BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD

ILLINOIS POWER GENERATING COMPANY Petitioner **v.** **ILLINOIS ENVIRONMENTAL PROTECTION AGENCY** Respondent.	**PCB 2023-________**

NOTICE OF FILING

To: Pollution Control Board, Attn: Clerk
100 West Randolph Street
James R. Thompson Center
Suite 11-500
Chicago, Illinois 60601-3218
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Division of Legal Counsel
Illinois Environmental Protection Agency
1021 N. Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276
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PLEASE TAKE NOTICE that I have today filed with the Office of the Clerk of the Pollution Control Board the attached **PETITION FOR REVIEW OF ILLINOIS ENVIRONMENTAL PROTECTION AGENCY'S NON-CONCURRENCE WITH ALTERNATIVE SOURCE DEMONSTRATION UNDER 35 ILL. ADMIN. CODE PART 845 AND MOTION FOR STAY**; **APPEARANCES OF JOSHUA MORE, BINA JOSHI, AND SAMUEL RASCHE**; and a **CERTIFICATE OF SERVICE**, copies of which are herewith served upon you.

/s/ *Samuel A. Rasche*
Dated: December 15, 2023

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ILLINOIS POLLUTION CONTROL BOARD

ILLINOIS POWER GENERATING COMPANY Petitioner **v.** **ILLINOIS ENVIRONMENTAL PROTECTION AGENCY** Respondent.	**PCB 2023-________**

APPEARANCE OF JOSHUA R. MORE
AND CONSENT TO E-MAIL SERVICE

I, Joshua R. More, hereby enter my appearance on behalf of ILLINOIS POWER GENERATING COMPANY and authorize the service of documents on me by email in lieu of receiving paper documents in the above-captioned proceeding. My email address to receive service is as follows:

Joshua.More@afslaw.com

/s/ *Joshua R. More*
Joshua R. More

Dated: December 15, 2023

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BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD

ILLINOIS POWER GENERATING COMPANY Petitioner **v.** **ILLINOIS ENVIRONMENTAL PROTECTION AGENCY** Respondent.	**PCB 2023-________**

APPEARANCE OF BINA JOSHI
AND CONSENT TO E-MAIL SERVICE

I, Bina Joshi, hereby enter my appearance on behalf of ILLINOIS POWER GENERATING COMPANY and authorize the service of documents on me by email in lieu of receiving paper documents in the above-captioned proceeding. My email address to receive service is as follows:

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/s/ *Bina Joshi*
Bina Joshi

Dated: December 15, 2023

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BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD

ILLINOIS POWER GENERATING COMPANY Petitioner **v.** **ILLINOIS ENVIRONMENTAL PROTECTION AGENCY** Respondent.	**PCB 2023-________**

APPEARANCE OF SAMUEL A. RASCHE
AND CONSENT TO E-MAIL SERVICE

I, Samuel A. Rasche, hereby enter my appearance on behalf of ILLINOIS POWER GENERATING COMPANY and authorize the service of documents on me by email in lieu of receiving paper documents in the above-captioned proceeding. My email address to receive service is as follows:

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/s/ *Samuel A. Rasche*
Samuel A. Rasche

Dated: December 15, 2023

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BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD

ILLINOIS POWER GENERATING COMPANY Petitioner **v.** **ILLINOIS ENVIRONMENTAL PROTECTION AGENCY** Respondent.	**PCB 2023-________**

PETITION FOR REVIEW OF ILLINOIS ENVIRONMENTAL PROTECTION AGENCY'S NON-CONCURRENCE WITH ALTERNATIVE SOURCE DEMONSTRATION UNDER 35 ILL. ADM. CODE PART 845 AND MOTION FOR STAY

Petitioner Illinois Power Generating Company ("IPGC"), pursuant to Sections 105.200 *et seq.* and 845.650(e) of Title 35 of the Illinois Administrative Code, 35 Ill. Adm. Code §§ 105.200 *et seq.* and § 845.650(e), appeals the final decision of the Illinois Environmental Protection Agency ("IEPA" or the "Agency") that did not concur with the Alternative Source Demonstration (the "Newton ASD") for the Newton Primary Ash Pond submitted to the Agency on October 6, 2023. IEPA's non-concurrence is stated in a letter from IEPA Bureau of Water Groundwater Section Manager Michael Summers to IPGC dated November 7, 2023, and served upon IPGC on November 10, 2023, via U.S. Mail, which is attached as **Exhibit A** (the "IEPA Denial"). As detailed in Section II below, IEPA's Denial is contrary to the applicable regulations and arbitrary and capricious. For the reasons set forth in Section III below, Petitioner also requests a partial stay of Part 845 requirements as they apply to the detection of chloride that is the subject of the Newton ASD.

In support of this Petition and Motion for Stay, IPGC states as follows:

I. BACKGROUND

Regulatory Background

1. IEPA regulates coal combustion residuals ("CCR") surface impoundments under 35 Ill. Adm. Code. Part 845 ("Part 845").[1] Part 845 includes requirements for regular groundwater monitoring. 35 Ill. Adm. Code § 845.650.

2. If, during groundwater monitoring, one or more constituents are detected and confirmed to be in exceedance of the groundwater protection standards in Section 845.600 ("GWPS"), a series of additional steps are triggered.

3. Within 60 days after detecting an exceedance of a GWPS, an owner or operator may submit an Alternative Source Demonstration ("ASD") to IEPA demonstrating "that a source other than the CCR surface impoundment caused the contamination and the CCR surface impoundment did not contribute to the contamination, or that the exceedance of the GWPS resulted from error in sampling, analysis, statistical evaluation, natural variation in groundwater quality, or a change in the potentiometric surface and groundwater flow direction." 35 Ill. Adm. Code § 845.650(e).

4. The ASD must "include a report that contains the factual or evidentiary basis for any conclusions and a certification of accuracy by a qualified professional engineer." *Id.*

5. IEPA must send a public notice of the ASD, and members of the public may submit written comments to IEPA within 14 days of the notice. *Id.*

6. Within 30 days after receiving an ASD, IEPA must provide a written response to the owner or operator of the CCR surface impoundment either concurring or not with the ASD. If

[1] Subsequent references in this petition to "Section 845.xxx" or "§ 845.xxx" shall be to 35 Ill. Adm. Code, Part 845, unless otherwise specified.

IEPA concurs, the owner or operator must continue groundwater monitoring, but is not required to take additional actions in connection with the identified exceedance, including initiating an assessment of corrective measures. If IEPA does not concur, the owner or operator may petition the Board for review of the non-concurrence. *Id.*

7. Other requirements are prompted in the absence of an ASD, or in the event an ASD is denied and a stay is not granted. For example, within 90 days after detecting an exceedance of a GWPS, the owner or operator of the CCR surface impoundment must initiate an assessment of corrective measures. 35 Ill. Adm. Code § 845.660(a). The owner or operator must, within 90 days of initiating its assessment of corrective measures (or up to 60 days longer if an extension is requested and granted), submit to the Agency an assessment of corrective measures. *Id.* at § 845.660(a)(2). Within a year of completing the assessment of corrective measures, an owner or operator must submit a construction permit application and corrective action plan to IEPA identifying the selected remedy. *Id* at § 845.670(b).

B. IPGC's Alternative Source Demonstration

8. IPGC owns and operates the Newton Power Plant ("Newton") located approximately 7 miles southwest of the town of Newton in Jasper County, Illinois. Newton includes the Primary Ash Pond ("PAP"), a CCR surface impoundment regulated under Part 845.

9. On August 7, 2023, groundwater monitoring at Newton identified a GWPS exceedance of chloride at a single monitoring well (well # APW15).[2] IPGC notified IEPA of its groundwater monitoring results, including this exceedance, placed the information in its operating

[2] IPGC also detected GWPS exceedances of lithium, sulfate, and total dissolved solids at different wells. IPGC concluded the PAP may have caused or contributed to these exceedances and, therefore, did not address these exceedances in the Newton ASD. IPGC is addressing these exceedances by taking additional steps in accordance with Part 845, including 35 Ill. Adm. Code § 845.660.

record, and contracted with an environmental consultant to further investigate the cause of the GWPS exceedances. Newton Power Plant Primary Ash Pond; IEPA ID # W0798070001-01, Groundwater Monitoring data and Detected Exceedances Quarter 2 2023 (Aug. 7, 2023), available at 2023-Newton 2023 2Q 35 IAC 845 GW Rpt-W0798070001-01-Newton-Primary Ash Pond-W0798070001-01.pdf (luminant.com).

10. On October 6, 2023, IPGC submitted the Newton ASD to IEPA. The Newton ASD concluded that a source other than the PAP was responsible for the chloride GWPS exceedance at APW15 and that the PAP did not contribute to the chloride exceedance. The Newton ASD identified three lines of evidence to demonstrate that the PAP was not the cause of or contributing to the exceedance and that chloride in bedrock was a likely source of the chloride observed in APW15. The Newton ASD is attached as **Exhibit B**.

11. First, the Newton ASD explained that the PAP is separated from the uppermost aquifer at APW15 by a thick layer (approximately 60 feet) of low permeability glacial till. Accordingly, the ASD concluded there is "no complete pathway for transport of CCR constituents to APW 15, and the PAP is not the source of the chloride exceedance at that well." **Exhibit B** at 7.

12. Second, the Newton ASD noted that "concentrations of primary CCR indicators in APW15 do not exceed background limits and are not increasing." Id. at 7. The Newton ASD explains that boron and sulfate are common indicators of CCR impacts to groundwater "due to their leachability from CCR and mobility in groundwater," and as such boron and/or sulfate concentrations "would be expected to be elevated above their respective background Upper Tolerance Limits" if "groundwater in APW15 had been impacted by CCR from the [PAP]." Id.

The Newton ASD reports that the concentrations of boron and sulfate in APW15 are below their respective Upper Tolerance Limits. *Id.*

13. Combined with the fact that there is not an increasing trend of boron and sulfate concentrations in APW15, the Newton ASD concludes that these facts "indicate that [APW15] has not been affected by CCR from the [Newton] PAP." *Id.* at 8.

14. Third, the Newton ASD reported that "concentrations of chloride at APW15 are greater" than the concentrations in the PAP. By comparing the chloride concentrations of porewater in the PAP to APW15, the Newton ASD concluded that the "median chloride concentration observed in porewater is an order of magnitude lower than the median chloride concentrations observed in . . . APW15" and that the "maximum observed chloride concentration in . . . APW15 is approximately four times the concentration observed in porewater." *Id.*

15. The Newton ASD explains that "if the PAP was the source of chloride in downgradient groundwater, chloride concentrations in PAP porewater would be expected to be greater than the groundwater concentrations." Because the chloride concentration in APW15 is greater than the concentrations observed in PAP porewater, the Newton ASD concluded that the chloride concentrations in the groundwater "are not related to the PAP." *Id.*

16. For the above reasons, the Newton ASD concluded that the "preponderance of evidence" demonstrated the PAP is not the source of elevated chloride detected in APW15. *Id.* at 9.

17. The Newton ASD further concluded that "chloride concentrations in bedrock groundwater" are a likely source of the chloride exceedance at APW15. The Newton ASD supported this conclusion with three reasons. *Id.* at 9.

18. First, the Newton ASD presented evidence that chloride is present in Pennsylvanian shale bedrock in Jasper County at concentrations above those detected in APW15. *Id.*

19. Second, "[u]pward vertical hydraulic gradients and fractures near geologic features provide conduits for these chloride-rich waters to migrate. The Clay City Anticline is present east of the PAP and a saline spring has been mapped adjacent to this anticline approximately 10 miles south of the PAP in Clay County." *Id.*

20. Third, the Newton ASD notes that APW15 is "located in close proximity to bedrock" and the high hydraulic conductivity" of the uppermost aquifer at that location relative to the "low hydraulic conductivity of the underlying bedrock . . . provides a potential pathway" for chloride to migrate from the bedrock into the uppermost aquifer. The Newton ASD also observes that this would explain why APW15 was the only well affected by elevated chloride. *Id.*

21. The Newton ASD was certified by a qualified professional engineer and a professional geologist. *Id.*

C. IEPA's Review of the Newton ASD

22. On October 24, 2023, IEPA provided notice to its listserve regarding the posting of the Newton ASD submittal, triggering a 14-day period for written comments on the Newton ASD submittal pursuant to Section 845.650(e)(3).

23. Between October 19 and 31, 2023, IPGC and IEPA engaged in communications regarding the Newton ASD submittal. On November 3, 2023, within the 14-day period for written comments, IPGC submitted a written comment providing additional support for the Newton ASD in the form of a letter to IEPA (the "Comment Letter"). The Comment Letter was delivered to IEPA via email and is attached as **Exhibit C.**

24. In response to requests from IEPA, the Comment Letter provided hydraulic conductivity and boring log data, "all of which was previously provided or referenced in the

Newton PAP operating permit application and/or construction permit application." The Comment Letter also notified IEPA that "IPGC (with this letter) is incorporating by reference the entirety of its October 25, 2021, operating permit application for the Newton PAP and July 28, 2022, construction permit application for the Newton PAP into its Newton PAP ASD submittal." **Exhibit C** at 1.

25. The Comment Letter also included a detailed explanation of why IEPA's requests for "source characterization that includes total solids sampling, analysis and reporting in accordance with SW-846 testing methods and [] sampling and analysis in accordance with 25 Ill. Admin. Code 845.640 of the alternative source" were impractical and unfounded. The Comment Letter attached an additional letter from IPGC's qualified professional engineer detailing why IEPA's requests were unnecessary. *Id.*

D. The IEPA Denial

26. On November 7, 2023, four days after receiving the Comment Letter, IEPA sent a one-page letter notifying IPGC of IEPA's non-concurrence with the Newton ASD (the "IEPA Denial"). The IEPA Denial states that "IEPA does not concur" due to three "data gaps." **Exhibit A**. The three listed data gaps according to IEPA are:

27. First, "[s]ource characterization of the CCR at the Primary Ash Pond must include total solids sampling in accordance with SW846" ("Data Gap 1").

28. Second, "[h]ydraulic conductivities from laboratory or in-situ testing must be collected, analyzed, and presented with hydrogeologic characterization of bedrock unit" ("Data Gap 2").

29. Third, "[c]haracterization to include sample and analysis in accordance with 35 IAC 845.640 of alternative source must be provided with ASD" ("Data Gap 3").

30. These three "Data Gaps" are similar to the three issues discussed in IPGC's Comment Letter. However, the IEPA Denial does not respond to or acknowledge the existence of the Comment Letter.

II. Discussion

31. IEPA's bases for its non-concurrence, the three "Data Gaps," are each arbitrary and capricious and not supported by IEPA's regulatory authority under Section 845.650.

A. There are no data gaps in the ASD.

32. IEPA's Denial unreasonably demands data and analysis that is not required by Section 845.650. The regulation requires only that IPGC submit a "demonstration . . . that a source other than the CCR surface impoundment caused the contamination and the CCR surface impoundment did not contribute to the contamination." 35 Ill. Adm. Code § 845.650(e). In support of the demonstration, the regulations require that an ASD "include a report that contains the factual or evidentiary basis for any conclusions and a certification of accuracy by a qualified professional engineer." *Id.* The Newton ASD report does just that through a scientifically supported analysis that contains multiple lines of evidence. **Exhibit B**; *See also*, Declaration of Melinda W. Hahn at 2-7 (December 15, 2023), attached as **Exhibit D**. The information identified by IEPA's "Data Gaps" is not necessary to form a "factual and evidentiary basis" for the conclusions reached in an ASD. The information would not lead to a different result, and the fact the data was not submitted is inadequate to support the Agency's nonconcurrence with the Newton ASD.

1. <u>"Data Gap 1"</u>

33. "Data Gap 1" demands that the Newton ASD should have included a "source characterization of the CCR at the Primary Ash Pond" including "total solids sampling in accordance with SW846." **Exhibit A**. However, there is no requirement in Part 845 that source characterization of CCR for an ASD be conducted "in accordance with SW846," and IEPA's

Denial provides no justification for its demand. Further, from a technical basis, the porewater analysis conducted in the Newton ASD is a more appropriate and accurate method to characterize the PAP's source material than SW846.

34. There is no legal requirement that a source characterization for purposes of an ASD conducted under Section 845.650(e) utilize SW846. Method SW846 is incorporated by reference into Part 845 by Section 845.150. However, inclusion in the general "incorporations by reference" section of Part 845 does not create an affirmative obligation to use SW846 in all circumstances. The Board has explained that where Illinois rules incorporate analytical methods by reference via a "centralized listing of incorporations by reference" such as Section 845.150, "Illinois rules further indicate where each method is used *in the body of the substantive provisions*." *See In the Matter of: SDWA Update, USEPA Amendments (January 1, 2013 through June 30, 2013)*, R 14-8, slip op. at 24-25 (Jan. 23, 2014) (emphasis added). Further, Chapter 2 of SW846 states that the methods in that document are not "mandatory" unless specifically specified as such by regulation. United States Environmental Protection Agency ("USEPA"), *SW-846 Update V*, (July 2014) at 1.[3] USEPA guidance also makes clear that SW846 is only legally required where "explicitly specified" in a regulation. USEPA, *Disclaimer for Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846)*, (July 2014), at 1.[4] The only substantive provision of Part 845 specifically requiring analysis using SW846 is Section 845.640(e), which applies to analyzing groundwater monitoring samples under a groundwater monitoring program and is not at issue here. 35 Ill. Adm. Code § 845.640(e). There is no requirement to use SW846 under Section 845.650(e).

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[3] Available at https://www.epa.gov/sites/default/files/2015-10/documents/chap2_1.pdf.
[4] Available at https://www.epa.gov/sites/default/files/2015-10/documents/disclaim.pdf.

The plain language of the rules does not require the utilization of SW846 for purposes of an ASD, and IEPA has provided no justification for any alternative interpretation.

35. Additionally, source characterization of the PAP was conducted using the best scientifically available procedure. As detailed in the November 3, 2023, letter from Ramboll to IEPA included with the Comment Letter, laboratory leach tests such as those prescribed by SW846 are used “to predict the potential concentration of chemicals under laboratory controlled conditions . . . which may or may not represent conditions observed in the field.” **Exhibit C** at Attachment 2, pp. 2-3. Because “ASDs are prepared to evaluate the potential of actual porewater leaking from a CCR [surface impoundment] to be the cause of a detected exceedance observed,” SW846’s “use of leach test results performed under variable conditions collected from any number of locations within the CCR [surface impoundment] to estimate a total potential for chemical leaching from CCR into groundwater under a variety of different conditions is irrelevant to an ASD.” *Id.* The porewater analysis used for the Newton ASD is the best and most accurate scientifically available information for source characterization of the PAP. *Id.*; **Exhibit D** at 4-9.

36. The IEPA Denial is not clear regarding what procedure under SW846 IEPA believes should have been utilized for source characterization including total solids sampling in accordance with SW846. **Exhibit A**. However, no method under SW846 would have been preferable to or provide better information than the source characterization methodology utilized for the Newton ASD. **Exhibit D** at 8-9. That sampling would have included laboratory simulated and/or indirect analysis of potential leaching from material in the PAP, while the methodology utilized for the Newton ASD included a direct analysis of porewater to determine what constituents are actually leaching from the PAP. *Id.*

37. If source characterization of CCR at the PAP did include total solids sampling in accordance with SW846, it would not be expected to change the results of the Newton ASD. **Exhibit D** at 9.

38. IEPA's denial of the Newton ASD based on "Data Gap 1" is accordingly arbitrary and capricious.

2. "Data Gaps" 2 & 3

39. "Data Gaps" 2 and 3 each relate to characterization of the bedrock, the alternative source identified in the Newton ASD. "Data Gap 2" demands that the Newton ASD should have included hydraulic conductivity data and hydrogeologic characterization of the bedrock unit. **Exhibit A**. "Data Gap 3" demands that the Newton ASD should have provided a characterization "in accordance with 35 IAC 845.640 of [the] alternative source . . ." **Exhibit A**. However, there is no requirement in Section 845.640, 845.650, or anywhere else in Part 845 to collect and analyze hydraulic conductivity data and do a hydrogeologic characterization of an alternative source for an ASD as suggested by "Data Gap 2." Nor is there a requirement to conduct groundwater monitoring of an alternative source in accordance with Section 845.640 as part of an ASD as suggested by "Data Gap 3." IEPA has not provided any justification for its demands related to the alternative source characterization and a characterization of the bedrock as set forth in "Data Gaps" 2 and 3 is unnecessary to support the Newton ASD.

40. The Newton ASD included a detailed explanation of how each conclusion was reached and the evidence supporting each conclusion, and provided significant data as attachments as well as references to any report or other document referred to or relied on. This is more than sufficient to provide the "factual and evidentiary basis" required by Section 845.650(e).

41. No provision of Part 845 requires a characterization including hydraulic conductivity data, hydrogeologic characterization, or sampling and analysis of the alternative

source as part of an ASD conducted under Section 845.650(e). The facts and evidence provided with the Newton ASD are supportive of a conclusion that "a source other than the CCR surface impoundment caused the contamination and the CCR surface impoundment did not contribute to the contamination." **Exhibit C** at Attachment 2, p. 3; **Exhibit D** at 4.

42. As noted above in Section II.A., the Newton ASD was prepared using a multiple lines of evidence approach in accordance with the Electric Power Research Institute ("EPRI") guidance for the development of ASDs at CCR sites. **Exhibit C** at Attachment 2, p. 2. Following the EPRI guidance, the Newton ASD reviewed "regional literature and site-specific bedrock conditions" and reached the conclusion that "chloride concentrations in bedrock groundwater are a likely source of chloride observed in APW15 . . ." **Exhibit B** at 9. More specifically, the Newton ASD demonstrated that chloride is present at elevated levels in the bedrock throughout Jasper County and that a specific geologic formation (the Clay City Anticline) exists in the vicinity of the Newton PAP and presents a likely conduit for chlorine-rich water to migrate into the groundwater. **Exhibit B** at 9; **Exhibit D** at 3, 10. Additionally, the Newton ASD evaluated the site-specific groundwater and geologic data to note that the specific location of APW15 made it likely that it would be impacted by chloride in the bedrock, explaining the otherwise anomalous fact that APW15 was the *only* monitoring well affected by a chloride exceedance. *Id.* Collecting and analyzing hydraulic conductivity data with a hydrogeologic characterization of the bedrock unit or conducting groundwater sampling and analysis of the bedrock would not change the conclusion of the Newton ASD. **Exhibit D** at 10.

43. The Newton ASD's use of site-specific information and identification of a specific geological feature and likely hydraulic connection between the affected well and chloride-containing bedrock (along with all the other information provided in the Newton ASD) is more

than sufficient to provide the "demonstration" required by the rules. IEPA's request for a complete characterization of the surrounding bedrock is unfounded, unexplained, and, as detailed below in Section II.B., practically infeasible. Accordingly, IEPA's use of "Data Gaps" 2 & 3 as a grounds for nonconcurrence is arbitrary and capricious.

B. IEPA's Denial imposes practically infeasible requirements.

44. IEPA's interpretation of Section 845.650(e) is further unreasonable because the "Data Gaps" demand complex sampling and analysis that cannot feasibly be completed within the timeframes contemplated by the regulations. Section 845.650(e) requires owners and operators to submit an ASD within 60 days after detecting a GWPS exceedance. The regulations further require IEPA to reach a final decision within 30 days after receiving an ASD. 35 Ill Adm. Code § 845.650(e)(4).

45. "Data Gap 1" requests that IPGC provide source characterization of the CCR at the PAP that includes "total solids sampling in accordance with SW846." **Exhibit A**. Such a characterization could take approximately 21 to 42 weeks to complete. **Exhibit E**, Declaration of Cynthia Vodopivec at 1. There would be no reason for an owner or operator to begin such a characterization until after a GWPS exceedance is detected. Thus, even if IPGC anticipated IEPA's request for this data and began the CCR source characterization at the exact moment the GWPS exceedance is detected, the characterization could not reasonably be completed until months *after* IEPA's deadline to reach a final decision on the Newton ASD (let alone IPGC's deadline to submit an ASD).

46. "Data Gaps" 2 & 3 request hydraulic conductivity data with hydrogeologic characterization of the bedrock unit and a full characterization of the alternative source bedrock "in accordance with 35 IAC 845.640[.]" **Exhibit A**. This additional characterization of the bedrock

would require approximately 20 to 30 weeks to complete. **Exhibit E** at 1.[5] Again, there is no regulatory requirement that IPGC maintain a full source characterization of nearby bedrock, and thus there would have been no reason for IPGC to begin any such characterization until a GWPS exceedance is detected. Once again, even if IPGC had fully anticipated IEPA's requests, it would not have been able to complete the bedrock characterization until months past the deadline to submit an ASD.

47. The data IEPA's Denial categorizes as "gaps" in the Newton ASD could not feasibly be completed before the prescribed deadline for submitting an ASD. IEPA's interpretation that Section 845.650 requires these characterizations would thus make the entire ASD provision meaningless, as it would be impossible for any owner or operator to submit a sufficient ASD.

48. Accordingly, IEPA's Denial is arbitrary and capricious and also ignores reality.

49. Furthermore, even if the data requested was required to be collected elsewhere under Part 845, there is no requirement in Section 845.650 that such data be used in connection with an ASD. Here, qualified professionals used best available information to develop an ASD within the regulatory deadline and in conformance with regulatory requirements. Certainly, additional lines of evidence could be added to the ASD analysis; however, professional judgment and practicality dictate that every possible line of evidence need not and cannot be developed. **Exhibit D** at 3-4. Doing so would take an unreasonable amount of time. Additionally, doing so is

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[5] Undertaking the steps required to provide the information IEPA seeks through "Data Gaps" 1 and 3 would also be costly: collecting the information requested by "Data Gap 1" would likely cost approximately $450,000 to $800,000, while "Data Gap 3" would cost approximately $150,000. **Exhibit E** at 1. While cost is not a driver of actions taken for completing an ASD, as Dr. Hahn explains, accepted scientific practice is to not develop costly additional lines of evidence when sufficient evidence exists from other, better lines of evidence to support a conclusion. **Exhibit D** at 4 (explaining that "lines of evidence are developed until sufficient confidence is achieved").

unnecessary when existing information is sufficient to support the conclusion that an alternative source caused the contamination detected and that the CCR surface impoundment at issue did not contribute to that contamination. **Exhibit D**.

C. IEPA's Denial was not based on a reasonable review of the data presented.

50. Finally, IEPA simply failed to fully evaluate the information presented to it before issuing its nonconcurrence. As noted above, IPGC submitted its Comment Letter via email on November 3, 2023, 10 days after IEPA provided public notice of the Newton ASD and well within the 14-day period for written comments required by Section 845.650(e)(3). The Comment Letter included significant information regarding the "Data Gaps" identified in the IEPA Denial.

51. However, the IEPA Denial, dated November 7, 2023 (four days *after* IEPA received the Comment Letter), makes no reference to the Comment Letter whatsoever.

52. IEPA's failure to address or consider data and arguments provided to it well within the prescribed comment period was arbitrary and capricious.

III. <u>MOTION FOR PARTIAL STAY</u>

53. Because Part 845 does not authorize an automatic stay, IPGC asks the Board to stay the requirements of Sections 845.650(d), 845.660, 845.670, and 845.680 for the GWPS exceedance for chloride at issue in this Petition until the later of (a) the Board's final resolution of this Petition, or (b) if this Petition is granted, IEPA's issuance of a concurrence.

A. The Board has authority to issue a stay.

54. The Board has long recognized its authority under Illinois law to issue discretionary stays. *See Community Landfill Co. and City of Morris v. IEPA*, PCB 01-48, PCB 01-49 (consol.), slip op. at 4 (Oct. 19, 2000); *see also, e.g., Ill. Power Generating Co. v. IEPA*, PCB 16-60, slip op. at 1 (Dec. 17, 2015). Section 845.650(e)(7), which authorizes a petition for review of an IEPA nonconcurrence with an ASD, "would be rendered meaningless" if the Board had no authority to

stay the associated regulations. *See Id.* An IEPA nonconcurrence with an ASD triggers corrective measure requirements that must be initiated within a short timeframe, likely far before the Board reaches a final resolution of this petition.[6]

55. Further, the rules specifically contemplate that the Board may stay certain regulatory requirements pending resolution of a petition for review: "The filing of a petition for review under subsection (e)(7) does not automatically stay any requirements of this Part as to the owner or operator, including the 90-day deadline to initiate an assessment of corrective measures (see Section 845.660(a)(1))." Section 845.650(e)(7). If the Board had no authority to stay the corrective measure requirements, there would have been no need for the rules to specify that the stay is not automatic.

B. A partial stay is appropriate under Illinois law.

56. The Board considers four factors[7] when determining whether to grant a discretionary stay of a final Agency decision:

- **a.** a certain and clearly ascertainable right needs protection;
- **b.** irreparable injury will occur without injunction;
- **c.** adequate remedy at law exists;
- **d.** a probability of success on the merits.

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[6] Section 845.660(a) requires: "The assessment of corrective measures must be initiated within 90 days after finding [of any GWPS exceedance]" and the "assessment of corrective measures must be completed and submitted to the Agency within 90 days after initiation of assessment of corrective measures . . ."

[7] When reviewing a request for a discretionary stay in the context of a permit appeal or appeal of final agency decision, the Board has held that "although there are no specific standards set by the Board for issuing stays, Illinois law provides for standards under which such equitable relief is appropriate." *Motor Oils Refining Co. v. IEPA*, PCB 89-116, slip op. at 1 (Aug. 31, 1989), *citing Junkunc v. S.J. Advanced Technology & Mfg.*, 101 Ill. Dec. 671, 498 N.E.2d 1179 (Ill. App. 1 Dist. 1986).

PCB 16-60, slip op. at 2 (Dec. 17, 2015), citing *Community Landfill Co. and City of Morris v. IEPA*, PCB 01-48, PCB 01-49 (consol.), slip op. at 4 (Oct. 19, 2000). The Board need not find that all of these factors exist in order to grant a discretionary stay. *Id.* The Board will also consider the likelihood of environmental harm should stay be granted. *Id.*, citing *Motor Oils Refining Co. v. IEPA*, PCB 89-116, slip op. at 2 (Aug. 31, 1989).

57. For the reasons stated in this Petition, a stay is necessary to protect IPGC's right to appeal the IEPA Denial and to prevent IPGC from being unlawfully and unreasonably required to comply with costly and potentially unnecessary corrective measure requirements before it is able to exercise its right to appeal and be heard by the Board. Accordingly, IGPC has an ascertainable right that needs protection.

58. IPGC will suffer irreparable injury if it is subject to the corrective measure requirements of Sections 845.650(d), 845.660, 845.670, and 845.680 for the chloride GWPS exceedance at issue in this Petition. Compliance with these requirements would require IPGC to expend resources to complete an assessment of corrective measures, prepare a corrective action plan and take other steps under Part 845 for an alleged discharge that, as explained in detail in the Newton ASD and this Petition, likely never occurred. The assessment of corrective measures alone would likely cost approximately $35,000. **Exhibit E** at 1. Selecting an appropriate remedy and developing a corrective action plan could cost an additional $800,000. *Id*. at 2. These expenditures would further divert resources from the corrective measures IPGC is currently conducting in response to GWPS exceedances not at issue in this Petition. *Id.* If IPGC complied with the corrective measure requirements for chloride at the Newton PAP and then succeeded on the merits of this Petition, costs, as well as time and other resources, would be lost. *Id*. Thus, IPGC would suffer irreparable injury.

59. IPGC has no other adequate remedy at law to prevent these injuries or to contest the IEPA Denial.

60. It is also likely that IPGC will succeed on the merits of this Petition. IPGC has demonstrated by a preponderance of the evidence that an alternative source other than the PAP is responsible for the GWPS exceedance for chloride detected at APW15 and that the PAP did not contribute to that contamination as evidenced through the thorough analysis of a qualified professional engineer, and IGPC is prepared to demonstrate that IEPA's nonconcurrence was arbitrary and capricious and/or inconsistent with applicable laws and regulations. *See, e.g.*, **Exhibit C**; **Exhibit D**.

61. Finally, no harm to human health or the environment will result from a stay of these requirements. The exceedance is limited to a single monitoring well. As demonstrated in the Newton ASD and this Petition, the Newton PAP is not the source of the chloride GWPS exceedance. Notably, the IEPA Denial does not suggest that IEPA believes the PAP is the cause of or is contributing to the GWPS exceedance – rather, the IEPA Denial is based on alleged "data gaps." **Exhibit A**. Moreover, the corrective measure requirements of Sections 845.650(d), 845.660, 845.670, and 845.680 include an assumption that the impoundment under assessment is at least a partial cause of the exceedance.[8] It is impossible to complete a corrective action assessment or to determine the optimal corrective action for a source that is not the cause of the exceedance, and to do so would provide no benefit to human health and the environment. Further, IPGC has conducted a human health and risk assessment for the PAP demonstrating that there is no exposure pathway for the PAP to impact residential drinking water or irrigation sources, and

[8] *See, e.g.*, Section 845.660(a) (". . .the owner or operator must initiate an assessment of corrective measures to prevent further releases, to remediate any releases, and to restore the affected area.").

that risks from other potential exposure pathways are "indistinguishable from normal background risks." Human Health and Ecological Risk Assessment, Primary Ash Pond, Newton Power Plant, Newton, Illinois at 14, 31 (Jul. 28, 2022), available at https://www.luminant.com/documents/ccr/Illinois/Newton/2022/Newton%20PAP%20Construction%20Permit%20Application.pdf. Lastly, IPGC has and will continue to be subject to the groundwater monitoring requirements of Section 845.650, which ensures that any changes in circumstances during the stay that could pose a risk to human health or the environment will be quickly identified.

IV. CONCLUSION

62. For the above reasons, IPGC respectfully requests that the Board stay the requirements of Sections 845.650(d), 845.660, 845.670, and 845.680 relating to the GPWS exceedance for chloride at issue in this Petition until the later of (a) the Board's final resolution of this Petition, or (b) if this Petition is granted, IEPA's issuance of a concurrence. Moreover, IPGC respectfully requests that the Board grant this Petition for Review and remand to IEPA to issue a new final written response concurring with the Newton ASD.

Respectfully submitted,

/s/ Samuel A. Rasche
Samuel A. Rasche

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Attorneys for Illinois Power Generating Company

BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD

ILLINOIS POWER GENERATING COMPANY Petitioner **v.** **ILLINOIS ENVIRONMENTAL PROTECTION AGENCY** Respondent.	**PCB 2023-________**

CERTIFICATE OF SERVICE

I, the undersigned, certify that on this 15th day of December, 2023:

I have electronically served a true and correct copy of the attached Petition for Review of Illinois Environmental Protection Agency's Non-Concurrence with Alternative Source Demonstration Under 35 Ill. Admin. Code Part 845 and Motion for Stay and Appearances of Joshua R. More, Bina Joshi, and Samuel A. Rasche by electronically filing with the Clerk of the Illinois Pollution Control Board and by e-mail upon the following persons:

Pollution Control Board, Attn: Clerk
100 West Randolph Street
James R. Thompson Center
Suite 11-500
Chicago, Illinois 60601-3218
PCB.Clerks@illinois.gov

Division of Legal Counsel
Illinois Environmental Protection Agency
1021 N. Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276
epa.dlc@illinois.gov

My e-mail address is sam.rasche@afslaw.com

The number of pages in the e-mail transmission is 248.

The e-mail transmission took place before 5:00 p.m.

/s/ Samuel A. Rasche
Samuel A. Rasche

Dated: December 15, 2023

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BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD

ILLINOIS POWER GENERATING COMPANY Petitioner **v.** **ILLINOIS ENVIRONMENTAL PROTECTION AGENCY** Respondent.	**PCB 2023-________**

INDEX OF EXHIBITS

Exhibit A — Letter from Michael Summers, P.G., Manager, Groundwater Section, Division of Public Water Supplies, Bureau of Water, Illinois Environmental Protection Agency to Phil Morris, Illinois Power Generating Company (November 7, 2023)

Exhibit B — Ramboll, 35 I.A.C. § 845.650(e): Alternative Source Demonstration, Primary Ash Pond, Newton Power Plant, Newton, Illinois, IEPA ID: W07980001-1 (October 6, 2023)

Exhibit C — Letter from Phil Morris, PE, Senior Director, Environmental, Illinois Power Generating Company to Heather Mullenax, Illinois Environmental Protection Agency (November 3, 2023)

Exhibit D — Declaration of Melinda W. Hahn, PhD (December 15, 2023)

Exhibit E — Declaration of Cynthia Vodopivec on behalf of Illinois Power Generating Company (December 15, 2023)

Exhibit A

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 · (217) 782-3397
JB PRITZKER, GOVERNOR JOHN J. KIM, DIRECTOR

217-782-1020

November 7, 2023

Phil Morris
Illinois Power Generating Company
1500 Eastport Plaza Drive
Collinsville, Illinois 62234

Re: Newton Power Plant Primary Ash Pond – W079807001-01
Alternative Source Demonstration Submittal

Dear Mr. Morris:

The purpose of this correspondence is to notify you that the Illinois Environmental Protection Agency (Illinois EPA) does not concur with the Newton Primary Ash Pond Alternative Source Demonstration (ASD) dated October 6, 2023. The Illinois EPA does not concur due to the following data gaps:

1. Source characterization of the CCR at the Primary Ash Pond must include total solids sampling in accordance with SW846.
2. Hydraulic conductivities from laboratory or in-situ testing must be collected, analyzed, and presented with hydrogeologic characterization of bedrock unit.
3. Characterization to include sample and analysis in accordance with 35 IAC 845.640 of alternative source must be provided with the ASD.

If you have any questions, please contact: **Heather Mullenax** Illinois EPA, Bureau of Water, PWS #13, P.O. Box 19276, Springfield, Illinois 62794-9276. If you have any questions concerning the investigation described above, please call 217-782-1020.

Sincerely,

Michael Summers, P.G.
Manager, Groundwater Section
Division of Public Water Supplies
Bureau of Water

cc: Heather Mullenax
Francisco Herrera
WPC Files 06M

Exhibit B

Luminant

Illinois Power Generating Company
1500 Eastport Plaza Drive
Collinsville, IL 62234

October 6, 2023
Illinois Environmental Protection Agency
DWPC – Permits MC#15
Attn: 35 I.A.C. § 845.610 Quarterly Report Submittal
1021 North Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276

Re: Newton Power Plant Primary Ash Pond; IEPA ID # W0798070001-01

Dear Mr. LeCrone:

In accordance with Title 35 of the Illinois Administrative Code (35 I.A.C.) Section (§) 845.650(e), Illinois Power Generating Company (IPGC) is submitting this Alternative Source Demonstration (ASD) for exceedances observed from the Quarter 2 2023 sampling event at the Newton Power Plant Primary Ash Pond, identified by Illinois Environmental Protection Agency (IEPA) ID No. W0798070001-01.

This ASD is being submitted within 60 days from the date of determination of an exceedance of a groundwater protection standard (GWPS) for constituents listed in 35 I.A.C. § 845.600. As required by 35 I.A.C. § 845.650 (e)(1), the ASD was placed on the facility's website within 24 hours of submittal to the agency.

One hard copy is provided with this submittal.

Sincerely,

Phil Morris, PE
Senior Director, Environmental

Enclosures
Alternate Source Demonstration, Quarter 2 2023, Primary Ash Pond Newton Power Plant, Newton Illinois

Intended for
Illinois Power Generating Company

Date
October 6, 2023

Project No.
1940103649-013

35 I.A.C. § 845.650(E): ALTERNATIVE SOURCE DEMONSTRATION

PRIMARY ASH POND
NEWTON POWER PLANT
NEWTON, ILLINOIS
IEPA ID: W0798070001-1

RAMBOLL Bright ideas. Sustainable change.

CERTIFICATIONS

I, Anne Frances Ackerman, a qualified professional engineer in good standing in the State of Illinois, certify that the information in this report is accurate as of the date of my signature below. The content of this report is not to be used other than for its intended purpose and meaning, or for extrapolations beyond the interpretations contained herein.

____

Anne Frances Ackerman
Qualified Professional Engineer
062-060586
Illinois
Ramboll Americas Engineering Solutions, Inc.
Date: October 6, 2023

I, Brian G. Hennings, a professional geologist in good standing in the State of Illinois, certify that the information in this report is accurate as of the date of my signature below. The content of this report is not to be used other than for its intended purpose and meaning, or for extrapolations beyond the interpretations contained herein.

____

Brian G. Hennings
Professional Geologist
196-001482
Illinois
Ramboll Americas Engineering Solutions, Inc.
Date: October 6, 2023

Ramboll
234 W. Florida Street
Fifth Floor
Milwaukee, WI 53204
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CONTENTS

TABLES (IN TEXT)

FIGURES (ATTACHED)

APPENDICES

ACRONYMS AND ABBREVIATIONS

35 I.A.C.	Title 35 of the Illinois Administrative Code
ASD	Alternative Source Demonstration
bgs	below ground surface
CCR	coal combustion residuals
cm/s	centimeters per second
E001	Event 1
GWPS	groundwater protection standard
LCU	lower confining unit
LF2	Landfill 2
LOE(s)	Line(s) of evidence
M-K	Mann-Kendall
mg/L	milligrams per liter
NAVD88	North American Vertical Datum of 1988
NPDES	National Pollutant Discharge Elimination System
NPP	Newton Power Plant
NRT/OBG	Natural Resource Technology, an OBG Company
PAP	Primary Ash Pond
PMP	primary migration pathway
Ramboll	Ramboll Americas Engineering Solutions, Inc.
Rapps	Rapps Engineering and Applied Science
TDS	total dissolved solids
UA	uppermost aquifer
UCU	upper confining unit
UD	upper drift
UTL	Upper Tolerance Limit

1. INTRODUCTION

Under Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845.650(e), within 60 days from the date of determination of an exceedance of a groundwater protection standard (GWPS) for constituents listed in 35 I.A.C. § 845.600, an owner or operator of a coal combustion residuals (CCR) surface impoundment may complete a written demonstration that a source other than the CCR surface impoundment caused the contamination and the CCR surface impoundment did not contribute to the contamination, or that the exceedance of the GWPS resulted from error in sampling, analysis, statistical evaluation, natural variation in groundwater quality, or a change in the potentiometric surface and groundwater flow direction (Alternative Source Demonstration [ASD]).

This ASD has been prepared on behalf of Illinois Power Generating Company, by Ramboll Americas Engineering Solutions, Inc (Ramboll), to provide pertinent information pursuant to 35 I.A.C. § 845.650(e) for the Newton Power Plant (NPP) Primary Ash Pond (PAP) located near Newton, Illinois.

The most recent quarterly sampling event (Event 1 [E001]) was completed on April 28, 2023, and analytical data were received on June 8, 2023. In accordance with 35 I.A.C. § 845.610(b)(3)(C), comparison of statistically derived values with the GWPSs described in 35 I.A.C. § 845.600 to determine exceedances of the GWPS was completed by August 7, 2023, within 60 days of receipt of the analytical data (Ramboll, 2023). The statistical determination identified the following GWPS exceedances at compliance groundwater monitoring wells:

- Chloride at well APW15
- Lithium at well APW02
- Sulfate at wells APW02, APW04, APW05S, and APW10
- Total dissolved solids (TDS) at wells APW02, APW04, and APW05S

Pursuant to 35 I.A.C. § 845.650(e), the lines of evidence (LOEs) presented in Section 3 demonstrate that sources other than the PAP were the cause of the chloride GWPS exceedance listed above. This ASD was completed by October 6, 2023, within 60 days of determination of the exceedances (August 7, 2023), as required by 35 I.A.C. § 845.650(e).

Lithium, sulfate, and TDS exceedances will be addressed in accordance with 35 I.A.C. § 845.660.

2. BACKGROUND

2.1 Site Location and Description

The NPP is located in Jasper County in the southeastern part of central Illinois, approximately 7 miles southwest of the town of Newton. The plant is located on the north side of Newton Lake. The area is bounded by Newton Lake and agricultural land to the west, south, and east, and agricultural land to the north. Beyond the lake is additional agricultural land.

2.2 Description of Primary Ash Pond CCR Unit

The NPP's sole CCR surface impoundment, the PAP, was constructed in 1977 and has a design capacity of approximately 9,715 acre-feet. The PAP has a surface area of 400 acres and a height of approximately 71 feet above grade. The PAP currently receives bottom ash, fly ash, and low-volume wastewater from the plant's two coal-fired boilers, and is operated per National Pollutant Discharge Elimination System (NPDES) Permit IL0049191, Outfall 001. The PAP was not excavated during construction, except for native borrow materials used to build the containment berms.

2.3 Geology and Hydrogeology

2.3.1 Site Hydrogeology

The information used to describe the hydrogeology is based on the local geology obtained from published sources, hydrogeologic investigation data, and boring data collected during site investigations conducted from 1997 to 2021 (Natural Resource Technology, an OBG Company [NRT/OBG], 2017; Ramboll, 2021a).

Quaternary deposits in the Newton area consist mainly of diamictons and outwash deposits that were deposited during Illinoian and Pre-Illinoian glaciations (Lineback, 1979; Willman et al., 1975). The unconsolidated deposits include the following units (beginning at the ground surface):

- Upper Drift (UD) / Potential Migration Pathway (PMP): The upper drift is composed of the low permeability silts and clays of the Peoria Silt and Sangamon Soil and the sandier soils of the Hagarstown Member. The hydraulic conductivity of this unit, calculated from field hydraulic test data from monitoring wells screened between 8 and 36 feet below ground surface (bgs), was observed to range from 2.4×10^{-6} to 6.1×10^{-5} centimeters per second (cm/s) with a geometric mean of 1.3×10^{-5} cm/s (Rapps Engineering and Applied Science [Rapps], 1997).
    - Hagarstown Member / PMP: The Hagarstown Member consists of the discontinuous, sandier deposits of the UD where present and overlies the Vandalia Till. Results of field hydraulic conductivity tests in wells screened within the Hagarstown PMP (APW05S and APW12) ranged from 6.1×10^{-4} to 1.5×10^{-2} cm/s, with a geometric mean hydraulic conductivity of 3.1×10^{-3} cm/s (Ramboll, 2021a).
- Upper Confining Unit (UCU): The UCU consists of a thick package of the low permeability clay and silt of the Vandalia Till Member. This unit is a laterally continuous layer between the base of the upper drift and the top of the uppermost aquifer (UA). The hydraulic conductivity of this unit was observed to range from 6.3×10^{-9} to 2.1×10^{-8} cm/s with a geometric mean of 1.1×10^{-8} cm/s (Rapps, 1997).

- Uppermost Aquifer (UA): The UA is composed of the Mulberry Grove Member, which has been classified as poorly graded sand, silty sand, clayey sand, and gravel. The top of the UA is highest in elevation in the north and east portions of the unit and slopes downward toward APW15. The top of unit elevations range from approximately 482 feet (APW05 and APW10) to 425 feet (APW15) North American Vertical Datum of 1988 (NAVD88). Field hydraulic conductivity tests conducted in 2021 at monitoring wells screened in the UA ranged from 2.0×10^{-4} to 1.5×10^{-1} cm/s with a geometric mean hydraulic conductivity of 6.8×10^{-3} cm/s. The highest conductivities are measured in APW15, APW16, and APW17 (Ramboll, 2021a).
- Lower Confining Unit (LCU): The LCU is comprised of low permeability silt and clay of the Smithboro Till Member and the Banner Formation. The hydraulic conductivity of this unit was observed to be 1.4×10^{-7} cm/s (Rapps, 1997).
- Bedrock Unit: Shale bedrock of the Pennsylvanian-age Mattoon Formation (Willman et al., 1967) was encountered at the NPP during recent and historical investigations. Based on boring logs, the bedrock surface elevation at the NPP ranges from 408 feet NAVD88 (B141) (Appendix A) to 445 feet NAVD88 (APW13) (Ramboll, 2021a). Bedrock was not encountered at APW15, which was advanced to approximately 412 feet NAVD88 (Ramboll, 2021a). This indicates that APW15, which is screened within the UA from 424 to 419 feet NAVD88, is located in close proximity to the bedrock surface.

2.3.2 Regional Bedrock Geology

Regional investigations of the Illinois Basin have identified bedrock (specifically brines within the bedrock formations) as a source of chloride in groundwater (Kelley et al, 2012; Panno et al, 2018). Studies by Cartwright (1970) and Siegel (1989) indicate that groundwater migrates toward the center of the Illinois Basin and discharges upward through overlying confining units. The "Saline groundwater and brines can be brought near or to the land surface by natural conditions, such as migrating up prominent fractures and/or faults in bedrock, or by anthropogenic activities, such as exploration for and exploitation of petroleum. The mixing of upward-migrating saline groundwater with fresh groundwater from shallow aquifers can make groundwater from private wells undrinkable and can present a very expensive problem for municipalities (Panno and Hackley, 2010). "A saline spring was identified in Clay County (Kelley et al, 2012) approximately 10 miles south of the NPP and is adjacent to the Clay City Anticline which runs north into Jasper County and east of the NPP. Concentrations of chloride in groundwater collected from the Pennsylvanian shale in Jasper County range from 100 to 5,000 milligrams per liter (mg/L) (Panno et al, 2017).

2.3.3 Water Table Elevation and Groundwater Flow Direction

Groundwater elevations in the UA (referenced to NAVD88) across the PAP ranged from approximately 491 to 530 feet during E001 (Figure 1). Depth to groundwater measurements used to generate the groundwater elevation contours shown on Figure 1 were collected on April 24, 2023. Groundwater flow in the UA beneath the eastern portion of the PAP is generally to the south, with flow direction diverging to the southwest beneath the western portion of the PAP, toward Landfill 2 (LF2), where groundwater flow in the area is converging along the major axis of LF2 Cells 1 and 2.

2.4 Groundwater and PAP Monitoring

The monitoring system for the PAP is shown on Figure 1 and consists of two background monitoring wells (APW05 and APW06), 16 compliance monitoring wells (APW02, APW03, APW04, APW05S, APW07, APW08, APW09, APW10, APW11, APW12, APW13, APW14, APW15, APW16, APW17, and APW18), and two temporary water level only surface water staff gages (XSG01 and SG02) to monitor potential impacts from the PAP (Ramboll, 2021b). These monitoring wells are screened within the UD (APW02, APW03, APW04, APW05S, and APW12) and the UA (APW05, APW06, APW07, APW08, APW09, APW10, APW11, APW13, APW14, APW15, APW16, APW17, and APW18) along the perimeter of the PAP. Porewater samples are collected from locations XPW01 and XPW02 on the northern side of the PAP, and from XPW03 and XPW04 on the northeastern side of the PAP (Figure 1).

3. ALTERNATIVE SOURCE DEMONSTRATION: LINES OF EVIDENCE

As allowed by 35 I.A.C. § 845.650(e), this ASD demonstrates that sources other than the PAP (the CCR unit) caused the chloride exceedance at APW15. LOEs supporting this ASD include the following:

1. The PAP is separated from the UA at APW15 by a thick layer of low permeability glacial till (UCU).
2. Concentrations of primary CCR indicators in APW15 do not exceed background limits and are not increasing.
3. Concentrations of chloride at APW15 are greater than source concentrations.

These LOEs are described and supported in greater detail below.

3.1 LOE #1: The PAP is Separated from the UA at APW15 by a Thick Layer of Low Permeability Glacial Till (UCU)

Based on the boring log for monitoring well APW15, the top elevation of the UA is 424.9 feet NAVD88 (Ramboll, 2021a), which corresponds to 97.2 feet bgs on the boring log. At this location, the UA is overlain by the UCU, a low permeability (6.3×10^{-9} to 2.1×10^{-8} cm/s) glacial till. The bottom of the PAP, as presented in drawing S-69, is situated within the UCU, generally consistent with ground surface topography at the time the PAP was constructed (AECOM, 2022). The estimated bottom elevation of CCR presented on profile B-B’ of sheet 00C302 (HDR, 2022), which bisects the axis of a former drainage feature, is 485 feet and has been interpreted to be the minimum base of ash elevation across the PAP. Thus, separation between the UA and the base of ash is approximately 60 feet, which represents the thickness of the low permeability glacial till that comprises the UCU. Based upon these observations, there is no complete pathway for transport of CCR constituents to APW15, and the PAP is not the source of the chloride exceedance at that well. Appendix B includes the boring log for APW15, drawing S-69, and sheet 00C302 to support this LOE.

3.2 LOE #2: Concentrations of Primary CCR Indicators in APW15 Do Not Exceed Background Limits and are Not Increasing

Boron and sulfate can be indicators of CCR impacts to groundwater due to their leachability from CCR and mobility in groundwater. Porewater in the NPP PAP is elevated in both boron and sulfate, indicating that these parameters are site-specific key indicators for CCR. If the groundwater in APW15 had been impacted by CCR from the unit, boron and sulfate concentrations would be expected to be elevated above their respective background Upper Tolerance Limits (UTLs). The UTL is an upper bound on background concentrations calculated for the purpose of comparing compliance measurements to background.

Mann-Kendall (M-K) trend analysis tests were performed to determine whether there are trends in the boron and sulfate concentrations in each well. If groundwater downgradient of the PAP was being affected by CCR but boron and sulfate did not yet exceed background concentrations, boron and sulfate concentrations would be expected to be increasing. No trends in boron or sulfate concentrations were identified by the M-K tests in compliance well APW15.

The concentration of boron in compliance well APW15 (0.13 mg/L) is less than the boron UTL (0.26 mg/L) and the concentration of sulfate in APW15 (0.40 mg/L) is also less than the sulfate UTL (35.84 mg/L), and the lack of increasing trends in boron and sulfate concentrations at monitoring well APW15 indicate that this well has not been affected by CCR impacts from the NPP PAP (Ramboll 2021b; Ramboll 2023). Analytical data to support this LOE are included in Appendix C.

3.3 LOE #3: Concentrations of Chloride at APW15 are Greater than Source Concentrations

Table A below provides summary statistics for chloride in APW15 and PAP porewater collected from XPW01, XPW02, XPW03, and XPW04.

Table A. Summary Statistics for Chloride in APW15 and PAP Porewater (February 2021 to April 2023)

Sample Location	Chloride (mg/L)		
	Minimum	Maximum	Median
Composite Porewater[1]	8.1	62.0	12.5
APW15	130	270	235

[1] Composite Porewater includes summary statistics of data collected at porewater locations XPW01, XPW02, XPW03, and XPW04

The following observations can be made from Table A:

- Concentrations of chloride in compliance monitoring well APW15 ranged from 130 mg/L to 270 mg/L, with a median chloride concentration of 235 mg/L.
- Concentrations of chloride within PAP porewater ranged from 8.1 mg/L to 62.0 mg/L, with a median chloride concentration of 12.5 mg/L.
- The median chloride concentration observed in porewater is an order of magnitude lower than the median chloride concentrations observed in compliance monitoring well APW15.
- The maximum observed chloride concentration in compliance monitoring well APW15 is approximately four times the concentration observed in porewater.

Analytical data to support the summary statistics presented in Table A are included in Appendix C. If the PAP was the source of chloride in downgradient groundwater, chloride concentrations in PAP porewater would be expected to be greater than the groundwater concentrations. However, the median chloride concentration observed in compliance groundwater monitoring well APW15 is greater than the median chloride concentrations observed porewater, indicating that chloride concentrations are not related to the PAP.

4. CONCLUSIONS

Based on the three LOEs presented below and described in the previous section, it has been demonstrated that the GWPS exceedance of chloride at APW15 is not due to the PAP but is from a source other than the CCR unit.

1. The PAP is separated from the UA at APW15 by a thick layer of low permeability glacial till (UCU).
2. Concentrations of primary CCR indicators in APW15 do not exceed background limits and are not increasing.
3. Concentrations of chloride at APW15 are greater than source concentrations.

Given the preponderance of evidence demonstrating that the PAP is not the source of elevated chloride in groundwater compliance well APW15, regional literature was reviewed to identify an alternative source. Based on the literature discussed in Section 2.3.2, elevated chloride concentrations (ranging 100 to 5,000 mg/L) are present in bedrock at concentrations above those detected in APW15. The UA was encountered at the lowest elevation onsite at APW15 (~425 feet NAVD88), and the screened elevation of this well (424 to 419 feet NAVD88) indicates that it is in close proximity to the bedrock surface, which is known to range between 408 and 445 feet NAVD88 at the NPP. Upward migration of chloride-containing groundwater from the shale bedrock into the overlying unlithified materials above the bedrock valley has the potential to impact groundwater within the UA.

Based on the review of regional literature and site-specific bedrock conditions, chloride concentrations in bedrock groundwater are a likely source of chloride observed in APW15 for the following reasons:

- Chloride is present in Pennsylvanian shale in Jasper County at concentrations ranging from 100 to 5,000 mg/L.
- Upward vertical hydraulic gradients and fractures near geologic features provide conduits for these chloride-rich waters to migrate. The Clay City Anticline is present east of the PAP and a saline spring has been mapped adjacent to this anticline approximately 10 miles south of the PAP in Clay County.
- Well APW15 is located in close proximity to bedrock and screened at a lower elevation than other wells monitoring the UA which could explain why this is the only affected well. The screened interval is estimated to be 10 to 15 feet lower than the top of bedrock in adjacent wells. The high hydraulic conductivity of the UA relative to the low hydraulic conductivity of underlying bedrock (Mehnert et al, 1990) at this location provides a potential pathway for interaction with upward-migrating chloride-containing bedrock groundwater.

This information serves as the written ASD prepared in accordance with 35 I.A.C. § 845.650(e), demonstrating that the chloride exceedance observed at APW15 during the E001 sampling event was not due to the PAP. Therefore, assessment of corrective measures is not required for chloride at the PAP.

Lithium, sulfate, and TDS exceedances will be addressed in accordance with 35 I.A.C. § 845.660.

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Figures

Y:\Mapping\Projects\22\2285\MXD\GW_Contours\Round_2023\Newton\PAP_501\NEW 501 PAP Pot Surface 20230424.mxd

PROJECT: 169000XXXX | DATED: 9/20/2023 | DESIGNER: GALARNMC

COMPLIANCE MONITORING WELL
BACKGROUND MONITORING WELL
MONITORING WELL
PORE WATER WELL
LEACHATE WELL
STAFF GAGE, CCR UNIT
STAFF GAGE, LAKE
GROUNDWATER ELEVATION CONTOUR (5-FT CONTOUR INTERVAL, NAVD88)
INFERRED GROUNDWATER ELEVATION
GROUNDWATER FLOW DIRECTION
REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE

NOTES:
1. ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.
2. ELEVATION CONTOURS SHOWN IN FEET, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)

0 400 800 Feet

SAMPLING LOCATIONS AND POTENTIOMETRIC SURFACE MAP APRIL 24, 2023

ALTERNATIVE SOURCE DEMONSTRATION PRIMARY ASH POND
NEWTON POWER PLANT
NEWTON, ILLINOIS

FIGURE 1

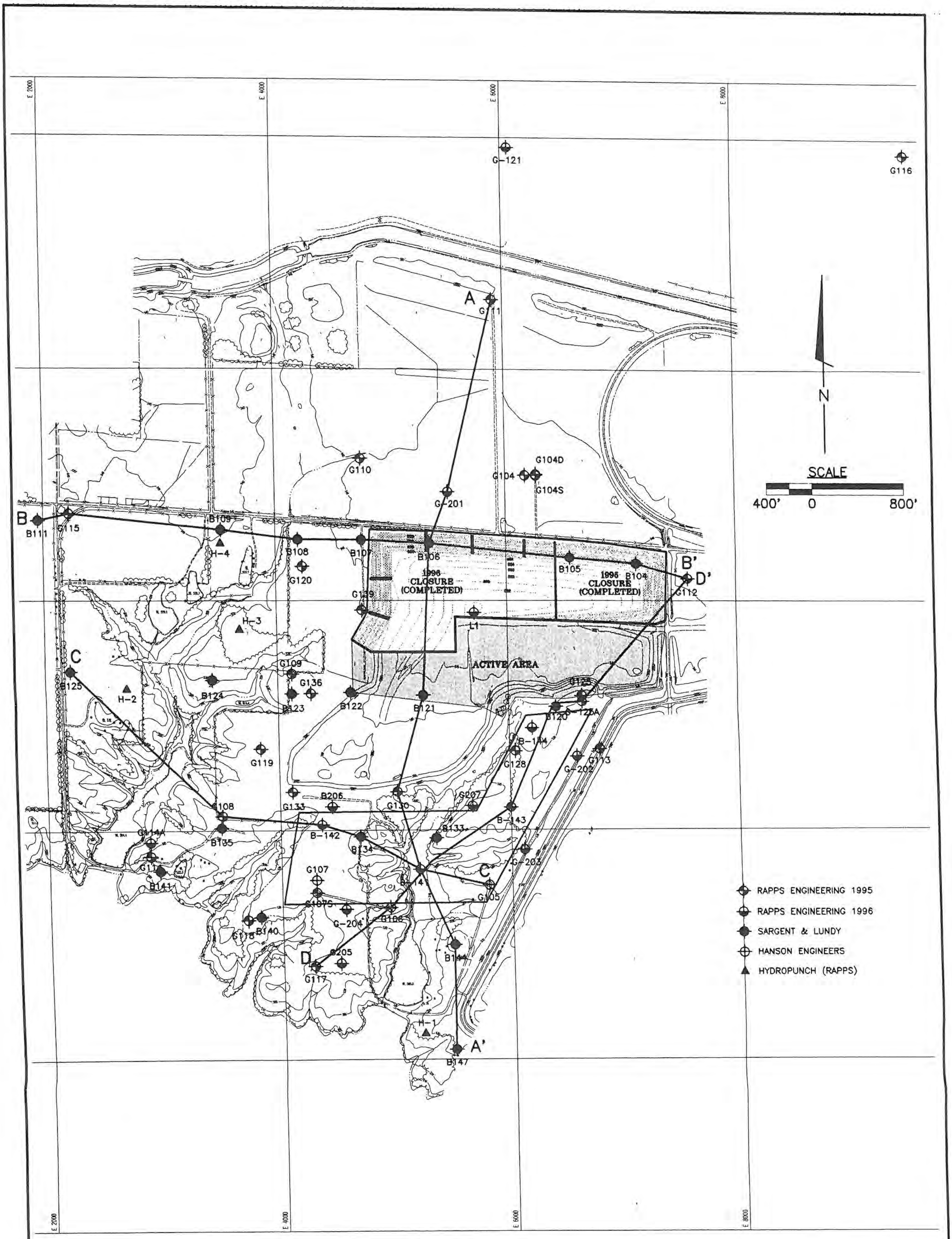
RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.

RAMBOLL

Appendix A

Soil Boring B141 Location and Boring Log

RAPPS ENGINEERING & APPLIED SCIENCE C:\FILES\SA96083\FIGURES\XSECKEY



RAPPS
ENGINEERING & APPLIED SCIENCE
821 S. DURKIN DR. • SPRINGFIELD, IL 62704 • (217) 787-2118
1601 BROADWAY • MT. VERNON, IL 62864 • (618) 244-2611

FIGURE 3-2
CROSS SECTION KEY
NEWTON POWER STATION LANDFILL
CENTRAL ILLINOIS PUBLIC SERVICE
NEWTON, ILLINOIS

F 344-4 5C PADS

TEST BORING REPORT

RAYMOND

CONCRETE PILE DIVISION

To SARGENT & LUNDY — Date FEBRUARY 14, 1974 Job No. C8-21241-X

Location of Borings NEWTON, ILLINOIS — PROPOSED POWER PLANT EXPANSION

All borings are plotted to a scale of 1" = 8' ft. using ELEVATIONS AS FURNISHED as a fixed datum.

No. 141

Elev.	Description	Blows	Depth
	GROUND SURFACE		
525	ELEV. 524.5'		0.0'
	LIGHT GREY SILTY TOP SOIL		0.5'
520	BROWN CLAYEY SILT	20	
515		9	11.3'
	FINE SAND & SMALL TO MEDIUM GRAVEL		11.5'
510	BROWN CLAYEY SANDY SILT	43	14.5'
	BROWN SANDY SILT		15.0'
505	BROWN COMPACT SANDY CLAYEY SILT TR. GRAVEL	60/6	
500		44	27.0'
	SMALL TO MED. GRAVEL & SAND		27.9'
495	BROWN SANDY SILTY CLAY TR. GRAVEL	36	32.0'
	SMALL TO MED. GRAVEL & SAND		33.1'
490	BROWN SANDY SILTY CLAY	34	34.4'
485		38	
480	GREY SANDY	47	
475	CLAYEY SILT	55	
470	TR. GRAVEL	47	
465		35	

No. 142

Description	Blows	Depth
GROUND SURFACE		0
ELEV. 534.8'		
GREY SILTY TOP SOIL		0
BROWN & GREY SILTY CLAY	6	
	14	11
FINE SAND & GRAVEL		11
BROWN & GREY SILTY CLAY	22	16.
SAND & GRAVEL		18.
BROWN COMPACT FINE SAND	60/9	22.
FINE TO COURSE SAND & MED. TO LARGE GRAVEL	60/11	25.
	60	
GREY COMPACT SANDY CLAYEY	60/11	
SILT TR. GRAVEL SOME	38	
SAND SEAMS	39	48.
	43	
BROWN & GREY SANDY SILTY CLAY TR. GRAVEL	51	56.
GREY COMPACT SANDY CLAYEY SILT TR. GRAVEL		57.
FINE SAND & SMALL TO MED. GRAVEL SEAM	41	58.
	43	
GREY COMPACT	44	

Elev.	Description	Blows	Depth
			68.3'
5	SAND & SMALL TO MED. GRAVEL	60/9	69.0'
	LIGHT GREY SANDY CLAYEY SILT TR. GRAVEL		
450		60/8	74.0'
	COMPACT SANDY SILT		
445	TR. GRAVEL & CLAY	60/7	
			83.0'
440		21	
435	GREY SILTY	25	
430	CLAY TR. SAND	24	
425	& GRAVEL	20	
	(TR. WOOD)	23	
415		21	
410		60/11	114.0'
	BLACK SILTY SAND & WOOD	60/1	116.0'
	SHALE OR BOULDER		

BORING ADVANCED BY AUGER.
WATER ENCOUNTERED @ 15.0'.
WATER LEVEL @ 13.0' 24 HRS. AFTER COMPLETION.
USED 20.0' OF BX CASING.

405

Description	Blows	Depth
	37	
	41	
		8
	37	
GREY SANDY SILTY CLAY TR. GRAVEL	34	
SAND & GRAVEL		9 / 9
GREY SILTY CLAY TR. GRAVEL	36	
	30	106
SAND & GRAVEL		108
	29	
GREY SANDY SILTY	26	
CLAY TR. GRAVEL	24	120

BORING ADVANCED BY AUGER TO 20.0'.
WATER ENCOUNTERED @ 16.0'.
WATER LEVEL @ 10.0' 24 HRS. AFTER COMPLETION.
USED 20.0' OF BX CASING.

FIGURES IN RIGHT HAND COLUMN SHOWN AS FRACTIONS
NUMERATOR - NUMBER OF BLOWS
DENOMINATOR - PENETRATION (IN INCHES)

Classifications are made by visual inspection.

Water levels (WL). Figure indicates time of reading (hours) after completion of boring. Water levels indicated are those observed when borings were made, or as noted. Porosity of the soil strata, variations of rainfall, site topography, etc., may cause changes in these levels.

Figures in right hand column indicate number of blows required to drive 2" O.D. sampling pipe one foot, using 140-lb. weight falling 30 inches.

