	35	CL	Low
35	55	GP	High
55	70	CL	Low
70	99	SW	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

API Well Number:
120192781800

Top Depth (ft bgs)	Bottom Depth (ft bgs)	USCS	Transmissivity Classification
0	35	CL	Low
35	55	GP	High
55	95	CL	Low
95	128	GP	High
128	135	GC	Low
135	195	CL	Low
195	206	GP	High
206	216	CL	Low
216	225	GP	High

Source: Illinois Water Well (ILWATER) Database
http://isgs.illinois.edu/ilwater

Appendix F: Molecular and Isotopic Gas Data

APPENDIX F
MOLECULAR AND ISOTOPIC GAS DATA
Groundwater Management Zone
Manlove Gas Storage Field

Location ID	Sample Date	Sample ID	X_coord	Y_coord	Final Classification (Based on Consideration of Notes)	Other Thermogenic Gas Source (1960's)	Methane MOL %	Methane cc/L	Methane mg/L	Ethane MOL %	Ethane cc/L	Ethane mg/L	Ethene MOL %	Propane MOL %	Propane cc/L	Propane mg/L	Propene MOL %
[redacted]	10/11/2017	101117[redacted]	382789	4458185	Unknown Source		0.456	0.14	0.097	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	10/17/2017	101717[redacted]	387134	4462772	Predominantly Microbial		21.23	7.5	5	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	11/3/2017	110317[redacted]	384406.6984	4453795.653	Unknown Source		0.0154	0.0051	0.0034	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	10/10/2017	101017[redacted]	381827	4458219	Unknown Source		0.002	0.00071	0.00047	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	3/11/2019	031119[redacted]	381827	4458219	Unknown Source		0.0015	0.0004	0.0003	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	6/25/2018	062518[redacted]	377057.4298	4458839.75	Predominantly Microbial		25.95	11	7.5	0.0007	0.00033	0.00041	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	10/11/2017	101117[redacted]	381203	4458419	Minor Thermogenic Component		2.87	0.81	0.54	0.0043	0.0013	0.0017	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	3/11/2019	031119[redacted]	381203	4458419	Minor Thermogenic Component		3.09	0.9	0.6	0.0062	0.002	0.0024	<0.0001	0.0019	0.00057	0.001	<0.0001
[redacted]	1/10/2017	Container #4	378994	4459457	Unknown Source		0.001	--	--	<0.0001	--	--	<0.0001	<0.0001	--	--	<0.0001
[redacted]	6/28/2017	062817[redacted]	378994	4459457	Predominantly Microbial		4.21	2	1.3	<0.0001	<0.0001	<0.0002	<0.0001	0.0006	0.00027	0.0005	<0.0001
[redacted]	11/3/2017	110317[redacted]	383443.9923	4455054.223	Unknown Source		0.143	0.045	0.03	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	10/12/2017	101217[redacted]	381321	4461559	Predominantly Microbial		1.77	0.56	0.38	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	1/31/2018	013118K[redacted]	379445.1528	4456713.623	Thermogenic	Other	2.02	0.64	0.43	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	10/17/2017	101717[redacted]	382737	4455261	Unknown Source		0.0358	0.011	0.0075	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	10/17/2017	101717[redacted]	382573	4455392	Unknown Source		0.112	0.035	0.023	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	5/30/2019	053019[redacted]	--	--	Thermogenic	Other	24.6	10	6.9	0.141	0.064	0.08	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	10/30/2017	103017[redacted]	381768	4457793	Unknown Source		0.1	0.042	0.028	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	3/14/2019	031419[redacted]	381768	4457793	Predominantly Microbial		1.52	0.69	0.46	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	2/14/2017	21417	381704	4458451	Thermogenic		39.43	--	--	0.602	--	--	<0.0001	0.0621	--	--	<0.0001
[redacted]	4/10/2018	4A	381704	4458451	Thermogenic		16.43	5.9	4	0.344	0.13	0.17	<0.0001	0.0159	0.0059	0.011	<0.0001
[redacted]	4/10/2018	4B	381704	4458451	Thermogenic		10.65	3.5	2.3	0.247	0.088	0.11	<0.0001	0.0165	0.0056	0.01	<0.0001
[redacted]	4/5/2018	040518[redacted]	382796.5689	4455017.958	Unknown Source		0.136	0.043	0.029	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001
[redacted]	10/10/2017	101017[redacted]	381836	4458392	Unknown Source		0.003	0.00084	0.00056	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	3/11/2019	031119[redacted]	381836	4458392	Unknown Source		0.0728	0.021	0.014	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]y	10/25/2017	102517[redacted]	382971	4458292	Predominantly Microbial		1.19	0.34	0.23	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	10/11/2017	101117[redacted]	381895	4457615	Predominantly Microbial		5.69	1.8	1.2	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001
[redacted]	3/15/2017	031517[redacted]	381921	4458215	Thermogenic		14.95	7.4	5	0.293	0.16	0.2	<0.0001	0.0128	0.0064	0.012	<0.0001
[redacted]	7/12/2017	071217[redacted]	381921	4458215	Thermogenic		36.31	17	11	0.0983	0.049	0.061	<0.0001	0.0013	0.00059	0.0011	<0.0001
[redacted]	8/8/2017	080817[redacted]	381921	4458215	Thermogenic		73.74	93	62	1.97	2.7	3.4	<0.0001	0.0711	0.091	0.17	<0.0001
[redacted]	4/10/2018	2A	381921	4458215	Thermogenic		82.83	110	75	2.39	3.6	4.5	<0.0001	0.114	0.16	0.29	<0.0001
[redacted]	4/10/2018	2B	381921	4458215	Thermogenic		50.04	24	16	1.91	0.98	1.2	<0.0001	0.0915	0.044	0.082	<0.0001
[redacted]	3/27/2019	A After	381921	4458215	Thermogenic		39.06	17	11	1.42	0.67	0.84	<0.0001	0.1	0.044	0.082	<0.0001
[redacted]	3/27/2019	A Before	381921	4458215	Thermogenic		83.84	120	77	2.41	3.6	4.5	<0.0001	0.164	0.23	0.42	<0.0001
[redacted]	1/4/2018	010418[redacted]	378485.6565	4452412.066	Unknown Source		0.457	0.11	0.075	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001
Fisher, Village of	10/20/2017	102017VF-40038	--	--	Unknown Source		0.0928	0.028	0.019	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
Fisher, Village of, 40039	10/20/2017	102017VF-40039	--	--	Unknown Source		0.0777	0.023	0.016	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
Fisher, Village of, Transfer Pump	10/20/2017	102017VF-TP	--	--	Unknown Source		0.0104	0.0027	0.0018	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001
[redacted]	3/11/2019	031119[redacted]	382374.8055	4456349.795	Thermogenic		0.0081	0.0028	0.0019	0.0009	0.00033	0.00042	<0.0001	0.0014	0.00047	0.00087	<0.0001
[redacted]	12/19/2016	[redacted] House	381570	4459988	Thermogenic		59.72	--	--	1.86	--	--	<0.0001	0.0798	--	--	<0.0001
[redacted]	2/20/2017	22017	381570	4459988	Predominantly Microbial		8.57	15	9.7	<0.0001	<0.0002	<0.0002	<0.0001	0.0002	0.00035	0.00064	<0.0001
[redacted]	3/21/2017	032117[redacted]	381570	4459988	Thermogenic		51.73	130	84	1.68	4.3	5.3	<0.0001	0.0811	0.2	0.36	<0.0001
[redacted]	6/15/2017	061517[redacted]	381570	4459988	Thermogenic		89.38	130	85	2.88	4.4	5.5	<0.0001	0.145	0.21	0.38	<0.0001
[redacted]	4/10/2018	3A	381570	4459988	Thermogenic		87.95	140	92	1.75	3	3.7	<0.0001	0.0472	0.076	0.14	<0.0001
[redacted]	4/10/2018	3B	381570	4459988	Thermogenic		39.13	17	11	1.04	0.48	0.6	<0.0001	0.0274	0.012	0.022	<0.0001
[redacted]	8/28/2017	082817[redacted]	375819.9365	4461527.773	Predominantly Microbial		42.53	21	14	0.0003	0.0002	0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	10/25/2017	102517[redacted]	380821	4467847	Predominantly Microbial		23.44	8.8	5.9	0.0012	0.00049	0.00061	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	10/11/2017	101117[redacted]	381110	4457623	Predominantly Microbial		6.6	2.3	1.6	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001

Notes:
1) *Natural gas stored in Manlove Field.
2) Samples analyzed at Isotech Laboratories, Champaign Illinois.
3) < = Compound not detected at the Method Detection Limit (MDL).
4) -- = No data.
5) Unknown Source = Levels of methane and other hydrocarbons too low to distinguish microbial vs. thermogenic gas.

