HYDROGEOLOGICAL INVESTIGATION REPORT
LA CROSSE BOILING WATER REACTOR
DAIRYLAND POWER COOPERATIVE
GENOA, WISCONSIN

by

Haley & Aldrich, Inc.
Portland, Maine

for

Dairyland Power Cooperative
S4601 State Highway
Genoa, WI 54632

File No. 38705-008
Revised 15 January 2015

HALEY & ALDRICH

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Mr. Don Egge
Dairyland Power Cooperative
S4601 State Highway
Genoa, WI 54632

Subject: Hydrogeological Investigation Report
La Crosse Boiling Water Reactor
Dairyland Power Cooperative
Genoa, Wisconsin

Dear Mr. Egge:

Enclosed please find the revised Hydrogeological Investigation Report for the La Crosse Boiling Water Reactor located in Genoa, Wisconsin. This Report has been developed to supplement our preliminary findings in the Hydrogeological Conceptual Site Model and to support the ongoing decommissioning of the reactor and associated structures.

This revision includes changes to Figures 6 and 7. The Mississippi River stage and date were corrected on both of these figures.

As in the original report, the data suggest that there are no significant impacts to groundwater downgradient from the areas of interest previously identified. Please note that data gaps still remain directly below some of the structures, but in general, the geology and hydrogeology has been characterized with no immediate actions recommended other than to continue sampling to further document baseline conditions.

If you have any questions or would like to discuss our findings, please feel free to call Nadia Glucksberg at 207.482.4623.

Sincerely yours,
HALEY & ALDRICH, INC.

Meghan A. Daigle
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Nadia Glucksberg, PG
Lead Hydrogeologist

Enclosures

EXECUTIVE SUMMARY

Haley & Aldrich, Inc. (Haley & Aldrich) installed five well pairs within the Protected Area (PA) of the La Crosse Boiling Water Reactor (LACBWR) facility to clarify the hydrogeologic properties of soil and groundwater in the area and better understand the fate and transport of potential radionuclides at the Site. Soil and groundwater samples were collected for laboratory analysis. Slug tests were performed to assess hydraulic conductivity at each well pair. The following conclusions are based on the details of this investigation and revised conceptual site model (CSM):

- Geology is well understood and consists of fill sands overlying fine to medium sands with increasingly coarse sands and gravel with depth. Bedrock is encountered at approximately 130 feet below ground surface (bgs). In general, the monitoring well network installed within the LACBWR area is screened in medium or medium-fine sand.

- Groundwater flows towards the Mississippi River and is hydraulically connected to the river. River stage affects local groundwater fluctuations and may slightly alter groundwater flow direction to parallel river flow. Typically, groundwater is encountered at approximately 20 feet bgs.

- The average shallow aquifer hydraulic conductivity is approximately 313 feet per day and the average deep aquifer hydraulic conductivity is approximately 429 feet per day.

- The horizontal gradient of the water table ranges from 0.004 to 0.005 feet per foot (ft/ft) in the shallow aquifer and 0.001 to 0.002 ft/ft in the deeper aquifer.

- Vertical groundwater gradients are impacted by the river stage. Generally there is an upward gradient, as expected, during the low river stages with a downward gradient during times of extremely high water. Vertical gradients are small, and range from 0.015 ft/ft in the downward direction to 0.028 ft/ft in the upward direction.

- Groundwater velocity in the shallow water bearing zone ranges from 0.005 to 0.073 feet per day (ft/day) and 0.009 to 0.030 ft/day in the deep zone.

- The data indicate that the shallow aquifer has slower velocities and groundwater movement below the turbine building and faster groundwater movement outside and around the turbine building, suggesting some interference of the subsurface pilings associated with the building. Groundwater velocity data for the deep aquifer indicate less variability and lack the influence of subsurface disturbances.

- The most likely Areas of Interest (AOIs) where radionuclides could have been released to soils and groundwater include the Turbine Building waste collection system and the Underground Gas Storage Tank Vault and Piping. No radionuclides were detected above background from the groundwater monitoring wells suggesting that these AOIs did not impact downgradient conditions. However, soils and groundwater directly below these areas have not yet been characterized.

- Groundwater analytical results did not report radionuclides at activities above background in any of the samples; historic site operations did not significantly impact groundwater quality downgradient of the potential AOIs.

Haley & Aldrich recommend the following actions to continue to build the baseline data set to support the ongoing Decontamination and Decommissioning (D&D):

- Continue to monitor groundwater elevations and groundwater quality (including Cesium-137, Strontium-90, Cobalt-60 and tritium concentrations) in wells inside the PA on a semi-annual basis to document groundwater level fluctuations and groundwater quality over time.

- Once the buildings have been decommissioned, then additional characterization should be completed directly below the Turbine Building.

- Eventually, the presence of Hard-to-Detect radionuclides may be questioned and several groundwater samples may have to be submitted for analysis. However, because no other radionuclides were detected above background, there is not an immediate need for these data. Samples may be submitted for Hard-to-Detect radionuclides during future sampling rounds or more appropriately, when groundwater is characterized below the Turbine Building.

- Finally, site closure will also require more frequent groundwater monitoring. However, that schedule should only commence after all D&D for structures and soils remediation (if any) have been completed.

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LIST OF ACRONYMS

AEC	Atomic Energy Commission
AOI	Area of Interest
ALARA	As Low As Reasonably Achievable
bgs	below ground surface
CFR	Code of Federal Regulations
cm/sec	centimeters per second
CRD	Control Rod Drive
CSM	Conceptual Site Model
D&D	Decontamination and Decommissioning
DCGL	Derived Concentration Guideline Level
DPC	Dairyland Power Cooperative
Eberline	Eberline Analytical Corporation
EPA	Environmental Protection Agency
ft/day	feet per day
ft/ft	feet per foot
g/cc	grams per cubic centimeter
Haley & Aldrich	Haley & Aldrich, Inc.
HSA	Historical Site Assessment
ISFSI	Independent Spent Fuel Storage Installation
LACBWR	La Crosse Boiling Water Reactor
MCL	Maximum Contaminant Level
mrem/year	millirem per year
MSL	Mean Sea Level
MWe	megawatt electrical
NAD83	North American Datum of 1983
NAVD88	North American Vertical Datum of 1988
NRC	Nuclear Regulatory Commission
ORP	Oxidation Reduction Potential
PA	Protected Area
PCBs	polychlorinated biphenyls
pCi/L	picoCuries per liter
PVC	polyvinyl chloride
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance / Quality Control
TEDE	Total Effective Dose Equivalent
WDNR	Wisconsin Department of Natural Resources

1. INTRODUCTION

Haley & Aldrich, Inc. (Haley & Aldrich) has been contracted by Dairyland Power Cooperative (DPC) to characterize groundwater at the La Crosse Boiling Water Reactor (LACBWR) located near Genoa, Wisconsin (Figure 1). The purpose of this Hydrogeological Investigation Report is to document findings of the groundwater investigation within the context of the ongoing decontamination and decommissioning (D&D) of the former power plant with the end goal of license termination. The Nuclear Regulatory Commission (NRC) requires that the licensee understands potential impacts to environmental media and that those impacts be addressed as part of the license termination process. The conceptual site model (CSM) presented in this report satisfies this requirement.

The initial Hydrogeological Conceptual Site Model Report was the first step to better understand groundwater flow regimes and groundwater quality with respect to radionuclides associated with LACBWR (Haley & Aldrich, 2012a). This initial CSM presented the preliminary findings and identified data gaps. The purpose of this report is to address those data gaps, document the additional investigation activities and provide the baseline for groundwater data moving forward. This report also presents recommendations for future groundwater monitoring that is tied to the D&D and realistic end goals for the Site.

The goal of the LACBWR decommissioning project is to terminate the current 10 CFR 50 Possession Only license for much of the footprint of the site and to retain the property for future reuse. Although the end state of the LACBWR parcel has not yet been determined, at this time DPC does not intend to sell the property, but rather to use it for its current power generation activities. Therefore, the site will remain classified as Industrial/Commercial. Because DPC does not intend to redevelop these lands for residential use, risk-based decisions will be based on the realistic future use of the property, and with the goal of reducing the area within the NRC license to the area immediately surrounding the Independent Spent Fuel Storage Installation (ISFSI).

1.1 Background

LACBWR was a 50 megawatt electrical (MWe) nuclear power plant that is owned and operated by DPC of La Crosse, Wisconsin. The plant is located on the east bank of the Mississippi River in Vernon County, Wisconsin, approximately one mile south of the village of Genoa, Wisconsin, and approximately 19 miles south of the city of La Crosse, Wisconsin. The plant was one of a series of demonstration plants funded in part by the United States Atomic Energy Commission (AEC). The Allis-Chalmers Company was the original licensee. The AEC later sold the plant to DPC and provided DPC with a provisional operating license. LACBWR achieved initial criticality on 11 July 1967 and began commercial power generation on 1 November 1969. The plant operated for 19 years until it was shut down permanently on 30 April 1987 and de-fueled.

The NRC approved the Decommissioning Plan on 7 August 1991. Since then, DPC has commenced D&D activities; including the milestone that all fuel was moved from the reactor to the ISFSI by November 2012. This report represents one of the next steps in the D&D process: to characterize environmental media including groundwater.

It should be noted that the LACBWR radiological controlled area is only 2.5 acres when compared to the licensed area that includes all of the DPC-owned property. Figure 2 identifies the LACBWR radiological portion of the site investigated in this report as well as relevant site features.

1.2 Regulatory Setting

The NRC is the primary regulatory stakeholder for license termination. However, it is also recognized that the Wisconsin Department of Natural Resources (WDNR) and the United States Environmental Protection Agency (EPA) may also have jurisdiction over the groundwater, soil and surface waters if they have been impacted by historic site operations.

Below is a brief description of the regulatory requirements for site closure from each agency.

- **NRC Requirements:** The NRC requires a cleanup goal of 25 millirem per year (mrem/year) Total Effective Dose Equivalent (TEDE) plus As Low As Reasonably Achievable (ALARA). This means that the total radiation dose for all pathways (e.g., structures, groundwater, soil, sediment) cannot exceed the published regulatory criteria without written approval. However, realistic property uses and associated future scenarios can be used to calculate the Derived Concentration Guideline Levels (DCGLs) that correspond to the 25 mrem/year dose limit. Employing different end use scenarios to populate the model can result in less conservative or higher cleanup values. For groundwater, it is critical to first understand if there have been any impacts to the aquifer; and if so, to define the extent of the plume as well as understand the fate and transport of radionuclides in groundwater. This knowledge can then determine the contribution of groundwater to the DCGLs.

- **WDNR Requirements:** The State of Wisconsin requires that sites meet the 25 mrem/year TEDE plus ALARA for all pathways at license termination. In addition, the WDNR establishes investigation and remediation requirements for Hazardous Substances, which, at a minimum, include chemical parameters such as lead, polychlorinated biphenyls (PCBs), and petroleum in soil, groundwater, surface water and sediment. With respect to groundwater, the State has established that Hazardous Substances identified in groundwater at a property must be reported to the State, and that groundwater leaving a property must ultimately meet the State's drinking water standards and be protective for aquatic receptors.

- Additionally, WDNR regulates the manner in which wells are to be installed and registered. Groundwater wells must be installed under Chapter NR 141 Groundwater Monitoring Well Requirements of the Wisconsin Administrative Code.

- **EPA Requirements:** The EPA will not regulate radionuclides in the environment at a NRC-licensed site until the license has been terminated. As noted above, the NRC will likely require final DCGLs to correspond to a dose of 25 mrem/year TEDE plus ALARA. However, if the final DCGLs (or, more significantly, the final status survey results) exceed the EPA drinking water standards (e.g., Maximum Contaminant Levels [MCLs]), then the NRC and EPA will hold a consultation. If EPA does not approve of the groundwater quality to be left at the time of License Termination, they may invoke regulatory authority under the Comprehensive Environmental Response, Compensation, and Liability Act to require further investigations and/or remediation.

For the purpose of evaluating groundwater, and in the absence of DCGLs, analytical data in this report are compared to the EPA MCLs.

2. REGIONAL SETTING AND PREVIOUS INVESTIGATIONS

The LACBWR site was first developed by hydraulic dredging and relocating sands from the adjacent river to fill in the low-lying areas thereby extending the shoreline as apparent in the current topography. This section provides an overview of the physical setting of the area, with a focus on the plant itself and specifically how the physical setting impacts groundwater flow directions and hydrogeological properties.

The site is located at 43° 13' 35" north and 91° 13' 53" west, one mile south of Genoa, Wisconsin in Vernon County, with the surrounding lands predominantly used for agriculture (dairy) and forestry (DPC, 1972). LACBWR is bordered to the west by the Mississippi River, to the north by the former Genoa-1 coal-fired plant (currently a vacant lot), to the east by State Highway 35 and to the south by the Genoa-3 coal-fired plant. The railroad also crosses through the eastern portion of the parcel, east of the plant structures.

2.1 Topography

The site is located within the Mississippi River Valley, where the valley is cut into highly dissected uplands. From La Crosse to Prairie du Chien, Wisconsin, the valley width varies between 2.5 to 4.5 miles and the valley walls rise sharply to heights of 500 to 600 feet above the river level.

Initially, the Site consisted of marshes and low-lying wetlands. The current property was then built up via the deposition of hydraulically dredged sands from the river. During the sand placement and site preparation (prior to construction), the area was graded to a relatively flat ground surface. The resulting grade for the LACBWR site is generally flat with grade level at approximately 639 feet above Mean Sea Level (MSL) from the access road along the eastern boundary of the site to the riprap along the river shore. A topographic survey of the site is presented in Figure 3 and in the raw data presented Appendix A.

The LACBWR site is situated between two valleys that cut in to the bluffs located east of Highway 35 (Figure 1). The first valley drains to an area north of the site, toward Genoa, and the second valley drains to an area south of the site. These two valleys limit the drainage area that may contribute stormwater runoff from upgradient sources. Furthermore, drainage upgradient of the site is channeled along the highway and railroad into a recharge swale. A small amount of other drainage from the railroad right-of-way and nearby hills is channeled to the river via three underground culverts. These culverts cross the property discharging to the Mississippi River (DPC, 1972).

2.2 Geology

LACBWR is located on the east bank of the Mississippi River in the Wisconsin Driftless section of the Central Lowland Physiographic Province. The Site is located on the southwest flank of the Wisconsin Dome and the western flank of the Wisconsin Arch. The sedimentary strata or bedrock in this region dips less than 20 feet per mile to the southwest (Dames & Moore, 1973).

Much of the regional and site geology has been studied and is well documented. During construction and then during support of seismic studies (Dames & Moore, 1973), soil borings were completed within the LACBWR footprint and the shallow geology is very well understood.

Generally, the local geology is described as approximately 15 feet of hydraulic fill overlying 100 to 130 feet of glacial outwash and fluvial deposits on the east flood plain of the Mississippi River Valley. These unconsolidated deposits are underlain by flat lying sandstone and shales of the Dreshbach Group (Upper Cambrian). The Dreshbach Group is then underlain by dense Precambrian crystalline rocks encountered at approximately 650 feet bgs (Dames & Moore, 1973). At the subject site, the bedrock surface is encountered at an elevation of approximately 509 feet above MSL near the Reactor Building and slopes to approximately 501 feet above MSL near the river shoreline.

Numerous geotechnical studies have been completed both during plant construction and more recently to support heavy haul path and cask stack-up area improvements. These reports provide the grain size analysis, soil classification and other physical soil properties such as dry density, Attenberg limits, unconfined compression, organic content and moisture content.

These reports also provide a more detailed description of the primary soil types encountered at the Site:

- 0 to 20 feet bgs. Hydraulic Fill – Fill sands are encountered from approximately 0 to 20 feet bgs and described as light brown to brown, fine to medium sands with occasional fine gravel.

- 20 to 30 feet bgs. Brown to grey, fine to medium sands underlie the fill, with an average thickness of 7 to 28 feet.

- 30 to 100 feet bgs. Brown, fine to medium sands that also have zones of coarse sand and fine gravel below the finer sands.

- 100 to 115 feet bgs. Brown fine to medium sand and fine to medium gravels.

- 115 to 135 feet bgs. Brown fine to medium sand with trace silt, occasional zones of gravel.

As part of this investigation, additional soil samples were collected and submitted for geotechnical properties (discussed further in Section 3.1). These data were also used to better understand the local hydrogeology of the site, and specifically the shallow unconsolidated deposits that underlie LACBWR that govern groundwater flow as well as the fate and transport of potential radionuclides in both the vadose zone and in the aquifers below.

2.3 Hydrogeology

Regionally, groundwater will flow from the bluff towards the Mississippi River. Closer to the river, it is likely that the groundwater flow direction turns 'downstream' as groundwater discharges to the surface water.

Prior to this hydrogeological investigation, eight monitoring wells were installed within the site boundary of the DPC property, with only one well point located within the LACBWR site. Groundwater elevation data from these wells agree with the regional groundwater flow, and also show seasonal variation on upward and downward gradients, that are influenced by the river stage.

The eight pre-existing monitoring wells within the licensed property were installed around the perimeter of the coal storage areas associated with Genoa-3. Three paired wells and two single wells are sampled under the Genoa-3 Environmental Monitoring Program. Logs for these wells were presented in

Appendix B of the initial Hydrogeological CSM Report (Haley & Aldrich, 2012a). Data from these wells have been used to better understand the local geochemistry as well as the physical properties of the aquifer. No LACBWR-related constituents have been detected in these wells, which is consistent with current assumptions of groundwater flow and also suggests that these wells may be used to better understand background conditions. However, these wells were not sufficient to characterize the groundwater flow below and around the LACBWR site structures or areas where potential releases associated with LACBWR could have occurred. In these areas, pilings, deep structures/foundations and paleo-soil horizons or variations in fill materials could locally influence groundwater flow directions.

The pre-existing well point located within the LACBWR site was installed in a (presumed) downgradient location from the floor drains in the Turbine Building. Groundwater samples were collected and analyzed on-site, and no radionuclides were detected above the minimum detectable activity. This well point is no longer present and was last sampled in approximately the mid-1980s.

There are also two deeper groundwater supply wells (Deep Well 3 and Deep Well 4) that were installed in 1963 to 129 and 116 feet, respectively. Both wells are located upgradient from the plant and are still in use to supply potable water for LACBWR. Logs for these wells were presented in Appendix A of the initial Hydrogeological CSM Report (Haley & Aldrich, 2012a). Separate groundwater wells supply water to the Genoa-3 plant. Annual radiochemical analyses from Deep Well 3 and Deep Well 4 show gross alpha and gross beta activities below the WDNR standards and EPA drinking water MCLs. Furthermore, these analyses suggest that plant-related radionuclides have not impacted the deeper portion of the aquifer.

Regionally, there are five domestic wells south of the LACBWR site and east of Highway 35 with the water table encountered from 20 to 45 feet bgs. Yield of each well is reported at 10 gallons per minute (DPC, 1972). These data suggest that the native unconsolidated deposits or overburden is relatively permeable with an estimated hydraulic conductivity of at least approximately 10^{-1} centimeters per second (cm/sec) (or 100 feet per day [feet/day]) (Freeze & Cherry, 1979).

Additional hydrogeological information collected from this investigation is discussed further in Sections 3.2 and 6.

2.4 Surface Water

LACBWR is located along the Mississippi River with the discharge located at the head of Thief Slough, a side channel of the Mississippi River that is separated from the main channel by Island 126. The Mississippi River Valley floor is primarily comprised of marsh lands, with islands between river channels and extensions of low lying flood plain cut by ponds, sloughs and meandering stream channels. The main channel of the river varies greatly in width both above and below the site. A series of dams are operated by the United States Army Corps of Engineers for navigational purposes. Above Dam No. 8 (about ¾ mile north of the site) the river is nearly 4 miles wide. Below the dam and closer to the site, the river is 1,500 to 2,000 feet wide (DPC, 1972). The published flood stages for the Mississippi River at the site are:

- 50 year flood state is at 635’2” above MSL
- 100 year flood stage is 637’2” above MSL
- 500 year flood stage is at 640’ above MSL

Therefore, the 100 year flood is within two feet of the plant grade (639 feet above MSL).

3. HYDROGEOLOGICAL INVESTIGATION

In general, a CSM not only describes the history and hydrogeological setting of the plant, but also describes areas where radiological contamination could have been released to the environment. It should be noted that the first step is typically a Historical Site Assessment (HSA) to identify systems, piping, storage tanks, or work practices that could have led to the potential release of radiological constituents to the environment. Because the focus was limited to the potential impact of site activities on groundwater (and not a complete HSA[1]) the results of the groundwater assessment was documented in the initial Hydrogeological CSM Report (Haley & Aldrich, 2012a).

The next step was to identify data gaps and develop a field investigation to collect site-specific data documenting site conditions and refining the CSM. This Hydrogeological Investigation Report presents the scope of work completed, analytical data, findings, and interpreted groundwater flow regime(s) to support the LACBWR D&D with respect to groundwater.

The initial review identified nine Areas of Interest (AOIs) where historic operations may have potentially released radionuclides to the environment. They included:

- Reactor Building
- Turbine Building
- Waste Disposal Building
- Underground Gas Storage Tank Vault and Piping
- Contaminated Water Release Area
- Septic Tank and Dry Well
- Outfalls
- Resin Tank Storage Area
- Control Rod Drive (CRD) Oil Reuse Areas

Although this hydrogeological investigation focused on groundwater characterization, potential or known releases to soils can also migrate through the vadose zone and reach the water table. This investigation only evaluated soils that were collocated with the proposed monitoring wells, located in accessible areas; no isolated soils were characterized.

Generally isolated soils are those below impermeable caps (i.e., building foundations). Contaminants in these soils are less likely to migrate in the subsurface as there is no mechanism for rainwater to percolate through, providing the transport mechanism. However, it should also be noted that radionuclides that are present in isolated soils, or beneath impermeable layers or building foundations, must still be characterized (and potentially remediated) to reach NRC License Termination.

The scope of the investigation included:

- Drilling of five deep borings for observation and collection of soil samples
- Installation of five paired monitoring wells
- Collection of soil samples for geotechnical analyses

[1] HSA as defined by the Multi-Agency Radiation Survey and Site Investigation Manual, Rev. 1 (National Technical Information Service (NTIS) Document No. PB97-117659).

- Hydraulic conductivity testing of all newly installed wells
- Collection of two rounds of groundwater level measurements
- Collection of two rounds of groundwater samples for on-site tritium analysis and off-site radiochemical analyses.

The technical justification for each of the proposed wells is presented on Table 1. Soil boring and monitoring well locations are shown on Figure 3, with the specific coordinates of each location presented in Table 2 and the well installation details presented on Table 3. With the exception of those items noted in Subsection 3.1, all field activities were performed per the Work Plan, Health and Safety Plan, and Quality Assurance Project Plan (Haley & Aldrich, 2012b, c, and d, respectively).

3.1 Deviations From the Work Plan

The scope of work and associated field methods were initially presented in the work plan and Quality Assurance Project Plan (QAPP). However, during the course of the program, some modifications were made in data collection methods. These deviations were discussed with the project team in advance of completing the tasks. The changes did not result in inferior or compromised data. The objectives of the Work Plan were met.

Deviations from the Work Plan include the following:

- Soil collection methods. Instead of collecting soil samples using a split-spoon sampler with hollow stem auger, a GeoProbe® rig was used to collect soil samples continuously from the ground surface to final termination depth via direct-push technology. This provided the data needed to visually log the soil samples without data gaps and decreased the potential for cross-contamination of soil relocation to a depth other than actual conditions (i.e., shallow soils moved to deeper depth).

- Analytical Services. After the program commenced, the Eberline Analytical Corporation (Eberline) of Richmond, California, identified in the QAPP, could not accept the samples. However, the Eberline laboratory located in Oak Ridge, Tennessee was audited and approved by LACBWR's QA staff: the Eberline laboratory in Oak Ridge, Tennessee was then used for the required analyses.

- Hydraulic Conductivity Testing. Two falling and two rising head tests were proposed for each of the newly installed wells as well as from the existing well pair at B-11R /AR. During the field effort, the rise for the shallow well at B-11R was bent and the 'slug' could not be deployed in the well. These data were not collected.

- Topographic Survey. As no recent surveys were available to document the current conditions of the LACBWR site, a topographic survey, conducted by Lampman & Associates of De Soto, Wisconsin, was incorporated into the field program to locate the existing structures and provide an accurate and scaled base map. The survey will also be needed to document D&D activities and potential future remediation (if warranted). The survey results are presented in Appendix A.

- Finally, it was suggested that a minimum of two groundwater samples from each round be submitted for Hard-to-Detect radionuclides. Samples analyzed would be determined based on

tritium screening data as well as analytical results of strontium, cobalt, and cesium. No radionuclides were detected above background and subsequently, Hard-to-Detect analyses were not requested.

These deviations from the original plan did not impact the data quality and met the intent of the scope of work proposed.

3.2 Soil Investigation

As noted above, a series of five paired boreholes were advanced using direct-push technology to assess potential releases of radiological contamination to soils and to better characterize hydrogeological conditions. Each borehole pair had a shallow termination depth of 25 feet bgs (identified with an "A") and deep termination depth of 55 ft bgs (identified with a "B"). The lateral distance between each shallow and deep pair is approximately 5 feet.

Soil samples were collected continuously from each of the deeper boreholes, from the ground surface to final termination depth, and logged for geology and any indications of site-related impacts. Soil drill cuttings were analyzed for radionuclides on-site by LACBWR's Health & Physics Department and were unconditionally released. Soil cuttings were then spread on the ground surface adjacent to the boreholes.

Two soil samples were collected from each of the deep locations and analyzed for tritium on-site and then submitted to PTS Laboratories, Inc. of Santa Fe Springs, California for geotechnical analyses, described further below.

3.2.1 Observed Lithology

Soils at the LACBWR site are described as fine to medium sand and are consistent with previous investigations and regional descriptions. With the exception of soils logged from MW-201B, soil descriptions indicated 1- to 2-foot thick layer of slightly finer materials such as silty sand or silty clay at varying depths beginning from approximately 22 to 27 ft bgs (this likely indicates a historic flooding event). Finer materials such as silt and lean clay impede water flow due to lack of pore space for water storage and movement. Additionally, for soils described at monitoring well pair MW-202, the well location nearest the Mississippi River, the final 2 feet of the deep borehole (53 to 55 ft bgs) were described as lean clay indicating native soil structure.

No visible staining or olfactory observations were noted for any of the samples. However, the soil description associated with monitoring well pair MW-204 noted evidence of some fill materials such as concrete, brick pieces and wood debris, confirming that the soils are reworked fill and not native materials. Additional details are provided in the Soil Boring Logs in Appendix B.

3.2.2 Geotechnical Laboratory Analysis

Two soil samples were collected from each of the borehole pairs from depths of 20 and 50 ft bgs. The samples were submitted for the following geotechnical laboratory analyses:

- Moisture content (API RP 40 / ASTM D2216);
- Bulk density (API RP40);
- Total and effective porosity (Mod. ASTM D425); and
- Particle size (ASTM D422/D4464M).

Samples were collected from within the proposed well screen intervals to support the future development of DCGLs as site-specific data is generally less conservative than the preset defaults, allowing for protective and realistic cleanup criteria. These data were also used to estimate the hydraulic conductivities and groundwater velocities at the site. A summary of the geotechnical data is presented in Table 4 and with the laboratory data presented in Appendix E.

3.3 Groundwater Investigation

- Five pairs of monitoring wells (MW-200A/B through MW-204A/B) were installed as part of this hydrogeological investigation. The monitoring wells in this network were installed downgradient of the most likely areas where potential releases could have occurred and as described in Table 1.

- Hollow stem augers were used to create boreholes that were of sufficient diameter to install an acceptable well. The "A" designated wells were screened from approximately 15 to 25 ft bgs; the "B" designated wells were screened from approximately 45 to 55 ft bgs. Monitoring wells were installed in compliance with WDNR regulations. Each well was then developed by surging and purging methods and allowed to equilibrate for at least 14 days prior to sampling. The well construction details are presented in Table 3. Well Construction Logs and Well Development Records are presented in Appendices C and D, respectively.

- The paired wells were installed so that the shallow wells generally intersected the water table and the deeper wells were installed at depths approximately 20 to 30 feet below the shallow wells. It should be noted that with the large fluctuation in groundwater levels, this was not always achieved. The wells were installed during a 'dryer' period, so during times of flooding the top of the shallow well is submerged. The vertical separation between the shallow and deeper wells provided data to evaluate vertical gradients across the site.

- Groundwater elevation data were collected from each well and used to contour groundwater flow in the shallow and deeper portions of the aquifer. Based on the estimated contours, groundwater flows, as anticipated, from the east to the west, discharging into the adjacent Mississippi River. Groundwater contours from each of the sampling rounds are presented in Figures 4 through 7.

- In addition to collecting groundwater data to evaluate flow direction, a series of hydraulic conductivity tests, referred to as slug tests or falling/rising head tests, were completed at each well to collect data to estimate the hydraulic conductivity.

- Finally, groundwater quality was also assessed during two groundwater monitoring events in 2013. Groundwater sample analytical results are discussed below in Subsection 3.3.2. Overall these groundwater investigation tasks were designed to assess potential releases of radiological contamination and to better characterize hydrogeological conditions.

3.3.1 Hydraulic Conductivity Tests

In order to determine the hydraulic conductivity of the formations and groundwater velocity, Haley & Aldrich conducted a minimum of two rising and falling head slug tests at each of the new wells and one existing well, B-11AR. A hydraulic conductivity test is performed by instantaneously lowering or raising the water level and measuring how quickly the aquifer recovers to static conditions. The slug used to change the water level was a solid steel cylinder measuring approximately 1.5-inches in diameter by 3 feet long and several Solinst Leveloggers® were used to log the results. Data collected were downloaded and observed with Levelogger® version 3.11. In addition to the existing well, two previously installed wells were also scheduled to be tested, B-11R and B-11AR. Due to well damage in the upper three feet of the B11AR well, the tests were unsuccessful.

Data were evaluated using the Bouwer and Rice method (Bouwer & Rice, 1976). Because of the water loss to the vadose zone for the shallow wells that intercepted the water table, falling head data were not used in the average hydraulic conductivity calculations. Hydraulic conductivity results are shown on Table 5 and the supporting data presented in Appendix F. The average shallow aquifer hydraulic conductivity is approximately 313 feet per day. The average deep aquifer hydraulic conductivity is approximately 429 feet per day.

Based on the interpreted groundwater contours and the hydraulic conductivity data, the groundwater velocity at the LACBWR site ranges from 0.005 to 0.073 feet per day in the shallow aquifer. The groundwater velocity for the deeper water bearing zone ranges from 0.009 to 0.030 feet per day, indicating that there is a difference in hydrogeologic properties between the shallow and deeper zones. These differences may be attributed to the installation of the pilings during construction as well as subsurface barriers or structures (i.e., the Reactor Building). The shallow aquifer groundwater appears to have lower groundwater gradients below the buildings and steeper groundwater gradients outside the buildings. The deep aquifer groundwater does not experience the same barriers as the shallow aquifer and so velocity data indicate less variability.

3.3.2 Groundwater Quality

Two rounds of groundwater samples were collected as part of this hydrogeological investigation. Samples were collected during the seasonal high water in June 2013 and then again during a seasonal low groundwater level in November 2013. Groundwater samples were collected using low flow methods at monitoring wells equipped with dedicated tubing.

Groundwater data was collected in the field using a Horiba model U-52 to measure pH, temperature, dissolved oxygen, turbidity, specific conductance, and oxidation reduction potential (ORP). Field data, collected from each monitoring well during the purging was recorded on the field data records presented in Appendix G.

Groundwater analysis results show that groundwater has not been impacted by historic operations. No radionuclides were detected above background.. Groundwater sample analytical results are summarized on Tables 7 and 8 and the raw data from the laboratory reports are included as Appendix E.

All sampling and quality assurance/quality control (QA/QC) requirements were completed in accordance with the Quality Assurance Program Plan (Haley & Aldrich, 2012d). Groundwater, samples were submitted to the Eberline laboratory in Oak Ridge, Tennessee for analysis of Cesium-137, Strontium-90, and Cobalt-60, with selected samples submitted for Hard-to-Detect analysis, if needed. Tritium analyses were performed on-site at LACBWR.

4. REVISED CONCEPTUAL SITE MODEL

The LACBWR site is a former 50 MWe nuclear generating plant that was put into SAFSTOR in 1987 and is now undergoing final decommissioning with the goal of license termination. The area where the plant sits was created by hydraulically dredging the adjacent river sediments to bring the shoreline to an elevation of approximately 639 feet above MSL.

The site is relatively flat from the railroad tracks on the east to the riprap that borders the Mississippi River on the west. The geology consists primarily of fill materials (fine sands and silts) underlain by fine to medium sands with some soils containing higher percentages of coarse sands and gravels. Bedrock is encountered at approximately 130 feet bgs.

Each of the larger structures is supported by driven piles. These piles likely compressed the soils making them less permeable than the native and dredged materials.

Groundwater beneath the site is first encountered at depths ranging from approximately 15 to 25 feet bgs and the water table aquifer is in strong hydraulic communication with the adjacent Mississippi River. Groundwater in the shallow deposits and fill material flows towards the west and discharges into the Mississippi River. The deeper groundwater flows west but may be influenced by the river and may turn and flow parallel to the river.

Groundwater flow through the site is generally towards the river but impacted locally by the deeper structures (i.e., the containment structure shell) as well as the deep pilings that support the structures. During plant construction, and more specifically the installation of the support pilings, the soil was compacted, reducing the effective porosity and permeability of the soils. This reduction in permeability likely decreased the hydraulic conductivity of the aquifer within the footprint of the buildings. The resulting impact to groundwater flow is that groundwater within the compacted soils will flow at a slower velocity.

Based on the soil classification of fine to medium sands (SM and SP) and silts (ML) for the shallow soils, expected hydraulic conductivities for the shallow aquifer range from 10^{-5} cm/sec (or 10^{-1} feet/day) to 10^{-1} cm/sec (or 100 feet/day). The average shallow aquifer hydraulic conductivity is approximately 313 feet per day and the average deep aquifer hydraulic conductivity is approximately 429 feet per day.

The horizontal gradient of the water table ranges from 0.004 to 0.005 ft/ft in the shallow aquifer and 0.001 to 0.002 ft/ft in the deeper aquifer. Vertical groundwater gradients also vary, and are impacted by the river stage. Generally, there is an upward gradient, as expected, during the low river stages with a downward gradient during times of extremely high water. Vertical gradients are small, and range from 0.015 ft/ft in the downward direction to 0.028 ft/ft in the upward direction.

Groundwater velocity is directly related to the gradients or difference in hydraulic head across the site. Groundwater velocity in the shallow water bearing zone ranges from 0.005 to 0.073 ft/day and 0.009 to 0.030 ft/day in the deep zone.

Historic operations may potentially have released radionuclides to the environment, however, no impacts have been observed in data collected from downgradient wells. Generally, most of the potential releases are associated with the waste collection system in the Turbine Building. For this

building, radioactive liquid waste was collected by floor drains, pumped into waste water tanks and then batch released into the circulating water line. In the late 1970s, voids were characterized below the building (mostly in the northeast below the laundry area). When the voids were grouted, grout then entered the floor drains, plugging them. These data raise questions on the integrity of the Turbine Building subsurface floor drains.

As noted above, there are likely localized impacts on groundwater flow from deeper plant structure and the areas where pilings were used to support structures. The implications of these localized flow regimes on contaminant fate and transport are that potential releases that occurred within the footprint of the buildings via floor drains could take longer to migrate both in the vadose zone as well as the underlying aquifer. This is further compounded as the overlying structures isolate the shallow soils from precipitation, creating an area that will likely retain any potentially released contamination. Therefore, although no site related radionuclides were detected above background levels, it is still possible to have impacted media below the Turbine Building.

5. DATA GAPS

Prior to this investigation, one set of paired wells was located in the LACBWR area. Five additional paired well sets have been added and are located downgradient from the LACBWR AOIs. Soil physical properties specifically within the LACBWR were evaluated to assess contaminant fate and transport in both the shallow and deep aquifer. Aquifer properties were also investigated and calculated. These actions have addressed most of the previously identified data gaps.

- The remaining data gaps include a more robust baseline data set to mark trends over time. Two rounds of data are sufficient to get an understanding of groundwater conditions, but the NRC will likely prefer additional data collection as the decommissioning continues.

- It should also be noted that historic operations may have led to the potential release of radiological contamination to environmental media, especially below the Turbine Building floor drains. Although there is no evidence suggesting a large plume or impacts to groundwater downgradient of the AOIs, the remaining data gaps directly below the building should be addressed after the building is dismantled.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The following conclusions are based on the details of this investigation and revised CSM:

- Geology is well understood and consists of fill sands overlying fine to medium sands with increasingly coarse sands and gravel with depth. Bedrock is encountered at approximately 130 feet bgs. In general, the monitoring well network installed within the LACBWR area is screened in medium or medium-fine sand.

- Groundwater flows towards the Mississippi River and is hydraulically connected to the river. River stage affects local groundwater fluctuations and may slightly alter groundwater flow direction to parallel river flow. Typically, groundwater is encountered at approximately 20 feet bgs.

- The average shallow aquifer hydraulic conductivity is approximately 313 feet per day and the average deep aquifer hydraulic conductivity is approximately 429 feet per day.

- The horizontal gradient of the water table ranges from 0.004 to 0.005 ft/ft in the shallow aquifer and 0.001 to 0.002 ft/ft in the deeper aquifer.

- Vertical groundwater gradients are impacted by the river stage. Generally there is an upward gradient, as expected, during the low river stages with a downward gradient during times of extremely high water. Vertical gradients are small, and range from 0.015 ft/ft in the downward direction to 0.028 ft/ft in the upward direction.

- Groundwater velocity in the shallow water bearing zone ranges from 0.005 to 0.073 ft/day and 0.009 to 0.030 ft/day in the deep zone.

- The data indicate that the shallow aquifer has slower velocities and groundwater movement below the turbine building and faster groundwater movement outside and around the turbine building, suggesting some interference of the subsurface pilings associated with the building. Groundwater velocity data for the deep aquifer indicate less variability and lack the influence of subsurface disturbances.

- The most likely AOIs where radionuclides could have been released to soils and groundwater include the Turbine Building waste collection system and the Underground Gas Storage Tank Vault and Piping. No radionuclides were detected above background from the groundwater monitoring wells suggesting that these AOIs did not impact downgradient conditions. However, soils and groundwater directly below these areas have not yet been characterized.

- Groundwater analytical results did not report radionuclides at activities above background in any of the samples; historic site operations did not significantly impact groundwater quality downgradient of the potential AOIs.

6.2 Recommendations

The following actions are recommended to continue to build the baseline data set to support the ongoing D&D:

- Continue to monitor groundwater elevations and groundwater quality (including Cesium-137, Strontium-90, Cobalt-60 and tritium concentrations) in wells inside the PA on a semi-annual basis to document groundwater level fluctuations and groundwater quality over time.

- Once the buildings have been decommissioned, then additional characterization should be completed directly below the Turbine Building.

- Eventually, the presence of Hard-to-Detect radionuclides may be questioned and several groundwater samples may have to be submitted for analysis. However, this may also be completed in future sampling rounds or when groundwater is characterized below the Turbine Building.

- Finally site closure will also require more frequent groundwater monitoring. However, that schedule should only commence after all D&D for structures and soils remediation (if any) have been completed.

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Table 1
Program Summary and Technical Rationale for Monitoring Wells
Hydrogeological Investigation Report
LACBWR, Dairyland Power Cooperative
Genoa, Wisconsin

Well Identification	Location	Termination Criteria	Data Objective
MW-200A/B	The well pair located within the footprint of the former 20,000 gallon above ground storage tank.	The shallow well was installed to intercept the water table during normal river stage (non-flooding conditions), the deeper well was screened from 20 to 30 feet below the water table.	To collect data cross-gradient from the main buildings/structures to better characterize groundwater flow directions.
MW-201A/B	The well pair located west of the turbine building floor drains, in the area of the resin fluid release, as well as the septic dry well and switchyard.	The shallow well was installed to intercept the water table during normal river stage (non-flooding conditions), the deeper well was screened from 20 to 30 feet below the water table.	To characterize groundwater quality downgradient and northwest of the turbine building, the resin liquid release are, and the dry well. Data were also collected to better characterize site hydrogeology.
MW-202A/B	Located west of the turbine building floor drains, and downgradient of the switchyard.	The shallow well was installed to intercept the water table during normal river stage (non-flooding conditions), the deeper well was screened from 20 to 30 feet below the water table.	To characterize groundwater quality downgradient and southwest side of the turbine building, and the switchyard. Data were also collected to better characterize site hydrogeology.
MW-203A/B	Located near and downgradient of the Emergency Diesel Generator tanks.	The shallow well was installed to intercept the water table during normal river stage (non-flooding conditions), the deeper well was screened from 20 to 30 feet below the water table.	To characterize groundwater to the south of the turbine building and to provide spatial distribution to better characterize groundwater flow directions.
MW-204A/B	Located downgradient of the gas storage tank vault.	The shallow well was installed to intercept the water table during normal river stage (non-flooding conditions), the deeper well was screened from 20 to 30 feet below the water table.	To characterize groundwater quality downgradient of the gas storage tank vault. Data were also collected to better characterize hydrogeology with this well providing additional spatial distribution to evaluate groundwater flow directions.

Table 2
Sample Locations
Hydrogeological Investigation Report
LACBWR, Dairyland Power Cooperative
Genoa, Wisconsin

Sample Location Identification	Coordinates		Elevation (feet above MSL)	
	Northing	Easting	Ground Surface	Top of Casing (PVC)
MW-200A	571192.59	1642062.37	639.29	641.70
MW-200B	571195.30	1642058.27	639.56	641.94
MW-201A	571097.63	1642014.44	638.63	640.69
MW-201B	571094.46	1642013.53	638.48	640.36
MW-202A	571079.50	1641904.94	638.94	641.19
MW-202B	571083.12	1641907.10	638.74	641.14
MW-203A	570976.74	1642031.59	638.89	641.15
MW-203B	570980.12	1642034.82	638.99	641.28
MW-204A	570947.05	1642205.67	638.71	640.86
MW-204B	570952.57	1642207.05	638.62	640.73
MW-B11R	570959.99	1642481.77	638.96	640.76
MW-B11AR	570957.30	1642479.01	639.13	641.27

Notes:
MSL = Mean Sea Level
PVC = polyvinyl chloride
Survey conducted by Lampman & Associates of De Soto, Wisconsin, 20 November 2012.
Horizontal coordinates (Grid) are Wisconsin State Plane Coordinate System (South Zone) and referenced to NAD83(1991) in survey feet.
Horizontal survey tied to Wisconsin Department of Transportation survey control station 9000 (STH35).

Elevations are referenced to NAVD88(1991) and reported in feet.

Table 3
Monitoring Well Construction Details
Hydrogeological Investigation Report
LACBWR, Dairyland Power Cooperative
Genoa, Wisconsin

Sample Location Identification	Date Installed	Total Boring Depth (feet bgs)	Total Well Depth	Casing Diameter (inches)	Screen Slot Size (inches)	Screened Interval (feet bgs)	Casing Material	TOC Elevation (feet above MSL)
MW-200A	11/6/2012	25	25.0	2	0.010	15-25	PVC	641.70
MW-200B	11/6/2012	55	55.0	2	0.010	45-55	PVC	641.94
MW-201A	11/7/2012	25	25.0	2	0.010	15-25	PVC	640.69
MW-201B	11/7/2012	55	55.0	2	0.010	45-55	PVC	640.36
MW-202A	11/8/2012	25	25.0	2	0.010	15-25	PVC	641.19
MW-202B	11/8/2012	55	55.0	2	0.010	45-55	PVC	641.14
MW-203A	11/8/2012	25	25.0	2	0.010	15-25	PVC	641.15
MW-203B	11/8/2012	55	55.0	2	0.010	45-55	PVC	641.28
MW-204A	11/6/2012	25	25.0	2	0.010	15-25	PVC	640.86
MW-204B	11/5/2012	55	55.0	2	0.010	45-55	PVC	640.73
MW-B11R	2006	27.16	27.16	2	0.010	17.2-27.2	PVC	640.76
MW-B11AR	2006	46.54	46.54	2	0.010	41.5-46.5	PVC	641.27

Notes:
Survey conducted by Lampman & Associates of De Soto, Wisconsin on 20 November 2012.
All monitoring wells listed above have risers above ground surface which are not accounted for in the riser casing interval (feet bgs).
bgs = below ground surface
TOC = Top of Casing, referencing PVC casing above ground surface
MSL = Mean Sea Level

Table 4
Summary of Geotechnical Data
Hydrogeological Investigation Report
LACBWR, Dairyland Power Cooperative
Genoa, Wisconsin

Sample ID	Depth (feet bgs)	Core Recovery (feet)	Moisture Content (% weight)	Bulk Density (g/cc)	Total Porosity (%Vb)	Effective Porosity (%Vb)	Mean Grain Size Description (1)	Median Grain Size (mm)	Particle Size Distribution (% weight)						Total Silt & Clay (% weight)
									Gravel	Sand Size			Silt	Clay	
										Coarse	Medium	Fine			
SB-200-20	20	1.08	3.8	1.74	31.6	28.6	Medium sand	0.438	0.00	0.00	53.21	44.11	1.99	0.70	2.69
SB-200-50	50	1.25	13.1	1.85	29.7	27.1	Medium sand	0.527	0.00	0.00	68.09	29.44	1.83	0.64	2.47
SB-201-20	20	0.83	5.3	1.73	26.2	20.7	Medium sand	0.452	0.00	0.00	54.22	41.55	3.14	1.09	4.23
SB-201-50	50	0.83	15.3	1.69	32.3	30.1	Medium sand	0.517	0.00	0.00	69.36	30.02	0.38	0.24	0.62
SB-202-20	20	1.00	3.6	1.69	29.5	27.1	Medium sand	0.452	4.14	2.07	48.97	43.38	(2)	(2)	1.44
SB-202-50	50	0.92	14.2	1.82	31.9	28.6	Fine sand	0.340	0.00	0.00	36.52	61.51	1.47	0.51	1.98
SB-203-20	20	0.92	5.5	1.74	30.2	26.6	Medium sand	0.519	0.00	0.00	65.55	31.35	2.21	0.90	3.11
SB-203-50	50	0.83	14.1	1.83	31.6	28.7	Medium sand	0.418	0.00	0.00	49.51	49.76	0.47	0.27	0.73
SB-204-30	30	0.92	15.9	1.75	34.0	31.1	Medium sand	0.542	0.00	0.00	74.55	24.77	0.45	0.23	0.68
SB-204-50	50	1.50	14.7	1.74	32.0	29.1	Medium sand	0.550	0.00	0.00	69.19	29.78	0.68	0.35	1.03

Notes:
Sample ID. SB-200 correlates to MW-200A/B pair.
% weight = percent weight
g/cc = grams per cubic centimeter
% Vb = percent bulk volume
mm = millimeters
(1) = Geological Society of America (GSA) soil classification
(2) = Mechanical sieve did not differentiate silt/clay fractions

Table 5
Summary of Groundwater Elevations and Vertical Gradients
Hydrogeological Investigation Report
LACBWR, Dairyland Power Cooperative
Genoa, Wisconsin

Well ID	Date	Groundwater Elevation, Feet MSL	Head Difference (feet)	Vertical Gradient[1, 2] (feet/feet)	Direction
MW-200A	11/13/2012	620.70	0.05	0.002	Downward
MW-200B		620.65			
MW-200A	12/11/2012	620.73	-0.85	-0.028	Upward
MW-200B		621.58			
MW-200A	6/26/2013	629.39	0.07	0.002	Downward
MW-200B		629.32			
MW-200A	11/5/2013	621.50	-0.24	-0.008	Upward
MW-200B		621.74			
MW-201A	11/13/2012	620.71	0.07	0.002	Downward
MW-201B		620.64			
MW-201A	12/11/2012	620.72	0.13	0.004	Downward
MW-201B		620.59			
MW-201A	6/26/2013	629.41	0.08	0.003	Downward
MW-201B		629.33			
MW-201A	11/5/2013	621.52	0.46	0.015	Downward
MW-201B		621.06			
MW-202A	11/13/2012	620.51	0.00	0.000	--
MW-202B		620.51			
MW-202A	12/11/2012	620.57	0.03	0.001	Downward
MW-202B		620.54			
MW-202A	6/26/2013	629.26	0.00	0.000	--
MW-202B		629.26			
MW-202A	11/5/2013	621.06	0.09	0.003	Downward
MW-202B		620.97			
MW-203A	11/13/2012	620.47	-0.18	-0.006	Upward
MW-203B		620.65			
MW-203A	12/11/2012	620.53	-0.15	-0.005	Upward
MW-203B		620.68			
MW-203A	6/26/2013	629.62	0.18	0.006	Downward
MW-203B		629.44			
MW-203A	11/5/2013	621.47	0.31	0.010	Downward
MW-203B		621.16			
MW-204A	11/13/2012	620.83	0.07	0.002	Downward
MW-204B		620.76			
MW-204A	12/11/2012	620.89	0.05	0.002	Downward
MW-204B		620.84			
MW-204A	6/26/2013	629.83	0.17	0.006	Downward
MW-204B		629.66			
MW-204A	11/5/2013	621.48	0.17	0.006	Downward
MW-204B		621.31			

Notes:
[1]Shallow wells (denoted with an "A") were installed from 15 to 25 feet bgs.
[2]Deeper wells (denoted with a "B") were installed from 45 to 55 feet bgs.
Distance between the shallow and deeper screens is 30 feet.
Survey conducted by Lampman & Associates of De Soto, Wisconsin on 20 November 2012.
bgs = below ground surface
TOC = Top of Casing, referencing PVC casing above ground surface
MSL = Mean Sea Level
-- = no directional gradient observed

Table 6
Summary of Estimated Hydraulic Conductivity
Hydrogeological Investigation Report
LACBWR, Dairyland Power Cooperative
Genoa, Wisconsin

	Individual Test Calculations for Hydraulic Conductivity (feet/day)									Permeability Calculations (average)	
Sample ID	**Rising Test 1**	**Rising Test 2**	**Rising Test 3**	**Rising Test 4**	**Rising Test 5**	**Falling Test 1**	**Falling Test 2**	**Falling Test 3**	**Falling Test 4**	**Rising Head K (feet/day)**	**Falling Head K (feet/day)**
MW-200A	4.80E+02	5.92E+01	-	-	-	1.63E+01	5.11E+01	-	-	2.70E+02	3.37E+01*
MW-200B	2.27E+02	3.65E+02	-	-	-	2.12E+02	1.73E+02	-	-	2.96E+02	1.93E+02
MW-201A	3.10E+02	3.57E+02	4.11E+02	3.74E+02	-	4.70E+01	5.22E+01	5.30E+01	5.89E+01	3.63E+02	5.28E+01*
MW-201B	1.42E+02	1.21E+02	-	-	-	1.09E+02	1.95E+02	-	-	1.32E+02	1.52E+02
MW-202A	1.07E+03	2.87E+02	3.49E+02	3.19E+02	-	5.79E+02	1.74E+02	-	-	5.06E+02	5.80E+02
MW-202B	9.54E+02	8.19E+02	-	-	-	5.94E+02	5.66E+02	-	-	8.87E+02	5.80E+02
MW-203A	4.16E+02	4.53E+02	2.10E+02	-	-	1.11E+01	1.02E+02	1.80E+02	9.27E+01	3.60E+02	9.65E+01*
MW-203B	4.12E+02	1.38E+02	2.59E+02	-	-	6.07E+02	1.36E+02	4.13E+02	-	2.70E+02	3.85E+02
MW-204A	1.71E+01	1.64E+01	3.38E+01	2.30E+02	3.56E+01	1.09E+01	1.30E+01	1.26E+01	3.65E+01	6.66E+01	1.83E+01
MW-204B	1.59E+03	4.78E+02	-	-	-	4.47E+02	2.71E+02	-	-	1.03E+03	3.59E+02
MW-B11AR	-	-	-	6.44E+01	-	-	-	-	6.28E+01	6.44E+01	6.28E+01

Notes:
K = hydraulic conductivity
- = data not acceptable, or not collected.
* = apparent water loss to vadose zone; not representative of permeability.
Rising and Falling Head Permeability Calculations via Bower & Rice Method are based on data collected on 11/13/2012 and 12/11/2012.
Hydraulic conductivity testing could not be completed on MW-B11R and MW-B11AR due to bent riser casings through which the slug could not pass.
A minimum of two data sets were used for each rising or falling head test calculation; when appropriate, additional data sets were also used
Falling head tests for water table wells can lose water through the well screen into the vadose zone.