Total Footage 230.0'
Foreman A. NEWBERRY
Classification by FOREMAN
Sheet of

Appendix B

Supporting Materials for LOE#1

SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Newton Power Station		APW15

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Adam Jochimsen Cascade Drilling	1/21/2021	1/22/2021	Mini Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
APW15	Feet (NAVD88)	522.06 Feet (NAVD88)	6.0 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 821,107.90 N, 997,938.87 E Ⓔ/W
1/4 of 1/4 of Section 26, T 6 N, R 8 E
Lat 38° 55' 17.71"
Long -88° 17' 6.79"
Local Grid Location: Feet ☐ N ☐ S; Feet ☐ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Jasper	IL	Newton

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
! ()	8$ '&		0–6.5	Ā$Ā9Ā#&Ā ?;B Ā> <PĀ ;< =Ā(; BĀ4FGĀH$=IĀ' A%B EDĀH 9Ā L JĀEGNĀH$L JĀEW Ā#ĀD K.C O5BĀ# K#7C3G EEBĀ-ND7/ Ā0 EKOK5Ā/+DEK#	H'?;;J (;				!#"' !#"'					() *Ā+ ,-). / 01
Ā ()	8$ &$													
			6.5–12	Ā#%Ā9Ā$Ā><PĀ ;< =Ā(; BĀNVĀC 5ĀH$=IĀ&A.UB EDĀH 9Ā L JĀEGNĀH$L JĀC M-ĀH$L JĀ+C. GD / . K-D ĀH$L JĀM5ĀEW ĀD K.C O5B / -ND7/Ā+7C3G-EEBĀ -ND7/Ā01.EKOK5Ā +DE#	(;				Ā#Ā' & !					
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I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: [signature]

Firm: Ramboll, 234 W. Florida Street, Milwaukee, WI 53204
Tel: (414) 837-3607
Fax: (414) 837-3608

Boring Number APW15

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
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Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
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Boring Number APW15

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			53	ĀÀ# Ā98!#&Ā ?6 ĀA@BĀN,VĀC 5ĀH$=IĀ&AUJĀO5 H!'9Ā' L JB3Ā, NĀG+ĀND1.KG5BĀ -ND7/Ā+7C3G-EEB G+G901 EKDBĀ5#					&#					
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Boring Number APW15

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
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Boring Number APW15

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
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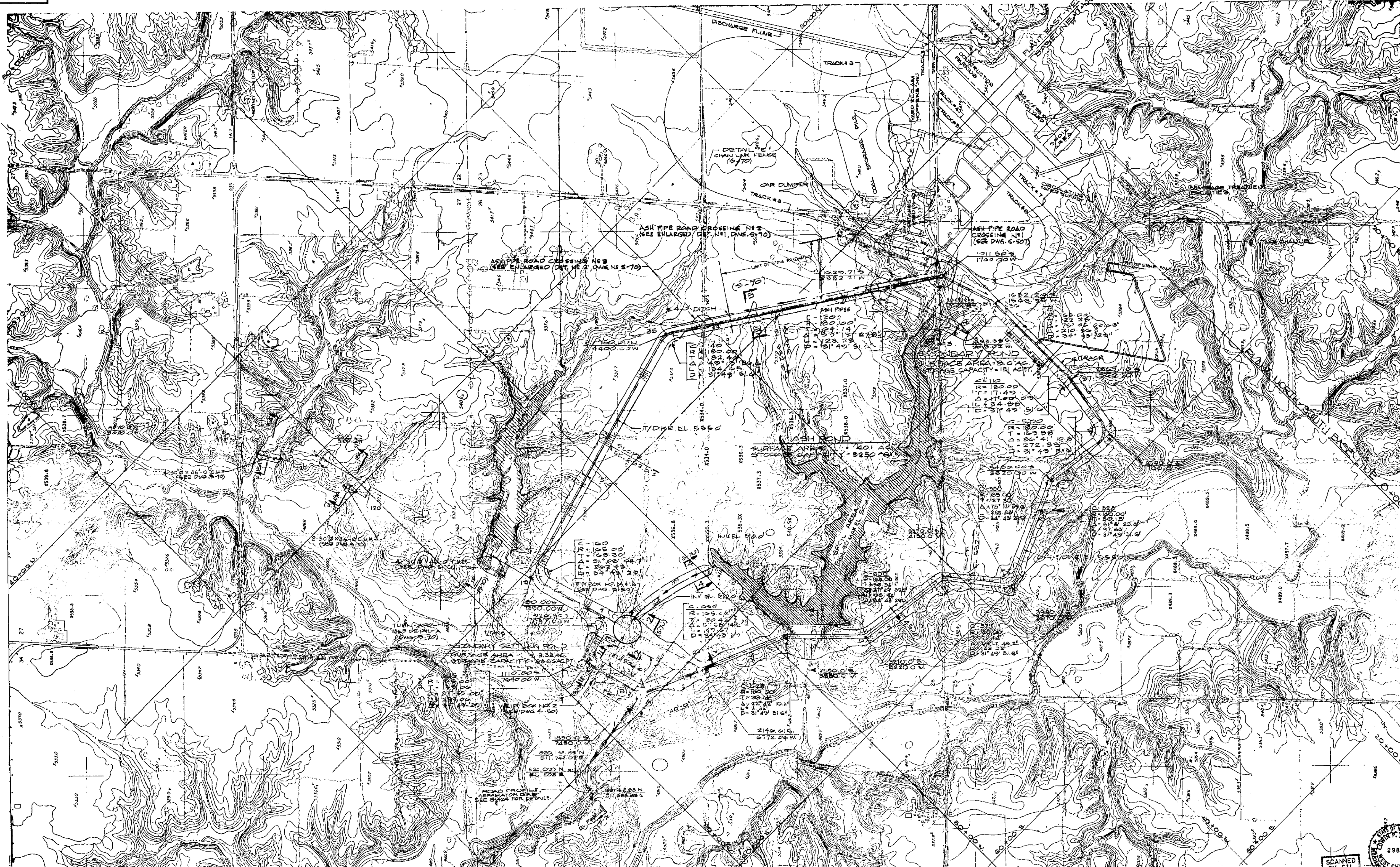
69-S



POINT NO.	SIDE	CURVE NO.	R	T	Δ	L	D
8	ASH POND		100'	52.87'	49°43' 13.6"	86.78	57°17' 45.60"
8	SECONDARY ASH POND		65'	140.29'	130°16' 46.4"	147.80	88°08' 51.69"
21	LAKESIDE (A)		165'	49.55	33°25' 06.4"	96.27	34°43' 29.00"
21	LAKESIDE (B)		65'	70.49'	94°36' 00.0"	107.32	88°08' 51.69'
36	ASH POND (A)		57.5'	57.50	90° 00' 00.0"	90.27	99° 38' 41.53"
36	SECONDARY (B) POND		57.5	77.59	106°54' 52.38"	107.24	99° 38' 41.53"
39	SECONDARY POND		57.5	161.37	140°46' 29.17"	141.21	99° 58' 41.53"

NORTH

PLANT NORTH

NOTES

7. THE WATER LEVEL IN ASH POND SHALL BE MAINTAINED AT AN ELEVATION 10.0' ABOVE THE SEDIMENT LEVEL FOR ENVIRONMENTAL PURPOSES.

NOTES

1. FOR GENERAL NOTES SEE DWG. S-14.
2. ALL WORK SHOWN IN THIS DRAWING SHALL BE DONE BY SUPERSTRUCTURE CONTRACTOR IN ACCORDANCE WITH JOB SPEC. A-3022.
3. ALL EXTERIOR SIDE SLOPES OF DIKE BELOW ELEV. 510.0' THAT IS TO BE CONSTRUCTED BEFORE LAKE FILLING. SHALL BE PROVIDED WITH 24" STONE RIPRAP ON 24" SAND AND GRAVEL FILTER BEDDING AS SHOWN ON DWG. S-70. AND ALL DIKE CONSTRUCTION SHALL BE DONE IN ACCORDANCE WITH JOB SPEC. A-3017 AND A-3022.
4. ALL DIKE TOPS AND SIDE SLOPES AND ALL EXTERNAL DITCHES SHALL BE PROVIDED WITH 4" TOPSOIL AND SEEDED IN ACCORDANCE WITH JOB SPEC. A-3017 AND A-3022.
5. EXISTING LOW AREAS SHALL BE FILLED WITH SPOILMATERIAL AS REQUIRED FOR SPOIL DISPOSAL SPOILS SHALL BE PLACED IN LAYERS AND GRADED PROPERLY FOR DRAINAGE.
6. REMOVED "HOLD" FROM SO_2 POND AREAS FOR CLEARING. SLOPE STAKING & CROSS- SECTIONING ONLY.

REFERENCE DRAWINGS

S-19	SITE CONTOURS AND DEVELOPMENT PLAN SHEET 4.
S-39	GRADING AND DRAINAGE PLAN. PLANT AREA SHEET 2.
S-40	GRADING AND DRAINAGE PLAN. PLANT AREA SHEET 3.
S-50	WEIR BOX STRUCTURES AT PRIMARY AND SECONDARY SETTLING PONDS.
S-70	ASH POND DIKE PROFILE DETAILS & SECTION
S-507	GRADING & DRAINAGE PLAN- PLANT AREA- SHT7.

ASH POND & SO_2
DISPOSAL POND
NEWTON POWER STATION UNIT 1
CENTRAL ILL PUBLIC SERVICE CO.
NEWTON, ILLINOIS

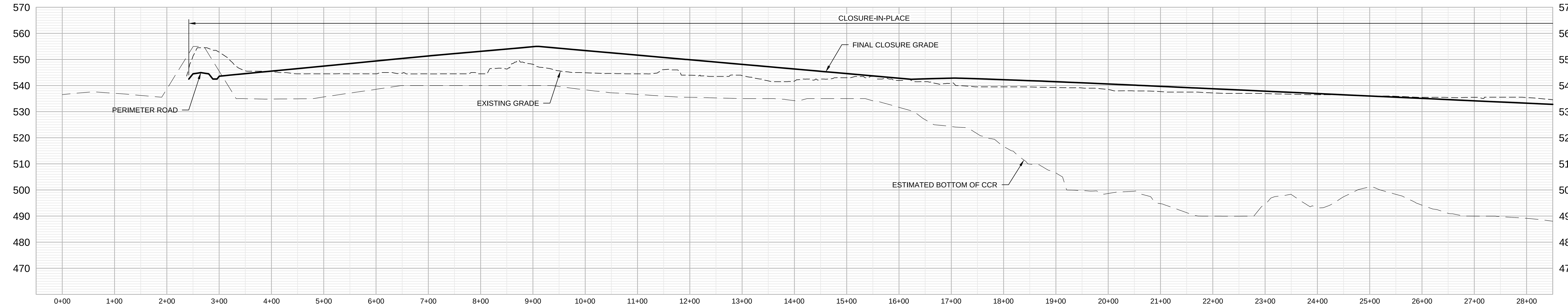
SCALE 1" = 400'-0" & U.N.
DRAWN B. SANCHEZ 8-6-74
CHECKED C. R. Bhattacharya 8-6-74
ENGINEER A. J. Shale 8-6-74
APPROVED [illegible]

SARGENT & LUNDY ENGINEERS CHICAGO

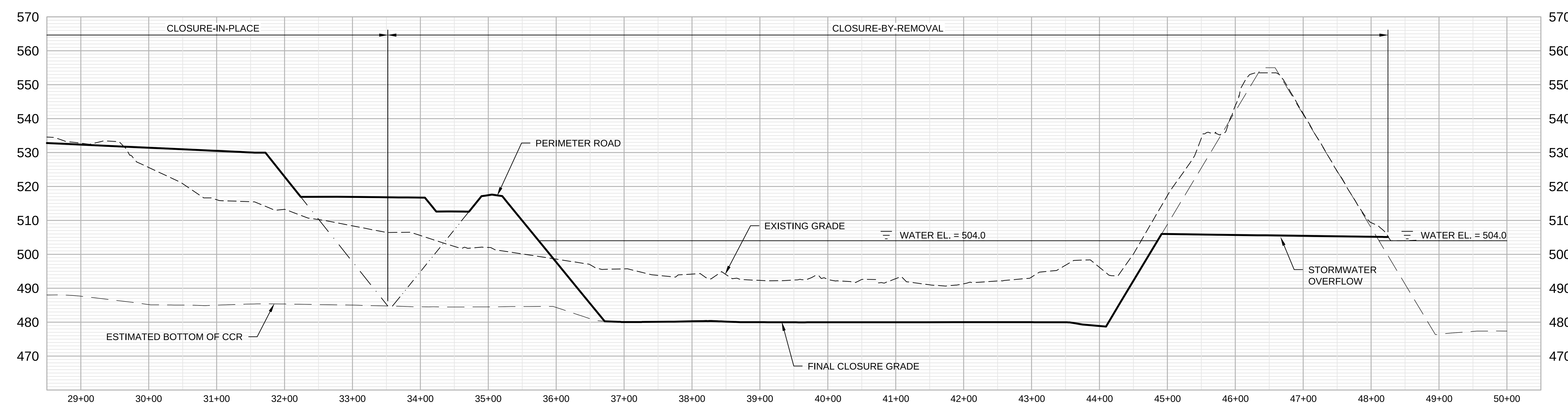
DRAWING NO. S-69

1 2 3 4 5 6 7 8

D C B A



B-B
00C106
SECTION B-B
HORIZ: 1" = 100' | VERT: 1" = 20'



B-B
00C106
SECTION B-B (cont.)
HORIZ: 1" = 100' | VERT: 1" = 20'

c:\pwworking\central01\d3722207\00C302.dwg, Layout1, 7/25/2022 12:56:07 PM, MBICKFORD

HDR

ISSUE	DATE	DESCRIPTION
0	07/28/2022	ISSUED TO IEPA

PROJECT MANAGER	M. ROBERTS
CIVIL	G. WILLIAMS
CIVIL	K. KINLEY
DRAWN BY	M. BICKFORD
PROJECT NUMBER	10296144

ILLINOIS POWER GENERATING COMPANY
NEWTON POWER PLANT
PRIMARY ASH POND CLOSURE

CROSS SECTIONS

0 1" 2"

FILENAME 00C302.DWG
SCALE AS NOTED

SHEET
00C302

Appendix C

Supplemental Analytical Data

APPENDIX **C**.
SUPPORTING GROUNDWATER ANALYTICAL DATA
35 I.A.C. § 845: ALTERNATIVE SOURCE DEMONSTRATION
NEWTON POWER PLANT
PRIMARY ASH POND
NEWTON, IL

Well ID	Well Type	Date	Parameter	Result	Unit
APW15	Compliance	02/23/2021	Boron, total	0.140	mg/L
APW15	Compliance	03/10/2021	Boron, total	0.130	mg/L
APW15	Compliance	03/31/2021	Boron, total	0.160	mg/L
APW15	Compliance	04/28/2021	Boron, total	0.130	mg/L
APW15	Compliance	05/24/2021	Boron, total	0.150	mg/L
APW15	Compliance	06/17/2021	Boron, total	0.130	mg/L
APW15	Compliance	06/30/2021	Boron, total	0.130	mg/L
APW15	Compliance	07/14/2021	Boron, total	0.160	mg/L
APW15	Compliance	03/14/2023	Boron, total	0.180	mg/L
APW15	Compliance	04/26/2023	Boron, total	0.130	mg/L
APW15	Compliance	02/23/2021	Chloride, total	260	mg/L
APW15	Compliance	03/10/2021	Chloride, total	250	mg/L
APW15	Compliance	03/31/2021	Chloride, total	240	mg/L
APW15	Compliance	04/28/2021	Chloride, total	230	mg/L
APW15	Compliance	05/24/2021	Chloride, total	230	mg/L
APW15	Compliance	06/17/2021	Chloride, total	240	mg/L
APW15	Compliance	06/30/2021	Chloride, total	230	mg/L
APW15	Compliance	07/14/2021	Chloride, total	130	mg/L
APW15	Compliance	03/14/2023	Chloride, total	230	mg/L
APW15	Compliance	04/26/2023	Chloride, total	270	mg/L
APW15	Compliance	02/23/2021	Sulfate, total	1 U	mg/L
APW15	Compliance	03/10/2021	Sulfate, total	1 U	mg/L
APW15	Compliance	03/31/2021	Sulfate, total	1 U	mg/L
APW15	Compliance	04/28/2021	Sulfate, total	1 U	mg/L
APW15	Compliance	05/24/2021	Sulfate, total	1 U	mg/L
APW15	Compliance	06/17/2021	Sulfate, total	1 U	mg/L
APW15	Compliance	06/30/2021	Sulfate, total	1 U	mg/L
APW15	Compliance	07/14/2021	Sulfate, total	1 U	mg/L
APW15	Compliance	03/14/2023	Sulfate, total	0.6 J	mg/L
APW15	Compliance	04/26/2023	Sulfate, total	0.4 J	mg/L
XPW01	Porewater	02/17/2021	Boron, total	9.50	mg/L
XPW01	Porewater	03/09/2021	Boron, total	11.0	mg/L
XPW01	Porewater	03/30/2021	Boron, total	9.90	mg/L
XPW01	Porewater	04/28/2021	Boron, total	10.0	mg/L
XPW01	Porewater	07/14/2021	Boron, total	12.0	mg/L
XPW01	Porewater	02/23/2022	Boron, total	12.0	mg/L
XPW01	Porewater	08/15/2022	Boron, total	13.0	mg/L
XPW01	Porewater	02/01/2023	Boron, total	15.0	mg/L
XPW01	Porewater	04/27/2023	Boron, total	14.0	mg/L
XPW01	Porewater	02/17/2021	Chloride, total	49.0	mg/L
XPW01	Porewater	03/09/2021	Chloride, total	38.0	mg/L
XPW01	Porewater	03/30/2021	Chloride, total	32.0	mg/L
XPW01	Porewater	04/28/2021	Chloride, total	33.0	mg/L
XPW01	Porewater	07/14/2021	Chloride, total	27.0	mg/L
XPW01	Porewater	02/23/2022	Chloride, total	25.0	mg/L
XPW01	Porewater	06/14/2022	Chloride, total	14.0	mg/L

APPENDIX C.
SUPPORTING GROUNDWATER ANALYTICAL DATA
35 I.A.C. § 845: ALTERNATIVE SOURCE DEMONSTRATION
NEWTON POWER PLANT
PRIMARY ASH POND
NEWTON, IL

Well ID	Well Type	Date	Parameter	Result	Unit
XPW01	Porewater	08/15/2022	Chloride, total	11.0	mg/L
XPW01	Porewater	02/01/2023	Chloride, total	9.70	mg/L
XPW01	Porewater	04/27/2023	Chloride, total	8.10	mg/L
XPW01	Porewater	02/17/2021	Sulfate, total	19,000	mg/L
XPW01	Porewater	03/09/2021	Sulfate, total	14,000	mg/L
XPW01	Porewater	03/30/2021	Sulfate, total	19,000	mg/L
XPW01	Porewater	04/28/2021	Sulfate, total	12,000	mg/L
XPW01	Porewater	07/14/2021	Sulfate, total	11,000	mg/L
XPW01	Porewater	02/23/2022	Sulfate, total	9,300	mg/L
XPW01	Porewater	06/14/2022	Sulfate, total	6,100	mg/L
XPW01	Porewater	08/15/2022	Sulfate, total	5,900	mg/L
XPW01	Porewater	02/01/2023	Sulfate, total	4,200	mg/L
XPW01	Porewater	04/27/2023	Sulfate, total	2,900	mg/L
XPW02	Porewater	02/17/2021	Boron, total	2.30	mg/L
XPW02	Porewater	03/09/2021	Boron, total	2.50	mg/L
XPW02	Porewater	03/30/2021	Boron, total	2.40	mg/L
XPW02	Porewater	04/28/2021	Boron, total	2.60	mg/L
XPW02	Porewater	07/14/2021	Boron, total	2.50	mg/L
XPW02	Porewater	02/23/2022	Boron, total	2.40	mg/L
XPW02	Porewater	08/15/2022	Boron, total	2.40	mg/L
XPW02	Porewater	02/01/2023	Boron, total	2.30	mg/L
XPW02	Porewater	04/27/2023	Boron, total	2.30	mg/L
XPW02	Porewater	02/17/2021	Chloride, total	10.0	mg/L
XPW02	Porewater	03/09/2021	Chloride, total	9.60	mg/L
XPW02	Porewater	03/30/2021	Chloride, total	9.90	mg/L
XPW02	Porewater	04/28/2021	Chloride, total	9.70	mg/L
XPW02	Porewater	07/14/2021	Chloride, total	10.0	mg/L
XPW02	Porewater	02/23/2022	Chloride, total	12.0	mg/L
XPW02	Porewater	06/14/2022	Chloride, total	8.60	mg/L
XPW02	Porewater	08/15/2022	Chloride, total	8.90	mg/L
XPW02	Porewater	02/01/2023	Chloride, total	8.40 B	mg/L
XPW02	Porewater	04/27/2023	Chloride, total	8.80	mg/L
XPW02	Porewater	02/17/2021	Sulfate, total	160	mg/L
XPW02	Porewater	03/09/2021	Sulfate, total	150	mg/L
XPW02	Porewater	03/30/2021	Sulfate, total	160	mg/L
XPW02	Porewater	04/28/2021	Sulfate, total	190	mg/L
XPW02	Porewater	07/14/2021	Sulfate, total	160	mg/L
XPW02	Porewater	02/23/2022	Sulfate, total	210	mg/L
XPW02	Porewater	06/14/2022	Sulfate, total	170	mg/L
XPW02	Porewater	08/15/2022	Sulfate, total	160	mg/L
XPW02	Porewater	02/01/2023	Sulfate, total	150	mg/L
XPW02	Porewater	04/27/2023	Sulfate, total	150	mg/L
XPW03	Porewater	02/17/2021	Boron, total	1.30	mg/L
XPW03	Porewater	03/09/2021	Boron, total	1.20	mg/L
XPW03	Porewater	03/30/2021	Boron, total	0.840	mg/L
XPW03	Porewater	04/28/2021	Boron, total	1.20	mg/L

APPENDIX C.
SUPPORTING GROUNDWATER ANALYTICAL DATA
35 I.A.C. § 845: ALTERNATIVE SOURCE DEMONSTRATION
NEWTON POWER PLANT
PRIMARY ASH POND
NEWTON, IL

Well ID	Well Type	Date	Parameter	Result	Unit
XPW03	Porewater	07/14/2021	Boron, total	1.30	mg/L
XPW03	Porewater	02/23/2022	Boron, total	1.70	mg/L
XPW03	Porewater	08/16/2022	Boron, total	1.40	mg/L
XPW03	Porewater	02/02/2023	Boron, total	1.70	mg/L
XPW03	Porewater	04/27/2023	Boron, total	1.80	mg/L
XPW03	Porewater	02/17/2021	Chloride, total	14.0	mg/L
XPW03	Porewater	03/09/2021	Chloride, total	9.20	mg/L
XPW03	Porewater	03/30/2021	Chloride, total	13.0	mg/L
XPW03	Porewater	04/28/2021	Chloride, total	11.0	mg/L
XPW03	Porewater	07/14/2021	Chloride, total	11.0	mg/L
XPW03	Porewater	02/23/2022	Chloride, total	13.0	mg/L
XPW03	Porewater	06/15/2022	Chloride, total	11.0	mg/L
XPW03	Porewater	08/16/2022	Chloride, total	11.0	mg/L
XPW03	Porewater	02/02/2023	Chloride, total	9.60	mg/L
XPW03	Porewater	04/27/2023	Chloride, total	9.70	mg/L
XPW03	Porewater	02/17/2021	Sulfate, total	92.0	mg/L
XPW03	Porewater	03/09/2021	Sulfate, total	93.0	mg/L
XPW03	Porewater	03/30/2021	Sulfate, total	94.0	mg/L
XPW03	Porewater	04/28/2021	Sulfate, total	96.0	mg/L
XPW03	Porewater	07/14/2021	Sulfate, total	120	mg/L
XPW03	Porewater	02/23/2022	Sulfate, total	130	mg/L
XPW03	Porewater	06/15/2022	Sulfate, total	150	mg/L
XPW03	Porewater	08/16/2022	Sulfate, total	180	mg/L
XPW03	Porewater	02/02/2023	Sulfate, total	98.0	mg/L
XPW03	Porewater	04/27/2023	Sulfate, total	120	mg/L
XPW04	Porewater	02/17/2021	Boron, total	2.50	mg/L
XPW04	Porewater	03/09/2021	Boron, total	2.40	mg/L
XPW04	Porewater	03/29/2021	Boron, total	2.10	mg/L
XPW04	Porewater	04/28/2021	Boron, total	2.80	mg/L
XPW04	Porewater	07/14/2021	Boron, total	2.30	mg/L
XPW04	Porewater	02/23/2022	Boron, total	2.20	mg/L
XPW04	Porewater	08/16/2022	Boron, total	3.70	mg/L
XPW04	Porewater	02/01/2023	Boron, total	3.50	mg/L
XPW04	Porewater	04/28/2023	Boron, total	4.00	mg/L
XPW04	Porewater	02/17/2021	Chloride, total	62.0	mg/L
XPW04	Porewater	03/09/2021	Chloride, total	34.0	mg/L
XPW04	Porewater	03/29/2021	Chloride, total	31.0	mg/L
XPW04	Porewater	04/28/2021	Chloride, total	37.0	mg/L
XPW04	Porewater	07/14/2021	Chloride, total	34.0	mg/L
XPW04	Porewater	02/23/2022	Chloride, total	30.0	mg/L
XPW04	Porewater	06/15/2022	Chloride, total	50.0	mg/L
XPW04	Porewater	08/16/2022	Chloride, total	54.0	mg/L
XPW04	Porewater	02/01/2023	Chloride, total	46.0	mg/L
XPW04	Porewater	04/28/2023	Chloride, total	59.0	mg/L
XPW04	Porewater	02/17/2021	Sulfate, total	2,200	mg/L
XPW04	Porewater	03/09/2021	Sulfate, total	1,400	mg/L

APPENDIX **C**.
SUPPORTING GROUNDWATER ANALYTICAL DATA
35 I.A.C. § 845: ALTERNATIVE SOURCE DEMONSTRATION
NEWTON POWER PLANT
PRIMARY ASH POND
NEWTON, IL

Well ID	Well Type	Date	Parameter	Result	Unit
XPW04	Porewater	03/29/2021	Sulfate, total	600	mg/L
XPW04	Porewater	04/28/2021	Sulfate, total	3,800	mg/L
XPW04	Porewater	07/14/2021	Sulfate, total	1,600	mg/L
XPW04	Porewater	02/23/2022	Sulfate, total	1,800	mg/L
XPW04	Porewater	06/15/2022	Sulfate, total	7,500	mg/L
XPW04	Porewater	08/16/2022	Sulfate, total	4,000	mg/L
XPW04	Porewater	02/01/2023	Sulfate, total	6,200	mg/L
XPW04	Porewater	04/28/2023	Sulfate, total	9,500	mg/L

Notes:
mg/L = milligrams per liter
B = The analyte was found in sample and in associated method blank.
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the level of the adjusted detection limit or quantitation limit, as appropriate.

Exhibit C

Luminant

Illinois Power Generating Company
1500 Eastport Plaza Drive
Collinsville, IL 62234

November 3, 2023

VIA E-MAIL
heather.mullenax@illinois.gov
EPA.CCR.PART845.COORDINATOR@ILLINOIS.GOV
EPA.CCR.Part845.Notify@Illinois.gov

Re: Alternative Source Demonstration ("ASD") for Newton Power Plant Primary Ash Pond

To Whom It May Concern:

On October 6, 2023, Illinois Power Generating Company ("IPGC") submitted an ASD for the Newton Power Plant Primary Ash Pond ("Newton PAP") to the Illinois Environmental Protection Agency ("IEPA") pursuant to 35 Ill. Admin. Code 845.650(e). On October 24, 2023, IEPA provided notice to its listserve regarding the posting of the ASD submittal, triggering a 14-day period for written comments on the ASD submittal pursuant to 35 Ill Admin. Code 845.650(e)(3). Between October 19 and 31, 2023, IPGC and IEPA engaged in communications regarding the Newton PAP ASD submittal. IPGC submits this letter and its attachments, within the 14-day period for written comments, to provide additional information to IEPA in response to those communications. As explained below and in the attached materials, IPGC's October 6 ASD submittal was comprehensive in scope and used scientifically supported, industry standard methodologies.

IEPA requested certain additional data as part of its communications with IPGC. While IPGC does not agree that any additional data is necessary in support of the ASD submittal, IPGC has compiled and is providing, as Attachment 1 to this letter, the hydraulic conductivity and boring log data requested by IEPA, all of which was previously provided or referenced in the Newton PAP operating permit application and/or construction permit application. Because both of these applications were used and relied upon in preparing the Newton PAP ASD and both contain information IEPA has sought in connection with its review of the ASD, IPGC (with this letter) is incorporating by reference the entirety of its October 25, 2021 operating permit application for the Newton PAP and July 28, 2022 construction permit application for the Newton PAP into its Newton PAP ASD submittal.

In its communications with IPGC, IEPA also requested (1) source characterization of CCR that includes total solids sampling, analysis and reporting in accordance with SW-846 leach testing methods and (2) sampling and analysis in accordance with 35 Ill. Admin. Code 845.640 of the alternative source. Collecting this information would be a considerable undertaking that IPGC would not be able to complete prior to the decision deadline or within the comment period for the Newton PAP ASD. Additionally, this information is not required by law and is unnecessary to support the Newton PAP ASD. First, there is no requirement under Part 845 that source characterization of CCR be conducted in accordance with SW-846. While Part 845.150 incorporates by reference SW-846, that incorporation does not create an affirmative obligation to analyze all samples in accordance with SW-846. As set forth in Chapter 2 of SW-846, the methods are not “mandatory” unless specifically specified in the regulation. Groundwater samples taken under Part 845 are the only samples specifically required by Part 845 to be analyzed using SW-846. In particular, Part 845.640(e) requires groundwater samples taken under a groundwater monitoring program be analyzed in accordance with SW-846. Notably, samples collected under the Newton PAP’s groundwater monitoring program have been analyzed in accordance with SW-846 (and were otherwise collected and analyzed in accordance with 35 Ill. Admin. Code 845.640). Attachment 2 to this letter explains how CCR source characterization was conducted for the Newton PAP ASD and explains why the methodology used is more appropriate than SW-846 leach testing methods for characterizing the source material.

Second, there is no requirement under 35 Ill Admin. Code 845.640, 35 Ill. Admin. Code 845.650 or elsewhere in Part 845 to identify, sample or analyze an alternative source. Section 845.650(e), which governs alternative source demonstrations, simply requires a determination that a source other than the CCR surface impoundment caused the contamination and that the CCR surface impoundment did not contribute to the contamination. As described in Attachment 2, this demonstration is made through a multiple lines of evidence analysis in the Newton PAP ASD submittal. Nevertheless, as explained in Attachment 2, an alternative source was also identified in the Newton PAP ASD submittal and its identification further supports that the Newton PAP is not the source of the chloride exceedance in APW15. However, identification and a full characterization of that alternative source is not required for the ASD or necessary to determine that a source other than the Newton PAP caused the chloride exceedance and that the Newton PAP did not contribute to the exceedance.

Finally, given that this submittal responds to questions and requests raised by IEPA regarding the Newton PAP ASD, IPGC hereby incorporates this letter and its attachments (including the references set forth in those attachments) into its Newton PAP submittal.

Should you have any questions regarding the information contained in this letter or its attachments, please feel free to reach out.

Sincerely,

Phil Morris, PE
Senior Director, Environmental

SHDOCS:220382798.1

ATTACHMENT 1

HYDRAULIC CONDUCTIVITY DATA

INFORMATION AND DATA PREVIOUSLY PROVIDED IN THE HYDROGEOLOGIC SITE CHARACTERIZATION REPORT

SUBMITTED TO IEPA ON OCTOBER 29, 2021

TABLE 2-1. GEOTECHNICAL DATA SUMMARY
HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
NEWTON POWER PLANT
PRIMARY ASH POND
NEWTON, ILLINOIS

Sample ID	Field Location ID	Top of Sample (ft bgs)	Bottom of Sample (ft bgs)	HSU	Moisture Content (%)	Dry Density (pcf)	Specific Gravity	Calculated Porosity [1] (%)	Vertical Hydraulic Conductivity (cm/s)	LL	PL	PI	Laboratory USCS	Gravel (%)	Sand (%)	Fines (%)
Sangamon Soil																
APW11	APW11	10	12	UD	17.8	111.7	2.645	32	8.57E-08	28	12	16	CL	1.1	45.1	53.8
APW15	APW15	20	22	UD	18.5	109.8	2.686	34	3.21E-08	33	10	23	CL	0.0	40.8	59.2
Hagarstown Member																
APW12	APW12	20	22	UD/PMP	15.1	118.3	2.694	30	1.07E-07	27	12	15	SC	7.4	46.8	45.8
APW12	APW12	25.5	26	UD/PMP	8.4	113.0	2.654	32	8.43E-06	10	13	NP	SP-SM	24.3	69.5	6.2
APW13	APW13	25	27	UD/PMP	21.2	87.1	2.649	47	9.63E-05	9	10	NP	SP-SM	0.0	88.9	11.1
Vandalia Till Member																
APW14	APW14	45	47	UCU	12.4	119.6	2.706	29	9.65E-08	26	14	12	CL	4.4	32.3	63.3
APW17	APW17	40	42	UCU	16.6	108.8	2.709	36	3.34E-08	26	13	13	CL	1.3	27.6	71.1
SB300	APW18	50	52	UCU	12.9	122.7	2.700	27	7.29E-08	32	12	20	CL	0.8	22.4	76.8
SB301	SB301	48	50	UCU	14.1	117.3	2.697	30	6.63E-08	27	14	13	CL	0.4	34.2	65.4
Mulberry Grove Member																
APW13	APW13	60.5	61	UA	14.5	114.3	2.661	31	2.18E-04	8	13	NP	SM	0.3	75.2	24.5
APW15	APW15	100.5	101	UA	12.1	116.4	2.665	30	3.50E-06	15	12	3	SM	4.4	49.8	45.8
APW17	APW17	71	71.5	UA	7.8	110.2	2.660	34	7.21E-04	5	9	NP	SW-SM	14.3	76.8	8.9
APW17	APW17	90.5	91	UA	6.1	116.8	2.672	30	6.39E-04	6	8	NP	SP-SM	28.2	65.1	6.7
SB300	APW18	61	61.5	UA	13.6	109.6	2.686	35	1.85E-05	5	9	NP	SM	4.7	78.2	17.1
Smithboro Till Member																
APW11	APW11	61	61.5	LCU	17.8	110.5	2.686	34	1.87E-07	27	18	9	CL	0.0	21.4	78.6
APW11	APW11	80	82	LCU	16.5	116.1	2.705	31	2.94E-08	32	14	18	CL	0.0	21	79
APW12	APW12	85	87	LCU	14.4	116.4	2.711	31	2.36E-08	29	14	15	CL	0.3	19.5	80.2
APW14	APW14	55.5	56	LCU	18.0	104.6	2.709	38	2.74E-07	25	15	10	CL	0.0	27.8	72.2
APW15	APW15	105	107	LCU	19.1	107.8	2.695	36	8.20E-08	29	13	16	CL	0.0	23.8	76.2
SB300	APW18	62.5	63	LCU	11.1	124.6	2.659	25	4.32E-06	20	14	6	CL-ML	0.0	42.4	57.6
SB300	APW18	105	107	LCU	14.1	116.4	2.710	31	4.28E-08	28	13	15	CL	0.0	30.7	69.3
SB301	SB301	68.5	69	LCU	13.1	121.3	2.723	29	4.05E-08	23	14	9	CL	0.0	31.3	68.7
SB301	SB301	98	100	LCU	15.7	118.2	2.720	30	6.13E-08	37	15	22	CL	0.0	17.8	82.2
CCR																
XPW01	XPW01	8.5	9	CCR	18.6	87.7	2.675	47	1.71E-04	47	57	NP	SP-SM	37.1	51.1	11.8
XPW01	XPW01	15.5	16	CCR	12.6	84.4	2.741	51	1.58E-05	35	17	18	CL	4.6	34.1	61.3
XPW03	XPW03	6	6.5	CCR	17.4	75.3	2.663	55	1.34E-03	33	27	6	SM	6.8	71.7	21.5
XPW03	XPW03	15.5	16	CCR	16.7	103.6	2.689	38	9.70E-05	12	19	NP	SM	16.4	67.3	16.3
XPW04	XPW04	6.5	7	CCR	31.1	73.9	2.697	56	1.61E-04	41	38	3	SM	1.6	84.5	13.9
XPW04	XPW04	15.5	16	CCR	31.1	80.8	2.650	51	7.83E-05	46	42	4	SM	15.7	51	33.3

RAMBOLL

TABLE 2-1. GEOTECHNICAL DATA SUMMARY
HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
NEWTON POWER PLANT
PRIMARY ASH POND
NEWTON, ILLINOIS

Sample ID	Field Location ID	Top of Sample (ft bgs)	Bottom of Sample (ft bgs)	HSU	Moisture Content (%)	Dry Density (pcf)	Specific Gravity	Calculated Porosity [1] (%)	Vertical Hydraulic Conductivity (cm/s)	LL	PL	PI	Laboratory USCS	Gravel (%)	Sand (%)	Fines (%)
Fill																
XPW02	XPW02	8	8.5	CCR	29.1	92.9	2.691	45	6.07E-08	36	16	20	CL	0.3	44.8	54.9
XPW02	XPW02	16.5	17	CCR	21.8	103.7	2.694	38	7.38E-08	36	14	22	CL	0.0	19.8	80.2

[O: SSW 04/22/21, U:EDP 08/23/21, U: SSW 08/26/21, C: LDC 08/31/21; U: LDC 09/16/21, C: SSW 09/21/21]

Notes:
[1] Porosity calculated as relationship of bulk density to particle density (n = 100[1- (pb/pd)])
% = Percent
bgs = below ground surface
CCR = coal combustion residuals
cm/s = centimeters per second
ft = foot/feet
in = inch
LL = Liquid limit
NP = Non Plastic
pcf = pounds per cubic foot
PI = Plastic Index
PL = Plasticity Limit

HSU = Hydrostratigraphic Unit
LCU = lower confining unit
PMP = potential migration pathway
UA = uppermost aquifer
UCU = upper confining unit
UD = upper drift

USCS = Unified Soil Classification System
CL - Lean Clay
CL-ML = Silty Lean Clay
SC = Clayey Sand
SM = Silty Sand
SP-SM = Poorly Graded Sand with Silt
SW-SM = Well Graded Sand with Silt

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HYDRAULIC CONDUCTIVITY DETERMINATION
ASTM D 5084, METHOD C
RISING TAILWATER LEVEL

Laboratory Services Group **192 Exchange Blvd** **Glendale Heights, Illinois 60139** **Ph. (630) 717-4263**

TERRACON PROJECT NO. **11215019** **4/9/2021**
PROJECT NAME: **NEWTON POWER STATION**
CLIENT: **RAMBOLL ENVIRON US CORP**
LOCATION : **NEWTON, IL**

SUMMARY OF TEST RESULTS

BORING NO. APW-14

TIME SAMPLED: 9:55

DEPTH: 45.0'-47.0'

CLASSIFICATION BROWN SANDY LEAN CLAY

	INITIAL	FINAL
DRY UNIT WEIGHT (pcf)	119.6	120.3
WATER CONTENT (%)	12.4	14.2
DIAMETER (cm)	7.380	7.372
LENGTH (cm)	10.775	10.736
B VALUE PARAMETER:	0.98	
HYDRAULIC GRADIENT (MAXIMUM)	18.54	
PERCENT SATURATION	100.5	
HYDRAULIC CONDUCTIVITY k (cm/sec)	9.65E-08	

SPECIMEN PHOTO

(Percent saturation calculation is based on final measurements and a measured specific gravity.)

Deaired water was used as the liquid permeant.

Terracon
Consulting Engineers & Scientists

Laboratory Services Group **192 Exchange Blvd** **Glendale Heights, Illinois 60139** **Ph. (630) 717-4263**

TERRACON PROJECT NO. **11215019** **4/9/2021**
PROJECT NAME: **NEWTON POWER STATION**
CLIENT: **RAMBOLL ENVIRON US CORP**
LOCATION : **NEWTON, IL**

SUMMARY OF TEST RESULTS

BORING NO. APW-17

TIME SAMPLED: 9:45

DEPTH: 40.0'-42.0'

CLASSIFICATION GRAY LEAN CLAY WITH SAND

	INITIAL	FINAL
DRY UNIT WEIGHT (pcf)	108.8	109.5
WATER CONTENT (%)	16.6	19.6
DIAMETER (cm)	7.262	7.262
LENGTH (cm)	9.605	9.545
B VALUE PARAMETER:	0.98	
HYDRAULIC GRADIENT (MAXIMUM)	28.12	
PERCENT SATURATION	98.4	
HYDRAULIC CONDUCTIVITY k (cm/sec)	3.34E-08	

SPECIMEN PHOTO

(Percent saturation calculation is based on final measurements and a measured specific gravity.)

Deaired water was used as the liquid permeant.

Laboratory Services Group **192 Exchange Blvd** **Glendale Heights, Illinois 60139** **Ph. (630) 717-4263**

TERRACON PROJECT NO. **11215019** **4/9/2021**
PROJECT NAME: **NEWTON POWER STATION**
CLIENT: **RAMBOLL ENVIRN US CORP**
LOCATION : **NEWTON , IL**

SUMMARY OF TEST RESULTS

BORING NO. SB-300

TIME SAMPLED: 8:25

DEPTH: 50.0'-52.0'

CLASSIFICATION GRAY LEAN CLAY WITH SAND

	INITIAL	FINAL
DRY UNIT WEIGHT (pcf)	122.7	123.5
WATER CONTENT (%)	12.9	13.3
DIAMETER (cm)	7.242	7.217
LENGTH (cm)	10.288	10.288
B VALUE PARAMETER:	0.98	
HYDRAULIC GRADIENT (MAXIMUM)	19.42	
PERCENT SATURATION	99.1	
HYDRAULIC CONDUCTIVITY k (cm/sec)	7.29E-08	

SPECIMEN PHOTO

(Percent saturation calculation is based on final measurements and a measured specific gravity.)

Deaired water was used as the liquid permeant.

TERRACON PROJECT NO.	**11215019**	**4/9/2021**
PROJECT NAME:	**NEWTON POWER STATION**	
CLIENT:	**RAMBOLL ENVIRON US CORP**	
LOCATION :	**NEWTON, IL**	

SUMMARY OF TEST RESULTS

BORING NO.	SB-301
TIME SAMPLED:	13:30
DEPTH:	48.0'-50.0'
CLASSIFICATION	BROWN AND GRAY SANDY LEAN CLAY

	INITIAL	FINAL
DRY UNIT WEIGHT (pcf)	117.3	117.7
WATER CONTENT (%)	14.1	15.8
DIAMETER (cm)	7.204	7.230
LENGTH (cm)	10.348	10.239
B VALUE PARAMETER:	0.99	
HYDRAULIC GRADIENT (MAXIMUM)	19.30	
PERCENT SATURATION	99.6	
HYDRAULIC CONDUCTIVITY k (cm/sec)	6.63E-08	

SPECIMEN PHOTO

(Percent saturation calculation is based on final measurements and a measured specific gravity.)

Deaired water was used as the liquid permeant.

20**21** HYDRAULIC CONDUCTIVITY TEST DATA

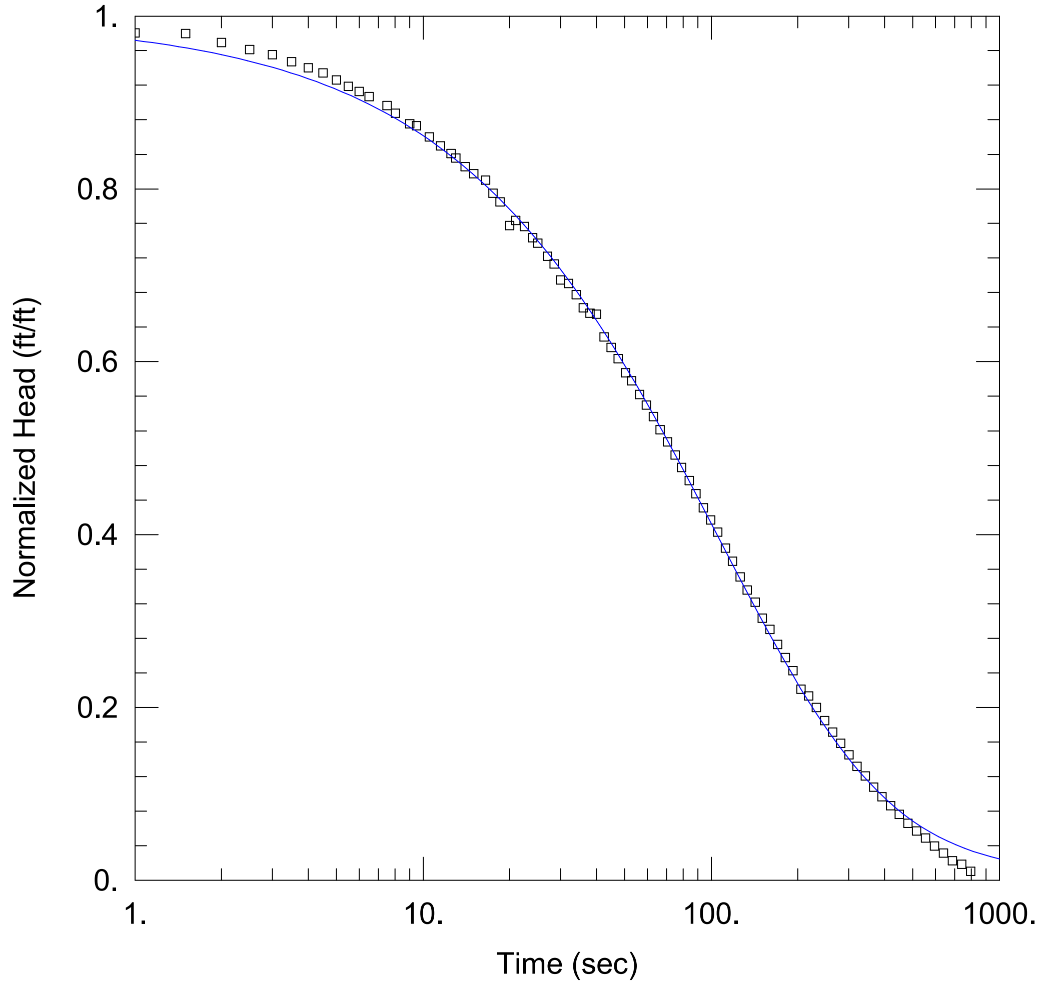
TABLE 3-3. FIELD HYDRAULIC CONDUCTIVITIES
HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
NEWTON POWER STATION
PRIMARY ASH POND
NEWTON, ILLINOIS

Well ID	Gradient Position	Bottom of Screen Elevation (ft NAVD88)	Screen Length [1] (ft)	Field Identified Screened Material	Slug Type	Analysis Method	Falling Head (Slug In) K (cm/s)			Rising Head (Slug Out) K (cm/s)			Minimum Hydraulic Conductivity (cm/s)	Maximum Hydraulic Conductivity (cm/s)	Hydraulic Conductivity Geometric Mean (cm/s)
							1	2	3	1	2	3			
Upper Drift Unit/Potential Migration Pathway															
APW5S	U	521.05	10	SP	Solid	C-B-P	8.9E-04	7.4E-04		6.1E-04	8.5E-04		6.1E-04	1.5E-02	3.1E-03
APW12	U	513.33	10	SP	Solid	C-B-P	1.3E-02	9.8E-03		1.3E-02	1.5E-02				
Uppermost Aquifer															
APW11	U	471.05	5	SP-SC/GP	Solid	KGS Model	6.8E-03	5.9E-03		3.5E-03	7.8E-03		2.0E-04	1.5E-01	6.8E-03
APW13	D	471.66	5	SM	Solid	C-B-P	1.6E-03	1.5E-03	3.3E-03	3.8E-03	3.4E-03				
APW14	D	468.85	5	SC	Solid	KGS Model	3.9E-03	4.3E-03		3.2E-04	3.2E-04	2.8E-03			
APW15	D	419.06	5	SP-SM	Solid	KGS Model	4.9E-04	2.0E-04	1.4E-01	1.5E-01	1.5E-01				
APW16	D	443.66	5	SP	Solid	B-Z	1.24E-01	1.41E-01		7.60E-02	7.96E-02				
APW17	D	437.84	5	(SW)g/(SP)g	Solid	C-B-P	1.13E-01	1.15E-02							
APW18	D	460.55	5	(SW)g/SC	Solid	C-B-P	2.67E-04								
Ash Pond															
XPW01	CCR	531.62	10	(SW)g	Solid	Bouwer-Rice	1.8E-01	1.3E-02		2.4E-02	1.4E-02		1.0E-03	2.3E-01	2.0E-02
XPW02	CCR	535.97	10	(SW)g	Solid	Bouwer-Rice	2.0E-03	2.6E-03							
XPW03	CCR	530.81	10	(SW)g/SP	Solid	Bouwer-Rice	5.7E-02	7.2E-02	2.3E-01	1.5E-01	1.2E-01	1.4E-01			
XPW04	CCR	531.90	10	(SW)g	Solid	KGS Model		2.1E-03		1.2E-03	1.0E-03				

[O: SSW 7/1/20; U:SSW 8/20/21; C:LDC 08/31/21]

Notes:
[1] All wells are constructed from 2 inch PVC with 0.01 inch slotted screens.
Test not analyzed/performed
B-Z = Butler-Zhan Test Solution
C-B-P = Cooper-Bredehoeft-Papadopulos Slug Test Solution
CCR = coal combustion residuals
cm/s = centimeters per second
D = downgradient
ft = foot/feet
K = hydraulic conductivity
KGS = Kansas Geological Survey
NAVD88 = North American Vertical Datum of 1988
U = upgradient

USCS = Unified Soil Classification System
GP = Poorly Graded Gravel
SC = Clayey Sand
SM = Silty Sand
SP = Poorly Graded Sand
SP-SC = Poorly Graded Sand to Clayey Sand
SP-SM = Poorly Graded Sand with Silt
(SW)g = Well Graded Sand with Gravel



APW-5S FH1

Data Set: \...\NEW_APW-5S FH1_07202021.aqt
Date: 10/21/21 Time: 14:56:12

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-5S
Test Date: 2/16/2021

AQUIFER DATA

Saturated Thickness: 3.2 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW-5S)

Initial Displacement: 0.986 ft Static Water Column Height: 12.6 ft
Total Well Penetration Depth: 3.2 ft Screen Length: 3.2 ft
Casing Radius: 0.08625 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Bredehoeft-Papadopulos

T = 0.087 cm^2/sec S = 0.000403

SOLUTION

Slug Test
Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	0.087	cm^2/sec
S	0.000403	

K = T/b = 0.000892 cm/sec
Ss = S/b = 0.0001259 1/ft

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
T	0.08962	0.02397	+/- 0.04765	3.739	cm^2/sec

S	0.0003389	0.000496	+/- 0.0009861	0.6832

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

K = T/b = 0.0009188 cm/sec
Ss = S/b = 0.0001059 1/ft

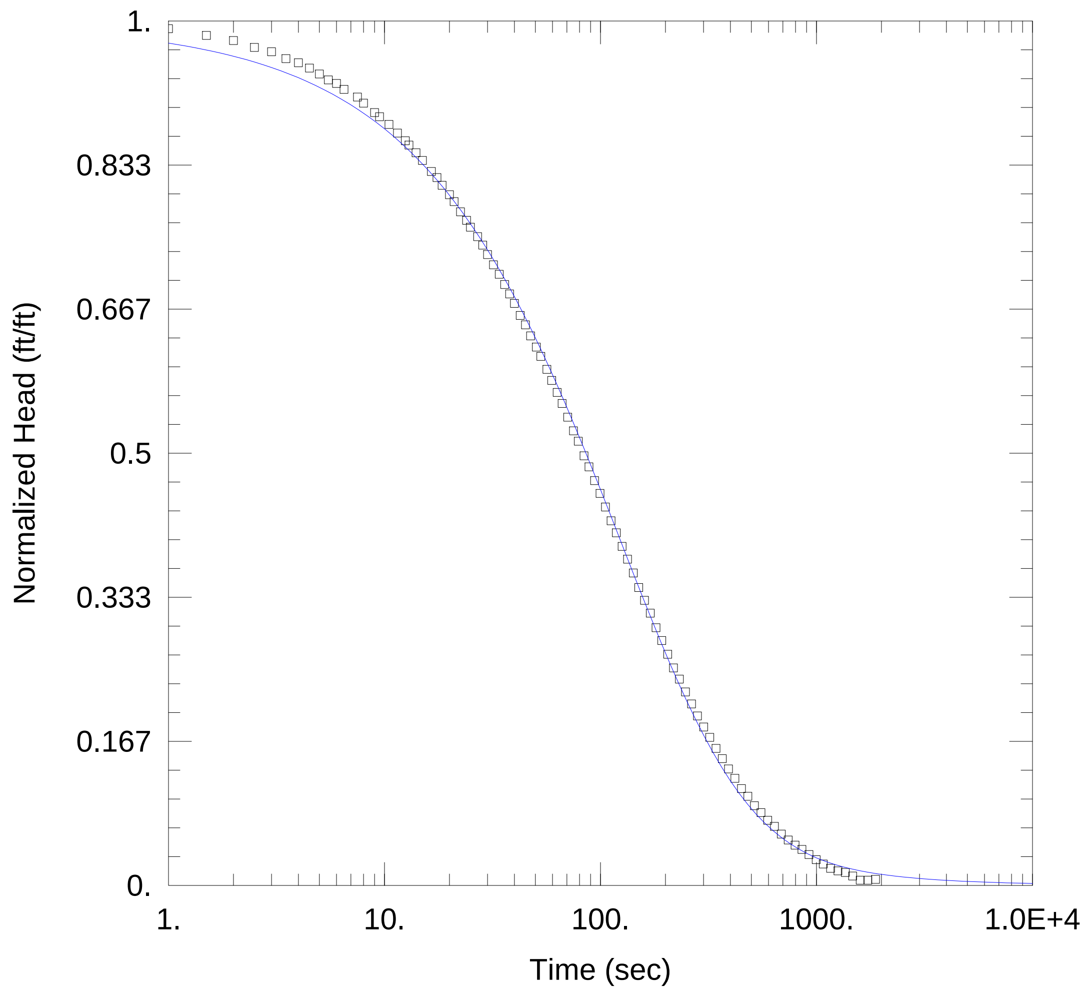
Parameter Correlations

	T	S
T	1.00	-0.97
S	-0.97	1.00

Residual Statistics

for weighted residuals

Sum of Squares ..... 0.9777 ft^2
Variance .... 0.01124 ft^2
Std. Deviation .... 0.106 ft
Mean .... 0.01073 ft
No. of Residuals..... 89
No. of Estimates..... 2



APW-5S FH2

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-5S
Test Date: 2/16/2021

AQUIFER DATA

Saturated Thickness: 3.2 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW-5S)

Initial Displacement: 1.01 ft
Total Well Penetration Depth: 3.2 ft
Casing Radius: 0.086 ft
Static Water Column Height: 12.6 ft
Screen Length: 3.2 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

T = 0.0718 cm^2/sec
S = 0.000454

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
21.	0.799	419.5	0.125
22.5	0.787	449.5	0.113
24.	0.777	481.5	0.104
25.	0.769	516.5	0.093
27.	0.758	554.	0.085
28.5	0.748	595.	0.076
30.	0.737	639.5	0.069
32.	0.725	687.5	0.06
34.	0.714	739.5	0.053
36.	0.702	796.	0.047
38.	0.691	857.5	0.042
40.	0.68	924.	0.036
42.5	0.666	997.	0.03
45.	0.655	1076.	0.025
47.5	0.642	1162.5	0.02
50.5	0.629	1257.	0.017
53.	0.618	1360.	0.015
56.5	0.603	1472.5	0.011
59.5	0.59	1595.5	0.006
63.	0.576	1730.	0.006
66.5	0.563	1877.5	0.007

SOLUTION

Slug Test
Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	0.0718	cm^2/sec
S	0.000454	

K = T/b = 0.0007361 cm/sec
Ss = S/b = 0.0001419 1/ft

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
T	0.07177	0.01724	+/- 0.03421	4.163	cm^2/sec
S	0.0004536	0.0005595	+/- 0.00111	0.8107	

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

K = T/b = 0.0007359 cm/sec
Ss = S/b = 0.0001418 1/ft

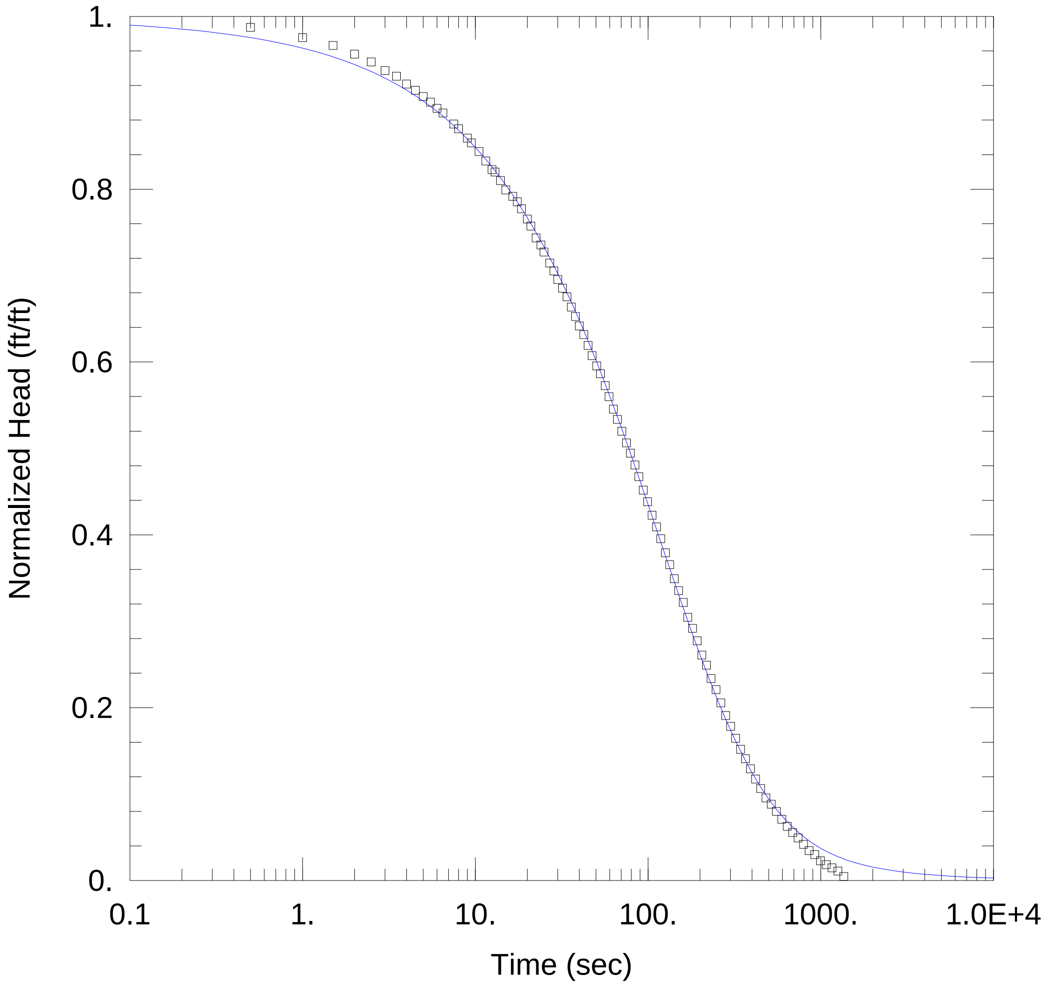
Parameter Correlations

	T	S
T	1.00	-0.97
S	-0.97	1.00

Residual Statistics

for weighted residuals

Sum of Squares . . . . . . 1.028 ft^2
Variance . . . . 0.01049 ft^2



APW-5S RH1

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-5S
Test Date: 2/16/2021

AQUIFER DATA

Saturated Thickness: 3.2 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW-5S)

Initial Displacement: 1.1 ft
Total Well Penetration Depth: 3.2 ft
Casing Radius: 0.08625 ft
Static Water Column Height: 12.6 ft
Screen Length: 3.2 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

T = 0.0591 cm^2/sec
S = 0.00178

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
20.	0.842	366.5	0.155
21.	0.833	392.	0.142
22.5	0.818	419.5	0.129
24.	0.809	449.5	0.117
25.	0.8	481.5	0.105
27.	0.786	516.5	0.097
28.5	0.776	554.	0.088
30.	0.765	595.	0.078
32.	0.754	639.5	0.069
34.	0.743	687.5	0.061
36.	0.73	739.5	0.054
38.	0.718	796.	0.046
40.	0.706	857.5	0.038
42.5	0.695	924.	0.033
45.	0.681	997.	0.025
47.5	0.668	1076.	0.02
50.5	0.655	1162.5	0.016
53.	0.645	1257.	0.012
56.5	0.63	1360.	0.005
59.5	0.616		

SOLUTION

Slug Test
Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	0.0591	cm^2/sec
S	0.00178	

K = T/b = 0.0006059 cm/sec
Ss = S/b = 0.0005562 1/ft

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
T	0.05907	0.01974	+/- 0.03919	2.992	cm^2/sec
S	0.001784	0.002265	+/- 0.004496	0.7877	

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

K = T/b = 0.0006056 cm/sec
Ss = S/b = 0.0005575 1/ft

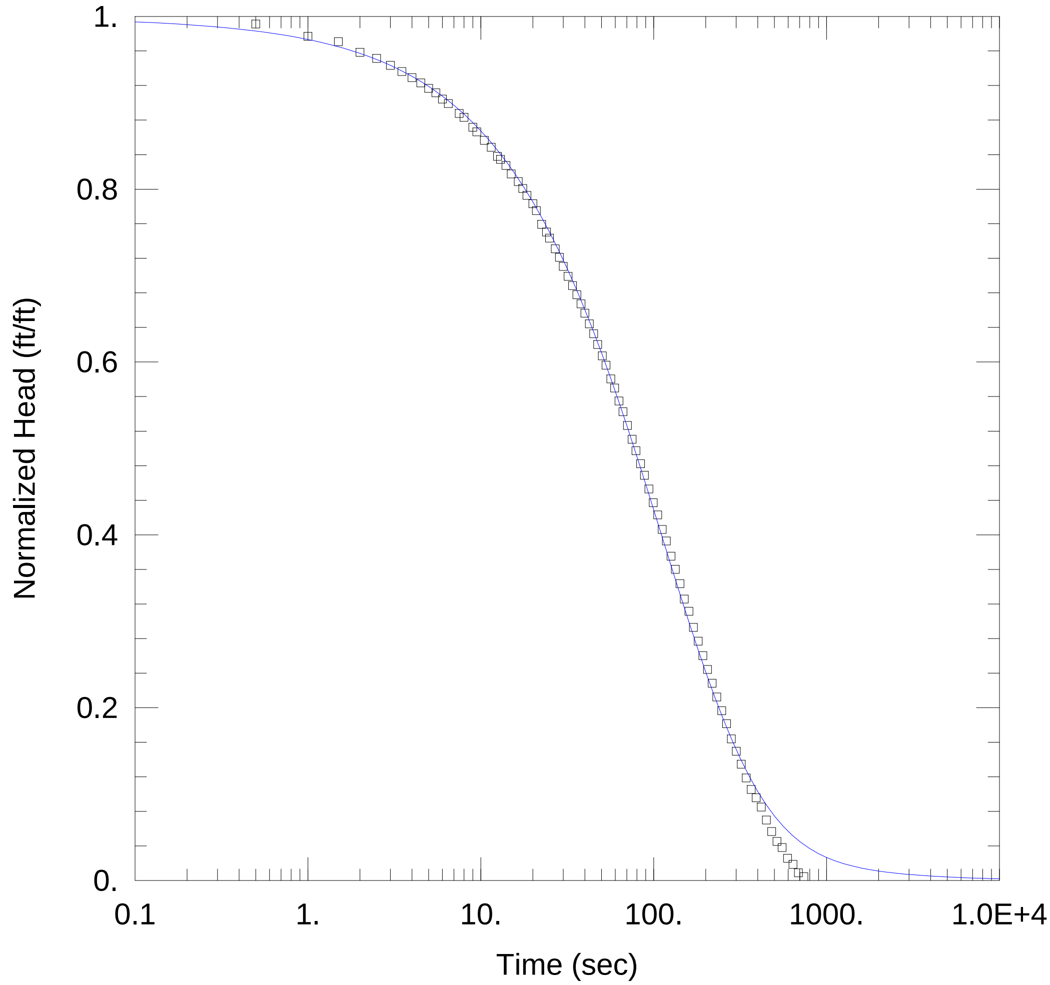
Parameter Correlations

	T	S
T	1.00	-0.96
S	-0.96	1.00

Residual Statistics

for weighted residuals

Sum of Squares . . . . . . 2.725 ft^2
Variance . . . . 0.02869 ft^2
Std. Deviation . . . . 0.1694 ft



APW-5S RH2

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-5S
Test Date: 2/16/2021

AQUIFER DATA

Saturated Thickness: 3.2 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW-5S)

Initial Displacement: 1.13 ft
Static Water Column Height: 12.6 ft
Total Well Penetration Depth: 3.2 ft
Screen Length: 3.2 ft
Casing Radius: 0.08625 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

T = 0.0825 cm^2/sec
S = 0.000391

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
20.	0.885	281.5	0.185
21.	0.876	300.5	0.169
22.5	0.858	321.	0.152
24.	0.848	343.	0.134
25.	0.84	366.5	0.119
27.	0.826	392.	0.108
28.5	0.815	419.5	0.096
30.	0.803	449.5	0.079
32.	0.79	481.5	0.064
34.	0.778	516.5	0.051
36.	0.766	554.	0.043
38.	0.754	595.	0.029
40.	0.742	639.5	0.021
42.5	0.728	687.5	0.01
45.	0.715	739.5	0.005
47.5	0.701		

SOLUTION

Slug Test
Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	0.0825	cm^2/sec
S	0.000391	

K = T/b = 0.0008458 cm/sec
Ss = S/b = 0.0001222 1/ft

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
T	0.08245	0.03155	+/- 0.06271	2.614	cm^2/sec
S	0.0003915	0.0007946	+/- 0.00158	0.4927	

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

K = T/b = 0.0008454 cm/sec
Ss = S/b = 0.0001223 1/ft

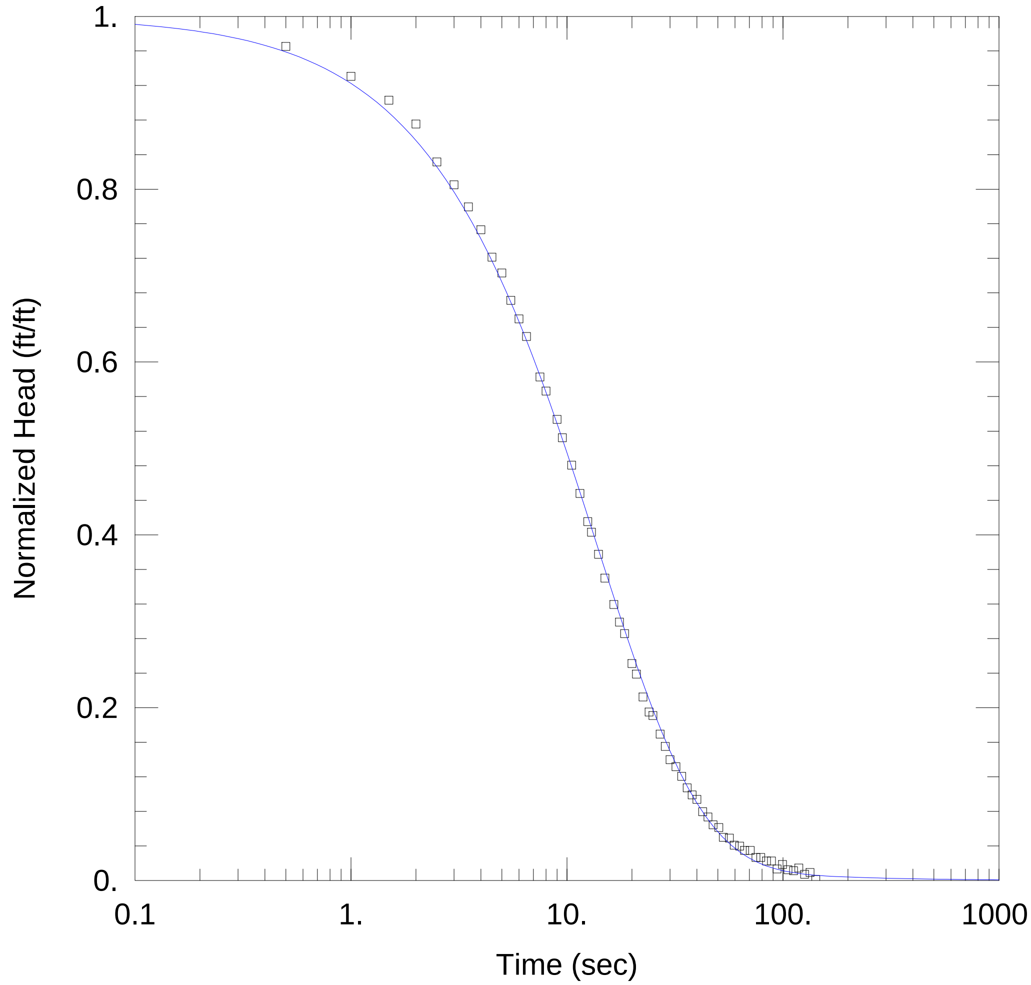
Parameter Correlations

	T	S
T	1.00	-0.97
S	-0.97	1.00

Residual Statistics

for weighted residuals

Sum of Squares . . . . . . 2.682 ft^2
Variance . . . . 0.03083 ft^2
Std. Deviation . . . . 0.1756 ft
Mean . . . . -0.02888 ft
No. of Residuals 89
No. of Estimates 2



APW-11 FH1

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-11
Test Date: 3/11/2021

AQUIFER DATA

Saturated Thickness: 9.2 ft

WELL DATA (APW-11)

Initial Displacement: 0.98 ft
Total Well Penetration Depth: 7. ft
Casing Radius: 0.086 ft

Static Water Column Height: 43.37 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

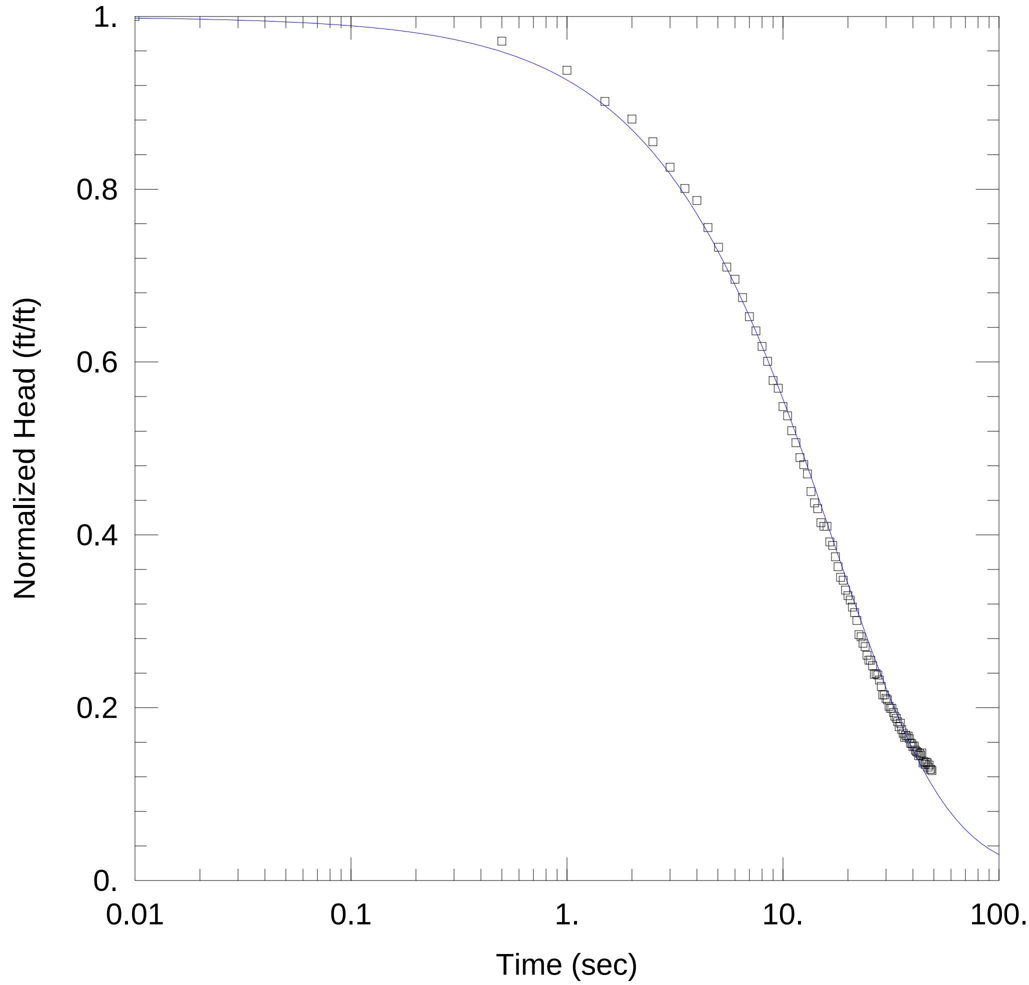
SOLUTION

Aquifer Model: Confined

Kr = 0.0078 cm/sec
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 1.09E-9 ft^{-1}



APW-11 FH02

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-11
Test Date: 3/11/2021

AQUIFER DATA

Saturated Thickness: 9.2 ft

WELL DATA (APW-11)

Initial Displacement: 1.22 ft
Total Well Penetration Depth: 7. ft
Casing Radius: 0.086 ft

Static Water Column Height: 43.53 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

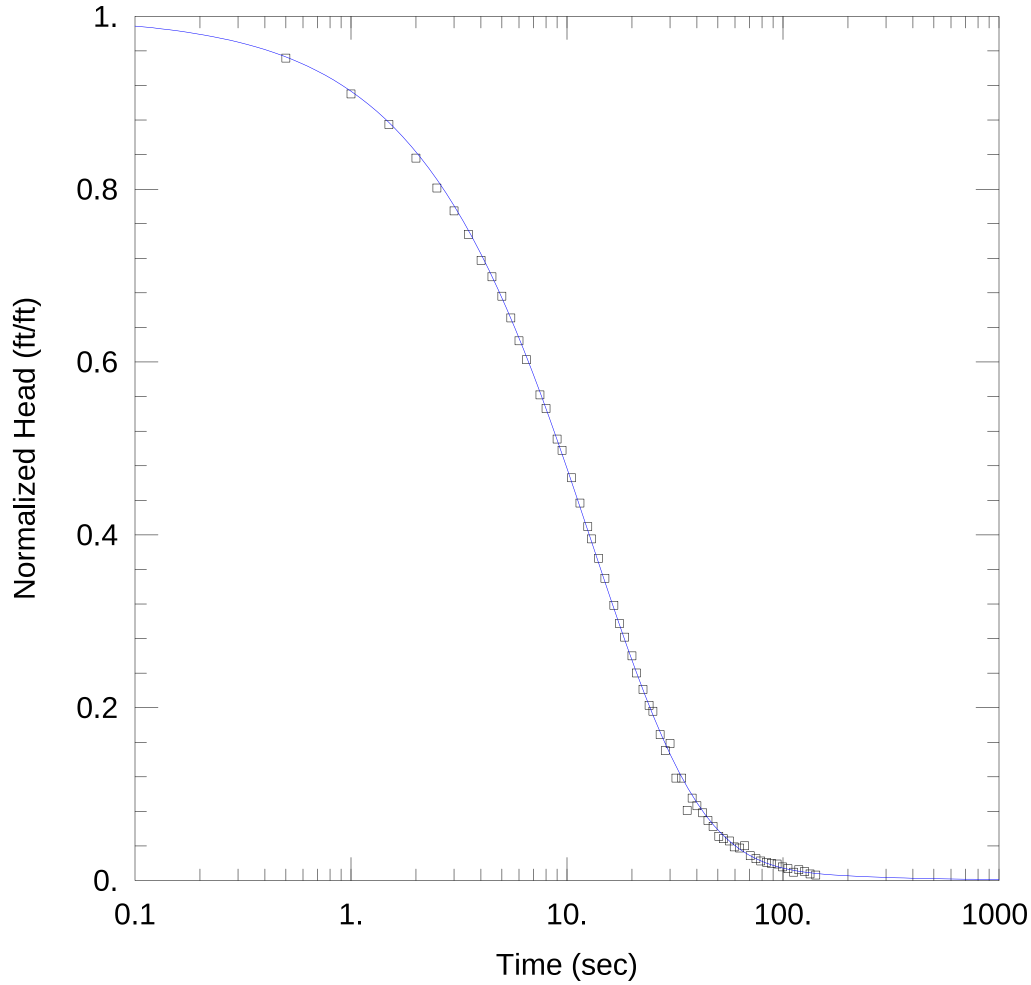
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 0.00351 cm/sec
Kz/Kr = 1.

