



2024 Annual Water Quality Report

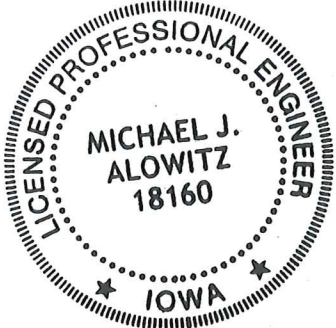


**Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa**

Viking Pump, Inc.
A Unit of IDEX Corporation

December 19, 2024

→ The Power of Commitment

Certification Page

	I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.	
		
	Michael Alowitz, P.E.	Date
	License Number: 18160	
	My license renewal date is: December 31, 2026	
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Executive Summary

This 2024 Annual Water Quality Report (Report) addresses the April 1-4, 2024 (April 2024) and October 7-9, 2024 (October 2024) sampling events at the Viking Pump (Viking) Foundry Sand Landfill in Cedar Falls, Iowa (Landfill). When discussing both the April 2024 and October 2024 sampling events they will be referred to as the 2024 sampling events. This Report also includes a leachate management summary covering December 2023 through October 2024.

This Report does not require an urgent review based on the included conclusions and recommendations. This is the second annual report to IDNR with a new statistical evaluation approach. Future monitoring will continue to provide data to evaluate changes in water quality over time. No other actions or permit amendments are needed based on this year's results.

The Landfill is in active use. The south cell continues to accept foundry sand waste such as green sand, isocure chemically bonded sand and no-bake sand. Viking contracted Wapsie Pines to fill the south cell in line with the Draft Operations and Fill Plan, dated August 17, 2024. Following a meeting at the Landfill in October 2023, Wapsie Pines constructed portions of the gravel haul road as described in the Draft Operations and Fill Plan drawings.

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Acronyms/Abbreviations

%	Percent
AL	Action Level
AMSL	Above Mean Sea Level
Avg.	Average
Ba	Barium
BG	Background
°C	Degrees Celsius
CCF	Centum Cubic Feet (One Hundred Cubic Feet)
cm/s	Centimeter per Second
COD	Chemical Oxygen Demand
DG	Downgradient
EPA	United States Environmental Protection Agency
FD	Field Duplicate Sample
Fe	Iron
FRZ	Frozen
ft	Feet
GPM	Gallons per Minute
GWQA	Groundwater Quality Assessment
HAL	Health Advisory Level
HMSP	Hydrologic Monitoring System Plan
IAC	Iowa Administrative Code
IDNR	Iowa Department of Natural Resources
ICL	Interwell Control Limit
ILCL	Interwell Lower Control Limit
IUCL	Interwell Upper Control Limit
LAL	Lower Action Level
M	Mean
MCL	EPA Maximum Contaminant Level
mg/L	Milligrams per Liter
MSL	Mean Sea Level
MW	Monitoring Well
N	Nitrogen (e.g., Ammonia (as N)) Normal Sample Result
N/A	Not Applicable
NC	No Change
ND	Non-Detect
NM	Not Measured
NS	Not Sampled
P.E.	Professional Engineer
PL	Prediction Limit

Acronyms/Abbreviations (cont'd)

QA/QC	Quality Assurance/Quality Control
S.C.	Specific Conductance
SD	Standard Deviation
SDWR	Secondary Drinking Water Regulation
SSD	Statistically Significant Decrease
SSI	Statistically Significant Increase
S.U.	Standard pH Units
SW	Surface Water (e.g., SW-1)
SWS	Statewide Standard
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
TOX	Total Organic Halogens/Halides
TT	Taste Threshold
U	Not Detected At or Above the Reporting Limit
UAL	Upper Action Level
UG	Upgradient
µg/L	Micrograms per Liter
µS/cm	Micro Siemens per Centimeter
VOC	Volatile Organic Compounds

1. Introduction

1.1 Background

This Report was prepared by GHD Services, Inc. (GHD) on behalf of IDEX Corporation for the evaluation of groundwater and surface water quality data from the Viking Pump (Viking) Foundry Sand Landfill (Landfill). The Landfill is located in Cedar Falls, Iowa. The site location is identified in Figure 1. This report includes data collected from the Landfill monitoring system since 1995. The Hydrologic Monitoring System Plan (HMSP) was initiated on September 26, 1995, with the issuance of the Sanitary Disposal Project Permit (Permit No. 07-SDP-12-89P-FSL) (Operating Permit). The current HMSP dated June 6, 2024 was included the Permit Renewal Application, submitted in June 2024. The Viking landfill permit expires on December 8, 2024 and a permit renewal application was submitted on June 17, 2024.

The current monitoring well system monitors the original landfill cell and the lined landfill cell constructed in 2014. The original landfill cell is unlined. In 2014, approximately 1.3 acres of side slope were constructed, and the top was lined to close the unlined portion of the landfill. The monitoring wells installed are intended to monitor groundwater conditions both upgradient and downgradient of the landfill. The current monitoring system locations are depicted on Figure 2.

1.2 Site History

The Landfill has been used as a disposal area for foundry waste generated at the Viking Pump Foundry since construction of the foundry. The site was undeveloped prior to that time. The Landfill operated as an unlined industrial landfill until 2014 when the unlined portion of the landfill was closed and capped. Foundry sand is currently placed in lined cells with leachate collection. The leachate is pumped to the Cedar Falls Wastewater Treatment Facility for treatment/disposal. The cap of the initial industrial landfill serves as a lined cell to place additional foundry sand. The Landfill has received the foundry waste streams generated at the Viking Pump Foundry, which include:

- Green sand;
- Isocure chemically bonded sand and;
- No-bake sand.

The general site geology is sand and clay layers in approximately the first 15 feet overlying a gray glacial till. In the northeast corner of the site, which is partially covered by the landfill, the upper oxidized till layers were removed. A sand layer is found approximately 50 feet below the water table. This sand lens is thickest at the north, thins to the south, and forms a glacial drift aquifer. Soil borings indicate over 100 feet of till is present under the Site.

Surface water from the covered areas of the Landfill flows to the perimeter ditch on the north and then to the northwest of the Landfill into a drainage area off-site. An east surface water ditch directs stormwater to the southern catch basin. Precipitation falling on the open areas of the landfill is collected as leachate. Shallow groundwater historically moves from the east to the west. Monitoring wells to the east of the landfill are located hydraulically upgradient. Monitoring wells located west of the landfill are downgradient.

1.3 Water Monitoring Program

Viking has an established program for monitoring groundwater quality at the landfill. Groundwater is not used for drinking water at the site. Hence, the monitoring program serves to evaluate the general condition of groundwater as a resource.

The monitoring program at the Landfill consists of water table and surface water monitoring systems. The sampling locations are shown in Figure 2. The monitoring systems are typically sampled on a semi-annual basis. Table 1 provides a monitoring program summary. Table 2 describes the monitoring program implementation schedule.

1.3.1 Water Table Monitoring System

A water table monitoring system was established to monitor groundwater upgradient and downgradient of the landfill in both the shallow and deep groundwater zones using a network of monitoring wells.

The water table monitoring system consists of three (3) upgradient monitoring wells (MW-5, MW-14, and MW-16), and nine (9) downgradient monitoring wells (MW-7R, MW-8, MW-11, MW-15, MW-17R, MW-19, MW-20, MW-21, and MW-22). MW-18 was abandoned and sealed in 2022 and is no longer included in the water table monitoring system. Two (2) additional monitoring wells MW-12 and MW-13 are used to gather water levels and are not sampled as part of the groundwater monitoring program for the Landfill.

GHD reviewed the location of MW-12, historical aerials of the landfill, and the MW-12 log itself to assess the suitability of the monitoring well. The former haul road adjacent to MW-12 was removed during the 2014 construction. The well log indicates specifically that MW-12 is drilled through the road, and it was capped with concrete and the well boring annulus filled with bentonite to the well screen which is at depth between 70-80 feet below ground surface. The likelihood of surface flow/connect to the well screen is relatively small and the well remains appropriate for use.

The locations of monitoring wells are presented on Figure 2. Additional discussion of the wells and piezometers installed are included in the following sections.

1.3.2 Surface Water Monitoring System

The surface water monitoring system consists of one (1) surface water monitoring location, SW-1, shown on Figure 2. This location may be dry, and samples are taken when surface water is present.

1.4 Monitoring Well Condition Assessment

The monitoring wells were inspected during the 2024 sampling events. Viking Pump performed maintenance on the monitoring wells in July 2019. During the 2024 sampling events the wells remained in good condition. Table 3 describes the monitoring well maintenance and performance re-evaluation schedule.

Total well depth was measured during the 2024 sampling events. Results are presented on Tables 3c and 4, respectively. Table 3c includes the original installation depth of each well and measured well depths in feet above mean sea level (AMSL) for comparison. Table 4 includes the original installation depth of each well and measured well depths in feet below top of casing for comparison. Most monitoring wells show little sediment buildup since they were installed, which suggests the wells are still in good physical condition. The measured total depths are consistent with expected results. In some cases, the recent total depth measurement exceeds the expected value. This is likely due to imprecise measurement at well construction.

1.5 Sampling Protocol Evaluation

The current sampling protocol, outlined in the HMSP, remains effective. Procedures in the sampling protocol, as described in 567-115.20(455B), were followed during the 2024 sampling events. IDNR sampling forms and GHD low-flow sampling forms are provided in Appendix A.

If recent drought conditions persist, some wells, like the surface water monitoring point, may have insufficient water to collect samples under standard purging procedures in the future.

1.6 Analytical Parameters

Samples collected during the 2024 sampling events were analyzed for the parameters presented in Table 2, which include but are not limited to metals like barium and iron, field parameters, and volatile organic compounds (VOCs) like benzene. These are as specified in chapter 115.26(4), paragraphs e and f of the Iowa Administrative Code (IAC) 567 and in the special provisions and amendments of the Operating Permit.

Historically dissolved metals (samples were field filtered) were analyzed in groundwater at the Landfill. In October 2018, the IDNR issued a variance to Viking Pump requiring total metals analysis. Samples are no longer analyzed for dissolved metals.

1.7 Laboratory Analysis

Laboratory analysis of groundwater and surface water samples was conducted by Eurofins, located in Cedar Falls, Iowa. Sample containers for the spring 2024 sampling event were prepared and provided by Eurofins, located in Minneapolis, Minnesota. Sample containers for the fall 2024 sampling event were prepared and provided by Eurofins located in Cedar Falls, Iowa. The laboratory reports for the 2024 sampling events are provided in Appendix B.

Analyses were conducted by Eurofins in accordance with the procedures and methods described in EPA Manual SW-846 or otherwise approved by the EPA.

As addressed in the comment letter dated September 4, 2024 regarding the 2023 Annual Water Quality Report (Document No. 109109), there was concern about temperature blanks received by Eurofins and the impact on the validity of test data. The temperature blank for samples received on October 4, 2023 at the Eurofins laboratory was 15.4 degrees Celsius and the temperature blank for samples received on October 5, 2023 was 11.5 degrees Celsius. The high temperature is due to the proximity of the lab to the Viking Pump Landfill. The temperature blank was placed in the iced cooler and then promptly delivered less than 2 miles to the laboratory. The issue was that the temperature blank did not have enough time to cool rather than be out of compliance because of insufficient ice or extended travel time. Temperature blanks will be placed in coolers earlier to be representative of samples throughout the day.

Following receipt of the final laboratory analytical reports from the fall 2024 sampling event, GHD completed an analytical data quality assessment and verification for the groundwater and field quality assurance samples collected during both monitoring events. Based on these assessments, the data are acceptable for use as reported by the laboratories.

2. Groundwater Flow Conditions

2.1 Horizontal Groundwater Flow

Static water levels at each monitoring well within the monitoring system network were measured during the 2024 sampling events and tabulated in Table 3a. Shallow and deep groundwater contours were prepared for the 2024 sampling events and are presented on Figure 3a and Figure 3b. The shallow and deep groundwater flow directions were consistent with historical patterns, flowing to the west and southwest, during the April 2024 and October 2024 sampling events.

2.2 Vertical Hydraulic Gradients

Water levels measured in monitoring well clusters MW-5/MW-16, MW-7R/MW-15, MW-8/MW-13, MW-17R/MW-12, MW-19/MW-20, and MW-21/MW-22 during the 2024 sampling events were used to calculate vertical hydraulic gradients for the site. The vertical hydraulic gradients were calculated using the following equation:

$$\text{Vertical Hydraulic Gradient} = \frac{\left(\begin{array}{c} \text{Groundwater Elevation} \\ \text{in Deep Well} \end{array} - \begin{array}{c} \text{Groundwater Elevation} \\ \text{in Shallow Well} \end{array} \right)}{\left(\begin{array}{c} \text{Elevation of Middle} \\ \text{of Saturated Zone} \\ \text{of Shallow Well Screen} \end{array} - \begin{array}{c} \text{Elevation of Middle} \\ \text{of Saturated Zone} \\ \text{of Deep Well Screen} \end{array} \right)}$$

During 2024, the vertical hydraulic gradients were downward directed. The calculated vertical hydraulic gradients are presented in Table 3b.

2.3 Water Level and Location Evaluation

As required by Paragraph 567-115.21(2)a of the IAC, an evaluation of the high and low water level elevations of each well and the vertical and horizontal acceptability of each well location was completed. Table 3a shows the elevations of the high and low water levels observed in each well during 2024 sampling events. The elevations of the top and bottom of the well screen are also provided in Table 3a to show where the observed water level was in comparison to the screen. No new historical low or high water level measurements were observed in either sampling event. Water level elevations in the monitoring wells for the April 2024 and October 2024 sampling events were located above the top of the well screen except at MW-5 and MW-8.

2.4 Potential Groundwater Mounding

During landfill cell and partial cover construction in 2014, it was determined that the waste mass contained leachate and released it slowly through the naturally occurring clay. The unlined landfill was closed in 2014, and the active areas for future waste disposal are lined. IDNR approved the removal of the former leachate piezometers when the landfill was capped. Leachate within the closed landfill was dewatered through a drain tile that was installed during construction. The drain tile discharge line was sealed late July 2019 as flows had decreased substantially. The discharge pipe was filled with bentonite, plugged, capped, and sealed.

The existing lined footprint head is monitored within the sump as standard practice. Leachate head is recorded daily and reported annually with the leachate volumes supplied in Table 10 and Appendix C. The nature of the foundry sand creates a transmissive waste mass. Although capillary action is possible, most water will percolate through to the leachate collection media and toward the sump. The leachate within the lined landfill is collected and disposed of through the City of Cedar Falls Water Reclamation Facility.

There is no evidence of groundwater mounding occurring in the clay at this site as evidenced by the lack of groundwater contours reflecting mounding and the leachate collection systems and data showing head does not exceed 12 inches.

2.5 Permeability Testing

In April and October 2024 GHD performed in situ hydraulic conductivity tests in the monitoring wells in order to estimate the hydraulic conductivity of the soils surrounding the well screens. GHD personnel performed all tests utilizing the rising head (slug out) and falling head (slug-in) tests using a polyvinyl chloride slug tool to induce displacement. Data were collected from Van Essen Instrument Divers. The hydraulic conductivity was estimated utilizing the AQTESOLV Pro v4.51 using the solution from Bouwer and Rice (1976) for confined and unconfined aquifers.

Table D1 in Appendix D shows the summary of the hydraulic conductivity testing and the most recent rounds results. Appendix D also includes the calculations and raw data from the field testing. Table 4 shows the summary of the previous hydraulic conductivity testing and the most recent rounds results.

The majority of the monitoring well hydraulic conductivity testing estimates indicate a significant reduction in permeability, particularly for wells with higher conductivity in 2019. In one case, the reported decrease is nearly two orders of magnitude. The reason for the reported changes is unclear, however it is noted that for several wells

(MW-7R, MW-8, MW-11, MW-14) the 2024 test results are much closer to the baseline results than 2019 results. For several newer wells (MW-16, MW-19, MW-20, MW-21, and MW-22), 2019 served as the baseline event.

3. Analysis of Annual Monitoring Results

Groundwater quality is assessed against two benchmarks. The first is comparison against upgradient conditions represented by Interwell Control Limits (ICLs) per IAC 567.113.10(4)g(3). The second is comparison against IDNR risk-based Action Levels (ALs). The methodology and results of these comparisons are discussed in the following report sections.

3.1 Interwell Control Limits (Upgradient Comparisons)

Requirements for the statistical analysis of groundwater monitoring data are prescribed in IAC 567.113.10(4). Under the regulation, four categories of statistical comparisons are listed (under 113.10(4)g) for the purposes of comparing groundwater quality in downgradient wells against that found in upgradient wells (i.e., *Interwell* comparisons). Chapter 567-113 is not the regulation under which the Landfill is permitted, but IDNR indicated the statistical analysis should be completed in accordance with this regulation. This section of the IAC regulation is based on federal RCRA regulation (40CFR264.97(h)), for which USEPA issued a Unified Guidance document in 2009¹. This Unified Guidance provides more concrete description and interpretation of the regulation, with the focus of providing a statistical framework and tools for conducting monitoring data evaluations.

USEPA (2009) recommends the use of statistical prediction limits (PLs) with resampling for performing interwell comparisons (see Chapters 18 and 19). These values are similar conceptually to the previous IDNR control limit methodology (mean \pm two standard deviations) in that a historical baseline of data from groundwater collected in upgradient wells is utilized to calculate values bounding the statistical tails of the background distribution against which downgradient data may be compared. The statistical PLs provide bounds with specified confidence that the next number of future samples collected from the same population (i.e., consistent with upgradient conditions) are expected to lie within. If a result from downgradient sample lies outside of the PLs and is confirmed by a verification sample, then a statistically significant increase (SSI) is identified.

ICLs were calculated applying the methodology presented in Chapter 19 of the Unified Guidance. Specifically, an annual site-wide false positive rate (SWFPR) of 0.10, the default recommendation in the Unified Guidance, was applied utilizing a “1-of-2” Interwell Prediction Limit model. Based on the current monitoring program, the PLs were calculated for a semi-annual monitoring program consisting of ten downgradient wells, and ten constituents of concern (in consideration that groundwater temperature, included in reporting, is not commonly included/counted in statistical testing of groundwater quality).

PL calculations were carried out for each constituent of concern by pooling the monitoring data from upgradient wells MW-5, MW-14 and MW-16, following the Unified Guidance. The resulting ICLs are presented in Table 5. Some specific items of note during the calculations include the following:

- Field duplicate results were averaged prior to statistical calculations (duplicates are not statistically independent data).
- Data distribution testing was carried out using probability plotting and the statistical goodness-of-fit tests provided in USEPA’s ProUCL software². The statistical distributions tested, in priority order, were normal, gamma and lognormal distributions.

¹ USEPA, March 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance. Office of Resource Conservation and Recovery, Program Implementation and Information Division, United States Environmental Protection Agency Washington DC. EPA 530-R-09-007

² Current version 5.2, available at <https://www.epa.gov/land-research/proucl-software>

- The presence of censored data (non-detects) was assessed, and statistical methodology was adjusted to accommodate these data. Where very high proportions of censored data were present (above 70 percent non-detects and/or fewer than 8 detected results in the pooled upgradient dataset), rank-based (non-parametric) statistical methods were used.
- The presence of statistical outliers was tested for. Four data sets were found to have statistical outliers at a 95 percent confidence level, and these were removed from the prediction level calculations (as a long monitoring history is available with 89 to 180 results available, varying by constituent). These were:
 - Three pH values in upgradient groundwater – one high and one low (9.93 and 4.85)
 - Five high iron values (35.6, 23.6, 8.24, 7.15, and 6.19 mg/L)
 - One high chemical oxygen demand (COD) result (78.0 mg/L)
 - Two high chloride values (201 and 137 mg/L)
- Although not identifiable as statistical outliers, the phenolics and total organic halide data sets each contained one recent non-detect with an elevated reporting limit (an order of magnitude above the typical reporting limits). Since both data sets were highly-censored and required non-parametric PL calculations, these two elevated non-detects were excluded from computations since the resulting interwell comparison values would be based on detected concentrations.
- The potential for significant seasonal variation was investigated by comparing the Spring vs. Fall sampling results using box-whisker plots. The only constituent with an identifiable seasonal effect was groundwater temperature (higher in Fall vs. Spring samples), and no further consideration of seasonality was carried through in the prediction limit calculations (i.e., no de-seasonalization of the data was attempted).
- Temporal stationarity, an assumption of the PL calculations, was assessed through trend testing. Specifically, a Regional Kendall trend test was conducted (recognizing that constituent concentrations in the three upgradient wells do vary) for each constituent. Statistically significant increasing trends were identified for specific conductance, pH, iron, and chloride concentrations in upgradient groundwater over the entire monitoring period (1995-2024). Therefore, these data sets were trimmed (i.e., excluding older data) to obtain temporally-stable baseline periods. The resulting baseline periods for each background data set are presented in Table 5.
- Following initial ICL calculations for chloride (which utilized a baseline period of 1996-2024), it was identified that current conditions in groundwater from upgradient well MW-5 have exceeded the resulting PL over the past 3 years. This signifies a change in regional upgradient conditions and therefore the baseline period for chloride was further trimmed to represent current upgradient conditions (i.e., a baseline period of 2022-2024).
- Finally, the potential presence of significant spatial variation between the three upgradient wells was graphically assessed using box-whisker plots. The following differences are apparent:
 - Specific conductance in groundwater from MW-14 is higher than the other two upgradient wells.
 - pH at MW-16 is higher than at MW-14 (but not different from MW-5).
 - Barium and COD are lower at MW-14 than at the other two upgradient wells.
 - MW-16 has higher ammonia and lower chloride levels than the other two upgradient wells.
- Although the present analysis utilized the pooled upgradient data sets (pooling the three monitoring wells), the presence of measurable spatial variation is noted, and therefore the use of intrawell comparisons for analysis of the groundwater quality data (appropriate when significant spatial variation is present, per USEPA's Unified Guidance) may be considered in the future if needed.

For pH, both upper and lower PLs were calculated and are listed in Table 5.

The ICLs are also provided in Tables 6, 7 and 9 for reference in evaluating the downgradient groundwater quality. Similarly, they are included on the graphs in Appendix E. Data, outputs and calculations involved in this statistical analysis are included in Appendix F.

As an important application note, the ICLs as calculated are to be applied utilizing a 1-of-2 verification approach. That is, a single result above the PL (or below for pH) is considered as an initial or unconfirmed increase. If the next

subsequent sample does not exceed the limit, then no SSI is present. It is only when two successive samples both exceed the control limit (or are below for pH) that an SSI is identified.

3.2 IDNR Action Levels

In order to evaluate the status of water quality at the landfill, a comparison was made to the IDNR ALs established by the IAC 567-133. IDNR ALs are established for specific chemical and exposure numbers, lifetime exposure, cancer risks (for carcinogens), and drinking water exposure over a 70-year period. The following are definitions of various terms used in Rule 567-133.2 455B, 455E), IAC:

- IDNR Action Level (AL) – The IDNR AL for the contaminant is as follows: the United States Environmental Protection Agency (USEPA) Maximum Contaminant Level (MCL), or if none exists, the Health Advisory level (HAL), if one exists; if there is no MCL or HAL, then the Secondary Drinking Water Regulation (SDWR) may be referenced. If there is no MCL, HAL, or SDWR guideline, an AL may be established by the IDNR based on current technical literature and recommended guidelines of the USEPA such as the Iowa Statewide Standard (SWS) and recognized experts on a case-by-case basis. Each type of AL is defined as follows:
 - Maximum Contaminant Level (MCL) – The enforceable MCL is established by the United States Environmental Protection Agency (USEPA) pursuant to the Safe Drinking Water Act.
 - Health Advisory Level (HAL) – A lifetime HAL for a contaminant is established by the USEPA. HALs represent the concentration of a single contaminant, based on current toxicological information in drinking water, which is not expected to cause adverse health effects over a lifetime of exposure.
 - Secondary Drinking Water Regulation (SDWR) – A SDWR value exists for some contaminants that do not have HALs or MCLs. The number represents the aesthetic qualities of the parameter and is generally not an enforceable limit. These are also established by the USEPA pursuant to the Safe Drinking Water Act.
 - Statewide Standard (SWS) – Where no MCL, HAL, or SDWR value exists, the IDNR-established SWS is used for evaluation.

ALs are identified for each parameter in Table 5.

3.3 Groundwater Quality

Parameters analyzed and evaluated during the 2024 sampling events, the applicable IDNR AL for each, and a brief summary of analytical results for the sampling events is presented in this section. The statistical analyses included in Section 3.1 should be referred to while reviewing the following summaries. A comparison of the most recent constituent results against the ICLs is presented in Table 6. In addition, a summary of the most recent results for individual parameters at monitoring wells or surface water points that had a current or recent exceedance (within the past three years) of either the IDNR AL or the ICL are presented on Table 7. Historical data from 1995 to 2024 are presented on Table 8. A brief summary of both IDNR AL and ICL exceedances within the past three years is presented on Table 9.

At the request of the IDNR, acetone and total suspended solids (TSS) were added to the sampling program. The results of these constituents are included in Table 8 and the analytical results in Appendix B. However, no statistical analyses were performed, and no trend analyses were performed, due to an insufficient amount of data. When there is a sufficient amount of data, control limits will be established, and they will be included in the statistical analysis discussion and monitored as the rest of the parameters of concern are.

3.3.1 Field Parameters

3.3.1.1 pH

The IDNR AL for pH is the final SDWR of 6.5 to 8.5 standard pH units (S.U). SW-1 exceeded the upper AL (UAL) for pH at 8.58 S.U. in April 2024. The lower AL (LAL) for pH was exceeded by all MW locations in April 2024, except MW-11, MW-15, and MW-21. In October 2024, six MW locations exceeded the LAL for pH (MW-5, MW-11, MW-17R, MW-20, MW-21, and MW-22); the values for these exceedances can be found in Table 8. The IDNR UAL/LAL for pH was not exceeded at the other monitoring well locations during the 2024 sampling events.

The Interwell Lower Control Limit (ILCL) for pH is 6.05 S.U. MW-8 and MW-22 exceeded the ILCL for pH in April 2024 at 6.01 S.U. and 5.82 S.U., respectively. MW-20 exceeded the ILCL for pH in October 2024 at 6.01 S.U.. The Interwell Upper Control Limit (IUCL) for pH is 8.28 S.U. SW-1 exceeded the IUCL for pH at 8.58 S.U. in April 2024. The IUCL for pH was not exceeded at other monitoring well locations during the 2024 sampling events. The IUCL or ILCL for pH was not exceeded at the other monitoring well locations during the 2024 sampling events.

Since the exceedances of the ICLs were singular, they are unconfirmed SSIs or statistically significant decreases (SSDs). There were no other significant comparisons to either the IDNR UAL/LAL or IUCL/ILCL for pH during the 2024 sampling events.

The graph showing historical pH results are presented in Figure E-1 of Appendix E.

3.3.1.2 Specific Conductance

Specific conductance is a qualitative measurement of the components of leachate such as inorganic acids, bases, and salts. Due to the historically elevated salt concentrations, it is to be expected that the specific conductance would be elevated as well.

There is no IDNR AL for specific conductance.

The ICL for specific conductance is 3,044 micro-Siemens per centimeter ($\mu\text{S}/\text{cm}$). The ICL for specific conductance was not exceeded at the other monitoring well locations during the 2024 sampling events.

No significant comparison could be made to the ICL for specific conductance during the 2024 sampling events.

The chart showing historical specific conductance results are presented in Figure E-2 of Appendix E.

3.3.1.3 Temperature

There is no IDNR AL for temperature.

The ICL for temperature is 20.3 degrees Celsius ($^{\circ}\text{C}$). MW-5 exceeded the ICL for temperature at 22.24 $^{\circ}\text{C}$ in October 2024. Since the exceedance was singular, it is an unconfirmed SSI. The exceedance follows the seasonal variation trend where fall temperatures are higher than spring temperatures. The ICL for temperature was not exceeded at the other monitoring well locations during the 2024 sampling events.

There was no significant comparison to the ICL for temperature during the 2024 sampling events.

The chart showing historical temperature measurements are presented in Figure E-3 of Appendix E.

3.3.2 Inorganics

3.3.2.1 Ammonia

The IDNR AL for ammonia nitrogen is the draft lifetime HAL and Taste Threshold of 30 milligrams per liter (mg/L). The IDNR AL for ammonia was not exceeded by monitoring well locations during the 2024 sampling events.

The ICL for ammonia is 1.85 mg/L. MW-20 exceeded the ICL for ammonia at 2.15/2.12 mg/L in April 2024 (the sample was a duplicate). Since the ammonia exceedance at MW-20 is a singular event, and a subsequent sample was taken

where there was not an exceedance, it is not a significant increase. The ICL for ammonia was not exceeded at the other monitoring well locations during the 2024 sampling events.

There was no significant comparison to either the IDNR AL or ICL for ammonia during the 2024 sampling events.

The chart showing historical ammonia nitrogen concentrations are presented in Figure E-4 of Appendix E.

3.3.2.2 Barium

The IDNR AL for barium is the final MCL of 2.0 mg/L. The IDNR AL for barium was not exceeded at the monitoring well locations during the 2024 sampling events.

The ICL for barium is 0.340 mg/L. The ICL for barium was not exceeded at the monitoring well locations during the 2024 sampling events.

No significant comparison could be made to the ICL for barium during the 2024 sampling events.

The chart showing historical barium results are presented in Figure E-5 of Appendix E.

3.3.2.3 Iron

The installation of a liner system in 2014, which serves as a cap over the unlined portion of the landfill, is expected to improve iron concentration in groundwater quality over time.

Beginning with the 2024 sampling events, Eurofins used EPA Method 6020B to analyze for iron in all samples, including groundwater, surface water, and leachate. This method has a lower non-detect reporting limit (RL) of 0.100 mg/L, allowing for better determination of exceedances of the SDWR value (0.3 mg/L) compared to the previous method where the reporting limit was greater than the SDWR value.

The IDNR AL for iron is the SDWR of 0.3 mg/L. The IDNR AL for iron was exceeded by wells MW-7R, MW-15, MW-17R, MW-20, MW-21, and MW-22 during both of the 2024 sampling events. MW-16, MW-19, and SW-1 exceedances only occurred in April 2024. MW-5 only exceeded the AL during the October 2024 sampling event. The sample results for iron can be found in Table 8.

There were no exceedances if the ICL (16.50 mg/L) for iron during the 2024 sampling events.

The SDWR value was exceeded at MW-7R, MW-15, MW-17R, MW-20, MW-21, and MW-22 during the two most recent sampling events, but the ICL was not. There were no other significant comparisons to either the IDNR AL or ICL for iron during the 2024 sampling events.

The chart showing historical iron results are presented in Figure E-6 of Appendix E.

3.3.3 Organics

3.3.3.1 Benzene

The IDNR AL for benzene is the final lifetime HAL of 3 micrograms per liter ($\mu\text{g/L}$). The IDNR AL for benzene was not exceeded at the monitoring well locations during the 2024 sampling events.

The ICL for benzene is 0.500 U $\mu\text{g/L}$. The benzene samples results were non-detect (0.500 U $\mu\text{g/L}$) during the 2024 sampling events, therefore the ICL for benzene was not exceeded at the monitoring well locations during the 2024 sampling events.

No significant comparison could be made to the IDNR AL or ICL for benzene during the 2024 sampling events.

The chart showing historical benzene concentrations are presented in Figure E-7 of Appendix E.

3.3.3.2 Phenol

Phenol is an aromatic, organic compound that migrates readily in groundwater.

The IDNR AL for phenol is the draft lifetime HAL of 2 mg/L. Samples are analyzed for phenol during the spring sampling event of each monitoring year. Historically, samples have been non-detect with few exceptions. The IDNR AL for phenol was not exceeded at the monitoring well locations during the 2024 sampling events.

The ICL for phenol is 0.0519 mg/L. The ICL for phenol was not exceeded at the monitoring well locations during the 2024 sampling events.

No significant comparison could be made to the IDNR AL or ICL for phenol during the 2024 sampling events.

The chart showing historical phenol results are presented in Figure E-8 of Appendix E.

3.3.3.3 Total Organic Halogens

There is no IDNR AL for total organic halogens (TOX). Samples are analyzed for TOX during the spring sampling event of each monitoring year.

Historically, TOX concentrations were elevated and attributed to chloride from the use of salt on gravel roads in the winter. To evaluate this potential influence, the Viking Pump facility changed the de-icing compound used during the 2011/2012 winter to a sand and salt mixture, reducing the amount of sodium chloride put onto the facility roads. Decreased chloride and TOX concentrations were noted during the following years at the monitoring well locations except for MW-18 (plugged and abandoned in 2022). The potential influence of chloride to TOX levels will continue to be evaluated with future sampling events. Viking will continue using the sand/salt de-icing mixture during future winter seasons to minimize the amount of sodium chloride near the monitoring points.

The ICL for TOX is 0.126 mg/L. The ICL for TOX was not exceeded at any monitoring well locations during the 2024 sampling events.

There were no significant comparisons to the ICL for TOX during the 2024 sampling events.

The chart showing historical TOX results are presented in Figure E-9 of Appendix E.

3.3.4 General Chemistry

3.3.4.1 Chloride

The IDNR AL for chloride is 250 mg/L. The IDNR AL was not exceeded at the monitoring well locations during the 2024 sampling events.

The ICL for chloride is 344 mg/L. The ICL for chloride was not exceeded at any monitoring well locations during the 2024 sampling events.

There were no significant comparisons to the ICL for chloride during the 2024 sampling events.

The chart showing historical chloride concentrations are presented in Figure E-10 of Appendix E.

Viking changed the de-icing compound used during the 2011/2012 winter to a sand and salt mixture, reducing the amount of sodium chloride put onto the facility roads. The reduction and or stabilization of concentrations can be seen in the trends for the downgradient wells near the road. Elevated chloride in upgradient background monitoring well MW-5 not likely due to treatment of facility roads.

3.3.4.2 Chemical Oxygen Demand

COD is a measure of the oxygen equivalent of the organic content of a sample that is susceptible to oxidation by a strong chemical oxidant. There is no IDNR AL for COD.

The ICL for COD is 12.3 mg/L. The ICL for COD was exceeded at MW-11, MW-17R, and MW-22 in both April and October 2024. Other exceedances during April 2024 were at wells MW-8, MW-16, and SW-1. Well MW-7R only exceeded the ICL for COD in October 2024. The ICL for COD was not exceeded at the other monitoring well locations during the 2024 sampling events. The sample results for COD can be found in Table 8.

The exceedances at MW-11, MW-17R, and MW-22 are confirmed SSIs. The other exceedances were singular, and these are either unconfirmed SSIs or not significant increases. There were no other significant comparisons to the ICL for COD during the 2024 sampling events.

The chart showing historical COD concentrations are presented in Figure E-11 of Appendix E.

3.4 Surface Water Quality

There is only one surface water location (SW-1), which is located downgradient of the Landfill in a drainage ditch that is typically dry. Since no upgradient sampling point exists for surface water, no control limits can be calculated, therefore surface water samples can only be compared to the IDNR ALs.

Surface water samples were collected in April 2024, but not in October 2024 due to dry conditions. Surface water samples did not exceed the IDNR AL for the constituents analyzed in April 2024.

Charts showing historical constituent concentrations at SW-1 are presented in Appendix E.

3.5 Leachate Quality

Leachate samples were collected from the landfill leachate sump during the 2024 sampling events. The leachate head and flow volumes are measured and recorded daily. Leachate management is summarized in Table 10 and full details are included in Appendix C. The leachate sampling results are summarized in Table 11. Viking collects samples for the parameters per the requirements of the City of Cedar Falls. The leachate lab reports are included in Appendix B.

The results support the conclusion that high chloride concentrations detected at upgradient, downgradient, and background wells are not a result of leaching from the landfill but rather from the use of road salt for de-icing since chloride concentrations detected in the leachate samples are typically lower than the concentrations detected at various monitoring well locations.

There were no detected concentrations of VOCs reported in the leachate samples for 2024. There was a qualifier for the leachate sample in October for hexane, denoting that the Laboratory Control Sample and/or Laboratory Control Sample Duplicate is outside acceptance limits, high biased.

Detected total metals include barium, copper, iron, lead, manganese, and molybdenum during the 2024 sampling events. Barium has been detected in monitoring wells at low concentrations, often at concentrations one to two orders of magnitude below the IDNR AL. The April and October 2024 leachate samples exceeded the IDNR AL for iron. Detected constituents from previous leachate samples will be added to the groundwater and surface water monitoring program starting with the scheduled events in 2024. Neither ammonia or phenols were detected in the spring or fall leachate samples.

4. Groundwater Quality Assessment

The approved Groundwater Quality Assessment (GWQA) for the existing Landfill contained, but is not limited to the following components:

- Chemical leaching test for each sand type to determine parameters for expanded monitoring program
- Evaluation of expanded monitoring program
- Installation of additional monitoring wells
- Sampling of additional monitoring wells

Details of each component is provided in the following sections.

4.1 Chemical Leaching Tests

Chemical leaching tests of each type of sand disposed within the Landfill were completed in early 2009. Barium and benzene were detected in the toxicity characteristic leaching procedure (TCLP) tests and were recommended for inclusion in the expanded monitoring program. At the direction of the IDNR, monitoring of barium and benzene were added to the semi-annual monitoring program. TCLP analysis was performed on the waste stream in April 2024 and was included in the Permit Application submitted in June 2024. The analysis was compared to the leachate parameters detected and the parameters that appeared in both the TCLP results as well as the leachate were added to the groundwater monitoring program proposed in the Permit Application. The parameters will be added to the groundwater monitoring program upon renewal of the permit. The analytical report for this sample can be found in Appendix B.

Barium and benzene were analyzed in leachate samples obtained during the 2024 sampling events. Results show that barium and benzene concentrations in leachate are non-detect or well below the IDNR ALs for groundwater. As discussed in Sections 3.3.2.2 and 3.3.3.1, barium and benzene concentrations at monitoring well and surface water locations are below the IDNR ALs for groundwater. Sampling results show that barium leaching from the various types of sand disposed in the Landfill is not the main source impacting groundwater since the leachate concentrations are typically less than the monitoring well and surface water location concentrations.

Foundry sand additives have not been modified from the permitted waste list. Should Safety Data Sheet (SDS) data comparisons indicate that a new waste material is proposed, the material will be tested and notification provided to IDNR.

4.2 Evaluation of Current Monitoring Program

Based on the results of the 2024 sampling events the groundwater quality shows minimal impacts and a reduction of impacts from the landfill compared to previous years for most parameters. The only confirmed SSI above ICLs is iron at MW-7R. Unconfirmed SSIs include pH at MW-5, COD at MW-8, temperature at MW-11, pH at MW-14, COD and temperature at MW-17R, iron, ammonia and TOX at MW-20, and pH at MW-22. Future monitoring will continue to provide data to evaluate changes in water quality over time. At multiple locations the SDWR limit (based on aesthetics) was exceeded for iron. Historical trends that also show IDNR AL and ICL exceedances are presented in Appendix E.

Since the initial expanded monitoring program sampling events, the wells within the monitoring system network have been sampled annually for the complete parameter list noted above and semi-annually for a partial parameter list as approved by the IDNR. The only change in the monitoring program between 2019 to 2024 was the plugging and abandonment of MW-18 in October 2022.

4.3 Installation and Sampling of Additional Monitoring Wells

No additional monitoring wells are proposed for the site at this time.

4.4 Recommendations

Based upon the results of the monitoring program noted above, continued sampling of the existing monitoring network is recommended.

Tables

Table 1

**Monitoring Program Summary
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa**

Monitoring Well	Formation	Current Monitoring Program	Change for Next Sampling Event	Control Limit Exceedances within Past 3 Years (Past 6 Sampling Events)	Total # of Samples in each Monitoring Program since January 1, 2018		
					Routine	Supplemental	Remedial Action
MW-5	Shallow	Routine	NC	Chloride, TOX, pH, Temperature	18	0	0
MW-7R	Shallow	Routine	NC	Chloride, COD, TOX	12	0	0
MW-8	Shallow	Routine	NC	COD, pH	12	0	0
MW-11	Shallow	Routine	NC	COD, pH, Temperature	12	0	0
MW-12	Deep	Water Level	NC	N/A	N/A	N/A	N/A
MW-13	Deep	Water Level	NC	N/A	N/A	N/A	N/A
MW-14	Shallow	Routine	NC		15	0	0
MW-15	Deep	Routine	NC	pH	12	0	0
MW-16	Deep	Routine	NC	Barium, Iron, COD, pH	12	0	0
MW-17R	Shallow	Routine	NC	Iron, COD, TOX, pH, Temperature	17	0	0
MW-18	Shallow	Removed	N/A	Chloride, COD, TOX, S.C.	9	0	0
MW-19	Shallow	Routine	NC	pH	12	0	0
MW-20	Deep	Routine	NC	Ammonia, COD, TOX, pH	14	0	0
MW-21	Shallow	Routine	NC	pH	13	0	0
MW-22	Deep	Routine	NC	Iron, COD, pH	14	0	0
Other monitoring points							
SW-1	Surface Water	Routine	NC	COD, TOX, pH	7	0	0

Key:

COD - Chemical Oxygen Demand

MW - Monitoring Well

N - Nitrogen

N/A - Not Applicable

NC - No Change

S.C. - Specific Conductance

SW - Surface Water

TOX - Total Organic Halogens

Table 2
Monitoring Program Implementation Schedule
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa

Monitoring Well							Upcoming Sampling Dates and Constituents	
	April-2022	October-2022	March-2023	October-2023	March-2024	October-2024	March-2025	October-2025
MW-5	List A, List B, List C	List A, List C	List A, List B, List C	List A, List C	List A, List B, List C, List D	List A, List C, List D	List A, List B, List C, List D	List A, List C, List D
MW-7R	List A, List B, List C	List A, List C	List A, List B, List C	List A, List C	List A, List B, List C, List D	List A, List C, List D	List A, List B, List C, List D	List A, List C, List D
MW-8	List A, List B, List C	List A, List C	List A, List B, List C	List A, List C	List A, List B, List C, List D	List A, List C, List D	List A, List B, List C, List D	List A, List C, List D
MW-11	List A, List B, List C	List A, List C	List A, List B, List C	List A, List C	List A, List B, List C, List D	List A, List C, List D	List A, List B, List C, List D	List A, List C, List D
MW-12	<i>N/A - Water Level Only</i>	<i>N/A - Water Level Only</i>	<i>N/A - Water Level Only</i>	<i>N/A - Water Level Only</i>	<i>N/A - Water Level Only</i>	<i>N/A - Water Level Only</i>	<i>N/A - Water Level Only</i>	<i>N/A - Water Level Only</i>
MW-13	<i>N/A - Water Level Only</i>	<i>N/A - Water Level Only</i>	<i>N/A - Water Level Only</i>	<i>N/A - Water Level Only</i>	<i>N/A - Water Level Only</i>	<i>N/A - Water Level Only</i>	<i>N/A - Water Level Only</i>	<i>N/A - Water Level Only</i>
MW-14	List A, List B, List C	List A, List C	List A, List B, List C	List A, List C	List A, List B, List C, List D	List A, List C, List D	List A, List B, List C, List D	List A, List C, List D
MW-15	List A, List B, List C	List A, List C	List A, List B, List C	List A, List C	List A, List B, List C, List D	List A, List C, List D	List A, List B, List C, List D	List A, List C, List D
MW-16	List A, List B, List C	List A, List C	List A, List B, List C	List A, List C	List A, List B, List C, List D	List A, List C, List D	List A, List B, List C, List D	List A, List C, List D
MW-17R	List A, List B, List C	List A, List C	List A, List B, List C	List A, List C	List A, List B, List C, List D	List A, List C, List D	List A, List B, List C, List D	List A, List C, List D
MW-18	List A, List B, List C	List A, List C	<i>N/A - well removed</i>	<i>N/A - well removed</i>	<i>N/A - well removed</i>	<i>N/A - well removed</i>	<i>N/A - well removed</i>	<i>N/A - well removed</i>
MW-19	List A, List B, List C	List A, List C	List A, List B, List C	List A, List C	List A, List B, List C, List D	List A, List C, List D	List A, List B, List C, List D	List A, List C, List D
MW-20	List A, List B, List C	List A, List C	List A, List B, List C	List A, List C	List A, List B, List C, List D	List A, List C, List D	List A, List B, List C, List D	List A, List C, List D
MW-21	List A, List B, List C	List A, List C	List A, List B, List C	List A, List C	List A, List B, List C, List D	List A, List C, List D	List A, List B, List C, List D	List A, List C, List D
MW-22	List A, List B, List C	List A, List C	List A, List B, List C	List A, List C	List A, List B, List C, List D	List A, List C, List D	List A, List B, List C, List D	List A, List C, List D
SW-1	List A, List B, List C	List A, List C DRY	List A, List B, List C	List A, List C DRY	List A, List B, List C, List D	List A, List C, List D DRY	List A, List B, List C, List D	List A, List C, List D

Notes:

List A - Semi-Annual Parameters¹: Chloride, COD, Ammonia (as N), Iron (Total, formerly Dissolved), and Field Parameters¹: pH, Specific Conductance, Temperature

List B - Annual Parameters²: Phenols, TOX

List C - Groundwater Quality Assessment Plan Parameters³: Barium (Total, formerly Dissolved), Benzene

List D - Acetone and TSS as requested by IDNR

¹ As specified by Iowa Administrative Code 567-115.26(4)e

² As specified by Iowa Administrative Code 567-115.26(4)f

³ As specified by Amendment #2 to permit number 07-SDP-12-89P

Key:

COD - Chemical Oxygen Demand

MW - Monitoring Well

N - Nitrogen

N/A - Not Applicable

SW - Surface Water

TOX - Total Organic Halogens

TSS - Total Suspended Solids

Table 3

**Monitoring Well Maintenance and Performance Reevaluation Schedule
 2024 Annual Water Quality Report
 Viking Pump Foundry Sand Landfill
 Permit No. 07-SDP-12-89P-FSL
 Cedar Falls, Iowa**

Compliance with:	Monitoring Calendar Years							
	2018	2019	2020	2021	2022	2023	2024	2025
567 IAC 115.21(2) a. high and low water levels (semi-annual)	Completed	Completed	Completed	Completed	Completed	Completed	Completed	Scheduled
567 IAC 115.21(2) b. changes in the hydrologic setting and resultant flow paths (semi-annual)	Completed	Completed	Completed	Completed	Completed	Completed	Completed	Scheduled
567 IAC 115.21(2) c. well depths (annual)	Completed	Completed	Completed	Completed	Completed	Completed	Completed	Scheduled
567 IAC 115.21(2) d. in-situ permeability tests (quinquennial)		Completed					Completed	

Table 3a

**Recorded High and Low Water Level Elevations
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa**

Monitoring Well	High Water Level (feet AMSL)	Low Water Level (feet AMSL)	Bottom and Top of Well Screen (feet AMSL)
MW-5	939.53	937.24	933.58 - 941.58
MW-7R	926.79	925.62	911.34 - 921.34
MW-8	928.1	924.68	918.26 - 928.26
MW-11	928.94	926.77	904.41 - 909.41
MW-12	889.87	889.64	848.17 - 858.17
MW-13	911.7	910.94	863.36 - 873.36
MW-14	939.31	935.46	925.14 - 935.14
MW-15	908.45	908.26	865.64 - 875.64
MW-16	912.17	911.48	865.66 - 875.66
MW-17R	928.82	926.02	920.72 - 925.72
MW-19	929.74	927.41	906.41 - 916.41
MW-20	906.52	904.63	859.52 - 869.52
MW-21	925.26	922.7	869.52 - 915.17
MW-22	900.91	900.31	854.12 - 864.12

Notes:

BOLD - Record High or Low Water Level

Red Font Color - Water level is below the top of the screen

Key:

AMSL - Above Mean Sea Level

Table 3b

**Vertical Hydraulic Gradients
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa**

Well Cluster Shallow/Deep	April 1, 2024	October 7, 2024	Average Gradient
MW-5/MW-16	-0.41	-0.38	-0.40
MW-7R/MW-15	-0.40	-0.38	-0.39
MW-8/MW-13	-0.31	-0.24	-0.27
MW-17R/MW-12	-0.56	-0.52	-0.54
MW-19/MW-20	-0.35	-0.38	-0.37
MW-21/MW-22	-0.73	-0.67	-0.70

Notes:

Positive hydraulic gradient indicates upward-directed flow

Negative hydraulic gradient indicates downward-directed flow

Key:

MW - Monitoring Well

Table 3c
Groundwater Elevations and Monitoring Well Depths
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa

Monitoring Well	Top of Casing Elevation	Original Installation Bottom of Well Elevation	Groundwater Elevation	Measured Bottom of Well Elevation	Groundwater Elevation	Measured Bottom of Well Elevation
	(ft AMSL)		April 1, 2024	April 1, 2024	October 7, 2024	October 7, 2024
		(ft AMSL)	(ft AMSL)	(ft AMSL)	(ft AMSL)	(ft AMSL)
MW-5	949.34	933.58	939.53	934.19	937.24	934.19
MW-7R	932.77	911.34	926.79	913.17	925.62	913.17
MW-8	939.91	918.26	928.10	918.45	924.68	918.45
MW-11	934.96	904.41	928.94	905.07	926.77	905.07
MW-12	934.65	848.17	889.64	848.43	889.87	848.43
MW-13	939.60	863.36	910.94	864.30	911.70	864.30
MW-14	944.12	925.14	939.31	925.00	935.46	925.00
MW-15	928.92	865.64	908.45	865.81	908.26	865.81
MW-16	948.42	865.66	912.17	865.92	911.48	865.92
MW-17R	933.82	920.72	928.82	920.90	926.02	920.90
MW-19	934.26	906.41	927.41	906.71	929.74	906.71
MW-20	934.16	859.34	906.51	858.96	904.63	858.96
MW-21	931.97	905.17	925.26	904.42	922.73	904.42
MW-22	931.77	854.12	900.91	853.74	900.34	853.74

Key:

AMSL - Above Mean Sea Level

ft - Feet

Table 4

**Monitoring Well Maintenance and Performance Summary
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa**

Monitoring Well	Top of Casing	Top of Screen	Total Depth		Date of Measurements		Maximum Depth Discrepancy (ft)	Baseline Permeability (cm/s) (date)	2019 Permeability (cm/s) (date)	2024 Permeability	
					4/1/2024	10/7/2024				(cm/s) (date)	% Change from 2019 to 2024
MW-5	949.34	941.58	15.76	Groundwater Level (ft)	9.81	12.10	0.61	6.327E-04 4/27/2011	5.655E-04 10/8/2019	1.406E-03 4/4/2024	149%
				Groundwater Elevation (Ft MSL)	939.53	937.24					
				Measured Well Depth (ft)	15.15	15.15					
				Submerged screen	No	No					
MW-7R	932.77	921.34	21.43	Groundwater Level (ft)	5.98	7.15	1.83	6.534E-05 4/27/2011	8.828E-04 10/7/2019	7.127E-05 4/4/2024	-92%
				Groundwater Elevation (Ft MSL)	926.79	925.62					
				Measured Well Depth (ft)	19.60	19.60					
				Submerged screen	Yes	Yes					
MW-8	939.91	928.26	21.65	Groundwater Level (ft)	11.81	21.46	0.19	1.732E-03 4/27/2011	7.961E-03 10/7/2019	1.199E-03 4/4/2024	-85%
				Groundwater Elevation (Ft MSL)	928.10	918.45					
				Measured Well Depth (ft)	21.46	21.46					
				Submerged screen	No	No					
MW-11	934.96	909.41	30.55	Groundwater Level (ft)	6.02	8.19	0.66	1.224E-03 4/27/2011	6.913E-03 10/7/2019	7.064E-04 4/4/2024	-90%
				Groundwater Elevation (Ft MSL)	928.94	926.77					
				Measured Well Depth (ft)	29.89	29.89					
				Submerged screen	Yes	Yes					
MW-12	934.65	858.17	86.48	Groundwater Level (ft)	45.01	44.78	0.26	NM --	NM --	NM --	NM
				Groundwater Elevation (Ft MSL)	889.64	889.87					
				Measured Well Depth (ft)	86.22	86.22					
				Submerged screen	Yes	Yes					
MW-13	939.60	873.36	76.24	Groundwater Level (ft)	28.66	27.90	0.94	NM --	NM --	NM --	NM
				Groundwater Elevation (Ft MSL)	910.94	911.70					
				Measured Well Depth (ft)	75.30	75.30					
				Submerged screen	Yes	Yes					
MW-14	944.12	935.14	18.98	Groundwater Level (ft)	4.81	8.66	-0.14	1.970E-06 4/27/2011	6.692E-06 10/7/2019	1.730E-06 10/8/2024	-74%
				Groundwater Elevation (Ft MSL)	939.31	935.46					
				Measured Well Depth (ft)	19.12	19.12					
				Submerged screen	Yes	Yes					
MW-15	928.92	875.64	63.28	Groundwater Level (ft)	20.47	20.66	0.17	3.584E-04 4/27/2011	8.290E-04 10/16/2019	4.521E-06 10/7/2024	-99%
				Groundwater Elevation (Ft MSL)	908.45	908.26					
				Measured Well Depth (ft)	63.11	63.11					
				Submerged screen	Yes	Yes					
MW-16	948.42	875.66	82.76	Groundwater Level (ft)	36.25	36.94	0.26	9.344E-07 10/9/2019	9.344E-07 10/9/2019	3.843E-07 10/8/2024	-59%
				Groundwater Elevation (Ft MSL)	912.17	911.48					
				Measured Well Depth (ft)	82.50	82.50					
				Submerged screen	Yes	Yes					
MW-17R	933.82	925.72	13.10	Groundwater Level (ft)	5.00	7.80	0.18	8.169E-04 4/27/2011	2.786E-03 10/7/2019	3.768E-04 4/4/2024	-86%
				Groundwater Elevation (Ft MSL)	928.82	926.02					
				Measured Well Depth (ft)	12.92	12.92					
				Submerged screen	Yes	Yes					
MW-19	934.26	916.41	27.85	Groundwater Level (ft)	6.85	4.52	0.30	2.267E-03 10/7/2019	2.267E-03 10/7/2019	2.371E-04 4/4/2024	-90%
				Groundwater Elevation (Ft MSL)	927.41	929.74					
				Measured Well Depth (ft)	27.55	27.55					
				Submerged screen	Yes	Yes					
MW-20	934.16	869.52	74.82	Groundwater Level (ft)	27.65	29.53	-0.38	1.519E-06 10/8/2019	1.519E-06 10/8/2019	6.477E-07 10/8/2024	-57%
				Groundwater Elevation (Ft MSL)	906.51	904.63					
				Measured Well Depth (ft)	75.20	75.20					
				Submerged screen	Yes	Yes					
MW-21	931.97	915.17	26.80	Groundwater Level (ft)	6.71	9.24	-0.75	1.055E-02 10/8/2019	1.055E-02 10/8/2019	1.533E-03 4/4/2024	-85%
				Groundwater Elevation (Ft MSL)	925.26	922.73					
				Measured Well Depth (ft)	27.55	27.55					
				Submerged screen	Yes	Yes					
MW-22	931.77	864.12	77.65	Groundwater Level (ft)	30.86	31.43	-0.38	2.012E-06 10/9/2019	2.012E-06 10/9/2019	2.245E-06 10/7/2024	12%
				Groundwater Elevation (Ft MSL)	900.91	900.34					
				Measured Well Depth (ft)	78.03	78.03					
				Submerged screen	Yes	Yes					

Notes:

- All tests are rising head (slug-out) using the Bouwer-Rice Solution and Unconfined Aquifer Model.
- All 2019 tests utilized a disposable bailer to induce displacement.
- Many deeper well tests during 2019 (MW-15, -16, and -20) should be considered estimated values as water levels in this aquifer were either rebounding from recent sampling and/or increasing due to recent precipitation.
- All 2024 tests results were originally reported in ft/min and converted to cm/s for this table.
- 2024 permeability is the average of the rising and falling permeability results; a full table is provided in Appendix D.

Key:

- % - Percent
- cm/s - Centimeters per Second
- ft - feet
- MSL - Mean Sea Level
- NA - Not Applicable
- NM - Not Measured

Table 5

**Control Limit Summary
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa**

Interwell Control Limit (Upgradient wells MW-5, MW-14, and MW-16)

Constituent	Units	Baseline Period	Samples	Detections	Maximum Observed	Statistical PL Method	Control Limit	Action Level	Source
Inorganics									
Ammonia (as Nitrogen)	mg/L	1995-2024	180	59	2.2	KM Normal UPL	1.85	30	HAL & TT
Barium (Ba)	mg/L	2010-2024	91	91	0.344	Gamma UPL	0.340	2	EPA MCL
Iron (Fe)	mg/L	2010-2024	89	50	8.24	KM Log UPL	16.50	0.3	SDWR
Organics									
Benzene	µg/l	2010-2024	91	0	1.00 U	Reporting Limit	0.500 U	3	HAL
Phenol	mg/L	1995-2024	107	5	0.0519	Nonparametric	0.0519	2	HAL
Total Organic Halogens (TOX)	mg/L	1995-2024	94	16	0.126	Nonparametric	0.126	N/A	--
General Chemistry									
Chloride	mg/L	2022-2024	18	12	201	KM Log UPL	344	250	IDNR AL
Chemical Oxygen Demand (COD)	mg/L	1995-2024	179	66	25.0	KM Log UPL	12.3	N/A	--
Field Parameters									
pH (Upper Control)	S.U.	2010-2024	90	90	8.70	Normal UPL	8.28	8.5	SDWR
pH (Lower Control)	S.U.	2010-2024	90	90	6.15 (min)	Normal LPL	6.05	6.5	SDWR
Specific Conductance	µS/cm	2016-2024	51	51	2490	Gamma UPL	3044	N/A	--
Temperature	°C	1995-2024	177	177	24.0	Normal UPL	20.3	N/A	--

Units:

°C - Degree Celsius
mg/L - Milligrams per Liter
S.U. - Standard pH Units
µg/L - Micrograms per Liter
µS/cm - MicroSiemens per Centimeter

Notes:

EPA - United States Environmental Protection Agency
HAL - Health Action Level
IDNR - Iowa Department of Natural Resources
MCL - Maximum Contaminant Level
N/A - Not Applicable
SDWR - Secondary Drinking Water Regulation
TT - Taste Threshold

Statistical Methods:

PL - Prediction Limit: 1-of-2 Interwell Prediction Limit (10 COCs, Semi-Annual Sampling, 10 Downgradient wells), per IAC 567.113.10(4)g(3) and described in Chapter 19 of EPA's *Unified Guidance* (2009).
UPL - Upper Prediction Limit
LPL - Lower Prediction Limit
Normal - Prediction limit based on normal data distribution
Gamma - Prediction limit based on gamma data distribution
Log - Prediction limit based on lognormal data distribution
KM - Kaplan-Meier Method used to accommodate censored values (non-detects)
Nonparametric - Rank-based prediction limit used due to severe data censoring
Reporting Limit - Current reporting limit used due to no detected values

Table 6

**Summary of Well/Detected Constituent Pairs With No Immediately Preceding Control Limit Exceedances
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa**

Well	Constituent	Units	Most Recent Result	Interwell Control Limit
MW-5	Temperature	°C	22.24	20.1
MW-7R	COD	mg/L	30.6	12.3
MW-20	pH	S.U.	6.01	6.05-8.28
SW-1	COD	mg/L	14.4	12.3
SW-1	pH	S.U.	8.58	6.05-8.28

Units:

°C - Degrees Celsius
mg/L - Milligrams per Liter
S.U. - Standard pH Units

Notes:

MW - Monitoring Well
SW - Surface Water
COD - Chemical Oxygen Demand

Table 7

**Summary of Recent (Past 3 Years) Comparisons to Interwell Control Limits and Action Levels
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa**

Well	Constituent	Units	Most Recent Result (Oct 2024)	Previous Result (April 2024)	Current Interwell Control Limit	Interwell Comparison Conclusion	Action Level/Statewide Standard	Action Level Comparison Conclusion	Comments
MW-5	Iron	mg/L	1.54	0.154	16.5	Not significant	0.3	Unconfirmed	Exceeded Action Level only on 4/4/2022, 10/3/2022, and 10/8/2024. Unconfirmed increase.
	pH	S.U.	6.17	6.15	6.05-8.28	Not significant	6.5-8.5	Confirmed Exceeds	Outside Interwell Control Limits and Action Levels on 4/4/2022. Outside only Action Level on 10/3/2023, 4/2/2024, and 10/8/2024.
	Temperature	°C	22.24	5.84	20.3	Unconfirmed	N/A	N/A	Exceeded Interwell Control Limit on 10/8/2024. Unconfirmed increase.
MW-7R	Iron	mg/L	1.39	0.592	16.5	Not significant	0.3	Confirmed Exceeds	Exceeded Action Level on every event in past 3 years.
	COD	mg/L	30.6	10.6	12.3	Unconfirmed	N/A	N/A	Exceeded Interwell Control Limit on 10/3/2022 and 10/7/2024. Unconfirmed increase.
	pH	S.U.	6.80	6.46	6.05-8.28	Not significant	6.5-8.5	Not Significant	Outside Action Level on 4/4/2024.
	TOX	mg/L	NS	0.116	0.126	Not significant	N/A	N/A	Exceeded Interwell Control Limit on 4/4/2022.
MW-8	COD	mg/L	25.0 U	18.3	12.3	Inconclusive	N/A	N/A	Exceeded Interwell Control Limit on 10/3/2023 & 4/3/2024. Inconclusive comparison due to reporting limit.
	Iron	mg/L	0.100 U	0.100 U	16.5	Not significant	0.3	Not Significant	Inconclusive comparison due to reporting limits on 4/4/2022, 3/29/2023, and 10/3/2023.
	pH	mg/L	6.57	6.01	6.05-8.28	Not significant	6.5-8.5	Not Significant	Outside of Interwell Control Limits only on 4/4/2022 and 3/29/2023. Outside Interwell Control Limits and Action Levels on 4/3/2024.
MW-11	Iron	mg/L	0.163	0.123	16.5	Not significant	0.3	Not Significant	Exceeded Action Level only on 4/5/2022.
	COD	mg/L	30.6	16.4	12.3	Confirmed SSI	N/A	N/A	Exceeded Interwell Control Limit on 4/4/2024 and 10/8/2024. Confirmed Statistically Significant Increase (SSI).
	pH	S.U.	6.32	6.64	6.05-8.28	Not significant	6.5-8.5	Unconfirmed	Outside of Interwell Control Limits and Action Levels on 4/5/2022. Outside Action Levels on 10/8/2024. Unconfirmed decrease.
	Temperature	°C	16.42	11.78	20.3	Not significant	N/A	N/A	Exceeded Interwell Control Limit on 10/3/2023.
MW-14	Iron	mg/L	0.100 U	0.100 U/0.100 U	16.5	Not significant	0.3	Not Significant	Inconclusive comparison due to reporting limits on 4/4/2022, 3/29/2023, and 10/3/2023.
	pH	S.U.	6.71	6.47	6.05-8.28	Not significant	6.5-8.5	Not Significant	Outside Action Levels only on 10/4/2023 and 4/2/2024.
MW-15	Iron	mg/L	0.801	0.776	16.5	Not significant	0.3	Confirmed Exceeds	Exceeded Action Level only during all events in past 3 years.
	pH	S.U.	7.21	6.67	6.05-8.28	Not significant	6.5-8.5	Not Significant	Outside Interwell Control Limits and Action Levels on 4/4/2022.
MW-16	Barium	mg/L	0.131	0.132	0.34	Not significant	2	Not Significant	Exceeded Interwell Control Limit on 10/3/2022.
	COD	mg/L	5.00 U	21.8	12.3	Not significant	N/A	N/A	Exceeded Interwell Control Limit on 10/4/2023 and 4/3/2024.
	Iron	mg/L	0.262	1.02	16.5	Not significant	0.3	Not Significant	Exceeded Action Level on 4/4/2022, 3/29/2023, 10/4/2023, and 4/3/2024. Exceeded Interwell Control Limit and Action Level on 10/3/2022.
	pH	S.U.	6.63	6.35	6.05-8.28	Not significant	6.5-8.5	Not Significant	Outside of Interwell Control Limits and Action Levels on 4/4/2022 and 3/29/2023. Outside Interwell Control Limits only on 10/3/2022. Outside Action Levels only on 4/3/2024.
MW-17R	Iron	mg/L	8.00	8.58	16.5	Not significant	0.3	Confirmed Exceeds	Exceeded Interwell Control Limit during all events in past 3 years. Additionally exceeded Action Level on 10/4/2022.
	COD	mg/L	35.9	16.7	12.3	Confirmed SSI	N/A	N/A	Exceeded Interwell Control Limit on 10/3/2023 (one of two field duplicates), 4/4/2024, and 10/8/2024. Confirmed Statistically Significant Increase (SSI).
	pH	S.U.	6.19	6.40	6.05-8.28	Not significant	6.5-8.5	Confirmed Exceeds	Outside of Interwell Control Limits and Action Levels on 4/5/2022. Outside Action Levels only on 4/4/2024 and 10/8/2024.
	Temperature	°C	19.94	9.22	20.3	Not significant	N/A	N/A	Exceeded Interwell Control Limit on 10/3/2023.
MW-18	Chloride	mg/L	NS	NS	343.5	N/A	250	N/A	Exceeded Interwell Control Limit and Action Level on 4/6/2022 and 10/3/2022 - Removed from monitoring program on 10/5/2022.
	COD	mg/L	NS	NS	12.3	N/A	N/A	N/A	Exceeded Interwell Control Limit on 4/6/2022 and 10/3/2022 - Removed from monitoring program on 10/5/2022.
	Iron	mg/L	NS	NS	16.5	N/A	0.3	N/A	Inconclusive comparison on 10/3/2022 due to reporting limit - Removed from monitoring program on 10/5/2022.
	Specific Conductance	µS/cm	NS	NS	3044	N/A	N/A	N/A	Exceeded Interwell Control Limit on 4/6/2022 and 10/3/2022 - Removed from monitoring program on 10/5/2022.
MW-19	Iron	mg/L	0.100 U/0.100 U	0.415	16.5	Not significant	0.3	Not Significant	Exceeded Action Level only on 10/4/2022, 3/28/2023, and 4/4/2024.
	pH	S.U.	7.13	6.45	6.05-8.28	Not significant	6.5-8.5	Not Significant	Outside of Interwell Control Limits only on 4/5/2022. Outside of Action Levels on 4/4/2024.
MW-20	Iron	mg/L	1.07	0.838/0.155	16.5	Not significant	0.3	Confirmed Exceeds	Exceeded Action Level only during all events in past 3 years, except non-detect on 3/28/2023.
	Ammonia (as N)	mg/L	0.635	2.15/2.12	1.85	Not significant	30	Not Significant	Exceeded Interwell Control Limit on 10/5/2023 and 4/4/2024.
	pH	S.U.	6.01	6.48	6.05-8.28	Unconfirmed	6.5-8.5	Unconfirmed	Outside only Action Levels on 4/4/2024. Outside Action Levels and Interwell Control Limits on 10/8/2024. Unconfirmed decrease.
	TOX	mg/L	NS	0.0400 U/0.0400 U	0.126	Not significant	N/A	N/A	Exceeded Interwell Control Limit on 3/28/2023.
MW-21	Iron	mg/L	1.95/1.87	1.98	16.5	Not significant	0.3	Confirmed Exceeds	Exceeded Action Level only during all events in past 3 years.
	pH	S.U.	6.42	6.50	6.05-8.28	Not significant	6.5-8.5	Unconfirmed	Outside of Action Levels only on 10/8/2024. Outside of Interwell Control Limits and Action Levels on 4/5/2022.
MW-22	Iron	mg/L	0.937	1.32	16.5	Not significant	0.3	Confirmed Exceeds	Exceeded Action Level only during all events in past 3 years.
	COD	mg/L	25.30	12.6	12.3	Confirmed SSI	N/A	N/A	Exceeded Interwell Control Limit on 4/3/2024 and 10/8/2024. Confirmed Statistically Significant Increase (SSI).
	pH	S.U.	6.44	5.82	6.05-8.28	Not significant	6.5-8.5	Not Significant	Outside of Interwell Control Limits and Action Limits on 4/5/2022 and 4/3/2024. Outside Action Levels only on 10/5/2023 and 10/8/2024.
SW-1	COD	mg/L	DRY	14.4	12.3	Not significant	N/A	N/A	Exceeded Interwell Control Limit on 4/6/2022 and 4/1/2024.
	pH	S.U.	DRY	8.58	6.05-8.28	Unconfirmed	6.5-8.5	Unconfirmed	Outside of Interwell Control Limits and Action Limits on 4/1/2024. Unconfirmed increase.

Units:
 °C - Degree Celsius
 mg/L - Milligrams per Liter
 S.U. - Standard pH Units
 µg/L - Micrograms per Liter
 µS/cm - MicroSiemens per Centimeter

Abbreviations:
 COD - Chemical Oxygen Demand
 MW - Monitoring Well
 N - Nitrogen
 SW - Surface Water
 TOX - Total Organic Halogens

Notes:
 N/A - Not Applicable
 U - Not Detected above the Reporting Limit
 Confirmed SSI / Confirmed Exceeds - indicates that two most recent samples exceed (or are outside of for pH) the Interwell Control Limits and/or Action Levels, respectively.
 6.12 - Bold+red values exceed Interwell Control Limit and IDNR AL
 Unconfirmed - Indicates only the most recent sample is above/outside limits, and requires a subsequent sample for confirmation.
 Inconclusive - The reporting limit is above the Interwell Control Limit/Action Level, and therefore no meaningful comparison to the Interwell Control Limit/Action Level can be made.

Table 8
Analytical Data Summary
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa

Constituent (CAS #)	Sample Date	Units	MW-5 BG/UG	MW-14 BG/UG	MW-16 BG/UG	MW-7R DG	MW-8 DG	MW-11 DG	MW-15 DG	MW-17R DG	MW-18 DG	MW-19 DG	MW-20 DG	MW-21 DG	MW-22 DG	SW-1 SW	
Benzene (71-43-2) MCL = 5 IDNR AL = 3 Interwell CL = 0.500 U	3/25/2010	µg/L		1.00 U		1.00 U	1.00 U	1.00 U	1.00 U	1.00 U/1.00 U						1.00 U	
	3/30/2010	µg/L	1.00 U		1.00 U												
	4/22/2010	µg/L	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U/1.00 U						1.00 U	
	10/16/2010	µg/L	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U/1.00 U						1.00 U	
	4/28/2011	µg/L	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U				1.00 U	
	10/18/2011	µg/L	1.00 U		1.00 U							1.00 U					
	10/19/2011	µg/L		1.00 U		1.00 U	1.00 U	1.00 U/1.00 U	1.00 U	1.00 U	1.00 U						1.00 U
	4/25/2012	µg/L	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U					1.00 U
	10/9/2012	µg/L									1.00 U/1.00 U	1.00 U					
	10/10/2012	µg/L		1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U							
	4/16/2013	µg/L	0.500 U	0.500 U				0.500 U				0.500 U					0.500 U
	4/17/2013	µg/L			0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U/0.500 U						
	10/29/2013	µg/L		0.500 U/0.500 U			0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U					
	10/30/2013	µg/L			0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
	4/14/2014	µg/L	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U/0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U					0.500 U
	4/15/2014	µg/L										0.500 U/0.500 U			0.500 U	0.500 U	
	10/7/2014	µg/L							0.500 U/0.500 U								
	10/8/2014	µg/L		0.500 U			0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U					
	10/9/2014	µg/L	0.500 U		0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U/0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
	4/16/2015	µg/L		0.500 U/0.500 U			0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U					
	4/17/2015	µg/L	0.500 U		0.500 U							0.500 U/0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	
	10/14/2015	µg/L		0.500 U			0.500 U	0.500 U/0.500 U		0.500 U							
	10/15/2015	µg/L							0.500 U/0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	
	10/16/2015	µg/L	0.500 U		0.500 U												0.500 U
	3/16/2016	µg/L		0.500 U/0.500 U			0.500 U										
	3/17/2016	µg/L	0.500 U		0.500 U/0.500 U		0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U					0.500 U
	3/18/2016	µg/L										0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	
	9/27/2016	µg/L		0.500 U/0.500 U			0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U					
	9/28/2016	µg/L							0.500 U	0.500 U	0.500 U/0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	
	9/29/2016	µg/L	0.500 U		0.500 U												
	3/7/2017	µg/L		0.500 U/0.500 U													
	3/8/2017	µg/L	0.500 U		0.500 U		0.500 U	0.500 U		0.500 U/0.500 U	0.500 U	0.500 U					
	3/9/2017	µg/L							0.500 U				0.500 U	0.500 U	0.500 U	0.500 U	
	10/4/2017	µg/L	0.500 U	0.500 U			0.500 U	0.500 U/0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	
	10/5/2017	µg/L											0.500 U	0.500 U	0.500 U	0.500 U/0.500 U	
	3/12/2018	µg/L	0.500 U	0.500 U					0.500 U/0.500 U								
	3/13/2018	µg/L					0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	
	3/14/2018	µg/L													0.500 U	0.500 U/0.500 U	
	10/8/2018	µg/L									0.500 U	0.500 U					0.500 U
	10/9/2018	µg/L	0.500 U	0.500 U/0.500 U	0.500 U		0.500 U	0.500 U	0.500 U								
10/10/2018	µg/L					0.500 U			0.500 U/0.500 U			0.500 U	0.500 U	0.500 U	0.500 U		
3/25/2019	µg/L	0.500 U/0.500 U	0.500 U	0.500 U		0.500 U	0.500 U		0.500 U	0.500 U							
3/26/2019	µg/L					0.500 U		0.500 U				0.500 U	0.500 U			0.500 U/0.500 U	
3/27/2019	µg/L													0.500 U	0.500 U		
10/3/2019	µg/L	0.500 U/0.500 U	0.500 U	0.500 U		0.500 U	0.500 U	0.500 U	0.500 U		0.500 U					0.500 U	
10/4/2019	µg/L									0.500 U		0.500 U	0.500 U/0.500 U	0.500 U	0.500 U		
3/17/2020	µg/L	0.500 U/0.500 U	0.500 U	0.500 U		0.500 U	0.500 U		0.500 U								
3/18/2020	µg/L							0.500 U		0.500 U/0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	
10/4/2020	µg/L	0.500 U	0.500 U	0.500 U/0.500 U			0.500 U										
10/5/2020	µg/L					0.500 U		0.500 U	0.500 U/0.500 U	0.500 U	0.500 U	0.500 U	0.500 U				
10/6/2020	µg/L																
03/29/2021	ug/L							0.500 U		0.500 U	0.500 U	0.500 U	6.320	0.500 U/0.500 U	2.380		
03/30/2021	ug/L	0.500 U	0.500 U/0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U							0.500 U	
10/05/2021	ug/L	0.500 U/0.500 U		0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U		0.500 U						
10/06/2021	ug/L							0.500 U		0.500 U/0.500 U		0.500 U	0.500 U	0.500 U	0.500 U		
10/8/2021	ug/L														0.500 U		
4/4/2022	ug/L	0.500 U/0.500 U	0.500 U	0.500 U		0.500 U	0.500 U		0.500 U								
4/5/2022	ug/L							0.500 U		0.500 U/0.500 U		0.500 U	0.500 U	0.500 U	0.500 U		

Table 8

Analytical Data Summary
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 Viking Pump Foundry Sand Landfill
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 Cedar Falls, Iowa

Constituent (CAS #)	Sample Date	Units	MW-5 BG/UG	MW-14 BG/UG	MW-16 BG/UG	MW-7R DG	MW-8 DG	MW-11 DG	MW-15 DG	MW-17R DG	MW-18 DG	MW-19 DG	MW-20 DG	MW-21 DG	MW-22 DG	SW-1 SW
Benzene (71-43-2) MCL = 5 IDNR AL = 3 Interwell CL = 0.500 U	4/6/2022	ug/L									0.500 U					0.500 U
	10/3/2022	ug/L	0.500 U/0.500 U	0.500 U	0.500 U	0.500 U	0.500 U				0.500 U					
	10/4/2022	ug/L						0.500 U	0.500 U	0.500 U		0.500 U	0.500 U/0.500 U	0.500 U	0.500 U	
	3/27/2023	ug/L	0.500 U					0.500 U		0.500 U/0.500 U						
	3/28/2023	ug/L				0.500 U			0.500 U			0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
	3/29/2023	ug/L		0.500 U/0.500 U	0.500 U		0.500 U									
	10/3/2023	ug/L	0.500 U				0.500 U	0.500 U	0.500 U	0.500 U	0.500 U/0.500 U		0.500 U			
	10/4/2023	ug/L		0.500 U	0.500 U	0.500 U									0.500 U	
	10/5/2023	ug/L											0.500 U		0.500 U/0.500 U	
	4/1/2024	ug/L														0.500 U
	4/2/2024	ug/L	0.500 U	0.500 U/0.500 U												
	4/3/2024	ug/L			0.500 U		0.500 U	0.500 U							0.500 U	0.500 U
	4/4/2024	ug/L				0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U		0.500 U	0.500 U/0.500 U		
10/7/2024	ug/L				0.500 U	0.500 U	0.500 U	0.500 U	0.500 U							
10/8/2024	ug/L	0.500 U		0.500 U				0.500 U					0.500 U	0.500 U/0.500 U	0.500 U	
10/9/2024	ug/L		0.500 U									0.500 U/0.500 U				
Chloride (7647-14-5) MCL = N/A IDNR AL = 250 Interwell CL = 344	7/1/1995	mg/L	6.7	6.7	5.00 U	27.0	29.0	5.3	5.00 U							
	8/1/1995	mg/L	5.00 U	6.0	6.0	26.0	32.0	5.00 U	5.00 U	130.0						47.0
	11/1/1995	mg/L	5.8	7.7	5.00 U	26.0	73.0	5.8	5.00 U	130.0						
	2/1/1996	mg/L	7.7	7.7	5.00 U		73.0	5.00 U	9.6	160.0						
	5/1/1996	mg/L	5.00 U	8.3	5.00 U	30.0	74.0	5.4	5.00 U	170.0						16.0
	11/1/1996	mg/L	6.3	8.1	5.00 U	5.00 U	56.0	5.00 U	33.0	120.0						34.0
	4/1/1997	mg/L	5.00 U	9.4	5.00 U	31.0	26.0	5.8	7.6	18.0						28.0
	11/1/1997	mg/L	5.9	8.7	5.00 U	32.0	50.0	5.00 U	5.00 U							35.0
	5/1/1998	mg/L	6.0	11.7	5.00 U	32.8	33.3	7.7	5.00 U	52.1						
	11/1/1998	mg/L	8.5	8.4	5.00 U	33.0	51.0	5.5	5.00 U	69.0						20.0
	5/1/1999	mg/L	6.2	9.3	5.00 U	39.0	67.0	5.00 U	5.00 U	61.0						5.3
	11/1/1999	mg/L	5.1	8.8	5.00 U	36.0	93.0	5.00 U	5.00 U	55.0						
	5/1/2000	mg/L	5.2	9.4	5.00 U	35.7	89.8	5.00 U	5.00 U	49.9						
	12/1/2000	mg/L	5.9	8.2	5.00 U	29.7	89.4	5.00 U	5.00 U	35.4						
	6/1/2001	mg/L	7.4	8.6	5.00 U	31.4	88.0	5.00 U	5.00 U	18.9						
	11/1/2001	mg/L	5.00 U	8.6	6.7	30.2	92.5	5.00 U	5.00 U	20.2						21.9
	5/2/2002	mg/L	11.8	8.7	5.00 U	29.7	89.0	5.00 U	5.00 U	24.7						
	11/2/2002	mg/L	6.1	7.9	5.00 U	22.2	86.0	5.00 U	5.00 U	20.6						
	5/3/2003	mg/L	6.5	10.2	5.00 U	29.8	101.0	5.6	5.00 U	35.8						9.9
	11/3/2003	mg/L		8.6	5.00 U	23.4	67.8	5.00 U	6.2	42.2						10.9
	5/1/2004	mg/L	5.1	9.6	5.00 U	25.2	103.0	6.4	7.5	32.1						8.1
	12/1/2004	mg/L		7.9	5.00 U	22.3	84.1	6.3	6.0	19.9						
	5/5/2005	mg/L	12.0	8.4	5.00 U	24.0	98.0	5.00 U	7.6	40.0						
	11/5/2005	mg/L		8.6	5.00 U		67.6	5.1	18.7							
	5/6/2006	mg/L	27.0	8.2	5.00 U	52.7	74.2	5.9	9.9	163.0						17.7
	10/6/2006	mg/L		8.2	5.00 U	41.2	46.6	5.7	12.1	77.8						
	4/7/2007	mg/L	33.8	7.9	5.00 U	218.0	4.2	5.2	13.3	123.0						25.1
	10/7/2007	mg/L	10.2	7.8	5.00 U	179.0	54.2	5.00 U	7.5	85.1						24.4
	4/1/2008	mg/L	11.9	7.6	5.00 U	179.0	49.9	6.5	13.3	172.0						44.6
	10/1/2008	mg/L	26.1	6.9	5.00 U	91.0	52.8	5.00 U	7.8	132.0						
	10/29/2009	mg/L	12.1	6.7	5.00 U	102.0	35.8	70.9	21.2	245/257						16.3
3/25/2010	mg/L		6.8		239.0	38.4	46.6	5.00 U	1620/1630						49.2	
3/30/2010	mg/L	8.5		5.00 U												
4/22/2010	mg/L	10.6	7.1	5.00 U	212.0	31.7	40.8	5.5	1690/1780						39.8	
10/16/2010	mg/L	6.8	6.6	5.00 U	161.0	38.1	31.1/31.1	8.6	374.0						128.0	
4/28/2011	mg/L	5.5	7.1	5.00 U	150.0	31.8	14.5	36.7	415.0	368.0					36.1	
10/18/2011	mg/L	13.2		5.00 U					339.0							
10/19/2011	mg/L		7.6		98.3	31.0/31.8	15.8	11.3	381.0						92.8	
4/25/2012	mg/L	5.6	6.6	5.00 U	106.0	32.4	11.4/11.4	8.9	233.0	321.0					40.8	
10/9/2012	mg/L								189/185	300.0						
10/10/2012	mg/L		7.4	5.00 U	73.4	22.7	11.7	6.2								
4/16/2013	mg/L	5.00 U	7.6				30.8				292.0				39.7	

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Chloride (7647-14-5) MCL = N/A IDNR AL = 250 Interwell CL = 344	4/17/2013	mg/L			5.00 U	207.0		10.9	7.9	245/271						
	10/29/2013	mg/L		7.89/7.89		173.0	27.7		6.1	224.0	289.0					
	10/30/2013	mg/L			5.00 U			10.1				5.00 U	5.00 U	643.0	6.8	96.7
	4/14/2014	mg/L	24.4	7.5	5.00 U	216.0	28.4/29.7	7.0	5.7	1190.0	268.0					63.9
	4/15/2014	mg/L										5.00 U/5.00 U		635.0	7.3	
	10/7/2014	mg/L					23/22.3									
	10/8/2014	mg/L		7.2		233.0		7.8	5.1	1200.0	301.0					
	10/9/2014	mg/L	46.2		5.00 U							5.00 U/5.00 U	5.00 U	546.0	5.00 U	
	4/16/2015	mg/L		7.61/7.55		273.0	28.5	6.5	5.00 U	694.0	314.0					
	4/17/2015	mg/L	54.5		5.00 U							5.00 U/5.00 U	5.00 U	332.0	5.00 U	
	10/14/2015	mg/L		11.8		234.0	28.5/28.1		5.00 U							
	10/15/2015	mg/L						6.39/6.72			635.0	330.0	5.00 U	5.00 U		5.00 U
	10/16/2015	mg/L	61.6		7.5										180.0	
	3/16/2016	mg/L		7.97/8.11			36.3									
	3/17/2016	mg/L	16.1		5.00 U/5.00 U	166.0		7.0	5.00 U	425.0	392.0					74.4
	3/18/2016	mg/L										5.00 U	5.00 U	150.0	5.00 U	
	9/27/2016	mg/L		8.79/8.2		120.0	20.1		5.5		477.0					
	9/28/2016	mg/L						7.5			335/341		5.00 U	5.00 U	108.0	5.00 U
	9/29/2016	mg/L	22.1		5.00 U											
	3/7/2017	mg/L		8.26/8.26			10.3									
	3/8/2017	mg/L	16.6		5.00 U	202.0				5.00 U/5.00 U	363.0	446.0				
	3/9/2017	mg/L						6.5					5.00 U	5.00 U	105.0	5.00 U
	10/4/2017	mg/L	23.4	6.9	5.00 U	208.0	13.3/13.1	5.9	5.00 U	279.0	470.0		5.00 U			
	10/5/2017	mg/L											5.00 U		46.9	5.00 U/5.00 U
	3/12/2018	mg/L	20.9	8.8	5.00 U		10.7/9.97									
	3/13/2018	mg/L				158.0		6.8	5.00 U	242.0	235.0		5.00 U	5.00 U		
	3/14/2018	mg/L													102.0	5.00 U/5.00 U
	10/8/2018	mg/L								167.0	419.0					11.8
	10/9/2018	mg/L	5.00 U	8.91/8.95	5.00 U		5.00 U	5.9								
	10/10/2018	mg/L				147.0				5.00 U/5.00 U			5.00 U	7.4	71.8	5.00 U
	3/25/2019	mg/L	6.87/6.28	8.8	5.00 U		5.00 U			5.00 U	113.0					
	3/26/2019	mg/L				68.5		5.3					5.00 U	5.00 U		
	3/27/2019	mg/L													94.1	5.00 U
	10/3/2019	mg/L	5.00 U/5.00 U	8.5	5.00 U	91.1	5.00 U	6.0	5.00 U			565.0				15.3
	10/4/2019	mg/L									126.0		5.00 U	5.00 U/5.00 U	88.4	5.00 U
	3/17/2020	mg/L	5.00 U/5.00 U	8.8	5.00 U	106.0	5.00 U			5.00 U						
	3/18/2020	mg/L						5.6			133/134	551.0	5.00 U	5.00 U	82.4	5.00 U
	10/4/2020	mg/L	5.00 U	7.7	5.00 U/5.00 U		5.00 U									
	10/5/2020	mg/L				168.0			5.00 U	5.00 U/5.00 U	105.0	662.0		5.00 U	5.00 U	
	10/6/2020	mg/L													72.9	5.00 U
03/29/2021	mg/L						6.49			87.6	58.0	5.00 U	5.00 U	75.4/80.5	5.00 U	
03/30/2021	mg/L	6.65	11.4/10.4	5.00 U	76.2	5.00 U		9.20								
10/05/2021	mg/L	11.0/11.7	8.63	5.00 U	137	5.86		7.65			107					
10/06/2021	mg/L						5.52			108/110		5.00 U	5.00 U	66.2		
10/08/2021	mg/L														5.00 U	
4/4/2022	mg/L	30.2/29.2	9.34	5.00 U	101.0	6.41		9.27								
4/5/2022	mg/L						5.38			91.7/95.3		5.00 U	5.00 U	89.3	5.00 U	
4/6/2022	mg/L										629					
10/3/2022	mg/L	49.4/43.6	8.68	5.00 U	82.9	5.27					631.0				43.3	
10/4/2022	mg/L						5.37	6.32	72.8			5.00 U	5.00 U/5.00 U	71.2	5.00 U	
3/27/2023	mg/L	71.9					6.02			69.8/69.5						
3/28/2023	mg/L				157.0			9.4				69.5	5.00 U	5.00 U	5.00 U	
3/29/2023	mg/L		9.69/9.7	5.00 U			7.6									
10/3/2023	mg/L	117.0					24.0	17.90	16.5	87.6/88.1		14.1				
10/4/2023	mg/L		8.5	5.00 U	95.0									71.3		
10/5/2023	mg/L											5.00 U			5.00 U/5.00 U	
4/1/2024	mg/L															
4/2/2024	mg/L		9.32/8.66													

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Chloride (7647-14-5) MCL = N/A IDNR AL = 250 Interwell CL = 344	4/3/2024	mg/L	137		5.00 U		5.50							75.7	5.00 U	
	4/4/2024	mg/L				169		5.92	5.92	60.2		5.00 U	5.00 U/5.00 U			
	10/7/2024	mg/L				61.1	5.00 U		6.85							
	10/8/2024	mg/L	201		5.00 U			5.39		42.3			5.00 U	65.9/67.3	5.00 U	
	10/9/2024	mg/L		9.78								5.00 U/5.00 U				
Barium (Dissolved/ Total) (7440-39-3) MCL = 2 IDNR AL = 2 Interwell CL = 0.340	3/25/2010	mg/L		0.0136		0.1120	0.0730	0.1110	0.0591	0.331/0.325						0.0592
	3/30/2010	mg/L	0.1460		0.1400											0.0695
	4/22/2010	mg/L	0.1550	0.0157	0.1380	0.0937	0.0756	0.1180	0.0596	0.361/0.372						0.0837
	10/16/2010	mg/L	0.1690	0.0252	0.1390	0.0879	0.0929	0.139/0.137	0.0616	0.1240						0.0595
	4/28/2011	mg/L	0.1370	0.0205	0.1320	0.0735	0.0890	0.1200	0.0583	0.1310	0.1200					0.0606
	10/18/2011	mg/L	0.1280		0.1700						0.1000					0.0759
	10/19/2011	mg/L		0.0231		0.0684	0.0929/0.0917	0.1390	0.0622	0.0606						0.0606
	4/25/2012	mg/L	0.1620	0.1580	0.1770	0.0552	0.0940	0.157/0.0100 U	0.0654	0.1130	0.0948					0.0759
	10/9/2012	mg/L								0.127/0.13	0.1120					
	10/10/2012	mg/L		0.0255	0.1650	0.0586	0.1220	0.1670	0.0648							
	4/16/2013	mg/L	0.1320	0.0210			0.1150				0.1100					0.0558
	4/17/2013	mg/L			0.1750	0.0894		0.1700	0.0691	0.163/0.161						
	10/29/2013	mg/L		0.0256/0.025		0.0844	0.1260		0.0702	0.1480	0.1090					
	10/30/2013	mg/L			0.1530		0.1740				0.2020	0.1730	0.3130	0.0873	0.0639	0.0412
	4/14/2014	mg/L	0.0878	0.0205	0.1580	0.0659	0.108/0.106	0.1780	0.0640	0.3160	0.0986					
	4/15/2014	mg/L									0.182/0.185		0.3000	0.0880		
	10/7/2014	mg/L					0.106/0.107									
	10/8/2014	mg/L		0.0217		0.0783		0.1740	0.0631	0.2920	0.1060					
	10/9/2014	mg/L	0.1490		0.1410						0.182/0.213	0.1760	0.1870	0.1050		
	4/16/2015	mg/L		0.026/0.0382		0.0731	0.0998	0.1770	0.0649	0.1900	0.1030					
	4/17/2015	mg/L	0.0894		0.2560						0.177/0.182	0.1390	0.2280	0.2000		
	10/14/2015	mg/L		0.0256		0.1000	0.12/0.12		0.0638							
	10/15/2015	mg/L						0.224/0.181		0.2150	0.1220	0.1860	0.1320		0.0929	
	10/16/2015	mg/L	0.1480		0.2300									0.1600		
	3/16/2016	mg/L		0.0213/0.0219			0.1160									
	3/17/2016	mg/L	0.0858		0.142/0.139	0.0450		0.1660	0.0610	0.1410	0.1090					0.0699
	3/18/2016	mg/L									0.1650	0.1120	0.1450	0.0853		
	9/27/2016	mg/L		0.0247/0.0255		0.0708	0.1260		0.0620		0.1220					
	9/28/2016	mg/L						0.1630		0.138/0.141		0.1700	0.1040	0.1380	0.1170	
	9/29/2016	mg/L	0.1340		0.2200											
	3/7/2017	mg/L		0.0272/0.0313			0.1250									
	3/8/2017	mg/L	0.1200		0.1410	0.0632			0.0657/0.0663	0.0603	0.1230					
	3/9/2017	mg/L						0.1740			0.1680	0.1120	0.1760	0.0981		
	10/4/2017	mg/L	0.0967	0.0294	0.1340	0.1060	0.108/0.108	0.1630	0.0645	0.1260	0.1300	0.1870		0.1710	0.1580	0.0972/0.098
	10/5/2017	mg/L												0.1710	0.1580	0.0972/0.098
3/12/2018	mg/L	0.0836	0.1500	0.2210		0.0993/0.0985		0.1630	0.0642	0.1570	0.1260	0.1660	0.1140			
3/13/2018	mg/L				0.0650									0.1820	0.117/0.116	
3/14/2018	mg/L									0.0826	0.1090				0.0689	
10/8/2018	mg/L															
10/9/2018	mg/L	0.1150	0.0477/0.0554	0.1530		0.0809	0.1630									
10/10/2018	mg/L				0.0826			0.07/0.0677			0.1800	0.1640	0.1650	0.1190		
3/25/2019	mg/L	0.0793/0.0783	0.0862	0.1290		0.0322		0.0657	0.0535							
3/26/2019	mg/L					0.0535		0.1570			0.1520	0.0990			0.0636/0.0627	
3/27/2019	mg/L												0.1790	0.1310		
10/3/2019	mg/L	0.163/0.158	0.0289	0.1360	0.0858	0.0913	0.1660	0.0643		0.1440					0.0878	
10/4/2019	mg/L								0.0858		0.1710	0.178/0.244	0.1850	0.1580		
3/17/2020	mg/L	0.111/0.11	0.0639	0.3370	0.0773	0.0785		0.0722								
3/18/2020	mg/L							0.1650		0.099/0.161	0.1370	0.1600	0.1220	0.1880	0.1650	
10/4/2020	mg/L	0.0984	0.0243	0.144/0.143		0.1110										
10/5/2020	mg/L				0.1250		0.1860	0.0708/0.0714	0.0981	0.1620	0.1790	0.1390				
10/6/2020	mg/L													0.1870	0.1340	
03/29/2021	mg/L						0.158		0.0801	0.136	0.184	0.376	0.186/0.182	0.102		
03/30/2021	mg/L	0.1240	0.0141/0.0136	0.140	0.0528	0.0683		0.0617							0.0713	

Table 8

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 2024 Annual Water Quality Report
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 Cedar Falls, Iowa

Constituent (CAS #)	Sample Date	Units	MW-5 BG/UG	MW-14 BG/UG	MW-16 BG/UG	MW-7R DG	MW-8 DG	MW-11 DG	MW-15 DG	MW-17R DG	MW-18 DG	MW-19 DG	MW-20 DG	MW-21 DG	MW-22 DG	SW-1 SW
Barium (Dissolved/ Total) (7440-39-3) MCL = 2 IDNR AL = 2 Interwell CL = 0.340	10/05/2021	mg/L	0.120/0.125	0.127	0.153	0.117	0.107		0.0659		0.163					
	10/06/2021	mg/L						0.2090		0.176/0.135		0.1910	0.1080	0.189		
	10/08/2021	mg/L													0.151	
	4/4/2022	mg/L	0.0888/0.0828	0.0242	0.1300	0.0441	0.0701		0.0635							
	4/5/2022	mg/L						0.1670		0.0886/0.0920		0.1560	0.1060	0.180	0.097	
	4/6/2022	mg/L									0.1380					0.0703
	10/3/2022	mg/L	0.153/0.153	0.0194	0.3440	0.0569	0.0771				0.1410					
	10/4/2022	mg/L						0.139	0.0615	0.1090		0.159	0.0877/0.0885	0.174	0.0804	
	3/27/2023	mg/L	0.1380					0.167		0.0922/0.0934						
	3/28/2023	mg/L				0.0416			0.0665			0.165	0.093	0.191	0.0992	0.0641
	3/29/2023	mg/L		0.0260/0.0223	0.1310		0.0736									
	10/3/2023	mg/L	0.2440				0.1250	0.195	0.0786	0.139/0.142		0.223				
	10/4/2023	mg/L		0.0246	0.2060	0.1100								0.210	0.114/0.119	
	10/5/2023	mg/L											0.130			
	4/1/2024	mg/L														0.0715
	4/2/2024	mg/L	0.0822	0.0154/0.0153												
	4/3/2024	mg/L			0.132		0.0928								0.168	0.0916
4/4/2024	mg/L				0.0506		0.160	0.0617	0.0912		0.156	0.0910/0.0864				
10/7/2024	mg/L				0.0642	0.103		0.0553								
10/8/2024	mg/L	0.121		0.131			0.147		0.0936				0.101	0.163/0.161	0.0814	
10/9/2024	mg/L		0.0230								0.179/0.183					
Iron (Dissolved/ Total) (7439-89-6) IDNR AL = 0.3 Interwell CL = 16.50	7/1/1995	mg/L	0.100 U	0.100 U	1.30	1.60	0.100 U	0.100 U	1.60							
	8/1/1995	mg/L	0.100 U	0.100 U	0.100 U	0.69	0.100 U	0.14	2.10							
	11/1/1995	mg/L	0.100 U	0.100 U	0.100 U	0.49	0.100 U	0.13	2.70							
	2/1/1996	mg/L	0.100 U	0.100 U	0.16		0.100 U	0.100 U	0.20							
	5/1/1996	mg/L								0.10						0.100 U
	11/1/1996	mg/L	0.100 U	0.100 U	0.100 U	2.25	0.100 U	0.100 U	0.27							0.13
	4/1/1997	mg/L	0.100 U	0.100 U	0.100 U	0.68	0.100 U	0.100 U	2.80	0.21						0.100 U
	11/1/1997	mg/L	0.100 U	0.17	0.21	0.29	0.100 U	0.100 U	2.10							0.100 U
	5/1/1998	mg/L	0.100 U	0.100 U	0.100 U	1.70	0.100 U	0.100 U	1.20	1.60						
	11/1/1998	mg/L	0.100 U	0.100 U	0.54	0.43	0.100 U	0.100 U	2.00	0.58						0.100 U
	5/1/1999	mg/L	0.100 U	0.100 U	0.100 U	1.20	0.100 U	0.100 U	0.88	1.60						0.100 U
	11/1/1999	mg/L	0.100 U	3.20	0.100 U	0.500 U	0.100 U	0.100 U	0.78							
	5/1/2000	mg/L	0.100 U	0.100 U	0.100 U	1.20	0.100 U	0.100 U	1.00	0.15						
	12/1/2000	mg/L	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	1.90	1.40						
	6/1/2001	mg/L	0.100 U	0.100 U	0.17	1.00	0.100 U	0.100 U	0.86	2.10						
	11/1/2001	mg/L	0.100 U	0.100 U	0.100 U	0.75	0.100 U	0.100 U	1.20	0.10						0.100 U
	5/2/2002	mg/L	0.100 U	0.100 U	0.100 U	0.99	0.100 U	0.100 U	0.48	0.60						
	11/2/2002	mg/L	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.17	0.61	2.50						
	5/3/2003	mg/L	0.100 U	0.100 U	0.100 U	2.20	0.100 U	0.100 U	0.36	6.70						0.100 U
	11/3/2003	mg/L		0.100 U	0.100 U	0.23	0.26	0.100 U	0.100 U	0.76						0.100 U
	5/1/2004	mg/L	0.100 U	0.100 U	0.100 U	1.10	0.100 U	0.100 U	0.100 U	2.20						0.100 U
	12/1/2004	mg/L		0.100 U	0.100 U	0.24	0.100 U	0.100 U	0.100 U	3.70						
	5/5/2005	mg/L	0.100 U	0.100 U	0.100 U	1.50	0.29	0.100 U	0.100 U	3.40						
	11/5/2005	mg/L		0.100 U	0.23		0.16	0.100 U	0.100 U							
	5/6/2006	mg/L	1.51	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	4.47						0.100 U
	10/6/2006	mg/L		0.100 U	0.100 U	0.37	0.16	0.100 U	0.100 U	4.49						
	4/7/2007	mg/L	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	1.18	5.64						0.100 U
10/7/2007	mg/L	0.31	0.100 U	0.100 U	0.11	0.16	0.100 U	0.19	3.31						0.100 U	
4/1/2008	mg/L	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.38	1.18	6.38					0.27	
10/1/2008	mg/L	1.13	0.100 U	0.100 U	0.11	0.29	0.100 U	0.13	4.85							
10/29/2009	mg/L	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.10	6.31/5.96						7.69	
3/25/2010	mg/L		0.100 U		0.58	0.100 U	0.100 U	0.100 U	28.5/28.1						0.100 U	
3/30/2010	mg/L	0.99		0.100 U												
4/22/2010	mg/L	1.03	0.100 U	0.12	0.100 U	0.100 U	0.100 U	0.100 U	28.3/27.9						0.100 U	
10/16/2010	mg/L	1.15	0.100 U	0.51	0.15	0.100 U	0.100 U/0.100 U	0.100 U	6.43						3.79	
4/28/2011	mg/L	0.28	0.100 U	0.18	0.14	0.100 U	0.100 U	0.23	9.92	0.100 U					0.100 U	
10/18/2011	mg/L	1.61		1.77						0.100 U						

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Iron (Dissolved/ Total) (7439-89-6) IDNR AL = 0.3 Interwell CL = 16.50	10/19/2011	mg/L		0.100 U		0.15	0.100 U/0.100 U	0.100 U	0.29	8.41						0.100 U	
	4/25/2012	mg/L	0.80	0.100 U	1.10	0.17	0.100 U	0.100 U/0.100 U	0.48	7.08	0.10					0.100 U	
	10/9/2012	mg/L								2.68/2.44	0.20						
	10/10/2012	mg/L		0.100 U	0.11	0.76	0.18	0.100 U	0.33								
	4/16/2013	mg/L	0.100 U	0.100 U				0.100 U			0.17					0.100 U	
	4/17/2013	mg/L			0.100 U	0.100 U		0.100 U	0.75	11.7/11.6							
	10/29/2013	mg/L		0.100 U/0.100 U		0.32	0.100 U		0.43	1.98	0.13						
	10/30/2013	mg/L			0.13			0.100 U				0.100 U	0.100 U	3.90	0.87	0.53	
	4/14/2014	mg/L	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U/0.100 U	0.100 U	0.57	17.30	0.15	0.100 U	0.100 U			0.22	
	4/15/2014	mg/L										0.100 U/0.100 U		3.38	1.19		
	10/7/2014	mg/L						0.100 U/0.100 U									
	10/8/2014	mg/L		0.100 U			0.100 U		0.100 U	0.62	19.60	0.14					
	10/9/2014	mg/L	2.63		0.100 U							0.100 U/0.100 U	0.29	3.12	1.39		
	4/16/2015	mg/L		0.100 U/0.3		0.100 U	0.100 U	0.100 U	0.12	0.73	10.90	0.11					
	4/17/2015	mg/L	0.39		0.100 U	0.100 U						0.100 U/0.100 U	0.24	2.45	18.70		
	10/14/2015	mg/L		0.100 U		0.100 U	0.100 U	0.100 U/0.100 U		0.94							
	10/15/2015	mg/L							0.100 U/0.100 U		4.02	0.23	0.100 U	0.21		0.85	
	10/16/2015	mg/L	4.89		8.24										1.53		
	3/16/2016	mg/L		0.100 U/0.100 U		0.100 U											0.20
	3/17/2016	mg/L	0.100 U		0.101/0.100 U	0.34			0.100 U	0.72	11.60	0.100 U					
	3/18/2016	mg/L										0.100 U	0.53	1.56	1.21		
	9/27/2016	mg/L		0.100 U/0.100 U		0.74	0.100 U			0.85							
	9/28/2016	mg/L							0.100 U		9.28/9.27	0.26	0.100 U	0.37	2.02	9.15	
	9/29/2016	mg/L	0.91		6.19												
	3/7/2017	mg/L		0.500 U/0.500 U				0.500 U									
	3/8/2017	mg/L	0.68		0.500 U	0.500 U	0.500 U			0.846/0.841	10.80	0.500 U					
	3/9/2017	mg/L							0.500 U			0.500 U	1.71	1.40	2.35		
	10/4/2017	mg/L	1.62	0.500 U	0.69	7.78	0.500 U/0.500 U	0.500 U	0.72	6.80	0.165 J	0.74					
	10/5/2017	mg/L											27.60	1.86	2.13/2.72		
	3/12/2018	mg/L	1.54	1.54	7.15		0.500 U/0.500 U										
	3/13/2018	mg/L				0.500 U		0.500 U	0.500 U	0.84	19.70	0.500 U	0.79	2.32			
	3/14/2018	mg/L													2.78	6.53/5.69	
	10/8/2018	mg/L									6.14	0.500 U					0.79
	10/9/2018	mg/L	1.09	0.500 U/0.702	0.87		0.500 U	0.500 U									
	10/10/2018	mg/L				0.57				1.2/1.21		0.500 U	8.38	2.29	5.84		
	3/25/2019	mg/L	0.59/0.567	1.01	0.87		0.500 U			1.06	10.60						
	3/26/2019	mg/L				0.500 U		0.500 U	0.500 U			0.93	1.88				0.500 U/0.500 U
	3/27/2019	mg/L												3.95	10.50		
	10/3/2019	mg/L	0.500 U/0.500 U	0.500 U	1.58	4.02	0.500 U	0.500 U	1.18			0.500 U					0.500 U
	10/4/2019	mg/L									11.00	0.500 U		18.3/33.7	2.93	15.10	
3/17/2020	mg/L	0.54/0.571	0.500 U	35.60	4.66	0.500 U			1.39								
3/18/2020	mg/L							0.500 U		11.1/36	0.500 U	0.72	4.27	4.25	17.10	0.500 U	
10/4/2020	mg/L	1.34	0.500 U	0.598/0.679			0.500 U										
10/5/2020	mg/L				6.09			0.85	1.23/1.28	4.67	0.500 U	0.500 U	6.71				
10/6/2020	mg/L													4.57	7.45		
03/29/2021	mg/L							0.500 U		7.25	0.500 U	1.02	67.7	3.11/3.40	3.30		
03/30/2021	mg/L	0.500 U	0.500 U/0.500 U	0.861	1.98	0.500 U			0.798							0.500 U	
10/05/2021	mg/L	2.38/3.08	1.12	2.23	6.94	0.500 U			1.31		0.500 U						
10/06/2021	mg/L							3.61		29.1/16.1	0.500 U	1.97	3.44				
10/08/2021	mg/L														13.6		
4/4/2022	mg/L	0.689/0.524	0.500 U	0.852	3.17	0.500 U			1.16								
4/5/2022	mg/L							0.672		9.72/10.6	0.500 U	2.47	1.93	6.68			
4/6/2022	mg/L										0.500 U					0.500 U	
10/3/2022	mg/L	0.446/2.10	0.100 U	23.6	0.584	0.100 U					0.111						
10/4/2022	mg/L						0.100 U	1.01		18.9		0.34	2.59/0.820	5.21	1.56		
3/27/2023	mg/L	0.500 U					0.500 U			9.40/9.70							
3/28/2023	mg/L				1.84				1.39			0.56	0.500 U	4.86	3.51	0.500 U	
3/29/2023	mg/L		0.500 U/0.500 U	1.42			0.500 U										

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Iron (Dissolved/ Total) (7439-89-6) IDNR AL = 0.3 Interwell CL = 16.50	10/3/2023	mg/L	0.500 U				0.500 U	0.500 U	1.07	11.0/11.4		0.500 U					
	10/4/2023	mg/L		0.500 U	2.83	0.68								2.41			
	10/5/2023	mg/L											1.52		1.39/1.70		
	4/1/2024	mg/L														0.568	
	4/2/2024	mg/L	0.154	0.100 U/0.100 U													
	4/3/2024	mg/L			1.02			0.100 U							1.98	1.32	
	4/4/2024	mg/L				0.592		0.123	0.776	8.58		0.415	0.838/0.155				
	10/7/2024	mg/L				1.39		0.100 U	0.801								
	10/8/2024	mg/L	1.54		0.262				0.163					1.07	1.95/1.87	0.937	
10/9/2024	mg/L		0.100 U								0.100 U/0.100 U						
Ammonia (as N) (N/A) MCL = N/A IDNR AL = 30 Interwell CL = 1.85	7/1/1995	mg/L	0.200 U	0.560	1.500	0.200 U	0.200 U	0.400	1.700								
	8/1/1995	mg/L	0.200 U	0.200 U	1.700	0.240	0.200 U	0.370	1.500	0.490						0.200 U	
	11/1/1995	mg/L	0.200 U	0.200 U	1.500	0.520	0.200 U	0.320	1.300	0.430							
	2/1/1996	mg/L	0.200 U	0.200 U	2.200		0.200 U	1.200	1.400	0.430							
	5/1/1996	mg/L	0.200 U	0.200 U	1.700	0.200 U	0.200 U	0.460	1.500	0.200 U						0.200 U	
	11/1/1996	mg/L	0.200 U	0.230	0.800	0.900	0.200 U	0.450	0.200 U	0.200 U						0.200 U	
	4/1/1997	mg/L	0.200 U	0.200 U	1.000	0.200 U	0.200 U	0.260	1.700	0.200 U						0.200 U	
	11/1/1997	mg/L	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.400	1.500							0.200 U	
	5/1/1998	mg/L	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	1.500	0.950							
	11/1/1998	mg/L	0.200 U	0.200 U	1.500	0.200 U	0.200 U	0.420	1.600	0.200 U						0.240	
	5/1/1999	mg/L	0.200 U	0.230	1.800	0.200 U	0.200 U	0.570	1.700	0.200 U						0.200 U	
	11/1/1999	mg/L	0.200 U	0.200 U	1.700	0.200 U	0.200 U	0.480	1.400	0.550							
	5/1/2000	mg/L	0.200 U	0.240	1.980	0.320	0.200 U	0.640	1.510	0.290							
	12/1/2000	mg/L	0.200 U	0.200 U	1.780	0.200 U	0.200 U	0.420	1.530	0.200 U							
	6/1/2001	mg/L	0.200 U	0.200 U	1.620	0.200 U	0.200 U	0.340	1.440	0.200 U							
	11/1/2001	mg/L	0.200 U	0.200 U	1.400	0.200 U	0.200 U	0.370	1.500	0.200 U						0.200 U	
	5/2/2002	mg/L	0.200 U	0.200 U	1.640	0.200 U	0.200 U	0.220	1.040	0.200 U							
	11/2/2002	mg/L	0.200 U	0.200 U	1.420	0.200 U	0.200 U	0.340	1.200	0.200 U							
	5/3/2003	mg/L	0.200 U	0.200 U	1.650	0.200 U	0.200 U	0.200 U	1.310	0.300						0.200 U	
	11/3/2003	mg/L		0.200 U	1.750	0.200 U	0.210	0.220	0.210	0.200 U						0.200 U	
	5/1/2004	mg/L	0.200 U	0.200 U	1.600	0.200 U	0.200 U	0.200 U	0.200 U	0.220						0.200 U	
	12/1/2004	mg/L		0.200 U	1.590	0.200 U	0.200 U	0.200 U	0.410	0.200 U							
	5/5/2005	mg/L	0.200 U	0.200 U	1.500	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U						
	11/5/2005	mg/L		0.200 U	0.200 U	0.210		0.200 U	0.507								
	5/6/2006	mg/L	0.200 U	0.200 U	0.469	0.200 U	0.200 U	0.208	0.200 U	0.439						0.200 U	
	10/6/2006	mg/L		0.200 U	1.660	0.200 U	0.200 U	0.200 U	0.249	0.317							
	4/7/2007	mg/L	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.202	0.369						0.200 U	
	10/7/2007	mg/L	0.200 U	0.200 U	1.100	0.200 U	0.200 U	0.200 U	0.467	0.332						0.200 U	
	4/1/2008	mg/L	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.543						0.200 U	
	10/1/2008	mg/L	0.200 U	0.200 U	1.490	0.200 U	0.200 U	0.200 U	0.716	0.295							
	10/29/2009	mg/L	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.551/0.552						0.200 U	
	3/25/2010	mg/L		0.200 U		0.200 U	0.200 U	0.200 U	0.784	1.25/1.25						0.200 U	
	3/30/2010	mg/L	0.200 U		1.800												
4/22/2010	mg/L	0.200 U	0.200 U	1.830	0.200 U	0.200 U	0.200 U	1.100	1.41/1.44						0.200 U		
10/16/2010	mg/L	0.200 U	0.200 U	1.830	0.200 U	0.200 U	0.200 U/0.200 U	0.200 U	0.485						0.200 U		
4/28/2011	mg/L	0.200 U	0.200 U	1.890	0.200 U	0.200 U	0.392	0.908	0.838	0.200 U					0.200 U		
10/18/2011	mg/L	0.200 U		2.000						0.200 U							
10/19/2011	mg/L		0.200 U		0.200 U	0.200 U/0.200 U	0.218	0.918	0.730						0.200 U		
4/25/2012	mg/L	0.200 U	0.200 U	2.170	0.200 U	0.200 U	0.301/0.327	1.050	0.719	0.200 U					0.200 U		
10/9/2012	mg/L								0.624/0.63	0.200 U							
10/10/2012	mg/L		0.200 U	1.690	0.200 U	0.200 U	0.327	1.050									
4/16/2013	mg/L	0.200 U	0.200 U							0.200 U					0.200 U		
4/17/2013	mg/L			1.890	0.200 U			1.250	0.762/0.799								
10/29/2013	mg/L		0.200 U/0.200 U		0.224	0.200 U	0.200 U	1.060	0.760	0.200 U							
10/30/2013	mg/L			0.952				0.386			0.332	1.050	0.909	1.450	0.200 U		
4/14/2014	mg/L	0.200 U	0.200 U	1.690	0.200 U	0.200 U/0.200 U	0.358	1.250	1.230	0.200 U					0.200 U		
4/15/2014	mg/L										0.200 U/0.200 U		0.665	1.010			
10/7/2014	mg/L					0.200 U/0.200 U											

Table 8

Analytical Data Summary
 2024 Annual Water Quality Report
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 Cedar Falls, Iowa

Constituent (CAS #)	Sample Date	Units	MW-5 BG/UG	MW-14 BG/UG	MW-16 BG/UG	MW-7R DG	MW-8 DG	MW-11 DG	MW-15 DG	MW-17R DG	MW-18 DG	MW-19 DG	MW-20 DG	MW-21 DG	MW-22 DG	SW-1 SW
Ammonia (as N) (N/A) MCL = N/A IDNR AL = 30 Interwell CL = 1.85	10/8/2014	mg/L		0.200 U		0.200 U		0.351	1.110	1.170	0.200 U					
	10/9/2014	mg/L	0.200 U		0.811							0.241/0.251	0.601	0.650	0.801	
	4/16/2015	mg/L		0.200 U/0.200 U		0.200 U	0.200 U	0.309	1.200	0.829	0.200 U					
	4/17/2015	mg/L	0.200 U		1.880							0.200 U/0.200 U	1.860	0.506	1.860	
	10/14/2015	mg/L		0.200 U		0.200 U	0.200 U/0.200 U		1.190							
	10/15/2015	mg/L						0.3/0.305		0.874	0.200 U	0.200 U	0.750		1.110	
	10/16/2015	mg/L	0.200 U		1.560									0.392		
	3/16/2016	mg/L		0.200 U/0.200 U			0.200 U									
	3/17/2016	mg/L	0.200 U		0.456/0.59	0.200 U		0.405	1.280	0.814	0.200 U					0.200 U
	3/18/2016	mg/L										0.200 U	1.790	0.426	1.540	
	9/27/2016	mg/L		0.200 U/0.200 U		0.200 U	0.200 U		1.140		0.200 U					
	9/28/2016	mg/L							0.308		0.761/0.769	0.200 U	0.748	0.897	0.892	
	9/29/2016	mg/L	0.200 U		1.530											
	3/7/2017	mg/L		0.200 U/0.200 U			0.200 U									
	3/8/2017	mg/L	0.200 U		0.584	0.200 U				1.43/1.38	0.759	0.200 U				
	3/9/2017	mg/L							0.406			0.200 U	1.760	0.423	1.250	
	10/4/2017	mg/L	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U/0.200 U	0.322	1.030	0.733	0.200 U	0.200 U				
	10/5/2017	mg/L											0.828	0.380	1.47/1.49	
	3/12/2018	mg/L	0.200 U	0.200 U	0.776		0.200 U/0.200 U									
	3/13/2018	mg/L				0.200 U		0.271	1.340	0.787	0.200 U	0.200 U	0.888			
	3/14/2018	mg/L												0.507	1.12/0.957	
	10/8/2018	mg/L									0.200 U	0.200 U				0.200 U
	10/9/2018	mg/L	0.200 U	0.200 U/0.200 U	1.430		0.200 U	0.372								
	10/10/2018	mg/L				0.200 U	0.200 U			1.4/1.36			0.200 U	0.743	0.483	1.620
	3/25/2019	mg/L	0.200 U/0.200 U	0.200 U	0.316		0.200 U			1.340	0.200 U					
	3/26/2019	mg/L				0.200 U		0.229				0.200 U	0.418			0.200 U/0.200 U
	3/27/2019	mg/L												0.432	0.878	
	10/3/2019	mg/L	0.200 U/0.200 U	0.200 U	1.420	0.200 U	0.200 U	0.377	1.370		0.200 U	0.200 U				0.200 U
	10/4/2019	mg/L									0.200 U		0.221	1.31/1.6	0.511	0.866
	3/17/2020	mg/L	0.200 U/0.200 U	0.200 U	1.860	0.200 U	0.200 U		1.510							
	3/18/2020	mg/L						0.312		0.708/0.679	0.200 U	0.200 U	1.630	0.440	1.470	0.200 U
	10/4/2020	mg/L	0.200 U	0.200 U	0.536/0.542		0.200 U									
	10/5/2020	mg/L				0.200 U		0.391	1.28/1.3	0.756	0.200 U	0.200 U	0.317			
	10/6/2020	mg/L												0.478	1.120	
	03/29/2021	mg/L							0.200 U		0.599	0.200 U	0.200 U	1.66	0.478/0.447	1.38
	03/30/2021	mg/L	0.200 U	0.200 U/0.200 U	1.35	0.200 U	0.200 U		1.19							0.200 U
	10/05/2021	mg/L	0.200 U/0.200 U	0.200 U	0.671	0.200 U	0.200 U		1.33			0.200 U				
	10/06/2021	mg/L							0.405		0.829/0.820		0.200 U	0.312	0.471	
	10/08/2021	mg/L													1.57	
	4/4/2022	mg/L	0.200 U/0.200 U	0.200 U	1.520	0.200 U	0.200 U		1.270							
4/5/2022	mg/L						0.289		0.604/0.626		0.200 U	1.390	0.438	1.34		
4/6/2022	mg/L										0.200 U				0.200 U	
10/3/2022	mg/L	0.200 U/0.200 U	0.200 U	0.368	0.200 U	0.200 U					0.200 U					
10/4/2022	mg/L						0.218	1.110	0.569		0.200 U	0.301/0.371	0.355	0.777		
3/27/2023	mg/L	0.200 U					0.200 U		0.602/0.681							
3/28/2023	mg/L				0.200 U			1.190				0.200 U	1.410	0.483	1.550	0.200 U
3/29/2023	mg/L		0.200 U/0.200 U	1.660		0.200 U										
10/3/2023	mg/L	0.200 U				0.200 U		0.297	1.470	0.668/0.878		0.200 U				
10/4/2023	mg/L		0.200 U	1.760	0.200 U									0.469		
10/5/2023	mg/L												2.410		1.52/1.60	
4/1/2024	mg/L														0.200 U	
4/2/2024	mg/L	0.200 U	0.200 U/0.200 U													
4/3/2024	mg/L			1.24		0.200 U								0.418	1.50	
4/4/2024	mg/L					0.200 U	0.389	1.59	0.632		0.200 U	2.15/2.12				
10/7/2024	mg/L				0.377	0.200 U		1.18								
10/8/2024	mg/L	0.200 U		1.45			0.314		0.516				0.635	0.392/0.385	1.02	
10/9/2024	mg/L		0.200 U									0.344/0.200 U				
COD (Interwell CL = 12.3)	7/1/1995	mg/L	5.00 U	5.00 U	6.8	34.0	99.0	5.00 U	5.00 U							

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COD (N/A) MCL = N/A IDNR AL = N/A Interwell CL = 12.3	8/1/1995	mg/L	5.00 U	5.00 U	8.9	32.0	100.0	5.00 U	8.3	14.0						47.0
	11/1/1995	mg/L	5.00 U	5.2	14.0	27.0	230.0	5.8	16.0	17.0						
	2/1/1996	mg/L	12.0	7.3	5.00 U		270.0	5.00 U	15.0	21.0						
	5/1/1996	mg/L	5.00 U	5.00 U	7.5	26.0	230.0	5.00 U	6.7	19.0						16.0
	11/1/1996	mg/L	5.00 U	5.00 U	11.0	5.00 U	230.0	5.00 U	29.0	16.0						34.0
	4/1/1997	mg/L	5.00 U	5.00 U	5.00 U	15.0	56.0	5.00 U	5.00 U	6.6						28.0
	11/1/1997	mg/L	5.00 U	5.00 U	5.00 U	17.0	150.0	5.00 U	6.5							35.0
	5/1/1998	mg/L	7.3	5.00 U	5.00 U	26.0	86.0	5.00 U	5.00 U	15.0						
	11/1/1998	mg/L	5.00 U	5.00 U	8.6	22.0	170.0	5.00 U	5.00 U	17.0						20.0
	5/1/1999	mg/L	24.0	78.0	5.2	22.0	180.0	96.0	5.00 U	82.0						5.3
	11/1/1999	mg/L	5.00 U	5.00 U	5.00 U	14.0	260.0	5.00 U	5.00 U	19.0						
	5/1/2000	mg/L	5.00 U	5.00 U	12.0	18.0	270.0	9.6	5.00 U	17.0						
	12/1/2000	mg/L	5.00 U	5.00 U	5.00 U	7.3	210.0	5.00 U	5.00 U	14.0						
	6/1/2001	mg/L	7.4	5.00 U	6.4	12.0	130.0	5.00 U	5.00 U	25.0						
	11/1/2001	mg/L	5.00 U	5.00 U	6.7	14.0	200.0	5.00 U	5.00 U	20.0						21.9
	5/2/2002	mg/L	5.00 U	5.00 U	5.00 U	16.0	710.0	5.00 U	5.00 U	9.2						
	11/2/2002	mg/L	8.3	12.0	7.8	17.0	86.0	6.9	8.4	21.0						
	5/3/2003	mg/L	5.00 U	5.00 U	5.00 U	8.3	190.0	5.00 U	5.2	27.0						22.0
	11/3/2003	mg/L	5.00 U	5.00 U	5.00 U	6.2	93.0	5.00 U	5.00 U	27.0						13.0
	5/1/2004	mg/L	10.0	5.3	5.00 U	12.0	86.0	5.00 U	5.00 U	14.0						22.0
	12/1/2004	mg/L		5.00 U	5.00 U	12.0	140.0	5.00 U	6.7	12.0						
	5/5/2005	mg/L	5.00 U	5.00 U	6.8	12.0	100.0	5.00 U	5.9	12.0						
	11/5/2005	mg/L		5.00 U	5.00 U		120.0	5.00 U	5.6							
	5/6/2006	mg/L	18.5	5.00 U	5.00 U	13.4	117.0	5.00 U	10.8	16.8						25.0
	10/6/2006	mg/L		8.1	9.0	17.6	51.8	6.9	17.2	19.3						
	4/7/2007	mg/L	5.2	5.00 U	5.00 U	10.6	37.1	5.5	7.1	12.2						29.6
	10/7/2007	mg/L	9.3	5.00 U	5.00 U	7.0	94.3	5.00 U	5.00 U	7.5						5.00 U
	4/1/2008	mg/L	12.6	20.8	20.6	25.7	74.0	22.9	7.1	29.8						30.1
	10/1/2008	mg/L	9.3	5.00 U	9.9	14.4	86.8	11.2	6.6	14.8						
	10/29/2009	mg/L	5.6	5.00 U	25.0 U	25.0 U	62.6	5.00 U	25.0 U	12.1/5.00 U						5.00 U
	3/25/2010	mg/L		25.0 U		5.4	35.1	5.00 U	5.00 U	14.0/15.3						9.5
	3/30/2010	mg/L	5.00 U		5.00 U			5.00 U	5.00 U							
	4/22/2010	mg/L	5.00 U	5.00 U	5.00 U	5.00 U	35.3	5.00 U	5.00 U	16.5/14.7						7.9
10/16/2010	mg/L	5.00 U	7.5	5.00 U	11.6	44.9	6.90/5.00 U	6.9	8.7						14.4	
4/28/2011	mg/L	5.00 U	5.00 U	5.5	10.1	19.9	5.00 U	5.5	10.1	13.1					7.6	
10/18/2011	mg/L	5.00 U		6.6						16.7						
10/19/2011	mg/L		5.6		12.1	40.2/40.2	5.00 U	5.00 U	13.5						22.9	
4/25/2012	mg/L	5.00 U	5.00 U	5.00 U	5.00 U	27.9	5.00 U/5.00 U	5.00 U	5.00 U	6.8					5.00 U	
10/9/2012	mg/L			5.00 U	5.00 U					18.4/5.00 U	5.00 U					
10/10/2012	mg/L		5.00 U	5.00 U	16.1	58.0	5.1	5.00 U								
4/16/2013	mg/L	7.9	5.00 U			31.1				31.4					12.8	
4/17/2013	mg/L			5.00 U	8.8		5.00 U	5.00 U	21.3/11.8							
10/29/2013	mg/L		5.00 U/5.00 U		5.00 U	22.1		8.6	9.6	9.9						
10/30/2013	mg/L			6.3			5.00 U			6.7			15.0	5.00 U	8.0	
4/14/2014	mg/L	5.00 U	5.00 U	5.00 U	5.00 U	30.7/30	5.00 U	5.00 U	21.0	10.2					23.7	
4/15/2014	mg/L										5.00 U/5.00 U			16.1	5.2	
10/7/2014	mg/L					19.2/16.8										
10/8/2014	mg/L		5.00 U		5.00 U		5.00 U	5.00 U	25.3	8.3						
10/9/2014	mg/L	5.00 U		5.00 U							5.00 U/5.00 U		302.0	14.8	5.00 U	
4/16/2015	mg/L		5.00 U/5.00 U		5.00 U	23.3	5.00 U	5.00 U	19.1	10.2						
4/17/2015	mg/L	5.00 U		5.7							5.00 U/5.00 U		5.00 U	10.2	10.9	
10/14/2015	mg/L		5.00 U		5.00 U	26.9/22.4		5.00 U								
10/15/2015	mg/L						5.00 U/5.00 U		14.8	15.5	5.00 U		7.9		5.00 U	
10/16/2015	mg/L	11.6		5.3										17.8		
3/16/2016	mg/L		6.88/7.54			10.5										
3/17/2016	mg/L	7.5		5.00 U/5.00 U	5.00 U		9.5	5.00 U	16.8	18.1					5.00 U	
3/18/2016	mg/L										5.00 U		8.9	7.5	7.2	
9/27/2016	mg/L		5.00 U/5.00 U		5.00 U		5.00 U				5.00 U					

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COD (N/A) MCL = N/A IDNR AL = N/A Interwell CL = 12.3	9/28/2016	mg/L						5.00 U		8.57/5.00 U		12.9	14.2	18.8	15.5	
	9/29/2016	mg/L	9.6		20.1											
	3/7/2017	mg/L		5.00 U/5.00 U			6.5									
	3/8/2017	mg/L	5.5		5.00 U	5.00 U			6.86/5.00 U	5.00 U	9.2					
	3/9/2017	mg/L						5.00 U				5.00 U	5.00 U	26.5	5.00 U	
	10/4/2017	mg/L	5.00 U	5.00 U	6.8	15.0	9.39/30	7.5	5.00 U	39.4	107.0	5.00 U				
	10/5/2017	mg/L											93.4	5.00 U	5.00 U/5.00 U	
	3/12/2018	mg/L	5.00 U	5.00 U	5.00 U		5.00 U/7.01									
	3/13/2018	mg/L				5.00 U		5.4	5.00 U	10.5	7.3	5.1	5.00 U			
	3/14/2018	mg/L												5.00 U	5.00 U/5.00 U	
	10/8/2018	mg/L								5.00 U	14.0					12.0
	10/9/2018	mg/L	13.4	5.00 U/5.00 U	5.00 U		5.00 U	6.3								
	10/10/2018	mg/L				5.00 U			5.00 U/5.00 U				5.00 U	5.00 U	5.00 U	5.00 U
	3/25/2019	mg/L	5.00 U/5.00 U	5.00 U	5.00 U		5.0		5.00 U				5.00 U	5.00 U	5.00 U	5.00 U
	3/26/2019	mg/L				5.00 U			5.00 U				5.00 U	5.00 U		6.06/5.00 U
	3/27/2019	mg/L													6.8	7.1
	10/3/2019	mg/L	9.33/8.99	5.00 U	5.00 U	8.0	5.00 U	6.9	5.00 U			17.3				
	10/4/2019	mg/L									8.0		5.00 U	5.00 U/5.00 U	5.00 U	5.00 U
	3/17/2020	mg/L	5.00 U/5.00 U	6.7	5.0	5.7	5.00 U			5.4						
	3/18/2020	mg/L							8.6							
	10/4/2020	mg/L	5.4	5.00 U	5.00 U/5.1			6.8								
	10/5/2020	mg/L						13.5		11.1	5.77/5.00 U	10.1	24.9	5.00 U	5.4	
	10/6/2020	mg/L													7.1	6.1
	03/29/2021	mg/L							5.25		5.00 U		17.9	5.00 U	6.29	5.00 U/5.00 U
	03/30/2021	mg/L	5.00 U	5.00 U/5.00 U	5.00 U	5.94	5.00 U		5.00 U							
	10/05/2021	mg/L	5.00 U/7.98	9.04	5.00 U			23.5	14.0	8.68			28.0			
	10/06/2021	mg/L									13.6			15.1/12.6	6.21	6.92
	10/08/2021	mg/L														11.5
	4/4/2022	mg/L	5.00 U/9.14	6.0	8.45	13.3	7.75			5.3						
	4/5/2022	mg/L							7.05					5.00 U/6.00		
4/6/2022	mg/L													13.7		
10/3/2022	mg/L	7.23/5.00 U	5.00 U	7.23	9.32	9.32								15.6		
10/4/2022	mg/L							5.49	5.00 U	6.19		5.00 U	5.00 U/10.0	5.00 U	5.00 U	
3/27/2023	mg/L	25.0 U						6.06		5.00 U/10.4						
3/28/2023	mg/L				6.1				5.00 U			7.49	5.00 U	5.00 U	5.00 U	
3/29/2023	mg/L		5.00 U/5.00 U	5.00 U			9.3									
10/3/2023	mg/L	7.9					26.9	7.24	7.9	16.0/8.93		5.00 U				
10/4/2023	mg/L		5.5	15.5	8.3									7.6		
10/5/2023	mg/L												11.7		11.0/5.13	
4/1/2024	mg/L															
4/2/2024	mg/L	5.00 U	5.00 U/5.45													
4/3/2024	mg/L			21.8			18.3							11.9	12.6	
4/4/2024	mg/L					10.6		16.4	11.3	16.7		10.0	10.6/12.2			
10/7/2024	mg/L					30.6	25.0 U		25.0 U							
10/8/2024	mg/L	5.00 U		5.00 U				30.6					5.00 U	25.0 U/25.0 U	25.3	
10/9/2024	mg/L		5.00 U									5.00 U/5.00 U				
Acetone (67-64-1) MCL = N/A IDNR AL = 6300 Interwell CL = Not Established	4/1/2024	µg/L														10.0 U
	4/2/2024	µg/L	10.0 U	10.0 U/10.0 U												
	4/3/2024	µg/L			10.0 U			10.0 U						10.0 U	10.0 U	
	4/4/2024	µg/L				10.0 U		10.0 U	10.0 U	10.0 U		10.0 U	10.0 U/10.0 U			
	10/7/2024	µg/L				10.0 U		10.0 U	10.0 U							
10/8/2024	µg/L	10.0 U		10.0 U				10.0 U	10.0 U				10.0 U	10.0 U/10.0 U	10.0 U	
10/9/2024	µg/L		10.0 U									10.0 U/10.0 U				
TSS (N/A) MCL = N/A IDNR AL = N/A Interwell CL = Not Established	4/1/2024	mg/L														26.0
	4/2/2024	mg/L	5.00 U	5.00 U/5.00 U												
	4/3/2024	mg/L			58.0			5.00 U						5.33	49.7	
	4/4/2024	mg/L				15.3		9.33	15.3	19.0		46.3	32.3/14.0			
10/7/2024	mg/L				5.00 U		5.00 U	5.00 U								

Table 8

Analytical Data Summary
 2024 Annual Water Quality Report
 Viking Pump Foundry Sand Landfill
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 Cedar Falls, Iowa

Constituent (CAS #)	Sample Date	Units	MW-5 BG/UG	MW-14 BG/UG	MW-16 BG/UG	MW-7R DG	MW-8 DG	MW-11 DG	MW-15 DG	MW-17R DG	MW-18 DG	MW-19 DG	MW-20 DG	MW-21 DG	MW-22 DG	SW-1 SW
TSS	10/8/2024	mg/L	94.5		6.00			5.00 U		14.0			74.7	5.00 U/5.00 U	5.00 U	
Interwell CL = Not Established	10/9/2024	mg/L		1.88 U								64.5/1.88 U				
TOX (N/A)	11/1/1995	mg/L	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0290	0.0100 U	0.0220						
MCL = N/A	2/1/1996	mg/L														
IDNR AL = N/A	5/1/1996	mg/L														
Interwell CL = 0.126	11/1/1996	mg/L	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0170	0.0100 U	0.0110						
	4/1/1997	mg/L														
	11/1/1997	mg/L	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0240	0.0100 U							
	5/1/1998	mg/L														
	11/1/1998	mg/L	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0130	0.0100 U	0.0100 U						
	5/1/1999	mg/L														
	11/1/1999	mg/L	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0220	0.0100 U	0.0180						
	5/1/2000	mg/L														
	12/1/2000	mg/L	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0140	0.0100 U	0.0140						
	6/1/2001	mg/L														
	11/1/2001	mg/L	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U						
	5/2/2002	mg/L														
	11/2/2002	mg/L	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U						
	5/3/2003	mg/L														
	11/3/2003	mg/L			0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U						
	5/1/2004	mg/L														
	12/1/2004	mg/L			0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U						
	5/5/2005	mg/L														
	11/5/2005	mg/L			0.0100 U			0.0100 U	0.0100 U							
	5/6/2006	mg/L														
	10/6/2006	mg/L			0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U						
	4/7/2007	mg/L														
	10/7/2007	mg/L	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0291	0.0156	0.0100 U	0.0141						
	4/1/2008	mg/L														
	10/1/2008	mg/L	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0125	0.0177	0.0100 U	0.0225						
	10/29/2009	mg/L	0.0232	0.0177	0.0125	0.0138	0.0177	0.0130	0.0111	0.0170/0.0213						0.0129
	3/25/2010	mg/L		0.0100 U		0.0119	0.0108	0.0100 U	0.0100 U	0.0236/0.0285						0.0204
	3/30/2010	mg/L	0.0100 U		0.0424											
	4/22/2010	mg/L	0.0138	0.0100 U	0.0100 U	0.0106	0.0165	0.0100 U	0.0100 U	0.0212/0.0319						0.0160
	10/16/2010	mg/L	0.0230	0.0356	0.0100 U	0.0313	0.0195	0.0120/0.0100 U	0.0113	0.0307						0.0278
	4/28/2011	mg/L	0.0114	0.0100 U	0.0100 U	0.0219	0.0188	0.0100 U	0.0100	0.0222	0.0234					0.0172
	10/18/2011	mg/L	0.0100 U		0.0100 U						0.0140					
	10/19/2011	mg/L		0.0100 U		0.0176	0.0253/0.0120	0.0209	0.0100 U	0.0316						0.0316
	4/25/2012	mg/L	0.0144	0.0112	0.0106	0.0145	0.0112	0.0100 U/0.0100 U	0.0200	0.0304	0.0196					0.0227
	10/9/2012	mg/L								0.0429/0.025	0.500 U					
	10/10/2012	mg/L		0.0128	0.0100 U	0.0254	0.0217	0.0247	0.0227							
	4/16/2013	mg/L	0.0300 U	0.0300 U			0.0356				0.0713					0.0300 U
	4/17/2013	mg/L			0.0300 U	0.0706		0.0300 U	0.0300 U	0.0508/0.0669						
	10/29/2013	mg/L		0.0300 U/0.0300 U		0.0372	0.0300 U	0.0300 U	0.0300 U	0.0300 U	0.0783					
	10/30/2013	mg/L			0.0300 U			0.0300 U	0.0300 U			0.0300 U	0.0300 U	0.0300 U	0.0300 U	0.0687
	4/14/2014	mg/L	0.0300 U	0.0300 U	0.0300 U	0.0557	0.0300 U/0.0300 U	0.0300 U	0.0300 U	0.1360	0.1320					0.0431
	4/15/2014	mg/L										0.0300 U/0.0300 U		0.1190	0.0300 U	
	4/16/2015	mg/L		0.0300 U/0.0300 U		0.0887	0.0300 U	0.0300 U	0.0300 U	0.1680	0.0537					
	4/17/2015	mg/L	0.0300 U		0.0300 U							0.0300 U/0.0300 U	0.0300 U	0.0300 U	0.0300 U	
	3/16/2016	mg/L		0.0300 U/0.0300 U				0.0300 U								
	3/17/2016	mg/L	0.0300 U		0.0300 U/0.0300 U	0.0300 U		0.0300 U	0.0300 U	0.0541	0.0534					0.0300 U
	3/18/2016	mg/L										0.0300 U	0.0300 U	0.0300 U	0.0300 U	
	3/7/2017	mg/L		0.0200 U/0.0200 U			0.0200 U									
	3/8/2017	mg/L	0.200 U		0.0200 U	0.0729			0.0537/0.0200 U	0.0632	0.0561					
	3/9/2017	mg/L						0.0200 U				0.0200 U	0.0200 U	0.0484	0.0200 U	
	3/12/2018	mg/L	0.0300 U	0.0300 U	0.0300 U			0.0300 U/0.0300 U								
	3/13/2018	mg/L				0.0300 U		0.0300 U	0.0300 U	0.0300 U	0.0899	0.0300 U	0.0300 U			
	3/14/2018	mg/L												0.0300 U	0.0300 U/0.0300 U	

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TOX (N/A) MCL = N/A IDNR AL = N/A Interwell CL = 0.126	3/25/2019	mg/L	0.0300 U/0.0300 U	0.0300 U	0.0300 U		0.0300 U		0.0300 U	0.0300 U						
	3/26/2019	mg/L				0.0300 U		0.0300 U				0.0300 U	0.0300 U			0.0469/0.154
	3/27/2019	mg/L												0.0300 U	0.0300 U	
	3/17/2020	mg/L	0.0400 U/0.0400 U	0.0400 U	0.0400 U	0.0400 U	0.0400 U		0.0400 U							
	3/18/2020	mg/L						0.0400 U		0.0656/0.0656	0.1960	0.0400 U	0.0400 U	0.1420	0.0836	0.0614
	03/29/2021	mg/L						0.0400 U		0.0759	0.255	0.0400 U	0.0400 U	0.0400 U/0.0400 U	0.0400 U	
	03/30/2021	mg/L	0.0400 U	0.0400 U/0.0400 U	0.0400 U	0.0400 U	0.0400 U	0.0400 U	0.0400 U							0.0400 U
	4/4/2022	mg/L	0.0400 U/0.0461	0.0400 U	0.0484	0.177	0.0400 U									
	4/5/2022	mg/L						0.0400 U		0.0400 U/0.0400 U		0.0400 U	0.0400 U	0.0400 U	0.0400 U	
	4/6/2022	mg/L									0.116					0.0400 U
	3/27/2023	mg/L	0.0400 U						0.0400 U		0.0805/0.0405					
	3/28/2023	mg/L				0.0400 U		0.0400 U		0.0400 U		0.0400 U	0.1460	0.0400 U	0.0400 U	0.0400 U
	3/29/2023	mg/L		0.0400 U/0.0400 U	0.0400 U		0.0400 U									
	4/1/2024	mg/L														0.0654
4/2/2024	mg/L	0.126	0.0400 U/0.0400 U													
4/3/2024	mg/L			0.0982		0.0400 U								0.0400 U	0.0400 U	
4/4/2024	mg/L				0.116		0.0400 U	0.0400 U	0.0400 U	0.0400 U		0.0400 U	0.0400 U/0.0400 U			
Phenols (108-95-2) MCL = N/A IDNR AL = 2 Interwell CL = 0.0519	7/1/1995	mg/L	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U						
	8/1/1995	mg/L	0.0200 U	0.0240	0.0240	0.0200 U	0.0200 U	0.0240	0.0210	0.0280						0.0280
	11/1/1995	mg/L	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U						
	2/1/1996	mg/L	0.0200 U	0.0200 U	0.0200 U		0.0200 U	0.0200 U	0.0200 U	0.0200 U						
	5/1/1996	mg/L														0.0200 U
	11/1/1996	mg/L	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U						0.0200 U
	4/1/1997	mg/L														
	11/1/1997	mg/L	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U						0.0200 U
	5/1/1998	mg/L														
	11/1/1998	mg/L	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U						0.0200 U
	5/1/1999	mg/L														
	11/1/1999	mg/L	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U						
	5/1/2000	mg/L														
	12/1/2000	mg/L	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U					
	6/1/2001	mg/L														
	11/1/2001	mg/L	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U					0.0200 U
	5/2/2002	mg/L														
	11/2/2002	mg/L	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U					
	5/3/2003	mg/L														
	11/3/2003	mg/L		0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U					0.0200 U
	5/1/2004	mg/L														
	12/1/2004	mg/L		0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U					
	5/5/2005	mg/L														
	11/5/2005	mg/L		0.0200 U	0.0200 U			0.0200 U	0.0200 U	0.0200 U	0.0200 U					
	5/6/2006	mg/L														
	10/6/2006	mg/L		0.0160	0.0180 U	0.0200 U	0.0164	0.0200 U	0.0200 U	0.0200 U	0.0180 U					
	4/7/2007	mg/L														
	10/7/2007	mg/L	0.0180 U	0.0180 U	0.0200 U	0.0180 U	0.0180 U	0.0180 U	0.0180 U	0.0200 U	0.0180 U					0.0200 U
	4/1/2008	mg/L														
	10/1/2008	mg/L	0.0180 U	0.0200 U	0.0200 U	0.0180 U	0.0200 U	0.0180 U	0.0180 U	0.0180 U	0.0180 U					
10/29/2009	mg/L	0.0180 U	0.0180 U	0.0180 U	0.0180 U	0.0180 U	0.0180 U	0.0200 U	0.0180 U	0.0200 U/0.0200 U					0.1450	
3/25/2010	mg/L		0.0180 U			0.0200 U	0.0180 U	0.0236	0.0271	0.0180 U/0.0180 U					0.0180 U	
3/30/2010	mg/L	0.0200 U		0.0200 U												
4/22/2010	mg/L	0.0180 U	0.0180 U	0.0180 U	0.0180 U	0.0180 U	0.0180 U	0.0200 U	0.0180 U	0.0180 U/0.0180 U					0.0180 U	
10/16/2010	mg/L	0.0200 U	0.0200 U	0.0200 U	0.0180 U	0.0200 U	0.0200 U/0.0180 U	0.0180 U	0.0200 U	0.0200 U					0.0180 U	
4/28/2011	mg/L	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0180 U	0.0180 U				0.0180 U	
10/18/2011	mg/L	0.0200 U		0.0200 U							0.0200 U					
10/19/2011	mg/L		0.0200 U			0.0200 U	0.0200 U/0.0200 U	0.0180 U	0.0200 U	0.0180 U					0.0180 U	
4/25/2012	mg/L	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U/0.0200 U	0.0200 U	0.0200 U	0.0200 U				0.0180 U	
10/9/2012	mg/L									0.0180 U/0.0200 U	0.0200 U					
10/10/2012	mg/L		0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U							

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Phenols (108-95-2) MCL = N/A IDNR AL = 2 Interwell CL = 0.0519	4/16/2013	mg/L	0.0200 U	0.0192 U			0.0192 U				0.0200 U					0.0196 U		
	4/17/2013	mg/L			0.0210 U	0.0200 U		0.0192	0.0196 U	0.0196 U/0.0194 U								
	10/29/2013	mg/L		0.0196 U/0.0180 U		0.0204 U	0.0184 U		0.0200 U	0.0196 U	0.0196 U							
	10/30/2013	mg/L			0.0180 U			0.0188 U				0.0204 U	0.0204 U	0.0192 U	0.0180 U	0.0255		
	4/14/2014	mg/L	0.0100 U	0.0180 U	0.0196 U	0.0188 U	0.0216 U/0.0196 U	0.0630	0.0196 U	0.0588	0.0204					0.0192 U		
	4/15/2014	mg/L										0.0200 U/0.0196 U		0.0214	0.0306			
	4/16/2015	mg/L		0.0200 U/0.0180 U		0.0196 U	0.0180 U	0.0188 U	0.0196 U	0.0180 U	0.0184 U							
	4/17/2015	mg/L	0.0184 U		0.0200 U							0.0188 U/0.0188 U	0.0180 U	0.0184 U	0.0188 U			
	3/16/2016	mg/L		0.0196 U/0.0204 U				0.0196 U										
	3/17/2016	mg/L	0.0196 U		0.0180 U/0.0204 U	0.0180 U		0.0200 U	0.0184 U	0.0196 U	0.0184 U					0.0200 U		
	3/18/2016	mg/L										0.0188 U	0.0188 U	0.0184 U	0.0184 U			
	3/7/2017	mg/L		0.0188 U/0.0180 U				0.0200 U										
	3/8/2017	mg/L	0.0193		0.0180 U	0.0200 U			0.0200 U/0.0196 U	0.0197	0.0192 U							
	3/9/2017	mg/L							0.0310			0.0192 U	0.0188 U	0.0184 U	0.0196 U			
	3/12/2018	mg/L	0.0180 U	0.0184 U	0.0180 U		0.0180 U/0.0202											
	3/13/2018	mg/L				0.0200 U		0.0180 U	0.0180 U	0.0184 U	0.0184 U	0.0184 U	0.0184 U					
	3/14/2018	mg/L												0.0208 U	0.0188 U/0.0184 U			
	3/25/2019	mg/L	0.0188 U/0.0200 U	0.0204 U	0.0519		0.0208 U			0.0204 U	0.0314							
	3/26/2019	mg/L				0.0314		0.0192 U					0.0188 U	0.0188 U		0.0238/0.0589		
	3/27/2019	mg/L													0.0212 U	0.0184 U		
	3/17/2020	mg/L	0.0200 U/0.0184 U	0.0192 U	0.0180 U	0.0204 U	0.0204 U			0.0196 U								
	3/18/2020	mg/L							0.0184 U		0.0180 U/0.0188 U	0.0192 U	0.0180 U	0.0180 U	0.0180 U	0.0235	0.0200 U	0.0204 U
	03/29/2021	mg/L						0.0180 U			0.0184 U	0.0192 U	0.0192 U	0.0184 U	0.0216 U/0.0184 U	0.0224 U		
	03/30/2021	mg/L	0.0188 U	0.0184 U/0.0212 U	0.0184 U	0.0244	0.0188 U			0.0224 U							0.0188 U	
	4/4/2022	mg/L	0.0200 U/0.0196 U	0.0192 U	0.0192 U	0.0192 U	0.0188 U			0.0200 U								
	4/5/2022	mg/L							0.0192 U		0.0196 U/0.0196 U		0.0192 U	0.0208 U	0.0184 U	0.0200 U		
	4/6/2022	mg/L										0.0188 U					0.0200 U	
	3/27/2023	mg/L	0.0200 U						0.0200 U		0.0200 U/0.0200 U							
	3/28/2023	mg/L					0.0212 U			0.0200 U			0.0204 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	
	3/29/2023	mg/L		0.0200 U/0.0204 U	0.200 U			0.0200 U										
4/1/2024	mg/L															0.0208 U		
4/2/2024	mg/L	0.0200 U	0.0208 U/0.0200 U															
4/3/2024	mg/L			0.0200 U			0.0220 U											
4/4/2024	mg/L				0.0200 U			0.0208 U	0.0208 U	0.0200 U		0.0200 U	0.0228 U/0.0184 U					
pH (N/A) MCL = N/A IDNR UAL = 8.5 IDNR LAL = 6.5 Interwell CLs = 6.05-8.28	7/1/1995	S.U.	6.70	7.05	7.58	6.97	6.80	7.35	7.25									
	8/1/1995	S.U.	7.22	7.05	7.41	6.97	6.88	7.26	7.27	7.11						8.06		
	11/1/1995	S.U.	6.26	6.03	6.93	6.87	6.09	6.85	6.77	6.94								
	2/1/1996	S.U.	7.56	7.60	7.14	7.59	6.76	7.58	6.75									
	5/1/1996	S.U.	7.44	6.97	7.44	6.93	6.37	7.23	7.33	6.70						6.79		
	11/1/1996	S.U.	7.48	7.30	7.54	6.50	6.87	7.03	6.20	6.94						7.62		
	4/1/1997	S.U.	8.33	8.23	8.24	8.54	8.56	8.43	7.77	7.71						8.56		
	11/1/1997	S.U.	7.65	7.20	7.64	6.42	7.33	7.50	6.40							8.04		
	5/1/1998	S.U.	6.21	5.97	5.67	7.20	8.30	7.80										
	11/1/1998	S.U.	6.96	6.82	6.78	6.09	6.60	6.17	6.02	5.41						7.13		
	5/1/1999	S.U.	9.93	7.33	7.76	7.06	8.64	8.36	7.09	7.51						7.15		
	11/1/1999	S.U.	7.02	6.82	7.10	6.65	6.80	7.36	7.20	7.35								
	5/1/2000	S.U.	7.13	7.12	7.62	7.07	7.03	7.40	7.56	7.17								
	12/1/2000	S.U.	4.85	7.60	7.08	6.54	6.05	6.12	6.01	6.11								
	6/1/2001	S.U.	8.09	8.10	8.27	8.81												
	11/1/2001	S.U.	7.24	7.01	7.42	7.23	7.09	7.39	7.32	7.43						7.99		
	5/2/2002	S.U.	7.50	7.24	7.42	7.40	7.29	7.56	7.70	7.54								
	11/2/2002	S.U.	7.49	7.44	7.40	7.78	7.42	8.34	8.04	7.73								
	5/3/2003	S.U.	7.76	7.64	7.03	7.24	6.63	7.59	7.46	7.06						7.33		
	11/3/2003	S.U.		7.38	7.56	7.89	7.02	7.69	7.50	7.15						7.25		
	5/1/2004	S.U.	7.66	7.01	7.36	7.09	6.75	7.49	7.54	6.93						7.91		
	12/1/2004	S.U.		7.01	7.59	7.12	6.70	7.54	7.58	6.87								
	5/5/2005	S.U.	7.98	7.05	7.47	8.65	6.07	8.38	8.59	7.99								
11/5/2005	S.U.		7.11	7.48		6.82	7.48	7.45										

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pH (N/A) MCL = N/A IDNR UAL = 8.5 IDNR LAL = 6.5 Interwell CLs = 6.05-8.28	5/6/2006	S.U.	7.42	7.33	7.86	7.65	7.43	7.69	8.19	7.44						8.49
	10/6/2006	S.U.		7.79		7.91	7.76	8.05	8.31	7.81						
	4/7/2007	S.U.	8.32	6.95	8.40	7.35	7.18	8.34	8.43	8.03						8.59
	10/7/2007	S.U.	7.75	7.72	7.45	7.85	7.68	7.85	8.06	7.77						7.29
	4/1/2008	S.U.	7.95	7.01	8.22	7.25	7.21	8.01	8.11	8.12						8.32
	10/1/2008	S.U.	7.08	7.13	7.77	7.27	7.15	7.43	7.95	7.12						
	10/29/2009	S.U.	7.06	7.08	8.33	7.25	7.12	7.70	8.28	7.19						8.01
	3/25/2010	S.U.		6.95		7.24	7.06	7.57	7.52	6.99						7.90
	3/30/2010	S.U.	7.18		7.85											
	4/22/2010	S.U.	6.96	6.87	7.49	6.86	7.09	7.48	7.48	6.90						7.74
	10/16/2010	S.U.	6.87	7.02	7.70	7.07	7.02	7.33	7.74	7.00						7.62
	4/28/2011	S.U.	7.03	6.93	7.70	7.26	7.12	7.30	7.67	7.20	6.88					8.39
	10/18/2011	S.U.	7.04		8.04						7.03					
	10/19/2011	S.U.		6.92		7.07	6.98	7.41	7.50	6.94						8.37
	4/25/2012	S.U.	7.11	7.00	7.48	7.22	7.10	7.34	7.55	7.12	6.92					8.08
	10/9/2012	S.U.								6.92	6.44					
	10/10/2012	S.U.		6.74	7.33	6.83	6.89	7.26	7.30							
	4/16/2013	S.U.	6.61	6.79			7.01				6.76					8.02
	4/17/2013	S.U.			6.95	7.05	7.01	7.35	7.32	7.08						
	10/29/2013	S.U.		6.86		7.07	7.08		7.47	7.10	6.74					
	10/30/2013	S.U.			7.44		7.01	7.26				7.23	7.10	7.22	7.53	8.54
	4/14/2014	S.U.	7.51	6.91	7.51	7.20	7.10	7.36	7.44	7.02	6.82					7.17
	4/15/2014	S.U.										7.35		7.50	7.64	
	10/7/2014	S.U.					6.99									
	10/8/2014	S.U.		7.05		7.30		7.40	7.73	7.11	7.02					
	10/9/2014	S.U.	7.20		8.02							7.31	7.52	7.99	7.99	
	4/16/2015	S.U.		6.50		6.85	6.85	7.70	7.15	6.96	6.68					
	4/17/2015	S.U.	6.96		6.96							6.43	6.85	7.23	7.55	
	10/14/2015	S.U.		7.07		7.14	7.21		7.58							
	10/15/2015	S.U.						7.63		7.15	6.94	7.47	7.52		7.63	
10/16/2015	S.U.	7.29		7.74									7.94			
3/16/2016	S.U.		6.29			6.65										
3/17/2016	S.U.	6.60		8.70	9.10		7.68	9.12	8.44	8.83					8.80	
3/18/2016	S.U.										8.98	8.28	8.12	7.98		
9/27/2016	S.U.		6.84		7.08	6.97		7.46		6.70						
9/28/2016	S.U.							7.28		7.10		7.21	7.20	7.49	7.48	
9/29/2016	S.U.	6.98		7.43												
3/7/2017	S.U.		6.80			6.84										
3/8/2017	S.U.	7.00		7.31	7.06			7.35	7.16	6.73						
3/9/2017	S.U.										7.24	7.05	7.38	7.75		
10/4/2017	S.U.	6.63	6.65	7.23	6.59	6.61	6.89	6.87	6.81	6.38	7.01					
10/5/2017	S.U.											6.87	7.09	7.01		
3/12/2018	S.U.	6.70	6.59	7.16												
3/13/2018	S.U.				6.92		7.11	7.29	6.97	6.62	7.10	7.01				
3/14/2018	S.U.												7.23	7.33		
10/8/2018	S.U.									7.19	6.79				8.09	
10/9/2018	S.U.	7.20	6.98	7.61			6.92	7.54								
10/10/2018	S.U.				7.18				7.62		7.45	7.49	7.21	7.69		
3/25/2019	S.U.	7.42	7.21	8.04			7.50		7.86	7.70						
3/26/2019	S.U.				7.71			7.74				7.64	7.63			
3/27/2019	S.U.													7.72	7.91	
10/3/2019	S.U.	6.89	6.68	7.40	6.80	6.58	7.07	7.34		6.59					7.89	
10/4/2019	S.U.									7.04		7.16	7.08	7.27	7.41	
3/17/2020	S.U.	7.33	6.99	7.60	7.19	7.04		7.52								
3/18/2020	S.U.							7.51		7.45	6.76	7.48	7.37	7.56	7.63	
10/4/2020	S.U.	6.93	6.85	7.29			6.82									
10/5/2020	S.U.				7.03			7.28	7.51	7.19	6.99	7.20	7.11			
10/6/2020	S.U.													7.43	7.50	

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pH (N/A) MCL = N/A IDNR UAL = 8.5 IDNR LAL = 6.5 Interwell CLs = 6.05-8.28	3/29/2021	S.U.						7.57		7.43	7.07	7.34	7.33	7.55	7.54	
	3/30/2021	S.U.	7.28	7.16	7.56	7.32	7.25		7.53							7.98
	10/5/2021	S.U.	6.97	6.85	7.79	7.08	7.18		7.56		6.83					
	10/6/2021	S.U.						7.33		7.20		7.22	7.33	7.47		
	10/8/2021	S.U.													7.55	
	4/4/2022	S.U.	9.27	8.19	8.68	8.11	8.41		8.54							
	4/5/2022	S.U.						8.63		8.59		8.50	8.27	8.53	8.52	
	4/6/2022	S.U.										7.98				
	10/3/2022	S.U.	7.53	7.62	8.49	7.67	7.82					7.45				
	10/4/2022	S.U.						8.04	8.26	7.92		7.95	7.83	8.10	7.96	
	3/27/2023	S.U.	7.02						7.19		7.77					
	3/28/2023	S.U.				7.70				8.05		7.84	7.82	7.93	8.24	7.90
	3/29/2023	S.U.		8.01	8.56			8.30								
	10/3/2023	S.U.	6.42					6.93	7.12	7.17	6.85		7.10			
	10/4/2023	S.U.		6.34	6.89	6.52									6.99	
	10/5/2023	S.U.											7.51		6.12	
	4/1/2024	S.U.														8.58
	4/2/2024	S.U.	6.15	6.47												
	4/3/2024	S.U.			6.35			6.01							6.50	5.82
	4/4/2024	S.U.					6.46		6.64	6.67	6.40		6.45	6.48		
10/7/2024	S.U.				6.80	6.57			7.21							
10/8/2024	S.U.	6.17		6.63				6.32		6.19				6.42	6.44	
10/9/2024	S.U.		6.71								7.13					
Temperature (N/A) MCL = N/A IDNR AL = N/A Interwell CL = 20.3	7/1/1995	°C	23.0	18.0	24.0	19.0	17.0	18.0	16.0							
	8/1/1995	°C	20.0	19.0	17.0	17.0	15.0	16.0	16.0	19.0						28.0
	11/1/1995	°C	10.0	8.0	9.0	8.0	9.0	10.0	10.0	9.0						
	2/1/1996	°C	6.0	7.0	10.0		9.5	11.0	10.5	6.0						
	5/1/1996	°C	11.1	9.4	11.1	9.4	9.4	11.1	11.1	11.1						16.1
	11/1/1996	°C	13.0	13.0	13.0	13.0	13.0	12.0	11.0	13.0						
	4/1/1997	°C	15.0	15.0	13.9	10.0	13.3	12.8	5.6	11.7						
	11/1/1997	°C	6.9	7.3	7.0	10.6	8.1	8.1	9.9							10.4
	5/1/1998	°C	11.1	12.2	11.1	12.2	10.6	11.1	12.2	14.4						
	11/1/1998	°C	11.2	11.7	9.6	11.0	12.0	12.1	10.5	10.7						7.1
	5/1/1999	°C	9.4	9.4	10.0	9.4	10.0	10.6	10.0	11.1						13.3
	11/1/1999	°C	14.4	15.0	15.6	13.9	15.0	13.9	14.4	5.6						
	5/1/2000	°C	11.6	10.6	11.5	12.4	10.7	12.7	13.7	13.7						
	12/1/2000	°C	5.0	8.3	6.7	10.0	12.8	10.6	10.0	6.7						
	6/1/2001	°C	14.2	21.9	17.3	13.1	14.8	14.8	14.8							
	11/1/2001	°C	10.1	11.6	8.5	11.0	10.9	12.0	10.3	9.9						5.1
	5/2/2002	°C	13.9	12.5	15.5	13.0	13.2	13.7	15.2	14.3						
	11/2/2002	°C	10.2	11.3	10.1	10.0	10.2	10.8	9.9	9.0						
	5/3/2003	°C	18.6	16.6	17.5	16.9	15.1	17.4	16.9	18.2						22.0
	11/3/2003	°C		11.4	10.5	10.6	10.8	11.0	10.0	9.8						7.5
	5/1/2004	°C	18.9	18.3	18.9	19.9	18.8	20.8	20.9	20.4						25.5
	12/1/2004	°C		14.7	13.5	11.6	12.4	12.1	11.6	12.4						
	5/5/2005	°C	12.5	13.8	13.2	17.4	13.7	15.7	17.2	18.0						
	11/5/2005	°C		13.8	13.4		12.2	12.3	12.1							
	5/6/2006	°C	13.1	14.5	13.7	15.1	14.6	14.3	15.8	14.0						24.5
	10/6/2006	°C		15.6		18.5	13.4	16.3	14.5	17.3						
	4/7/2007	°C	12.7	14.1	14.1	13.4	12.9	13.3	14.9	11.5						23.3
	10/7/2007	°C	15.5	14.5	13.9	16.3	15.5	15.9	14.1	15.9						19.5
	4/1/2008	°C	12.4	13.5	13.5	12.9	12.2	12.5	13.6	12.9						18.1
	10/1/2008	°C	12.1	14.0	12.5	12.2	11.7	15.3	13.1	15.1						
10/29/2009	°C	10.2	10.8	9.3	11.0	10.5	10.7	9.8	1.1						9.8	
3/25/2010	°C		4.1		4.8	7.3	7.6	9.3	4.0						6.8	
3/30/2010	°C	6.0		9.3												
4/22/2010	°C	9.7	9.9	11.7	10.0	9.7	10.0	11.8	9.8						18.2	
10/16/2010	°C	12.9	13.8	9.5	14.8	12.7	13.9	12.1	15.7						15.3	

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Temperature (N/A) MCL = N/A IDNR AL = N/A Interwell CL = 20.3	4/28/2011	°C	7.5	7.9	9.3	8.2	9.0	10.3	11.8	8.2	9.7					10.9
	10/18/2011	°C	13.8		11.3						16.5					
	10/19/2011	°C		14.2		15.3	12.3	13.4	12.0	16.6						10.2
	4/25/2012	°C	11.8	11.0	14.6	13.5	11.0	12.9	13.1	12.2	12.2					25.0
	10/9/2012	°C								17.9	18.2					
	10/10/2012	°C		15.5	11.8	17.6	13.4	15.4	12.1							
	4/16/2013	°C	6.9	6.6			9.4				10.2					9.6
	4/17/2013	°C			11.4	6.5		9.4	12.2	6.5						
	10/29/2013	°C		13.5		15.4	12.3			15.7	16.2					
	10/30/2013	°C			11.2			13.7				13.7	12.5	14.3	12.5	12.5
	4/14/2014	°C	6.1	6.0	11.1	6.6	8.9	10.0	12.0	5.9	8.7					6.8
	4/15/2014	°C										9.9		9.1	12.0	
	10/7/2014	°C					13.0									
	10/8/2014	°C		15.7			13.2		13.1	11.6	17.3	14.7				
	10/9/2014	°C	13.8		13.1								13.8	12.6	13.3	12.3
	4/16/2015	°C		2.9		5.1	3.9	6.2	7.9	6.6	4.9					
	4/17/2015	°C										5.9	9.0	5.7	9.7	
	10/14/2015	°C		18.2		15.1	15.4		13.1							
	10/15/2015	°C							14.1		18.4	15.5	14.2	13.8		12.3
	10/16/2015	°C	14.1		10.1										12.2	
	3/16/2016	°C		7.4			9.2									
	3/17/2016	°C	5.8		10.2	8.7		10.9	12.1	6.3	10.0					11.7
	3/18/2016	°C										10.2	12.0	10.4	12.2	
	9/27/2016	°C		16.7			16.3	14.3		12.9		16.2				
	9/28/2016	°C							14.1		18.9		15.0	14.3	14.4	13.8
	9/29/2016	°C	18.0		12.9											
	3/7/2017	°C		4.1			6.0									
	3/8/2017	°C	2.7		7.2	5.1				9.4	3.1	7.6				
	3/9/2017	°C							8.5			7.6	7.6	9.9	8.0	9.4
	10/4/2017	°C	15.9	15.3	12.2	16.4	12.5	13.7	12.6	17.8	15.6	14.6				
	10/5/2017	°C												13.5	14.5	12.5
	3/12/2018	°C	4.9	6.6	11.0		8.6									
	3/13/2018	°C				6.4		10.6	11.6	5.3	9.4	9.8	10.7			
3/14/2018	°C												9.5	12.2		
10/8/2018	°C									16.9	15.8				16.6	
10/9/2018	°C	15.8	15.3	11.6		15.0	14.8									
10/10/2018	°C				15.9			12.1			14.3	13.8	14.4	12.9		
3/25/2019	°C	4.0	6.1	10.4		4.8		11.7		4.3						
3/26/2019	°C				5.3		10.0				9.4	12.2			4.8	
3/27/2019	°C												9.3	12.1		
10/3/2019	°C	16.8	14.8	11.9	15.0	13.8	13.5	12.4		15.3					15.5	
10/4/2019	°C									17.7	13.9	13.6	14.1	12.5		
3/17/2020	°C	5.0	7.0	11.1	6.7	7.4		11.8								
3/18/2020	°C						9.8		5.3	9.1	9.2	11.4	9.8	12.0	5.4	
10/4/2020	°C	15.3	15.4	12.0		13.2										
10/5/2020	°C				15.4		13.4	12.1	16.9	15.2	13.7	14.8				
10/6/2020	°C												13.9	12.7		
3/29/2021	°C						13.2		8.3	10.6	10.9	14.5	13.0	12.9		
3/30/2021	°C	6.8	6.7	9.9	7.4	7.0		11.6							13.8	
10/5/2021	°C	16.4	16.6	12.8	15.8	13.8		12.7		16.0						
10/6/2021	°C							14.5		18.6	16.8	14.0	15.5			
10/8/2021	°C													15.1		
4/4/2022	°C	4.2	6.0	9.0	5.9	6.9			11.2							
4/5/2022	°C						9.4			4.8		8.7	11.7	8.8	11.0	
4/6/2022	°C										8.6					
10/3/2022	°C	15.2	15.4	12.4	16.0	12.6				15.7						
10/4/2022	°C						14.4	12.1		17.4	15.8	14.2	15.5	14.9		
3/27/2023	°C	5.5						9.6		5.5						

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Constituent (CAS #)	Sample Date	Units	MW-5 BG/UG	MW-14 BG/UG	MW-16 BG/UG	MW-7R DG	MW-8 DG	MW-11 DG	MW-15 DG	MW-17R DG	MW-18 DG	MW-19 DG	MW-20 DG	MW-21 DG	MW-22 DG	SW-1 SW
Temperature (N/A) MCL = N/A IDNR AL = N/A Interwell CL = 20.3	3/28/2023	°C				6.8			11.3			8.4	7.9	8.9	9.5	7.0
	3/29/2023	°C		8.0	8.6		5.9									
	10/3/2023	°C	18.7				15.1	21.0	16.4	21.2		19.3				
	10/4/2023	°C		15.8	13.1	18.3								16.2		
	10/5/2023	°C										13.4			13.7	
	4/1/2024	°C														8.36
	4/2/2024	°C	5.84	7.34												
	4/3/2024	°C			9.73		8.53								10.95	12.03
	4/4/2024	°C				8.76	14.77	11.78	10.68	9.22		8.11	9.79			
	10/7/2024	°C				18.22			13.55							
10/8/2024	°C	22.24		14.83			16.42		19.94				15.64	16.55	12.80	
10/9/2024	°C		15.76								14.83					
Specific Conductance (N/A) MCL = N/A IDNR AL = N/A Interwell CL = 3044	7/1/1995	µS/cm	640	1274	670	1411	1100	644	726							
	8/1/1995	µS/cm	670	1340	660	1380	1050	660	810	1880						1700
	11/1/1995	µS/cm	1110	1460	820	1200	1510	230	810	1800						
	2/1/1996	µS/cm	492	1271	940		1214	634	468	2200						
	5/1/1996	µS/cm	580	1530	730	1290	1320	630	610	2630						980
	11/1/1996	µS/cm	608	1270	654	1460	1150	596	2410	2040						1020
	4/1/1997	µS/cm	645	1530	698	2320	1210	1410	3950	2320						1090
	11/1/1997	µS/cm	675	1576	747	1381	1231	671	948							1646
	5/1/1998	µS/cm	536	1520	698	1187	908		702							
	11/1/1998	µS/cm	617	1380	613	1177	1037	585	662	2380						1166
	5/1/1999	µS/cm	710	1630	750	1270	1270	650	780	1500						770
	11/1/1999	µS/cm	690	1585	733	1292	1338	654	644	1550						
	5/1/2000	µS/cm	644	1604	682	1227	1343	630	709	1520						
	12/1/2000	µS/cm	710	1620	1570	1287	1300	1020	1892	1325						
	6/1/2001	µS/cm	622	1600	700	600	600		760							
	11/1/2001	µS/cm	683.4	1627	760	1290	1405	656	767.2	144						1304
	5/2/2002	µS/cm	636	1657	720	1225	1321	620	739	1330						
	11/2/2002	µS/cm	689	1620	712	1248	1322	646	748	1349						
	5/3/2003	µS/cm	502	1602	707	992	1354	617	649	1151						955
	11/3/2003	µS/cm		1658	745	1210	1325	649	725	1289						1012
	5/1/2004	µS/cm	306	1105	479	805	954	475	524	1295						755
	12/1/2004	µS/cm		1285	570	917	1141	516	665	1229						
	5/5/2005	µS/cm	552	1144	577	941	1057	555	733	1269						
	11/5/2005	µS/cm		1290	565	1035	589	672								
	5/6/2006	µS/cm	989	1432	665	1079	1168	593	741	1490						835
	10/6/2006	µS/cm		1502		1152	1248	631	726	1435						
	4/7/2007	µS/cm	532	1412	662	911	1058	581	655	1384						906
	10/7/2007	µS/cm	645	1489	622	1134	1252	648	721	1420						901
	4/1/2008	µS/cm	535	1392	648	913	1045	593	645	1342						922
	10/1/2008	µS/cm	993	1222	743	1388	1254	726	695	1619						
	10/29/2009	µS/cm	984	1620	454	1385	1161	674	683	1799						469
	3/25/2010	µS/cm		1623		1322	924	583	662	5470						501
	3/30/2010	µS/cm	797		660											
	4/22/2010	µS/cm	724	1318	642	801	864	551	612	4830						627
	10/16/2010	µS/cm	984	1699	805	1415	1055	693	717	2210						692
	4/28/2011	µS/cm	678	1573	693	1356	913	594	717	1978	1655					738
	10/18/2011	µS/cm	816		561						1568					
	10/19/2011	µS/cm		1398		1144	887	580	649	1756						1476
	4/25/2012	µS/cm	813	1711	736	1320	1013	641	779	1742	2630					1148
	10/9/2012	µS/cm								1585	1758					
10/10/2012	µS/cm		1716	771	1412	944	688	1241								
4/16/2013	µS/cm	539	1255			923				1262					839	
4/17/2013	µS/cm			679	1219		578	647	1456							
10/29/2013	µS/cm		1986		1219	1296		841	2224	1992						
10/30/2013	µS/cm			826			723				695	912	2678	808	2337	
4/14/2014	µS/cm	802	1793	728	1645	1091	644	734	5320	1702					999	

Table 8

Analytical Data Summary
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
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Cedar Falls, Iowa

Constituent (CAS #)	Sample Date	Units	MW-5 BG/UG	MW-14 BG/UG	MW-16 BG/UG	MW-7R DG	MW-8 DG	MW-11 DG	MW-15 DG	MW-17R DG	MW-18 DG	MW-19 DG	MW-20 DG	MW-21 DG	MW-22 DG	SW-1 SW
Specific Conductance (N/A) MCL = N/A IDNR AL = N/A Interwell CL = 3044	4/15/2014	µS/cm										580		3040	684	
	10/7/2014	µS/cm					1400									
	10/8/2014	µS/cm		2120		2180		760	888	5110	2150					
	10/9/2014	µS/cm	1340		864							809	970	2420	883	
	4/16/2015	µS/cm		566		605	331	223	223	981	587					
	4/17/2015	µS/cm	297		225							187	278	573	249	
	10/14/2015	µS/cm		890		990	510		302							
	10/15/2015	µS/cm						341		1713	1062	352	482		382	
	10/16/2015	µS/cm	612		250										557	
	3/16/2016	µS/cm		1240			850									
	3/17/2016	µS/cm	339		546	896		477	551	1689	1468					793
	3/18/2016	µS/cm										463	699	701	593	
	9/27/2016	µS/cm		1680		1510	980		600		2000					
	9/28/2016	µS/cm						560			2310		570	770	720	630
	9/29/2016	µS/cm	830		650											
	3/7/2017	µS/cm		2261				1218								
	3/8/2017	µS/cm	1025		872	1900			853	2684	2505					
	3/9/2017	µS/cm						755				760	1069	958	906	
	10/4/2017	µS/cm	1096	2090	812	1826	1100		722	801	2295	2427	728			
	10/5/2017	µS/cm												1017	842	852
	3/12/2018	µS/cm	1013	2091	796			928								
	3/13/2018	µS/cm				1555			685	764	2159	2305	686	966		
	3/14/2018	µS/cm													879	813
	10/8/2018	µS/cm									1568	1598				683
	10/9/2018	µS/cm	484	1548	714		654	633								
	10/10/2018	µS/cm				1392			688				645	853	706	731
	3/25/2019	µS/cm	703.8	1492	626.1		276.1		661.5	1319						
	3/26/2019	µS/cm				1073			608.7				619.1	800.1		714.7
	3/27/2019	µS/cm													7381	670
	10/3/2019	µS/cm	690	2470	803	1600	770	751	831			2810				968
	10/4/2019	µS/cm									1880		759	1040	907	894
	3/17/2020	µS/cm	872.2	2250	808.7	1493	592.7			779.9						
3/18/2020	µS/cm							702.4		1572	2440	710.3	979.8	831	821.3	
10/4/2020	µS/cm	948.1	2140	783.1		790.6										
10/5/2020	µS/cm				1807			710.6	780.1	1379	2900	964.8	702.6			
10/6/2020	µS/cm													798.9	812.8	
3/29/2021	µS/cm							840		1545	2560	826	1135	962	963	
3/30/2021	µS/cm	977	2170	964	1429	689		875							1122	
10/5/2021	µS/cm	935.8	2310	742.7	1971	729.6			754.2		2640					
10/6/2021	µS/cm							671		1343		647	918.1	718.2		
10/8/2021	µS/cm														782.7	
4/4/2022	µS/cm	1010	2490	811	1770	605			798							
4/5/2022	µS/cm							764		1610		772	1100	950	935	
4/6/2022	µS/cm										3110					
10/3/2022	µS/cm	981.7	2320	682.7	1507	654.4					2590					
10/4/2022	µS/cm							662	713.7	1211		653.6	904.3	740.1	755.3	
3/27/2023	µS/cm	989.4						644.9		1234						
3/28/2023	µS/cm				1350				716.7			659.5	885.6	763.3	446.3	
3/29/2023	µS/cm		1953	722			571.9									
10/3/2023	µS/cm	1090					734	691	725	1230		680				
10/4/2023	µS/cm		2130	779	1450									760		
10/5/2023	µS/cm												961		845	

Table 8

**Analytical Data Summary
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa**

Constituent (CAS #)	Sample Date	Units	MW-5 BG/UG	MW-14 BG/UG	MW-16 BG/UG	MW-7R DG	MW-8 DG	MW-11 DG	MW-15 DG	MW-17R DG	MW-18 DG	MW-19 DG	MW-20 DG	MW-21 DG	MW-22 DG	SW-1 SW
Specific Conductance (N/A) MCL = N/A IDNR AL = N/A Interwell CL = 3044	4/1/2024	µS/cm														930
	4/2/2024	µS/cm	128	240												
	4/3/2024	µS/cm			833		810							814	1	
	4/4/2024	µS/cm				139	834	683	754	1380		703	1000			
	10/7/2024	µS/cm				1060	834		805							
	10/8/2024	µS/cm	1670		916			853		1340			1170	921	1000	
	10/9/2024	µS/cm		2210								676				

Key:
 N/FD - Normal Sample Result/Field Duplicate Sample Result
 AL - Action Level
 BG - Background
 °C - Degress Celsius
 CL - Control Limit
 COD - Chemical Oxygen Demand
 DG - Downgradient
 IDNR - Iowa Department of Natural Resources
 Interwell CL - 1-of-2 Interwell Prediction Limit (10 COCs, Semi-Annual Sampling, 10 Downgradient wells) per IAC 567.113.10(4)g(3) and described in Chapter 19 of EPA's Unified Guidance (2009), based on Upgradient Wells MW-5, MW-14 and MW-16.
 LAL - Lower Action Level
 LCL - Lower Control Limit
 MCL - Maximum Contaminant Level
 mg/L - Milligrams per Liter
 N - Nitrogen
 N/A - Not Applicable
 S.U. - Standard pH Units
 SW - Surface Water
 TOX - Total Organic Halogens
 TSS - Total Suspended Solids
 U - Not Detected Above the Reporting Limit
 UAL - Upper Action Level
 UG - Upgradient
 µg/L - Micrograms per Liter
 ULCL - Upgradient Lower Control Limit
 µS/cm - MicroSiemens per Centimeter
 UUCL - Upgradient Upper Control Limit

Notes:
BOLD - Constituent Detection
BOLD+red - Interwell Control Limit Exceedance

Table 9
Historical Control Limit and Action Level Exceedances
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa

Well	Constituent	Interwell Control Limit(s)	IDNR Action Level(s)	Spring 2022	Fall 2022	Spring 2023	Fall 2023	Spring 2024	Fall 2024
MW-5	Iron ¹	16.5	0.3	0.689/0.524	0.446/2.10	0.500 U	0.500 U	0.154	1.54
	pH ²	6.05-8.28	6.5-8.5	9.27	7.53	7.02	6.42	6.15	6.17
	Temperature	20.3	N/A	4.23	15.2	5.5	18.72	5.84	22.24
MW-7R	Iron ¹	16.5	0.3	3.17	0.584	1.84	0.68	0.592	1.39
	COD	12.3	N/A	13.3	9.32	6.06	8.25	10.6	30.6
	pH ²	6.05-8.28	6.5-8.5	8.11	7.67	7.70	6.52	6.46	6.80
	TOX	0.126	N/A	0.177	NS	0.0400 U	NS	0.116	NS
MW-8	COD	12.3	N/A	7.75	9.32	9.28	26.9	18.3	25.0 U
	Iron ¹	16.5	0.3	0.500 U	0.100 U	0.500 U	0.500 U	0.100 U	0.100 U
	pH ²	6.05-8.28	6.5-8.5	8.41	7.82	8.30	6.93	6.01	6.57
MW-11	Iron ¹	16.5	0.3	0.672	0.100 U	0.500 U	0.500 U	0.123	0.163
	COD	12.3	N/A	7.05	5.49	6.06	7.24	16.4	30.6
	pH ²	6.05-8.28	6.5-8.5	8.63	8.04	7.19	7.12	6.64	6.32
	Temperature	20.3	N/A	9.4	14.4	9.6	20.95	11.78	16.42
MW-14	Iron ¹	16.5	0.3	0.500 U	0.100 U	0.500 U/0.500 U	0.500 U	0.100 U/0.100 U	0.100 U
	pH ²	6.05-8.28	6.5-8.5	8.19	7.62	8.01	6.34	6.47	6.71
MW-15	Iron ¹	16.5	0.3	1.16	1.01	1.39	1.07	0.776	0.801
	pH ²	6.05-8.28	6.5-8.5	8.54	8.26	8.05	7.17	6.67	7.21
MW-16	Barium	0.34	2	0.13	0.344	0.131	0.206	0.132	0.131
	COD	12.3	N/A	8.45	7.23	5.00 U	15.5	21.8	5.00 U
	Iron ¹	16.5	0.3	0.852	23.60	1.42	2.83	1.02	0.262
	pH ²	6.05-8.28	6.5-8.5	8.68	8.49	8.56	6.89	6.35	6.63
MW-17R	Iron ¹	16.5	0.3	9.72/10.6	18.9	9.40/9.70	11.0/11.4	8.58	8.00
	COD	12.3	N/A	5.00 U/6.00	6.19	5.00 U/10.4	16.0/8.93	16.7	35.9
	pH ²	6.05-8.28	6.5-8.5	8.59	7.92	7.77	6.85	6.40	6.19
	Temperature	20.3	N/A	4.79	17.4	5.5	21.22	9.22	19.94
MW-18	Chloride	343.5	250	629	631	NS	NS	NS	NS
	COD	12.3	N/A	13.7	15.6	NS	NS	NS	NS
	Iron ¹	16.5	0.3	0.500 U	0.111	NS	NS	NS	NS
	Specific Conductance	3044	N/A	3110	2590	NS	NS	NS	NS

Table 9

**Historical Control Limit and Action Level Exceedances
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa**

Well	Constituent	Interwell Control Limit(s)	IDNR Action Level(s)	Spring 2022	Fall 2022	Spring 2023	Fall 2023	Spring 2024	Fall 2024
MW-19	Iron ¹	16.5	0.3	0.500 U	0.34	0.56	0.500 U	0.415	0.100 U/0.100 U
	pH ²	6.05-8.28	6.5-8.5	8.50	7.95	7.84	7.10	6.45	7.13
MW-20	Iron ¹	16.5	0.3	2.47	2.59/0.820	0.500 U	1.52	0.838/0.155	1.07
	Ammonia (as N)	1.85	30	1.39	0.301/0.371	1.41	2.41	2.15/2.12	0.635
	pH ²	6.05-8.28	6.5-8.5	8.27	7.83	7.82	7.51	6.48	6.01
	TOX	0.126	N/A	0.0400 U	NS	0.146	NS	0.0400 U/0.0400 U	NS
MW-21	Iron ¹	16.5	0.3	1.93	5.21	4.86	2.41	1.98	1.95/1.87
	pH ²	6.05-8.28	6.5-8.5	8.53	8.10	7.93	6.99	6.50	6.42
MW-22	Iron ¹	16.5	0.3	6.68	1.56	3.51	1.39/1.70	1.32	0.937
	COD	12.3	N/A	5.00 U	5.00 U	5.00 U	11.0/5.13	12.6	25.3
	pH ²	6.05-8.28	6.5-8.5	8.52	7.96	8.24	6.12	5.82	6.44
SW-1	COD	12.3	N/A	13	DRY	5.00 U	DRY	14.4	DRY
	pH ²	6.05-8.28	6.5-8.5	NS	DRY	7.90	DRY	8.58	DRY

Notes:

- Exceeds Interwell Control Limit only (or is below lower limit for pH)
- Exceeds IDNR Action Level only (or is below lower limit for pH)
- Exceeds both Intrewell Control Limit and IDNR Action Level (or is below both lower limits for pH)
- Inconclusive comparison (non-detect result with reporting limit higher than IDNR Action Level or Interwell Control Limit)

¹ - For Iron, the IDNR Action Level is lower than the Upgradient Control Limit. Typically, the Upgradient Control Limit is more stringent than the IDNR Action Level. Additionally, the non-detect reporting limit for Iron is greater than the IDNR Action Level.

