Assessment of Corrective Measures

Grand River Dam Authority Landfill

Grand River Energy Center

Mayes County, Oklahoma Solid

Waste Permit No. 3549012

Consent Order, Case No. 23-155

Submitted to:

Grand River Dam Authority

Mayes County, Oklahoma

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1.0 INTRODUCTION

This Assessment of Corrective Measures (ACM) addresses the Grand River Dam Authority (GRDA) Coal Combustion Residual (CCR) Landfill at the Grand River Energy Center (GREC), (the Site) operated by the GRDA. This report was developed in accordance with the Oklahoma Administrative Code (OAC) Title 252, Chapter 517: Disposal of CCR from Electric Utilities Rule (Rule), effective September 15, 2018. This ACM is also being submitted in accordance with Consent Order, Case No. 23-155.

Consistent with applicable sections of OAC 252:517-9, this report documents the ACM to evaluate remedies that would prevent further releases, remediate any potential releases, and to restore the affected area to original conditions. This ACM is being submitted to the Oklahoma Department of Environmental Quality (ODEQ) to satisfy the requirement under OAC 252:517-9-7 that the owner or operator of a CCR unit complete an ACM upon detecting any Appendix B constituent that demonstrates a statistically significant increase in concentration or exceeds a groundwater protection standard (GWPS) or Maximum Contaminant Level (MCL) pursuant to OAC 252:517-9. This report will be placed in the GRDA Landfill operating record and on GRDA's publicly accessible CCR Website (https://grda.com/resources/ccr-rule-compliance-data/).

2.0 REQUIREMENTS

2.1 Requirements for Assessment of Corrective Measures (OAC 252:517-9-7)

Within 90 days of finding that any constituent listed in Appendix B to this Chapter has been detected at a statistically significant level exceeding the groundwater protection standard defined under OAC 252:517-9-6(h), or immediately upon detection of a release from a CCR unit, the owner or operator must initiate an ACM to prevent further releases, to remediate any releases and to restore the affected area to original conditions. A proposed plan and schedule for analyzing the release from the facility into the environment and for developing appropriate corrective action must be submitted to DEQ. The ACM must be completed within 90 days unless the owner or operator demonstrates the need for additional time to complete the assessment of corrective measures due to site-specific conditions or circumstances. A Consent Agreement was executed on August 25, 2023, to establish guidelines on the submission of this ACM. The Consent Agreement stipulates that the ACM be completed by February 21, 2024.

2.2 Requirements for the Selection of the Remedy (OAC 252:517-9-8)

Based on the results of the ACM, the owner or operator must, as soon as feasible, select a remedy that, at a minimum, meets the following standards:

1. Be protective of human health and the environment;

2. Attain the groundwater protection standard as specified pursuant to OAC 252:517-9- 6(h);
3. Control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of constituents in Appendix B to this Chapter into the environment;
4. Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems;
5. Comply with standards for management of wastes as specified in OAC 252:517-9-9(d).

Upon selection of a remedy, the owner or operator must prepare, and submit to DEQ for approval, a final report describing the selected remedy and how it meets the above standards. The owner or operator must obtain a certification from a qualified professional engineer that the remedy selected meets the requirements of this Section. The report has been completed when it is placed in the operating record as required by OAC 252:517-19-1(h)(12).

3.0 BACKGROUND

3.1 Site Description

GREC is an electric power generating facility located approximately three miles east of the City of Chouteau, in Mayes County, Oklahoma. GREC houses two coal-fired boilers (Unit #1 and Unit #2) and one combined cycle natural gas turbine (Unit #3). Unit #1 was retired in December 2020. Unit #2 and Unit #3 are currently operational. Decommissioning of Unit #2 is planned for 2026.

CCR (fly ash, bottom ash, and spent powdered activated carbon) used to control flue gas emissions generated at the GREC are disposed on site in an ODEQ permitted Non-Hazardous Industrial Waste (NHIW) Landfill. The landfill is situated south of the operational area within the GREC complex. The total landfill permit area consists of approximately 116 acres, of which only 47 acres have been utilized for CCR disposal (**Figure 1**).

3.2 Hydrogeologic Setting and Conceptual Site Model

Lithologic data collected during monitoring well installation activities and the Site Characterization Study conducted in 2022 (ENERCON, 2022) indicate that the Site sits on a wedge of fluvial sediments (alluvium) overlying an unconformable bedrock surface that crops out in an arc pattern at topographic highs to the west, north and east of the plant. The alluvium consists primarily of tight clays and silty/clayey sands coarsening downward to subrounded clasts of gravel to cobble sized chert common in a silty/clayey matrix. Geotechnical soil samples collected in 2023 indicate porosity of the alluvium is on the order of 20 percent. The underlying bedrock is low permeability Pennsylvanian sandstone/limestone bedrock. Bedrock occurs at the site at depths that range from 7.5 feet to 30 feet below ground surface (BGS) with bedrock occurring at shallowing depths on the northern portion of the Site becoming deeper southward. The coal ash landfill was constructed overlying the alluvium.

The alluvium is the surficial water bearing unit. Generally, saturated thickness of the alluvial aquifer increases moving southward as the alluvium becomes thicker and depth to bedrock is greater with the exception of a bedrock ridge that occurs on the southern portion of the Site near MW03-2. Saturated thickness of the alluvial aquifer ranges from zero feet in on the northern portion of the property and near MW03-1 to approximately 15 feet or greater on the southern perimeter of the Site.

Stormwater/precipitation infiltration is the primary mechanism for groundwater recharge. The majority of stormwater on the plant portion of the Site is diverted to storm drains that ultimately discharge to the wastewater ponds or to stormwater outfalls located on the western perimeter of the property. Stormwater management practices on the northern portion of the site have resulted in little infiltration and groundwater recharge, and as a result, groundwater availability is limited in that area. This was observed during the Site Characterization Study where groundwater was not encountered in soil borings advanced to refusal (seven to 10 feet below ground surface) where bedrock occurred at shallower depths. There are also two small creeks that are located to the east and west of the landfill. The small creek to the west was diverted during the construction of the stormwater ponds and appears to discharge to stormwater pond F07. The small creek to the east of the landfill appears to flow during most seasons and discharges to stormwater pond F09.

There are 19 landfill monitoring wells and several piezometers installed into the landfill. Two monitoring wells, MW93-1 and MW22-01, are located upgradient of the landfill, and the remainder of the monitoring wells are located downgradient or side gradient of the landfill. Groundwater elevations collected from the landfill piezometers indicate that there may be a perched groundwater layer that seeps into the surrounding wastewater ponds. Groundwater elevations in the landfill monitoring wells indicate groundwater in the alluvial aquifer flows radially to the west, south, and east. A groundwater divide is present that coincides with the bedrock high observed near MW03-1, and groundwater in the alluvial aquifer flows from the landfill towards the small creeks to the east and west and ultimately discharges to F07, F09, Chouteau Creek, and the Neosho River. The stormwater ponds may also contribute to groundwater during low groundwater conditions.

Slug tests were conducted in all 19 landfill monitoring wells to evaluate hydraulic conductivity of the alluvium and to assess groundwater flow velocity at the Site. Results of slug tests indicate that calculated hydraulic conductivity (K) at the site varied from 0.000007 centimeters per second (cm/s) to 0.0065 cm/s. The highest K value was observed in monitor well MW93-2, calculated to be an order of magnitude higher than those observed in other monitor wells. The higher K values combined with the lithologic logs indicate that MW93-2 is not screened in the alluvium, but within a perched water unit within the landfill that is overlying the alluvium. Average K calculated using the landfill monitoring wells (with the exception of MW93-2) is 0.0006 cm/s.

The potentiometric surface map from the December 2023 sampling event is presented as **Figure 2**. Groundwater elevations for each sampling event conducted in 2023 are presented in **Table 1. G**eotechnical soil sampling results, slug test results, and cross sections are included in **Attachment A.**

3.3 Potential Receptors

Potential receptors of groundwater from the Site include surface water features and public and private water supply wells. Surface water receptors include the creek to the east of the landfill, the wastewater ponds, and, ultimately, Chouteau Creek (located between 2,500 feet and 4,800 feet to the west and south of the Site) and the Neosho River (located approximately 1,500 feet to the southeast at its closest point). A search of public and private water supply wells was conducted during the development of the CCR landfill groundwater monitoring plan and was verified using the Groundwater Well Record Search on the Oklahoma Water Resources Board website (https://www.oklahoma.gov/owrb/wells-and-licensing.html). No public or private water supply wells were identified within the 0.5-mile radius of the Site **(Figure 3**). As such, the risk posed for public or private water supply wells in the vicinity of the Site does not exist.

3.4 GREC Facility Updates

Several changes are planned for the Site over the next five years. Some of these proposed changes have the potential to substantially change the flow of groundwater at the site, impact the implementation of some of the corrective remedies, and affect some of the groundwater monitoring wells on the southern portion of the site. These changes include:

1. **Transition from coal generated energy to no- or lower-carbon emission gas and solar energy generation** – The decommissioning of the coal fired boilers is planned during and after 2026 to facilitate the transition to all gas and solar generated energy. During that transition, the coal pile will be eliminated, and CCR material generation will cease. A second gas unit will be constructed in the plant area at that time, and solar panels will be installed across the Site to maximize no to low-carbon emission energy generation.
2. **Final landfill closure –** The CCR landfill has been in operation since the 1980s, and, over time, several improvements have been completed to reduce infiltration capacity. Parts of the eastern and western portions of the landfill were capped and closed in the 1980s. In 2019-2020, the top of the southern two-thirds of the landfill were graded and capped. Today, only the northern one-third of the landfill remains operational. Final landfill closure is proposed for 2026 after the retirement of the coal-fired units and when CCR material is no longer generated at the Site. Final landfill closure design includes the installation of a low permeability cap with stormwater runoff management to reduce any standing water on the closed landfill surface. Final landfill closure will serve as effective source control of any constituents of concern to groundwater.

3. **Changes to the Wastewater Pond System** – Changes to the wastewater pond system have been planned for several years to streamline wastewater management at the site and facilitate the transition from coal generated energy to gas and solar generated energy. Changes to the wastewater system will be decided pending the outcome of the ACM and using other design criteria.

4. **Highway 412 Expansion -** The expansion of US Hwy 412 to the south of the facility is planned for late 2025 into 2026. The expansion includes the construction of a highway exit interchange with on- and off-ramps and a bridge over the highway. The exact configuration of the highway expansion is unknown at this time, but the potential exists that the southern portion of the Site including locations with existing monitoring wells could be impacted by the expansion.

4.0 SUMMARY OF GROUNDWATER ASSESSMENT AND DETECTION MONITORING

Sampling and analysis of groundwater at the GRDA Landfill is an on-going activity that has been conducted for at least 30 years. Detection monitoring events conducted in 2018 identified and verified statistically significant increases in concentrations (SSIs) in certain wells. In accordance with OAC 252:517-9-6, an Assessment Monitoring Plan was developed and first submitted to the ODEQ on March 29, 2019. The Revised Assessment Monitoring Plan was approved by the ODEQ on January 28, 2020.

The most recent landfill groundwater monitoring data and statistical analysis from December 2023 is presented in **Table 2** and is summarized below:

- Inter-well exceedances (relative to background) were observed for all Appendix A constituents except alkalinity, calcium, and pH. Inter-well exceedances for Appendix B constituents were observed for arsenic, barium, fluoride, lithium, mercury, molybdenum, and selenium.
- There were no statistically significant increases in concentration (both inter-well and intra-well) for any Appendix A constituent.
- A statistically significant increase in lithium concentration was demonstrated in MW22-08.
- Concentrations of arsenic (MW93-2), lithium (MW22-03, MW22-08, MW93-3, MW23-05), molybdenum (MW93-2), and selenium (MW22-02) were reported greater than the GWPS/MCL.
- Molybdenum concentrations decreased below the GWPS in MW22-02.
- The May 2023 cobalt and lithium concentrations reported in MW22-03 appear to have been elevated due to the presence high levels of total dissolved solids (TDS). The December 2023 groundwater TDS concentrations reported in MW22-03 were less than

half of what was reported in May 2023. December 2023 cobalt concentrations reported in MW22-03 decreased to below the GWPS indicating that cobalt may not be a constituent of concern.

These results indicate that groundwater downgradient of the GRDA landfill may be impacted by a potential release of lithium, molybdenum, and selenium. GRDA installed six additional monitoring wells in September 2023. The purpose of the monitoring wells is to monitor any potential downgradient movement of the potential landfill impacts in groundwater while the ACM is completed. No constituents of concern were reported in groundwater samples collected in December 2023 from the new wells with the exception of a low-level exceedance of lithium in MW23-05. Lithium concentrations in MW23-05 decreased from September to December, and the exceedance is 0.004 mg/L greater than the lithium groundwater standard of 0.04 mg/L and 0.007 mg/L greater than the background concentration of 0.037 mg/L. Monitoring well MW23-05 is located in close proximity and downgradient of the ponds. GRDA plans to sample the perimeter wells on a quarterly basis to develop a statistically significant population of groundwater data and to monitor groundwater quality during the ACM and implementation of corrective remedies.

5.0 SUMMARY OF ASSESSMENT OF CORRECTIVE MEASURES

5.1 Methodology

Pursuant to OAC Section 252:517-9-7, further assessment of corrective measures is required to address potential releases from the landfill. The corrective measures assessment must include:

- An evaluation of the performance, reliability, potential impact, and exposure risk of the remedy;
- Determine the time to begin and complete the remedy, and
- Ensure that institutional requirements including any permitting or health requirements are met.

Based on these criteria and in order to evaluate appropriate corrective measures to address potential releases from the landfill, ENERCON completed the ACM by constructing a groundwater flow and transport model of Site, the landfill, and the areas hydraulically downgradient of the landfill. The objective of the groundwater modeling was to evaluate the movement of groundwater and the migration of landfill constituents of concern in the alluvial aquifer, to assess the potential impact and exposure risk of potential receptors (discussed in Section 3.3), and to evaluate the performance and reliability of potential corrective measures.

Groundwater modeling efforts were performed using Groundwater Modeling Software (GMS) (Version 10.7.6 utilizing a three-dimensional model to simulate saturated groundwater flow using the widely applied MODFLOW code. Constituent transport simulations were completed using MT3DMS using a partition coefficient (K_d) approach. The model structure represents hydrogeologic conditions at the Site based on observed conditions, interpreted site-specific data, available local and regional data, and other accepted published information. All model coordinates are in Oklahoma State Plane 3501 North (feet), and all units are in feet and days.

Details regarding the construction, assumption, inputs, and output of the groundwater model are described below.

5.1.1 Model Domain and Grid

The model domain and grid have dimensions of approximately 15,000 feet north to south and 10,500 feet east to west. It is bounded to the south by the Neosho River and Chouteau Creek and by topographic highs (groundwater divides) to the northeast and northwest. The distances from the boundaries to the Site are large enough to prevent boundary conditions from artificially impacting the groundwater flow gradients in the landfill area.

The model is comprised of a three-layer grid with layers representing the shallower lower permeability clay alluvial material and landfill material, the higher permeability alluvial material overlying the bedrock, and low permeability bedrock. The grid was initially discretized with 100-foot by 100-foot grid blocks. The grid was discretized into smaller grid block sizes ranging from 25-50 feet in the landfill area. The ground surface was developed using LIDAR data provided by GRDA, topographic maps, and site-specific monitoring well survey data. Surfaces of the contacts between the alluvial layers and the bedrock surface were developed from site-specific borehole data and extrapolated across the model domain. Layer 1 thicknesses range from just below one-foot thick to approximately 80-feet thick in the landfill. Layer 2 ranges in thickness from approximately under one foot to 20-feet thick, and Layer 3 is over 100-feet thick with a bottom elevation of 525 feet. **Table 3** summarized site-specific survey data incorporated into the grid, and **Figure 4** shows the discretized three-dimensional hydrostratigraphic grid viewed from the southeast with a vertical exaggeration of two times. The mound in the center of the grid represents the landfill, and the topographic highs are evident on the northwest and northeastern sides. The blue areas on the grid are the wastewater ponds, the creek to the east of the landfill, Chouteau Creek, and Neosho.

5.1.2 Groundwater Model Boundary Conditions, Sources/Sinks, and Hydraulic Parameters

Neosho River and Chouteau Creek form the hydraulic boundaries to the southeast and southwest of the groundwater model. Both are treated as General Head Boundaries within all three model layers. Constant Head elevations for the Neosho River and Chouteau Creek are assigned at 570 feet on the upgradient stretch of the stream down to 557 feet where they intersect. The northwestern and northeastern model boundaries that occur at topographic highs are treated as no flow boundaries (groundwater divides). The wastewater ponds are also treated as general head boundaries with each having a representative elevation. General Head boundaries in

MODFLOW models are assigned a conductance rate. The conductance value determines the amount of water that flows into or out of the model due to the calculated hydraulic head within the model cell. Conductance values were adjusted based on volume of water contained within a water body (flow for rivers and widths and depth for ponds), size of the water body, thickness of the material, and model calibration targets. Because the wastewater ponds are constructed with natural clay liners and the bottom of ponds are covered with fine-grained sediment accumulation, the assigned conductance rates for the ponds are relatively low ranging from 0.001 to one square foot per day per square foot ($ft^2/d/ft^2$). The conductance values assigned to the Neosho River and Chouteau Creek are much higher, 250,000 $ft^2/d/ft^2$ and 10,000 $ft^2/d/ft^2$. The conductance values for the rivers were assigned based on estimated volumetric flow rates within the river from USGS gauging stations and the Groundwater Atlas. **Figure 4** shows the distribution of the general head boundaries assigned in the model.

Recharge is the primary source of water within the model area. Based on estimates by the Oklahoma Cooperative Extension Service, average aquifer recharge rates in similar locations in Oklahoma range from zero feet per year in paved areas to 0.00137 feet per day (ft/d) (six inches per year) in areas with uncovered ground with little vegetation. In portions of the model that are paved or in areas where stormwater is diverted to storm drains/ponds/outfalls the recharge rate was set from zero to 0.00001 ft/d. Recharge rates for other portions of the model were based on vegetative cover and adjusted for calibration purposes. Grassy unpaved areas have an assigned recharge rate of 0.00008 to 0.0001 ft/d, and uncovered portions of the landfill with no vegetative cover were assigned recharge rates of 0.0002-0.0004 feet per day. **Figure 5** shows the distribution of recharge zones.

The main hydraulic parameters within the model are horizontal hydraulic conductivity (K) and vertical hydraulic conductivity. The distribution of these parameters is based on the hydrostratigraphy and results of slug tests conducted within landfill monitoring wells, and K values were adjusted during model calibration. Layer 1 has 16 K zones, Layer 2 has three K zones, and Layer 1 has 1 K zone. The following summarizes K values used in the model, and **Figures 6 and 7** show the distribution of K zones in each model layer.

<u>Layer 1</u>

Initial estimates and zones assumed that K values were higher near creeks and rivers (water flows through the path of least resistance); therefore, zones of higher K were assigned adjacent to the Neosho River, Chouteau Creek, and the creek to the east of the landfill. K in those zones ranges from one to two ft/d. K values in the vicinity of the landfill were based on landfill well slug testing results. A K value of 0.15 to 0.5 ft/d (0.00005 - 0.0001 cm/s) was assigned for the area downgradient of the landfill and the wastewater pond area. K values in the plant area and upgradient of the plant area were assigned to be 0.1 ft/d (0.00003 cm/s). These K values were derived from slug tests conducted in monitoring wells located in the plant area. The K of coal ash material was assigned a value of 0.005 ft/d. These K values were derived from slug testing conducted in landfill piezometers, from literature values from other CCR landfill sites, and K values were adjusted based on calibration. Vertical K values used in layer 1 ranged from one-tenth to one half of the horizontal K values.

Layer 2

Zones of higher K were assigned adjacent to the Neosho River and Chouteau Creek. K in those zones was assigned to be two ft/d. K values in the plant area, landfill area, wastewater pond area, and area downgradient from the landfill/ponds ranged from 0.4 to 0.5 ft/d and were based on slug testing results. Vertical K within Layer 2 was approximately one-tenth of horizontal K.

Layer 3

K values in layer three were homogeneous across the entire layer. Layer 3 represents low permeability bedrock and K values were based on literature values, assumed that bedrock in the area is relatively unfractured, and low permeability. A K value of 0.0002 ft/d was used, and vertical K was one-tenth of horizontal K.

5.1.3 Transport Model Parameters

The transport model uses a steady-state MODFLOW groundwater flow simulation to provide a transient analysis of constituent flow in groundwater using MT3D. Transport simulations were completed only for lithium because soil water distribution coefficients (K_d) for molybdenum [48 – over 2000 cubic feet per milligram (ft^3/mg)] and selenium (2.2 – 1,800 ft^3/mg) are significantly higher than lithium (0.2-0.5 ft^3/mg) and modeled lithium simulations represent a “worst case scenario.”

Because lithium is a naturally occurring, a starting concentration of 0.007 mg/l was assigned to every cell in the transport model. Lithium was also introduced as a constant source through recharge in the landfill and through the un-used landfill cell (assumed CCR runoff to low-lying area). Lithium recharge concentrations were adjusted during model calibration and resulting lithium recharge concentrations assigned to source area recharge range from 0.3 to 0.7 milligrams per liter.

When initial groundwater and transport simulations were completed, it became apparent that there may be contribution of potential impacts related to the wastewater ponds. As a result, ENERCON recommended the collection of sediment samples from ponds that appeared to have the most impact on the groundwater simulations. Three composite sediment samples were collected from three 5-inch cores collected from wastewater ponds F07 and both F08 ponds. Sediment samples were analyzed for Appendix B constituents. Sampling results were compared to the United States Environmental Protection Agency residential soil-to-groundwater Regional Screening Levels (RSL) for lithium, molybdenum, and selenium. Sediment samples exceeded the residential RSLs, and based on this, lithium concentrations were assigned as constant sources to the general head boundaries at wastewater ponds. The assigned lithium concentration was adjusted during model calibration, and the resulting lithium concentration assigned to the general head boundaries ranges from 0.1 to 0.075 milligrams per liter. Sediment sampling results are included in **Attachment A.**

Retardation of lithium was modeled using adsorption. A retardation factor is calculated in MT3D using the following equation:

$$R = 1 + \frac{\rho_b K_d}{\phi}$$

where *R* is the retardation factor, ρ_b is soil bulk density, and ϕ is porosity. The retardation factor uses a ratio of soil bulk density and K_d to develop a dimensionless constant that is divided by porosity. The K_d values for lithium in literature range from 0.2 to 0.5 cubic centimeters per gram (Strenge and Peterson, 1989). Generally, lower soil bulk density and K_d values and higher porosity translate to a lower retardation factor and higher mobility in groundwater. Considering that soil properties differ across the site and in CCR material, a lower soil bulk density value of 1.67 grams per cubic centimeter was used in the models. Porosity was assumed to be 20 percent based on soil types encountered during well installation activities. Additionally, a K_d of 0.1 cubic centimeters per gram was used in the model for conservatism. Based on this, a unitless retardation factor of 1.835 was used in the lithium simulations.

5.1.4 Model Calibration and Sensitivity

The groundwater flow model was calibrated to the December 2023 site conditions using data from all 19 landfill monitoring wells. Observation points were established at each monitoring well location in the model and were used as targets for calibration. Calibration was initially completed using trial and error by changing parameters and comparing the simulated water levels to the observed water levels. Once the groundwater model produced a reasonable error and flow budget, an automated parameter estimation simulation was run using PEST to optimize the groundwater flow model and reduced the error between the observed and simulated water levels. PEST uses specified ranges of inputs for selected parameters to determine the best statistical fit of hydraulic parameters and calculates which parameters are sensitive to the model output. The PEST results were adjusted to match the site conceptual model, and the calibrated groundwater flow model was used to model lithium transport. The final calibrated flow model has a mean head residual of -0.59 feet, a root mean absolute residual of 2.08 feet, and a root mean squared residual of 2.88 percent. The mass balance for the calibrated flow model is 0.0004%. The calibration statistics are acceptably low for this application. The resulting potentiometric map and a plot of observed versus simulated water levels in Layer 2 (convertible layer type) are provided on **Figure 8.**

The transport model calibration consisted of a series of two steady state groundwater flow models. The initial MT3D run assumed that the entirety of the landfill was uncovered for a period of 40 years (1980-2020). Those resulting conditions were used as initial concentrations to model lithium transport in groundwater from 2020 to 2023 when the top of the southern two-thirds of the landfill were capped. This output was calibrated and represents current conditions. Calibration adjustments were made to recharge concentrations in the landfill and in the wastewater ponds and to retardation factors until a reasonable fit and distribution of current lithium concentrations was achieved.

A sensitivity analysis was run in PEST during groundwater model calibration. Recharge, hydraulic conductivity, and conductance rates were analyzed. Results of the PEST automated parameter estimation sensitivity analysis indicate that the flow field simulations are most sensitive to recharge rates. The results of the sensitivity analysis are reasonable in that the only source to groundwater within the model is recharge because the site is bounded by topographic divides (no flow boundaries). Transport simulations are typically sensitive to retardation factors. Because lithium has a high cation exchange capacity, it tends to be more mobile in groundwater compared to other constituents of concern. The retardation factors used in the transport model were below those typically used for lithium in an effort to match current site conditions. When K_d values similar to other constituents of concern (selenium or molybdenum) were used on the model, the simulated outcomes were similar to where the exceedances of selenium and molybdenum have been observed at the site. Ratios of longitudinal and transverse dispersivities were also adjusted in the transport model simulation. The resulting effects did not significantly change the outcome of the modeling effort.

Overall, the groundwater flow and lithium transport simulations appear to reasonably match the observed concentrations in most areas of the Site and are acceptable for this application.

5.1.5 Predictive Simulations of Corrective Remedies

Transport simulations for potential corrective remedies were completed to simulate the future migration of constituents of concern in groundwater after remedy implementation. Based on the uncertainty of the planned highway expansion to US HWY 412 on the southern portion of the Site, modeled corrective remedies include both interim remedies that can be implemented in the short term and final remedies that will be implemented after 2026. In addition to the planned facility updates discussed in Section 3.4 including transition from coal generated energy to no- or lower carbon emission gas and solar energy generation, retirement of coal fired boilers, reducing and eventually eliminating the coal pile, and changes to the wastewater system including closure of wastewater ponds, the following corrective remedies are being considered:

- **Interim Remedy 1 - Monitored Natural Attenuation (MNA) with Enhanced Monitoring**– This scenario assumes current conditions with no changes to the facility (no pond closures, no pond cleanouts, and no landfill closure). The working portion of the landfill remains open, residual impacts will be addressed through MNA, and groundwater monitoring will be conducted with an enhanced monitoring network consisting of the current landfill monitoring wells and one to three new “sentinel” monitoring points located on the southern property boundary.

- **Interim Remedy 2 – Source Reduction through pond closures/sediment cleanout and MNA with Enhanced Monitoring** – This scenario assumes wastewater ponds F04 and F08 will be closed and sediment that has accumulated over time in pond F07 will be removed. Pond F04 is the long rectangular pond located on the west adjacent side of the landfill, F08 consists of the two ponds due south of the landfill, and F07 is located near the southwestern corner of the landfill (Figure 1). The working portion of the landfill remains open, residual impacts will be addressed through MNA, and groundwater monitoring will be conducted with an enhanced monitoring network consisting of the current landfill monitoring wells and one to three new “sentinel” monitoring points located on the southern property boundary.
- **Final Remedy 1 – Interim Remedy 2 and Source Reduction through Final Landfill Closure** – This scenario assumes that Interim Remedy 2 is implemented through at least 2026. After the retirement of coal fired boilers, the CCR landfill will be closed, and sources of landfill constituents of concern within the landfill will be eliminated or greatly reduced via the installation of a low permeability landfill cap and stormwater management practices.
- **Final Remedy 2 - Interim Remedy 2, Source Reduction through Final Landfill Closure, and Containment using a Leachate Collection Trench** – This scenario assumes that Interim Remedy 2 is implemented though at least 2026. After the retirement of coal fired boilers, the CCR landfill will be closed, and sources of landfill constituents of concern within the landfill will be eliminated or greatly reduced via the installation of a low permeability landfill cap and stormwater management practices. In addition to landfill closure, a leachate collection trench will be installed downgradient of the landfill to contain potential residual groundwater impacts. The leachate collection trench is modeled as a high permeability row of cells with a combined extraction rate of 160 cubic feet per day (approximately 1,200 gallons per day).

Simulated output was used to evaluate the performance, reliability, potential impact, and exposure risk of the potential corrective remedies. Isoconcentration maps of current conditions are included in **Figures 9 and 10**, and simulated isoconcentration maps of each corrective remedy at 10 years, 30 years, and 60 years are included in **Figures 11, 12, and 13.**

5.1.6 Groundwater Fate and Transport Modeling Results

Groundwater and transport modeling conducted at the site appear to be consistent with what has been observed at the Site. Groundwater modeling results indicate the following:

1. **Observed and simulated conditions indicate that there is limited groundwater available in the alluvial aquifer.** The primary source of water to the subsurface at the site is through recharge. Most storm water is diverted to storm drains on the northern portion of the property. As a result, there is little to groundwater on the northern portion of the property as shown by dry wells within Layer 1 in that portion of the model, and most of the groundwater comes from recharge through the uncovered landfill, other uncovered portions of the Site, or through to groundwater interactions with the wastewater ponds. Groundwater sampling activities conducted on the Site also corroborate the findings of the modeling. Saturated thickness observed in site monitoring wells in December was 15 feet or less, and groundwater is relatively slow to recharge during purging and slug testing activities.

2. **A portion of groundwater on the Site discharges to the small creek to the east of the landfill.** The small creek discharges into wastewater pond F09 and ultimately discharges to the permitted outfall on the eastern side of wastewater pond F10. No exceedances of landfill constituents of concern were observed during comprehensive sampling conducted as part of the five-year NPDES permit renewal process conducted in 2023. These results indicate that any constituents of concern that discharge to the creek are likely attenuated through natural processes and are not a concern to human health or the environment, and no constituents of concern are likely to migrate across the creek to the eastern property boundary.

3. **The results of groundwater and transport modeling indicate that the migration of constituents of concern in groundwater is slow, in line with observations from groundwater monitoring conducted since the 1990s. Furthermore, it's likely that the wastewater ponds may have contributed to the potential impacts.** The CCR landfill has operated at the Site since the 1980s. The landfill was uncovered for most of that period of time, and sediment samples collected from ponds F07 and F08 (see Section 5.1.3) indicate that that CCR material from the landfill may have discharged into stormwater ponds through stormwater runoff. Groundwater monitoring conducted around the landfill indicates the furthest downgradient migration of constituents of concern in groundwater is observed in MW23-05, located 250 feet downgradient of F08, 450 feet to the southeast of F07, and approximately 1,000 feet downgradient of the landfill. Lithium concentrations in MW23-05 are just slightly greater than the background and GWPS for lithium (on the order of parts per billion). The potential exists that the lithium concentrations observed in MW23-05 are more likely due to the wastewater ponds and are not entirely related to potential releases from the landfill. Based on this, the removal of pond sediment from F07 and closure of ponds F04 and F08 can be considered as corrective remedies.

4. **Modeling output indicates that groundwater on the site is not a risk to surface water receptors, and groundwater is not likely to migrate offsite over the next 50 years for all proposed interim and final remedies.** The transport modeling parameters used in the model assumed minimal retardation resulting higher mobility in groundwater to

produce simulations that are conservative in nature. The resulting simulations indicate that potential groundwater impacts downgradient of the landfill can be attributed in part to wastewater ponds F07 and F08. The furthest downgradient impact occurs approximately 350 feet to the south of F07. **Figures 11, 12, 13, and 14** shows isoconcentration maps of lithium for all corrective remedies at 10, 20, and 50 years.

5. **The decrease in volume of groundwater in the alluvial aquifer resulting from the closure of wastewater ponds and landfill closure results in a lower hydraulic gradient that slows migration residual lithium in groundwater over time. The installation of the leachate collection trench may result in a reversal of the hydraulic gradient.** The results of the modeling and transport simulations indicate that closure of the landfill and closure of wastewater ponds result in a dewatering of Layer 1 within the open portion of the landfill and reduces the volume of water in the landfill and pond area by approximately 30 percent when compared to current conditions. The reduction in the volume of water slows the migration of lithium in groundwater and may reduce attenuation via dilution. The installation of the leachate collection trench increases the dewatered area to include the majority of the permitted landfill area and decreases the volume of water in the landfill and pond area by 35 percent when compared to current conditions.
6. **Both Final Remedy 1 and Final Remedy 2 result in large reductions of lithium mass observed over time.** Final Remedy 1 (pond closures/cleanout, final landfill closure, MNA) results in a 20 to 50 percent reduction in lithium mass over a 10-year to 30-year time period. Final Remedy 2 (pond closures/cleanout, final landfill closure, leachate collection trench, MNA) results in a 40 to 60 percent reduction in lithium mass over a 10-year to 30-year time period.

6.0 CORRECTIVE REMEDY EVALUATION (OAC 252:517-9-8()

Based on the results of this ACM, the owner or operator must, as soon as feasible, select a remedy that, at a minimum, meets the following standards:

1. Be protective of human health and the environment;
2. Attain the groundwater protection standard as specified pursuant to OAC 252:517-9- 6(h);
3. Control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of constituents in Appendix B to this Chapter into the environment;
4. Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems;
5. Comply with standards for management of wastes as specified in OAC 252:517-9-9(d).

The following summarizes how each corrective remedy meets the above standards.

Interim Remedy 1 - Monitored Natural Attenuation (MNA) with Enhanced Monitoring

Standard	Does the remedy meet the standard?	Basis
Be protective of human health and the environment	**YES**	Does not pose a risk to receptors
Attain the groundwater protection standard as specified pursuant to OAC 252:517-9- 6(h)	**YES**	Concentrations of constituents of concern are not expected to exceed groundwater standards offsite
Control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of constituents in Appendix B to this Chapter into the environment;	**NO**	
Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems	**NO**	
Comply with standards for management of wastes as specified in OAC 252:517-9-9(d)	**YES**	

Interim Remedy 2 – Source Reduction through pond closures/sediment cleanout and MNA with Enhanced Monitoring

Standard	Does the remedy meet the standard?	Basis
Be protective of human health and the environment	**YES**	Does not pose a risk to receptors
Attain the groundwater protection standard as specified pursuant to OAC 252:517-9- 6(h)	**YES**	Concentrations of constituents of concern are not expected to exceed groundwater standards offsite
Control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of constituents in Appendix B to this Chapter into the environment;	**PARTIALLY**	Sediment will be removed from F07. Ponds F04 and F08 will be closed. Closure of wastewater ponds F04 and F08 will eliminate standing water in contact with CCR
Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems	**PARTIALLY**	Sediment will be removed from F07. Ponds F04 and F08 will be closed.
Comply with standards for management of wastes as specified in OAC 252:517-9-9(d)	**YES**	

Final Remedy 1 – Interim Remedy 2 and Source Reduction through Final Landfill Closure

Standard	Does the remedy meet the standard?	Basis
Be protective of human health and the environment	**YES**	Does not pose a risk to receptors
Attain the groundwater protection standard as specified pursuant to OAC 252:517-9- 6(h)	**YES**	Concentrations of constituents of concern are not expected to exceed groundwater standards offsite
Control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of constituents in Appendix B to this Chapter into the environment;	**YES**	The CCR landfill will be closed, and sources of landfill constituents of concern within the landfill will be eliminated or greatly reduced via the installation of a low permeability landfill cap and stormwater management practices. Sediment will be removed from F07. Ponds F04 and F08 will be closed. Closure of wastewater ponds F04 and F08 will eliminate standing water in contact with CCR.
Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems	**PARTIALLY**	Sediment will be removed from F07. Ponds F04 and F08 will be closed.
Comply with standards for management of wastes as specified in OAC 252:517-9-9(d)	**YES**	

Final Remedy 2 – Interim Remedy 2 with Source Reduction through Final Landfill Closure and the Installation of a Leachate Collection Trench

Standard	Does the remedy meet the standard?	Basis
Be protective of human health and the environment	**YES**	Does not pose a risk to receptors
Attain the groundwater protection standard as specified pursuant to OAC 252:517-9- 6(h)	**YES**	Concentrations of constituents of concern are not expected to exceed groundwater standards offsite
Control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of constituents in Appendix B to this Chapter into the environment;	**YES**	The CCR landfill will be closed, and sources of landfill constituents of concern within the landfill will be eliminated or greatly reduced via the installation of a low permeability landfill cap and stormwater management practices. Sediment will be removed from F07. Ponds F04 and F08 will be closed. Closure of wastewater ponds F04 and F08 will eliminate standing water in contact with CCR
Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems	**YES**	Installation of a leachate collection trench will remove and contain any potential residual impacts in groundwater downgradient of the landfill. Sediment will be removed from F07. Ponds F04 and F08 will be closed.
Comply with standards for management of wastes as specified in OAC 252:517-9-9(d)	**YES**	

7.0 CORRECTIVE REMEDY SELECTION

Based on the results of the ACM, GRDA proposes to implement **Final Remedy 1** which includes:

1. **Source Reduction through pond closures/sediment cleanout -** The closure of ponds F04 and F08 and the cleanout of F07 has been shown to reduce groundwater levels and lithium mass within and downgradient of the landfill ultimately slowing the migration of landfill of constituents of concern. The closure of ponds F04 and F08 will also reduce the amount of water in contact with CCR material in the landfill and reduce seepage to the water table and along the southern toe of the landfill. Sediment will be removed from the ponds and disposed of either offsite or within the landfill if waste criteria is achieved. Confirmation samples will be collected from the sides and bottom of the ponds, and ponds F04 and F08 will be filled with native, unimpacted fill material to grade.
2. **MNA with Enhanced Monitoring** – Semi-Annual and Annual Groundwater Monitoring and Reporting will continue using an Enhanced Monitoring Network to monitor any potential migration of landfill constituents of concern in groundwater. The Enhanced Monitoring Network will consist of the addition of one to three additional "sentinel" monitoring wells downgradient of MW23-05 and pond F07 in locations that are not likely to be disturbed by the proposed highway expansion or facility updates. The purpose of the Enhanced Monitoring Network is to assess the migration of landfill constituents of concern in groundwater during the interim period until final landfill closure is achieved and after landfill closure, if necessary.
3. **Source Reduction through Final Landfill Closure** – GRDA is currently working to evaluate criteria for the final landfill closure design. The open portion of the landfill will remain open until the retirement of the coal fired boilers. The final landfill closure plan will incorporate all landfill closure requirements specified under OAC 252:517-9-6(h) including mechanisms to:
    - A. Control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere;
    - B. Preclude the probability of future impoundment of water, sediment, or slurry;
    - C. Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during the closure and post-closure care period;
    - D. Minimize the need for further maintenance of the CCR unit; and
    - E. Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.

Final Remedy 1 was selected for the following reasons:

1. The transport simulations produced in the ACM indicate that concentrations of constituents of concern in groundwater are relatively stable over time, do not migrate offsite after fifty years, and are not a risk to any receptors.
2. Concentrations of landfill constituents of concern observed in landfill monitoring wells that exceed the GWPS or MCL are mainly located in close proximity to the landfill and only slightly exceed their respective standards.
3. The plan for the proposed highway expansion of the southern portion of the Site is unknown, and the potential exists that a substantial portion of the southern portion of the Site including current monitoring well locations and the modeled location of the leachate collection trench will be included in the proposed highway expansion.
4. GRDA is currently planning several updates to the GREC facility including the transition from coal generated energy to no- or lower carbon emission gas and solar energy generation, retirement of coal fired boilers, reduction/elimination of the coal pile, and changes to the wastewater system including closure of wastewater ponds. Plans are to incorporate the coal pile area into the solar field. Once the plan for the proposed highway expansion is understood and given there are no exceedances observed during Enhanced Monitoring, the solar field is planned to expand to the southern portion of the site including the former locations of the wastewater ponds and the modeled location of the leachate collection trench.

A Corrective Measures Implementation Plan outlining Interim Remedy 2 including locations of proposed “sentinel” monitoring wells, pond closure/sediment cleanout plans, and final design criteria will be completed upon the approval of this ACM. The Final Corrective Measures Implementation Plan will be completed once criteria for the landfill closure design are finalized.

8.0 REFERENCES

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Tables

Table 1
Static Water Level Survey Data - 2023
Grand River Dam Authority Landfill
Grand River Energy Center - Mayes County, Oklahoma

Sample Location	TOC Elevation (ft. AMSL)	5/3/2023		9/13/2023		11/30/2023	
		Depth to Water (ft. BTOC)	GW Elevation (ft. AMSL)	Depth to Water (ft. BTOC)	GW Elevation (ft. AMSL)	Depth to Water (ft. BTOC)	GW Elevation (ft. AMSL)
MW93-1	620.57	10.77	609.80	10.72	609.85	10.66	609.91
MW 93-02	608.31	7.68	600.63	7.88	600.43	8.01	600.3
MW93-03	608.74	14.56	594.18	16.09	592.65	15.09	593.65
MW03-01	604.97	8.61	596.36	Dry	Dry	Dry	Dry
MW03-02	607.92	14.53	593.39	16.23	591.69	16.16	591.76
MW22-01	613.72	16.52	597.20	18.86	594.86	18.6	595.12
MW22-02	609.94	12.98	596.96	14.56	595.38	13.61	596.33
MW22-03	601.37	6.64	594.73	6.83	594.54	6.6	594.77
MW22-04	609.9	14.25	595.65	16.42	593.48	15.12	594.78
MW22-05	602.23	8.46	593.77	10.25	591.98	10.14	592.09
MW22-06	607.76	21.81	585.95	23.08	584.68	22.87	584.89
MW22-07	603.37	19.2	584.17	19.46	583.91	19.5	583.87
MW22-08	600.09	8.21	591.88	9.02	591.07	8.07	592.02
MW23-01	611.487	NS	NS	19.99	591.50	19.97	591.517
MW23-02	602.641	NS	NS	17.81	584.83	18.32	584.321
MW23-03	604.685	NS	NS	11.20	593.49	10.89	593.795
MW23-04	610.359	NS	NS	16.51	593.85	17.12	593.239
MW23-05	610.497	NS	NS	16.52	593.98	17.69	592.807
MW23-06	598.777	NS	NS	9.64	589.14	9.51	589.267

AMSL - above mean sea level
BTOC - below top of casing
ft - feet
NS - Not Sampled

Table 2
Summary of Semi-Annual Groundwater Monitoring Results - November 30 - December 1-4, 2023
Grand River Dam Authority Landfill
Grand River Energy Center - Mayes County, Oklahoma

Appendix A or B	Analyte	Units	Background	GWPS/MCL	MW22-01 11/30/2023 Result	MW93-1 12/4/2023 Result	MW22-02 ######### Result	MW22-03 ######### Result	MW22-04 ######### Result	MW22-05 12/1/2023 Result	MW22-06 12/1/2023 Result
A	Alkalinity	mg/L	637	NA	524	416	374	257	118	396	276
A	Boron	mg/L	0.499	NA	0.115 J	0.298	3.02	0.155 J	<0.200	<0.200	<0.200
A	Calcium	mg/L	670	NA	239	196	333	127	60.9	223	198
A	Chloride	mg/L	63	NA	11.1	13.4	269	678	37.1	1010	159
A	Dissolved Solids	mg/L	1230	NA	916	974	5480	1410	367	2000	916
A	pH	su	7.20	NA	6.98	6.6	7.3	7.07	6.8	6.93	6.86
A	Sodium	mg/L	130	NA	23.5	92.4	1430	423	45.2	517	59.8
A	Specific Conductance	umhos/cm	1888	NA	1400	1470	7750	3100	622	4050	1390
A	Sulfate	mg/L	880	NA	282	371	3480	212	106	115	266
A,B	Fluoride	mg/L	0.245	4.0	0.165	0.157	<1.50	<0.150	0.0998 J	0.117 J	<0.150
B	Antimony	mg/L	0.005***	0.01	<0.00500	<0.00500 J4	<0.00500	<0.00500	<0.00500	<0.00500 J4	<0.00500
B	Arsenic	mg/L	0.0109	0.01	0.000311 J	0.000303 J	0.00194	0.000459 J	0.000353 J	0.000271 J	0.00029 J
B	Barium	mg/L	0.0621	2.0	0.0362	0.0124	0.0305	0.156	0.0576	0.295	0.0695
B	Beryllium	mg/L	0.005***	0.004	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
B	Cadmium	mg/L	0.00125	0.00500	0.000755 J	0.00034 J	<0.00100	0.000164 J	<0.00100	<0.00100	<0.00100
B	Chromium	mg/L	0.02	0.1	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
B	Cobalt	mg/L	0.00738***	0.006	0.00283	<0.00200	0.000386 J	0.00433	<0.00200	<0.00200	<0.00200
B	Lead	mg/L	0.005	0.015	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200
B	Lithium	mg/L	0.0370	0.04	<0.0150	<0.015	0.0153	**0.0906**	0.00904 J	0.0103 J	0.00721 J
B	Mercury	mg/L	0.0002	0.002	<0.0002 J6 O1	<0.0002 J6 O1	<0.000200	<0.000200	<0.000200	<0.000200	<0.000200
B	Molybdenum	mg/L	0.005***	0.1	<0.00500	0.000871 J	0.0945	<0.00500	<0.00500	<0.00500	<0.00500
B	Selenium	mg/L	0.002***	0.05	<0.00200	<0.00200	**0.0565**	<0.00200	<0.00200	<0.00200	<0.00200
B	Thallium	mg/L	0.001***	0.002	<0.00100	<0.00100	0.000373 J	<0.00100	<0.00100	<0.00100	<0.00100
B	Radium Combined	pCi/L	3.838	5	1.333	0.362 J	1.468 J	1.931	2.123	2.019	0.143 J

***Due to historical elevated detection limits in MW93-1, background levels are derived from MW22-01.
Constituents that exceed the GWPS/MCL are in bold.
Constituents that exceed the Background Concentration derived from MW93-1/MW22-01 are in gray.
NA - Not Applicable
B: The same analyte is found in the associated blank.
J: The identification of the analyte is acceptable; the reported value is an estimate.
J4: The associated batch QC was outside the established quality control range for accuracy
J6: The sample matrix interfered with the ability to make any accurate determination; spike value is low
O1: The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.

Table 2

Summary of Semi-Annual Groundwater Monitoring Results - November 30 - December 1-4, 2023

Grand River Dam Authority Landfill

Grand River Energy Center - Mayes County, Oklahoma

Appendix A or B	Analyte	Units	Background	GWPS/MCL	MW22-07	MW22-08	MW93-2	MW93-3	MW03-2	MW23-01	MW23-02
					12/4/2023	12/1/2023	11/30/2023	#########	12/1/2023	12/1/2023	12/1/2023
					Result	Result	Result	Result	Result	Result	Result
A	Alkalinity	mg/L	637	NA	314	404	89.2	577	217	241	197
A	Boron	mg/L	0.499	NA	0.103 J	0.194 J	1.8	0.094 J	<0.200	0.104 J	<0.200
A	Calcium	mg/L	670	NA	143	60.4	226	73.4	202	216	146
A	Chloride	mg/L	63	NA	16.5	218	1580	218	277	79.2	239
A	Dissolved Solids	mg/L	1230	NA	812	1030	6140	1170	1160	1300	884
A	pH	su	7.20	NA	7.01	7.31	10	6.98	6.7	6.74	6.22
A	Sodium	mg/L	130	NA	113	307	2680	347	136	138	136
A	Specific Conductance	umhos/cm	1888	NA	1270	1870	13900	2070	1810	1830	1590
A	Sulfate	mg/L	880	NA	345	215	5220	179	292	640	227
A,B	Fluoride	mg/L	0.245	4.0	0.143 J	0.206	<1.50	0.222	<0.150	0.11 J	<0.150
B	Antimony	mg/L	0.005***	0.01	<0.00500 J4	<0.00500 J4	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500 J4
B	Arsenic	mg/L	0.0109	0.01	0.000322 J	0.000396 J	**0.0387**	0.00057 J	<0.00100	0.000467 J	0.000224 J
B	Barium	mg/L	0.0621	2.0	0.0441	0.049	0.124	0.062	0.0292	0.0338	0.0731
B	Beryllium	mg/L	0.005***	0.004	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
B	Cadmium	mg/L	0.00125	0.00500	<0.00100	<0.00100	0.000203 J	<0.00100	<0.00100	<0.00100	<0.00100
B	Chromium	mg/L	0.02	0.1	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
B	Cobalt	mg/L	0.00738***	0.006	<0.00200	<0.00200	0.000174 J	<0.00200	<0.00200	0.000236 J	<0.00200
B	Lead	mg/L	0.005	0.015	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200
B	Lithium	mg/L	0.0370	0.04	<0.0150	**0.106**	0.0111 J	**0.133**	<0.0150	<0.0150	0.0132 J
B	Mercury	mg/L	0.0002	0.002	<0.000200	<0.000200	<0.000200	0.000933	0.000679	<0.000200	<0.000200
B	Molybdenum	mg/L	0.005***	0.1	<0.00500	<0.00500	**1.85**	<0.00500	<0.00500	<0.00500	<0.00500
B	Selenium	mg/L	0.002***	0.05	<0.00200	<0.00200	0.00137 J	<0.00200	<0.00200	<0.00200	<0.00200
B	Thallium	mg/L	0.001***	0.002	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
B	Radium Combined	pCi/L	3.838	5	0.101 J	0.866	3.093	0.278	1.117	0.248	1.267

***Due to historical elevated detection limits in MW93-1, background levels are derived fro

Constituents that exceed the GWPS/MCL are in bold.

Constituents that exceed the Background Concentration derived from MW93-1/MW22-01 a

NA - Not Applicable

B: The same analyte is found in the associated blank.

J: The identification of the analyte is acceptable; the reported value is an estimate.