Ss = 6.23E-6 ft^{-1}



APW-11 RH01

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-11
Test Date: 3/11/2021

AQUIFER DATA

Saturated Thickness: 9.2 ft

WELL DATA (APW-11)

Initial Displacement: 1.47 ft
Total Well Penetration Depth: 7. ft
Casing Radius: 0.086 ft

Static Water Column Height: 43.48 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

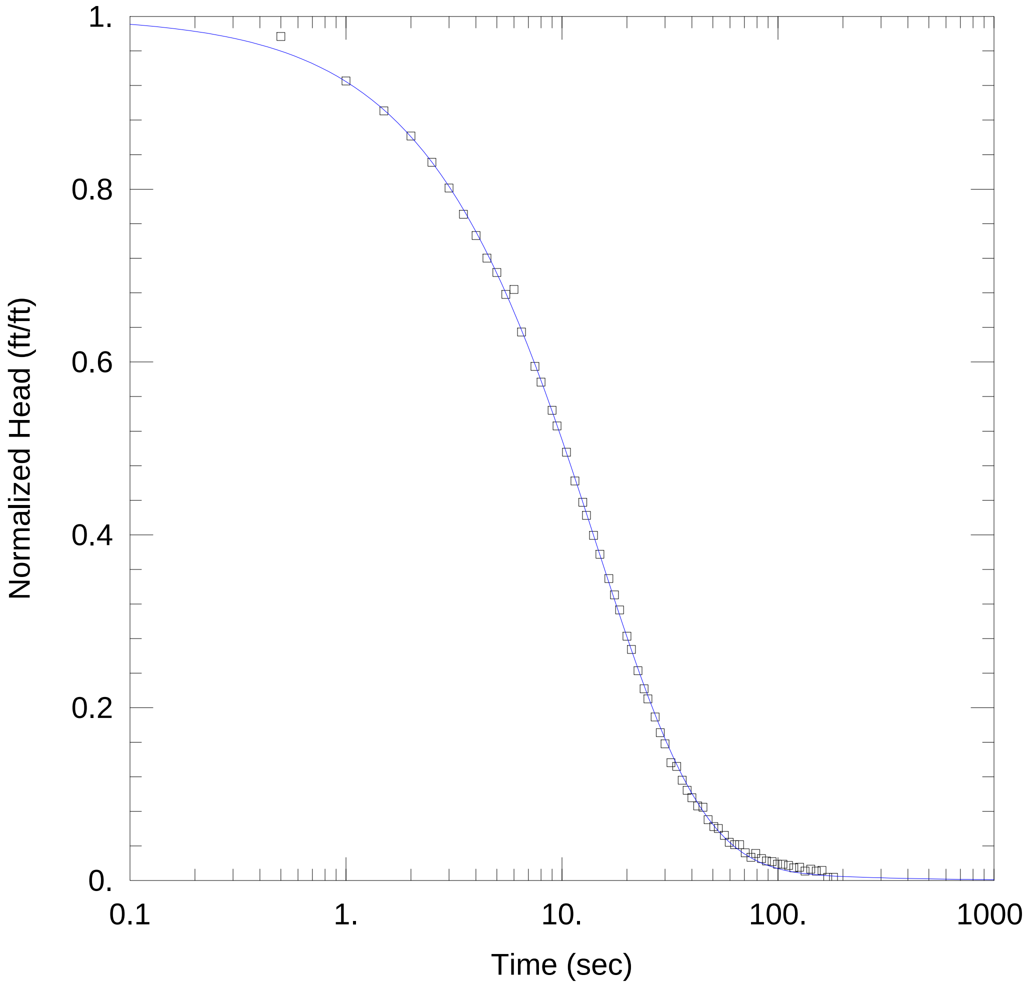
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 0.00588 cm/sec
Kz/Kr = 1.

Ss = 3.02E-7 ft^{-1}



APW-11 RH02

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-11
Test Date: 3/11/2021

AQUIFER DATA

Saturated Thickness: 9.2 ft

WELL DATA (APW-11 RH02)

Initial Displacement: 1.38 ft
Total Well Penetration Depth: 7. ft
Casing Radius: 0.086 ft

Static Water Column Height: 43.53 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

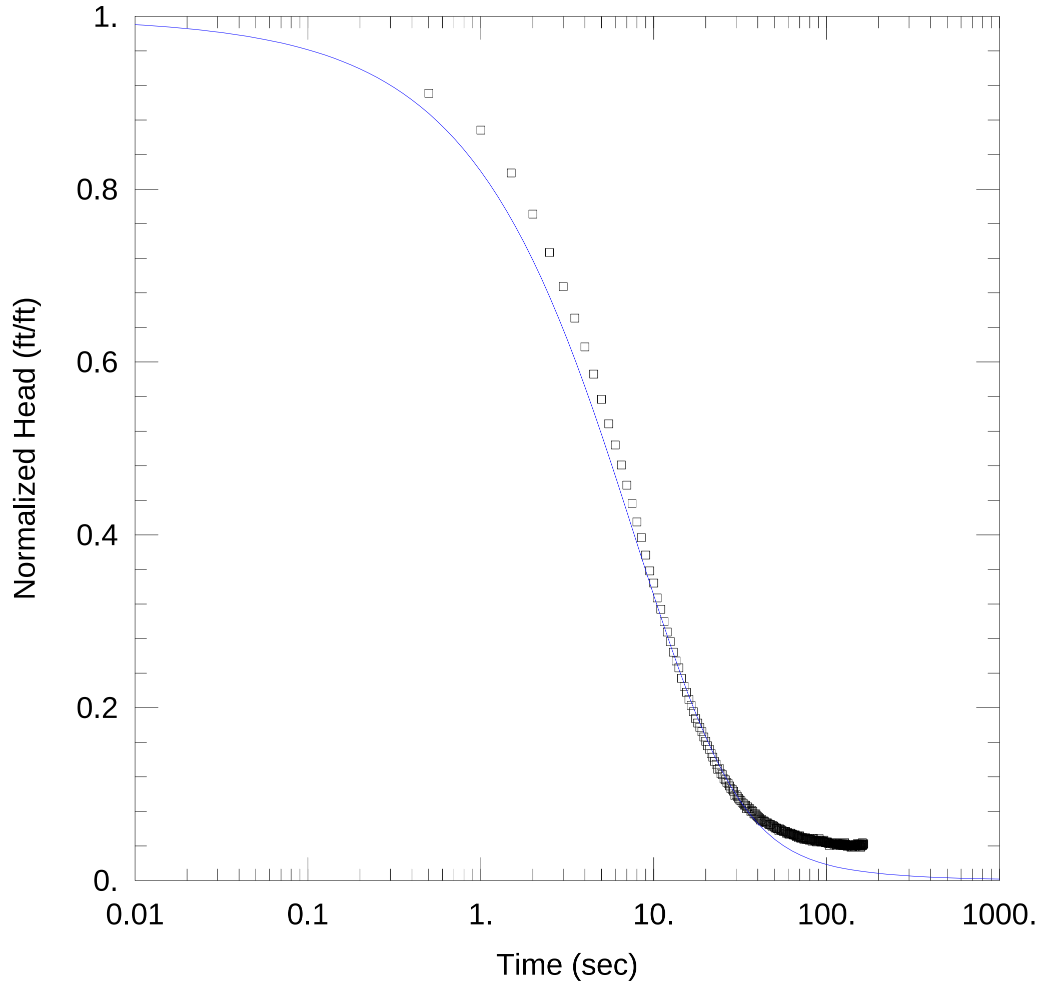
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 0.00676 cm/sec
Kz/Kr = 1.

Ss = 6.55E-9 ft^{-1}



APW-12 FH1

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-12
Test Date: 3/12/2021

AQUIFER DATA

Saturated Thickness: 3.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW-12)

Initial Displacement: 0.988 ft
Total Well Penetration Depth: 3.5 ft
Casing Radius: 0.086 ft
Static Water Column Height: 19.03 ft
Screen Length: 3.5 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

T = 1.05 cm^2/sec
S = 0.000733

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
75.5	0.049	160.5	0.041
76.	0.047	161.	0.04
76.5	0.047	161.5	0.043
77.	0.047	162.	0.04
77.5	0.048	162.5	0.041
78.	0.047	163.	0.041
78.5	0.047	163.5	0.041
79.	0.047	164.	0.042
79.5	0.046		

SOLUTION

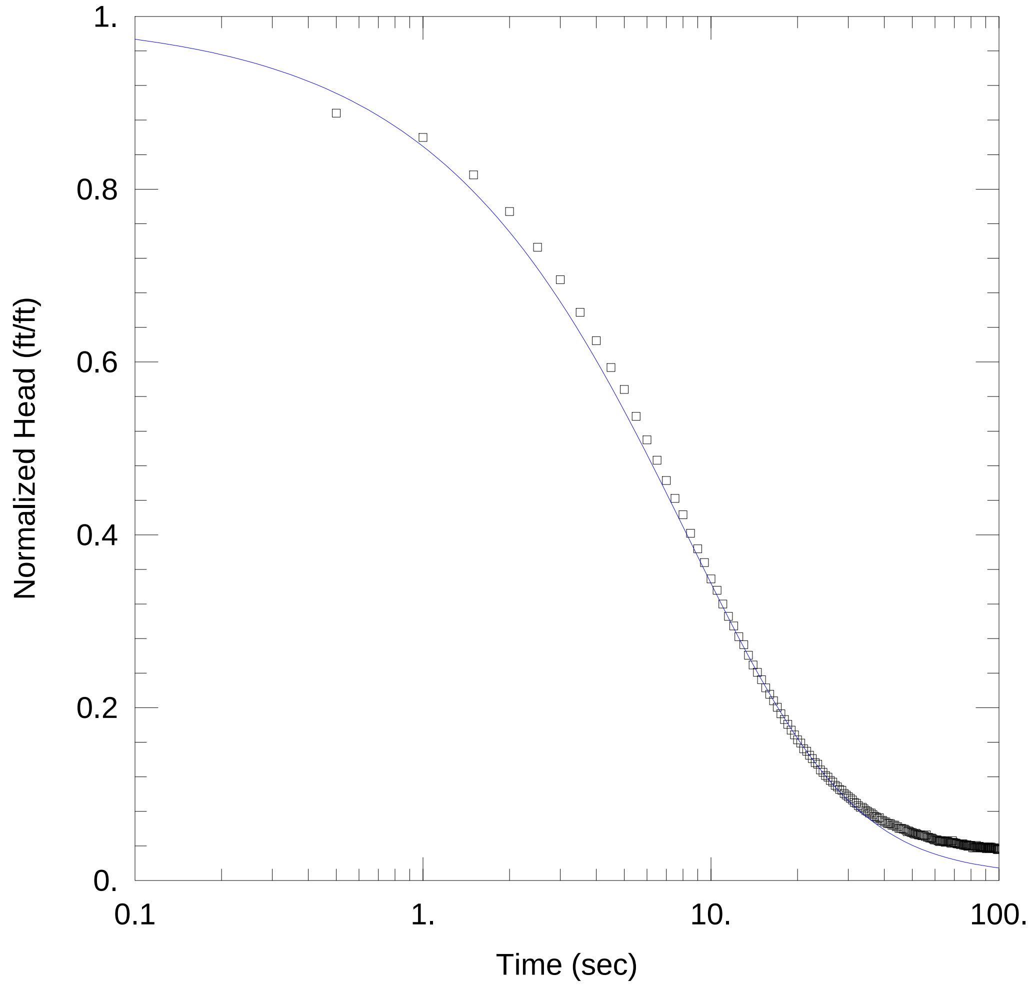
Slug Test
Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	1.05	cm^2/sec
S	0.000733	

K = T/b = 0.009843 cm/sec
Ss = S/b = 0.0002094 1/ft



APW-12 FH02

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-12
Test Date: 3/12/2021

AQUIFER DATA

Saturated Thickness: 3.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW-12)

Initial Displacement: 1.063 ft
Total Well Penetration Depth: 3.5 ft
Casing Radius: 0.08625 ft
Static Water Column Height: 19.06 ft
Screen Length: 3.5 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

T = 1.35 cm^2/sec
S = 0.000108

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
40.	0.072	94.5	0.04
40.5	0.072	95.	0.04
41.	0.07	95.5	0.04
41.5	0.07	96.	0.04
42.	0.07	96.5	0.039
42.5	0.068	97.	0.039
43.	0.068	97.5	0.039
43.5	0.068	98.	0.04
44.	0.066	98.5	0.038
44.5	0.066	99.	0.038
45.	0.064	99.5	0.038
45.5	0.064	100.	0.039
46.	0.064	100.5	0.036
46.5	0.063	101.	0.038

SOLUTION

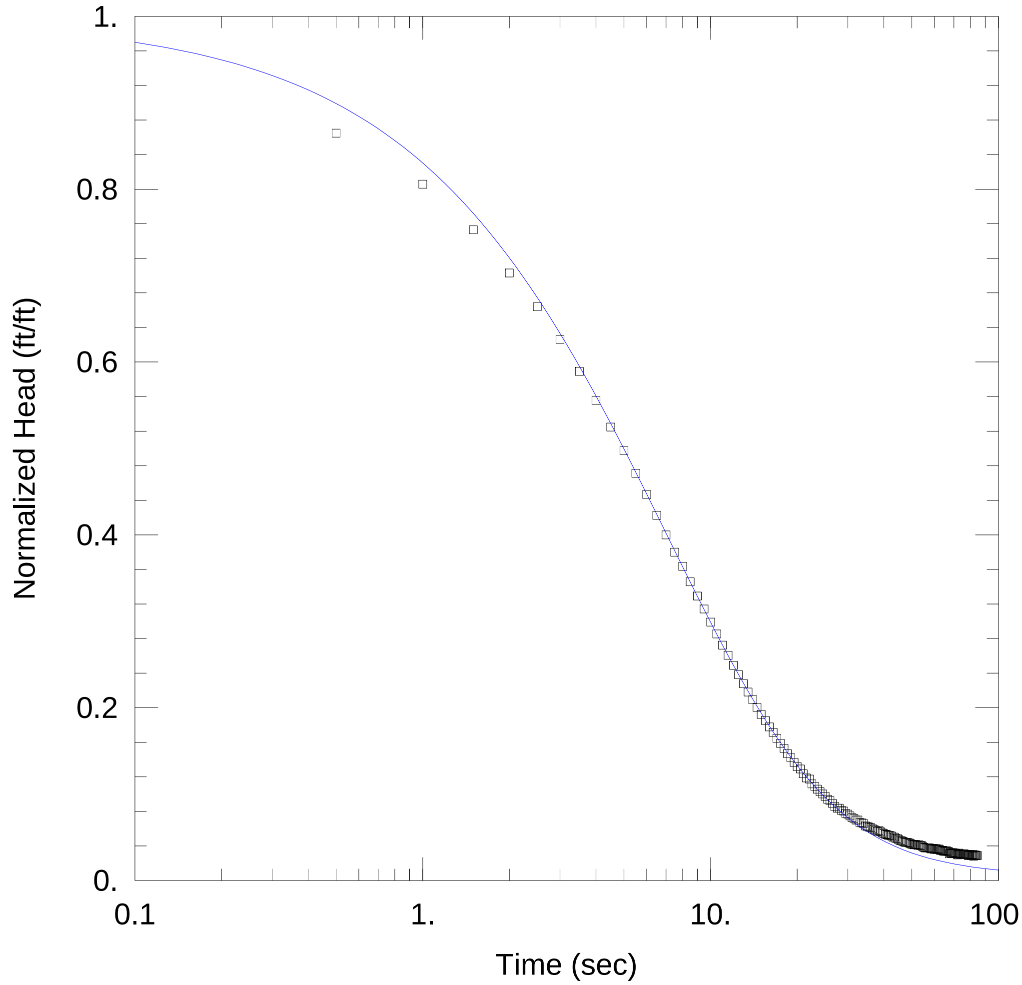
Slug Test
Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	1.35	cm^2/sec
S	0.000108	

K = T/b = 0.01265 cm/sec
Ss = S/b = 3.086E-5 1/ft



APW-12 RH01	
PROJECT INFORMATION	
Company: Ramboll	
Client: IPGC	
Project: 1940100499-001	
Location: Newton	
Test Well: APW-12	
Test Date: 3/12/2021	
AQUIFER DATA	
Saturated Thickness: 3.5 ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (APW-12)	
Initial Displacement: -1.458 ft	Static Water Column Height: 19.06 ft
Total Well Penetration Depth: 3.5 ft	Screen Length: 3.5 ft
Casing Radius: 0.08625 ft	Well Radius: 0.25 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Cooper-Bredehoeft-Papadopulos
T = 1.57 cm^2/sec	S = 0.000114

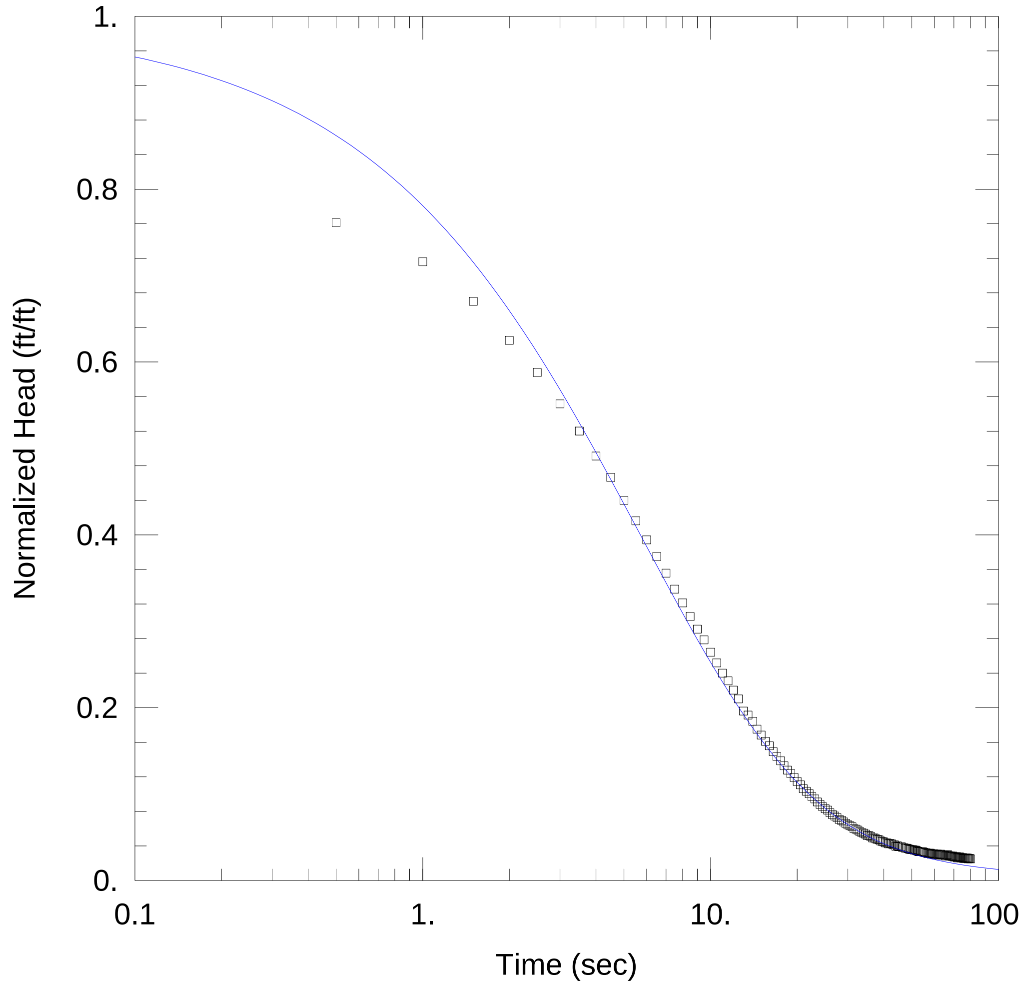
Slug Test
Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	1.57	cm^2/sec
S	0.000114	

K = T/b = 0.01472 cm/sec
Ss = S/b = 3.257E-5 1/ft



APW-12 RH2

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-12
Test Date: 3/12/2021

AQUIFER DATA

Saturated Thickness: 3.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW-12)

Initial Displacement: -1.771 ft
Total Well Penetration Depth: 3.5 ft
Casing Radius: 0.08625 ft
Static Water Column Height: 19.06 ft
Screen Length: 3.5 ft
Well Radius: 0.25 ft

SOLUTION

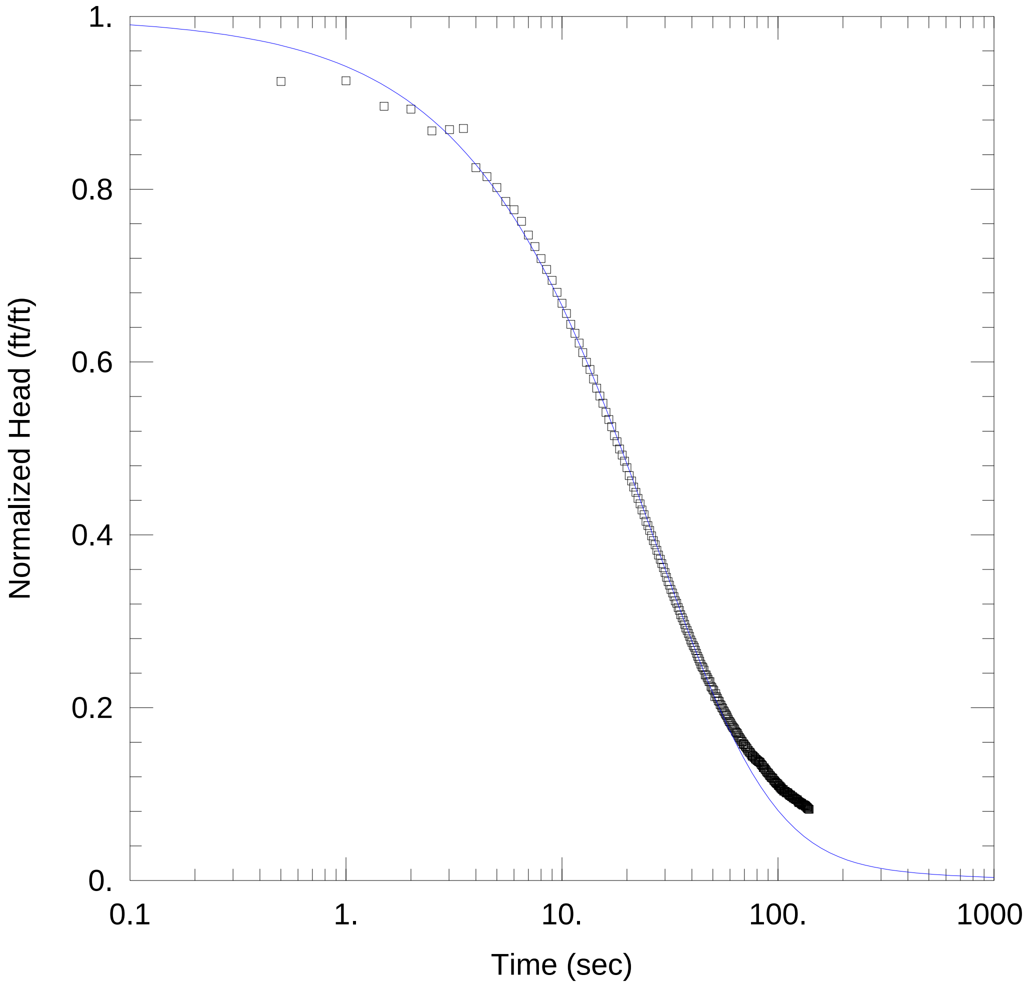
Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

T = 1.433 cm^2/sec
S = 0.000733

Estimated Parameters

Parameter	Estimate	
T	1.433	cm^2/sec
S	0.000733	

K = T/b = 0.01343 cm/sec
Ss = S/b = 0.0002094 1/ft



APW-13 FH-01

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-13
Test Date: 3/12/2021

AQUIFER DATA

Saturated Thickness: 7.4 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW-13)

Initial Displacement: 1.434 ft
Total Well Penetration Depth: 5.9 ft
Casing Radius: 0.08625 ft
Static Water Column Height: 34.23 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

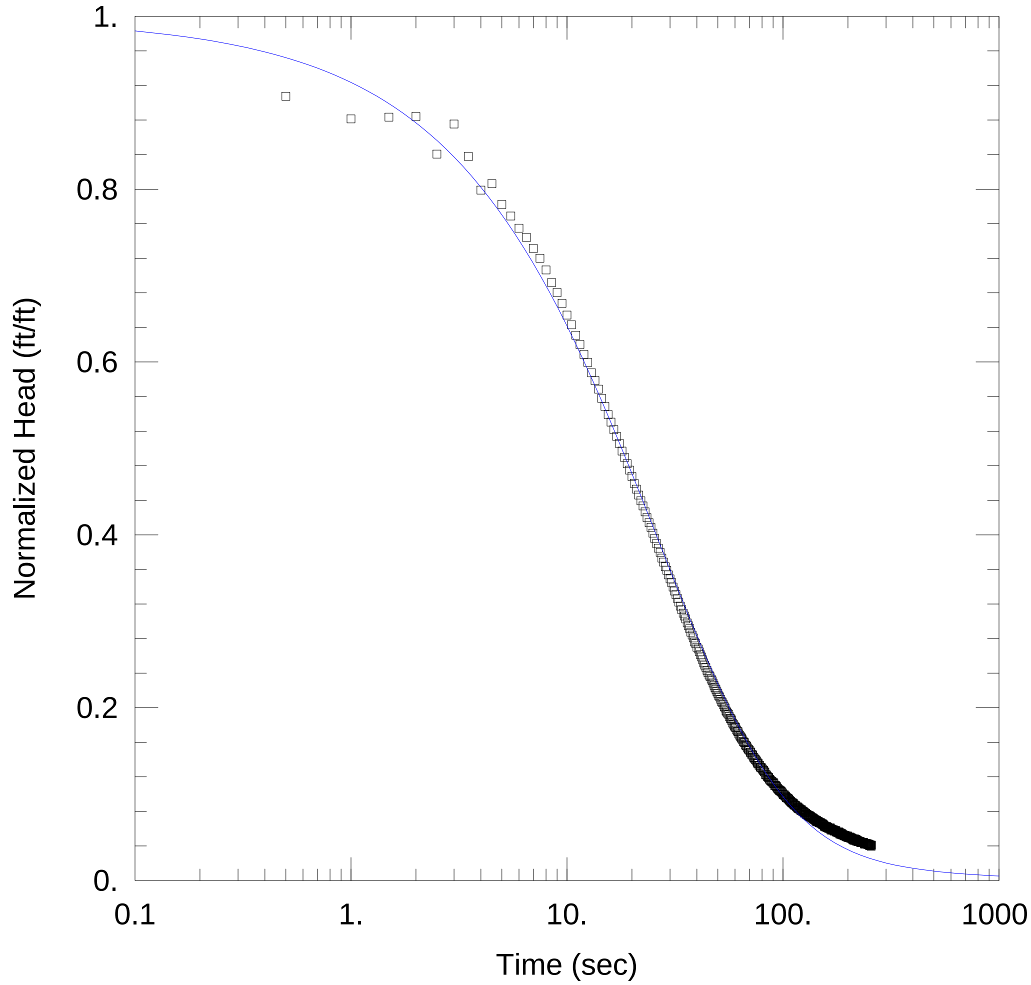
SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

T = 0.475 cm^2/sec
S = 4.47E-5

S	4.47E-5

K = T/b = 0.002106 cm/sec
Ss = S/b = 6.041E-6 1/ft



APW-13 FH02	
PROJECT INFORMATION	
Company: Ramboll Client: IPGC Project: 1940100499-001 Location: Newton Test Well: APW-13 Test Date: 3/12/2021	
AQUIFER DATA	
Saturated Thickness: 7.4 ft	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (APW-13)	
Initial Displacement: 1.493 ft Total Well Penetration Depth: 5.9 ft Casing Radius: 0.086 ft	Static Water Column Height: 34.26 ft Screen Length: 5. ft Well Radius: 0.25 ft
SOLUTION	
Aquifer Model: Confined	Solution Method: Cooper-Bredehoeft-Papadopulos
T = 0.329 cm^2/sec	S = 0.000562

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
106.	0.141	238.5	0.064
106.5	0.14	239.	0.063
107.	0.139	239.5	0.064
107.5	0.138	240.	0.063
108.	0.137	240.5	0.064
108.5	0.137	241.	0.063
109.	0.136	241.5	0.063
109.5	0.135	242.	0.063
110.	0.134	242.5	0.064
110.5	0.134	243.	0.063
111.	0.134	243.5	0.063
111.5	0.132	244.	0.064
112.	0.133	244.5	0.063
112.5	0.131	245.	0.063
113.	0.13	245.5	0.063
113.5	0.13	246.	0.062
114.	0.13	246.5	0.063
114.5	0.129	247.	0.063
115.	0.129	247.5	0.063
115.5	0.127	248.	0.062
116.	0.127	248.5	0.062
116.5	0.126	249.	0.063
117.	0.127	249.5	0.062
117.5	0.124	250.	0.062
118.	0.125	250.5	0.061
118.5	0.125	251.	0.062
119.	0.125	251.5	0.062
119.5	0.123	252.	0.06
120.	0.123	252.5	0.061
120.5	0.123	253.	0.061
121.	0.121	253.5	0.06
121.5	0.121	254.	0.061
122.	0.122	254.5	0.061
122.5	0.12	255.	0.061
123.	0.12	255.5	0.06
123.5	0.119	256.	0.059
124.	0.119	256.5	0.061
124.5	0.119	257.	0.061

SOLUTION

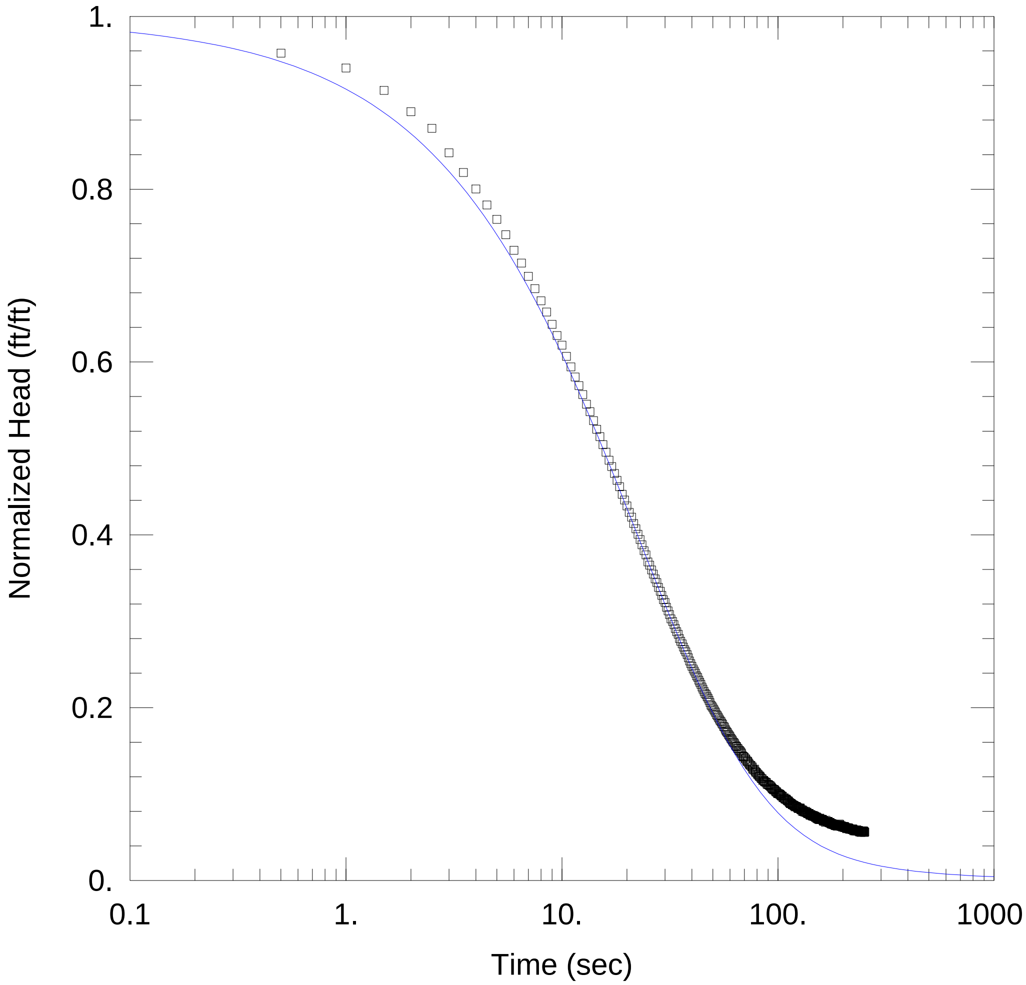
Slug Test
Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	0.329	cm^2/sec
S	0.000562	

K = T/b = 0.001459 cm/sec
Ss = S/b = 7.595E-5 1/ft



APW-13 RH01

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-13
Test Date: 3/12/2021

AQUIFER DATA

Saturated Thickness: 7.4 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW-13)

Initial Displacement: -1.622 ft
Total Well Penetration Depth: 5.9 ft
Casing Radius: 0.086 ft
Static Water Column Height: 34.22 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

T = 0.384 cm^2/sec
S = 0.000541

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
106.5	-0.155	236.5	-0.093
107.	-0.155	237.	-0.094
107.5	-0.153	237.5	-0.093
108.	-0.153	238.	-0.092
108.5	-0.152	238.5	-0.091
109.	-0.153	239.	-0.092
109.5	-0.152	239.5	-0.092
110.	-0.151	240.	-0.091
110.5	-0.15	240.5	-0.092
111.	-0.149	241.	-0.092
111.5	-0.149	241.5	-0.093
112.	-0.149	242.	-0.092
112.5	-0.147	242.5	-0.09
113.	-0.146	243.	-0.092
113.5	-0.146	243.5	-0.092
114.	-0.144	244.	-0.091
114.5	-0.145	244.5	-0.093
115.	-0.145	245.	-0.091
115.5	-0.144	245.5	-0.093
116.	-0.143	246.	-0.093
116.5	-0.142	246.5	-0.092
117.	-0.142	247.	-0.092
117.5	-0.142	247.5	-0.093
118.	-0.141	248.	-0.092
118.5	-0.141	248.5	-0.092
119.	-0.14	249.	-0.092
119.5	-0.14	249.5	-0.093
120.	-0.138	250.	-0.092
120.5	-0.139	250.5	-0.092
121.	-0.139	251.	-0.091
121.5	-0.139	251.5	-0.09
122.	-0.138	252.	-0.091
122.5	-0.138	252.5	-0.091

SOLUTION

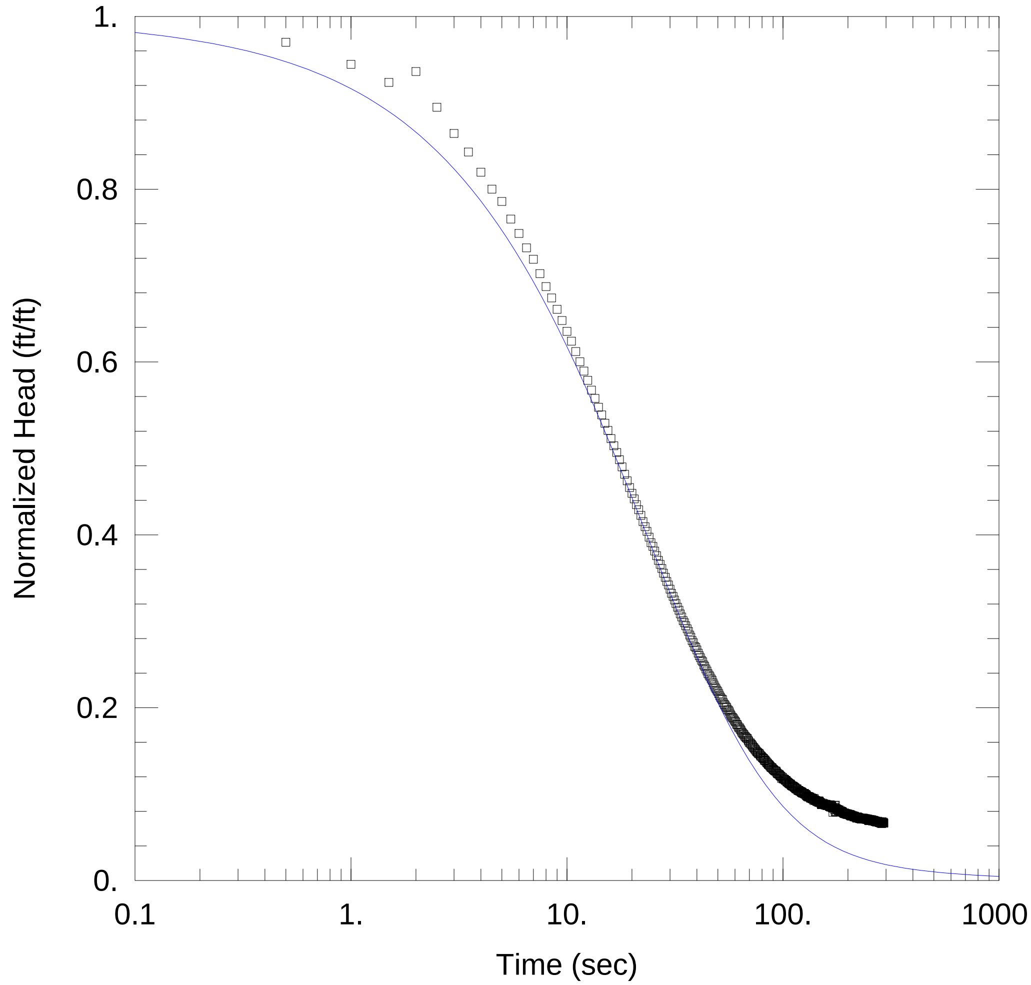
Slug Test
Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	0.384	cm^2/sec
S	0.000541	

K = T/b = 0.001702 cm/sec
Ss = S/b = 7.311E-5 1/ft



APW-13 RH02

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-13
Test Date: 3/12/2021

AQUIFER DATA

Saturated Thickness: 7.4 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW-13)

Initial Displacement: -1.676 ft
Total Well Penetration Depth: 5.9 ft
Casing Radius: 0.086 ft
Static Water Column Height: 34.26 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

T = 0.353 cm^2/sec
S = 0.000661

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
140.	-0.157	290.5	-0.111
140.5	-0.156	291.	-0.112
141.	-0.155	291.5	-0.113
141.5	-0.155	292.	-0.112
142.	-0.155	292.5	-0.111
142.5	-0.155	293.	-0.112
143.	-0.154	293.5	-0.111
143.5	-0.153		

SOLUTION

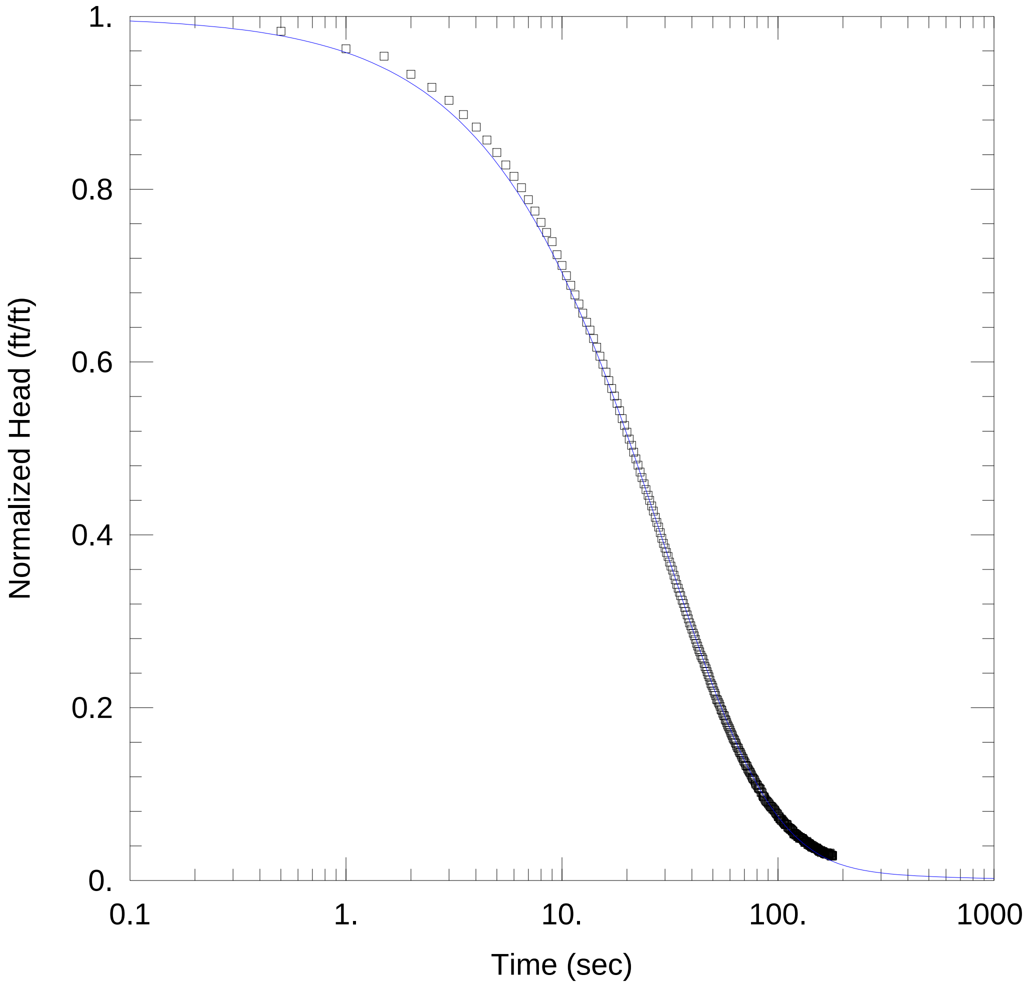
Slug Test
Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	0.353	cm^2/sec
S	0.000661	

K = T/b = 0.001565 cm/sec
Ss = S/b = 8.932E-5 1/ft



APW-14 FH01

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-14
Test Date: 3/31/2021

AQUIFER DATA

Saturated Thickness: 6.3 ft

WELL DATA (APW-14)

Initial Displacement: 1.523 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.086 ft

Static Water Column Height: 36.72 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

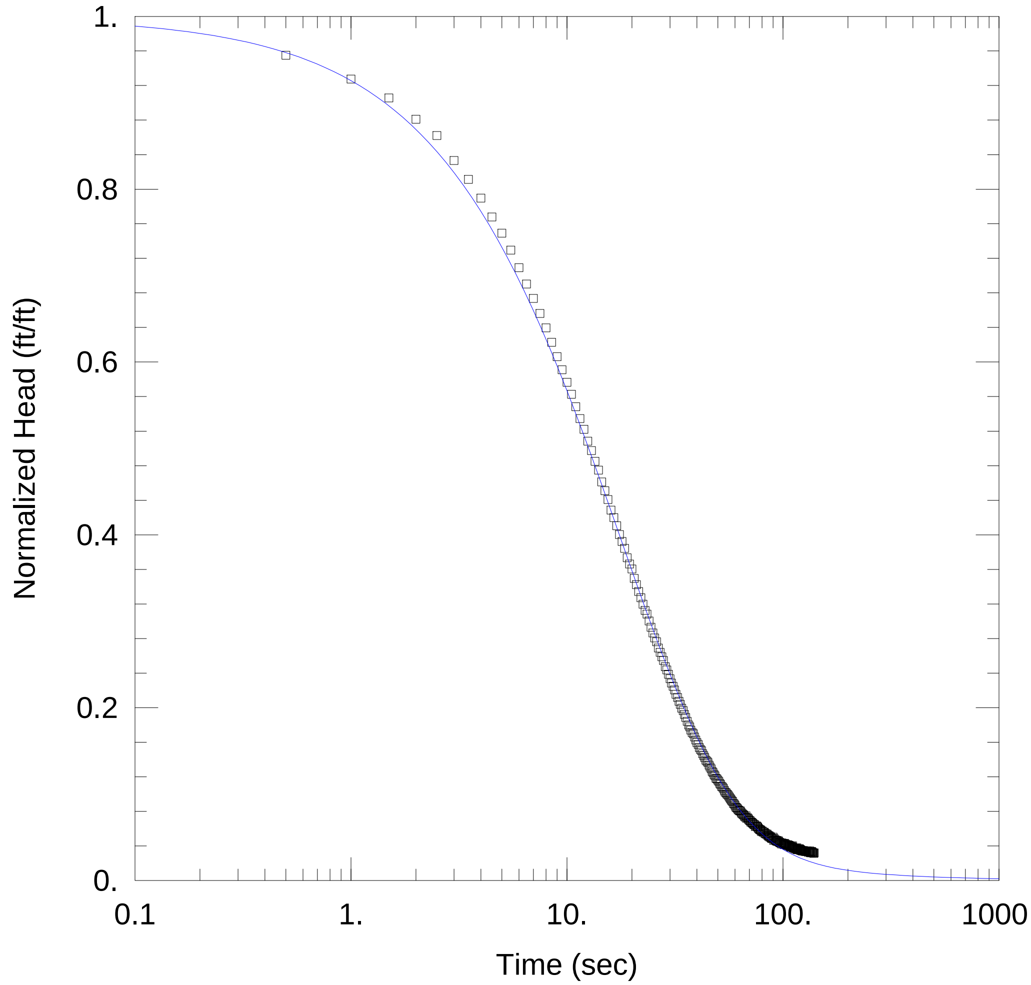
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 0.00388 cm/sec
Kz/Kr = 1.

Ss = 4.23E-8 ft^{-1}



APW-14 FH02

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-14
Test Date: 3/31/2021

AQUIFER DATA

Saturated Thickness: 6.3 ft

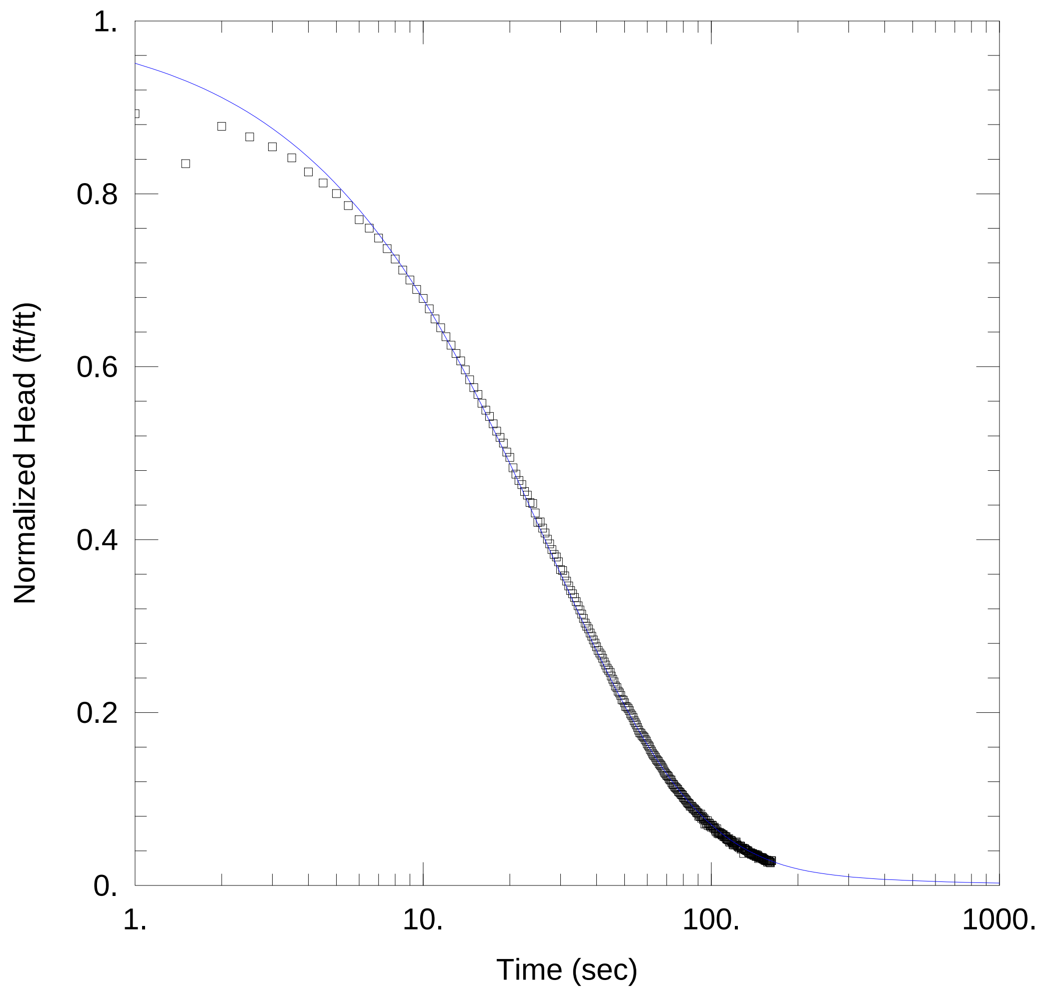
WELL DATA (APW-14)

Initial Displacement: 1.379 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.086 ft
Static Water Column Height: 36.73 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.00433 cm/sec
Kz/Kr = 1.
Ss = 4.29E-6 ft^{-1}



APW-14 FH3

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-14
Test Date: 3/31/2021

AQUIFER DATA

Saturated Thickness: 6.3 ft

WELL DATA (APW-14)

Initial Displacement: 1.648 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.086 ft

Static Water Column Height: 36.72 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

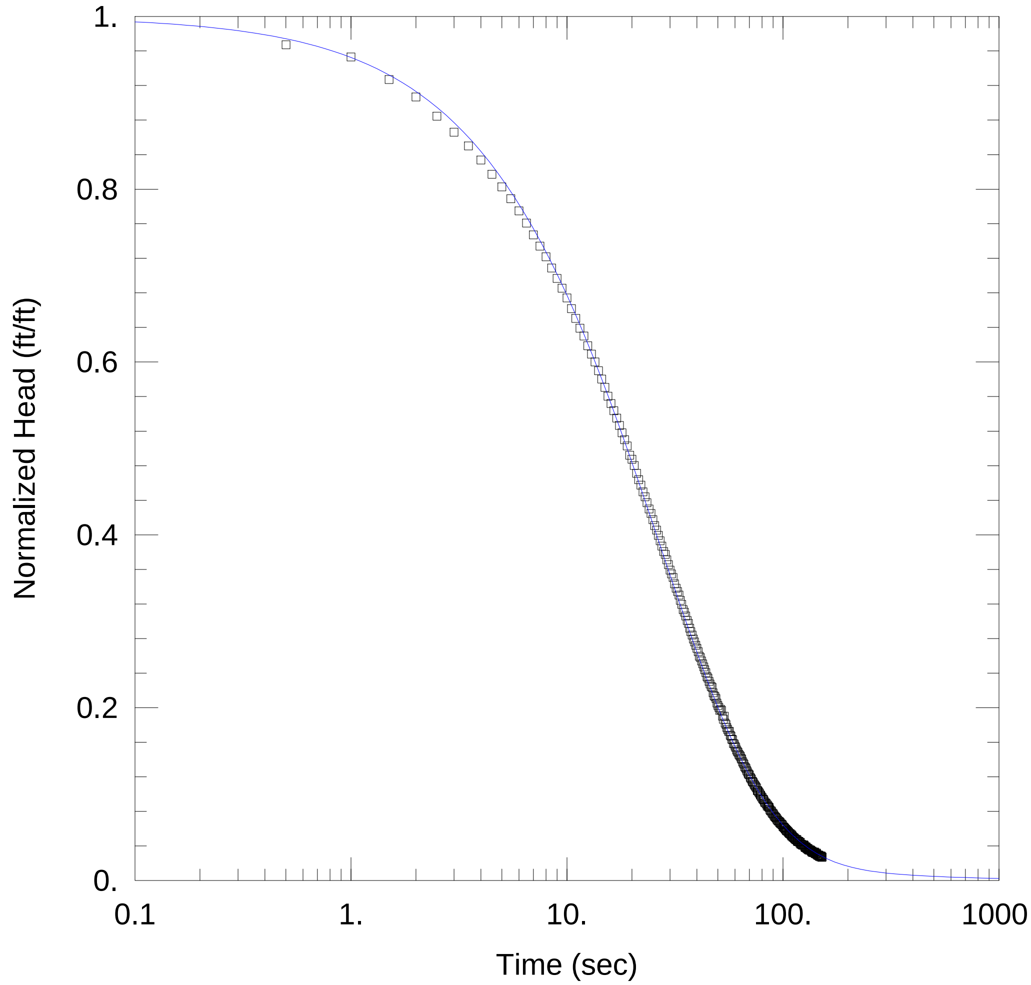
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 0.00332 cm/sec
Kz/Kr = 1.

Ss = 8.98E-7 ft^{-1}



APW-14 RH1

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-14
Test Date: 3/31/2021

AQUIFER DATA

Saturated Thickness: 6.3 ft

WELL DATA (APW-14)

Initial Displacement: -1.768 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.086 ft

Static Water Column Height: 36.76 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

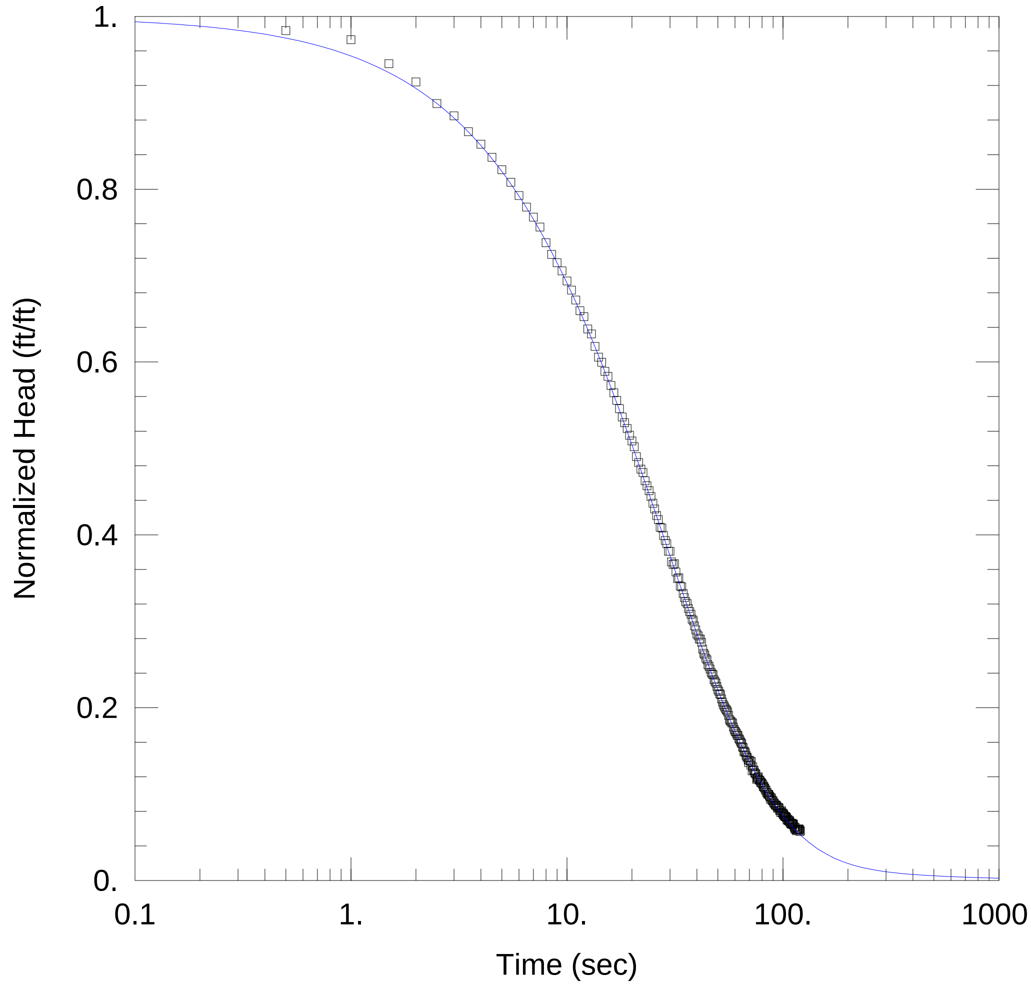
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 0.00381 cm/sec
Kz/Kr = 1.

Ss = 2.12E-7 ft^{-1}



APW-14 RH2

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-14
Test Date: 3/31/2021

AQUIFER DATA

Saturated Thickness: 6.3 ft

WELL DATA (APW-14)

Initial Displacement: -1.042 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.086 ft

Static Water Column Height: 36.72 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

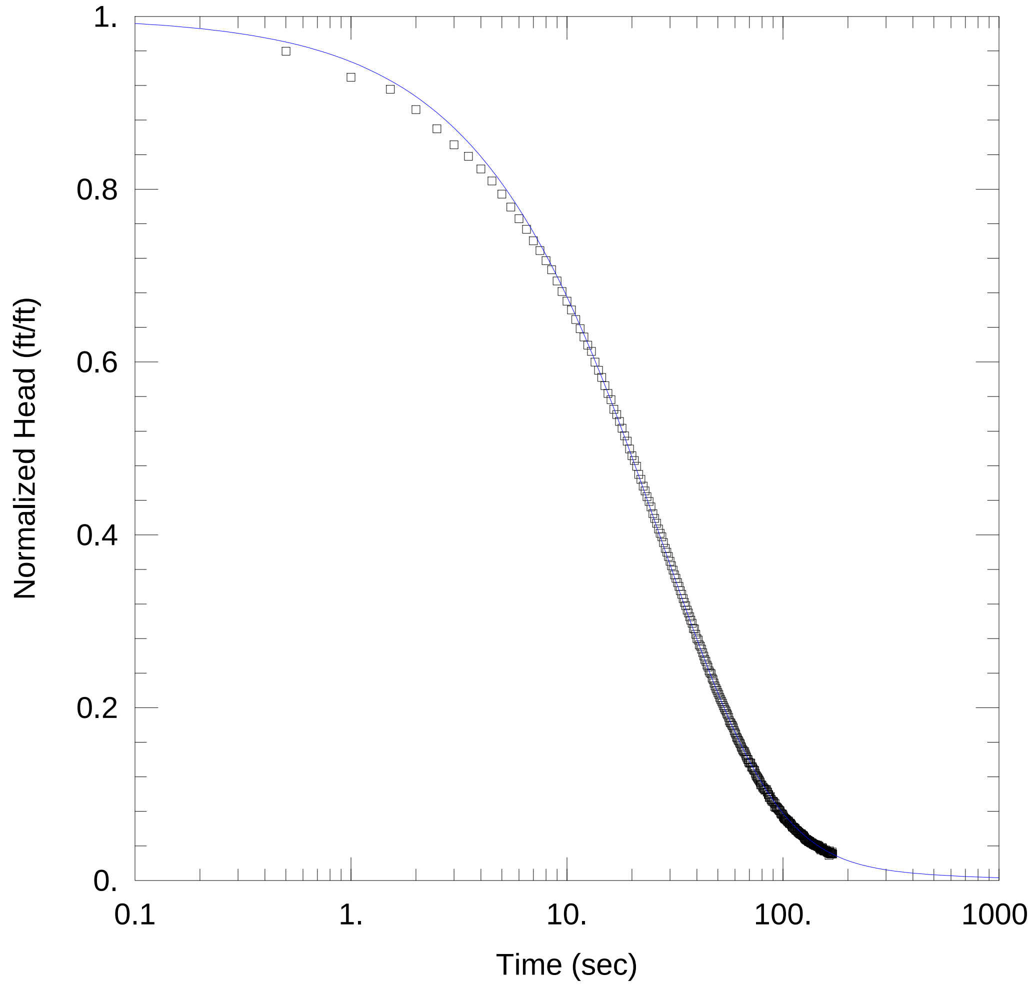
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 0.00336 cm/sec
Kz/Kr = 1.

