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August 31, 2010

Ms. Yolande Norman
U.S. Nuclear Regulatory Commission (NRC)
Mailstop T-8-F-5
Washington, DC 20555-0001

Dear Ms. Norman:

In accordance with the U.S. Army Jefferson Proving Ground License SUB-1435 requirements, and at the U.S. Army's request, Science Applications International Corporation (SAIC) is submitting six hard copies and 4 electronic copies on compact disk-read only memory (CD-ROM) of the *Slug Testing Report, Depleted Uranium Impact Area Site Characterization: Aquifer Testing for Hydraulic Conductivity, Jefferson Proving Ground, Madison, Indiana*.

Please contact Mr. Paul Cloud at (410) 436-2381, e-mail address: paul.d.cloud@us.army.mil or the undersigned at (703) 375-2074, e-mail address: skibinskij@saic.com if you have any questions.

Sincerely,

Joseph N. Skibinski

cc: Paul Cloud
Brooks Evens
SAIC Central Records Project File (transmittal meme only)

U.S. Army Corps of Engineers

SLUG TESTING REPORT

Depleted Uranium Impact Area Site Characterization: Aquifer Testing for Hydraulic Conductivity Jefferson Proving Ground, Madison, Indiana

FINAL

Prepared for:

U.S. Department of Army
Installation Support Management Activity
5183 Blackhawk Road
Aberdeen Proving Ground, Maryland 21010-5424

and

U.S. Army Corps of Engineers
Louisville District
600 Dr. Martin Luther King, Jr. Place
Louisville, Kentucky 40202-2230

Submitted by:

SAIC
From Science to Solutions

Science Applications International Corporation
12100 Sunset Hills Road
Reston, Virginia 20190

Contract No. DACW62-03-D-0003
Delivery Order No. CY07

August 2010

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Depleted Uranium Impact Area Site Characterization: Hydraulic Conductivity Testing
Jefferson Proving Ground, Madison, Indiana

Contract No. DACW62-03-D-0003
Delivery Order No. CY07

Nuclear Regulatory Commission License No. 24-32591-01

August 2010

Final

Joseph N. Skibinski Project Manager	(703) 375-2074 Telephone	8/31/2010 Date

The work completed and the preparation of this report was accomplished under direction of the undersigned Licensed Indiana Professional Geologist.

Tad C. Fox Licensed Indiana Professional Geologist (Registration # IN2244)	(330) 405-5820 Telephone	8/31/2010 Date

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Certification 4
CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

Science Applications International Corporation (SAIC) has prepared this Slug Testing Data Report for Jefferson Proving Ground's Depleted Uranium Impact Area, located in Madison, Indiana. Notice is hereby given that an independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in the project, as defined in the Quality Control Plan (QCP). During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing Corps policy.

Joseph N. Skibinski
Project Manager
Science Applications International Corporation

8/31/2010
Date

Joseph E. Peters
Quality Assurance Officer
Science Applications International Corporation

8/31/2010
Date

Heather Thorn
Independent Technical Review
Science Applications International Corporation

8/31/2010
Date

Significant concerns and explanation of the resolutions, if identified, are documented within the project file. As noted above, all concerns resulting from independent technical review of the project have been considered.

Lisa D. Jones-Bateman
Vice President
Science Applications International Corporation

8/31/2010
Date

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LIST OF ACRONYMS AND ABBREVIATIONS

BLS	Below Land Surface
CD	Compact Disc
CSM	Conceptual Site Model
DO	Delivery Order
DU	Depleted Uranium
FSP	Field Sampling Plan
ft	Feet
ft^2	Square Feet
gal	Gallon
JPG	Jefferson Proving Ground
K	Hydraulic Conductivity
KGS	Kansas Geological Survey
NRC	Nuclear Regulatory Commission
RQD	Rock Quality Designation
SAIC	Science Applications International Corporation
S	Storativity
S_s	Specific Storage
SOW	Statement of Work
TD	Total Depth
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey

1. INTRODUCTION

This report provides the hydraulic conductivity results based on aquifer testing completed in groundwater monitoring wells installed within and around the Jefferson Proving Ground (JPG) Depleted Uranium (DU) Impact Area. The tests were completed in April 2009 as part of the Army's phased site characterization. The data are needed to develop the Army's Decommissioning Plan and Environmental Report, both of which are required to be submitted for the U.S. Nuclear Regulatory Commission's (NRC's) review and approval by the end of 2011 or earlier (NRC 2006). Additional information about these activities is described in the Field Sampling Plan (FSP) Addendum 7 (SAIC 2008a). Specific details about the groundwater wells tested are presented in the Well Construction and Surface Water Data Report (SAIC 2008b). Science Applications International Corporation (SAIC) has prepared this document in accordance with the Statement of Work (SOW) requirements under the U.S. Army Corps of Engineers (USACE) Contract No. DACW62-03-D-0003, Delivery Order (DO) No. CY07.

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2. SLUG TEST

Exposure modeling that is planned for the JPG DU Impact Area includes assessing the potential migration of DU with groundwater and the potential exposure to present and future receptors. In order to complete this assessment, various hydrogeologic parameters or inputs to the models must be either selected from previously established acceptable ranges for the subsurface conditions believed to be present at the site, from literature, using default values provided with the model, or by collecting site-specific data to estimate those hydrogeologic parameters. Hydraulic conductivity (K) is one of the hydrogeologic parameters required by the models. It is defined as the volume of water that will move through a porous medium in a unit time under a unit hydraulic gradient through a unit area oriented perpendicular to the direction of flow (Kruseman and de Ridder 1992).

Many methods have been developed for measuring and estimating hydraulic conductivities. Slug testing and longer term aquifer pumping testing are widely used and accepted field methods for collecting site- and well-specific data that can be used to estimate the hydraulic conductivity. Slug tests are single well aquifer tests, which provide a measure of the aquifer hydraulic properties immediately adjacent to the well tested, and thus sample a relatively small portion of the aquifer. Slug tests are easily performed on numerous monitoring wells to provide a range of hydraulic conductivities of zones monitored. Slug tests typically involve relatively small stresses to the aquifer and provide an order of magnitude estimate of aquifer hydraulic conductivity.

In most aquifer conditions, aquifer pumping tests are preferred, because the test yields hydraulic parameters for a larger portion of the aquifer. An aquifer pumping test typically involves relatively larger stresses to the aquifer (in terms of groundwater withdrawal) from the pumping of a well while water levels in that well and other wells in the vicinity are observed. The drawdown of water levels in the wells resulting from the pumping and the recovery after pumping is ceased is used to calculate hydraulic parameters. However, the aquifer underlying JPG is poorly suited for aquifer pumping tests due to the very low hydraulic conductivity of the glacial tills and the shallow bedrock (below approximately 30 feet from the bedrock surface), which makes developing a pumping well that can produce a yield sufficient to measure conductivity very difficult. In addition, the heterogeneity of the shallow bedrock, which has highly permeable zones due to solution-enhanced discontinuities in the otherwise solid and slowly permeable blocks of bedrock, complicates the positioning of pumping and observation wells in the aquifer to obtain meaningful data from a pumping test.

For those reasons, slug testing was used on this site to estimate the hydraulic conductivities of the locations in the overburden (glacial tills) and shallow bedrock screened by each of the tested wells, and in that manner, gain a site-specific understanding of this hydrogeologic parameter. This report summarizes the slug testing field methods that were completed, the basics of the analysis of the collected data, and the calculated estimates of hydraulic conductivity.

2.1 APPROACH AND SUMMARY OF FIELD PROCEDURES

A slug test is completed by causing a near-instantaneous change in hydraulic head (i.e., the pressure exerted by the weight of water above a given point) and measuring and recording the resulting head response or displacement. This is completed by either adding a solid object or "slug" into (slug in) or removing the slug (slug out) from the water column present in a well. There are numerous types of "slugs," but probably the most prevalent and commonly used consist of a solid or sealed pipe of known volume that is either lowered into or raised from the water column in the well. All of the slug tests performed during this investigation were completed using solid or sealed pipes or a combination thereof. The slug testing and analysis were completed in accordance with the procedures provided in FSP Addendum 7 (SAIC 2008a).

The slug test method is relatively simple and requires limited field equipment. The following equipment was used for the tests completed at JPG:

- Electronic water tape for manually completing depth to water measurements
- Slugs – solid and sealed pipes
- A pressure transducer attached to an electronic data recorder
- A laptop computer.

The use of a pressure transducer attached to an electronic data recorder enabled highly accurate head or water level changes to be collected and recorded faster than would be possible by manually collecting the water level measurements. The recorded electronic data file was imported directly to Microsoft® Excel, eliminating the chance for errors in the data that could be caused from manual measurements and data entry.

Based on a review of the well construction details and the limited water level data at the time of the preparation of FSP Addendum 7 (SAIC 2008a), a subset of the existing wells within and surrounding the DU Impact Area appeared to have had sufficient water column during the April 2009 sampling event to physically accommodate the introduction of the measurement equipment and the solid slugs. Figure 2-1 shows the locations of all wells evaluated for slug testing and the wells in which slug tests were ultimately performed. Copies of logbook records and field forms are included in Appendix A. Data collected during slug tests are provided in Appendix B (on compact disc [CD] in electronic format). The following 25 wells were selected for field evaluation for suitability as provided in FSP Addendum 7 (SAIC 2008a):

- JPG-DU-01I
- JPG-DU-01D
- JPG-DU-02I
- JPG-DU-03O
- JPG-DU-03I
- JPG-DU-04O
- JPG-DU-04I
- JPG-DU-04D
- JPG-DU-05I
- JPG-DU-06O
- JPG-DU-06I
- JPG-DU-06D
- JPG-DU-09O
- JPG-DU-09I
- JPG-DU-09D
- JPG-DU-010O
- JPG-DU-010D
- MW-2
- MW-3
- MW-5
- MW-6
- MW-7
- MW-10
- MW-11
- MW-RS2.

Following field evaluation of the wells and the conditions at the time of testing, 11 of the wells were determined to not be suitable for slug testing (Table 2-1). Of these 11 wells, 3 are completed in the overburden and 4 each are completed in the shallow and deep bedrock. Field observations during evaluation of the wells, observations during drilling (e.g., water loss during rock coring), and water level data over time (hydrographs for wells containing continuous recorders) from the wells were reviewed with pertinent comments for each well included in Table 2-1.

Wells completed above the top of bedrock are denoted as overburden wells. Wells completed beneath the top of bedrock are denoted as shallow and deep bedrock wells. The base of the shallow bedrock zone was determined from the boring logs for each well when possible using the depth of the deepest fracture or secondary porosity featured to define the base. In cases where these features extended to the total depth of the boring, the bases of the shallow bedrock were determined from an adjacent deeper

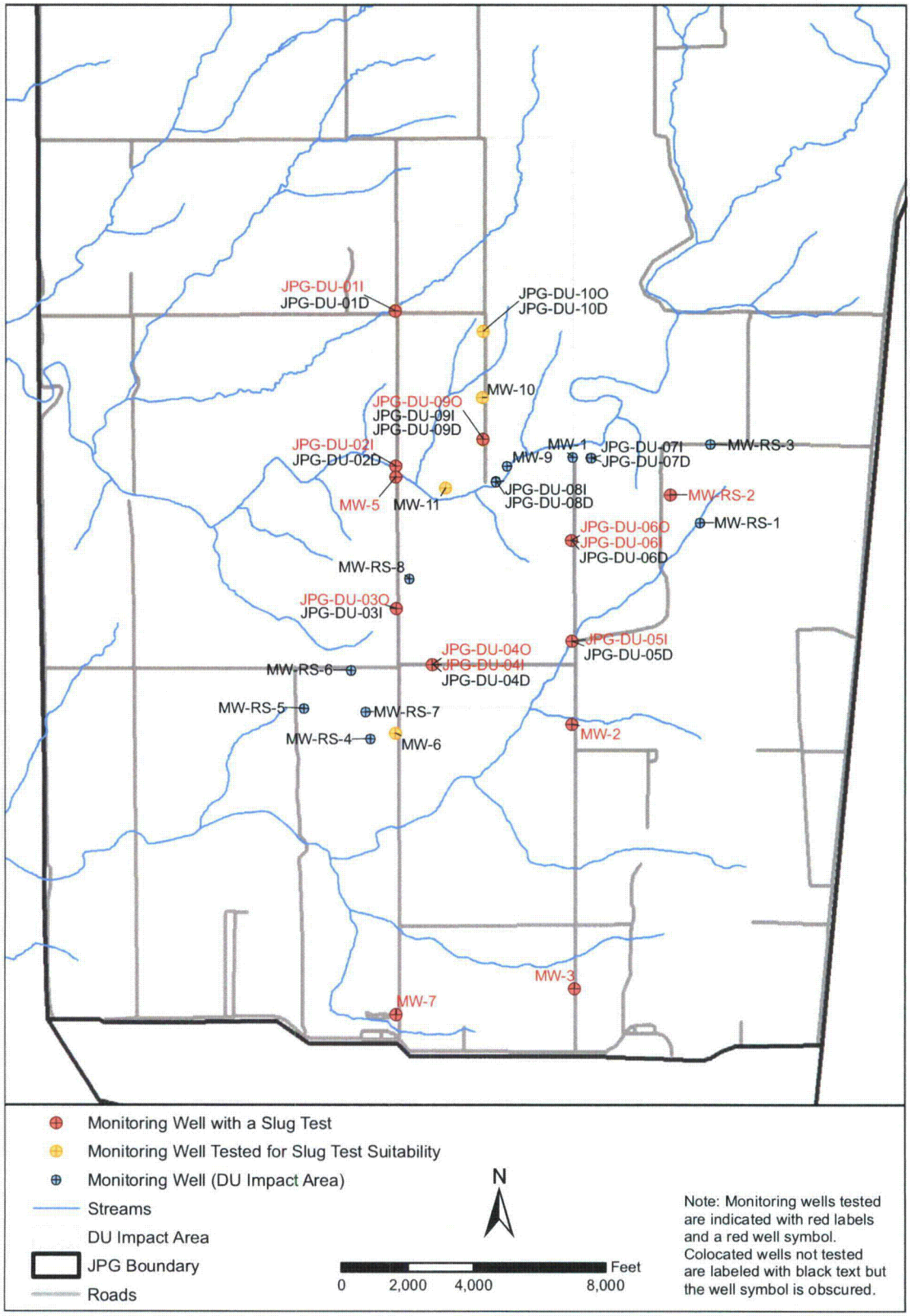

Figure 2-1. Locations of DU Monitoring Wells Evaluated for Slug Testing and Wells Where Slug Testing Was Performed

Table 2-1. Monitoring Wells in Which No Slug Tests Were Performed

Well Name	Overburden Thickness (ft)	Total Depth (ft)	Top Bedrock (ft)	RQD b (ft)	Lithologic Log b (ft)	Open Interval (ft BLS)	Evaluation Comments
Overburden							
JPG-DU-10O	71.8	71.8	71.8	NDE	NDE	55.9-71.8	• Water level in well took more than a day to recover from initial displacement caused by introduction of transducer and cable.
MW-6	>40	40	>40	NDE	NDE	28-40	• Nonstatic water conditions with water level rising overnight; possible leakage from precipitation event, attempted falling head test after precipitation event and water level response very slow overnight.
MW-10	>41.8	41.8	>41.8	NDE	NDE	25.95-41.3	• Water level in well took more than 19 hours to recover from initial displacement caused by introduction of transducer and cable. Well completed in glacial till (SEC Donahue, Inc. 1992).
Shallow Bedrock							
JPG-DU-031	40.6	120.6	40.6	45	104-116	48.3-62.5	• Water level in well recovered only 0.02 feet overnight from introduction of transducer and cable. • Water loss during drilling of 100 gallons in first 5 feet of core, then consistent to 60.6 feet (no change in water loss rate), increase to 150 gallons per 5 feet core pull to 115.6 feet. • Transducer data indicate very slow recovery following sampling events.
JPG-DU-09I	34	74	34	67	NA	36.9-51	• Water level response very slow, attempted multiple tests including several overnight tests with less than half recovery to pre-slug insertion levels. Preliminary evaluation of test data indicated no usable data from this well. • No water loss in open interval during drilling. • Transducer data indicate very slow recovery following sampling events.
JPG-DU-10D	72.5	118.75	72.5	120	103.5	75.3-89.8	• Water level in well took more than a day to recover from initial displacement caused by introduction of transducer and cable. • Minor water loss (20 to 50 gallons) over open interval.
MW-11	2	42.2	2	NA	NA	12.16-41.9	• Well was not tested due to venomous snake (copperhead) beneath well pad; bedrock interval noted as limestone with horizontal solution features. Solution cavities filled with sediment (SEC Donahue, Inc. 1992). • Transducer data may indicate very slow recovery following sampling events, possible surface water infiltration.
Deep Bedrock							
JPG-DU-01D	19.5	113	19.5	48	54	99.8-113.1	• After more than 4 hours, water level in well had not equilibrated after initial displacement caused by introduction of transducer and cable. • No water loss noted during drilling for well installation.
JPG-DU-04D	46.2	120.8	46.2	64	66.3	86.7-102	• Nonstatic water conditions; recovering from prior sampling event as data show linear trend from prior sampling. • Slight increase in water loss during drilling (increased from 250 to 300 gallons) over bottom portion of open interval. • Transducer data indicate very slow recovery following sampling events.
JPG-DU-06D	35.7	118.7	35.7	38	43	85.6-101	• Water level response very slow, attempted number of tests including several overnight tests with less than half recovery to pre-slug insertion levels. Preliminary evaluation of test data indicated no usable data from this well. • Minor water loss (~40 gallons) noted at 97.5 feet BLS; remainder of open interval had no water loss during drilling. • Transducer data indicate very slow recovery following sampling events.
JPG-DU-09D	34	119.05	34	34	79.5	70-85.6	• Water level response very slow, attempted number of tests including several overnight tests with less than half recovery to pre-slug insertion levels. Preliminary evaluation of test data indicated no usable data from this well. • Minor water loss (150 gallons) noted at 76 feet BLS; no loss above, no change in water loss below in open interval. • Transducer data indicate very slow recovery following sampling events.

Note: MW-10 and MW-11 installed 9/18/1988; borehole logs are not available for these wells. Data shown here collected from tables in previous investigation report (SEC Donahue, Inc. 1992).
Average depth to karst base from RQD = 29 feet from top of rock.
Open interval equals the screen plus filter pack or open interval adjacent to the screen.
RQD b = Estimated depth to base of karst from RQD analysis.
Log b = Estimated depth to base of karst from visual inspection of logs for fractures, vugs, voids, or other possible secondary solution features.
NDE = Not deep enough.

well in the same cluster or from the average depth of weathered bedrock from rock core examination. Core examination indicated an average depth to weathered bedrock of 29 feet using rock quality designation (RQD) evaluation or 33 feet using the observed depth of the deepest fracture or secondary porosity feature described in the boring log. The RQD was determined from the total length of all core pieces greater than 10 centimeters (approximately 4 inches) divided by the total length of the core run, commonly 5 feet (Deere et al. 1967, Das 1998). The resultant RQD is a percentage, ranked according to a descriptive index related to the stability of underground openings, as follows:

- RQD < 25 % = very poor rock mass quality
- RQD 25-50 % = poor rock mass quality
- RQD 50-75 % = fair rock mass quality
- RQD 75-90 % = good rock mass quality
- RQD 90-100 % = excellent rock mass quality.

For the overburden wells screened and not slug tested, two wells (JPG-DU-10O and MW-10) appear to be completed in very tight glacial tills. Water levels in these wells did not recover from the submergence of either the transducer or initial slug. The third well, MW-6, exhibited a rise in water levels overnight in response to a precipitation event. Subsequent testing at this well showed very slow response to slug testing, suggesting the possibility of well bore leakage.

One of the four shallow bedrock wells, MW-11, was not tested because of the presence of a venomous snake (copperhead) beneath the well pad. The remaining three shallow bedrock wells, JPG-DU-031, JPG-DU-091, and JPG-DU-10D, did not recover overnight from submergence of either the transducer or initial slug. Continuous water level data for JPG-DU-031 and JPG-DU-091 indicate very slow recovery following sampling events. Hydraulic conductivities for the shallow bedrock at these well locations are estimated to be at the low end of the published range for limestones and dolomites.

None of the deep bedrock wells evaluated met the screening criteria for slug testing. Water levels in these wells did not recover overnight from submergence of either the transducer or initial slug. Continuous water level data for JPG-DU-04D, JPG-DU-06D, and JPG-DU-09D indicate very slow recovery following sampling events. Similar to the shallow bedrock wells noted above, the hydraulic conductivity for the deep bedrock at these well locations also is estimated to be at the low end of the published range for limestones and dolomites.

Slug tests were conducted at 14 wells (Table 2-2), including 4 wells completed in the overburden (glacial till above bedrock) and 10 wells completed in the shallow bedrock. A series of tests were completed at each of the tested wells. The testing program consisted of two to typically three separate tests with each test consisting of both a slug in and slug out event. In addition, two different sized slugs were used to vary the initial displacement by an approximate factor of two. Where three tests were performed, the first and last tests were completed with the same sized slug to affect the same initial displacement as a check on data reproducibility. During the testing, all equipment that was deployed down hole was properly decontaminated prior to placing into the well in accordance with FSP Addendum 7 (SAIC 2008a).

Table 2-2 summarizes pertinent information for each of the wells tested. Wells in the overburden exist under water table or unconfined conditions. Wells completed within the shallow bedrock exist under confined, unconfined, or potentially a combination with semi-confined conditions. Confined conditions were noted when wells screened within the shallow bedrock were overlain by relatively thick overburden (generally greater than 10 feet) and water levels at the time of testing were clearly above the till-bedrock contact. Unconfined conditions were noted in shallow bedrock wells where the water level in the well occurred beneath the till-bedrock contact (at some depth beneath the top of the shallow bedrock). Wells having water levels near the till-bedrock contact were classified as a combination with semi-confined conditions.

Table 2-2. Summary Table for Wells Tested

Well I.D.	Aquifer Type	Aquifer Thickness (ft)	Tested Interval (ft BLS)	Initial Depth to Water – Pre Test (ft)	Overburden Thickness (ft)	Total Depth	Top of Bedrock	RQD b (ft)	Lithologic Log b (ft)	Comments on Weathered Bedrock Thickness	Top of Casing	Ground Surface
Overburden Wells												
JPG–DU–03O	Unconfined	32.35	12-25	4.81	40.6	25	NA	NA	NA	NA	865.54	862.1
JPG-DU-04O	Unconfined	33.03	25-47	10.8	47	47	NA	NA	NA	NA	867.28	864.11
JPG-DU-06O	Unconfined	27.23	6.5-22	4.71	35.4	25	NA	NA	NA	NA	876.02	872.56
JPG-DU-09O	Unconfined	18.05	22.2-34	12.95	34	34	NA	NA	NA	NA	849.63	846.63
Bedrock Wells												
JPG-DU-01I	Confined	34.5	28.5-41.7	2.72	20	41.7	20	25e	34.5	Estimated from JPG-DU-01D	841.23	838.06
JPG-DU-02I	Unconfined – Semiconfined	22.5	18.2-35	17.09	16	35	16	18	22.5	JPG-DU-02D shows weathered bedrock zone of 51.4 feet	803.94	800.93
MW-2	Unconfined – Semiconfined	29	12.5-23.7	9.63	7	23.7	7	NA	>16.7	Assume 29 feet from RQD average	850.49	848.25
MW-3	Confined	29	31-42.8	8.37	18.5	43	18.5	NA	>25.5	Assume 29 feet from RQD average	873.64	870.96
JPG-DU-04I	Confined	20.1	53.1-65.5	11.05	47	65.5	47	12	20.1	Estimated from JPG-DU-04D	867.38	864.32
MW-5	Unconfined	12.86	22-33.4	19.29	5.6	33.4	5.6	NA	>27.8	Assume 29 feet from RQD average	804.36	801.91
JPG-DU-05I	Unconfined – Semiconfined	29.01	21.6-34.9	6.29	5.8	35.8	5.8	8	>30	Assume 33.2 feet from lithology log average	847.21	843.71
JPG-DU-06I	Confined	8.7	36-48.4	7.75	35.7	48.4	35.7	7	8.7	JPG-DU-06D shows weathered bedrock zone of 7.3 feet	875.65	872.91
MW-7	Confined	29	42-53.7	8.92	26.5	53.7	26.5	NA	>27.2	Assume 29 feet from RQD average	853.7	850.99
MW-RS-2	Confined – Semiconfined	9	12.9-25.2	3.62	9	25.7	9	NA	9	From log	875.83	873.28

Notes:

Average depth to karst base from RQD = 29 feet from top of rock.
Tested interval equals the screen plus filter pack or open interval adjacent to screen.
Initial depth to water from top of casing.
RQD b = Estimated depth to base of karst from RQD analysis.
Log b = Estimated depth to base of karst from visual inspection of logs for fractures, vugs, voids, or other possible secondary solution features.
e = Estimated as well penetrated less than the RQD depth into bedrock.

In most cases, the interval tested for each well was assumed to represent the material adjacent to the filter pack, which is typically slightly longer than the screened interval for each well. In some cases, the base of the bentonite seal did not occur directly on top of the filter pack, and in these cases, the tested interval extended from the base of the bentonite seal to the base of the filter pack. The rationale behind this assumption was that the response from the unit tested could occur over this interval, rather than just the screened interval of the well. Overburden thickness, depth to top of bedrock, and total depth of the well were determined from the boring (lithologic) logs for each well.

The aquifer thickness for the overburden wells simply represents the difference between the water table elevation and the top of bedrock elevation. For shallow bedrock wells, the aquifer thickness represented the difference between the top of bedrock and base of the shallow bedrock for confined wells or the difference between the water level elevation and base of shallow bedrock for unconfined or semi-confined wells.

2.2 PRELIMINARY DATA SUITABILITY ANALYSIS

Several preliminary evaluations of the slug test displacement data sets were completed to evaluate the following: 1) the potential presence of trapped air in well sand packs, 2) the potential presence of a low permeable borehole skin, 3) test reproducibility, and 4) data suitability to conventional slug test analysis theory. Air trapped in the screen filter pack during testing and borehole skin effects owing to smeared clays and partial presence of drilling fluids can result in hydraulic conductivity values biased lower than actual. A check on test reproducibility ensures the integrity of the testing program at all wells. Lastly, verification that test methods, individual well and aquifer characteristics, and collected response data are consistent with the assumptions of the slug test analysis theory model is essential to ensuring accurate estimates of hydraulic conductivity. Several of these evaluations aided in the determination of the appropriateness of several specific inputs, such as effective casing radius, effective screen radius, and effective screen length. Results of the preliminary data evaluation are provided below:

- ***Comparison of Measured Initial Displacements with Calculated Theoretical or Estimated Initial Displacements***—If the observed displacement is significantly lower than the theoretical displacement owing to slug volume, it could indicate trapped air in the well filter pack or the effective casing radius is greater than the nominal casing radius. Failure to identify these conditions can result in an underestimation of hydraulic conductivity. Evaluation of data sets for the various tests indicated close agreement between actual and theoretical slug displacements for tests, as exemplified at MW-7 in Table 2-3. Displacement comparison indicated trapped air was not an issue at wells and assumptions on effective casing radius were consistent with the understanding of borehole drilling and a given well's completion.

Table 2-3. Calculated and Measured Displacements in MW-7 Slug Tests

Test Identification	Calculated Theoretical Displacement (ft)	Measured Initial Displacement (ft)
Test1fh	0.43	0.47
Test1rh	0.43	0.54
Test2fh	2.24	2.14
Test2rh	2.24	2.39
Test3fh	0.43	0.48
fh = Falling Head Test (slug in) rh = Rising Head Test (slug out)		

- ***Comparison of Normalized Rising Head and Falling Head Response Data***—The purpose of this comparative evaluation was: 1) identification of a dynamic well skin, and 2) determination of the adequate representation of the water table at a given well where that well screen

straddled the water table (Butler 1998, p.27). Figure 2-2 provides a graphical data presentation of normalized displacement versus time for the slug tests completed at MW-7, which exemplifies the subsequent analysis completed for all data sets. Test1fh, Test1rh, and Test3fh were performed using the same size slug, while Test2fh and Test2rh were performed with a slug approximately twice the size of the other tests. The plots of the individual tests are very similar. In the case of MW-7, results of the evaluation do not indicate a directional or dynamic skin effect is present as an artifact of drilling. Further, the close correlation of data sets indicates that the effective screen length is constant and that the water table at the time of the tests could be represented by a constant-head boundary (i.e., little or no change in position) for accurate calculation of the hydraulic conductivity. At JPG, borehole skin effects are most likely in overburden wells drilled through fine-grained, clay-rich till; borehole skin effects are not expected to occur in the shallow bedrock wells where the boreholes were advanced by rock coring (only water was used as drilling fluid).

- ***Comparison of the Normalized Response Data of the First and Last Tests in the Series with the Similar Initial Displacements***—The purpose of this comparison was to verify test reproducibility and to evaluate the potential for mobilization and movement of fines during the testing. An underdeveloped well could have an excess of fines in the filter pack, which could contribute to slower groundwater movement into a well and, therefore, bias any permeability estimate lower than actual. Subsequent slug tests could progressively dislodge these fines and result in progressively higher permeability estimates as the filter pack approaches complete hydraulic communication with the formation. Figure 2-2 illustrates the data for MW-7, which again is representative of the body of response data from the testing program. It can be seen that the initial test (Test1fh) and the final test (Test3fh) that were completed with the same sized slug are in close agreement; therefore, it could be concluded that adverse effects from potential mobilization and movement of fines were not present during the testing of MW-7, nor to any appreciable extent during the other tests, in general.

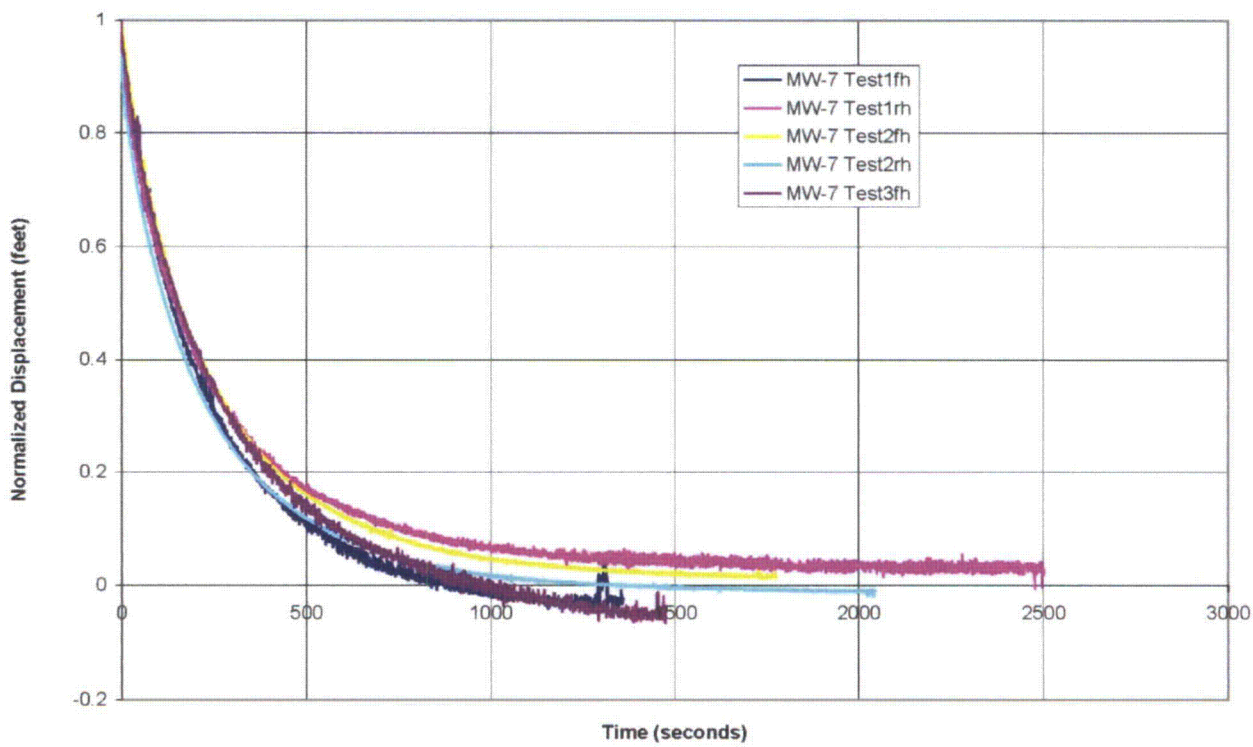

Figure 2-2. Normalized Displacement Versus Time for MW-7 Slug Tests

2.3 DATA ANALYSIS

Following completion of the preliminary data analysis, test data were deemed suitable for further analysis for permeability estimation. Displacement data were imported into AQTESOLV™ for Windows® Pro software package (Version 4.5), which is a widely used and accepted, commercially available software for analyzing aquifer tests. Aquifer^{Win32} (Environmental Simulations, Inc. 2003) was used to confirm the AQTESOLV™ results. Both programs were used to evaluate slug test data using several solution techniques to assess potential uncertainty in the calculated hydraulic conductivity.

The majority of reported hydraulic conductivities were calculated using the Kansas Geological Survey (KGS) model analytical solution in AQTESOLV™. The KGS solution was selected for its ability to identify and factor in the effects of low conductivity well skins and resulted in the best fit to test displacement data. In addition to estimating hydraulic conductivity values, the KGS model predicts specific storage (S_s) of a formation adjacent to the well bore. The exceptions to use of the KGS model were the data sets for the below wells, where the Bouwer and Rice analytical solution was felt to be a more suitable model to calculate hydraulic conductivity (Bouwer 1989):

- ***JPG-DU-01I***—Data for Test1fh did not match well against theoretical curves for the KGS solution. The Bouwer and Rice analytical solution provided a better fit to the data from this test. The remaining tests did provide reasonable matches to the KGS type curves.
- ***JPG-DU-02I***—This well is screened across an open 6-inch void in the shallow bedrock. During the slug tests, water displacement and recovery were very fast, on the order of minutes. Although displacement data did not show any skin effects or colloid concerns, test data sets did not match well against the theoretical curves of the KGS solution. The Bouwer and Rice analytical solution provided the best fit to the JPG-DU-02I data sets and is discussed further in the results summary. Lastly, several other solutions were completed for select wells for internal checks of variability and consistency, which reinforced selection of the above solutions.
- ***JPG-DU-05I***—Data for Test1fh, Test1rh, and Test2fh did not match well against theoretical curves of the KGS solution. The Bouwer and Rice analytical solution provided a better fit to the data from those test. Test2rh and Test3fh did provide reasonable matches to the KGS type curves.
- ***JPG-DU-06I***—Data for all tests did not match well against theoretical curves of the KGS solution. The Bouwer and Rice analytical solution provided a better fit to the data.
- ***MW-5***—Data from Test1rh, Test2fh, and Test2rh did not match well against theoretical curves of the KGS solution. The Bouwer and Rice analytical solution provided a better fit to the data from these tests.

The KGS model allowed further evaluation of the presence of a static low permeability well skin relative to effects from S_s when the calculated S_s is abnormally low. As noted above, well skin effects, if present at all, are most likely within the clay-rich overburden.

A variety of other slug test solutions were evaluated in order to assess uncertainty in hydraulic conductivity calculations. In addition to the KGS method, as indicated above, the Bouwer and Rice method was used to evaluate slug test data from all shallow bedrock wells using AQTESOLV™. KGS and Bouwer and Rice methods were applied to the slug test data using AQTESOLV™ and KGS, Bouwer and Rice, and Hvorslev solutions were evaluated in Aquifer^{Win32} for JPG-DU-04O and JPG-DU-09O. Table 2-4 presents hydraulic conductivity calculations for JPG-DU-09O from various methods using both AQTESOLV™ and Aquifer^{Win32}.

Table 2-4. Hydraulic Conductivity Calculation Comparison for Various Solutions for Well JPG-DU-09O

Test	AQTESOLV™		Aquifer^{Win32}		
	KGS	Bouwer and Rice	KGS	Bouwer and Rice	Hvorslev
Test1fh	0.055	0.0074	0.22	0.036	0.022
Test1rh	0.073	0.014	0.38	0.04	0.025

The hydraulic conductivity values for JPG-DU-09O summarized in Table 2-4 vary over approximately one order of magnitude. This variability was similar for calculations made on slug tests from JPG-DU-04O (though Bouwer and Rice solution using AQTESOLV™ was not conducted for this well) and yields uncertainty in the calculated hydraulic conductivity values. The variability among methods and programs may result from variability in manual curve matching conducted by the slug test analysts, different solvers used between AQTESOLV™ and Aquifer^{Win32}, and the solution types.

2.4 RESULTS

The AQTESOLV™ graphical outputs are provided in Appendix C. A review of the results is provided below. The calculated hydraulic conductivity for each of the overburden wells is included in Table 2-5 and the values for the shallow bedrock wells are shown in Table 2-6.

Table 2-5. Hydraulic Conductivities for Overburden Wells

Well	Test	Hydraulic Conductivity, K (gal/day/ft²)	Average Hydraulic Conductivity, K (gal/day/ft²)
JPG-DU-03O	Test1fh	3.059	2.4
	Test1rh	2.522	
	Test2fh	2.082	
	Test2rh	1.54	
	Test3fh	2.647	
	Test3rh	2.572	
JPG-DU-04O	Test1fh	4.16	4.1
	Test1rh	3.73	
	Test2fh	4.46	
	Test4fh	4.15	
JPG-DU-06O	Test1fh	8.391	5.3
	Test1rh	5.927	
	Test2rh	3.115	
	Test3fh	4.521	
	Test3rh	4.567	
JPG-DU-09O	Test1fh	0.0074	0.01
	Test1rh	0.014	

As shown in Table 2-5, the hydraulic conductivity calculated for overburden wells that were successfully tested ranges from 0.01 to 5.3 gal/day/ft^2 with a geometric mean of 0.85 gal/day/ft^2. Overburden well JPG-DU-09O responded very slowly to induced head changes and the resulting calculated hydraulic conductivity was several orders of magnitude lower than the other three overburden wells tested. The geometric mean for the overburden wells without the value for JPG-DU-09O is 3.74 gal/day/ft^2.

Table 2-6. Hydraulic Conductivities for Shallow Bedrock Wells

Well	Test	Hydraulic Conductivity, K (gal/day/ft²)	Average Hydraulic Conductivity, K (gal/day/ft²)
JPG-DU-01I	Test1fh	0.23	0.15 (Bouwer and Rice solution used for Test1fh due to poor KGS solution match)
	Test1rh	0.37	
	Test2fh	0.046	
	Test2rh	0.042	
	Test3fh	0.059	
JPG-DU-02I	Test1fh	16.04	18.55 (Bouwer and Rice solution used for this well due to poor KGS solution match)
	Test1rh	13.75	
	Test2fh	16.14	
	Test2rh	20.67	
	Test3fh	20.97	
	Test3rh	23.2	
	Test4fh	18.98	
MW-2	Test1fh	0.53	0.56
	Test1rh	0.5	
	Test2fh	0.53	
	Test2rh	0.5	
	Test4fh	0.74	
MW-3	Test1fh	0.54	0.40
	Test1rh	0.22	
	Test2fh	0.35	
	Test2rh	0.27	
	Test3fh	0.6	
JPG-DU-04I	Test1fh	8.32	10.40
	Test1rh	9.35	
	Test2fh	10.38	
	Test2rh	10.37	
	Test3fh	10.44	
	Test3rh	13.54	
MW-5	Test1fh	0.07	0.26 (Test1fh used KGS solution; remaining tests used Bouwer and Rice solution due to poor match to KGS solution type curves)
	Test1rh	0.33	
	Test2fh	0.35	
	Test2rh	0.28	
JPG-DU-05I	Test1fh	0.07	0.078 (Test1fh, Test1rh, and Tesh2fh used Bouwer and Rice solution; Test2rh and Test3fh used KGS solution)
	Test1rh	0.05	
	Test2fh	0.077	
	Test2rh	0.095	
	Test3fh	0.098	
JPG-DU-06I	Test1fh	4.66	4.27 (Bouwer and Rice solution used for these tests due to poor late time data match to KGS solution type curves)
	Test1rh	2.64	
	Test2fh	4.2	
	Test2rh	7.47	
	Test3fh	4.94	
	Test3rh	1.71	

Table 2-6. Hydraulic Conductivities for Shallow Bedrock Wells (Continued)

Well	Test	Hydraulic Conductivity K (gal/day/ft2)	Average Hydraulic Conductivity K (gal/day/ft2)
MW-7	Test1fh	3.4	3.00
	Test1rh	2.22	
	Test2fh	3.44	
	Test2rh	2.72	
	Test3fh	3.23	
MW-RS2	Test1fh	10.42	10.2
	Test1rh	10.38	
	Test2fh	10.79	
	Test2rh	10.12	
	Test3fh	11.1	
	Test3rh	8.32	

The published range for till is approximately 10 to 0.00001 gal/day/ft^2 (Freeze and Cherry 1979) putting the JPG average overburden hydraulic conductivity estimate in the upper range. The estimate for JPG-DU-09O is reasonable based on the published range. Two of the overburden wells evaluated during field efforts were found not suitable for testing due to very slow water level recovery. Hydraulic conductivities in these wells are estimated to be at the low range of published values for glacial till.