J4: The associated batch QC was outside the established quality control range for accuracy

J6: The sample matrix interfered with the ability to make any accurate determination; spike

O1: The analyte failed the method required serial dilution test and/or subsequent post-spik

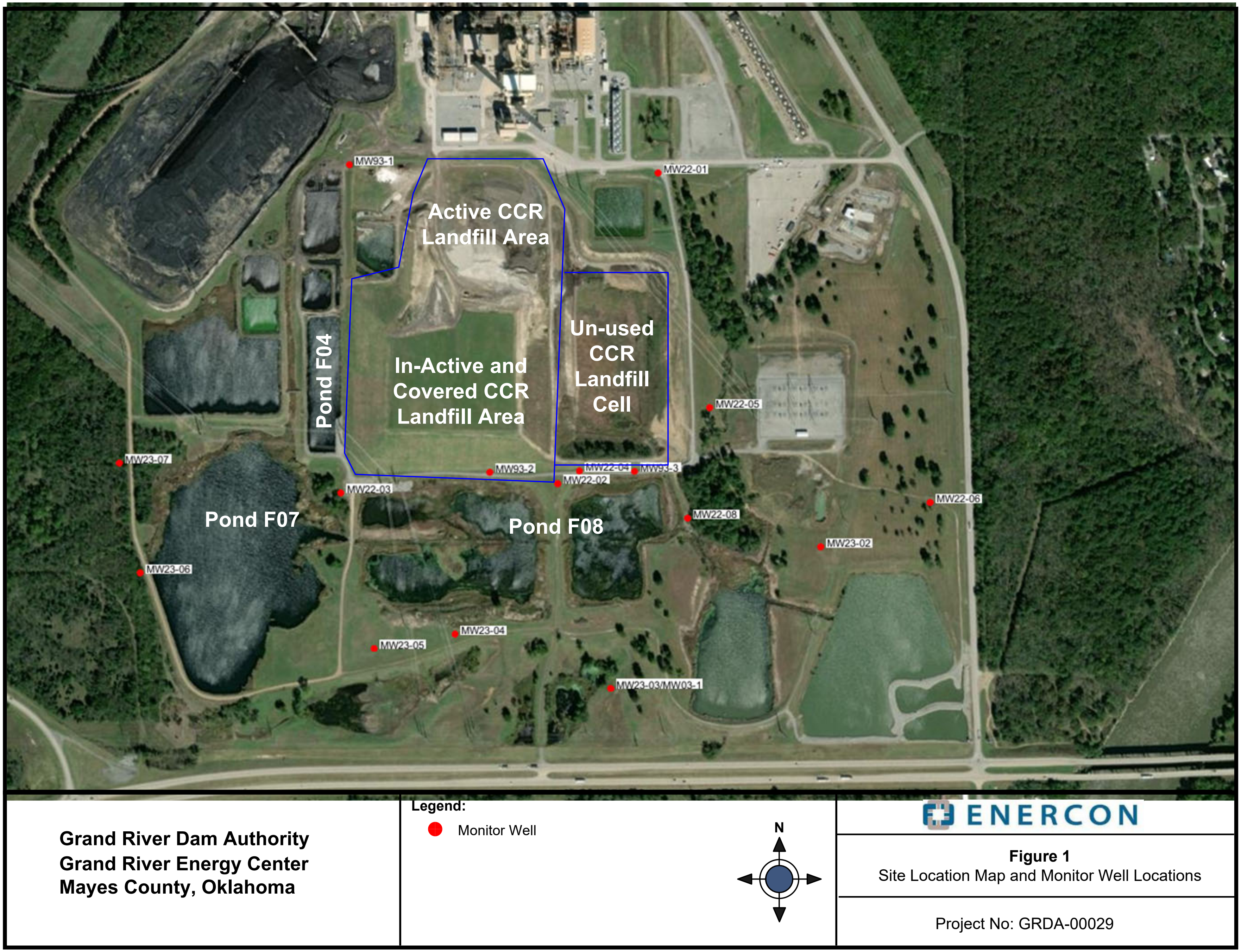
Table 2
Summary of Semi-Annual Groundwater Monitoring Results - November 30 - December 1-4, 2023
Grand River Dam Authority Landfill
Grand River Energy Center - Mayes County, Oklahoma

Appendix A or B	Analyte	Units	Background	GWPS/MCL	MW23-03	MW23-04	MW23-05	MW23-06	MW23-06DUP
					12/1/2023	12/4/2023	12/4/2023	12/4/2023	12/4/2023
					Result	Result	Result	Result	Result
A	Alkalinity	mg/L	637	NA	238	266	435	169	168
A	Boron	mg/L	0.499	NA	0.1 J	<0.200	0.509	0.131 J	0.132 J
A	Calcium	mg/L	670	NA	73.5	81.4	145	105	106
A	Chloride	mg/L	63	NA	6.1	8.45	13.1	20.1	20.1
A	Dissolved Solids	mg/L	1230	NA	337	303	632	752	755
A	pH	su	7.20	NA	7.4	7.02	6.61	7.32	6.86
A	Sodium	mg/L	130	NA	15.4	7.92	46.6	114	113
A	Specific Conductance	umhos/cm	1888	NA	573	546	1090	1150	1160
A	Sulfate	mg/L	880	NA	55.5 J6	10.7	158	403	384
A,B	Fluoride	mg/L	0.245	4.0	0.392	0.187	<0.150	0.2	0.198
B	Antimony	mg/L	0.005***	0.01	<0.00500 J4	<0.00500 J4	<0.00500 J4	<0.00500 J4	NA
B	Arsenic	mg/L	0.0109	0.01	0.00373	0.00123	0.000533 J	0.00066 J	NA
B	Barium	mg/L	0.0621	2.0	0.126	0.132	0.0848	0.0488	NA
B	Beryllium	mg/L	0.005***	0.004	<0.00100	<0.00100	<0.00100	<0.00100	NA
B	Cadmium	mg/L	0.00125	0.00500	<0.00100	<0.00100	<0.00100	<0.00100	NA
B	Chromium	mg/L	0.02	0.1	<0.0200	<0.0200	<0.0200	<0.0200	NA
B	Cobalt	mg/L	0.00738***	0.006	0.000387 J	<0.0200	0.000232 J	0.000767 J	NA
B	Lead	mg/L	0.005	0.015	<0.00200	<0.00200	<0.00200	<0.00200	NA
B	Lithium	mg/L	0.0370	0.04	0.00942 J	<0.0150	**0.0442**	<0.0150	NA
B	Mercury	mg/L	0.0002	0.002	<0.000200	<0.000200	<0.000200	<0.000200	NA
B	Molybdenum	mg/L	0.005***	0.1	0.0441	0.00286 J	<0.00500	0.00141 J	NA
B	Selenium	mg/L	0.002***	0.05	0.00056 J	<0.00200	<0.00200	<0.00200	NA
B	Thallium	mg/L	0.001***	0.002	<0.00100	<0.00100	<0.00100	<0.00100	NA
B	Radium Combined	pCi/L	3.838	5	1.111	1.329	2.867	0.777 J	NA

***Due to historical elevated detection limits in MW93-1, background levels are derived fro
Constituents that exceed the GWPS/MCL are in bold.
Constituents that exceed the Background Concentration derived from MW93-1/MW22-01 a
NA - Not Applicable
B: The same analyte is found in the associated blank.
J: The identification of the analyte is acceptable; the reported value is an estimate.
J4: The associated batch QC was outside the established quality control range for accuracy
J6: The sample matrix interfered with the ability to make any accurate determination; spike
O1: The analyte failed the method required serial dilution test and/or subsequent post-spik

Table 3
Site Specific Elevation Data
Grand River Dam Authority Landfill
Grand River Energy Center - Mayes County, Oklahoma

Well ID	Ground Elevation (ft# AMSL)	Northing (OK 3501 N ft)	Easting (OK 3501 N ft)	Top of Screen (ft# AMSL)	Btm of Screen (ft# AMSL)	Well Depth (ft btoc)	Boring Depth (ft bgs)	Elevation Top of Alluvium	Elevation Top of Bedrock/Refusal	Elevation Bottom of Fly Ash	Elevation Bottom of Layer 1
BH-1	639.647	442622.521	2767825.612	611.147	601.147	39.27	n/a		599.647	608	
BH-10	605	442196.948	2768740.9				8	603.00	597		
BH-11	607	441879.871	2768732.047				8	605.00	599		
BH-12	604.01	442075.125	2769604.998	595.51	585.51	20	n/a	590.51	584.01	600.51	
BH-13	614.522	443063.859	2768740.033	601.022	591.022	27.34	n/a	595.52	589.022		
BH-2	624.492	442287.72	2767480.072	595.992	585.992	40.05	n/a	590.49	581.492	600	
BH-3	626.971	441831.942	2767489.771	598.471	588.471	23.43	n/a	587.97	581.971	595	
BH-4	640.383	441567.388	2767719.791				15			598	
BH-5	630.967	441550.674	2768581.227	592.467	582.467	46.68	n/a	602.97	581.967	602	
BH-6	602.258	441451.653	2767686.626	593.758	583.758	20.35	n/a	588.26	583.258	598	
BH-7	619.479	441699.458	2768722.277				30	600.48	589.479	604	
BH-8	614.17	442314.585	2768701.784	595.67	585.67	29.7	n/a	593.17	584.17	608	
BH-9	610.096	442854.909	2768764.431				30	589.10	580.096		
MW 03-1	602.22	440142.322	2769093.76	598.02	593.02	12.4	10	599.72	592.72		599.72
MW 03-2	605.54	441457.793	2770510.35	591.59	581.59	26.78	25	585.04	580.54		585.04
01	610.92	443336.776	2769376.937	601.78	581.78	32.39	30	595.92	580.92		595.92
02	607.15	441405.78	2768753.766	598.34	583.34	27.05	25	599.65	582.15		599.65
03	598.42	441348.233	2767402.037	594.32	584.32	17.5	15.5	590.42	582.92		590.42
04	607.04	441485.604	2768889.172	597.28	582.28	28.07	25	597.04	582.04		597.04
05	599.45	441879.827	2769700.89	595.52	580.52	22.16	20	593.45	579.45		593.45
06	605.23	441288.4	2771073.999	594.69	579.69	28.52	26	585.23	579.23		585.23
07	600.82	441538.035	2766029.897	593.82	578.82	25	22	591.82	578.82		591.82
08	597.73	441191.043	2769563.242	590.53	580.53	20.01	17	589.73	580.73		589.73
01	608.949	441714.31	2771109.387	593.949	583.949	25	25	592.95	583.949		592.949
02	599.706	441011.932	2770391.802	586.706	576.706	23	23	584.71	576.706		584.706
03	601.977	440129.469	2769084.068	599.477	589.477	12.5	12.5	596.98	589.477		596.977
04	607.118	440448.433	2768127.609	604.118	589.118	18	18	605.12	589.118		
05	607.238	440378.421	2767609.704	604.238	589.238	18	18	597.24	589.238		597.238
06	596.304	440851.809	2766153.012	589.304	579.304	17	17	586.30	579.304		586.304
MW 93-1	618.38	443384.617	2767461.222	610.22	605.22	15.8	13.5	609.38	604.88		609.38
MW 93-2	606.58	441476.417	2768330.884	601.03	591.03	17.73	23			584.08	591.58
MW 93-3	606.17	441482.638	2769228.651	591.69	581.69	27.5	25	591.67	581.17		591.67
MW-01	620.96	444433.001	2767857.678				n/a		607.46		
MW-02	622.69	444331.189	2767959.132				n/a		613.69		
MW-03	621.76	444238.525	2768081.728				n/a		613.76		
MW-04	620.95	444128.287	2768018.374				n/a		609.95		
MW-05	621.28	444490.458	2767712.356				n/a		608.78		
MW-06	621.72	444365.526	2767705.334				n/a		609.22		
MW-07	621.02	444331.699	2767735.652				n/a		608.02		
MW-08	623.42	444252.027	2767738.447				n/a		609.92		
MW-09	621.37	444129.66	2768072.561				n/a		611.87		
MW-10	621.22	444087.509	2768042.157				n/a		612.22		
MW-11	620.65	443873.212	2768248.325				n/a		611.65		
MW-12	622.34	443868.332	2768022.294				n/a		610.34		
MW-13	618.24	443891.915	2767848.995				n/a		610.74		
PSB-01	620	444851.919	2767219.083				10		610		610
PSB-02	625	444682.681	2767541.287				7.5		617.5		617.5
PSB-05	615	443945.333	2769545.809				12	607.00	603		607
PSB-07	601	441525.207	2767380.686				14	591.00	587		591
PSB-09	600	441479.88	2768310.15				23	592.50	577		592.5
PSB-12	613	441485.411	2769240.559				24	601.00	589		601
PSB-17	615	442367.335	2765613.012				19	615.00	600		
TBH-1	679.159	441800.237	2767907.734				75			603.159	
TMW-1	683.859	441832.301	2767921.364	619.842	609.842	69.69	n/a			600	
TMW-2	684.122	441798.566	2768457.377	602.109	592.109	81.6	n/a			602	
TMW-3	681.999	442083.893	2768121.032	613.999	603.999	72.52	n/a			603	
TMW-4	681.454	442291.38	2767952.658	617	605	69.5	n/a			605	
TMW-5	680.199	442433.806	2768341.83	615.024	607.024	71.78	n/a			608	
TMW-6	637.751	442931.565	2768268.484	618	608	30	30			613	
TMW-7	616.905	442643.501	2767740.565	607	597	20	20			608	
TMW-8	603	441073.528	2768740.463	593	583	20	20			600	



Grand River Dam Authority
Grand River Energy Center
Mayes County, Oklahoma

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Figure 1
Site Location Map and Monitor Well Locations

Project No: GRDA-00029

Grand River Dam Authority
Grand River Energy Center
Mayes County, Oklahoma

Legend:

Monitor Well

MW03-1, located next to MW23-03 was dry in December 2023.

N

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Figure 2
Groundwater Gradient
December 2023

Project No: GRDA-00029

Grand River Dam Authority
Grand River Energy Center
Mayes County, Oklahoma

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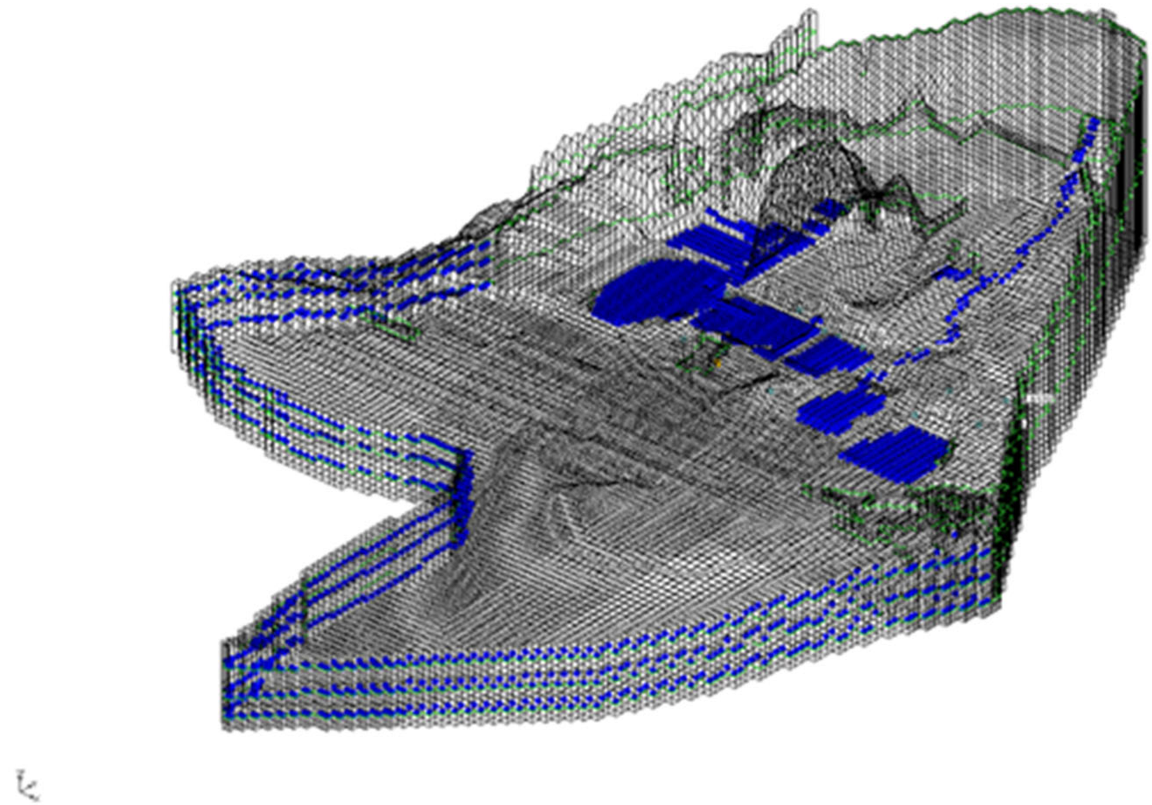
Figure 3
Potential Receptors

Project No: GRDA-00029



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Mayes County, Oklahoma

General Head Boundary

N

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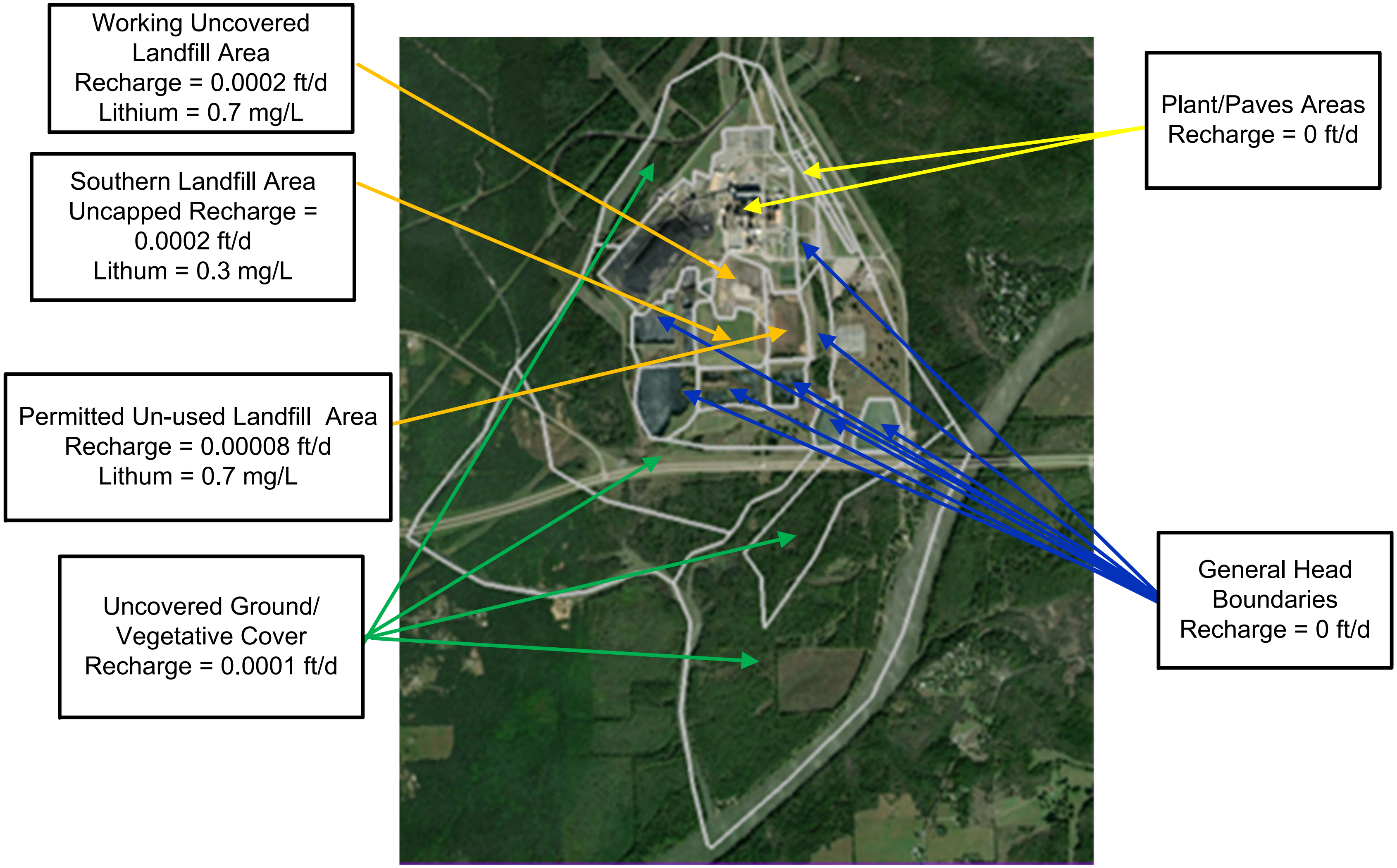
Figure 4
3-D Discretized Hydrostratigraphic Grid and Boundary Conditions

Project No: GRDA-00029



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Mayes County, Oklahoma

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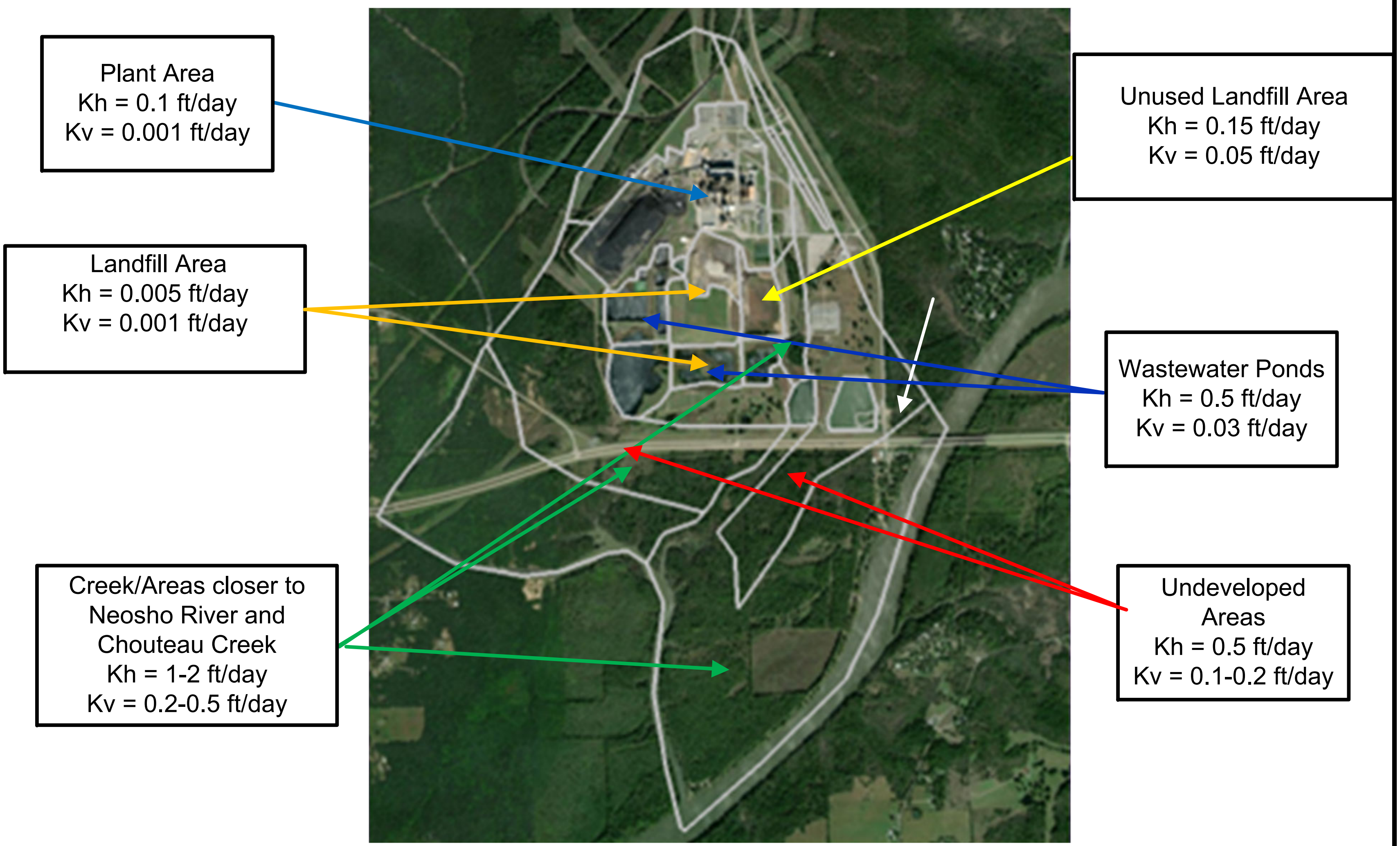
Figure 5
Recharge Zones – Layer 1

Project No: GRDA-00029



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Mayes County, Oklahoma

Kh = Horizontal Hydraulic Conductivity
Kv = Vertical Hydraulic Conductivity

N

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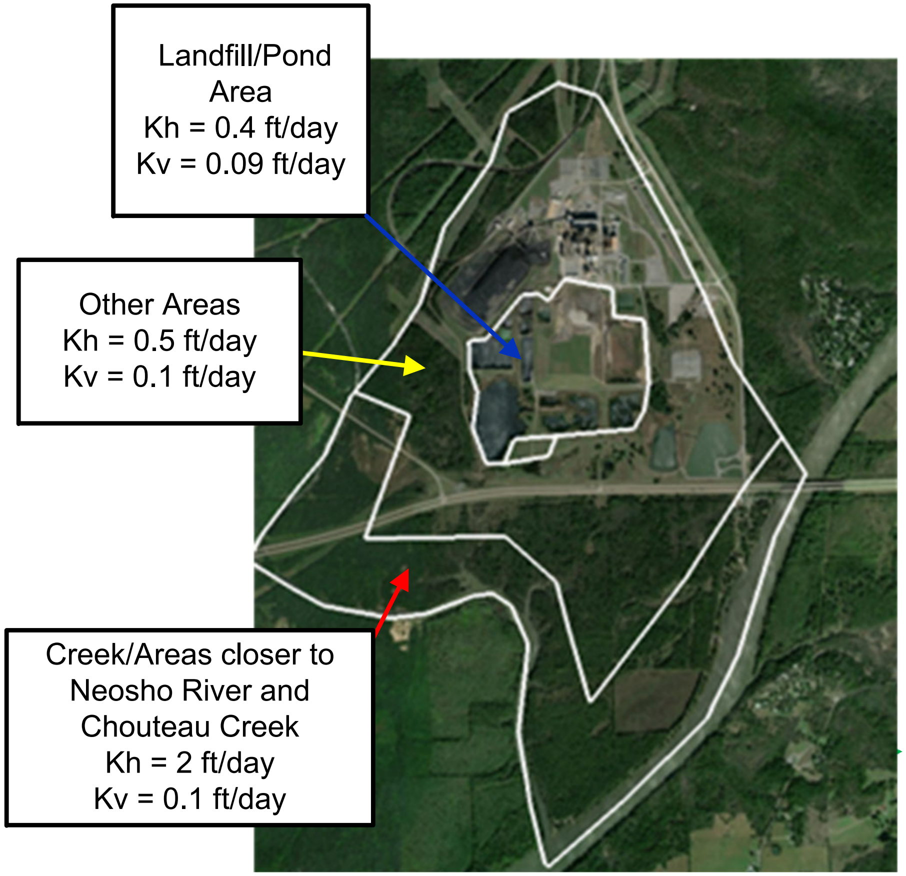
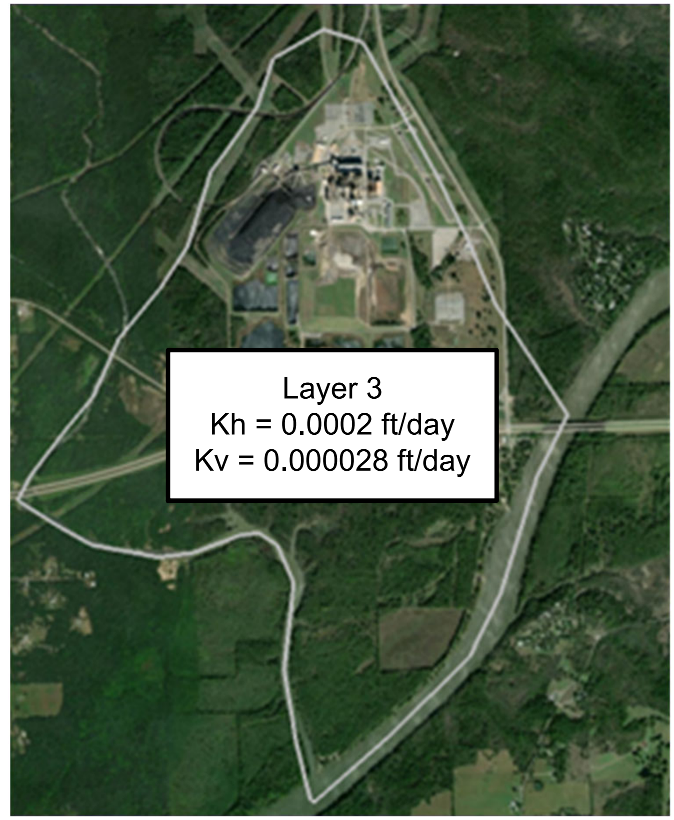
Figure 6
Layer 1 Hydraulic Conductivity Zones

Project No: GRDA-00029





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Mayes County, Oklahoma

Kh = Horizontal Hydraulic Conductivity
Kv = Vertical Hydraulic Conductivity

N

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Figure 7
Layers 2 and 3 Hydraulic Conductivity Zones

Project No: GRDA-00029

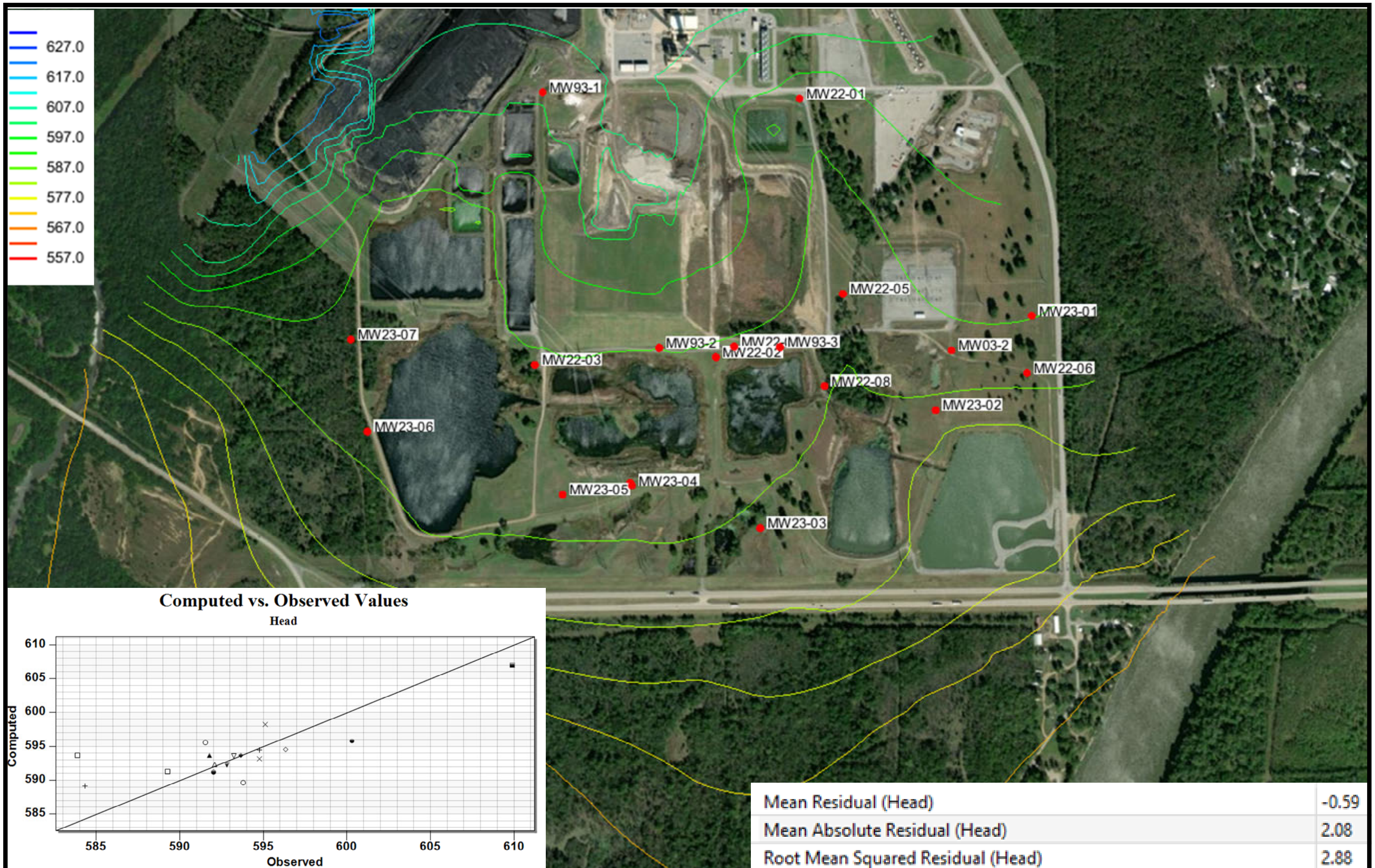

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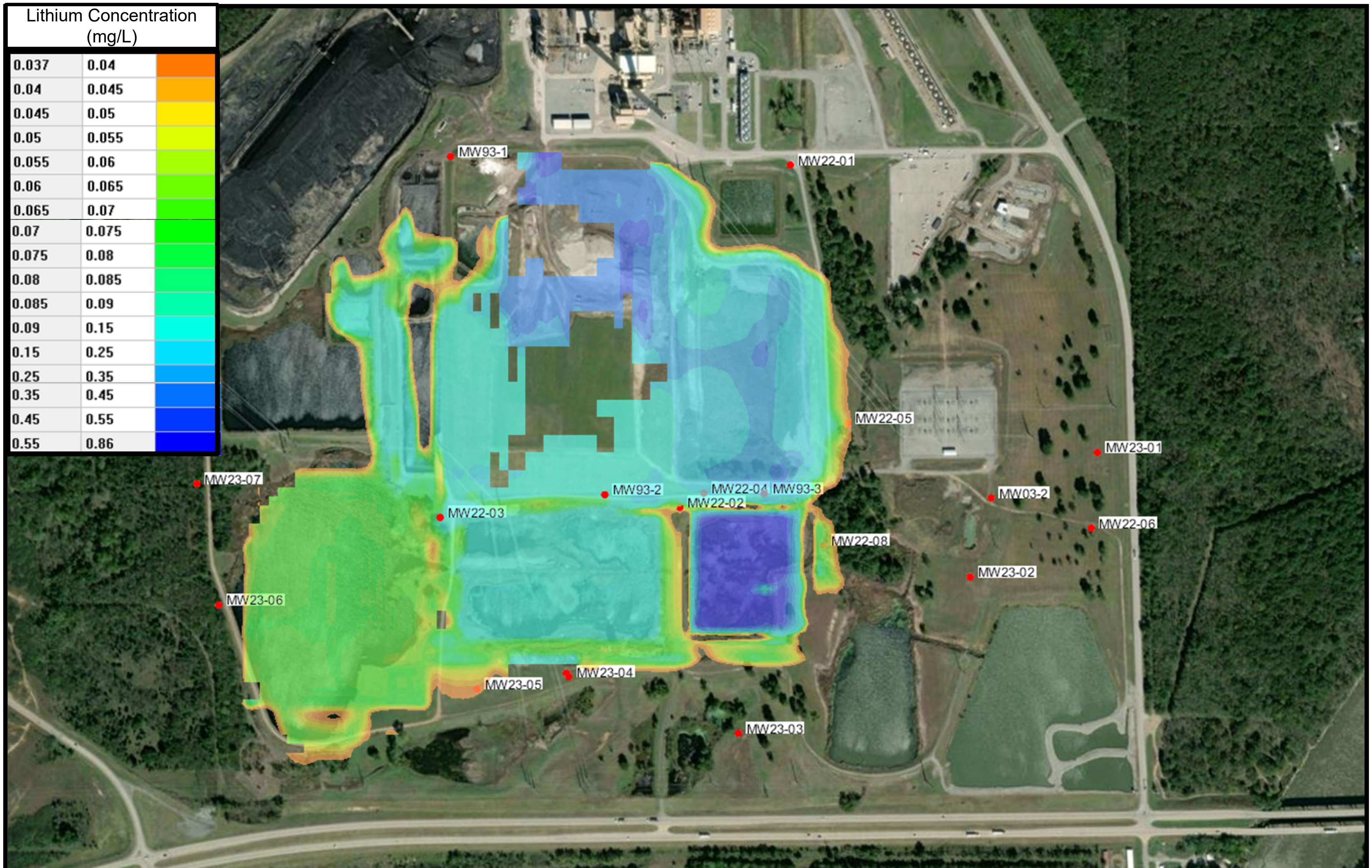
Figure 8
Simulated Potentiometric Surface

Project No: GRDA-00029



Grand River Dam Authority
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Mayes County, Oklahoma

Legend:

● Monitor Well

N

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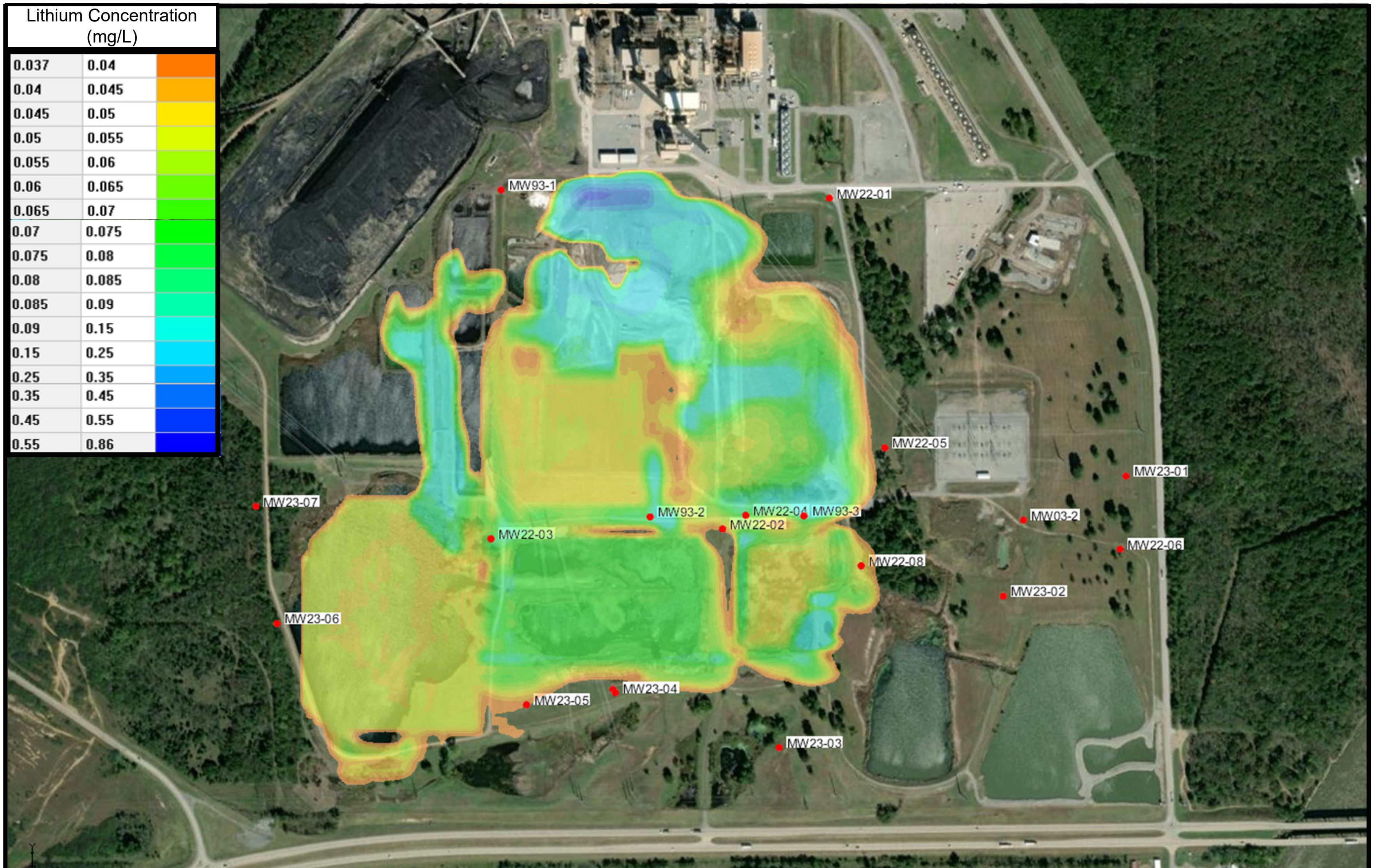
Figure 9
Current Conditions Layer 1
December 2023

Project No: GRDA-00029



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Mayes County, Oklahoma

Legend:

- Monitor Well

N

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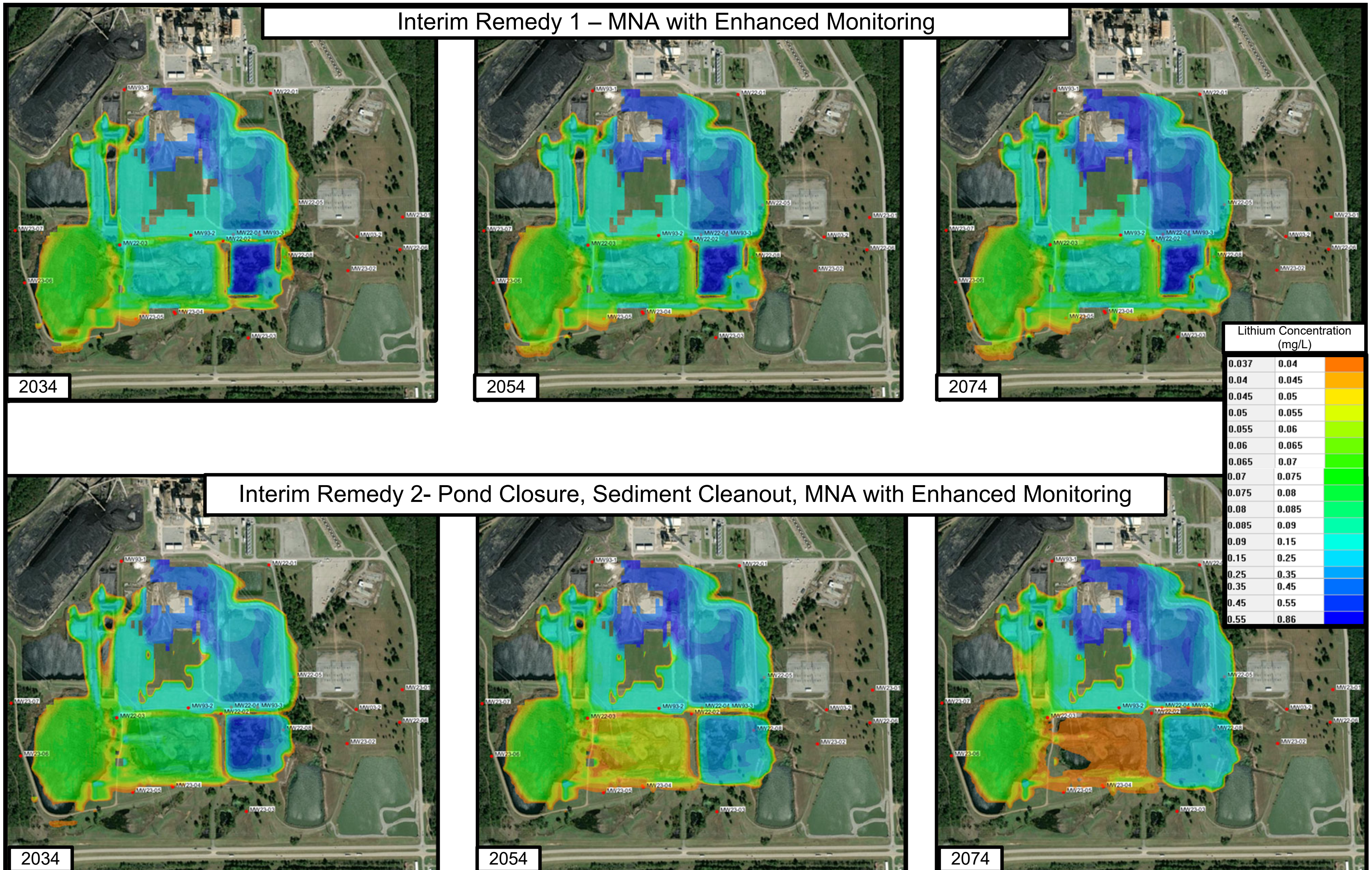
Figure 10
Current Conditions Layer 2
December 2023

Project No: GRDA-00029



Grand River Dam Authority
Grand River Energy Center
Mayes County, Oklahoma

Legend:

Monitor Well

N

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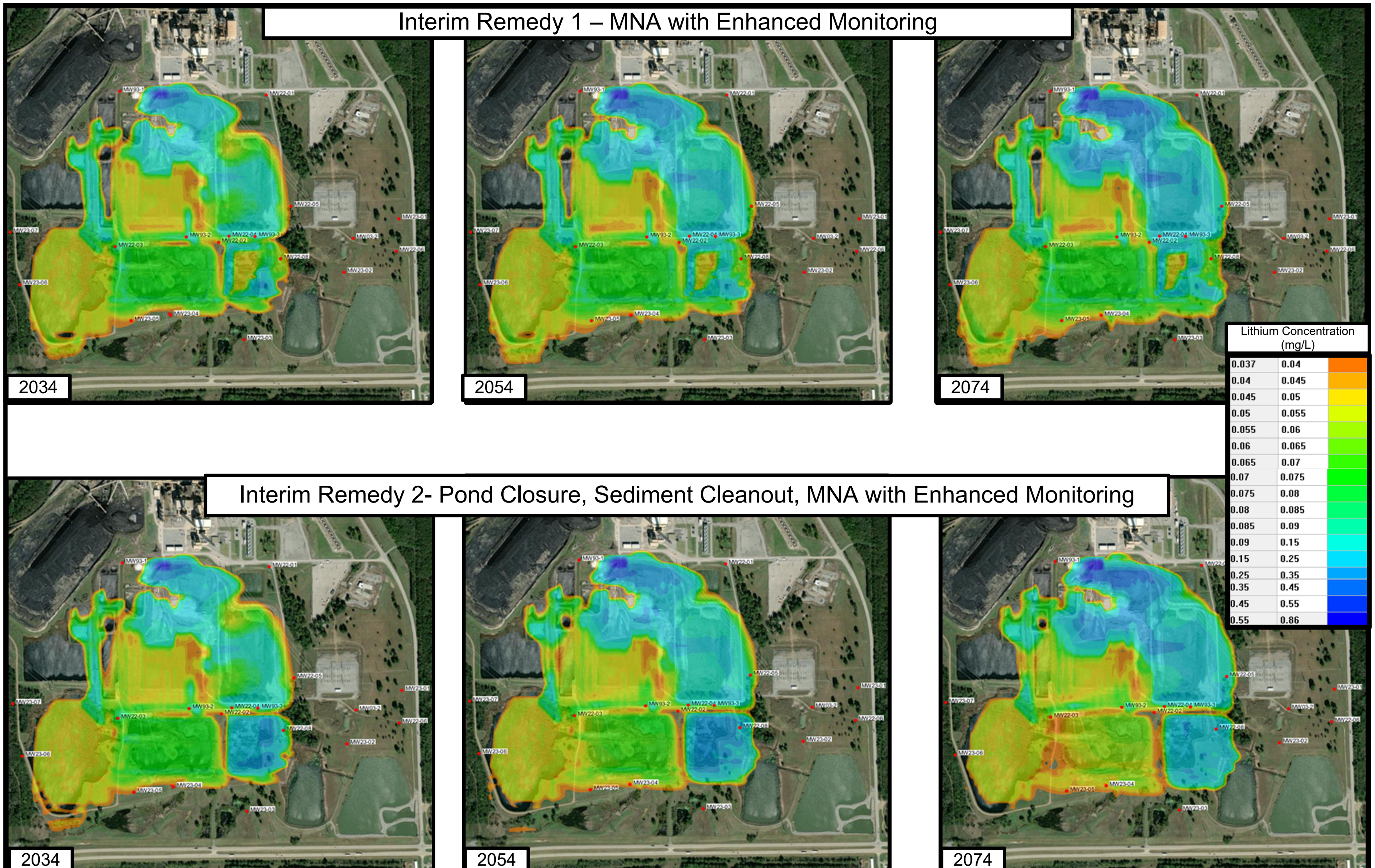
Figure 11
Proposed Corrective Remedies
MNA and Pond Closure - Layer 1

Project No: GRDA-00029



Grand River Dam Authority
Grand River Energy Center
Mayes County, Oklahoma

Legend:

Monitor Well

N

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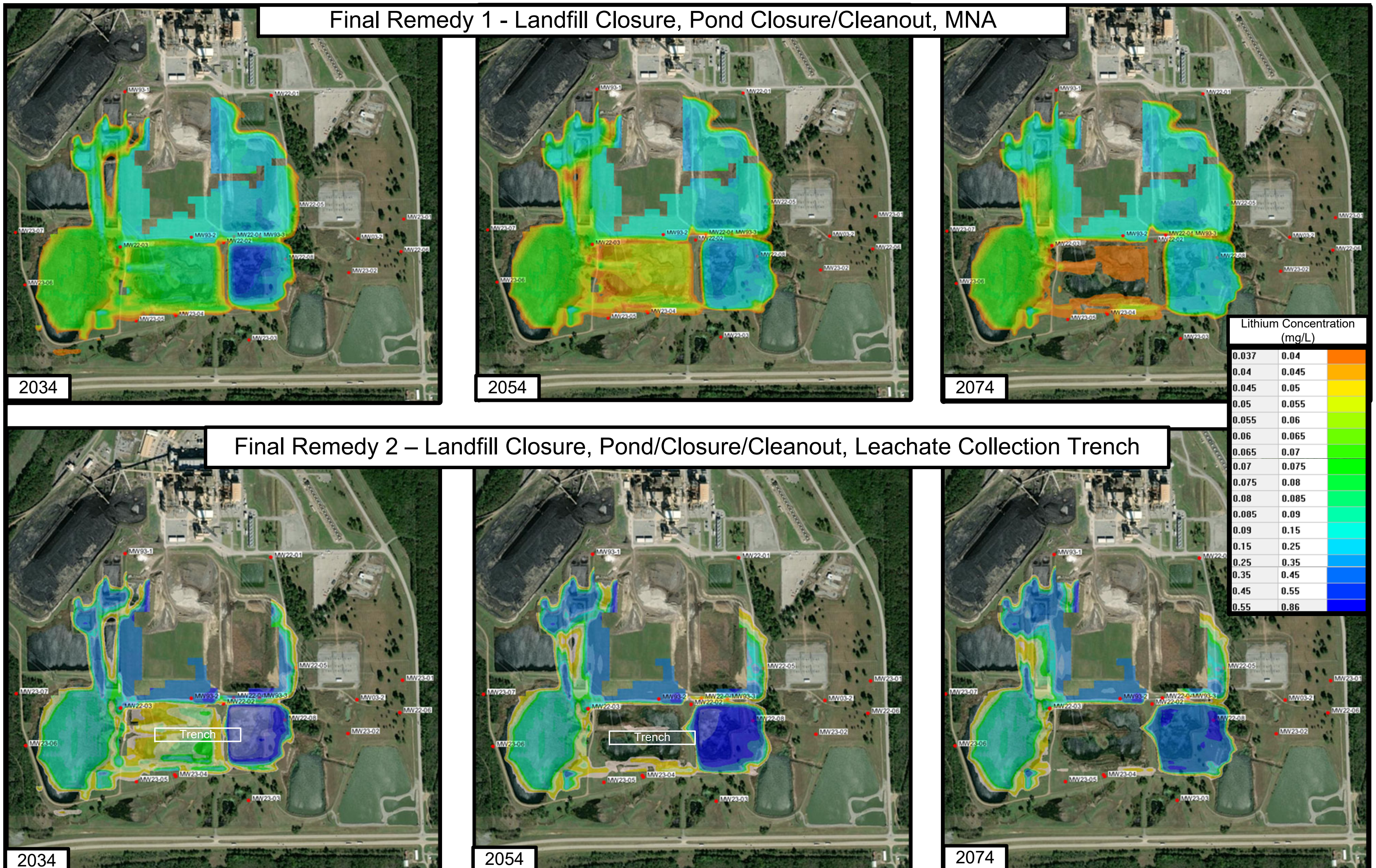
Figure 12
Proposed Corrective Remedies
MNA and Pond Closure - Layer 2

Project No: GRDA-00029



Grand River Dam Authority
Grand River Energy Center
Mayes County, Oklahoma

** The areas within the landfill with no isoconcentration contours are dry/dewatered from the implementation of corrective measures. As a result, the residual lithium present within the top layer of the model appears to be concentrating in the eastern portion of pond F08. This is a function of the lowering of the water table, and lower volumes of water decrease the dilution and lower the mobility of residual lithium.

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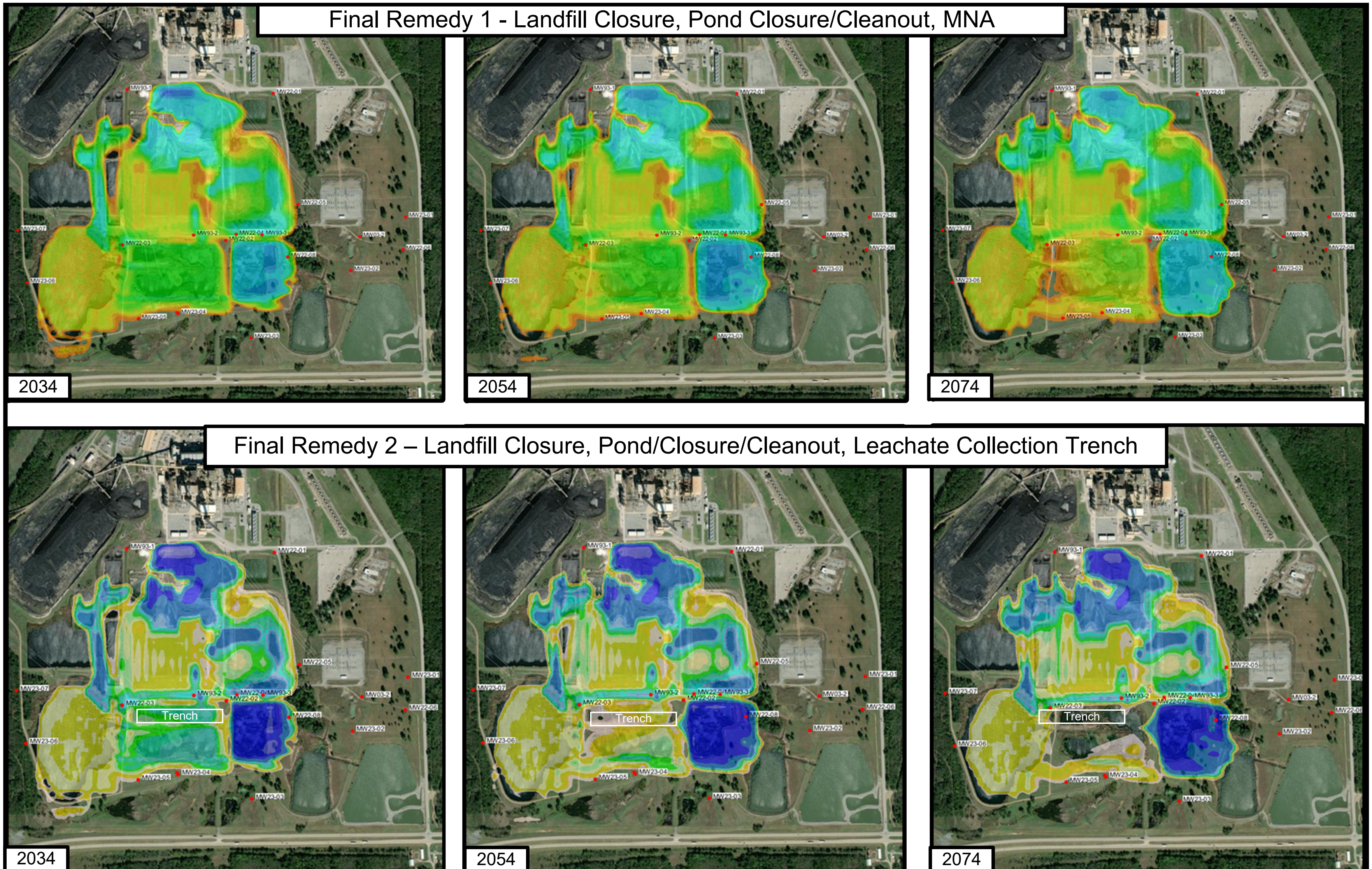
Figure 13
Proposed Corrective Remedies
Landfill Closure/Pond Closure and Leachate Collection Trench - Layer 1

Project No: GRDA-00029



Grand River Dam Authority
Grand River Energy Center
Mayes County, Oklahoma

**Residual lithium present within the layer 2 of the model appears to be concentrating in the eastern portion of pond F08 due to the dewatering of areas of layer 1 and removal of groundwater at the leachate collection trench. The mobility and dilution of residual lithium is decreased due to a flatter gradient and decrease in the volume of groundwater.