APPENDIX F
MOLECULAR AND ISOTOPIC GAS DATA
Groundwater Management Zone
Manlove Gas Storage Field

							Methane	Methane	Methane	Ethane	Ethane	Ethane	Ethene	Propane	Propane	Propane	Propene
Location ID	**Sample Date**	**Sample ID**	**X_coord**	**Y_coord**	**Final Classification (Based on Consideration of Notes)**	**Other Thermogenic Gas Source (1960's)**	**MOL %**	**cc/L**	**mg/L**	**MOL %**	**cc/L**	**mg/L**	**MOL %**	**MOL %**	**cc/L**	**mg/L**	**MOL %**
[redacted]	10/11/2017	101117[redacted]	382270	4459968	Predominantly Microbial		1.18	0.34	0.23	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	10/24/2017	102417[redacted]	382786	4458245	Unknown Source		0.274	0.084	0.056	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	10/12/2017	101217[redacted]	380601	4457875	Predominantly Microbial		10.14	3.5	2.3	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	11/22/2017	112217[redacted]	383570.09	4457537.879	Unknown Source		0.3	0.091	0.061	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	11/20/2017	112017[redacted]	383489.0233	4461186.278	Unknown Source		0.181	0.059	0.039	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	10/24/2017	102417[redacted]	380554	4459957	Minor Thermogenic Component		10.61	3.8	2.5	0.049	0.019	0.024	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	11/16/2017	111617[redacted]	382298.9463	4456074.586	Unknown Source		0.0524	0.018	0.012	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	1/5/2018	010518[redacted]	378957.0782	4456511.013	Thermogenic	Other	34.08	14	9.5	0.346	0.16	0.2	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	11/17/2017	111717[redacted]	382346.783	4456204.253	Unknown Source		0.0447	0.014	0.0094	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	11/2/2017	110217[redacted]	378191	4455190	Thermogenic	Other	18.25	6.4	4.2	1.74	0.66	0.82	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
E[redacted]	11/29/2017	[redacted]	379877.7845	4459195.638	Thermogenic		93.75	--	--	4.02	--	--	<0.0001	0.928	--	--	0.0004
[redacted]	10/17/2017	101717[redacted]	381816	4457653	Predominantly Microbial		7.21	2.5	1.7	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	8/28/2017	082817[redacted]	376936	4455146	Minor Thermogenic Component	Other	18.31	6.6	4.4	0.0164	0.0063	0.0079	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	11/17/2017	111717[redacted]	381986.5047	4456836.033	Unknown Source		0.23	0.082	0.055	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	3/15/2017	031517[redacted]	381905	4458377	Thermogenic		54.47	87	58	2.07	3.6	4.5	<0.0001	0.0334	0.055	0.1	<0.0001
[redacted]	3/27/2019	B After	381905	4458377	Thermogenic		51.35	24	16	2.17	1.1	1.4	<0.0001	0.0959	0.046	0.085	<0.0001
[redacted]	3/27/2019	B Before	381905	4458377	Thermogenic		83.94	84	56	3.05	3.3	4.1	<0.0001	0.131	0.13	0.24	<0.0001
[redacted]	10/23/2017	102317[redacted]	367248	4446214	Predominantly Microbial		86.44	90	60	0.0008	0.00089	0.0011	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	1/24/2019	012419[redacted]	376407.9043	4464207.514	Predominantly Microbial		59.82	40	27	0.0013	0.00092	0.0012	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	10/12/2017	101217[redacted]	381511	4457577	Predominantly Microbial		5.92	2.5	1.7	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	12/21/2017	122117[redacted]	378430.3725	4455114.655	Thermogenic	Other	32.51	14	9.5	1.58	0.75	0.94	<0.0001	0.0072	0.0032	0.0058	<0.0001
[redacted]	4/26/2017	042617[redacted]	382013	4458341	Unknown Source		0.0024	0.0012	0.0008	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	10/30/2017	103017[redacted]	382013	4458341	Thermogenic		5.27	1.7	1.1	0.0785	0.028	0.035	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	4/4/2019	040419[redacted]	382013	4458341	Thermogenic		12.03	4.3	2.9	0.341	0.13	0.16	<0.0001	0.0032	0.0011	0.0021	<0.0001
[redacted]	11/2/2017	110217[redacted]	377998	4455194	Thermogenic	Other	47.4	26	17	1.57	0.93	1.2	<0.0001	0.0057	0.0032	0.0059	<0.0001
[redacted]	12/20/2017	122017[redacted]	374501.7657	4455148.134	Predominantly Microbial		61.49	44	29	0.0011	0.00086	0.0011	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	6/25/2018	062518[redacted]	377403.4391	4459832.721	Predominantly Microbial		18.51	7.4	4.9	0.0004	0.0002	0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	10/17/2017	101717[redacted]	379488	4461732	Predominantly Microbial		6.49	2.2	1.4	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	10/17/2017	101717[redacted]	370823	4457652	Minor Thermogenic Component	Other	4.37	1.5	0.99	0.016	0.0059	0.0073	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
Mahomet, Village of, 6" Raw Water Line Port	10/16/2017	101617 VM Pre	381609.4117	4457937.901	Unknown Source		0.0951	0.028	0.019	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
Mahomet, Village of, 6" Raw Water Line Port	3/11/2019	031119VMpre	381609.4117	4457937.901	Unknown Source		0.0985	0.028	0.019	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
Mahomet, Village of, Faucet in Shop	10/16/2017	101617 VM Post	381601.7114	4457768.495	Unknown Source		0.0038	0.00096	0.00064	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
Mahomet, Village of, Faucet in Shop	3/11/2019	031119VMpost	381601.7114	4457768.495	Unknown Source		0.0057	0.0014	0.00094	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	12/8/2017	120817[redacted]	377970.0633	4449710.923	Unknown Source		0.21	0.027	0.018	0.001	0.0001	0.0002	<0.0001	0.001	0.0001	0.0002	<0.0001
[redacted]	10/12/2017	101217[redacted]	378206	4458361	Predominantly Microbial		18.16	6.7	4.5	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	11/2/2017	110217[redacted]	384162.4251	4455479.743	Unknown Source		0.133	0.041	0.027	0.0005	0.0002	0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]f	10/26/2017	102617[redacted]	380075	4466410	Predominantly Microbial		37.11	18	12	0.001	0.0005	0.00063	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[1] McCord #2	11/29/2017	McCord #2	381865.0259	445467.8011	Thermogenic		94.18	--	--	3.37	--	--	<0.0001	0.27	--	--	<0.0001
[redacted]	10/11/2017	101117[redacted]	381352	4457926	Unknown Source		0.0149	0.0044	0.003	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	3/11/2019	031119[redacted]	381352	4457926	Unknown Source		0.0175	0.005	0.0033	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	10/12/2017	101217[redacted]	381697	4457618	Unknown Source		0.0371	0.011	0.0072	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	11/17/2017	111717[redacted]	382272.9799	4456606.584	Unknown Source		0.0039	0.0013	0.00084	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	1/3/2018	010318[redacted]	382115.0482	4462848.64	Predominantly Microbial		12.52	4.3	2.9	0.0004	0.0002	0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	11/3/2017	110317[redacted]	397980.5969	4467913.838	Predominantly Microbial		74.89	87	58	0.001	0.0013	0.0016	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001
[redacted]	10/11/2017	101117[redacted]	382009	4458235	Predominantly Microbial		9.19	3.3	2.2	0.0011	0.00044	0.00055	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	7/24/2018	072418[redacted]	382009	4458235	Predominantly Microbial		10.14	3.9	2.6	0.002	0.00082	0.001	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	3/11/2019	031119[redacted]	382009	4458235	Predominantly Microbial		9.11	3.6	2.4	0.0004	0.0002	0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001

Notes:
1) *Natural gas stored in Manlove Field.
2) Samples analyzed at Isotech Laboratories, Champaign Illinois.
3) < = Compound not detected at the Method Detection Limit (MDL).
4) -- = No data.
5) Unknown Source = Levels of methane and other hydrocarbons too low to distinguish microbial vs. thermogenic gas.

APPENDIX F
MOLECULAR AND ISOTOPIC GAS DATA
Groundwater Management Zone
Manlove Gas Storage Field