² - For pH, the IDNR lower limit is higher than the lower Interwell Control Limit (i.e., less stringent instead of more stringent)

COD - Chemical Oxygen Demand.
 DRY - Dry, unable to be sampled.
 MW - Monitoring Well
 NA - Not applicable - well removed.
 NS - Not Sampled, as scheduled.
 SW - Surface Water
 TOX - Total Organic Halogens

Table 10

**Leachate Management Summary
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa**

Month	Max. Sump Head Level	Max. Liner Head Level (12" on liner = 48")	Leachate Collected	Discharge to Cedar Falls POTW
	(Inches)	(Inches)	(Gallons)	(Gallons)
December ('23)	26.0	0.00	1,820	1,820
January	26.1	0.00	8,533	8,533
February	26.1	0.00	14,693	14,693
March	26.0	0.00	3,427	3,427
April	26.4	0.00	30,045	30,045
May	26.5	0.00	370,824	370,824
June	26.4	0.00	98,074	98,074
July	26.4	0.00	103,566	103,566
August	26.6	0.00	20,238	20,238
September	26.1	0.00	3,119	3,119
October	26.3	0.00	2,353	2,353
2024 Annual Total			656,692	656,692

Notes:

- Sump is set 3 ft deeper than Liner. 12 inches head on liner is 48 inches

Key:

POTW - Publically Operated Treatment Works

Table 11
Leachate Detection Summary
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa

Chemical Name	Units	LCS-24" Pipe, Landfill Sump 4/3/2024		LCS-24" Pipe, Landfill Sump 10/9/2024	
General Water Quality Parameters					
Ammonia-N	mg/L	0.200 U		0.500 U	
Chloride	mg/L	12.2		11.3	
COD	mg/L	25.0 U		25.0 U	
Flashpoint	°F	>162		>161	
HEM (Oil and Grease)	mg/L	5.0 U		5.0 U	
pH, lab	S.U.	7.7	HF	7.5	HF
Sulfate	mg/L	38.8		10.9	
TDS	mg/L	580		670	
Total Phenols	mg/L	0.0200 U		0.0200 U	
TOX	mg/L	0.0400 U		NS	
TSS	mg/L	5.00 U		8.00	
<i>(all other General Parameters are ND)</i>					
Metals (Total)					
Barium	mg/L	0.0576		0.114	
Copper	mg/L	0.00612		0.00500 U	
Iron	mg/L	1.19		3.77	
Lead	mg/L	0.00166		0.000500 U	
Manganese	mg/L	0.0807		0.134	
Molybdenum	mg/L	0.0302		0.0131	
<i>(all other analyzed Metals are ND)</i>					
VOCs					
Acetone	µg/L	10.0 U		10.0 U	
Benzene	µg/L	0.500 U		0.500 U	
Hexane	µg/L	1.0 U		1.0 U	
<i>(all other analyzed VOCs are ND)</i>					

Notes:

*+ - Laboratory Control Sample (LCS) and/or LCS-Duplicate is outside acceptance limits, high biased.

COD - Chemical Oxygen Demand

°F - Degrees Fahrenheit

HEM - n-Hexane Extractable Material

HF - Parameter with a holding time of 15 minutes. Sample was analyzed outside of hold time.

LCS - Leachate Collection System

mg/L - Milligrams per Liter

N - Nitrogen

ND - Not Detected above the reporting limit

NS - Not Sampled, parameter was not analyzed during that sampling event

S.U. - Standard pH Units

TDS - Total Dissolved Solids

TOX - Halogens, Total Organic

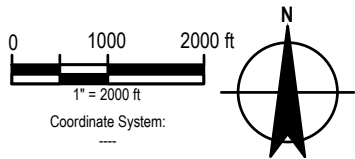
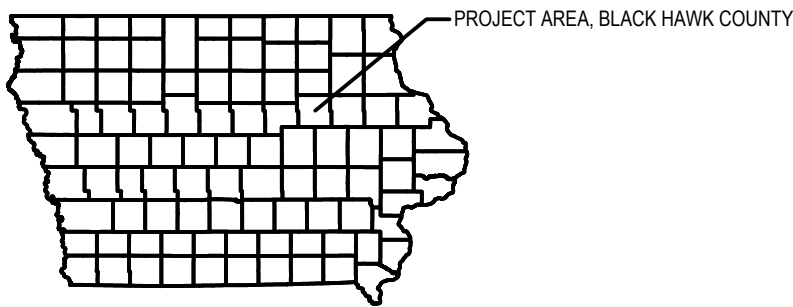
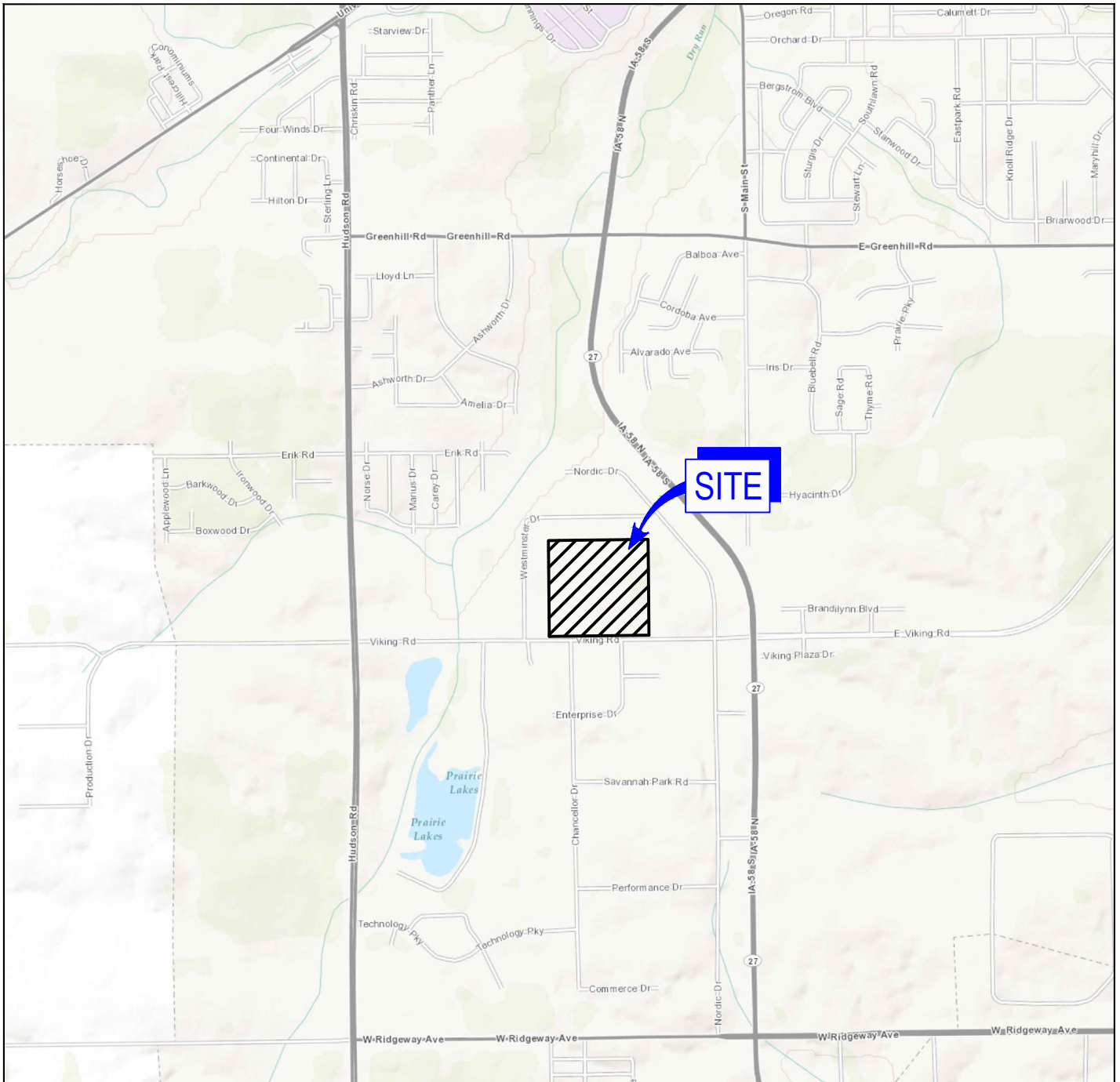
TSS - Total Suspended Solids

U - Not Detected Above the Reporting Limit

µg/L - Micrograms per Liter

VOC - Volatile Organic Compounds

Figures



**VIKING PUMP FOUNDRY SAND LANDFILL
CEDAR FALLS, IOWA**

Project No. **56934**
Date **April 2024**

SITE LOCATION

FIGURE 1



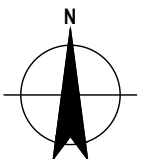
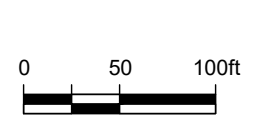
- LEGEND**
- MW-5 SHALLOW GROUNDWATER MONITORING WELL
 - MW-16 DEEP GROUNDWATER MONITORING WELL
 - + SW-01 SURFACE WATER SAMPLE LOCATION
 - △ INDICATES UPGRADIENT LOCATION

NOTES:

MW-12 AND MW-13 USED FOR WATER LEVEL GAUGING ONLY.

MW-18 WAS SEALED DURING THE OCTOBER 2023 SAMPLING EVENT AND HAS BEEN REMOVED FROM THE MONITORING PROGRAM.

AERIAL FLYOVER SURVEY PERFORMED BY GHD ON 10/27/21

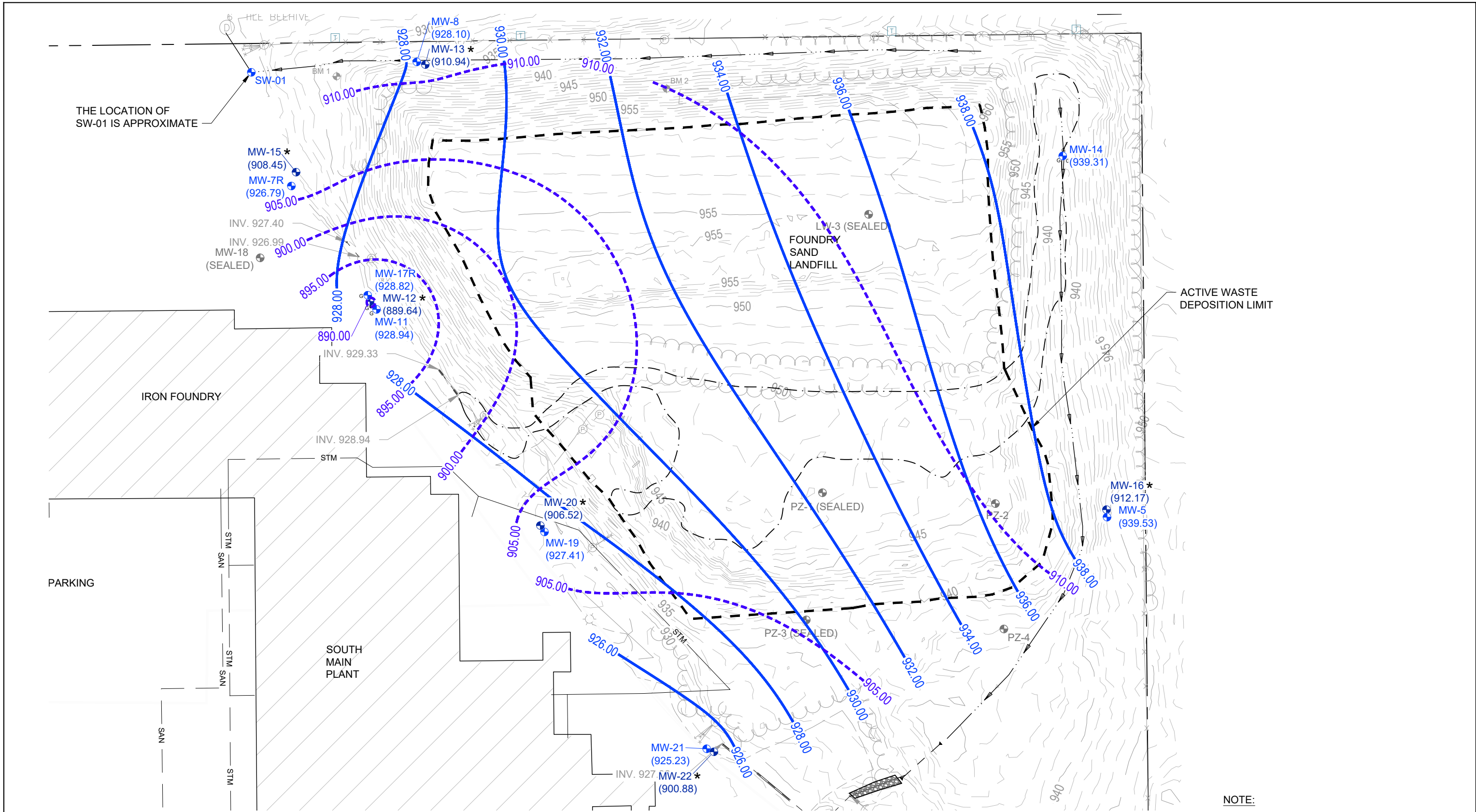


VIKING PUMP FOUNDRY SAND LANDFILL
CEDAR FALLS, IOWA

**GROUNDWATER MONITORING
WELL AND SURFACE WATER
MONITORING LOCATIONS**

Project No. 56934
Date April 2024

FIGURE 2



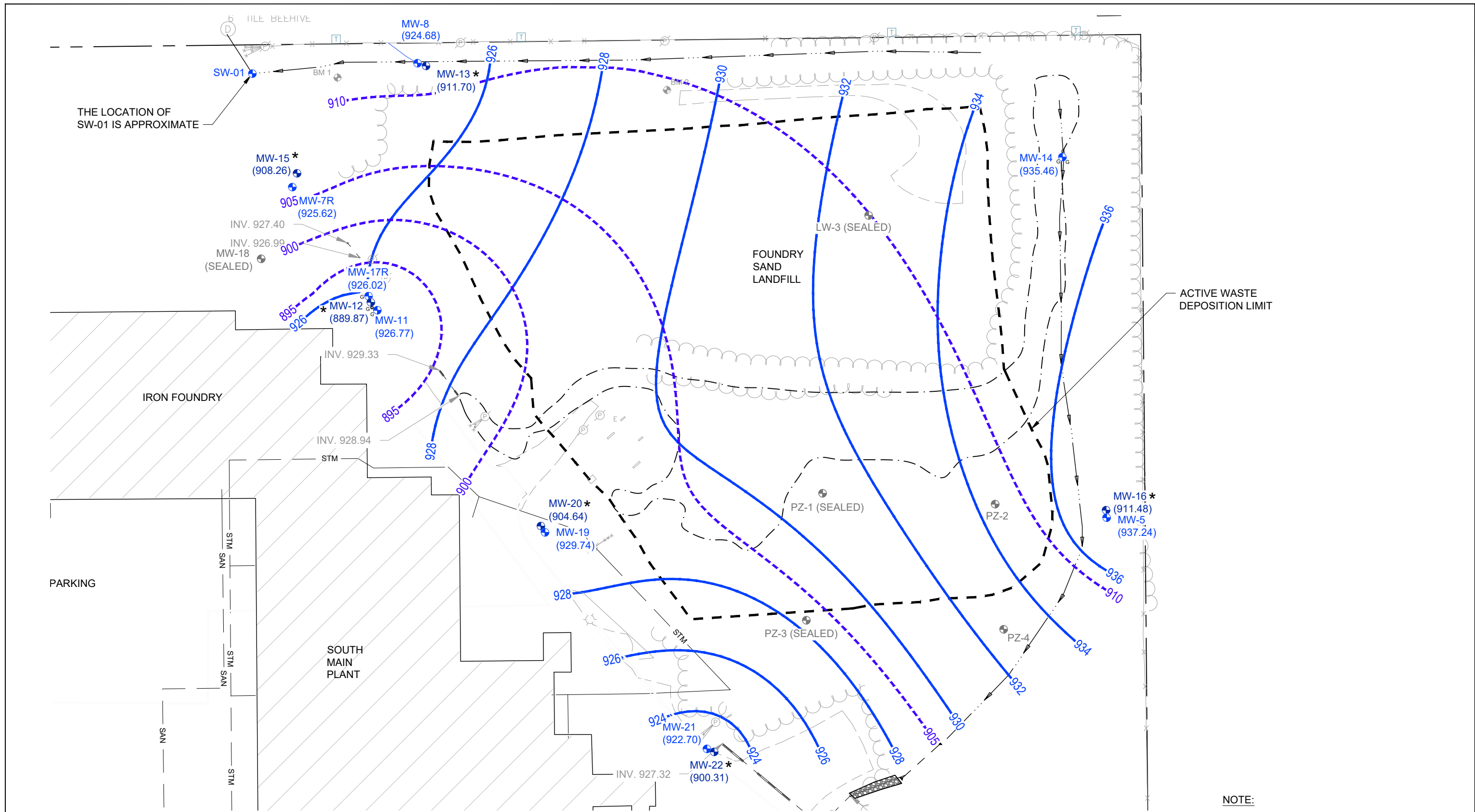
NOTE:
AERIAL FLYOVER SURVEY
PERFORMED BY GHD ON 10/27/21

- LEGEND**
- MW-16 (913.76) GROUNDWATER MONITORING WELL
 - 927.50 SHALLOW GROUNDWATER CONTOUR
 - 910 DEEP GROUNDWATER CONTOUR
 - * USED FOR DEEP GROUNDWATER CONTOURS ONLY

 		VIKING PUMP FOUNDRY SAND LANDFILL CEDAR FALLS, IOWA GROUNDWATER CONTOURS APRIL 2024	Project No. 56934 Date April 2024
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FIGURE 3a

Filename: \\ghdnet\ghd\US\St Paul\Projects\563\056934\Digital_Design\ACAD 2018\Figures\RPT031\056934-GHD-00-00-RPT-EN-D102_WA-031.DWG
Plot Date: 24 April 2024 7:44 AM



ACTIVE WASTE DEPOSITION LIMIT

NOTE:
AERIAL FLYOVER SURVEY
PERFORMED BY GHD ON 10/27/21

- LEGEND**
- MW-16 ● GROUNDWATER MONITORING WELL
 - (913.09) GROUNDWATER ELEVATION (FT AMSL)
 - 932.5 — SHALLOW GROUNDWATER CONTOUR
 - 902.5 - - - DEEP GROUNDWATER CONTOUR
 - * USED FOR DEEP GROUNDWATER CONTOURS ONLY

			VIKING PUMP FOUNDRY SAND LANDFILL CEDAR FALLS, IOWA	Project No. 56934 Date NOV 2024
GROUNDWATER CONTOURS OCTOBER 2024			FIGURE 3b	

Filename: \\ghdnet\ghd\US\St Paul\Projects\563\056934\Digital_Design\ACAD 2018\Figures\RPT035\056934-GHD-00-00-RPT-EN-D101_WA-035.dwg
 Plot Date: 04 November 2024 4:46 PM

Appendices

Appendix A

**IDNR Sampling Forms from April 2024 and
October 2024**



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL

Well/Piezometer: MW-11 Weather: 46F, mostly cloudy, windy

Date: 4/4/2024 Sampler Name: EM

Monitoring Well Details

Construction Data

Borehole Diameter (in): 10.8 Depth to Top of Screen (ft): 25.55

Casing Diameter (in): 2.0 Casing Material: PVC

Top of Casing Elevation (ft. MSL): 934.96 Ground Surface Elevation (ft. MSL): 930.1

Field Observations

Well Lock Condition: Good

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	6.02	6.5	6.5
Water Elevation (ft. MSL):	928.94	928.46	928.46

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) Yes

	Start	End
Purge Date/Time	4/4 3:18 PM	4/4 3:48 PM

Well Conditions Commentary:

Well Condition: Good Well Cap Condition: Good Well ID Condition: Good

Sampling Equipment and Methods:

Purging Equipment: Peristaltic Pump Sampling Equipment: Peristaltic Pump

Sampling Method: Low Flow Equipment Type: Portable

Decontamination Method: no decontamination

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)
4/4 3:18 PM	0.00	6.3						
4/4 3:23 PM	0.36	6.34	6.87	12.41	645	5.69	415	84
4/4 3:28 PM	0.74	6.4	6.79	12.15	657	4.32	285	85
4/4 3:33 PM	1.12	6.37	6.74	12.00	663	3.61	173	84
4/4 3:38 PM	1.73	6.41	6.69	11.88	671	2.64	84.8	81
4/4 3:43 PM	2.13	6.45	6.67	11.82	677	2.42	62.3	78
4/4 3:48 PM	2.54	6.5	6.64	11.78	683	2.18	39.6	75

Equipment Depth: 25 ft Flow Rate: 300 mL/min Volume Removed: 2.54 gal Volume Sampled: 0.75 gal

Odor? None Color? Clear

Comments: None



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL
 Well/Piezometer: MW-14 Weather: 42F, overcast, high winds and gusts
 Date: 4/2/2024 Sampler Name: EM

Monitoring Well Details

Construction Data

Borehole Diameter (in): 7.9 Depth to Top of Screen (ft): 8.98
 Casing Diameter (in): 2.0 Casing Material: PVC
 Top of Casing Elevation (ft. MSL): 944.12 Ground Surface Elevation (ft. MSL): 940.8

Field Observations

Well Lock Condition: Good

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	4.81	11.86	11.86
Water Elevation (ft. MSL):	939.31	932.26	932.26

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) Yes

	Start	End
Purge Date/Time	4/2 4:33 PM	4/2 4:58 PM

Well Conditions Commentary:

Well Condition: Good Well Cap Condition: Fair Well ID Condition: Fair

Sampling Equipment and Methods:

Purging Equipment: Peristaltic Pump Sampling Equipment: Peristaltic Pump
 Sampling Method: Low Flow Equipment Type: Portable
 Decontamination Method: no decontamination

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)
4/2 4:33 PM	0.00	6.8						
4/2 4:43 PM	0.47	10.8						
4/2 4:48 PM	0.67	11.05	6.6	7.31	240	3.06	2.8	101
4/2 4:53 PM	0.88	11.48	6.52	7.33	239	2.35	2.4	101
4/2 4:58 PM	1.09	11.86	6.47	7.34	240	1.73	2.3	101

Equipment Depth: N/A Flow Rate: 150 mL/min Volume Removed: 1.09 gal Volume Sampled: 0.75 gal
 Odor? None Color? None
 Comments: None



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL
 Well/Piezometer: MW-15 Weather: 44F, partly cloudy, breezy
 Date: 4/4/2024 Sampler Name: EM

Monitoring Well Details

Construction Data

Borehole Diameter (in): 7.9 Depth to Top of Screen (ft): 53.28
 Casing Diameter (in): 2.0 Casing Material: PVC
 Top of Casing Elevation (ft. MSL): 928.92 Ground Surface Elevation (ft. MSL): 926.6

Field Observations

Well Lock Condition: Poor

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	20.47	21.81	21.81
Water Elevation (ft. MSL):	908.45	907.11	907.11

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) Yes

	Start	End
Purge Date/Time	4/4 6:45 PM	4/4 7:11 PM

Well Conditions Commentary:

Well Condition: Good Well Cap Condition: Good Well ID Condition: Fair

Sampling Equipment and Methods:

Purging Equipment: Electric Submersible Pump Sampling Equipment: Electric Submersible Pump
 Sampling Method: Low Flow Equipment Type: Portable
 Decontamination Method: Alconox and water rinse

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)
4/4 6:45 PM	0.00	20.72						
4/4 6:50 PM	0.20	21.07	6.77	11.38	755	1.84	23.2	-124
4/4 6:55 PM	0.39	21.31	6.71	11.12	761	0.77	13.4	-153
4/4 7:01 PM	0.63	21.52	6.68	11.1	754	0.31	16.6	-153
4/4 7:05 PM	0.82	21.66	6.68	10.94	753	0.29	17	-151
4/4 7:11 PM	1.03	21.81	6.67	10.68	754	0.26	16.7	-150

Equipment Depth: 49.3 ft Flow Rate: 150 mL/min Volume Removed: 1.03 gal Volume Sampled: 0.75 gal
 Odor? None Color? None

Comments: Tubing not long enough to sit inside screen during pumping



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL

Well/Piezometer: MW-16 Weather: 42F, gusts up to 50 mph, overcast

Date: 4/3/2024 Sampler Name: EM

Monitoring Well Details

Construction Data

Borehole Diameter (in): 7.9 Depth to Top of Screen (ft): 72.76

Casing Diameter (in): 2.0 Casing Material: PVC

Top of Casing Elevation (ft. MSL): 948.42 Ground Surface Elevation (ft. MSL): 945.6

Field Observations

Well Lock Condition: Good

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	47.8	54.75	54.75
Water Elevation (ft. MSL):	900.62	893.67	893.67

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) Yes

	Start	End
Purge Date/Time	4/3 12:26 PM	4/3 12:51 PM

Well Conditions Commentary:

Well Condition: Good Well Cap Condition: Good Well ID Condition: Good

Sampling Equipment and Methods:

Purging Equipment: Electric Submersible Pump Sampling Equipment: Electric Submersible Pump

Sampling Method: Low Flow Equipment Type: Portable

Decontamination Method: Alconox and water rinse

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)
4/3 12:26 PM	0.00	52.25						
4/3 12:31 PM	0.68	52.68	5.88	9.99	846	0.86	160	168
4/3 12:36 PM	1.36	53.4	6.11	9.87	835	0.53	137	160
4/3 12:41 PM	2.03	53.82	6.22	9.79	833	0.44	119	155
4/3 12:46 PM	2.23	54.17	6.29	9.78	833	0.47	119	151
4/3 12:51 PM	2.41	54.75	6.35	9.73	833	0.46	123	145

Equipment Depth: 72.15 Flow Rate: 150 mL/min Volume Removed: 2.41 gal Volume Sampled: 0.75 gal

Odor? None Color? None

Comments: New static WL after pumping yesterday. Pump depth refers to top of pump, inlet is at the bottom, about 2 ft from top so the pump inlet is in the screen. WL shot down when pump turned on. Turned it down immediately to the lowest flow possible (50-250 mL/min), drawdown will still be >0.4'. Flow was inconsistent, constantly has to change pump rate to maintain slowest flow possible that didn't increase drawdown too much.



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL
 Well/Piezometer: MW-17R Weather: 41F, mostly cloudy, windy
 Date: 4/4/2024 Sampler Name: EM

Monitoring Well Details

Construction Data

Borehole Diameter (in): 8.0 Depth to Top of Screen (ft): 8.1
 Casing Diameter (in): 2.0 Casing Material: PVC
 Top of Casing Elevation (ft. MSL): 933.82 Ground Surface Elevation (ft. MSL): 930.72

Field Observations

Well Lock Condition: Good

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	5.00	5.56	5.56
Water Elevation (ft. MSL):	928.82	928.26	928.26

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) Yes

	Start	End
Purge Date/Time	4/4 4:10 PM	4/4 4:35 PM

Well Conditions Commentary:

Well Condition: Good Well Cap Condition: Good Well ID Condition: Good

Sampling Equipment and Methods:

Purging Equipment: Peristaltic Pump Sampling Equipment: Peristaltic Pump
 Sampling Method: Low Flow Equipment Type: Portable
 Decontamination Method: no decontamination

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)
4/4 4:10 PM		5.5						
4/4 4:15 PM	0.58	5.59	6.49	9.53	1350	1.7	23.1	-137
4/4 4:20 PM	1.33	5.5	6.43	9.3	1360	0.06	15.5	-132
4/4 4:25 PM	1.88	5.55	6.42	9.26	1370	0.00	15.5	-138
4/4 4:30 PM	2.40	5.56	6.41	9.18	1370	0.00	11.9	-142
4/4 4:35 PM	2.92	5.56	6.4	9.22	1380	0.00	8.3	-151

Equipment Depth: N/A Flow Rate: 400 mL/min Volume Removed: 2.92 gal Volume Sampled: 0.75 gal
 Odor? None Color? None
 Comments: None



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL
 Well/Piezometer: MW-19 Weather: 37F, mostly cloudy, windy
 Date: 4/4/2024 Sampler Name: EM

Monitoring Well Details

Construction Data

Borehole Diameter (in): 8.0 Depth to Top of Screen (ft): 17.85
 Casing Diameter (in): 2.0 Casing Material: PVC
 Top of Casing Elevation (ft. MSL): 934.26 Ground Surface Elevation (ft. MSL): 931.38

Field Observations

Well Lock Condition: Good

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	6.85	7.16	7.16
Water Elevation (ft. MSL):	927.41	927.1	927.1

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) Yes

	Start	End
Purge Date/Time	4/4 9:59 AM	4/4 10:23 AM

Well Conditions Commentary:

Well Condition: Good Well Cap Condition: Good Well ID Condition: Good

Sampling Equipment and Methods:

Purging Equipment: Electric Submersible Pump Sampling Equipment: Electric Submersible Pump
 Sampling Method: Low Flow Equipment Type: Portable
 Decontamination Method: Alconox and water rinse

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)
4/4 9:58 AM	0.00	7.01						
4/4 10:03 AM	0.43	7.17	6.3	8.3	702	12.08	56.7	128
4/4 10:08 AM	1.05	7.14	6.36	8.55	699	10.38	66.5	131
4/4 10:13 AM	1.50	7.05	6.41	8.4	695	9.24	75.4	131
4/4 10:18 AM	1.84	7.16	6.44	8.02	700	8.47	69.3	130
4/4 10:23 AM	2.25	7.16	6.45	8.11	703	7.63	60.9	129

Equipment Depth: 17 ft Flow Rate: 300 mL/min Volume Removed: 2.25 gal Volume Sampled: 0.75 gal
 Odor? None Color? None

Comments: Pump depth refers to top of pump, inlet is at the bottom, about 2 ft from top so the pump inlet is in the screen.



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL
 Well/Piezometer: MW-20 Weather: 41F, mostly cloudy, windy
 Date: 4/4/2024 Sampler Name: EM

Monitoring Well Details

Construction Data

Borehole Diameter (in): 8.0 Depth to Top of Screen (ft): 64.65
 Casing Diameter (in): 2.0 Casing Material: PVC
 Top of Casing Elevation (ft. MSL): 934.17 Ground Surface Elevation (ft. MSL): 931.95

Field Observations

Well Lock Condition: Fair

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	27.65	31.22	31.22
Water Elevation (ft. MSL):	906.52	902.95	902.95

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) Yes

	Start	End
Purge Date/Time	4/4 10:58 AM	4/4 11:22 AM

Well Conditions Commentary:

Well Condition: Good Well Cap Condition: Good Well ID Condition: Good

Sampling Equipment and Methods:

Purging Equipment: Electric Submersible Pump Sampling Equipment: Electric Submersible Pump
 Sampling Method: Low Flow Equipment Type: Portable
 Decontamination Method: Alconox and water rinse

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)
4/4 10:58 AM	0.00	29.9						
4/4 11:03 AM	0.79	30.14	6.4	10.64	1010	9.83	126	-118
4/4 11:08 AM	1.12	30.73	6.4	10.38	997	8.85	102	-130
4/4 11:13 AM	1.54	31.05	6.4	10.11	999	8.31	81.8	-130
4/4 11:18 AM	1.95	31.22	6.41	9.88	1000	8.01	78.8	-130
4/4 11:22 AM	2.26	31.22	6.48	9.79	1000	7.82	80.2	-121

Equipment Depth: 65.4 ft Flow Rate: 300 mL/min Volume Removed: 2.26 gal Volume Sampled: 0.75 gal
 Odor? None Color? None

Comments: Pump depth refers to top of pump, inlet is at the bottom, about 2 ft from top so the pump inlet is in the screen.



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL
 Well/Piezometer: MW-21 Weather: 47F, overcast, gusts up to 50 mph
 Date: 4/3/2024 Sampler Name: EM

Monitoring Well Details

Construction Data

Borehole Diameter (in): 8.0 Depth to Top of Screen (ft): 16.77
 Casing Diameter (in): 2.0 Casing Material: PVC
 Top of Casing Elevation (ft. MSL): 931.94 Ground Surface Elevation (ft. MSL): 929.17

Field Observations

Well Lock Condition: Good

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	6.71	6.84	6.84
Water Elevation (ft. MSL):	925.23	925.1	925.1

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) Yes

	Start	End
Purge Date/Time	4/3 5:17 PM	4/3 5:47 PM

Well Conditions Commentary:

Well Condition: Good Well Cap Condition: Good Well ID Condition: Good

Sampling Equipment and Methods:

Purging Equipment: Peristaltic Pump Sampling Equipment: Peristaltic Pump
 Sampling Method: Low Flow Equipment Type: Portable
 Decontamination Method: no decontamination

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)
4/3 5:17 PM	0.00	6.7						
4/3 5:22 PM	0.44	6.72	6.55	11.62	814	2.06	222	-175
4/3 5:27 PM	0.80	6.76	6.52	11.7	814	0.76	96.1	-166
4/3 5:32 PM	1.30	6.79	6.50	11.39	811	0.13	115	-163
4/3 5:37 PM	1.80	6.81	6.50	11.27	810	0.16	39.3	-166
4/3 5:42 PM	2.20	6.82	6.5	11.12	811	0.05	45.2	-166
4/3 5:47 PM	2.61	6.84	6.5	10.95	814	0	30.9	-170

Equipment Depth: N/A Flow Rate: 300 mL/min Volume Removed: 2.61 gal Volume Sampled: 0.75 gal
 Odor? None Color? None
 Comments: None



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL
 Well/Piezometer: MW-22 Weather: Mostly cloudy, 47F, gusts up to 50mph
 Date: 4/3/2024 Sampler Name: EM

Monitoring Well Details

Construction Data

Borehole Diameter (in): 8.0 Depth to Top of Screen (ft): 67.62
 Casing Diameter (in): 2.0 Casing Material: PVC
 Top of Casing Elevation (ft. MSL): 931.74 Ground Surface Elevation (ft. MSL): 929.45

Field Observations

Well Lock Condition: Fair

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	30.86	34.05	34.05
Water Elevation (ft. MSL):	900.88	897.69	897.69

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) Yes

	Start	End
Purge Date/Time	4/3 4:38 PM	4/3 4:58 PM

Well Conditions Commentary:

Well Condition: Good Well Cap Condition: Good Well ID Condition: Good

Sampling Equipment and Methods:

Purging Equipment: Electric Submersible Pump Sampling Equipment: Electric Submersible Pump
 Sampling Method: Low Flow Equipment Type: Portable
 Decontamination Method: Alconox and water rinse

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)
4/3 4:38 PM	0.00	30.2						
4/3 4:43 PM	0.40	32.02	5.86	12.28		11.94	257	-71
4/3 4:48 PM	0.83	32.8	5.65	11.73	1	11.84	258	-74
4/3 4:53 PM	1.16	33.73	5.76	11.9	1	11.6	260	-67
4/3 4:58 PM	1.52	34.05	5.82	12.03	1	11.45	262	-58

Equipment Depth: 67.27 ft Flow Rate: 250 mL/min Volume Removed: 1.52 gal Volume Sampled: 0.75 gal
 Odor? None Color? None

Comments: Pump depth refers to top of pump, inlet is at the bottom, about 2 ft from top so the pump inlet is in the screen.



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL
 Well/Piezometer: MW-5 Weather: 36F snow/rain mix
 Date: 4/2/2024 Sampler Name: EM

Monitoring Well Details

Construction Data

Borehole Diameter (in): 10.8 Depth to Top of Screen (ft): 7.76
 Casing Diameter (in): 2.0 Casing Material: PVC
 Top of Casing Elevation (ft. MSL): 949.34 Ground Surface Elevation (ft. MSL): 945.5

Field Observations

Well Lock Condition: Good

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	9.81	10.66	10.66
Water Elevation (ft. MSL):	939.53	938.68	938.68

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) No

	Start	End
Purge Date/Time	4/2 9:08 AM	4/2 9:33 AM

Well Conditions Commentary:

Well Condition: Good Well Cap Condition: Good Well ID Condition: Fair

Sampling Equipment and Methods:

Purging Equipment: Peristaltic Pump Sampling Equipment: Peristaltic Pump
 Sampling Method: Low Flow Equipment Type: Portable
 Decontamination Method: no decontamination

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)
4/2 9:08 AM	0.00							
4/2 9:13 AM	0.21	10.16	5.47	5.78	122	5.07	6.6	199
4/2 9:18 AM	0.41	10.29	5.80	5.94	123	1.92	7.7	188
4/2 9:23 AM	0.61	10.41	5.98	5.83	127	1.51	7.7	181
4/2 9:28 AM	0.80	10.53	6.08	5.89	128	1.43	5.6	177
4/2 9:33 AM	1.00	10.66	6.15	5.84	128	1.02	4.4	173

Equipment Depth: N/A Flow Rate: 150 mL/min Volume Removed: 1.05 gal Volume Sampled: 0.75 gal
 Odor? None Color? None

Comments: None



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL
 Well/Piezometer: MW-7R Weather: 50F, partly cloudy, breezy
 Date: 4/2/2024 Sampler Name: EM

Monitoring Well Details

Construction Data

Borehole Diameter (in): 8.0 Depth to Top of Screen (ft): 9.68
 Casing Diameter (in): 2.0 Casing Material: PVC
 Top of Casing Elevation (ft. MSL): 932.77 Ground Surface Elevation (ft. MSL): 930.09

Field Observations

Well Lock Condition: Good

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	5.98	6.91	6.91
Water Elevation (ft. MSL):	926.79	925.86	925.86

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) Yes

	Start	End
Purge Date/Time	4/2 5:51 PM	4/2 6:11 PM

Well Conditions Commentary:

Well Condition: Good Well Cap Condition: Good Well ID Condition: Good

Sampling Equipment and Methods:

Purging Equipment: Peristaltic Pump Sampling Equipment: Peristaltic Pump
 Sampling Method: Low Flow Equipment Type: Portable
 Decontamination Method: no decontamination

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)
4/4 5:51 PM	0.00	6.4						
4/4 5:56 PM	0.07	6.64	6.54	9.14	140	7.23	33.9	54
4/4 6:01 PM	0.14	6.74	6.51	8.88	140	6.48	27	54
4/4 6:06 PM	0.21	6.9	6.47	8.84	140	6.06	24.4	53
4/4 6:11 PM	0.28	6.91	6.46	8.76	139	5.74	22.7	52

Equipment Depth: N/A Flow Rate: 50 mL/min Volume Removed: 0.28 gal Volume Sampled: 0.75 gal
 Odor? None Color? None

Comments: None



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL
 Well/Piezometer: MW-8 Weather: 35F, overcast, windy
 Date: 4/4/2024 Sampler Name: EM

Monitoring Well Details

Construction Data

Borehole Diameter (in): 10.8 Depth to Top of Screen (ft): 11.65
 Casing Diameter (in): 2.0 Casing Material: PVC
 Top of Casing Elevation (ft. MSL): 939.91 Ground Surface Elevation (ft. MSL): 937.8

Field Observations

Well Lock Condition: Good

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	11.81	12.25	12.25
Water Elevation (ft. MSL):	928.1	927.66	927.66

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) No

	Start	End
Purge Date/Time	4/4 8:47 AM	4/4 9:07 AM

Well Conditions Commentary:

Well Condition: Good Well Cap Condition: Fair Well ID Condition: Good

Sampling Equipment and Methods:

Purging Equipment: Peristaltic Pump Sampling Equipment: Peristaltic Pump
 Sampling Method: Low Flow Equipment Type: Portable
 Decontamination Method: no decontamination

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)
4/4 8:47 AM	0.00	12.00						
4/4 8:52 AM	0.33	12.02	5.61	8.33	812	4.78	14.5	172
4/4 8:57 AM	0.71	12.14	5.85	8.50	809	4.51	4.6	162
4/4 9:02 AM	0.99	12.2	5.94	8.53	809	4.45	4.3	158
4/4 9:07 AM	1.32	12.25	6.01	8.53	810	4.28	0.0	155

Equipment Depth: N/A Flow Rate: 250 mL/min Volume Removed: 1.32 gal Volume Sampled: 0.75 gal
 Odor? None Color? None

Comments: None



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL
 Well/Piezometer: MW-14 Weather: 79F, sunny, no wind
 Date: 10/8/2024 Sampler Name: MGA

Monitoring Well Details

Construction Data

Borehole Diameter (in): 7.9 Depth to Top of Screen (ft): 8.98
 Casing Diameter (in): 2.0 Casing Material: PVC
 Top of Casing Elevation (ft. MSL): 944.12 Ground Surface Elevation (ft. MSL): 940.8

Field Observations

Well Lock Condition: Good

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	8.66	11.87	11.87
Water Elevation (ft. MSL):	935.46	932.25	932.25

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) Yes

	Start	End
Purge Date/Time	7:50 AM	08:10:00

Well Conditions Commentary:

Well Condition: Good Well Cap Condition: Fair Well ID Condition: Good

Sampling Equipment and Methods:

Purging Equipment: Peristaltic Pump Sampling Equipment: Peristaltic Pump
 Sampling Method: Low Flow Equipment Type: Portable
 Decontamination Method: no decontamination

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (millivolts)
10/9 7:50 AM	0.00	8.66						
10/9 7:54 AM	0.13	9.93	6.45	14.63	2200	2.52	0.0	240
10/9 8:00 AM	0.33	10.8	6.66	15.32	2220	1.67	0.0	217
10/9 8:05 AM	0.50	11.3	6.71	15.63	2200	1.78	0.0	207
10/9 8:10 AM	0.67	11.87	6.71	15.76	2210	1.27	0.0	200

Equipment Depth: _____ Flow Rate: 125 mL/min Volume Removed: 0.67 gal Volume Sampled: 0.5 gal
 Odor? None Color? None

Comments: _____



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL
 Well/Piezometer: MW-15 Weather: 69F, sunny, no wind
 Date: 10/7/2024 Sampler Name: MGA

Monitoring Well Details

Construction Data

Borehole Diameter (in): 7.9 Depth to Top of Screen (ft): 53.28
 Casing Diameter (in): 2.0 Casing Material: PVC
 Top of Casing Elevation (ft. MSL): 928.92 Ground Surface Elevation (ft. MSL): 926.6

Field Observations

Well Lock Condition: Good

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	20.66	25.40	25.4
Water Elevation (ft. MSL):	908.26	903.52	903.52

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) Yes

	Start	End
Purge Date/Time		17:51:02

Well Conditions Commentary:

Well Condition: Fair Well Cap Condition: Good Well ID Condition: Fair

Sampling Equipment and Methods:

Purging Equipment: Electric Submersible Pump Sampling Equipment: Electric Submersible Pump
 Sampling Method: Low Flow Equipment Type: Dedicated
 Decontamination Method: Alconox and water rinse

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (millivolts)
10/7 5:36 PM		24.83	7.26	13.06	800	3.63	2.2	-101
10/7 5:41 PM	0.27	24.97	7.21	13.33	802	2.94	2.2	-104
10/7 5:46 PM	0.52	25.24	7.21	13.46	801	2.54	2.0	-106
10/7 5:51 PM	0.78	25.40	7.21	13.55	805	2.40	2.3	-108

Equipment Depth: _____ Flow Rate: 200 mL/min Volume Removed: .78 gal Volume Sampled: 0.5 gal
 Odor? None Color? None

Comments: _____



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL
 Well/Piezometer: MW-16 Weather: 78F, sunny, no wind
 Date: 10/8/2024 Sampler Name: MGA

Monitoring Well Details

Construction Data

Borehole Diameter (in): 7.9 Depth to Top of Screen (ft): 72.76
 Casing Diameter (in): 2.0 Casing Material: PVC
 Top of Casing Elevation (ft. MSL): 948.42 Ground Surface Elevation (ft. MSL): 945.6

Field Observations

Well Lock Condition: Good

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	36.94	60.25	60.25
Water Elevation (ft. MSL):	911.48	888.17	888.17

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) Yes

	Start	End
Purge Date/Time	1:45 PM	14:29:00

Well Conditions Commentary:

Well Condition: Fair Well Cap Condition: Good Well ID Condition: Good

Sampling Equipment and Methods:

Purging Equipment: Electric Submersible Pump Sampling Equipment: Electric Submersible Pump
 Sampling Method: Low Flow Equipment Type: Portable
 Decontamination Method: Alconox and water rinse

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (millivolts)
10/8 1:45 PM	0.00	36.94						
10/8 2:09 PM	0.95	48.60	6.42	14.17	955	0.00	26.3	-82
10/8 2:14 PM	1.15	52.82	6.52	14.80	937	0.00	24.6	-102
10/8 2:19 PM	1.35	54.76	6.57	15.95	917	0.00	19.9	-115
10/8 2:24 PM	1.55	57.42	6.58	15.09	921	0.00	19.9	-120
10/8 2:29 PM	1.75	60.25	6.63	14.83	916	0.00	20.6	-127

Equipment Depth: _____ Flow Rate: 150 mL/min Volume Removed: 1.75 gal Volume Sampled: 0.5 gal
 Odor? None Color? None

Comments: Large drawdown, sampled



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL
 Well/Piezometer: MW-17R Weather: 78F, sunny, no wind
 Date: 10/8/2024 Sampler Name: MGA

Monitoring Well Details

Construction Data

Borehole Diameter (in): 8.0 Depth to Top of Screen (ft): 8.1
 Casing Diameter (in): 2.0 Casing Material: PVC
 Top of Casing Elevation (ft. MSL): 933.82 Ground Surface Elevation (ft. MSL): 930.72

Field Observations

Well Lock Condition: Good

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	7.80	8.6	8.6
Water Elevation (ft. MSL):	926.02	925.22	925.22

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) Yes

	Start	End
Purge Date/Time	11:17 AM	11:48:00

Well Conditions Commentary:

Well Condition: Good Well Cap Condition: Good Well ID Condition: Good

Sampling Equipment and Methods:

Purging Equipment: Peristaltic Pump Sampling Equipment: Peristaltic Pump
 Sampling Method: Low Flow Equipment Type: Portable
 Decontamination Method: no decontamination

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (millivolts)
10/8 11:17 AM	0.00	7.80						
10/8 11:38 AM	0.83	8.56	6.19	19.88	1310	0.06	2.6	-117
10/8 11:43 AM	1.03	8.57	6.19	19.92	1320	0.00	2.5	-119
10/8 11:48 AM	1.23	8.6	6.19	19.94	1340	0.06	1.8	-121

Equipment Depth: _____ Flow Rate: 150 mL/min Volume Removed: 1.23 gal Volume Sampled: 0.5 gal
 Odor? None Color? None

Comments: _____



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL
 Well/Piezometer: MW-19 Weather: 79F, sunny, no wind
 Date: 10/8/2024 Sampler Name: MGA

Monitoring Well Details

Construction Data

Borehole Diameter (in): 8.0 Depth to Top of Screen (ft): 17.85
 Casing Diameter (in): 2.0 Casing Material: PVC
 Top of Casing Elevation (ft. MSL): 934.26 Ground Surface Elevation (ft. MSL): 931.38

Field Observations

Well Lock Condition: Good

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	4.52	5.25	5.25
Water Elevation (ft. MSL):	929.74	929.01	929.01

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) Yes

	Start	End
Purge Date/Time	8:31:54 AM	08:50:33

Well Conditions Commentary:

Well Condition: Good Well Cap Condition: Good Well ID Condition: Good

Sampling Equipment and Methods:

Purging Equipment: Peristaltic Pump Sampling Equipment: Peristaltic Pump
 Sampling Method: Low Flow Equipment Type: Portable
 Decontamination Method: no decontamination

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (millivolts)
10/9 8:31 AM	0.00	4.91	7.17	14.27	739	2.05	36.6	-110
10/9 8:36 AM	0.14	5.01	7.14	14.20	708	0.24	14.9	-83
10/9 8:40 AM	0.28	5.10	7.13	14.34	695	0.00	5.4	-57
10/9 8:46 AM	0.48	5.19	7.13	14.62	685	0.00	1.2	-37
10/9 8:50 AM	0.62	5.25	7.13	14.83	676	0.00	0.0	-28

Equipment Depth: _____ Flow Rate: 125 mL/min Volume Removed: 0.62 gal Volume Sampled: 0.5 gal
 Odor? None Color? None

Comments: _____



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL
 Well/Piezometer: MW-20 Weather: 78F, sunny, no wind
 Date: 10/8/2024 Sampler Name: MGA

Monitoring Well Details

Construction Data

Borehole Diameter (in): 8.0 Depth to Top of Screen (ft): 64.65
 Casing Diameter (in): 2.0 Casing Material: PVC
 Top of Casing Elevation (ft. MSL): 934.17 Ground Surface Elevation (ft. MSL): 931.95

Field Observations

Well Lock Condition: Good

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	29.53	49.30	49.3
Water Elevation (ft. MSL):	904.64	884.87	884.87

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) Yes

	Start	End
Purge Date/Time		16:26:00

Well Conditions Commentary:

Well Condition: Good Well Cap Condition: Good Well ID Condition: Good

Sampling Equipment and Methods:

Purging Equipment: Electric Submersible Pump Sampling Equipment: Electric Submersible Pump
 Sampling Method: Low Flow Equipment Type: Portable
 Decontamination Method: Alconox and water rinse

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (millivolts)
10/8 3:35 PM		29.53						
10/8 3:55 PM	0.79	38.75	6.13	16.43	1180	9.26	0.0	-59
10/8 4:01 PM	1.03	41.79	6.05	14.93	1200	8.94	278	-53
10/8 4:06 PM	1.23	43.55	6.01	15.80	1170	7.92	189	-51
10/8 4:11 PM	1.43	44.25	5.99	17.20	1150	7.24	172	-50
10/8 4:16 PM	1.63	46.15	5.98	15.56	1180	7.75	391	-46
10/8 4:21 PM	1.83	47.75	5.99	15.82	1160	7.14	265	-45
10/8 4:26 PM	2.03	49.30	6.01	15.64	1170	7.02	489	-44

Equipment Depth: _____ Flow Rate: 150 mL/min Volume Removed: 2.03 gal Volume Sampled: 0.5 gal
 Odor? None Color? Brown

Comments: Had to keep adjusting controller to maintain flow rate, may explain temp not stabilizing



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL
 Well/Piezometer: MW-21 Weather: 78F, sunny, no wind
 Date: 10/8/2024 Sampler Name: MGA

Monitoring Well Details

Construction Data

Borehole Diameter (in): 8.0 Depth to Top of Screen (ft): 16.77
 Casing Diameter (in): 2.0 Casing Material: PVC
 Top of Casing Elevation (ft. MSL): 931.94 Ground Surface Elevation (ft. MSL): 929.17

Field Observations

Well Lock Condition: Good

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	9.24	9.49	9.49
Water Elevation (ft. MSL):	922.7	922.45	922.45

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) Yes

	Start	End
Purge Date/Time	9:09 AM	09:47:00

Well Conditions Commentary:

Well Condition: Good Well Cap Condition: Good Well ID Condition: Good

Sampling Equipment and Methods:

Purging Equipment: Peristaltic Pump Sampling Equipment: Peristaltic Pump
 Sampling Method: Low Flow Equipment Type: Portable
 Decontamination Method: no decontamination

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (millivolts)
10/8 9:09 AM	0.00	9.24						
10/8 9:23 AM	0.55	9.46	6.41	16.30	926	0.40	7.2	-123
10/8 9:28 AM	0.75	9.47	6.42	16.36	924	0.07	5.4	-123
10/8 9:32 AM	0.91	9.48	6.41	16.43	923	0.31	5.7	-123
10/8 9:37 AM	1.11	9.48	6.42	16.51	922	0.00	4.6	-123
10/8 9:42 AM	1.31	9.48	6.42	16.53	921	0.00	3.9	-123
10/8 9:47 AM	1.51	9.49	6.42	16.55	921	0.00	3.6	-123

Equipment Depth: _____ Flow Rate: 150 mL/min Volume Removed: 1.51 gal Volume Sampled: 0.5 gal
 Odor? None Color? None

Comments: _____



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL
 Well/Piezometer: MW-22 Weather: 78F, sunny, no wind
 Date: 10/8/2024 Sampler Name: MGA

Monitoring Well Details

Construction Data

Borehole Diameter (in): 8.0 Depth to Top of Screen (ft): 67.62
 Casing Diameter (in): 2.0 Casing Material: PVC
 Top of Casing Elevation (ft. MSL): 931.74 Ground Surface Elevation (ft. MSL): 929.45

Field Observations

Well Lock Condition: Good

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	31.43	43.19	43.19
Water Elevation (ft. MSL):	900.31	888.55	888.55

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) Yes

	Start	End
Purge Date/Time		08:38:12

Well Conditions Commentary:

Well Condition: Good Well Cap Condition: Good Well ID Condition: Good

Sampling Equipment and Methods:

Purging Equipment: Electric Submersible Pump Sampling Equipment: Electric Submersible Pump
 Sampling Method: Low Flow Equipment Type: Portable
 Decontamination Method: Alconox and water rinse

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (millivolts)
10/8 7:50 AM		33.82	5.93	11.35	994	1.47	25.6	-97
10/8 7:55 AM	0.20	33.82	6.36	11.73	993	0.05	27.0	-132
10/8 7:59 AM	0.37	34.58	6.39	11.85	993	0.05	28.1	-137
10/8 8:06 AM	0.62	36.96	6.42	12.29	996	0.00	46.0	-143
10/8 8:11 AM	0.81	37.76	6.43	12.19	1000	0.00	40.3	-147
10/8 8:16 AM	1.02	39.30	6.42	12.52	1000	0.00	24.6	-149
10/8 8:22 AM	1.26	39.91	6.43	12.35	1000	0.00	22.6	-151
10/8 8:27 AM	1.46	41.64	6.43	12.74	1000	0.00	16.5	-152
10/8 8:32 AM	1.65	42.49	6.43	12.91	998	0.00	16.6	-153
10/8 8:38 AM	1.89	43.19	6.44	12.80	1000	0.00	12.0	-153

Equipment Depth: _____ Flow Rate: 150 mL/min Volume Removed: 1.89 gal Volume Sampled: 0.5 gal
 Odor? None Color? None

Comments: _____



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL
 Well/Piezometer: MW-7R Weather: 69F, sunny, no wind
 Date: 10/7/2024 Sampler Name: MGA

Monitoring Well Details

Construction Data

Borehole Diameter (in): 8.0 Depth to Top of Screen (ft): 9.68
 Casing Diameter (in): 2.0 Casing Material: PVC
 Top of Casing Elevation (ft. MSL): 932.77 Ground Surface Elevation (ft. MSL): 930.09

Field Observations

Well Lock Condition: Good

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	7.15	10.39	10.39
Water Elevation (ft. MSL):	925.62	922.38	922.38

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) Yes

	Start	End
Purge Date/Time		16:47:12

Well Conditions Commentary:

Well Condition: Good Well Cap Condition: Good Well ID Condition: Good

Sampling Equipment and Methods:

Purging Equipment: Peristaltic Pump Sampling Equipment: Peristaltic Pump
 Sampling Method: Low Flow Equipment Type: Portable
 Decontamination Method: no decontamination

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (millivolts)
10/7 4:02 PM		7.69	6.94	17.20	1430	9.60	34.1	-35
10/7 4:06 PM	0.14	8.28	6.85	17.38	1280	8.42	24.7	-61
10/7 4:12 PM	0.36	8.51	6.81	17.76	1160	0.95	3.4	-64
10/7 4:17 PM	0.58	8.73	6.81	17.93	1120	2.67	4.1	-88
10/7 4:22 PM	0.78	8.97	6.81	18.04	1110	1.85	2.6	-102
10/7 4:27 PM	0.99	9.26	6.81	18.11	1100	1.89	1.8	-112
10/7 4:32 PM	1.16	9.49	6.82	18.15	1090	0.42	1.5	-118
10/7 4:37 PM	1.37	9.82	6.81	18.19	1080	0.28	1.3	-124
10/7 4:42 PM	1.56	10.12	6.80	18.22	1070	0.21	1.4	-126
10/7 4:47 PM	1.75	10.39	6.80	18.22	1060	0.19	1.4	-125

Equipment Depth: _____ Flow Rate: 150 mL/min Volume Removed: 1.75 gal Volume Sampled: 0.5 gal
 Odor? None Color? None

Comments: _____



Groundwater Sampling Field Sheet

Disposal Site Name: Viking Pump Foundry Sand Landfill Permit No.: 07-SDP-12-89P-FSL

Well/Piezometer: MW-8 Weather: 69F, sunny, no wind

Date: 10/7/2024 Sampler Name: MGA

Monitoring Well Details

Construction Data

Borehole Diameter (in): 10.8 Depth to Top of Screen (ft): 11.65

Casing Diameter (in): 2.0 Casing Material: PVC

Top of Casing Elevation (ft. MSL): 939.91 Ground Surface Elevation (ft. MSL): 937.8

Field Observations

Well Lock Condition: Fair

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	15.23	15.83	15.83
Water Elevation (ft. MSL):	924.68	924.08	924.08

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) No

	Start	End
Purge Date/Time	2:46:37 PM	15:31:10

Well Conditions Commentary:

Well Condition: Fair Well Cap Condition: Fair Well ID Condition: Fair

Sampling Equipment and Methods:

Purging Equipment: Peristaltic Pump Sampling Equipment: Peristaltic Pump

Sampling Method: Low Flow Equipment Type: Portable

Decontamination Method: no decontamination

Field Analysis

Date/Time	Cumulative Volume Purged (gal)	Depth To Water (ft BREF)	pH (standard units)	Temp (deg C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (millivolts)
10/7 2:46 PM	0.00	15.23	7.08	15.91	898	4.80	9.1	99
10/7 2:51 PM	0.18	15.64	6.79	14.94	846	2.28	3.0	128
10/7 2:56 PM	0.39	15.7	6.71	14.64	841	1.39	3.0	140
10/7 3:01 PM	0.58	15.72	6.68	14.50	841	1.05	2.0	147
10/7 3:06 PM	0.79	15.64	6.67	15.48	815	2.27	2.3	152
10/7 3:11 PM	0.97	15.64	6.65	15.70	815	2.08	1.6	151
10/7 3:17 PM	1.22	15.7	6.62	15.84	822	3.51	1.4	148
10/7 3:22 PM	1.42	15.77	6.60	15.06	827	1.84	1.9	152
10/7 3:27 PM	1.61	15.81	6.58	15.04	827	1.61	1.4	154
10/7 3:31 PM	1.78	15.83	6.57	14.77	834	1.47	1.4	156

Equipment Depth: _____ Flow Rate: 150 mL/min Volume Removed: 1.78 gal Volume Sampled: 0.5 gal

Odor? None Color? None

Comments: _____

Appendix B

**Laboratory Analytical Reports - April 2024
and October 2024**

ANALYTICAL REPORT

PREPARED FOR

Attn: Mr. Grant Anderson
GHD Services Inc.
900 Long Lake Road
Suite 200
New Brighton, Minnesota 55112

Generated 4/12/2024 12:51:00 PM

JOB DESCRIPTION

Viking Pump Landfill - MW/SW Semi-Annual

JOB NUMBER

310-278035-1

Eurofins Cedar Falls

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

Authorization



Generated
4/12/2024 12:51:00 PM

Authorized for release by
Zach Bindert, Client Service Manager
Zach.Bindert@et.eurofinsus.com
(319)277-2401



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Case Narrative

Client: GHD Services Inc.
Project: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

Job ID: 310-278035-1

Eurofins Cedar Falls

Job Narrative 310-278035-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt

The samples were received on 4/3/2024 9:15 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 0.7°C.

GC/MS VOA

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

HPLC/IC

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Metals

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry

Method 9020B: Breakthrough exceeded 10% for the following sample:W-240401-EM-01 (310-278035-1).

Method 9020B: Breakthrough exceeded 10% for the following samples:W-240402-EM-02 (310-278035-2) and W-240402-EM-03 (310-278035-3).

Method 9020B: Breakthrough exceeded 10% for the following sample:W-240402-EM-04 (310-278035-4).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Eurofins Cedar Falls

Sample Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-278035-1	W-240401-EM-01 SW-01	Water	04/01/24 10:58	04/03/24 09:15
310-278035-2	W-240402-EM-02 MW-5	Water	04/02/24 09:35	04/03/24 09:15
310-278035-3	W-240402-EM-03 MW-14	Water	04/02/24 17:00	04/03/24 09:15
310-278035-4	W-240402-EM-04 MW-14 DUP	Water	04/02/24 17:15	04/03/24 09:15
310-278035-5	Trip Blank	Water	04/02/24 00:00	04/03/24 09:15

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15

Detection Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

Client Sample ID: W-240401-EM-01 **SW-01**

Lab Sample ID: 310-278035-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	45.1		5.00		mg/L	5		9056A	Total/NA
Barium	0.0715		0.00200		mg/L	1		6020B	Total/NA
Iron	0.568		0.100		mg/L	1		6020B	Total/NA
Chemical Oxygen Demand	14.4		5.00		mg/L	1		5220D LL	Total/NA
Halogens, Total Organic	0.0654		0.0400		mg/L	1		9020B	Total/NA
Total Suspended Solids	26.0		5.00		mg/L	1		I-3765-85	Total/NA

Client Sample ID: W-240402-EM-02 **MW-5**

Lab Sample ID: 310-278035-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	137		5.00		mg/L	5		9056A	Total/NA
Barium	0.0822		0.00200		mg/L	1		6020B	Total/NA
Iron	0.154		0.100		mg/L	1		6020B	Total/NA
Halogens, Total Organic	0.126		0.0400		mg/L	1		9020B	Total/NA

Client Sample ID: W-240402-EM-03 **MW-14**

Lab Sample ID: 310-278035-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	9.32		5.00		mg/L	5		9056A	Total/NA
Barium	0.0154		0.00200		mg/L	1		6020B	Total/NA

Client Sample ID: W-240402-EM-04 **MW-DUP**

Lab Sample ID: 310-278035-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	8.66		5.00		mg/L	5		9056A	Total/NA
Barium	0.0153		0.00200		mg/L	1		6020B	Total/NA
Chemical Oxygen Demand	5.45		5.00		mg/L	1		5220D LL	Total/NA

Client Sample ID: Trip Blank

Lab Sample ID: 310-278035-5

No Detections.

This Detection Summary does not include radiochemical test results.

Eurofins Cedar Falls

Client Sample Results

Client: GHD Services Inc.
 Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

Client Sample ID: W-240401-EM-01 SW-01

Lab Sample ID: 310-278035-1

Date Collected: 04/01/24 10:58

Matrix: Water

Date Received: 04/03/24 09:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/04/24 17:14	1
Benzene	<0.500		0.500		ug/L			04/04/24 17:14	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		80 - 120					04/04/24 17:14	1
Dibromofluoromethane (Surr)	113		73 - 130					04/04/24 17:14	1
Toluene-d8 (Surr)	95		80 - 120					04/04/24 17:14	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	45.1		5.00		mg/L			04/04/24 20:34	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.0715		0.00200		mg/L		04/04/24 09:00	04/11/24 15:25	1
Iron	0.568		0.100		mg/L		04/04/24 09:00	04/11/24 15:25	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	<0.200		0.200		mg/L			04/09/24 21:37	1
Chemical Oxygen Demand (SM 5220D LL)	14.4		5.00		mg/L			04/05/24 10:12	1
Halogens, Total Organic (SW846 9020B)	0.0654		0.0400		mg/L		04/08/24 07:30	04/08/24 13:16	1
Phenols, Total (SW846 9066)	<0.0208		0.0208		mg/L		04/08/24 09:17	04/08/24 17:10	1
Total Suspended Solids (USGS I-3765-85)	26.0		5.00		mg/L			04/05/24 13:58	1

Client Sample Results

Client: GHD Services Inc.
 Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

Client Sample ID: W-240402-EM-02 MW-05

Lab Sample ID: 310-278035-2

Date Collected: 04/02/24 09:35

Matrix: Water

Date Received: 04/03/24 09:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/05/24 18:03	1
Benzene	<0.500		0.500		ug/L			04/05/24 18:03	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	108		80 - 120					04/05/24 18:03	1
Dibromofluoromethane (Surr)	105		73 - 130					04/05/24 18:03	1
Toluene-d8 (Surr)	93		80 - 120					04/05/24 18:03	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	137		5.00		mg/L			04/04/24 20:48	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.0822		0.00200		mg/L		04/04/24 09:00	04/11/24 15:27	1
Iron	0.154		0.100		mg/L		04/04/24 09:00	04/11/24 15:27	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	<0.200		0.200		mg/L			04/09/24 21:37	1
Chemical Oxygen Demand (SM 5220D LL)	<5.00		5.00		mg/L			04/05/24 10:12	1
Halogens, Total Organic (SW846 9020B)	0.126		0.0400		mg/L		04/10/24 13:45	04/11/24 11:22	1
Phenols, Total (SW846 9066)	<0.0200		0.0200		mg/L		04/08/24 09:17	04/08/24 17:11	1
Total Suspended Solids (USGS I-3765-85)	<5.00		5.00		mg/L			04/05/24 16:33	1

Client Sample Results

Client: GHD Services Inc.
 Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

Client Sample ID: W-240402-EM-03 MW-14

Lab Sample ID: 310-278035-3

Date Collected: 04/02/24 17:00

Matrix: Water

Date Received: 04/03/24 09:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/05/24 18:26	1
Benzene	<0.500		0.500		ug/L			04/05/24 18:26	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		80 - 120					04/05/24 18:26	1
Dibromofluoromethane (Surr)	103		73 - 130					04/05/24 18:26	1
Toluene-d8 (Surr)	96		80 - 120					04/05/24 18:26	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	9.32		5.00		mg/L			04/04/24 21:02	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.0154		0.00200		mg/L		04/04/24 09:00	04/11/24 15:29	1
Iron	<0.100		0.100		mg/L		04/04/24 09:00	04/11/24 15:29	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	<0.200		0.200		mg/L			04/09/24 21:39	1
Chemical Oxygen Demand (SM 5220D LL)	<5.00		5.00		mg/L			04/05/24 10:12	1
Halogens, Total Organic (SW846 9020B)	<0.0400		0.0400		mg/L		04/10/24 13:45	04/11/24 12:08	1
Phenols, Total (SW846 9066)	<0.0208		0.0208		mg/L		04/08/24 09:17	04/08/24 17:11	1
Total Suspended Solids (USGS I-3765-85)	<5.00		5.00		mg/L			04/05/24 16:33	1

Client Sample Results

Client: GHD Services Inc.
 Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

Client Sample ID: W-240402-EM-04 **MW-14 DUP**

Lab Sample ID: 310-278035-4

Date Collected: 04/02/24 17:15

Matrix: Water

Date Received: 04/03/24 09:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/05/24 18:49	1
Benzene	<0.500		0.500		ug/L			04/05/24 18:49	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	104		80 - 120					04/05/24 18:49	1
Dibromofluoromethane (Surr)	100		73 - 130					04/05/24 18:49	1
Toluene-d8 (Surr)	98		80 - 120					04/05/24 18:49	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	8.66		5.00		mg/L			04/04/24 21:16	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.0153		0.00200		mg/L		04/04/24 09:00	04/11/24 15:32	1
Iron	<0.100		0.100		mg/L		04/04/24 09:00	04/11/24 15:32	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	<0.200		0.200		mg/L			04/09/24 21:39	1
Chemical Oxygen Demand (SM 5220D LL)	5.45		5.00		mg/L			04/05/24 10:12	1
Halogens, Total Organic (SW846 9020B)	<0.0400		0.0400		mg/L		04/11/24 11:00	04/11/24 16:27	1
Phenols, Total (SW846 9066)	<0.0200		0.0200		mg/L		04/08/24 09:17	04/08/24 17:12	1
Total Suspended Solids (USGS I-3765-85)	<5.00		5.00		mg/L			04/05/24 17:13	1

Client Sample Results

Client: GHD Services Inc.
 Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

Client Sample ID: Trip Blank

Lab Sample ID: 310-278035-5

Date Collected: 04/02/24 00:00

Matrix: Water

Date Received: 04/03/24 09:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/05/24 16:33	1
Benzene	<0.500		0.500		ug/L			04/05/24 16:33	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Dibromofluoromethane (Surr)	105		73 - 130					04/05/24 16:33	1
Toluene-d8 (Surr)	98		80 - 120					04/05/24 16:33	1
4-Bromofluorobenzene (Surr)	103		80 - 120					04/05/24 16:33	1

Definitions/Glossary

Client: GHD Services Inc.

Job ID: 310-278035-1

Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Surrogate Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

Method: 8260D - Volatile Organic Compounds by GC/MS

Matrix: Water

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)		
		BFB (80-120)	DBFM (73-130)	TOL (80-120)
310-278035-1	W-240401-EM-01	102	113	95
310-278035-2	W-240402-EM-02	108	105	93
310-278035-2 MS	W-240402-EM-02	96	107	100
310-278035-2 MSD	W-240402-EM-02	98	103	100
310-278035-3	W-240402-EM-03	97	103	96
310-278035-4	W-240402-EM-04	104	100	98
310-278035-5	Trip Blank	103	105	98
LCS 310-417852/6	Lab Control Sample	102	96	98
LCS 310-417996/6	Lab Control Sample	97	99	97
MB 310-417852/5	Method Blank	100	112	96
MB 310-417996/5	Method Blank	104	107	99

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane (Surr)
TOL = Toluene-d8 (Surr)

QC Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

Method: 8260D - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 310-417852/5

Matrix: Water

Analysis Batch: 417852

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Acetone	<10.0		10.0		ug/L			04/04/24 11:55	1
Benzene	<0.500		0.500		ug/L			04/04/24 11:55	1
Surrogate	MB	MB	Limits	Prepared	Analyzed	Dil Fac			
%Recovery	Qualifier								
4-Bromofluorobenzene (Surr)	100		80 - 120		04/04/24 11:55	1			
Dibromofluoromethane (Surr)	112		73 - 130		04/04/24 11:55	1			
Toluene-d8 (Surr)	96		80 - 120		04/04/24 11:55	1			

Lab Sample ID: LCS 310-417852/6

Matrix: Water

Analysis Batch: 417852

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec Limits
		Result	Qualifier				
Acetone	40.0	38.62		ug/L		97	50 - 150
Benzene	20.0	21.23		ug/L		106	72 - 124
Surrogate	LCS	LCS	Limits				
%Recovery	Qualifier						
4-Bromofluorobenzene (Surr)	102		80 - 120				
Dibromofluoromethane (Surr)	96		73 - 130				
Toluene-d8 (Surr)	98		80 - 120				

Lab Sample ID: MB 310-417996/5

Matrix: Water

Analysis Batch: 417996

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Acetone	<10.0		10.0		ug/L			04/05/24 15:25	1
Benzene	<0.500		0.500		ug/L			04/05/24 15:25	1
Surrogate	MB	MB	Limits	Prepared	Analyzed	Dil Fac			
%Recovery	Qualifier								
4-Bromofluorobenzene (Surr)	104		80 - 120		04/05/24 15:25	1			
Dibromofluoromethane (Surr)	107		73 - 130		04/05/24 15:25	1			
Toluene-d8 (Surr)	99		80 - 120		04/05/24 15:25	1			

Lab Sample ID: LCS 310-417996/6

Matrix: Water

Analysis Batch: 417996

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec Limits
		Result	Qualifier				
Acetone	40.0	33.08		ug/L		83	50 - 150
Benzene	20.0	19.83		ug/L		99	72 - 124
Surrogate	LCS	LCS	Limits				
%Recovery	Qualifier						
4-Bromofluorobenzene (Surr)	97		80 - 120				
Dibromofluoromethane (Surr)	99		73 - 130				
Toluene-d8 (Surr)	97		80 - 120				

Eurofins Cedar Falls

QC Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: 310-278035-2 MS

Client Sample ID: W-240402-EM-02

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 417996

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	%Rec	Limits
	Result	Qualifier	Added	Result	Qualifier					
Acetone	<10.0		40.0	28.60		ug/L		71		31 - 150
Benzene	<0.500		20.0	17.29		ug/L		86		46 - 130
MS MS										
Surrogate	%Recovery	Qualifier	Limits							
4-Bromofluorobenzene (Surr)	96		80 - 120							
Dibromofluoromethane (Surr)	107		73 - 130							
Toluene-d8 (Surr)	100		80 - 120							

Lab Sample ID: 310-278035-2 MSD

Client Sample ID: W-240402-EM-02

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 417996

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec	Limits	RPD	RPD
	Result	Qualifier	Added	Result	Qualifier						Limit	
Acetone	<10.0		40.0	27.87		ug/L		70		31 - 150	3	29
Benzene	<0.500		20.0	17.38		ug/L		87		46 - 130	1	20
MSD MSD												
Surrogate	%Recovery	Qualifier	Limits									
4-Bromofluorobenzene (Surr)	98		80 - 120									
Dibromofluoromethane (Surr)	103		73 - 130									
Toluene-d8 (Surr)	100		80 - 120									

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 310-418131/3

Client Sample ID: Method Blank

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 418131

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Chloride	<1.00		1.00		mg/L			04/04/24 18:13	1

Lab Sample ID: LCS 310-418131/4

Client Sample ID: Lab Control Sample

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 418131

Analyte	Spike	LCS	LCS	Unit	D	%Rec	%Rec	Limits
		Added	Result					
Chloride	10.0	10.12		mg/L		101		90 - 110

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 310-417771/1-A

Client Sample ID: Method Blank

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 418555

Prep Batch: 417771

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Barium	<0.00200		0.00200		mg/L		04/04/24 09:00	04/11/24 14:19	1
Iron	<0.100		0.100		mg/L		04/04/24 09:00	04/11/24 14:19	1

Eurofins Cedar Falls

QC Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

Method: 6020B - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 310-417771/2-A
Matrix: Water
Analysis Batch: 418555

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 417771

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Barium	0.100	0.1016		mg/L		102	80 - 120
Iron	0.200	0.1941		mg/L		97	80 - 120

Method: 350.1 - Nitrogen, Ammonia

Lab Sample ID: MB 310-418277/167
Matrix: Water
Analysis Batch: 418277

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	<0.200		0.200		mg/L			04/09/24 21:34	1

Lab Sample ID: LCS 310-418277/168
Matrix: Water
Analysis Batch: 418277

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Ammonia	8.55	8.919		mg/L		104	90 - 110

Method: 5220D LL - COD

Lab Sample ID: MB 310-417970/32
Matrix: Water
Analysis Batch: 417970

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	<5.00		5.00		mg/L			04/05/24 10:12	1

Lab Sample ID: LCS 310-417970/33
Matrix: Water
Analysis Batch: 417970

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chemical Oxygen Demand	125	121.2		mg/L		97	85 - 115

Method: 9020B - Organic Halides, Total (TOX)

Lab Sample ID: MB 680-832024/1-A
Matrix: Water
Analysis Batch: 832034

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 832024

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Halogens, Total Organic	<0.0400		0.0400		mg/L		04/08/24 07:30	04/08/24 10:50	1

Lab Sample ID: LCS 680-832024/2-A
Matrix: Water
Analysis Batch: 832034

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 832024

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Halogens, Total Organic	0.400	0.3616		mg/L		90	60 - 140

Eurofins Cedar Falls

QC Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

Method: 9020B - Organic Halides, Total (TOX) (Continued)

Lab Sample ID: 310-278035-1 MS

Matrix: Water

Analysis Batch: 832034

Client Sample ID: W-240401-EM-01

Prep Type: Total/NA

Prep Batch: 832024

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Halogens, Total Organic	0.0654		0.400	0.3943		mg/L		82	60 - 140

Lab Sample ID: 310-278035-1 MSD

Matrix: Water

Analysis Batch: 832034

Client Sample ID: W-240401-EM-01

Prep Type: Total/NA

Prep Batch: 832024

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Halogens, Total Organic	0.0654		0.400	0.3294		mg/L		66	60 - 140	18	40

Lab Sample ID: MB 680-832423/1-A

Matrix: Water

Analysis Batch: 832482

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 832423

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Halogens, Total Organic	<0.0400		0.0400		mg/L		04/10/24 13:45	04/10/24 14:20	1

Lab Sample ID: LCS 680-832423/2-A

Matrix: Water

Analysis Batch: 832482

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 832423

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Halogens, Total Organic	0.400	0.3948		mg/L		99	60 - 140

Lab Sample ID: LCSD 680-832423/14-A

Matrix: Water

Analysis Batch: 832482

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 832423

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Halogens, Total Organic	0.400	0.3916		mg/L		98	60 - 140	1	40

Lab Sample ID: MB 680-832608/1-A

Matrix: Water

Analysis Batch: 832663

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 832608

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Halogens, Total Organic	<0.0400		0.0400		mg/L		04/11/24 11:00	04/11/24 14:52	1

Lab Sample ID: LCS 680-832608/2-A

Matrix: Water

Analysis Batch: 832663

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 832608

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Halogens, Total Organic	0.400	0.3888		mg/L		97	60 - 140

Lab Sample ID: LCSD 680-832608/15-A

Matrix: Water

Analysis Batch: 832663

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 832608

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Halogens, Total Organic	0.400	0.3509		mg/L		88	60 - 140	10	40

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QC Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

Method: 9020B - Organic Halides, Total (TOX)

Lab Sample ID: 310-278035-4 MS
Matrix: Water
Analysis Batch: 832663

Client Sample ID: W-240402-EM-04
Prep Type: Total/NA
Prep Batch: 832608

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Halogens, Total Organic	<0.0400		0.400	0.4071		mg/L		102	60 - 140

Lab Sample ID: 310-278035-4 MSD
Matrix: Water
Analysis Batch: 832663

Client Sample ID: W-240402-EM-04
Prep Type: Total/NA
Prep Batch: 832608

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Halogens, Total Organic	<0.0400		0.400	0.3659		mg/L		91	60 - 140	11	40

Method: 9066 - Phenolics, Total Recoverable

Lab Sample ID: MB 310-418093/1-A
Matrix: Water
Analysis Batch: 418171

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 418093

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenols, Total	<0.0184		0.0184		mg/L		04/08/24 09:17	04/08/24 17:04	1

Lab Sample ID: LCS 310-418093/2-A
Matrix: Water
Analysis Batch: 418171

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 418093

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Phenols, Total	0.100	0.09799		mg/L		98	90 - 110

Method: I-3765-85 - Residue, Non-filterable (TSS)

Lab Sample ID: MB 310-418010/1
Matrix: Water
Analysis Batch: 418010

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<5.00		5.00		mg/L			04/05/24 13:58	1

Lab Sample ID: LCS 310-418010/2
Matrix: Water
Analysis Batch: 418010

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	100	104.0		mg/L		104	75 - 116

Lab Sample ID: MB 310-418042/1
Matrix: Water
Analysis Batch: 418042

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<5.00		5.00		mg/L			04/05/24 16:33	1

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QC Sample Results

Client: GHD Services Inc.
 Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

Method: I-3765-85 - Residue, Non-filterable (TSS) (Continued)

Lab Sample ID: LCS 310-418042/2
Matrix: Water
Analysis Batch: 418042

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	100	98.00		mg/L		98	75 - 116

Lab Sample ID: MB 310-418045/1
Matrix: Water
Analysis Batch: 418045

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<5.00		5.00		mg/L			04/05/24 17:13	1

Lab Sample ID: LCS 310-418045/2
Matrix: Water
Analysis Batch: 418045

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	100	100.0		mg/L		100	75 - 116

QC Association Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

GC/MS VOA

Analysis Batch: 417852

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278035-1	W-240401-EM-01	Total/NA	Water	8260D	
MB 310-417852/5	Method Blank	Total/NA	Water	8260D	
LCS 310-417852/6	Lab Control Sample	Total/NA	Water	8260D	

Analysis Batch: 417996

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278035-2	W-240402-EM-02	Total/NA	Water	8260D	
310-278035-3	W-240402-EM-03	Total/NA	Water	8260D	
310-278035-4	W-240402-EM-04	Total/NA	Water	8260D	
310-278035-5	Trip Blank	Total/NA	Water	8260D	
MB 310-417996/5	Method Blank	Total/NA	Water	8260D	
LCS 310-417996/6	Lab Control Sample	Total/NA	Water	8260D	
310-278035-2 MS	W-240402-EM-02	Total/NA	Water	8260D	
310-278035-2 MSD	W-240402-EM-02	Total/NA	Water	8260D	

HPLC/IC

Analysis Batch: 418131

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278035-1	W-240401-EM-01	Total/NA	Water	9056A	
310-278035-2	W-240402-EM-02	Total/NA	Water	9056A	
310-278035-3	W-240402-EM-03	Total/NA	Water	9056A	
310-278035-4	W-240402-EM-04	Total/NA	Water	9056A	
MB 310-418131/3	Method Blank	Total/NA	Water	9056A	
LCS 310-418131/4	Lab Control Sample	Total/NA	Water	9056A	

Metals

Prep Batch: 417771

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278035-1	W-240401-EM-01	Total/NA	Water	3005A	
310-278035-2	W-240402-EM-02	Total/NA	Water	3005A	
310-278035-3	W-240402-EM-03	Total/NA	Water	3005A	
310-278035-4	W-240402-EM-04	Total/NA	Water	3005A	
MB 310-417771/1-A	Method Blank	Total/NA	Water	3005A	
LCS 310-417771/2-A	Lab Control Sample	Total/NA	Water	3005A	

Analysis Batch: 418555

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278035-1	W-240401-EM-01	Total/NA	Water	6020B	417771
310-278035-2	W-240402-EM-02	Total/NA	Water	6020B	417771
310-278035-3	W-240402-EM-03	Total/NA	Water	6020B	417771
310-278035-4	W-240402-EM-04	Total/NA	Water	6020B	417771
MB 310-417771/1-A	Method Blank	Total/NA	Water	6020B	417771
LCS 310-417771/2-A	Lab Control Sample	Total/NA	Water	6020B	417771

General Chemistry

Analysis Batch: 417970

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278035-1	W-240401-EM-01	Total/NA	Water	5220D LL	
310-278035-2	W-240402-EM-02	Total/NA	Water	5220D LL	

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QC Association Summary

Client: GHD Services Inc.
 Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

General Chemistry (Continued)

Analysis Batch: 417970 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278035-3	W-240402-EM-03	Total/NA	Water	5220D LL	
310-278035-4	W-240402-EM-04	Total/NA	Water	5220D LL	
MB 310-417970/32	Method Blank	Total/NA	Water	5220D LL	
LCS 310-417970/33	Lab Control Sample	Total/NA	Water	5220D LL	

Analysis Batch: 418010

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278035-1	W-240401-EM-01	Total/NA	Water	I-3765-85	
MB 310-418010/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-418010/2	Lab Control Sample	Total/NA	Water	I-3765-85	

Analysis Batch: 418042

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278035-2	W-240402-EM-02	Total/NA	Water	I-3765-85	
310-278035-3	W-240402-EM-03	Total/NA	Water	I-3765-85	
MB 310-418042/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-418042/2	Lab Control Sample	Total/NA	Water	I-3765-85	

Analysis Batch: 418045

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278035-4	W-240402-EM-04	Total/NA	Water	I-3765-85	
MB 310-418045/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-418045/2	Lab Control Sample	Total/NA	Water	I-3765-85	

Prep Batch: 418093

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278035-1	W-240401-EM-01	Total/NA	Water	Distill/Phenol	
310-278035-2	W-240402-EM-02	Total/NA	Water	Distill/Phenol	
310-278035-3	W-240402-EM-03	Total/NA	Water	Distill/Phenol	
310-278035-4	W-240402-EM-04	Total/NA	Water	Distill/Phenol	
MB 310-418093/1-A	Method Blank	Total/NA	Water	Distill/Phenol	
LCS 310-418093/2-A	Lab Control Sample	Total/NA	Water	Distill/Phenol	

Analysis Batch: 418171

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278035-1	W-240401-EM-01	Total/NA	Water	9066	418093
310-278035-2	W-240402-EM-02	Total/NA	Water	9066	418093
310-278035-3	W-240402-EM-03	Total/NA	Water	9066	418093
310-278035-4	W-240402-EM-04	Total/NA	Water	9066	418093
MB 310-418093/1-A	Method Blank	Total/NA	Water	9066	418093
LCS 310-418093/2-A	Lab Control Sample	Total/NA	Water	9066	418093

Analysis Batch: 418277

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278035-1	W-240401-EM-01	Total/NA	Water	350.1	
310-278035-2	W-240402-EM-02	Total/NA	Water	350.1	
310-278035-3	W-240402-EM-03	Total/NA	Water	350.1	
310-278035-4	W-240402-EM-04	Total/NA	Water	350.1	
MB 310-418277/167	Method Blank	Total/NA	Water	350.1	
LCS 310-418277/168	Lab Control Sample	Total/NA	Water	350.1	

QC Association Summary

Client: GHD Services Inc.
 Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

General Chemistry

Prep Batch: 832024

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278035-1	W-240401-EM-01	Total/NA	Water	Carbon Trap	
MB 680-832024/1-A	Method Blank	Total/NA	Water	Carbon Trap	
LCS 680-832024/2-A	Lab Control Sample	Total/NA	Water	Carbon Trap	
310-278035-1 MS	W-240401-EM-01	Total/NA	Water	Carbon Trap	
310-278035-1 MSD	W-240401-EM-01	Total/NA	Water	Carbon Trap	

Analysis Batch: 832034

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278035-1	W-240401-EM-01	Total/NA	Water	9020B	832024
MB 680-832024/1-A	Method Blank	Total/NA	Water	9020B	832024
LCS 680-832024/2-A	Lab Control Sample	Total/NA	Water	9020B	832024
310-278035-1 MS	W-240401-EM-01	Total/NA	Water	9020B	832024
310-278035-1 MSD	W-240401-EM-01	Total/NA	Water	9020B	832024

Prep Batch: 832423

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278035-2	W-240402-EM-02	Total/NA	Water	Carbon Trap	
310-278035-3	W-240402-EM-03	Total/NA	Water	Carbon Trap	
MB 680-832423/1-A	Method Blank	Total/NA	Water	Carbon Trap	
LCS 680-832423/2-A	Lab Control Sample	Total/NA	Water	Carbon Trap	
LCSD 680-832423/14-A	Lab Control Sample Dup	Total/NA	Water	Carbon Trap	

Analysis Batch: 832482

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278035-2	W-240402-EM-02	Total/NA	Water	9020B	832423
310-278035-3	W-240402-EM-03	Total/NA	Water	9020B	832423
MB 680-832423/1-A	Method Blank	Total/NA	Water	9020B	832423
LCS 680-832423/2-A	Lab Control Sample	Total/NA	Water	9020B	832423
LCSD 680-832423/14-A	Lab Control Sample Dup	Total/NA	Water	9020B	832423

Prep Batch: 832608

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278035-4	W-240402-EM-04	Total/NA	Water	Carbon Trap	
MB 680-832608/1-A	Method Blank	Total/NA	Water	Carbon Trap	
LCS 680-832608/2-A	Lab Control Sample	Total/NA	Water	Carbon Trap	
LCSD 680-832608/15-A	Lab Control Sample Dup	Total/NA	Water	Carbon Trap	
310-278035-4 MS	W-240402-EM-04	Total/NA	Water	Carbon Trap	
310-278035-4 MSD	W-240402-EM-04	Total/NA	Water	Carbon Trap	

Analysis Batch: 832663

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278035-4	W-240402-EM-04	Total/NA	Water	9020B	832608
MB 680-832608/1-A	Method Blank	Total/NA	Water	9020B	832608
LCS 680-832608/2-A	Lab Control Sample	Total/NA	Water	9020B	832608
LCSD 680-832608/15-A	Lab Control Sample Dup	Total/NA	Water	9020B	832608
310-278035-4 MS	W-240402-EM-04	Total/NA	Water	9020B	832608
310-278035-4 MSD	W-240402-EM-04	Total/NA	Water	9020B	832608

Lab Chronicle

Client: GHD Services Inc.
 Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

Client Sample ID: W-240401-EM-01

Lab Sample ID: 310-278035-1

Date Collected: 04/01/24 10:58

Matrix: Water

Date Received: 04/03/24 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	417852	FE5V	EET CF	04/04/24 17:14
Total/NA	Analysis	9056A		5	418131	QTZ5	EET CF	04/04/24 20:34
Total/NA	Prep	3005A			417771	QTZ5	EET CF	04/04/24 09:00
Total/NA	Analysis	6020B		1	418555	NFT2	EET CF	04/11/24 15:25
Total/NA	Analysis	350.1		1	418277	ZJX4	EET CF	04/09/24 21:37
Total/NA	Analysis	5220D LL		1	417970	D7CP	EET CF	04/05/24 10:12
Total/NA	Prep	Carbon Trap			832024	CLJ	EET SAV	04/08/24 07:30
Total/NA	Analysis	9020B		1	832034	CLJ	EET SAV	04/08/24 13:16
Total/NA	Prep	Distill/Phenol			418093	ENB7	EET CF	04/08/24 09:17
Total/NA	Analysis	9066		1	418171	ZJX4	EET CF	04/08/24 17:10
Total/NA	Analysis	I-3765-85		1	418010	HE7K	EET CF	04/05/24 13:58

Client Sample ID: W-240402-EM-02

Lab Sample ID: 310-278035-2

Date Collected: 04/02/24 09:35

Matrix: Water

Date Received: 04/03/24 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	417996	WSE8	EET CF	04/05/24 18:03
Total/NA	Analysis	9056A		5	418131	QTZ5	EET CF	04/04/24 20:48
Total/NA	Prep	3005A			417771	QTZ5	EET CF	04/04/24 09:00
Total/NA	Analysis	6020B		1	418555	NFT2	EET CF	04/11/24 15:27
Total/NA	Analysis	350.1		1	418277	ZJX4	EET CF	04/09/24 21:37
Total/NA	Analysis	5220D LL		1	417970	D7CP	EET CF	04/05/24 10:12
Total/NA	Prep	Carbon Trap			832423	CLJ	EET SAV	04/10/24 13:45
Total/NA	Analysis	9020B		1	832482	CLJ	EET SAV	04/11/24 11:22
Total/NA	Prep	Distill/Phenol			418093	ENB7	EET CF	04/08/24 09:17
Total/NA	Analysis	9066		1	418171	ZJX4	EET CF	04/08/24 17:11
Total/NA	Analysis	I-3765-85		1	418042	A4XP	EET CF	04/05/24 16:33

Client Sample ID: W-240402-EM-03

Lab Sample ID: 310-278035-3

Date Collected: 04/02/24 17:00

Matrix: Water

Date Received: 04/03/24 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	417996	WSE8	EET CF	04/05/24 18:26
Total/NA	Analysis	9056A		5	418131	QTZ5	EET CF	04/04/24 21:02
Total/NA	Prep	3005A			417771	QTZ5	EET CF	04/04/24 09:00
Total/NA	Analysis	6020B		1	418555	NFT2	EET CF	04/11/24 15:29
Total/NA	Analysis	350.1		1	418277	ZJX4	EET CF	04/09/24 21:39
Total/NA	Analysis	5220D LL		1	417970	D7CP	EET CF	04/05/24 10:12
Total/NA	Prep	Carbon Trap			832423	CLJ	EET SAV	04/10/24 13:45
Total/NA	Analysis	9020B		1	832482	CLJ	EET SAV	04/11/24 12:08

Lab Chronicle

Client: GHD Services Inc.
 Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

Client Sample ID: W-240402-EM-03

Lab Sample ID: 310-278035-3

Date Collected: 04/02/24 17:00

Matrix: Water

Date Received: 04/03/24 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	Distill/Phenol			418093	ENB7	EET CF	04/08/24 09:17
Total/NA	Analysis	9066		1	418171	ZJX4	EET CF	04/08/24 17:11
Total/NA	Analysis	I-3765-85		1	418042	A4XP	EET CF	04/05/24 16:33

Client Sample ID: W-240402-EM-04

Lab Sample ID: 310-278035-4

Date Collected: 04/02/24 17:15

Matrix: Water

Date Received: 04/03/24 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	417996	WSE8	EET CF	04/05/24 18:49
Total/NA	Analysis	9056A		5	418131	QTZ5	EET CF	04/04/24 21:16
Total/NA	Prep	3005A			417771	QTZ5	EET CF	04/04/24 09:00
Total/NA	Analysis	6020B		1	418555	NFT2	EET CF	04/11/24 15:32
Total/NA	Analysis	350.1		1	418277	ZJX4	EET CF	04/09/24 21:39
Total/NA	Analysis	5220D LL		1	417970	D7CP	EET CF	04/05/24 10:12
Total/NA	Prep	Carbon Trap			832608	CLJ	EET SAV	04/11/24 11:00
Total/NA	Analysis	9020B		1	832663	CLJ	EET SAV	04/11/24 16:27
Total/NA	Prep	Distill/Phenol			418093	ENB7	EET CF	04/08/24 09:17
Total/NA	Analysis	9066		1	418171	ZJX4	EET CF	04/08/24 17:12
Total/NA	Analysis	I-3765-85		1	418045	A4XP	EET CF	04/05/24 17:13

Client Sample ID: Trip Blank

Lab Sample ID: 310-278035-5

Date Collected: 04/02/24 00:00

Matrix: Water

Date Received: 04/03/24 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	417996	WSE8	EET CF	04/05/24 16:33

Laboratory References:

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401

EET SAV = Eurofins Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

Accreditation/Certification Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

Laboratory: Eurofins Cedar Falls

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Iowa	State	007	12-01-25

Laboratory: Eurofins Savannah

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Iowa	State	353	07-01-25

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Method Summary

Client: GHD Services Inc.
 Project/Site: Viking Pump Landfill - MW/SW Semi-Annual

Job ID: 310-278035-1

Method	Method Description	Protocol	Laboratory
8260D	Volatile Organic Compounds by GC/MS	SW846	EET CF
9056A	Anions, Ion Chromatography	SW846	EET CF
6020B	Metals (ICP/MS)	SW846	EET CF
350.1	Nitrogen, Ammonia	EPA	EET CF
5220D LL	COD	SM	EET CF
9020B	Organic Halides, Total (TOX)	SW846	EET SAV
9066	Phenolics, Total Recoverable	SW846	EET CF
I-3765-85	Residue, Non-filterable (TSS)	USGS	EET CF
3005A	Preparation, Total Metals	SW846	EET CF
5030B	Purge and Trap	SW846	EET CF
Carbon Trap	Carbon Trap Preparation	EPA-17	EET SAV
Distill/Phenol	Distillation, Phenolics	None	EET CF

Protocol References:

- EPA = US Environmental Protection Agency
- EPA-17 = "Method 1650, Revision A, Adsorbable Organic Halides By Adsorption And Colormetric Titration," EPA, February 1992
- None = None
- SM = "Standard Methods For The Examination Of Water And Wastewater"
- SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.
- USGS = "Methods For Analysis Of Water And Fluvial Sediments", USGS, 1989

Laboratory References:

- EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401
- EET SAV = Eurofins Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858





Environment Testing America



310-278035 Chain of Custody

Cooler/Sample Receipt and Temperature Log Form

Client Information			
Client: <u>GHD</u>			
City/State:	CITY <u>New Brighton</u>	STATE <u>NY</u>	Project: <u>MU/SU Semi-Annual</u>
Receipt Information			
Date/Time Received:	DATE <u>4/3/24</u>	TIME <u>0915</u>	Received By: <u>TS</u>
Delivery Type: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee <input type="checkbox"/> Lab Courier <input type="checkbox"/> Lab Field Services <input checked="" type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____			
Condition of Cooler/Containers			
Sample(s) received in Cooler?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler ID: _____	
Multiple Coolers?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Cooler # ____ of ____	
Cooler Custody Seals Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler custody seals intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Sample Custody Seals Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Sample custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Which VOA samples are in cooler? ↓	
Temperature Record			
Coolant:	<input checked="" type="checkbox"/> Wet ice <input type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> Other: _____ <input type="checkbox"/> NONE		
Thermometer ID:	<u>X</u>	Correction Factor (°C): <u>0.0</u>	
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature			
Uncorrected Temp (°C):	<u>0.7</u>	Corrected Temp (°C): <u>0.7</u>	
• Sample Container Temperature			
Container(s) used:	<u>CONTAINER 1</u>	<u>CONTAINER 2</u>	
Uncorrected Temp (°C):			
Corrected Temp (°C):			
Exceptions Noted			
1) If temperature exceeds criteria, was sample(s) received same day of sampling? <input type="checkbox"/> Yes <input type="checkbox"/> No a) If yes: Is there evidence that the chilling process began? <input type="checkbox"/> Yes <input type="checkbox"/> No			
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) <input type="checkbox"/> Yes <input type="checkbox"/> No			
NOTE If yes, contact PM before proceeding. If no, proceed with login			
Additional Comments			

Client Information		Lab PM: Bindert, Zach T		Carrier Tracking No(s): 310-90685-25028 1	
Client Contact: Mr Grant Anderson		E-Mail: Zach.Bindert@eurofins.com		Page: Page 1 of 01	
Company: GHD Services Inc.		PWSID:		Job #:	
Address: 900 Long Lake Road Suite 200		Due Date Requested:		Preservation Codes:	
City: New Brighton		TAT Requested (days): 14		A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA Other	
State, Zip: MN 55112		Compliance Project: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		M - Hexane N - None O - AsNaO2 P - Na2OAS Q - Na2SO3 R - Na2SO4 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - pH 4-5 Y - Trizma Z - other (specify)	
Phone: 651-639-0913(Tel) 651-639-0923(Fax)		Purchase Order Requested		Total Number of Containers: 9	
Email: grant.anderson@ghd.com		PO #: 056934		Special Instructions/Note	
Project Name: Viking Pump Landfill - MW/SW Semi-Annual		Project #: 31017275			
Site: SSOW#		SSOW#			

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Preservation Code:	Matrix (W=water, S=solid, O=waste/oli, AT=ATIS, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	Ammonia - 350 f, COD 5220D_LL	9066_ORGFM_28D - Chloride	6020B - Barium and Iron	9066 - Total Recoverable Phenolics	8260D - Benzene and Acetone	9020B - Total Organic Halides (TOX)	Analysis Requested	Special Instructions/Note
W-240401-EM-01	4/1/24	1058	G		Water	N	X	X	X	X	X	X	X	NTSS	
W-240402-EM-02	4/2/24	0935	G		Water	N	X	X	X	X	X	X	X		
W-240402-EM-03	4/2/24	1700	G		Water	N	X	X	X	X	X	X	X		
W-240402-EM-04	4/2/24	1716	G		Water	N	X	X	X	X	X	X	X		
TRP Blanks	-	-	-		Water	N	X	X	X	X	X	X	X		
					Water										
					Water										
					Water										
					Water										
					Water										

Possible Hazard Identification
 Non-Hazard Flammable Skin Irritant Poison B Unknown Radiological
 Deliverable Requested I, II, III, IV, Other (specify)

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
 Return To Client Disposal By Lab Archive For _____ Months

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date/Time:	Method of Shipment:
Relinquished by:	4/3/24 0900	
Relinquished by:	Date/Time:	Company:
Relinquished by:	Date/Time:	Company:
Relinquished by:	Date/Time:	Company:

Cooler Temperature(s) °C and Other Remarks:



Login Sample Receipt Checklist

Client: GHD Services Inc.

Job Number: 310-278035-1

Login Number: 278035

List Source: Eurofins Cedar Falls

List Number: 1

Creator: Costello, Mackenzie K

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	Sample ID discrepancies present for the vials.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



Login Sample Receipt Checklist

Client: GHD Services Inc.

Job Number: 310-278035-1

Login Number: 278035

List Number: 2

Creator: Munro, Caroline

List Source: Eurofins Savannah

List Creation: 04/04/24 04:10 PM

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	





ANALYTICAL REPORT

PREPARED FOR

Attn: Mr. Grant Anderson
GHD Services Inc.
900 Long Lake Road
Suite 200
New Brighton, Minnesota 55112

Generated 4/17/2024 2:15:37 PM

JOB DESCRIPTION

Viking Pump Landfill

JOB NUMBER

310-278236-1

Eurofins Cedar Falls

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

Authorization



Generated
4/17/2024 2:15:37 PM

Authorized for release by
Zach Bindert, Client Service Manager
Zach.Bindert@et.eurofinsus.com
(319)277-2401



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Case Narrative

Client: GHD Services Inc.
Project: Viking Pump Landfill

Job ID: 310-278236-1

Job ID: 310-278236-1

Eurofins Cedar Falls

Job Narrative 310-278236-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt

The samples were received on 4/4/2024 1:15 PM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperatures of the 2 coolers at receipt time were 2.4°C and 10.8°C.

GC/MS VOA

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

HPLC/IC

Method 9056A_ORGFM_28D: The following samples were diluted due to the nature of the sample matrix: W-240403-EM-05 (310-278236-1), W-240403-EM-06 (310-278236-2), W-240403-EM-10 (310-278236-6), W-240403-EM-11 (310-278236-7) and W-240403-EM-12 (310-278236-8). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Metals

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry

Method 9020B: Breakthrough exceeded 10% for the following samples: W-240403-EM-05 (310-278236-1), W-240403-EM-06 (310-278236-2), W-240403-EM-07 (310-278236-3), W-240403-EM-08 (310-278236-4), W-240403-EM-09 (310-278236-5), W-240403-EM-10 (310-278236-6), W-240403-EM-11 (310-278236-7) and W-240403-EM-12 (310-278236-8).

Method 9066: The laboratory control sample (LCS) for Prep Batch 418129 recovered outside control limits for the following analytes: Phenol. These analytes were biased high in the LCS and were not detected in the associated samples; therefore, the data have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Eurofins Cedar Falls

Sample Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-278236-1	W-240403-EM-05	MW-16	04/03/24 12:54	04/04/24 13:15
310-278236-2	W-240403-EM-06	RB	04/03/24 14:10	04/04/24 13:15
310-278236-3	W-240403-EM-07	MW-22	04/03/24 17:02	04/04/24 13:15
310-278236-4	W-240403-EM-08	MW-21	04/03/24 17:50	04/04/24 13:15
310-278236-5	W-240403-EM-09	MW-8	04/04/24 09:10	04/04/24 13:15
310-278236-6	W-240403-EM-10	MW-19	04/04/24 10:25	04/04/24 13:15
310-278236-7	W-240403-EM-11	MW-20	04/04/24 11:25	04/04/24 13:15
310-278236-8	W-240403-EM-12	MW-20 DUP	04/04/24 11:35	04/04/24 13:15
310-278236-9	Trip Blank 1	Water	04/04/24 00:00	04/04/24 13:15
310-278236-10	Trip Blank 2	Water	04/04/24 00:00	04/04/24 13:15

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Detection Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Client Sample ID: W-240403-EM-05 **MW-16** **Lab Sample ID: 310-278236-1**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.132		0.00200		mg/L	1		6020B	Total/NA
Iron	1.02		0.100		mg/L	1		6020B	Total/NA
Ammonia	1.24		0.200		mg/L	1		350.1	Total/NA
Chemical Oxygen Demand	21.8		5.00		mg/L	1		5220D LL	Total/NA
Halogens, Total Organic	0.0982		0.0400		mg/L	1		9020B	Total/NA
Total Suspended Solids	58.0		7.50		mg/L	1		I-3765-85	Total/NA

Client Sample ID: W-240403-EM-06 **RB** **Lab Sample ID: 310-278236-2**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Iron	0.435		0.100		mg/L	1		6020B	Total/NA
Chemical Oxygen Demand	8.72		5.00		mg/L	1		5220D LL	Total/NA
Total Suspended Solids	8.33		5.00		mg/L	1		I-3765-85	Total/NA

Client Sample ID: W-240403-EM-07 **MW-22** **Lab Sample ID: 310-278236-3**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.0916		0.00200		mg/L	1		6020B	Total/NA
Iron	1.32		0.100		mg/L	1		6020B	Total/NA
Ammonia	1.50		0.200		mg/L	1		350.1	Total/NA
Chemical Oxygen Demand	12.6		5.00		mg/L	1		5220D LL	Total/NA
Total Suspended Solids	49.7		5.00		mg/L	1		I-3765-85	Total/NA

Client Sample ID: W-240403-EM-08 **MW-21** **Lab Sample ID: 310-278236-4**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	75.7		5.00		mg/L	5		9056A	Total/NA
Barium	0.168		0.00200		mg/L	1		6020B	Total/NA
Iron	1.98		0.100		mg/L	1		6020B	Total/NA
Ammonia	0.418		0.200		mg/L	1		350.1	Total/NA
Chemical Oxygen Demand	11.9		5.00		mg/L	1		5220D LL	Total/NA
Total Suspended Solids	5.33		5.00		mg/L	1		I-3765-85	Total/NA

Client Sample ID: W-240403-EM-09 **MW-8** **Lab Sample ID: 310-278236-5**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	5.50		5.00		mg/L	5		9056A	Total/NA
Barium	0.0928		0.00200		mg/L	1		6020B	Total/NA
Chemical Oxygen Demand	18.3		5.00		mg/L	1		5220D LL	Total/NA

Client Sample ID: W-240403-EM-10 **MW-19** **Lab Sample ID: 310-278236-6**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.156		0.00200		mg/L	1		6020B	Total/NA
Iron	0.415		0.100		mg/L	1		6020B	Total/NA
Chemical Oxygen Demand	10.0		5.00		mg/L	1		5220D LL	Total/NA
Total Suspended Solids	46.3		5.00		mg/L	1		I-3765-85	Total/NA

Client Sample ID: W-240403-EM-11 **MW-20** **Lab Sample ID: 310-278236-7**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.0910		0.00200		mg/L	1		6020B	Total/NA
Iron	0.838		0.100		mg/L	1		6020B	Total/NA
Ammonia	2.15		0.200		mg/L	1		350.1	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Cedar Falls

Detection Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Client Sample ID: W-240403-EM-11 (Continued) MW-20 **Lab Sample ID: 310-278236-7**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chemical Oxygen Demand	10.6		5.00		mg/L	1		5220D LL	Total/NA
Total Suspended Solids	32.3		5.00		mg/L	1		I-3765-85	Total/NA

Client Sample ID: W-240403-EM-12 MW-20 DUP **Lab Sample ID: 310-278236-8**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.0864		0.00200		mg/L	1		6020B	Total/NA
Iron	0.155		0.100		mg/L	1		6020B	Total/NA
Ammonia	2.12		0.200		mg/L	1		350.1	Total/NA
Chemical Oxygen Demand	12.2		5.00		mg/L	1		5220D LL	Total/NA
Total Suspended Solids	14.0		5.00		mg/L	1		I-3765-85	Total/NA

Client Sample ID: Trip Blank 1 **Lab Sample ID: 310-278236-9**

No Detections.

Client Sample ID: Trip Blank 2 **Lab Sample ID: 310-278236-10**

No Detections.

This Detection Summary does not include radiochemical test results.

Eurofins Cedar Falls

Client Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Client Sample ID: W-240403-EM-05 **MW-16**

Lab Sample ID: 310-278236-1

Date Collected: 04/03/24 12:54

Matrix: Water

Date Received: 04/04/24 13:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/05/24 22:58	1
Benzene	<0.500		0.500		ug/L			04/05/24 22:58	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	105		80 - 120					04/05/24 22:58	1
Dibromofluoromethane (Surr)	107		73 - 130					04/05/24 22:58	1
Toluene-d8 (Surr)	97		80 - 120					04/05/24 22:58	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<5.00		5.00		mg/L			04/05/24 14:02	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.132		0.00200		mg/L		04/08/24 09:00	04/15/24 21:11	1
Iron	1.02		0.100		mg/L		04/08/24 09:00	04/15/24 21:11	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	1.24		0.200		mg/L			04/09/24 22:33	1
Chemical Oxygen Demand (SM 5220D LL)	21.8		5.00		mg/L			04/12/24 11:00	1
Halogens, Total Organic (SW846 9020B)	0.0982		0.0400		mg/L		04/16/24 14:30	04/16/24 16:12	1
Phenols, Total (SW846 9066)	<0.0200		0.0200		mg/L		04/08/24 09:17	04/08/24 17:13	1
Total Suspended Solids (USGS I-3765-85)	58.0		7.50		mg/L			04/05/24 17:13	1

Client Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Client Sample ID: W-240403-EM-06 RB

Lab Sample ID: 310-278236-2

Date Collected: 04/03/24 14:10

Matrix: Water

Date Received: 04/04/24 13:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/06/24 04:33	1
Benzene	<0.500		0.500		ug/L			04/06/24 04:33	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		80 - 120					04/06/24 04:33	1
Dibromofluoromethane (Surr)	103		73 - 130					04/06/24 04:33	1
Toluene-d8 (Surr)	97		80 - 120					04/06/24 04:33	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<5.00		5.00		mg/L			04/05/24 14:16	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	<0.00200		0.00200		mg/L		04/08/24 09:00	04/15/24 21:13	1
Iron	0.435		0.100		mg/L		04/08/24 09:00	04/15/24 21:13	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	<0.200		0.200		mg/L			04/09/24 22:35	1
Chemical Oxygen Demand (SM 5220D LL)	8.72		5.00		mg/L			04/12/24 11:00	1
Halogens, Total Organic (SW846 9020B)	<0.0400		0.0400		mg/L		04/16/24 14:30	04/16/24 17:33	1
Phenols, Total (SW846 9066)	<0.0184		0.0184		mg/L		04/08/24 09:17	04/08/24 17:14	1
Total Suspended Solids (USGS I-3765-85)	8.33		5.00		mg/L			04/05/24 17:13	1

Client Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Client Sample ID: W-240403-EM-07 MW-22

Lab Sample ID: 310-278236-3

Date Collected: 04/03/24 17:02

Matrix: Water

Date Received: 04/04/24 13:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/06/24 04:55	1
Benzene	<0.500		0.500		ug/L			04/06/24 04:55	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	106		80 - 120					04/06/24 04:55	1
Dibromofluoromethane (Surr)	106		73 - 130					04/06/24 04:55	1
Toluene-d8 (Surr)	97		80 - 120					04/06/24 04:55	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<5.00		5.00		mg/L			04/05/24 14:58	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.0916		0.00200		mg/L		04/08/24 09:00	04/15/24 21:15	1
Iron	1.32		0.100		mg/L		04/08/24 09:00	04/15/24 21:15	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	1.50		0.200		mg/L			04/09/24 22:37	1
Chemical Oxygen Demand (SM 5220D LL)	12.6		5.00		mg/L			04/12/24 11:00	1
Halogens, Total Organic (SW846 9020B)	<0.0400		0.0400		mg/L		04/16/24 14:30	04/16/24 18:04	1
Phenols, Total (SW846 9066)	<0.0200		0.0200		mg/L		04/08/24 09:17	04/08/24 17:14	1
Total Suspended Solids (USGS I-3765-85)	49.7		5.00		mg/L			04/05/24 16:33	1

Client Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Client Sample ID: W-240403-EM-08 MW-21

Lab Sample ID: 310-278236-4

Date Collected: 04/03/24 17:50

Matrix: Water

Date Received: 04/04/24 13:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/06/24 05:17	1
Benzene	<0.500		0.500		ug/L			04/06/24 05:17	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	107		80 - 120					04/06/24 05:17	1
Dibromofluoromethane (Surr)	107		73 - 130					04/06/24 05:17	1
Toluene-d8 (Surr)	95		80 - 120					04/06/24 05:17	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	75.7		5.00		mg/L			04/05/24 15:12	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.168		0.00200		mg/L		04/08/24 09:00	04/15/24 21:18	1
Iron	1.98		0.100		mg/L		04/08/24 09:00	04/15/24 21:18	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	0.418		0.200		mg/L			04/09/24 22:38	1
Chemical Oxygen Demand (SM 5220D LL)	11.9		5.00		mg/L			04/12/24 11:00	1
Halogens, Total Organic (SW846 9020B)	<0.0400		0.0400		mg/L		04/16/24 14:30	04/17/24 06:56	1
Phenols, Total (SW846 9066)	<0.0208		0.0208		mg/L		04/08/24 09:17	04/08/24 17:14	1
Total Suspended Solids (USGS I-3765-85)	5.33		5.00		mg/L			04/05/24 16:33	1

Client Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Client Sample ID: W-240403-EM-09 MW-8

Lab Sample ID: 310-278236-5

Date Collected: 04/04/24 09:10

Matrix: Water

Date Received: 04/04/24 13:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/06/24 05:40	1
Benzene	<0.500		0.500		ug/L			04/06/24 05:40	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		80 - 120					04/06/24 05:40	1
Dibromofluoromethane (Surr)	105		73 - 130					04/06/24 05:40	1
Toluene-d8 (Surr)	98		80 - 120					04/06/24 05:40	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	5.50		5.00		mg/L			04/05/24 15:26	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.0928		0.00200		mg/L		04/08/24 09:00	04/15/24 21:29	1
Iron	<0.100		0.100		mg/L		04/08/24 09:00	04/15/24 21:29	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	<0.200		0.200		mg/L			04/09/24 22:38	1
Chemical Oxygen Demand (SM 5220D LL)	18.3		5.00		mg/L			04/12/24 11:00	1
Halogens, Total Organic (SW846 9020B)	<0.0400		0.0400		mg/L		04/16/24 14:30	04/17/24 08:19	1
Phenols, Total (SW846 9066)	<0.0220		0.0220		mg/L		04/08/24 09:17	04/08/24 17:15	1
Total Suspended Solids (USGS I-3765-85)	<5.00		5.00		mg/L			04/05/24 16:33	1

Client Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Client Sample ID: W-240403-EM-10 **MW-19**

Lab Sample ID: 310-278236-6

Date Collected: 04/04/24 10:25

Matrix: Water

Date Received: 04/04/24 13:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/06/24 06:02	1
Benzene	<0.500		0.500		ug/L			04/06/24 06:02	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		80 - 120					04/06/24 06:02	1
Dibromofluoromethane (Surr)	103		73 - 130					04/06/24 06:02	1
Toluene-d8 (Surr)	96		80 - 120					04/06/24 06:02	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<5.00		5.00		mg/L			04/05/24 15:41	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.156		0.00200		mg/L		04/08/24 09:00	04/15/24 21:31	1
Iron	0.415		0.100		mg/L		04/08/24 09:00	04/15/24 21:31	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	<0.200		0.200		mg/L			04/09/24 22:40	1
Chemical Oxygen Demand (SM 5220D LL)	10.0		5.00		mg/L			04/12/24 11:00	1
Halogens, Total Organic (SW846 9020B)	<0.0400		0.0400		mg/L		04/16/24 14:30	04/17/24 08:50	1
Phenols, Total (SW846 9066)	<0.0200		0.0200		mg/L		04/08/24 09:17	04/08/24 17:15	1
Total Suspended Solids (USGS I-3765-85)	46.3		5.00		mg/L			04/05/24 18:43	1

Client Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Client Sample ID: W-240403-EM-11 MW-20

Lab Sample ID: 310-278236-7

Date Collected: 04/04/24 11:25

Matrix: Water

Date Received: 04/04/24 13:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/06/24 06:24	1
Benzene	<0.500		0.500		ug/L			04/06/24 06:24	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	105		80 - 120					04/06/24 06:24	1
Dibromofluoromethane (Surr)	104		73 - 130					04/06/24 06:24	1
Toluene-d8 (Surr)	97		80 - 120					04/06/24 06:24	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<5.00		5.00		mg/L			04/05/24 15:55	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.0910		0.00200		mg/L		04/08/24 09:00	04/15/24 21:34	1
Iron	0.838		0.100		mg/L		04/08/24 09:00	04/15/24 21:34	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	2.15		0.200		mg/L			04/09/24 22:40	1
Chemical Oxygen Demand (SM 5220D LL)	10.6		5.00		mg/L			04/12/24 11:00	1
Halogens, Total Organic (SW846 9020B)	<0.0400		0.0400		mg/L		04/16/24 14:30	04/17/24 09:35	1
Phenols, Total (SW846 9066)	<0.0228	*+	0.0228		mg/L		04/08/24 12:39	04/08/24 18:43	1
Total Suspended Solids (USGS I-3765-85)	32.3		5.00		mg/L			04/05/24 18:43	1

Client Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Client Sample ID: W-240403-EM-12 MW-20 DUP

Lab Sample ID: 310-278236-8

Date Collected: 04/04/24 11:35

Matrix: Water

Date Received: 04/04/24 13:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/06/24 06:46	1
Benzene	<0.500		0.500		ug/L			04/06/24 06:46	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	109		80 - 120					04/06/24 06:46	1
Dibromofluoromethane (Surr)	98		73 - 130					04/06/24 06:46	1
Toluene-d8 (Surr)	96		80 - 120					04/06/24 06:46	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<5.00		5.00		mg/L			04/05/24 16:09	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.0864		0.00200		mg/L		04/08/24 09:00	04/15/24 21:36	1
Iron	0.155		0.100		mg/L		04/08/24 09:00	04/15/24 21:36	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	2.12		0.200		mg/L			04/09/24 22:40	1
Chemical Oxygen Demand (SM 5220D LL)	12.2		5.00		mg/L			04/12/24 11:00	1
Halogens, Total Organic (SW846 9020B)	<0.0400		0.0400		mg/L		04/16/24 14:30	04/17/24 10:15	1
Phenols, Total (SW846 9066)	<0.0184	*+	0.0184		mg/L		04/08/24 12:39	04/08/24 18:44	1
Total Suspended Solids (USGS I-3765-85)	14.0		5.00		mg/L			04/05/24 18:43	1

Client Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Client Sample ID: Trip Blank 1

Lab Sample ID: 310-278236-9

Date Collected: 04/04/24 00:00

Matrix: Water

Date Received: 04/04/24 13:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/06/24 03:27	1
Benzene	<0.500		0.500		ug/L			04/06/24 03:27	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Dibromofluoromethane (Surr)	100		73 - 130					04/06/24 03:27	1
Toluene-d8 (Surr)	96		80 - 120					04/06/24 03:27	1
4-Bromofluorobenzene (Surr)	103		80 - 120					04/06/24 03:27	1

Client Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Client Sample ID: Trip Blank 2

Lab Sample ID: 310-278236-10

Date Collected: 04/04/24 00:00

Matrix: Water

Date Received: 04/04/24 13:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/06/24 03:49	1
Benzene	<0.500		0.500		ug/L			04/06/24 03:49	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Dibromofluoromethane (Surr)	106		73 - 130					04/06/24 03:49	1
Toluene-d8 (Surr)	96		80 - 120					04/06/24 03:49	1
4-Bromofluorobenzene (Surr)	102		80 - 120					04/06/24 03:49	1

Definitions/Glossary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Qualifiers

General Chemistry

Qualifier	Qualifier Description
*+	LCS and/or LCSD is outside acceptance limits, high biased.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Surrogate Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Method: 8260D - Volatile Organic Compounds by GC/MS

Matrix: Water

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)		
		BFB (80-120)	DBFM (73-130)	TOL (80-120)
310-278236-1	W-240403-EM-05	105	107	97
310-278236-2	W-240403-EM-06	102	103	97
310-278236-2 MS	W-240403-EM-06	99	103	99
310-278236-2 MSD	W-240403-EM-06	98	103	98
310-278236-3	W-240403-EM-07	106	106	97
310-278236-4	W-240403-EM-08	107	107	95
310-278236-5	W-240403-EM-09	102	105	98
310-278236-6	W-240403-EM-10	102	103	96
310-278236-7	W-240403-EM-11	105	104	97
310-278236-8	W-240403-EM-12	109	98	96
310-278236-9	Trip Blank 1	103	100	96
310-278236-10	Trip Blank 2	102	106	96
LCS 310-417996/6	Lab Control Sample	97	99	97
LCS 310-418000/6	Lab Control Sample	97	103	100
MB 310-417996/5	Method Blank	104	107	99
MB 310-418000/5	Method Blank	100	101	95

Surrogate Legend

- BFB = 4-Bromofluorobenzene (Surr)
- DBFM = Dibromofluoromethane (Surr)
- TOL = Toluene-d8 (Surr)

QC Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Method: 8260D - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 310-417996/5

Matrix: Water

Analysis Batch: 417996

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Acetone	<10.0		10.0		ug/L			04/05/24 15:25	1
Benzene	<0.500		0.500		ug/L			04/05/24 15:25	1
Surrogate									
	MB MB		Limits	Prepared	Analyzed	Dil Fac			
Surrogate	%Recovery	Qualifier							
4-Bromofluorobenzene (Surr)	104		80 - 120		04/05/24 15:25	1			
Dibromofluoromethane (Surr)	107		73 - 130		04/05/24 15:25	1			
Toluene-d8 (Surr)	99		80 - 120		04/05/24 15:25	1			

Lab Sample ID: LCS 310-417996/6

Matrix: Water

Analysis Batch: 417996

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS LCS		Unit	D	%Rec	%Rec Limits
		Result	Qualifier				
Acetone	40.0	33.08		ug/L		83	50 - 150
Benzene	20.0	19.83		ug/L		99	72 - 124
Surrogate							
	LCS LCS		Limits				
Surrogate	%Recovery	Qualifier					
4-Bromofluorobenzene (Surr)	97		80 - 120				
Dibromofluoromethane (Surr)	99		73 - 130				
Toluene-d8 (Surr)	97		80 - 120				

Lab Sample ID: MB 310-418000/5

Matrix: Water

Analysis Batch: 418000

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Acetone	<10.0		10.0		ug/L			04/06/24 02:20	1
Benzene	<0.500		0.500		ug/L			04/06/24 02:20	1
Surrogate									
	MB MB		Limits	Prepared	Analyzed	Dil Fac			
Surrogate	%Recovery	Qualifier							
4-Bromofluorobenzene (Surr)	100		80 - 120		04/06/24 02:20	1			
Dibromofluoromethane (Surr)	101		73 - 130		04/06/24 02:20	1			
Toluene-d8 (Surr)	95		80 - 120		04/06/24 02:20	1			

Lab Sample ID: LCS 310-418000/6

Matrix: Water

Analysis Batch: 418000

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS LCS		Unit	D	%Rec	%Rec Limits
		Result	Qualifier				
Acetone	40.0	32.28		ug/L		81	50 - 150
Benzene	20.0	18.45		ug/L		92	72 - 124
Surrogate							
	LCS LCS		Limits				
Surrogate	%Recovery	Qualifier					
4-Bromofluorobenzene (Surr)	97		80 - 120				
Dibromofluoromethane (Surr)	103		73 - 130				
Toluene-d8 (Surr)	100		80 - 120				

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QC Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: 310-278236-2 MS

Client Sample ID: W-240403-EM-06

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 418000

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	%Rec	Limits
	Result	Qualifier	Added	Result	Qualifier					
Acetone	<10.0		40.0	32.68		ug/L		71		31 - 150
Benzene	<0.500		20.0	18.56		ug/L		93		46 - 130
MS MS										
Surrogate	%Recovery	Qualifier	Limits							
4-Bromofluorobenzene (Surr)	99		80 - 120							
Dibromofluoromethane (Surr)	103		73 - 130							
Toluene-d8 (Surr)	99		80 - 120							

Lab Sample ID: 310-278236-2 MSD

Client Sample ID: W-240403-EM-06

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 418000

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec	Limits	RPD	RPD
	Result	Qualifier	Added	Result	Qualifier						Limit	
Acetone	<10.0		40.0	33.74		ug/L		74		31 - 150	3	29
Benzene	<0.500		20.0	17.74		ug/L		89		46 - 130	4	20
MSD MSD												
Surrogate	%Recovery	Qualifier	Limits									
4-Bromofluorobenzene (Surr)	98		80 - 120									
Dibromofluoromethane (Surr)	103		73 - 130									
Toluene-d8 (Surr)	98		80 - 120									

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 310-418152/3

Client Sample ID: Method Blank

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 418152

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Chloride	<1.00		1.00		mg/L			04/05/24 10:25	1

Lab Sample ID: LCS 310-418152/4

Client Sample ID: Lab Control Sample

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 418152

Analyte	Spike	LCS	LCS	Unit	D	%Rec	%Rec	Limits
		Added	Result					
Chloride	10.0	10.02		mg/L		100		90 - 110

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 310-418030/1-A

Client Sample ID: Method Blank

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 418822

Prep Batch: 418030

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Barium	<0.00200		0.00200		mg/L		04/08/24 09:00	04/15/24 20:12	1
Iron	<0.100		0.100		mg/L		04/08/24 09:00	04/15/24 20:12	1

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QC Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Method: 6020B - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 310-418030/2-A
Matrix: Water
Analysis Batch: 418822

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 418030

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Barium	0.100	0.1018		mg/L		102	80 - 120
Iron	0.200	0.1697		mg/L		85	80 - 120

Method: 350.1 - Nitrogen, Ammonia

Lab Sample ID: MB 310-418277/195
Matrix: Water
Analysis Batch: 418277

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	<0.200		0.200		mg/L			04/09/24 21:56	1

Lab Sample ID: LCS 310-418277/196
Matrix: Water
Analysis Batch: 418277

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Ammonia	8.55	8.353		mg/L		98	90 - 110

Method: 5220D LL - COD

Lab Sample ID: MB 310-418543/32
Matrix: Water
Analysis Batch: 418543

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	<5.00		5.00		mg/L			04/12/24 11:00	1

Lab Sample ID: MB 310-418543/5
Matrix: Water
Analysis Batch: 418543

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	<5.00		5.00		mg/L			04/12/24 11:00	1

Lab Sample ID: LCS 310-418543/3
Matrix: Water
Analysis Batch: 418543

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chemical Oxygen Demand	125	129.0		mg/L		103	85 - 115

Lab Sample ID: LCS 310-418543/33
Matrix: Water
Analysis Batch: 418543

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chemical Oxygen Demand	125	128.0		mg/L		102	85 - 115

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QC Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Method: 9020B - Organic Halides, Total (TOX)

Lab Sample ID: MB 680-833363/1-A
Matrix: Water
Analysis Batch: 833402

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 833363

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Halogens, Total Organic	<0.0400		0.0400		mg/L		04/16/24 14:30	04/16/24 15:06	1

Lab Sample ID: LCS 680-833363/2-A
Matrix: Water
Analysis Batch: 833402

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 833363

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Halogens, Total Organic	0.400	0.3700		mg/L		93	60 - 140

Lab Sample ID: 310-278236-2 MS
Matrix: Water
Analysis Batch: 833402

Client Sample ID: W-240403-EM-06
Prep Type: Total/NA
Prep Batch: 833363

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Halogens, Total Organic	<0.0400		0.400	0.2919		mg/L		73	60 - 140

Lab Sample ID: 310-278236-2 MSD
Matrix: Water
Analysis Batch: 833402

Client Sample ID: W-240403-EM-06
Prep Type: Total/NA
Prep Batch: 833363

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Halogens, Total Organic	<0.0400		0.400	0.2945		mg/L		74	60 - 140	1	40

Method: 9066 - Phenolics, Total Recoverable

Lab Sample ID: MB 310-418093/1-A
Matrix: Water
Analysis Batch: 418171

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 418093

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenols, Total	<0.0184		0.0184		mg/L		04/08/24 09:17	04/08/24 17:04	1

Lab Sample ID: LCS 310-418093/2-A
Matrix: Water
Analysis Batch: 418171

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 418093

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Phenols, Total	0.100	0.09799		mg/L		98	90 - 110

Lab Sample ID: MB 310-418129/1-A
Matrix: Water
Analysis Batch: 418173

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 418129

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenols, Total	<0.0204		0.0204		mg/L		04/08/24 12:39	04/08/24 18:41	1

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QC Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Method: 9066 - Phenolics, Total Recoverable (Continued)

Lab Sample ID: LCS 310-418129/2-A
Matrix: Water
Analysis Batch: 418173

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 418129

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Phenols, Total	0.100	0.1143	*+	mg/L		114	90 - 110

Method: I-3765-85 - Residue, Non-filterable (TSS)

Lab Sample ID: MB 310-418042/1
Matrix: Water
Analysis Batch: 418042

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<5.00		5.00		mg/L			04/05/24 16:33	1

Lab Sample ID: LCS 310-418042/2
Matrix: Water
Analysis Batch: 418042

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	100	98.00		mg/L		98	75 - 116

Lab Sample ID: MB 310-418045/1
Matrix: Water
Analysis Batch: 418045

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<5.00		5.00		mg/L			04/05/24 17:13	1

Lab Sample ID: LCS 310-418045/2
Matrix: Water
Analysis Batch: 418045

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	100	100.0		mg/L		100	75 - 116

Lab Sample ID: MB 310-418050/1
Matrix: Water
Analysis Batch: 418050

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<5.00		5.00		mg/L			04/05/24 18:43	1

Lab Sample ID: LCS 310-418050/2
Matrix: Water
Analysis Batch: 418050

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	100	106.0		mg/L		106	75 - 116

QC Association Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

GC/MS VOA

Analysis Batch: 417996

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278236-1	W-240403-EM-05	Total/NA	Water	8260D	
MB 310-417996/5	Method Blank	Total/NA	Water	8260D	
LCS 310-417996/6	Lab Control Sample	Total/NA	Water	8260D	

Analysis Batch: 418000

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278236-2	W-240403-EM-06	Total/NA	Water	8260D	
310-278236-3	W-240403-EM-07	Total/NA	Water	8260D	
310-278236-4	W-240403-EM-08	Total/NA	Water	8260D	
310-278236-5	W-240403-EM-09	Total/NA	Water	8260D	
310-278236-6	W-240403-EM-10	Total/NA	Water	8260D	
310-278236-7	W-240403-EM-11	Total/NA	Water	8260D	
310-278236-8	W-240403-EM-12	Total/NA	Water	8260D	
310-278236-9	Trip Blank 1	Total/NA	Water	8260D	
310-278236-10	Trip Blank 2	Total/NA	Water	8260D	
MB 310-418000/5	Method Blank	Total/NA	Water	8260D	
LCS 310-418000/6	Lab Control Sample	Total/NA	Water	8260D	
310-278236-2 MS	W-240403-EM-06	Total/NA	Water	8260D	
310-278236-2 MSD	W-240403-EM-06	Total/NA	Water	8260D	

HPLC/IC

Analysis Batch: 418152

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278236-1	W-240403-EM-05	Total/NA	Water	9056A	
310-278236-2	W-240403-EM-06	Total/NA	Water	9056A	
310-278236-3	W-240403-EM-07	Total/NA	Water	9056A	
310-278236-4	W-240403-EM-08	Total/NA	Water	9056A	
310-278236-5	W-240403-EM-09	Total/NA	Water	9056A	
310-278236-6	W-240403-EM-10	Total/NA	Water	9056A	
310-278236-7	W-240403-EM-11	Total/NA	Water	9056A	
310-278236-8	W-240403-EM-12	Total/NA	Water	9056A	
MB 310-418152/3	Method Blank	Total/NA	Water	9056A	
LCS 310-418152/4	Lab Control Sample	Total/NA	Water	9056A	

Metals

Prep Batch: 418030

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278236-1	W-240403-EM-05	Total/NA	Water	3005A	
310-278236-2	W-240403-EM-06	Total/NA	Water	3005A	
310-278236-3	W-240403-EM-07	Total/NA	Water	3005A	
310-278236-4	W-240403-EM-08	Total/NA	Water	3005A	
310-278236-5	W-240403-EM-09	Total/NA	Water	3005A	
310-278236-6	W-240403-EM-10	Total/NA	Water	3005A	
310-278236-7	W-240403-EM-11	Total/NA	Water	3005A	
310-278236-8	W-240403-EM-12	Total/NA	Water	3005A	
MB 310-418030/1-A	Method Blank	Total/NA	Water	3005A	
LCS 310-418030/2-A	Lab Control Sample	Total/NA	Water	3005A	

QC Association Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Metals

Analysis Batch: 418822

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278236-1	W-240403-EM-05	Total/NA	Water	6020B	418030
310-278236-2	W-240403-EM-06	Total/NA	Water	6020B	418030
310-278236-3	W-240403-EM-07	Total/NA	Water	6020B	418030
310-278236-4	W-240403-EM-08	Total/NA	Water	6020B	418030
310-278236-5	W-240403-EM-09	Total/NA	Water	6020B	418030
310-278236-6	W-240403-EM-10	Total/NA	Water	6020B	418030
310-278236-7	W-240403-EM-11	Total/NA	Water	6020B	418030
310-278236-8	W-240403-EM-12	Total/NA	Water	6020B	418030
MB 310-418030/1-A	Method Blank	Total/NA	Water	6020B	418030
LCS 310-418030/2-A	Lab Control Sample	Total/NA	Water	6020B	418030

General Chemistry

Analysis Batch: 418042

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278236-3	W-240403-EM-07	Total/NA	Water	I-3765-85	
310-278236-4	W-240403-EM-08	Total/NA	Water	I-3765-85	
310-278236-5	W-240403-EM-09	Total/NA	Water	I-3765-85	
MB 310-418042/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-418042/2	Lab Control Sample	Total/NA	Water	I-3765-85	

Analysis Batch: 418045

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278236-1	W-240403-EM-05	Total/NA	Water	I-3765-85	
310-278236-2	W-240403-EM-06	Total/NA	Water	I-3765-85	
MB 310-418045/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-418045/2	Lab Control Sample	Total/NA	Water	I-3765-85	

Analysis Batch: 418050

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278236-6	W-240403-EM-10	Total/NA	Water	I-3765-85	
310-278236-7	W-240403-EM-11	Total/NA	Water	I-3765-85	
310-278236-8	W-240403-EM-12	Total/NA	Water	I-3765-85	
MB 310-418050/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-418050/2	Lab Control Sample	Total/NA	Water	I-3765-85	

Prep Batch: 418093

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278236-1	W-240403-EM-05	Total/NA	Water	Distill/Phenol	
310-278236-2	W-240403-EM-06	Total/NA	Water	Distill/Phenol	
310-278236-3	W-240403-EM-07	Total/NA	Water	Distill/Phenol	
310-278236-4	W-240403-EM-08	Total/NA	Water	Distill/Phenol	
310-278236-5	W-240403-EM-09	Total/NA	Water	Distill/Phenol	
310-278236-6	W-240403-EM-10	Total/NA	Water	Distill/Phenol	
MB 310-418093/1-A	Method Blank	Total/NA	Water	Distill/Phenol	
LCS 310-418093/2-A	Lab Control Sample	Total/NA	Water	Distill/Phenol	

Prep Batch: 418129

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278236-7	W-240403-EM-11	Total/NA	Water	Distill/Phenol	
310-278236-8	W-240403-EM-12	Total/NA	Water	Distill/Phenol	

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QC Association Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

General Chemistry (Continued)

Prep Batch: 418129 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 310-418129/1-A	Method Blank	Total/NA	Water	Distill/Phenol	
LCS 310-418129/2-A	Lab Control Sample	Total/NA	Water	Distill/Phenol	

Analysis Batch: 418171

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278236-1	W-240403-EM-05	Total/NA	Water	9066	418093
310-278236-2	W-240403-EM-06	Total/NA	Water	9066	418093
310-278236-3	W-240403-EM-07	Total/NA	Water	9066	418093
310-278236-4	W-240403-EM-08	Total/NA	Water	9066	418093
310-278236-5	W-240403-EM-09	Total/NA	Water	9066	418093
310-278236-6	W-240403-EM-10	Total/NA	Water	9066	418093
MB 310-418093/1-A	Method Blank	Total/NA	Water	9066	418093
LCS 310-418093/2-A	Lab Control Sample	Total/NA	Water	9066	418093

Analysis Batch: 418173

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278236-7	W-240403-EM-11	Total/NA	Water	9066	418129
310-278236-8	W-240403-EM-12	Total/NA	Water	9066	418129
MB 310-418129/1-A	Method Blank	Total/NA	Water	9066	418129
LCS 310-418129/2-A	Lab Control Sample	Total/NA	Water	9066	418129

Analysis Batch: 418277

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278236-1	W-240403-EM-05	Total/NA	Water	350.1	
310-278236-2	W-240403-EM-06	Total/NA	Water	350.1	
310-278236-3	W-240403-EM-07	Total/NA	Water	350.1	
310-278236-4	W-240403-EM-08	Total/NA	Water	350.1	
310-278236-5	W-240403-EM-09	Total/NA	Water	350.1	
310-278236-6	W-240403-EM-10	Total/NA	Water	350.1	
310-278236-7	W-240403-EM-11	Total/NA	Water	350.1	
310-278236-8	W-240403-EM-12	Total/NA	Water	350.1	
MB 310-418277/195	Method Blank	Total/NA	Water	350.1	
LCS 310-418277/196	Lab Control Sample	Total/NA	Water	350.1	

Analysis Batch: 418543

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278236-1	W-240403-EM-05	Total/NA	Water	5220D LL	
310-278236-2	W-240403-EM-06	Total/NA	Water	5220D LL	
310-278236-3	W-240403-EM-07	Total/NA	Water	5220D LL	
310-278236-4	W-240403-EM-08	Total/NA	Water	5220D LL	
310-278236-5	W-240403-EM-09	Total/NA	Water	5220D LL	
310-278236-6	W-240403-EM-10	Total/NA	Water	5220D LL	
310-278236-7	W-240403-EM-11	Total/NA	Water	5220D LL	
310-278236-8	W-240403-EM-12	Total/NA	Water	5220D LL	
MB 310-418543/32	Method Blank	Total/NA	Water	5220D LL	
MB 310-418543/5	Method Blank	Total/NA	Water	5220D LL	
LCS 310-418543/3	Lab Control Sample	Total/NA	Water	5220D LL	
LCS 310-418543/33	Lab Control Sample	Total/NA	Water	5220D LL	

QC Association Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

General Chemistry

Prep Batch: 833363

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278236-1	W-240403-EM-05	Total/NA	Water	Carbon Trap	
310-278236-2	W-240403-EM-06	Total/NA	Water	Carbon Trap	
310-278236-3	W-240403-EM-07	Total/NA	Water	Carbon Trap	
310-278236-4	W-240403-EM-08	Total/NA	Water	Carbon Trap	
310-278236-5	W-240403-EM-09	Total/NA	Water	Carbon Trap	
310-278236-6	W-240403-EM-10	Total/NA	Water	Carbon Trap	
310-278236-7	W-240403-EM-11	Total/NA	Water	Carbon Trap	
310-278236-8	W-240403-EM-12	Total/NA	Water	Carbon Trap	
MB 680-833363/1-A	Method Blank	Total/NA	Water	Carbon Trap	
LCS 680-833363/2-A	Lab Control Sample	Total/NA	Water	Carbon Trap	
310-278236-2 MS	W-240403-EM-06	Total/NA	Water	Carbon Trap	
310-278236-2 MSD	W-240403-EM-06	Total/NA	Water	Carbon Trap	

Analysis Batch: 833402

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278236-1	W-240403-EM-05	Total/NA	Water	9020B	833363
310-278236-2	W-240403-EM-06	Total/NA	Water	9020B	833363
310-278236-3	W-240403-EM-07	Total/NA	Water	9020B	833363
310-278236-4	W-240403-EM-08	Total/NA	Water	9020B	833363
310-278236-5	W-240403-EM-09	Total/NA	Water	9020B	833363
310-278236-6	W-240403-EM-10	Total/NA	Water	9020B	833363
310-278236-7	W-240403-EM-11	Total/NA	Water	9020B	833363
310-278236-8	W-240403-EM-12	Total/NA	Water	9020B	833363
MB 680-833363/1-A	Method Blank	Total/NA	Water	9020B	833363
LCS 680-833363/2-A	Lab Control Sample	Total/NA	Water	9020B	833363
310-278236-2 MS	W-240403-EM-06	Total/NA	Water	9020B	833363
310-278236-2 MSD	W-240403-EM-06	Total/NA	Water	9020B	833363

Lab Chronicle

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Client Sample ID: W-240403-EM-05

Lab Sample ID: 310-278236-1

Date Collected: 04/03/24 12:54

Matrix: Water

Date Received: 04/04/24 13:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	417996	WSE8	EET CF	04/05/24 22:58
Total/NA	Analysis	9056A		5	418152	QTZ5	EET CF	04/05/24 14:02
Total/NA	Prep	3005A			418030	QTZ5	EET CF	04/08/24 09:00
Total/NA	Analysis	6020B		1	418822	NFT2	EET CF	04/15/24 21:11
Total/NA	Analysis	350.1		1	418277	ZJX4	EET CF	04/09/24 22:33
Total/NA	Analysis	5220D LL		1	418543	ENB7	EET CF	04/12/24 11:00
Total/NA	Prep	Carbon Trap			833363	CLJ	EET SAV	04/16/24 14:30
Total/NA	Analysis	9020B		1	833402	CLJ	EET SAV	04/16/24 16:12
Total/NA	Prep	Distill/Phenol			418093	ENB7	EET CF	04/08/24 09:17
Total/NA	Analysis	9066		1	418171	ZJX4	EET CF	04/08/24 17:13
Total/NA	Analysis	I-3765-85		1	418045	A4XP	EET CF	04/05/24 17:13

Client Sample ID: W-240403-EM-06

Lab Sample ID: 310-278236-2

Date Collected: 04/03/24 14:10

Matrix: Water

Date Received: 04/04/24 13:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	418000	WSE8	EET CF	04/06/24 04:33
Total/NA	Analysis	9056A		5	418152	QTZ5	EET CF	04/05/24 14:16
Total/NA	Prep	3005A			418030	QTZ5	EET CF	04/08/24 09:00
Total/NA	Analysis	6020B		1	418822	NFT2	EET CF	04/15/24 21:13
Total/NA	Analysis	350.1		1	418277	ZJX4	EET CF	04/09/24 22:35
Total/NA	Analysis	5220D LL		1	418543	ENB7	EET CF	04/12/24 11:00
Total/NA	Prep	Carbon Trap			833363	CLJ	EET SAV	04/16/24 14:30
Total/NA	Analysis	9020B		1	833402	CLJ	EET SAV	04/16/24 17:33
Total/NA	Prep	Distill/Phenol			418093	ENB7	EET CF	04/08/24 09:17
Total/NA	Analysis	9066		1	418171	ZJX4	EET CF	04/08/24 17:14
Total/NA	Analysis	I-3765-85		1	418045	A4XP	EET CF	04/05/24 17:13

Client Sample ID: W-240403-EM-07

Lab Sample ID: 310-278236-3

Date Collected: 04/03/24 17:02

Matrix: Water

Date Received: 04/04/24 13:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	418000	WSE8	EET CF	04/06/24 04:55
Total/NA	Analysis	9056A		5	418152	QTZ5	EET CF	04/05/24 14:58
Total/NA	Prep	3005A			418030	QTZ5	EET CF	04/08/24 09:00
Total/NA	Analysis	6020B		1	418822	NFT2	EET CF	04/15/24 21:15
Total/NA	Analysis	350.1		1	418277	ZJX4	EET CF	04/09/24 22:37
Total/NA	Analysis	5220D LL		1	418543	ENB7	EET CF	04/12/24 11:00
Total/NA	Prep	Carbon Trap			833363	CLJ	EET SAV	04/16/24 14:30
Total/NA	Analysis	9020B		1	833402	CLJ	EET SAV	04/16/24 18:04

Lab Chronicle

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Client Sample ID: W-240403-EM-07

Lab Sample ID: 310-278236-3

Date Collected: 04/03/24 17:02

Matrix: Water

Date Received: 04/04/24 13:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	Distill/Phenol			418093	ENB7	EET CF	04/08/24 09:17
Total/NA	Analysis	9066		1	418171	ZJX4	EET CF	04/08/24 17:14
Total/NA	Analysis	I-3765-85		1	418042	A4XP	EET CF	04/05/24 16:33

Client Sample ID: W-240403-EM-08

Lab Sample ID: 310-278236-4

Date Collected: 04/03/24 17:50

Matrix: Water

Date Received: 04/04/24 13:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	418000	WSE8	EET CF	04/06/24 05:17
Total/NA	Analysis	9056A		5	418152	QTZ5	EET CF	04/05/24 15:12
Total/NA	Prep	3005A			418030	QTZ5	EET CF	04/08/24 09:00
Total/NA	Analysis	6020B		1	418822	NFT2	EET CF	04/15/24 21:18
Total/NA	Analysis	350.1		1	418277	ZJX4	EET CF	04/09/24 22:38
Total/NA	Analysis	5220D LL		1	418543	ENB7	EET CF	04/12/24 11:00
Total/NA	Prep	Carbon Trap			833363	CLJ	EET SAV	04/16/24 14:30
Total/NA	Analysis	9020B		1	833402	CLJ	EET SAV	04/17/24 06:56
Total/NA	Prep	Distill/Phenol			418093	ENB7	EET CF	04/08/24 09:17
Total/NA	Analysis	9066		1	418171	ZJX4	EET CF	04/08/24 17:14
Total/NA	Analysis	I-3765-85		1	418042	A4XP	EET CF	04/05/24 16:33

Client Sample ID: W-240403-EM-09

Lab Sample ID: 310-278236-5

Date Collected: 04/04/24 09:10

Matrix: Water

Date Received: 04/04/24 13:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	418000	WSE8	EET CF	04/06/24 05:40
Total/NA	Analysis	9056A		5	418152	QTZ5	EET CF	04/05/24 15:26
Total/NA	Prep	3005A			418030	QTZ5	EET CF	04/08/24 09:00
Total/NA	Analysis	6020B		1	418822	NFT2	EET CF	04/15/24 21:29
Total/NA	Analysis	350.1		1	418277	ZJX4	EET CF	04/09/24 22:38
Total/NA	Analysis	5220D LL		1	418543	ENB7	EET CF	04/12/24 11:00
Total/NA	Prep	Carbon Trap			833363	CLJ	EET SAV	04/16/24 14:30
Total/NA	Analysis	9020B		1	833402	CLJ	EET SAV	04/17/24 08:19
Total/NA	Prep	Distill/Phenol			418093	ENB7	EET CF	04/08/24 09:17
Total/NA	Analysis	9066		1	418171	ZJX4	EET CF	04/08/24 17:15
Total/NA	Analysis	I-3765-85		1	418042	A4XP	EET CF	04/05/24 16:33

Client Sample ID: W-240403-EM-10

Lab Sample ID: 310-278236-6

Date Collected: 04/04/24 10:25

Matrix: Water

Date Received: 04/04/24 13:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	418000	WSE8	EET CF	04/06/24 06:02

Lab Chronicle

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Client Sample ID: W-240403-EM-10

Lab Sample ID: 310-278236-6

Date Collected: 04/04/24 10:25

Matrix: Water

Date Received: 04/04/24 13:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	418152	QTZ5	EET CF	04/05/24 15:41
Total/NA	Prep	3005A			418030	QTZ5	EET CF	04/08/24 09:00
Total/NA	Analysis	6020B		1	418822	NFT2	EET CF	04/15/24 21:31
Total/NA	Analysis	350.1		1	418277	ZJX4	EET CF	04/09/24 22:40
Total/NA	Analysis	5220D LL		1	418543	ENB7	EET CF	04/12/24 11:00
Total/NA	Prep	Carbon Trap			833363	CLJ	EET SAV	04/16/24 14:30
Total/NA	Analysis	9020B		1	833402	CLJ	EET SAV	04/17/24 08:50
Total/NA	Prep	Distill/Phenol			418093	ENB7	EET CF	04/08/24 09:17
Total/NA	Analysis	9066		1	418171	ZJX4	EET CF	04/08/24 17:15
Total/NA	Analysis	I-3765-85		1	418050	A4XP	EET CF	04/05/24 18:43

Client Sample ID: W-240403-EM-11

Lab Sample ID: 310-278236-7

Date Collected: 04/04/24 11:25

Matrix: Water

Date Received: 04/04/24 13:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	418000	WSE8	EET CF	04/06/24 06:24
Total/NA	Analysis	9056A		5	418152	QTZ5	EET CF	04/05/24 15:55
Total/NA	Prep	3005A			418030	QTZ5	EET CF	04/08/24 09:00
Total/NA	Analysis	6020B		1	418822	NFT2	EET CF	04/15/24 21:34
Total/NA	Analysis	350.1		1	418277	ZJX4	EET CF	04/09/24 22:40
Total/NA	Analysis	5220D LL		1	418543	ENB7	EET CF	04/12/24 11:00
Total/NA	Prep	Carbon Trap			833363	CLJ	EET SAV	04/16/24 14:30
Total/NA	Analysis	9020B		1	833402	CLJ	EET SAV	04/17/24 09:35
Total/NA	Prep	Distill/Phenol			418129	ENB7	EET CF	04/08/24 12:39
Total/NA	Analysis	9066		1	418173	ZJX4	EET CF	04/08/24 18:43
Total/NA	Analysis	I-3765-85		1	418050	A4XP	EET CF	04/05/24 18:43

Client Sample ID: W-240403-EM-12

Lab Sample ID: 310-278236-8

Date Collected: 04/04/24 11:35

Matrix: Water

Date Received: 04/04/24 13:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	418000	WSE8	EET CF	04/06/24 06:46
Total/NA	Analysis	9056A		5	418152	QTZ5	EET CF	04/05/24 16:09
Total/NA	Prep	3005A			418030	QTZ5	EET CF	04/08/24 09:00
Total/NA	Analysis	6020B		1	418822	NFT2	EET CF	04/15/24 21:36
Total/NA	Analysis	350.1		1	418277	ZJX4	EET CF	04/09/24 22:40
Total/NA	Analysis	5220D LL		1	418543	ENB7	EET CF	04/12/24 11:00
Total/NA	Prep	Carbon Trap			833363	CLJ	EET SAV	04/16/24 14:30
Total/NA	Analysis	9020B		1	833402	CLJ	EET SAV	04/17/24 10:15
Total/NA	Prep	Distill/Phenol			418129	ENB7	EET CF	04/08/24 12:39
Total/NA	Analysis	9066		1	418173	ZJX4	EET CF	04/08/24 18:44

Lab Chronicle

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Client Sample ID: W-240403-EM-12

Lab Sample ID: 310-278236-8

Date Collected: 04/04/24 11:35

Matrix: Water

Date Received: 04/04/24 13:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	I-3765-85		1	418050	A4XP	EET CF	04/05/24 18:43

Client Sample ID: Trip Blank 1

Lab Sample ID: 310-278236-9

Date Collected: 04/04/24 00:00

Matrix: Water

Date Received: 04/04/24 13:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	418000	WSE8	EET CF	04/06/24 03:27

Client Sample ID: Trip Blank 2

Lab Sample ID: 310-278236-10

Date Collected: 04/04/24 00:00

Matrix: Water

Date Received: 04/04/24 13:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	418000	WSE8	EET CF	04/06/24 03:49

Laboratory References:

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401

EET SAV = Eurofins Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

Accreditation/Certification Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Laboratory: Eurofins Cedar Falls

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Iowa	State	007	12-01-25

Laboratory: Eurofins Savannah

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Iowa	State	353	07-01-25

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15

Method Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278236-1

Method	Method Description	Protocol	Laboratory
8260D	Volatile Organic Compounds by GC/MS	SW846	EET CF
9056A	Anions, Ion Chromatography	SW846	EET CF
6020B	Metals (ICP/MS)	SW846	EET CF
350.1	Nitrogen, Ammonia	EPA	EET CF
5220D LL	COD	SM	EET CF
9020B	Organic Halides, Total (TOX)	SW846	EET SAV
9066	Phenolics, Total Recoverable	SW846	EET CF
I-3765-85	Residue, Non-filterable (TSS)	USGS	EET CF
3005A	Preparation, Total Metals	SW846	EET CF
5030B	Purge and Trap	SW846	EET CF
Carbon Trap	Carbon Trap Preparation	EPA-17	EET SAV
Distill/Phenol	Distillation, Phenolics	None	EET CF

Protocol References:

EPA = US Environmental Protection Agency

EPA-17 = "Method 1650, Revision A, Adsorbable Organic Halides By Adsorption And Colormetric Titration," EPA, February 1992

None = None

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

USGS = "Methods For Analysis Of Water And Fluvial Sediments", USGS, 1989

Laboratory References:

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401

EET SAV = Eurofins Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858



Environment Testing
America



310-278236 Chain of Custody

Cooler/Sample Receipt and Temperature Log Form

Client Information			
Client: <u>GAD</u>			
City/State:	CITY <u>MW Br.pton</u>	STATE <u>MN</u>	Project: <u>V. King Pump MW/SE</u>
Receipt Information			
Date/Time Received:	DATE <u>4/4/24</u>	TIME <u>1315</u>	Received By: <u>TD</u>
Delivery Type: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee <input type="checkbox"/> Lab Courier <input type="checkbox"/> Lab Field Services <input checked="" type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____			
Condition of Cooler/Containers			
Sample(s) received in Cooler?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler ID: _____	
Multiple Coolers?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler # <u>1</u> of <u>2</u>	
Cooler Custody Seals Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler custody seals intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Sample Custody Seals Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Sample custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank Present?	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Which VOA samples are in cooler? ↓	
Temperature Record			
Coolant: <input checked="" type="checkbox"/> Wet ice <input type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> Other: _____ <input type="checkbox"/> NONE			
Thermometer ID: <u>X</u>		Correction Factor (°C): <u>0.0</u>	
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature			
Uncorrected Temp (°C): <u>2.4</u>		Corrected Temp (°C): <u>2.4</u>	
• Sample Container Temperature			
Container(s) used:	<u>CONTAINER 1</u>	<u>CONTAINER 2</u>	
Uncorrected Temp (°C):			
Corrected Temp (°C):			
Exceptions Noted			
1) If temperature exceeds criteria, was sample(s) received same day of sampling? <input type="checkbox"/> Yes <input type="checkbox"/> No a) If yes: Is there evidence that the chilling process began? <input type="checkbox"/> Yes <input type="checkbox"/> No			
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) <input type="checkbox"/> Yes <input type="checkbox"/> No			
NOTE If yes, contact PM before proceeding. If no, proceed with login			
Additional Comments			



Place COC scanning label here

Cooler/Sample Receipt and Temperature Log Form

Client Information			
Client: <u>GAD</u>			
City/State:	CITY <u>MW Briston</u>	STATE <u>MN</u>	Project: <u>Viking Pump ML/SW</u>
Receipt Information			
Date/Time Received:	DATE <u>4/4/24</u>	TIME <u>1315</u>	Received By: <u>JD</u>
Delivery Type: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee <input type="checkbox"/> Lab Courier <input type="checkbox"/> Lab Field Services <input checked="" type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____			
Condition of Cooler/Containers			
Sample(s) received in Cooler?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler ID: _____	
Multiple Coolers?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler # <u>2</u> of <u>2</u>	
Cooler Custody Seals Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler custody seals intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Sample Custody Seals Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Sample custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Which VOA samples are in cooler? ↓	
Temperature Record			
Coolant:	<input checked="" type="checkbox"/> Wet ice <input type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> Other: _____ <input type="checkbox"/> NONE		
Thermometer ID:	<u>X</u>	Correction Factor (°C):	<u>0.0</u>
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature			
Uncorrected Temp (°C):		Corrected Temp (°C):	
• Sample Container Temperature			
Container(s) used:	CONTAINER 1 <u>1 CNT - Em 12</u>	CONTAINER 2	
Uncorrected Temp (°C):	<u>10.8</u>		
Corrected Temp (°C):	<u>10.8</u>		
Exceptions Noted			
1) If temperature exceeds criteria, was sample(s) received same day of sampling? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No a) If yes: Is there evidence that the chilling process began? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) <input type="checkbox"/> Yes <input type="checkbox"/> No			
NOTE If yes, contact PM before proceeding. If no, proceed with login			
Additional Comments			
<u>Trip blanks from cooler 2 in bag.</u>			
<u>Em-9, 10, 11, 12 in cooler - no vials. Vials are all in cooler 1.</u>			

Client Information Client Contact: Mr. Grant Anderson Company: GHD Services Inc. Address: 900 Long Lake Road Suite 200 City: New Brighton State, Zip: MN 55112 Phone: 651-639-0913(Tel) 651-639-0923(Fax) Email: grant.anderson@ghd.com Project Name: Viking Pump Landfill - MWW/SW Semi-Annua Site:		Due Date Requested: TAT Requested (days): 14 Compliance Project: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> PO #: Purchase Order Requested: WO #: 056934 Project #: 31017275 SSONW#:		Lab PM: Bindert, Zach T E-Mail: Zach.Bindert@et.eurofins.com Carrier Tracking No(s): 310-90685-25028 2 State of Origin: Page 2 of 2 Job #:	
Sample ID: ET1703241538 PWSID:		Analysis Requested: 9066 - Total Recoverable Phenolics 8260D - Benzene, Benzene Halides (TOX) 9020B - Total Organic Halides (TOX)		Preservation Codes: A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA Other:	
Sample Identification: W-240403-EM-05 W-240403-EM-06 W-240403-EM-07 W-240403-EM-08 W-240404-EM-09 W-240404-EM-10 W-240404-EM-11 W-240404-EM-12 W-240404-EM-13 W-240404-EM-14 W-TRIP BLANKS		Matrix (W=water, S=solid, O=wasteliq, AT=tissue, A=air) Sample Type (C=Comp, G=grab) Sample Time Sample Date		Field Filtered Sample (Yes or No) Perform MS/MSD (Yes or No) Ammonia - 350 f, COD 6220D_LL 9066A_ORCFM_28D - Chloride 6020B - Barium and Iron 9066 - Total Recoverable Phenolics 8260D - Benzene, Benzene Halides (TOX) 9020B - Total Organic Halides (TOX)	
Possible Hazard Identification <input checked="" type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological		Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months		Total Number of Containers: 9	
Empty Kit Relinquished by: SPD Relinquished by: SPD Relinquished by:		Date: 4/14/24 12:45 Date/Time:		Method of Shipment:	
Custody Seals Intact: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Δ Yes Δ No		Cooler Temperature(s) °C and Other Remarks:		Date/Time: 4/23/15 Date/Time:	



Eurofins Cedar Falls

3019 Venture Way
 Cedar Falls, IA 50613
 Phone: 319-277-2401 Fax: 319-277-2425

Chain of Custody Record



Environment Testing

Client Information (Sub Contract Lab)		Sampler:		Lab PM: Bindert, Zach T		Carrier Tracking No(s):		COC No: 310-71015.1			
Client Contact: Shipping/Receiving		Phone:		E-Mail: Zach.Bindert@et.eurofinsus.com		State of Origin: Iowa		Page: Page 1 of 1			
Company: Eurofins Environment Testing Southeast,				Accreditations Required (See note): State - Iowa				Job #: 310-278236-1			
Address: 5102 LaRoche Avenue,		Due Date Requested: 4/17/2024		Analysis Requested						Preservation Codes: A - HCL M - Hexane B - NaOH N - None C - Zn Acetate O - AsNaO2 D - Nitric Acid P - Na2O4S E - NaHSO4 Q - Na2SO3 F - MeOH R - Na2S2O3 G - Amchlor S - H2SO4 H - Ascorbic Acid T - TSP Dodecahydrate I - Ice U - Acetone J - DI Water V - MCAA K - EDTA W - pH 4-5 L - EDA Y - Trizma Z - other (specify)	
City: Savannah		TAT Requested (days):									
State, Zip: GA, 31404		PO #:									
Phone: 912-354-7858(Tel) 912-352-0165(Fax)		WO #:									
Email:		Project #: 31017275									
Project Name: Viking Pump Landfill		SSOV#:		Field Filtered Sample (Yes or No)		Perform MS/MSD (Yes or No)		Total Number of Containers			
Site:				9020B/Carbon_Trap (MOD) Total Organic Halides (TOX)							
Sample Identification - Client ID (Lab ID)		Sample Date		Sample Time		Sample Type (C=comp, G=grab)		Matrix (W=water, S=solid, O=waste/soil, BT=Tissue, ANAL)			
								Special Instructions/Note:			
W-240403-EM-05 (310-278236-1)		4/3/24		12:54 Central		Water		X			
W-240403-EM-06 (310-278236-2)		4/3/24		14:10 Central		Water		X			
W-240403-EM-07 (310-278236-3)		4/3/24		17:02 Central		Water		X			
W-240403-EM-08 (310-278236-4)		4/3/24		17:50 Central		Water		X			
W-240403-EM-09 (310-278236-5)		4/4/24		09:10 Central		Water		X			
W-240403-EM-10 (310-278236-6)		4/4/24		10:25 Central		Water		X			
W-240403-EM-11 (310-278236-7)		4/4/24		11:25 Central		Water		X			
W-240403-EM-12 (310-278236-8)		4/4/24		11:35 Central		Water		X			
Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing North Central, LLC places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Environment Testing North Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing North Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Environment Testing North Central, LLC.											
Possible Hazard Identification					Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)						
Unconfirmed					<input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months						
Deliverable Requested: I, II, III, IV, Other (specify)			Primary Deliverable Rank: 2		Special Instructions/QC Requirements:						
Empty Kit Relinquished by:			Date:		Time:		Method of Shipment:				
Relinquished by: <i>T. DeWitt</i>		Date/Time: 4/5/24 1105		Company:		Received by: <i>[Signature]</i>		Date/Time: 4-6-24 931			
Relinquished by:		Date/Time:		Company:		Received by:		Date/Time:			
Relinquished by:		Date/Time:		Company:		Received by:		Date/Time:			
Custody Seals Intact: Δ Yes Δ No		Custody Seal No.:			Cooler Temperature(s) °C and Other Remarks: 2.3/2.7						



Login Sample Receipt Checklist

Client: GHD Services Inc.