Table 7

Summary of Analytical Results for Groundwater
Hydrogeological Investigation Report
LACBWR, Dairyland Power Cooperative
Genoa, Wisconsin

			Parameter	Strontium-90		Cobalt-60		Cesium-137	
Sample ID:	**Date & Time**	**Lab Sample ID**	**QC**	**Result**	**CSU**	**Result**	**CSU**	**Result**	**CSU**
MW-201A	06/27/13 11:43	13-08018-12		2.05E+00	6.47E-01	-2.20E+00	2.40E+00	-1.02E+00	2.25E+00
	11/05/13 13:34	13-11035-13		2.98E-01	5.68E-01	1.80E+00	2.22E+00	2.10E+00	2.35E+00
MW-201B	06/27/13 11:31	13-08018-11		2.00E+00	7.07E-01	1.72E+00	2.49E+00	-6.56E-01	2.24E+00
	11/05/13 13:28	13-11035-12		2.80E-01	9.04E-01	2.48E-01	1.90E+00	1.96E-01	1.86E+00
MW-202A	06/27/13 10:08	13-08018-10		1.82E+00	7.35E-01	2.30E+00	2.20E+00	-2.77E-01	2.20E+00
	11/05/13 12:18	13-11035-11		4.74E-01	5.82E-01	3.50E-01	4.55E+00	1.61E+00	4.71E+00
MW-202B	06/27/13 09:57	13-08018-09		1.43E+00	7.10E-01	-2.17E-01	2.41E+00	-1.28E+00	2.34E+00
	11/05/13 12:18	13-11035-10		-5.67E-01	8.21E-01	4.87E-01	2.93E+00	-2.62E-01	2.50E+00
	11/05/13 12:18	13-11035-14	-D	5.81E-01	7.75E-01	-1.11E+00	2.09E+00	1.87E+00	2.34E+00
MW-203A	06/26/13 15:01	13-08018-07		2.06E+00	6.63E-01	2.83E-01	2.61E+00	-2.43E-01	2.48E+00
	11/05/13 11:00	13-11035-09		4.92E-02	8.75E-01	3.51E+00	2.25E+00	1.11E+00	2.29E+00
MW-203B	06/26/13 14:32	13-08018-06		2.96E+00	7.79E-01	-5.41E-02	2.14E+00	1.64E+00	2.31E+00
	06/26/13 14:58	13-08018-08	-D	1.67E+00	6.92E-01	-6.59E-01	1.63E+00	-2.41E-01	2.12E+00
	11/05/13 11:06	13-11035-08		-8.98E-02	1.12E+00	4.67E-01	1.93E+00	-2.24E-01	2.29E+00
MW-204A	06/26/13 12:52	13-08018-05		2.18E+00	7.55E-01	3.34E-01	2.23E+00	2.32E+00	2.40E+00
	11/05/13 09:47	13-11035-07		4.06E-01	5.73E-01	-2.40E-01	7.16E-01	-7.36E-02	2.52E+00
MW-204B	06/26/13 12:40	13-08018-04		2.08E+00	7.47E-01	-9.84E-01	2.16E+00	2.24E+00	2.49E+00
	06/26/13 12:40	13-08018-03	+D	2.06E+00	7.40E-01	9.26E-01	2.07E+00	4.33E-01	2.21E+00
	11/05/13 09:17	13-11035-06		2.03E-01	7.18E-01	1.93E+00	4.11E+00	8.68E-01	4.38E+00
EQUIPMENT-RINSE	11/05/13 13:57	13-11035-04		6.40E-01	5.79E-01	4.24E-01	2.18E+00	1.77E+00	2.20E+00
EQUIPMENT-RINSE	11/05/13 13:57	13-11035-03	+D	1.34E-01	4.64E-01	1.06E+00	2.15E+00	2.69E+00	2.58E+00
FIELD-BLANK	06/27/13 13:00	13-08018-14		2.01E+00	7.18E-01	-3.59E-01	2.20E+00	-8.00E-01	2.39E+00
FIELD-BLANK	11/05/13 14:10	13-11035-05		2.10E-01	5.05E-01	2.52E+00	2.97E+00	1.93E+00	2.89E+00

Notes:
1. Results are in units of pCi/L: picoCuries per liter
2. CSU: combined standard uncertainty
3. -D: field duplicate sample
4. +D: laboratory duplicate analysis

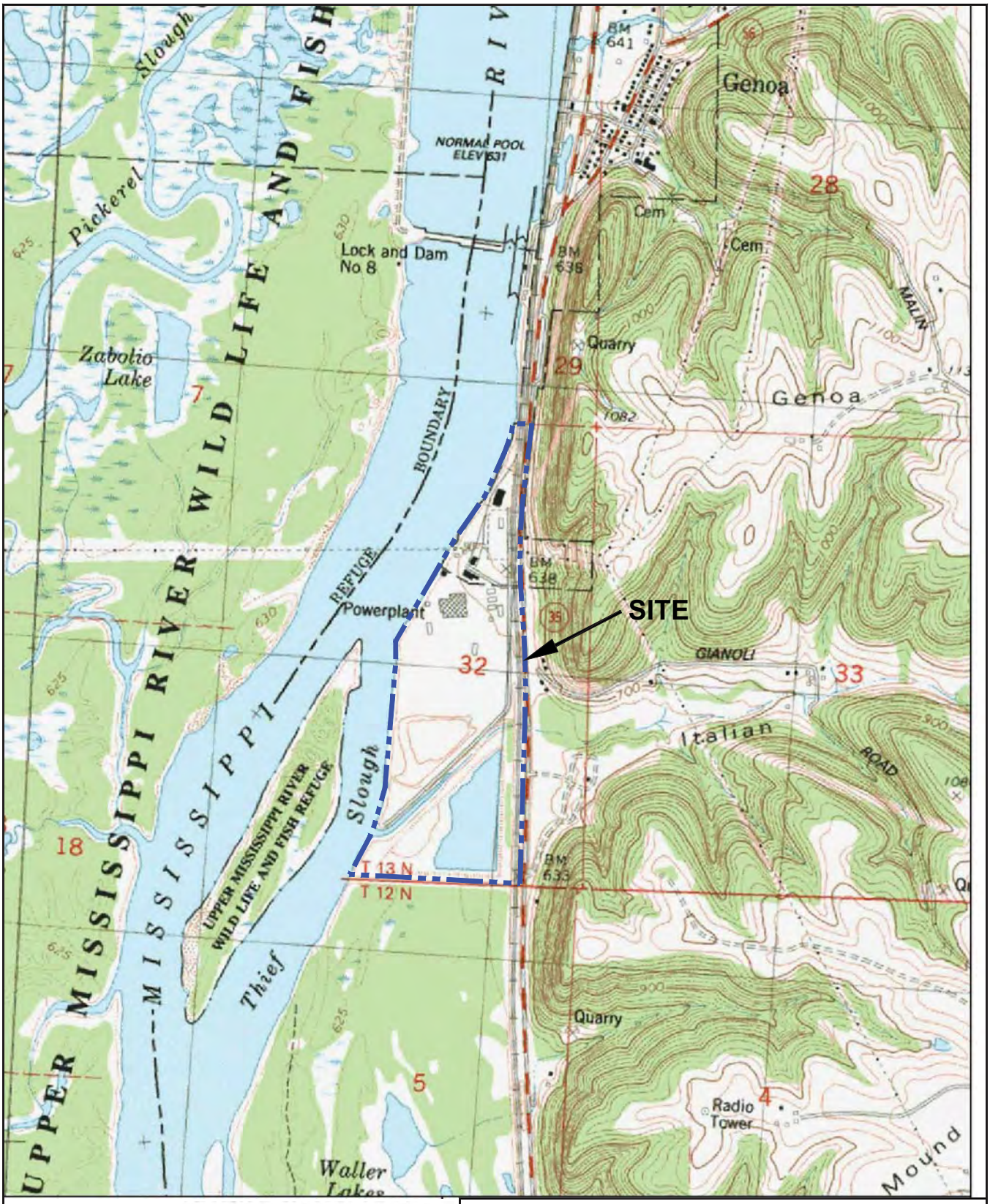
No analyitical data were collected from MW-200A/B as the location was installed for hydrogeological purposes only.

Table 8
Summary of On-Site Analysis of Tritium in Groundwater
Hydrogeological Investigation Report
LACBWR, Dairyland Power Cooperative
Genoa, Wisconsin

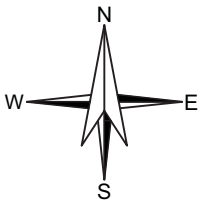
Sample ID:	Date	Tritium Result	Tritium Uncertainty	CPM/DPM
MW-200A	06/27/13	8.37E+02	±104	0.341
	11/05/13	1.50E+02	±96	0.351
MW-200B	06/27/13	6.16E+02	±101	0.341
	11/05/13	2.57E+02	±97	0.351
MW-201A	06/27/13	5.72E+02	±101	0.341
	11/05/13	2.35E+02	±97	0.351
MW-201B	06/27/13	5.06E+02	±101	0.341
	11/05/13	1.50E+02	±96	0.351
MW-202A	06/27/13	6.60E+02	±102	0.341
	11/05/13	2.57E+02	±97	0.351
MW-202B	06/27/13	4.84E+02	±100	0.341
	11/05/13	2.78E+02	±98	0.351
MW-203A	06/26/13	--	--	--
	11/05/13	4.49E+02	±100	0.351
MW-203B	06/26/13	4.20E+02	±100	0.341
	11/05/13	2.35E+02	±97	0.351
MW-204A	06/26/13	3.97E+02	±100	0.341
	11/05/13	1.93E+02	±97	0.351
MW-204B	06/26/13	4.20E+02	±100	0.341
	11/05/13	1.71E+02	±96	0.351

Notes:
1. Results are in units of pCi/L: picoCuries per liter
2. CPM/DPM: Countrate per minute / Disintegration per minute; counter efficiency
3. -- not reported

No analyiclal data were collected from MW-200A/B as this well pair was installed for hydrogeological purposes only.



SITE COORDINATES:43°33'34"N 91°13'52"W



U.S.G.S. QUADRANGLE: GENOA, WI

HALEY & ALDRICH

DAIRYLAND POWER COOPERATIVE
GENOA, WISCONSIN

SITE LOCUS

SCALE: 1:24000
AUGUST 2012

FIGURE 1

G:\38705-LACBWR\001\GIS\DATA\CAD\38705-001-0001-LOCUS.DWG

N
W E
S

0 40 80 120 160
APPROXIMATE SCALE IN FEET

HALEY & ALDRICH

DAIRYLAND POWER COOPERATIVE
GENOA, WISCONSIN

CURRENT SITE CONDITIONS AND AREAS OF INTEREST

SCALE: AS SHOWN
AUGUST 2012

FIGURE 2

G:\38705-LACBWR\001\GIS\DATA\CAD\38705-001-0003-SITE-CONDITIONS-AREA.DWG

LEGEND:

- MONITORING WELL IN SHALLOW AQUIFER
- MONITORING WELL IN DEEP AQUIFER
- MINOR ELEVATION CONTOUR LINE
- MAJOR ELEVATION CONTOUR LINE
- LIGHT POLE
- TRANSMISSION LINE STRUCTURE
- GUY/STUB POLE
- ANCHOR
- ELECTRIC PEDESTAL
- SECURITY CAMERA ON PEDESTAL
- MAN HOLE
- STORM INLET
- HYDRANT
- WATER VALVE
- CHAIN-LINK FENCE

NOTES:

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE
2. REFERENCE: " TOPOGRAPHIC/SITE SURVEY, DAIRYLAND POWER COOPERATIVE, LACBWR, GENOA, WISCONSIN"; DATE NOVEMBER 26, 2012; SCALE 1"=40' BY LAMPMAN & ASSOCIATES; E750 ROBERTS ROAD, DE SOTO, WI.

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S

0 60 120
SCALE IN FEET

HALEY & ALDRICH

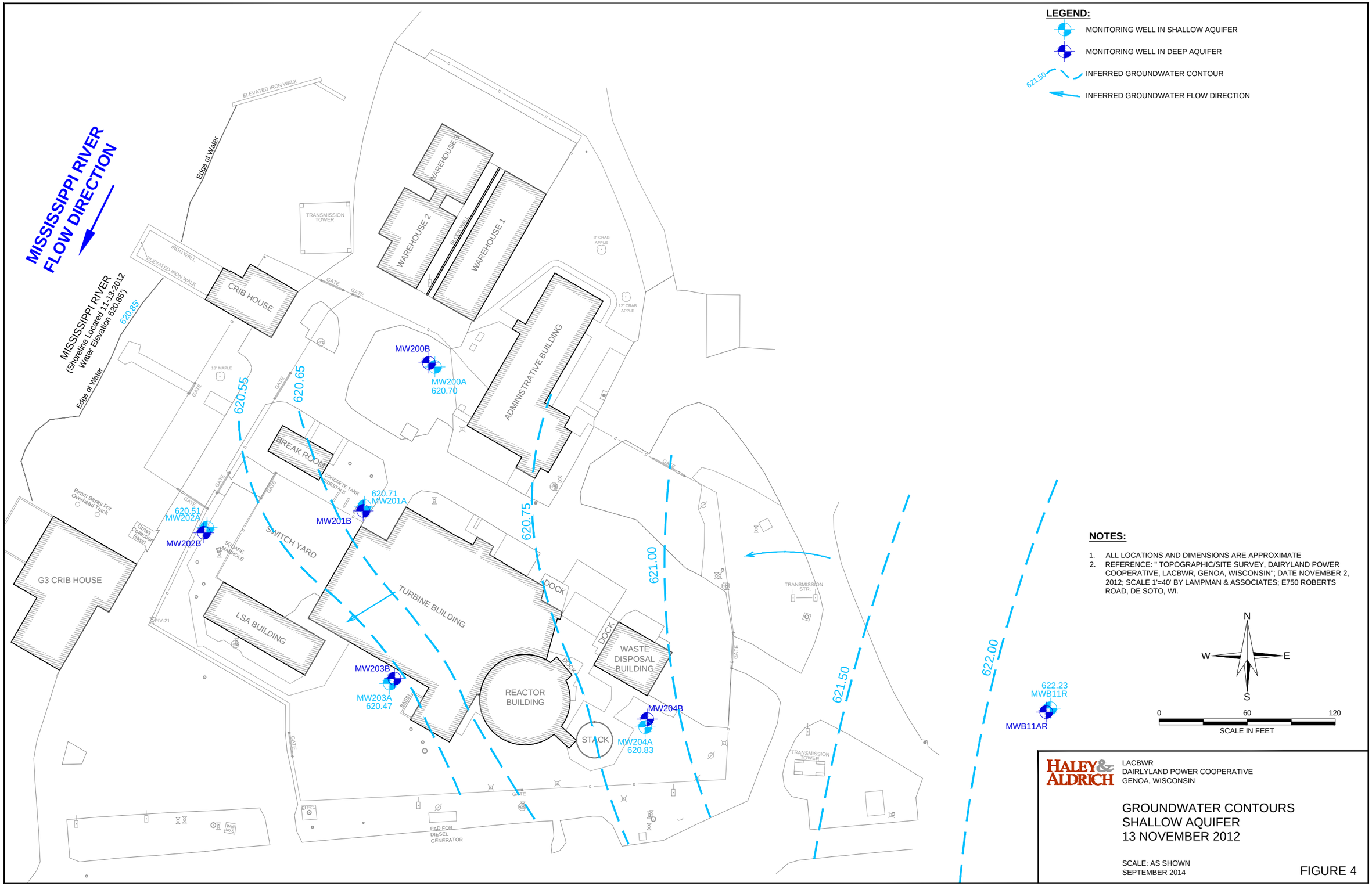
LACBWR
DAIRYLAND POWER COOPERATIVE
GENOA, WISCONSIN

SITE TOPOGRAPHIC MAP

SCALE: AS SHOWN
DECEMBER 2013

FIGURE 3

G:\38705-LACBWR\001\CAD\DRAWINGS\2013-12\38705-008-0003-SITEPLAN.DWG



NOTES:

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE
2. REFERENCE: " TOPOGRAPHIC/SITE SURVEY, DAIRYLAND POWER COOPERATIVE, LACBWR, GENOA, WISCONSIN"; DATE NOVEMBER 2, 2012; SCALE 1'=40' BY LAMPMAN & ASSOCIATES; E750 ROBERTS ROAD, DE SOTO, WI.

HALEY & ALDRICH

LACBWR
DAIRLYLAND POWER COOPERATIVE
GENOA, WISCONSIN

GROUNDWATER CONTOURS
SHALLOW AQUIFER
13 NOVEMBER 2012

SCALE: AS SHOWN
SEPTEMBER 2014

FIGURE 4

G:\38705-LACBWR\0011\CAD\DRAWINGS\2014-09\38705-008-0004-SHALLOWGW.DWG

LEGEND:

- MONITORING WELL IN SHALLOW AQUIFER
- MONITORING WELL IN DEEP AQUIFER
- 620.50 INFERRED GROUNDWATER CONTOUR
- INFERRED GROUNDWATER FLOW DIRECTION

NOTES:

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE
2. REFERENCE: " TOPOGRAPHIC/SITE SURVEY, DAIRYLAND POWER COOPERATIVE, LACBWR, GENOA, WISCONSIN"; DATE NOVEMBER 2, 2012; SCALE 1'=40' BY LAMPMAN & ASSOCIATES; E750 ROBERTS ROAD, DE SOTO, WI.

N
W E
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0 60 120
SCALE IN FEET

HALEY & ALDRICH

LACBWR
DAIRLYLAND POWER COOPERATIVE
GENOA, WISCONSIN

GROUNDWATER CONTOURS
DEEP AQUIFER
13 NOVEMBER 2012

SCALE: AS SHOWN
SEPTEMBER 2014

FIGURE 5

G:\38705-LACBWR\001\CAD\DRAWINGS\2014-09\38705-008-0005-DEEPGW.DWG

LEGEND:

- MONITORING WELL IN SHALLOW AQUIFER
- MONITORING WELL IN DEEP AQUIFER
- 629.50 INFERRED GROUNDWATER CONTOUR
- INFERRED GROUNDWATER FLOW DIRECTION

NOTES:

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE
2. REFERENCE: " TOPOGRAPHIC/SITE SURVEY, DAIRYLAND POWER COOPERATIVE, LACBWR, GENOA, WISCONSIN"; DATE NOVEMBER 2, 2012; SCALE 1'=40' BY LAMPMAN & ASSOCIATES; E750 ROBERTS ROAD, DE SOTO, WI.

N
W E
S

0 60 120
SCALE IN FEET

HALEY & ALDRICH

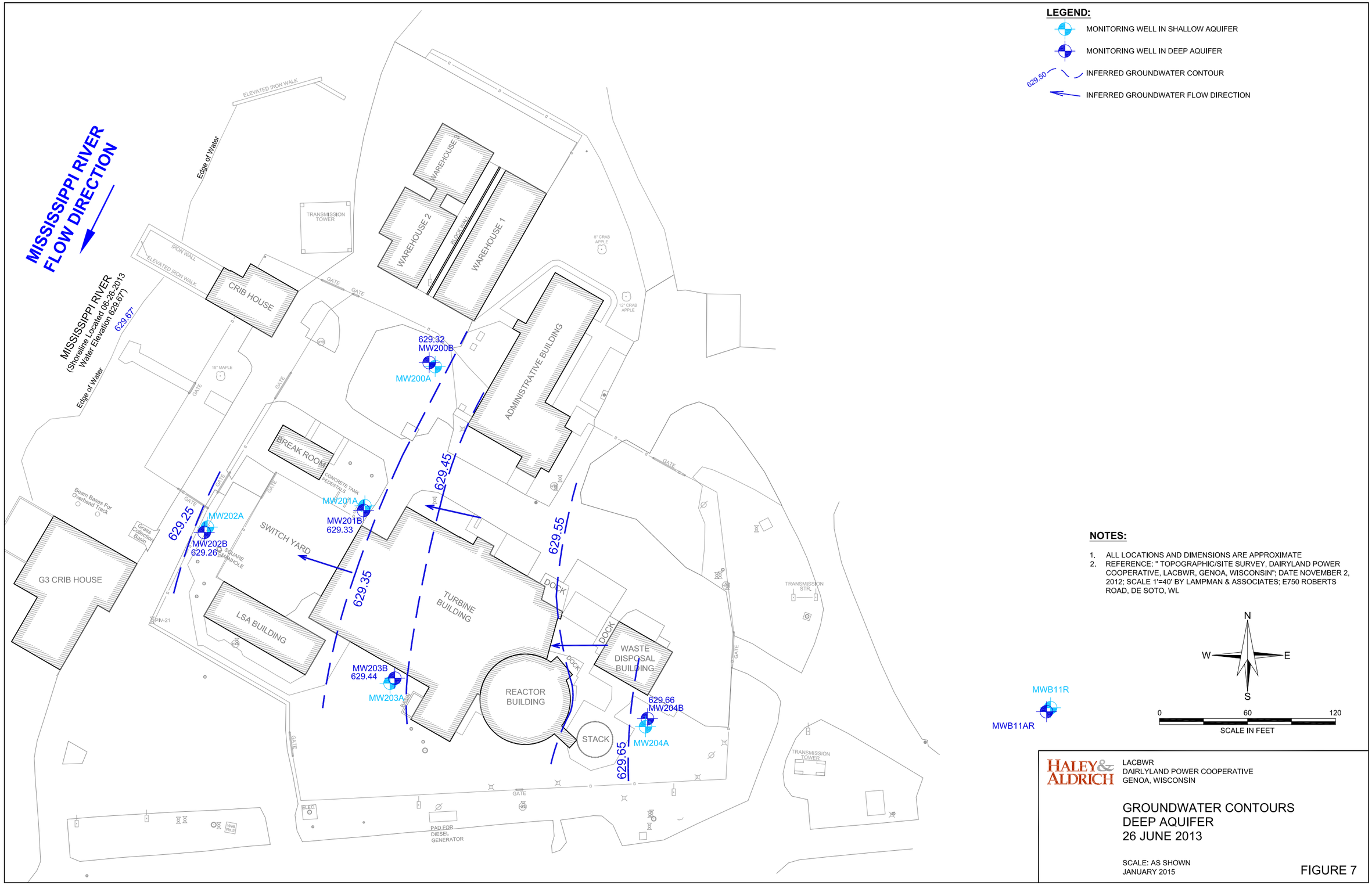
LACBWR
DAIRLYLAND POWER COOPERATIVE
GENOA, WISCONSIN

GROUNDWATER CONTOURS
SHALLOW AQUIFER
26 JUNE 2013

SCALE: AS SHOWN
JANUARY 2015

FIGURE 6

G:\38705-LACBWR\001\CAD\DRAWINGS\2015-01\38705-008-0006-SHALLOWGW-2013.DWG



NOTES:

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE
2. REFERENCE: " TOPOGRAPHIC/SITE SURVEY, DAIRYLAND POWER COOPERATIVE, LACBWR, GENOA, WISCONSIN"; DATE NOVEMBER 2, 2012; SCALE 1'=40' BY LAMPMAN & ASSOCIATES; E750 ROBERTS ROAD, DE SOTO, WI.

HALEY & ALDRICH

LACBWR
DAIRLYLAND POWER COOPERATIVE
GENOA, WISCONSIN

GROUNDWATER CONTOURS
DEEP AQUIFER
26 JUNE 2013

SCALE: AS SHOWN
JANUARY 2015

FIGURE 7

G:\38705-LACBWR\001\CAD\DRAWINGS\2014-09\38705-008-0007-DEEPGW-2013.DWG

APPENDIX A

Topographic Survey

TOPOGRAPHIC/SITE SURVEY

Dairyland Power Cooperative
LACBWR
Genoa, Wisconsin

This site survey prepared in conjunction with a horizontal and vertical survey of new monitoring well locations. The tabular results of the monitoring well survey are in included herein (lower left). Details regarding survey datum and benchmarks are included with said tabular results.

LEGEND
- Monitoring Well
- Spot Elevation
- Light Pole
- Transmission Line Structure
- Guy/Stub Pole
- Anchor
- Electric Pedestal
- Security Camera on Pedestal
- Man Hole
- Storm Inlet
- Hydrant
- Water Valve
- Chain-link Fence
- Bituminous Surface
- Gravel Surface
- Concrete Surface or Concrete Pad

Pnt_ID	Survey_Pnt_No	Description	Grid_North	Grid_East	Elev	Ground_North	Ground_East
MW200A	1625	Monitoring Well 200A	571192.59	1642062.37	641.70	571192.68	1642062.35
GRND200A	1624	Ground Adjacent 200A			639.29		
MW200B	1627	Monitoring Well 200B	571195.30	1642058.27	641.94	571195.39	1642058.24
GRND200B	1626	Ground Adjacent 200B			639.56		
MW201A	1621	Monitoring Well 201A	571097.63	1642014.44	640.69	571097.72	1642014.41
GRND201A	1620	Ground Adjacent 201A			638.63		
MW201B	1623	Monitoring Well 201B	571094.46	1642013.53	640.36	571094.55	1642013.50
GRND201B	1622	Ground Adjacent 201B			638.48		
MW202A	1191	Monitoring Well 202A	571079.50	1641904.94	641.19	571079.58	1641904.90
GRND202A	1266	Ground Adjacent 202A			638.94		
MW202B	1192	Monitoring Well 202B	571083.12	1641907.10	641.14	571083.21	1641907.06
GRND202B	1268	Ground Adjacent 202B			638.74		
MW203A	1390	Monitoring Well 203A	570976.74	1642031.59	641.15	570976.81	1642031.56
GRND203A	1391	Ground Adjacent 203A			638.89		
MW203B	1392	Monitoring Well 203B	570980.12	1642034.82	641.28	570980.20	1642034.79
GRND203B	1393	Ground Adjacent 203B			638.99		
MW204A	1431	Monitoring Well 204A	570947.05	1642205.67	640.86	570947.12	1642205.66
GRND204A	1432	Ground Adjacent 204A			638.71		
MW204B	1433	Monitoring Well 204B	570952.57	1642207.05	640.73	570952.64	1642207.04
GRND204B	1434	Ground Adjacent 204B			638.62		
MWB11AR	401	Monitoring Well B11AR	570957.30	1642479.01	641.27	570957.37	1642479.02
GRNDB11AR	402	Ground Adjacent B11AR			639.13		
MWB11R	403	Monitoring Well B11R	570959.99	1642481.77	640.76	570960.06	1642481.78
GRNDB11R	404	Ground Adjacent B11R			638.96		
BM9A	5	Permanent DPC BM 9A	570822.57	1642287.79	639.73	570822.63	1642287.78

LACBWR Groundwater Monitoring Well Survey Data

Notes:

Horizontal coordinates (Grid) are Wisconsin State Plane Coordinate System (South Zone) and referenced to NAD83(1991) in survey feet. Horizontal survey tied to Wisconsin Department of Transportation survey control station 9000 (STH35). Said station being an aluminum monument marked with signage. Coordinate information for said station being from year 2000. Lampman & Associates has previously verified the published coordinate information for this station by using OPUS observations. Geodetic coordinates for said station published as follows: 43˚34'09.03409"N 91˚13'44.55107"W NAD83(1991).

Elevations are referenced to NAVD88(1991) and reported in feet. Elevations derived from NGS Bench Mark Disk designation S123 and PID ON0214.

Project Bench Mark being existing Dairyland Power Cooperative BM 9A. Coordinates and elevation for said Bench Mark are included above. The Bench Mark is an existing brass cap in concrete located near the southeast corner of this project area, surrounded by concrete guard posts and identified with signage.

Ground coordinates were calculated utilizing a project combination factor of 0.99991052. Said combination factor being the same as that utilized on adjacent survey projects for Dairyland Power Cooperative. Ground coordinates determined for the purpose of preparing an AutoCAD site map reflecting ground distances and matching with adjacent survey information. Ground coordinates were determined by applying the inverse of the combination factor (scaling at 1.00008948). Base point for application of combination factor being Dairyland Power Cooperative BM 10A at Grid Coordinate N=570138.27' E=1642349.05'. Said BM 10A being an existing brass cap in concrete, surrounded by guard posts, marked with signage and located along a curve in the roadway westerly of the DPC Genoa-3 truck scales.

SCALE: 1" = 40'
0 10 20 40 60 80

Surveyor's Certificate:
I, Jessica A. Sandry, Registered Land Surveyor, do hereby certify that this topographic survey was prepared by the order of Laura A. Davis of Haley & Aldrich, Inc.. I further certify that the within drawing is a true and correct representation of the features located to the best of my knowledge and belief.

Jessica A. Sandry R.L.S. S-2310

Date

Location: Located in part of Section 32, T13N, R7W, Town of Genoa, Vernon County, Wisconsin.

Prepared For: Haley & Aldrich, Inc.
600 South Meyer Avenue, Suite 100
Tucson, AZ 85701-2554
By the Order of: Laura A. Davis, Senior Hydrogeologist

File No.: 38705-007
Client.: Dairyland Power Cooperative

Prepared By: Lampman & Associates
E750 Roberts Road
De Soto, WI 54624
Phone: (608)648-2288

File No.: 38 G-3a	Drafted By: J.A.S.	Sheet No.: 1 of 1
Date: November 26, 2012	Scale: 1" = 40'	Project No.: 1440-1106-12

APPENDIX B

Soil Boring Logs

HALEY & ALDRICH

TEST BORING REPORT

Boring No. SB-200A/B

Project Hydrogeologic Investigation, La Crosse Boiling Water Reactor (LACBWR)
Client Dairyland Power Cooperative
Contractor Onsite Environmental

File No. 38705-007
Sheet No. 1 of 2
Start November 6, 2012
Finish November 6, 2012
Driller A. Kapugi
H&A Rep. S. Collinge
Elevation Datum 639.4(1)
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	N/A	N/A	N/A	Rig Make & Model: GeoProbe
Inside Diameter (in.)	--	--	--	Bit Type:
Hammer Weight (lb)	--	--	--	Drill Mud: None
Hammer Fall (in.)	--	--	--	Casing: --
				Hoist/Hammer: -- --
				PID Make & Model: N/A

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0					1.0	GP	Yellowish-brown, poorly graded GRAVEL with fine to medium sand, gravels subangular, fine up to 0.5 in., no odor or staining, moist		55		30	15	-	N	N	N	N
						SP	Yellowish-brown, poorly graded fine to medium SAND, no odor or staining				30	70	<5	N	N	N	N
5																	
10							Similar to above										
15																	
							Note: Wet at 18.5 ft.										
20		SB-200-20 1045	20.0				Similar to above, color change to grayish-brown, pieces of coal										
25																	

Water Level Data					
Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (ft) 55
Rock Cored (ft) 0
Samples 2

Boring No. SB-200A/B

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None **Toughness**: L - Low M - Medium H - High **Plasticity**: N - Nonplastic L - Low M - Medium H - High **Dry Strength**: N - None L - Low M - Medium H - High V - Very High

***Note: Maximum particle size is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

H&A-TEST BORING-07-1 38705-007_HA-LIB07-1R_SAN_12-07-12.GLB HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\38705 - LACBWR\GLOBAL\GINT\38705-007_MW200_MW205.GPJ Dec 7, 12

HALEY & ALDRICH

TEST BORING REPORT

Boring No. SB-200A/B

File No. 38705-007
Sheet No. 2 of 2

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
25					25.0	ML/CL	Soft, dark gray, SILT/lean CLAY (ML/CL), silt non-plastic, clay low plastic, no odor or staining, moist to wet						100	L	N/L	N/L	N/L
					27.0	SP	Dark gray, poorly graded fine to medium SAND, no odor or staining, saturated										
30																	
35																	
40							Similar to above										
45																	
50		SB-200-50 1100	50.0				Similar to above										
55					55.0		Bottom of Exploration at 55.0 ft										

Notes:
Monitoring well MW-200A was drilled and set in an adjacent hole approximately 5 ft west of MW-200B. No samples were taken from MW-200A. See Observation Well Logs MW-200A and MW-200B for well details.

(1)Ground Elevation Datum is a calculated average elevation from measurements at collected MW-200A and MW-200B.

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. SB-200A/B

HALEY & ALDRICH

TEST BORING REPORT

Boring No. SB-201A/B

Project Hydrogeologic Investigation, La Crosse Boiling Water Reactor (LACBWR)
Client Dairyland Power Cooperative
Contractor Onsite Environmental

File No. 38705-007
Sheet No. 1 of 2
Start November 7, 2012
Finish November 7, 2012
Driller A. Kapugi
H&A Rep. S. Collinge
Elevation Datum 638.5(1)
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	N/A	N/A	N/A	Rig Make & Model: GeoProbe
Inside Diameter (in.)	--	--	--	Bit Type:
Hammer Weight (lb)	--	--	--	Drill Mud: None
Hammer Fall (in.)	--	--	--	Casing: --
				Hoist/Hammer: -- --
				PID Make & Model: N/A

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0						SM	Dark brown, fine silty SAND, non plastic, organics-roots and grass, moist		55			70	30	R	N	N	N
					1.0	SP	Yellowish-brown, poorly graded fine to medium SAND, no odor or staining				20	80	<5	L	N	N	N
5																	
10							Similar to above										
15																	
							Note: Wet to saturated at 18.5 ft.										
20		SB-201-20 0820	20.0				Similar to above										
					23.0	CL	Dark gray, lean CLAY, low to medium plastic, no odor or staining, moist						100	N	L/M	L/M	L/M
					24.4			-	-	-	-	30	70	R	N	N	N
25																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (ft) 55
Rock Cored (ft) 0
Samples 2

Boring No. SB-201A/B

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None **Toughness**: L - Low M - Medium H - High **Plasticity**: N - Nonplastic L - Low M - Medium H - High **Dry Strength**: N - None L - Low M - Medium H - High V - Very High

***Note: Maximum particle size is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

H&A-TEST BORING-07-1 38705-007_HA-LIB07-1R_SAN_12-07-12.GLB HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\38705 - LACBWR\GLOBAL\GINT\38705-007_MW200_MW205.GPJ Dec 7, 12

HALEY & ALDRICH

TEST BORING REPORT

Boring No. SB-201A/B

File No. 38705-007
Sheet No. 2 of 2

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
25					24.8	ML	Dark gray, fine sandy SILT, non plastic, no odor or staining, saturated										
						SP	Dark gray, poorly graded fine to medium SAND, no odor or staining, saturated				20	80	<5	N	N	N	N
30							Similar to above										
35																	
40							At 41.0 ft, sands fine to medium, mostly medium grained				60	40	<5	N	N	N	N
45																	
50		SB-201-50 0845	50.0				Similar to above, color change to light gray										
55					55.0		Bottom of Exploration at 55.0 ft										

Notes:
Monitoring well MW-201A was drilled and set in an adjacent hole approximately 5 ft west of MW-201B. No samples were taken from MW-201A. See Observation Well Logs MW-201A and MW-201B for well details.

(1)Ground Elevation Datum is a calculated average elevation from measurements at collected MW-201A and MW-201B.

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

H&A-TEST BORING-07-1 38705-007_HA-LIB07-1R_SAN_12-07-12.GLB HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\38705 - LACBWR\GLOBAL\GINT\38705-007_MW200_MW205.GPJ Dec 7, 12

HALEY & ALDRICH

TEST BORING REPORT

Boring No. SB-202A/B

Project Hydrogeologic Investigation, La Crosse Boiling Water Reactor (LACBWR)
Client Dairyland Power Cooperative
Contractor Onsite Environmental

File No. 38705-007
Sheet No. 1 of 2
Start November 8, 2012
Finish November 8, 2012
Driller A. Kapugi
H&A Rep. S. Collinge
Elevation Datum 638.8(1)
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	N/A	N/A	N/A	Rig Make & Model: GeoProbe
Inside Diameter (in.)	--	--	--	Bit Type:
Hammer Weight (lb)	--	--	--	Drill Mud: None
Hammer Fall (in.)	--	--	--	Casing: --
				Hoist/Hammer: -- --
				PID Make & Model: N/A

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0					0.3	SM	Medium brown, fine silty SAND, non plastic, no odor or staining, moist					20	30	L	N	N	N
						SP	Yellowish-brown, poorly graded fine to medium SAND, no odor or staining, moist				30	70	<5	L	N	N	N
5																	
10							Similar to above										
15																	
							Similar to above Note: Wet to saturated froom 17.5 to 18 ft.										
20		SB-202-20 1405	20.0				Similar to above										
25																	

Water Level Data					
Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (ft) 55
Rock Cored (ft) 0
Samples 2

Boring No. SB-202A/B

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None **Plasticity**: N - Nonplastic L - Low M - Medium H - High
Toughness: L - Low M - Medium H - High **Dry Strength**: N - None L - Low M - Medium H - High V - Very High

***Note: Maximum particle size is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

H&A-TEST BORING-07-1 38705-007_HA-LIB07-1R_SAN_12-07-12.GLB HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\38705 - LACBWR\GLOBAL\GINT\38705-007_MW200_MW205.GPJ Dec 7, 12

HALEY & ALDRICH

TEST BORING REPORT

Boring No. SB-202A/B

File No. 38705-007
Sheet No. 2 of 2

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
25						SW	Similar to above, color change to dark gray, sands fine to coarse, mostly medium to coarse grained										
30					30.0	SP	Dark gray, poorly graded fine to medium SAND, no odor or staining, saturated										
35																	
40							Similar to above At 41.0 ft, sands fine to coarse, mostly medium to coarse At 43.0 ft, sands fine to medium										
45					45.0	SP	Grayish-brown, poorly graded fine SAND, no odor or staining, saturated					100		N	N	N	N
					46.0	--	Dark brown, piece of wood										
					46.9	SP	Light grayish-brown, poorly graded fine to medium SAND (mostly fine grained), no odor or staining, saturated				20	80	<5	L	N	N	N
50		SB-202-50 1450	50.0														
					53.0	CL-ML	Greenish-blue, lean CLAY, low to medium plastic, no odors or staining, moist						100	N	L/ML	ML/M	L/M
55					55.0		Bottom of Exploration at 55.0 ft										

Notes:
Monitoring well MW-202A was drilled and set in an adjacent hole approximately 5 ft west of MW-202B. No samples were taken from MW-202A. See Observation Well Logs MW-202A and MW-202B for well details.

(1)Ground Elevation Datum is a calculated average elevation from measurements at collected MW-202A and MW-202B.

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

H&A-TEST BORING-07-1 38705-007_HA-LIB07-1R_SAN_12-07-12.GLB HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\38705 - LACBWR\GLOBAL\GINT\38705-007_MW200_MW205.GPJ Dec 7, 12

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TEST BORING REPORT

Boring No. SB-203A/B

Project Hydrogeologic Investigation, La Crosse Boiling Water Reactor (LACBWR)
Client Dairyland Power Cooperative
Contractor Onsite Environmental

File No. 38705-007
Sheet No. 1 of 2
Start November 8, 2012
Finish November 8, 2012
Driller A. Kapugi
H&A Rep. S. Collinge
Elevation Datum 638.9(1)
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	N/A	N/A	N/A	Rig Make & Model: GeoProbe
Inside Diameter (in.)	--	--	--	Bit Type:
Hammer Weight (lb)	--	--	--	Drill Mud: None
Hammer Fall (in.)	--	--	--	Casing: --
				Hoist/Hammer: -- --
				PID Make & Model: N/A

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0					0.3	SP	Medium brown, silty fine to medium SAND, no odor or staining, moist				10	70	20	R	N	N	N
						SP	Yellowish-brown, poorly graded fine to medium SAND, no odors or staining, moist				20	80	<5	N	N	N	N
5																	
10							Similar to above										
15																	
							Note: Wet between 18.0 and 18.5 ft.										
20		SB-203-20 1130	20.0				At 21.0 ft, similar to above, color change to dark grayish-brown										
					21.8	ML/CL	Dark gray, SILT/lean CLAY, silt non plastic, clay low plastic, no odor or staining, moist						100	N	N/L	N/L	N/L
25																	

Water Level Data					
Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (ft) 55
Rock Cored (ft) 0
Samples 2

Boring No. SB-203A/B

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None **Toughness**: L - Low M - Medium H - High **Plasticity**: N - Nonplastic L - Low M - Medium H - High **Dry Strength**: N - None L - Low M - Medium H - High V - Very High

***Note: Maximum particle size is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

H&A-TEST BORING-07-1 38705-007_HA-LIB07-1R_SAN_12-07-12.GLB HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\38705 - LACBWR\GLOBAL\GINT\38705-007_MW200_MW205.GPJ Dec 7, 12

HALEY & ALDRICH

TEST BORING REPORT

Boring No. SB-203A/B

File No. 38705-007
Sheet No. 2 of 2

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
25																	
					26.0	ML	Dark gray, SILT, non plastic, no odor or staining, moist to wet						100	R	N	N	N
					27.0	SP	Dark gray, poorly graded fine to medium SAND, no odor or staining, saturated				30	70		N	N	N	N
30																	
35							Similar to above										
40							Similar to above										
45																	
					47.5	SP	Grayish-brown, poorly graded fine to coarse SAND (mostly medium grained), no odor or staining, saturated			20	50	30	<5	N	N	N	N
50		SB-203-50 1205	50.0														
55					55.0		Bottom of Exploration at 55.0 ft										

Notes:
Monitoring well MW-203A was drilled and set in an adjacent hole approximately 5 ft west of MW-203B. No samples were taken from MW-203A. See Observation Well Logs MW-203A and MW-203B for well details.

(1)Ground Elevation Datum is a calculated average elevation from measurements at collected MW-203A and MW-203B.

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

H&A-TEST BORING-07-1 38705-007_HA-LIB07-1R_SAN_12-07-12.GLB HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\38705 - LACBWR\GLOBAL\GINT\38705-007_MW200_MW205.GPJ Dec 7, 12

HALEY & ALDRICH

TEST BORING REPORT

Boring No. SB-204A/B

Project Hydrogeologic Investigation, La Crosse Boiling Water Reactor (LACBWR)
Client Dairyland Power Cooperative
Contractor Onsite Environmental

File No. 38705-007
Sheet No. 1 of 2
Start November 6, 2012
Finish November 6, 2012
Driller A. Kapugi
H&A Rep. S. Collinge
Elevation Datum 638.7(1)
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	N/A	N/A	N/A	Rig Make & Model: GeoProbe
Inside Diameter (in.)	--	--	--	Bit Type:
Hammer Weight (lb)	--	--	--	Drill Mud: None
Hammer Fall (in.)	--	--	--	Casing: --
				Hoist/Hammer: -- --
				PID Make & Model: N/A

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0					0.4	SP	Medium brown, fine silty SAND, non plastic, no odor or staining, moist					70	30	R	N	N	N
					0.6	GP	Yellowish-brown, broken gravels	-	-	-	30	70	<5	L	N	N	N
					0.9	SM	Dark brown, fine silty SAND, non plastic, no odor or staining, moist										
						SP	Yellowish-brown, poorly graded fine to medium SAND (mostly fine grained), no odor or staining, moist										
5																	
10																	
					14.0	--	Concrete, bricks				10	90	<5	L	N	N	N
15					14.2	SP	Dark yellowish-brown, poorly graded fine SAND, no odor or staining, moist										
							Note: Wet to saturated bewteen 18.0 and 18.5 ft.										
20		SB-204-20 1225	20.0				Similar to above, pieces of wood debris										
					23.0	ML/SP	Dark gray, fine silty SAND/sandy SILT, non-plastic, no odor or staining, satuated					50	50				
					23.5	SP	Dark gray, poorly graded fine to coarse SAND (mostly fine to medium										
25																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (ft)	55
Rock Cored (ft)	0
Samples	2

Boring No. SB-204A/B

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None **Toughness**: L - Low M - Medium H - High **Plasticity**: N - Nonplastic L - Low M - Medium H - High **Dry Strength**: N - None L - Low M - Medium H - High V - Very High

***Note: Maximum particle size is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

H&A-TEST BORING-07-1 38705-007_HA-LIB07-1R_SAN_12-07-12.GLB HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\38705 - LACBWR\GLOBAL\GINT\38705-007_MW200_MW205.GPJ Dec 7, 12

HALEY & ALDRICH

TEST BORING REPORT

Boring No. SB-204A/B

File No. 38705-007
Sheet No. 2 of 2

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
25							grained), no odor or staining, saturated										
30																	
35					35.5	SW	Yellowish-brown, well graded fine SAND, no odor or staining, saturated					100	-	N	N	N	N
					37.0	SP	Dark gray, poorly graded fine to medium SAND, contains organic material (roots), saturated				30	70	<5	L	N	N	N
40																	
45							Similar to above										
50		SB-204-50 1330	50.0		50.0	SP	Medium brown, poorly graded fine to coarse SAND (mostly fine to medium grained), no odor or staining, saturated			15	30	55	<5	L	N	N	N
55					55.0		Bottom of Exploration at 55.0 ft										

Notes:
Monitoring well MW-204A was drilled and set in an adjacent hole approximately 5 ft west of MW-204B. No samples were taken from MW-204A. See Observation Well Logs MW-204A and MW-204B for well details.

(1)Ground Elevation Datum is a calculated average elevation from measurements at collected MW-204A and MW-204B.

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

H&A-TEST BORING-07-1 38705-007_HA-LIB07-1R_SAN_12-07-12.GLB HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\38705 - LACBWR\GLOBAL\GINT\38705-007_MW200_MW205.GPJ Dec 7, 12

APPENDIX C

Well Construction Logs

HALEY & ALDRICH

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

Well No. MW-200A
Boring No. SB-200A/B

Project: Hydrogeologic Investigation
Location: La Crosse Boiling Water Reactor (LACBWR)
Client: Dairyland Power Cooperative
Contractor: Onsite Environmental
Driller: A. Kapugi

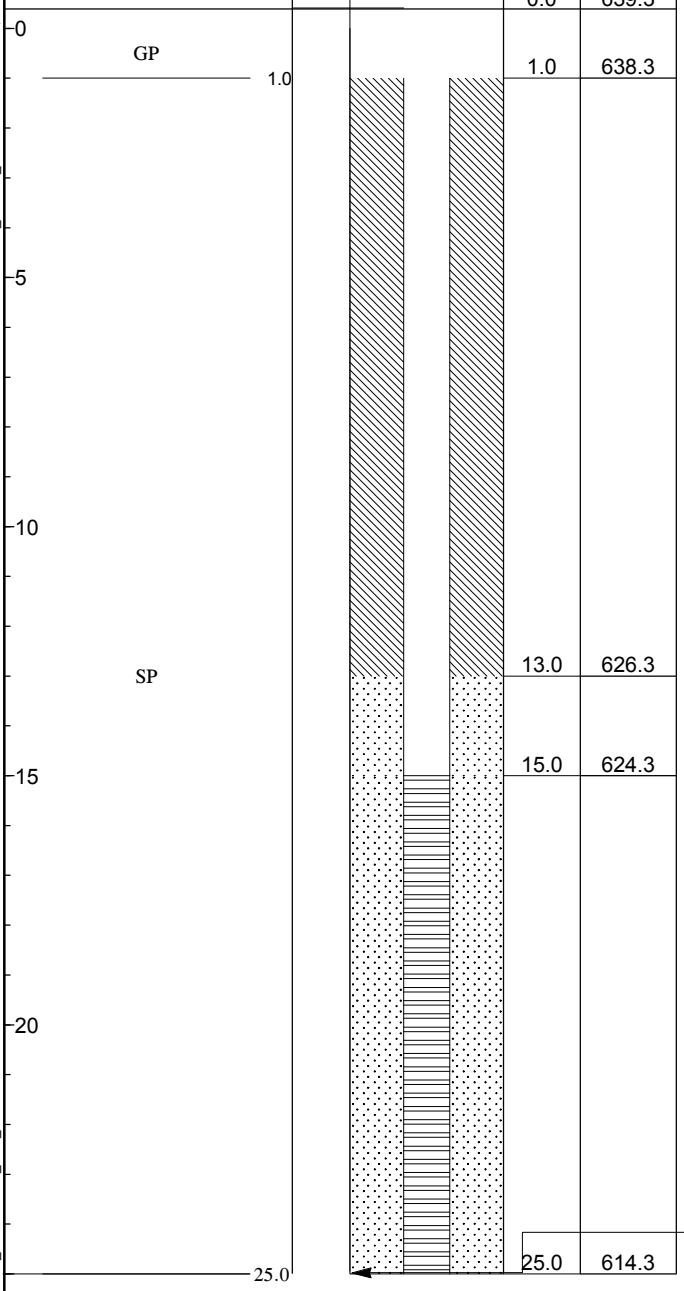
Initial Water Level (depth TOC): 20.95 ft

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No. 38705-007
Date Installed: 06 Nov 2012
H&A Rep.: S. Collinge
Location: See Plan

Ground El.: 639.29
Datum: 641.70

SOIL/ROCK CONDITIONS	DEPTH (ft.)	GRAPHIC	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)
				0.0	639.3
GP	1.0			1.0	638.3
SP				13.0	626.3
				15.0	624.3
	25.0			25.0	614.3



WELL CONSTRUCTION DETAILS

Type of protective cover: Guard Pipe
Depth of Metal below ground surface: 0.00 ft
Depth of top of riser below ground surface: N/A

Type of protective casing: Metal
- Length: 2.5 ft
- Inside diameter: 4.0 in.
- Depth of bottom of Metal: 2.5 ft

Type of riser pipe: Schedule 40 PVC
- Inside diameter of riser pipe: 2.0 in.
- Depth of bottom of riser pipe: 15.0 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Bentonite	1.0 ft	12.0 ft
Filter Sand	13.0 ft	12.0 ft
	-	-
	-	-

Diameter of borehole: 8.5 in.

Type of screen: Machine slotted Sch 40 PVC
- Screen gauge or size of openings: 0.010 in.
- Diameter of screen: 2.0 in.
- Depth to top of well screen: 15.0 ft
- Depth to bottom of well screen: 25.0 ft

Bottom of silt trap: N/A
Depth of bottom of borehole: 25.0 ft

COMMENTS:

38705-007_HA-LIB07-1R_SAN_12-07-12.GLB GW INSTALLATION REPORT-07-1 HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\38705 - LACBWR\GLOBAL\GINT\38705-007_MW200_MW205.GPJ Dec 7, 12

HALEY & ALDRICH

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

Well No. MW-200B
Boring No. SB-200A/B

Project: Hydrogeologic Investigation
Location: La Crosse Boiling Water Reactor (LACBWR)
Client: Dairyland Power Cooperative
Contractor: Onsite Environmental
Driller: A. Kapugi

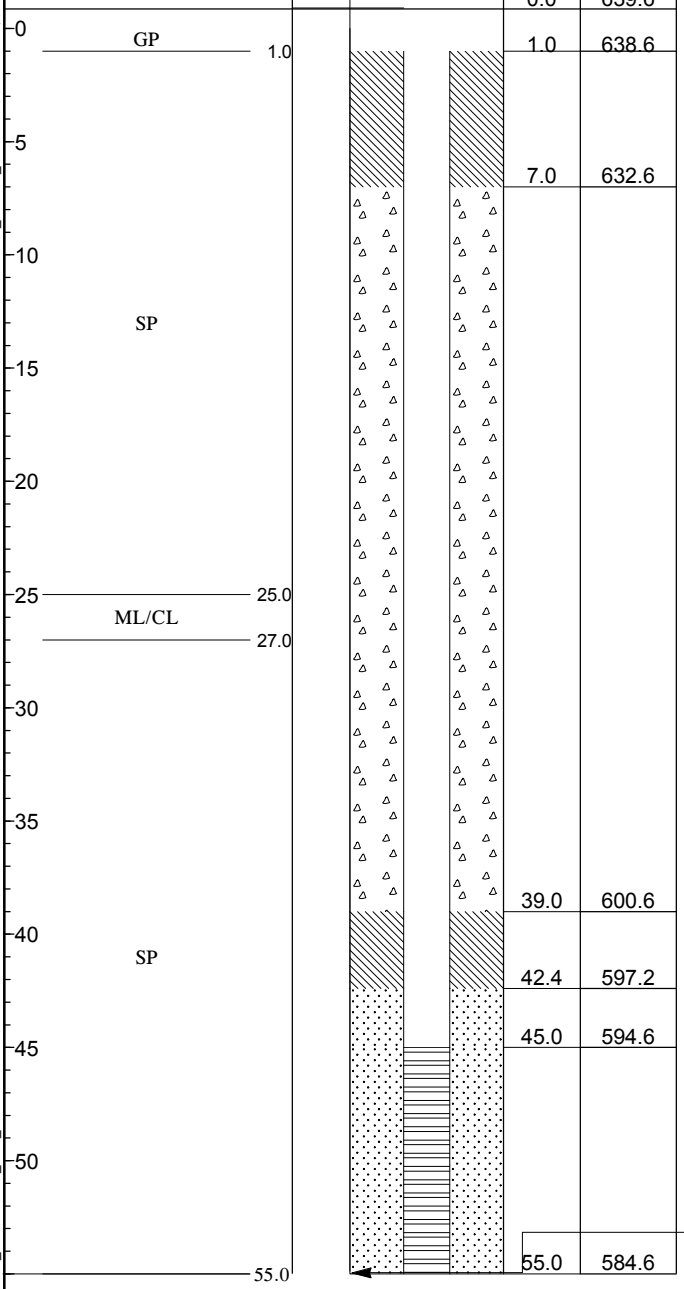
Initial Water Level (depth TOC): 21.30 ft

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No. 38705-007
Date Installed 06 Nov 2012
H&A Rep. S. Collinge
Location See Plan

Ground El. 639.56
Datum 641.94

SOIL/ROCK CONDITIONS	DEPTH (ft.)	GRAPHIC	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)
				0.0	639.6
GP	1.0			1.0	638.6
SP				7.0	632.6
ML/CL	25.0				
	27.0				
SP				39.0	600.6
				42.4	597.2
				45.0	594.6
	55.0			55.0	584.6



WELL CONSTRUCTION DETAILS

Type of protective cover: Guard Pipe

Depth of Metal below ground surface: 0.00 ft

Depth of top of riser below ground surface: N/A

Type of protective casing: Metal

Length: 2.5 ft

Inside diameter: 4.0 in.

Depth of bottom of Metal: 2.5 ft

Type of riser pipe: Schedule 40 PVC

Inside diameter of riser pipe: 2.0 in.

Depth of bottom of riser pipe: 45.0 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Bentonite	1.0 ft	6.0 ft
Concrete	7.0 ft	32.0 ft
Bentonite	42.4 ft	12.6 ft
Filter Sand	42.4 ft	12.6 ft

Diameter of borehole: 8.5 in.

Type of screen: Machine slotted Sch 40 PVC

Screen gauge or size of openings: 0.010 in.

Diameter of screen: 2.0 in.

Depth to top of well screen: 45.0 ft

Depth to bottom of well screen: 55.0 ft

Bottom of silt trap: N/A

Depth of bottom of borehole: 55.0 ft

COMMENTS:

38705-007_HA-LIB07-1R_SAN_12-07-12.GLB GW INSTALLATION REPORT-07-1 HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\38705 - LACBWR\GLOBAL\GINT\38705-007_MW200_MW205.GPJ Dec 7, 12

HALEY & ALDRICH

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

Well No. MW-201A
Boring No. SB-201A/B

Project: Hydrogeologic Investigation
Location: La Crosse Boiling Water Reactor (LACBWR)
Client: Dairyland Power Cooperative
Contractor: Onsite Environmental
Driller: A. Kapugi

Initial Water Level (depth TOC): 19.89 ft

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No. 38705-007
Date Installed 07 Nov 2012
H&A Rep. S. Collinge
Location See Plan

Ground El. 638.63
Datum 640.69

SOIL/ROCK CONDITIONS	DEPTH (ft.)	GRAPHIC	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)
				0.0	638.6
SM	1.0			1.0	637.6
SP				13.0	625.6
				15.0	623.6
CL	23.0				
ML	24.4				
	25.0			25.0	613.6

WELL CONSTRUCTION DETAILS

Type of protective cover: Guard Pipe

Depth of Metal below ground surface: 0.00 ft

Depth of top of riser below ground surface: N/A

Type of protective casing: Metal

Length: 2.5 ft

Inside diameter: 4.0 in.

Depth of bottom of Metal: 2.5 ft

Type of riser pipe: Schedule 40 PVC

Inside diameter of riser pipe: 2.0 in.

Depth of bottom of riser pipe: 15.0 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Bentonite	1.0 ft	12.0 ft
Filter Sand	13.0 ft	12.0 ft
	-	-
	-	-

Diameter of borehole: 8.5 in.

Type of screen: Machine slotted Sch 40 PVC

Screen gauge or size of openings: 0.010 in.

Diameter of screen: 2.0 in.