Location ID	Sample Date	Sample ID	X_coord	Y_coord	Final Classification (Based on Consideration of Notes)	Other Thermogenic Gas Source (1960's)	Methane MOL %	Methane cc/L	Methane mg/L	Ethane MOL %	Ethane cc/L	Ethane mg/L	Ethene MOL %	Propane MOL %	Propane cc/L	Propane mg/L	Propene MOL %
[redacted]	11/15/2018	111518[redacted]	381331	4458038	Unknown Source		0.0063	0.002	0.0013	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001
[redacted]	2/16/2017	021617[redacted]	382287	4461242	Unknown Source		12.56	--	--	<0.0001	--	--	<0.0001	<0.0001	--	--	<0.0001
[redacted]	7/19/2017	071917[redacted]	382287	4461242	Predominantly Microbial		36.18	18	12	0.0003	0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001
[redacted]	10/18/2017	101817[redacted]	383511	4457867	Unknown Source		0.307	0.094	0.063	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	11/16/2017	111617[redacted]	378436.7614	4461667.953	Predominantly Microbial		12.11	4.3	2.9	0.0004	0.0002	0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	6/26/2018	062618[redacted]	378436.7614	4461667.953	Predominantly Microbial		4	1.2	0.8	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	11/3/2017	110317[redacted]	383816.5535	4455359.602	Unknown Source		0.0829	0.027	0.018	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	5/6/2017	050617[redacted]	381661	4458483	Predominantly Microbial		7.44	2.5	1.7	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	3/1/2019	030119[redacted]-A	381661	4458483	Thermogenic		58.77	43	29	0.0007	0.00058	0.00072	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	3/1/2019	030119[redacted]B	381661	4458483	Thermogenic		55.05	39	26	0.0006	0.00042	0.00053	<0.0001	<0.0001	<0.0002	<0.0004	<0.0001
[redacted]	11/20/2017	112017[redacted]	382374	4458350	Unknown Source		0.172	0.049	0.033	0.0005	0.0002	0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted])	11/3/2017	110317[redacted]	382304	4458346	Thermogenic		3.2	1	0.7	0.0048	0.0017	0.0021	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted])	3/11/2019	031119[redacted]	382304	4458346	Thermogenic		28.86	13	8.5	0.459	0.22	0.27	<0.0001	0.017	0.0077	0.014	<0.0001
[redacted]	11/7/2017	110717[redacted]	379054.47	4457991.242	Minor Thermogenic Component		15.45	5.3	3.6	0.0941	0.035	0.044	<0.0001	0.0804	0.028	0.052	<0.0001
[redacted]	10/30/2018	103018[redacted]	379054.47	4457991.242	Unknown Source		0.524	0.13	0.088	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001
[redacted]	11/17/2017	111717[redacted]	379088.2968	4450620.081	Unknown Source		0.142	0.039	0.026	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	10/16/2017	101617[redacted]	381547	4457845	Predominantly Microbial		10.09	3.4	2.3	0.0009	0.00032	0.0004	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	1/22/2018	012218[redacted]	368363.4199	4456874.087	Predominantly Microbial		86.85	83	56	0.0014	0.0015	0.0019	<0.0001	0.0009	0.00089	0.0016	<0.0001
[redacted]	5/7/2018	050718[redacted]	368363.4199	4456874.087	Predominantly Microbial		86.47	94	63	0.0008	0.00097	0.0012	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001
[redacted]	8/28/2017	082817[redacted]	379795	4455189	Unknown Source		0.385	0.11	0.075	0.0005	0.0002	0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	10/9/2018	100918[redacted]-A	379795	4455189	Unknown Source		0.407	0.12	0.079	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	10/9/2018	100918[redacted]-B	379795	4455189	Unknown Source		0.432	0.13	0.086	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	9/22/2017	092217[redacted]	378955	4455448	Thermogenic	Other	39.99	22	15	1.67	1	1.3	<0.0001	0.0366	0.021	0.038	<0.0001
[redacted]	7/10/2018	071018[redacted]-A	378955	4455448	Thermogenic	Other	46.58	25	17	1.79	1.1	1.3	<0.0001	0.0312	0.017	0.032	<0.0001
[redacted]	7/10/2018	071018[redacted]-B	378955	4455448	Thermogenic	Other	46.15	26	17	1.77	1.1	1.3	<0.0001	0.0305	0.017	0.032	<0.0001
[redacted]	7/10/2018	071018[redacted]C	378955	4455448	Thermogenic	Other	46.37	25	17	1.77	1	1.3	<0.0001	0.0303	0.017	0.031	<0.0001
[redacted])	11/26/2018	[redacted]112618	--	--	Thermogenic	Other	55.33	37	25	2.05	1.5	1.8	<0.0001	0.178	0.12	0.22	<0.0001
Unknown 1A	4/10/2018	1A	--	--	Thermogenic		85.28	110	72	3.21	4.5	5.6	<0.0001	0.555	0.73	1.3	<0.0001
Unknown 1B	4/10/2018	1B	--	--	Thermogenic		71.5	37	24	2.77	1.5	1.9	<0.0001	0.309	0.16	0.3	0.001
[redacted]	11/16/2017	111617[redacted]	379316.0655	4459983.453	Predominantly Microbial		9.22	3.2	2.2	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	3/17/2017	031717[redacted]	382721	4459137	Thermogenic		14.22	--	--	0.531	--	--	<0.0001	0.0266	--	--	<0.0001
[redacted]	3/27/2019	C After	382721	4459137	Thermogenic		53.52	24	16	2.24	1.1	1.3	<0.0001	0.12	0.054	0.099	<0.0001
[redacted]	3/27/2019	C Before	382721	4459137	Thermogenic		89.01	50	33	3.37	2	2.5	<0.0001	0.163	0.093	0.17	<0.0001
[redacted]	10/25/2017	102517[redacted]	--	--	Predominantly Microbial		28.49	11	7.1	0.0004	0.0002	0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
Water District, Sangamon Valley, 3/4" Well line	10/18/2017	101817SVW-4	--	--	Predominantly Microbial		2.79	0.86	0.57	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
Water District, Sangamon Valley, Lab sink finished water	10/18/2017	101817SV-F	--	--	Unknown Source		0.273	0.073	0.049	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
Water District, Sangamon Valley, Lab sink well water	10/18/2017	101817SVW-1	--	--	Predominantly Microbial		1.98	0.54	0.36	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
Water District, Sangamon Valley, Well Hydrant	10/18/2017	101817SVW-3	--	--	Predominantly Microbial		0.61	0.22	0.15	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	3/22/2017	032217[redacted]	382000	4458600	Predominantly Microbial		7.58	2.6	1.8	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001
[redacted]	11/8/2017	110817[redacted]	382000	4458600	Predominantly Microbial		9.65	3.1	2.1	0.0004	0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	3/14/2019	031419[redacted]	382000	4458600	Thermogenic		42.29	22	15	0.0728	0.04	0.05	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	6/13/2019	061319[redacted]	382000	4458600	Thermogenic		63.03	46	31	0.0699	0.055	0.069	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	10/25/2017	102517[redacted]	373401	4456855	Predominantly Microbial		70.04	66	44	0.0008	0.00084	0.0011	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001
[redacted]	8/28/2017	082817[redacted]	384755	4453938	Unknown Source		0.0056	0.0017	0.0012	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	10/26/2017	102617[redacted]	380692	4462950	Predominantly Microbial		13.24	4.5	3	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0003	<0.0001
[redacted]	10/11/2017	101117[redacted]	381730	4457903	Predominantly Microbial		6.55	2.9	2	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001
[redacted]	3/11/2019	031119[redacted]	381730	4457903	Predominantly Microbial		12.88	5.2	3.5	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0002	<0.0003	<0.0001

Notes:
1) *Natural gas stored in Manlove Field.
2) Samples analyzed at Isotech Laboratories, Champaign Illinois.
3) < = Compound not detected at the Method Detection Limit (MDL).
4) -- = No data.
5) Unknown Source = Levels of methane and other hydrocarbons too low to distinguish microbial vs. thermogenic gas.

APPENDIX F
MOLECULAR AND ISOTOPIC GAS DATA
Groundwater Management Zone
Manlove Gas Storage Field