Job Number: 310-278236-1

Login Number: 278236

List Source: Eurofins Cedar Falls

List Number: 1

Creator: Costello, Mackenzie K

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



Login Sample Receipt Checklist

Client: GHD Services Inc.

Job Number: 310-278236-1

Login Number: 278236

List Number: 2

Creator: Watters, David

List Source: Eurofins Savannah

List Creation: 04/06/24 01:11 PM

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	





ANALYTICAL REPORT

PREPARED FOR

Attn: Mr. Grant Anderson
GHD Services Inc.
900 Long Lake Road
Suite 200
New Brighton, Minnesota 55112

Generated 4/19/2024 5:25:32 PM

JOB DESCRIPTION

Viking Pump Landfill

JOB NUMBER

310-278358-1

Eurofins Cedar Falls

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

Authorization



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Authorized for release by
Zach Bindert, Client Service Manager
Zach.Bindert@et.eurofinsus.com
(319)277-2401



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Case Narrative

Client: GHD Services Inc.
Project: Viking Pump Landfill

Job ID: 310-278358-1

Job ID: 310-278358-1

Eurofins Cedar Falls

Job Narrative 310-278358-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt

The samples were received on 4/5/2024 11:40 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperatures of the 2 coolers at receipt time were 2.8°C and 3.6°C.

GC/MS VOA

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

HPLC/IC

Method 9056A_ORGFM_28D: The following sample was diluted due to the nature of the sample matrix: W-240404-EM-13 (310-278358-1). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Metals

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry

Method 9020B: Breakthrough exceeded 10% for the following sample:W-240404-EM-17 (310-278358-5).

Method 9020B: Breakthrough exceeded 10% for the following samples:W-240404-EM-13 (310-278358-1), W-240404-EM-14 (310-278358-2), W-240404-EM-15 (310-278358-3) and W-240404-EM-16 (310-278358-4).

Method 9066: The laboratory control sample (LCS) for Prep Batch 418129 recovered outside control limits for the following analytes: Phenol. These analytes were biased high in the LCS and were not detected in the associated samples; therefore, the data have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Eurofins Cedar Falls

Sample Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-278358-1	W-240404-EM-13 FB	Water	04/04/24 13:51	04/05/24 11:40
310-278358-2	W-240404-EM-14 MW-11	Water	04/04/24 15:52	04/05/24 11:40
310-278358-3	W-240404-EM-15 MW-17R	Water	04/04/24 16:38	04/05/24 11:40
310-278358-4	W-240404-EM-16 MW-7R	Water	04/04/24 18:15	04/05/24 11:40
310-278358-5	W-240404-EM-17 MW-15 MS/MSD	Water	04/04/24 19:14	04/05/24 11:40
310-278358-6	Trip Blank 1	Water	04/04/24 00:00	04/05/24 11:40
310-278358-7	Trip Blank 2	Water	04/04/24 00:00	04/05/24 11:40

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15

Detection Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Client Sample ID: W-240404-EM-13 FB

Lab Sample ID: 310-278358-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chemical Oxygen Demand	6.81		5.00		mg/L	1		5220D LL	Total/NA

Client Sample ID: W-240404-EM-14 MW-11

Lab Sample ID: 310-278358-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	5.92		5.00		mg/L	5		9056A	Total/NA
Barium	0.160		0.00200		mg/L	1		6020B	Total/NA
Iron	0.123		0.100		mg/L	1		6020B	Total/NA
Ammonia	0.389		0.200		mg/L	1		350.1	Total/NA
Chemical Oxygen Demand	16.4		5.00		mg/L	1		5220D LL	Total/NA
Total Suspended Solids	9.33		5.00		mg/L	1		I-3765-85	Total/NA

Client Sample ID: W-240404-EM-15 MW-17R

Lab Sample ID: 310-278358-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	60.2		5.00		mg/L	5		9056A	Total/NA
Barium	0.0912		0.00200		mg/L	1		6020B	Total/NA
Iron	8.58		0.100		mg/L	1		6020B	Total/NA
Ammonia	0.632		0.200		mg/L	1		350.1	Total/NA
Chemical Oxygen Demand	16.7		5.00		mg/L	1		5220D LL	Total/NA
Total Suspended Solids	19.0		5.00		mg/L	1		I-3765-85	Total/NA

Client Sample ID: W-240404-EM-16 MW-7R

Lab Sample ID: 310-278358-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	169		5.00		mg/L	5		9056A	Total/NA
Barium	0.0506		0.00200		mg/L	1		6020B	Total/NA
Iron	0.592		0.100		mg/L	1		6020B	Total/NA
Chemical Oxygen Demand	10.6		5.00		mg/L	1		5220D LL	Total/NA
Halogens, Total Organic	0.116		0.0400		mg/L	1		9020B	Total/NA
Total Suspended Solids	15.3		5.00		mg/L	1		I-3765-85	Total/NA

Client Sample ID: W-240404-EM-17 MW-15 MS/MSD

Lab Sample ID: 310-278358-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	5.92		5.00		mg/L	5		9056A	Total/NA
Barium	0.0617		0.00200		mg/L	1		6020B	Total/NA
Iron	0.776	F1	0.100		mg/L	1		6020B	Total/NA
Ammonia	1.59	F1	0.200		mg/L	1		350.1	Total/NA
Chemical Oxygen Demand	11.3		5.00		mg/L	1		5220D LL	Total/NA
Total Suspended Solids	15.3		5.00		mg/L	1		I-3765-85	Total/NA

Client Sample ID: Trip Blank 1

Lab Sample ID: 310-278358-6

No Detections.

Client Sample ID: Trip Blank 2

Lab Sample ID: 310-278358-7

No Detections.

This Detection Summary does not include radiochemical test results.

Eurofins Cedar Falls

Client Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Client Sample ID: W-240404-EM-13 **FB**

Lab Sample ID: 310-278358-1

Date Collected: 04/04/24 13:51

Matrix: Water

Date Received: 04/05/24 11:40

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/09/24 15:02	1
Benzene	<0.500		0.500		ug/L			04/09/24 15:02	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	103		80 - 120					04/09/24 15:02	1
Dibromofluoromethane (Surr)	107		73 - 130					04/09/24 15:02	1
Toluene-d8 (Surr)	96		80 - 120					04/09/24 15:02	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<5.00		5.00		mg/L			04/12/24 11:28	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	<0.00200		0.00200		mg/L		04/09/24 09:00	04/17/24 23:36	1
Iron	<0.100		0.100		mg/L		04/09/24 09:00	04/17/24 23:36	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	<0.200		0.200		mg/L			04/09/24 22:42	1
Chemical Oxygen Demand (SM 5220D LL)	6.81		5.00		mg/L			04/12/24 11:00	1
Halogens, Total Organic (SW846 9020B)	<0.0400		0.0400		mg/L		04/17/24 08:43	04/17/24 12:46	1
Phenols, Total (SW846 9066)	<0.0196	*+	0.0196		mg/L		04/08/24 12:39	04/08/24 18:44	1
Total Suspended Solids (USGS I-3765-85)	<5.00		5.00		mg/L			04/09/24 16:37	1

Client Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Client Sample ID: W-240404-EM-14 MW-11

Lab Sample ID: 310-278358-2

Date Collected: 04/04/24 15:52

Matrix: Water

Date Received: 04/05/24 11:40

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/09/24 15:24	1
Benzene	<0.500		0.500		ug/L			04/09/24 15:24	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	104		80 - 120					04/09/24 15:24	1
Dibromofluoromethane (Surr)	107		73 - 130					04/09/24 15:24	1
Toluene-d8 (Surr)	97		80 - 120					04/09/24 15:24	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	5.92		5.00		mg/L			04/12/24 11:40	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.160		0.00200		mg/L		04/09/24 09:00	04/17/24 23:39	1
Iron	0.123		0.100		mg/L		04/09/24 09:00	04/17/24 23:39	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	0.389		0.200		mg/L			04/09/24 22:42	1
Chemical Oxygen Demand (SM 5220D LL)	16.4		5.00		mg/L			04/12/24 11:00	1
Halogens, Total Organic (SW846 9020B)	<0.0400		0.0400		mg/L		04/17/24 08:43	04/17/24 14:43	1
Phenols, Total (SW846 9066)	<0.0208	*+	0.0208		mg/L		04/08/24 12:39	04/08/24 18:45	1
Total Suspended Solids (USGS I-3765-85)	9.33		5.00		mg/L			04/09/24 16:37	1

Client Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Client Sample ID: W-240404-EM-15 MW-17R

Lab Sample ID: 310-278358-3

Date Collected: 04/04/24 16:38

Matrix: Water

Date Received: 04/05/24 11:40

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/09/24 15:47	1
Benzene	<0.500		0.500		ug/L			04/09/24 15:47	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	105		80 - 120					04/09/24 15:47	1
Dibromofluoromethane (Surr)	105		73 - 130					04/09/24 15:47	1
Toluene-d8 (Surr)	97		80 - 120					04/09/24 15:47	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	60.2		5.00		mg/L			04/12/24 11:53	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.0912		0.00200		mg/L		04/09/24 09:00	04/17/24 23:41	1
Iron	8.58		0.100		mg/L		04/09/24 09:00	04/17/24 23:41	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	0.632		0.200		mg/L			04/09/24 22:47	1
Chemical Oxygen Demand (SM 5220D LL)	16.7		5.00		mg/L			04/12/24 11:00	1
Halogens, Total Organic (SW846 9020B)	<0.0400		0.0400		mg/L		04/17/24 08:43	04/17/24 15:34	1
Phenols, Total (SW846 9066)	<0.0200	*+	0.0200		mg/L		04/08/24 12:39	04/08/24 18:46	1
Total Suspended Solids (USGS I-3765-85)	19.0		5.00		mg/L			04/09/24 16:37	1

Client Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Client Sample ID: W-240404-EM-16 MW-7R

Lab Sample ID: 310-278358-4

Date Collected: 04/04/24 18:15

Matrix: Water

Date Received: 04/05/24 11:40

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/09/24 16:09	1
Benzene	<0.500		0.500		ug/L			04/09/24 16:09	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	108		80 - 120					04/09/24 16:09	1
Dibromofluoromethane (Surr)	108		73 - 130					04/09/24 16:09	1
Toluene-d8 (Surr)	97		80 - 120					04/09/24 16:09	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	169		5.00		mg/L			04/12/24 12:05	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.0506		0.00200		mg/L		04/09/24 09:00	04/17/24 23:43	1
Iron	0.592		0.100		mg/L		04/09/24 09:00	04/17/24 23:43	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	<0.200		0.200		mg/L			04/09/24 22:47	1
Chemical Oxygen Demand (SM 5220D LL)	10.6		5.00		mg/L			04/12/24 11:00	1
Halogens, Total Organic (SW846 9020B)	0.116		0.0400		mg/L		04/17/24 08:43	04/18/24 08:14	1
Phenols, Total (SW846 9066)	<0.0200	*+	0.0200		mg/L		04/08/24 12:39	04/08/24 18:46	1
Total Suspended Solids (USGS I-3765-85)	15.3		5.00		mg/L			04/09/24 15:49	1

Client Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Client Sample ID: W-240404-EM-17 MW-15 MS/MSD

Lab Sample ID: 310-278358-5

Date Collected: 04/04/24 19:14

Matrix: Water

Date Received: 04/05/24 11:40

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/10/24 13:37	1
Benzene	<0.500		0.500		ug/L			04/10/24 13:37	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		80 - 120					04/10/24 13:37	1
Dibromofluoromethane (Surr)	122		73 - 130					04/10/24 13:37	1
Toluene-d8 (Surr)	87		80 - 120					04/10/24 13:37	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	5.92		5.00		mg/L			04/12/24 12:17	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.0617		0.00200		mg/L		04/09/24 09:00	04/17/24 23:55	1
Iron	0.776	F1	0.100		mg/L		04/09/24 09:00	04/17/24 23:55	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	1.59	F1	0.200		mg/L			04/09/24 22:48	1
Chemical Oxygen Demand (SM 5220D LL)	11.3		5.00		mg/L			04/12/24 11:00	1
Halogens, Total Organic (SW846 9020B)	<0.0400		0.0400		mg/L		04/16/24 07:59	04/16/24 11:46	1
Phenols, Total (SW846 9066)	<0.0208	*+	0.0208		mg/L		04/08/24 12:39	04/08/24 18:42	1
Total Suspended Solids (USGS I-3765-85)	15.3		5.00		mg/L			04/09/24 15:49	1

Client Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Client Sample ID: Trip Blank 1

Lab Sample ID: 310-278358-6

Date Collected: 04/04/24 00:00

Matrix: Water

Date Received: 04/05/24 11:40

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/09/24 13:32	1
Benzene	<0.500		0.500		ug/L			04/09/24 13:32	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		80 - 120					04/09/24 13:32	1
Dibromofluoromethane (Surr)	104		73 - 130					04/09/24 13:32	1
Toluene-d8 (Surr)	99		80 - 120					04/09/24 13:32	1

Client Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Client Sample ID: Trip Blank 2

Lab Sample ID: 310-278358-7

Date Collected: 04/04/24 00:00

Matrix: Water

Date Received: 04/05/24 11:40

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/09/24 14:17	1
Benzene	<0.500		0.500		ug/L			04/09/24 14:17	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	107		80 - 120					04/09/24 14:17	1
Dibromofluoromethane (Surr)	107		73 - 130					04/09/24 14:17	1
Toluene-d8 (Surr)	95		80 - 120					04/09/24 14:17	1

Definitions/Glossary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Qualifiers

Metals

Qualifier	Qualifier Description
F1	MS and/or MSD recovery exceeds control limits.

General Chemistry

Qualifier	Qualifier Description
*+	LCS and/or LCSD is outside acceptance limits, high biased.
F1	MS and/or MSD recovery exceeds control limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
□	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Surrogate Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Method: 8260D - Volatile Organic Compounds by GC/MS

Matrix: Water

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)		
		BFB (80-120)	DBFM (73-130)	TOL (80-120)
310-278358-1	W-240404-EM-13	103	107	96
310-278358-2	W-240404-EM-14	104	107	97
310-278358-3	W-240404-EM-15	105	105	97
310-278358-4	W-240404-EM-16	108	108	97
310-278358-5	W-240404-EM-17	99	122	87
310-278358-5 MS	W-240404-EM-17	100	107	91
310-278358-5 MSD	W-240404-EM-17	95	104	91
310-278358-6	Trip Blank 1	100	104	99
310-278358-7	Trip Blank 2	107	107	95
LCS 310-418243/6	Lab Control Sample	100	105	100
LCS 310-418350/6	Lab Control Sample	101	104	91
MB 310-418243/5	Method Blank	109	108	96
MB 310-418350/5	Method Blank	91	117	90

Surrogate Legend

- BFB = 4-Bromofluorobenzene (Surr)
- DBFM = Dibromofluoromethane (Surr)
- TOL = Toluene-d8 (Surr)



QC Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Method: 8260D - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 310-418243/5

Matrix: Water

Analysis Batch: 418243

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Acetone	<10.0		10.0		ug/L			04/09/24 12:24	1
Benzene	<0.500		0.500		ug/L			04/09/24 12:24	1
Surrogate									
	MB	MB	Limits	Prepared	Analyzed	Dil Fac			
Surrogate	%Recovery	Qualifier							
4-Bromofluorobenzene (Surr)	109		80 - 120		04/09/24 12:24	1			
Dibromofluoromethane (Surr)	108		73 - 130		04/09/24 12:24	1			
Toluene-d8 (Surr)	96		80 - 120		04/09/24 12:24	1			

Lab Sample ID: LCS 310-418243/6

Matrix: Water

Analysis Batch: 418243

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec Limits
		Result	Qualifier				
Acetone	40.0	30.14		ug/L		75	50 - 150
Benzene	20.0	16.89		ug/L		84	72 - 124
Surrogate							
	LCS	LCS	Limits				
Surrogate	%Recovery	Qualifier					
4-Bromofluorobenzene (Surr)	100		80 - 120				
Dibromofluoromethane (Surr)	105		73 - 130				
Toluene-d8 (Surr)	100		80 - 120				

Lab Sample ID: MB 310-418350/5

Matrix: Water

Analysis Batch: 418350

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Acetone	<10.0		10.0		ug/L			04/10/24 11:43	1
Benzene	<0.500		0.500		ug/L			04/10/24 11:43	1
Surrogate									
	MB	MB	Limits	Prepared	Analyzed	Dil Fac			
Surrogate	%Recovery	Qualifier							
4-Bromofluorobenzene (Surr)	91		80 - 120		04/10/24 11:43	1			
Dibromofluoromethane (Surr)	117		73 - 130		04/10/24 11:43	1			
Toluene-d8 (Surr)	90		80 - 120		04/10/24 11:43	1			

Lab Sample ID: LCS 310-418350/6

Matrix: Water

Analysis Batch: 418350

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec Limits
		Result	Qualifier				
Acetone	40.0	35.33		ug/L		88	50 - 150
Benzene	20.0	20.88		ug/L		104	72 - 124
Surrogate							
	LCS	LCS	Limits				
Surrogate	%Recovery	Qualifier					
4-Bromofluorobenzene (Surr)	101		80 - 120				
Dibromofluoromethane (Surr)	104		73 - 130				
Toluene-d8 (Surr)	91		80 - 120				

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QC Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: 310-278358-5 MS

Client Sample ID: W-240404-EM-17

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 418350

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	%Rec	Limits
	Result	Qualifier	Added	Result	Qualifier					
Acetone	<10.0		40.0	31.97		ug/L		80		31 - 150
Benzene	<0.500		20.0	19.55		ug/L		98		46 - 130
MS MS										
Surrogate	%Recovery	Qualifier	Limits							
4-Bromofluorobenzene (Surr)	100		80 - 120							
Dibromofluoromethane (Surr)	107		73 - 130							
Toluene-d8 (Surr)	91		80 - 120							

Lab Sample ID: 310-278358-5 MSD

Client Sample ID: W-240404-EM-17

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 418350

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec	Limits	RPD	RPD
	Result	Qualifier	Added	Result	Qualifier						Limit	
Acetone	<10.0		40.0	34.09		ug/L		85		31 - 150	6	29
Benzene	<0.500		20.0	19.80		ug/L		99		46 - 130	1	20
MSD MSD												
Surrogate	%Recovery	Qualifier	Limits									
4-Bromofluorobenzene (Surr)	95		80 - 120									
Dibromofluoromethane (Surr)	104		73 - 130									
Toluene-d8 (Surr)	91		80 - 120									

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 310-418758/3

Client Sample ID: Method Blank

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 418758

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Chloride	<1.00		1.00		mg/L			04/12/24 11:05	1

Lab Sample ID: LCS 310-418758/4

Client Sample ID: Lab Control Sample

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 418758

Analyte	Spike	LCS	LCS	Unit	D	%Rec	%Rec	Limits
		Added	Result					
Chloride	10.0	10.09		mg/L		101		90 - 110

Lab Sample ID: 310-278358-5 MS

Client Sample ID: W-240404-EM-17

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 418758

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	%Rec	Limits
	Result	Qualifier	Added	Result	Qualifier					
Chloride	5.92		25.0	29.46		mg/L		94		80 - 120

Eurofins Cedar Falls

QC Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Method: 9056A - Anions, Ion Chromatography (Continued)

Lab Sample ID: 310-278358-5 MSD
Matrix: Water
Analysis Batch: 418758

Client Sample ID: W-240404-EM-17
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Chloride	5.92		25.0	30.26		mg/L		97	80 - 120	3	15

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 310-418159/1-A
Matrix: Water
Analysis Batch: 419086

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 418159

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	<0.00200		0.00200		mg/L		04/09/24 09:00	04/17/24 23:32	1
Iron	<0.100		0.100		mg/L		04/09/24 09:00	04/17/24 23:32	1

Lab Sample ID: LCS 310-418159/2-A
Matrix: Water
Analysis Batch: 419086

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 418159

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Barium	0.100	0.1071		mg/L		107	80 - 120
Iron	0.200	0.1967		mg/L		98	80 - 120

Lab Sample ID: 310-278358-5 MS
Matrix: Water
Analysis Batch: 419086

Client Sample ID: W-240404-EM-17
Prep Type: Total/NA
Prep Batch: 418159

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Barium	0.0617		0.100	0.1694		mg/L		108	75 - 125
Iron	0.776	F1	0.200	0.9994		mg/L		112	75 - 125

Lab Sample ID: 310-278358-5 MSD
Matrix: Water
Analysis Batch: 419086

Client Sample ID: W-240404-EM-17
Prep Type: Total/NA
Prep Batch: 418159

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Barium	0.0617		0.100	0.1697		mg/L		108	75 - 125	0	20
Iron	0.776	F1	0.200	1.032	F1	mg/L		128	75 - 125	3	20

Method: 350.1 - Nitrogen, Ammonia

Lab Sample ID: MB 310-418277/195
Matrix: Water
Analysis Batch: 418277

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	<0.200		0.200		mg/L			04/09/24 21:56	1

QC Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Method: 350.1 - Nitrogen, Ammonia (Continued)

Lab Sample ID: MB 310-418277/236
Matrix: Water
Analysis Batch: 418277

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	<0.200		0.200		mg/L			04/09/24 22:43	1

Lab Sample ID: LCS 310-418277/196
Matrix: Water
Analysis Batch: 418277

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Ammonia	8.55	8.353		mg/L		98	90 - 110

Lab Sample ID: LCS 310-418277/254
Matrix: Water
Analysis Batch: 418277

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Ammonia	8.55	8.387		mg/L		98	90 - 110

Lab Sample ID: 310-278358-5 MS
Matrix: Water
Analysis Batch: 418277

Client Sample ID: W-240404-EM-17
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Ammonia	1.59	F1	1.00	2.314	F1	mg/L		72	90 - 110

Lab Sample ID: 310-278358-5 MSD
Matrix: Water
Analysis Batch: 418277

Client Sample ID: W-240404-EM-17
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Ammonia	1.59	F1	1.00	2.392	F1	mg/L		80	90 - 110	3	10

Method: 5220D LL - COD

Lab Sample ID: MB 310-418543/32
Matrix: Water
Analysis Batch: 418543

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	<5.00		5.00		mg/L			04/12/24 11:00	1

Lab Sample ID: MB 310-418543/60
Matrix: Water
Analysis Batch: 418543

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	<5.00		5.00		mg/L			04/12/24 11:00	1

QC Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Method: 5220D LL - COD (Continued)

Lab Sample ID: LCS 310-418543/33
Matrix: Water
Analysis Batch: 418543

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chemical Oxygen Demand	125	128.0		mg/L		102	85 - 115

Lab Sample ID: LCS 310-418543/63
Matrix: Water
Analysis Batch: 418543

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chemical Oxygen Demand	125	129.0		mg/L		103	85 - 115

Lab Sample ID: 310-278358-5 MS
Matrix: Water
Analysis Batch: 418543

Client Sample ID: W-240404-EM-17
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Chemical Oxygen Demand	11.3		50.0	64.21		mg/L		106	80 - 148

Lab Sample ID: 310-278358-5 MSD
Matrix: Water
Analysis Batch: 418543

Client Sample ID: W-240404-EM-17
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	Limit
Chemical Oxygen Demand	11.3		50.0	61.66		mg/L		101	80 - 148	4	10

Method: 9020B - Organic Halides, Total (TOX)

Lab Sample ID: MB 680-833312/1-A
Matrix: Water
Analysis Batch: 833331

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 833312

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Halogens, Total Organic	<0.0400		0.0400		mg/L		04/16/24 07:59	04/16/24 10:33	1

Lab Sample ID: LCS 680-833312/2-A
Matrix: Water
Analysis Batch: 833331

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 833312

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Halogens, Total Organic	0.400	0.4240		mg/L		106	60 - 140

Lab Sample ID: LCSD 680-833312/26-A
Matrix: Water
Analysis Batch: 833331

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 833312

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	Limit
Halogens, Total Organic	0.400	0.3390		mg/L		85	60 - 140	22	40

Eurofins Cedar Falls

QC Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Method: 9020B - Organic Halides, Total (TOX) (Continued)

Lab Sample ID: 310-278358-5 MS
Matrix: Water
Analysis Batch: 833331

Client Sample ID: W-240404-EM-17
Prep Type: Total/NA
Prep Batch: 833312

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Halogens, Total Organic	<0.0400		0.400	0.3860		mg/L		97	60 - 140

Lab Sample ID: 310-278358-5 MSD
Matrix: Water
Analysis Batch: 833331

Client Sample ID: W-240404-EM-17
Prep Type: Total/NA
Prep Batch: 833312

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Halogens, Total Organic	<0.0400		0.400	0.3410		mg/L		85	60 - 140	12	40

Lab Sample ID: MB 680-833503/1-A
Matrix: Water
Analysis Batch: 833568

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 833503

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Halogens, Total Organic	<0.0400		0.0400		mg/L		04/17/24 08:43	04/17/24 11:33	1

Lab Sample ID: LCS 680-833503/2-A
Matrix: Water
Analysis Batch: 833568

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 833503

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Halogens, Total Organic	0.400	0.3856		mg/L		96	60 - 140

Lab Sample ID: 310-278358-1 MS
Matrix: Water
Analysis Batch: 833568

Client Sample ID: W-240404-EM-13
Prep Type: Total/NA
Prep Batch: 833503

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Halogens, Total Organic	<0.0400		0.400	0.3806		mg/L		95	60 - 140

Lab Sample ID: 310-278358-1 MSD
Matrix: Water
Analysis Batch: 833568

Client Sample ID: W-240404-EM-13
Prep Type: Total/NA
Prep Batch: 833503

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Halogens, Total Organic	<0.0400		0.400	0.4070		mg/L		102	60 - 140	7	40

Method: 9066 - Phenolics, Total Recoverable

Lab Sample ID: MB 310-418129/1-A
Matrix: Water
Analysis Batch: 418173

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 418129

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenols, Total	<0.0204		0.0204		mg/L		04/08/24 12:39	04/08/24 18:41	1

Eurofins Cedar Falls

QC Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Method: 9066 - Phenolics, Total Recoverable (Continued)

Lab Sample ID: LCS 310-418129/2-A
Matrix: Water
Analysis Batch: 418173

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 418129

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Phenols, Total	0.100	0.1143	*+	mg/L		114	90 - 110

Lab Sample ID: 310-278358-5 MS
Matrix: Water
Analysis Batch: 418173

Client Sample ID: W-240404-EM-17
Prep Type: Total/NA
Prep Batch: 418129

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Phenols, Total	<0.0208	*+	0.100	0.09927		mg/L		99	76 - 124

Lab Sample ID: 310-278358-5 MSD
Matrix: Water
Analysis Batch: 418173

Client Sample ID: W-240404-EM-17
Prep Type: Total/NA
Prep Batch: 418129

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Phenols, Total	<0.0208	*+	0.100	0.09915		mg/L		99	76 - 124	0	14

Method: I-3765-85 - Residue, Non-filterable (TSS)

Lab Sample ID: MB 310-418270/1
Matrix: Water
Analysis Batch: 418270

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<5.00		5.00		mg/L			04/09/24 15:49	1

Lab Sample ID: LCS 310-418270/2
Matrix: Water
Analysis Batch: 418270

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	100	100.0		mg/L		100	75 - 116

Lab Sample ID: MB 310-418274/1
Matrix: Water
Analysis Batch: 418274

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<5.00		5.00		mg/L			04/09/24 16:37	1

Lab Sample ID: LCS 310-418274/2
Matrix: Water
Analysis Batch: 418274

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	100	102.0		mg/L		102	75 - 116

QC Association Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

GC/MS VOA

Analysis Batch: 418243

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278358-1	W-240404-EM-13	Total/NA	Water	8260D	
310-278358-2	W-240404-EM-14	Total/NA	Water	8260D	
310-278358-3	W-240404-EM-15	Total/NA	Water	8260D	
310-278358-4	W-240404-EM-16	Total/NA	Water	8260D	
310-278358-6	Trip Blank 1	Total/NA	Water	8260D	
310-278358-7	Trip Blank 2	Total/NA	Water	8260D	
MB 310-418243/5	Method Blank	Total/NA	Water	8260D	
LCS 310-418243/6	Lab Control Sample	Total/NA	Water	8260D	

Analysis Batch: 418350

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278358-5	W-240404-EM-17	Total/NA	Water	8260D	
MB 310-418350/5	Method Blank	Total/NA	Water	8260D	
LCS 310-418350/6	Lab Control Sample	Total/NA	Water	8260D	
310-278358-5 MS	W-240404-EM-17	Total/NA	Water	8260D	
310-278358-5 MSD	W-240404-EM-17	Total/NA	Water	8260D	

HPLC/IC

Analysis Batch: 418758

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278358-1	W-240404-EM-13	Total/NA	Water	9056A	
310-278358-2	W-240404-EM-14	Total/NA	Water	9056A	
310-278358-3	W-240404-EM-15	Total/NA	Water	9056A	
310-278358-4	W-240404-EM-16	Total/NA	Water	9056A	
310-278358-5	W-240404-EM-17	Total/NA	Water	9056A	
MB 310-418758/3	Method Blank	Total/NA	Water	9056A	
LCS 310-418758/4	Lab Control Sample	Total/NA	Water	9056A	
310-278358-5 MS	W-240404-EM-17	Total/NA	Water	9056A	
310-278358-5 MSD	W-240404-EM-17	Total/NA	Water	9056A	

Metals

Prep Batch: 418159

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278358-1	W-240404-EM-13	Total/NA	Water	3005A	
310-278358-2	W-240404-EM-14	Total/NA	Water	3005A	
310-278358-3	W-240404-EM-15	Total/NA	Water	3005A	
310-278358-4	W-240404-EM-16	Total/NA	Water	3005A	
310-278358-5	W-240404-EM-17	Total/NA	Water	3005A	
MB 310-418159/1-A	Method Blank	Total/NA	Water	3005A	
LCS 310-418159/2-A	Lab Control Sample	Total/NA	Water	3005A	
310-278358-5 MS	W-240404-EM-17	Total/NA	Water	3005A	
310-278358-5 MSD	W-240404-EM-17	Total/NA	Water	3005A	

Analysis Batch: 419086

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278358-1	W-240404-EM-13	Total/NA	Water	6020B	418159
310-278358-2	W-240404-EM-14	Total/NA	Water	6020B	418159
310-278358-3	W-240404-EM-15	Total/NA	Water	6020B	418159
310-278358-4	W-240404-EM-16	Total/NA	Water	6020B	418159
310-278358-5	W-240404-EM-17	Total/NA	Water	6020B	418159

Eurofins Cedar Falls

QC Association Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Metals (Continued)

Analysis Batch: 419086 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 310-418159/1-A	Method Blank	Total/NA	Water	6020B	418159
LCS 310-418159/2-A	Lab Control Sample	Total/NA	Water	6020B	418159
310-278358-5 MS	W-240404-EM-17	Total/NA	Water	6020B	418159
310-278358-5 MSD	W-240404-EM-17	Total/NA	Water	6020B	418159

General Chemistry

Prep Batch: 418129

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278358-1	W-240404-EM-13	Total/NA	Water	Distill/Phenol	
310-278358-2	W-240404-EM-14	Total/NA	Water	Distill/Phenol	
310-278358-3	W-240404-EM-15	Total/NA	Water	Distill/Phenol	
310-278358-4	W-240404-EM-16	Total/NA	Water	Distill/Phenol	
310-278358-5	W-240404-EM-17	Total/NA	Water	Distill/Phenol	
MB 310-418129/1-A	Method Blank	Total/NA	Water	Distill/Phenol	
LCS 310-418129/2-A	Lab Control Sample	Total/NA	Water	Distill/Phenol	
310-278358-5 MS	W-240404-EM-17	Total/NA	Water	Distill/Phenol	
310-278358-5 MSD	W-240404-EM-17	Total/NA	Water	Distill/Phenol	

Analysis Batch: 418173

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278358-1	W-240404-EM-13	Total/NA	Water	9066	418129
310-278358-2	W-240404-EM-14	Total/NA	Water	9066	418129
310-278358-3	W-240404-EM-15	Total/NA	Water	9066	418129
310-278358-4	W-240404-EM-16	Total/NA	Water	9066	418129
310-278358-5	W-240404-EM-17	Total/NA	Water	9066	418129
MB 310-418129/1-A	Method Blank	Total/NA	Water	9066	418129
LCS 310-418129/2-A	Lab Control Sample	Total/NA	Water	9066	418129
310-278358-5 MS	W-240404-EM-17	Total/NA	Water	9066	418129
310-278358-5 MSD	W-240404-EM-17	Total/NA	Water	9066	418129

Analysis Batch: 418270

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278358-4	W-240404-EM-16	Total/NA	Water	I-3765-85	
310-278358-5	W-240404-EM-17	Total/NA	Water	I-3765-85	
MB 310-418270/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-418270/2	Lab Control Sample	Total/NA	Water	I-3765-85	

Analysis Batch: 418274

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278358-1	W-240404-EM-13	Total/NA	Water	I-3765-85	
310-278358-2	W-240404-EM-14	Total/NA	Water	I-3765-85	
310-278358-3	W-240404-EM-15	Total/NA	Water	I-3765-85	
MB 310-418274/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-418274/2	Lab Control Sample	Total/NA	Water	I-3765-85	

Analysis Batch: 418277

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278358-1	W-240404-EM-13	Total/NA	Water	350.1	
310-278358-2	W-240404-EM-14	Total/NA	Water	350.1	
310-278358-3	W-240404-EM-15	Total/NA	Water	350.1	

Eurofins Cedar Falls

QC Association Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

General Chemistry (Continued)

Analysis Batch: 418277 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278358-4	W-240404-EM-16	Total/NA	Water	350.1	
310-278358-5	W-240404-EM-17	Total/NA	Water	350.1	
MB 310-418277/195	Method Blank	Total/NA	Water	350.1	
MB 310-418277/236	Method Blank	Total/NA	Water	350.1	
LCS 310-418277/196	Lab Control Sample	Total/NA	Water	350.1	
LCS 310-418277/254	Lab Control Sample	Total/NA	Water	350.1	
310-278358-5 MS	W-240404-EM-17	Total/NA	Water	350.1	
310-278358-5 MSD	W-240404-EM-17	Total/NA	Water	350.1	

Analysis Batch: 418543

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278358-1	W-240404-EM-13	Total/NA	Water	5220D LL	
310-278358-2	W-240404-EM-14	Total/NA	Water	5220D LL	
310-278358-3	W-240404-EM-15	Total/NA	Water	5220D LL	
310-278358-4	W-240404-EM-16	Total/NA	Water	5220D LL	
310-278358-5	W-240404-EM-17	Total/NA	Water	5220D LL	
MB 310-418543/32	Method Blank	Total/NA	Water	5220D LL	
MB 310-418543/60	Method Blank	Total/NA	Water	5220D LL	
LCS 310-418543/33	Lab Control Sample	Total/NA	Water	5220D LL	
LCS 310-418543/63	Lab Control Sample	Total/NA	Water	5220D LL	
310-278358-5 MS	W-240404-EM-17	Total/NA	Water	5220D LL	
310-278358-5 MSD	W-240404-EM-17	Total/NA	Water	5220D LL	

Prep Batch: 833312

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278358-5	W-240404-EM-17	Total/NA	Water	Carbon Trap	
MB 680-833312/1-A	Method Blank	Total/NA	Water	Carbon Trap	
LCS 680-833312/2-A	Lab Control Sample	Total/NA	Water	Carbon Trap	
LCSD 680-833312/26-A	Lab Control Sample Dup	Total/NA	Water	Carbon Trap	
310-278358-5 MS	W-240404-EM-17	Total/NA	Water	Carbon Trap	
310-278358-5 MSD	W-240404-EM-17	Total/NA	Water	Carbon Trap	

Analysis Batch: 833331

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278358-5	W-240404-EM-17	Total/NA	Water	9020B	833312
MB 680-833312/1-A	Method Blank	Total/NA	Water	9020B	833312
LCS 680-833312/2-A	Lab Control Sample	Total/NA	Water	9020B	833312
LCSD 680-833312/26-A	Lab Control Sample Dup	Total/NA	Water	9020B	833312
310-278358-5 MS	W-240404-EM-17	Total/NA	Water	9020B	833312
310-278358-5 MSD	W-240404-EM-17	Total/NA	Water	9020B	833312

Prep Batch: 833503

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278358-1	W-240404-EM-13	Total/NA	Water	Carbon Trap	
310-278358-2	W-240404-EM-14	Total/NA	Water	Carbon Trap	
310-278358-3	W-240404-EM-15	Total/NA	Water	Carbon Trap	
310-278358-4	W-240404-EM-16	Total/NA	Water	Carbon Trap	
MB 680-833503/1-A	Method Blank	Total/NA	Water	Carbon Trap	
LCS 680-833503/2-A	Lab Control Sample	Total/NA	Water	Carbon Trap	
310-278358-1 MS	W-240404-EM-13	Total/NA	Water	Carbon Trap	
310-278358-1 MSD	W-240404-EM-13	Total/NA	Water	Carbon Trap	

Eurofins Cedar Falls

QC Association Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

General Chemistry

Analysis Batch: 833568

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278358-1	W-240404-EM-13	Total/NA	Water	9020B	833503
310-278358-2	W-240404-EM-14	Total/NA	Water	9020B	833503
310-278358-3	W-240404-EM-15	Total/NA	Water	9020B	833503
310-278358-4	W-240404-EM-16	Total/NA	Water	9020B	833503
MB 680-833503/1-A	Method Blank	Total/NA	Water	9020B	833503
LCS 680-833503/2-A	Lab Control Sample	Total/NA	Water	9020B	833503
310-278358-1 MS	W-240404-EM-13	Total/NA	Water	9020B	833503
310-278358-1 MSD	W-240404-EM-13	Total/NA	Water	9020B	833503

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Lab Chronicle

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Client Sample ID: W-240404-EM-13

Lab Sample ID: 310-278358-1

Date Collected: 04/04/24 13:51

Matrix: Water

Date Received: 04/05/24 11:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	418243	FE5V	EET CF	04/09/24 15:02
Total/NA	Analysis	9056A		5	418758	QTZ5	EET CF	04/12/24 11:28
Total/NA	Prep	3005A			418159	QTZ5	EET CF	04/09/24 09:00
Total/NA	Analysis	6020B		1	419086	NFT2	EET CF	04/17/24 23:36
Total/NA	Analysis	350.1		1	418277	ZJX4	EET CF	04/09/24 22:42
Total/NA	Analysis	5220D LL		1	418543	ENB7	EET CF	04/12/24 11:00
Total/NA	Prep	Carbon Trap			833503	CLJ	EET SAV	04/17/24 08:43
Total/NA	Analysis	9020B		1	833568	CLJ	EET SAV	04/17/24 12:46
Total/NA	Prep	Distill/Phenol			418129	ENB7	EET CF	04/08/24 12:39
Total/NA	Analysis	9066		1	418173	ZJX4	EET CF	04/08/24 18:44
Total/NA	Analysis	I-3765-85		1	418274	A4XP	EET CF	04/09/24 16:37

Client Sample ID: W-240404-EM-14

Lab Sample ID: 310-278358-2

Date Collected: 04/04/24 15:52

Matrix: Water

Date Received: 04/05/24 11:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	418243	FE5V	EET CF	04/09/24 15:24
Total/NA	Analysis	9056A		5	418758	QTZ5	EET CF	04/12/24 11:40
Total/NA	Prep	3005A			418159	QTZ5	EET CF	04/09/24 09:00
Total/NA	Analysis	6020B		1	419086	NFT2	EET CF	04/17/24 23:39
Total/NA	Analysis	350.1		1	418277	ZJX4	EET CF	04/09/24 22:42
Total/NA	Analysis	5220D LL		1	418543	ENB7	EET CF	04/12/24 11:00
Total/NA	Prep	Carbon Trap			833503	CLJ	EET SAV	04/17/24 08:43
Total/NA	Analysis	9020B		1	833568	CLJ	EET SAV	04/17/24 14:43
Total/NA	Prep	Distill/Phenol			418129	ENB7	EET CF	04/08/24 12:39
Total/NA	Analysis	9066		1	418173	ZJX4	EET CF	04/08/24 18:45
Total/NA	Analysis	I-3765-85		1	418274	A4XP	EET CF	04/09/24 16:37

Client Sample ID: W-240404-EM-15

Lab Sample ID: 310-278358-3

Date Collected: 04/04/24 16:38

Matrix: Water

Date Received: 04/05/24 11:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	418243	FE5V	EET CF	04/09/24 15:47
Total/NA	Analysis	9056A		5	418758	QTZ5	EET CF	04/12/24 11:53
Total/NA	Prep	3005A			418159	QTZ5	EET CF	04/09/24 09:00
Total/NA	Analysis	6020B		1	419086	NFT2	EET CF	04/17/24 23:41
Total/NA	Analysis	350.1		1	418277	ZJX4	EET CF	04/09/24 22:47
Total/NA	Analysis	5220D LL		1	418543	ENB7	EET CF	04/12/24 11:00
Total/NA	Prep	Carbon Trap			833503	CLJ	EET SAV	04/17/24 08:43
Total/NA	Analysis	9020B		1	833568	CLJ	EET SAV	04/17/24 15:34

Lab Chronicle

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Client Sample ID: W-240404-EM-15

Lab Sample ID: 310-278358-3

Date Collected: 04/04/24 16:38

Matrix: Water

Date Received: 04/05/24 11:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	Distill/Phenol			418129	ENB7	EET CF	04/08/24 12:39
Total/NA	Analysis	9066		1	418173	ZJX4	EET CF	04/08/24 18:46
Total/NA	Analysis	I-3765-85		1	418274	A4XP	EET CF	04/09/24 16:37

Client Sample ID: W-240404-EM-16

Lab Sample ID: 310-278358-4

Date Collected: 04/04/24 18:15

Matrix: Water

Date Received: 04/05/24 11:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	418243	FE5V	EET CF	04/09/24 16:09
Total/NA	Analysis	9056A		5	418758	QTZ5	EET CF	04/12/24 12:05
Total/NA	Prep	3005A			418159	QTZ5	EET CF	04/09/24 09:00
Total/NA	Analysis	6020B		1	419086	NFT2	EET CF	04/17/24 23:43
Total/NA	Analysis	350.1		1	418277	ZJX4	EET CF	04/09/24 22:47
Total/NA	Analysis	5220D LL		1	418543	ENB7	EET CF	04/12/24 11:00
Total/NA	Prep	Carbon Trap			833503	CLJ	EET SAV	04/17/24 08:43
Total/NA	Analysis	9020B		1	833568	CLJ	EET SAV	04/18/24 08:14
Total/NA	Prep	Distill/Phenol			418129	ENB7	EET CF	04/08/24 12:39
Total/NA	Analysis	9066		1	418173	ZJX4	EET CF	04/08/24 18:46
Total/NA	Analysis	I-3765-85		1	418270	A4XP	EET CF	04/09/24 15:49

Client Sample ID: W-240404-EM-17

Lab Sample ID: 310-278358-5

Date Collected: 04/04/24 19:14

Matrix: Water

Date Received: 04/05/24 11:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	418350	FE5V	EET CF	04/10/24 13:37
Total/NA	Analysis	9056A		5	418758	QTZ5	EET CF	04/12/24 12:17
Total/NA	Prep	3005A			418159	QTZ5	EET CF	04/09/24 09:00
Total/NA	Analysis	6020B		1	419086	NFT2	EET CF	04/17/24 23:55
Total/NA	Analysis	350.1		1	418277	ZJX4	EET CF	04/09/24 22:48
Total/NA	Analysis	5220D LL		1	418543	ENB7	EET CF	04/12/24 11:00
Total/NA	Prep	Carbon Trap			833312	CLJ	EET SAV	04/16/24 07:59
Total/NA	Analysis	9020B		1	833331	CLJ	EET SAV	04/16/24 11:46
Total/NA	Prep	Distill/Phenol			418129	ENB7	EET CF	04/08/24 12:39
Total/NA	Analysis	9066		1	418173	ZJX4	EET CF	04/08/24 18:42
Total/NA	Analysis	I-3765-85		1	418270	A4XP	EET CF	04/09/24 15:49

Client Sample ID: Trip Blank 1

Lab Sample ID: 310-278358-6

Date Collected: 04/04/24 00:00

Matrix: Water

Date Received: 04/05/24 11:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	418243	FE5V	EET CF	04/09/24 13:32

Lab Chronicle

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Client Sample ID: Trip Blank 2

Lab Sample ID: 310-278358-7

Date Collected: 04/04/24 00:00

Matrix: Water

Date Received: 04/05/24 11:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	418243	FE5V	EET CF	04/09/24 14:17

Laboratory References:

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401

EET SAV = Eurofins Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

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Accreditation/Certification Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Laboratory: Eurofins Cedar Falls

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Iowa	State	007	12-01-25

Laboratory: Eurofins Savannah

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Iowa	State	353	07-01-25

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Method Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278358-1

Method	Method Description	Protocol	Laboratory
8260D	Volatile Organic Compounds by GC/MS	SW846	EET CF
9056A	Anions, Ion Chromatography	SW846	EET CF
6020B	Metals (ICP/MS)	SW846	EET CF
350.1	Nitrogen, Ammonia	EPA	EET CF
5220D LL	COD	SM	EET CF
9020B	Organic Halides, Total (TOX)	SW846	EET SAV
9066	Phenolics, Total Recoverable	SW846	EET CF
I-3765-85	Residue, Non-filterable (TSS)	USGS	EET CF
3005A	Preparation, Total Metals	SW846	EET CF
5030B	Purge and Trap	SW846	EET CF
Carbon Trap	Carbon Trap Preparation	EPA-17	EET SAV
Distill/Phenol	Distillation, Phenolics	None	EET CF

Protocol References:

- EPA = US Environmental Protection Agency
- EPA-17 = "Method 1650, Revision A, Adsorbable Organic Halides By Adsorption And Colormetric Titration," EPA, February 1992
- None = None
- SM = "Standard Methods For The Examination Of Water And Wastewater"
- SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.
- USGS = "Methods For Analysis Of Water And Fluvial Sediments", USGS, 1989

Laboratory References:

- EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401
- EET SAV = Eurofins Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858



310-278358 Chain of Custody

Cooler/Sample Receipt and Temperature Log Form

Client Information			
Client: <u>GHD</u>			
City/State:	<small>CITY</small>	<small>STATE</small>	Project:
		<u>MN</u>	
Receipt Information			
Date/Time Received:	<small>DATE</small>	<small>TIME</small>	Received By:
	<u>4-5-24</u>	<u>1140</u>	<u>MU</u>
Delivery Type: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee			
<input type="checkbox"/> Lab Courier <input type="checkbox"/> Lab Field Services <input checked="" type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____			
Condition of Cooler/Containers			
Sample(s) received in Cooler?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler ID: _____	
Multiple Coolers?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler # <u>1</u> of <u>2</u>	
Cooler Custody Seals Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler custody seals intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Sample Custody Seals Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Sample custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Which VOA samples are in cooler? ↓	
<u>Samples -13 -14 -15 -16</u>			
Temperature Record			
Coolant: <input checked="" type="checkbox"/> Wet ice <input type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> Other: _____ <input type="checkbox"/> NONE			
Thermometer ID: <u>T</u>		Correction Factor (°C): <u>0</u>	
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature			
Uncorrected Temp (°C): <u>2.8</u>		Corrected Temp (°C): <u>2.8</u>	
Sample Container Temperature			
Container(s) used:	<u>CONTAINER 1</u>	<u>CONTAINER 2</u>	
Uncorrected Temp (°C):			
Corrected Temp (°C):			
Exceptions Noted			
1) If temperature exceeds criteria, was sample(s) received same day of sampling? <input type="checkbox"/> Yes <input type="checkbox"/> No			
a) If yes: Is there evidence that the chilling process began? <input type="checkbox"/> Yes <input type="checkbox"/> No			
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) <input type="checkbox"/> Yes <input type="checkbox"/> No			
NOTE: If yes, contact PM before proceeding. If no, proceed with login			
Additional Comments			





Environment Testing
America

Place COC scanning label
here

Cooler/Sample Receipt and Temperature Log Form

Client Information			
Client: <u>GHD</u>			
City/State:	CITY	STATE	Project:
		<u>MN</u>	
Receipt Information			
Date/Time Received:	DATE	TIME	Received By:
	<u>4-5-24</u>	<u>1140</u>	<u>MU</u>
Delivery Type: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee			
<input type="checkbox"/> Lab Courier <input type="checkbox"/> Lab Field Services <input checked="" type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____			
Condition of Cooler/Containers			
Sample(s) received in Cooler?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler ID:	
Multiple Coolers?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler # <u>2</u> of <u>2</u>	
Cooler Custody Seals Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler custody seals intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Sample Custody Seals Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Sample custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Which VOA samples are in cooler? ↓	
<u>-17 and -17 MS/MSD</u>			
Temperature Record			
Coolant: <input checked="" type="checkbox"/> Wet ice <input type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> Other: _____ <input type="checkbox"/> NONE			
Thermometer ID: <u>T</u>		Correction Factor (°C): <u>0</u>	
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature			
Uncorrected Temp (°C): <u>3.6</u>		Corrected Temp (°C): <u>3.6</u>	
• Sample Container Temperature			
Container(s) used:	CONTAINER 1	CONTAINER 2	
Uncorrected Temp (°C):			
Corrected Temp (°C):			
Exceptions Noted			
1) If temperature exceeds criteria, was sample(s) received same day of sampling? <input type="checkbox"/> Yes <input type="checkbox"/> No			
a) If yes: Is there evidence that the chilling process began? <input type="checkbox"/> Yes <input type="checkbox"/> No			
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) <input type="checkbox"/> Yes <input type="checkbox"/> No			
NOTE: If yes, contact PM before proceeding. If no, proceed with login			
Additional Comments			

TAL-8210

euoifins

Regulatory Program: DW NPDES RCRA Other

Project Manager: Grant Anderson @ghd.com
Site Contact: Elizabeth Mitchell
Lab Contact: Zach Gindoff
Carrier:
Date:
COC No 1 of 1 COCs

Company Name: GHD
Address: 100 Long Lane Rd 200
City/State/Zip: MN, 55112
Phone: 651-639-0913
Object Name: vials sample
ID #: 056134

Analysis Turnaround Time: WORKING DAYS
TAT if different from Below:
 2 weeks
 1 week
 2 days
 1 day

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS/MSD (Y/N)	Chloride	Barium + Ions	Total Residual	Benzene + Acetone	TOX	TSS	Sample Specific Notes
W-240404-EM-13	4/4/24	1351	G	W	9	N	X	X	X	X	X	X	X	
W-240404-EM-14		1552		W										Top & Temp
W-240404-EM-15		1638		W										Blank in both
W-240404-EM-16		1815		W										COOLERS.
W-240404-EM-17		1914		W	27									
TRIP BLANK														

Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other
 Possible Hazard Identification:
 Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample
 Non-Hazardous Flammable Skin Irritant Poison B Unknown
 Special Instructions/QC Requirements & Comments:

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
 Return to Client Disposal by Lab Archive for _____ Months

Custody Seal No:
 Relinquished by: GHD
 Date/Time: 6/15/24
 Received by:
 Date/Time:
 Company:
 Relinquished by:
 Date/Time:
 Company:
 Relinquished by:
 Date/Time:
 Company:



Eurofins Cedar Falls

3019 Venture Way
Cedar Falls, IA 50613
Phone: 319-277-2401 Fax: 319-277-2425

Chain of Custody Record



Environment Testing

Client Information (Sub Contract Lab)		Sampler:		Lab PM: Bindert, Zach T		Carrier Tracking No(s):		COC No: 310-71023.1			
Client Contact: Shipping/Receiving		Phone:		E-Mail: Zach.Bindert@et.eurofinsus.com		State of Origin: Iowa		Page: Page 1 of 1			
Company: Eurofins Environment Testing Southeast				Accreditations Required (See note): State - Iowa				Job #: 310-278358-1			
Address: 5102 LaRoche Avenue, City: Savannah State, Zip: GA, 31404 Phone: 912-354-7858(Tel) 912-352-0165(Fax) Email:		Due Date Requested: 4/18/2024 TAT Requested (days):		Analysis Requested						Preservation Codes: A - HCL M - Hexane B - NaOH N - None C - Zn Acetate O - AsNaO2 D - Nitric Acid P - Na2O4S E - NaHSO4 Q - Na2SO3 F - MeOH R - Na2S2O3 G - Amchlor S - H2SO4 H - Ascorbic Acid T - TSP Dodecahydrate I - Ice U - Acetone J - DI Water V - MCAA K - EDTA W - pH 4-5 L - EDA Y - Trizma Z - other (specify)	
Project Name: Viking Pump Landfill Site:		Project #: 31017275 SSOW#:									
Sample Identification - Client ID (Lab ID)		Sample Date		Sample Time		Sample Type (C=Comp, G=grab)		Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)		Special Instructions/Note:	
										Field Filtered Sample (Yes or No) Perform MS/MSD (Yes or No) 9020B/Carbon_Trap (MOD) Total Organic Halides (TOX)	
W-240404-EM-13 (310-278358-1)		4/4/24		13:51 Central		Water				1	
W-240404-EM-14 (310-278358-2)		4/4/24		15:52 Central		Water				1	
W-240404-EM-15 (310-278358-3)		4/4/24		16:38 Central		Water				1	
W-240404-EM-16 (310-278358-4)		4/4/24		18:15 Central		Water				1	
W-240404-EM-17 (310-278358-5)		4/4/24		19:14 Central		Water				1	
W-240404-EM-17 (310-278358-5MS)		4/4/24		19:14 Central		MS				1	
W-240404-EM-17 (310-278358-5MSD)		4/4/24		19:14 Central		MSD				1	
Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing North Central, LLC places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Environment Testing North Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing North Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Environment Testing North Central, LLC.											
Possible Hazard Identification						Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)					
Unconfirmed						<input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months					
Deliverable Requested: I, II, III, IV, Other (specify)				Primary Deliverable Rank: 2		Special Instructions/QC Requirements:					
Empty Kit Relinquished by:				Date:		Time:		Method of Shipment:			
Relinquished by: <i>T. Deff</i>		Date/Time: 4/5/24 13:10		Company:		Received by: <i>DU</i>		Date/Time: 4-6-24 9:31		Company: <i>IN</i>	
Relinquished by:		Date/Time:		Company:		Received by:		Date/Time:		Company:	
Relinquished by:		Date/Time:		Company:		Received by:		Date/Time:		Company:	
Custody Seals Intact: Δ Yes Δ No		Custody Seal No.:				Cooler Temperature(s) °C and Other Remarks: 2.3/2.4					

Login Sample Receipt Checklist

Client: GHD Services Inc.

Job Number: 310-278358-1

Login Number: 278358

List Source: Eurofins Cedar Falls

List Number: 1

Creator: Costello, Mackenzie K

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



Login Sample Receipt Checklist

Client: GHD Services Inc.

Job Number: 310-278358-1

Login Number: 278358

List Number: 2

Creator: Watters, David

List Source: Eurofins Savannah

List Creation: 04/06/24 01:11 PM

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	





ANALYTICAL REPORT

PREPARED FOR

Attn: Mr. Grant Anderson
GHD Services Inc.
900 Long Lake Road
Suite 200
New Brighton, Minnesota 55112

Generated 4/11/2024 2:47:56 PM

JOB DESCRIPTION

Leachate Semi-Annual "LCS Sample"

JOB NUMBER

310-278033-1

Eurofins Cedar Falls

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

Authorization



Generated
4/11/2024 2:47:56 PM

Authorized for release by
Zach Bindert, Client Service Manager
Zach.Bindert@et.eurofinsus.com
(319)277-2401



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Case Narrative

Client: GHD Services Inc.
Project: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Job ID: 310-278033-1

Eurofins Cedar Falls

Job Narrative 310-278033-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt

The samples were received on 4/3/2024 9:15 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperatures of the 2 coolers at receipt time were 0.7°C and 1.6°C.

GC/MS VOA

Method 8260D: The method requirement for no headspace was not met. The following volatile sample was analyzed with headspace in the sample container: Trip Blank (310-278033-2).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

HPLC/IC

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Metals

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry

Method 9020B: Breakthrough exceeded 10% for the following sample:W-240403-EM-LCS (310-278033-1).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Eurofins Cedar Falls

Case Narrative

Client: GHD Services Inc.
Project: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Job ID: 310-278033-2

Eurofins Cedar Falls

Job Narrative 310-278033-2

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt

The samples were received on 4/3/2024 9:15 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperatures of the 2 coolers at receipt time were 0.7°C and 1.6°C.

HPLC/IC

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Eurofins Cedar Falls

Sample Summary

Client: GHD Services Inc.
Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

<u>Lab Sample ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Collected</u>	<u>Received</u>
310-278033-1	W-240403-EM-LCS	Water	04/03/24 08:00	04/03/24 09:15
310-278033-2	Trip Blank	Water	04/03/24 00:00	04/03/24 09:15

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Detection Summary

Client: GHD Services Inc.
Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Client Sample ID: W-240403-EM-LCS

Lab Sample ID: 310-278033-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	12.2		1.00		mg/L	1		300.0	Total/NA
Sulfate	38.8		1.00		mg/L	1		300.0	Total/NA
Barium	0.0576		0.00200		mg/L	1		6020B	Total/NA
Copper	0.00612		0.00500		mg/L	1		6020B	Total/NA
Iron	1.19		0.100		mg/L	1		6020B	Total/NA
Lead	0.00166		0.000500		mg/L	1		6020B	Total/NA
Manganese	0.0807		0.0100		mg/L	1		6020B	Total/NA
Molybdenum	0.0302		0.00200		mg/L	1		6020B	Total/NA
Flashpoint	>162		65.0		Degrees F	1		D93_85	Total/NA
Total Dissolved Solids	580		250		mg/L	1		SM 2540C	Total/NA
pH	7.7	HF	1.0		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: Trip Blank

Lab Sample ID: 310-278033-2

No Detections.

This Detection Summary does not include radiochemical test results.

Eurofins Cedar Falls

Client Sample Results

Client: GHD Services Inc.
Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Client Sample ID: W-240403-EM-LCS

Lab Sample ID: 310-278033-1

Date Collected: 04/03/24 08:00

Matrix: Water

Date Received: 04/03/24 09:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/04/24 13:53	1
Benzene	<0.500		0.500		ug/L			04/04/24 13:53	1
Bromobenzene	<1.00		1.00		ug/L			04/04/24 13:53	1
Bromochloromethane	<5.00		5.00		ug/L			04/04/24 13:53	1
Bromodichloromethane	<1.00		1.00		ug/L			04/04/24 13:53	1
Bromoform	<5.00		5.00		ug/L			04/04/24 13:53	1
Bromomethane	<4.00		4.00		ug/L			04/04/24 13:53	1
2-Butanone (MEK)	<10.0		10.0		ug/L			04/04/24 13:53	1
Carbon disulfide	<1.00		1.00		ug/L			04/04/24 13:53	1
Carbon tetrachloride	<2.00		2.00		ug/L			04/04/24 13:53	1
Chlorobenzene	<1.00		1.00		ug/L			04/04/24 13:53	1
Chlorodibromomethane	<5.00		5.00		ug/L			04/04/24 13:53	1
Chloroethane	<4.00		4.00		ug/L			04/04/24 13:53	1
Chloroform	<3.00		3.00		ug/L			04/04/24 13:53	1
Chloromethane	<3.00		3.00		ug/L			04/04/24 13:53	1
2-Chlorotoluene	<1.00		1.00		ug/L			04/04/24 13:53	1
4-Chlorotoluene	<1.00		1.00		ug/L			04/04/24 13:53	1
cis-1,2-Dichloroethene	<1.00		1.00		ug/L			04/04/24 13:53	1
cis-1,3-Dichloropropene	<5.00		5.00		ug/L			04/04/24 13:53	1
1,2-Dibromo-3-chloropropane	<5.00		5.00		ug/L			04/04/24 13:53	1
1,2-Dibromoethane (EDB)	<1.00		1.00		ug/L			04/04/24 13:53	1
Dibromomethane	<1.00		1.00		ug/L			04/04/24 13:53	1
1,2-Dichlorobenzene	<1.00		1.00		ug/L			04/04/24 13:53	1
1,3-Dichlorobenzene	<1.00		1.00		ug/L			04/04/24 13:53	1
1,4-Dichlorobenzene	<1.00		1.00		ug/L			04/04/24 13:53	1
Dichlorodifluoromethane	<3.00		3.00		ug/L			04/04/24 13:53	1
1,1-Dichloroethane	<1.00		1.00		ug/L			04/04/24 13:53	1
1,2-Dichloroethane	<1.00		1.00		ug/L			04/04/24 13:53	1
1,1-Dichloroethene	<2.00		2.00		ug/L			04/04/24 13:53	1
1,2-Dichloropropane	<1.00		1.00		ug/L			04/04/24 13:53	1
1,3-Dichloropropane	<1.00		1.00		ug/L			04/04/24 13:53	1
2,2-Dichloropropane	<4.00		4.00		ug/L			04/04/24 13:53	1
1,1-Dichloropropene	<1.00		1.00		ug/L			04/04/24 13:53	1
Ethylbenzene	<1.00		1.00		ug/L			04/04/24 13:53	1
Hexachlorobutadiene	<5.00		5.00		ug/L			04/04/24 13:53	1
Hexane	<1.00		1.00		ug/L			04/04/24 13:53	1
Isopropylbenzene	<1.00		1.00		ug/L			04/04/24 13:53	1
Methylene chloride	<5.00		5.00		ug/L			04/04/24 13:53	1
Methyl tert-butyl ether	<1.00		1.00		ug/L			04/04/24 13:53	1
Naphthalene	<5.00		5.00		ug/L			04/04/24 13:53	1
n-Butylbenzene	<1.00		1.00		ug/L			04/04/24 13:53	1
n-Propylbenzene	<1.00		1.00		ug/L			04/04/24 13:53	1
p-Isopropyltoluene	<1.00		1.00		ug/L			04/04/24 13:53	1
sec-Butylbenzene	<1.00		1.00		ug/L			04/04/24 13:53	1
Styrene	<1.00		1.00		ug/L			04/04/24 13:53	1
tert-Butylbenzene	<1.00		1.00		ug/L			04/04/24 13:53	1
1,1,1,2-Tetrachloroethane	<1.00		1.00		ug/L			04/04/24 13:53	1
1,1,1,2-Tetrachloroethane	<1.00		1.00		ug/L			04/04/24 13:53	1
Tetrachloroethene	<1.00		1.00		ug/L			04/04/24 13:53	1

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Client Sample Results

Client: GHD Services Inc.
Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Client Sample ID: W-240403-EM-LCS

Lab Sample ID: 310-278033-1

Date Collected: 04/03/24 08:00

Matrix: Water

Date Received: 04/03/24 09:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Toluene	<1.00		1.00		ug/L			04/04/24 13:53	1
trans-1,2-Dichloroethene	<1.00		1.00		ug/L			04/04/24 13:53	1
trans-1,3-Dichloropropene	<5.00		5.00		ug/L			04/04/24 13:53	1
1,2,3-Trichlorobenzene	<5.00		5.00		ug/L			04/04/24 13:53	1
1,2,4-Trichlorobenzene	<5.00		5.00		ug/L			04/04/24 13:53	1
1,1,1-Trichloroethane	<1.00		1.00		ug/L			04/04/24 13:53	1
1,1,2-Trichloroethane	<1.00		1.00		ug/L			04/04/24 13:53	1
Trichloroethene	<1.00		1.00		ug/L			04/04/24 13:53	1
Trichlorofluoromethane	<4.00		4.00		ug/L			04/04/24 13:53	1
1,2,3-Trichloropropane	<1.00		1.00		ug/L			04/04/24 13:53	1
1,2,4-Trimethylbenzene	<1.00		1.00		ug/L			04/04/24 13:53	1
1,3,5-Trimethylbenzene	<1.00		1.00		ug/L			04/04/24 13:53	1
Vinyl chloride	<1.00		1.00		ug/L			04/04/24 13:53	1
Xylenes, Total	<3.00		3.00		ug/L			04/04/24 13:53	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	104		80 - 120					04/04/24 13:53	1
Dibromofluoromethane (Surr)	97		73 - 130					04/04/24 13:53	1
Toluene-d8 (Surr)	102		80 - 120					04/04/24 13:53	1

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	12.2		1.00		mg/L			04/03/24 12:03	1
Nitrate as N	<0.200		0.200		mg/L			04/03/24 12:03	1
Nitrite as N	<0.200		0.200		mg/L			04/03/24 12:03	1
Sulfate	38.8		1.00		mg/L			04/03/24 12:03	1

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.00200		0.00200		mg/L		04/05/24 09:00	04/06/24 02:09	1
Barium	0.0576		0.00200		mg/L		04/05/24 09:00	04/06/24 02:09	1
Cadmium	<0.000200		0.000200		mg/L		04/05/24 09:00	04/06/24 02:09	1
Chromium	<0.00500		0.00500		mg/L		04/05/24 09:00	04/06/24 02:09	1
Copper	0.00612		0.00500		mg/L		04/05/24 09:00	04/06/24 02:09	1
Iron	1.19		0.100		mg/L		04/05/24 09:00	04/06/24 02:09	1
Lead	0.00166		0.000500		mg/L		04/05/24 09:00	04/06/24 02:09	1
Manganese	0.0807		0.0100		mg/L		04/05/24 09:00	04/06/24 02:09	1
Molybdenum	0.0302		0.00200		mg/L		04/05/24 09:00	04/06/24 02:09	1
Nickel	<0.00500		0.00500		mg/L		04/05/24 09:00	04/06/24 02:09	1
Selenium	<0.00500		0.00500		mg/L		04/05/24 09:00	04/06/24 02:09	1
Silver	<0.00100		0.00100		mg/L		04/05/24 09:00	04/06/24 02:09	1
Zinc	<0.0200		0.0200		mg/L		04/05/24 09:00	04/06/24 02:09	1

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		04/05/24 14:12	04/08/24 15:12	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease) (1664A)	<5.0		5.0		mg/L		04/08/24 06:00	04/08/24 06:00	1
Ammonia (EPA 350.1)	<0.200		0.200		mg/L			04/09/24 21:36	1

Eurofins Cedar Falls

Client Sample Results

Client: GHD Services Inc.
 Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Client Sample ID: W-240403-EM-LCS

Lab Sample ID: 310-278033-1

Date Collected: 04/03/24 08:00

Matrix: Water

Date Received: 04/03/24 09:15

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Halogens, Total Organic (SW846 9020B)	<0.0400		0.0400		mg/L		04/10/24 13:45	04/10/24 15:21	1
Sulfide (SW846 9034)	<3.00		3.00		mg/L		04/09/24 11:56	04/09/24 11:59	1
Phenols, Total (SW846 9066)	<0.0200		0.0200		mg/L		04/08/24 09:17	04/08/24 17:10	1
Total Suspended Solids (USGS I-3765-85)	<5.00		5.00		mg/L			04/05/24 18:06	1
Total Dissolved Solids (SM 2540C)	580		250		mg/L			04/08/24 15:48	1
Chemical Oxygen Demand (SM 5220D)	<25.0		25.0		mg/L			04/05/24 10:12	5
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Flashpoint (ASTM D93_85)	>162		65.0		Degrees F			04/09/24 16:05	1
pH (SM 4500 H+ B)	7.7	HF	1.0		SU			04/03/24 12:06	1

Client Sample Results

Client: GHD Services Inc.
Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Client Sample ID: Trip Blank

Lab Sample ID: 310-278033-2

Date Collected: 04/03/24 00:00

Matrix: Water

Date Received: 04/03/24 09:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/04/24 10:59	1
Benzene	<0.500		0.500		ug/L			04/04/24 10:59	1
Bromobenzene	<1.00		1.00		ug/L			04/04/24 10:59	1
Bromochloromethane	<5.00		5.00		ug/L			04/04/24 10:59	1
Bromodichloromethane	<1.00		1.00		ug/L			04/04/24 10:59	1
Bromoform	<5.00		5.00		ug/L			04/04/24 10:59	1
Bromomethane	<4.00		4.00		ug/L			04/04/24 10:59	1
2-Butanone (MEK)	<10.0		10.0		ug/L			04/04/24 10:59	1
Carbon disulfide	<1.00		1.00		ug/L			04/04/24 10:59	1
Carbon tetrachloride	<2.00		2.00		ug/L			04/04/24 10:59	1
Chlorobenzene	<1.00		1.00		ug/L			04/04/24 10:59	1
Chlorodibromomethane	<5.00		5.00		ug/L			04/04/24 10:59	1
Chloroethane	<4.00		4.00		ug/L			04/04/24 10:59	1
Chloroform	<3.00		3.00		ug/L			04/04/24 10:59	1
Chloromethane	<3.00		3.00		ug/L			04/04/24 10:59	1
2-Chlorotoluene	<1.00		1.00		ug/L			04/04/24 10:59	1
4-Chlorotoluene	<1.00		1.00		ug/L			04/04/24 10:59	1
cis-1,2-Dichloroethene	<1.00		1.00		ug/L			04/04/24 10:59	1
cis-1,3-Dichloropropene	<5.00		5.00		ug/L			04/04/24 10:59	1
1,2-Dibromo-3-chloropropane	<5.00		5.00		ug/L			04/04/24 10:59	1
1,2-Dibromoethane (EDB)	<1.00		1.00		ug/L			04/04/24 10:59	1
Dibromomethane	<1.00		1.00		ug/L			04/04/24 10:59	1
1,2-Dichlorobenzene	<1.00		1.00		ug/L			04/04/24 10:59	1
1,3-Dichlorobenzene	<1.00		1.00		ug/L			04/04/24 10:59	1
1,4-Dichlorobenzene	<1.00		1.00		ug/L			04/04/24 10:59	1
Dichlorodifluoromethane	<3.00		3.00		ug/L			04/04/24 10:59	1
1,1-Dichloroethane	<1.00		1.00		ug/L			04/04/24 10:59	1
1,2-Dichloroethane	<1.00		1.00		ug/L			04/04/24 10:59	1
1,1-Dichloroethene	<2.00		2.00		ug/L			04/04/24 10:59	1
1,2-Dichloropropane	<1.00		1.00		ug/L			04/04/24 10:59	1
1,3-Dichloropropane	<1.00		1.00		ug/L			04/04/24 10:59	1
2,2-Dichloropropane	<4.00		4.00		ug/L			04/04/24 10:59	1
1,1-Dichloropropene	<1.00		1.00		ug/L			04/04/24 10:59	1
Ethylbenzene	<1.00		1.00		ug/L			04/04/24 10:59	1
Hexachlorobutadiene	<5.00		5.00		ug/L			04/04/24 10:59	1
Hexane	<1.00		1.00		ug/L			04/04/24 10:59	1
Isopropylbenzene	<1.00		1.00		ug/L			04/04/24 10:59	1
Methylene chloride	<5.00		5.00		ug/L			04/04/24 10:59	1
Methyl tert-butyl ether	<1.00		1.00		ug/L			04/04/24 10:59	1
Naphthalene	<5.00		5.00		ug/L			04/04/24 10:59	1
n-Butylbenzene	<1.00		1.00		ug/L			04/04/24 10:59	1
n-Propylbenzene	<1.00		1.00		ug/L			04/04/24 10:59	1
p-Isopropyltoluene	<1.00		1.00		ug/L			04/04/24 10:59	1
sec-Butylbenzene	<1.00		1.00		ug/L			04/04/24 10:59	1
Styrene	<1.00		1.00		ug/L			04/04/24 10:59	1
tert-Butylbenzene	<1.00		1.00		ug/L			04/04/24 10:59	1
1,1,1,2-Tetrachloroethane	<1.00		1.00		ug/L			04/04/24 10:59	1
1,1,1,2-Tetrachloroethane	<1.00		1.00		ug/L			04/04/24 10:59	1
Tetrachloroethene	<1.00		1.00		ug/L			04/04/24 10:59	1

Eurofins Cedar Falls

Client Sample Results

Client: GHD Services Inc.
 Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Client Sample ID: Trip Blank

Lab Sample ID: 310-278033-2

Date Collected: 04/03/24 00:00

Matrix: Water

Date Received: 04/03/24 09:15

Method: SW846 8260D - Volatile Organic Compounds by GC/MS (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Toluene	<1.00		1.00		ug/L			04/04/24 10:59	1
trans-1,2-Dichloroethene	<1.00		1.00		ug/L			04/04/24 10:59	1
trans-1,3-Dichloropropene	<5.00		5.00		ug/L			04/04/24 10:59	1
1,2,3-Trichlorobenzene	<5.00		5.00		ug/L			04/04/24 10:59	1
1,2,4-Trichlorobenzene	<5.00		5.00		ug/L			04/04/24 10:59	1
1,1,1-Trichloroethane	<1.00		1.00		ug/L			04/04/24 10:59	1
1,1,2-Trichloroethane	<1.00		1.00		ug/L			04/04/24 10:59	1
Trichloroethene	<1.00		1.00		ug/L			04/04/24 10:59	1
Trichlorofluoromethane	<4.00		4.00		ug/L			04/04/24 10:59	1
1,2,3-Trichloropropane	<1.00		1.00		ug/L			04/04/24 10:59	1
1,2,4-Trimethylbenzene	<1.00		1.00		ug/L			04/04/24 10:59	1
1,3,5-Trimethylbenzene	<1.00		1.00		ug/L			04/04/24 10:59	1
Vinyl chloride	<1.00		1.00		ug/L			04/04/24 10:59	1
Xylenes, Total	<3.00		3.00		ug/L			04/04/24 10:59	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	107		80 - 120		04/04/24 10:59	1
Dibromofluoromethane (Surr)	98		73 - 130		04/04/24 10:59	1
Toluene-d8 (Surr)	100		80 - 120		04/04/24 10:59	1

Definitions/Glossary

Client: GHD Services Inc.
Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Qualifiers

General Chemistry

Qualifier	Qualifier Description
HF	Parameter with a holding time of 15 minutes. Test performed by laboratory at client's request. Sample was analyzed outside of hold time.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Surrogate Summary

Client: GHD Services Inc.
Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Method: 8260D - Volatile Organic Compounds by GC/MS

Matrix: Water

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	BFB	DBFM	TOL
		(80-120)	(73-130)	(80-120)
310-278033-1	W-240403-EM-LCS	104	97	102
310-278033-1 MS	W-240403-EM-LCS	101	95	105
310-278033-1 MSD	W-240403-EM-LCS	103	95	103
310-278033-2	Trip Blank	107	98	100
LCS 310-417831/6	Lab Control Sample	105	92	103
LCS 310-417831/7	Lab Control Sample	105	97	102
MB 310-417831/5	Method Blank	102	98	102

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)

DBFM = Dibromofluoromethane (Surr)

TOL = Toluene-d8 (Surr)

QC Sample Results

Client: GHD Services Inc.
 Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Method: 8260D - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 310-417831/5
Matrix: Water
Analysis Batch: 417831

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			04/04/24 09:53	1
Benzene	<0.500		0.500		ug/L			04/04/24 09:53	1
Bromobenzene	<1.00		1.00		ug/L			04/04/24 09:53	1
Bromochloromethane	<5.00		5.00		ug/L			04/04/24 09:53	1
Bromodichloromethane	<1.00		1.00		ug/L			04/04/24 09:53	1
Bromoform	<5.00		5.00		ug/L			04/04/24 09:53	1
Bromomethane	<4.00		4.00		ug/L			04/04/24 09:53	1
2-Butanone (MEK)	<10.0		10.0		ug/L			04/04/24 09:53	1
Carbon disulfide	<1.00		1.00		ug/L			04/04/24 09:53	1
Carbon tetrachloride	<2.00		2.00		ug/L			04/04/24 09:53	1
Chlorobenzene	<1.00		1.00		ug/L			04/04/24 09:53	1
Chlorodibromomethane	<5.00		5.00		ug/L			04/04/24 09:53	1
Chloroethane	<4.00		4.00		ug/L			04/04/24 09:53	1
Chloroform	<3.00		3.00		ug/L			04/04/24 09:53	1
Chloromethane	<3.00		3.00		ug/L			04/04/24 09:53	1
2-Chlorotoluene	<1.00		1.00		ug/L			04/04/24 09:53	1
4-Chlorotoluene	<1.00		1.00		ug/L			04/04/24 09:53	1
cis-1,2-Dichloroethene	<1.00		1.00		ug/L			04/04/24 09:53	1
cis-1,3-Dichloropropene	<5.00		5.00		ug/L			04/04/24 09:53	1
1,2-Dibromo-3-chloropropane	<5.00		5.00		ug/L			04/04/24 09:53	1
1,2-Dibromoethane (EDB)	<1.00		1.00		ug/L			04/04/24 09:53	1
Dibromomethane	<1.00		1.00		ug/L			04/04/24 09:53	1
1,2-Dichlorobenzene	<1.00		1.00		ug/L			04/04/24 09:53	1
1,3-Dichlorobenzene	<1.00		1.00		ug/L			04/04/24 09:53	1
1,4-Dichlorobenzene	<1.00		1.00		ug/L			04/04/24 09:53	1
Dichlorodifluoromethane	<3.00		3.00		ug/L			04/04/24 09:53	1
1,1-Dichloroethane	<1.00		1.00		ug/L			04/04/24 09:53	1
1,2-Dichloroethane	<1.00		1.00		ug/L			04/04/24 09:53	1
1,1-Dichloroethene	<2.00		2.00		ug/L			04/04/24 09:53	1
1,2-Dichloropropane	<1.00		1.00		ug/L			04/04/24 09:53	1
1,3-Dichloropropane	<1.00		1.00		ug/L			04/04/24 09:53	1
2,2-Dichloropropane	<4.00		4.00		ug/L			04/04/24 09:53	1
1,1-Dichloropropene	<1.00		1.00		ug/L			04/04/24 09:53	1
Ethylbenzene	<1.00		1.00		ug/L			04/04/24 09:53	1
Hexachlorobutadiene	<5.00		5.00		ug/L			04/04/24 09:53	1
Hexane	<1.00		1.00		ug/L			04/04/24 09:53	1
Isopropylbenzene	<1.00		1.00		ug/L			04/04/24 09:53	1
Methylene chloride	<5.00		5.00		ug/L			04/04/24 09:53	1
Methyl tert-butyl ether	<1.00		1.00		ug/L			04/04/24 09:53	1
Naphthalene	<5.00		5.00		ug/L			04/04/24 09:53	1
n-Butylbenzene	<1.00		1.00		ug/L			04/04/24 09:53	1
n-Propylbenzene	<1.00		1.00		ug/L			04/04/24 09:53	1
p-Isopropyltoluene	<1.00		1.00		ug/L			04/04/24 09:53	1
sec-Butylbenzene	<1.00		1.00		ug/L			04/04/24 09:53	1
Styrene	<1.00		1.00		ug/L			04/04/24 09:53	1
tert-Butylbenzene	<1.00		1.00		ug/L			04/04/24 09:53	1
1,1,1,2-Tetrachloroethane	<1.00		1.00		ug/L			04/04/24 09:53	1
1,1,1,2,2-Tetrachloroethane	<1.00		1.00		ug/L			04/04/24 09:53	1

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QC Sample Results

Client: GHD Services Inc.
Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: MB 310-417831/5
Matrix: Water
Analysis Batch: 417831

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	<1.00		1.00		ug/L			04/04/24 09:53	1
Toluene	<1.00		1.00		ug/L			04/04/24 09:53	1
trans-1,2-Dichloroethene	<1.00		1.00		ug/L			04/04/24 09:53	1
trans-1,3-Dichloropropene	<5.00		5.00		ug/L			04/04/24 09:53	1
1,2,3-Trichlorobenzene	<5.00		5.00		ug/L			04/04/24 09:53	1
1,2,4-Trichlorobenzene	<5.00		5.00		ug/L			04/04/24 09:53	1
1,1,1-Trichloroethane	<1.00		1.00		ug/L			04/04/24 09:53	1
1,1,2-Trichloroethane	<1.00		1.00		ug/L			04/04/24 09:53	1
Trichloroethene	<1.00		1.00		ug/L			04/04/24 09:53	1
Trichlorofluoromethane	<4.00		4.00		ug/L			04/04/24 09:53	1
1,2,3-Trichloropropane	<1.00		1.00		ug/L			04/04/24 09:53	1
1,2,4-Trimethylbenzene	<1.00		1.00		ug/L			04/04/24 09:53	1
1,3,5-Trimethylbenzene	<1.00		1.00		ug/L			04/04/24 09:53	1
Vinyl chloride	<1.00		1.00		ug/L			04/04/24 09:53	1
Xylenes, Total	<3.00		3.00		ug/L			04/04/24 09:53	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		80 - 120		04/04/24 09:53	1
Dibromofluoromethane (Surr)	98		73 - 130		04/04/24 09:53	1
Toluene-d8 (Surr)	102		80 - 120		04/04/24 09:53	1

Lab Sample ID: LCS 310-417831/6
Matrix: Water
Analysis Batch: 417831

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Acetone	40.0	37.45		ug/L		94	50 - 150
Benzene	20.0	16.16		ug/L		81	72 - 124
Bromobenzene	20.0	16.68		ug/L		83	72 - 120
Bromochloromethane	20.0	16.51		ug/L		83	73 - 130
Bromodichloromethane	20.0	16.39		ug/L		82	74 - 122
Bromoform	20.0	15.97		ug/L		80	61 - 122
2-Butanone (MEK)	40.0	33.74		ug/L		84	50 - 150
Carbon disulfide	20.0	17.50		ug/L		87	59 - 135
Carbon tetrachloride	20.0	15.69		ug/L		78	67 - 132
Chlorobenzene	20.0	17.19		ug/L		86	76 - 120
Chlorodibromomethane	20.0	16.15		ug/L		81	71 - 121
Chloroform	20.0	17.05		ug/L		85	72 - 125
2-Chlorotoluene	20.0	17.29		ug/L		86	73 - 121
4-Chlorotoluene	20.0	17.04		ug/L		85	72 - 121
cis-1,2-Dichloroethene	20.0	17.52		ug/L		88	74 - 123
cis-1,3-Dichloropropene	20.0	17.24		ug/L		86	71 - 125
1,2-Dibromo-3-chloropropane	20.0	21.45		ug/L		107	50 - 150
1,2-Dibromoethane (EDB)	20.0	17.07		ug/L		85	75 - 125
Dibromomethane	20.0	17.35		ug/L		87	74 - 125
1,2-Dichlorobenzene	20.0	19.44		ug/L		97	74 - 120
1,3-Dichlorobenzene	20.0	17.31		ug/L		87	72 - 120
1,4-Dichlorobenzene	20.0	19.93		ug/L		100	72 - 120

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QC Sample Results

Client: GHD Services Inc.
Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 310-417831/6
Matrix: Water
Analysis Batch: 417831

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
1,1-Dichloroethane	20.0	17.37		ug/L		87	70 - 127
1,2-Dichloroethane	20.0	16.97		ug/L		85	71 - 125
1,1-Dichloroethene	20.0	16.94		ug/L		85	63 - 132
1,2-Dichloropropane	20.0	16.66		ug/L		83	73 - 124
1,3-Dichloropropane	20.0	17.45		ug/L		87	72 - 125
2,2-Dichloropropane	20.0	18.07		ug/L		90	50 - 150
1,1-Dichloropropene	20.0	16.56		ug/L		83	69 - 132
Ethylbenzene	20.0	17.41		ug/L		87	74 - 122
Hexachlorobutadiene	20.0	21.00		ug/L		105	50 - 150
Hexane	20.0	19.83		ug/L		99	45 - 150
Isopropylbenzene	20.0	18.03		ug/L		90	73 - 125
Methylene chloride	20.0	18.92		ug/L		95	50 - 150
Methyl tert-butyl ether	20.0	16.72		ug/L		84	68 - 130
Naphthalene	20.0	20.22		ug/L		101	50 - 150
n-Butylbenzene	20.0	21.32		ug/L		107	67 - 131
n-Propylbenzene	20.0	18.14		ug/L		91	72 - 126
p-Isopropyltoluene	20.0	20.36		ug/L		102	70 - 127
sec-Butylbenzene	20.0	18.20		ug/L		91	70 - 127
Styrene	20.0	17.59		ug/L		88	74 - 121
tert-Butylbenzene	20.0	17.35		ug/L		87	72 - 124
1,1,1,2-Tetrachloroethane	20.0	16.96		ug/L		85	71 - 120
1,1,2,2-Tetrachloroethane	20.0	17.00		ug/L		85	68 - 124
Tetrachloroethene	20.0	17.13		ug/L		86	71 - 130
Toluene	20.0	16.87		ug/L		84	74 - 123
trans-1,2-Dichloroethene	20.0	16.80		ug/L		84	70 - 126
trans-1,3-Dichloropropene	20.0	18.21		ug/L		91	69 - 123
1,2,3-Trichlorobenzene	20.0	20.10		ug/L		100	50 - 150
1,2,4-Trichlorobenzene	20.0	20.70		ug/L		104	68 - 124
1,1,1-Trichloroethane	20.0	16.65		ug/L		83	73 - 129
1,1,2-Trichloroethane	20.0	17.63		ug/L		88	73 - 123
Trichloroethene	20.0	16.78		ug/L		84	72 - 126
1,2,3-Trichloropropane	20.0	18.00		ug/L		90	65 - 127
1,2,4-Trimethylbenzene	20.0	17.83		ug/L		89	73 - 124
1,3,5-Trimethylbenzene	20.0	17.40		ug/L		87	73 - 123
Xylenes, Total	40.0	34.04		ug/L		85	73 - 123

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	105		80 - 120
Dibromofluoromethane (Surr)	92		73 - 130
Toluene-d8 (Surr)	103		80 - 120

Lab Sample ID: LCS 310-417831/7
Matrix: Water
Analysis Batch: 417831

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Bromomethane	20.0	13.87		ug/L		69	23 - 150
Chloroethane	20.0	18.47		ug/L		92	54 - 136

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QC Sample Results

Client: GHD Services Inc.
Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 310-417831/7
Matrix: Water
Analysis Batch: 417831

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloromethane	20.0	16.21		ug/L		81	38 - 150
Dichlorodifluoromethane	20.0	14.12		ug/L		71	39 - 150
Trichlorofluoromethane	20.0	16.91		ug/L		85	54 - 149
Vinyl chloride	20.0	17.66		ug/L		88	56 - 140

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	105		80 - 120
Dibromofluoromethane (Surr)	97		73 - 130
Toluene-d8 (Surr)	102		80 - 120

Lab Sample ID: 310-278033-1 MS
Matrix: Water
Analysis Batch: 417831

Client Sample ID: W-240403-EM-LCS
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Acetone	<10.0		50.0	56.59		ug/L		96	31 - 150
Benzene	<0.500		25.0	19.15		ug/L		77	46 - 130
Bromobenzene	<1.00		25.0	20.98		ug/L		84	57 - 130
Bromochloromethane	<5.00		25.0	20.13		ug/L		81	57 - 130
Bromodichloromethane	<1.00		25.0	19.96		ug/L		80	57 - 130
Bromoform	<5.00		25.0	20.40		ug/L		82	44 - 130
2-Butanone (MEK)	<10.0		50.0	44.09		ug/L		88	38 - 150
Carbon disulfide	<1.00		25.0	21.36		ug/L		85	38 - 135
Carbon tetrachloride	<2.00		25.0	17.99		ug/L		72	45 - 132
Chlorobenzene	<1.00		25.0	21.36		ug/L		85	59 - 130
Chlorodibromomethane	<5.00		25.0	20.16		ug/L		81	54 - 130
Chloroform	<3.00		25.0	20.25		ug/L		81	51 - 130
2-Chlorotoluene	<1.00		25.0	21.60		ug/L		86	55 - 130
4-Chlorotoluene	<1.00		25.0	21.23		ug/L		85	50 - 130
cis-1,2-Dichloroethene	<1.00		25.0	20.19		ug/L		81	45 - 130
cis-1,3-Dichloropropene	<5.00		25.0	19.97		ug/L		80	53 - 130
1,2-Dibromo-3-chloropropane	<5.00		25.0	24.80		ug/L		99	38 - 150
1,2-Dibromoethane (EDB)	<1.00		25.0	21.41		ug/L		86	60 - 130
Dibromomethane	<1.00		25.0	21.16		ug/L		85	59 - 130
1,2-Dichlorobenzene	<1.00		25.0	23.94		ug/L		96	59 - 130
1,3-Dichlorobenzene	<1.00		25.0	21.50		ug/L		86	57 - 130
1,4-Dichlorobenzene	<1.00		25.0	24.89		ug/L		100	57 - 130
1,1-Dichloroethane	<1.00		25.0	20.27		ug/L		81	49 - 130
1,2-Dichloroethane	<1.00		25.0	20.29		ug/L		81	51 - 130
1,1-Dichloroethene	<2.00		25.0	20.33		ug/L		81	37 - 132
1,2-Dichloropropane	<1.00		25.0	20.25		ug/L		81	57 - 130
1,3-Dichloropropane	<1.00		25.0	21.50		ug/L		86	56 - 130
2,2-Dichloropropane	<4.00		25.0	19.20		ug/L		77	25 - 150
1,1-Dichloropropene	<1.00		25.0	19.52		ug/L		78	50 - 132
Ethylbenzene	<1.00		25.0	20.97		ug/L		84	45 - 130
Hexachlorobutadiene	<5.00		25.0	23.79		ug/L		95	28 - 150
Hexane	<1.00		25.0	19.87		ug/L		79	22 - 150
Isopropylbenzene	<1.00		25.0	21.10		ug/L		84	46 - 130

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QC Sample Results

Client: GHD Services Inc.
Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: 310-278033-1 MS

Client Sample ID: W-240403-EM-LCS

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 417831

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	%Rec	Limits
	Result	Qualifier	Added	Result	Qualifier					
Methylene chloride	<5.00		25.0	22.20		ug/L		89	37 - 150	
Methyl tert-butyl ether	<1.00		25.0	19.02		ug/L		76	52 - 130	
Naphthalene	<5.00		25.0	24.26		ug/L		97	40 - 150	
n-Butylbenzene	<1.00		25.0	24.10		ug/L		96	45 - 131	
n-Propylbenzene	<1.00		25.0	21.50		ug/L		86	47 - 130	
p-Isopropyltoluene	<1.00		25.0	23.22		ug/L		93	50 - 130	
sec-Butylbenzene	<1.00		25.0	21.46		ug/L		86	48 - 130	
Styrene	<1.00		25.0	22.07		ug/L		88	47 - 130	
tert-Butylbenzene	<1.00		25.0	20.52		ug/L		82	52 - 130	
1,1,1,2-Tetrachloroethane	<1.00		25.0	21.73		ug/L		87	55 - 130	
1,1,2,2-Tetrachloroethane	<1.00		25.0	22.38		ug/L		90	54 - 130	
Tetrachloroethene	<1.00		25.0	19.29		ug/L		77	47 - 130	
Toluene	<1.00		25.0	19.87		ug/L		79	51 - 130	
trans-1,2-Dichloroethene	<1.00		25.0	19.40		ug/L		78	48 - 130	
trans-1,3-Dichloropropene	<5.00		25.0	21.59		ug/L		86	50 - 130	
1,2,3-Trichlorobenzene	<5.00		25.0	24.25		ug/L		97	38 - 150	
1,2,4-Trichlorobenzene	<5.00		25.0	25.30		ug/L		101	55 - 130	
1,1,1-Trichloroethane	<1.00		25.0	19.14		ug/L		77	52 - 130	
1,1,2-Trichloroethane	<1.00		25.0	21.64		ug/L		87	58 - 130	
Trichloroethene	<1.00		25.0	19.55		ug/L		78	51 - 130	
1,2,3-Trichloropropane	<1.00		25.0	22.77		ug/L		91	49 - 130	
1,2,4-Trimethylbenzene	<1.00		25.0	21.91		ug/L		88	49 - 130	
1,3,5-Trimethylbenzene	<1.00		25.0	21.24		ug/L		85	50 - 130	
Xylenes, Total	<3.00		50.0	41.34		ug/L		83	43 - 130	

Surrogate	MS	MS	Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	101		80 - 120
Dibromofluoromethane (Surr)	95		73 - 130
Toluene-d8 (Surr)	105		80 - 120

Lab Sample ID: 310-278033-1 MSD

Client Sample ID: W-240403-EM-LCS

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 417831

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec	Limits	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier							
Acetone	<10.0		50.0	51.21		ug/L		85	31 - 150	10	29	
Benzene	<0.500		25.0	18.62		ug/L		74	46 - 130	3	20	
Bromobenzene	<1.00		25.0	20.90		ug/L		84	57 - 130	0	20	
Bromochloromethane	<5.00		25.0	19.74		ug/L		79	57 - 130	2	20	
Bromodichloromethane	<1.00		25.0	19.74		ug/L		79	57 - 130	1	20	
Bromoform	<5.00		25.0	19.89		ug/L		80	44 - 130	3	20	
2-Butanone (MEK)	<10.0		50.0	41.67		ug/L		83	38 - 150	6	20	
Carbon disulfide	<1.00		25.0	20.03		ug/L		80	38 - 135	6	30	
Carbon tetrachloride	<2.00		25.0	17.32		ug/L		69	45 - 132	4	20	
Chlorobenzene	<1.00		25.0	20.67		ug/L		83	59 - 130	3	20	
Chlorodibromomethane	<5.00		25.0	20.13		ug/L		81	54 - 130	0	20	
Chloroform	<3.00		25.0	19.51		ug/L		78	51 - 130	4	20	
2-Chlorotoluene	<1.00		25.0	21.18		ug/L		85	55 - 130	2	20	

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QC Sample Results

Client: GHD Services Inc.
Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: 310-278033-1 MSD

Client Sample ID: W-240403-EM-LCS

Matrix: Water

Prep Type: Total/NA

Analysis Batch: 417831

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
4-Chlorotoluene	<1.00		25.0	21.28		ug/L		85	50 - 130	0	20
cis-1,2-Dichloroethene	<1.00		25.0	20.35		ug/L		81	45 - 130	1	20
cis-1,3-Dichloropropene	<5.00		25.0	20.10		ug/L		80	53 - 130	1	20
1,2-Dibromo-3-chloropropane	<5.00		25.0	24.68		ug/L		99	38 - 150	0	20
1,2-Dibromoethane (EDB)	<1.00		25.0	21.63		ug/L		87	60 - 130	1	20
Dibromomethane	<1.00		25.0	21.21		ug/L		85	59 - 130	0	20
1,2-Dichlorobenzene	<1.00		25.0	23.56		ug/L		94	59 - 130	2	20
1,3-Dichlorobenzene	<1.00		25.0	21.47		ug/L		86	57 - 130	0	20
1,4-Dichlorobenzene	<1.00		25.0	24.45		ug/L		98	57 - 130	2	20
1,1-Dichloroethane	<1.00		25.0	19.43		ug/L		78	49 - 130	4	20
1,2-Dichloroethane	<1.00		25.0	19.91		ug/L		80	51 - 130	2	20
1,1-Dichloroethene	<2.00		25.0	20.06		ug/L		80	37 - 132	1	26
1,2-Dichloropropane	<1.00		25.0	19.56		ug/L		78	57 - 130	3	20
1,3-Dichloropropane	<1.00		25.0	20.89		ug/L		84	56 - 130	3	20
2,2-Dichloropropane	<4.00		25.0	19.14		ug/L		77	25 - 150	0	25
1,1-Dichloropropene	<1.00		25.0	18.95		ug/L		76	50 - 132	3	20
Ethylbenzene	<1.00		25.0	20.50		ug/L		82	45 - 130	2	20
Hexachlorobutadiene	<5.00		25.0	20.67		ug/L		83	28 - 150	14	24
Hexane	<1.00		25.0	20.34		ug/L		81	22 - 150	2	20
Isopropylbenzene	<1.00		25.0	21.45		ug/L		86	46 - 130	2	20
Methylene chloride	<5.00		25.0	21.78		ug/L		87	37 - 150	2	24
Methyl tert-butyl ether	<1.00		25.0	19.50		ug/L		78	52 - 130	2	20
Naphthalene	<5.00		25.0	25.15		ug/L		101	40 - 150	4	30
n-Butylbenzene	<1.00		25.0	23.75		ug/L		95	45 - 131	1	20
n-Propylbenzene	<1.00		25.0	21.74		ug/L		87	47 - 130	1	20
p-Isopropyltoluene	<1.00		25.0	23.29		ug/L		93	50 - 130	0	20
sec-Butylbenzene	<1.00		25.0	21.56		ug/L		86	48 - 130	0	20
Styrene	<1.00		25.0	21.25		ug/L		85	47 - 130	4	20
tert-Butylbenzene	<1.00		25.0	20.78		ug/L		83	52 - 130	1	20
1,1,1,2-Tetrachloroethane	<1.00		25.0	20.50		ug/L		82	55 - 130	6	20
1,1,1,2,2-Tetrachloroethane	<1.00		25.0	22.25		ug/L		89	54 - 130	1	20
Tetrachloroethene	<1.00		25.0	19.36		ug/L		77	47 - 130	0	20
Toluene	<1.00		25.0	19.76		ug/L		79	51 - 130	1	20
trans-1,2-Dichloroethene	<1.00		25.0	18.88		ug/L		76	48 - 130	3	22
trans-1,3-Dichloropropene	<5.00		25.0	21.96		ug/L		88	50 - 130	2	20
1,2,3-Trichlorobenzene	<5.00		25.0	25.25		ug/L		101	38 - 150	4	21
1,2,4-Trichlorobenzene	<5.00		25.0	26.15		ug/L		105	55 - 130	3	20
1,1,1-Trichloroethane	<1.00		25.0	18.51		ug/L		74	52 - 130	3	20
1,1,2-Trichloroethane	<1.00		25.0	20.89		ug/L		84	58 - 130	4	20
Trichloroethene	<1.00		25.0	18.83		ug/L		75	51 - 130	4	20
1,2,3-Trichloropropane	<1.00		25.0	22.56		ug/L		90	49 - 130	1	26
1,2,4-Trimethylbenzene	<1.00		25.0	21.98		ug/L		88	49 - 130	0	25
1,3,5-Trimethylbenzene	<1.00		25.0	21.31		ug/L		85	50 - 130	0	32
Xylenes, Total	<3.00		50.0	40.12		ug/L		80	43 - 130	3	20

Surrogate	MSD %Recovery	MSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	103		80 - 120
Dibromofluoromethane (Surr)	95		73 - 130

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QC Sample Results

Client: GHD Services Inc.
Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: 310-278033-1 MSD
Matrix: Water
Analysis Batch: 417831

Client Sample ID: W-240403-EM-LCS
Prep Type: Total/NA

Surrogate	%Recovery	MSD Qualifier	MSD Limits
Toluene-d8 (Surr)	103		80 - 120

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 310-417894/3
Matrix: Water
Analysis Batch: 417894

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<1.00		1.00		mg/L			04/03/24 09:31	1
Nitrate as N	<0.200		0.200		mg/L			04/03/24 09:31	1
Nitrite as N	<0.200		0.200		mg/L			04/03/24 09:31	1
Sulfate	<1.00		1.00		mg/L			04/03/24 09:31	1

Lab Sample ID: LCS 310-417894/4
Matrix: Water
Analysis Batch: 417894

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	10.0	9.928		mg/L		99	90 - 110
Nitrate as N	2.00	2.059		mg/L		103	90 - 110
Nitrite as N	2.00	1.991		mg/L		100	90 - 110
Sulfate	10.0	10.54		mg/L		105	90 - 110

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 310-417897/1-A
Matrix: Water
Analysis Batch: 418086

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 417897

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.00200		0.00200		mg/L		04/05/24 09:00	04/06/24 00:11	1
Barium	<0.00200		0.00200		mg/L		04/05/24 09:00	04/06/24 00:11	1
Cadmium	<0.000200		0.000200		mg/L		04/05/24 09:00	04/06/24 00:11	1
Chromium	<0.00500		0.00500		mg/L		04/05/24 09:00	04/06/24 00:11	1
Copper	<0.00500		0.00500		mg/L		04/05/24 09:00	04/06/24 00:11	1
Iron	<0.100		0.100		mg/L		04/05/24 09:00	04/06/24 00:11	1
Lead	<0.000500		0.000500		mg/L		04/05/24 09:00	04/06/24 00:11	1
Manganese	<0.0100		0.0100		mg/L		04/05/24 09:00	04/06/24 00:11	1
Molybdenum	<0.00200		0.00200		mg/L		04/05/24 09:00	04/06/24 00:11	1
Nickel	<0.00500		0.00500		mg/L		04/05/24 09:00	04/06/24 00:11	1
Selenium	<0.00500		0.00500		mg/L		04/05/24 09:00	04/06/24 00:11	1
Silver	<0.00100		0.00100		mg/L		04/05/24 09:00	04/06/24 00:11	1
Zinc	<0.0200		0.0200		mg/L		04/05/24 09:00	04/06/24 00:11	1

QC Sample Results

Client: GHD Services Inc.
Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Method: 6020B - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 310-417897/2-A
Matrix: Water
Analysis Batch: 418086

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 417897

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Arsenic	0.200	0.2078		mg/L		104	80 - 120
Barium	0.100	0.1002		mg/L		100	80 - 120
Cadmium	0.100	0.09437		mg/L		94	80 - 120
Chromium	0.100	0.1059		mg/L		106	80 - 120
Copper	0.200	0.2085		mg/L		104	80 - 120
Iron	0.200	0.2297		mg/L		115	80 - 120
Lead	0.200	0.2119		mg/L		106	80 - 120
Manganese	0.100	0.1070		mg/L		107	80 - 120
Molybdenum	0.200	0.2015		mg/L		101	80 - 120
Nickel	0.200	0.2174		mg/L		109	80 - 120
Selenium	0.400	0.3814		mg/L		95	80 - 120
Silver	0.100	0.1047		mg/L		105	80 - 120
Zinc	0.200	0.2036		mg/L		102	80 - 120

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 310-418014/1-A
Matrix: Water
Analysis Batch: 418170

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 418014

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		04/05/24 14:12	04/08/24 14:43	1

Lab Sample ID: LCS 310-418014/2-A
Matrix: Water
Analysis Batch: 418170

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 418014

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Mercury	0.00167	0.001740		mg/L		104	80 - 120

Method: 1664A - HEM and SGT-HEM

Lab Sample ID: MB 310-418011/1-A
Matrix: Water
Analysis Batch: 418140

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 418011

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	<5.0		5.0		mg/L		04/08/24 06:00	04/08/24 06:00	1

Lab Sample ID: LCS 310-418011/2-A
Matrix: Water
Analysis Batch: 418140

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 418011

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
HEM (Oil & Grease)	40.0	35.80		mg/L		89	78 - 114

QC Sample Results

Client: GHD Services Inc.
 Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Method: 350.1 - Nitrogen, Ammonia

Lab Sample ID: MB 310-418277/167
 Matrix: Water
 Analysis Batch: 418277

Client Sample ID: Method Blank
 Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	<0.200		0.200		mg/L			04/09/24 21:34	1

Lab Sample ID: LCS 310-418277/168
 Matrix: Water
 Analysis Batch: 418277

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Ammonia	8.55	8.919		mg/L		104	90 - 110

Method: 9020B - Organic Halides, Total (TOX)

Lab Sample ID: MB 680-832423/1-A
 Matrix: Water
 Analysis Batch: 832482

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 832423

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Halogens, Total Organic	<0.0400		0.0400		mg/L		04/10/24 13:45	04/10/24 14:20	1

Lab Sample ID: LCS 680-832423/2-A
 Matrix: Water
 Analysis Batch: 832482

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 832423

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Halogens, Total Organic	0.400	0.3948		mg/L		99	60 - 140

Lab Sample ID: LCSD 680-832423/14-A
 Matrix: Water
 Analysis Batch: 832482

Client Sample ID: Lab Control Sample Dup
 Prep Type: Total/NA
 Prep Batch: 832423

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Halogens, Total Organic	0.400	0.3916		mg/L		98	60 - 140	1	40

Lab Sample ID: 310-278033-1 MS
 Matrix: Water
 Analysis Batch: 832482

Client Sample ID: W-240403-EM-LCS
 Prep Type: Total/NA
 Prep Batch: 832423

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Halogens, Total Organic	<0.0400		0.400	0.4072		mg/L		97	60 - 140

Lab Sample ID: 310-278033-1 MSD
 Matrix: Water
 Analysis Batch: 832482

Client Sample ID: W-240403-EM-LCS
 Prep Type: Total/NA
 Prep Batch: 832423

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Halogens, Total Organic	<0.0400		0.400	0.4033		mg/L		96	60 - 140	1	40

QC Sample Results

Client: GHD Services Inc.
Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Method: 9034 - Sulfide, Acid soluble and Insoluble (Titrimetric)

Lab Sample ID: MB 240-608934/1-A
Matrix: Water
Analysis Batch: 608937

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 608934

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	<3.00		3.00		mg/L		04/09/24 11:56	04/09/24 11:59	1

Lab Sample ID: LCS 240-608934/2-A
Matrix: Water
Analysis Batch: 608937

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 608934

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Sulfide	7.33	5.467		mg/L		75	70 - 120

Method: 9066 - Phenolics, Total Recoverable

Lab Sample ID: MB 310-418093/1-A
Matrix: Water
Analysis Batch: 418171

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 418093

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenols, Total	<0.0184		0.0184		mg/L		04/08/24 09:17	04/08/24 17:04	1

Lab Sample ID: LCS 310-418093/2-A
Matrix: Water
Analysis Batch: 418171

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 418093

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Phenols, Total	0.100	0.09799		mg/L		98	90 - 110

Method: D93_85 - Ignitability, Pensky-Martens Closed Cup Method

Lab Sample ID: LCS 310-418273/1
Matrix: Water
Analysis Batch: 418273

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Flashpoint	81.0	85.50		Degrees F		106	94 - 109

Method: I-3765-85 - Residue, Non-filterable (TSS)

Lab Sample ID: MB 310-418049/1
Matrix: Water
Analysis Batch: 418049

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<5.00		5.00		mg/L			04/05/24 18:06	1

Lab Sample ID: LCS 310-418049/2
Matrix: Water
Analysis Batch: 418049

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	100	99.00		mg/L		99	75 - 116

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QC Sample Results

Client: GHD Services Inc.
 Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 310-418156/1
 Matrix: Water
 Analysis Batch: 418156

Client Sample ID: Method Blank
 Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<50.0		50.0		mg/L			04/08/24 15:48	1

Lab Sample ID: LCS 310-418156/2
 Matrix: Water
 Analysis Batch: 418156

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	1000	974.0		mg/L		97	90 - 110

Lab Sample ID: 310-278033-1 DU
 Matrix: Water
 Analysis Batch: 418156

Client Sample ID: W-240403-EM-LCS
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	580		500.0		mg/L		15	20

Method: SM 4500 H+ B - pH

Lab Sample ID: LCS 310-417741/1
 Matrix: Water
 Analysis Batch: 417741

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
pH	7.00	7.0		SU		100	98 - 102

Method: SM 5220D - COD

Lab Sample ID: MB 310-417970/32
 Matrix: Water
 Analysis Batch: 417970

Client Sample ID: Method Blank
 Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	<5.00		5.00		mg/L			04/05/24 10:12	1

Lab Sample ID: LCS 310-417970/33
 Matrix: Water
 Analysis Batch: 417970

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chemical Oxygen Demand	125	121.2		mg/L		97	85 - 115

QC Association Summary

Client: GHD Services Inc.
Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

GC/MS VOA

Analysis Batch: 417831

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278033-1	W-240403-EM-LCS	Total/NA	Water	8260D	
310-278033-2	Trip Blank	Total/NA	Water	8260D	
MB 310-417831/5	Method Blank	Total/NA	Water	8260D	
LCS 310-417831/6	Lab Control Sample	Total/NA	Water	8260D	
LCS 310-417831/7	Lab Control Sample	Total/NA	Water	8260D	
310-278033-1 MS	W-240403-EM-LCS	Total/NA	Water	8260D	
310-278033-1 MSD	W-240403-EM-LCS	Total/NA	Water	8260D	

HPLC/IC

Analysis Batch: 417894

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278033-1	W-240403-EM-LCS	Total/NA	Water	300.0	
MB 310-417894/3	Method Blank	Total/NA	Water	300.0	
LCS 310-417894/4	Lab Control Sample	Total/NA	Water	300.0	

Metals

Prep Batch: 417897

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278033-1	W-240403-EM-LCS	Total/NA	Water	3005A	
MB 310-417897/1-A	Method Blank	Total/NA	Water	3005A	
LCS 310-417897/2-A	Lab Control Sample	Total/NA	Water	3005A	

Prep Batch: 418014

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278033-1	W-240403-EM-LCS	Total/NA	Water	7470A	
MB 310-418014/1-A	Method Blank	Total/NA	Water	7470A	
LCS 310-418014/2-A	Lab Control Sample	Total/NA	Water	7470A	

Analysis Batch: 418086

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278033-1	W-240403-EM-LCS	Total/NA	Water	6020B	417897
MB 310-417897/1-A	Method Blank	Total/NA	Water	6020B	417897
LCS 310-417897/2-A	Lab Control Sample	Total/NA	Water	6020B	417897

Analysis Batch: 418170

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278033-1	W-240403-EM-LCS	Total/NA	Water	7470A	418014
MB 310-418014/1-A	Method Blank	Total/NA	Water	7470A	418014
LCS 310-418014/2-A	Lab Control Sample	Total/NA	Water	7470A	418014

General Chemistry

Analysis Batch: 417741

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278033-1	W-240403-EM-LCS	Total/NA	Water	SM 4500 H+ B	
LCS 310-417741/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	

Analysis Batch: 417970

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278033-1	W-240403-EM-LCS	Total/NA	Water	SM 5220D	

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QC Association Summary

Client: GHD Services Inc.
Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

General Chemistry (Continued)

Analysis Batch: 417970 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 310-417970/32	Method Blank	Total/NA	Water	SM 5220D	
LCS 310-417970/33	Lab Control Sample	Total/NA	Water	SM 5220D	

Prep Batch: 418011

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278033-1	W-240403-EM-LCS	Total/NA	Water	1664A	
MB 310-418011/1-A	Method Blank	Total/NA	Water	1664A	
LCS 310-418011/2-A	Lab Control Sample	Total/NA	Water	1664A	

Analysis Batch: 418049

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278033-1	W-240403-EM-LCS	Total/NA	Water	I-3765-85	
MB 310-418049/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-418049/2	Lab Control Sample	Total/NA	Water	I-3765-85	

Prep Batch: 418093

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278033-1	W-240403-EM-LCS	Total/NA	Water	Distill/Phenol	
MB 310-418093/1-A	Method Blank	Total/NA	Water	Distill/Phenol	
LCS 310-418093/2-A	Lab Control Sample	Total/NA	Water	Distill/Phenol	

Analysis Batch: 418140

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278033-1	W-240403-EM-LCS	Total/NA	Water	1664A	418011
MB 310-418011/1-A	Method Blank	Total/NA	Water	1664A	418011
LCS 310-418011/2-A	Lab Control Sample	Total/NA	Water	1664A	418011

Analysis Batch: 418156

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278033-1	W-240403-EM-LCS	Total/NA	Water	SM 2540C	
MB 310-418156/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 310-418156/2	Lab Control Sample	Total/NA	Water	SM 2540C	
310-278033-1 DU	W-240403-EM-LCS	Total/NA	Water	SM 2540C	

Analysis Batch: 418171

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278033-1	W-240403-EM-LCS	Total/NA	Water	9066	418093
MB 310-418093/1-A	Method Blank	Total/NA	Water	9066	418093
LCS 310-418093/2-A	Lab Control Sample	Total/NA	Water	9066	418093

Analysis Batch: 418273

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278033-1	W-240403-EM-LCS	Total/NA	Water	D93_85	
LCS 310-418273/1	Lab Control Sample	Total/NA	Water	D93_85	

Analysis Batch: 418277

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278033-1	W-240403-EM-LCS	Total/NA	Water	350.1	
MB 310-418277/167	Method Blank	Total/NA	Water	350.1	
LCS 310-418277/168	Lab Control Sample	Total/NA	Water	350.1	

QC Association Summary

Client: GHD Services Inc.
 Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

General Chemistry

Prep Batch: 608934

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278033-1	W-240403-EM-LCS	Total/NA	Water	9030B	
MB 240-608934/1-A	Method Blank	Total/NA	Water	9030B	
LCS 240-608934/2-A	Lab Control Sample	Total/NA	Water	9030B	

Analysis Batch: 608937

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278033-1	W-240403-EM-LCS	Total/NA	Water	9034	608934
MB 240-608934/1-A	Method Blank	Total/NA	Water	9034	608934
LCS 240-608934/2-A	Lab Control Sample	Total/NA	Water	9034	608934

Prep Batch: 832423

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278033-1	W-240403-EM-LCS	Total/NA	Water	Carbon Trap	
MB 680-832423/1-A	Method Blank	Total/NA	Water	Carbon Trap	
LCS 680-832423/2-A	Lab Control Sample	Total/NA	Water	Carbon Trap	
LCSD 680-832423/14-A	Lab Control Sample Dup	Total/NA	Water	Carbon Trap	
310-278033-1 MS	W-240403-EM-LCS	Total/NA	Water	Carbon Trap	
310-278033-1 MSD	W-240403-EM-LCS	Total/NA	Water	Carbon Trap	

Analysis Batch: 832482

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278033-1	W-240403-EM-LCS	Total/NA	Water	9020B	832423
MB 680-832423/1-A	Method Blank	Total/NA	Water	9020B	832423
LCS 680-832423/2-A	Lab Control Sample	Total/NA	Water	9020B	832423
LCSD 680-832423/14-A	Lab Control Sample Dup	Total/NA	Water	9020B	832423
310-278033-1 MS	W-240403-EM-LCS	Total/NA	Water	9020B	832423
310-278033-1 MSD	W-240403-EM-LCS	Total/NA	Water	9020B	832423

Lab Chronicle

Client: GHD Services Inc.
 Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Client Sample ID: W-240403-EM-LCS

Lab Sample ID: 310-278033-1

Date Collected: 04/03/24 08:00

Matrix: Water

Date Received: 04/03/24 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	417831	WSE8	EET CF	04/04/24 13:53
Total/NA	Analysis	300.0		1	417894	QTZ5	EET CF	04/03/24 12:03
Total/NA	Prep	3005A			417897	KM3E	EET CF	04/05/24 09:00
Total/NA	Analysis	6020B		1	418086	NFT2	EET CF	04/06/24 02:09
Total/NA	Prep	7470A			418014	A6US	EET CF	04/05/24 14:12
Total/NA	Analysis	7470A		1	418170	DHM5	EET CF	04/08/24 15:12
Total/NA	Prep	1664A			418011	DGU1	EET CF	04/08/24 06:00
Total/NA	Analysis	1664A		1	418140	DGU1	EET CF	04/08/24 06:00
Total/NA	Analysis	350.1		1	418277	ZJX4	EET CF	04/09/24 21:36
Total/NA	Prep	Carbon Trap			832423	CLJ	EET SAV	04/10/24 13:45
Total/NA	Analysis	9020B		1	832482	CLJ	EET SAV	04/10/24 15:21
Total/NA	Prep	9030B			608934	VH6H	EET CLE	04/09/24 11:56
Total/NA	Analysis	9034		1	608937	VH6H	EET CLE	04/09/24 11:59
Total/NA	Prep	Distill/Phenol			418093	ENB7	EET CF	04/08/24 09:17
Total/NA	Analysis	9066		1	418171	ZJX4	EET CF	04/08/24 17:10
Total/NA	Analysis	D93_85		1	418273	WZC8	EET CF	04/09/24 16:05
Total/NA	Analysis	I-3765-85		1	418049	A4XP	EET CF	04/05/24 18:06
Total/NA	Analysis	SM 2540C		1	418156	D7CP	EET CF	04/08/24 15:48
Total/NA	Analysis	SM 4500 H+ B		1	417741	W9YR	EET CF	04/03/24 12:06
Total/NA	Analysis	SM 5220D		5	417970	D7CP	EET CF	04/05/24 10:12

Client Sample ID: Trip Blank

Lab Sample ID: 310-278033-2

Date Collected: 04/03/24 00:00

Matrix: Water

Date Received: 04/03/24 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	417831	WSE8	EET CF	04/04/24 10:59

Laboratory References:

- EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401
- EET CLE = Eurofins Cleveland, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396
- EET SAV = Eurofins Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

Accreditation/Certification Summary

Client: GHD Services Inc.
 Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Laboratory: Eurofins Cedar Falls

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Iowa	State	007	12-01-25
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
8260D		Water	1,2,3-Trichlorobenzene
8260D		Water	1,2,4-Trichlorobenzene
8260D		Water	Bromobenzene
8260D		Water	Hexane
8260D		Water	p-Isopropyltoluene
8260D		Water	sec-Butylbenzene
8260D		Water	tert-Butylbenzene
D93_85		Water	Flashpoint

Laboratory: Eurofins Cleveland

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
California	State	2927	02-28-25
Georgia	State	4062	02-27-25
Illinois	NELAP	200004	07-31-24
Iowa	State	421	06-01-25
Kentucky (WW)	State	KY98016	12-30-24
Minnesota	NELAP	039-999-348	12-31-24
New Jersey	NELAP	OH001	06-30-24
New York	NELAP	10975	04-02-25
Ohio VAP	State	ORELAP 4062	02-27-25
Oregon	NELAP	4062	02-27-25
Pennsylvania	NELAP	68-00340	08-31-24
Texas	NELAP	T104704517-22-19	08-31-24
USDA	US Federal Programs	P330-18-00281	01-05-27
Virginia	NELAP	460175	09-14-24
West Virginia DEP	State	210	12-31-24

Laboratory: Eurofins Savannah

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Iowa	State	353	07-01-25

Method Summary

Client: GHD Services Inc.
Project/Site: Leachate Semi-Annual "LCS Sample"

Job ID: 310-278033-1

Method	Method Description	Protocol	Laboratory
8260D	Volatile Organic Compounds by GC/MS	SW846	EET CF
300.0	Anions, Ion Chromatography	EPA	EET CF
6020B	Metals (ICP/MS)	SW846	EET CF
7470A	Mercury (CVAA)	SW846	EET CF
1664A	HEM and SGT-HEM	1664A	EET CF
350.1	Nitrogen, Ammonia	EPA	EET CF
9020B	Organic Halides, Total (TOX)	SW846	EET SAV
9034	Sulfide, Acid soluble and Insoluble (Titrimetric)	SW846	EET CLE
9066	Phenolics, Total Recoverable	SW846	EET CF
D93_85	Ignitability, Pinsky-Martens Closed Cup Method	ASTM	EET CF
I-3765-85	Residue, Non-filterable (TSS)	USGS	EET CF
SM 2540C	Solids, Total Dissolved (TDS)	SM	EET CF
SM 4500 H+ B	pH	SM	EET CF
SM 5220D	COD	SM	EET CF
1664A	HEM and SGT-HEM (Aqueous)	1664A	EET CF
3005A	Preparation, Total Metals	SW846	EET CF
5030B	Purge and Trap	SW846	EET CF
7470A	Preparation, Mercury	SW846	EET CF
9030B	Sulfide, Distillation (Acid Soluble and Insoluble)	SW846	EET CLE
Carbon Trap	Carbon Trap Preparation	EPA-17	EET SAV
Distill/Phenol	Distillation, Phenolics	None	EET CF

Protocol References:

1664A = EPA-821-98-002

ASTM = ASTM International

EPA = US Environmental Protection Agency

EPA-17 = "Method 1650, Revision A, Adsorbable Organic Halides By Adsorption And Colormetric Titration," EPA, February 1992

None = None

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

USGS = "Methods For Analysis Of Water And Fluvial Sediments", USGS, 1989

Laboratory References:

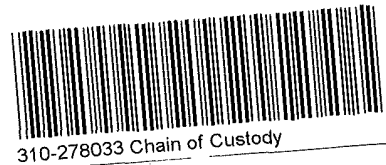
EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401

EET CLE = Eurofins Cleveland, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396

EET SAV = Eurofins Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858



Environment Testing
America



310-278033 Chain of Custody

Cooler/Sample Receipt and Temperature Log Form

Client Information			
Client: <u>GHD</u>			
City/State:	CITY <u>NEW Brighton</u>	STATE <u>MN</u>	Project: <u>Leachate Semi-Annual "LCS"</u>
Receipt Information			
Date/Time Received:	DATE <u>4/3/24</u>	TIME <u>0915</u>	Received By: <u>JD</u>
Delivery Type: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee <input type="checkbox"/> Lab Courier <input type="checkbox"/> Lab Field Services <input checked="" type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____			
Condition of Cooler/Containers			
Sample(s) received in Cooler?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler ID: _____	
Multiple Coolers?	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Cooler # <u>1</u> of <u>2</u>	
Cooler Custody Seals Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler custody seals intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Sample Custody Seals Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Sample custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Which VOA samples are in cooler? ↓	
Temperature Record			
Coolant:	<input checked="" type="checkbox"/> Wet ice <input type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> Other: _____ <input type="checkbox"/> NONE		
Thermometer ID:	<u>X</u>	Correction Factor (°C):	<u>0.0</u>
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature			
Uncorrected Temp (°C):	<u>1.6</u>	Corrected Temp (°C):	<u>1.6</u>
• Sample Container Temperature			
Container(s) used:	<u>CONTAINER 1</u>	<u>CONTAINER 2</u>	
Uncorrected Temp (°C):			
Corrected Temp (°C):			
Exceptions Noted			
1) If temperature exceeds criteria, was sample(s) received same day of sampling? <input type="checkbox"/> Yes <input type="checkbox"/> No a) If yes: Is there evidence that the chilling process began? <input type="checkbox"/> Yes <input type="checkbox"/> No			
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) <input type="checkbox"/> Yes <input type="checkbox"/> No			
NOTE If yes, contact PM before proceeding. If no, proceed with login			
Additional Comments			



Environment Testing
America

Place COC scanning label
here

Cooler/Sample Receipt and Temperature Log Form

Client Information			
Client: <u>GHD</u>			
City/State:	CITY <u>New Brighton</u>	STATE <u>MN</u>	Project: <u>"LCS"</u>
Receipt Information			
Date/Time Received:	DATE <u>7/3/24</u>	TIME <u>0915</u>	Received By: <u>[Signature]</u>
Delivery Type: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee <input type="checkbox"/> Lab Courier <input type="checkbox"/> Lab Field Services <input checked="" type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____			
Condition of Cooler/Containers			
Sample(s) received in Cooler?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler ID: _____	
Multiple Coolers?	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Cooler # <u>2</u> of <u>2</u>	
Cooler Custody Seals Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler custody seals intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Sample Custody Seals Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Sample custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank Present?	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Which VOA samples are in cooler? ↓	
<u>All</u>			
Temperature Record			
Coolant:	<input checked="" type="checkbox"/> Wet ice <input type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> Other: _____	<input type="checkbox"/> NONE	
Thermometer ID:	<u>X</u>	Correction Factor (°C): <u>0.0</u>	
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature			
Uncorrected Temp (°C):	<u>0.7</u>	Corrected Temp (°C): <u>0.7</u>	
• Sample Container Temperature			
Container(s) used:	<u>CONTAINER 1</u>	<u>CONTAINER 2</u>	
Uncorrected Temp (°C):			
Corrected Temp (°C):			
Exceptions Noted			
1) If temperature exceeds criteria, was sample(s) received same day of sampling? <input type="checkbox"/> Yes <input type="checkbox"/> No			
a) If yes: Is there evidence that the chilling process began? <input type="checkbox"/> Yes <input type="checkbox"/> No			
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) <input type="checkbox"/> Yes <input type="checkbox"/> No			
NOTE: If yes, contact PM before proceeding. If no, proceed with login			
Additional Comments			
<u>"LCS" VOC's only - in cooler "2"</u>			



Client Information
 Client Contact: Mr. Grant Anderson
 Company: GHD Services Inc.
 Address: 900 Long Lake Road Suite 200
 City: New Brighton
 State, Zip: MN 55112
 Phone: 651-639-0913 (Tel) 651-639-0923 (Fax)
 Email: grant.anderson@ghd.com
 Project Name: Leachate Semi-Annual "LCS Sample"
 Site: W-240403-EM-LCS

Sampler: Elizabeth Mitchell
 Bindert, Zach T
 E-Mail: Zach.Bindert@et.eurofins.com
 Phone: 978 324 1578
 PWSID: _____

Due Date Requested: _____
 TAT Requested (days): 14
 Compliance Project: Yes No
 PO #: _____
 Purchase Order Requested: _____
 WO #: 056934
 Project #: 31017275
 SSOW#: _____

Sample Identification
 Sample ID: W-240403-EM-LCS
 Sample Date: 4/3/24
 Sample Time: 0800
 Sample Type: G
 Matrix: Water
 Preservation Code: _____

Analysis Requested

Analysis Requested	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	Ammonia - 3501, COP - 6220D	Chloride and Sulfate - 300_ORGFM, 28D, Nitrate, Nitrite	300_ORGFM	PCRA Metals + Fe and Mn - 6020B, 7470A	D3, 86 - Flashpoint	8260D - Volatile Standard List	TDS - 2540C, Coloid, TSS - L, 3765, 85, pH - SM4500, H+	1664A - Oil and Grease	5024, Calc - Sulfide	9806 - Total Recoverable	5020B - TOX	Total Number of Containers	Special Instructions/Note.
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<u>14</u>	<u>Nitrate, Nitrite - 48 HOUR HOLD TIME</u>
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<u>14</u>	<u>900 vials in other cooler w/ top blank-5.</u>

Preservation Codes:
 A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, Other: _____
 M - Hexane, N - None, O - AshNaO2, P - Na2O4S, Q - Na2SO3, R - Na2SO4, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Y - Trizma, Z - other (specify)

Special Instructions/Note:
 Nitrate, Nitrite - 48 HOUR HOLD TIME
 900 vials in other cooler w/ top blank-5.

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
 Return To Client Disposal By Lab Archive For _____ Months

Possible Hazard Identification
 Non-Hazard Flammable Skin Irritant Poison B Unknown Radiological
 Deliverable Requested: I, II, III, IV, Other (specify)

Empty Kit Relinquished by: _____ Date: _____
 Relinquished by: [Signature] Date/Time: 4/3/24 0855 Company: GHD
 Relinquished by: _____ Date/Time: _____ Company: _____
 Relinquished by: _____ Date/Time: _____ Company: _____

Custody Seals Intact: Yes No
 Cooler Temperature(s) °C and Other Remarks: _____



Eurofins - Cleveland Sample Receipt Form/Narrative Login # _____

Barberton Facility

Client Eurofins - CF Site Name _____ Cooler unpacked by: [Signature]

Cooler Received on 4-4-24 Opened on 4-4-24

FedEx: 1st Grd UPS FAS Waypoint Client Drop Off Eurofins Courier Other _____

Receipt After-hours Drop-off Date/Time _____ Storage Location _____

Eurofins Cooler # EC Team Box Client Cooler Box Other _____

Packing material used Bubble Wrap Foam Plastic Bag None Other _____

COOLANT: Wet Ice Blue Ice Dry Ice Water None

1 Cooler temperature upon receipt See Multiple Cooler Form

IR GUN # 17 (CF +0.2 °C) Observed Cooler Temp 1.7 °C Corrected Cooler Temp 1.9 °C

2 Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 1
 -Were the seals on the outside of the cooler(s) signed & dated? Yes No NA
 Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)? Yes No NA
 Were tamper/custody seals intact and uncompromised? Yes No NA

3 Shippers' packing slip attached to the cooler(s)? Yes No NA

4 Did custody papers accompany the sample(s)? Yes No NA

5 Were the custody papers relinquished & signed in the appropriate place? Yes No NA

6 Was/were the person(s) who collected the samples clearly identified on the COC? Yes No NA

7 Did all bottles arrive in good condition (Unbroken)? Yes No NA

8 Could all bottle labels (ID/Date/Time) be reconciled with the COC? Yes No NA

9 For each sample, does the COC specify preservatives (Y/N), # of containers (Y/N), and sample type of grab/comp (Y/N)? Yes No NA

10 Were correct bottle(s) used for the test(s) indicated? Yes No NA

11 Sufficient quantity received to perform indicated analyses? Yes No NA

12 Are these work share samples and all listed on the COC? Yes No NA

If yes, Questions 13-17 have been checked at the originating laboratory

13 Were all preserved sample(s) at the correct pH upon receipt? Yes No NA pH Strp Lot# HCC329089

14 Were VOA's on the COC? Yes No NA

15 Were air bubbles >6 mm in any VOA vials? Larger than this Yes No NA

16 Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # _____ Yes No NA

17 Was a LL Hg or Me Hg trip blank present? Yes No NA

Contacted PM _____ Date _____ by _____ via Verbal Voice Mail Other _____

Concerning _____

18. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES additional next page Samples processed by _____

19 SAMPLE CONDITION _____ were received after the recommended holding time had expired.
 Sample(s) _____ were received in a broken container
 Sample(s) _____ were received with bubble >6 mm in diameter (Notify PM)
 Sample(s) _____

20 SAMPLE PRESERVATION _____ were further preserved in the laboratory
 Sample(s) _____
 Time preserved _____ Preservative(s) added/Lot number(s) _____
 VOA Sample Preservation Date/Time VOAs Frozen _____

Eurofins Cedar Falls

3019 Venture Way
Cedar Falls, IA 50613
Phone: 319-277-2401 Fax: 319-277-2425

Chain of Custody Record



Environment Testing

Client Information (Sub Contract Lab)		Sampler:		Lab PM:		Carrier Tracking No(s):		COC No:			
Client Contact: Shipping/Receiving		Phone:		Bindert, Zach T		E-Mail: Zach.Bindert@et.eurofinsus.com		310-70946.1			
Company: Eurofins Environment Testing Southeast,		Accreditations Required (See note): State - Iowa		State of Origin: Iowa		Page: Page 1 of 1		Job #: 310-278033-1			
Address: 5102 LaRoche Avenue,		Due Date Requested: 4/16/2024		Analysis Requested						Preservation Codes: A - HCL M - Hexane B - NaOH N - None C - Zn Acetate O - AsNaO2 D - Nitric Acid P - Na2O4S E - NaHSO4 Q - Na2SO3 F - MeOH R - Na2S2O3 G - Amchlor S - H2SO4 H - Ascorbic Acid T - TSP Dodecahydrate I - Ice U - Acetone J - DI Water V - MCAA K - EDTA W - pH 4-5 L - EDA Y - Trizma Z - other (specify)	
City: Savannah		TAT Requested (days):									
State, Zip: GA, 31404		PO #:		Field Filtered Sample (Yes or No)		Perform MS/MSD (Yes or No)		90208/Carbon_Trap (MOD) Total Organic Halides (TOX)		Total Number of Containers	
Phone: 912-354-7858(Tel) 912-352-0165(Fax)		WO #:									
Email:		Project #: 31017275		Sample Type (C=Comp, G=grab)		Matrix (W=water, S=solid, O=water/soil, BT=Tissue, AA=Air)		Preservation Code:		Special Instructions/Note:	
Project Name: Leachate Semi-Annual "LCS Sample"		SSOW#:									
Site:		Sample Date		Sample Time		Field Filtered Sample (Yes or No)		Perform MS/MSD (Yes or No)		Total Number of Containers	
Sample Identification - Client ID (Lab ID)		Sample Date		Sample Time		Field Filtered Sample (Yes or No)		Perform MS/MSD (Yes or No)		Total Number of Containers	
W-240403-EM-LCS (310-278033-1)		4/3/24		08:00 Central		X		X		1	
<p>Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing North Central, LLC places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Environment Testing North Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing North Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Environment Testing North Central, LLC.</p>											
Possible Hazard Identification						Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)					
Unconfirmed						<input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months					
Deliverable Requested: I, II, III, IV, Other (specify)						Primary Deliverable Rank: 2					
Special Instructions/QC Requirements:											
Empty Kit Relinquished by:				Date:		Time:		Method of Shipment:			
Relinquished by:		Date/Time:		Company		Received by:		Date/Time:		Company	
Relinquished by:		Date/Time:		Company		Received by:		Date/Time:		Company	
Relinquished by:		Date/Time:		Company		Received by:		Date/Time:		Company	
Custody Seals Intact:		Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:							
Δ Yes Δ No											



Login Sample Receipt Checklist

Client: GHD Services Inc.

Job Number: 310-278033-1

Login Number: 278033

List Source: Eurofins Cedar Falls

List Number: 1

Creator: Costello, Mackenzie K

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



Login Sample Receipt Checklist

Client: GHD Services Inc.

Job Number: 310-278033-1

Login Number: 278033

List Number: 3

Creator: Munro, Caroline

List Source: Eurofins Savannah

List Creation: 04/04/24 04:10 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ANALYTICAL REPORT

PREPARED FOR

Attn: Mr. Grant Anderson
GHD Services Inc.
900 Long Lake Road
Suite 200
New Brighton, Minnesota 55112

Generated 4/12/2024 12:39:13 PM

JOB DESCRIPTION

Viking Pump Landfill

JOB NUMBER

310-278364-1

Eurofins Cedar Falls

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

Authorization



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4/12/2024 12:39:13 PM

Authorized for release by
Zach Bindert, Client Service Manager
Zach.Bindert@et.eurofinsus.com
(319)277-2401



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Case Narrative

Client: GHD Services Inc.
Project: Viking Pump Landfill

Job ID: 310-278364-1

Job ID: 310-278364-1

Eurofins Cedar Falls

Job Narrative 310-278364-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt

The sample was received on 4/5/2024 11:40 AM. Unless otherwise noted below, the sample arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 3.6°C.

Metals

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Eurofins Cedar Falls

Sample Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278364-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-278364-1	S-240405-EM-WFS	Solid	04/05/24 10:43	04/05/24 11:40

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14

Detection Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278364-1

Client Sample ID: S-240405-EM-WFS

Lab Sample ID: 310-278364-1

No Detections.

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14

This Detection Summary does not include radiochemical test results.

Eurofins Cedar Falls

Client Sample Results

Client: GHD Services Inc.
 Project/Site: Viking Pump Landfill

Job ID: 310-278364-1

Client Sample ID: S-240405-EM-WFS

Lab Sample ID: 310-278364-1

Date Collected: 04/05/24 10:43

Matrix: Solid

Date Received: 04/05/24 11:40

Method: SW846 6010D - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.100		0.100		mg/L		04/10/24 09:00	04/10/24 17:53	1
Barium	<0.200		0.200		mg/L		04/10/24 09:00	04/10/24 17:53	1
Cadmium	<0.0200		0.0200		mg/L		04/10/24 09:00	04/10/24 17:53	1
Chromium	<0.0200		0.0200		mg/L		04/10/24 09:00	04/10/24 17:53	1
Lead	<0.100		0.100		mg/L		04/10/24 09:00	04/10/24 17:53	1
Selenium	<0.100		0.100		mg/L		04/10/24 09:00	04/10/24 17:53	1
Silver	<0.0500		0.0500		mg/L		04/10/24 09:00	04/10/24 17:53	1

Method: SW846 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00200		0.00200		mg/L		04/10/24 10:40	04/11/24 12:57	1

Definitions/Glossary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278364-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

QC Sample Results

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278364-1

Method: 6010D - Metals (ICP)

Lab Sample ID: LB 310-418143/1-B
Matrix: Solid
Analysis Batch: 418462

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 418254

Analyte	LB LB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Arsenic	<0.100		0.100		mg/L		04/10/24 09:00	04/10/24 17:16	1
Barium	<0.200		0.200		mg/L		04/10/24 09:00	04/10/24 17:16	1
Cadmium	<0.0200		0.0200		mg/L		04/10/24 09:00	04/10/24 17:16	1
Chromium	<0.0200		0.0200		mg/L		04/10/24 09:00	04/10/24 17:16	1
Lead	<0.100		0.100		mg/L		04/10/24 09:00	04/10/24 17:16	1
Selenium	<0.100		0.100		mg/L		04/10/24 09:00	04/10/24 17:16	1
Silver	<0.0500		0.0500		mg/L		04/10/24 09:00	04/10/24 17:16	1

Lab Sample ID: LCS 310-418143/2-B
Matrix: Solid
Analysis Batch: 418462

Client Sample ID: Lab Control Sample
Prep Type: TCLP
Prep Batch: 418254

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Barium	2.00	2.025		mg/L		101	80 - 120
Cadmium	2.00	1.827		mg/L		91	80 - 120
Chromium	2.00	1.883		mg/L		94	80 - 120
Lead	4.00	3.691		mg/L		92	80 - 120
Selenium	8.00	7.819		mg/L		98	80 - 120
Silver	2.00	2.060		mg/L		103	80 - 120

Method: 7470A - Mercury (CVAA)

Lab Sample ID: LB 310-418143/1-C
Matrix: Solid
Analysis Batch: 418535

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 418342

Analyte	LB LB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Mercury	<0.00200		0.00200		mg/L		04/10/24 10:40	04/11/24 12:29	1

Lab Sample ID: LCS 310-418143/2-C
Matrix: Solid
Analysis Batch: 418535

Client Sample ID: Lab Control Sample
Prep Type: TCLP
Prep Batch: 418342

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits

QC Association Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278364-1

Metals

Leach Batch: 418143

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278364-1	S-240405-EM-WFS	TCLP	Solid	1311	
LB 310-418143/1-B	Method Blank	TCLP	Solid	1311	
LB 310-418143/1-C	Method Blank	TCLP	Solid	1311	
LCS 310-418143/2-B	Lab Control Sample	TCLP	Solid	1311	
LCS 310-418143/2-C	Lab Control Sample	TCLP	Solid	1311	

Prep Batch: 418254

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278364-1	S-240405-EM-WFS	TCLP	Solid	3010A	418143
LB 310-418143/1-B	Method Blank	TCLP	Solid	3010A	418143
LCS 310-418143/2-B	Lab Control Sample	TCLP	Solid	3010A	418143

Prep Batch: 418342

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278364-1	S-240405-EM-WFS	TCLP	Solid	7470A	418143
LB 310-418143/1-C	Method Blank	TCLP	Solid	7470A	418143
LCS 310-418143/2-C	Lab Control Sample	TCLP	Solid	7470A	418143

Analysis Batch: 418462

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278364-1	S-240405-EM-WFS	TCLP	Solid	6010D	418254
LB 310-418143/1-B	Method Blank	TCLP	Solid	6010D	418254
LCS 310-418143/2-B	Lab Control Sample	TCLP	Solid	6010D	418254

Analysis Batch: 418535

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-278364-1	S-240405-EM-WFS	TCLP	Solid	7470A	418342
LB 310-418143/1-C	Method Blank	TCLP	Solid	7470A	418342
LCS 310-418143/2-C	Lab Control Sample	TCLP	Solid	7470A	418342

Lab Chronicle

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278364-1

Client Sample ID: S-240405-EM-WFS

Lab Sample ID: 310-278364-1

Date Collected: 04/05/24 10:43

Matrix: Solid

Date Received: 04/05/24 11:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
TCLP	Leach	1311			418143	D0DG	EET CF	04/08/24 15:30 - 04/09/24 08:00 ¹
TCLP	Prep	3010A			418254	KM3E	EET CF	04/10/24 09:00
TCLP	Analysis	6010D		1	418462	ZRI4	EET CF	04/10/24 17:53
TCLP	Leach	1311			418143	D0DG	EET CF	04/08/24 15:30 - 04/09/24 08:00 ¹
TCLP	Prep	7470A			418342	A6US	EET CF	04/10/24 10:40
TCLP	Analysis	7470A		1	418535	A6US	EET CF	04/11/24 12:57

¹ This procedure uses a method stipulated length of time for the process. Both start and end times are displayed.

Laboratory References:

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401



Accreditation/Certification Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278364-1

Laboratory: Eurofins Cedar Falls

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Iowa	State	007	12-01-25

- 1
- 2
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- 13
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Method Summary

Client: GHD Services Inc.
Project/Site: Viking Pump Landfill

Job ID: 310-278364-1

Method	Method Description	Protocol	Laboratory
6010D	Metals (ICP)	SW846	EET CF
7470A	Mercury (CVAA)	SW846	EET CF
1311	TCLP Extraction	SW846	EET CF
3010A	Preparation, Total Metals	SW846	EET CF
7470A	Preparation, Mercury	SW846	EET CF

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401





Environment Testing
America



310-278364 Chain of Custody

Cooler/Sample Receipt and Temperature Log Form

Client Information			
Client: <u>GHD</u>			
City/State:	CITY	STATE	Project:
		<u>MN</u>	
Receipt Information			
Date/Time Received:	DATE	TIME	Received By:
	<u>4-5-24</u>	<u>1140</u>	<u>ML</u>
Delivery Type: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee <input type="checkbox"/> Lab Courier <input type="checkbox"/> Lab Field Services <input checked="" type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____			
Condition of Cooler/Containers			
Sample(s) received in Cooler?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler ID: _____	
Multiple Coolers?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Cooler # _____ of _____	
Cooler Custody Seals Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler custody seals intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Sample Custody Seals Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Sample custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Which VOA samples are in cooler? ↓	
Temperature Record			
Coolant:	<input checked="" type="checkbox"/> Wet ice <input type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> Other: _____ <input type="checkbox"/> NONE		
Thermometer ID:	<u>T</u>	Correction Factor (°C):	<u>0</u>
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature			
Uncorrected Temp (°C):	<u>3.4</u>	Corrected Temp (°C):	<u>3.6</u>
• Sample Container Temperature			
Container(s) used:	CONTAINER 1	CONTAINER 2	
Uncorrected Temp (°C):			
Corrected Temp (°C):			
Exceptions Noted			
1) If temperature exceeds criteria, was sample(s) received same day of sampling? <input type="checkbox"/> Yes <input type="checkbox"/> No a) If yes: Is there evidence that the chilling process began? <input type="checkbox"/> Yes <input type="checkbox"/> No			
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) <input type="checkbox"/> Yes <input type="checkbox"/> No			
NOTE: If yes, contact PM before proceeding. If no, proceed with login			
Additional Comments			



TAL-8210

Client Contact		Project Manager: Grant Anderson		Site Contact: Elizabeth P. Zeschall		COC No: 1 of 1	
Company Name: btd		Tel/Email: gahd.com		Lab Contact: Leah Binder		Carrier:	
Address: 900 Congress St Ste 200		Analysis Turnaround Time		Performs MS/MSD (Y/N)		Sampler:	
City/State/Zip: MN 55112		<input type="checkbox"/> CALENDAR DAYS <input checked="" type="checkbox"/> WORKING DAYS TAT if different from Below:		Filtered Sample (Y/N)		For Lab Use Only:	
Phone: 651-639-8913		<input checked="" type="checkbox"/> 2 weeks <input type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 1 day		Matrix		Walk-in Client:	
Subject Name: Viking Pump		Sample Date		# of Cont.		Lab Sampling	
ID: bndf113		Sample Time		Matrix		Job / SDG No	
O# 050939		4/5/29/1043		soil 1			
Sample Identification		Sample Type (C=Comp, G=Grab)		Matrix		Sample Specific Notes	
240405-EM-WFS		C		soil 1			
Preservation Used: 1= Ice, 2= HCl, 3= H2SO4, 4= HNO3, 5= NaOH, 6= Other Possible Hazard Identification: Please List any EPA Waste Codes for the sample in the comments Section if the lab is to dispose of the sample <input checked="" type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Unknown							
Special Instructions/QC Requirements & Comments: Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) <input type="checkbox"/> Return to Client <input type="checkbox"/> Disposal by Lab <input type="checkbox"/> Archive for _____ Months							
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No		Cooler Temp (°C) Obs'd		Therm ID No	
Relinquished by: [Signature]		Company: GHD		Received by: [Signature]		Date/Time: 4/5/29 11:19	
Relinquished by: [Signature]		Company: GHD		Received by: [Signature]		Date/Time: 4/5/29 11:40	
Relinquished by: [Signature]		Company: GHD		Received in Laboratory by: [Signature]		Date/Time: [Blank]	



Login Sample Receipt Checklist

Client: GHD Services Inc.

Job Number: 310-278364-1

Login Number: 278364

List Source: Eurofins Cedar Falls

List Number: 1

Creator: Costello, Mackenzie K

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ANALYTICAL REPORT

PREPARED FOR

Attn: Alicia Ferber

GHD Inc.

900 Long Lake Road

Suite 200

New Brighton, Minnesota 55112

Generated 10/30/2024 9:28:57 AM Revision 1

JOB DESCRIPTION

MW/SW Semi-Annual Fall

JOB NUMBER

310-292237-1

Eurofins Cedar Falls

Job Notes

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The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

Authorization



Authorized for release by
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Zach.Bindert@et.eurofinsus.com
(319)595-2016

Generated
10/30/2024 9:28:57 AM
Revision 1



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Case Narrative

Client: GHD Inc.
Project: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Job ID: 310-292237-1

Eurofins Cedar Falls

Job Narrative 310-292237-1

REVISION

The report being provided is a revision of the original report sent on 10/28/2024. The report (revision 1) is being revised due to This report was revised 10/30/2024. Sample IDs were entered incorrectly..

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers and/or narrative comments are included to explain any exceptions, if applicable.

- Matrix QC may not be reported if insufficient sample is provided or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt

The samples were received on 10/8/2024 1:25 PM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperatures of the 2 coolers at receipt time were 3.5°C and 5.3°C.

GC/MS VOA

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

HPLC/IC

Method 9056A_ORGFM_28D: The following samples were diluted due to the nature of the sample matrix: GW-100724-MGA-01 (310-292237-1), GW-100824-MGA-04 (310-292237-4) and GW-100824-MGA-08 (310-292237-8). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Metals

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Eurofins Cedar Falls

Sample Summary

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-292237-1	GW-100724-MGA-01 MW-8	Water	10/07/24 15:35	10/08/24 13:25
310-292237-2	GW-100724-MGA-02 MW-7R	Water	10/07/24 16:50	10/08/24 13:25
310-292237-3	GW-100724-MGA-03 MW-15	Water	10/07/24 17:53	10/08/24 13:25
310-292237-4	GW-100824-MGA-04 MW-22 MS/MSD	Water	10/08/24 08:40	10/08/24 13:25
310-292237-5	GW-100824-MGA-05 MW-21	Water	10/08/24 09:50	10/08/24 13:25
310-292237-6	GW-100824-MGA-06 MW-21 DUP	Water	10/08/24 09:50	10/08/24 13:25
310-292237-7	GW-100824-MGA-07 MW-11	Water	10/08/24 11:00	10/08/24 13:25
310-292237-8	GW-100824-MGA-08 FB	Water	10/08/24 11:35	10/08/24 13:25
310-292237-9	GW-100824-MGA-09 MW-17R	Water	10/08/24 11:50	10/08/24 13:25
310-292237-10	Trip Blank	Water	10/08/24 00:00	10/08/24 13:25



Detection Summary

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Client Sample ID: GW-100724-MGA-01 MW-8

Lab Sample ID: 310-292237-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.103		0.00200		mg/L	1		6020B	Total/NA

Client Sample ID: GW-100724-MGA-02 MW-7R

Lab Sample ID: 310-292237-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	61.1		5.00		mg/L	5		9056A	Total/NA
Barium	0.0642		0.00200		mg/L	1		6020B	Total/NA
Iron	1.39		0.100		mg/L	1		6020B	Total/NA
Manganese	0.926		0.0100		mg/L	1		6020B	Total/NA
Molybdenum	0.00652		0.00200		mg/L	1		6020B	Total/NA
Ammonia	0.377		0.200		mg/L	1		350.1	Total/NA
Chemical Oxygen Demand	30.6		25.0		mg/L	5		SM 5220D	Total/NA

Client Sample ID: GW-100724-MGA-03 MW-15

Lab Sample ID: 310-292237-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	6.85		5.00		mg/L	5		9056A	Total/NA
Barium	0.0553		0.00200		mg/L	1		6020B	Total/NA
Iron	0.801		0.100		mg/L	1		6020B	Total/NA
Manganese	0.0531		0.0100		mg/L	1		6020B	Total/NA
Molybdenum	0.00820		0.00200		mg/L	1		6020B	Total/NA
Ammonia	1.18		0.200		mg/L	1		350.1	Total/NA

Client Sample ID: GW-100824-MGA-04 MW-22 MS/MSD

Lab Sample ID: 310-292237-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.0814		0.00200		mg/L	1		6020B	Total/NA
Iron	0.937		0.100		mg/L	1		6020B	Total/NA
Manganese	0.0487		0.0100		mg/L	1		6020B	Total/NA
Molybdenum	0.00497		0.00200		mg/L	1		6020B	Total/NA
Ammonia	1.02	F1	0.200		mg/L	1		350.1	Total/NA
Chemical Oxygen Demand	25.3		25.0		mg/L	5		SM 5220D	Total/NA

Client Sample ID: GW-100824-MGA-05 MW-21

Lab Sample ID: 310-292237-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	65.9		5.00		mg/L	5		9056A	Total/NA
Barium	0.163		0.00200		mg/L	1		6020B	Total/NA
Iron	1.95		0.100		mg/L	1		6020B	Total/NA
Manganese	0.217		0.0100		mg/L	1		6020B	Total/NA
Molybdenum	0.00226		0.00200		mg/L	1		6020B	Total/NA
Ammonia	0.392		0.200		mg/L	1		350.1	Total/NA

Client Sample ID: GW-100824-MGA-06 MW-21 DUP

Lab Sample ID: 310-292237-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	67.3		5.00		mg/L	5		9056A	Total/NA
Barium	0.161		0.00200		mg/L	1		6020B	Total/NA
Iron	1.87		0.100		mg/L	1		6020B	Total/NA
Manganese	0.213		0.0100		mg/L	1		6020B	Total/NA
Ammonia	0.385		0.200		mg/L	1		350.1	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Cedar Falls

Detection Summary

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Client Sample ID: GW-100824-MGA-07 MW-11

Lab Sample ID: 310-292237-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	5.39		5.00		mg/L	5		9056A	Total/NA
Barium	0.147		0.00200		mg/L	1		6020B	Total/NA
Iron	0.163		0.100		mg/L	1		6020B	Total/NA
Manganese	0.483		0.0100		mg/L	1		6020B	Total/NA
Molybdenum	0.00530		0.00200		mg/L	1		6020B	Total/NA
Ammonia	0.314		0.200		mg/L	1		350.1	Total/NA
Chemical Oxygen Demand	30.6		25.0		mg/L	5		SM 5220D	Total/NA

Client Sample ID: GW-100824-MGA-08 FB

Lab Sample ID: 310-292237-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chemical Oxygen Demand	27.1	F2	25.0		mg/L	5		SM 5220D	Total/NA

Client Sample ID: GW-100824-MGA-09 MW-17R

Lab Sample ID: 310-292237-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	42.3		5.00		mg/L	5		9056A	Total/NA
Barium	0.0936		0.00200		mg/L	1		6020B	Total/NA
Iron	8.00		0.100		mg/L	1		6020B	Total/NA
Manganese	1.97		0.0100		mg/L	1		6020B	Total/NA
Molybdenum	0.00390		0.00200		mg/L	1		6020B	Total/NA
Ammonia	0.516		0.200		mg/L	1		350.1	Total/NA
Total Suspended Solids	14.0		5.00		mg/L	1		I-3765-85	Total/NA
Chemical Oxygen Demand	35.9		25.0		mg/L	5		SM 5220D	Total/NA

Client Sample ID: Trip Blank

Lab Sample ID: 310-292237-10

No Detections.

This Detection Summary does not include radiochemical test results.