Depth to top of well screen: 15.0 ft

Depth to bottom of well screen: 25.0 ft

Bottom of silt trap: N/A

Depth of bottom of borehole: 25.0 ft

COMMENTS:

38705-007_HA-LIB07-1R_SAN_12-07-12.GLB GW INSTALLATION REPORT-07-1 HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\38705 - LACBWR\GLOBAL\GINT\38705-007_MW200_MW205.GPJ Dec 7, 12

HALEY & ALDRICH

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

Well No. MW-201B
Boring No. SB-201A/B

Project: Hydrogeologic Investigation
Location: La Crosse Boiling Water Reactor (LACBWR)
Client: Dairyland Power Cooperative
Contractor: Onsite Environmental
Driller: A. Kapugi

Initial Water Level (depth TOC): 19.71 ft

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No. 38705-007
Date Installed: 07 Nov 2012
H&A Rep.: S. Collinge
Location: See Plan

Ground El.: 638.48
Datum: 640.36

SOIL/ROCK CONDITIONS	DEPTH (ft.)	GRAPHIC	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)
				0.0	638.5
SM	1.0			1.0	637.5
				4.0	634.5
SP					
CL	23.0				
ML	24.4 / 24.8				
				39.0	599.5
SP					
				42.5	596.0
				45.0	593.5
	55.0			55.0	583.5

WELL CONSTRUCTION DETAILS

Type of protective cover: Guard Pipe
Depth of Metal below ground surface: 0.00 ft
Depth of top of riser below ground surface: N/A

Type of protective casing: Metal
- Length: 2.5 ft
- Inside diameter: 4.0 in.
- Depth of bottom of Metal: 2.5 ft

Type of riser pipe: Schedule 40 PVC
- Inside diameter of riser pipe: 2.0 in.
- Depth of bottom of riser pipe: 45.0 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Bentonite	1.0 ft	3.0 ft
Concrete	4.0 ft	35.0 ft
Bentonite	39.0 ft	3.5 ft
Filter Sand	42.5 ft	12.5 ft

Diameter of borehole: 8.5 in.

Type of screen: Machine slotted Sch 40 PVC
- Screen gauge or size of openings: 0.010 in.
- Diameter of screen: 2.0 in.
- Depth to top of well screen: 45.0 ft
- Depth to bottom of well screen: 55.0 ft

Bottom of silt trap: N/A
Depth of bottom of borehole: 55.0 ft

COMMENTS:

38705-007_HA-LIB07-1R_SAN_12-07-12.GLB GW INSTALLATION REPORT-07-1 HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\38705 - LACBWR\GLOBAL\GINT\38705-007_MW200_MW205.GPJ Dec 7, 12

HALEY & ALDRICH

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

Well No. MW-202A
Boring No. SB-202A/B

Project: Hydrogeologic Investigation
Location: La Crosse Boiling Water Reactor (LACBWR)
Client: Dairyland Power Cooperative
Contractor: Onsite Environmental
Driller: A. Kapugi

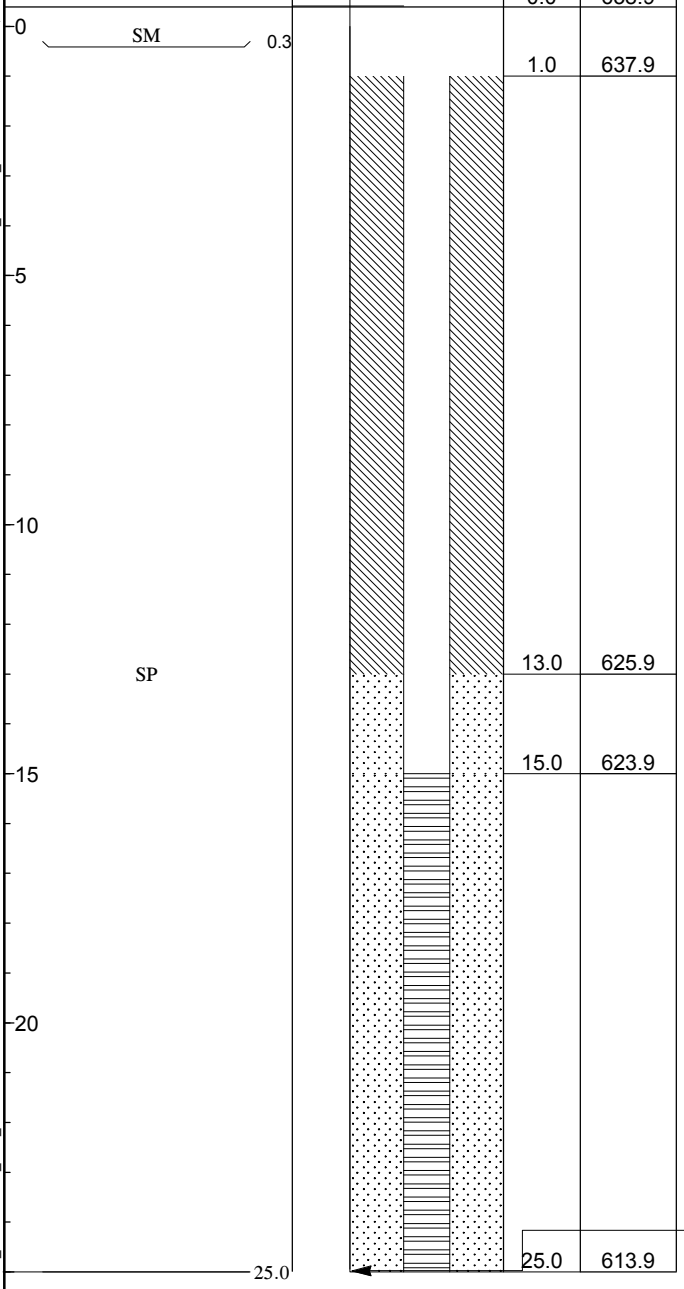
Initial Water Level (depth TOC): 27.83 ft

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No. 38705-007
Date Installed: 08 Nov 2012
H&A Rep.: S. Collinge
Location: See Plan

Ground El.: 638.94
Datum: 641.19

SOIL/ROCK CONDITIONS	DEPTH (ft.)	GRAPHIC	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)
				0.0	638.9
SM	0.3			1.0	637.9
SP				13.0	625.9
				15.0	623.9
	25.0			25.0	613.9



WELL CONSTRUCTION DETAILS

Type of protective cover: Guard Pipe

Depth of Metal below ground surface: 0.00 ft

Depth of top of riser below ground surface: N/A

Type of protective casing: Metal

Length: 2.5 ft

Inside diameter: 4.0 in.

Depth of bottom of Metal: 2.5 ft

Type of riser pipe: Schedule 40 PVC

Inside diameter of riser pipe: 2.0 in.

Depth of bottom of riser pipe: 15.0 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Bentonite	1.0 ft	12.0 ft
Filter Sand	13.0 ft	12.0 ft
	-	-
	-	-

Diameter of borehole: 8.5 in.

Type of screen: Machine slotted Sch 40 PVC

Screen gauge or size of openings: 0.010 in.

Diameter of screen: 2.0 in.

Depth to top of well screen: 15.0 ft

Depth to bottom of well screen: 25.0 ft

Bottom of silt trap: N/A

Depth of bottom of borehole: 25.0 ft

COMMENTS:

38705-007_HA-LIB07-1R_SAN_12-07-12.GLB GW INSTALLATION REPORT-07-1 HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\38705 - LACBWR\GLOBAL\GINT\38705-007_MW200_MW205.GPJ Dec 7, 12

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

HALEY & ALDRICH

Well No. MW-202B
Boring No. SB-202A/B

Project: Hydrogeologic Investigation
Location: La Crosse Boiling Water Reactor (LACBWR)
Client: Dairyland Power Cooperative
Contractor: Onsite Environmental
Driller: A. Kapugi

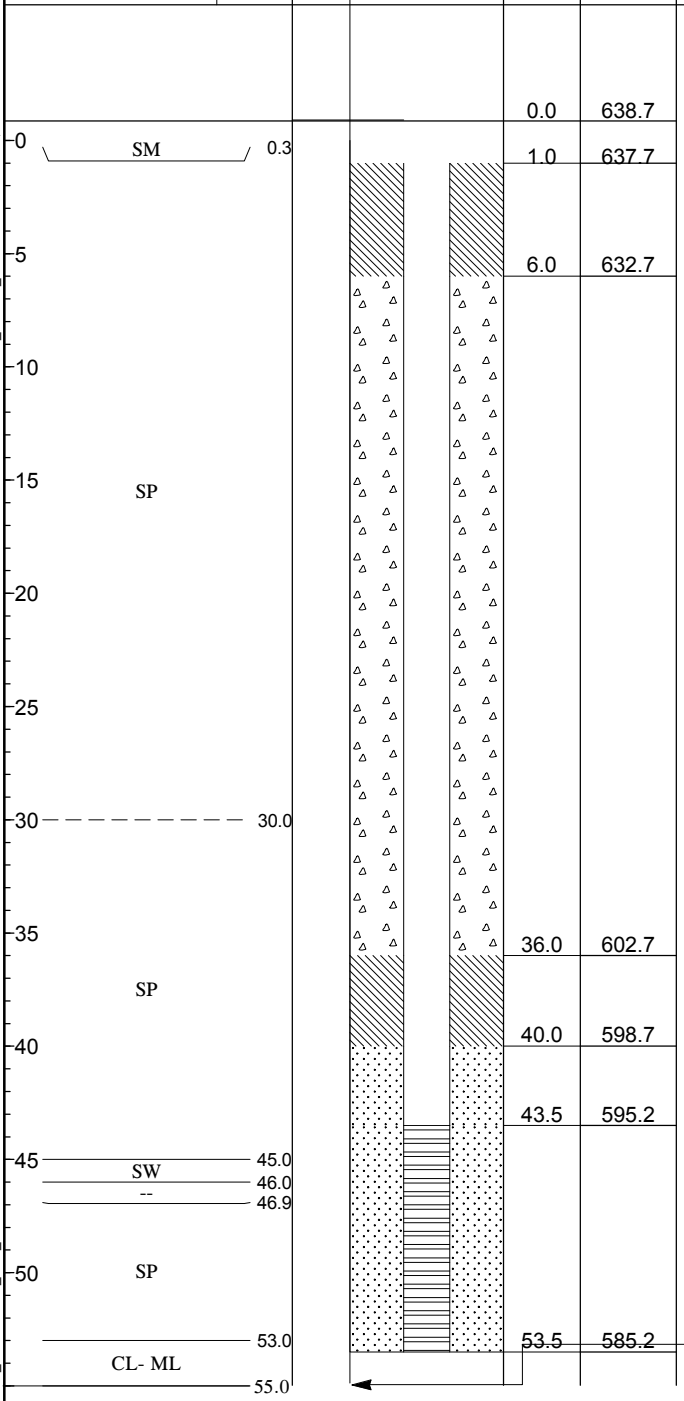
Initial Water Level (depth TOC): 20.62 ft

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No. 38705-007
Date Installed: 08 Nov 2012
H&A Rep.: S. Collinge
Location: See Plan

Ground El.: 638.74
Datum: 641.14

SOIL/ROCK CONDITIONS	DEPTH (ft.)	GRAPHIC	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)
				0.0	638.7
SM	0.3			1.0	637.7
				6.0	632.7
SP					
	30.0				
SP				36.0	602.7
				40.0	598.7
				43.5	595.2
SW	45.0				
--	46.0				
	46.9				
SP					
	53.0			53.5	585.2
CL- ML					
	55.0				



WELL CONSTRUCTION DETAILS

Type of protective cover: Guard Pipe
Depth of Metal below ground surface: 0.00 ft
Depth of top of riser below ground surface: N/A

Type of protective casing: Metal
- Length: 2.5 ft
- Inside diameter: 4.0 in.
- Depth of bottom of Metal: 2.5 ft

Type of riser pipe: Schedule 40 PVC
- Inside diameter of riser pipe: 2.0 in.
- Depth of bottom of riser pipe: 43.5 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Bentonite	1.0 ft	5.0 ft
Concrete	6.0 ft	30.0 ft
Bentonite	36.0 ft	4.0 ft
Filter Sand	40.0 ft	13.5 ft

Diameter of borehole: 8.5 in.

Type of screen: Machine slotted Sch 40 PVC
- Screen gauge or size of openings: 0.010 in.
- Diameter of screen: 2.0 in.
- Depth to top of well screen: 43.5 ft
- Depth to bottom of well screen: 53.5 ft

Bottom of silt trap: N/A
Depth of bottom of borehole: 55.0 ft

COMMENTS:

38705-007_HA-LIB07-1R_SAN_12-07-12.GLB GW INSTALLATION REPORT-07-1 HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\38705 - LACBWR\GLOBAL\GINT\38705-007_MW200_MW205.GPJ Dec 7, 12

HALEY & ALDRICH

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

Well No. MW-203A
Boring No. SB-203A/B

Project: Hydrogeologic Investigation
Location: La Crosse Boiling Water Reactor (LACBWR)
Client: Dairyland Power Cooperative
Contractor: Onsite Environmental
Driller: A. Kapugi

Initial Water Level (depth TOC): 20.48 ft

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No. 38705-007
Date Installed: 08 Nov 2012
H&A Rep.: S. Collinge
Location: See Plan

Ground El.: 638.89
Datum: 641.15

SOIL/ROCK CONDITIONS	DEPTH (ft.)	GRAPHIC	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)
				0.0	638.9
?	0.3			1.0	637.9
?				13.0	625.9
				15.0	623.9
ML/CL	21.8				
	25.0			25.0	613.9

WELL CONSTRUCTION DETAILS

Type of protective cover: Guard Pipe
Depth of Metal below ground surface: 0.00 ft
Depth of top of riser below ground surface: N/A

Type of protective casing: Metal
- Length: 2.5 ft
- Inside diameter: 4.0 in.
- Depth of bottom of Metal: 2.5 ft

Type of riser pipe: Schedule 40 PVC
- Inside diameter of riser pipe: 2.0 in.
- Depth of bottom of riser pipe: 15.0 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Bentonite	1.0 ft	12.0 ft
Filter Sand	13.0 ft	12.0 ft
	-	-
	-	-

Diameter of borehole: 8.5 in.

Type of screen: Machine slotted Sch 40 PVC
- Screen gauge or size of openings: 0.010 in.
- Diameter of screen: 2.0 in.
- Depth to top of well screen: 15.0 ft
- Depth to bottom of well screen: 25.0 ft

Bottom of silt trap: N/A
Depth of bottom of borehole: 25.0 ft

COMMENTS:

38705-007_HA-LIB07-1R_SAN_12-07-12.GLB GW INSTALLATION REPORT-07-1 HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\38705 - LACBWR\GLOBAL\GINT\38705-007_MW200_MW205.GPJ Dec 7, 12

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

HALEY & ALDRICH

Well No. MW-203B
Boring No. SB-203A/B

Project: Hydrogeologic Investigation
Location: La Crosse Boiling Water Reactor (LACBWR)
Client: Dairyland Power Cooperative
Contractor: Onsite Environmental
Driller: A. Kapugi

Initial Water Level (depth TOC): 20.62 ft

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No. 38705-007
Date Installed: 08 Nov 2012
H&A Rep.: S. Collinge
Location: See Plan

Ground El.: 638.99
Datum: 641.28

SOIL/ROCK CONDITIONS	DEPTH (ft.)	GRAPHIC	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)
				0.0	639.0
?	0.3			1.0	638.0
?				6.0	633.0
	21.8				
ML/CL					
	26.0				
ML	27.0				
SP				37.5	601.5
				41.5	597.5
				45.0	594.0
	47.5				
SP					
	55.0			55.0	584.0

WELL CONSTRUCTION DETAILS

Type of protective cover: Guard Pipe
Depth of Metal below ground surface: 0.00 ft
Depth of top of riser below ground surface: N/A

Type of protective casing: Metal
- Length: 2.5 ft
- Inside diameter: 4.0 in.
- Depth of bottom of Metal: 2.5 ft

Type of riser pipe: Schedule 40 PVC
- Inside diameter of riser pipe: 2.0 in.
- Depth of bottom of riser pipe: 45.0 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Bentonite	1.0 ft	5.0 ft
Concrete	6.0 ft	31.5 ft
Bentonite	37.5 ft	4.0 ft
Filter Sand	41.5 ft	13.5 ft

Diameter of borehole: 8.5 in.

Type of screen: Machine slotted Sch 40 PVC
- Screen gauge or size of openings: 0.010 in.
- Diameter of screen: 2.0 in.
- Depth to top of well screen: 45.0 ft
- Depth to bottom of well screen: 55.0 ft

Bottom of silt trap: N/A
Depth of bottom of borehole: 55.0 ft

COMMENTS:

38705-007_HA-LIB07-1R_SAN_12-07-12.GLB GW INSTALLATION REPORT-07-1 HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\38705 - LACBWR\GLOBAL\GINT\38705-007_MW200_MW205.GPJ Dec 7, 12

HALEY & ALDRICH

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

Well No. MW-204A
Boring No. SB-204A/B

Project: Hydrogeologic Investigation
Location: La Crosse Boiling Water Reactor (LACBWR)
Client: Dairyland Power Cooperative
Contractor: Onsite Environmental
Driller: A. Kapugi

Initial Water Level (depth TOC): 20.02 ft

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No. 38705-007
Date Installed 06 Nov 2012
H&A Rep. S. Collinge
Location See Plan

Ground El. 638.71
Datum 640.86

SOIL/ROCK CONDITIONS	DEPTH (ft.)	GRAPHIC	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)
				0.0	638.7
?	0.4				
?	0.6			1.0	637.7
SM	0.9				
SP					
				13.0	625.7
--	14.0 / 14.2				
				15.0	623.7
SP					
ML/SP	23.0 / 23.5				
	25.0			25.0	613.7

WELL CONSTRUCTION DETAILS

Type of protective cover: Guard Pipe

Depth of Metal below ground surface: 0.00 ft

Depth of top of riser below ground surface: N/A

Type of protective casing: Metal

Length: 2.5 ft

Inside diameter: 4.0 in.

Depth of bottom of Metal: 2.5 ft

Type of riser pipe: Schedule 40 PVC

Inside diameter of riser pipe: 2.0 in.

Depth of bottom of riser pipe: 15.0 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Bentonite	1.0 ft	12.0 ft
Filter Sand	13.0 ft	12.0 ft
	-	-
	-	-

Diameter of borehole: 8.5 in.

Type of screen: Machine slotted Sch 40 PVC

Screen gauge or size of openings: 0.010 in.

Diameter of screen: 2.0 in.

Depth to top of well screen: 15.0 ft

Depth to bottom of well screen: 25.0 ft

Bottom of silt trap: N/A

Depth of bottom of borehole: 25.0 ft

COMMENTS:

38705-007_HA-LIB07-1R_SAN_12-07-12.GLB GW INSTALLATION REPORT-07-1 HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\38705 - LACBWR\GLOBAL\GINT\38705-007_MW200_MW205.GPJ Dec 7, 12

HALEY & ALDRICH

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

Well No. MW-204B
Boring No. SB-204A/B

Project: Hydrogeologic Investigation
Location: La Crosse Boiling Water Reactor (LACBWR)
Client: Dairyland Power Cooperative
Contractor: Onsite Environmental
Driller: A. Kapugi

Initial Water Level (depth TOC): 20.10 ft

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No. 38705-007
Date Installed: 06 Nov 2012
H&A Rep.: S. Collinge
Location: See Plan

Ground El.: 638.62
Datum: 640.73

SOIL/ROCK CONDITIONS	DEPTH (ft.)	GRAPHIC	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)
				0.0	638.6
?	0.4			1.0	637.6
?	0.6				
SM	0.9				
SP				8.0	630.6
--	14.0 / 14.2				
SP					
ML/SP	23.0 / 23.5				
SP				34.4	604.2
SW	35.5 / 37.0			38.0	600.6
SP				45.0	593.6
SP	50.0 / 55.0			55.0	583.6

WELL CONSTRUCTION DETAILS

Type of protective cover: Guard Pipe
Depth of Metal below ground surface: 0.00 ft
Depth of top of riser below ground surface: N/A

Type of protective casing: Metal
- Length: 2.5 ft
- Inside diameter: 4.0 in.
- Depth of bottom of Metal: 2.5 ft

Type of riser pipe: Schedule 40 PVC
- Inside diameter of riser pipe: 2.0 in.
- Depth of bottom of riser pipe: 45.0 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Bentonite	1.0 ft	7.0 ft
Concrete	8.0 ft	26.4 ft
Bentonite	34.4 ft	3.6 ft
Filter Sand	38.0 ft	17.0 ft

Diameter of borehole: 8.5 in.

Type of screen: Machine slotted Sch 40 PVC
- Screen gauge or size of openings: 0.010 in.
- Diameter of screen: 2.0 in.
- Depth to top of well screen: 45.0 ft
- Depth to bottom of well screen: 55.0 ft

Bottom of silt trap: N/A
Depth of bottom of borehole: 55.0 ft

COMMENTS:

38705-007_HA-LIB07-1R_SAN_12-07-12.GLB GW INSTALLATION REPORT-07-1 HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\38705 - LACBWR\GLOBAL\GINT\38705-007_MW200_MW205.GPJ Dec 7, 12

APPENDIX D

Well Development Records

HALEY & ALDRICH

Well Development Record

Project Name	Hydrogeologic Investigation	Date:	MW-200A
Project Location	LaCrosse Boiling Water Reactor	Weather:	Cloudy, Cold, Lt Snow windy
Project Number	38705-007		
Technician	S. Collinge	Page	1 of 1

Water Level Data (from top of casing)

Total Well Depth (TD)	27.80	Casing Diameter (inches)	2
Static Water Level (DTW)	20.95	Screen Length (feet)	10
Standing Water Column (WC) (TD - DTW)	6.85	Borehole Diameter (inches)	8.5
		Date Installed	11/6/12

Well Purging Data

Purge Method	Whaler Pump	(gpm)	2.0
Well Volume (gallons) CD* (2" - 0.163, 2.5" - 0.255 4" - 0.653, 6" - 1.469)	1.12	Pump Description	Submersible
		Check Valve?	NO
Number of Volumes to be Purged	~~11.17~~ 10		
Total Gallons to be Purged	11.10	Drilling Company	Onsite Environmental

Surging and Bailing

Start Time:	Finish Time:	Comments:
Start Time:	Finish Time: N/A	Comments:
Start Time:	Finish Time:	Comments:
Start Time:	Finish Time:	Comments:

Pumping Parameters

Time	Depth to Water (feet)	Volume (gallons)	Pumping Rate (gpm)	Temp (°C)	Spec. Cond. ( ) enter units	pH (units)	Turbidity (NTUs)	Dis. Oxy. (mg/l)	ORP (mV)	Comments (color, odor, sheen)
1255	Started Purging & Surging									
1345	Stopped Purging									
		Purged Approx 100 gals before water cleared.								

QA/QC: NSC

Date: 11/29/12

Added Approx 30 gals during drilling ← well install

Well development Record

~~Groundwater Sampling Log~~

Project Name Hydrogelogic Investigation 11/12/12 **Well Number** MW-200B
Project Location La Crosse Boiling Water Reactor
Project Number 38705-007 **H&A Sampler Name** S. Collinge

Water Level Data (from top of casing)

Total Well Depth (TD) 57.45
Static Water Level (DTW) 21.30
Standing Water Column (WC) 36.15
(TD - DTW)

Casing Diameter (inches) 2
Screen Length (feet) 10
Borehole Diameter (inches) 8.5

Well Purging Data

Purge Method Whaler Pump
Well Volume (gallons) 5.89
WC* (2" - 0.163, 2.5" - 0.255 4" - 0.653, 6" - 1.469)
Number of Volumes to be Purged 10
Total Gallons to be Purged 58.92

Flow Rate (gpm) 2.5
Pump Description NA
80% Recharge Depth NA
Recharge Depth NA @ time
Company for Sampling Onsite Environmental

Field Parameters

Time	Volume (gallons)	Temp (°C)	Spec. Cond. (mmhos/cm)	pH (units)	Turbidity	Dissolved Oxygen	TDS	ORP	
1200	very Brown								
1340 -	Clear All the way up the water column								
	Purged Approx 125 gals before well ~~g~~ cleared								

Sampling Method NA
Analyses NA
NA
Number of Bottles NA

Sample Date NA
Sample Time NA
Duplicate Sample Collected NA
Duplicate Sample Number NA

Add approx 60 gals during the drilling of MW-200B

QA/QC NSC 11/29/12

HALEY & ALDRICH

Well Development Record

MW-201A

Project Name	Hydrogeologic Investigation	Date:	11/12/12
Project Location	La Crosse Boiling Water Reactor	Weather:	Cloudy, windy 1+ Snow
Project Number	38705-007		
Technician	S. Collinge	Page	1 of 1

Water Level Data (from top of casing)

Total Well Depth (TD)	27.83	Casing Diameter (inches)	2
Static Water Level (DTW)	19.89	Screen Length (feet)	10
Standing Water Column (WC) (TD - DTW)	7.94	Borehole Diameter (inches)	8.5
		Date Installed	11/7/12

Well Purging Data

Purge Method	Whaler Pump	(gpm)	2.0
Well Volume (gallons) CD* (2" - 0.163, 2.5" - 0.255 4" - 0.653, 6" - 1.469)	1.29	Pump Description	Submersible
		Check Valve?	No
Number of Volumes to be Purged	10		
Total Gallons to be Purged	12.94	Drilling Company	Onsite Environmental

Surging and Bailing

Start Time:		Finish Time:	NA	Comments:	
Start Time:		Finish Time:		Comments:	
Start Time:		Finish Time:		Comments:	
Start Time:		Finish Time:		Comments:	

Pumping Parameters

Time	Depth to Water (feet)	Volume (gallons)	Pumping Rate (gpm)	Temp (°C)	Spec. Cond. ( ) enter units	pH (units)	Turbidity (NTUs)	Dis. Oxy. (mg/l)	ORP (mV)	Comments (color, odor, sheen)
1152	Started purging & surging									
1245	Stopped purging									
	Purged approx 106 gals before well cleaned up									

QA/QC: NSC

Date: 11/23/12

Add 30 gals during well install.

HALEY & ALDRICH

Well Development Record

MW-201B

Project Name	Hydrogelogic Investigation	Date:	11/12/12
Project Location	La Crosse Boiling Water Reactor	Weather:	Cloudy Windy
Project Number	38705-007		Lt Sleet
Technician	S. Collinge	Page	1 of 1

Water Level Data (from top of casing)

Total Well Depth (TD)	57.03	Casing Diameter (inches)	2
Static Water Level (DTW)	19.71	Screen Length (feet)	10
Standing Water Column (WC) (TD - DTW)	37.32	Borehole Diameter (inches)	8.5
		Date Installed	11/7/12

Well Purging Data

Purge Method	Whaler Pump	(gpm)	2.5
Well Volume (gallons) CD* (2" - 0.163, 2.5" - 0.255 4" - 0.653, 6" - 1.469)	6.08	Pump Description	Submersible
		Check Valve?	NO
Number of Volumes to be Purged	10		
Total Gallons to be Purged	60.08	Drilling Company	Onsite Environmental

Surging and Bailing

Start Time:		Finish Time:	NA	Comments:	
Start Time:		Finish Time:		Comments:	
Start Time:		Finish Time:		Comments:	
Start Time:		Finish Time:		Comments:	

Pumping Parameters

Time	Depth to Water (feet)	Volume (gallons)	Pumping Rate (gpm)	Temp (°C)	Spec. Cond. ( ) enter units	pH (units)	Turbidity (NTUs)	Dis. Oxy. (mg/l)	ORP (mV)	Comments (color, odor, sheen)
1150	Started Purging & Surging									
1240	shut down									
	Purged Approx 125 gals before water cleared up									

QA/QC: NG

Date: 11/21/12

Added 60 gals during well install

HALEY & ALDRICH

Well Development Record

MW-202A

Project Name	Hydrogelogic Investigation	Date:	11/27/12
Project Location	La Crosse Boiling Water Reactor	Weather:	Cloudy Windy Cold Lt Snow
Project Number	38705-004		
Technician	S. Collinge	Page	1 of 1

Water Level Data (from top of casing)

Total Well Depth (TD)	20.69	Casing Diameter (inches)	2
Static Water Level (DTW)	27.83	Screen Length (feet)	10
Standing Water Column (WC) (TD - DTW)	7.14	Borehole Diameter (inches)	8.5
		Date Installed	11/8/12

Well Purging Data

Purge Method	Whaler Pump	(gpm)	2.0
Well Volume (gallons) CD* (2" - 0.163, 2.5" - 0.255 4" - 0.653, 6" - 1.469)	1.16	Pump Description	Submersible
		Check Valve?	NO
Number of Volumes to be Purged	10		
Total Gallons to be Purged	11.64	Drilling Company	Onsite Environmental

Surging and Bailing

Start Time:		Finish Time:	NA	Comments:	
Start Time:		Finish Time:		Comments:	
Start Time:		Finish Time:		Comments:	
Start Time:		Finish Time:		Comments:	

Pumping Parameters

Time	Depth to Water (feet)	Volume (gallons)	Pumping Rate (gpm)	Temp (°C)	Spec. Cond. ( ) enter units	pH (units)	Turbidity (NTUs)	Dis. Oxy. (mg/l)	ORP (mV)	Comments (color, odor, sheen)
1019	Started Purging & Surging									
1111	Clear									Purge 104 gals
										Before cleaning
										Clearing up

QA/QC: NSG

Date: 11/28/12

Add 25-30 DURING WELL INSTALLATION

HALEY & ALDRICH

Well Development Record

MW-202B

Project Name	Hydrogelogic Investigation	Date:	11/12/12
Project Location	La Crosse Boiling Water Reactor	Weather:	Cloudy Snowing
Project Number	38705-007		
Technician	S. Collinge	Page	1 of 1

Water Level Data (from top of casing)

Total Well Depth (TD)	~~20.62~~ 55.78	Casing Diameter (inches)	2
Static Water Level (DTW)	~~55.75~~ 20.62	Screen Length (feet)	10
Standing Water Column (WC)	35.13	Borehole Diameter (inches)	8.5
(TD - DTW)		Date Installed	11/8/12

Well Purging Data

Purge Method	Whaler Pump	(gpm)	2.5
Well Volume (gallons)	5.73	Pump Description	Submersible
CD* (2" - 0.163, 2.5" - 0.255 4" - 0.653, 6" - 1.469)		Check Valve?	NO
Number of Volumes to be Purged	10		
Total Gallons to be Purged	57.316	Drilling Company	Onsite Environmental

Surging and Bailing

~~Start Time:~~		Finish Time:	N/A	Comments:	
Start Time:		~~Finish Time:~~		Comments:	
Start Time:		Finish Time:		~~Comments:~~	
Start Time:		Finish Time:		Comments:	

Pumping Parameters

Time	Depth to Water (feet)	Volume (gallons)	Pumping Rate (gpm)	Temp (°C)	Spec. Cond. ( ) enter units	pH (units)	Turbidity (NTUs)	Dis. Oxy. (mg/l)	ORP (mV)	Comments (color, odor, sheen)
1017	Started Purging + Surging									
1140	Stopped Purging									
	Purged approx 207.5 gals before well cleared									

QA/QC: _____

Date:

Added 55-60 gals during well install

HALEY & ALDRICH

Well Development Record

MW-203A

Project Name	Hydrogelogic Investigation	Date:	11/12/12
Project Location	LaCrosse Boiling Water Reactor	Weather:	Cloudy Cold, Lt Snow Windy
Project Number	38705-004		
Technician	S. Collings	Page	1 of 1

Water Level Data (from top of casing)

Total Well Depth (TD)	27.91	Casing Diameter (inches)	2
Static Water Level (DTW)	20.48	Screen Length (feet)	10
Standing Water Column (WC) (TD - DTW)	7.43	Borehole Diameter (inches)	8.5
		Date Installed	11/8/12

Well Purging Data

Purge Method	Water Pump	(gpm)	2.0
Well Volume (gallons) CD* (2" - 0.163, 2.5" - 0.255 4" - 0.653, 6" - 1.469)	1.21	Pump Description	Submersible
		Check Valve?	No
Number of Volumes to be Purged	10.1		
Total Gallons to be Purged	12.11	Drilling Company	Onsite Environmental

Surging and Bailing

Start Time:		Finish Time:	NA	Comments:	
Start Time:		Finish Time:		Comments:	
Start Time:		Finish Time:		Comments:	
Start Time:		Finish Time:		Comments:	

Pumping Parameters

Time	Depth to Water (feet)	Volume (gallons)	Pumping Rate (gpm)	Temp (°C)	Spec. Cond. ( ) enter units	pH (units)	Turbidity (NTUs)	Dis. Oxy. (mg/l)	ORP (mV)	Comments (color, odor, sheen)
0920	Started Purging & Surging									
0955	–	Clear	Stopped							
	Purged Approx 70 gals before well Cleared									

QA/QC: _____

Date:

Added Approx 30 gals during well install

HALEY & ALDRICH

Well Development Record

MW203B

Project Name	Hydrogeologic Investigation	Date:	11/12/12
Project Location	LaCrosse Boiling Water	Weather:	Cloudy Cold
Project Number	38705-007		+ Snow windy
Technician	S. Collinge	Page	1 of 1

Water Level Data (from top of casing)

Total Well Depth (TD)	57.85	Casing Diameter (inches)	2
Static Water Level (DTW)	20.62	Screen Length (feet)	10
Standing Water Column (WC)	37.23	Borehole Diameter (inches)	8.5
(TD - DTW)		Date Installed	11/8/12

Well Purging Data

Purge Method	Whaler Pump	(gpm)	2.5
Well Volume (gallons)	6.07	Pump Description	Submersible
CD* (2" - 0.163, 2.5" - 0.255 4" - 0.653, 6" - 1.469)		Check Valve?	NO
Number of Volumes to be Purged	10		
Total Gallons to be Purged	60.68	Drilling Company	Onsite Environmental

Surging and Bailing

Start Time:		Finish Time:	NA	Comments:	
Start Time:		Finish Time:		Comments:	
Start Time:		Finish Time:		Comments:	
Start Time:		Finish Time:		Comments:	

Pumping Parameters

Time	Depth to Water (feet)	Volume (gallons)	Pumping Rate (gpm)	Temp (°C)	Spec. Cond. ( ) enter units	pH (units)	Turbidity (NTUs)	Dis. Oxy. (mg/l)	ORP (mV)	Comments (color, odor, sheen)
0915	Started Purging + Surging									
1010	Stopped Purging									
	Removed Approx 138 gals before well water cleared.									

QA/QC: MC

Date: 11/20/12

Added 60 gals during drilling

HALEY & ALDRICH

Well Development Record

MW-204A

Project Name	Hydrogelogic Investigation	Date:	11/12/12
Project Location	La Crosse Boiling Water Reactor	Weather:	Cloudy Pt Cloudy 30 - Windy Snow
Project Number	38705-007		
Technician	S. Collinge	Page	1 of 1

Water Level Data (from top of casing)

Total Well Depth (TD)	27.01	Casing Diameter (inches)	2
Static Water Level (DTW)	20.02	Screen Length (feet)	10
Standing Water Column (WC) (TD - DTW)	6.99	Borehole Diameter (inches)	8 1/2
		Date Installed	11/6/12

Well Purging Data

Purge Method	Whaler Pump	(gpm)	2.5
Well Volume (gallons) CD* (2" - 0.163, 2.5" - 0.255 4" - 0.653, 6" - 1.469)	1.14	Pump Description	Submersible
		Check Valve?	No
Number of Volumes to be Purged	10		
Total Gallons to be Purged	11.39	Drilling Company	Onsite Environmental

Surging and Bailing

Start Time:	~~1550~~ 800	Finish Time:	N/A	Comments:	
Start Time:		Finish Time:		Comments:	
Start Time:		Finish Time:		Comments:	
Start Time:		Finish Time:		Comments:	

Pumping Parameters

Time	Depth to Water (feet)	Volume (gallons)	Pumping Rate (gpm)	Temp (°C)	Spec. Cond. ( ) enter units	pH (units)	Turbidity (NTUs)	Dis. Oxy. (mg/l)	ORP (mV)	Comments (color, odor, sheen)
0807	Started Purging & Surging									Water Level 22.40
0835	Water is Clear Thru out water									22.40
	Column									
	Removed	Approx	70	gals						

QA/QC: _____

Date:

Note: Added approx 30 gals during drilling

HALEY & ALDRICH

Well Development Record MW-204B

Project Name		Date:	11/12/12
Project Location	Dairyland Power Cooperative	Weather:	Cloudy Pt Cloudy Snowing
Project Number			
Technician	S. Collinge	Page	1 of 1

Water Level Data (from top of casing)

Total Well Depth (TD)	56.45	Casing Diameter (inches)	2"
Static Water Level (DTW)	20.10	Screen Length (feet)	10
Standing Water Column (WC) (TD - DTW)	36.35	Borehole Diameter (inches)	8 1/2
		Date Installed	11/5/12

Well Purging Data

Purge Method	Whaler Pump	(gpm)	2.5
Well Volume (gallons) CD* (2" - 0.163, 2.5" - 0.255 4" - 0.653, 6" - 1.469)	5.93	Pump Description	Submersible
		Check Valve?	No
Number of Volumes to be Purged	10		
Total Gallons to be Purged	59.25	Drilling Company	Onsite Environmental

Surging and Bailing

Start Time:	0753	Finish Time:	0758	Comments:	
Start Time:		Finish Time:		Comments:	
Start Time:		Finish Time:		Comments:	
Start Time:		Finish Time:		Comments:	

Pumping Parameters

Time	Depth to Water (feet)	Volume (gallons)	Pumping Rate (gpm)	Temp (°C)	Spec. Cond. ( ) enter units	pH (units)	Turbidity (NTUs)	Dis. Oxy. (mg/l)	ORP (mV)	Comments (color, odor, sheen)
758	Started Purging & Surging									
900 -	Done Purging				water Clear					
	Purged 155 gals ~~during~~ before well									
	water became clean									

QA/QC: NKC
Date: 11/28/12

Note: Add approx 60 gal during drilling

APPENDIX E

Soil & Groundwater Laboratory Reports

Geotechnical Soil Data Explanation of Results.

Laboratory analysis indicated that the 20-foot interval moisture content ranged from 3.5 to 5.5 percent weight (30-foot, 16% weight), with an average bulk density of approximately 1.7 grams per cubic centimeter (g/cc). Total porosity for the 20-foot interval was in the upper 20 to low 30% bulk volume, including the 30-foot interval. Average particle size was categorized as medium sand, though in most cases fine-grained sand was a close secondary component comprising nearly half of each sample, except MW-203 and MW-204 where fine-grained particles were approximately only 25 to 30 percent of the samples. The moisture content of the 50-foot interval was similar to the 30-foot interval, one order of magnitude greater than the 20-foot interval, at approximately 13-15% weight. Average bulk density is roughly the same, up to 1.85 g/cc. Total porosity for the 50-foot interval was 30-32% bulk volume. Grain size at the 50-foot interval was categorized as medium sand with nearly 70% composition of medium sand to 30% fine-grained sand, except MW-202 where the reverse was true and at MW-203 where fine and medium sands were more evenly distributed, half and half. Silt and clay accounted for less than 5% of each submitted sample and was nearly twice as prevalent in the shallower interval as the deeper.

Grain size and porosity values associated with these soil samples are used in calculations to refine our understanding of groundwater movement in the subsurface: for the same volume, smaller particles have greater surface area and therefore higher water retention. So the larger the grain size, the higher permeability of the soil, i.e. the higher the ability of water to flow through soil. The porosity is a measure of pore (or void) space (between particles) out of the total volume. The soil porosity affects how much water the soil can hold, but also affects how quickly water flows through soil. To better analyze the connectivity of the pore space between particles and the movement of water in the shallow and deep aquifer at the site, these boreholes were completed as monitoring wells.

8100 Secura Way • Santa Fe Springs, CA 90670
Telephone (562) 347-2500 • Fax (562) 907-3610

November 28, 2012

Nadia Glucksberg
Haley & Aldrich, Inc.
600 South Meyer Avenue, Suite 100
Tucson, AZ 85701-2554

Re: PTS File No: 42823
Physical Properties Data
Dairyland Power Cooperative (LACBWR); 38705-007

Dear Ms. Glucksberg:

Please find enclosed report for Physical Properties analyses conducted upon samples received from your Dairyland Power Cooperative (LACBWR); 38705-007 project. All analyses were performed by applicable ASTM, EPA, or API methodologies. An electronic version of the report has previously been sent to your attention via the internet. The samples are currently in storage and will be retained for thirty days past completion of testing at no charge. Please note that the samples will be disposed of at that time. You may contact me regarding storage, disposal, or return of the samples.

PTS Laboratories appreciates the opportunity to be of service. If you have any questions or require additional information, please contact Rachel Spitz at (562) 347-2504.

Sincerely,
PTS Laboratories

Michael Mark Brady

Michael Mark Brady, P.G.
District Manager

Encl.

PTS Laboratories

Project Name: Dairyland Power Cooperative (LACBWR)
Project Number: 38705-007

PTS File No: 42823
Client: Haley & Aldrich, Inc.

TEST PROGRAM - 20121113

CORE ID	Depth ft.	Core Recovery ft.	Grain Size Analysis	Dry Bulk Density API RP40	Effective Porosity ASTM D425			Notes
		Plugs:	Grab	Vert. 1.5"	Vert. 1.5"			
Date Received: 20121113								
SB-200-20	20	1.08	X	X	X			
SB-200-50	50	1.25	X	X	X			
SB-201-20	20	0.83	X	X	X			
SB-201-50	50	0.83	X	X	X			
SB-202-20	20	1.00	X	X	X			
SB-202-50	50	0.92	X	X	X			
SB-203-20	20	0.92	X	X	X			
SB-203-50	50	0.83	X	X	X			
SB-204-30	30	0.92	X	X	X			
SB-204-50	50	1.50	X	X	X			
TOTALS:	10 cores	10.08	10	10	10			10

Laboratory Test Program Notes

Contaminant identification: _____

Standard TAT for basic analysis is 10 business days.

La Crosse Boiling Water Reactor (LACBWR)

PTS File No: 42823
Client: Haley & Aldrich, Inc.

PHYSICAL PROPERTIES DATA - DRAINAGE (EFFECTIVE) POROSITY

PROJECT NAME: Dairyland Power Cooperative (LACBWR)
PROJECT NO: 38705-007

			METHODS:	API RP 40 / ASTM D2216	API RP40	Mod. ASTM D425	Mod. ASTM D425
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	ANALYSIS DATE	MOISTURE CONTENT, % weight	DENSITY BULK, g/cc	TOTAL POROSITY, %Vb	EFFECTIVE POROSITY, %Vb
SB-200-20	20	V	20121119	3.8	1.74	31.6	28.6
SB-200-50	50	V	20121119	13.1	1.85	29.7	27.1
SB-201-20	20	V	20121119	5.3	1.73	26.2	20.7
SB-201-50	50	V	20121119	15.3	1.69	32.3	30.1
SB-202-20	20	V	20121119	3.6	1.69	29.5	27.1
SB-202-50	50	V	20121119	14.2	1.82	31.9	28.6
SB-203-20	20	V	20121119	5.5	1.74	30.2	26.6
SB-203-50	50	V	20121119	14.1	1.83	31.6	28.7
SB-204-30	30	V	20121119	15.9	1.75	34.0	31.1
SB-204-50	50	V	20121119	14.7	1.74	32.0	29.1

(1) Sample Orientation: H = horizontal; V = vertical; R = remold; Vb = Bulk Volume

PTS Laboratories, Inc.

Haley & Aldrich, Inc.
PTS File No: 42823

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: Dairyland Power Cooperative (LACBWR)
PROJECT NO: 38705-007

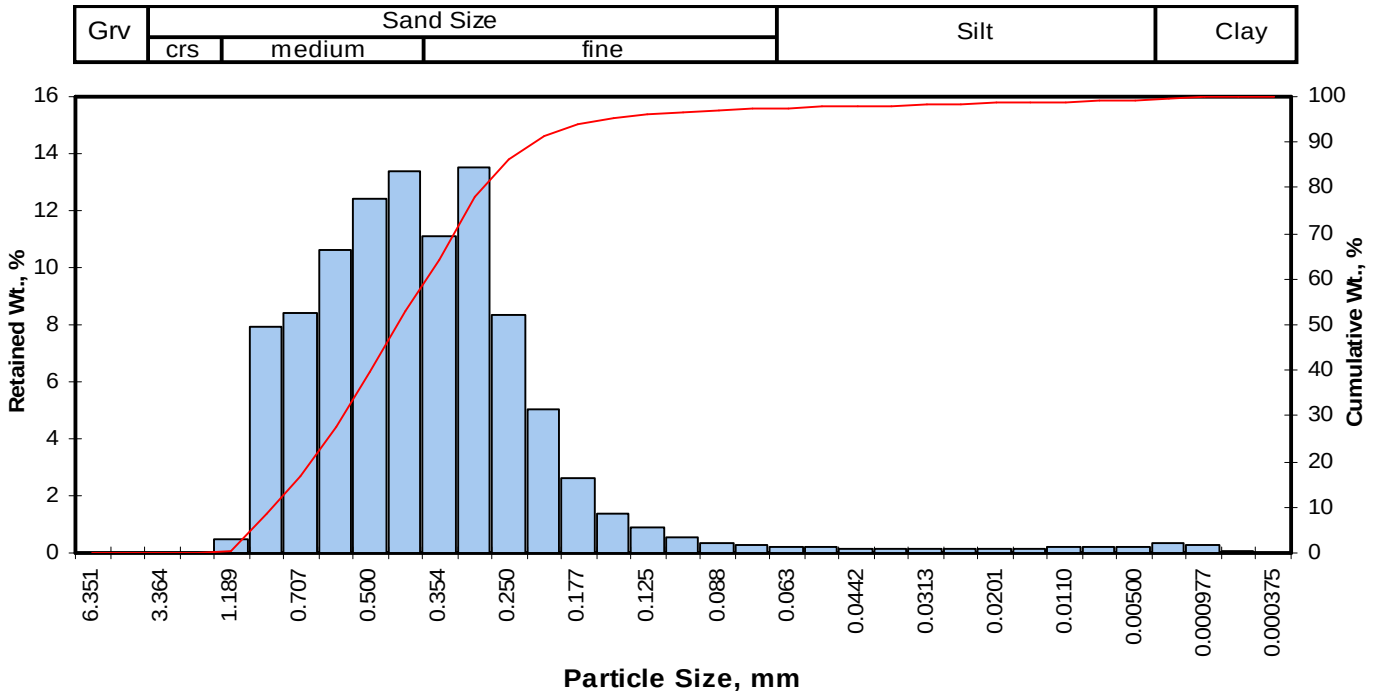
Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
SB-200-20	20	Medium sand	0.438	0.00	0.00	53.21	44.11	1.99	0.70	2.69
SB-200-50	50	Medium sand	0.527	0.00	0.00	68.09	29.44	1.83	0.64	2.47
SB-201-20	20	Medium sand	0.452	0.00	0.00	54.22	41.55	3.14	1.09	4.23
SB-201-50	50	Medium sand	0.517	0.00	0.00	69.36	30.02	0.38	0.24	0.62
SB-202-20	20	Medium sand	0.452	4.14	2.07	48.97	43.38	(2)	(2)	1.44
SB-202-50	50	Fine sand	0.340	0.00	0.00	36.52	61.51	1.47	0.51	1.98
SB-203-20	20	Medium sand	0.519	0.00	0.00	65.55	31.35	2.21	0.90	3.11
SB-203-50	50	Medium sand	0.418	0.00	0.00	49.51	49.76	0.47	0.27	0.73
SB-204-30	30	Medium sand	0.542	0.00	0.00	74.55	24.77	0.45	0.23	0.68
SB-204-50	50	Medium sand	0.550	0.00	0.00	69.19	29.78	0.68	0.35	1.03

(1) Based on Mean from Trask
(2) Mechanical sieve does not differentiate silt/clay fractions

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Haley & Aldrich, Inc.	**PTS File No:**	42823
Project:	Dairyland Power Cooperative (LACBWR)	**Sample ID:**	SB-200-20
Project No:	38705-007	**Depth, ft:**	20



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.49	0.49	0.49
0.0331	0.841	0.25	20	7.92	7.92	8.41
0.0278	0.707	0.50	25	8.39	8.39	16.80
0.0234	0.595	0.75	30	10.60	10.60	27.40
0.0197	0.500	1.00	35	12.40	12.40	39.81
0.0166	0.420	1.25	40	13.40	13.40	53.21
0.0139	0.354	1.50	45	11.10	11.10	64.31
0.0117	0.297	1.75	50	13.50	13.50	77.81
0.0098	0.250	2.00	60	8.33	8.33	86.14
0.0083	0.210	2.25	70	5.04	5.04	91.18
0.0070	0.177	2.50	80	2.64	2.64	93.82
0.0059	0.149	2.75	100	1.41	1.41	95.23
0.0049	0.125	3.00	120	0.88	0.88	96.11
0.0041	0.105	3.25	140	0.55	0.55	96.66
0.0035	0.088	3.50	170	0.36	0.36	97.02
0.0029	0.074	3.75	200	0.29	0.29	97.31
0.0025	0.063	4.00	230	0.24	0.24	97.55
0.0021	0.053	4.25	270	0.19	0.19	97.74
0.00174	0.0442	4.50	325	0.16	0.16	97.90
0.00146	0.0372	4.75	400	0.15	0.15	98.05
0.00123	0.0313	5.00	450	0.15	0.15	98.20
0.000986	0.0250	5.32	500	0.17	0.17	98.37
0.000790	0.0201	5.64	635	0.16	0.16	98.53
0.000615	0.0156	6.00		0.16	0.16	98.69
0.000435	0.0110	6.50		0.20	0.20	98.89
0.000308	0.00781	7.00		0.19	0.19	99.08
0.000197	0.00500	7.65		0.22	0.22	99.30
0.000077	0.00195	9.00		0.35	0.35	99.65
0.000038	0.000977	10.00		0.31	0.31	99.96
0.000019	0.000488	11.00		0.04	0.04	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	0.03	0.0384	0.976
10	0.30	0.0320	0.814
16	0.48	0.0283	0.719
25	0.69	0.0243	0.618
40	1.00	0.0196	0.499
50	1.19	0.0173	0.438
60	1.40	0.0149	0.378
75	1.70	0.0121	0.308
84	1.94	0.0103	0.261
90	2.19	0.0086	0.219
95	2.71	0.0060	0.153

Measure	Trask	Inman	Folk-Ward
Median, phi	1.19	1.19	1.19
Median, in.	0.0173	0.0173	0.0173
Median, mm	0.438	0.438	0.438
Mean, phi	1.11	1.21	1.20
Mean, in.	0.0182	0.0171	0.0171
Mean, mm	0.463	0.433	0.435
Sorting	1.416	0.730	0.770
Skewness	0.996	0.022	0.079
Kurtosis	0.261	0.832	1.091
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

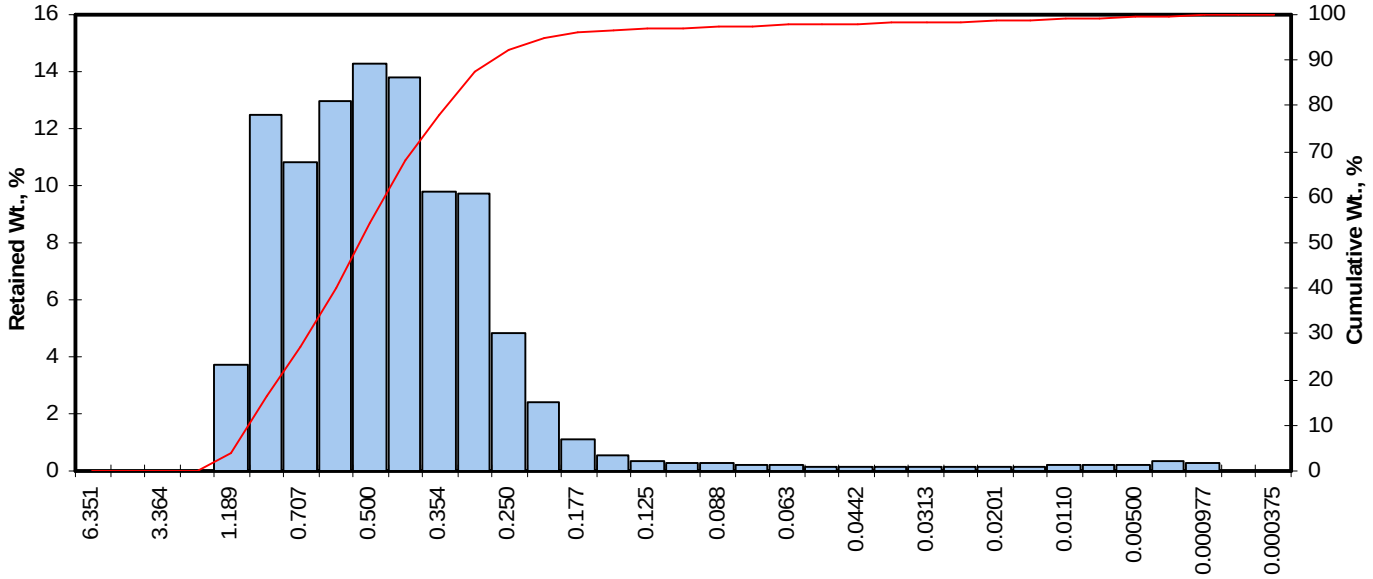
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	53.21
Fine Sand	200	44.11
Silt	>0.005 mm	1.99
Clay	<0.005 mm	0.70
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Haley & Aldrich, Inc.	**PTS File No:**	42823
Project:	Dairyland Power Cooperative (LACBWR)	**Sample ID:**	SB-200-50
Project No:	38705-007	**Depth, ft:**	50

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	3.70	3.70	3.70
0.0331	0.841	0.25	20	12.50	12.50	16.20
0.0278	0.707	0.50	25	10.80	10.80	26.99
0.0234	0.595	0.75	30	13.00	13.00	39.99
0.0197	0.500	1.00	35	14.30	14.30	54.29
0.0166	0.420	1.25	40	13.80	13.80	68.09
0.0139	0.354	1.50	45	9.78	9.78	77.87
0.0117	0.297	1.75	50	9.70	9.70	87.56
0.0098	0.250	2.00	60	4.83	4.83	92.39
0.0083	0.210	2.25	70	2.44	2.44	94.83
0.0070	0.177	2.50	80	1.08	1.08	95.91
0.0059	0.149	2.75	100	0.52	0.52	96.43
0.0049	0.125	3.00	120	0.35	0.35	96.78
0.0041	0.105	3.25	140	0.29	0.29	97.07
0.0035	0.088	3.50	170	0.25	0.25	97.32
0.0029	0.074	3.75	200	0.21	0.21	97.53
0.0025	0.063	4.00	230	0.18	0.18	97.71
0.0021	0.053	4.25	270	0.16	0.16	97.87
0.00174	0.0442	4.50	325	0.15	0.15	98.02
0.00146	0.0372	4.75	400	0.14	0.14	98.16
0.00123	0.0313	5.00	450	0.13	0.13	98.29
0.000986	0.0250	5.32	500	0.16	0.16	98.45
0.000790	0.0201	5.64	635	0.16	0.16	98.61
0.000615	0.0156	6.00		0.16	0.16	98.77
0.000435	0.0110	6.50		0.19	0.19	98.96
0.000308	0.00781	7.00		0.18	0.18	99.14
0.000197	0.00500	7.65		0.22	0.22	99.36
0.000077	0.00195	9.00		0.35	0.35	99.71
0.000038	0.000977	10.00		0.26	0.26	99.97
0.000019	0.000488	11.00		0.03	0.03	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.20	0.0452	1.147
10	0.00	0.0393	0.999
16	0.24	0.0333	0.846
25	0.45	0.0287	0.730
40	0.75	0.0234	0.595
50	0.92	0.0207	0.527
60	1.10	0.0183	0.465
75	1.43	0.0146	0.372
84	1.66	0.0125	0.317
90	1.88	0.0107	0.272
95	2.29	0.0081	0.205