Location ID	Sample Date	Sample ID	X_coord	Y_coord	Final Classification (Based on Consideration of Notes)	Other Thermogenic Gas Source (1960's)	Isobutane MOL %	N-Butane MOL %	Isopentane MOL %	N-Pentane MOL %	Hexanes + MOL %	Argon MOL %	Carbon Dioxide MOL %	Carbon Monoxide MOL %	Helium MOL %	Hydrogen MOL %	Nitrogen (N2) cc/L
[redacted]	10/11/2017	101117[redacted]	382789	4458185	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.71	8.98	<0.01	--	<0.01	--
[redacted]	10/17/2017	101717[redacted]	387134	4462772	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.42	5.04	<0.01	--	<0.01	--
[redacted]	11/3/2017	110317[redacted]	384406.6984	4453795.653	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.64	7.43	<0.01	--	<0.01	--
[redacted]	10/10/2017	101017[redacted]	381827	4458219	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.41	13.11	<0.01	--	<0.01	--
[redacted]	3/11/2019	031119[redacted]	381827	4458219	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.46	4.35	<0.01	--	<0.01	16
[redacted]	6/25/2018	062518[redacted]	377057.4298	4458839.75	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.26	5.4	<0.01	--	<0.01	24
[redacted]	10/11/2017	101117[redacted]	381203	4458419	Minor Thermogenic Component		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.69	9.45	<0.01	--	<0.01	--
[redacted]	3/11/2019	031119[redacted]	381203	4458419	Minor Thermogenic Component		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.73	9.13	<0.01	--	<0.01	21
[redacted]	1/10/2017	Container #4	378994	4459457	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.936	0.32	<0.01	<0.005	<0.01	--
[redacted]	6/28/2017	062817[redacted]	378994	4459457	Predominantly Microbial		<0.0001	0.0008	0.0006	0.0008	0.0006	1.42	5.45	<0.01	--	<0.01	--
[redacted]	11/3/2017	110317[redacted]	383443.9923	4455054.223	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.68	8.79	<0.01	--	<0.01	--
[redacted]	10/12/2017	101217[redacted]	381321	4461559	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.67	8.23	<0.01	--	<0.01	--
[redacted]	1/31/2018	013118[redacted]	379445.1528	4456713.623	Thermogenic	Other	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.69	7.77	<0.01	--	<0.01	24
[redacted]	10/17/2017	101717[redacted]	382737	4455261	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.64	10.55	<0.01	--	<0.01	--
[redacted]	10/17/2017	101717[redacted]	382573	4455392	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.52	9.37	<0.01	--	<0.01	--
[redacted]	5/30/2019	053019[redacted]	--	--	Thermogenic	Other	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.37	8.2	<0.01	--	<0.01	24
[redacted]	10/30/2017	103017[redacted]	381768	4457793	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.75	4.83	<0.01	--	<0.01	--
[redacted]	3/14/2019	031419[redacted]	381768	4457793	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.75	8.63	<0.01	--	<0.01	32
[redacted]	2/14/2017	21417	381704	4458451	Thermogenic		0.0106	0.0053	0.0013	0.0002	0.0001	0.692	1.78	<0.01	0.0548	<0.01	--
[redacted]n	4/10/2018	4A	381704	4458451	Thermogenic		0.0029	0.0013	<0.0001	<0.0001	<0.0001	1.33	9.69	<0.01	--	<0.01	22
[redacted]	4/10/2018	4B	381704	4458451	Thermogenic		0.0021	0.0013	<0.0001	<0.0001	<0.0001	1.33	7.94	<0.01	--	<0.01	18
[redacted]	4/5/2018	040518[redacted]	382796.5689	4455017.958	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.67	8.24	<0.01	--	<0.01	24
[redacted]	10/10/2017	101017[redacted]	381836	4458392	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.39	15.26	<0.01	--	<0.01	--
[redacted]	3/11/2019	031119[redacted]	381836	4458392	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.68	16.22	<0.01	--	<0.01	17
[redacted]	10/25/2017	102517[redacted]	382971	4458292	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.6	15.52	<0.01	--	<0.01	--
[redacted]	10/11/2017	101117[redacted]	381895	4457615	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.62	8.32	<0.01	--	<0.01	--
[redacted]	3/15/2017	031517[redacted]	381921	4458215	Thermogenic		0.0003	0.0003	<0.0001	<0.0001	<0.0001	1.22	4.55	<0.01	--	<0.01	--
[redacted]	7/12/2017	071217[redacted]	381921	4458215	Thermogenic		<0.0001	<0.0001	0.0003	0.0006	0.0023	1.02	0.1	<0.01	--	<0.01	--
[redacted]	8/8/2017	080817[redacted]	381921	4458215	Thermogenic		0.0021	0.0015	0.0001	<0.0001	<0.0001	0.364	2.4	<0.01	0.0146	<0.01	--
[redacted]	4/10/2018	2A	381921	4458215	Thermogenic		0.0033	0.0022	0.0001	<0.0001	<0.0001	0.226	2.11	<0.01	0.0121	<0.01	14
[redacted]	4/10/2018	2B	381921	4458215	Thermogenic		0.003	0.002	<0.0001	<0.0001	<0.0001	0.67	4.68	<0.01	--	<0.01	12
[redacted]	3/27/2019	A After	381921	4458215	Thermogenic		0.0046	0.0033	0.0003	<0.0001	<0.0001	0.909	5.13	<0.01	--	<0.01	15
[redacted]	3/27/2019	A Before	381921	4458215	Thermogenic		0.0068	0.0049	0.0005	0.0001	<0.0001	0.252	2.3	<0.01	0.0151	<0.01	13
[redacted]	1/4/2018	010418[redacted]	378485.6565	4452412.066	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.85	7.58	<0.01	--	<0.01	18
Fisher, Village of	10/20/2017	102017VF-40038	--	--	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.76	8.93	<0.01	--	<0.01	--
Fisher, Village of, 40039	10/20/2017	102017VF-40039	--	--	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.78	9.19	<0.01	--	<0.01	--
Fisher, Village of, Transfer Pump	10/20/2017	102017VF-TP	--	--	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.45	3.92	<0.01	--	<0.01	--
[redacted]	3/11/2019	031119[redacted]	382374.8055	4456349.795	Thermogenic		<0.0001	0.0009	<0.0001	<0.0001	<0.0001	1.55	15.69	<0.01	--	<0.01	25
[redacted]	12/19/2016	[redacted] House	381570	4459988	Thermogenic		0.0034	0.002	<0.0001	<0.0001	<0.0001	0.316	1.13	<0.01	--	<0.01	--
[redacted]r	2/20/2017	22017	381570	4459988	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.947	1.98	<0.01	0.0065	<0.01	--
[redacted]r	3/21/2017	032117[redacted]	381570	4459988	Thermogenic		0.0035	0.0025	0.0001	<0.0001	<0.0001	0.415	1.57	<0.01	0.0137	<0.01	--
[redacted]	6/15/2017	061517[redacted]	381570	4459988	Thermogenic		0.005	0.0041	0.0002	<0.0001	<0.0001	0.0692	1.78	<0.01	0.016	<0.01	--
[redacted]	4/10/2018	3A	381570	4459988	Thermogenic		0.0003	0.0002	<0.0001	<0.0001	<0.0001	0.165	1.87	<0.01	0.0139	<0.01	11
[redacted]	4/10/2018	3B	381570	4459988	Thermogenic		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.794	4.93	0.12	--	<0.01	14
[redacted]	8/28/2017	082817[redacted]	375819.9365	4461527.773	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.92	7.97	<0.01	--	<0.01	--
[redacted]	10/25/2017	102517[redacted]	380821	4467847	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.43	5.5	<0.01	--	<0.01	--
[redacted]	10/11/2017	101117[redacted]	381110	4457623	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.54	8.74	<0.01	--	<0.01	--

Notes:
1) *Natural gas stored in Manlove Field.
2) Samples analyzed at Isotech Laboratories, Champaign Illinois.
3) < = Compound not detected at the Method Detection Limit (MDL).
4) -- = No data.
5) Unknown Source = Levels of methane and other hydrocarbons too low to distinguish microbial vs. thermogenic gas.

APPENDIX F
MOLECULAR AND ISOTOPIC GAS DATA
Groundwater Management Zone
Manlove Gas Storage Field

GSI ENVIRONMENTAL

Location ID	Sample Date	Sample ID	X_coord	Y_coord	Final Classification (Based on Consideration of Notes)	Other Thermogenic Gas Source (1960's)	Isobutane MOL %	N-Butane MOL %	Isopentane MOL %	N-Pentane MOL %	Hexanes + MOL %	Argon MOL %	Carbon Dioxide MOL %	Carbon Monoxide MOL %	Helium MOL %	Hydrogen MOL %	Nitrogen (N2) cc/L
[redacted]	10/11/2017	101117[redacted]	382270	4459968	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.81	10.07	<0.01	--	<0.01	--
	10/24/2017	102417[redacted]	382786	4458245	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.69	12.1	<0.01	--	<0.01	--
	10/12/2017	101217[redacted]	380601	4457875	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.55	8.87	<0.01	--	<0.01	--
	11/22/2017	112217[redacted]	383570.09	4457537.879	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.55	9.2	<0.01	--	<0.01	23
	11/20/2017	112017[redacted]	383489.0233	4461186.278	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.62	9.08	<0.01	--	<0.01	24
	10/24/2017	102417[redacted]	380554	4459957	Minor Thermogenic Component		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.55	8.73	<0.01	--	<0.01	--
	11/16/2017	111617[redacted]	382298.9463	4456074.586	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.51	5.95	<0.01	--	<0.01	27
	1/5/2018	010518[redacted]	378957.0782	4456511.013	Thermogenic	Other	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.2	6.02	<0.01	--	<0.01	21
	11/17/2017	111717[redacted]	382346.783	4456204.253	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.52	6.56	<0.01	--	<0.01	24
	11/2/2017	110217[redacted]	378191	4455190	Thermogenic	Other	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.38	8.18	<0.01	--	<0.01	--
[1] Hunt #2	11/29/2017	Hunt #2	379877.7845	4459195.638	Thermogenic		0.13	0.108	0.0327	0.0207	0.0302	0.0061	0.28	<0.01	0.0056	0.0262	--
	10/17/2017	101717[redacted]	381816	4457653	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.59	9	<0.01	--	<0.01	--
	8/28/2017	082817[redacted]	376936	4455146	Minor Thermogenic Component	Other	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.36	7.47	<0.01	--	<0.01	--
	11/17/2017	111717[redacted]	381986.5047	4456836.033	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.43	7.61	<0.01	--	<0.01	27
	3/15/2017	031517[redacted]	381905	4458377	Thermogenic		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.426	2.55	<0.01	0.0075	<0.01	--
	3/27/2019	B After	381905	4458377	Thermogenic		0.0052	0.0038	0.0007	<0.0001	<0.0001	0.69	5.64	<0.01	--	<0.01	11
	3/27/2019	B Before	381905	4458377	Thermogenic		0.007	0.0051	0.0008	0.0002	<0.0001	0.164	5.27	<0.01	--	<0.01	6.5
	10/23/2017	102317[redacted]	367248	4446214	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.159	7.93	<0.01	--	<0.01	--
	1/24/2019	012419[redacted]	376407.9043	4464207.514	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.772	2.8	<0.01	--	<0.01	22
	10/12/2017	101217[redacted]	381511	4457577	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.52	7.51	<0.01	--	<0.01	--
	12/21/2017	122117[redacted]	378430.3725	4455114.655	Thermogenic	Other	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.18	6.76	<0.01	--	<0.01	22
	4/26/2017	042617[redacted]	382013	4458341	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.27	10.91	<0.01	--	<0.01	--
	10/30/2017	103017[redacted]	382013	4458341	Thermogenic		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.45	14.96	<0.01	--	<0.01	--
	4/4/2019	040419[redacted]	382013	4458341	Thermogenic		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.43	16.27	<0.01	--	<0.01	22
	11/2/2017	110217[redacted]	377998	4455194	Thermogenic	Other	0.0011	<0.0001	<0.0001	<0.0001	<0.0001	0.896	4.9	<0.01	--	<0.01	--
	12/20/2017	122017[redacted]	374501.7657	4455148.134	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.704	3.63	<0.01	--	<0.01	21
	6/25/2018	062518[redacted]	377403.4391	4459832.721	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.39	5.37	<0.01	--	<0.01	25
	10/17/2017	101717[redacted]	379488	4461732	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.5	10.82	<0.01	--	<0.01	--
	10/17/2017	101717[redacted]	370823	4457652	Minor Thermogenic Component	Other	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.62	8.6	<0.01	--	<0.01	--
Mahomet, Village of, 6" Raw Water Line Port	10/16/2017	101617 VM Pre	381609.4117	4457937.901	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.76	7.65	<0.01	--	<0.01	--
Mahomet, Village of, 6" Raw Water Line Port	3/11/2019	031119VMpre	381609.4117	4457937.901	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.94	8.49	<0.01	--	<0.01	22
Mahomet, Village of, Faucet in Shop	10/16/2017	101617 VM Post	381601.7114	4457768.495	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.66	6.34	<0.01	--	<0.01	--
Mahomet, Village of, Faucet in Shop	3/11/2019	031119VMpost	381601.7114	4457768.495	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.87	6.95	<0.01	--	<0.01	18
[redacted]	12/8/2017	120817[redacted]	377970.0633	4449710.923	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.89	10.87	<0.01	--	<0.01	9.3
	10/12/2017	101217[redacted]	378206	4458361	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.44	6.82	<0.01	--	<0.01	--
	11/2/2017	110217[redacted]	384162.4251	4455479.743	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.64	7.45	<0.01	--	<0.01	--
	10/26/2017	102617[redacted]	380075	4466410	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.18	3.63	<0.01	--	<0.01	--
[1] McCord #2	11/29/2017	McCord #2	381865.0259	445467.8011	Thermogenic		0.0257	0.0279	0.0096	0.0062	0.0166	0.0184	0.81	<0.01	0.0275	<0.01	--
[redacted]	10/11/2017	101117[redacted]	381352	4457926	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.51	10.89	<0.01	--	<0.01	--
	3/11/2019	031119[redacted]	381352	4457926	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.71	11.95	<0.01	--	<0.01	21
	10/12/2017	101217[redacted]	381697	4457618	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.6	10.36	<0.01	--	<0.01	--
	11/17/2017	111717[redacted]	382272.9799	4456606.584	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.47	5.82	<0.01	--	<0.01	26
	1/3/2018	010318[redacted]	382115.0482	4462848.64	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.58	6.71	<0.01	--	<0.01	23
	11/3/2017	110317[redacted]	397980.5969	4467913.838	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.447	2.22	<0.01	0.0097	<0.01	--
	10/11/2017	101117[redacted]	382009	4458235	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.51	8.34	<0.01	--	<0.01	--
	7/24/2018	072418[redacted]	382009	4458235	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.53	8.05	<0.01	--	<0.01	26
	3/11/2019	031119[redacted]	382009	4458235	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.61	8.09	<0.01	--	<0.01	26