Ss = 4.36E-7 ft^{-1}



APW-14 RH3

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-14
Test Date: 3/31/2021

AQUIFER DATA

Saturated Thickness: 6.3 ft

WELL DATA (APW-14)

Initial Displacement: -1.79 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.08625 ft

Static Water Column Height: 36.75 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

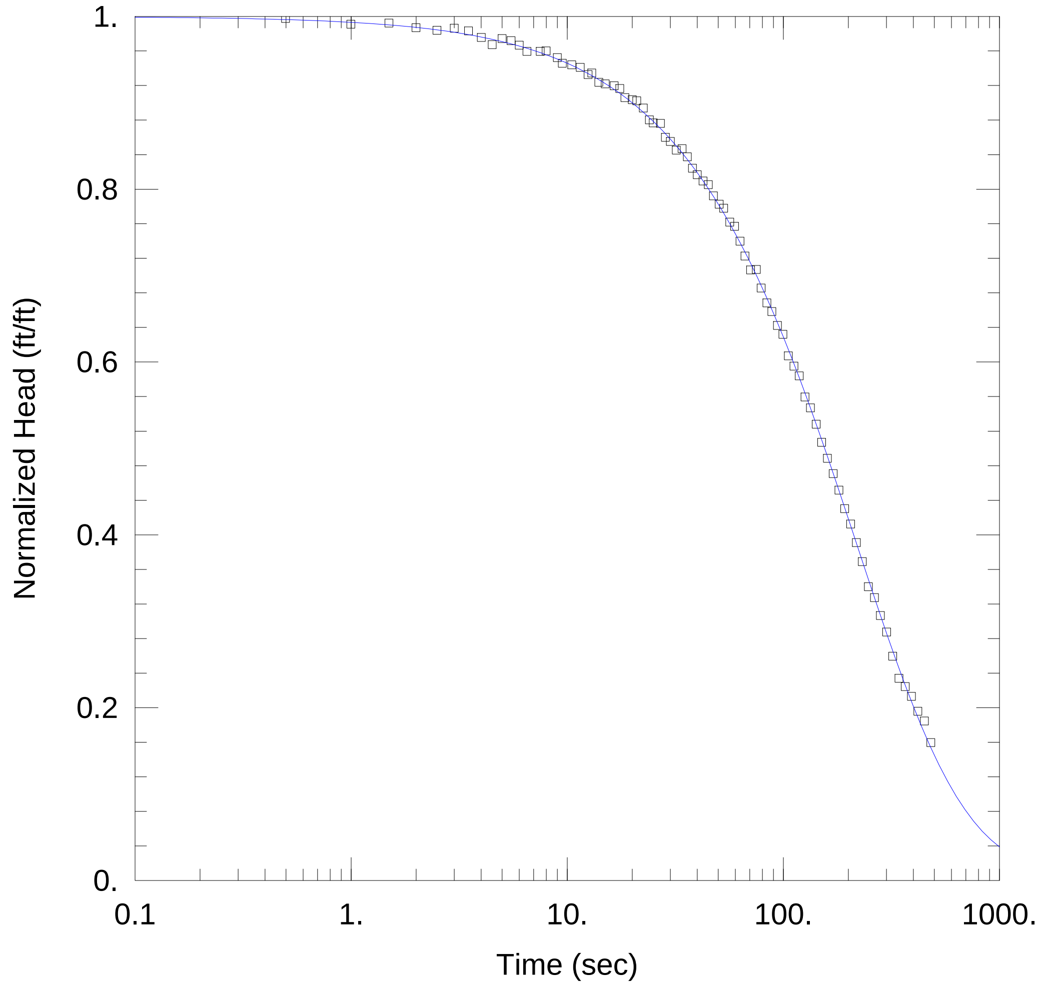
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 0.0028 cm/sec
Kz/Kr = 1.

Ss = 4.94E-6 ft^{-1}



APW-15 FH01

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-15
Test Date: 3/31/2021

AQUIFER DATA

Saturated Thickness: 7.1 ft

WELL DATA (APW-15)

Initial Displacement: 1.68 ft
Total Well Penetration Depth: 50.5 ft
Casing Radius: 0.086 ft

Static Water Column Height: 82.47 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

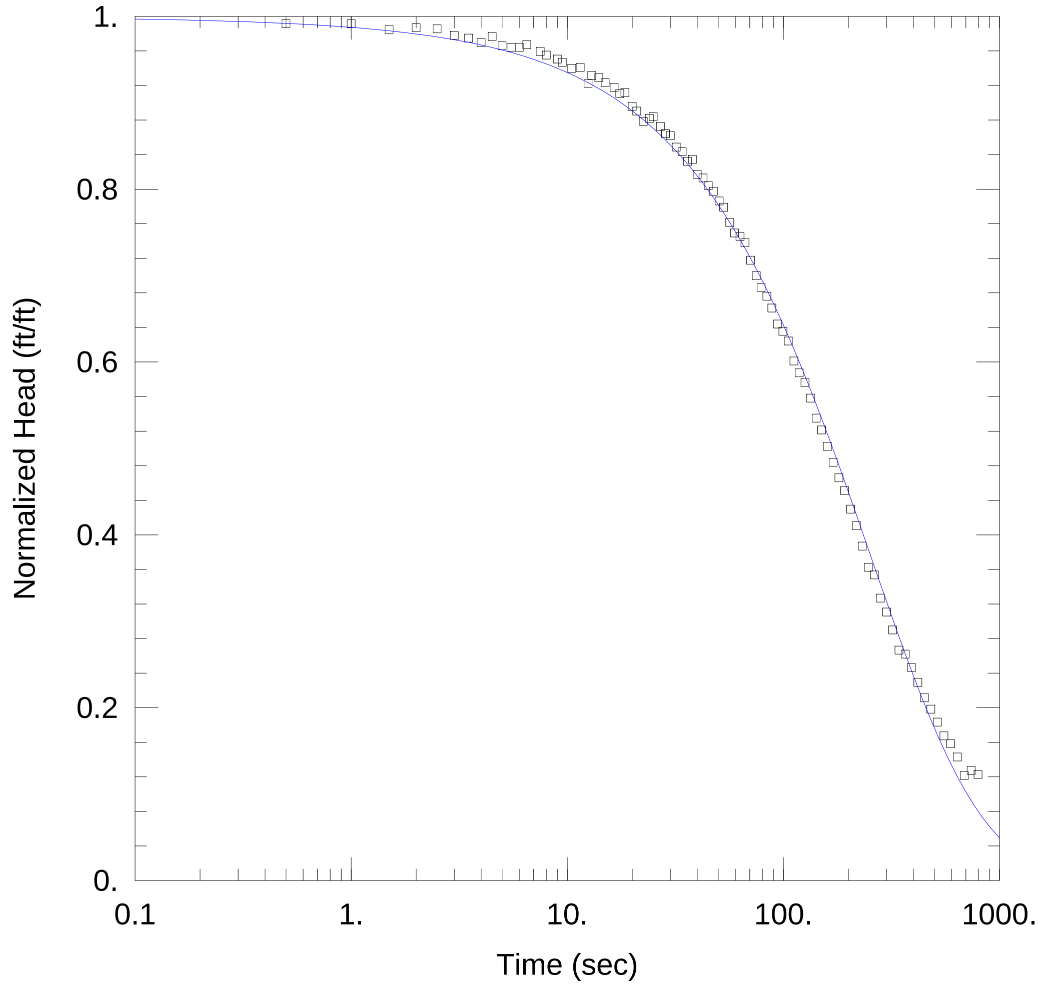
SOLUTION

Aquifer Model: Confined

Kr = 0.000485 cm/sec
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 3.29E-7 ft^{-1}



APW-15 FH2

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-15
Test Date: 3/31/2021

AQUIFER DATA

Saturated Thickness: 51.8 ft

WELL DATA (APW-15)

Initial Displacement: 1.68 ft
Total Well Penetration Depth: 50.5 ft
Casing Radius: 0.086 ft

Static Water Column Height: 82.32 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

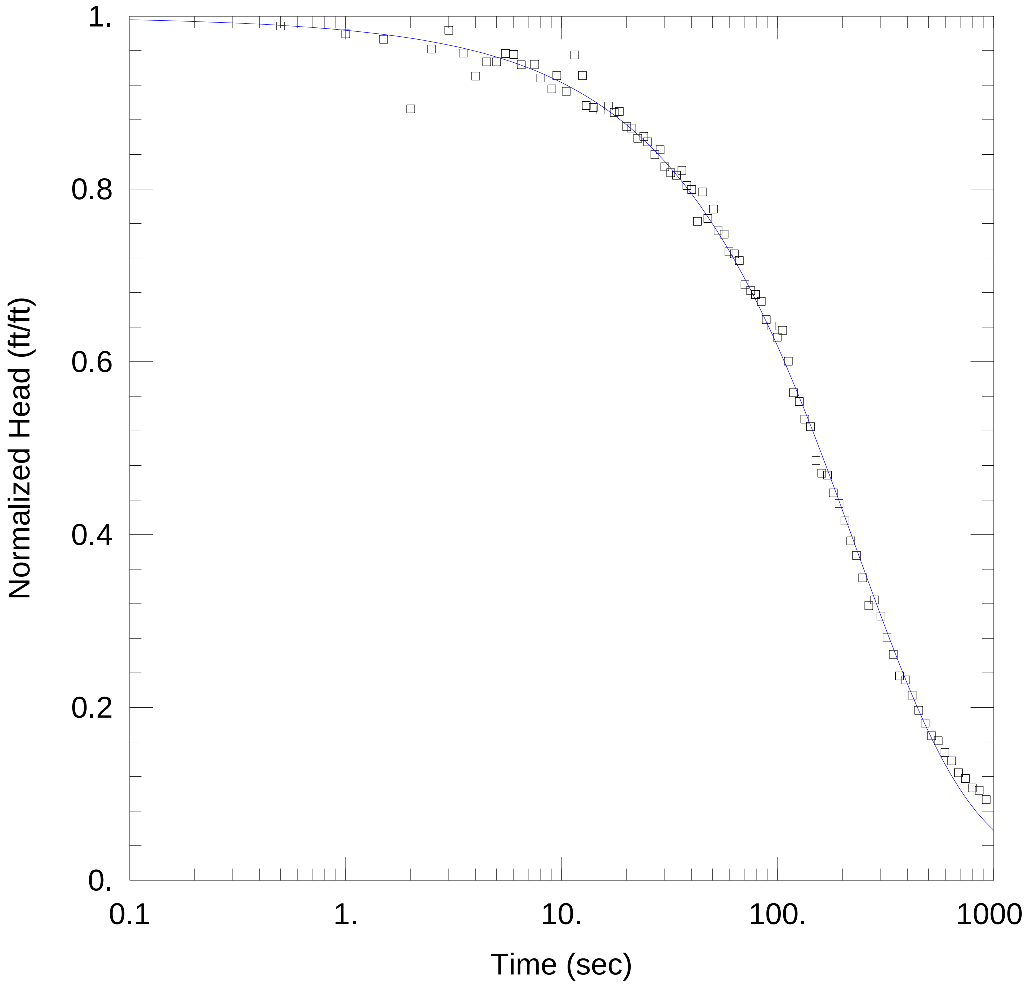
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 0.0002 cm/sec
Kz/Kr = 1.

Ss = 5.25E-5 ft^{-1}



APW-15 RH-01

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-15
Test Date: 3/31/2021

AQUIFER DATA

Saturated Thickness: 7.1 ft

WELL DATA (APW-15)

Initial Displacement: 1.76 ft
Total Well Penetration Depth: 50.5 ft
Casing Radius: 0.086 ft

Static Water Column Height: 82.59 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

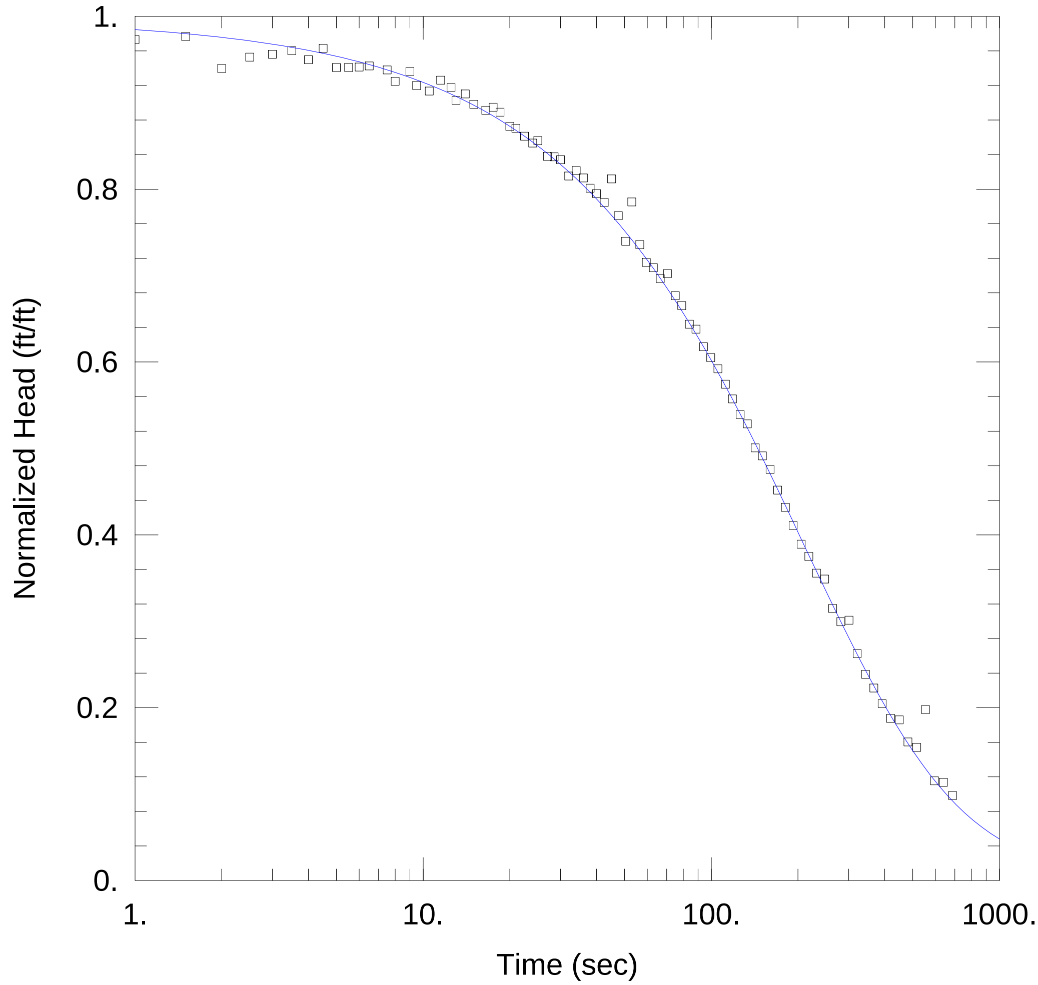
SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 0.000281 cm/sec
Kz/Kr = 1.

Ss = 0.000132 ft^{-1}



APW-15 RH2

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-15
Test Date: 3/31/2021

AQUIFER DATA

Saturated Thickness: 7.1 ft

WELL DATA (APW-15)

Initial Displacement: 1.76 ft
Total Well Penetration Depth: 50.5 ft
Casing Radius: 0.086 ft

Static Water Column Height: 82.52 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

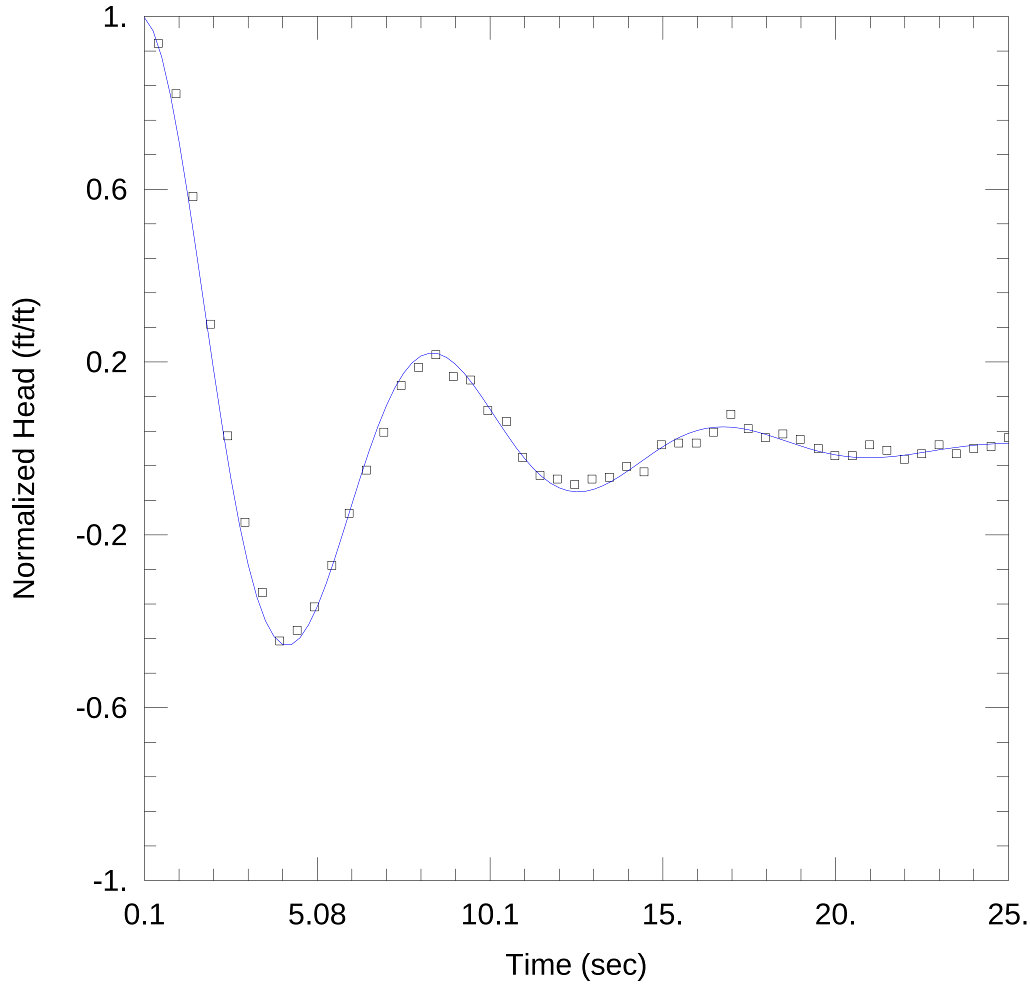
SOLUTION

Aquifer Model: Confined

Kr = 0.00032 cm/sec
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 8.48E-5 ft^{-1}



APW-16 FH01

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-16
Test Date: 3/11/2021

AQUIFER DATA

Saturated Thickness: 16.4 ft
Anisotropy Ratio (Kz/Kr): 1.

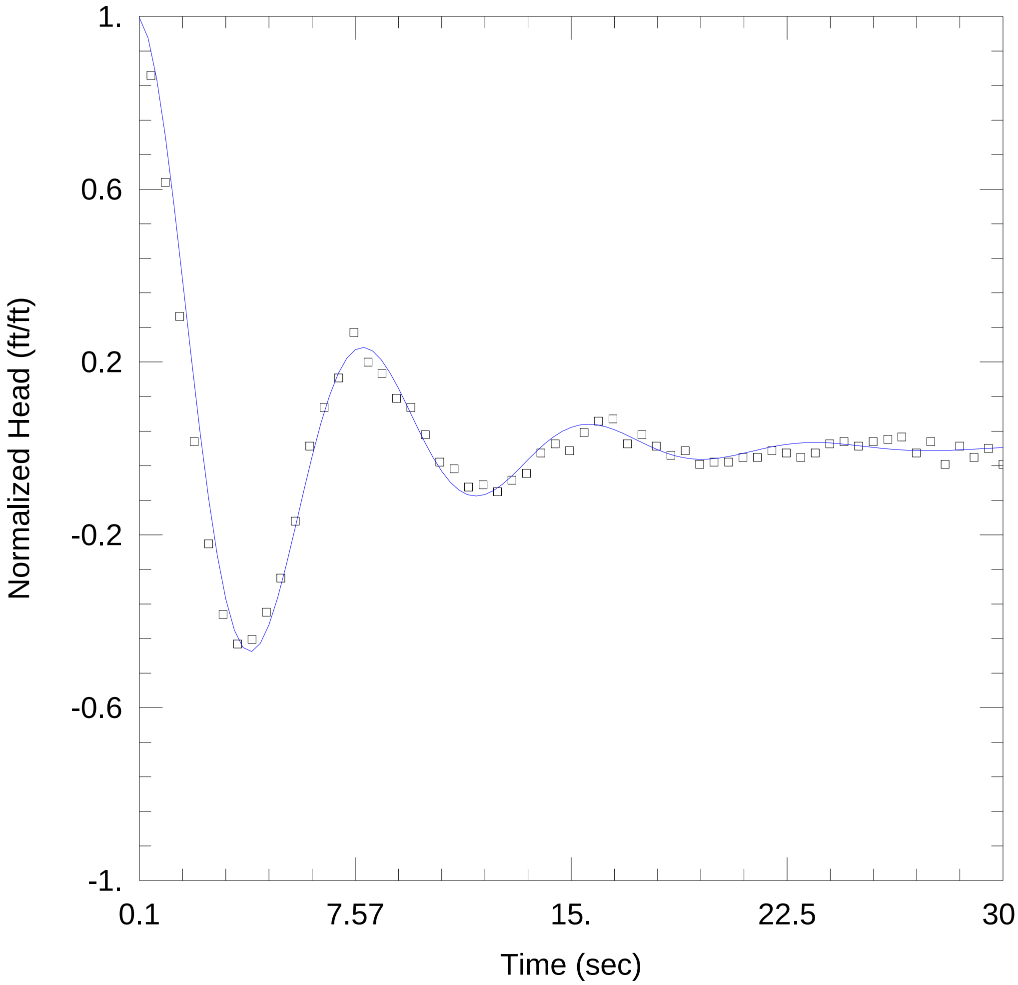
WELL DATA (APW-16)

Initial Displacement: 0.24 ft
Total Well Penetration Depth: 16.3 ft
Casing Radius: 0.086 ft
Static Water Column Height: 64.37 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler-Zhan

Kr = 0.124 cm/sec
Kz/Kr = 1.
Ss = 8.12E-7 ft^{-1}
Le = 56.01 ft



APW-16 FH02

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-16
Test Date: 3/11/2021

AQUIFER DATA

Saturated Thickness: 16.4 ft
Anisotropy Ratio (Kz/Kr): 1.

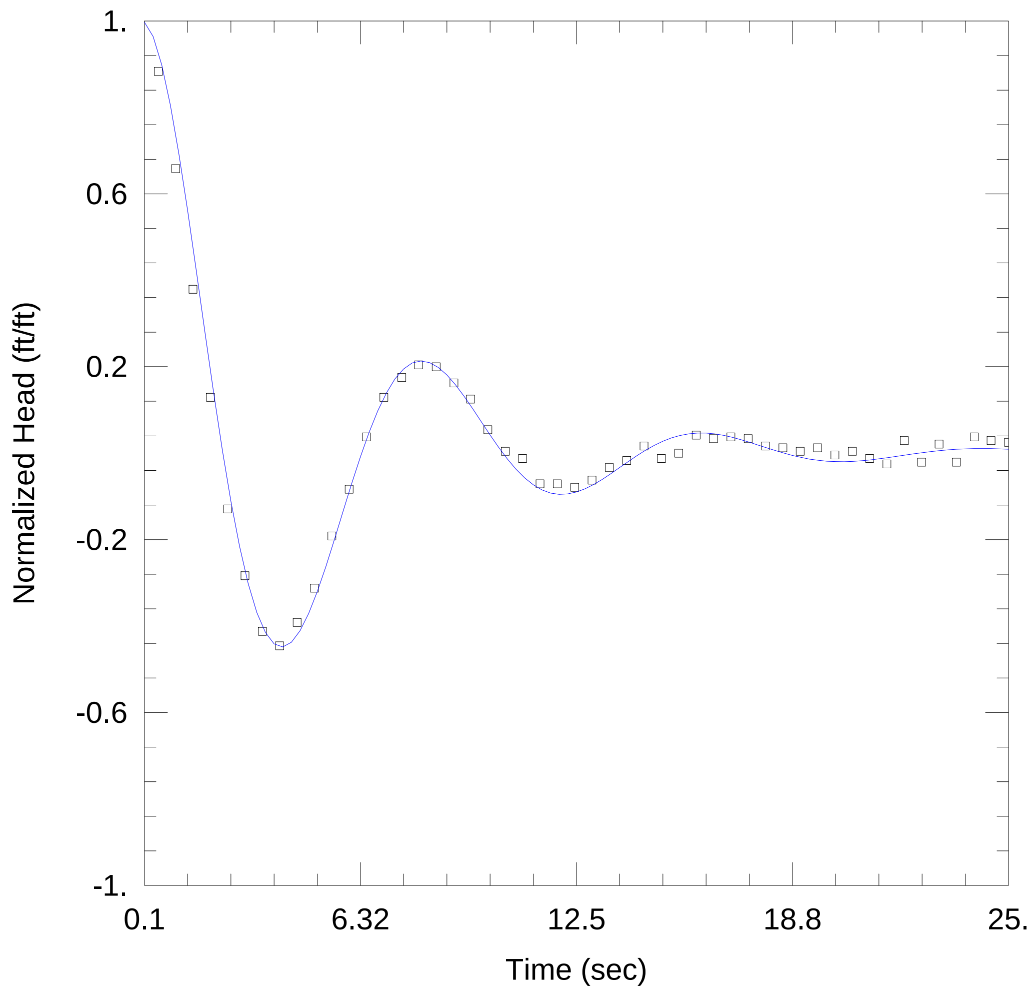
WELL DATA (APW-16)

Initial Displacement: 0.19 ft
Total Well Penetration Depth: 16.3 ft
Casing Radius: 0.08625 ft
Static Water Column Height: 64.22 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler-Zhan

Kr = 0.141 cm/sec
Kz/Kr = 1.
Ss = 6.55E-7 ft^{-1}
Le = 48.91 ft



APW-16 FH03

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-16
Test Date: 3/11/2021

AQUIFER DATA

Saturated Thickness: 16.4 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW-16)

Initial Displacement: 0.24 ft
Total Well Penetration Depth: 16.3 ft
Casing Radius: 0.086 ft

Static Water Column Height: 64.49 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

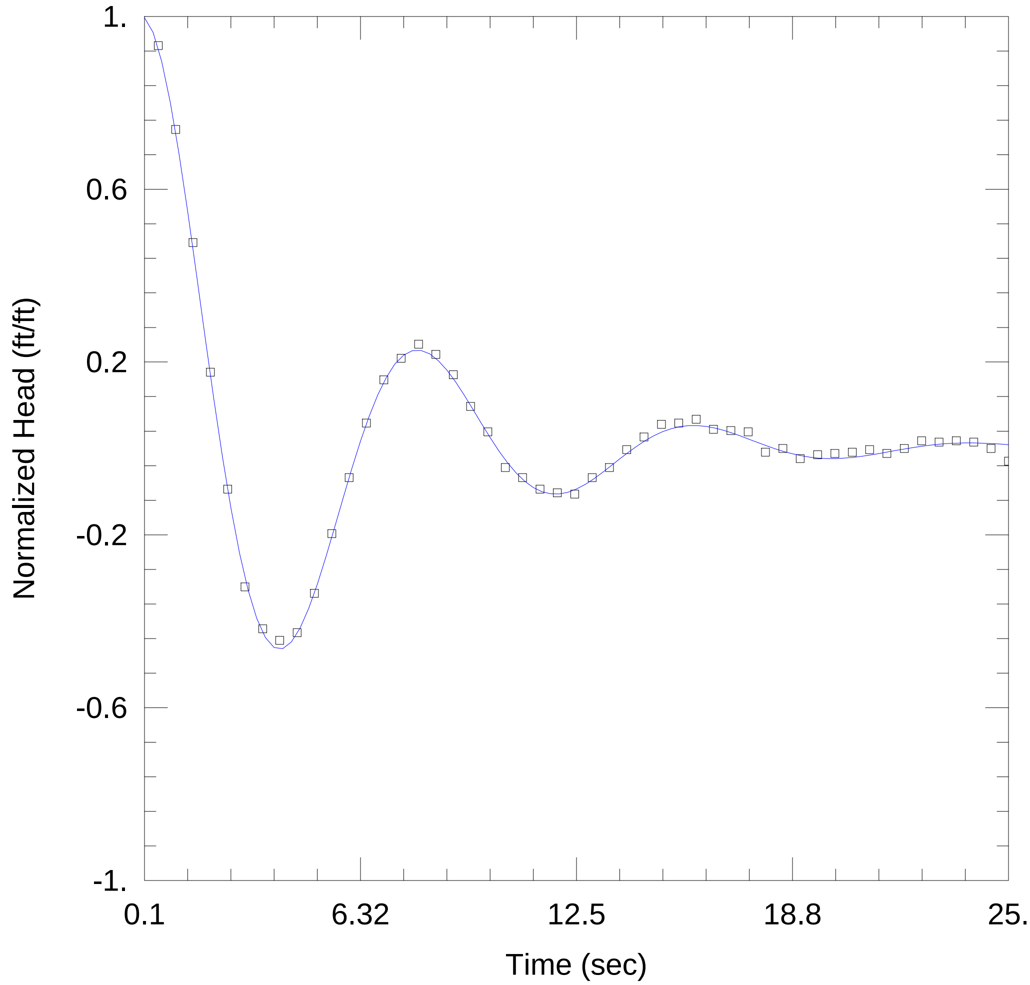
SOLUTION

Aquifer Model: Confined

Solution Method: Butler-Zhan

Kr = 0.135 cm/sec
Kz/Kr = 1.

Ss = 1.65E-7 ft^{-1}
Le = 51.68 ft



APW-16 RH01

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-16
Test Date: 3/11/2021

AQUIFER DATA

Saturated Thickness: 16.4 ft
Anisotropy Ratio (Kz/Kr): 1.

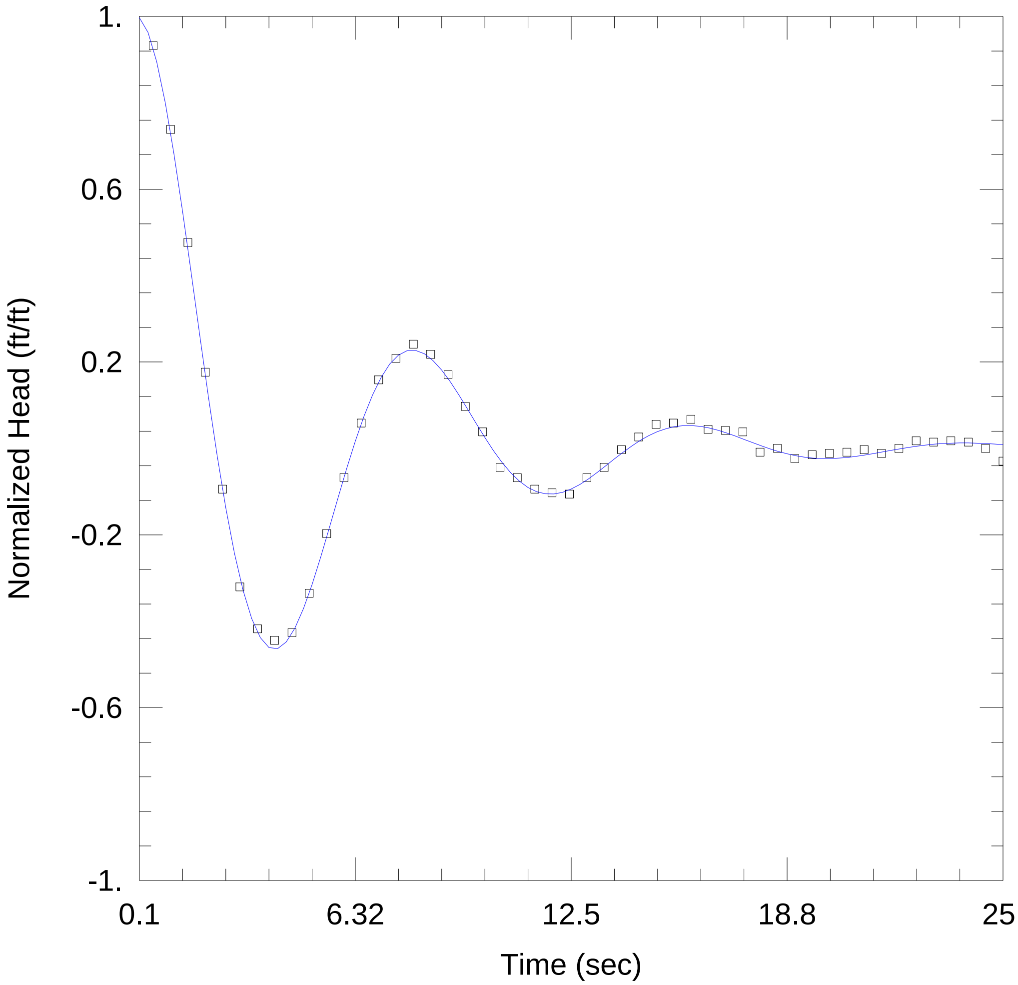
WELL DATA (APW-16)

Initial Displacement: 0.34 ft
Total Well Penetration Depth: 16.3 ft
Casing Radius: 0.086 ft
Static Water Column Height: 64.49 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler-Zhan

Kr = 0.145 cm/sec
Kz/Kr = 1.
Ss = 1.21E-7 ft^{-1}
Le = 50.37 ft



APW-16 RH01

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-16
Test Date: 3/11/2021

AQUIFER DATA

Saturated Thickness: 16.4 ft
Anisotropy Ratio (Kz/Kr): 1.

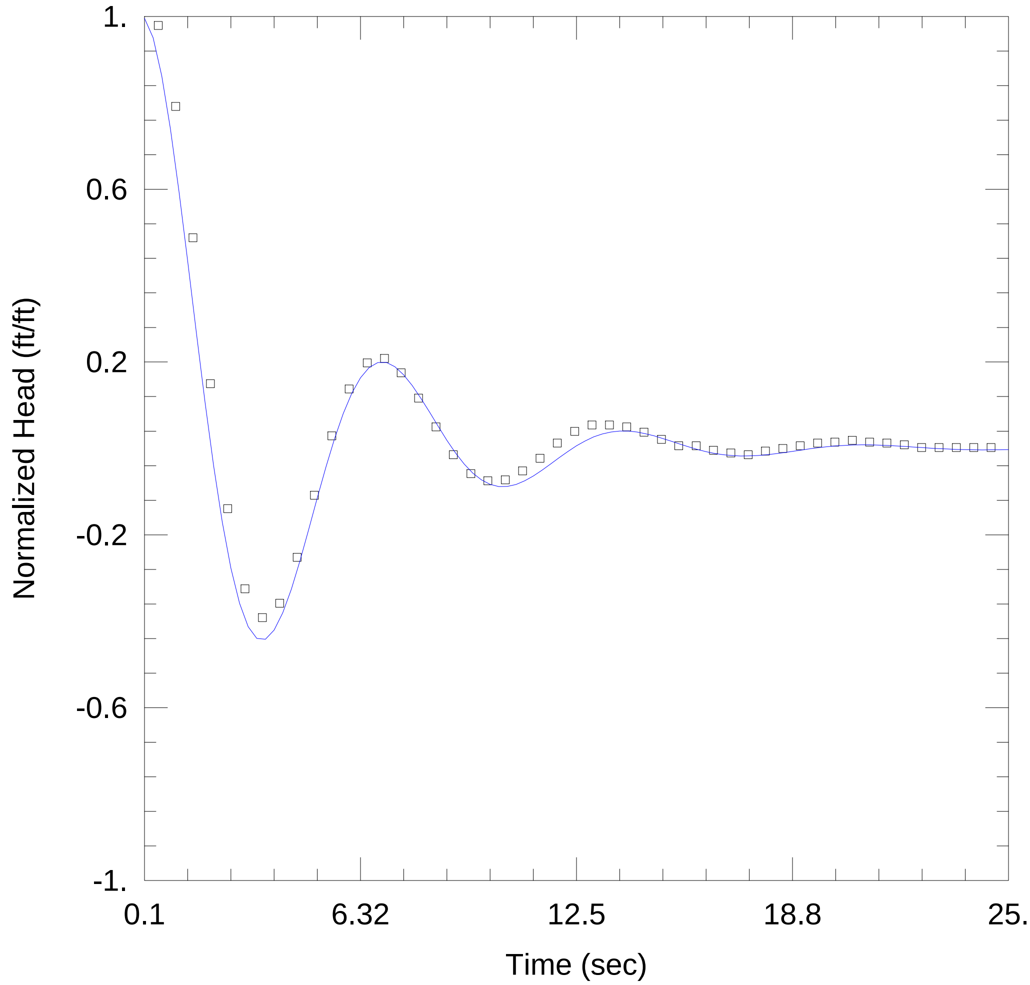
WELL DATA (APW-16)

Initial Displacement: 0.34 ft
Total Well Penetration Depth: 16.3 ft
Casing Radius: 0.086 ft
Static Water Column Height: 64.49 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler-Zhan

Kr = 0.145 cm/sec
Kz/Kr = 1.
Ss = 1.21E-7 ft^{-1}
Le = 50.37 ft



APW-17 FH01

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-17
Test Date: 02/16/2021

AQUIFER DATA

Saturated Thickness: 84.7 ft
Anisotropy Ratio (Kz/Kr): 1.

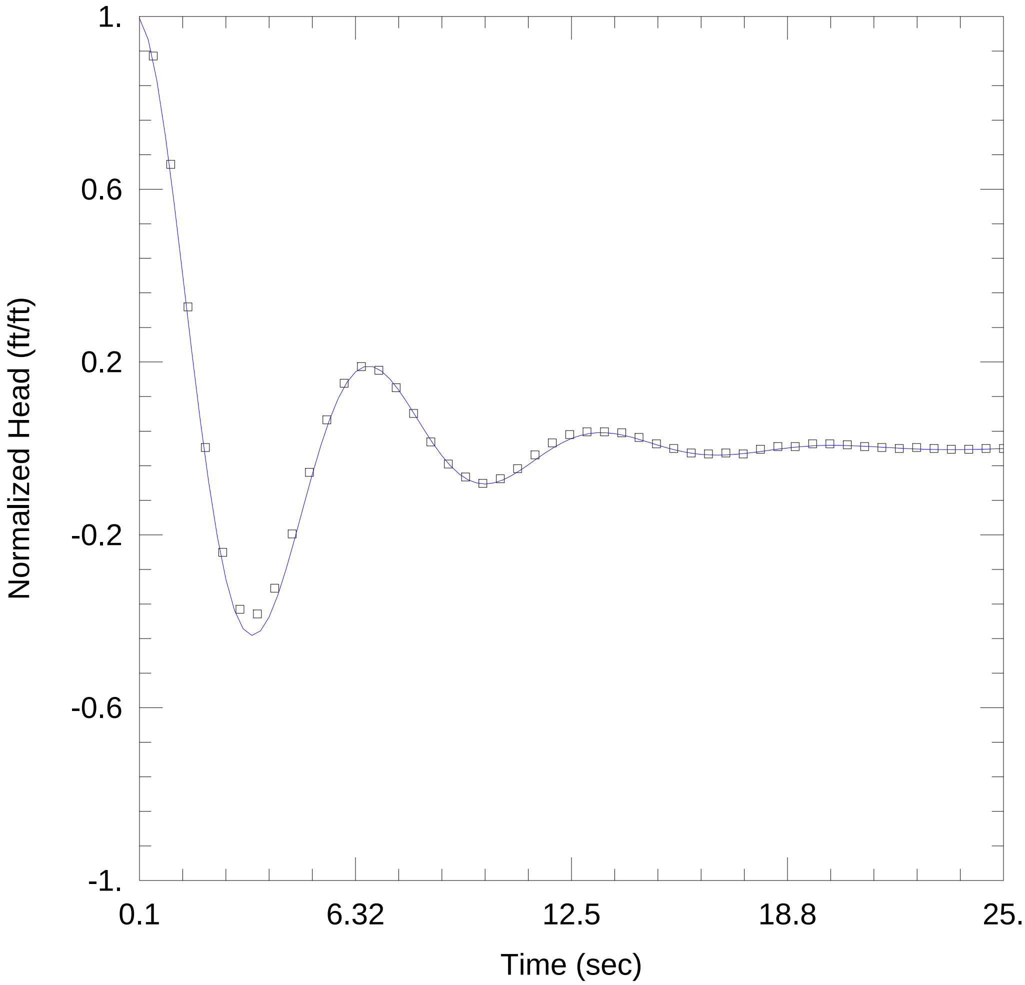
WELL DATA (APW-17)

Initial Displacement: 0.48 ft
Total Well Penetration Depth: 79.7 ft
Casing Radius: 0.086 ft
Static Water Column Height: 53.93 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler-Zhan

Kr = 0.113 cm/sec
Kz/Kr = 1.
Ss = 5.88E-7 ft^{-1}
Le = 37.31 ft



APW-17 FH02

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-17
Test Date: 02/16/2021

AQUIFER DATA

Saturated Thickness: 84.7 ft
Anisotropy Ratio (Kz/Kr): 1.

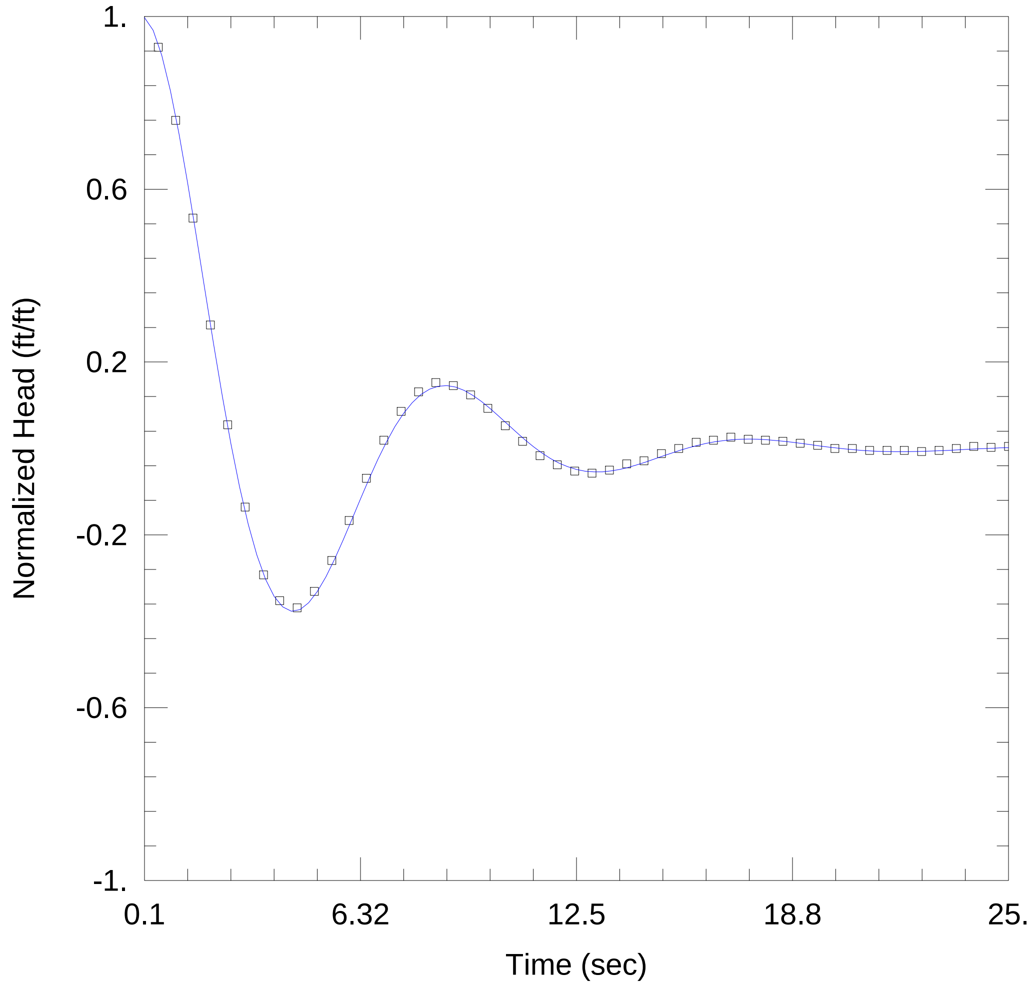
WELL DATA (APW-17)

Initial Displacement: 0.47 ft
Total Well Penetration Depth: 79.7 ft
Casing Radius: 0.086 ft
Static Water Column Height: 53.93 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler-Zhan

Kr = 0.115 cm/sec
Kz/Kr = 1.
Ss = 2.88E-7 ft^{-1}
Le = 34.54 ft



APW-17 RH01

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-17
Test Date: 02/16/2021

AQUIFER DATA

Saturated Thickness: 84.7 ft
Anisotropy Ratio (Kz/Kr): 1.

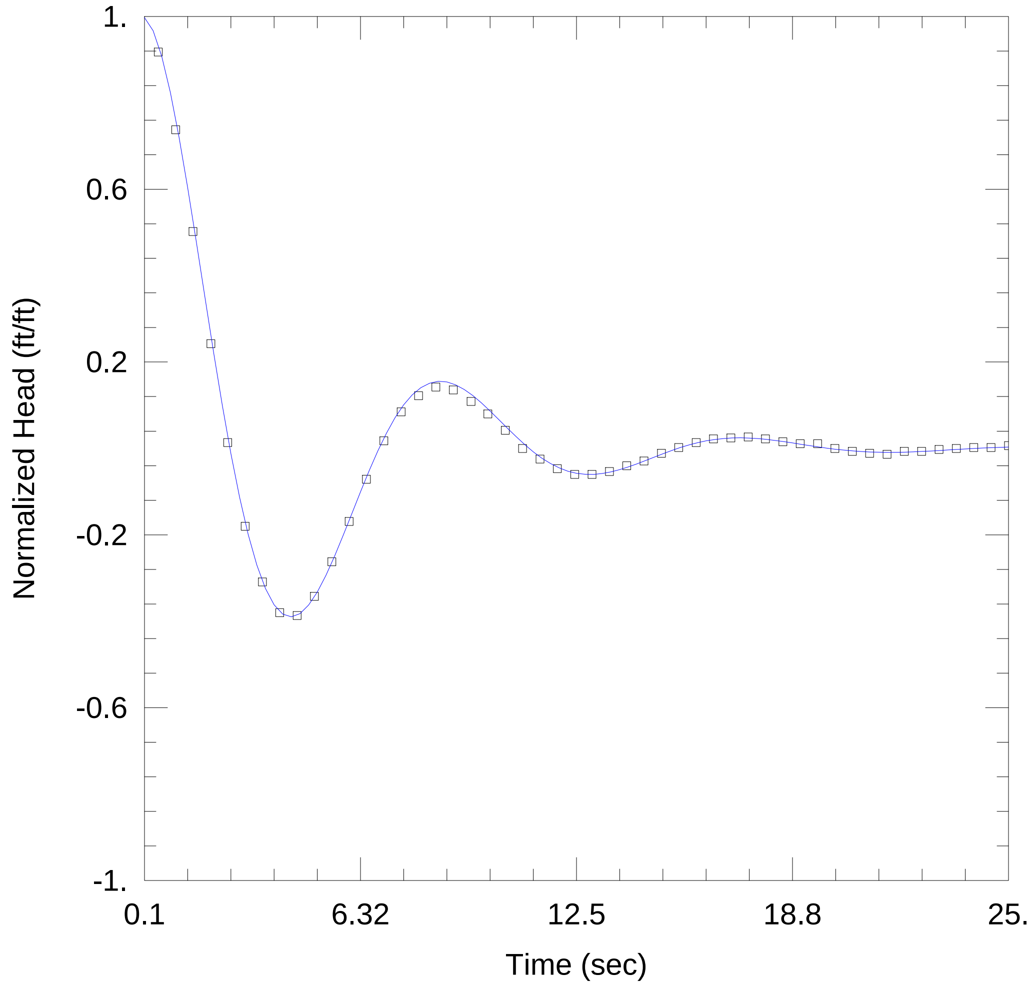
WELL DATA (APW-17)

Initial Displacement: 0.42 ft
Total Well Penetration Depth: 79.7 ft
Casing Radius: 0.086 ft
Static Water Column Height: 53.93 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler-Zhan

Kr = 0.076 cm/sec
Kz/Kr = 1.
Ss = 2.88E-7 ft^{-1}
Le = 57.77 ft



APW-17 RH02

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-17
Test Date: 02/16/2021

AQUIFER DATA

Saturated Thickness: 84.7 ft
Anisotropy Ratio (Kz/Kr): 1.

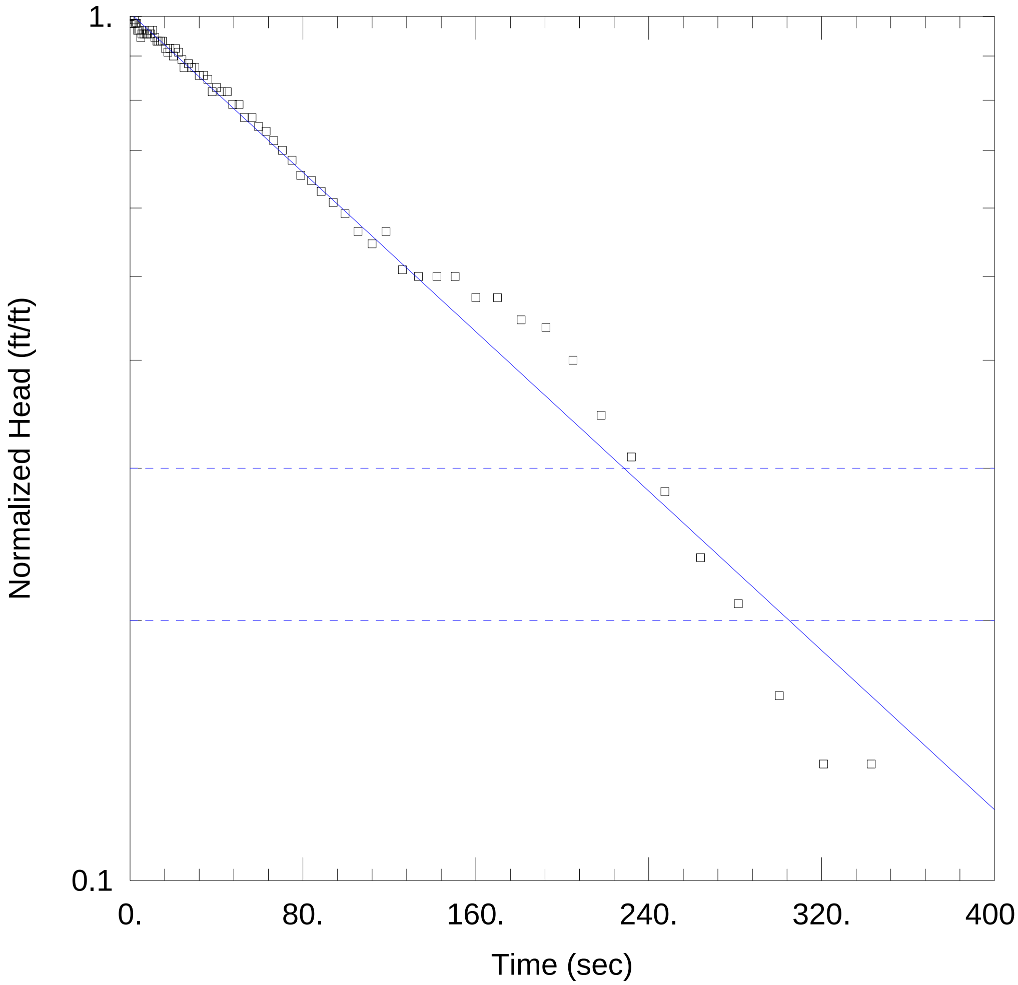
WELL DATA (APW-17)

Initial Displacement: 0.45 ft
Total Well Penetration Depth: 79.7 ft
Casing Radius: 0.086 ft
Static Water Column Height: 53.93 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler-Zhan

Kr = 0.0796 cm/sec
Kz/Kr = 1.
Ss = 2.88E-7 ft^{-1}
Le = 56.31 ft



APW-18 FH01

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: APW-18
Test Date: 2/16/21

AQUIFER DATA

Saturated Thickness: 78.8 ft
Anisotropy Ratio (Kz/Kr): 1.

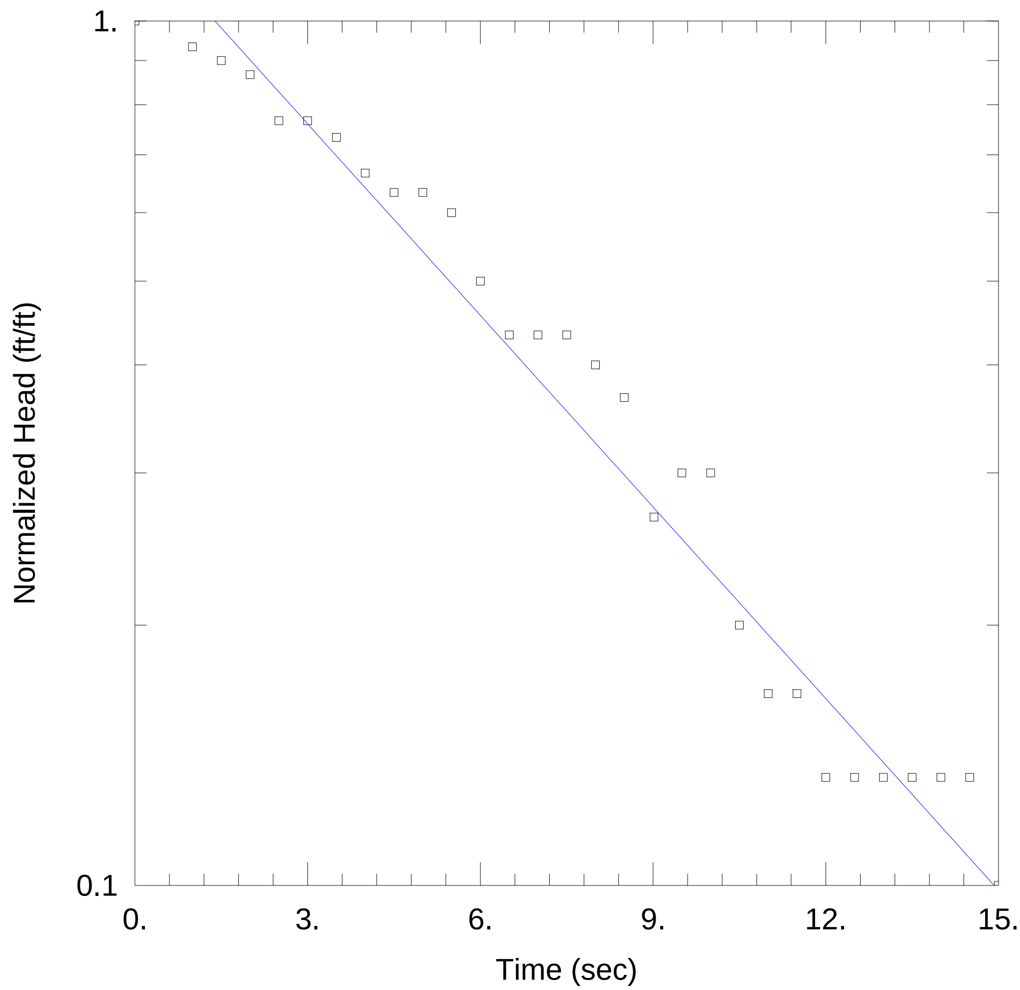
WELL DATA (APW-18)

Initial Displacement: 0.11 ft
Total Well Penetration Depth: 51.1 ft
Casing Radius: 0.086 ft
Static Water Column Height: 31.38 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.000267 cm/sec
y0 = 0.111 ft



XPW-01 FH01

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: XPW-01
Test Date: 3/11/21

AQUIFER DATA

Saturated Thickness: 8. ft
Anisotropy Ratio (Kz/Kr): 1.

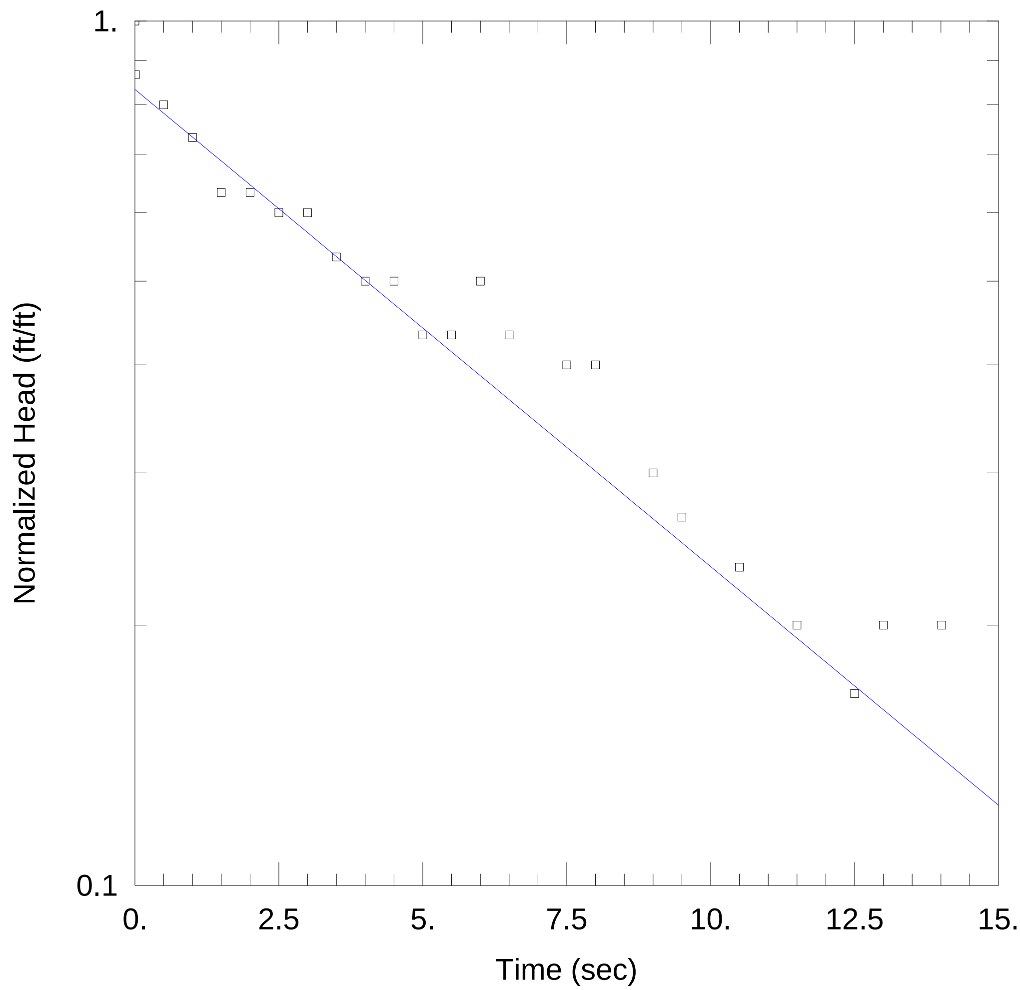
WELL DATA (XPW-01)

Initial Displacement: 0.03 ft
Total Well Penetration Depth: 8.033 ft
Casing Radius: 0.086 ft
Static Water Column Height: 8.033 ft
Screen Length: 8.033 ft
Well Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.183 cm/sec
y0 = 0.038 ft



XPW-01 FH-02

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: XPW-01
Test Date: 3/11/21

AQUIFER DATA

Saturated Thickness: 8. ft
Anisotropy Ratio (Kz/Kr): 1.

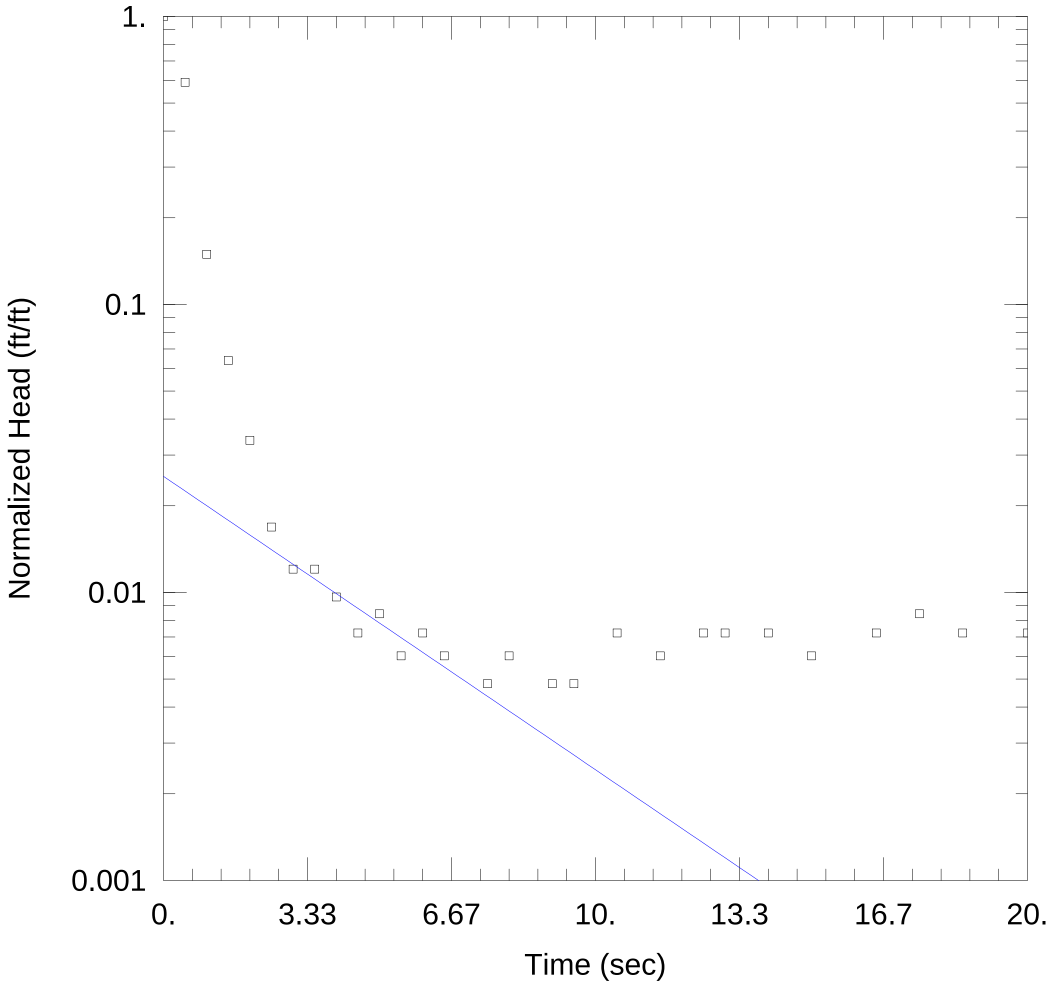
WELL DATA (XPW-01)

Initial Displacement: 0.03 ft
Total Well Penetration Depth: 8.033 ft
Casing Radius: 0.086 ft
Static Water Column Height: 8.033 ft
Screen Length: 8.033 ft
Well Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0129 cm/sec
y0 = 0.025 ft



XPW-01 RH1

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: XPW-01
Test Date: 3/11/21

AQUIFER DATA

Saturated Thickness: 8. ft
Anisotropy Ratio (Kz/Kr): 1.

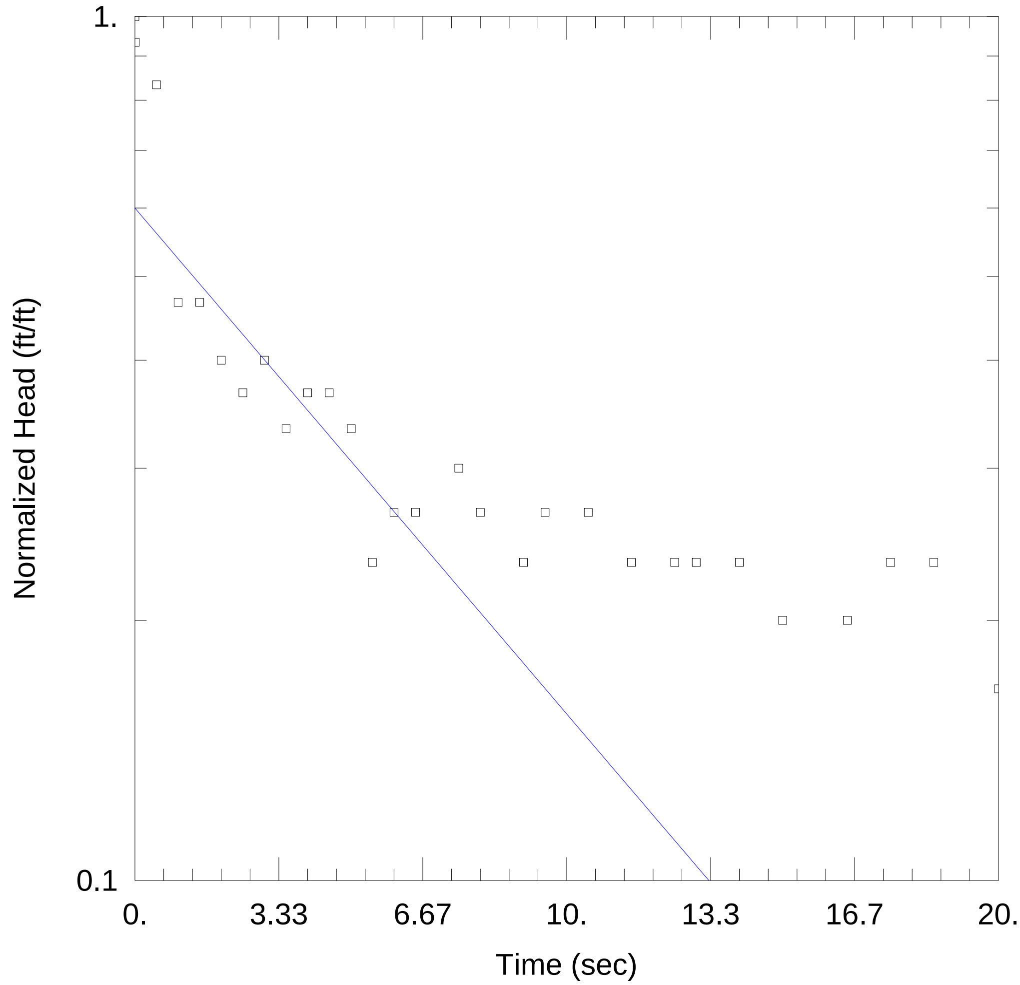
WELL DATA (XPW-01)

Initial Displacement: 0.83 ft
Total Well Penetration Depth: 8.033 ft
Casing Radius: 0.086 ft
Static Water Column Height: 8.033 ft
Screen Length: 8.033 ft
Well Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0238 cm/sec
y0 = 0.021 ft



XPW-01 RH2

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: XPW-01
Test Date: 3/11/21

AQUIFER DATA

Saturated Thickness: 8. ft
Anisotropy Ratio (Kz/Kr): 1.