N

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Figure 14
Proposed Corrective Remedies
Landfill Closure/Pond Closure and Leachate Collection Trench - Layer 2

Project No: GRDA-00029

Attachment A

ANALYTICAL REPORT

January 16, 2024

Enercon - Oklahoma City, OK

Sample Delivery Group:	L1685921
Samples Received:	12/07/2023
Project Number:	GRDA-00027
Description:	GRDA Landfill, Chouteau, OK
Report To:	Rusty Lynch 2302 S. Prospect Ave. Oklahoma City, OK 73129

Entire Report Reviewed By:

Jason Romer
Project Manager

Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

F-07 COMP L1685921-01 Solids and Chemical Materials

Collected by: C. Cope | Collected date/time: 12/06/23 09:20 | Received date/time: 12/07/23 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method Calculation	WG2194105	1	12/22/23 12:50	01/12/24 16:17	DDD	Mt. Juliet, TN
Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)	WG2196725	1	12/22/23 12:50	01/12/24 16:17	DDD	Mt. Juliet, TN

F-08 COMP W L1685921-02 Solids and Chemical Materials

Collected by: C. Cope | Collected date/time: 12/06/23 10:25 | Received date/time: 12/07/23 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method Calculation	WG2194105	1	12/22/23 12:50	01/12/24 15:14	DDD	Mt. Juliet, TN
Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)	WG2196725	1	12/22/23 12:50	01/12/24 15:14	DDD	Mt. Juliet, TN

F-08 COMP E L1685921-03 Solids and Chemical Materials

Collected by: C. Cope | Collected date/time: 12/06/23 10:50 | Received date/time: 12/07/23 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method Calculation	WG2194105	1	12/22/23 12:50	01/12/24 11:43	DDD	Mt. Juliet, TN
Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)	WG2196725	1	12/22/23 12:50	01/12/24 11:43	DDD	Mt. Juliet, TN

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Jason Romer
Project Manager

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	0.884		0.194	0.312	01/12/2024 16:17	WG2194105

Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)

Analyte	Result pCi/g	Qualifier	2 sigma CE +/-	TPU +/-	MDA pCi/g	Lc pCi/g	Analysis Date date / time	Batch
Actinium-228 (Ra-228)	0.390		0.148	0.148	0.274	0.112	01/12/2024 16:17	WG2196725
Bismuth-214 (Ra-226)	0.494		0.125	0.125	0.150	0.0638	01/12/2024 16:17	WG2196725

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	1.04		0.194	0.279	01/12/2024 15:14	WG2194105

Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)

Analyte	Result pCi/g	Qualifier	2 sigma CE +/-	TPU +/-	MDA pCi/g	Lc pCi/g	Analysis Date date / time	Batch
Actinium-228 (Ra-228)	0.373		0.137	0.137	0.242	0.0955	01/12/2024 15:14	WG2196725
Bismuth-214 (Ra-226)	0.667		0.137	0.137	0.139	0.0584	01/12/2024 15:14	WG2196725

Cp
Tc
Ss
Cn
Sr
Qc
Gl
Al
Sc

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty + / -	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	0.950		0.197	0.302	01/12/2024 11:43	WG2194105

Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)

Analyte	Result pCi/g	Qualifier	2 sigma CE + / -	TPU + / -	MDA pCi/g	Lc pCi/g	Analysis Date date / time	Batch
Actinium-228 (Ra-228)	0.458		0.154	0.154	0.264	0.106	01/12/2024 11:43	WG2196725
Bismuth-214 (Ra-226)	0.492		0.123	0.123	0.147	0.0618	01/12/2024 11:43	WG2196725

Method Blank (MB)

(MB) R4022656-4 01/12/24 20:02

Analyte	MB Result pCi/g	MB Qualifier	MB 2 sigma CE +/-	MB MDA pCi/g	MB Lc pCi/g
Actinium-228 (Ra-228)	-0.0409	U	0.103	0.277	0.115
Americium-241	0.00971	U	0.115	0.213	0.0980
Bismuth-214 (Ra-226)	-0.0116	U	0.0633	0.138	0.0583
Cesium-137	-0.00641	U	0.0388	0.0842	0.0361
Cobalt-60	-0.0207	U	0.0255	0.0791	0.0298

L1684146-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1684146-01 01/12/24 18:29 • (DUP) R4022656-2 01/12/24 17:06

Analyte	Original Result pCi/g	Original 2 sigma CE +/-	Original MDA pCi/g	Original Lc pCi/g	DUP Result pCi/g	DUP 2 sigma CE +/-	DUP MDA pCi/g	DUP Lc pCi/g	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Actinium-228 (Ra-228)	0.902	0.174	0.221	0.0952	0.772	0.154	0.237	0.106	15.6	0.562		20	3
Bismuth-214 (Ra-226)	1.55	0.178	0.120	0.0533	1.60	0.169	0.112	0.0509	3.49	0.224		20	3

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R4022656-3 01/12/24 18:53 • (LCSD) R4022656-1 01/12/24 16:42

Analyte	Spike Amount pCi/g	LCS Result pCi/g	LCSD Result pCi/g	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Americium-241	47.3	45.0	48.1	95.2	102	75.0-125			6.57	20
Cesium-137	72.4	76.2	76.7	105	106	80.0-120			0.602	20
Cobalt-60	86.9	83.2	85.8	95.7	98.7	80.0-120			3.09	20

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDA	Minimum Detectable Activity.
Rec.	Recovery.
RER	Replicate Error Ratio.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
U	Below Detectable Limits: Indicates that the analyte was not detected.

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Enercon - Oklahoma City, OK

2302 S. Prospect Ave.
Oklahoma City, OK 73129

Billing Information:
Accounts Payable - Lisa Hedrick
2302 S. Prospect Ave.
Oklahoma City, OK 73129

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

Pace PEOPLE ADVANCING SCIENCE

MT JULIET, TN

12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

Report to: Rusty Lynch

Email To: rlynch@enercon.com;ccurrent@enercon.com;cc

Project Description: GRDA Landfill, Chouteau, OK

City/State Collected: Chouteau/OK

Please Circle: PT MT (CT) ET

Phone: 405-722-7693

Client Project #: GRDA-00027

Lab Project #: ENERCOOK-GRDA

SDG # L1685921

M006

Collected by (print): C.Cope

Site/Facility ID #

P.O. #

Collected by (signature): [signature]

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Immediately Packed on Ice N ___ Y X

Acctnum: ENERCOOK
Template: T242894
Prelogin: P1041727
PM: 104 - Jason Romer
PB: 12-1-23 Gm
Shipped Via: FedEX Priority

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	FLUORIDE,TS 4ozClr-NoPres	Metals 4ozClr-NoPres	RA-226/228COMB 16ozHDPE-NoPres	Remarks	Sample # (lab only)
F-07 Comp	Comp	SCM		12-6-23	0920	3	X	X	X		-01
F-08 Comp W	Comp	SCM		12-6-23	1025	3	X	X	X		-02
F-08 Comp E	Comp	SCM		12-6-23	1050	3	X	X	X		-03

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other________

Remarks: Metals = Sb, As, Ba, Be, Cd, Cr, Co, Pb, Li, Mo, Se, & Tl by 6010 and Hg by 7471.

pH ______ Temp ______
Flow ______ Other ______

Samples returned via:
___ UPS ___ FedEx ___ Courier ________

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: ✓Y __N
<500 cpm

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)		
[signature]	12-6-23	1400	[signature]	Trip Blank Received: Yes / (No) HCL / MeoH TBR	
[signature] Chris R.	12-6-23	18:00	SWA	Temp: OPA °C .3+0=.3	Bottles Received: 9
			Received for lab by: (Signature) Caleb T.	Date: 12/7/23	Time: 08:00

If preservation required by Login: Date/Time

Hold:

Condition: NCF / (OK)

BURGESS ENGINEERING AND TESTING

October 20, 2023

Enercon Services
2302 S. Prospect Ave.
Oklahoma City, OK 73129

Attention: Mr. Rusty Lynch
Project Manager

Re: Letter of Laboratory Test Results
For GRDA-00027
Sample ID: MW23-06 (11'~12.4')
Project No.: 731-23141

Dear Mr. Lynch:

Enclosed please find the laboratory test results. As requested, Burgess Engineering and Testing (BET) has performed Hydraulic Conductivity (k) test, Soil Classification (including hydrometer), natural water content, Dry Bulk Density test, Specific Gravity and FOC tests on the one (1) Shelby tube Sample ID: MW23-06 (11'~12.4'), delivered to BET office on September 11, 2023 by Mr. Rusty Lynch, Project Manager at Enercon Services.

We appreciate the opportunity to have provided you with our geotechnical engineering services. If you have any questions concerning this letter or if we may be of further service in any manner please contact our office.

Respectfully,
BURGESS ENGINEERING AND TESTING

Basil Abdulkareem, P.E.
Geotechnical Engineer

Ali H. Ebrahimi, Ph.D., P.E.
Manager

LICENSED PROFESSIONAL ENGINEER
ALI HONARNMAND-EBRAHIMI
16029
OKLAHOMA

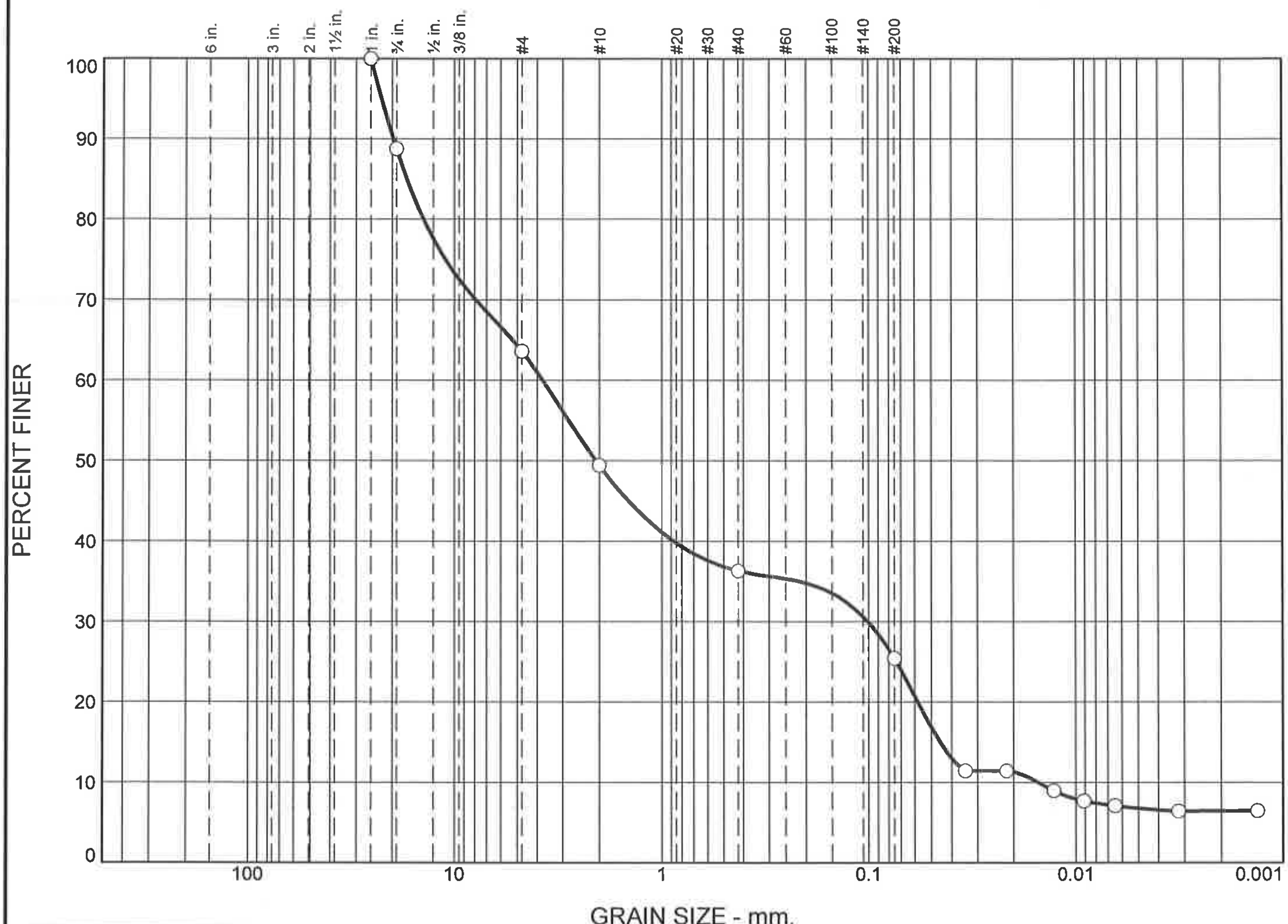
BA/jg

Attachments: Laboratory Test Results

SOIL CLASSIFICATION, NATURAL WATER CONTENT,
VOLUMETRIC WATER CONTENT , DRY BULK DENSITY
SPECIFIC GRAVITY, POROSITY AND HYDRAULIC CONDUCTIVITY
FOR GRDA-00027
SAMPLE ID: MW23-06 (11'~12.4')
PROJECT NO.: 731-23141

Soil Tests @ 11'~12.4'		
Soil Classification	USCS	Clayey Sand with Gravel (SC)
	AASHTO	A-2-7 (2)
Passing #10		49.4 %
Passing #40		36.3%
Passing #200		25.5 %
Liquid Limit (LL)		46
Plastic Limit		19
Plasticity Index		27
Natural Water Content		10.4 %
Volumetric Water Content		0.199 cm3/cm3
Dry Bulk Density		119.2 pcf
Specific Gravity		2.621
Porosity		0.271
Hydraulic Conductivity		1.06E-08 cm/sec
Fractional Organic Carbon		0.12 %
Organic Matter		0.20 %

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	11.2	25.2	14.2	13.1	10.8	18.7	6.8

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	46	19	16.9632	3.7542	2.0726	0.1006	0.0453	0.0152	0.18	247.00

Material Description	USCS	AASHTO
○ Mottled color Clayey Sand with Gravel	SC	A-2-7(2)

Project No. 731-23141 **Client:** Enercon

Project: Permeability & Soil tests for GRDA-00027

○ **Source:** ID: MW23-06 **Depth:** 11'-12.4' **Sample No.:** ID: MW23-06

Remarks:

Burgess Engineering And Testing

Moore, OK

Figure

4619 N. Santa Fe Ave
Oklahoma City, OK 73118
405.488.2400 Phone
405.488.2404 Fax
www.oilab.com

Burgess Engineering & Testing Inc.
809 NW 34th
Moore OK, 73160

Project Number: 731-23141 / ID: MW23 - 06 (11 - 12.4)
Project Manager: Accounts Payable

Reported:
10/03/23 10:34

P3I0092-01 (Solid)

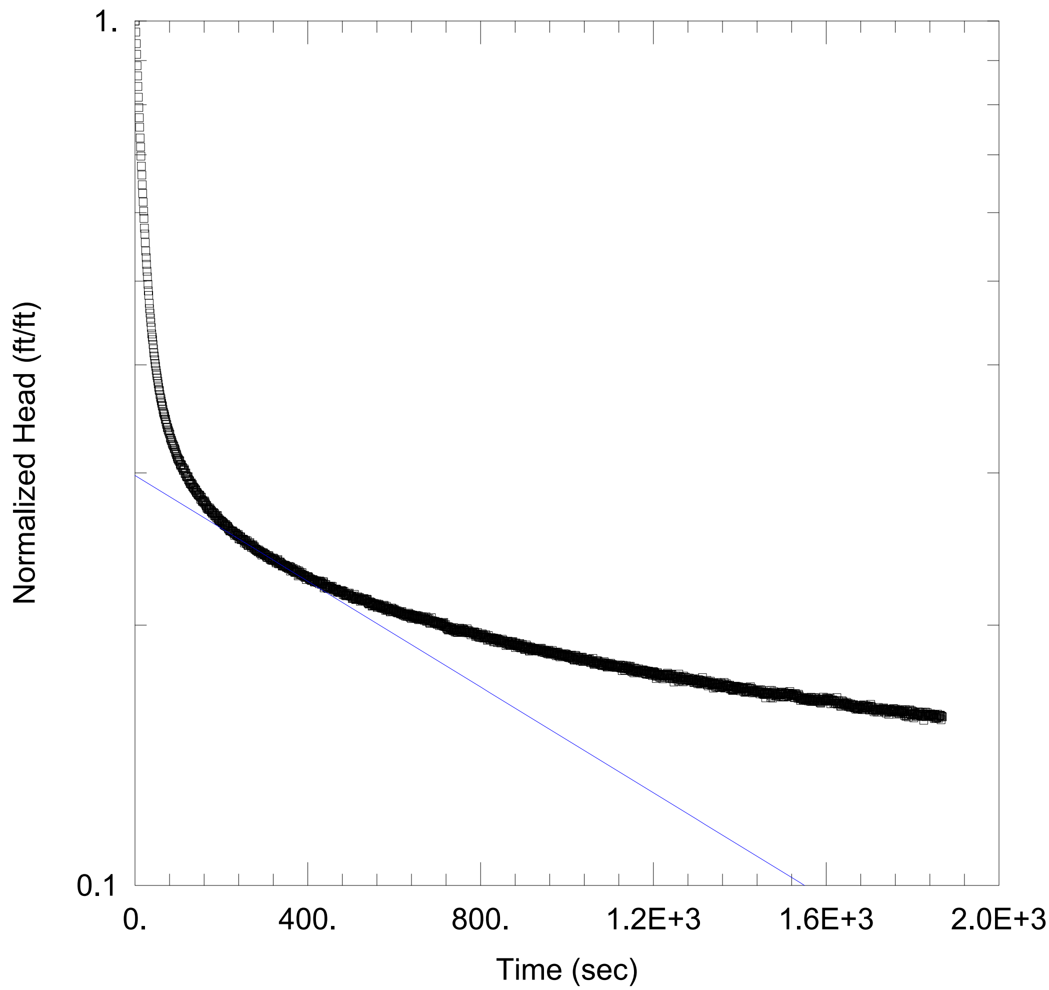
Sampled: 9/26/2023 12:00:00AM
Sample Name: MW23 - 06 (11'-12.4')

Parameter	Result	Reporting Limit	Units	Analyzed	Method	Qualifiers
Chemistry Parameters by ASTM Methods						
Fractional Organic Carbon	**0.12**	0.02	% by Weight	10/02/23	Walkley-Black	
Organic Matter	**0.20**	0.03	% by Weight	10/02/23	Walkley-Black	

ETI-Oilab, LLC

Jorge Gamarra For Russell Britten, President

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



MW-1 FH1

Data Set: C:\Desktop\GRDA\Slug2023\MW1fh1.aqt
Date: 11/15/23 Time: 15:23:47

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW-1 VCP Area
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 4.05 ft
Anisotropy Ratio (Kz/Kr): 0.1

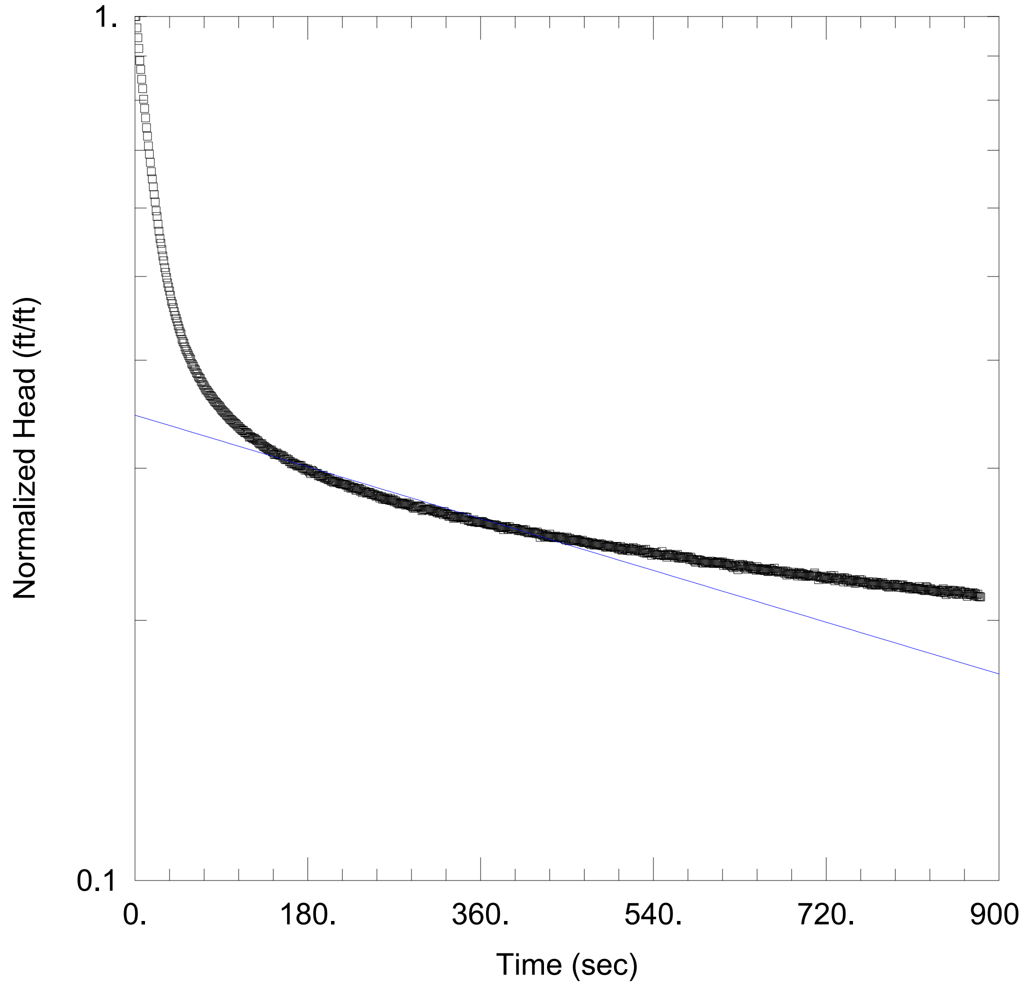
WELL DATA (MW-1)

Initial Displacement: 1.154 ft
Static Water Column Height: 4.05 ft
Total Well Penetration Depth: 10. ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 4.538E-5 cm/sec
y0 = 0.3439 ft



MW-1 FH2

Data Set: C:\Desktop\GRDA\Slug2023\MW1fh2.aqt
Date: 11/15/23
Time: 15:43:39

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW-1 VCP Area
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 4.05 ft
Anisotropy Ratio (Kz/Kr): 0.1

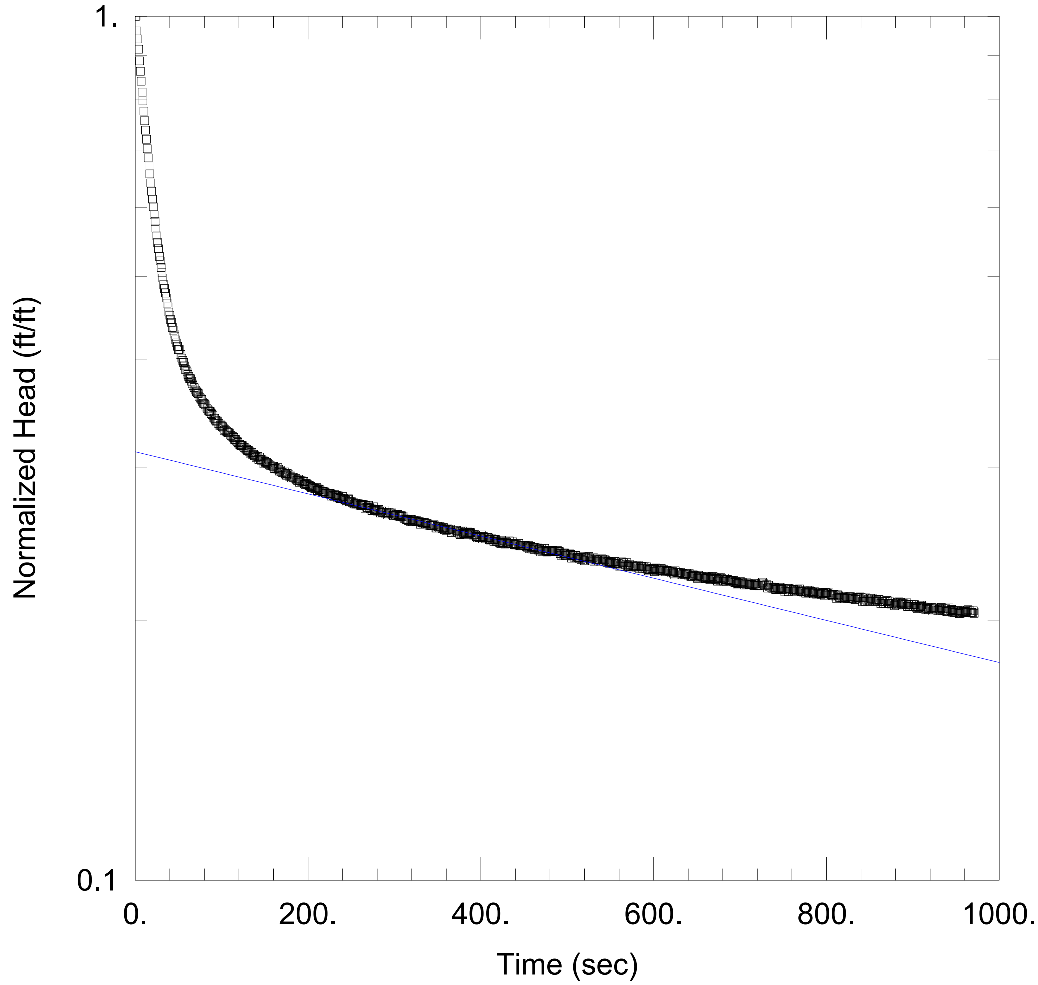
WELL DATA (MW-1)

Initial Displacement: 1.14 ft
Static Water Column Height: 4.05 ft
Total Well Penetration Depth: 10. ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 4.937E-5 cm/sec
y0 = 0.3938 ft



MW-1 FH3

Data Set: C:\Desktop\GRDA\Slug2023\MW1fh3.aqt
Date: 11/15/23 Time: 15:46:22

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW-1 VCP Area
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 4.05 ft
Anisotropy Ratio (Kz/Kr): 0.1

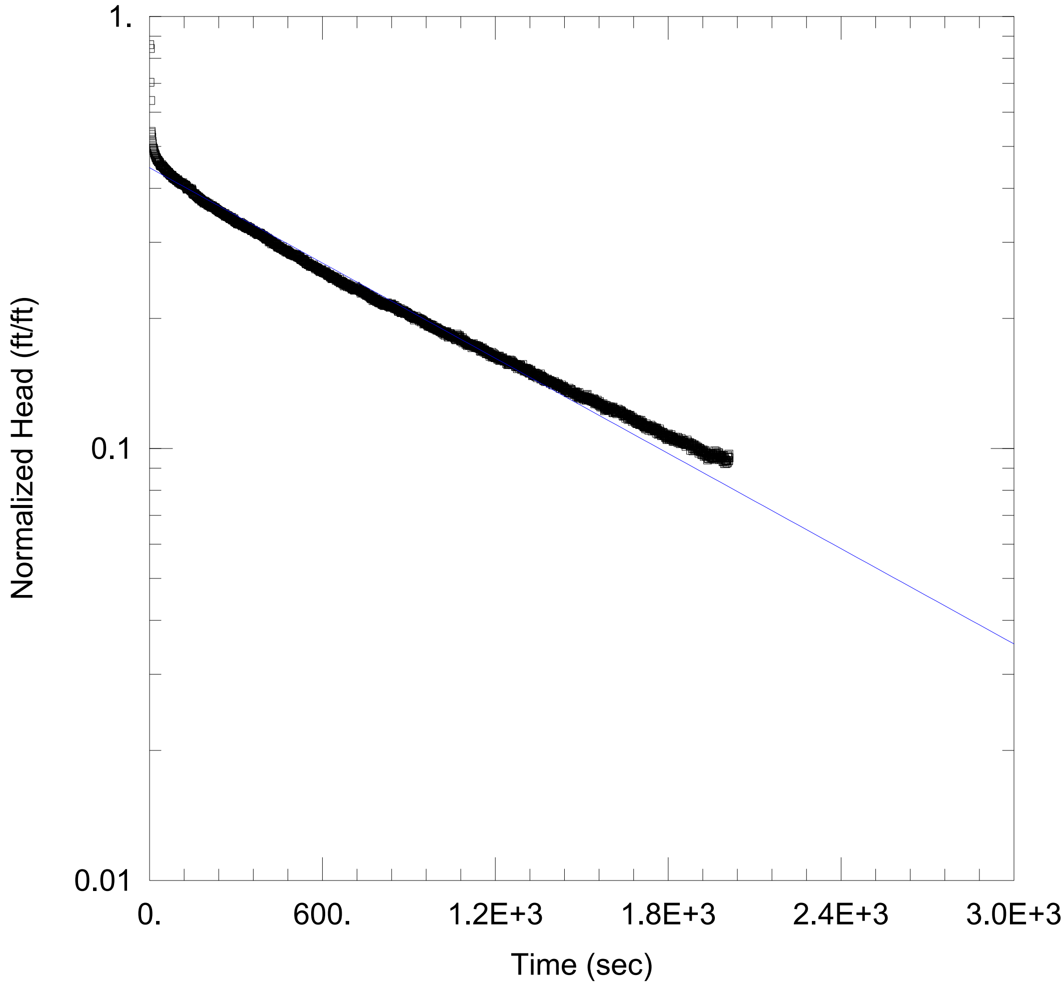
WELL DATA (MW-1)

Initial Displacement: 1.181 ft
Static Water Column Height: 4.05 ft
Total Well Penetration Depth: 10. ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3.62E-5 cm/sec
y0 = 0.37 ft



MW-1 RH1

Data Set:
Date: 11/15/23
Time: 14:48:04

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW-1 VCP Area
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 4.05 ft
Anisotropy Ratio (Kz/Kr): 0.1

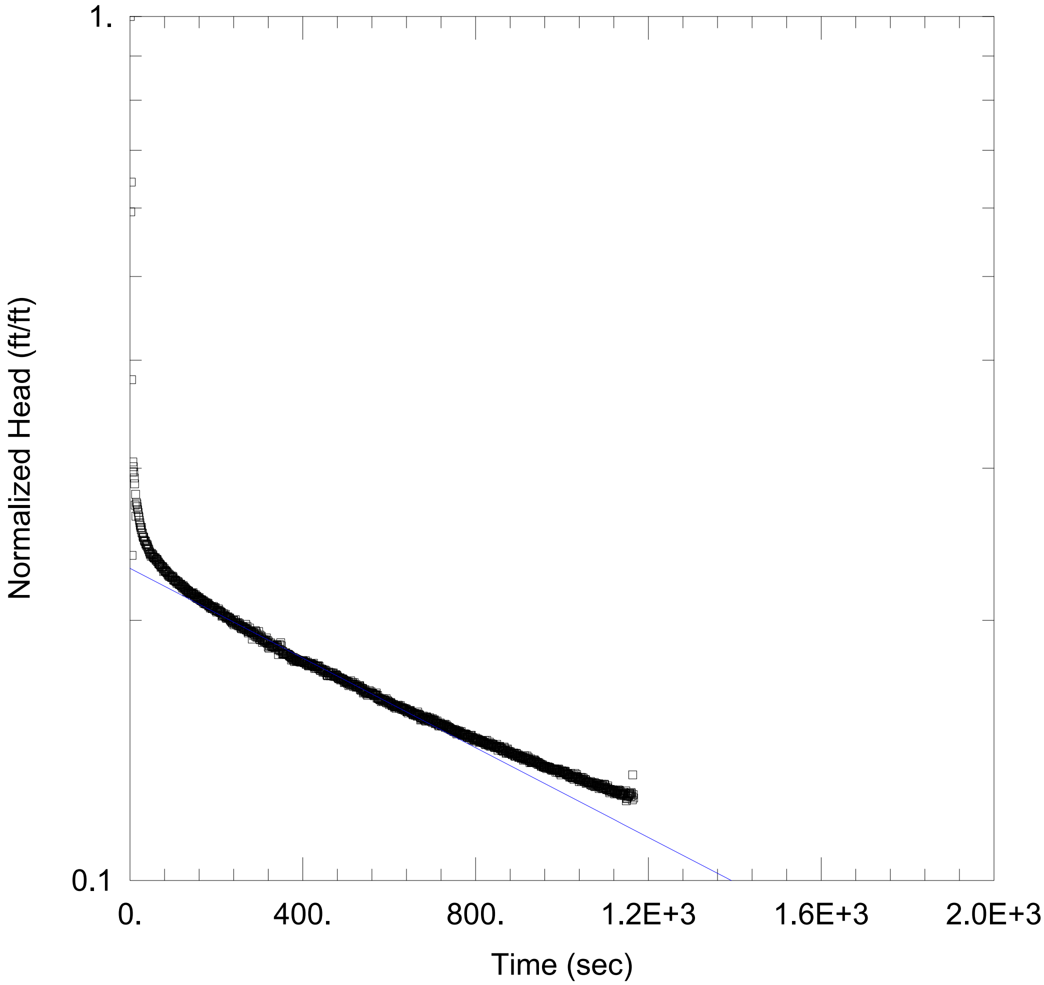
WELL DATA (MW-1)

Initial Displacement: -0.7766 ft
Static Water Column Height: 4.05 ft
Total Well Penetration Depth: 10. ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 5.449E-5 cm/sec
y0 = -0.3467 ft



MW-1 RH2

Data Set: C:\Desktop\GRDA\Slug2023\MW1rh2.aqt
Date: 11/15/23 Time: 14:52:52

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW-1 VCP Area
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 4.05 ft
Anisotropy Ratio (Kz/Kr): 0.1

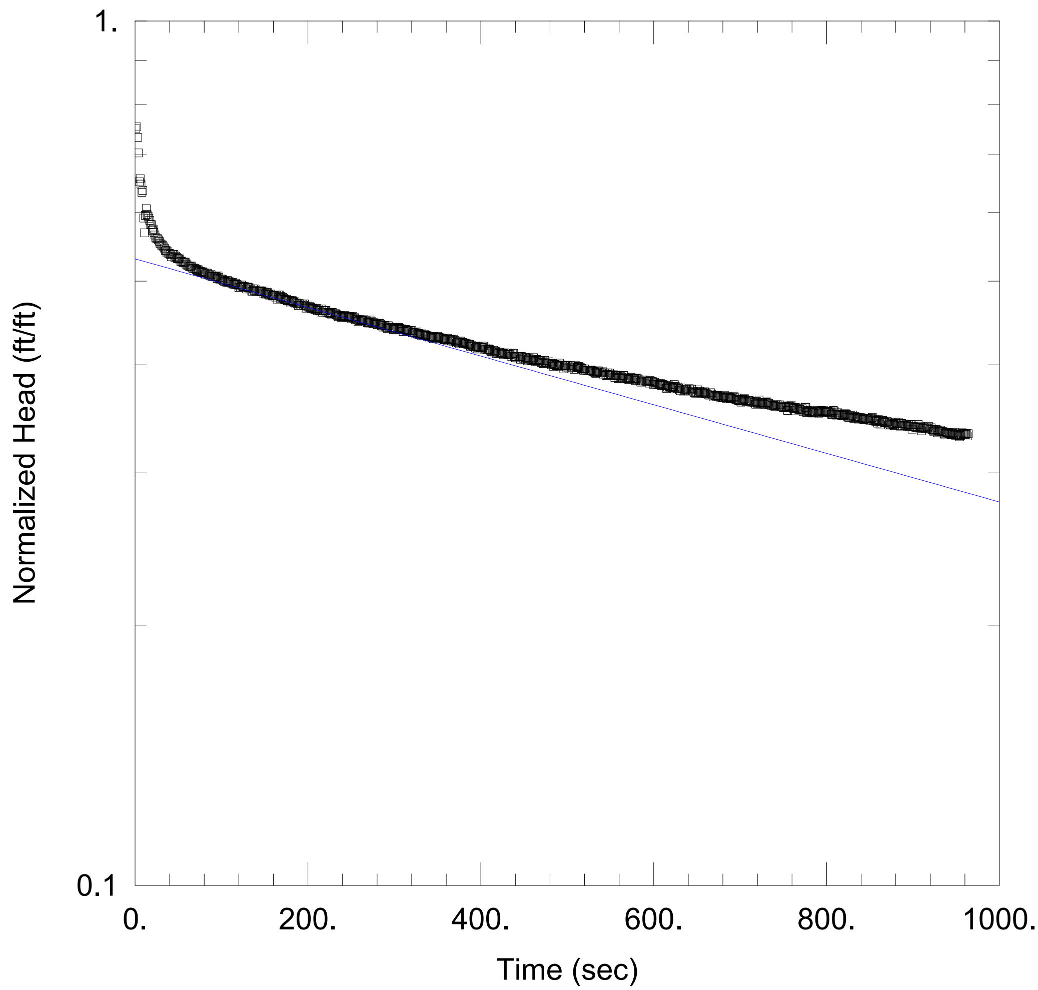
WELL DATA (MW-1)

Initial Displacement: -1.616 ft
Static Water Column Height: 4.05 ft
Total Well Penetration Depth: 10. ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3.849E-5 cm/sec
y0 = -0.3713 ft



MW-1 RH3

Data Set: C:\Desktop\GRDA\Slug2023\MW1rh3.aqt
Date: 11/15/23 Time: 14:55:41

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW-1 VCP Area
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 4.05 ft Anisotropy Ratio (Kz/Kr): 0.1

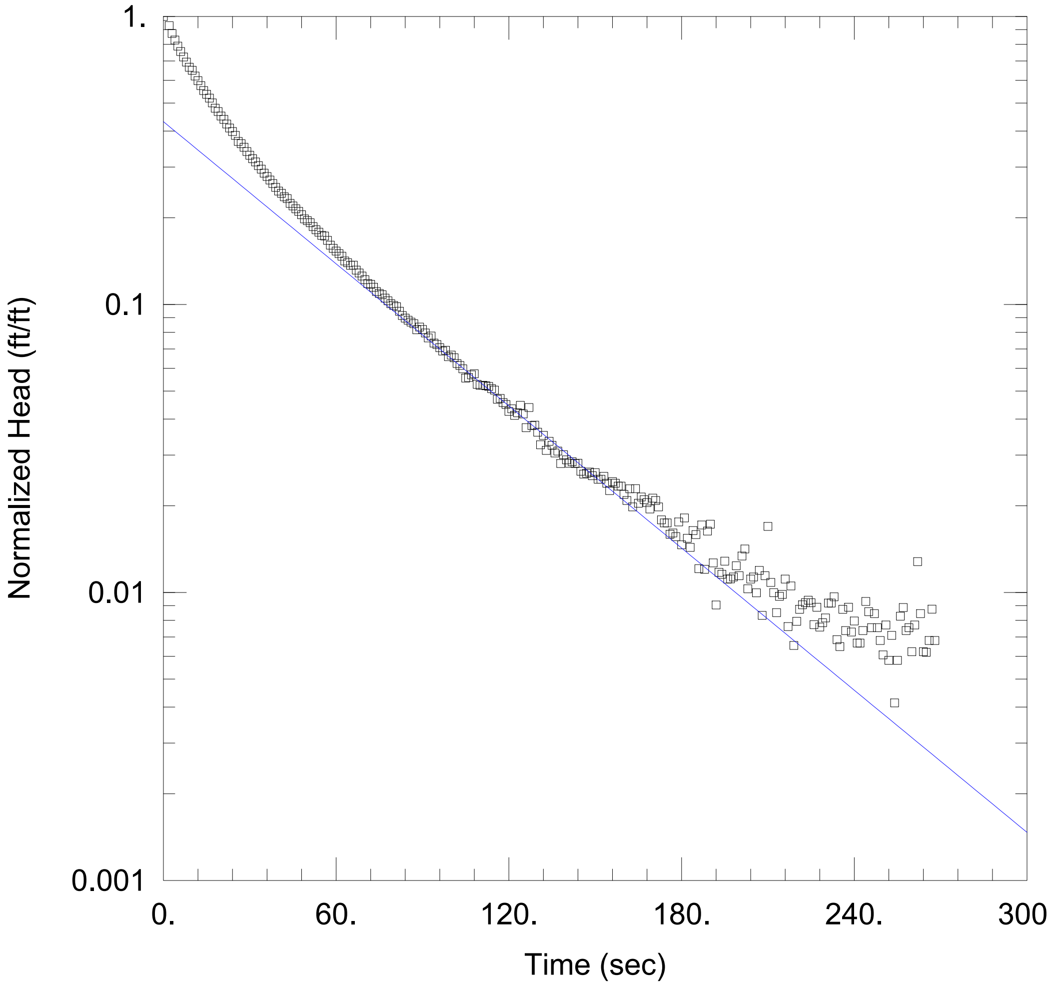
WELL DATA (MW-1)

Initial Displacement: -0.7217 ft Static Water Column Height: 4.05 ft
Total Well Penetration Depth: 10. ft Screen Length: 10. ft
Casing Radius: 0.08 ft Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 4.172E-5 cm/sec y0 = -0.3829 ft



MW23-01 FH1

Data Set: C:\Desktop\GRDA\Slug2023\MW2301FH1.aqt
Date: 11/20/23 Time: 11:42:53

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-01
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 20.54 ft
Anisotropy Ratio (Kz/Kr): 0.1

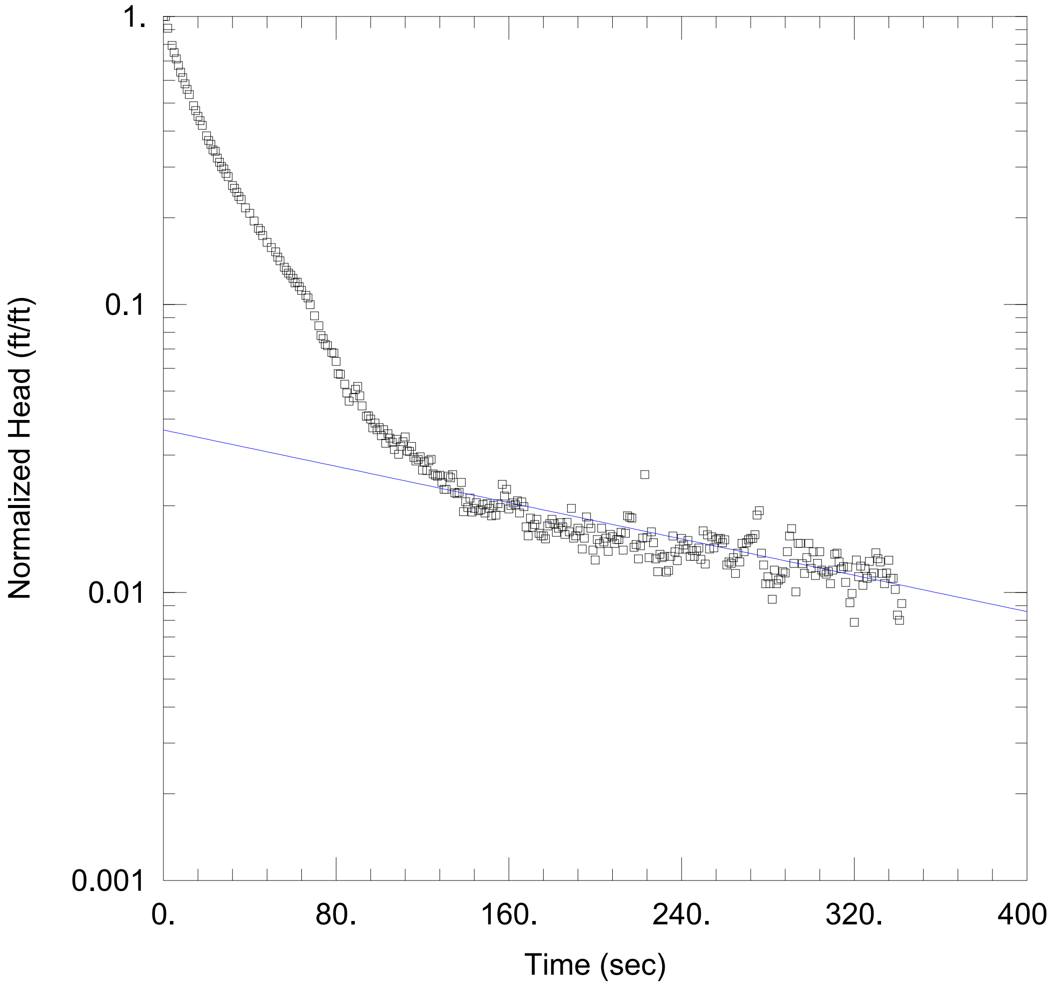
WELL DATA (New Well)

Initial Displacement: 1.057 ft
Static Water Column Height: 20.54 ft
Total Well Penetration Depth: 20.54 ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0007339 cm/sec
y0 = 0.4559 ft



MW23-01 FH2

Data Set: C:\Desktop\GRDA\Slug2023\MW2301FH2.aqt
Date: 11/20/23 Time: 11:53:04

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-01
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 20.54 ft Anisotropy Ratio (Kz/Kr): 0.1

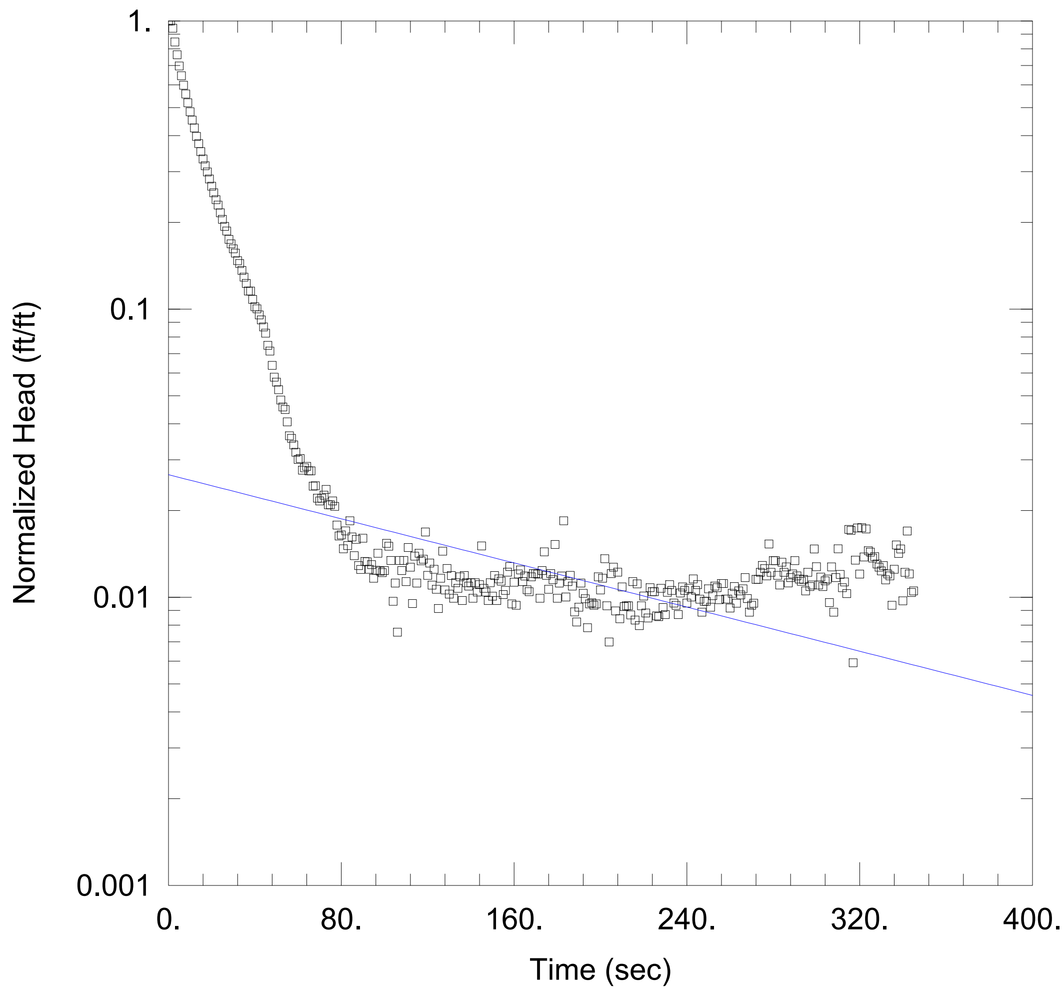
WELL DATA (New Well)

Initial Displacement: 1. ft Static Water Column Height: 20.54 ft
Total Well Penetration Depth: 20.54 ft Screen Length: 10. ft
Casing Radius: 0.08 ft Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0001406 cm/sec y0 = 0.03665 ft



MW23-01 FH3

Data Set: C:\Desktop\GRDA\Slug2023\MW2301FH3.aqt
Date: 11/20/23 Time: 13:55:23

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-01
Test Date: 11/1/2023

AQUIFER DATA

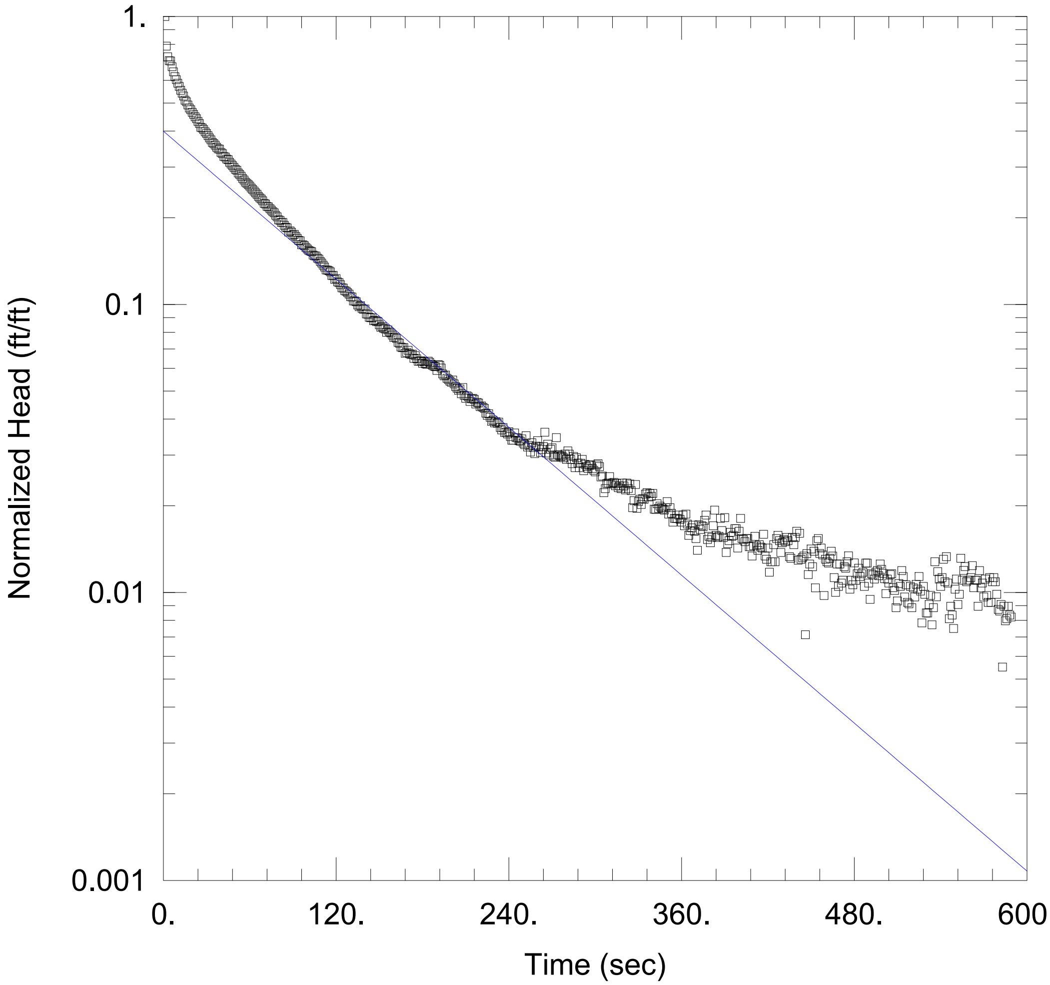
Saturated Thickness: 20.54 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (New Well)