Eurofins Cedar Falls

Client Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Client Sample ID: GW-100724-MGA-01 MW-8

Lab Sample ID: 310-292237-1

Date Collected: 10/07/24 15:35

Matrix: Water

Date Received: 10/08/24 13:25

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			10/12/24 09:11	1
Benzene	<0.500		0.500		ug/L			10/12/24 09:11	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		80 - 120					10/12/24 09:11	1
Dibromofluoromethane (Surr)	99		73 - 130					10/12/24 09:11	1
Toluene-d8 (Surr)	100		80 - 120					10/12/24 09:11	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<5.00		5.00		mg/L			10/16/24 12:38	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.103		0.00200		mg/L		10/11/24 09:30	10/11/24 22:28	1
Copper	<0.00500		0.00500		mg/L		10/11/24 09:30	10/11/24 22:28	1
Iron	<0.100		0.100		mg/L		10/11/24 09:30	10/17/24 15:34	1
Lead	<0.000500		0.000500		mg/L		10/11/24 09:30	10/11/24 22:28	1
Manganese	<0.0100		0.0100		mg/L		10/11/24 09:30	10/11/24 22:28	1
Molybdenum	<0.00200		0.00200		mg/L		10/11/24 09:30	10/11/24 22:28	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	<0.200		0.200		mg/L			10/08/24 20:14	1
Total Suspended Solids (USGS I-3765-85)	<5.00		5.00		mg/L			10/08/24 19:39	1
Chemical Oxygen Demand (SM 5220D)	<25.0		25.0		mg/L			10/09/24 12:33	5

Client Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Client Sample ID: GW-100724-MGA-02 MW-7R

Lab Sample ID: 310-292237-2

Date Collected: 10/07/24 16:50

Matrix: Water

Date Received: 10/08/24 13:25

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			10/12/24 19:50	1
Benzene	<0.500		0.500		ug/L			10/12/24 19:50	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		80 - 120					10/12/24 19:50	1
Dibromofluoromethane (Surr)	101		73 - 130					10/12/24 19:50	1
Toluene-d8 (Surr)	99		80 - 120					10/12/24 19:50	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	61.1		5.00		mg/L			10/16/24 12:53	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.0642		0.00200		mg/L		10/11/24 09:30	10/11/24 22:33	1
Copper	<0.00500		0.00500		mg/L		10/11/24 09:30	10/11/24 22:33	1
Iron	1.39		0.100		mg/L		10/11/24 09:30	10/11/24 22:33	1
Lead	<0.000500		0.000500		mg/L		10/11/24 09:30	10/11/24 22:33	1
Manganese	0.926		0.0100		mg/L		10/11/24 09:30	10/11/24 22:33	1
Molybdenum	0.00652		0.00200		mg/L		10/11/24 09:30	10/11/24 22:33	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	0.377		0.200		mg/L			10/08/24 20:14	1
Total Suspended Solids (USGS I-3765-85)	<5.00		5.00		mg/L			10/08/24 19:39	1
Chemical Oxygen Demand (SM 5220D)	30.6		25.0		mg/L			10/09/24 12:33	5

Client Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Client Sample ID: GW-100724-MGA-03 MW-15

Lab Sample ID: 310-292237-3

Date Collected: 10/07/24 17:53

Matrix: Water

Date Received: 10/08/24 13:25

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			10/12/24 20:13	1
Benzene	<0.500		0.500		ug/L			10/12/24 20:13	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		80 - 120					10/12/24 20:13	1
Dibromofluoromethane (Surr)	100		73 - 130					10/12/24 20:13	1
Toluene-d8 (Surr)	99		80 - 120					10/12/24 20:13	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	6.85		5.00		mg/L			10/16/24 13:09	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.0553		0.00200		mg/L		10/11/24 09:30	10/11/24 22:35	1
Copper	<0.00500		0.00500		mg/L		10/11/24 09:30	10/11/24 22:35	1
Iron	0.801		0.100		mg/L		10/11/24 09:30	10/11/24 22:35	1
Lead	<0.000500		0.000500		mg/L		10/11/24 09:30	10/11/24 22:35	1
Manganese	0.0531		0.0100		mg/L		10/11/24 09:30	10/11/24 22:35	1
Molybdenum	0.00820		0.00200		mg/L		10/11/24 09:30	10/11/24 22:35	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	1.18		0.200		mg/L			10/08/24 20:14	1
Total Suspended Solids (USGS I-3765-85)	<5.00		5.00		mg/L			10/08/24 19:39	1
Chemical Oxygen Demand (SM 5220D)	<25.0		25.0		mg/L			10/09/24 12:33	5

Client Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Client Sample ID: GW-100824-MGA-04 MW-22 MS/MSD

Lab Sample ID: 310-292237-4

Date Collected: 10/08/24 08:40

Matrix: Water

Date Received: 10/08/24 13:25

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			10/12/24 20:36	1
Benzene	<0.500		0.500		ug/L			10/12/24 20:36	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		80 - 120					10/12/24 20:36	1
Dibromofluoromethane (Surr)	100		73 - 130					10/12/24 20:36	1
Toluene-d8 (Surr)	98		80 - 120					10/12/24 20:36	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<5.00		5.00		mg/L			10/16/24 13:24	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.0814		0.00200		mg/L		10/11/24 09:30	10/11/24 22:46	1
Copper	<0.00500		0.00500		mg/L		10/11/24 09:30	10/11/24 22:46	1
Iron	0.937		0.100		mg/L		10/11/24 09:30	10/17/24 15:47	1
Lead	<0.000500		0.000500		mg/L		10/11/24 09:30	10/11/24 22:46	1
Manganese	0.0487		0.0100		mg/L		10/11/24 09:30	10/11/24 22:46	1
Molybdenum	0.00497		0.00200		mg/L		10/11/24 09:30	10/11/24 22:46	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	1.02	F1	0.200		mg/L			10/08/24 20:16	1
Total Suspended Solids (USGS I-3765-85)	<5.00		5.00		mg/L			10/08/24 19:39	1
Chemical Oxygen Demand (SM 5220D)	25.3		25.0		mg/L			10/09/24 12:33	5

Client Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Client Sample ID: GW-100824-MGA-05 MW-21

Lab Sample ID: 310-292237-5

Date Collected: 10/08/24 09:50

Matrix: Water

Date Received: 10/08/24 13:25

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			10/12/24 20:58	1
Benzene	<0.500		0.500		ug/L			10/12/24 20:58	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		80 - 120					10/12/24 20:58	1
Dibromofluoromethane (Surr)	100		73 - 130					10/12/24 20:58	1
Toluene-d8 (Surr)	99		80 - 120					10/12/24 20:58	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	65.9		5.00		mg/L			10/16/24 16:16	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.163		0.00200		mg/L		10/11/24 09:30	10/11/24 22:56	1
Copper	<0.00500		0.00500		mg/L		10/11/24 09:30	10/11/24 22:56	1
Iron	1.95		0.100		mg/L		10/11/24 09:30	10/11/24 22:56	1
Lead	<0.000500		0.000500		mg/L		10/11/24 09:30	10/11/24 22:56	1
Manganese	0.217		0.0100		mg/L		10/11/24 09:30	10/11/24 22:56	1
Molybdenum	0.00226		0.00200		mg/L		10/11/24 09:30	10/11/24 22:56	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	0.392		0.200		mg/L			10/08/24 20:18	1
Total Suspended Solids (USGS I-3765-85)	<5.00		5.00		mg/L			10/08/24 19:39	1
Chemical Oxygen Demand (SM 5220D)	<25.0		25.0		mg/L			10/09/24 12:33	5

Client Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Client Sample ID: GW-100824-MGA-06 MW-21 DUP

Lab Sample ID: 310-292237-6

Date Collected: 10/08/24 09:50

Matrix: Water

Date Received: 10/08/24 13:25

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			10/12/24 21:21	1
Benzene	<0.500		0.500		ug/L			10/12/24 21:21	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		80 - 120					10/12/24 21:21	1
Dibromofluoromethane (Surr)	100		73 - 130					10/12/24 21:21	1
Toluene-d8 (Surr)	99		80 - 120					10/12/24 21:21	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	67.3		5.00		mg/L			10/16/24 16:32	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.161		0.00200		mg/L		10/11/24 09:30	10/11/24 22:58	1
Copper	<0.00500		0.00500		mg/L		10/11/24 09:30	10/11/24 22:58	1
Iron	1.87		0.100		mg/L		10/11/24 09:30	10/11/24 22:58	1
Lead	<0.000500		0.000500		mg/L		10/11/24 09:30	10/11/24 22:58	1
Manganese	0.213		0.0100		mg/L		10/11/24 09:30	10/11/24 22:58	1
Molybdenum	<0.00200		0.00200		mg/L		10/11/24 09:30	10/11/24 22:58	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	0.385		0.200		mg/L			10/08/24 20:19	1
Total Suspended Solids (USGS I-3765-85)	<5.00		5.00		mg/L			10/08/24 19:39	1
Chemical Oxygen Demand (SM 5220D)	<25.0		25.0		mg/L			10/09/24 12:33	5

Client Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Client Sample ID: GW-100824-MGA-07 MW-11

Lab Sample ID: 310-292237-7

Date Collected: 10/08/24 11:00

Matrix: Water

Date Received: 10/08/24 13:25

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			10/13/24 00:25	1
Benzene	<0.500		0.500		ug/L			10/13/24 00:25	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		80 - 120					10/13/24 00:25	1
Dibromofluoromethane (Surr)	100		73 - 130					10/13/24 00:25	1
Toluene-d8 (Surr)	99		80 - 120					10/13/24 00:25	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	5.39		5.00		mg/L			10/16/24 16:47	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.147		0.00200		mg/L		10/11/24 09:30	10/11/24 23:00	1
Copper	<0.00500		0.00500		mg/L		10/11/24 09:30	10/11/24 23:00	1
Iron	0.163		0.100		mg/L		10/11/24 09:30	10/11/24 23:00	1
Lead	<0.000500		0.000500		mg/L		10/11/24 09:30	10/11/24 23:00	1
Manganese	0.483		0.0100		mg/L		10/11/24 09:30	10/11/24 23:00	1
Molybdenum	0.00530		0.00200		mg/L		10/11/24 09:30	10/11/24 23:00	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	0.314		0.200		mg/L			10/08/24 20:21	1
Total Suspended Solids (USGS I-3765-85)	<5.00		5.00		mg/L			10/08/24 19:39	1
Chemical Oxygen Demand (SM 5220D)	30.6		25.0		mg/L			10/09/24 12:33	5

Client Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Client Sample ID: GW-100824-MGA-08 FB

Lab Sample ID: 310-292237-8

Date Collected: 10/08/24 11:35

Matrix: Water

Date Received: 10/08/24 13:25

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			10/12/24 21:44	1
Benzene	<0.500		0.500		ug/L			10/12/24 21:44	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		80 - 120					10/12/24 21:44	1
Dibromofluoromethane (Surr)	100		73 - 130					10/12/24 21:44	1
Toluene-d8 (Surr)	99		80 - 120					10/12/24 21:44	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<5.00		5.00		mg/L			10/16/24 17:03	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	<0.00200		0.00200		mg/L		10/11/24 09:30	10/11/24 23:02	1
Copper	<0.00500		0.00500		mg/L		10/11/24 09:30	10/11/24 23:02	1
Iron	<0.100		0.100		mg/L		10/11/24 09:30	10/11/24 23:02	1
Lead	<0.000500		0.000500		mg/L		10/11/24 09:30	10/11/24 23:02	1
Manganese	<0.0100		0.0100		mg/L		10/11/24 09:30	10/11/24 23:02	1
Molybdenum	<0.00200		0.00200		mg/L		10/11/24 09:30	10/11/24 23:02	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	<0.200		0.200		mg/L			10/08/24 20:22	1
Total Suspended Solids (USGS I-3765-85)	<5.00		5.00		mg/L			10/08/24 19:39	1
Chemical Oxygen Demand (SM 5220D)	27.1	F2	25.0		mg/L			10/09/24 12:33	5

Client Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Client Sample ID: GW-100824-MGA-09 MW-17R

Lab Sample ID: 310-292237-9

Date Collected: 10/08/24 11:50

Matrix: Water

Date Received: 10/08/24 13:25

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			10/12/24 22:07	1
Benzene	<0.500		0.500		ug/L			10/12/24 22:07	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		80 - 120					10/12/24 22:07	1
Dibromofluoromethane (Surr)	101		73 - 130					10/12/24 22:07	1
Toluene-d8 (Surr)	99		80 - 120					10/12/24 22:07	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	42.3		5.00		mg/L			10/16/24 17:18	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.0936		0.00200		mg/L		10/11/24 09:30	10/11/24 23:05	1
Copper	<0.00500		0.00500		mg/L		10/11/24 09:30	10/11/24 23:05	1
Iron	8.00		0.100		mg/L		10/11/24 09:30	10/11/24 23:05	1
Lead	<0.000500		0.000500		mg/L		10/11/24 09:30	10/11/24 23:05	1
Manganese	1.97		0.0100		mg/L		10/11/24 09:30	10/11/24 23:05	1
Molybdenum	0.00390		0.00200		mg/L		10/11/24 09:30	10/11/24 23:05	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	0.516		0.200		mg/L			10/08/24 20:23	1
Total Suspended Solids (USGS I-3765-85)	14.0		5.00		mg/L			10/08/24 19:39	1
Chemical Oxygen Demand (SM 5220D)	35.9		25.0		mg/L			10/09/24 12:33	5

Client Sample Results

Client: GHD Inc.
 Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Client Sample ID: Trip Blank

Lab Sample ID: 310-292237-10

Date Collected: 10/08/24 00:00

Matrix: Water

Date Received: 10/08/24 13:25

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			10/12/24 19:04	1
Benzene	<0.500		0.500		ug/L			10/12/24 19:04	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		80 - 120					10/12/24 19:04	1
Dibromofluoromethane (Surr)	100		73 - 130					10/12/24 19:04	1
Toluene-d8 (Surr)	99		80 - 120					10/12/24 19:04	1

- 1
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- 14
- 15

Definitions/Glossary

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Qualifiers

Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

General Chemistry

Qualifier	Qualifier Description
F1	MS and/or MSD recovery exceeds control limits.
F2	MS/MSD RPD exceeds control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Surrogate Summary

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Method: 8260D - Volatile Organic Compounds by GC/MS

Matrix: Water

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	BFB	DBFM	TOL
		(80-120)	(73-130)	(80-120)
310-292237-1	GW-100724-MGA-01	100	99	100
310-292237-1 MS	GW-100724-MGA-01	98	97	102
310-292237-1 MSD	GW-100724-MGA-01	100	97	101
310-292237-2	GW-100724-MGA-02	100	101	99
310-292237-3	GW-100724-MGA-03	99	100	99
310-292237-4	GW-100824-MGA-04	99	100	98
310-292237-4 MS	GW-100824-MGA-04	100	100	100
310-292237-4 MSD	GW-100824-MGA-04	99	100	101
310-292237-5	GW-100824-MGA-05	99	100	99
310-292237-6	GW-100824-MGA-06	100	100	99
310-292237-7	GW-100824-MGA-07	99	100	99
310-292237-8	GW-100824-MGA-08	100	100	99
310-292237-9	GW-100824-MGA-09	99	101	99
310-292237-10	Trip Blank	99	100	99
LCS 310-435995/6	Lab Control Sample	100	99	101
LCS 310-435997/6	Lab Control Sample	98	100	100
MB 310-435995/5	Method Blank	100	100	100
MB 310-435997/5	Method Blank	99	101	99

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)

DBFM = Dibromofluoromethane (Surr)

TOL = Toluene-d8 (Surr)

QC Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Method: 8260D - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 310-435995/5
Matrix: Water
Analysis Batch: 435995

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Acetone	<10.0		10.0		ug/L			10/12/24 06:54	1
Benzene	<0.500		0.500		ug/L			10/12/24 06:54	1
Surrogate	MB MB		Limits				Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier							
4-Bromofluorobenzene (Surr)	100		80 - 120					10/12/24 06:54	1
Dibromofluoromethane (Surr)	100		73 - 130					10/12/24 06:54	1
Toluene-d8 (Surr)	100		80 - 120					10/12/24 06:54	1

Lab Sample ID: LCS 310-435995/6
Matrix: Water
Analysis Batch: 435995

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Benzene	20.0	20.95		ug/L		105	72 - 124
Surrogate	LCS LCS		Limits				%Rec Limits
	%Recovery	Qualifier					
4-Bromofluorobenzene (Surr)	100		80 - 120				
Dibromofluoromethane (Surr)	99		73 - 130				
Toluene-d8 (Surr)	101		80 - 120				

Lab Sample ID: 310-292237-1 MS
Matrix: Water
Analysis Batch: 435995

Client Sample ID: GW-100724-MGA-01
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Benzene	<0.500		25.0	22.19		ug/L		89	46 - 130
Surrogate	MS MS		Limits					%Rec	Limits
	%Recovery	Qualifier							
4-Bromofluorobenzene (Surr)	98		80 - 120						
Dibromofluoromethane (Surr)	97		73 - 130						
Toluene-d8 (Surr)	102		80 - 120						

Lab Sample ID: 310-292237-1 MSD
Matrix: Water
Analysis Batch: 435995

Client Sample ID: GW-100724-MGA-01
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	Limit
Benzene	<0.500		25.0	22.41		ug/L		90	46 - 130	1	20
Surrogate	MSD MSD		Limits					%Rec	Limits	RPD	Limit
	%Recovery	Qualifier									
4-Bromofluorobenzene (Surr)	100		80 - 120								
Dibromofluoromethane (Surr)	97		73 - 130								
Toluene-d8 (Surr)	101		80 - 120								

QC Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: MB 310-435997/5
Matrix: Water
Analysis Batch: 435997

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Acetone	<10.0		10.0		ug/L			10/12/24 17:55	1
Benzene	<0.500		0.500		ug/L			10/12/24 17:55	1
Surrogate	MB	MB	Limits	Prepared	Analyzed	Dil Fac			
	%Recovery	Qualifier							
4-Bromofluorobenzene (Surr)	99		80 - 120		10/12/24 17:55	1			
Dibromofluoromethane (Surr)	101		73 - 130		10/12/24 17:55	1			
Toluene-d8 (Surr)	99		80 - 120		10/12/24 17:55	1			

Lab Sample ID: LCS 310-435997/6
Matrix: Water
Analysis Batch: 435997

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec Limits
		Result	Qualifier				
Acetone	40.0	37.65		ug/L		94	50 - 150
Benzene	20.0	19.93		ug/L		100	72 - 124
Surrogate	LCS	LCS	Limits				
	%Recovery	Qualifier					
4-Bromofluorobenzene (Surr)	98		80 - 120				
Dibromofluoromethane (Surr)	100		73 - 130				
Toluene-d8 (Surr)	100		80 - 120				

Lab Sample ID: 310-292237-4 MS
Matrix: Water
Analysis Batch: 435997

Client Sample ID: GW-100824-MGA-04
Prep Type: Total/NA

Analyte	Sample	Sample	Spike Added	MS	MS	Unit	D	%Rec	%Rec Limits
	Result	Qualifier		Result	Qualifier				
Acetone	<10.0		50.0	50.42		ug/L		101	31 - 150
Benzene	<0.500		25.0	26.20		ug/L		105	46 - 130
Surrogate	MS	MS	Limits						
	%Recovery	Qualifier							
4-Bromofluorobenzene (Surr)	100		80 - 120						
Dibromofluoromethane (Surr)	100		73 - 130						
Toluene-d8 (Surr)	100		80 - 120						

Lab Sample ID: 310-292237-4 MSD
Matrix: Water
Analysis Batch: 435997

Client Sample ID: GW-100824-MGA-04
Prep Type: Total/NA

Analyte	Sample	Sample	Spike Added	MSD	MSD	Unit	D	%Rec	%Rec Limits	RPD	Limit
	Result	Qualifier		Result	Qualifier						
Acetone	<10.0		50.0	49.24		ug/L		98	31 - 150	2	29
Benzene	<0.500		25.0	23.46		ug/L		94	46 - 130	11	20
Surrogate	MSD	MSD	Limits								
	%Recovery	Qualifier									
4-Bromofluorobenzene (Surr)	99		80 - 120								
Dibromofluoromethane (Surr)	100		73 - 130								
Toluene-d8 (Surr)	101		80 - 120								

QC Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 310-436816/3
Matrix: Water
Analysis Batch: 436816

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<1.00		1.00		mg/L			10/16/24 11:04	1

Lab Sample ID: LCS 310-436816/4
Matrix: Water
Analysis Batch: 436816

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	10.0	9.571		mg/L		96	90 - 110

Lab Sample ID: 310-292237-4 MS
Matrix: Water
Analysis Batch: 436816

Client Sample ID: GW-100824-MGA-04
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	<5.00		25.0	24.85		mg/L		99	80 - 120

Lab Sample ID: 310-292237-4 MSD
Matrix: Water
Analysis Batch: 436816

Client Sample ID: GW-100824-MGA-04
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	Limit
Chloride	<5.00		25.0	24.33		mg/L		97	80 - 120	2	15

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 310-435876/1-A
Matrix: Water
Analysis Batch: 436085

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 435876

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	<0.00200		0.00200		mg/L		10/11/24 09:30	10/11/24 22:24	1
Copper	<0.00500		0.00500		mg/L		10/11/24 09:30	10/11/24 22:24	1
Iron	<0.100		0.100		mg/L		10/11/24 09:30	10/11/24 22:24	1
Lead	<0.000500		0.000500		mg/L		10/11/24 09:30	10/11/24 22:24	1
Manganese	<0.0100		0.0100		mg/L		10/11/24 09:30	10/11/24 22:24	1
Molybdenum	<0.00200		0.00200		mg/L		10/11/24 09:30	10/11/24 22:24	1

Lab Sample ID: LCS 310-435876/2-A
Matrix: Water
Analysis Batch: 436085

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 435876

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Barium	0.100	0.09948		mg/L		99	80 - 120
Copper	0.200	0.2262		mg/L		113	80 - 120
Lead	0.200	0.2078		mg/L		104	80 - 120
Manganese	0.100	0.09540		mg/L		95	80 - 120
Molybdenum	0.200	0.2004		mg/L		100	80 - 120

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QC Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Method: 6020B - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 310-435876/2-A
Matrix: Water
Analysis Batch: 436228

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 435876

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Iron	0.200	0.2173		mg/L		109	80 - 120

Lab Sample ID: 310-292237-4 MS
Matrix: Water
Analysis Batch: 436085

Client Sample ID: GW-100824-MGA-04
Prep Type: Total/NA
Prep Batch: 435876

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Barium	0.0814		0.100	0.1777		mg/L		96	75 - 125
Copper	<0.00500		0.200	0.2091		mg/L		105	75 - 125
Lead	<0.000500		0.200	0.1990		mg/L		99	75 - 125
Manganese	0.0487		0.100	0.1669		mg/L		118	75 - 125
Molybdenum	0.00497		0.200	0.2114		mg/L		103	75 - 125

Lab Sample ID: 310-292237-4 MS
Matrix: Water
Analysis Batch: 436697

Client Sample ID: GW-100824-MGA-04
Prep Type: Total/NA
Prep Batch: 435876

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Iron	0.937		0.200	1.124	4	mg/L		94	75 - 125

Lab Sample ID: 310-292237-4 MSD
Matrix: Water
Analysis Batch: 436085

Client Sample ID: GW-100824-MGA-04
Prep Type: Total/NA
Prep Batch: 435876

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	Limit
Barium	0.0814		0.100	0.1789		mg/L		98	75 - 125	1	20
Copper	<0.00500		0.200	0.2120		mg/L		106	75 - 125	1	20
Lead	<0.000500		0.200	0.2051		mg/L		103	75 - 125	3	20
Manganese	0.0487		0.100	0.1419		mg/L		93	75 - 125	16	20
Molybdenum	0.00497		0.200	0.2145		mg/L		105	75 - 125	1	20

Lab Sample ID: 310-292237-4 MSD
Matrix: Water
Analysis Batch: 436697

Client Sample ID: GW-100824-MGA-04
Prep Type: Total/NA
Prep Batch: 435876

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	Limit
Iron	0.937		0.200	1.053	4	mg/L		58	75 - 125	7	20

Lab Sample ID: 310-292237-1 DU
Matrix: Water
Analysis Batch: 436085

Client Sample ID: GW-100724-MGA-01
Prep Type: Total/NA
Prep Batch: 435876

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	Limit
Barium	0.103		0.1043		mg/L		1	20
Copper	<0.00500		<0.00500		mg/L		NC	20
Lead	<0.000500		<0.000500		mg/L		NC	20
Manganese	<0.0100		<0.0100		mg/L		NC	20
Molybdenum	<0.00200		<0.00200		mg/L		NC	20

QC Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Method: 6020B - Metals (ICP/MS) (Continued)

Lab Sample ID: 310-292237-1 DU
Matrix: Water
Analysis Batch: 436697

Client Sample ID: GW-100724-MGA-01
Prep Type: Total/NA
Prep Batch: 435876

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	Limit
Iron	<0.100		<0.100		mg/L		NC	20

Method: 350.1 - Nitrogen, Ammonia

Lab Sample ID: MB 310-435593/142
Matrix: Water
Analysis Batch: 435593

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	<0.200		0.200		mg/L			10/08/24 20:12	1

Lab Sample ID: LCS 310-435593/143
Matrix: Water
Analysis Batch: 435593

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Ammonia	8.55	8.423		mg/L		99	90 - 110

Lab Sample ID: 310-292237-4 MS
Matrix: Water
Analysis Batch: 435593

Client Sample ID: GW-100824-MGA-04
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Ammonia	1.02	F1	1.00	1.801	F1	mg/L		79	90 - 110

Lab Sample ID: 310-292237-4 MSD
Matrix: Water
Analysis Batch: 435593

Client Sample ID: GW-100824-MGA-04
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	Limit
Ammonia	1.02	F1	1.00	1.839	F1	mg/L		82	90 - 110	2	13

Method: I-3765-85 - Residue, Non-filterable (TSS)

Lab Sample ID: MB 310-435596/1
Matrix: Water
Analysis Batch: 435596

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<5.00		5.00		mg/L			10/08/24 19:39	1

Lab Sample ID: LCS 310-435596/2
Matrix: Water
Analysis Batch: 435596

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	100	90.00		mg/L		90	81 - 116

Eurofins Cedar Falls

QC Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Method: I-3765-85 - Residue, Non-filterable (TSS) (Continued)

Lab Sample ID: 310-292237-4 DU
Matrix: Water
Analysis Batch: 435596

Client Sample ID: GW-100824-MGA-04
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Suspended Solids	<5.00		6.333		mg/L		NC	35

Lab Sample ID: 310-292237-7 DU
Matrix: Water
Analysis Batch: 435596

Client Sample ID: GW-100824-MGA-07
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Suspended Solids	<5.00		<5.00		mg/L		NC	35

Lab Sample ID: 310-292237-8 DU
Matrix: Water
Analysis Batch: 435596

Client Sample ID: GW-100824-MGA-08
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Suspended Solids	<5.00		<5.00		mg/L		NC	35

Method: SM 5220D - COD

Lab Sample ID: MB 310-435682/32
Matrix: Water
Analysis Batch: 435682

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	<5.00		5.00		mg/L			10/09/24 12:33	1

Lab Sample ID: MB 310-435682/60
Matrix: Water
Analysis Batch: 435682

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	<5.00		5.00		mg/L			10/09/24 12:33	1

Lab Sample ID: LCS 310-435682/33
Matrix: Water
Analysis Batch: 435682

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chemical Oxygen Demand	125	126.2		mg/L		101	85 - 110

Lab Sample ID: LCS 310-435682/63
Matrix: Water
Analysis Batch: 435682

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chemical Oxygen Demand	125	125.1		mg/L		100	85 - 110

QC Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Method: SM 5220D - COD (Continued)

Lab Sample ID: 310-292237-4 MS

Matrix: Water

Analysis Batch: 435682

Client Sample ID: GW-100824-MGA-04

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Chemical Oxygen Demand	25.3		250	314.9		mg/L		116	83 - 145

Lab Sample ID: 310-292237-4 MSD

Matrix: Water

Analysis Batch: 435682

Client Sample ID: GW-100824-MGA-04

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Chemical Oxygen Demand	25.3		250	318.4		mg/L		117	83 - 145	1	16

Lab Sample ID: 310-292237-8 MS

Matrix: Water

Analysis Batch: 435682

Client Sample ID: GW-100824-MGA-08

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Chemical Oxygen Demand	27.1	F2	250	250.0		mg/L		89	83 - 145

Lab Sample ID: 310-292237-8 MSD

Matrix: Water

Analysis Batch: 435682

Client Sample ID: GW-100824-MGA-08

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Chemical Oxygen Demand	27.1	F2	250	318.4	F2	mg/L		117	83 - 145	24	16

QC Association Summary

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

GC/MS VOA

Analysis Batch: 435995

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292237-1	GW-100724-MGA-01	Total/NA	Water	8260D	
MB 310-435995/5	Method Blank	Total/NA	Water	8260D	
LCS 310-435995/6	Lab Control Sample	Total/NA	Water	8260D	
310-292237-1 MS	GW-100724-MGA-01	Total/NA	Water	8260D	
310-292237-1 MSD	GW-100724-MGA-01	Total/NA	Water	8260D	

Analysis Batch: 435997

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292237-2	GW-100724-MGA-02	Total/NA	Water	8260D	
310-292237-3	GW-100724-MGA-03	Total/NA	Water	8260D	
310-292237-4	GW-100824-MGA-04	Total/NA	Water	8260D	
310-292237-5	GW-100824-MGA-05	Total/NA	Water	8260D	
310-292237-6	GW-100824-MGA-06	Total/NA	Water	8260D	
310-292237-7	GW-100824-MGA-07	Total/NA	Water	8260D	
310-292237-8	GW-100824-MGA-08	Total/NA	Water	8260D	
310-292237-9	GW-100824-MGA-09	Total/NA	Water	8260D	
310-292237-10	Trip Blank	Total/NA	Water	8260D	
MB 310-435997/5	Method Blank	Total/NA	Water	8260D	
LCS 310-435997/6	Lab Control Sample	Total/NA	Water	8260D	
310-292237-4 MS	GW-100824-MGA-04	Total/NA	Water	8260D	
310-292237-4 MSD	GW-100824-MGA-04	Total/NA	Water	8260D	

HPLC/IC

Analysis Batch: 436816

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292237-1	GW-100724-MGA-01	Total/NA	Water	9056A	
310-292237-2	GW-100724-MGA-02	Total/NA	Water	9056A	
310-292237-3	GW-100724-MGA-03	Total/NA	Water	9056A	
310-292237-4	GW-100824-MGA-04	Total/NA	Water	9056A	
310-292237-5	GW-100824-MGA-05	Total/NA	Water	9056A	
310-292237-6	GW-100824-MGA-06	Total/NA	Water	9056A	
310-292237-7	GW-100824-MGA-07	Total/NA	Water	9056A	
310-292237-8	GW-100824-MGA-08	Total/NA	Water	9056A	
310-292237-9	GW-100824-MGA-09	Total/NA	Water	9056A	
MB 310-436816/3	Method Blank	Total/NA	Water	9056A	
LCS 310-436816/4	Lab Control Sample	Total/NA	Water	9056A	
310-292237-4 MS	GW-100824-MGA-04	Total/NA	Water	9056A	
310-292237-4 MSD	GW-100824-MGA-04	Total/NA	Water	9056A	

Metals

Prep Batch: 435876

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292237-1	GW-100724-MGA-01	Total/NA	Water	3005A	
310-292237-2	GW-100724-MGA-02	Total/NA	Water	3005A	
310-292237-3	GW-100724-MGA-03	Total/NA	Water	3005A	
310-292237-4	GW-100824-MGA-04	Total/NA	Water	3005A	
310-292237-5	GW-100824-MGA-05	Total/NA	Water	3005A	
310-292237-6	GW-100824-MGA-06	Total/NA	Water	3005A	
310-292237-7	GW-100824-MGA-07	Total/NA	Water	3005A	
310-292237-8	GW-100824-MGA-08	Total/NA	Water	3005A	

Eurofins Cedar Falls

QC Association Summary

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Metals (Continued)

Prep Batch: 435876 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292237-9	GW-100824-MGA-09	Total/NA	Water	3005A	
MB 310-435876/1-A	Method Blank	Total/NA	Water	3005A	
LCS 310-435876/2-A	Lab Control Sample	Total/NA	Water	3005A	
310-292237-4 MS	GW-100824-MGA-04	Total/NA	Water	3005A	
310-292237-4 MSD	GW-100824-MGA-04	Total/NA	Water	3005A	
310-292237-1 DU	GW-100724-MGA-01	Total/NA	Water	3005A	

Analysis Batch: 436085

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292237-1	GW-100724-MGA-01	Total/NA	Water	6020B	435876
310-292237-2	GW-100724-MGA-02	Total/NA	Water	6020B	435876
310-292237-3	GW-100724-MGA-03	Total/NA	Water	6020B	435876
310-292237-4	GW-100824-MGA-04	Total/NA	Water	6020B	435876
310-292237-5	GW-100824-MGA-05	Total/NA	Water	6020B	435876
310-292237-6	GW-100824-MGA-06	Total/NA	Water	6020B	435876
310-292237-7	GW-100824-MGA-07	Total/NA	Water	6020B	435876
310-292237-8	GW-100824-MGA-08	Total/NA	Water	6020B	435876
310-292237-9	GW-100824-MGA-09	Total/NA	Water	6020B	435876
MB 310-435876/1-A	Method Blank	Total/NA	Water	6020B	435876
LCS 310-435876/2-A	Lab Control Sample	Total/NA	Water	6020B	435876
310-292237-4 MS	GW-100824-MGA-04	Total/NA	Water	6020B	435876
310-292237-4 MSD	GW-100824-MGA-04	Total/NA	Water	6020B	435876
310-292237-1 DU	GW-100724-MGA-01	Total/NA	Water	6020B	435876

Analysis Batch: 436228

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 310-435876/2-A	Lab Control Sample	Total/NA	Water	6020B	435876

Analysis Batch: 436697

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292237-1	GW-100724-MGA-01	Total/NA	Water	6020B	435876
310-292237-4	GW-100824-MGA-04	Total/NA	Water	6020B	435876
310-292237-4 MS	GW-100824-MGA-04	Total/NA	Water	6020B	435876
310-292237-4 MSD	GW-100824-MGA-04	Total/NA	Water	6020B	435876
310-292237-1 DU	GW-100724-MGA-01	Total/NA	Water	6020B	435876

General Chemistry

Analysis Batch: 435593

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292237-1	GW-100724-MGA-01	Total/NA	Water	350.1	
310-292237-2	GW-100724-MGA-02	Total/NA	Water	350.1	
310-292237-3	GW-100724-MGA-03	Total/NA	Water	350.1	
310-292237-4	GW-100824-MGA-04	Total/NA	Water	350.1	
310-292237-5	GW-100824-MGA-05	Total/NA	Water	350.1	
310-292237-6	GW-100824-MGA-06	Total/NA	Water	350.1	
310-292237-7	GW-100824-MGA-07	Total/NA	Water	350.1	
310-292237-8	GW-100824-MGA-08	Total/NA	Water	350.1	
310-292237-9	GW-100824-MGA-09	Total/NA	Water	350.1	
MB 310-435593/142	Method Blank	Total/NA	Water	350.1	
LCS 310-435593/143	Lab Control Sample	Total/NA	Water	350.1	

Eurofins Cedar Falls

QC Association Summary

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

General Chemistry (Continued)

Analysis Batch: 435593 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292237-4 MS	GW-100824-MGA-04	Total/NA	Water	350.1	
310-292237-4 MSD	GW-100824-MGA-04	Total/NA	Water	350.1	

Analysis Batch: 435596

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292237-1	GW-100724-MGA-01	Total/NA	Water	I-3765-85	
310-292237-2	GW-100724-MGA-02	Total/NA	Water	I-3765-85	
310-292237-3	GW-100724-MGA-03	Total/NA	Water	I-3765-85	
310-292237-4	GW-100824-MGA-04	Total/NA	Water	I-3765-85	
310-292237-5	GW-100824-MGA-05	Total/NA	Water	I-3765-85	
310-292237-6	GW-100824-MGA-06	Total/NA	Water	I-3765-85	
310-292237-7	GW-100824-MGA-07	Total/NA	Water	I-3765-85	
310-292237-8	GW-100824-MGA-08	Total/NA	Water	I-3765-85	
310-292237-9	GW-100824-MGA-09	Total/NA	Water	I-3765-85	
MB 310-435596/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-435596/2	Lab Control Sample	Total/NA	Water	I-3765-85	
310-292237-4 DU	GW-100824-MGA-04	Total/NA	Water	I-3765-85	
310-292237-7 DU	GW-100824-MGA-07	Total/NA	Water	I-3765-85	
310-292237-8 DU	GW-100824-MGA-08	Total/NA	Water	I-3765-85	

Analysis Batch: 435682

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292237-1	GW-100724-MGA-01	Total/NA	Water	SM 5220D	
310-292237-2	GW-100724-MGA-02	Total/NA	Water	SM 5220D	
310-292237-3	GW-100724-MGA-03	Total/NA	Water	SM 5220D	
310-292237-4	GW-100824-MGA-04	Total/NA	Water	SM 5220D	
310-292237-5	GW-100824-MGA-05	Total/NA	Water	SM 5220D	
310-292237-6	GW-100824-MGA-06	Total/NA	Water	SM 5220D	
310-292237-7	GW-100824-MGA-07	Total/NA	Water	SM 5220D	
310-292237-8	GW-100824-MGA-08	Total/NA	Water	SM 5220D	
310-292237-9	GW-100824-MGA-09	Total/NA	Water	SM 5220D	
MB 310-435682/32	Method Blank	Total/NA	Water	SM 5220D	
MB 310-435682/60	Method Blank	Total/NA	Water	SM 5220D	
LCS 310-435682/33	Lab Control Sample	Total/NA	Water	SM 5220D	
LCS 310-435682/63	Lab Control Sample	Total/NA	Water	SM 5220D	
310-292237-4 MS	GW-100824-MGA-04	Total/NA	Water	SM 5220D	
310-292237-4 MSD	GW-100824-MGA-04	Total/NA	Water	SM 5220D	
310-292237-8 MS	GW-100824-MGA-08	Total/NA	Water	SM 5220D	
310-292237-8 MSD	GW-100824-MGA-08	Total/NA	Water	SM 5220D	

Lab Chronicle

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Client Sample ID: GW-100724-MGA-01

Lab Sample ID: 310-292237-1

Date Collected: 10/07/24 15:35

Matrix: Water

Date Received: 10/08/24 13:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	435995	FE5V	EET CF	10/12/24 09:11
Total/NA	Analysis	9056A		5	436816	HE7K	EET CF	10/16/24 12:38
Total/NA	Prep	3005A			435876	F5MW	EET CF	10/11/24 09:30
Total/NA	Analysis	6020B		1	436085	A6US	EET CF	10/11/24 22:28
Total/NA	Prep	3005A			435876	F5MW	EET CF	10/11/24 09:30
Total/NA	Analysis	6020B		1	436697	NFT2	EET CF	10/17/24 15:34
Total/NA	Analysis	350.1		1	435593	ZJX4	EET CF	10/08/24 20:14
Total/NA	Analysis	I-3765-85		1	435596	MDU9	EET CF	10/08/24 19:39
Total/NA	Analysis	SM 5220D		5	435682	ENB7	EET CF	10/09/24 12:33

Client Sample ID: GW-100724-MGA-02

Lab Sample ID: 310-292237-2

Date Collected: 10/07/24 16:50

Matrix: Water

Date Received: 10/08/24 13:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	435997	FE5V	EET CF	10/12/24 19:50
Total/NA	Analysis	9056A		5	436816	HE7K	EET CF	10/16/24 12:53
Total/NA	Prep	3005A			435876	F5MW	EET CF	10/11/24 09:30
Total/NA	Analysis	6020B		1	436085	A6US	EET CF	10/11/24 22:33
Total/NA	Analysis	350.1		1	435593	ZJX4	EET CF	10/08/24 20:14
Total/NA	Analysis	I-3765-85		1	435596	MDU9	EET CF	10/08/24 19:39
Total/NA	Analysis	SM 5220D		5	435682	ENB7	EET CF	10/09/24 12:33

Client Sample ID: GW-100724-MGA-03

Lab Sample ID: 310-292237-3

Date Collected: 10/07/24 17:53

Matrix: Water

Date Received: 10/08/24 13:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	435997	FE5V	EET CF	10/12/24 20:13
Total/NA	Analysis	9056A		5	436816	HE7K	EET CF	10/16/24 13:09
Total/NA	Prep	3005A			435876	F5MW	EET CF	10/11/24 09:30
Total/NA	Analysis	6020B		1	436085	A6US	EET CF	10/11/24 22:35
Total/NA	Analysis	350.1		1	435593	ZJX4	EET CF	10/08/24 20:14
Total/NA	Analysis	I-3765-85		1	435596	MDU9	EET CF	10/08/24 19:39
Total/NA	Analysis	SM 5220D		5	435682	ENB7	EET CF	10/09/24 12:33

Client Sample ID: GW-100824-MGA-04

Lab Sample ID: 310-292237-4

Date Collected: 10/08/24 08:40

Matrix: Water

Date Received: 10/08/24 13:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	435997	FE5V	EET CF	10/12/24 20:36
Total/NA	Analysis	9056A		5	436816	HE7K	EET CF	10/16/24 13:24

Eurofins Cedar Falls

Lab Chronicle

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Client Sample ID: GW-100824-MGA-04

Lab Sample ID: 310-292237-4

Date Collected: 10/08/24 08:40

Matrix: Water

Date Received: 10/08/24 13:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3005A			435876	F5MW	EET CF	10/11/24 09:30
Total/NA	Analysis	6020B		1	436085	A6US	EET CF	10/11/24 22:46
Total/NA	Prep	3005A			435876	F5MW	EET CF	10/11/24 09:30
Total/NA	Analysis	6020B		1	436697	NFT2	EET CF	10/17/24 15:47
Total/NA	Analysis	350.1		1	435593	ZJX4	EET CF	10/08/24 20:16
Total/NA	Analysis	I-3765-85		1	435596	MDU9	EET CF	10/08/24 19:39
Total/NA	Analysis	SM 5220D		5	435682	ENB7	EET CF	10/09/24 12:33

Client Sample ID: GW-100824-MGA-05

Lab Sample ID: 310-292237-5

Date Collected: 10/08/24 09:50

Matrix: Water

Date Received: 10/08/24 13:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	435997	FE5V	EET CF	10/12/24 20:58
Total/NA	Analysis	9056A		5	436816	HE7K	EET CF	10/16/24 16:16
Total/NA	Prep	3005A			435876	F5MW	EET CF	10/11/24 09:30
Total/NA	Analysis	6020B		1	436085	A6US	EET CF	10/11/24 22:56
Total/NA	Analysis	350.1		1	435593	ZJX4	EET CF	10/08/24 20:18
Total/NA	Analysis	I-3765-85		1	435596	MDU9	EET CF	10/08/24 19:39
Total/NA	Analysis	SM 5220D		5	435682	ENB7	EET CF	10/09/24 12:33

Client Sample ID: GW-100824-MGA-06

Lab Sample ID: 310-292237-6

Date Collected: 10/08/24 09:50

Matrix: Water

Date Received: 10/08/24 13:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	435997	FE5V	EET CF	10/12/24 21:21
Total/NA	Analysis	9056A		5	436816	HE7K	EET CF	10/16/24 16:32
Total/NA	Prep	3005A			435876	F5MW	EET CF	10/11/24 09:30
Total/NA	Analysis	6020B		1	436085	A6US	EET CF	10/11/24 22:58
Total/NA	Analysis	350.1		1	435593	ZJX4	EET CF	10/08/24 20:19
Total/NA	Analysis	I-3765-85		1	435596	MDU9	EET CF	10/08/24 19:39
Total/NA	Analysis	SM 5220D		5	435682	ENB7	EET CF	10/09/24 12:33

Client Sample ID: GW-100824-MGA-07

Lab Sample ID: 310-292237-7

Date Collected: 10/08/24 11:00

Matrix: Water

Date Received: 10/08/24 13:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	435997	FE5V	EET CF	10/13/24 00:25
Total/NA	Analysis	9056A		5	436816	HE7K	EET CF	10/16/24 16:47
Total/NA	Prep	3005A			435876	F5MW	EET CF	10/11/24 09:30
Total/NA	Analysis	6020B		1	436085	A6US	EET CF	10/11/24 23:00
Total/NA	Analysis	350.1		1	435593	ZJX4	EET CF	10/08/24 20:21

Eurofins Cedar Falls

Lab Chronicle

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Client Sample ID: GW-100824-MGA-07

Lab Sample ID: 310-292237-7

Date Collected: 10/08/24 11:00

Matrix: Water

Date Received: 10/08/24 13:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	I-3765-85		1	435596	MDU9	EET CF	10/08/24 19:39
Total/NA	Analysis	SM 5220D		5	435682	ENB7	EET CF	10/09/24 12:33

Client Sample ID: GW-100824-MGA-08

Lab Sample ID: 310-292237-8

Date Collected: 10/08/24 11:35

Matrix: Water

Date Received: 10/08/24 13:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	435997	FE5V	EET CF	10/12/24 21:44
Total/NA	Analysis	9056A		5	436816	HE7K	EET CF	10/16/24 17:03
Total/NA	Prep	3005A			435876	F5MW	EET CF	10/11/24 09:30
Total/NA	Analysis	6020B		1	436085	A6US	EET CF	10/11/24 23:02
Total/NA	Analysis	350.1		1	435593	ZJX4	EET CF	10/08/24 20:22
Total/NA	Analysis	I-3765-85		1	435596	MDU9	EET CF	10/08/24 19:39
Total/NA	Analysis	SM 5220D		5	435682	ENB7	EET CF	10/09/24 12:33

Client Sample ID: GW-100824-MGA-09

Lab Sample ID: 310-292237-9

Date Collected: 10/08/24 11:50

Matrix: Water

Date Received: 10/08/24 13:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	435997	FE5V	EET CF	10/12/24 22:07
Total/NA	Analysis	9056A		5	436816	HE7K	EET CF	10/16/24 17:18
Total/NA	Prep	3005A			435876	F5MW	EET CF	10/11/24 09:30
Total/NA	Analysis	6020B		1	436085	A6US	EET CF	10/11/24 23:05
Total/NA	Analysis	350.1		1	435593	ZJX4	EET CF	10/08/24 20:23
Total/NA	Analysis	I-3765-85		1	435596	MDU9	EET CF	10/08/24 19:39
Total/NA	Analysis	SM 5220D		5	435682	ENB7	EET CF	10/09/24 12:33

Client Sample ID: Trip Blank

Lab Sample ID: 310-292237-10

Date Collected: 10/08/24 00:00

Matrix: Water

Date Received: 10/08/24 13:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	435997	FE5V	EET CF	10/12/24 19:04

Laboratory References:

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401

Accreditation/Certification Summary

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Laboratory: Eurofins Cedar Falls

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Iowa	State	007	12-01-25

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Method Summary

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual Fall

Job ID: 310-292237-1

Method	Method Description	Protocol	Laboratory
8260D	Volatile Organic Compounds by GC/MS	SW846	EET CF
9056A	Anions, Ion Chromatography	SW846	EET CF
6020B	Metals (ICP/MS)	SW846	EET CF
350.1	Nitrogen, Ammonia	EPA	EET CF
I-3765-85	Residue, Non-filterable (TSS)	USGS	EET CF
SM 5220D	COD	SM	EET CF
3005A	Preparation, Total Metals	SW846	EET CF
5030B	Purge and Trap	SW846	EET CF

Protocol References:

EPA = US Environmental Protection Agency

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

USGS = "Methods For Analysis Of Water And Fluvial Sediments", USGS, 1989

Laboratory References:

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401





Cooler/Sample Receipt and Temperature Log Form

Client Information			
Client: <u>GHD</u>			
City/State:	CITY: <u>MINN</u>	STATE: <u>MINN</u>	Project:
Receipt Information			
Date/Time Received:	DATE: <u>10/8/24</u>	TIME: <u>1325</u>	Received By: <u>N</u>
Delivery Type: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee <input type="checkbox"/> Lab Courier <input type="checkbox"/> Lab Field Services <input checked="" type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____			
Condition of Cooler/Containers			
Sample(s) received in Cooler?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler ID: _____	
Multiple Coolers?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler # <u>1</u> of <u>2</u>	
Cooler Custody Seals Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Cooler custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Sample Custody Seals Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Sample custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Which VOA samples are in cooler? ↓	
Temperature Record			
Coolant:	<input checked="" type="checkbox"/> Wet ice	<input type="checkbox"/> Blue ice	<input type="checkbox"/> Dry ice <input type="checkbox"/> Other: _____ <input type="checkbox"/> NONE
Thermometer ID:	<u>Y</u>	Correction Factor (°C):	<u>10.0</u>
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature			
Uncorrected Temp (°C):	<u>3.5</u>	Corrected Temp (°C):	<u>35</u>
• Sample Container Temperature			
Container(s) used:	<u>CONTAINER 1</u>	<u>CONTAINER 2</u>	
Uncorrected Temp (°C):			
Corrected Temp (°C):			
Exceptions Noted			
1) If temperature exceeds criteria, was sample(s) received same day of sampling?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
a) If yes: Is there evidence that the chilling process began?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?)		<input type="checkbox"/> Yes	<input type="checkbox"/> No
NOTE. If yes, contact PM before proceeding. If no, proceed with login			
Additional Comments			





Environment Testing
America

Place COC scanning label
here

Cooler/Sample Receipt and Temperature Log Form

Client Information			
Client <u>4/10</u>			
City/State:	CITY <u>4/10</u>	STATE <u>MN</u>	Project:
Receipt Information			
Date/Time Received:	DATE <u>10/18/24</u>	TIME <u>1325</u>	Received By: <u>N</u>
Delivery Type: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee <input type="checkbox"/> Lab Courier <input type="checkbox"/> Lab Field Services <input checked="" type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____			
Condition of Cooler/Containers			
Sample(s) received in Cooler?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler ID:	
Multiple Coolers?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler # <u>2</u> of <u>2</u>	
Cooler Custody Seals Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Cooler custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Sample Custody Seals Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Sample custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Which VOA samples are in cooler? ↓	
<u>01, 02, 03, 04 MS, + MSD</u>			
Temperature Record			
Coolant: <input checked="" type="checkbox"/> Wet ice <input type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> Other: _____ <input type="checkbox"/> NONE			
Thermometer ID: <u>Ry</u>		Correction Factor (°C): <u>+0.0</u>	
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature			
Uncorrected Temp (°C): <u>5.3</u>		Corrected Temp (°C): <u>5.3</u>	
• Sample Container Temperature			
Container(s) used:	CONTAINER 1	CONTAINER 2	
Uncorrected Temp (°C):			
Corrected Temp (°C):			
Exceptions Noted			
1) If temperature exceeds criteria, was sample(s) received same day of sampling? <input type="checkbox"/> Yes <input type="checkbox"/> No a) If yes: Is there evidence that the chilling process began? <input type="checkbox"/> Yes <input type="checkbox"/> No			
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) <input type="checkbox"/> Yes <input type="checkbox"/> No			
NOTE If yes, contact PM before proceeding If no, proceed with login			
Additional Comments			



Client Information		Sampler: <u>Mary Grace Ambrust</u>		Lab P#M: <u>Bindert, Zach T</u>		Carrier Tracking No(s): <u>310-98396-26785 1</u>	
Client Contact: <u>Mr Grant Anderson</u>		Phone: <u>513-408-1673</u>		E-Mail: <u>Zach Bindert@et.eurofins.us.com</u>		Page: <u>Page 1 of 2</u>	
Company: <u>GHD Services Inc.</u>		PWSID: <u></u>		Analysis Requested		Job #:	
Address: <u>900 Long Lake Road Suite 200</u>		Due Date Requested: <u></u>		Field Filtered Sample (Yes or No)		Total Number of Containers	
City: <u>New Brighton</u>		TAT Requested (days): <u>14</u>		Param MS/MSD (Yes or No)		Preservation Codes: S - H2SO4 N - None D - HNO3 A - HCL	
State, Zip: <u>MN, 55112</u>		Compliance Project: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		965A - ORGM, 28D - Chloride		Other:	
Phone: <u>340-017991</u>		PO #: <u>340-017991</u>		960A - Barium and Iron			
Email: <u>grant.anderson@ghd.com</u>		WO #: <u>056934</u>		350, 4, 6220D, LL			
Project Name: <u>MW/SW Semi-Annual - Fall</u>		Project #: <u>31017275</u>		826D - (MOD) Benzene and Acetone			
Site: <u></u>		SSON#: <u></u>		1, 3765, 85 - Residue, Non-Filterable (TSS)			
Sample Identification		Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (Water, Solid, On-water, BT-Tissue, Air)	Special Instructions/Note:	
GW-100724-MGA-01		10/7/24	1535	G	Water		Temp Blanks
GW-100724-MGA-02		10/7/24	1650	G	Water		IN each cooler,
GW-100724-MGA-03		10/7/24	1753	G	Water		TRIP Blank in
GW-100824-MGA-04		10/8/24	0840	G	Water		MAX
GW-100824-MGA-05		10/8/24	0950	G	Water		
GW-100824-MGA-06		10/8/24	0950	G	Water		
GW-100824-MGA-07		10/8/24	1100	G	Water		
GW-100824-MGA-08		10/8/24	1035	G	Water		
GW-100824-MGA-09		10/8/24	1150	G	Water		
MGA 10-8-24					Water		
Possible Hazard Identification <input checked="" type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological Deliverable Requested I, II, III, IV, Other (specify)							
Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) <input type="checkbox"/> Return To Client <input checked="" type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months							
Special Instructions/QC Requirements:							
Empty Kit Relinquished by		Date		Time		Method of Shipment	
Relinquished by: <u>Mary Grace Ambrust</u>		Date/Time: <u>10/8/24 1325</u>		Company: <u>GHD</u>		Date/Time: <u>10/22/25</u> Company: <u></u>	
Relinquished by:		Date/Time:		Company:		Date/Time: Company:	
Relinquished by:		Date/Time:		Company:		Date/Time: Company:	
Custody Seals Intact: <u>Δ Yes Δ No</u>		Custody Seal No		Cooler Temperature(s) °C and Other Remarks:			



Login Sample Receipt Checklist

Client: GHD Inc.

Job Number: 310-292237-1

SDG Number:

Login Number: 292237

List Number: 1

Creator: Homolar, Dana J

List Source: Eurofins Cedar Falls

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



ANALYTICAL REPORT

PREPARED FOR

Attn: Alicia Ferber
GHD Inc.

900 Long Lake Road
Suite 200

New Brighton, Minnesota 55112

Generated 10/30/2024 9:31:17 AM Revision 1

JOB DESCRIPTION

MW/SW Semi-Annual - Fall

JOB NUMBER

310-292363-1

Eurofins Cedar Falls

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

Authorization



Authorized for release by
Zach Bindert, Senior Project Manager
Zach.Bindert@et.eurofinsus.com
(319)595-2016

Generated
10/30/2024 9:31:17 AM
Revision 1



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Case Narrative

Client: GHD Inc.
Project: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Job ID: 310-292363-1

Eurofins Cedar Falls

Job Narrative 310-292363-1

REVISION

The report being provided is a revision of the original report sent on 10/21/2024. The report (revision 1) is being revised due to This report was revised 10/30/2024. The sample IDs were entered incorrectly..

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers and/or narrative comments are included to explain any exceptions, if applicable.

- Matrix QC may not be reported if insufficient sample is provided or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt

The samples were received on 10/9/2024 11:48 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 9.6°C.

GC/MS VOA

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

HPLC/IC

Method 9056A_ORGFM_28D: The following samples were diluted due to the nature of the sample matrix: GW-100824-MGA-10 (310-292363-1), GW-100824-MGA-12 (310-292363-3), GW-100824-MGA-13 (310-292363-4), GW-100924-MGA-15 (310-292363-6) and GW-100924-MGA-16 (310-292363-7). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Metals

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Eurofins Cedar Falls

Sample Summary

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-292363-1	GW-100824-MGA-10 MW-16	Water	10/08/24 14:30	10/09/24 11:48
310-292363-2	GW-100824-MGA-11 MW-5	Water	10/08/24 15:20	10/09/24 11:48
310-292363-3	GW-100824-MGA-12 MW-16 RB	Water	10/08/24 15:00	10/09/24 11:48
310-292363-4	GW-100824-MGA-13 MW-20	Water	10/08/24 16:30	10/09/24 11:48
310-292363-5	GW-100924-MGA-14 MW-14	Water	10/09/24 08:15	10/09/24 11:48
310-292363-6	GW-100924-MGA-15 MW-19	Water	10/09/24 09:00	10/09/24 11:48
310-292363-7	GW-100924-MGA-16 MW-19 DUP	Water	10/09/24 09:10	10/09/24 11:48
310-292363-8	Trip Blank	Water	10/09/24 00:00	10/09/24 11:48

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Detection Summary

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Client Sample ID: GW-100824-MGA-10 MW-16

Lab Sample ID: 310-292363-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.131		0.00200		mg/L	1		6020B	Total/NA
Iron	0.262		0.100		mg/L	1		6020B	Total/NA
Manganese	0.394		0.0100		mg/L	1		6020B	Total/NA
Molybdenum	0.00288		0.00200		mg/L	1		6020B	Total/NA
Ammonia	1.45		0.200		mg/L	1		350.1	Total/NA
Total Suspended Solids	6.00		1.88		mg/L	1		I-3765-85	Total/NA

Client Sample ID: GW-100824-MGA-11 MW-5

Lab Sample ID: 310-292363-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	201		5.00		mg/L	5		9056A	Total/NA
Barium	0.121		0.00200		mg/L	1		6020B	Total/NA
Iron	1.54		0.100		mg/L	1		6020B	Total/NA
Manganese	0.433		0.0100		mg/L	1		6020B	Total/NA
Total Suspended Solids	94.5		7.50		mg/L	1		I-3765-85	Total/NA

Client Sample ID: GW-100824-MGA-12 MW-16 RB

Lab Sample ID: 310-292363-3

No Detections.

Client Sample ID: GW-100824-MGA-13 MW-20

Lab Sample ID: 310-292363-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.101		0.00200		mg/L	1		6020B	Total/NA
Iron	1.07		0.100		mg/L	1		6020B	Total/NA
Lead	0.000678		0.000500		mg/L	1		6020B	Total/NA
Manganese	0.221		0.0100		mg/L	1		6020B	Total/NA
Molybdenum	0.00314		0.00200		mg/L	1		6020B	Total/NA
Ammonia	0.635		0.200		mg/L	1		350.1	Total/NA
Total Suspended Solids	74.7		5.00		mg/L	1		I-3765-85	Total/NA

Client Sample ID: GW-100924-MGA-14 MW-14

Lab Sample ID: 310-292363-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	9.78		5.00		mg/L	5		9056A	Total/NA
Barium	0.0230		0.00200		mg/L	1		6020B	Total/NA

Client Sample ID: GW-100924-MGA-15 MW-19

Lab Sample ID: 310-292363-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.179		0.00200		mg/L	1		6020B	Total/NA
Manganese	0.194		0.0100		mg/L	1		6020B	Total/NA
Molybdenum	0.0114		0.00200		mg/L	1		6020B	Total/NA
Ammonia	0.344		0.200		mg/L	1		350.1	Total/NA
Total Suspended Solids	64.5		7.50		mg/L	1		I-3765-85	Total/NA

Client Sample ID: GW-100924-MGA-16 MW-19 DUP

Lab Sample ID: 310-292363-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.183		0.00200		mg/L	1		6020B	Total/NA
Manganese	0.168		0.0100		mg/L	1		6020B	Total/NA
Molybdenum	0.0116		0.00200		mg/L	1		6020B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Cedar Falls

Detection Summary

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Client Sample ID: Trip Blank

Lab Sample ID: 310-292363-8

No Detections.

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This Detection Summary does not include radiochemical test results.

Eurofins Cedar Falls

Client Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Client Sample ID: GW-100824-MGA-10 MW-16

Lab Sample ID: 310-292363-1

Date Collected: 10/08/24 14:30

Matrix: Water

Date Received: 10/09/24 11:48

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			10/12/24 22:53	1
Benzene	<0.500		0.500		ug/L			10/12/24 22:53	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		80 - 120					10/12/24 22:53	1
Dibromofluoromethane (Surr)	101		73 - 130					10/12/24 22:53	1
Toluene-d8 (Surr)	99		80 - 120					10/12/24 22:53	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<5.00		5.00		mg/L			10/16/24 13:13	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.131		0.00200		mg/L		10/11/24 09:30	10/16/24 13:35	1
Copper	<0.00500		0.00500		mg/L		10/11/24 09:30	10/16/24 13:35	1
Iron	0.262		0.100		mg/L		10/11/24 09:30	10/16/24 13:35	1
Lead	<0.000500		0.000500		mg/L		10/11/24 09:30	10/16/24 13:35	1
Manganese	0.394		0.0100		mg/L		10/11/24 09:30	10/16/24 13:35	1
Molybdenum	0.00288		0.00200		mg/L		10/11/24 09:30	10/16/24 13:35	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	1.45		0.200		mg/L			10/10/24 20:58	1
Chemical Oxygen Demand (SM 5220D LL)	<5.00		5.00		mg/L			10/16/24 10:09	1
Total Suspended Solids (USGS I-3765-85)	6.00		1.88		mg/L			10/11/24 08:52	1

Client Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Client Sample ID: GW-100824-MGA-11 MW-5

Lab Sample ID: 310-292363-2

Date Collected: 10/08/24 15:20

Matrix: Water

Date Received: 10/09/24 11:48

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			10/13/24 01:11	1
Benzene	<0.500		0.500		ug/L			10/14/24 13:36	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		80 - 120					10/13/24 01:11	1
4-Bromofluorobenzene (Surr)	100		80 - 120					10/14/24 13:36	1
Dibromofluoromethane (Surr)	99		73 - 130					10/13/24 01:11	1
Dibromofluoromethane (Surr)	101		73 - 130					10/14/24 13:36	1
Toluene-d8 (Surr)	100		80 - 120					10/13/24 01:11	1
Toluene-d8 (Surr)	99		80 - 120					10/14/24 13:36	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	201		5.00		mg/L			10/16/24 13:25	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.121		0.00200		mg/L		10/11/24 09:30	10/16/24 13:38	1
Copper	<0.00500		0.00500		mg/L		10/11/24 09:30	10/16/24 13:38	1
Iron	1.54		0.100		mg/L		10/11/24 09:30	10/16/24 13:38	1
Lead	<0.000500		0.000500		mg/L		10/11/24 09:30	10/16/24 13:38	1
Manganese	0.433		0.0100		mg/L		10/11/24 09:30	10/16/24 13:38	1
Molybdenum	<0.00200		0.00200		mg/L		10/11/24 09:30	10/16/24 13:38	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	<0.200		0.200		mg/L			10/10/24 20:58	1
Chemical Oxygen Demand (SM 5220D LL)	<5.00		5.00		mg/L			10/16/24 10:09	1
Total Suspended Solids (USGS I-3765-85)	94.5		7.50		mg/L			10/11/24 09:43	1

Client Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Client Sample ID: GW-100824-MGA-12 MW-16 RB

Lab Sample ID: 310-292363-3

Date Collected: 10/08/24 15:00

Matrix: Water

Date Received: 10/09/24 11:48

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			10/12/24 22:30	1
Benzene	<0.500		0.500		ug/L			10/12/24 22:30	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		80 - 120					10/12/24 22:30	1
Dibromofluoromethane (Surr)	100		73 - 130					10/12/24 22:30	1
Toluene-d8 (Surr)	99		80 - 120					10/12/24 22:30	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<5.00		5.00		mg/L			10/16/24 13:37	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	<0.00200		0.00200		mg/L		10/11/24 09:30	10/16/24 13:40	1
Copper	<0.00500		0.00500		mg/L		10/11/24 09:30	10/16/24 13:40	1
Iron	<0.100		0.100		mg/L		10/11/24 09:30	10/16/24 13:40	1
Lead	<0.000500		0.000500		mg/L		10/11/24 09:30	10/16/24 13:40	1
Manganese	<0.0100		0.0100		mg/L		10/11/24 09:30	10/16/24 13:40	1
Molybdenum	<0.00200		0.00200		mg/L		10/11/24 09:30	10/16/24 13:40	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	<0.200		0.200		mg/L			10/10/24 21:00	1
Chemical Oxygen Demand (SM 5220D LL)	<5.00		5.00		mg/L			10/16/24 10:09	1
Total Suspended Solids (USGS I-3765-85)	<1.88		1.88		mg/L			10/11/24 09:43	1

Client Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Client Sample ID: GW-100824-MGA-13 MW-20

Lab Sample ID: 310-292363-4

Date Collected: 10/08/24 16:30

Matrix: Water

Date Received: 10/09/24 11:48

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			10/13/24 01:34	1
Benzene	<0.500		0.500		ug/L			10/13/24 01:34	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		80 - 120					10/13/24 01:34	1
Dibromofluoromethane (Surr)	101		73 - 130					10/13/24 01:34	1
Toluene-d8 (Surr)	99		80 - 120					10/13/24 01:34	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<5.00		5.00		mg/L			10/16/24 13:49	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.101		0.00200		mg/L		10/11/24 09:30	10/16/24 13:42	1
Copper	<0.00500		0.00500		mg/L		10/11/24 09:30	10/16/24 13:42	1
Iron	1.07		0.100		mg/L		10/11/24 09:30	10/16/24 13:42	1
Lead	0.000678		0.000500		mg/L		10/11/24 09:30	10/16/24 13:42	1
Manganese	0.221		0.0100		mg/L		10/11/24 09:30	10/16/24 13:42	1
Molybdenum	0.00314		0.00200		mg/L		10/11/24 09:30	10/16/24 13:42	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	0.635		0.200		mg/L			10/10/24 21:00	1
Chemical Oxygen Demand (SM 5220D LL)	<5.00		5.00		mg/L			10/16/24 10:09	1
Total Suspended Solids (USGS I-3765-85)	74.7		5.00		mg/L			10/11/24 09:43	1

Client Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Client Sample ID: GW-100924-MGA-14 MW-14

Lab Sample ID: 310-292363-5

Date Collected: 10/09/24 08:15

Matrix: Water

Date Received: 10/09/24 11:48

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			10/12/24 23:39	1
Benzene	<0.500		0.500		ug/L			10/12/24 23:39	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		80 - 120					10/12/24 23:39	1
Dibromofluoromethane (Surr)	99		73 - 130					10/12/24 23:39	1
Toluene-d8 (Surr)	99		80 - 120					10/12/24 23:39	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	9.78		5.00		mg/L			10/16/24 14:01	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.0230		0.00200		mg/L		10/11/24 09:30	10/16/24 13:45	1
Copper	<0.00500		0.00500		mg/L		10/11/24 09:30	10/16/24 13:45	1
Iron	<0.100		0.100		mg/L		10/11/24 09:30	10/16/24 13:45	1
Lead	<0.000500		0.000500		mg/L		10/11/24 09:30	10/16/24 13:45	1
Manganese	<0.0100		0.0100		mg/L		10/11/24 09:30	10/16/24 13:45	1
Molybdenum	<0.00200		0.00200		mg/L		10/11/24 09:30	10/16/24 13:45	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	<0.200		0.200		mg/L			10/10/24 21:02	1
Chemical Oxygen Demand (SM 5220D LL)	<5.00		5.00		mg/L			10/16/24 10:09	1
Total Suspended Solids (USGS I-3765-85)	<1.88		1.88		mg/L			10/11/24 10:44	1

Client Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Client Sample ID: GW-100924-MGA-15 MW-19

Lab Sample ID: 310-292363-6

Date Collected: 10/09/24 09:00

Matrix: Water

Date Received: 10/09/24 11:48

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			10/12/24 23:16	1
Benzene	<0.500		0.500		ug/L			10/12/24 23:16	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		80 - 120					10/12/24 23:16	1
Dibromofluoromethane (Surr)	101		73 - 130					10/12/24 23:16	1
Toluene-d8 (Surr)	99		80 - 120					10/12/24 23:16	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<5.00		5.00		mg/L			10/16/24 14:13	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.179		0.00200		mg/L		10/11/24 09:30	10/16/24 13:47	1
Copper	<0.00500		0.00500		mg/L		10/11/24 09:30	10/16/24 13:47	1
Iron	<0.100		0.100		mg/L		10/11/24 09:30	10/16/24 13:47	1
Lead	<0.000500		0.000500		mg/L		10/11/24 09:30	10/16/24 13:47	1
Manganese	0.194		0.0100		mg/L		10/11/24 09:30	10/16/24 13:47	1
Molybdenum	0.0114		0.00200		mg/L		10/11/24 09:30	10/16/24 13:47	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	0.344		0.200		mg/L			10/10/24 21:03	1
Chemical Oxygen Demand (SM 5220D LL)	<5.00		5.00		mg/L			10/16/24 10:09	1
Total Suspended Solids (USGS I-3765-85)	64.5		7.50		mg/L			10/11/24 10:44	1

Client Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Client Sample ID: GW-100924-MGA-16 MW-19 DUP

Lab Sample ID: 310-292363-7

Date Collected: 10/09/24 09:10

Matrix: Water

Date Received: 10/09/24 11:48

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			10/13/24 00:02	1
Benzene	<0.500		0.500		ug/L			10/13/24 00:02	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		80 - 120					10/13/24 00:02	1
Dibromofluoromethane (Surr)	99		73 - 130					10/13/24 00:02	1
Toluene-d8 (Surr)	99		80 - 120					10/13/24 00:02	1

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<5.00		5.00		mg/L			10/16/24 14:26	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.183		0.00200		mg/L		10/11/24 09:30	10/16/24 13:49	1
Copper	<0.00500		0.00500		mg/L		10/11/24 09:30	10/16/24 13:49	1
Iron	<0.100		0.100		mg/L		10/11/24 09:30	10/16/24 13:49	1
Lead	<0.000500		0.000500		mg/L		10/11/24 09:30	10/16/24 13:49	1
Manganese	0.168		0.0100		mg/L		10/11/24 09:30	10/16/24 13:49	1
Molybdenum	0.0116		0.00200		mg/L		10/11/24 09:30	10/16/24 13:49	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (EPA 350.1)	<0.200		0.200		mg/L			10/10/24 21:04	1
Chemical Oxygen Demand (SM 5220D LL)	<5.00		5.00		mg/L			10/16/24 10:09	1
Total Suspended Solids (USGS I-3765-85)	<1.88		1.88		mg/L			10/11/24 10:44	1

Client Sample Results

Client: GHD Inc.
 Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Client Sample ID: Trip Blank

Lab Sample ID: 310-292363-8

Date Collected: 10/09/24 00:00

Matrix: Water

Date Received: 10/09/24 11:48

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			10/12/24 19:27	1
Benzene	<0.500		0.500		ug/L			10/12/24 19:27	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		80 - 120					10/12/24 19:27	1
Dibromofluoromethane (Surr)	100		73 - 130					10/12/24 19:27	1
Toluene-d8 (Surr)	99		80 - 120					10/12/24 19:27	1

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Definitions/Glossary

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Surrogate Summary

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Method: 8260D - Volatile Organic Compounds by GC/MS

Matrix: Water

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	BFB	DBFM	TOL
		(80-120)	(73-130)	(80-120)
310-292363-1	GW-100824-MGA-10	99	101	99
310-292363-2	GW-100824-MGA-11	100	99	100
310-292363-2	GW-100824-MGA-11	100	101	99
310-292363-3	GW-100824-MGA-12	98	100	99
310-292363-4	GW-100824-MGA-13	100	101	99
310-292363-5	GW-100924-MGA-14	99	99	99
310-292363-6	GW-100924-MGA-15	100	101	99
310-292363-7	GW-100924-MGA-16	99	99	99
310-292363-8	Trip Blank	100	100	99
LCS 310-435997/6	Lab Control Sample	98	100	100
LCS 310-436139/6	Lab Control Sample	99	101	100
MB 310-435997/5	Method Blank	99	101	99
MB 310-436139/5	Method Blank	100	102	99

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)

DBFM = Dibromofluoromethane (Surr)

TOL = Toluene-d8 (Surr)

QC Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Method: 8260D - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 310-435997/5
Matrix: Water
Analysis Batch: 435997

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Acetone	<10.0		10.0		ug/L			10/12/24 17:55	1
Benzene	<0.500		0.500		ug/L			10/12/24 17:55	1
Surrogate	MB	MB	Limits	Prepared	Analyzed	Dil Fac			
%Recovery	Qualifier								
4-Bromofluorobenzene (Surr)	99		80 - 120		10/12/24 17:55	1			
Dibromofluoromethane (Surr)	101		73 - 130		10/12/24 17:55	1			
Toluene-d8 (Surr)	99		80 - 120		10/12/24 17:55	1			

Lab Sample ID: LCS 310-435997/6
Matrix: Water
Analysis Batch: 435997

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec Limits
		Result	Qualifier				
Acetone	40.0	37.65		ug/L		94	50 - 150
Benzene	20.0	19.93		ug/L		100	72 - 124
Surrogate	LCS	LCS	Limits				
%Recovery	Qualifier						
4-Bromofluorobenzene (Surr)	98		80 - 120				
Dibromofluoromethane (Surr)	100		73 - 130				
Toluene-d8 (Surr)	100		80 - 120				

Lab Sample ID: MB 310-436139/5
Matrix: Water
Analysis Batch: 436139

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Acetone	<10.0		10.0		ug/L			10/14/24 12:05	1
Benzene	<0.500		0.500		ug/L			10/14/24 12:05	1
Surrogate	MB	MB	Limits	Prepared	Analyzed	Dil Fac			
%Recovery	Qualifier								
4-Bromofluorobenzene (Surr)	100		80 - 120		10/14/24 12:05	1			
Dibromofluoromethane (Surr)	102		73 - 130		10/14/24 12:05	1			
Toluene-d8 (Surr)	99		80 - 120		10/14/24 12:05	1			

Lab Sample ID: LCS 310-436139/6
Matrix: Water
Analysis Batch: 436139

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec Limits
		Result	Qualifier				
Acetone	40.0	38.38		ug/L		96	50 - 150
Benzene	20.0	18.33		ug/L		92	72 - 124
Surrogate	LCS	LCS	Limits				
%Recovery	Qualifier						
4-Bromofluorobenzene (Surr)	99		80 - 120				
Dibromofluoromethane (Surr)	101		73 - 130				
Toluene-d8 (Surr)	100		80 - 120				

Eurofins Cedar Falls

QC Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 310-436817/3
Matrix: Water
Analysis Batch: 436817

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<1.00		1.00		mg/L			10/16/24 11:37	1

Lab Sample ID: LCS 310-436817/4
Matrix: Water
Analysis Batch: 436817

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	10.0	9.655		mg/L		97	90 - 110

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 310-435877/1-A
Matrix: Water
Analysis Batch: 436544

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 435877

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	<0.00200		0.00200		mg/L		10/11/24 09:30	10/16/24 13:11	1
Copper	<0.00500		0.00500		mg/L		10/11/24 09:30	10/16/24 13:11	1
Iron	<0.100		0.100		mg/L		10/11/24 09:30	10/16/24 13:11	1
Lead	<0.000500		0.000500		mg/L		10/11/24 09:30	10/16/24 13:11	1
Manganese	<0.0100		0.0100		mg/L		10/11/24 09:30	10/16/24 13:11	1
Molybdenum	<0.00200		0.00200		mg/L		10/11/24 09:30	10/16/24 13:11	1

Lab Sample ID: LCS 310-435877/2-A
Matrix: Water
Analysis Batch: 436544

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 435877

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Barium	0.100	0.1053		mg/L		105	80 - 120
Copper	0.200	0.2106		mg/L		105	80 - 120
Iron	0.200	0.2238		mg/L		112	80 - 120
Lead	0.200	0.2190		mg/L		109	80 - 120
Manganese	0.100	0.1075		mg/L		108	80 - 120
Molybdenum	0.200	0.2058		mg/L		103	80 - 120

Method: 350.1 - Nitrogen, Ammonia

Lab Sample ID: MB 310-435888/135
Matrix: Water
Analysis Batch: 435888

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	<0.200		0.200		mg/L			10/10/24 20:53	1

Lab Sample ID: MB 310-435888/163
Matrix: Water
Analysis Batch: 435888

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	<0.200		0.200		mg/L			10/10/24 21:15	1

Eurofins Cedar Falls

QC Sample Results

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Method: 350.1 - Nitrogen, Ammonia (Continued)

Lab Sample ID: LCS 310-435888/136
Matrix: Water
Analysis Batch: 435888

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Ammonia	8.55	8.462		mg/L		99	90 - 110

Lab Sample ID: LCS 310-435888/164
Matrix: Water
Analysis Batch: 435888

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Ammonia	8.55	8.725		mg/L		102	90 - 110

Method: 5220D LL - COD

Lab Sample ID: MB 310-436415/5
Matrix: Water
Analysis Batch: 436415

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	<5.00		5.00		mg/L			10/16/24 10:09	1

Lab Sample ID: LCS 310-436415/3
Matrix: Water
Analysis Batch: 436415

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chemical Oxygen Demand	125	130.4		mg/L		104	85 - 110

Method: I-3765-85 - Residue, Non-filterable (TSS)

Lab Sample ID: MB 310-435918/1
Matrix: Water
Analysis Batch: 435918

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<5.00		5.00		mg/L			10/11/24 08:52	1

Lab Sample ID: LCS 310-435918/2
Matrix: Water
Analysis Batch: 435918

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	100	108.0		mg/L		108	81 - 116

Lab Sample ID: MB 310-435927/1
Matrix: Water
Analysis Batch: 435927

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<5.00		5.00		mg/L			10/11/24 09:43	1

Eurofins Cedar Falls

QC Sample Results

Client: GHD Inc.
 Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Method: I-3765-85 - Residue, Non-filterable (TSS) (Continued)

Lab Sample ID: LCS 310-435927/2
Matrix: Water
Analysis Batch: 435927

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	100	98.00		mg/L		98	81 - 116

Lab Sample ID: MB 310-435939/1
Matrix: Water
Analysis Batch: 435939

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<5.00		5.00		mg/L			10/11/24 10:44	1

Lab Sample ID: LCS 310-435939/2
Matrix: Water
Analysis Batch: 435939

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	100	104.0		mg/L		104	81 - 116

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QC Association Summary

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

GC/MS VOA

Analysis Batch: 435997

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292363-1	GW-100824-MGA-10	Total/NA	Water	8260D	
310-292363-2	GW-100824-MGA-11	Total/NA	Water	8260D	
310-292363-3	GW-100824-MGA-12	Total/NA	Water	8260D	
310-292363-4	GW-100824-MGA-13	Total/NA	Water	8260D	
310-292363-5	GW-100924-MGA-14	Total/NA	Water	8260D	
310-292363-6	GW-100924-MGA-15	Total/NA	Water	8260D	
310-292363-7	GW-100924-MGA-16	Total/NA	Water	8260D	
310-292363-8	Trip Blank	Total/NA	Water	8260D	
MB 310-435997/5	Method Blank	Total/NA	Water	8260D	
LCS 310-435997/6	Lab Control Sample	Total/NA	Water	8260D	

Analysis Batch: 436139

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292363-2	GW-100824-MGA-11	Total/NA	Water	8260D	
MB 310-436139/5	Method Blank	Total/NA	Water	8260D	
LCS 310-436139/6	Lab Control Sample	Total/NA	Water	8260D	

HPLC/IC

Analysis Batch: 436817

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292363-1	GW-100824-MGA-10	Total/NA	Water	9056A	
310-292363-2	GW-100824-MGA-11	Total/NA	Water	9056A	
310-292363-3	GW-100824-MGA-12	Total/NA	Water	9056A	
310-292363-4	GW-100824-MGA-13	Total/NA	Water	9056A	
310-292363-5	GW-100924-MGA-14	Total/NA	Water	9056A	
310-292363-6	GW-100924-MGA-15	Total/NA	Water	9056A	
310-292363-7	GW-100924-MGA-16	Total/NA	Water	9056A	
MB 310-436817/3	Method Blank	Total/NA	Water	9056A	
LCS 310-436817/4	Lab Control Sample	Total/NA	Water	9056A	

Metals

Prep Batch: 435877

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292363-1	GW-100824-MGA-10	Total/NA	Water	3005A	
310-292363-2	GW-100824-MGA-11	Total/NA	Water	3005A	
310-292363-3	GW-100824-MGA-12	Total/NA	Water	3005A	
310-292363-4	GW-100824-MGA-13	Total/NA	Water	3005A	
310-292363-5	GW-100924-MGA-14	Total/NA	Water	3005A	
310-292363-6	GW-100924-MGA-15	Total/NA	Water	3005A	
310-292363-7	GW-100924-MGA-16	Total/NA	Water	3005A	
MB 310-435877/1-A	Method Blank	Total/NA	Water	3005A	
LCS 310-435877/2-A	Lab Control Sample	Total/NA	Water	3005A	

Analysis Batch: 436544

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292363-1	GW-100824-MGA-10	Total/NA	Water	6020B	435877
310-292363-2	GW-100824-MGA-11	Total/NA	Water	6020B	435877
310-292363-3	GW-100824-MGA-12	Total/NA	Water	6020B	435877
310-292363-4	GW-100824-MGA-13	Total/NA	Water	6020B	435877
310-292363-5	GW-100924-MGA-14	Total/NA	Water	6020B	435877

Eurofins Cedar Falls

QC Association Summary

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Metals (Continued)

Analysis Batch: 436544 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292363-6	GW-100924-MGA-15	Total/NA	Water	6020B	435877
310-292363-7	GW-100924-MGA-16	Total/NA	Water	6020B	435877
MB 310-435877/1-A	Method Blank	Total/NA	Water	6020B	435877
LCS 310-435877/2-A	Lab Control Sample	Total/NA	Water	6020B	435877

General Chemistry

Analysis Batch: 435888

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292363-1	GW-100824-MGA-10	Total/NA	Water	350.1	
310-292363-2	GW-100824-MGA-11	Total/NA	Water	350.1	
310-292363-3	GW-100824-MGA-12	Total/NA	Water	350.1	
310-292363-4	GW-100824-MGA-13	Total/NA	Water	350.1	
310-292363-5	GW-100924-MGA-14	Total/NA	Water	350.1	
310-292363-6	GW-100924-MGA-15	Total/NA	Water	350.1	
310-292363-7	GW-100924-MGA-16	Total/NA	Water	350.1	
MB 310-435888/135	Method Blank	Total/NA	Water	350.1	
MB 310-435888/163	Method Blank	Total/NA	Water	350.1	
LCS 310-435888/136	Lab Control Sample	Total/NA	Water	350.1	
LCS 310-435888/164	Lab Control Sample	Total/NA	Water	350.1	

Analysis Batch: 435918

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292363-1	GW-100824-MGA-10	Total/NA	Water	I-3765-85	
MB 310-435918/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-435918/2	Lab Control Sample	Total/NA	Water	I-3765-85	

Analysis Batch: 435927

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292363-2	GW-100824-MGA-11	Total/NA	Water	I-3765-85	
310-292363-3	GW-100824-MGA-12	Total/NA	Water	I-3765-85	
310-292363-4	GW-100824-MGA-13	Total/NA	Water	I-3765-85	
MB 310-435927/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-435927/2	Lab Control Sample	Total/NA	Water	I-3765-85	

Analysis Batch: 435939

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292363-5	GW-100924-MGA-14	Total/NA	Water	I-3765-85	
310-292363-6	GW-100924-MGA-15	Total/NA	Water	I-3765-85	
310-292363-7	GW-100924-MGA-16	Total/NA	Water	I-3765-85	
MB 310-435939/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-435939/2	Lab Control Sample	Total/NA	Water	I-3765-85	

Analysis Batch: 436415

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292363-1	GW-100824-MGA-10	Total/NA	Water	5220D LL	
310-292363-2	GW-100824-MGA-11	Total/NA	Water	5220D LL	
310-292363-3	GW-100824-MGA-12	Total/NA	Water	5220D LL	
310-292363-4	GW-100824-MGA-13	Total/NA	Water	5220D LL	
310-292363-5	GW-100924-MGA-14	Total/NA	Water	5220D LL	
310-292363-6	GW-100924-MGA-15	Total/NA	Water	5220D LL	

Eurofins Cedar Falls

QC Association Summary

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

General Chemistry (Continued)

Analysis Batch: 436415 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292363-7	GW-100924-MGA-16	Total/NA	Water	5220D LL	
MB 310-436415/5	Method Blank	Total/NA	Water	5220D LL	
LCS 310-436415/3	Lab Control Sample	Total/NA	Water	5220D LL	

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Lab Chronicle

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Client Sample ID: GW-100824-MGA-10

Lab Sample ID: 310-292363-1

Date Collected: 10/08/24 14:30

Matrix: Water

Date Received: 10/09/24 11:48

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	435997	FE5V	EET CF	10/12/24 22:53
Total/NA	Analysis	9056A		5	436817	ZRI4	EET CF	10/16/24 13:13
Total/NA	Prep	3005A			435877	F5MW	EET CF	10/11/24 09:30
Total/NA	Analysis	6020B		1	436544	A6US	EET CF	10/16/24 13:35
Total/NA	Analysis	350.1		1	435888	ZJX4	EET CF	10/10/24 20:58
Total/NA	Analysis	5220D LL		1	436415	HE7K	EET CF	10/16/24 10:09
Total/NA	Analysis	I-3765-85		1	435918	HE7K	EET CF	10/11/24 08:52

Client Sample ID: GW-100824-MGA-11

Lab Sample ID: 310-292363-2

Date Collected: 10/08/24 15:20

Matrix: Water

Date Received: 10/09/24 11:48

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	435997	FE5V	EET CF	10/13/24 01:11
Total/NA	Analysis	8260D		1	436139	FE5V	EET CF	10/14/24 13:36
Total/NA	Analysis	9056A		5	436817	ZRI4	EET CF	10/16/24 13:25
Total/NA	Prep	3005A			435877	F5MW	EET CF	10/11/24 09:30
Total/NA	Analysis	6020B		1	436544	A6US	EET CF	10/16/24 13:38
Total/NA	Analysis	350.1		1	435888	ZJX4	EET CF	10/10/24 20:58
Total/NA	Analysis	5220D LL		1	436415	HE7K	EET CF	10/16/24 10:09
Total/NA	Analysis	I-3765-85		1	435927	HE7K	EET CF	10/11/24 09:43

Client Sample ID: GW-100824-MGA-12

Lab Sample ID: 310-292363-3

Date Collected: 10/08/24 15:00

Matrix: Water

Date Received: 10/09/24 11:48

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	435997	FE5V	EET CF	10/12/24 22:30
Total/NA	Analysis	9056A		5	436817	ZRI4	EET CF	10/16/24 13:37
Total/NA	Prep	3005A			435877	F5MW	EET CF	10/11/24 09:30
Total/NA	Analysis	6020B		1	436544	A6US	EET CF	10/16/24 13:40
Total/NA	Analysis	350.1		1	435888	ZJX4	EET CF	10/10/24 21:00
Total/NA	Analysis	5220D LL		1	436415	HE7K	EET CF	10/16/24 10:09
Total/NA	Analysis	I-3765-85		1	435927	HE7K	EET CF	10/11/24 09:43

Client Sample ID: GW-100824-MGA-13

Lab Sample ID: 310-292363-4

Date Collected: 10/08/24 16:30

Matrix: Water

Date Received: 10/09/24 11:48

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	435997	FE5V	EET CF	10/13/24 01:34
Total/NA	Analysis	9056A		5	436817	ZRI4	EET CF	10/16/24 13:49

Lab Chronicle

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Client Sample ID: GW-100824-MGA-13

Lab Sample ID: 310-292363-4

Date Collected: 10/08/24 16:30

Matrix: Water

Date Received: 10/09/24 11:48

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3005A			435877	F5MW	EET CF	10/11/24 09:30
Total/NA	Analysis	6020B		1	436544	A6US	EET CF	10/16/24 13:42
Total/NA	Analysis	350.1		1	435888	ZJX4	EET CF	10/10/24 21:00
Total/NA	Analysis	5220D LL		1	436415	HE7K	EET CF	10/16/24 10:09
Total/NA	Analysis	I-3765-85		1	435927	HE7K	EET CF	10/11/24 09:43

Client Sample ID: GW-100924-MGA-14

Lab Sample ID: 310-292363-5

Date Collected: 10/09/24 08:15

Matrix: Water

Date Received: 10/09/24 11:48

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	435997	FE5V	EET CF	10/12/24 23:39
Total/NA	Analysis	9056A		5	436817	ZRI4	EET CF	10/16/24 14:01
Total/NA	Prep	3005A			435877	F5MW	EET CF	10/11/24 09:30
Total/NA	Analysis	6020B		1	436544	A6US	EET CF	10/16/24 13:45
Total/NA	Analysis	350.1		1	435888	ZJX4	EET CF	10/10/24 21:02
Total/NA	Analysis	5220D LL		1	436415	HE7K	EET CF	10/16/24 10:09
Total/NA	Analysis	I-3765-85		1	435939	HE7K	EET CF	10/11/24 10:44

Client Sample ID: GW-100924-MGA-15

Lab Sample ID: 310-292363-6

Date Collected: 10/09/24 09:00

Matrix: Water

Date Received: 10/09/24 11:48

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	435997	FE5V	EET CF	10/12/24 23:16
Total/NA	Analysis	9056A		5	436817	ZRI4	EET CF	10/16/24 14:13
Total/NA	Prep	3005A			435877	F5MW	EET CF	10/11/24 09:30
Total/NA	Analysis	6020B		1	436544	A6US	EET CF	10/16/24 13:47
Total/NA	Analysis	350.1		1	435888	ZJX4	EET CF	10/10/24 21:03
Total/NA	Analysis	5220D LL		1	436415	HE7K	EET CF	10/16/24 10:09
Total/NA	Analysis	I-3765-85		1	435939	HE7K	EET CF	10/11/24 10:44

Client Sample ID: GW-100924-MGA-16

Lab Sample ID: 310-292363-7

Date Collected: 10/09/24 09:10

Matrix: Water

Date Received: 10/09/24 11:48

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Batch Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	435997	FE5V	EET CF	10/13/24 00:02
Total/NA	Analysis	9056A		5	436817	ZRI4	EET CF	10/16/24 14:26
Total/NA	Prep	3005A			435877	F5MW	EET CF	10/11/24 09:30
Total/NA	Analysis	6020B		1	436544	A6US	EET CF	10/16/24 13:49
Total/NA	Analysis	350.1		1	435888	ZJX4	EET CF	10/10/24 21:04
Total/NA	Analysis	5220D LL		1	436415	HE7K	EET CF	10/16/24 10:09

Lab Chronicle

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Client Sample ID: GW-100924-MGA-16

Lab Sample ID: 310-292363-7

Date Collected: 10/09/24 09:10

Matrix: Water

Date Received: 10/09/24 11:48

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	I-3765-85		1	435939	HE7K	EET CF	10/11/24 10:44

Client Sample ID: Trip Blank

Lab Sample ID: 310-292363-8

Date Collected: 10/09/24 00:00

Matrix: Water

Date Received: 10/09/24 11:48

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	435997	FE5V	EET CF	10/12/24 19:27

Laboratory References:

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401



Accreditation/Certification Summary

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Laboratory: Eurofins Cedar Falls

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Iowa	State	007	12-01-25

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15

Method Summary

Client: GHD Inc.
Project/Site: MW/SW Semi-Annual - Fall

Job ID: 310-292363-1

Method	Method Description	Protocol	Laboratory
8260D	Volatile Organic Compounds by GC/MS	SW846	EET CF
9056A	Anions, Ion Chromatography	SW846	EET CF
6020B	Metals (ICP/MS)	SW846	EET CF
350.1	Nitrogen, Ammonia	EPA	EET CF
5220D LL	COD	SM	EET CF
I-3765-85	Residue, Non-filterable (TSS)	USGS	EET CF
3005A	Preparation, Total Metals	SW846	EET CF
5030B	Purge and Trap	SW846	EET CF

Protocol References:

EPA = US Environmental Protection Agency

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

USGS = "Methods For Analysis Of Water And Fluvial Sediments", USGS, 1989

Laboratory References:

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401



Environment Testing
America



310-292363 Chain of Custody

Cooler/Sample Receipt and Temperature Log Form

Client Information			
Client: <u>GHD</u>			
City/State: <u>New Brighton MN</u>		Project:	
Receipt Information			
Date/Time Received:	DATE	TIME	Received By:
		<u>1/4/22</u>	
Delivery Type: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee <input checked="" type="checkbox"/> Lab Courier <input type="checkbox"/> Lab Field Services <input checked="" type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____			
Condition of Cooler/Containers			
Sample(s) received in Cooler?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler ID:
Multiple Coolers?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Cooler # ____ of ____
Cooler Custody Seals Present?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Cooler custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No
Sample Custody Seals Present?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Sample custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No
Trip Blank Present?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Which VOA samples are in cooler? ↓
<u>All</u>			
Temperature Record			
Coolant: <input checked="" type="checkbox"/> Wet ice <input type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> Other: <u>meltd</u> <input type="checkbox"/> NONE			
Thermometer ID: <u>2</u>		Correction Factor (°C): <u>0.0</u>	
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature			
Uncorrected Temp (°C): <u>9.6</u>		Corrected Temp (°C): <u>9.6</u>	
• Sample Container Temperature			
Container(s) used:	CONTAINER 1	CONTAINER 2	
Uncorrected Temp (°C):			
Corrected Temp (°C):			
Exceptions Noted			
1) If temperature exceeds criteria, was sample(s) received same day of sampling? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No a) If yes: Is there evidence that the chilling process began? <input type="checkbox"/> Yes <input type="checkbox"/> No			
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g , bulging septa, broken/cracked bottles, frozen solid?) <input type="checkbox"/> Yes <input type="checkbox"/> No			
NOTE If yes, contact PM before proceeding. If no, proceed with login			
Additional Comments			



Chain of Custody Record

Client Information Client Contact: Mr. Grant Anderson Company: GHD Services Inc. Address: 900 Long Lake Road Suite 200 City: New Brighton State, Zip: IA, 50612 Phone: 340-017991 Email: grant.anderson@ghd.com Project Name: MW/SW Semi-Annual - Fall Site:		Lab PM: Bindert, Zach T E-Mail: Zach.Bindert@et.eurofins.com PWSID:		Camper Tracking No(s): 310-963996-26785 2 State of Origin:		COC No: 310-963996-26785 2 Page: Page 2 of 2 Job #:	
Due Date Requested: TAT Requested (days): 14 Compliance Project: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No PO #: 340-017991 WO #: 056934 Project #: 31017275 SSOW#:		Analysis Requested Perform MS/MSD (Yes or No) <input checked="" type="checkbox"/> Field Filtered Sample (Yes or No) <input checked="" type="checkbox"/> 3601_6220_LL <input checked="" type="checkbox"/> S <input type="checkbox"/> N <input type="checkbox"/> D <input type="checkbox"/> A <input type="checkbox"/> N 9056A_ORGM_28D - Chloride <input checked="" type="checkbox"/> S <input type="checkbox"/> N <input type="checkbox"/> D <input type="checkbox"/> A <input type="checkbox"/> N 6020B - Barium and Iron <input checked="" type="checkbox"/> S <input type="checkbox"/> N <input type="checkbox"/> D <input type="checkbox"/> A <input type="checkbox"/> N 6260D - (MOD) Benzene Only and Acetone <input checked="" type="checkbox"/> S <input type="checkbox"/> N <input type="checkbox"/> D <input type="checkbox"/> A <input type="checkbox"/> N 13765_85 - Residue, Non-Filterable (TSS) <input checked="" type="checkbox"/> S <input type="checkbox"/> N <input type="checkbox"/> D <input type="checkbox"/> A <input type="checkbox"/> N Total Number of Containers: 7					
Sample Identification Sample ID: GW-100824-M6A-10 Sample Date: 10/8/24 Sample Time: 1430 Sample Type (C=Comp, G=grab): G Matrix (W=Water, S=solid, O=soil, BT=Tissue, A=Air): Water Preservation Code:		Special Instructions/Note: Temp Blank + Trip Blank in cooler					
Sample ID: GW-100824-M6A-11 Sample Date: 10/8/24 Sample Time: 1520 Sample Type (C=Comp, G=grab): G Matrix (W=Water, S=solid, O=soil, BT=Tissue, A=Air): Water Preservation Code:							
Sample ID: GW-100824-M6A-12 Sample Date: 10/8/24 Sample Time: 1500 Sample Type (C=Comp, G=grab): G Matrix (W=Water, S=solid, O=soil, BT=Tissue, A=Air): Water Preservation Code:							
Sample ID: GW-100824-M6A-13 Sample Date: 10/8/24 Sample Time: 1630 Sample Type (C=Comp, G=grab): G Matrix (W=Water, S=solid, O=soil, BT=Tissue, A=Air): Water Preservation Code:							
Sample ID: GW-100924-M6A-14 Sample Date: 10/9/24 Sample Time: 0815 Sample Type (C=Comp, G=grab): G Matrix (W=Water, S=solid, O=soil, BT=Tissue, A=Air): Water Preservation Code:							
Sample ID: GW-100924-M6A-15 Sample Date: 10/9/24 Sample Time: 0900 Sample Type (C=Comp, G=grab): G Matrix (W=Water, S=solid, O=soil, BT=Tissue, A=Air): Water Preservation Code:							
Sample ID: GW-100924-M6A-16 Sample Date: 10/9/24 Sample Time: 0910 Sample Type (C=Comp, G=grab): G Matrix (W=Water, S=solid, O=soil, BT=Tissue, A=Air): Water Preservation Code:							
Sample ID: MGA 10-9-24 Sample Date: 10/9/24 Sample Time:							
Possible Hazard Identification <input checked="" type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological Deliverable Requested I, II, III, IV, Other (specify)		Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) <input type="checkbox"/> Return To Client <input checked="" type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months Special Instructions/QC Requirements:					
Empty Kit Relinquished by:		Date:		Time:		Method of Shipment:	
Relinquished by: Mary Grace Ammonst		Date/Time: 10/9/24 1148		Company: GHD		Date/Time: 10/9/24 1148	
Relinquished by:		Date/Time:		Company:		Date/Time:	
Relinquished by:		Date/Time:		Company:		Date/Time:	
Custody Seals Intact: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.		Cooler Temperature(s) °C and Other Remarks:		Company:	



Login Sample Receipt Checklist

Client: GHD Inc.

Job Number: 310-292363-1

Login Number: 292363

List Number: 1

Creator: Hirsch, Preston

List Source: Eurofins Cedar Falls

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	





ANALYTICAL REPORT

PREPARED FOR

Attn: Alicia Ferber
GHD Inc.
900 Long Lake Road
Suite 200
New Brighton, Minnesota 55112

Generated 10/21/2024 1:18:20 PM

JOB DESCRIPTION

Leachate Semi-Annual LCS Sample

JOB NUMBER

310-292368-1

Eurofins Cedar Falls

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

Authorization



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10/21/2024 1:18:20 PM

Authorized for release by
Zach Bindert, Senior Project Manager
Zach.Bindert@et.eurofinsus.com
(319)595-2016



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Case Narrative

Client: GHD Inc.
Project: Leachate Semi-Annual LCS Sample

Job ID: 310-292368-1

Job ID: 310-292368-1

Eurofins Cedar Falls

Job Narrative 310-292368-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers and/or narrative comments are included to explain any exceptions, if applicable.

- Matrix QC may not be reported if insufficient sample is provided or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt

The sample was received on 10/9/2024 11:48 AM. Unless otherwise noted below, the sample arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 3.4°C.

GC/MS VOA

Method 8260D: The laboratory control sample (LCS) for 310-436121 recovered outside control limits for the following analyte: Hexane. This analyte was biased high in the LCS and was not detected in the associated samples; therefore, the data have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

HPLC/IC

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Metals

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Eurofins Cedar Falls

Case Narrative

Client: GHD Inc.
Project: Leachate Semi-Annual LCS Sample

Job ID: 310-292368-1

Job ID: 310-292368-2

Eurofins Cedar Falls

Job Narrative 310-292368-2

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers and/or narrative comments are included to explain any exceptions, if applicable.

- Matrix QC may not be reported if insufficient sample is provided or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt

The sample was received on 10/9/2024 11:48 AM. Unless otherwise noted below, the sample arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 3.4°C.

HPLC/IC

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Eurofins Cedar Falls

Sample Summary

Client: GHD Inc.

Job ID: 310-292368-1

Project/Site: Leachate Semi-Annual LCS Sample

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-292368-1	LCS	Water	10/09/24 09:00	10/09/24 11:48

1

2

3

4

5

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Detection Summary

Client: GHD Inc.

Job ID: 310-292368-1

Project/Site: Leachate Semi-Annual LCS Sample

Client Sample ID: LCS

Lab Sample ID: 310-292368-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	11.3		1.00		mg/L	1		300.0	Total/NA
Sulfate	10.9		1.00		mg/L	1		300.0	Total/NA
Barium	0.114		0.00200		mg/L	1		6020B	Total/NA
Iron	3.77		0.100		mg/L	1		6020B	Total/NA
Manganese	0.134		0.0100		mg/L	1		6020B	Total/NA
Molybdenum	0.0131		0.00200		mg/L	1		6020B	Total/NA
Flashpoint	>161		65.0		Degrees F	1		D93_85	Total/NA
Total Suspended Solids	8.00		5.00		mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	670		250		mg/L	1		SM 2540C	Total/NA
pH	7.5	HF	1.0		SU	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Cedar Falls

Client Sample Results

Client: GHD Inc.
Project/Site: Leachate Semi-Annual LCS Sample

Job ID: 310-292368-1

Client Sample ID: LCS

Lab Sample ID: 310-292368-1

Date Collected: 10/09/24 09:00

Matrix: Water

Date Received: 10/09/24 11:48

Method: SW846 8260D - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			10/14/24 14:27	1
Benzene	<0.500		0.500		ug/L			10/14/24 14:27	1
Bromobenzene	<1.00		1.00		ug/L			10/14/24 14:27	1
Bromochloromethane	<5.00		5.00		ug/L			10/14/24 14:27	1
Bromodichloromethane	<1.00		1.00		ug/L			10/14/24 14:27	1
Bromoform	<5.00		5.00		ug/L			10/14/24 14:27	1
Bromomethane	<4.00		4.00		ug/L			10/14/24 14:27	1
2-Butanone (MEK)	<10.0		10.0		ug/L			10/14/24 14:27	1
Carbon disulfide	<1.00		1.00		ug/L			10/14/24 14:27	1
Carbon tetrachloride	<2.00		2.00		ug/L			10/14/24 14:27	1
Chlorobenzene	<1.00		1.00		ug/L			10/14/24 14:27	1
Chlorodibromomethane	<5.00		5.00		ug/L			10/14/24 14:27	1
Chloroethane	<4.00		4.00		ug/L			10/14/24 14:27	1
Chloroform	<3.00		3.00		ug/L			10/14/24 14:27	1
Chloromethane	<3.00		3.00		ug/L			10/14/24 14:27	1
2-Chlorotoluene	<1.00		1.00		ug/L			10/14/24 14:27	1
4-Chlorotoluene	<1.00		1.00		ug/L			10/14/24 14:27	1
cis-1,2-Dichloroethene	<1.00		1.00		ug/L			10/14/24 14:27	1
cis-1,3-Dichloropropene	<5.00		5.00		ug/L			10/14/24 14:27	1
1,2-Dibromo-3-chloropropane	<5.00		5.00		ug/L			10/14/24 14:27	1
1,2-Dibromoethane (EDB)	<1.00		1.00		ug/L			10/14/24 14:27	1
Dibromomethane	<1.00		1.00		ug/L			10/14/24 14:27	1
1,2-Dichlorobenzene	<1.00		1.00		ug/L			10/14/24 14:27	1
1,3-Dichlorobenzene	<1.00		1.00		ug/L			10/14/24 14:27	1
1,4-Dichlorobenzene	<1.00		1.00		ug/L			10/14/24 14:27	1
Dichlorodifluoromethane	<3.00		3.00		ug/L			10/14/24 14:27	1
1,1-Dichloroethane	<1.00		1.00		ug/L			10/14/24 14:27	1
1,2-Dichloroethane	<1.00		1.00		ug/L			10/14/24 14:27	1
1,1-Dichloroethene	<2.00		2.00		ug/L			10/14/24 14:27	1
1,2-Dichloropropane	<1.00		1.00		ug/L			10/14/24 14:27	1
1,3-Dichloropropane	<1.00		1.00		ug/L			10/14/24 14:27	1
2,2-Dichloropropane	<4.00		4.00		ug/L			10/14/24 14:27	1
1,1-Dichloropropene	<1.00		1.00		ug/L			10/14/24 14:27	1
Ethylbenzene	<1.00		1.00		ug/L			10/14/24 14:27	1
Hexachlorobutadiene	<5.00		5.00		ug/L			10/14/24 14:27	1
Hexane	<1.00	+	1.00		ug/L			10/14/24 14:27	1
Isopropylbenzene	<1.00		1.00		ug/L			10/14/24 14:27	1
Methylene chloride	<5.00		5.00		ug/L			10/14/24 14:27	1
Methyl tert-butyl ether	<1.00		1.00		ug/L			10/14/24 14:27	1
Naphthalene	<5.00		5.00		ug/L			10/14/24 14:27	1
n-Butylbenzene	<1.00		1.00		ug/L			10/14/24 14:27	1
n-Propylbenzene	<1.00		1.00		ug/L			10/14/24 14:27	1
p-Isopropyltoluene	<1.00		1.00		ug/L			10/14/24 14:27	1
sec-Butylbenzene	<1.00		1.00		ug/L			10/14/24 14:27	1
Styrene	<1.00		1.00		ug/L			10/14/24 14:27	1
tert-Butylbenzene	<1.00		1.00		ug/L			10/14/24 14:27	1
1,1,1,2-Tetrachloroethane	<1.00		1.00		ug/L			10/14/24 14:27	1
1,1,2,2-Tetrachloroethane	<1.00		1.00		ug/L			10/14/24 14:27	1
Tetrachloroethene	<1.00		1.00		ug/L			10/14/24 14:27	1

Eurofins Cedar Falls

Client Sample Results

Client: GHD Inc.
Project/Site: Leachate Semi-Annual LCS Sample

Job ID: 310-292368-1

Client Sample ID: LCS

Lab Sample ID: 310-292368-1

Date Collected: 10/09/24 09:00

Matrix: Water

Date Received: 10/09/24 11:48

Method: SW846 8260D - Volatile Organic Compounds by GC/MS (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Toluene	<1.00		1.00		ug/L			10/14/24 14:27	1
trans-1,2-Dichloroethene	<1.00		1.00		ug/L			10/14/24 14:27	1
trans-1,3-Dichloropropene	<5.00		5.00		ug/L			10/14/24 14:27	1
1,2,3-Trichlorobenzene	<5.00		5.00		ug/L			10/14/24 14:27	1
1,2,4-Trichlorobenzene	<5.00		5.00		ug/L			10/14/24 14:27	1
1,1,1-Trichloroethane	<1.00		1.00		ug/L			10/14/24 14:27	1
1,1,2-Trichloroethane	<1.00		1.00		ug/L			10/14/24 14:27	1
Trichloroethene	<1.00		1.00		ug/L			10/14/24 14:27	1
Trichlorofluoromethane	<4.00		4.00		ug/L			10/14/24 14:27	1
1,2,3-Trichloropropane	<1.00		1.00		ug/L			10/14/24 14:27	1
1,2,4-Trimethylbenzene	<1.00		1.00		ug/L			10/14/24 14:27	1
1,3,5-Trimethylbenzene	<1.00		1.00		ug/L			10/14/24 14:27	1
Vinyl chloride	<1.00		1.00		ug/L			10/14/24 14:27	1
Xylenes, Total	<3.00		3.00		ug/L			10/14/24 14:27	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		80 - 120					10/14/24 14:27	1
Dibromofluoromethane (Surr)	101		73 - 130					10/14/24 14:27	1
Toluene-d8 (Surr)	99		80 - 120					10/14/24 14:27	1

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	11.3		1.00		mg/L			10/09/24 13:35	1
Nitrate as N	<0.200		0.200		mg/L			10/09/24 13:35	1
Nitrite as N	<0.200		0.200		mg/L			10/09/24 13:35	1
Sulfate	10.9		1.00		mg/L			10/09/24 13:35	1

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.00200		0.00200		mg/L		10/11/24 09:30	10/16/24 13:51	1
Barium	0.114		0.00200		mg/L		10/11/24 09:30	10/16/24 13:51	1
Cadmium	<0.000200		0.000200		mg/L		10/11/24 09:30	10/16/24 13:51	1
Chromium	<0.00500		0.00500		mg/L		10/11/24 09:30	10/16/24 13:51	1
Copper	<0.00500		0.00500		mg/L		10/11/24 09:30	10/16/24 13:51	1
Iron	3.77		0.100		mg/L		10/11/24 09:30	10/16/24 13:51	1
Lead	<0.000500		0.000500		mg/L		10/11/24 09:30	10/16/24 13:51	1
Manganese	0.134		0.0100		mg/L		10/11/24 09:30	10/16/24 13:51	1
Molybdenum	0.0131		0.00200		mg/L		10/11/24 09:30	10/16/24 13:51	1
Nickel	<0.00500		0.00500		mg/L		10/11/24 09:30	10/17/24 16:26	1
Selenium	<0.00500		0.00500		mg/L		10/11/24 09:30	10/16/24 13:51	1
Silver	<0.00100		0.00100		mg/L		10/11/24 09:30	10/16/24 13:51	1
Zinc	<0.0200		0.0200		mg/L		10/11/24 09:30	10/16/24 13:51	1

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		10/15/24 15:55	10/16/24 16:51	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease) (1664A)	<5.0		5.0		mg/L		10/15/24 14:00	10/15/24 14:00	1
Ammonia as N (EPA 350.1)	<0.500		0.500		mg/L		10/10/24 09:32	10/10/24 17:52	1

Eurofins Cedar Falls

Client Sample Results

Client: GHD Inc.
 Project/Site: Leachate Semi-Annual LCS Sample

Job ID: 310-292368-1

Client Sample ID: LCS

Lab Sample ID: 310-292368-1

Date Collected: 10/09/24 09:00

Matrix: Water

Date Received: 10/09/24 11:48

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide (SW846 9034)	<3.00		3.00		mg/L		10/15/24 10:09	10/15/24 15:13	1
Phenols, Total (SW846 9066)	<0.0200		0.0200		mg/L		10/14/24 08:29	10/14/24 23:13	1
Total Suspended Solids (USGS I-3765-85)	8.00		5.00		mg/L			10/11/24 08:52	1
Total Dissolved Solids (SM 2540C)	670		250		mg/L			10/15/24 17:46	1
Chemical Oxygen Demand (SM 5220D)	<25.0		25.0		mg/L			10/16/24 10:09	5
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Flashpoint (ASTM D93_85)	>161		65.0		Degrees F			10/20/24 11:20	1
pH (SM 4500 H+ B)	7.5	HF	1.0		SU			10/09/24 12:50	1

- 1
- 2
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- 13
- 14
- 15

Definitions/Glossary

Client: GHD Inc.
Project/Site: Leachate Semi-Annual LCS Sample

Job ID: 310-292368-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
*+	LCS and/or LCSD is outside acceptance limits, high biased.

General Chemistry

Qualifier	Qualifier Description
HF	Parameter with a holding time of 15 minutes. Test performed by laboratory at client's request. Sample was analyzed outside of hold time.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Surrogate Summary

Client: GHD Inc.
Project/Site: Leachate Semi-Annual LCS Sample

Job ID: 310-292368-1

Method: 8260D - Volatile Organic Compounds by GC/MS

Matrix: Water

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	BFB	DBFM	TOL
		(80-120)	(73-130)	(80-120)
310-292368-1	LCS	101	101	99
LCS 310-436121/6	Lab Control Sample	100	97	100
LCS 310-436121/7	Lab Control Sample	102	101	97
MB 310-436121/5	Method Blank	102	100	98

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)

DBFM = Dibromofluoromethane (Surr)

TOL = Toluene-d8 (Surr)

QC Sample Results

Client: GHD Inc.
 Project/Site: Leachate Semi-Annual LCS Sample

Job ID: 310-292368-1

Method: 8260D - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 310-436121/5
Matrix: Water
Analysis Batch: 436121

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	<10.0		10.0		ug/L			10/14/24 09:47	1
Benzene	<0.500		0.500		ug/L			10/14/24 09:47	1
Bromobenzene	<1.00		1.00		ug/L			10/14/24 09:47	1
Bromochloromethane	<5.00		5.00		ug/L			10/14/24 09:47	1
Bromodichloromethane	<1.00		1.00		ug/L			10/14/24 09:47	1
Bromoform	<5.00		5.00		ug/L			10/14/24 09:47	1
Bromomethane	<4.00		4.00		ug/L			10/14/24 09:47	1
2-Butanone (MEK)	<10.0		10.0		ug/L			10/14/24 09:47	1
Carbon disulfide	<1.00		1.00		ug/L			10/14/24 09:47	1
Carbon tetrachloride	<2.00		2.00		ug/L			10/14/24 09:47	1
Chlorobenzene	<1.00		1.00		ug/L			10/14/24 09:47	1
Chlorodibromomethane	<5.00		5.00		ug/L			10/14/24 09:47	1
Chloroethane	<4.00		4.00		ug/L			10/14/24 09:47	1
Chloroform	<3.00		3.00		ug/L			10/14/24 09:47	1
Chloromethane	<3.00		3.00		ug/L			10/14/24 09:47	1
2-Chlorotoluene	<1.00		1.00		ug/L			10/14/24 09:47	1
4-Chlorotoluene	<1.00		1.00		ug/L			10/14/24 09:47	1
cis-1,2-Dichloroethene	<1.00		1.00		ug/L			10/14/24 09:47	1
cis-1,3-Dichloropropene	<5.00		5.00		ug/L			10/14/24 09:47	1
1,2-Dibromo-3-chloropropane	<5.00		5.00		ug/L			10/14/24 09:47	1
1,2-Dibromoethane (EDB)	<1.00		1.00		ug/L			10/14/24 09:47	1
Dibromomethane	<1.00		1.00		ug/L			10/14/24 09:47	1
1,2-Dichlorobenzene	<1.00		1.00		ug/L			10/14/24 09:47	1
1,3-Dichlorobenzene	<1.00		1.00		ug/L			10/14/24 09:47	1
1,4-Dichlorobenzene	<1.00		1.00		ug/L			10/14/24 09:47	1
Dichlorodifluoromethane	<3.00		3.00		ug/L			10/14/24 09:47	1
1,1-Dichloroethane	<1.00		1.00		ug/L			10/14/24 09:47	1
1,2-Dichloroethane	<1.00		1.00		ug/L			10/14/24 09:47	1
1,1-Dichloroethene	<2.00		2.00		ug/L			10/14/24 09:47	1
1,2-Dichloropropane	<1.00		1.00		ug/L			10/14/24 09:47	1
1,3-Dichloropropane	<1.00		1.00		ug/L			10/14/24 09:47	1
2,2-Dichloropropane	<4.00		4.00		ug/L			10/14/24 09:47	1
1,1-Dichloropropene	<1.00		1.00		ug/L			10/14/24 09:47	1
Ethylbenzene	<1.00		1.00		ug/L			10/14/24 09:47	1
Hexachlorobutadiene	<5.00		5.00		ug/L			10/14/24 09:47	1
Hexane	<1.00		1.00		ug/L			10/14/24 09:47	1
Isopropylbenzene	<1.00		1.00		ug/L			10/14/24 09:47	1
Methylene chloride	<5.00		5.00		ug/L			10/14/24 09:47	1
Methyl tert-butyl ether	<1.00		1.00		ug/L			10/14/24 09:47	1
Naphthalene	<5.00		5.00		ug/L			10/14/24 09:47	1
n-Butylbenzene	<1.00		1.00		ug/L			10/14/24 09:47	1
n-Propylbenzene	<1.00		1.00		ug/L			10/14/24 09:47	1
p-Isopropyltoluene	<1.00		1.00		ug/L			10/14/24 09:47	1
sec-Butylbenzene	<1.00		1.00		ug/L			10/14/24 09:47	1
Styrene	<1.00		1.00		ug/L			10/14/24 09:47	1
tert-Butylbenzene	<1.00		1.00		ug/L			10/14/24 09:47	1
1,1,1,2-Tetrachloroethane	<1.00		1.00		ug/L			10/14/24 09:47	1
1,1,1,2,2-Tetrachloroethane	<1.00		1.00		ug/L			10/14/24 09:47	1

Eurofins Cedar Falls

QC Sample Results

Client: GHD Inc.
Project/Site: Leachate Semi-Annual LCS Sample

Job ID: 310-292368-1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: MB 310-436121/5
Matrix: Water
Analysis Batch: 436121

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	<1.00		1.00		ug/L			10/14/24 09:47	1
Toluene	<1.00		1.00		ug/L			10/14/24 09:47	1
trans-1,2-Dichloroethene	<1.00		1.00		ug/L			10/14/24 09:47	1
trans-1,3-Dichloropropene	<5.00		5.00		ug/L			10/14/24 09:47	1
1,2,3-Trichlorobenzene	<5.00		5.00		ug/L			10/14/24 09:47	1
1,2,4-Trichlorobenzene	<5.00		5.00		ug/L			10/14/24 09:47	1
1,1,1-Trichloroethane	<1.00		1.00		ug/L			10/14/24 09:47	1
1,1,2-Trichloroethane	<1.00		1.00		ug/L			10/14/24 09:47	1
Trichloroethene	<1.00		1.00		ug/L			10/14/24 09:47	1
Trichlorofluoromethane	<4.00		4.00		ug/L			10/14/24 09:47	1
1,2,3-Trichloropropane	<1.00		1.00		ug/L			10/14/24 09:47	1
1,2,4-Trimethylbenzene	<1.00		1.00		ug/L			10/14/24 09:47	1
1,3,5-Trimethylbenzene	<1.00		1.00		ug/L			10/14/24 09:47	1
Vinyl chloride	<1.00		1.00		ug/L			10/14/24 09:47	1
Xylenes, Total	<3.00		3.00		ug/L			10/14/24 09:47	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		80 - 120		10/14/24 09:47	1
Dibromofluoromethane (Surr)	100		73 - 130		10/14/24 09:47	1
Toluene-d8 (Surr)	98		80 - 120		10/14/24 09:47	1

Lab Sample ID: LCS 310-436121/6
Matrix: Water
Analysis Batch: 436121

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Acetone	40.0	38.70		ug/L		97	50 - 150
Benzene	20.0	22.47		ug/L		112	72 - 124
Bromobenzene	20.0	18.91		ug/L		95	72 - 120
Bromochloromethane	20.0	20.23		ug/L		101	73 - 130
Bromodichloromethane	20.0	20.09		ug/L		100	74 - 122
Bromoform	20.0	18.31		ug/L		92	61 - 122
2-Butanone (MEK)	40.0	40.47		ug/L		101	50 - 150
Carbon disulfide	20.0	25.34		ug/L		127	59 - 135
Carbon tetrachloride	20.0	22.53		ug/L		113	67 - 132
Chlorobenzene	20.0	19.70		ug/L		98	76 - 120
Chlorodibromomethane	20.0	19.55		ug/L		98	71 - 121
Chloroform	20.0	20.20		ug/L		101	72 - 125
2-Chlorotoluene	20.0	20.15		ug/L		101	73 - 121
4-Chlorotoluene	20.0	19.92		ug/L		100	72 - 121
cis-1,2-Dichloroethene	20.0	20.63		ug/L		103	74 - 123
cis-1,3-Dichloropropene	20.0	21.84		ug/L		109	71 - 125
1,2-Dibromo-3-chloropropane	20.0	21.41		ug/L		107	50 - 150
1,2-Dibromoethane (EDB)	20.0	19.60		ug/L		98	75 - 125
Dibromomethane	20.0	20.19		ug/L		101	74 - 125
1,2-Dichlorobenzene	20.0	20.19		ug/L		101	74 - 120
1,3-Dichlorobenzene	20.0	19.08		ug/L		95	72 - 120
1,4-Dichlorobenzene	20.0	20.07		ug/L		100	72 - 120

Eurofins Cedar Falls

QC Sample Results

Client: GHD Inc.
Project/Site: Leachate Semi-Annual LCS Sample

Job ID: 310-292368-1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 310-436121/6
Matrix: Water
Analysis Batch: 436121

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
1,1-Dichloroethane	20.0	23.26		ug/L		116	70 - 127
1,2-Dichloroethane	20.0	20.36		ug/L		102	71 - 125
1,1-Dichloroethene	20.0	25.09		ug/L		125	63 - 132
1,2-Dichloropropane	20.0	23.49		ug/L		117	73 - 124
1,3-Dichloropropane	20.0	20.81		ug/L		104	72 - 125
2,2-Dichloropropane	20.0	25.05		ug/L		125	50 - 150
1,1-Dichloropropene	20.0	23.43		ug/L		117	69 - 132
Ethylbenzene	20.0	20.69		ug/L		103	74 - 122
Hexachlorobutadiene	20.0	21.56		ug/L		108	50 - 150
Hexane	20.0	31.50	*+	ug/L		158	45 - 150
Isopropylbenzene	20.0	20.33		ug/L		102	73 - 125
Methylene chloride	20.0	23.62		ug/L		118	50 - 150
Methyl tert-butyl ether	20.0	21.76		ug/L		109	68 - 130
Naphthalene	20.0	21.74		ug/L		109	50 - 150
n-Butylbenzene	20.0	23.40		ug/L		117	67 - 131
n-Propylbenzene	20.0	21.31		ug/L		107	72 - 126
p-Isopropyltoluene	20.0	21.66		ug/L		108	70 - 127
sec-Butylbenzene	20.0	21.19		ug/L		106	70 - 127
Styrene	20.0	20.18		ug/L		101	74 - 121
tert-Butylbenzene	20.0	20.25		ug/L		101	72 - 124
1,1,1,2-Tetrachloroethane	20.0	19.90		ug/L		99	71 - 120
1,1,2,2-Tetrachloroethane	20.0	20.54		ug/L		103	68 - 124
Tetrachloroethene	20.0	20.33		ug/L		102	71 - 130
Toluene	20.0	20.29		ug/L		101	74 - 123
trans-1,2-Dichloroethene	20.0	22.00		ug/L		110	70 - 126
trans-1,3-Dichloropropene	20.0	19.97		ug/L		100	69 - 123
1,2,3-Trichlorobenzene	20.0	20.83		ug/L		104	50 - 150
1,2,4-Trichlorobenzene	20.0	20.56		ug/L		103	68 - 124
1,1,1-Trichloroethane	20.0	22.48		ug/L		112	73 - 129
1,1,2-Trichloroethane	20.0	20.67		ug/L		103	73 - 123
Trichloroethene	20.0	21.12		ug/L		106	72 - 126
1,2,3-Trichloropropane	20.0	20.34		ug/L		102	65 - 127
1,2,4-Trimethylbenzene	20.0	20.14		ug/L		101	73 - 124
1,3,5-Trimethylbenzene	20.0	20.21		ug/L		101	73 - 123
Xylenes, Total	40.0	39.70		ug/L		99	73 - 123

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	100		80 - 120
Dibromofluoromethane (Surr)	97		73 - 130
Toluene-d8 (Surr)	100		80 - 120

Lab Sample ID: LCS 310-436121/7
Matrix: Water
Analysis Batch: 436121

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Bromomethane	20.0	19.81		ug/L		99	23 - 150
Chloroethane	20.0	19.26		ug/L		96	54 - 136

Eurofins Cedar Falls

QC Sample Results

Client: GHD Inc.
Project/Site: Leachate Semi-Annual LCS Sample

Job ID: 310-292368-1

Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 310-436121/7
Matrix: Water
Analysis Batch: 436121

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloromethane	20.0	20.44		ug/L		102	38 - 150
Dichlorodifluoromethane	20.0	17.83		ug/L		89	39 - 150
Trichlorofluoromethane	20.0	18.65		ug/L		93	54 - 149
Vinyl chloride	20.0	18.91		ug/L		95	56 - 140

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	102		80 - 120
Dibromofluoromethane (Surr)	101		73 - 130
Toluene-d8 (Surr)	97		80 - 120

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 310-435763/3
Matrix: Water
Analysis Batch: 435763

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<1.00		1.00		mg/L			10/08/24 16:51	1
Nitrate as N	<0.200		0.200		mg/L			10/08/24 16:51	1
Nitrite as N	<0.200		0.200		mg/L			10/08/24 16:51	1
Sulfate	<1.00		1.00		mg/L			10/08/24 16:51	1

Lab Sample ID: LCS 310-435763/4
Matrix: Water
Analysis Batch: 435763

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	10.0	10.07		mg/L		101	90 - 110
Nitrate as N	2.00	2.064		mg/L		103	90 - 110
Nitrite as N	2.00	2.016		mg/L		101	90 - 110
Sulfate	10.0	10.30		mg/L		103	90 - 110

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 310-435877/1-A
Matrix: Water
Analysis Batch: 436544

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 435877

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.00200		0.00200		mg/L		10/11/24 09:30	10/16/24 13:11	1
Barium	<0.00200		0.00200		mg/L		10/11/24 09:30	10/16/24 13:11	1
Cadmium	<0.000200		0.000200		mg/L		10/11/24 09:30	10/16/24 13:11	1
Chromium	<0.00500		0.00500		mg/L		10/11/24 09:30	10/16/24 13:11	1
Copper	<0.00500		0.00500		mg/L		10/11/24 09:30	10/16/24 13:11	1
Iron	<0.100		0.100		mg/L		10/11/24 09:30	10/16/24 13:11	1
Lead	<0.000500		0.000500		mg/L		10/11/24 09:30	10/16/24 13:11	1
Manganese	<0.0100		0.0100		mg/L		10/11/24 09:30	10/16/24 13:11	1
Molybdenum	<0.00200		0.00200		mg/L		10/11/24 09:30	10/16/24 13:11	1
Selenium	<0.00500		0.00500		mg/L		10/11/24 09:30	10/16/24 13:11	1

Eurofins Cedar Falls

QC Sample Results

Client: GHD Inc.
Project/Site: Leachate Semi-Annual LCS Sample

Job ID: 310-292368-1

Method: 6020B - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 310-435877/1-A
Matrix: Water
Analysis Batch: 436544

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 435877

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	<0.00100		0.00100		mg/L		10/11/24 09:30	10/16/24 13:11	1
Zinc	<0.0200		0.0200		mg/L		10/11/24 09:30	10/16/24 13:11	1

Lab Sample ID: MB 310-435877/1-A
Matrix: Water
Analysis Batch: 436697

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 435877

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nickel	<0.00500		0.00500		mg/L		10/11/24 09:30	10/17/24 16:04	1

Lab Sample ID: LCS 310-435877/2-A
Matrix: Water
Analysis Batch: 436544

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 435877

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Arsenic	0.200	0.2158		mg/L		108	80 - 120
Barium	0.100	0.1053		mg/L		105	80 - 120
Cadmium	0.100	0.1024		mg/L		102	80 - 120
Chromium	0.100	0.1072		mg/L		107	80 - 120
Copper	0.200	0.2106		mg/L		105	80 - 120
Iron	0.200	0.2238		mg/L		112	80 - 120
Lead	0.200	0.2190		mg/L		109	80 - 120
Manganese	0.100	0.1075		mg/L		108	80 - 120
Molybdenum	0.200	0.2058		mg/L		103	80 - 120
Selenium	0.400	0.4050		mg/L		101	80 - 120
Silver	0.100	0.1113		mg/L		111	80 - 120
Zinc	0.200	0.2021		mg/L		101	80 - 120

Lab Sample ID: LCS 310-435877/2-A
Matrix: Water
Analysis Batch: 436697

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 435877

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Nickel	0.200	0.2037		mg/L		102	80 - 120

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 310-436310/1-A
Matrix: Water
Analysis Batch: 436502

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 436310

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		10/15/24 15:55	10/16/24 16:01	1

Lab Sample ID: LCS 310-436310/2-A
Matrix: Water
Analysis Batch: 436502

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 436310

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	0.00167	0.001528		mg/L		92	80 - 120

Eurofins Cedar Falls

QC Sample Results

Client: GHD Inc.
Project/Site: Leachate Semi-Annual LCS Sample

Job ID: 310-292368-1

Method: 1664A - HEM and SGT-HEM

Lab Sample ID: MB 310-436190/1-A
Matrix: Water
Analysis Batch: 436363

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 436190

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	<5.0		5.0		mg/L		10/15/24 14:00	10/15/24 14:00	1

Lab Sample ID: LCS 310-436190/2-A
Matrix: Water
Analysis Batch: 436363

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 436190

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
HEM (Oil & Grease)	40.0	35.10		mg/L		88	78 - 114

Lab Sample ID: 310-292368-1 MS
Matrix: Water
Analysis Batch: 436363

Client Sample ID: LCS
Prep Type: Total/NA
Prep Batch: 436190

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
HEM (Oil & Grease)	<5.0		40.0	34.30		mg/L		86	78 - 114

Method: 350.1 - Nitrogen, Ammonia

Lab Sample ID: MB 310-435798/1-A
Matrix: Water
Analysis Batch: 435888

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 435798

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia as N	<0.500		0.500		mg/L		10/10/24 09:32	10/10/24 17:43	1

Lab Sample ID: LCS 310-435798/2-A
Matrix: Water
Analysis Batch: 435888

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 435798

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Ammonia as N	4.00	3.677		mg/L		92	90 - 110

Method: 9034 - Sulfide, Acid soluble and Insoluble (Titrimetric)

Lab Sample ID: MB 240-630855/1-A
Matrix: Water
Analysis Batch: 630934

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 630855

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	<3.00		3.00		mg/L		10/15/24 10:09	10/15/24 15:13	1

Lab Sample ID: LCS 240-630855/2-A
Matrix: Water
Analysis Batch: 630934

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 630855

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Sulfide	8.00	5.867		mg/L		73	70 - 120

Eurofins Cedar Falls

QC Sample Results

Client: GHD Inc.
Project/Site: Leachate Semi-Annual LCS Sample

Job ID: 310-292368-1

Method: 9066 - Phenolics, Total Recoverable

Lab Sample ID: MB 310-436090/1-A
Matrix: Water
Analysis Batch: 436206

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 436090

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenols, Total	<0.0200		0.0200		mg/L		10/14/24 08:29	10/14/24 23:07	1

Lab Sample ID: LCS 310-436090/2-A
Matrix: Water
Analysis Batch: 436206

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 436090

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Phenols, Total	0.100	0.09833		mg/L		98	90 - 110

Method: D93_85 - Ignitability, Pensky-Martens Closed Cup Method

Lab Sample ID: LCS 310-436862/1
Matrix: Water
Analysis Batch: 436862

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Flashpoint	81.0	86.10		Degrees F		106	95 - 112

Method: I-3765-85 - Residue, Non-filterable (TSS)

Lab Sample ID: MB 310-435918/1
Matrix: Water
Analysis Batch: 435918

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<5.00		5.00		mg/L			10/11/24 08:52	1

Lab Sample ID: LCS 310-435918/2
Matrix: Water
Analysis Batch: 435918

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	100	108.0		mg/L		108	81 - 116

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 310-436360/1
Matrix: Water
Analysis Batch: 436360

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<50.0		50.0		mg/L			10/15/24 17:46	1

Lab Sample ID: LCS 310-436360/2
Matrix: Water
Analysis Batch: 436360

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	1000	984.0		mg/L		98	88 - 110

Eurofins Cedar Falls

QC Sample Results

Client: GHD Inc.
Project/Site: Leachate Semi-Annual LCS Sample

Job ID: 310-292368-1

Method: SM 4500 H+ B - pH

Lab Sample ID: LCS 310-435611/1
Matrix: Water
Analysis Batch: 435611

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
pH	7.00	7.1		SU		101	98 - 102

Method: SM 5220D - COD

Lab Sample ID: MB 310-436415/32
Matrix: Water
Analysis Batch: 436415

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	<5.00		5.00		mg/L			10/16/24 10:09	1

Lab Sample ID: LCS 310-436415/33
Matrix: Water
Analysis Batch: 436415

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chemical Oxygen Demand	125	131.0		mg/L		105	85 - 110

Lab Sample ID: 310-292368-1 MS
Matrix: Water
Analysis Batch: 436415

Client Sample ID: LCS
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Chemical Oxygen Demand	<25.0		250	300.5		mg/L		120	83 - 145

Lab Sample ID: 310-292368-1 MSD
Matrix: Water
Analysis Batch: 436415

Client Sample ID: LCS
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Chemical Oxygen Demand	<25.0		250	300.5		mg/L		120	83 - 145	0	16

QC Association Summary

Client: GHD Inc.
Project/Site: Leachate Semi-Annual LCS Sample

Job ID: 310-292368-1

GC/MS VOA

Analysis Batch: 436121

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292368-1	LCS	Total/NA	Water	8260D	
MB 310-436121/5	Method Blank	Total/NA	Water	8260D	
LCS 310-436121/6	Lab Control Sample	Total/NA	Water	8260D	
LCS 310-436121/7	Lab Control Sample	Total/NA	Water	8260D	

HPLC/IC

Analysis Batch: 435763

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292368-1	LCS	Total/NA	Water	300.0	
MB 310-435763/3	Method Blank	Total/NA	Water	300.0	
LCS 310-435763/4	Lab Control Sample	Total/NA	Water	300.0	

Metals

Prep Batch: 435877

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292368-1	LCS	Total/NA	Water	3005A	
MB 310-435877/1-A	Method Blank	Total/NA	Water	3005A	
LCS 310-435877/2-A	Lab Control Sample	Total/NA	Water	3005A	

Prep Batch: 436310

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292368-1	LCS	Total/NA	Water	7470A	
MB 310-436310/1-A	Method Blank	Total/NA	Water	7470A	
LCS 310-436310/2-A	Lab Control Sample	Total/NA	Water	7470A	

Analysis Batch: 436502

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292368-1	LCS	Total/NA	Water	7470A	436310
MB 310-436310/1-A	Method Blank	Total/NA	Water	7470A	436310
LCS 310-436310/2-A	Lab Control Sample	Total/NA	Water	7470A	436310

Analysis Batch: 436544

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292368-1	LCS	Total/NA	Water	6020B	435877
MB 310-435877/1-A	Method Blank	Total/NA	Water	6020B	435877
LCS 310-435877/2-A	Lab Control Sample	Total/NA	Water	6020B	435877

Analysis Batch: 436697

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292368-1	LCS	Total/NA	Water	6020B	435877
MB 310-435877/1-A	Method Blank	Total/NA	Water	6020B	435877
LCS 310-435877/2-A	Lab Control Sample	Total/NA	Water	6020B	435877

General Chemistry

Analysis Batch: 435611

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292368-1	LCS	Total/NA	Water	SM 4500 H+ B	
LCS 310-435611/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	

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QC Association Summary

Client: GHD Inc.
Project/Site: Leachate Semi-Annual LCS Sample

Job ID: 310-292368-1

General Chemistry

Prep Batch: 435798

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292368-1	LCS	Total/NA	Water	350.1	
MB 310-435798/1-A	Method Blank	Total/NA	Water	350.1	
LCS 310-435798/2-A	Lab Control Sample	Total/NA	Water	350.1	

Analysis Batch: 435888

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292368-1	LCS	Total/NA	Water	350.1	435798
MB 310-435798/1-A	Method Blank	Total/NA	Water	350.1	435798
LCS 310-435798/2-A	Lab Control Sample	Total/NA	Water	350.1	435798

Analysis Batch: 435918

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292368-1	LCS	Total/NA	Water	I-3765-85	
MB 310-435918/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-435918/2	Lab Control Sample	Total/NA	Water	I-3765-85	

Prep Batch: 436090

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292368-1	LCS	Total/NA	Water	Distill/Phenol	
MB 310-436090/1-A	Method Blank	Total/NA	Water	Distill/Phenol	
LCS 310-436090/2-A	Lab Control Sample	Total/NA	Water	Distill/Phenol	

Prep Batch: 436190

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292368-1	LCS	Total/NA	Water	1664A	
MB 310-436190/1-A	Method Blank	Total/NA	Water	1664A	
LCS 310-436190/2-A	Lab Control Sample	Total/NA	Water	1664A	
310-292368-1 MS	LCS	Total/NA	Water	1664A	

Analysis Batch: 436206

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292368-1	LCS	Total/NA	Water	9066	436090
MB 310-436090/1-A	Method Blank	Total/NA	Water	9066	436090
LCS 310-436090/2-A	Lab Control Sample	Total/NA	Water	9066	436090

Analysis Batch: 436360

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292368-1	LCS	Total/NA	Water	SM 2540C	
MB 310-436360/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 310-436360/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Analysis Batch: 436363

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292368-1	LCS	Total/NA	Water	1664A	436190
MB 310-436190/1-A	Method Blank	Total/NA	Water	1664A	436190
LCS 310-436190/2-A	Lab Control Sample	Total/NA	Water	1664A	436190
310-292368-1 MS	LCS	Total/NA	Water	1664A	436190

Analysis Batch: 436415

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292368-1	LCS	Total/NA	Water	SM 5220D	

Eurofins Cedar Falls

QC Association Summary

Client: GHD Inc.

Job ID: 310-292368-1

Project/Site: Leachate Semi-Annual LCS Sample

General Chemistry (Continued)

Analysis Batch: 436415 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 310-436415/32	Method Blank	Total/NA	Water	SM 5220D	
LCS 310-436415/33	Lab Control Sample	Total/NA	Water	SM 5220D	
310-292368-1 MS	LCS	Total/NA	Water	SM 5220D	
310-292368-1 MSD	LCS	Total/NA	Water	SM 5220D	

Analysis Batch: 436862

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292368-1	LCS	Total/NA	Water	D93_85	
LCS 310-436862/1	Lab Control Sample	Total/NA	Water	D93_85	

Prep Batch: 630855

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292368-1	LCS	Total/NA	Water	9030B	
MB 240-630855/1-A	Method Blank	Total/NA	Water	9030B	
LCS 240-630855/2-A	Lab Control Sample	Total/NA	Water	9030B	

Analysis Batch: 630934

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-292368-1	LCS	Total/NA	Water	9034	630855
MB 240-630855/1-A	Method Blank	Total/NA	Water	9034	630855
LCS 240-630855/2-A	Lab Control Sample	Total/NA	Water	9034	630855

Lab Chronicle

Client: GHD Inc.
 Project/Site: Leachate Semi-Annual LCS Sample

Job ID: 310-292368-1

Client Sample ID: LCS

Lab Sample ID: 310-292368-1

Date Collected: 10/09/24 09:00

Matrix: Water

Date Received: 10/09/24 11:48

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260D		1	436121	WSE8	EET CF	10/14/24 14:27
Total/NA	Analysis	300.0		1	435763	HE7K	EET CF	10/09/24 13:35
Total/NA	Prep	3005A			435877	F5MW	EET CF	10/11/24 09:30
Total/NA	Analysis	6020B		1	436544	A6US	EET CF	10/16/24 13:51
Total/NA	Prep	3005A			435877	F5MW	EET CF	10/11/24 09:30
Total/NA	Analysis	6020B		1	436697	NFT2	EET CF	10/17/24 16:26
Total/NA	Prep	7470A			436310	QTZ5	EET CF	10/15/24 15:55
Total/NA	Analysis	7470A		1	436502	QTZ5	EET CF	10/16/24 16:51
Total/NA	Prep	1664A			436190	MDU9	EET CF	10/15/24 14:00
Total/NA	Analysis	1664A		1	436363	MDU9	EET CF	10/15/24 14:00
Total/NA	Prep	350.1			435798	MQ8M	EET CF	10/10/24 09:32
Total/NA	Analysis	350.1		1	435888	ZJX4	EET CF	10/10/24 17:52
Total/NA	Prep	9030B			630855	C5SV	EET CLE	10/15/24 10:09
Total/NA	Analysis	9034		1	630934	C5SV	EET CLE	10/15/24 15:13
Total/NA	Prep	Distill/Phenol			436090	HE7K	EET CF	10/14/24 08:29
Total/NA	Analysis	9066		1	436206	ZJX4	EET CF	10/14/24 23:13
Total/NA	Analysis	D93_85		1	436862	WZC8	EET CF	10/20/24 11:20
Total/NA	Analysis	I-3765-85		1	435918	HE7K	EET CF	10/11/24 08:52
Total/NA	Analysis	SM 2540C		1	436360	MDU9	EET CF	10/15/24 17:46
Total/NA	Analysis	SM 4500 H+ B		1	435611	W9YR	EET CF	10/09/24 12:50
Total/NA	Analysis	SM 5220D		5	436415	HE7K	EET CF	10/16/24 10:09

Laboratory References:

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401
 EET CLE = Eurofins Cleveland, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396



Accreditation/Certification Summary

Client: GHD Inc.
Project/Site: Leachate Semi-Annual LCS Sample

Job ID: 310-292368-1

Laboratory: Eurofins Cedar Falls

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Iowa	State	007	12-01-25
<p>The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.</p>			
Analysis Method	Prep Method	Matrix	Analyte
8260D		Water	1,2,3-Trichlorobenzene
8260D		Water	1,2,4-Trichlorobenzene
8260D		Water	Bromobenzene
8260D		Water	Hexane
8260D		Water	p-Isopropyltoluene
8260D		Water	sec-Butylbenzene
8260D		Water	tert-Butylbenzene
D93_85		Water	Flashpoint

Laboratory: Eurofins Cleveland

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
California	State	2927	02-28-25
Connecticut	State	PH-0806	12-31-26
Georgia	State	4062	02-27-25
Illinois	NELAP	200004	08-31-25
Iowa	State	421	06-01-25
Kentucky (UST)	State	112225	02-27-25
Kentucky (WW)	State	KY98016	12-30-24
Minnesota	NELAP	039-999-348	12-31-24
New Hampshire	NELAP	225024	09-30-25
New Jersey	NELAP	OH001	07-03-25
New York	NELAP	10975	04-02-25
Ohio VAP	State	ORELAP 4062	02-27-25
Oregon	NELAP	4062	02-27-25
Pennsylvania	NELAP	68-00340	08-31-25
Texas	NELAP	T104704517-22-19	08-31-25
USDA	US Federal Programs	P330-18-00281	01-05-27
Virginia	NELAP	460175	09-14-25
West Virginia DEP	State	210	12-31-24

Method Summary

Client: GHD Inc.
Project/Site: Leachate Semi-Annual LCS Sample

Job ID: 310-292368-1

Method	Method Description	Protocol	Laboratory
8260D	Volatile Organic Compounds by GC/MS	SW846	EET CF
300.0	Anions, Ion Chromatography	EPA	EET CF
6020B	Metals (ICP/MS)	SW846	EET CF
7470A	Mercury (CVAA)	SW846	EET CF
1664A	HEM and SGT-HEM	1664A	EET CF
350.1	Nitrogen, Ammonia	EPA	EET CF
9034	Sulfide, Acid soluble and Insoluble (Titrimetric)	SW846	EET CLE
9066	Phenolics, Total Recoverable	SW846	EET CF
D93_85	Ignitability, Pinsky-Martens Closed Cup Method	ASTM	EET CF
I-3765-85	Residue, Non-filterable (TSS)	USGS	EET CF
SM 2540C	Solids, Total Dissolved (TDS)	SM	EET CF
SM 4500 H+ B	pH	SM	EET CF
SM 5220D	COD	SM	EET CF
1664A	HEM and SGT-HEM (Aqueous)	1664A	EET CF
3005A	Preparation, Total Metals	SW846	EET CF
350.1	Distillation, Ammonia	EPA	EET CF
5030B	Purge and Trap	SW846	EET CF
7470A	Preparation, Mercury	SW846	EET CF
9030B	Sulfide, Distillation (Acid Soluble and Insoluble)	SW846	EET CLE
Distill/Phenol	Distillation, Phenolics	None	EET CF

Protocol References:

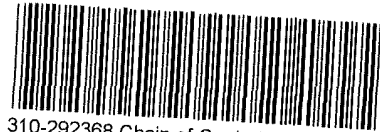
1664A = EPA-821-98-002
 ASTM = ASTM International
 EPA = US Environmental Protection Agency
 None = None
 SM = "Standard Methods For The Examination Of Water And Wastewater"
 SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.
 USGS = "Methods For Analysis Of Water And Fluvial Sediments", USGS, 1989

Laboratory References:

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401
 EET CLE = Eurofins Cleveland, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396



Environment Testing
America



310-292368 Chain of Custody

Cooler/Sample Receipt and Temperature Log Form

Client Information			
Client: <u>GHD</u>			
City/State: <u>New Brighton</u> <u>MN</u>		Project:	
Receipt Information			
Date/Time Received:	DATE <u>10/09/24</u>	TIME <u>11:25</u>	Received By: <u>AM</u>
Delivery Type: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee <input checked="" type="checkbox"/> Lab Courier <input type="checkbox"/> Lab Field Services <input type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____			
Condition of Cooler/Containers			
Sample(s) received in Cooler?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler ID: _____	
Multiple Coolers?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Cooler # _____ of _____	
Cooler Custody Seals Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Cooler custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Sample Custody Seals Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Sample custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Which VOA samples are in cooler? ↓	
Temperature Record			
Coolant: <input checked="" type="checkbox"/> Wet ice <input type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> Other: _____ <input type="checkbox"/> NONE			
Thermometer ID: <u>7</u>		Correction Factor (°C): <u>0.0</u>	
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature			
Uncorrected Temp (°C): <u>3.4</u>		Corrected Temp (°C): <u>3.4</u>	
• Sample Container Temperature			
Container(s) used:	<u>CONTAINER 1</u>	<u>CONTAINER 2</u>	
Uncorrected Temp (°C):			
Corrected Temp (°C):			
Exceptions Noted			
1) If temperature exceeds criteria, was sample(s) received same day of sampling? <input type="checkbox"/> Yes <input type="checkbox"/> No a) If yes: Is there evidence that the chilling process began? <input type="checkbox"/> Yes <input type="checkbox"/> No			
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g , bulging septa, broken/cracked bottles, frozen solid?) <input type="checkbox"/> Yes <input type="checkbox"/> No			
NOTE: If yes, contact PM before proceeding If no, proceed with login			
Additional Comments			



Eurofins Cleveland Sample Receipt Form/Narrative
 Barberton Facility
 Login # _____

Client ISPECTRO EA Site Name _____
 Cooler Received on 10/16/24 Opened on 10/16/24 Cooler unpacked by: TF

FedEx: 1st Grd UPS FAS Waypoint Client Drop Off Eurofins Courier Other _____
 Receipt After-hours Drop-off/Date/Time _____ Storage Location _____

Eurofins Cooler # CE Foam Box Client Cooler Box Other _____
 Packing material used: Bubble Wrap Foam Plastic Bag None Other _____

1 Cooler temperature upon receipt See Multiple Cooler Form
 IR GUN # 17 (CF 10.1 °C) Observed Cooler Temp. 1.3 °C Corrected Cooler Temp. 1.4 °C

2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity _____ Yes No
 -Were the seals on the outside of the cooler(s) signed & dated? Yes No
 -Were tamper/custody seals on the bottle(s) or bottle kits (LIHg/MeHg)? Yes No
 -Were tamper/custody seals intact and uncompromised? Yes No
 3 Shippers' packing slip attached to the cooler(s)? Yes No
 4 Did custody papers accompany the sample(s)? Yes No
 5 Were the custody papers relinquished & signed in the appropriate place? Yes No
 6 Was/were the person(s) who collected the samples clearly identified on the COC? Yes No
 7 Did all bottles arrive in good condition (Unbroken)? Yes No
 8 Could all bottle labels (ID/Date/Time) be reconciled with the COC? Yes No
 9 For each sample, does the COC specify preservatives (Y/N), # of containers (N), and sample type of grab/comp (N)? Yes No
 10 Were correct bottle(s) used for the test(s) indicated? Yes No
 11 Sufficient quantity received to perform indicated analyses? Yes No
 12. Are these work share samples and all listed on the COC? Yes No
 If yes, Questions 13-17 have been checked at the originating laboratory

Tests that are not checked for pH by Receiving:
 VOAs
 Oil and Grease
 TOC

13 Were all preserved sample(s) at the correct pH upon receipt? Yes No NA pH Strip Lot# HC447997
 14. Were VOAs on the COC? Yes No
 15 Were air bubbles >6 mm in any VOA vials? Larger than this. Yes No NA
 16. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # _____ Yes No
 17 Was a LI. Hg or Me Hg trip blank present? Yes No

Contacted PM _____ Date _____ by _____ via Verbal Voice Mail Other _____
 Concerning _____

18. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES additional next page Samples processed by: _____

19. SAMPLE CONDITION
 Sample(s) _____ were received after the recommended holding time had expired.
 Sample(s) _____ were received in a broken container
 Sample(s) _____ were received with bubble >6 mm in diameter (Notify PM)

20. SAMPLE PRESERVATION
 Sample(s) _____ were further preserved in the laboratory
 Time preserved. _____ Preservative(s) added/Lot number(s) _____
 VOA Sample Preservation - Date/Time VOAs Frozen. _____

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15

Part# 15948B-434 MTW EXP 08/25

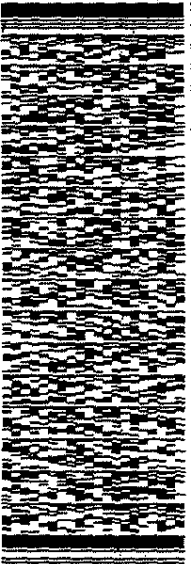
ORIGIN ID #108 (319) 277-2401
 SAMPLE RECEIVING
 EUROFINS TESTAMERICA
 3819 VENTURE WAY
 CEDAR FALLS, IA 50613
 UNITED STATES US

SHIP DATE 090C124
 ACTWGT 19.95 LB
 CRD 0670970/CAF39855
 BILL SENDER

TO SHIPPING/RECEIVING
 EUROFINS ENVIRONMENT TESTING NORTH
 180 S. VAN BUREN AVENUE
 BARBERTON OH 44203

(330) 497-9396
 REF. S310-99193

589CC/928/2585

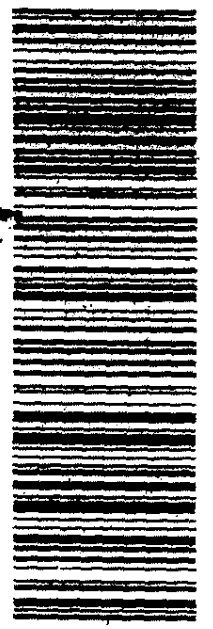


31948B28292F

TRK# 4085 8612 8316
 0201

THU - 10 OCT 10:30A
 PRIORITY OVERNIGHT

XS CAKA 44203
 OH-US CLE



Login Sample Receipt Checklist

Client: GHD Inc.

Job Number: 310-292368-1

Login Number: 292368

List Number: 1

Creator: Hirsch, Preston

List Source: Eurofins Cedar Falls

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



Login Sample Receipt Checklist

Client: GHD Inc.

Job Number: 310-292368-1

Login Number: 292368

List Number: 2

Creator: Foltyn, Tristan

List Source: Eurofins Cleveland

List Creation: 10/10/24 02:12 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.		
The cooler's custody seal, if present, is intact.		
Sample custody seals, if present, are intact.		
The cooler or samples do not appear to have been compromised or tampered with.		
Samples were received on ice.		
Cooler Temperature is acceptable.		
Cooler Temperature is recorded.		
COC is present.		
COC is filled out in ink and legible.		
COC is filled out with all pertinent information.		
Is the Field Sampler's name present on COC?		
There are no discrepancies between the containers received and the COC.		
Samples are received within Holding Time (excluding tests with immediate HTs)		
Sample containers have legible labels.		
Containers are not broken or leaking.		
Sample collection date/times are provided.		
Appropriate sample containers are used.		
Sample bottles are completely filled.		
Sample Preservation Verified.		
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs		
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").		
Multiphasic samples are not present.		
Samples do not require splitting or compositing.		
Residual Chlorine Checked.		

Appendix C

December 2023 through October 2024

Leachate Flow Data

2023 LEACHATE DISCHARGE - VIKING PUMP FOUNDRY SAND LANDFILL CEDAR FALLS, IOWA									
DATE	HEAD LEVEL	40 DAILY	90 DAILY	90 GPM CUMULATIVE	NOTES	TOTAL MIN.'S PUMPED	DAILY MIN.'S PUMPED	GPM	MOTOR STARTS
	INCHES	GALLONS	GALLONS	GALLONS					
12/1/2023	24.5		51	15,096,746		154,793	0.0	0.00	1
12/2/2023	24.9		50	15,096,796		154,794	1.0	50.00	1
12/3/2023	24.6		50	15,096,846		154,795	1.0	50.00	1
12/4/2023	24.3		50	15,096,896		154,795	1.0	50.00	1
12/5/2023	24.4		50	15,096,946		154,796	0.0	0.00	1
12/6/2023	24.4		50	15,096,996		154,797	1.0	50.00	1
12/7/2023	25.6		52	15,097,048		154,797	0.0	0.00	1
12/8/2023	24.3		105	15,097,153		154,798	1.0	105.00	2
12/9/2023	23.9		51	15,097,204		154,799	1.0	51.00	1
12/10/2023	23.6		50	15,097,254		154,799	0.0	0.00	1
12/11/2023	23.4		51	15,097,305		154,800	1.0	51.00	1
12/12/2023	23.5		49	15,097,354		154,800	0.0	0.00	1
12/13/2023	23.9		52	15,097,406		154,801	1.0	52.00	1
12/14/2023	25.0		49	15,097,455		154,801	0.0	0.00	1
12/15/2023	26.0		49	15,097,504		154,802	1.0	49.00	1
12/16/2023	22.6		99	15,097,603		154,803	1.0	99.00	2
12/17/2023	24.3		51	15,097,654		154,803	0.0	0.00	1
12/18/2023	24.3		96	15,097,750		154,804	1.0	96.00	2
12/19/2023	22.7		47	15,097,797		154,805	1.0	47.00	1
12/20/2023	24.5		49	15,097,846		154,805	0.0	0.00	1
12/21/2023	26.0		48	15,097,894		154,806	1.0	48.00	1
12/22/2023	23.0		99	15,097,993		154,807	1.0	99.00	2
12/23/2023	23.4		48	15,098,042		154,807	0.0	0.00	1
12/24/2023	25.3		49	15,098,141		154,808	1.0	49.00	1
12/25/2023	23.9		99	15,098,188		154,809	1.0	99.00	2
12/26/2023	23.6		47	15,098,235		154,809	0.0	0.00	1
12/27/2023	23.6		47	15,098,282		154,810	1.0	47.00	1
12/28/2023	24.4		48	15,098,330		154,810	0.0	0.00	1
12/29/2023	23.9		97	15,098,427		154,811	1.0	97.00	2
12/30/2023	22.9		41	15,098,468		154,812	1.0	41.00	1
12/31/2023	25.3		46	15,098,514		154,812	0.0	0.00	1

GPMS	AVG GPD
51	51
50	51
50	50
50	50
50	50
50	50
50	50
52	50
53	57
51	57
50	56
51	55
49	55
52	55
49	54
49	54
50	57
51	56
48	59
47	58
49	58
48	57
50	59
48	58
49	60
50	59
47	59
47	59
48	58
49	60
41	60
46	60

Total Gallons Pumped In 12-2023	1,820
Total Pumped Since 01-01-2015	15,093,316

Total Pumped In 2015	3,415,648
Total Pumped In 2016	3,780,646
Total Pumped In 2017	1,650,925
Total Pumped In 2018	2,960,728
Total Pumped In 2019	1,209,557
Total Pumped In 2020	891,294
Total Pumped In 2021	245,405
Total Pumped In 2022	410,178
Total Pumped In 2023	513,929

Total CCF Pumped In 12-2023	2
Monthly Avg. CCF Pumped - 2023	57

2024 LEACHATE DISCHARGE - VIKING PUMP FOUNDRY SAND LANDFILL CEDAR FALLS, IOWA									
DATE	HEAD LEVEL	40 DAILY	90 DAILY	90 GPM CUMULATIVE	NOTES	TOTAL MIN.'S PUMPED	DAILY MIN.'S PUMPED	GPM	MOTOR STARTS
	INCHES	GALLONS	GALLONS	GALLONS					
1/1/2024	23.5		92	15,098,606		154,813	1.0	92.00	2
1/2/2024	22.9		46	15,098,652		154,814	1.0	46.00	1
1/3/2024	24.2		46	15,098,698		154,814	0.0	0.00	1
1/4/2024	25.7		45	15,098,743		154,815	1.0	45.00	1
1/5/2024	23.3		119	15,098,862		154,815	1.0	119.00	6
1/6/2024	23.1		46	15,098,908		154,815	0.0	0.00	1
1/7/2024	25.3		45	15,098,953		154,816	1.0	45.00	1
1/8/2024	24.2		94	15,099,047		154,817	1.0	94.00	2
1/9/2024	22.8		46	15,099,093		154,817	0.0	0.00	1
1/10/2024	24.2		46	15,099,139		154,818	1.0	46.00	1
1/11/2024	25.5		46	15,099,185		154,818	0.0	0.00	1
1/12/2024	23.4		93	15,099,278		154,818	0.0	0.00	1
1/13/2024	23.1		45	15,099,323		154,819	1.0	45.00	1
1/14/2024	24.3		47	15,099,370		154,819	0.0	0.00	1
1/15/2024	25.5		47	15,099,417		154,820	1.0	47.00	1
1/16/2024	23.3		94	15,099,511		154,821	1.0	94.00	2
1/17/2024	23.1		47	15,099,558		154,821	0.0	0.00	1
1/18/2024	24.4		47	15,099,605		154,822	1.0	47.00	1
1/19/2024	25.6		44	15,099,649		154,822	0.0	0.00	1
1/20/2024	23.1		92	15,099,741		154,823	1.0	92.00	2
1/21/2024	22.9		48	15,099,789		154,823	0.0	0.00	1
1/22/2024	24.2		47	15,099,836		154,824	1.0	47.00	1
1/23/2024	25.6		44	15,099,880		154,824	0.0	0.00	1
1/24/2024	23.4		95	15,099,975		154,825	1.0	95.00	2
1/25/2024	23.1		47	15,100,022		154,826	1.0	47.00	1
1/26/2024	24.3		91	15,100,113		154,827	1.0	91.00	2
1/27/2024	25.6		94	15,100,207		154,828	1.0	94.00	2
1/28/2024	25.5		607	15,100,814		154,834	6.0	101.17	13
1/29/2024	26.1		1,337	15,102,151		154,849	15.0	89.13	29
1/30/2024	23.3		2,087	15,104,238		154,871	22.0	94.86	45
1/31/2024	26.0		2,809	15,107,047		154,902	31.0	90.61	61

GPMS	AVG GPD
46	92
46	69
46	61
45	70
20	70
46	66
45	63
47	67
46	64
46	63
46	61
93	64
45	62
47	61
47	60
47	62
47	61
47	61
44	60
46	61
48	61
47	60
44	61
48	60
47	62
46	62
47	63
47	82
46	127
46	200
46	298

Total Gallons Pumped In 1-2024	8,533
Total Pumped Since 01-01-2015	15,101,849

Total Pumped In 2015	3,415,648
Total Pumped In 2016	3,780,646
Total Pumped In 2017	1,650,925
Total Pumped In 2018	2,960,728
Total Pumped In 2019	1,209,557
Total Pumped In 2020	891,294
Total Pumped In 2021	245,405
Total Pumped In 2022	410,178
Total Pumped In 2023	520,642
Total Pumped In 2024	8,533

Total CCF Pumped In 1-2024	11
Monthly Avg. CCF Pumped - 2024	11

2024 LEACHATE DISCHARGE - VIKING PUMP FOUNDRY SAND LANDFILL CEDAR FALLS, IOWA									
DATE	HEAD LEVEL	40 DAILY	90 DAILY	90 GPM CUMULATIVE	NOTES	TOTAL MIN.'S PUMPED	DAILY MIN.'S PUMPED	GPM	MOTOR STARTS
	INCHES	GALLONS	GALLONS	GALLONS					
2/1/2024	24.7		3,323	15,110,370		154,937	35.0	94.94	71
2/2/2024	25.9		3,162	15,113,532		154,972	35.0	90.34	68
2/3/2024	25.7		2,154	15,115,686		154,995	23.0	93.65	47
2/4/2024	26.0		1,284	15,116,970		155,006	14.0	91.71	29
2/5/2024	18.4		1060	15,118,030		155,014	11.0	96.36	23
2/6/2024	25.5		776	15,118,806		155,022	8.0	97.00	17
2/7/2024	18.7		639	15,119,445		155,026	4.0	159.75	8
2/8/2024	25.7		362	15,119,807		155,030	4.0	90.50	8
2/9/2024	25.9		499	15,120,306		155,035	5.0	99.80	11
2/10/2024	25.6		131	15,120,437		155,036	1.0	131.00	3
2/11/2024	25.4		88	15,120,525		155,037	1.0	88.00	2
2/12/2024	25.8		89	15,120,614		155,038	1.0	89.00	2
2/13/2024	25.8		91	15,120,705		155,039	1.0	91.00	2
2/14/2024	24.8		90	15,120,795		155,040	1.0	90.00	2
2/15/2024	25.5		45	15,120,840		155,041	1.0	45.00	1
2/16/2024	24.8		90	15,120,930		155,042	1.0	90.00	2
2/17/2024	25.4		46	15,120,976		155,042	0.0	0.00	1
2/18/2024	26.1		45	15,121,021		155,043	1.0	45.00	1
2/19/2024	25.6		91	15,121,112		155,044	1.0	91.00	2
2/20/2024	26.0		46	15,121,158		155,044	0.0	0.00	1
2/21/2024	24.8		92	15,121,250		155,045	1.0	92.00	2
2/22/2024	24.6		133	15,121,383		155,047	2.0	66.50	14
2/23/2024	25.0		46	15,121,429		155,047	0.0	0.00	1
2/24/2024	25.5		44	15,121,473		155,047	0.0	0.00	1
2/25/2024	25.7		45	15,121,518		155,048	1.0	45.00	1
2/26/2024	24.9		91	15,121,609		155,049	1.0	91.00	2
2/27/2024	25.6		44	15,121,653		155,049	0.0	0.00	1
2/28/2024	25.5		45	15,121,698		155,050	1.0	45.00	1
2/29/2024	25.1		42	15,121,740		155,050	0.0	0.00	1

GPMS	AVG GPD
47	3,323
47	3,243
46	2,880
44	2,197
46	2,197
46	1,960
80	1,771
45	1,595
45	1,473
44	1,339
44	1,225
45	1,131
46	1,051
45	982
45	920
45	868
46	819
45	776
46	740
46	706
46	676
10	652
46	601
44	579
45	560
46	560
44	541
45	523
42	406

Total Gallons Pumped In 2-2024	14,693
Total Pumped Since 01-01-2015	15,116,542

Total Pumped In 2015	3,415,648
Total Pumped In 2016	3,780,646
Total Pumped In 2017	1,650,925
Total Pumped In 2018	2,960,728
Total Pumped In 2019	1,209,557
Total Pumped In 2020	891,294
Total Pumped In 2021	245,405
Total Pumped In 2022	410,178
Total Pumped In 2023	526,802
Total Pumped In 2024	23,226

Total CCF Pumped In 2-2024	20
Monthly Avg. CCF Pumped - 2024	16

2024 LEACHATE DISCHARGE - VIKING PUMP FOUNDRY SAND LANDFILL CEDAR FALLS, IOWA										GPMS	AVG GPD
DATE	HEAD LEVEL	40 DAILY	90 DAILY	90 GPM CUMULATIVE	NOTES	TOTAL MIN.'S PUMPED	DAILY MIN.'S PUMPED	GPM	MOTOR STARTS		
	INCHES	GALLONS	GALLONS	GALLONS							
3/1/2024	25.0		45	15,121,785		155,051	1.0	45.00	1	45	45
3/2/2024	25.3		46	15,121,831		155,051	0.0	0.00	1	46	46
3/3/2024	25.7		46	15,121,877		155,052	1.0	46.00	1	46	46
3/4/2024	25.5		45	15,121,922		155,053	0.0	0.00	1	45	45
3/5/2024	24.8		44	15,121,966		155,053	1.0	44.00	1	44	45
3/6/2024	25.0		43	15,122,009		155,053	0.0	0.00	1	43	45
3/7/2024	24.8		44	15,122,053		155,054	1.0	44.00	1	44	45
3/8/2024	25.0		43	15,122,096		155,054	0.0	0.00	1	43	45
3/9/2024	24.4		87	15,122,183		155,055	1.0	87.00	2	44	49
3/10/2024	23.8		43	15,122,226		155,056	1.0	43.00	1	43	49
3/11/2024	24.2		42	15,122,268		155,056	0.0	0.00	1	42	48
3/12/2024	24.2		42	15,122,310		155,056	0.0	0.00	1	42	48
3/13/2024	24.4		43	15,122,353		155,057	1.0	43.00	1	43	47
3/14/2024	24.3		193	15,122,546		155,059	2.0	96.50	4	48	58
3/15/2024	24.4		108	15,122,654		155,060	1.0	108.00	2	54	61
3/16/2024	23.6		107	15,122,761		155,061	1.0	107.00	2	54	64
3/17/2024	24.8		106	15,122,867		155,062	1.0	106.00	2	53	66
3/18/2024	24.5		162	15,123,029		155,063	1.0	162.00	3	54	72
3/19/2024	24.8		109	15,123,138		155,064	1.0	109.00	2	55	74
3/20/2024	23.9		160	15,123,298		155,065	1.0	160.00	3	53	78
3/21/2024	23.7		108	15,123,406		155,066	1.0	108.00	2	54	79
3/22/2024	25.3		109	15,123,515		155,067	1.0	109.00	2	55	81
3/23/2024	24.4		162	15,123,677		155,069	2.0	81.00	3	54	85
3/24/2024	23.6		108	15,123,785		155,070	1.0	108.00	3	36	88
3/25/2024	24.6		163	15,123,948		155,071	1.0	163.00	3	54	91
3/26/2024	24.9		161	15,124,109		155,073	2.0	80.50	3	54	91
3/27/2024	26.0		226	15,124,335		155,075	2.0	113.00	4	57	96
3/28/2024	25.1		286	15,124,621		155,077	2.0	143.00	5	57	103
3/29/2024	25.4		166	15,124,787		155,079	2.0	83.00	3	55	107
3/30/2024	25.1		217	15,125,004		155,081	2.0	108.50	4	54	113
3/31/2024	24.7		163	15,125,167		155,082	1.0	163.00	3	54	118

Total Gallons Pumped In 3-2024	3,427
Total Pumped Since 01-01-2015	15,119,969

Total Pumped In 2015	3,415,648
Total Pumped In 2016	3,780,646
Total Pumped In 2017	1,650,925
Total Pumped In 2018	2,960,728
Total Pumped In 2019	1,209,557
Total Pumped In 2020	891,294
Total Pumped In 2021	245,405
Total Pumped In 2022	410,178
Total Pumped In 2023	515,536
Total Pumped In 2024	26,653

Total CCF Pumped In 3-2024	5
Monthly Avg. CCF Pumped - 2024	12

2024 LEACHATE DISCHARGE - VIKING PUMP FOUNDRY SAND LANDFILL CEDAR FALLS, IOWA										GPMS	AVG GPD
DATE	HEAD LEVEL	40 DAILY	90 DAILY	90 GPM CUMULATIVE	NOTES	TOTAL MIN.'S PUMPED	DAILY MIN.'S PUMPED	GPM	MOTOR STARTS		
	INCHES	GALLONS	GALLONS	GALLONS							
4/1/2024	24.6		217	15,125,384		155,082	0.0	0.00	4	54	217
4/2/2024	24.7		161	15,125,545		155,084	2.0	80.50	3	54	189
4/3/2024	24.7		277	15,125,822		155,085	1.0	277.00	5	55	218
4/4/2024	25.9		476	15,126,298		155,089	3.0	158.67	22	22	284
4/5/2024	25.6		288	15,126,586		155,092	4.0	72.00	5	58	284
4/6/2024	25.5		228	15,126,814		155,095	3.0	76.00	4	57	275
4/7/2024	25.6		169	15,126,983		155,097	2.0	84.50	3	56	259
4/8/2024	25.4		223	15,127,206		155,098	1.0	223.00	4	56	255
4/9/2024	25.0		164	15,127,370		155,100	2.0	82.00	3	55	245
4/10/2024	24.8		161	15,127,531		155,102	2.0	80.50	3	54	236
4/11/2024	24.7		162	15,127,693		155,103	1.0	162.00	3	54	230
4/12/2024	24.9		161	15,127,854		155,104	1.0	161.00	3	54	224
4/13/2024	24.6		160	15,128,014		155,106	2.0	80.00	3	53	219
4/14/2024	24.7		161	15,128,175		155,107	1.0	161.00	3	54	215
4/15/2024	24.7		160	15,128,335		155,109	2.0	80.00	3	53	211
4/16/2024	25.7		108	15,128,443		155,110	1.0	108.00	2	54	205
4/17/2024	24.9		160	15,128,603		155,111	1.0	160.00	3	53	202
4/18/2024	25.7		286	15,128,889		155,113	2.0	143.00	5	57	207
4/19/2024	26.3		584	15,129,473		155,115	2.0	292.00	10	58	227
4/20/2024	20.4		1,302	15,130,775		155,120	5.0	260.40	22	59	280
4/21/2024	25.5		939	15,131,714		155,131	11.0	85.36	16	59	312
4/22/2024	26.3		702	15,132,416		155,139	8.0	87.75	12	59	330
4/23/2024	26.1		579	15,132,995		155,144	5.0	115.80	10	58	343
4/24/2024	26.4		404	15,133,399		155,149	5.0	80.80	7	58	341
4/25/2024	26.1		286	15,133,685		155,153	4.0	71.50	5	57	336
4/26/2024	26.0		228	15,133,913		155,155	2.0	114.00	4	57	336
4/27/2024	25.4		225	15,134,138		155,157	2.0	112.50	4	56	332
4/28/2024	26.3		4,500	15,138,638		155,159	2.0	2250.00	74	61	481
4/29/2024	21.3		7,624	15,146,262		155,196	37.0	206.05	121	63	746
4/30/2024	24.2		8,950	15,155,212		155,259	63.0	142.06	139	64	1,060

Total Gallons Pumped In 4-2024	30,045
Total Pumped Since 01-01-2015	15,150,014

Total Pumped In 2015	3,415,648
Total Pumped In 2016	3,780,646
Total Pumped In 2017	1,650,925
Total Pumped In 2018	2,960,728
Total Pumped In 2019	1,209,557
Total Pumped In 2020	891,294
Total Pumped In 2021	245,405
Total Pumped In 2022	410,178
Total Pumped In 2023	542,154
Total Pumped In 2024	56,698

Total CCF Pumped In 4-2024	40
Monthly Avg. CCF Pumped - 2024	19

2024 LEACHATE DISCHARGE - VIKING PUMP FOUNDRY SAND LANDFILL CEDAR FALLS, IOWA											
DATE	HEAD LEVEL	40 DAILY	90 DAILY	90 GPM CUMULATIVE	NOTES	TOTAL MIN.'S PUMPED	DAILY MIN.'S PUMPED	GPM	MOTOR STARTS	GPMS	AVG GPD
	INCHES	GALLONS	GALLONS	GALLONS							
5/1/2024	17.4		7,286	15,162,498		155,318	59.0	123.49	116	63	7,286
5/2/2024	25.8		5,861	15,168,359		155,366	48.0	122.10	95	62	6,574
5/3/2024	18.1		8,315	15,176,674		155,433	67.0	124.10	129	64	7,154
5/4/2024	26.3		8,459	15,185,133		155,497	68.0	124.40	132	64	7,564
5/5/2024	23.6		7900	15,193,033		155,552	64.0	123.44	124	64	7,564
5/6/2024	22.5		6,825	15,199,858		155,607	55.0	124.09	109	63	7,441
5/7/2024	18.1		5,928	15,205,786		155,655	48.0	123.50	96	62	7,225
5/8/2024	25.3		7,307	15,213,093		155,714	59.0	123.85	116	63	7,235
5/9/2024	25.8		6,678	15,219,771		155,768	54.0	123.67	107	62	7,173
5/10/2024	19.5		17,375	15,237,146		155,906	138.0	125.91	236	74	8,193
5/11/2024	22.3		21,325	15,258,471		156,074	168.0	126.93	283	75	9,387
5/12/2024	25.4		17,133	15,275,604		156,210	136.0	125.98	235	73	10,033
5/13/2024	21.5		11,254	15,286,858		156,299	89.0	126.45	160	70	10,127
5/14/2024	26.1		4,886	15,291,744		156,338	39.0	125.28	71	69	9,752
5/15/2024	17.9		6,838	15,298,582		156,393	55.0	124.33	105	65	9,558
5/16/2024	20.9		7,934	15,306,516		156,457	64.0	123.97	126	63	9,457
5/17/2024	26.3		6,627	15,313,143		156,511	54.0	122.72	107	62	9,290
5/18/2024	26.4		5,661	15,318,804		156,557	46.0	123.07	93	61	9,088
5/19/2024	25.5		4,713	15,323,517		156,595	38.0	124.03	77	61	8,858
5/20/2024	18.6		4,085	15,327,602		156,628	33.0	123.79	67	61	8,620
5/21/2024	26.5		8,391	15,335,993		156,696	68.0	123.40	131	64	8,609
5/22/2024	18.3		26,771	15,362,764		156,908	212.0	126.28	331	81	9,434
5/23/2024	26.3		47,075	15,409,839		157,279	371.0	126.89	534	88	12,283
5/24/2024	17.5		40,166	15,450,005		157,596	317.0	126.71	477	84	12,778
5/25/2024	24.5		24,650	15,474,655		157,791	195.0	126.41	322	77	12,821
5/26/2024	20.9		13,905	15,488,560		157,901	110.0	126.41	196	71	12,821
5/27/2024	26.4		11,195	15,499,755		157,990	89.0	125.79	160	70	12,761
5/28/2024	26.0		7,776	15,507,531		158,052	62.0	125.42	114	68	12,583
5/29/2024	26.3		2,920	15,510,451		158,061	9.0	324.44	17	172	12,427
5/30/2024	26.0		7,758	15,518,209		158,123	62.0	125.13	130	60	12,495
5/31/2024	23.1		7,827	15,526,036		158,187	64.0	122.30	129	61	12,477

Total Gallons Pumped In 5-2024	370,824
Total Pumped Since 01-01-2015	15,520,838

Total Pumped In 2015	3,415,648
Total Pumped In 2016	3,780,646
Total Pumped In 2017	1,650,925
Total Pumped In 2018	2,960,728
Total Pumped In 2019	1,209,557
Total Pumped In 2020	891,294
Total Pumped In 2021	245,405
Total Pumped In 2022	410,178
Total Pumped In 2023	882,933
Total Pumped In 2024	427,522

Total CCF Pumped In 5-2024	496
Monthly Avg. CCF Pumped - 2024	114

2024 LEACHATE DISCHARGE - VIKING PUMP FOUNDRY SAND LANDFILL CEDAR FALLS, IOWA											
DATE	HEAD LEVEL	40 DAILY	90 DAILY	90 GPM CUMULATIVE	NOTES	TOTAL MIN.'S PUMPED	DAILY MIN.'S PUMPED	GPM	MOTOR STARTS	GPMs	AVG GPD
	INCHES	GALLONS	GALLONS	GALLONS							
6/1/2024	25.9		6,409	15,532,445		158,239	52.0	123.25	106	60	6,409
6/2/2024	22.0		5,584	15,538,029		158,284	45.0	124.09	93	60	5,997
6/3/2024	25.9		4,642	15,542,671		158,322	38.0	122.16	78	60	5,545
6/4/2024	26.1		4,174	15,546,845		158,357	34.0	122.76	71	59	5,029
6/5/2024	23.3		4337	15,551,182		158,410	35.0	123.91	73	59	5,029
6/6/2024	18.2		6,417	15,557,599		158,463	53.0	121.08	103	62	5,261
6/7/2024	20.8		5,792	15,563,391		158,510	47.0	123.23	96	60	5,336
6/8/2024	20.4		4,801	15,568,192		158,549	39.0	123.10	82	59	5,270
6/9/2024	26.0		4,160	15,572,352		158,583	34.0	122.35	70	59	5,146
6/10/2024	25.9		3,824	15,576,176		158,615	32.0	119.50	65	59	5,014
6/11/2024	24.2		3,508	15,579,684		158,643	28.0	125.29	60	58	4,877
6/12/2024	24.6		3,227	15,582,911		158,670	27.0	119.52	56	58	4,740
6/13/2024	25.8		2,740	15,585,651		158,692	22.0	124.55	48	57	4,586
6/14/2024	25.8		2,445	15,588,096		158,713	21.0	116.43	43	57	4,433
6/15/2024	26.3		2,037	15,590,133		158,729	16.0	127.31	36	57	4,273
6/16/2024	24.5		1,916	15,592,049		158,745	16.0	119.75	34	56	4,126
6/17/2024	26.3		1,678	15,593,727		158,759	14.0	119.86	30	56	3,982
6/18/2024	25.4		1,764	15,595,491		158,774	15.0	117.60	49	36	3,859
6/19/2024	25.7		1,345	15,596,836		158,785	11.0	122.27	24	56	3,726
6/20/2024	25.5		1,756	15,598,592		158,799	14.0	125.43	31	57	3,628
6/21/2024	26.0		2,041	15,600,633		158,816	17.0	120.06	36	57	3,552
6/22/2024	25.6		1,947	15,602,580		158,833	17.0	114.53	35	56	3,479
6/23/2024	26.4		2,289	15,604,869		158,852	19.0	120.47	41	56	3,395
6/24/2024	25.6		2,655	15,607,524		158,868	16.0	165.94	34	78	3,357
6/25/2024	25.9		2,449	15,609,973		158,889	21.0	116.62	44	56	3,317
6/26/2024	26.3		2,297	15,612,270		158,908	19.0	120.89	42	55	3,317
6/27/2024	26.3		2,176	15,614,446		158,926	18.0	120.89	40	54	3,274
6/28/2024	25.9		2,097	15,616,543		158,944	18.0	116.50	40	52	3,232
6/29/2024	17.9		3,650	15,620,193		158,975	31.0	117.74	67	54	3,134
6/30/2024	26.3		3,917	15,624,110		159,008	33.0	118.70	71	55	3,074

Total Gallons Pumped In 6-2024	98,074
Total Pumped Since 01-01-2015	15,618,912

Total Pumped In 2015	3,415,648
Total Pumped In 2016	3,780,646
Total Pumped In 2017	1,650,925
Total Pumped In 2018	2,960,728
Total Pumped In 2019	1,209,557
Total Pumped In 2020	891,294
Total Pumped In 2021	245,405
Total Pumped In 2022	410,178
Total Pumped In 2023	610,183
Total Pumped In 2024	525,596

Total CCF Pumped In 2-2024	131
Monthly Avg. CCF Pumped - 2024	117

2024 LEACHATE DISCHARGE - VIKING PUMP FOUNDRY SAND LANDFILL CEDAR FALLS, IOWA									
DATE	HEAD LEVEL	40 DAILY	90 DAILY	90 GPM CUMULATIVE	NOTES	TOTAL MIN.'S PUMPED	DAILY MIN.'S PUMPED	GPM	MOTOR STARTS
	INCHES	GALLONS	GALLONS	GALLONS					
7/1/2024	25.4		3,760	15,627,870		159,040	32.0	117.50	71
7/2/2024	24.6		3,843	15,631,713		159,072	32.0	120.09	75
7/3/2024	25.9		4,951	15,636,664		159,114	42.0	117.88	96
7/4/2024	25.9		6,684	15,643,348		159,164	56.0	119.36	124
7/5/2024	26.1		6,959	15,649,307		159,212	50.0	119.18	110
7/6/2024	20.3		5,668	15,654,975		159,260	48.0	118.08	105
7/7/2024	24.6		5,190	15,660,165		159,303	43.0	120.70	96
7/8/2024	26.1		4,779	15,664,944		159,344	41.0	116.56	89
7/9/2024	26.1		4,608	15,669,552		159,382	38.0	121.26	87
7/10/2024	18.3		4,526	15,674,078		159,421	39.0	116.05	86
7/11/2024	26.0		4,187	15,678,265		159,456	35.0	119.63	80
7/12/2024	26.1		3,925	15,682,190		159,489	33.0	118.94	75
7/13/2024	25.4		3,626	15,685,816		159,520	31.0	116.97	69
7/14/2024	26.4		3,294	15,689,110		159,548	28.0	117.64	63
7/15/2024	25.8		3,054	15,692,164		159,574	26.0	117.46	59
7/16/2024	26.0		2,845	15,695,009		159,599	25.0	113.80	56
7/17/2024	20.7		2,927	15,697,936		159,624	25.0	117.08	57
7/18/2024	25.9		2,685	15,700,621		159,646	22.0	122.05	52
7/19/2024	25.4		2,514	15,703,135		159,668	22.0	114.27	53
7/20/2024	24.7		2,357	15,705,492		159,688	20.0	117.85	55
7/21/2024	26.1		2,154	15,707,646		159,707	19.0	113.37	56
7/22/2024	26.3		2,445	15,710,091		159,728	21.0	116.43	102
7/23/2024	21.0		2,560	15,712,651		159,750	22.0	116.36	122
7/24/2024	23.3		2,237	15,714,888		159,769	19.0	117.74	98
7/25/2024	24.2		2,068	15,716,956		159,786	17.0	121.65	85
7/26/2024	25.8		1,889	15,718,845		159,803	17.0	111.12	73
7/27/2024	25.1		2,084	15,720,929		159,821	18.0	115.78	54
7/28/2024	25.8		1,934	15,722,863		159,837	16.0	120.88	49
7/29/2024	26.3		1,788	15,724,651		159,853	16.0	111.75	49
7/30/2024	21.0		1,611	15,726,262		159,867	14.0	115.07	36
7/31/2024	26.3		1,414	15,727,676		159,879	12.0	117.83	27

GPMS AVG GPD

53 3,760
51 3,802
52 4,185
54 5,039
54 5,039
54 5,144
54 5,151
54 5,104
53 5,049
53 4,997
52 4,923
52 4,840
53 4,747
52 4,643
52 4,537
51 4,431
51 4,343
52 4,251
47 4,159
43 4,069
38 3,978
24 3,908
21 3,782
23 3,714
24 3,644
26 3,644
39 3,586
39 3,527
36 3,456
45 3,377
52 3,250

Total Gallons Pumped In 7-2024	103,566
Total Pumped Since 01-01-2015	15,722,478

Total Pumped In 2015	3,415,648
Total Pumped In 2016	3,780,646
Total Pumped In 2017	1,650,925
Total Pumped In 2018	2,960,728
Total Pumped In 2019	1,209,557
Total Pumped In 2020	891,294
Total Pumped In 2021	245,405
Total Pumped In 2022	410,178
Total Pumped In 2023	615,675
Total Pumped In 2024	629,162

Total CCF Pumped In 1-2024	138
Monthly Avg. CCF Pumped - 2024	120

2024 LEACHATE DISCHARGE - VIKING PUMP FOUNDRY SAND LANDFILL CEDAR FALLS, IOWA									
DATE	HEAD LEVEL	40 DAILY	90 DAILY	90 GPM CUMULATIVE	NOTES	TOTAL MIN.'S PUMPED	DAILY MIN.'S PUMPED	GPM	MOTOR STARTS
	INCHES	GALLONS	GALLONS	GALLONS					
8/1/2024	26.0		1,360	15,729,036		159,890	11.0	123.64	
8/2/2024	26.4		1,240	15,730,276		159,901	11.0	112.73	
8/3/2024	22.4		1,276	15,731,552		159,913	12.0	106.33	
8/4/2024	26.1		1,279	15,732,831		159,924	11.0	116.27	
8/5/2024	25.7		1226	15,734,057		159,933	11.0	111.45	
8/6/2024	25.9		1,120	15,735,177		159,942	9.0	124.44	
8/7/2024	19.8		1,024	15,736,201		159,952	10.0	102.40	
8/8/2024	26.3		929	15,737,130		159,960	8.0	116.13	
8/9/2024	25.7		1,038	15,738,168		159,969	9.0	115.33	
8/10/2024	25.8		830	15,738,998		159,976	7.0	118.57	
8/11/2024	25.9		782	15,739,780		159,983	7.0	111.71	
8/12/2024	26.3		784	15,740,564		159,990	7.0	112.00	
8/13/2024	20.4		683	15,741,247		159,996	6.0	113.83	
8/14/2024	26.3		628	15,741,875		160,002	6.0	104.67	
8/15/2024	26.1		628	15,742,503		160,008	6.0	104.67	
8/16/2024	26.3		625	15,743,128		160,013	5.0	125.00	
8/17/2024	26.1		523	15,743,651		160,018	5.0	104.60	
8/18/2024	25.8		524	15,744,175		160,023	5.0	104.80	
8/19/2024	25.7		416	15,744,591		160,026	3.0	138.67	
8/20/2024	26.1		413	15,745,004		160,030	4.0	103.25	
8/21/2024	25.9		363	15,745,367		160,033	3.0	121.00	
8/22/2024	26.6		361	15,745,728		160,037	4.0	90.25	
8/23/2024	25.8		413	15,746,141		160,040	3.0	137.67	
8/24/2024	26.1		309	15,746,450		160,043	3.0	103.00	
8/25/2024	25.8		306	15,746,756		160,046	3.0	102.00	
8/26/2024	25.7		204	15,746,960		160,048	2.0	102.00	
8/27/2024	26.5		152	15,747,112		160,049	1.0	152.00	
8/28/2024	25.4		202	15,747,314		160,051	2.0	101.00	
8/29/2024	25.8		298	15,747,612		160,054	3.0	99.33	
8/30/2024	25.8		151	15,747,763		160,055	1.0	151.00	
8/31/2024	25.4		151	15,747,914		160,053	2.0	75.50	

GPMS	AVG GPD
#DIV/0!	1,360
#DIV/0!	1,300
#DIV/0!	1,292
#DIV/0!	1,276
#DIV/0!	1,276
#DIV/0!	1,250
#DIV/0!	1,218
#DIV/0!	1,182
#DIV/0!	1,166
#DIV/0!	1,132
#DIV/0!	1,100
#DIV/0!	1,074
#DIV/0!	1,044
#DIV/0!	1,014
#DIV/0!	988
#DIV/0!	966
#DIV/0!	940
#DIV/0!	917
#DIV/0!	890
#DIV/0!	866
#DIV/0!	842
#DIV/0!	821
#DIV/0!	782
#DIV/0!	763
#DIV/0!	742
#DIV/0!	742
#DIV/0!	720
#DIV/0!	701
#DIV/0!	629

Total Gallons Pumped In 8-2024	20,238
Total Pumped Since 01-01-2015	15,742,716

Total Pumped In 2015	3,415,648
Total Pumped In 2016	3,780,646
Total Pumped In 2017	1,650,925
Total Pumped In 2018	2,960,728
Total Pumped In 2019	1,209,557
Total Pumped In 2020	891,294
Total Pumped In 2021	245,405
Total Pumped In 2022	410,178
Total Pumped In 2023	532,347
Total Pumped In 2024	649,400

Total CCF Pumped In 8-2024	27
Monthly Avg. CCF Pumped - 2024	109

2024 LEACHATE DISCHARGE - VIKING PUMP FOUNDRY SAND LANDFILL CEDAR FALLS, IOWA										GPMS	AVG GPD
DATE	HEAD LEVEL	40 DAILY	90 DAILY	90 GPM CUMULATIVE	NOTES	TOTAL MIN.'S PUMPED	DAILY MIN.'S PUMPED	GPM	MOTOR STARTS		
	INCHES	GALLONS	GALLONS	GALLONS							
9/1/2024	25.9		100	15,747,565		160,053	0.0	0.00	2	50	100
9/2/2024	25.5		150	15,747,715		160,055	2.0	75.00	3	50	125
9/3/2024	25.8		99	15,747,814		160,056	1.0	99.00	2	50	116
9/4/2024	26.1		99	15,747,913		160,057	1.0	99.00	2	50	119
9/5/2024	25.3		149	15,748,062		160,059	1.0	149.00	4	37	119
9/6/2024	25.5		206	15,748,268		160,061	2.0	103.00	7	29	134
9/7/2024	24.9		100	15,748,368		160,062	1.0	100.00	2	50	129
9/8/2024	26.0		97	15,748,465		160,063	1.0	97.00	3	32	125
9/9/2024	25.7		96	15,748,561		160,064	1.0	96.00	3	32	122
9/10/2024	18.1		149	15,748,710		160,065	1.0	149.00	3	50	125
9/11/2024	25.6		99	15,748,809		160,066	1.0	99.00	2	50	122
9/12/2024	25.4		99	15,748,908		160,067	1.0	99.00	2	50	120
9/13/2024	24.9		149	15,749,057		160,068	1.0	149.00	3	50	122
9/14/2024	26.0		50	15,749,107		160,069	1.0	50.00	1	50	117
9/15/2024	25.5		148	15,749,255		160,070	1.0	148.00	3	49	119
9/16/2024	25.1		99	15,749,354		160,071	1.0	99.00	2	50	118
9/17/2024	25.5		202	15,749,556		160,073	2.0	101.00	4	51	123
9/18/2024	24.6		99	15,749,655		160,074	1.0	99.00	2	50	122
9/19/2024	24.3		98	15,749,753		160,075	1.0	98.00	4	25	120
9/20/2024	24.5		98	15,749,851		160,076	1.0	98.00	4	25	119
9/21/2024	25.3		49	15,749,900		160,076	0.0	0.00	2	25	116
9/22/2024	25.6		101	15,750,001		160,077	1.0	101.00	4	25	115
9/23/2024	25.1		51	15,750,052		160,078	1.0	51.00	2	26	112
9/24/2024	24.8		98	15,750,150		160,079	1.0	98.00	3	33	111
9/25/2024	24.7		98	15,750,248		160,080	1.0	98.00	2	49	109
9/26/2024	25.0		47	15,750,295		160,080	0.0	0.00	1	47	109
9/27/2024	26.0		48	15,750,343		160,081	1.0	48.00	1	48	107
9/28/2024	26.0		97	15,750,440		160,082	1.0	97.00	2	49	106
9/29/2024	24.3		97	15,750,537		160,083	1.0	97.00	2	49	106
9/30/2024	24.7		47	15,750,584		160,083	0.0	0.00	1	47	103

Total Gallons Pumped In 9-2024	3,119
Total Pumped Since 01-01-2015	15,745,835

Total Pumped In 2015	3,415,648
Total Pumped In 2016	3,780,646
Total Pumped In 2017	1,650,925
Total Pumped In 2018	2,960,728
Total Pumped In 2019	1,209,557
Total Pumped In 2020	891,294
Total Pumped In 2021	245,405
Total Pumped In 2022	410,178
Total Pumped In 2023	515,228
Total Pumped In 2024	652,519