Notes:
1) *Natural gas stored in Manlove Field.
2) Samples analyzed at Isotech Laboratories, Champaign Illinois.
3) < = Compound not detected at the Method Detection Limit (MDL).
4) -- = No data.
5) Unknown Source = Levels of methane and other hydrocarbons too low to distinguish microbial vs. thermogenic gas.

APPENDIX F
MOLECULAR AND ISOTOPIC GAS DATA
Groundwater Management Zone
Manlove Gas Storage Field

Location ID	Sample Date	Sample ID	X_coord	Y_coord	Final Classification (Based on Consideration of Notes)	Other Thermogenic Gas Source (1960's)	Isobutane MOL %	N-Butane MOL %	Isopentane MOL %	N-Pentane MOL %	Hexanes + MOL %	Argon MOL %	Carbon Dioxide MOL %	Carbon Monoxide MOL %	Helium MOL %	Hydrogen MOL %	Nitrogen (N2) cc/L
[redacted]	11/15/2018	111518[redacted]	381331	4458038	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.59	10.47	<0.01	--	<0.01	23
[redacted]	2/16/2017	021617[redacted]	382287	4461242	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.977	4.1	<0.01	--	<0.01	--
[redacted]	7/19/2017	071917[redacted]	382287	4461242	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.09	6.54	<0.01	--	<0.01	--
[redacted]	10/18/2017	101817[redacted]	383511	4457867	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.62	11	<0.01	--	<0.01	--
[redacted]	11/16/2017	111617[redacted]	378436.7614	4461667.953	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.48	6.98	<0.01	--	<0.01	24
[redacted]	6/26/2018	062618[redacted]	378436.7614	4461667.953	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.6	10.19	<0.01	--	<0.01	21
[redacted]	11/3/2017	110317[redacted]	383816.5535	4455359.602	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.6	9.05	0.043	--	<0.01	--
[redacted]	5/6/2017	050617[redacted]	381661	4458483	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.53	8.85	<0.01	--	<0.01	--
[redacted]	3/1/2019	030119[redacted]-A	381661	4458483	Thermogenic		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.745	5.29	<0.01	--	<0.01	22
[redacted]	3/1/2019	030119[redacted]-B	381661	4458483	Thermogenic		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.795	5.98	<0.01	--	<0.01	24
[redacted]	11/20/2017	112017[redacted]	382374	4458350	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.48	8.87	<0.01	--	<0.01	21
[redacted])	11/3/2017	110317[redacted]	382304	4458346	Thermogenic		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.41	12.11	<0.01	--	<0.01	--
[redacted])	3/11/2019	031119[redacted]	382304	4458346	Thermogenic		0.0007	0.0003	<0.0001	<0.0001	0.0007	1.15	8.9	<0.01	--	<0.01	23
[redacted]	11/7/2017	110717[redacted]	379054.47	4457991.242	Minor Thermogenic Component		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.46	7.9	<0.01	--	<0.01	22
[redacted]	10/30/2018	103018[redacted]	379054.47	4457991.242	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.85	11.99	<0.01	--	<0.01	18
[redacted]	11/17/2017	111717[redacted]	379088.2968	4450620.081	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.7	7.25	<0.01	--	<0.01	21
[redacted]	10/16/2017	101617[redacted]	381547	4457845	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.54	9.48	<0.01	--	<0.01	--
[redacted]	1/22/2018	012218[redacted]	368363.4199	4456874.087	Predominantly Microbial		0.0002	0.001	0.0006	0.001	0.0071	0.249	1.23	<0.01	0.0089	<0.01	8.9
[redacted]	5/7/2018	050718[redacted]	368363.4199	4456874.087	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.252	1.1	<0.01	0.0065	<0.01	11
[redacted]g	8/28/2017	082817[redacted]	379795	4455189	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.68	7.91	<0.01	--	<0.01	--
[redacted]	10/9/2018	100918[redacted]-A	379795	4455189	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.79	8.18	<0.01	--	<0.01	22
[redacted]	10/9/2018	100918[redacted]-B	379795	4455189	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.75	8.83	<0.01	--	<0.01	23
[redacted]	9/22/2017	092217[redacted]	378955	4455448	Thermogenic	Other	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.955	5.36	<0.01	--	<0.01	23
[redacted]	7/10/2018	071018[redacted]-A	378955	4455448	Thermogenic	Other	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.91	5.65	<0.01	--	<0.01	21
[redacted]	7/10/2018	071018[redacted]B	378955	4455448	Thermogenic	Other	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.91	5.69	<0.01	--	<0.01	22
[redacted]	7/10/2018	071018[redacted]-C	378955	4455448	Thermogenic	Other	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.904	5.79	<0.01	--	<0.01	21
[redacted])	11/26/2018	[redacted]-112618	--	--	Thermogenic	Other	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.74	5.63	<0.01	--	<0.01	21
Unknown 1A	4/10/2018	1A	--	--	Thermogenic		0.0028	0.003	<0.0001	<0.0001	<0.0001	0.284	1.52	<0.01	<0.005	<0.01	9.6
Unknown 1B	4/10/2018	1B	--	--	Thermogenic		0.0024	0.0017	<0.0001	<0.0001	<0.0001	0.493	4.71	<0.01	--	<0.01	8.3
[redacted]	11/16/2017	111617[redacted]	379316.0655	4459983.453	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.5	8.88	<0.01	--	<0.01	24
[redacted]	3/17/2017	031717[redacted]	382721	4459137	Thermogenic		0.0007	0.001	<0.0001	<0.0001	<0.0001	0.793	0.79	<0.01	<0.005	<0.01	--
[redacted]	3/27/2019	C After	382721	4459137	Thermogenic		0.007	0.0063	0.0011	0.0004	<0.0001	0.629	3.72	<0.01	--	<0.01	10
[redacted]	3/27/2019	C Before	382721	4459137	Thermogenic		0.0094	0.0083	0.0014	0.0006	<0.0001	0.0874	3.91	<0.01	--	<0.01	1.5
[redacted]	10/25/2017	102517[redacted]	--	--	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.41	3.08	<0.01	--	<0.01	--
Water District, Sangamon Valley, 3/4" Well line	10/18/2017	101817SVW-4	--	--	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.5	7.71	<0.01	--	<0.01	--
Water District, Sangamon Valley, Lab sink finished water	10/18/2017	101817SV-F	--	--	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.58	7.88	<0.01	--	<0.01	--
Water District, Sangamon Valley, Lab sink well water	10/18/2017	101817SVW-1	--	--	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	0.0021	1.74	7.15	<0.01	--	<0.01	--
Water District, Sangamon Valley, Well Hydrant	10/18/2017	101817SVW-3	--	--	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.54	5.48	<0.01	--	<0.01	--
[redacted]	3/22/2017	032217[redacted]	382000	4458600	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.56	7.93	<0.01	--	<0.01	--
[redacted]	11/8/2017	110817RW	382000	4458600	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.59	8.39	<0.01	--	<0.01	22
[redacted]	3/14/2019	031419[redacted]	382000	4458600	Thermogenic		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.06	6.94	<0.01	--	<0.01	22
[redacted]	6/13/2019	061319[redacted]	382000	4458600	Thermogenic		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.626	4.09	<0.01	--	<0.01	20
[redacted]	10/25/2017	102517[redacted]	373401	4456855	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.527	2.11	<0.01	0.0074	<0.01	--
[redacted]	8/28/2017	082817[redacted]	384755	4453938	Unknown Source		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.26	11.74	<0.01	--	<0.01	--
[redacted]	10/26/2017	102617[redacted]	380692	4462950	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.51	7.46	<0.01	--	<0.01	--
[redacted]	10/11/2017	101117[redacted]	381730	4457903	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.48	7.6	<0.01	--	<0.01	--
[redacted]	3/11/2019	031119[redacted]	381730	4457903	Predominantly Microbial		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.55	9.12	<0.01	--	<0.01	26

Notes:
1) *Natural gas stored in Manlove Field.
2) Samples analyzed at Isotech Laboratories, Champaign Illinois.
3) < = Compound not detected at the Method Detection Limit (MDL).
4) -- = No data.
5) Unknown Source = Levels of methane and other hydrocarbons too low to distinguish microbial vs. thermogenic gas.