Initial Displacement: 0.9484 ft
Static Water Column Height: 20.54 ft
Total Well Penetration Depth: 20.54 ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0001708 cm/sec
y0 = 0.02525 ft



MW23-01 RH1

Data Set: C:\Desktop\GRDA\Slug2023\MW2301RH1.aqt
Date: 11/20/23 Time: 11:33:54

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-01
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 20.54 ft
Anisotropy Ratio (Kz/Kr): 0.1

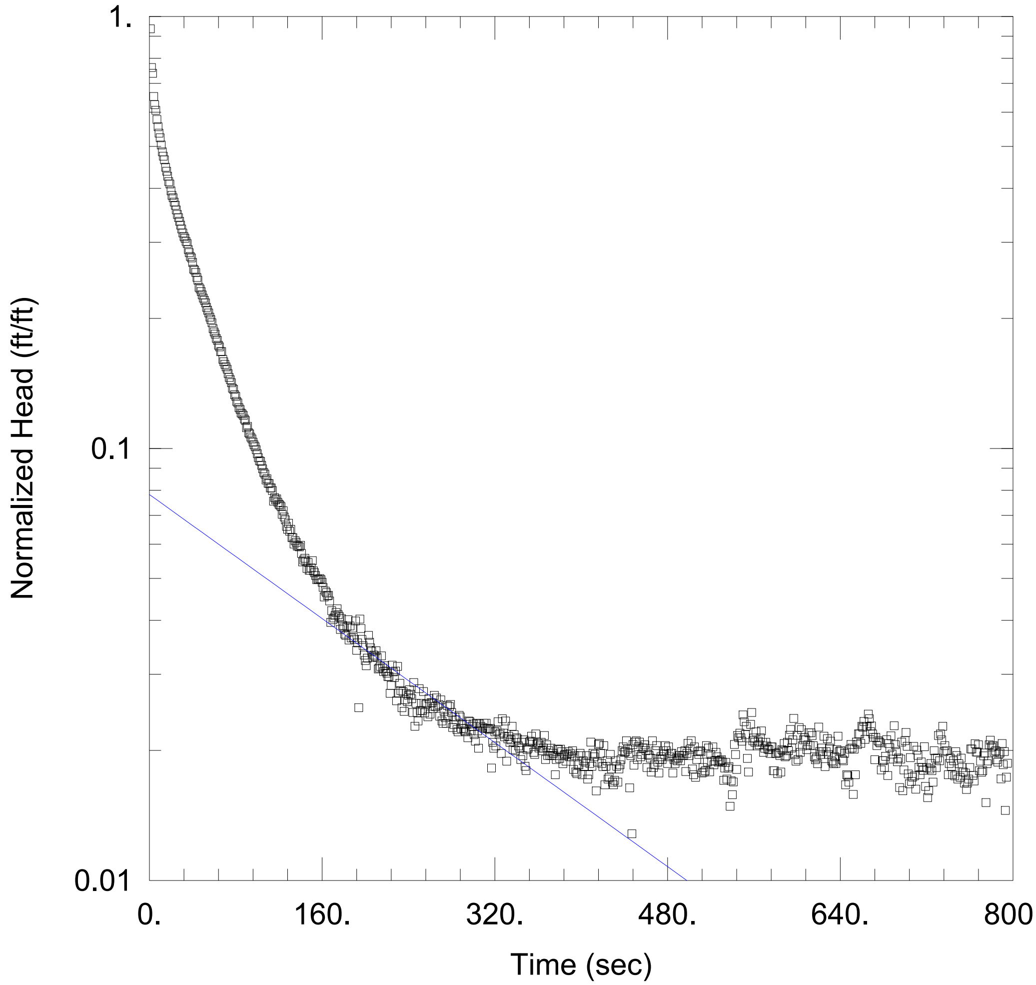
WELL DATA (New Well)

Initial Displacement: -1.251 ft
Static Water Column Height: 20.54 ft
Total Well Penetration Depth: 20.54 ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.000382 cm/sec
y0 = -0.4994 ft



MW23-01 RH2

Data Set: C:\Desktop\GRDA\Slug2023\MW2301RH2.aqt
Date: 11/20/23 Time: 11:48:15

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-01
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 20.54 ft
Anisotropy Ratio (Kz/Kr): 0.1

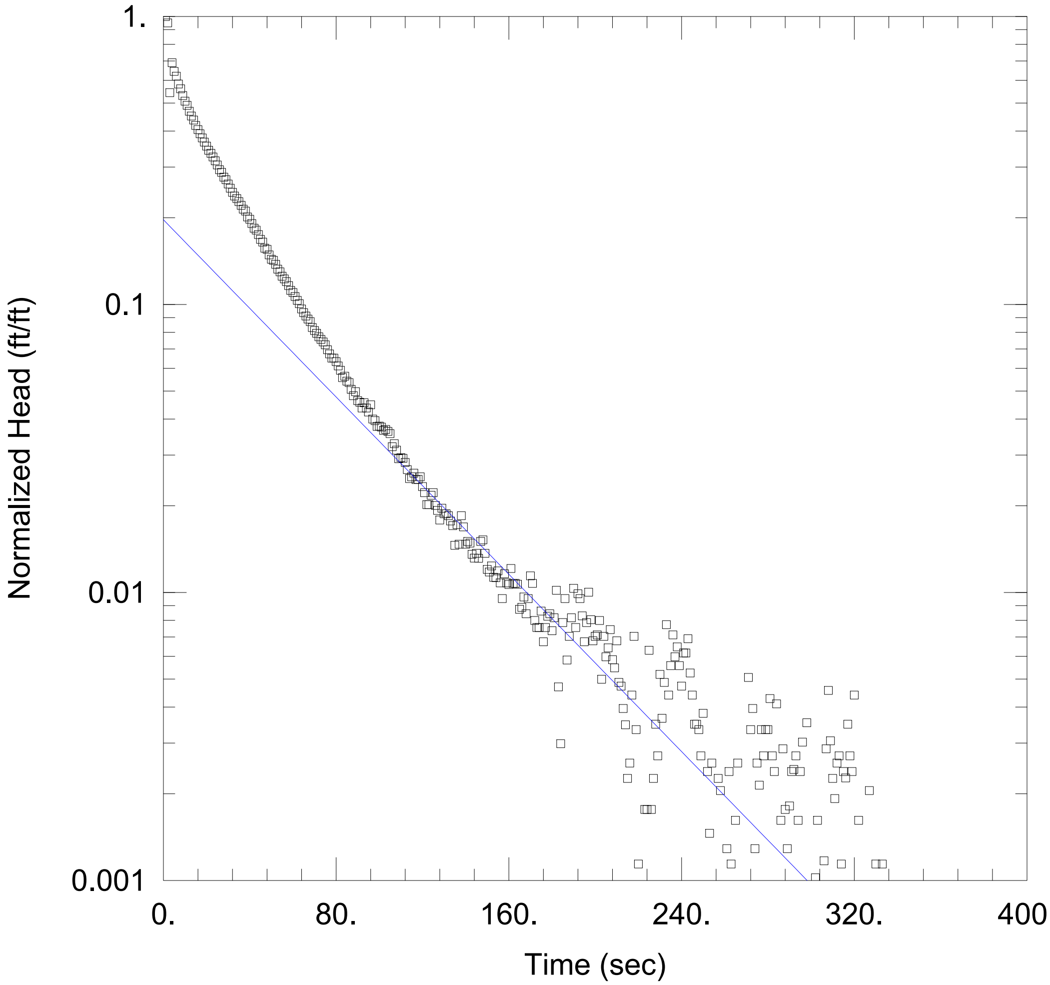
WELL DATA (New Well)

Initial Displacement: -1.184 ft
Static Water Column Height: 20.54 ft
Total Well Penetration Depth: 20.54 ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001601 cm/sec
y0 = -0.09257 ft



MW23-01 RH3

Data Set: C:\Desktop\GRDA\Slug2023\MW2301RH3.aqt
Date: 11/20/23 Time: 13:53:42

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-01
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 20.54 ft
Anisotropy Ratio (Kz/Kr): 0.1

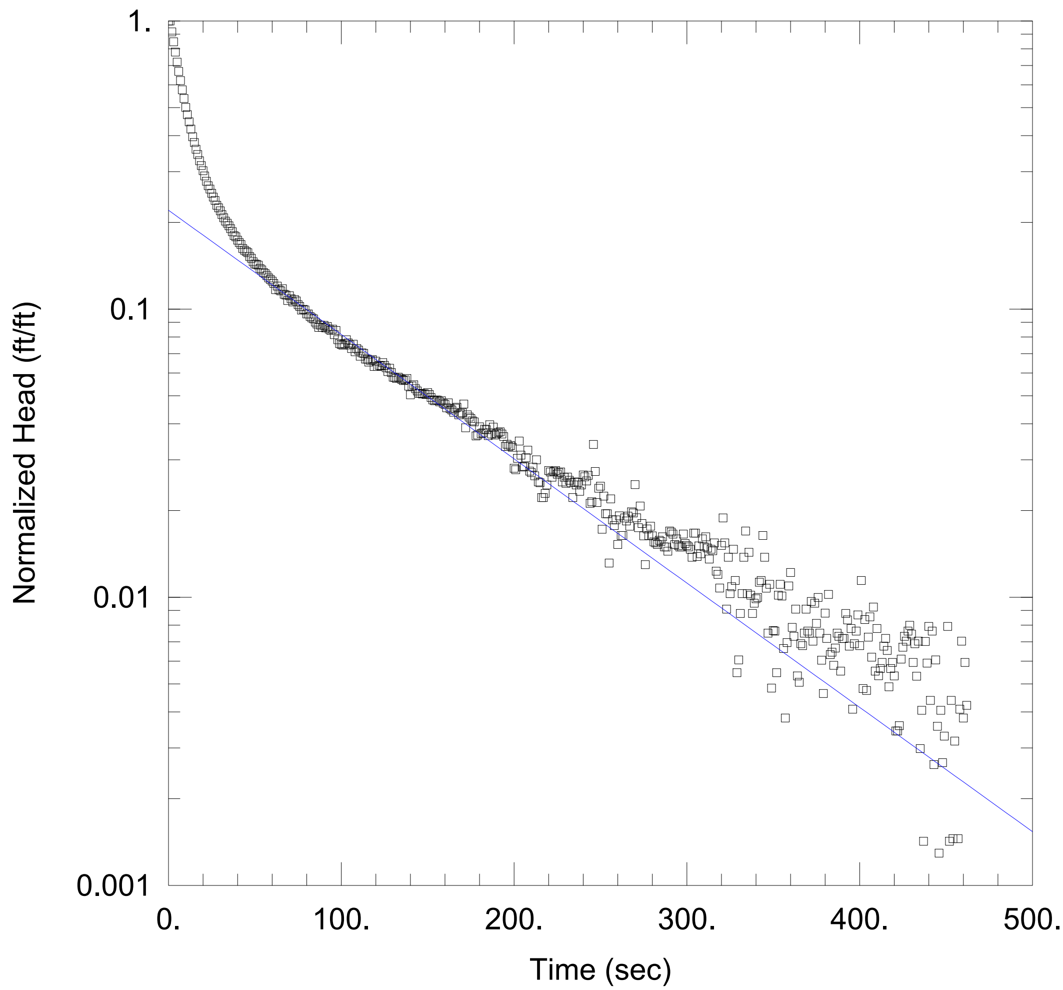
WELL DATA (New Well)

Initial Displacement: -1.009 ft
Static Water Column Height: 20.54 ft
Total Well Penetration Depth: 20.54 ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0006864 cm/sec
y0 = -0.1985 ft



MW23-02 FH1

Data Set: C:\Desktop\GRDA\Slug2023\MW2302FH1.aqt
Date: 11/20/23 Time: 14:09:58

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-02
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 18.17 ft
Anisotropy Ratio (Kz/Kr): 0.1

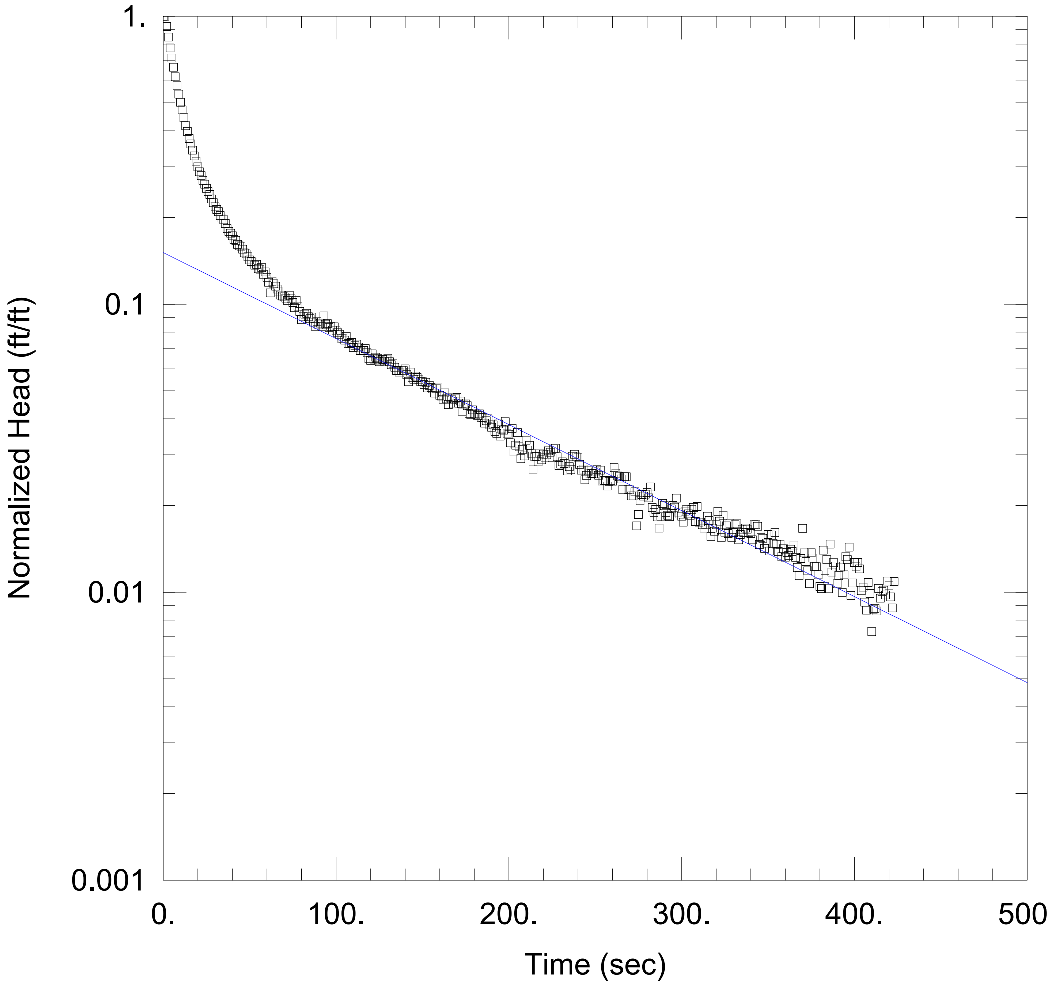
WELL DATA (MW23-02)

Initial Displacement: 1.013 ft
Static Water Column Height: 18.17 ft
Total Well Penetration Depth: 18.17 ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0003787 cm/sec
y0 = 0.2231 ft



MW23-02 FH2

Data Set: C:\Desktop\GRDA\Slug2023\MW2302FH2.aqt
Date: 11/20/23 Time: 14:14:15

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-02
Test Date: 11/1/2023

AQUIFER DATA

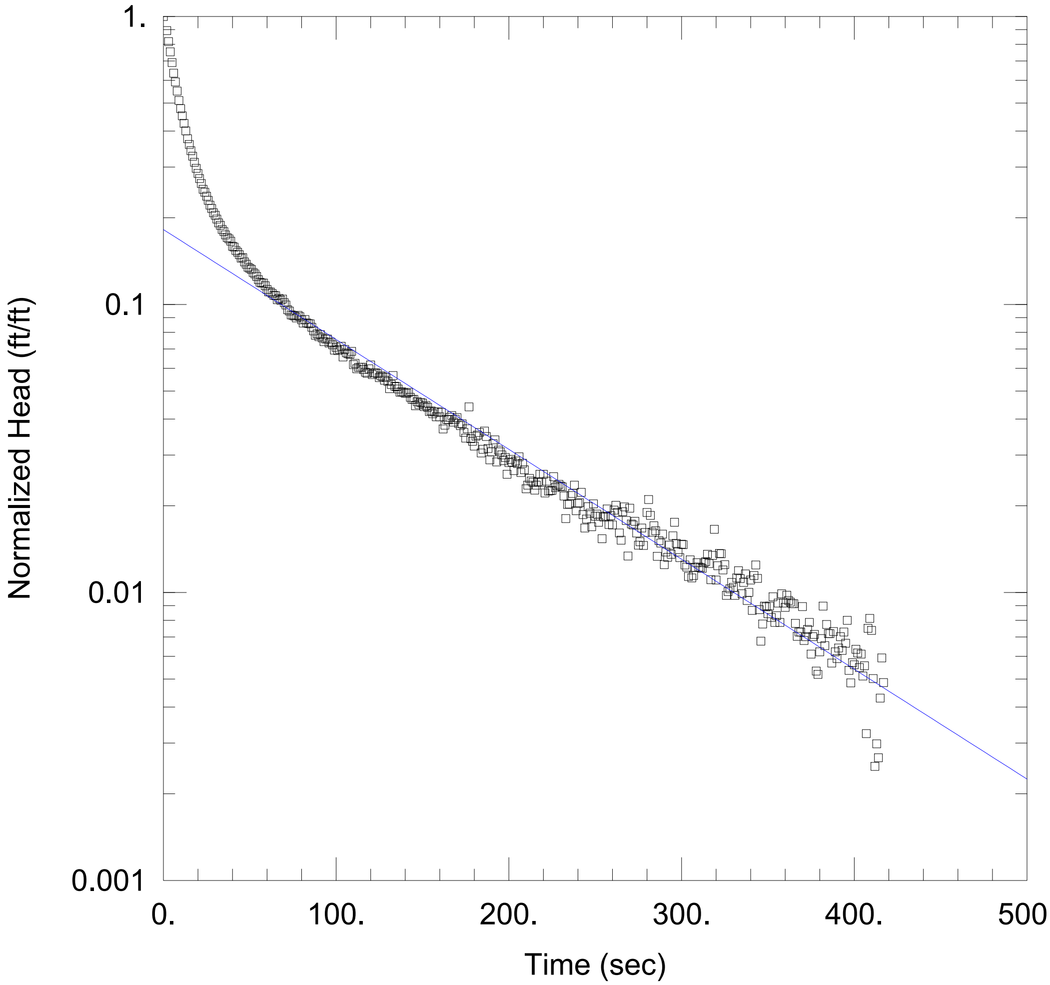
Saturated Thickness: 18.17 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW23-02)

Initial Displacement: 1.07 ft
Static Water Column Height: 18.17 ft
Total Well Penetration Depth: 18.17 ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0002622 cm/sec
y0 = 0.1617 ft



MW23-02 FH3

Data Set: C:\Desktop\GRDA\Slug2023\MW2302FH3.aqt
Date: 11/20/23 Time: 14:16:52

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-02
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 18.17 ft Anisotropy Ratio (Kz/Kr): 0.1

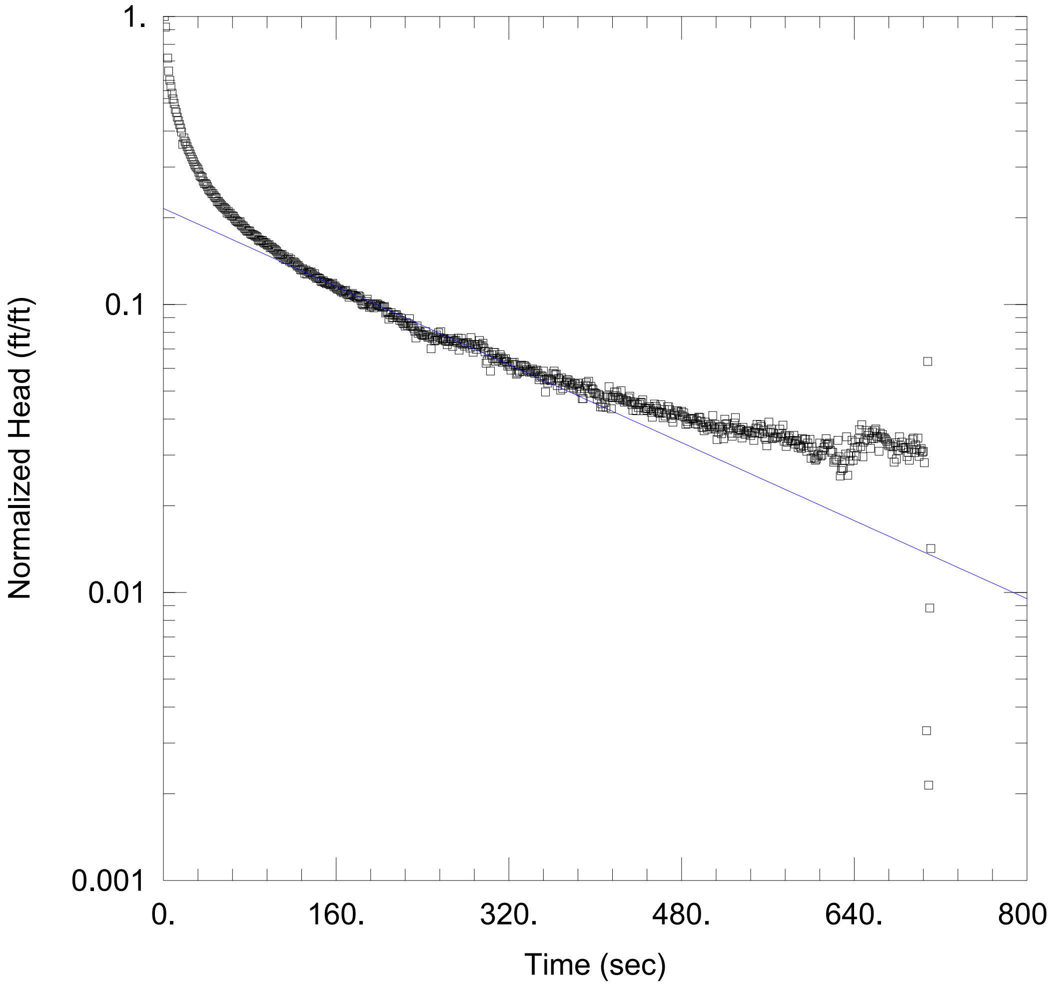
WELL DATA (MW23-02)

Initial Displacement: 1.061 ft Static Water Column Height: 18.17 ft
Total Well Penetration Depth: 18.17 ft Screen Length: 10. ft
Casing Radius: 0.08 ft Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.000335 cm/sec y0 = 0.193 ft



WELL TEST ANALYSIS

Data Set: C:\Desktop\GRDA\Slug2023\MW2302RH1.aqt
Date: 11/20/23 Time: 14:08:49

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-02
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 18.17 ft
Anisotropy Ratio (Kz/Kr): 0.1

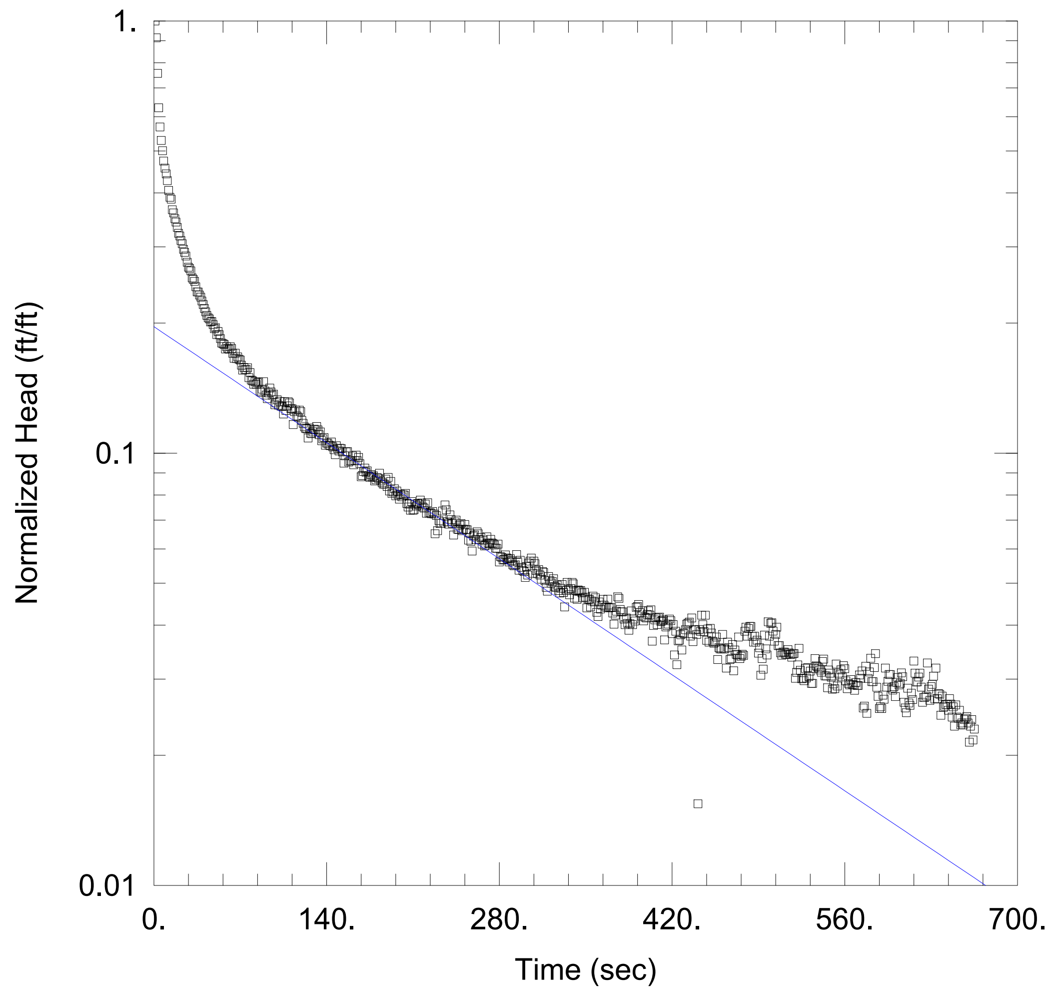
WELL DATA (MW23-02)

Initial Displacement: -0.677 ft
Static Water Column Height: 18.17 ft
Total Well Penetration Depth: 18.17 ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001487 cm/sec
y0 = -0.1459 ft



MW23-02 RH2

Data Set: C:\Desktop\GRDA\Slug2023\MW2302RH2.aqt
Date: 11/20/23 Time: 14:11:06

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-02
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 18.17 ft
Anisotropy Ratio (Kz/Kr): 0.1

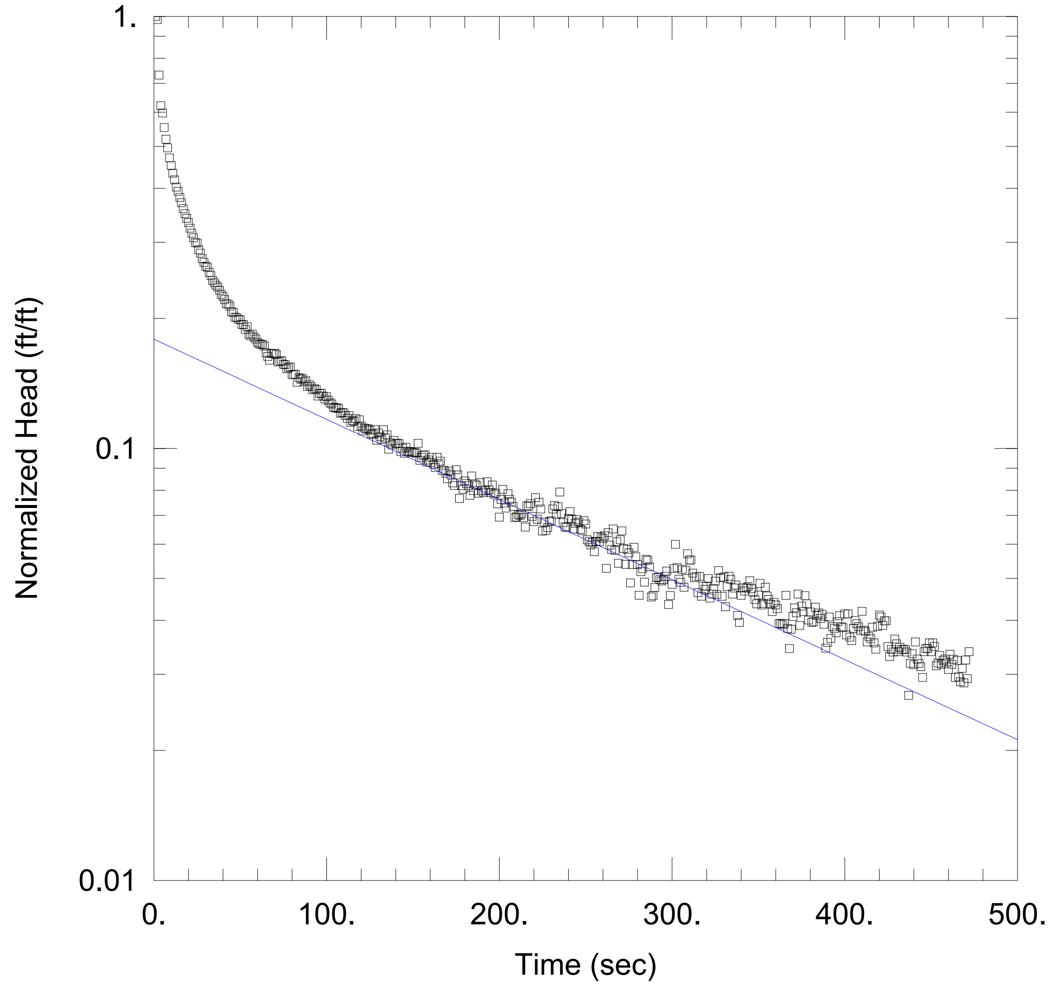
WELL DATA (MW23-02)

Initial Displacement: -0.7752 ft
Static Water Column Height: 18.17 ft
Total Well Penetration Depth: 18.17 ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001684 cm/sec
y0 = -0.1521 ft



MW23-02 RH3

Data Set: C:\Desktop\GRDA\Slug2023\MW2302RH3.aqt
Date: 11/20/23 Time: 14:16:02

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-02
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 18.17 ft
Anisotropy Ratio (Kz/Kr): 0.1

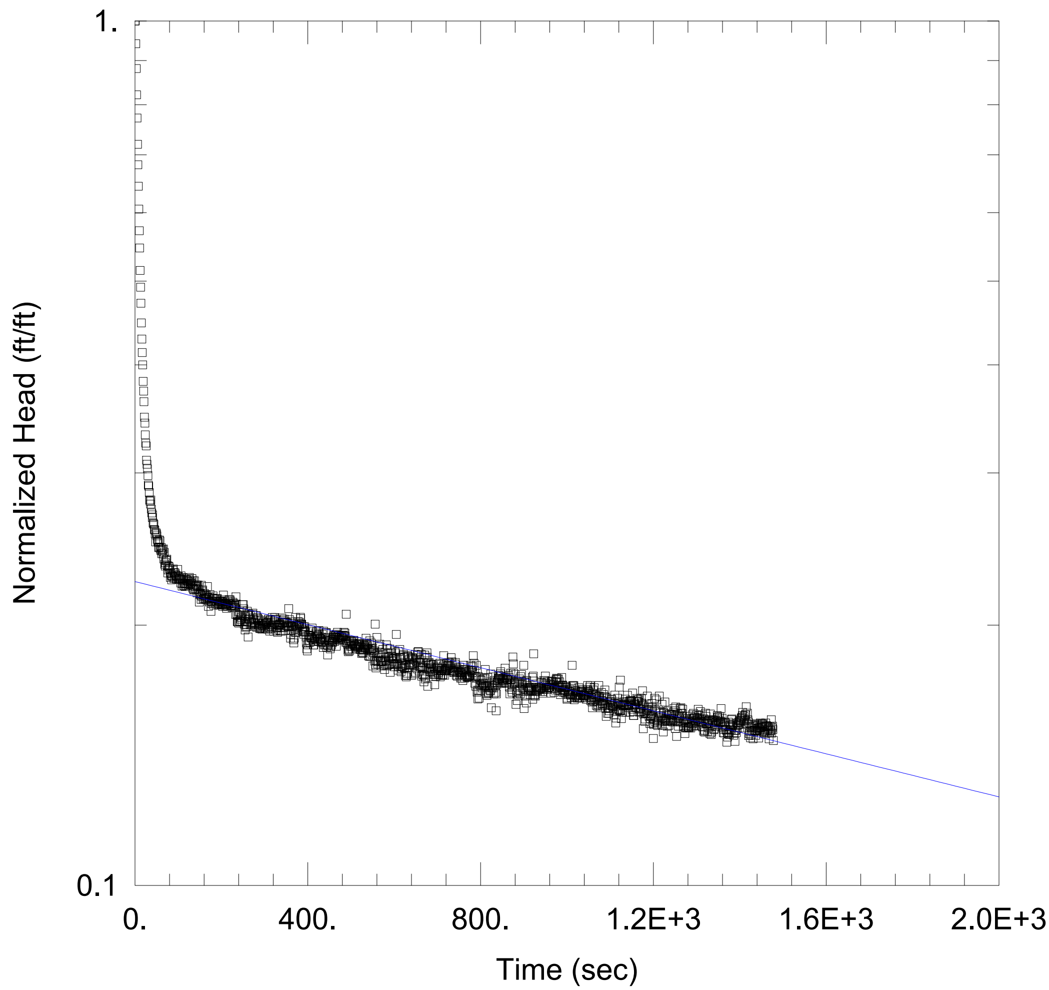
WELL DATA (MW23-02)

Initial Displacement: -0.74 ft
Static Water Column Height: 18.17 ft
Total Well Penetration Depth: 18.17 ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001628 cm/sec
y0 = -0.1324 ft



MW23-04 FH1

Data Set: C:\Desktop\GRDA\Slug2023\MW2304FH1.aqt
Date: 11/20/23 Time: 15:12:00

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-04
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 17.41 ft
Anisotropy Ratio (Kz/Kr): 0.1

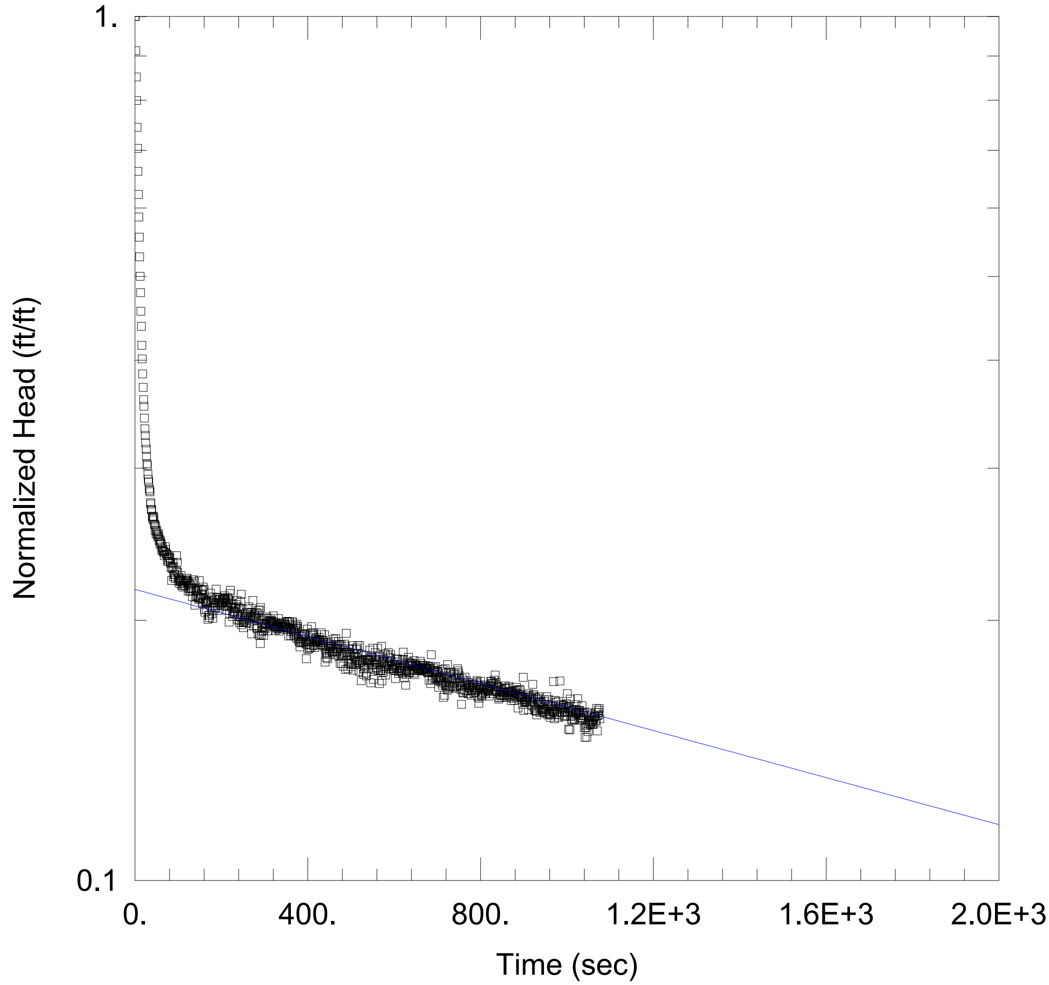
WELL DATA (MW23-04 RH1)

Initial Displacement: 0.4704 ft
Static Water Column Height: 17.41 ft
Total Well Penetration Depth: 17.41 ft
Screen Length: 15. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 7.471E-6 cm/sec
y0 = 0.1057 ft



MW23-04 FH2

Data Set: C:\Desktop\GRDA\Slug2023\MW2304FH2.aqt
Date: 11/20/23 Time: 15:14:55

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-04
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 17.41 ft
Anisotropy Ratio (Kz/Kr): 0.1

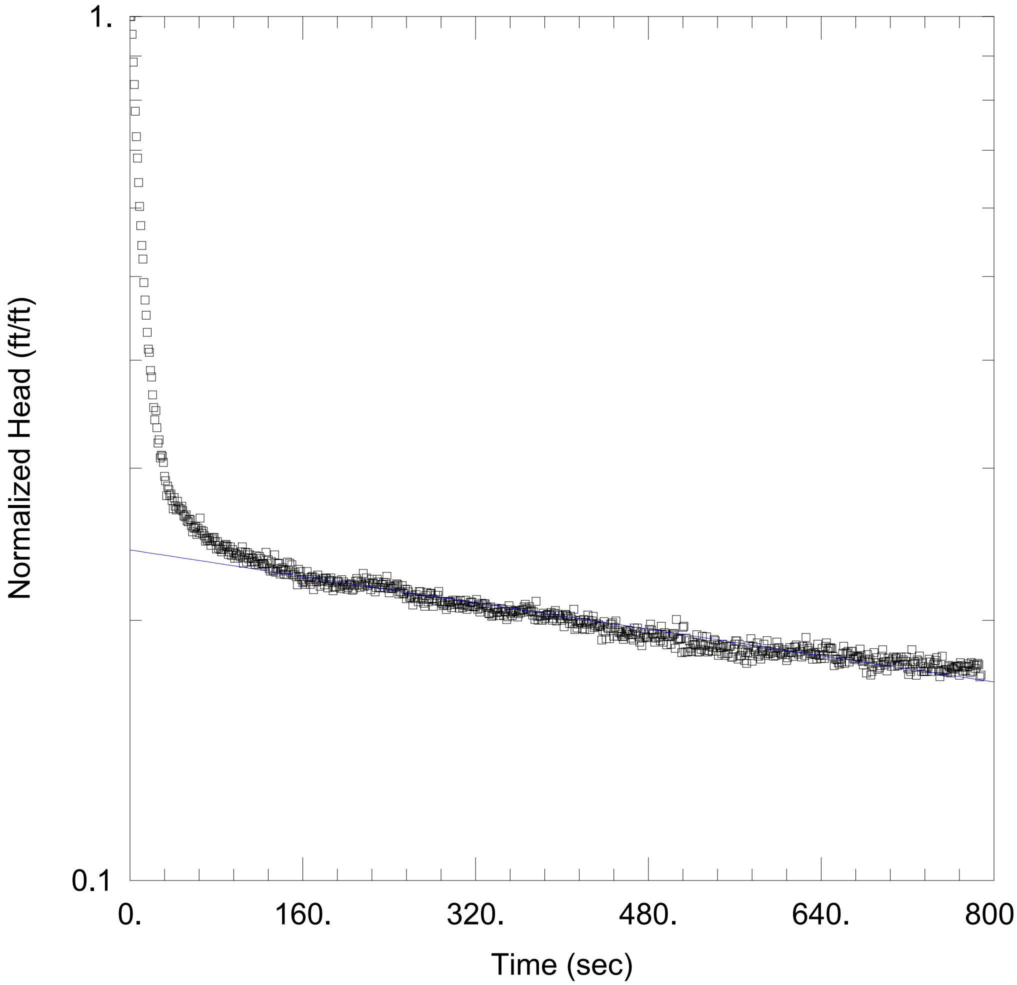
WELL DATA (MW23-04 RH1)

Initial Displacement: 0.4907 ft
Static Water Column Height: 17.41 ft
Total Well Penetration Depth: 17.41 ft
Screen Length: 15. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 8.169E-6 cm/sec
y0 = 0.1066 ft



MW23-04 FH3

Data Set: C:\Desktop\GRDA\Slug2023\MW2304FH3.aqt
Date: 11/20/23 Time: 15:19:28

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-04
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 17.41 ft
Anisotropy Ratio (Kz/Kr): 0.1

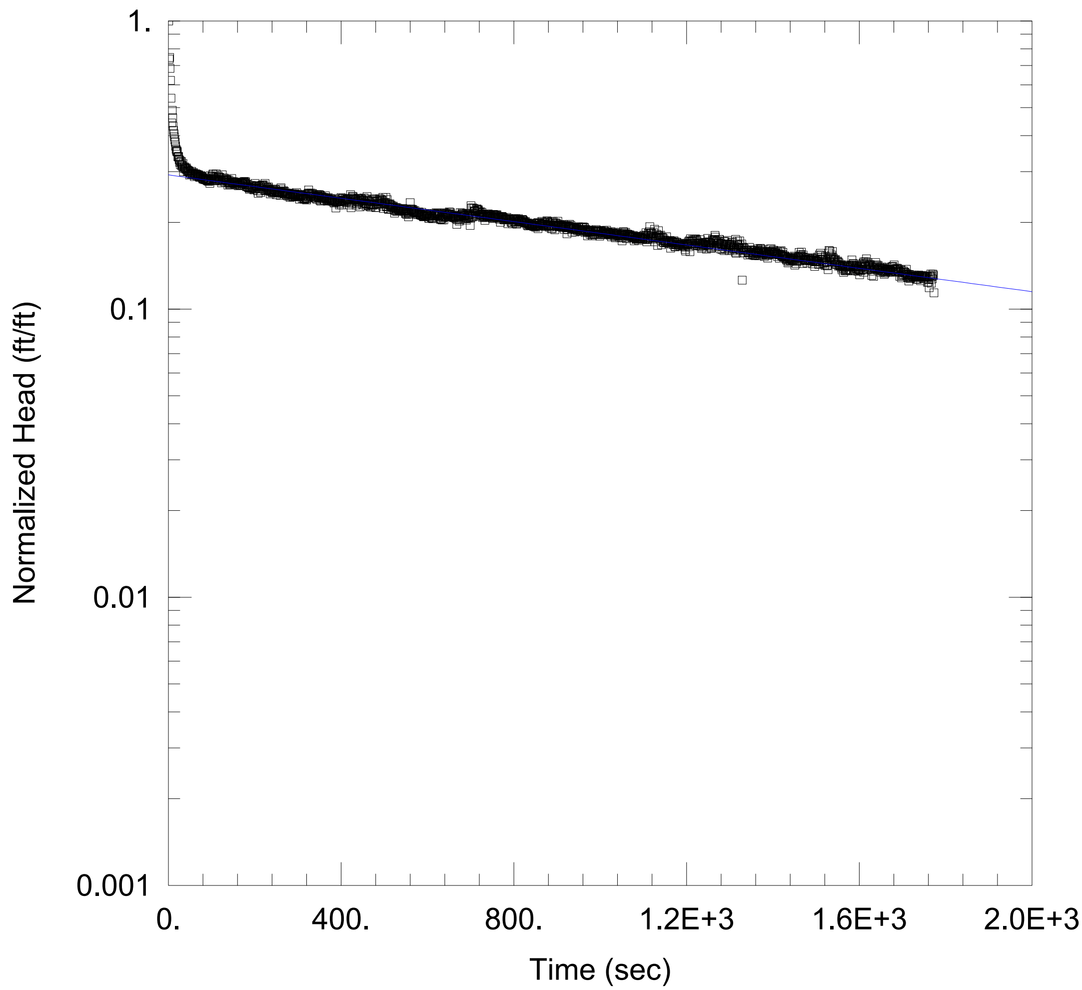
WELL DATA (MW23-04 RH1)

Initial Displacement: 0.4579 ft
Static Water Column Height: 17.41 ft
Total Well Penetration Depth: 17.41 ft
Screen Length: 15. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.146E-5 cm/sec
y0 = 0.1105 ft



MW23-04 RH1

Data Set: C:\Desktop\GRDA\Slug2023\MW2304RH1.aqt
Date: 11/20/23 Time: 15:05:52

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-04
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 17.41 ft
Anisotropy Ratio (Kz/Kr): 0.1

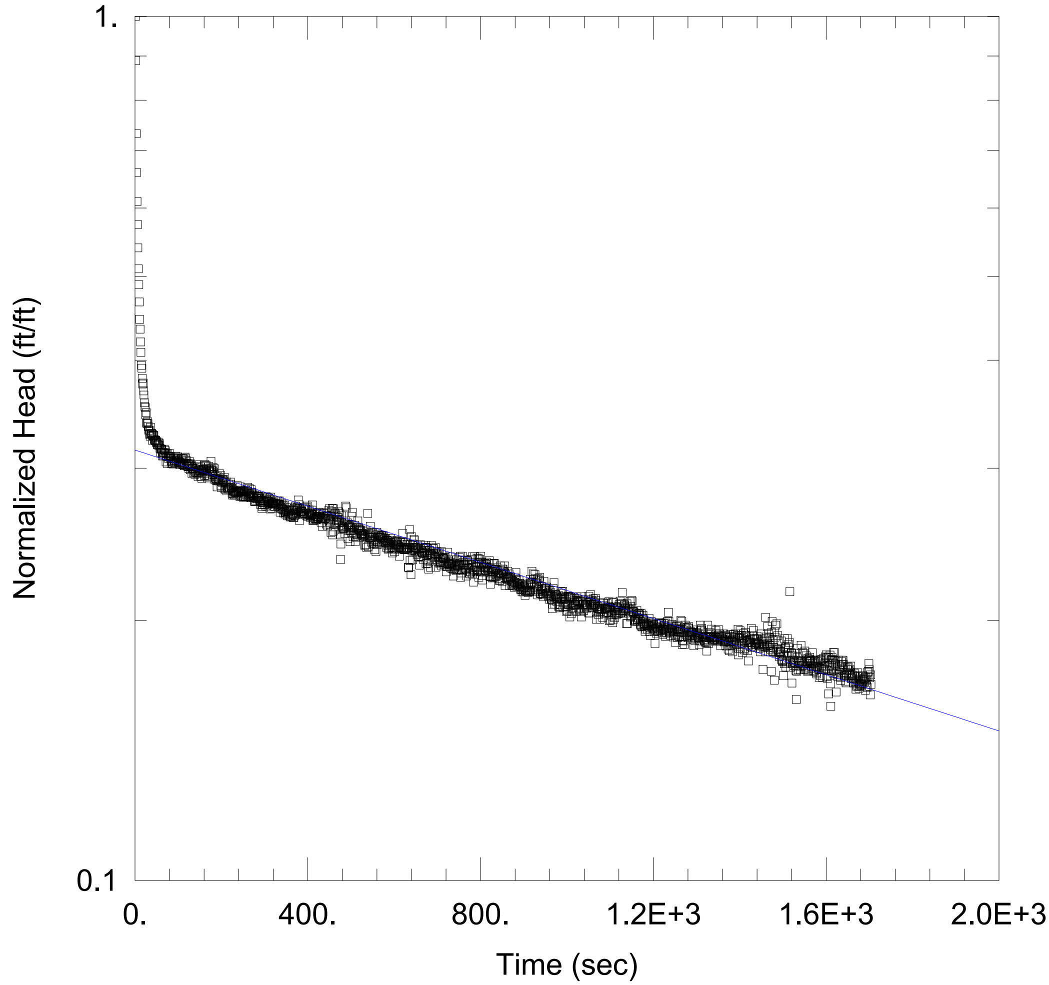
WELL DATA (MW23-04 RH1)

Initial Displacement: -0.4389 ft
Static Water Column Height: 17.41 ft
Total Well Penetration Depth: 17.41 ft
Screen Length: 15. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.216E-5 cm/sec
y0 = -0.1282 ft



MW23-04 RH2

Data Set: C:\Desktop\GRDA\Slug2023\MW2304RH2.aqt
Date: 11/20/23 Time: 15:13:35

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-04
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 17.41 ft
Anisotropy Ratio (Kz/Kr): 0.1

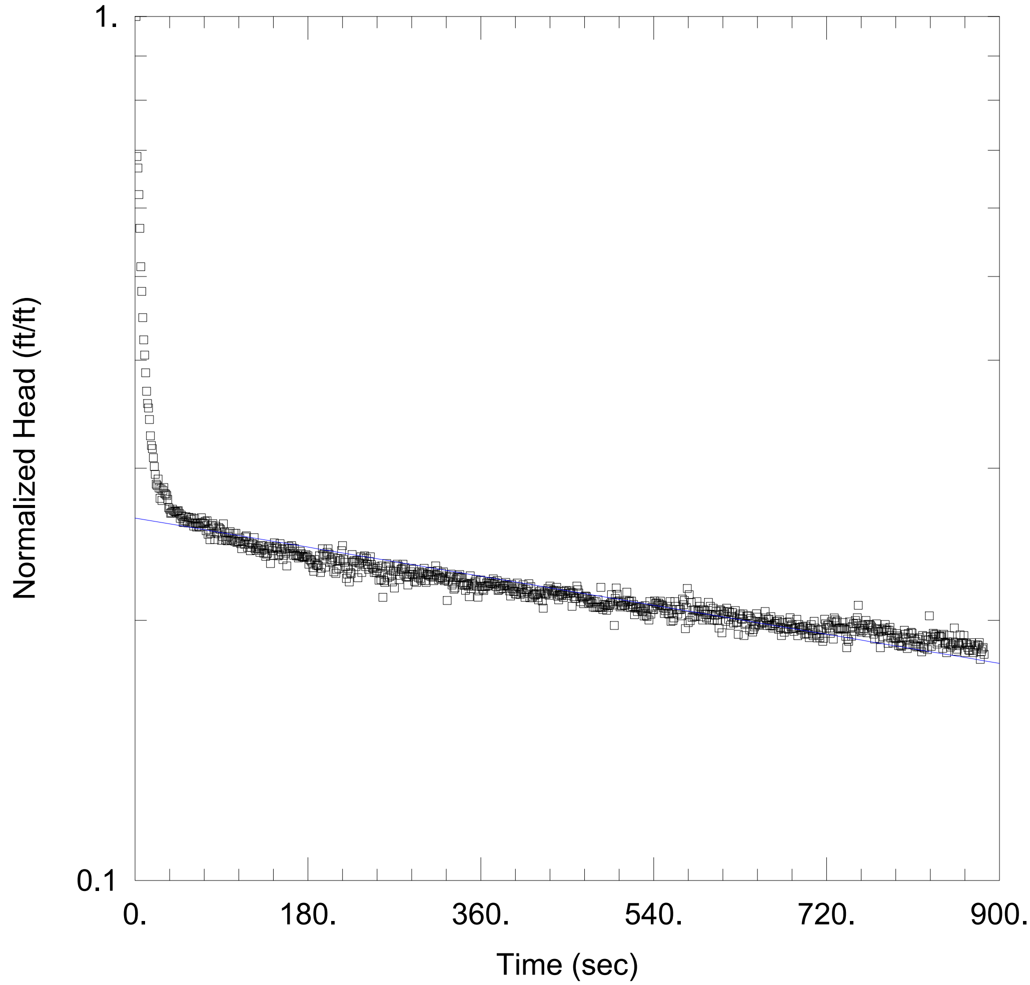
WELL DATA (MW23-04 RH1)