Total CCF Pumped In 9-2024	4
Monthly Avg. CCF Pumped - 2024	97

2024 LEACHATE DISCHARGE - VIKING PUMP FOUNDRY SAND LANDFILL CEDAR FALLS, IOWA										GPMS	AVG GPD
DATE	HEAD LEVEL	40 DAILY	90 DAILY	90 GPM CUMULATIVE	NOTES	TOTAL MIN.'S PUMPED	DAILY MIN.'S PUMPED	GPM	MOTOR STARTS		
	INCHES	GALLONS	GALLONS	GALLONS							
10/1/2024	25.6		95	15,750,679		160,084	1.0	95.00	2	48	95
10/2/2024	24.6		94	15,750,773		160,085	1.0	94.00	2	47	95
10/3/2024	24.2		90	15,750,863		160,086	1.0	90.00	2	45	93
10/4/2024	23.4		92	15,750,955		160,086	1.0	92.00	2	46	83
10/5/2024	24.4		45	15,751,000		160,087	0.0	0.00	1	45	83
10/6/2024	25.1		44	15,751,044		160,088	1.0	44.00	1	44	77
10/7/2024	25.8		91	15,751,135		160,089	1.0	91.00	2	46	79
10/8/2024	23.9		87	15,751,222		160,090	1.0	87.00	2	44	80
10/9/2024	26.3		41	15,751,263		160,090	0.0	0.00	1	41	75
10/10/2024	23.8		217	15,751,480		160,093	3.0	72.33	12	18	90
10/11/2024	23.8		42	15,751,522		160,093	0.0	0.00	1	42	85
10/12/2024	25.7		45	15,751,567		160,094	1.0	45.00	1	45	82
10/13/2024	23.5		87	15,751,654		160,094	0.0	0.00	2	44	82
10/14/2024	26.0		41	15,751,695		160,095	1.0	41.00	1	41	79
10/15/2024	25.6		87	15,751,782		160,096	1.0	87.00	2	44	80
10/16/2024	24.5		86	15,751,868		160,097	1.0	86.00	2	43	80
10/17/2024	23.8		83	15,751,951		160,098	1.0	83.00	2	42	80
10/18/2024	23.3		85	15,752,036		160,099	1.0	85.00	2	43	81
10/19/2024	23.8		84	15,752,120		160,100	1.0	84.00	2	42	81
10/20/2024	25.3		44	15,752,164		160,100	0.0	0.00	1	44	79
10/21/2024	23.3		90	15,752,254		160,101	1.0	90.00	2	45	80
10/22/2024	24.9		43	15,752,297		160,101	0.0	0.00	1	43	78
10/23/2024	23.0		88	15,752,385		160,102	1.0	88.00	2		
10/24/2024	24.7		57	15,752,442		160,103	1.0	57.00	7	8	78
10/25/2024	23.5		88	15,752,530		160,104	1.0	88.00	2	44	78
10/26/2024	23.1		89	15,752,619		160,105	1.0	89.00	2	45	77
10/27/2024	24.9		45	15,752,664		160,105	0.0	0.00	1	45	77
10/28/2024	23.3		90	15,752,754		160,106	1.0	90.00	2	45	78
10/29/2024	25.5		46	15,752,800		160,107	1.0	46.00	1	46	76
10/30/2024	23.9		91	15,752,891		160,108	1.0	91.00	2	46	76
10/31/2024	23.4		46	15,752,937		160,108	0.0	0.00	1	46	75

Total Gallons Pumped In 10-2024	2,353
Total Pumped Since 01-01-2015	15,748,188

Total Pumped In 2015	3,415,648
Total Pumped In 2016	3,780,646
Total Pumped In 2017	1,650,925
Total Pumped In 2018	2,960,728
Total Pumped In 2019	1,209,557
Total Pumped In 2020	891,294
Total Pumped In 2021	245,405
Total Pumped In 2022	410,178
Total Pumped In 2023	514,462
Total Pumped In 2024	654,872

Total CCF Pumped In 10-2024	3
Monthly Avg. CCF Pumped - 2024	88

Appendix D

Aquifer Testing Calculations and Raw Data

Table D1
InSitu K Results
Viking Pump
Cedar Falls, Iowa

Group	Well No.	Falling Head (K in ft/min)	Rising Head (K in ft/min)	Geometric Mean (K in ft/min)
Shallow Aquifer	MW-5	0.00334	0.00220	4.86×10^{-4}
	MW-7R	0.00015	0.00013	
	MW-8	0.00295	0.00177	
	MW-11	0.00136	0.00142	
	MW-14	5.56×10^{-6}	1.25×10^{-6}	
	MW-17R	0.00077	0.00071	
	MW-19	0.00062	0.00031	
	MW-21	0.00344	0.00260	
Deep Aquifer	MW-15	8.59×10^{-6}	9.21×10^{-6}	2.28×10^{-6}
	MW-16	1.26×10^{-6}	2.53×10^{-7}	
	MW-20	1.25×10^{-6}	1.30×10^{-6}	
	MW-22	5.45×10^{-6}	3.39×10^{-6}	

Notes:

K - Hydraulic Conductivity

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-5 Falling Head Test.aqt

Title: MW-5 Falling Head Test

Date: 05/29/24

Time: 12:38:31

PROJECT INFORMATION

Company: GHD Services Inc

Client: Viking Pump/IDEX

Project: 056934

Location: Cedar Falls, Iowa

Test Date: 04-04-24

Test Well: MW-5

AQUIFER DATA

Saturated Thickness: 5.34 ft

Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-5

X Location: 0. ft

Y Location: 0. ft

Initial Displacement: 4.126 ft

Static Water Column Height: 5.34 ft

Casing Radius: 0.083 ft

Well Radius: 0.45 ft

Well Skin Radius: 0.45 ft

Screen Length: 7.5 ft

Total Well Penetration Depth: 7.5 ft

No. of Observations: 32

Time (min)	Observation Data		Displacement (ft)
	Displacement (ft)	Time (min)	
0.	4.126	0.5333	0.3428
0.03333	0.5865	0.5667	0.3308
0.06667	0.424	0.6	0.3428
0.1	0.391	0.6333	0.3428
0.1333	0.3549	0.6667	0.3308
0.1667	0.3428	0.7	0.3308
0.2	0.3308	0.7333	0.3308
0.2333	0.3308	0.7667	0.3428
0.2667	0.3428	0.8	0.3308
0.3	0.3308	0.8333	0.3308
0.3333	0.3308	0.8667	0.3428
0.3667	0.3428	0.9	0.3428
0.4	0.3308	0.9333	0.3428
0.4333	0.3308	0.9667	0.3308
0.4667	0.3308	1.	0.3308
0.5	0.3428	1.033	0.3428

SOLUTION

Slug Test

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

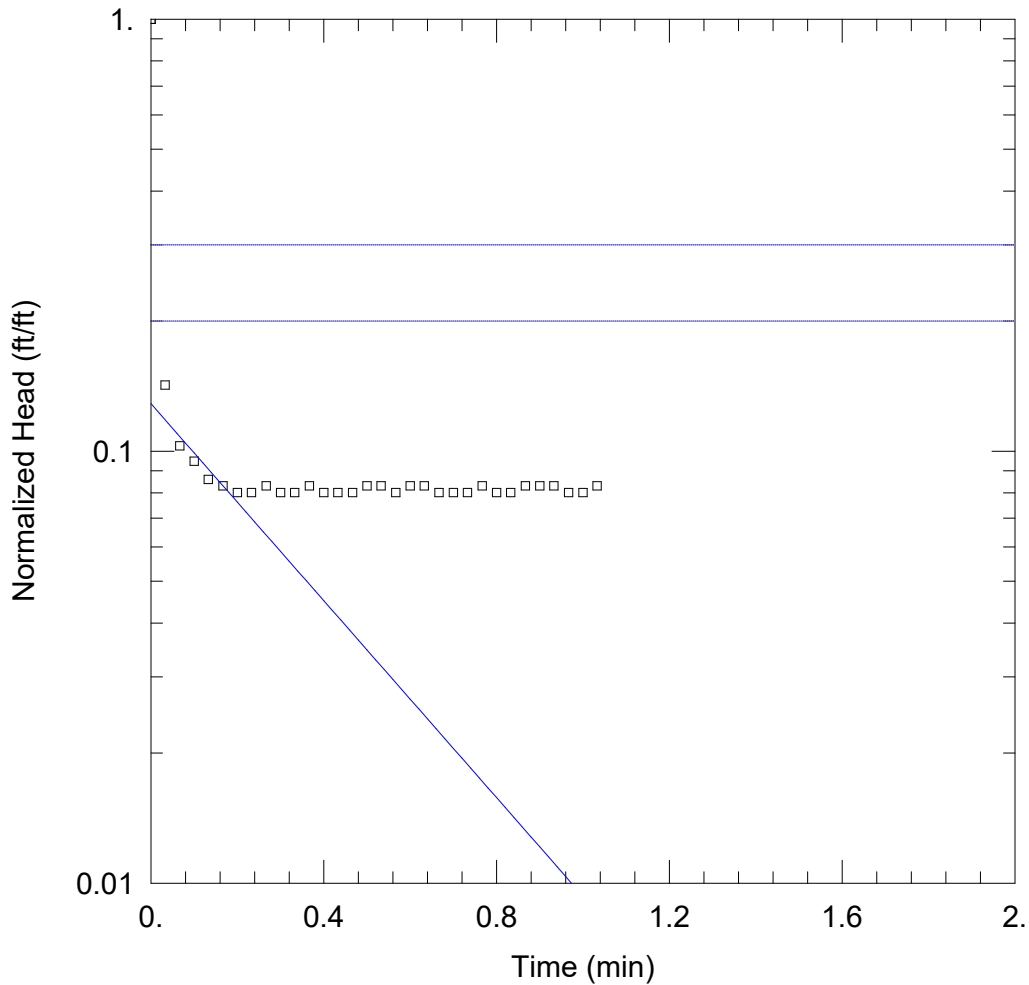
ln(Re/rw): 2.065

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	0.00334	ft/min
y0	0.5311	ft

K = 0.001697 cm/sec

T = K*b = 0.01783 ft²/min (0.2762 sq. cm/sec)



MW-5 FALLING HEAD TEST

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-5 Falling Head Test.aqt
 Date: 05/29/24 Time: 12:37:48

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Well: MW-5
 Test Date: 04-04-24

AQUIFER DATA

Saturated Thickness: 5.34 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-5)

Initial Displacement: 4.126 ft Static Water Column Height: 5.34 ft
 Total Well Penetration Depth: 7.5 ft Screen Length: 7.5 ft
 Casing Radius: 0.083 ft Well Radius: 0.45 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bower-Rice
 K = 0.00334 ft/min y0 = 0.5311 ft

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-5 Rising Head Test.aqt
 Title: MW-5 Rising Head Test
 Date: 05/29/24
 Time: 12:40:22

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: 04-04-24
 Test Well: MW-5

AQUIFER DATA

Saturated Thickness: 5.34 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-5

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 1.38 ft
 Static Water Column Height: 5.34 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.45 ft
 Well Skin Radius: 0.45 ft
 Screen Length: 7.5 ft
 Total Well Penetration Depth: 7.5 ft

No. of Observations: 128

Time (min)	Observation Data		Displacement (ft)
	Displacement (ft)	Time (min)	
0.	1.38	2.133	0.391
0.03333	1.38	2.167	0.391
0.06667	1.266	2.2	0.391
0.1	1.185	2.233	0.391
0.1333	1.104	2.267	0.3789
0.1667	1.035	2.3	0.3789
0.2	0.9774	2.333	0.391
0.2333	0.9083	2.367	0.3789
0.2667	0.8541	2.4	0.3789
0.3	0.806	2.433	0.391
0.3333	0.7579	2.467	0.391
0.3667	0.7128	2.5	0.3789
0.4	0.6767	2.533	0.391
0.4333	0.6436	2.567	0.3789
0.4667	0.6105	2.6	0.391
0.5	0.5865	2.633	0.3789

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
0.5333	0.5504	2.667	0.3789
0.5667	0.5413	2.7	0.3789
0.6	0.5293	2.733	0.3789
0.6333	0.5173	2.767	0.391
0.6667	0.5052	2.8	0.3789
0.7	0.4932	2.833	0.3789
0.7333	0.4812	2.867	0.3789
0.7667	0.4722	2.9	0.3789
0.8	0.4722	2.933	0.3789
0.8333	0.4601	2.967	0.3789
0.8667	0.4601	3.	0.388
0.9	0.4601	3.033	0.388
0.9333	0.4481	3.067	0.388
0.9667	0.4481	3.1	0.388
1.	0.4481	3.133	0.3789
1.033	0.4361	3.167	0.3789
1.067	0.4361	3.2	0.3789
1.1	0.424	3.233	0.3789
1.133	0.424	3.267	0.388
1.167	0.424	3.3	0.388
1.2	0.424	3.333	0.388
1.233	0.424	3.367	0.388
1.267	0.424	3.4	0.388
1.3	0.415	3.433	0.388
1.333	0.415	3.467	0.388
1.367	0.415	3.5	0.388
1.4	0.415	3.533	0.388
1.433	0.421	3.567	0.388
1.467	0.421	3.6	0.388
1.5	0.421	3.633	0.388
1.533	0.421	3.667	0.388
1.567	0.421	3.7	0.3759
1.6	0.409	3.733	0.388
1.633	0.409	3.767	0.388
1.667	0.403	3.8	0.388
1.7	0.403	3.833	0.388
1.733	0.403	3.867	0.3789
1.767	0.403	3.9	0.3669
1.8	0.403	3.933	0.3669
1.833	0.403	3.967	0.3669
1.867	0.403	4.	0.3669
1.9	0.391	4.033	0.3669
1.933	0.391	4.067	0.3669
1.967	0.391	4.1	0.3669
2.	0.403	4.133	0.3669
2.033	0.391	4.167	0.3669
2.067	0.391	4.2	0.3669
2.1	0.391	4.233	0.3759

SOLUTION

Slug Test
 Aquifer Model: Unconfined

Solution Method: Bouwer-Rice
ln(Re/rw): 2.065

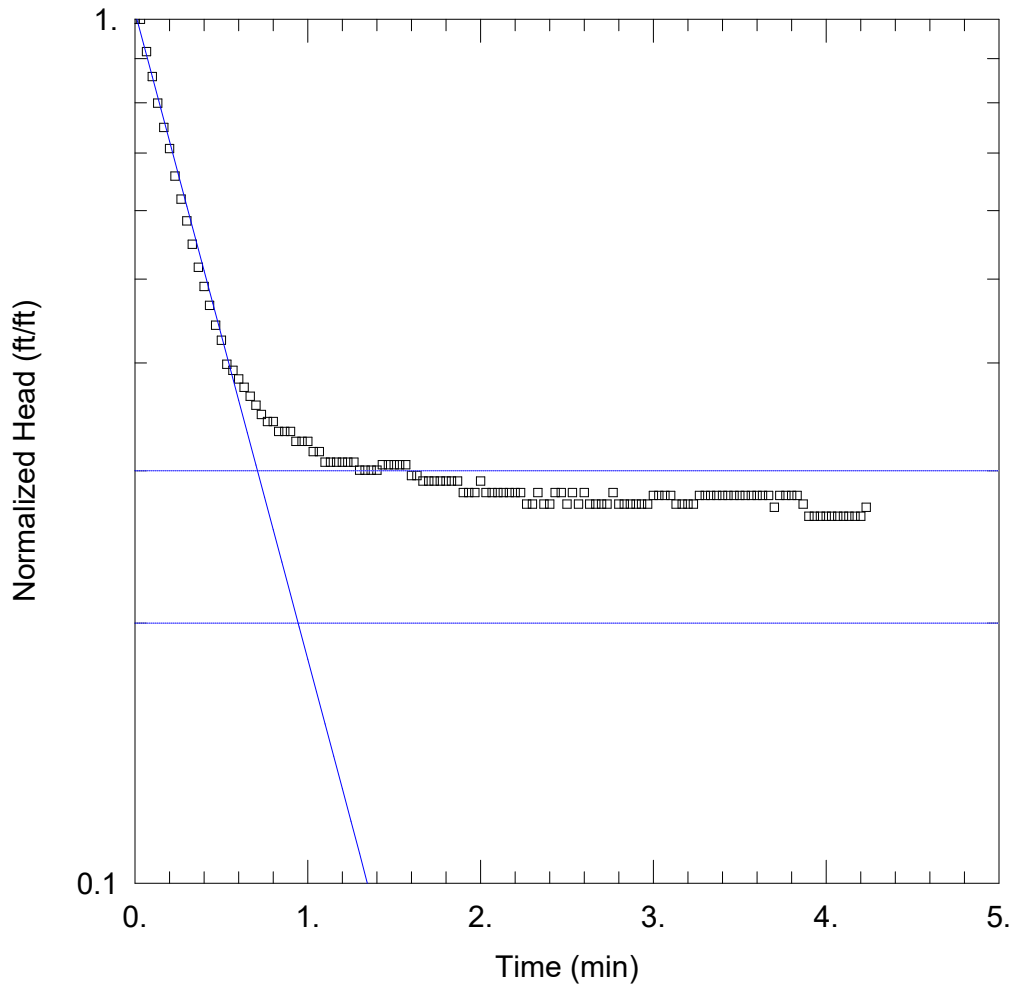
VISUAL ESTIMATION RESULTS

Estimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	0.002196	ft/min
y0	1.407	ft

$K = 0.001115$ cm/sec

$T = K*b = 0.01172$ ft²/min (0.1815 sq. cm/sec)



MW-5 RISING HEAD TEST

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-5 Rising Head Test.aqt
 Date: 05/29/24 Time: 12:40:03

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Well: MW-5
 Test Date: 04-04-24

AQUIFER DATA

Saturated Thickness: 5.34 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-5)

Initial Displacement: 1.38 ft Static Water Column Height: 5.34 ft
 Total Well Penetration Depth: 7.5 ft Screen Length: 7.5 ft
 Casing Radius: 0.083 ft Well Radius: 0.45 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bower-Rice
 K = 0.002196 ft/min $y_0 =$ 1.407 ft

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-7R Falling Head Test.aqt
 Title: MW-7R Falling Head Test
 Date: 05/29/24
 Time: 12:49:12

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: 04-04-24
 Test Well: MW-7R

AQUIFER DATA

Saturated Thickness: 11.01 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-7R

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 1.176 ft
 Static Water Column Height: 11.01 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.45 ft
 Well Skin Radius: 0.45 ft
 Screen Length: 10. ft
 Total Well Penetration Depth: 11.01 ft

No. of Observations: 395

Time (min)	Observation Data		Displacement (ft)
	Displacement (ft)	Time (min)	
0.	1.176	6.6	0.2647
0.03333	1.347	6.633	0.2767
0.06667	1.326	6.667	0.2767
0.1	1.314	6.7	0.2647
0.1333	1.29	6.733	0.2647
0.1667	1.266	6.767	0.2647
0.2	1.242	6.8	0.2647
0.2333	1.221	6.833	0.2647
0.2667	1.197	6.867	0.2647
0.3	1.185	6.9	0.2526
0.3333	1.164	6.933	0.2526
0.3667	1.152	6.967	0.2647
0.4	1.14	7.	0.2647
0.4333	1.116	7.033	0.2526
0.4667	1.107	7.067	0.2526
0.5	1.095	7.1	0.2436

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
0.5333	1.083	7.133	0.2526
0.5667	1.071	7.167	0.2436
0.6	1.071	7.2	0.2526
0.6333	1.059	7.233	0.2436
0.6667	1.047	7.267	0.2436
0.7	1.038	7.3	0.2436
0.7333	1.026	7.333	0.2436
0.7667	1.014	7.367	0.2436
0.8	1.001	7.4	0.2436
0.8333	0.9895	7.433	0.2316
0.8667	0.9774	7.467	0.2436
0.9	0.9684	7.5	0.2436
0.9333	0.9684	7.533	0.2436
0.9667	0.9564	7.567	0.2316
1.	0.9443	7.6	0.2316
1.033	0.9203	7.633	0.2316
1.067	0.9203	7.667	0.2196
1.1	0.9113	7.7	0.2316
1.133	0.9113	7.733	0.2316
1.167	0.8992	7.767	0.2316
1.2	0.8872	7.8	0.2196
1.233	0.8752	7.833	0.2196
1.267	0.8752	7.867	0.2196
1.3	0.8661	7.9	0.2316
1.333	0.8541	7.933	0.2196
1.367	0.8421	7.967	0.2196
1.4	0.8421	8.	0.2196
1.433	0.83	8.033	0.2075
1.467	0.83	8.067	0.2196
1.5	0.818	8.1	0.2196
1.533	0.806	8.133	0.2196
1.567	0.794	8.167	0.2075
1.6	0.794	8.2	0.2075
1.633	0.7819	8.233	0.2075
1.667	0.7819	8.267	0.2075
1.7	0.7729	8.3	0.2075
1.733	0.7729	8.333	0.2075
1.767	0.7609	8.367	0.2075
1.8	0.7609	8.4	0.2196
1.833	0.7489	8.433	0.2075
1.867	0.7368	8.467	0.2075
1.9	0.7398	8.5	0.2075
1.933	0.7278	8.533	0.1955
1.967	0.7278	8.567	0.1955
2.	0.7158	8.6	0.1955
2.033	0.7158	8.633	0.1955
2.067	0.7037	8.667	0.1955
2.1	0.7037	8.7	0.1955
2.133	0.6917	8.733	0.1955
2.167	0.6917	8.767	0.1955
2.2	0.6797	8.8	0.1955
2.233	0.6676	8.833	0.1835
2.267	0.6797	8.867	0.1835

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
2.3	0.6676	8.9	0.1835
2.333	0.6676	8.933	0.1835
2.367	0.6556	8.967	0.1835
2.4	0.6556	9.	0.1835
2.433	0.6466	9.033	0.1835
2.467	0.6346	9.067	0.1835
2.5	0.6346	9.1	0.1744
2.533	0.6346	9.133	0.1835
2.567	0.6225	9.167	0.1835
2.6	0.6225	9.2	0.1744
2.633	0.6105	9.233	0.1744
2.667	0.6105	9.267	0.1835
2.7	0.5985	9.3	0.1744
2.733	0.5985	9.333	0.1744
2.767	0.5985	9.367	0.1744
2.8	0.5865	9.4	0.1744
2.833	0.5865	9.433	0.1744
2.867	0.5774	9.467	0.1744
2.9	0.5774	9.5	0.1744
2.933	0.5774	9.533	0.1744
2.967	0.5654	9.567	0.1744
3.	0.5654	9.6	0.1744
3.033	0.5654	9.633	0.1624
3.067	0.5534	9.667	0.1624
3.1	0.5654	9.7	0.1624
3.133	0.5413	9.733	0.1624
3.167	0.5413	9.767	0.1624
3.2	0.5444	9.8	0.1624
3.233	0.5444	9.833	0.1744
3.267	0.5323	9.867	0.1624
3.3	0.5323	9.9	0.1624
3.333	0.5203	9.933	0.1624
3.367	0.5203	9.967	0.1624
3.4	0.5203	10.	0.1624
3.433	0.5083	10.03	0.1624
3.467	0.5083	10.07	0.1504
3.5	0.4962	10.1	0.1504
3.533	0.4962	10.13	0.1504
3.567	0.4962	10.17	0.1624
3.6	0.4962	10.2	0.1504
3.633	0.4842	10.23	0.1504
3.667	0.4842	10.27	0.1504
3.7	0.4842	10.3	0.1504
3.733	0.4842	10.33	0.1504
3.767	0.4722	10.37	0.1504
3.8	0.4722	10.4	0.1383
3.833	0.4601	10.43	0.1383
3.867	0.4601	10.47	0.1383
3.9	0.4601	10.5	0.1383
3.933	0.4481	10.53	0.1383
3.967	0.4481	10.57	0.1383
4.	0.4481	10.6	0.1383
4.033	0.4481	10.63	0.1383

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
4.067	0.4391	10.67	0.1383
4.1	0.4391	10.7	0.1383
4.133	0.4391	10.73	0.1383
4.167	0.4391	10.77	0.1383
4.2	0.4271	10.8	0.1383
4.233	0.4271	10.83	0.1383
4.267	0.4271	10.87	0.1383
4.3	0.415	10.9	0.1263
4.333	0.415	10.93	0.1383
4.367	0.415	10.97	0.1383
4.4	0.415	11.	0.1383
4.433	0.415	11.03	0.1263
4.467	0.406	11.07	0.1383
4.5	0.406	11.1	0.1383
4.533	0.394	11.13	0.1263
4.567	0.406	11.17	0.1383
4.6	0.394	11.2	0.1383
4.633	0.394	11.23	0.1263
4.667	0.394	11.27	0.1263
4.7	0.394	11.3	0.1263
4.733	0.394	11.33	0.1263
4.767	0.382	11.37	0.1263
4.8	0.382	11.4	0.1263
4.833	0.3789	11.43	0.1263
4.867	0.382	11.47	0.1263
4.9	0.3699	11.5	0.1263
4.933	0.3789	11.53	0.1143
4.967	0.3699	11.57	0.1143
5.	0.3699	11.6	0.1263
5.033	0.3579	11.63	0.1143
5.067	0.3579	11.67	0.1143
5.1	0.3579	11.7	0.1143
5.133	0.3579	11.73	0.1143
5.167	0.3459	11.77	0.1263
5.2	0.3579	11.8	0.1143
5.233	0.3579	11.83	0.1143
5.267	0.3579	11.87	0.1143
5.3	0.3459	11.9	0.1143
5.333	0.3459	11.93	0.1143
5.367	0.3459	11.97	0.1143
5.4	0.3338	12.	0.1143
5.433	0.3338	12.03	0.1143
5.467	0.3338	12.07	0.1143
5.5	0.3338	12.1	0.1143
5.533	0.3338	12.13	0.1143
5.567	0.3338	12.17	0.1143
5.6	0.3338	12.2	0.1053
5.633	0.3218	12.23	0.1053
5.667	0.3218	12.27	0.1053
5.7	0.3218	12.3	0.1053
5.733	0.3218	12.33	0.1053
5.767	0.3128	12.37	0.1053
5.8	0.3128	12.4	0.1053

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
5.833	0.3128	12.43	0.1053
5.867	0.3128	12.47	0.1053
5.9	0.3128	12.5	0.1053
5.933	0.3008	12.53	0.1053
5.967	0.3008	12.57	0.1053
6.	0.3008	12.6	0.1053
6.033	0.3008	12.63	0.1053
6.067	0.3008	12.67	0.1053
6.1	0.3008	12.7	0.1053
6.133	0.3008	12.73	0.1053
6.167	0.3008	12.77	0.1053
6.2	0.3008	12.8	0.1053
6.233	0.2887	12.83	0.1053
6.267	0.2887	12.87	0.1053
6.3	0.2887	12.9	0.1053
6.333	0.2887	12.93	0.09323
6.367	0.2767	12.97	0.1053
6.4	0.2887	13.	0.1053
6.433	0.2767	13.03	0.1053
6.467	0.2767	13.07	0.1053
6.5	0.2767	13.1	0.1053
6.533	0.2767	13.13	0.1053
6.567	0.2647		

SOLUTION

Slug Test

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

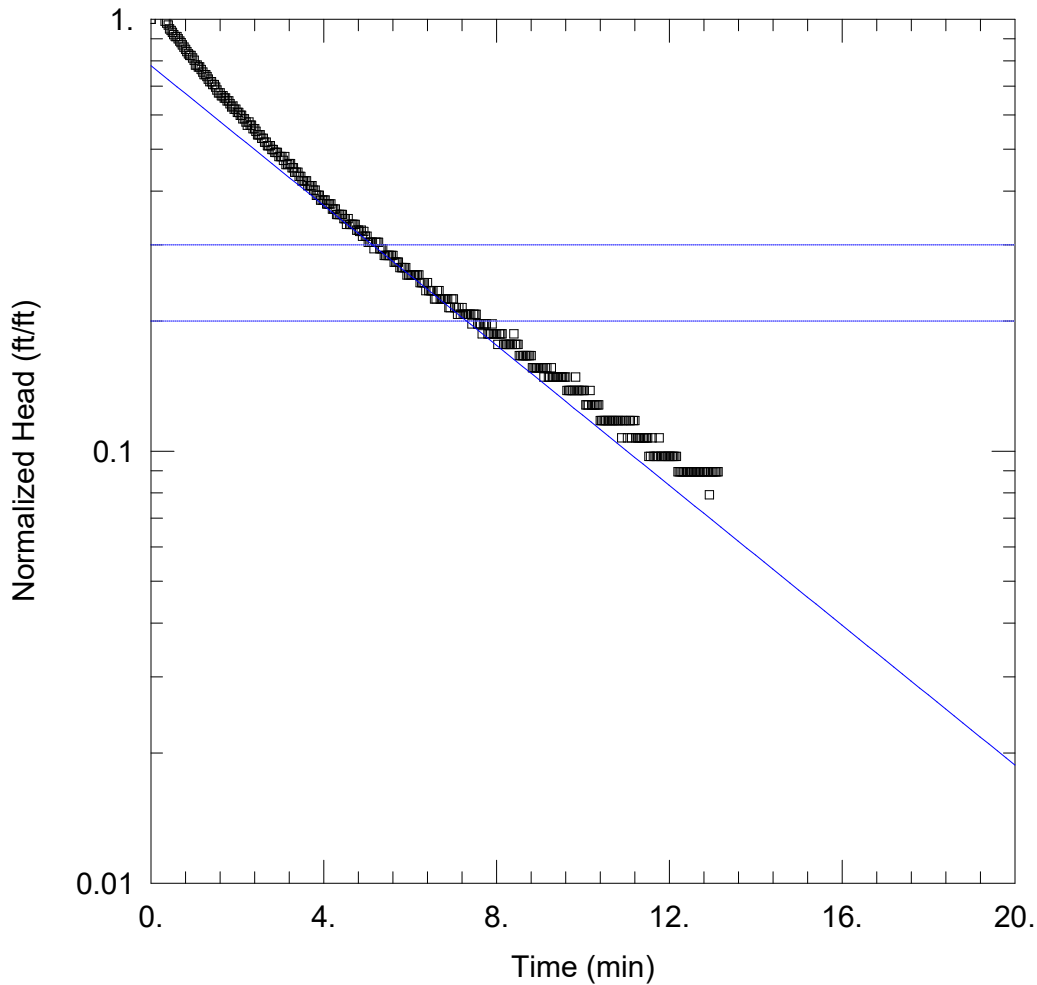
ln(Re/rw): 2.371

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>
K	0.0001522 ft/min
y0	0.9174 ft

K = 7.729E-5 cm/sec

T = K*b = 0.001675 ft²/min (0.02594 sq. cm/sec)



MW-7R FALLING HEAD TEST

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-7R Falling Head Test.aqt
 Date: 05/29/24 Time: 12:48:46

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Well: MW-7R
 Test Date: 04-04-24

AQUIFER DATA

Saturated Thickness: 11.01 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-7R)

Initial Displacement: 1.176 ft Static Water Column Height: 11.01 ft
 Total Well Penetration Depth: 11.01 ft Screen Length: 10. ft
 Casing Radius: 0.083 ft Well Radius: 0.45 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bower-Rice
 K = 0.0001522 ft/min y0 = 0.9174 ft

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-7R Rising Head Test.aqt
 Title: MW-7R Rising Head Test
 Date: 05/29/24
 Time: 12:50:18

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: 04-04-24
 Test Well: MW-7R

AQUIFER DATA

Saturated Thickness: 11.01 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-7R

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 1.486 ft
 Static Water Column Height: 11.01 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.45 ft
 Well Skin Radius: 0.45 ft
 Screen Length: 10. ft
 Total Well Penetration Depth: 11.01 ft

No. of Observations: 529

Time (min)	Observation Data		Displacement (ft)
	Displacement (ft)	Time (min)	
0.	1.486	8.833	0.2436
0.03333	1.417	8.867	0.2436
0.06667	1.383	8.9	0.2436
0.1	1.359	8.933	0.2436
0.1333	1.335	8.967	0.2436
0.1667	1.326	9.	0.2436
0.2	1.314	9.033	0.2436
0.2333	1.302	9.067	0.2436
0.2667	1.278	9.1	0.2436
0.3	1.266	9.133	0.2436
0.3333	1.257	9.167	0.2436
0.3667	1.233	9.2	0.2316
0.4	1.233	9.233	0.2436
0.4333	1.209	9.267	0.2436
0.4667	1.209	9.3	0.2436
0.5	1.188	9.333	0.2436

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
0.5333	1.176	9.367	0.2316
0.5667	1.164	9.4	0.2316
0.6	1.14	9.433	0.2316
0.6333	1.14	9.467	0.2316
0.6667	1.128	9.5	0.2316
0.7	1.119	9.533	0.2316
0.7333	1.107	9.567	0.2316
0.7667	1.107	9.6	0.2316
0.8	1.095	9.633	0.2195
0.8333	1.083	9.667	0.2195
0.8667	1.071	9.7	0.2316
0.9	1.062	9.733	0.2195
0.9333	1.05	9.767	0.2195
0.9667	1.05	9.8	0.2195
1.	1.038	9.833	0.2195
1.033	1.026	9.867	0.2195
1.067	1.014	9.9	0.2195
1.1	1.001	9.933	0.2195
1.133	0.9925	9.967	0.2195
1.167	0.9804	10.	0.2195
1.2	0.9804	10.03	0.2075
1.233	0.9684	10.07	0.2195
1.267	0.9564	10.1	0.2195
1.3	0.9564	10.13	0.2075
1.333	0.9443	10.17	0.2075
1.367	0.9323	10.2	0.2075
1.4	0.9233	10.23	0.2075
1.433	0.9323	10.27	0.2075
1.467	0.9113	10.3	0.2075
1.5	0.8992	10.33	0.1985
1.533	0.8992	10.37	0.2075
1.567	0.8872	10.4	0.2075
1.6	0.8872	10.43	0.2075
1.633	0.8752	10.47	0.2075
1.667	0.8752	10.5	0.1985
1.7	0.8631	10.53	0.2075
1.733	0.8541	10.57	0.1985
1.767	0.8541	10.6	0.1955
1.8	0.8421	10.63	0.1955
1.833	0.8421	10.67	0.1955
1.867	0.83	10.7	0.1955
1.9	0.818	10.73	0.1955
1.933	0.818	10.77	0.1955
1.967	0.806	10.8	0.1955
2.	0.806	10.83	0.1955
2.033	0.797	10.87	0.1955
2.067	0.797	10.9	0.1955
2.1	0.7849	10.93	0.1835
2.133	0.7849	10.97	0.1835
2.167	0.7729	11.	0.1835
2.2	0.7729	11.03	0.1835
2.233	0.7609	11.07	0.1835
2.267	0.7609	11.1	0.1985

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
2.3	0.7489	11.13	0.1955
2.333	0.7489	11.17	0.1985
2.367	0.7368	11.2	0.1985
2.4	0.7368	11.23	0.1985
2.433	0.7368	11.27	0.1985
2.467	0.7278	11.3	0.1865
2.5	0.7158	11.33	0.1985
2.533	0.7158	11.37	0.1865
2.567	0.7158	11.4	0.1865
2.6	0.7037	11.43	0.1985
2.633	0.7037	11.47	0.1865
2.667	0.6917	11.5	0.1865
2.7	0.6917	11.53	0.1865
2.733	0.6917	11.57	0.1865
2.767	0.6797	11.6	0.1865
2.8	0.6797	11.63	0.1865
2.833	0.6676	11.67	0.1744
2.867	0.6586	11.7	0.1744
2.9	0.6586	11.73	0.1744
2.933	0.6586	11.77	0.1865
2.967	0.6466	11.8	0.1744
3.	0.6466	11.83	0.1744
3.033	0.6466	11.87	0.1744
3.067	0.6466	11.9	0.1744
3.1	0.6346	11.93	0.1744
3.133	0.6346	11.97	0.1744
3.167	0.6225	12.	0.1744
3.2	0.6105	12.03	0.1744
3.233	0.6225	12.07	0.1744
3.267	0.6105	12.1	0.1744
3.3	0.6105	12.13	0.1624
3.333	0.6105	12.17	0.1744
3.367	0.5985	12.2	0.1744
3.4	0.5985	12.23	0.1624
3.433	0.5895	12.27	0.1624
3.467	0.5895	12.3	0.1624
3.5	0.5895	12.33	0.1624
3.533	0.5774	12.37	0.1624
3.567	0.5774	12.4	0.1744
3.6	0.5654	12.43	0.1744
3.633	0.5654	12.47	0.1624
3.667	0.5654	12.5	0.1624
3.7	0.5654	12.53	0.1624
3.733	0.5534	12.57	0.1624
3.767	0.5534	12.6	0.1624
3.8	0.5534	12.63	0.1624
3.833	0.5413	12.67	0.1624
3.867	0.5413	12.7	0.1624
3.9	0.5413	12.73	0.1624
3.933	0.5293	12.77	0.1624
3.967	0.5293	12.8	0.1624
4.	0.5293	12.83	0.1624
4.033	0.5293	12.87	0.1624

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
4.067	0.5203	12.9	0.1504
4.1	0.5203	12.93	0.1624
4.133	0.5203	12.97	0.1624
4.167	0.5203	13.	0.1504
4.2	0.5203	13.03	0.1624
4.233	0.5083	13.07	0.1504
4.267	0.5083	13.1	0.1504
4.3	0.5083	13.13	0.1624
4.333	0.4962	13.17	0.1504
4.367	0.4962	13.2	0.1504
4.4	0.4962	13.23	0.1504
4.433	0.4962	13.27	0.1504
4.467	0.4842	13.3	0.1504
4.5	0.4842	13.33	0.1504
4.533	0.4842	13.37	0.1504
4.567	0.4722	13.4	0.1504
4.6	0.4722	13.43	0.1504
4.633	0.4722	13.47	0.1504
4.667	0.4722	13.5	0.1383
4.7	0.4722	13.53	0.1383
4.733	0.4631	13.57	0.1504
4.767	0.4631	13.6	0.1383
4.8	0.4631	13.63	0.1504
4.833	0.4631	13.67	0.1504
4.867	0.4631	13.7	0.1383
4.9	0.4511	13.73	0.1504
4.933	0.4631	13.77	0.1383
4.967	0.4511	13.8	0.1504
5.	0.4511	13.83	0.1383
5.033	0.4511	13.87	0.1383
5.067	0.4391	13.9	0.1383
5.1	0.4391	13.93	0.1383
5.133	0.427	13.97	0.1383
5.167	0.427	14.	0.1383
5.2	0.4391	14.03	0.1383
5.233	0.427	14.07	0.1383
5.267	0.427	14.1	0.1383
5.3	0.427	14.13	0.1383
5.333	0.427	14.17	0.1383
5.367	0.415	14.2	0.1383
5.4	0.415	14.23	0.1263
5.433	0.415	14.27	0.1383
5.467	0.415	14.3	0.1383
5.5	0.415	14.33	0.1383
5.533	0.415	14.37	0.1383
5.567	0.403	14.4	0.1383
5.6	0.403	14.43	0.1383
5.633	0.394	14.47	0.1263
5.667	0.394	14.5	0.1383
5.7	0.394	14.53	0.1383
5.733	0.394	14.57	0.1383
5.767	0.394	14.6	0.1263
5.8	0.394	14.63	0.1263

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
5.833	0.394	14.67	0.1383
5.867	0.3819	14.7	0.1263
5.9	0.3819	14.73	0.1263
5.933	0.3819	14.77	0.1263
5.967	0.3819	14.8	0.1263
6.	0.3699	14.83	0.1383
6.033	0.3819	14.87	0.1293
6.067	0.3699	14.9	0.1263
6.1	0.3699	14.93	0.1293
6.133	0.3699	14.97	0.1263
6.167	0.3699	15.	0.1293
6.2	0.3699	15.03	0.1293
6.233	0.3699	15.07	0.1293
6.267	0.3699	15.1	0.1293
6.3	0.3579	15.13	0.1293
6.333	0.3579	15.17	0.1293
6.367	0.3579	15.2	0.1293
6.4	0.3579	15.23	0.1383
6.433	0.3458	15.27	0.1293
6.467	0.3458	15.3	0.1293
6.5	0.3458	15.33	0.1293
6.533	0.3458	15.37	0.1293
6.567	0.3458	15.4	0.1293
6.6	0.3458	15.43	0.1293
6.633	0.3458	15.47	0.1293
6.667	0.3458	15.5	0.1173
6.7	0.3338	15.53	0.1293
6.733	0.3338	15.57	0.1293
6.767	0.3338	15.6	0.1293
6.8	0.3338	15.63	0.1293
6.833	0.3338	15.67	0.1293
6.867	0.3338	15.7	0.1293
6.9	0.3248	15.73	0.1293
6.933	0.3338	15.77	0.1293
6.967	0.3248	15.8	0.1293
7.	0.3248	15.83	0.1293
7.033	0.3248	15.87	0.1293
7.067	0.3248	15.9	0.1293
7.1	0.3248	15.93	0.1293
7.133	0.3248	15.97	0.1293
7.167	0.3248	16.	0.1293
7.2	0.3128	16.03	0.1293
7.233	0.3128	16.07	0.1293
7.267	0.3248	16.1	0.1293
7.3	0.3128	16.13	0.1173
7.333	0.3128	16.17	0.1293
7.367	0.3128	16.2	0.1293
7.4	0.3128	16.23	0.1293
7.433	0.3007	16.27	0.1293
7.467	0.3007	16.3	0.1173
7.5	0.3007	16.33	0.1173
7.533	0.3007	16.37	0.1293
7.567	0.3007	16.4	0.1173

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
7.6	0.3007	16.43	0.1173
7.633	0.3007	16.47	0.1173
7.667	0.3007	16.5	0.1173
7.7	0.3007	16.53	0.1173
7.733	0.3007	16.57	0.1173
7.767	0.2857	16.6	0.1173
7.8	0.2857	16.63	0.1173
7.833	0.2857	16.67	0.1173
7.867	0.2767	16.7	0.1173
7.9	0.2767	16.73	0.1173
7.933	0.2767	16.77	0.1173
7.967	0.2767	16.8	0.1173
8.	0.2767	16.83	0.1053
8.033	0.2767	16.87	0.1173
8.067	0.2767	16.9	0.1173
8.1	0.2767	16.93	0.1173
8.133	0.2767	16.97	0.1173
8.167	0.2767	17.	0.1173
8.2	0.2767	17.03	0.1173
8.233	0.2647	17.07	0.1173
8.267	0.2647	17.1	0.1053
8.3	0.2647	17.13	0.1173
8.333	0.2647	17.17	0.1173
8.367	0.2647	17.2	0.1173
8.4	0.2647	17.23	0.1053
8.433	0.2647	17.27	0.1053
8.467	0.2647	17.3	0.1053
8.5	0.2556	17.33	0.1173
8.533	0.2556	17.37	0.1173
8.567	0.2556	17.4	0.1173
8.6	0.2556	17.43	0.1173
8.633	0.2556	17.47	0.1053
8.667	0.2556	17.5	0.1053
8.7	0.2556	17.53	0.1053
8.733	0.2556	17.57	0.1173
8.767	0.2556	17.6	0.1053
8.8	0.2556		

SOLUTION

Slug Test

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

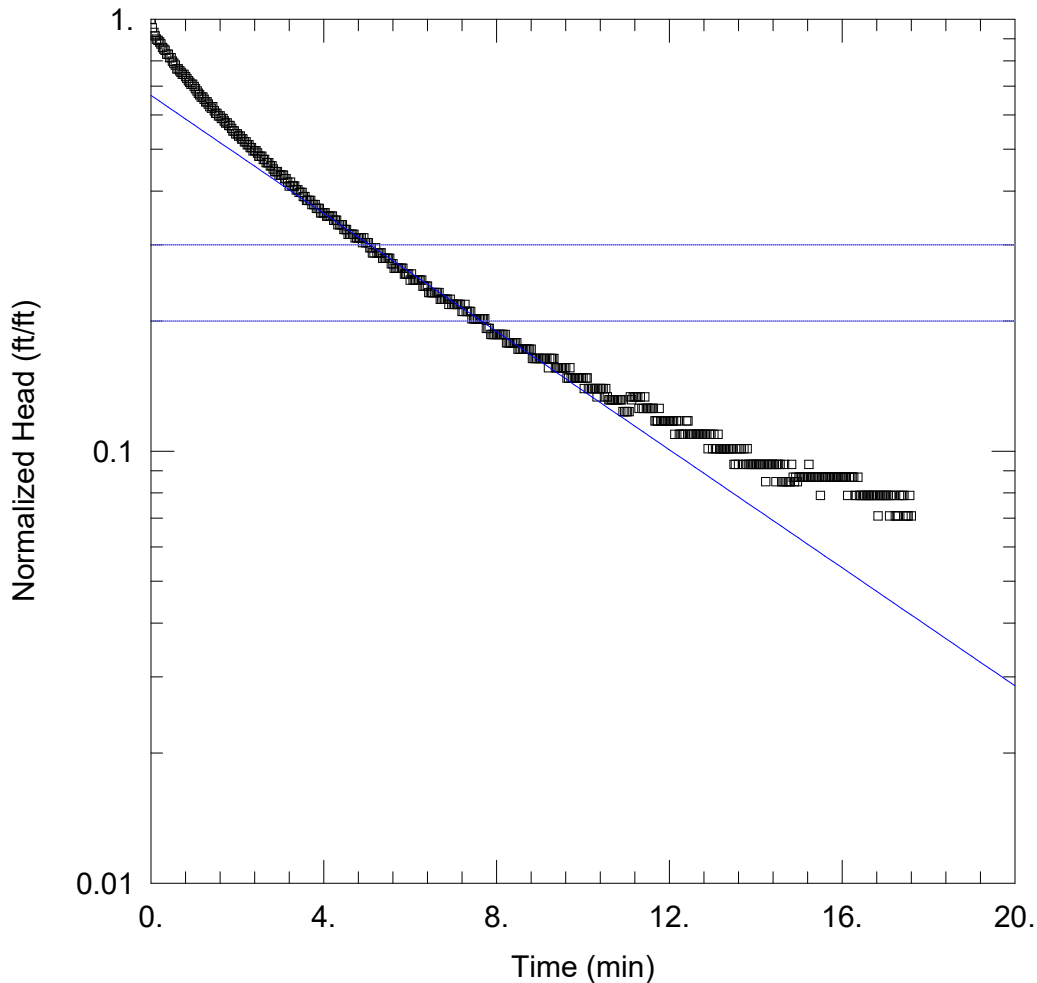
ln(Re/rw): 2.371

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	0.0001284	ft/min
y0	0.9892	ft

$K = 6.525E-5$ cm/sec

$T = K*b = 0.001414$ ft²/min (0.0219 sq. cm/sec)



MW-7R RISING HEAD TEST

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-7R Rising Head Test.aqt
 Date: 05/29/24 Time: 12:49:56

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Well: MW-7R
 Test Date: 04-04-24

AQUIFER DATA

Saturated Thickness: 11.01 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-7R)

Initial Displacement: 1.486 ft Static Water Column Height: 11.01 ft
 Total Well Penetration Depth: 11.01 ft Screen Length: 10. ft
 Casing Radius: 0.083 ft Well Radius: 0.45 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bower-Rice
 K = 0.0001284 ft/min y0 = 0.9892 ft

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-8 Falling Head Test.aqt

Title: MW-8 Falling Head Test

Date: 05/29/24

Time: 12:53:44

PROJECT INFORMATION

Company: GHD Services Inc

Client: Viking Pump/IDEX

Project: 056934

Location: Cedar Falls, Iowa

Test Date: 04-04-24

Test Well: MW-8

AQUIFER DATA

Saturated Thickness: 9.72 ft

Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-8

X Location: 0. ft

Y Location: 0. ft

Initial Displacement: 0.7368 ft

Static Water Column Height: 9.72 ft

Casing Radius: 0.083 ft

Well Radius: 0.45 ft

Well Skin Radius: 0.45 ft

Screen Length: 10. ft

Total Well Penetration Depth: 10. ft

No. of Observations: 28

Time (min)	Observation Data		Displacement (ft)
	Displacement (ft)	Time (min)	
0.	0.7368	0.4667	0.1173
0.03333	0.5413	0.5	0.1053
0.06667	0.4391	0.5333	0.1053
0.1	0.3579	0.5667	0.1053
0.1333	0.3007	0.6	0.1053
0.1667	0.2556	0.6333	0.09323
0.2	0.2195	0.6667	0.09323
0.2333	0.1955	0.7	0.09323
0.2667	0.1744	0.7333	0.09323
0.3	0.1504	0.7667	0.09323
0.3333	0.1504	0.8	0.09323
0.3667	0.1383	0.8333	0.0812
0.4	0.1263	0.8667	0.09323
0.4333	0.1263	0.9	0.0812

SOLUTION

Slug Test

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

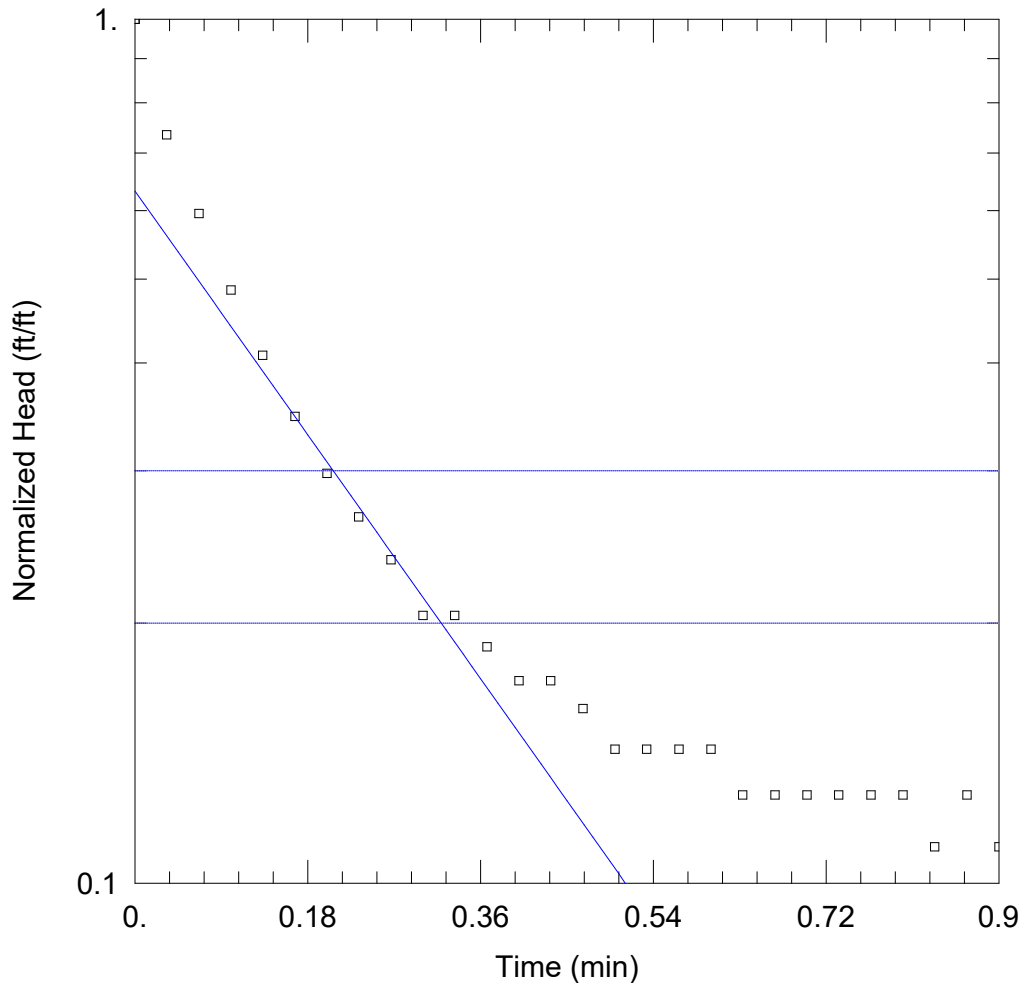
 $\ln(R_e/r_w)$: 2.312

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	0.002949	ft/min
y0	0.4661	ft

K = 0.001498 cm/sec

T = K*b = 0.02866 ft²/min (0.4438 sq. cm/sec)



MW-8 FALLING HEAD TEST

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-8 Falling Head Test.aqt
 Date: 05/29/24 Time: 12:53:24

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Well: MW-8
 Test Date: 04-04-24

AQUIFER DATA

Saturated Thickness: 9.72 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-8)

Initial Displacement: 0.7368 ft Static Water Column Height: 9.72 ft
 Total Well Penetration Depth: 10. ft Screen Length: 10. ft
 Casing Radius: 0.083 ft Well Radius: 0.45 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bower-Rice
 K = 0.002949 ft/min y0 = 0.4661 ft

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-8 Rising Head Test.aqt

Title: MW-8 Rising Head Test

Date: 05/29/24

Time: 12:54:57

PROJECT INFORMATION

Company: GHD Services Inc

Client: Viking Pump/IDEX

Project: 056934

Location: Cedar Falls, Iowa

Test Date: 04-04-24

Test Well: MW-8

AQUIFER DATA

Saturated Thickness: 9.72 ft

Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-8

X Location: 0. ft

Y Location: 0. ft

Initial Displacement: 0.806 ft

Static Water Column Height: 9.72 ft

Casing Radius: 0.083 ft

Well Radius: 0.45 ft

Well Skin Radius: 0.45 ft

Screen Length: 10. ft

Total Well Penetration Depth: 10. ft

No. of Observations: 30

Time (min)	Observation Data		Displacement (ft)
	Displacement (ft)	Time (min)	
0.	0.806	0.5	0.1263
0.03333	0.403	0.5333	0.1263
0.06667	0.3579	0.5667	0.1173
0.1	0.3218	0.6	0.1263
0.1333	0.2887	0.6333	0.1173
0.1667	0.2556	0.6667	0.1173
0.2	0.2316	0.7	0.1173
0.2333	0.2075	0.7333	0.1053
0.2667	0.1955	0.7667	0.1053
0.3	0.1865	0.8	0.1053
0.3333	0.1744	0.8333	0.1053
0.3667	0.1624	0.8667	0.1053
0.4	0.1624	0.9	0.09323
0.4333	0.1384	0.9333	0.09323
0.4667	0.1384	0.9667	0.09323

SOLUTION

Slug Test

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

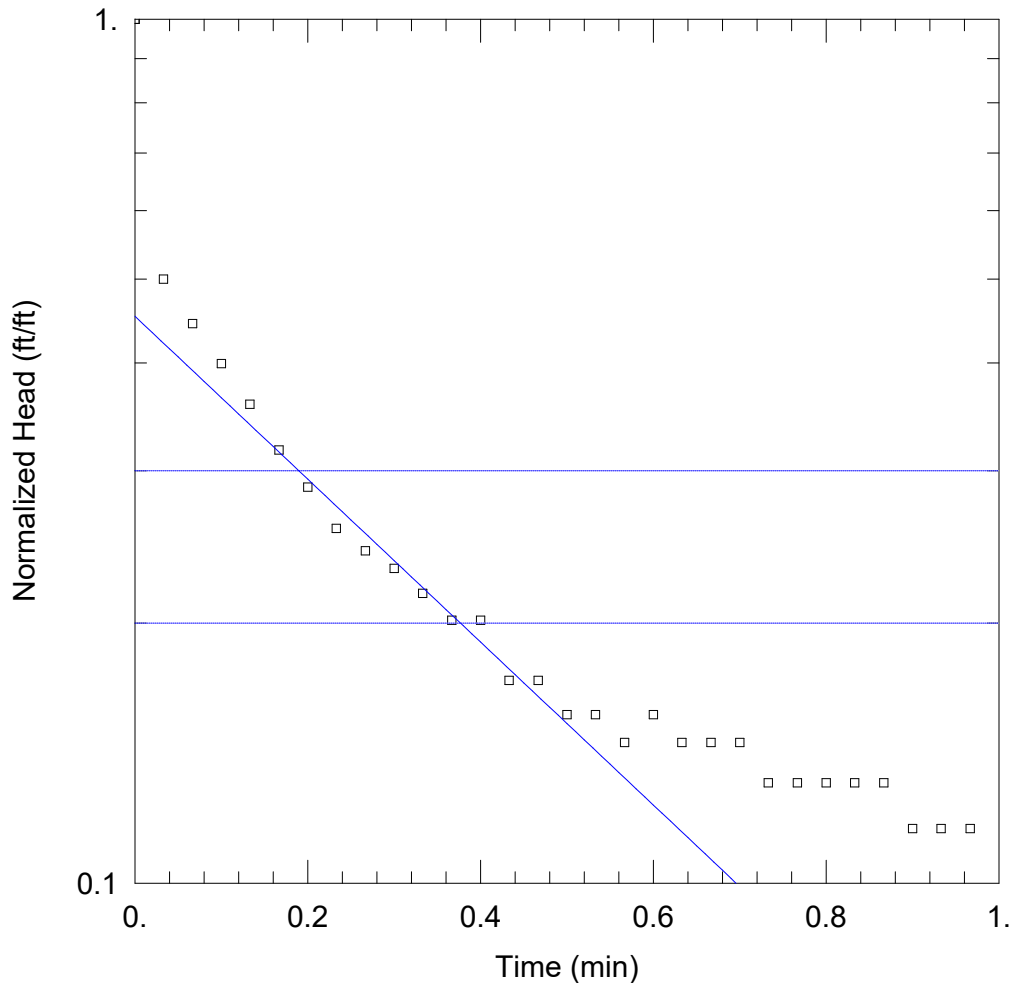
ln(Re/rw): 2.312

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	0.001773	ft/min
y0	0.3651	ft

K = 0.0009007 cm/sec

T = K*b = 0.01723 ft²/min (0.2669 sq. cm/sec)



MW-8 RISING HEAD TEST

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-8 Rising Head Test.aqt
 Date: 05/29/24 Time: 12:54:37

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Well: MW-8
 Test Date: 04-04-24

AQUIFER DATA

Saturated Thickness: 9.72 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-8)

Initial Displacement: 0.806 ft Static Water Column Height: 9.72 ft
 Total Well Penetration Depth: 10. ft Screen Length: 10. ft
 Casing Radius: 0.083 ft Well Radius: 0.45 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bower-Rice
 K = 0.001773 ft/min $y_0 =$ 0.3651 ft

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-11 Falling Head Test.aqt
 Title: MW-11 Falling Head Test
 Date: 05/29/24
 Time: 12:57:05

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: 04-04-24
 Test Well: MW-11

AQUIFER DATA

Saturated Thickness: 19.59 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-11

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 2.126 ft
 Static Water Column Height: 19.59 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.45 ft
 Well Skin Radius: 0.45 ft
 Screen Length: 5. ft
 Total Well Penetration Depth: 19.59 ft

No. of Observations: 249

Time (min)	Observation Data		Displacement (ft)
	Displacement (ft)	Time (min)	
0.	2.126	4.167	0.1053
0.03333	1.438	4.2	0.1053
0.06667	1.311	4.233	0.1053
0.1	1.266	4.267	0.1053
0.1333	1.221	4.3	0.09323
0.1667	1.173	4.333	0.09323
0.2	1.14	4.367	0.09323
0.2333	1.095	4.4	0.09323
0.2667	1.059	4.433	0.09323
0.3	1.026	4.467	0.09323
0.3333	0.9895	4.5	0.09323
0.3667	0.9564	4.533	0.09323
0.4	0.9323	4.567	0.09323
0.4333	0.8992	4.6	0.09323
0.4667	0.8631	4.633	0.09323
0.5	0.8421	4.667	0.09323

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
0.5333	0.818	4.7	0.09323
0.5667	0.794	4.733	0.09323
0.6	0.7729	4.767	0.09323
0.6333	0.7489	4.8	0.09323
0.6667	0.7248	4.833	0.0812
0.7	0.7037	4.867	0.0812
0.7333	0.6797	4.9	0.0812
0.7667	0.6676	4.933	0.09323
0.8	0.6436	4.967	0.09323
0.8333	0.6225	5.	0.0812
0.8667	0.6105	5.033	0.0812
0.9	0.5985	5.067	0.0812
0.9333	0.5744	5.1	0.0812
0.9667	0.5654	5.133	0.0812
1.	0.5413	5.167	0.0812
1.033	0.5293	5.2	0.0812
1.067	0.5173	5.233	0.0812
1.1	0.4962	5.267	0.0812
1.133	0.4842	5.3	0.0812
1.167	0.4722	5.333	0.06917
1.2	0.4601	5.367	0.06917
1.233	0.4481	5.4	0.0812
1.267	0.4391	5.433	0.06917
1.3	0.4271	5.467	0.06917
1.333	0.415	5.5	0.06917
1.367	0.403	5.533	0.06917
1.4	0.391	5.567	0.0812
1.433	0.3789	5.6	0.06917
1.467	0.3699	5.633	0.06917
1.5	0.3699	5.667	0.06917
1.533	0.3579	5.7	0.06917
1.567	0.3579	5.733	0.06917
1.6	0.3459	5.767	0.06917
1.633	0.3338	5.8	0.06917
1.667	0.3338	5.833	0.06917
1.7	0.3218	5.867	0.06917
1.733	0.3218	5.9	0.06917
1.767	0.3098	5.933	0.06917
1.8	0.3098	5.967	0.06917
1.833	0.2887	6.	0.06917
1.867	0.2887	6.033	0.06917
1.9	0.2887	6.067	0.06917
1.933	0.2887	6.1	0.06917
1.967	0.2767	6.133	0.06917
2.	0.2647	6.167	0.06917
2.033	0.2647	6.2	0.06917
2.067	0.2647	6.233	0.06917
2.1	0.2526	6.267	0.06917
2.133	0.2436	6.3	0.06917
2.167	0.2436	6.333	0.0812
2.2	0.2436	6.367	0.0812
2.233	0.2316	6.4	0.06917
2.267	0.2316	6.433	0.06917

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
2.3	0.2195	6.467	0.05714
2.333	0.2195	6.5	0.06917
2.367	0.2195	6.533	0.05714
2.4	0.2075	6.567	0.05714
2.433	0.2075	6.6	0.05714
2.467	0.2075	6.633	0.05714
2.5	0.1955	6.667	0.06917
2.533	0.1955	6.7	0.05714
2.567	0.1955	6.733	0.05714
2.6	0.1955	6.767	0.06917
2.633	0.1835	6.8	0.05714
2.667	0.1835	6.833	0.05714
2.7	0.1835	6.867	0.05714
2.733	0.1744	6.9	0.06917
2.767	0.1744	6.933	0.05714
2.8	0.1744	6.967	0.05714
2.833	0.1744	7.	0.05714
2.867	0.1624	7.033	0.06917
2.9	0.1624	7.067	0.06917
2.933	0.1504	7.1	0.05714
2.967	0.1624	7.133	0.05714
3.	0.1504	7.167	0.05714
3.033	0.1624	7.2	0.05714
3.067	0.1504	7.233	0.05714
3.1	0.1504	7.267	0.05714
3.133	0.1504	7.3	0.05714
3.167	0.1383	7.333	0.05714
3.2	0.1383	7.367	0.05714
3.233	0.1383	7.4	0.05714
3.267	0.1383	7.433	0.06917
3.3	0.1263	7.467	0.05714
3.333	0.1383	7.5	0.06917
3.367	0.1263	7.533	0.05714
3.4	0.1263	7.567	0.05714
3.433	0.1263	7.6	0.05714
3.467	0.1263	7.633	0.05714
3.5	0.1263	7.667	0.05714
3.533	0.1263	7.7	0.05714
3.567	0.1143	7.733	0.05714
3.6	0.1263	7.767	0.05714
3.633	0.1143	7.8	0.05714
3.667	0.1143	7.833	0.05714
3.7	0.1143	7.867	0.05714
3.733	0.1143	7.9	0.05714
3.767	0.1143	7.933	0.05714
3.8	0.1143	7.967	0.05714
3.833	0.1143	8.	0.05714
3.867	0.1053	8.033	0.04511
3.9	0.1143	8.067	0.05714
3.933	0.1053	8.1	0.05714
3.967	0.1053	8.133	0.05714
4.	0.1053	8.167	0.05714
4.033	0.1053	8.2	0.05714

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
4.067	0.1053	8.233	0.05714
4.1	0.1053	8.267	0.05714
4.133	0.1053		

SOLUTION

Slug Test

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

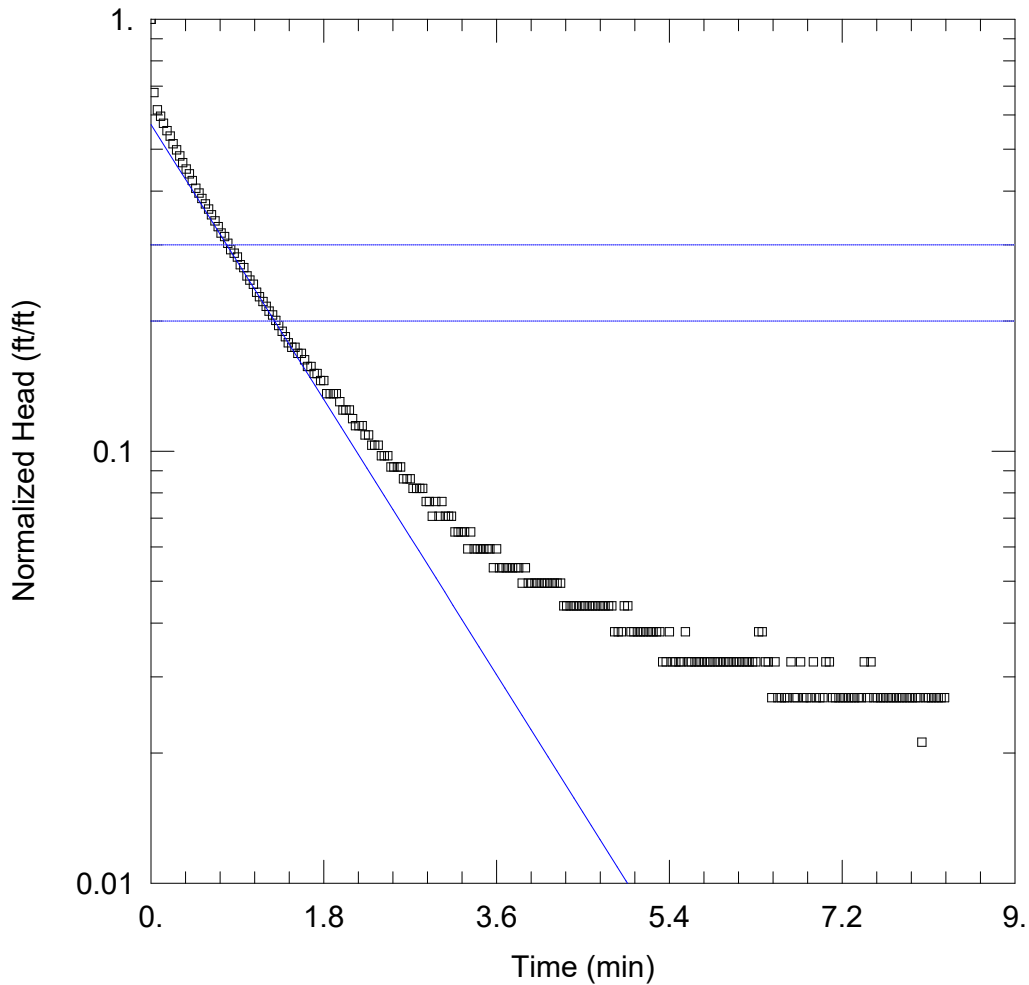
ln(Re/rw): 2.427

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	0.001361	ft/min
y0	1.213	ft

K = 0.0006914 cm/sec

T = K*b = 0.02666 ft²/min (0.4129 sq. cm/sec)



MW-11 FALLING HEAD TEST

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-11 Falling Head Test.aqt
 Date: 05/29/24 Time: 12:56:46

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Well: MW-11
 Test Date: 04-04-24

AQUIFER DATA

Saturated Thickness: 19.59 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-11)

Initial Displacement: 2.126 ft Static Water Column Height: 19.59 ft
 Total Well Penetration Depth: 19.59 ft Screen Length: 5. ft
 Casing Radius: 0.083 ft Well Radius: 0.45 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bower-Rice
 K = 0.001361 ft/min $y_0 =$ 1.213 ft

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-11 Rising Head Test.aqt
 Title: MW-11 Rising Head Test
 Date: 05/29/24
 Time: 12:58:03

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: 04-04-24
 Test Well: MW-11

AQUIFER DATA

Saturated Thickness: 19.59 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-11

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 1.853 ft
 Static Water Column Height: 19.59 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.45 ft
 Well Skin Radius: 0.45 ft
 Screen Length: 5. ft
 Total Well Penetration Depth: 19.59 ft

No. of Observations: 164

Time (min)	Observation Data		Displacement (ft)
	Displacement (ft)	Time (min)	
0.	1.853	2.733	0.1714
0.03333	1.552	2.767	0.1714
0.06667	1.401	2.8	0.1594
0.1	1.344	2.833	0.1594
0.1333	1.287	2.867	0.1594
0.1667	1.23	2.9	0.1594
0.2	1.185	2.933	0.1474
0.2333	1.149	2.967	0.1474
0.2667	1.104	3.	0.1474
0.3	1.068	3.033	0.1474
0.3333	1.035	3.067	0.1353
0.3667	0.9985	3.1	0.1353
0.4	0.9654	3.133	0.1353
0.4333	0.9293	3.167	0.1353
0.4667	0.9082	3.2	0.1263
0.5	0.8721	3.233	0.1353

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
0.5333	0.8511	3.267	0.1263
0.5667	0.827	3.3	0.1263
0.6	0.794	3.333	0.1263
0.6333	0.7699	3.367	0.1263
0.6667	0.7458	3.4	0.1143
0.7	0.7248	3.433	0.1143
0.7333	0.7007	3.467	0.1143
0.7667	0.6887	3.5	0.1143
0.8	0.6646	3.533	0.1143
0.8333	0.6436	3.567	0.1143
0.8667	0.6316	3.6	0.1143
0.9	0.6195	3.633	0.1143
0.9333	0.5985	3.667	0.1022
0.9667	0.5744	3.7	0.1022
1.	0.5624	3.733	0.1022
1.033	0.5504	3.767	0.1022
1.067	0.5383	3.8	0.1022
1.1	0.5173	3.833	0.1022
1.133	0.5052	3.867	0.09022
1.167	0.4932	3.9	0.09022
1.2	0.4812	3.933	0.09022
1.233	0.4601	3.967	0.09022
1.267	0.4481	4.	0.09022
1.3	0.4361	4.033	0.09022
1.333	0.424	4.067	0.07819
1.367	0.412	4.1	0.07819
1.4	0.4	4.133	0.07819
1.433	0.4	4.167	0.09022
1.467	0.3789	4.2	0.07819
1.5	0.3669	4.233	0.07819
1.533	0.3669	4.267	0.07819
1.567	0.3549	4.3	0.07819
1.6	0.3549	4.333	0.07819
1.633	0.3428	4.367	0.07819
1.667	0.3308	4.4	0.06616
1.7	0.3218	4.433	0.07819
1.733	0.3098	4.467	0.07819
1.767	0.3098	4.5	0.07819
1.8	0.3098	4.533	0.07819
1.833	0.2977	4.567	0.07819
1.867	0.2857	4.6	0.07819
1.9	0.2857	4.633	0.07819
1.933	0.2737	4.667	0.06616
1.967	0.2737	4.7	0.06616
2.	0.2647	4.733	0.07218
2.033	0.2526	4.767	0.06616
2.067	0.2526	4.8	0.06616
2.1	0.2526	4.833	0.06616
2.133	0.2406	4.867	0.06616
2.167	0.2406	4.9	0.06616
2.2	0.2286	4.933	0.06616
2.233	0.2286	4.967	0.06616
2.267	0.2286	5.	0.06616

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
2.3	0.2165	5.033	0.06616
2.333	0.2165	5.067	0.05714
2.367	0.2105	5.1	0.06616
2.4	0.2105	5.133	0.06616
2.433	0.1985	5.167	0.06616
2.467	0.1955	5.2	0.06616
2.5	0.1955	5.233	0.05714
2.533	0.1835	5.267	0.06616
2.567	0.1835	5.3	0.06015
2.6	0.1714	5.333	0.05714
2.633	0.1714	5.367	0.05714
2.667	0.1714	5.4	0.06616
2.7	0.1714	5.433	0.05714

SOLUTION

Slug Test

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

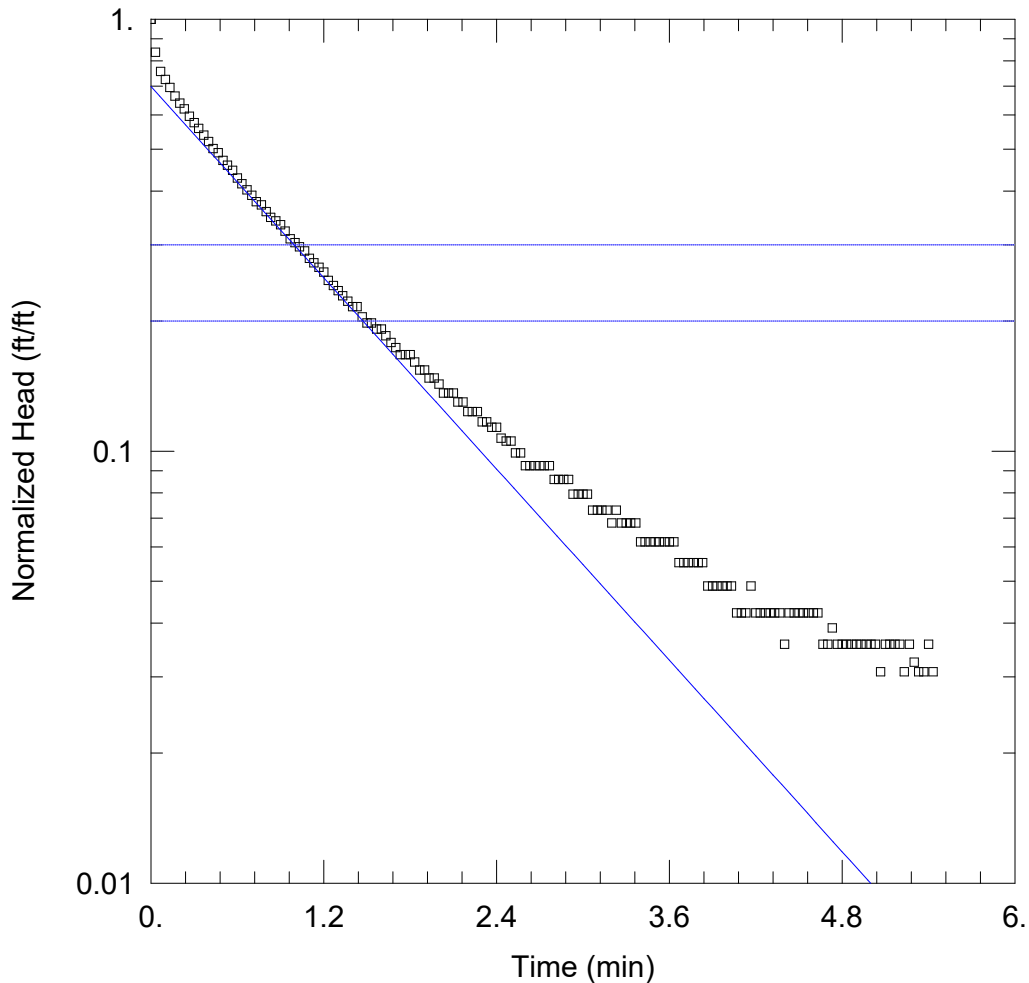
ln(Re/rw): 2.427

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	0.00142	ft/min
y0	1.293	ft

K = 0.0007213 cm/sec

T = K*b = 0.02781 ft²/min (0.4307 sq. cm/sec)



MW-11 RISING HEAD TEST

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-11 Rising Head Test.aqt
 Date: 05/29/24 Time: 12:57:48

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Well: MW-11
 Test Date: 04-04-24

AQUIFER DATA

Saturated Thickness: 19.59 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-11)

Initial Displacement: 1.853 ft Static Water Column Height: 19.59 ft
 Total Well Penetration Depth: 19.59 ft Screen Length: 5. ft
 Casing Radius: 0.083 ft Well Radius: 0.45 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bower-Rice
 K = 0.00142 ft/min $y_0 =$ 1.293 ft

Data Set: N:\US\St Paul\Projects\563\056934\Workshare\Aquifer Testing\2024-04 Aquifer testing\AQT Files\MW-14
 Title: MW-14 Falling Head Test
 Date: 10/31/24
 Time: 10:23:22

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: October 2024
 Test Well: MW-14

AQUIFER DATA

Saturated Thickness: 11.66 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-14

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 1.612 ft
 Static Water Column Height: 11.66 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.34 ft
 Well Skin Radius: 0.34 ft
 Screen Length: 10. ft
 Total Well Penetration Depth: 15.34 ft

No. of Observations: 2417

Time (min)	Observation Data		Displacement (ft)
	Displacement (ft)	Time (min)	
0.	1.612	100.8	0.6586
0.08333	1.125	100.8	0.6586
0.1667	1.143	100.9	0.6586
0.25	1.146	101.	0.6586
0.3333	1.137	101.1	0.6586
0.4167	1.137	101.2	0.6676
0.5	1.137	101.3	0.6586
0.5833	1.125	101.3	0.6586
0.6667	1.134	101.4	0.6586
0.75	1.125	101.5	0.6676
0.8333	1.134	101.6	0.6586
0.9167	1.134	101.7	0.6586
1.	1.134	101.8	0.6676
1.083	1.125	101.8	0.6586
1.167	1.134	101.9	0.6586
1.25	1.134	102.	0.6586
1.333	1.134	102.1	0.6586
1.417	1.152	102.2	0.6586
1.5	1.143	102.3	0.6586
1.583	1.137	102.3	0.6586
1.667	1.128	102.4	0.6586
1.75	1.137	102.5	0.6586
1.833	1.128	102.6	0.6496
1.917	1.128	102.7	0.6586
2.	1.128	102.8	0.6496
2.083	1.128	102.8	0.6586
2.167	1.128	102.9	0.6586
2.25	1.119	103.	0.6586
2.333	1.128	103.1	0.6586

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
2.417	1.134	103.2	0.6586
2.5	1.134	103.3	0.6496
2.583	1.125	103.3	0.6586
2.667	1.125	103.4	0.6496
2.75	1.116	103.5	0.6496
2.833	1.125	103.6	0.6496
2.917	1.116	103.7	0.6496
3.	1.116	103.8	0.6496
3.083	1.122	103.8	0.6496
3.167	1.122	103.9	0.6586
3.25	1.122	104.	0.6496
3.333	1.122	104.1	0.6496
3.417	1.125	104.2	0.6586
3.5	1.107	104.3	0.6496
3.583	1.107	104.3	0.6496
3.667	1.107	104.4	0.6496
3.75	1.113	104.5	0.6496
3.833	1.116	104.6	0.6496
3.917	1.113	104.7	0.6496
4.	1.113	104.8	0.6496
4.083	1.113	104.8	0.6406
4.167	1.122	104.9	0.6406
4.25	1.119	105.	0.6496
4.333	1.119	105.1	0.6406
4.417	1.11	105.2	0.6496
4.5	1.119	105.3	0.6406
4.583	1.11	105.3	0.6526
4.667	1.116	105.4	0.6406
4.75	1.116	105.5	0.6406
4.833	1.116	105.6	0.6496
4.917	1.116	105.7	0.6406
5.	1.098	105.8	0.6406
5.083	1.107	105.8	0.6436
5.167	1.107	105.9	0.6406
5.25	1.107	106.	0.6496
5.333	1.107	106.1	0.6406
5.417	1.107	106.2	0.6316
5.5	1.107	106.3	0.6406
5.583	1.107	106.3	0.6406
5.667	1.098	106.4	0.6406
5.75	1.107	106.5	0.6406
5.833	1.107	106.6	0.6406
5.917	1.101	106.7	0.6406
6.	1.101	106.8	0.6496
6.083	1.092	106.8	0.6406
6.167	1.092	106.9	0.6406
6.25	1.092	107.	0.6316
6.333	1.101	107.1	0.6316
6.417	1.092	107.2	0.6316
6.5	1.092	107.3	0.6316
6.583	1.092	107.3	0.6316
6.667	1.092	107.4	0.6406
6.75	1.098	107.5	0.6316
6.833	1.098	107.6	0.6406
6.917	1.107	107.7	0.6406
7.	1.098	107.8	0.6406
7.083	1.098	107.8	0.6406
7.167	1.098	107.9	0.6316
7.25	1.107	108.	0.6316
7.333	1.098	108.1	0.6406
7.417	1.089	108.2	0.6316
7.5	1.089	108.3	0.6316
7.583	1.098	108.3	0.6316
7.667	1.089	108.4	0.6316
7.75	1.083	108.5	0.6316
7.833	1.089	108.6	0.6316

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
7.917	1.083	108.7	0.6406
8.	1.083	108.8	0.6316
8.083	1.083	108.8	0.6316
8.167	1.083	108.9	0.6316
8.25	1.083	109.	0.6406
8.333	1.092	109.1	0.6316
8.417	1.083	109.2	0.6316
8.5	1.083	109.3	0.6316
8.583	1.083	109.3	0.6225
8.667	1.083	109.4	0.6316
8.75	1.083	109.5	0.6316
8.833	1.083	109.6	0.6406
8.917	1.08	109.7	0.6316
9.	1.083	109.8	0.6406
9.083	1.08	109.8	0.6316
9.167	1.074	109.9	0.6406
9.25	1.083	110.	0.6316
9.333	1.08	110.1	0.6316
9.417	1.089	110.2	0.6406
9.5	1.089	110.3	0.6316
9.583	1.089	110.3	0.6316
9.667	1.08	110.4	0.6316
9.75	1.08	110.5	0.6225
9.833	1.071	110.6	0.6316
9.917	1.08	110.7	0.6316
10.	1.071	110.8	0.6225
10.08	1.08	110.8	0.6225
10.17	1.08	110.9	0.6316
10.25	1.071	111.	0.6225
10.33	1.071	111.1	0.6316
10.42	1.071	111.2	0.6316
10.5	1.071	111.3	0.6225
10.58	1.071	111.3	0.6225
10.67	1.071	111.4	0.6316
10.75	1.071	111.5	0.6225
10.83	1.062	111.6	0.6316
10.92	1.071	111.7	0.6316
11.	1.071	111.8	0.6256
11.08	1.062	111.8	0.6225
11.17	1.062	111.9	0.6225
11.25	1.071	112.	0.6225
11.33	1.062	112.1	0.6225
11.42	1.062	112.2	0.6316
11.5	1.062	112.3	0.6225
11.58	1.062	112.3	0.6225
11.67	1.062	112.4	0.6225
11.75	1.062	112.5	0.6316
11.83	1.062	112.6	0.6225
11.92	1.056	112.7	0.6256
12.	1.056	112.8	0.6225
12.08	1.056	112.8	0.6225
12.17	1.062	112.9	0.6225
12.25	1.056	113.	0.6225
12.33	1.056	113.1	0.6225
12.42	1.062	113.2	0.6225
12.5	1.047	113.3	0.6225
12.58	1.047	113.3	0.6225
12.67	1.047	113.4	0.6225
12.75	1.047	113.5	0.6225
12.83	1.047	113.6	0.6256
12.92	1.047	113.7	0.6135
13.	1.062	113.8	0.6135
13.08	1.047	113.8	0.6225
13.17	1.047	113.9	0.6225
13.25	1.047	114.	0.6135
13.33	1.047	114.1	0.6135

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
13.42	1.038	114.2	0.6135
13.5	1.038	114.3	0.6135
13.58	1.047	114.3	0.6135
13.67	1.047	114.4	0.6135
13.75	1.038	114.5	0.6225
13.83	1.047	114.6	0.6135
13.92	1.038	114.7	0.6225
14.	1.038	114.8	0.6135
14.08	1.038	114.8	0.6135
14.17	1.038	114.9	0.6135
14.25	1.047	115.	0.6135
14.33	1.047	115.1	0.6135
14.42	1.038	115.2	0.6225
14.5	1.038	115.3	0.6225
14.58	1.038	115.3	0.6045
14.67	1.038	115.4	0.6045
14.75	1.038	115.5	0.6135
14.83	1.038	115.6	0.6045
14.92	1.038	115.7	0.6135
15.	1.038	115.8	0.6135
15.08	1.038	115.8	0.6135
15.17	1.038	115.9	0.6045
15.25	1.038	116.	0.6135
15.33	1.038	116.1	0.6135
15.42	1.029	116.2	0.6045
15.5	1.029	116.3	0.6045
15.58	1.029	116.3	0.6135
15.67	1.029	116.4	0.6135
15.75	1.029	116.5	0.6135
15.83	1.029	116.6	0.6135
15.92	1.02	116.7	0.6135
16.	1.029	116.8	0.6045
16.08	1.029	116.8	0.6045
16.17	1.029	116.9	0.6045
16.25	1.029	117.	0.5955
16.33	1.02	117.1	0.6045
16.42	1.02	117.2	0.6045
16.5	1.02	117.3	0.6045
16.58	1.02	117.3	0.6075
16.67	1.02	117.4	0.6045
16.75	1.011	117.5	0.6045
16.83	1.011	117.6	0.6045
16.92	1.011	117.7	0.5955
17.	1.02	117.8	0.6045
17.08	1.02	117.8	0.6045
17.17	1.02	117.9	0.6045
17.25	1.029	118.	0.5955
17.33	1.02	118.1	0.5955
17.42	1.02	118.2	0.6045
17.5	1.011	118.3	0.5955
17.58	1.011	118.3	0.5955
17.67	1.02	118.4	0.5955
17.75	1.02	118.5	0.5955
17.83	1.02	118.6	0.5955
17.92	1.02	118.7	0.5955
18.	1.011	118.8	0.5865
18.08	1.011	118.8	0.5955
18.17	1.02	118.9	0.5865
18.25	1.011	119.	0.5985
18.33	1.011	119.1	0.5955
18.42	1.02	119.2	0.5955
18.5	1.011	119.3	0.5955
18.58	1.011	119.3	0.5955
18.67	1.011	119.4	0.6045
18.75	1.011	119.5	0.5985
18.83	1.011	119.6	0.6045

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
18.92	1.011	119.7	0.5955
19.	1.011	119.8	0.5955
19.08	1.011	119.8	0.6045
19.17	1.011	119.9	0.6045
19.25	1.011	120.	0.5955
19.33	1.011	120.1	0.5955
19.42	1.011	120.2	0.5955
19.5	1.011	120.3	0.5955
19.58	1.001	120.3	0.5955
19.67	1.001	120.4	0.5955
19.75	1.011	120.5	0.5955
19.83	1.001	120.6	0.5955
19.92	1.001	120.7	0.5955
20.	1.011	120.8	0.5865
20.08	1.001	120.8	0.5895
20.17	1.011	120.9	0.5895
20.25	1.001	121.	0.5955
20.33	1.001	121.1	0.5955
20.42	1.001	121.2	0.5865
20.5	1.001	121.3	0.5865
20.58	1.011	121.3	0.5955
20.67	1.001	121.4	0.5955
20.75	1.011	121.5	0.5955
20.83	1.001	121.6	0.6045
20.92	0.9925	121.7	0.5985
21.	0.9925	121.8	0.5955
21.08	1.001	121.8	0.5865
21.17	1.001	121.9	0.5955
21.25	1.001	122.	0.5865
21.33	1.001	122.1	0.5955
21.42	1.001	122.2	0.5865
21.5	1.001	122.3	0.5895
21.58	0.9925	122.3	0.5985
21.67	0.9925	122.4	0.5865
21.75	0.9925	122.5	0.5865
21.83	1.001	122.6	0.5865
21.92	1.001	122.7	0.5774
22.	0.9925	122.8	0.5865
22.08	0.9925	122.8	0.5865
22.17	0.9925	122.9	0.5865
22.25	0.9925	123.	0.5865
22.33	0.9925	123.1	0.5865
22.42	0.9834	123.2	0.5865
22.5	0.9925	123.3	0.5865
22.58	0.9834	123.3	0.5774
22.67	0.9895	123.4	0.5865
22.75	0.9834	123.5	0.5895
22.83	0.9834	123.6	0.5774
22.92	0.9744	123.7	0.5774
23.	0.9834	123.8	0.5865
23.08	0.9834	123.8	0.5774
23.17	0.9834	123.9	0.5804
23.25	0.9834	124.	0.5804
23.33	0.9834	124.1	0.5774
23.42	0.9834	124.2	0.5774
23.5	0.9925	124.3	0.5774
23.58	0.9834	124.3	0.5774
23.67	0.9834	124.4	0.5804
23.75	0.9925	124.5	0.5774
23.83	0.9834	124.6	0.5774
23.92	0.9834	124.7	0.5804
24.	0.9834	124.8	0.5865
24.08	0.9834	124.8	0.5865
24.17	0.9834	124.9	0.5774
24.25	0.9834	125.	0.5865
24.33	0.9895	125.1	0.5774

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
24.42	0.9804	125.2	0.5774
24.5	0.9895	125.3	0.5804
24.58	0.9834	125.3	0.5774
24.67	0.9834	125.4	0.5774
24.75	0.9744	125.5	0.5774
24.83	0.9744	125.6	0.5774
24.92	0.9744	125.7	0.5684
25.	0.9804	125.8	0.5684
25.08	0.9804	125.8	0.5774
25.17	0.9804	125.9	0.5804
25.25	0.9744	126.	0.5714
25.33	0.9654	126.1	0.5774
25.42	0.9804	126.2	0.5714
25.5	0.9744	126.3	0.5774
25.58	0.9804	126.3	0.5684
25.67	0.9654	126.4	0.5684
25.75	0.9714	126.5	0.5774
25.83	0.9895	126.6	0.5774
25.92	0.9744	126.7	0.5684
26.	0.9804	126.8	0.5684
26.08	0.9744	126.8	0.5714
26.17	0.9804	126.9	0.5684
26.25	0.9744	127.	0.5774
26.33	0.9804	127.1	0.5774
26.42	0.9744	127.2	0.5684
26.5	0.9804	127.3	0.5684
26.58	0.9744	127.3	0.5774
26.67	0.9624	127.4	0.5684
26.75	0.9714	127.5	0.5684
26.83	0.9714	127.6	0.5684
26.92	0.9654	127.7	0.5774
27.	0.9654	127.8	0.5684
27.08	0.9654	127.8	0.5684
27.17	0.9714	127.9	0.5684
27.25	0.9714	128.	0.5774
27.33	0.9714	128.1	0.5774
27.42	0.9714	128.2	0.5774
27.5	0.9714	128.3	0.5684
27.58	0.9714	128.3	0.5594
27.67	0.9654	128.4	0.5714
27.75	0.9714	128.5	0.5684
27.83	0.9624	128.6	0.5684
27.92	0.9714	128.7	0.5684
28.	0.9714	128.8	0.5684
28.08	0.9714	128.8	0.5684
28.17	0.9624	128.9	0.5774
28.25	0.9714	129.	0.5684
28.33	0.9624	129.1	0.5684
28.42	0.9714	129.2	0.5684
28.5	0.9714	129.3	0.5684
28.58	0.9714	129.3	0.5594
28.67	0.9714	129.4	0.5594
28.75	0.9624	129.5	0.5594
28.83	0.9624	129.6	0.5594
28.92	0.9624	129.7	0.5594
29.	0.9624	129.8	0.5594
29.08	0.9624	129.8	0.5594
29.17	0.9624	129.9	0.5594
29.25	0.9624	130.	0.5594
29.33	0.9624	130.1	0.5594
29.42	0.9534	130.2	0.5594
29.5	0.9624	130.3	0.5594
29.58	0.9534	130.3	0.5594
29.67	0.9534	130.4	0.5504
29.75	0.9473	130.5	0.5504
29.83	0.9534	130.6	0.5594

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
29.92	0.9534	130.7	0.5504
30.	0.9534	130.8	0.5504
30.08	0.9534	130.8	0.5504
30.17	0.9534	130.9	0.5504
30.25	0.9534	131.	0.5594
30.33	0.9624	131.1	0.5504
30.42	0.9624	131.2	0.5594
30.5	0.9534	131.3	0.5594
30.58	0.9534	131.3	0.5504
30.67	0.9443	131.4	0.5504
30.75	0.9624	131.5	0.5594
30.83	0.9534	131.6	0.5594
30.92	0.9534	131.7	0.5594
31.	0.9534	131.8	0.5504
31.08	0.9534	131.8	0.5504
31.17	0.9473	131.9	0.5504
31.25	0.9534	132.	0.5534
31.33	0.9443	132.1	0.5504
31.42	0.9534	132.2	0.5504
31.5	0.9534	132.3	0.5594
31.58	0.9534	132.3	0.5504
31.67	0.9443	132.4	0.5504
31.75	0.9534	132.5	0.5504
31.83	0.9473	132.6	0.5504
31.92	0.9534	132.7	0.5504
32.	0.9534	132.8	0.5504
32.08	0.9383	132.8	0.5504
32.17	0.9473	132.9	0.5504
32.25	0.9443	133.	0.5504
32.33	0.9534	133.1	0.5504
32.42	0.9443	133.2	0.5504
32.5	0.9353	133.3	0.5504
32.58	0.9443	133.3	0.5504
32.67	0.9443	133.4	0.5413
32.75	0.9443	133.5	0.5504
32.83	0.9443	133.6	0.5594
32.92	0.9443	133.7	0.5504
33.	0.9534	133.8	0.5413
33.08	0.9443	133.8	0.5413
33.17	0.9443	133.9	0.5413
33.25	0.9534	134.	0.5504
33.33	0.9443	134.1	0.5413
33.42	0.9443	134.2	0.5413
33.5	0.9443	134.3	0.5413
33.58	0.9353	134.3	0.5413
33.67	0.9443	134.4	0.5413
33.75	0.9353	134.5	0.5353
33.83	0.9353	134.6	0.5504
33.92	0.9353	134.7	0.5413
34.	0.9353	134.8	0.5413
34.08	0.9353	134.8	0.5413
34.17	0.9263	134.9	0.5413
34.25	0.9353	135.	0.5413
34.33	0.9353	135.1	0.5413
34.42	0.9353	135.2	0.5413
34.5	0.9443	135.3	0.5413
34.58	0.9443	135.3	0.5444
34.67	0.9353	135.4	0.5413
34.75	0.9353	135.5	0.5413
34.83	0.9353	135.6	0.5413
34.92	0.9353	135.7	0.5353
35.	0.9353	135.8	0.5353
35.08	0.9353	135.8	0.5413
35.17	0.9353	135.9	0.5353
35.25	0.9353	136.	0.5413
35.33	0.9263	136.1	0.5413

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
35.42	0.9263	136.2	0.5353
35.5	0.9263	136.3	0.5353
35.58	0.9353	136.3	0.5413
35.67	0.9263	136.4	0.5444
35.75	0.9263	136.5	0.5353
35.83	0.9353	136.6	0.5353
35.92	0.9263	136.7	0.5353
36.	0.9263	136.8	0.5353
36.08	0.9263	136.8	0.5353
36.17	0.9263	136.9	0.5413
36.25	0.9263	137.	0.5353
36.33	0.9263	137.1	0.5353
36.42	0.9263	137.2	0.5353
36.5	0.9263	137.3	0.5353
36.58	0.9263	137.3	0.5263
36.67	0.9263	137.4	0.5353
36.75	0.9263	137.5	0.5353
36.83	0.9263	137.6	0.5353
36.92	0.9173	137.7	0.5353
37.	0.9263	137.8	0.5353
37.08	0.9173	137.8	0.5353
37.17	0.9263	137.9	0.5353
37.25	0.9263	138.	0.5353
37.33	0.9173	138.1	0.5353
37.42	0.9263	138.2	0.5353
37.5	0.9173	138.3	0.5353
37.58	0.9173	138.3	0.5353
37.67	0.9173	138.4	0.5353
37.75	0.9263	138.5	0.5263
37.83	0.9263	138.6	0.5353
37.92	0.9173	138.7	0.5353
38.	0.9173	138.8	0.5353
38.08	0.9083	138.8	0.5263
38.17	0.9083	138.9	0.5353
38.25	0.9173	139.	0.5353
38.33	0.9083	139.1	0.5353
38.42	0.9173	139.2	0.5263
38.5	0.9173	139.3	0.5263
38.58	0.9173	139.3	0.5263
38.67	0.9083	139.4	0.5263
38.75	0.9173	139.5	0.5173
38.83	0.9173	139.6	0.5263
38.92	0.9173	139.7	0.5263
39.	0.9173	139.8	0.5263
39.08	0.9173	139.8	0.5263
39.17	0.9173	139.9	0.5353
39.25	0.9173	140.	0.5263
39.33	0.9173	140.1	0.5263
39.42	0.9173	140.2	0.5263
39.5	0.9083	140.3	0.5263
39.58	0.9083	140.3	0.5383
39.67	0.9173	140.4	0.5263
39.75	0.9083	140.5	0.5353
39.83	0.9173	140.6	0.5263
39.92	0.9173	140.7	0.5263
40.	0.9173	140.8	0.5173
40.08	0.9083	140.8	0.5263
40.17	0.9083	140.9	0.5173
40.25	0.9083	141.	0.5263
40.33	0.9083	141.1	0.5263
40.42	0.8992	141.2	0.5263
40.5	0.9083	141.3	0.5263
40.58	0.8992	141.3	0.5173
40.67	0.9083	141.4	0.5173
40.75	0.9083	141.5	0.5263
40.83	0.9083	141.6	0.5263

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
40.92	0.8992	141.7	0.5263
41.	0.9083	141.8	0.5263
41.08	0.9083	141.8	0.5263
41.17	0.8992	141.9	0.5173
41.25	0.9083	142.	0.5173
41.33	0.8992	142.1	0.5173
41.42	0.9083	142.2	0.5263
41.5	0.8992	142.3	0.5263
41.58	0.8992	142.3	0.5173
41.67	0.9083	142.4	0.5173
41.75	0.8992	142.5	0.5173
41.83	0.8992	142.6	0.5263
41.92	0.8992	142.7	0.5173
42.	0.8992	142.8	0.5203
42.08	0.8992	142.8	0.5173
42.17	0.8992	142.9	0.5173
42.25	0.8992	143.	0.5173
42.33	0.8992	143.1	0.5173
42.42	0.8992	143.2	0.5083
42.5	0.9083	143.3	0.5173
42.58	0.8992	143.3	0.5173
42.67	0.8992	143.4	0.5173
42.75	0.8932	143.5	0.5083
42.83	0.8932	143.6	0.5173
42.92	0.8932	143.7	0.5083
43.	0.8932	143.8	0.5173
43.08	0.8932	143.8	0.5173
43.17	0.8932	143.9	0.5173
43.25	0.8842	144.	0.5203
43.33	0.8842	144.1	0.5173
43.42	0.8932	144.2	0.5083
43.5	0.8932	144.3	0.5203
43.58	0.8932	144.3	0.5173
43.67	0.8932	144.4	0.5173
43.75	0.8932	144.5	0.5173
43.83	0.8842	144.6	0.5083
43.92	0.8932	144.7	0.5083
44.	0.8842	144.8	0.5113
44.08	0.8932	144.8	0.5083
44.17	0.8932	144.9	0.5083
44.25	0.8932	145.	0.5173
44.33	0.8932	145.1	0.5173
44.42	0.8932	145.2	0.5083
44.5	0.8932	145.3	0.5083
44.58	0.8932	145.3	0.5083
44.67	0.8932	145.4	0.5083
44.75	0.8842	145.5	0.5083
44.83	0.8842	145.6	0.5173
44.92	0.8932	145.7	0.5083
45.	0.8932	145.8	0.5083
45.08	0.8842	145.8	0.4992
45.17	0.8842	145.9	0.5083
45.25	0.8842	146.	0.4992
45.33	0.8752	146.1	0.5083
45.42	0.8842	146.2	0.5083
45.5	0.8842	146.3	0.5083
45.58	0.8842	146.3	0.5083
45.67	0.8842	146.4	0.4992
45.75	0.8842	146.5	0.5083
45.83	0.8842	146.6	0.4992
45.92	0.8842	146.7	0.5083
46.	0.8842	146.8	0.5083
46.08	0.8752	146.8	0.5083
46.17	0.8842	146.9	0.5083
46.25	0.8842	147.	0.4992
46.33	0.8842	147.1	0.5083

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
46.42	0.8842	147.2	0.4992
46.5	0.8842	147.3	0.4992
46.58	0.8752	147.3	0.5083
46.67	0.8752	147.4	0.4992
46.75	0.8842	147.5	0.4992
46.83	0.8842	147.6	0.4992
46.92	0.8752	147.7	0.4992
47.	0.8752	147.8	0.4992
47.08	0.8752	147.8	0.5083
47.17	0.8752	147.9	0.4992
47.25	0.8752	148.	0.4992
47.33	0.8842	148.1	0.4902
47.42	0.8842	148.2	0.4992
47.5	0.8752	148.3	0.5022
47.58	0.8752	148.3	0.4992
47.67	0.8752	148.4	0.4992
47.75	0.8752	148.5	0.4992
47.83	0.8752	148.6	0.4992
47.92	0.8752	148.7	0.4992
48.	0.8752	148.8	0.4992
48.08	0.8752	148.8	0.4992
48.17	0.8752	148.9	0.4992
48.25	0.8752	149.	0.4992
48.33	0.8752	149.1	0.4992
48.42	0.8752	149.2	0.4902
48.5	0.8752	149.3	0.4992
48.58	0.8752	149.3	0.4992
48.67	0.8661	149.4	0.4992
48.75	0.8661	149.5	0.4992
48.83	0.8661	149.6	0.4992
48.92	0.8661	149.7	0.4992
49.	0.8661	149.8	0.4992
49.08	0.8752	149.8	0.4992
49.17	0.8752	149.9	0.4992
49.25	0.8752	150.	0.4992
49.33	0.8752	150.1	0.4902
49.42	0.8661	150.2	0.4902
49.5	0.8661	150.3	0.4902
49.58	0.8752	150.3	0.4902
49.67	0.8571	150.4	0.4902
49.75	0.8661	150.5	0.4992
49.83	0.8661	150.6	0.4932
49.92	0.8661	150.7	0.4992
50.	0.8661	150.8	0.4902
50.08	0.8661	150.8	0.4902
50.17	0.8661	150.9	0.4902
50.25	0.8752	151.	0.4902
50.33	0.8661	151.1	0.4902
50.42	0.8661	151.2	0.4902
50.5	0.8661	151.3	0.4992
50.58	0.8661	151.3	0.4902
50.67	0.8661	151.4	0.4992
50.75	0.8661	151.5	0.4992
50.83	0.8661	151.6	0.4902
50.92	0.8661	151.7	0.4902
51.	0.8571	151.8	0.4902
51.08	0.8571	151.8	0.4812
51.17	0.8571	151.9	0.4812
51.25	0.8661	152.	0.4902
51.33	0.8571	152.1	0.4902
51.42	0.8661	152.2	0.4902
51.5	0.8571	152.3	0.4902
51.58	0.8661	152.3	0.4902
51.67	0.8661	152.4	0.4812
51.75	0.8661	152.5	0.4812
51.83	0.8661	152.6	0.4722

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
51.92	0.8661	152.7	0.4812
52.	0.8661	152.8	0.4722
52.08	0.8571	152.8	0.4812
52.17	0.8571	152.9	0.4812
52.25	0.8571	153.	0.4722
52.33	0.8571	153.1	0.4812
52.42	0.8571	153.2	0.4812
52.5	0.8571	153.3	0.4812
52.58	0.8481	153.3	0.4812
52.67	0.8481	153.4	0.4812
52.75	0.8571	153.5	0.4812
52.83	0.8571	153.6	0.4812
52.92	0.8571	153.7	0.4812
53.	0.8481	153.8	0.4812
53.08	0.8571	153.8	0.4812
53.17	0.8571	153.9	0.4812
53.25	0.8571	154.	0.4812
53.33	0.8571	154.1	0.4812
53.42	0.8481	154.2	0.4722
53.5	0.8571	154.3	0.4812
53.58	0.8481	154.3	0.4722
53.67	0.8481	154.4	0.4722
53.75	0.8481	154.5	0.4812
53.83	0.8571	154.6	0.4722
53.92	0.8571	154.7	0.4812
54.	0.8481	154.8	0.4812
54.08	0.8571	154.8	0.4812
54.17	0.8571	154.9	0.4722
54.25	0.8481	155.	0.4722
54.33	0.8481	155.1	0.4812
54.42	0.8481	155.2	0.4812
54.5	0.8481	155.3	0.4812
54.58	0.8481	155.3	0.4812
54.67	0.8361	155.4	0.4812
54.75	0.8391	155.5	0.4812
54.83	0.8391	155.6	0.4722
54.92	0.8391	155.7	0.4722
55.	0.8391	155.8	0.4812
55.08	0.8481	155.8	0.4722
55.17	0.8481	155.9	0.4632
55.25	0.8481	156.	0.4722
55.33	0.8391	156.1	0.4722
55.42	0.8391	156.2	0.4722
55.5	0.8391	156.3	0.4752
55.58	0.8391	156.3	0.4722
55.67	0.8391	156.4	0.4722
55.75	0.8391	156.5	0.4722
55.83	0.8481	156.6	0.4632
55.92	0.8481	156.7	0.4722
56.	0.8391	156.8	0.4722
56.08	0.8391	156.8	0.4722
56.17	0.8391	156.9	0.4752
56.25	0.8481	157.	0.4632
56.33	0.8481	157.1	0.4662
56.42	0.8391	157.2	0.4752
56.5	0.8391	157.3	0.4722
56.58	0.83	157.3	0.4632
56.67	0.8391	157.4	0.4722
56.75	0.8391	157.5	0.4752
56.83	0.8391	157.6	0.4722
56.92	0.8391	157.7	0.4752
57.	0.8391	157.8	0.4722
57.08	0.83	157.8	0.4722
57.17	0.8391	157.9	0.4722
57.25	0.83	158.	0.4632
57.33	0.8391	158.1	0.4632

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
57.42	0.83	158.2	0.4722
57.5	0.83	158.3	0.4722
57.58	0.83	158.3	0.4632
57.67	0.83	158.4	0.4632
57.75	0.83	158.5	0.4632
57.83	0.83	158.6	0.4722
57.92	0.83	158.7	0.4632
58.	0.83	158.8	0.4722
58.08	0.83	158.8	0.4632
58.17	0.83	158.9	0.4722
58.25	0.83	159.	0.4722
58.33	0.83	159.1	0.4632
58.42	0.83	159.2	0.4662
58.5	0.83	159.3	0.4722
58.58	0.83	159.3	0.4632
58.67	0.83	159.4	0.4632
58.75	0.821	159.5	0.4632
58.83	0.818	159.6	0.4632
58.92	0.821	159.7	0.4632
59.	0.83	159.8	0.4541
59.08	0.821	159.8	0.4632
59.17	0.83	159.9	0.4632
59.25	0.83	160.	0.4541
59.33	0.827	160.1	0.4632
59.42	0.821	160.2	0.4541
59.5	0.827	160.3	0.4571
59.58	0.821	160.3	0.4541
59.67	0.821	160.4	0.4632
59.75	0.83	160.5	0.4632
59.83	0.83	160.6	0.4632
59.92	0.821	160.7	0.4632
60.	0.821	160.8	0.4632
60.08	0.821	160.8	0.4632
60.17	0.821	160.9	0.4632
60.25	0.821	161.	0.4632
60.33	0.821	161.1	0.4662
60.42	0.821	161.2	0.4632
60.5	0.821	161.3	0.4632
60.58	0.821	161.3	0.4632
60.67	0.821	161.4	0.4722
60.75	0.821	161.5	0.4632
60.83	0.83	161.6	0.4632
60.92	0.821	161.7	0.4632
61.	0.821	161.8	0.4632
61.08	0.821	161.8	0.4632
61.17	0.821	161.9	0.4632
61.25	0.83	162.	0.4632
61.33	0.821	162.1	0.4632
61.42	0.821	162.2	0.4632
61.5	0.821	162.3	0.4632
61.58	0.812	162.3	0.4632
61.67	0.812	162.4	0.4632
61.75	0.812	162.5	0.4632
61.83	0.812	162.6	0.4632
61.92	0.812	162.7	0.4541
62.	0.812	162.8	0.4632
62.08	0.812	162.8	0.4541
62.17	0.812	162.9	0.4541
62.25	0.812	163.	0.4541
62.33	0.812	163.1	0.4541
62.42	0.818	163.2	0.4541
62.5	0.812	163.3	0.4541
62.58	0.803	163.3	0.4632
62.67	0.8	163.4	0.4541
62.75	0.803	163.5	0.4541
62.83	0.812	163.6	0.4451

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
62.92	0.8	163.7	0.4541
63.	0.809	163.8	0.4541
63.08	0.812	163.8	0.4541
63.17	0.812	163.9	0.4541
63.25	0.812	164.	0.4541
63.33	0.803	164.1	0.4541
63.42	0.803	164.2	0.4541
63.5	0.791	164.3	0.4541
63.58	0.803	164.3	0.4451
63.67	0.803	164.4	0.4541
63.75	0.812	164.5	0.4541
63.83	0.812	164.6	0.4541
63.92	0.803	164.7	0.4541
64.	0.8	164.8	0.4451
64.08	0.8	164.8	0.4541
64.17	0.803	164.9	0.4451
64.25	0.812	165.	0.4451
64.33	0.803	165.1	0.4451
64.42	0.803	165.2	0.4451
64.5	0.794	165.3	0.4451
64.58	0.794	165.3	0.4451
64.67	0.803	165.4	0.4361
64.75	0.803	165.5	0.4451
64.83	0.794	165.6	0.4541
64.92	0.794	165.7	0.4451
65.	0.794	165.8	0.4451
65.08	0.803	165.8	0.4451
65.17	0.794	165.9	0.4451
65.25	0.794	166.	0.4451
65.33	0.803	166.1	0.4451
65.42	0.794	166.2	0.4451
65.5	0.794	166.3	0.4451
65.58	0.794	166.3	0.4451
65.67	0.794	166.4	0.4451
65.75	0.794	166.5	0.4451
65.83	0.794	166.6	0.4451
65.92	0.791	166.7	0.4451
66.	0.794	166.8	0.4361
66.08	0.794	166.8	0.4451
66.17	0.794	166.9	0.4451
66.25	0.794	167.	0.4451
66.33	0.794	167.1	0.4361
66.42	0.7819	167.2	0.4451
66.5	0.791	167.3	0.4451
66.58	0.7849	167.3	0.4451
66.67	0.7849	167.4	0.4361
66.75	0.794	167.5	0.4361
66.83	0.794	167.6	0.4361
66.92	0.794	167.7	0.4451
67.	0.794	167.8	0.4451
67.08	0.794	167.8	0.4451
67.17	0.794	167.9	0.4451
67.25	0.7849	168.	0.4361
67.33	0.794	168.1	0.4361
67.42	0.791	168.2	0.4271
67.5	0.7849	168.3	0.4451
67.58	0.7849	168.3	0.4361
67.67	0.791	168.4	0.4361
67.75	0.794	168.5	0.4361
67.83	0.794	168.6	0.4361
67.92	0.791	168.7	0.4361
68.	0.794	168.8	0.4361
68.08	0.794	168.8	0.4361
68.17	0.794	168.9	0.4361
68.25	0.794	169.	0.4361
68.33	0.794	169.1	0.4271

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
68.42	0.794	169.2	0.4361
68.5	0.7819	169.3	0.4391
68.58	0.791	169.3	0.4361
68.67	0.7849	169.4	0.4361
68.75	0.794	169.5	0.4361
68.83	0.794	169.6	0.4361
68.92	0.7849	169.7	0.4271
69.	0.7849	169.8	0.4361
69.08	0.7819	169.8	0.4361
69.17	0.794	169.9	0.4361
69.25	0.7849	170.	0.4361
69.33	0.7849	170.1	0.4271
69.42	0.7849	170.2	0.4361
69.5	0.7849	170.3	0.4361
69.58	0.7819	170.3	0.4391
69.67	0.794	170.4	0.4271
69.75	0.7849	170.5	0.4271
69.83	0.7849	170.6	0.4361
69.92	0.7849	170.7	0.4271
70.	0.7849	170.8	0.4361
70.08	0.7759	170.8	0.4361
70.17	0.7819	170.9	0.4361
70.25	0.7759	171.	0.4271
70.33	0.7759	171.1	0.4271
70.42	0.7759	171.2	0.4361
70.5	0.7849	171.3	0.4361
70.58	0.7729	171.3	0.4361
70.67	0.7849	171.4	0.4271
70.75	0.7849	171.5	0.4271
70.83	0.7729	171.6	0.4271
70.92	0.7759	171.7	0.4361
71.	0.7759	171.8	0.4271
71.08	0.7729	171.8	0.4271
71.17	0.7729	171.9	0.4271
71.25	0.7759	172.	0.4271
71.33	0.7729	172.1	0.4271
71.42	0.7759	172.2	0.4271
71.5	0.7849	172.3	0.4271
71.58	0.7759	172.3	0.4271
71.67	0.7819	172.4	0.4361
71.75	0.7729	172.5	0.4271
71.83	0.7849	172.6	0.4271
71.92	0.7759	172.7	0.4271
72.	0.7759	172.8	0.4271
72.08	0.7729	172.8	0.4271
72.17	0.7759	172.9	0.4271
72.25	0.7849	173.	0.4271
72.33	0.7729	173.1	0.4271
72.42	0.7759	173.2	0.4271
72.5	0.7729	173.3	0.418
72.58	0.7759	173.3	0.4271
72.67	0.7729	173.4	0.4271
72.75	0.7759	173.5	0.4271
72.83	0.7759	173.6	0.418
72.92	0.7669	173.7	0.418
73.	0.7669	173.8	0.418
73.08	0.7669	173.8	0.418
73.17	0.7669	173.9	0.4271
73.25	0.7669	174.	0.418
73.33	0.7759	174.1	0.418
73.42	0.7669	174.2	0.409
73.5	0.7759	174.3	0.418
73.58	0.7669	174.3	0.418
73.67	0.7639	174.4	0.409
73.75	0.7729	174.5	0.418
73.83	0.7759	174.6	0.409

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
73.92	0.7729	174.7	0.418
74.	0.7759	174.8	0.418
74.08	0.7639	174.8	0.418
74.17	0.7669	174.9	0.418
74.25	0.7639	175.	0.418
74.33	0.7729	175.1	0.418
74.42	0.7669	175.2	0.418
74.5	0.7639	175.3	0.409
74.58	0.7669	175.3	0.418
74.67	0.7639	175.4	0.418
74.75	0.7669	175.5	0.418
74.83	0.7669	175.6	0.418
74.92	0.7669	175.7	0.409
75.	0.7669	175.8	0.409
75.08	0.7669	175.8	0.409
75.17	0.7669	175.9	0.418
75.25	0.7669	176.	0.409
75.33	0.7669	176.1	0.409
75.42	0.7579	176.2	0.409
75.5	0.7549	176.3	0.409
75.58	0.7579	176.3	0.409
75.67	0.7669	176.4	0.409
75.75	0.7669	176.5	0.409
75.83	0.7669	176.6	0.409
75.92	0.7549	176.7	0.409
76.	0.7489	176.8	0.418
76.08	0.7579	176.8	0.409
76.17	0.7579	176.9	0.409
76.25	0.7549	177.	0.409
76.33	0.7579	177.1	0.409
76.42	0.7669	177.2	0.409
76.5	0.7579	177.3	0.409
76.58	0.7669	177.3	0.409
76.67	0.7579	177.4	0.409
76.75	0.7669	177.5	0.409
76.83	0.7669	177.6	0.409
76.92	0.7669	177.7	0.409
77.	0.7579	177.8	0.409
77.08	0.7579	177.8	0.4
77.17	0.7669	177.9	0.409
77.25	0.7669	178.	0.409
77.33	0.7579	178.1	0.4
77.42	0.7579	178.2	0.409
77.5	0.7669	178.3	0.409
77.58	0.7669	178.3	0.409
77.67	0.7549	178.4	0.418
77.75	0.7579	178.5	0.409
77.83	0.7579	178.6	0.409
77.92	0.7579	178.7	0.418
78.	0.7579	178.8	0.409
78.08	0.7579	178.8	0.409
78.17	0.7579	178.9	0.418
78.25	0.7579	179.	0.409
78.33	0.7579	179.1	0.409
78.42	0.7549	179.2	0.409
78.5	0.7549	179.3	0.409
78.58	0.7458	179.3	0.409
78.67	0.7489	179.4	0.409
78.75	0.7549	179.5	0.409
78.83	0.7398	179.6	0.409
78.92	0.7458	179.7	0.409
79.	0.7489	179.8	0.409
79.08	0.7458	179.8	0.409
79.17	0.7489	179.9	0.409
79.25	0.7579	180.	0.409
79.33	0.7458	180.1	0.409

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
79.42	0.7489	180.2	0.409
79.5	0.7489	180.3	0.409
79.58	0.7489	180.3	0.409
79.67	0.7489	180.4	0.409
79.75	0.7458	180.5	0.409
79.83	0.7398	180.6	0.409
79.92	0.7458	180.7	0.409
80.	0.7489	180.8	0.409
80.08	0.7368	180.8	0.409
80.17	0.7398	180.9	0.4
80.25	0.7489	181.	0.4
80.33	0.7489	181.1	0.4
80.42	0.7398	181.2	0.4
80.5	0.7368	181.3	0.409
80.58	0.7489	181.3	0.4
80.67	0.7398	181.4	0.4
80.75	0.7368	181.5	0.4
80.83	0.7398	181.6	0.4
80.92	0.7489	181.7	0.4
81.	0.7398	181.8	0.391
81.08	0.7489	181.8	0.391
81.17	0.7398	181.9	0.4
81.25	0.7398	182.	0.4
81.33	0.7458	182.1	0.4
81.42	0.7398	182.2	0.4
81.5	0.7398	182.3	0.4
81.58	0.7489	182.3	0.4
81.67	0.7368	182.4	0.4
81.75	0.7489	182.5	0.409
81.83	0.7398	182.6	0.4
81.92	0.7398	182.7	0.403
82.	0.7489	182.8	0.4
82.08	0.7398	182.8	0.4
82.17	0.7368	182.9	0.4
82.25	0.7398	183.	0.4
82.33	0.7368	183.1	0.4
82.42	0.7308	183.2	0.4
82.5	0.7368	183.3	0.391
82.58	0.7308	183.3	0.4
82.67	0.7278	183.4	0.4
82.75	0.7398	183.5	0.391
82.83	0.7368	183.6	0.403
82.92	0.7308	183.7	0.403
83.	0.7398	183.8	0.4
83.08	0.7308	183.8	0.4
83.17	0.7278	183.9	0.4
83.25	0.7308	184.	0.4
83.33	0.7278	184.1	0.391
83.42	0.7278	184.2	0.4
83.5	0.7308	184.3	0.391
83.58	0.7308	184.3	0.4
83.67	0.7278	184.4	0.4
83.75	0.7278	184.5	0.403
83.83	0.7278	184.6	0.4
83.92	0.7308	184.7	0.4
84.	0.7308	184.8	0.4
84.08	0.7278	184.8	0.4
84.17	0.7278	184.9	0.391
84.25	0.7278	185.	0.391
84.33	0.7278	185.1	0.391
84.42	0.7188	185.2	0.391
84.5	0.7278	185.3	0.391
84.58	0.7248	185.3	0.391
84.67	0.7338	185.4	0.4
84.75	0.7248	185.5	0.4
84.83	0.7188	185.6	0.4

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
84.92	0.7188	185.7	0.4
85.	0.7278	185.8	0.391
85.08	0.7338	185.8	0.391
85.17	0.7248	185.9	0.4
85.25	0.7248	186.	0.4
85.33	0.7248	186.1	0.4
85.42	0.7158	186.2	0.4
85.5	0.7158	186.3	0.4
85.58	0.7248	186.3	0.4
85.67	0.7188	186.4	0.391
85.75	0.7098	186.5	0.391
85.83	0.7098	186.6	0.391
85.92	0.7248	186.7	0.4
86.	0.7098	186.8	0.391
86.08	0.7158	186.8	0.4
86.17	0.7248	186.9	0.4
86.25	0.7158	187.	0.391
86.33	0.7158	187.1	0.391
86.42	0.7158	187.2	0.394
86.5	0.7158	187.3	0.391
86.58	0.7248	187.3	0.4
86.67	0.7158	187.4	0.394
86.75	0.7098	187.5	0.391
86.83	0.7158	187.6	0.391
86.92	0.7158	187.7	0.391
87.	0.7158	187.8	0.391
87.08	0.7098	187.8	0.391
87.17	0.7098	187.9	0.391
87.25	0.7158	188.	0.382
87.33	0.7158	188.1	0.391
87.42	0.7158	188.2	0.391
87.5	0.7098	188.3	0.391
87.58	0.7098	188.3	0.382
87.67	0.7158	188.4	0.382
87.75	0.7158	188.5	0.391
87.83	0.7158	188.6	0.382
87.92	0.7158	188.7	0.391
88.	0.7158	188.8	0.382
88.08	0.7158	188.8	0.382
88.17	0.7158	188.9	0.391
88.25	0.7098	189.	0.382
88.33	0.7158	189.1	0.382
88.42	0.7158	189.2	0.394
88.5	0.7098	189.3	0.391
88.58	0.7158	189.3	0.382
88.67	0.7158	189.4	0.382
88.75	0.7098	189.5	0.394
88.83	0.7098	189.6	0.382
88.92	0.7158	189.7	0.382
89.	0.7158	189.8	0.382
89.08	0.7098	189.8	0.385
89.17	0.7098	189.9	0.382
89.25	0.7098	190.	0.382
89.33	0.7158	190.1	0.385
89.42	0.7098	190.2	0.3729
89.5	0.7098	190.3	0.382
89.58	0.7098	190.3	0.382
89.67	0.7098	190.4	0.382
89.75	0.7098	190.5	0.3759
89.83	0.7098	190.6	0.382
89.92	0.7098	190.7	0.3729
90.	0.7098	190.8	0.3729
90.08	0.7098	190.8	0.3729
90.17	0.7098	190.9	0.3729
90.25	0.7098	191.	0.382
90.33	0.7007	191.1	0.382

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
90.42	0.7098	191.2	0.3729
90.5	0.7098	191.3	0.382
90.58	0.7098	191.3	0.382
90.67	0.7158	191.4	0.382
90.75	0.7158	191.5	0.382
90.83	0.7158	191.6	0.391
90.92	0.7098	191.7	0.382
91.	0.7098	191.8	0.391
91.08	0.7098	191.8	0.382
91.17	0.7098	191.9	0.382
91.25	0.7098	192.	0.382
91.33	0.7098	192.1	0.3729
91.42	0.7098	192.2	0.3729
91.5	0.7098	192.3	0.3729
91.58	0.7098	192.3	0.3729
91.67	0.7098	192.4	0.3729
91.75	0.7098	192.5	0.3699
91.83	0.7007	192.6	0.3669
91.92	0.7007	192.7	0.3729
92.	0.7098	192.8	0.3729
92.08	0.7098	192.8	0.3729
92.17	0.7007	192.9	0.3729
92.25	0.7007	193.	0.3729
92.33	0.7007	193.1	0.3729
92.42	0.7098	193.2	0.3729
92.5	0.7007	193.3	0.3729
92.58	0.7098	193.3	0.3729
92.67	0.7007	193.4	0.3729
92.75	0.7007	193.5	0.3729
92.83	0.7098	193.6	0.3729
92.92	0.7007	193.7	0.3729
93.	0.7098	193.8	0.3729
93.08	0.7007	193.8	0.3729
93.17	0.7007	193.9	0.3669
93.25	0.7098	194.	0.3699
93.33	0.7007	194.1	0.3669
93.42	0.7007	194.2	0.3669
93.5	0.7007	194.3	0.3669
93.58	0.7098	194.3	0.3669
93.67	0.7007	194.4	0.3669
93.75	0.7007	194.5	0.3669
93.83	0.7007	194.6	0.3729
93.92	0.6917	194.7	0.3729
94.	0.6917	194.8	0.3669
94.08	0.6917	194.8	0.3669
94.17	0.6917	194.9	0.3669
94.25	0.6917	195.	0.3669
94.33	0.6917	195.1	0.3579
94.42	0.7007	195.2	0.3669
94.5	0.6917	195.3	0.3609
94.58	0.6917	195.3	0.3699
94.67	0.6917	195.4	0.3579
94.75	0.6917	195.5	0.3669
94.83	0.6917	195.6	0.3579
94.92	0.6917	195.7	0.3669
95.	0.6917	195.8	0.3669
95.08	0.6827	195.8	0.3579
95.17	0.6827	195.9	0.3579
95.25	0.6917	196.	0.3669
95.33	0.6917	196.1	0.3669
95.42	0.6767	196.2	0.3669
95.5	0.6767	196.3	0.3669
95.58	0.6857	196.3	0.3669
95.67	0.6767	196.4	0.3669
95.75	0.6767	196.5	0.3579
95.83	0.6767	196.6	0.3669

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
95.92	0.6857	196.7	0.3669
96.	0.6767	196.8	0.3669
96.08	0.6767	196.8	0.3669
96.17	0.6767	196.9	0.3579
96.25	0.6857	197.	0.3579
96.33	0.6767	197.1	0.3579
96.42	0.6767	197.2	0.3669
96.5	0.6857	197.3	0.3669
96.58	0.6767	197.3	0.3669
96.67	0.6857	197.4	0.3579
96.75	0.6767	197.5	0.3669
96.83	0.6767	197.6	0.3669
96.92	0.6767	197.7	0.3669
97.	0.6767	197.8	0.3669
97.08	0.6767	197.8	0.3669
97.17	0.6767	197.9	0.3579
97.25	0.6857	198.	0.3669
97.33	0.6767	198.1	0.3579
97.42	0.6767	198.2	0.3579
97.5	0.6767	198.3	0.3579
97.58	0.6767	198.3	0.3579
97.67	0.6767	198.4	0.3609
97.75	0.6767	198.5	0.3579
97.83	0.6767	198.6	0.3579
97.92	0.6767	198.7	0.3579
98.	0.6857	198.8	0.3579
98.08	0.6857	198.8	0.3579
98.17	0.6767	198.9	0.3579
98.25	0.6857	199.	0.3579
98.33	0.6767	199.1	0.3579
98.42	0.6767	199.2	0.3579
98.5	0.6857	199.3	0.3579
98.58	0.6767	199.3	0.3579
98.67	0.6767	199.4	0.3579
98.75	0.6767	199.5	0.3699
98.83	0.6767	199.6	0.3579
98.92	0.6767	199.7	0.3579
99.	0.6767	199.8	0.3579
99.08	0.6767	199.8	0.3579
99.17	0.6767	199.9	0.3579
99.25	0.6767	200.	0.3579
99.33	0.6767	200.1	0.3579
99.42	0.6767	200.2	0.3579
99.5	0.6767	200.3	0.3579
99.58	0.6676	200.3	0.3579
99.67	0.6676	200.4	0.3579
99.75	0.6676	200.5	0.3669
99.83	0.6676	200.6	0.3519
99.92	0.6676	200.7	0.3579
100.	0.6676	200.8	0.3489
100.1	0.6676	200.8	0.3489
100.2	0.6586	200.9	0.3489
100.3	0.6586	201.	0.3489
100.3	0.6586	201.1	0.3489
100.4	0.6676	201.2	0.3549
100.5	0.6676	201.3	0.3579
100.6	0.6586	201.3	0.3549
100.7	0.6586		

SOLUTION

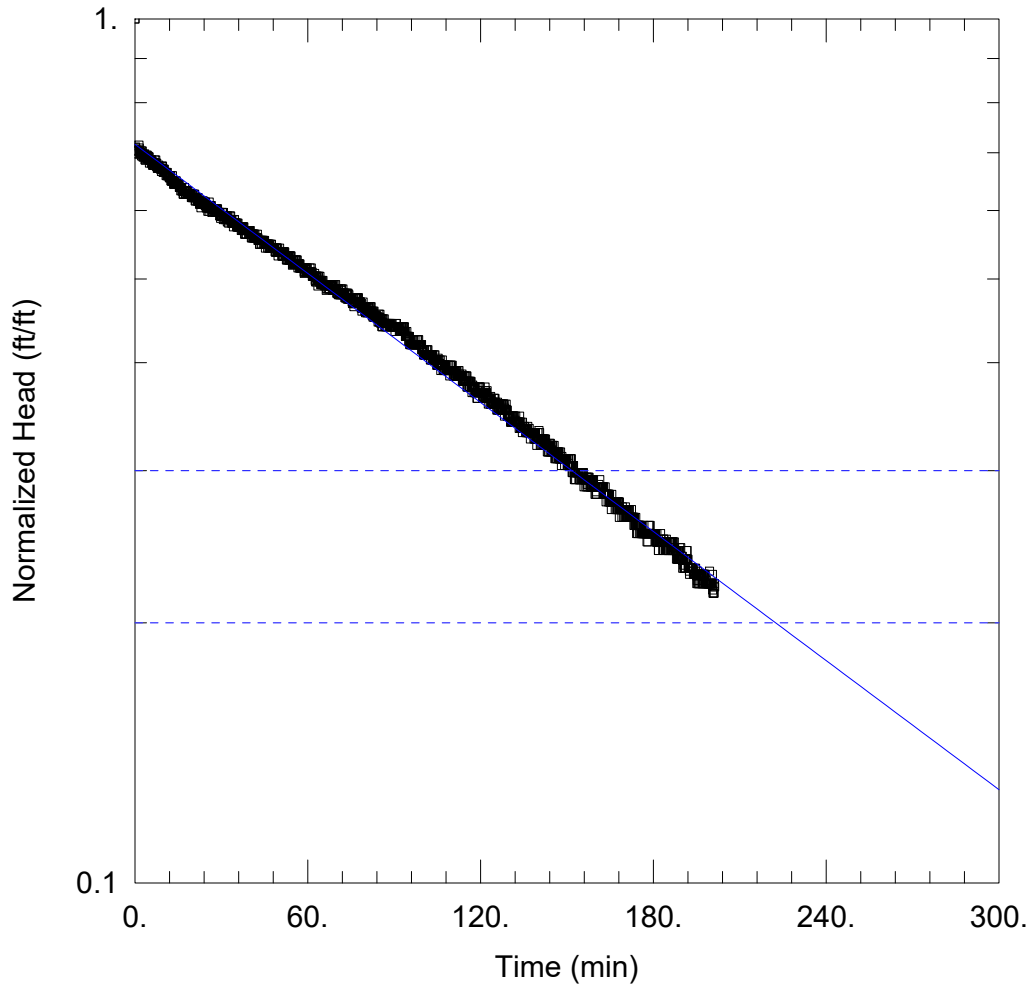
Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $\ln(R_e/r_w)$: 2.816

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	5.561E-6	ft/min
y0	1.154	ft

K = 2.825E-6 cm/sec

T = K*b = 6.484E-5 ft²/min (0.001004 sq. cm/sec)



MW-14 FALLING HEAD TEST

Data Set: N:\...\MW-14 Falling Head Test.aqt

Date: 10/31/24

Time: 10:22:48

PROJECT INFORMATION

Company: GHD Services Inc

Client: Viking Pump/IDEX

Project: 056934

Location: Cedar Falls, Iowa

Test Well: MW-14

Test Date: October 2024

AQUIFER DATA

Saturated Thickness: 11.66 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-14)

Initial Displacement: 1.612 ft

Static Water Column Height: 11.66 ft

Total Well Penetration Depth: 15.34 ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Well Radius: 0.34 ft

SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 5.561E-6 ft/min

y0 = 1.154 ft

Data Set: N:\US\St Paul\Projects\563\056934\Workshare\Aquifer Testing\2024-04 Aquifer testing\AQT Files\MW-14
 Title: MW-14 Rising Head Test
 Date: 10/31/24
 Time: 10:24:49

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: October 2024
 Test Well: MW-14

AQUIFER DATA

Saturated Thickness: 11.66 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-14

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 1.242 ft
 Static Water Column Height: 11.66 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.34 ft
 Well Skin Radius: 0.34 ft
 Screen Length: 10. ft
 Total Well Penetration Depth: 15.34 ft

No. of Observations: 1983

Time (min)	Observation Data		Displacement (ft)
	Displacement (ft)	Time (min)	
0.	1.242	82.67	1.053
0.08333	1.173	82.75	1.053
0.1667	1.173	82.83	1.044
0.25	1.176	82.92	1.044
0.3333	1.176	83.	1.044
0.4167	1.176	83.08	1.044
0.5	1.167	83.17	1.053
0.5833	1.164	83.25	1.044
0.6667	1.173	83.33	1.044
0.75	1.173	83.42	1.044
0.8333	1.164	83.5	1.044
0.9167	1.164	83.58	1.044
1.	1.164	83.67	1.053
1.083	1.164	83.75	1.053
1.167	1.164	83.83	1.044
1.25	1.164	83.92	1.053
1.333	1.155	84.	1.053
1.417	1.164	84.08	1.053
1.5	1.164	84.17	1.053
1.583	1.164	84.25	1.053
1.667	1.164	84.33	1.044
1.75	1.164	84.42	1.044
1.833	1.164	84.5	1.044
1.917	1.164	84.58	1.044
2.	1.155	84.67	1.053
2.083	1.155	84.75	1.053
2.167	1.155	84.83	1.053
2.25	1.155	84.92	1.044
2.333	1.155	85.	1.044

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
2.417	1.164	85.08	1.044
2.5	1.155	85.17	1.044
2.583	1.155	85.25	1.044
2.667	1.146	85.33	1.044
2.75	1.155	85.42	1.053
2.833	1.164	85.5	1.044
2.917	1.155	85.58	1.044
3.	1.146	85.67	1.035
3.083	1.155	85.75	1.044
3.167	1.155	85.83	1.044
3.25	1.146	85.92	1.044
3.333	1.155	86.	1.035
3.417	1.146	86.08	1.044
3.5	1.146	86.17	1.035
3.583	1.155	86.25	1.044
3.667	1.146	86.33	1.044
3.75	1.146	86.42	1.044
3.833	1.155	86.5	1.044
3.917	1.146	86.58	1.053
4.	1.146	86.67	1.044
4.083	1.146	86.75	1.044
4.167	1.146	86.83	1.053
4.25	1.155	86.92	1.053
4.333	1.155	87.	1.044
4.417	1.146	87.08	1.044
4.5	1.155	87.17	1.044
4.583	1.146	87.25	1.044
4.667	1.146	87.33	1.044
4.75	1.155	87.42	1.044
4.833	1.146	87.5	1.044
4.917	1.146	87.58	1.035
5.	1.146	87.67	1.035
5.083	1.146	87.75	1.035
5.167	1.146	87.83	1.044
5.25	1.146	87.92	1.053
5.333	1.155	88.	1.044
5.417	1.146	88.08	1.044
5.5	1.137	88.17	1.044
5.583	1.146	88.25	1.035
5.667	1.137	88.33	1.035
5.75	1.146	88.42	1.044
5.833	1.137	88.5	1.044
5.917	1.137	88.58	1.044
6.	1.146	88.67	1.044
6.083	1.137	88.75	1.044
6.167	1.146	88.83	1.044
6.25	1.137	88.92	1.053
6.333	1.137	89.	1.053
6.417	1.137	89.08	1.053
6.5	1.137	89.17	1.044
6.583	1.137	89.25	1.044
6.667	1.146	89.33	1.053
6.75	1.137	89.42	1.053
6.833	1.137	89.5	1.053
6.917	1.137	89.58	1.053
7.	1.137	89.67	1.044
7.083	1.146	89.75	1.044
7.167	1.137	89.83	1.044
7.25	1.137	89.92	1.035
7.333	1.128	90.	1.035
7.417	1.137	90.08	1.044
7.5	1.137	90.17	1.044
7.583	1.143	90.25	1.044
7.667	1.143	90.33	1.035
7.75	1.137	90.42	1.044
7.833	1.146	90.5	1.044

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
7.917	1.137	90.58	1.035
8.	1.137	90.67	1.044
8.083	1.137	90.75	1.035
8.167	1.128	90.83	1.035
8.25	1.128	90.92	1.035
8.333	1.128	91.	1.035
8.417	1.137	91.08	1.044
8.5	1.128	91.17	1.044
8.583	1.137	91.25	1.044
8.667	1.137	91.33	1.035
8.75	1.128	91.42	1.044
8.833	1.128	91.5	1.044
8.917	1.137	91.58	1.044
9.	1.128	91.67	1.035
9.083	1.137	91.75	1.035
9.167	1.128	91.83	1.044
9.25	1.137	91.92	1.044
9.333	1.128	92.	1.044
9.417	1.128	92.08	1.044
9.5	1.128	92.17	1.035
9.583	1.137	92.25	1.044
9.667	1.128	92.33	1.044
9.75	1.137	92.42	1.035
9.833	1.128	92.5	1.035
9.917	1.137	92.58	1.044
10.	1.137	92.67	1.035
10.08	1.137	92.75	1.044
10.17	1.128	92.83	1.044
10.25	1.137	92.92	1.044
10.33	1.128	93.	1.044
10.42	1.137	93.08	1.035
10.5	1.137	93.17	1.044
10.58	1.137	93.25	1.044
10.67	1.128	93.33	1.044
10.75	1.137	93.42	1.044
10.83	1.137	93.5	1.035
10.92	1.128	93.58	1.035
11.	1.143	93.67	1.035
11.08	1.128	93.75	1.035
11.17	1.128	93.83	1.035
11.25	1.134	93.92	1.035
11.33	1.128	94.	1.035
11.42	1.134	94.08	1.044
11.5	1.119	94.17	1.035
11.58	1.125	94.25	1.035
11.67	1.128	94.33	1.035
11.75	1.134	94.42	1.035
11.83	1.119	94.5	1.035
11.92	1.119	94.58	1.035
12.	1.134	94.67	1.035
12.08	1.125	94.75	1.035
12.17	1.134	94.83	1.035
12.25	1.125	94.92	1.035
12.33	1.125	95.	1.035
12.42	1.125	95.08	1.035
12.5	1.134	95.17	1.026
12.58	1.125	95.25	1.035
12.67	1.125	95.33	1.035
12.75	1.125	95.42	1.035
12.83	1.128	95.5	1.044
12.92	1.125	95.58	1.035
13.	1.134	95.67	1.044
13.08	1.134	95.75	1.035
13.17	1.134	95.83	1.035
13.25	1.134	95.92	1.035
13.33	1.134	96.	1.035

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
13.42	1.134	96.08	1.035
13.5	1.134	96.17	1.035
13.58	1.134	96.25	1.035
13.67	1.134	96.33	1.035
13.75	1.128	96.42	1.035
13.83	1.143	96.5	1.044
13.92	1.128	96.58	1.035
14.	1.134	96.67	1.044
14.08	1.125	96.75	1.035
14.17	1.134	96.83	1.035
14.25	1.128	96.92	1.035
14.33	1.134	97.	1.035
14.42	1.134	97.08	1.035
14.5	1.134	97.17	1.035
14.58	1.143	97.25	1.035
14.67	1.134	97.33	1.035
14.75	1.134	97.42	1.026
14.83	1.128	97.5	1.035
14.92	1.125	97.58	1.026
15.	1.125	97.67	1.035
15.08	1.128	97.75	1.035
15.17	1.134	97.83	1.035
15.25	1.125	97.92	1.035
15.33	1.125	98.	1.035
15.42	1.134	98.08	1.035
15.5	1.143	98.17	1.035
15.58	1.143	98.25	1.035
15.67	1.134	98.33	1.035
15.75	1.134	98.42	1.035
15.83	1.134	98.5	1.035
15.92	1.134	98.58	1.035
16.	1.134	98.67	1.035
16.08	1.134	98.75	1.035
16.17	1.134	98.83	1.035
16.25	1.134	98.92	1.035
16.33	1.134	99.	1.035
16.42	1.125	99.08	1.035
16.5	1.128	99.17	1.035
16.58	1.134	99.25	1.035
16.67	1.134	99.33	1.035
16.75	1.134	99.42	1.035
16.83	1.134	99.5	1.044
16.92	1.125	99.58	1.035
17.	1.125	99.67	1.035
17.08	1.125	99.75	1.035
17.17	1.134	99.83	1.026
17.25	1.125	99.92	1.035
17.33	1.125	100.	1.035
17.42	1.125	100.1	1.035
17.5	1.134	100.2	1.035
17.58	1.125	100.3	1.044
17.67	1.125	100.3	1.044
17.75	1.125	100.4	1.035
17.83	1.125	100.5	1.035
17.92	1.125	100.6	1.035
18.	1.125	100.7	1.035
18.08	1.125	100.8	1.044
18.17	1.125	100.8	1.035
18.25	1.116	100.9	1.035
18.33	1.125	101.	1.035
18.42	1.116	101.1	1.044
18.5	1.125	101.2	1.035
18.58	1.125	101.3	1.035
18.67	1.125	101.3	1.035
18.75	1.125	101.4	1.035
18.83	1.125	101.5	1.035

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
18.92	1.125	101.6	1.035
19.	1.125	101.7	1.035
19.08	1.125	101.8	1.035
19.17	1.116	101.8	1.044
19.25	1.125	101.9	1.044
19.33	1.125	102.	1.035
19.42	1.125	102.1	1.035
19.5	1.125	102.2	1.035
19.58	1.125	102.3	1.035
19.67	1.125	102.3	1.035
19.75	1.125	102.4	1.035
19.83	1.125	102.5	1.044
19.92	1.116	102.6	1.035
20.	1.116	102.7	1.035
20.08	1.125	102.8	1.035
20.17	1.116	102.8	1.026
20.25	1.125	102.9	1.035
20.33	1.125	103.	1.035
20.42	1.125	103.1	1.035
20.5	1.125	103.2	1.035
20.58	1.125	103.3	1.026
20.67	1.11	103.3	1.026
20.75	1.125	103.4	1.026
20.83	1.116	103.5	1.026
20.92	1.125	103.6	1.026
21.	1.125	103.7	1.026
21.08	1.116	103.8	1.035
21.17	1.125	103.8	1.035
21.25	1.116	103.9	1.026
21.33	1.116	104.	1.035
21.42	1.125	104.1	1.035
21.5	1.125	104.2	1.026
21.58	1.125	104.3	1.026
21.67	1.125	104.3	1.026
21.75	1.125	104.4	1.026
21.83	1.116	104.5	1.026
21.92	1.125	104.6	1.035
22.	1.125	104.7	1.035
22.08	1.125	104.8	1.035
22.17	1.125	104.8	1.035
22.25	1.125	104.9	1.035
22.33	1.125	105.	1.026
22.42	1.125	105.1	1.035
22.5	1.125	105.2	1.035
22.58	1.125	105.3	1.035
22.67	1.125	105.3	1.035
22.75	1.125	105.4	1.035
22.83	1.125	105.5	1.026
22.92	1.125	105.6	1.035
23.	1.116	105.7	1.035
23.08	1.116	105.8	1.035
23.17	1.116	105.8	1.035
23.25	1.116	105.9	1.035
23.33	1.125	106.	1.035
23.42	1.125	106.1	1.035
23.5	1.116	106.2	1.035
23.58	1.116	106.3	1.035
23.67	1.116	106.3	1.035
23.75	1.116	106.4	1.035
23.83	1.125	106.5	1.035
23.92	1.125	106.6	1.035
24.	1.125	106.7	1.026
24.08	1.116	106.8	1.035
24.17	1.125	106.8	1.044
24.25	1.125	106.9	1.035
24.33	1.125	107.	1.035

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
24.42	1.116	107.1	1.044
24.5	1.116	107.2	1.035
24.58	1.125	107.3	1.035
24.67	1.125	107.3	1.026
24.75	1.125	107.4	1.035
24.83	1.116	107.5	1.026
24.92	1.116	107.6	1.035
25.	1.116	107.7	1.035
25.08	1.125	107.8	1.035
25.17	1.125	107.8	1.035
25.25	1.116	107.9	1.035
25.33	1.116	108.	1.035
25.42	1.116	108.1	1.035
25.5	1.116	108.2	1.035
25.58	1.116	108.3	1.035
25.67	1.125	108.3	1.035
25.75	1.116	108.4	1.035
25.83	1.116	108.5	1.035
25.92	1.116	108.6	1.026
26.	1.116	108.7	1.026
26.08	1.116	108.8	1.026
26.17	1.116	108.8	1.026
26.25	1.116	108.9	1.026
26.33	1.116	109.	1.026
26.42	1.116	109.1	1.026
26.5	1.125	109.2	1.026
26.58	1.107	109.3	1.026
26.67	1.107	109.3	1.026
26.75	1.116	109.4	1.026
26.83	1.116	109.5	1.026
26.92	1.116	109.6	1.026
27.	1.107	109.7	1.026
27.08	1.116	109.8	1.026
27.17	1.107	109.8	1.035
27.25	1.107	109.9	1.026
27.33	1.107	110.	1.026
27.42	1.107	110.1	1.035
27.5	1.107	110.2	1.035
27.58	1.107	110.3	1.026
27.67	1.107	110.3	1.035
27.75	1.107	110.4	1.026
27.83	1.107	110.5	1.026
27.92	1.107	110.6	1.026
28.	1.107	110.7	1.026
28.08	1.098	110.8	1.026
28.17	1.107	110.8	1.026
28.25	1.107	110.9	1.026
28.33	1.107	111.	1.017
28.42	1.107	111.1	1.026
28.5	1.107	111.2	1.026
28.58	1.116	111.3	1.026
28.67	1.107	111.3	1.026
28.75	1.116	111.4	1.026
28.83	1.116	111.5	1.026
28.92	1.107	111.6	1.026
29.	1.107	111.7	1.026
29.08	1.116	111.8	1.026
29.17	1.107	111.8	1.026
29.25	1.107	111.9	1.026
29.33	1.107	112.	1.017
29.42	1.107	112.1	1.026
29.5	1.107	112.2	1.026
29.58	1.116	112.3	1.026
29.67	1.107	112.3	1.026
29.75	1.107	112.4	1.026
29.83	1.107	112.5	1.026

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
29.92	1.107	112.6	1.026
30.	1.107	112.7	1.035
30.08	1.107	112.8	1.035
30.17	1.107	112.8	1.026
30.25	1.107	112.9	1.026
30.33	1.107	113.	1.026
30.42	1.107	113.1	1.026
30.5	1.107	113.2	1.026
30.58	1.107	113.3	1.026
30.67	1.107	113.3	1.026
30.75	1.107	113.4	1.026
30.83	1.098	113.5	1.035
30.92	1.107	113.6	1.026
31.	1.107	113.7	1.026
31.08	1.107	113.8	1.035
31.17	1.107	113.8	1.026
31.25	1.107	113.9	1.026
31.33	1.107	114.	1.026
31.42	1.107	114.1	1.026
31.5	1.116	114.2	1.026
31.58	1.107	114.3	1.026
31.67	1.107	114.3	1.026
31.75	1.107	114.4	1.035
31.83	1.107	114.5	1.026
31.92	1.107	114.6	1.017
32.	1.098	114.7	1.026
32.08	1.107	114.8	1.026
32.17	1.107	114.8	1.026
32.25	1.107	114.9	1.026
32.33	1.116	115.	1.026
32.42	1.116	115.1	1.026
32.5	1.116	115.2	1.017
32.58	1.116	115.3	1.026
32.67	1.107	115.3	1.026
32.75	1.107	115.4	1.026
32.83	1.107	115.5	1.026
32.92	1.098	115.6	1.017
33.	1.107	115.7	1.026
33.08	1.098	115.8	1.017
33.17	1.107	115.8	1.026
33.25	1.098	115.9	1.026
33.33	1.107	116.	1.017
33.42	1.107	116.1	1.026
33.5	1.107	116.2	1.026
33.58	1.107	116.3	1.026
33.67	1.107	116.3	1.026
33.75	1.098	116.4	1.035
33.83	1.107	116.5	1.026
33.92	1.098	116.6	1.017
34.	1.107	116.7	1.017
34.08	1.107	116.8	1.017
34.17	1.107	116.8	1.017
34.25	1.107	116.9	1.017
34.33	1.107	117.	1.017
34.42	1.107	117.1	1.017
34.5	1.107	117.2	1.026
34.58	1.107	117.3	1.017
34.67	1.107	117.3	1.017
34.75	1.107	117.4	1.017
34.83	1.107	117.5	1.017
34.92	1.107	117.6	1.026
35.	1.107	117.7	1.017
35.08	1.107	117.8	1.026
35.17	1.107	117.8	1.017
35.25	1.107	117.9	1.026
35.33	1.107	118.	1.026

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
35.42	1.098	118.1	1.026
35.5	1.098	118.2	1.017
35.58	1.107	118.3	1.017
35.67	1.098	118.3	1.026
35.75	1.098	118.4	1.026
35.83	1.098	118.5	1.017
35.92	1.098	118.6	1.026
36.	1.098	118.7	1.026
36.08	1.098	118.8	1.026
36.17	1.098	118.8	1.026
36.25	1.098	118.9	1.026
36.33	1.098	119.	1.026
36.42	1.098	119.1	1.017
36.5	1.098	119.2	1.017
36.58	1.107	119.3	1.035
36.67	1.098	119.3	1.026
36.75	1.107	119.4	1.017
36.83	1.098	119.5	1.017
36.92	1.098	119.6	1.017
37.	1.098	119.7	1.026
37.08	1.098	119.8	1.026
37.17	1.107	119.8	1.017
37.25	1.098	119.9	1.017
37.33	1.107	120.	1.017
37.42	1.098	120.1	1.026
37.5	1.107	120.2	1.026
37.58	1.107	120.3	1.017
37.67	1.107	120.3	1.026
37.75	1.107	120.4	1.026
37.83	1.107	120.5	1.026
37.92	1.098	120.6	1.026
38.	1.098	120.7	1.026
38.08	1.098	120.8	1.026
38.17	1.098	120.8	1.026
38.25	1.098	120.9	1.026
38.33	1.098	121.	1.026
38.42	1.098	121.1	1.026
38.5	1.098	121.2	1.026
38.58	1.098	121.3	1.026
38.67	1.098	121.3	1.026
38.75	1.098	121.4	1.026
38.83	1.098	121.5	1.026
38.92	1.098	121.6	1.017
39.	1.107	121.7	1.017
39.08	1.098	121.8	1.017
39.17	1.089	121.8	1.017
39.25	1.089	121.9	1.017
39.33	1.098	122.	1.026
39.42	1.089	122.1	1.017
39.5	1.089	122.2	1.017
39.58	1.089	122.3	1.026
39.67	1.089	122.3	1.017
39.75	1.098	122.4	1.026
39.83	1.098	122.5	1.026
39.92	1.098	122.6	1.017
40.	1.089	122.7	1.026
40.08	1.098	122.8	1.017
40.17	1.089	122.8	1.026
40.25	1.098	122.9	1.026
40.33	1.098	123.	1.017
40.42	1.098	123.1	1.017
40.5	1.089	123.2	1.017
40.58	1.089	123.3	1.026
40.67	1.089	123.3	1.017
40.75	1.089	123.4	1.017
40.83	1.089	123.5	1.017

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
40.92	1.089	123.6	1.017
41.	1.089	123.7	1.017
41.08	1.089	123.8	1.026
41.17	1.089	123.8	1.017
41.25	1.089	123.9	1.026
41.33	1.089	124.	1.017
41.42	1.089	124.1	1.026
41.5	1.08	124.2	1.026
41.58	1.089	124.3	1.026
41.67	1.089	124.3	1.017
41.75	1.089	124.4	1.026
41.83	1.089	124.5	1.026
41.92	1.08	124.6	1.026
42.	1.089	124.7	1.017
42.08	1.089	124.8	1.026
42.17	1.089	124.8	1.017
42.25	1.089	124.9	1.026
42.33	1.089	125.	1.017
42.42	1.089	125.1	1.017
42.5	1.08	125.2	1.017
42.58	1.08	125.3	1.017
42.67	1.089	125.3	1.017
42.75	1.08	125.4	1.026
42.83	1.08	125.5	1.017
42.92	1.08	125.6	1.017
43.	1.089	125.7	1.017
43.08	1.089	125.8	1.026
43.17	1.089	125.8	1.017
43.25	1.089	125.9	1.026
43.33	1.08	126.	1.026
43.42	1.08	126.1	1.026
43.5	1.08	126.2	1.017
43.58	1.08	126.3	1.017
43.67	1.08	126.3	1.026
43.75	1.089	126.4	1.017
43.83	1.08	126.5	1.017
43.92	1.089	126.6	1.017
44.	1.089	126.7	1.017
44.08	1.08	126.8	1.017
44.17	1.089	126.8	1.007
44.25	1.089	126.9	1.017
44.33	1.089	127.	1.007
44.42	1.08	127.1	1.017
44.5	1.089	127.2	1.017
44.58	1.089	127.3	1.007
44.67	1.08	127.3	1.017
44.75	1.089	127.4	1.017
44.83	1.089	127.5	1.007
44.92	1.089	127.6	1.017
45.	1.089	127.7	1.017
45.08	1.08	127.8	1.017
45.17	1.089	127.8	1.017
45.25	1.08	127.9	1.017
45.33	1.089	128.	1.017
45.42	1.089	128.1	1.007
45.5	1.08	128.2	1.017
45.58	1.089	128.3	1.017
45.67	1.089	128.3	1.007
45.75	1.089	128.4	1.017
45.83	1.098	128.5	1.007
45.92	1.089	128.6	1.017
46.	1.089	128.7	1.017
46.08	1.08	128.8	1.026
46.17	1.08	128.8	1.017
46.25	1.089	128.9	1.026
46.33	1.08	129.	1.017

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
46.42	1.089	129.1	1.017
46.5	1.08	129.2	1.017
46.58	1.089	129.3	1.017
46.67	1.089	129.3	1.026
46.75	1.089	129.4	1.017
46.83	1.089	129.5	1.007
46.92	1.089	129.6	1.017
47.	1.08	129.7	1.017
47.08	1.089	129.8	1.017
47.17	1.089	129.8	1.017
47.25	1.08	129.9	1.007
47.33	1.08	130.	1.007
47.42	1.08	130.1	1.017
47.5	1.08	130.2	1.017
47.58	1.089	130.3	1.017
47.67	1.089	130.3	1.017
47.75	1.089	130.4	1.017
47.83	1.089	130.5	1.017
47.92	1.08	130.6	1.017
48.	1.089	130.7	1.017
48.08	1.089	130.8	1.017
48.17	1.089	130.8	1.017
48.25	1.089	130.9	1.026
48.33	1.089	131.	1.007
48.42	1.08	131.1	1.017
48.5	1.08	131.2	1.017
48.58	1.08	131.3	1.017
48.67	1.089	131.3	1.017
48.75	1.089	131.4	1.026
48.83	1.089	131.5	1.017
48.92	1.071	131.6	1.017
49.	1.08	131.7	1.017
49.08	1.089	131.8	1.017
49.17	1.08	131.8	1.026
49.25	1.08	131.9	1.017
49.33	1.08	132.	1.007
49.42	1.08	132.1	1.007
49.5	1.089	132.2	1.017
49.58	1.08	132.3	1.017
49.67	1.089	132.3	1.017
49.75	1.089	132.4	1.017
49.83	1.08	132.5	1.007
49.92	1.08	132.6	1.017
50.	1.08	132.7	1.017
50.08	1.08	132.8	1.007
50.17	1.089	132.8	1.007
50.25	1.08	132.9	1.007
50.33	1.08	133.	1.007
50.42	1.071	133.1	1.017
50.5	1.08	133.2	1.007
50.58	1.089	133.3	1.017
50.67	1.08	133.3	1.017
50.75	1.08	133.4	1.007
50.83	1.089	133.5	1.007
50.92	1.08	133.6	1.007
51.	1.08	133.7	1.007
51.08	1.08	133.8	1.017
51.17	1.08	133.8	1.007
51.25	1.089	133.9	1.017
51.33	1.089	134.	1.017
51.42	1.089	134.1	1.017
51.5	1.089	134.2	1.017
51.58	1.08	134.3	1.017
51.67	1.08	134.3	1.017
51.75	1.089	134.4	1.017
51.83	1.08	134.5	1.017

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
51.92	1.08	134.6	1.007
52.	1.089	134.7	1.017
52.08	1.089	134.8	1.007
52.17	1.089	134.8	1.017
52.25	1.08	134.9	1.007
52.33	1.08	135.	1.007
52.42	1.08	135.1	1.017
52.5	1.08	135.2	1.007
52.58	1.089	135.3	1.007
52.67	1.08	135.3	1.007
52.75	1.089	135.4	1.007
52.83	1.08	135.5	1.007
52.92	1.08	135.6	1.007
53.	1.08	135.7	1.007
53.08	1.08	135.8	0.9985
53.17	1.08	135.8	1.007
53.25	1.08	135.9	1.017
53.33	1.08	136.	1.007
53.42	1.08	136.1	1.007
53.5	1.071	136.2	1.007
53.58	1.071	136.3	0.9985
53.67	1.08	136.3	0.9985
53.75	1.08	136.4	0.9985
53.83	1.08	136.5	1.007
53.92	1.08	136.6	1.007
54.	1.08	136.7	1.007
54.08	1.08	136.8	1.007
54.17	1.08	136.8	1.007
54.25	1.08	136.9	0.9985
54.33	1.08	137.	0.9985
54.42	1.08	137.1	0.9985
54.5	1.08	137.2	1.007
54.58	1.071	137.3	0.9985
54.67	1.08	137.3	0.9985
54.75	1.08	137.4	0.9985
54.83	1.071	137.5	1.007
54.92	1.071	137.6	1.007
55.	1.08	137.7	1.007
55.08	1.071	137.8	1.007
55.17	1.08	137.8	1.007
55.25	1.08	137.9	0.9985
55.33	1.071	138.	0.9985
55.42	1.08	138.1	1.007
55.5	1.08	138.2	0.9985
55.58	1.08	138.3	1.007
55.67	1.08	138.3	1.007
55.75	1.08	138.4	1.007
55.83	1.08	138.5	0.9985
55.92	1.071	138.6	1.007
56.	1.071	138.7	1.007
56.08	1.071	138.8	0.9985
56.17	1.08	138.8	1.007
56.25	1.08	138.9	1.007
56.33	1.071	139.	0.9985
56.42	1.071	139.1	0.9985
56.5	1.071	139.2	0.9985
56.58	1.071	139.3	0.9985
56.67	1.08	139.3	1.007
56.75	1.08	139.4	0.9985
56.83	1.08	139.5	1.007
56.92	1.071	139.6	0.9985
57.	1.071	139.7	1.007
57.08	1.08	139.8	1.007
57.17	1.08	139.8	0.9985
57.25	1.071	139.9	1.007
57.33	1.071	140.	1.007

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
57.42	1.071	140.1	0.9985
57.5	1.071	140.2	0.9985
57.58	1.08	140.3	0.9985
57.67	1.071	140.3	0.9985
57.75	1.08	140.4	0.9985
57.83	1.08	140.5	1.007
57.92	1.08	140.6	1.007
58.	1.08	140.7	0.9985
58.08	1.08	140.8	0.9985
58.17	1.08	140.8	0.9985
58.25	1.08	140.9	0.9985
58.33	1.071	141.	0.9895
58.42	1.08	141.1	0.9985
58.5	1.08	141.2	0.9985
58.58	1.071	141.3	0.9985
58.67	1.071	141.3	0.9985
58.75	1.08	141.4	1.007
58.83	1.08	141.5	0.9985
58.92	1.08	141.6	0.9985
59.	1.08	141.7	0.9985
59.08	1.08	141.8	0.9985
59.17	1.08	141.8	0.9985
59.25	1.071	141.9	0.9985
59.33	1.071	142.	0.9985
59.42	1.071	142.1	0.9985
59.5	1.08	142.2	1.007
59.58	1.08	142.3	0.9985
59.67	1.071	142.3	0.9985
59.75	1.08	142.4	0.9985
59.83	1.08	142.5	0.9985
59.92	1.08	142.6	1.007
60.	1.071	142.7	1.007
60.08	1.08	142.8	0.9985
60.17	1.08	142.8	0.9985
60.25	1.071	142.9	1.007
60.33	1.08	143.	0.9985
60.42	1.071	143.1	0.9985
60.5	1.071	143.2	1.007
60.58	1.071	143.3	0.9985
60.67	1.08	143.3	0.9985
60.75	1.071	143.4	1.007
60.83	1.08	143.5	0.9985
60.92	1.071	143.6	0.9985
61.	1.071	143.7	0.9985
61.08	1.071	143.8	0.9985
61.17	1.071	143.8	0.9985
61.25	1.08	143.9	1.007
61.33	1.071	144.	0.9985
61.42	1.071	144.1	1.007
61.5	1.071	144.2	0.9985
61.58	1.062	144.3	0.9985
61.67	1.071	144.3	0.9985
61.75	1.071	144.4	1.007
61.83	1.071	144.5	1.007
61.92	1.08	144.6	0.9985
62.	1.08	144.7	1.007
62.08	1.08	144.8	0.9985
62.17	1.071	144.8	1.007
62.25	1.071	144.9	0.9895
62.33	1.08	145.	0.9985
62.42	1.08	145.1	0.9985
62.5	1.071	145.2	0.9985
62.58	1.071	145.3	0.9985
62.67	1.071	145.3	0.9895
62.75	1.071	145.4	0.9895
62.83	1.071	145.5	0.9985

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
62.92	1.071	145.6	1.007
63.	1.071	145.7	0.9985
63.08	1.071	145.8	0.9985
63.17	1.071	145.8	1.007
63.25	1.071	145.9	0.9985
63.33	1.071	146.	0.9985
63.42	1.062	146.1	0.9895
63.5	1.062	146.2	0.9985
63.58	1.062	146.3	0.9985
63.67	1.062	146.3	0.9985
63.75	1.062	146.4	0.9985
63.83	1.062	146.5	0.9985
63.92	1.062	146.6	0.9985
64.	1.062	146.7	0.9985
64.08	1.062	146.8	0.9985
64.17	1.071	146.8	1.007
64.25	1.071	146.9	1.007
64.33	1.062	147.	0.9985
64.42	1.062	147.1	0.9985
64.5	1.071	147.2	1.007
64.58	1.071	147.3	0.9985
64.67	1.071	147.3	1.007
64.75	1.071	147.4	1.007
64.83	1.071	147.5	0.9985
64.92	1.071	147.6	0.9985
65.	1.071	147.7	1.007
65.08	1.071	147.8	0.9985
65.17	1.071	147.8	0.9985
65.25	1.062	147.9	1.007
65.33	1.071	148.	0.9985
65.42	1.071	148.1	0.9985
65.5	1.071	148.2	0.9985
65.58	1.071	148.3	0.9985
65.67	1.071	148.3	0.9985
65.75	1.062	148.4	0.9985
65.83	1.071	148.5	0.9895
65.92	1.071	148.6	0.9985
66.	1.071	148.7	0.9985
66.08	1.071	148.8	0.9985
66.17	1.062	148.8	0.9985
66.25	1.071	148.9	0.9985
66.33	1.062	149.	0.9985
66.42	1.062	149.1	0.9985
66.5	1.071	149.2	0.9985
66.58	1.071	149.3	0.9985
66.67	1.071	149.3	0.9895
66.75	1.062	149.4	0.9985
66.83	1.062	149.5	0.9985
66.92	1.062	149.6	0.9985
67.	1.071	149.7	0.9985
67.08	1.071	149.8	0.9985
67.17	1.062	149.8	0.9985
67.25	1.071	149.9	0.9895
67.33	1.062	150.	0.9895
67.42	1.062	150.1	0.9985
67.5	1.062	150.2	0.9985
67.58	1.062	150.3	0.9985
67.67	1.062	150.3	0.9985
67.75	1.062	150.4	0.9985
67.83	1.062	150.5	0.9985
67.92	1.062	150.6	0.9985
68.	1.053	150.7	0.9985
68.08	1.062	150.8	0.9985
68.17	1.062	150.8	0.9895
68.25	1.062	150.9	0.9895
68.33	1.062	151.	0.9895

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
68.42	1.062	151.1	0.9895
68.5	1.062	151.2	0.9895
68.58	1.062	151.3	0.9895
68.67	1.053	151.3	0.9895
68.75	1.053	151.4	0.9895
68.83	1.053	151.5	0.9895
68.92	1.053	151.6	0.9895
69.	1.062	151.7	0.9895
69.08	1.062	151.8	0.9895
69.17	1.062	151.8	0.9985
69.25	1.062	151.9	0.9985
69.33	1.053	152.	0.9985
69.42	1.062	152.1	0.9985
69.5	1.053	152.2	0.9985
69.58	1.053	152.3	0.9985
69.67	1.053	152.3	0.9985
69.75	1.053	152.4	0.9985
69.83	1.053	152.5	0.9985
69.92	1.053	152.6	0.9985
70.	1.053	152.7	0.9985
70.08	1.062	152.8	0.9985
70.17	1.053	152.8	0.9985
70.25	1.062	152.9	0.9895
70.33	1.053	153.	0.9895
70.42	1.053	153.1	0.9985
70.5	1.062	153.2	0.9985
70.58	1.062	153.3	0.9985
70.67	1.062	153.3	0.9985
70.75	1.062	153.4	0.9895
70.83	1.071	153.5	0.9895
70.92	1.062	153.6	0.9834
71.	1.062	153.7	0.9834
71.08	1.062	153.8	0.9834
71.17	1.062	153.8	0.9895
71.25	1.062	153.9	0.9895
71.33	1.062	154.	0.9895
71.42	1.062	154.1	0.9834
71.5	1.062	154.2	0.9834
71.58	1.062	154.3	0.9895
71.67	1.062	154.3	0.9895
71.75	1.062	154.4	0.9895
71.83	1.053	154.5	0.9895
71.92	1.062	154.6	0.9895
72.	1.062	154.7	0.9895
72.08	1.062	154.8	0.9834
72.17	1.062	154.8	0.9895
72.25	1.062	154.9	0.9895
72.33	1.053	155.	0.9985
72.42	1.062	155.1	0.9985
72.5	1.053	155.2	0.9985
72.58	1.053	155.3	0.9895
72.67	1.062	155.3	0.9895
72.75	1.053	155.4	0.9895
72.83	1.062	155.5	0.9985
72.92	1.062	155.6	0.9895
73.	1.062	155.7	0.9895
73.08	1.053	155.8	0.9985
73.17	1.053	155.8	0.9895
73.25	1.062	155.9	0.9895
73.33	1.062	156.	0.9985
73.42	1.053	156.1	0.9985
73.5	1.062	156.2	0.9985
73.58	1.062	156.3	0.9985
73.67	1.062	156.3	0.9895
73.75	1.053	156.4	0.9895
73.83	1.053	156.5	0.9985

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
73.92	1.062	156.6	0.9985
74.	1.062	156.7	0.9985
74.08	1.062	156.8	0.9985
74.17	1.062	156.8	0.9895
74.25	1.062	156.9	0.9895
74.33	1.053	157.	0.9895
74.42	1.062	157.1	0.9985
74.5	1.053	157.2	0.9895
74.58	1.053	157.3	0.9985
74.67	1.062	157.3	0.9895
74.75	1.062	157.4	0.9985
74.83	1.062	157.5	0.9895
74.92	1.053	157.6	0.9895
75.	1.062	157.7	0.9985
75.08	1.053	157.8	0.9985
75.17	1.053	157.8	0.9985
75.25	1.053	157.9	0.9895
75.33	1.044	158.	0.9895
75.42	1.053	158.1	0.9895
75.5	1.053	158.2	0.9985
75.58	1.053	158.3	0.9985
75.67	1.053	158.3	0.9895
75.75	1.062	158.4	0.9895
75.83	1.053	158.5	0.9895
75.92	1.053	158.6	0.9834
76.	1.053	158.7	0.9895
76.08	1.053	158.8	0.9895
76.17	1.053	158.8	0.9834
76.25	1.044	158.9	0.9895
76.33	1.062	159.	0.9834
76.42	1.044	159.1	0.9895
76.5	1.053	159.2	0.9895
76.58	1.053	159.3	0.9895
76.67	1.044	159.3	0.9895
76.75	1.053	159.4	0.9834
76.83	1.053	159.5	0.9895
76.92	1.053	159.6	0.9895
77.	1.053	159.7	0.9895
77.08	1.062	159.8	0.9895
77.17	1.053	159.8	0.9895
77.25	1.053	159.9	0.9895
77.33	1.053	160.	0.9985
77.42	1.053	160.1	0.9895
77.5	1.044	160.2	0.9895
77.58	1.053	160.3	0.9895
77.67	1.044	160.3	0.9895
77.75	1.053	160.4	0.9895
77.83	1.053	160.5	0.9895
77.92	1.044	160.6	0.9895
78.	1.053	160.7	0.9895
78.08	1.053	160.8	0.9895
78.17	1.053	160.8	0.9895
78.25	1.053	160.9	0.9895
78.33	1.044	161.	0.9895
78.42	1.044	161.1	0.9895
78.5	1.053	161.2	0.9895
78.58	1.053	161.3	0.9895
78.67	1.053	161.3	0.9895
78.75	1.053	161.4	0.9895
78.83	1.053	161.5	0.9895
78.92	1.044	161.6	0.9895
79.	1.053	161.7	0.9985
79.08	1.044	161.8	0.9895
79.17	1.053	161.8	0.9985
79.25	1.044	161.9	0.9895
79.33	1.053	162.	0.9895

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
79.42	1.044	162.1	0.9895
79.5	1.044	162.2	0.9895
79.58	1.044	162.3	0.9895
79.67	1.044	162.3	0.9985
79.75	1.053	162.4	0.9895
79.83	1.053	162.5	0.9895
79.92	1.044	162.6	0.9834
80.	1.044	162.7	0.9834
80.08	1.053	162.8	0.9895
80.17	1.044	162.8	0.9834
80.25	1.044	162.9	0.9895
80.33	1.053	163.	0.9895
80.42	1.053	163.1	0.9895
80.5	1.044	163.2	0.9895
80.58	1.044	163.3	0.9895
80.67	1.044	163.3	0.9895
80.75	1.044	163.4	0.9895
80.83	1.044	163.5	0.9895
80.92	1.044	163.6	0.9834
81.	1.044	163.7	0.9834
81.08	1.044	163.8	0.9895
81.17	1.044	163.8	0.9895
81.25	1.053	163.9	0.9834
81.33	1.053	164.	0.9895
81.42	1.044	164.1	0.9895
81.5	1.044	164.2	0.9895
81.58	1.053	164.3	0.9834
81.67	1.053	164.3	0.9834
81.75	1.044	164.4	0.9895
81.83	1.053	164.5	0.9834
81.92	1.053	164.6	0.9895
82.	1.044	164.7	0.9985
82.08	1.044	164.8	0.9895
82.17	1.044	164.8	0.9864
82.25	1.044	164.9	0.9985
82.33	1.044	165.	0.9895
82.42	1.044	165.1	0.9864
82.5	1.044	165.2	0.9834
82.58	1.053		

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 ln(Re/rw): 2.816

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	1.259E-6	ft/min
y0	1.172	ft

K = 6.397E-7 cm/sec
 T = K*b = 1.468E-5 ft²/min (0.0002274 sq. cm/sec)

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	1.259E-6	8.887E-9	+/- 1.743E-8	141.7	ft/min
y0	1.172	0.0009683	+/- 0.001899	1210.6	ft

C.I. is approximate 95% confidence interval for parameter
 t-ratio = estimate/std. error
 No estimation window

$K = 6.397E-7$ cm/sec
 $T = K*b = 1.468E-5$ ft²/min (0.0002274 sq. cm/sec)