APPENDIX F
MOLECULAR AND ISOTOPIC GAS DATA
Groundwater Management Zone
Manlove Gas Storage Field

Location ID	Sample Date	Sample ID	X_coord	Y_coord	Final Classification (Based on Consideration of Notes)	Other Thermogenic Gas Source (1960's)	Nitrogen (N2) mg/L	Nitrogen (N_2) MOL %	Oxygen (O2) cc/L	Oxygen (O2) mg/L	Oxygen (O_2) MOL %	Propylene MOL %	$\delta^{13}C$ C1 ‰	$\delta^{13}C$ C2 ‰	$\delta^{13}C$ C3 ‰	$\delta^{13}C$ CO_2 ‰	δD C1 ‰
[redacted]	10/11/2017	101117[redacted]	382789	4458185	Unknown Source		--	86.71	--	--	2.14	<0.0001	-46.67	--	--	-18.91	--
[redacted]	10/17/2017	101717LG	387134	4462772	Predominantly Microbial		--	71.81	--	--	0.5	<0.0001	-79.34	--	--	-21.18	-218.9
[redacted]	11/3/2017	110317[redacted]	384406.6984	4453795.653	Unknown Source		--	82.82	--	--	8.09	<0.0001	--	--	--	-18.3	--
[redacted]	10/10/2017	101017[redacted]	381827	4458219	Unknown Source		--	73.52	--	--	11.96	<0.0001	--	--	--	-19.04	--
[redacted]	3/11/2019	031119[redacted]	381827	4458219	Unknown Source		18	65.08	--	--	29.11	--	--	--	--	-18.54	--
[redacted]	6/25/2018	062518[redacted]	377057.4298	4458839.75	Predominantly Microbial		28	64.36	--	--	3.03	--	-86.15	--	--	-17.03	-238.6
[redacted]	10/11/2017	101117[redacted]	381203	4458419	Minor Thermogenic Component		--	84.64	--	--	1.35	<0.0001	-72.16	--	--	-14.82	-157
[redacted]	3/11/2019	031119[redacted]	381203	4458419	Minor Thermogenic Component		25	84.63	--	--	1.41	--	-69.42	--	--	-15.01	-155.2
[redacted]	1/10/2017	Container #4	378994	4459457	Unknown Source		--	77.84	--	--	20.9	<0.0001	--	--	--	--	--
[redacted]	6/28/2017	062817[redacted]	378994	4459457	Predominantly Microbial		--	71.69	--	--	17.23	<0.0001	-79.23	--	--	--	-186
[redacted]	11/3/2017	110317[redacted]	383443.9923	4455054.223	Unknown Source		--	87.94	--	--	1.45	<0.0001	--	--	--	-18.16	--
[redacted]	10/12/2017	101217[redacted]	381321	4461559	Predominantly Microbial		--	86.68	--	--	1.65	<0.0001	-71.88	--	--	-15.5	--
[redacted]	1/31/2018	013118[redacted]	379445.1528	4456713.623	Thermogenic	Other	28	86.2	--	--	2.32	<0.0001	-34.7	--	--	-15.71	-64.2
[redacted]	10/17/2017	101717[redacted]	382737	4455261	Unknown Source		--	85.46	--	--	2.31	<0.0001	--	--	--	-18.73	--
[redacted]	10/17/2017	101717[redacted]	382573	4455392	Unknown Source		--	87.67	--	--	1.33	<0.0001	--	--	--	-18.8	--
[redacted]	5/30/2019	053019[redacted]	--	--	Thermogenic	Other	28	65.2	--	--	0.49	--	-41.56	--	--	-15.5	-126.9
[redacted]	10/30/2017	103017[redacted]	381768	4457793	Unknown Source		--	83.79	--	--	9.53	<0.0001	--	--	--	-18.07	--
[redacted]	3/14/2019	031419[redacted]	381768	4457793	Predominantly Microbial		37	80.11	--	--	7.99	--	-70.24	--	--	-17.31	-130.7
[redacted]	2/14/2017	21417	381704	4458451	Thermogenic		--	53.65	--	--	3.71	<0.0001	--	--	--	--	--
[redacted]	4/10/2018	4A	381704	4458451	Thermogenic		26	70.92	--	--	1.27	--	-43.76	--	--	-19.26	-183.9
[redacted]	4/10/2018	4B	381704	4458451	Thermogenic		22	65.64	--	--	14.17	--	-43.48	--	--	--	-181.3
[redacted]	4/5/2018	040518[redacted]	382796.5689	4455017.958	Unknown Source		28	89.34	--	--	0.61	--	--	--	--	-18.36	--
[redacted]	10/10/2017	101017[redacted]	381836	4458392	Unknown Source		--	74.13	2.5	3.3	9.22	<0.0001	--	--	--	-19.26	--
[redacted]	3/11/2019	031119[redacted]	381836	4458392	Unknown Source		20	69.6	--	--	12.43	--	--	--	--	-20.82	--
[redacted]	10/25/2017	102517[redacted]	382971	4458292	Predominantly Microbial		--	81.16	--	--	0.53	<0.0001	-71.61	--	--	-18.46	-149
[redacted]	10/11/2017	101117[redacted]	381895	4457615	Predominantly Microbial		--	82.96	--	--	1.41	<0.0001	-85.35	--	--	-17.51	-219.4
[redacted]	3/15/2017	031517[redacted]	381921	4458215	Thermogenic		--	58.97	--	--	20	<0.0001	--	--	--	--	--
[redacted]	7/12/2017	071217[redacted]	381921	4458215	Thermogenic		--	51.86	--	--	10.61	<0.0001	-42.6	-33	--	--	-181.4
[redacted]	8/8/2017	080817[redacted]	381921	4458215	Thermogenic		--	18.48	--	--	2.96	<0.0001	--	--	--	--	--
[redacted]	4/10/2018	2A	381921	4458215	Thermogenic		16	11.69	--	--	0.62	--	-43.88	--	--	-17.4	-189.8
[redacted]	4/10/2018	2B	381921	4458215	Thermogenic		15	29.94	--	--	12.66	--	-43.24	--	--	-18.01	-178.3
[redacted]	3/27/2019	A After	381921	4458215	Thermogenic		17	39.09	--	--	14.28	--	--	--	--	--	--
[redacted]	3/27/2019	A Before	381921	4458215	Thermogenic		15	10.84	--	--	0.17	--	--	--	--	--	--
[redacted]	1/4/2018	010418[redacted]	378485.6565	4452412.066	Unknown Source		21	88.54	--	--	1.57	<0.0001	-50.3	--	--	-17.45	--
Fisher, Village of	10/20/2017	102017VF-40038	--	--	Unknown Source		--	88.47	--	--	0.75	<0.0001	--	--	--	-19.38	--
Fisher, Village of, 40039	10/20/2017	102017VF-40039	--	--	Unknown Source		--	88.09	--	--	0.86	<0.0001	--	--	--	-19.82	--
Fisher, Village of, Transfer Pump	10/20/2017	102017VF-TP	--	--	Unknown Source		--	65.88	--	--	28.74	<0.0001	--	--	--	-20.07	--
[redacted]	3/11/2019	031119[redacted]	382374.8055	4456349.795	Thermogenic		29	81.75	--	--	1	--	--	--	--	-20.81	--
[redacted]	12/19/2016	[redacted] House	381570	4459988	Thermogenic		--	29.52	--	--	7.37	<0.0001	-43.25	-33.5	-29.4	-14.8	-184.5
[redacted]	2/20/2017	22017	381570	4459988	Predominantly Microbial		--	73.54	--	--	14.96	<0.0001	-83	--	--	-17.13	-232
[redacted]	3/21/2017	032117[redacted]	381570	4459988	Thermogenic		--	35.59	--	--	8.91	<0.0001	--	--	--	--	--
[redacted]	6/15/2017	061517[redacted]	381570	4459988	Thermogenic		--	4.79	--	--	0.93	<0.0001	--	--	--	--	--
[redacted]	4/10/2018	3A	381570	4459988	Thermogenic		12	7.75	--	--	0.45	--	-43.64	--	--	-15.05	-191.1
[redacted]	4/10/2018	3B	381570	4459988	Thermogenic		17	37.79	--	--	16.17	--	-42.75	--	--	-15.64	-180.3
[redacted]	8/28/2017	082817[redacted]	375819.9365	4461527.773	Predominantly Microbial		--	47.96	0.3	0.4	0.62	<0.0001	-85.44	--	--	--	-241.2
[redacted]	10/25/2017	102517[redacted]	380821	4467847	Predominantly Microbial		--	69.23	--	--	0.4	<0.0001	-87.82	--	--	-20.93	-240.9
[redacted]	10/11/2017	101117[redacted]	381110	4457623	Predominantly Microbial		--	81.22	--	--	1.9	<0.0001	-85.05	--	--	-16.65	-234.8

Notes:
1) *Natural gas stored in Manlove Field.
2) Samples analyzed at Isotech Laboratories, Champaign Illinois.
3) < = Compound not detected at the Method Detection Limit (MDL).
4) -- = No data.
5) Unknown Source = Levels of methane and other hydrocarbons too low to distinguish microbial vs. thermogenic gas.