The calculated hydraulic conductivity for each of the shallow bedrock wells that were successfully tested is included in Table 2-6. The range of calculated hydraulic conductivities for the shallow bedrock wells is 0.078 to 29.2 gal/day/ft^2, for a geometric mean of 1.67 gal/day/ft^2. The highest value in the range was calculated for JPG-DU-02I. This well was constructed with the screen interval intersecting an open 6-inch void. Previous evaluations of groundwater elevation measurements from this well, precipitation records, and stream stage measurements at nearby SGS-BC-01 have provided information leading to the conclusion that this well has intercepted a permeable solution zone most likely connected to grade via one or more sink holes. During slug testing, the water levels in the well responded very quickly to the induced head changes such that the maximum displacement was missed by the automatic electronic recorder. As a result, displacement data do not match well with the theoretical KGS data curves. Alternative use of the Bouwer and Rice solution was attempted to approximate the hydraulic conductivity of the void, but it should be recognized that the value is likely lower than actual, but likely not more than an order of magnitude lower. The various tests at this well indicate an average hydraulic conductivity of 18.55 gal/day/ft^2.

The published range for limestone and dolomite is approximately 10 to 0.02 gal/day/ft^2 (Freeze and Cherry 1979) putting the JPG average (without JPG-DU-02I) hydraulic conductivity estimate on the upper end of the published range and at the low end of solution enhanced, or karst limestone. The published range for karst limestone is 100,000 to approximately 5 gal/day/ft^2 (Freeze and Cherry 1979). The average hydraulic conductivity calculated for JPG-DU-02I, the only well identified to have intersected secondary porosity (i.e., karst or solution feature), is on the lower end of the published range for karst limestone.

Three of the shallow bedrock wells evaluated during field efforts were found not suitable for testing due to very slow water level recoveries. Observations during drilling and subsequent water level data suggest the shallow bedrock hydraulic conductivities at these wells are at the low range of published values for limestones and dolomites.

A qualitative analysis of the hydraulic conductivity of the deeper bedrock can be made from the response of the wells following development or following slug/transducer installation. Deep wells

generally can be grouped into two categories: 1) wells that very slowly (over periods of days/weeks) recovered following development (JPG-DU-02D, JPG-DU-05D, JPG-DU-07D, and JPG-DU-08D), and 2) wells that never recovered following submergence of the transducer or in some cases the slug the night before testing (JPG-DU-01D, JPG-DU-04D, JPG-DU-06D, and JPG-DU-09D). In either instance, responses reflect very low rock permeability. These wells realistically could be estimated to have hydraulic conductivities of 0.02 gal/day/ft^2 or less, the low end value published for limestone and dolomite (Freeze and Cherry 1979).

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3. SUMMARY AND CONCLUSIONS

The slug testing program was successfully implemented at overburden and shallow bedrock wells; however, deep bedrock wells penetrate such low permeable rock, conclusive quantitative tests could not be performed. Preliminary review of the data indicated tests, where able to be performed, were implemented correctly and reproducibly, resulting in analyzable data sets. Trapped air in well filter packs did not appear to be a factor influencing hydraulic conductivity estimates. Overall, well construction characteristics and water column displacement data sets conformed to assumptions for use of conventional slug test analysis solutions, allowing analysis to proceed and reliable hydraulic conductivity value estimates to be achieved.

The hydraulic conductivity in the overburden and shallow bedrock is highly variable. Both zones included several wells where slug testing was not performed due to very slow water level recovery during preliminary field evaluation. The respective hydraulic conductivity in these cases is estimated to be at the low end of published literature values. As a result, the calculated hydraulic conductivities reported herein and summarized below for both the overburden and shallow bedrock can be thought of as at the higher range of representative values at JPG, but representative of the transmissible portions of each hydrostratigraphic zone, as further concluded below.

The range in hydraulic conductivity values in overburden wells is from 0.01 to 5.3 gal/day/ft^2 with a geometric mean for all overburden wells of 0.85 gal/day/ft^2. The geometric mean for the overburden wells with JPG-DU-09O removed is 3.74 gal/day/ft^2. The published range for till is approximately 10 to 0.00001 gal/day/ft^2 (Freeze and Cherry 1979), putting the JPG average overburden hydraulic conductivity estimate in the upper range. Since the hydraulic conductivity values calculated for JPG-DU-03O, JPG-DU-04O, and JPG-DU-06O are at the high end of the literature range for tills, any skin effects developed during installation of these wells are minimal and do not impact the usability of the slug test data. Hydraulic conductivity values calculated for JPG-DU-09O were approximately two orders of magnitude lower than the other overburden wells evaluated, but still at the higher end of published till conductivities.

The average hydraulic conductivity value for shallow bedrock wells, including JPG-DU-02I where a dominant solution zone is present, is 5.79 gal/day/ft^2. Without JPG-DU-02I, the average is slightly lower at 3.34 gal/day/ft^2. The published range for limestone and dolomite is approximately 10 to 0.02 gal/day/ft^2 (Freeze and Cherry 1979), putting the JPG average (without JPG-DU-02I) hydraulic conductivity value on the upper end of the published range for limestone and dolomite and at the low end of solution enhanced, or karst limestone. Factoring in the several wells that could not be tested would certainly drop the shallow bedrock average hydraulic conductivity.

Deeper bedrock permeability is clearly lower than overburden or shallow bedrock, although remains unquantified due to the incomplete recovery of wells following development or incomplete recovery following installation of the data logger transducer/slug the night before testing. The above traits have led to a qualitative estimate of permeability for the deep bedrock on the order of 0.02 gal/day/ft^2, which is at the low end of published values for limestone (Freeze and Cherry 1979).

In terms of the conceptual site model (CSM), slug testing has quantified the permeability of overburden and shallow bedrock with values relatively similar for both hydrostratigraphic zones. Results suggest on a local scale that the overburden can transmit groundwater horizontally, possibly in discrete coarser-grained zones in the till, and that the till is likely in hydraulic communication with shallow bedrock. Slug test results confirm portions of each medium will essentially not transmit groundwater or transmit it very slowly. Water will reside for long periods of time in these low-permeability areas, as confirmed through groundwater age dating tests being conducted by the U.S. Geological Survey (USGS) as described in FSP Addendum 6 (USGS 2008). The response of shallow bedrock well JPG-DU-02I to slug testing and the resultant hydraulic conductivity value estimate indicates that the shallow limestone

may be more permeable on an average, large-scale basis than the overlying till, especially where the till is thin and rock is most susceptible to dissolution over time and subsequent enhanced fracture permeability.

Based on observed very slow recovery in deeper bedrock wells (following development, sampling, etc.) and the inability to conclusively slug test these wells relative to the hydraulic conductivity values for overburden and shallow bedrock, there is a pronounced reduction in average rock permeability below an average depth of 29 to 33 feet into the bedrock. The deeper limestone bedrock may be three or more orders of magnitude lower in hydraulic conductivity than either the overburden or the shallow, solution enhanced bedrock. The lack of secondary porosity features at depth is the likely explanation for the pronounced decrease in permeability with depth in the DU Impact Area. There is little to no transmission of groundwater within this deeper rock.

Lastly, a groundwater pumping test is not needed to further characterize the overburden and bedrock groundwater hydraulics. Well density and yields being what they are precludes obtaining a better level of understanding of hydrostratigraphic zone permeability and hydraulic connection beyond what has been quantified or inferred from the slug testing program.

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APPENDIX A
SLUG TESTING LOGBOOK RECORDS AND FIELD FORMS

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Location JPG - DN IMPACT AREA Date 4-15-09

Project / Client USACE

TOE, ~ 40°F, CLOUDY

0700 ON-SITE AT OFFICE, M&S BRIEFING LOAD EQUIP.

0810 AT BC-01 DOWNLOAD DATA LOGGER STAGE 2.29'

0842 BOTH TEAMS SETTING UP AT SR-BC-00 TEAM A FIRST

CONDUCTING SIDE BY SIDE METER MEASUREMENTS | 2nd Loc.

MATT'S INSTRUMENT	0.72	ft/s	0.29
SIMON'S "	0.70	ft/s	0.31

0932 COMPLETE BOTH TEAM MEASUREMENTS AT SR-BC-00

TEAM A 55.2358 ft³/s

TEAM B 53.65 ft³/s

CGS-BC-11 3.55 SEC 5-GALLON BUCKET YIELD

3.13 SEC

~~3.8~~ TOE 0.38' ON WEIR

1020 COMPLETE SR-BC-99

- CAVE ~ 100' UPSTREAM OF LOCATION - TOOK PICTURE

SOME FLOW BUT LOTS OF RIVULETS

1051 SETTING UP ON SR-BC-98

1121 SETTING UP ON SR-BC-97 ~300' UPSTREAM OF CONCRETE BRIDGE ON "D ROAD", ~200' DOWNSTREAM OF TRIBUTARY ON NORTH SIDE OF BIG CREEK

1315 SIMON TAKING JIM TO AIRPORT. CONSOLIDATE INTO ONE TEAM

Location JPG - SEEPAGE RUN Date 4-15-09

Project / Client USACE

TOE

	Gpm	CFS
Team A		
SR-BC-00	24,789.8	55.2358
SR-BC-99	24,148.3	53.8063
SR-BC-98	20819.9	46.3901
SR-BC-97	20272.2	45.1697
SR-TB-96	333.387	0.74284
Team B		
SR-BC-01		55.49
SR-BC-02		48.81
SR-BC-03		47.06
SR-BC-04		53.28
SR-BC-05		49.32
SR-BC-05 DUP		50.55
— CAVE BETWEEN 5 AND 6		
SR-BC-06		44.77
AFTER TEAMS COMBINE SR-BC-05 DUP 2	46.99	~~47.7~~ TOE 45.5
SR-BC-07		48.5

- SR-BC-07 IS ~150' DOWNSTREAM OF TWO CAVES
  - ONE ON N. SIDE AND ONE ON S. SIDE
  - NEITHER CAN BE GAGGED AND SOUTH SIDE IS PARTIALLY UNDER WATER (AM MORE WATER FLOWING FROM BOTH
- COLLECTED FLOW FROM TRIBUTARY DOWNSTREAM OF SR-BC-07 AND THEN BELOW THAT DEFINITELY AFFECTED BY LOG DAM AT BRIDGE ON MORGAN ROAD

Location JBG - SEEPAGE RUN Date 4-15-09

Project / Client USACE

TOB

- COLLECT SR-BC-08 ~ 200' DOWNSTREAM OF MORGAN ROAD, DOWNSTREAM FROM THAT LOCATION THE STREAM APPEARS TO BE AFFECTED BY WILSON DAM AND POOLING

SR-BC-08 44.9 cfs

SR-BC-09 44.91 cfs

1812 MOVED UP TO UPSTREAM SECTION UPSTREAM FROM SR-TB-96 TRIED LOCATIONS, BUT TOO MUCH ORDNANCE IN CREEK FOR SAFE TRANSECT, KEPT MOVING UPSTREAM AND CHANNEL WAS EITHER OBSTRUCTED, TOO MUCH ORDNANCE OR TOO TURBULENT, FINALLY GOT CLEAR LOCATION ~~AREA~~ ~~BOR~~ SGS-BC-~~09~~ 03 ~~~ 150-200'~~ DOWNSTREAM, NOT OPTIMUM LOCATION, TURBULENT SR-BC-95

- BATTERY IN PDA LOW WAITING REPL. AS BACKUP

DIST. FROM BANK	DEPTH	vel. ft/s
1.5	0.5	2.05
3.5	0.72	2.57
5.5	1.05	2.26
7.5	0.84	2.68
9.5	1.11	2.19
11.5	1.09	2.05
13.5	NOR ~~1.04~~ 1.14	2.14
15.5	1.4	2.5

Location JBG - SEEPAGE RUN Date 4-15-09

Project / Client USACE

DIST. FROM BANK	DEPTH	vel. (ft/s)
17.5	0.81	2.44
19.5	0.66	2.29
21.5	0.59	1.3
23.5	0.45	0.67
25.5	0.3	1.9
27.5	0.54	1.64
29.5	0.22	0.76

1909 BACK TO SR-BC-00 LOCATION FOR QA CHECK

- BATTERY IN PDA LOW SO WAITING REPL. AS BACKUP

DIST. FROM BANK	DEPTH	vel (ft/s)
3	0.55	0
6	0.93	NOR ~~1.78~~ 0
9	1.78	NOR ~~.27~~ 0.27
12	2.26	0.14
15	2.50	0.51
18	2.48	0.58
21	2.4	0.69
24	2.46	0.7
27	2.65	0.63
30	2.55	0.6
33	2.51	0.59
36	2.24	0.43
39	2.06	0.46

10

Location JPG - Stepage Row Date 4-15-09

Project / Client USACE

TDE

Dist from Bank	Depth	Vel (ft/s)
42	1.8	0.1
45	1.41	0.04
48		

- Downloaded SGS-BC-01

11

Location JPG Date 4-16-09

Project / Client USACE

DF

0700 Getting equipment ready, MJL hit's bucks

0750 Heading out finish off last ERM sample locations
Simon Fong
Bill Mengy
Eric Schrumpf
Matt Logan

0830 Downloading SGS-BC-03
- Matt Logan collecting ERM sample nearby - ERM notes in MJL's logbook

0934 @ CGS-BC-12 Downloading logger
- Weir is undermined on one side and no water going over weir
- Did not re-set the data logger
- Downloaded SGS-BC-02 Matt Logan collect ERM samples
- Collect ERM samples at Big Creek at Western Perimeter

1100 MJL collecting ERM sample from Middle Fork Creek at Western Perimeter

1200 Re-loaded equipment for slug testing
Bill Mengy left site, Simon sampling MW-9
Matt, Eric and I going to start slug testing

Location JPG - SLUG TESTING Date 4-16-09

Project / Client USACE

TDE, ~55 °F, BREEZY, CLOUDY

1250 SETTING UP ON JPG-DU-01D AND I

1302 - DOWNLOADING JPG-DU-01I

DTW 2.73 BPVC

1325 STARTED 1ST SLUG TEST @ JPG-DU-01I

- NOTES OF TEST SPECS ON FIELD FORM
- DATA LOGGER SET IN JPG-DU-01D AND WELL IS SLOWER TO RECOVER FROM INSERTION OF DATA LOGGER

H_0 = 1.094'

1355 RESIDUAL DEVIATION ~31% SO MOVING TO JPG-DU-02I AND SET UP TO TEST

DTW 17.06' BPVC

H_0 = 0.993

- THERE IS SOME NOISE AT BEGINNING OF FILE AND MAY NEED TO LOOK AT SELECTING H_0 w/ TRANSLATION METHOD

JPG-DU-02I Test 1 rh

H_0 = 0.65'

JPG-DU-02I TEST 2 fh (5' SLUG)

H_0 = 1.64'

JPG-DU-02I TEST 2 rh (5' SLUG)

H_0 = 1.81'

Location JPG - SLUG TESTING Date 4-16-09

Project / Client

1647 COMPLETED 7 SLUGS AT JPG-DU-02I

- MOVE UP TO JPG-DU-01I

JPG-DU-01I

- TEST 1 fh RECOVERED TO ~18%, STOPPING TEST SINCE NEEDING 4 hrs WILL EVALUATE EFFECTS AND SEE IF CAN REDUCE REQ. OF RESIDUAL DEVIATION TO 20% FOR THIS WELL

JPG 4-16-09

1657 JPG-DU-01I rh INITIATED WITH A 4 hr STOP TIME

CHECKED JPG-DU-01D AND STILL NOT RECOVERED AT ALL FROM PUTTING IN THE DATA LOGGER

- OVER 4 hrs AND NOT STABILIZED AT ALL WILL NOT BE ABLE TO SLUG TEST THIS WELL

Location JPG Date 4-17-09

Project / Client Slug Testing

TOE
Sunny 45°F(am), 70°F(pm)
0700 LOADING UP EQUIPMENT / H&S BRIEFING
SIMON FONG
MATT LOGAN
ERIC SCHANNOFF
0800 AT JPG-DU-01I, DOWNLOAD AND START NEXT SLUG
0900 Install data loggers in JPG-DU-100 and D. Water level dropped by cable and logger. Allowing wells to return to static conditions. To JPG-DU-09 cluster.
0903. Stop and download JPG-DU-090_February, 2009. DTW=37.80' BPVC. Desiccant OK.
0910. Setting up at JPG-DU-090.
0924. Start JPG-DU-090 test 1 fh. Initial data suggests well will be slow to equilibrate to slug.
0942 - Stop and download JPG-DU-09I. DTW: 17.65' BPVC. Desiccant OK. Setting up at JPG-DU-09I to slug test.
0953. Start JPG-DU-09I test 1 fh.
1009. Stop and download JPG-DU-090_February 2009. DTW=17.93' BPVC. Desiccant OK. Setting up to slug test well.
1081. Start JPG-DU-090 test 1 fh.
1110. Out of small slugs. Wells at 9 cluster are slow to recover from 2.67' slugs TOE to

Location JPG Date 4-17-09

Project / Client Slug Testing

1200. JPG-DU-09I test 2 fh at 13% residual deviation. Will check 4 hr that test was running in 30 mins. Check w/ TOE if OK to stop w/ deviation > 5% or allow to continue to run to reach 5%.
1231. Stop JPG-DU-09I test 2 fh. 18% residual deviation.
1238. Start JPG-DU-09I test 2 fh.
1300. DTW = 36.98' at JPG-DU-100. DTW = 37.81' prior to setting cable/logger (0.23'). DTW = 37.00' at JPG-DU-100. DTW = 37.79' prior to setting cable/logger (0.23'). Loggers set out 4 hrs ago. Check later to see if DTW changes
1312. Setting up to install data logger in MW-10
1317. DTW = 1.98' bpvc (initial). DTW = 1.48' after installing logger and cable
1409. Stop and download JPG-DU-09I test 1 fh. Well recovering very slow from introduction of slug. Will restart a new test at well collecting data every 10 mins and allow well to continue to recover overnight.
1446. Start JPG-DU-09I test 1 fh-b. Collecting level every 10 mins.
1414 - JPG-DU-090 recovering v. slowly from slug. Stop and download. New test will be started at

Location JPG Date 4-17-09

Project / Client Slug Testing

1426 - Start JPG-DU-090 test 1 fh-b. Collecting level every 10 mins.
1428 - Stop and download JPG-DU-090. Will recovery is slowly from introduction of slug. Will start a new test and allow well to continue to recover overnight and collect level every 10 mins.
1432 - Start JPG-DU-090 test 1 fh-b.
1448 - DTW at MW-10 = 1.65' bpvc
1501 - DTW at JPG-DU-100 = 37.55' bpvc. Will start logger and run overnight to track recovery of well from introduction of logger / cable.
1458. Computer clock true, start JPG-DU-100 and 100 to collect level overnight at 15 min interval.
DTW = 37.06' bpvc at JPG-DU-100
1515. TDE down loading SGS-BC-01.
1605. Drop TDE off at Bldg 125. Back to JPG-DU-011
1626. Stop and download JPG-DU-011 test 2 fh.
1644. Start JPG-DU-011 test 3 fh.
1655. To Bldg 125.
1715. Leaving site.

[signature]
4-17-09

Location JPG Date 4-18-09

Project / Client Slug Testing

Sunny 45°F (am)

Onsite: MJL, EBS
0715 - Mob to site
0730 - Arrive onsite, load equipment, H&S meeting
0740 - Mob to N side of Big Creek
0800. Download JPG-DU-011 test 3 fh.
0830 - DTW = 37.69' bpvc at JPG-DU-100 and DTW = 37.28' bpvc at JPG-DU-100. Stop and download JPG-DU-100. File was set up to track recovery of well to data logger introduction. Well just at equilibrium 1 day after setting logger. Probably won't slug test.
0835. Stop and download JPG-DU-100. File set up to track recovery of well to logger introduction.
0837 - DTW = 38.05' after pulling logger from JPG-DU-100. 37.69' prior to pulling (0.36' of displacement).
0844 - DTW = 38.19' after pulling logger from JPG-DU-100. 37.28' prior to pulling (0.97' of displacement).
0848 - DTW = 1.98' bpvc at MW-10. After pulling logger DTW = 2.59' bpvc. 0.69' of displacement.
0850. Stop and download JPG-DU-090 test 1 fh-b.
0857. Start JPG-DU-090 test 1 fh.

Location JPG Date 4.18.09

Project / Client Slug Testing

0857. Stop and download JPG DU 09I test 1 fh-b
0906. Start JPG DU 09I test 1 ch.
0917 Stop and download JPG DU 09O test 1 fh b
0916 Start JPG DU 09O test 1 ch.
0950 Setting up at JPG DU 04I and O.
1005. Start JPG DU 04I test 1 fh
1011 - Stop and download JPG DU 04I test 1 fh.
1016 Start JPG DU 04I test 1 ch
1022 - Stop JPG DU 04I test 1 ch.
1026. Start JPG DU 04I test 2 fh
1032. Stop and download JPG DU 04I test 2 fh
1037 Start JPG DU 04I test 2 ch
1044 Stop and download JPG DU 04I test 2 ch.
1049 Start JPG DU 04I test 3 fh
1057 Stop and download JPG DU 04I test 3 fh.
1102 Start JPG DU 04I test 3 ch
1108 - Stop and download JPG DU 04I test 3 ch
1119 Start JPG DU 04O test 1 fh
~~Stop JPG DU 04O test 1 fh~~ (MJL 4-18-09)
1135. Stop and down load JPG DU 05I _ February 2009. DTW: 6.29' bgs. Desiccant OK.
1203 Start JPG DU 05I test 1 fh.
1300. JPG DU 05I and 04O still recovering from slug ins. Setting up at JPG DU 03O.

Location JPG Date 4.18.09

Project / Client Slug Testing

1323. Start JPG DU 03O test 1 fh
1346. JPG DU 04O still recovering
1355. JPG DU 05I still recovering
1400. Stop and down load JPG DU 05I _ February 2009. DTW: ~~4.~~ 5.43' bgs. Desiccant OK
1404. Start JPG DU 05I test 1 fh.
1417. Start JPG DU 03O test 1 fh.
1430. To JPG DU 09 cluster
1446 - Stop and down load JPG DU 09O test 1 ch
Will start new test to run overnight collecting level every 10 mins
1451 - Start JPG DU 09O test 1 ch b
1453. Stop and download JPG DU 09I test 1 ch
Will start new test to run overnight collecting level every 10 mins.
1457 - Start JPG DU 09I test 1 fh-b
1501. Stop and down load JPG DU 09O test 1 fh
Will start new test to run overnight collecting level every 10 mins
1506 - Start JPG DU 09O test 1 ch b
1507. Stop JPG DU 04O test 1 fh. Residual drawdown > 5% (~16%). Plan to allow well to recharge overnight to see if water level returns to pre-test level. If not will conduct slug out

Location JPG Date 4.18.09

Project / Client Slug Testing

1540 JPG-DU-031 still recovering. ~21% res. dev
1555 JPG-DU-031 still recovering. ~96% res. dev
1555 Stop and down load JPG-DU-030 test 1 ch
1604 - Start JPG-DU-030 test 2 ch
1619 Stop JPG-DU-031 test 1 ch. Res dev ~17%. Plan to allow well to recover overnight. Have not analyzed if OK to reduce res dev to 20%
1638 Stop and download JPG-DU-030 test 2 ch
1643 Start JPG-DU-030 test 2 ch
1648 - Stop and download JPG-031 test 1 ch. Res dev ~96% after ~3 hrs. Will start a new test to run overnight at a slower data collection interval (10 mins)
1652 Start JPG-DU-031 test 1 ch-b
1711 - Stop JPG-DU-030 test 2 ch.
1720 Cleaning up materials then to Bld 125
1730 Leaving site

Matthew Fry
4-18-09

Location JPG Date 4-19-09

Project / Client Slug Testing

Light rain 50°F (am), occasional moderate rain.

Onsite: MW, EBG
0700 - Mob to site
0710 - Arrive onsite, load equipment, H&S meeting
0740 - Mob to JPG-DU-031. Conducted analysis of test 1 ch data from well last night. Data plotted linear. OK to run test w/ res. dev. >5% and <20%. Analysis of JPG-DU-040 showed a falling head trend after introducing slug then water level began to rise in well. Maybe a precip influence.
0759 Start JPG-DU-031 test 1 ch. To JPG-DU-040
0817 Start JPG-DU-040 test 1 ch. DTW up 0.06' since yesterday after rain. Possible precip influence
0827 Stop and down load JPG-DU-031. Well recovered 0.02' since 1652 yesterday. Discussed w/ TDE last night that if well doesn't respond overnight end test
0885 Start JPG-DU-030 test 3 ch. To DU-09 chute
0901 Stop and down load JPG-DU-040 test 1 ch-b
0907 Stop and down load JPG-DU-031 test 1 ch-b
0916 Stop and down load JPG-DU-09 test 1 ch-b
0925 To JPG-DU-030
0946 Stop and down load JPG-DU-030 test 3 ch.
0951 Start JPG-DU-030 test 3 ch.

Location JPG Date 4.19.09

Project / Client Slug Testing

1009. Start JPG DU 040 test 2 fh
1025. JPG DU 051 ~ 50% res. dev
1035. Stop and download JPG DU 061 _ February
2008 DTW: 7.84' bgsx. Desiccant OK
1039. Stop and download JPG DU 060. February
2009. DTW = 25.25' bgsx _ Desiccant OK.
1043. Stop and download JPG DU 060 _ February
2009 DTW = 4.73' bgsx. Desiccant OK. Beginning to rain moderate.
1053. Start JPG DU 060 test 1 fh.
1100. Stop JPG DU 060 test 1 fh.
1104. Start JPG DU 060 test 1 rh
1115. Stop and download JPG-DU 060 test 1 rh. To JPG DU 030.
1131. Stop and download JPG DU 030 test 3 fh.
1150. JPG DU 040 still recovering. ~ 9% res. dev
1200 JPG DU 051 still recovering. ~ 37% res. dev
1206. Start JPG DU 060 test 2 fh.
1223 - Stop JPG DU 060 test 2 fh.
1227. Start JPG DU 060 test 2 rh
1241 - Stop JPG DU 060 test 2 rh
1244. Start JPG DU 060 test 3 fh
1258. Stop JPG DU 060 test 3 fh
1301. Start JPG DU 060 test 3 rh. Moderate rain

Location JPG Date 4.19.09

Project / Client Slug Testing

1315 - Stop JPG DU 060 test 3 rh
1337 - Stop and download JPG DU 040 test 2 fh
Well responded to slug in, water level dropping in well. Water level flattened out then started to rise. Possible precip influence. Stopped test. Will not start new test because well is not at equil. brom. 75% res. dev.
1354. Stop and download JPG DU 051 test 1 rh
Res. dev to 18%. Next test is slug in w/ 5.17' slug. Slug 1st thing tomorrow.
1405. Setting up at JPG DU 061
1412. Start JPG DU 061 test 1 fh.
1430. Stop and download JPG DU 061 test 1 fh.
1434. Start JPG DU 061 test 1 rh
1527 - Stop JPG DU 061 test 1 rh
1534. Start JPG DU 061 test 2 fh
1550 - Stop JPG DU 061 test 2 fh. Steady, moderate rain has continued since ~ 1300.
1554. Start JPG DU 061 test 2 rh.
1614 - Stop JPG DU 061 test 2 rh. Cleaning up materials then to Bldg 125.
1645. Leaving site.

[signature]
4.19.09

Location JPG Date 4.20.09

Project / Client Slug Testing

55°F, light rain (am), (pm)

Onsite: MJL, EDJ

0715. Mob to site.

0730. Arrive onsite, organize equipment, tailgate H&S meeting

0755. To JPG DU 051

0812. Start JPG DU 051 test 2 fh. To JPG DU 040

0828. Start JPG DU 040 test 2 fh. To JPG DU 06

0856. Start JPG DU 060 test 1 fh

0910. Start JPG DU 061 test 3 fh

0933. Stop JPG DU 061 test 3 fh

0937. Start JPG DU 061 test 3 rh

(MJL) ~~Stop JPG DU 051 test 3 rh~~. Light - moderate rain began ~ 0945.

1018. Tried getting truck back to MW RS-2 so we will to work from truck due to rain. Got truck stuck. Call to DE to see if he can contact Fish and Wildlife to see if they can pull us out.

1025. Start MW RS2 test 1 fh

1033 - Stop MW-RS2 test 1 fh.

1038. Start MW RS2 test 1 rh

1112 - Stop MW-RS2 test 1 rh Fish and Wildlife pulled truck out.

1126. Stop and download JPG DU 061 test 3 rh

1149. Stop and download JPG DU 040 test 2 rh.

Location JPG Date 4.20.09

Project / Client Slug Testing

1155. Start JPG DU 040 test 3 fh.

1218. Start MW-RS2 test 2 fh

1231 - Stop MW-RS2 test 2 fh

1235 - Start MW RS2 test 3 fh

1246. Stop and download JPG DU 060 test 1 fh. Will start a new test to run overnight collecting level every 10 mins. Res. dev at download: 97%

1250 Start JPG DU 060 test 1 fh. b

1256. Stop and download JPG DU 051 test 2 fh.

1302 - Start JPG DU 051 test 2 rh. Falling head test ended after 4 hr, res. dev = 20%

1314. Stop and download MW-RS2 test 2 rh

1318. Start MW RS2 test 3 fh

1329 - Stop MW-RS2 test 3 fh download

1330. Start MW-RS2 test 3 rh

1351 - Stop and download MW RS2 test 3 rh

1406. Stop and download JPG DU 040 test 3 fh. Data file look odd. Evaluate later. May need to do another test.

1430. Setting up at MW-3

1436. Start MW-3 test 1 fh

1500. Set up at MW-3. Installed logger. DTW = 8.41' before logger, 7.81' after logger.

1521. Start MW-7 test 1 fh.

Location JPG Date 4.20.09

Project / Client Slug Testing

1535. Setting up to install logger at MW-6. DTW = 7.51' before logger, 7.08' after logger.
1543. Stop and download MW-7 test 1 fh
1548. Start MW-7 test 1 rh.
1600. MW-3 at 8.27' (8.41' before logger). To MW-2
1603. Stop and download MW-2 test 1 fh.
1607. Start MW-2 test 1 rh.
1613. Check JPG-DW-OSI, 44% res dev.
1629. Stop and download MW-7 test 1 rh.
1634. Start MW-7 test 2 fh.
1650. Took cable / logger from JPG-DW-OSI to install in MW-5 to equilibrate overnight.
1700. @ 26' of displacement from installing cable / logger in MW-5.
1703. Stop and download MW-7 test 2 fh.
1706. Start MW-7 test 2 rh.
1720. Stop and download JPG-DW-OSI test 2 rh.
1725. Start JPG-DW-OSI test 2 rh to run overnight collecting level every 10 mins. Res. dev = 33%
1740. Stop and download MW-7 test 2 rh.
1745. Start MW-7 test 3 fh.
1755. Stop and download MW-2 test 1 rh. Res. dev > 5%. Thunderstorms moving in. Next test not until AM.

Location JPG Date 4.20.09

Project / Client Slug Testing

1809. Stop and download MW-7 test 3 fh. To 04/25
1830. Leaving site.

Matthew Day
4.20.09

Location JPG Date 4.21.09

Project / Client Slug Testing

Cloudy 40°F(am), windy, occasional rain 50°F(pm)

Onsite: MNL / EBS

0610 - Mob to site

0620 - Arrive onsite, organize materials, tailgate H&S meeting.

0630 - Mob to Lincoln Rd.

0700 - Start MW-3 test 1 fh.

0717 - Start MW-2 test 2 fh.

0727 - Start JPG-DU-05I test 3 fh.

0730 - Stop and download JPG-DU-06D test 1 fh-b

0750 - Stop and download JPG-DU-04D _ February 2009. DTW = 45.35' bgs. Descent OK

0800 - Start JPG-DU-04D _ April 2009 to collect DTW linear, every 60 mins. Called TDE about well. Feb 09 file shows linear recovery since well was sampled. Will not slug test well.

0814 - Start MW-5 test 1 fh.

0830 - Start MW-6 test 1 fh.

0855 - Stop and download MW-3 test 1 fh.

0901 - Start MW-3 test 1 fh.

0912 - Stop and download MW-2 test 2 fh.

0925 - Data logger and slug became weighted in well. Able to get both out. Shorten up rope. Reinstalled slug and logger. Allowing well to equilibrate to actions at well prior to starting 1st slug out.

Location JPG Date 4.21.09

Project / Client Slug Testing

0940 - MW-5 still recovering.

0950 - Check MW-6. Water level has risen above level displaced by slug. Well influenced by rain or large puddle surrounding well. Talked w/ TDE. Let logger to continue to record to evaluate equilibrium.

1005 - MW-3 still recovering from slug out.

1014 - Start MW-2 test 2 fh.

1030 - Setting up to re-test JPG-DU-04D. Lost slug in locked box.

1042 - Start JPG-DU-04D test 4 fh.

1100 - MW-5 recovering from slug in

1114 - MW-3 recovering from slug out.

1125 - MW-2 recovering from slug out.

1129 - Start JPG-DU-05I _ April 2009 to collect DTW linear, every 60 mins. Rel. = 7.65' bgs.

1135 - Start JPG-DU-06D _ April 2009 to collect DTW linear, every 60 mins. Rel = 4.49' bgs.

1146 - Stop and download JPG-DU-05I test 3 fh. At 34% res. dev. Start a new test to run overnight collect w/ level every 10 mins

1153 - Start JPG-DU-05I test 3 fh-b.

1203 - Stop and download JPG-DU-04D test 4 fh. Data series looks good.

Location JPG Date 4-21-09

Project / Client Slug Testing

1217. Stop and download ~~JPG~~ MW-5 test 1 fh. After 4 hrs res dev 13%.
1221. Start MW-5 test 1 rh
1238. Stop and download MW-3 test 1 rh.
1246. Start MW-3 test 2 fh. Ended MW-3 test 1 rh w/ res. dev. = 6%. Test running 4 hrs.
1257. Stop and download MW-2 test 2 rh.
1302. Start MW-2 test 3 fh.
1316. Check MW-6. DTW is 0.09' above level displaced by slug in.
1333. Start JPG-DW-08I_ April 2009. Ref: 14.14' bpvc. Collecting DTW 1 meas. every 60 mins.
1339. Stop and download JPG-DW-08I_ February 2009. DTW: 33.18' bpvc. Desiccant OK.
1343 - Start JPG-DW-08I_ April 2009. Ref = 33.A' bpvc. Collecting DTW 1 meas every 60 mins
1415. MW-3 recovering for 2nd slug in.
1421. Stop and download MW-2 test 3 fh. Pulling slug to add rope. Conduct 1 more slug in after well equilibrates to amount of slug.
1434. Stop and download MW-6 test 1 fh. Level above initial displacement caused by slug. Will set up a test to record DTW every 10 mins overnight
1440 - Start MW-6. Ref = 5.80' bpvc.

Location JPG Date 4-21-09

Project / Client Slug Testing

1500. Check MW-2. Still recovering from slug removal. Let well equilibrate overnight and run last slug in in morning.
1503. Stop and download MW-3 test 2 fh.
1512. Start MW-3 test 2 rh. Have set for scheduled stop after 4 hrs
1530. At MW-5 Res dev drops to 30%. Will not reach 5% within 4 hrs of test start. Allowing to get below 30% then stopping test.
1613. Stop and download MW-5 test 1 rh
1621. Start MW-5 test 2 fh. Test scheduled to stop in 4 hrs.
1645. Leaving site.

MW-2 4-21-09

Location JPG Date 4-22-09

Project / Client Slug Testing

Sunny, 35°F (am), partly cloudy 60°F (pm)

Onsite: MW, EGS
0610 - Mob to site
0620 - Arrive onsite, organize equipment, H&S meeting
0645 - Mob to MW-5.
0700 - Download MW-5 test 2 ft. Test stopped at 2038 on 4-21-09. Res. dev. = 179° at end of test
0708 - Start MW-5 test 2 ft
0713 - Stop and download JPG-DU-05I test 3 ft - b.
0735 - Start MW-2 test 4 ft
0744 - Download MW-3 test 2 ft. Test stopped at 1112 on 4-21-09.
0748 - Start MW-3 test 3 ft.
0800 - Stop and download MW-6 Depth to water at end of test manual = 5.55', logger 5.399'. DTW up since yesterday, starting to trend down. Needs to drop ~ 2' to reach static or pre-slug levels. Well will not be static by shift end. Pulling logger and slug.
0820 - At Old 125 to get bailer rope to hang logger in MW-11 and MW-9, EGS to scan and secure equipment, clean up materials
0924 - Stop and download MW-3 test 3 ft. Pulling logger and slug from well
0938 - Stop and download MW-2 test 4 ft.

Location JPG Date 4-22-09

Project / Client Slug Testing

0957 - Start JPG-DU-06D April 2009. Ref = 25.04' bpvc. Collecting DTW every 60 mins
1030 - Setting up to install logger in MW-11. Well under pressure from compression capsul
1045 - DTW = 6.57' bpvc prior to installing logger 5.85' after installing logger.
1108 - Stopped download MW-5 test 2 ft
1113 - Start MW-5 test 3 ft.
1130 - Setting up to install logger in MW-9 DTW = 37.30' bpvc before logger, 37.30' after.
1135 - Logger set.
1149 - Start JPG-DU-09D April 2009. Ref = 37.30' bpvc Collecting DTW every 60 mins
1154 - Start JPG-DU-09I April 2009. Ref = 17.46' bpvc Collecting DTW every 60 mins
1159 - Start JPG-DU-09D April 2009. Ref = 12.71' bpvc. Collecting DTW every 60 mins
1210 - Start JPG-DU-01I April 2009. Ref = 2.46' bpvc Collecting DTW every 60 mins.
1237 - Start JPG-DU-05I April 2009. Ref = 5.91' bpvc Collecting DTW every 60 mins
1243 - Start MW-2 April 2009. Ref = 9.85' bpvc. Collecting DTW every 60 mins.
1305 - At Old 125 to finish scans and unload equipment

Location JPG Date 4.22.09

Project / Client Slug Testing

1410. Went to restart data logger MW-11. ~3' copper head? crawled under pad. Not real interested in going to well to restart. Calling Eden to discuss.
1430. Tried poking under pad w/ 5' slugs to scare snake out. No. Tried to flood out w/ water. No. In interest of H&S, decide not to start logger. Snake is probably irritated now and may bite.
1436. Start MW9 - April 2009. Ref = 38.[redacted]3' bgs. Collecting DTW every 60 mins.
1508. Stop and download MW-5 test 3 - Ch. Res dev. ~50%. Discussed w/ TOE. Probably a temporal influence. OK to stop.
1510. Start MC-OW-03I - April 2009. DTW = 5.44' bgs. Collecting DTW every 60 mins.
1615. Leaving site. EBS demob, MBL demob in AM.

[illegible] 4.22.09

Location Date

Project / Client

Science Applications International Corporation

From Science to Solutions™

SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-0381-210
Test by: MDL & EBS TDE

Well Identification: JPG-OW-010
Project Location: Madison, Indiana
Date: 4-16-09
Transducer ID:
Cable Length: 40', set 8' into water

WATER COLUMN HEIGHT

Total Depth (115.69 ft)-Depth to Water(_____ft)= Height of water column(_____ft)

TEST 1

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: / 4-16-09
Time / Date Stop: /
DTW Initial: 2.96 (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

Well never equilibrated after displacement caused by installing data logger and 8' of cable. Removed cable/logger. DTW = initial. Well will not be tested.