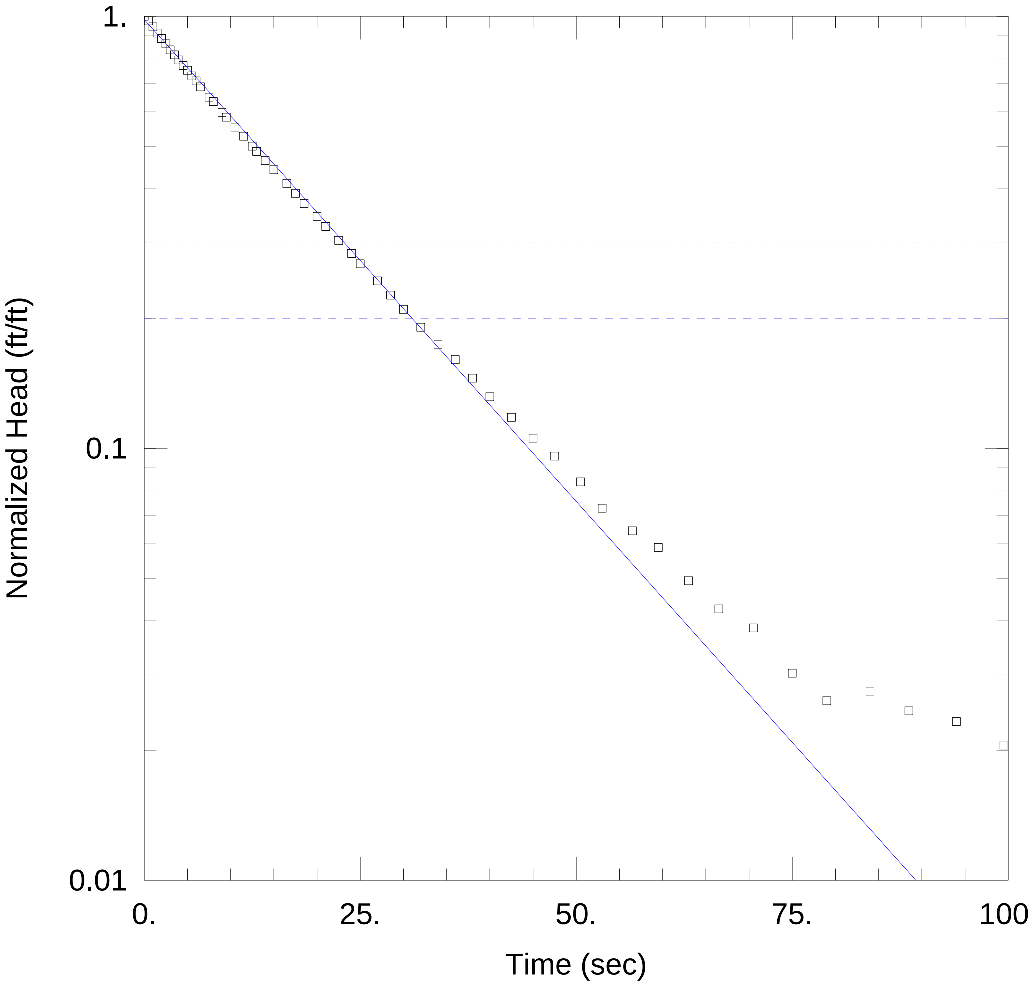
WELL DATA (XPW-01)

Initial Displacement: 0.03 ft
Total Well Penetration Depth: 8.033 ft
Casing Radius: 0.08625 ft
Static Water Column Height: 8.033 ft
Screen Length: 8.033 ft
Well Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0137 cm/sec
y0 = 0.018 ft



XPW02 FH1

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: XPW02
Test Date: 3/11/21

AQUIFER DATA

Saturated Thickness: 7.259 ft
Anisotropy Ratio (Kz/Kr): 1.

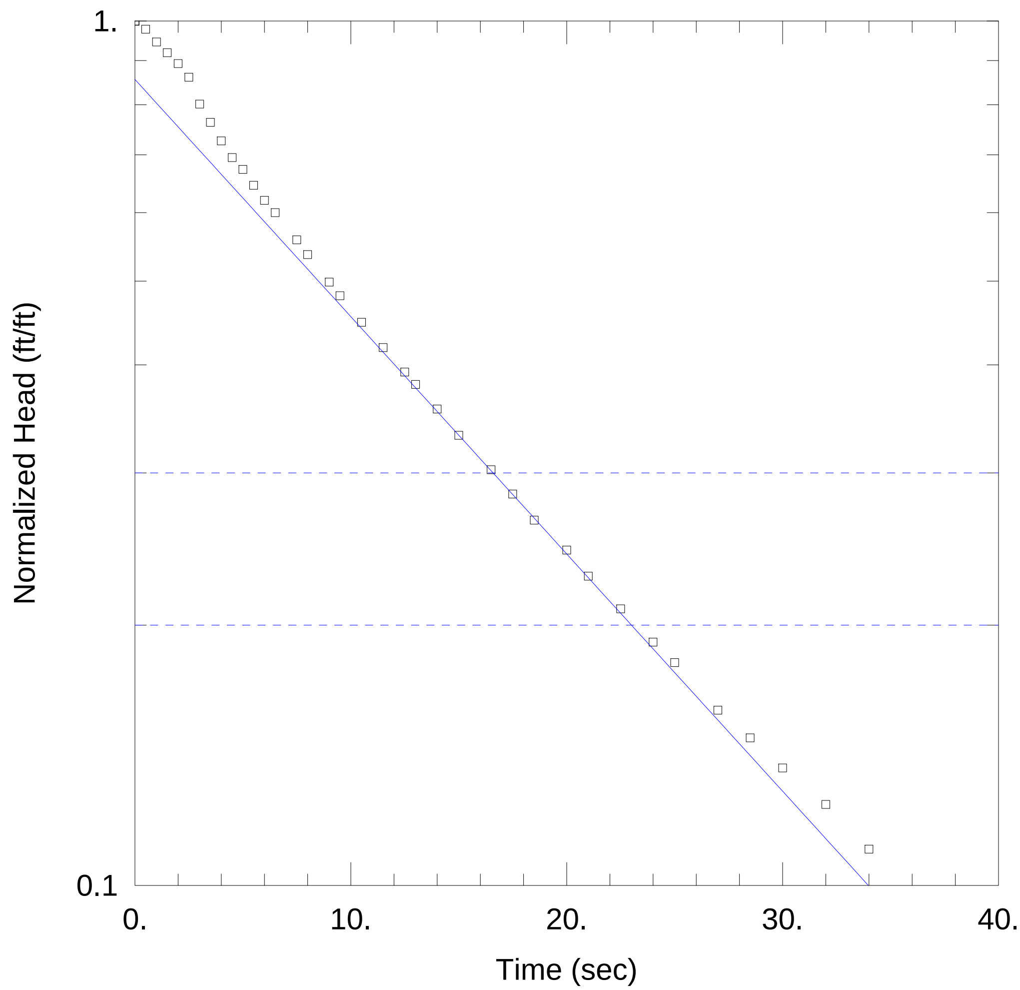
WELL DATA (XPW02)

Initial Displacement: 0.73 ft
Total Well Penetration Depth: 7.259 ft
Casing Radius: 0.086 ft
Static Water Column Height: 9.759 ft
Screen Length: 7.259 ft
Well Radius: 0.25 ft
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.00197 cm/sec
y0 = 0.717 ft



XPW02 FH2

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: XPW02
Test Date: 3/11/21

AQUIFER DATA

Saturated Thickness: 7.259 ft
Anisotropy Ratio (Kz/Kr): 1.

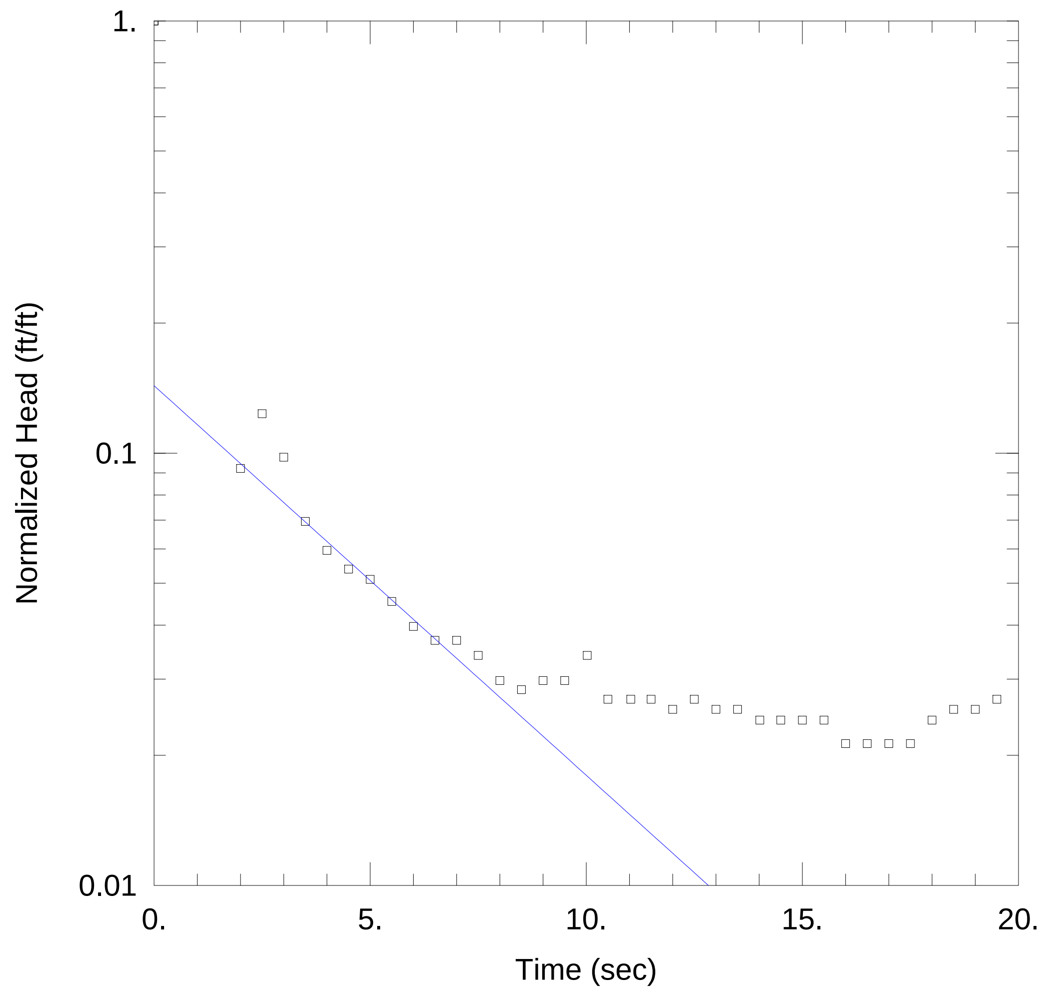
WELL DATA (XPW02)

Initial Displacement: 0.79 ft
Total Well Penetration Depth: 7.259 ft
Casing Radius: 0.086 ft
Static Water Column Height: 9.759 ft
Screen Length: 7.259 ft
Well Radius: 0.25 ft
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.00257 cm/sec
y0 = 0.676 ft



XPW03 FH1

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: XPW03
Test Date: 3/31/21

AQUIFER DATA

Saturated Thickness: 7.958 ft
Anisotropy Ratio (Kz/Kr): 1.

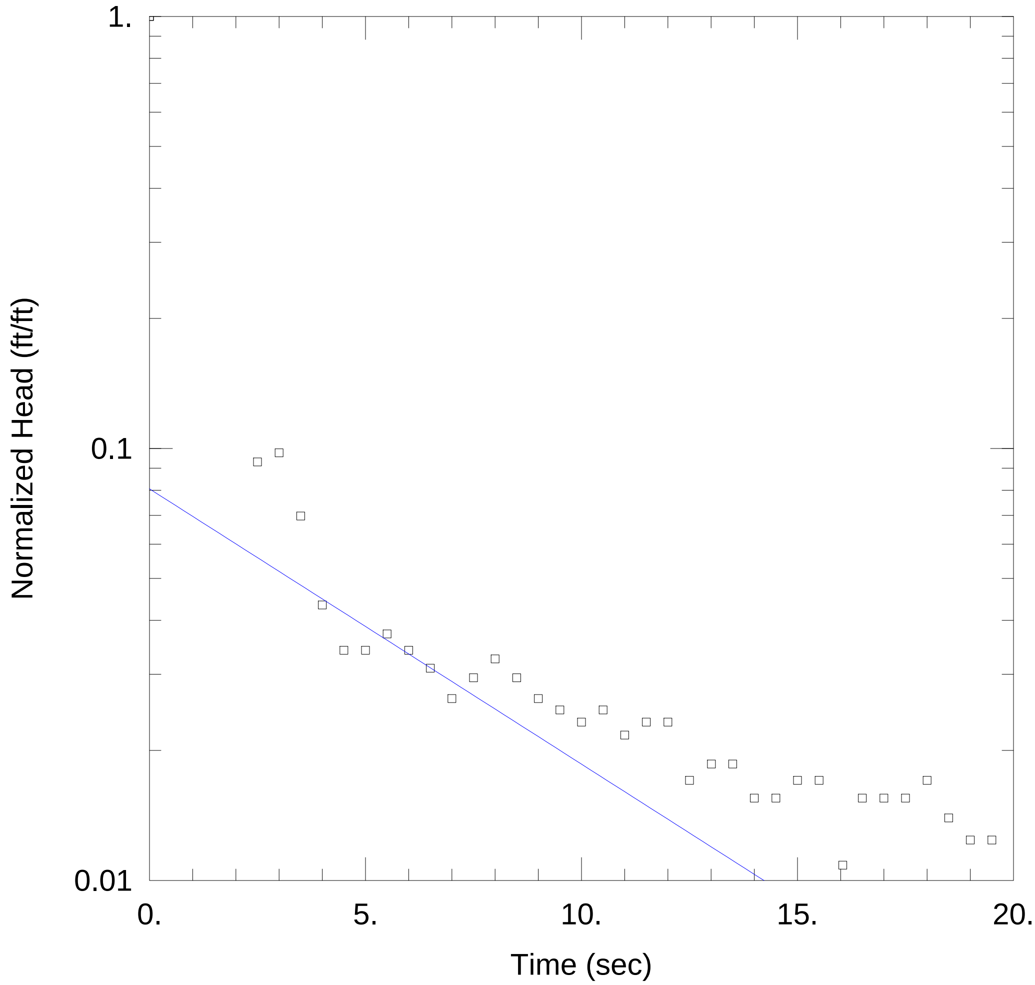
WELL DATA (XPW03)

Initial Displacement: 0.705 ft
Total Well Penetration Depth: 4.7 ft
Casing Radius: 0.086 ft
Static Water Column Height: 13.26 ft
Screen Length: 4.7 ft
Well Radius: 0.25 ft
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0573 cm/sec
y0 = 0.101 ft



XPW03 FH2

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: XPW03
Test Date: 3/31/21

AQUIFER DATA

Saturated Thickness: 7.938 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (XPW03)

Initial Displacement: 0.645 ft
Total Well Penetration Depth: 4.7 ft
Casing Radius: 0.086 ft

Static Water Column Height: 13.24 ft
Screen Length: 4.7 ft
Well Radius: 0.25 ft
Gravel Pack Porosity: 0.

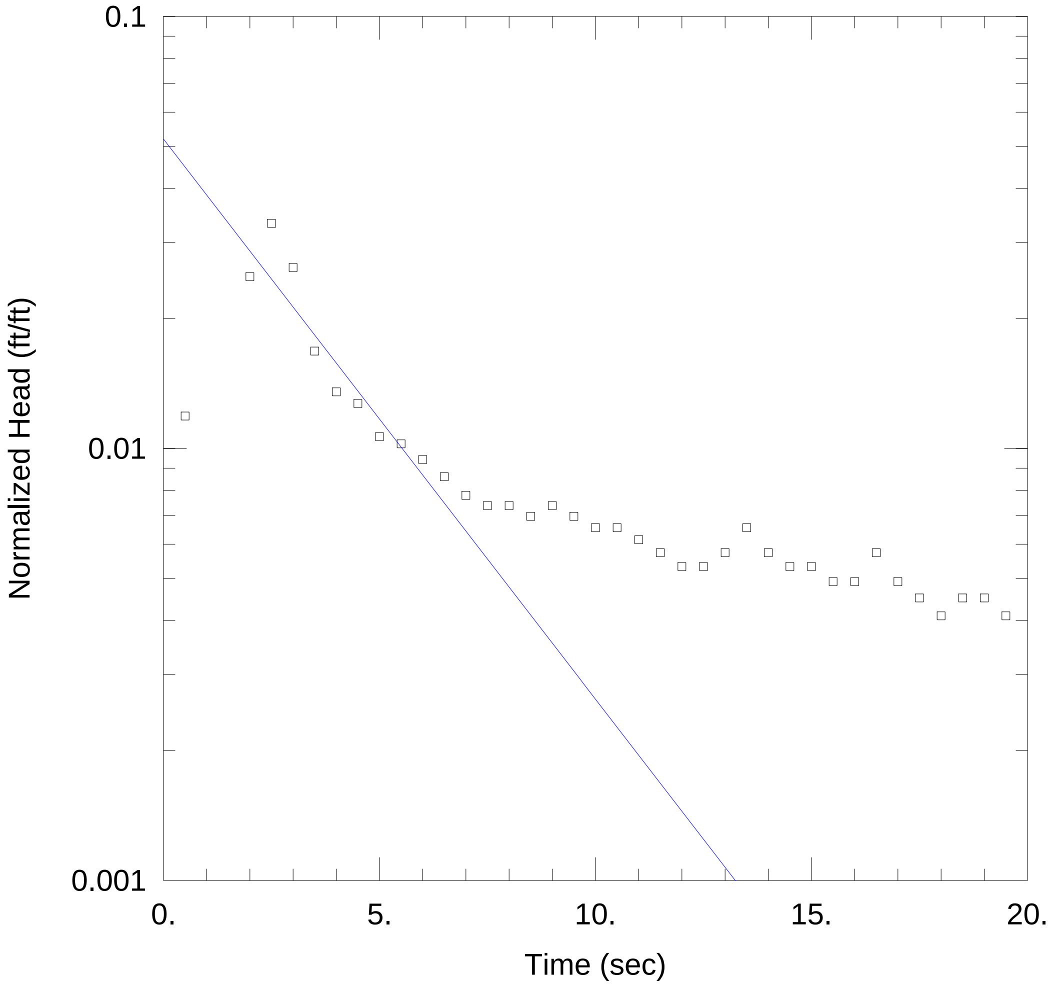
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.072 cm/sec

y0 = 0.052 ft



XPW03 FH3

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: XPW03
Test Date: 3/31/21

AQUIFER DATA

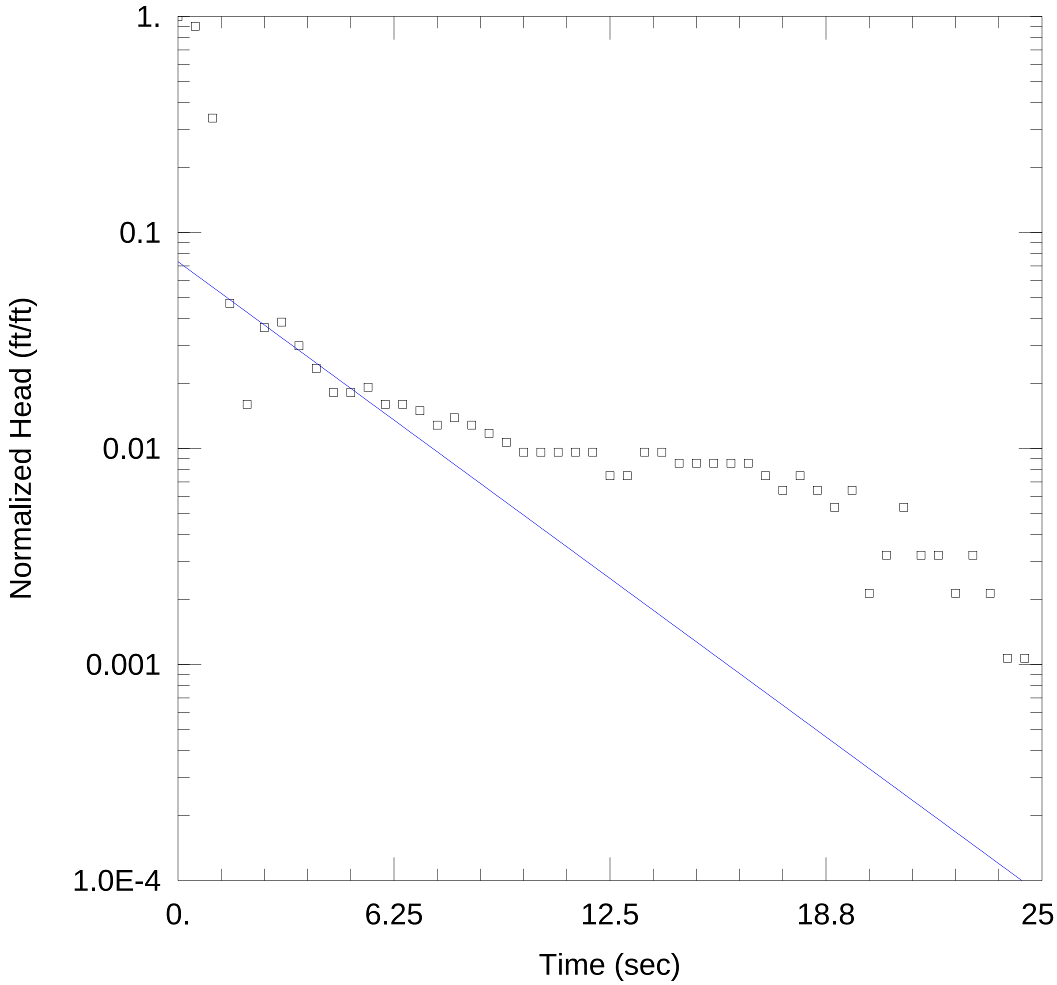
Saturated Thickness: 7.948 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (XPW03)

Initial Displacement: 2.441 ft
Total Well Penetration Depth: 4.7 ft
Casing Radius: 0.086 ft
Static Water Column Height: 13.25 ft
Screen Length: 4.7 ft
Well Radius: 0.25 ft
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.227 cm/sec
y0 = 0.127 ft



XPW03 RH01

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: XPW03
Test Date: 3/31/21

AQUIFER DATA

Saturated Thickness: 7.948 ft
Anisotropy Ratio (Kz/Kr): 1.

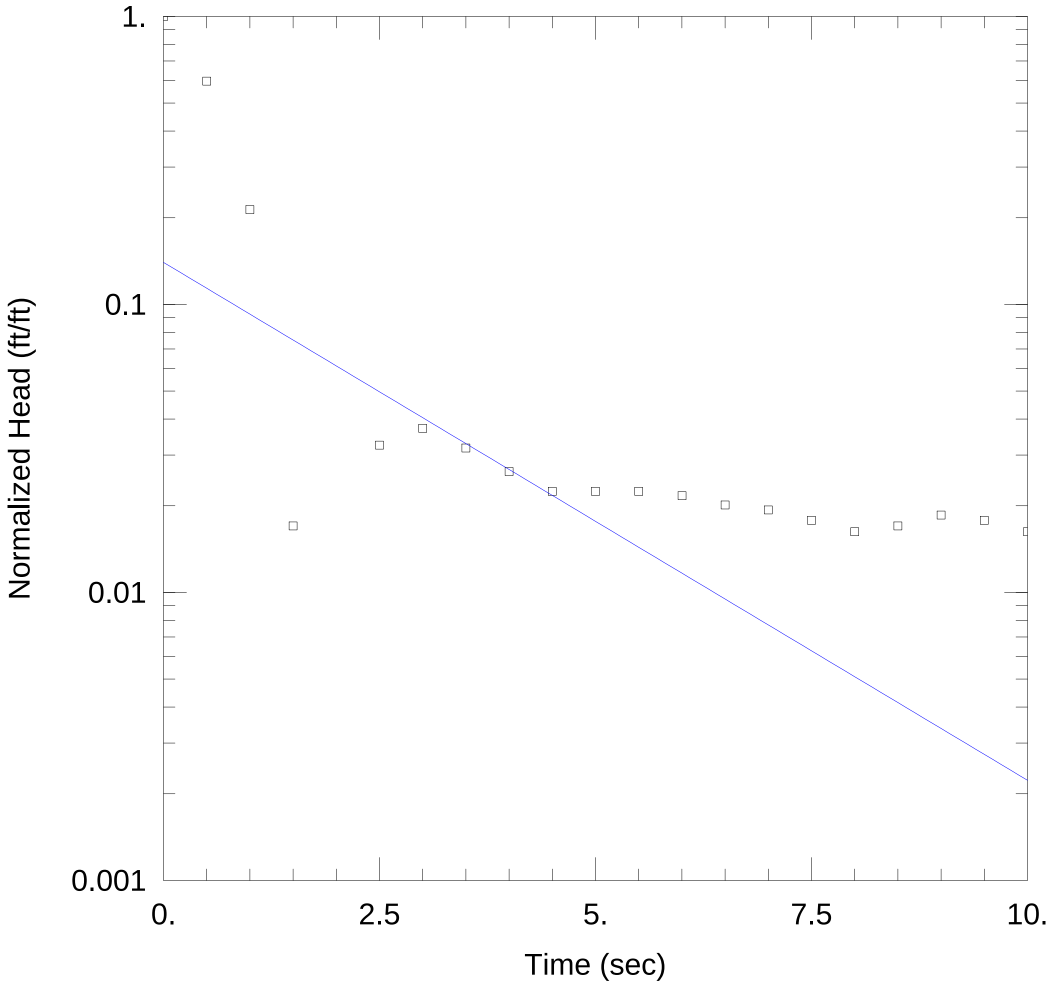
WELL DATA (XPW03)

Initial Displacement: -0.937 ft
Total Well Penetration Depth: 4.7 ft
Casing Radius: 0.086 ft
Static Water Column Height: 13.25 ft
Screen Length: 4.7 ft
Well Radius: 0.25 ft
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.146 cm/sec
y0 = -0.0686 ft



XPW03 RH2

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: XPW03
Test Date: 3/31/21

AQUIFER DATA

Saturated Thickness: 7.948 ft
Anisotropy Ratio (Kz/Kr): 1.

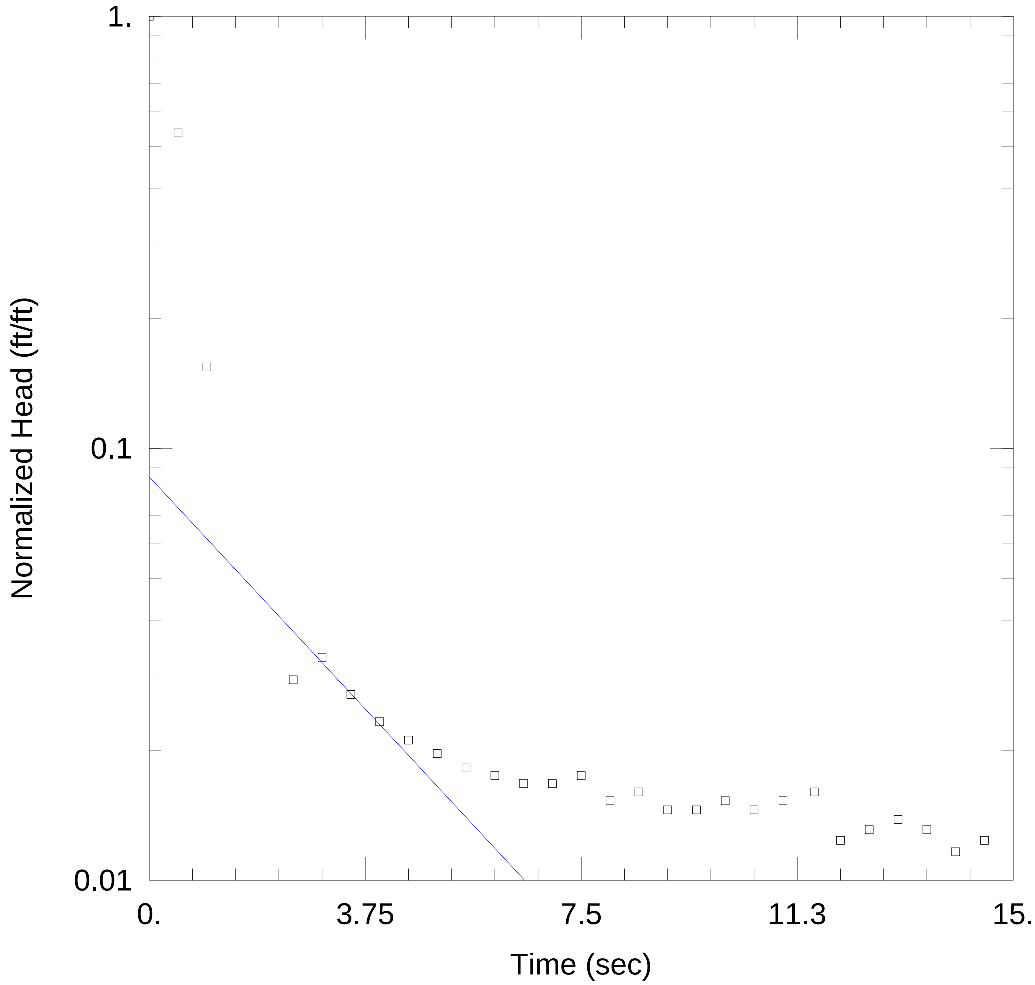
WELL DATA (XPW03)

Initial Displacement: -1.293 ft
Total Well Penetration Depth: 4.7 ft
Casing Radius: 0.086 ft
Static Water Column Height: 13.25 ft
Screen Length: 4.7 ft
Well Radius: 0.25 ft
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.117 cm/sec
y0 = -0.181 ft



XPW03 RH3

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: XPW03
Test Date: 3/31/21

AQUIFER DATA

Saturated Thickness: 7.948 ft
Anisotropy Ratio (Kz/Kr): 1.

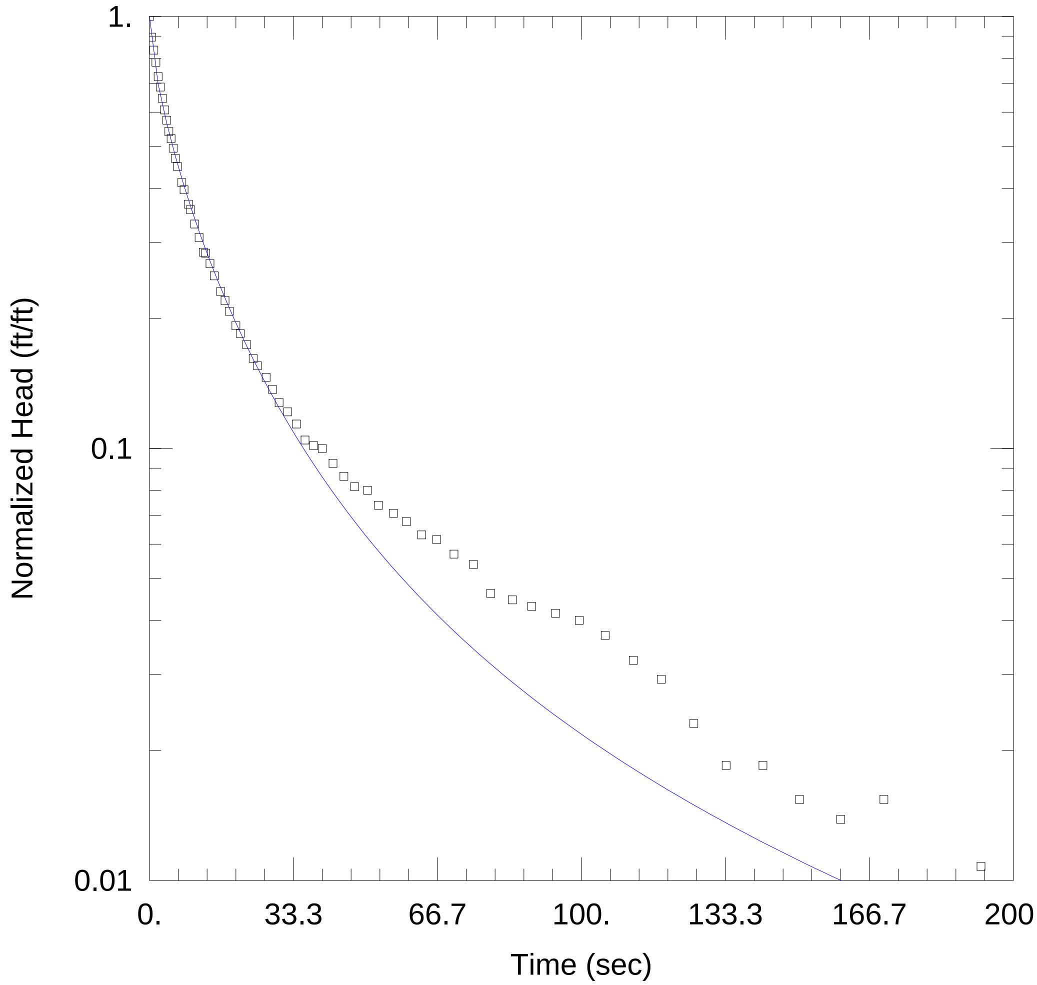
WELL DATA (XPW03)

Initial Displacement: -1.375 ft
Total Well Penetration Depth: 4.7 ft
Casing Radius: 0.086 ft
Static Water Column Height: 13.25 ft
Screen Length: 4.7 ft
Well Radius: 0.25 ft
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.143 cm/sec
y0 = -0.118 ft



XPW04 FH2

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: XPW04
Test Date: 3/11/21

AQUIFER DATA

Saturated Thickness: 9.9 ft

WELL DATA (XPW04)

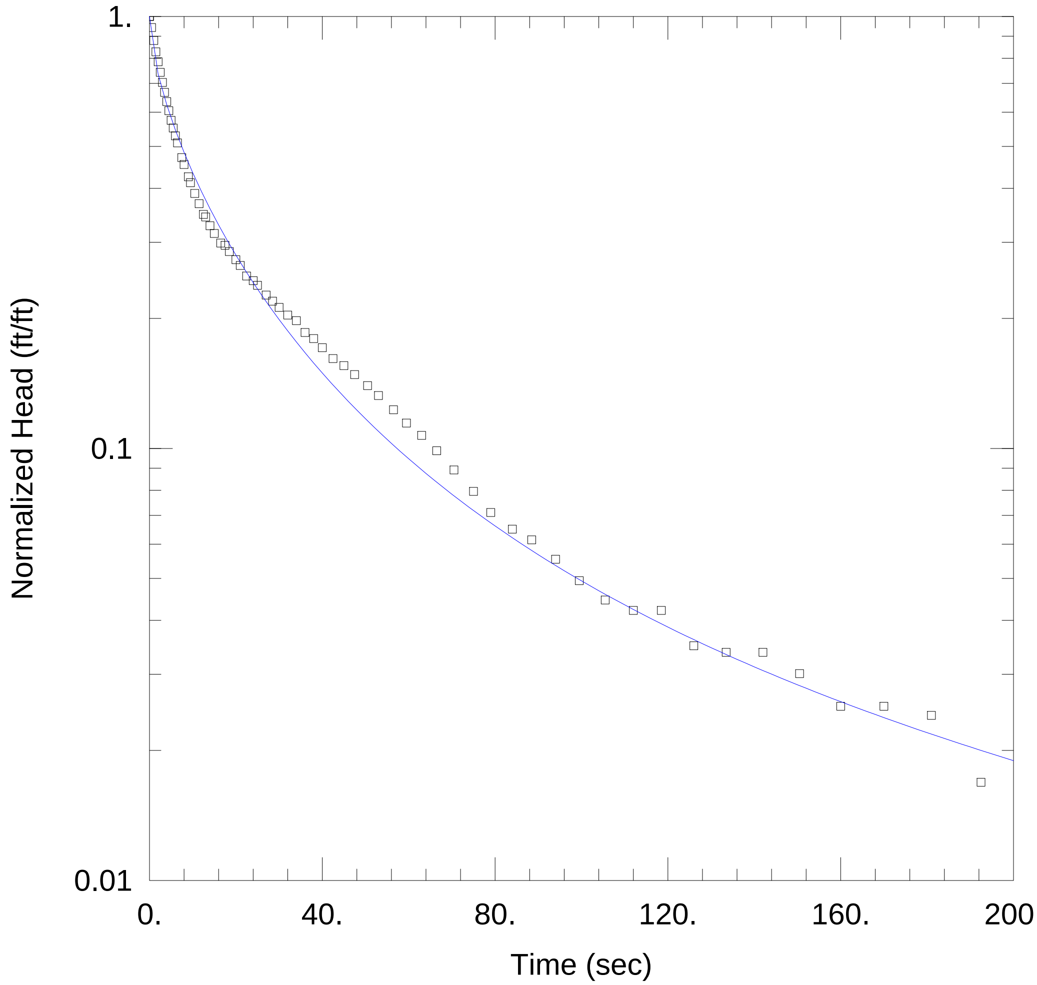
Initial Displacement: 0.65 ft
Total Well Penetration Depth: 9.9 ft
Casing Radius: 0.086 ft

Static Water Column Height: 10.4 ft
Screen Length: 9.5 ft
Well Radius: 0.25 ft
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined
Kr = 0.0021 cm/sec
Kz/Kr = 1.

Solution Method: KGS Model
Ss = 0.00051 ft^{-1}



XPW04 RH1

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: XPW04
Test Date: 3/11/21

AQUIFER DATA

Saturated Thickness: 9.9 ft

WELL DATA (XPW04)

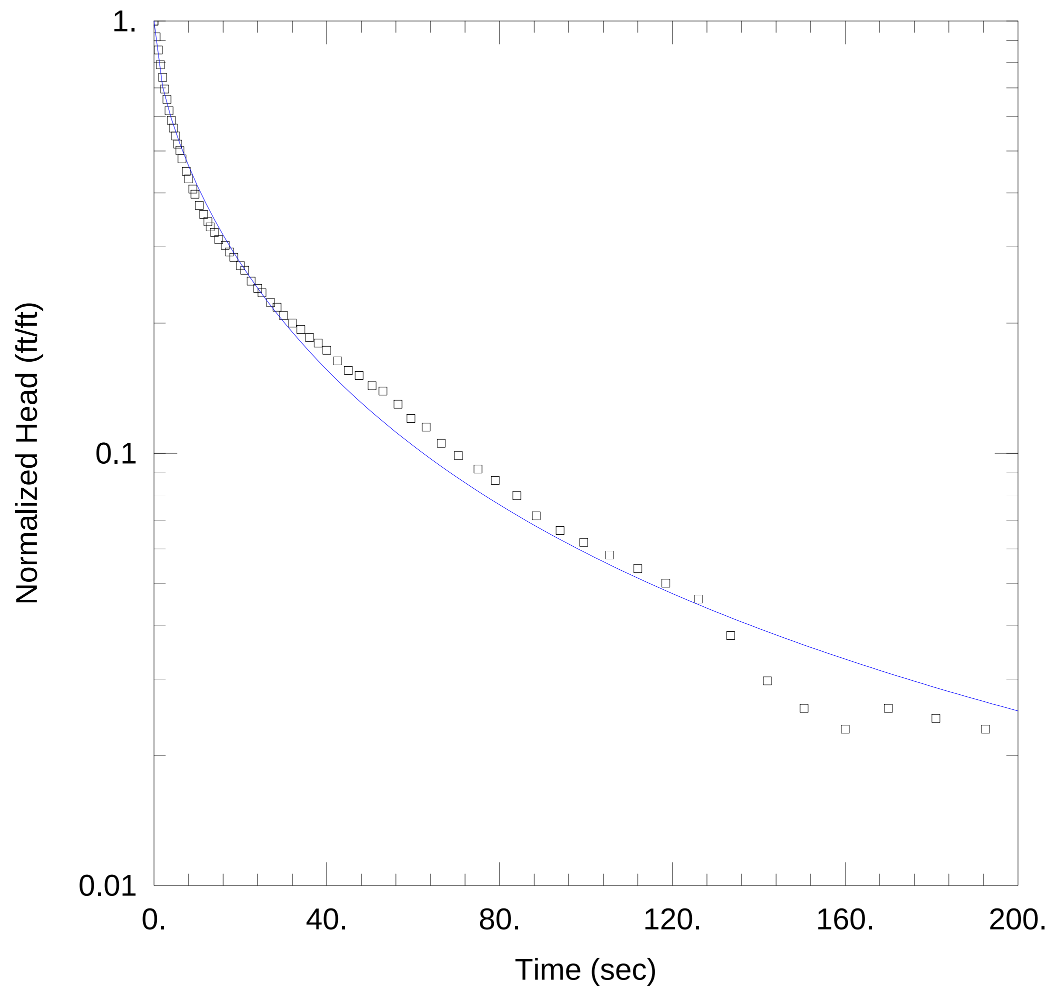
Initial Displacement: 0.83 ft
Total Well Penetration Depth: 9.9 ft
Casing Radius: 0.086 ft

Static Water Column Height: 10.4 ft
Screen Length: 9.5 ft
Well Radius: 0.25 ft
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.00122 cm/sec
Kz/Kr = 1.
Ss = 0.00094 ft^{-1}



XPW04 RH2

PROJECT INFORMATION

Company: Ramboll
Client: IPGC
Project: 1940100499-001
Location: Newton
Test Well: XPW04
Test Date: 3/11/21

AQUIFER DATA

Saturated Thickness: 9.9 ft

WELL DATA (XPW04)

Initial Displacement: 0.74 ft
Total Well Penetration Depth: 9.9 ft
Casing Radius: 0.086 ft

Static Water Column Height: 10.4 ft
Screen Length: 9.5 ft
Well Radius: 0.25 ft
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined

Solution Method: KGS Model

Kr = 0.00101 cm/sec
Kz/Kr = 1.

Ss = 0.0019 ft^{-1}

2017 HYDRAULIC CONDUCTIVITY TEST DATA

Appendix C - Table 1
Newton Power Station
Slug Test Results - Primary Ash Pond Wells (ID 501)
Hydrogeologic Monitoring Plan

Well ID	Slug In 1	Slug In 2	Slug In 3	Slug Out 1	Slug Out 2	Slug Out 3	Slug Out 4	MIN	MAX	GEOMEAN	Solution
APW2		4.41E-05		4.52E-05		3.45E-05		3.45E-05	4.52E-05	4.1E-05	Bouwer-Rice
APW3	8.44E-06			8.61E-06				8.44E-06	8.61E-06	8.5E-06	Bouwer-Rice
APW4	6.66E-06			5.14E-06				5.14E-06	6.66E-06	5.8E-06	Bouwer-Rice
APW5	5.66E-04	1.42E-03		1.54E-04	2.74E-04	2.56E-04		1.54E-04	1.42E-03	3.9E-04	Bouwer-Rice
APW6	1.64E-03	2.18E-03			2.09E-03	1.98E-03		1.64E-03	2.18E-03	2.0E-03	Bouwer-Rice
APW7	2.25E-03				3.24E-03	2.99E-03	2.75E-03	2.25E-03	3.24E-03	2.8E-03	Bouwer-Rice
APW8	6.60E-04	1.31E-03			1.06E-03	7.89E-04		6.60E-04	1.31E-03	9.2E-04	Bouwer-Rice
APW9	3.21E-03	3.28E-03		3.40E-03	3.00E-03			3.00E-03	3.40E-03	3.2E-03	Bouwer-Rice
APW10	5.27E-04	5.49E-04			5.73E-04	5.60E-04		5.27E-04	5.73E-04	5.5E-04	Bouwer-Rice

All slug test (i.e. hydraulic conductivity) results are in centimeters per second
[grey box] Not Applicable

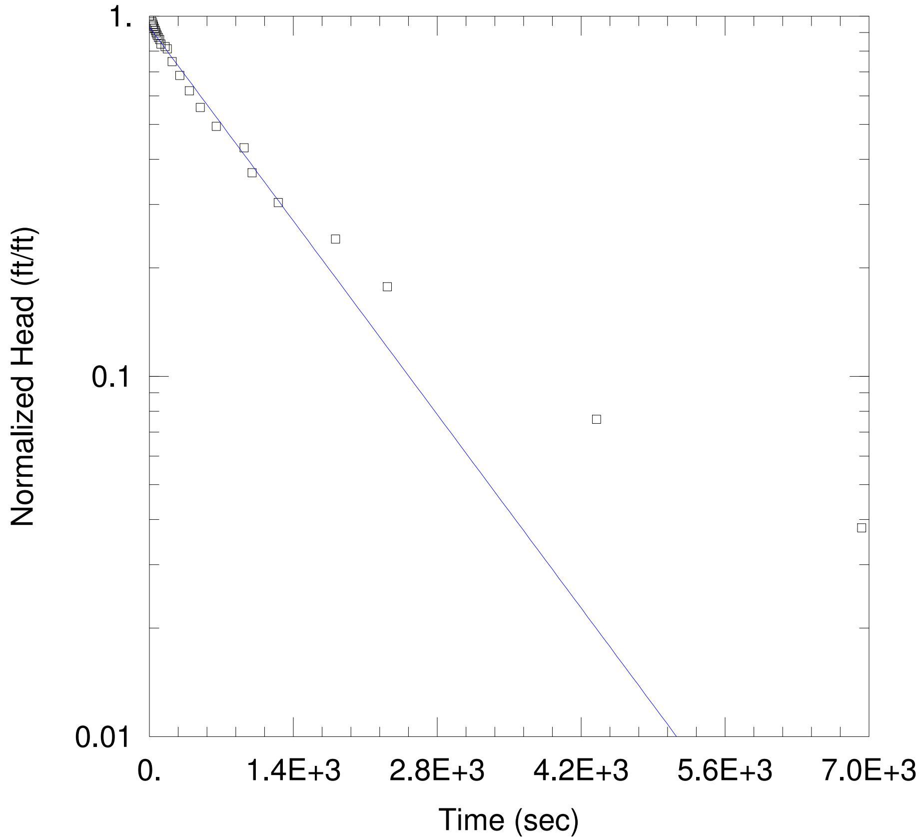
Appendix C - Table 2
Newton Power Station
Slug Test Results - Landfill 2 CCR Wells (ID 502)
Hydrogeologic Monitoring Plan

Well ID	Slug In 1	Slug In 2	Slug In 3	Slug Out 1	Slug Out 2	Slug Out 3	MIN	MAX	GEOMEAN	Solution
G06D				3.92E-08			3.92E-08	3.92E-08	3.9E-08	Bouwer-Rice
G202	1.70E-02	1.43E-02			2.87E-02	2.33E-02	1.43E-02	2.87E-02	2.0E-02	Bouwer-Rice
G203	2.53E-02			2.42E-02	3.47E-02		2.42E-02	3.47E-02	2.8E-02	Bouwer-Rice
G208				1.32E-08			1.32E-08	1.32E-08	1.3E-08	Bouwer-Rice
G217D	2.27E-04	2.92E-04				3.03E-04	2.27E-04	3.03E-04	2.7E-04	Bouwer-Rice
G220				3.51E-07			3.51E-07	3.51E-07	3.5E-07	Bouwer-Rice
G222				1.54E-06			1.54E-06	1.54E-06	1.5E-06	Bouwer-Rice
G223	5.19E-05	2.50E-05		1.37E-05	1.79E-05		1.37E-05	5.19E-05	2.4E-05	Bouwer-Rice
G224	5.15E-02	1.90E-02	4.64E-02	4.31E-02		2.97E-02	1.90E-02	5.15E-02	3.6E-02	Bouwer-Rice

All slug test (i.e. hydraulic conductivity) results are in centimeters per second

Not Applicable

Natural Resource Technology
AN OBG COMPANY



WELL TEST ANALYSIS

Data Set: P:\...\APW2 SI2.aqt
Date: 10/09/17 Time: 15:04:26

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW2
Test Date: 4/6/17

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

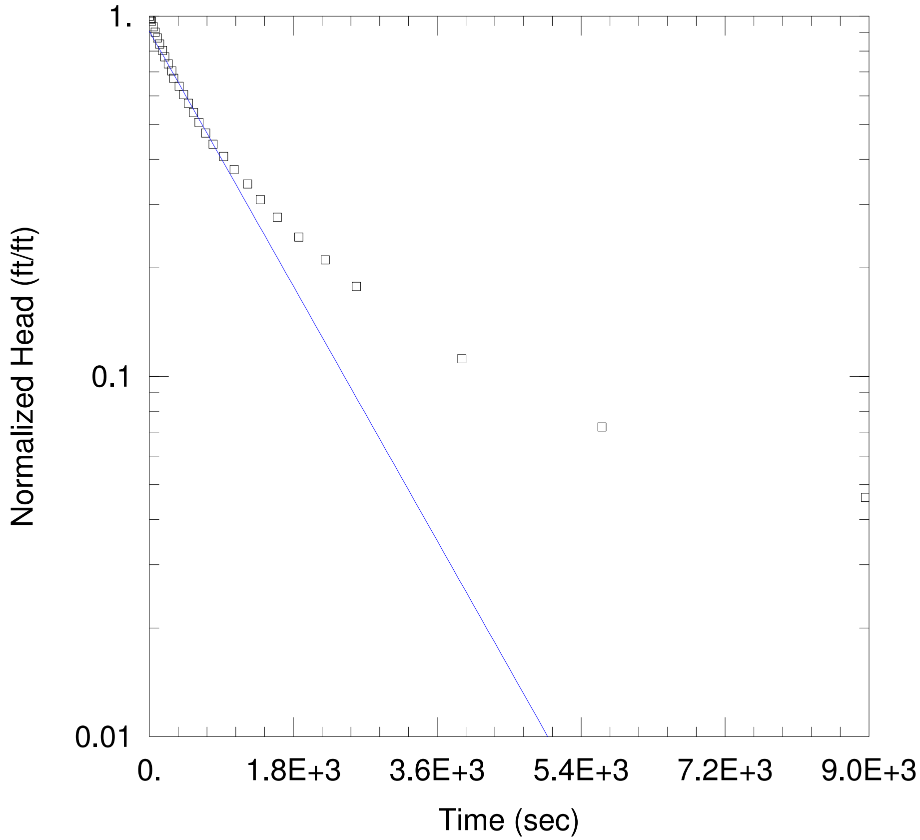
K = 4.414E-5 cm/sec
y0 = 0.7361 ft

AQUIFER DATA

Saturated Thickness: 9. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW2 SI2)

Initial Displacement: 0.79 ft
Total Well Penetration Depth: 6.4 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 9. ft
Screen Length: 3.4 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW2 SO1.aqt
Date: 10/09/17 Time: 15:05:33

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW2
Test Date: 4/6/17

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

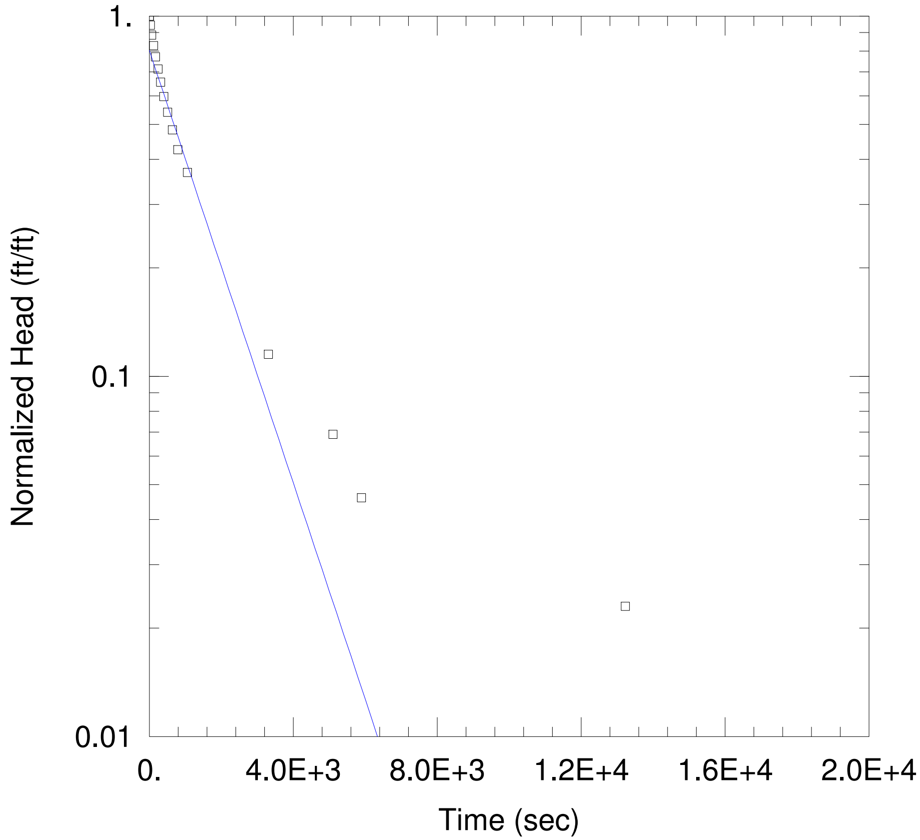
K = 4.517E-5 cm/sec
y0 = 1.38 ft

AQUIFER DATA

Saturated Thickness: 9. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW2 SO1)

Initial Displacement: 1.52 ft
Total Well Penetration Depth: 6.4 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 9. ft
Screen Length: 3.4 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW2 SO3.aqt
Date: 10/09/17 Time: 15:06:23

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW2
Test Date: 4/6/17

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

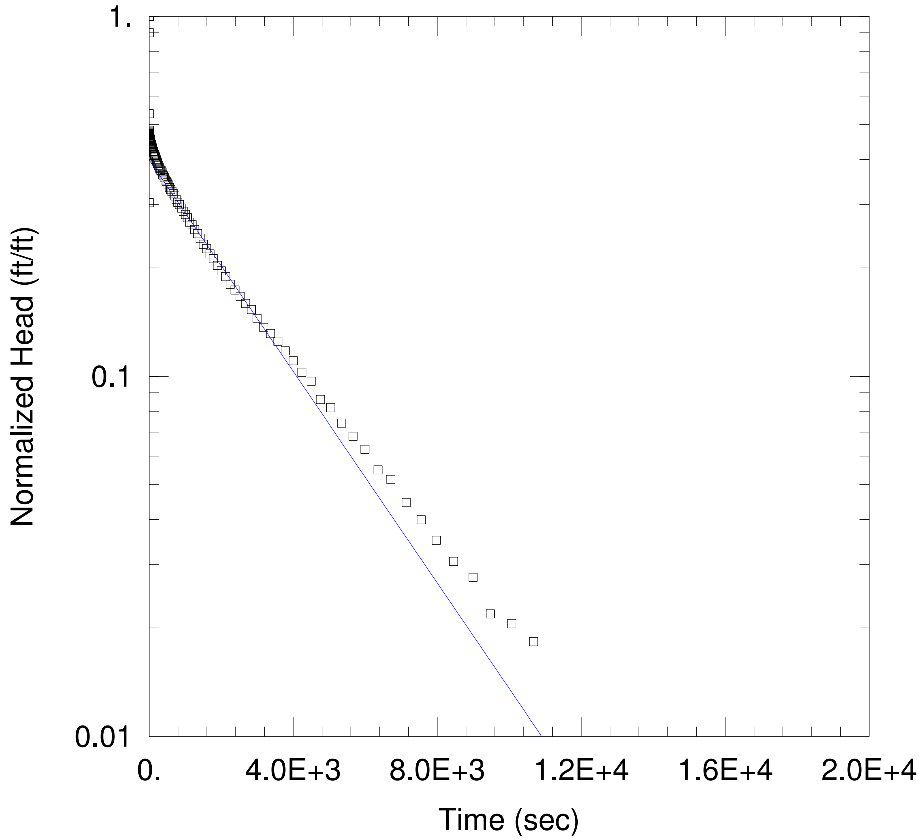
K = 3.449E-5 cm/sec
y0 = 0.698 ft

AQUIFER DATA

Saturated Thickness: 9. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW2 SO3)

Initial Displacement: 0.87 ft
Total Well Penetration Depth: 6.4 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 9. ft
Screen Length: 3.4 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW 3 SI1.aqt
Date: 10/09/17 Time: 15:13:21

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW3
Test Date: 4/6/17

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

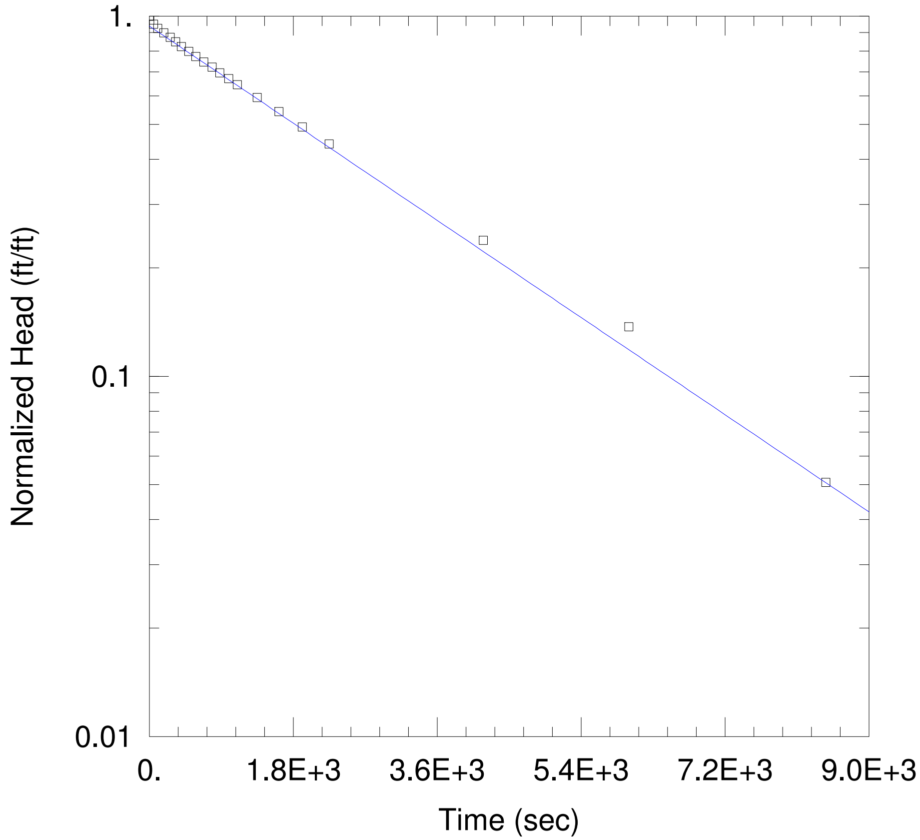
K = 8.437E-6 cm/sec
y0 = 1.458 ft

AQUIFER DATA

Saturated Thickness: 14. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW3 SI1)

Initial Displacement: 3.656 ft
Total Well Penetration Depth: 11.5 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 14. ft
Screen Length: 10. ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW 3 SO1.aqt
Date: 10/09/17 Time: 15:08:16

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW3
Test Date: 4/6/17

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

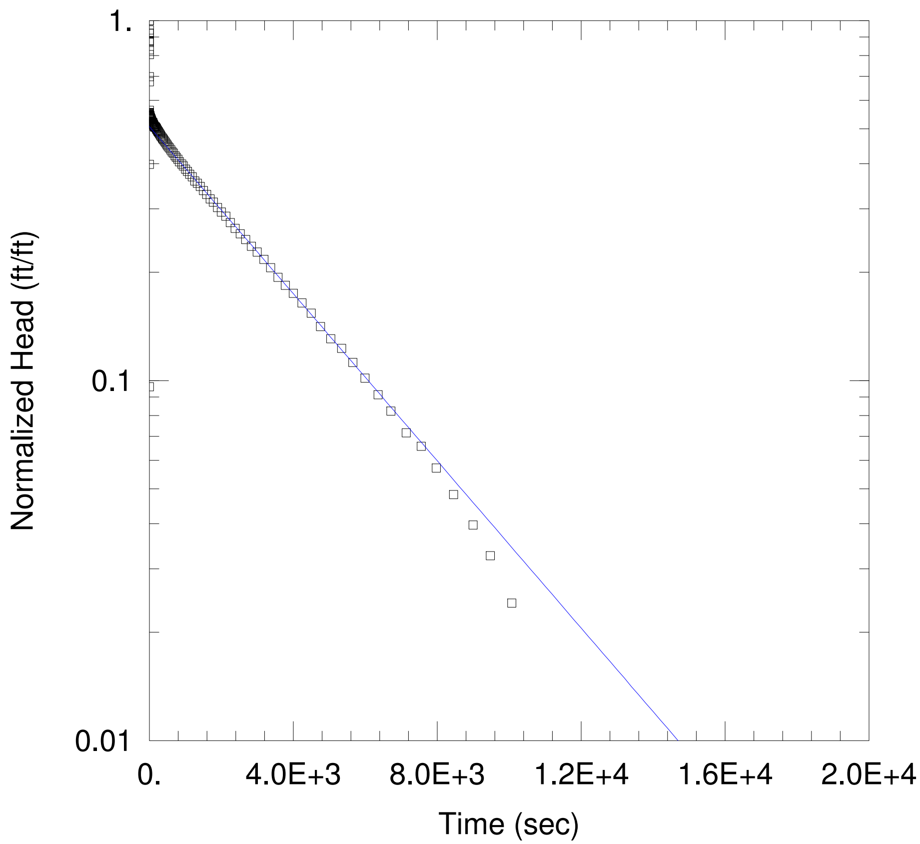
K = 8.611E-6 cm/sec
y0 = 1.848 ft

AQUIFER DATA

Saturated Thickness: 14. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW3 SO1)

Initial Displacement: 1.97 ft
Total Well Penetration Depth: 11.5 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 14. ft
Screen Length: 10. ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW 4 SI1.aqt
Date: 10/09/17 Time: 15:15:09

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW4
Test Date: 4/6/17

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

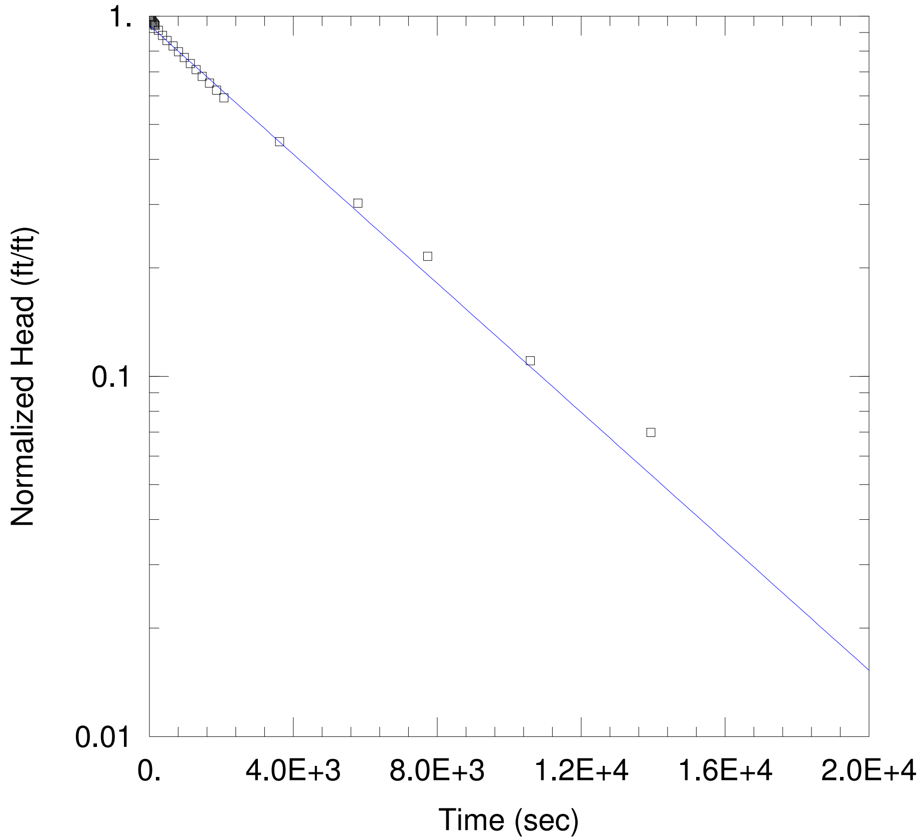
K = 6.66E-6 cm/sec
y0 = 1.37 ft

AQUIFER DATA

Saturated Thickness: 11. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW4 S11)

Initial Displacement: 2.697 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.08333 ft
Static Water Column Height: 11. ft
Screen Length: 10. ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW 4 SO1.aqt
Date: 10/09/17 Time: 15:15:46

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW4
Test Date: 4/6/17

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

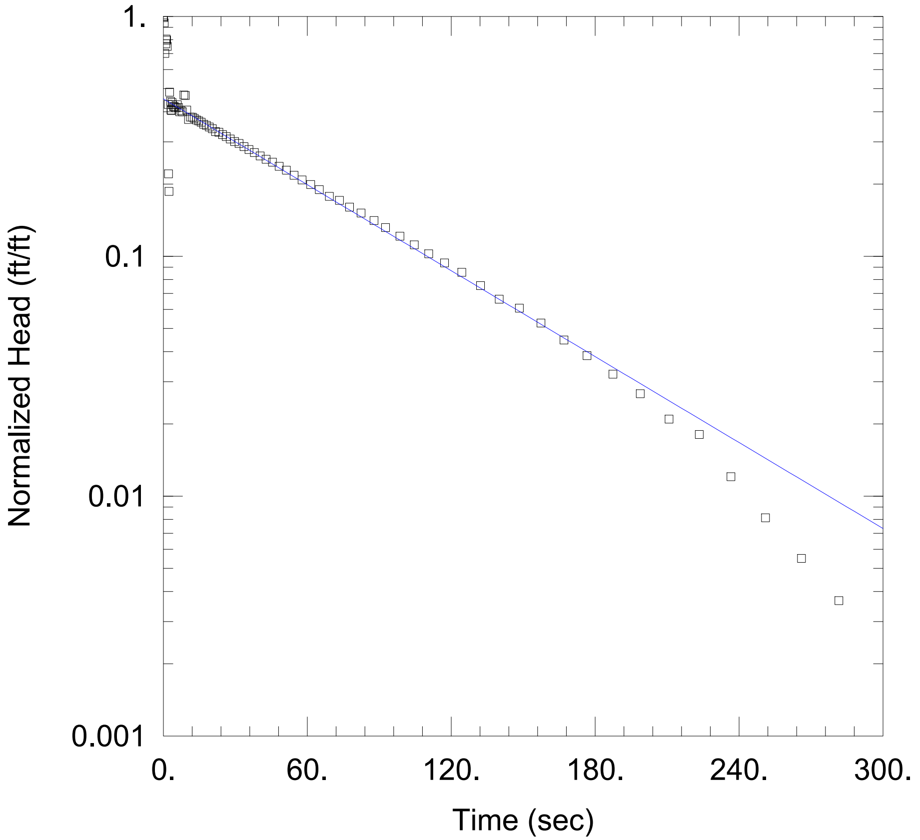
K = 5.137E-6 cm/sec
y0 = 1.622 ft

AQUIFER DATA

Saturated Thickness: 11. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW4 SO1)

Initial Displacement: 1.72 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.08333 ft
Static Water Column Height: 11. ft
Screen Length: 10. ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW5 SI1.aqt
Date: 06/15/17 Time: 11:53:01