Measure	Trask	Inman	Folk-Ward
Median, phi	0.92	0.92	0.92
Median, in.	0.0207	0.0207	0.0207
Median, mm	0.527	0.527	0.527
Mean, phi	0.86	0.95	0.94
Mean, in.	0.0217	0.0204	0.0205
Mean, mm	0.551	0.518	0.521
Sorting	1.401	0.708	0.731
Skewness	0.989	0.036	0.066
Kurtosis	0.247	0.756	1.048
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

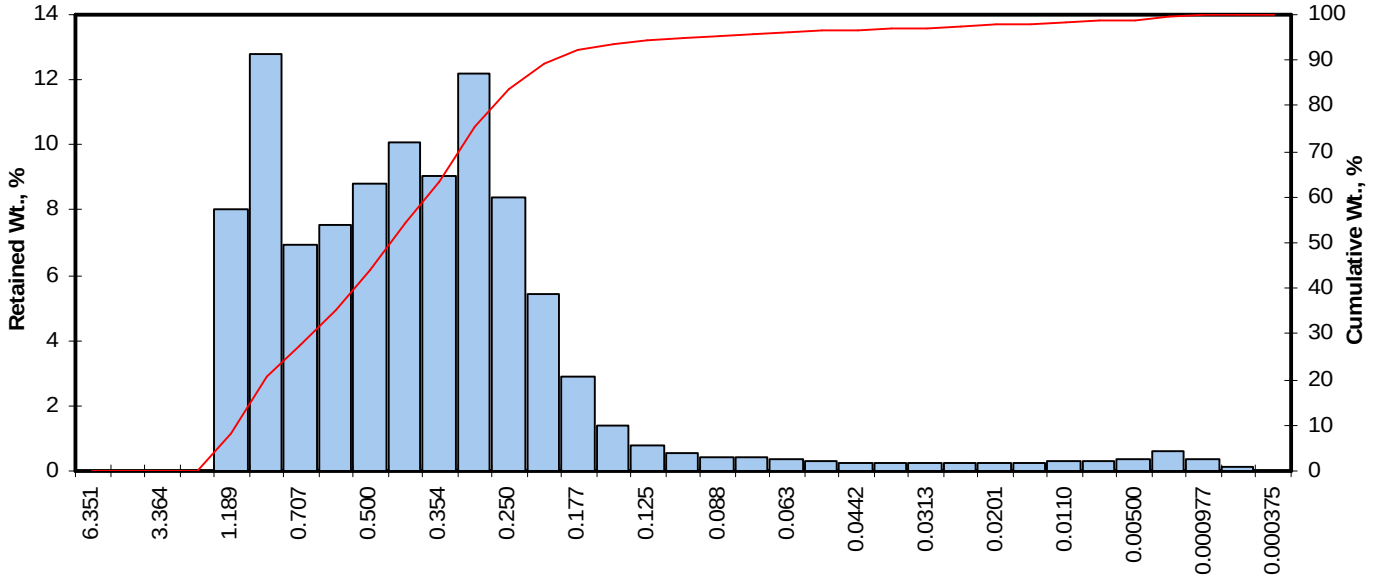
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	68.09
Fine Sand	200	29.44
Silt	>0.005 mm	1.83
Clay	<0.005 mm	0.64
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Haley & Aldrich, Inc.	**PTS File No:**	42823
Project:	Dairyland Power Cooperative (LACBWR)	**Sample ID:**	SB-201-20
Project No:	38705-007	**Depth, ft:**	20

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	8.03	8.02	8.02
0.0331	0.841	0.25	20	12.80	12.79	20.82
0.0278	0.707	0.50	25	6.97	6.97	27.78
0.0234	0.595	0.75	30	7.54	7.53	35.32
0.0197	0.500	1.00	35	8.82	8.81	44.13
0.0166	0.420	1.25	40	10.10	10.09	54.22
0.0139	0.354	1.50	45	9.06	9.05	63.28
0.0117	0.297	1.75	50	12.20	12.19	75.47
0.0098	0.250	2.00	60	8.37	8.36	83.83
0.0083	0.210	2.25	70	5.45	5.45	89.28
0.0070	0.177	2.50	80	2.89	2.89	92.17
0.0059	0.149	2.75	100	1.41	1.41	93.57
0.0049	0.125	3.00	120	0.80	0.80	94.37
0.0041	0.105	3.25	140	0.55	0.55	94.92
0.0035	0.088	3.50	170	0.45	0.45	95.37
0.0029	0.074	3.75	200	0.40	0.40	95.77
0.0025	0.063	4.00	230	0.37	0.37	96.14
0.0021	0.053	4.25	270	0.32	0.32	96.46
0.00174	0.0442	4.50	325	0.25	0.25	96.71
0.00146	0.0372	4.75	400	0.23	0.23	96.94
0.00123	0.0313	5.00	450	0.23	0.23	97.17
0.000986	0.0250	5.32	500	0.27	0.27	97.44
0.000790	0.0201	5.64	635	0.24	0.24	97.68
0.000615	0.0156	6.00		0.24	0.24	97.92
0.000435	0.0110	6.50		0.32	0.32	98.24
0.000308	0.00781	7.00		0.31	0.31	98.55
0.000197	0.00500	7.65		0.36	0.36	98.91
0.000077	0.00195	9.00		0.61	0.61	99.52
0.000038	0.000977	10.00		0.35	0.35	99.87
0.000019	0.000488	11.00		0.13	0.13	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.53	0.0570	1.447
10	-0.17	0.0444	1.127
16	0.06	0.0377	0.958
25	0.40	0.0298	0.758
40	0.88	0.0213	0.542
50	1.15	0.0178	0.452
60	1.41	0.0148	0.376
75	1.74	0.0118	0.299
84	2.01	0.0098	0.249
90	2.31	0.0079	0.201
95	3.29	0.0040	0.102

Measure	Trask	Inman	Folk-Ward
Median, phi	1.15	1.15	1.15
Median, in.	0.0178	0.0178	0.0178
Median, mm	0.452	0.452	0.452
Mean, phi	0.92	1.03	1.07
Mean, in.	0.0208	0.0192	0.0187
Mean, mm	0.529	0.488	0.476
Sorting	1.591	0.973	1.066
Skewness	1.053	-0.114	0.004
Kurtosis	0.248	0.966	1.170
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	54.22
Fine Sand	200	41.55
Silt	>0.005 mm	3.14
Clay	<0.005 mm	1.09
	Total	**100**

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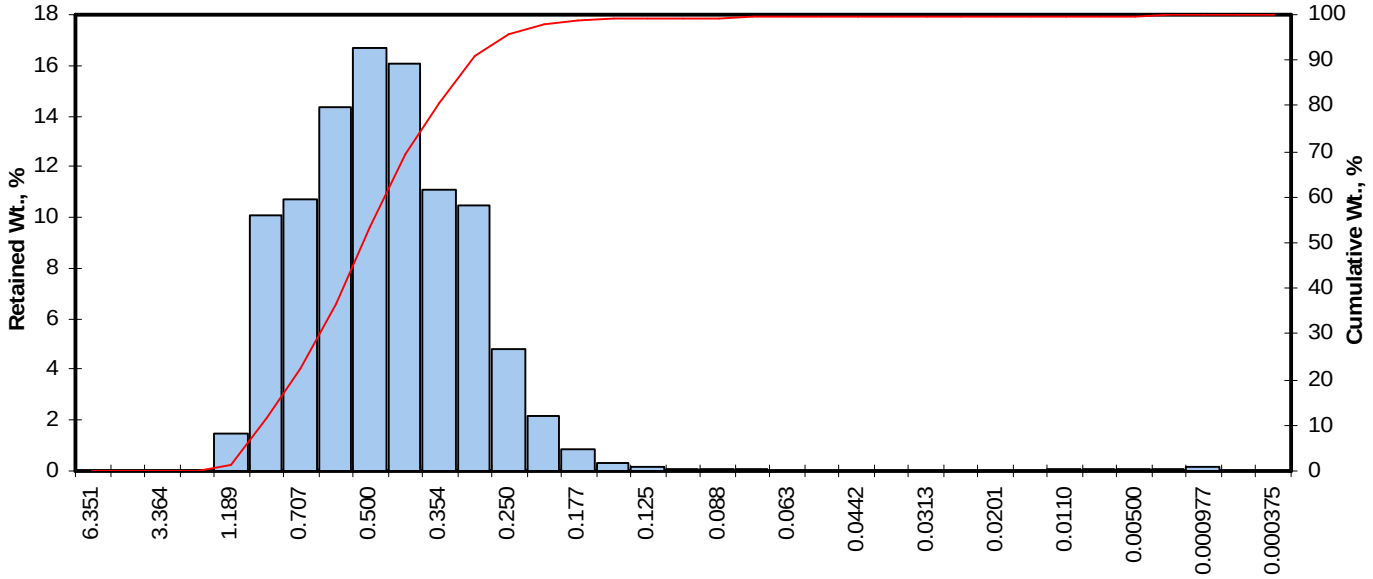
Particle Size Analysis - ASTM D4464M

Client:	Haley & Aldrich, Inc.	**PTS File No:**	42823
Project:	Dairyland Power Cooperative (LACBWR)	**Sample ID:**	SB-201-50
Project No:	38705-007	**Depth, ft:**	50

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	1.47	1.47	1.47
0.0331	0.841	0.25	20	10.10	10.08	11.55
0.0278	0.707	0.50	25	10.70	10.68	22.24
0.0234	0.595	0.75	30	14.40	14.38	36.61
0.0197	0.500	1.00	35	16.70	16.67	53.29
0.0166	0.420	1.25	40	16.10	16.08	69.36
0.0139	0.354	1.50	45	11.10	11.08	80.45
0.0117	0.297	1.75	50	10.50	10.48	90.93
0.0098	0.250	2.00	60	4.79	4.78	95.71
0.0083	0.210	2.25	70	2.16	2.16	97.87
0.0070	0.177	2.50	80	0.83	0.83	98.70
0.0059	0.149	2.75	100	0.32	0.32	99.02
0.0049	0.125	3.00	120	0.17	0.17	99.19
0.0041	0.105	3.25	140	0.10	0.10	99.28
0.0035	0.088	3.50	170	0.06	0.06	99.34
0.0029	0.074	3.75	200	0.04	0.04	99.38
0.0025	0.063	4.00	230	0.03	0.03	99.41
0.0021	0.053	4.25	270	0.03	0.03	99.44
0.00174	0.0442	4.50	325	0.02	0.02	99.46
0.00146	0.0372	4.75	400	0.02	0.02	99.48
0.00123	0.0313	5.00	450	0.03	0.03	99.51
0.000986	0.0250	5.32	500	0.04	0.04	99.55
0.000790	0.0201	5.64	635	0.03	0.03	99.58
0.000615	0.0156	6.00		0.03	0.03	99.61
0.000435	0.0110	6.50		0.04	0.04	99.66
0.000308	0.00781	7.00		0.05	0.05	99.70
0.000197	0.00500	7.65		0.05	0.05	99.76
0.000077	0.00195	9.00		0.10	0.10	99.86
0.000038	0.000977	10.00		0.13	0.13	99.99
0.000019	0.000488	11.00		0.01	0.01	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**100.20**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.07	0.0415	1.053
10	0.17	0.0349	0.887
16	0.35	0.0308	0.782
25	0.55	0.0269	0.684
40	0.80	0.0226	0.574
50	0.95	0.0204	0.517
60	1.10	0.0183	0.465
75	1.38	0.0152	0.385
84	1.58	0.0131	0.333
90	1.73	0.0119	0.302
95	1.96	0.0101	0.257

Measure	Trask	Inman	Folk-Ward
Median, phi	0.95	0.95	0.95
Median, in.	0.0204	0.0204	0.0204
Median, mm	0.517	0.517	0.517
Mean, phi	0.90	0.97	0.96
Mean, in.	0.0210	0.0201	0.0202
Mean, mm	0.534	0.511	0.513
Sorting	1.333	0.615	0.616
Skewness	0.992	0.030	0.012
Kurtosis	0.255	0.656	1.007
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	69.36
Fine Sand	200	30.02
Silt	>0.005 mm	0.38
Clay	<0.005 mm	0.24
	Total	**100**

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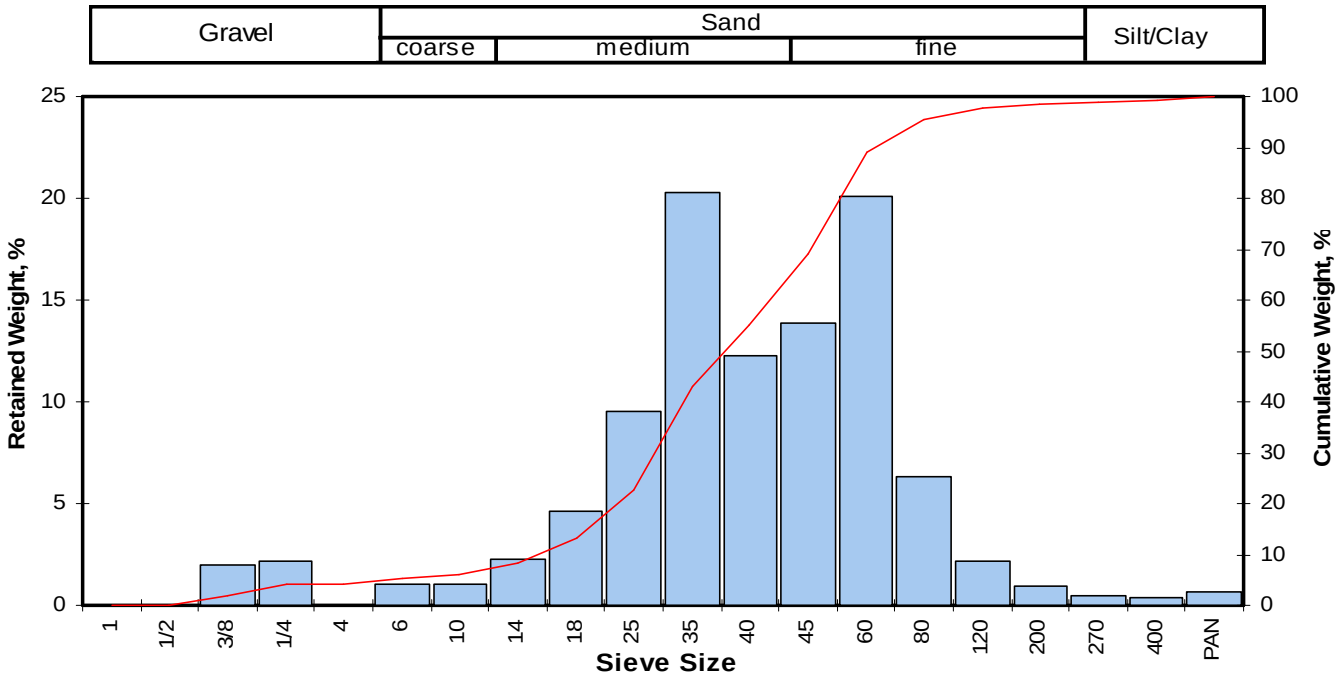
Particle Size Analysis - ASTM D422M

Client:	Haley & Aldrich, Inc.	**PTS File No:**	42823
Project:	Dairyland Power Cooperative (LACBWR)	**Sample ID:**	SB-202-20
Project No:	38705-007	**Depth, ft:**	20



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	1.39	1.98	1.98
0.2500	6.351	-2.67	1/4	1.52	2.16	4.14
0.1873	4.757	-2.25	4	0.00	0.00	4.14
0.1324	3.364	-1.75	6	0.75	1.07	5.20
0.0787	2.000	-1.00	10	0.71	1.01	6.21
0.0557	1.414	-0.50	14	1.57	2.23	8.44
0.0394	1.000	0.00	18	3.25	4.62	13.06
0.0278	0.707	0.50	25	6.72	9.55	22.61
0.0197	0.500	1.00	35	14.27	20.28	42.89
0.0166	0.420	1.25	40	8.65	12.29	55.18
0.0139	0.354	1.50	45	9.77	13.88	69.06
0.0098	0.250	2.00	60	14.13	20.08	89.14
0.0070	0.177	2.50	80	4.44	6.31	95.45
0.0049	0.125	3.00	120	1.52	2.16	97.61
0.0029	0.074	3.75	200	0.67	0.95	98.56
0.0021	0.053	4.25	270	0.32	0.45	99.02
0.0015	0.037	4.75	400	0.25	0.36	99.37
			PAN	0.44	0.63	100.00
TOTALS				70.37	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-1.84	0.1414	3.591
10	-0.33	0.0495	1.258
16	0.15	0.0354	0.899
25	0.56	0.0267	0.679
40	0.93	0.0207	0.525
50	1.14	0.0178	0.452
60	1.34	0.0156	0.396
75	1.65	0.0126	0.319
84	1.87	0.0108	0.273
90	2.07	0.0094	0.239
95	2.46	0.0071	0.181

Measure	Trask	Inman	Folk-Ward
Median, phi	1.14	1.14	1.14
Median, in.	0.0178	0.0178	0.0178
Median, mm	0.452	0.452	0.452
Mean, phi	1.00	1.01	1.06
Mean, in.	0.0196	0.0195	0.0189
Mean, mm	0.499	0.496	0.481
Sorting	1.458	0.859	1.082
Skewness	1.029	-0.153	-0.270
Kurtosis	0.176	1.508	1.622
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

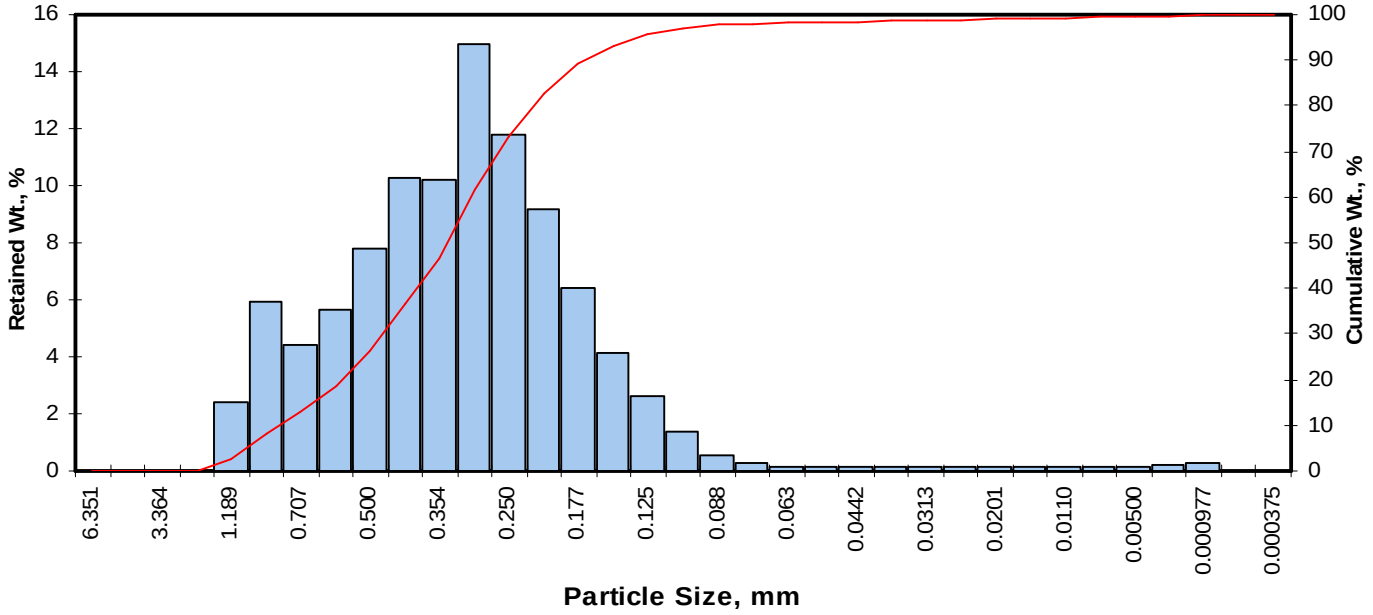
Description	Retained on Sieve #	Weight Percent
Gravel	4	4.14
Coarse Sand	10	2.07
Medium Sand	40	48.97
Fine Sand	200	43.38
Silt/Clay	<200	1.44
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Haley & Aldrich, Inc.	**PTS File No:**	42823
Project:	Dairyland Power Cooperative (LACBWR)	**Sample ID:**	SB-202-50
Project No:	38705-007	**Depth, ft:**	50

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	2.41	2.41	2.41
0.0331	0.841	0.25	20	5.94	5.93	8.34
0.0278	0.707	0.50	25	4.41	4.41	12.75
0.0234	0.595	0.75	30	5.68	5.68	18.42
0.0197	0.500	1.00	35	7.81	7.80	26.23
0.0166	0.420	1.25	40	10.30	10.29	36.52
0.0139	0.354	1.50	45	10.20	10.19	46.71
0.0117	0.297	1.75	50	15.00	14.99	61.70
0.0098	0.250	2.00	60	11.80	11.79	73.49
0.0083	0.210	2.25	70	9.21	9.20	82.69
0.0070	0.177	2.50	80	6.39	6.38	89.07
0.0059	0.149	2.75	100	4.17	4.17	93.24
0.0049	0.125	3.00	120	2.59	2.59	95.83
0.0041	0.105	3.25	140	1.35	1.35	97.18
0.0035	0.088	3.50	170	0.58	0.58	97.75
0.0029	0.074	3.75	200	0.27	0.27	98.02
0.0025	0.063	4.00	230	0.17	0.17	98.19
0.0021	0.053	4.25	270	0.13	0.13	98.32
0.00174	0.0442	4.50	325	0.11	0.11	98.43
0.00146	0.0372	4.75	400	0.11	0.11	98.54
0.00123	0.0313	5.00	450	0.11	0.11	98.65
0.000986	0.0250	5.32	500	0.14	0.14	98.79
0.000790	0.0201	5.64	635	0.14	0.14	98.93
0.000615	0.0156	6.00		0.14	0.14	99.07
0.000435	0.0110	6.50		0.15	0.15	99.22
0.000308	0.00781	7.00		0.13	0.13	99.35
0.000197	0.00500	7.65		0.14	0.14	99.49
0.000077	0.00195	9.00		0.23	0.23	99.72
0.000038	0.000977	10.00		0.25	0.25	99.97
0.000019	0.000488	11.00		0.03	0.03	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.03	0.0402	1.022
10	0.34	0.0310	0.788
16	0.64	0.0252	0.640
25	0.96	0.0202	0.514
40	1.34	0.0156	0.396
50	1.55	0.0134	0.340
60	1.72	0.0119	0.303
75	2.04	0.0096	0.243
84	2.30	0.0080	0.203
90	2.56	0.0067	0.170
95	2.92	0.0052	0.132

Measure	Trask	Inman	Folk-Ward
Median, phi	1.55	1.55	1.55
Median, in.	0.0134	0.0134	0.0134
Median, mm	0.340	0.340	0.340
Mean, phi	1.40	1.47	1.50
Mean, in.	0.0149	0.0142	0.0139
Mean, mm	0.378	0.360	0.354
Sorting	1.454	0.829	0.862
Skewness	1.038	-0.100	-0.087
Kurtosis	0.219	0.780	1.120
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

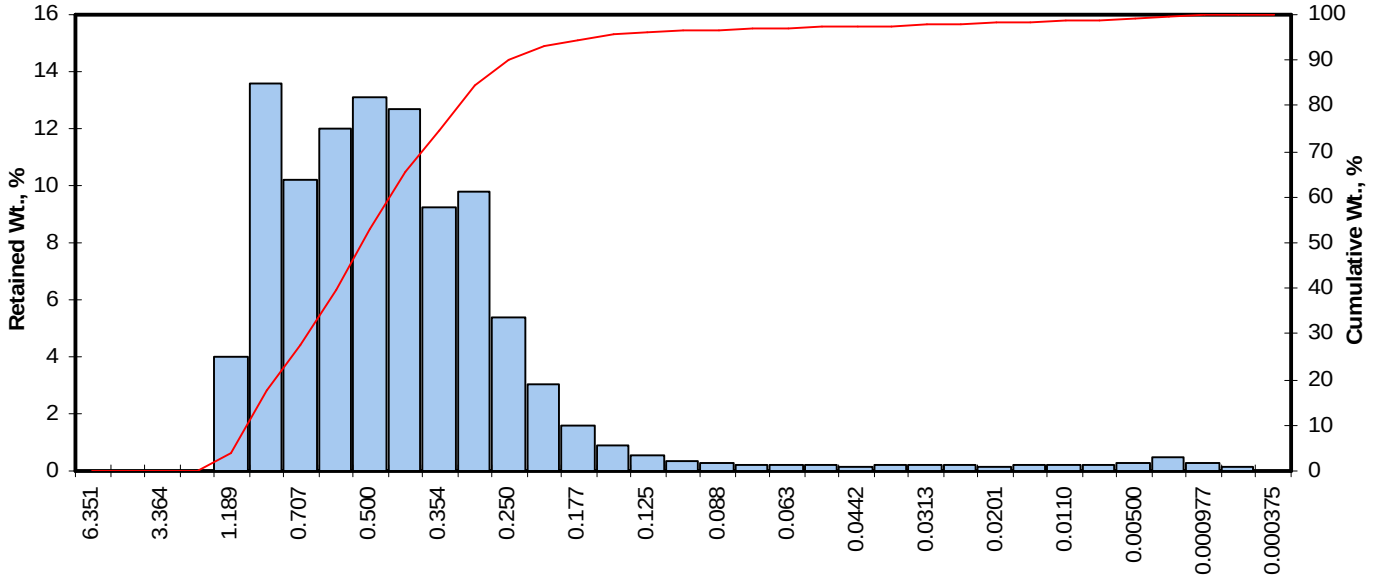
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	36.52
Fine Sand	200	61.51
Silt	>0.005 mm	1.47
Clay	<0.005 mm	0.51
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Haley & Aldrich, Inc.	**PTS File No:**	42823
Project:	Dairyland Power Cooperative (LACBWR)	**Sample ID:**	SB-203-20
Project No:	38705-007	**Depth, ft:**	20

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	4.04	4.03	4.03
0.0331	0.841	0.25	20	13.60	13.58	17.62
0.0278	0.707	0.50	25	10.20	10.19	27.80
0.0234	0.595	0.75	30	12.00	11.98	39.78
0.0197	0.500	1.00	35	13.10	13.08	52.87
0.0166	0.420	1.25	40	12.70	12.68	65.55
0.0139	0.354	1.50	45	9.23	9.22	74.77
0.0117	0.297	1.75	50	9.78	9.77	84.53
0.0098	0.250	2.00	60	5.40	5.39	89.92
0.0083	0.210	2.25	70	3.07	3.07	92.99
0.0070	0.177	2.50	80	1.60	1.60	94.59
0.0059	0.149	2.75	100	0.91	0.91	95.50
0.0049	0.125	3.00	120	0.56	0.56	96.06
0.0041	0.105	3.25	140	0.33	0.33	96.39
0.0035	0.088	3.50	170	0.27	0.27	96.65
0.0029	0.074	3.75	200	0.24	0.24	96.89
0.0025	0.063	4.00	230	0.20	0.20	97.09
0.0021	0.053	4.25	270	0.18	0.18	97.27
0.00174	0.0442	4.50	325	0.17	0.17	97.44
0.00146	0.0372	4.75	400	0.18	0.18	97.62
0.00123	0.0313	5.00	450	0.18	0.18	97.80
0.000986	0.0250	5.32	500	0.20	0.20	98.00
0.000790	0.0201	5.64	635	0.17	0.17	98.17
0.000615	0.0156	6.00		0.19	0.19	98.36
0.000435	0.0110	6.50		0.24	0.24	98.60
0.000308	0.00781	7.00		0.23	0.23	98.83
0.000197	0.00500	7.65		0.27	0.27	99.10
0.000077	0.00195	9.00		0.47	0.47	99.57
0.000038	0.000977	10.00		0.30	0.30	99.87
0.000019	0.000488	11.00		0.13	0.13	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.21	0.0457	1.160
10	-0.03	0.0402	1.021
16	0.19	0.0345	0.876
25	0.43	0.0292	0.742
40	0.75	0.0233	0.593
50	0.95	0.0204	0.519
60	1.14	0.0179	0.454
75	1.51	0.0139	0.352
84	1.74	0.0118	0.300
90	2.01	0.0098	0.249
95	2.61	0.0064	0.163

Measure	Trask	Inman	Folk-Ward
Median, phi	0.95	0.95	0.95
Median, in.	0.0204	0.0204	0.0204
Median, mm	0.519	0.519	0.519
Mean, phi	0.87	0.96	0.96
Mean, in.	0.0215	0.0202	0.0203
Mean, mm	0.547	0.513	0.515
Sorting	1.451	0.773	0.815
Skewness	0.984	0.024	0.102
Kurtosis	0.252	0.829	1.078
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

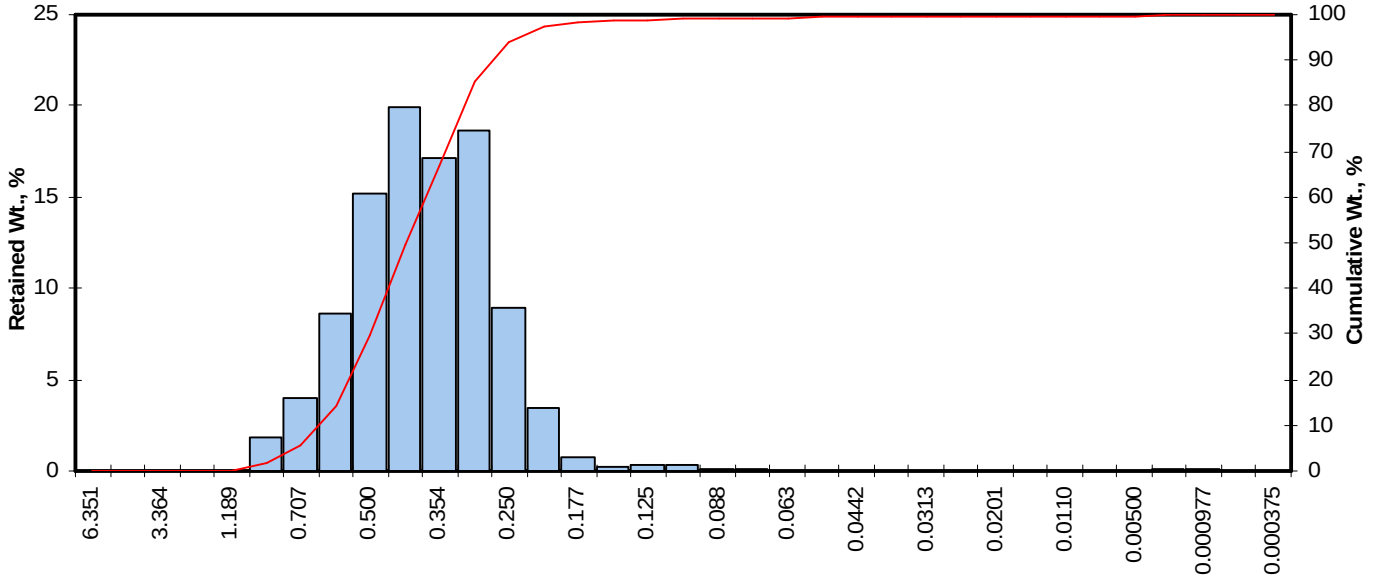
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	65.55
Fine Sand	200	31.35
Silt	>0.005 mm	2.21
Clay	<0.005 mm	0.90
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Haley & Aldrich, Inc.	**PTS File No:**	42823
Project:	Dairyland Power Cooperative (LACBWR)	**Sample ID:**	SB-203-50
Project No:	38705-007	**Depth, ft:**	50

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.04	0.04	0.04
0.0331	0.841	0.25	20	1.82	1.82	1.86
0.0278	0.707	0.50	25	3.94	3.94	5.80
0.0234	0.595	0.75	30	8.61	8.61	14.41
0.0197	0.500	1.00	35	15.20	15.20	29.61
0.0166	0.420	1.25	40	19.90	19.90	49.51
0.0139	0.354	1.50	45	17.10	17.10	66.61
0.0117	0.297	1.75	50	18.60	18.60	85.21
0.0098	0.250	2.00	60	8.92	8.92	94.13
0.0083	0.210	2.25	70	3.45	3.45	97.58
0.0070	0.177	2.50	80	0.74	0.74	98.32
0.0059	0.149	2.75	100	0.18	0.18	98.50
0.0049	0.125	3.00	120	0.28	0.28	98.78
0.0041	0.105	3.25	140	0.27	0.27	99.05
0.0035	0.088	3.50	170	0.15	0.15	99.20
0.0029	0.074	3.75	200	0.07	0.07	99.27
0.0025	0.063	4.00	230	0.05	0.05	99.32
0.0021	0.053	4.25	270	0.05	0.05	99.37
0.00174	0.0442	4.50	325	0.04	0.04	99.42
0.00146	0.0372	4.75	400	0.04	0.04	99.45
0.00123	0.0313	5.00	450	0.04	0.04	99.49
0.000986	0.0250	5.32	500	0.04	0.04	99.53
0.000790	0.0201	5.64	635	0.04	0.04	99.57
0.000615	0.0156	6.00		0.03	0.03	99.60
0.000435	0.0110	6.50		0.04	0.04	99.65
0.000308	0.00781	7.00		0.04	0.04	99.69
0.000197	0.00500	7.65		0.05	0.04	99.73
0.000077	0.00195	9.00		0.10	0.10	99.83
0.000038	0.000977	10.00		0.15	0.15	99.98
0.000019	0.000488	11.00		0.02	0.02	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	0.45	0.0288	0.733
10	0.62	0.0256	0.650
16	0.78	0.0230	0.584
25	0.92	0.0207	0.527
40	1.13	0.0180	0.457
50	1.26	0.0165	0.418
60	1.40	0.0149	0.378
75	1.61	0.0129	0.327
84	1.73	0.0118	0.301
90	1.88	0.0107	0.271
95	2.06	0.0094	0.239

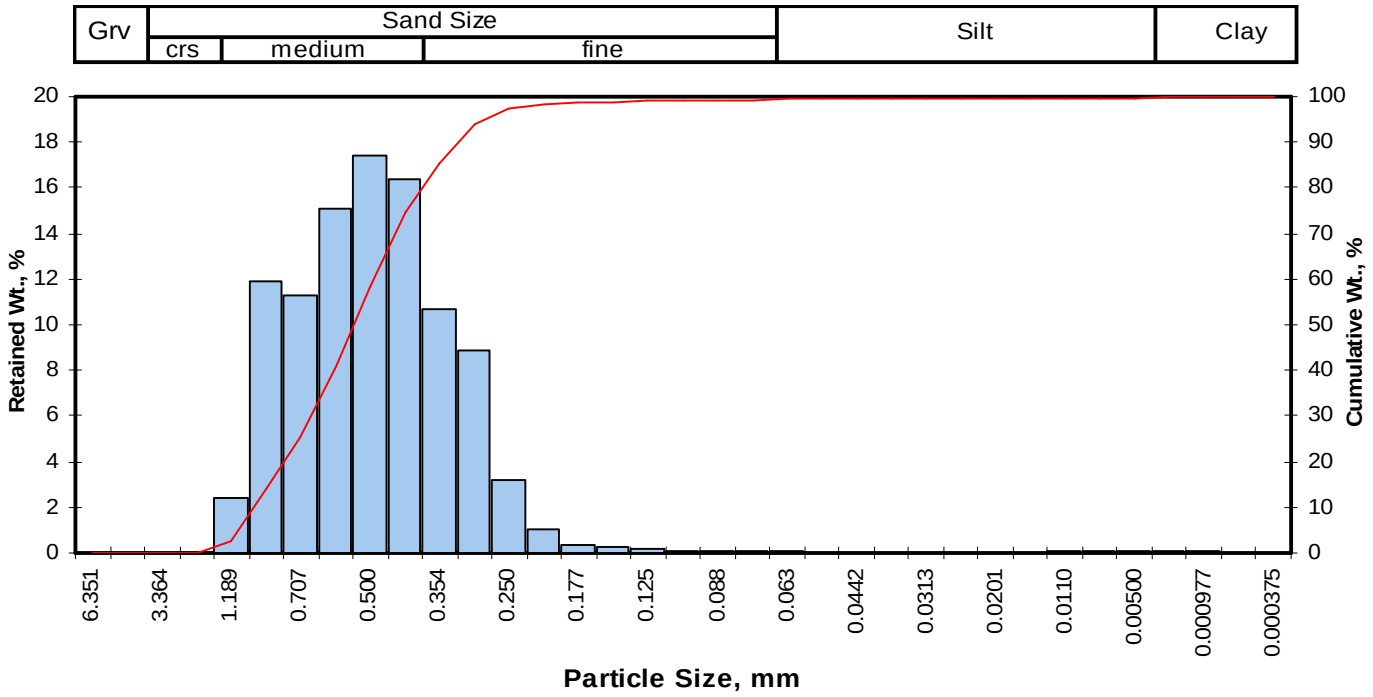
Measure	Trask	Inman	Folk-Ward
Median, phi	1.26	1.26	1.26
Median, in.	0.0165	0.0165	0.0165
Median, mm	0.418	0.418	0.418
Mean, phi	1.23	1.25	1.26
Mean, in.	0.0168	0.0165	0.0165
Mean, mm	0.427	0.419	0.419
Sorting	1.270	0.479	0.484
Skewness	0.992	-0.005	-0.003
Kurtosis	0.264	0.686	0.961
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	49.51
Fine Sand	200	49.76
Silt	>0.005 mm	0.47
Clay	<0.005 mm	0.27
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Haley & Aldrich, Inc.	**PTS File No:**	42823
Project:	Dairyland Power Cooperative (LACBWR)	**Sample ID:**	SB-204-30
Project No:	38705-007	**Depth, ft:**	30



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	2.43	2.43	2.43
0.0331	0.841	0.25	20	11.90	11.90	14.33
0.0278	0.707	0.50	25	11.30	11.30	25.64
0.0234	0.595	0.75	30	15.10	15.10	40.74
0.0197	0.500	1.00	35	17.40	17.40	58.15
0.0166	0.420	1.25	40	16.40	16.40	74.55
0.0139	0.354	1.50	45	10.70	10.70	85.25
0.0117	0.297	1.75	50	8.88	8.88	94.14
0.0098	0.250	2.00	60	3.15	3.15	97.29
0.0083	0.210	2.25	70	1.00	1.00	98.29
0.0070	0.177	2.50	80	0.35	0.35	98.64
0.0059	0.149	2.75	100	0.27	0.27	98.91
0.0049	0.125	3.00	120	0.21	0.21	99.12
0.0041	0.105	3.25	140	0.11	0.11	99.23
0.0035	0.088	3.50	170	0.05	0.05	99.28
0.0029	0.074	3.75	200	0.04	0.04	99.32
0.0025	0.063	4.00	230	0.05	0.05	99.37
0.0021	0.053	4.25	270	0.04	0.04	99.40
0.00174	0.0442	4.50	325	0.02	0.02	99.43
0.00146	0.0372	4.75	400	0.03	0.03	99.45
0.00123	0.0313	5.00	450	0.03	0.03	99.48
0.000986	0.0250	5.32	500	0.04	0.04	99.53
0.000790	0.0201	5.64	635	0.04	0.04	99.57
0.000615	0.0156	6.00		0.04	0.04	99.61
0.000435	0.0110	6.50		0.05	0.05	99.66
0.000308	0.00781	7.00		0.05	0.05	99.71
0.000197	0.00500	7.65		0.06	0.06	99.77
0.000077	0.00195	9.00		0.10	0.10	99.87
0.000038	0.000977	10.00		0.12	0.12	99.99
0.000019	0.000488	11.00		0.01	0.01	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.14	0.0434	1.103
10	0.07	0.0376	0.954
16	0.29	0.0323	0.820
25	0.49	0.0281	0.714
40	0.74	0.0236	0.600
50	0.88	0.0213	0.542
60	1.03	0.0193	0.490
75	1.26	0.0164	0.417
84	1.47	0.0142	0.361
90	1.63	0.0127	0.322
95	1.82	0.0112	0.284

Measure	Trask	Inman	Folk-Ward
Median, phi	0.88	0.88	0.88
Median, in.	0.0213	0.0213	0.0213
Median, mm	0.542	0.542	0.542
Mean, phi	0.82	0.88	0.88
Mean, in.	0.0223	0.0214	0.0214
Mean, mm	0.566	0.544	0.543
Sorting	1.308	0.592	0.593
Skewness	1.007	-0.007	-0.026
Kurtosis	0.235	0.656	1.037
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

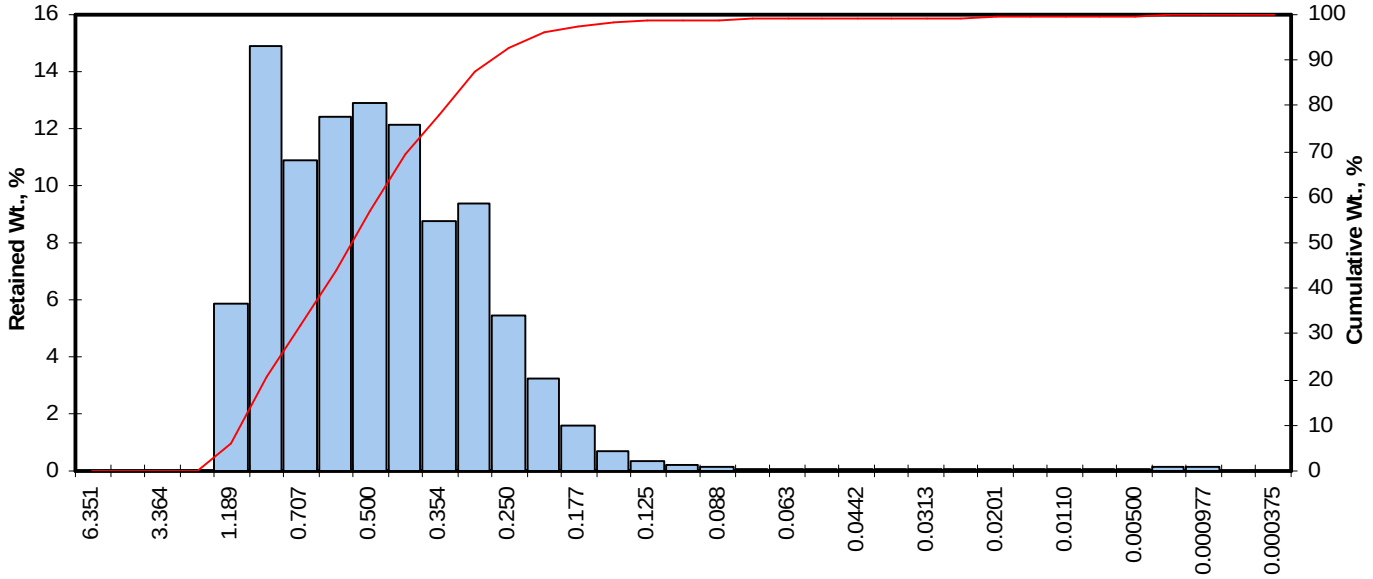
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	74.55
Fine Sand	200	24.77
Silt	>0.005 mm	0.45
Clay	<0.005 mm	0.23
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Haley & Aldrich, Inc.	**PTS File No:**	42823
Project:	Dairyland Power Cooperative (LACBWR)	**Sample ID:**	SB-204-50
Project No:	38705-007	**Depth, ft:**	50

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	5.87	5.88	5.88
0.0331	0.841	0.25	20	14.90	14.93	20.81
0.0278	0.707	0.50	25	10.90	10.92	31.72
0.0234	0.595	0.75	30	12.40	12.42	44.15
0.0197	0.500	1.00	35	12.90	12.92	57.07
0.0166	0.420	1.25	40	12.10	12.12	69.19
0.0139	0.354	1.50	45	8.73	8.74	77.93
0.0117	0.297	1.75	50	9.37	9.39	87.32
0.0098	0.250	2.00	60	5.42	5.43	92.75
0.0083	0.210	2.25	70	3.22	3.23	95.97
0.0070	0.177	2.50	80	1.59	1.59	97.57
0.0059	0.149	2.75	100	0.67	0.67	98.24
0.0049	0.125	3.00	120	0.32	0.32	98.56
0.0041	0.105	3.25	140	0.18	0.18	98.74
0.0035	0.088	3.50	170	0.13	0.13	98.87
0.0029	0.074	3.75	200	0.10	0.10	98.97
0.0025	0.063	4.00	230	0.08	0.08	99.05
0.0021	0.053	4.25	270	0.06	0.06	99.10
0.00174	0.0442	4.50	325	0.05	0.05	99.15
0.00146	0.0372	4.75	400	0.05	0.05	99.20
0.00123	0.0313	5.00	450	0.05	0.05	99.25
0.000986	0.0250	5.32	500	0.06	0.06	99.31
0.000790	0.0201	5.64	635	0.05	0.05	99.36
0.000615	0.0156	6.00		0.06	0.06	99.42
0.000435	0.0110	6.50		0.07	0.07	99.49
0.000308	0.00781	7.00		0.07	0.07	99.56
0.000197	0.00500	7.65		0.09	0.09	99.65
0.000077	0.00195	9.00		0.16	0.16	99.81
0.000038	0.000977	10.00		0.17	0.17	99.98
0.000019	0.000488	11.00		0.02	0.02	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**99.80**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.36	0.0506	1.285
10	-0.11	0.0425	1.081
16	0.09	0.0370	0.940
25	0.35	0.0310	0.787
40	0.67	0.0248	0.630
50	0.86	0.0216	0.550
60	1.06	0.0189	0.479
75	1.42	0.0148	0.375
84	1.66	0.0124	0.316
90	1.87	0.0107	0.273
95	2.17	0.0087	0.222

Measure	Trask	Inman	Folk-Ward
Median, phi	0.86	0.86	0.86
Median, in.	0.0216	0.0216	0.0216
Median, mm	0.550	0.550	0.550
Mean, phi	0.78	0.88	0.87
Mean, in.	0.0229	0.0215	0.0215
Mean, mm	0.581	0.545	0.547
Sorting	1.449	0.786	0.778
Skewness	0.988	0.015	0.025
Kurtosis	0.255	0.613	0.972
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	69.19
Fine Sand	200	29.78
Silt	>0.005 mm	0.68
Clay	<0.005 mm	0.35
	Total	**100**

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HALEY & ALDRICH

Haley & Aldrich, Inc.
600 S. Meyer Ave.,
Tucson, AZ 85701

CHAIN OF CUSTODY RECORD 42823

Phone (520) 289-8600
Fax (520) 882-8178

H&A FILE NO.	38705-007	LABORATORY	PTS Laboratories	DELIVERY DATE	11/9/2012
PROJECT NAME	Dairyland Power Cooperative	ADDRESS	8100 Secura Way	TURNAROUND TIME	Standard
H&A CONTACT	Laura Davis	CONTACT	Santa Fe Springs, Ca 90670	PROJECT MANAGER	Nadia Glucksburg

Sample No.	Date	Time	Depth	Type	API RP40 MOD. ASTM D425	API RP40	ASTM D422 OR ASTM D4464										Number of Containers	Comments (special instructions, precautions, additional method numbers, etc.)
SB-200-20	11/6/2012	10:45	20'	Sleeve	X	X	X										1	PTS QUOTE; Q12-141
SB-200-50	11/6/2012	11:00	50'	Sleeve	X	X	X										1	
SB-201-20	11/7/2012	8:20	20'	Sleeve	X	X	X										1	
SB-201-50	11/7/2012	8:45	50'	Sleeve	X	X	X										1	
SB-202-20	11/7/2012	14:05	20'	Sleeve	X	X	X										1	
SB-202-50	11/7/2012	14:50	50'	Sleeve	X	X	X										1	
SB-203-20	11/8/2012	11:30	20'	Sleeve	X	X	X										1	
SB-203-50	11/8/2012	12:05	50'	Sleeve	X	X	X										1	
SB-204-30	11/5/2012	12:25	30'	Sleeve	X	X	X										1	
SB-204-50	11/5/2012	13:30	50'	Sleeve	X	X	X										1	

Analysis Requested

Sampled and Relinquished by	Received by
Sign [signature]	Sign
Print Shannon Collinge	Print
Firm Haley + Aldrich	Firm FedEx
Date 11/9/12 Time 1600	Date 11/9/12 Time 1600
Relinquished by	**Received by**
Sign	Sign [signature] 63.6°F
Print	Print Robert Rojo
Firm	Firm PTS LABS
Date Time	Date 11/13/12 Time 1125
Relinquished by	**Received by**
Sign	Sign
Print	Print
Firm	Firm
Date Time	Date Time

LIQUID													
													VOA Vial
													Amber Glass
													Plastic Bottle
													Preservative
													Volume

SOLID													
X	X	X											Sleeve
													Amber Glass
													Clear Glass
None	None	None											Preservative
													Volume

PRESERVATION KEY

A Sample chilled	C NaOH	E H_2SO_4	G Methanol
B Sample filtered	D HNO_3	F HCL	H Water/NaHSO4 (circle)

Sampling Comments

Evidence samples were tampered with? YES NO

If YES, please explain in section below.

Presumptive Certainty Data Package (Laboratory to use applicable DEP CAM methods)

If Presumptive Certainty Data Package is needed, initial all sections:

_____ The required minimum field QC samples, as designated in BWSC CAM-VII have been or will be collected, as appropriate, to meet the requirements of Presumptive Certainty.

_____ Matrix Spike (MS) samples for MCP Metals and/or Cyanide are included and identified herein.

_____ This Chain of Custody Record (specify) _____includes _____does not include samples defined as Drinking Water Samples.

_____ If this Chain of Custody Record identifies samples defined as Drinking Water Samples, Trip Blanks and Field Duplicates are included and identified and analysis of TICs are required, as appropriate. Laboratory should (specify if applicable)_____analyz

Required Reporting Limits and Data Quality Objectives

☐ RC-S1 ☐ S1 ☐ GW1
☐ RC-S2 ☐ S2 ☐ GW2
☐ RC-GW1 ☐ S3 ☐ GW3
☐ RC-GW2

WHITE - Laboratory CANARY - Project Manager PINK - Haley & Aldrich Laboratory GOLDENROD - Haley & Aldrich Contact

EBERLINE SERVICES

EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD
OAK RIDGE, TENNESSEE 37830
PHONE (865) 481-0683
FAX (865) 483-4621

EBS-OR-36031

August 30, 2013

Robin De Clute
Dairyland Power Cooperative
4601 State Road 35
Genoa, WI 54632

CASE NARRATIVE
Work Order # 13-08018-OR

SAMPLE RECEIPT

This work order contains eleven water samples received 08/05/2013. These samples were analyzed for Strontium-90 and by Gamma Spectroscopy.

CLIENT ID	LAB ID	CLIENT ID	LAB ID
MW-204B-06262013	13-08018-04	MW-202A-06272013	13-08018-10
MW-204A-06262013	13-08018-05	MW-201B-06272013	13-08018-11
MW-203B-06262013	13-08018-06	MW-201A-06272013	13-08018-12
MW-203A-06262013	13-08018-07	EQUIPMENT-RINSE-06272013	13-08018-13
MW-203B-D-06262013	13-08018-08	FIELD-BLANK-06272013	13-08018-14
MW-202B-06272013	13-08018-09		

ANALYTICAL METHODS

Strontium-90 was analyzed using EIChroM Method SRW01 Modified. Gamma Spectroscopy was analyzed using EPA Method 901.1 Modified.

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 2-sigma value.

STRONTIUM-90

Samples demonstrated acceptable results for all Strontium-90 analyses. Chemical recovery was acceptable for all samples. The Strontium-90 method blank demonstrated results slightly greater than the detection limit. Results for the Strontium-90 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Strontium-90 laboratory control sample demonstrated an acceptable percent recovery.

ANALYTICAL RESULTS CONTINUED

GAMMA SPECTROSCOPY

Samples demonstrated acceptable results for all gamma-emitting radionuclides as reported. The Cobalt-60 and Cesium-137 method blank demonstrated acceptable results. Results for the Cobalt-60 and Cesium-137 replicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Cobalt-60 and Cesium-137 laboratory control sample demonstrated an acceptable percent recovery.

CERTIFICATION OF ACCURACY

I certify that this data report is in compliance with the terms and conditions of the Purchase Order, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the cognizant project manager or his/her designee to be accurate as verified by the following signature.

M.R. McDougall
Laboratory Manager

Date: 8/30/2013

Eberline Analytical wants and encourages your feedback regarding our performance providing radioanalytical services. Please visit http://www.eberlineservices.com/client.htm to provide us with feedback on our services.