TEST 2

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 3

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 4

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 5

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 6

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start:
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

Science Applications International Corporation
From Science to Solutions™

SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: [redacted] & TDE

Well Identification: JPG-DU-01I
Project Location: Madison, Indiana
Date: 4-16-09 - 4-18-09
Transducer ID:
Cable Length: 10'

WATER COLUMN HEIGHT
Total Depth ([redacted] ft)-Depth to Water(2.72 ft)=Height of water column(41.85 ft)

TEST 1
Type of Test: Falling Head/Rising Head
Data File Name: [redacted] ✓
Time / Date Start: [redacted] / [redacted]-09
Time / Date Stop: [redacted] / [redacted]-09
DTW Initial: [redacted] (ft)
DTW Equilibrated: [redacted] (ft)
DTW Final: [redacted] (ft)
Residual Deviation: (%)
Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft3

TEST 1
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-01I test 1 fh ✓
Time / Date Start: 1657 / 4-16-09
Time / Date Stop: 2957 / 4-17-09
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: 2.72 (ft)
Residual Deviation: (%)
Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft3

TEST 2
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-01I test 2 fh ✓
Time / Date Start: 819:54 / 4-17-09
Time / Date Stop: 1231:35 / 4-17-09
DTW Initial: (ft)
DTW Equilibrated: 2.72 (ft)
DTW Final: 2.43 (ft)
Residual Deviation: 12 (%)
Slug Description and ID: 5.17' PVC
Slug Volume: 0.0785 ft3
Ho - 2.426'

TEST 2
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-01I test 2 rh ✓
Time / Date Start: 1238:13 / 4-17-09
Time / Date Stop: 1638:01 / 4-17-09
DTW Initial: (ft)
DTW Equilibrated: 2.43 (ft)
DTW Final: 2.86 (ft)
Residual Deviation: 18 (%)
Slug Description and ID: 5.17' PVC
Slug Volume: 0.0785 ft3
Ho: 2.207

TEST 3
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-01I test 3 fh ✓
Time / Date Start: 1644 / 4-17-09
Time / Date Stop: 1044 / 4-17-09
DTW Initial: (ft)
DTW Equilibrated: 2.86 (ft)
DTW Final: 2.67 @ 0800, 4-18-09 (ft)
Residual Deviation: (%)
Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft3
Ho: 1.162

TEST 6
Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)
Slug Description and ID:
Slug Volume:

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: MJL & TD

Well Identification: JPG-OU-02I
Project Location: Madison, Indiana
Date: 4-16-09
Transducer ID:
Cable Length: 30'

WATER COLUMN HEIGHT
Total Depth (31.81 ft)-Depth to Water(____ ft)=Height of water column(____ ft)

TEST 1
Type of Test: Falling Head/Rising Head
Data File Name: JPG-OU-02I Test1fh ✓
Time / Date Start: 1433:44 / 4-16-09
Time / Date Stop: 1441:01 / 4-16-09
DTW Initial: 17.06 (ft)
DTW Equilibrated: 17.09 (ft)
DTW Final: 17.07 (ft)
Residual Deviation: (%)

Slug Description and ID: 2.67' PVC
Slug Volume: 0.040443

Stream stage in reservoir. Water level in well may be responding to receding stream.

TEST 1
Type of Test: Falling Head/Rising Head
Data File Name: JPG-OU-02I Test1rh ✓
Time / Date Start: 1449:43 / 4-16-09
Time / Date Stop: 1500:08 / 4-16-09
DTW Initial: 17.07 (ft)
DTW Equilibrated: 17.07 (ft)
DTW Final: 17.12 (ft)
Residual Deviation: (%)

Slug Description and ID: 2.67' PVC
Slug Volume: 0.040443

TEST 2
Type of Test: Falling Head/Rising Head
Data File Name: JPG-OU-02I Test2fh ✓
Time / Date Start: 1503:57 / 4-16-09
Time / Date Stop: 1512:40 / 4-16-09
DTW Initial: (ft)
DTW Equilibrated: 17.12 (ft)
DTW Final: 17.06 (ft)
Residual Deviation: (%)

Slug Description and ID: 5.17' PVC
Slug Volume: 0.078443

TEST 2
Type of Test: Falling Head/Rising Head
Data File Name: JPG-OU-02I test2rh ✓
Time / Date Start: 1523:04 / 4-16-09
Time / Date Stop: 1530:32 / 4-16-09
DTW Initial: (ft)
DTW Equilibrated: 17.07 (ft)
DTW Final: 17.14 (ft)
Residual Deviation: (%)

Slug Description and ID: 5.17' PVC
Slug Volume: 0.078443

TEST 3
Type of Test: Falling Head/Rising Head
Data File Name: JPG-OU-02I test3fh ✓
Time / Date Start: 1541:49 / 4-16-09
Time / Date Stop: 1548:00 / 4-16-09
DTW Initial: (ft)
DTW Equilibrated: 17.17 (ft)
DTW Final: 17.04 (ft)
Residual Deviation: (%)

Slug Description and ID: 2.67' + 5.17' PVC
Slug Volume: 0.118
H_0 · 2.355'

TEST 3
Type of Test: Falling Head/Rising Head
Data File Name: JPG-OU-02I test3rh ✓
Time / Date Start: 1551:10 / 4-16-09
Time / Date Stop: 1556:20 / 4-16-09
DTW Initial: (ft)
DTW Equilibrated: 17.04 (ft)
DTW Final: 17.14 (ft)
Residual Deviation: (%)

Slug Description and ID: 2.67' + 5.17' PVC
Slug Volume: 0.118
H_0 · 2.226

2 of 2

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: _____ & _____

Well Identification: JPG-DW-02I
Project Location: Madison, Indiana
Date: 4-16-09
Transducer ID:
Cable Length:

WATER COLUMN HEIGHT

Total Depth (_____ft)-Depth to Water(_____ft)=Height of water column(_____ft)

TEST #4

Type of Test: Falling Head/Rising Head
Data File Name: JPG-DW-02I test 4 fh
Time / Date Start: 1554:27 / 4-16-09
Time / Date Stop: 1607:37 / 4-16-09
DTW Initial: _____(ft)
DTW Equilibrated: 17.14 (ft)
DTW Final: 17.09 (ft)
Residual Deviation: _____(%)

Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft³
Ho - 0.610'

TEST 2

Type of Test: Falling Head/Rising Head
Data File Name: _____
Time / Date Start: _____/_____
Time / Date Stop: _____/_____
DTW Initial: _____(ft)
DTW Equilibrated: _____(ft)
DTW Final: _____(ft)
Residual Deviation: _____(%)

Slug Description and ID: _____
Slug Volume: _____

TEST 3

Type of Test: Falling Head/Rising Head
Data File Name: _____
Time / Date Start: _____/_____
Time / Date Stop: _____/_____
DTW Initial: _____(ft)
DTW Equilibrated: _____(ft)
DTW Final: _____(ft)
Residual Deviation: _____(%)

Slug Description and ID: _____
Slug Volume: _____

TEST 4

Type of Test: Falling Head/Rising Head
Data File Name: _____
Time / Date Start: _____/_____
Time / Date Stop: _____/_____
DTW Initial: _____(ft)
DTW Equilibrated: _____(ft)
DTW Final: _____(ft)
Residual Deviation: _____(%)

Slug Description and ID: _____
Slug Volume: _____

TEST 5

Type of Test: Falling Head/Rising Head
Data File Name: _____
Time / Date Start: _____/_____
Time / Date Stop: _____/_____
DTW Initial: _____(ft)
DTW Equilibrated: _____(ft)
DTW Final: _____(ft)
Residual Deviation: _____(%)

Slug Description and ID: _____
Slug Volume: _____

TEST 6

Type of Type: Falling Head/Rising Head
Data File Name: _____
Time / Date Start: _____/_____
Time / Date Stop: _____/_____
DTW Initial: _____(ft)
DTW Equilibrated: _____(ft)
DTW Final: _____(ft)
Residual Deviation: _____(%)

Slug Description and ID: _____
Slug Volume: _____

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: MJL & EBS

Well Identification: JPG-DU-03I
Project Location: Madison, Indiana
Date: 4-18-09
Transducer ID:
Cable Length: 40'

WATER COLUMN HEIGHT
Total Depth (64.06 ft)-Depth to Water(_____ft)=Height of water column(_____ft)

TEST 1

Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-03I test1fh
Time / Date Start: 1404:38 / 4-18-09
Time / Date Stop: 1548:48 / 4-18-09
DTW Initial: 5.43 (ft)
DTW Equilibrated: 5.43 (ft)
DTW Final: 5.00 (ft)
Residual Deviation: 96 (%)

Slug Description and ID: 1.9" metal
Slug Volume: 0.01 ft3
Hc: 0.457
greater than calculated theoretical max for slug

TEST 2

Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-03I test1fh-b
Time / Date Start: 1639:04 / 4-18-09
Time / Date Stop: 0827:04 / 4-19-09
DTW Initial: (ft)
DTW Equilibrated: 5.00 (ft)
DTW Final: 5.06 (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:
Well recovered 0.02' overnight

TEST 3

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 4

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 5

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 6

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: MW & LBS

Well Identification: JPG-DU-030
Project Location: Madison, Indiana
Date: 4-18-09
Transducer ID:
Cable Length:

WATER COLUMN HEIGHT
Total Depth (37.44 ft)-Depth to Water(_____ft)=Height of water column(_____ft)

TEST 1
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-030 test1fh ✓
Time / Date Start: 1323:35 / 4-18-09
Time / Date Stop: 1414:23 / 4-18-09
DTW Initial: 5.02 (ft)
DTW Equilibrated: 4.81 (ft)
DTW Final: 4.78 (ft)
Residual Deviation: 4 (%)

Slug Description and ID: 1.9" metal
Slug Volume: 0.01473
Ho: 0.416
$\boxed{0.424}$

TEST #1
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-030 test1rh ✓
Time / Date Start: 1417:49 / 4-18-09
Time / Date Stop: 1555:37 / 4-18-09
DTW Initial: (ft)
DTW Equilibrated: 4.78 (ft)
DTW Final: 4.74 (ft)
Residual Deviation: 4 (%)

Slug Description and ID: 1.9" metal
Slug Volume: 0.01473
Ho 0.471
greater than calculated theoretical max displacement
$\boxed{0.472}$

TEST #2
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-030 test2fh ✓
Time / Date Start: 1603:55 / 4-18-09
Time / Date Stop: 1637:50 / 4-18-09
DTW Initial: (ft)
DTW Equilibrated: 4.74 (ft)
DTW Final: 4.68 (ft)
Residual Deviation: 3 (%)

Slug Description and ID: 5.17" PVC
Slug Volume: 0.078
Ho: 1.978

TEST #2
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-030 test2rh ✓
Time / Date Start: 1643:09 / 4-18-09
Time / Date Stop: 1711:17 / 4-18-09
DTW Initial: (ft)
DTW Equilibrated: 4.70 (ft)
DTW Final: 4.78 (ft)
Residual Deviation: 4 (%)

Slug Description and ID: 5.17" PVC
Slug Volume: 0.078473
Ho: 2.086

TEST #3
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-030 test3fh ✓
Time / Date Start: 0831:59 / 4-19-09
Time / Date Stop: 0846:55 / 4-19-09
DTW Initial: (ft)
DTW Equilibrated: 4.72 (ft)
DTW Final: 4.71 (ft)
Residual Deviation: 0 (%)

Slug Description and ID: 1.9" metal
Slug Volume: 0.01473
Ho: 0.467
DTW fell to pre-slug in level and continued to fall below pre-slug in level.

TEST #3
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-030 test3rh ✓
Time / Date Start: 0851:37 / 4-19-09
Time / Date Stop: 1131:37 / 4-19-09
DTW Initial: (ft)
DTW Equilibrated: 4.73 (ft)
DTW Final: 4.67 (ft)
Residual Deviation: (%)

Slug Description and ID: 1.9" metal
Slug Volume: 0.01473
Ho: 0.418
DTW above initial DTW

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: MJL & EDS

Well Identification: JPG-DU-041I
Project Location: Madison, Indiana
Date: 4.18.09
Transducer ID: 136618
Cable Length: 50

WATER COLUMN HEIGHT
Total Depth (68.16 ft)-Depth to Water(_____ft)=Height of water column(_____ft)

TEST 1
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-041I test1-fh ✓
Time / Date Start: 1004:43 / 4.18.09
Time / Date Stop: 1011:01 / 4.18.09
DTW Initial: 11.05 (ft)
DTW Equilibrated: 11.05 (ft)
DTW Final: 11.03 (ft)
Residual Deviation: 4 (%)
Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft3
Ho: 1.366

TEST #1
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-041I test1-rh ✓
Time / Date Start: 1016:07 / 4.18.09
Time / Date Stop: 1022:10 / 4.18.09
DTW Initial: (ft)
DTW Equilibrated: 11.05 (ft)
DTW Final: (ft)
Residual Deviation: 4 (%)
Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft3
Ho: 1.242

TEST #2
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-041I test2-fh ✓
Time / Date Start: 1025:58 / 4.18.09
Time / Date Stop: 1031:30 / 4.18.09
DTW Initial: (ft)
DTW Equilibrated: 11.05 (ft)
DTW Final: 10.98 (ft)
Residual Deviation: 4 (%)
Slug Description and ID: 2.67' + 5.17' PVC
Slug Volume: 0.118
Ho: 3.248

TEST #2
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-041I test2-rh ✓
Time / Date Start: 1037:02 / 4.18.09
Time / Date Stop: 1044:08 / 4.18.09
DTW Initial: (ft)
DTW Equilibrated: 11.01 (ft)
DTW Final: 11.11 (ft)
Residual Deviation: 4 (%)
Slug Description and ID: 2.67' + 5.17' PVC
Slug Volume: 0.118
Ho: 3.480

TEST #3
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-041I test3-fh ✓
Time / Date Start: 1049:00 / 4.18.09
Time / Date Stop: 1057:21 / 4.18.09
DTW Initial: (ft)
DTW Equilibrated: 11.11 (ft)
DTW Final: 11.07 (ft)
Residual Deviation: 4 (%)
Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft3
Ho: 1.152

TEST #3
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-041I test3-rh ✓
Time / Date Start: 1101:08 / 4.18.09
Time / Date Stop: 1108:27 / 4.18.09
DTW Initial: (ft)
DTW Equilibrated: 11.07 (ft)
DTW Final: 11.12 (ft)
Residual Deviation: 4 (%)
Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft3
Ho: 1.210

1.245

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: MJL & EJS

Well Identification: JPG-DU-040
Project Location: Madison, Indiana
Date: 4-18-09
Transducer ID: 127180
Cable Length: 40'

WATER COLUMN HEIGHT
Total Depth (49.97 ft)-Depth to Water(____ ft)=Height of water column(____ ft)

TEST 1
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-040 test1fh ✓
Time / Date Start: 1118:43 / 4-18-09
Time / Date Stop: 1517:07 / 4-18-09
DTW Initial: 11.83 10.79 (ft)
DTW Equilibrated: 10.80 (ft)
DTW Final: 10.67 (ft)
Residual Deviation: 17 (%)

water tape read incorrectly →

Slug Description and ID: 2.67" PVC
Slug Volume: 0.040 ft3
Ho: 0.942
- possible non linear

TEST #1
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-040 test1rh ✓
Time / Date Start: 0817:30 / 4-19-09
Time / Date Stop: 1004:35 / 4-19-09
DTW Initial: (ft)
DTW Equilibrated: 10.56 (ft)
DTW Final: 10.64 (ft)
Residual Deviation: 4 (%)

Slug Description and ID: 2.67" PVC
Slug Volume: 0.040 ft3
Ho: 1.132'

TEST #2
Type of Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-040 test2fh ✓
Time / Date Start: 1009:19 / 4-19-09
Time / Date Stop: 1337:37 / 4-19-09
DTW Initial: (ft)
DTW Equilibrated: 10.53 (ft)
DTW Final: 10.39 (ft)
Residual Deviation: 10 (%)

Slug Description and ID: 5.17" PVC
Slug Volume: 0.078 ft3
Ho: 1.901 [2.746] [2.028]
Well seems to be influenced by rain. Had res. dev to ~ 8% then water level began to rise - possible non

TEST #2
Type of Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-040 test2rh
Time / Date Start: 0833:47 / 4-20-09
Time / Date Stop: 1149:20 / 4-20-09
DTW Initial: 10.25 (ft)
DTW Equilibrated: 10.26 (ft)
DTW Final: 10.39 (ft)
Residual Deviation: 10 (%)

Slug Description and ID: 5.17" PVC
Slug Volume: 0.078 ft3
Ho: 1.702 [1.892]
DTW has stabilized at ~ 0.21' below initial less than 20% std. dev. approaching 4 hrs.

TEST #3
Type of Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-040 test3fh
Time / Date Start: 1155:25 / 4-20-09
Time / Date Stop: 1405:35 / 4-20-09
DTW Initial: 10.49 (ft)
DTW Equilibrated: 10.50 (ft)
DTW Final: 10.46 (ft)
Residual Deviation: (%)

Slug Description and ID: 2.67" PVC
Slug Volume: 0.040 ft3
Ho: 0.993'
Data file look strange. May need to evaluate possible need another test. Transducer possibly moved

TEST #4
Type of Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-040 test4fh ✓
Time / Date Start: 1043:18 / 4-21-09
Time / Date Stop: 1203:43 / 4-21-09
DTW Initial: 10.54 (ft)
DTW Equilibrated: 10.50 (ft)
DTW Final: (ft)
Residual Deviation: 5 (%)

Slug Description and ID: 2.67" PVC 90' cable
Slug Volume:
0.933' = Ho [0.939]

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: MW & EJS

Well Identification: JPG-DU-05I
Project Location: Madison, Indiana
Date: 4-18-09
Transducer ID:
Cable Length: 20'

WATER COLUMN HEIGHT
Total Depth (38.00 ft)-Depth to Water(____ ft)=Height of water column(____ ft)

TEST 1
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-05I test1fh ✓
Time / Date Start: 1303:03 / 4-18-09
Time / Date Stop: 1319:21 / 4-18-09
DTW Initial: 5.78 (ft)
DTW Equilibrated: 5.89 (ft)
DTW Final: 5.99 (ft)
Residual Deviation: 18 (%)

Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft3
Ho: 1.632

TEST # 1
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-05I test1rh ✓
Time / Date Start: 1319:04 / 4-19-09
Time / Date Stop: 1334:11 / 4-19-09
DTW Initial: (ft)
DTW Equilibrated: 6.40 (ft)
DTW Final: 6.60 (ft)
Residual Deviation: 18 (%)

Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft3
Ho: 1.200'

TEST # 2
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-05I test2fh ✓
Time / Date Start: 0811:49 / 4-20-09
Time / Date Stop: 1256:40 / 4-20-09
DTW Initial: 5.20 (ft)
DTW Equilibrated: 5.20 (ft)
DTW Final: 5.74 (ft)
Residual Deviation: 10 (%)

Slug Description and ID: ~~2.67' PVC + 1.9' metal~~ 5.17' PVC
Slug Volume: ~~0.050 ft3~~ 0.078
Ho = 2.100'
running for 4 hrs, res dev @ 30%

TEST # 2
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-05I test2rh ✓
Time / Date Start: 1301:53 / 4-20-09
Time / Date Stop: 1400:25 / 4-20-09
DTW Initial: 5.74 (ft)
DTW Equilibrated: 5.75 (ft)
DTW Final: (ft)
Residual Deviation: 33 (%)

Slug Description and ID: 5.17' PVC
Slug Volume: 0.078 ft3
Ho: 2.276'

TEST # 2
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-05I test2rh-b ✓
Time / Date Start: 1835:04 / 4-20-09
Time / Date Stop: 0715:04 / 4-21-09
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: 5.84 (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST # 3
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-05I test3fh
Time / Date Start: 0721:04 / 4-21-09
Time / Date Stop: 1146:00 / 4-21-09
DTW Initial: (ft)
DTW Equilibrated: 5.84 (ft)
DTW Final: (ft)
Residual Deviation: 34 (%) Test 3

Slug Description and ID: 2.67' PVC
Slug Volume:
Ho: 1.155'

JPG-DU-05I test3fh-b ✓ DTW final = 5.68'
1159:55 / 4-21-09
0718:55 / 4-22-09

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: MJL & EGS

Well Identification: JPG-DU-06D
Project Location: Madison, Indiana
Date: 4-20-09
Transducer ID:
Cable Length: 50'

WATER COLUMN HEIGHT
Total Depth (100.97 ft)-Depth to Water(_____ft)=Height of water column(_____ft)

TEST 1

Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-06D test1 fh
Time / Date Start: 0856:00 / 4-20-09
Time / Date Stop: 1146:16 / 4-20-09
DTW Initial: 25.11 (ft)
DTW Equilibrated: 25.13 (ft)
DTW Final: _____ (ft)
Residual Deviation: 97 (%)

Slug Description and ID: 1.9" metal
Slug Volume: 0.010 ft3
Ho: 0.477'

TEST 2

Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-06D test1fh-b
Time / Date Start: 1150:37 / 4-20-09
Time / Date Stop: 0730:37 / 4-21-09
DTW Initial: _____ (ft)
DTW Equilibrated: _____ (ft)
DTW Final: 24.65 (ft)
Residual Deviation: _____ (%)

Slug Description and ID: 1.9" metal
Slug Volume: 0.010 ft3

TEST 3

Type of Test: Falling Head/Rising Head
Data File Name: _____
Time / Date Start: _____ / _____
Time / Date Stop: _____ / _____
DTW Initial: _____ (ft)
DTW Equilibrated: _____ (ft)
DTW Final: _____ (ft)
Residual Deviation: _____ (%)

Slug Description and ID: _____
Slug Volume: _____

TEST 4

Type of Test: Falling Head/Rising Head
Data File Name: _____
Time / Date Start: _____ / _____
Time / Date Stop: _____ / _____
DTW Initial: _____ (ft)
DTW Equilibrated: _____ (ft)
DTW Final: _____ (ft)
Residual Deviation: _____ (%)

Slug Description and ID: _____
Slug Volume: _____

TEST 5

Type of Test: Falling Head/Rising Head
Data File Name: _____
Time / Date Start: _____ / _____
Time / Date Stop: _____ / _____
DTW Initial: _____ (ft)
DTW Equilibrated: _____ (ft)
DTW Final: _____ (ft)
Residual Deviation: _____ (%)

Slug Description and ID: _____
Slug Volume: _____

TEST 6

Type of Test: Falling Head/Rising Head
Data File Name: _____
Time / Date Start: _____ / _____
Time / Date Stop: _____ / _____
DTW Initial: _____ (ft)
DTW Equilibrated: _____ (ft)
DTW Final: _____ (ft)
Residual Deviation: _____ (%)

Slug Description and ID: _____
Slug Volume: _____

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: [illegible] & EGS

Well Identification: JPG-DW-06I
Project Location: Madison, Indiana
Date: 4-19-09
Transducer ID:
Cable Length: 40'

WATER COLUMN HEIGHT
Total Depth (50.54 ft)-Depth to Water(_____ft)=Height of water column(_____ft)

TEST 1

Type of Test: Falling Head/Rising Head
Data File Name: JPG-DW-06I test1 fh ✓
Time / Date Start: 1412:38 / 4-19-09
Time / Date Stop: 1430:32 / 4-19-09
DTW Initial: 7.75 (ft)
DTW Equilibrated: 7.75 (ft)
DTW Final: 7.67 (ft)
Residual Deviation: 4 (%)

Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft3
Ho: 1.377
1.115

TEST #1

Type of Test: Falling Head/Rising Head
Data File Name: JPG-DW-06I test1 rh ✓
Time / Date Start: 1434:14 / 4-19-09
Time / Date Stop: 1527:07 / 4-19-09
DTW Initial: (ft)
DTW Equilibrated: 7.69 (ft)
DTW Final: 7.76 (ft)
Residual Deviation: 5.6 (%)

Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft3
Ho: 1.113
Water level fluctuating by a few hundredths between readings

TEST #2

Type of Test: Falling Head/Rising Head
Data File Name: JPG-DW-06I test2 fh ✓
Time / Date Start: 1534:31 / 4-19-09
Time / Date Stop: 1550:13 / 4-19-09
DTW Initial: (ft)
DTW Equilibrated: 7.76 (ft)
DTW Final: 7.65 (ft)
Residual Deviation: 4 (%)

Slug Description and ID: 5.17' PVC
Slug Volume: 0.078 ft3
Ho: 1.783

TEST #2

Type of Test: Falling Head/Rising Head
Data File Name: JPG-DW-06I test2 rh ✓
Time / Date Start: 1554:25 / 4-19-09
Time / Date Stop: 1614:38 / 4-19-09
DTW Initial: (ft)
DTW Equilibrated: 7.69 (ft)
DTW Final: 7.79 (ft)
Residual Deviation: 4 (%)

Slug Description and ID: 5.17' PVC
Slug Volume: 0.078 ft3
Ho: 2.064

TEST #3

Type of Test: Falling Head/Rising Head
Data File Name: JPG-DW-06I test3 fh ✓
Time / Date Start: 0910:14 / 4-20-09
Time / Date Stop: 0955:01 / 4-20-09
DTW Initial: 7.66 (ft)
DTW Equilibrated: 7.66 (ft)
DTW Final: 7.61 (ft)
Residual Deviation: 4 (%)

Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft3
Ho: 1.216'

TEST #3

Type of Test: Falling Head/Rising Head
Data File Name: JPG-DW-06I test3 rh ✓
Time / Date Start: 0957:29 / 4-20-09
Time / Date Stop: 1126:38 / 4-20-09
DTW Initial: 7.61 (ft)
DTW Equilibrated: 7.63 (ft)
DTW Final: 7.69 (ft)
Residual Deviation: 4.7 (%)

Slug Description and ID: 2.6' PVC
Slug Volume: 0.040 ft3
Ho: 1.251'

res.dev. was OK when viewed before download. But the time test was stopped & downloaded res.dev at 7:00. Last test at well 50 should be an 15:00

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: MJC & EBS

Well Identification: JPG-DU-060
Project Location: Madison, Indiana
Date: 4.19.09
Transducer ID:
Cable Length: 30'

WATER COLUMN HEIGHT
Total Depth (23.46 ft)-Depth to Water(____ ft)=Height of water column(____ ft)

TEST 1
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-060 test 1fh ✓
Time / Date Start: 1053:38 / 4.19.09
Time / Date Stop: 1100:33 / 4.19.09
DTW Initial: 4.73 (ft)
DTW Equilibrated: 4.71 (ft)
DTW Final: 4.64 (ft)
Residual Deviation: 5 (%)
Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft3
Ho: 1.042

TEST #1
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-060 test 1rh ✓
Time / Date Start: 1109:31 / 4.19.09
Time / Date Stop: 1114:41 / 4.19.09
DTW Initial: (ft)
DTW Equilibrated: 4.67 (ft)
DTW Final: 4.69 (ft)
Residual Deviation: 4 (%)
Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft3
Ho: 1.139

TEST #2
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-060 test 2fh ✓
Time / Date Start: 1306:18 / 4.19.09
Time / Date Stop: 1333:44 / 4.19.09
DTW Initial: (ft)
DTW Equilibrated: 4.67 (ft)
DTW Final: 4.80 (ft)
Residual Deviation: 5 (%)
Slug Description and ID: 5.17' + 5.17' PVC
Slug Volume: 0.156 ft3
Ho: 3.804

TEST #2
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-060 test 2rh ✓
Time / Date Start: 1337:39 / 4.19.09
Time / Date Stop: 1341:45 / 4.19.09
DTW Initial: (ft)
DTW Equilibrated: 4.52 (ft)
DTW Final: 4.75 (ft)
Residual Deviation: 4 (%)
Slug Description and ID: 5.17' + 5.17' PVC
Slug Volume: 0.156 ft3
Ho: 4.458

TEST #3
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-060 test 3fh ✓
Time / Date Start: 1344:22 / 4.19.09
Time / Date Stop: 1358:53 / 4.19.09
DTW Initial: (ft)
DTW Equilibrated: 4.72 (ft)
DTW Final: 4.66 (ft)
Residual Deviation: 6 (%)
Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft3
Ho: 1.040

res. dev was < 5% while viewing real time data.

TEST #3
Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-060 test 3rh ✓
Time / Date Start: 1301:14 / 4.19.09
Time / Date Stop: 1314:56 /
DTW Initial: (ft)
DTW Equilibrated: 4.66 (ft)
DTW Final: 4.69 (ft)
Residual Deviation: 3 (%)
Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft3
Ho: 1.153

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: MSL & TDE

Well Identification: JPG-DU-09D
Project Location: Madison, Indiana
Date: 4-17-09
Transducer ID: 186843
Cable Length: 50'

WATER COLUMN HEIGHT

Total Depth (85.97 ft)-Depth to Water(_____ft)=Height of water column(_____ft)

TEST 1

Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-09D test1fh
Time / Date Start: 0934:35 / 4-17-09
Time / Date Stop: 1414:10 / 4-17-09
DTW Initial: 37.80 (ft)
DTW Equilibrated: 37.80 (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft³
H_0: 1.217
noise in beginning of test.

TEST 1

Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-09D test1fh-b
Time / Date Start: 1446:52 / 4-17-09
Time / Date Stop: 0846:52 / 4-18-09
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: 37.10 (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 2

Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-09D test1rh
Time / Date Start: 0857:30 / 4-18-09
Time / Date Stop: 1446:32 / 4-18-09
DTW Initial: (ft)
DTW Equilibrated: 37.10 (ft)
DTW Final: 38.00 (ft)
Residual Deviation: 80 (%)

Slug Description and ID: 2.67' PVC
Slug Volume: 0.040
H_0: 1.169

TEST 2

Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-09D test1rh-b
Time / Date Start: 1401:07 / 4-18-09
Time / Date Stop: 0901:07 / 4-19
DTW Initial: (ft)
DTW Equilibrated: 38.00 (ft)
DTW Final: 37.90 (ft)
Residual Deviation: (%)

Slug Description and ID: 2.67' PVC
Slug Volume: 0.040

TEST 5

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 6

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: MJL & EBS

Well Identification: JPG OU-09I
Project Location: Madison, Indiana
Date: 4-17-09
Transducer ID:
Cable Length: 30'

WATER COLUMN HEIGHT
Total Depth (51.93 ft)-Depth to Water(_____ft)=Height of water column(_____ft)

TEST 1

Type of Test: Falling Head/Rising Head
Data File Name: JPG OU-09I test1 fh
Time / Date Start: 0953:00 / 4-17-09
Time / Date Stop: 1002:38 / 4-17-09
DTW Initial: 17.66 (ft)
DTW Equilibrated: 17.69 (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID: 2.67' PVC
Slug Volume: 0.0460 ft3
Ho: 1.078

TEST #1

Type of Test: Falling Head/Rising Head
Data File Name: JPG-OU-09I test1 fh-b
Time / Date Start: 1106:47 / 4-17-09
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: 16.86 (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST #3

Type of Test: Falling Head/Rising Head
Data File Name: JPG-OU-09I test1 rh
Time / Date Start: 0905:55 / 4-18-09
Time / Date Stop: 1452:40 / 4-18-09
DTW Initial: (ft)
DTW Equilibrated: 16.85 (ft)
DTW Final: 18.03 (ft)
Residual Deviation: 89 (%)

Slug Description and ID: 2.67' PVC
Slug Volume: 0.0460 ft3
Ho: 1.139

TEST #2

Type of Test: Falling Head/Rising Head
Data File Name: JPG OU-09I test1 rh-b
Time / Date Start: 1457:38 / 4-18-09
Time / Date Stop: 0907:38 / 4-19-09
DTW Initial: (ft)
DTW Equilibrated: 18.02 (ft)
DTW Final: 17.82 (ft)
Residual Deviation: (%)

Slug Description and ID: 2.67' PVC
Slug Volume: 0.0460 ft3

TEST 5

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 6

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: MJL & EBS

Well Identification: JPG-DU-090
Project Location: Madison, Indiana
Date: 4-17-09
Transducer ID:
Cable Length: 30'

WATER COLUMN HEIGHT
Total Depth (36.70 ft)-Depth to Water(_____ft)=Height of water column(_____ft)

TEST 1

Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-090 test1fh
Time / Date Start: 1016:42 / 4-17-09
Time / Date Stop: 1318:05 / 4-17-09
DTW Initial: 12.93 (ft)
DTW Equilibrated: 12.95 (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID: 2.67" PVC
Slug Volume: 0.040773
Ho: 1.028'

TEST 2

Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-090 test1fh.b ✓
Time / Date Start: 1432:15 / 4-17-09
Time / Date Stop: 0912:25 / 4-18-09
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: 12.77 (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 3

Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-090 test1fh
Time / Date Start: 0916:49 / 4-18-09
Time / Date Stop: 1501:32 / 4-18-09
DTW Initial: (ft)
DTW Equilibrated: 12.77 (ft)
DTW Final: 13.09 (ft)
Residual Deviation: 25 (%)

Slug Description and ID: 2.67" PVC
Slug Volume: 0.040773
Ho: 1.078

TEST 4

Type of Test: Falling Head/Rising Head
Data File Name: JPG-DU-090 test1fh.b ✓
Time / Date Start: 1506:16 / 4-18-09
Time / Date Stop: 0905:16 / 4-19-09
DTW Initial: (ft)
DTW Equilibrated: 13.09 (ft)
DTW Final: 12.87 (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 5

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 6

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: MJL & JDE

Well Identification: JPG-OW-10D
Project Location: Madison, Indiana
Date:
Transducer ID: 135905
Cable Length: 90'

WATER COLUMN HEIGHT
Total Depth (90.93 ft)-Depth to Water(_____ft)=Height of water column(_____ft)

not tested, see logbook

TEST 1

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: 37.31 (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 2

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 3

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 4

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 5

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 6

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: MDL & TDE

Well Identification: JPG-OW-100
Project Location: Madison, Indiana
Date: 4-17-09
Transducer ID:
Cable Length: 100'

WATER COLUMN HEIGHT
Total Depth (71.18 ft)-Depth to Water(_____ft)=Height of water column(_____ft) not tested, see logbook

TEST 1

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: 37.70 (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 2

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 3

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 4

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 5

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 6

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: MDL & EBS

Well Identification: MW-10
Project Location: Madison, Indiana
Date: 4-17-09
Transducer ID: 137120
Cable Length: 40'

WATER COLUMN HEIGHT
Total Depth (41.53 ft)-Depth to Water(_____ft)=Height of water column(_____ft)

not tested, see logbook

TEST 1

Type of Test: Falling Head/Rising Head
Data File Name:_____
Time / Date Start:_____/_____
Time / Date Stop:_____/_____
DTW Initial: 1.98 (ft)
DTW Equilibrated:_____(ft)
DTW Final:_____(ft)
Residual Deviation:_____(%)

Slug Description and ID:_____
Slug Volume:_____

TEST 2

Type of Test: Falling Head/Rising Head
Data File Name:_____
Time / Date Start:_____/_____
Time / Date Stop:_____/_____
DTW Initial:_____(ft)
DTW Equilibrated:_____(ft)
DTW Final:_____(ft)
Residual Deviation:_____(%)

Slug Description and ID:_____
Slug Volume:_____

TEST 3

Type of Test: Falling Head/Rising Head
Data File Name:_____
Time / Date Start:_____/_____
Time / Date Stop:_____/_____
DTW Initial:_____(ft)
DTW Equilibrated:_____(ft)
DTW Final:_____(ft)
Residual Deviation:_____(%)

Slug Description and ID:_____
Slug Volume:_____

TEST 4

Type of Test: Falling Head/Rising Head
Data File Name:_____
Time / Date Start:_____/_____
Time / Date Stop:_____/_____
DTW Initial:_____(ft)
DTW Equilibrated:_____(ft)
DTW Final:_____(ft)
Residual Deviation:_____(%)

Slug Description and ID:_____
Slug Volume:_____

TEST 5

Type of Test: Falling Head/Rising Head
Data File Name:_____
Time / Date Start:_____/_____
Time / Date Stop:_____/_____
DTW Initial:_____(ft)
DTW Equilibrated:_____(ft)
DTW Final:_____(ft)
Residual Deviation:_____(%)

Slug Description and ID:_____
Slug Volume:_____

TEST 6

Type of Test: Falling Head/Rising Head
Data File Name:_____
Time / Date Start:_____/_____
Time / Date Stop:_____/_____
DTW Initial:_____(ft)
DTW Equilibrated:_____(ft)
DTW Final:_____(ft)
Residual Deviation:_____(%)

Slug Description and ID:_____
Slug Volume:_____

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: MN & EBS

Well Identification: MW-2
Project Location: Madison, Indiana
Date: 4.20.09
Transducer ID:
Cable Length: 20'

WATER COLUMN HEIGHT
Total Depth (25.94 ft)-Depth to Water(_____ft)=Height of water column(_____ft)

TEST 1

Type of Test: Falling Head/Rising Head
Data File Name: MW-2 test 1fh ✓
Time / Date Start: 1435:40 / 4.20.09
Time / Date Stop: 1605:03 / 4.20.09
DTW Initial: 9.63 (ft)
DTW Equilibrated: 9.63 (ft)
DTW Final: 9.59 (ft)
Residual Deviation: 5 (%)

Slug Description and ID: 1.9' metal
Slug Volume: 0.01473
Ho: 0.491'

TEST #1

Type of Test: Falling Head/Rising Head
Data File Name: MW-2 test 1fh ✓
Time / Date Start: 1655:43 / 4.20.09
Time / Date Stop: 1755:23 / 4.20.09
DTW Initial: 9.59 (ft)
DTW Equilibrated: 9.60 (ft)
DTW Final: 9.63 (ft)
Residual Deviation: 6 (%)

Slug Description and ID: 1.9' metal
Slug Volume: 0.01473
Ho: 0.568

res. dev. > 5. Thermometers moving in. Next test not until AM.

TEST #2

Type of Test: Falling Head/Rising Head
Data File Name: MW-2 test 2fh ✓
Time / Date Start: 0712:02 / 4.21.09
Time / Date Stop: 0912:12 / 4.21.09
DTW Initial: 9.65 (ft)
DTW Equilibrated: 9.65 (ft)
DTW Final: 9.60 (ft)
Residual Deviation: 4 (%)

Slug Description and ID: 5.17' PVC
Slug Volume:
Ho: 2.257'

TEST #2

Type of Test: Falling Head/Rising Head
Data File Name: MW-2 test 2fh ✓
Time / Date Start: 1013:58 / 4.21.09
Time / Date Stop: 1151:13 / 4.21.09
DTW Initial: 9.59 (ft)
DTW Equilibrated: 9.60 (ft)
DTW Final: 9.67 (ft)
Residual Deviation: 1 (%)

Slug Description and ID: 5.17' PVC
Slug Volume:
Ho: 2.162'

TEST #3

Type of Test: Falling Head/Rising Head
Data File Name: MW-2 test 3fh
Time / Date Start: 1302:36 / 4.21.09
Time / Date Stop: 1421:23 / 4.21.09
DTW Initial: 9.67 (ft)
DTW Equilibrated: 9.67 (ft)
DTW Final: 9.61 (ft)
Residual Deviation: 5.6 (%)

Slug Description and ID: 1.9' metal
Slug Volume:
Ho: 0.309'

Slug probably not fully submerged.

TEST #4

Type of Test: Falling Head/Rising Head
Data File Name: MW-2 test 4fh ✓
Time / Date Start: 0735:01 / 4.22.09
Time / Date Stop: 0930:06 / 4.22.09
DTW Initial: 9.73 (ft)
DTW Equilibrated: 9.73 (ft)
DTW Final: 9.80 (ft)
Residual Deviation:

Slug Description and ID: 1.9' metal
Slug Volume:
Ho: 0.482

Well recovered to below pre-slug in DTW

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: MJL & EDG

Well Identification: MW-3
Project Location: Madison, Indiana
Date: 4-20-09
Transducer ID:
Cable Length: 40'

WATER COLUMN HEIGHT
Total Depth (45.48 ft)-Depth to Water(_____ ft)=Height of water column(_____ ft)

TEST 1

Type of Test: Falling Head/Rising Head
Data File Name: MW-3 test 1 fh ✓
Time / Date Start: 0700:39 / 4-21-09
Time / Date Stop: 0858:16 / 4-21-09
DTW Initial: 8.41 (ft)
DTW Equilibrated: 8.37 (ft)
DTW Final: 8.33 (ft)
Residual Deviation: 5.6 (%)

Slug Description and ID: 1.9' metal
Slug Volume: 0.01773
Ho: 0.522'

level fluctuating at end of test. Res. dev. of 5% reached several times

TEST #1

Type of Test: Falling Head/Rising Head
Data File Name: MW-3 test 1 rh ✓
Time / Date Start: 0901:[illegible] / 4-21-09
Time / Date Stop: 1038:21 / 4-21-09
DTW Initial: 8.33 (ft)
DTW Equilibrated: 8.33 (ft)
DTW Final: 8.38 (ft)
Residual Deviation: 6 (%)

Slug Description and ID: 1.9' metal
Slug Volume:
Ho: 0.566'

Ended test w/ res. dev > 5%. Test running 3.5 hrs. Res. dev as low as 1% 14 sec prior to ending.