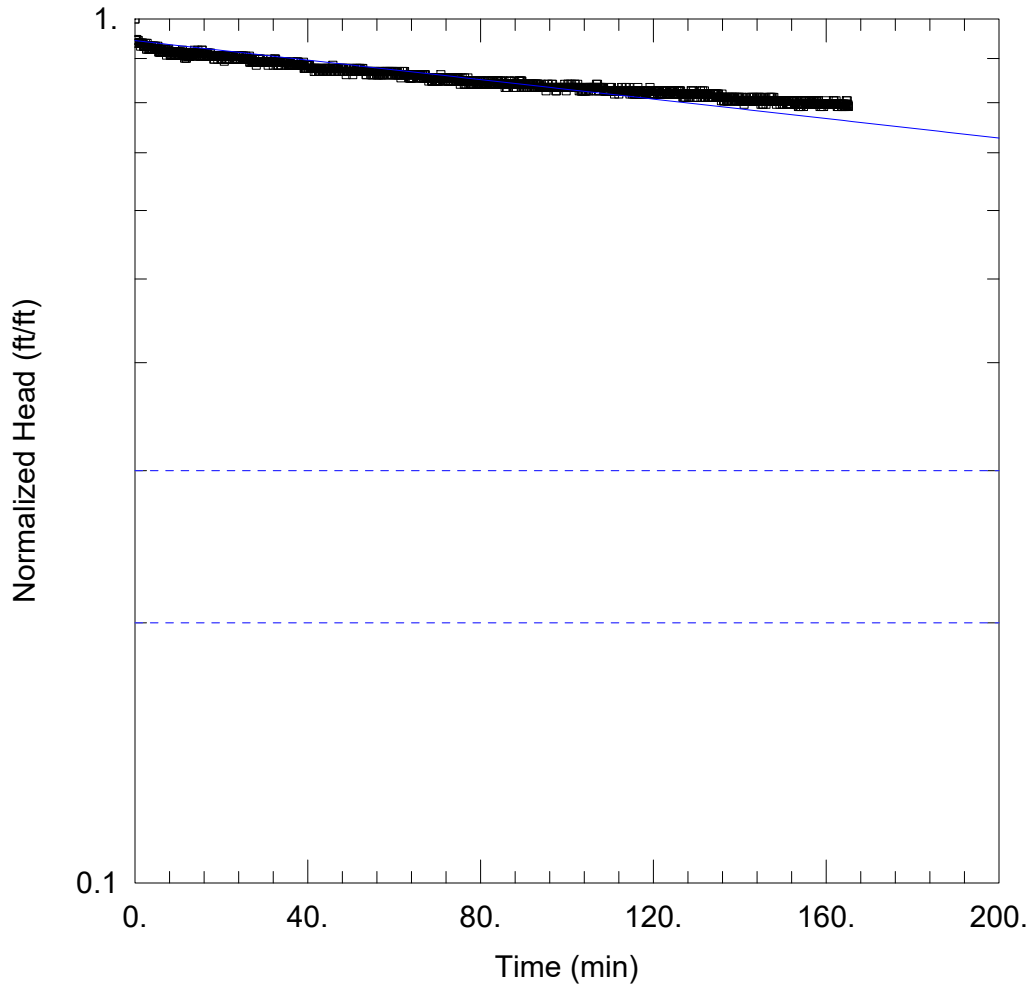
Parameter Correlations

	K	y0
K	1.00	0.85
y0	0.85	1.00

Residual Statistics

for weighted residuals

Sum of Squares 0.8298 ft²
 Variance 0.0004189 ft²
 Std. Deviation 0.02047 ft
 Mean 0.001567 ft
 No. of Residuals 1983
 No. of Estimates 2



MW-14 RISING HEAD TEST

Data Set: N:\...\MW-14 Rising Head Test.aqt

Date: 10/31/24

Time: 10:24:24

PROJECT INFORMATION

Company: GHD Services Inc

Client: Viking Pump/IDEX

Project: 056934

Location: Cedar Falls, Iowa

Test Well: MW-14

Test Date: October 2024

AQUIFER DATA

Saturated Thickness: 11.66 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-14)

Initial Displacement: 1.242 ft

Static Water Column Height: 11.66 ft

Total Well Penetration Depth: 15.34 ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Well Radius: 0.34 ft

SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 1.259E-6 ft/min

y0 = 1.172 ft

Data Set: N:\US\St Paul\Projects\563\056934\Workshare\Aquifer Testing\2024-04 Aquifer testing\AQT Files\MW-15
 Title: MW-15 Falling Head Test
 Date: 11/08/24
 Time: 12:54:38

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: October 2024
 Test Well: MW-15

AQUIFER DATA

Saturated Thickness: 41.66 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-15

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 0.6767 ft
 Static Water Column Height: 41.66 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.34 ft
 Well Skin Radius: 0.34 ft
 Screen Length: 10. ft
 Total Well Penetration Depth: 41.66 ft

No. of Observations: 1638

Time (min)	Observation Data		Displacement (ft)
	Displacement (ft)	Time (min)	
0.	0.6767	27.3	0.1714
0.03333	0.5383	27.33	0.1624
0.06667	0.4632	27.37	0.1624
0.1	0.418	27.4	0.1714
0.1333	0.385	27.43	0.1624
0.1667	0.3669	27.47	0.1624
0.2	0.3579	27.5	0.1624
0.2333	0.3338	27.53	0.1624
0.2667	0.3338	27.57	0.1624
0.3	0.3338	27.6	0.1624
0.3333	0.3248	27.63	0.1624
0.3667	0.3248	27.67	0.1624
0.4	0.3158	27.7	0.1624
0.4333	0.3158	27.73	0.1624
0.4667	0.2977	27.77	0.1624
0.5	0.2977	27.8	0.1714
0.5333	0.2977	27.83	0.1624
0.5667	0.2887	27.87	0.1624
0.6	0.2887	27.9	0.1624
0.6333	0.2887	27.93	0.1624
0.6667	0.2917	27.97	0.1624
0.7	0.2887	28.	0.1714
0.7333	0.2827	28.03	0.1624
0.7667	0.2977	28.07	0.1624
0.8	0.2887	28.1	0.1624
0.8333	0.2887	28.13	0.1624
0.8667	0.2887	28.17	0.1714
0.9	0.2827	28.2	0.1714
0.9333	0.2827	28.23	0.1714

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.9667	0.2797	28.27	0.1714
1.	0.2797	28.3	0.1714
1.033	0.2827	28.33	0.1714
1.067	0.2827	28.37	0.1714
1.1	0.2827	28.4	0.1624
1.133	0.2827	28.43	0.1714
1.167	0.2707	28.47	0.1714
1.2	0.2647	28.5	0.1624
1.233	0.2647	28.53	0.1624
1.267	0.2647	28.57	0.1624
1.3	0.2647	28.6	0.1624
1.333	0.2647	28.63	0.1624
1.367	0.2647	28.67	0.1624
1.4	0.2556	28.7	0.1624
1.433	0.2556	28.73	0.1714
1.467	0.2586	28.77	0.1714
1.5	0.2556	28.8	0.1624
1.533	0.2466	28.83	0.1534
1.567	0.2556	28.87	0.1624
1.6	0.2616	28.9	0.1624
1.633	0.2616	28.93	0.1714
1.667	0.2616	28.97	0.1624
1.7	0.2556	29.	0.1624
1.733	0.2556	29.03	0.1624
1.767	0.2556	29.07	0.1624
1.8	0.2556	29.1	0.1714
1.833	0.2556	29.13	0.1714
1.867	0.2556	29.17	0.1624
1.9	0.2556	29.2	0.1624
1.933	0.2556	29.23	0.1684
1.967	0.2466	29.27	0.1714
2.	0.2466	29.3	0.1684
2.033	0.2466	29.33	0.1714
2.067	0.2556	29.37	0.1684
2.1	0.2556	29.4	0.1684
2.133	0.2556	29.43	0.1714
2.167	0.2556	29.47	0.1714
2.2	0.2466	29.5	0.1684
2.233	0.2466	29.53	0.1594
2.267	0.2556	29.57	0.1684
2.3	0.2466	29.6	0.1684
2.333	0.2376	29.63	0.1684
2.367	0.2376	29.67	0.1774
2.4	0.2316	29.7	0.1684
2.433	0.2316	29.73	0.1594
2.467	0.2376	29.77	0.1684
2.5	0.2406	29.8	0.1594
2.533	0.2376	29.83	0.1594
2.567	0.2406	29.87	0.1684
2.6	0.2316	29.9	0.1684
2.633	0.2376	29.93	0.1684
2.667	0.2316	29.97	0.1684
2.7	0.2316	30.	0.1684
2.733	0.2316	30.03	0.1684
2.767	0.2376	30.07	0.1594
2.8	0.2376	30.1	0.1594
2.833	0.2316	30.13	0.1594
2.867	0.2376	30.17	0.1594
2.9	0.2376	30.2	0.1684
2.933	0.2376	30.23	0.1594
2.967	0.2376	30.27	0.1594
3.	0.2376	30.3	0.1504
3.033	0.2376	30.33	0.1594
3.067	0.2376	30.37	0.1594
3.1	0.2316	30.4	0.1684
3.133	0.2316	30.43	0.1684

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
3.167	0.2226	30.47	0.1594
3.2	0.2226	30.5	0.1594
3.233	0.2316	30.53	0.1594
3.267	0.2316	30.57	0.1594
3.3	0.2316	30.6	0.1594
3.333	0.2316	30.63	0.1594
3.367	0.2316	30.67	0.1594
3.4	0.2286	30.7	0.1624
3.433	0.2286	30.73	0.1624
3.467	0.2316	30.77	0.1624
3.5	0.2286	30.8	0.1624
3.533	0.2286	30.83	0.1624
3.567	0.2376	30.87	0.1624
3.6	0.2316	30.9	0.1714
3.633	0.2226	30.93	0.1714
3.667	0.2316	30.97	0.1714
3.7	0.2226	31.	0.1714
3.733	0.2226	31.03	0.1624
3.767	0.2316	31.07	0.1714
3.8	0.2286	31.1	0.1624
3.833	0.2195	31.13	0.1624
3.867	0.2226	31.17	0.1624
3.9	0.2226	31.2	0.1624
3.933	0.2226	31.23	0.1624
3.967	0.2195	31.27	0.1624
4.	0.2105	31.3	0.1624
4.033	0.2226	31.33	0.1624
4.067	0.2226	31.37	0.1624
4.1	0.2105	31.4	0.1624
4.133	0.2105	31.43	0.1624
4.167	0.2135	31.47	0.1624
4.2	0.2135	31.5	0.1624
4.233	0.2135	31.53	0.1624
4.267	0.2135	31.57	0.1624
4.3	0.2135	31.6	0.1714
4.333	0.2135	31.63	0.1624
4.367	0.2045	31.67	0.1624
4.4	0.2045	31.7	0.1534
4.433	0.2045	31.73	0.1624
4.467	0.2045	31.77	0.1624
4.5	0.2135	31.8	0.1624
4.533	0.2045	31.83	0.1714
4.567	0.2045	31.87	0.1534
4.6	0.2135	31.9	0.1594
4.633	0.2045	31.93	0.1624
4.667	0.2075	31.97	0.1624
4.7	0.2075	32.	0.1624
4.733	0.2075	32.03	0.1714
4.767	0.2135	32.07	0.1624
4.8	0.2045	32.1	0.1624
4.833	0.2075	32.13	0.1594
4.867	0.2075	32.17	0.1594
4.9	0.2075	32.2	0.1714
4.933	0.2135	32.23	0.1684
4.967	0.2045	32.27	0.1684
5.	0.2105	32.3	0.1684
5.033	0.2105	32.33	0.1684
5.067	0.2105	32.37	0.1684
5.1	0.2105	32.4	0.1684
5.133	0.2105	32.43	0.1684
5.167	0.2195	32.47	0.1684
5.2	0.2105	32.5	0.1594
5.233	0.2105	32.53	0.1594
5.267	0.2105	32.57	0.1594
5.3	0.2105	32.6	0.1684
5.333	0.2105	32.63	0.1594

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
5.367	0.2195	32.67	0.1594
5.4	0.2105	32.7	0.1594
5.433	0.2105	32.73	0.1594
5.467	0.2105	32.77	0.1594
5.5	0.2105	32.8	0.1594
5.533	0.2015	32.83	0.1594
5.567	0.2015	32.87	0.1594
5.6	0.2015	32.9	0.1594
5.633	0.2105	32.93	0.1594
5.667	0.2105	32.97	0.1594
5.7	0.1955	33.	0.1504
5.733	0.1955	33.03	0.1594
5.767	0.1955	33.07	0.1504
5.8	0.1955	33.1	0.1594
5.833	0.1955	33.13	0.1594
5.867	0.1955	33.17	0.1594
5.9	0.1955	33.2	0.1504
5.933	0.1955	33.23	0.1594
5.967	0.1955	33.27	0.1504
6.	0.2045	33.3	0.1504
6.033	0.1955	33.33	0.1594
6.067	0.1955	33.37	0.1594
6.1	0.1955	33.4	0.1594
6.133	0.1955	33.43	0.1624
6.167	0.1955	33.47	0.1534
6.2	0.1955	33.5	0.1594
6.233	0.1955	33.53	0.1594
6.267	0.1955	33.57	0.1624
6.3	0.1955	33.6	0.1624
6.333	0.1955	33.63	0.1594
6.367	0.1955	33.67	0.1714
6.4	0.1955	33.7	0.1624
6.433	0.1955	33.73	0.1624
6.467	0.2045	33.77	0.1624
6.5	0.1955	33.8	0.1624
6.533	0.2045	33.83	0.1624
6.567	0.1955	33.87	0.1624
6.6	0.2045	33.9	0.1624
6.633	0.1955	33.93	0.1624
6.667	0.1955	33.97	0.1534
6.7	0.1955	34.	0.1624
6.733	0.1955	34.03	0.1624
6.767	0.1955	34.07	0.1624
6.8	0.2015	34.1	0.1624
6.833	0.1955	34.13	0.1624
6.867	0.1955	34.17	0.1624
6.9	0.1955	34.2	0.1624
6.933	0.1955	34.23	0.1624
6.967	0.1955	34.27	0.1624
7.	0.1955	34.3	0.1624
7.033	0.1955	34.33	0.1624
7.067	0.1955	34.37	0.1624
7.1	0.1955	34.4	0.1534
7.133	0.2015	34.43	0.1624
7.167	0.1955	34.47	0.1624
7.2	0.2015	34.5	0.1624
7.233	0.2045	34.53	0.1624
7.267	0.2045	34.57	0.1624
7.3	0.2045	34.6	0.1624
7.333	0.2045	34.63	0.1624
7.367	0.1955	34.67	0.1624
7.4	0.2045	34.7	0.1624
7.433	0.1955	34.73	0.1624
7.467	0.2045	34.77	0.1624
7.5	0.1955	34.8	0.1624
7.533	0.1955	34.83	0.1594

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
7.567	0.1955	34.87	0.1624
7.6	0.1955	34.9	0.1594
7.633	0.1865	34.93	0.1594
7.667	0.1865	34.97	0.1624
7.7	0.1955	35.	0.1504
7.733	0.1955	35.03	0.1624
7.767	0.1955	35.07	0.1594
7.8	0.1955	35.1	0.1594
7.833	0.1955	35.13	0.1684
7.867	0.1955	35.17	0.1594
7.9	0.1955	35.2	0.1594
7.933	0.1955	35.23	0.1594
7.967	0.1955	35.27	0.1594
8.	0.1865	35.3	0.1594
8.033	0.1865	35.33	0.1594
8.067	0.1865	35.37	0.1594
8.1	0.1955	35.4	0.1594
8.133	0.1955	35.43	0.1684
8.167	0.1865	35.47	0.1594
8.2	0.1955	35.5	0.1594
8.233	0.1865	35.53	0.1594
8.267	0.1865	35.57	0.1594
8.3	0.1865	35.6	0.1594
8.333	0.1774	35.63	0.1594
8.367	0.1774	35.67	0.1594
8.4	0.1865	35.7	0.1594
8.433	0.1865	35.73	0.1594
8.467	0.1865	35.77	0.1594
8.5	0.1865	35.8	0.1594
8.533	0.1865	35.83	0.1594
8.567	0.1865	35.87	0.1594
8.6	0.1865	35.9	0.1684
8.633	0.1865	35.93	0.1594
8.667	0.1774	35.97	0.1594
8.7	0.1805	36.	0.1594
8.733	0.1805	36.03	0.1594
8.767	0.1714	36.07	0.1594
8.8	0.1714	36.1	0.1684
8.833	0.1805	36.13	0.1684
8.867	0.1714	36.17	0.1684
8.9	0.1805	36.2	0.1594
8.933	0.1774	36.23	0.1594
8.967	0.1714	36.27	0.1594
9.	0.1714	36.3	0.1684
9.033	0.1774	36.33	0.1714
9.067	0.1714	36.37	0.1714
9.1	0.1714	36.4	0.1684
9.133	0.1714	36.43	0.1684
9.167	0.1714	36.47	0.1714
9.2	0.1714	36.5	0.1684
9.233	0.1714	36.53	0.1684
9.267	0.1714	36.57	0.1714
9.3	0.1714	36.6	0.1624
9.333	0.1714	36.63	0.1714
9.367	0.1774	36.67	0.1714
9.4	0.1774	36.7	0.1714
9.433	0.1774	36.73	0.1714
9.467	0.1714	36.77	0.1714
9.5	0.1714	36.8	0.1714
9.533	0.1714	36.83	0.1714
9.567	0.1714	36.87	0.1714
9.6	0.1774	36.9	0.1714
9.633	0.1714	36.93	0.1714
9.667	0.1714	36.97	0.1624
9.7	0.1714	37.	0.1624
9.733	0.1714	37.03	0.1624

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
9.767	0.1624	37.07	0.1624
9.8	0.1714	37.1	0.1714
9.833	0.1714	37.13	0.1714
9.867	0.1805	37.17	0.1714
9.9	0.1714	37.2	0.1714
9.933	0.1714	37.23	0.1714
9.967	0.1624	37.27	0.1714
10.	0.1714	37.3	0.1624
10.03	0.1714	37.33	0.1624
10.07	0.1714	37.37	0.1624
10.1	0.1714	37.4	0.1624
10.13	0.1714	37.43	0.1714
10.17	0.1714	37.47	0.1714
10.2	0.1714	37.5	0.1714
10.23	0.1714	37.53	0.1624
10.27	0.1714	37.57	0.1624
10.3	0.1714	37.6	0.1714
10.33	0.1714	37.63	0.1714
10.37	0.1714	37.67	0.1714
10.4	0.1714	37.7	0.1714
10.43	0.1714	37.73	0.1714
10.47	0.1805	37.77	0.1714
10.5	0.1714	37.8	0.1714
10.53	0.1714	37.83	0.1714
10.57	0.1805	37.87	0.1714
10.6	0.1805	37.9	0.1714
10.63	0.1714	37.93	0.1714
10.67	0.1805	37.97	0.1714
10.7	0.1774	38.	0.1714
10.73	0.1714	38.03	0.1714
10.77	0.1774	38.07	0.1774
10.8	0.1714	38.1	0.1714
10.83	0.1714	38.13	0.1714
10.87	0.1774	38.17	0.1714
10.9	0.1865	38.2	0.1714
10.93	0.1865	38.23	0.1624
10.97	0.1774	38.27	0.1714
11.	0.1774	38.3	0.1714
11.03	0.1805	38.33	0.1714
11.07	0.1774	38.37	0.1684
11.1	0.1805	38.4	0.1684
11.13	0.1805	38.43	0.1684
11.17	0.1805	38.47	0.1714
11.2	0.1805	38.5	0.1774
11.23	0.1805	38.53	0.1624
11.27	0.1805	38.57	0.1714
11.3	0.1805	38.6	0.1714
11.33	0.1805	38.63	0.1684
11.37	0.1805	38.67	0.1684
11.4	0.1805	38.7	0.1684
11.43	0.1805	38.73	0.1594
11.47	0.1955	38.77	0.1624
11.5	0.1955	38.8	0.1714
11.53	0.1955	38.83	0.1714
11.57	0.1865	38.87	0.1714
11.6	0.1955	38.9	0.1624
11.63	0.1865	38.93	0.1624
11.67	0.1955	38.97	0.1714
11.7	0.1955	39.	0.1684
11.73	0.1865	39.03	0.1594
11.77	0.1955	39.07	0.1624
11.8	0.1955	39.1	0.1624
11.83	0.1865	39.13	0.1624
11.87	0.1955	39.17	0.1594
11.9	0.1865	39.2	0.1684
11.93	0.1955	39.23	0.1594

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
11.97	0.1865	39.27	0.1714
12.	0.1865	39.3	0.1714
12.03	0.1865	39.33	0.1714
12.07	0.1955	39.37	0.1714
12.1	0.1865	39.4	0.1594
12.13	0.1865	39.43	0.1684
12.17	0.1865	39.47	0.1594
12.2	0.1955	39.5	0.1684
12.23	0.1955	39.53	0.1594
12.27	0.1865	39.57	0.1594
12.3	0.1865	39.6	0.1684
12.33	0.1865	39.63	0.1684
12.37	0.1955	39.67	0.1684
12.4	0.1955	39.7	0.1684
12.43	0.1865	39.73	0.1714
12.47	0.1865	39.77	0.1624
12.5	0.1865	39.8	0.1624
12.53	0.1865	39.83	0.1534
12.57	0.1865	39.87	0.1714
12.6	0.1865	39.9	0.1714
12.63	0.1865	39.93	0.1714
12.67	0.1865	39.97	0.1714
12.7	0.1865	40.	0.1714
12.73	0.1865	40.03	0.1624
12.77	0.1865	40.07	0.1624
12.8	0.1865	40.1	0.1624
12.83	0.1865	40.13	0.1624
12.87	0.1865	40.17	0.1714
12.9	0.1865	40.2	0.1714
12.93	0.1865	40.23	0.1714
12.97	0.1865	40.27	0.1714
13.	0.1774	40.3	0.1714
13.03	0.1865	40.33	0.1624
13.07	0.1774	40.37	0.1624
13.1	0.1865	40.4	0.1624
13.13	0.1865	40.43	0.1714
13.17	0.1774	40.47	0.1624
13.2	0.1865	40.5	0.1624
13.23	0.1865	40.53	0.1714
13.27	0.1865	40.57	0.1624
13.3	0.1774	40.6	0.1624
13.33	0.1865	40.63	0.1714
13.37	0.1774	40.67	0.1624
13.4	0.1774	40.7	0.1714
13.43	0.1774	40.73	0.1774
13.47	0.1774	40.77	0.1624
13.5	0.1774	40.8	0.1714
13.53	0.1865	40.83	0.1624
13.57	0.1865	40.87	0.1624
13.6	0.1865	40.9	0.1624
13.63	0.1865	40.93	0.1714
13.67	0.1865	40.97	0.1534
13.7	0.1865	41.	0.1624
13.73	0.1865	41.03	0.1534
13.77	0.1774	41.07	0.1624
13.8	0.1774	41.1	0.1624
13.83	0.1774	41.13	0.1534
13.87	0.1865	41.17	0.1534
13.9	0.1774	41.2	0.1534
13.93	0.1774	41.23	0.1534
13.97	0.1774	41.27	0.1534
14.	0.1774	41.3	0.1534
14.03	0.1774	41.33	0.1624
14.07	0.1865	41.37	0.1624
14.1	0.1774	41.4	0.1624
14.13	0.1774	41.43	0.1624

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
14.17	0.1774	41.47	0.1624
14.2	0.1865	41.5	0.1624
14.23	0.1865	41.53	0.1624
14.27	0.1865	41.57	0.1534
14.3	0.1865	41.6	0.1624
14.33	0.1774	41.63	0.1534
14.37	0.1865	41.67	0.1624
14.4	0.1865	41.7	0.1624
14.43	0.1774	41.73	0.1624
14.47	0.1774	41.77	0.1624
14.5	0.1774	41.8	0.1624
14.53	0.1774	41.83	0.1624
14.57	0.1774	41.87	0.1624
14.6	0.1774	41.9	0.1624
14.63	0.1774	41.93	0.1624
14.67	0.1774	41.97	0.1624
14.7	0.1774	42.	0.1624
14.73	0.1774	42.03	0.1624
14.77	0.1774	42.07	0.1624
14.8	0.1774	42.1	0.1624
14.83	0.1774	42.13	0.1624
14.87	0.1774	42.17	0.1624
14.9	0.1774	42.2	0.1624
14.93	0.1774	42.23	0.1624
14.97	0.1774	42.27	0.1534
15.	0.1774	42.3	0.1624
15.03	0.1774	42.33	0.1534
15.07	0.1774	42.37	0.1624
15.1	0.1774	42.4	0.1624
15.13	0.1774	42.43	0.1624
15.17	0.1865	42.47	0.1624
15.2	0.1865	42.5	0.1624
15.23	0.1774	42.53	0.1624
15.27	0.1774	42.57	0.1624
15.3	0.1774	42.6	0.1624
15.33	0.1774	42.63	0.1624
15.37	0.1774	42.67	0.1624
15.4	0.1774	42.7	0.1624
15.43	0.1774	42.73	0.1624
15.47	0.1774	42.77	0.1624
15.5	0.1774	42.8	0.1624
15.53	0.1865	42.83	0.1534
15.57	0.1774	42.87	0.1624
15.6	0.1865	42.9	0.1534
15.63	0.1774	42.93	0.1624
15.67	0.1774	42.97	0.1624
15.7	0.1774	43.	0.1624
15.73	0.1774	43.03	0.1534
15.77	0.1865	43.07	0.1534
15.8	0.1865	43.1	0.1534
15.83	0.1774	43.13	0.1534
15.87	0.1865	43.17	0.1534
15.9	0.1865	43.2	0.1534
15.93	0.1865	43.23	0.1534
15.97	0.1865	43.27	0.1534
16.	0.1774	43.3	0.1534
16.03	0.1774	43.33	0.1534
16.07	0.1774	43.37	0.1534
16.1	0.1684	43.4	0.1534
16.13	0.1774	43.43	0.1534
16.17	0.1774	43.47	0.1534
16.2	0.1865	43.5	0.1534
16.23	0.1774	43.53	0.1624
16.27	0.1865	43.57	0.1534
16.3	0.1865	43.6	0.1534
16.33	0.1714	43.63	0.1624

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
16.37	0.1774	43.67	0.1534
16.4	0.1714	43.7	0.1624
16.43	0.1774	43.73	0.1534
16.47	0.1714	43.77	0.1624
16.5	0.1714	43.8	0.1534
16.53	0.1714	43.83	0.1534
16.57	0.1714	43.87	0.1534
16.6	0.1714	43.9	0.1534
16.63	0.1714	43.93	0.1534
16.67	0.1714	43.97	0.1534
16.7	0.1714	44.	0.1534
16.73	0.1714	44.03	0.1624
16.77	0.1714	44.07	0.1534
16.8	0.1714	44.1	0.1534
16.83	0.1714	44.13	0.1534
16.87	0.1714	44.17	0.1624
16.9	0.1624	44.2	0.1624
16.93	0.1624	44.23	0.1624
16.97	0.1624	44.27	0.1624
17.	0.1624	44.3	0.1534
17.03	0.1714	44.33	0.1534
17.07	0.1714	44.37	0.1624
17.1	0.1624	44.4	0.1624
17.13	0.1714	44.43	0.1534
17.17	0.1714	44.47	0.1534
17.2	0.1714	44.5	0.1534
17.23	0.1714	44.53	0.1534
17.27	0.1714	44.57	0.1534
17.3	0.1714	44.6	0.1534
17.33	0.1714	44.63	0.1534
17.37	0.1624	44.67	0.1534
17.4	0.1714	44.7	0.1534
17.43	0.1714	44.73	0.1534
17.47	0.1624	44.77	0.1474
17.5	0.1624	44.8	0.1534
17.53	0.1714	44.83	0.1534
17.57	0.1624	44.87	0.1534
17.6	0.1624	44.9	0.1534
17.63	0.1624	44.93	0.1624
17.67	0.1714	44.97	0.1534
17.7	0.1714	45.	0.1534
17.73	0.1714	45.03	0.1534
17.77	0.1714	45.07	0.1534
17.8	0.1624	45.1	0.1534
17.83	0.1624	45.13	0.1534
17.87	0.1714	45.17	0.1534
17.9	0.1714	45.2	0.1534
17.93	0.1624	45.23	0.1534
17.97	0.1714	45.27	0.1534
18.	0.1624	45.3	0.1534
18.03	0.1624	45.33	0.1534
18.07	0.1714	45.37	0.1534
18.1	0.1624	45.4	0.1474
18.13	0.1624	45.43	0.1534
18.17	0.1624	45.47	0.1474
18.2	0.1624	45.5	0.1534
18.23	0.1624	45.53	0.1474
18.27	0.1624	45.57	0.1474
18.3	0.1624	45.6	0.1474
18.33	0.1624	45.63	0.1474
18.37	0.1714	45.67	0.1474
18.4	0.1714	45.7	0.1534
18.43	0.1624	45.73	0.1474
18.47	0.1714	45.77	0.1534
18.5	0.1714	45.8	0.1474
18.53	0.1714	45.83	0.1534

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
18.57	0.1714	45.87	0.1474
18.6	0.1714	45.9	0.1474
18.63	0.1624	45.93	0.1474
18.67	0.1624	45.97	0.1534
18.7	0.1714	46.	0.1534
18.73	0.1714	46.03	0.1534
18.77	0.1624	46.07	0.1534
18.8	0.1624	46.1	0.1534
18.83	0.1714	46.13	0.1534
18.87	0.1714	46.17	0.1534
18.9	0.1624	46.2	0.1534
18.93	0.1624	46.23	0.1534
18.97	0.1714	46.27	0.1444
19.	0.1624	46.3	0.1534
19.03	0.1714	46.33	0.1534
19.07	0.1624	46.37	0.1444
19.1	0.1624	46.4	0.1534
19.13	0.1624	46.43	0.1474
19.17	0.1624	46.47	0.1534
19.2	0.1624	46.5	0.1534
19.23	0.1624	46.53	0.1534
19.27	0.1624	46.57	0.1534
19.3	0.1714	46.6	0.1534
19.33	0.1624	46.63	0.1534
19.37	0.1624	46.67	0.1474
19.4	0.1624	46.7	0.1534
19.43	0.1714	46.73	0.1534
19.47	0.1624	46.77	0.1534
19.5	0.1624	46.8	0.1534
19.53	0.1624	46.83	0.1534
19.57	0.1624	46.87	0.1534
19.6	0.1624	46.9	0.1534
19.63	0.1624	46.93	0.1444
19.67	0.1714	46.97	0.1444
19.7	0.1714	47.	0.1534
19.73	0.1624	47.03	0.1534
19.77	0.1624	47.07	0.1534
19.8	0.1624	47.1	0.1444
19.83	0.1714	47.13	0.1534
19.87	0.1714	47.17	0.1444
19.9	0.1624	47.2	0.1444
19.93	0.1624	47.23	0.1444
19.97	0.1714	47.27	0.1444
20.	0.1624	47.3	0.1444
20.03	0.1624	47.33	0.1444
20.07	0.1624	47.37	0.1444
20.1	0.1624	47.4	0.1444
20.13	0.1624	47.43	0.1444
20.17	0.1624	47.47	0.1444
20.2	0.1624	47.5	0.1444
20.23	0.1624	47.53	0.1444
20.27	0.1624	47.57	0.1534
20.3	0.1714	47.6	0.1444
20.33	0.1624	47.63	0.1534
20.37	0.1714	47.67	0.1534
20.4	0.1714	47.7	0.1534
20.43	0.1624	47.73	0.1534
20.47	0.1624	47.77	0.1534
20.5	0.1624	47.8	0.1534
20.53	0.1624	47.83	0.1534
20.57	0.1624	47.87	0.1534
20.6	0.1624	47.9	0.1534
20.63	0.1714	47.93	0.1534
20.67	0.1714	47.97	0.1534
20.7	0.1714	48.	0.1534
20.73	0.1624	48.03	0.1534

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
20.77	0.1624	48.07	0.1444
20.8	0.1624	48.1	0.1444
20.83	0.1714	48.13	0.1444
20.87	0.1714	48.17	0.1534
20.9	0.1714	48.2	0.1534
20.93	0.1624	48.23	0.1534
20.97	0.1624	48.27	0.1444
21.	0.1624	48.3	0.1534
21.03	0.1624	48.33	0.1534
21.07	0.1624	48.37	0.1534
21.1	0.1624	48.4	0.1534
21.13	0.1624	48.43	0.1534
21.17	0.1624	48.47	0.1534
21.2	0.1624	48.5	0.1534
21.23	0.1714	48.53	0.1534
21.27	0.1624	48.57	0.1534
21.3	0.1714	48.6	0.1534
21.33	0.1714	48.63	0.1534
21.37	0.1624	48.67	0.1534
21.4	0.1624	48.7	0.1534
21.43	0.1624	48.73	0.1534
21.47	0.1714	48.77	0.1534
21.5	0.1714	48.8	0.1534
21.53	0.1714	48.83	0.1474
21.57	0.1714	48.87	0.1534
21.6	0.1624	48.9	0.1474
21.63	0.1624	48.93	0.1474
21.67	0.1684	48.97	0.1474
21.7	0.1594	49.	0.1534
21.73	0.1624	49.03	0.1534
21.77	0.1594	49.07	0.1474
21.8	0.1624	49.1	0.1474
21.83	0.1594	49.13	0.1474
21.87	0.1594	49.17	0.1534
21.9	0.1594	49.2	0.1534
21.93	0.1594	49.23	0.1534
21.97	0.1594	49.27	0.1474
22.	0.1594	49.3	0.1534
22.03	0.1684	49.33	0.1534
22.07	0.1684	49.37	0.1534
22.1	0.1594	49.4	0.1474
22.13	0.1594	49.43	0.1534
22.17	0.1594	49.47	0.1474
22.2	0.1684	49.5	0.1474
22.23	0.1684	49.53	0.1474
22.27	0.1684	49.57	0.1474
22.3	0.1594	49.6	0.1474
22.33	0.1684	49.63	0.1534
22.37	0.1594	49.67	0.1534
22.4	0.1594	49.7	0.1534
22.43	0.1684	49.73	0.1474
22.47	0.1594	49.77	0.1474
22.5	0.1594	49.8	0.1474
22.53	0.1684	49.83	0.1534
22.57	0.1684	49.87	0.1534
22.6	0.1684	49.9	0.1534
22.63	0.1594	49.93	0.1474
22.67	0.1594	49.97	0.1474
22.7	0.1594	50.	0.1534
22.73	0.1624	50.03	0.1534
22.77	0.1624	50.07	0.1474
22.8	0.1534	50.1	0.1534
22.83	0.1594	50.13	0.1534
22.87	0.1534	50.17	0.1534
22.9	0.1534	50.2	0.1534
22.93	0.1534	50.23	0.1534

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
22.97	0.1624	50.27	0.1534
23.	0.1534	50.3	0.1534
23.03	0.1534	50.33	0.1534
23.07	0.1624	50.37	0.1534
23.1	0.1624	50.4	0.1534
23.13	0.1534	50.43	0.1534
23.17	0.1624	50.47	0.1534
23.2	0.1534	50.5	0.1534
23.23	0.1624	50.53	0.1534
23.27	0.1624	50.57	0.1534
23.3	0.1624	50.6	0.1534
23.33	0.1624	50.63	0.1534
23.37	0.1624	50.67	0.1534
23.4	0.1624	50.7	0.1534
23.43	0.1534	50.73	0.1534
23.47	0.1534	50.77	0.1534
23.5	0.1534	50.8	0.1534
23.53	0.1624	50.83	0.1624
23.57	0.1534	50.87	0.1534
23.6	0.1714	50.9	0.1534
23.63	0.1624	50.93	0.1534
23.67	0.1534	50.97	0.1534
23.7	0.1624	51.	0.1534
23.73	0.1594	51.03	0.1534
23.77	0.1624	51.07	0.1444
23.8	0.1624	51.1	0.1534
23.83	0.1594	51.13	0.1534
23.87	0.1594	51.17	0.1534
23.9	0.1624	51.2	0.1534
23.93	0.1594	51.23	0.1534
23.97	0.1594	51.27	0.1444
24.	0.1594	51.3	0.1534
24.03	0.1594	51.33	0.1444
24.07	0.1594	51.37	0.1444
24.1	0.1594	51.4	0.1444
24.13	0.1594	51.43	0.1444
24.17	0.1594	51.47	0.1534
24.2	0.1594	51.5	0.1444
24.23	0.1594	51.53	0.1444
24.27	0.1594	51.57	0.1444
24.3	0.1684	51.6	0.1534
24.33	0.1594	51.63	0.1534
24.37	0.1594	51.67	0.1534
24.4	0.1684	51.7	0.1534
24.43	0.1594	51.73	0.1534
24.47	0.1594	51.77	0.1534
24.5	0.1594	51.8	0.1534
24.53	0.1594	51.83	0.1534
24.57	0.1594	51.87	0.1444
24.6	0.1594	51.9	0.1534
24.63	0.1594	51.93	0.1534
24.67	0.1594	51.97	0.1534
24.7	0.1594	52.	0.1534
24.73	0.1594	52.03	0.1534
24.77	0.1594	52.07	0.1534
24.8	0.1594	52.1	0.1534
24.83	0.1624	52.13	0.1534
24.87	0.1714	52.17	0.1534
24.9	0.1594	52.2	0.1444
24.93	0.1594	52.23	0.1534
24.97	0.1684	52.27	0.1444
25.	0.1624	52.3	0.1534
25.03	0.1594	52.33	0.1444
25.07	0.1624	52.37	0.1534
25.1	0.1624	52.4	0.1534
25.13	0.1624	52.43	0.1534

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
25.17	0.1624	52.47	0.1534
25.2	0.1624	52.5	0.1444
25.23	0.1624	52.53	0.1534
25.27	0.1624	52.57	0.1534
25.3	0.1624	52.6	0.1444
25.33	0.1624	52.63	0.1534
25.37	0.1714	52.67	0.1534
25.4	0.1624	52.7	0.1444
25.43	0.1624	52.73	0.1534
25.47	0.1624	52.77	0.1444
25.5	0.1624	52.8	0.1534
25.53	0.1714	52.83	0.1534
25.57	0.1624	52.87	0.1444
25.6	0.1624	52.9	0.1534
25.63	0.1624	52.93	0.1444
25.67	0.1624	52.97	0.1534
25.7	0.1624	53.	0.1534
25.73	0.1624	53.03	0.1444
25.77	0.1714	53.07	0.1534
25.8	0.1624	53.1	0.1534
25.83	0.1714	53.13	0.1534
25.87	0.1624	53.17	0.1444
25.9	0.1624	53.2	0.1534
25.93	0.1624	53.23	0.1534
25.97	0.1624	53.27	0.1444
26.	0.1624	53.3	0.1444
26.03	0.1624	53.33	0.1534
26.07	0.1714	53.37	0.1444
26.1	0.1624	53.4	0.1534
26.13	0.1624	53.43	0.1444
26.17	0.1624	53.47	0.1444
26.2	0.1624	53.5	0.1474
26.23	0.1714	53.53	0.1534
26.27	0.1714	53.57	0.1444
26.3	0.1714	53.6	0.1534
26.33	0.1624	53.63	0.1474
26.37	0.1714	53.67	0.1474
26.4	0.1714	53.7	0.1474
26.43	0.1624	53.73	0.1474
26.47	0.1624	53.77	0.1534
26.5	0.1624	53.8	0.1534
26.53	0.1714	53.83	0.1534
26.57	0.1714	53.87	0.1534
26.6	0.1714	53.9	0.1534
26.63	0.1714	53.93	0.1534
26.67	0.1714	53.97	0.1534
26.7	0.1714	54.	0.1534
26.73	0.1714	54.03	0.1444
26.77	0.1624	54.07	0.1534
26.8	0.1624	54.1	0.1534
26.83	0.1624	54.13	0.1534
26.87	0.1624	54.17	0.1534
26.9	0.1624	54.2	0.1474
26.93	0.1624	54.23	0.1474
26.97	0.1624	54.27	0.1474
27.	0.1714	54.3	0.1474
27.03	0.1714	54.33	0.1444
27.07	0.1714	54.37	0.1534
27.1	0.1624	54.4	0.1534
27.13	0.1624	54.43	0.1534
27.17	0.1714	54.47	0.1534
27.2	0.1624	54.5	0.1444
27.23	0.1714	54.53	0.1624
27.27	0.1714	54.57	0.1624

SOLUTION

Slug Test
Aquifer Model: Confined
Solution Method: Bouwer-Rice
ln(Re/rw): 3.389

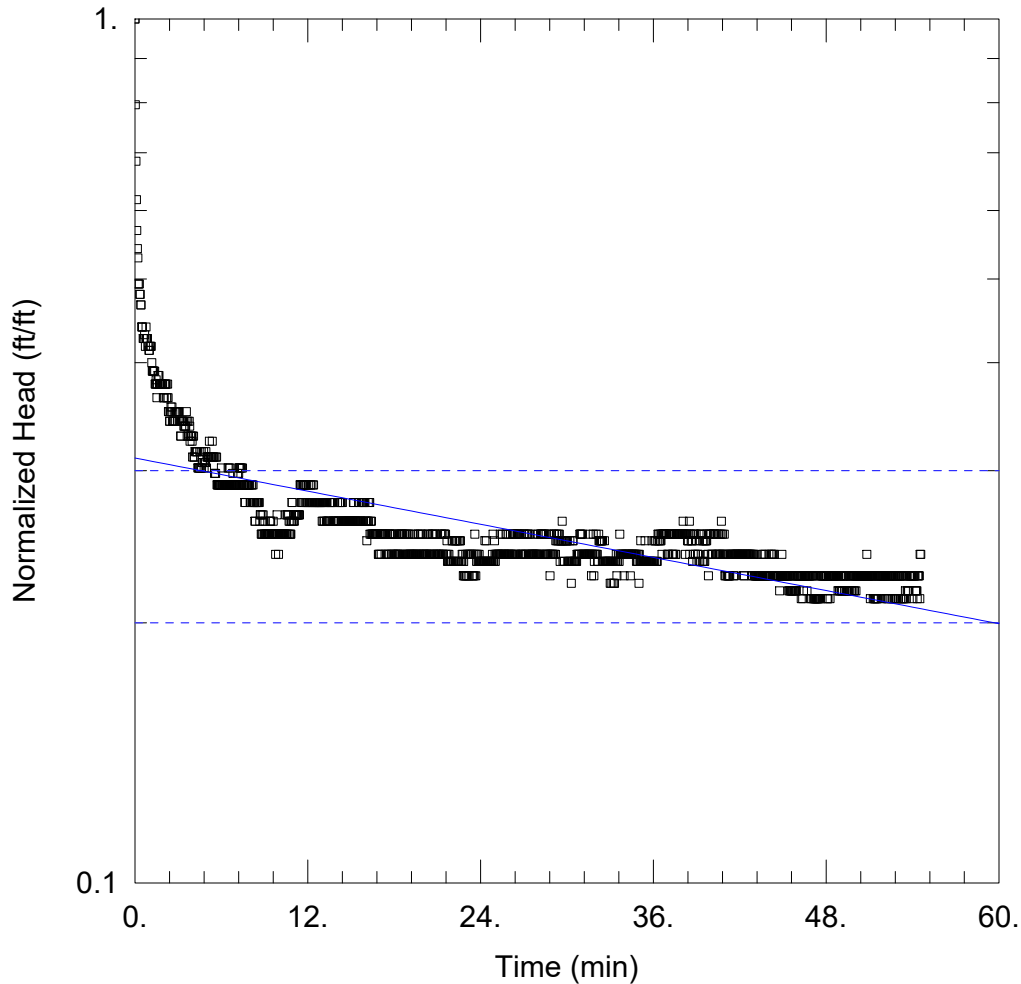
VISUAL ESTIMATION RESULTS

Estimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	8.59E-6	ft/min
y0	0.21	ft

K = 4.364E-6 cm/sec

T = K*b = 0.0003579 ft²/min (0.005541 sq. cm/sec)



MW-15 FALLING HEAD TEST

Data Set: N:\...\MW-15 Falling Head Test.aqt

Date: 11/08/24

Time: 12:54:11

PROJECT INFORMATION

Company: GHD Services Inc

Client: Viking Pump/IDEX

Project: 056934

Location: Cedar Falls, Iowa

Test Well: MW-15

Test Date: October 2024

AQUIFER DATA

Saturated Thickness: 41.66 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-15)

Initial Displacement: 0.6767 ft

Static Water Column Height: 41.66 ft

Total Well Penetration Depth: 41.66 ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Well Radius: 0.34 ft

SOLUTION

Aquifer Model: Confined

Solution Method: Bower-Rice

K = 8.59E-6 ft/min

y0 = 0.21 ft

Data Set: N:\US\St Paul\Projects\563\056934\Workshare\Aquifer Testing\2024-04 Aquifer testing\AQT Files\MW-15
 Title: MW-15 Rising Head Test
 Date: 11/08/24
 Time: 12:53:14

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: October 2024
 Test Well: MW-15

AQUIFER DATA

Saturated Thickness: 41.66 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-15

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 0.5834 ft
 Static Water Column Height: 41.66 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.34 ft
 Well Skin Radius: 0.34 ft
 Screen Length: 10. ft
 Total Well Penetration Depth: 41.66 ft

No. of Observations: 275

Observation Data			
Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.	0.5834	11.5	0.2316
0.08333	0.4361	11.58	0.2316
0.1667	0.3759	11.67	0.2316
0.25	0.3428	11.75	0.2316
0.3333	0.3368	11.83	0.2256
0.4167	0.3248	11.92	0.2316
0.5	0.3158	12.	0.2316
0.5833	0.3068	12.08	0.2256
0.6667	0.3007	12.17	0.2226
0.75	0.2977	12.25	0.2316
0.8333	0.2857	12.33	0.2256
0.9167	0.2767	12.42	0.2316
1.	0.2857	12.5	0.2316
1.083	0.2767	12.58	0.2316
1.167	0.2857	12.67	0.2316
1.25	0.2767	12.75	0.2316
1.333	0.2767	12.83	0.2406
1.417	0.2767	12.92	0.2316
1.5	0.2767	13.	0.2316
1.583	0.2677	13.08	0.2316
1.667	0.2737	13.17	0.2316
1.75	0.2737	13.25	0.2316
1.833	0.2737	13.33	0.2316
1.917	0.2737	13.42	0.2316
2.	0.2737	13.5	0.2406
2.083	0.2737	13.58	0.2316
2.167	0.2647	13.67	0.2316
2.25	0.2647	13.75	0.2316
2.333	0.2647	13.83	0.2316

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
2.417	0.2647	13.92	0.2316
2.5	0.2647	14.	0.2316
2.583	0.2647	14.08	0.2316
2.667	0.2647	14.17	0.2406
2.75	0.2647	14.25	0.2316
2.833	0.2647	14.33	0.2316
2.917	0.2647	14.42	0.2316
3.	0.2647	14.5	0.2316
3.083	0.2556	14.58	0.2406
3.167	0.2556	14.67	0.2406
3.25	0.2556	14.75	0.2316
3.333	0.2556	14.83	0.2316
3.417	0.2556	14.92	0.2316
3.5	0.2556	15.	0.2316
3.583	0.2556	15.08	0.2316
3.667	0.2556	15.17	0.2316
3.75	0.2556	15.25	0.2316
3.833	0.2556	15.33	0.2256
3.917	0.2556	15.42	0.2316
4.	0.2647	15.5	0.2406
4.083	0.2586	15.58	0.2406
4.167	0.2586	15.67	0.2316
4.25	0.2586	15.75	0.2316
4.333	0.2586	15.83	0.2316
4.417	0.2586	15.92	0.2256
4.5	0.2496	16.	0.2316
4.583	0.2586	16.08	0.2256
4.667	0.2586	16.17	0.2316
4.75	0.2496	16.25	0.2316
4.833	0.2586	16.33	0.2256
4.917	0.2496	16.42	0.2316
5.	0.2496	16.5	0.2316
5.083	0.2496	16.58	0.2256
5.167	0.2496	16.67	0.2316
5.25	0.2496	16.75	0.2316
5.333	0.2496	16.83	0.2316
5.417	0.2496	16.92	0.2316
5.5	0.2496	17.	0.2256
5.583	0.2586	17.08	0.2316
5.667	0.2496	17.17	0.2316
5.75	0.2496	17.25	0.2256
5.833	0.2496	17.33	0.2316
5.917	0.2496	17.42	0.2316
6.	0.2496	17.5	0.2316
6.083	0.2496	17.58	0.2316
6.167	0.2496	17.67	0.2256
6.25	0.2496	17.75	0.2316
6.333	0.2496	17.83	0.2316
6.417	0.2496	17.92	0.2316
6.5	0.2406	18.	0.2316
6.583	0.2496	18.08	0.2256
6.667	0.2406	18.17	0.2316
6.75	0.2496	18.25	0.2316
6.833	0.2406	18.33	0.2316
6.917	0.2406	18.42	0.2256
7.	0.2406	18.5	0.2316
7.083	0.2496	18.58	0.2316
7.167	0.2406	18.67	0.2316
7.25	0.2406	18.75	0.2256
7.333	0.2496	18.83	0.2316
7.417	0.2406	18.92	0.2256
7.5	0.2406	19.	0.2256
7.583	0.2496	19.08	0.2256
7.667	0.2406	19.17	0.2316
7.75	0.2406	19.25	0.2316
7.833	0.2406	19.33	0.2316

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
7.917	0.2406	19.42	0.2316
8.	0.2406	19.5	0.2316
8.083	0.2406	19.58	0.2316
8.167	0.2406	19.67	0.2256
8.25	0.2406	19.75	0.2256
8.333	0.2406	19.83	0.2316
8.417	0.2496	19.92	0.2256
8.5	0.2406	20.	0.2316
8.583	0.2406	20.08	0.2316
8.667	0.2406	20.17	0.2316
8.75	0.2406	20.25	0.2316
8.833	0.2316	20.33	0.2256
8.917	0.2406	20.42	0.2316
9.	0.2316	20.5	0.2316
9.083	0.2406	20.58	0.2316
9.167	0.2406	20.67	0.2316
9.25	0.2406	20.75	0.2316
9.333	0.2406	20.83	0.2256
9.417	0.2406	20.92	0.2256
9.5	0.2406	21.	0.2316
9.583	0.2316	21.08	0.2316
9.667	0.2316	21.17	0.2256
9.75	0.2316	21.25	0.2316
9.833	0.2406	21.33	0.2256
9.917	0.2316	21.42	0.2316
10.	0.2256	21.5	0.2316
10.08	0.2316	21.58	0.2256
10.17	0.2316	21.67	0.2256
10.25	0.2316	21.75	0.2256
10.33	0.2316	21.83	0.2256
10.42	0.2316	21.92	0.2316
10.5	0.2316	22.	0.2316
10.58	0.2316	22.08	0.2316
10.67	0.2316	22.17	0.2256
10.75	0.2316	22.25	0.2256
10.83	0.2256	22.33	0.2256
10.92	0.2226	22.42	0.2256
11.	0.2316	22.5	0.2256
11.08	0.2316	22.58	0.2316
11.17	0.2316	22.67	0.2316
11.25	0.2316	22.75	0.2316
11.33	0.2316	22.83	0.2316
11.42	0.2316		

SOLUTION

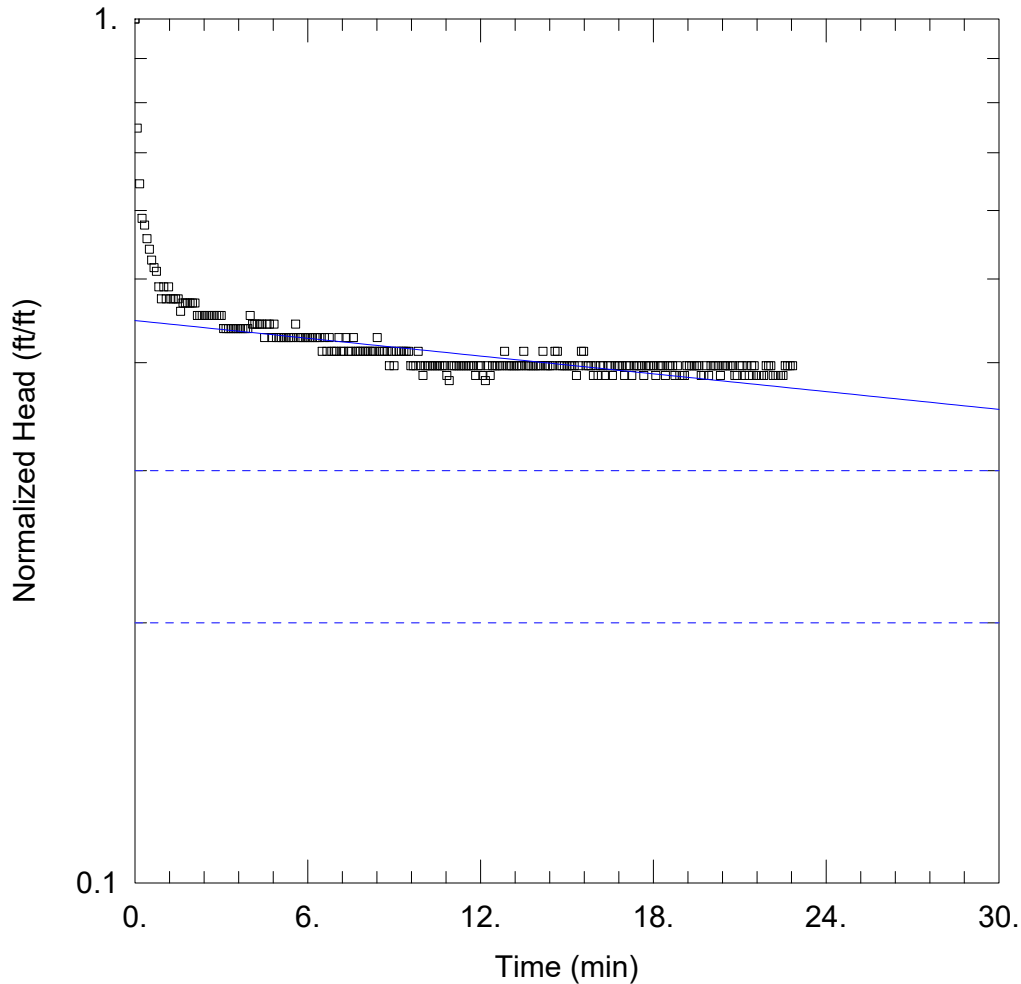
Slug Test
 Aquifer Model: Confined
 Solution Method: Bouwer-Rice
 ln(Re/rw): 3.389

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	9.212E-6	ft/min
y0	0.2612	ft

K = 4.68E-6 cm/sec
 T = K*b = 0.0003838 ft²/min (0.005942 sq. cm/sec)



MW-15 RISING HEAD TEST

Data Set: N:\...MW-15 Rising Head Test.aqt

Date: 11/08/24

Time: 12:52:48

PROJECT INFORMATION

Company: GHD Services Inc

Client: Viking Pump/IDEX

Project: 056934

Location: Cedar Falls, Iowa

Test Well: MW-15

Test Date: October 2024

AQUIFER DATA

Saturated Thickness: 41.66 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-15)

Initial Displacement: 0.5834 ft

Static Water Column Height: 41.66 ft

Total Well Penetration Depth: 41.66 ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Well Radius: 0.34 ft

SOLUTION

Aquifer Model: Confined

Solution Method: Bower-Rice

K = 9.212E-6 ft/min

y0 = 0.2612 ft

Data Set: N:\US\St Paul\Projects\563\056934\Workshare\Aquifer Testing\2024-04 Aquifer testing\AQT Files\MW-16
 Title: MW-16 Falling Head Test
 Date: 10/31/24
 Time: 10:37:47

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: October 2024
 Test Well: MW-16

AQUIFER DATA

Saturated Thickness: 45.88 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-16

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 1.48 ft
 Static Water Column Height: 45.88 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.34 ft
 Well Skin Radius: 0.34 ft
 Screen Length: 10. ft
 Total Well Penetration Depth: 45.88 ft

No. of Observations: 1010

Observation Data			
Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.	1.48	42.08	1.438
0.08333	1.477	42.17	1.438
0.1667	1.471	42.25	1.438
0.25	1.468	42.33	1.447
0.3333	1.462	42.42	1.438
0.4167	1.468	42.5	1.447
0.5	1.477	42.58	1.438
0.5833	1.462	42.67	1.438
0.6667	1.462	42.75	1.438
0.75	1.468	42.83	1.447
0.8333	1.471	42.92	1.438
0.9167	1.462	43.	1.438
1.	1.468	43.08	1.438
1.083	1.468	43.17	1.447
1.167	1.477	43.25	1.438
1.25	1.471	43.33	1.438
1.333	1.462	43.42	1.438
1.417	1.468	43.5	1.438
1.5	1.462	43.58	1.447
1.583	1.471	43.67	1.438
1.667	1.471	43.75	1.438
1.75	1.471	43.83	1.438
1.833	1.471	43.92	1.438
1.917	1.462	44.	1.438
2.	1.471	44.08	1.438
2.083	1.471	44.17	1.438
2.167	1.462	44.25	1.438
2.25	1.462	44.33	1.438
2.333	1.462	44.42	1.438

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
2.417	1.462	44.5	1.432
2.5	1.462	44.58	1.432
2.583	1.462	44.67	1.429
2.667	1.462	44.75	1.429
2.75	1.462	44.83	1.438
2.833	1.471	44.92	1.438
2.917	1.462	45.	1.438
3.	1.462	45.08	1.438
3.083	1.462	45.17	1.429
3.167	1.462	45.25	1.438
3.25	1.462	45.33	1.438
3.333	1.462	45.42	1.438
3.417	1.462	45.5	1.438
3.5	1.462	45.58	1.429
3.583	1.462	45.67	1.438
3.667	1.453	45.75	1.432
3.75	1.453	45.83	1.438
3.833	1.462	45.92	1.429
3.917	1.462	46.	1.438
4.	1.462	46.08	1.438
4.083	1.453	46.17	1.438
4.167	1.453	46.25	1.438
4.25	1.459	46.33	1.438
4.333	1.459	46.42	1.438
4.417	1.45	46.5	1.438
4.5	1.459	46.58	1.438
4.583	1.459	46.67	1.438
4.667	1.459	46.75	1.438
4.75	1.45	46.83	1.432
4.833	1.459	46.92	1.438
4.917	1.459	47.	1.432
5.	1.45	47.08	1.438
5.083	1.459	47.17	1.423
5.167	1.459	47.25	1.438
5.25	1.459	47.33	1.432
5.333	1.459	47.42	1.432
5.417	1.459	47.5	1.429
5.5	1.45	47.58	1.432
5.583	1.45	47.67	1.432
5.667	1.459	47.75	1.441
5.75	1.45	47.83	1.432
5.833	1.45	47.92	1.441
5.917	1.45	48.	1.432
6.	1.441	48.08	1.432
6.083	1.45	48.17	1.438
6.167	1.45	48.25	1.441
6.25	1.45	48.33	1.432
6.333	1.45	48.42	1.432
6.417	1.45	48.5	1.432
6.5	1.45	48.58	1.423
6.583	1.45	48.67	1.423
6.667	1.459	48.75	1.423
6.75	1.459	48.83	1.423
6.833	1.459	48.92	1.423
6.917	1.459	49.	1.423
7.	1.45	49.08	1.432
7.083	1.459	49.17	1.432
7.167	1.459	49.25	1.432
7.25	1.45	49.33	1.432
7.333	1.45	49.42	1.432
7.417	1.459	49.5	1.423
7.5	1.45	49.58	1.432
7.583	1.45	49.67	1.432
7.667	1.45	49.75	1.432
7.75	1.45	49.83	1.432
7.833	1.45	49.92	1.432

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
7.917	1.45	50.	1.432
8.	1.45	50.08	1.423
8.083	1.459	50.17	1.432
8.167	1.459	50.25	1.423
8.25	1.45	50.33	1.423
8.333	1.45	50.42	1.432
8.417	1.45	50.5	1.423
8.5	1.45	50.58	1.432
8.583	1.453	50.67	1.432
8.667	1.453	50.75	1.432
8.75	1.453	50.83	1.423
8.833	1.453	50.92	1.432
8.917	1.453	51.	1.423
9.	1.453	51.08	1.423
9.083	1.453	51.17	1.423
9.167	1.453	51.25	1.432
9.25	1.45	51.33	1.432
9.333	1.45	51.42	1.432
9.417	1.45	51.5	1.432
9.5	1.45	51.58	1.432
9.583	1.45	51.67	1.432
9.667	1.441	51.75	1.432
9.75	1.459	51.83	1.432
9.833	1.45	51.92	1.432
9.917	1.453	52.	1.423
10.	1.453	52.08	1.432
10.08	1.453	52.17	1.432
10.17	1.462	52.25	1.432
10.25	1.462	52.33	1.432
10.33	1.453	52.42	1.432
10.42	1.453	52.5	1.432
10.5	1.453	52.58	1.432
10.58	1.453	52.67	1.432
10.67	1.462	52.75	1.423
10.75	1.462	52.83	1.423
10.83	1.462	52.92	1.423
10.92	1.462	53.	1.432
11.	1.462	53.08	1.432
11.08	1.453	53.17	1.423
11.17	1.453	53.25	1.432
11.25	1.447	53.33	1.423
11.33	1.453	53.42	1.423
11.42	1.453	53.5	1.423
11.5	1.453	53.58	1.432
11.58	1.453	53.67	1.423
11.67	1.453	53.75	1.423
11.75	1.453	53.83	1.432
11.83	1.453	53.92	1.423
11.92	1.453	54.	1.423
12.	1.453	54.08	1.432
12.08	1.447	54.17	1.432
12.17	1.453	54.25	1.432
12.25	1.453	54.33	1.432
12.33	1.453	54.42	1.432
12.42	1.453	54.5	1.432
12.5	1.453	54.58	1.432
12.58	1.453	54.67	1.432
12.67	1.453	54.75	1.432
12.75	1.453	54.83	1.423
12.83	1.453	54.92	1.432
12.92	1.453	55.	1.423
13.	1.453	55.08	1.432
13.08	1.453	55.17	1.423
13.17	1.453	55.25	1.432
13.25	1.453	55.33	1.432
13.33	1.453	55.42	1.432

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
13.42	1.441	55.5	1.423
13.5	1.441	55.58	1.423
13.58	1.45	55.67	1.432
13.67	1.45	55.75	1.423
13.75	1.45	55.83	1.423
13.83	1.45	55.92	1.432
13.92	1.459	56.	1.432
14.	1.459	56.08	1.432
14.08	1.45	56.17	1.432
14.17	1.45	56.25	1.423
14.25	1.45	56.33	1.423
14.33	1.45	56.42	1.432
14.42	1.45	56.5	1.432
14.5	1.45	56.58	1.432
14.58	1.45	56.67	1.432
14.67	1.453	56.75	1.432
14.75	1.447	56.83	1.432
14.83	1.453	56.92	1.432
14.92	1.453	57.	1.432
15.	1.441	57.08	1.432
15.08	1.453	57.17	1.432
15.17	1.453	57.25	1.423
15.25	1.453	57.33	1.432
15.33	1.453	57.42	1.432
15.42	1.447	57.5	1.423
15.5	1.453	57.58	1.432
15.58	1.453	57.67	1.432
15.67	1.447	57.75	1.432
15.75	1.453	57.83	1.432
15.83	1.447	57.92	1.432
15.92	1.453	58.	1.432
16.	1.447	58.08	1.432
16.08	1.447	58.17	1.423
16.17	1.453	58.25	1.432
16.25	1.453	58.33	1.432
16.33	1.453	58.42	1.432
16.42	1.453	58.5	1.432
16.5	1.453	58.58	1.432
16.58	1.462	58.67	1.423
16.67	1.453	58.75	1.432
16.75	1.453	58.83	1.432
16.83	1.453	58.92	1.423
16.92	1.45	59.	1.423
17.	1.459	59.08	1.423
17.08	1.45	59.17	1.423
17.17	1.453	59.25	1.432
17.25	1.45	59.33	1.423
17.33	1.459	59.42	1.423
17.42	1.45	59.5	1.423
17.5	1.45	59.58	1.423
17.58	1.45	59.67	1.423
17.67	1.45	59.75	1.432
17.75	1.45	59.83	1.417
17.83	1.45	59.92	1.423
17.92	1.459	60.	1.423
18.	1.45	60.08	1.432
18.08	1.45	60.17	1.423
18.17	1.459	60.25	1.423
18.25	1.45	60.33	1.423
18.33	1.45	60.42	1.432
18.42	1.45	60.5	1.423
18.5	1.45	60.58	1.423
18.58	1.45	60.67	1.423
18.67	1.45	60.75	1.432
18.75	1.45	60.83	1.423
18.83	1.441	60.92	1.423

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
18.92	1.441	61.	1.423
19.	1.45	61.08	1.423
19.08	1.441	61.17	1.432
19.17	1.45	61.25	1.423
19.25	1.45	61.33	1.423
19.33	1.45	61.42	1.423
19.42	1.45	61.5	1.423
19.5	1.45	61.58	1.423
19.58	1.45	61.67	1.423
19.67	1.45	61.75	1.423
19.75	1.45	61.83	1.423
19.83	1.45	61.92	1.423
19.92	1.45	62.	1.423
20.	1.45	62.08	1.423
20.08	1.441	62.17	1.423
20.17	1.45	62.25	1.423
20.25	1.45	62.33	1.423
20.33	1.441	62.42	1.423
20.42	1.441	62.5	1.423
20.5	1.45	62.58	1.432
20.58	1.45	62.67	1.423
20.67	1.447	62.75	1.423
20.75	1.441	62.83	1.432
20.83	1.441	62.92	1.423
20.92	1.45	63.	1.432
21.	1.441	63.08	1.423
21.08	1.45	63.17	1.417
21.17	1.432	63.25	1.423
21.25	1.441	63.33	1.423
21.33	1.45	63.42	1.423
21.42	1.441	63.5	1.423
21.5	1.441	63.58	1.423
21.58	1.45	63.67	1.429
21.67	1.441	63.75	1.423
21.75	1.447	63.83	1.423
21.83	1.441	63.92	1.423
21.92	1.441	64.	1.429
22.	1.441	64.08	1.429
22.08	1.447	64.17	1.423
22.17	1.45	64.25	1.42
22.25	1.441	64.33	1.429
22.33	1.447	64.42	1.429
22.42	1.441	64.5	1.429
22.5	1.441	64.58	1.423
22.58	1.441	64.67	1.423
22.67	1.447	64.75	1.423
22.75	1.432	64.83	1.423
22.83	1.441	64.92	1.423
22.92	1.447	65.	1.423
23.	1.441	65.08	1.429
23.08	1.441	65.17	1.429
23.17	1.447	65.25	1.429
23.25	1.441	65.33	1.423
23.33	1.441	65.42	1.423
23.42	1.45	65.5	1.423
23.5	1.441	65.58	1.423
23.58	1.453	65.67	1.438
23.67	1.45	65.75	1.429
23.75	1.45	65.83	1.429
23.83	1.45	65.92	1.438
23.92	1.45	66.	1.423
24.	1.45	66.08	1.429
24.08	1.45	66.17	1.423
24.17	1.45	66.25	1.423
24.25	1.441	66.33	1.423
24.33	1.441	66.42	1.417

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
24.42	1.441	66.5	1.423
24.5	1.45	66.58	1.423
24.58	1.45	66.67	1.42
24.67	1.441	66.75	1.423
24.75	1.45	66.83	1.429
24.83	1.441	66.92	1.429
24.92	1.45	67.	1.429
25.	1.45	67.08	1.429
25.08	1.45	67.17	1.429
25.17	1.45	67.25	1.429
25.25	1.45	67.33	1.429
25.33	1.441	67.42	1.423
25.42	1.45	67.5	1.429
25.5	1.441	67.58	1.429
25.58	1.441	67.67	1.429
25.67	1.441	67.75	1.429
25.75	1.447	67.83	1.429
25.83	1.441	67.92	1.42
25.92	1.45	68.	1.429
26.	1.45	68.08	1.42
26.08	1.441	68.17	1.42
26.17	1.441	68.25	1.429
26.25	1.45	68.33	1.42
26.33	1.441	68.42	1.417
26.42	1.441	68.5	1.42
26.5	1.441	68.58	1.42
26.58	1.45	68.67	1.42
26.67	1.45	68.75	1.42
26.75	1.45	68.83	1.42
26.83	1.45	68.92	1.42
26.92	1.45	69.	1.417
27.	1.45	69.08	1.42
27.08	1.459	69.17	1.42
27.17	1.45	69.25	1.429
27.25	1.45	69.33	1.42
27.33	1.441	69.42	1.42
27.42	1.441	69.5	1.42
27.5	1.45	69.58	1.42
27.58	1.441	69.67	1.42
27.67	1.441	69.75	1.42
27.75	1.441	69.83	1.42
27.83	1.441	69.92	1.42
27.92	1.45	70.	1.42
28.	1.45	70.08	1.42
28.08	1.45	70.17	1.41
28.17	1.45	70.25	1.42
28.25	1.45	70.33	1.41
28.33	1.441	70.42	1.42
28.42	1.45	70.5	1.42
28.5	1.45	70.58	1.42
28.58	1.441	70.67	1.42
28.67	1.45	70.75	1.42
28.75	1.45	70.83	1.42
28.83	1.45	70.92	1.42
28.92	1.45	71.	1.42
29.	1.45	71.08	1.417
29.08	1.45	71.17	1.42
29.17	1.45	71.25	1.42
29.25	1.45	71.33	1.42
29.33	1.45	71.42	1.41
29.42	1.45	71.5	1.42
29.5	1.45	71.58	1.42
29.58	1.441	71.67	1.42
29.67	1.45	71.75	1.42
29.75	1.45	71.83	1.42
29.83	1.45	71.92	1.42

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
29.92	1.45	72.	1.42
30.	1.45	72.08	1.42
30.08	1.441	72.17	1.42
30.17	1.441	72.25	1.42
30.25	1.441	72.33	1.42
30.33	1.441	72.42	1.42
30.42	1.441	72.5	1.42
30.5	1.441	72.58	1.41
30.58	1.45	72.67	1.41
30.67	1.45	72.75	1.41
30.75	1.441	72.83	1.42
30.83	1.441	72.92	1.42
30.92	1.441	73.	1.41
31.	1.441	73.08	1.42
31.08	1.441	73.17	1.42
31.17	1.441	73.25	1.42
31.25	1.441	73.33	1.41
31.33	1.441	73.42	1.42
31.42	1.441	73.5	1.42
31.5	1.441	73.58	1.42
31.58	1.432	73.67	1.42
31.67	1.441	73.75	1.42
31.75	1.45	73.83	1.42
31.83	1.441	73.92	1.429
31.92	1.441	74.	1.429
32.	1.441	74.08	1.42
32.08	1.441	74.17	1.429
32.17	1.441	74.25	1.42
32.25	1.441	74.33	1.429
32.33	1.45	74.42	1.429
32.42	1.45	74.5	1.42
32.5	1.441	74.58	1.42
32.58	1.441	74.67	1.42
32.67	1.441	74.75	1.42
32.75	1.441	74.83	1.42
32.83	1.441	74.92	1.42
32.92	1.441	75.	1.42
33.	1.441	75.08	1.42
33.08	1.441	75.17	1.42
33.17	1.441	75.25	1.42
33.25	1.441	75.33	1.42
33.33	1.432	75.42	1.42
33.42	1.441	75.5	1.42
33.5	1.432	75.58	1.42
33.58	1.441	75.67	1.42
33.67	1.441	75.75	1.42
33.75	1.441	75.83	1.42
33.83	1.441	75.92	1.42
33.92	1.45	76.	1.41
34.	1.447	76.08	1.42
34.08	1.441	76.17	1.42
34.17	1.432	76.25	1.42
34.25	1.453	76.33	1.42
34.33	1.441	76.42	1.42
34.42	1.441	76.5	1.42
34.5	1.441	76.58	1.41
34.58	1.441	76.67	1.42
34.67	1.438	76.75	1.42
34.75	1.447	76.83	1.429
34.83	1.441	76.92	1.429
34.92	1.447	77.	1.42
35.	1.447	77.08	1.429
35.08	1.432	77.17	1.42
35.17	1.441	77.25	1.42
35.25	1.447	77.33	1.42
35.33	1.447	77.42	1.42

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
35.42	1.441	77.5	1.42
35.5	1.432	77.58	1.42
35.58	1.447	77.67	1.42
35.67	1.441	77.75	1.41
35.75	1.453	77.83	1.41
35.83	1.441	77.92	1.42
35.92	1.447	78.	1.42
36.	1.453	78.08	1.42
36.08	1.453	78.17	1.41
36.17	1.447	78.25	1.42
36.25	1.453	78.33	1.42
36.33	1.447	78.42	1.42
36.42	1.441	78.5	1.42
36.5	1.447	78.58	1.42
36.58	1.447	78.67	1.42
36.67	1.447	78.75	1.42
36.75	1.447	78.83	1.42
36.83	1.453	78.92	1.42
36.92	1.447	79.	1.42
37.	1.453	79.08	1.42
37.08	1.447	79.17	1.42
37.17	1.453	79.25	1.42
37.25	1.453	79.33	1.42
37.33	1.447	79.42	1.42
37.42	1.447	79.5	1.42
37.5	1.453	79.58	1.429
37.58	1.447	79.67	1.42
37.67	1.447	79.75	1.42
37.75	1.447	79.83	1.42
37.83	1.453	79.92	1.41
37.92	1.447	80.	1.42
38.	1.447	80.08	1.42
38.08	1.447	80.17	1.42
38.17	1.447	80.25	1.42
38.25	1.447	80.33	1.42
38.33	1.447	80.42	1.42
38.42	1.447	80.5	1.42
38.5	1.438	80.58	1.429
38.58	1.453	80.67	1.429
38.67	1.447	80.75	1.429
38.75	1.447	80.83	1.429
38.83	1.447	80.92	1.429
38.92	1.447	81.	1.42
39.	1.438	81.08	1.42
39.08	1.438	81.17	1.429
39.17	1.438	81.25	1.429
39.25	1.438	81.33	1.42
39.33	1.438	81.42	1.42
39.42	1.438	81.5	1.429
39.5	1.447	81.58	1.42
39.58	1.438	81.67	1.42
39.67	1.438	81.75	1.42
39.75	1.438	81.83	1.42
39.83	1.438	81.92	1.42
39.92	1.438	82.	1.41
40.	1.438	82.08	1.42
40.08	1.438	82.17	1.42
40.17	1.438	82.25	1.429
40.25	1.438	82.33	1.429
40.33	1.438	82.42	1.42
40.42	1.438	82.5	1.42
40.5	1.438	82.58	1.42
40.58	1.438	82.67	1.42
40.67	1.438	82.75	1.429
40.75	1.438	82.83	1.429
40.83	1.438	82.92	1.42

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
40.92	1.438	83.	1.42
41.	1.438	83.08	1.429
41.08	1.438	83.17	1.429
41.17	1.438	83.25	1.429
41.25	1.438	83.33	1.42
41.33	1.438	83.42	1.42
41.42	1.438	83.5	1.429
41.5	1.447	83.58	1.42
41.58	1.438	83.67	1.42
41.67	1.447	83.75	1.42
41.75	1.447	83.83	1.429
41.83	1.447	83.92	1.42
41.92	1.447	84.	1.42
42.	1.447	84.08	1.42

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 ln(Re/rw): 3.441

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	1.259E-6	ft/min
y0	1.499	ft

K = 6.397E-7 cm/sec
 T = K*b = 5.778E-5 ft²/min (0.0008946 sq. cm/sec)

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	1.259E-6	2.669E-8	+/- 5.237E-8	47.18	ft/min
y0	1.499	0.001602	+/- 0.003144	935.9	ft

C.I. is approximate 95% confidence interval for parameter
 t-ratio = estimate/std. error
 No estimation window

K = 6.397E-7 cm/sec
 T = K*b = 5.778E-5 ft²/min (0.0008946 sq. cm/sec)

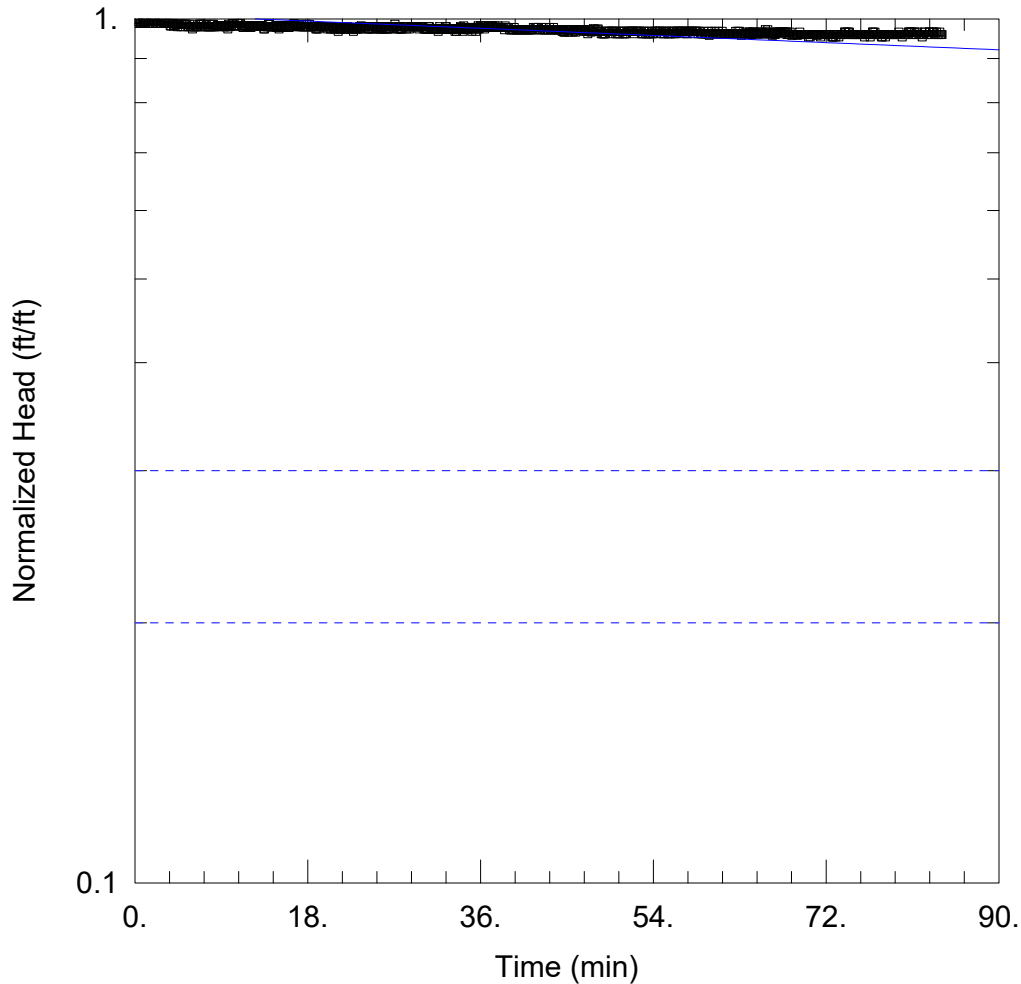
Parameter Correlations

	K	y0
K	1.00	0.86
y0	0.86	1.00

Residual Statistics

for weighted residuals

Sum of Squares 0.626 ft²
 Variance 0.000621 ft²
 Std. Deviation 0.02492 ft
 Mean 0.002886 ft
 No. of Residuals 1010
 No. of Estimates 2



MW-16 FALLING HEAD TEST

Data Set: N:\...\MW-16 Falling Head Test.aqt

Date: 10/31/24

Time: 10:37:18

PROJECT INFORMATION

Company: GHD Services Inc

Client: Viking Pump/IDEX

Project: 056934

Location: Cedar Falls, Iowa

Test Well: MW-16

Test Date: October 2024

AQUIFER DATA

Saturated Thickness: 45.88 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16)

Initial Displacement: 1.48 ft

Static Water Column Height: 45.88 ft

Total Well Penetration Depth: 45.88 ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Well Radius: 0.34 ft

SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 1.259E-6 ft/min

y0 = 1.499 ft

Data Set: N:\US\St Paul\Projects\563\056934\Workshare\Aquifer Testing\2024-04 Aquifer testing\AQT Files\MW-16
 Title: MW-16 Rising Head Test
 Date: 11/08/24
 Time: 12:51:17

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: October 2024
 Test Well: MW-16

AQUIFER DATA

Saturated Thickness: 45.88 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-16

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 1.54 ft
 Static Water Column Height: 45.88 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.34 ft
 Well Skin Radius: 0.34 ft
 Screen Length: 10. ft
 Total Well Penetration Depth: 45.88 ft

No. of Observations: 1270

Observation Data			
Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.	1.54	52.92	1.462
0.08333	1.519	53.	1.453
0.1667	1.51	53.08	1.462
0.25	1.507	53.17	1.453
0.3333	1.513	53.25	1.453
0.4167	1.498	53.33	1.453
0.5	1.498	53.42	1.453
0.5833	1.498	53.5	1.453
0.6667	1.489	53.58	1.453
0.75	1.489	53.67	1.453
0.8333	1.489	53.75	1.453
0.9167	1.489	53.83	1.462
1.	1.489	53.92	1.453
1.083	1.48	54.	1.453
1.167	1.489	54.08	1.462
1.25	1.489	54.17	1.462
1.333	1.489	54.25	1.462
1.417	1.489	54.33	1.453
1.5	1.489	54.42	1.453
1.583	1.489	54.5	1.462
1.667	1.489	54.58	1.453
1.75	1.489	54.67	1.453
1.833	1.489	54.75	1.453
1.917	1.48	54.83	1.453
2.	1.489	54.92	1.453
2.083	1.489	55.	1.453
2.167	1.48	55.08	1.462
2.25	1.48	55.17	1.453
2.333	1.48	55.25	1.453

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
2.417	1.48	55.33	1.453
2.5	1.48	55.42	1.453
2.583	1.489	55.5	1.462
2.667	1.48	55.58	1.462
2.75	1.48	55.67	1.453
2.833	1.48	55.75	1.453
2.917	1.48	55.83	1.462
3.	1.48	55.92	1.462
3.083	1.48	56.	1.453
3.167	1.48	56.08	1.462
3.25	1.48	56.17	1.453
3.333	1.48	56.25	1.462
3.417	1.48	56.33	1.462
3.5	1.48	56.42	1.462
3.583	1.489	56.5	1.453
3.667	1.48	56.58	1.453
3.75	1.48	56.67	1.462
3.833	1.48	56.75	1.462
3.917	1.489	56.83	1.462
4.	1.48	56.92	1.462
4.083	1.48	57.	1.462
4.167	1.48	57.08	1.462
4.25	1.48	57.17	1.462
4.333	1.489	57.25	1.462
4.417	1.48	57.33	1.453
4.5	1.48	57.42	1.462
4.583	1.48	57.5	1.462
4.667	1.471	57.58	1.453
4.75	1.48	57.67	1.462
4.833	1.48	57.75	1.462
4.917	1.48	57.83	1.462
5.	1.471	57.92	1.453
5.083	1.471	58.	1.462
5.167	1.471	58.08	1.462
5.25	1.48	58.17	1.462
5.333	1.48	58.25	1.453
5.417	1.471	58.33	1.453
5.5	1.48	58.42	1.453
5.583	1.471	58.5	1.462
5.667	1.471	58.58	1.462
5.75	1.48	58.67	1.453
5.833	1.48	58.75	1.453
5.917	1.471	58.83	1.453
6.	1.471	58.92	1.453
6.083	1.48	59.	1.453
6.167	1.471	59.08	1.453
6.25	1.48	59.17	1.453
6.333	1.471	59.25	1.462
6.417	1.471	59.33	1.462
6.5	1.48	59.42	1.462
6.583	1.48	59.5	1.453
6.667	1.48	59.58	1.447
6.75	1.471	59.67	1.453
6.833	1.48	59.75	1.447
6.917	1.471	59.83	1.453
7.	1.48	59.92	1.453
7.083	1.48	60.	1.453
7.167	1.489	60.08	1.453
7.25	1.48	60.17	1.453
7.333	1.48	60.25	1.453
7.417	1.48	60.33	1.462
7.5	1.48	60.42	1.462
7.583	1.48	60.5	1.453
7.667	1.48	60.58	1.453
7.75	1.48	60.67	1.453
7.833	1.48	60.75	1.453

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
7.917	1.489	60.83	1.462
8.	1.489	60.92	1.462
8.083	1.48	61.	1.453
8.167	1.48	61.08	1.453
8.25	1.489	61.17	1.462
8.333	1.48	61.25	1.462
8.417	1.48	61.33	1.462
8.5	1.48	61.42	1.453
8.583	1.48	61.5	1.453
8.667	1.489	61.58	1.453
8.75	1.489	61.67	1.462
8.833	1.48	61.75	1.462
8.917	1.48	61.83	1.453
9.	1.48	61.92	1.462
9.083	1.471	62.	1.462
9.167	1.471	62.08	1.453
9.25	1.471	62.17	1.453
9.333	1.48	62.25	1.453
9.417	1.48	62.33	1.453
9.5	1.48	62.42	1.453
9.583	1.48	62.5	1.453
9.667	1.48	62.58	1.462
9.75	1.48	62.67	1.453
9.833	1.48	62.75	1.462
9.917	1.471	62.83	1.453
10.	1.48	62.92	1.453
10.08	1.48	63.	1.453
10.17	1.48	63.08	1.453
10.25	1.48	63.17	1.453
10.33	1.48	63.25	1.453
10.42	1.471	63.33	1.453
10.5	1.471	63.42	1.453
10.58	1.48	63.5	1.453
10.67	1.48	63.58	1.453
10.75	1.471	63.67	1.462
10.83	1.471	63.75	1.453
10.92	1.471	63.83	1.453
11.	1.471	63.92	1.453
11.08	1.471	64.	1.453
11.17	1.471	64.08	1.453
11.25	1.471	64.17	1.453
11.33	1.471	64.25	1.453
11.42	1.471	64.33	1.453
11.5	1.471	64.42	1.462
11.58	1.471	64.5	1.462
11.67	1.471	64.58	1.453
11.75	1.471	64.67	1.453
11.83	1.471	64.75	1.453
11.92	1.471	64.83	1.447
12.	1.471	64.92	1.447
12.08	1.471	65.	1.447
12.17	1.471	65.08	1.453
12.25	1.471	65.17	1.453
12.33	1.48	65.25	1.447
12.42	1.471	65.33	1.447
12.5	1.48	65.42	1.447
12.58	1.471	65.5	1.447
12.67	1.471	65.58	1.453
12.75	1.48	65.67	1.447
12.83	1.471	65.75	1.453
12.92	1.471	65.83	1.462
13.	1.48	65.92	1.453
13.08	1.48	66.	1.447
13.17	1.48	66.08	1.447
13.25	1.48	66.17	1.453
13.33	1.471	66.25	1.453

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
13.42	1.471	66.33	1.453
13.5	1.48	66.42	1.453
13.58	1.48	66.5	1.447
13.67	1.471	66.58	1.447
13.75	1.48	66.67	1.447
13.83	1.48	66.75	1.453
13.92	1.48	66.83	1.447
14.	1.48	66.92	1.453
14.08	1.471	67.	1.447
14.17	1.48	67.08	1.447
14.25	1.48	67.17	1.447
14.33	1.48	67.25	1.453
14.42	1.48	67.33	1.447
14.5	1.471	67.42	1.447
14.58	1.471	67.5	1.453
14.67	1.471	67.58	1.453
14.75	1.471	67.67	1.453
14.83	1.471	67.75	1.447
14.92	1.462	67.83	1.453
15.	1.471	67.92	1.453
15.08	1.471	68.	1.453
15.17	1.48	68.08	1.453
15.25	1.471	68.17	1.447
15.33	1.471	68.25	1.453
15.42	1.471	68.33	1.453
15.5	1.471	68.42	1.453
15.58	1.471	68.5	1.453
15.67	1.471	68.58	1.453
15.75	1.471	68.67	1.447
15.83	1.471	68.75	1.447
15.92	1.471	68.83	1.447
16.	1.471	68.92	1.447
16.08	1.471	69.	1.447
16.17	1.471	69.08	1.453
16.25	1.471	69.17	1.462
16.33	1.48	69.25	1.453
16.42	1.471	69.33	1.453
16.5	1.462	69.42	1.453
16.58	1.471	69.5	1.453
16.67	1.471	69.58	1.453
16.75	1.471	69.67	1.447
16.83	1.471	69.75	1.453
16.92	1.471	69.83	1.462
17.	1.471	69.92	1.453
17.08	1.471	70.	1.453
17.17	1.471	70.08	1.453
17.25	1.471	70.17	1.453
17.33	1.471	70.25	1.453
17.42	1.471	70.33	1.453
17.5	1.471	70.42	1.453
17.58	1.471	70.5	1.453
17.67	1.471	70.58	1.453
17.75	1.471	70.67	1.462
17.83	1.471	70.75	1.453
17.92	1.471	70.83	1.453
18.	1.462	70.92	1.447
18.08	1.462	71.	1.453
18.17	1.471	71.08	1.447
18.25	1.462	71.17	1.447
18.33	1.462	71.25	1.453
18.42	1.471	71.33	1.447
18.5	1.471	71.42	1.453
18.58	1.471	71.5	1.453
18.67	1.462	71.58	1.453
18.75	1.471	71.67	1.453
18.83	1.462	71.75	1.453

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
18.92	1.471	71.83	1.453
19.	1.471	71.92	1.462
19.08	1.471	72.	1.453
19.17	1.462	72.08	1.453
19.25	1.471	72.17	1.453
19.33	1.471	72.25	1.453
19.42	1.471	72.33	1.453
19.5	1.462	72.42	1.453
19.58	1.471	72.5	1.462
19.67	1.462	72.58	1.462
19.75	1.462	72.67	1.453
19.83	1.462	72.75	1.453
19.92	1.462	72.83	1.453
20.	1.462	72.92	1.453
20.08	1.471	73.	1.453
20.17	1.471	73.08	1.453
20.25	1.462	73.17	1.453
20.33	1.462	73.25	1.447
20.42	1.471	73.33	1.453
20.5	1.471	73.42	1.447
20.58	1.471	73.5	1.453
20.67	1.471	73.58	1.453
20.75	1.462	73.67	1.453
20.83	1.471	73.75	1.453
20.92	1.471	73.83	1.453
21.	1.462	73.92	1.453
21.08	1.462	74.	1.453
21.17	1.462	74.08	1.453
21.25	1.462	74.17	1.447
21.33	1.462	74.25	1.453
21.42	1.462	74.33	1.447
21.5	1.471	74.42	1.447
21.58	1.471	74.5	1.447
21.67	1.471	74.58	1.453
21.75	1.462	74.67	1.453
21.83	1.462	74.75	1.453
21.92	1.471	74.83	1.453
22.	1.462	74.92	1.453
22.08	1.462	75.	1.447
22.17	1.471	75.08	1.453
22.25	1.471	75.17	1.447
22.33	1.471	75.25	1.453
22.42	1.462	75.33	1.453
22.5	1.471	75.42	1.453
22.58	1.471	75.5	1.453
22.67	1.462	75.58	1.453
22.75	1.471	75.67	1.453
22.83	1.462	75.75	1.453
22.92	1.462	75.83	1.453
23.	1.462	75.92	1.462
23.08	1.471	76.	1.453
23.17	1.462	76.08	1.453
23.25	1.471	76.17	1.453
23.33	1.471	76.25	1.453
23.42	1.462	76.33	1.453
23.5	1.471	76.42	1.453
23.58	1.471	76.5	1.462
23.67	1.471	76.58	1.453
23.75	1.471	76.67	1.453
23.83	1.462	76.75	1.453
23.92	1.471	76.83	1.462
24.	1.471	76.92	1.462
24.08	1.471	77.	1.462
24.17	1.471	77.08	1.462
24.25	1.471	77.17	1.462
24.33	1.471	77.25	1.453

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
24.42	1.471	77.33	1.462
24.5	1.471	77.42	1.462
24.58	1.471	77.5	1.453
24.67	1.462	77.58	1.462
24.75	1.471	77.67	1.462
24.83	1.462	77.75	1.453
24.92	1.471	77.83	1.462
25.	1.471	77.92	1.462
25.08	1.471	78.	1.462
25.17	1.471	78.08	1.453
25.25	1.471	78.17	1.453
25.33	1.462	78.25	1.462
25.42	1.471	78.33	1.453
25.5	1.462	78.42	1.453
25.58	1.462	78.5	1.447
25.67	1.471	78.58	1.447
25.75	1.462	78.67	1.447
25.83	1.462	78.75	1.453
25.92	1.462	78.83	1.453
26.	1.462	78.92	1.453
26.08	1.462	79.	1.453
26.17	1.471	79.08	1.453
26.25	1.462	79.17	1.453
26.33	1.462	79.25	1.453
26.42	1.462	79.33	1.453
26.5	1.471	79.42	1.453
26.58	1.471	79.5	1.453
26.67	1.471	79.58	1.453
26.75	1.462	79.67	1.453
26.83	1.462	79.75	1.447
26.92	1.462	79.83	1.447
27.	1.462	79.92	1.453
27.08	1.462	80.	1.453
27.17	1.453	80.08	1.447
27.25	1.462	80.17	1.453
27.33	1.471	80.25	1.447
27.42	1.462	80.33	1.447
27.5	1.462	80.42	1.453
27.58	1.462	80.5	1.453
27.67	1.462	80.58	1.447
27.75	1.462	80.67	1.453
27.83	1.453	80.75	1.453
27.92	1.462	80.83	1.453
28.	1.462	80.92	1.447
28.08	1.462	81.	1.447
28.17	1.462	81.08	1.453
28.25	1.462	81.17	1.453
28.33	1.453	81.25	1.453
28.42	1.462	81.33	1.453
28.5	1.453	81.42	1.447
28.58	1.462	81.5	1.447
28.67	1.462	81.58	1.447
28.75	1.462	81.67	1.447
28.83	1.462	81.75	1.447
28.92	1.462	81.83	1.447
29.	1.462	81.92	1.447
29.08	1.453	82.	1.447
29.17	1.462	82.08	1.447
29.25	1.471	82.17	1.447
29.33	1.462	82.25	1.447
29.42	1.462	82.33	1.447
29.5	1.471	82.42	1.447
29.58	1.462	82.5	1.453
29.67	1.471	82.58	1.447
29.75	1.462	82.67	1.447
29.83	1.462	82.75	1.447

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
29.92	1.462	82.83	1.453
30.	1.462	82.92	1.447
30.08	1.471	83.	1.453
30.17	1.462	83.08	1.447
30.25	1.462	83.17	1.447
30.33	1.462	83.25	1.447
30.42	1.462	83.33	1.453
30.5	1.462	83.42	1.447
30.58	1.462	83.5	1.453
30.67	1.462	83.58	1.453
30.75	1.462	83.67	1.453
30.83	1.462	83.75	1.447
30.92	1.462	83.83	1.453
31.	1.462	83.92	1.453
31.08	1.453	84.	1.447
31.17	1.462	84.08	1.453
31.25	1.453	84.17	1.453
31.33	1.462	84.25	1.447
31.42	1.453	84.33	1.447
31.5	1.453	84.42	1.462
31.58	1.462	84.5	1.453
31.67	1.462	84.58	1.453
31.75	1.462	84.67	1.453
31.83	1.453	84.75	1.453
31.92	1.462	84.83	1.447
32.	1.453	84.92	1.453
32.08	1.462	85.	1.453
32.17	1.462	85.08	1.453
32.25	1.462	85.17	1.447
32.33	1.462	85.25	1.453
32.42	1.453	85.33	1.447
32.5	1.462	85.42	1.447
32.58	1.462	85.5	1.453
32.67	1.471	85.58	1.447
32.75	1.462	85.67	1.453
32.83	1.462	85.75	1.453
32.92	1.462	85.83	1.453
33.	1.462	85.92	1.453
33.08	1.462	86.	1.462
33.17	1.462	86.08	1.453
33.25	1.462	86.17	1.453
33.33	1.462	86.25	1.453
33.42	1.462	86.33	1.453
33.5	1.462	86.42	1.453
33.58	1.462	86.5	1.453
33.67	1.462	86.58	1.453
33.75	1.462	86.67	1.453
33.83	1.462	86.75	1.453
33.92	1.462	86.83	1.453
34.	1.462	86.92	1.453
34.08	1.462	87.	1.453
34.17	1.453	87.08	1.453
34.25	1.462	87.17	1.453
34.33	1.462	87.25	1.453
34.42	1.453	87.33	1.453
34.5	1.453	87.42	1.453
34.58	1.462	87.5	1.453
34.67	1.462	87.58	1.453
34.75	1.462	87.67	1.453
34.83	1.462	87.75	1.453
34.92	1.453	87.83	1.453
35.	1.462	87.92	1.453
35.08	1.462	88.	1.453
35.17	1.462	88.08	1.453
35.25	1.462	88.17	1.453
35.33	1.462	88.25	1.453

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
35.42	1.462	88.33	1.447
35.5	1.462	88.42	1.453
35.58	1.453	88.5	1.453
35.67	1.462	88.58	1.453
35.75	1.453	88.67	1.453
35.83	1.462	88.75	1.453
35.92	1.462	88.83	1.453
36.	1.453	88.92	1.453
36.08	1.462	89.	1.453
36.17	1.462	89.08	1.453
36.25	1.453	89.17	1.453
36.33	1.453	89.25	1.453
36.42	1.462	89.33	1.453
36.5	1.462	89.42	1.447
36.58	1.462	89.5	1.453
36.67	1.462	89.58	1.447
36.75	1.462	89.67	1.447
36.83	1.462	89.75	1.447
36.92	1.462	89.83	1.447
37.	1.462	89.92	1.447
37.08	1.462	90.	1.438
37.17	1.462	90.08	1.447
37.25	1.453	90.17	1.447
37.33	1.462	90.25	1.447
37.42	1.462	90.33	1.447
37.5	1.462	90.42	1.447
37.58	1.453	90.5	1.447
37.67	1.453	90.58	1.447
37.75	1.462	90.67	1.453
37.83	1.462	90.75	1.447
37.92	1.453	90.83	1.447
38.	1.453	90.92	1.453
38.08	1.462	91.	1.453
38.17	1.462	91.08	1.447
38.25	1.462	91.17	1.453
38.33	1.462	91.25	1.447
38.42	1.462	91.33	1.453
38.5	1.462	91.42	1.453
38.58	1.462	91.5	1.453
38.67	1.471	91.58	1.453
38.75	1.471	91.67	1.453
38.83	1.453	91.75	1.447
38.92	1.462	91.83	1.447
39.	1.462	91.92	1.447
39.08	1.453	92.	1.447
39.17	1.462	92.08	1.453
39.25	1.462	92.17	1.447
39.33	1.462	92.25	1.447
39.42	1.462	92.33	1.453
39.5	1.453	92.42	1.447
39.58	1.453	92.5	1.447
39.67	1.453	92.58	1.447
39.75	1.453	92.67	1.447
39.83	1.453	92.75	1.447
39.92	1.453	92.83	1.453
40.	1.462	92.92	1.447
40.08	1.462	93.	1.453
40.17	1.462	93.08	1.453
40.25	1.453	93.17	1.447
40.33	1.453	93.25	1.447
40.42	1.462	93.33	1.447
40.5	1.462	93.42	1.453
40.58	1.453	93.5	1.447
40.67	1.453	93.58	1.447
40.75	1.453	93.67	1.453
40.83	1.453	93.75	1.447

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
40.92	1.453	93.83	1.453
41.	1.453	93.92	1.447
41.08	1.453	94.	1.447
41.17	1.462	94.08	1.447
41.25	1.462	94.17	1.453
41.33	1.462	94.25	1.453
41.42	1.462	94.33	1.453
41.5	1.462	94.42	1.453
41.58	1.462	94.5	1.453
41.67	1.453	94.58	1.447
41.75	1.453	94.67	1.447
41.83	1.462	94.75	1.453
41.92	1.453	94.83	1.447
42.	1.462	94.92	1.453
42.08	1.471	95.	1.447
42.17	1.462	95.08	1.453
42.25	1.453	95.17	1.453
42.33	1.453	95.25	1.453
42.42	1.453	95.33	1.453
42.5	1.462	95.42	1.453
42.58	1.453	95.5	1.453
42.67	1.462	95.58	1.453
42.75	1.462	95.67	1.453
42.83	1.453	95.75	1.453
42.92	1.462	95.83	1.462
43.	1.462	95.92	1.447
43.08	1.462	96.	1.453
43.17	1.462	96.08	1.453
43.25	1.453	96.17	1.453
43.33	1.462	96.25	1.453
43.42	1.453	96.33	1.453
43.5	1.462	96.42	1.447
43.58	1.462	96.5	1.447
43.67	1.462	96.58	1.453
43.75	1.462	96.67	1.453
43.83	1.462	96.75	1.453
43.92	1.462	96.83	1.453
44.	1.462	96.92	1.447
44.08	1.462	97.	1.447
44.17	1.453	97.08	1.453
44.25	1.453	97.17	1.453
44.33	1.453	97.25	1.447
44.42	1.453	97.33	1.453
44.5	1.462	97.42	1.453
44.58	1.462	97.5	1.453
44.67	1.453	97.58	1.453
44.75	1.447	97.67	1.453
44.83	1.453	97.75	1.447
44.92	1.462	97.83	1.453
45.	1.462	97.92	1.447
45.08	1.453	98.	1.453
45.17	1.462	98.08	1.453
45.25	1.453	98.17	1.453
45.33	1.462	98.25	1.453
45.42	1.462	98.33	1.447
45.5	1.462	98.42	1.447
45.58	1.462	98.5	1.453
45.67	1.462	98.58	1.453
45.75	1.462	98.67	1.453
45.83	1.462	98.75	1.453
45.92	1.462	98.83	1.453
46.	1.462	98.92	1.453
46.08	1.471	99.	1.453
46.17	1.462	99.08	1.453
46.25	1.462	99.17	1.453
46.33	1.462	99.25	1.453

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
46.42	1.462	99.33	1.453
46.5	1.462	99.42	1.453
46.58	1.462	99.5	1.453
46.67	1.462	99.58	1.447
46.75	1.462	99.67	1.453
46.83	1.462	99.75	1.447
46.92	1.462	99.83	1.447
47.	1.462	99.92	1.447
47.08	1.462	100.	1.447
47.17	1.462	100.1	1.453
47.25	1.462	100.2	1.453
47.33	1.462	100.3	1.447
47.42	1.471	100.3	1.447
47.5	1.462	100.4	1.453
47.58	1.471	100.5	1.453
47.67	1.471	100.6	1.453
47.75	1.471	100.7	1.453
47.83	1.462	100.8	1.453
47.92	1.462	100.8	1.453
48.	1.462	100.9	1.453
48.08	1.462	101.	1.453
48.17	1.462	101.1	1.453
48.25	1.462	101.2	1.453
48.33	1.462	101.3	1.453
48.42	1.471	101.3	1.453
48.5	1.471	101.4	1.453
48.58	1.462	101.5	1.453
48.67	1.462	101.6	1.453
48.75	1.462	101.7	1.453
48.83	1.453	101.8	1.462
48.92	1.462	101.8	1.453
49.	1.462	101.9	1.453
49.08	1.462	102.	1.453
49.17	1.462	102.1	1.453
49.25	1.462	102.2	1.453
49.33	1.453	102.3	1.453
49.42	1.462	102.3	1.453
49.5	1.462	102.4	1.453
49.58	1.462	102.5	1.453
49.67	1.462	102.6	1.453
49.75	1.462	102.7	1.453
49.83	1.462	102.8	1.453
49.92	1.453	102.8	1.462
50.	1.462	102.9	1.453
50.08	1.462	103.	1.447
50.17	1.462	103.1	1.453
50.25	1.453	103.2	1.453
50.33	1.462	103.3	1.453
50.42	1.453	103.3	1.447
50.5	1.462	103.4	1.453
50.58	1.453	103.5	1.453
50.67	1.453	103.6	1.453
50.75	1.462	103.7	1.447
50.83	1.462	103.8	1.453
50.92	1.462	103.8	1.453
51.	1.462	103.9	1.453
51.08	1.462	104.	1.447
51.17	1.462	104.1	1.447
51.25	1.462	104.2	1.453
51.33	1.453	104.3	1.453
51.42	1.462	104.3	1.453
51.5	1.462	104.4	1.453
51.58	1.471	104.5	1.453
51.67	1.462	104.6	1.453
51.75	1.462	104.7	1.453
51.83	1.462	104.8	1.453

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
51.92	1.462	104.8	1.453
52.	1.453	104.9	1.453
52.08	1.453	105.	1.453
52.17	1.453	105.1	1.453
52.25	1.453	105.2	1.462
52.33	1.453	105.3	1.453
52.42	1.462	105.3	1.453
52.5	1.462	105.4	1.453
52.58	1.453	105.5	1.453
52.67	1.453	105.6	1.453
52.75	1.453	105.7	1.459
52.83	1.462	105.8	1.459

SOLUTION

Slug Test

Aquifer Model: Confined

Solution Method: Bouwer-Rice

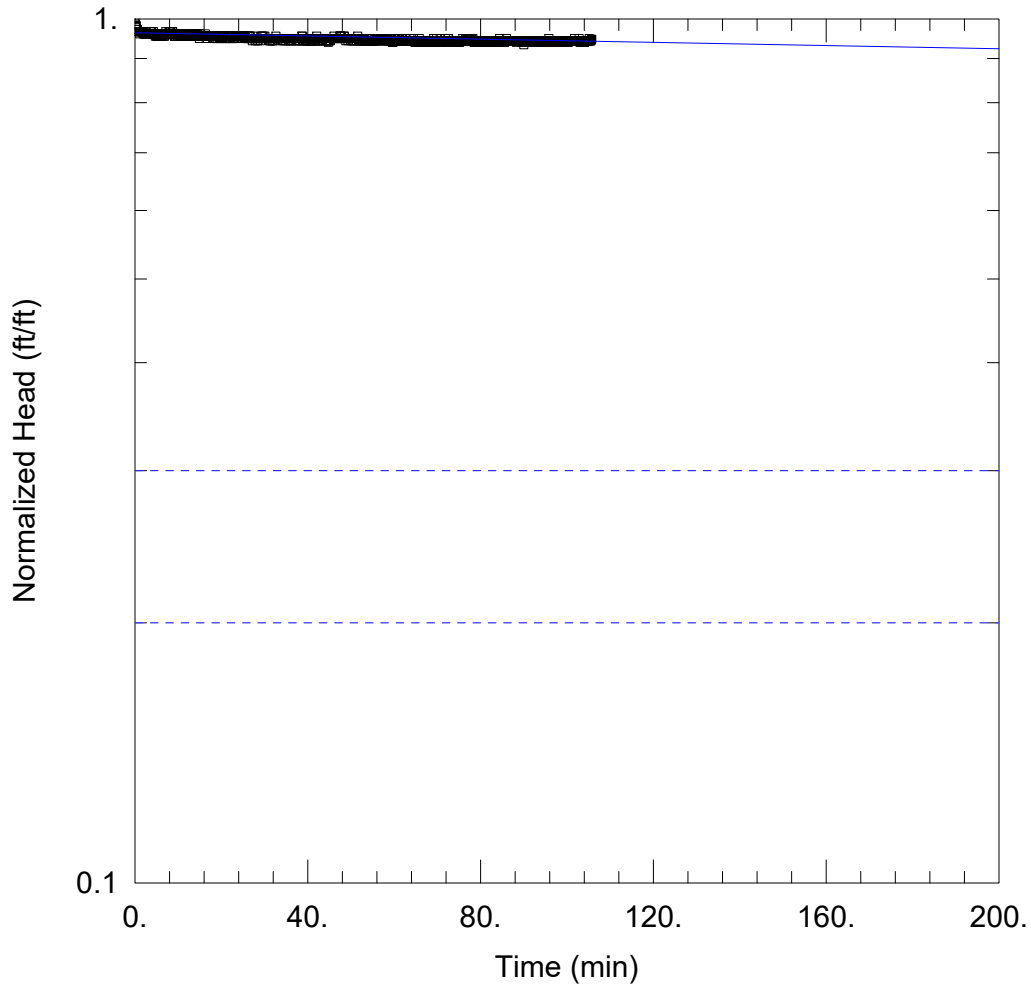
ln(Re/rw): 3.441

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	2.534E-7	ft/min
y0	1.484	ft

K = 1.287E-7 cm/sec

T = K*b = 1.163E-5 ft²/min (0.00018 sq. cm/sec)



MW-16 RISING HEAD TEST

Data Set: N:\...\MW-16 Rising Head Test.aqt

Date: 11/08/24

Time: 12:50:21

PROJECT INFORMATION

Company: GHD Services Inc

Client: Viking Pump/IDEX

Project: 056934

Location: Cedar Falls, Iowa

Test Well: MW-16

Test Date: October 2024

AQUIFER DATA

Saturated Thickness: 45.88 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16)

Initial Displacement: 1.54 ft

Static Water Column Height: 45.88 ft

Total Well Penetration Depth: 45.88 ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Well Radius: 0.34 ft

SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 2.534E-7 ft/min

y0 = 1.484 ft

Data Set: G:\563\056934\Workshare\Aquifer Testing\2024-04 Aquifer testing\AQT Files\MW-17R Falling Head Test
 Title: MW-17R Falling Head Test
 Date: 12/11/24
 Time: 09:38:37

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: April 2024
 Test Well: MW-17R

AQUIFER DATA

Saturated Thickness: 7.96 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-17R

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 2.18 ft
 Static Water Column Height: 7.96 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.34 ft
 Well Skin Radius: 0.34 ft
 Screen Length: 5. ft
 Total Well Penetration Depth: 7.96 ft

No. of Observations: 320

Observation Data			
Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.	2.18	5.333	0.1263
0.03333	1.501	5.367	0.1263
0.06667	1.468	5.4	0.1263
0.1	1.432	5.433	0.1263
0.1333	1.407	5.467	0.1263
0.1667	1.374	5.5	0.1263
0.2	1.35	5.533	0.1263
0.2333	1.329	5.567	0.1263
0.2667	1.293	5.6	0.1143
0.3	1.281	5.633	0.1083
0.3333	1.26	5.667	0.1083
0.3667	1.236	5.7	0.1083
0.4	1.203	5.733	0.09624
0.4333	1.179	5.767	0.1083
0.4667	1.167	5.8	0.1083
0.5	1.149	5.833	0.1083
0.5333	1.122	5.867	0.09624
0.5667	1.104	5.9	0.09624
0.6	1.08	5.933	0.09624
0.6333	1.056	5.967	0.09624
0.6667	1.047	6.	0.09624
0.7	1.023	6.033	0.09624
0.7333	0.9985	6.067	0.09624
0.7667	0.9774	6.1	0.09624
0.8	0.9654	6.133	0.09624
0.8333	0.9534	6.167	0.08421
0.8667	0.9413	6.2	0.09624
0.9	0.9143	6.233	0.09624
0.9333	0.8902	6.267	0.08421

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.9667	0.8782	6.3	0.08421
1.	0.8691	6.333	0.08421
1.033	0.8451	6.367	0.08421
1.067	0.8331	6.4	0.08421
1.1	0.821	6.433	0.08421
1.133	0.8	6.467	0.08421
1.167	0.788	6.5	0.07519
1.2	0.7759	6.533	0.08421
1.233	0.7639	6.567	0.08421
1.267	0.7428	6.6	0.07519
1.3	0.7459	6.633	0.07519
1.333	0.7248	6.667	0.07519
1.367	0.7128	6.7	0.07519
1.4	0.7007	6.733	0.07519
1.433	0.6887	6.767	0.07519
1.467	0.6767	6.8	0.07519
1.5	0.6646	6.833	0.0782
1.533	0.6556	6.867	0.07519
1.567	0.6556	6.9	0.07519
1.6	0.6316	6.933	0.07519
1.633	0.6195	6.967	0.0782
1.667	0.6075	7.	0.07519
1.7	0.6075	7.033	0.06918
1.733	0.5955	7.067	0.0782
1.767	0.5865	7.1	0.0782
1.8	0.5744	7.133	0.06918
1.833	0.5744	7.167	0.06918
1.867	0.5624	7.2	0.06918
1.9	0.5504	7.233	0.06918
1.933	0.5504	7.267	0.06918
1.967	0.5383	7.3	0.06918
2.	0.5293	7.333	0.06918
2.033	0.5173	7.367	0.06918
2.067	0.5052	7.4	0.06918
2.1	0.5052	7.433	0.06918
2.133	0.4932	7.467	0.06918
2.167	0.4812	7.5	0.06918
2.2	0.4692	7.533	0.06918
2.233	0.4692	7.567	0.06918
2.267	0.4481	7.6	0.06918
2.3	0.4481	7.633	0.05715
2.333	0.4361	7.667	0.05715
2.367	0.4361	7.7	0.06918
2.4	0.424	7.733	0.05715
2.433	0.424	7.767	0.05715
2.467	0.412	7.8	0.05715
2.5	0.412	7.833	0.05715
2.533	0.4	7.867	0.05715
2.567	0.4	7.9	0.05715
2.6	0.391	7.933	0.05715
2.633	0.391	7.967	0.05715
2.667	0.3789	8.	0.05715
2.7	0.3789	8.033	0.04512
2.733	0.3669	8.067	0.05715
2.767	0.3669	8.1	0.05715
2.8	0.3549	8.133	0.05715
2.833	0.3549	8.167	0.05715
2.867	0.3549	8.2	0.04512
2.9	0.3428	8.233	0.05715
2.933	0.3428	8.267	0.04512
2.967	0.3338	8.3	0.05715
3.	0.3338	8.333	0.05715
3.033	0.3218	8.367	0.05715
3.067	0.3218	8.4	0.05715
3.1	0.3218	8.433	0.05715
3.133	0.3158	8.467	0.05715

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
3.167	0.3038	8.5	0.05715
3.2	0.2917	8.533	0.04512
3.233	0.2917	8.567	0.05715
3.267	0.2917	8.6	0.05715
3.3	0.2917	8.633	0.04512
3.333	0.2797	8.667	0.04512
3.367	0.2797	8.7	0.04512
3.4	0.2797	8.733	0.04512
3.433	0.2707	8.767	0.04512
3.467	0.2707	8.8	0.04512
3.5	0.2586	8.833	0.04512
3.533	0.2586	8.867	0.04512
3.567	0.2586	8.9	0.04512
3.6	0.2586	8.933	0.04512
3.633	0.2466	8.967	0.03309
3.667	0.2466	9.	0.04512
3.7	0.2466	9.033	0.04512
3.733	0.2346	9.067	0.04512
3.767	0.2346	9.1	0.04512
3.8	0.2346	9.133	0.04512
3.833	0.2226	9.167	0.04512
3.867	0.2135	9.2	0.03309
3.9	0.2135	9.233	0.04512
3.933	0.2226	9.267	0.04512
3.967	0.2135	9.3	0.03309
4.	0.2135	9.333	0.03309
4.033	0.2135	9.367	0.04512
4.067	0.2015	9.4	0.04512
4.1	0.2015	9.433	0.04512
4.133	0.2015	9.467	0.04512
4.167	0.2015	9.5	0.03309
4.2	0.1895	9.533	0.03309
4.233	0.1895	9.567	0.03309
4.267	0.1895	9.6	0.04512
4.3	0.1895	9.633	0.02707
4.333	0.1774	9.667	0.0391
4.367	0.1774	9.7	0.03309
4.4	0.1774	9.733	0.02707
4.433	0.1774	9.767	0.0391
4.467	0.1654	9.8	0.02707
4.5	0.1774	9.833	0.02707
4.533	0.1654	9.867	0.02707
4.567	0.1654	9.9	0.02707
4.6	0.1654	9.933	0.02707
4.633	0.1654	9.967	0.02707
4.667	0.1534	10.	0.02707
4.7	0.1654	10.03	0.02707
4.733	0.1534	10.07	0.02707
4.767	0.1534	10.1	0.02707
4.8	0.1534	10.13	0.01504
4.833	0.1534	10.17	0.02707
4.867	0.1444	10.2	0.02707
4.9	0.1444	10.23	0.02707
4.933	0.1444	10.27	0.02707
4.967	0.1474	10.3	0.02707
5.	0.1474	10.33	0.02707
5.033	0.1474	10.37	0.02707
5.067	0.1384	10.4	0.02707
5.1	0.1323	10.43	0.02707
5.133	0.1323	10.47	0.02707
5.167	0.1323	10.5	0.02707
5.2	0.1323	10.53	0.02707
5.233	0.1384	10.57	0.02707
5.267	0.1263	10.6	0.01504
5.3	0.1384	10.63	0.01504

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 ln(Re/rw): 2.222

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0007739	ft/min
y0	1.496	ft

K = 0.0003931 cm/sec
 T = K*b = 0.00616 ft²/min (0.09538 sq. cm/sec)

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	0.0007739	8.692E-6	+/- 1.71E-5	89.04	ft/min
y0	1.496	0.01169	+/- 0.02299	128.	ft

C.I. is approximate 95% confidence interval for parameter
 t-ratio = estimate/std. error
 No estimation window

K = 0.0003931 cm/sec
 T = K*b = 0.00616 ft²/min (0.09538 sq. cm/sec)

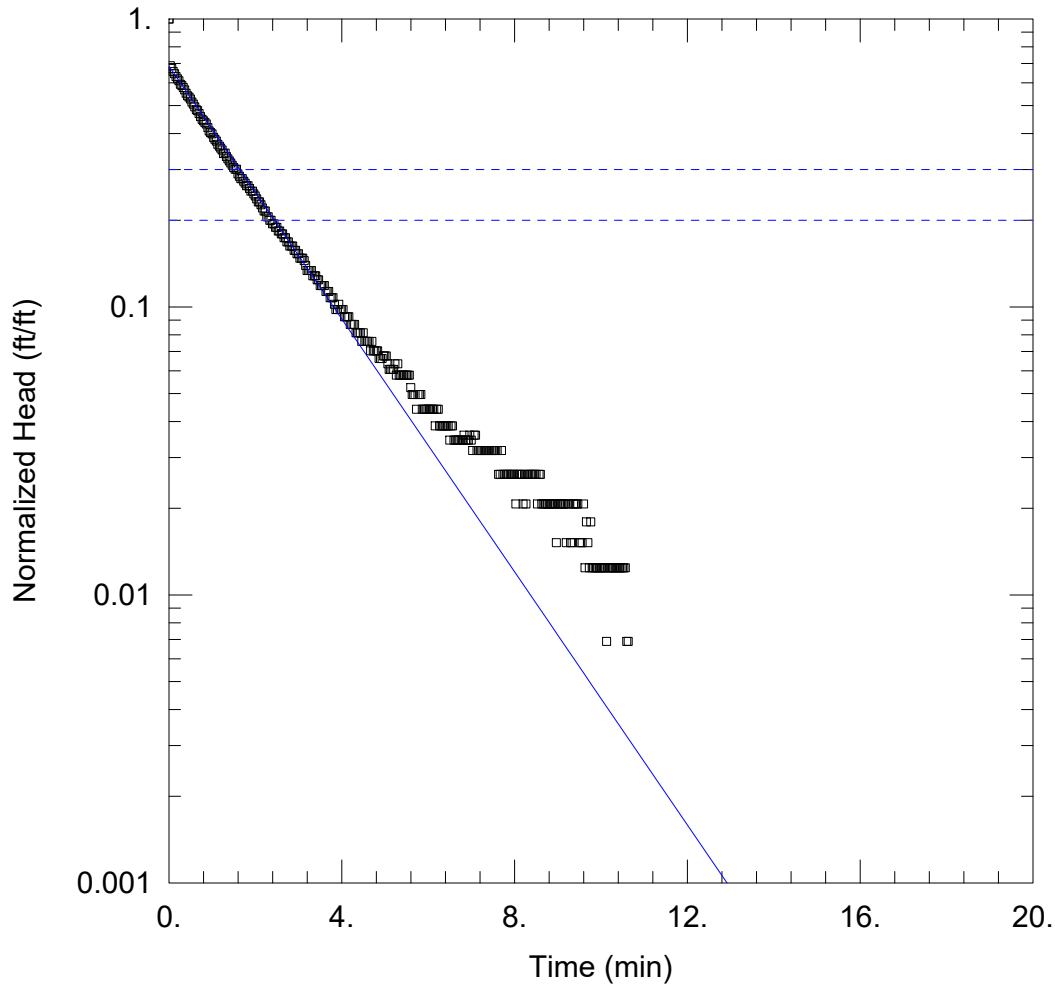
Parameter Correlations

	K	y0
K	1.00	0.70
y0	0.70	1.00

Residual Statistics

for weighted residuals

Sum of Squares 0.6627 ft²
 Variance 0.002084 ft²
 Std. Deviation 0.04565 ft
 Mean 0.01292 ft
 No. of Residuals 320
 No. of Estimates 2



MW-17R FALLING HEAD TEST

Data Set: G:\...\MW-17R Falling Head Test.aqt

Date: 12/11/24

Time: 09:37:44

PROJECT INFORMATION

Company: GHD Services Inc

Client: Viking Pump/IDEX

Project: 056934

Location: Cedar Falls, Iowa

Test Well: MW-17R

Test Date: April 2024

AQUIFER DATA

Saturated Thickness: 7.96 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-17R)

Initial Displacement: 2.18 ft

Static Water Column Height: 7.96 ft

Total Well Penetration Depth: 7.96 ft

Screen Length: 5. ft

Casing Radius: 0.083 ft

Well Radius: 0.34 ft

SOLUTION

Aquifer Model: Unconfined

Solution Method: Bowser-Rice

K = 0.0007739 ft/min

y0 = 1.496 ft

Data Set: G:\563\056934\Workshare\Aquifer Testing\2024-04 Aquifer testing\AQT Files\MW-17R Rising Head Test
 Title: MW-17R Rising Head Test
 Date: 12/11/24
 Time: 09:40:02

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: April 2024
 Test Well: MW-17R

AQUIFER DATA

Saturated Thickness: 7.96 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-17R

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 1.597 ft
 Static Water Column Height: 7.96 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.34 ft
 Well Skin Radius: 0.34 ft
 Screen Length: 5. ft
 Total Well Penetration Depth: 7.96 ft

No. of Observations: 208

Time (min)	Observation Data		Displacement (ft)
	Displacement (ft)	Time (min)	
0.	1.597	3.467	0.2406
0.03333	1.54	3.5	0.2406
0.06667	1.495	3.533	0.2286
0.1	1.447	3.567	0.2286
0.1333	1.414	3.6	0.2286
0.1667	1.377	3.633	0.2286
0.2	1.344	3.667	0.2165
0.2333	1.311	3.7	0.2165
0.2667	1.287	3.733	0.2165
0.3	1.251	3.767	0.2165
0.3333	1.218	3.8	0.2165
0.3667	1.182	3.833	0.2105
0.4	1.173	3.867	0.2105
0.4333	1.137	3.9	0.2105
0.4667	1.113	3.933	0.2105
0.5	1.092	3.967	0.2105
0.5333	1.068	4.	0.1985
0.5667	1.047	4.033	0.1955
0.6	1.023	4.067	0.1955
0.6333	0.9985	4.1	0.1955
0.6667	0.9774	4.133	0.1895
0.7	0.9534	4.167	0.1895
0.7333	0.9413	4.2	0.1895
0.7667	0.9173	4.233	0.1895
0.8	0.8962	4.267	0.1895
0.8333	0.8842	4.3	0.1895
0.8667	0.8722	4.333	0.1895
0.9	0.8571	4.367	0.1774
0.9333	0.8451	4.4	0.1774

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.9667	0.821	4.433	0.1774
1.	0.809	4.467	0.1774
1.033	0.797	4.5	0.1774
1.067	0.7819	4.533	0.1774
1.1	0.7579	4.567	0.1654
1.133	0.7459	4.6	0.1654
1.167	0.7218	4.633	0.1654
1.2	0.7128	4.667	0.1654
1.233	0.7007	4.7	0.1534
1.267	0.6887	4.733	0.1534
1.3	0.6767	4.767	0.1654
1.333	0.6646	4.8	0.1534
1.367	0.6436	4.833	0.1534
1.4	0.6316	4.867	0.1534
1.433	0.6195	4.9	0.1414
1.467	0.6075	4.933	0.1534
1.5	0.5955	4.967	0.1534
1.533	0.5955	5.	0.1414
1.567	0.5865	5.033	0.1414
1.6	0.5744	5.067	0.1534
1.633	0.5624	5.1	0.1414
1.667	0.5504	5.133	0.1414
1.7	0.5383	5.167	0.1414
1.733	0.5383	5.2	0.1414
1.767	0.5263	5.233	0.1293
1.8	0.5173	5.267	0.1293
1.833	0.5052	5.3	0.1293
1.867	0.5052	5.333	0.1293
1.9	0.4932	5.367	0.1293
1.933	0.4812	5.4	0.1293
1.967	0.4812	5.433	0.1293
2.	0.4692	5.467	0.1293
2.033	0.4601	5.5	0.1203
2.067	0.4601	5.533	0.1293
2.1	0.4481	5.567	0.1293
2.133	0.4361	5.6	0.1203
2.167	0.424	5.633	0.1203
2.2	0.424	5.667	0.1203
2.233	0.412	5.7	0.1203
2.267	0.412	5.733	0.1203
2.3	0.4	5.767	0.1203
2.333	0.4	5.8	0.1203
2.367	0.4	5.833	0.1203
2.4	0.391	5.867	0.1083
2.433	0.3789	5.9	0.1083
2.467	0.3789	5.933	0.1203
2.5	0.3669	5.967	0.1083
2.533	0.3669	6.	0.1083
2.567	0.3549	6.033	0.1083
2.6	0.3549	6.067	0.1083
2.633	0.3428	6.1	0.1083
2.667	0.3428	6.133	0.1083
2.7	0.3428	6.167	0.1083
2.733	0.3308	6.2	0.1083
2.767	0.3218	6.233	0.1083
2.8	0.3308	6.267	0.1083
2.833	0.3218	6.3	0.1083
2.867	0.3098	6.333	0.1083
2.9	0.3098	6.367	0.09624
2.933	0.2977	6.4	0.09624
2.967	0.2977	6.433	0.09624
3.	0.2977	6.467	0.09624
3.033	0.2857	6.5	0.09624
3.067	0.2857	6.533	0.09624
3.1	0.2857	6.567	0.09624
3.133	0.2857	6.6	0.09624

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
3.167	0.2737	6.633	0.09624
3.2	0.2647	6.667	0.09624
3.233	0.2647	6.7	0.09624
3.267	0.2647	6.733	0.09624
3.3	0.2526	6.767	0.09624
3.333	0.2526	6.8	0.09624
3.367	0.2406	6.833	0.09624
3.4	0.2406	6.867	0.09023
3.433	0.2406	6.9	0.0782

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 ln(Re/rw): 2.222

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0007097	ft/min
y0	1.185	ft

K = 0.0003605 cm/sec
 T = K*b = 0.005649 ft²/min (0.08747 sq. cm/sec)

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	0.0008046	8.928E-6	+/- 1.76E-5	90.11	ft/min
y0	1.432	0.01093	+/- 0.02154	131.	ft

C.I. is approximate 95% confidence interval for parameter
 t-ratio = estimate/std. error
 No estimation window

K = 0.0004087 cm/sec
 T = K*b = 0.006404 ft²/min (0.09916 sq. cm/sec)

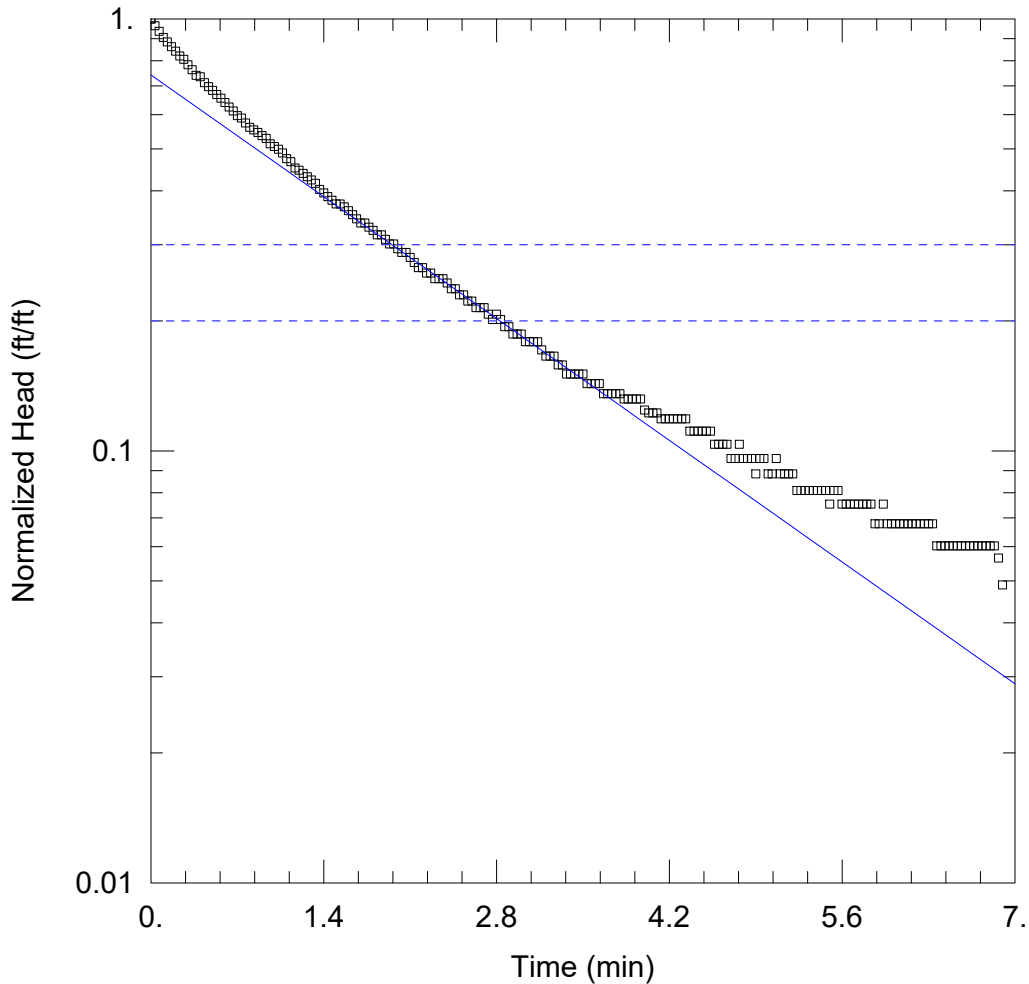
Parameter Correlations

	K	y0
K	1.00	0.71
y0	0.71	1.00

Residual Statistics

for weighted residuals

Sum of Squares 0.3567 ft²
 Variance 0.001732 ft²
 Std. Deviation 0.04161 ft
 Mean 0.0135 ft
 No. of Residuals 208
 No. of Estimates 2



MW-17R RISING HEAD TEST

Data Set: G:\...\MW-17R Rising Head Test.aqt

Date: 12/11/24

Time: 09:39:28

PROJECT INFORMATION

Company: GHD Services Inc

Client: Viking Pump/IDEX

Project: 056934

Location: Cedar Falls, Iowa

Test Well: MW-17R

Test Date: April 2024

AQUIFER DATA

Saturated Thickness: 7.96 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-17R)

Initial Displacement: 1.597 ft

Static Water Column Height: 7.96 ft

Total Well Penetration Depth: 7.96 ft

Screen Length: 5. ft

Casing Radius: 0.083 ft

Well Radius: 0.34 ft

SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.0007097 ft/min

y0 = 1.185 ft

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-19 Falling Head Test.aqt
 Title: MW-19 Falling Head Test
 Date: 05/29/24
 Time: 13:03:38

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: 04-04-24
 Test Well: MW-19

AQUIFER DATA

Saturated Thickness: 20.02 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-19

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 1.783 ft
 Static Water Column Height: 20.02 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.34 ft
 Well Skin Radius: 0.34 ft
 Screen Length: 10. ft
 Total Well Penetration Depth: 20.02 ft

No. of Observations: 139

Time (min)	Observation Data		Displacement (ft)
	Displacement (ft)	Time (min)	
0.	1.783	2.333	0.3007
0.03333	0.7849	2.367	0.2887
0.06667	1.278	2.4	0.2887
0.1	1.266	2.433	0.2887
0.1333	1.221	2.467	0.2887
0.1667	1.188	2.5	0.2767
0.2	1.152	2.533	0.2767
0.2333	1.107	2.567	0.2767
0.2667	1.071	2.6	0.2677
0.3	1.038	2.633	0.2677
0.3333	1.001	2.667	0.2677
0.3667	0.9684	2.7	0.2647
0.4	0.9443	2.733	0.2647
0.4333	0.9233	2.767	0.2526
0.4667	0.8872	2.8	0.2526
0.5	0.8661	2.833	0.2556

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
0.5333	0.8541	2.867	0.2436
0.5667	0.818	2.9	0.2436
0.6	0.806	2.933	0.2436
0.6333	0.7849	2.967	0.2436
0.6667	0.7609	3.	0.2436
0.7	0.7489	3.033	0.2316
0.7333	0.7278	3.067	0.2316
0.7667	0.7037	3.1	0.2316
0.8	0.6917	3.133	0.2316
0.8333	0.6706	3.167	0.2195
0.8667	0.6676	3.2	0.2195
0.9	0.6466	3.233	0.2195
0.9333	0.6346	3.267	0.2195
0.9667	0.6105	3.3	0.2195
1.	0.5985	3.333	0.2195
1.033	0.5895	3.367	0.2075
1.067	0.5774	3.4	0.2195
1.1	0.5654	3.433	0.2075
1.133	0.5534	3.467	0.2075
1.167	0.5413	3.5	0.2075
1.2	0.5323	3.533	0.2075
1.233	0.5203	3.567	0.2075
1.267	0.5082	3.6	0.1985
1.3	0.4962	3.633	0.1985
1.333	0.4842	3.667	0.1955
1.367	0.4722	3.7	0.1955
1.4	0.4722	3.733	0.1865
1.433	0.4631	3.767	0.1865
1.467	0.4511	3.8	0.1955
1.5	0.4511	3.833	0.1865
1.533	0.4391	3.867	0.1865
1.567	0.427	3.9	0.1865
1.6	0.415	3.933	0.1865
1.633	0.415	3.967	0.1865
1.667	0.406	4.	0.1744
1.7	0.406	4.033	0.1744
1.733	0.394	4.067	0.1744
1.767	0.3819	4.1	0.1744
1.8	0.3819	4.133	0.1744
1.833	0.3699	4.167	0.1744
1.867	0.3699	4.2	0.1744
1.9	0.3579	4.233	0.1744
1.933	0.3579	4.267	0.1624
1.967	0.3458	4.3	0.1744
2.	0.3458	4.333	0.1624
2.033	0.3368	4.367	0.1624
2.067	0.3248	4.4	0.1744
2.1	0.3248	4.433	0.1624
2.133	0.3248	4.467	0.1624
2.167	0.3248	4.5	0.1624
2.2	0.3248	4.533	0.1624
2.233	0.3128	4.567	0.1624
2.267	0.3128	4.6	0.1624

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
2.3	0.3007		

SOLUTION

Slug Test

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$\ln(R_e/r_w)$: 2.974

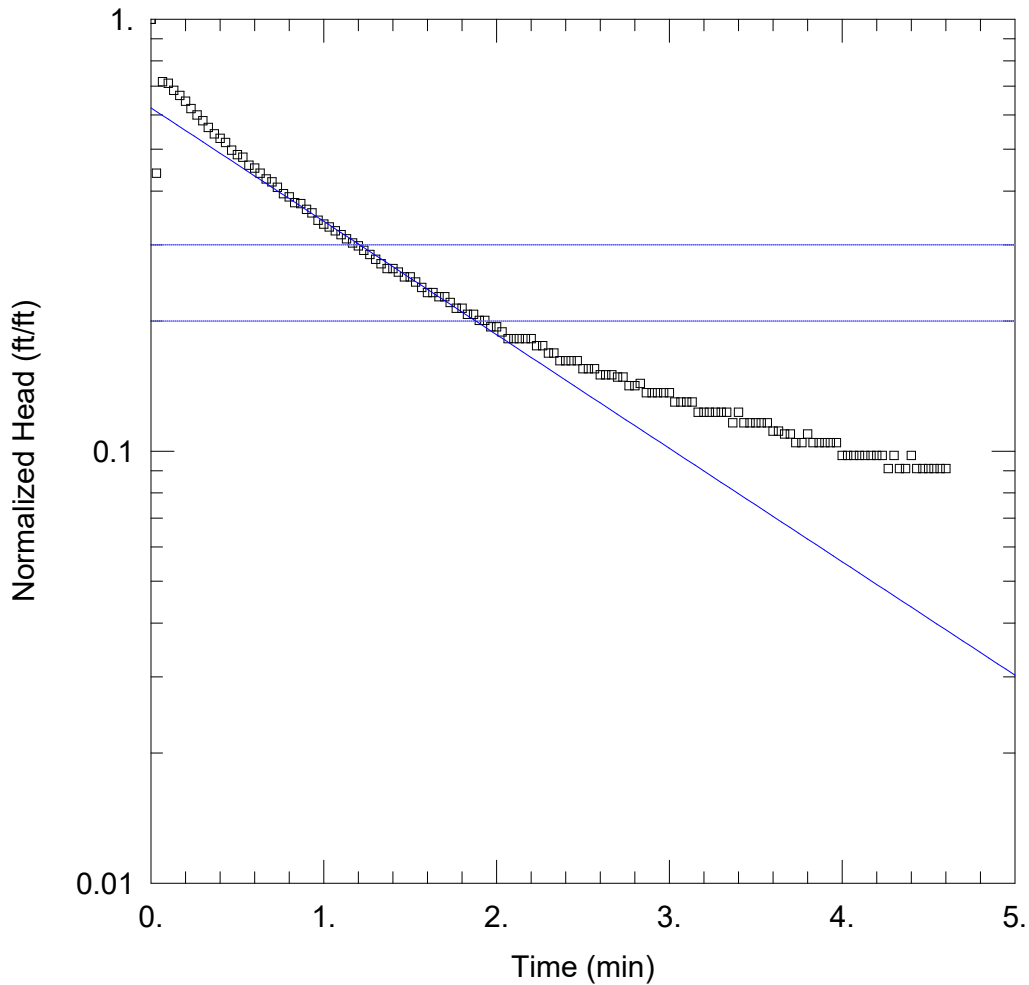
VISUAL ESTIMATION RESULTS

Estimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	0.0006193	ft/min
y0	1.111	ft

$K = 0.0003146$ cm/sec

$T = K \cdot b = 0.0124$ ft²/min (0.192 sq. cm/sec)



MW-19 FALLING HEAD TEST

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-19 Falling Head Test.aqt
 Date: 05/29/24 Time: 13:03:21

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Well: MW-19
 Test Date: 04-04-24

AQUIFER DATA

Saturated Thickness: 20.02 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-19)

Initial Displacement: 1.783 ft Static Water Column Height: 20.02 ft
 Total Well Penetration Depth: 20.02 ft Screen Length: 10. ft
 Casing Radius: 0.083 ft Well Radius: 0.34 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bower-Rice
 K = 0.0006193 ft/min y0 = 1.111 ft

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-19 Rising Head Test.aqt
 Title: MW-19 Rising Head Test
 Date: 05/29/24
 Time: 13:04:49

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: 04-04-24
 Test Well: MW-19

AQUIFER DATA

Saturated Thickness: 20.02 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-19

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 1.552 ft
 Static Water Column Height: 20.02 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.34 ft
 Well Skin Radius: 0.34 ft
 Screen Length: 10. ft
 Total Well Penetration Depth: 20.02 ft

No. of Observations: 207

Time (min)	Observation Data		Displacement (ft)
	Displacement (ft)	Time (min)	
0.	1.552	3.467	0.2977
0.03333	1.462	3.5	0.2977
0.06667	1.392	3.533	0.2977
0.1	1.344	3.567	0.2977
0.1333	1.299	3.6	0.2857
0.1667	1.254	3.633	0.2857
0.2	1.218	3.667	0.2857
0.2333	1.185	3.7	0.2857
0.2667	1.149	3.733	0.2857
0.3	1.116	3.767	0.2857
0.3333	1.08	3.8	0.2857
0.3667	1.059	3.833	0.2767
0.4	1.035	3.867	0.2767
0.4333	1.011	3.9	0.2767
0.4667	0.9895	3.933	0.2767
0.5	0.9654	3.967	0.2767

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
0.5333	0.9413	4.	0.2767
0.5667	0.9203	4.033	0.2767
0.6	0.9083	4.067	0.2767
0.6333	0.8842	4.1	0.2767
0.6667	0.8631	4.133	0.2647
0.7	0.8511	4.167	0.2647
0.7333	0.827	4.2	0.2647
0.7667	0.806	4.233	0.2647
0.8	0.794	4.267	0.2526
0.8333	0.7819	4.3	0.2647
0.8667	0.7699	4.333	0.2526
0.9	0.7459	4.367	0.2647
0.9333	0.7368	4.4	0.2526
0.9667	0.7248	4.433	0.2526
1.	0.7128	4.467	0.2526
1.033	0.7007	4.5	0.2526
1.067	0.6887	4.533	0.2526
1.1	0.6767	4.567	0.2526
1.133	0.6556	4.6	0.2526
1.167	0.6556	4.633	0.2526
1.2	0.6436	4.667	0.2526
1.233	0.6316	4.7	0.2406
1.267	0.6195	4.733	0.2406
1.3	0.6075	4.767	0.2406
1.333	0.6075	4.8	0.2406
1.367	0.5865	4.833	0.2406
1.4	0.5865	4.867	0.2406
1.433	0.5744	4.9	0.2406
1.467	0.5624	4.933	0.2406
1.5	0.5504	4.967	0.2406
1.533	0.5504	5.	0.2406
1.567	0.5413	5.033	0.2406
1.6	0.5413	5.067	0.2406
1.633	0.5293	5.1	0.2316
1.667	0.5173	5.133	0.2316
1.7	0.5173	5.167	0.2316
1.733	0.5052	5.2	0.2316
1.767	0.4932	5.233	0.2316
1.8	0.4932	5.267	0.2316
1.833	0.4812	5.3	0.2316
1.867	0.4812	5.333	0.2196
1.9	0.4722	5.367	0.2316
1.933	0.4722	5.4	0.2196
1.967	0.4601	5.433	0.2286
2.	0.4601	5.467	0.2165
2.033	0.4481	5.5	0.2165
2.067	0.4481	5.533	0.2165
2.1	0.4361	5.567	0.2286
2.133	0.4361	5.6	0.2165
2.167	0.4271	5.633	0.2165
2.2	0.4271	5.667	0.2165
2.233	0.415	5.7	0.2165
2.267	0.415	5.733	0.2075

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
2.3	0.415	5.767	0.2075
2.333	0.403	5.8	0.2075
2.367	0.403	5.833	0.2075
2.4	0.391	5.867	0.2075
2.433	0.391	5.9	0.2075
2.467	0.391	5.933	0.2165
2.5	0.3789	5.967	0.2075
2.533	0.3789	6.	0.2075
2.567	0.3789	6.033	0.2165
2.6	0.3699	6.067	0.2075
2.633	0.3699	6.1	0.2075
2.667	0.3549	6.133	0.2075
2.7	0.3669	6.167	0.2075
2.733	0.3579	6.2	0.2075
2.767	0.3549	6.233	0.2075
2.8	0.3428	6.267	0.2075
2.833	0.3428	6.3	0.2165
2.867	0.3428	6.333	0.2165
2.9	0.3338	6.367	0.2075
2.933	0.3428	6.4	0.2165
2.967	0.3338	6.433	0.2075
3.	0.3338	6.467	0.2075
3.033	0.3338	6.5	0.2075
3.067	0.3338	6.533	0.2075
3.1	0.3218	6.567	0.2075
3.133	0.3218	6.6	0.2075
3.167	0.3218	6.633	0.1955
3.2	0.3218	6.667	0.2075
3.233	0.3098	6.7	0.2075
3.267	0.3098	6.733	0.2075
3.3	0.3098	6.767	0.1955
3.333	0.2977	6.8	0.1835
3.367	0.3098	6.833	0.1835
3.4	0.2977	6.867	0.1835
3.433	0.2977		

SOLUTION

Slug Test

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

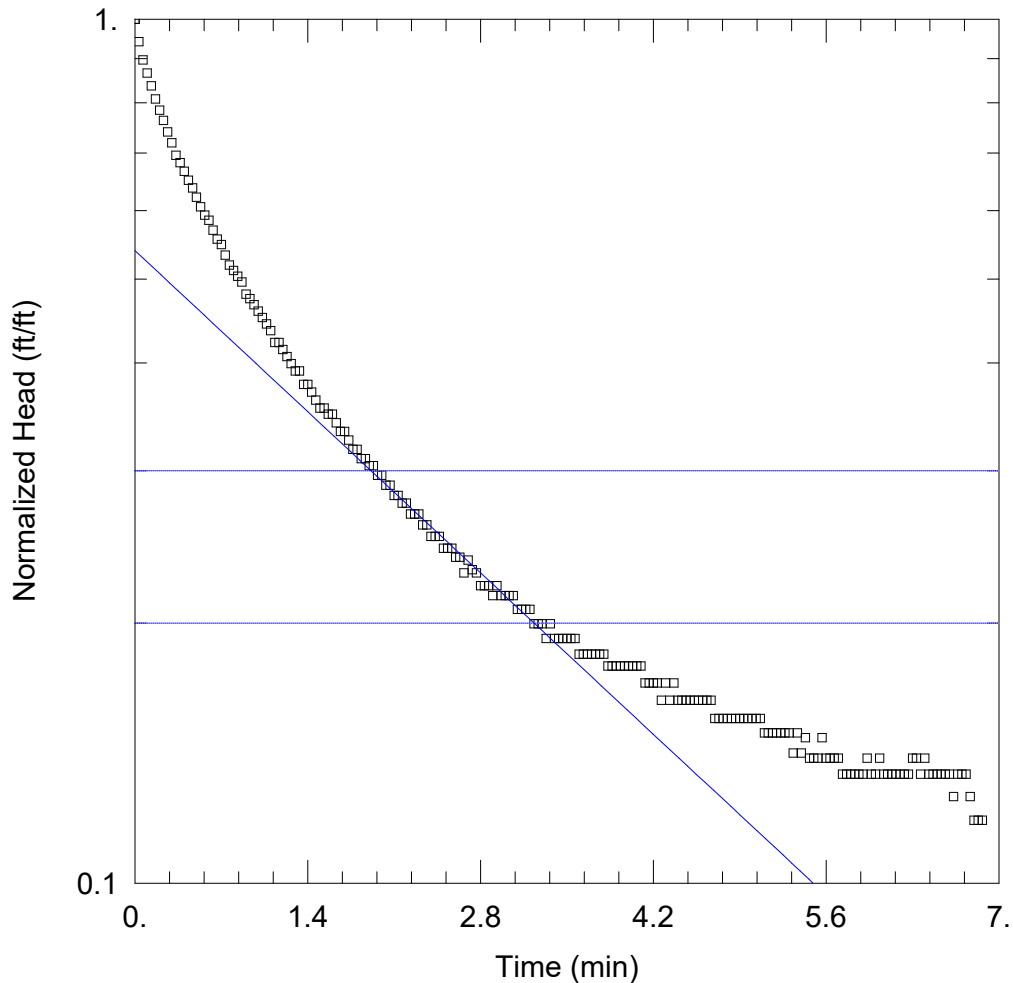
ln(Re/rw): 2.974

VISUAL ESTIMATION RESULTSEstimated Parameters

Parameter	Estimate	
K	0.0003143	ft/min
y0	0.8374	ft

K = 0.0001597 cm/sec

T = K*b = 0.006292 ft²/min (0.09742 sq. cm/sec)



MW-19 RISING HEAD TEST

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-19 Rising Head Test.aqt
 Date: 05/29/24 Time: 13:04:35

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Well: MW-19
 Test Date: 04-04-24

AQUIFER DATA

Saturated Thickness: 20.02 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-19)

Initial Displacement: 1.552 ft Static Water Column Height: 20.02 ft
 Total Well Penetration Depth: 20.02 ft Screen Length: 10. ft
 Casing Radius: 0.083 ft Well Radius: 0.34 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bower-Rice
 K = 0.0003143 ft/min y0 = 0.8374 ft

Data Set: N:\US\St Paul\Projects\563\056934\Workshare\Aquifer Testing\2024-04 Aquifer testing\AQT Files\MW-20
 Title: MW-20 Falling Head Test
 Date: 11/08/24
 Time: 12:58:34

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: October 2024
 Test Well: MW-20

AQUIFER DATA

Saturated Thickness: 44.69 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-20

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 1.492 ft
 Static Water Column Height: 44.69 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.34 ft
 Well Skin Radius: 0.34 ft
 Screen Length: 10. ft
 Total Well Penetration Depth: 44.69 ft

No. of Observations: 1615

Time (min)	Observation Data		Displacement (ft)
	Displacement (ft)	Time (min)	
0.	1.492	67.33	1.377
0.08333	1.474	67.42	1.377
0.1667	1.474	67.5	1.377
0.25	1.468	67.58	1.377
0.3333	1.477	67.67	1.377
0.4167	1.468	67.75	1.377
0.5	1.465	67.83	1.377
0.5833	1.471	67.92	1.377
0.6667	1.465	68.	1.377
0.75	1.465	68.08	1.377
0.8333	1.459	68.17	1.386
0.9167	1.459	68.25	1.377
1.	1.459	68.33	1.377
1.083	1.45	68.42	1.377
1.167	1.468	68.5	1.377
1.25	1.456	68.58	1.377
1.333	1.465	68.67	1.377
1.417	1.456	68.75	1.371
1.5	1.456	68.83	1.377
1.583	1.456	68.92	1.377
1.667	1.465	69.	1.371
1.75	1.456	69.08	1.371
1.833	1.465	69.17	1.377
1.917	1.45	69.25	1.377
2.	1.45	69.33	1.377
2.083	1.459	69.42	1.377
2.167	1.462	69.5	1.377
2.25	1.456	69.58	1.377
2.333	1.462	69.67	1.377

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
2.417	1.456	69.75	1.371
2.5	1.45	69.83	1.377
2.583	1.456	69.92	1.371
2.667	1.459	70.	1.377
2.75	1.45	70.08	1.377
2.833	1.45	70.17	1.371
2.917	1.45	70.25	1.371
3.	1.459	70.33	1.371
3.083	1.459	70.42	1.377
3.167	1.456	70.5	1.377
3.25	1.45	70.58	1.377
3.333	1.45	70.67	1.377
3.417	1.45	70.75	1.371
3.5	1.45	70.83	1.371
3.583	1.447	70.92	1.377
3.667	1.447	71.	1.377
3.75	1.447	71.08	1.371
3.833	1.447	71.17	1.38
3.917	1.447	71.25	1.371
4.	1.441	71.33	1.38
4.083	1.441	71.42	1.371
4.167	1.447	71.5	1.371
4.25	1.447	71.58	1.377
4.333	1.438	71.67	1.371
4.417	1.447	71.75	1.371
4.5	1.447	71.83	1.377
4.583	1.447	71.92	1.377
4.667	1.447	72.	1.371
4.75	1.438	72.08	1.377
4.833	1.438	72.17	1.377
4.917	1.432	72.25	1.371
5.	1.441	72.33	1.377
5.083	1.447	72.42	1.377
5.167	1.447	72.5	1.371
5.25	1.441	72.58	1.371
5.333	1.441	72.67	1.377
5.417	1.438	72.75	1.371
5.5	1.438	72.83	1.371
5.583	1.432	72.92	1.371
5.667	1.432	73.	1.371
5.75	1.438	73.08	1.371
5.833	1.438	73.17	1.377
5.917	1.438	73.25	1.371
6.	1.438	73.33	1.371
6.083	1.438	73.42	1.371
6.167	1.432	73.5	1.371
6.25	1.432	73.58	1.371
6.333	1.441	73.67	1.377
6.417	1.438	73.75	1.371
6.5	1.438	73.83	1.371
6.583	1.432	73.92	1.371
6.667	1.438	74.	1.377
6.75	1.432	74.08	1.371
6.833	1.438	74.17	1.371
6.917	1.438	74.25	1.377
7.	1.438	74.33	1.371
7.083	1.447	74.42	1.371
7.167	1.432	74.5	1.371
7.25	1.432	74.58	1.371
7.333	1.432	74.67	1.371
7.417	1.432	74.75	1.371
7.5	1.438	74.83	1.371
7.583	1.447	74.92	1.362
7.667	1.438	75.	1.362
7.75	1.447	75.08	1.371
7.833	1.441	75.17	1.371

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
7.917	1.432	75.25	1.371
8.	1.432	75.33	1.371
8.083	1.432	75.42	1.371
8.167	1.426	75.5	1.371
8.25	1.432	75.58	1.371
8.333	1.432	75.67	1.371
8.417	1.441	75.75	1.371
8.5	1.432	75.83	1.371
8.583	1.432	75.92	1.362
8.667	1.432	76.	1.377
8.75	1.432	76.08	1.371
8.833	1.426	76.17	1.371
8.917	1.432	76.25	1.371
9.	1.432	76.33	1.371
9.083	1.432	76.42	1.371
9.167	1.426	76.5	1.362
9.25	1.432	76.58	1.371
9.333	1.432	76.67	1.371
9.417	1.432	76.75	1.371
9.5	1.432	76.83	1.377
9.583	1.426	76.92	1.371
9.667	1.432	77.	1.371
9.75	1.432	77.08	1.362
9.833	1.426	77.17	1.371
9.917	1.426	77.25	1.371
10.	1.432	77.33	1.371
10.08	1.432	77.42	1.362
10.17	1.432	77.5	1.362
10.25	1.432	77.58	1.362
10.33	1.426	77.67	1.362
10.42	1.432	77.75	1.362
10.5	1.432	77.83	1.362
10.58	1.438	77.92	1.362
10.67	1.432	78.	1.371
10.75	1.438	78.08	1.362
10.83	1.438	78.17	1.362
10.92	1.447	78.25	1.362
11.	1.438	78.33	1.362
11.08	1.438	78.42	1.371
11.17	1.438	78.5	1.371
11.25	1.438	78.58	1.371
11.33	1.432	78.67	1.371
11.42	1.426	78.75	1.362
11.5	1.432	78.83	1.362
11.58	1.426	78.92	1.362
11.67	1.432	79.	1.362
11.75	1.432	79.08	1.362
11.83	1.432	79.17	1.353
11.92	1.432	79.25	1.362
12.	1.432	79.33	1.362
12.08	1.432	79.42	1.371
12.17	1.441	79.5	1.371
12.25	1.426	79.58	1.362
12.33	1.426	79.67	1.371
12.42	1.432	79.75	1.371
12.5	1.426	79.83	1.362
12.58	1.426	79.92	1.371
12.67	1.426	80.	1.371
12.75	1.432	80.08	1.362
12.83	1.426	80.17	1.362
12.92	1.426	80.25	1.362
13.	1.426	80.33	1.362
13.08	1.426	80.42	1.362
13.17	1.426	80.5	1.362
13.25	1.432	80.58	1.362
13.33	1.426	80.67	1.371

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
13.42	1.426	80.75	1.362
13.5	1.426	80.83	1.362
13.58	1.432	80.92	1.371
13.67	1.426	81.	1.362
13.75	1.426	81.08	1.371
13.83	1.426	81.17	1.362
13.92	1.426	81.25	1.362
14.	1.432	81.33	1.362
14.08	1.426	81.42	1.362
14.17	1.426	81.5	1.362
14.25	1.426	81.58	1.362
14.33	1.426	81.67	1.362
14.42	1.426	81.75	1.353
14.5	1.426	81.83	1.362
14.58	1.426	81.92	1.362
14.67	1.432	82.	1.362
14.75	1.426	82.08	1.353
14.83	1.426	82.17	1.353
14.92	1.426	82.25	1.353
15.	1.426	82.33	1.353
15.08	1.426	82.42	1.353
15.17	1.432	82.5	1.353
15.25	1.426	82.58	1.353
15.33	1.432	82.67	1.362
15.42	1.432	82.75	1.362
15.5	1.426	82.83	1.353
15.58	1.432	82.92	1.362
15.67	1.426	83.	1.362
15.75	1.426	83.08	1.362
15.83	1.426	83.17	1.362
15.92	1.432	83.25	1.362
16.	1.426	83.33	1.353
16.08	1.432	83.42	1.362
16.17	1.432	83.5	1.362
16.25	1.432	83.58	1.353
16.33	1.432	83.67	1.362
16.42	1.426	83.75	1.362
16.5	1.426	83.83	1.353
16.58	1.426	83.92	1.353
16.67	1.426	84.	1.353
16.75	1.426	84.08	1.353
16.83	1.426	84.17	1.353
16.92	1.426	84.25	1.353
17.	1.426	84.33	1.362
17.08	1.426	84.42	1.362
17.17	1.432	84.5	1.362
17.25	1.432	84.58	1.353
17.33	1.432	84.67	1.353
17.42	1.426	84.75	1.353
17.5	1.417	84.83	1.353
17.58	1.426	84.92	1.362
17.67	1.426	85.	1.362
17.75	1.426	85.08	1.353
17.83	1.426	85.17	1.353
17.92	1.426	85.25	1.362
18.	1.426	85.33	1.362
18.08	1.426	85.42	1.353
18.17	1.426	85.5	1.353
18.25	1.426	85.58	1.353
18.33	1.426	85.67	1.353
18.42	1.426	85.75	1.353
18.5	1.426	85.83	1.353
18.58	1.426	85.92	1.353
18.67	1.426	86.	1.353
18.75	1.426	86.08	1.362
18.83	1.426	86.17	1.362

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
18.92	1.426	86.25	1.362
19.	1.426	86.33	1.353
19.08	1.417	86.42	1.353
19.17	1.426	86.5	1.362
19.25	1.426	86.58	1.362
19.33	1.417	86.67	1.362
19.42	1.426	86.75	1.353
19.5	1.417	86.83	1.353
19.58	1.426	86.92	1.362
19.67	1.426	87.	1.362
19.75	1.426	87.08	1.362
19.83	1.417	87.17	1.362
19.92	1.426	87.25	1.362
20.	1.423	87.33	1.362
20.08	1.423	87.42	1.353
20.17	1.423	87.5	1.362
20.25	1.423	87.58	1.353
20.33	1.423	87.67	1.353
20.42	1.423	87.75	1.353
20.5	1.413	87.83	1.353
20.58	1.423	87.92	1.353
20.67	1.413	88.	1.353
20.75	1.404	88.08	1.353
20.83	1.423	88.17	1.362
20.92	1.413	88.25	1.362
21.	1.413	88.33	1.362
21.08	1.423	88.42	1.362
21.17	1.413	88.5	1.353
21.25	1.413	88.58	1.353
21.33	1.413	88.67	1.344
21.42	1.413	88.75	1.362
21.5	1.423	88.83	1.362
21.58	1.423	88.92	1.371
21.67	1.413	89.	1.362
21.75	1.423	89.08	1.362
21.83	1.423	89.17	1.353
21.92	1.423	89.25	1.362
22.	1.413	89.33	1.353
22.08	1.423	89.42	1.362
22.17	1.423	89.5	1.353
22.25	1.423	89.58	1.353
22.33	1.413	89.67	1.353
22.42	1.413	89.75	1.362
22.5	1.413	89.83	1.362
22.58	1.413	89.92	1.353
22.67	1.413	90.	1.362
22.75	1.413	90.08	1.353
22.83	1.413	90.17	1.362
22.92	1.413	90.25	1.353
23.	1.413	90.33	1.353
23.08	1.413	90.42	1.362
23.17	1.413	90.5	1.362
23.25	1.413	90.58	1.362
23.33	1.413	90.67	1.362
23.42	1.413	90.75	1.362
23.5	1.413	90.83	1.353
23.58	1.404	90.92	1.353
23.67	1.413	91.	1.353
23.75	1.413	91.08	1.353
23.83	1.413	91.17	1.353
23.92	1.423	91.25	1.362
24.	1.423	91.33	1.353
24.08	1.423	91.42	1.353
24.17	1.413	91.5	1.353
24.25	1.404	91.58	1.353
24.33	1.413	91.67	1.353

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
24.42	1.413	91.75	1.362
24.5	1.413	91.83	1.353
24.58	1.404	91.92	1.353
24.67	1.413	92.	1.362
24.75	1.413	92.08	1.353
24.83	1.404	92.17	1.353
24.92	1.413	92.25	1.362
25.	1.413	92.33	1.353
25.08	1.404	92.42	1.362
25.17	1.404	92.5	1.362
25.25	1.404	92.58	1.362
25.33	1.404	92.67	1.353
25.42	1.404	92.75	1.353
25.5	1.413	92.83	1.353
25.58	1.413	92.92	1.353
25.67	1.413	93.	1.353
25.75	1.413	93.08	1.353
25.83	1.413	93.17	1.353
25.92	1.413	93.25	1.353
26.	1.404	93.33	1.353
26.08	1.407	93.42	1.362
26.17	1.413	93.5	1.353
26.25	1.413	93.58	1.353
26.33	1.413	93.67	1.353
26.42	1.413	93.75	1.353
26.5	1.413	93.83	1.344
26.58	1.413	93.92	1.353
26.67	1.413	94.	1.353
26.75	1.407	94.08	1.353
26.83	1.398	94.17	1.353
26.92	1.404	94.25	1.353
27.	1.398	94.33	1.353
27.08	1.407	94.42	1.353
27.17	1.407	94.5	1.353
27.25	1.413	94.58	1.353
27.33	1.398	94.67	1.353
27.42	1.407	94.75	1.353
27.5	1.407	94.83	1.353
27.58	1.398	94.92	1.353
27.67	1.407	95.	1.344
27.75	1.398	95.08	1.353
27.83	1.398	95.17	1.353
27.92	1.398	95.25	1.353
28.	1.407	95.33	1.353
28.08	1.407	95.42	1.353
28.17	1.407	95.5	1.353
28.25	1.407	95.58	1.353
28.33	1.407	95.67	1.353
28.42	1.407	95.75	1.353
28.5	1.407	95.83	1.353
28.58	1.407	95.92	1.353
28.67	1.398	96.	1.353
28.75	1.407	96.08	1.344
28.83	1.407	96.17	1.353
28.92	1.407	96.25	1.353
29.	1.407	96.33	1.344
29.08	1.407	96.42	1.353
29.17	1.398	96.5	1.344
29.25	1.407	96.58	1.353
29.33	1.407	96.67	1.353
29.42	1.398	96.75	1.353
29.5	1.407	96.83	1.353
29.58	1.398	96.92	1.344
29.67	1.398	97.	1.344
29.75	1.398	97.08	1.353
29.83	1.398	97.17	1.353

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
29.92	1.398	97.25	1.353
30.	1.407	97.33	1.353
30.08	1.407	97.42	1.353
30.17	1.407	97.5	1.362
30.25	1.407	97.58	1.353
30.33	1.407	97.67	1.353
30.42	1.407	97.75	1.353
30.5	1.407	97.83	1.353
30.58	1.398	97.92	1.362
30.67	1.398	98.	1.362
30.75	1.398	98.08	1.353
30.83	1.407	98.17	1.353
30.92	1.407	98.25	1.353
31.	1.398	98.33	1.344
31.08	1.407	98.42	1.353
31.17	1.398	98.5	1.353
31.25	1.404	98.58	1.344
31.33	1.398	98.67	1.344
31.42	1.398	98.75	1.353
31.5	1.398	98.83	1.344
31.58	1.404	98.92	1.353
31.67	1.404	99.	1.353
31.75	1.407	99.08	1.353
31.83	1.404	99.17	1.344
31.92	1.398	99.25	1.353
32.	1.404	99.33	1.353
32.08	1.404	99.42	1.353
32.17	1.404	99.5	1.353
32.25	1.404	99.58	1.344
32.33	1.404	99.67	1.353
32.42	1.395	99.75	1.344
32.5	1.404	99.83	1.344
32.58	1.404	99.92	1.353
32.67	1.404	100.	1.344
32.75	1.404	100.1	1.344
32.83	1.404	100.2	1.344
32.92	1.404	100.3	1.344
33.	1.404	100.3	1.344
33.08	1.404	100.4	1.344
33.17	1.404	100.5	1.353
33.25	1.404	100.6	1.353
33.33	1.404	100.7	1.344
33.42	1.395	100.8	1.353
33.5	1.404	100.8	1.353
33.58	1.413	100.9	1.353
33.67	1.404	101.	1.353
33.75	1.404	101.1	1.353
33.83	1.404	101.2	1.353
33.92	1.404	101.3	1.353
34.	1.404	101.3	1.353
34.08	1.395	101.4	1.353
34.17	1.395	101.5	1.353
34.25	1.404	101.6	1.353
34.33	1.404	101.7	1.353
34.42	1.413	101.8	1.353
34.5	1.404	101.8	1.362
34.58	1.404	101.9	1.353
34.67	1.404	102.	1.353
34.75	1.404	102.1	1.353
34.83	1.395	102.2	1.353
34.92	1.404	102.3	1.353
35.	1.404	102.3	1.344
35.08	1.404	102.4	1.353
35.17	1.404	102.5	1.344
35.25	1.404	102.6	1.353
35.33	1.404	102.7	1.353

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
35.42	1.413	102.8	1.344
35.5	1.404	102.8	1.347
35.58	1.404	102.9	1.353
35.67	1.413	103.	1.353
35.75	1.404	103.1	1.344
35.83	1.404	103.2	1.353
35.92	1.395	103.3	1.353
36.	1.404	103.3	1.344
36.08	1.404	103.4	1.353
36.17	1.413	103.5	1.353
36.25	1.413	103.6	1.353
36.33	1.404	103.7	1.353
36.42	1.404	103.8	1.353
36.5	1.413	103.8	1.353
36.58	1.404	103.9	1.353
36.67	1.404	104.	1.353
36.75	1.404	104.1	1.353
36.83	1.404	104.2	1.344
36.92	1.404	104.3	1.344
37.	1.404	104.3	1.344
37.08	1.404	104.4	1.353
37.17	1.404	104.5	1.344
37.25	1.404	104.6	1.353
37.33	1.404	104.7	1.344
37.42	1.404	104.8	1.344
37.5	1.404	104.8	1.344
37.58	1.395	104.9	1.344
37.67	1.404	105.	1.344
37.75	1.404	105.1	1.344
37.83	1.404	105.2	1.353
37.92	1.404	105.3	1.353
38.	1.404	105.3	1.353
38.08	1.404	105.4	1.353
38.17	1.404	105.5	1.353
38.25	1.404	105.6	1.362
38.33	1.404	105.7	1.344
38.42	1.413	105.8	1.347
38.5	1.404	105.8	1.353
38.58	1.404	105.9	1.347
38.67	1.404	106.	1.353
38.75	1.395	106.1	1.344
38.83	1.395	106.2	1.353
38.92	1.404	106.3	1.344
39.	1.404	106.3	1.347
39.08	1.404	106.4	1.353
39.17	1.404	106.5	1.353
39.25	1.395	106.6	1.353
39.33	1.404	106.7	1.353
39.42	1.395	106.8	1.344
39.5	1.413	106.8	1.344
39.58	1.413	106.9	1.344
39.67	1.404	107.	1.344
39.75	1.404	107.1	1.338
39.83	1.395	107.2	1.344
39.92	1.395	107.3	1.344
40.	1.395	107.3	1.344
40.08	1.395	107.4	1.344
40.17	1.395	107.5	1.344
40.25	1.395	107.6	1.344
40.33	1.395	107.7	1.338
40.42	1.395	107.8	1.347
40.5	1.395	107.8	1.344
40.58	1.395	107.9	1.344
40.67	1.395	108.	1.353
40.75	1.395	108.1	1.344
40.83	1.395	108.2	1.344

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
40.92	1.395	108.3	1.344
41.	1.395	108.3	1.344
41.08	1.395	108.4	1.344
41.17	1.404	108.5	1.344
41.25	1.395	108.6	1.344
41.33	1.395	108.7	1.344
41.42	1.395	108.8	1.353
41.5	1.395	108.8	1.338
41.58	1.404	108.9	1.344
41.67	1.404	109.	1.335
41.75	1.404	109.1	1.338
41.83	1.395	109.2	1.344
41.92	1.404	109.3	1.335
42.	1.404	109.3	1.344
42.08	1.404	109.4	1.338
42.17	1.395	109.5	1.344
42.25	1.404	109.6	1.338
42.33	1.395	109.7	1.329
42.42	1.404	109.8	1.335
42.5	1.404	109.8	1.344
42.58	1.395	109.9	1.344
42.67	1.395	110.	1.353
42.75	1.395	110.1	1.344
42.83	1.404	110.2	1.344
42.92	1.404	110.3	1.344
43.	1.395	110.3	1.338
43.08	1.395	110.4	1.338
43.17	1.395	110.5	1.338
43.25	1.404	110.6	1.344
43.33	1.404	110.7	1.344
43.42	1.404	110.8	1.329
43.5	1.404	110.8	1.335
43.58	1.395	110.9	1.329
43.67	1.395	111.	1.344
43.75	1.395	111.1	1.344
43.83	1.395	111.2	1.335
43.92	1.395	111.3	1.329
44.	1.395	111.3	1.338
44.08	1.395	111.4	1.329
44.17	1.395	111.5	1.344
44.25	1.395	111.6	1.338
44.33	1.395	111.7	1.329
44.42	1.386	111.8	1.329
44.5	1.395	111.8	1.329
44.58	1.395	111.9	1.335
44.67	1.395	112.	1.329
44.75	1.386	112.1	1.335
44.83	1.395	112.2	1.335
44.92	1.395	112.3	1.329
45.	1.395	112.3	1.335
45.08	1.395	112.4	1.329
45.17	1.395	112.5	1.335
45.25	1.395	112.6	1.329
45.33	1.395	112.7	1.335
45.42	1.386	112.8	1.329
45.5	1.386	112.8	1.335
45.58	1.386	112.9	1.329
45.67	1.386	113.	1.329
45.75	1.386	113.1	1.329
45.83	1.386	113.2	1.329
45.92	1.386	113.3	1.329
46.	1.386	113.3	1.344
46.08	1.386	113.4	1.329
46.17	1.386	113.5	1.338
46.25	1.386	113.6	1.335
46.33	1.395	113.7	1.335

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
46.42	1.395	113.8	1.338
46.5	1.386	113.8	1.329
46.58	1.386	113.9	1.329
46.67	1.386	114.	1.335
46.75	1.395	114.1	1.32
46.83	1.395	114.2	1.335
46.92	1.395	114.3	1.329
47.	1.395	114.3	1.335
47.08	1.395	114.4	1.335
47.17	1.395	114.5	1.335
47.25	1.395	114.6	1.329
47.33	1.395	114.7	1.338
47.42	1.395	114.8	1.344
47.5	1.395	114.8	1.338
47.58	1.386	114.9	1.329
47.67	1.395	115.	1.329
47.75	1.395	115.1	1.329
47.83	1.395	115.2	1.329
47.92	1.395	115.3	1.329
48.	1.395	115.3	1.32
48.08	1.395	115.4	1.335
48.17	1.395	115.5	1.329
48.25	1.395	115.6	1.32
48.33	1.395	115.7	1.32
48.42	1.395	115.8	1.329
48.5	1.395	115.8	1.329
48.58	1.395	115.9	1.329
48.67	1.395	116.	1.329
48.75	1.395	116.1	1.329
48.83	1.395	116.2	1.329
48.92	1.395	116.3	1.338
49.	1.395	116.3	1.335
49.08	1.395	116.4	1.338
49.17	1.395	116.5	1.329
49.25	1.386	116.6	1.329
49.33	1.386	116.7	1.329
49.42	1.395	116.8	1.329
49.5	1.395	116.8	1.329
49.58	1.395	116.9	1.335
49.67	1.395	117.	1.335
49.75	1.395	117.1	1.338
49.83	1.395	117.2	1.338
49.92	1.395	117.3	1.338
50.	1.395	117.3	1.329
50.08	1.395	117.4	1.329
50.17	1.395	117.5	1.329
50.25	1.395	117.6	1.329
50.33	1.395	117.7	1.338
50.42	1.395	117.8	1.329
50.5	1.395	117.8	1.335
50.58	1.395	117.9	1.329
50.67	1.395	118.	1.338
50.75	1.395	118.1	1.329
50.83	1.395	118.2	1.329
50.92	1.395	118.3	1.32
51.	1.395	118.3	1.329
51.08	1.386	118.4	1.338
51.17	1.386	118.5	1.329
51.25	1.395	118.6	1.329
51.33	1.386	118.7	1.329
51.42	1.395	118.8	1.329
51.5	1.395	118.8	1.329
51.58	1.386	118.9	1.329
51.67	1.386	119.	1.329
51.75	1.386	119.1	1.329
51.83	1.395	119.2	1.329