Eberline Analytical
Final Report of Analysis

Report To:

Robin De Clute
Dairyland Power Cooperative
4601 State Road 35
Genoa, WI 54632

Work Order Details:

SDG:	13-08018
Purchase Order:	68252
Analysis Category:	ENVIRONMENTAL
Sample Matrix:	WA

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
13-08018-01	LCS	KNOWN	08/05/13 00:00	8/5/2013	8/26/2013	13-08018	Strontium-90	EIChroM SRW01 Modified	5.36E+01	3.00E-01			pCi/l
13-08018-01	LCS	SPIKE	08/05/13 00:00	8/5/2013	8/26/2013	13-08018	Strontium-90	EIChroM SRW01 Modified	6.23E+01	1.54E+00	8.61E+00	6.28E-01	pCi/l
13-08018-02	MBL	BLANK	08/05/13 00:00	8/5/2013	8/26/2013	13-08018	Strontium-90	EIChroM SRW01 Modified	1.12E+00	3.25E-01	3.58E-01	5.62E-01	pCi/l
13-08018-03	DUP	MW-204B-06262013	06/26/13 12:40	8/5/2013	8/26/2013	13-08018	Strontium-90	EIChroM SRW01 Modified	2.06E+00	6.85E-01	7.40E-01	1.24E+00	pCi/l
13-08018-04	DO	MW-204B-06262013	06/26/13 12:40	8/5/2013	8/26/2013	13-08018	Strontium-90	EIChroM SRW01 Modified	2.08E+00	6.91E-01	7.47E-01	1.25E+00	pCi/l
13-08018-05	TRG	MW-204A-06262013	06/26/13 12:52	8/5/2013	8/26/2013	13-08018	Strontium-90	EIChroM SRW01 Modified	2.18E+00	6.95E-01	7.55E-01	1.26E+00	pCi/l
13-08018-06	TRG	MW-203B-06262013	06/26/13 14:32	8/5/2013	8/26/2013	13-08018	Strontium-90	EIChroM SRW01 Modified	2.96E+00	6.67E-01	7.79E-01	1.07E+00	pCi/l
13-08018-07	TRG	MW-203A-06262013	06/26/13 15:01	8/5/2013	8/26/2013	13-08018	Strontium-90	EIChroM SRW01 Modified	2.06E+00	6.01E-01	6.63E-01	1.03E+00	pCi/l
13-08018-08	TRG	MW-203B-D-06262013	06/26/13 14:58	8/5/2013	8/26/2013	13-08018	Strontium-90	EIChroM SRW01 Modified	1.67E+00	6.53E-01	6.92E-01	1.20E+00	pCi/l
13-08018-09	TRG	MW-202B-06272013	06/27/13 09:57	8/5/2013	8/26/2013	13-08018	Strontium-90	EIChroM SRW01 Modified	1.43E+00	6.83E-01	7.10E-01	1.32E+00	pCi/l
13-08018-10	TRG	MW-202A-06272013	06/27/13 10:08	8/5/2013	8/26/2013	13-08018	Strontium-90	EIChroM SRW01 Modified	1.82E+00	6.92E-01	7.35E-01	1.29E+00	pCi/l
13-08018-11	TRG	MW-201B-06272013	06/27/13 11:31	8/5/2013	8/26/2013	13-08018	Strontium-90	EIChroM SRW01 Modified	2.00E+00	6.53E-01	7.07E-01	1.17E+00	pCi/l
13-08018-12	TRG	MW-201A-06272013	06/27/13 11:43	8/5/2013	8/26/2013	13-08018	Strontium-90	EIChroM SRW01 Modified	2.05E+00	5.84E-01	6.47E-01	1.01E+00	pCi/l
13-08018-13	TRG	EQUIPMENT-RINSE-06272013	06/27/13 12:35	8/5/2013	8/26/2013	13-08018	Strontium-90	EIChroM SRW01 Modified	3.12E+00	7.14E-01	8.31E-01	1.15E+00	pCi/l
13-08018-14	TRG	FIELD-BLANK-06272013	06/27/13 13:00	8/5/2013	8/26/2013	13-08018	Strontium-90	EIChroM SRW01 Modified	2.01E+00	6.64E-01	7.18E-01	1.20E+00	pCi/l
13-08018-01	LCS	KNOWN	08/05/13 00:00	8/5/2013	8/13/2013	13-08018	Cobalt-60	EPA 901.1 Modified	1.94E+05	7.76E+03			pCi/l
13-08018-01	LCS	KNOWN	08/05/13 00:00	8/5/2013	8/13/2013	13-08018	Cesium-137	EPA 901.1 Modified	1.18E+05	4.72E+03			pCi/l
13-08018-01	LCS	SPIKE	08/05/13 00:00	8/5/2013	8/13/2013	13-08018	Cobalt-60	EPA 901.1 Modified	1.99E+05	1.31E+04	1.66E+04	6.43E+02	pCi/l
13-08018-01	LCS	SPIKE	08/05/13 00:00	8/5/2013	8/13/2013	13-08018	Cesium-137	EPA 901.1 Modified	1.22E+05	1.15E+04	1.31E+04	4.41E+02	pCi/l
13-08018-02	MBL	BLANK	08/05/13 00:00	8/5/2013	8/9/2013	13-08018	Cobalt-60	EPA 901.1 Modified	-1.11E+00	2.53E+00	2.53E+00	4.64E+00	pCi/l
13-08018-02	MBL	BLANK	08/05/13 00:00	8/5/2013	8/9/2013	13-08018	Cesium-137	EPA 901.1 Modified	1.11E-01	2.39E+00	2.39E+00	4.34E+00	pCi/l
13-08018-03	DUP	MW-204B-06262013	06/26/13 12:40	8/5/2013	8/12/2013	13-08018	Cobalt-60	EPA 901.1 Modified	9.26E-01	2.07E+00	2.07E+00	4.26E+00	pCi/l
13-08018-03	DUP	MW-204B-06262013	06/26/13 12:40	8/5/2013	8/12/2013	13-08018	Cesium-137	EPA 901.1 Modified	4.33E-01	2.21E+00	2.21E+00	3.96E+00	pCi/l
13-08018-04	DO	MW-204B-06262013	06/26/13 12:40	8/5/2013	8/12/2013	13-08018	Cobalt-60	EPA 901.1 Modified	-9.84E-01	2.16E+00	2.16E+00	3.92E+00	pCi/l
13-08018-04	DO	MW-204B-06262013	06/26/13 12:40	8/5/2013	8/12/2013	13-08018	Cesium-137	EPA 901.1 Modified	2.24E+00	2.49E+00	2.49E+00	4.66E+00	pCi/l
13-08018-05	TRG	MW-204A-06262013	06/26/13 12:52	8/5/2013	8/9/2013	13-08018	Cobalt-60	EPA 901.1 Modified	3.34E-01	2.23E+00	2.23E+00	4.36E+00	pCi/l
13-08018-05	TRG	MW-204A-06262013	06/26/13 12:52	8/5/2013	8/9/2013	13-08018	Cesium-137	EPA 901.1 Modified	2.32E+00	2.40E+00	2.40E+00	4.11E+00	pCi/l

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample; MBL=Blank; DUP=Duplicate; TRG=Normal Sample; DO=Duplicate Original

EBERLINE SERVICES

EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical
Final Report of Analysis

Report To:	
Robin De Clute	
Dairyland Power Cooperative	
4601 State Road 35	
Genoa, WI 54632	

Work Order Details:	
SDG:	13-08018
Purchase Order:	68252
Analysis Category:	ENVIRONMENTAL
Sample Matrix:	WA

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
13-08018-06	TRG	MW-203B-06262013	06/26/13 14:32	8/5/2013	8/13/2013	13-08018	Cobalt-60	EPA 901.1 Modified	-5.41E-02	2.14E+00	2.14E+00	4.12E+00	pCi/l
13-08018-06	TRG	MW-203B-06262013	06/26/13 14:32	8/5/2013	8/13/2013	13-08018	Cesium-137	EPA 901.1 Modified	1.64E+00	2.31E+00	2.31E+00	4.31E+00	pCi/l
13-08018-07	TRG	MW-203A-06262013	06/26/13 15:01	8/5/2013	8/13/2013	13-08018	Cobalt-60	EPA 901.1 Modified	2.83E-01	2.61E+00	2.61E+00	4.95E+00	pCi/l
13-08018-07	TRG	MW-203A-06262013	06/26/13 15:01	8/5/2013	8/13/2013	13-08018	Cesium-137	EPA 901.1 Modified	-2.43E-01	2.48E+00	2.48E+00	4.52E+00	pCi/l
13-08018-08	TRG	MW-203B-D-06262013	06/26/13 14:58	8/5/2013	8/13/2013	13-08018	Cobalt-60	EPA 901.1 Modified	-6.59E-01	1.63E+00	1.63E+00	2.86E+00	pCi/l
13-08018-08	TRG	MW-203B-D-06262013	06/26/13 14:58	8/5/2013	8/13/2013	13-08018	Cesium-137	EPA 901.1 Modified	-2.41E-01	2.12E+00	2.12E+00	3.74E+00	pCi/l
13-08018-09	TRG	MW-202B-06272013	06/27/13 09:57	8/5/2013	8/13/2013	13-08018	Cobalt-60	EPA 901.1 Modified	-2.17E-01	2.41E+00	2.41E+00	4.51E+00	pCi/l
13-08018-09	TRG	MW-202B-06272013	06/27/13 09:57	8/5/2013	8/13/2013	13-08018	Cesium-137	EPA 901.1 Modified	-1.28E+00	2.34E+00	2.34E+00	3.91E+00	pCi/l
13-08018-10	TRG	MW-202A-06272013	06/27/13 10:08	8/5/2013	8/13/2013	13-08018	Cobalt-60	EPA 901.1 Modified	2.30E+00	2.20E+00	2.20E+00	4.76E+00	pCi/l
13-08018-10	TRG	MW-202A-06272013	06/27/13 10:08	8/5/2013	8/13/2013	13-08018	Cesium-137	EPA 901.1 Modified	-2.77E-01	2.20E+00	2.20E+00	4.05E+00	pCi/l
13-08018-11	TRG	MW-201B-06272013	06/27/13 11:31	8/5/2013	8/13/2013	13-08018	Cobalt-60	EPA 901.1 Modified	1.72E+00	2.49E+00	2.49E+00	5.01E+00	pCi/l
13-08018-11	TRG	MW-201B-06272013	06/27/13 11:31	8/5/2013	8/13/2013	13-08018	Cesium-137	EPA 901.1 Modified	-6.56E-01	2.24E+00	2.24E+00	3.84E+00	pCi/l
13-08018-12	TRG	MW-201A-06272013	06/27/13 11:43	8/5/2013	8/13/2013	13-08018	Cobalt-60	EPA 901.1 Modified	-2.20E+00	2.39E+00	2.40E+00	4.00E+00	pCi/l
13-08018-12	TRG	MW-201A-06272013	06/27/13 11:43	8/5/2013	8/13/2013	13-08018	Cesium-137	EPA 901.1 Modified	-1.02E+00	2.25E+00	2.25E+00	3.79E+00	pCi/l
13-08018-13	TRG	EQUIPMENT-RINSE-06272013	06/27/13 12:35	8/5/2013	8/13/2013	13-08018	Cobalt-60	EPA 901.1 Modified	9.97E-01	2.74E+00	2.74E+00	5.25E+00	pCi/l
13-08018-13	TRG	EQUIPMENT-RINSE-06272013	06/27/13 12:35	8/5/2013	8/13/2013	13-08018	Cesium-137	EPA 901.1 Modified	4.06E+00	2.92E+00	2.93E+00	2.78E+00	pCi/l
13-08018-14	TRG	FIELD-BLANK-06272013	06/27/13 13:00	8/5/2013	8/13/2013	13-08018	Cobalt-60	EPA 901.1 Modified	-3.59E-01	2.20E+00	2.20E+00	4.14E+00	pCi/l
13-08018-14	TRG	FIELD-BLANK-06272013	06/27/13 13:00	8/5/2013	8/13/2013	13-08018	Cesium-137	EPA 901.1 Modified	-8.00E-01	2.39E+00	2.39E+00	4.07E+00	pCi/l

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample; MBL=Blank; DUP=Duplicate; TRG=Normal Sample; DO=Duplicate Original

EBERLINE SERVICES

EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Page: 1 of 1
Project #: 38705-009
Quote #:
COC Number:
PO Number:

Chain of Custody and Analytical Request

13-08018

Work Order Number: 5795

REC'D AUG 05 2013

Laboratory Address: Eberline Services
601 Scarboro Road
Oak Ridge, TN 37830
Phone: 865.481.0683
Fax: 865.483.4621

Client Name: Dairyland Power Cooperative
Phone #:
Project/Site Name: LACBWR
Fax #:
Address:
Collected by: MAD, MVP, LCT
Send Results To: Mike V. Peters → mvp@dairynet.com
Meghan A. Daigle → mdaigle@haleyaldrich.com

Sample Analysis Requested (5) (Fill in the number of containers for each test)

Sample ID (* For composites - indicate start and stop date/time)		*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code (2)	Field Filtered (3)	Sample Matrix (4)	Should this sample be considered: Radioactive	TSCA Regulated	Total number of containers	Strontium	Cobalt-60	Cesium-137	HTDs							<-- Preservative Type (6)	Comments Note: extra sample is required for sample specific QC
										N	N	N	N								
MW-204B-06262013	4	06-26-13	1140	N	N	GW	N	N	2	X	X	X									
MW-204A-06262013	5	06-26-13	1152	N	N	GW	N	N	2	X	X	X									
MW-203B-06262013	6	06-26-13	1332	N	N	GW	N	N	2	X	X	X	X								HOLD HTDs
MW-203A-06262013	7	06-26-13	1401	N	N	GW	N	N	2	X	X	X	X								HOLD HTDs
MW-203B-D-06262013	8	06-26-13	1358	FD	N	GW	N	N	2	X	X	X									
MW-202B-06272013	9	06-27-13	0857	N	N	GW	N	N	3	X	X	X	X								HOLD HTDs
MW-202A-06272013	10	06-27-13	0908	N	N	GW	N	N	3	X	X	X	X								HOLD HTDs
MW-201B-06272013	11	06-27-13	1031	N	N	GW	N	N	3	X	X	X	X								HOLD HTDs
MW-201A-06272013	12	06-27-13	1043	N	N	GW	N	N	3	X	X	X	X								HOLD HTDs
Equipment-Rinse-06272013	13	06-27-13	1135	EB	N	DI	N	N	4	X	X	X									
Field-Blank-06272013	14	06-27-13	1200	EB	N	DI	N	N	4	X	X	X									

Plastic Gallons or 1 Liter Plastic.

TAT Requested: Normal: 10 Rush: Specify: (Subject to Surcharge)
Fax Results: ~~Yes/No~~ (see project setup) email + hardcopy
Circle Deliverable: C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 5

Remarks: *Are there any known hazards applicable to these samples? If so, please list the hazards*
HTDs = Hard to Detects: Carbon-14; Iron-55; Nickel-63; technetium-99; and Iodine-129.
Results to mdaigle@haleyaldrich.com and mvp@dairynet.com

Sample Collection Time Zone: Eastern / Pacific / Central / Other / Mountain X

Chain of Custody Signatures

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1 [signature]	7/31/13	0915	1 Kristen Coulter	8/5/13	1000
2			2		
3			3		

Sample Shipping and Delivery Details

Method of Shipment: FedEx
Date Shipped:
Airbill #:
Airbill #:

1.) Chain of Custody Number = Client Determined
2.) QC Codes: N = Normal Sample, TB = Trip Blank, FD = Field Duplicate, EB = Equipment Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite
3.) Field Filtered: For liquid matrices, indicate with a - Y - for yes the sample was field filtered or - N - for sample was not field filtered.
4.) Matrix Codes: DW=Drinking Water, GW=Groundwater, SW=Surface Water, WW=Waste Water, W=Water, ML=Misc Liquid, SO=Soil, SD=Sediment, SL=Sludge, SS=Solid Waste, O=Oil, F=Filter, P=Wipe, U=Urine, F=Fecal, N=Nasal, DI = Deionized water
5.) Sample Analysis Requested: Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. 8260B - 3, 6010B/7470A - 1).
6.) Preservative Type: HA = Hydrochloric Acid, NI = Nitric Acid, SH = Sodium Hydroxide, SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexane, ST = Sodium Thiosulfate, If no preservative is added = leave field blank

For Lab Receiving Use Only
Custody Seal Intact? YES NO
Cooler Temp: C

COPY

EBERLINE SERVICES

EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD
OAK RIDGE, TENNESSEE 37830
PHONE (865) 481-0683
FAX (865) 483-4621

EBS-OR-36412

November 27, 2013

Robin De Clute
Dairyland Power Cooperative
4601 State Road 35
Genoa, WI 54632

CASE NARRATIVE
Work Order # 13-11035-OR

SAMPLE RECEIPT

This work order contains eleven water samples received 11/12/2013. These samples were analyzed for Strontium-90 and by Gamma Spectroscopy.

CLIENT ID	LAB ID	CLIENT ID	LAB ID
EQUIPMENT-RINSE-11052013	13-11035-04	MW-202B-11052013	13-11035-10
FIELD-BLANK-11052013	13-11035-05	MW-202A-11052013	13-11035-11
MW-204B-11052013	13-11035-06	MW-201B-11052013	13-11035-12
MW-204A-11052013	13-11035-07	MW-201A-11052013	13-11035-13
MW-203B-11052013	13-11035-08	MW-202B-D-11052013	13-11035-14
MW-203A-11052013	13-11035-09		

ANALYTICAL METHODS

Strontium-90 was analyzed using EIChroM Method SRW01 Modified. Gamma Spectroscopy was performed using EPA Method 901.1 Modified.

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 2-sigma value.

STRONTIUM-90

Samples demonstrated acceptable results for all Strontium-90 analyses. Chemical recovery was acceptable for all samples. The Strontium-90 method blank demonstrated acceptable results. Results for the Strontium-90 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Strontium-90 laboratory control sample demonstrated an acceptable percent recovery.

ANALYTICAL RESULTS CONTINUED

GAMMA SPECTROSCOPY

Samples demonstrated acceptable results for all gamma-emitting radionuclides as reported. The Cobalt-60 and Cesium-137 method blank demonstrated acceptable results. Results for the Cobalt-60 and Cesium-137 replicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Cobalt-60 and Cesium-137 laboratory control sample demonstrated an acceptable percent recovery.

CERTIFICATION OF ACCURACY

I certify that this data report is in compliance with the terms and conditions of the Purchase Order, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the cognizant project manager or his/her designee to be accurate as verified by the following signature.

M.R. McDougall
Laboratory Manager

Date: 11/27/2013

Eberline Analytical wants and encourages your feedback regarding our performance providing radioanalytical services. Please visit http://www.eberlineservices.com/client.htm to provide us with feedback on our services.

Eberline Analytical
Final Report of Analysis

Report To:

Robin De Clute
Dairyland Power Cooperative
4601 State Road 35
Genoa, WI 54632

Work Order Details:

SDG: **13-11035**
Purchase Order: 68252
Analysis Category: ENVIRONMENTAL
Sample Matrix: WA

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
13-11035-01	LCS	KNOWN	11/12/13 00:00	11/12/2013	11/15/2013	13-11035	Cobalt-60	EPA 901.1 Modified	1.95E+05	7.82E+03			pCi/l
13-11035-01	LCS	KNOWN	11/12/13 00:00	11/12/2013	11/15/2013	13-11035	Cesium-137	EPA 901.1 Modified	1.24E+05	4.97E+03			pCi/l
13-11035-01	LCS	SPIKE	11/12/13 00:00	11/12/2013	11/15/2013	13-11035	Cobalt-60	EPA 901.1 Modified	2.07E+05	1.22E+04	1.61E+04	1.71E+03	pCi/l
13-11035-01	LCS	SPIKE	11/12/13 00:00	11/12/2013	11/15/2013	13-11035	Cesium-137	EPA 901.1 Modified	1.32E+05	1.13E+04	1.32E+04	2.01E+03	pCi/l
13-11035-02	MBL	BLANK	11/12/13 00:00	11/12/2013	11/15/2013	13-11035	Cobalt-60	EPA 901.1 Modified	-1.81E+00	4.82E+00	4.82E+00	7.95E+00	pCi/l
13-11035-02	MBL	BLANK	11/12/13 00:00	11/12/2013	11/15/2013	13-11035	Cesium-137	EPA 901.1 Modified	1.23E+00	5.06E+00	5.06E+00	8.95E+00	pCi/l
13-11035-03	DUP	EQUIPMENT-RINSE-11052013	11/05/13 13:57	11/12/2013	11/15/2013	13-11035	Cobalt-60	EPA 901.1 Modified	1.06E+00	2.15E+00	2.15E+00	4.36E+00	pCi/l
13-11035-03	DUP	EQUIPMENT-RINSE-11052013	11/05/13 13:57	11/12/2013	11/15/2013	13-11035	Cesium-137	EPA 901.1 Modified	2.69E+00	2.58E+00	2.58E+00	4.26E+00	pCi/l
13-11035-04	DO	EQUIPMENT-RINSE-11052013	11/05/13 13:57	11/12/2013	11/15/2013	13-11035	Cobalt-60	EPA 901.1 Modified	4.24E-01	2.18E+00	2.18E+00	4.13E+00	pCi/l
13-11035-04	DO	EQUIPMENT-RINSE-11052013	11/05/13 13:57	11/12/2013	11/15/2013	13-11035	Cesium-137	EPA 901.1 Modified	1.77E+00	2.20E+00	2.20E+00	4.34E+00	pCi/l
13-11035-05	TRG	FIELD-BLANK-11052013	11/05/13 14:10	11/12/2013	11/15/2013	13-11035	Cobalt-60	EPA 901.1 Modified	2.52E+00	2.96E+00	2.97E+00	5.57E+00	pCi/l
13-11035-05	TRG	FIELD-BLANK-11052013	11/05/13 14:10	11/12/2013	11/15/2013	13-11035	Cesium-137	EPA 901.1 Modified	1.93E+00	2.89E+00	2.89E+00	5.71E+00	pCi/l
13-11035-06	TRG	MW-204B-11052013	11/05/13 09:17	11/12/2013	11/15/2013	13-11035	Cobalt-60	EPA 901.1 Modified	1.93E+00	4.11E+00	4.11E+00	8.24E+00	pCi/l
13-11035-06	TRG	MW-204B-11052013	11/05/13 09:17	11/12/2013	11/15/2013	13-11035	Cesium-137	EPA 901.1 Modified	8.68E-01	4.38E+00	4.38E+00	7.92E+00	pCi/l
13-11035-07	TRG	MW-204A-11052013	11/05/13 09:47	11/12/2013	11/15/2013	13-11035	Cobalt-60	EPA 901.1 Modified	-2.40E-01	7.16E-01	7.16E-01	4.52E+00	pCi/l
13-11035-07	TRG	MW-204A-11052013	11/05/13 09:47	11/12/2013	11/15/2013	13-11035	Cesium-137	EPA 901.1 Modified	-7.36E-02	2.52E+00	2.52E+00	4.77E+00	pCi/l
13-11035-08	TRG	MW-203B-11052013	11/05/13 11:06	11/12/2013	11/15/2013	13-11035	Cobalt-60	EPA 901.1 Modified	4.67E-01	1.93E+00	1.93E+00	3.89E+00	pCi/l
13-11035-08	TRG	MW-203B-11052013	11/05/13 11:06	11/12/2013	11/15/2013	13-11035	Cesium-137	EPA 901.1 Modified	-2.24E-01	2.29E+00	2.29E+00	3.98E+00	pCi/l
13-11035-09	TRG	MW-203A-11052013	11/05/13 11:00	11/12/2013	11/15/2013	13-11035	Cobalt-60	EPA 901.1 Modified	3.51E+00	2.24E+00	2.25E+00	4.43E+00	pCi/l
13-11035-09	TRG	MW-203A-11052013	11/05/13 11:00	11/12/2013	11/15/2013	13-11035	Cesium-137	EPA 901.1 Modified	1.11E+00	2.28E+00	2.29E+00	4.41E+00	pCi/l
13-11035-10	TRG	MW-202B-11052013	11/05/13 12:18	11/12/2013	11/15/2013	13-11035	Cobalt-60	EPA 901.1 Modified	4.87E-01	2.93E+00	2.93E+00	5.41E+00	pCi/l
13-11035-10	TRG	MW-202B-11052013	11/05/13 12:18	11/12/2013	11/15/2013	13-11035	Cesium-137	EPA 901.1 Modified	-2.62E-01	2.50E+00	2.50E+00	4.70E+00	pCi/l

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample; MBL=Blank; DUP=Duplicate; TRG=Normal Sample; DO=Duplicate Original

EBERLINE SERVICES

EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical
Final Report of Analysis

Report To:

Robin De Clute
Dairyland Power Cooperative
4601 State Road 35
Genoa, WI 54632

Work Order Details:

SDG: 13-11035
Purchase Order: 68252
Analysis Category: ENVIRONMENTAL
Sample Matrix: WA

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
13-11035-11	TRG	MW-202A-11052013	11/05/13 12:18	11/12/2013	11/15/2013	13-11035	Cobalt-60	EPA 901.1 Modified	3.50E-01	4.55E+00	4.55E+00	8.26E+00	pCi/l
13-11035-11	TRG	MW-202A-11052013	11/05/13 12:18	11/12/2013	11/15/2013	13-11035	Cesium-137	EPA 901.1 Modified	1.61E+00	4.71E+00	4.71E+00	8.54E+00	pCi/l
13-11035-12	TRG	MW-201B-11052013	11/05/13 13:28	11/12/2013	11/15/2013	13-11035	Cobalt-60	EPA 901.1 Modified	2.48E-01	1.90E+00	1.90E+00	3.80E+00	pCi/l
13-11035-12	TRG	MW-201B-11052013	11/05/13 13:28	11/12/2013	11/15/2013	13-11035	Cesium-137	EPA 901.1 Modified	1.96E-01	1.86E+00	1.86E+00	3.73E+00	pCi/l
13-11035-13	TRG	MW-201A-11052013	11/05/13 13:34	11/12/2013	11/15/2013	13-11035	Cobalt-60	EPA 901.1 Modified	1.80E+00	2.22E+00	2.22E+00	4.64E+00	pCi/l
13-11035-13	TRG	MW-201A-11052013	11/05/13 13:34	11/12/2013	11/15/2013	13-11035	Cesium-137	EPA 901.1 Modified	2.10E+00	2.34E+00	2.35E+00	4.64E+00	pCi/l
13-11035-14	TRG	MW-202B-D-11052013	11/05/13 12:18	11/12/2013	11/15/2013	13-11035	Cobalt-60	EPA 901.1 Modified	-1.11E+00	2.09E+00	2.09E+00	5.06E+00	pCi/l
13-11035-14	TRG	MW-202B-D-11052013	11/05/13 12:18	11/12/2013	11/15/2013	13-11035	Cesium-137	EPA 901.1 Modified	1.87E+00	2.34E+00	2.34E+00	4.83E+00	pCi/l
13-11035-01	LCS	KNOWN	11/12/13 00:00	11/12/2013	11/19/2013	13-11035	Strontium-90	EIChroM SRW01 Modified	4.71E+01	2.64E-01			pCi/l
13-11035-01	LCS	SPIKE	11/12/13 00:00	11/12/2013	11/19/2013	13-11035	Strontium-90	EIChroM SRW01 Modified	4.32E+01	2.54E+00	6.40E+00	1.19E+00	pCi/l
13-11035-02	MBL	BLANK	11/12/13 00:00	11/12/2013	11/19/2013	13-11035	Strontium-90	EIChroM SRW01 Modified	4.76E-02	2.58E-01	2.58E-01	5.48E-01	pCi/l
13-11035-03	DUP	EQUIPMENT-RINSE-11052013	11/05/13 13:57	11/12/2013	11/19/2013	13-11035	Strontium-90	EIChroM SRW01 Modified	1.34E-01	4.64E-01	4.64E-01	9.81E-01	pCi/l
13-11035-04	DO	EQUIPMENT-RINSE-11052013	11/05/13 13:57	11/12/2013	11/19/2013	13-11035	Strontium-90	EIChroM SRW01 Modified	6.40E-01	5.73E-01	5.79E-01	1.15E+00	pCi/l
13-11035-05	TRG	FIELD-BLANK-11052013	11/05/13 14:10	11/12/2013	11/19/2013	13-11035	Strontium-90	EIChroM SRW01 Modified	2.10E-01	5.05E-01	5.05E-01	1.06E+00	pCi/l
13-11035-06	TRG	MW-204B-11052013	11/05/13 09:17	11/12/2013	11/19/2013	13-11035	Strontium-90	EIChroM SRW01 Modified	2.03E-01	7.17E-01	7.18E-01	1.51E+00	pCi/l
13-11035-07	TRG	MW-204A-11052013	11/05/13 09:47	11/12/2013	11/19/2013	13-11035	Strontium-90	EIChroM SRW01 Modified	4.06E-01	5.71E-01	5.73E-01	1.18E+00	pCi/l
13-11035-08	TRG	MW-203B-11052013	11/05/13 11:06	11/12/2013	11/19/2013	13-11035	Strontium-90	EIChroM SRW01 Modified	-8.98E-02	1.12E+00	1.12E+00	2.40E+00	pCi/l
13-11035-09	TRG	MW-203A-11052013	11/05/13 11:00	11/12/2013	11/19/2013	13-11035	Strontium-90	EIChroM SRW01 Modified	4.92E-02	8.75E-01	8.75E-01	1.87E+00	pCi/l
13-11035-10	TRG	MW-202B-11052013	11/05/13 12:18	11/12/2013	11/19/2013	13-11035	Strontium-90	EIChroM SRW01 Modified	-5.67E-01	8.17E-01	8.21E-01	1.81E+00	pCi/l
13-11035-11	TRG	MW-202A-11052013	11/05/13 12:18	11/12/2013	11/19/2013	13-11035	Strontium-90	EIChroM SRW01 Modified	4.74E-01	5.78E-01	5.82E-01	1.18E+00	pCi/l
13-11035-12	TRG	MW-201B-11052013	11/05/13 13:28	11/12/2013	11/19/2013	13-11035	Strontium-90	EIChroM SRW01 Modified	2.80E-01	9.03E-01	9.04E-01	1.90E+00	pCi/l
13-11035-13	TRG	MW-201A-11052013	11/05/13 13:34	11/12/2013	11/19/2013	13-11035	Strontium-90	EIChroM SRW01 Modified	2.98E-01	5.67E-01	5.68E-01	1.18E+00	pCi/l
13-11035-14	TRG	MW-202B-D-11052013	11/05/13 12:18	11/12/2013	11/19/2013	13-11035	Strontium-90	EIChroM SRW01 Modified	5.81E-01	7.71E-01	7.75E-01	1.59E+00	pCi/l

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample; MBL=Blank; DUP=Duplicate; TRG=Normal Sample; DO=Duplicate Original

EBERLINE SERVICES

EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Page: 1 of 1
Project #:
Quote #:
COC Number:
PO Number:

Chain of Custody and Analytical Request

Work Order Number: 13-11035

Laboratory Address: Eberline Services
601 Scarboro Road
Oak Ridge, TN 37830
Phone: 865.481.0683
Fax: 865.483.4621

Client Name: Dairyland Power Cooperative — Phone #: 608.792.9568
Project/Site Name: LACBWR — Fax #:
Address: 3251 East Avenue South, P.O. Box 817, La Crosse, WI 54602
Collected by: MVP, LCT — Send Results To: Mike V. Peters, mvp@dairynet.com and Meghan Daigle, mdaigle@haleyaldrich.com

Sample Analysis Requested (5) (Fill in the number of containers for each test)

Sample ID (* For composites - indicate start and stop date/time)	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code (2)	Field Filtered (3)	Sample Matrix (4)	Radioactive	TSCA Regulated	Total number of containers	905.0 - Strontium-90	901.1 - Cobalt-60, Cesium-137	Hard-to-Detects (HTDs)	906.0 - Tritium							<-- Preservative Type (6) / Comments
						Should this sample be considered:			---	---	---	---							
									gal poly	gal poly	gal poly	oz. glass jars							
Equipment-Rinse- 1105 2013 4	11/05/2013	1357	EB	N	W	n	n	1	X	X									
Field-Blank- 1105 2013 5	11/05/2013	1410	EB	N	W	n	n	1	X	X									
MW-204B-11052013 6	11/05/2013	0917	N	N	GW	n	n	1	X	X	X								Hold HTD's
MW-204A-11052013 7	11/05/2013	0947	N	N	GW	n	n	1	X	X									
MW-203B-11052013 8	11/05/2013	1106	N	N	GW	n	n	1	X	X	X								Hold HTD's
MW-203A-11052013 9	11/05/2013	1100	N	N	GW	n	n	1	X	X	X								Hold HTD's
MW-202B-11052013 10	11/05/2013	1218	N	N	GW	n	n	1	X	X									
MW-202A-11052013 11	11/05/2013	1218	N	N	GW	n	n	1	X	X									
MW-201B-11052013 12	11/05/2013	1328	N	N	GW	n	n	1	X	X									
MW-201A-11052013 13	11/05/2013	1334	N	N	GW	n	n	1	X	X	X								Hold HTD's
MW-202B-D-11052013 14	11/05/2013	1218	FD	N	GW	n	n	1	X	X									

RECD NOV 12 2013

TAT Requested: Normal: 10 Rush: Specify: (Subject to Surcharge) — Send results by **e-mail and hardcopy**

Circle Deliverable: C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 5

Remarks: *Are there any known hazards applicable to these samples? If so, please list the hazards*
Hold all HTD analyses until notified. HTDs = Hard to Detects: carbon-14, iron-55, nickel-63, technetium-99, iodine-129.

Sample Collection Time Zone: Eastern / Pacific / Central / Mountain / Other

Chain of Custody Signatures

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1	11/6/13	MTA			
2			2		
3			3 Kristen Conlon	11/12/13	1310

Sample Shipping and Delivery Details

Method of Shipment: UPS — Date Shipped: 11/6/13
Tracking # 1Z 576 507 03 4526 4334
Airbill #:

For Lab Receiving Use Only
Custody Seal Intact? YES NO
Cooler Temp: C

1.) Chain of Custody Number = Client Determined
2.) QC Codes: N = Normal Sample, TB = Trip Blank, FD = Field Duplicate, EB = Equipment Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite
3.) Field Filtered: For liquid matrices, indicate with-eY - for yes the sample was field filtered or N - for sample was not field filtered.
4.) Matrix Codes: DW=Drinking Water, GW=Groundwater, SW=Surface Water, WW=Waste Water, W=Water, ML=Misc Liquid
5.) Sample Analysis Requested: Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. 8260B - 3, 6010B/7470A - 1).
6.) Preservative Type: HA = Hydrochloric Acid, NI = Nitric Acid, SH = Sodium Hydroxide, SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexane, ST = Sodium Thiosulfate, If no preservative is added = put a dash in the field

APPENDIX F

Rising and Falling Head Test Summary Forms

HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-200A
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

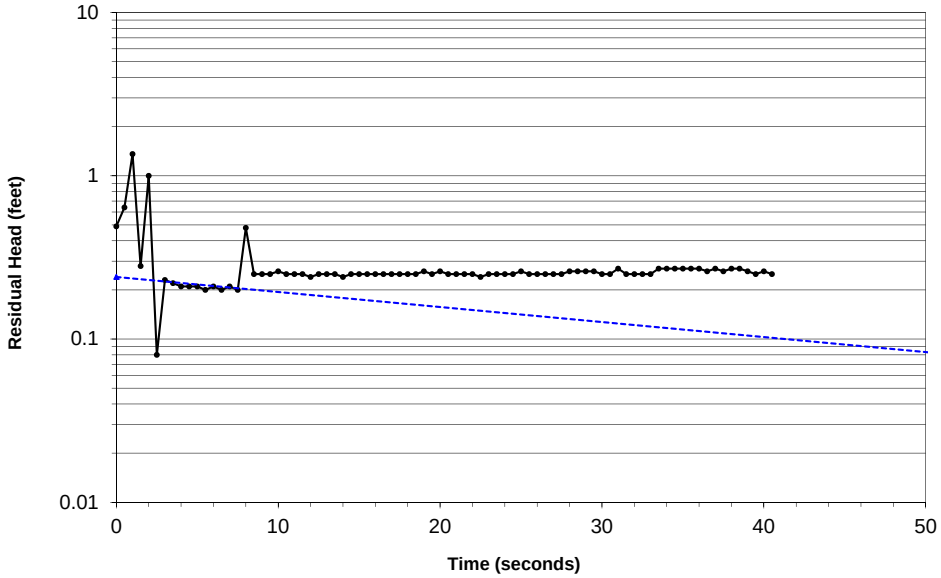
MW-200A

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	28.11	
Depth to Static (PVC) in ft.:	20.97	
Well Depth-Static (Lw), in ft.:	7.14	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2390	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.14	
A:	2.226	
B:	0.347	
C:	1.700	
Le/rw:	20.169	
Saturated Thickness (H), in ft.:	7.14	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.220	
Yo, in ft.:	0.24	
Yt, in ft.:	0.010	
t, in min.:	2.500	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		5.73E-03
Kh (ft/min) =		1.13E-02
Kh (ft/day) =		1.63E+01

Elapsed Time (sec)	Residual Head (ft.)
0	0.49
0.5	0.64
1	1.36
1.5	0.28
2	1
2.5	0.08
3	0.23
3.5	0.22
4	0.21
4.5	0.21
5	0.21
5.5	0.2
6	0.21
6.5	0.2
7	0.21
7.5	0.2
8	0.48
8.5	0.25
9	0.25
9.5	0.25
10	0.26
10.5	0.25
11	0.25
11.5	0.25
12	0.24
12.5	0.25
13	0.25
13.5	0.25
14	0.24
14.5	0.25
15	0.25
15.5	0.25
16	0.25
16.5	0.25
17	0.25
17.5	0.25
18	0.25
18.5	0.25
19	0.26
19.5	0.25
20	0.26
20.5	0.25
21	0.25
21.5	0.25
22	0.25
22.5	0.24
23	0.25
23.5	0.25
24	0.25
24.5	0.25



HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-200A
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

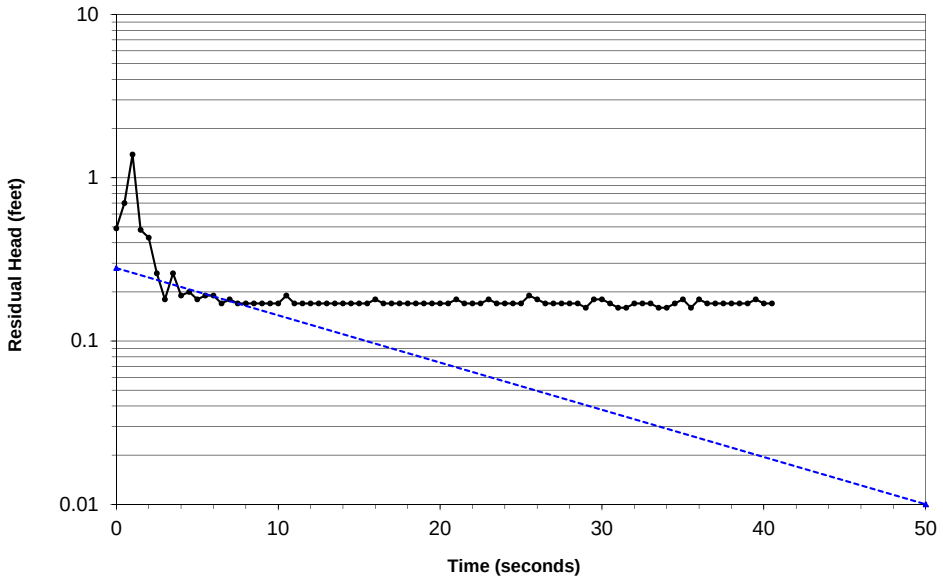
MW-200A

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	28.11	
Depth to Static (PVC) in ft.:	20.97	
Well Depth-Static (Lw), in ft.:	7.14	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2390	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.14	
A:	2.226	
B:	0.347	
C:	1.700	
Le/rw:	20.169	
Saturated Thickness (H), in ft.:	7.14	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.220	
Yo, in ft.:	0.28	
Yt, in ft.:	0.010	
t, in min.:	0.833	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		1.80E-02
Kh (ft/min) =		3.55E-02
Kh (ft/day) =		5.11E+01

Elapsed Time (sec)	Residual Head (ft.)
0	0.49
0.5	0.7
1	1.39
1.5	0.48
2	0.43
2.5	0.26
3	0.18
3.5	0.26
4	0.19
4.5	0.2
5	0.18
5.5	0.19
6	0.19
6.5	0.17
7	0.18
7.5	0.17
8	0.17
8.5	0.17
9	0.17
9.5	0.17
10	0.17
10.5	0.19
11	0.17
11.5	0.17
12	0.17
12.5	0.17
13	0.17
13.5	0.17
14	0.17
14.5	0.17
15	0.17
15.5	0.17
16	0.18
16.5	0.17
17	0.17
17.5	0.17
18	0.17
18.5	0.17
19	0.17
19.5	0.17
20	0.17
20.5	0.17
21	0.18
21.5	0.17
22	0.17
22.5	0.17
23	0.18
23.5	0.17
24	0.17
24.5	0.17



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-200A
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

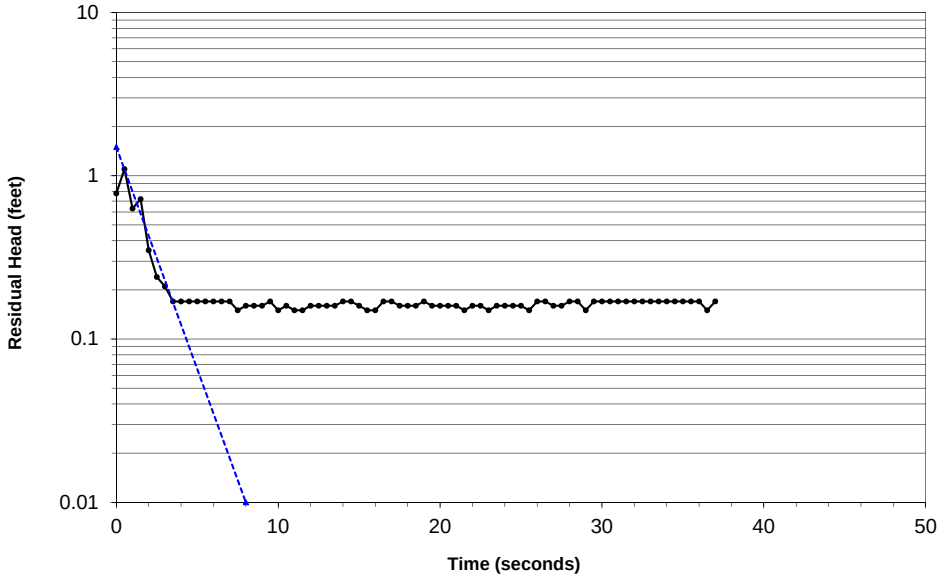
MW-200A

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	28.11	
Depth to Static (PVC) in ft.:	20.97	
Well Depth-Static (Lw), in ft.:	7.14	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.14	
A:	2.225	
B:	0.347	
C:	1.699	
Le/rw:	20.160	
Saturated Thickness (H), in ft.:	7.14	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.220	
Yo, in ft.:	1.50	
Yt, in ft.:	0.010	
t, in min.:	0.133	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		1.69E-01
Kh (ft/min) =		3.33E-01
Kh (ft/day) =		4.80E+02

Elapsed Time (sec)	Residual Head (ft.)
0	0.78
0.5	1.1
1	0.63
1.5	0.72
2	0.35
2.5	0.24
3	0.21
3.5	0.17
4	0.17
4.5	0.17
5	0.17
5.5	0.17
6	0.17
6.5	0.17
7	0.17
7.5	0.15
8	0.16
8.5	0.16
9	0.16
9.5	0.17
10	0.15
10.5	0.16
11	0.15
11.5	0.15
12	0.16
12.5	0.16
13	0.16
13.5	0.16
14	0.17
14.5	0.17
15	0.16
15.5	0.15
16	0.15
16.5	0.17
17	0.17
17.5	0.16
18	0.16
18.5	0.16
19	0.17
19.5	0.16
20	0.16
20.5	0.16
21	0.16
21.5	0.15
22	0.16
22.5	0.16
23	0.15
23.5	0.16
24	0.16
24.5	0.16



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-200A
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

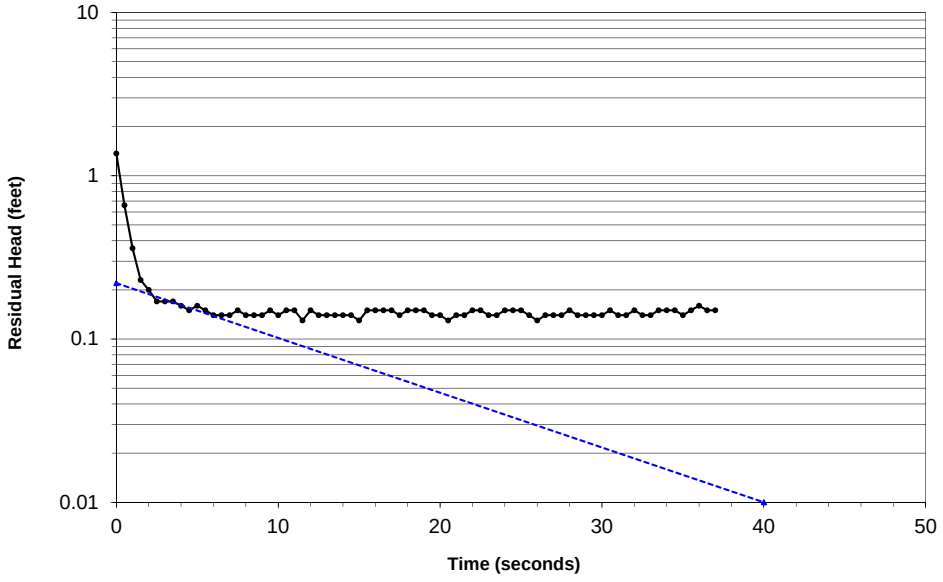
MW-200A

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	28.11	
Depth to Static (PVC) in ft.:	20.97	
Well Depth-Static (Lw), in ft.:	7.14	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.14	
A:	2.225	
B:	0.347	
C:	1.699	
Le/rw:	20.160	
Saturated Thickness (H), in ft.:	7.14	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.220	
Yo, in ft.:	0.22	
Yt, in ft.:	0.010	
t, in min.:	0.667	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		2.09E-02
Kh (ft/min) =		4.11E-02
Kh (ft/day) =		5.92E+01

Elapsed Time (sec)	Residual Head (ft.)
0	1.37
0.5	0.66
1	0.36
1.5	0.23
2	0.2
2.5	0.17
3	0.17
3.5	0.17
4	0.16
4.5	0.15
5	0.16
5.5	0.15
6	0.14
6.5	0.14
7	0.14
7.5	0.15
8	0.14
8.5	0.14
9	0.14
9.5	0.15
10	0.14
10.5	0.15
11	0.15
11.5	0.13
12	0.15
12.5	0.14
13	0.14
13.5	0.14
14	0.14
14.5	0.14
15	0.13
15.5	0.15
16	0.15
16.5	0.15
17	0.15
17.5	0.14
18	0.15
18.5	0.15
19	0.15
19.5	0.14
20	0.14
20.5	0.13
21	0.14
21.5	0.14
22	0.15
22.5	0.15
23	0.14
23.5	0.14
24	0.15
24.5	0.15



HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-200B
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

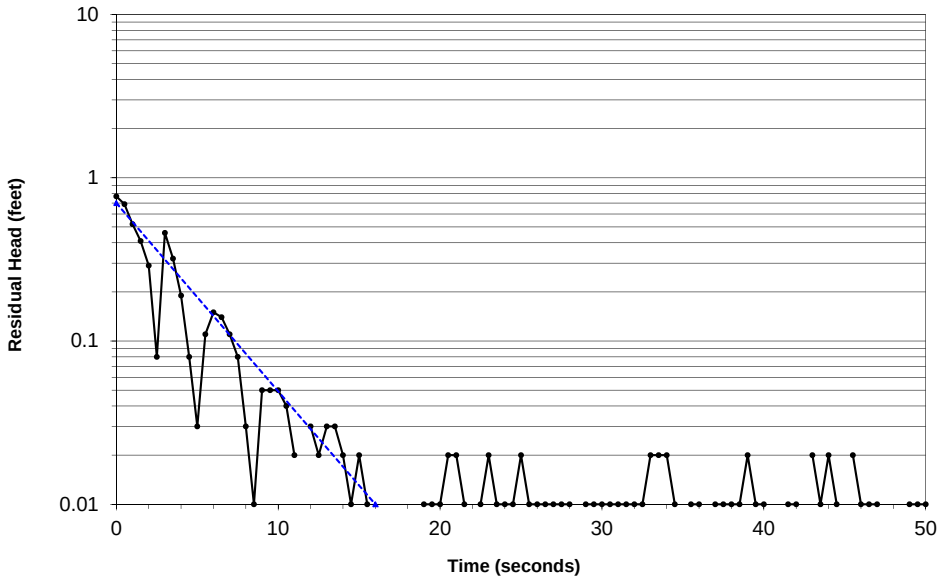
MW-200B

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	58.36	
Depth to Static (PVC) in ft.:	20.36	
Well Depth-Static (Lw), in ft.:	38	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	38	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.244	
Yo, in ft.:	0.70	
Yt, in ft.:	0.010	
t, in min.:	0.267	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		7.49E-02
Kh (ft/min) =		1.47E-01
Kh (ft/day) =		2.12E+02

Elapsed Time (sec)	Residual Head (ft.)
0	0.77
0.5	0.69
1	0.52
1.5	0.41
2	0.29
2.5	0.08
3	0.46
3.5	0.32
4	0.19
4.5	0.08
5	0.03
5.5	0.11
6	0.15
6.5	0.14
7	0.11
7.5	0.08
8	0.03
8.5	0.01
9	0.05
9.5	0.05
10	0.05
10.5	0.04
11	0.02
11.5	0
12	0.03
12.5	0.02
13	0.03
13.5	0.03
14	0.02
14.5	0.01
15	0.02
15.5	0.01
16	0
16.5	0
17	0
17.5	0
18	0
18.5	0
19	0.01
19.5	0.01
20	0.01
20.5	0.02
21	0.02
21.5	0.01
22	0
22.5	0.01
23	0.02
23.5	0.01
24	0.01
24.5	0.01



HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-200B
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

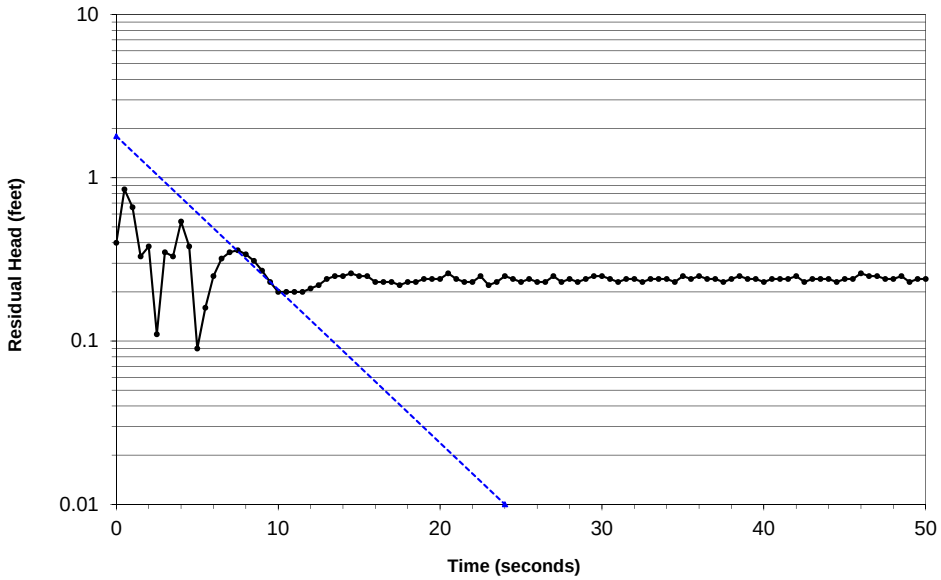
MW-200B

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	58.36	
Depth to Static (PVC) in ft.:	20.36	
Well Depth-Static (Lw), in ft.:	38	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	38	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.244	
Yo, in ft.:	1.80	
Yt, in ft.:	0.010	
t, in min.:	0.400	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		6.11E-02
Kh (ft/min) =		1.20E-01
Kh (ft/day) =		1.73E+02

Elapsed Time (sec)	Residual Head (ft.)
0	0.4
0.5	0.85
1	0.66
1.5	0.33
2	0.38
2.5	0.11
3	0.35
3.5	0.33
4	0.54
4.5	0.38
5	0.09
5.5	0.16
6	0.25
6.5	0.32
7	0.35
7.5	0.36
8	0.34
8.5	0.31
9	0.27
9.5	0.23
10	0.2
10.5	0.2
11	0.2
11.5	0.2
12	0.21
12.5	0.22
13	0.24
13.5	0.25
14	0.25
14.5	0.26
15	0.25
15.5	0.25
16	0.23
16.5	0.23
17	0.23
17.5	0.22
18	0.23
18.5	0.23
19	0.24
19.5	0.24
20	0.24
20.5	0.26
21	0.24
21.5	0.23
22	0.23
22.5	0.25
23	0.22
23.5	0.23
24	0.25
24.5	0.24



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-200B
GREAT RIVER ROAD, GENOA, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

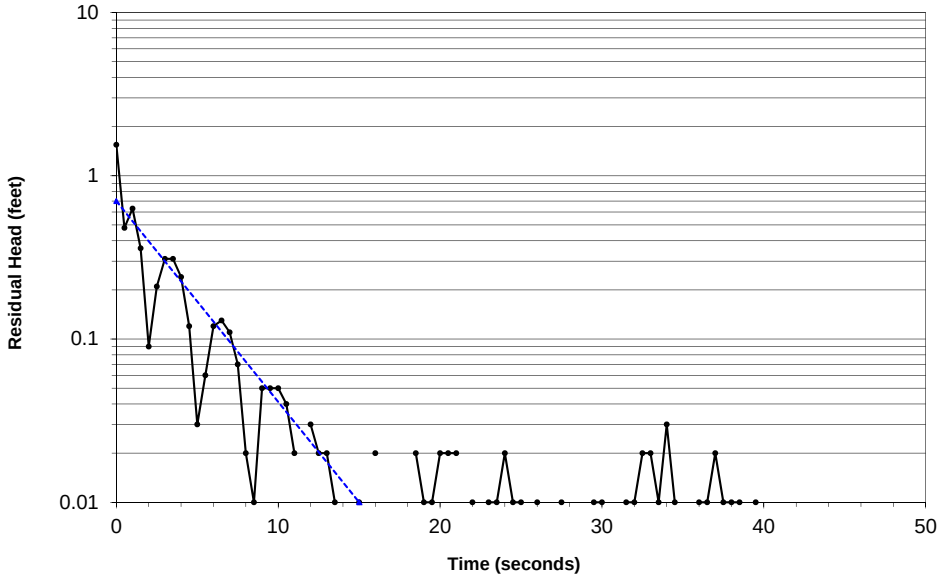
MW-200B

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	58.36	
Depth to Static (PVC) in ft.:	20.36	
Well Depth-Static (Lw), in ft.:	38	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	38	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.244	
Yo, in ft.:	0.70	
Yt, in ft.:	0.010	
t, in min.:	0.250	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		7.99E-02
Kh (ft/min) =		1.57E-01
Kh (ft/day) =		2.27E+02

Elapsed Time (sec)	Residual Head (ft.)
0	1.55
0.5	0.48
1	0.63
1.5	0.36
2	0.09
2.5	0.21
3	0.31
3.5	0.31
4	0.24
4.5	0.12
5	0.03
5.5	0.06
6	0.12
6.5	0.13
7	0.11
7.5	0.07
8	0.02
8.5	0.01
9	0.05
9.5	0.05
10	0.05
10.5	0.04
11	0.02
11.5	0
12	0.03
12.5	0.02
13	0.02
13.5	0.01
14	0
14.5	0
15	0.01
15.5	0
16	0.02
16.5	0
17	0
17.5	0
18	0
18.5	0.02
19	0.01
19.5	0.01
20	0.02
20.5	0.02
21	0.02
21.5	0
22	0.01
22.5	0
23	0.01
23.5	0.01
24	0.02
24.5	0.01



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-200B
GREAT RIVER ROAD, GENOA, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