TEST # 2

Type of Test: Falling Head/Rising Head
Data File Name: MW-3 test 2 fh ✓
Time / Date Start: 1245:37 / 4-21-09
Time / Date Stop: 1503:30 / 4-21-09
DTW Initial: 8.38 (ft)
DTW Equilibrated: 8.38 (ft)
DTW Final: 8.39 (ft)
Residual Deviation: 4 (%)

Slug Description and ID: 5.17' PVC
Slug Volume:
Ho: 2.264'

TEST # 2

Type of Test: Falling Head/Rising Head
Data File Name: MW-3 test 2 rh ✓
Time / Date Start: 1512 / 4-21-09
Time / Date Stop: 1912 / 4-21-09
DTW Initial: 8.39 (ft)
DTW Equilibrated: 8.39 (ft)
DTW Final: 8.47 (ft)
Residual Deviation: 5 (%)

Slug Description and ID: 5.17' PVC
Slug Volume:
Ho: 2.331'

TEST # 3

Type of Test: Falling Head/Rising Head
Data File Name: MW-3 test 3 fh ✓
Time / Date Start: 0708:21 / 4-22-09
Time / Date Stop: 0994:30 /
DTW Initial: 8.47 (ft)
DTW Equilibrated: 8.47 (ft)
DTW Final: 8.44 (ft)
Residual Deviation: 3 (%)

Slug Description and ID: 1.9' metal
Slug Volume:
Ho: 0.491'

TEST 6

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start:
Time / Date Stop:
DTW Initial:
DTW Equilibrated:
DTW Final:
Residual Deviation:

Slug Description and ID
Slug Volume

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: MJL & EGS

Well Identification: MW-5
Project Location: Madison, Indiana
Date: 4-20-09
Transducer ID:
Cable Length: 40'

WATER COLUMN HEIGHT
Total Depth (35.85 ft)-Depth to Water(____ ft)=Height of water column(____ ft)

TEST 1

Type of Test: Falling Head/Rising Head
Data File Name: MW-5 test 1 fh ✓
Time / Date Start: 0814:46 / 4-21-09
Time / Date Stop: 816:5 / 4-21-09
DTW Initial: 19.31 (19.05 after install cable)
DTW Equilibrated: 19.29 (ft)
DTW Final: 19.21 (ft)
Residual Deviation: 13 (%)

Slug Description and ID: 1.9' metal
Slug Volume:
Ho: 0.463'

TEST #1

Type of Test: Falling Head/Rising Head
Data File Name: MW-5 test 1 rh ✓
Time / Date Start: 831:58 / 4-21-09
Time / Date Stop: 833:12 / 4-21-09
DTW Initial: 19.21 (ft)
DTW Equilibrated: 19.21 (ft)
DTW Final: 19.33 (ft)
Residual Deviation: 21.19 (%)

Slug Description and ID: 1.9' metal
Slug Volume:
Ho: 0.445' [0.45]
level fluctuating ahead of test res dev 21.19%
logger cable bumped when slug removed.

TEST #2

Type of Test: Falling Head/Rising Head
Data File Name: MW-5 test 2 fh ✓
Time / Date Start: 832 / 4-21-09
Time / Date Stop: 2022 / 4-21-09
DTW Initial: 19.33 (ft)
DTW Equilibrated: 19.34 (ft)
DTW Final: @0700 on 4-22 19.05 (ft)
Residual Deviation: 17 (%)

Slug Description and ID: 5.17' PVC
Slug Volume:
Ho: 2.944'
2.

TEST #2

Type of Test: Falling Head/Rising Head
Data File Name: MW-5 test 2 rh ✓
Time / Date Start: 0707:51 / 4-22-09
Time / Date Stop: 1107:38 / 4-22-09
DTW Initial: 19.05 (ft)
DTW Equilibrated: 19.05 (ft)
DTW Final: 19.40 (ft)
Residual Deviation: 19 (%)

Slug Description and ID: 5.17 PVC
Slug Volume:
Ho: 2.139
[2.186]

TEST #3

Type of Test: Falling Head/Rising Head
Data File Name: MW-5 test 3 fh
Time / Date Start: 1113:09 / 4-22-09
Time / Date Stop: 1307:44 / 4-22-09
DTW Initial: 19.40 (ft)
DTW Equilibrated: 19.40 (ft)
DTW Final: 19.16 (ft)
Residual Deviation: 51 (%)

Slug Description and ID: 1.9' metal
Slug Volume:
Ho: 0.479

TEST 6

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start:
Time / Date Stop:
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: MJL & EBS

Well Identification: MW-6
Project Location: Madison, Indiana
Date: 4-20-09
Transducer ID:
Cable Length: 50'

WATER COLUMN HEIGHT
Total Depth (42.78 ft)-Depth to Water(_____ft)=Height of water column(_____ft)

TEST 1

Type of Test: Falling Head/Rising Head
Data File Name: MW-6 test 1 fh
Time / Date Start: 0830:09 / 4-21-09
Time / Date Stop: 1434:01 / 4-21-09
DTW Initial: 7.51 (ft)
DTW Equilibrated: 6.41 (ft)
DTW Final: 5.79 (ft)
Residual Deviation: level -0.625 (%)

Slug Description and ID: 1.9' metal
Slug Volume:
Ho: 0.499'

DTW up since yesterday. Large puddle surrounds well. Viewed level w/ logger. Stable.

DTW @ 0800 on 4-21-09 5.53'

TEST 2

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 3

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 4

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 5

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

TEST 6

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start: /
Time / Date Stop: /
DTW Initial: (ft)
DTW Equilibrated: (ft)
DTW Final: (ft)
Residual Deviation: (%)

Slug Description and ID:
Slug Volume:

Science Applications International Corporation
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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: MWL & EBS

Well Identification: MW-7
Project Location: Madison, Indiana
Date: 4-20-09
Transducer ID:
Cable Length: 90'

WATER COLUMN HEIGHT
Total Depth (56.41 ft)-Depth to Water(____ ft)=Height of water column(____ ft)

TEST 1

Type of Test: Falling Head/Rising Head
Data File Name: MW-7 test 1 fh ✓
Time / Date Start: 520:43 / 4-20-09
Time / Date Stop: 543:31 / 4-20-09
DTW Initial: 8.97 (ft)
DTW Equilibrated: 8.97 (ft)
DTW Final: 8.95 (ft)
Residual Deviation: ____ (%)

Slug Description and ID: 1.9' metal
Slug Volume: 0.01773
Ho: 0.465' $\boxed{0.512}$

Could hear turbulence in well after slug introduced. Was a good drop, tight formation. Well recovered to below static

TEST #1

Type of Test: Falling Head/Rising Head
Data File Name: MW-7 test 1 rh ✓
Time / Date Start: 547:37 / 4-20-09
Time / Date Stop: 629:20 / 4-20-09
DTW Initial: 8.95 (ft)
DTW Equilibrated: 8.95 (ft)
DTW Final: 8.96 (ft)
Residual Deviation: 3 (%)

Slug Description and ID: 1.9' steel
Slug Volume: 0.01773
Ho: 0.537
$\boxed{0.572}$

TEST #2

Type of Type: Falling Head/Rising Head
Data File Name: MW-7 test 2 fh ✓
Time / Date Start: 633:31 / 4-20-09
Time / Date Stop: 703:13 / 4-20-09
DTW Initial: 8.96 (ft)
DTW Equilibrated: 8.95 (ft)
DTW Final: 8.94 (ft)
Residual Deviation: 1 (%)

Slug Description and ID: 5.17' PVC
Slug Volume: 0.078773
Ho: 2.147

TEST #2

Type of Test: Falling Head/Rising Head
Data File Name: MW-7 test 2 rh ✓
Time / Date Start: 706:05 / 4-20-09
Time / Date Stop: 740:15 / 4-20-09
DTW Initial: 8.94 (ft)
DTW Equilibrated: 8.94 (ft)
DTW Final: 8.96 (ft)
Residual Deviation: ____ (%)

Slug Description and ID: 5.17' PVC
Slug Volume: 0.078773
Ho: 2.392

well recovered to below pre-slug out level

TEST #3

Type of Test: Falling Head/Rising Head
Data File Name: MW-7 test 3 fh ✓
Time / Date Start: 744:52 / 4-20-09
Time / Date Stop: 809:34 / 4-20-09
DTW Initial: 8.96 (ft)
DTW Equilibrated: 8.97 (ft)
DTW Final: 9.01 (ft)
Residual Deviation: ____ (%)

Slug Description and ID: 1.9' metal
Slug Volume: 0.01773
Ho: 0.480'
$\boxed{0.494'}$

TEST 6

Type of Test: Falling Head/Rising Head
Data File Name:
Time / Date Start:
Time / Date Stop:
DTW Initial:
DTW Equilibrated:
DTW Final:
Residual Deviation:

Slug Description and ID
Slug Volume

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SLUG TEST FIELD DATA COLLECTION FORM

Project Name: Jefferson Proving Ground
Project Number: 01-1633-04-9381-210
Test by: MW & EBS

Well Identification: MW-RS2
Project Location: Madison, Indiana
Date: 4-20-09
Transducer ID:
Cable Length:

WATER COLUMN HEIGHT
Total Depth (21.75 ft)-Depth to Water(____ ft)=Height of water column(____ ft)

TEST 1
Type of Test: Falling Head/Rising Head
Data File Name: MW-RS2 test 1fh ✓
Time / Date Start: 1035:08 / 4-20-09
Time / Date Stop: 1033:26 / 4-20-09
DTW Initial: 3.62 (ft)
DTW Equilibrated: 3.63 (ft)
DTW Final: 3.60 (ft)
Residual Deviation: 4 (%)

Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft3
Ho: 1.042'
1.265'

TEST 1
Type of Test: Falling Head/Rising Head
Data File Name: MW-RS2 test 1rh ✓
Time / Date Start: 1038:30 / 4-20-09
Time / Date Stop: 1112:15 / 4-20-09
DTW Initial: (ft)
DTW Equilibrated: 3.62 (ft)
DTW Final: 3.69 (ft)
Residual Deviation: 5 (%)

Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft3
Ho: 1.167

TEST 2
Type of Test: Falling Head/Rising Head
Data File Name: MW-RS2 test 2fh ✓
Time / Date Start: 1218:04 / 4-20-09
Time / Date Stop: 1231:44 / 4-20-09
DTW Initial: 3.69 (ft)
DTW Equilibrated: 3.69 (ft)
DTW Final: (ft)
Residual Deviation: 4 (%)

Slug Description and ID: 2.67' + 5.17' PVC
Slug Volume: 0.118 ft3
Ho: 2.949

TEST 2
Type of Test: Falling Head/Rising Head
Data File Name: MW-RS2 test 2rh ✓
Time / Date Start: 1235:06 / 4-20-09
Time / Date Stop: 1314:11 / 4-20-09
DTW Initial: 3.69 (ft)
DTW Equilibrated: 3.81 (ft)
DTW Final: 3.69 (ft)
Residual Deviation: 3 (%)

Slug Description and ID: 2.67' + 5.17' PVC
Slug Volume: 0.118 ft3

TEST 3
Type of Test: Falling Head/Rising Head
Data File Name: MW-RS2 test 3fh ✓
Time / Date Start: 1318:07 / 4-20-09
Time / Date Stop: 1329:17 / 4-20-09
DTW Initial: 3.69 (ft)
DTW Equilibrated: 3.70 (ft)
DTW Final: 3.68 (ft)
Residual Deviation: 5 (%)

Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft3
Ho: 1.041'

TEST 6
Type of Test: Falling Head/Rising Head
Data File Name: MW-RS2 test 3rh ✓
Time / Date Start: 1331:55 4-20-09
Time / Date Stop: 1350:49 4-20-09
DTW Initial: 3.68 (ft)
DTW Equilibrated: (ft)
DTW Final: 3.70 (ft)
Residual Deviation: 5 (%)

Slug Description and ID: 2.67' PVC
Slug Volume: 0.040 ft3
Ho: 1.216

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APPENDIX B
SLUG TEST DATA (ELECTRONIC)

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APPENDIX C
AQTESOLV™ AND AQUIFER^{Win32} GRAPHICAL OUTPUTS

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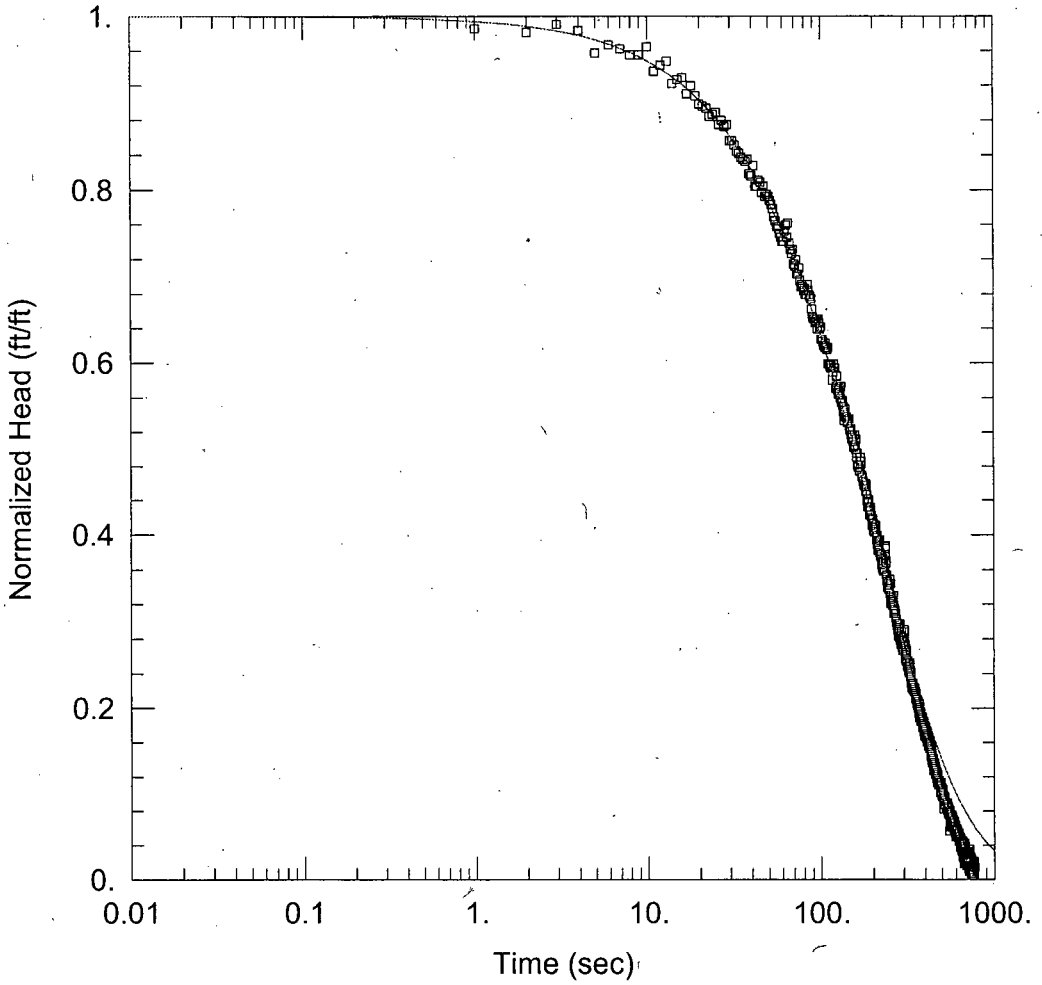


JPG-DU-03O TEST1FH

Data Set: H:\Jobs\JPG\Slug Testing\Data\03O\JPG-DU-03O Analysis\JPG-DU-03O Test1fh.aqt
Date: 06/04/09 Time: 15:28:07

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 39.24 ft Anisotropy Ratio (Kz/Kr): 1.

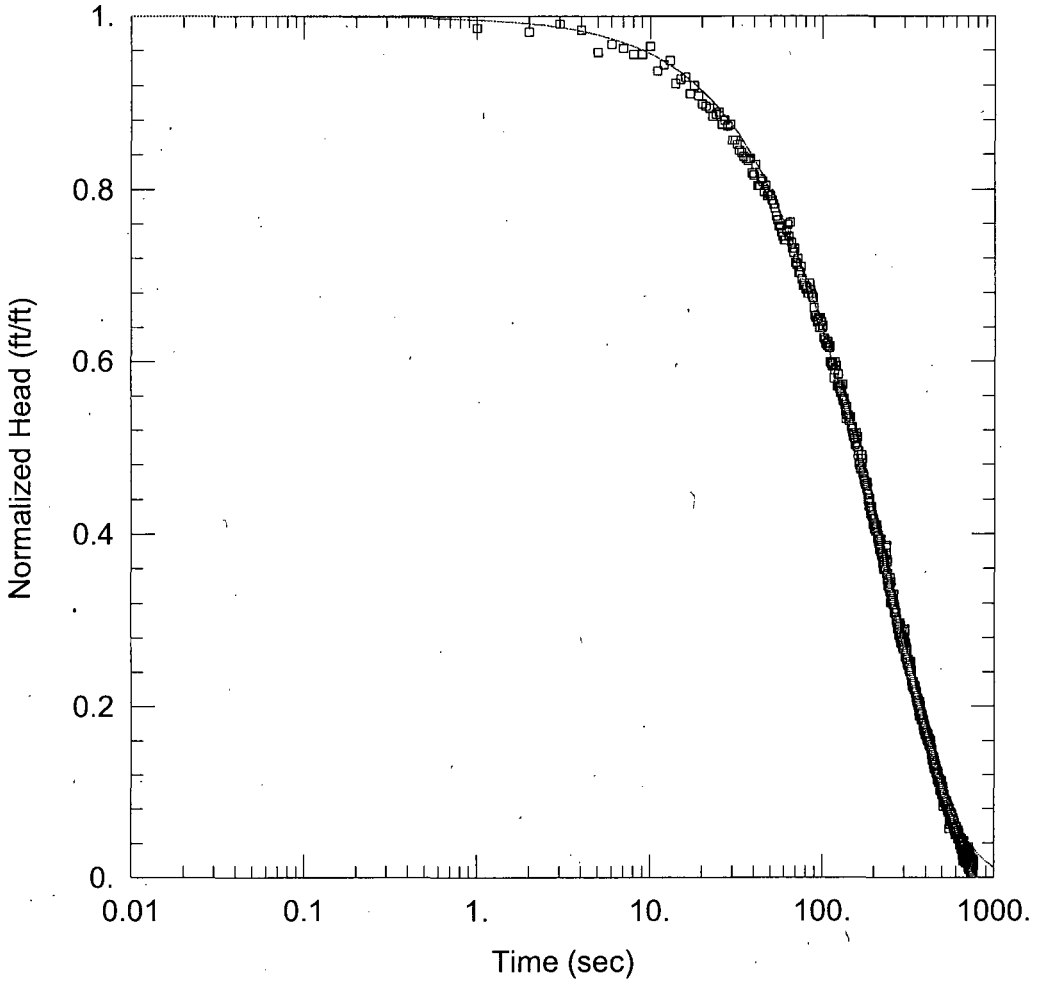
WELL DATA (JPG-DU-03O)

Initial Displacement: 0.424 ft Static Water Column Height: 22.63 ft
Total Well Penetration Depth: 22.63 ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.333 ft

SOLUTION

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

T = 96.12 gal/day/ft S = 1.0E-9



JPG-DU-03O TEST1FH

Data Set: H:\Jobs\JPG\Slug Testing\Data\03O\JPG-DU-03O Analysis\JPG-DU-03O Test1fh.aqt
Date: 06/04/09 Time: 15:36:41

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 39.24 ft

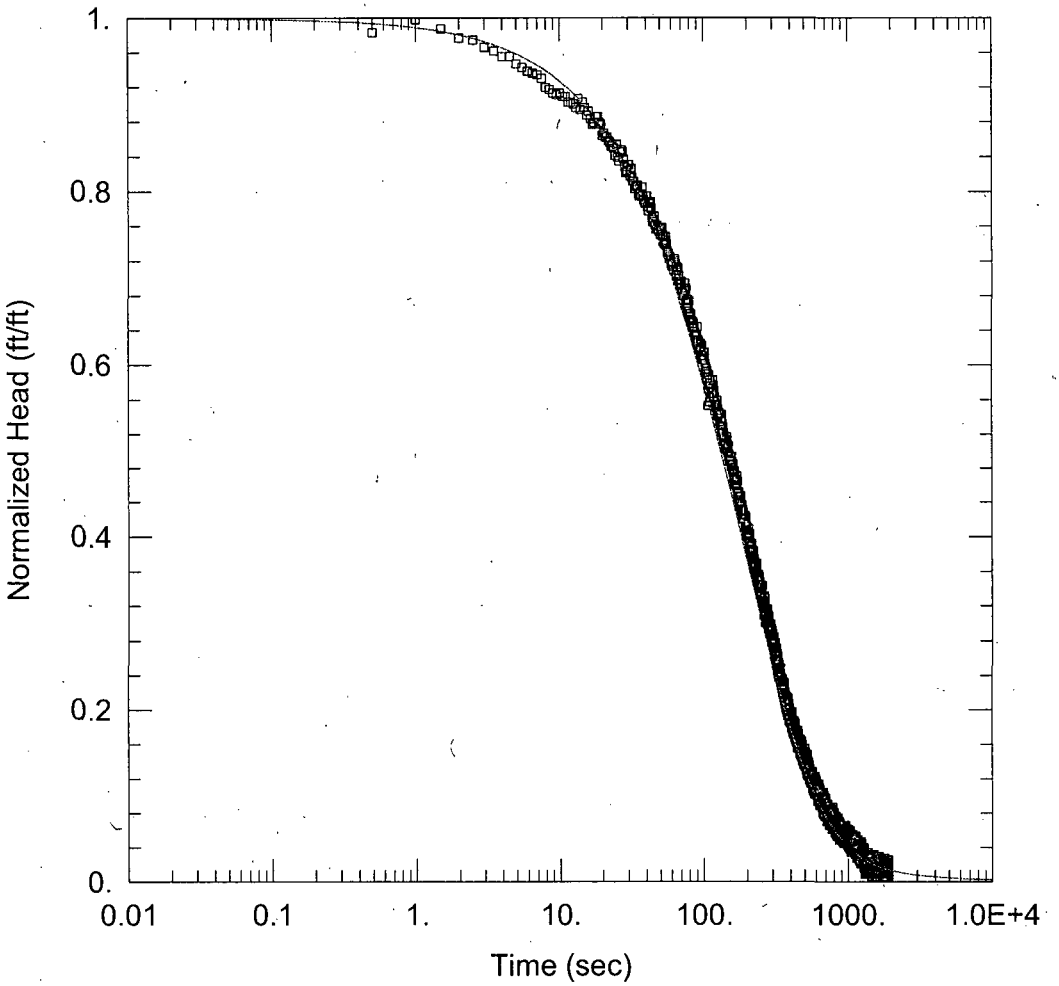
WELL DATA (JPG-DU-03O)

Initial Displacement: 0.424 ft
Total Well Penetration Depth: 22.63 ft
Casing Radius: 0.083 ft
Static Water Column Height: 22.63 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 3.059 gal/day/ft^2
Kz/Kr = 1.
Ss = 2.548E-11 ft^{-1}



JPG-DU-03O TEST1RH

Data Set: H:\Jobs\JPG\Slug Testing\Data\03O\JPG-DU-03O Analysis\JPG-DU-03O Test1rh.aqt
Date: 06/04/09 Time: 15:50:55

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

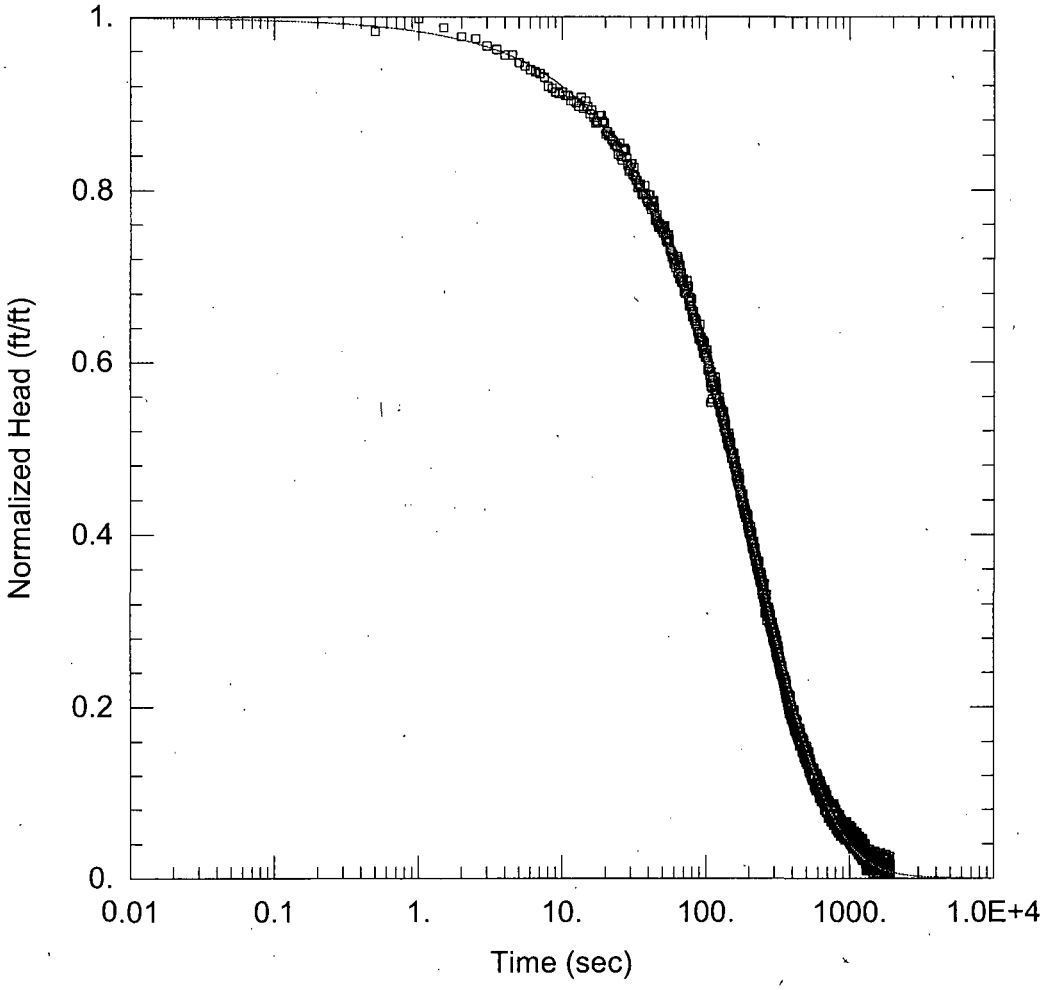
WELL DATA (JPG-DU-03O)

Initial Displacement: 0.472 ft
Total Well Penetration Depth: 22.66 ft
Casing Radius: 0.083 ft
Static Water Column Height: 22.66 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

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

T = 56.08 gal/day/ft
S = 1.0E-5



JPG-DU-03O TEST1RH

Data Set: H:\Jobs\JPG\Slug Testing\Data\03O\JPG-DU-03O Analysis\JPG-DU-03O Test1rh.aqt
Date: 06/08/09 Time: 12:28:56

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 35. ft

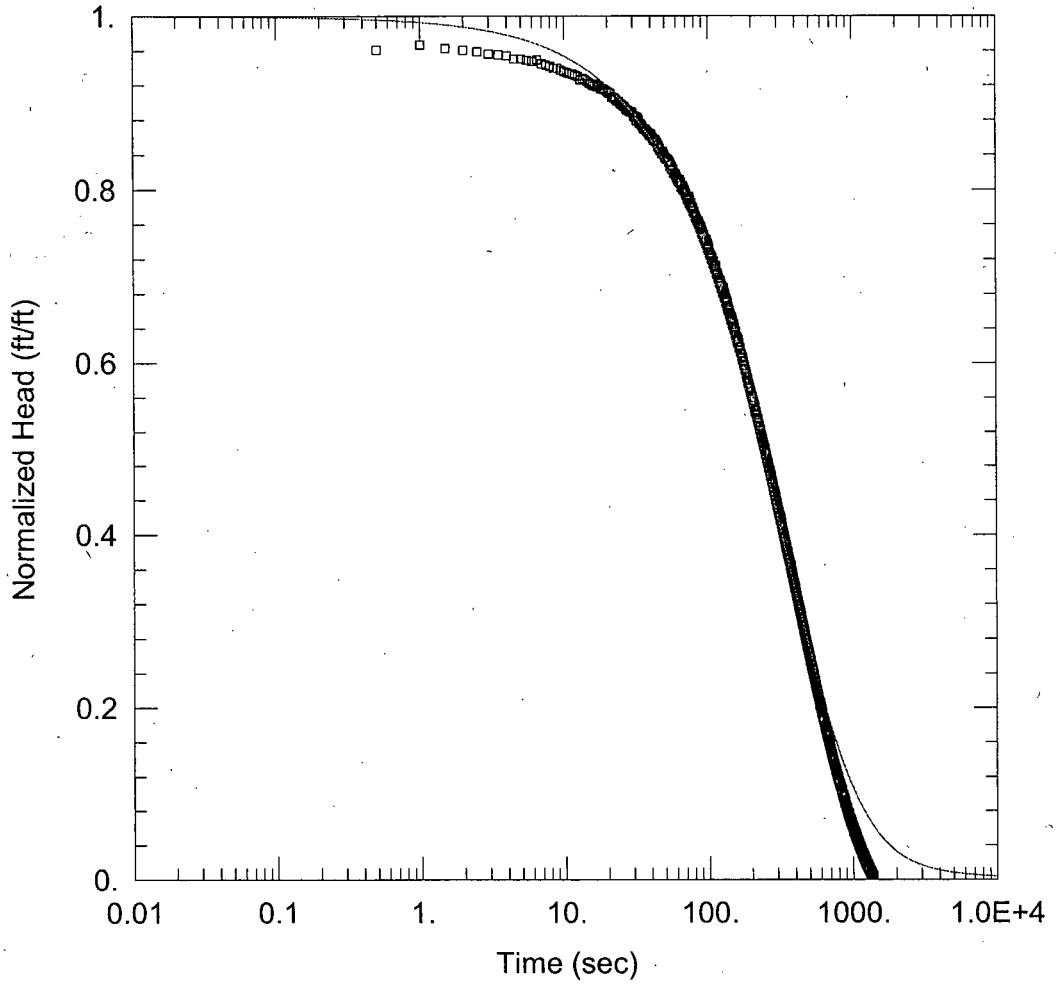
WELL DATA (JPG-DU-03O)

Initial Displacement: 0.472 ft
Total Well Penetration Depth: 22.66 ft
Casing Radius: 0.083 ft
Static Water Column Height: 22.66 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 2.522 gal/day/ft^2
Kz/Kr = 1.
Ss = 3.126E-5 ft^{-1}



JPG-DU-03O TEST2FH

Data Set: H:\Jobs\JPG\Slug Testing\Data\03O\JPG-DU-03O Analysis\JPG-DU-03O Test2fh.aqt
Date: 06/08/09 Time: 12:34:11

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

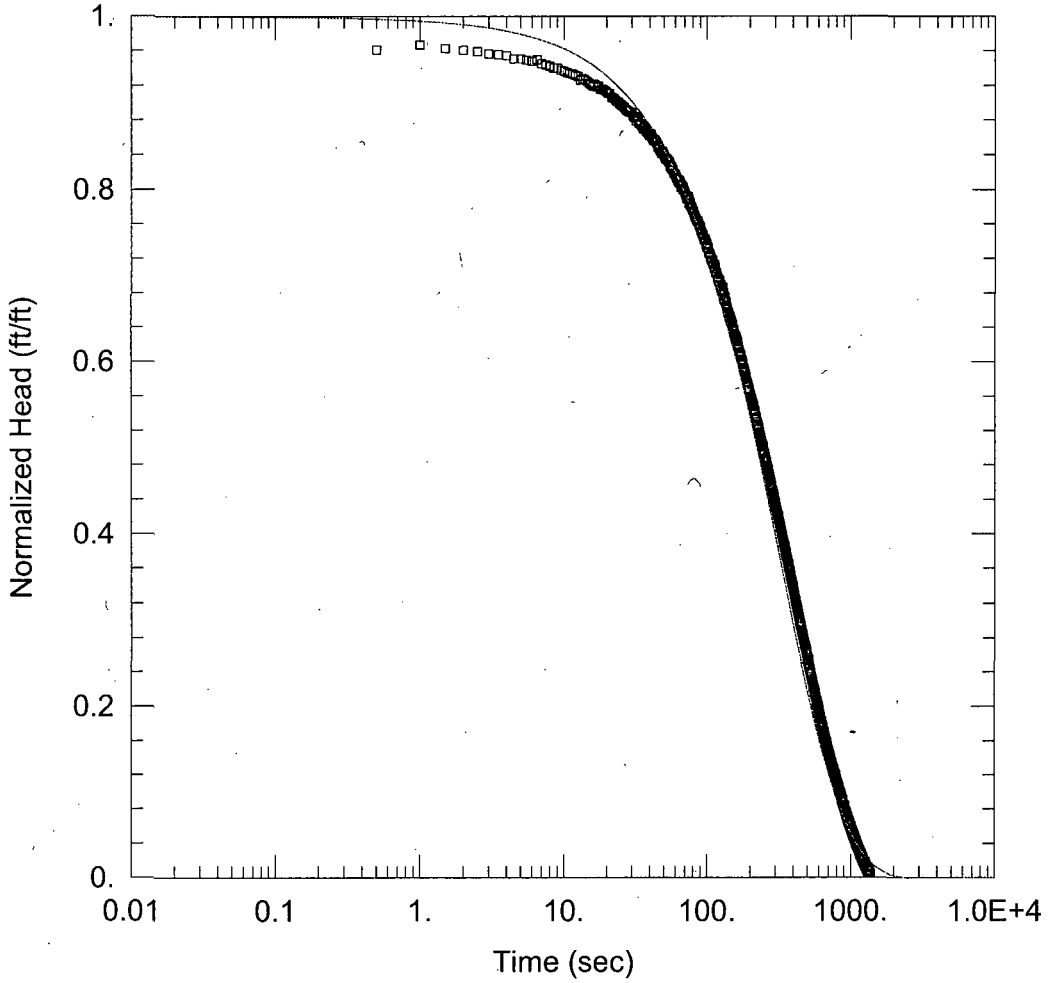
WELL DATA (JPG-DU-03O)

Initial Displacement: 1.928 ft
Total Well Penetration Depth: 22.7 ft
Casing Radius: 0.083 ft
Static Water Column Height: 22.7 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

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

T = 31.87 gal/day/ft
S = 1.0E-5



JPG-DU-03O TEST2FH

Data Set: H:\Jobs\JPG\Slug Testing\Data\03O\JPG-DU-03O Analysis\JPG-DU-03O Test2fh.aqt
Date: 06/08/09 Time: 12:40:05

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 35. ft

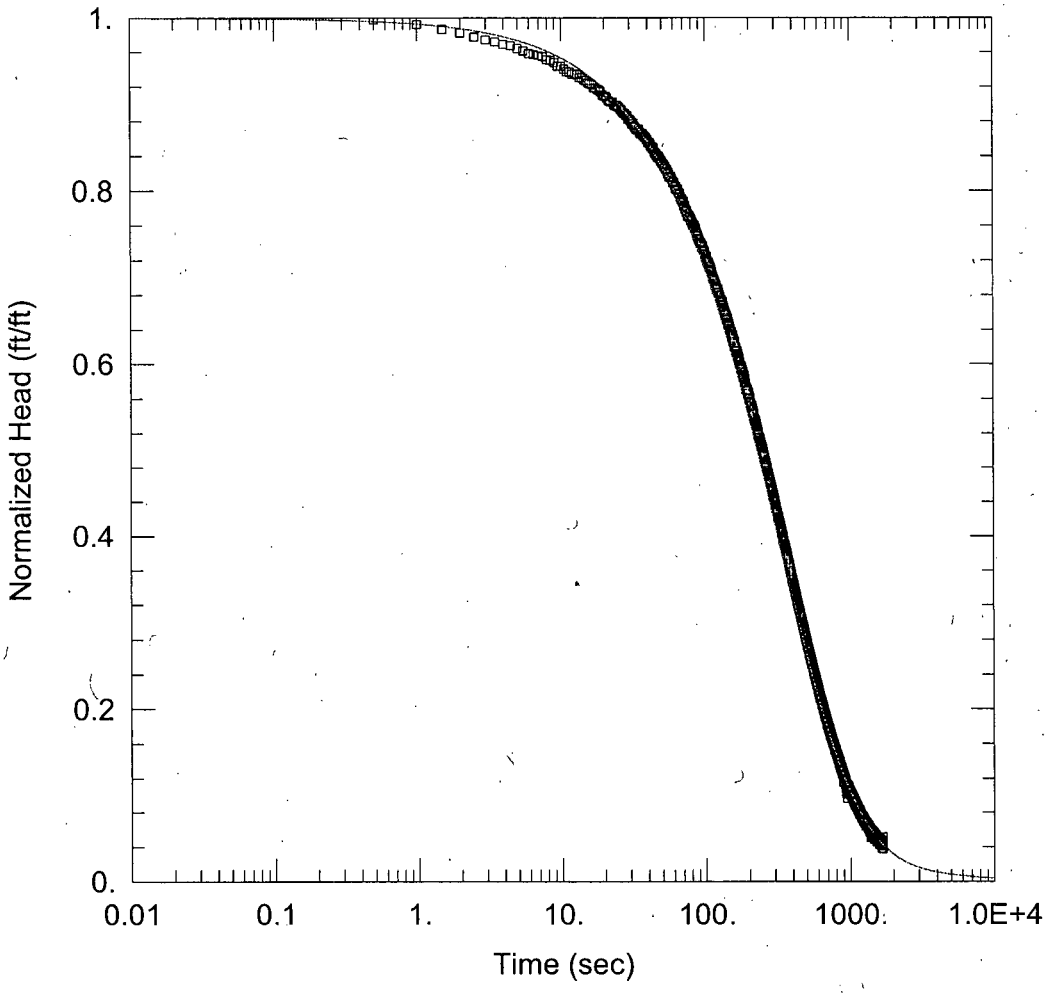
WELL DATA (JPG-DU-03O)

Initial Displacement: 1.928 ft
Total Well Penetration Depth: 22.7 ft
Casing Radius: 0.083 ft
Static Water Column Height: 22.7 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 2.082 gal/day/ft^2
Kz/Kr = 1.
Ss = 1.0E-6 ft^{-1}



JPG-DU-03O TEST2RH

Data Set: H:\Jobs\JPG\Slug Testing\Data\03O\JPG-DU-03O Analysis\JPG-DU-03O Test2rh.aqt
Date: 06/09/09 Time: 16:16:41