Initial Displacement: -0.3876 ft
Static Water Column Height: 17.41 ft
Total Well Penetration Depth: 17.41 ft
Screen Length: 15. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 9.753E-6 cm/sec
y0 = -0.122 ft



MW23-04 RH3

Data Set: C:\Desktop\GRDA\Slug2023\MW2304RH3.aqt
Date: 11/20/23 Time: 15:17:11

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-04
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 17.41 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW23-04 RH1)

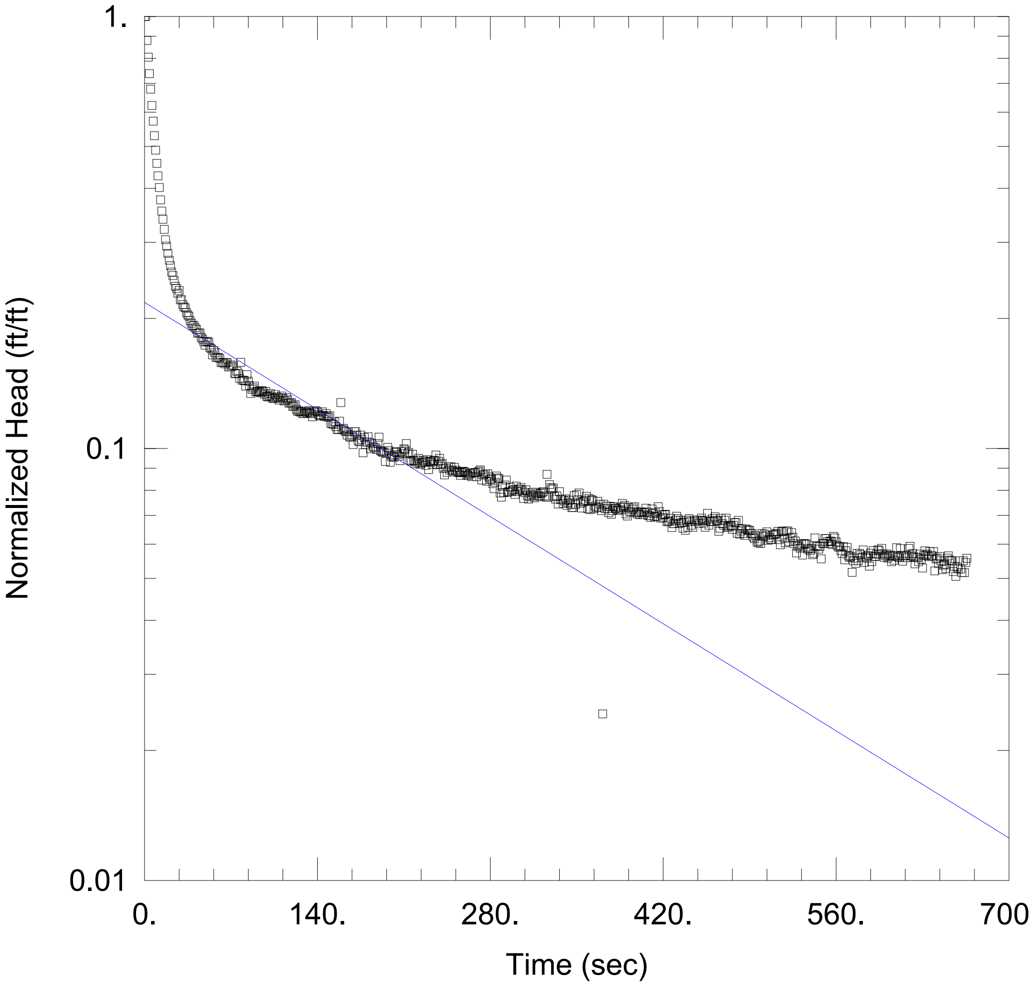
Initial Displacement: -0.4438 ft
Total Well Penetration Depth: 17.41 ft
Casing Radius: 0.08 ft

Static Water Column Height: 17.41 ft
Screen Length: 15. ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 1.121E-5 cm/sec y0 = -0.1166 ft



MW23-05 FH1

Data Set: C:\Desktop\GRDA\Slug2023\MW2305FH1.aqt
Date: 11/20/23 Time: 15:36:43

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-05
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 17.41 ft Anisotropy Ratio (Kz/Kr): 0.1

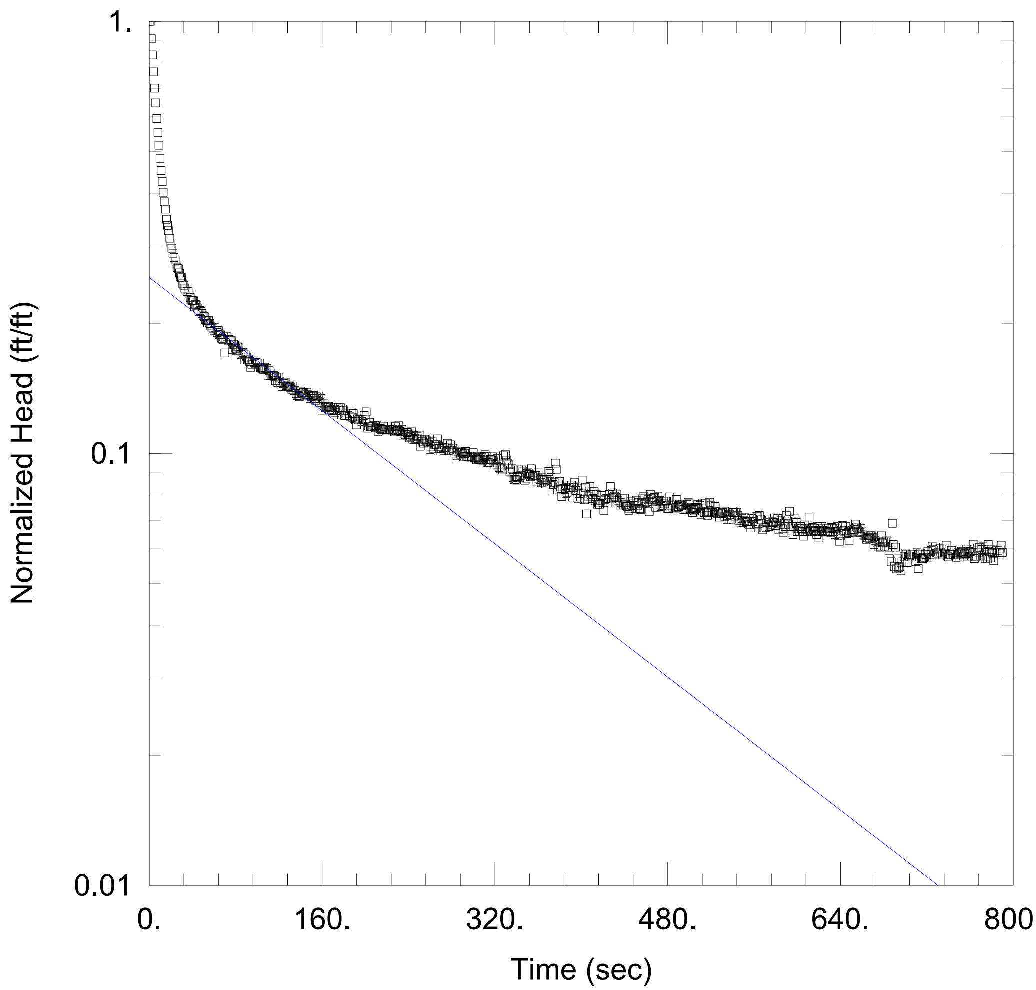
WELL DATA (MW23-05 RH1)

Initial Displacement: 0.6172 ft Static Water Column Height: 17.41 ft
Total Well Penetration Depth: 17.01 ft Screen Length: 15. ft
Casing Radius: 0.08 ft Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0001026 cm/sec y0 = 0.1345 ft



MW23-05 FH2

Data Set: C:\Desktop\GRDA\Slug2023\MW2305FH2.aqt
Date: 11/20/23 Time: 15:43:24

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-05
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 17.41 ft
Anisotropy Ratio (Kz/Kr): 0.1

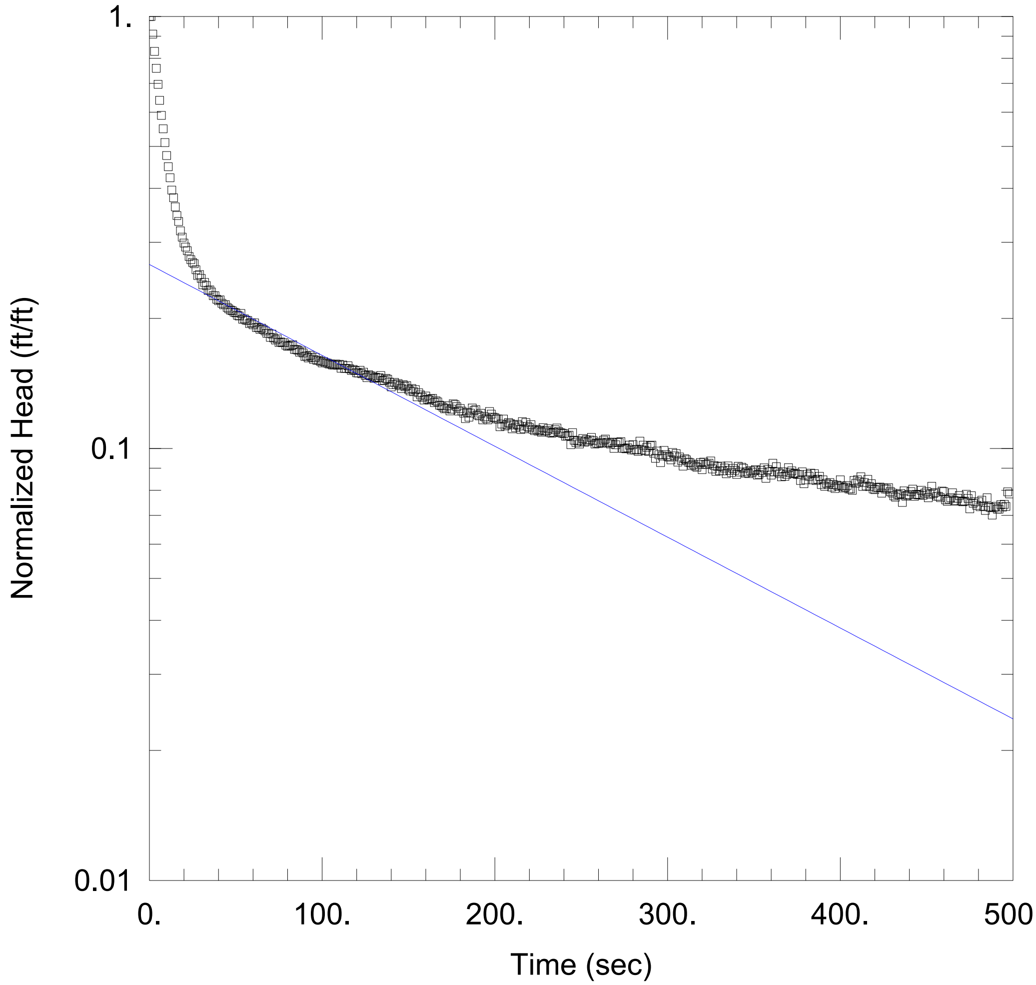
WELL DATA (MW23-05 RH1)

Initial Displacement: 0.5517 ft
Static Water Column Height: 17.41 ft
Total Well Penetration Depth: 17.01 ft
Screen Length: 15. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001116 cm/sec
y0 = 0.1407 ft



MW23-05 FH3

Data Set: C:\Desktop\GRDA\Slug2023\MW2305FH3.aqt
Date: 11/20/23 Time: 15:46:48

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-05
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 17.41 ft
Anisotropy Ratio (Kz/Kr): 0.1

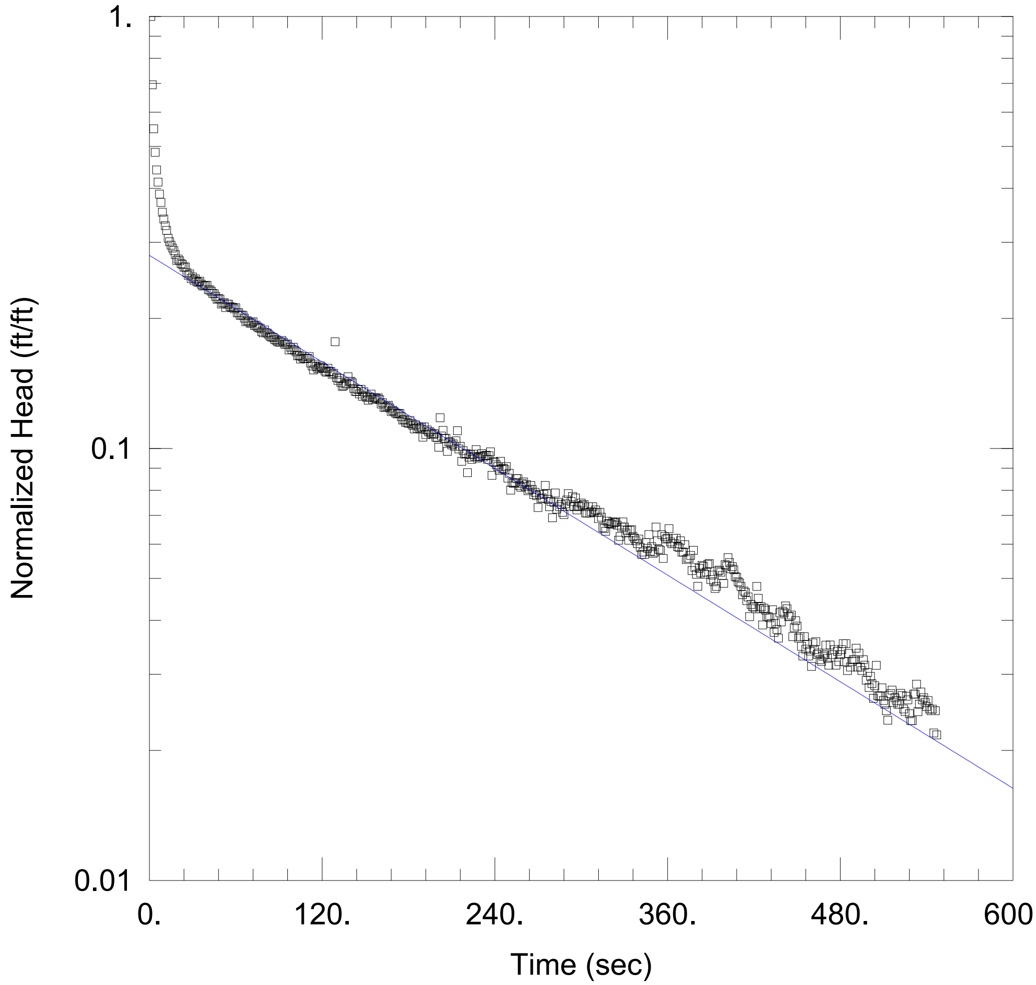
WELL DATA (MW23-05 RH1)

Initial Displacement: 0.5582 ft
Static Water Column Height: 17.41 ft
Total Well Penetration Depth: 17.01 ft
Screen Length: 15. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001218 cm/sec
y0 = 0.1488 ft



WELL TEST ANALYSIS

Data Set: C:\Desktop\GRDA\Slug2023\MW2305RH1.aqt
Date: 11/20/23 Time: 15:34:02

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-05
Test Date: 11/1/2023

AQUIFER DATA

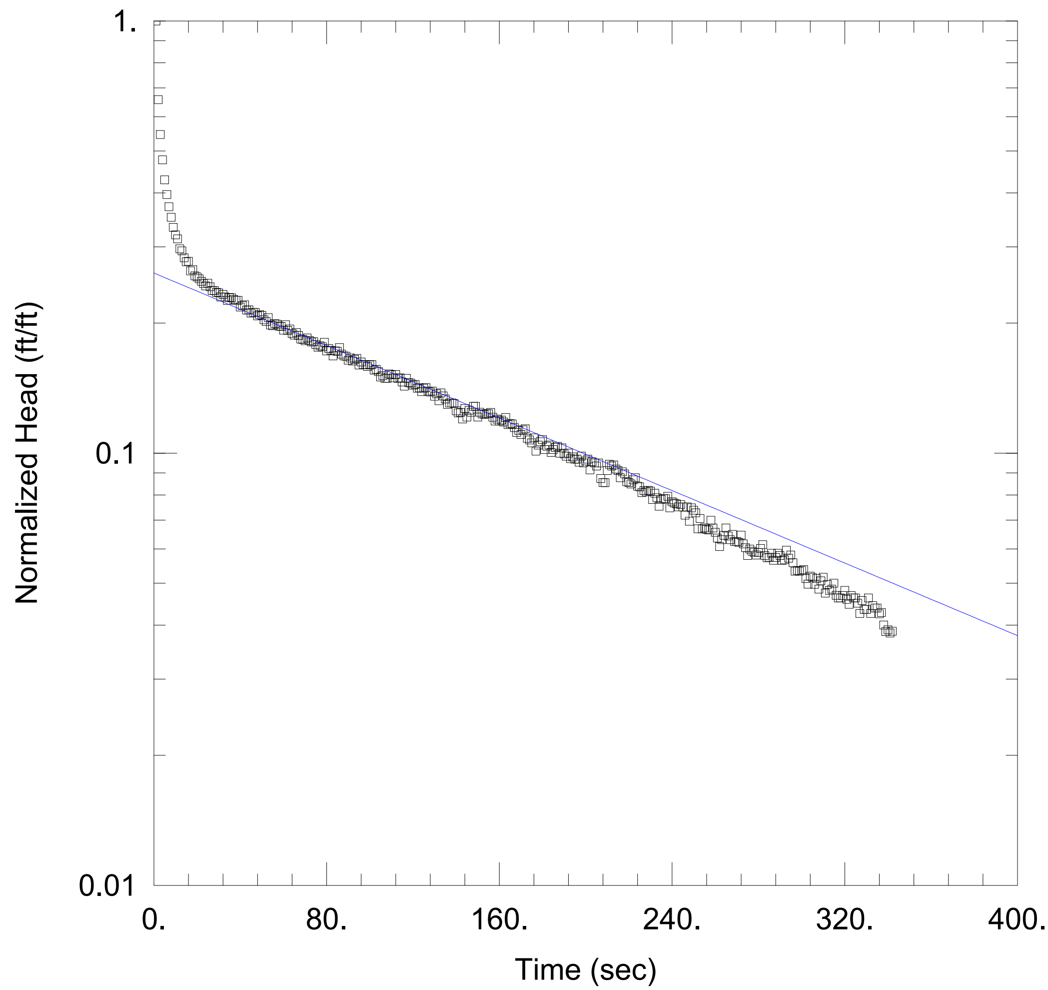
Saturated Thickness: 17.41 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW23-05 RH1)

Initial Displacement: -0.5303 ft
Static Water Column Height: 17.41 ft
Total Well Penetration Depth: 17.01 ft
Screen Length: 15. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0001191 cm/sec
y0 = -0.1484 ft



MW23-05 RH2

Data Set: C:\Desktop\GRDA\Slug2023\MW2305RH2.aqt
Date: 11/20/23 Time: 15:38:40

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-05
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 17.41 ft Anisotropy Ratio (Kz/Kr): 0.1

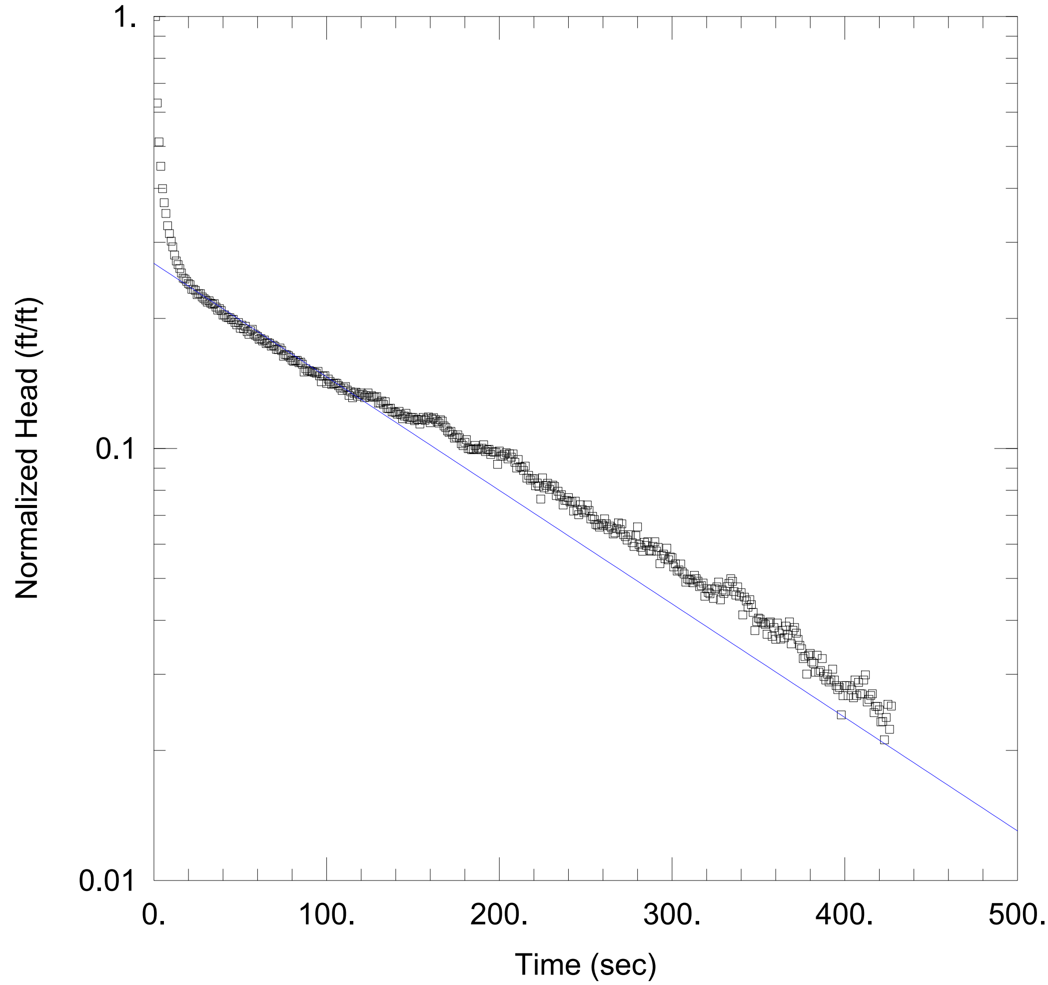
WELL DATA (MW23-05 RH1)

Initial Displacement: -0.4988 ft Static Water Column Height: 17.41 ft
Total Well Penetration Depth: 17.01 ft Screen Length: 15. ft
Casing Radius: 0.08 ft Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0001215 cm/sec y0 = -0.1302 ft



MW23-05 RH3

Data Set: C:\Desktop\GRDA\Slug2023\MW2305RH3.aqt
Date: 11/20/23 Time: 15:45:36

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-05
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 17.41 ft
Anisotropy Ratio (Kz/Kr): 0.1

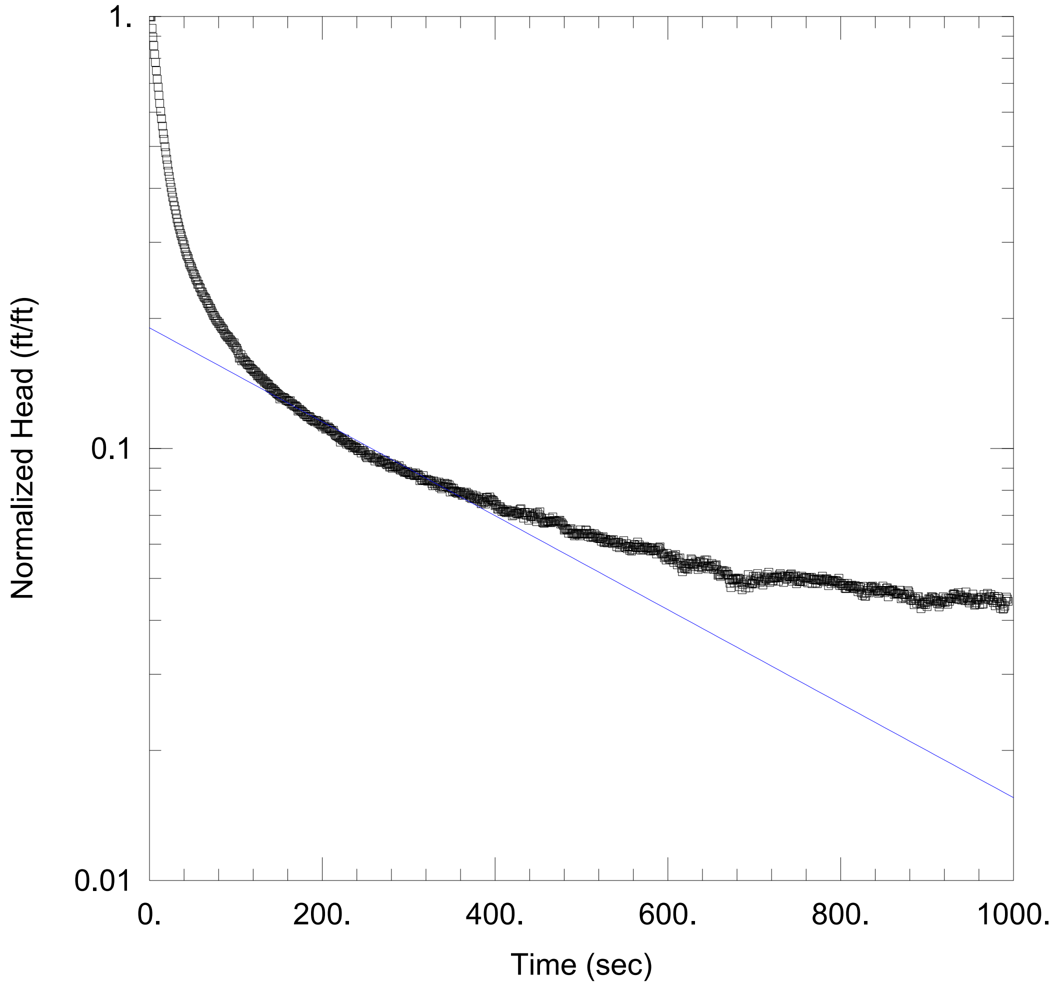
WELL DATA (MW23-05 RH1)

Initial Displacement: -0.5374 ft
Static Water Column Height: 17.41 ft
Total Well Penetration Depth: 17.01 ft
Screen Length: 15. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001522 cm/sec
y0 = -0.1441 ft



MW23-06 FH1

Data Set: C:\Desktop\GRDA\Slug2023\MW2306FH1.aqt
Date: 11/17/23 Time: 13:17:48

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-06
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 9.46 ft
Anisotropy Ratio (Kz/Kr): 0.1

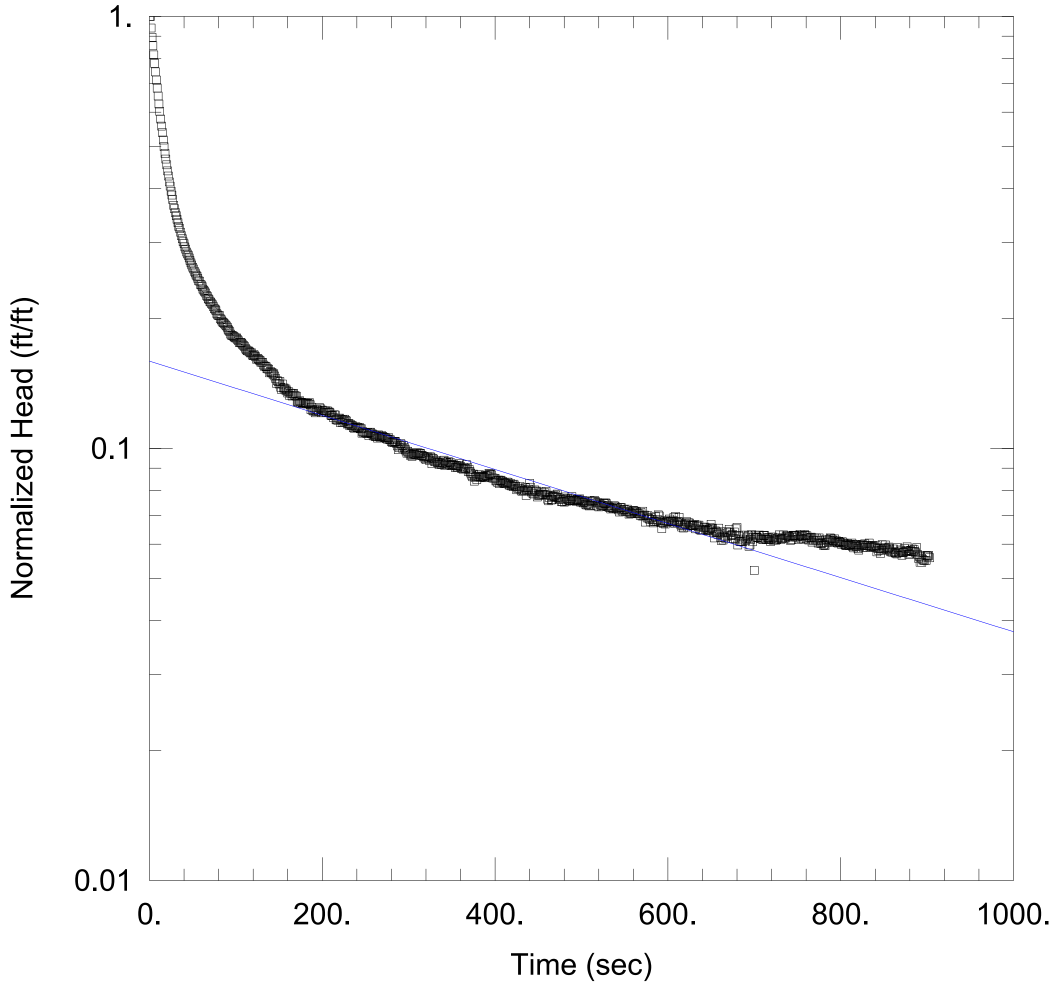
WELL DATA (MW23-06)

Initial Displacement: 1.049 ft
Static Water Column Height: 9.46 ft
Total Well Penetration Depth: 10. ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 7.196E-5 cm/sec
y0 = 0.1996 ft



MW23-06 FH2

Data Set: C:\Desktop\GRDA\Slug2023\MW2306FH2.aqt
Date: 11/17/23 Time: 13:24:00

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-06
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 9.46 ft Anisotropy Ratio (Kz/Kr): 0.1

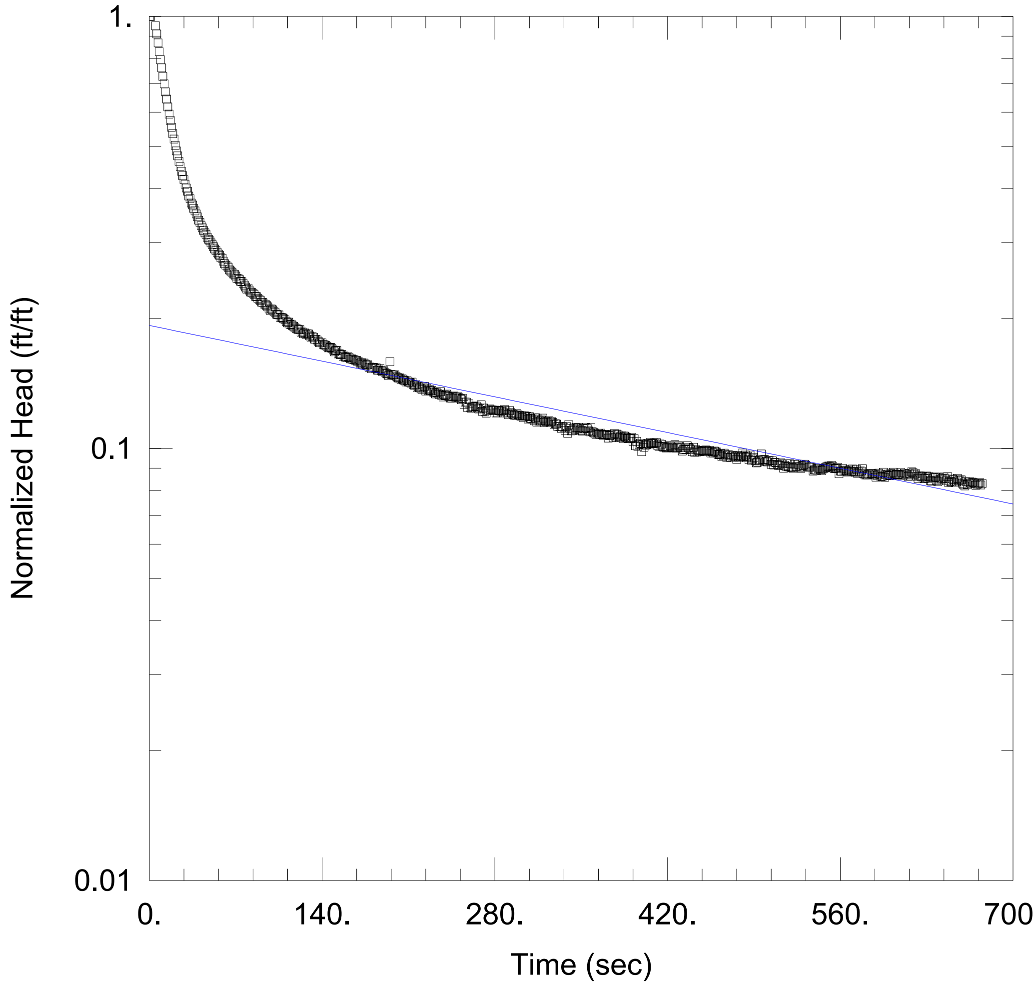
WELL DATA (MW23-06)

Initial Displacement: 1.136 ft Static Water Column Height: 9.46 ft
Total Well Penetration Depth: 10. ft Screen Length: 10. ft
Casing Radius: 0.08 ft Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 4.144E-5 cm/sec y0 = 0.1809 ft



MW23-06 FH3

Data Set: C:\Desktop\GRDA\Slug2023\MW2306FH3.aqt
Date: 11/17/23 Time: 13:29:47

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-06
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 9.46 ft
Anisotropy Ratio (Kz/Kr): 0.1

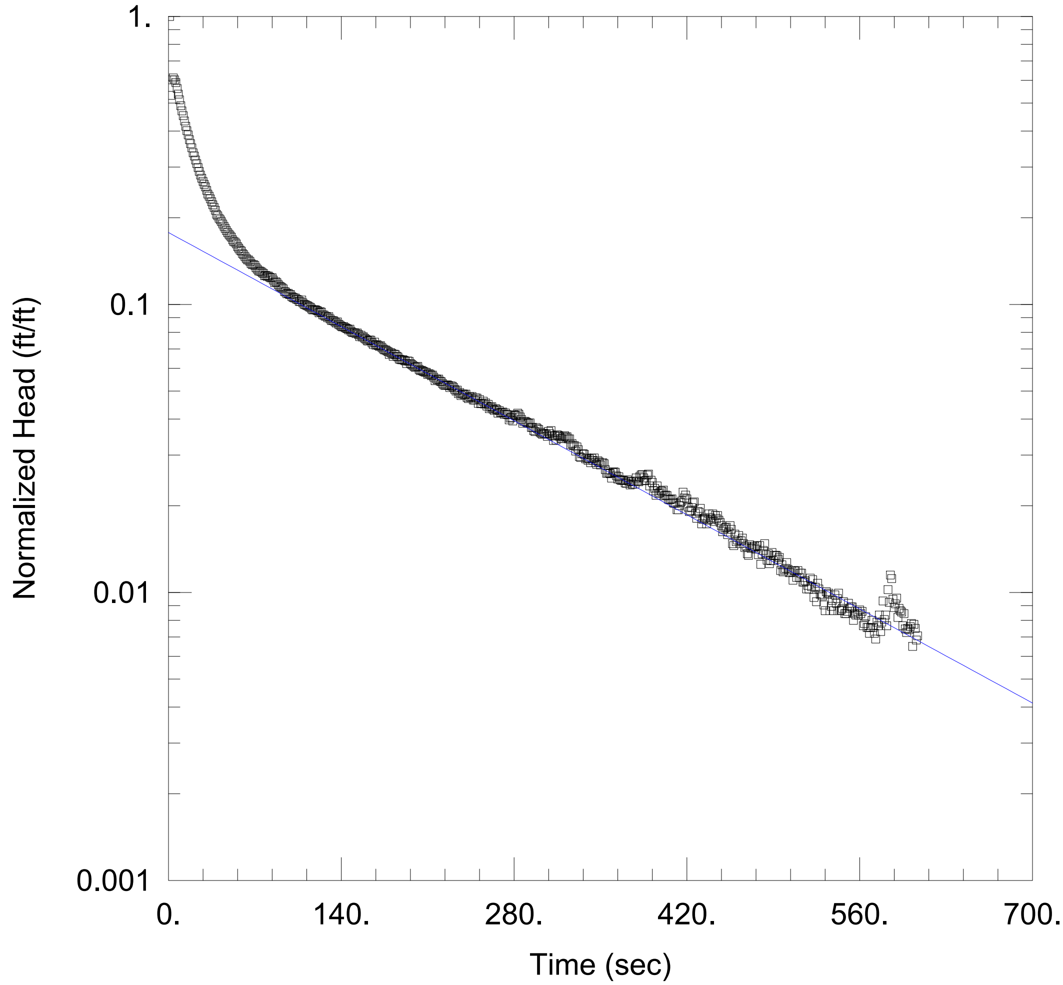
WELL DATA (MW23-06)

Initial Displacement: 1.002 ft
Static Water Column Height: 9.46 ft
Total Well Penetration Depth: 10. ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3.906E-5 cm/sec
y0 = 0.1929 ft



WELL TEST ANALYSIS

Data Set: C:\Desktop\GRDA\Slug2023\MW2306RH1.aqt
Date: 11/17/23 Time: 12:57:06

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-06
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 9.46 ft
Anisotropy Ratio (Kz/Kr): 0.1

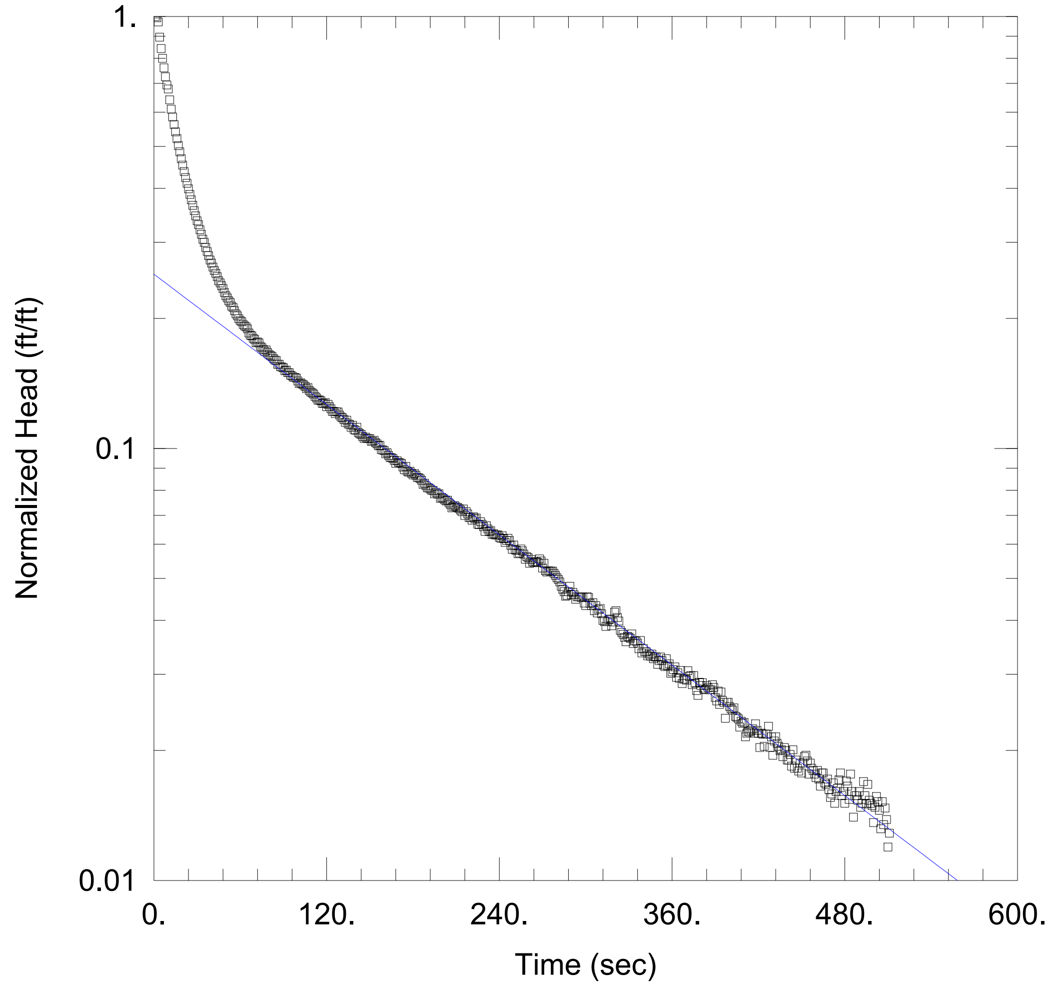
WELL DATA (MW23-06)

Initial Displacement: -1.41 ft
Static Water Column Height: 9.46 ft
Total Well Penetration Depth: 10. ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001544 cm/sec
y0 = -0.2505 ft



MW23-06 RH2

Data Set: C:\Desktop\GRDA\Slug2023\MW2306RH2.aqt
Date: 11/17/23 Time: 13:19:31

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-06
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 9.46 ft
Anisotropy Ratio (Kz/Kr): 0.1

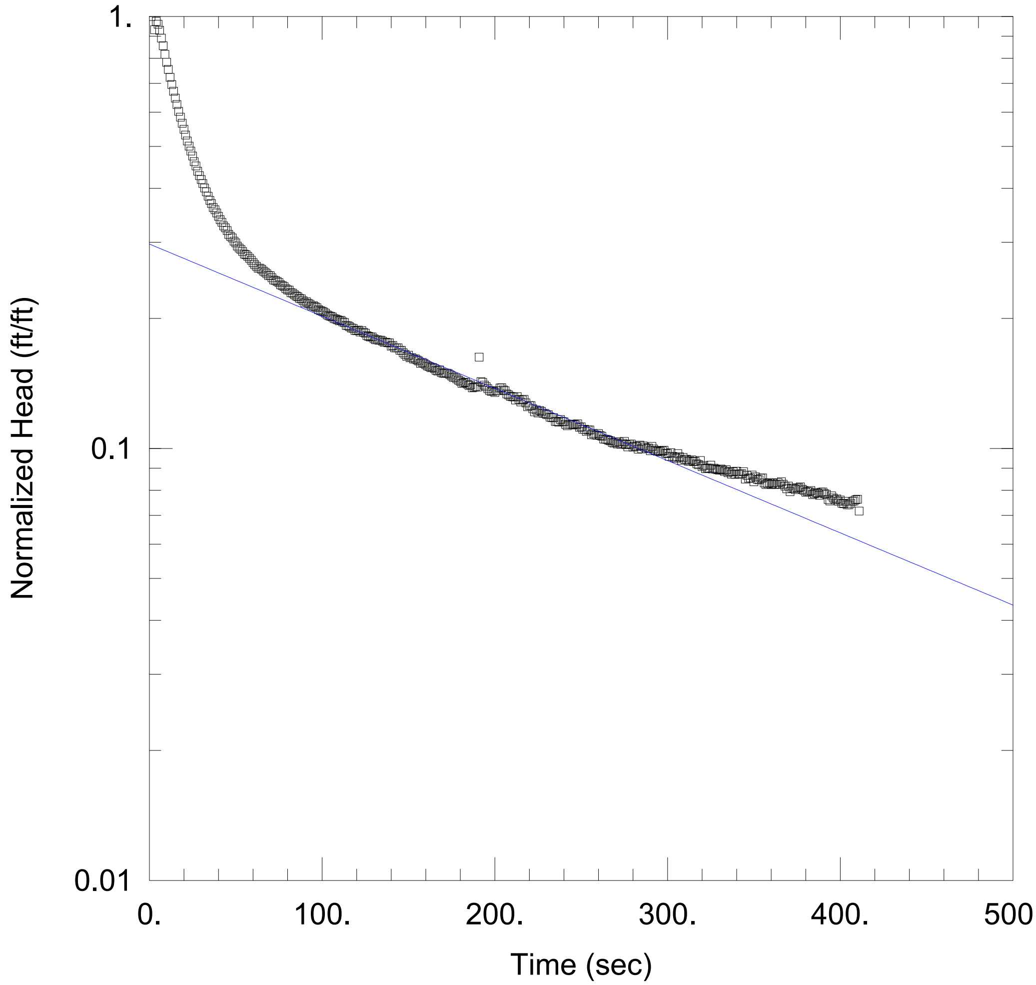
WELL DATA (MW23-06)

Initial Displacement: -1.011 ft
Static Water Column Height: 9.46 ft
Total Well Penetration Depth: 10. ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001663 cm/sec
y0 = -0.256 ft



MW23-06 RH3

Data Set: C:\Desktop\GRDA\Slug2023\MW2306RH3.aqt
Date: 11/17/23 Time: 13:27:17

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: MW23-06
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 9.46 ft
Anisotropy Ratio (Kz/Kr): 0.1

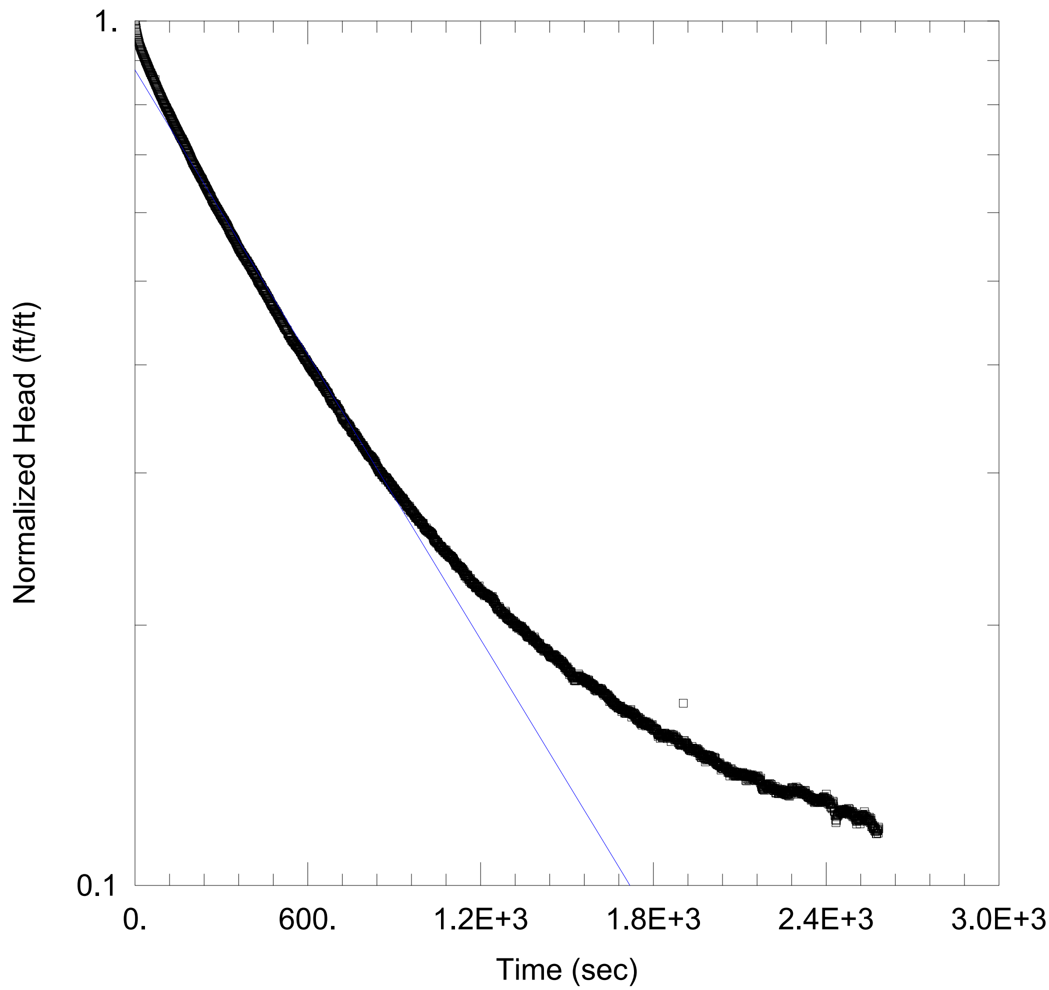
WELL DATA (MW23-06)

Initial Displacement: -0.9152 ft
Static Water Column Height: 9.46 ft
Total Well Penetration Depth: 10. ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001106 cm/sec
y0 = -0.2721 ft



TMW-7 FH1

Data Set: C:\Desktop\GRDA\Slug2023\TMW7FH1.aqt
Date: 11/16/23 Time: 10:50:09

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: TMW-1 LANDFILL PIEZOMETER
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 15.05 ft
Anisotropy Ratio (Kz/Kr): 0.1

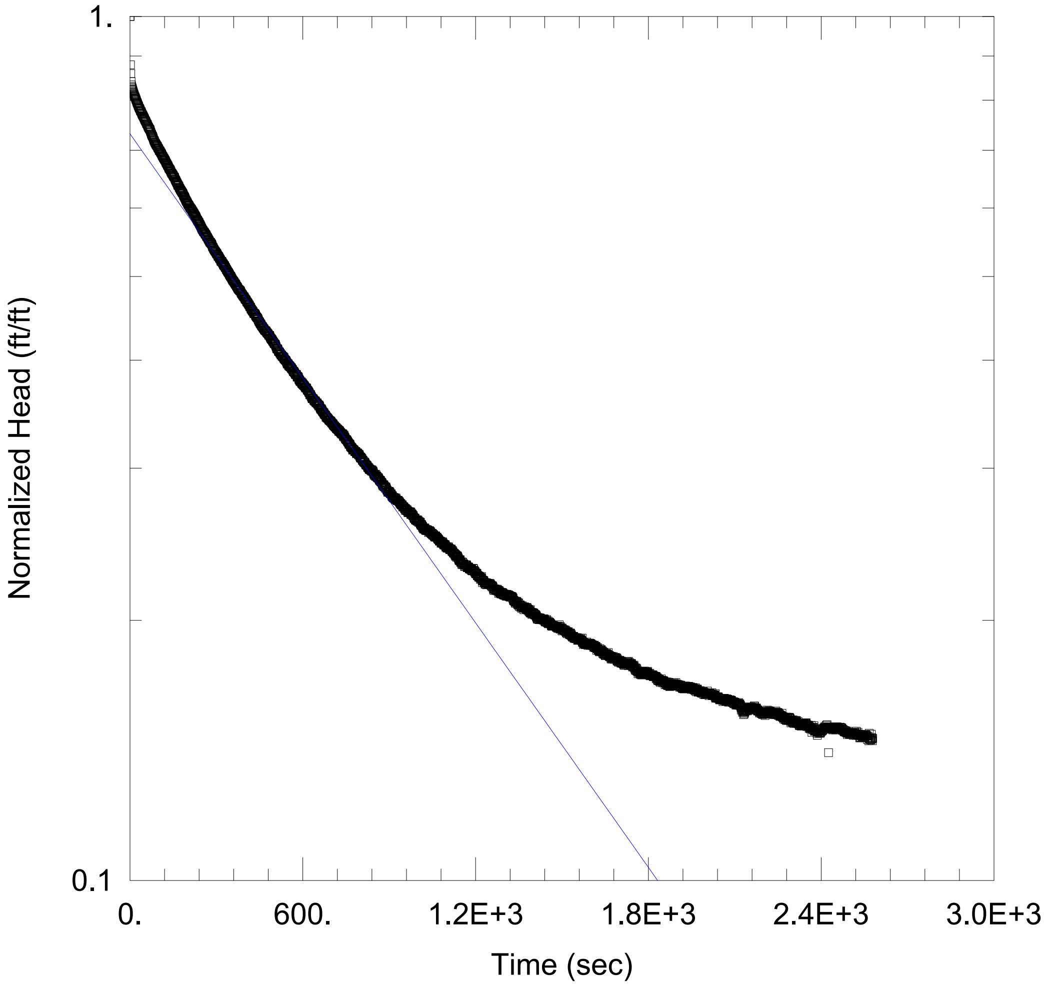
WELL DATA (TMW-7)