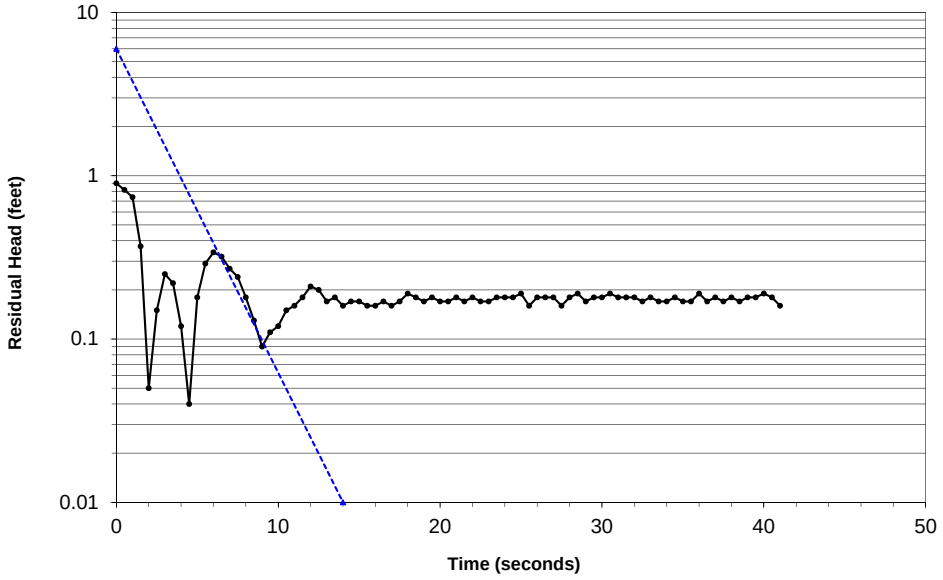
MW-200B

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	58.36	
Depth to Static (PVC) in ft.:	20.36	
Well Depth-Static (Lw), in ft.:	38	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	38	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.244	
Yo, in ft.:	6.00	
Yt, in ft.:	0.010	
t, in min.:	0.233	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		1.29E-01
Kh (ft/min) =		2.54E-01
Kh (ft/day) =		3.65E+02

Elapsed Time (sec)	Residual Head (ft.)
0	0.9
0.5	0.82
1	0.74
1.5	0.37
2	0.05
2.5	0.15
3	0.25
3.5	0.22
4	0.12
4.5	0.04
5	0.18
5.5	0.29
6	0.34
6.5	0.32
7	0.27
7.5	0.24
8	0.18
8.5	0.13
9	0.09
9.5	0.11
10	0.12
10.5	0.15
11	0.16
11.5	0.18
12	0.21
12.5	0.2
13	0.17
13.5	0.18
14	0.16
14.5	0.17
15	0.17
15.5	0.16
16	0.16
16.5	0.17
17	0.16
17.5	0.17
18	0.19
18.5	0.18
19	0.17
19.5	0.18
20	0.17
20.5	0.17
21	0.18
21.5	0.17
22	0.18
22.5	0.17
23	0.17
23.5	0.18
24	0.18
24.5	0.18



HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-201A
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

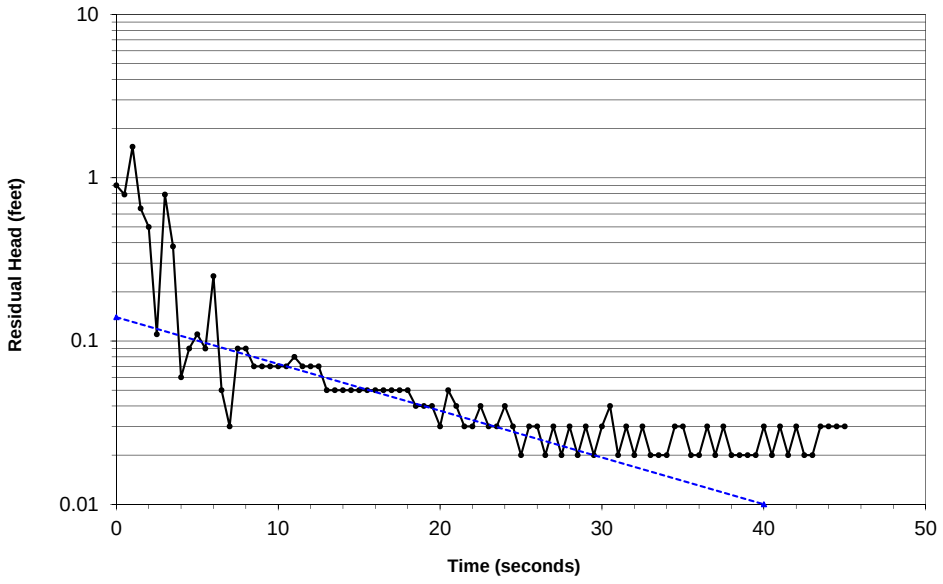
MW-201A

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	27.95	
Depth to Static (PVC) in ft.:	19.97	
Well Depth-Static (Lw), in ft.:	7.98	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.98	
A:	2.296	
B:	0.362	
C:	1.806	
Le/rw:	22.532	
Saturated Thickness (H), in ft.:	7.98	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.308	
Yo, in ft.:	0.14	
Yt, in ft.:	0.010	
t, in min.:	0.667	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		1.66E-02
Kh (ft/min) =		3.27E-02
Kh (ft/day) =		4.70E+01

Elapsed Time (sec)	Residual Head (ft.)
0	0.9
0.5	0.79
1	1.55
1.5	0.65
2	0.5
2.5	0.11
3	0.79
3.5	0.38
4	0.06
4.5	0.09
5	0.11
5.5	0.09
6	0.25
6.5	0.05
7	0.03
7.5	0.09
8	0.09
8.5	0.07
9	0.07
9.5	0.07
10	0.07
10.5	0.07
11	0.08
11.5	0.07
12	0.07
12.5	0.07
13	0.05
13.5	0.05
14	0.05
14.5	0.05
15	0.05
15.5	0.05
16	0.05
16.5	0.05
17	0.05
17.5	0.05
18	0.05
18.5	0.04
19	0.04
19.5	0.04
20	0.03
20.5	0.05
21	0.04
21.5	0.03
22	0.03
22.5	0.04
23	0.03
23.5	0.03
24	0.04
24.5	0.03



HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-201A
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

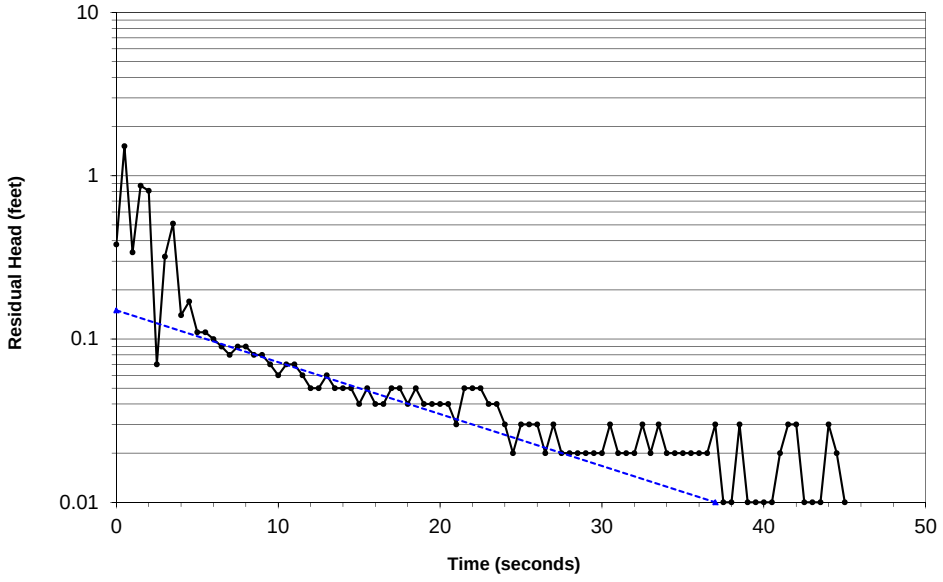
MW-201A

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	27.95	
Depth to Static (PVC) in ft.:	19.97	
Well Depth-Static (Lw), in ft.:	7.98	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.98	
A:	2.296	
B:	0.362	
C:	1.806	
Le/rw:	22.532	
Saturated Thickness (H), in ft.:	7.98	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.308	
Yo, in ft.:	0.15	
Yt, in ft.:	0.010	
t, in min.:	0.617	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		1.84E-02
Kh (ft/min) =		3.62E-02
Kh (ft/day) =		5.22E+01

Elapsed Time (sec)	Residual Head (ft.)
0	0.38
0.5	1.52
1	0.34
1.5	0.87
2	0.81
2.5	0.07
3	0.32
3.5	0.51
4	0.14
4.5	0.17
5	0.11
5.5	0.11
6	0.1
6.5	0.09
7	0.08
7.5	0.09
8	0.09
8.5	0.08
9	0.08
9.5	0.07
10	0.06
10.5	0.07
11	0.07
11.5	0.06
12	0.05
12.5	0.05
13	0.06
13.5	0.05
14	0.05
14.5	0.05
15	0.04
15.5	0.05
16	0.04
16.5	0.04
17	0.05
17.5	0.05
18	0.04
18.5	0.05
19	0.04
19.5	0.04
20	0.04
20.5	0.04
21	0.03
21.5	0.05
22	0.05
22.5	0.05
23	0.04
23.5	0.04
24	0.03
24.5	0.02



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-201A
GREAT RIVER ROAD, GENOA, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

MW-201A

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	27.95	
Depth to Static (PVC) in ft.:	19.97	
Well Depth-Static (Lw), in ft.:	7.98	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.98	
A:	2.296	
B:	0.362	
C:	1.806	
Le/rw:	22.532	
Saturated Thickness (H), in ft.:	7.98	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.308	
Yo, in ft.:	1.20	
Yt, in ft.:	0.010	
t, in min.:	0.183	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		1.09E-01
Kh (ft/min) =		2.16E-01
Kh (ft/day) =		3.10E+02

Elapsed Time (sec)	Residual Head (ft.)
0	1.07
0.5	0.28
1	0.81
1.5	0.71
2	0.52
2.5	0.4
3	0.31
3.5	0.23
4	0.19
4.5	0.14
5	0.11
5.5	0.1
6	0.08
6.5	0.06
7	0.06
7.5	0.04
8	0.04
8.5	0.05
9	0.04
9.5	0.02
10	0.03
10.5	0.03
11	0.03
11.5	0.02
12	0.02
12.5	0.02
13	0
13.5	0.01
14	0
14.5	0
15	0.01
15.5	0
16	0
16.5	0
17	0
17.5	0
18	0
18.5	0
19	0.01
19.5	0.01
20	0
20.5	0
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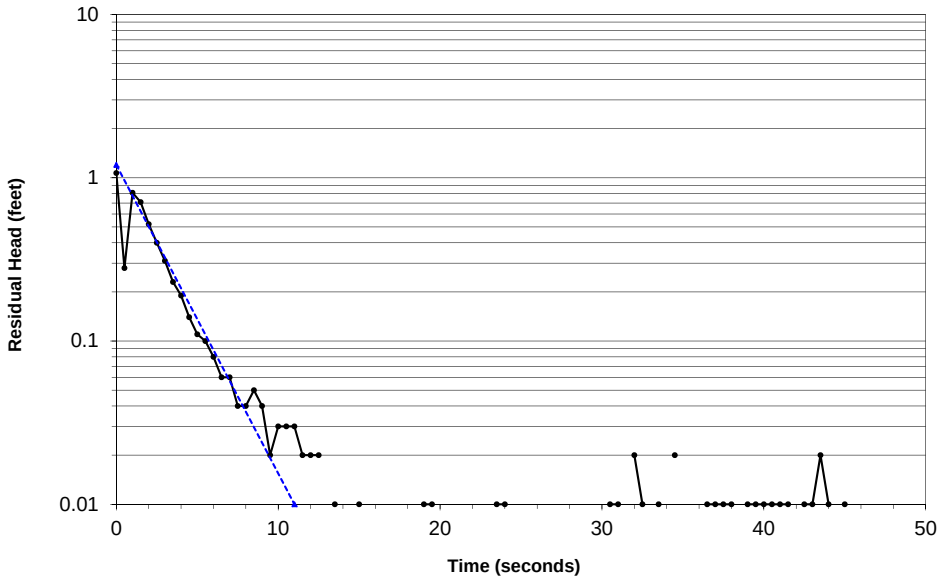
22	0
22.5	0
23	0
23.5	0.01
24	0.01
24.5	0



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-201A
GREAT RIVER ROAD, GENOA, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

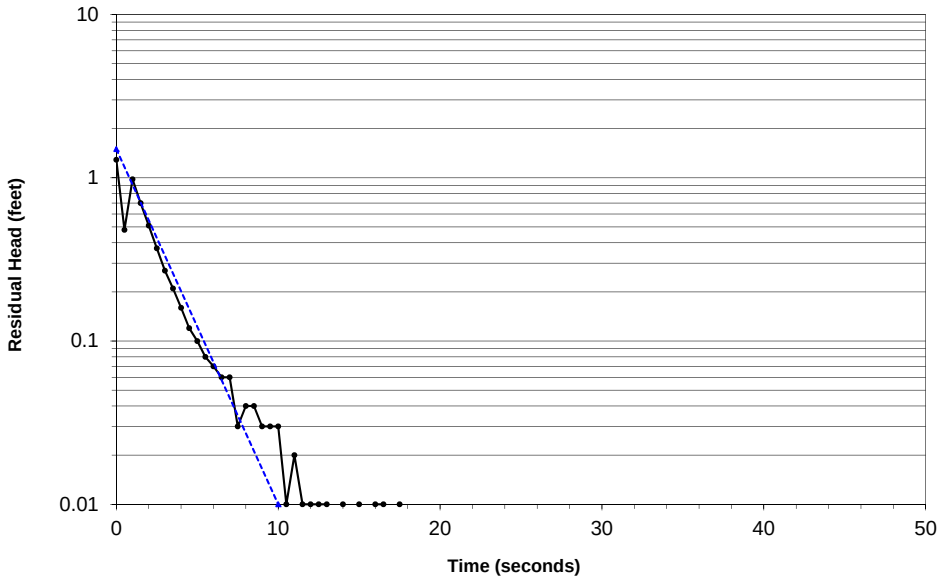
MW-201A

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	27.95	
Depth to Static (PVC) in ft.:	19.97	
Well Depth-Static (Lw), in ft.:	7.98	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.98	
A:	2.296	
B:	0.362	
C:	1.806	
Le/rw:	22.532	
Saturated Thickness (H), in ft.:	7.98	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.308	
Yo, in ft.:	1.50	
Yt, in ft.:	0.010	
t, in min.:	0.167	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		1.26E-01
Kh (ft/min) =		2.48E-01
Kh (ft/day) =		3.57E+02

Elapsed Time (sec)	Residual Head (ft.)
0	1.29
0.5	0.48
1	0.98
1.5	0.7
2	0.51
2.5	0.37
3	0.27
3.5	0.21
4	0.16
4.5	0.12
5	0.1
5.5	0.08
6	0.07
6.5	0.06
7	0.06
7.5	0.03
8	0.04
8.5	0.04
9	0.03
9.5	0.03
10	0.03
10.5	0.01
11	0.02
11.5	0.01
12	0.01
12.5	0.01
13	0.01
13.5	0
14	0.01
14.5	0
15	0.01
15.5	0
16	0.01
16.5	0.01
17	0
17.5	0.01
18	0
18.5	-0.01
19	0
19.5	-0.01
20	0
20.5	-0.01
21	0
21.5	0
22	0
22.5	0
23	-0.01
23.5	-0.01
24	0
24.5	0



HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-201B
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

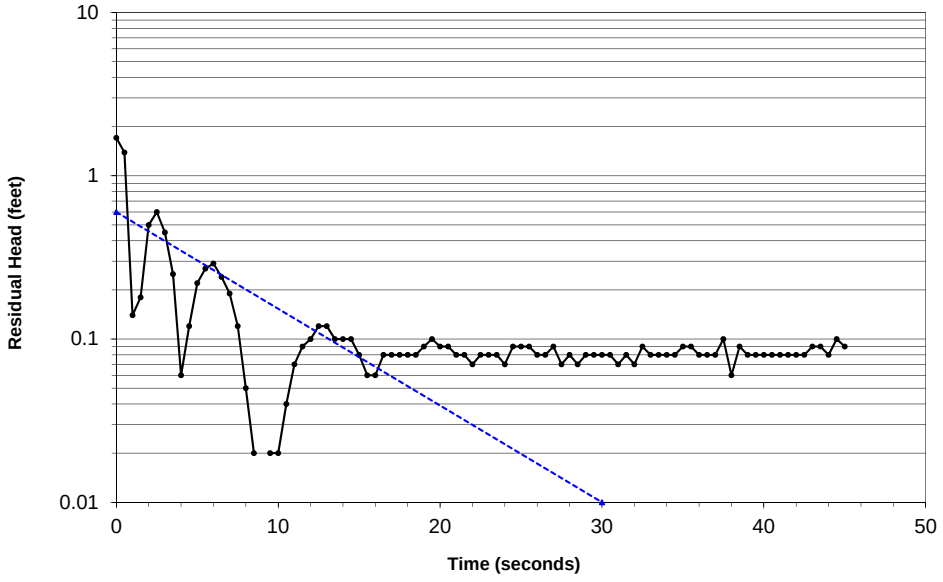
MW-201B

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	57.63	
Depth to Static (PVC) in ft.:	19.77	
Well Depth-Static (Lw), in ft.:	37.86	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	37.86	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.242	
Yo, in ft.:	0.60	
Yt, in ft.:	0.010	
t, in min.:	0.500	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		3.85E-02
Kh (ft/min) =		7.58E-02
Kh (ft/day) =		1.09E+02

Elapsed Time (sec)	Residual Head (ft.)
0	1.71
0.5	1.39
1	0.14
1.5	0.18
2	0.5
2.5	0.6
3	0.45
3.5	0.25
4	0.06
4.5	0.12
5	0.22
5.5	0.27
6	0.29
6.5	0.24
7	0.19
7.5	0.12
8	0.05
8.5	0.02
9	0
9.5	0.02
10	0.02
10.5	0.04
11	0.07
11.5	0.09
12	0.1
12.5	0.12
13	0.12
13.5	0.1
14	0.1
14.5	0.1
15	0.08
15.5	0.06
16	0.06
16.5	0.08
17	0.08
17.5	0.08
18	0.08
18.5	0.08
19	0.09
19.5	0.1
20	0.09
20.5	0.09
21	0.08
21.5	0.08
22	0.07
22.5	0.08
23	0.08
23.5	0.08
24	0.07
24.5	0.09



HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-201B
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

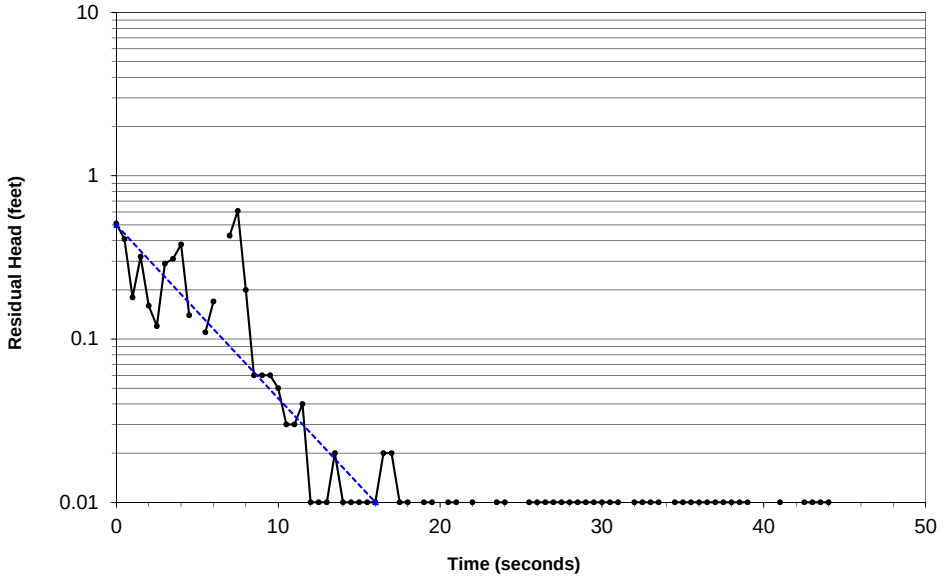
MW-201B

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	57.63	
Depth to Static (PVC) in ft.:	19.77	
Well Depth-Static (Lw), in ft.:	37.86	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	37.86	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.242	
Yo, in ft.:	0.50	
Yt, in ft.:	0.010	
t, in min.:	0.267	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		6.89E-02
Kh (ft/min) =		1.36E-01
Kh (ft/day) =		1.95E+02

Elapsed Time (sec)	Residual Head (ft.)
0	0.51
0.5	0.41
1	0.18
1.5	0.32
2	0.16
2.5	0.12
3	0.29
3.5	0.31
4	0.38
4.5	0.14
5	-0.01
5.5	0.11
6	0.17
6.5	-3.73
7	0.43
7.5	0.61
8	0.2
8.5	0.06
9	0.06
9.5	0.06
10	0.05
10.5	0.03
11	0.03
11.5	0.04
12	0.01
12.5	0.01
13	0.01
13.5	0.02
14	0.01
14.5	0.01
15	0.01
15.5	0.01
16	0.01
16.5	0.02
17	0.02
17.5	0.01
18	0.01
18.5	0
19	0.01
19.5	0.01
20	0
20.5	0.01
21	0.01
21.5	0
22	0.01
22.5	0
23	0
23.5	0.01
24	0.01
24.5	0



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-201B
GREAT RIVER ROAD, GENOA, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

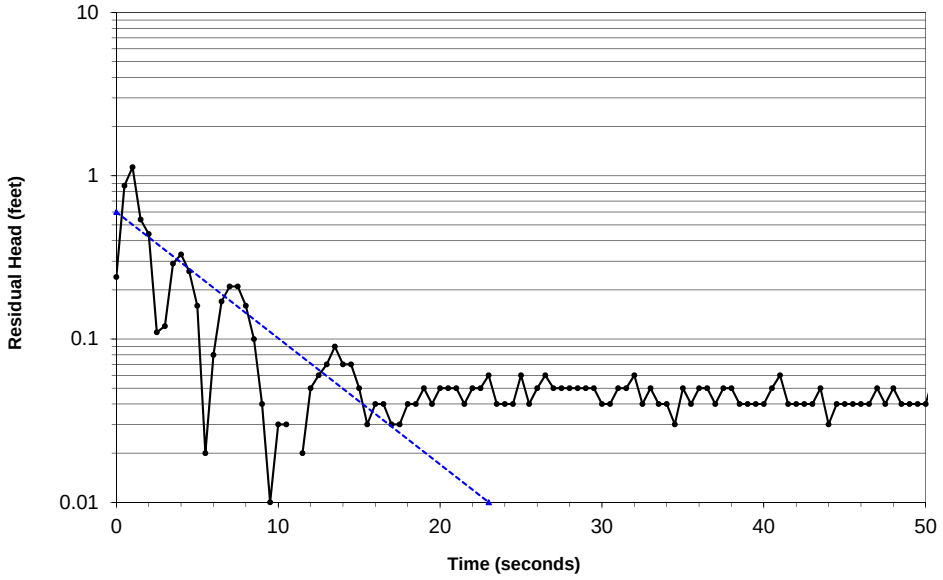
MW-201B

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	57.63	
Depth to Static (PVC) in ft.:	19.77	
Well Depth-Static (Lw), in ft.:	37.86	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	37.86	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.242	
Yo, in ft.:	0.60	
Yt, in ft.:	0.010	
t, in min.:	0.383	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		5.02E-02
Kh (ft/min) =		9.88E-02
Kh (ft/day) =		1.42E+02

Elapsed Time (sec)	Residual Head (ft.)
0	0.24
0.5	0.87
1	1.13
1.5	0.54
2	0.44
2.5	0.11
3	0.12
3.5	0.29
4	0.33
4.5	0.26
5	0.16
5.5	0.02
6	0.08
6.5	0.17
7	0.21
7.5	0.21
8	0.16
8.5	0.1
9	0.04
9.5	0.01
10	0.03
10.5	0.03
11	0
11.5	0.02
12	0.05
12.5	0.06
13	0.07
13.5	0.09
14	0.07
14.5	0.07
15	0.05
15.5	0.03
16	0.04
16.5	0.04
17	0.03
17.5	0.03
18	0.04
18.5	0.04
19	0.05
19.5	0.04
20	0.05
20.5	0.05
21	0.05
21.5	0.04
22	0.05
22.5	0.05
23	0.06
23.5	0.04
24	0.04
24.5	0.04



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-201B
GREAT RIVER ROAD, GENOA, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

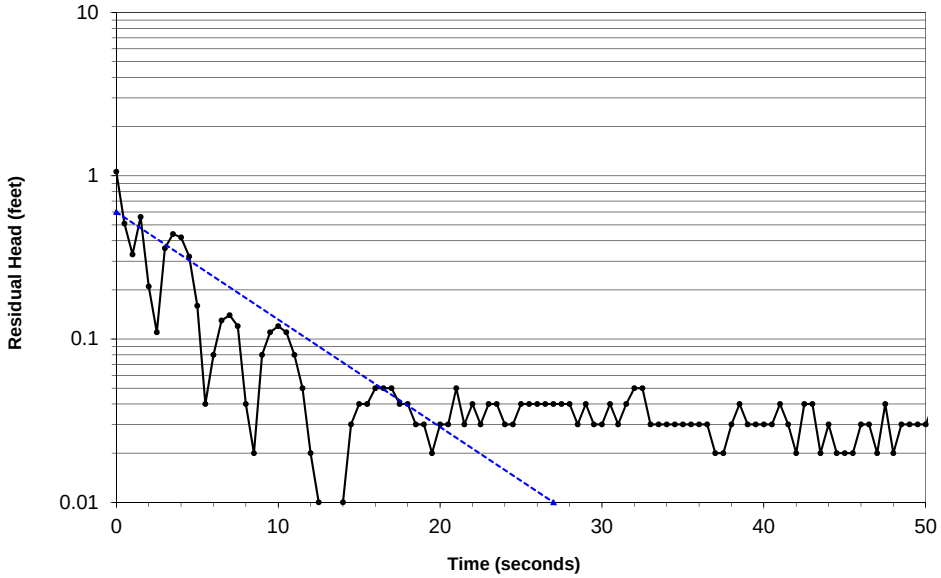
MW-201B

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	57.63	
Depth to Static (PVC) in ft.:	19.77	
Well Depth-Static (Lw), in ft.:	37.86	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	37.86	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.242	
Yo, in ft.:	0.60	
Yt, in ft.:	0.010	
t, in min.:	0.450	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		4.28E-02
Kh (ft/min) =		8.42E-02
Kh (ft/day) =		1.21E+02

Elapsed Time (sec)	Residual Head (ft.)
0	1.06
0.5	0.51
1	0.33
1.5	0.56
2	0.21
2.5	0.11
3	0.36
3.5	0.44
4	0.42
4.5	0.32
5	0.16
5.5	0.04
6	0.08
6.5	0.13
7	0.14
7.5	0.12
8	0.04
8.5	0.02
9	0.08
9.5	0.11
10	0.12
10.5	0.11
11	0.08
11.5	0.05
12	0.02
12.5	0.01
13	0
13.5	0
14	0.01
14.5	0.03
15	0.04
15.5	0.04
16	0.05
16.5	0.05
17	0.05
17.5	0.04
18	0.04
18.5	0.03
19	0.03
19.5	0.02
20	0.03
20.5	0.03
21	0.05
21.5	0.03
22	0.04
22.5	0.03
23	0.04
23.5	0.04
24	0.03
24.5	0.03



HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-202A
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

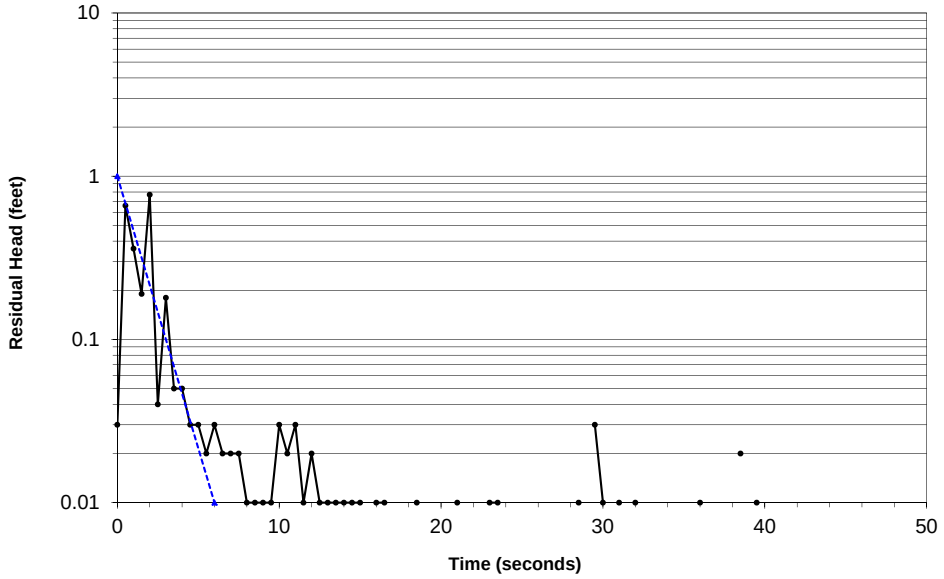
MW-202A

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	27.94	
Depth to Static (PVC) in ft.:	20.62	
Well Depth-Static (Lw), in ft.:	7.32	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.32	
A:	2.241	
B:	0.350	
C:	1.722	
Le/rw:	20.669	
Saturated Thickness (H), in ft.:	7.32	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.240	
Yo, in ft.:	1.00	
Yt, in ft.:	0.010	
t, in min.:	0.100	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		2.04E-01
Kh (ft/min) =		4.02E-01
Kh (ft/day) =		5.79E+02

Elapsed Time (sec)	Residual Head (ft.)
0	0.03
0.5	0.66
1	0.36
1.5	0.19
2	0.77
2.5	0.04
3	0.18
3.5	0.05
4	0.05
4.5	0.03
5	0.03
5.5	0.02
6	0.03
6.5	0.02
7	0.02
7.5	0.02
8	0.01
8.5	0.01
9	0.01
9.5	0.01
10	0.03
10.5	0.02
11	0.03
11.5	0.01
12	0.02
12.5	0.01
13	0.01
13.5	0.01
14	0.01
14.5	0.01
15	0.01
15.5	0
16	0.01
16.5	0.01
17	0
17.5	0
18	0
18.5	0.01
19	0
19.5	0
20	0
20.5	0
21	0.01
21.5	0
22	0
22.5	0
23	0.01
23.5	0.01
24	0
24.5	0



HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-202A
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

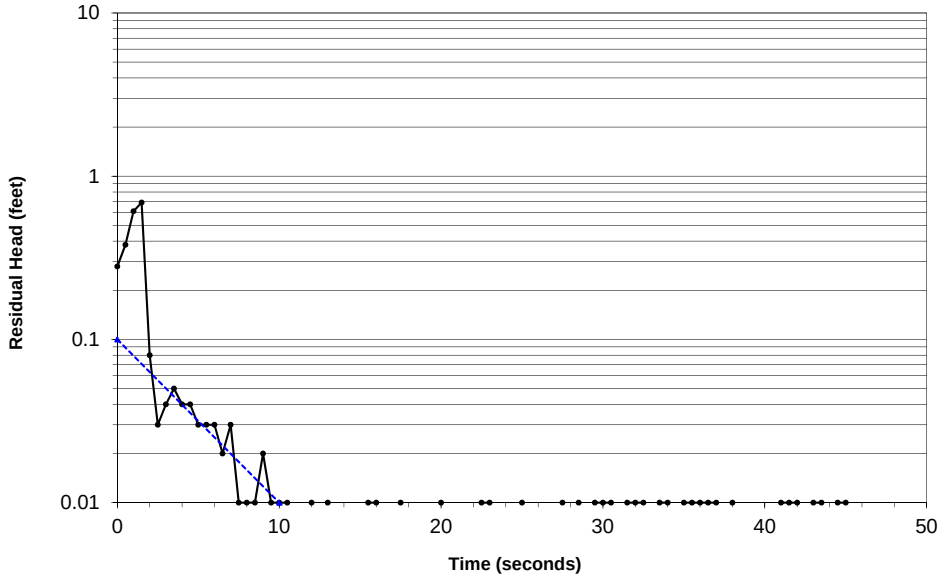
MW-202A

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	27.94	
Depth to Static (PVC) in ft.:	20.62	
Well Depth-Static (Lw), in ft.:	7.32	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.32	
A:	2.241	
B:	0.350	
C:	1.722	
Le/rw:	20.669	
Saturated Thickness (H), in ft.:	7.32	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.240	
Yo, in ft.:	0.10	
Yt, in ft.:	0.010	
t, in min.:	0.167	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		6.13E-02
Kh (ft/min) =		1.21E-01
Kh (ft/day) =		1.74E+02

Elapsed Time (sec)	Residual Head (ft.)
0	0.28
0.5	0.38
1	0.61
1.5	0.69
2	0.08
2.5	0.03
3	0.04
3.5	0.05
4	0.04
4.5	0.04
5	0.03
5.5	0.03
6	0.03
6.5	0.02
7	0.03
7.5	0.01
8	0.01
8.5	0.01
9	0.02
9.5	0.01
10	0.01
10.5	0.01
11	0
11.5	0
12	0.01
12.5	0
13	0.01
13.5	0
14	0
14.5	0
15	0
15.5	0.01
16	0.01
16.5	0
17	0
17.5	0.01
18	0
18.5	0
19	0
19.5	0
20	0.01
20.5	0
21	0
21.5	0
22	0
22.5	0.01
23	0.01
23.5	0
24	0
24.5	0



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-202A
GREAT RIVER ROAD, GENOA, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

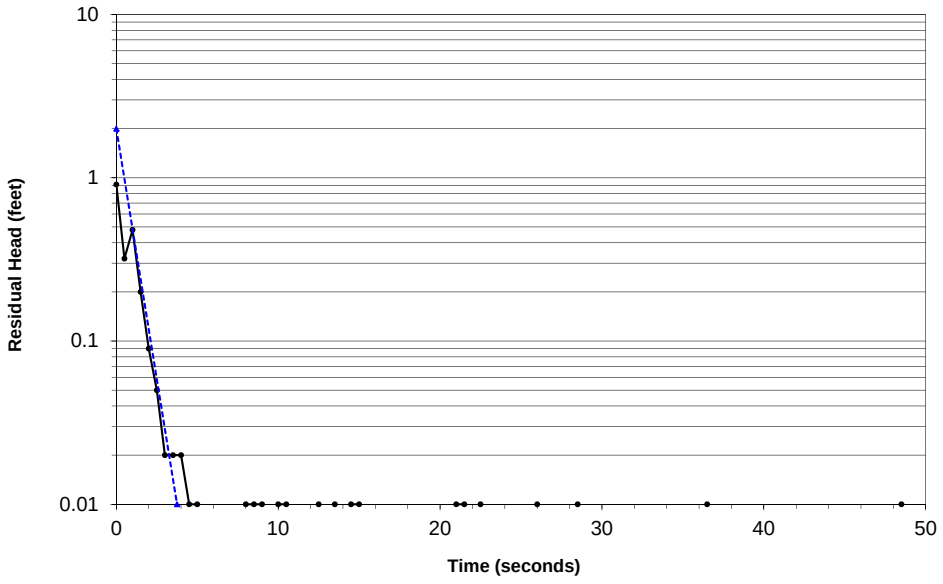
MW-202A

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	27.94	
Depth to Static (PVC) in ft.:	20.62	
Well Depth-Static (Lw), in ft.:	7.32	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.32	
A:	2.241	
B:	0.350	
C:	1.722	
Le/rw:	20.669	
Saturated Thickness (H), in ft.:	7.32	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.240	
Yo, in ft.:	2.00	
Yt, in ft.:	0.010	
t, in min.:	0.063	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		3.76E-01
Kh (ft/min) =		7.40E-01
Kh (ft/day) =		1.07E+03

Elapsed Time (sec)	Residual Head (ft.)
0	0.91
0.5	0.32
1	0.48
1.5	0.2
2	0.09
2.5	0.05
3	0.02
3.5	0.02
4	0.02
4.5	0.01
5	0.01
5.5	0
6	0
6.5	0
7	0
7.5	0
8	0.01
8.5	0.01
9	0.01
9.5	0
10	0.01
10.5	0.01
11	0
11.5	0
12	0
12.5	0.01
13	0
13.5	0.01
14	0
14.5	0.01
15	0.01
15.5	0
16	0
16.5	0
17	0
17.5	0
18	0
18.5	0
19	0
19.5	0
20	0
20.5	0
21	0.01
21.5	0.01
22	0
22.5	0.01
23	0
23.5	0
24	0
24.5	0



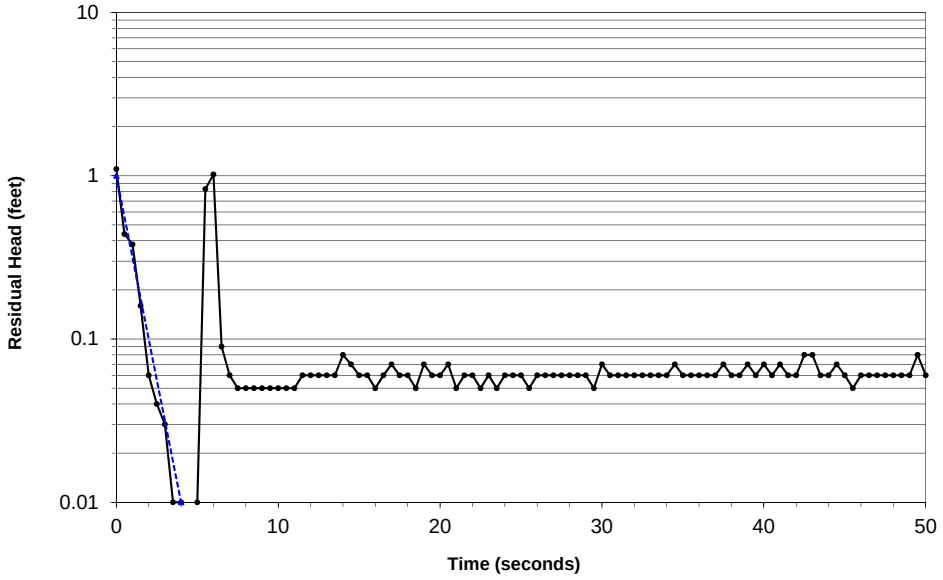
HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-202A
GREAT RIVER ROAD, GENOA, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

MW-202A

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	27.94	
Depth to Static (PVC) in ft.:	20.62	
Well Depth-Static (Lw), in ft.:	7.32	
Test Section Radius (rw), in ft.:	0.188	
Nominal Casing Radius (rc), in ft.:	0.083	
Equivalent Casing Radius (rc') in ft:	0.1241	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.32	
A:	2.772	
B:	0.460	
C:	2.533	
Le/rw:	39.040	
Saturated Thickness (H), in ft.:	7.32	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.739	
Yo, in ft.:	1.00	
Yt, in ft.:	0.010	
t, in min.:	0.067	
	(Lw<H)	(Lw=H)
Kh (cm/sec) =		1.01E-01
Kh (ft/min) =		1.99E-01
Kh (ft/day) =		2.87E+02

Elapsed Time (sec)	Residual Head (ft.)
0	1.1
0.5	0.44
1	0.38
1.5	0.16
2	0.06
2.5	0.04
3	0.03
3.5	0.01
4	0.01
4.5	0
5	0.01
5.5	0.83
6	1.02
6.5	0.09
7	0.06
7.5	0.05
8	0.05
8.5	0.05
9	0.05
9.5	0.05
10	0.05
10.5	0.05
11	0.05
11.5	0.06
12	0.06
12.5	0.06
13	0.06
13.5	0.06
14	0.08
14.5	0.07
15	0.06
15.5	0.06
16	0.05
16.5	0.06
17	0.07
17.5	0.06
18	0.06
18.5	0.05
19	0.07
19.5	0.06
20	0.06
20.5	0.07
21	0.05
21.5	0.06
22	0.06
22.5	0.05
23	0.06
23.5	0.05
24	0.06
24.5	0.06



HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-202B
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

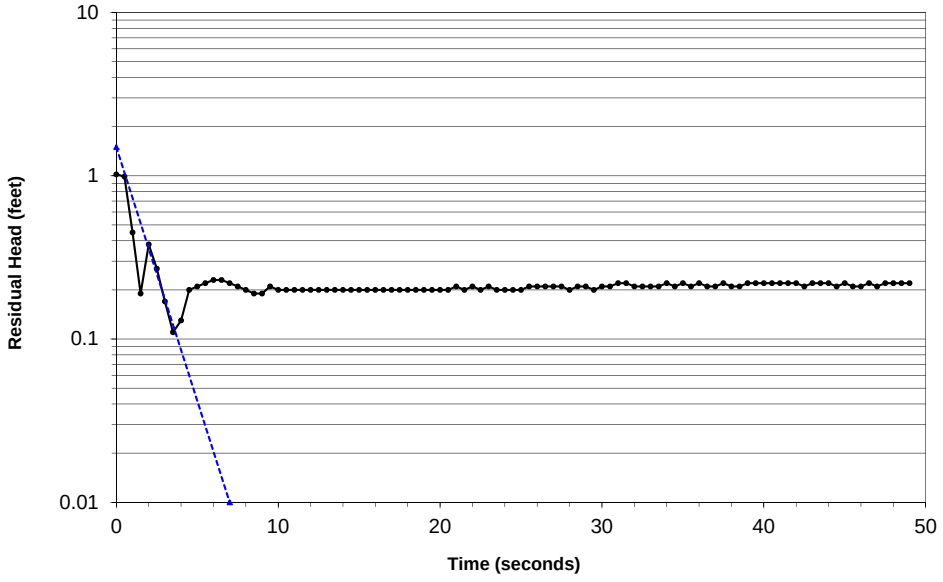
MW-202B

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	56.02	
Depth to Static (PVC) in ft.:	20.6	
Well Depth-Static (Lw), in ft.:	35.42	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	35.42	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.207	
Yo, in ft.:	1.50	
Yt, in ft.:	0.010	
t, in min.:	0.117	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		2.00E-01
Kh (ft/min) =		3.93E-01
Kh (ft/day) =		5.66E+02

Elapsed Time (sec)	Residual Head (ft.)
0	1.02
0.5	0.99
1	0.45
1.5	0.19
2	0.38
2.5	0.27
3	0.17
3.5	0.11
4	0.13
4.5	0.2
5	0.21
5.5	0.22
6	0.23
6.5	0.23
7	0.22
7.5	0.21
8	0.2
8.5	0.19
9	0.19
9.5	0.21
10	0.2
10.5	0.2
11	0.2
11.5	0.2
12	0.2
12.5	0.2
13	0.2
13.5	0.2
14	0.2
14.5	0.2
15	0.2
15.5	0.2
16	0.2
16.5	0.2
17	0.2
17.5	0.2
18	0.2
18.5	0.2
19	0.2
19.5	0.2
20	0.2
20.5	0.2
21	0.21
21.5	0.2
22	0.21
22.5	0.2
23	0.21
23.5	0.2
24	0.2
24.5	0.2



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-202B
GREAT RIVER ROAD, GENOA, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

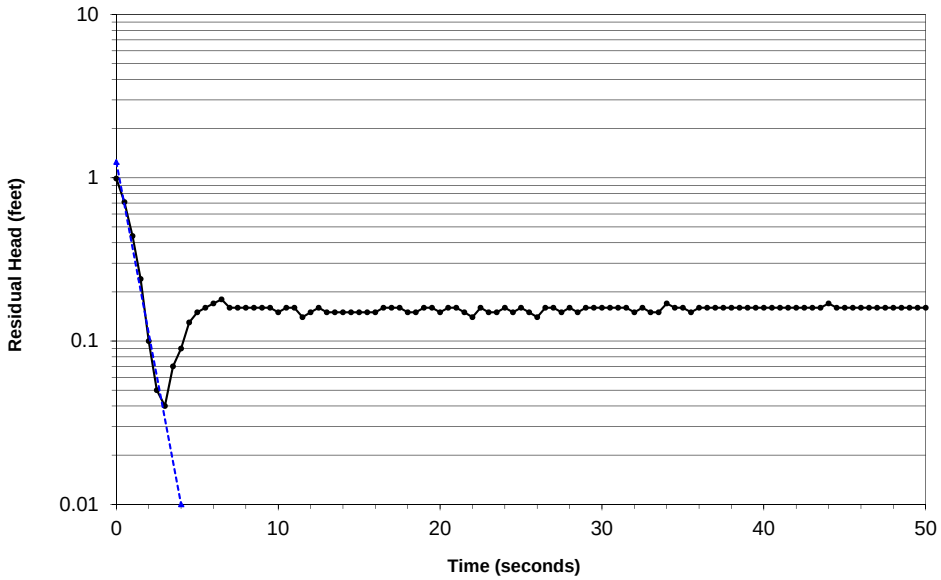
MW-202B

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	56.02	
Depth to Static (PVC) in ft.:	20.6	
Well Depth-Static (Lw), in ft.:	35.42	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	35.42	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.207	
Yo, in ft.:	1.25	
Yt, in ft.:	0.010	
t, in min.:	0.067	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		3.37E-01
Kh (ft/min) =		6.63E-01
Kh (ft/day) =		9.54E+02

Elapsed Time (sec)	Residual Head (ft.)
0	0.99
0.5	0.71
1	0.44
1.5	0.24
2	0.1
2.5	0.05
3	0.04
3.5	0.07
4	0.09
4.5	0.13
5	0.15
5.5	0.16
6	0.17
6.5	0.18
7	0.16
7.5	0.16
8	0.16
8.5	0.16
9	0.16
9.5	0.16
10	0.15
10.5	0.16
11	0.16
11.5	0.14
12	0.15
12.5	0.16
13	0.15
13.5	0.15
14	0.15
14.5	0.15
15	0.15
15.5	0.15
16	0.15
16.5	0.16
17	0.16
17.5	0.16
18	0.15
18.5	0.15
19	0.16
19.5	0.16
20	0.15
20.5	0.16
21	0.16
21.5	0.15
22	0.14
22.5	0.16
23	0.15
23.5	0.15
24	0.16
24.5	0.15



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-202B
GREAT RIVER ROAD, GENOA, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

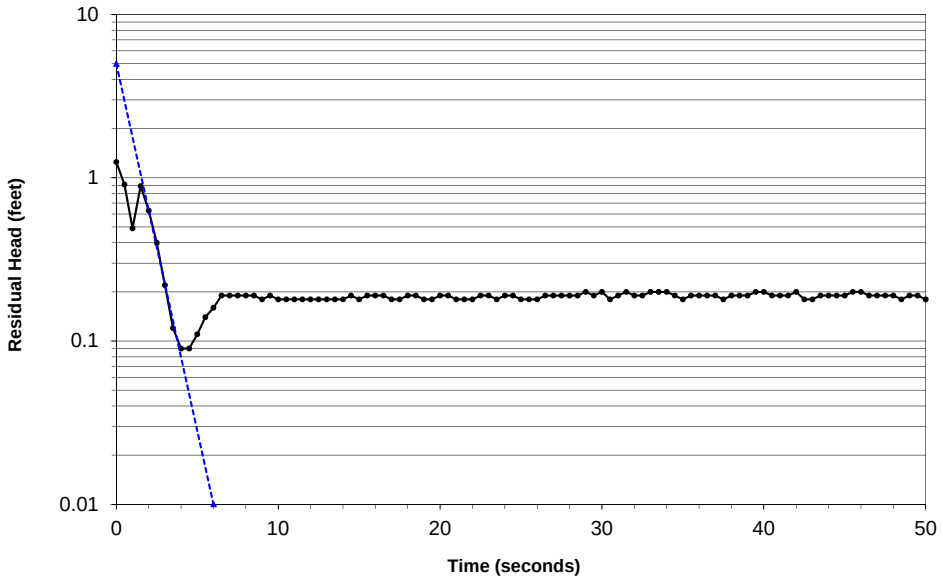
MW-202B

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	56.02	
Depth to Static (PVC) in ft.:	20.6	
Well Depth-Static (Lw), in ft.:	35.42	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	35.42	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.207	
Yo, in ft.:	5.00	
Yt, in ft.:	0.010	
t, in min.:	0.100	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		2.89E-01
Kh (ft/min) =		5.69E-01
Kh (ft/day) =		8.19E+02

Elapsed Time (sec)	Residual Head (ft.)
0	1.25
0.5	0.91
1	0.49
1.5	0.89
2	0.63
2.5	0.4
3	0.22
3.5	0.12
4	0.09
4.5	0.09
5	0.11
5.5	0.14
6	0.16
6.5	0.19
7	0.19
7.5	0.19
8	0.19
8.5	0.19
9	0.18
9.5	0.19
10	0.18
10.5	0.18
11	0.18
11.5	0.18
12	0.18
12.5	0.18
13	0.18
13.5	0.18
14	0.18
14.5	0.19
15	0.18
15.5	0.19
16	0.19
16.5	0.19
17	0.18
17.5	0.18
18	0.19
18.5	0.19
19	0.18
19.5	0.18
20	0.19
20.5	0.19
21	0.18
21.5	0.18
22	0.18
22.5	0.19
23	0.19
23.5	0.18
24	0.19
24.5	0.19



HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-203A
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

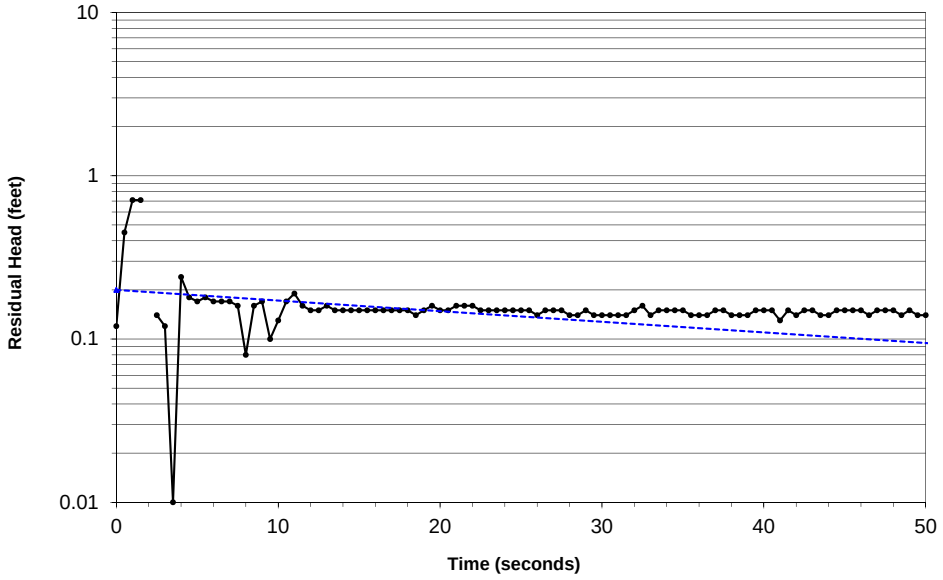
MW-203A

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	28.02	
Depth to Static (PVC) in ft.:	20.45	
Well Depth-Static (Lw), in ft.:	7.57	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.57	
A:	2.262	
B:	0.355	
C:	1.754	
Le/rw:	21.375	
Saturated Thickness (H), in ft.:	7.57	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.266	
Yo, in ft.:	0.20	
Yt, in ft.:	0.010	
t, in min.:	3.333	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		3.90E-03
Kh (ft/min) =		7.68E-03
Kh (ft/day) =		1.11E+01

Elapsed Time (sec)	Residual Head (ft.)
0	0.12
0.5	0.45
1	0.71
1.5	0.71
2	-0.17
2.5	0.14
3	0.12
3.5	0.01
4	0.24
4.5	0.18
5	0.17
5.5	0.18
6	0.17
6.5	0.17
7	0.17
7.5	0.16
8	0.08
8.5	0.16
9	0.17
9.5	0.1
10	0.13
10.5	0.17
11	0.19
11.5	0.16
12	0.15
12.5	0.15
13	0.16
13.5	0.15
14	0.15
14.5	0.15
15	0.15
15.5	0.15
16	0.15
16.5	0.15
17	0.15
17.5	0.15
18	0.15
18.5	0.14
19	0.15
19.5	0.16
20	0.15
20.5	0.15
21	0.16
21.5	0.16
22	0.16
22.5	0.15
23	0.15
23.5	0.15
24	0.15
24.5	0.15



HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-203A
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

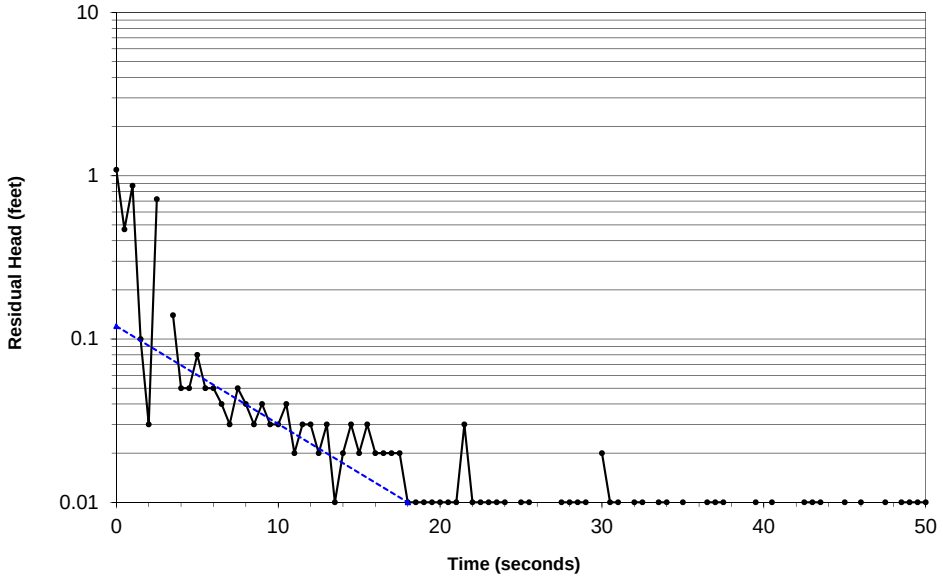
MW-203A

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	28.02	
Depth to Static (PVC) in ft.:	20.45	
Well Depth-Static (Lw), in ft.:	7.57	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.57	
A:	2.262	
B:	0.355	
C:	1.754	
Le/rw:	21.375	
Saturated Thickness (H), in ft.:	7.57	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.266	
Yo, in ft.:	0.12	
Yt, in ft.:	0.010	
t, in min.:	0.300	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		3.59E-02
Kh (ft/min) =		7.08E-02
Kh (ft/day) =		1.02E+02