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW5
Test Date: 4/6/17

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

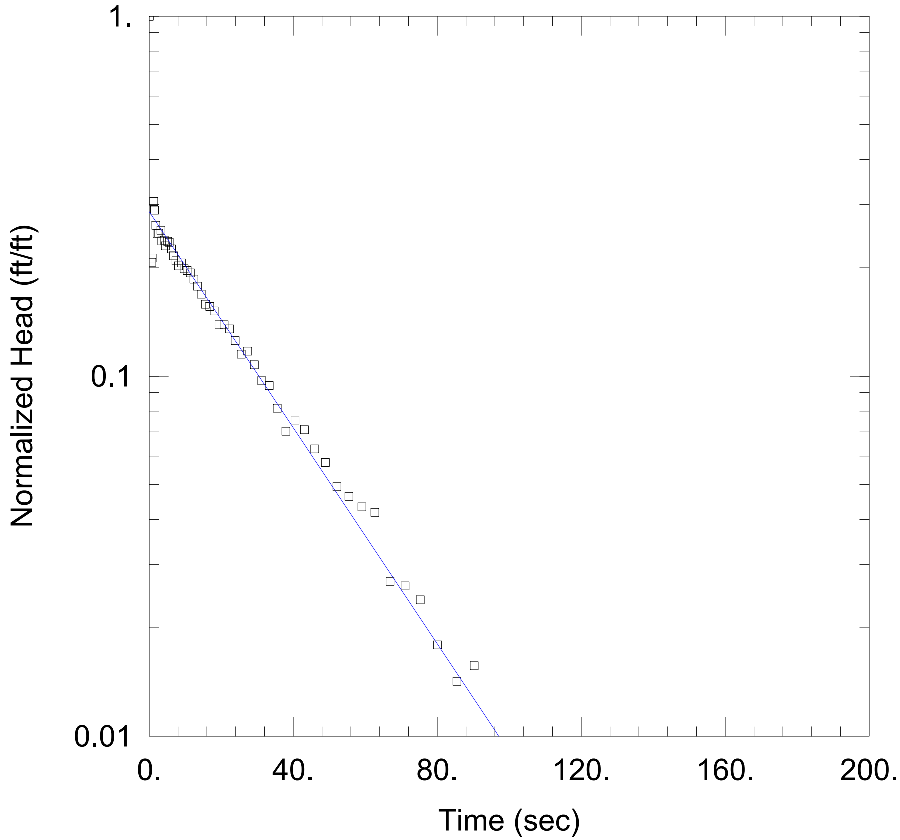
K = 0.0005655 cm/sec
y0 = 1.731 ft

AQUIFER DATA

Saturated Thickness: 8.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW5 SI1)

Initial Displacement: 3.818 ft
Total Well Penetration Depth: 6.81 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 8.5 ft
Screen Length: 4.68 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW5 SI2.aqt
Date: 05/12/17 Time: 17:23:52

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW5
Test Date: 4/6/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

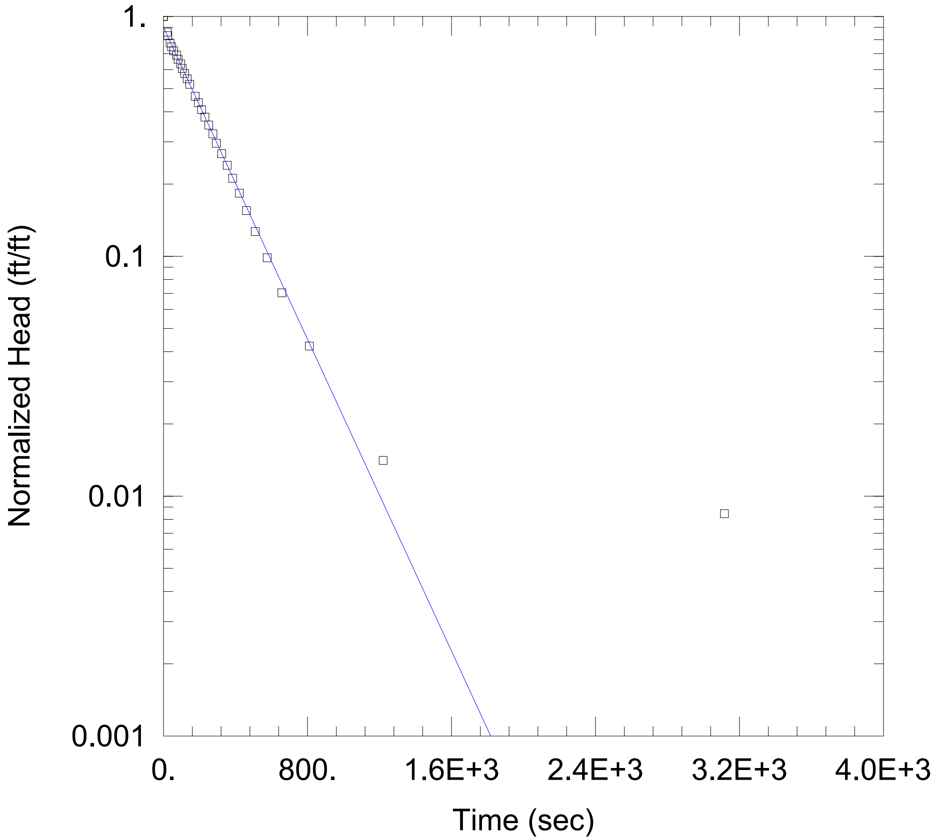
K = 0.001421 cm/sec
y0 = 0.383 ft

AQUIFER DATA

Saturated Thickness: 8.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW5 SI2)

Initial Displacement: 1.338 ft
Total Well Penetration Depth: 6.81 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 8.5 ft
Screen Length: 4.68 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW5 SO1.aqt
Date: 05/12/17 Time: 17:30:12

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW5
Test Date: 4/6/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

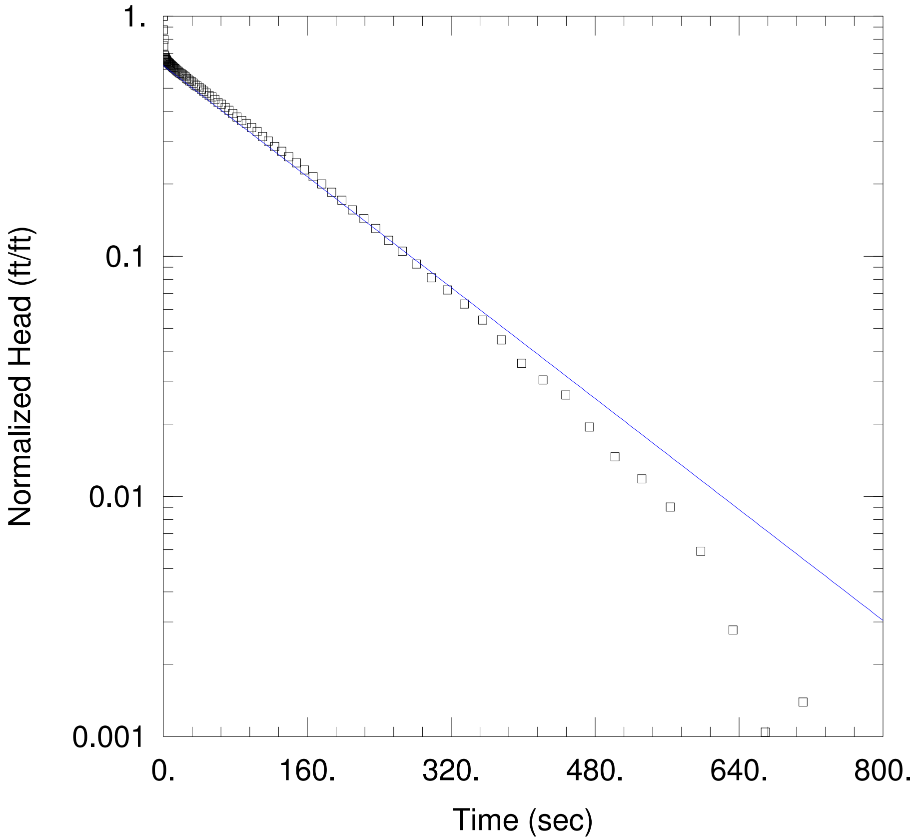
K = 0.0001539 cm/sec
y0 = 3.197 ft

AQUIFER DATA

Saturated Thickness: 8.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW5 SO1)

Initial Displacement: 3.55 ft
Total Well Penetration Depth: 6.81 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 8.5 ft
Screen Length: 4.68 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW5 SO2.aqt
Date: 10/09/17 Time: 14:59:07

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW5
Test Date: 4/6/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

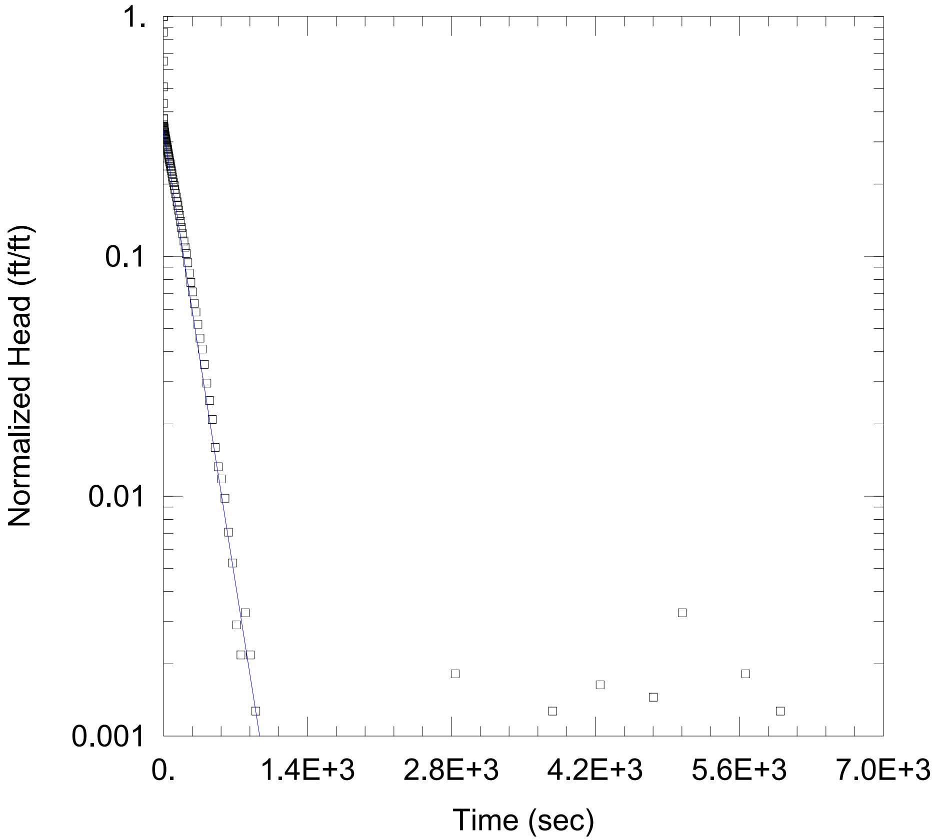
K = 0.0002735 cm/sec
y0 = 1.789 ft

AQUIFER DATA

Saturated Thickness: 8.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW5 SO2)

Initial Displacement: 2.879 ft
Total Well Penetration Depth: 6.81 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 8.5 ft
Screen Length: 4.68 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW5 SO3.aqt
Date: 06/15/17 Time: 11:57:15

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW5
Test Date: 4/6/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

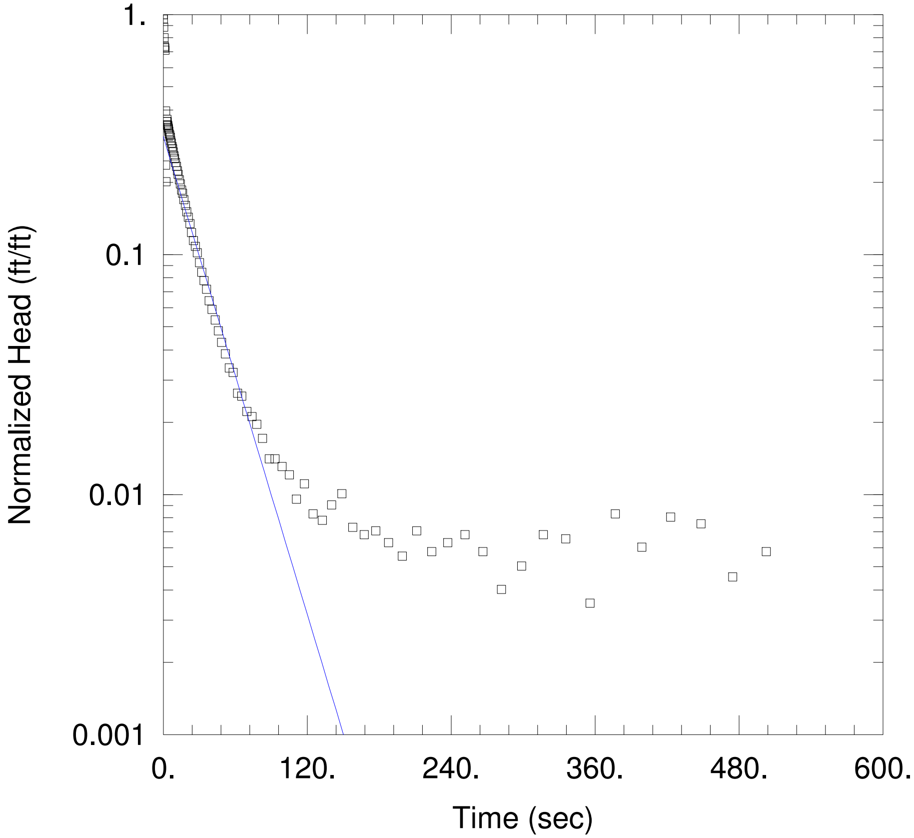
K = 0.0002559 cm/sec
y0 = 1.858 ft

AQUIFER DATA

Saturated Thickness: 8.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW5 SO3)

Initial Displacement: 5.512 ft
Total Well Penetration Depth: 6.81 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 8.5 ft
Screen Length: 4.68 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW6 SI1.aqt
Date: 10/10/17 Time: 08:43:51

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW6
Test Date: 4/6/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

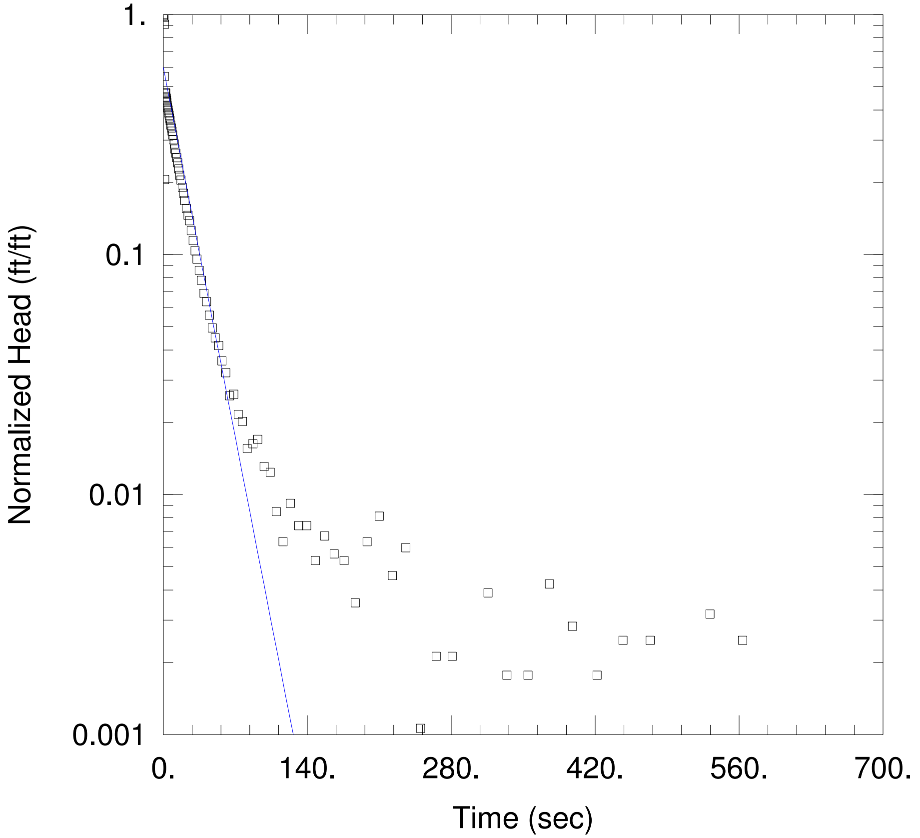
K = 0.001642 cm/sec
y0 = 1.231 ft

AQUIFER DATA

Saturated Thickness: 6.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW6 SI1)

Initial Displacement: 3.973 ft
Total Well Penetration Depth: 3.3 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 6.5 ft
Screen Length: 3.3 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW6 SI2.aqt
Date: 10/10/17 Time: 08:45:57

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW6
Test Date: 4/6/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

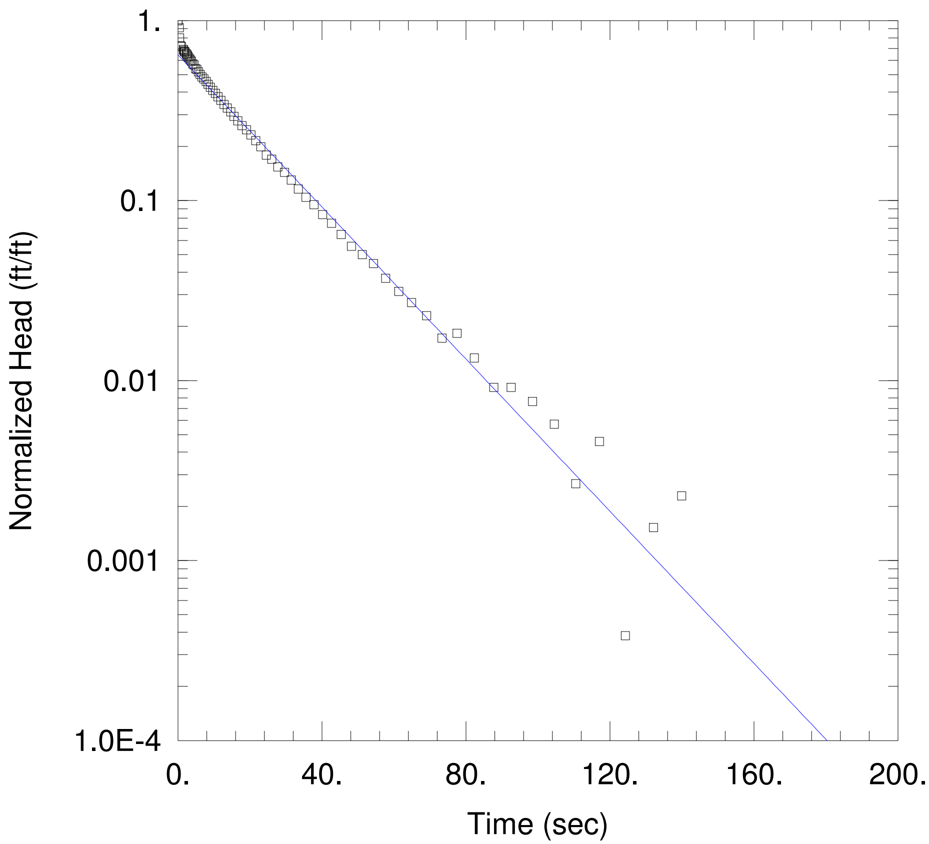
K = 0.002177 cm/sec
y0 = 1.702 ft

AQUIFER DATA

Saturated Thickness: 6.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW6 SI2)

Initial Displacement: 2.83 ft
Total Well Penetration Depth: 3.3 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 6.5 ft
Screen Length: 3.3 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW6 SO2.aqt
Date: 10/10/17 Time: 08:48:43

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW6
Test Date: 4/6/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

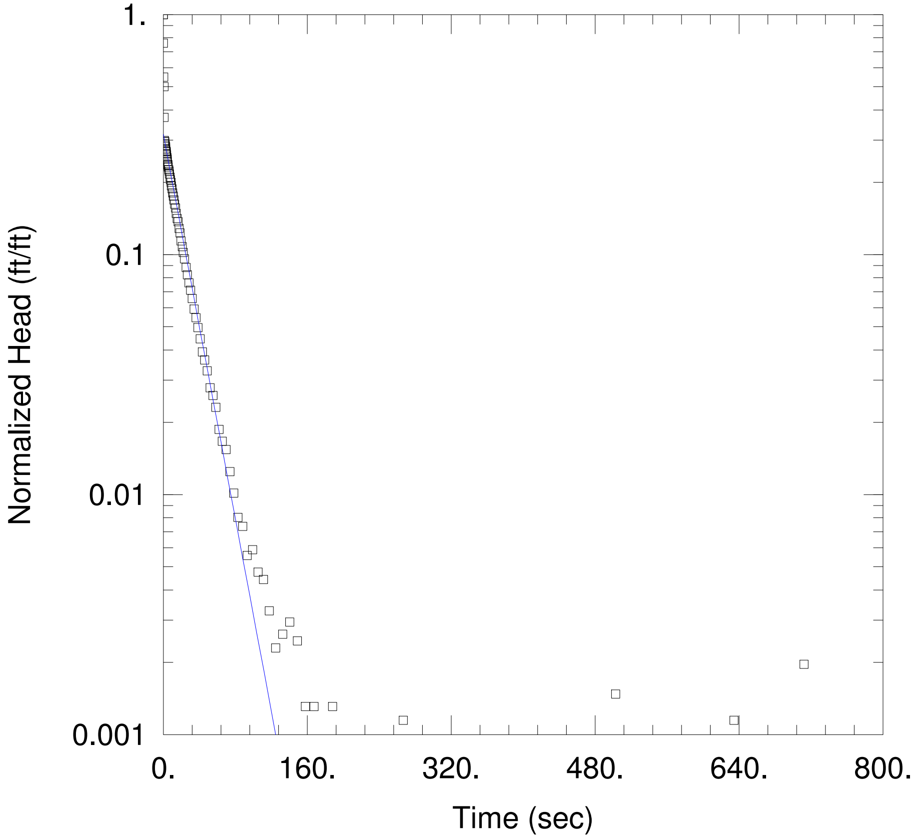
K = 0.002091 cm/sec
y0 = 1.689 ft

AQUIFER DATA

Saturated Thickness: 6.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW6 SO2)

Initial Displacement: 2.62 ft
Total Well Penetration Depth: 3.3 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 6.5 ft
Screen Length: 3.3 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW6 SO3.aqt
Date: 10/10/17 Time: 08:51:05

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW6
Test Date: 4/6/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.001979 cm/sec
y0 = 1.936 ft

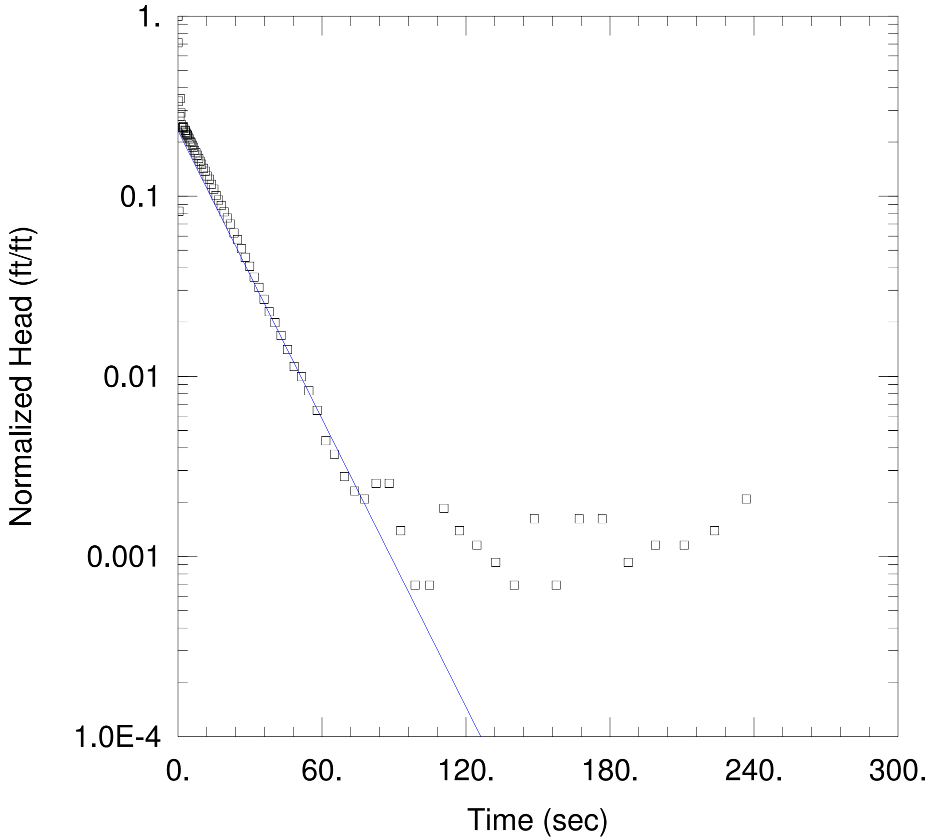
AQUIFER DATA

Saturated Thickness: 6.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW6 SO3)

Initial Displacement: 6.109 ft
Total Well Penetration Depth: 3.3 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 6.5 ft
Screen Length: 3.3 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW7 SI1.aqt
Date: 10/10/17 Time: 09:03:20

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW7
Test Date: 4/6/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

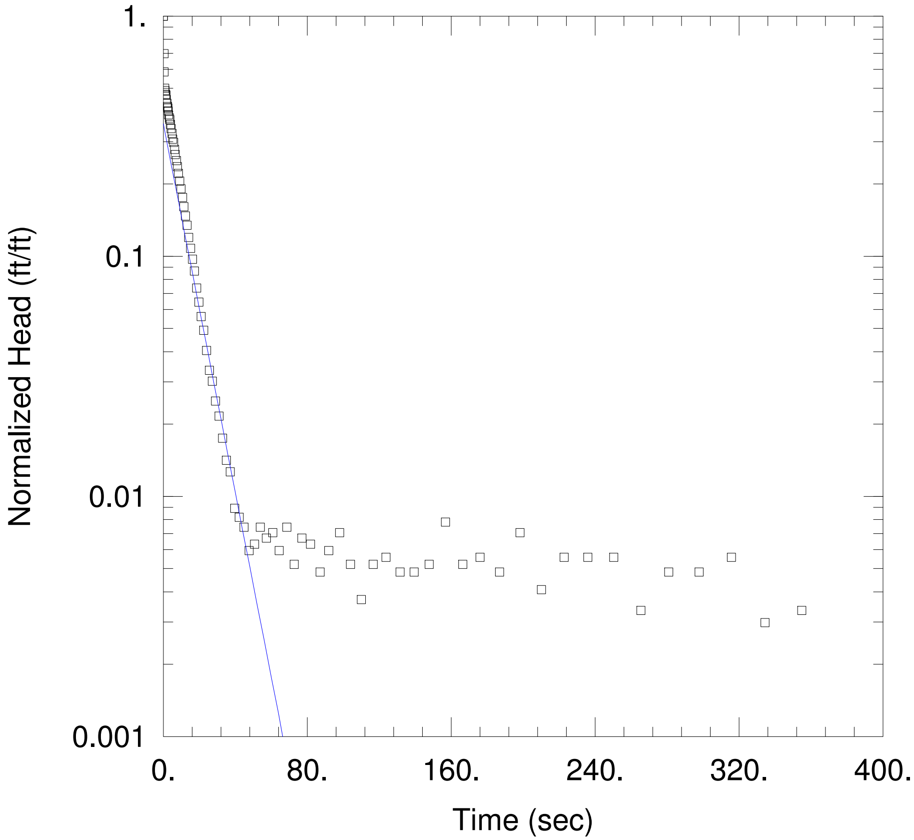
K = 0.00225 cm/sec
y0 = 1.004 ft

AQUIFER DATA

Saturated Thickness: 7.1 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW7 SI1)

Initial Displacement: 4.331 ft
Total Well Penetration Depth: 4.8 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 7.1 ft
Screen Length: 4.8 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW7 SO2.aqt
Date: 10/10/17 Time: 09:05:47

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW7
Test Date: 4/6/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

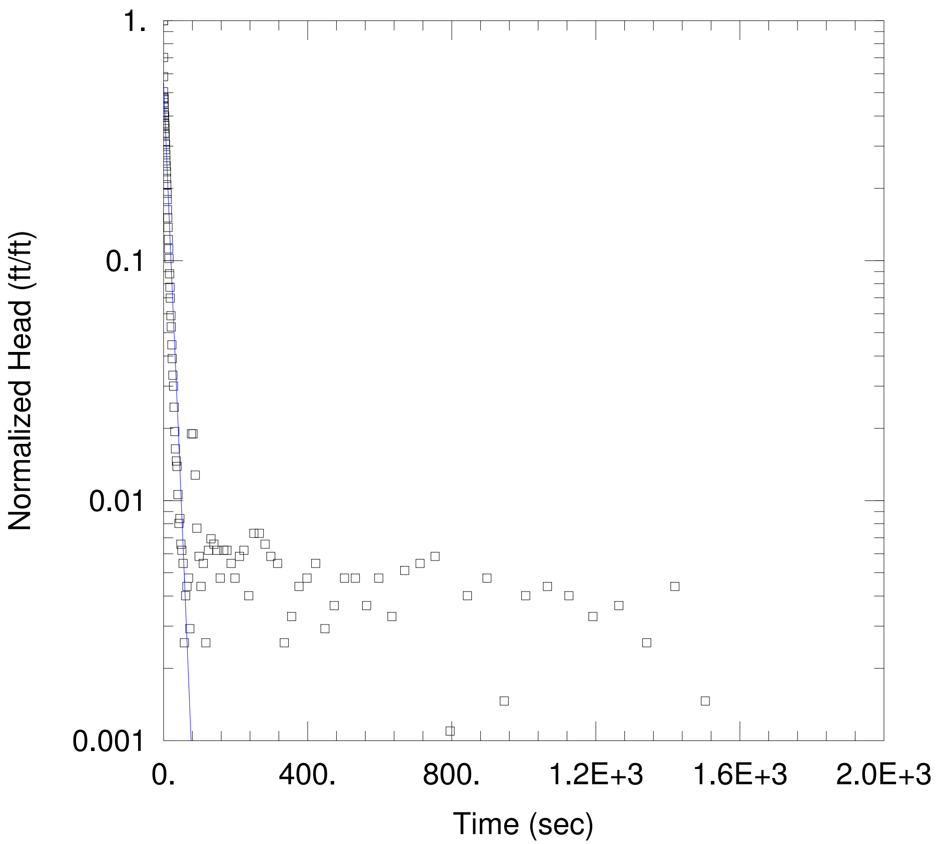
K = 0.003237 cm/sec
y0 = 0.9561 ft

AQUIFER DATA

Saturated Thickness: 7.1 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW7 S02)

Initial Displacement: 2.69 ft
Total Well Penetration Depth: 4.8 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 7.1 ft
Screen Length: 4.8 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW7 SO3.aqt
Date: 10/10/17 Time: 09:07:38

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW7
Test Date: 4/6/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

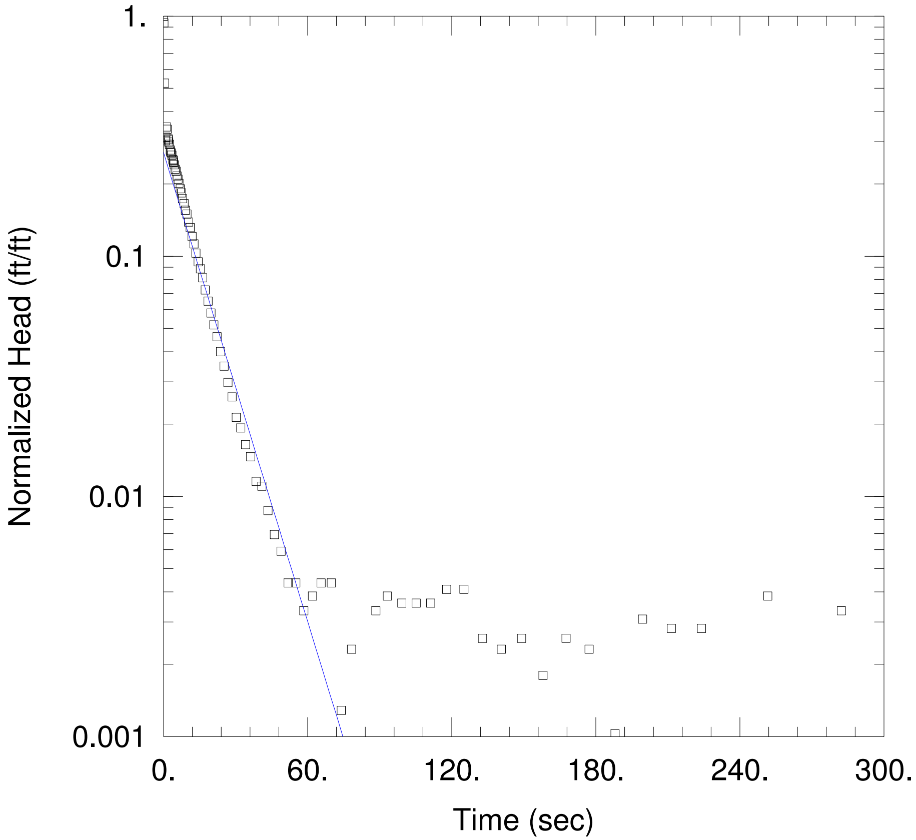
K = 0.002989 cm/sec
y0 = 1.503 ft

AQUIFER DATA

Saturated Thickness: 7.1 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW7 S03)

Initial Displacement: 2.738 ft
Total Well Penetration Depth: 4.8 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 7.1 ft
Screen Length: 4.8 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW7 SO4.aqt
Date: 10/10/17 Time: 09:09:26

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW7
Test Date: 4/6/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

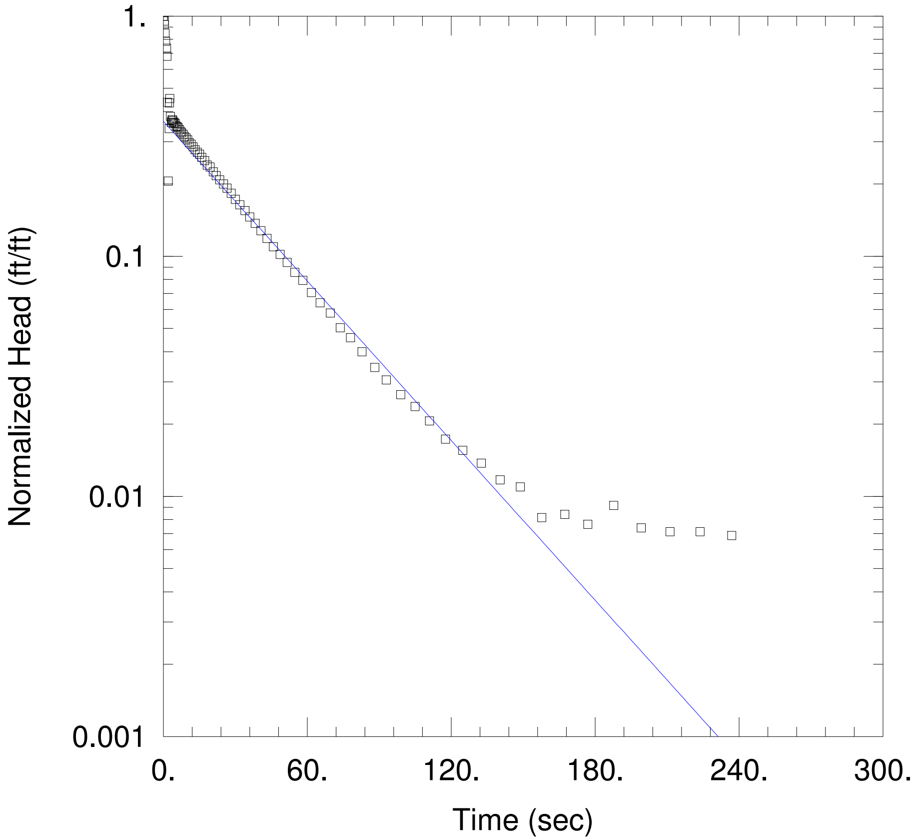
K = 0.002745 cm/sec
y0 = 1.052 ft

AQUIFER DATA

Saturated Thickness: 7.1 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW7 SO4)

Initial Displacement: 3.899 ft
Total Well Penetration Depth: 4.8 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 7.1 ft
Screen Length: 4.8 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW8 SI1.aqt
Date: 10/10/17 Time: 09:12:16

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW8
Test Date: 4/6/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

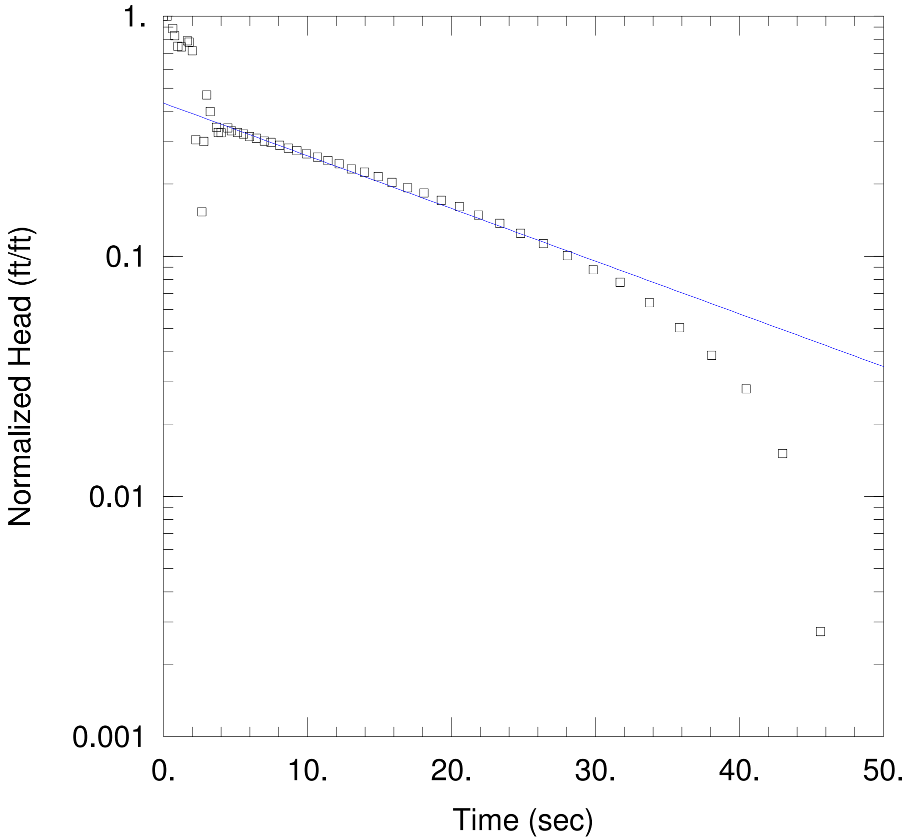
K = 0.0006602 cm/sec
y0 = 1.431 ft

AQUIFER DATA

Saturated Thickness: 16.3 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW8 SI1)

Initial Displacement: 3.929 ft
Total Well Penetration Depth: 12.8 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 16.3 ft
Screen Length: 9.7 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW8 SI2.aqt
Date: 10/10/17 Time: 09:39:50

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW8
Test Date: 4/6/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

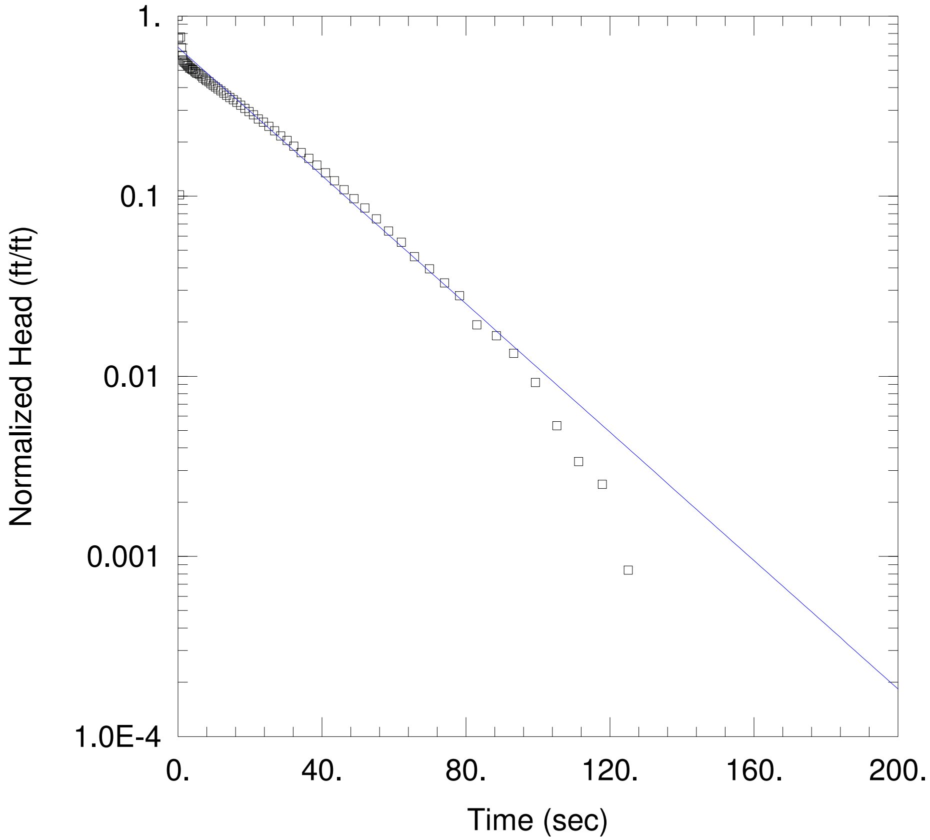
K = 0.001308 cm/sec
y0 = 1.269 ft

AQUIFER DATA

Saturated Thickness: 16.3 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW8 SI2)

Initial Displacement: 2.924 ft
Total Well Penetration Depth: 12.8 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 16.3 ft
Screen Length: 9.7 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW8 SO2.aqt
Date: 10/10/17 Time: 09:41:42

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW8
Test Date: 4/6/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

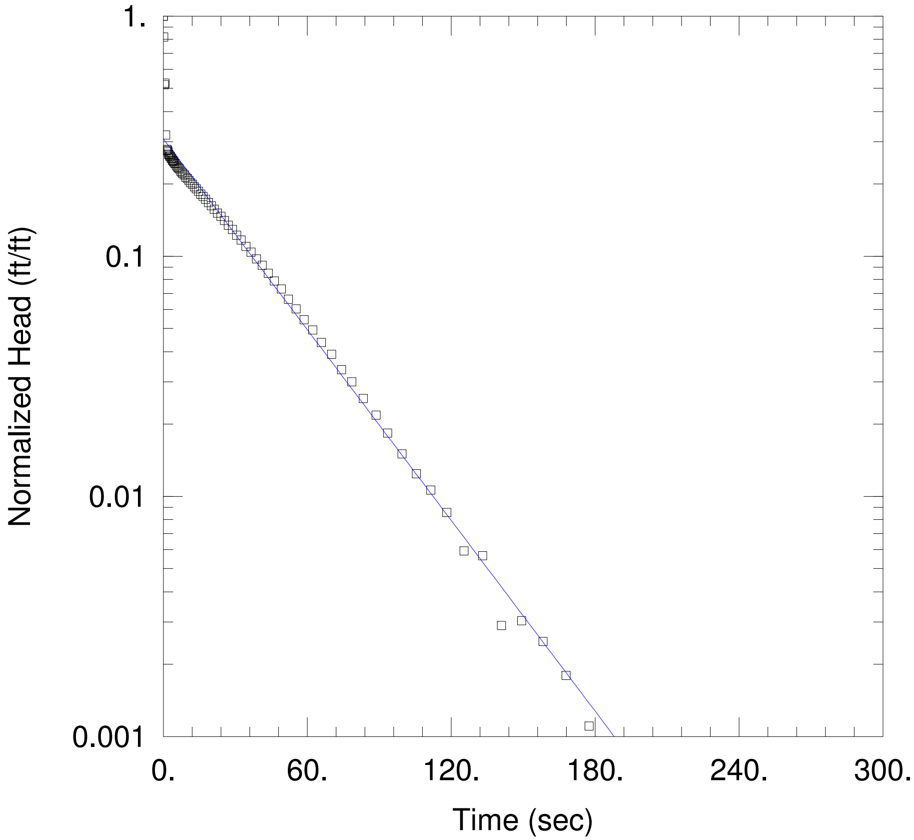
K = 0.001062 cm/sec
y0 = 2.403 ft

AQUIFER DATA

Saturated Thickness: 16.3 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW8 SO2)

Initial Displacement: 3.577 ft
Total Well Penetration Depth: 12.8 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 16.3 ft
Screen Length: 9.7 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW8 SO3.aqt
Date: 10/10/17 Time: 09:43:26

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW8
Test Date: 4/6/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

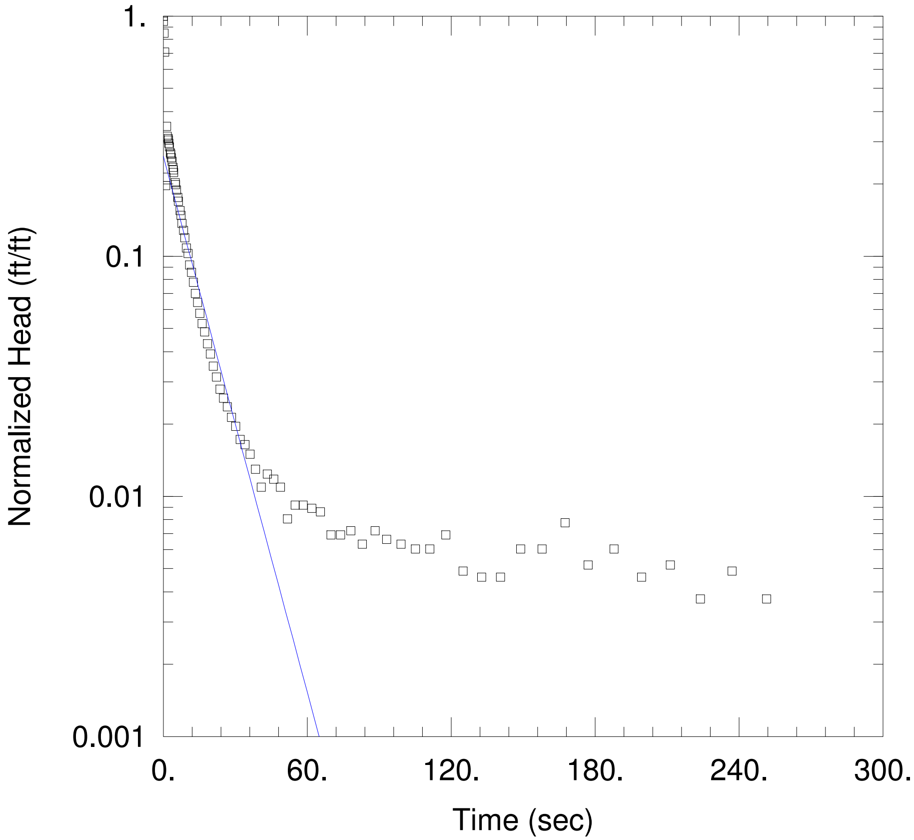
K = 0.0007891 cm/sec
y0 = 2.233 ft

AQUIFER DATA

Saturated Thickness: 16.3 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW8 SO3)

Initial Displacement: 7.249 ft
Total Well Penetration Depth: 12.8 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 16.3 ft
Screen Length: 9.7 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW9 SI1.aqt
Date: 10/10/17 Time: 09:48:54

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW9
Test Date: 4/7/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

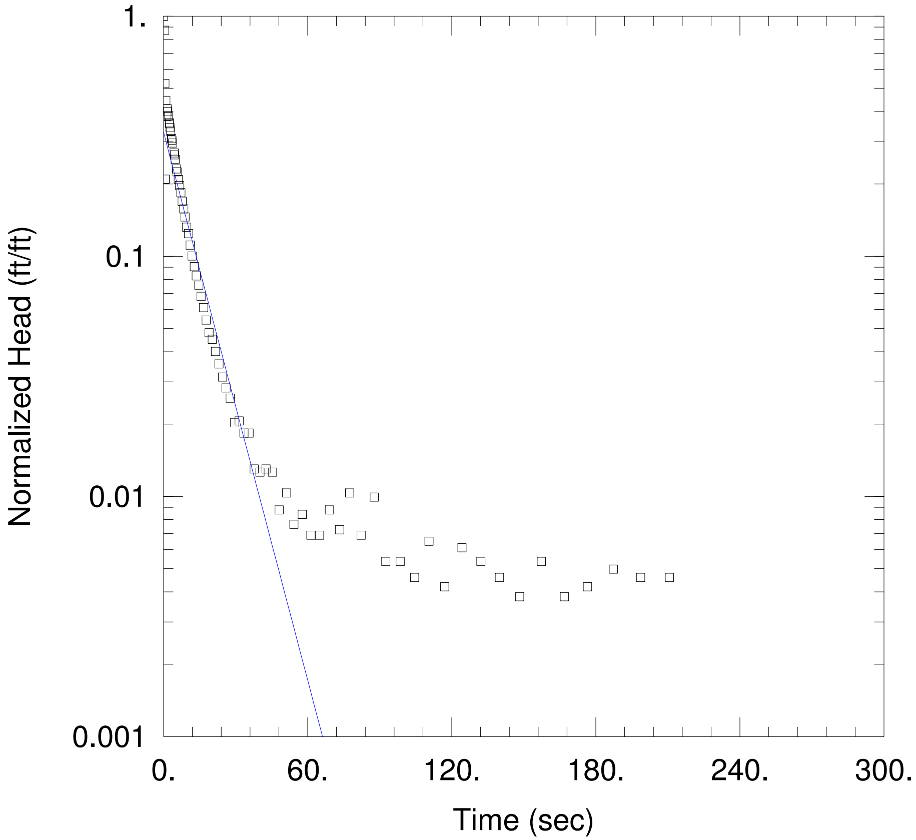
K = 0.00321 cm/sec
y0 = 0.9059 ft

AQUIFER DATA

Saturated Thickness: 6.3 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW9 SI1)

Initial Displacement: 3.477 ft
Total Well Penetration Depth: 4.7 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 6.3 ft
Screen Length: 4.7 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW9 SI2.aqt
Date: 10/10/17 Time: 09:50:42

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW9
Test Date: 4/7/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

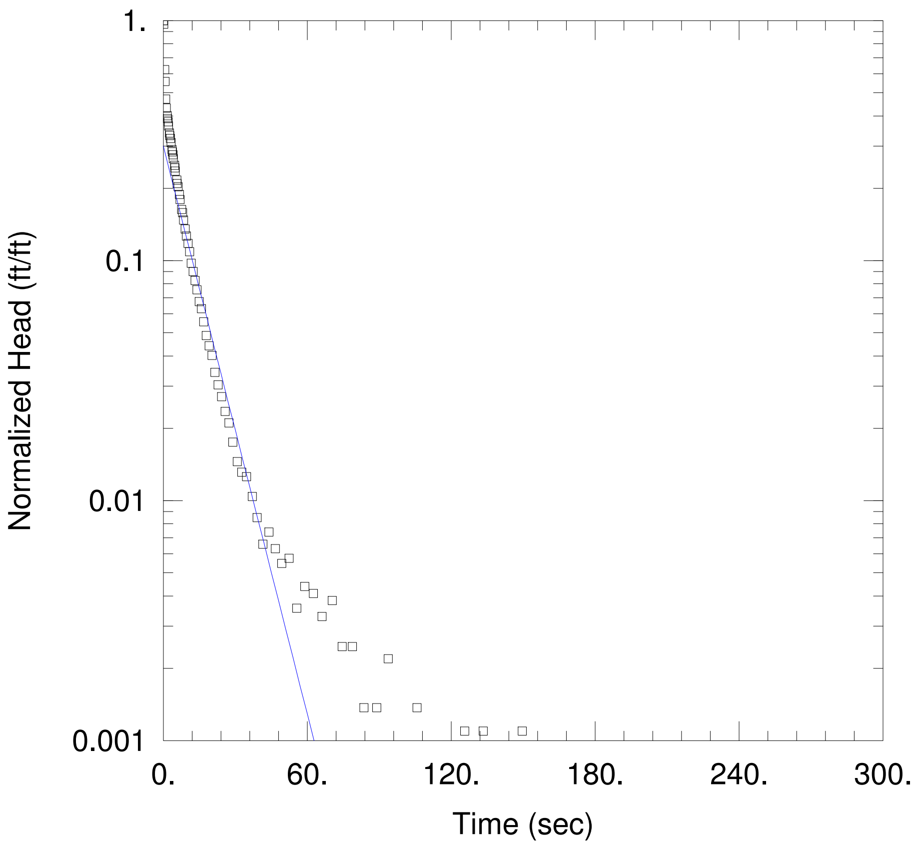
K = 0.003282 cm/sec
y0 = 0.8588 ft

AQUIFER DATA

Saturated Thickness: 6.3 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW9 SI2)

Initial Displacement: 2.617 ft
Total Well Penetration Depth: 4.7 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 6.3 ft
Screen Length: 4.7 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW9 SO1.aqt
Date: 10/10/17 Time: 09:52:04

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW9
Test Date: 4/7/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.003404 cm/sec
y0 = 1.094 ft

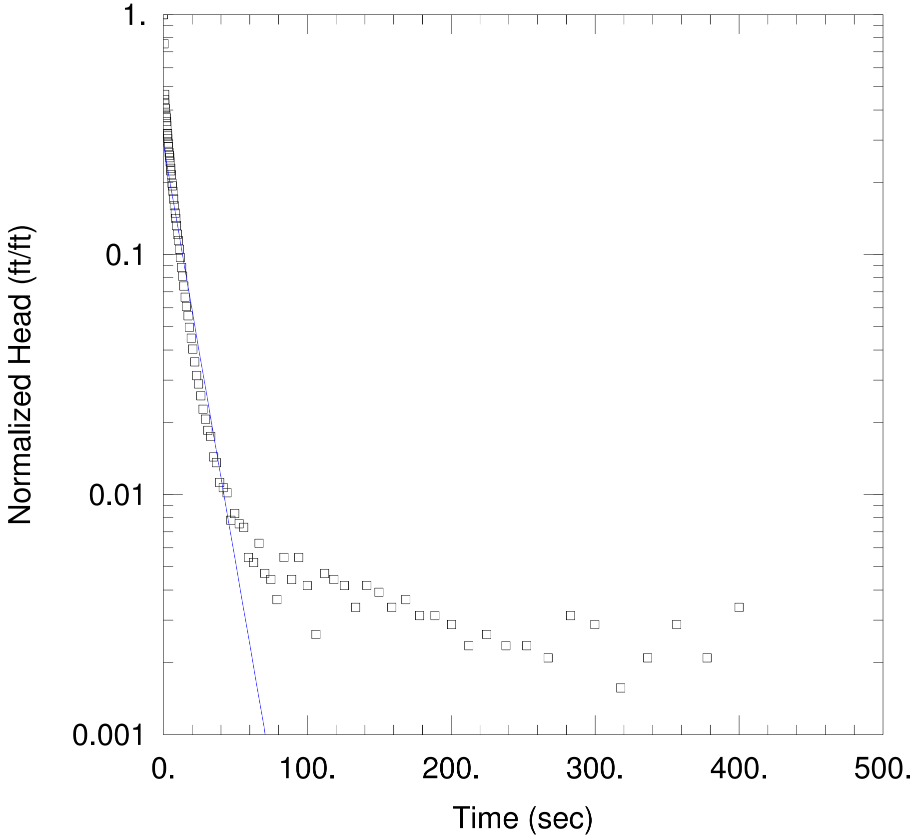
AQUIFER DATA

Saturated Thickness: 6.3 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW9 SO1)

Initial Displacement: 3.654 ft
Total Well Penetration Depth: 4.7 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 6.3 ft
Screen Length: 4.7 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW9 SO2.aqt
Date: 10/10/17 Time: 09:53:49

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW9
Test Date: 4/7/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

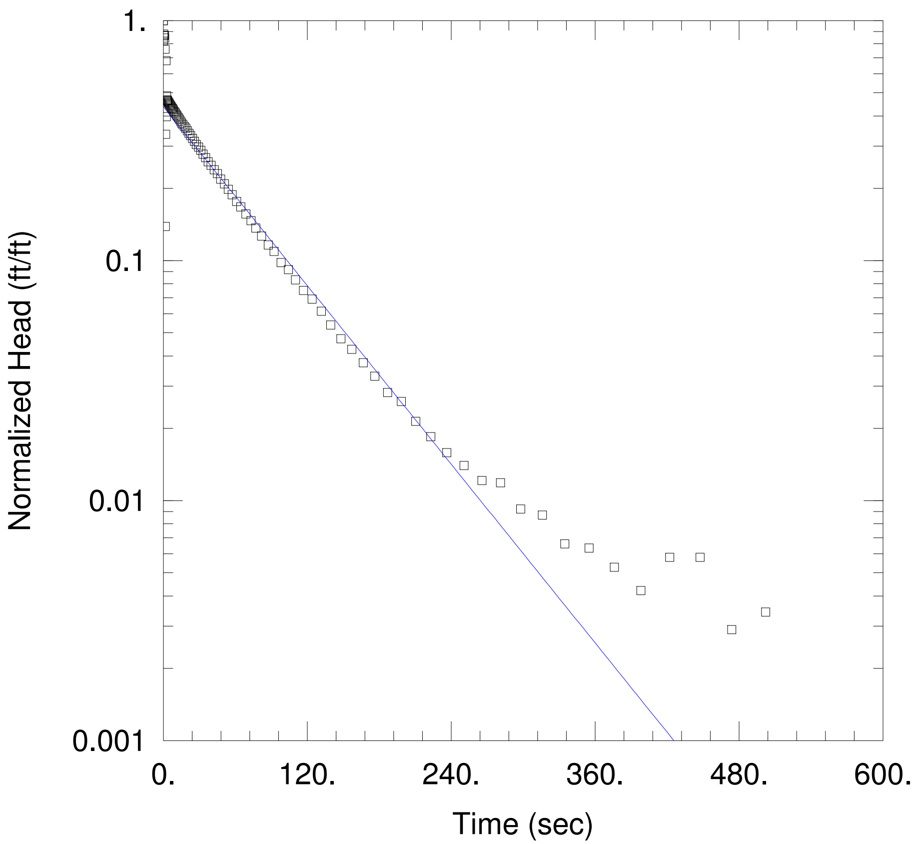
K = 0.003003 cm/sec
y0 = 1.117 ft

AQUIFER DATA

Saturated Thickness: 6.3 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW9 SO2)

Initial Displacement: 3.837 ft
Total Well Penetration Depth: 4.7 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 6.3 ft
Screen Length: 4.7 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW10 SI1.aqt
Date: 10/10/17 Time: 09:56:32

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW10
Test Date: 4/7/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

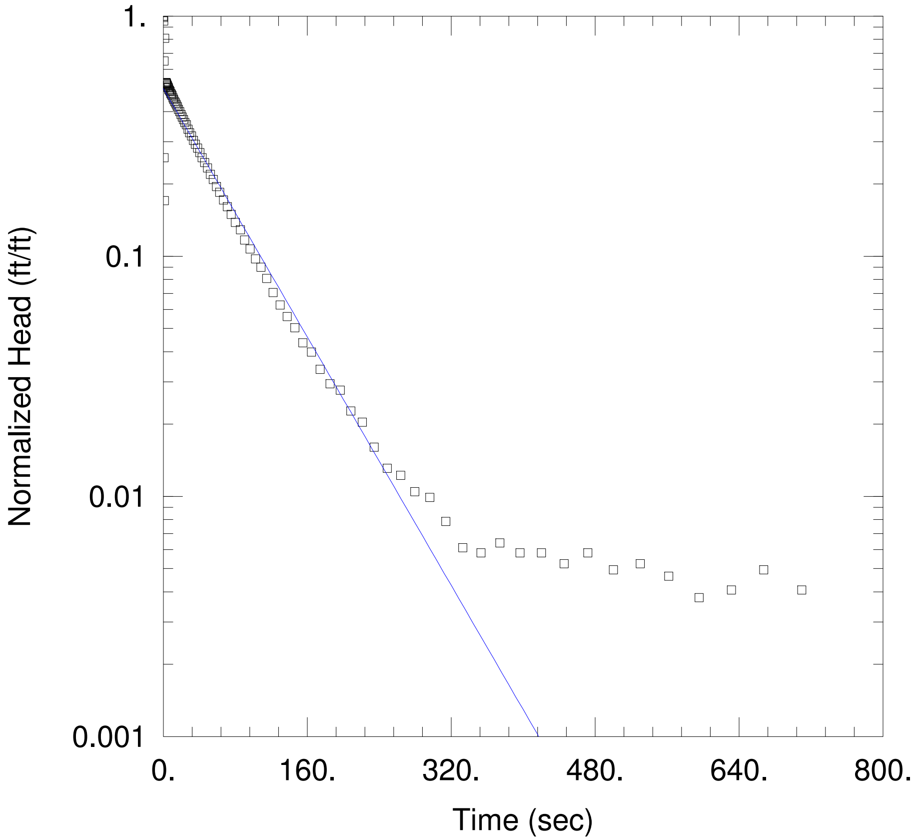
K = 0.0005269 cm/sec
y0 = 1.656 ft

AQUIFER DATA

Saturated Thickness: 6.7 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW10 SI1)

Initial Displacement: 3.792 ft
Total Well Penetration Depth: 4.8 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 6.7 ft
Screen Length: 4.8 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW10 SI2.aqt
Date: 10/10/17 Time: 09:59:35

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW10
Test Date: 4/7/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

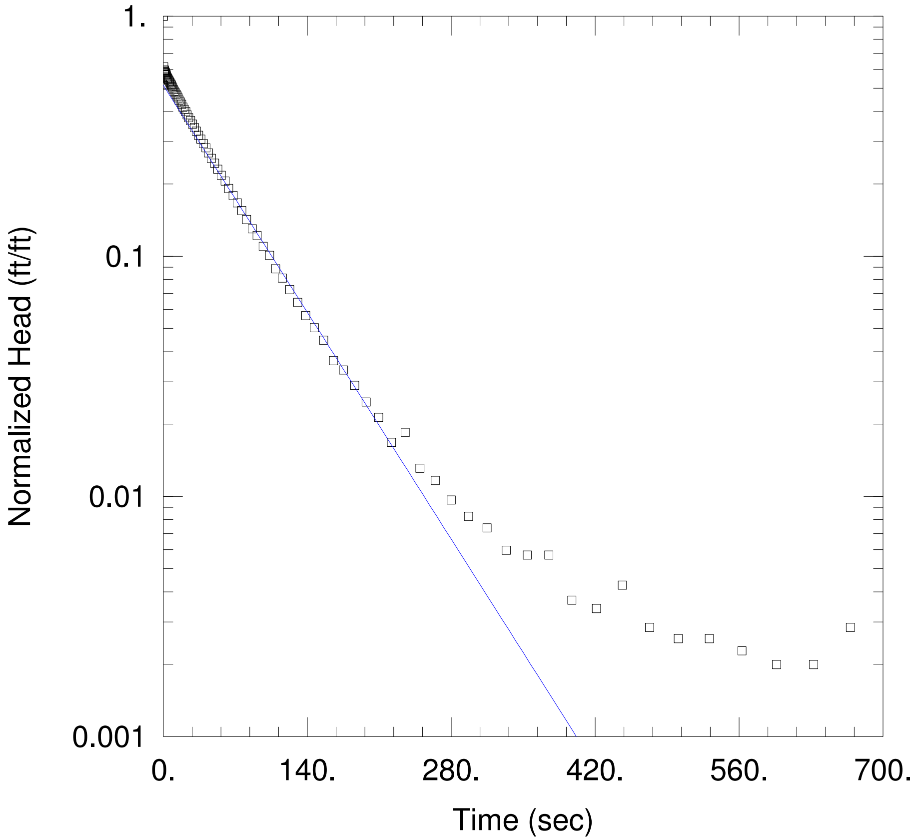
K = 0.0005491 cm/sec
y0 = 1.716 ft

AQUIFER DATA

Saturated Thickness: 6.7 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW10 SI2)

Initial Displacement: 3.438 ft
Total Well Penetration Depth: 4.8 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 6.7 ft
Screen Length: 4.8 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW10 SO2.aqt
Date: 10/10/17 Time: 10:01:28

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW10
Test Date: 4/7/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

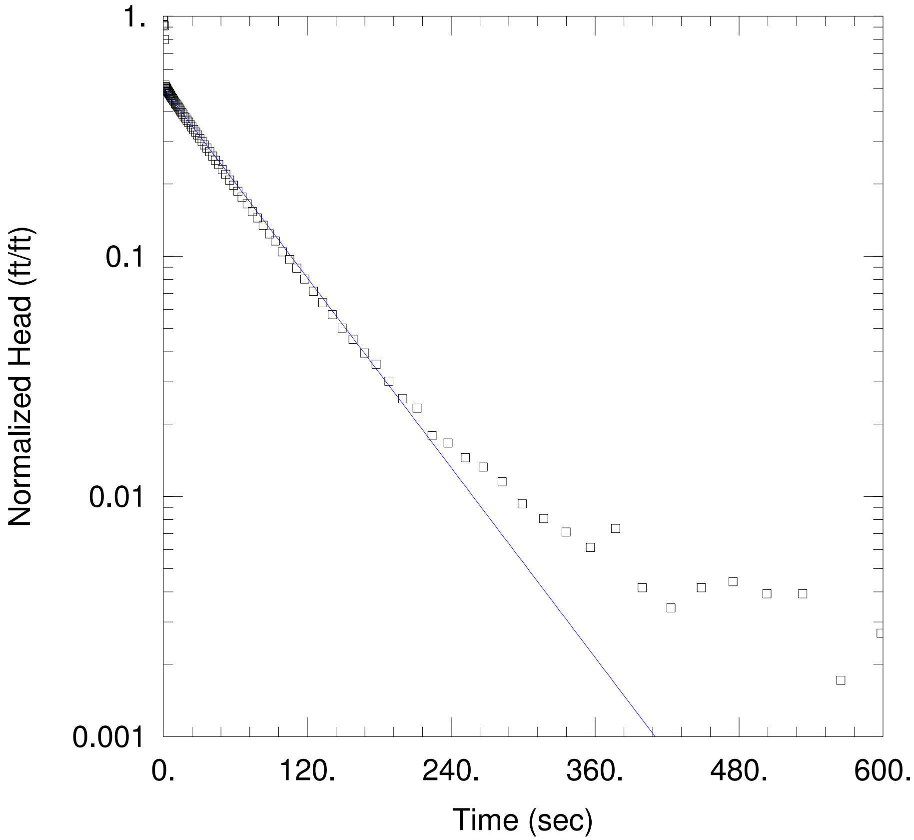
K = 0.0005731 cm/sec
y0 = 1.809 ft

AQUIFER DATA

Saturated Thickness: 6.7 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW10 SO2)

Initial Displacement: 3.518 ft
Total Well Penetration Depth: 4.8 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 6.7 ft
Screen Length: 4.8 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\APW10 SO3.aqt
Date: 10/10/17 Time: 10:09:04

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Primary Ash Pond
Test Well: APW10
Test Date: 4/7/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