Initial Displacement: 1.343 ft
Static Water Column Height: 5.15 ft
Total Well Penetration Depth: 10. ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 4.056E-5 cm/sec
y0 = 1.178 ft



TMW-7 FH2

Data Set: C:\Desktop\GRDA\Slug2023\TMW7FH2.aqt
Date: 11/16/23 Time: 10:59:17

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: TMW-1 LANDFILL PIEZOMETER
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 15.05 ft
Anisotropy Ratio (Kz/Kr): 0.1

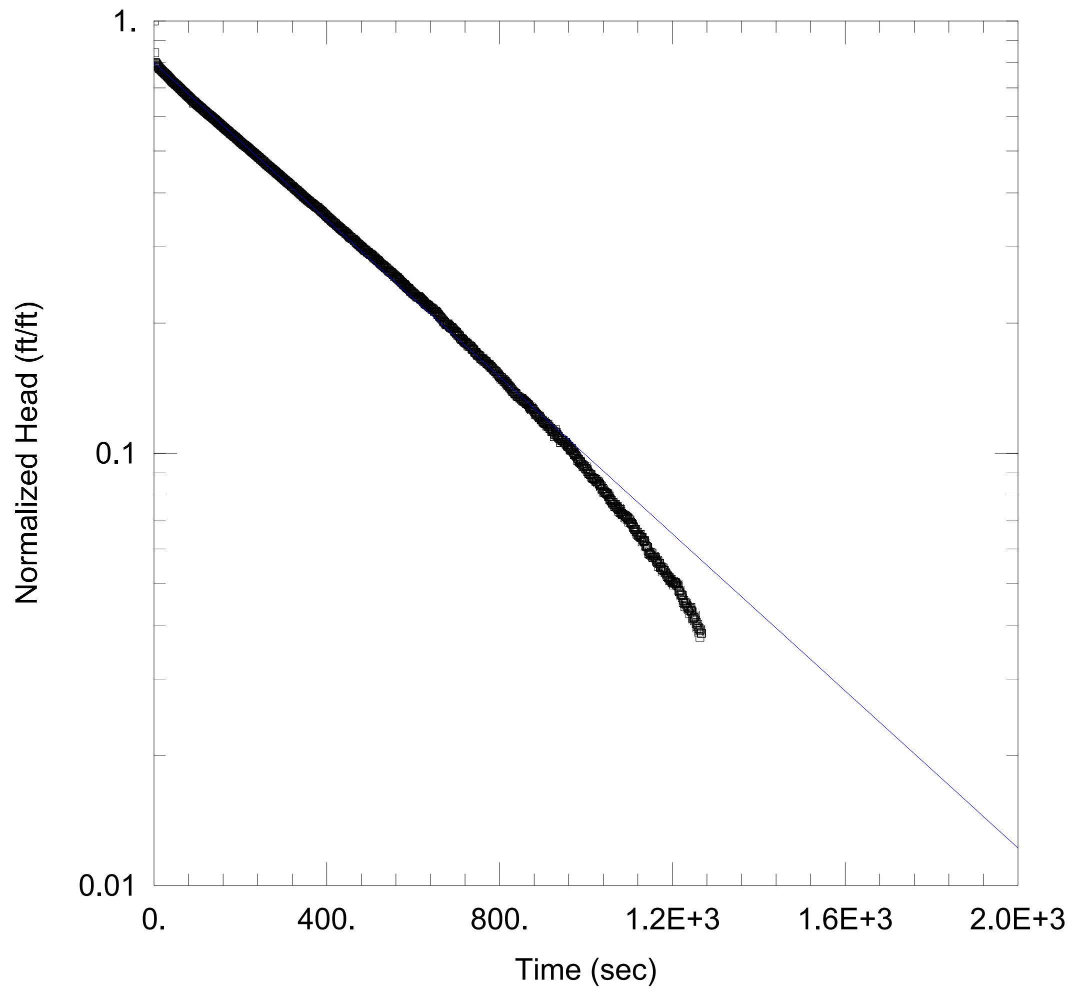
WELL DATA (TMW-7)

Initial Displacement: 1.732 ft
Static Water Column Height: 5.15 ft
Total Well Penetration Depth: 10. ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3.486E-5 cm/sec
y0 = 1.266 ft



WELL TEST ANALYSIS

Data Set: C:\Desktop\GRDA\Slug2023\TMW7RH1.aqt
Date: 11/15/23 Time: 16:04:27

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: TMW-1 LANDFILL PIEZOMETER
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 15.05 ft Anisotropy Ratio (Kz/Kr): 0.1

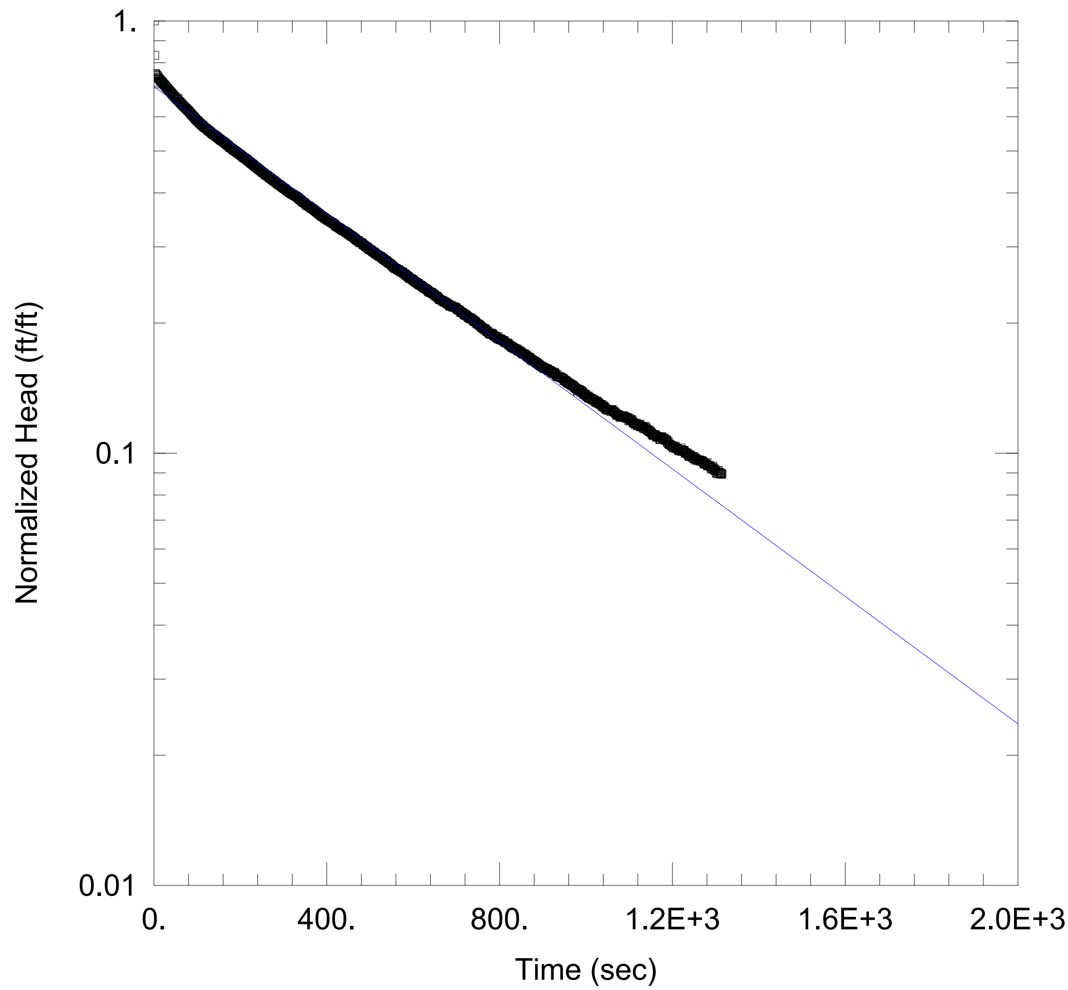
WELL DATA (TMW-7)

Initial Displacement: -1.613 ft Static Water Column Height: 5.15 ft
Total Well Penetration Depth: 10. ft Screen Length: 10. ft
Casing Radius: 0.08 ft Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 6.713E-5 cm/sec y0 = -1.291 ft



TMW-7 RH2

Data Set: C:\Desktop\GRDA\Slug2023\TMW7RH2.aqt
Date: 11/16/23 Time: 10:46:03

PROJECT INFORMATION

Company: Enercon Services, Inc.
Client: GREC
Project: GRDA-00029
Location: Chouteau, Oklahoma
Test Well: TMW-1 LANDFILL PIEZOMETER
Test Date: 11/1/2023

AQUIFER DATA

Saturated Thickness: 15.05 ft
Anisotropy Ratio (Kz/Kr): 0.1

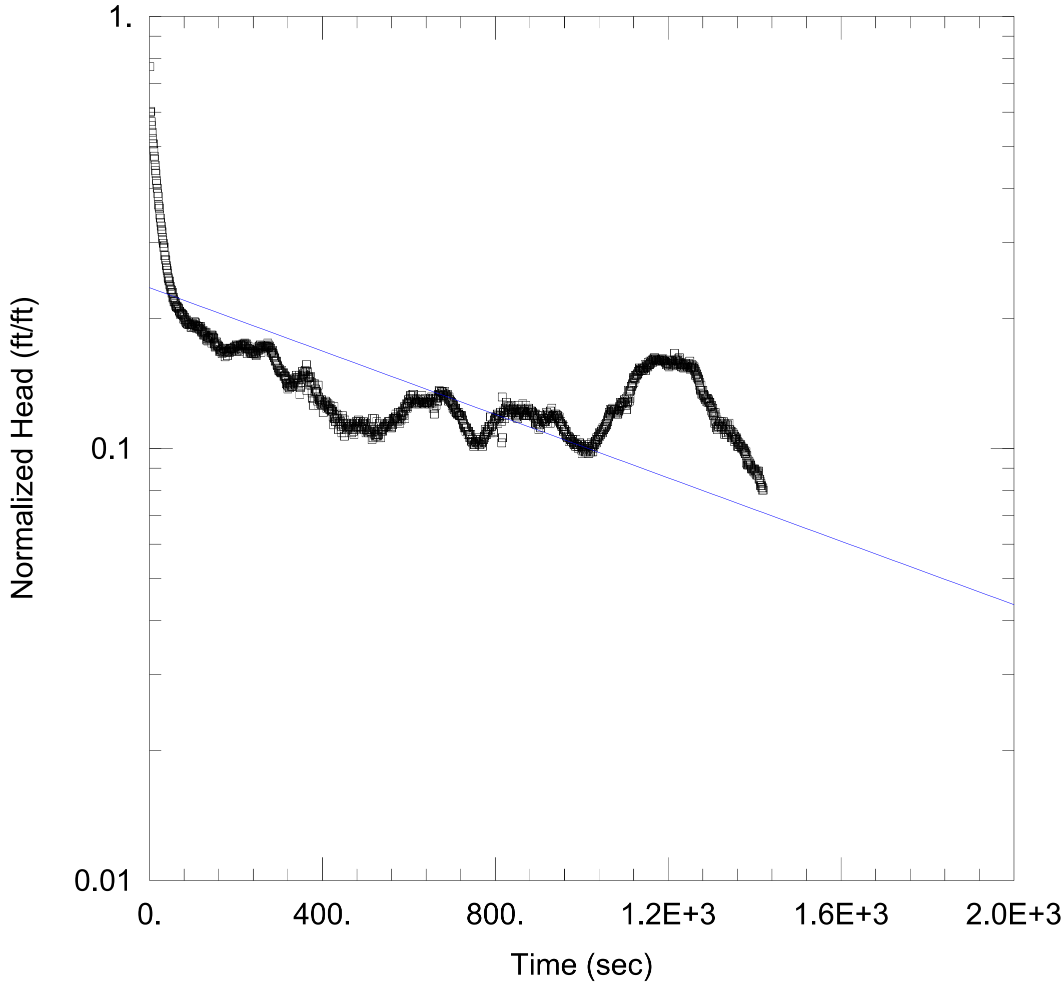
WELL DATA (TMW-7)

Initial Displacement: -1.716 ft
Static Water Column Height: 5.15 ft
Total Well Penetration Depth: 10. ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 5.449E-5 cm/sec
y0 = -1.21 ft



MW03-1 RISING HEAD

Data Set: C:\...\MW03-1_1.aqt
Date: 05/17/22
Time: 14:21:43

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW03-1
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 4.51 ft
Anisotropy Ratio (Kz/Kr): 1.

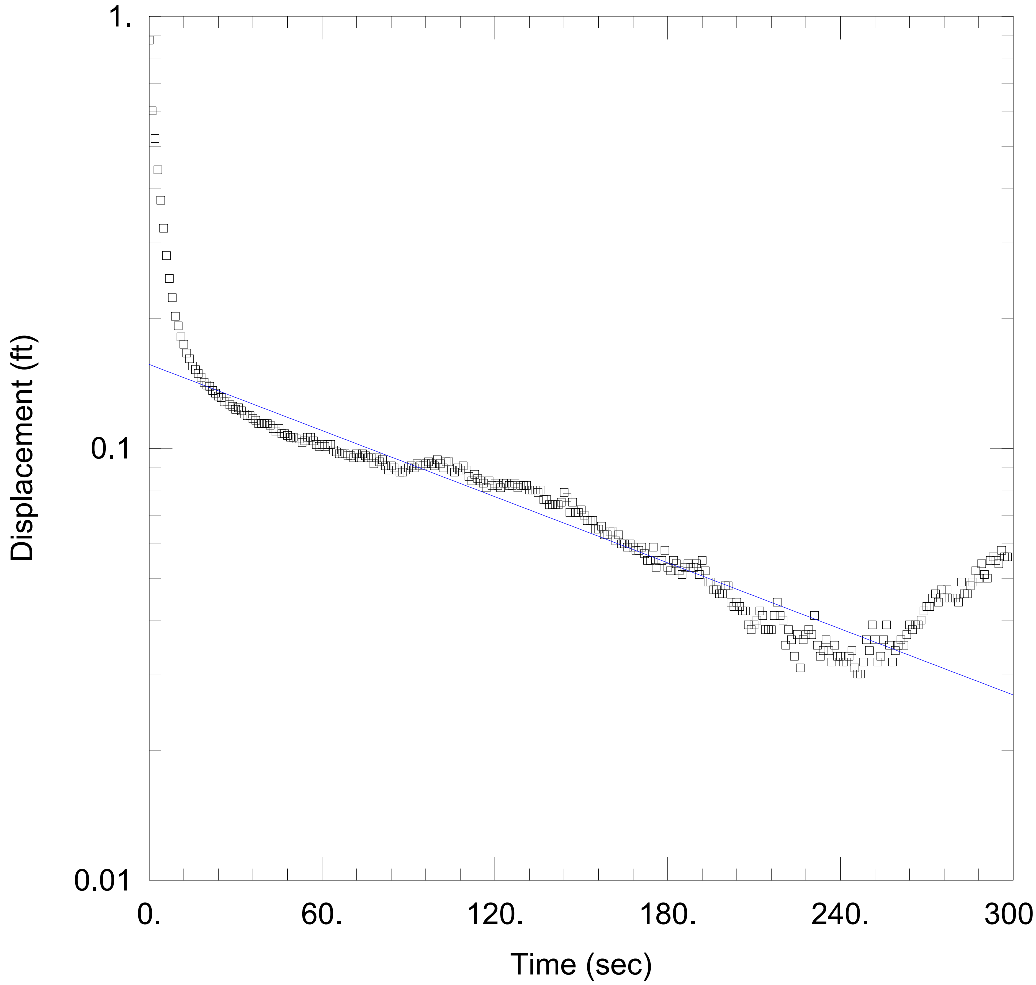
WELL DATA (New Well)

Initial Displacement: -1.049 ft
Static Water Column Height: 4.51 ft
Total Well Penetration Depth: 5. ft
Screen Length: 5. ft
Casing Radius: 0.083 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 5.698E-5 cm/sec
y0 = -0.2471 ft



MW03-1 FALLING HEAD

Data Set: C:\...\MW03-1_2.aqt
Date: 05/17/22 Time: 14:25:44

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW03-1
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 4.51 ft Anisotropy Ratio (Kz/Kr): 1.

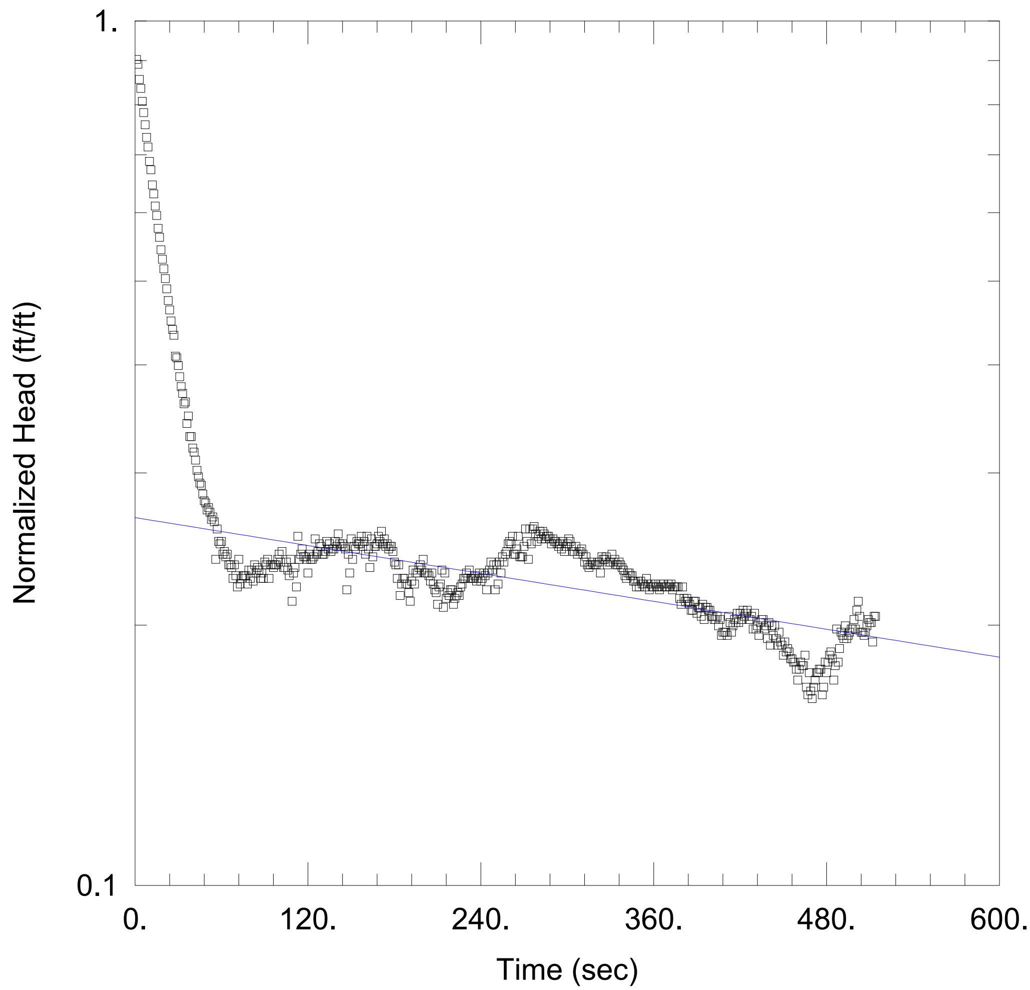
WELL DATA (New Well)

Initial Displacement: 0.88 ft Static Water Column Height: 4.51 ft
Total Well Penetration Depth: 5. ft Screen Length: 5. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0003961 cm/sec y0 = 0.1563 ft



MW03-1 RISING HEAD

Data Set: C:\...\MW03-1_3.aqt
Date: 05/17/22 Time: 14:26:42

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW03-1
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 4.51 ft Anisotropy Ratio (Kz/Kr): 1.

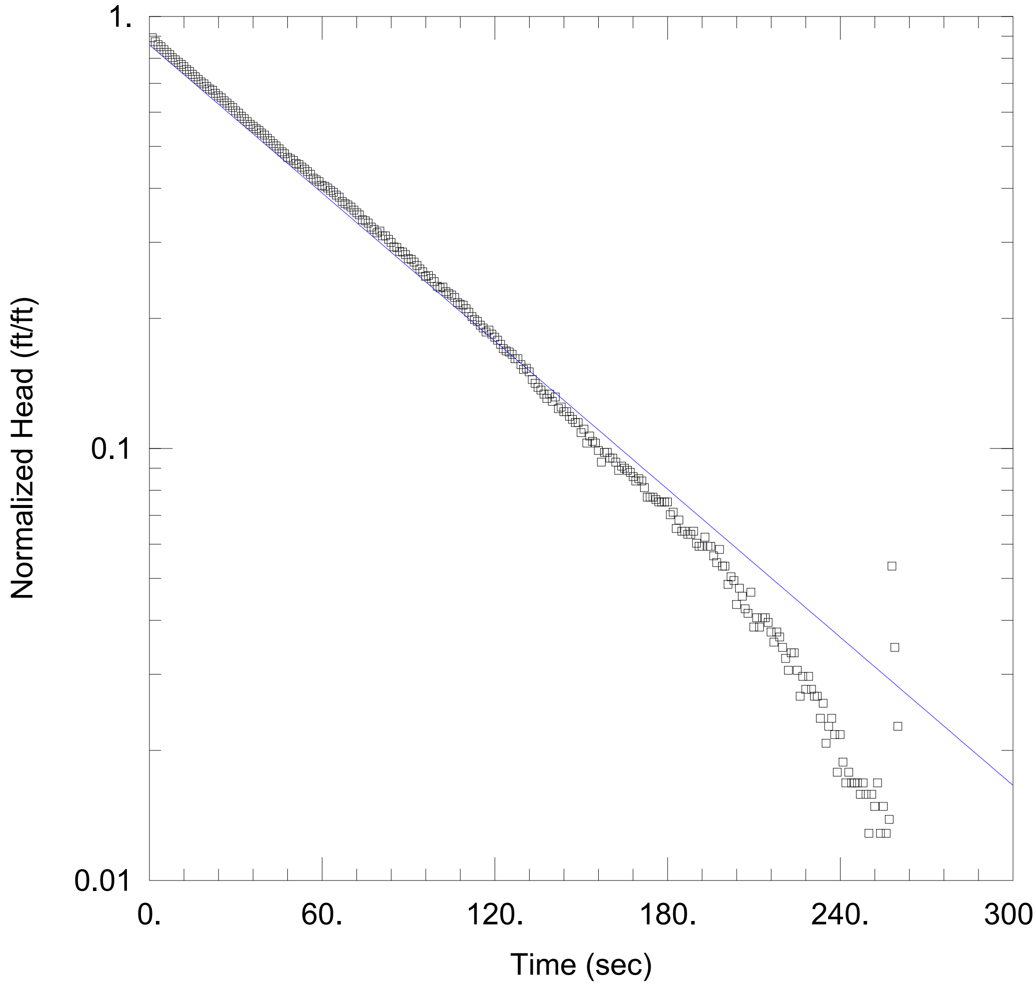
WELL DATA (New Well)

Initial Displacement: -0.596 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.083 ft
Static Water Column Height: 4.51 ft
Screen Length: 5. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 4.179E-5 cm/sec y0 = -0.1587 ft



MW03-2 RISING HEAD

Data Set: C:\...\MW03-2_1.aqt
Date: 05/17/22 Time: 14:27:46

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW03-2
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 12.98 ft Anisotropy Ratio (Kz/Kr): 1.

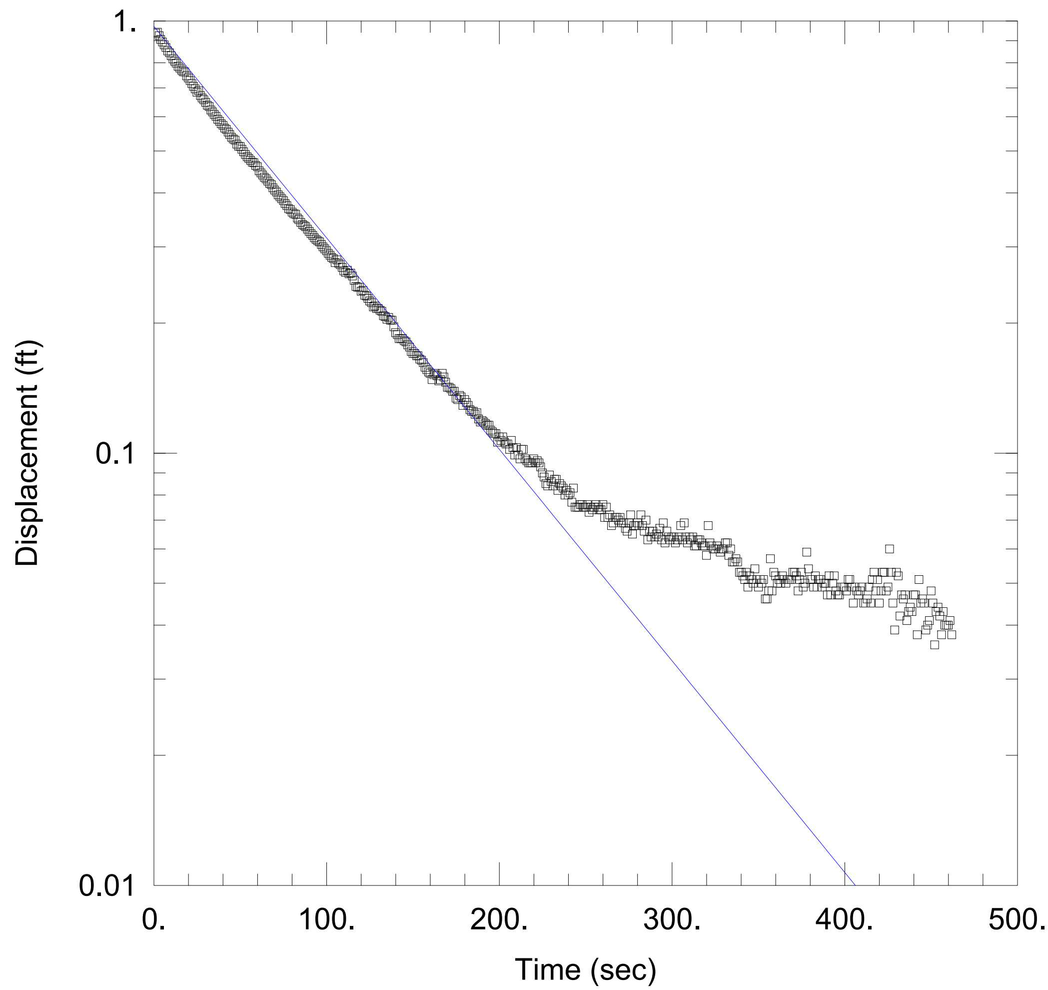
WELL DATA (New Well)

Initial Displacement: -1.011 ft
Static Water Column Height: 12.98 ft
Total Well Penetration Depth: 12.98 ft
Screen Length: 10. ft
Casing Radius: 0.083 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0004944 cm/sec y0 = -0.8682 ft



MW03-2 FALLING HEAD

Data Set: C:\...\MW03-2_2.aqt
Date: 05/17/22 Time: 14:28:59

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW03-2
Test Date: 4/26/2022

AQUIFER DATA

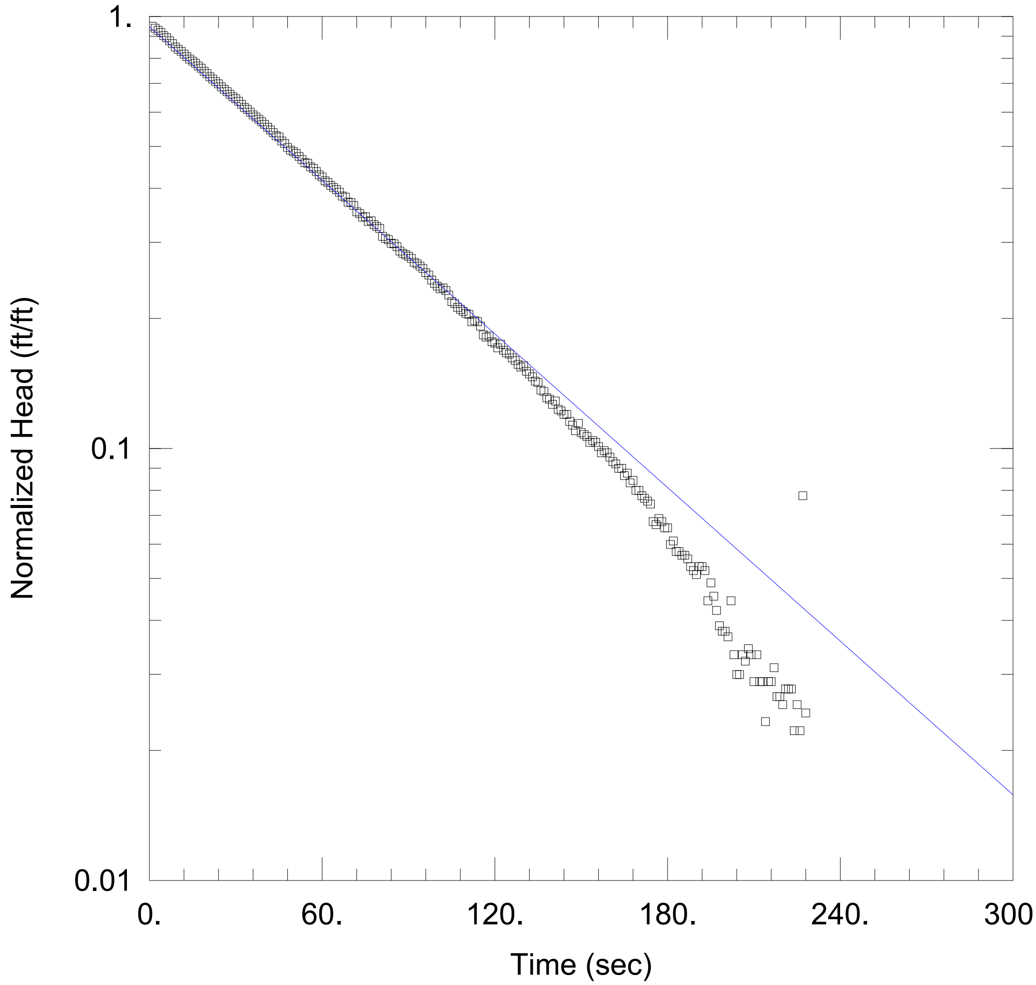
Saturated Thickness: 12.98 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 1.186 ft
Total Well Penetration Depth: 12.98 ft
Casing Radius: 0.083 ft
Static Water Column Height: 12.98 ft
Screen Length: 10. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0004235 cm/sec
y0 = 0.9712 ft



MW03-2 RISING HEAD

Data Set: C:\...\MW03-2_3.aqt
Date: 05/17/22 Time: 15:50:01

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW03-2
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 12.98 ft Anisotropy Ratio (Kz/Kr): 1.

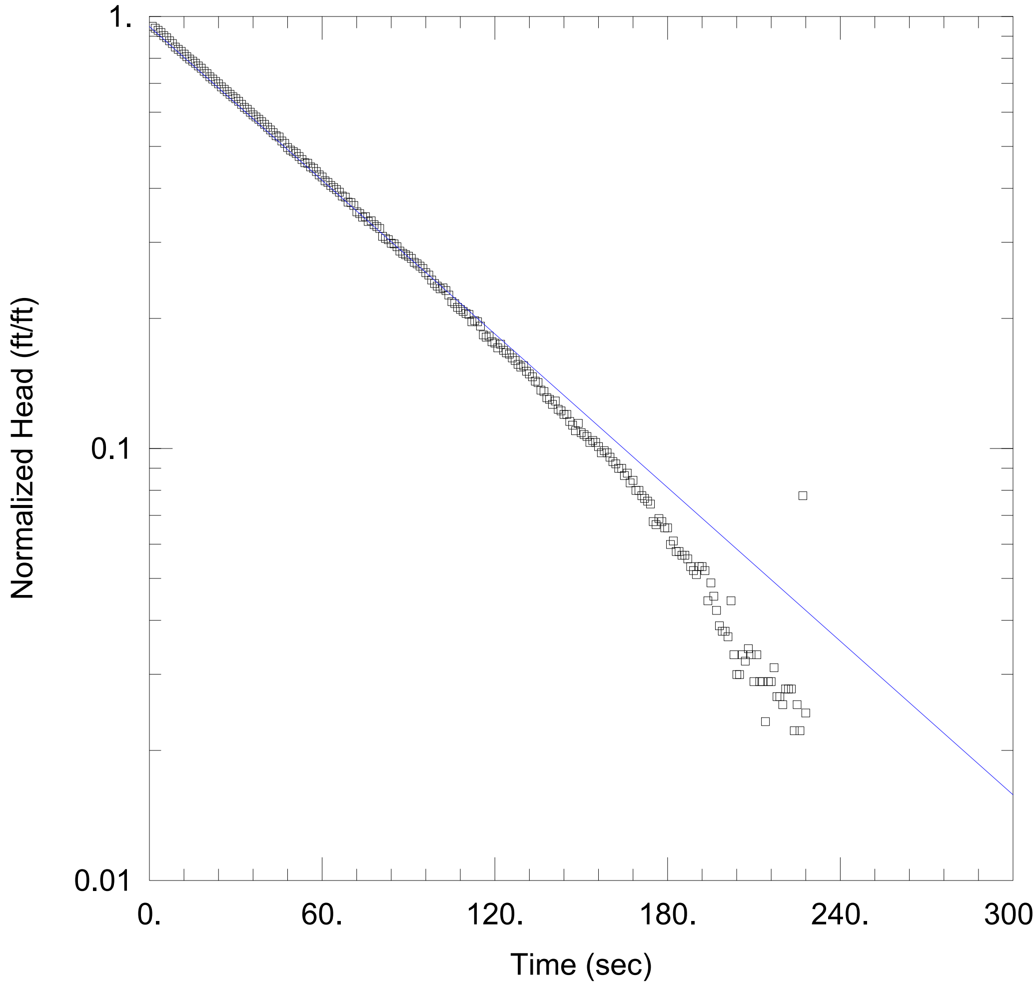
WELL DATA (New Well)

Initial Displacement: -0.901 ft Static Water Column Height: 12.98 ft
Total Well Penetration Depth: 12.98 ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.000513 cm/sec y0 = -0.8532 ft



MW03-2 RISING HEAD

Data Set: C:\...\MW03-2_3.aqt
Date: 05/17/22 Time: 15:51:18

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW03-2
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 12.98 ft
Anisotropy Ratio (Kz/Kr): 1.

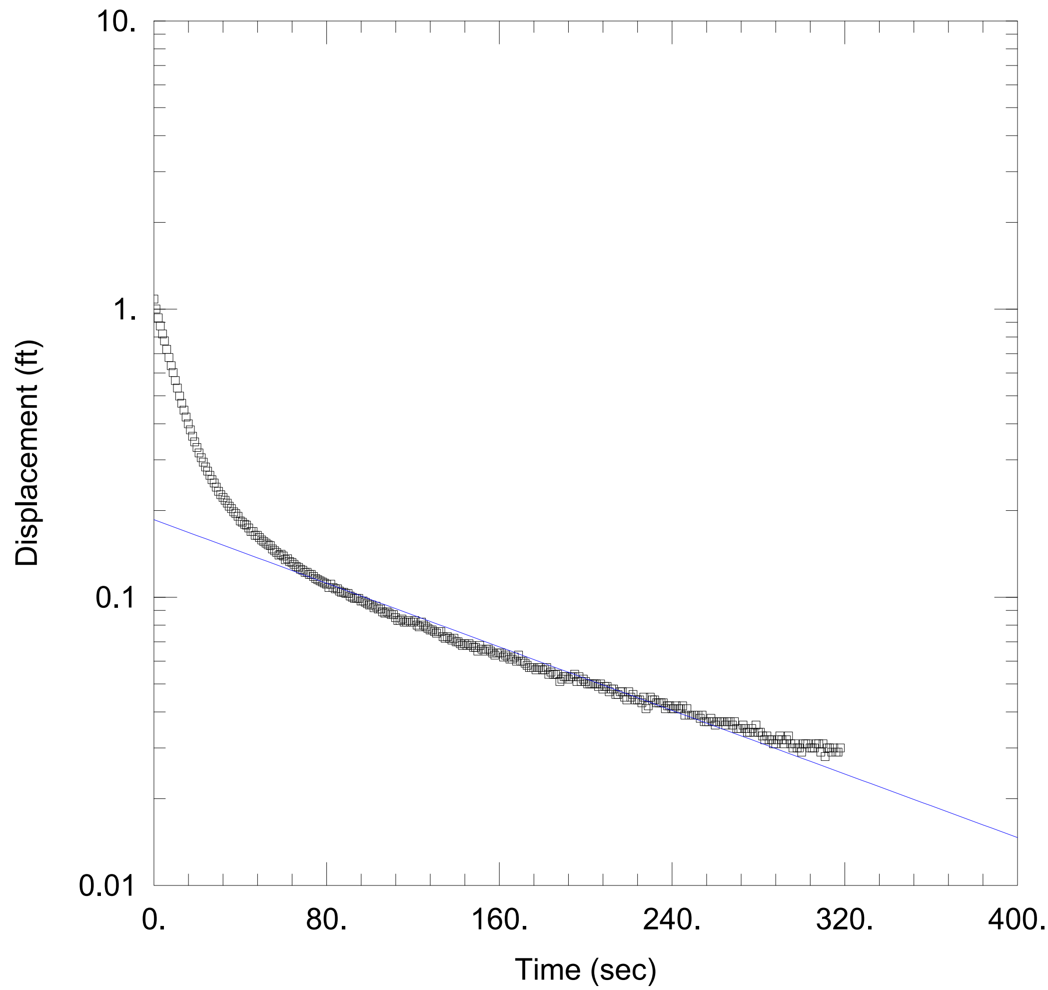
WELL DATA (New Well)

Initial Displacement: -0.901 ft
Static Water Column Height: 12.98 ft
Total Well Penetration Depth: 12.98 ft
Screen Length: 10. ft
Casing Radius: 0.083 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.000513 cm/sec
y0 = -0.8532 ft



MW22-01 FALLING HEAD

Data Set: C:\...\MW22-01_2.aqt
Date: 05/17/22 Time: 14:30:22

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-01
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 15.56 ft
Anisotropy Ratio (Kz/Kr): 1.

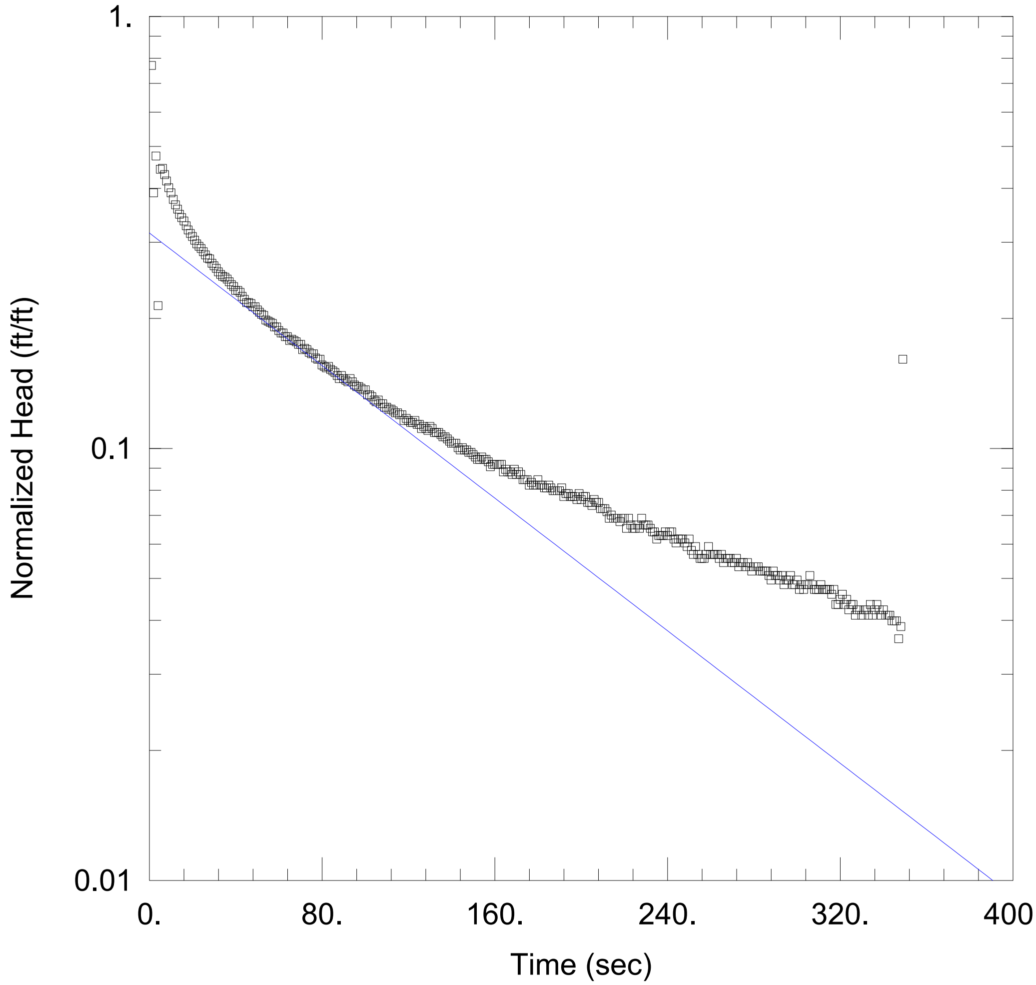
WELL DATA (New Well)

Initial Displacement: 1.083 ft
Total Well Penetration Depth: 15. ft
Casing Radius: 0.083 ft
Static Water Column Height: 15.56 ft
Screen Length: 15. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001612 cm/sec
y0 = 0.1858 ft



MW22-01 RISING HEAD

Data Set: C:\...\MW22-01_3.aqt
Date: 05/17/22 Time: 14:31:41

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-01
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 15.56 ft Anisotropy Ratio (Kz/Kr): 1.

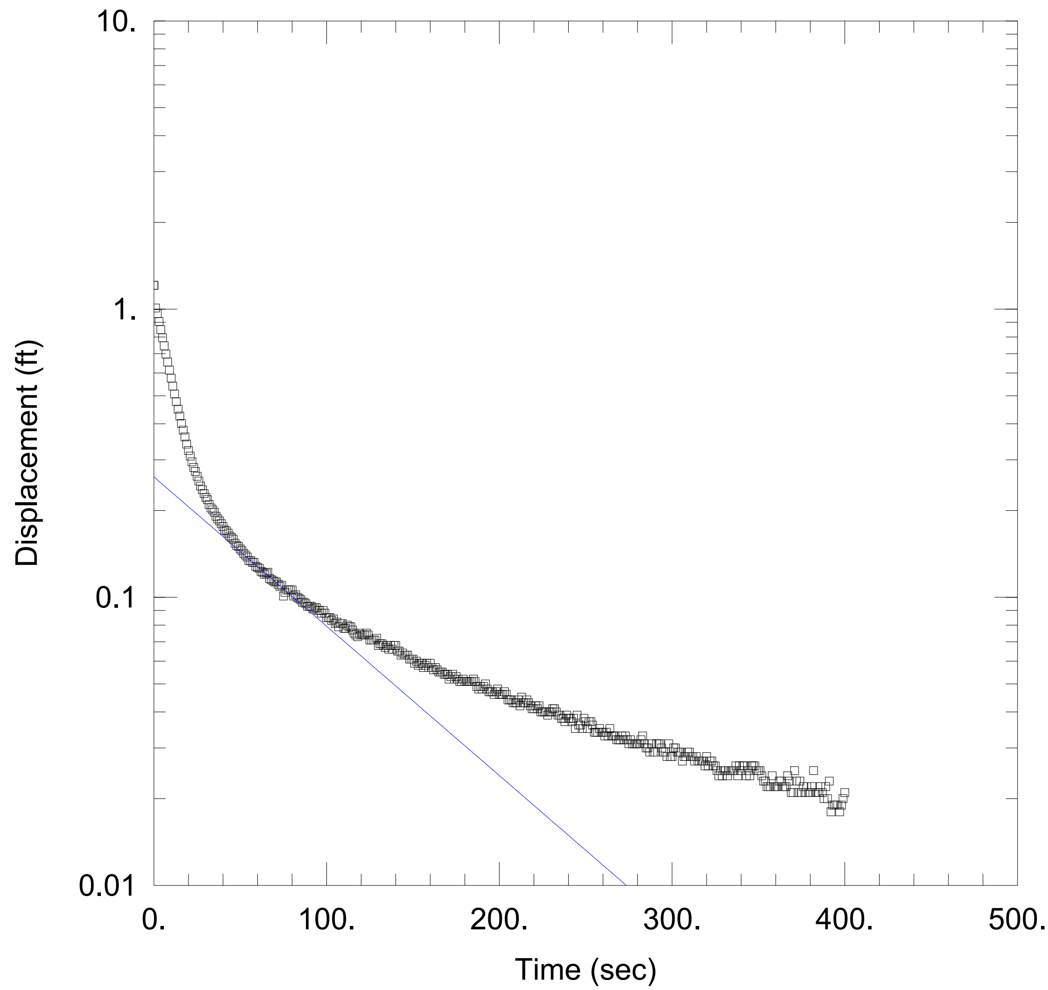
WELL DATA (New Well)

Initial Displacement: -0.827 ft Static Water Column Height: 15.56 ft
Total Well Penetration Depth: 15. ft Screen Length: 15. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0002243 cm/sec y0 = -0.2607 ft



MW22-01 FALLING HEAD

Data Set: C:\...\MW22-01_4.aqt
Date: 05/17/22 Time: 16:45:37

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-01
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 15.56 ft
Anisotropy Ratio (Kz/Kr): 1.

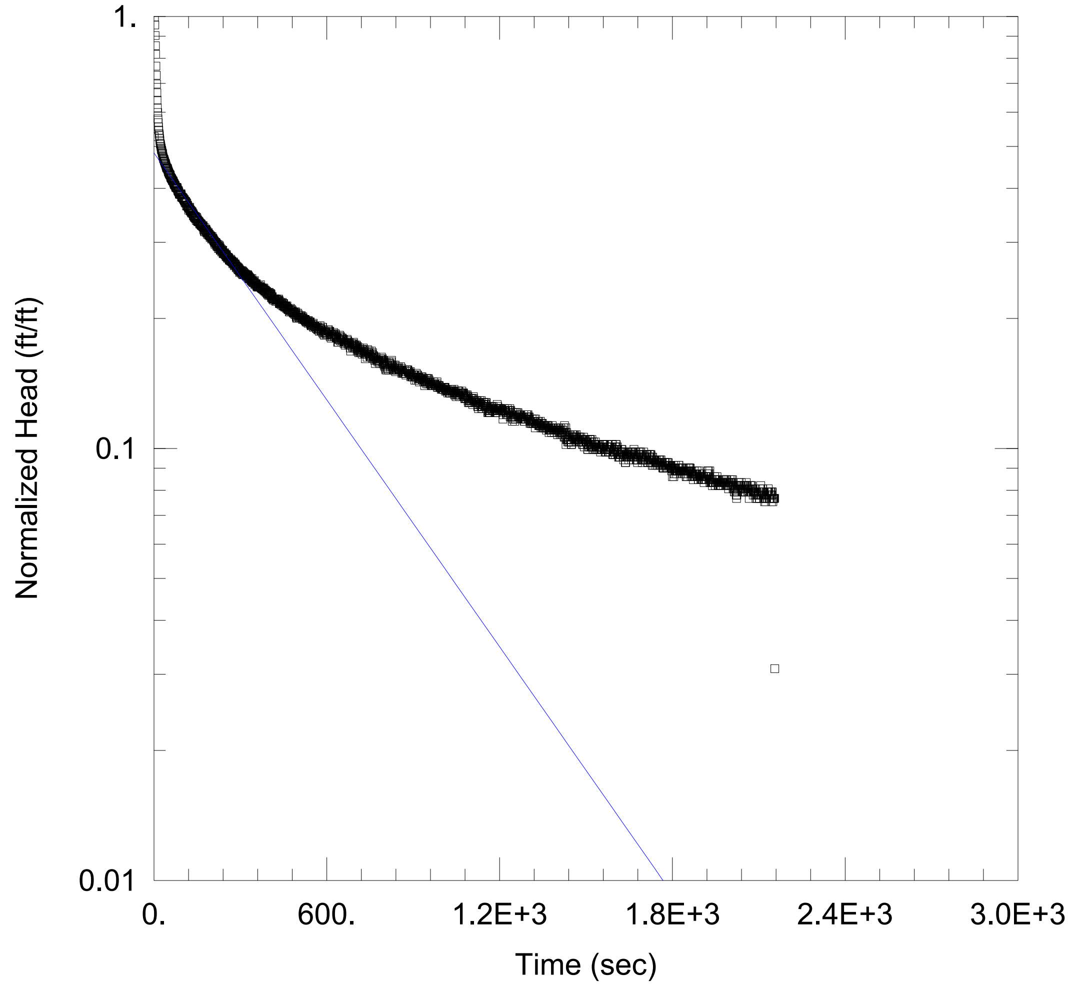
WELL DATA (New Well)

Initial Displacement: 1.209 ft
Total Well Penetration Depth: 15. ft
Casing Radius: 0.083 ft
Static Water Column Height: 15.56 ft
Screen Length: 15. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.000303 cm/sec
y0 = 0.2615 ft



MW22-02 RISING HEAD

Data Set: C:\...\MW22-02_1.aqt
Date: 05/17/22 Time: 14:35:16

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-02
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 13.59 ft Anisotropy Ratio (Kz/Kr): 1.

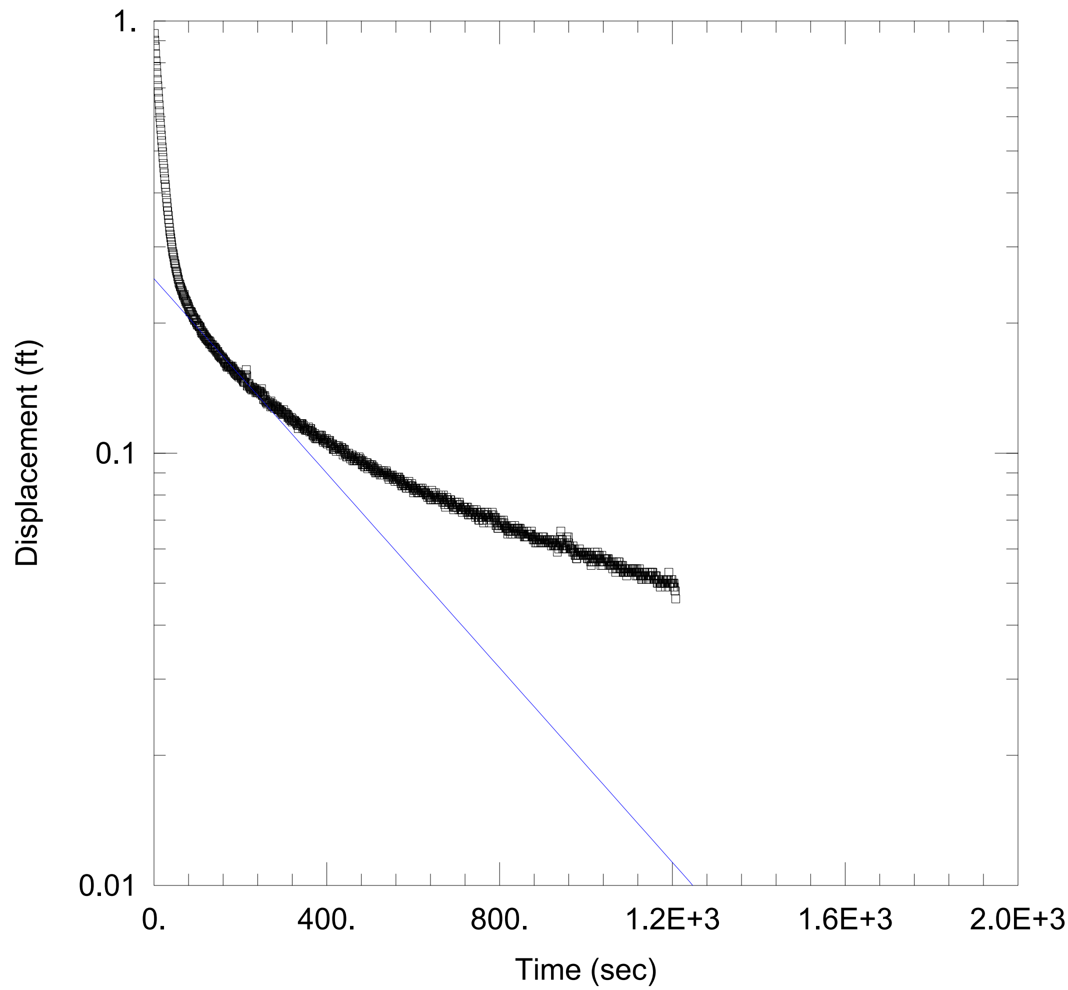
WELL DATA (New Well)

Initial Displacement: -0.744 ft Static Water Column Height: 13.59 ft
Total Well Penetration Depth: 15. ft Screen Length: 15. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 6.308E-5 cm/sec y0 = -0.3593 ft



MW22-02 FALLING HEAD

Data Set: C:\...\MW22-02_2.aqt
Date: 05/17/22 Time: 14:36:47

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-02
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 13.59 ft Anisotropy Ratio (Kz/Kr): 1.