APPENDIX F
MOLECULAR AND ISOTOPIC GAS DATA
Groundwater Management Zone
Manlove Gas Storage Field

Location ID	Sample Date	Sample ID	X_coord	Y_coord	Final Classification (Based on Consideration of Notes)	Other Thermogenic Gas Source (1960's)	Nitrogen (N2) mg/L	Nitrogen (N_2) MOL %	Oxygen (O2) cc/L	Oxygen (O2) mg/L	Oxygen (O_2) MOL %	Propylene MOL %	$\delta^{13}C$ C1 ‰	$\delta^{13}C$ C2 ‰	$\delta^{13}C$ C3 ‰	$\delta^{13}C$ CO_2 ‰	δD C1 ‰
[redacted]	10/11/2017	10111[redacted]	382270	4459968	Predominantly Microbial		--	86.21	--	--	0.73	<0.0001	-70.7	--	--	-14.89	--
[redacted]	10/24/2017	10241[redacted]	382786	4458245	Unknown Source		--	85.38	--	--	0.56	<0.0001	--	--	--	-15.74	--
[redacted]	10/12/2017	10121[redacted]	380601	4457875	Predominantly Microbial		--	78.74	--	--	0.7	<0.0001	-85.17	--	--	-17.6	-239.3
[redacted]	11/22/2017	11221[redacted]	383570.09	4457537.879	Unknown Source		27	88.37	--	--	0.58	<0.0001	--	--	--	-18.88	--
[redacted]	11/20/2017	11201[redacted]	383489.0233	4461186.278	Unknown Source		28	86.64	--	--	2.48	<0.0001	--	--	--	-17.32	--
[redacted]n	10/24/2017	10241[redacted]	380554	4459957	Minor Thermogenic Component		--	78.61	--	--	0.45	<0.0001	-87.66	--	--	-16.15	-253.6
[redacted]	11/16/2017	11161[redacted]	382298.9463	4456074.586	Unknown Source		32	91.12	--	--	1.37	<0.0001	--	--	--	-18.65	--
[redacted]	1/5/2018	01051[redacted]	378957.0782	4456511.013	Thermogenic	Other	24	57.46	--	--	0.89	<0.0001	-50.2	-30.9	--	-17.44	-177.5
[redacted]	11/17/2017	11171[redacted]	382346.783	4456204.253	Unknown Source		28	90.23	--	--	1.65	<0.0001	--	--	--	-18.85	--
[redacted]	11/2/2017	11021[redacted]	378191	4455190	Thermogenic	Other	--	70.09	--	--	0.36	<0.0001	-57.19	-29.4	--	-17.13	-186.2
[1] Hunt #2	11/29/2017	Hunt #2	379877.7845	4459195.638	Thermogenic		--	0.66	--	--	<0.01	0.0004	-42.32	-29.85	-28.14	-15.61	-171.9
[redacted]	10/17/2017	10171[redacted]	381816	4457653	Predominantly Microbial		--	80.81	--	--	1.39	<0.0001	-86.28	--	--	-17.41	-226.8
[redacted]	8/28/2017	08281[redacted]	376936	4455146	Minor Thermogenic Component	Other	--	70.97	0.66	0.88	1.87	<0.0001	-80.77	-28.2	--	--	-225.5
[redacted]	11/17/2017	11171[redacted]	381986.5047	4456836.033	Unknown Source		31	87.99	--	--	2.74	<0.0001	-52.54	--	--	-20.48	--
[redacted]	3/15/2017	03151[redacted]	381905	4458377	Thermogenic		--	31.63	--	--	8.81	<0.0001	--	--	--	--	--
[redacted]	3/27/2019	B After	381905	4458377	Thermogenic		13	26.99	--	--	13.05	--	--	--	--	--	--
[redacted]	3/27/2019	B Before	381905	4458377	Thermogenic		7.6	7.19	--	--	0.24	--	--	--	--	--	--
[redacted]a	10/23/2017	10231[redacted]	367248	4446214	Predominantly Microbial		--	5.37	--	--	0.099	<0.0001	-74.15	--	--	-5.39	-232.8
[redacted]l	1/24/2019	01241[redacted]	376407.9043	4464207.514	Predominantly Microbial		25	36.14	--	--	0.47	--	-84.43	--	--	-16.72	-233.9
[redacted]	10/12/2017	10121[redacted]	381511	4457577	Predominantly Microbial		--	76.74	--	--	8.31	<0.0001	-86.43	--	--	-16.71	-232.2
[redacted]	12/21/2017	12211[redacted]	378430.3725	4455114.655	Thermogenic	Other	26	57.55	--	--	0.41	<0.0001	-51.84	-30.8	--	-17.47	-184.3
[redacted]	4/26/2017	04261[redacted]	382013	4458341	Unknown Source		--	80.54	--	--	7.28	<0.0001	--	--	--	--	--
[redacted]	10/30/2017	10301[redacted]	382013	4458341	Thermogenic		--	77.42	--	--	0.82	<0.0001	-43.3	--	--	-19.27	-185
[redacted]	4/4/2019	04041[redacted]	382013	4458341	Thermogenic		25	68.87	--	--	1.06	--	-43.27	--	--	-19.34	-183.7
[redacted]	11/2/2017	11021[redacted]	377998	4455194	Thermogenic	Other	--	44.79	--	--	0.44	<0.0001	-51.55	-30.4	--	-17.87	-183.3
[redacted]	12/20/2017	12201[redacted]	374501.7657	4455148.134	Predominantly Microbial		25	33.65	--	--	0.52	<0.0001	-82.27	--	--	-14.18	-240.5
[redacted]	6/25/2018	06251[redacted]	377403.4391	4459832.721	Predominantly Microbial		29	71.75	--	--	2.98	--	-88.72	--	--	-18.62	-238.6
[redacted]	10/17/2017	10171[redacted]	379488	4461732	Predominantly Microbial		--	80.35	--	--	0.84	<0.0001	-89.86	--	--	-17.89	-237.4
[redacted]	10/17/2017	10171[redacted]	370823	4457652	Minor Thermogenic Component	Other	--	83.64	--	--	1.75	<0.0001	-78.04	--	--	-16.2	-213.1
Mahomet, Village of, 6" Raw Water Line Port	10/16/2017	101617 VM Pre	381609.4117	4457937.901	Unknown Source		--	89.45	--	--	1.04	<0.0001	--	--	--	-17.93	--
Mahomet, Village of, 6" Raw Water Line Port	3/11/2019	031119VMpre	381609.4117	4457937.901	Unknown Source		26	88.72	--	--	0.75	--	--	--	--	-18.01	--
Mahomet, Village of, Faucet in Shop	10/16/2017	101617 VM Post	381601.7114	4457768.495	Unknown Source		--	80.12	--	--	11.88	<0.0001	--	--	--	-17.51	--
Mahomet, Village of, Faucet in Shop	3/11/2019	031119VMpost	381601.7114	4457768.495	Unknown Source		20	80.61	--	--	10.56	--	--	--	--	-17.67	--
[redacted]	12/8/2017	12081[redacted]	377970.0633	4449710.923	Unknown Source		11	85.37	--	--	1.66	<0.0001	--	--	--	-20.26	--
[redacted]	10/12/2017	10121[redacted]	378206	4458361	Predominantly Microbial		--	72.52	--	--	1.06	<0.0001	-89.2	--	--	-18.3	-243.6
[redacted]	11/2/2017	11021[redacted]	384162.4251	4455479.743	Unknown Source		--	90.05	--	--	0.73	<0.0001	--	--	--	-18.5	--
[redacted]	10/26/2017	10261[redacted]	380075	4466410	Predominantly Microbial		--	57.33	--	--	0.75	<0.0001	-88.51	--	--	-19.34	-235.2
[1] McCord #2	11/29/2017	McCord #2	381865.0259	445467.8011	Thermogenic		--	1.24	--	--	<0.01	<0.0001	-43.55	-33.98	-29.94	-8.29	-188.5
[redacted]	10/11/2017	10111[redacted]	381352	4457926	Unknown Source		--	86.4	--	--	1.19	<0.0001	--	--	--	-19.13	--
[redacted]	3/11/2019	031119[redacted]	381352	4457926	Unknown Source		25	85.5	--	--	0.82	--	--	--	--	-19.48	--
[redacted]h	10/12/2017	10121[redacted]	381697	4457618	Unknown Source		--	86.91	--	--	1.09	<0.0001	--	--	--	-19.36	--
[redacted]	11/17/2017	11171[redacted]	382272.9799	4456606.584	Unknown Source		30	90.95	--	--	1.76	<0.0001	--	--	--	-19.73	--
[redacted]	1/3/2018	01031[redacted]	382115.0482	4462848.64	Predominantly Microbial		27	78.9	--	--	0.29	<0.0001	-86.49	--	--	-16.4	-256.3
[redacted]	11/3/2017	11031[redacted]	397980.5969	4467913.838	Predominantly Microbial		--	22.26	--	--	0.17	<0.0001	-79.61	--	--	-10.71	-236.1
[redacted]	10/11/2017	10111[redacted]	382009	4458235	Predominantly Microbial		--	77.82	--	--	3.14	<0.0001	-84.86	--	--	-16.94	-233
[redacted]	7/24/2018	07241[redacted]	382009	4458235	Predominantly Microbial		30	77.33	--	--	2.95	--	-84.31	--	--	-17.3	-231.3
[redacted]	3/11/2019	031119[redacted]	382009	4458235	Predominantly Microbial		31	76.48	--	--	4.71	--	-84.16	--	--	-17.08	-230.4

Notes:
1) *Natural gas stored in Manlove Field.
2) Samples analyzed at Isotech Laboratories, Champaign Illinois.
3) < = Compound not detected at the Method Detection Limit (MDL).
4) -- = No data.
5) Unknown Source = Levels of methane and other hydrocarbons too low to distinguish microbial vs. thermogenic gas.