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

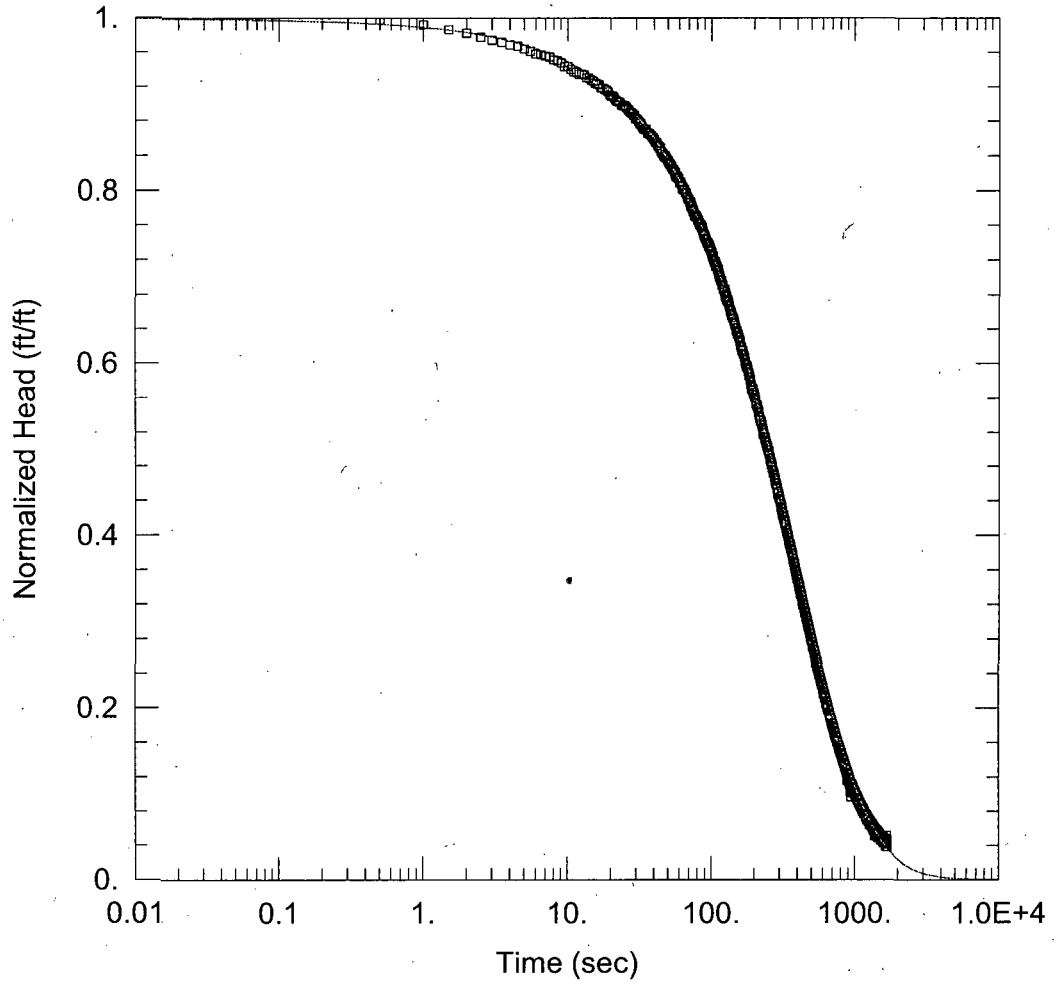
WELL DATA (JPG-DU-03O)

Initial Displacement: 2.086 ft
Total Well Penetration Depth: 22.74 ft
Casing Radius: 0.083 ft
Static Water Column Height: 22.74 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

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

T = 32.48 gal/day/ft
S = 1.0E-5



JPG-DU-03O TEST2RH

Data Set: H:\Jobs\JPG\Slug Testing\Data\03O\JPG-DU-03O Analysis\JPG-DU-03O Test2rh.aqt
Date: 06/09/09 Time: 16:18:52

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 35. ft

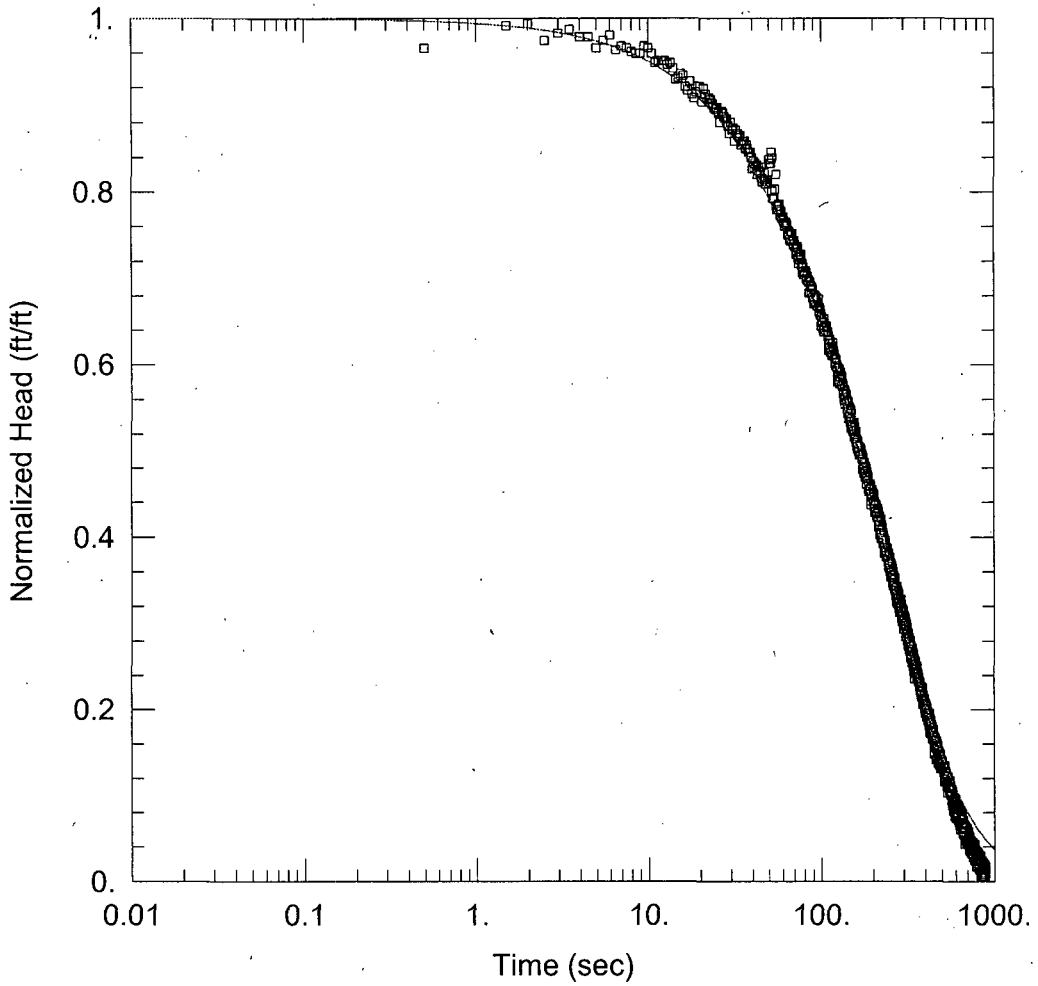
WELL DATA (JPG-DU-03O)

Initial Displacement: 2.086 ft
Total Well Penetration Depth: 22.74 ft
Casing Radius: 0.083 ft
Static Water Column Height: 22.74 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 1.54 gal/day/ft^2
Kz/Kr = 1.
Ss = 2.065E-5 ft^{-1}



JPG-DU-03O TEST3FH

Data Set: H:\Jobs\JPG\Slug Testing\Data\03O\JPG-DU-03O Analysis\JPG-DU-03O Test3fh.aqt
Date: 06/09/09 Time: 16:22:09

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

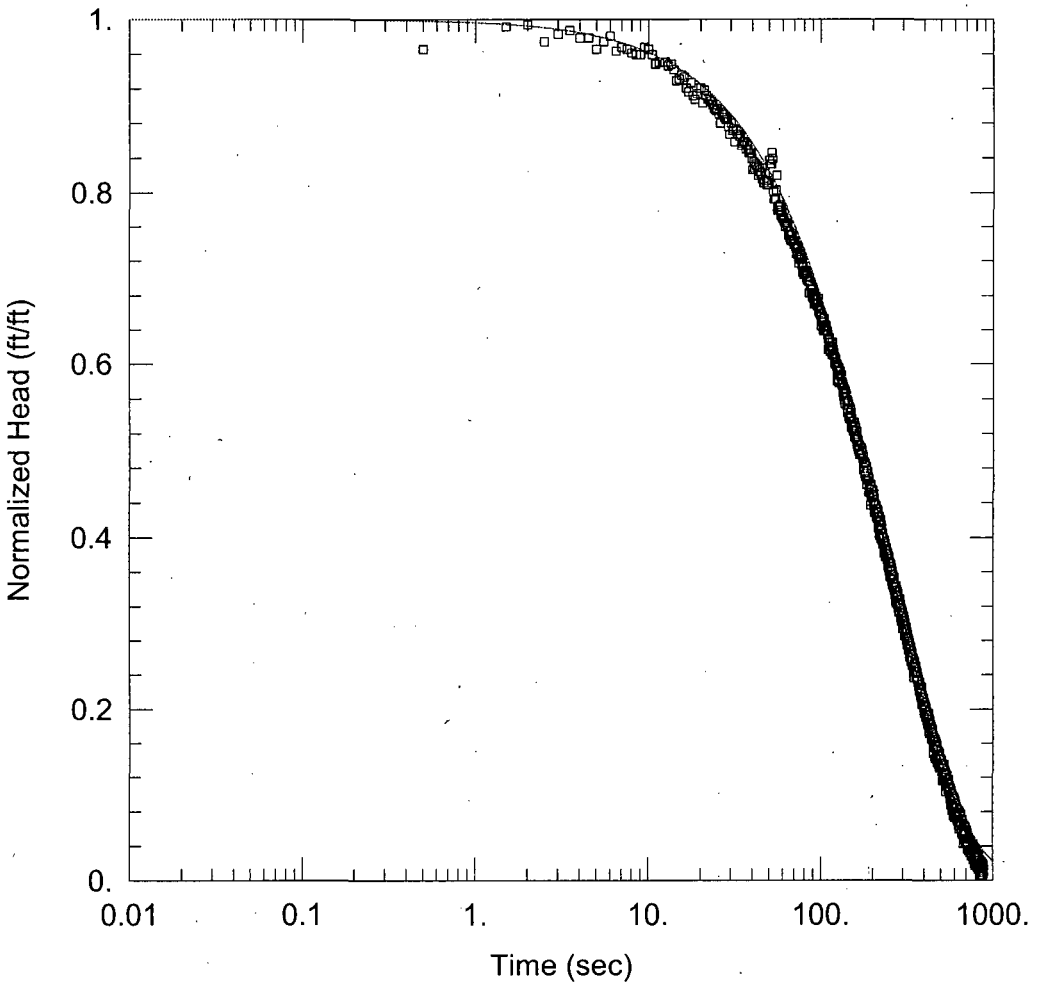
WELL DATA (JPG-DU-03O)

Initial Displacement: 0.467 ft
Total Well Penetration Depth: 22.72 ft
Casing Radius: 0.083 ft
Static Water Column Height: 22.72 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

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

T = 92.64 gal/day/ft
S = 1.0E-9



JPG-DU-03O TEST3FH

Data Set: H:\Jobs\JPG\Slug Testing\Data\03O\JPG-DU-03O Analysis\JPG-DU-03O Test3fh.aqt
Date: 06/09/09 Time: 16:27:39

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 35. ft

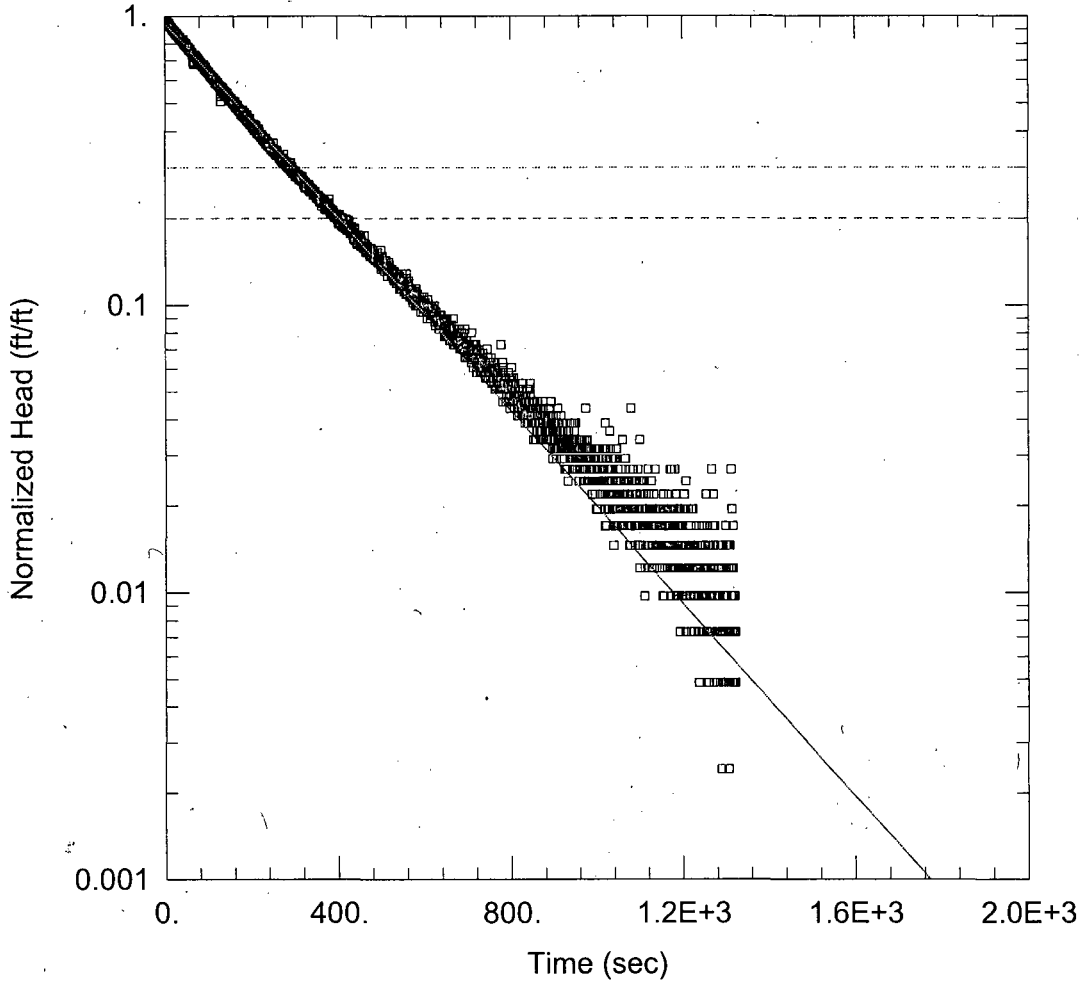
WELL DATA (JPG-DU-03O)

Initial Displacement: 0.467 ft
Total Well Penetration Depth: 22.72 ft
Casing Radius: 0.083 ft
Static Water Column Height: 22.72 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 2.647 gal/day/ft^2
Kz/Kr = 1.
Ss = 2.857E-11 ft^{-1}



JPG-DU-03O TEST3RH

Data Set: H:\Jobs\JPG\Slug Testing\Data\03O\JPG-DU-03O Analysis\JPG-DU-03O Test3rh.aqt
Date: 08/13/09 Time: 15:31:46

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

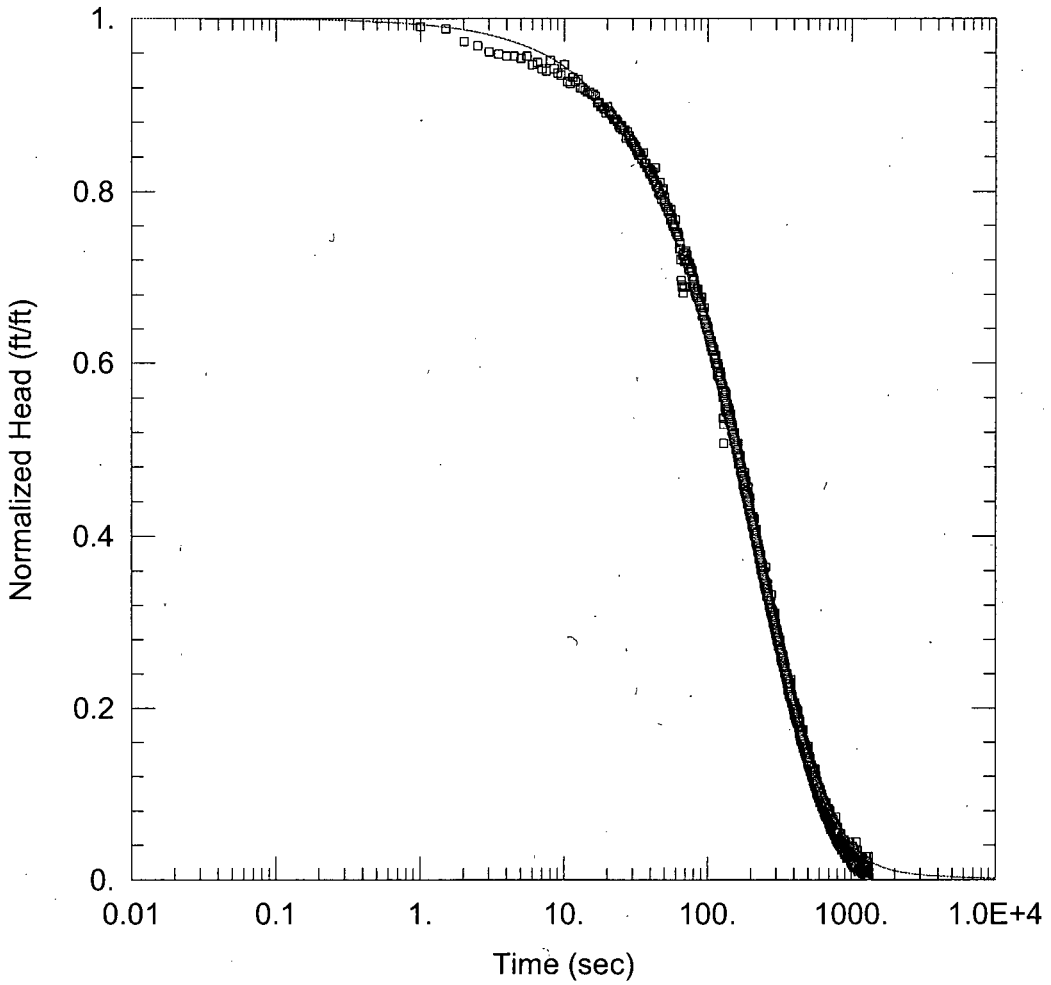
Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-03O)

Initial Displacement: 0.412 ft
Total Well Penetration Depth: 22.71 ft
Casing Radius: 0.083 ft
Static Water Column Height: 22.71 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.209 gal/day/ft^2
y0 = 0.3904 ft



JPG-DU-03O TEST3RH

Data Set: H:\Jobs\JPG\Slug Testing\Data\03O\JPG-DU-03O Analysis\JPG-DU-03O Test3rh.aqt
Date: 06/09/09 Time: 16:38:27

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

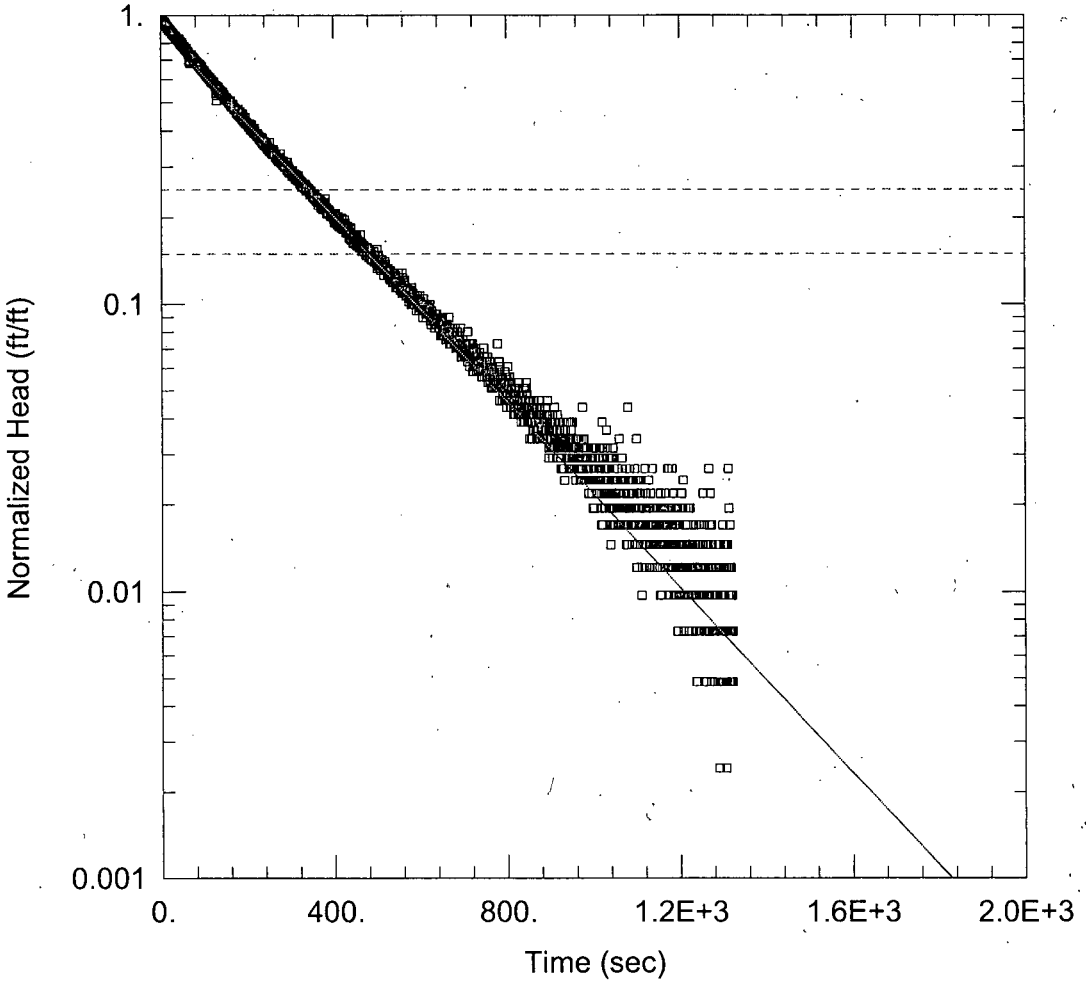
WELL DATA (JPG-DU-03O)

Initial Displacement: 0.412 ft
Total Well Penetration Depth: 22.71 ft
Casing Radius: 0.083 ft
Static Water Column Height: 22.71 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

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

T = 72.71 gal/day/ft
S = 1.0E-7



JPG-DU-03O TEST3RH

Data Set: H:\Jobs\JPG\Slug Testing\Data\03O\JPG-DU-03O Analysis\JPG-DU-03O Test3rh.aqt
Date: 08/13/09 Time: 15:34:07

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

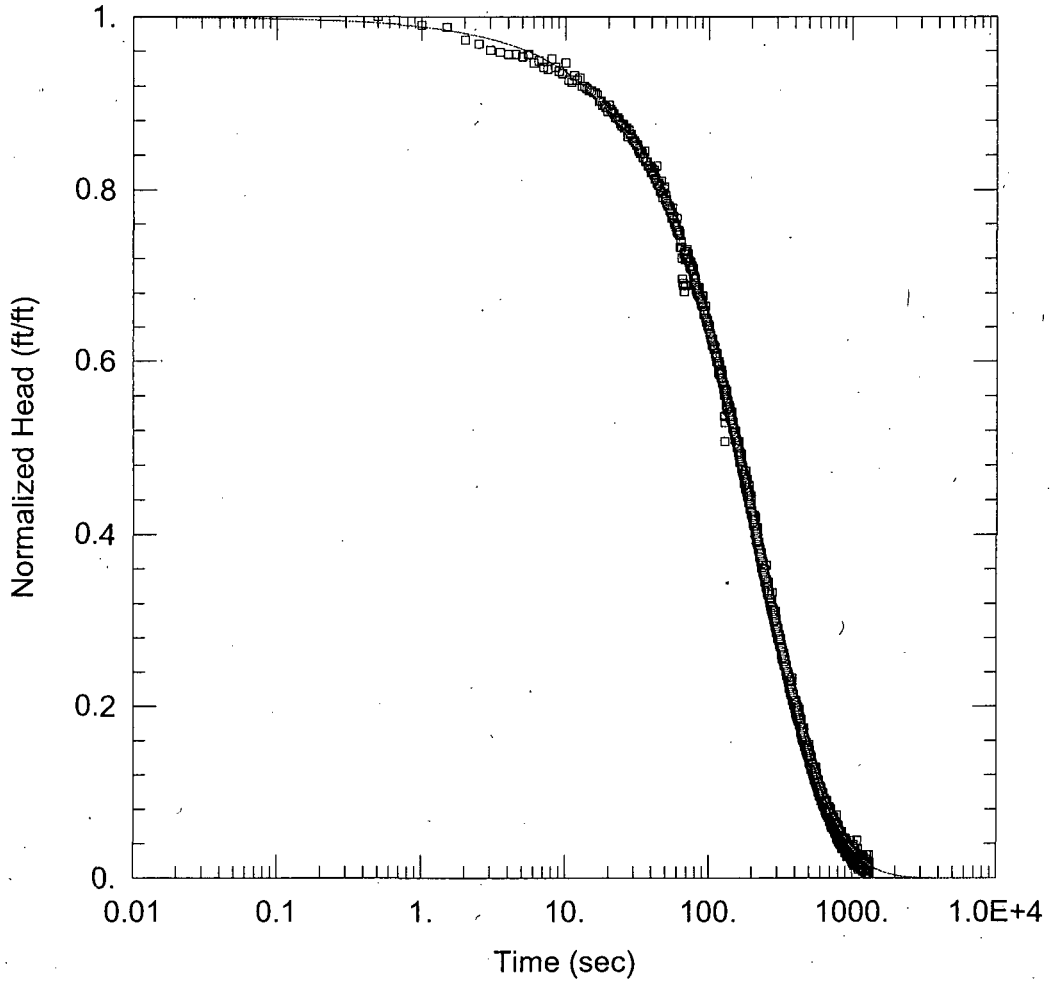
Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-03O)

Initial Displacement: 0.412 ft
Total Well Penetration Depth: 22.71 ft
Casing Radius: 0.083 ft
Static Water Column Height: 22.71 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 2.816 gal/day/ft^2
y0 = 0.368 ft



JPG-DU-03O TEST3RH

Data Set: H:\Jobs\JPG\Slug Testing\Data\03O\JPG-DU-03O Analysis\JPG-DU-03O Test3rh.aqt
Date: 06/09/09 Time: 16:40:06

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 35. ft

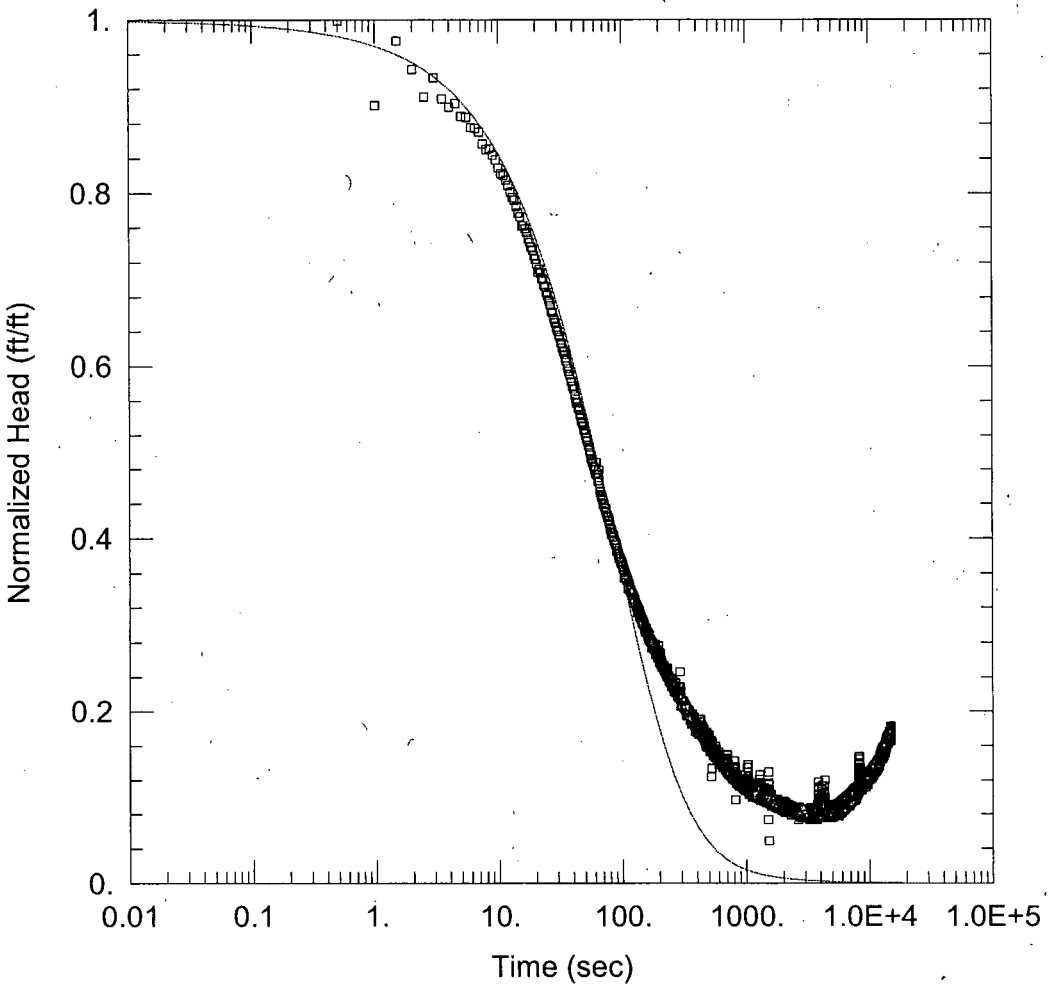
WELL DATA (JPG-DU-03O)

Initial Displacement: 0.412 ft
Total Well Penetration Depth: 22.71 ft
Casing Radius: 0.083 ft
Static Water Column Height: 22.71 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 2.572 gal/day/ft^2
Kz/Kr = 1.
Ss = 1.0E-5 ft^{-1}



JPG-DU-040 TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-04O\JPG-DU-040 Test1fh KGS.aqt
Date: 07/26/10 Time: 15:13:36

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 39. ft

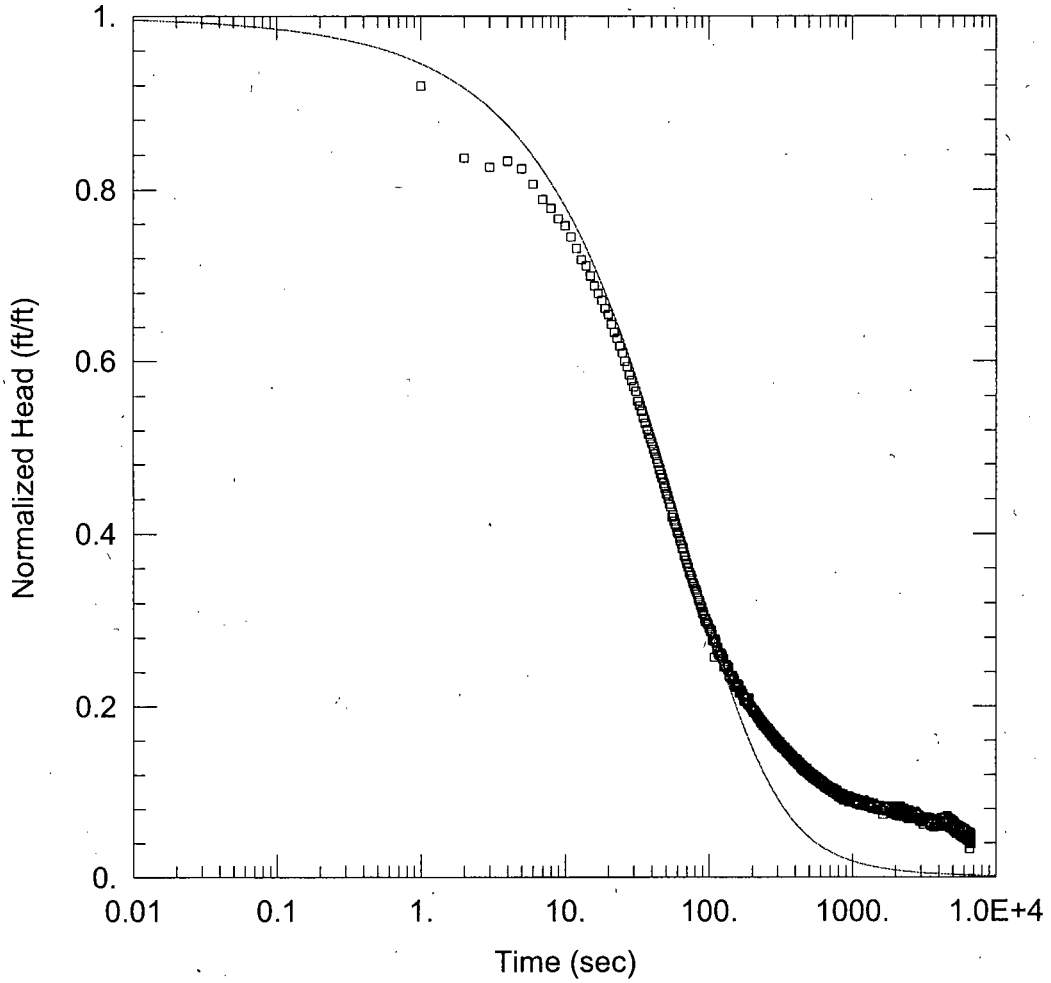
WELL DATA (JPG-DU-04O)

Initial Displacement: 0.942 ft
Total Well Penetration Depth: 41.17 ft
Casing Radius: 0.083 ft
Static Water Column Height: 39.17 ft
Screen Length: 22. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 4.162 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.0001679 ft^{-1}



JPG-DU-040 TEST1RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-04O\JPG-DU-040 Test1rh KGS.aqt
Date: 07/26/10 Time: 15:14:21

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 39. ft

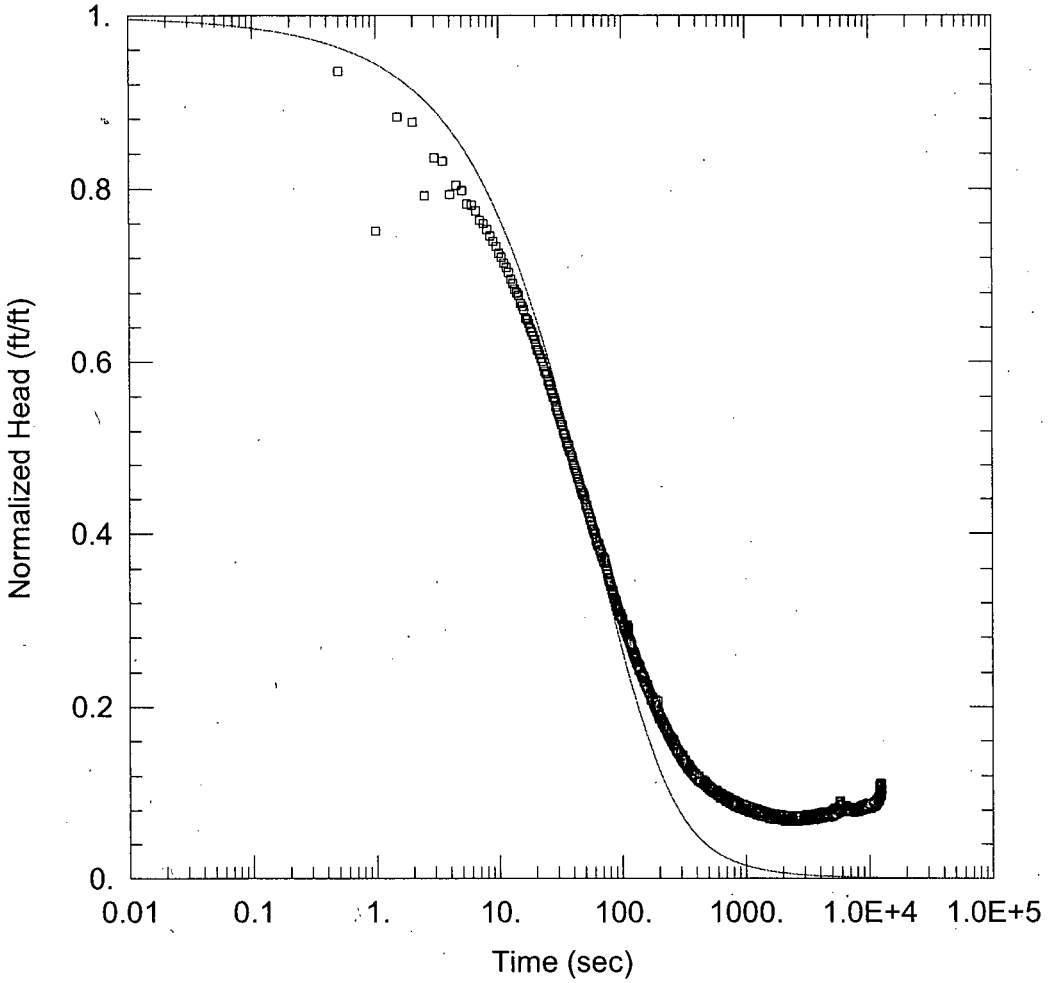
WELL DATA (JPG-DU-04O)

Initial Displacement: 1.132 ft
Total Well Penetration Depth: 41.41 ft
Casing Radius: 0.083 ft
Static Water Column Height: 39.41 ft
Screen Length: 22. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 3.727 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.001271 ft^{-1}



JPG-DU-040 TEST2FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-04O\JPG-DU-040 Test2fh KGS.aqt
Date: 07/26/10 Time: 15:15:20

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 39. ft

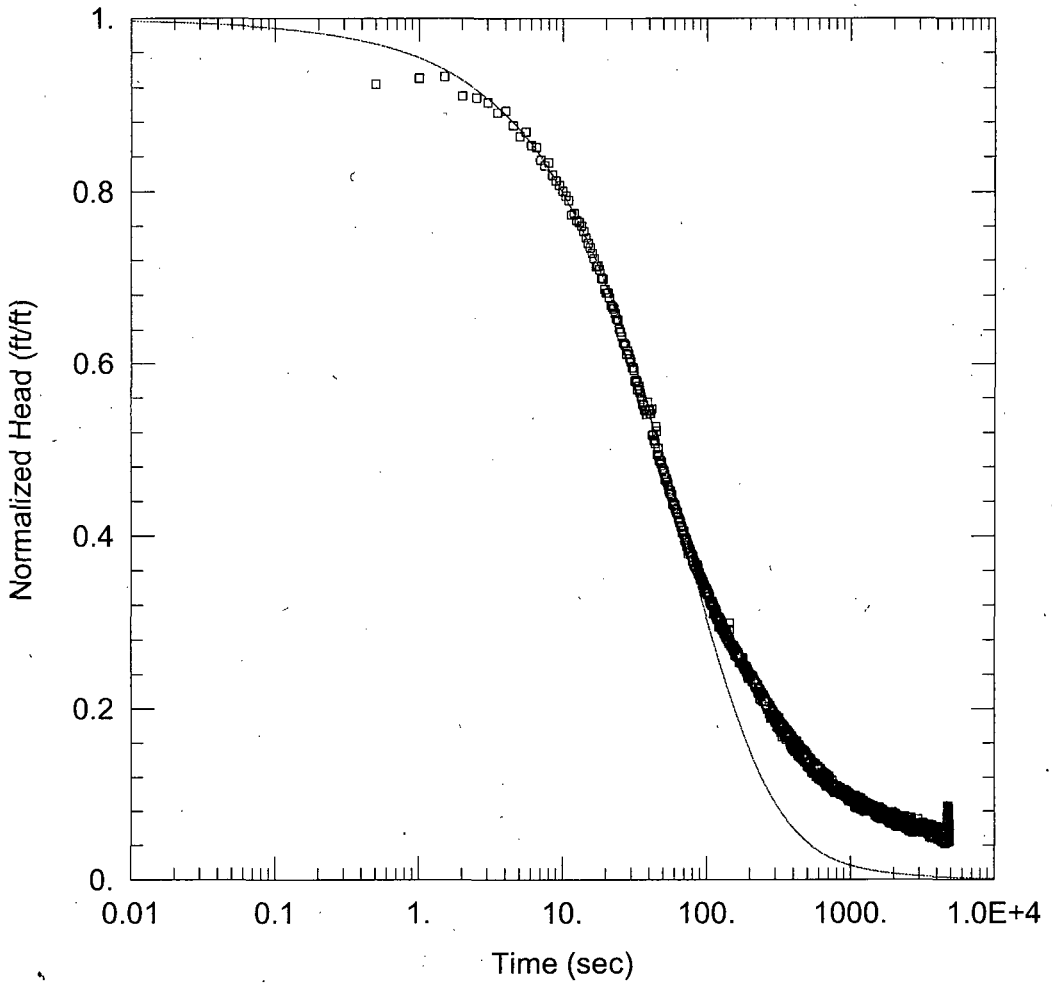
WELL DATA (JPG-DU-04O)

Initial Displacement: 2.028 ft
Total Well Penetration Depth: 41.34 ft
Casing Radius: 0.083 ft
Static Water Column Height: 39.34 ft
Screen Length: 22. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 4.462 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.001 ft^{-1}



JPG-DU-040 TEST4FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-04O\JPG-DU-040 Test4fh KGS.aqt
Date: 07/26/10 Time: 15:16:44