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
51.92	1.386	119.3	1.329
52.	1.386	119.3	1.329
52.08	1.395	119.4	1.329
52.17	1.395	119.5	1.329
52.25	1.395	119.6	1.329
52.33	1.395	119.7	1.329
52.42	1.395	119.8	1.326
52.5	1.395	119.8	1.329
52.58	1.395	119.9	1.329
52.67	1.395	120.	1.329
52.75	1.386	120.1	1.329
52.83	1.386	120.2	1.329
52.92	1.395	120.3	1.329
53.	1.395	120.3	1.329
53.08	1.395	120.4	1.335
53.17	1.395	120.5	1.335
53.25	1.386	120.6	1.329
53.33	1.386	120.7	1.329
53.42	1.395	120.8	1.329
53.5	1.386	120.8	1.329
53.58	1.386	120.9	1.329
53.67	1.386	121.	1.338
53.75	1.386	121.1	1.329
53.83	1.386	121.2	1.329
53.92	1.386	121.3	1.329
54.	1.395	121.3	1.329
54.08	1.386	121.4	1.329
54.17	1.386	121.5	1.329
54.25	1.377	121.6	1.329
54.33	1.386	121.7	1.329
54.42	1.386	121.8	1.329
54.5	1.386	121.8	1.329
54.58	1.386	121.9	1.329
54.67	1.386	122.	1.329
54.75	1.386	122.1	1.329
54.83	1.377	122.2	1.338
54.92	1.386	122.3	1.329
55.	1.386	122.3	1.329
55.08	1.377	122.4	1.329
55.17	1.386	122.5	1.338
55.25	1.386	122.6	1.338
55.33	1.386	122.7	1.329
55.42	1.386	122.8	1.338
55.5	1.386	122.8	1.338
55.58	1.386	122.9	1.329
55.67	1.386	123.	1.329
55.75	1.386	123.1	1.329
55.83	1.386	123.2	1.338
55.92	1.386	123.3	1.32
56.	1.386	123.3	1.329
56.08	1.386	123.4	1.329
56.17	1.386	123.5	1.329
56.25	1.386	123.6	1.32
56.33	1.386	123.7	1.32
56.42	1.386	123.8	1.329
56.5	1.386	123.8	1.32
56.58	1.386	123.9	1.329
56.67	1.386	124.	1.329
56.75	1.386	124.1	1.329
56.83	1.377	124.2	1.329
56.92	1.386	124.3	1.329
57.	1.386	124.3	1.329
57.08	1.386	124.4	1.32
57.17	1.377	124.5	1.32
57.25	1.377	124.6	1.329
57.33	1.386	124.7	1.329

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
57.42	1.386	124.8	1.329
57.5	1.386	124.8	1.329
57.58	1.395	124.9	1.329
57.67	1.386	125.	1.32
57.75	1.377	125.1	1.32
57.83	1.386	125.2	1.329
57.92	1.386	125.3	1.32
58.	1.386	125.3	1.329
58.08	1.386	125.4	1.329
58.17	1.386	125.5	1.329
58.25	1.377	125.6	1.32
58.33	1.386	125.7	1.32
58.42	1.377	125.8	1.32
58.5	1.386	125.8	1.329
58.58	1.386	125.9	1.32
58.67	1.386	126.	1.32
58.75	1.386	126.1	1.32
58.83	1.386	126.2	1.32
58.92	1.386	126.3	1.32
59.	1.386	126.3	1.32
59.08	1.386	126.4	1.329
59.17	1.386	126.5	1.329
59.25	1.386	126.6	1.329
59.33	1.386	126.7	1.329
59.42	1.386	126.8	1.329
59.5	1.386	126.8	1.329
59.58	1.386	126.9	1.329
59.67	1.377	127.	1.329
59.75	1.386	127.1	1.329
59.83	1.386	127.2	1.32
59.92	1.386	127.3	1.32
60.	1.386	127.3	1.329
60.08	1.386	127.4	1.32
60.17	1.377	127.5	1.32
60.25	1.377	127.6	1.32
60.33	1.386	127.7	1.32
60.42	1.386	127.8	1.32
60.5	1.395	127.8	1.32
60.58	1.386	127.9	1.32
60.67	1.386	128.	1.32
60.75	1.377	128.1	1.329
60.83	1.386	128.2	1.32
60.92	1.386	128.3	1.329
61.	1.377	128.3	1.32
61.08	1.377	128.4	1.329
61.17	1.386	128.5	1.32
61.25	1.386	128.6	1.32
61.33	1.377	128.7	1.32
61.42	1.386	128.8	1.329
61.5	1.377	128.8	1.32
61.58	1.386	128.9	1.32
61.67	1.386	129.	1.32
61.75	1.377	129.1	1.32
61.83	1.377	129.2	1.32
61.92	1.377	129.3	1.32
62.	1.386	129.3	1.32
62.08	1.377	129.4	1.32
62.17	1.377	129.5	1.311
62.25	1.377	129.6	1.32
62.33	1.386	129.7	1.32
62.42	1.377	129.8	1.311
62.5	1.386	129.8	1.32
62.58	1.386	129.9	1.32
62.67	1.377	130.	1.32
62.75	1.377	130.1	1.32
62.83	1.377	130.2	1.311

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
62.92	1.377	130.3	1.32
63.	1.377	130.3	1.311
63.08	1.377	130.4	1.32
63.17	1.377	130.5	1.32
63.25	1.377	130.6	1.311
63.33	1.377	130.7	1.311
63.42	1.377	130.8	1.311
63.5	1.377	130.8	1.311
63.58	1.377	130.9	1.311
63.67	1.377	131.	1.311
63.75	1.377	131.1	1.311
63.83	1.377	131.2	1.311
63.92	1.377	131.3	1.311
64.	1.377	131.3	1.311
64.08	1.377	131.4	1.311
64.17	1.377	131.5	1.32
64.25	1.377	131.6	1.32
64.33	1.386	131.7	1.32
64.42	1.377	131.8	1.311
64.5	1.386	131.8	1.32
64.58	1.386	131.9	1.32
64.67	1.377	132.	1.311
64.75	1.377	132.1	1.311
64.83	1.377	132.2	1.32
64.92	1.386	132.3	1.32
65.	1.377	132.3	1.32
65.08	1.377	132.4	1.32
65.17	1.377	132.5	1.32
65.25	1.386	132.6	1.311
65.33	1.386	132.7	1.311
65.42	1.377	132.8	1.311
65.5	1.377	132.8	1.32
65.58	1.377	132.9	1.311
65.67	1.377	133.	1.311
65.75	1.386	133.1	1.32
65.83	1.386	133.2	1.32
65.92	1.377	133.3	1.311
66.	1.386	133.3	1.311
66.08	1.377	133.4	1.32
66.17	1.371	133.5	1.311
66.25	1.386	133.6	1.305
66.33	1.386	133.7	1.311
66.42	1.377	133.8	1.311
66.5	1.377	133.8	1.317
66.58	1.377	133.9	1.317
66.67	1.377	134.	1.317
66.75	1.377	134.1	1.326
66.83	1.377	134.2	1.326
66.92	1.377	134.3	1.326
67.	1.377	134.3	1.317
67.08	1.377	134.4	1.329
67.17	1.377	134.5	1.329
67.25	1.371		

SOLUTION

Slug Test
 Aquifer Model: Confined
 Solution Method: Bouwer-Rice
 ln(Re/rw): 3.427

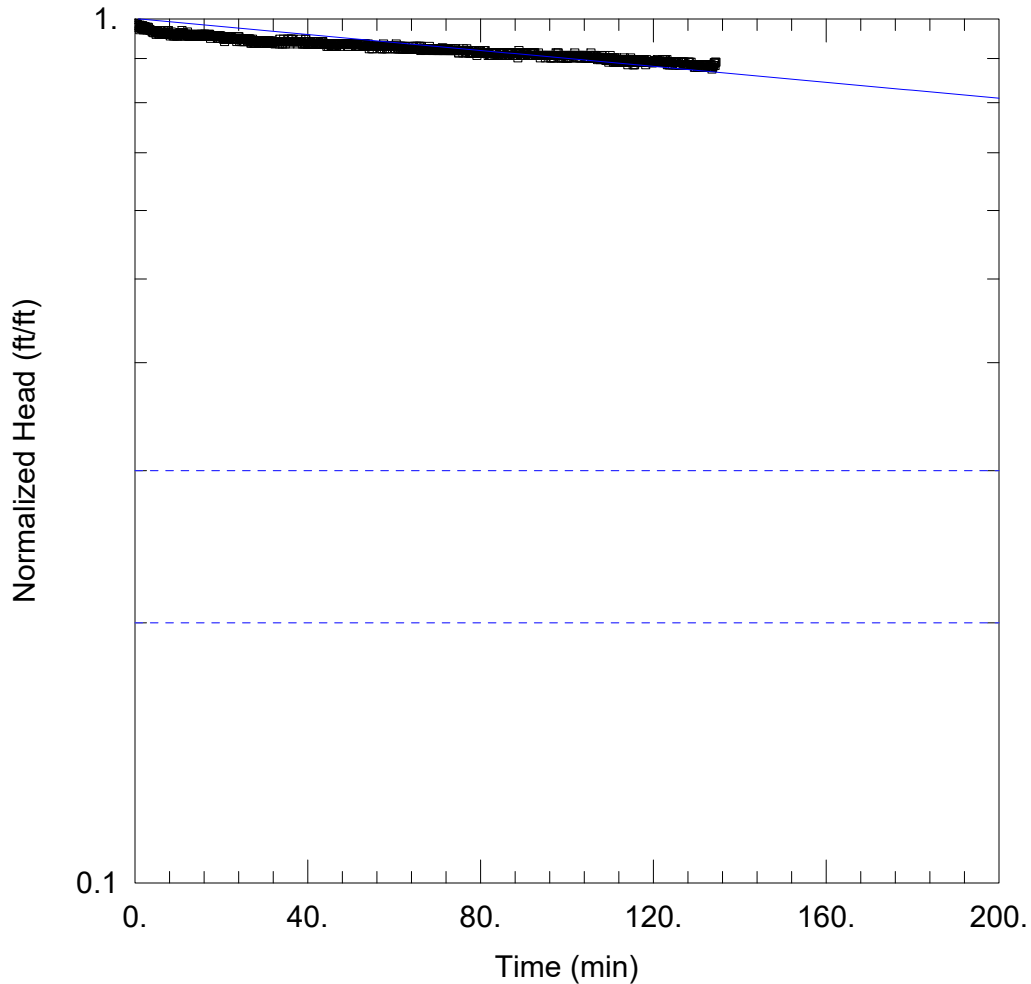
VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>
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K	1.253E-6	ft/min
y0	1.493	ft

$K = 6.365E-7$ cm/sec

$T = K*b = 5.6E-5$ ft²/min (0.000867 sq. cm/sec)



MW-20 FALLING HEAD TEST

Data Set: N:\...\MW-20 Falling Head Test.aqt

Date: 11/08/24

Time: 12:58:14

PROJECT INFORMATION

Company: GHD Services Inc

Client: Viking Pump/IDEX

Project: 056934

Location: Cedar Falls, Iowa

Test Well: MW-20

Test Date: October 2024

AQUIFER DATA

Saturated Thickness: 44.69 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-20)

Initial Displacement: 1.492 ft

Static Water Column Height: 44.69 ft

Total Well Penetration Depth: 44.69 ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Well Radius: 0.34 ft

SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 1.253E-6 ft/min

y0 = 1.493 ft

Data Set: N:\US\St Paul\Projects\563\056934\Workshare\Aquifer Testing\2024-04 Aquifer testing\AQT Files\MW-20
 Title: MW-20 Rising Head Test
 Date: 11/08/24
 Time: 12:57:32

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: October 2024
 Test Well: MW-20

AQUIFER DATA

Saturated Thickness: 44.69 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-20

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 1.636 ft
 Static Water Column Height: 44.69 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.34 ft
 Well Skin Radius: 0.34 ft
 Screen Length: 10. ft
 Total Well Penetration Depth: 44.69 ft

No. of Observations: 636

Time (min)	Observation Data		Displacement (ft)
	Displacement (ft)	Time (min)	
0.	1.636	26.5	1.573
0.08333	1.612	26.58	1.573
0.1667	1.612	26.67	1.573
0.25	1.612	26.75	1.573
0.3333	1.603	26.83	1.573
0.4167	1.603	26.92	1.573
0.5	1.603	27.	1.573
0.5833	1.603	27.08	1.564
0.6667	1.603	27.17	1.573
0.75	1.603	27.25	1.573
0.8333	1.603	27.33	1.564
0.9167	1.603	27.42	1.564
1.	1.594	27.5	1.573
1.083	1.603	27.58	1.564
1.167	1.603	27.67	1.573
1.25	1.603	27.75	1.564
1.333	1.594	27.83	1.567
1.417	1.594	27.92	1.573
1.5	1.603	28.	1.564
1.583	1.594	28.08	1.564
1.667	1.594	28.17	1.564
1.75	1.594	28.25	1.564
1.833	1.594	28.33	1.564
1.917	1.603	28.42	1.564
2.	1.594	28.5	1.564
2.083	1.594	28.58	1.564
2.167	1.594	28.67	1.564
2.25	1.603	28.75	1.573
2.333	1.594	28.83	1.573

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
2.417	1.594	28.92	1.573
2.5	1.594	29.	1.573
2.583	1.594	29.08	1.564
2.667	1.585	29.17	1.564
2.75	1.585	29.25	1.564
2.833	1.585	29.33	1.564
2.917	1.591	29.42	1.564
3.	1.594	29.5	1.564
3.083	1.585	29.58	1.564
3.167	1.594	29.67	1.564
3.25	1.585	29.75	1.564
3.333	1.594	29.83	1.564
3.417	1.585	29.92	1.564
3.5	1.594	30.	1.564
3.583	1.582	30.08	1.561
3.667	1.585	30.17	1.564
3.75	1.6	30.25	1.555
3.833	1.585	30.33	1.555
3.917	1.591	30.42	1.564
4.	1.594	30.5	1.564
4.083	1.585	30.58	1.564
4.167	1.591	30.67	1.564
4.25	1.591	30.75	1.573
4.333	1.585	30.83	1.573
4.417	1.591	30.92	1.564
4.5	1.591	31.	1.564
4.583	1.582	31.08	1.573
4.667	1.591	31.17	1.573
4.75	1.591	31.25	1.573
4.833	1.582	31.33	1.564
4.917	1.591	31.42	1.564
5.	1.582	31.5	1.564
5.083	1.582	31.58	1.573
5.167	1.576	31.67	1.573
5.25	1.582	31.75	1.573
5.333	1.582	31.83	1.573
5.417	1.582	31.92	1.564
5.5	1.582	32.	1.564
5.583	1.591	32.08	1.564
5.667	1.582	32.17	1.564
5.75	1.591	32.25	1.573
5.833	1.582	32.33	1.573
5.917	1.582	32.42	1.573
6.	1.582	32.5	1.564
6.083	1.582	32.58	1.564
6.167	1.582	32.67	1.573
6.25	1.582	32.75	1.564
6.333	1.582	32.83	1.573
6.417	1.582	32.92	1.573
6.5	1.582	33.	1.564
6.583	1.591	33.08	1.564
6.667	1.582	33.17	1.564
6.75	1.582	33.25	1.564
6.833	1.582	33.33	1.564
6.917	1.591	33.42	1.564
7.	1.591	33.5	1.573
7.083	1.591	33.58	1.573
7.167	1.582	33.67	1.573
7.25	1.582	33.75	1.573
7.333	1.582	33.83	1.564
7.417	1.582	33.92	1.564
7.5	1.582	34.	1.564
7.583	1.582	34.08	1.564
7.667	1.582	34.17	1.555
7.75	1.582	34.25	1.564
7.833	1.582	34.33	1.564

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
7.917	1.582	34.42	1.573
8.	1.582	34.5	1.564
8.083	1.591	34.58	1.564
8.167	1.582	34.67	1.555
8.25	1.582	34.75	1.564
8.333	1.582	34.83	1.555
8.417	1.573	34.92	1.555
8.5	1.573	35.	1.555
8.583	1.573	35.08	1.564
8.667	1.573	35.17	1.564
8.75	1.573	35.25	1.564
8.833	1.582	35.33	1.555
8.917	1.582	35.42	1.564
9.	1.573	35.5	1.564
9.083	1.582	35.58	1.573
9.167	1.582	35.67	1.573
9.25	1.582	35.75	1.573
9.333	1.573	35.83	1.564
9.417	1.582	35.92	1.564
9.5	1.582	36.	1.573
9.583	1.582	36.08	1.573
9.667	1.573	36.17	1.564
9.75	1.573	36.25	1.573
9.833	1.573	36.33	1.564
9.917	1.582	36.42	1.564
10.	1.582	36.5	1.564
10.08	1.582	36.58	1.564
10.17	1.582	36.67	1.564
10.25	1.582	36.75	1.564
10.33	1.582	36.83	1.564
10.42	1.573	36.92	1.564
10.5	1.573	37.	1.564
10.58	1.573	37.08	1.573
10.67	1.582	37.17	1.555
10.75	1.582	37.25	1.555
10.83	1.573	37.33	1.573
10.92	1.573	37.42	1.564
11.	1.582	37.5	1.564
11.08	1.582	37.58	1.564
11.17	1.573	37.67	1.555
11.25	1.573	37.75	1.555
11.33	1.573	37.83	1.564
11.42	1.573	37.92	1.564
11.5	1.582	38.	1.564
11.58	1.573	38.08	1.564
11.67	1.573	38.17	1.564
11.75	1.582	38.25	1.573
11.83	1.582	38.33	1.564
11.92	1.573	38.42	1.564
12.	1.573	38.5	1.564
12.08	1.582	38.58	1.564
12.17	1.582	38.67	1.555
12.25	1.582	38.75	1.564
12.33	1.573	38.83	1.561
12.42	1.573	38.92	1.573
12.5	1.573	39.	1.564
12.58	1.573	39.08	1.564
12.67	1.573	39.17	1.564
12.75	1.582	39.25	1.564
12.83	1.582	39.33	1.555
12.92	1.582	39.42	1.564
13.	1.573	39.5	1.564
13.08	1.582	39.58	1.564
13.17	1.582	39.67	1.564
13.25	1.582	39.75	1.564
13.33	1.573	39.83	1.564

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
13.42	1.573	39.92	1.564
13.5	1.573	40.	1.564
13.58	1.582	40.08	1.564
13.67	1.582	40.17	1.564
13.75	1.582	40.25	1.555
13.83	1.582	40.33	1.564
13.92	1.573	40.42	1.564
14.	1.582	40.5	1.564
14.08	1.582	40.58	1.564
14.17	1.573	40.67	1.573
14.25	1.573	40.75	1.573
14.33	1.582	40.83	1.573
14.42	1.573	40.92	1.573
14.5	1.573	41.	1.564
14.58	1.573	41.08	1.564
14.67	1.573	41.17	1.564
14.75	1.582	41.25	1.564
14.83	1.573	41.33	1.564
14.92	1.573	41.42	1.564
15.	1.582	41.5	1.573
15.08	1.573	41.58	1.573
15.17	1.573	41.67	1.573
15.25	1.582	41.75	1.564
15.33	1.582	41.83	1.564
15.42	1.573	41.92	1.564
15.5	1.564	42.	1.564
15.58	1.573	42.08	1.564
15.67	1.582	42.17	1.564
15.75	1.573	42.25	1.564
15.83	1.573	42.33	1.552
15.92	1.582	42.42	1.564
16.	1.582	42.5	1.564
16.08	1.582	42.58	1.564
16.17	1.573	42.67	1.564
16.25	1.582	42.75	1.555
16.33	1.573	42.83	1.564
16.42	1.582	42.92	1.564
16.5	1.582	43.	1.555
16.58	1.582	43.08	1.564
16.67	1.582	43.17	1.564
16.75	1.573	43.25	1.564
16.83	1.582	43.33	1.555
16.92	1.582	43.42	1.564
17.	1.582	43.5	1.561
17.08	1.582	43.58	1.564
17.17	1.582	43.67	1.561
17.25	1.573	43.75	1.564
17.33	1.573	43.83	1.555
17.42	1.582	43.92	1.552
17.5	1.573	44.	1.555
17.58	1.573	44.08	1.555
17.67	1.582	44.17	1.564
17.75	1.582	44.25	1.564
17.83	1.582	44.33	1.564
17.92	1.573	44.42	1.564
18.	1.573	44.5	1.564
18.08	1.582	44.58	1.564
18.17	1.573	44.67	1.564
18.25	1.582	44.75	1.564
18.33	1.573	44.83	1.555
18.42	1.573	44.92	1.564
18.5	1.573	45.	1.555
18.58	1.573	45.08	1.555
18.67	1.573	45.17	1.564
18.75	1.573	45.25	1.564
18.83	1.573	45.33	1.564

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
18.92	1.573	45.42	1.555
19.	1.564	45.5	1.555
19.08	1.564	45.58	1.564
19.17	1.573	45.67	1.555
19.25	1.573	45.75	1.555
19.33	1.573	45.83	1.564
19.42	1.573	45.92	1.555
19.5	1.564	46.	1.549
19.58	1.573	46.08	1.555
19.67	1.573	46.17	1.555
19.75	1.573	46.25	1.564
19.83	1.573	46.33	1.555
19.92	1.573	46.42	1.552
20.	1.573	46.5	1.552
20.08	1.567	46.58	1.555
20.17	1.573	46.67	1.564
20.25	1.573	46.75	1.555
20.33	1.573	46.83	1.552
20.42	1.582	46.92	1.561
20.5	1.573	47.	1.564
20.58	1.573	47.08	1.564
20.67	1.564	47.17	1.555
20.75	1.564	47.25	1.555
20.83	1.573	47.33	1.564
20.92	1.573	47.42	1.555
21.	1.573	47.5	1.555
21.08	1.573	47.58	1.555
21.17	1.573	47.67	1.564
21.25	1.573	47.75	1.555
21.33	1.573	47.83	1.555
21.42	1.573	47.92	1.555
21.5	1.573	48.	1.555
21.58	1.573	48.08	1.555
21.67	1.564	48.17	1.549
21.75	1.564	48.25	1.555
21.83	1.564	48.33	1.555
21.92	1.564	48.42	1.555
22.	1.573	48.5	1.555
22.08	1.573	48.58	1.555
22.17	1.573	48.67	1.555
22.25	1.573	48.75	1.564
22.33	1.573	48.83	1.564
22.42	1.573	48.92	1.555
22.5	1.573	49.	1.564
22.58	1.582	49.08	1.564
22.67	1.573	49.17	1.555
22.75	1.564	49.25	1.564
22.83	1.564	49.33	1.555
22.92	1.573	49.42	1.561
23.	1.573	49.5	1.552
23.08	1.582	49.58	1.555
23.17	1.573	49.67	1.555
23.25	1.573	49.75	1.555
23.33	1.573	49.83	1.561
23.42	1.573	49.92	1.564
23.5	1.573	50.	1.555
23.58	1.573	50.08	1.561
23.67	1.573	50.17	1.555
23.75	1.573	50.25	1.564
23.83	1.573	50.33	1.555
23.92	1.573	50.42	1.555
24.	1.573	50.5	1.552
24.08	1.573	50.58	1.555
24.17	1.564	50.67	1.555
24.25	1.573	50.75	1.555
24.33	1.573	50.83	1.555

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
24.42	1.573	50.92	1.555
24.5	1.573	51.	1.564
24.58	1.573	51.08	1.555
24.67	1.573	51.17	1.552
24.75	1.573	51.25	1.555
24.83	1.564	51.33	1.564
24.92	1.573	51.42	1.564
25.	1.573	51.5	1.555
25.08	1.573	51.58	1.564
25.17	1.573	51.67	1.564
25.25	1.573	51.75	1.555
25.33	1.573	51.83	1.555
25.42	1.573	51.92	1.552
25.5	1.573	52.	1.564
25.58	1.573	52.08	1.564
25.67	1.573	52.17	1.555
25.75	1.573	52.25	1.555
25.83	1.573	52.33	1.564
25.92	1.573	52.42	1.555
26.	1.573	52.5	1.564
26.08	1.573	52.58	1.555
26.17	1.564	52.67	1.555
26.25	1.573	52.75	1.564
26.33	1.573	52.83	1.555
26.42	1.573	52.92	1.561

SOLUTION

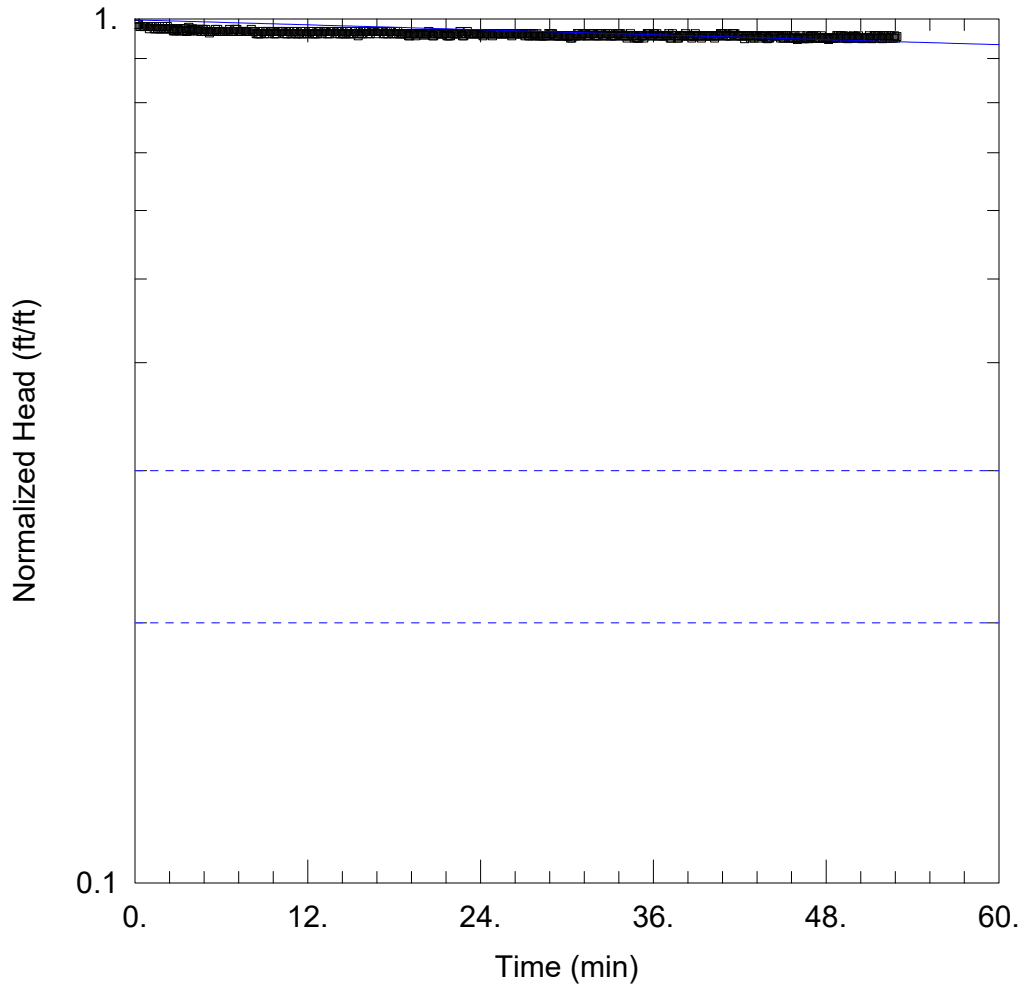
Slug Test
 Aquifer Model: Confined
 Solution Method: Bouwer-Rice
 ln(Re/rw): 3.427

VISUAL ESTIMATION RESULTS

Estimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	1.298E-6	ft/min
y0	1.632	ft

K = 6.595E-7 cm/sec
 T = K*b = 5.802E-5 ft²/min (0.0008984 sq. cm/sec)



MW-20 RISING HEAD TEST

Data Set: N:\...\MW-20 Rising Head Test.aqt

Date: 11/08/24

Time: 12:57:01

PROJECT INFORMATION

Company: GHD Services Inc

Client: Viking Pump/IDEX

Project: 056934

Location: Cedar Falls, Iowa

Test Well: MW-20

Test Date: October 2024

AQUIFER DATA

Saturated Thickness: 44.69 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-20)

Initial Displacement: 1.636 ft

Static Water Column Height: 44.69 ft

Total Well Penetration Depth: 44.69 ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Well Radius: 0.34 ft

SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 1.298E-6 ft/min

y0 = 1.632 ft

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-21 Falling Head Test.aqt
 Title: MW-21 Falling Head Test
 Date: 05/29/24
 Time: 13:07:28

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: 04-04-24
 Test Well: MW-21

AQUIFER DATA

Saturated Thickness: 20.09 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-21

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 1.633 ft
 Static Water Column Height: 20.09 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.34 ft
 Well Skin Radius: 0.34 ft
 Screen Length: 10. ft
 Total Well Penetration Depth: 20.09 ft

No. of Observations: 92

Time (min)	Observation Data		Displacement (ft)
	Displacement (ft)	Time (min)	
0.	1.633	1.533	0.05714
0.03333	0.9654	1.567	0.05714
0.06667	0.8631	1.6	0.05714
0.1	0.7368	1.633	0.06917
0.1333	0.6436	1.667	0.05714
0.1667	0.5624	1.7	0.05714
0.2	0.5052	1.733	0.05714
0.2333	0.4481	1.767	0.05714
0.2667	0.403	1.8	0.05714
0.3	0.3579	1.833	0.05714
0.3333	0.3338	1.867	0.04812
0.3667	0.3007	1.9	0.05714
0.4	0.2767	1.933	0.05714
0.4333	0.2436	1.967	0.05714
0.4667	0.2316	2.	0.05714
0.5	0.2195	2.033	0.04812

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
0.5333	0.1955	2.067	0.05714
0.5667	0.1835	2.1	0.04812
0.6	0.1744	2.133	0.04812
0.6333	0.1624	2.167	0.04812
0.6667	0.1504	2.2	0.04812
0.7	0.1383	2.233	0.04812
0.7333	0.1383	2.267	0.03609
0.7667	0.1263	2.3	0.04812
0.8	0.1263	2.333	0.04812
0.8333	0.1143	2.367	0.04812
0.8667	0.1053	2.4	0.04812
0.9	0.1053	2.433	0.03609
0.9333	0.1053	2.467	0.04812
0.9667	0.1053	2.5	0.04812
1.	0.09323	2.533	0.04812
1.033	0.09323	2.567	0.04812
1.067	0.0812	2.6	0.04812
1.1	0.0812	2.633	0.04812
1.133	0.0812	2.667	0.04812
1.167	0.0812	2.7	0.04812
1.2	0.0812	2.733	0.04812
1.233	0.0812	2.767	0.04812
1.267	0.06917	2.8	0.04812
1.3	0.0812	2.833	0.03609
1.333	0.06917	2.867	0.03609
1.367	0.06917	2.9	0.03609
1.4	0.06917	2.933	0.04812
1.433	0.06917	2.967	0.03609
1.467	0.06917	3.	0.03609
1.5	0.06917	3.033	0.03609

SOLUTION

Slug Test

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

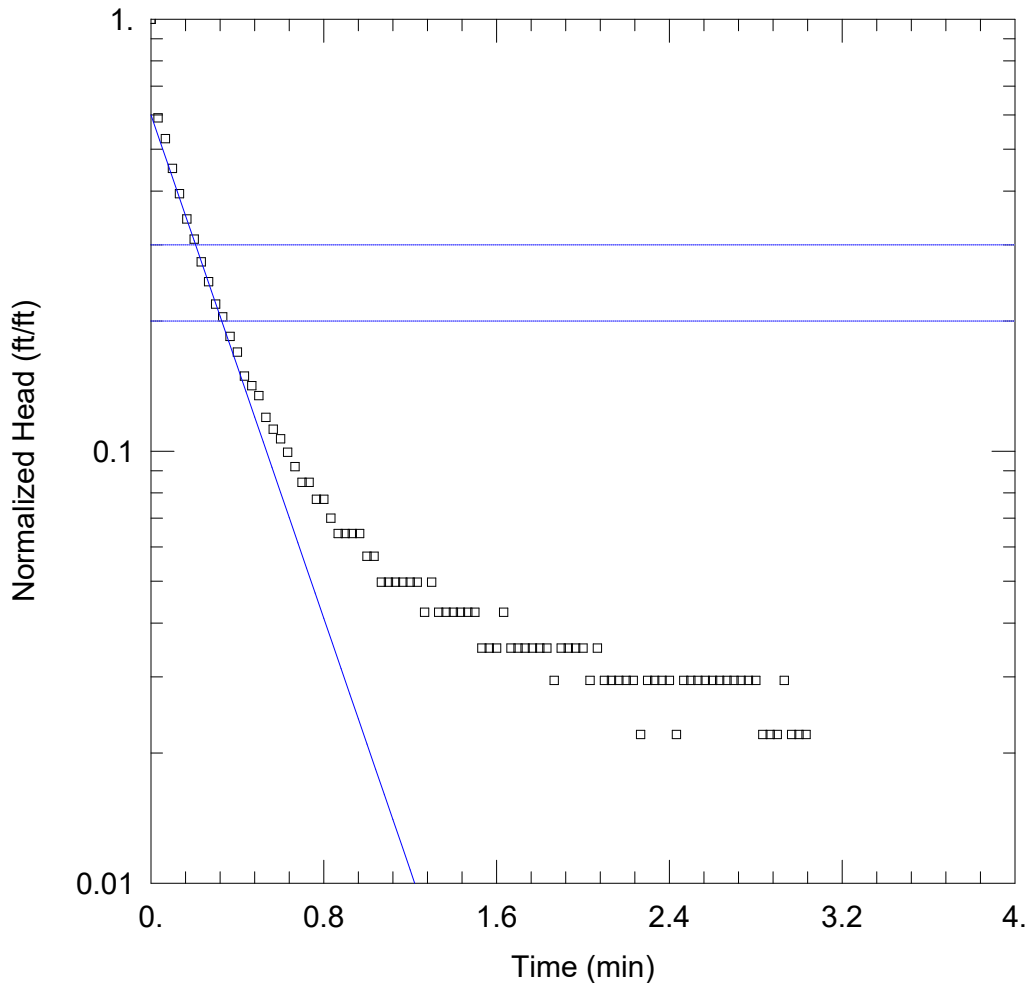
ln(Re/rw): 2.976

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	0.003437	ft/min
y0	0.9795	ft

K = 0.001746 cm/sec

T = K*b = 0.06906 ft²/min (1.069 sq. cm/sec)



MW-21 FALLING HEAD TEST

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-21 Falling Head Test.aqt
 Date: 05/29/24 Time: 13:07:11

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Well: MW-21
 Test Date: 04-04-24

AQUIFER DATA

Saturated Thickness: 20.09 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-21)

Initial Displacement: 1.633 ft Static Water Column Height: 20.09 ft
 Total Well Penetration Depth: 20.09 ft Screen Length: 10. ft
 Casing Radius: 0.083 ft Well Radius: 0.34 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bower-Rice
 K = 0.003437 ft/min y0 = 0.9795 ft

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-21 Rising Head Test.aqt
 Title: MW-21 Rising Head Test
 Date: 05/29/24
 Time: 13:08:56

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: 04-04-24
 Test Well: MW-21

AQUIFER DATA

Saturated Thickness: 20.09 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-11

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 1.233 ft
 Static Water Column Height: 20.09 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.34 ft
 Well Skin Radius: 0.34 ft
 Screen Length: 10. ft
 Total Well Penetration Depth: 20.09 ft

No. of Observations: 56

Time (min)	Observation Data		Displacement (ft)
	Displacement (ft)	Time (min)	
0.	1.233	0.9333	0.1143
0.03333	1.035	0.9667	0.1143
0.06667	0.8872	1.	0.1053
0.1	0.7699	1.033	0.1053
0.1333	0.6797	1.067	0.1053
0.1667	0.5985	1.1	0.09323
0.2	0.5413	1.133	0.09323
0.2333	0.4722	1.167	0.09323
0.2667	0.424	1.2	0.09323
0.3	0.3789	1.233	0.09323
0.3333	0.3459	1.267	0.0812
0.3667	0.3098	1.3	0.0812
0.4	0.2887	1.333	0.0812
0.4333	0.2647	1.367	0.0812
0.4667	0.2526	1.4	0.06917
0.5	0.2316	1.433	0.0812

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
0.5333	0.2196	1.467	0.0812
0.5667	0.2075	1.5	0.0812
0.6	0.1835	1.533	0.06917
0.6333	0.1714	1.567	0.06917
0.6667	0.1714	1.6	0.06917
0.7	0.1624	1.633	0.06917
0.7333	0.1384	1.667	0.06917
0.7667	0.1384	1.7	0.06917
0.8	0.1384	1.733	0.05714
0.8333	0.1263	1.767	0.06917
0.8667	0.1263	1.8	0.05714
0.9	0.1143	1.833	0.05714

SOLUTION

Slug Test

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

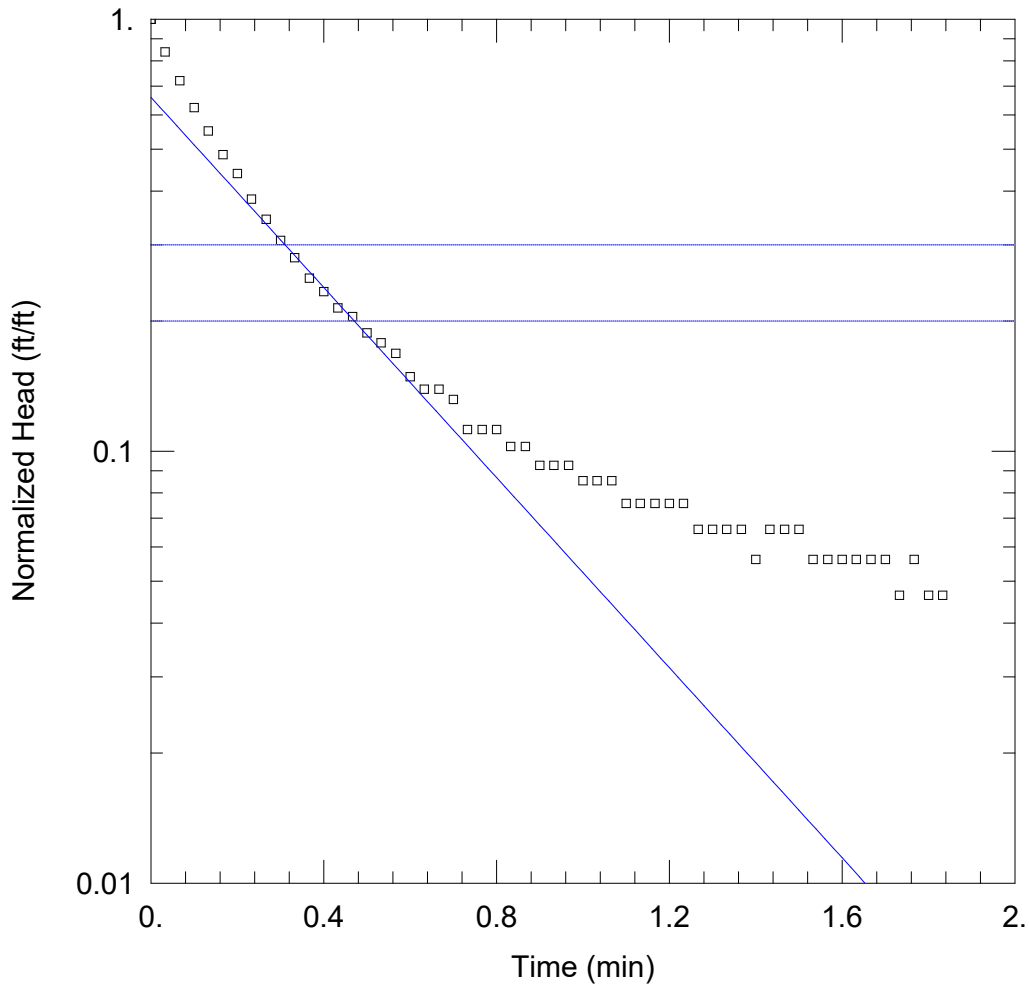
ln(Re/rw): 2.976

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	0.002597	ft/min
y0	0.8126	ft

K = 0.001319 cm/sec

T = K*b = 0.05218 ft²/min (0.8079 sq. cm/sec)



MW-21 RISING HEAD TEST

Data Set: C:\Users\raamot\Desktop\Viking Pump Slug Test\AQT Files\MW-21 Rising Head Test.aqt
 Date: 05/29/24 Time: 13:08:36

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Well: MW-21
 Test Date: 04-04-24

AQUIFER DATA

Saturated Thickness: 20.09 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-11)

Initial Displacement: 1.233 ft Static Water Column Height: 20.09 ft
 Total Well Penetration Depth: 20.09 ft Screen Length: 10. ft
 Casing Radius: 0.083 ft Well Radius: 0.34 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bower-Rice
 K = 0.002597 ft/min y0 = 0.8126 ft

Data Set: N:\US\St Paul\Projects\563\056934\Workshare\Aquifer Testing\2024-04 Aquifer testing\AQT Files\MW-22
 Title: MW-22 Falling Head Test
 Date: 11/08/24
 Time: 12:56:28

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: October 2024
 Test Well: MW-22

AQUIFER DATA

Saturated Thickness: 45.86 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-22

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 1.48 ft
 Static Water Column Height: 45.86 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.34 ft
 Well Skin Radius: 0.34 ft
 Screen Length: 10. ft
 Total Well Penetration Depth: 45.86 ft

No. of Observations: 1438

Time (min)	Observation Data		Displacement (ft)
	Displacement (ft)	Time (min)	
0.	1.48	23.97	1.011
0.03333	1.456	24.	1.011
0.06667	1.435	24.03	1.011
0.1	1.407	24.07	1.02
0.1333	1.392	24.1	1.02
0.1667	1.383	24.13	1.02
0.2	1.374	24.17	1.02
0.2333	1.353	24.2	1.011
0.2667	1.338	24.23	1.011
0.3	1.338	24.27	1.011
0.3333	1.335	24.3	1.02
0.3667	1.326	24.33	1.02
0.4	1.311	24.37	1.02
0.4333	1.311	24.4	1.02
0.4667	1.311	24.43	1.02
0.5	1.311	24.47	1.02
0.5333	1.305	24.5	1.02
0.5667	1.302	24.53	1.011
0.6	1.29	24.57	1.011
0.6333	1.284	24.6	1.011
0.6667	1.29	24.63	1.011
0.7	1.281	24.67	1.011
0.7333	1.275	24.7	1.02
0.7667	1.272	24.73	1.02
0.8	1.266	24.77	1.02
0.8333	1.257	24.8	1.02
0.8667	1.26	24.83	1.011
0.9	1.257	24.87	1.02
0.9333	1.257	24.9	1.02

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.9667	1.254	24.93	1.02
1.	1.257	24.97	1.02
1.033	1.248	25.	1.02
1.067	1.239	25.03	1.02
1.1	1.242	25.07	1.02
1.133	1.239	25.1	1.029
1.167	1.242	25.13	1.02
1.2	1.239	25.17	1.02
1.233	1.239	25.2	1.02
1.267	1.239	25.23	1.011
1.3	1.239	25.27	1.02
1.333	1.221	25.3	1.02
1.367	1.221	25.33	1.02
1.4	1.221	25.37	1.02
1.433	1.221	25.4	1.02
1.467	1.224	25.43	1.011
1.5	1.221	25.47	1.011
1.533	1.221	25.5	1.029
1.567	1.23	25.53	1.02
1.6	1.221	25.57	1.02
1.633	1.23	25.6	1.02
1.667	1.221	25.63	1.02
1.7	1.221	25.67	1.02
1.733	1.215	25.7	1.029
1.767	1.215	25.73	1.02
1.8	1.206	25.77	1.02
1.833	1.206	25.8	1.02
1.867	1.206	25.83	1.02
1.9	1.206	25.87	1.02
1.933	1.206	25.9	1.02
1.967	1.197	25.93	1.029
2.	1.206	25.97	1.02
2.033	1.209	26.	1.02
2.067	1.206	26.03	1.02
2.1	1.206	26.07	1.02
2.133	1.194	26.1	1.02
2.167	1.194	26.13	1.011
2.2	1.197	26.17	1.011
2.233	1.194	26.2	1.02
2.267	1.197	26.23	1.02
2.3	1.197	26.27	1.02
2.333	1.194	26.3	1.02
2.367	1.197	26.33	1.02
2.4	1.188	26.37	1.011
2.433	1.194	26.4	1.011
2.467	1.185	26.43	1.02
2.5	1.182	26.47	1.02
2.533	1.182	26.5	1.02
2.567	1.182	26.53	1.02
2.6	1.185	26.57	1.02
2.633	1.176	26.6	1.02
2.667	1.188	26.63	1.02
2.7	1.176	26.67	1.011
2.733	1.185	26.7	1.011
2.767	1.179	26.73	1.011
2.8	1.179	26.77	1.011
2.833	1.176	26.8	1.02
2.867	1.176	26.83	1.02
2.9	1.179	26.87	1.011
2.933	1.179	26.9	1.011
2.967	1.176	26.93	1.011
3.	1.173	26.97	1.011
3.033	1.173	27.	1.011
3.067	1.17	27.03	1.011
3.1	1.17	27.07	1.011
3.133	1.17	27.1	1.011

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
3.167	1.17	27.13	1.011
3.2	1.17	27.17	1.011
3.233	1.17	27.2	1.011
3.267	1.167	27.23	1.011
3.3	1.167	27.27	1.011
3.333	1.167	27.3	1.011
3.367	1.167	27.33	1.02
3.4	1.167	27.37	1.011
3.433	1.167	27.4	1.011
3.467	1.161	27.43	1.02
3.5	1.161	27.47	1.011
3.533	1.17	27.5	1.011
3.567	1.167	27.53	1.011
3.6	1.158	27.57	1.001
3.633	1.161	27.6	1.011
3.667	1.152	27.63	1.011
3.7	1.161	27.67	1.011
3.733	1.152	27.7	1.011
3.767	1.161	27.73	1.011
3.8	1.152	27.77	1.001
3.833	1.161	27.8	1.011
3.867	1.161	27.83	1.011
3.9	1.161	27.87	1.011
3.933	1.152	27.9	1.011
3.967	1.152	27.93	1.011
4.	1.152	27.97	1.011
4.033	1.152	28.	1.011
4.067	1.152	28.03	1.011
4.1	1.152	28.07	1.011
4.133	1.167	28.1	1.02
4.167	1.158	28.13	1.011
4.2	1.158	28.17	1.011
4.233	1.158	28.2	1.011
4.267	1.158	28.23	1.011
4.3	1.158	28.27	1.001
4.333	1.158	28.3	1.001
4.367	1.158	28.33	1.011
4.4	1.158	28.37	1.011
4.433	1.143	28.4	1.011
4.467	1.143	28.43	1.011
4.5	1.143	28.47	1.011
4.533	1.143	28.5	1.001
4.567	1.143	28.53	1.011
4.6	1.152	28.57	1.011
4.633	1.143	28.6	1.011
4.667	1.143	28.63	1.011
4.7	1.143	28.67	1.011
4.733	1.143	28.7	1.011
4.767	1.143	28.73	1.011
4.8	1.143	28.77	1.011
4.833	1.143	28.8	1.011
4.867	1.143	28.83	1.011
4.9	1.134	28.87	1.011
4.933	1.143	28.9	1.001
4.967	1.143	28.93	1.011
5.	1.14	28.97	1.011
5.033	1.149	29.	1.011
5.067	1.14	29.03	1.011
5.1	1.14	29.07	1.011
5.133	1.143	29.1	1.011
5.167	1.143	29.13	1.02
5.2	1.143	29.17	1.011
5.233	1.14	29.2	1.017
5.267	1.14	29.23	1.011
5.3	1.14	29.27	1.011
5.333	1.14	29.3	1.011

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
5.367	1.149	29.33	1.011
5.4	1.149	29.37	1.011
5.433	1.149	29.4	1.011
5.467	1.14	29.43	1.011
5.5	1.149	29.47	1.011
5.533	1.131	29.5	1.011
5.567	1.131	29.53	1.017
5.6	1.14	29.57	1.017
5.633	1.14	29.6	1.017
5.667	1.134	29.63	1.007
5.7	1.143	29.67	1.011
5.733	1.134	29.7	1.017
5.767	1.134	29.73	1.017
5.8	1.134	29.77	1.017
5.833	1.131	29.8	1.017
5.867	1.131	29.83	1.017
5.9	1.131	29.87	1.017
5.933	1.131	29.9	1.007
5.967	1.131	29.93	1.017
6.	1.134	29.97	1.017
6.033	1.134	30.	1.007
6.067	1.125	30.03	1.017
6.1	1.125	30.07	1.007
6.133	1.134	30.1	1.017
6.167	1.125	30.13	1.007
6.2	1.134	30.17	1.007
6.233	1.134	30.2	1.007
6.267	1.134	30.23	1.007
6.3	1.134	30.27	1.007
6.333	1.122	30.3	1.007
6.367	1.134	30.33	1.007
6.4	1.131	30.37	1.007
6.433	1.122	30.4	1.017
6.467	1.131	30.43	1.007
6.5	1.131	30.47	1.007
6.533	1.122	30.5	1.007
6.567	1.125	30.53	1.017
6.6	1.134	30.57	1.017
6.633	1.125	30.6	1.007
6.667	1.125	30.63	1.007
6.7	1.125	30.67	1.007
6.733	1.125	30.7	0.9985
6.767	1.113	30.73	1.007
6.8	1.122	30.77	1.007
6.833	1.122	30.8	0.9985
6.867	1.131	30.83	1.007
6.9	1.122	30.87	1.007
6.933	1.122	30.9	1.007
6.967	1.122	30.93	1.007
7.	1.122	30.97	1.007
7.033	1.134	31.	1.007
7.067	1.122	31.03	1.007
7.1	1.125	31.07	1.007
7.133	1.125	31.1	1.007
7.167	1.125	31.13	1.007
7.2	1.125	31.17	1.007
7.233	1.116	31.2	1.007
7.267	1.116	31.23	1.007
7.3	1.116	31.27	1.017
7.333	1.107	31.3	1.007
7.367	1.107	31.33	1.007
7.4	1.107	31.37	1.007
7.433	1.107	31.4	1.007
7.467	1.098	31.43	1.007
7.5	1.107	31.47	1.007
7.533	1.098	31.5	1.007

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
7.567	1.107	31.53	1.007
7.6	1.116	31.57	1.007
7.633	1.107	31.6	1.007
7.667	1.116	31.63	1.007
7.7	1.116	31.67	1.007
7.733	1.116	31.7	1.007
7.767	1.116	31.73	1.007
7.8	1.107	31.77	0.9985
7.833	1.113	31.8	0.9985
7.867	1.104	31.83	1.007
7.9	1.104	31.87	1.007
7.933	1.104	31.9	1.007
7.967	1.104	31.93	1.007
8.	1.113	31.97	1.007
8.033	1.104	32.	1.007
8.067	1.113	32.03	1.007
8.1	1.113	32.07	1.007
8.133	1.104	32.1	1.007
8.167	1.113	32.13	0.9985
8.2	1.116	32.17	1.007
8.233	1.116	32.2	1.007
8.267	1.107	32.23	1.007
8.3	1.107	32.27	1.007
8.333	1.116	32.3	1.007
8.367	1.116	32.33	1.007
8.4	1.116	32.37	1.007
8.433	1.116	32.4	0.9985
8.467	1.107	32.43	1.007
8.5	1.107	32.47	1.007
8.533	1.107	32.5	1.007
8.567	1.107	32.53	1.007
8.6	1.107	32.57	1.007
8.633	1.104	32.6	1.007
8.667	1.095	32.63	1.017
8.7	1.104	32.67	1.007
8.733	1.113	32.7	1.007
8.767	1.104	32.73	1.007
8.8	1.104	32.77	1.007
8.833	1.104	32.8	1.007
8.867	1.104	32.83	1.007
8.9	1.104	32.87	0.9985
8.933	1.104	32.9	1.007
8.967	1.095	32.93	0.9985
9.	1.095	32.97	0.9985
9.033	1.104	33.	0.9985
9.067	1.104	33.03	0.9985
9.1	1.104	33.07	0.9985
9.133	1.113	33.1	1.007
9.167	1.104	33.13	0.9985
9.2	1.104	33.17	1.007
9.233	1.104	33.2	1.007
9.267	1.104	33.23	0.9985
9.3	1.095	33.27	0.9985
9.333	1.104	33.3	0.9985
9.367	1.104	33.33	0.9985
9.4	1.104	33.37	1.007
9.433	1.104	33.4	0.9985
9.467	1.104	33.43	1.007
9.5	1.098	33.47	1.007
9.533	1.107	33.5	0.9985
9.567	1.107	33.53	0.9985
9.6	1.107	33.57	0.9985
9.633	1.107	33.6	0.9985
9.667	1.107	33.63	0.9985
9.7	1.107	33.67	1.007
9.733	1.107	33.7	1.007

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
9.767	1.107	33.73	0.9985
9.8	1.098	33.77	0.9985
9.833	1.107	33.8	1.007
9.867	1.107	33.83	1.007
9.9	1.098	33.87	1.007
9.933	1.098	33.9	1.007
9.967	1.089	33.93	1.007
10.	1.098	33.97	1.007
10.03	1.095	34.	1.007
10.07	1.098	34.03	0.9985
10.1	1.098	34.07	0.9985
10.13	1.098	34.1	0.9985
10.17	1.095	34.13	0.9985
10.2	1.098	34.17	0.9985
10.23	1.098	34.2	0.9985
10.27	1.098	34.23	0.9895
10.3	1.095	34.27	0.9895
10.33	1.098	34.3	0.9985
10.37	1.095	34.33	0.9895
10.4	1.095	34.37	0.9985
10.43	1.107	34.4	0.9985
10.47	1.098	34.43	0.9985
10.5	1.095	34.47	0.9985
10.53	1.095	34.5	0.9985
10.57	1.095	34.53	0.9985
10.6	1.107	34.57	0.9985
10.63	1.098	34.6	0.9985
10.67	1.089	34.63	0.9985
10.7	1.086	34.67	0.9985
10.73	1.086	34.7	0.9985
10.77	1.086	34.73	0.9985
10.8	1.095	34.77	0.9985
10.83	1.086	34.8	1.007
10.87	1.095	34.83	0.9895
10.9	1.095	34.87	0.9985
10.93	1.089	34.9	0.9985
10.97	1.089	34.93	0.9985
11.	1.098	34.97	0.9985
11.03	1.089	35.	1.007
11.07	1.089	35.03	0.9985
11.1	1.089	35.07	0.9985
11.13	1.098	35.1	1.007
11.17	1.086	35.13	1.007
11.2	1.095	35.17	0.9985
11.23	1.086	35.2	0.9985
11.27	1.095	35.23	1.007
11.3	1.086	35.27	1.007
11.33	1.095	35.3	1.007
11.37	1.086	35.33	1.017
11.4	1.086	35.37	1.007
11.43	1.086	35.4	1.007
11.47	1.086	35.43	1.001
11.5	1.086	35.47	0.9985
11.53	1.086	35.5	0.9925
11.57	1.086	35.53	0.9985
11.6	1.074	35.57	0.9985
11.63	1.083	35.6	0.9985
11.67	1.083	35.63	0.9985
11.7	1.083	35.67	0.9925
11.73	1.083	35.7	0.9925
11.77	1.074	35.73	0.9895
11.8	1.074	35.77	0.9985
11.83	1.083	35.8	0.9925
11.87	1.071	35.83	0.9985
11.9	1.08	35.87	0.9925
11.93	1.071	35.9	0.9925

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
11.97	1.08	35.93	0.9925
12.	1.071	35.97	0.9925
12.03	1.071	36.	0.9925
12.07	1.071	36.03	0.9925
12.1	1.08	36.07	0.9925
12.13	1.071	36.1	0.9925
12.17	1.071	36.13	0.9925
12.2	1.071	36.17	0.9834
12.23	1.071	36.2	0.9925
12.27	1.08	36.23	0.9925
12.3	1.071	36.27	0.9925
12.33	1.071	36.3	0.9834
12.37	1.08	36.33	0.9925
12.4	1.08	36.37	0.9925
12.43	1.071	36.4	0.9925
12.47	1.071	36.43	0.9925
12.5	1.071	36.47	0.9925
12.53	1.071	36.5	0.9925
12.57	1.071	36.53	0.9925
12.6	1.062	36.57	0.9925
12.63	1.071	36.6	0.9925
12.67	1.071	36.63	0.9925
12.7	1.071	36.67	0.9925
12.73	1.071	36.7	0.9925
12.77	1.071	36.73	0.9925
12.8	1.08	36.77	0.9925
12.83	1.071	36.8	0.9925
12.87	1.071	36.83	0.9834
12.9	1.071	36.87	0.9925
12.93	1.062	36.9	0.9925
12.97	1.071	36.93	0.9834
13.	1.071	36.97	0.9834
13.03	1.071	37.	0.9925
13.07	1.071	37.03	1.001
13.1	1.071	37.07	0.9925
13.13	1.071	37.1	0.9925
13.17	1.062	37.13	0.9925
13.2	1.071	37.17	0.9925
13.23	1.071	37.2	0.9925
13.27	1.071	37.23	0.9834
13.3	1.071	37.27	0.9834
13.33	1.071	37.3	0.9925
13.37	1.071	37.33	0.9925
13.4	1.071	37.37	0.9925
13.43	1.071	37.4	0.9925
13.47	1.071	37.43	0.9834
13.5	1.071	37.47	0.9834
13.53	1.062	37.5	0.9925
13.57	1.062	37.53	0.9834
13.6	1.071	37.57	0.9834
13.63	1.062	37.6	0.9834
13.67	1.062	37.63	0.9925
13.7	1.062	37.67	0.9925
13.73	1.062	37.7	0.9925
13.77	1.062	37.73	0.9925
13.8	1.071	37.77	0.9925
13.83	1.062	37.8	0.9925
13.87	1.062	37.83	0.9834
13.9	1.071	37.87	0.9834
13.93	1.071	37.9	0.9834
13.97	1.062	37.93	0.9925
14.	1.071	37.97	0.9834
14.03	1.071	38.	0.9925
14.07	1.071	38.03	0.9834
14.1	1.071	38.07	0.9925
14.13	1.071	38.1	0.9834

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
14.17	1.071	38.13	0.9834
14.2	1.071	38.17	0.9834
14.23	1.071	38.2	0.9834
14.27	1.071	38.23	0.9834
14.3	1.071	38.27	0.9925
14.33	1.071	38.3	0.9925
14.37	1.071	38.33	0.9834
14.4	1.071	38.37	0.9834
14.43	1.071	38.4	0.9834
14.47	1.071	38.43	0.9834
14.5	1.071	38.47	0.9834
14.53	1.062	38.5	0.9834
14.57	1.071	38.53	0.9834
14.6	1.062	38.57	0.9834
14.63	1.071	38.6	0.9834
14.67	1.062	38.63	0.9834
14.7	1.062	38.67	0.9834
14.73	1.071	38.7	0.9834
14.77	1.071	38.73	0.9834
14.8	1.062	38.77	0.9925
14.83	1.062	38.8	0.9925
14.87	1.071	38.83	0.9925
14.9	1.062	38.87	0.9834
14.93	1.071	38.9	0.9834
14.97	1.062	38.93	0.9834
15.	1.071	38.97	0.9925
15.03	1.062	39.	0.9834
15.07	1.062	39.03	0.9834
15.1	1.062	39.07	0.9834
15.13	1.062	39.1	0.9834
15.17	1.062	39.13	0.9834
15.2	1.062	39.17	0.9834
15.23	1.062	39.2	0.9834
15.27	1.062	39.23	0.9834
15.3	1.062	39.27	0.9834
15.33	1.062	39.3	0.9834
15.37	1.062	39.33	0.9834
15.4	1.062	39.37	0.9834
15.43	1.071	39.4	0.9925
15.47	1.062	39.43	0.9925
15.5	1.062	39.47	0.9925
15.53	1.062	39.5	0.9834
15.57	1.053	39.53	0.9834
15.6	1.062	39.57	0.9834
15.63	1.062	39.6	0.9834
15.67	1.053	39.63	0.9834
15.7	1.062	39.67	0.9834
15.73	1.053	39.7	0.9834
15.77	1.062	39.73	0.9834
15.8	1.062	39.77	0.9925
15.83	1.053	39.8	0.9804
15.87	1.062	39.83	0.9834
15.9	1.053	39.87	0.9834
15.93	1.062	39.9	0.9925
15.97	1.053	39.93	0.9925
16.	1.062	39.97	0.9925
16.03	1.053	40.	0.9925
16.07	1.053	40.03	0.9834
16.1	1.044	40.07	0.9834
16.13	1.053	40.1	0.9895
16.17	1.053	40.13	0.9834
16.2	1.053	40.17	0.9834
16.23	1.053	40.2	0.9895
16.27	1.053	40.23	0.9834
16.3	1.053	40.27	0.9804
16.33	1.062	40.3	0.9834

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
16.37	1.053	40.33	0.9895
16.4	1.053	40.37	0.9804
16.43	1.053	40.4	0.9804
16.47	1.062	40.43	0.9804
16.5	1.053	40.47	0.9804
16.53	1.062	40.5	0.9804
16.57	1.062	40.53	0.9804
16.6	1.062	40.57	0.9804
16.63	1.053	40.6	0.9804
16.67	1.053	40.63	0.9804
16.7	1.062	40.67	0.9804
16.73	1.062	40.7	0.9804
16.77	1.062	40.73	0.9804
16.8	1.053	40.77	0.9804
16.83	1.062	40.8	0.9804
16.87	1.062	40.83	0.9804
16.9	1.053	40.87	0.9804
16.93	1.053	40.9	0.9804
16.97	1.062	40.93	0.9895
17.	1.062	40.97	0.9895
17.03	1.053	41.	0.9804
17.07	1.053	41.03	0.9804
17.1	1.053	41.07	0.9804
17.13	1.053	41.1	0.9804
17.17	1.053	41.13	0.9804
17.2	1.053	41.17	0.9804
17.23	1.053	41.2	0.9804
17.27	1.053	41.23	0.9804
17.3	1.053	41.27	0.9895
17.33	1.062	41.3	0.9895
17.37	1.053	41.33	0.9895
17.4	1.053	41.37	0.9804
17.43	1.053	41.4	0.9804
17.47	1.053	41.43	0.9804
17.5	1.053	41.47	0.9804
17.53	1.053	41.5	0.9804
17.57	1.062	41.53	0.9804
17.6	1.053	41.57	0.9804
17.63	1.062	41.6	0.9804
17.67	1.053	41.63	0.9804
17.7	1.053	41.67	0.9804
17.73	1.053	41.7	0.9804
17.77	1.053	41.73	0.9804
17.8	1.053	41.77	0.9804
17.83	1.053	41.8	0.9804
17.87	1.053	41.83	0.9804
17.9	1.053	41.87	0.9804
17.93	1.053	41.9	0.9804
17.97	1.053	41.93	0.9804
18.	1.053	41.97	0.9804
18.03	1.062	42.	0.9804
18.07	1.053	42.03	0.9804
18.1	1.053	42.07	0.9714
18.13	1.053	42.1	0.9804
18.17	1.053	42.13	0.9804
18.2	1.044	42.17	0.9804
18.23	1.044	42.2	0.9714
18.27	1.053	42.23	0.9714
18.3	1.053	42.27	0.9714
18.33	1.044	42.3	0.9804
18.37	1.044	42.33	0.9744
18.4	1.053	42.37	0.9714
18.43	1.044	42.4	0.9804
18.47	1.053	42.43	0.9714
18.5	1.053	42.47	0.9834
18.53	1.053	42.5	0.9834

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
18.57	1.053	42.53	0.9834
18.6	1.053	42.57	0.9744
18.63	1.053	42.6	0.9744
18.67	1.053	42.63	0.9834
18.7	1.053	42.67	0.9804
18.73	1.044	42.7	0.9834
18.77	1.053	42.73	0.9834
18.8	1.053	42.77	0.9834
18.83	1.044	42.8	0.9834
18.87	1.044	42.83	0.9744
18.9	1.044	42.87	0.9744
18.93	1.044	42.9	0.9744
18.97	1.044	42.93	0.9744
19.	1.044	42.97	0.9834
19.03	1.035	43.	0.9744
19.07	1.044	43.03	0.9834
19.1	1.044	43.07	0.9834
19.13	1.044	43.1	0.9744
19.17	1.053	43.13	0.9744
19.2	1.053	43.17	0.9744
19.23	1.044	43.2	0.9744
19.27	1.053	43.23	0.9744
19.3	1.044	43.27	0.9834
19.33	1.044	43.3	0.9834
19.37	1.053	43.33	0.9744
19.4	1.044	43.37	0.9744
19.43	1.044	43.4	0.9834
19.47	1.044	43.43	0.9744
19.5	1.044	43.47	0.9834
19.53	1.044	43.5	0.9744
19.57	1.044	43.53	0.9744
19.6	1.044	43.57	0.9834
19.63	1.044	43.6	0.9744
19.67	1.044	43.63	0.9834
19.7	1.044	43.67	0.9744
19.73	1.038	43.7	0.9834
19.77	1.044	43.73	0.9834
19.8	1.047	43.77	0.9744
19.83	1.047	43.8	0.9744
19.87	1.044	43.83	0.9744
19.9	1.044	43.87	0.9744
19.93	1.047	43.9	0.9744
19.97	1.053	43.93	0.9744
20.	1.038	43.97	0.9744
20.03	1.047	44.	0.9834
20.07	1.038	44.03	0.9834
20.1	1.038	44.07	0.9744
20.13	1.038	44.1	0.9744
20.17	1.038	44.13	0.9744
20.2	1.038	44.17	0.9744
20.23	1.038	44.2	0.9744
20.27	1.038	44.23	0.9834
20.3	1.038	44.27	0.9834
20.33	1.038	44.3	0.9834
20.37	1.038	44.33	0.9834
20.4	1.038	44.37	0.9834
20.43	1.029	44.4	0.9744
20.47	1.038	44.43	0.9744
20.5	1.038	44.47	0.9744
20.53	1.038	44.5	0.9744
20.57	1.029	44.53	0.9834
20.6	1.038	44.57	0.9744
20.63	1.038	44.6	0.9744
20.67	1.038	44.63	0.9744
20.7	1.038	44.67	0.9744
20.73	1.038	44.7	0.9714

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
20.77	1.038	44.73	0.9744
20.8	1.029	44.77	0.9834
20.83	1.029	44.8	0.9714
20.87	1.029	44.83	0.9834
20.9	1.038	44.87	0.9804
20.93	1.029	44.9	0.9804
20.97	1.029	44.93	0.9834
21.	1.029	44.97	0.9834
21.03	1.038	45.	0.9804
21.07	1.038	45.03	0.9804
21.1	1.038	45.07	0.9744
21.13	1.029	45.1	0.9834
21.17	1.038	45.13	0.9804
21.2	1.029	45.17	0.9804
21.23	1.029	45.2	0.9804
21.27	1.029	45.23	0.9804
21.3	1.029	45.27	0.9714
21.33	1.029	45.3	0.9804
21.37	1.029	45.33	0.9804
21.4	1.029	45.37	0.9714
21.43	1.029	45.4	0.9804
21.47	1.029	45.43	0.9714
21.5	1.029	45.47	0.9804
21.53	1.038	45.5	0.9804
21.57	1.029	45.53	0.9804
21.6	1.038	45.57	0.9804
21.63	1.029	45.6	0.9804
21.67	1.029	45.63	0.9804
21.7	1.029	45.67	0.9714
21.73	1.029	45.7	0.9804
21.77	1.029	45.73	0.9714
21.8	1.029	45.77	0.9714
21.83	1.029	45.8	0.9804
21.87	1.029	45.83	0.9714
21.9	1.029	45.87	0.9714
21.93	1.029	45.9	0.9804
21.97	1.038	45.93	0.9804
22.	1.029	45.97	0.9804
22.03	1.029	46.	0.9804
22.07	1.029	46.03	0.9714
22.1	1.029	46.07	0.9804
22.13	1.029	46.1	0.9804
22.17	1.029	46.13	0.9804
22.2	1.029	46.17	0.9714
22.23	1.029	46.2	0.9714
22.27	1.02	46.23	0.9714
22.3	1.02	46.27	0.9714
22.33	1.02	46.3	0.9714
22.37	1.029	46.33	0.9804
22.4	1.02	46.37	0.9804
22.43	1.02	46.4	0.9804
22.47	1.02	46.43	0.9714
22.5	1.02	46.47	0.9714
22.53	1.029	46.5	0.9714
22.57	1.029	46.53	0.9714
22.6	1.029	46.57	0.9714
22.63	1.029	46.6	0.9624
22.67	1.02	46.63	0.9714
22.7	1.02	46.67	0.9624
22.73	1.02	46.7	0.9624
22.77	1.02	46.73	0.9624
22.8	1.029	46.77	0.9714
22.83	1.02	46.8	0.9714
22.87	1.029	46.83	0.9624
22.9	1.029	46.87	0.9714
22.93	1.029	46.9	0.9714

<u>Time (min)</u>	<u>Displacement (ft)</u>	<u>Time (min)</u>	<u>Displacement (ft)</u>
22.97	1.029	46.93	0.9714
23.	1.02	46.97	0.9624
23.03	1.029	47.	0.9624
23.07	1.029	47.03	0.9624
23.1	1.029	47.07	0.9714
23.13	1.029	47.1	0.9714
23.17	1.02	47.13	0.9714
23.2	1.029	47.17	0.9714
23.23	1.02	47.2	0.9714
23.27	1.02	47.23	0.9624
23.3	1.029	47.27	0.9624
23.33	1.02	47.3	0.9624
23.37	1.02	47.33	0.9624
23.4	1.02	47.37	0.9624
23.43	1.02	47.4	0.9714
23.47	1.029	47.43	0.9714
23.5	1.02	47.47	0.9714
23.53	1.02	47.5	0.9714
23.57	1.02	47.53	0.9714
23.6	1.02	47.57	0.9714
23.63	1.02	47.6	0.9714
23.67	1.02	47.63	0.9714
23.7	1.02	47.67	0.9714
23.73	1.02	47.7	0.9714
23.77	1.02	47.73	0.9654
23.8	1.02	47.77	0.9714
23.83	1.011	47.8	0.9714
23.87	1.011	47.83	0.9744
23.9	1.011	47.87	0.9895
23.93	1.02	47.9	0.9804

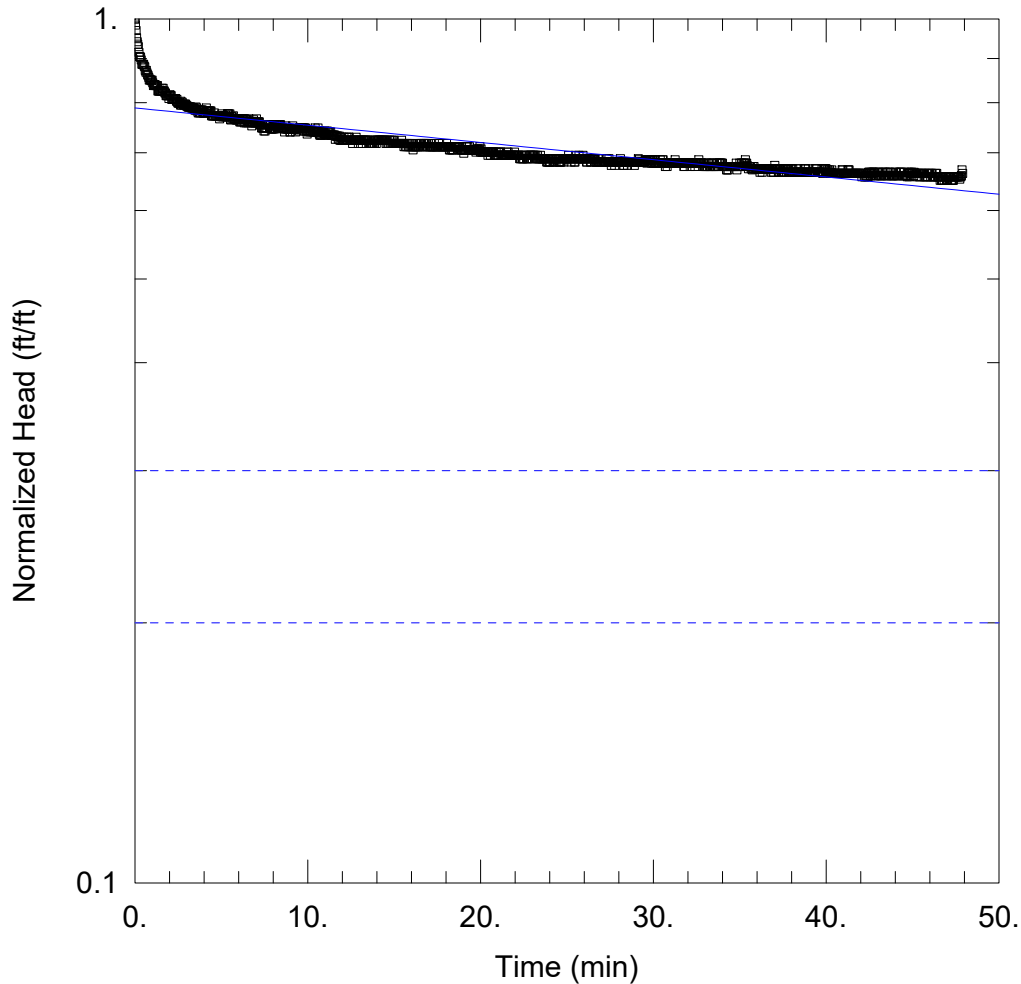
SOLUTION

Slug Test
 Aquifer Model: Confined
 Solution Method: Bouwer-Rice
 ln(Re/rw): 3.441

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	5.453E-6	ft/min
y0	1.167	ft

K = 2.77E-6 cm/sec
 T = K*b = 0.0002501 ft²/min (0.003872 sq. cm/sec)



MW-22 FALLING HEAD TEST

Data Set: N:\...\MW-22 Falling Head Test.aqt

Date: 11/08/24

Time: 12:56:03

PROJECT INFORMATION

Company: GHD Services Inc

Client: Viking Pump/IDEX

Project: 056934

Location: Cedar Falls, Iowa

Test Well: MW-22

Test Date: October 2024

AQUIFER DATA

Saturated Thickness: 45.86 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-22)

Initial Displacement: 1.48 ft

Static Water Column Height: 45.86 ft

Total Well Penetration Depth: 45.86 ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Well Radius: 0.34 ft

SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 5.453E-6 ft/min

y0 = 1.167 ft

Data Set: N:\US\St Paul\Projects\563\056934\Workshare\Aquifer Testing\2024-04 Aquifer testing\AQT Files\MW-22
 Title: MW-22 Rising Head Test
 Date: 11/08/24
 Time: 12:55:37

PROJECT INFORMATION

Company: GHD Services Inc
 Client: Viking Pump/IDEX
 Project: 056934
 Location: Cedar Falls, Iowa
 Test Date: October 2024
 Test Well: MW-22

AQUIFER DATA

Saturated Thickness: 45.86 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-22

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 1.597 ft
 Static Water Column Height: 45.86 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.34 ft
 Well Skin Radius: 0.34 ft
 Screen Length: 10. ft
 Total Well Penetration Depth: 45.86 ft

No. of Observations: 660

Time (min)	Observation Data		Displacement (ft)
	Displacement (ft)	Time (min)	
0.	1.597	27.5	1.065
0.08333	1.447	27.58	1.065
0.1667	1.386	27.67	1.065
0.25	1.347	27.75	1.056
0.3333	1.332	27.83	1.056
0.4167	1.314	27.92	1.056
0.5	1.293	28.	1.056
0.5833	1.278	28.08	1.056
0.6667	1.269	28.17	1.056
0.75	1.251	28.25	1.065
0.8333	1.251	28.33	1.056
0.9167	1.251	28.42	1.056
1.	1.242	28.5	1.056
1.083	1.233	28.58	1.056
1.167	1.233	28.67	1.056
1.25	1.233	28.75	1.056
1.333	1.233	28.83	1.047
1.417	1.215	28.92	1.056
1.5	1.215	29.	1.056
1.583	1.218	29.08	1.056
1.667	1.209	29.17	1.056
1.75	1.206	29.25	1.047
1.833	1.197	29.33	1.056
1.917	1.206	29.42	1.056
2.	1.2	29.5	1.056
2.083	1.2	29.58	1.056
2.167	1.2	29.67	1.056
2.25	1.191	29.75	1.056
2.333	1.188	29.83	1.056

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
2.417	1.188	29.92	1.056
2.5	1.179	30.	1.056
2.583	1.188	30.08	1.056
2.667	1.179	30.17	1.047
2.75	1.17	30.25	1.056
2.833	1.179	30.33	1.047
2.917	1.179	30.42	1.056
3.	1.173	30.5	1.056
3.083	1.173	30.58	1.056
3.167	1.164	30.67	1.056
3.25	1.173	30.75	1.065
3.333	1.173	30.83	1.056
3.417	1.17	30.92	1.056
3.5	1.161	31.	1.056
3.583	1.161	31.08	1.056
3.667	1.161	31.17	1.056
3.75	1.161	31.25	1.047
3.833	1.152	31.33	1.047
3.917	1.161	31.42	1.047
4.	1.161	31.5	1.047
4.083	1.161	31.58	1.047
4.167	1.152	31.67	1.056
4.25	1.152	31.75	1.047
4.333	1.152	31.83	1.056
4.417	1.143	31.92	1.047
4.5	1.143	32.	1.047
4.583	1.134	32.08	1.056
4.667	1.143	32.17	1.056
4.75	1.143	32.25	1.056
4.833	1.143	32.33	1.056
4.917	1.143	32.42	1.056
5.	1.143	32.5	1.056
5.083	1.134	32.58	1.047
5.167	1.152	32.67	1.047
5.25	1.152	32.75	1.056
5.333	1.143	32.83	1.047
5.417	1.134	32.92	1.047
5.5	1.134	33.	1.038
5.583	1.137	33.08	1.047
5.667	1.137	33.17	1.047
5.75	1.137	33.25	1.047
5.833	1.134	33.33	1.047
5.917	1.134	33.42	1.047
6.	1.134	33.5	1.047
6.083	1.125	33.58	1.047
6.167	1.125	33.67	1.047
6.25	1.134	33.75	1.047
6.333	1.137	33.83	1.047
6.417	1.128	33.92	1.047
6.5	1.119	34.	1.047
6.583	1.137	34.08	1.047
6.667	1.119	34.17	1.047
6.75	1.128	34.25	1.047
6.833	1.128	34.33	1.038
6.917	1.128	34.42	1.047
7.	1.128	34.5	1.038
7.083	1.128	34.58	1.047
7.167	1.119	34.67	1.047
7.25	1.119	34.75	1.047
7.333	1.119	34.83	1.038
7.417	1.119	34.92	1.047
7.5	1.119	35.	1.047
7.583	1.119	35.08	1.047
7.667	1.119	35.17	1.047
7.75	1.125	35.25	1.047
7.833	1.125	35.33	1.056

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
7.917	1.119	35.42	1.047
8.	1.125	35.5	1.056
8.083	1.119	35.58	1.038
8.167	1.125	35.67	1.047
8.25	1.119	35.75	1.038
8.333	1.119	35.83	1.038
8.417	1.11	35.92	1.038
8.5	1.119	36.	1.038
8.583	1.119	36.08	1.047
8.667	1.119	36.17	1.038
8.75	1.11	36.25	1.038
8.833	1.119	36.33	1.047
8.917	1.11	36.42	1.047
9.	1.119	36.5	1.038
9.083	1.119	36.58	1.047
9.167	1.11	36.67	1.038
9.25	1.11	36.75	1.038
9.333	1.101	36.83	1.038
9.417	1.11	36.92	1.038
9.5	1.11	37.	1.047
9.583	1.11	37.08	1.047
9.667	1.119	37.17	1.038
9.75	1.119	37.25	1.038
9.833	1.11	37.33	1.029
9.917	1.119	37.42	1.029
10.	1.11	37.5	1.038
10.08	1.11	37.58	1.038
10.17	1.119	37.67	1.047
10.25	1.119	37.75	1.038
10.33	1.11	37.83	1.038
10.42	1.11	37.92	1.038
10.5	1.11	38.	1.038
10.58	1.101	38.08	1.038
10.67	1.11	38.17	1.029
10.75	1.119	38.25	1.038
10.83	1.11	38.33	1.038
10.92	1.101	38.42	1.038
11.	1.11	38.5	1.038
11.08	1.101	38.58	1.038
11.17	1.101	38.67	1.047
11.25	1.101	38.75	1.038
11.33	1.101	38.83	1.038
11.42	1.101	38.92	1.038
11.5	1.101	39.	1.038
11.58	1.11	39.08	1.038
11.67	1.11	39.17	1.038
11.75	1.11	39.25	1.038
11.83	1.11	39.33	1.038
11.92	1.101	39.42	1.038
12.	1.101	39.5	1.047
12.08	1.092	39.58	1.038
12.17	1.101	39.67	1.038
12.25	1.101	39.75	1.029
12.33	1.101	39.83	1.038
12.42	1.101	39.92	1.038
12.5	1.101	40.	1.038
12.58	1.092	40.08	1.038
12.67	1.092	40.17	1.038
12.75	1.092	40.25	1.038
12.83	1.092	40.33	1.038
12.92	1.092	40.42	1.038
13.	1.092	40.5	1.029
13.08	1.092	40.58	1.038
13.17	1.092	40.67	1.029
13.25	1.092	40.75	1.038
13.33	1.101	40.83	1.029

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
13.42	1.092	40.92	1.038
13.5	1.092	41.	1.029
13.58	1.092	41.08	1.038
13.67	1.092	41.17	1.047
13.75	1.092	41.25	1.038
13.83	1.101	41.33	1.038
13.92	1.092	41.42	1.038
14.	1.092	41.5	1.038
14.08	1.092	41.58	1.038
14.17	1.092	41.67	1.029
14.25	1.101	41.75	1.029
14.33	1.101	41.83	1.038
14.42	1.101	41.92	1.038
14.5	1.101	42.	1.038
14.58	1.092	42.08	1.038
14.67	1.092	42.17	1.029
14.75	1.092	42.25	1.038
14.83	1.083	42.33	1.038
14.92	1.092	42.42	1.029
15.	1.083	42.5	1.038
15.08	1.083	42.58	1.029
15.17	1.083	42.67	1.038
15.25	1.083	42.75	1.029
15.33	1.083	42.83	1.038
15.42	1.092	42.92	1.029
15.5	1.083	43.	1.029
15.58	1.083	43.08	1.029
15.67	1.083	43.17	1.029
15.75	1.083	43.25	1.029
15.83	1.083	43.33	1.029
15.92	1.074	43.42	1.038
16.	1.083	43.5	1.038
16.08	1.083	43.58	1.029
16.17	1.083	43.67	1.038
16.25	1.083	43.75	1.038
16.33	1.083	43.83	1.038
16.42	1.083	43.92	1.038
16.5	1.092	44.	1.029
16.58	1.083	44.08	1.038
16.67	1.083	44.17	1.038
16.75	1.083	44.25	1.038
16.83	1.083	44.33	1.038
16.92	1.092	44.42	1.038
17.	1.101	44.5	1.038
17.08	1.083	44.58	1.029
17.17	1.083	44.67	1.029
17.25	1.083	44.75	1.038
17.33	1.083	44.83	1.038
17.42	1.074	44.92	1.029
17.5	1.074	45.	1.029
17.58	1.074	45.08	1.029
17.67	1.083	45.17	1.038
17.75	1.083	45.25	1.029
17.83	1.092	45.33	1.029
17.92	1.074	45.42	1.029
18.	1.074	45.5	1.029
18.08	1.092	45.58	1.029
18.17	1.074	45.67	1.029
18.25	1.074	45.75	1.029
18.33	1.083	45.83	1.029
18.42	1.083	45.92	1.02
18.5	1.083	46.	1.029
18.58	1.083	46.08	1.029
18.67	1.083	46.17	1.029
18.75	1.083	46.25	1.029
18.83	1.083	46.33	1.038

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
18.92	1.083	46.42	1.038
19.	1.074	46.5	1.029
19.08	1.083	46.58	1.029
19.17	1.083	46.67	1.038
19.25	1.065	46.75	1.029
19.33	1.074	46.83	1.029
19.42	1.074	46.92	1.029
19.5	1.074	47.	1.029
19.58	1.074	47.08	1.029
19.67	1.074	47.17	1.029
19.75	1.074	47.25	1.029
19.83	1.083	47.33	1.029
19.92	1.083	47.42	1.029
20.	1.074	47.5	1.029
20.08	1.074	47.58	1.02
20.17	1.074	47.67	1.029
20.25	1.074	47.75	1.029
20.33	1.074	47.83	1.029
20.42	1.074	47.92	1.038
20.5	1.083	48.	1.029
20.58	1.074	48.08	1.029
20.67	1.074	48.17	1.029
20.75	1.074	48.25	1.02
20.83	1.074	48.33	1.029
20.92	1.074	48.42	1.029
21.	1.074	48.5	1.02
21.08	1.074	48.58	1.029
21.17	1.074	48.67	1.029
21.25	1.074	48.75	1.02
21.33	1.074	48.83	1.029
21.42	1.074	48.92	1.029
21.5	1.074	49.	1.029
21.58	1.074	49.08	1.02
21.67	1.074	49.17	1.02
21.75	1.074	49.25	1.02
21.83	1.074	49.33	1.02
21.92	1.074	49.42	1.02
22.	1.074	49.5	1.029
22.08	1.065	49.58	1.029
22.17	1.074	49.67	1.02
22.25	1.065	49.75	1.02
22.33	1.065	49.83	1.02
22.42	1.065	49.92	1.02
22.5	1.074	50.	1.02
22.58	1.065	50.08	1.02
22.67	1.074	50.17	1.02
22.75	1.065	50.25	1.029
22.83	1.074	50.33	1.029
22.92	1.074	50.42	1.02
23.	1.074	50.5	1.029
23.08	1.083	50.58	1.02
23.17	1.083	50.67	1.02
23.25	1.074	50.75	1.02
23.33	1.074	50.83	1.02
23.42	1.074	50.92	1.02
23.5	1.074	51.	1.029
23.58	1.074	51.08	1.02
23.67	1.074	51.17	1.02
23.75	1.074	51.25	1.02
23.83	1.074	51.33	1.02
23.92	1.065	51.42	1.029
24.	1.074	51.5	1.02
24.08	1.074	51.58	1.02
24.17	1.065	51.67	1.02
24.25	1.065	51.75	1.02
24.33	1.074	51.83	1.02

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
24.42	1.074	51.92	1.02
24.5	1.074	52.	1.011
24.58	1.074	52.08	1.02
24.67	1.074	52.17	1.011
24.75	1.074	52.25	1.011
24.83	1.074	52.33	1.02
24.92	1.074	52.42	1.02
25.	1.074	52.5	1.011
25.08	1.074	52.58	1.011
25.17	1.065	52.67	1.02
25.25	1.074	52.75	1.02
25.33	1.074	52.83	1.02
25.42	1.065	52.92	1.02
25.5	1.065	53.	1.02
25.58	1.056	53.08	1.02
25.67	1.065	53.17	1.011
25.75	1.065	53.25	1.02
25.83	1.065	53.33	1.02
25.92	1.065	53.42	1.02
26.	1.065	53.5	1.029
26.08	1.065	53.58	1.02
26.17	1.074	53.67	1.02
26.25	1.065	53.75	1.02
26.33	1.065	53.83	1.02
26.42	1.065	53.92	1.02
26.5	1.065	54.	1.02
26.58	1.074	54.08	1.011
26.67	1.065	54.17	1.02
26.75	1.065	54.25	1.02
26.83	1.065	54.33	1.02
26.92	1.065	54.42	1.011
27.	1.065	54.5	1.02
27.08	1.065	54.58	1.02
27.17	1.074	54.67	1.02
27.25	1.065	54.75	1.02
27.33	1.074	54.83	1.02
27.42	1.065	54.92	1.014

SOLUTION

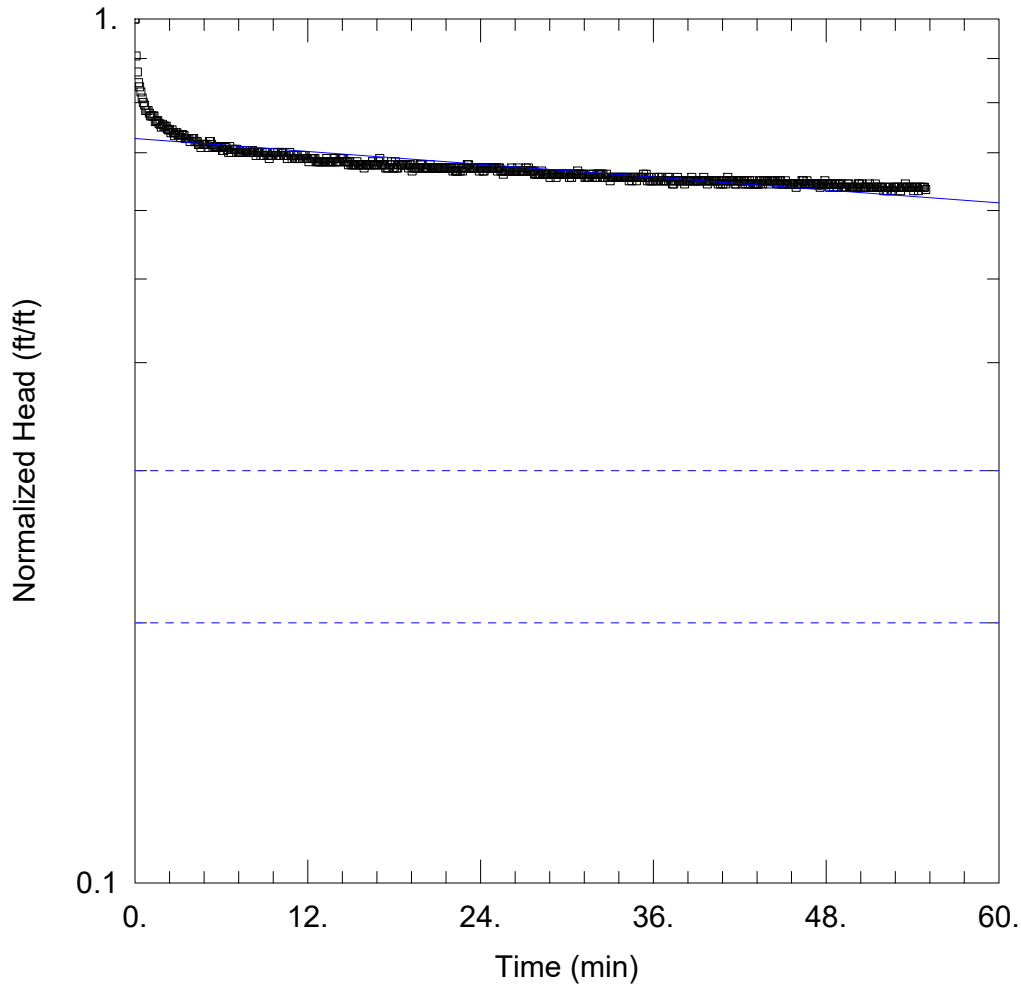
Slug Test
 Aquifer Model: Confined
 Solution Method: Bouwer-Rice
 ln(Re/rw): 3.441

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	3.387E-6	ft/min
y0	1.161	ft

K = 1.72E-6 cm/sec
 T = K*b = 0.0001553 ft²/min (0.002405 sq. cm/sec)



MW-22 RISING HEAD TEST

Data Set: N:\...\MW-22 Rising Head Test.aqt

Date: 11/08/24

Time: 12:55:09

PROJECT INFORMATION

Company: GHD Services Inc

Client: Viking Pump/IDEX

Project: 056934

Location: Cedar Falls, Iowa

Test Well: MW-22

Test Date: October 2024

AQUIFER DATA

Saturated Thickness: 45.86 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-22)

Initial Displacement: 1.597 ft

Static Water Column Height: 45.86 ft

Total Well Penetration Depth: 45.86 ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Well Radius: 0.34 ft

SOLUTION

Aquifer Model: Confined

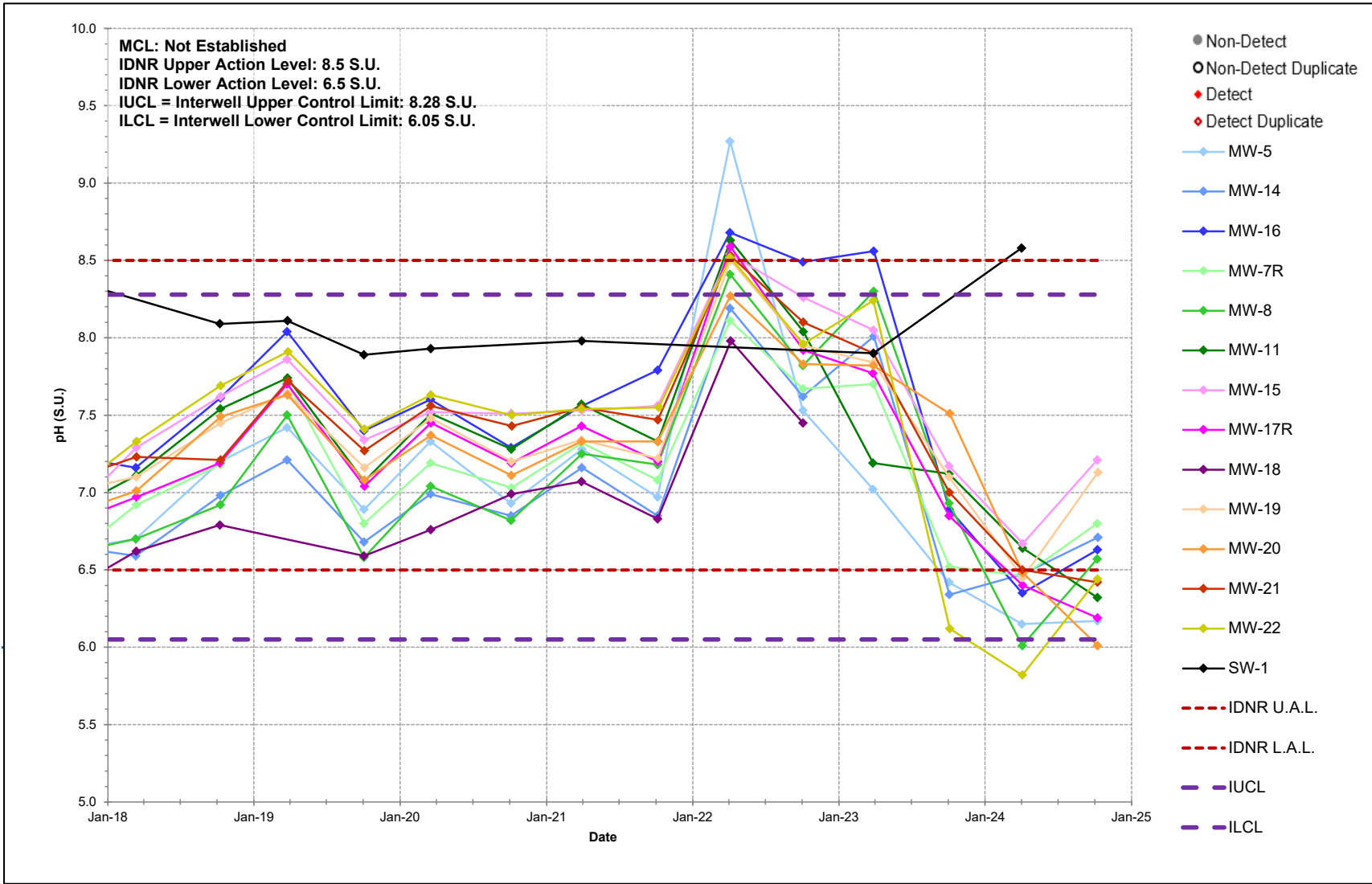
Solution Method: Bouwer-Rice

K = 3.387E-6 ft/min

y0 = 1.161 ft

Appendix E

Historical Groundwater and Surface Water Quality Figures

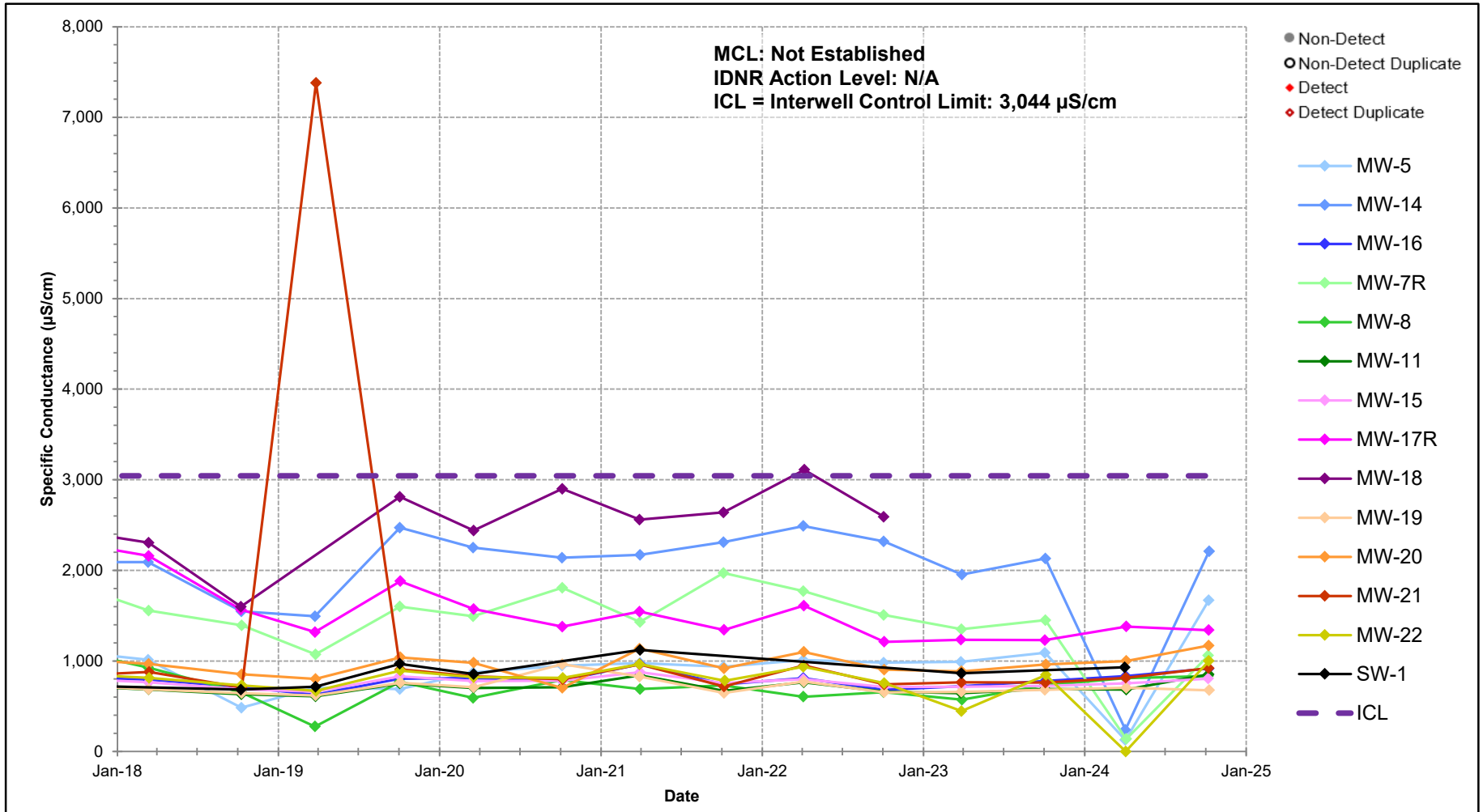


VIKING PUMP
 FOUNDRY SAND LANDFILL
 CEDAR FALLS, IOWA

pH VS. TIME
 Upgradient Wells: MW-5, MW-14, and MW-16

56934
 12/5/2024

FIGURE E-1



VIKING PUMP
 FOUNDRY SAND LANDFILL
 CEDAR FALLS, IOWA

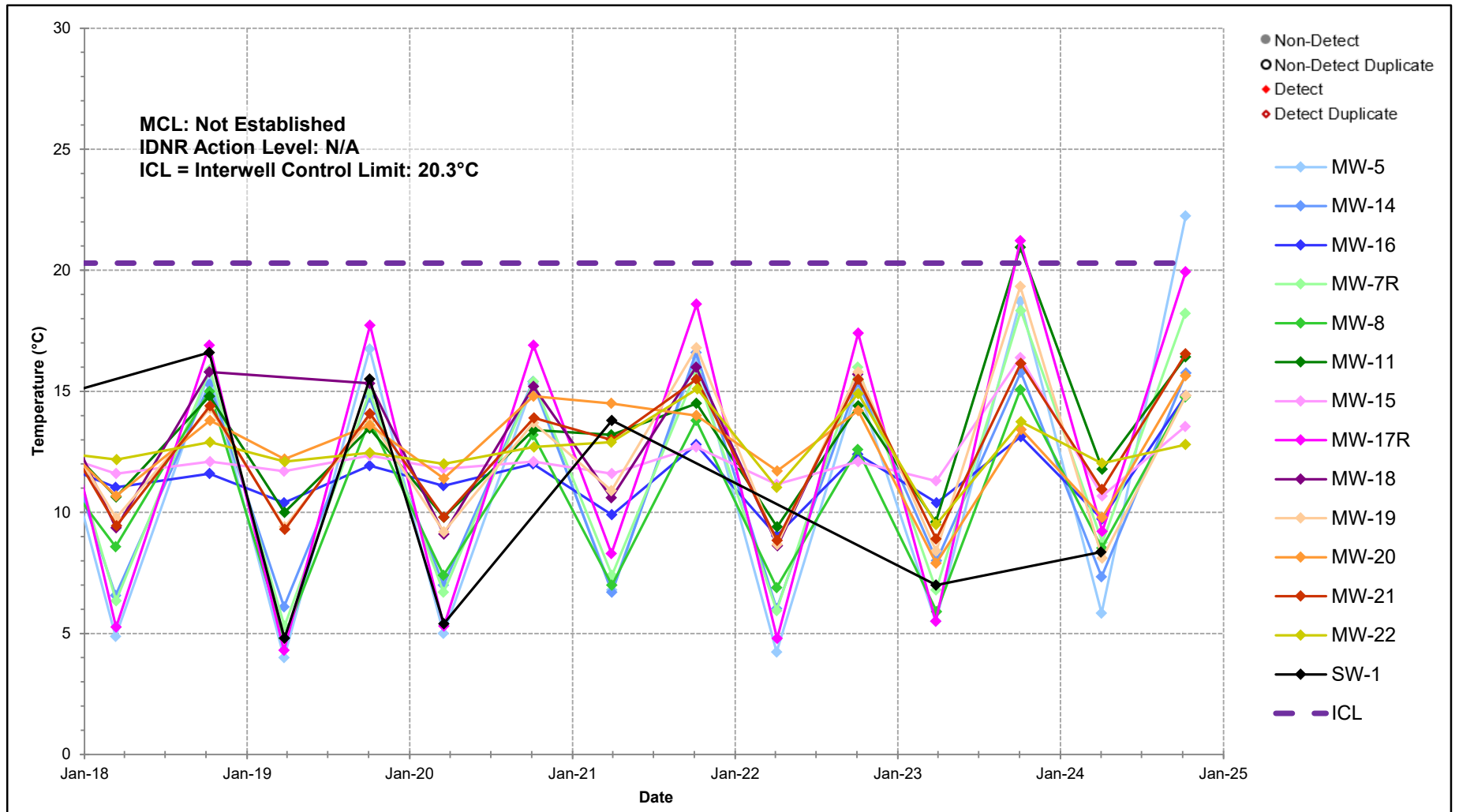
SPECIFIC CONDUCTANCE VS. TIME

Upgradient Wells: MW-5, MW-14, and MW-16

56934

12/5/2024

FIGURE E-2



VIKING PUMP
 FOUNDRY SAND LANDFILL
 CEDAR FALLS, IOWA

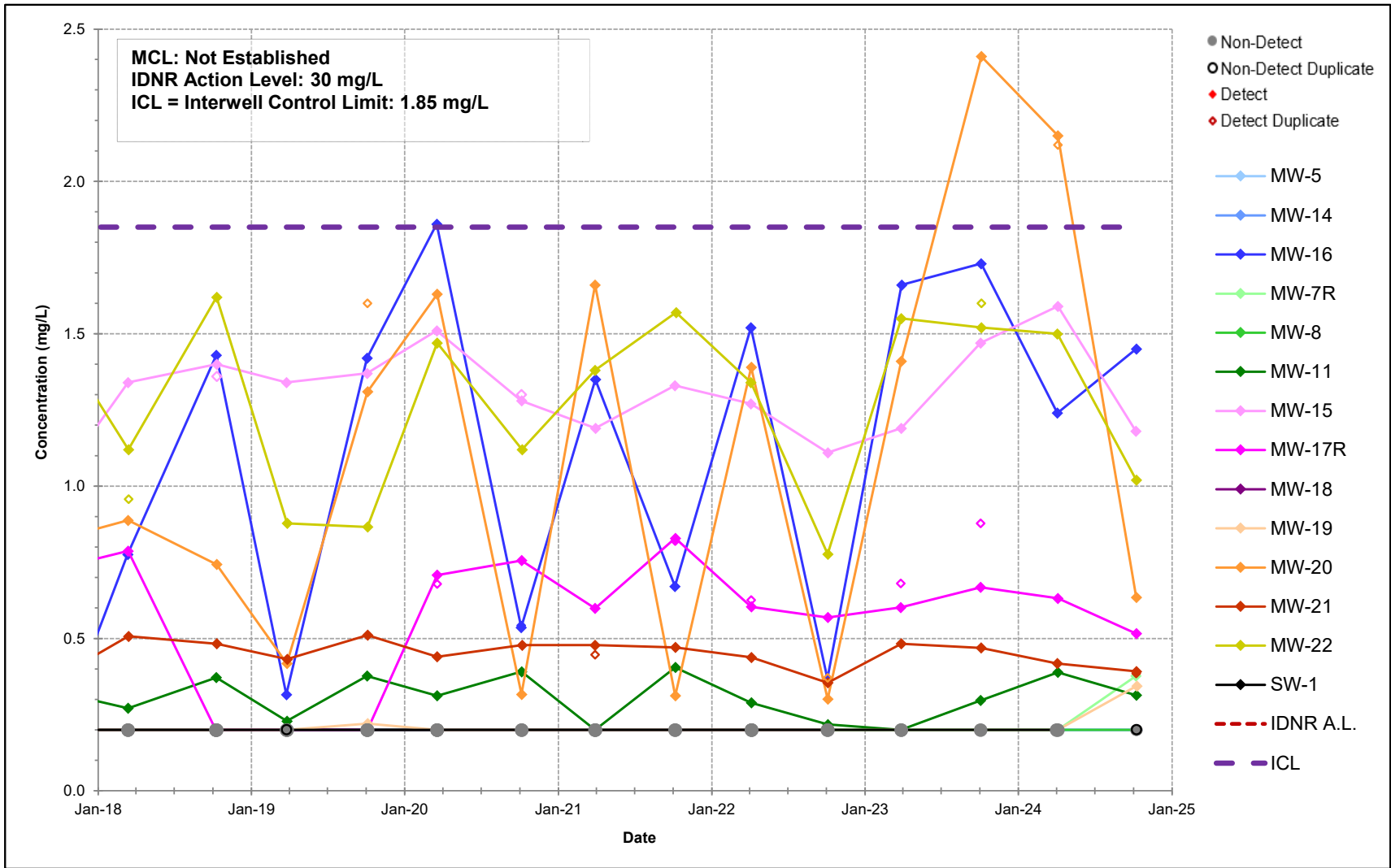
TEMPERATURE VS. TIME

Upgradient Wells: MW-5, MW-14, and MW-16

56934

12/5/2024

FIGURE E-3

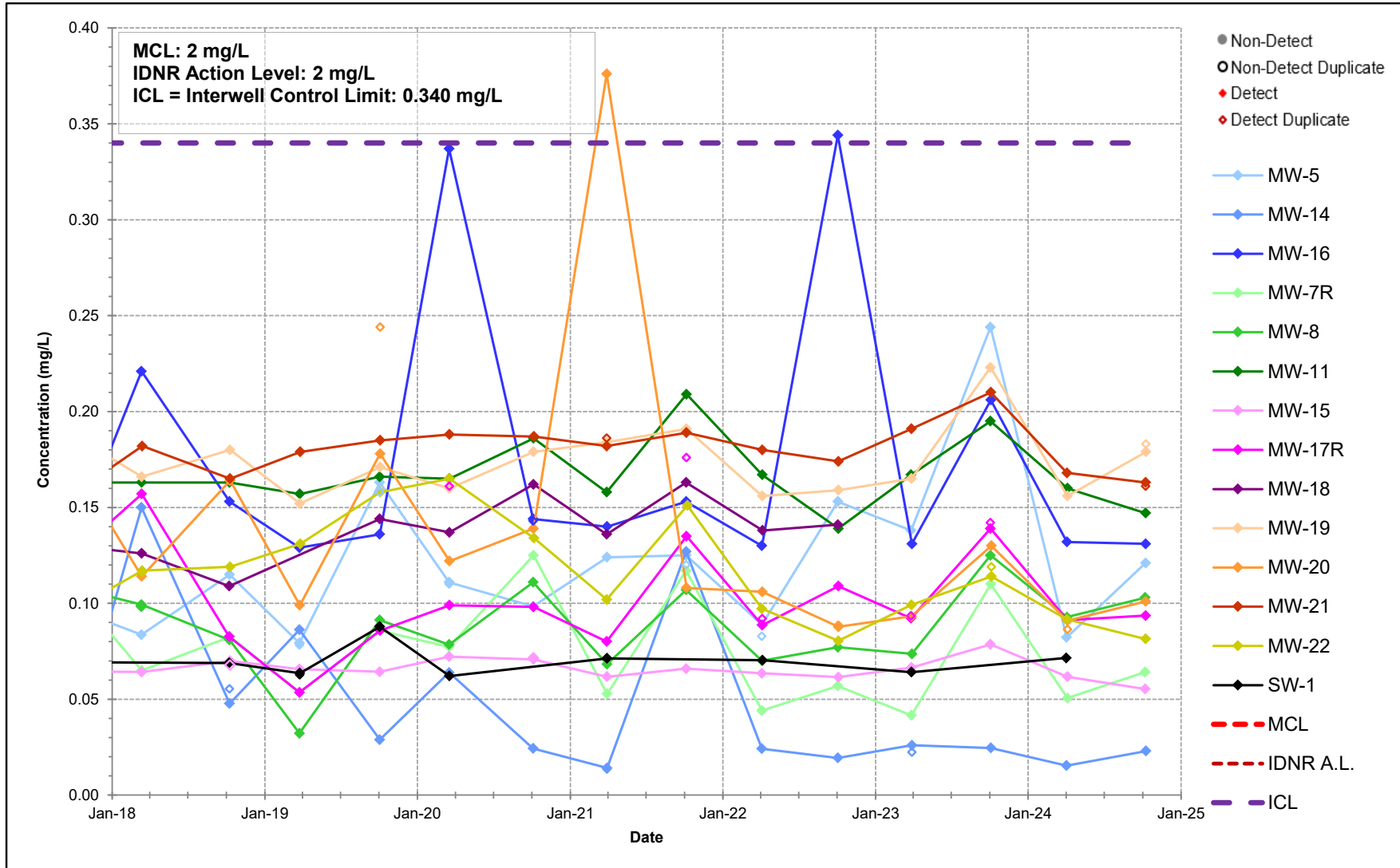


VIKING PUMP
 FOUNDRY SAND LANDFILL
 CEDAR FALLS, IOWA

AMMONIA (as N) CONCENTRATION VS. TIME
 Upgradient Wells: MW-5, MW-14, and MW-16

56934
 12/5/2024

FIGURE E-4

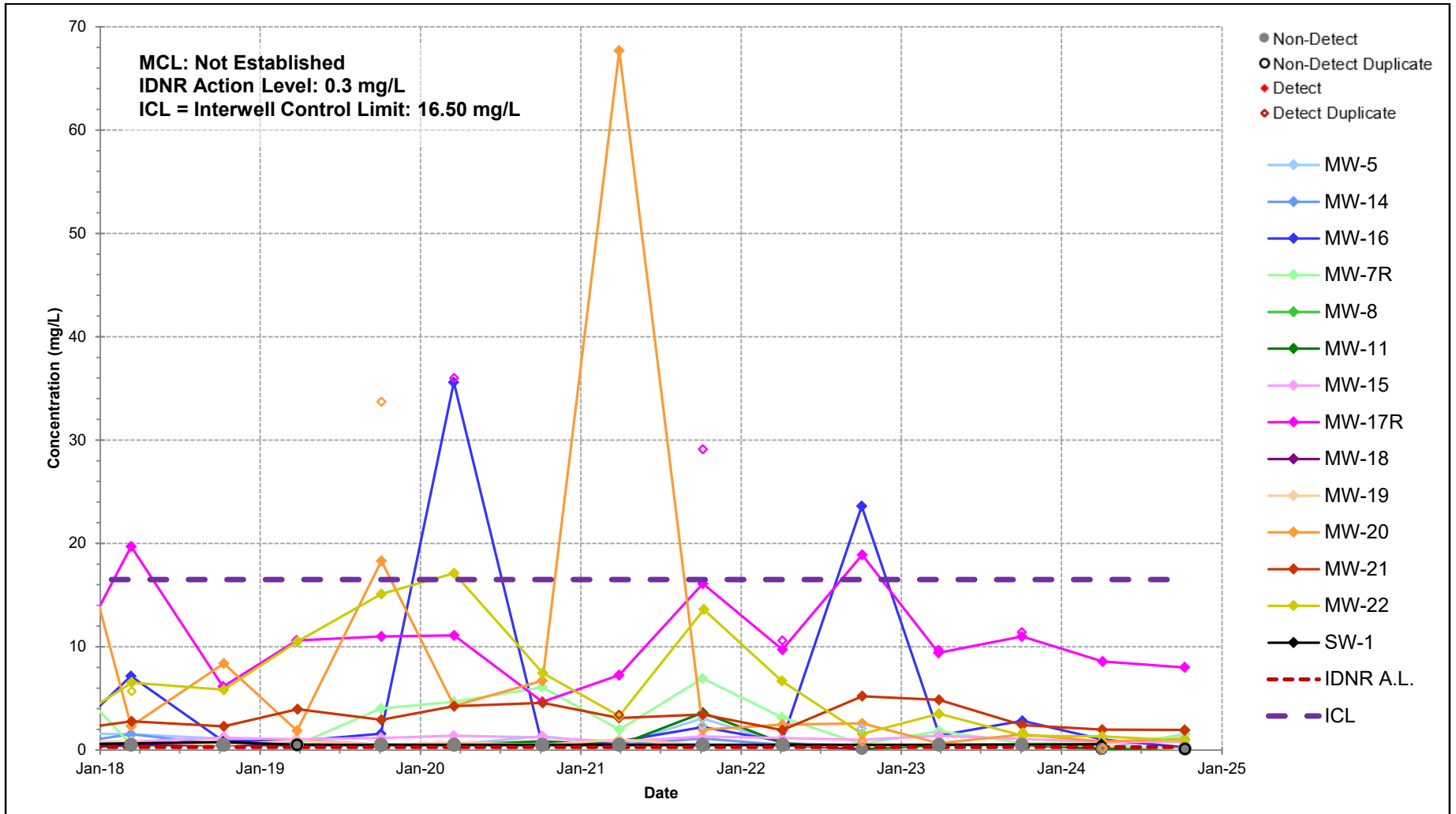


VIKING PUMP
 FOUNDRY SAND LANDFILL
 CEDAR FALLS, IOWA

BARIUM CONCENTRATION VS. TIME
 Upgradient Wells: MW-5, MW-14, and MW-16

56934
 12/5/2024

FIGURE E-5



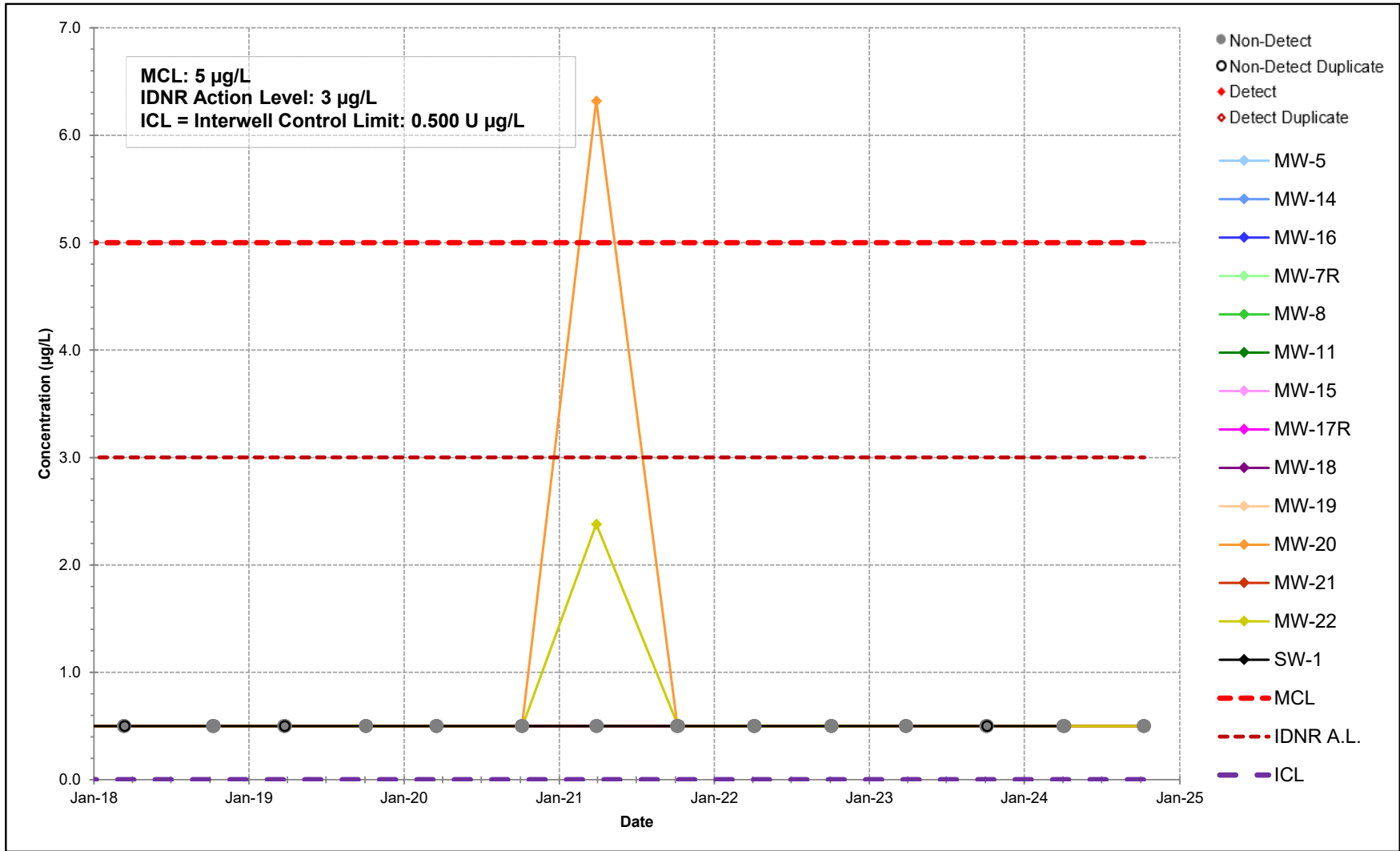
VIKING PUMP
 FOUNDRY SAND LANDFILL
 CEDAR FALLS, IOWA

IRON CONCENTRATION VS. TIME
 Upgradient Wells: MW-5, MW-14, and MW-16

56934

12/5/2024

FIGURE E-6

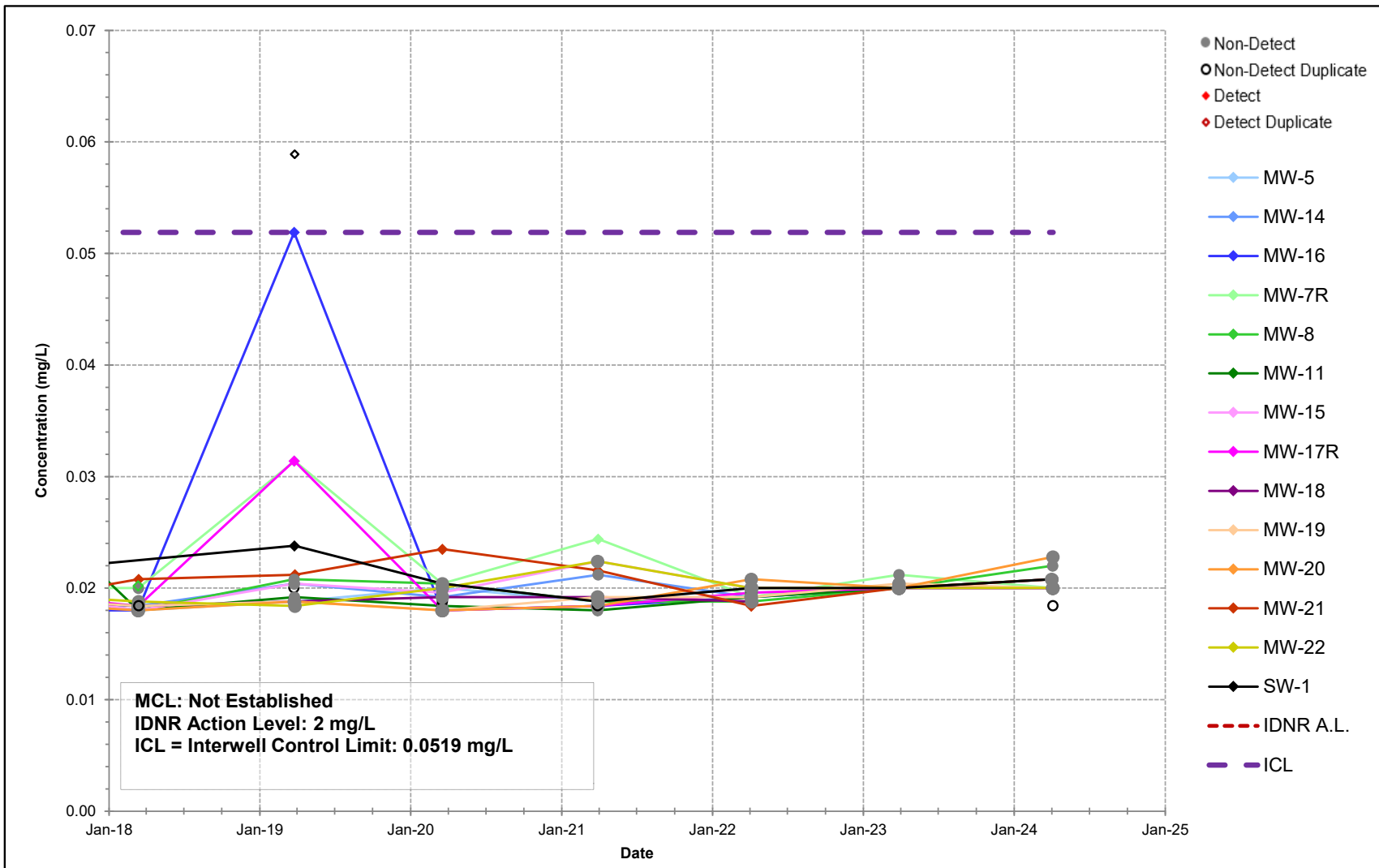


VIKING PUMP
 FOUNDRY SAND LANDFILL
 CEDAR FALLS, IOWA

BENZENE CONCENTRATION VS. TIME
 Upgradient Wells: MW-5, MW-14, and MW-16

56934
 12/5/2024

FIGURE E-7

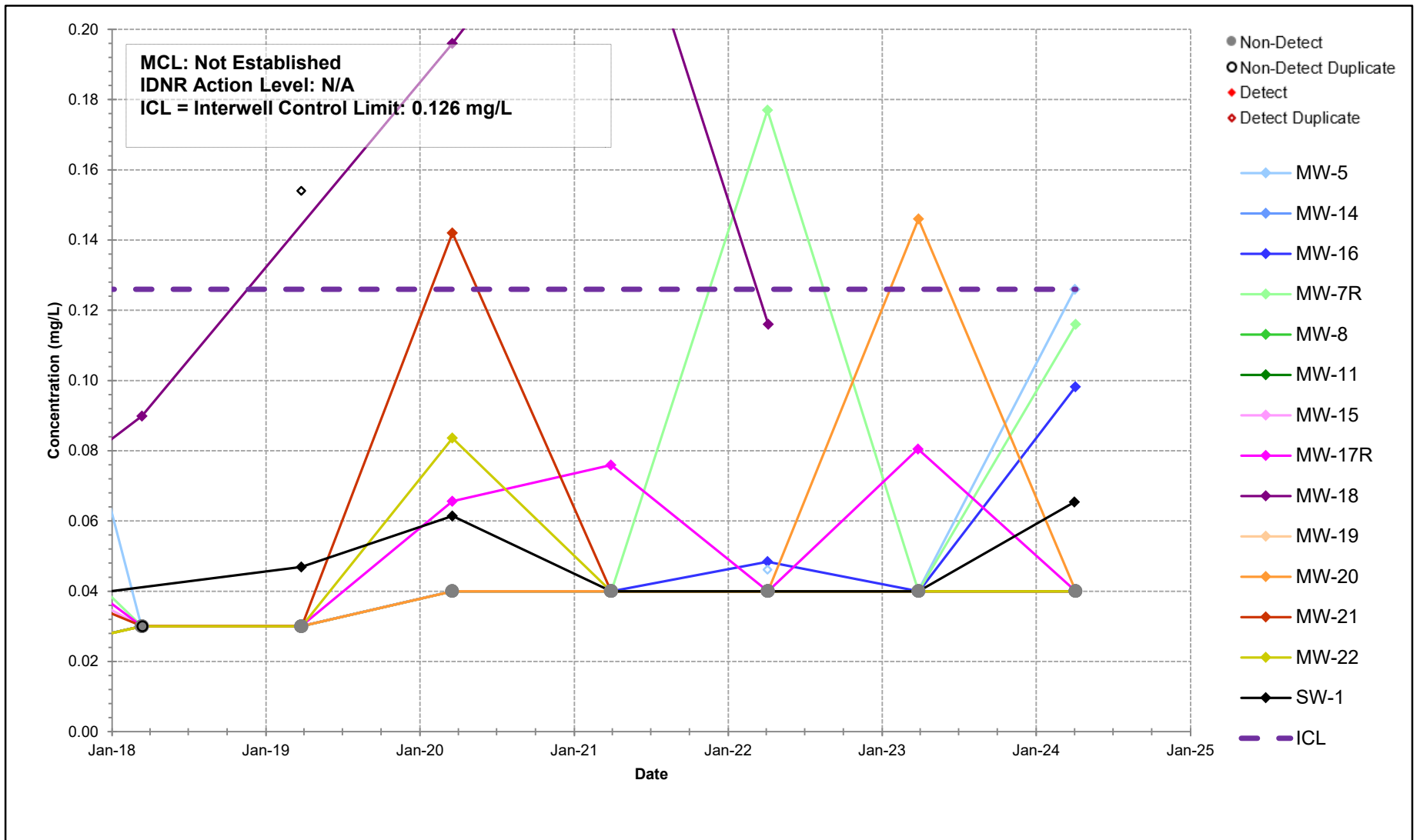


VIKING PUMP
 FOUNDRY SAND LANDFILL
 CEDAR FALLS, IOWA

TOTAL PHENOLS CONCENTRATION VS. TIME
 Upgradient Wells: MW-5, MW-14, and MW-16

56934
 12/5/2024

FIGURE E-8

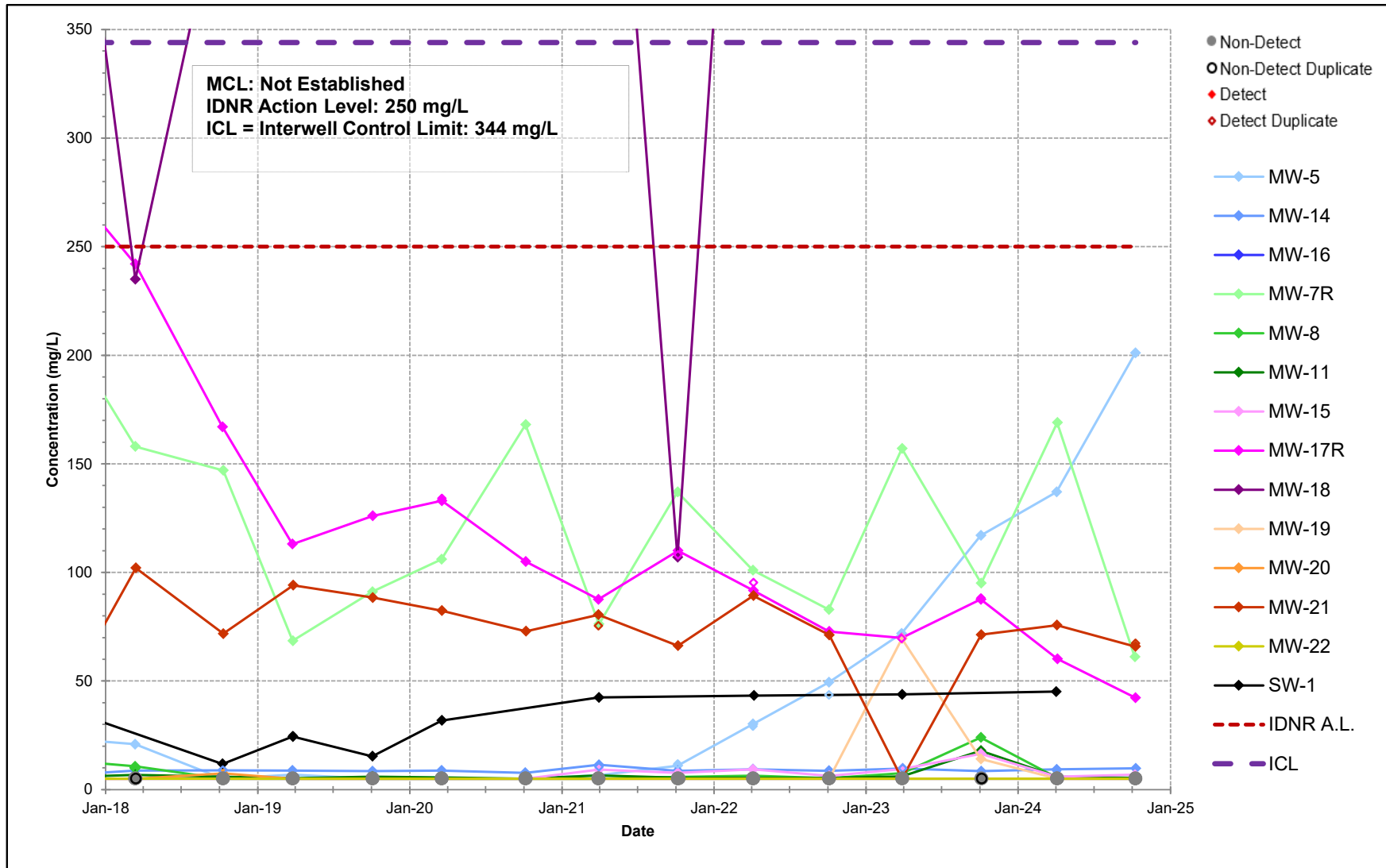


VIKING PUMP
 FOUNDRY SAND LANDFILL
 CEDAR FALLS, IOWA

TOX CONCENTRATION VS. TIME
 Upgradient Wells: MW-5, MW-14, and MW-16

56934
 12/5/2024

FIGURE E-9

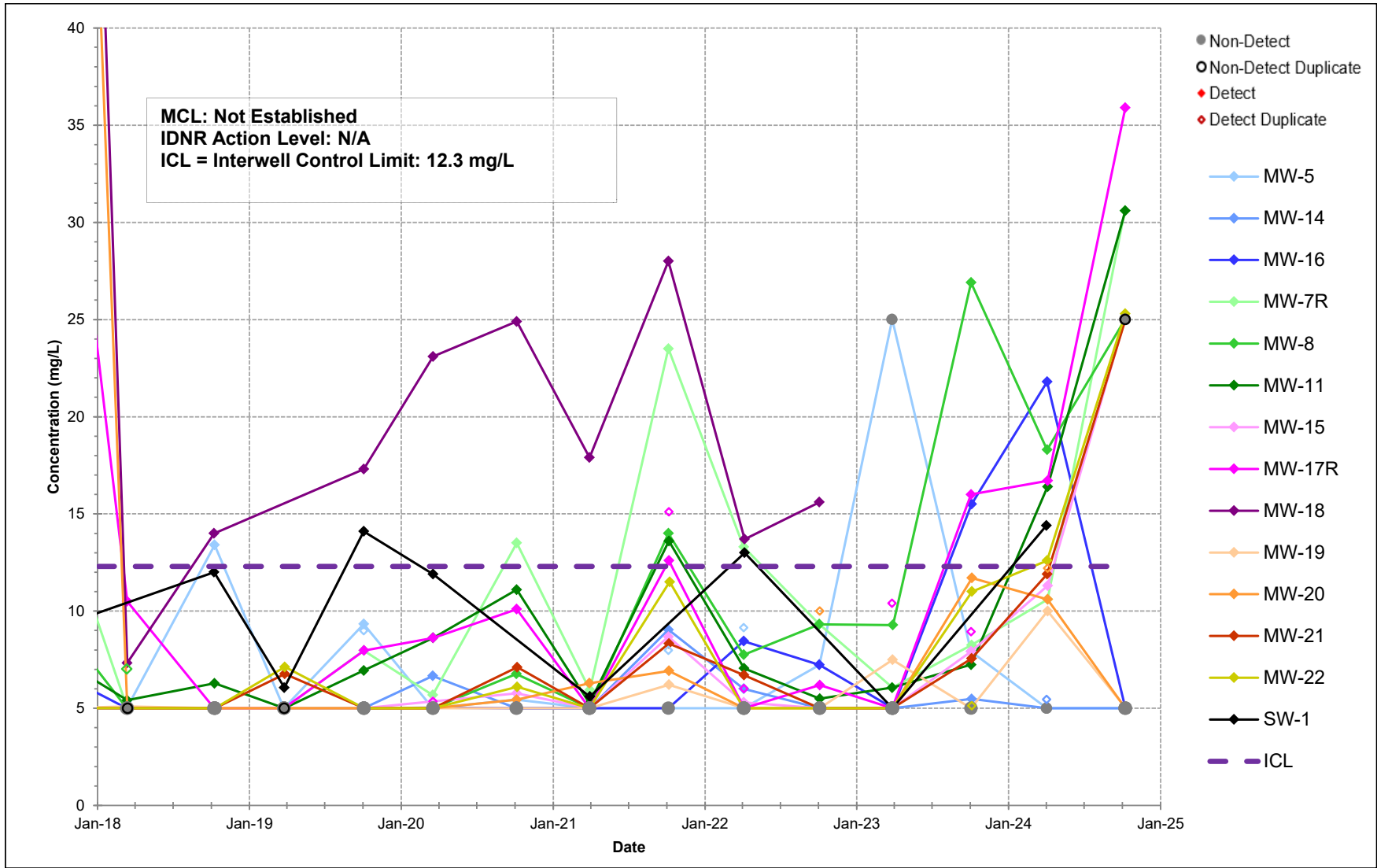


VIKING PUMP
 FOUNDRY SAND LANDFILL
 CEDAR FALLS, IOWA

CHLORIDE CONCENTRATION VS. TIME
 Upgradient Wells: MW-5, MW-14, and MW-16

56934
 12/5/2024

FIGURE E-10



VIKING PUMP
 FOUNDRY SAND LANDFILL
 CEDAR FALLS, IOWA

COD CONCENTRATION VS. TIME
 Upgradient Wells: MW-5, MW-14, and MW-16

56934
 12/5/2024

FIGURE E-11

Appendix F

Statistical Analysis Data, Outputs and Calculations

Table F.1
 Upgradient Well Data Used for Inter-Well Control Limit Calculations
 2024 Annual Water Quality Report
 Viking Pump Foundry Sand Landfill
 Permit No. 07-SDP-12-89P-FSL
 Cedar Falls, Iowa

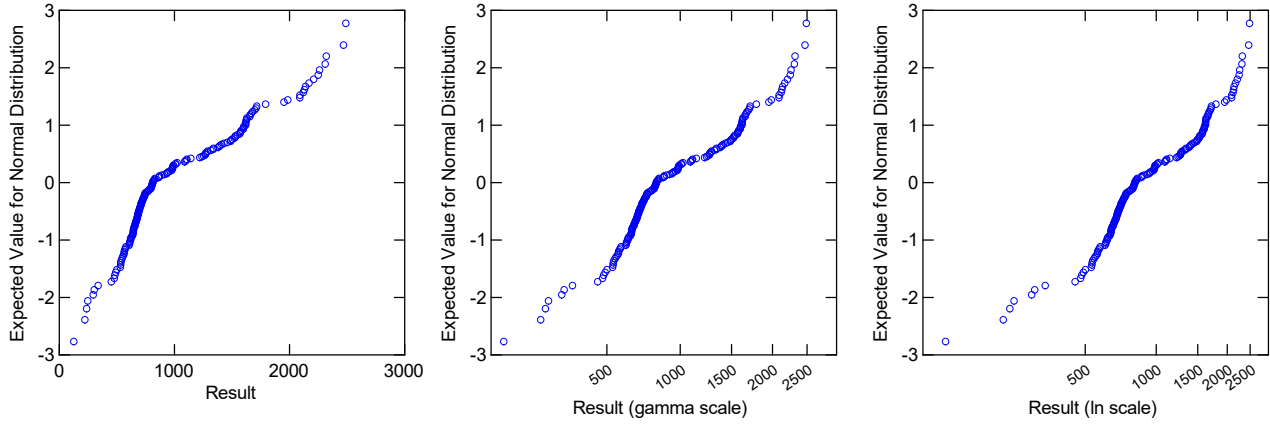
Well Group	Well Name	Sample Date	Specific Conductance (µS/cm)			pH, field (s.u.)			Temperature, field (°C)			Barium, total or dissolved (mg/L)			Iron, total or dissolved (mg/L)			Benzene (µg/L)						
			Lab	Value	Gamma	Ln	Field	Value	Ln	Field	Value	Ln	Lab	Value	D_Value	Gamma	Ln	Lab	Value	D_Value	Ln			
Upgradient	MW-5	7/1/1995	640.0	640	8.62	6.46	6.70	6.7	23.00	23	3.135494	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	8/1/1995	670.0	670	8.75	6.51	7.22	7.22	20.00	20	2.995732	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	11/1/1995	1110.0	1110	10.35	7.01	6.26	6.26	10.00	10	2.302585	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	12/1/1996	492.0	492	7.89	6.20	7.56	7.56	6.00	6	1.791759	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	5/1/1996	580.0	580	8.34	6.36	7.44	7.44	11.10	11.1	2.406945	-	-	-	-	-	-	-	-	-	-	-	-	
Upgradient	MW-5	11/1/1996	608.0	608	8.47	6.41	7.48	7.48	13.00	13	2.564949	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	4/1/1997	645.0	645	8.64	6.47	8.33	8.33	15.00	15	2.70805	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	11/1/1997	675.0	675	8.77	6.51	7.65	7.65	6.90	6.9	1.931521	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	5/1/1998	536.0	536	8.12	6.28	6.21	6.21	11.10	11.1	2.406945	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	11/1/1998	617.0	617	8.51	6.42	6.96	6.96	11.20	11.2	2.415914	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	5/1/1999	710.0	710	8.92	6.57	9.93	9.93	9.40	9.4	2.24071	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	11/1/1999	690.0	690	8.84	6.54	7.02	7.02	14.40	14.4	2.667228	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	5/1/2000	644.0	644	8.64	6.47	7.13	7.13	11.60	11.6	2.451005	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	12/1/2000	710.0	710	8.92	6.57	4.85	4.85	5.00	5	1.609438	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	6/1/2001	622.0	622	8.54	6.43	8.09	8.09	14.20	14.2	2.653242	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	11/1/2001	683.4	683.4	8.81	6.53	7.24	7.24	10.10	10.1	2.312535	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	5/2/2002	636.0	636	8.60	6.46	7.50	7.5	13.90	13.9	2.631889	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	11/2/2002	689.0	689	8.93	6.54	7.49	7.49	10.20	10.2	2.322388	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	5/3/2003	502.0	502	7.95	6.22	7.76	7.76	18.60	18.6	2.923162	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	5/1/2004	306.0	306	6.74	5.72	7.66	7.66	18.90	18.9	2.939162	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	5/5/2005	552.0	552	8.20	6.31	7.98	7.98	12.50	12.5	2.525729	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	5/6/2006	989.0	989	9.96	6.90	7.42	7.42	13.10	13.1	2.572612	-	-	-	-	-	1.51	1.51	1	0.41211	-	-	-	
Upgradient	MW-5	4/7/2007	532.0	532	8.10	6.28	8.32	8.32	12.70	12.7	2.541602	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	10/7/2007	645.0	645	8.64	6.47	7.75	7.75	15.50	15.5	2.74084	-	-	-	-	-	0.31	0.31	1	-1.171183	-	-	-	
Upgradient	MW-5	4/1/2008	535.0	535	8.12	6.28	7.95	7.95	12.40	12.4	2.517696	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	10/1/2008	993.0	993	9.98	6.90	7.08	7.08	12.10	12.1	2.493205	-	-	-	-	-	1.13	1.13	1	0.122218	-	-	-	
Upgradient	MW-5	10/29/2009	984.0	984	9.95	6.89	7.06	7.06	10.20	10.2	2.322388	-	-	-	-	-	0.100 U	0.1	0	-2.302585	-	-	-	
Upgradient	MW-5	3/30/2010	797.0	797	9.27	6.68	7.18	7.18	6.00	6	1.791759	0.1460	0.146	1	0.526564	-1.924149	0.99	0.99	1	-0.10005	1.00 U	1	0	
Upgradient	MW-5	4/22/2010	724.0	724	8.98	6.58	6.96	6.96	9.70	9.7	2.272126	0.1550	0.155	1	0.537169	-1.86433	1.03	1.03	1	0.029559	1.00 U	1	0	
Upgradient	MW-5	10/16/2010	984.0	984	9.95	6.89	6.87	6.87	12.90	12.9	2.557227	0.1690	0.169	1	0.552877	-1.777857	1.15	1.15	1	0.139762	1.00 U	1	0	
Upgradient	MW-5	4/28/2011	678.0	678	8.79	6.52	7.03	7.03	7.50	7.5	2.014903	0.1370	0.137	1	0.515514	-1.987774	0.28	0.28	1	-1.727966	1.00 U	1	0	
Upgradient	MW-5	10/18/2011	816.0	816	9.34	6.70	7.04	7.04	13.80	13.8	2.624669	0.1280	0.128	1	0.503968	-2.055725	1.61	1.61	1	0.476234	1.00 U	1	0	
Upgradient	MW-5	4/25/2012	813.0	813	9.33	6.77	7.11	7.11	11.80	11.8	2.45681	0.1620	0.162	1	0.54396	-1.820159	0.80	0.8	1	-0.225144	1.00 U	1	0	
Upgradient	MW-5	4/16/2013	539.0	539	8.14	6.29	6.81	6.81	6.90	6.9	1.931521	0.1320	0.132	1	0.509184	-2.024953	0.100 U	0.1	0	-2.302585	0.500 U	0.5	0	
Upgradient	MW-5	4/14/2014	802.0	802	9.29	6.69	7.51	7.51	6.10	6.1	1.808289	0.0878	0.0878	1	0.444459	-2.432694	0.100 U	0.1	0	-2.302585	0.500 U	0.5	-0.693147	
Upgradient	MW-5	10/9/2014	1340.0	1340	11.02	7.20	7.20	7.2	13.76	13.76	2.621766	0.1490	0.149	1	0.530146	-1.903809	2.63	2.63	1	0.966984	0.500 U	0.5	0	
Upgradient	MW-5	4/17/2015	297.0	297	6.67	5.69	6.96	6.96	-	-	-	0.0894	0.0894	1	0.447142	-2.414635	0.39	0.39	1	-0.941609	0.500 U	0.5	-0.693147	
Upgradient	MW-5	10/16/2015	612.0	612	8.49	6.42	7.29	7.29	14.10	14.1	2.646175	0.1480	0.148	1	0.528957	-1.910543	4.89	4.89	1	1.587192	0.500 U	0.5	0	
Upgradient	MW-5	3/17/2016	339.0	339	6.97	5.83	6.60	6.6	5.76	5.76	1.750937	0.0858	0.0858	1	0.441058	-2.455736	0.100 U	0.1	0	-2.302585	0.500 U	0.5	-0.693147	
Upgradient	MW-5	9/29/2016	830.0	830	9.40	6.72	6.98	6.98	18.00	18	2.890372	0.1340	0.134	1	0.511723	-2.009915	0.91	0.91	1	-0.094311	0.500 U	0.5	0	
Upgradient	MW-5	3/8/2017	1025.0	1025	10.08	6.93	7.00	7	2.70	2.7	0.993252	0.1200	0.12	1	0.493242	-2.120264	0.68	0.68	1	-0.385662	0.500 U	0.5	0	
Upgradient	MW-5	10/4/2017	1096.0	1096	10.31	7.00	6.63	6.63	15.87	15.87	2.764431	0.0967	0.0967	1	0.458996	-2.336142	1.62	1.62	1	0.484246	0.500 U	0.5	0	
Upgradient	MW-5	3/12/2018	1013.0	1013	10.04	6.92	6.70	6.7	4.88	4.88	1.585145	0.0836	0.0836	1	0.437256	-2.481712	1.54	1.54	1	0.431782	0.500 U	0.5	0	
Upgradient	MW-5	10/9/2018	484.0	484	7.85	6.18	7.20	7.2	15.80	15.8	2.76001	0.1150	0.115	1	0.486294	-2.162823	1.09	1.09	1	0.086178	0.500 U	0.5	0	
Upgradient	MW-5	3/25/2019	703.8	703.8	8.90	6.56	7.42	7.42	4.00	4	1.386294	0.0793/0.0783	0.0788	1	0.428722	-2.540842	0.59/0.567	0.59	0.57	1	-0.547317	0.500 U/0.500 U	0.5	0
Upgradient	MW-5	10/3/2019	690.0	690	8.84	6.54	6.89	6.89	6.75	6.75	2.181838	0.1580/0.163	0.1605	1	0.543448	-1.829461	0.500 U/0.500 U	0.5	0	-0.693147	0.500 U/0.500 U	0.5	0	
Upgradient	MW-5	3/17/2020	872.0	872	9.22	6.77	7.33	7.33	15.00	15	1.609438	0.110/0.111	0.105	1	0.476987	-2.20274	0.54/0.571	0.5555	1	-0.587887	0.500 U/0.500 U	0.5	0	
Upgradient	MW-5	10/4/2020	948.1	948.1	9.82	6.85	6.93	6.93	15.30	15.3	2.731953	0.094	0.094	1	0.45167	-2.318714	1.34	1.34	1	0.23287	0.500 U	0.5	0	
Upgradient	MW-5	3/30/2021	977.0	977	9.92	6.88	6.28	6.28	6.80	6.8	1.916293	0.124	0.124	1	0.498663	-2.084744	0.500 U	0.5	0	-0.693147	0.500 U	0.5	0	
Upgradient	MW-5	10/5/2021	935.8	935.8	9.78	6.84	6.97	6.97	16.40	16.4	2.797281	0.125/0.120	0.1225	1	0.496644	-2.099644	2.38/3.08	2.73	1	1.004302	0.500 U/0.500 U	0.5	0	
Upgradient	MW-5	4/4/2022	1010.0	1010	10.03	6.92	9.27	9.27	4.23	4.23	1.442202	0.0828/0.0888	0.0858	1	0.441058	-2.455736	0.524/0.689	0.6065	1	-0.500051	0.500 U/0.500 U	0.5	0	
Upgradient	MW-5	10/3/2022	981.7	981.7	9.94	6.89	7.53	7.53	15.20	15.2	2.721295	0.153/0.153	0.153	1	0.534848	-1.877317	2.10/0.446	1.273	1	0.241376	0.500 U/0.500 U	0.5	0	
Upgradient	MW-5	3/27/2023	989.4	989.4	9.96	6.90	7.02	7.02	5.50	5.5	1.704748	0.1380	0.138	1	0.516765	-1.980502	0.500 U	0.5	0	-0.693147	0.500 U	0.5	0	
Upgradient	MW-5	10/3/2023	1090.0	1090	10.29	6.99	6.42	6.42	18.72	18.72	2.929592	0.2440	0.244	1	0.62488	-1.410587	0.500 U	0.5	0	-0.693147	0.500 U	0.5	0	
Upgradient	MW-5	4/2/2024	128	128	5.04	4.85	6.15	6.15	5.84	5.84	1.764731	0.0822	0.0822	1	0.434801	-2.4986	0.1							

Table E.1
Upgradient Well Data Used for Inter-Well Control Limit Calculations
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa

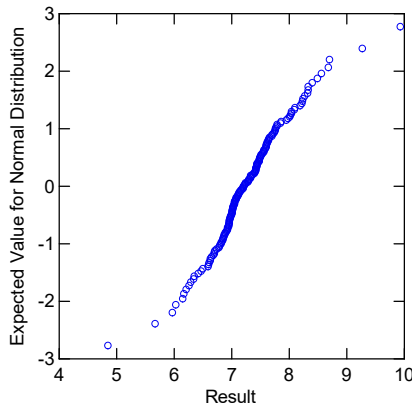
Well Group	Well Name	Sample Date	Ammonia-N (mg/L)			Chemical oxygen demand (COD) (mg/L)			Phenolics, total (mg/L)			Sodium chloride, soluble salts (mg/L)			Total organic halides (TOX) (mg/L)			
			Lab	Value	D_Value	Ln	Lab	Value	D_Value	Ln	Lab	Value	D_Value	Ln	Lab	Value	D_Value	Ln
Upgradient	MW-5	7/1/1995	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0200 U	0.02	0	-3.912023	6.7	6.7	1	1.902108
Upgradient	MW-5	8/1/1995	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0200 U	0.02	0	-3.912023	5.00 U	5	0	1.609438
Upgradient	MW-5	11/1/1995	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0200 U	0.02	0	-3.912023	5.8	5.8	1	1.757858
Upgradient	MW-5	2/1/1996	0.200 U	0.2	0	-1.609438	12.0	12	0	2.484907	0.0200 U	0.02	0	-3.912023	7.7	7.7	1	2.04122
Upgradient	MW-5	5/1/1996	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	-	-	-	-	5.00 U	5	0	1.609438
Upgradient	MW-5	11/1/1996	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0200 U	0.02	0	-3.912023	6.3	6.3	1	1.84055
Upgradient	MW-5	4/1/1997	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	-	-	-	-	5.00 U	5	0	1.609438
Upgradient	MW-5	11/1/1997	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0200 U	0.02	0	-3.912023	5.9	5.9	1	1.774952
Upgradient	MW-5	5/1/1998	0.200 U	0.2	0	-1.609438	7.3	7.3	1	1.987874	-	-	-	-	6.0	6.0	1	1.791759
Upgradient	MW-5	11/1/1998	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0200 U	0.02	0	-3.912023	8.5	8.5	1	2.140066
Upgradient	MW-5	5/1/1999	0.200 U	0.2	0	-1.609438	24.0	24	1	3.178054	-	-	-	-	6.2	6.2	1	1.824549
Upgradient	MW-5	11/1/1999	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0200 U	0.02	0	-3.912023	5.1	5.1	1	1.629241
Upgradient	MW-5	5/1/2000	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	-	-	-	-	5.2	5.2	1	1.648659
Upgradient	MW-5	12/1/2000	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0200 U	0.02	0	-3.912023	5.9	5.9	1	1.774952
Upgradient	MW-5	6/1/2001	0.200 U	0.2	0	-1.609438	7.4	7.4	1	2.00148	-	-	-	-	7.4	7.4	1	2.00148
Upgradient	MW-5	11/1/2001	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0200 U	0.02	0	-3.912023	5.00 U	5	0	1.609438
Upgradient	MW-5	5/2/2002	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	-	-	-	-	11.8	11.8	1	2.4681
Upgradient	MW-5	11/2/2002	0.200 U	0.2	0	-1.609438	8.3	8.3	1	2.116256	0.0200 U	0.02	0	-3.912023	6.1	6.1	1	1.808289
Upgradient	MW-5	5/3/2003	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	-	-	-	-	6.5	6.5	1	1.871802
Upgradient	MW-5	5/1/2004	0.200 U	0.2	0	-1.609438	10.0	10	1	2.302585	-	-	-	-	5.1	5.1	1	1.629241
Upgradient	MW-5	5/5/2005	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	-	-	-	-	12.0	12	1	2.484907
Upgradient	MW-5	5/6/2006	0.200 U	0.2	0	-1.609438	18.5	18.5	1	2.917771	-	-	-	-	27.0	27	1	3.295837
Upgradient	MW-5	4/7/2007	0.200 U	0.2	0	-1.609438	5.2	5.2	1	1.648659	-	-	-	-	33.8	33.8	1	3.520461
Upgradient	MW-5	10/7/2007	0.200 U	0.2	0	-1.609438	9.3	9.3	1	2.230014	0.0180 U	0.018	0	-4.017384	10.2	10.2	1	2.322388
Upgradient	MW-5	4/1/2008	0.200 U	0.2	0	-1.609438	12.6	12.6	1	2.533697	-	-	-	-	11.9	11.9	1	2.476538
Upgradient	MW-5	10/1/2008	0.200 U	0.2	0	-1.609438	9.3	9.3	1	2.230014	0.0180 U	0.018	0	-4.017384	26.1	26.1	1	3.261935
Upgradient	MW-5	10/29/2009	0.200 U	0.2	0	-1.609438	5.6	5.6	1	1.722767	0.0180 U	0.018	0	-4.017384	12.1	12.1	1	2.493205
Upgradient	MW-5	3/30/2010	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0200 U	0.02	0	-3.912023	8.5	8.5	1	2.140066
Upgradient	MW-5	4/22/2010	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0180 U	0.018	0	-4.017384	10.6	10.6	1	2.360854
Upgradient	MW-5	10/16/2010	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0200 U	0.02	0	-3.912023	6.8	6.8	1	1.916923
Upgradient	MW-5	4/28/2011	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0200 U	0.02	0	-3.912023	15.2	15.2	1	1.704748
Upgradient	MW-5	10/18/2011	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0200 U	0.02	0	-3.912023	5.5	5.5	1	2.580217
Upgradient	MW-5	4/25/2012	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0200 U	0.02	0	-3.912023	5.8	5.8	1	1.722767
Upgradient	MW-5	4/16/2013	0.200 U	0.2	0	-1.609438	7.9	7.9	1	2.068663	0.0200 U	0.02	0	-3.912023	5.00 U	5	0	1.609438
Upgradient	MW-5	4/14/2014	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0100 U	0.01	0	-4.60517	24.4	24.4	1	3.194583
Upgradient	MW-5	10/9/2014	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	-	-	-	-	46.2	46.2	1	3.83298
Upgradient	MW-5	4/17/2015	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0184 U	0.0184	0	-3.995405	54.5	54.5	1	3.998201
Upgradient	MW-5	10/16/2015	0.200 U	0.2	0	-1.609438	11.6	11.6	1	2.451005	-	-	-	-	61.6	61.6	1	4.120662
Upgradient	MW-5	3/17/2016	0.200 U	0.2	0	-1.609438	7.5	7.5	1	2.014903	0.0196 U	0.0196	0	-3.932226	16.1	16.1	1	2.778819
Upgradient	MW-5	9/29/2016	0.200 U	0.2	0	-1.609438	9.6	9.6	1	2.261763	-	-	-	-	22.1	22.1	1	3.095578
Upgradient	MW-5	3/8/2017	0.200 U	0.2	0	-1.609438	5.5	5.5	1	1.704748	0.0193	0.0193	1	-3.94765	16.6	16.6	1	2.809403
Upgradient	MW-5	10/4/2017	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	-	-	-	-	23.4	23.4	1	3.152736
Upgradient	MW-5	3/12/2018	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0180 U	0.018	0	-4.017384	20.9	20.9	1	3.039749
Upgradient	MW-5	10/9/2018	0.200 U	0.2	0	-1.609438	13.4	13.4	1	2.595255	-	-	-	-	5.00 U	5	0	1.609438
Upgradient	MW-5	3/25/2019	0.200 U/0.200 U	0.2	0	-1.609438	5.00 U/5.00 U	5	0	1.609438	0.0200 U/0.0188 U	0.0194	0	-3.942482	6.87/6.28	6.575	1	1.883275
Upgradient	MW-5	10/3/2019	0.200 U/0.200 U	0.2	0	-1.609438	8.99/9.33	9.16	1	2.214846	-	-	-	-	5.00 U/5.00 U	5	0	1.609438
Upgradient	MW-5	3/17/2020	0.200 U/0.200 U	0.2	0	-1.609438	5.00 U/5.00 U	5	0	1.609438	0.0200 U/0.0184 U	0.0192	0	-3.952845	5.00 U/5.00 U	5	0	1.609438
Upgradient	MW-5	10/4/2020	0.200 U	0.2	0	-1.609438	5.4	5.4	1	1.686399	-	-	-	-	5.00 U	5	0	1.609438
Upgradient	MW-5	3/30/2021	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0188 U	0.0188	0	-3.973898	6.65	6.65	1	1.894617
Upgradient	MW-5	10/5/2021	0.200 U/0.200 U	0.2	0	-1.609438	5.00 U/7.98	7.98	1	2.076938	-	-	-	-	11.0/11.7	11.35	1	2.429218
Upgradient	MW-5	4/4/2022	0.200 U/0.200 U	0.2	0	-1.609438	5.00 U/9.14	9.14	1	2.21266	0.0200 U/0.0196 U	0.0198	0	-3.922073	29/23.02	29.7	1	3.391147
Upgradient	MW-5	10/3/2022	0.200 U/0.200 U	0.2	0	-1.609438	5.00 U/7.23	7.23	1	1.978239	-	-	-	-	49.4/43.6	46.5	1	3.839452
Upgradient	MW-5	3/27/2023	0.200 U	0.2	0	-1.609438	25.0 U	25	0	3.218876	0.0200 U	0.02	0	-3.912023	71.9	71.9	1	4.252762
Upgradient	MW-5	10/3/2023	0.200 U	0.2	0	-1.609438	7.9	7.9	1	2.066863	-	-	-	-	117.0	117	1	4.762174
Upgradient	MW-5	4/2/2024	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0200 U	0.02	0	-3.912023	137	137	1	4.919981
Upgradient	MW-5	10/8/2024	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	-	-	-	-	201	201	1	5.303305
Upgradient	MW-14	7/1/1995	0.560	0.56	1	-0.579818	5.00 U	5	0	1.609438	0.0200 U	0.02	0	-3.912023	6.7	6.7	1	1.902108
Upgradient	MW-14	8/1/1995	0.200 U	0.2	0	-1.609438	5.00 U	5	0	1.609438	0.0240	0.024	1	-3.729701	6.0	6.0	1	1.791759
Upgradient	MW-14	11/1/1995	0.200 U	0.2	0	-1.609438	5.2	5.2	1	1.648659	0.0200 U	0.02	0	-3.912023	7.7	7.7	1	2.04122
Upgradient	MW-14	2/1/1996	0.200 U	0.2	0	-1.609438	7.3	7.3	1	1.987874	0.0200 U	0.02	0	-3.912023	7.7	7.7	1	2.04122
Upgradient	MW-14																	

Appendix F.2 (Probability Plots for Upgradient Data)

Conductance ($\mu\text{S}/\text{cm}$) in Upgradient Groundwater (MW-5, MW-14, MW-16)

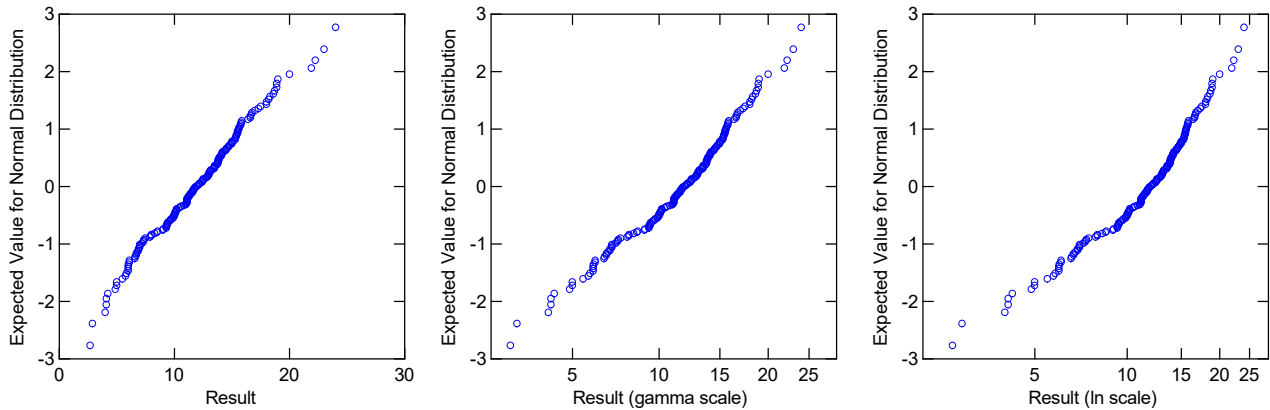


pH, field (s.u.) in Upgradient Groundwater (MW-5, MW-14, MW-16)



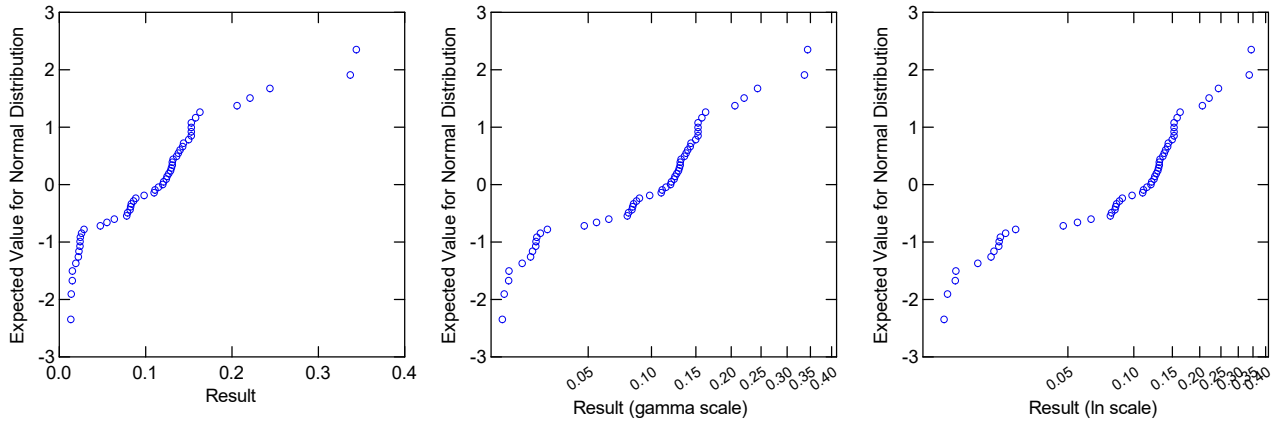
Note: pH is already a log-based measurement (negative log of hydronium ion)

Temperature ($^{\circ}\text{C}$) in Upgradient Groundwater (MW-5, MW-14, MW-16)

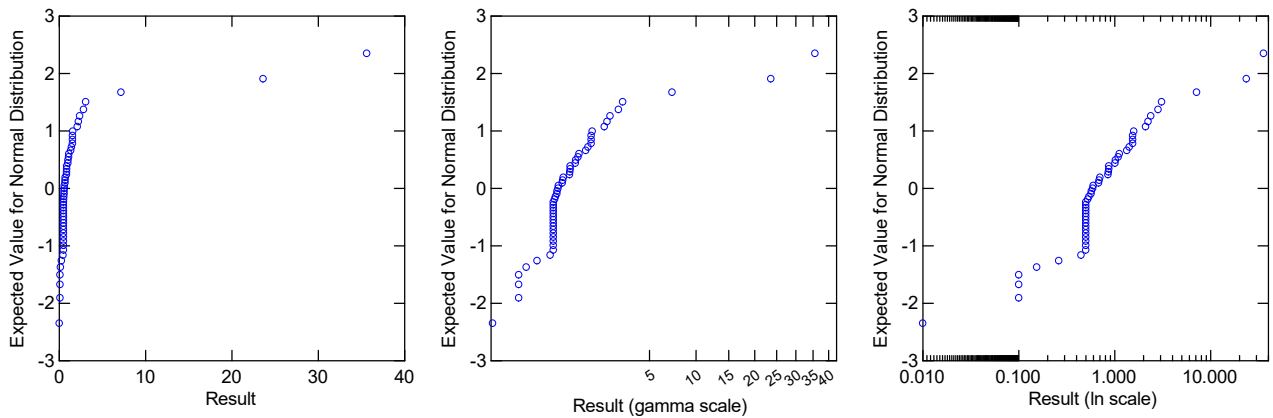


Appendix F.2 (Probability Plots for Upgradient Data)

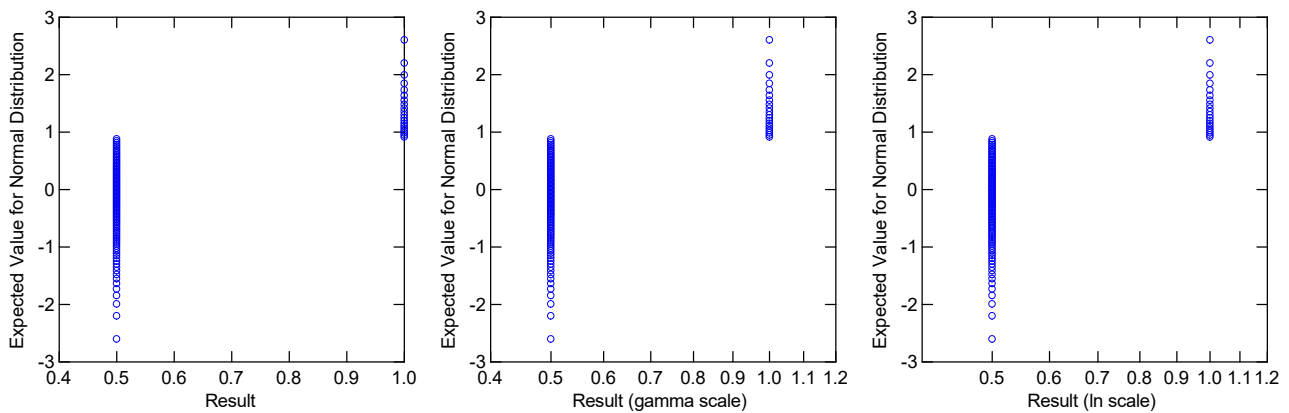
Barium, total or dissolved (mg/L) in Upgradient Groundwater (MW-5, MW-14, MW-16)



Iron, total or dissolved (mg/L) in Upgradient Groundwater (MW-5, MW-14, MW-16)

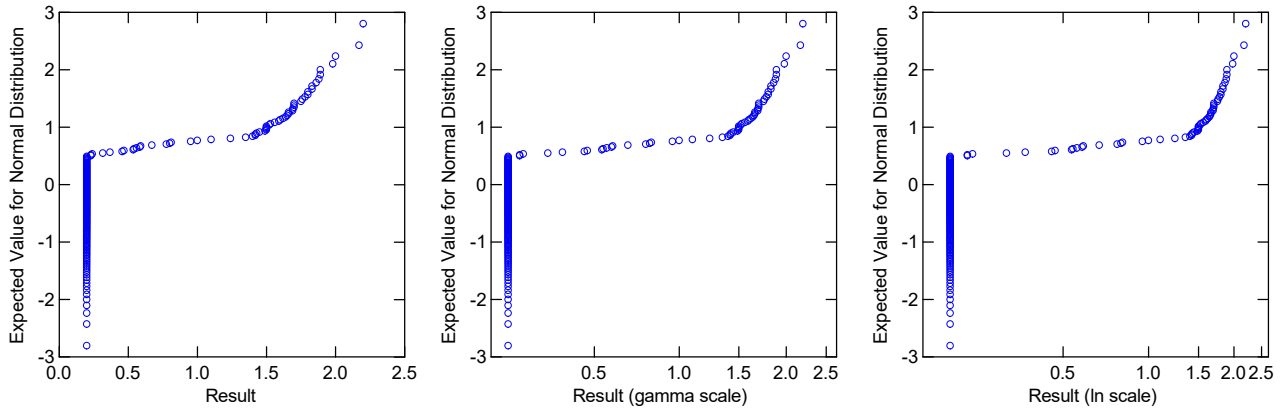


Benzene ($\mu\text{g/L}$) in Upgradient Groundwater (MW-5, MW-14, MW-16)

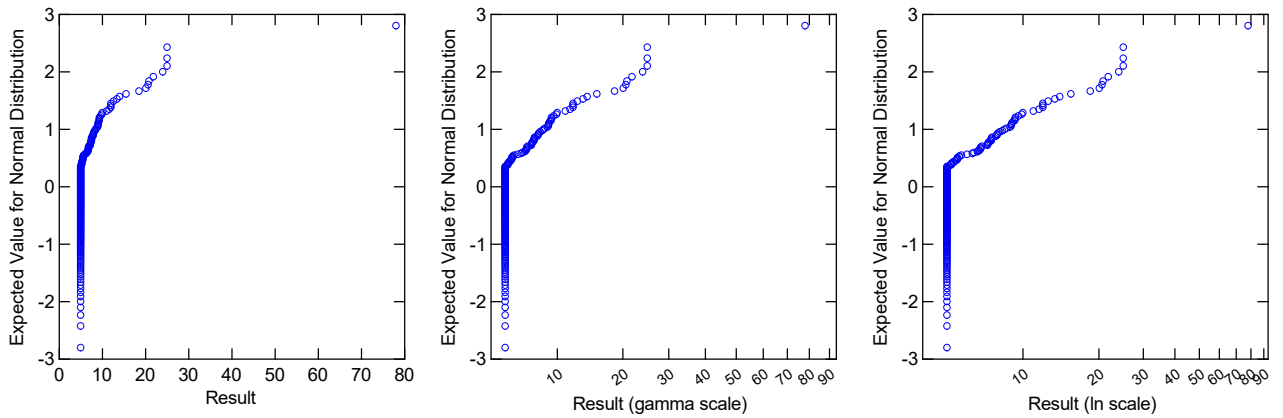


Appendix F.2 (Probability Plots for Upgradient Data)

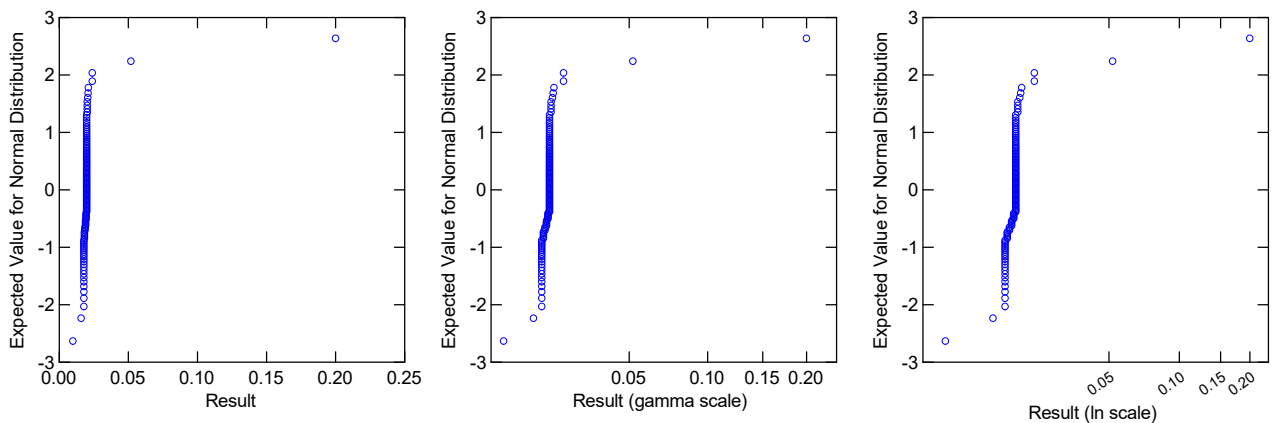
Ammonia as N (mg/L) in Upgradient Groundwater (MW-5, MW-14, MW-16)



Chemical Oxygen Demand (COD) (mg/L); Upgradient (MW-5, MW-14, MW-16)

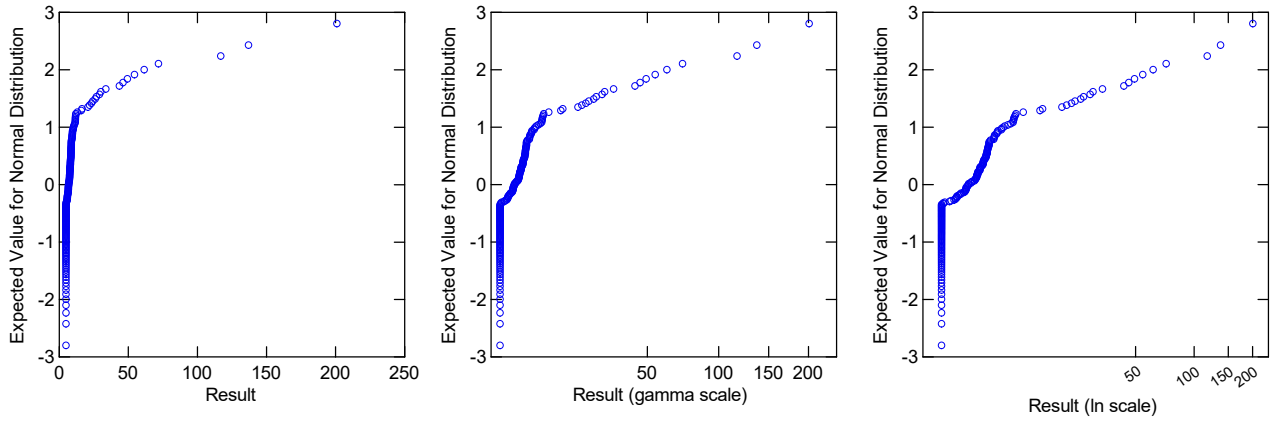


Phenolics (Total) (mg/L) in Upgradient Groundwater (MW-5, MW-14, MW-16)

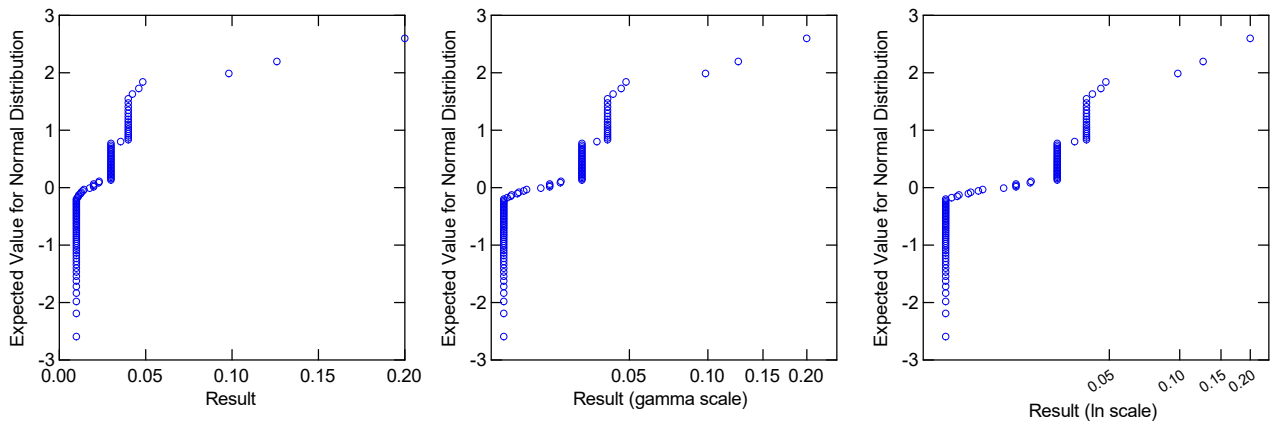


Appendix F.2 (Probability Plots for Upgradient Data)

Chloride (mg/L) in Upgradient Groundwater (MW-5, MW-14, MW-16)



Total Organic Halides (TOX) (mg/L) in Upgradient Groundwater (MW-5, MW-14, MW-16)



Appendix F.3a -- Outlier Tests for Data Sets Without Non-Detects

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.2 12/2/2024 10:35:59 PM
 From File 056934 Upgradient ProUCL data 2024.xls
 Full Precision OFF

Rosner's Outlier Test for Sp. Cond. ($\mu\text{S}/\text{cm}$)

Mean 1038
Standard Deviation 519.5
Number of data 179
Number of suspected outliers 10

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	1038	518	2490	113	2.803	3.572	3.942
2	1030	509.3	2470	108	2.828	3.562	3.942
3	1021	499	2320	114	2.602	3.562	3.936
4	1014	490.7	2310	112	2.641	3.562	3.932
5	1007	482.1	2261	103	2.602	3.562	3.932
6	999.5	474	2250	109	2.638	3.56	3.93
7	992.2	465.6	2210	118	2.615	3.558	3.928
8	985.1	457.5	2170	111	2.59	3.556	3.926
9	978.2	449.7	2140	110	2.583	3.554	3.924
10	971.4	442.1	2130	116	2.621	3.552	3.922

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

Appendix F.3a -- Outlier Tests for Data Sets Without Non-Detects

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.2 12/2/2024 10:35:59 PM
 From File 056934 Upgradient ProUCL data 2024.xls
 Full Precision OFF

Rosner's Outlier Test for pH (s.u.)