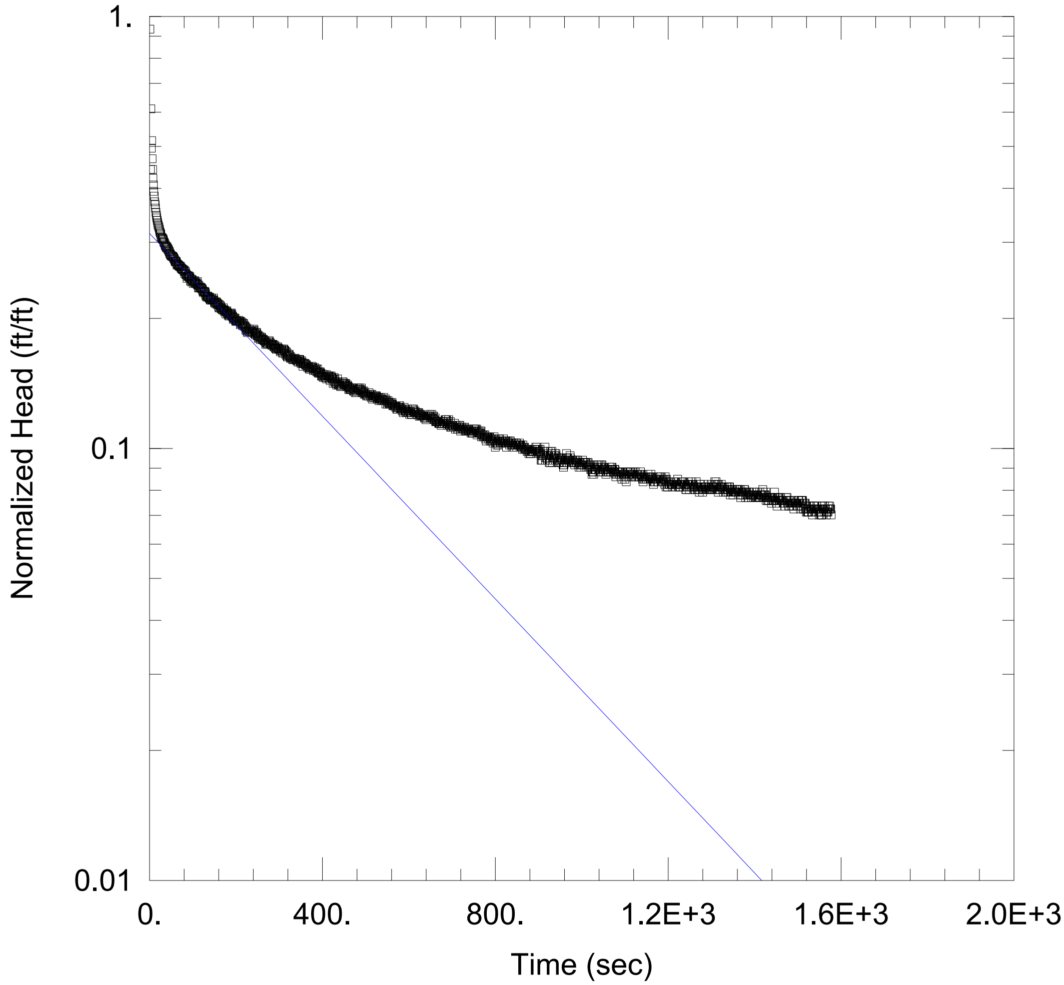
WELL DATA (New Well)

Initial Displacement: 1.112 ft Static Water Column Height: 13.59 ft
Total Well Penetration Depth: 15. ft Screen Length: 15. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 9.826E-5 cm/sec y0 = 0.2532 ft



MW22-02 RISING HEAD

Data Set: C:\...\MW22-02_3.aqt
Date: 05/17/22 Time: 14:38:03

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-02
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 15.59 ft Anisotropy Ratio (Kz/Kr): 1.

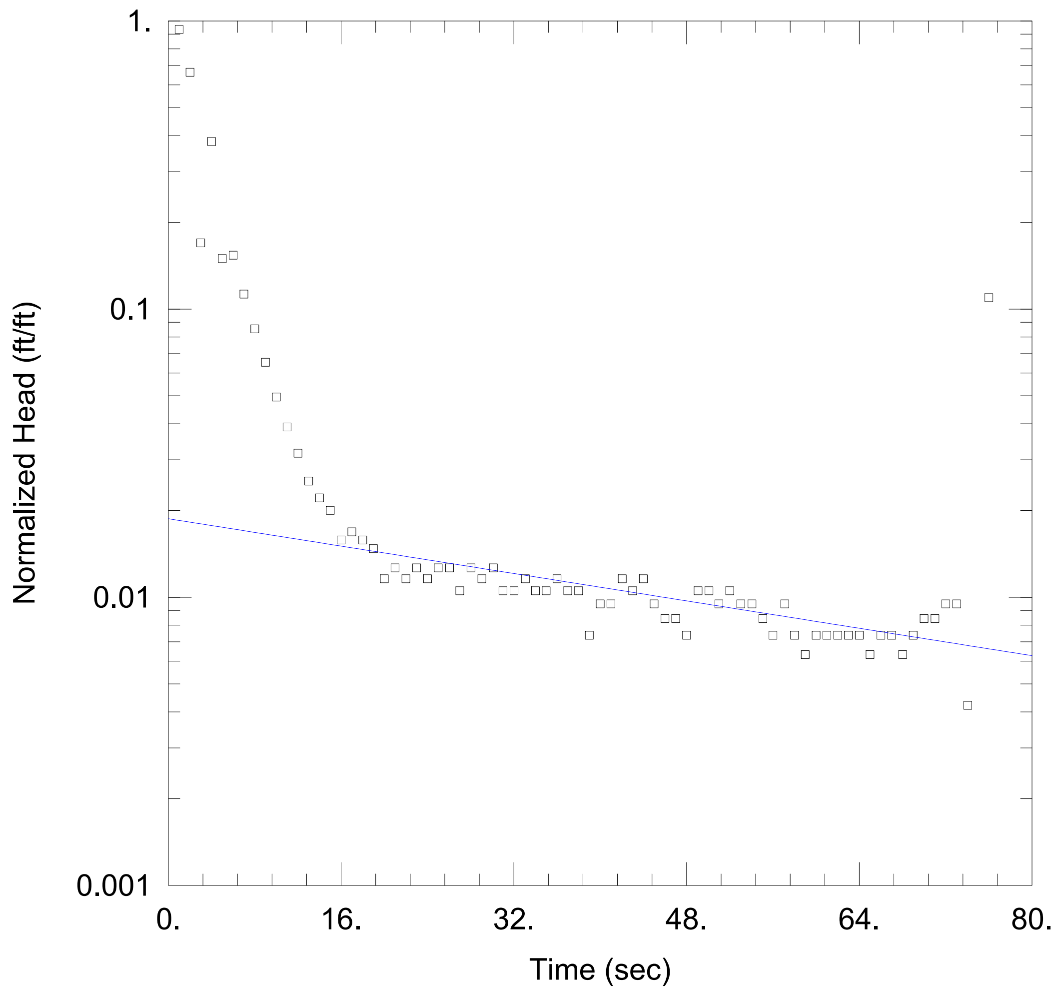
WELL DATA (New Well)

Initial Displacement: -0.884 ft Static Water Column Height: 13.59 ft
Total Well Penetration Depth: 15. ft Screen Length: 15. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 6.174E-5 cm/sec y0 = -0.278 ft



MW22-03 RISING HEAD

Data Set: C:\...\MW22-03_1.aqt
Date: 05/17/22 Time: 14:39:40

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-03
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 8.97 ft Anisotropy Ratio (Kz/Kr): 1.

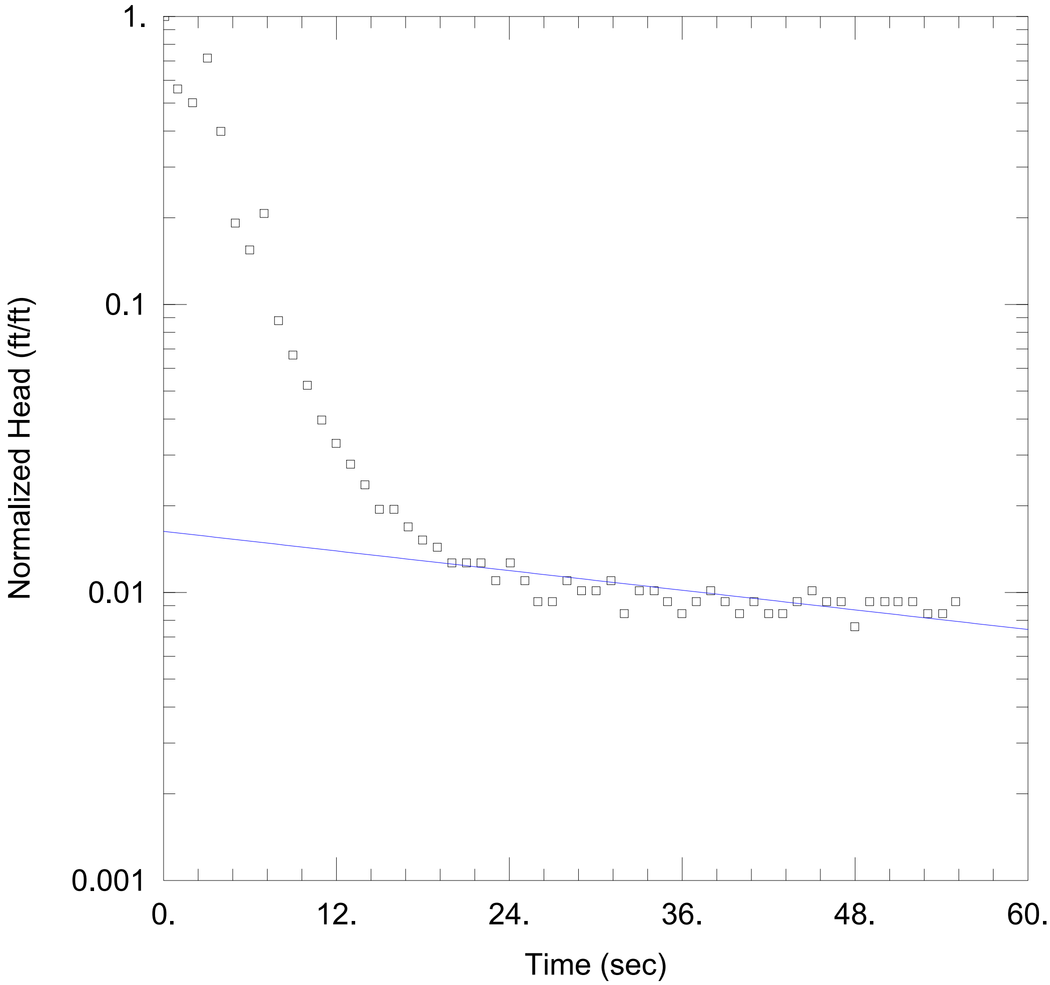
WELL DATA (New Well)

Initial Displacement: -0.949 ft Static Water Column Height: 8.97 ft
Total Well Penetration Depth: 10. ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0005454 cm/sec y0 = -0.01777 ft



MW22-03 RISING HEAD

Data Set: C:\...\MW22-03_3.aqt
Date: 05/17/22 Time: 14:40:56

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-03
Test Date: 4/26/2022

AQUIFER DATA

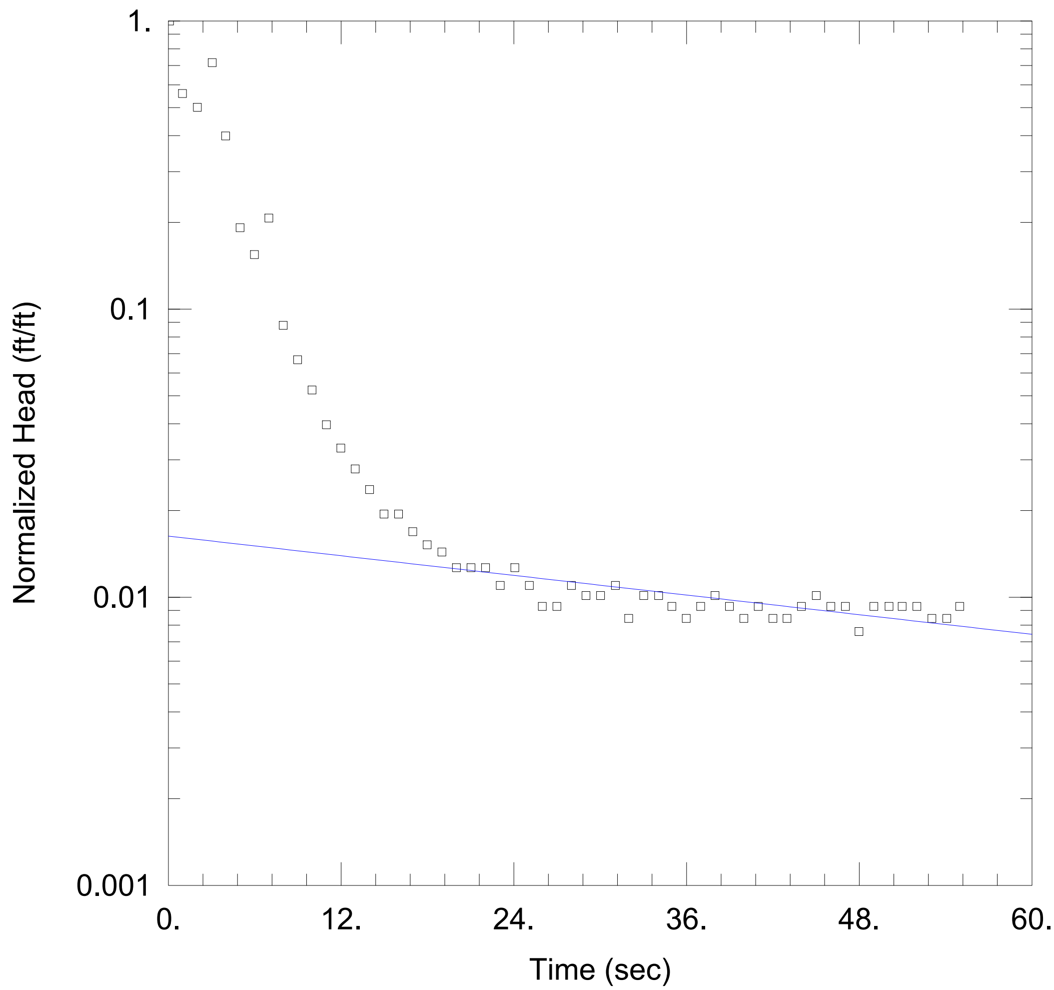
Saturated Thickness: 8.97 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: -1.184 ft
Static Water Column Height: 8.97 ft
Total Well Penetration Depth: 10. ft
Screen Length: 10. ft
Casing Radius: 0.083 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0005218 cm/sec
y0 = -0.0193 ft



MW22-03 RISING HEAD

Data Set: C:\...\MW22-03_4.aqt
Date: 05/25/22 Time: 11:40:59

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-03
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 8.97 ft
Anisotropy Ratio (Kz/Kr): 1.

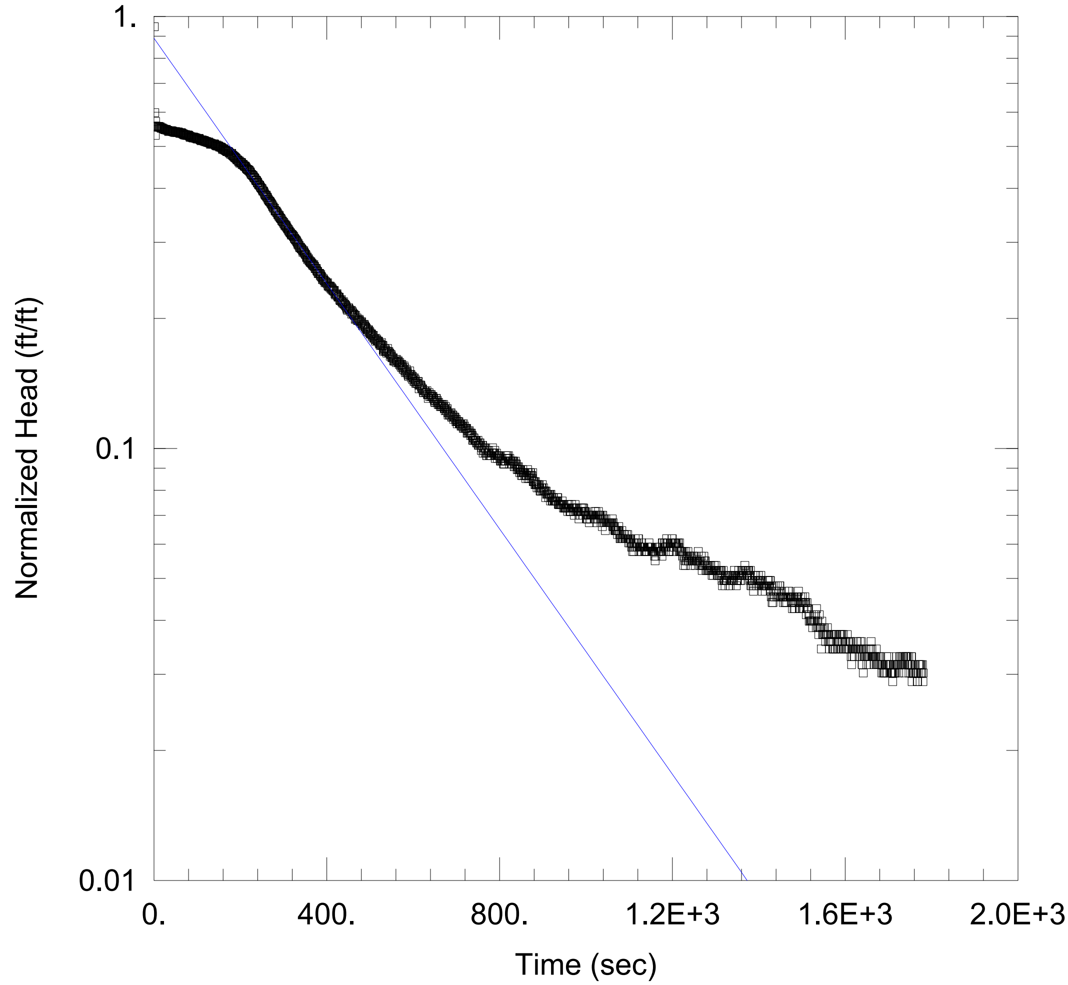
WELL DATA (New Well)

Initial Displacement: -1.184 ft
Static Water Column Height: 8.97 ft
Total Well Penetration Depth: 10. ft
Screen Length: 10. ft
Casing Radius: 0.083 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0005218 cm/sec
y0 = -0.0193 ft



MW22-04 RISING HEAD

Data Set: C:\...\MW22-04_1.aqt
Date: 05/17/22 Time: 14:43:54

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-04
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 10.61 ft Anisotropy Ratio (Kz/Kr): 1.

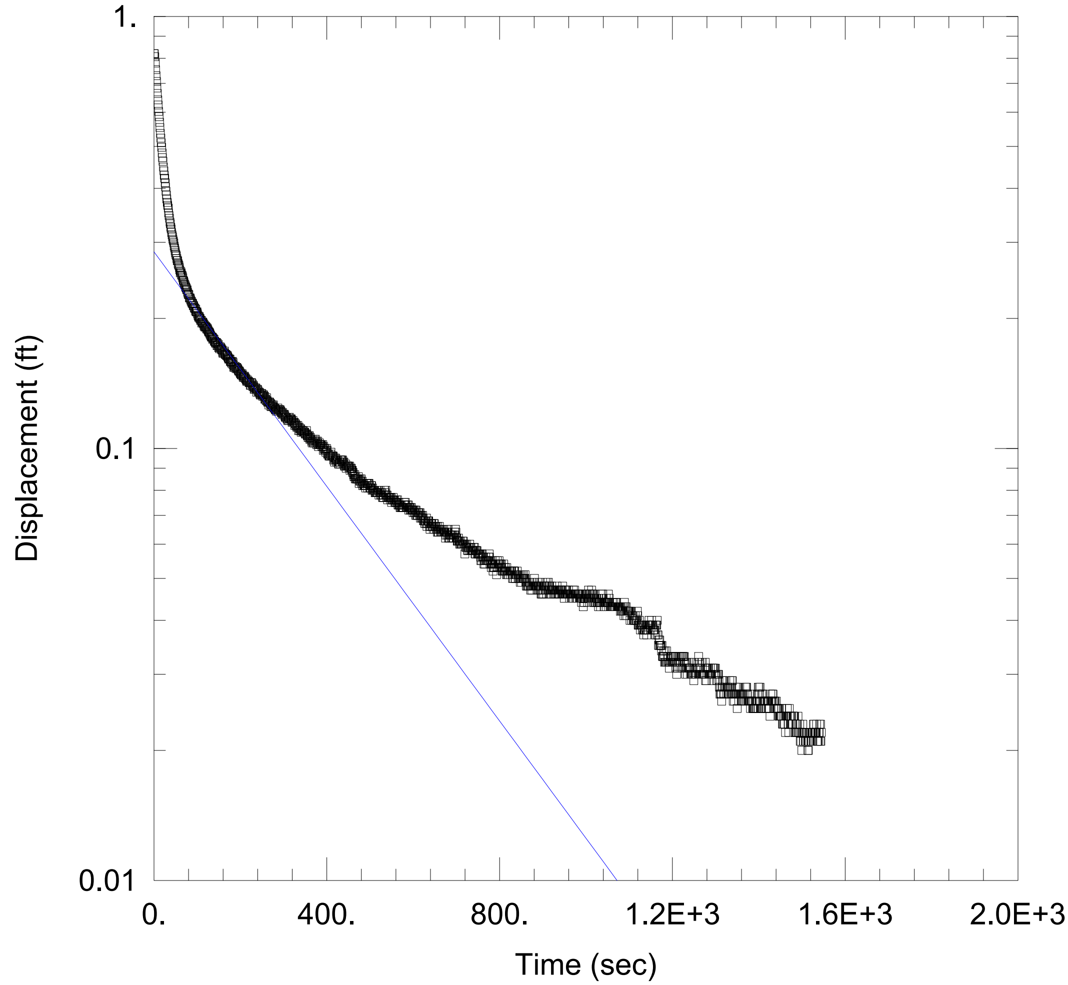
WELL DATA (New Well)

Initial Displacement: -0.728 ft Static Water Column Height: 10.61 ft
Total Well Penetration Depth: 15. ft Screen Length: 15. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0001189 cm/sec y0 = -0.6478 ft



MW22-04 FALLING HEAD

Data Set: C:\...\MW22-04_2.aqt
Date: 05/17/22 Time: 14:45:05

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-04
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 10.61 ft Anisotropy Ratio (Kz/Kr): 1.

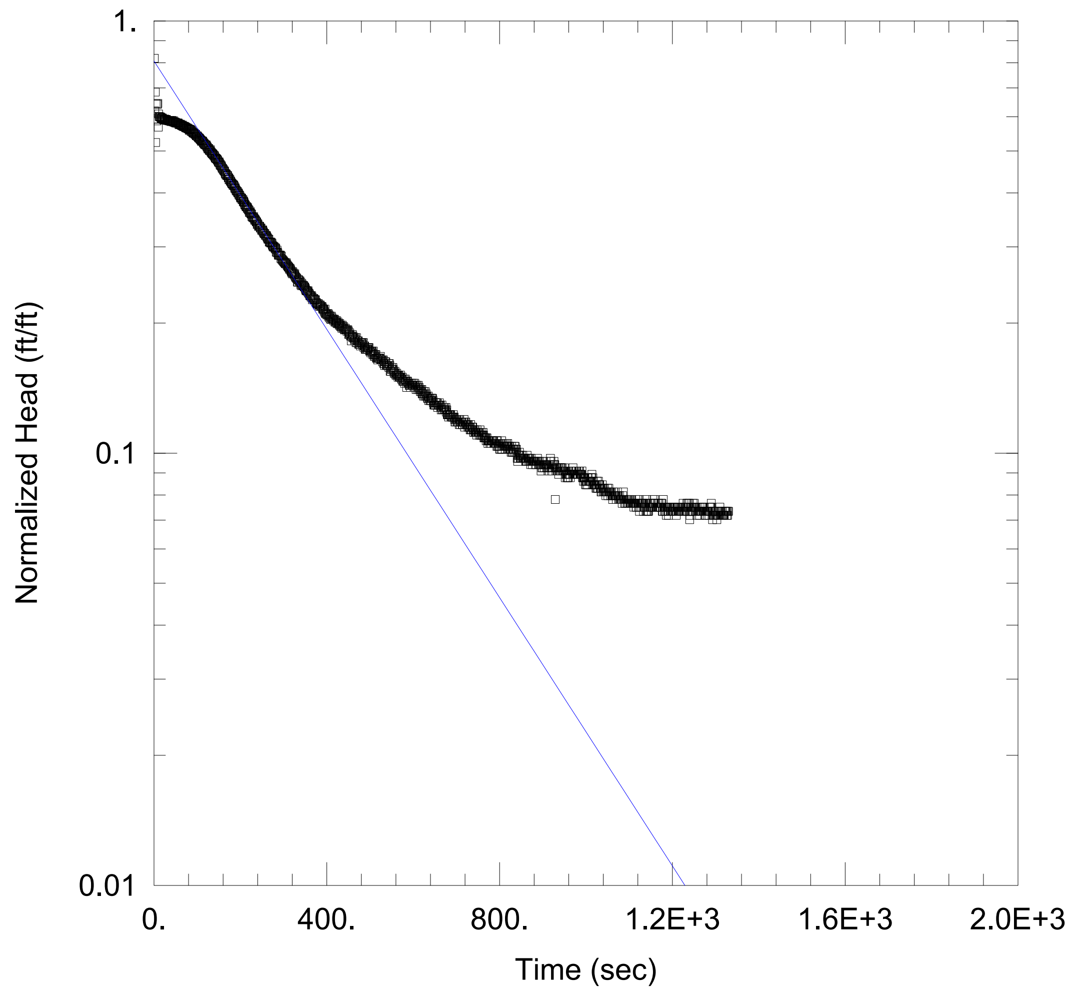
WELL DATA (New Well)

Initial Displacement: 0.82 ft Static Water Column Height: 10.61 ft
Total Well Penetration Depth: 15. ft Screen Length: 15. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0001137 cm/sec y0 = 0.2851 ft



MW22-04 RISING HEAD

Data Set: C:\...\MW22-04_3.aqt
Date: 05/17/22 Time: 14:45:53

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-04
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 10.61 ft Anisotropy Ratio (Kz/Kr): 1.

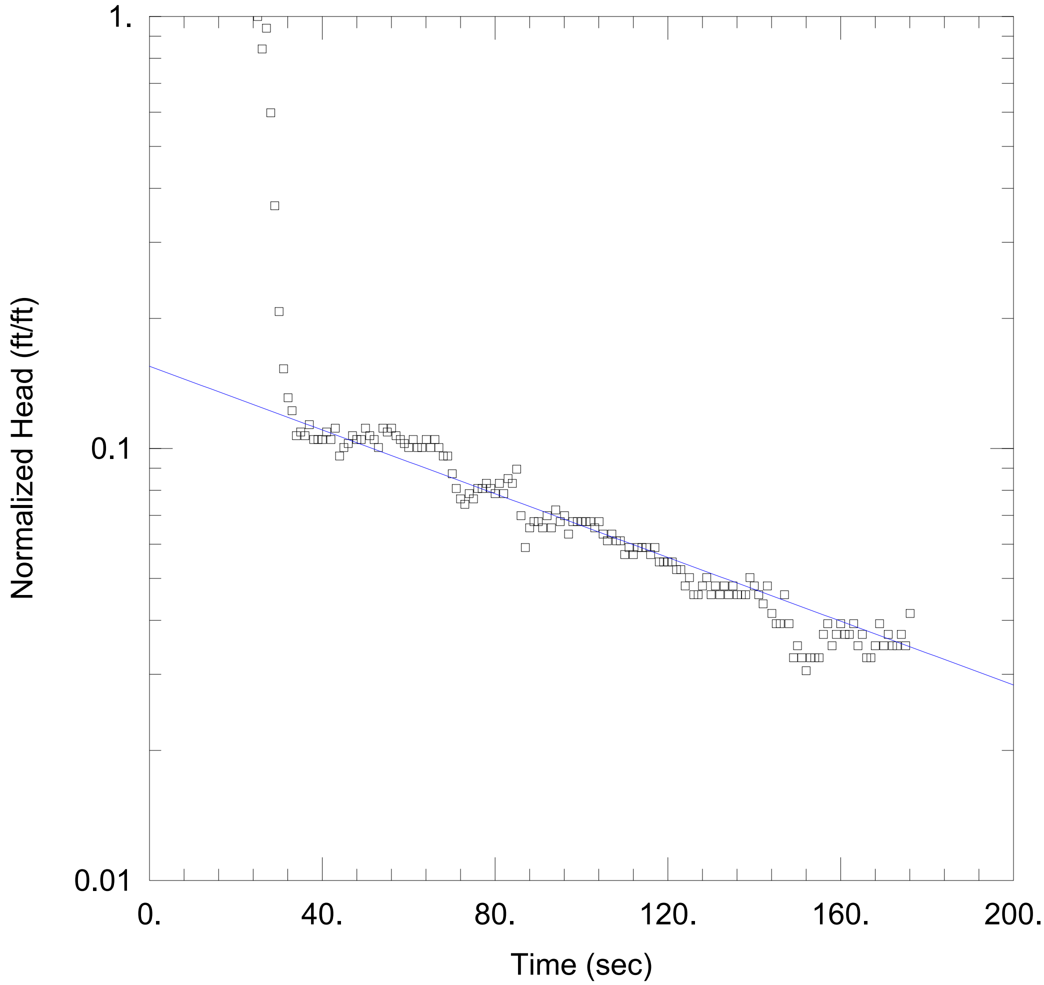
WELL DATA (New Well)

Initial Displacement: -0.627 ft Static Water Column Height: 10.61 ft
Total Well Penetration Depth: 15. ft Screen Length: 15. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.00013 cm/sec y0 = -0.5065 ft



MW22-05 RISING HEAD

Data Set: C:\...\MW22-05_1.aqt
Date: 05/17/22 Time: 14:47:39

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-05
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 12.42 ft Anisotropy Ratio (Kz/Kr): 1.

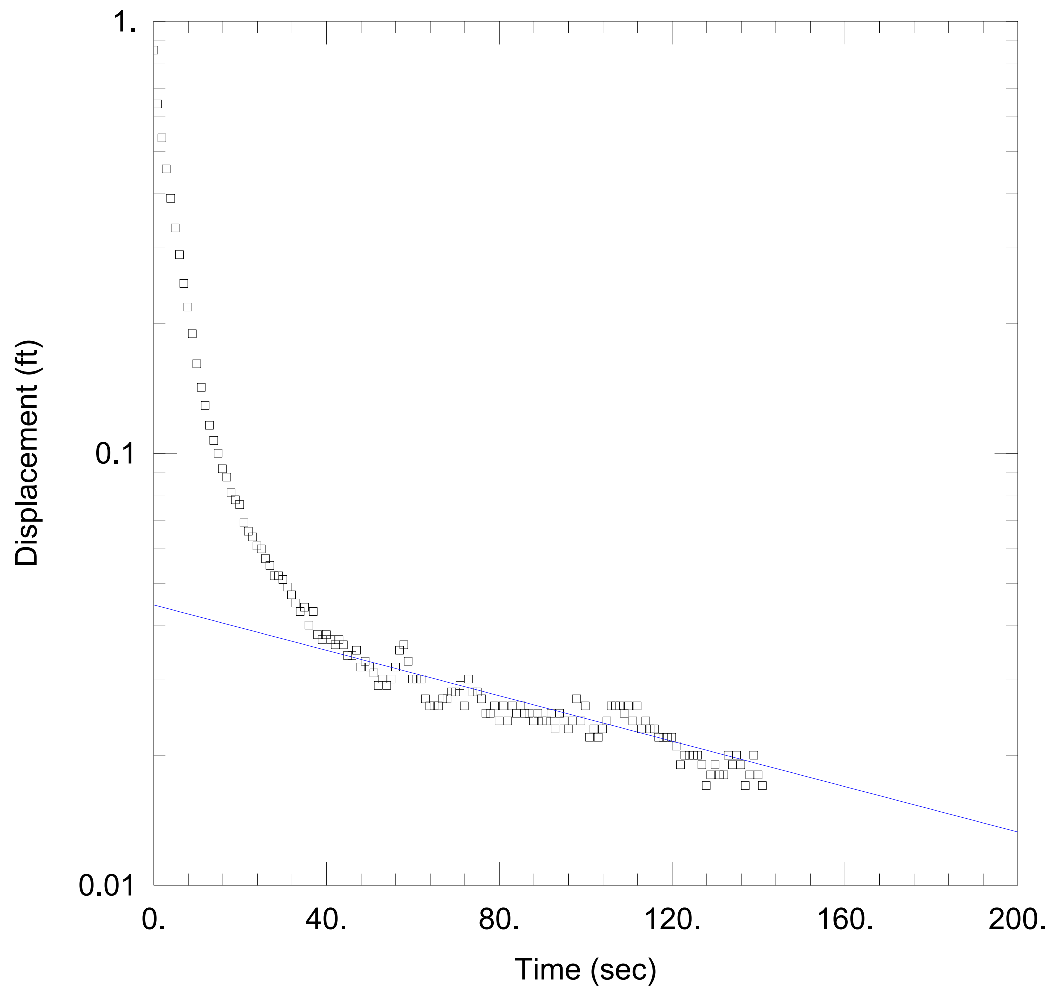
WELL DATA (New Well)

Initial Displacement: -0.458 ft Static Water Column Height: 12.42 ft
Total Well Penetration Depth: 15. ft Screen Length: 15. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.000266 cm/sec y0 = -0.07096 ft



MW22-05 FALLING HEAD

Data Set: C:\...\MW22-05_2.aqt
Date: 05/17/22 Time: 14:48:27

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-05
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 12.42 ft
Anisotropy Ratio (Kz/Kr): 1.

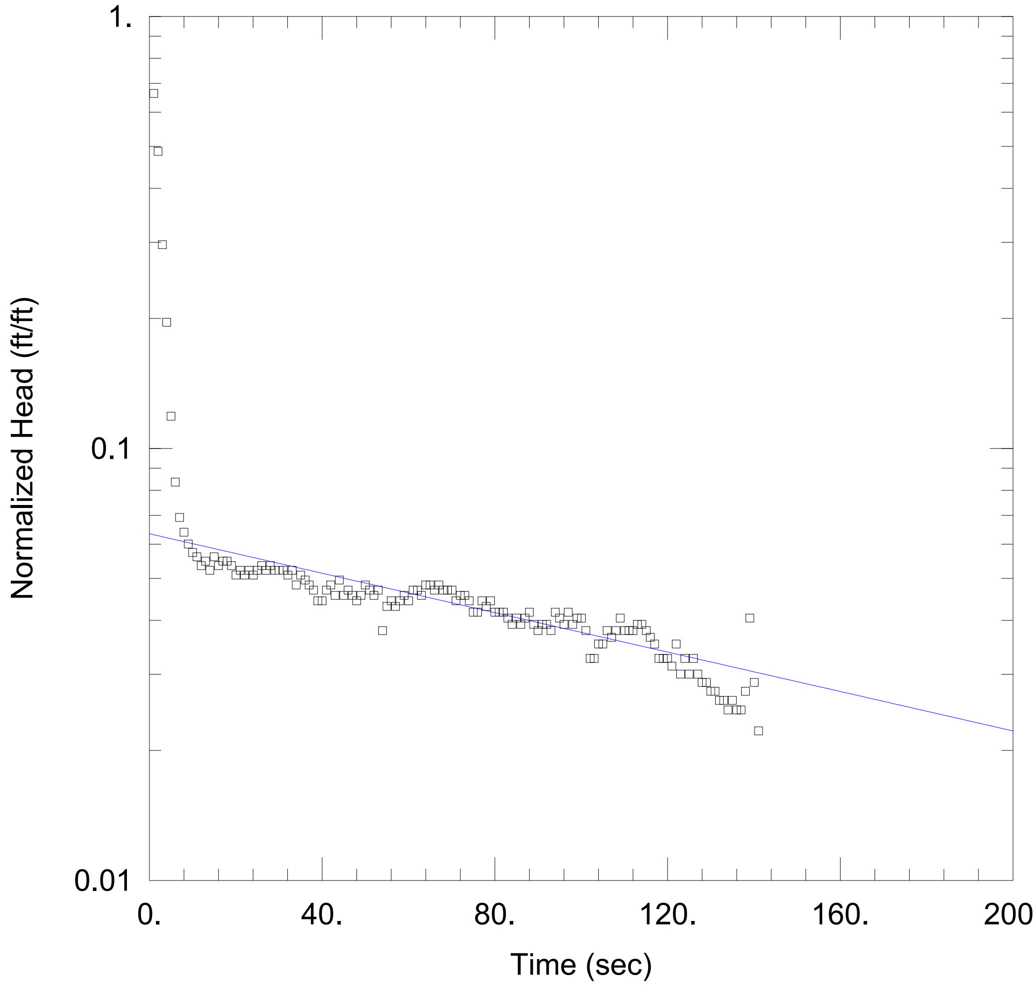
WELL DATA (New Well)

Initial Displacement: 0.857 ft
Static Water Column Height: 12.42 ft
Total Well Penetration Depth: 15. ft
Screen Length: 15. ft
Casing Radius: 0.083 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001896 cm/sec
y0 = 0.04453 ft



MW22-05 RISING HEAD

Data Set: C:\...\MW22-05_3.aqt
Date: 05/17/22 Time: 14:49:07

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-05
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 12.42 ft Anisotropy Ratio (Kz/Kr): 1.

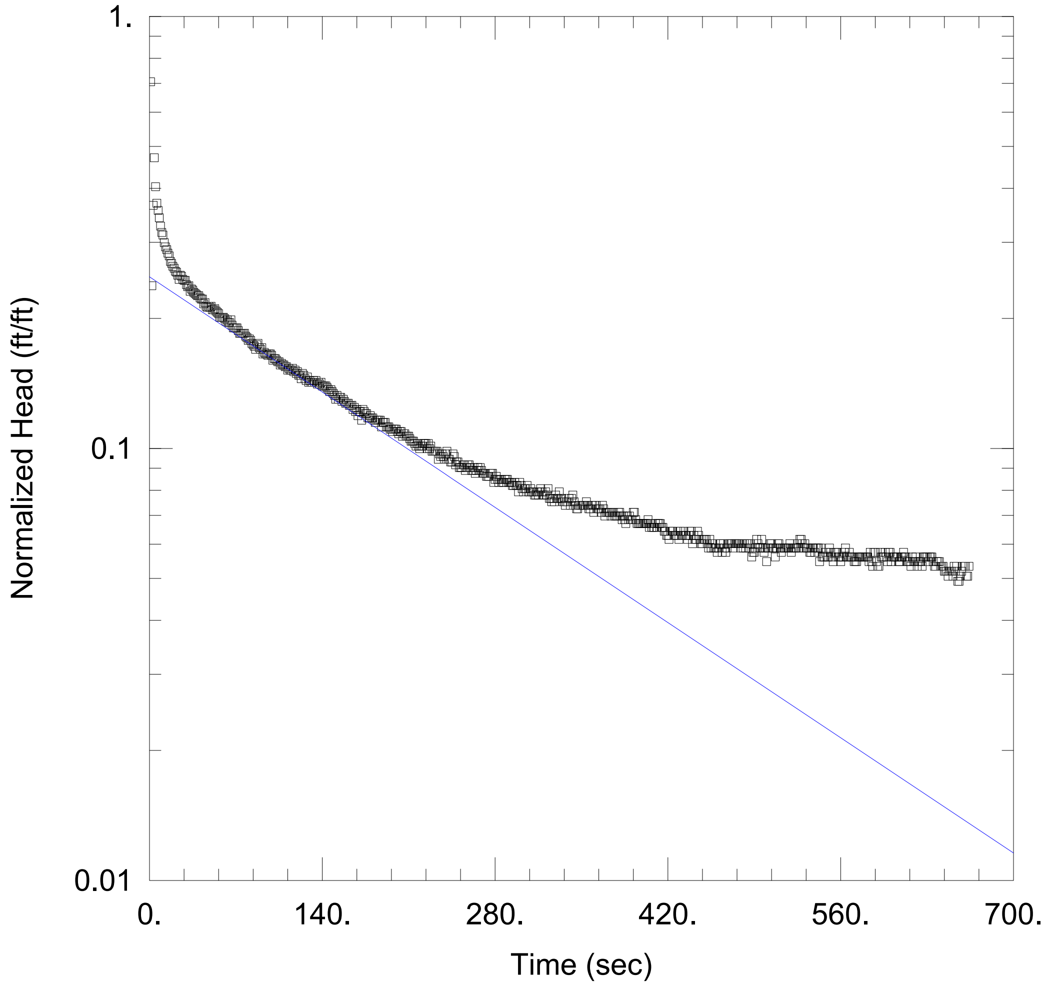
WELL DATA (New Well)

Initial Displacement: -0.766 ft Static Water Column Height: 12.42 ft
Total Well Penetration Depth: 15. ft Screen Length: 15. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0001646 cm/sec y0 = -0.0486 ft



MW22-06 RISING HEAD

Data Set: C:\...\MW22-06_1.aqt
Date: 05/17/22 Time: 14:50:55

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-05
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 3.87 ft Anisotropy Ratio (Kz/Kr): 1.

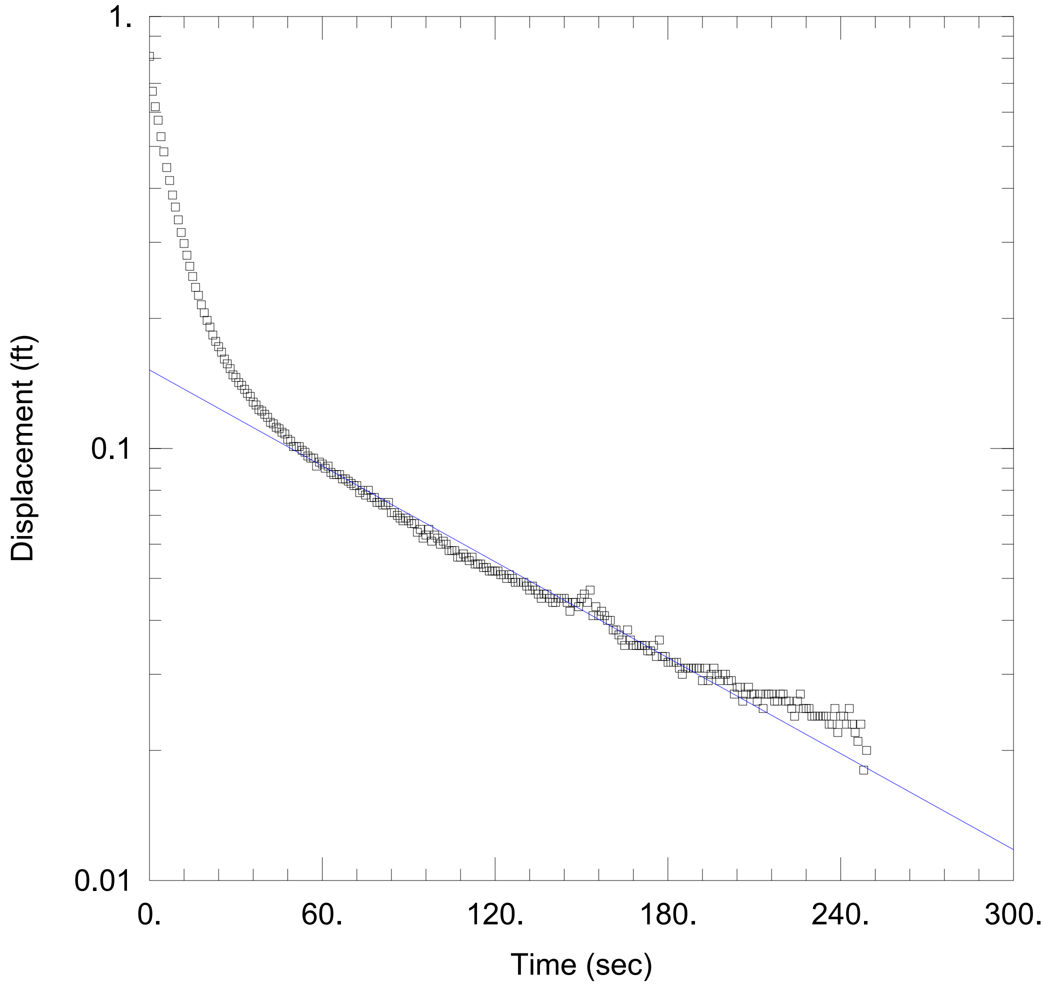
WELL DATA (New Well)

Initial Displacement: -0.731 ft Static Water Column Height: 3.87 ft
Total Well Penetration Depth: 15. ft Screen Length: 15. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0004149 cm/sec y0 = -0.1824 ft



MW22-06 FALLING HEAD

Data Set: C:\...\MW22-06_2.aqt
Date: 05/17/22
Time: 14:52:31

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-05
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 3.87 ft
Anisotropy Ratio (Kz/Kr): 1.

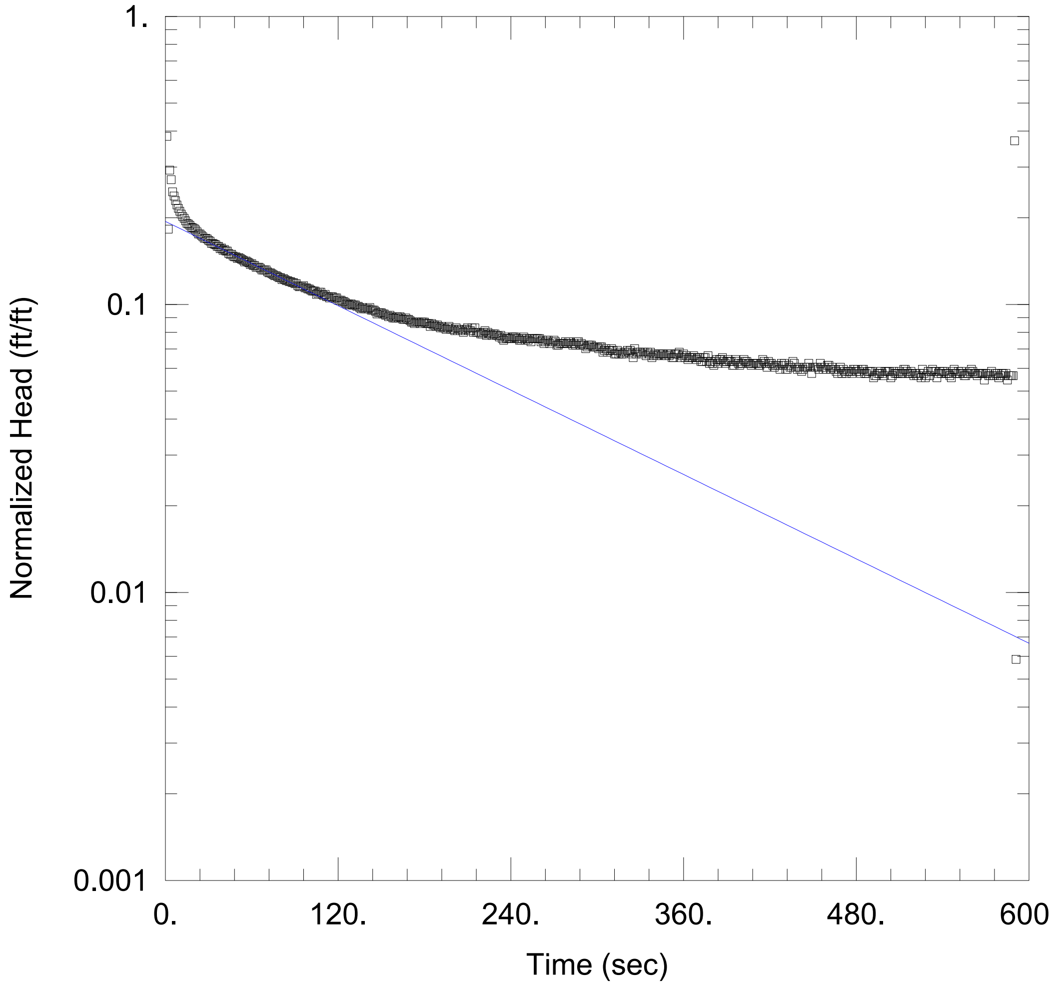
WELL DATA (New Well)

Initial Displacement: 0.808 ft
Static Water Column Height: 3.87 ft
Total Well Penetration Depth: 15. ft
Screen Length: 15. ft
Casing Radius: 0.083 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0008058 cm/sec
y0 = 0.1519 ft



MW22-06 RISING HEAD

Data Set: C:\...\MW22-06_3.aqt
Date: 05/17/22 Time: 14:53:34

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-05
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 3.87 ft
Anisotropy Ratio (Kz/Kr): 1.

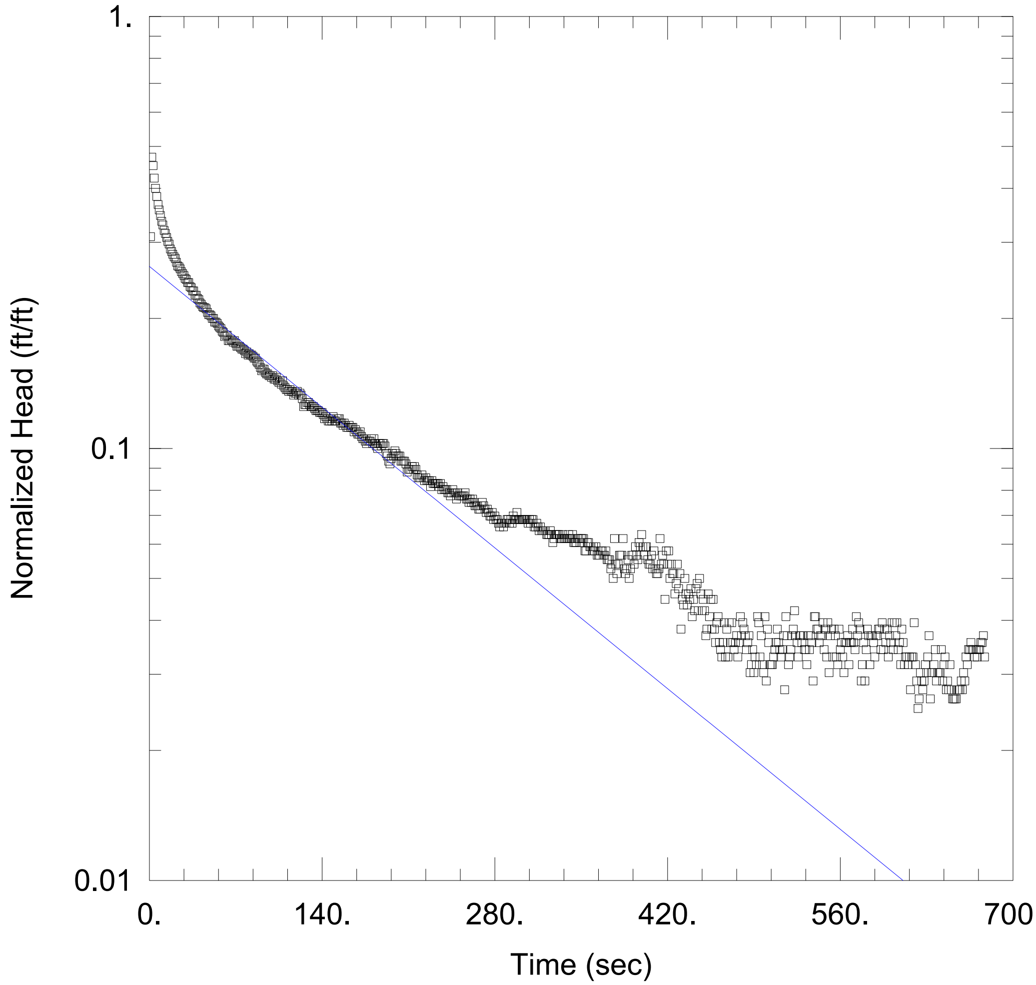
WELL DATA (New Well)

Initial Displacement: -1.025 ft
Static Water Column Height: 3.87 ft
Total Well Penetration Depth: 15. ft
Screen Length: 15. ft
Casing Radius: 0.083 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0005315 cm/sec
y0 = -0.199 ft



MW22-07 RISING HEAD

Data Set: C:\...\MW22-07_1.aqt
Date: 05/17/22 Time: 14:54:33

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-07
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 2.98 ft
Anisotropy Ratio (Kz/Kr): 1.