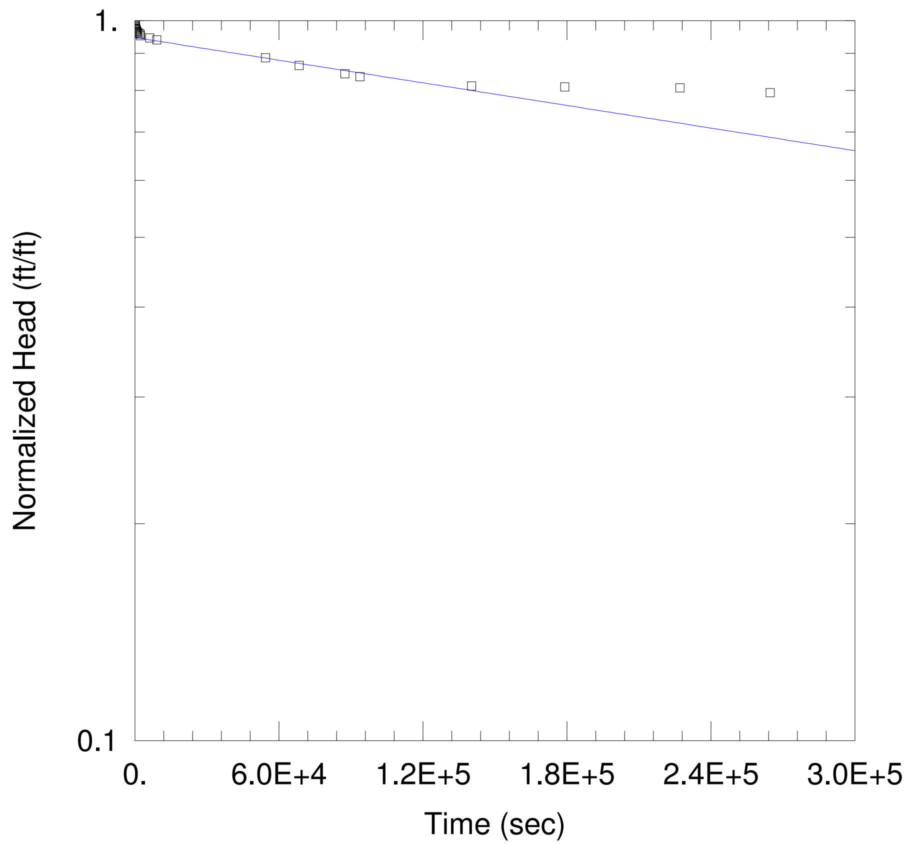
K = 0.0005595 cm/sec
y0 = 2.048 ft

AQUIFER DATA

Saturated Thickness: 6.7 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (APW10 SO2)

Initial Displacement: 4.081 ft
Total Well Penetration Depth: 4.8 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 6.7 ft
Screen Length: 4.8 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G06D SO1.aqt
Date: 10/10/17 Time: 10:15:04

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G06D
Test Date: 4/4/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

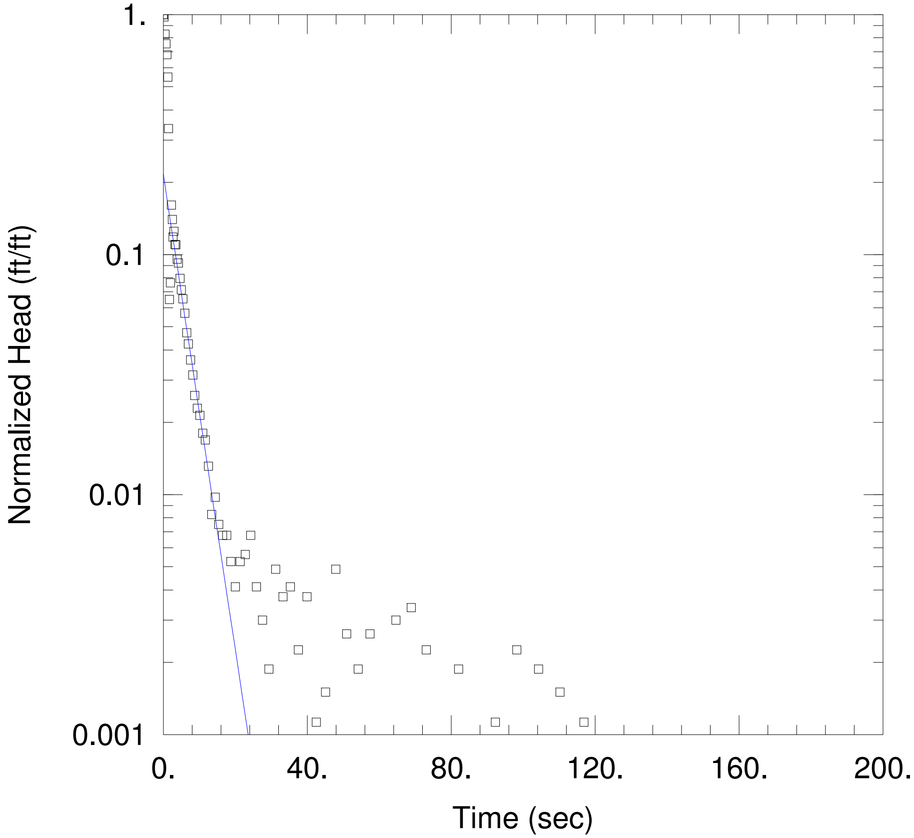
K = 3.917E-8 cm/sec
y0 = 3.807 ft

AQUIFER DATA

Saturated Thickness: 0.4 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G06D)

Initial Displacement: 4.02 ft
Total Well Penetration Depth: 0.4 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 0.4 ft
Screen Length: 0.4 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G202 SI1.aqt
Date: 10/10/17 Time: 10:19:06

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G202
Test Date: 4/5/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

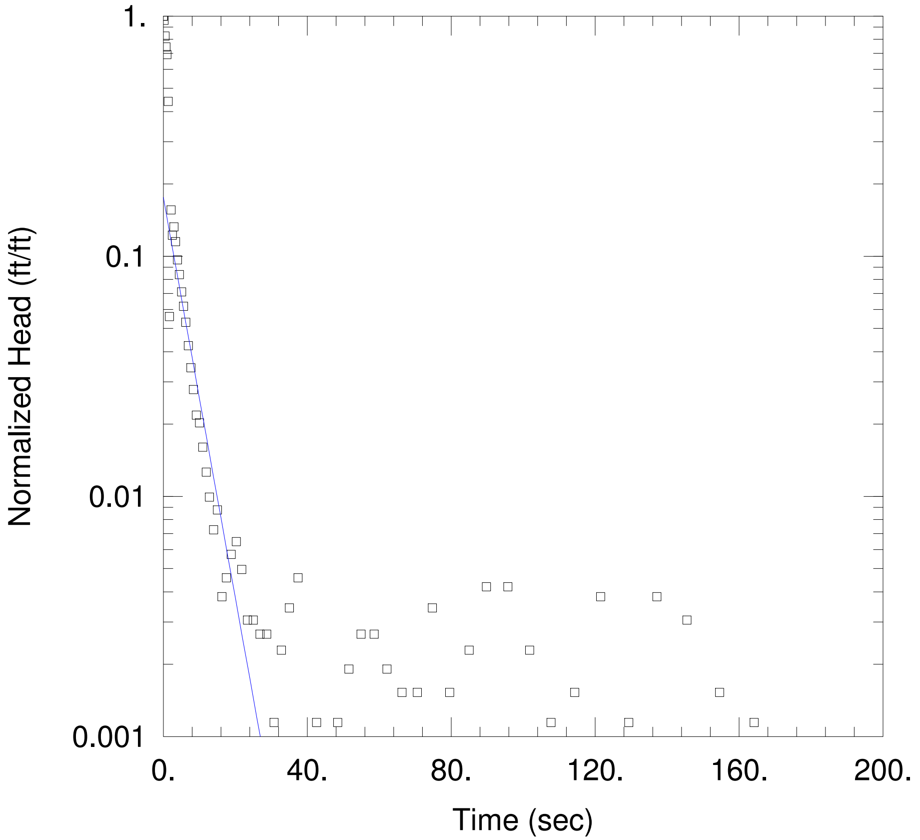
K = 0.01698 cm/sec
y0 = 0.5744 ft

AQUIFER DATA

Saturated Thickness: 0.6 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G202 SI1)

Initial Displacement: 2.666 ft
Total Well Penetration Depth: 0.6 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 0.6 ft
Screen Length: 0.6 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G202 SI2.aqt
Date: 10/10/17 Time: 10:20:26

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G202
Test Date: 4/5/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

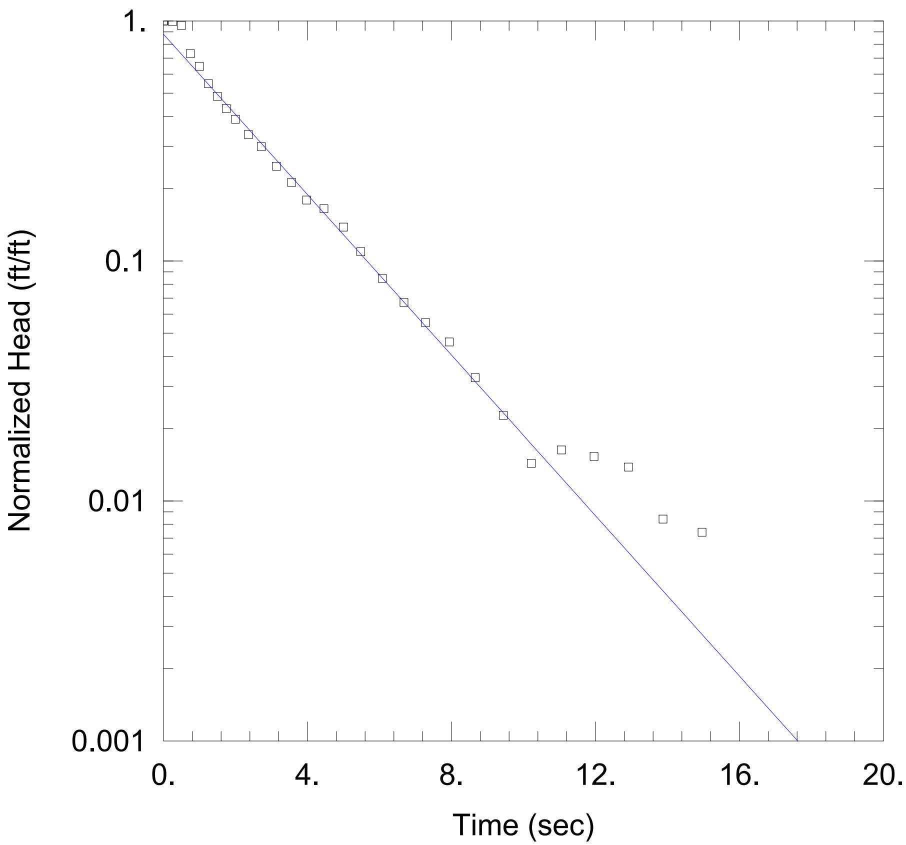
K = 0.0143 cm/sec
y0 = 0.4599 ft

AQUIFER DATA

Saturated Thickness: 0.6 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G202 SI2)

Initial Displacement: 2.621 ft
Total Well Penetration Depth: 0.6 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 0.6 ft
Screen Length: 0.6 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G202 SO2.aqt
Date: 06/15/17 Time: 10:21:12

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G202
Test Date: 4/5/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

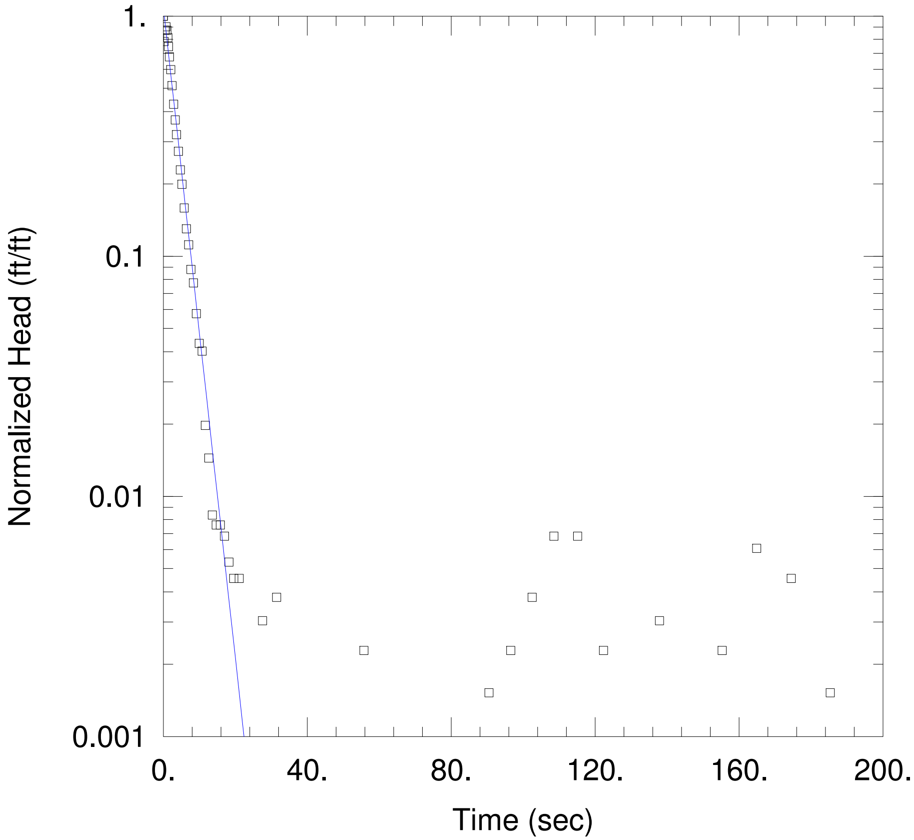
K = 0.02868 cm/sec
y0 = 1.781 ft

AQUIFER DATA

Saturated Thickness: 0.6 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G202 SO2)

Initial Displacement: 2.024 ft
Total Well Penetration Depth: 0.6 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 0.6 ft
Screen Length: 0.6 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G202 SO3.aqt
Date: 10/10/17 Time: 10:21:38

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G202
Test Date: 4/5/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

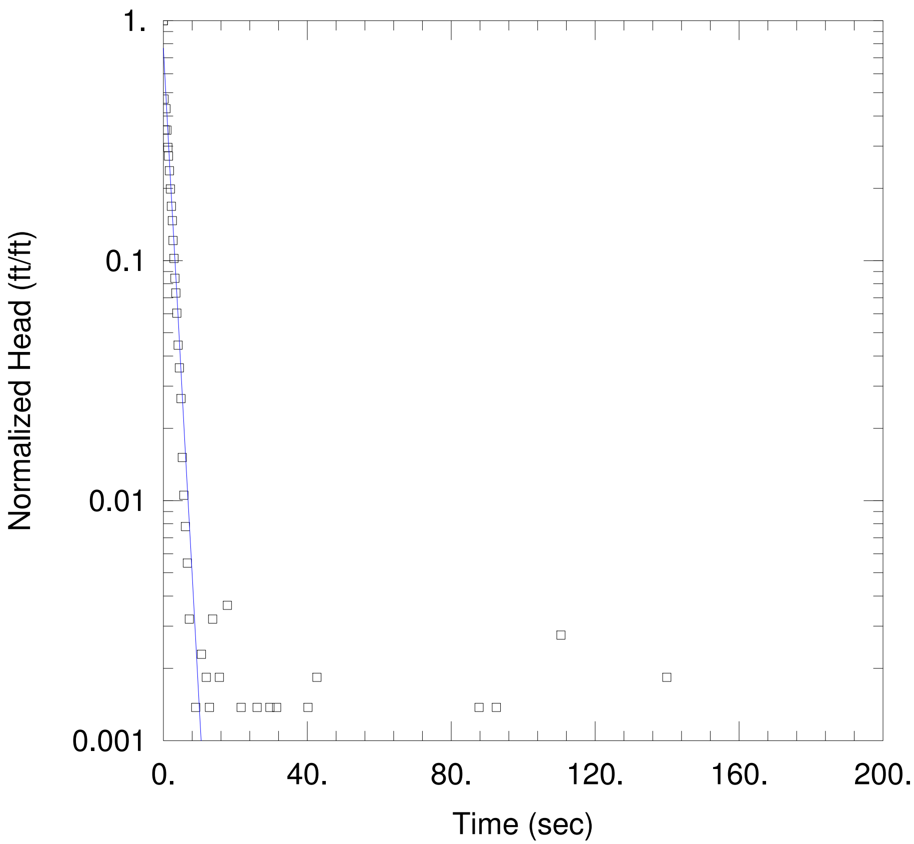
K = 0.02325 cm/sec
y0 = 1.444 ft

AQUIFER DATA

Saturated Thickness: 0.6 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G202 SO3)

Initial Displacement: 1.317 ft
Total Well Penetration Depth: 0.6 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 0.6 ft
Screen Length: 0.6 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G203 SI1.aqt
Date: 10/10/17 Time: 10:24:55

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G203
Test Date: 4/4/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

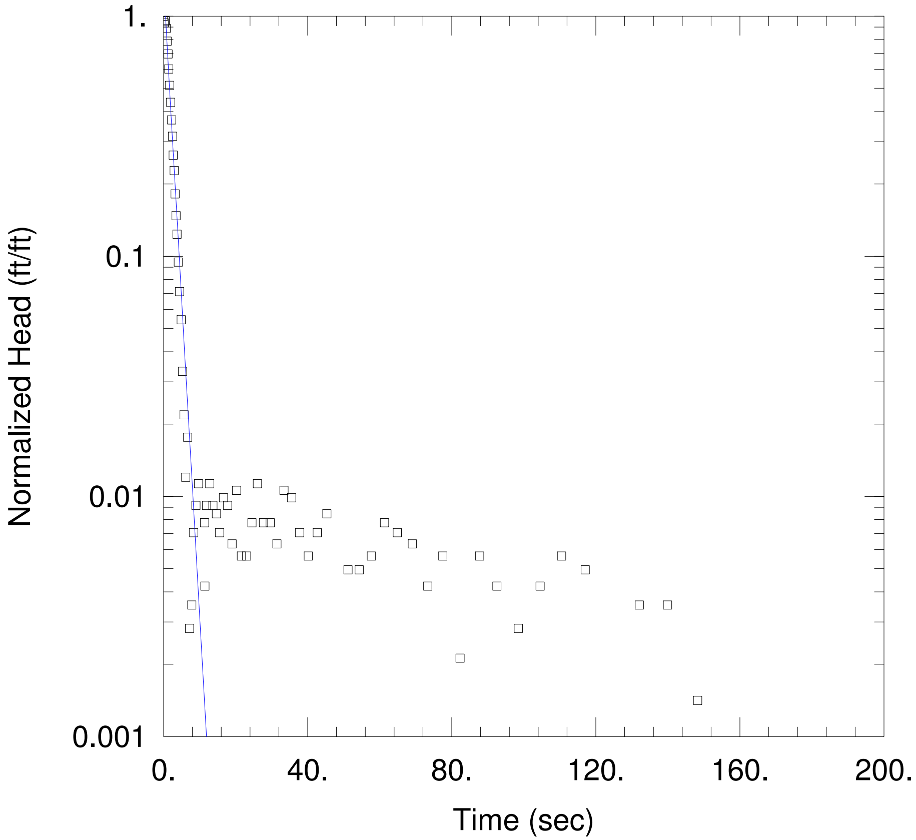
K = 0.02529 cm/sec
y0 = 1.676 ft

AQUIFER DATA

Saturated Thickness: 6.9 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G203 SI1)

Initial Displacement: 2.184 ft
Total Well Penetration Depth: 3.9 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 6.9 ft
Screen Length: 3.9 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G203 SO1.aqt
Date: 10/10/17 Time: 10:28:31

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G203
Test Date: 4/4/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

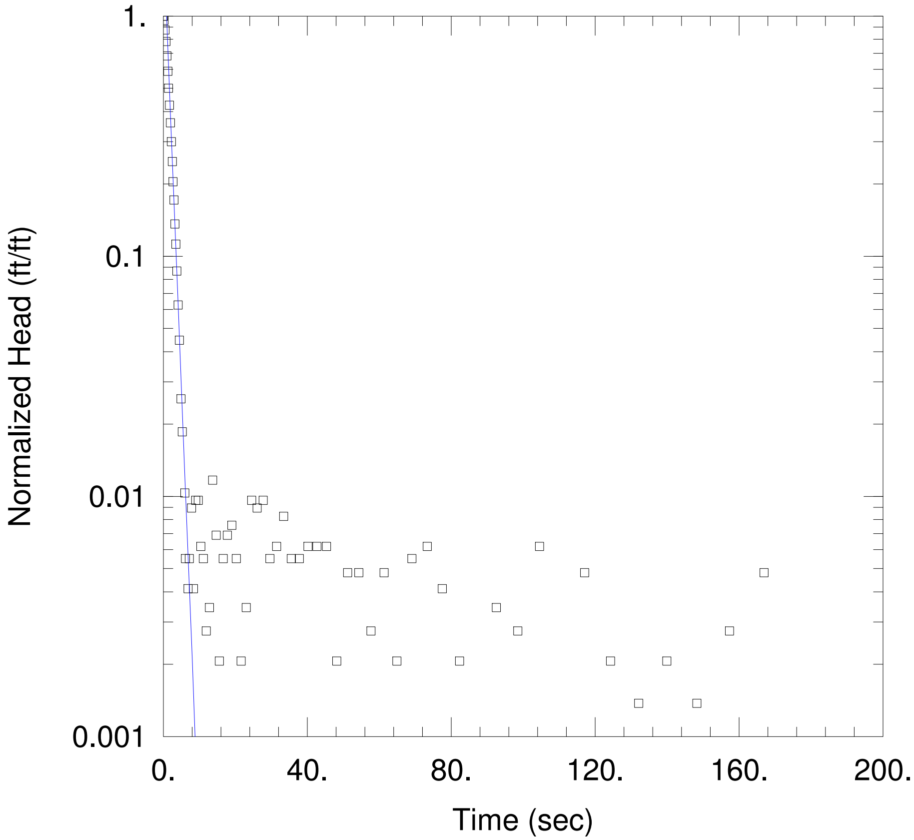
K = 0.02421 cm/sec
y0 = 1.958 ft

AQUIFER DATA

Saturated Thickness: 6.9 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G203 SO1)

Initial Displacement: 1.418 ft
Total Well Penetration Depth: 3.9 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 6.9 ft
Screen Length: 3.9 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G203 SO2.aqt
Date: 10/10/17 Time: 10:30:34

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G203
Test Date: 4/4/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

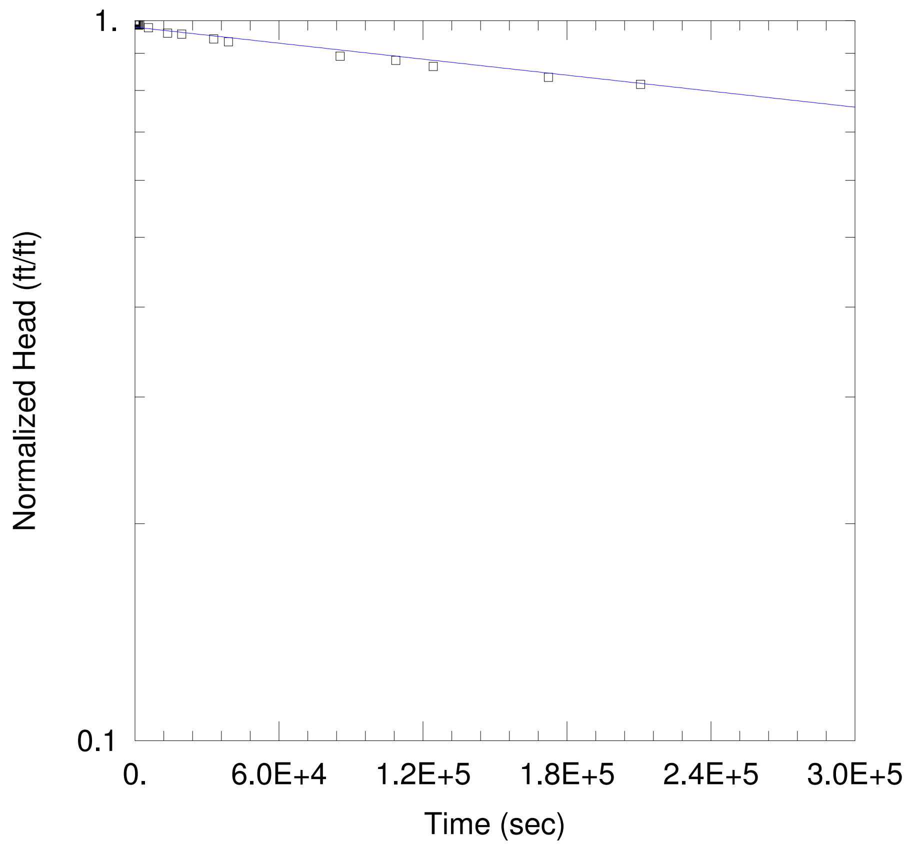
K = 0.03469 cm/sec
y0 = 3.185 ft

AQUIFER DATA

Saturated Thickness: 6.9 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G203 SO2)

Initial Displacement: 1.454 ft
Total Well Penetration Depth: 3.9 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 6.9 ft
Screen Length: 3.9 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G208 SO1.aqt
Date: 10/10/17 Time: 10:33:25

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G208
Test Date: 4/4/17

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

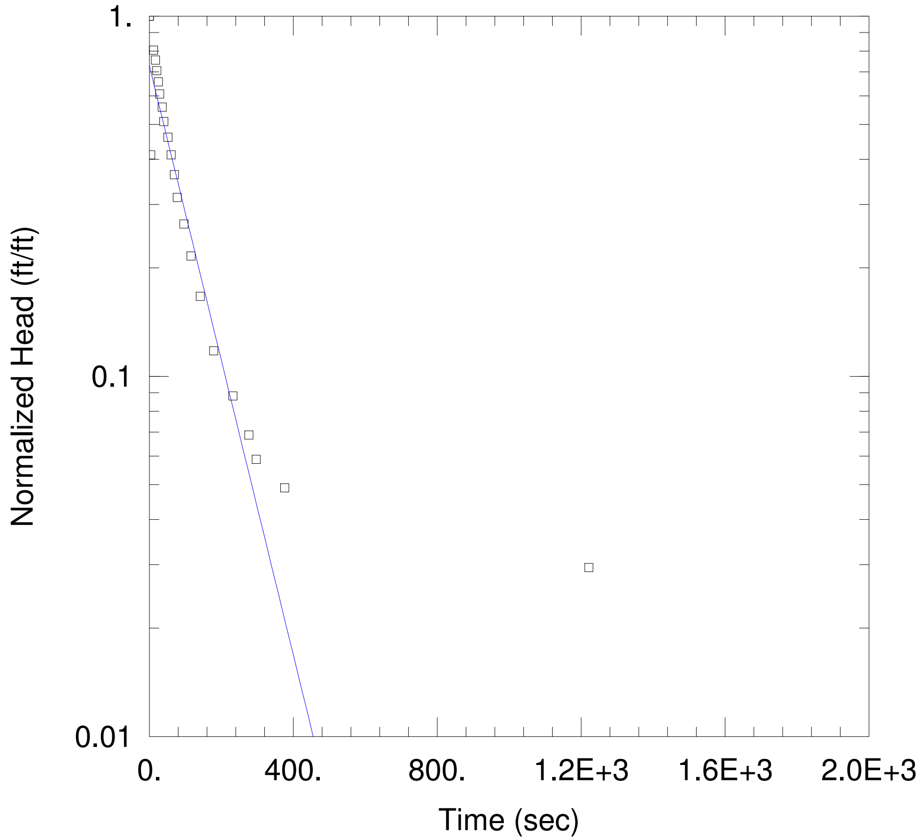
K = 1.315E-8 cm/sec
y0 = 10.16 ft

AQUIFER DATA

Saturated Thickness: 22.1 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G208 SO1)

Initial Displacement: 10.38 ft
Total Well Penetration Depth: 19.8 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 22.1 ft
Screen Length: 19.8 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G217D SI1.aqt
Date: 10/10/17 Time: 10:35:45

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G217D
Test Date: 4/4/17

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

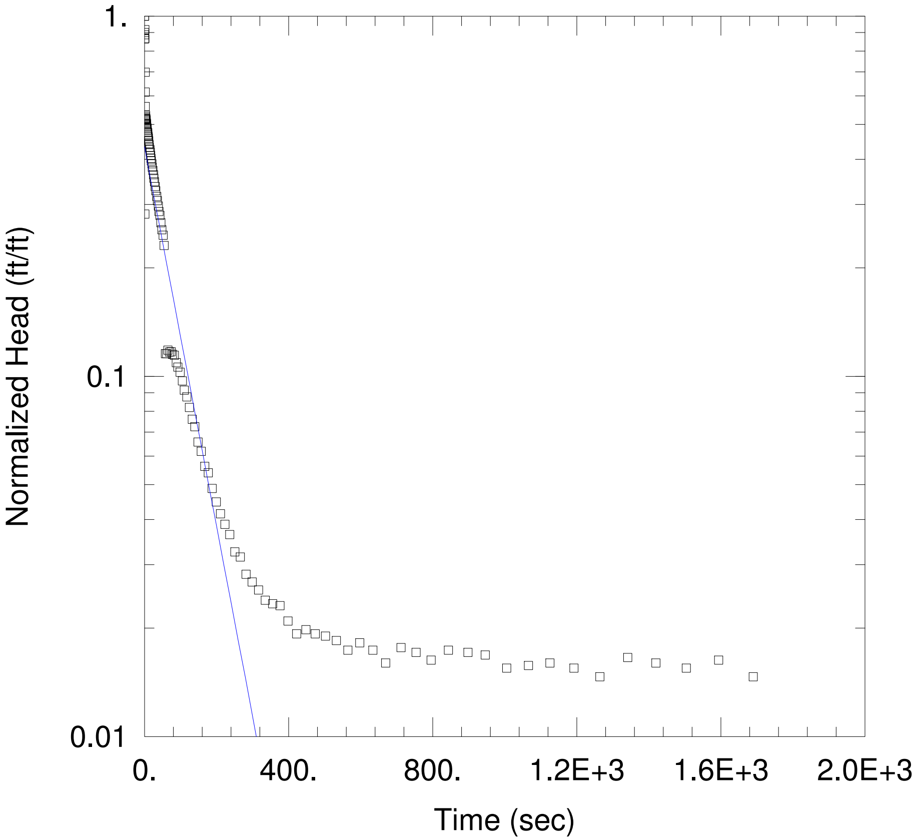
K = 0.0002266 cm/sec
y0 = 0.743 ft

AQUIFER DATA

Saturated Thickness: 13. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G217D SI1)

Initial Displacement: 1.02 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.08333 ft
Static Water Column Height: 13. ft
Screen Length: 10. ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G217D SI2.aqt
Date: 10/10/17 Time: 10:38:05

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G217D
Test Date: 4/4/17

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

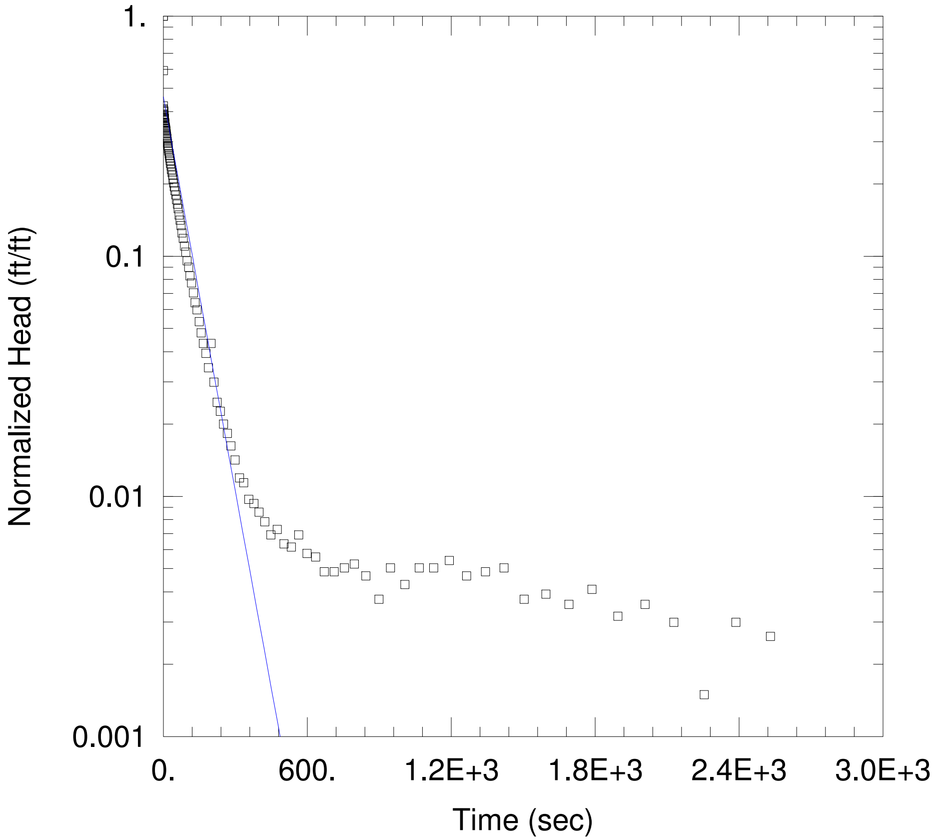
K = 0.0002919 cm/sec
y0 = 1.598 ft

AQUIFER DATA

Saturated Thickness: 13. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G217D SI2)

Initial Displacement: 3.685 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.08333 ft
Static Water Column Height: 13. ft
Screen Length: 10. ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G217D SO3.aqt
Date: 10/10/17 Time: 10:40:18

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G217D
Test Date: 4/4/17

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

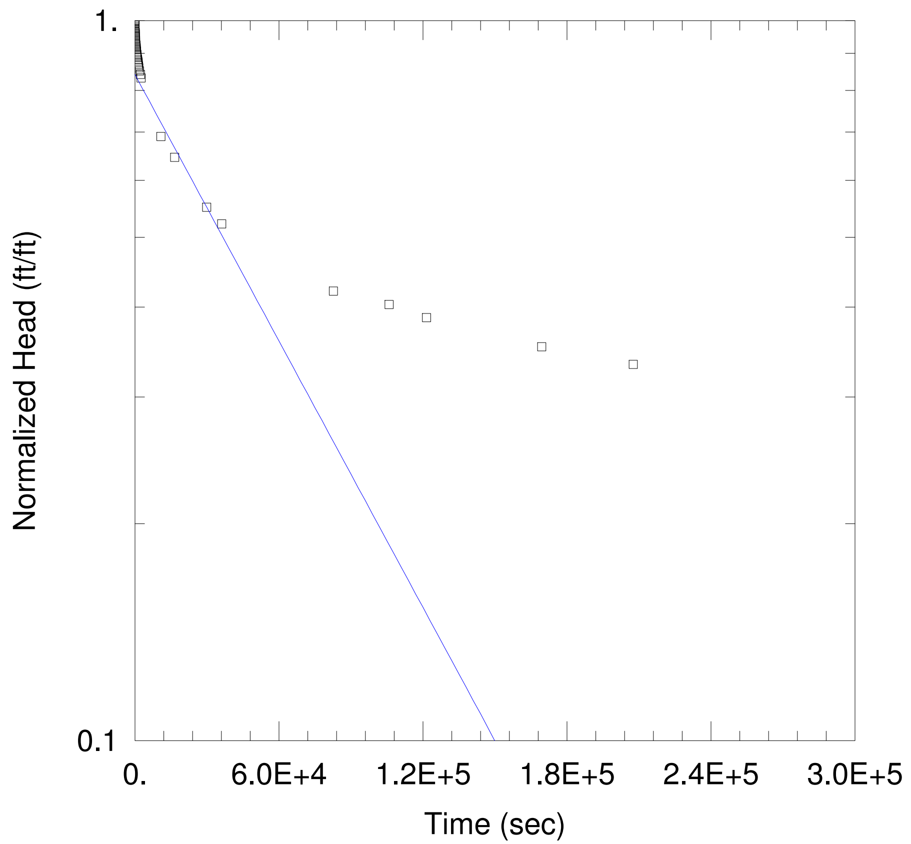
K = 0.0003032 cm/sec
y0 = 2.469 ft

AQUIFER DATA

Saturated Thickness: 13. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G217D SO3)

Initial Displacement: 5.362 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.08333 ft
Static Water Column Height: 13. ft
Screen Length: 10. ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G220 SO1.aqt
Date: 10/10/17 Time: 10:42:50

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G220
Test Date: 4/4/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

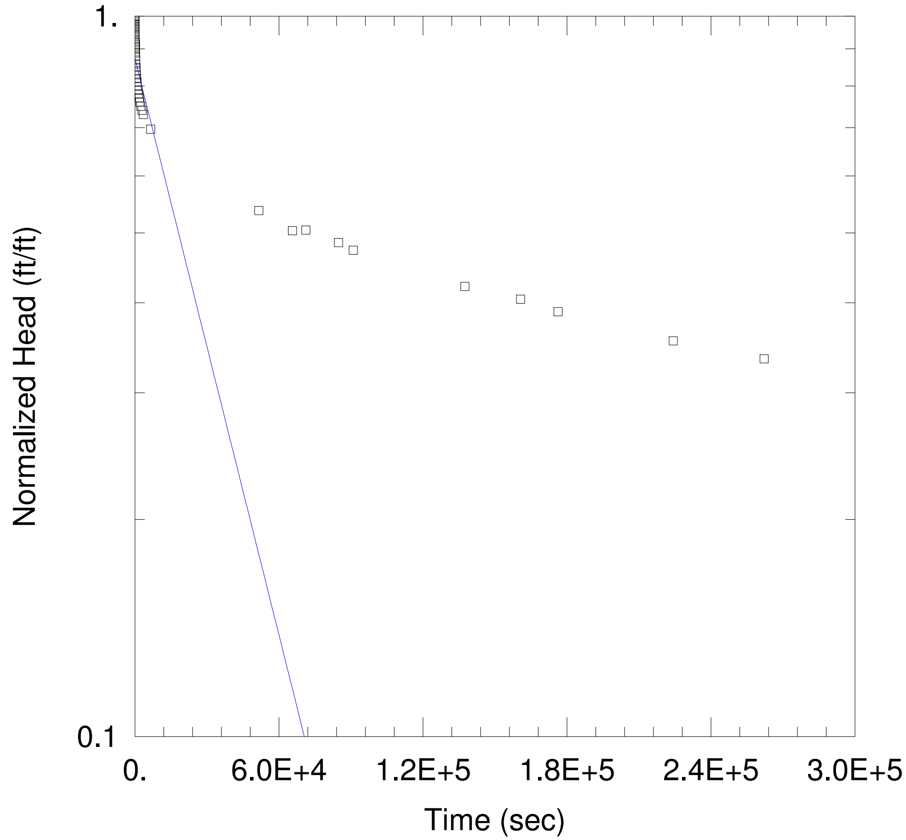
K = 3.513E-7 cm/sec
y0 = 9.098 ft

AQUIFER DATA

Saturated Thickness: 12. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G220 SO1)

Initial Displacement: 10.81 ft
Total Well Penetration Depth: 9.7 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 12. ft
Screen Length: 9.7 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G222 SO1.aqt
Date: 10/10/17 Time: 10:49:55

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G222
Test Date: 4/4/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

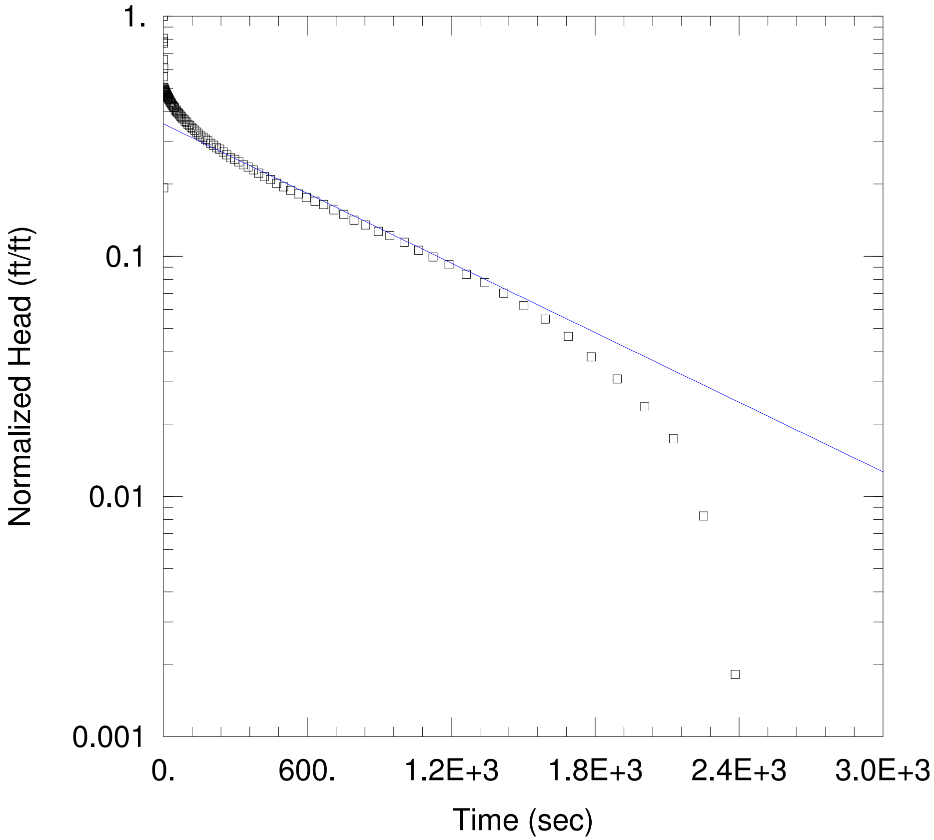
K = 1.541E-6 cm/sec
y0 = 8.832 ft

AQUIFER DATA

Saturated Thickness: 3.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G222 SO1)

Initial Displacement: 10.11 ft
Total Well Penetration Depth: 3.5 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 3.5 ft
Screen Length: 3.5 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G223 SI1.aqt
Date: 10/10/17 Time: 10:55:09

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G223
Test Date: 4/5/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

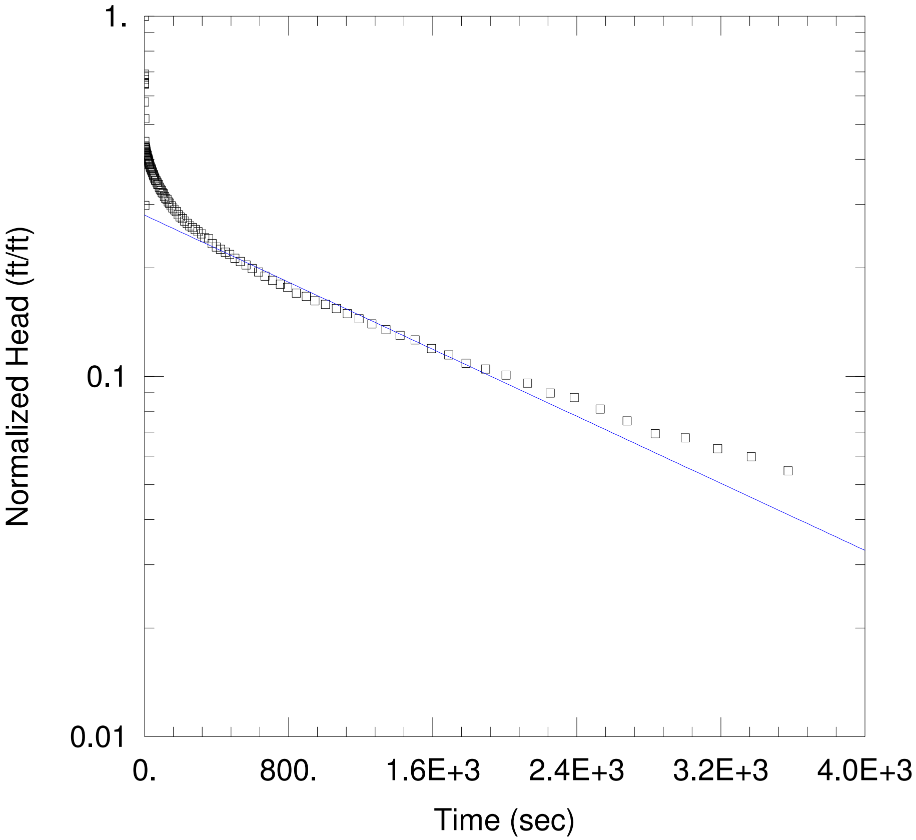
K = 5.19E-5 cm/sec
y0 = 1.374 ft

AQUIFER DATA

Saturated Thickness: 4. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G223 SI1)

Initial Displacement: 3.86 ft
Total Well Penetration Depth: 4. ft
Casing Radius: 0.08333 ft
Static Water Column Height: 4. ft
Screen Length: 4. ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G223 SI2.aqt
Date: 10/10/17 Time: 10:57:35

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G223
Test Date: 4/5/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

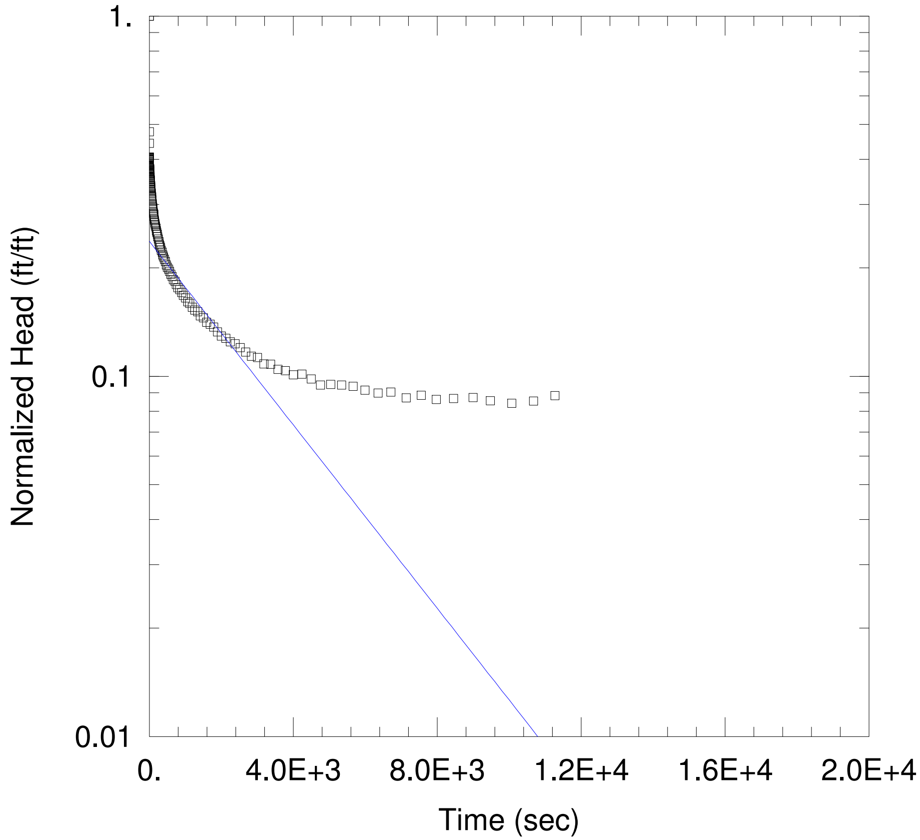
K = 2.5E-5 cm/sec
y0 = 1.251 ft

AQUIFER DATA

Saturated Thickness: 4. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G223 SI2)

Initial Displacement: 4.466 ft
Total Well Penetration Depth: 4. ft
Casing Radius: 0.08333 ft
Static Water Column Height: 4. ft
Screen Length: 4. ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G223 SO1.aqt
Date: 10/10/17 Time: 11:00:37

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G223
Test Date: 4/5/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

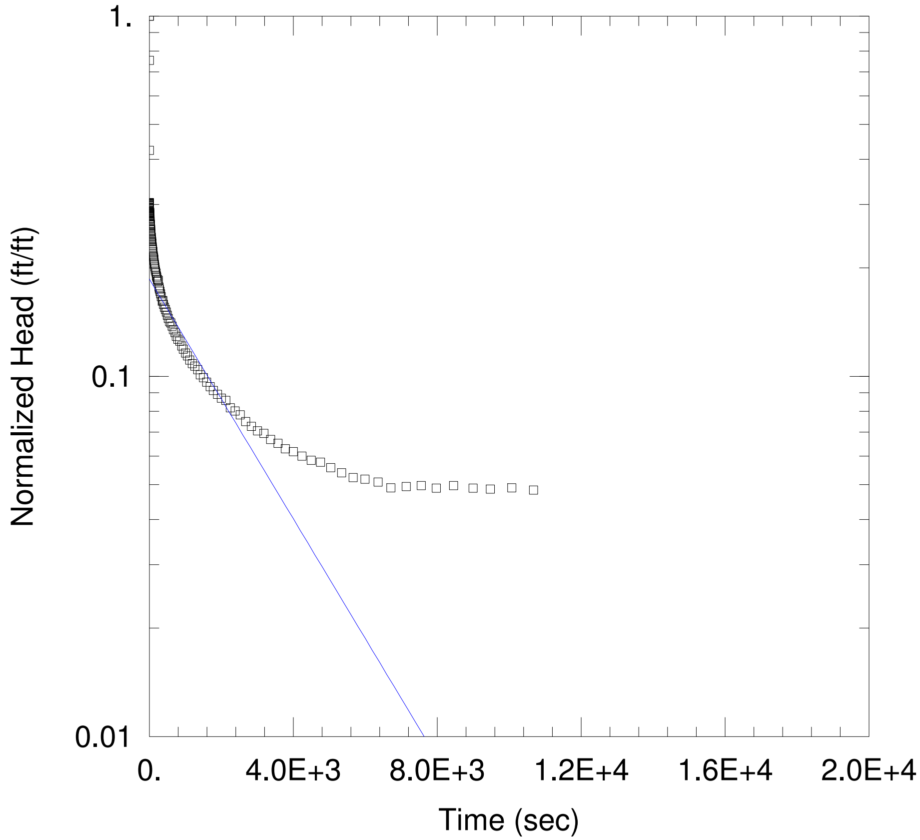
K = 1.368E-5 cm/sec
y0 = 1.281 ft

AQUIFER DATA

Saturated Thickness: 4. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G223 SO1)

Initial Displacement: 5.412 ft
Total Well Penetration Depth: 4. ft
Casing Radius: 0.08333 ft
Static Water Column Height: 4. ft
Screen Length: 4. ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G223 SO2.aqt
Date: 10/10/17 Time: 11:01:58

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G223
Test Date: 4/5/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

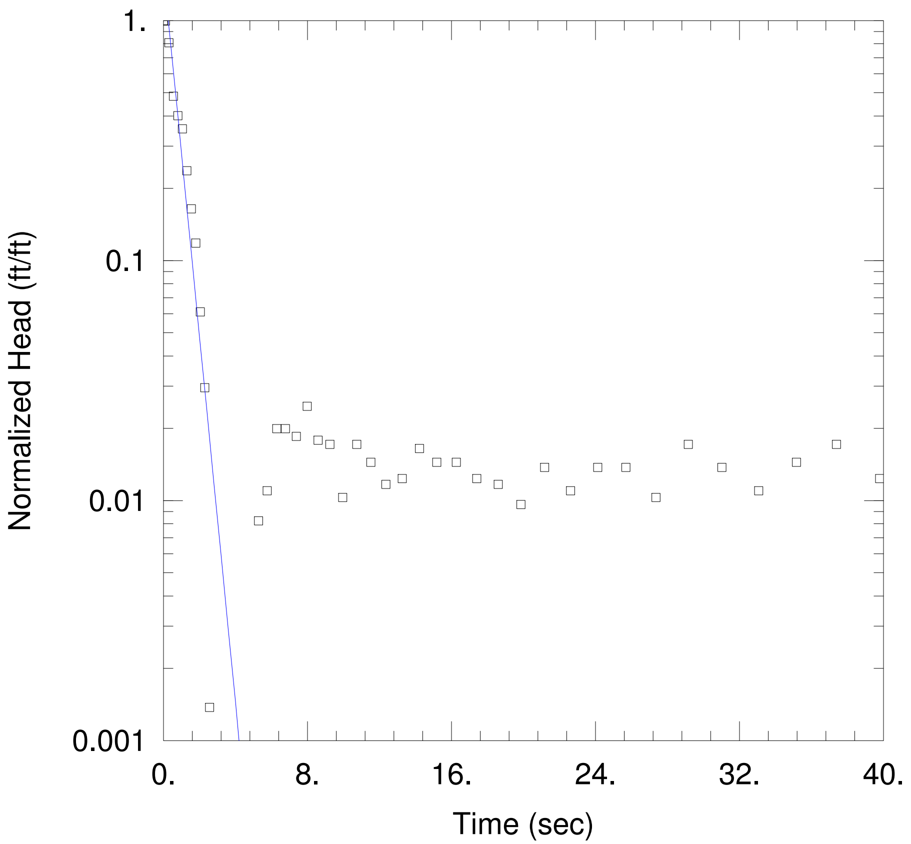
K = 1.786E-5 cm/sec
y0 = 1.359 ft

AQUIFER DATA

Saturated Thickness: 4. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G223 SO2)

Initial Displacement: 7.304 ft
Total Well Penetration Depth: 4. ft
Casing Radius: 0.08333 ft
Static Water Column Height: 4. ft
Screen Length: 4. ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G224 SI1.aqt
Date: 10/10/17 Time: 11:04:28

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G224
Test Date: 4/5/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

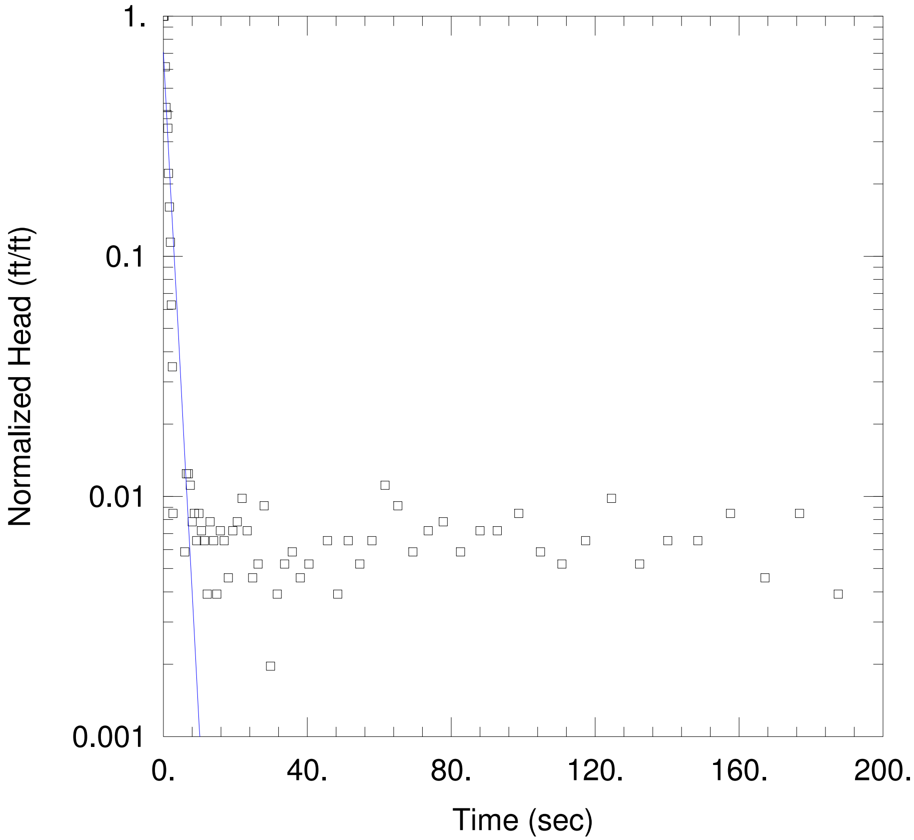
K = 0.05146 cm/sec
y0 = 2.38 ft

AQUIFER DATA

Saturated Thickness: 8.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G224 SI1)

Initial Displacement: 1.457 ft
Total Well Penetration Depth: 8.2 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 8.5 ft
Screen Length: 8.2 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G224 SI2.aqt
Date: 10/10/17   Time: 11:06:55

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G224
Test Date: 4/5/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.01897 cm/sec
y0 = 1.081 ft

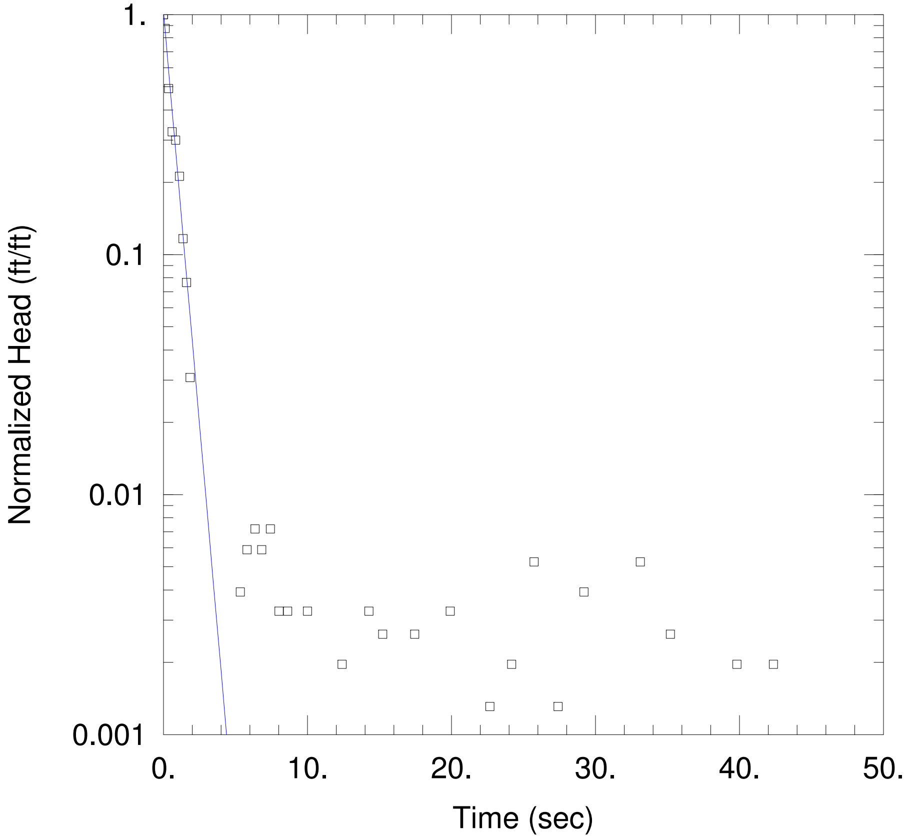
AQUIFER DATA

Saturated Thickness: 8.5 ft   Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G224 SI2)

Initial Displacement: 1.531 ft
Total Well Penetration Depth: 8.2 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 8.5 ft
Screen Length: 8.2 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G224 SI3.aqt
Date: 10/10/17 Time: 11:08:48

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G224
Test Date: 4/5/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

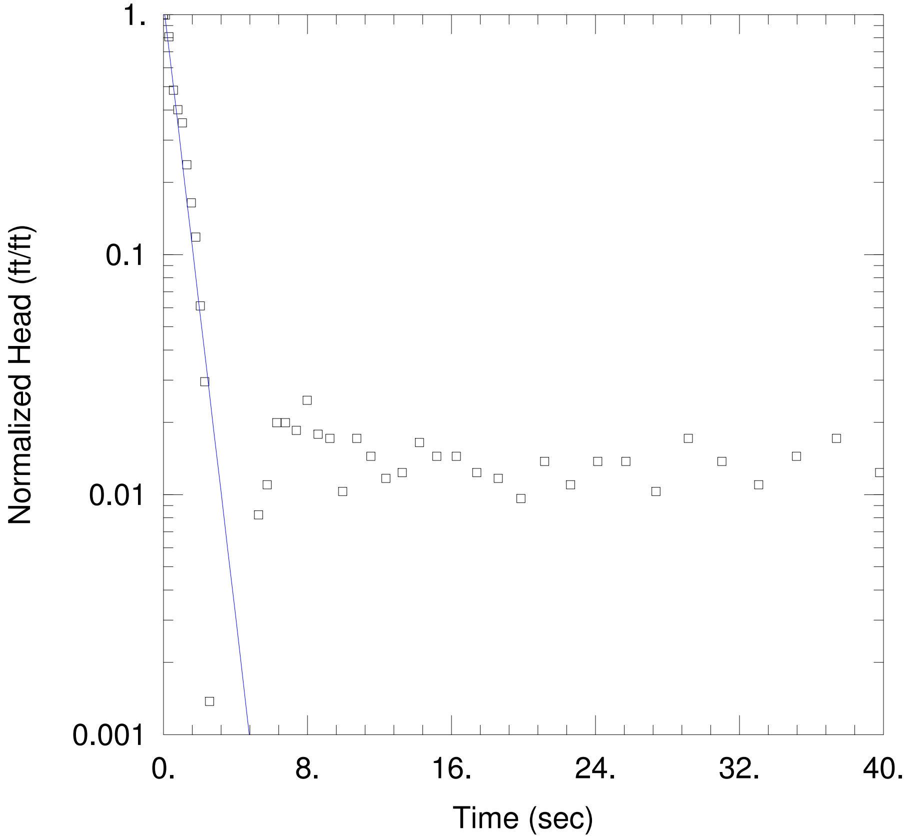
K = 0.04637 cm/sec
y0 = 1.586 ft

AQUIFER DATA

Saturated Thickness: 8.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G224 SI3)

Initial Displacement: 1.529 ft
Total Well Penetration Depth: 8.2 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 8.5 ft
Screen Length: 8.2 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G224 SO1.aqt
Date: 10/10/17 Time: 11:10:44

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G224
Test Date: 4/5/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

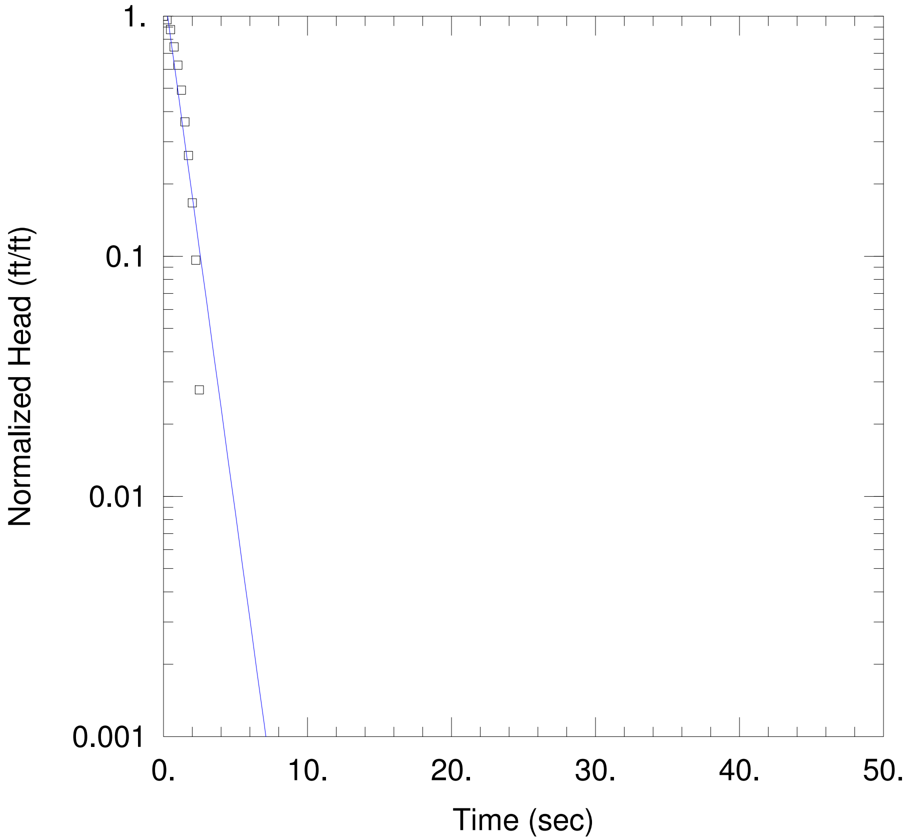
K = 0.04312 cm/sec
y0 = 1.657 ft

AQUIFER DATA

Saturated Thickness: 8.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G224 SI1)

Initial Displacement: 1.457 ft
Total Well Penetration Depth: 8.2 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 8.5 ft
Screen Length: 8.2 ft
Well Radius: 0.3458 ft



WELL TEST ANALYSIS

Data Set: P:\...\G224 SO3.aqt
Date: 10/10/17 Time: 11:12:56

PROJECT INFORMATION

Company: Natural Resource Technology
Client: Dynegy
Project: 2285
Location: Newton Landfill
Test Well: G224
Test Date: 4/5/17

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.0297 cm/sec
y0 = 1.264 ft

AQUIFER DATA

Saturated Thickness: 8.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (G224 SO2)

Initial Displacement: 0.936 ft
Total Well Penetration Depth: 8.2 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 8.5 ft
Screen Length: 8.2 ft
Well Radius: 0.3458 ft

INFORMATION AND DATA PROVIDED IN THE NEWTON POWER STATION LANDFILL, APPLICATION FOR LANDFILL PERMIT

SUBMITTED BY RAPPS TO IEPA IN 1997

from: Rapps, 1997. "Newton Power Station Landfill, Application for Landfill Permit", Rapps Engineering and Applied Sciences, Springfield, IL

VOLUME III

APPENDIX 5.0

HYDROGEOLOGIC INVESTIGATION AND GROUNDWATER MONITORING PROGRAM CIPS - NEWTON POWERSTATION LANDFILL JASPER COUNTY, ILLINOIS

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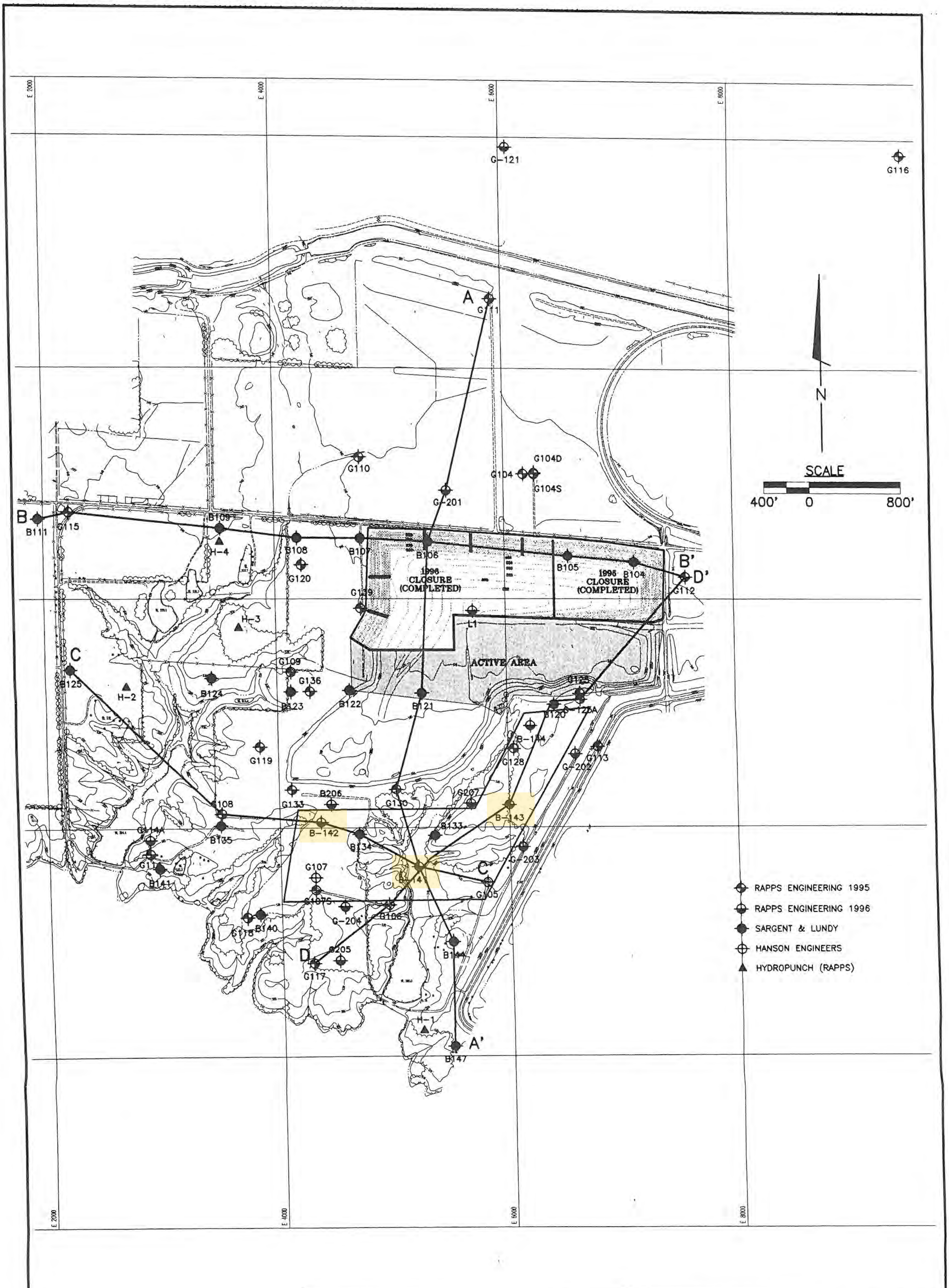

RAPPS

ENGINEERING & APPLIED SCIENCE
821 S. DURKIN DR. • SPRINGFIELD, IL 62704 • (217) 787-2118
1601 BROADWAY • MT. VERNON, IL 62864 • (618) 244-2611

FIGURE 3-2
CROSS SECTION KEY
NEWTON POWER STATION LANDFILL
CENTRAL ILLINOIS PUBLIC SERVICE
NEWTON, ILLINOIS

TABLE 3-1

LABORATORY AND IN-SITU HYDRAULIC CONDUCTIVITY TESTS

WELL/BORING	TESTED INTERVAL	HYDRAULIC CONDUCTIVITY (CM/SEC)	GEOLOGIC UNIT MONITORED
G105	11-26 ft	2.39×10^{-6} (F)	Upper Drift
G106	21-36 ft	7.53×10^{-6} (F)	Upper Drift
G115	8-18 ft	1.42×10^{-5} (F)	Upper Drift
G116	10-20 ft	3.09×10^{-5} (F)	Upper Drift
G119	10-20 ft	6.10×10^{-5} (F)	Upper Drift
G139	10-20 ft	5.14×10^{-5} (F)	Upper Drift
G201	57-67 ft	1.58×10^{-4} (F)	Uppermost Aquifer
G203	60-70 ft	5.14×10^{-3} (F)	Uppermost Aquifer
G204	55.5-64.5 ft	5.99×10^{-3} (F)	Uppermost Aquifer
G205	67-80 ft	2.54×10^{-6} (F)	Uppermost Aquifer
G207	57-70 ft	7.19×10^{-5} (F)	Uppermost Aquifer
B-141 (R)	20-25 ft	1.69×10^{-8} (L)	Vandalia Till Aquitard
B-141	27-28.5 ft	6.34×10^{-9} (L)	Vandalia Till Aquitard
B-142	27.5-30 ft	9.25×10^{-9} (L)	Vandalia Till Aquitard
B-142 (R)	28-32 ft	2.11×10^{-8} (L)	Vandalia Till Aquitard
B-143	21-22.5 ft	9.55×10^{-9} (L)	Vandalia Till Aquitard
G104D	79-87 ft	1.4×10^{-7} (F)	Lower Drift Aquitard

(F) From in-situ field test
(L) From laboratory analysis of site boring samples
(R) Re-molded Sample

Table 3-2 lists the number of tests, range of hydraulic conductivities (K), and the mean K for each hydrostratigraphic unit.