APPENDIX F
MOLECULAR AND ISOTOPIC GAS DATA
Groundwater Management Zone
Manlove Gas Storage Field

Location ID	Sample Date	Sample ID	X_coord	Y_coord	Final Classification (Based on Consideration of Notes)	Other Thermogenic Gas Source (1960's)	Nitrogen (N2) mg/L	Nitrogen (N_2) MOL %	Oxygen (O2) cc/L	Oxygen (O2) mg/L	Oxygen (O_2) MOL %	Propylene MOL %	$\delta^{13}C$ C1 ‰	$\delta^{13}C$ C2 ‰	$\delta^{13}C$ C3 ‰	$\delta^{13}C$ CO_2 ‰	δD C1 ‰
[redacted]	11/15/2018	111518[redacted]	381331	4458038	Unknown Source		27	85.6	--	--	2.33	--	--	--	--	-19.41	--
[redacted]	2/16/2017	021617[redacted]	382287	4461242	Unknown Source		--	68.99	--	--	13.37	<0.0001	--	--	--	--	--
[redacted]	7/19/2017	071917[redacted]	382287	4461242	Predominantly Microbial		--	55.93	--	--	0.26	<0.0001	-82.05	--	--	-16.84	-225.8
[redacted]	10/18/2017	101817[redacted]	383511	4457867	Unknown Source		--	85.22	--	--	1.85	<0.0001	--	--	--	-16.52	--
[redacted]	11/16/2017	111617[redacted]	378436.7614	4461667.953	Predominantly Microbial		28	78.2	--	--	1.23	<0.0001	-86.68	--	--	-17.31	-244
[redacted]	6/26/2018	062618[redacted]	378436.7614	4461667.953	Predominantly Microbial		24	80.61	--	--	3.6	--	-52.7	--	--	-17.19	-16
[redacted]	11/3/2017	110317[redacted]	383816.5535	4455359.602	Unknown Source		--	86.76	--	--	2.46	<0.0001	--	--	--	-18.06	--
[redacted]	5/6/2017	050617[redacted]	381661	4458483	Predominantly Microbial		--	81.33	--	--	0.85	<0.0001	-79.1	--	--	--	-202.7
[redacted]	3/1/2019	030119[redacted]-A	381661	4458483	Thermogenic		26	34.19	--	--	1	--	-47.99	--	--	-16.99	-179.8
[redacted]	3/1/2019	030119[redacted]-B	381661	4458483	Thermogenic		28	36.69	--	--	1.48	--	-47.5	--	--	-16.99	-181.5
[redacted]	11/20/2017	112017[redacted]	382374	4458350	Unknown Source		25	87.35	--	--	2.13	<0.0001	--	--	--	-18.8	--
[redacted]	11/3/2017	110317[redacted]	382304	4458346	Thermogenic		--	82.81	--	--	0.47	<0.0001	-43.07	--	--	-18.87	-182
[redacted])]	3/11/2019	031119[redacted]	382304	4458346	Thermogenic		27	59.81	--	--	0.8	--	-42.43	--	--	-18.68	-179.8
[redacted]e	11/7/2017	110717[redacted]	379054.47	4457991.242	Minor Thermogenic Component		26	74.49	--	--	0.53	<0.0001	-83.27	-30.3	-27.3	-17.77	-230.3
[redacted]	10/30/2018	103018[redacted]	379054.47	4457991.242	Unknown Source		21	82.31	--	--	3.33	--	--	--	--	-17.18	--
[redacted]	11/17/2017	111717[redacted]	379088.2968	4450620.081	Unknown Source		24	89	--	--	1.91	<0.0001	--	--	--	-18.24	--
[redacted]	10/16/2017	101617[redacted]	381547	4457845	Predominantly Microbial		--	78.38	--	--	0.51	<0.0001	-86.63	--	--	-16.6	-233.3
[redacted]	1/22/2018	012218[redacted]	368363.4199	4456874.087	Predominantly Microbial		10	11.54	--	--	0.11	<0.0001	-80.51	--	--	-12.07	-241.9
[redacted]	5/7/2018	050718[redacted]	368363.4199	4456874.087	Predominantly Microbial		13	11.94	--	--	0.23	--	-80.27	--	--	-11.29	-238.3
[redacted]	8/28/2017	082817[redacted]	379795	4455189	Unknown Source		--	87.44	0.74	0.98	2.58	<0.0001	--	--	--	--	--
[redacted]	10/9/2018	100918[redacted]-A	379795	4455189	Unknown Source		26	88.56	--	--	1.06	--	--	--	--	-16.67	--
[redacted]	10/9/2018	100918[redacted]-B	379795	4455189	Unknown Source		27	87.1	--	--	1.89	--	--	--	--	-16.65	--
[redacted]	9/22/2017	092217[redacted]	378955	4455448	Thermogenic	Other	27	48.4	2	2.6	3.59	<0.0001	-45.42	-29.84	--	-16.81	-162.7
[redacted]	7/10/2018	071018LT-A	378955	4455448	Thermogenic	Other	24	44.47	--	--	0.57	--	-44.98	--	--	-16.96	-165.4
[redacted]	7/10/2018	07101[redacted]B	378955	4455448	Thermogenic	Other	25	44.78	--	--	0.67	--	-45	-29.81	--	-17.03	-165.6
[redacted]	7/10/2018	07101[redacted]C	378955	4455448	Thermogenic	Other	24	44.5	--	--	0.64	--	-45.04	--	--	-17	-165.5
[redacted])	11/26/2018	[redacted]-112618	--	--	Thermogenic	Other	25	35.4	--	--	0.67	--	-43.82	-29.62	-26.9	-16.77	-162.8
Unknown 1A	4/10/2018	1A	--	--	Thermogenic		11	8.94	--	--	0.21	--	-42.99	--	--	-16.31	-170.7
Unknown 1B	4/10/2018	1B	--	--	Thermogenic		9.7	18.21	--	--	2	--	-42.45	--	--	-8.02	-165.2
[redacted]	11/16/2017	111617[redacted]	379316.0655	4459983.453	Predominantly Microbial		28	79.05	--	--	1.35	<0.0001	-90.91	--	--	-16.34	-244.4
[redacted]	3/17/2017	031717[redacted]	382721	4459137	Thermogenic		--	66.33	--	--	17.31	<0.0001	--	--	--	--	--
[redacted]	3/27/2019	C After	382721	4459137	Thermogenic		12	26.52	--	--	13.24	--	--	--	--	--	--
[redacted]	3/27/2019	C Before	382721	4459137	Thermogenic		1.7	3.04	--	--	0.4	--	--	--	--	--	--
[redacted]	10/25/2017	102517[redacted]	--	--	Predominantly Microbial		--	65.68	--	--	1.34	<0.0001	-78.82	--	--	-18.69	-226.9
Water District, Sangamon Valley, 3/4" Well line	10/18/2017	101817SVW-4	--	--	Predominantly Microbial		--	87.29	--	--	0.71	<0.0001	-76.17	--	--	-19.59	-230.7
Water District, Sangamon Valley, Lab sink finished water	10/18/2017	101817SV-F	--	--	Unknown Source		--	76.77	--	--	13.5	<0.0001	--	--	--	-19.41	--
Water District, Sangamon Valley, Lab sink well water	10/18/2017	101817SVW-1	--	--	Predominantly Microbial		--	88.33	--	--	0.8	<0.0001	-66.03	--	--	-19.09	--
Water District, Sangamon Valley, Well Hydrant	10/18/2017	101817SVW-3	--	--	Predominantly Microbial		--	87.16	--	--	5.21	<0.0001	-61.19	--	--	-18.7	--
[redacted]	3/22/2017	032217[redacted]	382000	4458600	Predominantly Microbial		--	79.31	--	--	3.62	<0.0001	-82.35	--	--	-17.14	-210.3
[redacted]	11/8/2017	110817[redacted]	382000	4458600	Predominantly Microbial		26	79.51	--	--	0.86	<0.0001	-85.51	--	--	-17.16	-233.4
[redacted]	3/14/2019	031419[redacted]	382000	4458600	Thermogenic		26	49.21	--	--	0.43	--	-51	--	--	-16.75	-189.8
[redacted]	6/13/2019	061319[redacted]	382000	4458600	Thermogenic		23	31.81	--	--	0.37	--	-46.37	--	--	-16.73	-183.9
[redacted]	10/25/2017	102517[redacted]	373401	4456855	Predominantly Microbial		--	27.09	--	--	0.22	<0.0001	-81.69	--	--	-12.93	-240.3
[redacted]	8/28/2017	082817[redacted]	384755	4453938	Unknown Source		--	67.82	--	--	19.17	<0.0001	--	--	--	--	--
[redacted]	10/26/2017	102617[redacted]	380692	4462950	Predominantly Microbial		--	76.54	--	--	1.25	<0.0001	-79.81	--	--	-18.94	-207
[redacted]	10/11/2017	101117[redacted]	381730	4457903	Predominantly Microbial		--	73.04	--	--	11.33	<0.0001	-86.67	--	--	-16.74	-235.9
[redacted]	3/11/2019	031119[redacted]	381730	4457903	Predominantly Microbial		30	72.75	--	--	3.7	--	-76.54	--	--	-16.79	-220.3

Notes:
1) *Natural gas stored in Manlove Field.
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