Mean 7.274
Standard Deviation 0.619
Number of data 179
Number of suspected outliers 10

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	7.274	0.618	9.93	11	4.3	3.572	3.942
2	7.259	0.588	4.85	14	4.099	3.562	3.942
3	7.273	0.561	9.27	51	3.562	3.562	3.936
4	7.262	0.542	5.67	127	2.939	3.562	3.932
5	7.271	0.529	8.7	162	2.699	3.562	3.932
6	7.263	0.52	8.68	174	2.728	3.56	3.93
7	7.254	0.51	8.56	176	2.561	3.558	3.928
8	7.247	0.501	5.97	65	2.547	3.556	3.926
9	7.254	0.493	8.49	175	2.506	3.554	3.924
10	7.247	0.485	6.03	59	2.508	3.552	3.922

For 5% significance level, there are 2 Potential Outliers

Potential outliers are:

9.93, 4.85

For 1% Significance Level, there are 2 Potential Outliers

Potential outliers are:

9.93, 4.85

Appendix F.3a -- Outlier Tests for Data Sets Without Non-Detects

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.2 12/2/2024 10:35:59 PM
 From File 056934 Upgradient ProUCL data 2024.xls
 Full Precision OFF

Rosner's Outlier Test for Temp (deg.C)

Mean 11.92
Standard Deviation 4.104
Number of data 177
Number of suspected outliers 10

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	11.92	4.093	24	118	2.951	3.569	3.939
2	11.85	4.013	23	1	2.778	3.559	3.939
3	11.79	3.934	22.24	55	2.656	3.559	3.933
4	11.73	3.864	21.9	70	2.632	3.559	3.929
5	11.67	3.797	2.7	40	2.363	3.559	3.929
6	11.72	3.745	2.9	98	2.356	3.557	3.927
7	11.77	3.694	20	2	2.227	3.555	3.925
8	11.73	3.65	4	44	2.117	3.553	3.923
9	11.77	3.612	4.1	87	2.124	3.551	3.921
10	11.82	3.574	4.1	102	2.16	3.549	3.919

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

Appendix F.3b -- Outlier Tests for Data Sets With Non-Detects

Outlier Tests for Selected Variables replacing nondetects with 1/2 the Detection Limit

User Selected Options

Date/Time of Computation ProUCL 5.2 12/2/2024 10:42:13 PM

From File 056934 Upgradient ProUCL data 2024.xls

Full Precision OFF

Rosner's Outlier Test for 10 Outliers in Ln_Barium (mg/L)

Total N 91
Number NDs 0
Number Detects 91
Mean with NDs=DL/2 -2.484
SD with NDs=DL/2 0.871
Number of data 91
Number of suspected outliers 10
NDs replaced with half value.

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	-2.484	0.866	-4.298	30	2.093	3.353	3.723
2	-2.464	0.854	-4.279	53	2.124	3.344	3.714
3	-2.444	0.837	-4.177	59	2.07	3.344	3.714
4	-2.424	0.821	-4.154	31	2.108	3.343	3.704
5	-2.404	0.804	-3.942	56	1.913	3.334	3.704
6	-2.386	0.791	-3.887	33	1.897	3.33	3.7
7	-2.369	0.778	-3.887	39	1.951	3.326	3.696
8	-2.351	0.765	-3.863	37	1.977	3.322	3.692
9	-2.332	0.751	-3.835	43	2.001	3.318	3.688
10	-2.314	0.737	-3.83	40	2.058	3.314	3.684

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

Appendix F.3b -- Outlier Tests for Data Sets With Non-Detects

Outlier Tests for Selected Variables replacing nondetects with 1/2 the Detection Limit

User Selected Options

Date/Time of Computation ProUCL 5.2 12/2/2024 10:42:13 PM

From File 056934 Upgradient ProUCL data 2024.xls

Full Precision OFF

Rosner's Outlier Test for 10 Outliers in Ln_Iron (mg/L)

Total N 177
 Number NDs 114
 Number Detects 177
 Mean with NDs=DL/2 -0.719
 SD with NDs=DL/2 0.878
 Number of data 177
 Number of suspected outliers 10
 NDs replaced with half value.

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	-0.719	0.876	3.572	168	4.9	3.569	3.939
2	-0.744	0.819	3.161	173	4.77	3.559	3.939
3	-0.766	0.765	2.109	159	3.756	3.559	3.933
4	-0.782	0.736	1.967	164	3.738	3.559	3.929
5	-0.798	0.707	1.823	161	3.707	3.559	3.929
6	-0.814	0.68	1.587	37	3.53	3.557	3.927
7	-0.828	0.657	1.163	66	3.032	3.555	3.925
8	-0.839	0.64	1.04	175	2.935	3.553	3.923
9	-0.85	0.626	1.004	49	2.964	3.551	3.921
10	-0.862	0.611	0.967	35	2.994	3.549	3.919

For 5% significance level, there are 5 Potential Outliers
 3.572, 3.161, 2.109, 1.967, 1.823

Note: Outliers in original units (mg/L) are exp(#):
 35.6, 23.6, 8.24, 7.15, 6.19

For 1% Significance Level, there are 2 Potential Outliers
 3.572, 3.161

Appendix F.3b -- Outlier Tests for Data Sets With Non-Detects

Outlier Tests for Selected Variables replacing nondetects with 1/2 the Detection Limit

User Selected Options

Date/Time of Computation ProUCL 5.2 12/2/2024 10:42:13 PM

From File 056934 Upgradient ProUCL data 2024.xls

Full Precision OFF

Rosner's Outlier Test for 10 Outliers in Ammonia-N (mg/L)

Total N 180
Number NDs 121
Number Detects 180
Mean with NDs=DL/2 0.513
SD with NDs=DL/2 0.669
Number of data 180
Number of suspected outliers 10
NDs replaced with half value.

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0.513	0.667	2.2	122	2.53	3.574	3.944
2	0.504	0.658	2.17	155	2.531	3.564	3.944
3	0.495	0.648	2	154	2.323	3.564	3.938
4	0.486	0.64	1.98	131	2.334	3.564	3.934
5	0.478	0.632	1.89	153	2.236	3.564	3.934
6	0.469	0.624	1.89	157	2.275	3.562	3.932
7	0.461	0.617	1.88	161	2.3	3.56	3.93
8	0.453	0.609	1.86	171	2.31	3.558	3.928
9	0.445	0.601	1.83	151	2.304	3.556	3.926
10	0.437	0.593	1.83	152	2.348	3.554	3.924

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

Appendix F.3b -- Outlier Tests for Data Sets With Non-Detects

Outlier Tests for Selected Variables replacing nondetects with 1/2 the Detection Limit

User Selected Options

Date/Time of Computation ProUCL 5.2 12/2/2024 10:42:13 PM

From File 056934 Upgradient ProUCL data 2024.xls

Full Precision OFF

Rosner's Outlier Test for 10 Outliers in Ln_COD (mg/L)

Total N 180
 Number NDs 113
 Number Detects 180
 Mean with NDs=DL/2 1.322
 SD with NDs=DL/2 0.717
 Number of data 180
 Number of suspected outliers 10
 NDs replaced with half value.

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	1.322	0.715	4.357	67	4.247	3.574	3.944
2	1.305	0.681	3.178	11	2.749	3.564	3.944
3	1.294	0.669	3.082	179	2.674	3.564	3.938
4	1.284	0.657	3.035	85	2.666	3.564	3.934
5	1.274	0.645	3.025	147	2.714	3.564	3.934
6	1.264	0.633	3.001	164	2.743	3.562	3.932
7	1.254	0.621	2.918	22	2.679	3.56	3.93
8	1.245	0.61	2.741	178	2.454	3.558	3.928
9	1.236	0.601	2.639	121	2.336	3.556	3.926
10	1.228	0.593	2.595	44	2.308	3.554	3.924

For 5% Significance Level, there is 1 Potential Outlier Note: Outlier in original units (mg/L) is exp(#):
 Therefore, Observation 4.357 is a Potential Statistical Outlier 78.0

For 1% Significance Level, there is 1 Potential Outlier

Appendix F.3b -- Outlier Tests for Data Sets With Non-Detects

Outlier Tests for Selected Variables replacing nondetects with 1/2 the Detection Limit

User Selected Options

Date/Time of Computation ProUCL 5.2 12/2/2024 10:42:13 PM

From File 056934 Upgradient ProUCL data 2024.xls

Full Precision OFF

Rosner's Outlier Test for 10 Outliers in Ln_Chloride (mg/L)

Total N 180
 Number NDs 68
 Number Detects 180
 Mean with NDs=DL/2 1.756
 SD with NDs=DL/2 0.922
 Number of data 180
 Number of suspected outliers 10
 NDs replaced with half value.

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	1.756	0.92	5.303	56	3.857	3.574	3.944
2	1.736	0.886	4.92	55	3.595	3.564	3.944
3	1.718	0.855	4.762	54	3.56	3.564	3.938
4	1.701	0.826	4.275	53	3.116	3.564	3.934
5	1.686	0.805	4.121	38	3.024	3.564	3.934
6	1.673	0.786	3.998	37	2.959	3.562	3.932
7	1.659	0.768	3.839	52	2.839	3.56	3.93
8	1.647	0.752	3.833	36	2.908	3.558	3.928
9	1.634	0.735	3.52	23	2.566	3.556	3.926
10	1.623	0.723	3.391	51	2.446	3.554	3.924

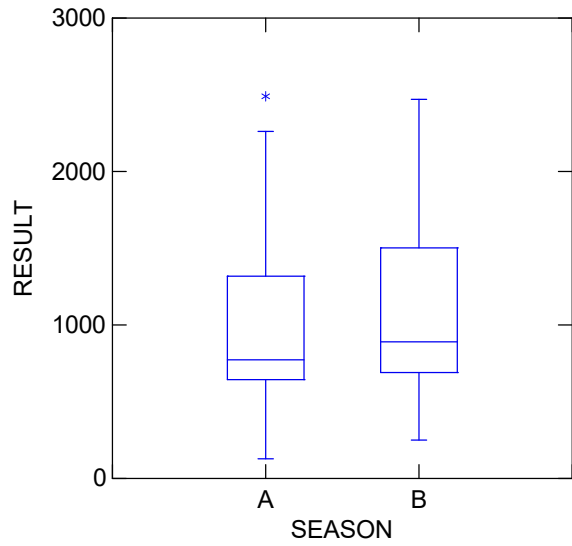
For 5% significance level, there are 2 Potential Outliers
 5.303, 4.92

Note: Outliers in original units (mg/L) are exp(#):
 201, 137

For 1% Significance Level, there is no Potential Outlier

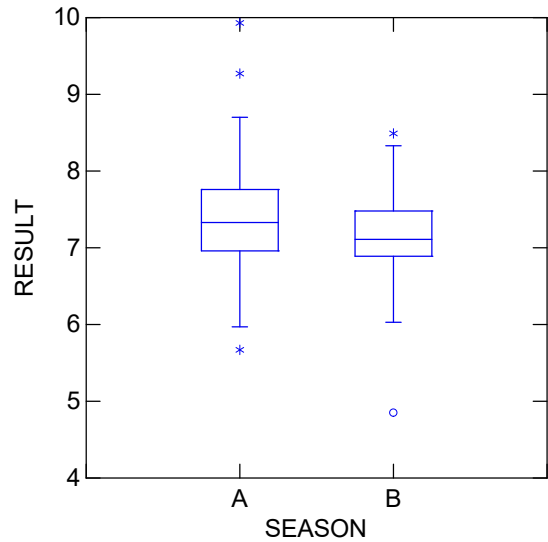
Appendix F.4 (Box-Whisker Plots Comparing Seasons)

Conductance ($\mu\text{S}/\text{cm}$) in Upgradient Groundwater (MW-5, MW-14, MW-16)



(A = Spring Samples; B = Fall Samples)

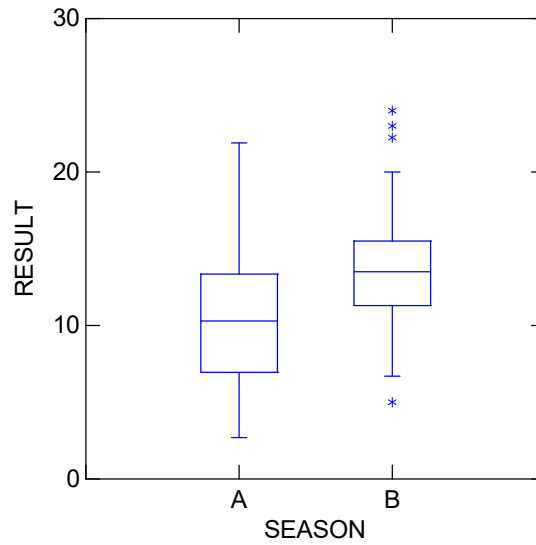
pH, field (s.u.) in Upgradient Groundwater (MW-5, MW-14, MW-16)



(A = Spring Samples; B = Fall Samples)

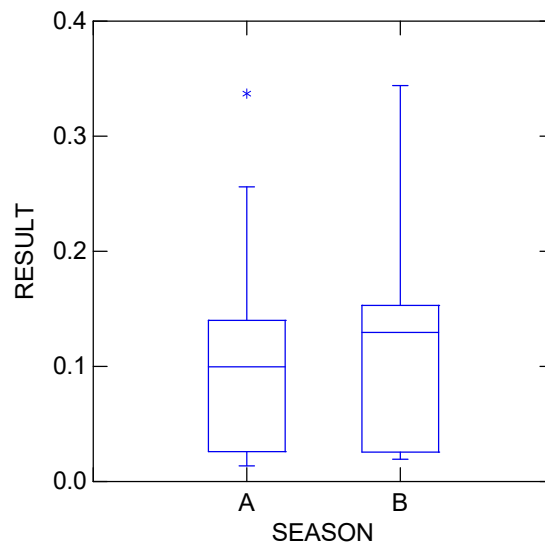
Appendix F.4 (Box-Whisker Plots Comparing Seasons)

Temperature (°C) in Upgradient Groundwater (MW-5, MW-14, MW-16)



(A = Spring Samples; B = Fall Samples)

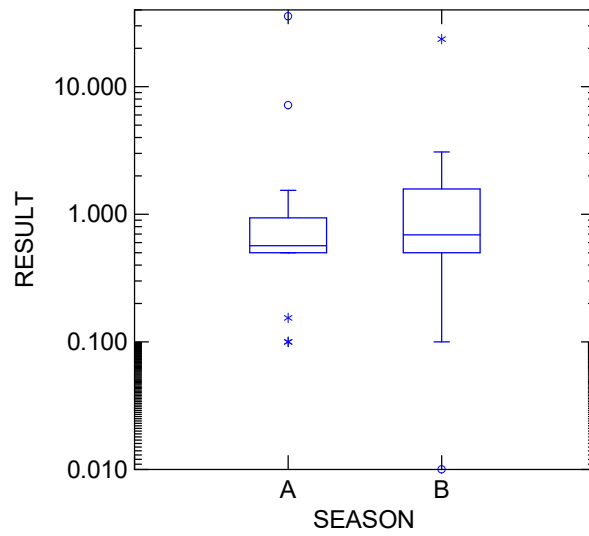
Barium, total or dissolved (mg/L) in Upgradient Groundwater (MW-5, MW-14, MW-16)



(A = Spring Samples; B = Fall Samples)

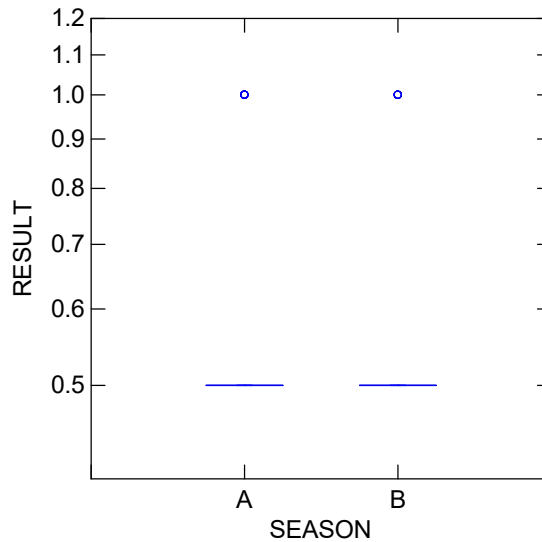
Appendix F.4 (Box-Whisker Plots Comparing Seasons)

Iron, total or dissolved (mg/L) in Upgradient Groundwater (MW-5, MW-14, MW-16)



(A = Spring Samples; B = Fall Samples)

Benzene ($\mu\text{g/L}$) in Upgradient Groundwater (MW-5, MW-14, MW-16)

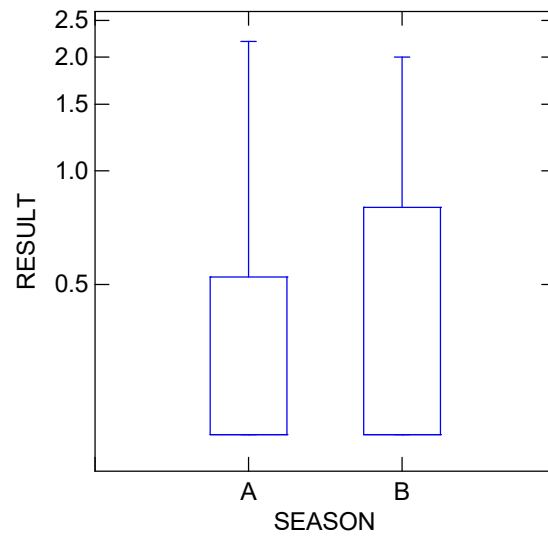


(A = Spring Samples; B = Fall Samples)

[ALL DATA ARE NON-DETECTS]

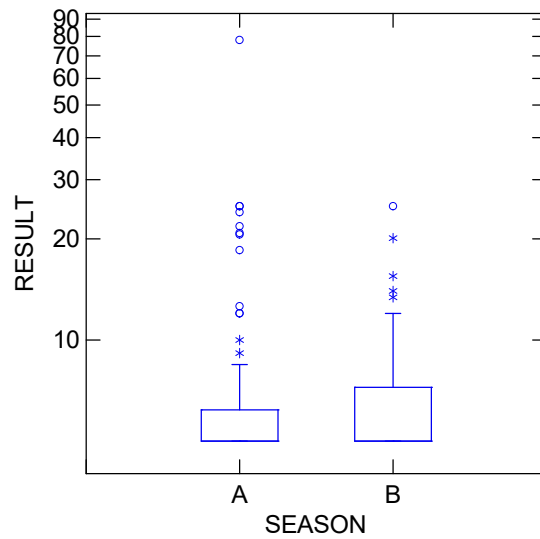
Appendix F.4 (Box-Whisker Plots Comparing Seasons)

Ammonia as N (mg/L) in Upgradient Groundwater (MW-5, MW-14, MW-16)



(A = Spring Samples; B = Fall Samples)

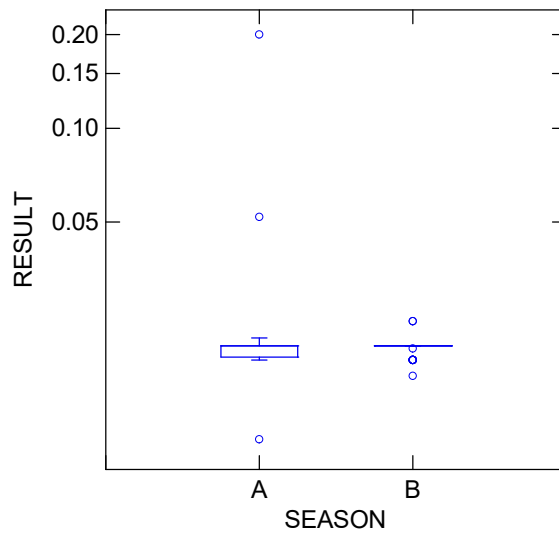
Chemical Oxygen Demand (COD) (mg/L); Upgradient (MW-5, MW-14, MW-16)



(A = Spring Samples; B = Fall Samples)

Appendix F.4 (Box-Whisker Plots Comparing Seasons)

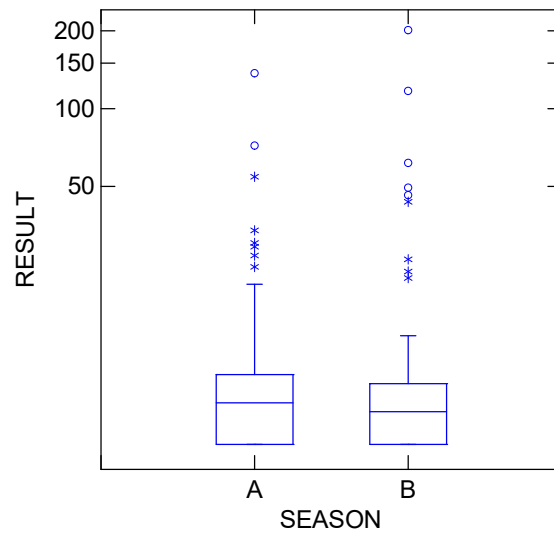
Phenolics (Total) (mg/L) in Upgradient Groundwater (MW-5, MW-14, MW-16)



(A = Spring Samples; B = Fall Samples)

[DATA ARE 95 PERCENT NON-DETECTS]

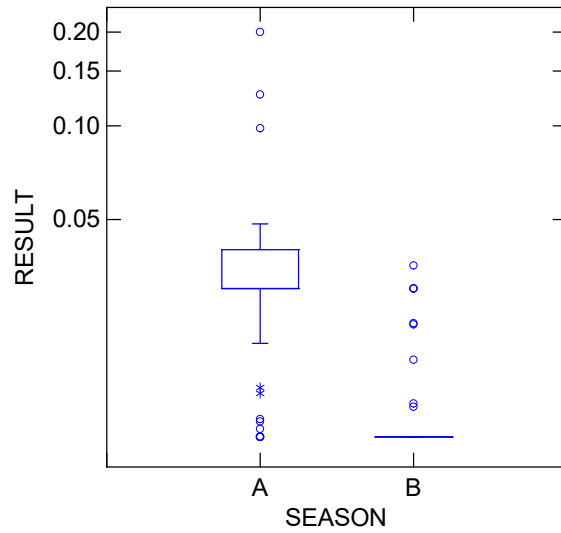
Chloride (mg/L) in Upgradient Groundwater (MW-5, MW-14, MW-16)



(A = Spring Samples; B = Fall Samples)

Appendix F.4 (Box-Whisker Plots Comparing Seasons)

Total Organic Halides (TOX) (mg/L) in Upgradient Groundwater (MW-5, MW-14, MW-16)



(A = Spring Samples; B = Fall Samples)

[DATA ARE 83 PERCENT NON-DETECTS]

**Regional-Kendall Test for Upgradient Groundwater
(Wells MW-5, MW-14, MW-16)
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa**

Conductance

Regional Test

Sum of ND	0
Total %ND	0%
Total N	179
Total S	1397
Pooled sigma	270.0882572
Z	5.16868084
Prob	2.35752E-07
M-K result	Increasing trend

Per-Well Calcs

N	56	62	61
Number ND	0	0	0
%ND	0%	0%	0%
M-K S	458	683	256
M-K sigma	141.49	164.63	160.70
M-K sigma^2	20020	27104	25823

Input Data

	MW-05	MW-14	MW-16
7/1/1995	640.0	1274.0	670.0
8/1/1995	670.0	1340.0	660.0
11/1/1995	1110.0	1460.0	820.0
2/1/1996	492.0	1271.0	940.0
5/1/1996	580.0	1530.0	730.0
11/1/1996	608.0	1270.0	654.0
4/1/1997	645.0	1530.0	698.0
11/1/1997	675.0	1576.0	747.0
5/1/1998	536.0	1520.0	698.0
11/1/1998	617.0	1380.0	613.0
5/1/1999	710.0	1630.0	750.0
11/1/1999	690.0	1585.0	733.0
5/1/2000	644.0	1604.0	682.0
12/1/2000	710.0	1620.0	1570.0
6/1/2001	622.0	1600.0	700.0
11/1/2001	683.4	1627.0	760.0
5/2/2002	636.0	1657.0	720.0
11/2/2002	689.0	1620.0	712.0
5/3/2003	502.0	1602.0	707.0
5/1/2004	306.0	1658.0	745.0
5/5/2005	552.0	1105.0	479.0
5/6/2006	989.0	1285.0	570.0
4/7/2007	532.0	1144.0	577.0
10/7/2007	645.0	1290.0	565.0
4/1/2008	535.0	1432.0	665.0
10/1/2008	993.0	1502.0	-
10/29/2009	984.0	1412.0	662.0
3/30/2010	797.0	1489.0	622.0
4/22/2010	724.0	1392.0	648.0
10/16/2010	984.0	1222.0	743.0
4/28/2011	678.0	1620.0	454.0
10/18/2011	816.0	1623.0	660.0
4/25/2012	813.0	1318.0	642.0
4/16/2013	539.0	1699.0	805.0
4/14/2014	802.0	1573.0	693.0
10/9/2014	1340.0	1398.0	561.0
4/17/2015	297.0	1711.0	736.0
10/16/2015	612.0	1716.0	771.0
3/17/2016	339.0	1255.0	679.0
9/29/2016	830.0	1986.0	826.0
3/8/2017	1025.0	1793.0	728.0
10/4/2017	1096.0	2120.0	864.0
3/12/2018	1013.0	566.0	225.0
10/9/2018	484.0	890.0	250.0
3/25/2019	703.8	1240.0	546.0
10/3/2019	690.0	1680.0	650.0
3/17/2020	872.2	2261.0	872.0
10/4/2020	948.1	2090.0	812.0
3/30/2021	977.0	2091.0	796.0
10/5/2021	935.8	1548.0	714.0
4/4/2022	1010.0	1492.0	626.1
10/3/2022	981.7	2470.0	803.0
3/27/2023	989.4	2250.0	808.7
10/3/2023	1090.0	2140.0	783.1
4/2/2024	128	2170.0	964.0
10/8/2024	1670	2310.0	742.7
		2490.0	811.0
		2320.0	682.7
		1953.0	722.0
		2130.0	779.0
		240	833
		2210	916

**Regional-Kendall Test for Upgradient Groundwater
(Wells MW-5, MW-14, MW-16)
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa**

pH

Regional Test

Sum of ND	0
Total %ND	0%
Total N	177
Total S	-637
Pooled sigma	266.260524
Z	-2.388637979
Prob	0.016910957
M-K result	Decreasing trend

Per-Well Calcs

N	54	62	61
Number ND	0	0	0
%ND	0%	0%	0%
M-K S	-310	-464	137
M-K sigma	134.04	164.63	160.70
M-K sigma^2	17967	27104	25823

Input Data

	MW-05	MW-14	MW-16
7/1/1995	6.70	7.05	7.58
8/1/1995	7.22	7.05	7.41
11/1/1995	6.26	6.03	6.93
2/1/1996	7.56	7.60	7.14
5/1/1996	7.44	6.97	7.44
11/1/1996	7.48	7.30	7.54
4/1/1997	8.33	8.23	8.24
11/1/1997	7.65	7.20	7.64
5/1/1998	6.21	5.97	5.67
11/1/1998	6.96	6.82	6.78
5/1/1999	Outlier	7.33	7.76
11/1/1999	7.02	6.82	7.10
5/1/2000	7.13	7.12	7.62
12/1/2000	Outlier	7.60	7.08
6/1/2001	8.09	8.10	8.27
11/1/2001	7.24	7.01	7.42
5/2/2002	7.50	7.24	7.42
11/2/2002	7.49	7.44	7.40
5/3/2003	7.76	7.64	7.03
5/1/2004	7.66	7.38	7.56
5/5/2005	7.98	7.01	7.36
5/6/2006	7.42	7.01	7.59
4/7/2007	8.32	7.05	7.47
10/7/2007	7.75	7.11	7.48
4/1/2008	7.95	7.33	7.86
10/1/2008	7.08	7.79	-
10/29/2009	7.06	6.95	8.40
3/30/2010	7.18	7.72	7.45
4/22/2010	6.96	7.01	8.22
10/16/2010	6.87	7.13	7.77
4/28/2011	7.03	7.08	8.33
10/18/2011	7.04	6.95	7.85
4/25/2012	7.11	6.87	7.49
4/16/2013	6.61	7.02	7.70
4/14/2014	7.51	6.93	7.70
10/9/2014	7.20	6.92	8.04
4/17/2015	6.96	7.00	7.48
10/16/2015	7.29	6.74	7.33
3/17/2016	6.60	6.79	6.95
9/29/2016	6.98	6.86	7.44
3/8/2017	7.00	6.91	7.51
10/4/2017	6.63	7.05	8.02
3/12/2018	6.70	6.50	6.96
10/9/2018	7.20	7.07	7.74
3/25/2019	7.42	6.29	8.70
10/3/2019	6.89	6.84	7.43
3/17/2020	7.33	6.80	7.31
10/4/2020	6.93	6.65	7.23
3/30/2021	7.28	6.59	7.16
10/5/2021	6.97	6.98	7.61
4/4/2022	9.27	7.21	8.04
10/3/2022	7.53	6.68	7.40
3/27/2023	7.02	6.99	7.60
10/3/2023	6.42	6.85	7.29
4/2/2024	6.15	7.16	7.56
10/8/2024	6.17	6.85	7.79
		8.19	8.68
		7.62	8.49
		8.01	8.56
		6.34	6.89
		6.47	6.35
		6.71	6.63

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Temperature

Regional Test

Sum of ND	0
Total %ND	0%
Total N	177
Total S	-315
Pooled sigma	265.8245035
Z	-1.181230458
Prob	0.237511185
M-K result	No trend identified

Per-Well Calcs

N	55	62	60
Number ND	0	0	0
%ND	0%	0%	0%
M-K S	-76	-62	-177
M-K sigma	137.75	164.63	156.79
M-K sigma^2	18975	27104	24583

Input Data

	MW-05	MW-14	MW-16
7/1/1995	23.00	18.00	24.00
8/1/1995	20.00	19.00	17.00
11/1/1995	10.00	8.00	9.00
2/1/1996	6.00	7.00	10.00
5/1/1996	11.10	9.40	11.10
11/1/1996	13.00	13.00	13.00
4/1/1997	15.00	15.00	13.90
11/1/1997	6.90	7.30	7.00
5/1/1998	11.10	12.20	11.10
11/1/1998	11.20	11.70	9.60
5/1/1999	9.40	9.40	10.00
11/1/1999	14.40	15.00	15.60
5/1/2000	11.60	10.60	11.50
12/1/2000	5.00	8.30	6.70
6/1/2001	14.20	21.90	17.30
11/1/2001	10.10	11.60	8.50
5/2/2002	13.90	12.50	15.50
11/2/2002	10.20	11.30	10.10
5/3/2003	18.60	16.60	17.50
5/1/2004	18.90	11.40	10.50
5/5/2005	12.50	18.30	18.90
5/6/2006	13.10	14.70	13.50
4/7/2007	12.70	13.80	13.20
10/7/2007	15.50	13.80	13.40
4/1/2008	12.40	14.50	13.70
10/1/2008	12.10	15.60	-
10/29/2009	10.20	14.10	14.10
3/30/2010	6.00	14.50	13.90
4/22/2010	9.70	13.50	13.50
10/16/2010	12.90	14.00	12.50
4/28/2011	7.50	10.80	9.30
10/18/2011	13.80	4.10	9.30
4/25/2012	11.80	9.90	11.70
4/16/2013	6.90	13.80	9.50
4/14/2014	6.10	7.90	9.30
10/9/2014	13.76	14.20	11.30
4/17/2015	-	11.00	14.60
10/16/2015	14.10	15.50	11.80
3/17/2016	5.76	6.60	11.40
9/29/2016	18.00	13.50	11.20
3/8/2017	2.70	6.00	11.10
10/4/2017	15.87	15.66	13.12
3/12/2018	4.88	2.90	-
10/9/2018	15.80	18.20	10.10
3/25/2019	4.00	7.38	10.19
10/3/2019	16.75	16.70	12.90
3/17/2020	5.00	4.10	7.20
10/4/2020	15.30	15.34	12.21
3/30/2021	6.80	6.57	11.03
10/5/2021	16.40	15.30	11.60
4/4/2022	4.23	6.10	10.40
10/3/2022	15.20	14.75	11.93
3/27/2023	5.50	7.00	11.10
10/3/2023	18.72	15.40	12.00
4/2/2024	5.84	6.70	9.90
10/8/2024	22.24	16.60	12.80
		6.02	9.03
		15.40	12.40
		8.01	8.56
		15.79	13.13
		7.34	9.73
		15.76	14.83

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Barium

Regional Test

Sum of ND	0
Total %ND	0%
Total N	91
Total S	-83
Pooled sigma	98.81970114
Z	-0.82979405
Prob	0.406655236
M-K result	No trend identified

Per-Well Calcs

N	29	31	31
Number ND	0	0	0
%ND	0%	0%	0%
M-K S	-81	40	-42
M-K sigma	53.31	58.84	58.84
M-K sigma^2	2842	3462	3462

Input Data

	MW-05	MW-14	MW-16	
7/1/1995	-	7/1/1995	-	
8/1/1995	-	8/1/1995	-	
11/1/1995	-	11/1/1995	-	
2/1/1996	-	2/1/1996	-	
5/1/1996	-	5/1/1996	-	
11/1/1996	-	11/1/1996	-	
4/1/1997	-	4/1/1997	-	
11/1/1997	-	11/1/1997	-	
5/1/1998	-	5/1/1998	-	
11/1/1998	-	11/1/1998	-	
5/1/1999	-	5/1/1999	-	
11/1/1999	-	11/1/1999	-	
5/1/2000	-	5/1/2000	-	
12/1/2000	-	12/1/2000	-	
6/1/2001	-	6/1/2001	-	
11/1/2001	-	11/1/2001	-	
5/2/2002	-	5/2/2002	-	
11/2/2002	-	11/2/2002	-	
5/3/2003	-	5/3/2003	-	
5/1/2004	-	11/3/2003	-	
5/5/2005	-	5/1/2004	-	
5/6/2006	-	12/1/2004	-	
4/7/2007	-	5/5/2005	-	
10/7/2007	-	11/5/2005	-	
4/1/2008	-	5/6/2006	-	
10/1/2008	-	10/6/2006	-	
10/29/2009	-	4/7/2007	-	
3/30/2010	0.1460	10/7/2007	-	
4/22/2010	0.1550	4/1/2008	-	
10/16/2010	0.1690	10/1/2008	-	
4/28/2011	0.1370	10/29/2009	-	
10/18/2011	0.1280	3/25/2010	0.0136	
4/25/2012	0.1620	4/22/2010	0.0157	
4/16/2013	0.1320	10/16/2010	0.0252	
4/14/2014	0.0878	4/28/2011	0.0205	
10/9/2014	0.1490	10/19/2011	0.0231	
4/17/2015	0.0894	4/25/2012	0.1580	
10/16/2015	0.1480	10/10/2012	0.0255	
3/17/2016	0.0858	4/16/2013	0.0210	
9/29/2016	0.1340	10/29/2013	0.025/0.0256	
3/8/2017	0.1200	4/14/2014	0.0205	
10/4/2017	0.0967	10/8/2014	0.0217	
3/12/2018	0.0836	4/16/2015	0.026/0.0382	
10/9/2018	0.1150	10/14/2015	0.0256	
3/25/2019	0.0793/0.0783	3/16/2016	0.0213/0.0219	
10/3/2019	0.158/0.163	9/27/2016	0.0255/0.0247	
3/17/2020	0.11/0.111	3/7/2017	0.0272/0.0313	
10/4/2020	0.0984	10/4/2017	0.0294	
3/30/2021	0.124	3/12/2018	0.1500	
10/5/2021	0.125/0.120	10/9/2018	0.0477/0.0554	
4/4/2022	0.0828/0.0888	3/25/2019	0.0862	
10/3/2022	0.153/0.153	10/3/2019	0.0289	
3/27/2023	0.1380	3/17/2020	0.0639	
10/3/2023	0.2440	10/4/2020	0.0243	
4/2/2024	0.0822	3/30/2021	0.0141/0.0136	
10/8/2024	0.121	10/5/2021	0.127	
		4/4/2022	0.0242	
		10/3/2022	0.0194	
		3/29/2023	0.0223/0.0260	
		10/4/2023	0.0246	
		4/2/2024	0.0154/0.0153	
		10/9/2024	0.023	
			7/1/1995	-
			8/1/1995	-
			11/1/1995	-
			2/1/1996	-
			5/1/1996	-
			11/1/1996	-
			4/1/1997	-
			11/1/1997	-
			5/1/1998	-
			11/1/1998	-
			5/1/1999	-
			11/1/1999	-
			5/1/2000	-
			12/1/2000	-
			6/1/2001	-
			11/1/2001	-
			5/2/2002	-
			11/2/2002	-
			5/3/2003	-
			11/3/2003	-
			5/1/2004	-
			12/1/2004	-
			5/5/2005	-
			11/5/2005	-
			5/6/2006	-
			10/6/2006	-
			4/7/2007	-
			10/7/2007	-
			4/1/2008	-
			10/1/2008	-
			10/29/2009	-
			3/30/2010	0.1400
			4/22/2010	0.1380
			10/16/2010	0.1390
			4/28/2011	0.1320
			10/18/2011	0.1700
			4/25/2012	0.1770
			10/10/2012	0.1650
			4/17/2013	0.1750
			10/30/2013	0.1530
			4/14/2014	0.1580
			10/9/2014	0.1410
			4/17/2015	0.2560
			10/16/2015	0.2300
			3/17/2016	0.139/0.142
			9/29/2016	0.2200
			3/8/2017	0.1410
			10/4/2017	0.1340
			3/12/2018	0.2210
			10/9/2018	0.1530
			3/25/2019	0.1290
			10/3/2019	0.1360
			3/17/2020	0.3370
			10/4/2020	0.144/0.143
			3/30/2021	0.140
			10/5/2021	0.153
			4/4/2022	0.1300
			10/3/2022	0.3440
			3/29/2023	0.1310
			10/4/2023	0.2060
			4/3/2024	0.132
			10/8/2024	0.131

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Iron

Regional Test

Sum of ND	114
Total %ND	65%
Total N	176
Total S	1270
Pooled sigma	263.403999
Z	4.817694511
Prob	1.45226E-06
M-K result	Increasing trend

Per-Well Calcs

N	55	61	60
Number ND	30	54	30
%ND	55%	89%	50%
M-K S	515	93	662
M-K sigma	137.75	160.70	156.79
M-K sigma^2	18975	25823	24583

Input Data

	MW-05	MW-14	MW-16
7/1/1995	0.100 U	0.100 U	1.30
8/1/1995	0.100 U	0.100 U	0.100 U
11/1/1995	0.100 U	0.100 U	0.100 U
2/1/1996	0.100 U	0.100 U	0.16
5/1/1996	-	-	-
11/1/1996	0.100 U	0.100 U	0.100 U
4/1/1997	0.100 U	0.100 U	0.100 U
11/1/1997	0.100 U	0.17	0.21
5/1/1998	0.100 U	0.100 U	0.100 U
11/1/1998	0.100 U	0.100 U	0.54
5/1/1999	0.100 U	0.100 U	0.100 U
11/1/1999	0.100 U	3.20	0.100 U
5/1/2000	0.100 U	0.100 U	0.100 U
12/1/2000	0.100 U	0.100 U	0.100 U
6/1/2001	0.100 U	0.100 U	0.17
11/1/2001	0.100 U	0.100 U	0.100 U
5/2/2002	0.100 U	0.100 U	0.100 U
11/2/2002	0.100 U	0.100 U	0.100 U
5/3/2003	0.100 U	0.100 U	0.100 U
5/1/2004	0.100 U	0.100 U	0.100 U
5/5/2005	0.100 U	0.100 U	0.100 U
5/6/2006	1.51	0.100 U	0.100 U
4/7/2007	0.100 U	0.100 U	0.100 U
10/7/2007	0.31	0.100 U	0.23
4/1/2008	0.100 U	0.100 U	0.100 U
10/1/2008	1.13	0.100 U	0.100 U
10/29/2009	0.100 U	0.100 U	0.100 U
3/30/2010	0.99	0.100 U	0.100 U
4/22/2010	1.03	0.100 U	0.100 U
10/16/2010	1.15	0.100 U	0.100 U
4/28/2011	0.28	0.100 U	0.100 U
10/18/2011	1.61	0.100 U	0.100 U
4/25/2012	0.80	0.100 U	0.12
4/16/2013	0.100 U	0.100 U	0.51
4/14/2014	0.100 U	0.100 U	0.18
10/9/2014	2.63	0.100 U	1.77
4/17/2015	0.39	0.100 U	1.10
10/16/2015	4.89	0.100 U	0.11
3/17/2016	0.100 U	0.100 U	0.100 U
9/29/2016	0.91	0.100 U/0.100 U	0.13
3/8/2017	0.68	0.100 U	0.100 U
10/4/2017	1.62	0.100 U	0.100 U
3/12/2018	1.54	0.100 U/0.3	0.100 U
10/9/2018	1.09	0.100 U	8.24
3/25/2019	0.59/0.567	0.100 U/0.100 U	0.100 U/0.101
10/3/2019	0.500 U/0.500 U	0.100 U/0.100 U	6.19
3/17/2020	0.54/0.571	0.500 U/0.500 U	0.500 U
10/4/2020	1.34	0.500 U	0.69
3/30/2021	0.500 U	1.54	7.15
10/5/2021	2.38/3.08	0.702/0.500 U	0.87
4/4/2022	0.524/0.689	1.01	0.87
10/3/2022	2.10/0.446	0.500 U	1.58
3/27/2023	0.500 U	0.500 U	Outlier
10/3/2023	0.500 U	0.500 U	0.679/0.598
4/2/2024	0.154	0.500 U/0.500 U	0.861
10/8/2024	1.54	1.12	2.23
		0.500 U	0.852
		0.100 U	23.6
		0.500 U/0.500 U	1.42
		0.500 U	2.83
		0.100 U/0.100 U	1.02
		0.0100 U	0.262

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Benzene

Regional Test

Sum of ND	91
Total %ND	100%
Total N	91
Total S	0
Pooled sigma	98.81970114
Z	0
Prob	1
M-K result	>90% ND

Per-Well Calcs

N	29	31	31
Number ND	29	31	31
%ND	100%	100%	100%
M-K S	0	0	0
M-K sigma	53.31	58.84	58.84
M-K sigma^2	2842	3462	3462

Input Data

	MW-05	MW-14	MW-16
7/1/1995	-	7/1/1995	-
8/1/1995	-	8/1/1995	-
11/1/1995	-	11/1/1995	-
2/1/1996	-	2/1/1996	-
5/1/1996	-	5/1/1996	-
11/1/1996	-	11/1/1996	-
4/1/1997	-	4/1/1997	-
11/1/1997	-	11/1/1997	-
5/1/1998	-	5/1/1998	-
11/1/1998	-	11/1/1998	-
5/1/1999	-	5/1/1999	-
11/1/1999	-	11/1/1999	-
5/1/2000	-	5/1/2000	-
12/1/2000	-	12/1/2000	-
6/1/2001	-	6/1/2001	-
11/1/2001	-	11/1/2001	-
5/2/2002	-	5/2/2002	-
11/2/2002	-	11/2/2002	-
5/3/2003	-	5/3/2003	-
5/1/2004	-	11/3/2003	-
5/5/2005	-	5/1/2004	-
5/6/2006	-	12/1/2004	-
4/7/2007	-	5/5/2005	-
10/7/2007	-	11/5/2005	-
4/1/2008	-	5/6/2006	-
10/1/2008	-	10/6/2006	-
10/29/2009	-	4/7/2007	-
3/30/2010	1.00 U	10/7/2007	-
4/22/2010	1.00 U	4/1/2008	-
10/16/2010	1.00 U	10/1/2008	-
4/28/2011	1.00 U	10/29/2009	-
10/18/2011	1.00 U	3/25/2010	1.00 U
4/25/2012	1.00 U	4/22/2010	1.00 U
4/16/2013	0.500 U	10/16/2010	1.00 U
4/14/2014	0.500 U	4/28/2011	1.00 U
10/9/2014	0.500 U	10/19/2011	1.00 U
4/17/2015	0.500 U	4/25/2012	1.00 U
10/16/2015	0.500 U	10/10/2012	1.00 U
3/17/2016	0.500 U	4/16/2013	0.500 U
9/29/2016	0.500 U	10/29/2013	0.500 U/0.500 U
3/8/2017	0.500 U	4/14/2014	0.500 U
10/4/2017	0.500 U	10/8/2014	0.500 U
3/12/2018	0.500 U	4/16/2015	0.500 U/0.500 U
10/9/2018	0.500 U	10/14/2015	0.500 U
3/25/2019	0.500 U/0.500 U	3/16/2016	0.500 U/0.500 U
10/3/2019	0.500 U/0.500 U	9/27/2016	0.500 U/0.500 U
3/17/2020	0.500 U/0.500 U	3/7/2017	0.500 U/0.500 U
10/4/2020	0.500 U	10/4/2017	0.500 U
3/30/2021	0.500 U	3/12/2018	0.500 U
10/5/2021	0.500 U/0.500 U	10/9/2018	0.500 U/0.500 U
4/4/2022	0.500 U/0.500 U	3/25/2019	0.500 U
10/3/2022	0.500 U/0.500 U	10/3/2019	0.500 U
3/27/2023	0.500 U	3/17/2020	0.500 U
10/3/2023	0.500 U	10/4/2020	0.500 U
4/2/2024	0.500 U	3/30/2021	0.500 U/0.500 U
10/8/2024	0.500 U	10/5/2021	0.500 U
		4/4/2022	0.500 U
		10/3/2022	0.500 U
		3/29/2023	0.500 U/0.500 U
		10/4/2023	0.500 U
		4/2/2024	0.500 U/0.500 U
		10/9/2024	0.500 U

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Ammonia-N

Regional Test

Sum of ND	121
Total %ND	67%
Total N	180
Total S	-364
Pooled sigma	272.4493837
Z	-1.332357574
Prob	0.182742716
M-K result	No trend identified

Per-Well Calcs

N	56	62	62
Number ND	56	58	7
%ND	100%	94%	11%
M-K S	0	-191	-173
M-K sigma	141.49	164.63	164.63
M-K sigma^2	20020	27104	27104

Input Data

	MW-05	MW-14	MW-16
7/1/1995	0.200 U	0.560	1.500
8/1/1995	0.200 U	0.200 U	1.700
11/1/1995	0.200 U	0.200 U	1.500
2/1/1996	0.200 U	0.200 U	2.200
5/1/1996	0.200 U	0.200 U	1.700
11/1/1996	0.200 U	0.230	0.800
4/1/1997	0.200 U	0.200 U	1.000
11/1/1997	0.200 U	0.200 U	0.200 U
5/1/1998	0.200 U	0.200 U	0.200 U
11/1/1998	0.200 U	0.200 U	1.500
5/1/1999	0.200 U	0.230	1.800
11/1/1999	0.200 U	0.200 U	1.700
5/1/2000	0.200 U	0.240	1.980
12/1/2000	0.200 U	0.200 U	1.780
6/1/2001	0.200 U	0.200 U	1.620
11/1/2001	0.200 U	0.200 U	1.400
5/2/2002	0.200 U	0.200 U	1.640
11/2/2002	0.200 U	0.200 U	1.420
5/3/2003	0.200 U	0.200 U	1.650
5/1/2004	0.200 U	0.200 U	1.750
5/5/2005	0.200 U	0.200 U	1.600
5/6/2006	0.200 U	12/1/2004	1.590
4/7/2007	0.200 U	5/5/2005	1.500
10/7/2007	0.200 U	11/5/2005	0.200 U
4/1/2008	0.200 U	5/6/2006	0.469
10/1/2008	0.200 U	10/6/2006	1.660
10/29/2009	0.200 U	4/7/2007	0.200 U
3/30/2010	0.200 U	10/7/2007	1.100
4/22/2010	0.200 U	4/1/2008	0.200 U
10/16/2010	0.200 U	10/1/2008	1.490
4/28/2011	0.200 U	10/29/2009	0.200 U
10/18/2011	0.200 U	3/25/2010	1.800
4/25/2012	0.200 U	4/22/2010	1.830
4/16/2013	0.200 U	10/16/2010	1.830
4/14/2014	0.200 U	4/28/2011	1.890
10/9/2014	0.200 U	10/19/2011	2.000
4/17/2015	0.200 U	4/25/2012	2.170
10/16/2015	0.200 U	10/10/2012	1.690
3/17/2016	0.200 U	4/16/2013	1.890
9/29/2016	0.200 U	10/29/2013	0.200 U/0.200 U
3/8/2017	0.200 U	4/14/2014	1.690
10/4/2017	0.200 U	10/8/2014	0.811
3/12/2018	0.200 U	4/16/2015	0.200 U/0.200 U
10/9/2018	0.200 U	10/14/2015	1.560
3/25/2019	0.200 U/0.200 U	3/16/2016	0.59/0.456
10/3/2019	0.200 U/0.200 U	9/27/2016	1.530
3/17/2020	0.200 U/0.200 U	3/7/2017	0.584
10/4/2020	0.200 U	10/4/2017	0.200 U
3/30/2021	0.200 U	3/12/2018	0.776
10/5/2021	0.200 U/0.200 U	10/9/2018	1.430
4/4/2022	0.200 U/0.200 U	3/25/2019	0.316
10/3/2022	0.200 U/0.200 U	10/3/2019	1.420
3/27/2023	0.200 U	3/17/2020	1.860
10/3/2023	0.200 U	10/4/2020	0.536/0.542
4/2/2024	0.200 U	3/30/2021	1.35
10/8/2024	0.200 U	10/5/2021	0.671
		4/4/2022	1.520
		10/3/2022	0.368
		3/29/2023	1.660
		10/4/2023	1.760
		4/2/2024	1.24
		10/9/2024	1.45

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COD

Regional Test

Sum of ND	113
Total %ND	63%
Total N	179
Total S	50
Pooled sigma	270.0882572
Z	0.181422178
Prob	0.856036212
M-K result	No trend identified

Per-Well Calcs

N	56	61	62
Number ND	32	47	34
%ND	57%	77%	55%
M-K S	62	95	-107
M-K sigma	141.49	160.70	164.63
M-K sigma^2	20020	25823	27104

Input Data

	MW-05	MW-14	MW-16
7/1/1995	5.00 U	5.00 U	6.8
8/1/1995	5.00 U	5.00 U	8.9
11/1/1995	5.00 U	5.2	14.0
2/1/1996	12.0	7.3	5.00 U
5/1/1996	5.00 U	5.00 U	7.5
11/1/1996	5.00 U	5.00 U	11.0
4/1/1997	5.00 U	5.00 U	5.00 U
11/1/1997	5.00 U	5.00 U	5.00 U
5/1/1998	7.3	5.00 U	5.00 U
11/1/1998	5.00 U	5.00 U	8.6
5/1/1999	24.0	Outlier	5.2
11/1/1999	5.00 U	5.00 U	5.00 U
5/1/2000	5.00 U	5.00 U	12.0
12/1/2000	5.00 U	5.00 U	5.00 U
6/1/2001	7.4	5.00 U	6.4
11/1/2001	5.00 U	5.00 U	6.7
5/2/2002	5.00 U	5.00 U	5.00 U
11/2/2002	8.3	12.0	7.8
5/3/2003	5.00 U	5.00 U	5.00 U
5/1/2004	10.0	5.00 U	5.00 U
5/5/2005	5.00 U	5.3	5.00 U
5/6/2006	18.5	5.00 U	5.00 U
4/7/2007	5.2	5.00 U	6.8
10/7/2007	9.3	5.00 U	5.00 U
4/1/2008	12.6	5.00 U	5.00 U
10/1/2008	9.3	8.1	9.0
10/29/2009	5.6	5.00 U	5.00 U
3/30/2010	5.00 U	5.00 U	5.00 U
4/22/2010	5.00 U	20.8	20.6
10/16/2010	5.00 U	5.00 U	9.9
4/28/2011	5.00 U	5.00 U	25.0 U
10/18/2011	5.00 U	25.0 U	5.00 U
4/25/2012	5.00 U	5.00 U	5.00 U
4/16/2013	7.9	7.5	5.00 U
4/14/2014	5.00 U	5.00 U	5.5
10/9/2014	5.00 U	5.6	6.6
4/17/2015	5.00 U	5.00 U	5.00 U
10/16/2015	11.6	5.00 U	5.00 U
3/17/2016	7.5	5.00 U	5.00 U
9/29/2016	9.6	5.00 U/5.00 U	6.3
3/8/2017	5.5	5.00 U	5.00 U
10/4/2017	5.00 U	5.00 U	5.00 U
3/12/2018	5.00 U	5.00 U/5.00 U	5.7
10/9/2018	13.4	5.00 U	5.3
3/25/2019	5.00 U/5.00 U	7.54/6.88	5.00 U/5.00 U
10/3/2019	8.99/9.33	5.00 U/5.00 U	20.1
3/17/2020	5.00 U/5.00 U	5.00 U/5.00 U	5.00 U
10/4/2020	5.4	5.00 U	6.8
3/30/2021	5.00 U	5.00 U	5.00 U
10/5/2021	5.00 U/7.98	5.00 U/5.00 U	5.00 U
4/4/2022	5.00 U/9.14	5.00 U	5.00 U
10/3/2022	5.00 U/7.23	5.00 U	5.00 U
3/27/2023	25.0 U	6.7	5.0
10/3/2023	7.9	5.00 U	5.00 U/5.1
4/2/2024	5.00 U	5.00 U/5.00 U	5.00 U
10/8/2024	5.00 U	9.04	5.00 U
		6.0	8.45
		5.00 U	7.23
		5.00 U/5.00 U	5.00 U
		5.5	15.5
		5.00 U/5.45	21.8
		5.00 U	5.00 U

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Phenolics

Regional Test

Sum of ND	103
Total %ND	95%
Total N	108
Total S	-35
Pooled sigma	128.2835401
Z	-0.265037899
Prob	0.790980266
M-K result	>90% ND

Per-Well Calcs

N	32	38	38
Number ND	31	36	36
%ND	97%	95%	95%
M-K S	17	-45	-7
M-K sigma	61.67	79.54	79.54
M-K sigma^2	3803	6327	6327

Input Data

	MW-05	MW-14	MW-16
7/1/1995	0.0200 U	7/1/1995 0.0200 U	7/1/1995 0.0200 U
8/1/1995	0.0200 U	8/1/1995 0.0240	8/1/1995 0.0240
11/1/1995	0.0200 U	11/1/1995 0.0200 U	11/1/1995 0.0200 U
2/1/1996	0.0200 U	2/1/1996 0.0200 U	2/1/1996 0.0200 U
5/1/1996	-	5/1/1996 -	5/1/1996 -
11/1/1996	0.0200 U	11/1/1996 0.0200 U	11/1/1996 0.0200 U
4/1/1997	-	4/1/1997 -	4/1/1997 -
11/1/1997	0.0200 U	11/1/1997 0.0200 U	11/1/1997 0.0200 U
5/1/1998	-	5/1/1998 -	5/1/1998 -
11/1/1998	0.0200 U	11/1/1998 0.0200 U	11/1/1998 0.0200 U
5/1/1999	-	5/1/1999 -	5/1/1999 -
11/1/1999	0.0200 U	11/1/1999 0.0200 U	11/1/1999 0.0200 U
5/1/2000	-	5/1/2000 -	5/1/2000 -
12/1/2000	0.0200 U	12/1/2000 0.0200 U	12/1/2000 0.0200 U
6/1/2001	-	6/1/2001 -	6/1/2001 -
11/1/2001	0.0200 U	11/1/2001 0.0200 U	11/1/2001 0.0200 U
5/2/2002	-	5/2/2002 -	5/2/2002 -
11/2/2002	0.0200 U	11/2/2002 0.0200 U	11/2/2002 0.0200 U
5/3/2003	-	5/3/2003 -	5/3/2003 -
5/1/2004	-	11/3/2003 0.0200 U	11/3/2003 0.0200 U
5/5/2005	-	5/1/2004 -	5/1/2004 -
5/6/2006	-	12/1/2004 0.0200 U	12/1/2004 0.0200 U
4/7/2007	-	5/5/2005 -	5/5/2005 -
10/7/2007	0.0180 U	11/5/2005 0.0200 U	11/5/2005 0.0200 U
4/1/2008	-	5/6/2006 -	5/6/2006 -
10/1/2008	0.0180 U	10/6/2006 0.0160	10/6/2006 0.0180 U
10/29/2009	0.0180 U	4/7/2007 -	4/7/2007 -
3/30/2010	0.0200 U	10/7/2007 0.0180 U	10/7/2007 0.0200 U
4/22/2010	0.0180 U	4/1/2008 -	4/1/2008 -
10/16/2010	0.0200 U	10/1/2008 0.0200 U	10/1/2008 0.0200 U
4/28/2011	0.0200 U	10/29/2009 0.0180 U	10/29/2009 0.0180 U
10/18/2011	0.0200 U	3/25/2010 0.0180 U	3/30/2010 0.0200 U
4/25/2012	0.0200 U	4/22/2010 0.0180 U	4/22/2010 0.0180 U
4/16/2013	0.0200 U	10/16/2010 0.0200 U	10/16/2010 0.0200 U
4/14/2014	0.0100 U	4/28/2011 0.0200 U	4/28/2011 0.0200 U
10/9/2014	-	10/19/2011 0.0200 U	10/18/2011 0.0200 U
4/17/2015	0.0184 U	4/25/2012 0.0200 U	4/25/2012 0.0200 U
10/16/2015	-	10/10/2012 0.0200 U	10/10/2012 0.0200 U
3/17/2016	0.0196 U	4/16/2013 0.0192 U	4/17/2013 0.0210 U
9/29/2016	-	10/29/2013 0.0196 U/0.0180 U	10/30/2013 0.0180 U
3/8/2017	0.0193	4/14/2014 0.0180 U	4/14/2014 0.0196 U
10/4/2017	-	10/8/2014 -	10/9/2014 -
3/12/2018	0.0180 U	4/16/2015 0.0180 U/0.0200 U	4/17/2015 0.0200 U
10/9/2018	-	10/14/2015 -	10/16/2015 -
3/25/2019	0.0200 U/0.0188 U	3/16/2016 0.0196 U/0.0204 U	3/17/2016 0.0204 U/0.0180 U
10/3/2019	-	9/27/2016 -	9/29/2016 -
3/17/2020	0.0200 U/0.0184 U	3/7/2017 0.0180 U/0.0188 U	3/8/2017 0.0180 U
10/4/2020	-	10/4/2017 -	10/4/2017 -
3/30/2021	0.0188 U	3/12/2018 0.0184 U	3/12/2018 0.0180 U
10/5/2021	-	10/9/2018 -	10/9/2018 -
4/4/2022	0.0200 U/0.0196 U	3/25/2019 0.0204 U	3/25/2019 0.0519
10/3/2022	-	10/3/2019 -	10/3/2019 -
3/27/2023	0.0200 U	3/17/2020 0.0192 U	3/17/2020 0.0180 U
10/3/2023	-	10/4/2020 -	10/4/2020 -
4/2/2024	0.0200 U	3/30/2021 0.0212 U/0.0184 U	3/30/2021 0.0184 U
10/8/2024	-	10/5/2021 -	10/5/2021 -
		4/4/2022 0.0192 U	4/4/2022 0.0192 U
		10/3/2022 -	10/3/2022 -
		3/29/2023 0.0204 U/0.0200 U	3/29/2023 0.200 U
		10/4/2023 -	10/4/2023 -
		4/2/2024 0.0208 U/0.0200 U	4/3/2024 0.0200 U
		10/9/2024 -	10/8/2024 -

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Chloride

Regional Test

Sum of ND	68
Total %ND	38%
Total N	178
Total S	543
Pooled sigma	268.6552934
Z	2.017455131
Prob	0.043648039
M-K result	Increasing trend

Per-Well Calcs

N	54	62	62
Number ND	9	0	59
%ND	17%	0%	95%
M-K S	450	155	-62
M-K sigma	134.04	164.63	164.63
M-K sigma^2	17967	27104	27104

Input Data

	MW-05	MW-14	MW-16		
7/1/1995	6.7	7/1/1995	6.7	7/1/1995	5.00 U
8/1/1995	5.00 U	8/1/1995	6.0	8/1/1995	6.0
11/1/1995	5.8	11/1/1995	7.7	11/1/1995	5.00 U
2/1/1996	7.7	2/1/1996	7.7	2/1/1996	5.00 U
5/1/1996	5.00 U	5/1/1996	8.3	5/1/1996	5.00 U
11/1/1996	6.3	11/1/1996	8.1	11/1/1996	5.00 U
4/1/1997	5.00 U	4/1/1997	9.4	4/1/1997	5.00 U
11/1/1997	5.9	11/1/1997	8.7	11/1/1997	5.00 U
5/1/1998	6.0	5/1/1998	11.7	5/1/1998	5.00 U
11/1/1998	8.5	11/1/1998	8.4	11/1/1998	5.00 U
5/1/1999	6.2	5/1/1999	9.3	5/1/1999	5.00 U
11/1/1999	5.1	11/1/1999	8.8	11/1/1999	5.00 U
5/1/2000	5.2	5/1/2000	9.4	5/1/2000	5.00 U
12/1/2000	5.9	12/1/2000	8.2	12/1/2000	5.00 U
6/1/2001	7.4	6/1/2001	8.6	6/1/2001	5.00 U
11/1/2001	5.00 U	11/1/2001	8.6	11/1/2001	6.7
5/2/2002	11.8	5/2/2002	8.7	5/2/2002	5.00 U
11/2/2002	6.1	11/2/2002	7.9	11/2/2002	5.00 U
5/3/2003	6.5	5/3/2003	10.2	5/3/2003	5.00 U
11/3/2003	5.1	11/3/2003	8.6	11/3/2003	5.00 U
5/5/2005	12.0	5/1/2004	9.6	5/1/2004	5.00 U
5/6/2006	27.0	12/1/2004	7.9	12/1/2004	5.00 U
4/7/2007	33.8	5/5/2005	8.4	5/5/2005	5.00 U
10/7/2007	10.2	11/5/2005	8.6	11/5/2005	5.00 U
4/1/2008	11.9	5/6/2006	8.2	5/6/2006	5.00 U
10/1/2008	26.1	10/6/2006	8.2	10/6/2006	5.00 U
10/29/2009	12.1	4/7/2007	7.9	4/7/2007	5.00 U
3/30/2010	8.5	10/7/2007	7.8	10/7/2007	5.00 U
4/22/2010	10.6	4/1/2008	7.6	4/1/2008	5.00 U
10/16/2010	6.8	10/1/2008	6.9	10/1/2008	5.00 U
4/28/2011	5.5	10/29/2009	6.7	10/29/2009	5.00 U
10/18/2011	13.2	3/25/2010	6.8	3/25/2010	5.00 U
4/25/2012	5.6	4/22/2010	7.1	4/22/2010	5.00 U
4/16/2013	5.00 U	10/16/2010	6.6	10/16/2010	5.00 U
4/14/2014	24.4	4/28/2011	7.1	4/28/2011	5.00 U
10/9/2014	46.2	10/19/2011	7.6	10/18/2011	5.00 U
4/17/2015	54.5	4/25/2012	6.6	4/25/2012	5.00 U
10/16/2015	61.6	10/10/2012	7.4	10/10/2012	5.00 U
3/17/2016	16.1	4/16/2013	7.6	4/17/2013	5.00 U
9/29/2016	22.1	10/29/2013	7.89/7.89	10/30/2013	5.00 U
3/8/2017	16.6	4/14/2014	7.5	4/14/2014	5.00 U
10/4/2017	23.4	10/8/2014	7.2	10/9/2014	5.00 U
3/12/2018	20.9	4/16/2015	7.55/7.61	4/17/2015	5.00 U
10/9/2018	5.00 U	10/14/2015	11.8	10/16/2015	7.5
3/25/2019	6.87/6.28	3/16/2016	8.11/7.97	3/17/2016	5.00 U/5.00 U
10/3/2019	5.00 U/5.00 U	9/27/2016	8.79/8.2	9/29/2016	5.00 U
3/17/2020	5.00 U/5.00 U	3/7/2017	8.26/8.26	3/8/2017	5.00 U
10/4/2020	5.00 U	10/4/2017	6.9	10/4/2017	5.00 U
3/30/2021	6.65	3/12/2018	8.8	3/12/2018	5.00 U
10/5/2021	11.0/11.7	10/9/2018	8.95/8.91	10/9/2018	5.00 U
4/4/2022	29.2/30.2	3/25/2019	8.8	3/25/2019	5.00 U
10/3/2022	49.4/43.6	10/3/2019	8.5	10/3/2019	5.00 U
3/27/2023	71.9	3/17/2020	8.8	3/17/2020	5.00 U
10/3/2023	117.0	10/4/2020	7.7	10/4/2020	5.00 U/5.00 U
4/2/2024	Outlier	3/30/2021	10.4/11.4	3/30/2021	5.00 U
10/8/2024	Outlier	10/5/2021	8.63	10/5/2021	5.00 U
		4/4/2022	9.34	4/4/2022	5.00 U
		10/3/2022	8.68	10/3/2022	5.00 U
		3/29/2023	9.69/9.7	3/29/2023	5.00 U
		10/4/2023	8.5	10/4/2023	5.00 U
		4/2/2024	9.32/8.66	4/3/2024	5.00 U
		10/9/2024	9.78	10/8/2024	5.00 U

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TOX

Regional Test

Sum of ND	79
Total %ND	83%
Total N	95
Total S	103
Pooled sigma	106.1225706
Z	0.961152744
Prob	0.336475373
M-K result	No trend identified

Per-Well Calcs

N	29	31	35
Number ND	22	27	30
%ND	76%	87%	86%
M-K S	47	-10	66
M-K sigma	53.31	58.84	70.42
M-K sigma^2	2842	3462	4958

Input Data

	MW-05	MW-14	MW-16
7/1/1995	-	7/1/1995	-
8/1/1995	-	8/1/1995	-
11/1/1995	0.0100 U	11/1/1995	0.0100 U
2/1/1996	-	2/1/1996	-
5/1/1996	-	5/1/1996	-
11/1/1996	0.0100 U	11/1/1996	0.0100 U
4/1/1997	-	4/1/1997	-
11/1/1997	0.0100 U	11/1/1997	0.0100 U
5/1/1998	-	5/1/1998	-
11/1/1998	0.0100 U	11/1/1998	0.0100 U
5/1/1999	-	5/1/1999	-
11/1/1999	0.0100 U	11/1/1999	0.0100 U
5/1/2000	-	5/1/2000	-
12/1/2000	0.0100 U	12/1/2000	0.0100 U
6/1/2001	-	6/1/2001	-
11/1/2001	0.0100 U	11/1/2001	0.0100 U
5/2/2002	-	5/2/2002	-
11/2/2002	0.0100 U	11/2/2002	0.0100 U
5/3/2003	-	5/3/2003	-
5/1/2004	-	11/3/2003	0.0100 U
5/5/2005	-	5/1/2004	-
5/6/2006	-	12/1/2004	0.0100 U
4/7/2007	-	5/5/2005	-
10/7/2007	0.0100 U	11/5/2005	0.0100 U
4/1/2008	-	5/6/2006	-
10/1/2008	0.0100 U	10/6/2006	0.0100 U
10/29/2009	0.0232	4/7/2007	-
3/30/2010	0.0100 U	10/7/2007	0.0100 U
4/22/2010	0.0138	4/1/2008	-
10/16/2010	0.0230	10/1/2008	0.0100 U
4/28/2011	0.0114	10/29/2009	0.0125
10/18/2011	0.0100 U	3/25/2010	0.0424
4/25/2012	0.0144	4/22/2010	0.0100 U
4/16/2013	0.0300 U	10/16/2010	0.0100 U
4/14/2014	0.0300 U	4/28/2011	0.0100 U
10/9/2014	-	10/19/2011	0.0100 U
4/17/2015	0.0300 U	4/25/2012	0.0106
10/16/2015	-	10/10/2012	0.0100 U
3/17/2016	0.0300 U	4/16/2013	0.0300 U
9/29/2016	-	10/29/2013	0.0300 U
3/8/2017	0.200 U	4/14/2014	0.0300 U
10/4/2017	-	10/8/2014	-
3/12/2018	0.0300 U	4/16/2015	0.0300 U
10/9/2018	-	10/14/2015	-
3/25/2019	0.0300 U/0.0300 U	3/16/2016	0.0300 U/0.0300 U
10/3/2019	-	9/27/2016	-
3/17/2020	0.0400 U/0.0400 U	3/7/2017	0.0200 U/0.0200 U
10/4/2020	-	10/4/2017	-
3/30/2021	0.0400 U	3/12/2018	0.0300 U
10/5/2021	-	10/9/2018	-
4/4/2022	0.0400 U/0.0461	3/25/2019	0.0300 U
10/3/2022	-	10/3/2019	-
3/27/2023	0.0400 U	3/17/2020	0.0400 U
10/3/2023	-	10/4/2020	-
4/2/2024	0.126	3/30/2021	0.0400 U
10/8/2024	-	10/5/2021	-
		4/4/2022	0.0484
		10/3/2022	-
		3/29/2023	0.0400 U
		10/4/2023	-
		4/2/2024	0.0982
		10/9/2024	-

**Regional-Kendall Test for Upgradient Groundwater -- Trimmed Data Sets
(Wells MW-5, MW-14, MW-16)
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pH

Regional Test

Sum of ND	0
Total %ND	0%
Total N	99
Total S	-207
Pooled sigma	112.954268
Z	-1.823746934
Prob	0.06819034
M-K result	No trend identified

Per-Well Calcs

N	29	35	35
Number ND	0	0	0
%ND	0%	0%	0%
M-K S	-20	-94	-93
M-K sigma	53.31	70.42	70.42
M-K sigma^2	2842	4958	4958

Input Data

	MW-05	MW-14	MW-16
3/30/2010	7.18	10/7/2007	7.72
4/22/2010	6.96	4/1/2008	7.01
10/16/2010	6.87	10/1/2008	7.13
4/28/2011	7.03	10/29/2009	7.08
10/18/2011	7.04	3/25/2010	6.95
4/25/2012	7.11	4/22/2010	6.87
4/16/2013	6.61	10/16/2010	7.02
4/14/2014	7.51	4/28/2011	6.93
10/9/2014	7.20	10/19/2011	6.92
4/17/2015	6.96	4/25/2012	7.00
10/16/2015	7.29	10/10/2012	6.74
3/17/2016	6.60	4/16/2013	6.79
9/29/2016	6.98	10/29/2013	6.86
3/8/2017	7.00	4/14/2014	6.91
10/4/2017	6.63	10/8/2014	7.05
3/12/2018	6.70	4/16/2015	6.50
10/9/2018	7.20	10/14/2015	7.07
3/25/2019	7.42	3/16/2016	6.29
10/3/2019	6.89	9/27/2016	6.84
3/17/2020	7.33	3/7/2017	6.80
10/4/2020	6.93	10/4/2017	6.65
3/30/2021	7.28	3/12/2018	6.59
10/5/2021	6.97	10/9/2018	6.98
4/4/2022	9.27	3/25/2019	7.21
10/3/2022	7.53	10/3/2019	6.68
3/27/2023	7.02	3/17/2020	6.99
10/3/2023	6.42	10/4/2020	6.85
4/2/2024	6.15	3/30/2021	7.16
10/8/2024	6.17	10/5/2021	6.85
		4/4/2022	8.19
		10/3/2022	7.62
		3/29/2023	8.01
		10/4/2023	6.34
		4/2/2024	6.47
		10/9/2024	6.71
		10/7/2007	7.45
		4/1/2008	8.22
		10/1/2008	7.77
		10/29/2009	8.33
		3/30/2010	7.85
		4/22/2010	7.49
		10/16/2010	7.70
		4/28/2011	7.70
		10/18/2011	8.04
		4/25/2012	7.48
		10/10/2012	7.33
		4/17/2013	6.95
		10/30/2013	7.44
		4/14/2014	7.51
		10/9/2014	8.02
		4/17/2015	6.96
		10/16/2015	7.74
		3/17/2016	8.70
		9/29/2016	7.43
		3/8/2017	7.31
		10/4/2017	7.23
		3/12/2018	7.16
		10/9/2018	7.61
		3/25/2019	8.04
		10/3/2019	7.40
		3/17/2020	7.60
		10/4/2020	7.29
		3/30/2021	7.56
		10/5/2021	7.79
		4/4/2022	8.68
		10/3/2022	8.49
		3/29/2023	8.56
		10/4/2023	6.89
		4/3/2024	6.35
		10/8/2024	6.63

Regional-Kendall Test for Upgradient Groundwater -- Trimmed Data Sets
 (Wells MW-5, MW-14, MW-16)
 2024 Annual Water Quality Report
 Viking Pump Foundry Sand Landfill
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 Cedar Falls, Iowa

Iron

Regional Test

Sum of ND	39
Total %ND	43%
Total N	90
Total S	127
Pooled sigma	97.18710477
Z	1.296468295
Prob	0.194814196
M-K result	No trend identified

Per-Well Calcs

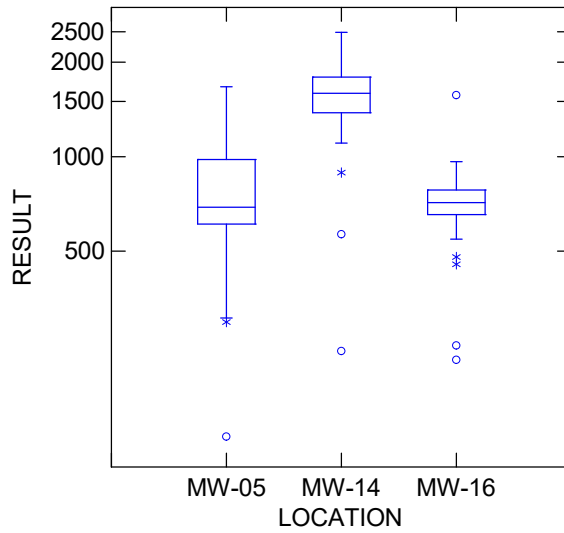
N	29	31	30
Number ND	7	26	6
%ND	24%	84%	20%
M-K S	-34	32	129
M-K sigma	53.31	58.84	56.05
M-K sigma^2	2842	3462	3142

Input Data

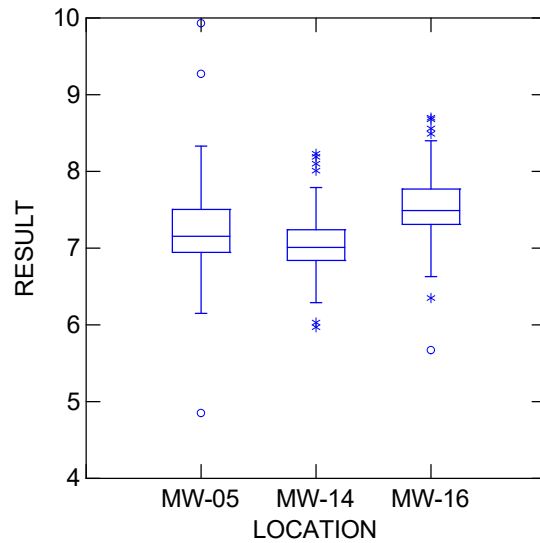
	MW-05	MW-14	MW-16
3/30/2010	0.99		0.100 U
4/22/2010	1.03		0.12
10/16/2010	1.15		0.51
4/28/2011	0.28		0.18
10/18/2011	1.61	0.100 U	1.77
4/25/2012	0.80	0.100 U	1.10
4/16/2013	0.100 U	0.100 U	0.11
4/14/2014	0.100 U	0.100 U	0.13
10/9/2014	2.63	0.100 U	0.100 U
4/17/2015	0.39	0.100 U	0.100 U
10/16/2015	4.89	0.100 U	8.24
3/17/2016	0.100 U	0.100 U	0.100 U/0.101
9/29/2016	0.91	0.100 U/0.100 U	6.19
3/8/2017	0.68	0.100 U	0.500 U
10/4/2017	1.62	0.100 U	0.69
3/12/2018	1.54	0.100 U/0.3	7.15
10/9/2018	1.09	0.100 U	0.87
3/25/2019	0.59/0.567	0.100 U/0.100 U	0.87
10/3/2019	0.500 U/0.500 U	0.100 U/0.100 U	1.58
3/17/2020	0.54/0.571	0.500 U/0.500 U	Outlier
10/4/2020	1.34	0.500 U	0.679/0.598
3/30/2021	0.500 U	1.54	0.861
10/5/2021	2.38/3.08	0.702/0.500 U	2.23
4/4/2022	0.524/0.689	1.01	0.852
10/3/2022	2.10/0.446	0.500 U	23.6
3/27/2023	0.500 U	0.500 U	1.42
10/3/2023	0.500 U	0.500 U	2.83
4/2/2024	0.154	0.500 U/0.500 U	1.02
10/8/2024	1.54	0.100 U/0.100 U	0.262
		10/9/2024	0.0100 U

Appendix F.7 (Box-Whisker Plots Comparing Upgradient Wells)

Conductance ($\mu\text{S}/\text{cm}$) in Upgradient Groundwater (MW-5, MW-14, MW-16)

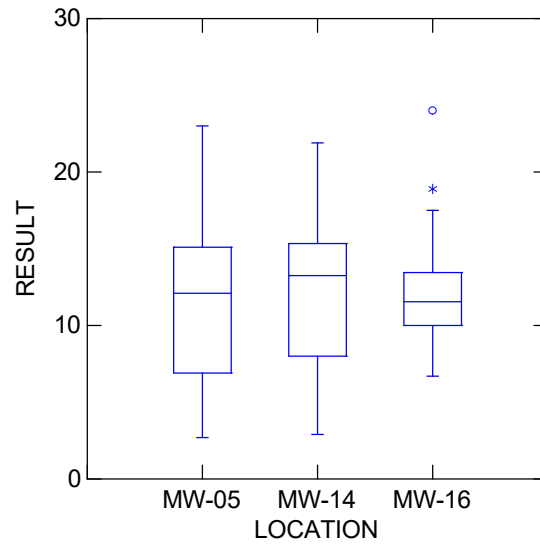


pH, field (s.u.) in Upgradient Groundwater (MW-5, MW-14, MW-16)

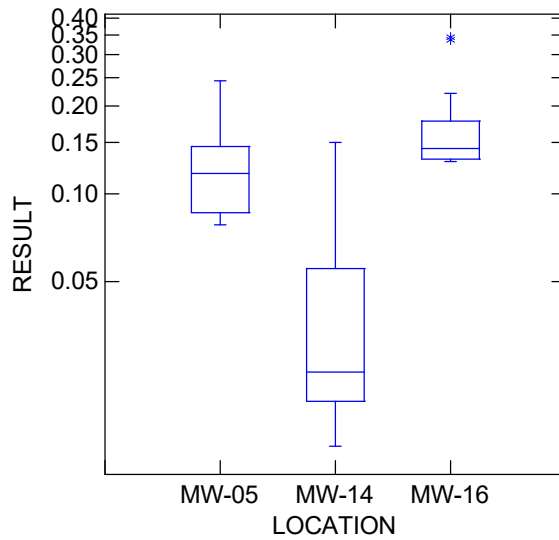


Appendix F.7 (Box-Whisker Plots Comparing Upgradient Wells)

Temperature (°C) in Upgradient Groundwater (MW-5, MW-14, MW-16)

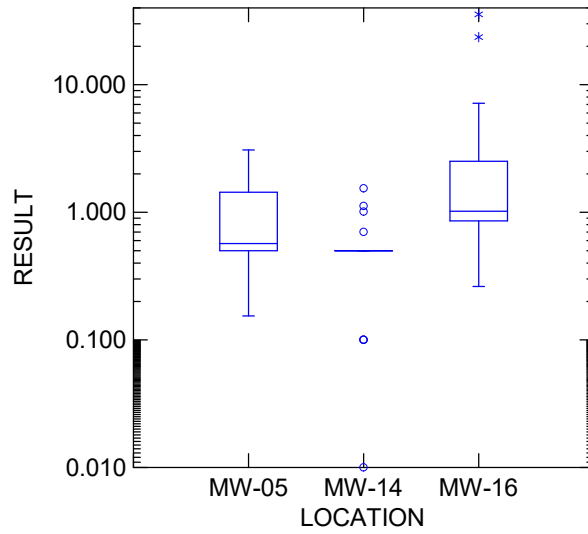


Barium, total or dissolved (mg/L) in Upgradient Groundwater (MW-5, MW-14, MW-16)

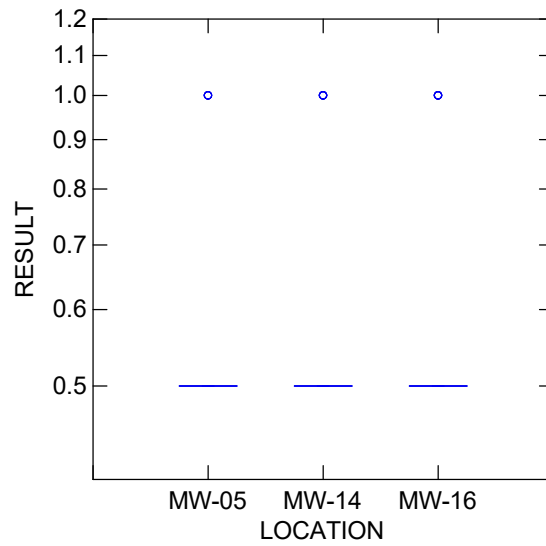


Appendix F.7 (Box-Whisker Plots Comparing Upgradient Wells)

Iron, total or dissolved (mg/L) in Upgradient Groundwater (MW-5, MW-14, MW-16)



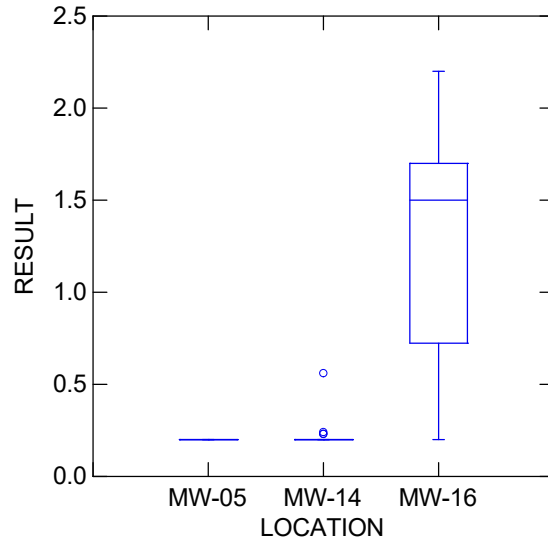
Benzene ($\mu\text{g/L}$) in Upgradient Groundwater (MW-5, MW-14, MW-16)



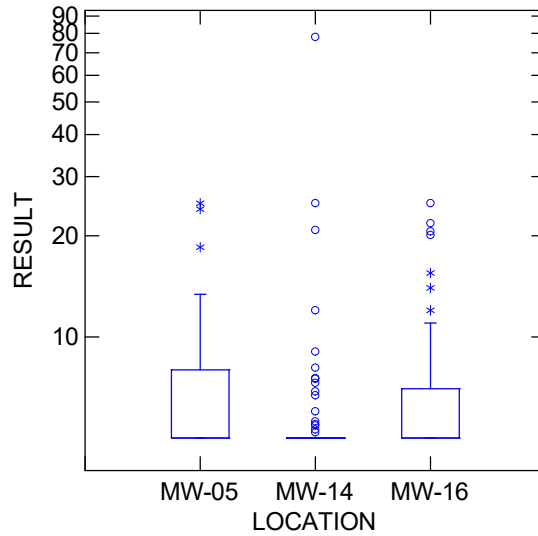
Note: All results are non-detects

Appendix F.7 (Box-Whisker Plots Comparing Upgradient Wells)

Ammonia as N (mg/L) in Upgradient Groundwater (MW-5, MW-14, MW-16)

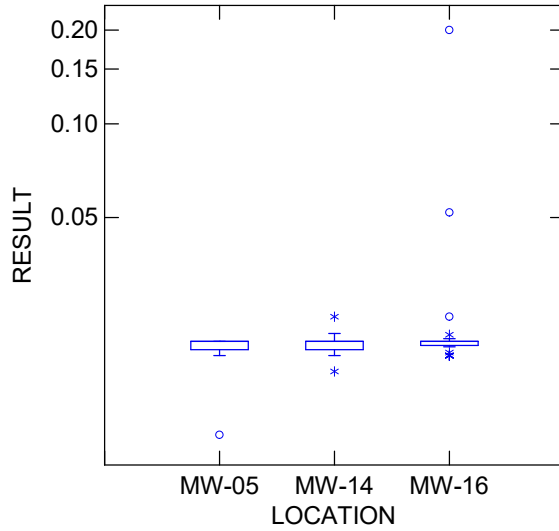


Chemical Oxygen Demand (COD) (mg/L); Upgradient (MW-5, MW-14, MW-16)



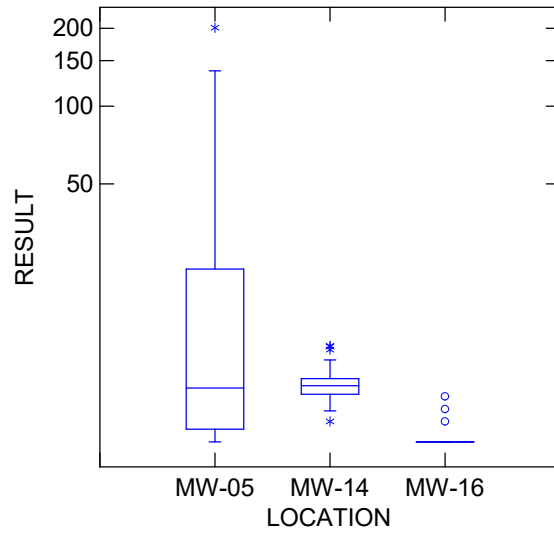
Appendix F.7 (Box-Whisker Plots Comparing Upgradient Wells)

Phenolics (Total) (mg/L) in Upgradient Groundwater (MW-5, MW-14, MW-16)



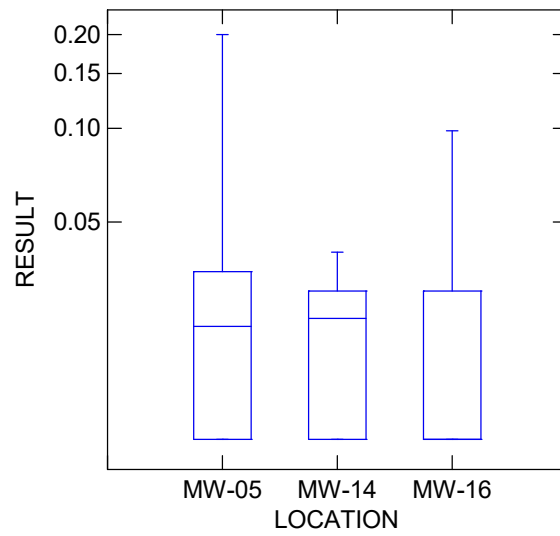
Note: Results are 95 percent non-detects

Chloride (mg/L) in Upgradient Groundwater (MW-5, MW-14, MW-16)



Appendix F.7 (Box-Whisker Plots Comparing Upgradient Wells)

Total Organic Halides (TOX) (mg/L) in Upgradient Groundwater (MW-5, MW-14, MW-16)



Note: Results are 83 percent non-detects

Appendix F.8
Interwell Control Limit Calculations -- Statistical Prediction Limits
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa

<u>DATA SUMMARY</u>	<u>Conductance</u>		<u>pH</u>		<u>Temperature</u>
Observations (n)	179	51	179	90	177
Earliest Sample	1995-07-01	2016-09-27	1995-07-01	2010-03-25	1995-07-01
Latest Sample	2024-10-09	2024-10-09	2024-10-09	2024-10-09	2024-10-09
Detects	179	51	179	90	177
Non-Detects	0	0	0	0	0
Percent ND	0%	0%	0%	0%	0%
Maximum	2490	2490	9.93	8.7	24
Minimum (for pH only)			4.85	6.15	
Distribution		Gamma		Normal	Normal
UPL METHOD:		Log UPL		Normal PLs	Normal UPL

<u>UPL CALCULATION</u>				
Mean	10.368	7.164	11.922	
Standard Deviation	1.927	0.539	4.104	
Site-Wide False Positive Rate	0.1	0.1	0.1	
Compliance wells (w)	10	10	10	
Constituents (c)	10	10	10	
Sampling Frequency	2x/year	2x/year	2x/year	
Resampling Strategy	1-of-2	1-of-2	1-of-2	
Factor K (USEPA Table 19-1)	2.14	2.07	2.035	
Upper Prediction Limit (UPL)	3044	8.28	20.3	
Lower Prediction Limit (LPL)		6.05		

<u>UPGRADIENT DATA</u>							
Well	Date	Original	Trimmed	Gamma-transform	Original	Trimmed	Original
MW-05	7/1/1995	640.0	Trimmed	Trimmed	6.70	Trimmed	23.00
MW-05	8/1/1995	670.0	Trimmed	Trimmed	7.22	Trimmed	20.00
MW-05	11/1/1995	1110.0	Trimmed	Trimmed	6.26	Trimmed	10.00
MW-05	2/1/1996	492.0	Trimmed	Trimmed	7.56	Trimmed	6.00
MW-05	5/1/1996	580.0	Trimmed	Trimmed	7.44	Trimmed	11.10
MW-05	11/1/1996	608.0	Trimmed	Trimmed	7.48	Trimmed	13.00
MW-05	4/1/1997	645.0	Trimmed	Trimmed	8.33	Trimmed	15.00
MW-05	11/1/1997	675.0	Trimmed	Trimmed	7.65	Trimmed	6.90
MW-05	5/1/1998	536.0	Trimmed	Trimmed	6.21	Trimmed	11.10
MW-05	11/1/1998	617.0	Trimmed	Trimmed	6.96	Trimmed	11.20
MW-05	5/1/1999	710.0	Trimmed	Trimmed	9.93	Trimmed	9.40
MW-05	11/1/1999	690.0	Trimmed	Trimmed	7.02	Trimmed	14.40
MW-05	5/1/2000	644.0	Trimmed	Trimmed	7.13	Trimmed	11.60
MW-05	12/1/2000	710.0	Trimmed	Trimmed	4.85	Trimmed	5.00
MW-05	6/1/2001	622.0	Trimmed	Trimmed	8.09	Trimmed	14.20
MW-05	11/1/2001	683.4	Trimmed	Trimmed	7.24	Trimmed	10.10
MW-05	5/2/2002	636.0	Trimmed	Trimmed	7.50	Trimmed	13.90
MW-05	11/2/2002	689.0	Trimmed	Trimmed	7.49	Trimmed	10.20
MW-05	5/3/2003	502.0	Trimmed	Trimmed	7.76	Trimmed	18.60
MW-05	5/1/2004	306.0	Trimmed	Trimmed	7.66	Trimmed	18.90
MW-05	5/5/2005	552.0	Trimmed	Trimmed	7.98	Trimmed	12.50
MW-05	5/6/2006	989.0	Trimmed	Trimmed	7.42	Trimmed	13.10
MW-05	4/7/2007	532.0	Trimmed	Trimmed	8.32	Trimmed	12.70
MW-05	10/7/2007	645.0	Trimmed	Trimmed	7.75	Trimmed	15.50
MW-05	4/1/2008	535.0	Trimmed	Trimmed	7.95	Trimmed	12.40
MW-05	10/1/2008	993.0	Trimmed	Trimmed	7.08	Trimmed	12.10
MW-05	10/29/2009	984.0	Trimmed	Trimmed	7.06	Trimmed	10.20
MW-05	3/30/2010	797.0	Trimmed	Trimmed	7.18	7.18	6.00
MW-05	4/22/2010	724.0	Trimmed	Trimmed	6.96	6.96	9.70
MW-05	10/16/2010	984.0	Trimmed	Trimmed	6.87	6.87	12.90
MW-05	4/28/2011	678.0	Trimmed	Trimmed	7.03	7.03	7.50
MW-05	10/18/2011	816.0	Trimmed	Trimmed	7.04	7.04	13.80
MW-05	4/25/2012	813.0	Trimmed	Trimmed	7.11	7.11	11.80
MW-05	4/16/2013	539.0	Trimmed	Trimmed	6.61	6.61	6.90
MW-05	4/14/2014	802.0	Trimmed	Trimmed	7.51	7.51	6.10
MW-05	10/9/2014	1340.0	Trimmed	Trimmed	7.20	7.20	13.76
MW-05	4/17/2015	297.0	Trimmed	Trimmed	6.96	6.96	-
MW-05	10/16/2015	612.0	Trimmed	Trimmed	7.29	7.29	14.10
MW-05	3/17/2016	339.0	Trimmed	Trimmed	6.60	6.60	5.76
MW-05	9/29/2016	830.0	830.0	9.397796375	6.98	6.98	18.00
MW-05	3/8/2017	1025.0	1025.0	10.08264838	7.00	7.00	2.70
MW-05	10/4/2017	1096.0	1096.0	10.31027347	6.63	6.63	15.87
MW-05	3/12/2018	1013.0	1013.0	10.0431469	6.70	6.70	4.88
MW-05	10/9/2018	484.0	484.0	7.851424411	7.20	7.20	15.80
MW-05	3/25/2019	703.8	703.8	8.895077866	7.42	7.42	4.00
MW-05	10/3/2019	690.0	690.0	8.836555922	6.89	6.89	16.75
MW-05	3/17/2020	872.2	872.2	9.554442712	7.33	7.33	5.00
MW-05	10/4/2020	948.1	948.1	9.8239177	6.93	6.93	15.30
MW-05	3/30/2021	977.0	977.0	9.922737928	7.28	7.28	6.80
MW-05	10/5/2021	935.8	935.8	9.781249724	6.97	6.97	16.40
MW-05	4/4/2022	1010.0	1010.0	10.03322284	9.27	Outlier	4.23
MW-05	10/3/2022	981.7	981.7	9.93862407	7.53	7.53	15.20
MW-05	3/27/2023	989.4	989.4	9.964541082	7.02	7.02	5.50
MW-05	10/3/2023	1090.0	1090.0	10.29142467	6.42	6.42	18.72
MW-05	4/2/2024	128	128	5.0396842	6.15	6.15	5.84
MW-05	10/8/2024	1670	1670	11.86420996	6.17	6.17	22.24
MW-14	7/1/1995	1274.0	Trimmed	Trimmed	7.05	Trimmed	18.00
MW-14	8/1/1995	1340.0	Trimmed	Trimmed	7.05	Trimmed	19.00
MW-14	11/1/1995	1460.0	Trimmed	Trimmed	6.03	Trimmed	8.00
MW-14	2/1/1996	1271.0	Trimmed	Trimmed	7.60	Trimmed	7.00
MW-14	5/1/1996	1530.0	Trimmed	Trimmed	6.97	Trimmed	9.40

**Appendix F.8
Interwell Control Limit Calculations -- Statistical Prediction Limits
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa**

<u>DATA SUMMARY</u>	<u>Conductance</u>		<u>pH</u>		<u>Temperature</u>
Observations (n)	179	51	179	90	177
Earliest Sample	1995-07-01	2016-09-27	1995-07-01	2010-03-25	1995-07-01
Latest Sample	2024-10-09	2024-10-09	2024-10-09	2024-10-09	2024-10-09
Detects	179	51	179	90	177
Non-Detects	0	0	0	0	0
Percent ND	0%	0%	0%	0%	0%
Maximum	2490	2490	9.93	8.7	24
Minimum (for pH only)			4.85	6.15	
Distribution		Gamma		Normal	Normal
UPL METHOD:		Log UPL		Normal PLs	Normal UPL

<u>UPL CALCULATION</u>				
Mean		10.368	7.164	11.922
Standard Deviation		1.927	0.539	4.104
Site-Wide False Positive Rate		0.1	0.1	0.1
Compliance wells (w)		10	10	10
Constituents (c)		10	10	10
Sampling Frequency		2x/year	2x/year	2x/year
Resampling Strategy		1-of-2	1-of-2	1-of-2
Factor K (USEPA Table 19-1)		2.14	2.07	2.035
Upper Prediction Limit (UPL)		3044	8.28	20.3
Lower Prediction Limit (LPL)			6.05	

<u>UPGRADIENT DATA</u>		<u>Original</u>	<u>Trimmed</u>	<u>Gamma-transform</u>	<u>Original</u>	<u>Trimmed</u>	<u>Original</u>
MW-14	11/1/1996	1270.0	Trimmed	Trimmed	7.30	Trimmed	13.00
MW-14	4/1/1997	1530.0	Trimmed	Trimmed	8.23	Trimmed	15.00
MW-14	11/1/1997	1576.0	Trimmed	Trimmed	7.20	Trimmed	7.30
MW-14	5/1/1998	1520.0	Trimmed	Trimmed	5.97	Trimmed	12.20
MW-14	11/1/1998	1380.0	Trimmed	Trimmed	6.82	Trimmed	11.70
MW-14	5/1/1999	1630.0	Trimmed	Trimmed	7.33	Trimmed	9.40
MW-14	11/1/1999	1585.0	Trimmed	Trimmed	6.82	Trimmed	15.00
MW-14	5/1/2000	1604.0	Trimmed	Trimmed	7.12	Trimmed	10.60
MW-14	12/1/2000	1620.0	Trimmed	Trimmed	7.60	Trimmed	8.30
MW-14	6/1/2001	1600.0	Trimmed	Trimmed	8.10	Trimmed	21.90
MW-14	11/1/2001	1627.0	Trimmed	Trimmed	7.01	Trimmed	11.60
MW-14	5/2/2002	1657.0	Trimmed	Trimmed	7.24	Trimmed	12.50
MW-14	11/2/2002	1620.0	Trimmed	Trimmed	7.44	Trimmed	11.30
MW-14	5/3/2003	1602.0	Trimmed	Trimmed	7.64	Trimmed	16.60
MW-14	11/3/2003	1658.0	Trimmed	Trimmed	7.38	Trimmed	11.40
MW-14	5/1/2004	1105.0	Trimmed	Trimmed	7.01	Trimmed	18.30
MW-14	12/1/2004	1285.0	Trimmed	Trimmed	7.01	Trimmed	14.70
MW-14	5/5/2005	1144.0	Trimmed	Trimmed	7.05	Trimmed	13.80
MW-14	11/5/2005	1290.0	Trimmed	Trimmed	7.11	Trimmed	13.80
MW-14	5/6/2006	1432.0	Trimmed	Trimmed	7.33	Trimmed	14.50
MW-14	10/6/2006	1502.0	Trimmed	Trimmed	7.79	Trimmed	15.60
MW-14	4/7/2007	1412.0	Trimmed	Trimmed	6.95	Trimmed	14.10
MW-14	10/7/2007	1489.0	Trimmed	Trimmed	7.72	Trimmed	14.50
MW-14	4/1/2008	1392.0	Trimmed	Trimmed	7.01	Trimmed	13.50
MW-14	10/1/2008	1222.0	Trimmed	Trimmed	7.13	Trimmed	14.00
MW-14	10/29/2009	1620.0	Trimmed	Trimmed	7.08	Trimmed	10.80
MW-14	3/25/2010	1623.0	Trimmed	Trimmed	6.95	6.95	4.10
MW-14	4/22/2010	1318.0	Trimmed	Trimmed	6.87	6.87	9.90
MW-14	10/16/2010	1699.0	Trimmed	Trimmed	7.02	7.02	13.80
MW-14	4/28/2011	1573.0	Trimmed	Trimmed	6.93	6.93	7.90
MW-14	10/19/2011	1398.0	Trimmed	Trimmed	6.92	6.92	14.20
MW-14	4/25/2012	1711.0	Trimmed	Trimmed	7.00	7.00	11.00
MW-14	10/10/2012	1716.0	Trimmed	Trimmed	6.74	6.74	15.50
MW-14	4/16/2013	1255.0	Trimmed	Trimmed	6.79	6.79	6.60
MW-14	10/29/2013	1986.0	Trimmed	Trimmed	6.86	6.86	13.50
MW-14	4/14/2014	1793.0	Trimmed	Trimmed	6.91	6.91	6.00
MW-14	10/8/2014	2120.0	Trimmed	Trimmed	7.05	7.05	15.66
MW-14	4/16/2015	566.0	Trimmed	Trimmed	6.50	6.50	2.90
MW-14	10/14/2015	890.0	Trimmed	Trimmed	7.07	7.07	18.20
MW-14	3/16/2016	1240.0	Trimmed	Trimmed	6.29	6.29	7.38
MW-14	9/27/2016	1680.0	1680.0	11.88784391	6.84	6.84	16.70
MW-14	3/7/2017	2261.0	2261.0	13.12502645	6.80	6.80	4.10
MW-14	10/4/2017	2090.0	2090.0	12.78543265	6.65	6.65	15.34
MW-14	3/12/2018	2091.0	2091.0	12.78747147	6.59	6.59	6.57
MW-14	10/9/2018	1548.0	1548.0	11.56796552	6.98	6.98	15.30
MW-14	3/25/2019	1492.0	1492.0	11.42675566	7.21	7.21	6.10
MW-14	10/3/2019	2470.0	2470.0	13.51758112	6.68	6.68	14.75
MW-14	3/17/2020	2250.0	2250.0	13.10370697	6.99	6.99	7.00
MW-14	10/4/2020	2140.0	2140.0	12.88658743	6.85	6.85	15.40
MW-14	3/30/2021	2170.0	2170.0	12.9465259	7.16	7.16	6.70
MW-14	10/5/2021	2310.0	2310.0	13.21916408	6.85	6.85	16.60
MW-14	4/4/2022	2490.0	2490.0	13.55396778	8.19	8.19	6.02
MW-14	10/3/2022	2320.0	2320.0	13.2382119	7.62	7.62	15.40
MW-14	3/29/2023	1953.0	1953.0	12.49973333	8.01	8.01	8.01
MW-14	10/4/2023	2130.0	2130.0	12.86648351	6.34	6.34	15.79
MW-14	4/2/2024	240	240	6.214465012	6.47	6.47	7.34
MW-14	10/9/2024	2210	2210	13.02559062	6.71	6.71	15.76
MW-16	7/1/1995	670.0	Trimmed	Trimmed	7.58	Trimmed	24.00
MW-16	8/1/1995	660.0	Trimmed	Trimmed	7.41	Trimmed	17.00
MW-16	11/1/1995	820.0	Trimmed	Trimmed	6.93	Trimmed	9.00
MW-16	2/1/1996	940.0	Trimmed	Trimmed	7.14	Trimmed	10.00

Appendix F.8
Interwell Control Limit Calculations -- Statistical Prediction Limits
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa

<u>DATA SUMMARY</u>	<u>Conductance</u>		<u>pH</u>		<u>Temperature</u>
	Observations (n)	179	51	179	90
Earliest Sample	1995-07-01	2016-09-27	1995-07-01	2010-03-25	1995-07-01
Latest Sample	2024-10-09	2024-10-09	2024-10-09	2024-10-09	2024-10-09
Detects	179	51	179	90	177
Non-Detects	0	0	0	0	0
Percent ND	0%	0%	0%	0%	0%
Maximum	2490	2490	9.93	8.7	24
Minimum (for pH only)			4.85	6.15	
Distribution		Gamma		Normal	Normal
UPL METHOD:		Log UPL		Normal PLs	Normal UPL

<u>UPL CALCULATION</u>				
Mean		10.368	7.164	11.922
Standard Deviation		1.927	0.539	4.104
Site-Wide False Positive Rate		0.1	0.1	0.1
Compliance wells (w)		10	10	10
Constituents (c)		10	10	10
Sampling Frequency		2x/year	2x/year	2x/year
Resampling Strategy		1-of-2	1-of-2	1-of-2
Factor K (USEPA Table 19-1)		2.14	2.07	2.035
Upper Prediction Limit (UPL)		3044	8.28	20.3
Lower Prediction Limit (LPL)			6.05	

<u>UPGRADIENT DATA</u>							
Well	Date	Original	Trimmed	Gamma-transform	Original	Trimmed	Original
MW-16	5/1/1996	730.0	Trimmed	Trimmed	7.44	Trimmed	11.10
MW-16	11/1/1996	654.0	Trimmed	Trimmed	7.54	Trimmed	13.00
MW-16	4/1/1997	698.0	Trimmed	Trimmed	8.24	Trimmed	13.90
MW-16	11/1/1997	747.0	Trimmed	Trimmed	7.64	Trimmed	7.00
MW-16	5/1/1998	698.0	Trimmed	Trimmed	5.67	Trimmed	11.10
MW-16	11/1/1998	613.0	Trimmed	Trimmed	6.78	Trimmed	9.60
MW-16	5/1/1999	750.0	Trimmed	Trimmed	7.76	Trimmed	10.00
MW-16	11/1/1999	733.0	Trimmed	Trimmed	7.10	Trimmed	15.60
MW-16	5/1/2000	682.0	Trimmed	Trimmed	7.62	Trimmed	11.50
MW-16	12/1/2000	1570.0	Trimmed	Trimmed	7.08	Trimmed	6.70
MW-16	6/1/2001	700.0	Trimmed	Trimmed	8.27	Trimmed	17.30
MW-16	11/1/2001	760.0	Trimmed	Trimmed	7.42	Trimmed	8.50
MW-16	5/2/2002	720.0	Trimmed	Trimmed	7.42	Trimmed	15.50
MW-16	11/2/2002	712.0	Trimmed	Trimmed	7.40	Trimmed	10.10
MW-16	5/3/2003	707.0	Trimmed	Trimmed	7.03	Trimmed	17.50
MW-16	11/3/2003	745.0	Trimmed	Trimmed	7.56	Trimmed	10.50
MW-16	5/1/2004	479.0	Trimmed	Trimmed	7.36	Trimmed	18.90
MW-16	12/1/2004	570.0	Trimmed	Trimmed	7.59	Trimmed	13.50
MW-16	5/5/2005	577.0	Trimmed	Trimmed	7.47	Trimmed	13.20
MW-16	11/5/2005	565.0	Trimmed	Trimmed	7.48	Trimmed	13.40
MW-16	5/6/2006	665.0	Trimmed	Trimmed	7.86	Trimmed	13.70
MW-16	10/6/2006	-	Trimmed	Trimmed	-	Trimmed	-
MW-16	4/7/2007	662.0	Trimmed	Trimmed	8.40	Trimmed	14.10
MW-16	10/7/2007	622.0	Trimmed	Trimmed	7.45	Trimmed	13.90
MW-16	4/1/2008	648.0	Trimmed	Trimmed	8.22	Trimmed	13.50
MW-16	10/1/2008	743.0	Trimmed	Trimmed	7.77	Trimmed	12.50
MW-16	10/29/2009	454.0	Trimmed	Trimmed	8.33	Trimmed	9.30
MW-16	3/30/2010	660.0	Trimmed	Trimmed	7.85	7.85	9.30
MW-16	4/22/2010	642.0	Trimmed	Trimmed	7.49	7.49	11.70
MW-16	10/16/2010	805.0	Trimmed	Trimmed	7.70	7.70	9.50
MW-16	4/28/2011	693.0	Trimmed	Trimmed	7.70	7.70	9.30
MW-16	10/18/2011	561.0	Trimmed	Trimmed	8.04	8.04	11.30
MW-16	4/25/2012	736.0	Trimmed	Trimmed	7.48	7.48	14.60
MW-16	10/10/2012	771.0	Trimmed	Trimmed	7.33	7.33	11.80
MW-16	4/17/2013	679.0	Trimmed	Trimmed	6.95	6.95	11.40
MW-16	10/30/2013	826.0	Trimmed	Trimmed	7.44	7.44	11.20
MW-16	4/14/2014	728.0	Trimmed	Trimmed	7.51	7.51	11.10
MW-16	10/9/2014	864.0	Trimmed	Trimmed	8.02	8.02	13.12
MW-16	4/17/2015	225.0	Trimmed	Trimmed	6.96	6.96	-
MW-16	10/16/2015	250.0	Trimmed	Trimmed	7.74	7.74	10.10
MW-16	3/17/2016	546.0	Trimmed	Trimmed	8.70	8.70	10.19
MW-16	9/29/2016	650.0	650.0	8.662391053	7.43	7.43	12.90
MW-16	3/8/2017	872.0	872.0	9.553712362	7.31	7.31	7.20
MW-16	10/4/2017	812.0	812.0	9.329363391	7.23	7.23	12.21
MW-16	3/12/2018	796.0	796.0	9.267679846	7.16	7.16	11.03
MW-16	10/9/2018	714.0	714.0	8.937843321	7.61	7.61	11.60
MW-16	3/25/2019	626.1	626.1	8.554892723	8.04	8.04	10.40
MW-16	10/3/2019	803.0	803.0	9.294767164	7.40	7.40	11.93
MW-16	3/17/2020	808.7	808.7	9.316707931	7.60	7.60	11.10
MW-16	10/4/2020	783.1	783.1	9.217342838	7.29	7.29	12.00
MW-16	3/30/2021	964.0	964.0	9.87853049	7.56	7.56	9.90
MW-16	10/5/2021	742.7	742.7	9.056029071	7.79	7.79	12.80
MW-16	4/4/2022	811.0	811.0	9.32553203	8.68	8.68	9.03
MW-16	10/3/2022	682.7	682.7	8.805282641	8.49	8.49	12.40
MW-16	3/29/2023	722.0	722.0	8.971100718	8.56	8.56	8.56
MW-16	10/4/2023	779.0	779.0	9.201228569	6.89	6.89	13.13
MW-16	4/3/2024	833	833	9.409105407	6.35	6.35	9.73
MW-16	10/8/2024	916	916	9.711772294	6.63	6.63	14.83

**Interwell Control Limit Calculations -- Statistical Prediction Limits
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa**

<u>DATA SUMMARY</u>	<u>Barium</u>	<u>Iron</u>	<u>Benzene</u>
Observations (n)	91	177	91
Earliest Sample	2010-03-25	1995-07-01	2010-03-25
Latest Sample	2024-10-09	2024-10-09	2024-10-09
Detects	91	63	0
Non-Detects	0	114	91
Percent ND	0%	64%	100%
Maximum	0.344	35.6	0.500 U
Minimum (for pH only)			
Distribution	Gamma	Lognormal	Non-detect
UPL METHOD:	Gamma UPL	KM Log UPL	Reporting Limit

<u>UPL CALCULATION</u>	Barium	Iron	Benzene
Mean	0.454	-1.953	n/a
Standard Deviation	0.118	2.293	n/a
Site-Wide False Positive Rate	0.1	0.1	0.1
Compliance wells (w)	10	10	10
Constituents (c)	10	10	10
Sampling Frequency	2x/year	2x/year	2x/year
Resampling Strategy	1-of-2	1-of-2	1-of-2
Factor K (USEPA Table 19-1)	2.07	2.075	n/a
Upper Prediction Limit (UPL)	0.340	16.5	n/a
Lower Prediction Limit (LPL)			

<u>UPGRADIENT DATA</u>		Original	Gamma-transformed	Original	Trimmed	Ln-transformed	Original
MW-05	7/1/1995	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	8/1/1995	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	11/1/1995	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	2/1/1996	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	5/1/1996	-	-	-	Trimmed	Trimmed	-
MW-05	11/1/1996	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	4/1/1997	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	11/1/1997	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	5/1/1998	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	11/1/1998	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	5/1/1999	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	11/1/1999	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	5/1/2000	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	12/1/2000	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	6/1/2001	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	11/1/2001	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	5/2/2002	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	11/2/2002	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	5/3/2003	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	5/1/2004	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	5/5/2005	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	5/6/2006	-	-	1.51	Trimmed	Trimmed	-
MW-05	4/7/2007	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	10/7/2007	-	-	0.31	Trimmed	Trimmed	-
MW-05	4/1/2008	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	10/1/2008	-	-	1.13	Trimmed	Trimmed	-
MW-05	10/29/2009	-	-	0.100 U	Trimmed	Trimmed	-
MW-05	3/30/2010	0.1460	0.526563743	0.99	0.99	-0.010050336	1.00 U
MW-05	4/22/2010	0.1550	0.537168535	1.03	1.03	0.029558802	1.00 U
MW-05	10/16/2010	0.1690	0.552877481	1.15	1.15	0.139761942	1.00 U
MW-05	4/28/2011	0.1370	0.515513674	0.28	0.28	-1.272965676	1.00 U
MW-05	10/18/2011	0.1280	0.50396842	1.61	1.61	0.476234179	1.00 U
MW-05	4/25/2012	0.1620	0.545136178	0.80	0.80	-0.223143551	1.00 U
MW-05	4/16/2013	0.1320	0.509164337	0.100 U	0.100 U	-2.302585093	0.500 U
MW-05	4/14/2014	0.0878	0.444458796	0.100 U	0.100 U	-2.302585093	0.500 U
MW-05	10/9/2014	0.1490	0.530145919	2.63	2.63	0.966983846	0.500 U
MW-05	4/17/2015	0.0894	0.447142386	0.39	0.39	-0.94160854	0.500 U
MW-05	10/16/2015	0.1480	0.528957247	4.89	4.89	1.587192303	0.500 U
MW-05	3/17/2016	0.0858	0.44105806	0.100 U	0.100 U	-2.302585093	0.500 U
MW-05	9/29/2016	0.1340	0.511722995	0.91	0.91	-0.094310679	0.500 U
MW-05	3/8/2017	0.1200	0.493242415	0.68	0.68	-0.385662481	0.500 U
MW-05	10/4/2017	0.0967	0.45899592	1.62	1.62	0.482426149	0.500 U
MW-05	3/12/2018	0.0836	0.437255646	1.54	1.54	0.431782416	0.500 U
MW-05	10/9/2018	0.1150	0.486294413	1.09	1.09	0.086177696	0.500 U
MW-05	3/25/2019	0.0793/0.0783	0.42872164	0.59/0.567	0.59/0.567	-0.547316732	0.500 U/0.500 U
MW-05	10/3/2019	0.158/0.163	0.543448439	0.500 U/0.500 U	0.500 U/0.500 U	-0.693147181	0.500 U/0.500 U
MW-05	3/17/2020	0.11/0.111	0.479866861	0.54/0.571	0.54/0.571	-0.58788667	0.500 U/0.500 U
MW-05	10/4/2020	0.0984	0.461670048	1.34	1.34	0.292669614	0.500 U
MW-05	3/30/2021	0.124	0.498663095	0.500 U	0.500 U	-0.693147181	0.500 U
MW-05	10/5/2021	0.125/0.120	0.496644194	2.38/3.08	2.38/3.08	1.004301609	0.500 U/0.500 U
MW-05	4/4/2022	0.0828/0.0888	0.44105806	0.524/0.689	0.524/0.689	-0.500050551	0.500 U/0.500 U
MW-05	10/3/2022	0.153/0.153	0.534848124	2.10/0.446	2.10/0.446	0.24137632	0.500 U/0.500 U
MW-05	3/27/2023	0.1380	0.516764925	0.500 U	0.500 U	-0.693147181	0.500 U
MW-05	10/3/2023	0.2440	0.624879977	0.500 U	0.500 U	-0.693147181	0.500 U
MW-05	4/2/2024	0.0822	0.434801072	0.154	0.154	-1.870802677	0.500 U
MW-05	10/8/2024	0.121	0.494608744	1.54	1.54	0.431782416	0.500 U
MW-14	7/1/1995	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	8/1/1995	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	11/1/1995	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	2/1/1996	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	5/1/1996	-	-	-	Trimmed	Trimmed	-

**Interwell Control Limit Calculations -- Statistical Prediction Limits
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Viking Pump Foundry Sand Landfill
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DATA SUMMARY

	Barium	Iron	Benzene
Observations (n)	91	177	89
Earliest Sample	2010-03-25	1995-07-01	2010-03-25
Latest Sample	2024-10-09	2024-10-09	2024-10-09
Detects	91	63	50
Non-Detects	0	114	39
Percent ND	0%	64%	44%
Maximum	0.344	35.6	8.24
Minimum (for pH only)			0.500 U
Distribution	Gamma		Lognormal
UPL METHOD:	Gamma UPL		KM Log UPL Non-detect Reporting Limit

UPL CALCULATION

Mean	0.454	-1.953	n/a
Standard Deviation	0.118	2.293	n/a
Site-Wide False Positive Rate	0.1	0.1	0.1
Compliance wells (w)	10	10	10
Constituents (c)	10	10	10
Sampling Frequency	2x/year	2x/year	2x/year
Resampling Strategy	1-of-2	1-of-2	1-of-2
Factor K (USEPA Table 19-1)	2.07	2.075	n/a
Upper Prediction Limit (UPL)	0.340	16.5	n/a
Lower Prediction Limit (LPL)			

UPGRADIENT DATA

Well	Date	Original	Gamma-transformed	Original	Trimmed	Ln-transformed	Original
MW-14	11/1/1996	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	4/1/1997	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	11/1/1997	-	-	0.17	Trimmed	Trimmed	-
MW-14	5/1/1998	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	11/1/1998	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	5/1/1999	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	11/1/1999	-	-	3.20	Trimmed	Trimmed	-
MW-14	5/1/2000	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	12/1/2000	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	6/1/2001	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	11/1/2001	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	5/2/2002	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	11/2/2002	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	5/3/2003	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	11/3/2003	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	5/1/2004	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	12/1/2004	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	5/5/2005	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	11/5/2005	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	5/6/2006	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	10/6/2006	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	4/7/2007	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	10/7/2007	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	4/1/2008	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	10/1/2008	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	10/29/2009	-	-	0.100 U	Trimmed	Trimmed	-
MW-14	3/25/2010	0.0136	0.238696638	0.100 U	0.100 U	-2.302585093	1.00 U
MW-14	4/22/2010	0.0157	0.250399362	0.100 U	0.100 U	-2.302585093	1.00 U
MW-14	10/16/2010	0.0252	0.293179442	0.100 U	0.100 U	-2.302585093	1.00 U
MW-14	4/28/2011	0.0205	0.273685184	0.100 U	0.100 U	-2.302585093	1.00 U
MW-14	10/19/2011	0.0231	0.284798257	0.100 U	0.100 U	-2.302585093	1.00 U
MW-14	4/25/2012	0.1580	0.540612018	0.100 U	0.100 U	-2.302585093	1.00 U
MW-14	10/10/2012	0.0255	0.294338266	0.100 U	0.100 U	-2.302585093	1.00 U
MW-14	4/16/2013	0.0210	0.275892418	0.100 U	0.100 U	-2.302585093	0.500 U
MW-14	10/29/2013	0.025/0.0256	0.293566733	0.100 U/0.100 U	0.100 U/0.100 U	-2.302585093	0.500 U/0.500 U
MW-14	4/14/2014	0.0205	0.273685184	0.100 U	0.100 U	-2.302585093	0.500 U
MW-14	10/8/2014	0.0217	0.278924445	0.100 U	0.100 U	-2.302585093	0.500 U
MW-14	4/16/2015	0.026/0.0382	0.317810575	0.100 U/0.3	0.100 U/0.3	-1.203972804	0.500 U/0.500 U
MW-14	10/14/2015	0.0256	0.29472252	0.100 U	0.100 U	-2.302585093	0.500 U
MW-14	3/16/2016	0.0213/0.0219	0.27849533	0.100 U/0.100 U	0.100 U/0.100 U	-2.302585093	0.500 U/0.500 U
MW-14	9/27/2016	0.0255/0.0247	0.292791124	0.100 U/0.100 U	0.100 U/0.100 U	-2.302585093	0.500 U/0.500 U
MW-14	3/7/2017	0.0272/0.0313	0.308112007	0.500 U/0.500 U	0.500 U/0.500 U	-0.693147181	0.500 U/0.500 U
MW-14	10/4/2017	0.0294	0.308637797	0.500 U	0.500 U	-0.693147181	0.500 U
MW-14	3/12/2018	0.1500	0.531329285	1.54	1.54	0.431782416	0.500 U
MW-14	10/9/2018	0.0477/0.0554	0.372171309	0.702/0.500 U	0.702/0.500 U	-0.353821875	0.500 U/0.500 U
MW-14	3/25/2019	0.0862	0.441742402	1.01	1.01	0.009950331	0.500 U
MW-14	10/3/2019	0.0289	0.306878136	0.500 U	0.500 U	-0.693147181	0.500 U
MW-14	3/17/2020	0.0639	0.399791558	0.500 U	0.500 U	-0.693147181	0.500 U
MW-14	10/4/2020	0.0243	0.289646815	0.500 U	0.500 U	-0.693147181	0.500 U
MW-14	3/30/2021	0.0141/0.0136	0.240150369	0.500 U/0.500 U	0.500 U/0.500 U	-0.693147181	0.500 U/0.500 U
MW-14	10/5/2021	0.127	0.50265257	1.12	1.12	0.113328685	0.500 U
MW-14	4/4/2022	0.0242	0.289248948	0.500 U	0.500 U	-0.693147181	0.500 U
MW-14	10/3/2022	0.0194	0.268699738	0.100 U	0.100 U	-2.302585093	0.500 U
MW-14	3/29/2023	0.0223/0.0260	0.289049604	0.500 U/0.500 U	0.500 U/0.500 U	-0.693147181	0.500 U/0.500 U
MW-14	10/4/2023	0.0246	0.290833906	0.500 U	0.500 U	-0.693147181	0.500 U
MW-14	4/2/2024	0.0154/0.0153	0.248524644	0.100 U/0.100 U	0.100 U/0.100 U	-2.302585093	0.500 U/0.500 U
MW-14	10/9/2024	0.023	0.284386698	0.0100 U	0.0100 U	-4.605170186	0.500 U
MW-16	7/1/1995	-	-	1.30	Trimmed	Trimmed	-
MW-16	8/1/1995	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	11/1/1995	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	2/1/1996	-	-	0.16	Trimmed	Trimmed	-

**Interwell Control Limit Calculations -- Statistical Prediction Limits
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa**

DATA SUMMARY	Barium	Iron	Benzene
Observations (n)	91	177	91
Earliest Sample	2010-03-25	1995-07-01	2010-03-25
Latest Sample	2024-10-09	2024-10-09	2024-10-09
Detects	91	63	0
Non-Detects	0	114	91
Percent ND	0%	64%	100%
Maximum	0.344	35.6	0.500 U
Minimum (for pH only)			
Distribution	Gamma	Lognormal	Non-detect
UPL METHOD:	Gamma UPL	KM Log UPL	Reporting Limit

UPL CALCULATION	Barium	Iron	Benzene
Mean	0.454	-1.953	n/a
Standard Deviation	0.118	2.293	n/a
Site-Wide False Positive Rate	0.1	0.1	0.1
Compliance wells (w)	10	10	10
Constituents (c)	10	10	10
Sampling Frequency	2x/year	2x/year	2x/year
Resampling Strategy	1-of-2	1-of-2	1-of-2
Factor K (USEPA Table 19-1)	2.07	2.075	n/a
Upper Prediction Limit (UPL)	0.340	16.5	n/a
Lower Prediction Limit (LPL)			

UPGRADIENT DATA		Original	Gamma-transformed	Original	Trimmed	Ln-transformed	Original
MW-16	5/1/1996	-	-	-	Trimmed	Trimmed	-
MW-16	11/1/1996	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	4/1/1997	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	11/1/1997	-	-	0.21	Trimmed	Trimmed	-
MW-16	5/1/1998	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	11/1/1998	-	-	0.54	Trimmed	Trimmed	-
MW-16	5/1/1999	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	11/1/1999	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	5/1/2000	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	12/1/2000	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	6/1/2001	-	-	0.17	Trimmed	Trimmed	-
MW-16	11/1/2001	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	5/2/2002	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	11/2/2002	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	5/3/2003	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	11/3/2003	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	5/1/2004	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	12/1/2004	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	5/5/2005	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	11/5/2005	-	-	0.23	Trimmed	Trimmed	-
MW-16	5/6/2006	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	10/6/2006	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	4/7/2007	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	10/7/2007	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	4/1/2008	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	10/1/2008	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	10/29/2009	-	-	0.100 U	Trimmed	Trimmed	-
MW-16	3/30/2010	0.1400	0.51924941	0.100 U	0.100 U	-2.302585093	1.00 U
MW-16	4/22/2010	0.1380	0.516764925	0.12	0.12	-2.120263536	1.00 U
MW-16	10/16/2010	0.1390	0.518010147	0.51	0.51	-0.673344553	1.00 U
MW-16	4/28/2011	0.1320	0.509164337	0.18	0.18	-1.714798428	1.00 U
MW-16	10/18/2011	0.1700	0.553965826	1.77	1.77	0.570979547	1.00 U
MW-16	4/25/2012	0.1770	0.561467241	1.10	1.10	0.09531018	1.00 U
MW-16	10/10/2012	0.1650	0.548480655	0.11	0.11	-2.207274913	1.00 U
MW-16	4/17/2013	0.1750	0.559344471	0.100 U	0.100 U	-2.302585093	0.500 U
MW-16	10/30/2013	0.1530	0.534848124	0.13	0.13	-2.040220829	0.500 U
MW-16	4/14/2014	0.1580	0.540612018	0.100 U	0.100 U	-2.302585093	0.500 U
MW-16	10/9/2014	0.1410	0.520482786	0.100 U	0.100 U	-2.302585093	0.500 U
MW-16	4/17/2015	0.2560	0.634960421	0.100 U	0.100 U	-2.302585093	0.500 U
MW-16	10/16/2015	0.2300	0.612692568	8.24	8.24	2.109000344	0.500 U
MW-16	3/17/2016	0.139/0.142	0.51986683	0.100 U/0.101	0.100 U/0.101	-2.292634762	0.500 U/0.500 U
MW-16	9/29/2016	0.2200	0.603681074	6.19	6.19	1.822935087	0.500 U
MW-16	3/8/2017	0.1410	0.520482786	0.500 U	0.500 U	-0.693147181	0.500 U
MW-16	10/4/2017	0.1340	0.511722995	0.69	0.69	-0.371063681	0.500 U
MW-16	3/12/2018	0.2210	0.60459436	7.15	7.15	1.967112357	0.500 U
MW-16	10/9/2018	0.1530	0.534848124	0.87	0.87	-0.139262067	0.500 U
MW-16	3/25/2019	0.1290	0.505277435	0.87	0.87	-0.139262067	0.500 U
MW-16	10/3/2019	0.1360	0.514256318	1.58	1.58	0.457424847	0.500 U
MW-16	3/17/2020	0.3370	0.695894334	35.6	Outlier	Outlier	0.500 U
MW-16	10/4/2020	0.144/0.143	0.523540922	0.679/0.598	0.679/0.598	-0.448633604	0.500 U/0.500 U
MW-16	3/30/2021	0.140	0.51924941	0.861	0.861	-0.149660775	0.500 U
MW-16	10/5/2021	0.153	0.534848124	2.23	2.23	0.802001585	0.500 U
MW-16	4/4/2022	0.1300	0.506579702	0.852	0.852	-0.160168752	0.500 U
MW-16	10/3/2022	0.3440	0.700679612	23.6	Outlier	Outlier	0.500 U
MW-16	3/29/2023	0.1310	0.507875308	1.42	1.42	0.350656872	0.500 U
MW-16	10/4/2023	0.2060	0.590594058	2.83	2.83	1.040276712	0.500 U
MW-16	4/3/2024	0.132	0.509164337	1.02	1.02	0.019802627	0.500 U
MW-16	10/8/2024	0.131	0.507875308	0.262	0.262	-1.339410775	0.500 U

Appendix F.8
Interwell Control Limit Calculations -- Statistical Prediction Limits
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa

<u>DATA SUMMARY</u>	<u>Ammonia-N</u>	<u>COD</u>	<u>Phenolics</u>
Observations (n)	180	179	107
Earliest Sample	1995-07-01	1995-07-01	1995-07-01
Latest Sample	2024-10-09	2024-10-09	2024-04-03
Detects	59	66	5
Non-Detects	121	113	102
Percent ND	67%	63%	95%
Maximum	2.2	25	0.0519
Minimum (for pH only)			
Distribution	Normal	Lognormal	95% Non-detect
UPL METHOD:	KM Normal UPL	KM Log UPL	Nonparametric

<u>UPL CALCULATION</u>			
Mean	0.581	1.803	n/a
Standard Deviation	0.625	0.349	n/a
Site-Wide False Positive Rate	0.1	0.1	0.1
Compliance wells (w)	10	10	10
Constituents (c)	10	10	10
Sampling Frequency	2x/year	2x/year	1x/year
Resampling Strategy	1-of-2	1-of-2	1-of-2
Factor K (USEPA Table 19-1)	2.035	2.035	n/a
Upper Prediction Limit (UPL)	1.85	12.3	n/a
Lower Prediction Limit (LPL)			

<u>UPGRADIENT DATA</u>					
Well	Date	Original	Original	Ln-transformed	Original
MW-05	7/1/1995	0.200 U	5.00 U	1.609437912	0.0200 U
MW-05	8/1/1995	0.200 U	5.00 U	1.609437912	0.0200 U
MW-05	11/1/1995	0.200 U	5.00 U	1.609437912	0.0200 U
MW-05	2/1/1996	0.200 U	12.0	2.48490665	0.0200 U
MW-05	5/1/1996	0.200 U	5.00 U	1.609437912	-
MW-05	11/1/1996	0.200 U	5.00 U	1.609437912	0.0200 U
MW-05	4/1/1997	0.200 U	5.00 U	1.609437912	-
MW-05	11/1/1997	0.200 U	5.00 U	1.609437912	0.0200 U
MW-05	5/1/1998	0.200 U	7.3	1.987874348	-
MW-05	11/1/1998	0.200 U	5.00 U	1.609437912	0.0200 U
MW-05	5/1/1999	0.200 U	24.0	3.17805383	-
MW-05	11/1/1999	0.200 U	5.00 U	1.609437912	0.0200 U
MW-05	5/1/2000	0.200 U	5.00 U	1.609437912	-
MW-05	12/1/2000	0.200 U	5.00 U	1.609437912	0.0200 U
MW-05	6/1/2001	0.200 U	7.4	2.00148	-
MW-05	11/1/2001	0.200 U	5.00 U	1.609437912	0.0200 U
MW-05	5/2/2002	0.200 U	5.00 U	1.609437912	-
MW-05	11/2/2002	0.200 U	8.3	2.116255515	0.0200 U
MW-05	5/3/2003	0.200 U	5.00 U	1.609437912	-
MW-05	5/1/2004	0.200 U	10.0	2.302585093	-
MW-05	5/5/2005	0.200 U	5.00 U	1.609437912	-
MW-05	5/6/2006	0.200 U	18.5	2.917770732	-
MW-05	4/7/2007	0.200 U	5.2	1.648658626	-
MW-05	10/7/2007	0.200 U	9.3	2.2300144	0.0180 U
MW-05	4/1/2008	0.200 U	12.6	2.533696814	-
MW-05	10/1/2008	0.200 U	9.3	2.2300144	0.0180 U
MW-05	10/29/2009	0.200 U	5.6	1.722766598	0.0180 U
MW-05	3/30/2010	0.200 U	5.00 U	1.609437912	0.0200 U
MW-05	4/22/2010	0.200 U	5.00 U	1.609437912	0.0180 U
MW-05	10/16/2010	0.200 U	5.00 U	1.609437912	0.0200 U
MW-05	4/28/2011	0.200 U	5.00 U	1.609437912	0.0200 U
MW-05	10/18/2011	0.200 U	5.00 U	1.609437912	0.0200 U
MW-05	4/25/2012	0.200 U	5.00 U	1.609437912	0.0200 U
MW-05	4/16/2013	0.200 U	7.9	2.066862759	0.0200 U
MW-05	4/14/2014	0.200 U	5.00 U	1.609437912	0.0100 U
MW-05	10/9/2014	0.200 U	5.00 U	1.609437912	-
MW-05	4/17/2015	0.200 U	5.00 U	1.609437912	0.0184 U
MW-05	10/16/2015	0.200 U	11.6	2.451005098	-
MW-05	3/17/2016	0.200 U	7.5	2.014903021	0.0196 U
MW-05	9/29/2016	0.200 U	9.6	2.261763098	-
MW-05	3/8/2017	0.200 U	5.5	1.704748092	0.0193
MW-05	10/4/2017	0.200 U	5.00 U	1.609437912	-
MW-05	3/12/2018	0.200 U	5.00 U	1.609437912	0.0180 U
MW-05	10/9/2018	0.200 U	13.4	2.595254707	-
MW-05	3/25/2019	0.200 U/0.200 U	5.00 U/5.00 U	1.609437912	0.0200 U/0.0188 U
MW-05	10/3/2019	0.200 U/0.200 U	8.99/9.33	2.214846179	-
MW-05	3/17/2020	0.200 U/0.200 U	5.00 U/5.00 U	1.609437912	0.0200 U/0.0184 U
MW-05	10/4/2020	0.200 U	5.4	1.686398954	-
MW-05	3/30/2021	0.200 U	5.00 U	1.609437912	0.0188 U
MW-05	10/5/2021	0.200 U/0.200 U	5.00 U/7.98	2.076938411	-
MW-05	4/4/2022	0.200 U/0.200 U	5.00 U/9.14	2.212660385	0.0200 U/0.0196 U
MW-05	10/3/2022	0.200 U/0.200 U	5.00 U/7.23	1.978239036	-
MW-05	3/27/2023	0.200 U	25.0 U	3.218875825	0.0200 U
MW-05	10/3/2023	0.200 U	7.9	2.066862759	-
MW-05	4/2/2024	0.200 U	5.00 U	1.609437912	0.0200 U
MW-05	10/8/2024	0.200 U	5.00 U	1.609437912	-
MW-14	7/1/1995	0.560	5.00 U	1.609437912	0.0200 U
MW-14	8/1/1995	0.200 U	5.00 U	1.609437912	0.0240
MW-14	11/1/1995	0.200 U	5.2	1.648658626	0.0200 U
MW-14	2/1/1996	0.200 U	7.3	1.987874348	0.0200 U
MW-14	5/1/1996	0.200 U	5.00 U	1.609437912	-

**Appendix F.8
Interwell Control Limit Calculations -- Statistical Prediction Limits
2024 Annual Water Quality Report
Viking Pump Foundry Sand Landfill
Permit No. 07-SDP-12-89P-FSL
Cedar Falls, Iowa**

DATA SUMMARY	Ammonia-N	COD	Phenolics
Observations (n)	180	179	107
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Latest Sample	2024-10-09	2024-10-09	2024-04-03
Detects	59	66	5
Non-Detects	121	113	102
Percent ND	67%	63%	95%
Maximum	2.2	25	0.0519
Minimum (for pH only)			
Distribution	Normal	Lognormal	95% Non-detect
UPL METHOD:	KM Normal UPL	KM Log UPL	Nonparametric

UPL CALCULATION			
Mean	0.581	1.803	n/a
Standard Deviation	0.625	0.349	n/a
Site-Wide False Positive Rate	0.1	0.1	0.1
Compliance wells (w)	10	10	10
Constituents (c)	10	10	10
Sampling Frequency	2x/year	2x/year	1x/year
Resampling Strategy	1-of-2	1-of-2	1-of-2
Factor K (USEPA Table 19-1)	2.035	2.035	n/a
Upper Prediction Limit (UPL)	1.85	12.3	n/a
Lower Prediction Limit (LPL)			

UPGRADIENT DATA					
Well	Date	Original	Original	Ln-transformed	Original
MW-14	11/1/1996	0.230	5.00 U	1.609437912	0.0200 U
MW-14	4/1/1997	0.200 U	5.00 U	1.609437912	-
MW-14	11/1/1997	0.200 U	5.00 U	1.609437912	0.0200 U
MW-14	5/1/1998	0.200 U	5.00 U	1.609437912	-
MW-14	11/1/1998	0.200 U	5.00 U	1.609437912	0.0200 U
MW-14	5/1/1999	0.230	Outlier	Outlier	-
MW-14	11/1/1999	0.200 U	5.00 U	1.609437912	0.0200 U
MW-14	5/1/2000	0.240	5.00 U	1.609437912	-
MW-14	12/1/2000	0.200 U	5.00 U	1.609437912	0.0200 U
MW-14	6/1/2001	0.200 U	5.00 U	1.609437912	-
MW-14	11/1/2001	0.200 U	5.00 U	1.609437912	0.0200 U
MW-14	5/2/2002	0.200 U	5.00 U	1.609437912	-
MW-14	11/2/2002	0.200 U	12.0	2.48490665	0.0200 U
MW-14	5/3/2003	0.200 U	5.00 U	1.609437912	-
MW-14	11/3/2003	0.200 U	5.00 U	1.609437912	0.0200 U
MW-14	5/1/2004	0.200 U	5.3	1.667706821	-
MW-14	12/1/2004	0.200 U	5.00 U	1.609437912	0.0200 U
MW-14	5/5/2005	0.200 U	5.00 U	1.609437912	-
MW-14	11/5/2005	0.200 U	5.00 U	1.609437912	0.0200 U
MW-14	5/6/2006	0.200 U	5.00 U	1.609437912	-
MW-14	10/6/2006	0.200 U	8.1	2.091864062	0.0160
MW-14	4/7/2007	0.200 U	5.00 U	1.609437912	-
MW-14	10/7/2007	0.200 U	5.00 U	1.609437912	0.0180 U
MW-14	4/1/2008	0.200 U	20.8	3.034952987	-
MW-14	10/1/2008	0.200 U	5.00 U	1.609437912	0.0200 U
MW-14	10/29/2009	0.200 U	5.00 U	1.609437912	0.0180 U
MW-14	3/25/2010	0.200 U	25.0 U	3.218875825	0.0180 U
MW-14	4/22/2010	0.200 U	5.00 U	1.609437912	0.0180 U
MW-14	10/16/2010	0.200 U	7.5	2.014903021	0.0200 U
MW-14	4/28/2011	0.200 U	5.00 U	1.609437912	0.0200 U
MW-14	10/19/2011	0.200 U	5.6	1.722766598	0.0200 U
MW-14	4/25/2012	0.200 U	5.00 U	1.609437912	0.0200 U
MW-14	10/10/2012	0.200 U	5.00 U	1.609437912	0.0200 U
MW-14	4/16/2013	0.200 U	5.00 U	1.609437912	0.0192 U
MW-14	10/29/2013	0.200 U/0.200 U	5.00 U/5.00 U	1.609437912	0.0196 U/0.0180 U
MW-14	4/14/2014	0.200 U	5.00 U	1.609437912	0.0180 U
MW-14	10/8/2014	0.200 U	5.00 U	1.609437912	-
MW-14	4/16/2015	0.200 U/0.200 U	5.00 U/5.00 U	1.609437912	0.0180 U/0.0200 U
MW-14	10/14/2015	0.200 U	5.00 U	1.609437912	-
MW-14	3/16/2016	0.200 U/0.200 U	7.54/6.88	1.975468951	0.0196 U/0.0204 U
MW-14	9/27/2016	0.200 U/0.200 U	5.00 U/5.00 U	1.609437912	-
MW-14	3/7/2017	0.200 U/0.200 U	5.00 U/5.00 U	1.609437912	0.0180 U/0.0188 U
MW-14	10/4/2017	0.200 U	5.00 U	1.609437912	-
MW-14	3/12/2018	0.200 U	5.00 U	1.609437912	0.0184 U
MW-14	10/9/2018	0.200 U/0.200 U	5.00 U/5.00 U	1.609437912	-
MW-14	3/25/2019	0.200 U	5.00 U	1.609437912	0.0204 U
MW-14	10/3/2019	0.200 U	5.00 U	1.609437912	-
MW-14	3/17/2020	0.200 U	6.7	1.902107526	0.0192 U
MW-14	10/4/2020	0.200 U	5.00 U	1.609437912	-
MW-14	3/30/2021	0.200 U/0.200 U	5.00 U/5.00 U	1.609437912	0.0212 U/0.0184 U
MW-14	10/5/2021	0.200 U	9.04	2.201659174	-
MW-14	4/4/2022	0.200 U	6.0	1.791759469	0.0192 U
MW-14	10/3/2022	0.200 U	5.00 U	1.609437912	-
MW-14	3/29/2023	0.200 U/0.200 U	5.00 U/5.00 U	1.609437912	0.0204 U/0.0200 U
MW-14	10/4/2023	0.200 U	5.5	1.704748092	-
MW-14	4/2/2024	0.200 U/0.200 U	5.00 U/5.45	1.695615609	0.0208 U/0.0200 U
MW-14	10/9/2024	0.200 U	5.00 U	1.609437912	-
MW-16	7/1/1995	1.500	6.8	1.916922612	0.0200 U
MW-16	8/1/1995	1.700	8.9	2.186051277	0.0240
MW-16	11/1/1995	1.500	14.0	2.63905733	0.0200 U
MW-16	2/1/1996	2.200	5.00 U	1.609437912	0.0200 U

Appendix F.8
Interwell Control Limit Calculations -- Statistical Prediction Limits
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<u>DATA SUMMARY</u>	<u>Ammonia-N</u>	<u>COD</u>	<u>Phenolics</u>
Observations (n)	180	179	107
Earliest Sample	1995-07-01	1995-07-01	1995-07-01
Latest Sample	2024-10-09	2024-10-09	2024-04-03
Detects	59	66	5
Non-Detects	121	113	102
Percent ND	67%	63%	95%
Maximum	2.2	25	0.0519
Minimum (for pH only)			
Distribution	Normal	Lognormal	95% Non-detect
UPL METHOD:	KM Normal UPL	KM Log UPL	Nonparametric

<u>UPL CALCULATION</u>			
Mean	0.581	1.803	n/a
Standard Deviation	0.625	0.349	n/a
Site-Wide False Positive Rate	0.1	0.1	0.1
Compliance wells (w)	10	10	10
Constituents (c)	10	10	10
Sampling Frequency	2x/year	2x/year	1x/year
Resampling Strategy	1-of-2	1-of-2	1-of-2
Factor K (USEPA Table 19-1)	2.035	2.035	n/a
Upper Prediction Limit (UPL)	1.85	12.3	n/a
Lower Prediction Limit (LPL)			

<u>UPGRADIENT DATA</u>					
Well	Date	Original	Original	Ln-transformed	Original
MW-16	5/1/1996	1.700	7.5	2.014903021	-
MW-16	11/1/1996	0.800	11.0	2.397895273	0.0200 U
MW-16	4/1/1997	1.000	5.00 U	1.609437912	-
MW-16	11/1/1997	0.200 U	5.00 U	1.609437912	0.0200 U
MW-16	5/1/1998	0.200 U	5.00 U	1.609437912	-
MW-16	11/1/1998	1.500	8.6	2.151762203	0.0200 U
MW-16	5/1/1999	1.800	5.2	1.648658626	-
MW-16	11/1/1999	1.700	5.00 U	1.609437912	0.0200 U
MW-16	5/1/2000	1.980	12.0	2.48490665	-
MW-16	12/1/2000	1.780	5.00 U	1.609437912	0.0200 U
MW-16	6/1/2001	1.620	6.4	1.85629799	-
MW-16	11/1/2001	1.400	6.7	1.902107526	0.0200 U
MW-16	5/2/2002	1.640	5.00 U	1.609437912	-
MW-16	11/2/2002	1.420	7.8	2.054123734	0.0200 U
MW-16	5/3/2003	1.650	5.00 U	1.609437912	-
MW-16	11/3/2003	1.750	5.00 U	1.609437912	0.0200 U
MW-16	5/1/2004	1.600	5.00 U	1.609437912	-
MW-16	12/1/2004	1.590	5.00 U	1.609437912	0.0200 U
MW-16	5/5/2005	1.500	6.8	1.916922612	-
MW-16	11/5/2005	0.200 U	5.00 U	1.609437912	0.0200 U
MW-16	5/6/2006	0.469	5.00 U	1.609437912	-
MW-16	10/6/2006	1.660	9.0	2.197224577	0.0180 U
MW-16	4/7/2007	0.200 U	5.00 U	1.609437912	-
MW-16	10/7/2007	1.100	5.00 U	1.609437912	0.0200 U
MW-16	4/1/2008	0.200 U	20.6	3.025291076	-
MW-16	10/1/2008	1.490	9.9	2.292534757	0.0200 U
MW-16	10/29/2009	0.200 U	25.0 U	3.218875825	0.0180 U
MW-16	3/30/2010	1.800	5.00 U	1.609437912	0.0200 U
MW-16	4/22/2010	1.830	5.00 U	1.609437912	0.0180 U
MW-16	10/16/2010	1.830	5.00 U	1.609437912	0.0200 U
MW-16	4/28/2011	1.890	5.5	1.704748092	0.0200 U
MW-16	10/18/2011	2.000	6.6	1.887069649	0.0200 U
MW-16	4/25/2012	2.170	5.00 U	1.609437912	0.0200 U
MW-16	10/10/2012	1.690	5.00 U	1.609437912	0.0200 U
MW-16	4/17/2013	1.890	5.00 U	1.609437912	0.0210 U
MW-16	10/30/2013	0.952	6.3	1.840549633	0.0180 U
MW-16	4/14/2014	1.690	5.00 U	1.609437912	0.0196 U
MW-16	10/9/2014	0.811	5.00 U	1.609437912	-
MW-16	4/17/2015	1.880	5.7	1.740466175	0.0200 U
MW-16	10/16/2015	1.560	5.3	1.667706821	-
MW-16	3/17/2016	0.59/0.456	5.00 U/5.00 U	1.609437912	0.0204 U/0.0180 U
MW-16	9/29/2016	1.530	20.1	3.000719815	-
MW-16	3/8/2017	0.584	5.00 U	1.609437912	0.0180 U
MW-16	10/4/2017	0.200 U	6.8	1.916922612	-
MW-16	3/12/2018	0.776	5.00 U	1.609437912	0.0180 U
MW-16	10/9/2018	1.430	5.00 U	1.609437912	-
MW-16	3/25/2019	0.316	5.00 U	1.609437912	0.0519
MW-16	10/3/2019	1.420	5.00 U	1.609437912	-
MW-16	3/17/2020	1.860	5.0	1.609437912	0.0180 U
MW-16	10/4/2020	0.536/0.542	5.00 U/5.1	1.62924054	-
MW-16	3/30/2021	1.35	5.00 U	1.609437912	0.0184 U
MW-16	10/5/2021	0.671	5.00 U	1.609437912	-
MW-16	4/4/2022	1.520	8.45	2.134166441	0.0192 U
MW-16	10/3/2022	0.368	7.23	1.978239036	-
MW-16	3/29/2023	1.660	5.00 U	1.609437912	High RL excluded
MW-16	10/4/2023	1.760	15.5	2.740840024	-
MW-16	4/3/2024	1.24	21.8	3.08190997	0.0200 U
MW-16	10/8/2024	1.45	5.00 U	1.609437912	-

Appendix F.8
Interwell Control Limit Calculations -- Statistical Prediction Limits
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<u>DATA SUMMARY</u>	<u>Chloride</u>	<u>TOX</u>
Observations (n)	180	18
Earliest Sample	1995-07-01	2022-04-04
Latest Sample	2024-10-09	2024-10-09
Detects	112	12
Non-Detects	68	6
Percent ND	38%	33%
Maximum	201	201
Minimum (for pH only)		0.126
Distribution	Lognormal	85% Non-detect
UPL METHOD:	KM Log UPL	Nonparametric

<u>UPL CALCULATION</u>		
Mean	2.746	n/a
Standard Deviation	1.264	n/a
Site-Wide False Positive Rate	0.1	0.1
Compliance wells (w)	10	10
Constituents (c)	10	10
Sampling Frequency	2x/year	1x/year
Resampling Strategy	1-of-2	1-of-2
Factor K (USEPA Table 19-1)	2.4475	n/a
Upper Prediction Limit (UPL)	344	n/a
Lower Prediction Limit (LPL)		

<u>UPGRADIENT DATA</u>					
Well	Date	Original	Trimmed	Ln-transformed	Original
MW-05	7/1/1995	6.7	Trimmed	Trimmed	-
MW-05	8/1/1995	5.00 U	Trimmed	Trimmed	-
MW-05	11/1/1995	5.8	Trimmed	Trimmed	0.0100 U
MW-05	2/1/1996	7.7	Trimmed	Trimmed	-
MW-05	5/1/1996	5.00 U	Trimmed	Trimmed	-
MW-05	11/1/1996	6.3	Trimmed	Trimmed	0.0100 U
MW-05	4/1/1997	5.00 U	Trimmed	Trimmed	-
MW-05	11/1/1997	5.9	Trimmed	Trimmed	0.0100 U
MW-05	5/1/1998	6.0	Trimmed	Trimmed	-
MW-05	11/1/1998	8.5	Trimmed	Trimmed	0.0100 U
MW-05	5/1/1999	6.2	Trimmed	Trimmed	-
MW-05	11/1/1999	5.1	Trimmed	Trimmed	0.0100 U
MW-05	5/1/2000	5.2	Trimmed	Trimmed	-
MW-05	12/1/2000	5.9	Trimmed	Trimmed	0.0100 U
MW-05	6/1/2001	7.4	Trimmed	Trimmed	-
MW-05	11/1/2001	5.00 U	Trimmed	Trimmed	0.0100 U
MW-05	5/2/2002	11.8	Trimmed	Trimmed	-
MW-05	11/2/2002	6.1	Trimmed	Trimmed	0.0100 U
MW-05	5/3/2003	6.5	Trimmed	Trimmed	-
MW-05	5/1/2004	5.1	Trimmed	Trimmed	-
MW-05	5/5/2005	12.0	Trimmed	Trimmed	-
MW-05	5/6/2006	27.0	Trimmed	Trimmed	-
MW-05	4/7/2007	33.8	Trimmed	Trimmed	-
MW-05	10/7/2007	10.2	Trimmed	Trimmed	0.0100 U
MW-05	4/1/2008	11.9	Trimmed	Trimmed	-
MW-05	10/1/2008	26.1	Trimmed	Trimmed	0.0100 U
MW-05	10/29/2009	12.1	Trimmed	Trimmed	0.0232
MW-05	3/30/2010	8.5	Trimmed	Trimmed	0.0100 U
MW-05	4/22/2010	10.6	Trimmed	Trimmed	0.0138
MW-05	10/16/2010	6.8	Trimmed	Trimmed	0.0230
MW-05	4/28/2011	5.5	Trimmed	Trimmed	0.0114
MW-05	10/18/2011	13.2	Trimmed	Trimmed	0.0100 U
MW-05	4/25/2012	5.6	Trimmed	Trimmed	0.0144
MW-05	4/16/2013	5.00 U	Trimmed	Trimmed	0.0300 U
MW-05	4/14/2014	24.4	Trimmed	Trimmed	0.0300 U
MW-05	10/9/2014	46.2	Trimmed	Trimmed	-
MW-05	4/17/2015	54.5	Trimmed	Trimmed	0.0300 U
MW-05	10/16/2015	61.6	Trimmed	Trimmed	-
MW-05	3/17/2016	16.1	Trimmed	Trimmed	0.0300 U
MW-05	9/29/2016	22.1	Trimmed	Trimmed	-
MW-05	3/8/2017	16.6	Trimmed	Trimmed	High RL removed
MW-05	10/4/2017	23.4	Trimmed	Trimmed	-
MW-05	3/12/2018	20.9	Trimmed	Trimmed	0.0300 U
MW-05	10/9/2018	5.00 U	Trimmed	Trimmed	-
MW-05	3/25/2019	6.87/6.28	Trimmed	Trimmed	0.0300 U/0.0300 U
MW-05	10/3/2019	5.00 U/5.00 U	Trimmed	Trimmed	-
MW-05	3/17/2020	5.00 U/5.00 U	Trimmed	Trimmed	0.0400 U/0.0400 U
MW-05	10/4/2020	5.00 U	Trimmed	Trimmed	-
MW-05	3/30/2021	6.65	Trimmed	Trimmed	0.0400 U
MW-05	10/5/2021	11.0/11.7	Trimmed	Trimmed	-
MW-05	4/4/2022	29.2/30.2	29.2/30.2	3.391147046	0.0400 U/0.0461
MW-05	10/3/2022	49.4/43.6	49.4/43.6	3.839452313	-
MW-05	3/27/2023	71.9	71.9	4.275276265	0.0400 U
MW-05	10/3/2023	117.0	117.0	4.762173935	-
MW-05	4/2/2024	137	137	4.919980926	0.126
MW-05	10/8/2024	201	201	5.303304908	-
MW-14	7/1/1995	6.7	Trimmed	Trimmed	-
MW-14	8/1/1995	6.0	Trimmed	Trimmed	-
MW-14	11/1/1995	7.7	Trimmed	Trimmed	0.0100 U
MW-14	2/1/1996	7.7	Trimmed	Trimmed	-
MW-14	5/1/1996	8.3	Trimmed	Trimmed	-

**Appendix F.8
Interwell Control Limit Calculations -- Statistical Prediction Limits
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	<u>Chloride</u>	<u>TOX</u>
DATA SUMMARY		
Observations (n)	180	18
Earliest Sample	1995-07-01	2022-04-04
Latest Sample	2024-10-09	2024-10-09
Detects	112	12
Non-Detects	68	6
Percent ND	38%	33%
Maximum	201	201
Minimum (for pH only)		0.126
Distribution	Lognormal	85% Non-detect
UPL METHOD:	KM Log UPL	Nonparametric

UPL CALCULATION		
Mean	2.746	n/a
Standard Deviation	1.264	n/a
Site-Wide False Positive Rate	0.1	0.1
Compliance wells (w)	10	10
Constituents (c)	10	10
Sampling Frequency	2x/year	1x/year
Resampling Strategy	1-of-2	1-of-2
Factor K (USEPA Table 19-1)	2.4475	n/a
Upper Prediction Limit (UPL)	344	n/a
Lower Prediction Limit (LPL)		

UPGRADIENT DATA					
Well	Date	Original	Trimmed	Ln-transformed	Original
MW-14	11/1/1996	8.1	Trimmed	Trimmed	0.0100 U
MW-14	4/1/1997	9.4	Trimmed	Trimmed	-
MW-14	11/1/1997	8.7	Trimmed	Trimmed	0.0100 U
MW-14	5/1/1998	11.7	Trimmed	Trimmed	-
MW-14	11/1/1998	8.4	Trimmed	Trimmed	0.0100 U
MW-14	5/1/1999	9.3	Trimmed	Trimmed	-
MW-14	11/1/1999	8.8	Trimmed	Trimmed	0.0100 U
MW-14	5/1/2000	9.4	Trimmed	Trimmed	-
MW-14	12/1/2000	8.2	Trimmed	Trimmed	0.0100 U
MW-14	6/1/2001	8.6	Trimmed	Trimmed	-
MW-14	11/1/2001	8.6	Trimmed	Trimmed	0.0100 U
MW-14	5/2/2002	8.7	Trimmed	Trimmed	-
MW-14	11/2/2002	7.9	Trimmed	Trimmed	0.0100 U
MW-14	5/3/2003	10.2	Trimmed	Trimmed	-
MW-14	11/3/2003	8.6	Trimmed	Trimmed	-
MW-14	5/1/2004	9.6	Trimmed	Trimmed	-
MW-14	12/1/2004	7.9	Trimmed	Trimmed	-
MW-14	5/5/2005	8.4	Trimmed	Trimmed	-
MW-14	11/5/2005	8.6	Trimmed	Trimmed	-
MW-14	5/6/2006	8.2	Trimmed	Trimmed	-
MW-14	10/6/2006	8.2	Trimmed	Trimmed	-
MW-14	4/7/2007	7.9	Trimmed	Trimmed	-
MW-14	10/7/2007	7.8	Trimmed	Trimmed	0.0100 U
MW-14	4/1/2008	7.6	Trimmed	Trimmed	-
MW-14	10/1/2008	6.9	Trimmed	Trimmed	0.0100 U
MW-14	10/29/2009	6.7	Trimmed	Trimmed	0.0177
MW-14	3/25/2010	6.8	Trimmed	Trimmed	0.0100 U
MW-14	4/22/2010	7.1	Trimmed	Trimmed	0.0100 U
MW-14	10/16/2010	6.6	Trimmed	Trimmed	0.0356
MW-14	4/28/2011	7.1	Trimmed	Trimmed	0.0100 U
MW-14	10/19/2011	7.6	Trimmed	Trimmed	0.0100 U
MW-14	4/25/2012	6.6	Trimmed	Trimmed	0.0112
MW-14	10/10/2012	7.4	Trimmed	Trimmed	0.0128
MW-14	4/16/2013	7.6	Trimmed	Trimmed	0.0300 U
MW-14	10/29/2013	7.89/7.89	Trimmed	Trimmed	0.0300 U/0.0300 U
MW-14	4/14/2014	7.5	Trimmed	Trimmed	0.0300 U
MW-14	10/8/2014	7.2	Trimmed	Trimmed	-
MW-14	4/16/2015	7.55/7.61	Trimmed	Trimmed	0.0300 U/0.0300 U
MW-14	10/14/2015	11.8	Trimmed	Trimmed	-
MW-14	3/16/2016	8.11/7.97	Trimmed	Trimmed	0.0300 U/0.0300 U
MW-14	9/27/2016	8.79/8.2	Trimmed	Trimmed	-
MW-14	3/7/2017	8.26/8.26	Trimmed	Trimmed	0.0200 U/0.0200 U
MW-14	10/4/2017	6.9	Trimmed	Trimmed	-
MW-14	3/12/2018	8.8	Trimmed	Trimmed	0.0300 U
MW-14	10/9/2018	8.95/8.91	Trimmed	Trimmed	-
MW-14	3/25/2019	8.8	Trimmed	Trimmed	0.0300 U
MW-14	10/3/2019	8.5	Trimmed	Trimmed	-
MW-14	3/17/2020	8.8	Trimmed	Trimmed	0.0400 U
MW-14	10/4/2020	7.7	Trimmed	Trimmed	-
MW-14	3/30/2021	10.4/11.4	Trimmed	Trimmed	0.0400 U/0.0400 U
MW-14	10/5/2021	8.63	Trimmed	Trimmed	-
MW-14	4/4/2022	9.34	9.34	2.234306252	0.0400 U
MW-14	10/3/2022	8.68	8.68	2.161021529	-
MW-14	3/29/2023	9.69/9.7	9.69/9.7	2.271610289	0.0400 U/0.0400 U
MW-14	10/4/2023	8.5	8.5	2.140066163	-
MW-14	4/2/2024	9.32/8.66	9.32/8.66	2.196112848	0.0400 U/0.0400 U
MW-14	10/9/2024	9.78	9.78	2.280339484	-
MW-16	7/1/1995	5.00 U	Trimmed	Trimmed	-
MW-16	8/1/1995	6.0	Trimmed	Trimmed	-
MW-16	11/1/1995	5.00 U	Trimmed	Trimmed	0.0100 U
MW-16	2/1/1996	5.00 U	Trimmed	Trimmed	-

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Interwell Control Limit Calculations -- Statistical Prediction Limits
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<u>DATA SUMMARY</u>	<u>Chloride</u>	<u>TOX</u>
Observations (n)	180	18
Earliest Sample	1995-07-01	2022-04-04
Latest Sample	2024-10-09	2024-10-09
Detects	112	12
Non-Detects	68	6
Percent ND	38%	33%
Maximum	201	201
Minimum (for pH only)		0.126
Distribution	Lognormal	85% Non-detect
UPL METHOD:	KM Log UPL	Nonparametric

<u>UPL CALCULATION</u>		
Mean	2.746	n/a
Standard Deviation	1.264	n/a
Site-Wide False Positive Rate	0.1	0.1
Compliance wells (w)	10	10
Constituents (c)	10	10
Sampling Frequency	2x/year	1x/year
Resampling Strategy	1-of-2	1-of-2
Factor K (USEPA Table 19-1)	2.4475	n/a
Upper Prediction Limit (UPL)	344	n/a
Lower Prediction Limit (LPL)		

<u>UPGRADIENT DATA</u>					
Well	Date	Original	Trimmed	Ln-transformed	Original
MW-16	5/1/1996	5.00 U	Trimmed	Trimmed	-
MW-16	11/1/1996	5.00 U	Trimmed	Trimmed	0.0100 U
MW-16	4/1/1997	5.00 U	Trimmed	Trimmed	-
MW-16	11/1/1997	5.00 U	Trimmed	Trimmed	0.0100 U
MW-16	5/1/1998	5.00 U	Trimmed	Trimmed	-
MW-16	11/1/1998	5.00 U	Trimmed	Trimmed	0.0100 U
MW-16	5/1/1999	5.00 U	Trimmed	Trimmed	-
MW-16	11/1/1999	5.00 U	Trimmed	Trimmed	0.0100 U
MW-16	5/1/2000	5.00 U	Trimmed	Trimmed	-
MW-16	12/1/2000	5.00 U	Trimmed	Trimmed	0.0100 U
MW-16	6/1/2001	5.00 U	Trimmed	Trimmed	-
MW-16	11/1/2001	6.7	Trimmed	Trimmed	0.0100 U
MW-16	5/2/2002	5.00 U	Trimmed	Trimmed	-
MW-16	11/2/2002	5.00 U	Trimmed	Trimmed	0.0100 U
MW-16	5/3/2003	5.00 U	Trimmed	Trimmed	-
MW-16	11/3/2003	5.00 U	Trimmed	Trimmed	0.0100 U
MW-16	5/1/2004	5.00 U	Trimmed	Trimmed	-
MW-16	12/1/2004	5.00 U	Trimmed	Trimmed	0.0100 U
MW-16	5/5/2005	5.00 U	Trimmed	Trimmed	-
MW-16	11/5/2005	5.00 U	Trimmed	Trimmed	0.0100 U
MW-16	5/6/2006	5.00 U	Trimmed	Trimmed	-
MW-16	10/6/2006	5.00 U	Trimmed	Trimmed	0.0100 U
MW-16	4/7/2007	5.00 U	Trimmed	Trimmed	-
MW-16	10/7/2007	5.00 U	Trimmed	Trimmed	0.0100 U
MW-16	4/1/2008	5.00 U	Trimmed	Trimmed	-
MW-16	10/1/2008	5.00 U	Trimmed	Trimmed	0.0100 U
MW-16	10/29/2009	5.00 U	Trimmed	Trimmed	0.0125
MW-16	3/30/2010	5.00 U	Trimmed	Trimmed	0.0424
MW-16	4/22/2010	5.00 U	Trimmed	Trimmed	0.0100 U
MW-16	10/16/2010	5.00 U	Trimmed	Trimmed	0.0100 U
MW-16	4/28/2011	5.00 U	Trimmed	Trimmed	0.0100 U
MW-16	10/18/2011	5.00 U	Trimmed	Trimmed	0.0100 U
MW-16	4/25/2012	5.00 U	Trimmed	Trimmed	0.0106
MW-16	10/10/2012	5.00 U	Trimmed	Trimmed	0.0100 U
MW-16	4/17/2013	5.00 U	Trimmed	Trimmed	0.0300 U
MW-16	10/30/2013	5.00 U	Trimmed	Trimmed	0.0300 U
MW-16	4/14/2014	5.00 U	Trimmed	Trimmed	0.0300 U
MW-16	10/9/2014	5.00 U	Trimmed	Trimmed	-
MW-16	4/17/2015	5.00 U	Trimmed	Trimmed	0.0300 U
MW-16	10/16/2015	7.5	Trimmed	Trimmed	-
MW-16	3/17/2016	5.00 U/5.00 U	Trimmed	Trimmed	0.0300 U/0.0300 U
MW-16	9/29/2016	5.00 U	Trimmed	Trimmed	-
MW-16	3/8/2017	5.00 U	Trimmed	Trimmed	0.0200 U
MW-16	10/4/2017	5.00 U	Trimmed	Trimmed	-
MW-16	3/12/2018	5.00 U	Trimmed	Trimmed	0.0300 U
MW-16	10/9/2018	5.00 U	Trimmed	Trimmed	-
MW-16	3/25/2019	5.00 U	Trimmed	Trimmed	0.0300 U
MW-16	10/3/2019	5.00 U	Trimmed	Trimmed	-
MW-16	3/17/2020	5.00 U	Trimmed	Trimmed	0.0400 U
MW-16	10/4/2020	5.00 U/5.00 U	Trimmed	Trimmed	-
MW-16	3/30/2021	5.00 U	Trimmed	Trimmed	0.0400 U
MW-16	10/5/2021	5.00 U	Trimmed	Trimmed	-
MW-16	4/4/2022	5.00 U	5.00 U	1.609437912	0.0484
MW-16	10/3/2022	5.00 U	5.00 U	1.609437912	-
MW-16	3/29/2023	5.00 U	5.00 U	1.609437912	0.0400 U
MW-16	10/4/2023	5.00 U	5.00 U	1.609437912	-
MW-16	4/3/2024	5.00 U	5.00 U	1.609437912	0.0982
MW-16	10/8/2024	5.00 U	5.00 U	1.609437912	-



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