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 39. ft

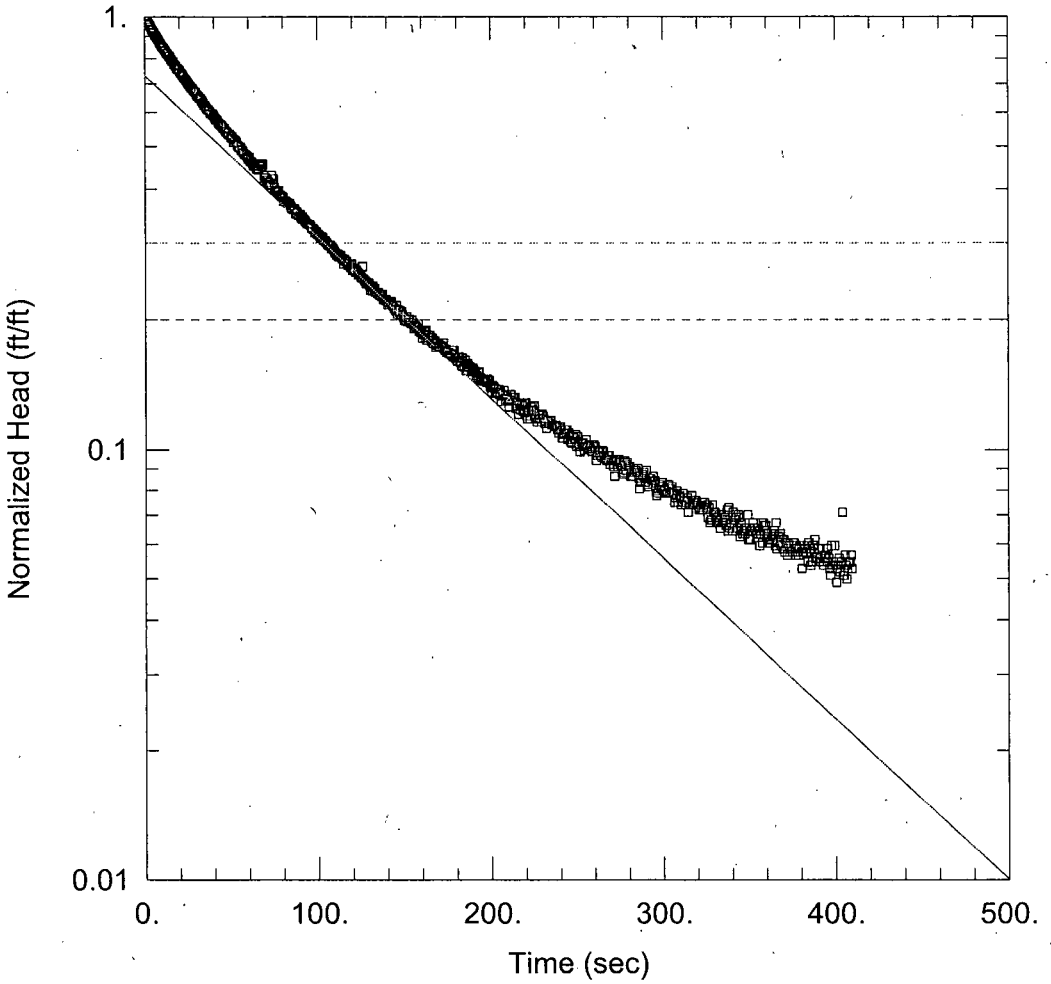
WELL DATA (JPG-DU-04O)

Initial Displacement: 0.939 ft
Total Well Penetration Depth: 41.47 ft
Casing Radius: 0.083 ft
Static Water Column Height: 39.47 ft
Screen Length: 22. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 4.15 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.0006607 ft^{-1}



JPG-DU-060 TEST1FH

Data Set: H:\Jobs\JPG\Slug Testing\Data\06O\JPG-DU-06O Analysis\JPG-DU-060 Test1fh.aqt
Date: 07/17/09 Time: 11:44:44

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

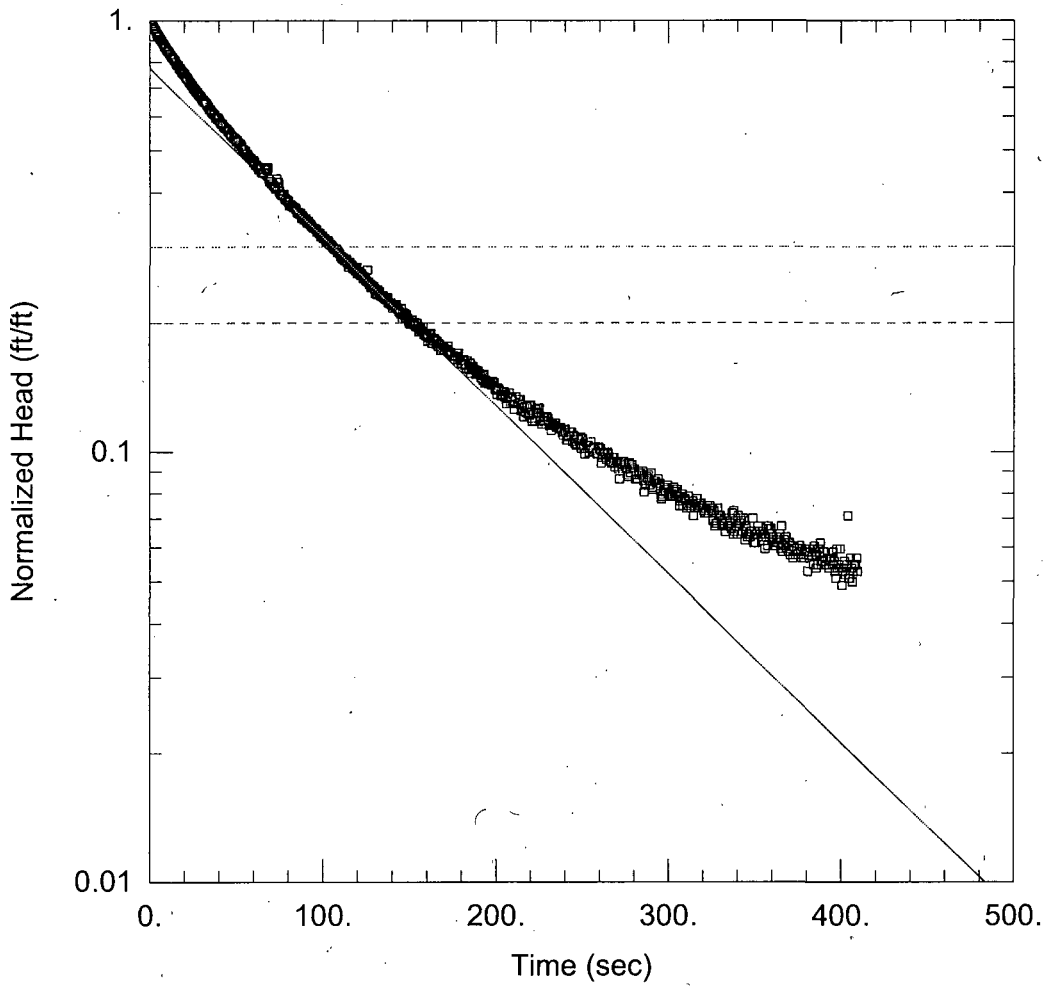
Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06O)

Initial Displacement: 1.042 ft
Total Well Penetration Depth: 18.75 ft
Casing Radius: 0.083 ft
Static Water Column Height: 18.75 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 4.76 gal/day/ft^2
y0 = 0.7604 ft



JPG-DU-060 TEST1FH

Data Set: H:\...\JPG-DU-060 Test1fh_Calc Effective Radius.aqt
Date: 07/17/09 Time: 11:46:59

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

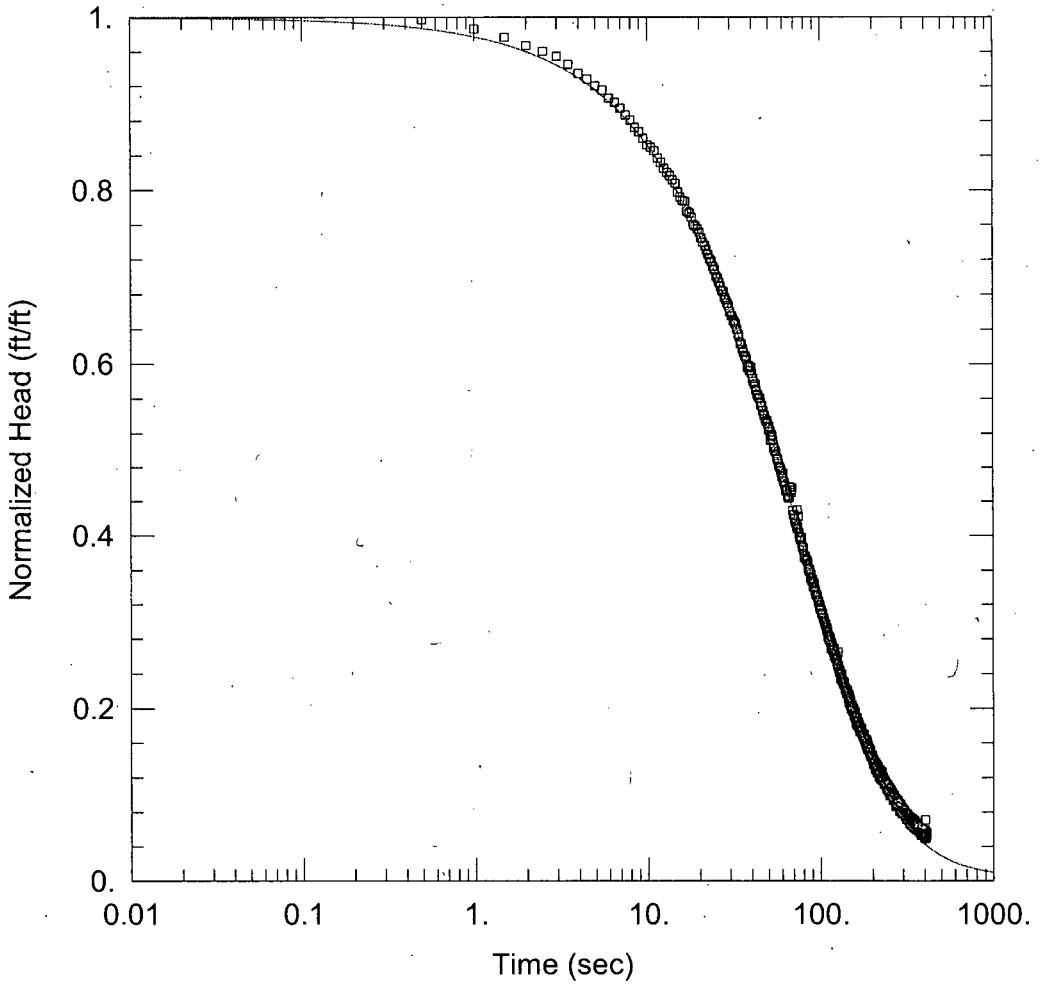
Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06O)

Initial Displacement: 1.042 ft
Total Well Penetration Depth: 18.75 ft
Casing Radius: 0.09 ft
Static Water Column Height: 18.75 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 5.881 gal/day/ft^2
y0 = 0.8093 ft



JPG-DU-060 TEST1FH

Data Set: H:\...\JPG-DU-060 Test1fh_Calc Effective Radius.aqt
Date: 07/17/09 Time: 11:52:52

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 1.

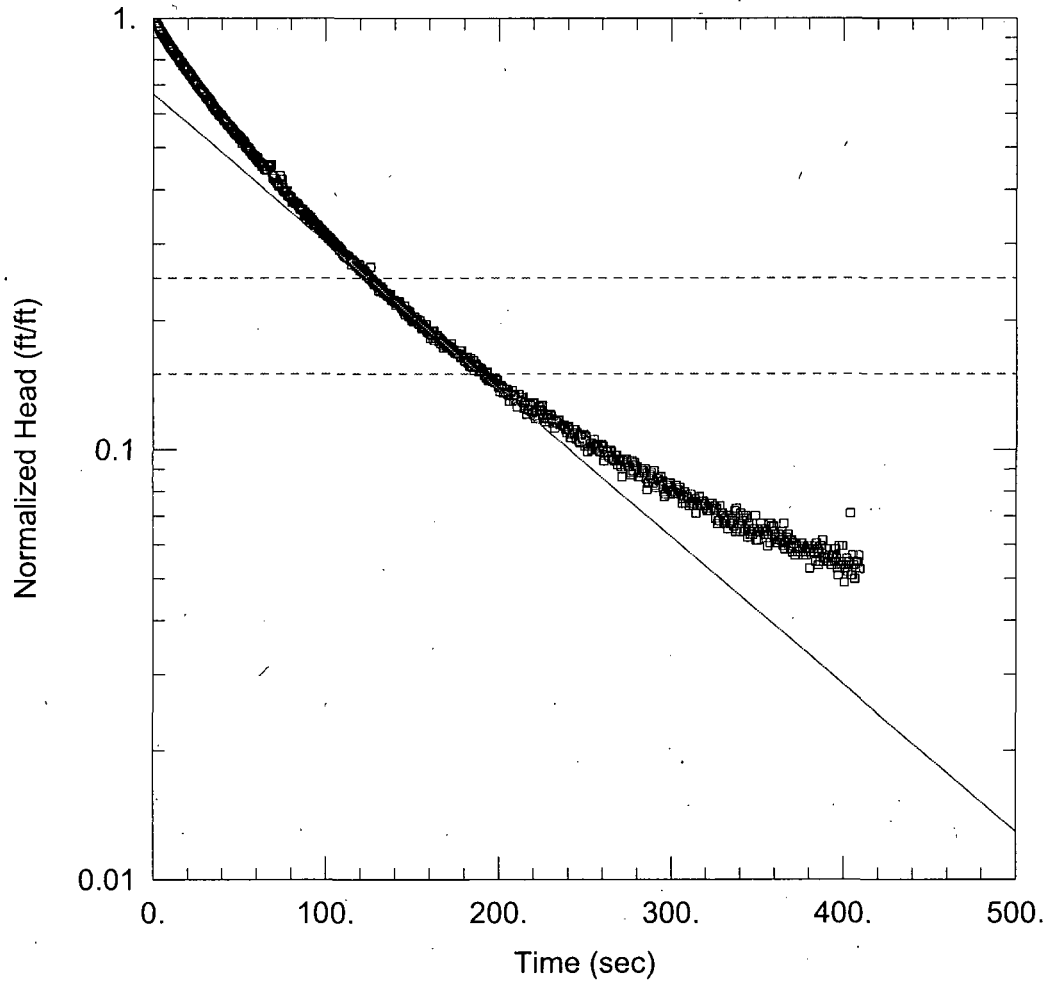
WELL DATA (JPG-DU-06O)

Initial Displacement: 1.042 ft
Total Well Penetration Depth: 18.75 ft
Casing Radius: 0.09 ft
Static Water Column Height: 18.75 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

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

T = 161.4 gal/day/ft
S = 1.0E-5



JPG-DU-060 TEST1FH

Data Set: H:\...\JPG-DU-060 Test1fh_Calc Effective Radius.aqt
Date: 07/17/09 Time: 11:48:14

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

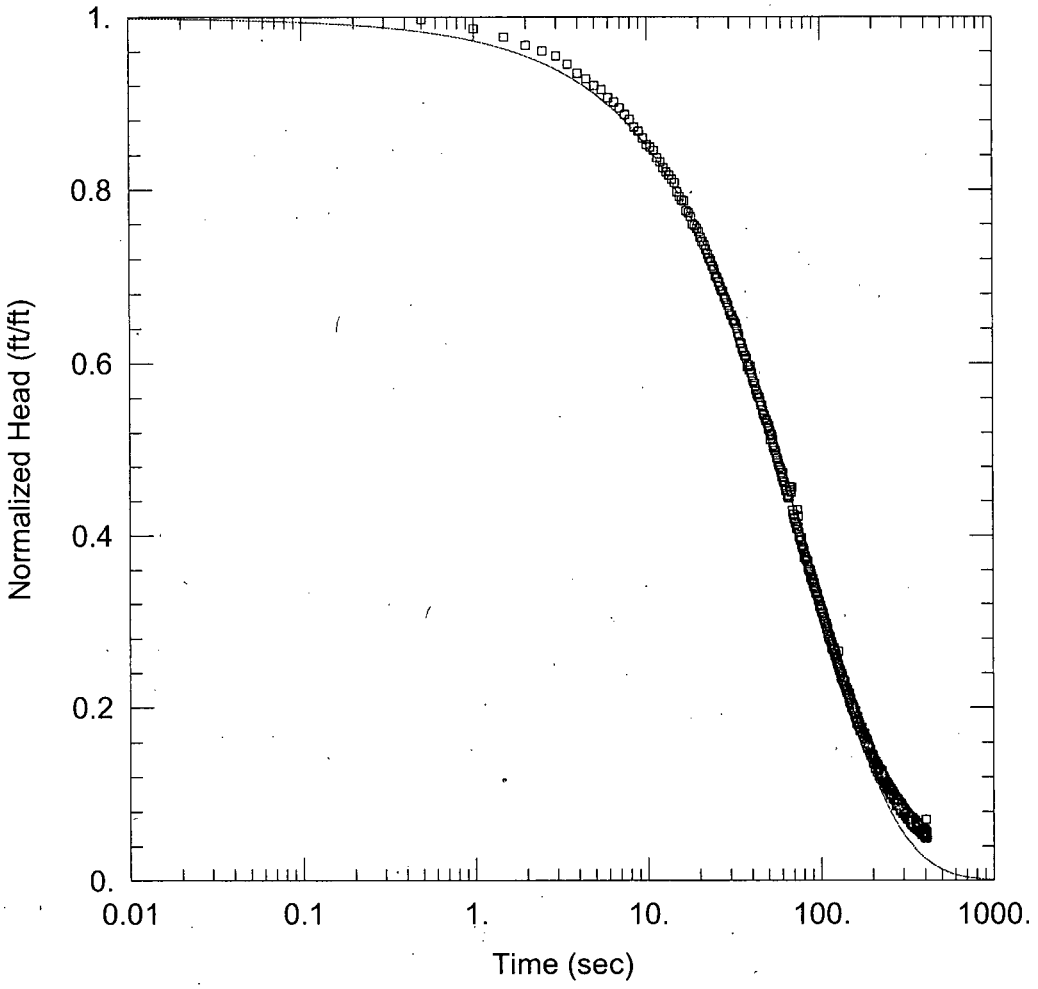
Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06O)

Initial Displacement: 1.042 ft
Total Well Penetration Depth: 18.75 ft
Casing Radius: 0.09 ft
Static Water Column Height: 18.75 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 7.024 gal/day/ft^2
y0 = 0.6947 ft



JPG-DU-060 TEST1FH

Data Set: H:\...\JPG-DU-060 Test1fh_Calc Effective Radius.aqt
Date: 07/17/09 Time: 11:50:19

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 30. ft

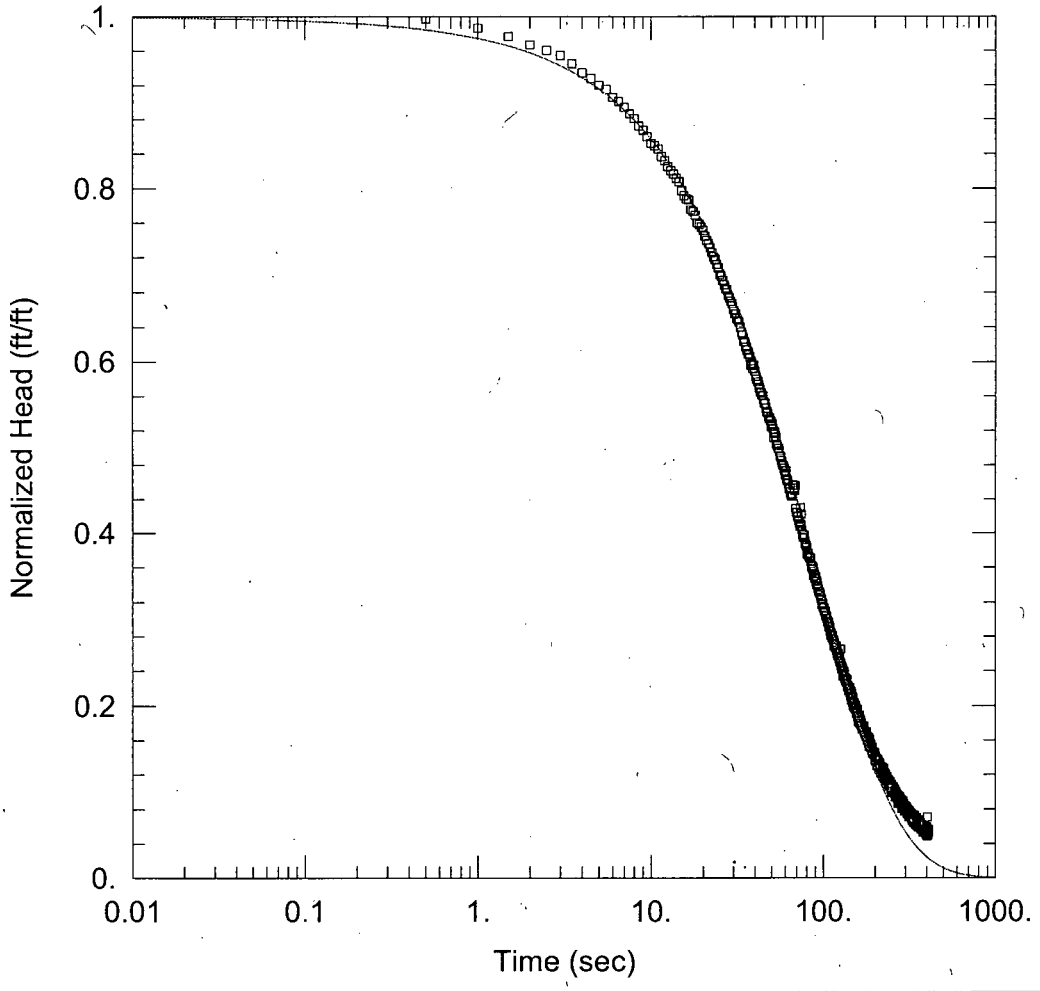
WELL DATA (JPG-DU-06O)

Initial Displacement: 1.042 ft
Total Well Penetration Depth: 18.75 ft
Casing Radius: 0.09 ft
Static Water Column Height: 18.75 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 8.391 gal/day/ft^2
Kz/Kr = 1.
Ss = 1.862E-5 ft^{-1}



JPG-DU-060 TEST1FH

Data Set: H:\...\JPG-DU-060 Test1fh_Calc Effective Radius.aqt
Date: 07/17/09 Time: 11:51:11

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 30. ft

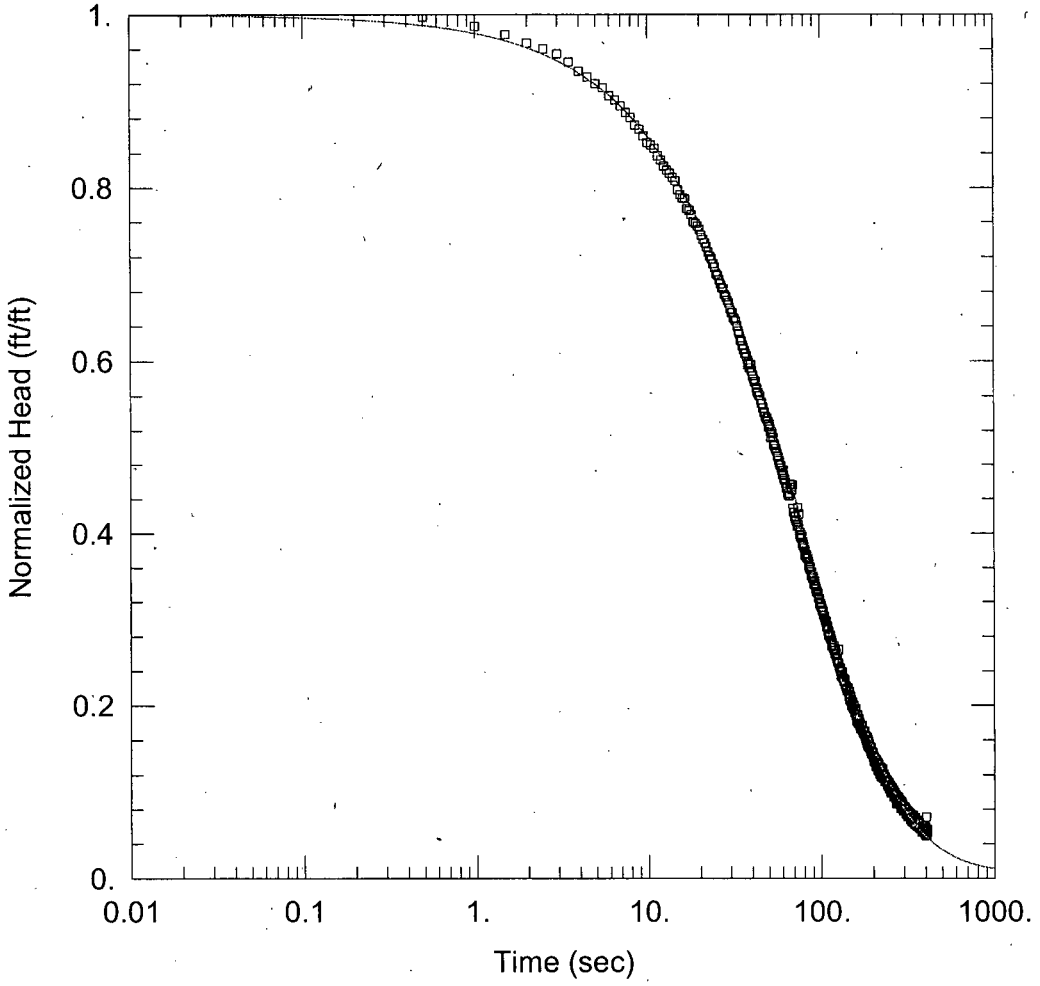
WELL DATA (JPG-DU-06O)

Initial Displacement: 1.042 ft
Total Well Penetration Depth: 18.75 ft
Casing Radius: 0.09 ft
Static Water Column Height: 18.75 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 8.391 gal/day/ft^2
Kz/Kr = 1.
Ss = 1.365E-5 ft^{-1}



JPG-DU-060 TEST1FH

Data Set: H:\...\JPG-DU-060 Test1fh_cooper et al.aqt
Date: 07/17/09 Time: 11:40:39

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 30. ft Anisotropy Ratio (Kz/Kr): 1.

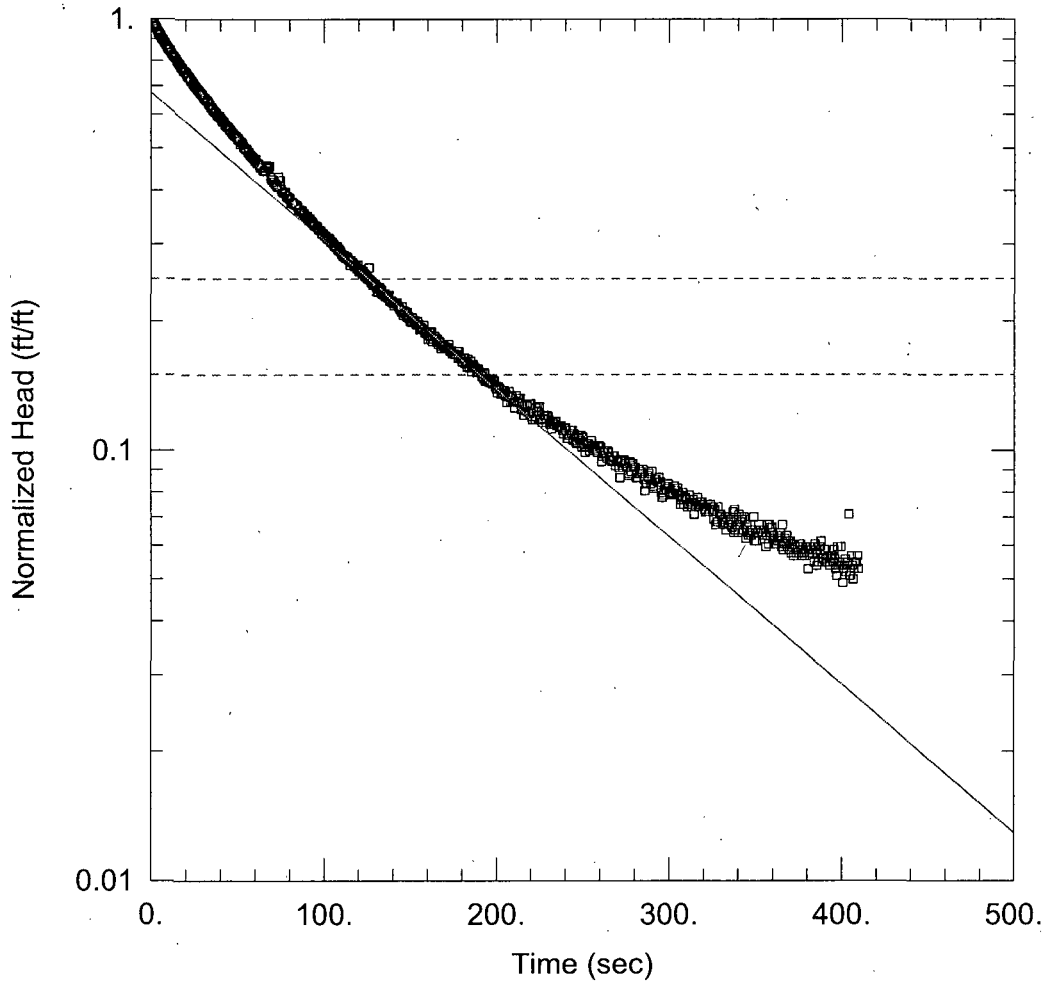
WELL DATA (JPG-DU-06O)

Initial Displacement: 1.042 ft Static Water Column Height: 18.75 ft
Total Well Penetration Depth: 18.75 ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.333 ft

SOLUTION

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

T = 126.5 gal/day/ft S = 1.0E-5



JPG-DU-060 TEST1FH

Data Set: H:\Jobs\JPG\Slug Testing\Data\06O\JPG-DU-06O Analysis\JPG-DU-060 Test1fh.aqt
Date: 07/17/09 Time: 11:42:51

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

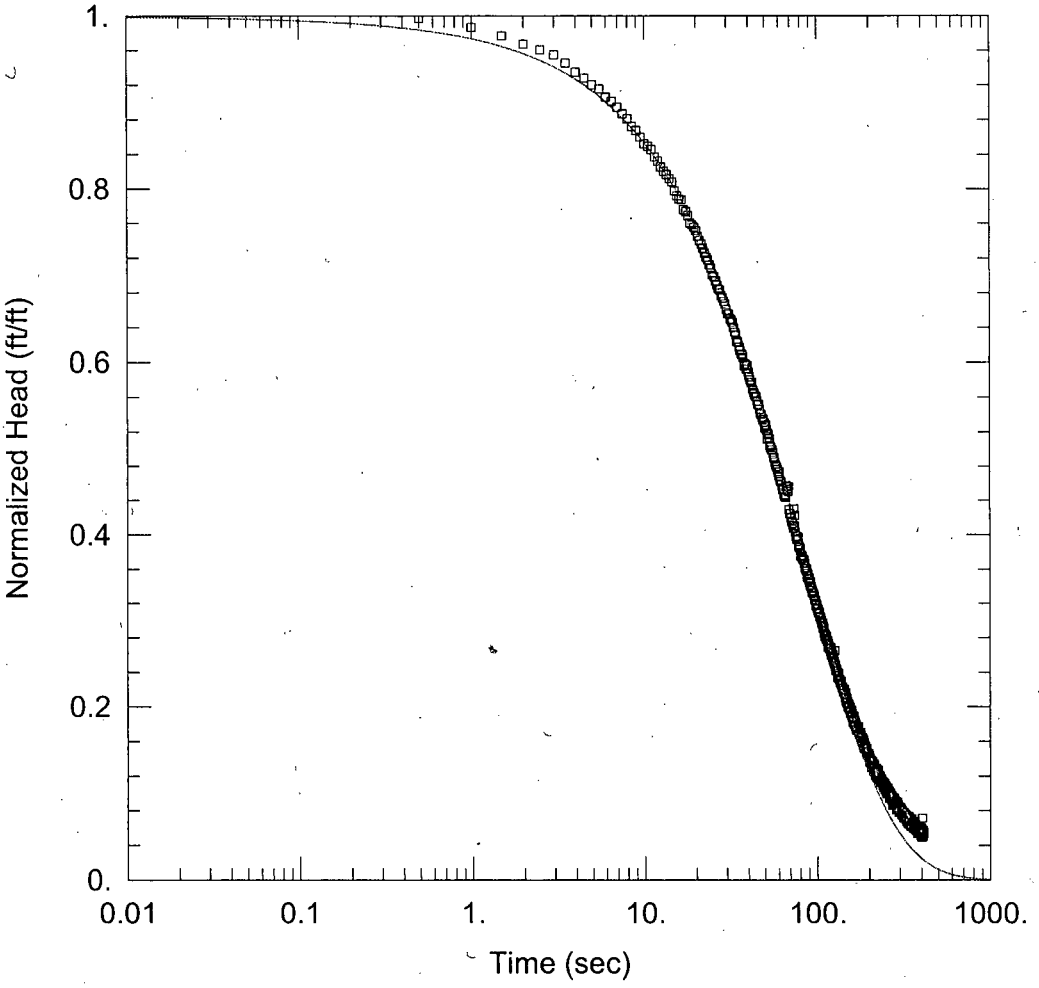
Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06O)

Initial Displacement: 1.042 ft
Total Well Penetration Depth: 18.75 ft
Casing Radius: 0.083 ft
Static Water Column Height: 18.75 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 5.993 gal/day/ft^2
y0 = 0.704 ft



JPG-DU-060 TEST1FH

Data Set: H:\...\JPG-DU-060 Test1fh_cooper et al.aqt
Date: 07/17/09 Time: 11:34:41

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 30. ft

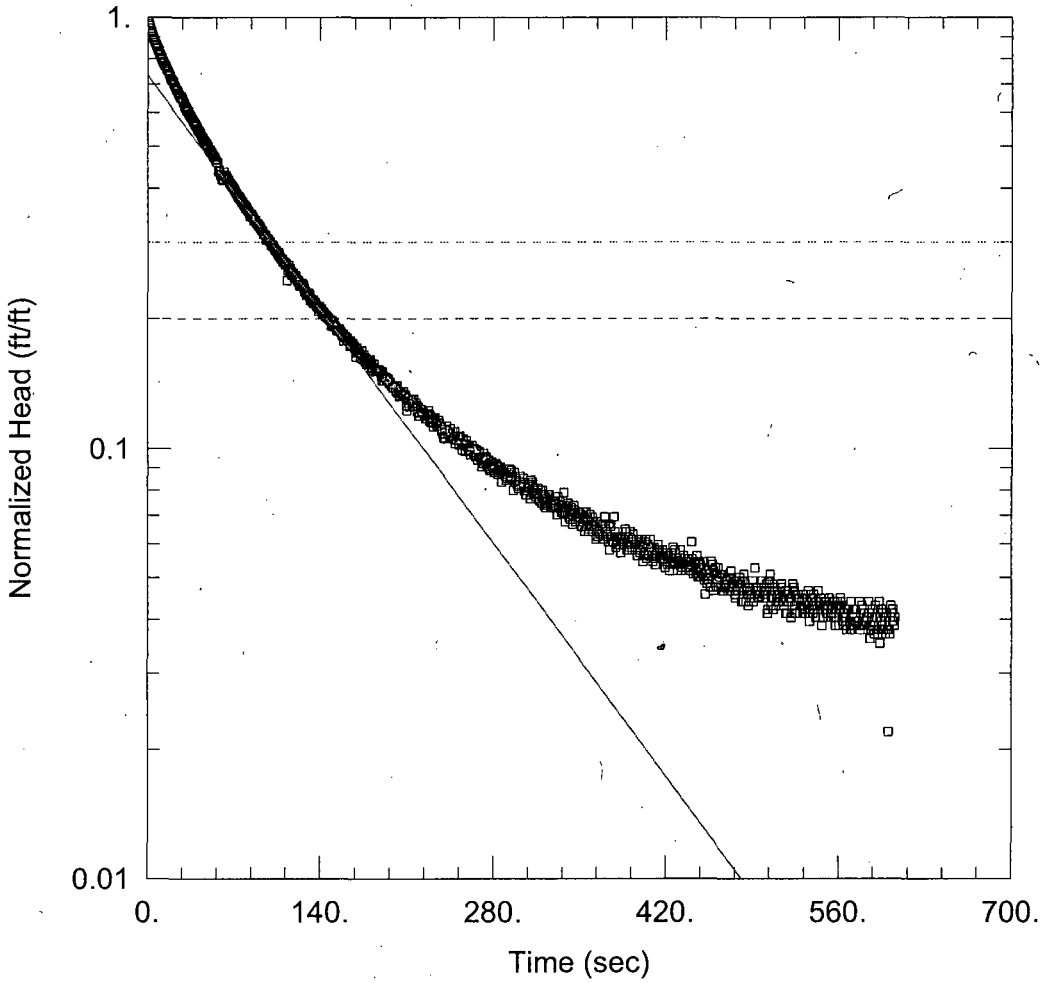
WELL DATA (JPG-DU-06O)

Initial Displacement: 1.042 ft
Total Well Penetration Depth: 18.75 ft
Casing Radius: 0.083 ft
Static Water Column Height: 18.75 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 7.188 gal/day/ft^2
Kz/Kr = 1.
Ss = 1.334E-5 ft^{-1}



JPG-DU-060 TEST1RH

Data Set: H:\Jobs\JPG\Slug Testing\Data\06O\JPG-DU-06O Analysis\JPG-DU-060 Test1rh.aqt
Date: 07/17/09 Time: 13:37:53

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

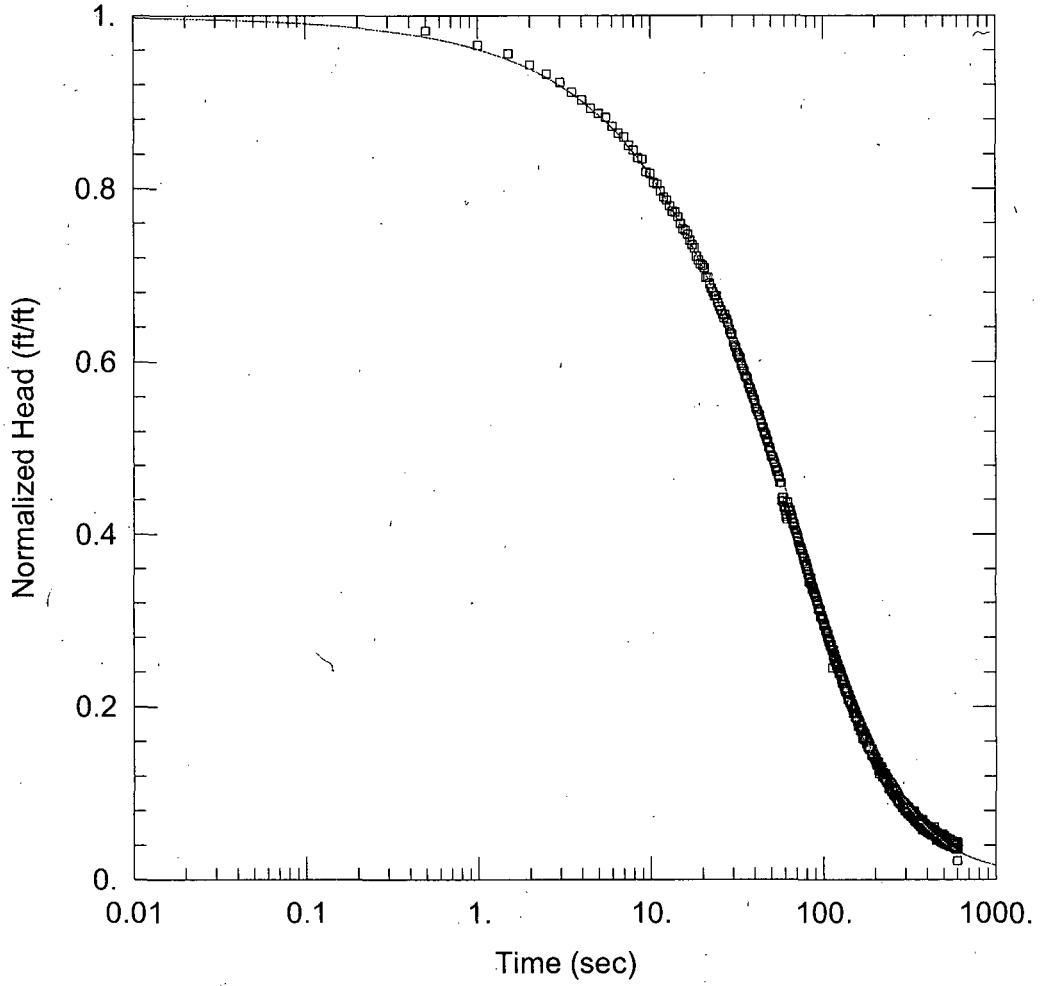
Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06O)

Initial Displacement: 1.139 ft
Total Well Penetration Depth: 18.79 ft
Casing Radius: 0.083 ft
Static Water Column Height: 18.79 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 4.953 gal/day/ft^2
y0 = 0.8337 ft



JPG-DU-060 TEST1RH

Data Set: H:\Jobs\JPG\Slug Testing\Data\06O\JPG-DU-06O Analysis\JPG-DU-060 Test1rh.aqt
Date: 07/17/09 Time: 11:58:24

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 1.