Elapsed Time (sec)	Residual Head (ft.)
0	1.09
0.5	0.47
1	0.87
1.5	0.1
2	0.03
2.5	0.72
3	-0.02
3.5	0.14
4	0.05
4.5	0.05
5	0.08
5.5	0.05
6	0.05
6.5	0.04
7	0.03
7.5	0.05
8	0.04
8.5	0.03
9	0.04
9.5	0.03
10	0.03
10.5	0.04
11	0.02
11.5	0.03
12	0.03
12.5	0.02
13	0.03
13.5	0.01
14	0.02
14.5	0.03
15	0.02
15.5	0.03
16	0.02
16.5	0.02
17	0.02
17.5	0.02
18	0.01
18.5	0.01
19	0.01
19.5	0.01
20	0.01
20.5	0.01
21	0.01
21.5	0.03
22	0.01
22.5	0.01
23	0.01
23.5	0.01
24	0.01
24.5	0



HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-203A
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

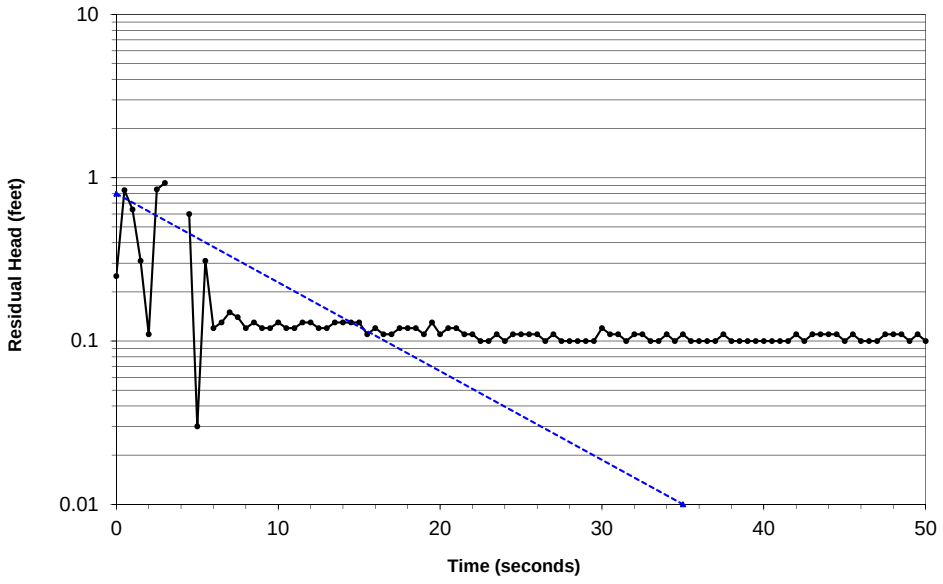
MW-203A

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	28.02	
Depth to Static (PVC) in ft.:	20.45	
Well Depth-Static (Lw), in ft.:	7.57	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.57	
A:	2.262	
B:	0.355	
C:	1.754	
Le/rw:	21.375	
Saturated Thickness (H), in ft.:	7.57	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.266	
Yo, in ft.:	0.80	
Yt, in ft.:	0.010	
t, in min.:	0.583	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		3.26E-02
Kh (ft/min) =		6.42E-02
Kh (ft/day) =		9.24E+01

Elapsed Time (sec)	Residual Head (ft.)
0	0.25
0.5	0.84
1	0.64
1.5	0.31
2	0.11
2.5	0.85
3	0.93
3.5	-0.04
4	-0.12
4.5	0.6
5	0.03
5.5	0.31
6	0.12
6.5	0.13
7	0.15
7.5	0.14
8	0.12
8.5	0.13
9	0.12
9.5	0.12
10	0.13
10.5	0.12
11	0.12
11.5	0.13
12	0.13
12.5	0.12
13	0.12
13.5	0.13
14	0.13
14.5	0.13
15	0.13
15.5	0.11
16	0.12
16.5	0.11
17	0.11
17.5	0.12
18	0.12
18.5	0.12
19	0.11
19.5	0.13
20	0.11
20.5	0.12
21	0.12
21.5	0.11
22	0.11
22.5	0.1
23	0.1
23.5	0.11
24	0.1
24.5	0.11



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-203A
GREAT RIVER ROAD, GENOA, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

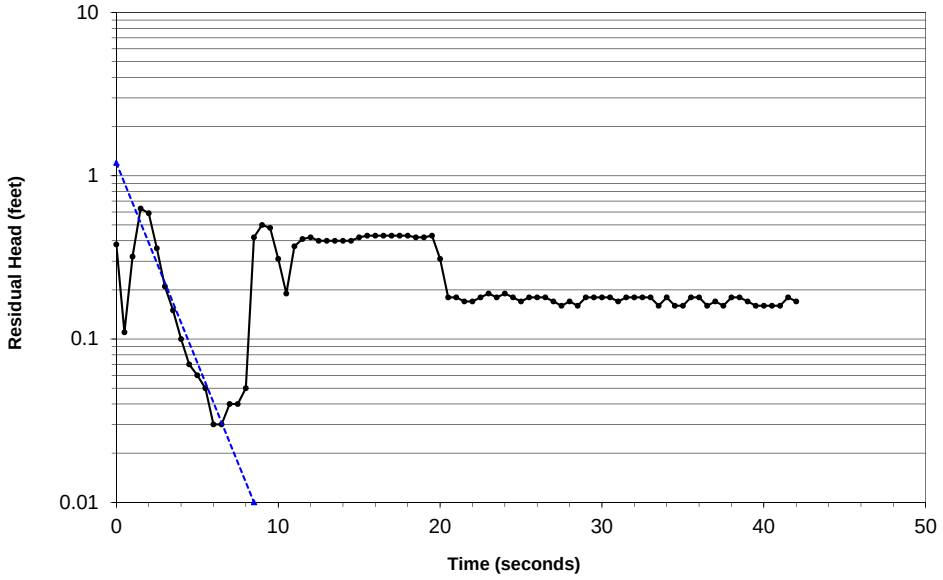
MW-203A

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	28.02	
Depth to Static (PVC) in ft.:	20.45	
Well Depth-Static (Lw), in ft.:	7.57	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.57	
A:	2.262	
B:	0.355	
C:	1.754	
Le/rw:	21.375	
Saturated Thickness (H), in ft.:	7.57	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.266	
Yo, in ft.:	1.20	
Yt, in ft.:	0.010	
t, in min.:	0.142	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		1.47E-01
Kh (ft/min) =		2.89E-01
Kh (ft/day) =		4.16E+02

Elapsed Time (sec)	Residual Head (ft.)
0	0.38
0.5	0.11
1	0.32
1.5	0.63
2	0.59
2.5	0.36
3	0.21
3.5	0.15
4	0.1
4.5	0.07
5	0.06
5.5	0.05
6	0.03
6.5	0.03
7	0.04
7.5	0.04
8	0.05
8.5	0.42
9	0.5
9.5	0.48
10	0.31
10.5	0.19
11	0.37
11.5	0.41
12	0.42
12.5	0.4
13	0.4
13.5	0.4
14	0.4
14.5	0.4
15	0.42
15.5	0.43
16	0.43
16.5	0.43
17	0.43
17.5	0.43
18	0.43
18.5	0.42
19	0.42
19.5	0.43
20	0.31
20.5	0.18
21	0.18
21.5	0.17
22	0.17
22.5	0.18
23	0.19
23.5	0.18
24	0.19
24.5	0.18



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-203A
GREAT RIVER ROAD, GENOA, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

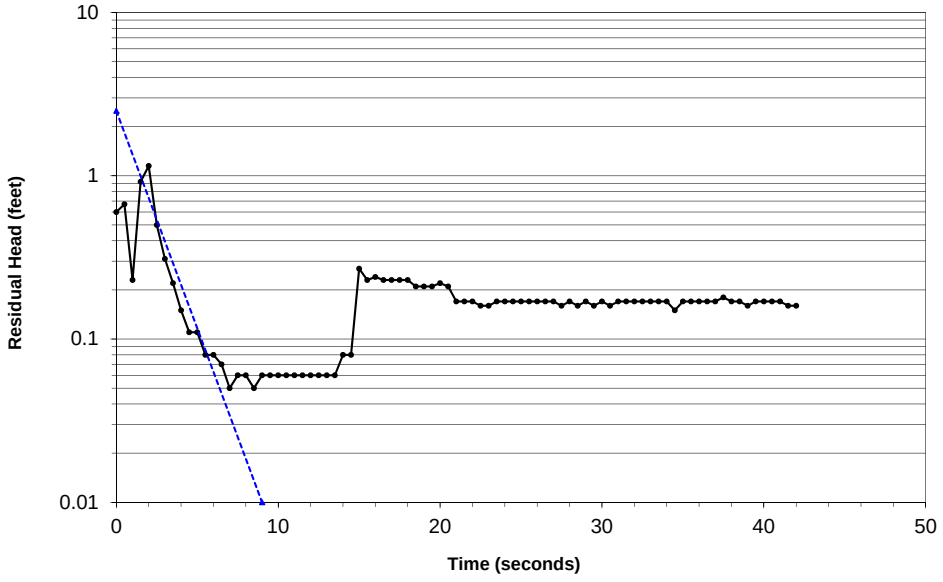
MW-203A

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	28.02	
Depth to Static (PVC) in ft.:	20.45	
Well Depth-Static (Lw), in ft.:	7.57	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.57	
A:	2.262	
B:	0.355	
C:	1.754	
Le/rw:	21.375	
Saturated Thickness (H), in ft.:	7.57	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.266	
Yo, in ft.:	2.50	
Yt, in ft.:	0.010	
t, in min.:	0.150	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		1.60E-01
Kh (ft/min) =		3.14E-01
Kh (ft/day) =		4.53E+02

Elapsed Time (sec)	Residual Head (ft.)
0	0.6
0.5	0.67
1	0.23
1.5	0.92
2	1.15
2.5	0.5
3	0.31
3.5	0.22
4	0.15
4.5	0.11
5	0.11
5.5	0.08
6	0.08
6.5	0.07
7	0.05
7.5	0.06
8	0.06
8.5	0.05
9	0.06
9.5	0.06
10	0.06
10.5	0.06
11	0.06
11.5	0.06
12	0.06
12.5	0.06
13	0.06
13.5	0.06
14	0.08
14.5	0.08
15	0.27
15.5	0.23
16	0.24
16.5	0.23
17	0.23
17.5	0.23
18	0.23
18.5	0.21
19	0.21
19.5	0.21
20	0.22
20.5	0.21
21	0.17
21.5	0.17
22	0.17
22.5	0.16
23	0.16
23.5	0.17
24	0.17
24.5	0.17



HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-203B
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

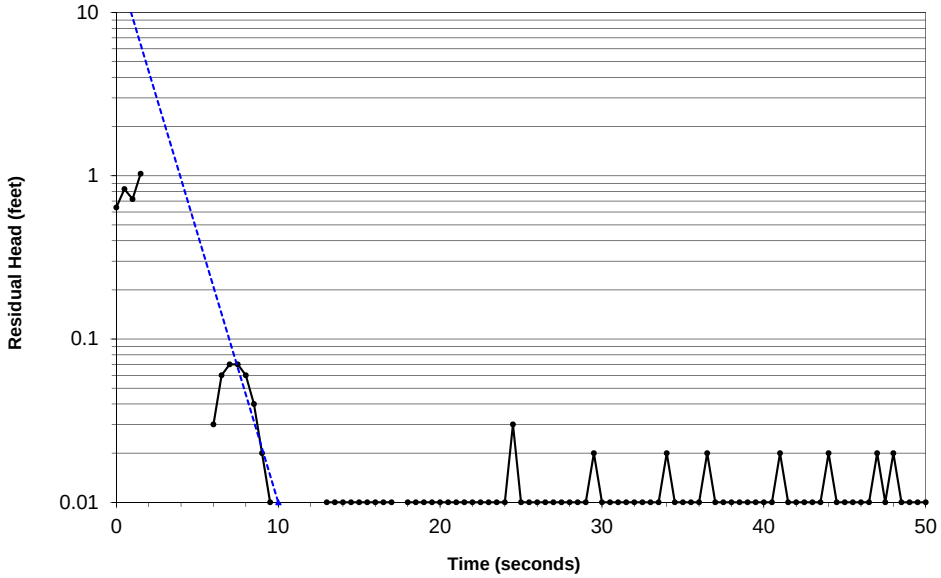
MW-203B

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	58.17	
Depth to Static (PVC) in ft.:	20.61	
Well Depth-Static (Lw), in ft.:	37.56	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	37.56	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.238	
Yo, in ft.:	20.00	
Yt, in ft.:	0.010	
t, in min.:	0.167	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		2.14E-01
Kh (ft/min) =		4.21E-01
Kh (ft/day) =		6.07E+02

Elapsed Time (sec)	Residual Head (ft.)
0	0.64
0.5	0.83
1	0.72
1.5	1.03
2	-0.02
2.5	-0.04
3	-0.06
3.5	-0.36
4	-0.19
4.5	-0.14
5	-0.13
5.5	-0.04
6	0.03
6.5	0.06
7	0.07
7.5	0.07
8	0.06
8.5	0.04
9	0.02
9.5	0.01
10	0
10.5	-0.01
11	-0.01
11.5	0
12	0
12.5	0
13	0.01
13.5	0.01
14	0.01
14.5	0.01
15	0.01
15.5	0.01
16	0.01
16.5	0.01
17	0.01
17.5	0
18	0.01
18.5	0.01
19	0.01
19.5	0.01
20	0.01
20.5	0.01
21	0.01
21.5	0.01
22	0.01
22.5	0.01
23	0.01
23.5	0.01
24.0	0.01
24.5	0.03



HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-203B
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

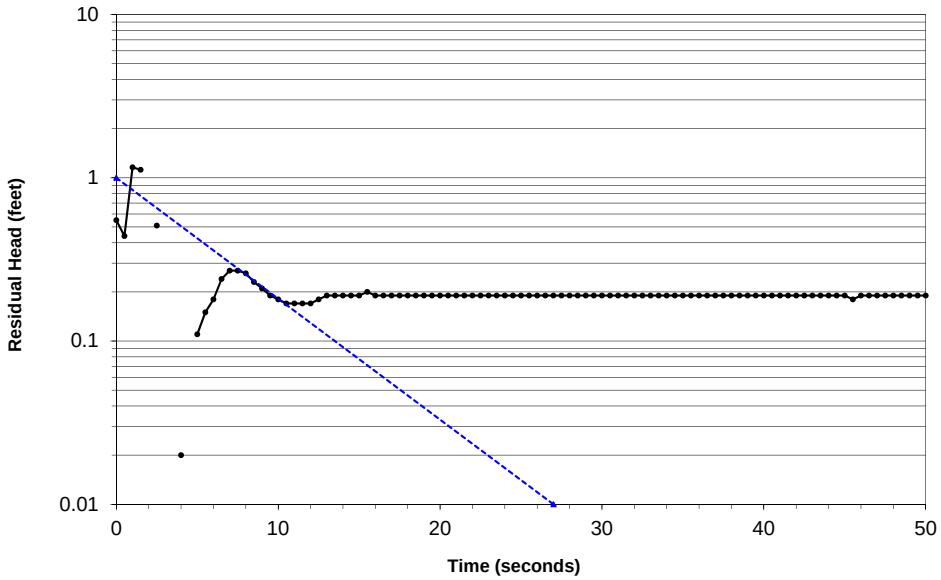
MW-203B

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	58.17	
Depth to Static (PVC) in ft.:	20.61	
Well Depth-Static (Lw), in ft.:	37.56	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	37.56	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.238	
Yo, in ft.:	1.00	
Yt, in ft.:	0.010	
t, in min.:	0.450	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		4.80E-02
Kh (ft/min) =		9.46E-02
Kh (ft/day) =		1.36E+02

Elapsed Time (sec)	Residual Head (ft.)
0	0.55
0.5	0.44
1	1.16
1.5	1.12
2	-0.51
2.5	0.51
3	-1.51
3.5	-0.67
4	0.02
4.5	-0.47
5	0.11
5.5	0.15
6	0.18
6.5	0.24
7	0.27
7.5	0.27
8	0.26
8.5	0.23
9	0.21
9.5	0.19
10	0.18
10.5	0.17
11	0.17
11.5	0.17
12	0.17
12.5	0.18
13	0.19
13.5	0.19
14	0.19
14.5	0.19
15	0.19
15.5	0.2
16	0.19
16.5	0.19
17	0.19
17.5	0.19
18	0.19
18.5	0.19
19	0.19
19.5	0.19
20	0.19
20.5	0.19
21	0.19
21.5	0.19
22	0.19
22.5	0.19
23	0.19
23.5	0.19
24.0	0.19
24.5	0.19



HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-203B
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

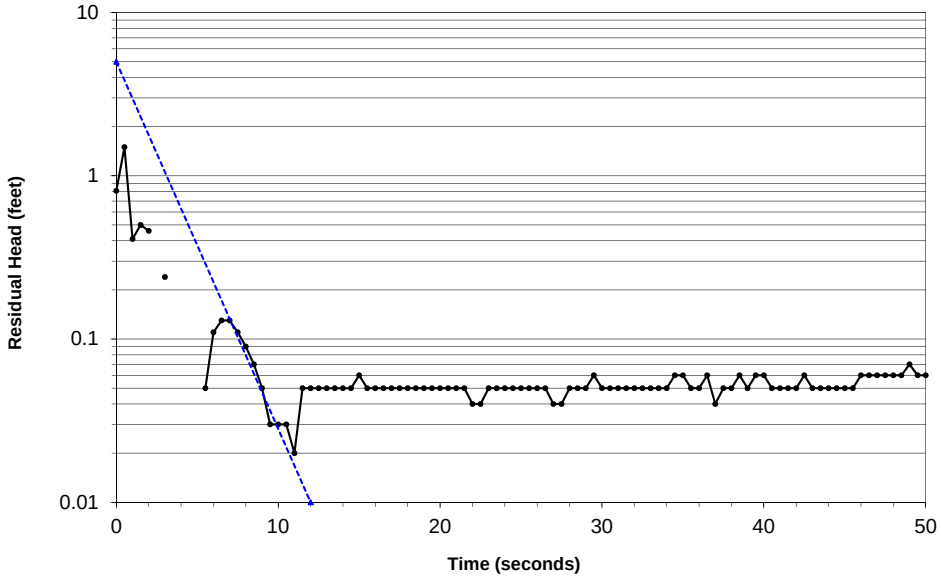
MW-203B

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	58.17	
Depth to Static (PVC) in ft.:	20.61	
Well Depth-Static (Lw), in ft.:	37.56	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	37.56	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.238	
Yo, in ft.:	5.00	
Yt, in ft.:	0.010	
t, in min.:	0.200	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		1.46E-01
Kh (ft/min) =		2.87E-01
Kh (ft/day) =		4.13E+02

Elapsed Time (sec)	Residual Head (ft.)
0	0.81
0.5	1.5
1	0.41
1.5	0.5
2	0.46
2.5	-0.76
3	0.24
3.5	-0.15
4	-0.16
4.5	-0.18
5	-0.03
5.5	0.05
6	0.11
6.5	0.13
7	0.13
7.5	0.11
8	0.09
8.5	0.07
9	0.05
9.5	0.03
10	0.03
10.5	0.03
11	0.02
11.5	0.05
12	0.05
12.5	0.05
13	0.05
13.5	0.05
14	0.05
14.5	0.05
15	0.06
15.5	0.05
16	0.05
16.5	0.05
17	0.05
17.5	0.05
18	0.05
18.5	0.05
19	0.05
19.5	0.05
20	0.05
20.5	0.05
21	0.05
21.5	0.05
22	0.04
22.5	0.04
23	0.05
23.5	0.05
24.0	0.05
24.5	0.05



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-203B
GREAT RIVER ROAD, GENOA, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

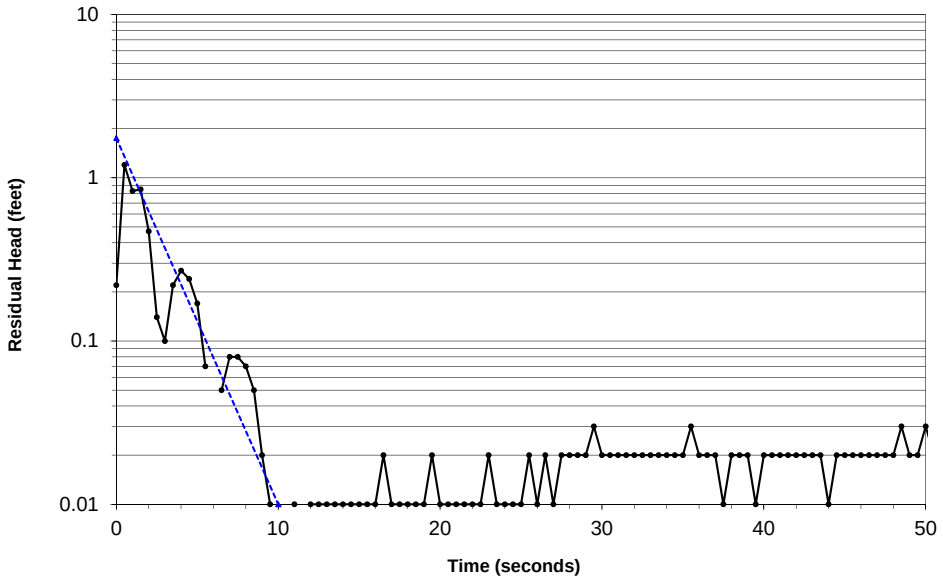
MW-203B

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	58.17	
Depth to Static (PVC) in ft.:	20.61	
Well Depth-Static (Lw), in ft.:	37.56	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	37.56	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.238	
Yo, in ft.:	1.75	
Yt, in ft.:	0.010	
t, in min.:	0.167	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		1.45E-01
Kh (ft/min) =		2.86E-01
Kh (ft/day) =		4.12E+02

Elapsed Time (sec)	Residual Head (ft.)
0	0.22
0.5	1.2
1	0.83
1.5	0.85
2	0.47
2.5	0.14
3	0.1
3.5	0.22
4	0.27
4.5	0.24
5	0.17
5.5	0.07
6	0
6.5	0.05
7	0.08
7.5	0.08
8	0.07
8.5	0.05
9	0.02
9.5	0.01
10	0
10.5	0
11	0.01
11.5	0
12	0.01
12.5	0.01
13	0.01
13.5	0.01
14	0.01
14.5	0.01
15	0.01
15.5	0.01
16	0.01
16.5	0.02
17	0.01
17.5	0.01
18	0.01
18.5	0.01
19	0.01
19.5	0.02
20	0.01
20.5	0.01
21	0.01
21.5	0.01
22	0.01
22.5	0.01
23	0.02
23.5	0.01
24	0.01
24.5	0.01



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-203B
GREAT RIVER ROAD, GENOA, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

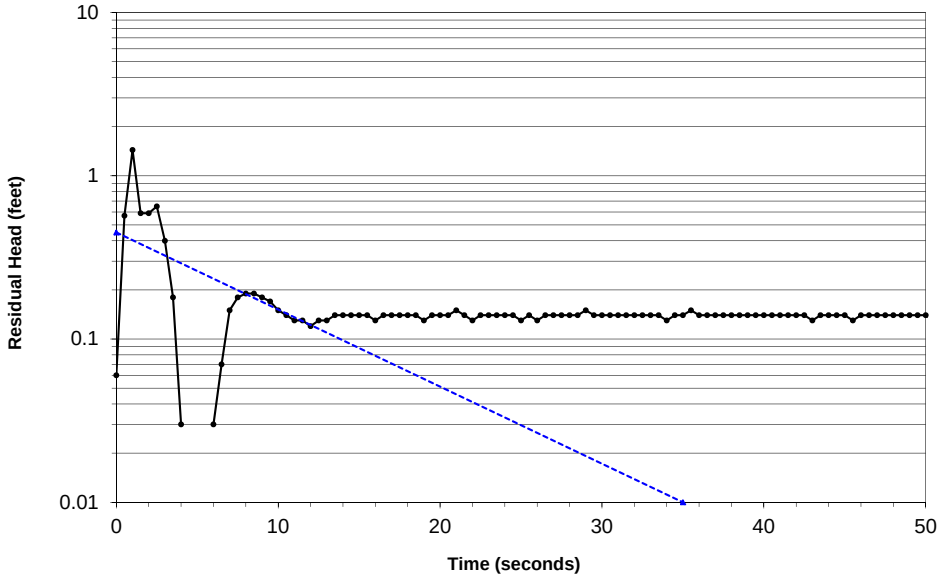
MW-203B

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	58.17	
Depth to Static (PVC) in ft.:	20.61	
Well Depth-Static (Lw), in ft.:	37.56	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	37.56	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.238	
Yo, in ft.:	0.45	
Yt, in ft.:	0.010	
t, in min.:	0.583	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		3.06E-02
Kh (ft/min) =		6.03E-02
Kh (ft/day) =		8.68E+01

Elapsed Time (sec)	Residual Head (ft.)
0	0.06
0.5	0.57
1	1.44
1.5	0.59
2	0.59
2.5	0.65
3	0.4
3.5	0.18
4	0.03
4.5	-0.05
5	-0.05
5.5	-0.02
6	0.03
6.5	0.07
7	0.15
7.5	0.18
8	0.19
8.5	0.19
9	0.18
9.5	0.17
10	0.15
10.5	0.14
11	0.13
11.5	0.13
12	0.12
12.5	0.13
13	0.13
13.5	0.14
14	0.14
14.5	0.14
15	0.14
15.5	0.14
16	0.13
16.5	0.14
17	0.14
17.5	0.14
18	0.14
18.5	0.14
19	0.13
19.5	0.14
20	0.14
20.5	0.14
21	0.15
21.5	0.14
22	0.13
22.5	0.14
23	0.14
23.5	0.14
24	0.14
24.5	0.14



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-203B
GREAT RIVER ROAD, GENOA, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

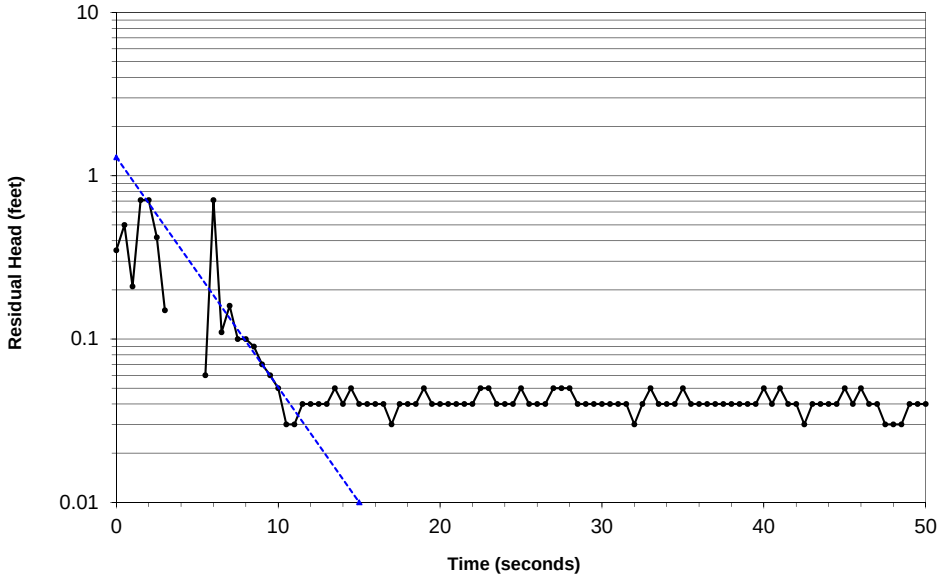
MW-203B

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	58.17	
Depth to Static (PVC) in ft.:	20.61	
Well Depth-Static (Lw), in ft.:	37.56	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	37.56	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.238	
Yo, in ft.:	1.30	
Yt, in ft.:	0.010	
t, in min.:	0.250	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		9.14E-02
Kh (ft/min) =		1.80E-01
Kh (ft/day) =		2.59E+02

Elapsed Time (sec)	Residual Head (ft.)
0	0.35
0.5	0.5
1	0.21
1.5	0.71
2	0.71
2.5	0.42
3	0.15
3.5	-0.04
4	-0.16
4.5	-0.2
5	-0.18
5.5	0.06
6	0.71
6.5	0.11
7	0.16
7.5	0.1
8	0.1
8.5	0.09
9	0.07
9.5	0.06
10	0.05
10.5	0.03
11	0.03
11.5	0.04
12	0.04
12.5	0.04
13	0.04
13.5	0.05
14	0.04
14.5	0.05
15	0.04
15.5	0.04
16	0.04
16.5	0.04
17	0.03
17.5	0.04
18	0.04
18.5	0.04
19	0.05
19.5	0.04
20	0.04
20.5	0.04
21	0.04
21.5	0.04
22	0.04
22.5	0.05
23	0.05
23.5	0.04
24	0.04
24.5	0.04



HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-204A
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

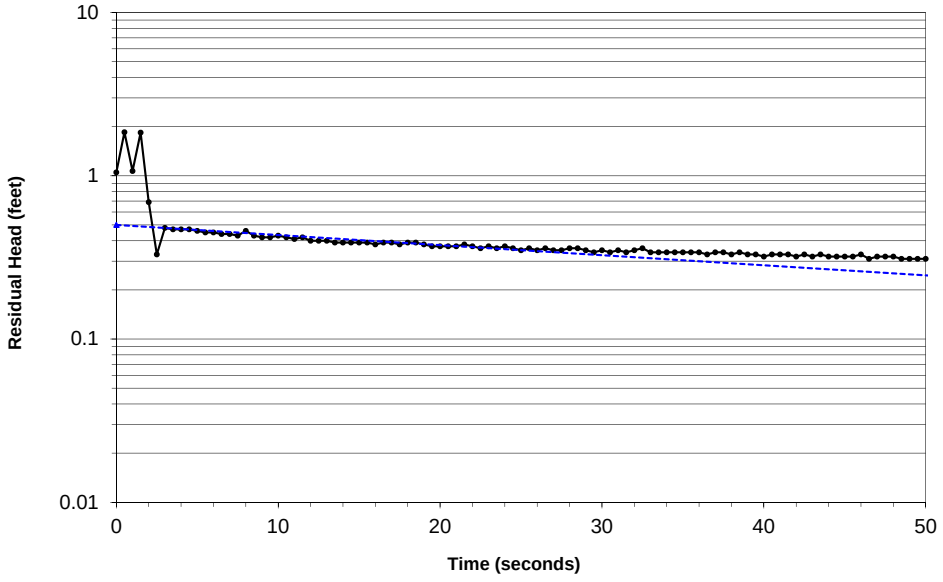
MW-204A

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	27.12	
Depth to Static (PVC) in ft.:	19.97	
Well Depth-Static (Lw), in ft.:	7.15	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.15	
A:	2.226	
B:	0.347	
C:	1.700	
Le/rw:	20.189	
Saturated Thickness (H), in ft.:	7.15	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.221	
Yo, in ft.:	0.50	
Yt, in ft.:	0.010	
t, in min.:	4.583	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		3.84E-03
Kh (ft/min) =		7.57E-03
Kh (ft/day) =		1.09E+01

Elapsed Time (sec)	Residual Head (ft.)
0	1.05
0.5	1.85
1	1.07
1.5	1.84
2	0.69
2.5	0.33
3	0.48
3.5	0.47
4	0.47
4.5	0.47
5	0.46
5.5	0.45
6	0.45
6.5	0.44
7	0.44
7.5	0.43
8	0.46
8.5	0.43
9	0.42
9.5	0.42
10	0.43
10.5	0.42
11	0.41
11.5	0.42
12	0.4
12.5	0.4
13	0.4
13.5	0.39
14	0.39
14.5	0.39
15	0.39
15.5	0.39
16	0.38
16.5	0.39
17	0.39
17.5	0.38
18	0.39
18.5	0.39
19	0.38
19.5	0.37
20	0.37
20.5	0.37
21	0.37
21.5	0.38
22	0.37
22.5	0.36
23	0.37
23.5	0.36
24	0.37
24.5	0.36



HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-204A
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

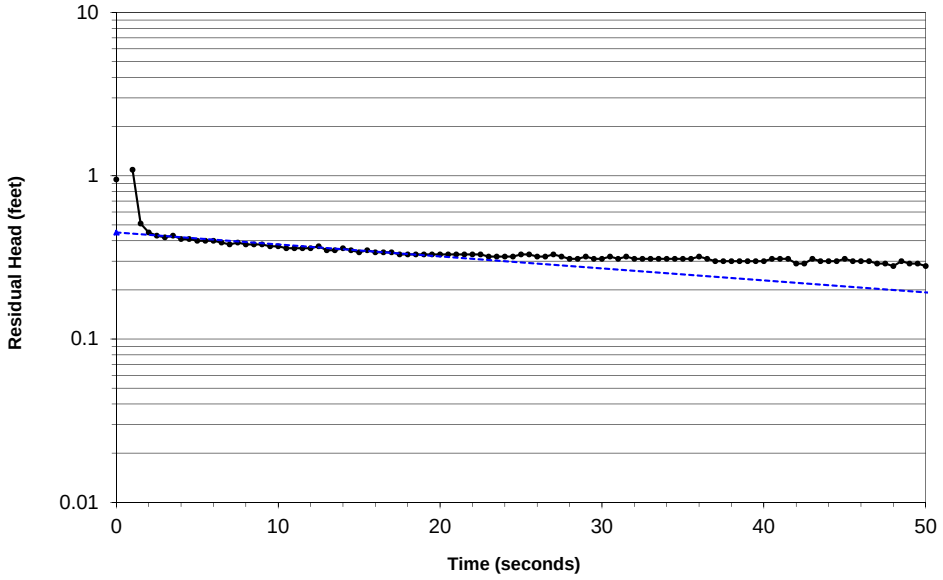
MW-204A

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	27.12	
Depth to Static (PVC) in ft.:	19.97	
Well Depth-Static (Lw), in ft.:	7.15	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.15	
A:	2.226	
B:	0.347	
C:	1.700	
Le/rw:	20.189	
Saturated Thickness (H), in ft.:	7.15	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.221	
Yo, in ft.:	0.45	
Yt, in ft.:	0.010	
t, in min.:	3.750	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		4.57E-03
Kh (ft/min) =		9.00E-03
Kh (ft/day) =		1.30E+01

Elapsed Time (sec)	Residual Head (ft.)
0	0.95
0.5	-0.06
1	1.09
1.5	0.51
2	0.45
2.5	0.43
3	0.42
3.5	0.43
4	0.41
4.5	0.41
5	0.4
5.5	0.4
6	0.4
6.5	0.39
7	0.38
7.5	0.39
8	0.38
8.5	0.38
9	0.38
9.5	0.37
10	0.37
10.5	0.36
11	0.36
11.5	0.36
12	0.36
12.5	0.37
13	0.35
13.5	0.35
14	0.36
14.5	0.35
15	0.34
15.5	0.35
16	0.34
16.5	0.34
17	0.34
17.5	0.33
18	0.33
18.5	0.33
19	0.33
19.5	0.33
20	0.33
20.5	0.33
21	0.33
21.5	0.33
22	0.33
22.5	0.33
23	0.32
23.5	0.32
24	0.32
24.5	0.32



HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-204A
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

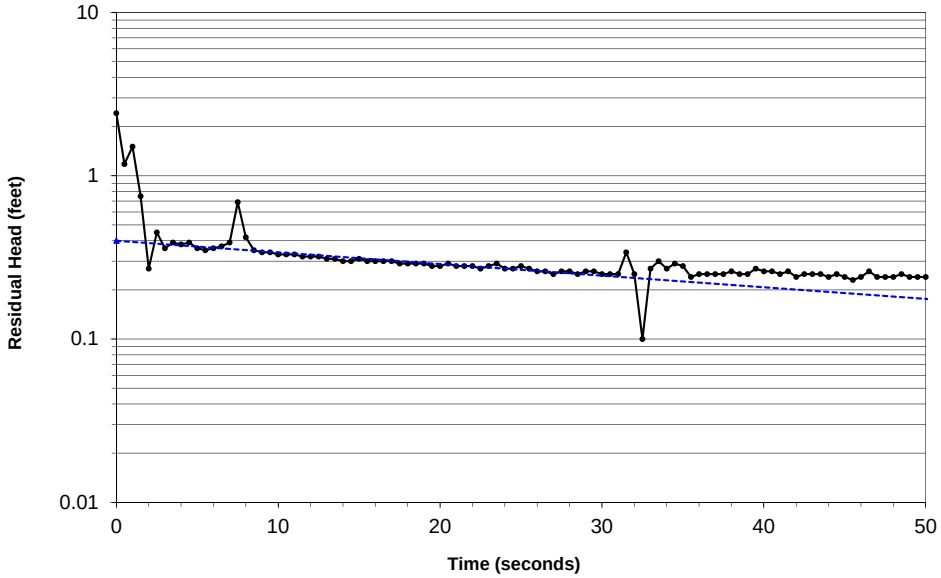
MW-204A

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	27.12	
Depth to Static (PVC) in ft.:	19.97	
Well Depth-Static (Lw), in ft.:	7.15	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.15	
A:	2.226	
B:	0.347	
C:	1.700	
Le/rw:	20.189	
Saturated Thickness (H), in ft.:	7.15	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.221	
Yo, in ft.:	0.40	
Yt, in ft.:	0.010	
t, in min.:	3.750	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		4.43E-03
Kh (ft/min) =		8.72E-03
Kh (ft/day) =		1.26E+01

Elapsed Time (sec)	Residual Head (ft.)
0	2.42
0.5	1.18
1	1.51
1.5	0.75
2	0.27
2.5	0.45
3	0.36
3.5	0.39
4	0.38
4.5	0.39
5	0.36
5.5	0.35
6	0.36
6.5	0.37
7	0.39
7.5	0.69
8	0.42
8.5	0.35
9	0.34
9.5	0.34
10	0.33
10.5	0.33
11	0.33
11.5	0.32
12	0.32
12.5	0.32
13	0.31
13.5	0.31
14	0.3
14.5	0.3
15	0.31
15.5	0.3
16	0.3
16.5	0.3
17	0.3
17.5	0.29
18	0.29
18.5	0.29
19	0.29
19.5	0.28
20	0.28
20.5	0.29
21	0.28
21.5	0.28
22	0.28
22.5	0.27
23	0.28
23.5	0.29
24	0.27
24.5	0.27



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-204A
GREAT RIVER ROAD, GENOA, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

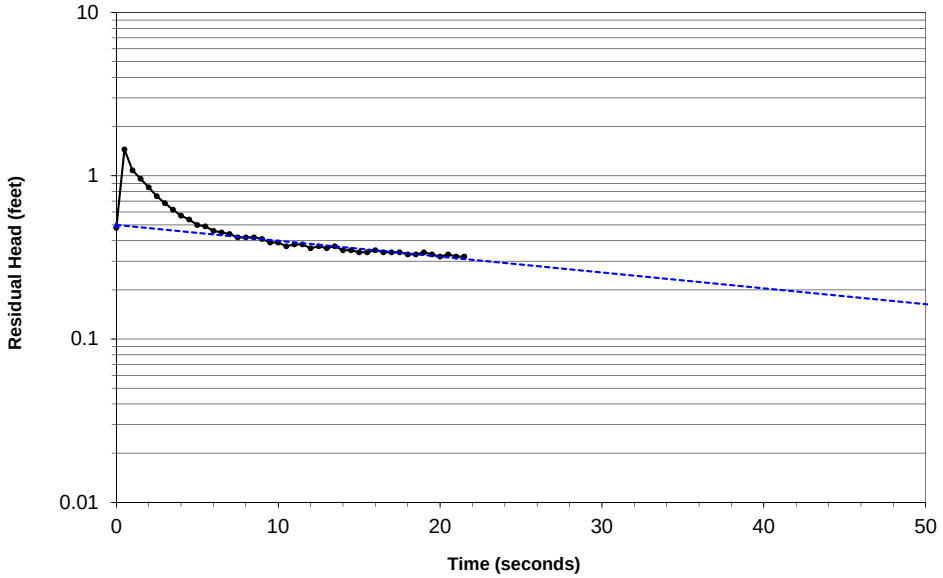
MW-204A

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	27.12	
Depth to Static (PVC) in ft.:	19.97	
Well Depth-Static (Lw), in ft.:	7.15	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.15	
A:	2.226	
B:	0.347	
C:	1.700	
Le/rw:	20.189	
Saturated Thickness (H), in ft.:	7.15	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.221	
Yo, in ft.:	0.50	
Yt, in ft.:	0.010	
t, in min.:	2.917	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		6.04E-03
Kh (ft/min) =		1.19E-02
Kh (ft/day) =		1.71E+01

Elapsed Time (sec)	Residual Head (ft.)
0	0.48
0.5	1.45
1	1.08
1.5	0.96
2	0.85
2.5	0.75
3	0.68
3.5	0.62
4	0.57
4.5	0.54
5	0.5
5.5	0.49
6	0.46
6.5	0.45
7	0.44
7.5	0.42
8	0.42
8.5	0.42
9	0.41
9.5	0.39
10	0.39
10.5	0.37
11	0.38
11.5	0.38
12	0.36
12.5	0.37
13	0.36
13.5	0.37
14	0.35
14.5	0.35
15	0.34
15.5	0.34
16	0.35
16.5	0.34
17	0.34
17.5	0.34
18	0.33
18.5	0.33
19	0.34
19.5	0.33
20	0.32
20.5	0.33
21	0.32
21.5	0.32



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-204A
GREAT RIVER ROAD, GENOA, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

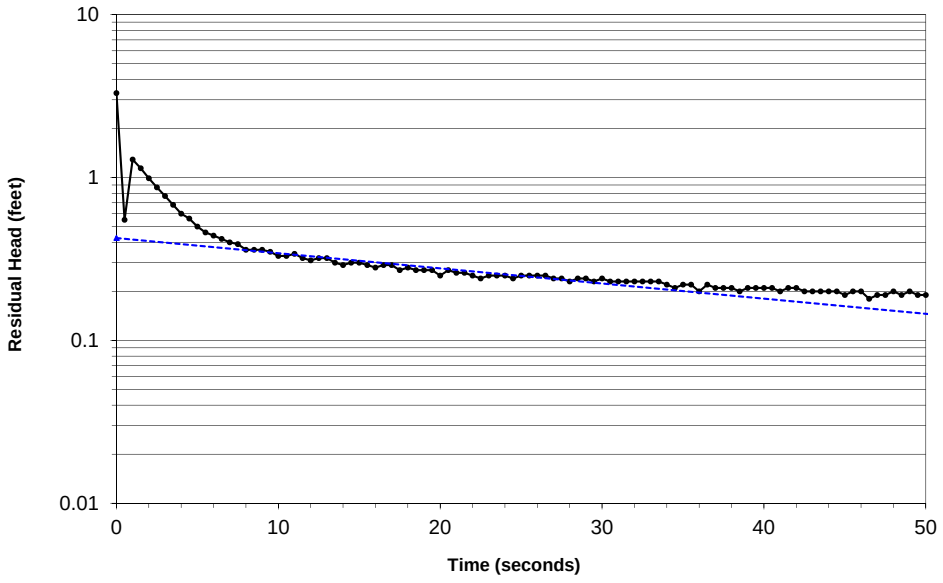
MW-204A

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	27.12	
Depth to Static (PVC) in ft.:	19.97	
Well Depth-Static (Lw), in ft.:	7.15	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.15	
A:	2.226	
B:	0.347	
C:	1.700	
Le/rw:	20.189	
Saturated Thickness (H), in ft.:	7.15	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.221	
Yo, in ft.:	0.43	
Yt, in ft.:	0.010	
t, in min.:	2.917	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		5.79E-03
Kh (ft/min) =		1.14E-02
Kh (ft/day) =		1.64E+01

Elapsed Time (sec)	Residual Head (ft.)
0	3.3
0.5	0.55
1	1.29
1.5	1.14
2	0.99
2.5	0.87
3	0.77
3.5	0.68
4	0.6
4.5	0.56
5	0.5
5.5	0.46
6	0.44
6.5	0.42
7	0.4
7.5	0.39
8	0.36
8.5	0.36
9	0.36
9.5	0.35
10	0.33
10.5	0.33
11	0.34
11.5	0.32
12	0.31
12.5	0.32
13	0.32
13.5	0.3
14	0.29
14.5	0.3
15	0.3
15.5	0.29
16	0.28
16.5	0.29
17	0.29
17.5	0.27
18	0.28
18.5	0.27
19	0.27
19.5	0.27
20	0.25
20.5	0.27
21	0.26
21.5	0.26
22	0.25
22.5	0.24
23	0.25
23.5	0.25
24	0.25
24.5	0.24



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-204A
GREAT RIVER ROAD, GENOA, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

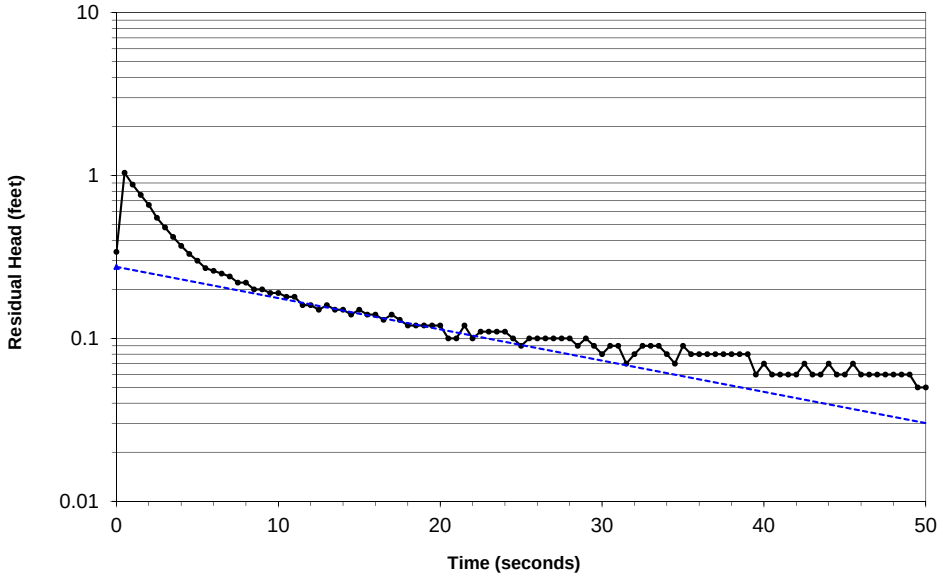
MW-204A

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	27.12	
Depth to Static (PVC) in ft.:	19.97	
Well Depth-Static (Lw), in ft.:	7.15	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	7.15	
A:	2.226	
B:	0.347	
C:	1.700	
Le/rw:	20.189	
Saturated Thickness (H), in ft.:	7.15	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	2.221	
Yo, in ft.:	0.28	
Yt, in ft.:	0.010	
t, in min.:	1.250	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		1.19E-02
Kh (ft/min) =		2.35E-02
Kh (ft/day) =		3.38E+01

Elapsed Time (sec)	Residual Head (ft.)
0	0.34
0.5	1.04
1	0.88
1.5	0.76
2	0.66
2.5	0.55
3	0.48
3.5	0.42
4	0.37
4.5	0.33
5	0.3
5.5	0.27
6	0.26
6.5	0.25
7	0.24
7.5	0.22
8	0.22
8.5	0.2
9	0.2
9.5	0.19
10	0.19
10.5	0.18
11	0.18
11.5	0.16
12	0.16
12.5	0.15
13	0.16
13.5	0.15
14	0.15
14.5	0.14
15	0.15
15.5	0.14
16	0.14
16.5	0.13
17	0.14
17.5	0.13
18	0.12
18.5	0.12
19	0.12
19.5	0.12
20	0.12
20.5	0.1
21	0.1
21.5	0.12
22	0.1
22.5	0.11
23	0.11
23.5	0.11
24	0.11
24.5	0.1



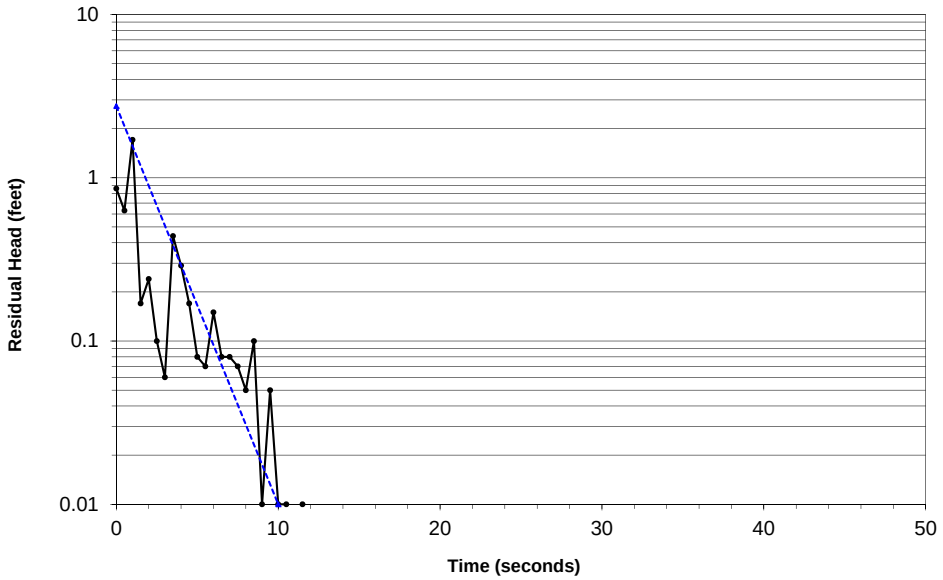
HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-204B
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

MW-204B

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	56.7	
Depth to Static (PVC) in ft.:	19.89	
Well Depth-Static (Lw), in ft.:	36.81	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	36.81	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.227	
Yo, in ft.:	2.75	
Yt, in ft.:	0.010	
t, in min.:	0.167	
	(Lw<H)	(Lw=H)
Kh (cm/sec) =		1.58E-01
Kh (ft/min) =		3.10E-01
Kh (ft/day) =		4.47E+02

Elapsed Time (sec)	Residual Head (ft.)
0	0.86
0.5	0.63
1	1.71
1.5	0.17
2	0.24
2.5	0.1
3	0.06
3.5	0.44
4	0.29
4.5	0.17
5	0.08
5.5	0.07
6	0.15
6.5	0.08
7	0.08
7.5	0.07
8	0.05
8.5	0.1
9	0.01
9.5	0.05
10	0.01
10.5	0.01
11	0
11.5	0.01
12	0



HALEY & ALDRICH, INC	FALLING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-204B
Great River Road, Genoa, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

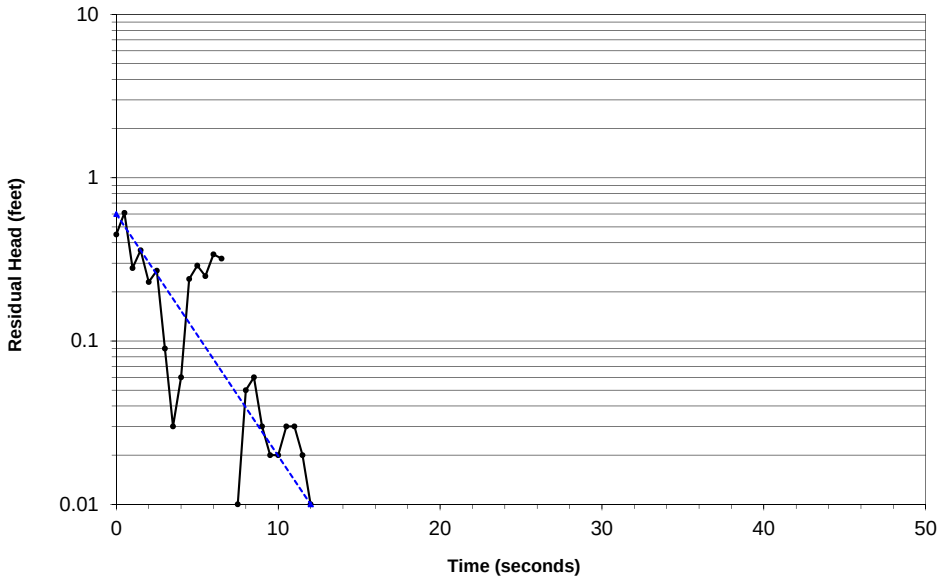
MW-204B

Falling Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	56.7	
Depth to Static (PVC) in ft.:	19.89	
Well Depth-Static (Lw), in ft.:	36.81	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	36.81	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.227	
Yo, in ft.:	0.60	
Yt, in ft.:	0.010	
t, in min.:	0.200	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		9.58E-02
Kh (ft/min) =		1.89E-01
Kh (ft/day) =		2.71E+02

Elapsed Time (sec)	Residual Head (ft.)
0	0.45
0.5	0.61
1	0.28
1.5	0.36
2	0.23
2.5	0.27
3	0.09
3.5	0.03
4	0.06
4.5	0.24
5	0.29
5.5	0.25
6	0.34
6.5	0.32
7	-0.42
7.5	0.01
8	0.05
8.5	0.06
9	0.03
9.5	0.02
10	0.02
10.5	0.03
11	0.03
11.5	0.02
12	0.01
12.5	0
13	0



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-204B
GREAT RIVER ROAD, GENOA, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

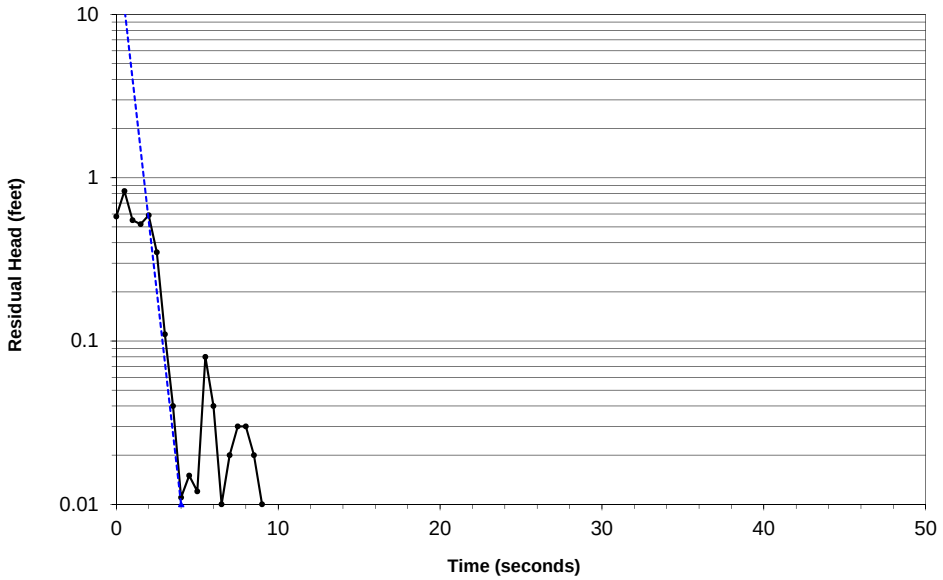
MW-204B

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	56.7	
Depth to Static (PVC) in ft.:	19.89	
Well Depth-Static (Lw), in ft.:	36.81	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	36.81	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.227	
Yo, in ft.:	30.00	
Yt, in ft.:	0.010	
t, in min.:	0.067	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		5.62E-01
Kh (ft/min) =		1.11E+00
Kh (ft/day) =		1.59E+03