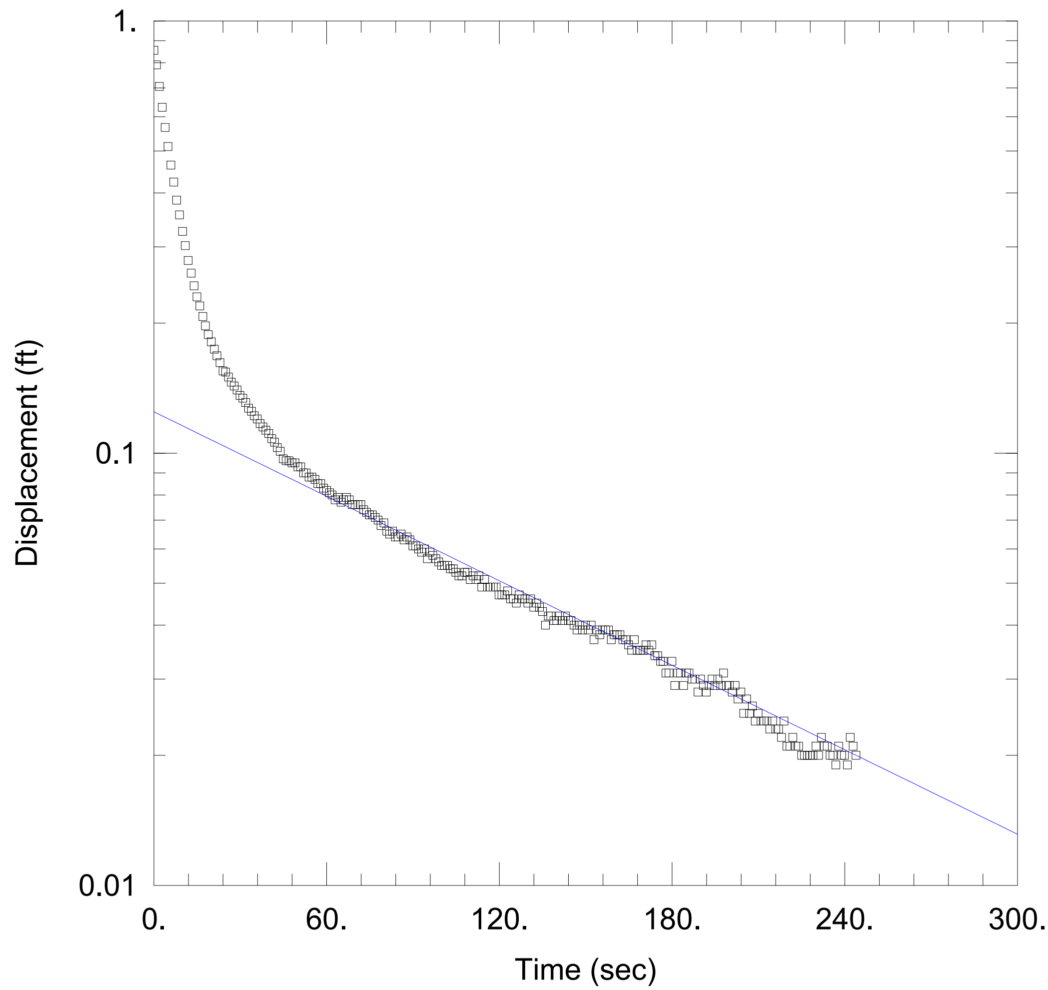
WELL DATA (New Well)

Initial Displacement: -0.76 ft
Static Water Column Height: 2.98 ft
Total Well Penetration Depth: 15. ft
Screen Length: 15. ft
Casing Radius: 0.083 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0006433 cm/sec
y0 = -0.2004 ft



MW22-07 FALLING HEAD

Data Set: C:\...\MW22-07_2.aqt
Date: 05/17/22 Time: 14:55:39

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-07
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 2.98 ft Anisotropy Ratio (Kz/Kr): 1.

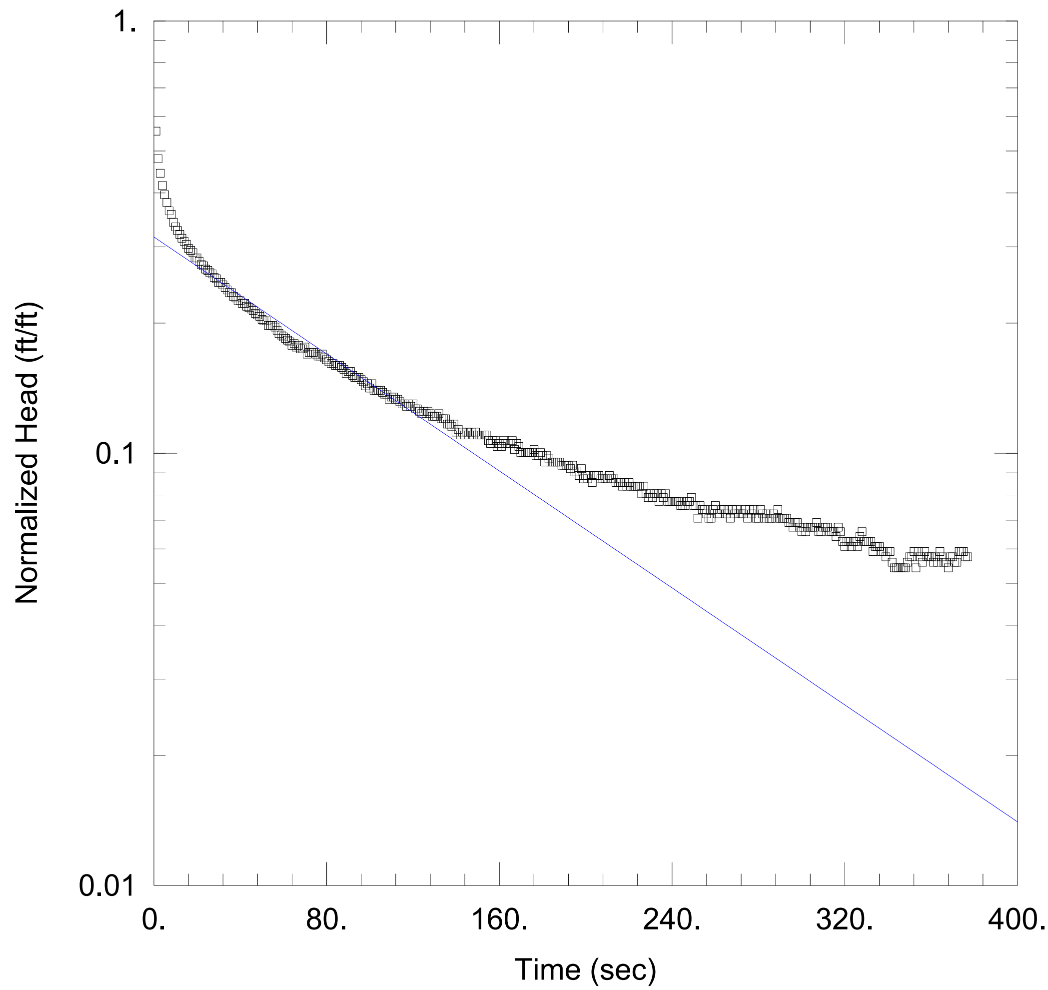
WELL DATA (New Well)

Initial Displacement: 0.855 ft Static Water Column Height: 2.98 ft
Total Well Penetration Depth: 15. ft Screen Length: 15. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0009008 cm/sec y0 = 0.1246 ft



MW22-07 RISING HEAD

Data Set: C:\...\MW22-07_3.aqt
Date: 05/17/22
Time: 14:56:39

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-07
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 2.98 ft
Anisotropy Ratio (Kz/Kr): 1.

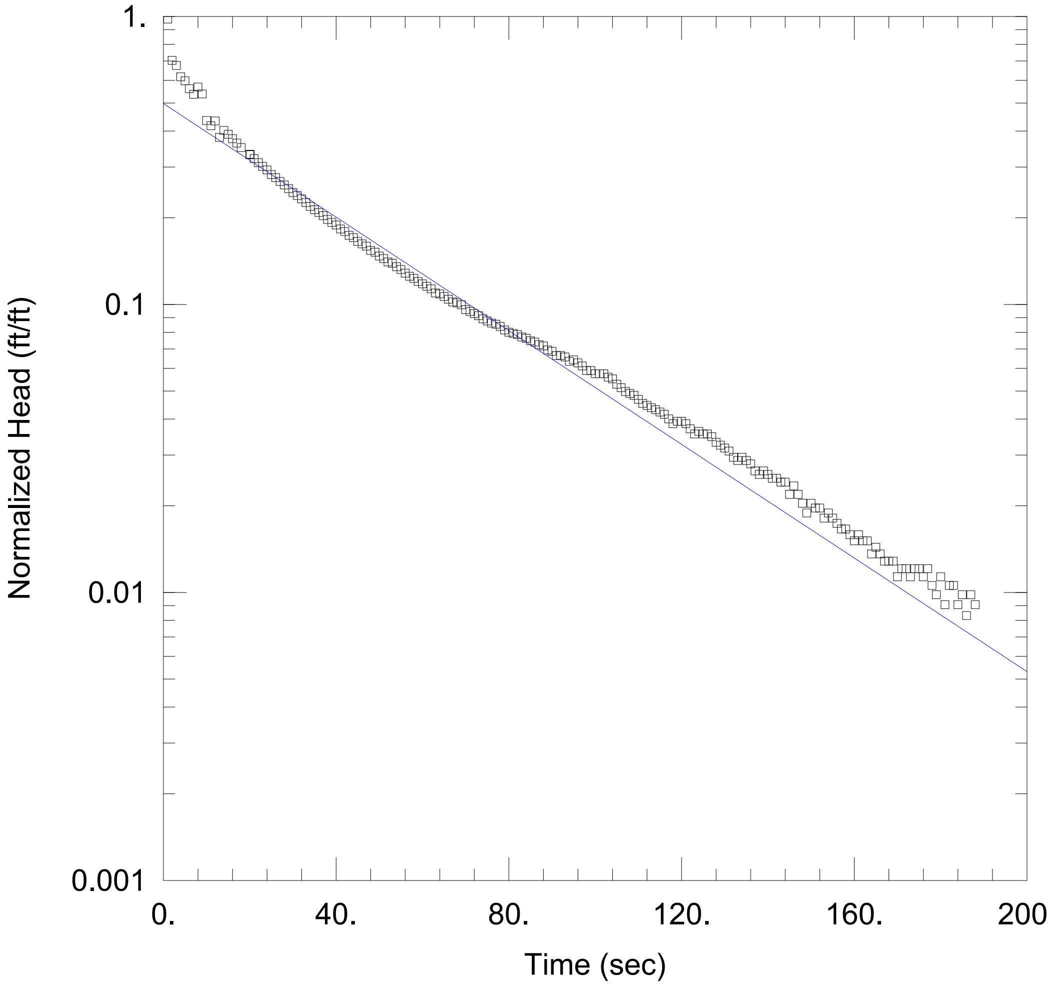
WELL DATA (New Well)

Initial Displacement: -0.608 ft
Static Water Column Height: 2.98 ft
Total Well Penetration Depth: 15. ft
Screen Length: 15. ft
Casing Radius: 0.083 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0009354 cm/sec
y0 = -0.1923 ft



MW22-08 RISING HEAD

Data Set: C:\...\MW22-08_1.aqt
Date: 05/17/22 Time: 14:57:42

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-08
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 9.72 ft Anisotropy Ratio (Kz/Kr): 1.

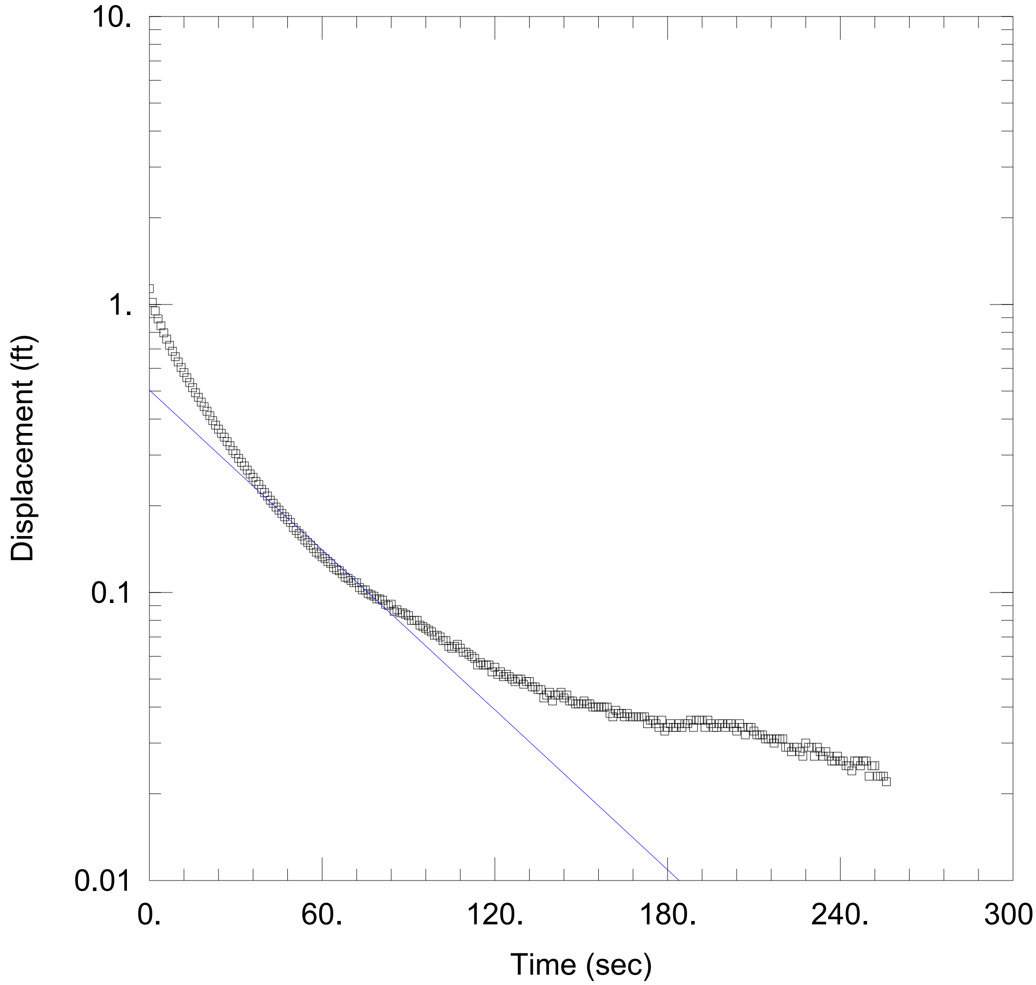
WELL DATA (New Well)

Initial Displacement: -1.324 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: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0008387 cm/sec y0 = -0.6597 ft



MW22-08 FALLING HEAD

Data Set: C:\...\MW22-08_2.aqt
Date: 05/17/22 Time: 14:58:53

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-08
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 9.72 ft
Anisotropy Ratio (Kz/Kr): 1.

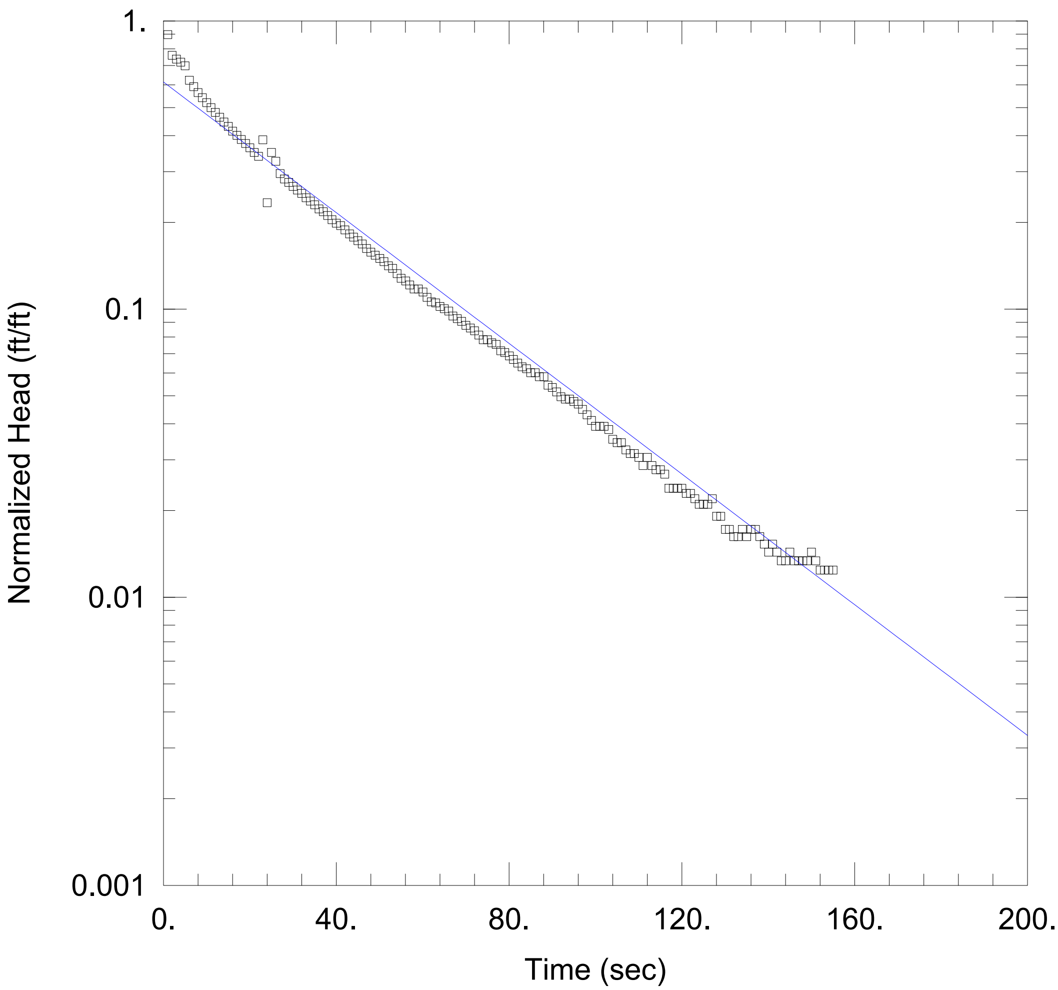
WELL DATA (New Well)

Initial Displacement: 1.134 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.083 ft
Static Water Column Height: 9.72 ft
Screen Length: 10. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0007867 cm/sec
y0 = 0.504 ft



MW22-08 RISING HEAD

Data Set: C:\...\MW22-08_3.aqt
Date: 05/17/22 Time: 15:00:07

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW22-08
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 9.72 ft Anisotropy Ratio (Kz/Kr): 1.

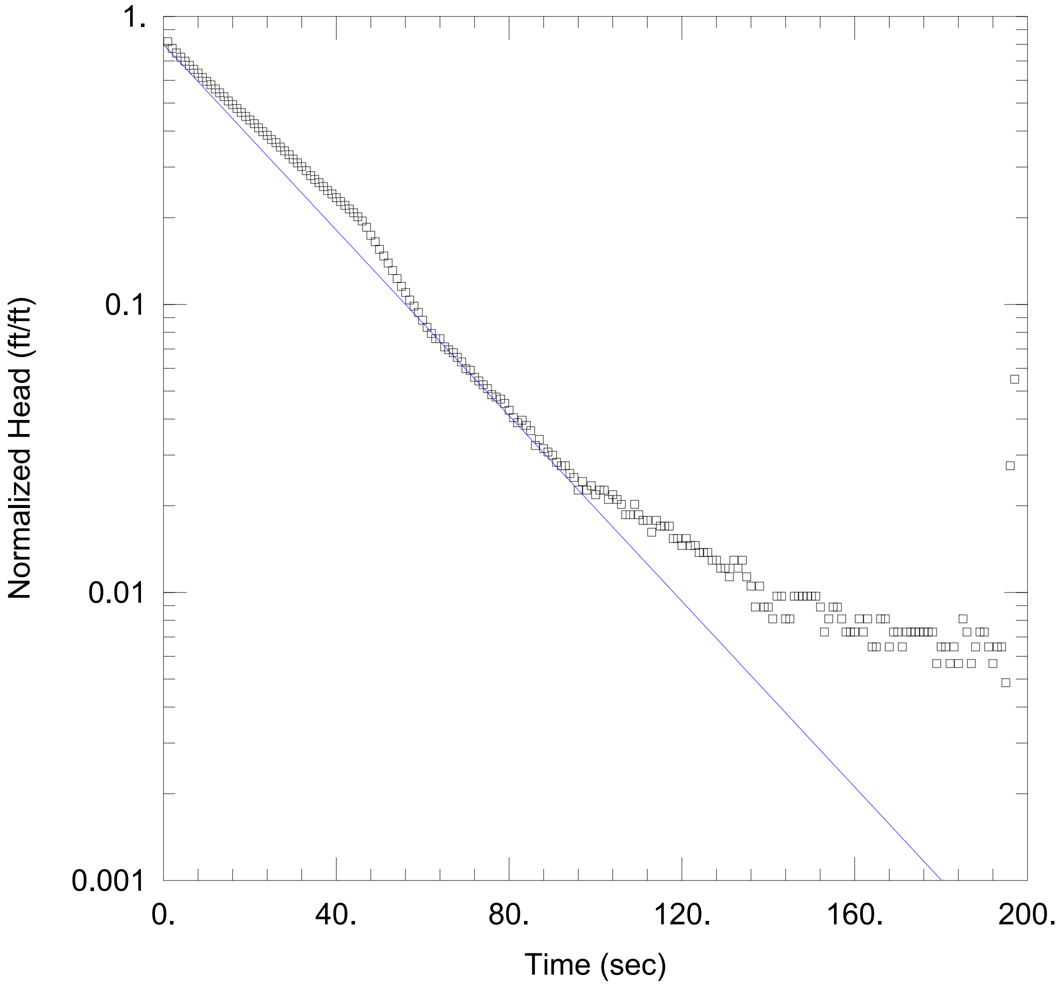
WELL DATA (New Well)

Initial Displacement: -1.047 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: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0009641 cm/sec y0 = -0.6426 ft



MW93-1 RISING HEAD

Data Set: C:\...\MW93-1_1.aqt
Date: 05/17/22 Time: 15:02:58

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW93-1
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 5.36 ft
Anisotropy Ratio (Kz/Kr): 1.

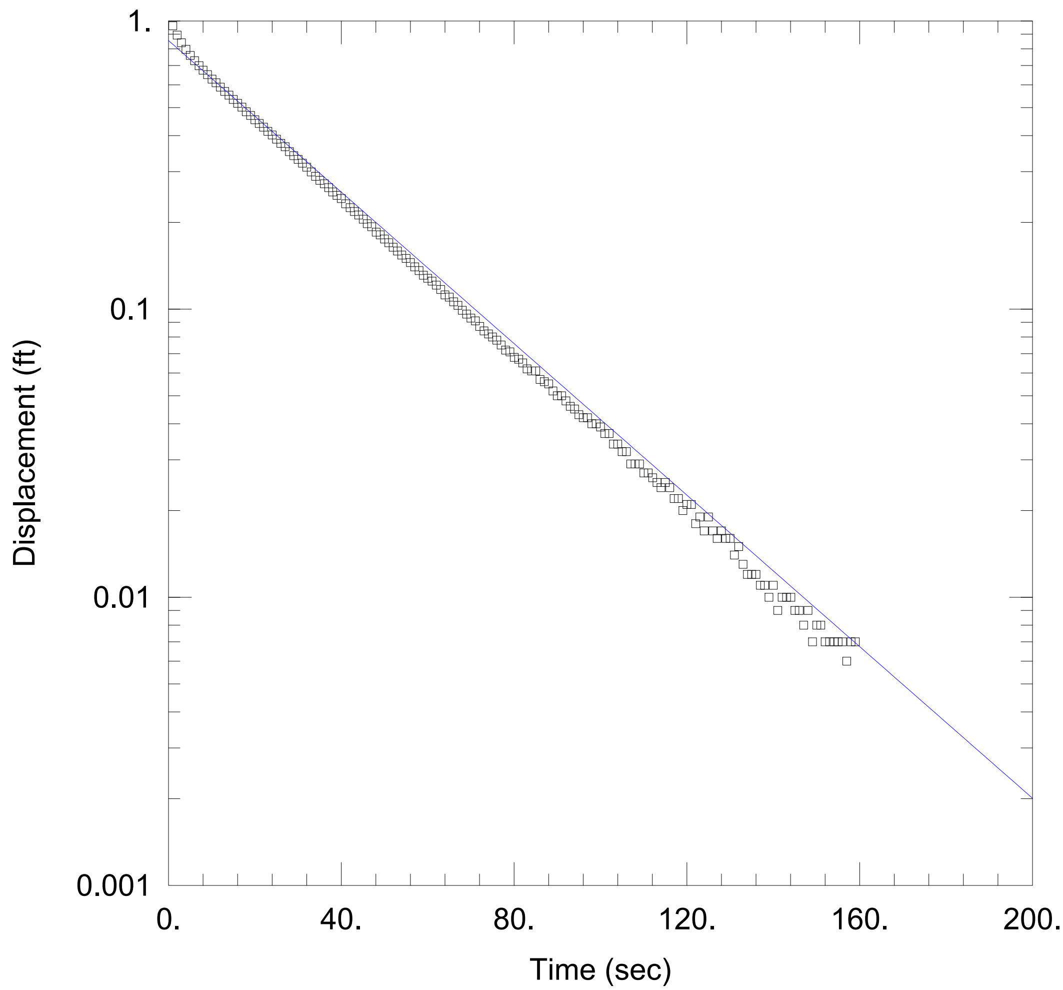
WELL DATA (New Well)

Initial Displacement: -1.236 ft
Static Water Column Height: 5.36 ft
Total Well Penetration Depth: 10. ft
Screen Length: 10. ft
Casing Radius: 0.083 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.002419 cm/sec
y0 = -0.9877 ft



MW93-1 FALLING HEAD

Data Set: C:\...\MW93-1_2.aqt
Date: 05/17/22 Time: 15:03:53

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW93-1
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 5.36 ft
Anisotropy Ratio (Kz/Kr): 1.

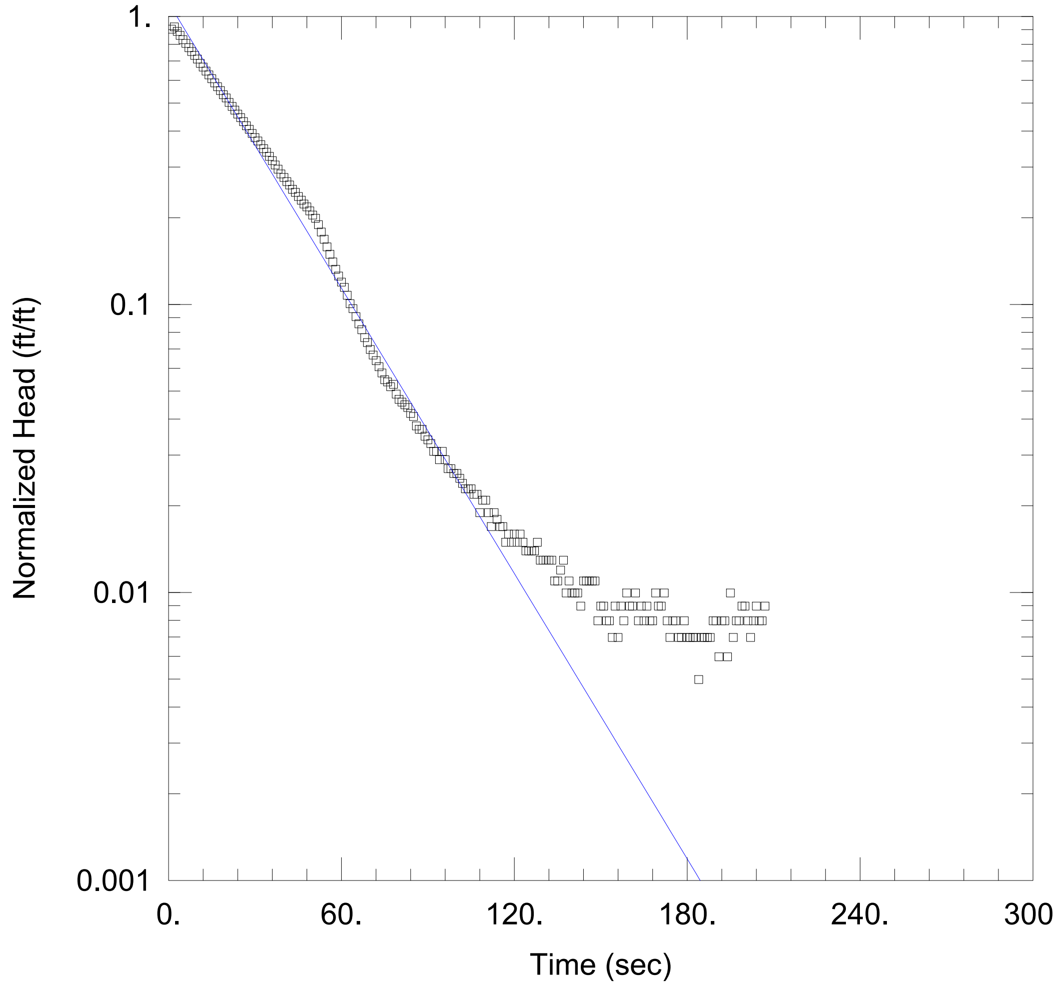
WELL DATA (New Well)

Initial Displacement: 1.053 ft
Static Water Column Height: 5.36 ft
Total Well Penetration Depth: 10. ft
Screen Length: 10. ft
Casing Radius: 0.083 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.001974 cm/sec
y0 = 0.8549 ft



MW93-1 RISING HEAD

Data Set: C:\...\MW93-1_3.aqt
Date: 05/17/22 Time: 15:04:57

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW93-1
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 5.36 ft Anisotropy Ratio (Kz/Kr): 1.

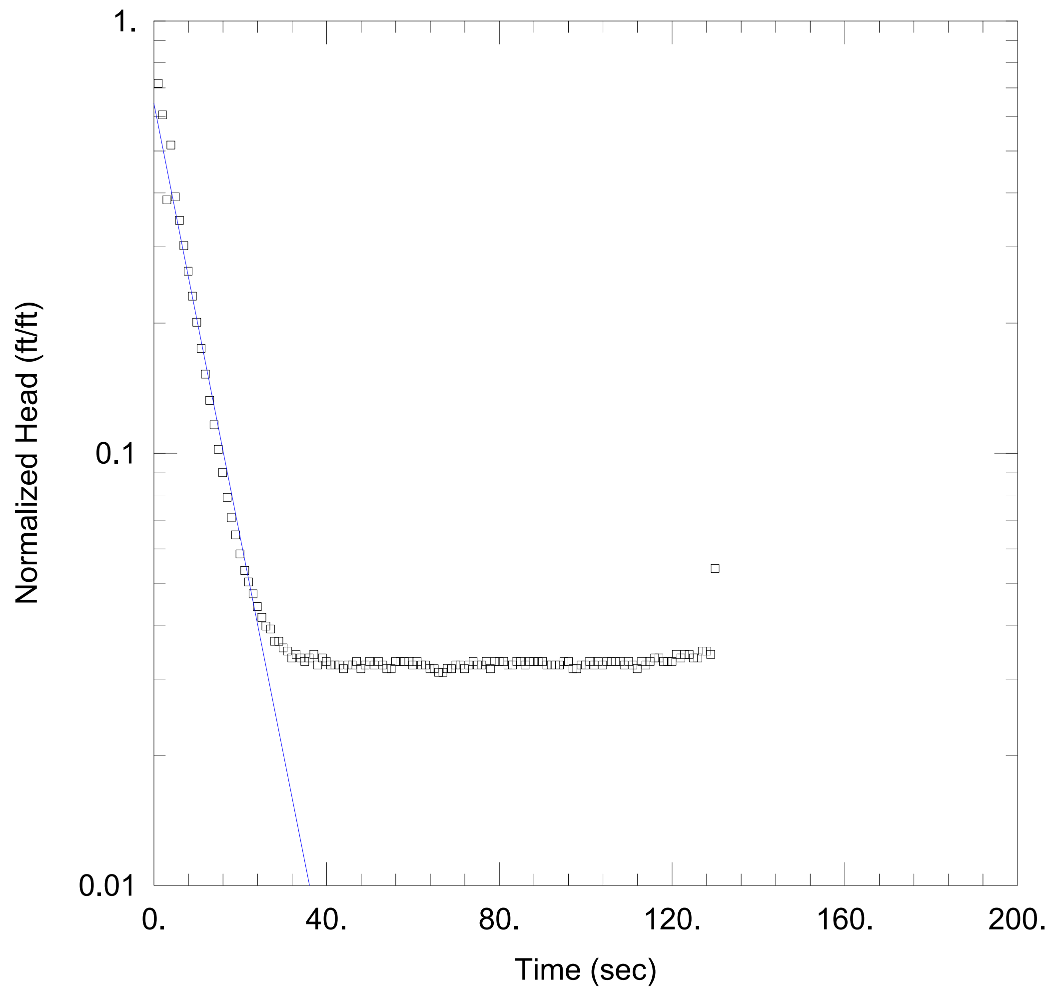
WELL DATA (New Well)

Initial Displacement: -1.004 ft Static Water Column Height: 5.36 ft
Total Well Penetration Depth: 10. ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.002479 cm/sec y0 = -1.12 ft



MW93-2 RISING HEAD

Data Set: C:\...\MW93-2_1.aqt
Date: 05/17/22 Time: 15:06:50

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW93-2
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 9.82 ft Anisotropy Ratio (Kz/Kr): 1.

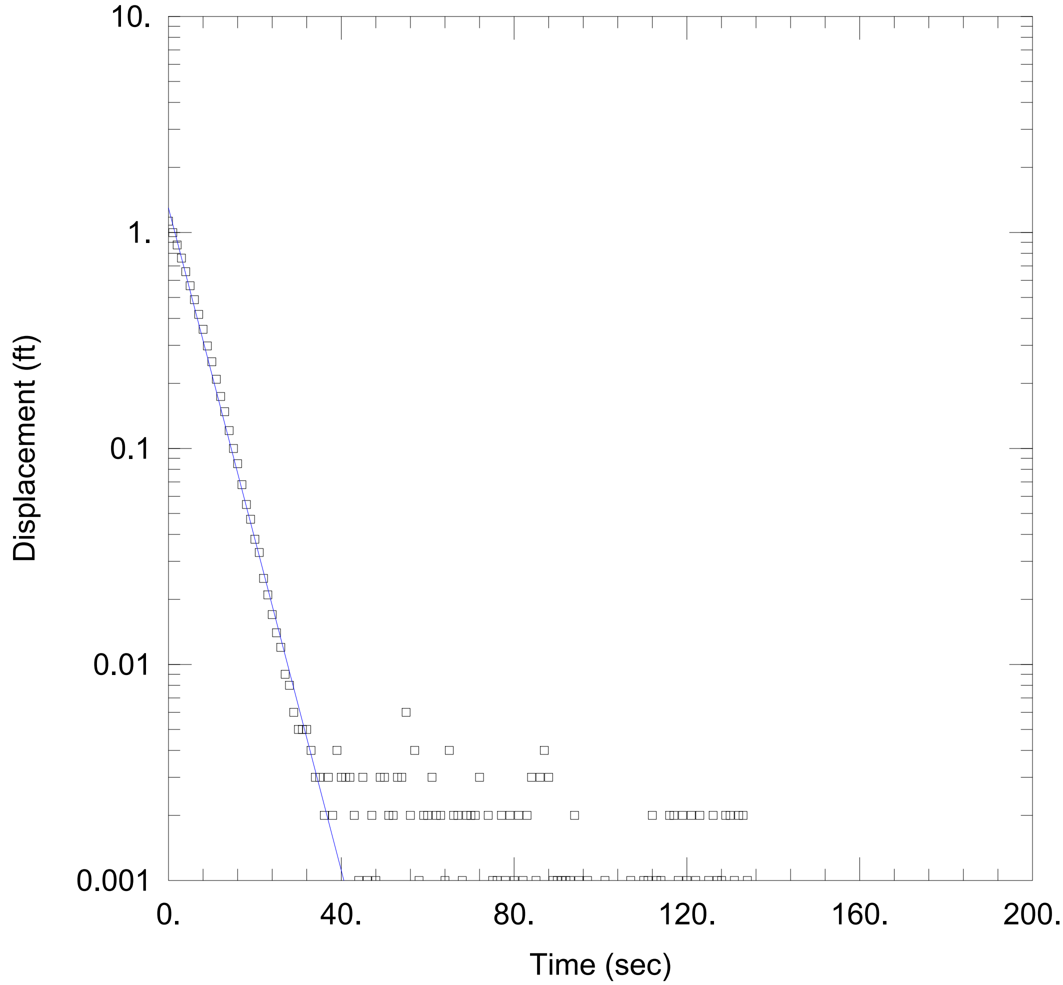
WELL DATA (New Well)

Initial Displacement: -1.608 ft Static Water Column Height: 9.82 ft
Total Well Penetration Depth: 10. ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.004227 cm/sec y0 = -1.036 ft



MW93-2 FALLING HEAD

Data Set: C:\...\MW93-2_2.aqt
Date: 05/17/22 Time: 15:07:37

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW93-2
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 9.82 ft Anisotropy Ratio (Kz/Kr): 1.

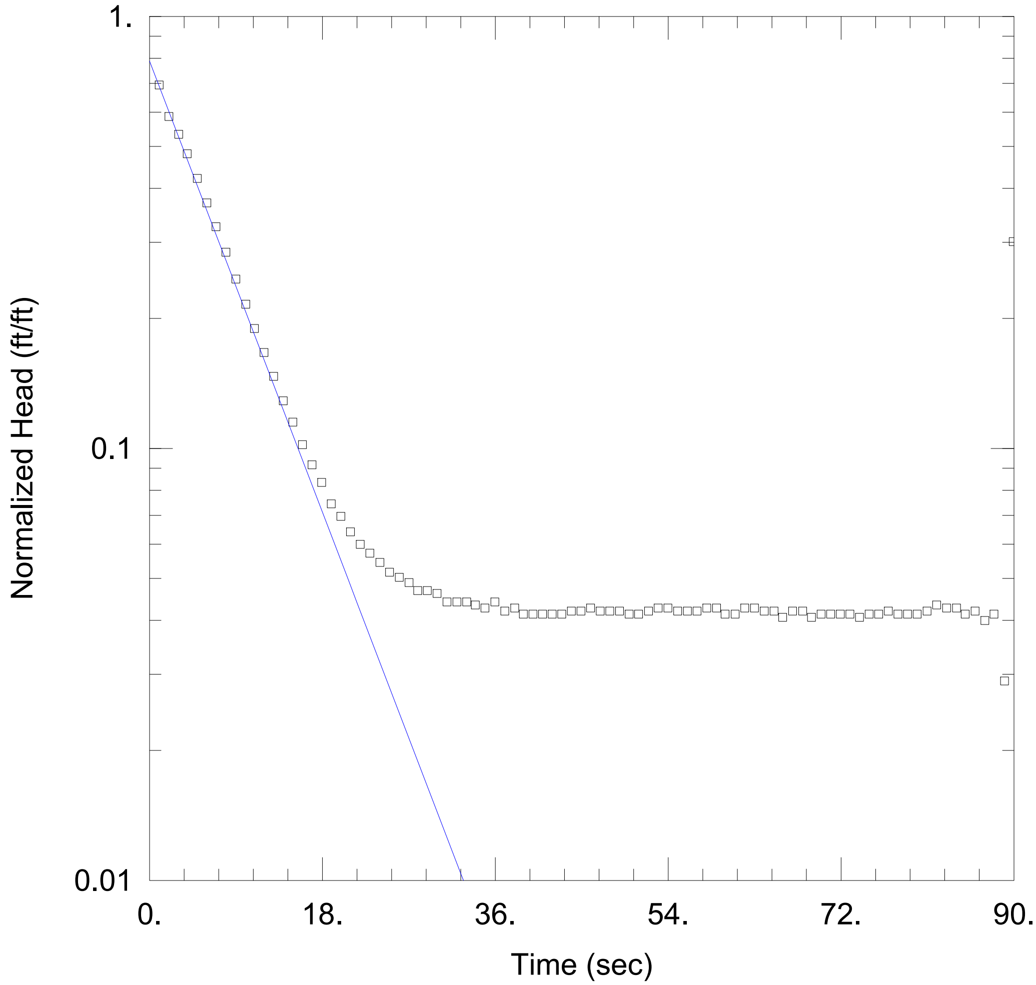
WELL DATA (New Well)

Initial Displacement: 1.128 ft Static Water Column Height: 9.82 ft
Total Well Penetration Depth: 10. ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.006457 cm/sec y0 = 1.298 ft



MW93-2 RISING HEAD

Data Set: C:\...\MW93-2_3.aqt
Date: 05/17/22 Time: 15:09:34

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW93-2
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 9.82 ft Anisotropy Ratio (Kz/Kr): 1.

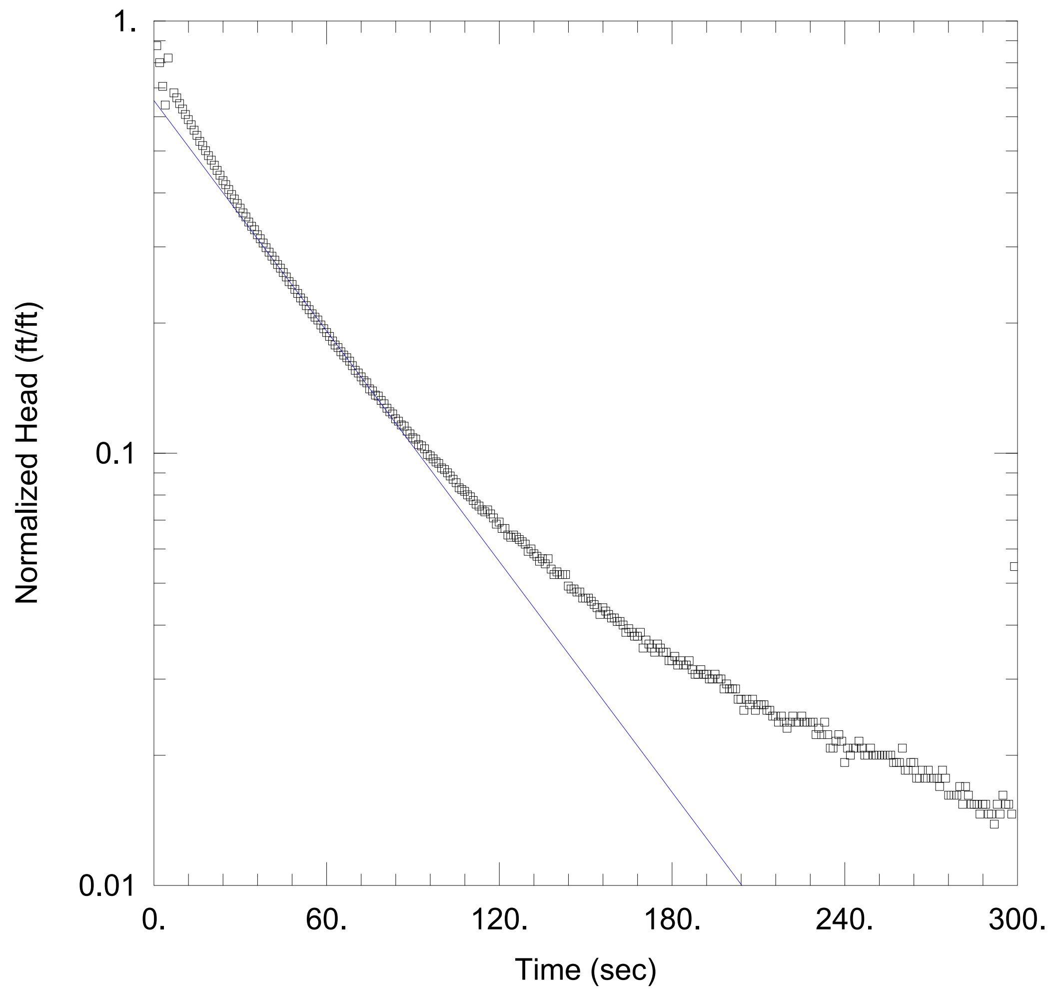
WELL DATA (New Well)

Initial Displacement: -1.451 ft Static Water Column Height: 9.82 ft
Total Well Penetration Depth: 10. ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.004885 cm/sec y0 = -1.144 ft



MW93-3 RISING HEAD

Data Set: C:\...\MW93-3_1.aqt
Date: 05/17/22 Time: 15:10:51

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW93-3
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 10.68 ft
Anisotropy Ratio (Kz/Kr): 1.

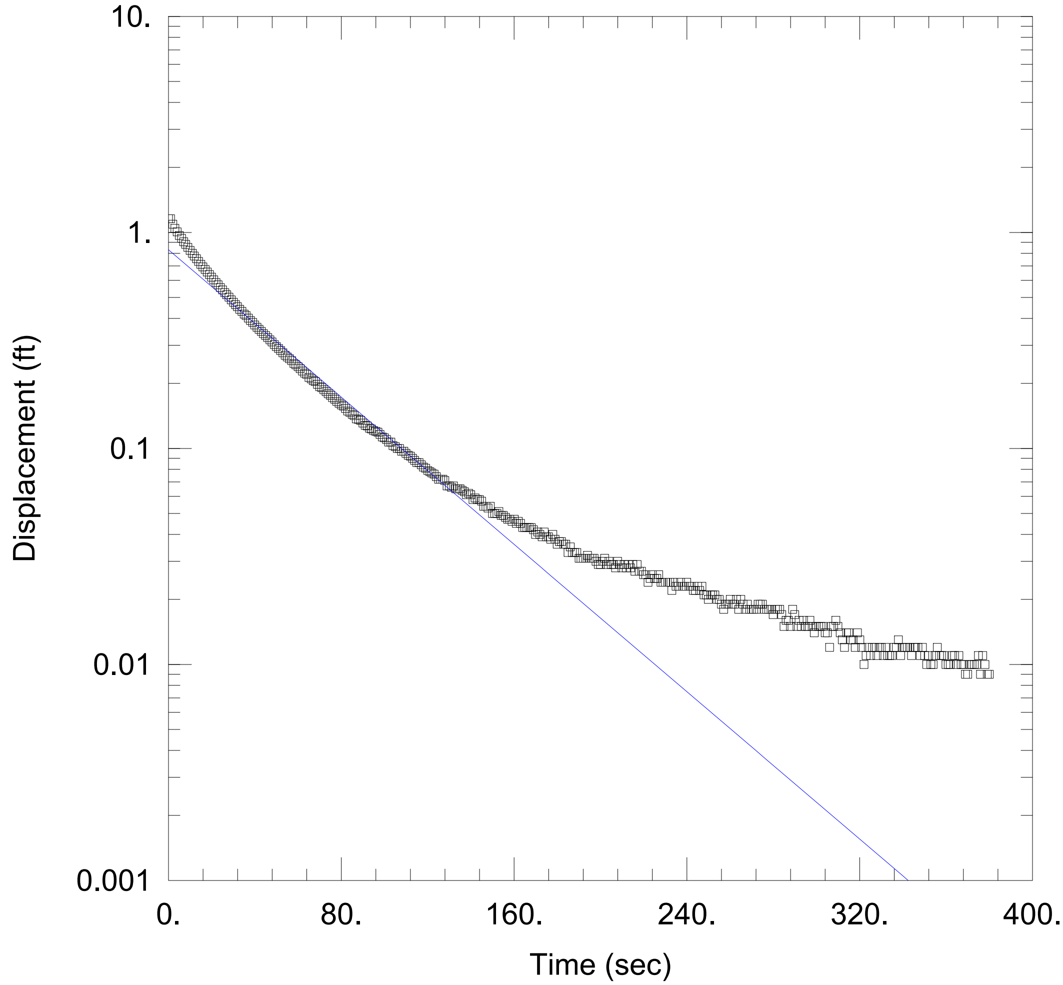
WELL DATA (MW93-3)

Initial Displacement: -1.299 ft
Static Water Column Height: 10.68 ft
Total Well Penetration Depth: 10.68 ft
Screen Length: 10. ft
Casing Radius: 0.083 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0007443 cm/sec
y0 = -0.8501 ft



MW93-3 FALLING HEAD

Data Set: C:\...\MW93-3_2.aqt
Date: 05/17/22 Time: 15:12:43

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW93-3
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 10.68 ft
Anisotropy Ratio (Kz/Kr): 1.

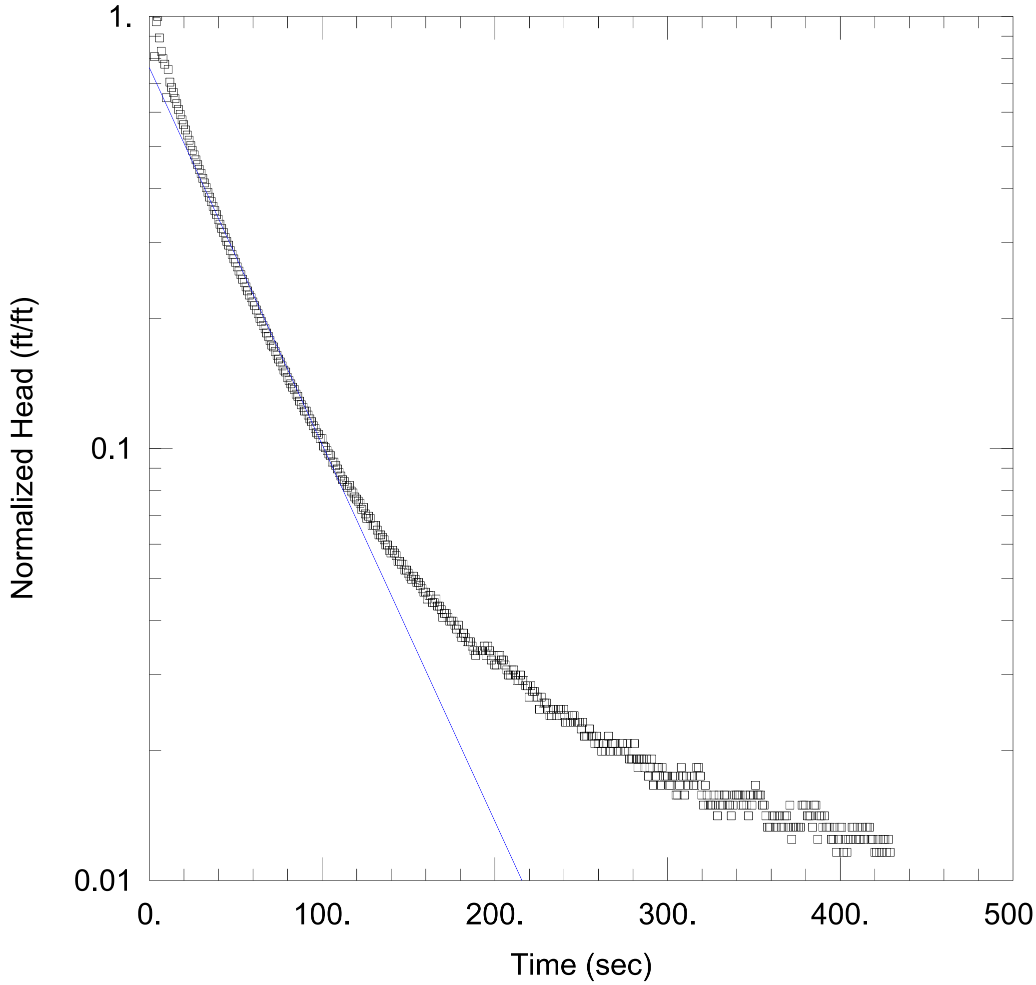
WELL DATA (New Well)

Initial Displacement: 1.157 ft
Static Water Column Height: 10.68 ft
Total Well Penetration Depth: 10.68 ft
Screen Length: 10. ft
Casing Radius: 0.083 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0007138 cm/sec
y0 = 0.8315 ft



MW93-3 FALLING HEAD

Data Set: C:\...\MW93-3_3.aqt
Date: 05/17/22 Time: 15:13:26

PROJECT INFORMATION

Company: Enercon Services
Client: Grand River Dam Authority
Project: GRDA-000021
Location: Mayes County, Oklahoma
Test Well: MW93-3
Test Date: 4/26/2022

AQUIFER DATA

Saturated Thickness: 10.68 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: -1.205 ft
Total Well Penetration Depth: 10.68 ft
Casing Radius: 0.083 ft

Static Water Column Height: 10.68 ft
Screen Length: 10. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0007301 cm/sec y0 = -0.9162 ft