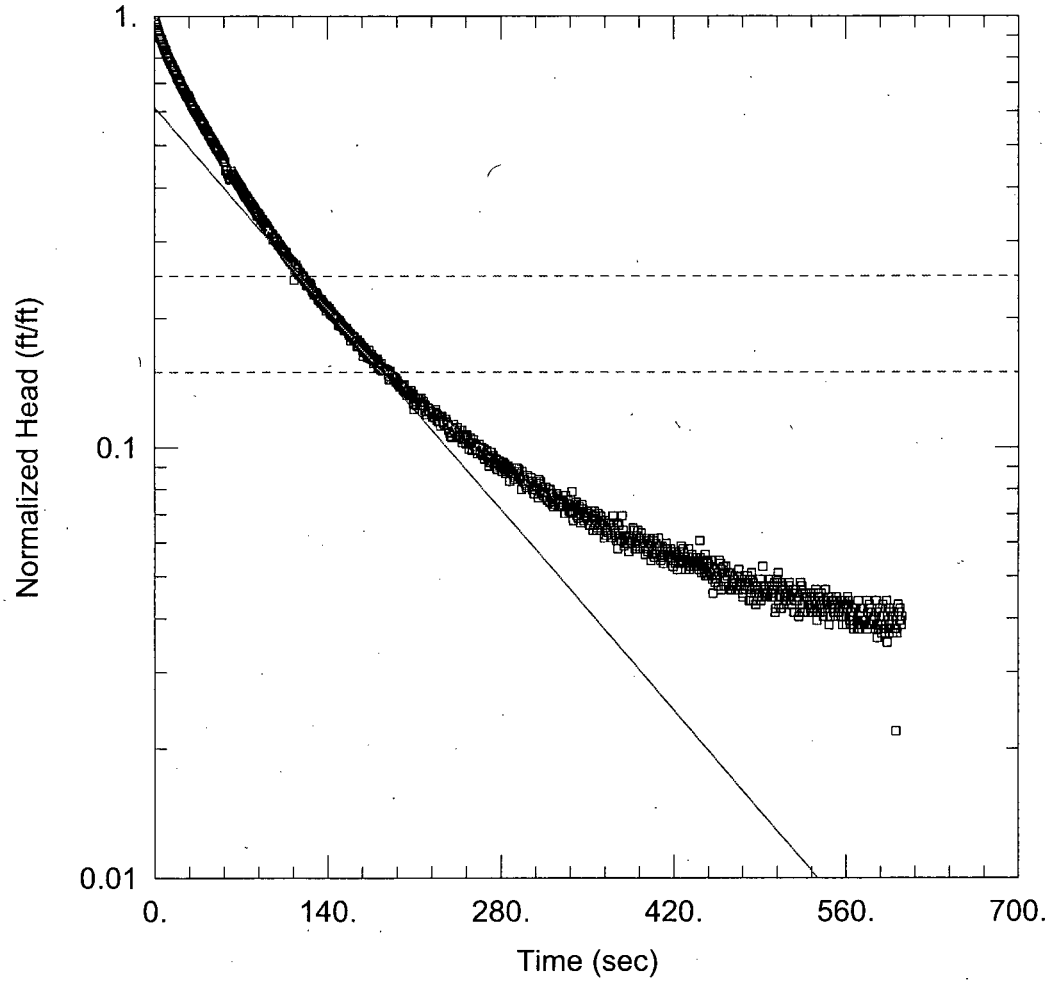
WELL DATA (JPG-DU-06O)

Initial Displacement: 1.139 ft
Total Well Penetration Depth: 18.79 ft
Casing Radius: 0.083 ft
Static Water Column Height: 18.79 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

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

T = 83.52 gal/day/ft
S = 0.0003936



JPG-DU-060 TEST1RH

Data Set: H:\Jobs\JPG\Slug Testing\Data\06O\JPG-DU-06O Analysis\JPG-DU-060 Test1rh.aqt
Date: 07/17/09 Time: 13:33:56

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

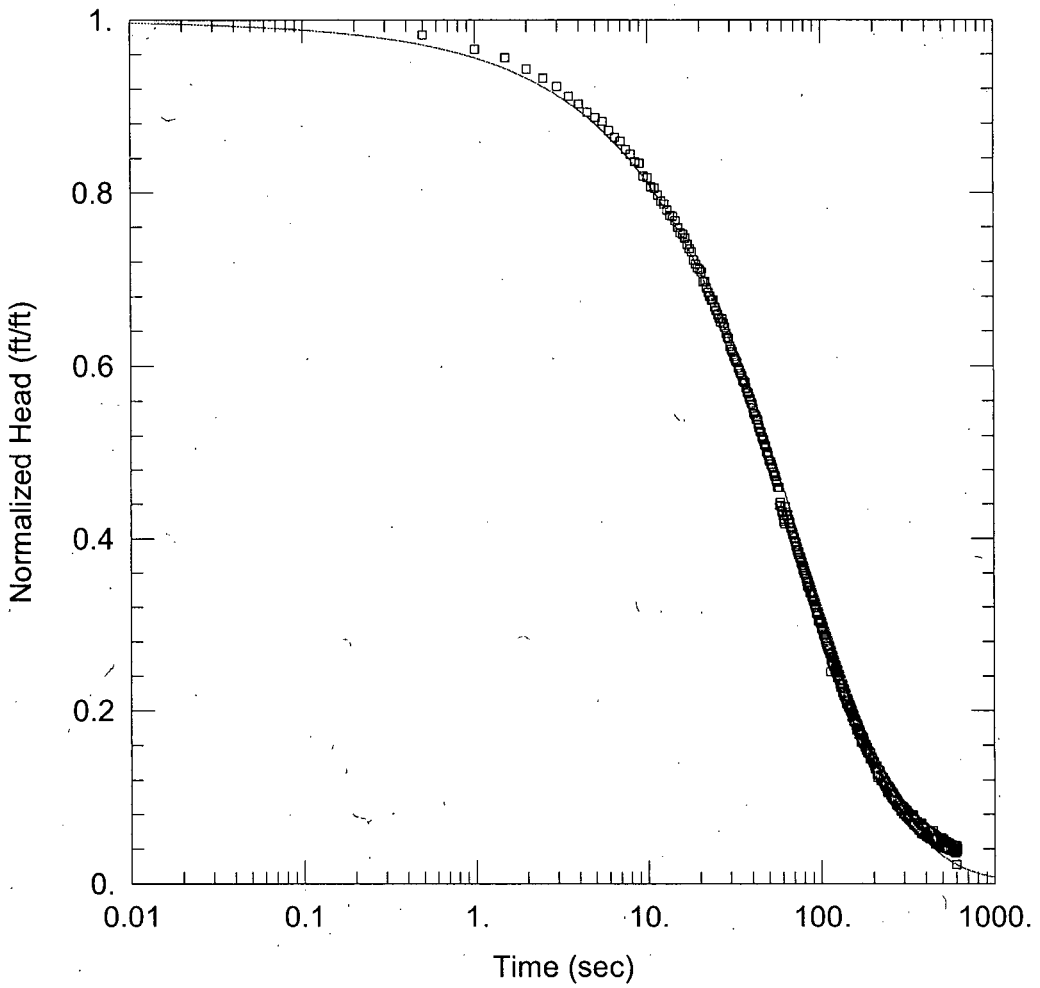
Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06O)

Initial Displacement: 1.139 ft
Total Well Penetration Depth: 18.79 ft
Casing Radius: 0.083 ft
Static Water Column Height: 18.79 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 5.806 gal/day/ft^2
y0 = 0.6983 ft



JPG-DU-060 TEST1RH

Data Set: H:\Jobs\JPG\Slug Testing\Data\06O\JPG-DU-06O Analysis\JPG-DU-060 Test1rh.aqt
Date: 07/17/09 Time: 13:32:06

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 30. ft

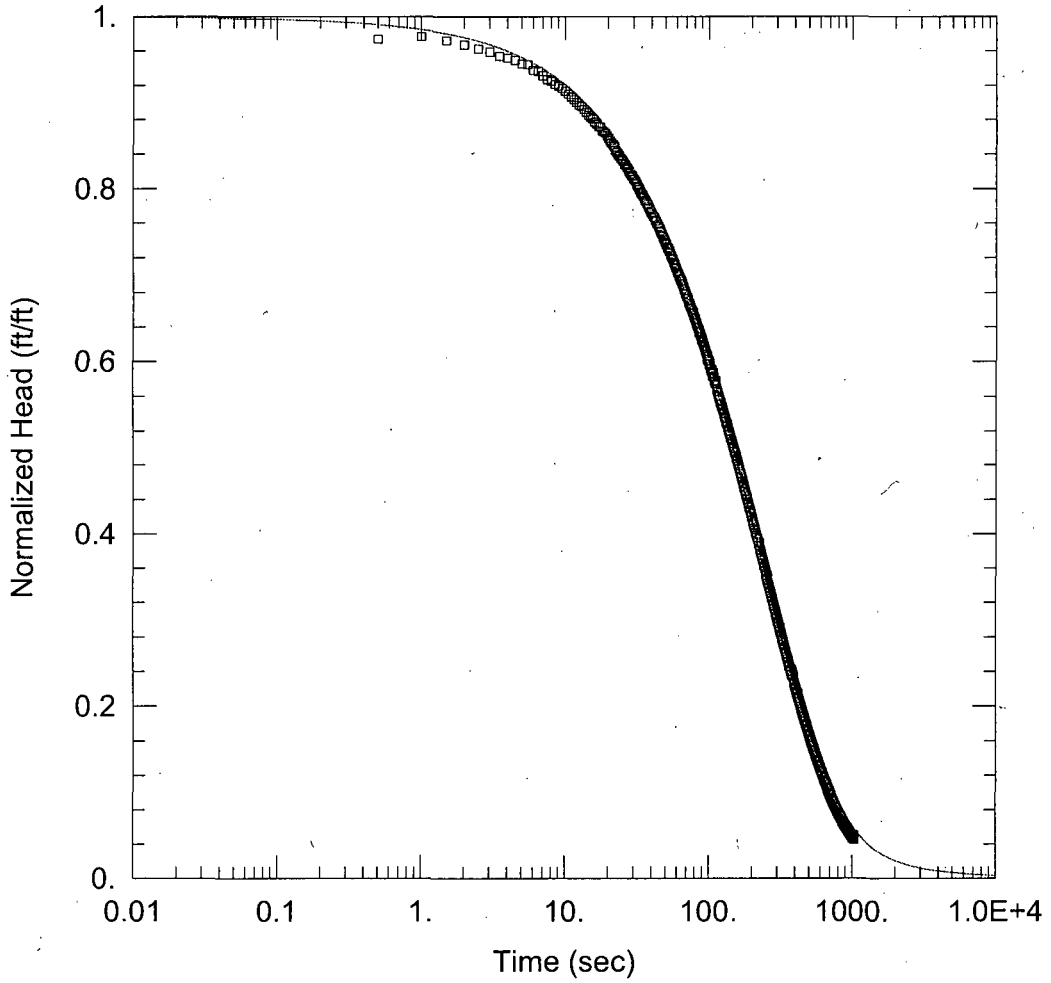
WELL DATA (JPG-DU-06O)

Initial Displacement: 1.139 ft
Total Well Penetration Depth: 18.79 ft
Casing Radius: 0.083 ft
Static Water Column Height: 18.79 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 5.927 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.0001 ft^{-1}



JPG-DU-060 TEST2FH

Data Set: H:\Jobs\JPG\Slug Testing\Data\06O\JPG-DU-06O Analysis\JPG-DU-060 Test2fh.aqt
Date: 07/17/09 Time: 13:40:42

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

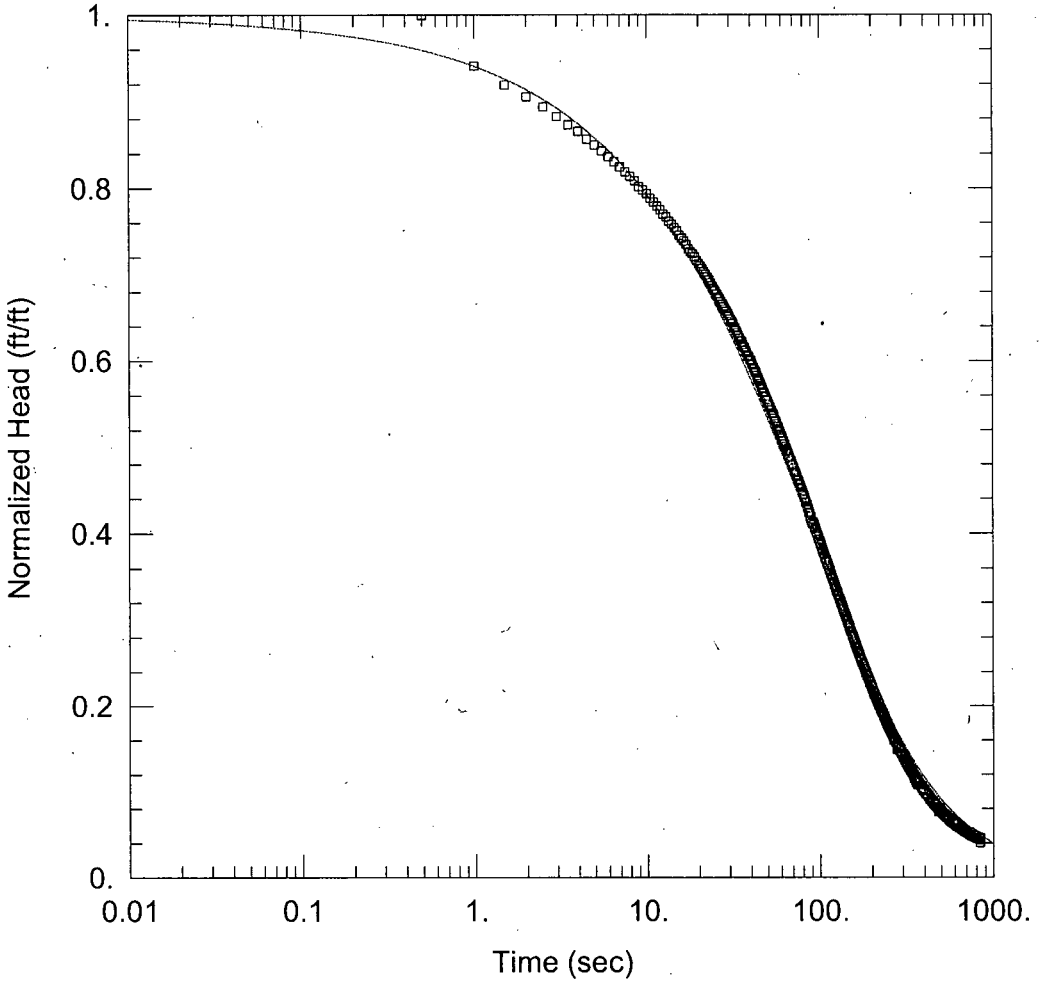
Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06O)

Initial Displacement: 3.804 ft
Total Well Penetration Depth: 18.79 ft
Casing Radius: 0.083 ft
Static Water Column Height: 18.79 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos
T = 37.63 gal/day/ft
S = 0.0001



JPG-DU-060 TEST2RH

Data Set: H:\Jobs\JPG\Slug Testing\Data\06O\JPG-DU-06O Analysis\JPG-DU-060 Test2rh.aqt
Date: 07/17/09 Time: 13:44:29

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 1.

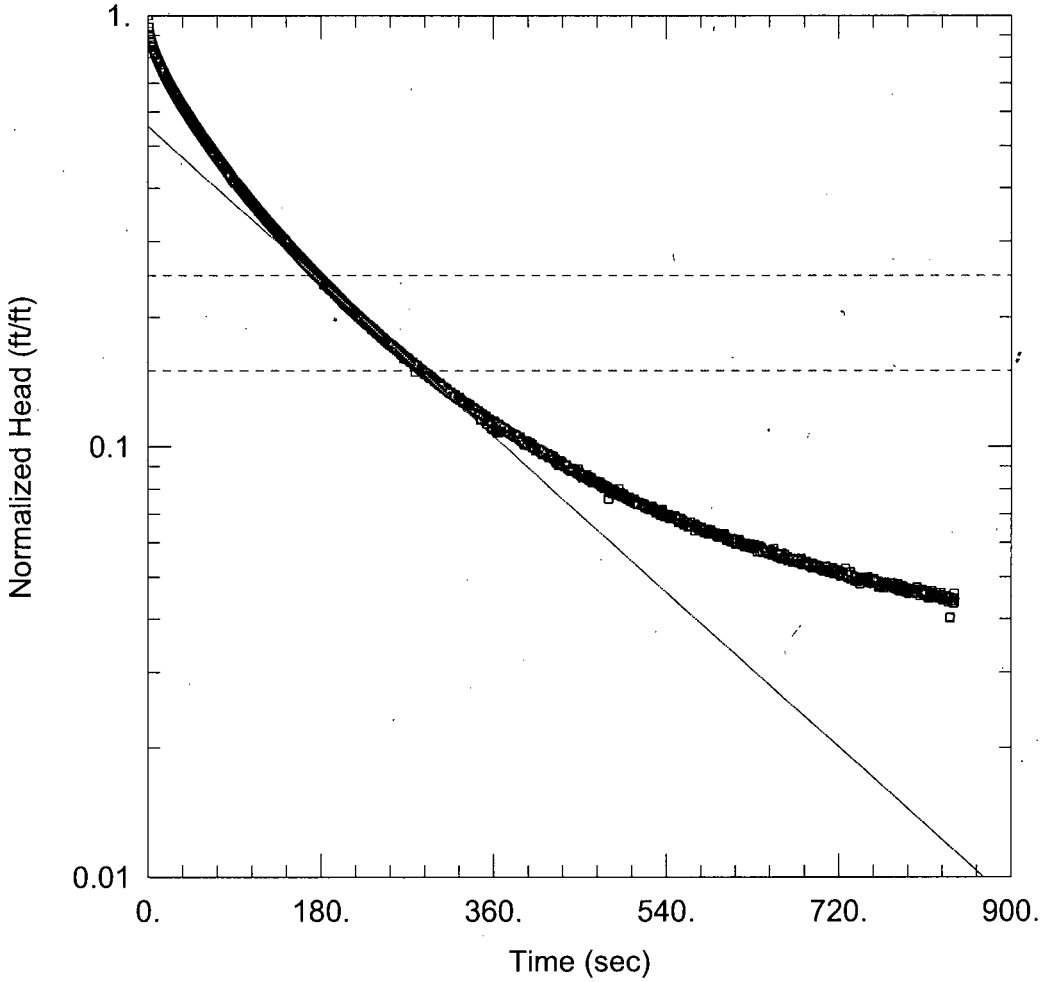
WELL DATA (JPG-DU-06O)

Initial Displacement: 4.458 ft
Total Well Penetration Depth: 18.94 ft
Casing Radius: 0.083 ft
Static Water Column Height: 18.94 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

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

T = 36.75 gal/day/ft
S = 0.004365



JPG-DU-060 TEST2RH

Data Set: H:\Jobs\JPG\Slug Testing\Data\06O\JPG-DU-06O Analysis\JPG-DU-060 Test2rh.aqt
Date: 07/17/09 Time: 13:48:09

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

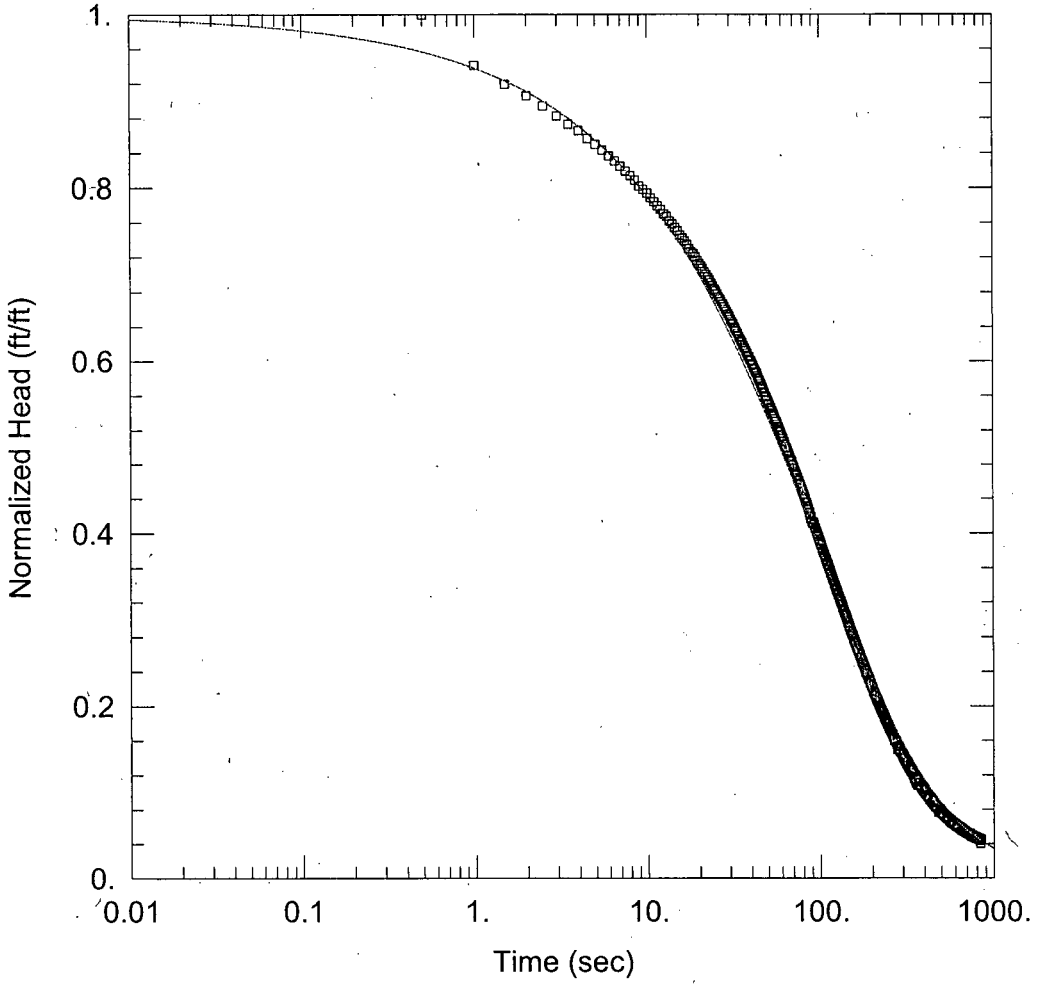
Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06O)

Initial Displacement: 4.458 ft
Static Water Column Height: 18.94 ft
Total Well Penetration Depth: 18.94 ft
Screen Length: 10. ft
Casing Radius: 0.083 ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 3.494 gal/day/ft^2
y0 = 2.479 ft



JPG-DU-060 TEST2RH

Data Set: H:\Jobs\JPG\Slug Testing\Data\06O\JPG-DU-06O Analysis\JPG-DU-060 Test2rh.aqt
Date: 07/17/09 Time: 13:47:13

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 30. ft

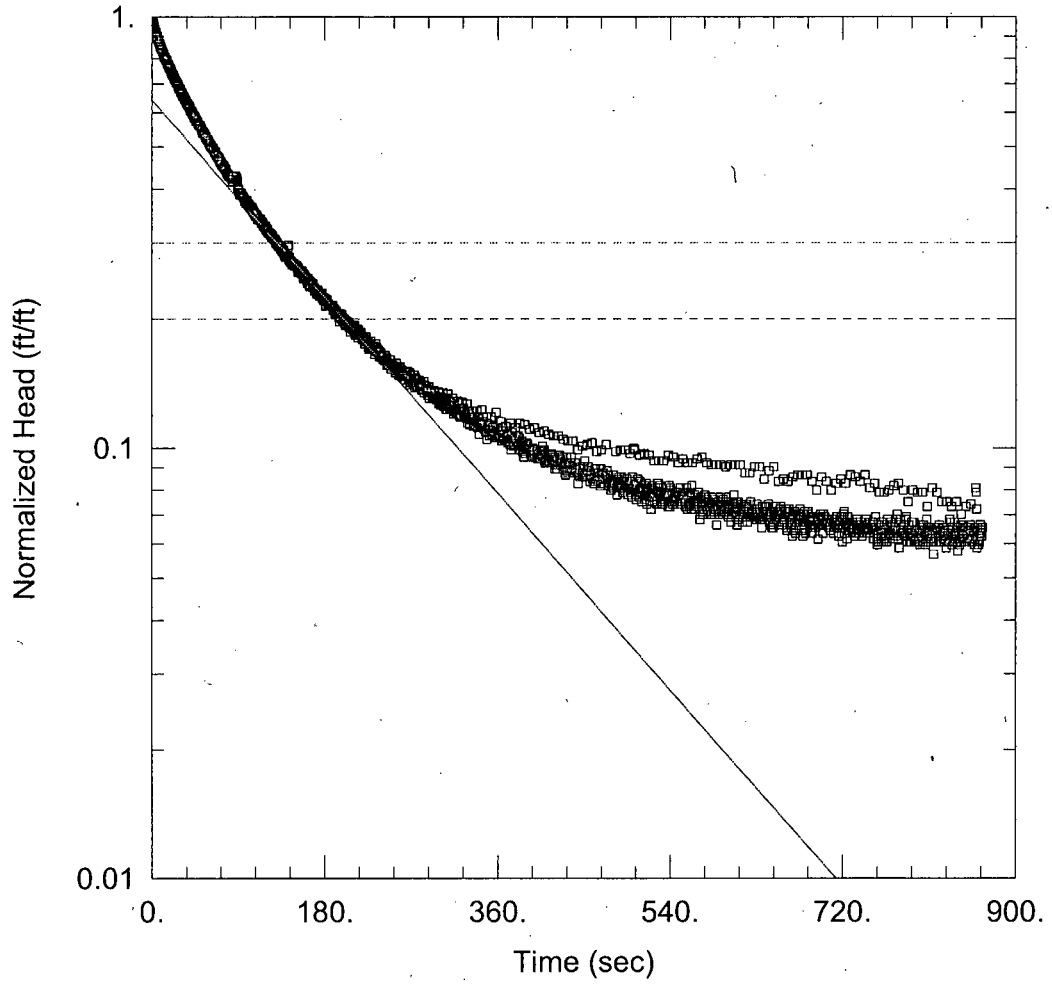
WELL DATA (JPG-DU-06O)

Initial Displacement: 4.458 ft
Total Well Penetration Depth: 18.94 ft
Casing Radius: 0.083 ft
Static Water Column Height: 18.94 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 3.115 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.0005821 ft^{-1}



JPG-DU-060 TEST3FH

Data Set: H:\Jobs\JPG\Slug Testing\Data\06O\JPG-DU-06O Analysis\JPG-DU-060 Test3fh.aqt
Date: 07/17/09 Time: 13:56:36

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

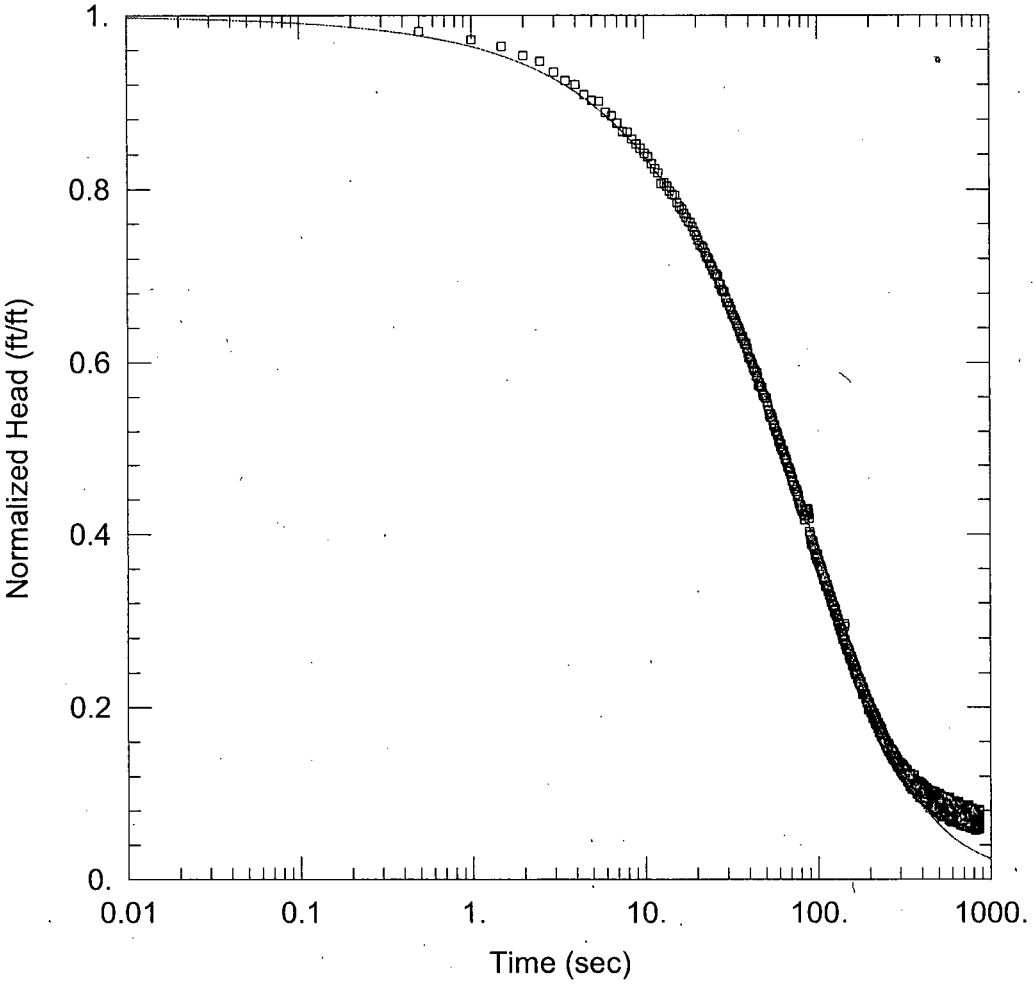
Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06O)

Initial Displacement: 1.04 ft
Total Well Penetration Depth: 18.74 ft
Casing Radius: 0.083 ft
Static Water Column Height: 18.74 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.24 gal/day/ft^2
y0 = 0.667 ft



JPG-DU-060 TEST3FH

Data Set: H:\Jobs\JPG\Slug Testing\Data\06O\JPG-DU-06O Analysis\JPG-DU-060 Test3fh.aqt
Date: 07/17/09 Time: 14:01:59

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 1.

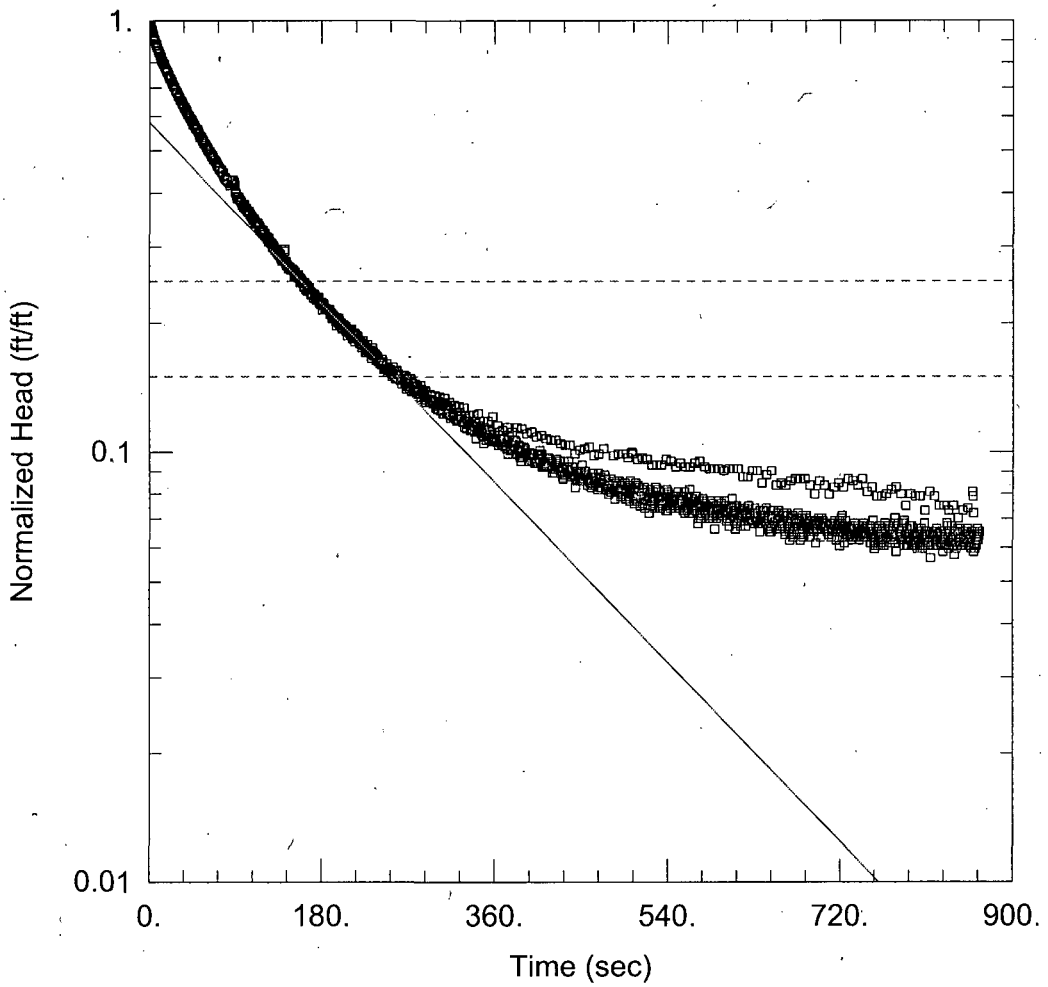
WELL DATA (JPG-DU-06O)

Initial Displacement: 1.04 ft
Total Well Penetration Depth: 18.74 ft
Casing Radius: 0.083 ft
Static Water Column Height: 18.74 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

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

T = 62.31 gal/day/ft
S = 0.000537



JPG-DU-060 TEST3FH

Data Set: H:\Jobs\JPG\Slug Testing\Data\06O\JPG-DU-06O Analysis\JPG-DU-060 Test3fh.aqt
Date: 07/17/09 Time: 14:06:39

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

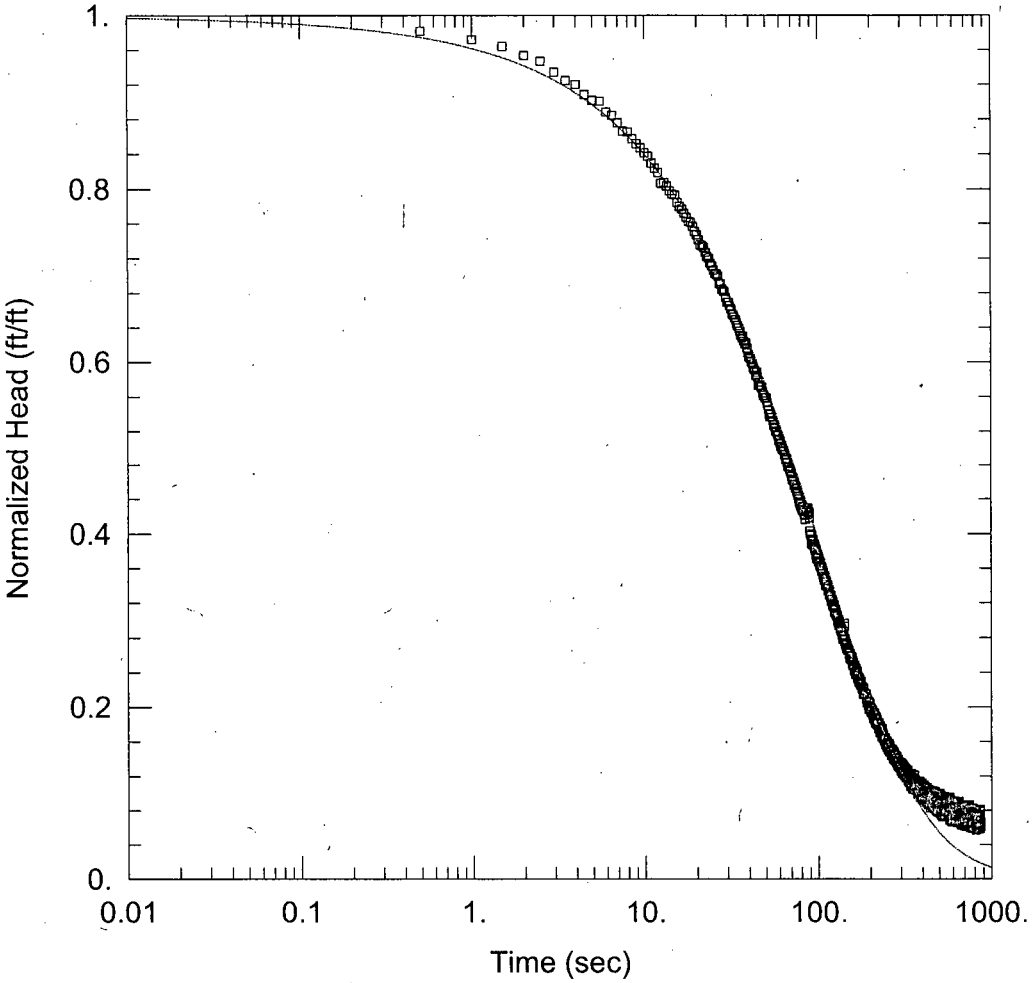
Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06O)

Initial Displacement: 1.04 ft
Total Well Penetration Depth: 18.74 ft
Casing Radius: 0.083 ft
Static Water Column Height: 18.74 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 4.046 gal/day/ft^2
y0 = 0.6049 ft



JPG-DU-060 TEST3FH

Data Set: H:\Jobs\JPG\Slug Testing\Data\06O\JPG-DU-06O Analysis\JPG-DU-060 Test3fh.aqt
Date: 10/08/09 Time: 12:03:47