Elapsed Time (sec)	Residual Head (ft.)
0	0.58
0.5	0.83
1	0.55
1.5	0.52
2	0.59
2.5	0.35
3	0.11
3.5	0.04
4	0.011
4.5	0.015
5	0.012
5.5	0.08
6	0.04
6.5	0.01
7	0.02
7.5	0.03
8	0.03
8.5	0.02
9	0.01
9.5	0



HALEY & ALDRICH, INC	RISING HEAD TEST SUMMARY	
LACBWR	Monitoring Well ID:	MW-204B
GREAT RIVER ROAD, GENOA, WI	Test Date:	11-Dec-12
38705-007	H&A Rep.:	MAD

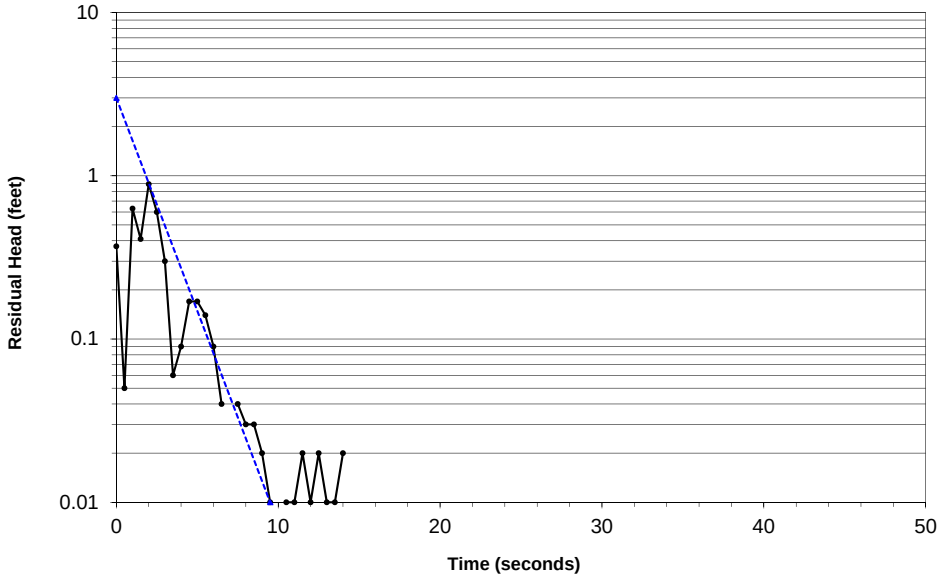
MW-204B

Rising Head Permeability Calculation: Bouwer-Rice Method

Well Depth (PVC), in ft.:	56.7	
Depth to Static (PVC) in ft.:	19.89	
Well Depth-Static (Lw), in ft.:	36.81	
Test Section Radius (rw), in ft.:	0.354	
Nominal Casing Radius (rc), in ft.:	0.167	
Equivalent Casing Radius (rc') in ft:	0.2389	(Adjust for water-table wells only)
Nominal Screen Length in ft:	10.0	
Test Length Section (Le), in ft.:	10	
A:	2.463	
B:	0.397	
C:	2.061	
Le/rw:	28.236	
Saturated Thickness (H), in ft.:	36.81	
For Lw<H - ln(Re/rw):		
For Lw=H - ln(Re/rw):	3.227	
Yo, in ft.:	3.00	
Yt, in ft.:	0.010	
t, in min.:	0.158	

	(Lw<H)	(Lw=H)
Kh (cm/sec) =		1.69E-01
Kh (ft/min) =		3.32E-01
Kh (ft/day) =		4.78E+02

Elapsed Time (sec)	Residual Head (ft.)
0	0.37
0.5	0.05
1	0.63
1.5	0.41
2	0.89
2.5	0.6
3	0.3
3.5	0.06
4	0.09
4.5	0.17
5	0.17
5.5	0.14
6	0.09
6.5	0.04
7	0
7.5	0.04
8	0.03
8.5	0.03
9	0.02
9.5	0.01
10	0
10.5	0.01
11	0.01
11.5	0.02
12	0.01
12.5	0.02
13	0.01
13.5	0.01
14	0.02
14.5	0



APPENDIX G

Groundwater Low Flow Documentation

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME MW-200A

Page 1 of 1

PROJECT	Dairyland Power Cooperative LACBWR	FILE NO.	38705-009	DATE	27 June 2013
LOCATION	Former UST	TUBE TYPE	~~1/4" x 3/8"~~ polyethylene 3/8" x 1/4"	WEATHER	Sunny
FIELD MONITOR DEVICE	Horiba U-52	PUMP DEVICE	peristaltic pump w/battery pack	TEMPERATURE	80 °F
WELL I.D. (in.)	2-inch	SCREEN LENGTH	10 ft	FIELD REP	MVP
WATER LEVEL	12.21 Ft.	MEASURING POINT	top of PVC casing	PUMP INTAKE DEPTH	20 Ft
WELL DEPTH (Log)	25 ft	DEPTH TO BOTTOM	27.64 Ft.	WELL VOLUME	2.08 Gal

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY mS/cm ~~(µS/cm)~~	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) (field filtrations) (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
1226	12.23	7.00	0.853	2.02	37.2	24.32	-60			NEW TUBING - DEDICATED
1229	12.22	6.84	0.842	0.00	26.4	26.76	-68			
1232	12.23	6.81	0.876	0.00	39.5	26.25	-65		400 mL	
1235	12.23	6.79	0.896	0.00	61.0	24.72	-63			
1238	12.23	6.78	0.890	0.00	73.0	24.88	-60			
1241	12.23	6.78	0.892	0.00	74.5	24.86	-60			
1244	12.22	6.79	0.885	0.00	74.1	24.88	-62		325 mL	
1247	12.22	6.80	0.884	0.00	73.1	24.84	-63			
1250	12.22	6.80	0.886	0.00	70.0	24.87	-64			
1253	12.22	6.86	0.886	0.00	64.6	24.92	-67			
1256	12.22	6.82	0.887	0.00	61.9	24.96	-68			
1259	12.22	6.81	0.885	0.00	60.9	25.33	-70			
1302	12.22	6.81	0.876	0.00	57.7	25.75	-73			TURB HIGH BUT STABLE
1305	12.22	6.81	0.872	0.00	59.1	25.93	-73			- FLOW AS LOW AS PUMP WILL ALLOW.
										WATER LEVEL METER
										WAS DECONTAMINATED
										PRIOR TO AND AFTER
										WELL

START PURGE 1223 STOP PURGE 1305 TOTAL PURGE VOLUME 3.70 gallons -

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
~~Tritium (H3)~~	NO	NONE	Tritium (H3)	1305	250 mL Plastic
~~Gamma~~					
~~Cobalt-60~~					
~~Strontium-90~~					
~~Cesium-137~~					
~~HTDs~~					

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME MW-200B

Page 1 of

PROJECT	Dairyland Power Cooperative LACBWR	**FILE NO.**	38705-009	**DATE**	27 June 2013
LOCATION	Former UST Area	**TUBE TYPE**	~~1/4"x3/8"~~ polyethylene 3/8"x1/2"	**WEATHER**	Sunny.
FIELD MONITOR DEVICE	Horiba U-52	**PUMP DEVICE**	peristaltic pump w/battery pack	**TEMPERATURE**	80°F's
WELL I.D. (in.)	2-inch	**SCREEN LENGTH**	10 ft	**FIELD REP**	MAD
WATER LEVEL	12.66	**MEASURING POINT**	top of PVC casing	**PUMP INTAKE DEPTH**	50'
WELL DEPTH (Log)	55 ft	**DEPTH TO BOTTOM**	57.36 ft	**WELL VOLUME**	6.610 gallons

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY mS/cm ~~(µS/cm)~~	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) (field filtrations) (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
1232	12.66	7.43	0.977	0.27	15.8	14.76	-161		475 mL/min	New tubing → dedicated
1235	12.66	7.41	0.975	0.00	6.5	14.63	-155			(adjust flow lower)
1238	12.66	7.37	0.977	0.00	4.1	14.58	-153		410 mL/min	No odor no sheen
1241	12.66	7.33	0.976	0.00	5.3	14.53	-150			
1244	12.66	7.34	0.973	0.00	2.2	14.57	-150			
1247	12.66	7.32	0.976	0.00	2.5	14.54	-150			
1250	12.66	7.33	0.976	0.00	4.7	14.45	-150			
1253	12.66	7.31	0.919	0.00	1.8	17.28	-150			adjust flow lower
1256	12.66	7.32	0.879	0.00	1.0	19.57	-150		325 mL/min	
1259	12.66	7.32	0.861	0.00	1.2	20.43	-150			
1302	12.66	7.33	0.853	0.00	1.3	20.82	-151			
1305	12.66	7.34	0.844	0.00	1.2	21.16	-151			Collect field sample for Tritium (H3) on-site testing
										Sounder Water Level Meter decontaminated prior + post use @ well.

START PURGE 1230 **STOP PURGE** 1305 **TOTAL PURGE VOLUME** 4.25 gallons

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
~~Tritium (H3)~~	NO	NONE	Tritium (H3)	1305	250 mL Plastic
~~Gamma~~					
~~Cobalt-60~~					
~~Strontium-90~~					
~~Cesium-137~~					
~~HTDs~~					

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME MW-201A

Page 1 of

PROJECT	Dairyland Power Cooperative LACBWR	FILE NO.	38705-009	DATE	27 June 2013
LOCATION		TUBE TYPE	~~1/4" x 3/8"~~ polyethylene	WEATHER	mid 70's F
FIELD MONITOR DEVICE	Horiba	PUMP DEVICE	peristaltic pump w/battery pack	TEMPERATURE	Sunny, P. Cloudy.
WELL I.D. (in.)	2-inch	SCREEN LENGTH	10 ft	FIELD REP	MVP
WATER LEVEL	11.22	MEASURING POINT	top of PVC casing	PUMP INTAKE DEPTH	20 FT.
WELL DEPTH (Log)	25 ft	DEPTH TO BOTTOM	27.66 ft	WELL VOLUME	2.25 GAL

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY mS/cm ~~(uS/cm)~~	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) (field filtrations) (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
1013	11.26	7.21	0.493	4.82	0.0	27.40	152		425	NEW TUBING - DEDICATED
1016	11.26	6.88	0.463	1.44	0.0	28.70	169			- NO ODOR - NO SHEEN
1019	11.26	6.80	0.476	0.13	2.1	27.38	172		450	
1022	11.26	6.72	0.497	0.00	23.3	26.49	176			
1025	11.25	6.67	0.504	0.00	37.0	25.78	178		375	
1028	11.25	6.64	0.509	0.00	43.7	25.27	180			
1031	11.25	6.62	0.511	0.00	45.0	24.83	182		325	
1034	11.25	6.61	0.516	0.00	44.4	24.48	183		310	LOWEST FLOW RATE
1037	11.25	6.60	0.520	0.00	43.2	24.29	184			EQUIPMENT WILL ALLOW
1040	11.25	6.59	0.524	0.00	42.6	24.11	184			
1043	11.25	6.58	0.529	0.00	40.1	23.87	184			TURB. HIGH BUT STABLE
										WATER LEVEL METER
										DECONTAMINATED PRIOR
										TO, AND AFTER WELL

START PURGE 1008 STOP PURGE 1043 TOTAL PURGE VOLUME 3.17 GAL

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
~~Tritium (H3)~~	1043	3 GAL. PLASTIC	Tritium (H3)	1043	250 mL Plastic
Gamma					
Cobalt-60					
Strontium-90					
Cesium-137					
HTDs					

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME MW-201B

PROJECT	Dairyland Power Cooperative LACBWR	FILE NO.	38705-009	DATE	27 June 2013
LOCATION		TUBE TYPE	~~1/4" x 3/8"~~ polyethylene	WEATHER	Mostly Sunny
FIELD MONITOR DEVICE	Horiba	PUMP DEVICE	peristaltic pump w/battery pack	TEMPERATURE	mid 70's F
WELL I.D. (in.)	2-inch	SCREEN LENGTH	10 ft	FIELD REP	MAD
WATER LEVEL	11.06	MEASURING POINT	top of PVC casing	PUMP INTAKE DEPTH	57 ft
WELL DEPTH (Log)	55 ft	DEPTH TO BOTTOM	56.88	WELL VOLUME	7.16 Gal

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY ~~(µS/cm)~~ mS/cm	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) (field filtrations) (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
1007	11.07	7.26	0.839	4.65	45.8	14.43	-101		470mL/min	new tubing → dedicated
1010	11.06	7.02	1.01	1.47	10.5	13.90	-114			No odor, no sheen.
1013	11.06	7.01	1.05	0.00	5.7	13.81	-119			(adjust flow lower)
1016	11.06	7.01	1.07	0.00	3.2	13.76	-121			
1019	11.06	7.00	1.09	0.00	3.6	13.88	-122			
1022	11.06	7.00	1.07	0.00	1.5	14.89	-123		450mL/min	(adjust flow lower)
1025	11.06	6.99	0.982	0.00	2.6	17.62	-123		380mL/min	
1028	11.06	7.00	1.09	0.00	2.4	14.04	-124			
1031	11.06	7.00	1.10	0.00	2.4	13.94	-124			Begin Sample.
										Silty, coloration = light orange.
										Solinst Water level meter
										decontaminated prior +
										post use @ well.

START PURGE 1006 STOP PURGE 1031 TOTAL PURGE VOLUME 3.5 gallons

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
~~Tritium (H3)~~	1031	3 gallons	Tritium (H3)	1031	250mL
Gamma		Plastic			Plastic
Cobalt-60					
Strontium-90					
Cesium-137					
HTDs					

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME MW-202A

Page 1 of 0

PROJECT	Dairyland Power Cooperative LACBWR	FILE NO.	38705-009	DATE	6/27/13
LOCATION	WEST OF SUBSTATION	TUBE TYPE	~~1/4" x 3/8"~~ polyethylene	WEATHER	SUNNY
FIELD MONITOR DEVICE	Horiba	PUMP DEVICE	peristaltic pump w/battery pack	TEMPERATURE	71°F
WELL I.D. (in.)	2-inch	SCREEN LENGTH	10 ft	FIELD REP	MVP
WATER LEVEL	11.97	MEASURING POINT	top of PVC casing	PUMP INTAKE DEPTH	20 FT
WELL DEPTH (Log)	25 ft	DEPTH TO BOTTOM	27.64 ft	WELL VOLUME	2.12 GAL

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY mS/cm ~~(µS/cm)~~	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) (field filtrations) (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
0829	11.97	6.73	0.480	2.31	0.0	15.26	271			NEW TUBING - DEDICATED
0832	11.96	6.82	0.469	1.78	0.0	17.84	259			NO COLOR
0835	11.96	6.90	0.471	1.48	0.0	19.23	245		310	NO SHEEN NO ODOR
0838	11.96	6.92	0.472	1.44	0.0	19.48	232			
0841	11.96	6.92	0.477	1.36	0.0	19.67	227			
0844	11.96	6.90	0.481	1.25	0.0	19.79	216			
0847	11.96	6.92	0.482	1.21	0.0	19.85	195		375	
0850	11.96	6.92	0.480 ~~0.80~~	1.15	0.0	19.86	162			
0853	11.96	6.93	0.481	1.27	0.0	19.87	130			
0856	11.96	6.95	0.477	1.09	0.0	19.85	109			
0859	11.96	6.98	0.479	1.10	0.0	19.84	93			
0902	11.96	6.99	0.480	1.03	0.0	19.84	84			
0905	11.96	7.01	0.482	1.01	0.0	19.86	78			
0908	11.96	7.02	0.481	0.97	0.0	19.93	72			SAMPLE START TIME
										WATER LEVEL METER
										DECONTAMINATED PRIOR
										TO, AND AFTER WELL.

START PURGE 0823 STOP PURGE 0908 TOTAL PURGE VOLUME 4.5 GAL.

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
~~Tritium (H3)~~	0908	3 GALLONS IN PLASTICS	Tritium (H3)	0908	250 mL PLASTIC
Gamma					
Cobalt-60					
Strontium-90					
Cesium-137					
HTDs					

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME MW-202B

PROJECT	Dairyland Power Cooperative LACBWR	FILE NO.	38705-009	DATE	27 June 2013
LOCATION	West of Substation	TUBE TYPE	~~1/4"~~ ~~3/8"~~ polyethylene 3/8" x 1/2"	WEATHER	Sunny. P.C loudy.
FIELD MONITOR DEVICE	Horiba	PUMP DEVICE	peristaltic pump w/battery pack	TEMPERATURE	71°F
WELL I.D. (in.)	2-inch	SCREEN LENGTH	10 ft	FIELD REP	MAD
WATER LEVEL	11.88	MEASURING POINT	top of PVC casing	PUMP INTAKE DEPTH	50 ft
WELL DEPTH (Log)	55 ft	DEPTH TO BOTTOM	55.68 ft	WELL VOLUME	7.03 gallons.

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY mS/cm ~~(µS/cm)~~	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) (field filtrations) (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
0829	11.90	6.32	0.765	4.31	18.0	23.39	216		410 mL/min	new tubing → dedicated
0833	11.90	6.80	0.796	0.00	0.0	24.94	-110		400 mL/min	No odor, no sheen
0836	11.90	6.92	0.808	0.00	0.0	24.59	-132		350 mL/min	
0839	11.90	6.97	0.810	0.00	0.0	24.36	-139			
0842	11.90	7.01	0.808	0.00	0.0	24.22	-145			
0845	11.90	7.02	0.810	0.00	0.0	24.12	-146			
0848	11.90	7.03	0.812	0.00	0.0	23.93	-148			
0851	11.90	7.04	0.813	0.00	0.0	23.75	-150			
0854	11.90	7.07	0.813	0.00	0.0	23.63	-151			
0857	11.90	7.06	0.815	0.00	0.0	23.48	-157		350 mL/min	Begin Sampling

START PURGE 0823 STOP PURGE 0857 TOTAL PURGE VOLUME 3.2 gallons

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
~~Tritium (H3)~~	0857	3 gallons	Tritium (H3)	0857	250 mL
Gamma		Plastics			Plastic
Cobalt-60					
Strontium-90					
Cesium-137					
HTDs					

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME: MW-203A

Page 1 of

PROJECT	Dairyland Power Cooperative LACBWR	FILE NO.	38705-009	DATE	26 June 2013
LOCATION		TUBE TYPE	~~1/4" x 3/8"~~ polyethylene	WEATHER	Sunny. light breeze.
FIELD MONITOR DEVICE	Horiba U-52	PUMP DEVICE	peristaltic pump w/battery pack	TEMPERATURE	
WELL I.D. (in.)	2-inch	SCREEN LENGTH	10 ft	FIELD REP	MAD
WATER LEVEL	11.55	MEASURING POINT	top of PVC casing	PUMP INTAKE DEPTH	20
WELL DEPTH (Log)	25 ft	DEPTH TO BOTTOM	27.74	WELL VOLUME	2.19 gal

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY ~~(mS/cm)~~ (uS/cm)	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) (field filtrations) (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
1153	11.57	7.28	0.247	4.10	30.4	23.72	185		200mL/min	new tubing → dedicated little orange silt
1156	11.58	7.23	0.245	3.97	25.4	24.93	188			No odor, no sheen
1159	11.57	7.22	0.240	3.54	25.9	24.69	187			discharge water stops + starts
1202	11.57	7.19	0.245	3.69	19.0	24.49	184			(affected by pumping on MW 203B?)
1205	11.57	7.18	0.245	3.30	24.8	21.6	181			
1208	11.56	7.18	0.263	3.75	19.3	22.28	175			
1211	11.57	7.18	0.255	4.88	25.1	24.58	174			Dead battery. Pump stop.
1332	11.58	7.18	0.262	4.27	20.9	27.86	178		250	Restarted due to power failure
1335	11.58	7.20	0.232	3.28	12.4	28.43	178			
1337	11.58	7.16	0.225	2.96	18.3	28.28	178			
1340	11.58	7.18	.245	3.50	20.5	25.10	177			
1343	11.58	7.15	.252	3.47	10.4	24.17	168			
1346	11.58	7.14	.239	2.69	5.4	25.47	162			
1349	11.58	7.13	.237	2.38	6.1	26.01	142			
1352	11.58	7.12	.238	2.38	6.0	26.01	127			
1355	11.58	7.12	.238	2.24	7.9	26.20	124			
1358	11.58	7.12	.238	2.1	7.92	26.49	115			
1401	11.58	7.11	.239	2.20	8.6	26.69	112			Sample
AV										

START PURGE 1236 STOP PURGE 1401 TOTAL PURGE VOLUME 3 gallons

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
~~Tritium (H3)~~	1401	2 gallons plastic	~~Tritium (H3)~~		
Gamma					
Cobalt-60					
Strontium-90					
Cesium-137					
HTDs					

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME MW-203B

PROJECT	Dairyland Power Cooperative LACBWR	FILE NO.	38705-009	DATE	6/26/13
LOCATION		TUBE TYPE	~~1/4" x 3/8"~~ polyethylene	WEATHER	Sunny
FIELD MONITOR DEVICE	Horiba U-52	PUMP DEVICE	peristaltic pump w/battery pack	TEMPERATURE	80°
WELL I.D. (in.)	2-inch	SCREEN LENGTH	10 ft	FIELD REP	LCT
WATER LEVEL	11.87	MEASURING POINT	top of PVC casing	PUMP INTAKE DEPTH	50'
WELL DEPTH (Log)	55 ft	DEPTH TO BOTTOM	57.80	WELL VOLUME	7.03 gallons

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY mS/cm ~~(mS/cm)~~	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) (field filtrations) (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
12:38										New tubing → dedicated
12:41	11.87	7.73	.680	2.26	~~21.60~~ 15.0	23.44	-27		300	Clear, no odor, no sheen
12:44	11.89	7.58	.703	1.04	13.2	22.63	-122			little silt.
12:47	11.88	7.55	.721	.62	15.2	22.23	-140			
12:50	11.88	7.53	.728	.41	17.6	21.95	-148			
12:53	11.88	7.53	.735	0.24	17.8	21.60	-152			
12:56	11.88	7.52	.736	0.10	19.8	21.75	-154		↓225	
12:59	11.89	7.52	.744	0.18	21.8	21.90	-154			
1302	11.88	7.53	.790	0.05	5.0	20.12	-151			
1305	11.89	7.53	.785	0.00	5.4	20.41	-156			
1308	11.88	7.53	.783	0.00	1.4	20.52	-160			
1311	11.89	7.54	.782	0.00	4.8	20.55	-162			
1314	11.88	7.54	.784	0.00	2.2	20.78	-164			
1317	11.88	7.55	.787	0.0	1.80	20.89	-165			
1320	11.88	7.55	.809	0.0	1.9	20.83	-165			
1323	11.88	7.56	.787	0.0	1.0	21.07	-165			
1326	11.88	7.56	.787	0	0.8	21.02	-167			
1329	11.88	7.56	.787	0	0.9	21.37	-168			
										Begin Sample
										Water level meter deconned
										prior + post use at well.

START PURGE 12:36 STOP PURGE 1329 TOTAL PURGE VOLUME 1.75 gallons

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
Tritium (H3)	1332	2 gallons Plastic	Tritium (H3)	1427	250mL Plastic
Gamma			GAMMA	1427	250mL Plastic
Cobalt-60					
Strontium-90					
Cesium-137	Duplicate 1358	2 gallons Plastic			
HTDs					

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME: MW-204A

PROJECT	Dairyland Power Cooperative LACBWR	FILE NO.	38705-009	DATE	6-26
LOCATION		TUBE TYPE	~~1/4" x 3/8"~~ polyethylene	WEATHER	Humid, Light Breez
FIELD MONITOR DEVICE	Horiba	PUMP DEVICE	peristaltic pump w/battery pack	TEMPERATURE	75, 88% Hum, 0.1
WELL I.D. (in.)	2-inch	SCREEN LENGTH	10 ft	FIELD REP	LCT
WATER LEVEL	11.05	MEASURING POINT	top of PVC casing	PUMP INTAKE DEPTH	20
WELL DEPTH (Log)	25 ft	DEPTH TO BOTTOM	26.83	WELL VOLUME	2.275 gallons

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY ~~(uS/cm)~~ mS/cm	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) (field filtrations) (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
0921	11.12	7.31	.901	4.75	18.7	22.87	190			NEW TUBING - DEDICATED
0924	11.11	7.26	.832	4.13	16.2	22.52	197		~380	NO ODOR, NO SHEEN
0927	11.13	7.23	.820	3.94	16.3	20.51	203			
0930	11.13	7.21	.813	3.79	16.2	19.75	204			
0933	11.13	7.19	.797	3.64	18.9	19.09	205		~260	
0936	11.11	7.17	.788	3.29	23.0	19.48	206			
0939	11.11	7.16	.792	3.04	23.6	19.57	205			
0941	11.11	7.16	.795	3.02	23.0	19.57	203			
0944	11.11	7.16	.791	3.05	21.3	19.63	203			
0947	11.11	7.16	.789	3.03	18.3	19.67	203			
0950	11.11	7.17	.789	3.00	16.7	19.64	202			
0953	11.11	7.18	.787	2.93	10.5	19.99	202			
0956	11.11	7.19	.783	2.80	10.5	19.97	202			
0959	11.11	7.20	.781	2.72	9.7	19.91	202			
10:02	11.11	7.21	.783	2.63	7.9	19.79	200			
10:05	11.11	7.21	.786	2.61	9.4	19.86	198	—		
10:08	11.11	7.19	.784	2.52	9.6	20.00	197			
10:11	11.10	7.18	.806	3.57	4.0	20.06	195		~250	Pump failed, were stable so we sampled
11:24	11.13	7.48	.734	2.73	0.0	23.27	162			re-start pump. Add'l
11:28	11.13	7.47	.718	2.45	0.0	23.39	163		250	
11:31	11.12	7.45	.763	2.40	0.0	21.78	164			

START PURGE 0919 + 1124 STOP PURGE 10:11 + 1152 TOTAL PURGE VOLUME 5.5 gallons

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
Tritium (H3)	~~1011~~ 1152	2 - 1G Plastic	Tritium (H3)	1011	~~[illegible]~~ 1L
Gamma		1 - 1L Plastic			plastic
Cobalt-60					
Strontium-90					
Cesium-137					
HTDs					

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

MW-204A
26 June 2013

Flow

Time	Depth	pH	(mS/cm) Conduct	DO	Turb	Temp	ORP
11:34	11.12	7.46	.748	2.24	0.0	21.99	168
11:37	11.12	7.45	.779	2.37	3.5	19.85	172
11:40	11.13	7.44	.766	2.26	3.4	21.03	175
11:43	11.13	7.42	.767	2.32	4.3	21.25	179
11:46	11.14	7.40	.767	2.21	5.4	21.20	182
11:49	11:13	7.38	.779	2.17	5.2	20.44	184
* 11:52	11.13	7.37	.770	2.02	5.2	20.71	186

sample time.

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME MW-204B

Page 1 of

PROJECT	Dairyland Power Cooperative LACBWR	FILE NO.	38705-009	DATE	26 June 2013
LOCATION		TUBE TYPE	1/4" x 3/8" polyethylene	WEATHER	humid, light breeze, P. Cloud
FIELD MONITOR DEVICE	Horiba U-52	PUMP DEVICE	peristaltic pump w/battery pack	TEMPERATURE	75°F
WELL I.D. (in.)	2-inch	SCREEN LENGTH	10 ft	FIELD REP	M. Daigle
WATER LEVEL	11.08	MEASURING POINT	top of PVC casing	PUMP INTAKE DEPTH	50
WELL DEPTH (Log)	55 ft	DEPTH TO BOTTOM	56.35 ft	WELL VOLUME	7.86 gal.

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY mS/cm ~~(µS/cm)~~	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) (field filtrations) (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
0905	11.08	6.85	.967	7.05	52.0	23.01	178			new tubing → dedicated
0910	11.09	7.14	1.07	5.12	43.1	23.21	179	-0.01	300mL/min	
0913	11.07	7.14	1.08	4.78	29.5	23.27	176	+0.02		No odor, no sheen
0916	11.09	7.14	1.09	4.19	26.3	23.44	168	-0.02		Clear, little silt.
0919	11.09	7.14	1.09	3.77	21.6	23.53	163			
0921	11.08	7.15	1.09	3.54	15.0	23.57	158			
0924	11.10	7.15	1.08	3.36	8.3	23.57	153			
0927	11.08	7.15	1.09	3.05	7.0	23.58	148			
0930	11.09	7.15	1.09	2.76	2.4	23.58	141			
0933	11.08	7.14	1.09	2.40	1.6	23.59	138			
0936	11.09	7.14	1.09	2.38	0.6	23.59	135		280mL/min	
0939	11.09	7.14	1.10	2.40	0.3	23.59	133			
0942	11.09	7.15	1.12	2.20	0.7	22.37	139			
1116	—								→	restart add'l volume needed
1120	11.08	7.25	1.06	0.00	3.9	29.32	157			
1123	11.09	7.22	1.04	0.00	4.5	28.57	151			
1126	11.08	7.23	1.03	0.00	3.0	28.16	152			Low Flow conditions met
1129	11.08	7.24	1.04	0.00	2.0	27.79	150			
1132	11.08	7.22	1.04	0.00	1.5	27.56	150			
1136	11.08	7.22	1.05	0.00	1.5	27.42	151			
1139	11.08	7.21	1.03	0.00	1.1	27.26	151		260 mL/min	Collect samples.

START PURGE 0900 + 1116 STOP PURGE ~~0942~~ 1140 TOTAL PURGE VOLUME 3 gallons + 2 gallons

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
no ~~Tritium (H3)~~ lab sample	~~0942~~ 1140	2 gallons + 1L plastic	Tritium (H3)	0942	1L Plastic
Gamma					
Cobalt-60					
Strontium-90					
Cesium-137					
HTDs					

2 samples

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME MW-200B

Page 1 of 1

PROJECT	Dairyland Power Cooperative LACBWR	FILE NO.		DATE	11/5/12
LOCATION	Former Fuel Oil Tank; West of Admin	TUBE TYPE	~~Teflon~~ polyethylene, ¼" silicone	WEATHER	Rainy
FIELD MONITOR DEVICE	Horiba -U52	PUMP DEVICE	peristaltic pump	TEMPERATURE	40
WELL I.D. (in.)	2-inch	SCREEN LENGTH	10 ft	FIELD REP	L-CT, MEP
WATER LEVEL	20.82	MEASURING POINT	top of PVC casing	PUMP INTAKE DEPTH	50
WELL DEPTH (Log)	55 ft	DEPTH TO BOTTOM	57.37	WELL VOLUME	6.0 gallons

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY (mS/cm)	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) (~~field filtrations~~) (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
1421										
1424	20.82	~~7.65~~								purge water Colored
1427	20.85	7.76	.945	1.93	74.2	12.09	-75		310	
1430	20.81	8.08	.919	1.15	67.1	11.89	-92			
1433	20.81	8.21	.908	.60	41	11.95	-99			
1436	20.80	8.24	.903	.46	41	11.94	-103		300	
1439	20.80	8.23	.902	.40	43.8	11.9	-104			
1442	20.82	8.20	.901	.36	30.3	11.93	-104		250	Purge clear now
1445	20.84	8.20	.901	.27	29.7	12.00	-104			
1448	20.79	8.20	.901	.19	34.6	12.01	-105			
1451	20.80	8.20	.901	.20	31.0	12.01	-105			
1454	20.78	8.12	.907	5.05	19.2	12.10	-94			Drained flow thru Cell
1457	20.78	8.16	.906	1.85	13.9	12.08	-98			
1500	20.83	8.20	.905	1.64	11.00	12.10	-103			
1503	20.81	8.20	.905	1.71	12.5	12.10	-104			
1506	20.79	8.25	.905	0.82	11.7	12.04	-105			
1509	20.79	8.24	.906	2.18	13.9	11.93	-106			
1512	20.78	8.23	.905	1.12	10.2	12.00	-106			
1515	20.79	8.23	.903	.71	9.9	12.02	-107			
1518	20.80	8.20	.903	.77	10.1	12.02	-109			all low flow conditions were
1521	20.81	8.2	.904	.78	9.9	12.00	-108			met. Sample Taken

START PURGE 1421 STOP PURGE 1521 TOTAL PURGE VOLUME 4 gallons

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
~~Tritium (H3)~~	None		Tritium (H3)	1521	500 mL Plastic
Gamma					
Cobalt-60					
Strontium-90					
Cesium-137					
HTDs					

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME MW-200A

PROJECT	Dairyland Power Cooperative LACBWR	FILE NO.		DATE	4/5/13
LOCATION	Former Fuel Oil Tank; West of Admin	TUBE TYPE	~~¼" x ½"~~ polyethylene, ¼" silicone	WEATHER	Rainy
FIELD MONITOR DEVICE	Horiba U52	PUMP DEVICE	peristaltic pump	TEMPERATURE	40
WELL I.D. (in.)	2-inch	SCREEN LENGTH	10 ft	FIELD REP	LCT, MVP
WATER LEVEL	20.17	MEASURING POINT	top of PVC casing	PUMP INTAKE DEPTH	21.0
WELL DEPTH (Log)	25 ft	DEPTH TO BOTTOM	27.86	WELL VOLUME	1.25 gallons

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY (µS/cm)	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) ~~(field titrations)~~ (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
1421										
1424	20.18	6.84	1.54	2.51	0.0	10.89	139		400	purge water not clear
1427	20.20	6.77	1.64	1.50	0.0	11.96	41			Clear
1430	20.20	6.74	1.70	1.17	0.0	12.18	-3			
1433	20.20	6.74	1.75	.84	0.0	12.32	-34			
1436	20.20	6.76	1.75	.66	0.0	12.36	-48		375	
1439	20.20	6.77	1.75	.54	0.0	12.37	-53		300	
1442	20.20	6.78	1.75	.42	0.0	12.34	-57			
1445	20.20	6.78	1.77	.34	0.0	12.34	-59			
1448	20.20	6.78	1.77	.30	0.0	12.38	-62			
1451	20.20	6.78	1.77	.23	0.0	12.38	-64			
1454	20.20	6.78	1.77	.20	0.0	12.39	-64			
1457	20.20	6.78	1.78	.19	0.0	12.40	-66			All Low Flow Sample Conditions
1500	20.20	6.78	1.78	.18	0.0	12.42	-67			were met. Sample Taken

START PURGE 1421 STOP PURGE 1500 TOTAL PURGE VOLUME 3.23 gallons

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
Tritium (H3)	~~1500~~		Tritium (H3)	1500	500 mL plastic
Gamma	none				
Cobalt-60					
Strontium-90					
Cesium-137					
HTDs					

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME MW-201A

Page 1 of 1

PROJECT	Dairyland Power Cooperative LACBWR	FILE NO.	38705-009	DATE	5 NOV 2013
LOCATION	West/Northwest of Turbine Bldg	TUBE TYPE	⅜" x ½" polyethylene, ¼" silicone	WEATHER	Light Rain, foggy
FIELD MONITOR DEVICE	Horiba -U52	PUMP DEVICE	peristaltic pump	TEMPERATURE	40°F
WELL I.D. (in.)	2-inch	SCREEN LENGTH	10 ft	FIELD REP	MVP, LCT, MAD
WATER LEVEL	19.17	MEASURING POINT	top of PVC casing	PUMP INTAKE DEPTH	22
WELL DEPTH (Log)	25 ft	DEPTH TO BOTTOM	27.88	WELL VOLUME	1.42

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY (mS/cm)	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) ~~(field filtrations)~~ (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
1304	19.20	6.79	0.781	13.37	0.0	12.78	107		320	
1307	19.19	6.77	0.794	1.295	0.0	12.95	113			Clear, no odor,
1310	19.19	6.76	0.820	2.37	0.0	13.06	115			no sheen.
1313	19.19	6.75	0.844	1.97	0.0	13.15	120			Dedicated tubing.
1316	19.20	6.75	0.859	1.69	0.0	13.22	123			
1319	19.20	6.75	0.869	1.42	0.0	13.31	124			
1322	19.19	6.74	0.876	1.29	0.0	13.32	126			
1325	19.19	6.74	0.881	1.12	0.0	13.37	127			
1328	19.19	6.74	0.883	1.0	0.0	13.30	128			
1331	19.19	6.74	0.889	0.95	0.0	13.29	129			All low flow sample cond. Fields met → Collect Sample.
1334	19.19	6.74	0.893	0.95	0.0	13.14	130			

START PURGE 1300 STOP PURGE 1334 TOTAL PURGE VOLUME 25 gallons

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
~~Tritium (H3)~~	1334	1 gal. plastic	Tritium (H3)	1334	500mL plastic
Gamma					
Cobalt-60					
Strontium-90	1331				
Cesium-137					
HTDs					

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME MW-201B

Page 1 of 1

PROJECT	Dairyland Power Cooperative LACBWR	FILE NO.		DATE	5 NOV. 2013
LOCATION	West/Northwest of Turbine Bldg	TUBE TYPE	⅜" x ½" polyethylene, ¼" silicone	WEATHER	Light Rain
FIELD MONITOR DEVICE	Horiba U-52	PUMP DEVICE	peristaltic pump	TEMPERATURE	40°F
WELL I.D. (in.)	2-inch	SCREEN LENGTH	10 ft	FIELD REP	MVP, LCT, MAD
WATER LEVEL	19.21	MEASURING POINT	top of PVC casing	PUMP INTAKE DEPTH	50 ft
WELL DEPTH (Log)	55 ft	DEPTH TO BOTTOM	56.88	WELL VOLUME	2.14 gallons

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY (mS/cm)	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) ~~(field filtrations)~~ (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
1304	19.25	7.54	1.14	1.78	17.5	12.22	-65		350	
1307	19.23	7.67	1.14	1.25	13.4	12.23	-67			Clear, no odor, no
1310	19.23	7.75	1.14	1.50	12.38	12.34	-69			sheen.
1313	19.22	7.80	1.15	3.05	10.8	12.56	-72			Dedicated tubing.
1316	19.22	7.81	1.15	2.82	10.0	12.55	-75			
1319	19.22	7.76	1.15	2.61	12.2	12.53	-76			
1322	19.25	7.76	1.15	2.12	7.5	12.47	-76			
1325	19.24	7.79	1.15	1.97	7.6	12.51	-77			All sample condition were met
1328	19.24	7.80	1.15	1.88	7.9	12.45	-76			→ Collect Sample

START PURGE 1300 STOP PURGE 1328 TOTAL PURGE VOLUME 2.2 gallons

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
~~Tritium (H3)~~	1328	1 gallon plastic	Tritium (H3)	1328	500mL plastic
Gamma					
Cobalt-60					
Strontium-90					
Cesium-137					
HTDs					

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME MW-202B

Page 1 of

PROJECT	Dairyland Power Cooperative LACBWR	FILE NO.	38705-009	DATE	5 NOV 2013
LOCATION	West of Switchyard/Substation	TUBE TYPE	⅜" x ½" polyethylene, ¼" silicone	WEATHER	Int. light rain, foggy
FIELD MONITOR DEVICE	Horiba U-52	PUMP DEVICE	peristaltic pump	TEMPERATURE	
WELL I.D. (in.)	2-inch	SCREEN LENGTH	10 ft	FIELD REP	MVP, LCT, MAD
WATER LEVEL	20.12	MEASURING POINT	top of PVC casing	PUMP INTAKE DEPTH	50 ft
WELL DEPTH (Log)	55 ft	DEPTH TO BOTTOM	55.42	WELL VOLUME	5.75

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY (mS/cm)	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) (~~field filtrations~~) (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
11:39										
11:42	20.14	7.12	1.01	2.02	1.01	12.03	-56			Clear, no odor, no
11:45	20.14	7.12	.988	.88	0.0	12.16	-82		400	sheen. Dedicated
11:48	20.13	7.12	.988	.88	0.0	12.16	-82		400	tubing.
11:51	20.13	7.14	.996	.29	0.0	12.10	-95			All low flow conditions
11:54	20.11	7.14	1.00	.70	0.0	12.08	-98			met.
11:57	20.14	7.14	1.01	0.23	0.0	12.09	-100			
12:00	20.12	7.14	1.01	0.20	0.0	12.12	-101			
12:03	20.12	7.14	1.02	0.16	0.0	12.16	-102			
12:06	20.10	7.14	1.02	0.13	0.0	12.12	-102			
12:09	20.11	7.13	1.02	0.14	0.0	12.17	-103			
12:12	20.12	7.13	1.02	0.11	0.0	12.11	-103			
12:15	20.12	7.13	1.03	0.10	0.0	12.14	-104			
12:18	20.12	7.13	1.02	0.09	0.0	12.17	-104			→ Sample collected.
										Duplicate collected
										for lab analysis.

START PURGE 1139 STOP PURGE 1218 TOTAL PURGE VOLUME 3.5 gallons

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
~~Tritium (H3)~~	1218	1 gallon plastic	Tritium (H3)	1218	500mL plastic
Gamma					
Cobalt-60					
Strontium-90					
Cesium-137					
HTDs					

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME MW-202A

Page 1 of

PROJECT	Dairyland Power Cooperative LACBWR	FILE NO.	38705-009	DATE	11/5/13
LOCATION	West of Switchyard/Substation	TUBE TYPE	⅜" x ½" polyethylene, ¼" silicone	WEATHER	Int. light rain, foggy
FIELD MONITOR DEVICE	Horiba U-52	PUMP DEVICE	peristaltic pump	TEMPERATURE	40°F
WELL I.D. (in.)	2-inch	SCREEN LENGTH	10 ft	FIELD REP	MVP, LCT, MAD
WATER LEVEL	20.08	MEASURING POINT	top of PVC casing	PUMP INTAKE DEPTH	21.5 ft
WELL DEPTH (Log)	25 ft	DEPTH TO BOTTOM	27.83	WELL VOLUME	1.26

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY (mS/cm)	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) (~~field filtrations~~) (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
11:39										
11:48	20.12	7.58	.357	3.23	19.4	12.73	204			Clear, no odor, no sheen
11:51	20.12	7.23	.349	2.95	16.3	14.48	181			Dedicated tubing.
11:54	20.12	7.29	.346	2.50	16.1	14.57	173		380	
11:57	20.12	7.32	0.342	2.73	14.5	14.49	161			Low flow conditions met
12:00	20.11	7.30	0.338	3.85	14.51	13.8	138			
12:03	20.11	7.26	0.334	3.46	14.57	12.8	105			
12:06	20.10	7.24	0.333	3.21	11.5	14.57	88			
12:09	20.11	7.21	0.332	2.91	10.9	14.57	77			
12:12	20.11	7.20	0.332	2.50	8.4	14.54	63			
12:15	20.11	7.19	0.331	2.43	7.2	14.50	63		300	
12:18	20.11	7.18	0.332	2.35	7.18	14.44	62			→ Collect Sample.

START PURGE 1139 STOP PURGE 1218 TOTAL PURGE VOLUME 3.55

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
~~Tritium (H3)~~	1218	1 gallon plastic	Tritium (H3)	1218	500mL plastic
Gamma					
Cobalt-60					
Strontium-90					
Cesium-137					
HTDs					

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME MW-203A

PROJECT	Dairyland Power Cooperative LACBWR	FILE NO.		DATE	11/5/13
LOCATION	South of Turbine Building	TUBE TYPE	~~3/8" x 1/2"~~ polyethylene, ¼" silicone	WEATHER	Cloudy 40
FIELD MONITOR DEVICE	Horiba - U52	PUMP DEVICE	peristaltic pump	TEMPERATURE	40
WELL I.D. (in.)	2-inch	SCREEN LENGTH	10 ft	FIELD REP	MVP, LCT
WATER LEVEL	19.63	MEASURING POINT	top of PVC casing	PUMP INTAKE DEPTH	20
WELL DEPTH (Log)	25 ft	DEPTH TO BOTTOM	22.93	WELL VOLUME	1.30

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY (mS/cm)	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) (~~field filtrations~~) (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
10:21										
10:24	19.65	6.69	.887	5.10	0.0	11.75	160		300	Clear, no odor, no sheen
10:27	19.65	6.51	.880	2.12	0.0	14.39	79			
10:30	19.65	6.60	.892	1.78	0.0	14.28	67		290	
10:33	19.66	6.67	.899	1.50	0.0	14.31	39			
10:36	19.66	6.73	.910	1.30	0.0	14.28	4		280	
10:39	19.66	6.78	.917	1.15	0.0	14.30	-15			
10:42	19.65	6.82	.923	1.05	0.0	14.20	-28		250	
10:45	19.65	6.85	.927	.96	0.0	14.18	-37			
10:48	19.66	6.88	.933	.89	0.0	14.24	-45			
10:51	19.66	6.91	.944	.79	0.0	14.29	-54			
10:54	19.66	6.94	.953	.70	0.0	14.29	-61			
10:57	19.65	6.97	.958	.65	0.0	14.31	-66		Low	Flow Sampling Conditions
11:00	19.66	6.99	.960	.60	0.0	14.37	-69		met	Sample Taken.

START PURGE 10:21 STOP PURGE 11:00 TOTAL PURGE VOLUME 2.6 gallons

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
~~Tritium (H3)~~	11:00	1 gallon plastic	Tritium (H3)	11:00	500mL plastic
Gamma					
Cobalt-60					
Strontium-90					
Cesium-137					
HTDs					

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME MW-203B

Page 1 of 1

PROJECT	Dairyland Power Cooperative LACBWR	FILE NO.		DATE	11/5/13
LOCATION	South of Turbine Building	TUBE TYPE	~~⅜" x ½"~~ polyethylene, ¼" silicone	WEATHER	Cloudy
FIELD MONITOR DEVICE	Horiba ~u52	PUMP DEVICE	peristaltic pump	TEMPERATURE	40
WELL I.D. (in.)	2-inch	SCREEN LENGTH	10 ft	FIELD REP	MVB, LCT
WATER LEVEL	20.12	MEASURING POINT	top of PVC casing	PUMP INTAKE DEPTH	50
WELL DEPTH (Log)	55 ft	DEPTH TO BOTTOM	57.85	WELL VOLUME	5.98

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY ~~(µS/cm)~~ (mS/cm)	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) ~~(field filtrations)~~ (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
10:21										
10:24	20.08	7.76	.677	2.95	28.3	13.31	-88		415	Clear, no odor, no sheen.
10:27	20.07	8.20	.561	1.46	25.9	13.75	-112		280	
10:30	20.06	8.26	.560	1.13	23.7	13.57	-117			
10:33	20.06	8.27	.571	.91	21.90	13.68	-121		280	
10:36	20.16	8.25	.585	.75	42.5	13.72	-122			
10:39	20.07	8.23	.583	.66	38.4	13.53	-124		250	
10:42	20.07	8.20	.589	.60	22.5	13.62	-125			
10:45	20.07	8.16	.610	.53	23.2	13.69	-126			
10:48	20.07	8.13	.619	.49	22.4	13.66	-127			
10:51	20.07	8.10	.620	.44	16.4	13.49	-128			
10:54	20.08	8.09	.616	.43	33.1	13.68	-129		230	
10:57	20.08	8.08	.596	.40	19.31	13.60	-129			
11:00	20.07	8.05	.610	.37	11.1	13.71	-130			
11:03	20.07	8.04	.615	.37	12.3	13.62	-129			Low Flow Sampling Conditions
11:06	20.07	8.02	.619	.36	10.1	13.61	-130			were met. Sample Taken

START PURGE 10:21 STOP PURGE 11:06 TOTAL PURGE VOLUME 2.5 gallon

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
~~Tritium (H3)~~	11:06	1 gallon plastic	Tritium (H3)	11:06	500 mL plastic
Gamma					
Cobalt-60					
Strontium-90					
Cesium-137					
HTDs					

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME MW-204A

Page 1 of 2

PROJECT	Dairyland Power Cooperative LACBWR	FILE NO.		DATE	10-5-13
LOCATION	East of Stack	TUBE TYPE	~~3/8" x 5/8"~~ polyethylene, ~~1/4" silicone~~	WEATHER	Cloudy, 40°
FIELD MONITOR DEVICE	Horiba U-52	PUMP DEVICE	peristaltic pump	TEMPERATURE	40°
WELL I.D. (in.)	2-inch	SCREEN LENGTH	10 ft	FIELD REP	LCT, MVP
WATER LEVEL	19.32	MEASURING POINT	top of PVC casing	PUMP INTAKE DEPTH	20
WELL DEPTH (Log)	25 ft	DEPTH TO BOTTOM	27.02	WELL VOLUME	1.2 ~~2.275 gallons~~ LT.

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY (mS/cm)	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) ~~(field filtrations)~~ (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
0830										Dedicated tubing
0841	19.41	7.24	.849	1.71	8.0	15.20	108			no color, odor or sheen
0844		7.32	.839	1.02	8.3	15.60	113		340	
0847	19.41	7.30	.836	0.85	9.1	15.49	115		360	
0850	19.39	7.28	.833	0.65	10.2	15.50	116			
0853	19.39	7.27	.832	0.59	9.7	15.39	117			
0856	19.39	7.26	.830	0.54	8.7	15.43	118		310	
0859	19.40	7.24	.826	0.49	8.1	15.46	117			
0902	19.39	7.23	.826	0.46	7.7	15.43	116			
0905	19.39	7.22	.826	0.40	7.4	15.47	113			
0908	19.39	7.20	.825	0.34	7.20	15.43	110			
0911	19.39	7.18	.823	0.35	7.18	15.41	106			
0914	19.39	9.16	.825	0.28	7.16	15.42	101			
0917	19.39	7.15	0.824	0.34	7.15	15.45	98			
0920	19.39	7.16	0.821	0.24	7.16	15.36	92		290	
0923	19.39	7.16	0.821	0.35	7.16	15.41	89			
0926	19.39	7.16	0.829	0.25	7.16	15.25	87			
0929	19.39	7.16	0.828	0.34	7.16	15.10	82			
0932	19.39	7.16	0.825	0.21	7.16	15.11	81			
0935	19.39	7.16	0.824	0.24	7.16	15.12	88			
0938	19.39	7.16	.823	0.20	7.16	15.01	74			

START PURGE 0841 STOP PURGE 0947 TOTAL PURGE VOLUME 5.55 gallons

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
~~Tritium (H3)~~	0947	1 gallon plastic	Tritium (H3)	0947	500 mL plastic
Gamma					
Cobalt-60					
Strontium-90					
Cesium-137					
HTDs					

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME MW-204A

Page 1 of

PROJECT	Dairyland Power Cooperative LACBWR	FILE NO.		DATE	
LOCATION	East of Stack	TUBE TYPE	~~½"~~ ½" polyethylene, ¼" silicone	WEATHER	
FIELD MONITOR DEVICE	Horiba	PUMP DEVICE	peristaltic pump	TEMPERATURE	
WELL I.D. (in.)	2-inch	SCREEN LENGTH	10 ft	FIELD REP	
WATER LEVEL	[redacted]	MEASURING POINT	top of PVC casing	PUMP INTAKE DEPTH	
WELL DEPTH (Log)	25 ft	DEPTH TO BOTTOM		WELL VOLUME	

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY (µS/cm)	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) (field filtrations) (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
0941	19.39	7.16	.825	0.25	6.8	15.21	74		280	
0944	19.38	7.17	.831	0.23	6.6	14.71	73		250	Low Flow Sample Conditions
0947	19.38	7.17	.832	0.23	6.7	14.55	71			were met. Sample Taken

START PURGE 0841 STOP PURGE 0947 TOTAL PURGE VOLUME

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
Tritium (H3)	0947		Tritium (H3)		
Gamma					
Cobalt-60					
Strontium-90					
Cesium-137					
HTDs					

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min

LOW-FLOW GROUNDWATER SAMPLING RECORD

WELL NAME MW-204B

Page 1 of 1

PROJECT	Dairyland Power Cooperative LACBWR	FILE NO.		DATE	11-5-13
LOCATION	East of Stack	TUBE TYPE	⅜" x ½" polyethylene, ¼" silicone	WEATHER	Cloudy, 60
FIELD MONITOR DEVICE	Horiba U-52	PUMP DEVICE	peristaltic pump	TEMPERATURE	60
WELL I.D. (in.)	2-inch	SCREEN LENGTH	10 ft	FIELD REP	LCT, MJP
WATER LEVEL	19.39	MEASURING POINT	top of PVC casing	PUMP INTAKE DEPTH	50
WELL DEPTH (Log)	55 ft	DEPTH TO BOTTOM	56.35	WELL VOLUME	6.0

TIME (24 hrs)	WATER DEPTH (ft)	pH (standard)	CONDUCTIVITY (mS/cm)	DO (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	DRAW-DOWN (ft)	FLOW RATE	REMARKS (color, odor, sheen) ~~(field filtrations)~~ (dedicated tubing, cleaning procedures)
Stabilized within →		[+/- 0.1]	[+/- 3%]	[+/- 10%]	[+/- 10%]	N/A	[+/- 10]	[+/- 0.3]	[<500mL/min]	
0830									350	no Color, odor, or sheen
0835		7.16	1.43	1.75	0.0	12.9	110			
0838		6.95	1.45	1.27	0.0	12.57	95			
0841	19.46	6.92	1.45	0.94	0.0	12.43	84		400	
0844	19.40	6.89	1.45	0.45	0.0	12.44	78			
0847	19.37	6.86	1.45	0.34	0.0	12.42	75			
0850	19.38	6.85	1.45	0.35	0.0	12.39	75			
0853	19.38	6.84	1.45	0.30	0.0	12.34	76		360	
0856	19.40	6.83	1.45	2.93	0.0	12.31	77			
0859	19.39	6.83	1.44	2.84	0.0	12.24	76			
0902	19.39	6.83	1.44	2.76	0.0	12.20	75			
0905	19.38	6.83	1.44	1.13	0.0	12.10	75			
0908	19.38	6.83	1.44	1.08	0.0	12.13	75			
0911	19.37	6.83	1.43	0.07	0.0	12.04	75			
0914	19.40	6.83	1.43	0.06	0.0	12.04	77			Low Flow Sample Conditions
0917	19.38	6.84	1.43	0.06	0.0	12.03	77			were met. Sample Taken

START PURGE 0830 STOP PURGE 0917 TOTAL PURGE VOLUME 4.6 gallons

SAMPLE ANALYTES	SAMPLE TIME	SAMPLE CONTAINER	FIELD ANALYTES	SAMPLE TIME	SAMPLE CONTAINER
~~Tritium (H3)~~	0917	1 Gallon plastic	Tritium (H3)	0917	~~250~~ 500ml plastic
Gamma					
Cobalt-60					
Strontium-90					
Cesium-137					
HTDs					

HTDs = Hard-to-detect radionuclides: carbon-14; iron-55; nickel-63; technetium-99; and iodine-129.

[well volume = 3.14 (PI) x radius^2 x height of water column] → 2 in well = 0.163 gal/ft, 4 in = 0.653 gal/ft, 6 in = 1.469 gal/ft

1 cu. ft. = 7.48 gal, 1 gal = 3.785 L, 1L = 0.264 gal, 0.5L/min = 0.132 gal/min