SHS ENGINEERS, INC.

CONSULTING ENGINEERS

2900 N. MARTIN LUTHER KING, JR. DRIVE • DECATUR, ILLINOIS 62526 • 217-877-2100 • FAX 217-877-4816

PERMEABILITY & CLASSIFICATION TEST RESULTS

PROJECT: NEWTON POWER STATION LANDFILL
DATE: November 22, 1996
PROJECT NO.: 66398
CLIENT: RAPPS
REPORT NO: 66398-1

SAMPLE IDENTIFICATION: B-141
DEPTH/ELEV: 20' - 25'

CLASSIFICATION; USCS:

DESCRIPTION: Gray, medium plasticity, SILTY CLAY, trace sand, trace gravel

SOIL PARTICLE SIZES
GRAVEL %: SAND %: SILT %: CLAY %: *

NATURAL MOISTURE %: 12.2
LIQUID LIMIT :
PLASTICITY INDEX :

DENSITY;lb/ft3 NATURAL: 0.0
MAX. DRY;lb/ft3: 126.3 REMOLDED: 120.1
PROCTOR;DEG OF COMPACTION (D698): 95.1

PERMEABILITY (k), cm/sec: 1.69E-8 **

PERMEABILITY TEST DETAILS

SAMPLES OBTAINED BY: CLIENT
TYPE OF SAMPLE: REMOLDED

SPECIMEN DATA
DIAMETER;cm: 7.264
LENGTH;cm: 7.442
AREA;cm2: 41.45
VOLUME;cm3: 308.5
INITIAL SATURATION; %: 23.46
TEST APPARATUS: GEOTEST

INITIAL DENSITY;pcf: 134.8
DRY UNIT DENSITY;pcf: 120.1
INITIAL MOISTURE; %: 12.2
FINAL MOISTURE; %:
FLOW ORIENTATION: -V

TEST PRESSURES
CELL/CONFINING; psi: 30.0
SAMPLE BACK PRESSURE;psi: 25.0
DRIVING PRESSURE; psi: 2.0
PERMEANT LIQUID: 0.005 N CaSO4

HYDRAULIC GRADIENT: 18.9

TIME OF TEST; SATURATION: 40.5 Hrs PERMEABILITY: 170.0 Hrs
FLOW THRU SPECIMEN; TOTAL: 13.41 ml PERMEABILITY TEST: 8.23 ml
TEMPERATURE CORRECTION; TEMPERATURE: 20.6 C FACTOR: 0.986

REMARKS:

* Percentage of silt and clay fractions is based on 0.002mm as the division between the fractions (Unified Soil Classification System)

** Hydraulic conductivity test conducted in accordance with ASTM D 5084-90 unless noted otherwise. E-8 equals 10 to the minus 8 (exponent); cm3 equals cubic centimeters; The 2 in H2O is a subscript.

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PERMEABILITY & CLASSIFICATION TEST RESULTS

PROJECT: NEWTON POWER STATION LANDFILL
DATE: November 22, 1996
PROJECT NO.: 66398
CLIENT: RAPPS
REPORT NO: 66398-1

SAMPLE IDENTIFICATION: B-142 DEPTH/ELEV: 28' - 32'

CLASSIFICATION; USCS:

DESCRIPTION: Gray, medium plasticity, SILTY CLAY, trace sand, trace gravel

SOIL PARTICLE SIZES
GRAVEL %: SAND %: SILT %: CLAY %: *

NATURAL MOISTURE %: 12.5
LIQUID LIMIT :
PLASTICITY INDEX :
DENSITY;lb/ft3 NATURAL: 0.0
MAX. DRY;lb/ft3: 126.3 REMOLDED: 118.6
PROCTOR;DEG OF COMPACTION (D698): 93.9

PERMEABILITY (k), cm/sec: 2.11E-8 **

= = = = = = = = = = = PERMEABILITY TEST DETAILS = = = = = = = = = = =

SAMPLES OBTAINED BY: CLIENT TYPE OF SAMPLE: REMOLDED

SPECIMEN DATA
DIAMETER;cm: 7.264
LENGTH;cm: 7.595
AREA;cm2: 41.45
VOLUME;cm3: 314.8
INITIAL SATURATION; %: 23.79
TEST APPARATUS: GEOTEST

INITIAL DENSITY;pcf: 133.4
DRY UNIT DENSITY;pcf: 118.6
INITIAL MOISTURE; %: 12.5
FINAL MOISTURE; %: 12.7
FLOW ORIENTATION: -V

TEST PRESSURES
CELL/CONFINING; psi: 30.0
SAMPLE BACK PRESSURE;psi: 25.0
DRIVING PRESSURE; psi: 2.0 HYDRAULIC GRADIENT: 18.5
PERMEANT LIQUID: 0.005 N $CaSO_4$

TIME OF TEST; SATURATION: 19.7 Hrs PERMEABILITY: 167.5 Hrs
FLOW THRU SPECIMEN; TOTAL: 10.81 ml PERMEABILITY TEST: 10.10 ml
TEMPERATURE CORRECTION; TEMPERATURE: 21.46 C FACTOR: 0.966

REMARKS:

* Percentage of silt and clay fractions is based on 0.002mm as the division between the fractions (Unified Soil Classification System)

** Hydraulic conductivity test conducted in accordance with ASTM D 5084-90 unless noted otherwise. E-8 equals 10 to the minus 8 (exponent); cm3 equals cubic centimeters; The 2 in H2O is a subscript.

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PERMEABILITY & CLASSIFICATION TEST RESULTS

PROJECT: NEWTON POWER STATION LANDFILL
DATE: November 10, 1996
PROJECT NO.: 66398
CLIENT: RAPPS
REPORT NO: 66398-1

SAMPLE IDENTIFICATION: B-141 DEPTH/ELEV: 27' - 28.5

CLASSIFICATION; USCS:

DESCRIPTION: Gray, medium plasticity, SILTY CLAY, trace sand, trace gravel

SOIL PARTICLE SIZES
GRAVEL %: SAND %: SILT %: CLAY %: *

NATURAL MOISTURE %: 13.0 DENSITY;lb/ft3 NATURAL: 124.6
LIQUID LIMIT : MAX. DRY;lb/ft3: REMOLDED: 0.0
PLASTICITY INDEX : PROCTOR;DEG OF COMPACTION (D698):

PERMEABILITY (k), cm/sec: 6.34E-9 **

PERMEABILITY TEST DETAILS

SAMPLES OBTAINED BY: CLIENT TYPE OF SAMPLE: 3" THIN-WALL TUBE

SPECIMEN DATA
DIAMETER;cm: 7.264 INITIAL DENSITY;pcf: 140.8
LENGTH;cm: 7.188 DRY UNIT DENSITY;pcf: 124.6
AREA;cm2: 41.45 INITIAL MOISTURE; %: 13.0
VOLUME;cm3: 297.9 FINAL MOISTURE; %: 13.8
INITIAL SATURATION; %: 26.01 FLOW ORIENTATION: -V
TEST APPARATUS: GEOTEST

TEST PRESSURES
CELL/CONFINING; psi: 30.0
SAMPLE BACK PRESSURE;psi: 25.0
DRIVING PRESSURE; psi: 2.0 HYDRAULIC GRADIENT: 19.6
PERMEANT LIQUID: 0.005 N CaSO4

TIME OF TEST; SATURATION: 115.2 Hrs PERMEABILITY: 167.0 Hrs
FLOW THRU SPECIMEN; TOTAL: 6.98 ml PERMEABILITY TEST: 3.24 ml
TEMPERATURE CORRECTION; TEMPERATURE: 22.06 C FACTOR: 0.953

REMARKS:

* Percentage of silt and clay fractions is based on 0.002mm as the division between the fractions (Unified Soil Classification System)

** Hydraulic conductivity test conducted in accordance with ASTM D 5084-90 unless noted otherwise. E-8 equals 10 to the minus 8 (exponent); cm3 equals cubic centimeters; The 2 in H2O is a subscript.

SKS ENGINEERS, INC.
CONSULTING ENGINEERS
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PERMEABILITY & CLASSIFICATION TEST RESULTS

PROJECT: NEWTON POWER STATION LANDFILL
DATE: November 10, 1996
PROJECT NO.: 66398
CLIENT: RAPPS
REPORT NO: 66398-1

SAMPLE IDENTIFICATION: B-142
DEPTH/ELEV: 27.5' - 30

CLASSIFICATION; USCS:

DESCRIPTION: Gray, medium plasticity, SILTY CLAY, trace sand, trace gravel

SOIL PARTICLE SIZES
GRAVEL %: SAND %: SILT %: CLAY %: *

NATURAL MOISTURE %: 11.9
DENSITY;lb/ft3 NATURAL: 124.1
LIQUID LIMIT :
MAX. DRY;lb/ft3: REMOLDED: 0.0
PLASTICITY INDEX :
PROCTOR;DEG OF COMPACTION (D698):

PERMEABILITY (k), cm/sec: 9.25E-9 **

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SAMPLES OBTAINED BY: CLIENT
TYPE OF SAMPLE: 3" THIN-WALL TUBE

SPECIMEN DATA
DIAMETER;cm: 7.264
LENGTH;cm: 7.696
AREA;cm2: 41.45
VOLUME;cm3: 319.0
INITIAL SATURATION; %: 23.69
TEST APPARATUS: GEOTEST

INITIAL DENSITY;pcf: 138.9
DRY UNIT DENSITY;pcf: 124.1
INITIAL MOISTURE; %: 11.9
FINAL MOISTURE; %: 12.9
FLOW ORIENTATION: -V

TEST PRESSURES
CELL/CONFINING; psi: 30.0
SAMPLE BACK PRESSURE;psi: 25.0
DRIVING PRESSURE; psi: 2.0
PERMEANT LIQUID: 0.005 N CaSO4

HYDRAULIC GRADIENT: 18.3

TIME OF TEST; SATURATION: 115.2 Hrs PERMEABILITY: 167.0 Hrs
FLOW THRU SPECIMEN; TOTAL: 9.41 ml PERMEABILITY TEST: 4.42 ml
TEMPERATURE CORRECTION; TEMPERATURE: 22.06 C FACTOR: 0.953

REMARKS:

* Percentage of silt and clay fractions is based on 0.002mm as the division between the fractions (Unified Soil Classification System)

** Hydraulic conductivity test conducted in accordance with ASTM D 5084-90 unless noted otherwise. E-8 equals 10 to the minus 8 (exponent); cm3 equals cubic centimeters; The 2 in H2O is a subscript.

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PERMEABILITY & CLASSIFICATION TEST RESULTS

PROJECT: NEWTON POWER STATION LANDFILL
DATE: November 10, 1996
PROJECT NO.: 66398
CLIENT: RAPP
REPORT NO: 66398-1

SAMPLE IDENTIFICATION: B-143
DEPTH/ELEV: 21' - 22.5

CLASSIFICATION; USCS:

DESCRIPTION: Gray, Silty Clay, trace sand, trace gravel

SOIL PARTICLE SIZES
GRAVEL %: SAND %: SILT %: CLAY %: *

NATURAL MOISTURE %: 11.4
DENSITY;lb/ft3 NATURAL: 125.4
LIQUID LIMIT :
MAX. DRY;lb/ft3: REMOLDED: 0.0
PLASTICITY INDEX :
PROCTOR;DEG OF COMPACTION (D698):

PERMEABILITY (k), cm/sec: 9.55E-9 **

PERMEABILITY TEST DETAILS

SAMPLES OBTAINED BY: CLIENT
TYPE OF SAMPLE: 3" THIN-WALL TUBE

SPECIMEN DATA
DIAMETER;cm: 7.264
LENGTH;cm: 7.595
AREA;cm2: 41.45
VOLUME;cm3: 314.8
INITIAL SATURATION; %: 22.89
TEST APPARATUS: GEOTEST

INITIAL DENSITY;pcf: 139.7
DRY UNIT DENSITY;pcf: 125.4
INITIAL MOISTURE; %: 11.4
FINAL MOISTURE; %: 14.3
FLOW ORIENTATION: -V

TEST PRESSURES
CELL/CONFINING; psi: 30.0
SAMPLE BACK PRESSURE;psi: 25.0
DRIVING PRESSURE; psi: 2.0
HYDRAULIC GRADIENT: 18.5
PERMEANT LIQUID: 0.005 N CaSO4

TIME OF TEST; SATURATION: 73.4 Hrs PERMEABILITY: 117.0 Hrs
FLOW THRU SPECIMEN; TOTAL: 6.40 ml PERMEABILITY TEST: 3.27 ml
TEMPERATURE CORRECTION; TEMPERATURE: 22.4 C FACTOR: 0.944

REMARKS:

* Percentage of silt and clay fractions is based on 0.002mm as the division between the fractions (Unified Soil Classification System)

** Hydraulic conductivity test conducted in accordance with ASTM D 5084-90 unless noted otherwise. E-8 equals 10 to the minus 8 (exponent); cm3 equals cubic centimeters; The 2 in H2O is a subscript.

APW15 BORING LOG

SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Newton Power Station		APW15

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Adam Jochimsen Cascade Drilling	1/21/2021	1/22/2021	Mini Sonic

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
APW15	Feet (NAVD88)	522.06 Feet (NAVD88)	6.0 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 821,107.90 N, 997,938.87 E (E)/W
1/4 of 1/4 of Section 26, T 6 N, R 8 E

Lat 38° 55' 17.71"
Long -88° 17' 6.79"

Local Grid Location: Feet ☐ N ☐ S; Feet ☐ E ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Jasper	IL	Newton

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
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			6.5–12	Ā#%Ā9ĀĀ><PĀ ;< =ĀĀ(; BĀNVĀC 5ĀH$=IĀ&AUB EĐĀH 9Ā L JĀEGNĀH$L JĀC M-ĀH$L JĀ+C GĐ / . K,D ĀH$L JĀM,5ĀEWĐĀ#EWĐĀ#ĀD K.GO5B / -ND7/Ā7C3G-EEBĀ -ND7/Ā01.EKD5BĀ +DE#	(;				Ā#Ā' & !					
% ()	8$ '$													

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

Signature	Firm	
[signature]	Ramboll 234 W. Florida Street, Milwaukee, WI 53204	Tel: (414) 837-3607 Fax: (414) 837-3608

Boring Number APW15

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			13	[illegible]					[illegible]					
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			27	[illegible]					[illegible]					
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			31						[illegible]					
			32											

Boring Number APW15

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
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Boring Number APW15

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
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Boring Number APW15

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
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Boring Number APW15

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID 10.6 eV Lamp	Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
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			97	[illegible]										
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			110	[illegible]										

ATTACHMENT 2

RAMBOLL RESPONSE LETTER DATED NOVEMBER 3, 2023

RAMBOLL ENVIRONMENT & HEALTH

November 3, 2023

VIA E-MAIL
heather.mullenax@illinois.gov
EPA.CCR.PART845.COORDINATOR@ILLINOIS.GOV
EPA.CCR.Part845.Notify@Illinois.gov

Re: Newton Power Plant Primary Ash Pond Alternative Source Demonstration Response to IEPA Comments

To Whom It May Concern:

This letter addresses the following requests for information from the Illinois Environmental Protection Agency (IEPA) provided on October 26, 2023 via email from Lauren Hunt regarding the Newton Power Plant Primary Ash Pond alternative source demonstration (ASD) submitted on October 6, 2023:

1. Source characterization of the CCR at the Primary Ash Pond must include total solids sampling, analysis and reporting in accordance with SW846.
2. Hydraulic conductivities from laboratory or insitu testing must be collected, analyzed and presented with hydrogeologic characterization of all units including aquifers and confining units. Hydraulic conductivity data must include field and software analysis.
3. Characterization to include sample and analysis in accordance with 35 IAC 845.640 of alternative source must be provided with the ASD.

Background

Alternative source demonstrations use a multiple lines of evidence approach to support the conclusions that 1) the coal combustion residuals (CCR) unit is not the source of an exceedance, and 2) there is an alternative source of the exceedance. The multiple lines of evidence approach is consistent with the approach used in many areas of environmental analysis such as ecological risk assessment, monitored natural attenuation (MNA), and vapor intrusion (USEPA, 2016; USEPA, 1999; ITRC, 2007). The goal of a multiple lines of evidence approach is to provide robust support for a causal relationship based on many smaller individual qualitative or quantitative pieces of evidence (USEPA, 2016). Critically, no individual line of evidence will be completely conclusive, and each will have varying degrees of certainty. The final determination of a conclusion is based on the totality of the evidence provided.

ASDs based on a multiple lines of evidence approach are routinely prepared by environmental consultants to comply with federal CCR rules (Title 40 of the Code of Federal Regulations [40 C.F.R.] § 257) and State CCR rules (Title 35 of the Illinois Administrative Code [35 I.A.C.] § 845). In Georgia, where the CCR permitting authority has been delegated to the State, the Georgia Environmental Protection Division has approved ASDs using multiple lines of evidence to satisfy the requirements of federal CCR rule. An example of such approval is documented in the summary section (page 3) of the 2023 Annual Groundwater Monitoring and Corrective Action Report found in the publicly accessible files linked here: https://www.georgiapower.com/content/dam/georgia-power/pdfs/company-pdfs/plant-mcmanus/20230731_2023agwmcar_mcm_ap-1.pdf.

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The Primary Ash Pond ASD was completed in conformance with the Electric Power Research Institute (EPRI) guidance for development of ASDs at CCR sites (EPRI, 2017). The EPRI document presents an approach for developing ASD lines of evidence that relies, where possible, on leachate samples collected from leachate wells, lysimeters, and/or leachate collection systems to provide samples that are representative of interstitial porewater. This direct approach for evaluating the potential for the Primary Ash Pond to impact groundwater is in contrast to the indirect approach implied by the IEPA request to characterize the CCR at the Primary Ash Pond using methods in accordance with SW-846 (specifically those used for waste characterization [*e.g.,* EP, TCLP, SPLP, LEAF[1]]), as discussed below.

Additionally, the lines of evidence as presented as section headings in the Primary Ash Pond ASD commonly contain multiple qualitative and quantitative pieces of information that contribute to the body of evidence that support the conclusion that the CCR surface impoundment (SI) is not the source of an exceedance.

Response to Request Number 1: SW-846 Characterization of CCR Material

The CCR porewater most accurately represents the mobile constituents associated with the waste management activity within the CCR SI (EPRI, 2017). The composition of CCR porewater accumulated at the base of the CCR unit, which is derived from, and represents contact with, CCR material above and around the well screen, is the truest representation of mobile constituents throughout the CCR SI. Leach tests presented in SW-846 (*e.g.*, TCLP, SPLP, LEAF 1313 - 1316) are inconsistent predictors or surrogates of *in situ* porewater chemical concentrations (EPRI, 2020; EPRI, 2021; and EPRI, 2022). Indeed, laboratory leach test effectiveness is determined by comparing results to porewater data (USEPA, 2014; EPRI, 2020; EPRI, 2021; and EPRI, 2022). These laboratory leach tests most accurately predict porewater concentrations when conditions in the test closely reflect conditions present in the field (USEPA, 2019). In many cases, the pH and/or redox potential of porewater is poorly represented by any laboratory leach test conditions. For these reasons, analysis of actual CCR porewater is more representative of potential contributions to groundwater observed in compliance monitoring wells than laboratory leach testing. The uncertainty in comparing the laboratory leach test results with the actual porewater concentrations means that the contribution of laboratory leach test data as a line of evidence to an ASD would be minimal.

Prior to performing hydrogeologic investigations in 2021, Ramboll completed a review of existing data to determine whether sufficient information existed to meet the requirements of 35 I.A.C. § 845. Based on the review, Ramboll developed an approach to fully characterize the CCR material as part of the 2021 investigation. Five locations for porewater wells were selected by evaluating the extent of ash through time on aerial photographs (Figure 1), identifying visible differences (color) in surficial materials, and capturing a representative spatial distribution. Porewater was encountered at an elevation of approximately 540 feet in 2021 (Ramboll, 2021). For the purpose of visualization, Figure 2 shows the areas within the SI that were not accessible for potential sampling and testing as illustrated by different colored portions of the Primary Ash Pond. Of the 404 acre unit only about 12% was accessible. A total of four porewater wells were installed in 2021, because the fifth location was not able to be accessed safely after evaluation with contractors in the field.

[1] Extraction Procedure, Toxic Characteristic Leaching Procedure, Synthetic Precipitation Leaching Procedure, Leaching Environmental Assessment Framework

During installation of the porewater wells, the borings were logged, and solid samples were collected from eight intervals for geotechnical and chemical analysis. Samples were analyzed for total metal concentrations via EPA Method 6010B and 6020A (SW-846) and results were summarized in the Hydrogeologic Site Characterization Report (Ramboll, 2021) and submitted in the 2021 Operating Permit (Burns and McDonnell, 2021).

As established above, testing porewater is a direct source term for evaluating potential influence on groundwater. SW-846 provides analytical methods for evaluating solid waste using leach tests that are designed to replicate potential *in situ* conditions (either current or future). The goal of these laboratory leach tests is to predict the potential concentration of chemicals under laboratory controlled conditions (*e.g.*, landfill leachate, synthetic precipitation, variable pH) which may or may not represent conditions observed in the field. The use of leach test results performed under variable conditions collected from any number of locations within the CCR SI to estimate a total potential for chemical leaching from CCR into groundwater under a variety of different conditions is irrelevant to an ASD. ASDs are prepared to evaluate the potential for actual porewater leaking from a CCR SI to be the cause of a detected exceedance observed in a compliance well.

Response to Request Number 2: Provide Hydraulic Conductivity Data

Responses to Request Number 2 are provided in the cover letter to this Attachment and in Attachment 1 to that cover letter.

Response to Request Number 3: Alternative Source Characterization

In the ASD, the multiple lines of evidence approach is appropriate for identifying that a source other than the Primary Ash Pond caused, and that the Primary Ash Pond did not contribute to, the chloride exceedance in APW15. Additionally, Ramboll's investigation and analysis determined bedrock is likely the source of chloride in APW15. Ramboll reviewed available power plant and public well records which did not yield any bedrock monitoring wells in the immediate vicinity to provide site-specific groundwater analytical results. However, the references provided in Section 2.3.2 of the ASD indicate chloride is present in bedrock groundwater in many locations within the Illinois Basin which underlies approximately 70% of Illinois. That and the observation of a saline spring approximately 10 miles from the site near the Clay City Anticline (a structural feature which could provide fractures that act as conduits to bring brines near the land surface) are strong indicators that the bedrock beneath the Primary Ash Pond also contains chloride.

Conclusions

The combined strength of the lines of evidence in the Primary Ash Pond ASD demonstrates that the Primary Ash Pond is not the source of the chloride exceedance at APW15 (and did not contribute to the chloride exceedance at APW15) and that the likely source is native bedrock. Ramboll does not believe that additional lines of evidence based on leach test data or testing of the alternative source would change the conclusion of the full body of evidence presented in the ASD that the Primary Ash Pond is not the source of the chloride exceedance at APW15 and did not contribute to the chloride exceedance at APW15.

RAMBOLL

References

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Interstate Technology Regulatory Council (ITRC), 2007. Technical and Regulatory Guidance Vapor Intrusion Pathway: A Practical Guide. January 2007.

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Ramboll Americas Engineering Services (Ramboll), 2021. Hydrogeologic Site Characterization Report. Newton Power Plant Primary Ash Pond. October

United States Environmental Protection Agency (USEPA), 2019. Leaching Environmental Assessment Framework (LEAF) How-To Guide. SW-846 Update VII. Revision 1. May.

United States Environmental Protection Agency (USEPA), 2016. Weight of Evidence in Ecological Assessment. EPA/100/R-16/001. December.

United States Environmental Protection Agency (USEPA), 2014. Leaching Test Relationships, Laboratory-to-Field Comparisons and Recommendations for Leaching Evaluation using the Leaching Environmental Assessment Framework. EPA 600/R-14/061 September.

United States Environmental Protection Agency (USEPA), 1999. Use of Monitoring Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites. OSWER Directive Number 9200.4-17P.

Attachments

Figure 1 CCR Characterization

Figure 2 2022 Conditions

If you have any questions about this letter, please do not hesitate to contact Brian Hennings or Frances Ackerman, as referenced below.

Sincerely,

Brian G. Hennings, PG
Project Officer, Hydrogeology
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D +1 262 719 4512
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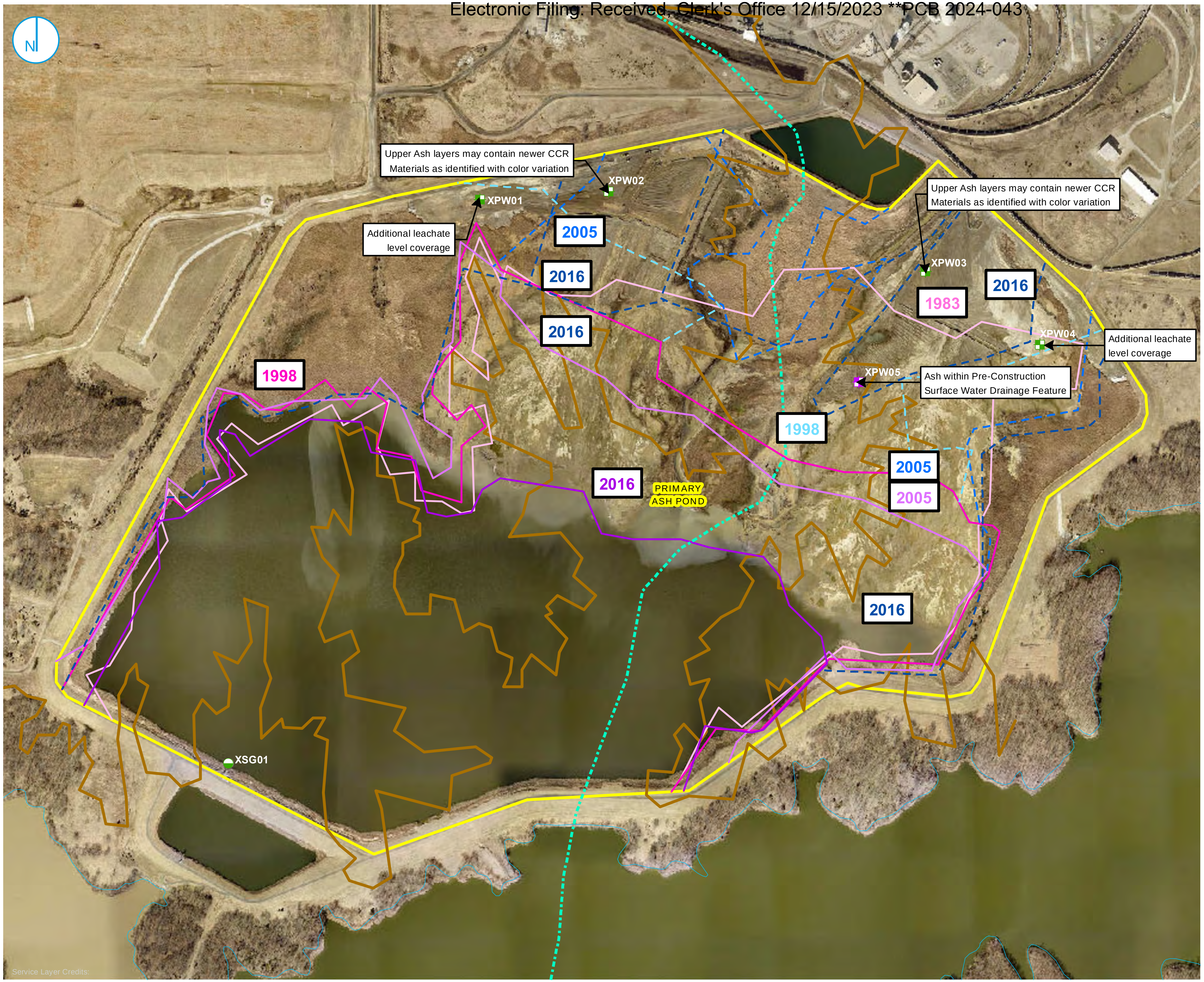
A. Frances Ackerman, PE
Subject Matter Expert/Technical Manager 2
D +1 414 308 0811
M +1 414 308 0811
frances.ackerman@ramboll.com

ATTACHMENTS



PORE WATER WELL
STAFF GAGE, CCR UNIT
PROPOSED LOCATION COULD NOT BE ACCESSED
APPROXIMATE LOCATION OF STREAM BASED ON 1953 TOPOGRAPHIC MAP (BASE OF STREAM ELEVATION DECREASES SOUTH TOWARD NEWTON LAKE)
APPROXIMATE LOCATION OF 530 FOOT GROUND SURFACE ELEVATION CONTOUR BASED ON 1953 TOPOGRAPHIC MAP (PRE-CONSTRUCTION SURFACE WATER DRAINAGE FEATURE)
APPROXIMATE LIMITS OF ASH BASED ON 1983 AERIAL
APPROXIMATE LIMITS OF ASH BASED ON 1998 AERIAL
APPROXIMATE LIMITS OF ASH BASED ON 2005 AERIAL
APPROXIMATE LIMITS OF ASH BASED ON 2016 AERIAL
APPROXIMATE LIMITS OF VARIANCE IN CCR MATERIAL COLORATION AS OBSERVED IN 1998 AERIAL
APPROXIMATE LIMITS OF VARIANCE IN CCR MATERIAL COLORATION AS OBSERVED IN 2005 AERIAL
APPROXIMATE LIMITS OF VARIANCE IN CCR MATERIAL COLORATION AS OBSERVED IN 2016 AERIAL
SURFACE WATER FEATURE
CCR MONITORED UNIT, SUBJECT SITE

0 275 550 Feet

CCR CHARACTERIZATION

NEWTON PRIMARY ASH POND (UNIT ID: 501)

NEWTON POWER STATION
NEWTON, ILLINOIS

FIGURE 1

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Y:\Mapping\Projects\22\2285\MXD\845\Newton\2023\INTERACTIVE_Figure 1_Newton_CCR Characterization.mxd

PROJECT: 169000XXXX | DATED: 11/3/2023 | DESIGNER: GALARNMC

PORE WATER WELL
STAFF GAGE, CCR UNIT
PROPOSED LOCATION COULD NOT BE COMPLETED
540 ELEVATION CONTOUR
ACTIVE SLUICE AREA
LIMITED ACCESS AREA
LOW LYING VEGETATION AREA
RECENT SLUICE AREA
ELEVATION BELOW 540FT
REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE

0 275 550
Feet

2022 CONDITIONS

NEWTON POWER PLANT
NEWTON, ILLINOIS

FIGURE 2

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Y:\Mapping\Projects\22\2285\MXD\845\Newton\2023\Figure 2_NEW 2022 Conditions.mxd

PROJECT: 169000XXXX | DATED: 11/3/2023 | DESIGNER: GALARNMC

Exhibit D

DECLARATION OF MELINDA W. HAHN, PhD

In support of Illinois Power Generation Company's (IPGC's) Petition for Review of IEPA's Non-concurrence with the Newton Alternative Source Demonstration and Request for Stay

I, Dr. Melinda W. Hahn, declare and state as follows:

1) I am an Environmental Engineer and Senior Managing Consultant with Ramboll Americas Engineering Solutions, Inc. Attached as Attachment 1 is a true and accurate copy of my Curriculum Vitae.

2) I hold a PhD in Environmental Engineering from Johns Hopkins University. The focus of my research for my PhD dissertation was contaminant transport in porous media (e.g., groundwater).

3) My practice over my 25-year career includes site investigation and remediation in multiple state and federal programs, such as voluntary remediation, Resource Conservation and Recovery Act (RCRA) corrective action, and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response action. My work in these programs includes contaminant fate

and transport modelling, site investigation and remediation, and statistics and forensic analysis of environmental contamination data. I have evaluated sites from many different industrial sectors with many different contaminants of concern, including volatile organic compounds (VOCs), which includes chlorinated volatile organic compounds (CVOCs), semivolatile organic compounds (SVOCs), metals, polychlorinated biphenyls (PCBs), and dioxins/furans.

4) To prepare this Declaration, I reviewed the Illinois Power Generation Company (IPGC) October 6, 2023 Alternative Source Demonstration (ASD) Report for chloride concentrations observed in groundwater from well APW15 at the Newton Power Plant Primary Ash Pond (PAP), the November 3, 2023 IPGC letter to the IEPA with supplementary information on the ASD, the November 7, 2023 IEPA denial of the ASD, and supporting information for the ASD. I reviewed the documents submitted by IPGC independently and was not personally involved in their preparation.

5) The three lines of evidence (LOEs) presented in the October 3, 2023 ASD report are as follows:

a) LOE 1: The thick layer of low permeability till that separates the PAP from the screened aquifer in APW15 prevents vertical migration of coal combustion residual (CCR) constituents;

b) LOE 2: Primary CCR indicators boron and sulfate do not exceed background limits and are not increasing at APW15; and

c) LOE 3: Concentrations of chloride at APW15 are greater than source porewater concentrations.

The ASD report also noted that concentrations of chloride at APW15 are consistent with published data for regional bedrock aquifer quality and the observation of a saline spring (that establishes the presence of an upward hydraulic gradient) within ten miles of the Newton Power Plant. These LOEs and observations are sufficient to determine that coal ash in the PAP is not the source of the chloride concentrations observed in monitoring well APW15, and that those concentrations are consistent with adjacent natural groundwater quality.

6) The ASD report relies on a multiple lines of evidence (MLE) approach that is standard practice in causal determinations in environmental forensic analysis, risk assessment, and site investigation.[1,2,3,4,5] The MLE approach involves analysis of multiple independent sets of data to test whether an identified source can explain observed data. Information to consider can be site-specific,

[1] Miller, J. Methods and Advances in the Forensic Analysis of Contaminated Rivers, E3S Web of Conferences Vol. 125, 2019, p. 3.

[2] U.S. EPA, U.S. Navy SPAWAR Systems Center, GeoChem Metrix Inc., and Battelle Memorial Institute, A Handbook for Determining the Sources of PCB Contamination in Sediments, Technical Report, TR-NAVFAC EXWC-EV-1302, October 2012, p. 13.

[3] U.S. EPA, Office of the Science Advisor, Risk Assessment Forum, Weight of Evidence in Ecological Assessment, EPA/100/R-16/001, December 2016.

[4] U.S. EPA, Office of Solid Waste and Emergency Response, OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor in Indoor Air, June 2015, pp. xv-xvii, 17-18, 38-40, 60-61, 117-123.

[5] EPRI, Guidelines for Development of Alternative Source Demonstrations at Coal Combustion Residual Sites, 2017 Technical Report, p. viii.

regional, or from the literature.[6,7] These independent lines of evidence are developed until sufficient confidence is achieved to either confirm or rule out a source.[8] For the Newton ASD, the independent lines of evidence include hydrogeological data to show that migration from the PAP to a deep well is unlikely, chemical data for key CCR indicators to show a lack of CCR impact at APW15, and the fundamental concept of contaminant migration that contaminant concentrations decrease in the downgradient direction due to the successive dilution of dispersion and diffusion (i.e., downgradient concentrations cannot be higher than source concentrations). In a CCR surface impoundment release scenario, leachate is subject to physical processes that dilute solute concentrations including mixing, dispersion and dilution.[9] Together, these lines result in sufficient confidence that a source other than the PAP is the cause of the chloride exceedance in APW15 and that the PAP is not contributing to the observed chloride concentrations.

7) The source concentrations in the PAP have been characterized through the collection of porewater samples. The source porewater data for the

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[6] U.S. EPA, Office of the Science Advisor, Risk Assessment Forum, Weight of Evidence in Ecological Assessment, EPA/100/R-16/001, December 2016, p. 20 et seq.

[7] U.S. EPA, U.S. Navy SPAWAR Systems Center, GeoChem Metrix Inc., and Battelle Memorial Institute, A Handbook for Determining the Sources of PCB Contamination in Sediments, Technical Report, TR-NAVFAC EXWC-EV-1302, October 2012, p. 30.

[8] Miller, J. Methods and Advances in the Forensic Analysis of Contaminated Rivers, E3S Web of Conferences Vol. 125, 2019, p. 3.

[9] U.S. EPA Office of Solid Waste and Emergency Response, Solid Waste Disposal Criteria, Technical Manual, EPA530-R-93-017, p. 126.

PAP are consistent with literature values for coal ash leachate,[10,11,12] and define the maximum concentrations for groundwater impact outside of the PAP. The porewater data also provide information on the relative abundance of coal ash constituents and the variability of the observed concentrations.

8) The two lines of evidence based on groundwater chemistry (lines 2 and 3) are sufficient to eliminate the PAP as the source of chloride concentrations in APW15. PAP source concentrations as described by the porewater data show that CCR impact is characterized primarily by increases in boron and sulfate compared to the background concentrations at APW05 and APW06, whereas chloride is not similarly enriched in the source porewater. At APW15, however, boron is not enriched with respect to background, sulfate is depleted with respect to background, but chloride is dramatically enriched (by an order of magnitude) with respect to background ***and*** porewater. This chloride enrichment relative to the source concentration is an indication of an alternate source because groundwater plume strength only decreases downgradient due to the dilutive physical processes discussed above. While all three analytes are considered to be conservative (travel unretarded with groundwater), boron is considered by U.S.

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[10] U.S. EPA, Industrial Environmental Research Laboratory, Chemical and Biological Characterization of Leachates from Coal Solid Wastes, EPA-600/7-80-039, March 1980.

[11] U.S. EPA and TVA, Effects of Coal-ash Leachate on Ground Water Quality, EPA-600/7-80-066, March 1980.

[12] U.S. EPA, Office of Research and Development, Characterization of Coal Combustion Residues from Electric Utilities – Leaching and Characterization Data, EPA-600/R-09/151, December 2009.

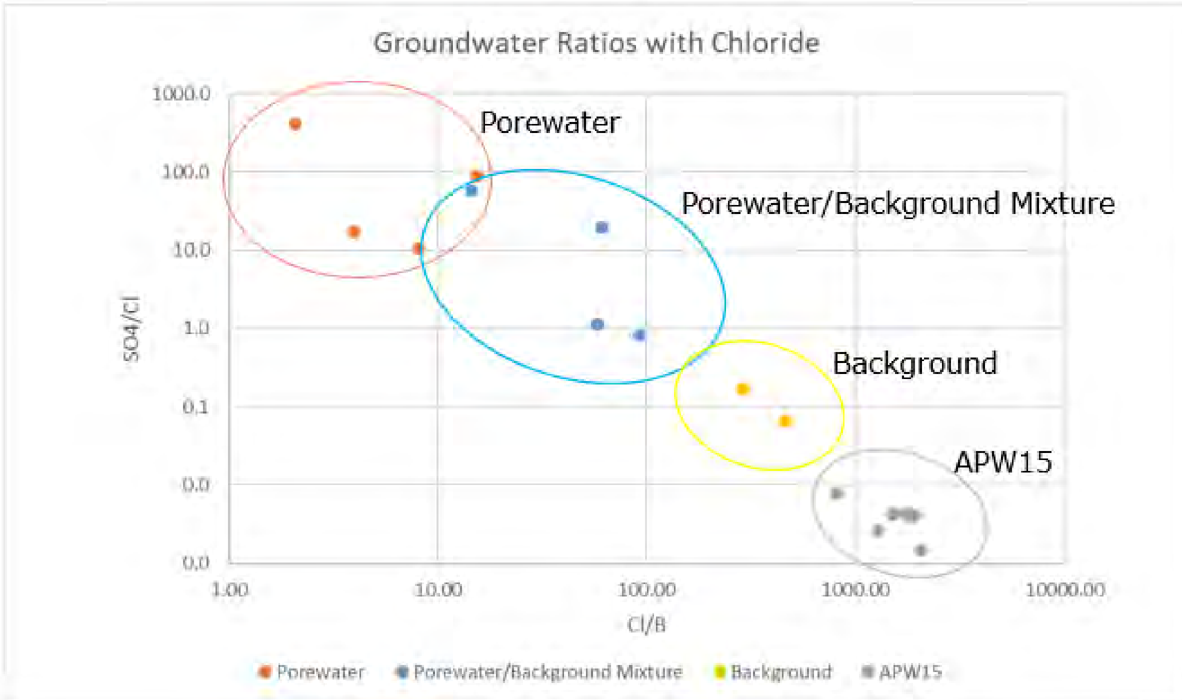
EPA to be the indicator analyte with the fastest travel time and likely the first indicator analyte to be detected.[13] The lack of consistency of APW15 groundwater chemistry with CCR impacted groundwater or even site-specific background groundwater is clear evidence of an additional source. An additional source rich in chloride is sufficiently explained by the published literature values for regional data and observations for the local bedrock aquifer and saline spring.[14,15] The relationship between boron, sulfate and chloride in PAP porewater (XPW01, XPW02, XPW03 and XPW04), background (APW05 and APW06), and APW15 is described graphically in the following chart:

[13] EPA Proposed Rule: Amendments to the National Minimum Criteria (Phase One for Disposal of Coal Combustion Residuals from Electric Utilities, FR Vol. 83, No. 51, March 15, 2018, p. 11588.

[14] Panno, V.P. et al, Recharge and Groundwater Flow Within an Intracratonic Basis, Midwestern United States, Groundwater, Vol. 56, No. 1, pp. 32-45.

[15] Illinois State Water Survey, The Sources, Distribution, and Trends of Chloride in the Waters of Illinois, Bulletin B-74, March 2012.

Figure 1: Newton PAP Well Data – CCR Indicator Ratios with Chloride[16]



Samples from the groups "porewater", "background", and APW15 appear in distinct clusters. A theoretical mixture of porewater and background data (a 20/80 mixture is assumed) group appears in between the porewater and background data group, as one would expect. The APW15 samples, however, are separate, distinct and outside of the area that includes all other groups. This comparison confirms the findings in the ASD that the PAP is not contributing to the groundwater chemistry observed at APW15.

[16] Porewater data are average values observed at XPW01, XPW02, XPW03, and XPW04. Background Samples are average values observed at APW05 and APW06, and mixture values are 20% average porewater and 80% global average background. Data included in this chart are provided in Attachment 2.

9) In its November 7, 2023 letter, the IEPA denied the ASD due to perceived "data gaps" that included the following:

a) Source characterization of the CCR at the Primary Ash Pond must include total solids sampling in accordance with SW846.

b) Hydraulic conductivities from laboratory or in-situ testing must be collected, analyzed and presented with hydrogeologic characterization of the bedrock unit.

c) Characterization to include sample and analysis in accordance with 35 IAC 845.640 of alternative source must be provided with the ASD.

10) The CCR source characterization request is so vague that it is not actionable. However, if the IEPA is requesting "total" constituent analysis of CCR in mg/kg (mass of constituent per mass of CCR on a dry weight basis), that information would not be more appropriate for a source impact analysis than the porewater data used for the ASD. In a land disposal scenario, groundwater would be impacted if leachate (or porewater) from the solid waste (rather than the solid waste itself) travels to and mixes with (and is diluted by) groundwater, then the impacted groundwater travels downgradient where dispersion and diffusion processes further dilute solid waste component concentrations. The most critical data needed for a groundwater impact analysis is the leachate quality, not the total amount of constituent in a solid sample of CCR, because leachate is the material that potentially mixes with groundwater. Similarly, if the IEPA is requesting

laboratory leach testing of solid CCR samples either by TCLP, SPLP, or LEAF, that information would also not be more appropriate for a source impact analysis than the actual porewater data collected from the CCR in the Newton PAP (as was used for the ASD). All of the synthetic laboratory leach tests on a solid sample aim to simulate a landfill environment in order to predict leachate quality from a solid sample. These "batch" one-day laboratory tests on a relatively small sample do not account for the long-term climatic and meteorological influences on a full-scale landfill operation.[17] These tests often yield high initial concentrations that are not typical of a full-scale operation.[18] Clearly, directly measuring CCR analytes in actual porewater samples from the actual disposal environment is a more accurate basis for an impact analysis. As stated above, the PAP CCR has been adequately characterized for performing an alternative source demonstration. Data from the 40 PAP porewater samples relied upon in the Alternative Source Demonstration Report[19] are sufficient to define the strength and variability of source water. Collection of additional CCR source characterization data referenced in IEPA's November 7 letter is not required for the ASD by Part 845 or Part 257 and would not change the conclusion of the ASD.

11) Similarly, hydraulic conductivity and hydrogeologic characterization

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[17] U.S. EPA Office of Solid Waste and Emergency Response, Solid Waste Disposal Criteria, Technical Manual, EPA530-R-93-017, p. 125.

[18] *Ibid.*

[19] Ramboll, Alternative Source Demonstration Report, October 6, 2023. Appendix C.

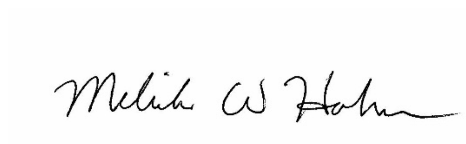
and the collection of alternate source samples is not required for the ASD and development of such information for the bedrock aquifer would not change the conclusion of the ASD. Parts 845 and 257 do not even require identification of the alternate source – only that a source other than the CCR is causing the chloride exceedance and that the CCR is not contributing to the chloride exceedance. At the Newton PAP, the CCR is ruled out as a source of chloride to APW15 solely on the basis of the chemistry data. The chloride concentrations in APW15 samples are an order of magnitude higher than the porewater "source" concentrations, which clearly indicates that the CCR cannot be a source, and the APW15 sample chemistry (chloride and key CCR indicator analytes boron and sulfate) cannot be explained by a mixture of PAP porewater and background groundwater (as would be the case if the CCR was the source). No information regarding the alternate source is needed to make this determination, and collecting this information would not change the ASD conclusions. The regional salinity of the underlying bedrock aquifer reported in the geologic literature as reported in the ASD, however, represents the plausible source. The regional bedrock chloride concentrations range from 100 to 5,000 mg/L[20] versus the maximum porewater concentration of 62 mg/L and the range of chloride concentrations at APW15 of 130 to 270 mg/L. The presence of a saline

[20] Panno, V.P. et al, Recharge and Groundwater Flow Within an Intracratonic Basis, Midwestern United States, Groundwater, 2017, Vol. 56, No. 1, p. 41.

spring just ten miles from the Newton Power Plant establishes the regional upward hydraulic gradient in this unit.[21]

I declare under penalty of perjury that the foregoing is true and correct.

Dated: December 15, 2023



Melinda W. Hahn, PhD

[21] Illinois State Water Survey, The Sources, Distribution, and Trends of Chloride in the Waters of Illinois, Bulletin B-74, March 2012.

ATTACHMENT 1

Curriculum Vitae of Melinda Hahn, PhD

ENVIRONMENT
& HEALTH

RAMBØLL

MELINDA W. HAHN, PH.D.

Senior Managing Consultant

Dr. Hahn's practice areas include site investigation and remediation, contaminant fate and transport modelling, statistics of environmental data, forensic analysis, and litigation support, including primarily environmental liability and cost allocation. Regulatory areas include RCRA, CERCLA, TSCA, and Voluntary Cleanup/Risk-Based Corrective Action. Dr. Hahn has experience in the following industry categories: energy (electric utilities, petroleum dispensing, pipeline operations, former manufactured gas plant sites), industrial equipment manufacturing, metal working and metal recycling, automobile manufacturing, ink and chemical manufacturing, wood treating, mining, cement manufacturing, milling and smelting operations, secondary aluminum production, and dry cleaning.

EDUCATION

1995
PhD, Environmental Engineering
The Johns Hopkins University

1990
BS, Physics
The University of Texas at Austin

1990
BS, Mathematics
The University of Texas at Austin

ACADEMIC HONORS

1992-1995
Graduate Fellow, National Science Foundation

1995
Most Distinguished Environmental Engineering Dissertation, Association of Environmental Engineering Professors

CAREER

1998-Present
Senior Managing Consultant, ENVIRON/Ramboll

1997-1998
Consultant, Roy Ball, PC

1995-1997
Senior Project Engineer, Environmental Resources Management-North Central, Inc.

CONTACT INFORMATION

Melinda W. Hahn, PhD

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+1 (512) 239-9883

Ramboll Environ
11782 Jollyville Road
Suite 211
Austin, TX 78759
United States of America

PROJECTS

- Provided technical litigation support for over 50 matters regarding extent, severity, timing, and source of soil and ground water contamination and vapor intrusion, necessity for and costs of remediation, human health risk assessment, toxic tort liability, Superfund cost allocation (including consistency with the NCP), insurance cost recovery, and the siting and monitoring of a hazardous waste landfill. The regulatory frameworks included Illinois Voluntary Cleanup Program, Illinois Leaking Underground Storage Tank Program, RCRA, CERCLA, TSCA, NCP, and California Proposition 65. Completed projects in more than twenty states, with a focus in the Midwest.
- Provided expert testimony in matters involving Superfund cost allocation, statistics of environmental data, and contaminant fate and transport.
- Retained as an expert witness and provided litigation/mediation support for a number of cost allocation cases involving remediation of contaminated soil, groundwater, and sediment.
- Provided litigation support for environmental liability/cost allocation mediation and litigation at several large sediment sites. Evaluated historical information on industrial processes and discharges, and conducted forensic/statistical analysis to estimate the relative contribution of contaminants to sediments.
- Provided litigation support for a number of insurance cost recovery projects, including a former wood treating facility, a jewelry manufacturer, metal plating facility, machine shop and dry cleaner. Tasks included the identification of likely sources and timing of contamination.
- Evaluated claims of residents living near a scrap metal facility of transport and deposition of lead-containing particles in their homes using statistical analysis of plaintiffs' chemical data. Provided expert testimony based on this analysis.
- Evaluated the hydrogeological setting of a proposed petroleum pipeline pumping station and estimated the likelihood of a release and groundwater contamination. Provided expert testimony based on this analysis.
- Provided expert testimony on proposed coal ash impoundment closure regulations and proposed new state groundwater standards in Illinois.
- Conducted environmental forensic evaluations to determine sources of observed environmental contamination in soil, groundwater, sediment and sub-slab/indoor air for sites in litigation and pre-litigation phases.
- Performed multivariate statistical analyses of data for forensic analysis, for contaminant ecological impact analysis, to determine appropriate remedial objectives, and as part of human health and ecological risk assessments.
- Lead RCRA Corrective Action at a former manufacturing facility.
- Directed and assisted in the closure of a number of sites in the Illinois Voluntary Cleanup Program and the Illinois Leaking Underground Storage Tank Program.
- Evaluated the potential contribution of urban industrial sources of heavy metals to urban soil and sediments using both simple data comparisons and multivariate statistical techniques.
- Performed ground water and contaminant fate and transport modeling using MODFLOW and MT3D for use as a Superfund cost allocation tool in support of expert testimony. Relative mass of TCE entering the Superfund Site from sources on two PRP's properties was used as a basis for cost allocation. A Monte Carlo analysis was also performed to evaluate the sensitivity of the proposed allocation to changes in key variables.

- Performed Monte Carlo analysis of risk to ground water posed by a proposed petroleum pipeline in support of expert testimony. The analysis examined the likelihood of the exceedance of the Illinois Class I ground water standard for benzene per mile of proposed pipeline.
- Performed Monte Carlo cost allocation among four PRPs for a Superfund Site in support of expert testimony. Total volume, volume of hazardous substances, and volume of drummed materials were considered.
- Utilized 3-D geostatistical interpolation techniques to visualize environmental data, to estimate excavation volumes for remediation, and to identify and distinguish source areas and potential preferential pathways of migration for a number of contaminated sites.
- Performed research and analysis of remedial activities and associated costs to determine compliance with the NCP for cost recovery matters for a number of sites.

PUBLICATIONS AND PRESENTATIONS

1993
Stochastic Models of Particle Deposition in Porous Media
Paper presented at the 1993 Midwest Regional Conference on Environmental Chemistry, University of Notre Dame
Authors: Hahn, M.W., and C. F. O'Melia

1994
Deposition and Reentrainment of Particles in Porous Media
Poster presented at the 1994 Gordon Research Conference on Environmental Science, Water, New Hampshire
Authors: Hahn, M.W., D. Abadzic, and C. R. O'Melia

1994
Colloid Transport in Groundwaters: Filtration of Fine Particles at Low Filtration Rates
Presented at the 1994 ASCE National Conference, Boulder, Colorado
Authors: Hahn, M.W., D. Abadzic, and C. R. O'Melia

1995
Deposition and Reentrainment of Brownian Particles under Unfavorable Chemical Conditions
Presented at the 1995 ACE National Conference, Environmental Chemistry Division
Authors: Hahn, M.W., D. Abadzic, and C. R. O'Melia

1995
Deposition and Reentrainment of Brownian Particles under Unfavorable Chemical Conditions
Doctoral Dissertation, Johns Hopkins University
Author: Hahn, M.W.

1997
Some Effects of Particles Size in Separation Processes Involving Colloids
Wat. Sci. Tech. Vol. 36, No. 4 pp. 119–126
Authors: O'Melia, C.R., M.W. Hahn, and C. Chen

1997
Literature Review 1997: Storage, Disposal, Remediation, and Closure
Water Environment Research, Vol. 69, No. 4, pp 6389-719
Authors: Millano E.F. and M.W. Hahn

1998
The Statistics of Small Data Sets
Accepted for publication, Superfund Risk Assessment in Soil Contamination Studies: Third Volume, ASTM STP 1338, K.B. Hoddinott Ed., American Society for Testing and Materials
Authors: Ball, R.O., and M.W. Hahn

1998
RBCA Compliance for Small Data Sets
Battelle Conference Proceedings, Remediation of Chlorinated and Recalcitrant Compounds: Risk, Resource and Regulatory Issues
The First International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California, pp. 73-78
Authors: Hahn, M.W., A.E. Sevcik, and R.O.Ball

1998
Contaminant Plume and using 3D Geostatistics
Battelle Conference Proceedings, Remediation of Chlorinated and Recalcitrant Compounds: Risk, Resource and Regulatory Issues
The First International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California, pp. 85-90
Authors: Ball, R.O., M.W. Hahn, and A.E. Sevcik1998
RBCA Closure at DNAPL Sites
Battelle Conference Proceedings, Remediation of Chlorinated and Recalcitrant Compounds: Risk, Resource and Regulatory Issues
The First International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California, pp.181-186
Authors: Sheahan, J.W., R.O. Ball, and M.W. Hahn

1998
RBCA Closure at DNAPL Sites, Ground Water Monitoring and Research
Authors: Sheahan, J.W., R.O. Ball, and M.W. Hahn

2004
Deposition and Reentrainment of Brownian Particles in Porous Media under Unfavorable Chemical Conditions: Some Concepts and Applications
Environmental Science & Technology, Vol. 38, pp 210-220
Authors: Hahn, M.W. and C.R. O'Melia

2010
Making the Case for Causation in Toxic Tort Cases: Superfund Rules Don't Apply
Environmental Law Reporter, News & Analysis, July 2010, pp. 10638-10641
Authors: More, J.R. and M.W. Hahn

ATTACHMENT 2

PAP Groundwater Data Supporting Figure 1

Groundwater Data Supporting Table 1
Newton Power Plant PAP

Parameter			Boron, total		Chloride, total		Sulfate, total		
Result Units			mg/L		mg/L		mg/L		
Program ID	Location	Sample Date	Result	RL	Result	RL		Result	RL
NEW-000	APW05	12/15/15	0.099	0.01	48	25		15	5
		01/20/16	0.12	0.01	50	10		15	10
		04/27/16	0.1	0.01	58	10		14	10
		08/01/16	0.1	0.01	52	10		1.8	1
		10/25/16	0.12	0.01	50	10	<	1	1
		01/23/17	0.09	0.01	50	10	<	1	1
		04/24/17	0.079	0.01	46	10		1.2	1
		06/13/17	0.082	0.01	47	10	<	1	1
		11/17/17	0.099	0.01	43	10	<	1	1
		05/18/18	0.1	0.01	48	10		2.1	1
		08/17/18			56	25		1.4	1
		11/09/18	0.098	0.01	51	10		5.1	1
		02/22/19	0.11	0.01	48	10		3.5	1
		08/22/19	0.12	0.01	50	10		2.3	1
		02/04/20	0.091	0.01	54	10		2.3	1
		07/28/20	0.1	0.01	52	10		1.8	1
		02/09/21	0.13	0.01	50	10		1.3	1
		02/17/21	0.1	0.01	52	10		3.3	1
		03/10/21	0.12	0.01	48	10		1.3	1
		03/30/21	0.092	0.01	49	10		1.3	1
		04/28/21	0.099	0.01	51	10		1.1	1
		05/25/21	0.12	0.01	48	10		1	1
		06/17/21	0.091	0.01	50	10	<	1	1
		06/30/21	0.26	0.01	51	25		1	1
		07/15/21	0.1	0.01	52	25		1.1	1
	APW06	12/15/15	0.073	0.01	26	25		9.9	5
		01/20/16	0.082	0.01	24	10		9.9	1
		04/27/16	0.16	0.01	29	5		7.4	1
		08/01/16	0.078	0.01	27	5		1.2	1
		10/25/16	0.093	0.01	26	5	<	1	1
		01/23/17	0.076	0.01	26	5	<	1	1
		04/24/17	0.074	0.01	50	10	<	1	1
		06/13/17	0.093	0.01	25	5		2.3	1
		11/17/17	0.094	0.01	23	10		1.9	1
		05/18/18	0.087	0.01	25	5		1.7	1
		08/17/18			25	5		1.7	1
		11/09/18	0.083	0.01	24	10		2.1	1
		02/22/19	0.09	0.01	24	5		1.7	1
		08/23/19	0.11	0.01	26	5		5.8	1
		02/04/20	0.08	0.015	27	10	<	1	1
		07/28/20	0.091	0.01	24	5		3.2	1
		02/09/21	0.087	0.01	24	10		1.8	1
		02/17/21	0.086	0.01	23	5		3.6	1
		03/10/21	0.086	0.01	22	10		9.2	1
		03/30/21	0.078	0.01	26	10		7.7	1
		04/29/21	0.082	0.01	23	10		8.5	1
		05/25/21	0.1	0.01	23	5		7.8	1
		06/16/21	0.11	0.01	25	5		6.2	1
		06/30/21	0.085	0.01	32	25		6.3	1
		07/15/21	0.083	0.01	27	10		7.8	1
	APW15	02/23/21	0.14	0.01	260	50	<	1	1
		03/10/21	0.13	0.01	250	50	<	1	1
		03/31/21	0.16	0.01	240	50	<	1	1

Groundwater Data Supporting Table 1
Newton Power Plant PAP

Parameter Result Units Program ID	Location	Sample Date	Boron, total mg/L Result	RL	Chloride, total mg/L Result	RL	Sulfate, total mg/L Result	RL
		04/28/21	0.13	0.01	230	50	< 1	1
		05/24/21	0.15	0.01	230	50	< 1	1
		06/17/21	0.13	0.01	240	25	< 1	1
		06/30/21	0.13	0.01	230	50	< 1	1
		07/14/21	0.16	0.01	130	50	< 1	1
		03/14/23	0.18	0.01	230	50	0.6	1
		04/26/23	0.13	0.01	270	50	0.4	1
	XPW01	02/17/21	9.5	0.01	49	10	19000	2500
		03/09/21	11	0.2	38	10	14000	5000
		03/30/21	9.9	0.01	32	10	19000	2500
		04/28/21	10	0.2	33	10	12000	2500
		07/14/21	12	0.4	27	10	11000	2500
		02/23/22	12	0.2	25	10	9300	2500
		06/14/22			14	10	6100	2500
		08/15/22	13	0.2	11	10	5900	1000
		02/01/23	15	0.2	9.7	5	4200	1000
		04/27/23	14	0.2	8.1	5	2900	1000
	XPW02	02/17/21	2.3	0.01	10	5	160	100
		03/09/21	2.5	0.01	9.6	1	150	50
		03/30/21	2.4	0.01	9.9	1	160	100
		04/28/21	2.6	0.02	9.7	1	190	25
		07/14/21	2.5	0.01	10	10	160	25
		02/23/22	2.4	0.01	12	10	210	100
		06/14/22			8.6	5	170	100
		08/15/22	2.4	0.01	8.9	5	160	25
		02/01/23	2.3	0.01	8.4	1	150	25
		04/27/23	2.3	0.01	8.8	1	150	25
	XPW03	02/17/21	1.3	0.01	14	10	92	25
		03/09/21	1.2	0.01	9.2	5	93	10
		03/30/21	0.84	0.01	13	10	94	10
		04/28/21	1.2	0.02	11	10	96	10
		07/14/21	1.3	0.01	11	10	120	25
		02/23/22	1.7	0.01	13	10	130	50
		06/15/22			11	5	150	50
		08/16/22	1.4	0.01	11	5	180	25
		02/02/23	1.7	0.01	9.6	1	98	25
		04/27/23	1.8	0.01	9.7	5	120	25
	XPW04	02/17/21	2.5	0.01	62	10	2200	500
		03/09/21	2.4	0.01	34	10	1400	250
		03/29/21	2.1	0.01	31	10	600	250
		04/28/21	2.8	0.02	37	10	3800	1000
		07/14/21	2.3	0.01	34	25	1600	500
		02/23/22	2.2	0.01	30	10	1800	250
		06/15/22			50	10	7500	1000
		08/16/22	3.7	0.01	54	10	4000	1000
		02/01/23	3.5	0.01	46	10	6200	1000
		04/28/23	4	0.01	59	10	9500	1000

Note: Porewater (XPW01, XPW02, XPW03, and XPW04) and APW15 data are from the October 6, 2023 ASD Report (Appendix C) and Background data APW05 and APW06 are from the October 2021 Hydrogeologic Site Characterization Report, Table 4-1.

Exhibit E

DECLARATION OF CYNTHIA VODOPIVEC
ON BEHALF OF ILLINOIS POWER GENERATING COMPANY

I, Cynthia Vodopivec, affirm and declare as follows:

1. I present this Declaration on behalf of Illinois Power Generating Company (hereinafter "IPGC"). I am Senior Vice President, Environmental Health and Safety at Vistra Corp., the indirect corporate parent of IPGC. As part of my duties, I oversee permitting, regulatory development, compliance (air, water, and waste issues), and health and safety at the Company, including IPGC's Newton Power Plant in Jasper County, Illinois. I received a Bachelor's Degree in Engineering from Dartmouth College in 1998 and an MBA from Rensselaer in 2009. I state the following in support of IPGC's Petition for Review of Illinois Environmental Protection Agency's Non-Concurrence with Alternative Source Demonstration under 35 Ill. Adm. Code Part 845 and Motion for Stay ("Petition").

2. IPGC received IEPA's November 7, 2023 letter notifying IPGC of IEPA's nonconcurrence with the Newton Primary Ash Pond Alternative Source Demonstration via U.S. Mail on November 10, 2023. This letter is attached as Exhibit A of the Petition.

3. Following IPGC's submittal of an Alternative Source Demonstration for the Newton Primary Ash Pond on October 6, 2023, IPGC Representatives communicated with IEPA multiple times between October 19 and October 31, 2023. Those communications occurred via telephone and email and included a discussion of (1) source characterization of the Primary Ash Pond using total solids sampling in accordance with SW846 methods; (2) hydraulic conductivities and hydrogeologic characterization; and (3) a complete characterization of the proposed alternative source in accordance with 35 Ill. Adm. Code § 845.640.

4. Performing source characterization of the CCR at the Newton Primary Ash Pond using total solids sampling techniques under SW846 would require drilling within the Newton Primary Ash Pond with up to 10 borings using specialized equipment to collect 20 samples. It would further require complete laboratory analyses, data evaluation and reporting for those samples. Assuming a driller is readily available, which is not always the case, this process would likely take approximately 21-42 weeks to complete, and would likely cost approximately $450,000-$800,000.

5. Conducting a characterization of the bedrock surrounding the Newton Primary Ash Pond in accordance with 35 Ill Adm. Code 845.640 would require drilling to bedrock, well installation, solids and groundwater sampling and analyses, and data evaluation and reporting. Assuming a driller is readily available, which is not always the case, this process would take approximately 20-30 weeks and would cost approximately $150,000.

6. Completing an assessment of corrective measures for a chloride exceedance at the Newton Primary Ash Pond in accordance with the requirements and deadlines of 35 Ill. Adm. Code § 845.660 would likely cost approximately $35,000. Completing the requirements of 35 Ill. Adm. Code § 845.670, including determining nature and extent, conducting a monitored natural attenuation evaluation, preparing and submitting the semi-annual reports, a construction permit application and a corrective action plan, for a chloride exceedance at the Newton Primary Ash

Pond would likely cost approximately $800,000. Undertaking the steps required in Sections 845.660 and 845.670 is a considerable undertaking that requires the dedication of many resources. For example, the corrective measures assessment may require development of groundwater models specific to chloride and could result in the development of potential engineered remedies. The Corrective Action Plan may require a 30 percent design for the selected remedy, a groundwater monitoring plan, a new Construction Permit Application, and attendance at a public meeting. Significant personnel time and resources will be necessary to dedicate specifically to this work.

FURTHER, the Declarant sayeth not.

Dated: December 15, 2023

[signature]