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 30. ft

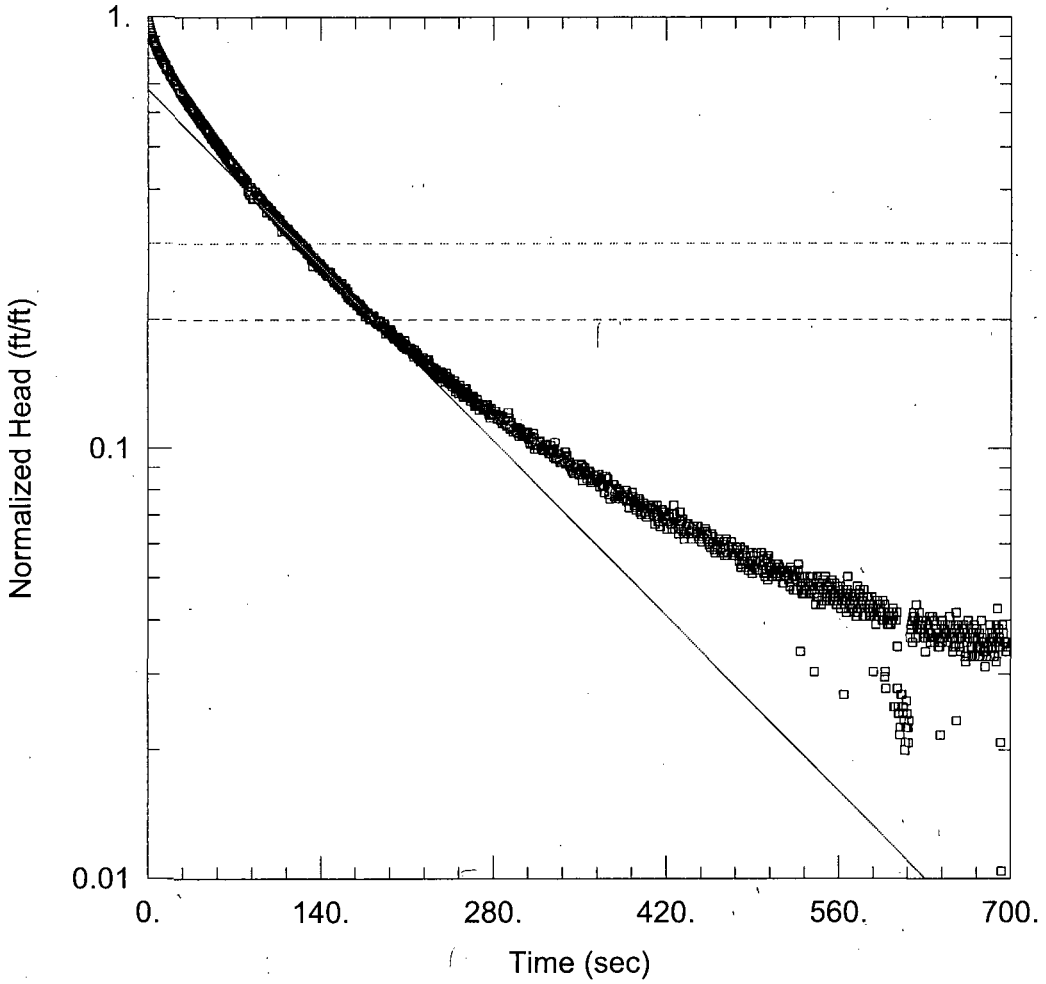
WELL DATA (JPG-DU-06O)

Initial Displacement: 1.04 ft
Total Well Penetration Depth: 18.74 ft
Casing Radius: 0.083 ft
Static Water Column Height: 18.74 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 4.521 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.0001042 ft^{-1}



JPG-DU-060 TEST3RH

Data Set: H:\Jobs\JPG\Slug Testing\Data\06O\JPG-DU-06O Analysis\JPG-DU-060 Test3rh.aqt
Date: 07/17/09 Time: 14:08:23

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

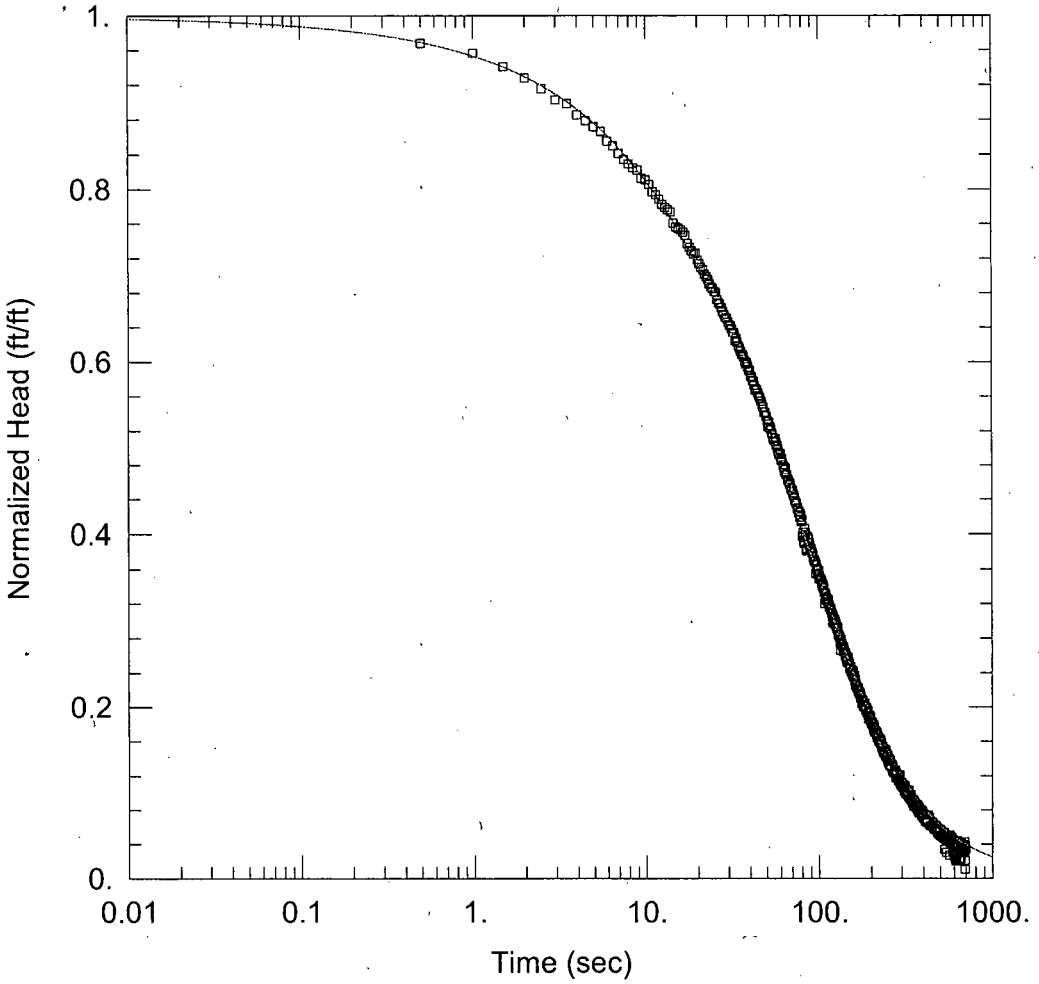
Saturated Thickness: 30. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06O)

Initial Displacement: 1.153 ft Static Water Column Height: 18.8 ft
Total Well Penetration Depth: 18.8 ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 3.715 gal/day/ft^2 y0 = 0.7822 ft



JPG-DU-060 TEST3RH

Data Set: H:\Jobs\JPG\Slug Testing\Data\06O\JPG-DU-06O Analysis\JPG-DU-060 Test3rh.aqt
Date: 07/17/09 Time: 14:10:42

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 1.

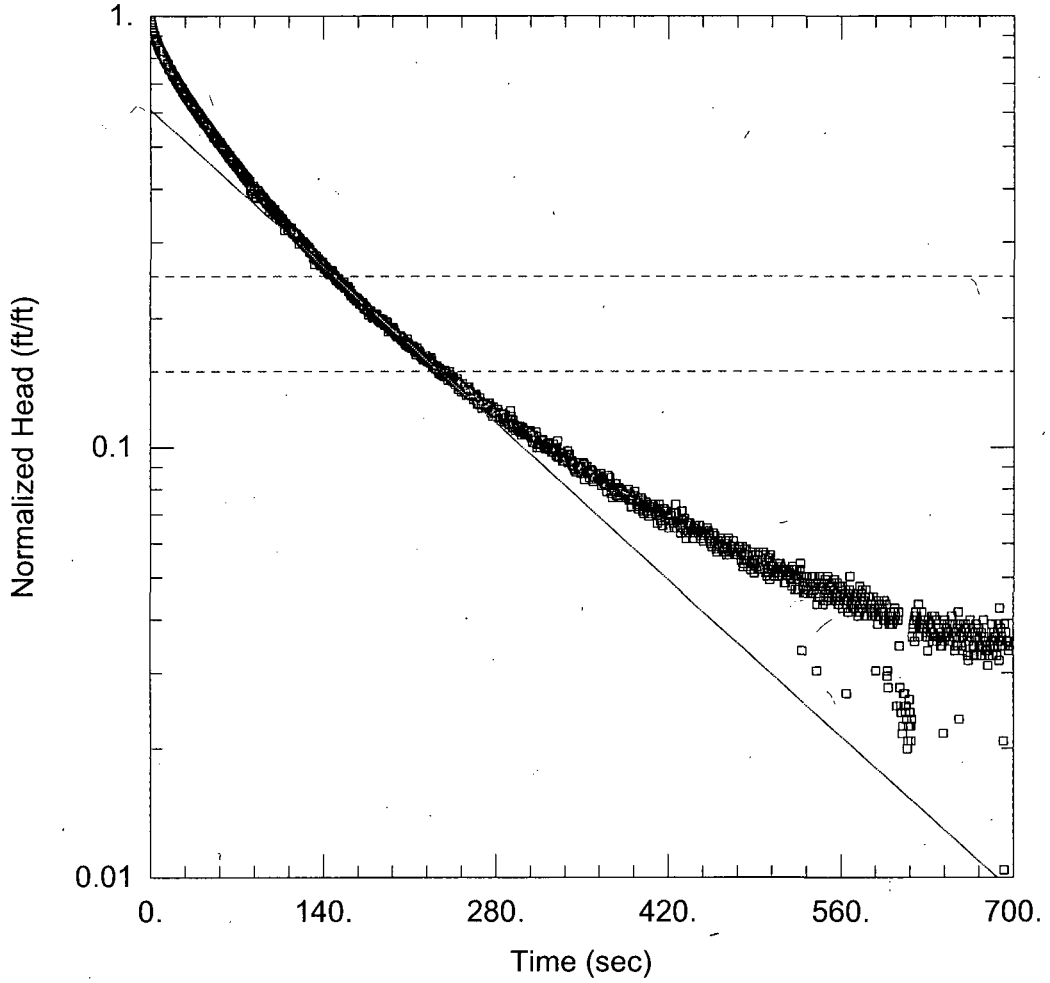
WELL DATA (JPG-DU-06O)

Initial Displacement: 1.153 ft
Total Well Penetration Depth: 18.8 ft
Casing Radius: 0.083 ft
Static Water Column Height: 18.8 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

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

T = 58.5 gal/day/ft
S = 0.00123



JPG-DU-060 TEST3RH

Data Set: H:\Jobs\JPG\Slug Testing\Data\06O\JPG-DU-06O Analysis\JPG-DU-060 Test3rh.aqt
Date: 07/17/09 Time: 15:05:54

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

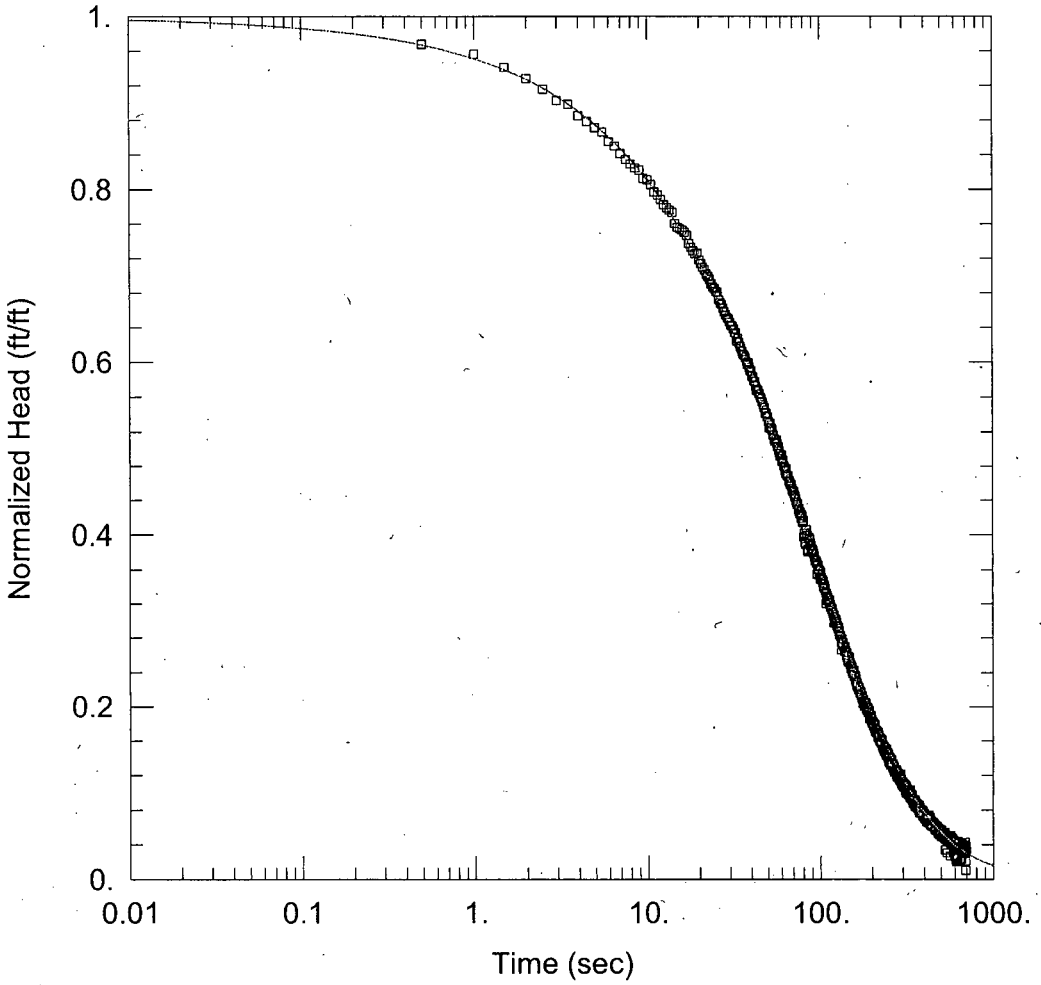
Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06O)

Initial Displacement: 1.153 ft
Total Well Penetration Depth: 18.8 ft
Casing Radius: 0.083 ft
Static Water Column Height: 18.8 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 4.532 gal/day/ft^2
y0 = 0.7014 ft



JPG-DU-060 TEST3RH

Data Set: H:\Jobs\JPG\Slug Testing\Data\06O\JPG-DU-06O Analysis\JPG-DU-060 Test3rh.aqt
Date: 07/17/09 Time: 14:37:17

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 30. ft

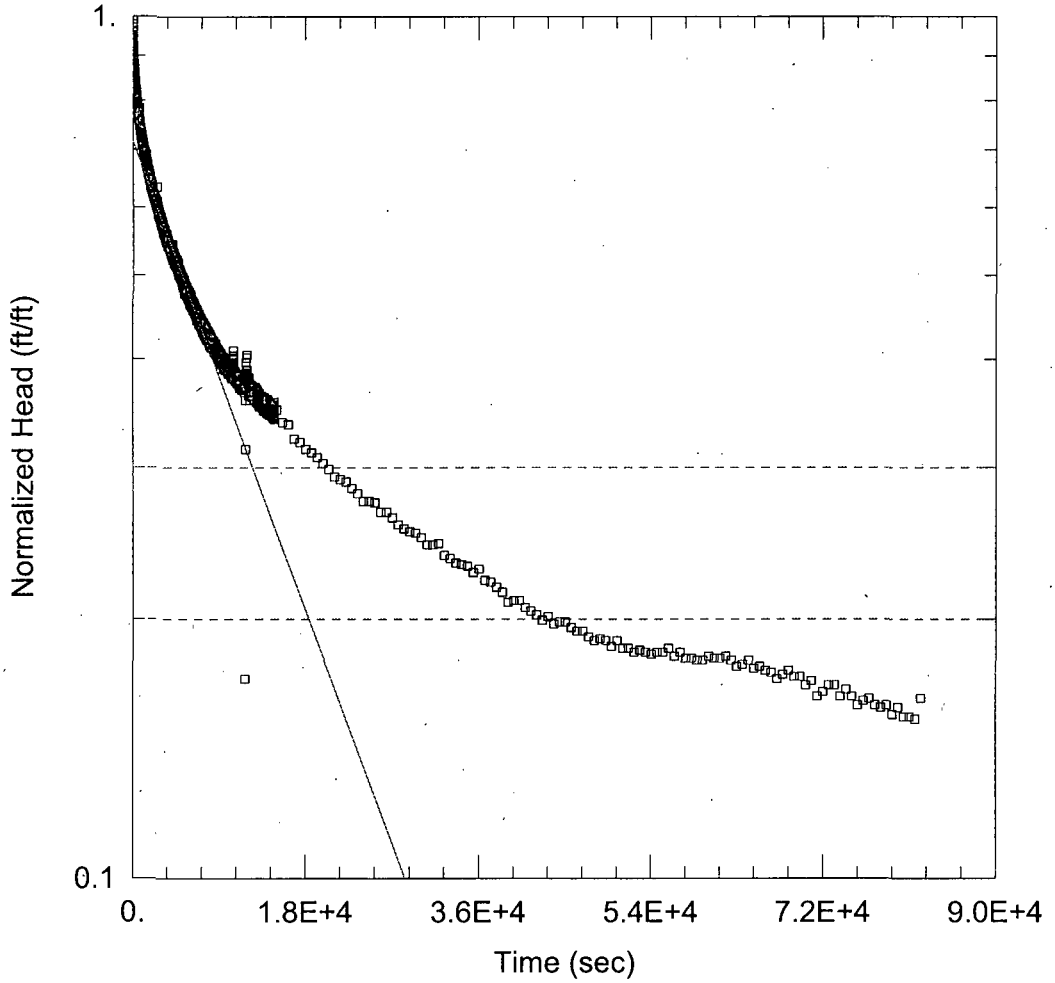
WELL DATA (JPG-DU-06O)

Initial Displacement: 1.153 ft
Total Well Penetration Depth: 18.8 ft
Casing Radius: 0.083 ft
Static Water Column Height: 18.8 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 4.567 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.000194 ft^{-1}



JPG-DU-09O TEST1FH_FHB

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-09O\JPG-DU-09O Test1fh_fhb B-R.aqt
Date: 07/26/10 Time: 16:11:14

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

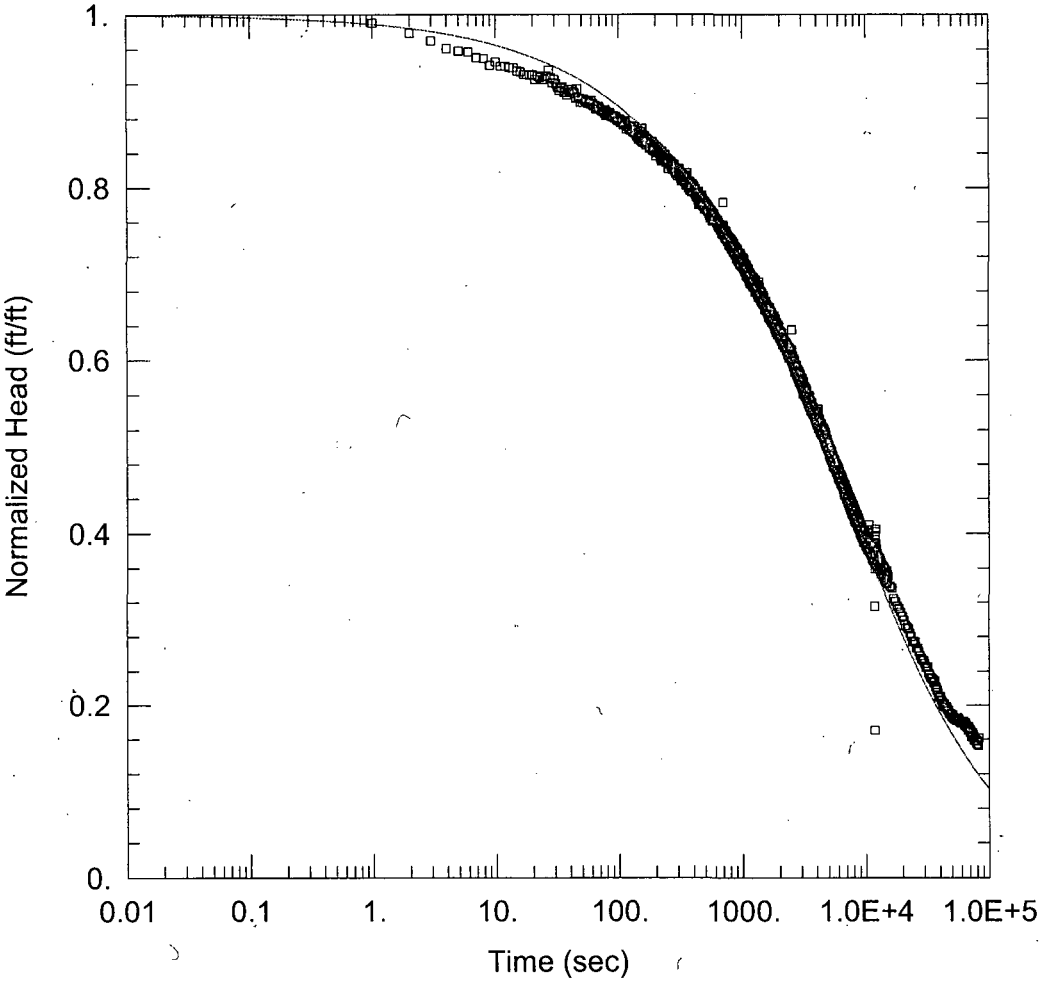
Saturated Thickness: 24. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-09O)

Initial Displacement: 1.028 ft
Total Well Penetration Depth: 25.75 ft
Casing Radius: 0.083 ft
Static Water Column Height: 23.75 ft
Screen Length: 12. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.05458 gal/day/ft^2
y0 = 0.7353 ft



JPG-DU-09O TEST1FH_FHB

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-09O\JPG-DU-09O Test1fh_fhb KGS.aqt
Date: 07/26/10 Time: 16:13:06

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 24. ft

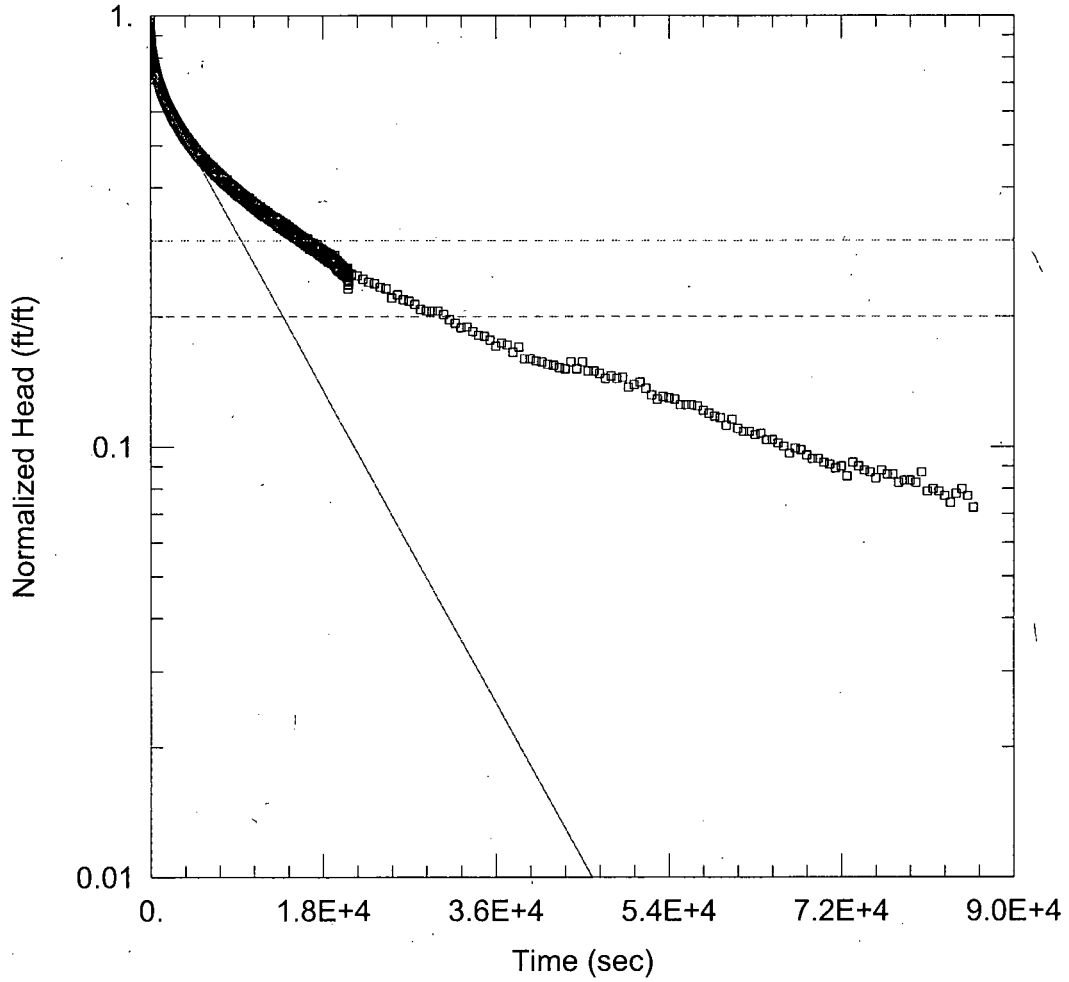
WELL DATA (JPG-DU-09O)

Initial Displacement: 1.028 ft
Total Well Penetration Depth: 25.75 ft
Casing Radius: 0.083 ft
Static Water Column Height: 23.75 ft
Screen Length: 12. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.007434 gal/day/ft^2
Ss = 0.1667 ft^{-1}
Kz/Kr = 1.



JPG-DU-09O TEST1RH_RHB

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-09O\JPG-DU-09O Test1rh_rhb B-R.aqt
Date: 07/26/10 Time: 16:14:27

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

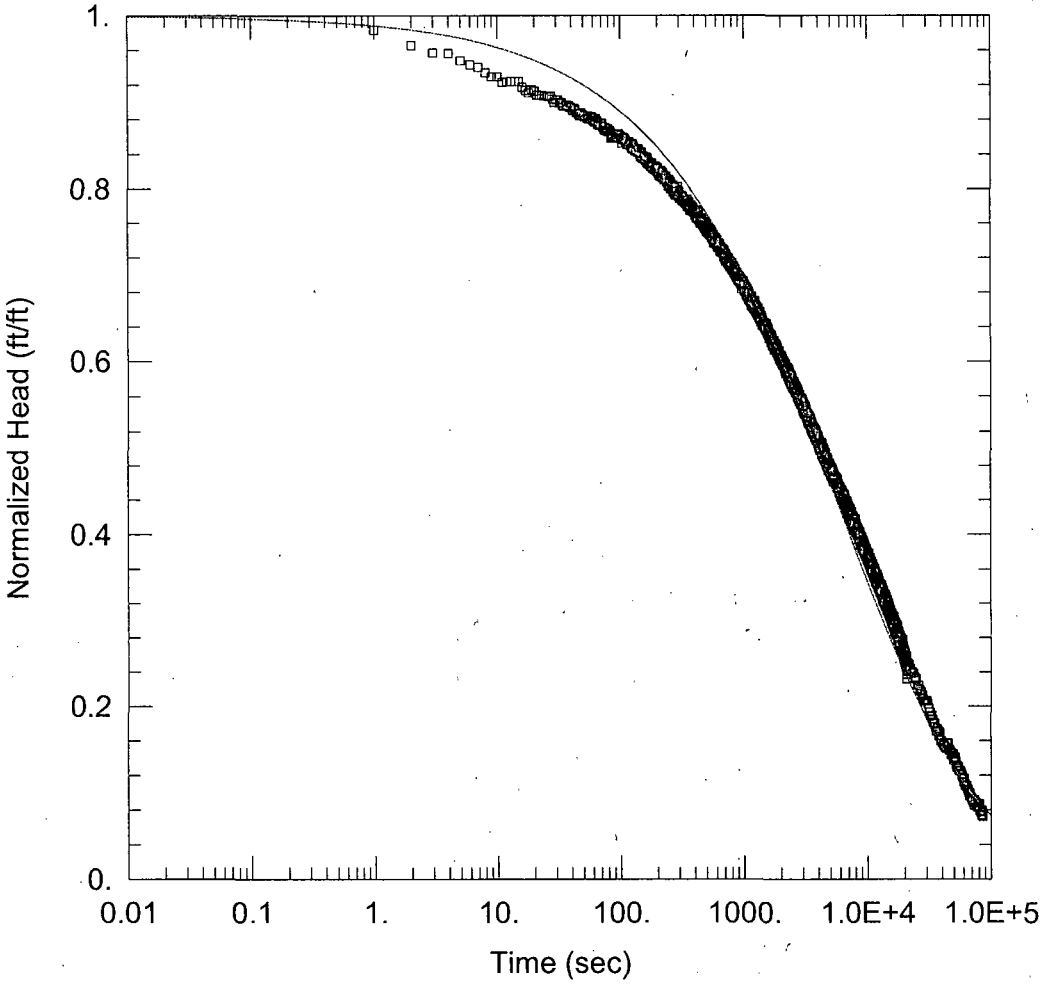
Saturated Thickness: 24. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-09O)

Initial Displacement: 1.078 ft
Total Well Penetration Depth: 25.93 ft
Casing Radius: 0.083 ft
Static Water Column Height: 23.93 ft
Screen Length: 12. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.07329 gal/day/ft^2
y0 = 0.7796 ft



JPG-DU-09O TEST1RH_RHB

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-09O\JPG-DU-09O Test1rh_rhb KGS.aqt
Date: 07/26/10 Time: 16:15:37

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 24. ft

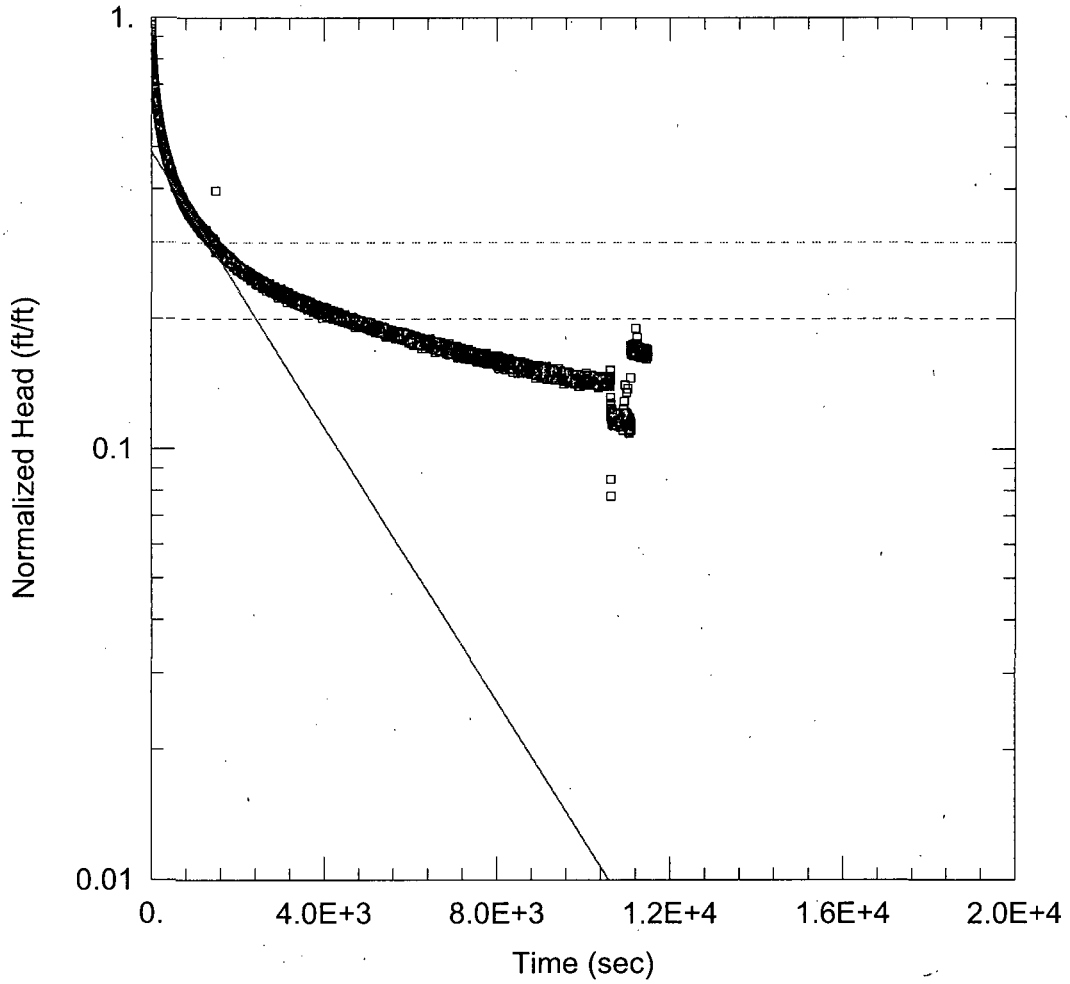
WELL DATA (JPG-DU-09O)

Initial Displacement: 1.078 ft
Total Well Penetration Depth: 25.93 ft
Casing Radius: 0.083 ft
Static Water Column Height: 23.93 ft
Screen Length: 12. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.01406 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.1 ft^{-1}



JPG-DU-01I TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-01I\JPG-DU-01I Test1fh B-R.aqt
Date: 07/26/10 Time: 09:32:59

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

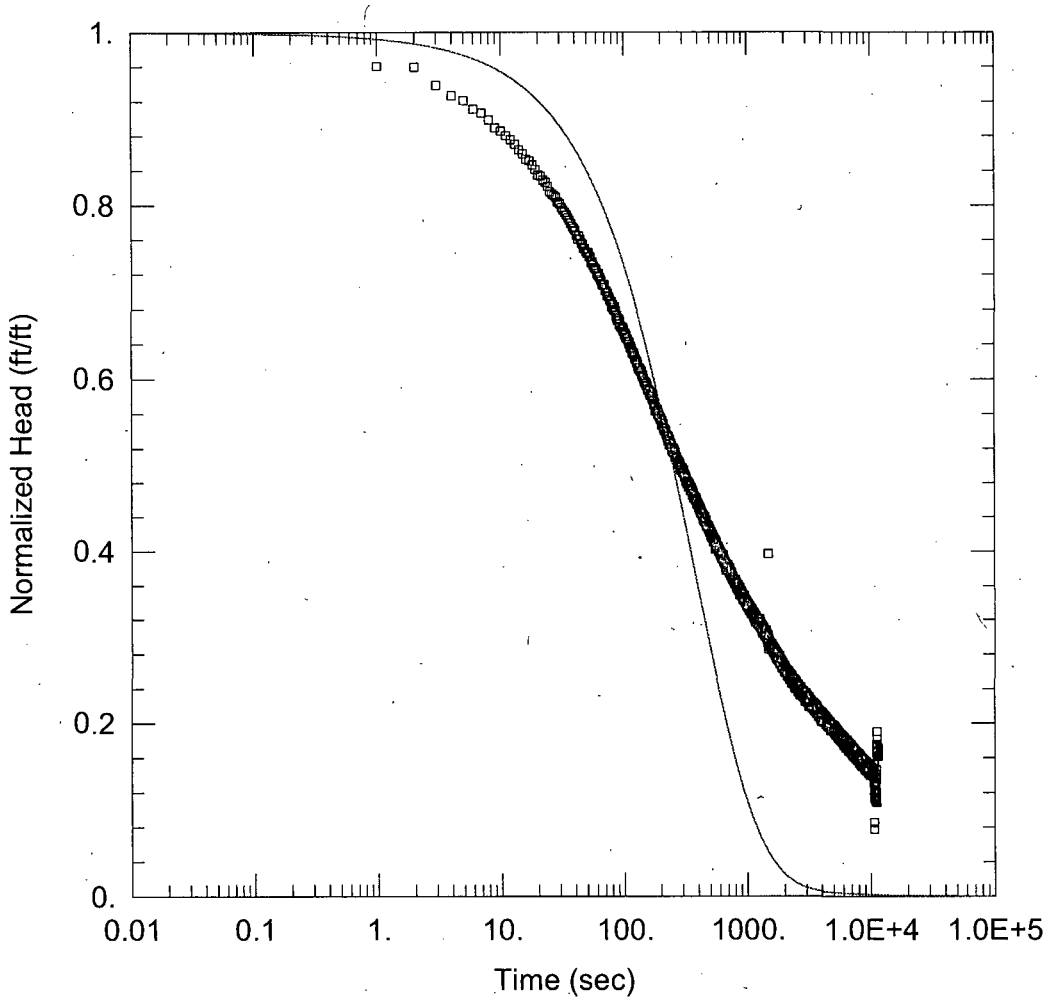
Saturated Thickness: 34.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-01I)

Initial Displacement: 1.094 ft
Total Well Penetration Depth: 21.7 ft
Casing Radius: 0.083 ft
Static Water Column Height: 41.85 ft
Screen Length: 13.2 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 0.2295 gal/day/ft^2
y0 = 0.5326 ft



JPG-DU-01I TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-01I\JPG-DU-01I Test1fh KGS.aqt
Date: 07/26/10 Time: 13:07:10

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 34.5 ft

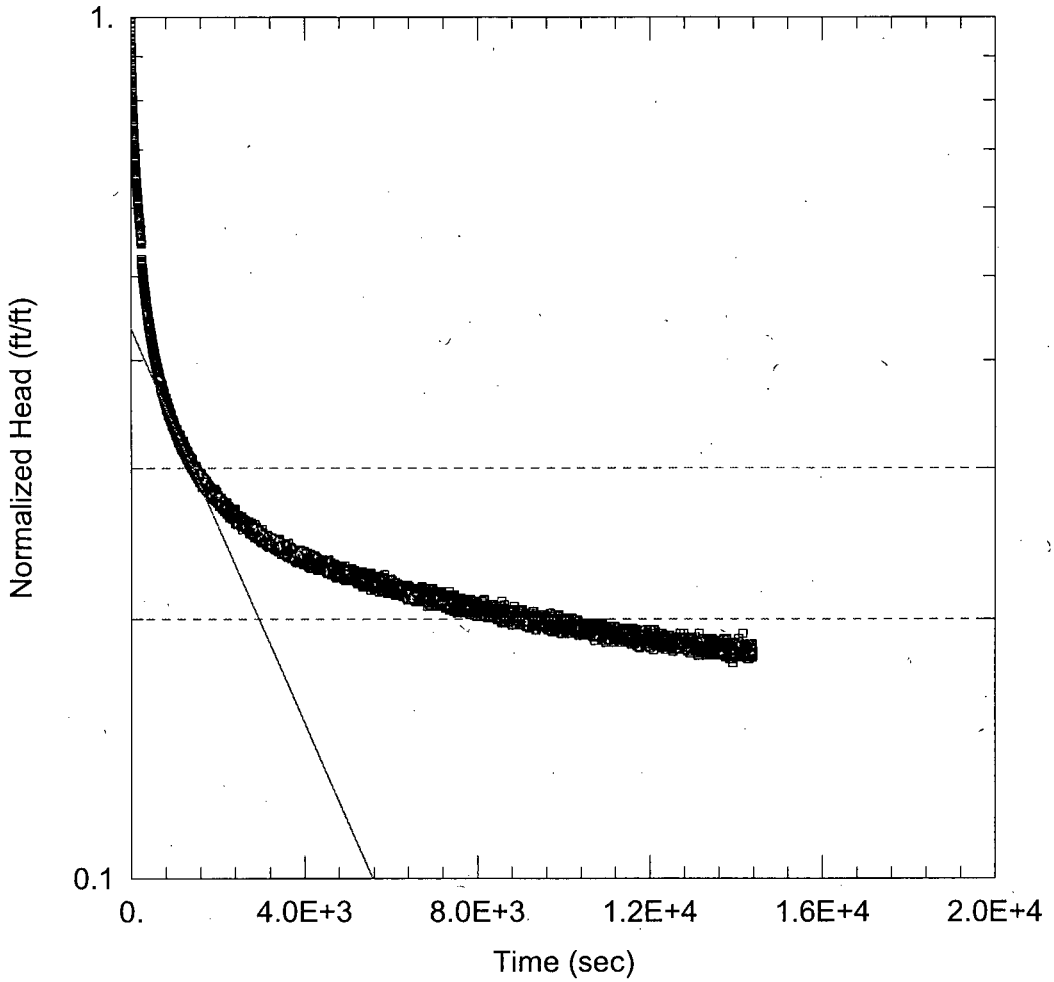
WELL DATA (JPG-DU-01I)

Initial Displacement: 1.094 ft
Total Well Penetration Depth: 21.7 ft
Casing Radius: 0.083 ft
Static Water Column Height: 41.85 ft
Screen Length: 13.2 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 1.703 gal/day/ft^2
Kz/Kr = 1.
Ss = 4.545E-5 ft^{-1}



JPG-DU-01I TEST1RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-01I\JPG-DU-01I Test1rh B-R.aqt
Date: 07/26/10 Time: 13:08:38

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

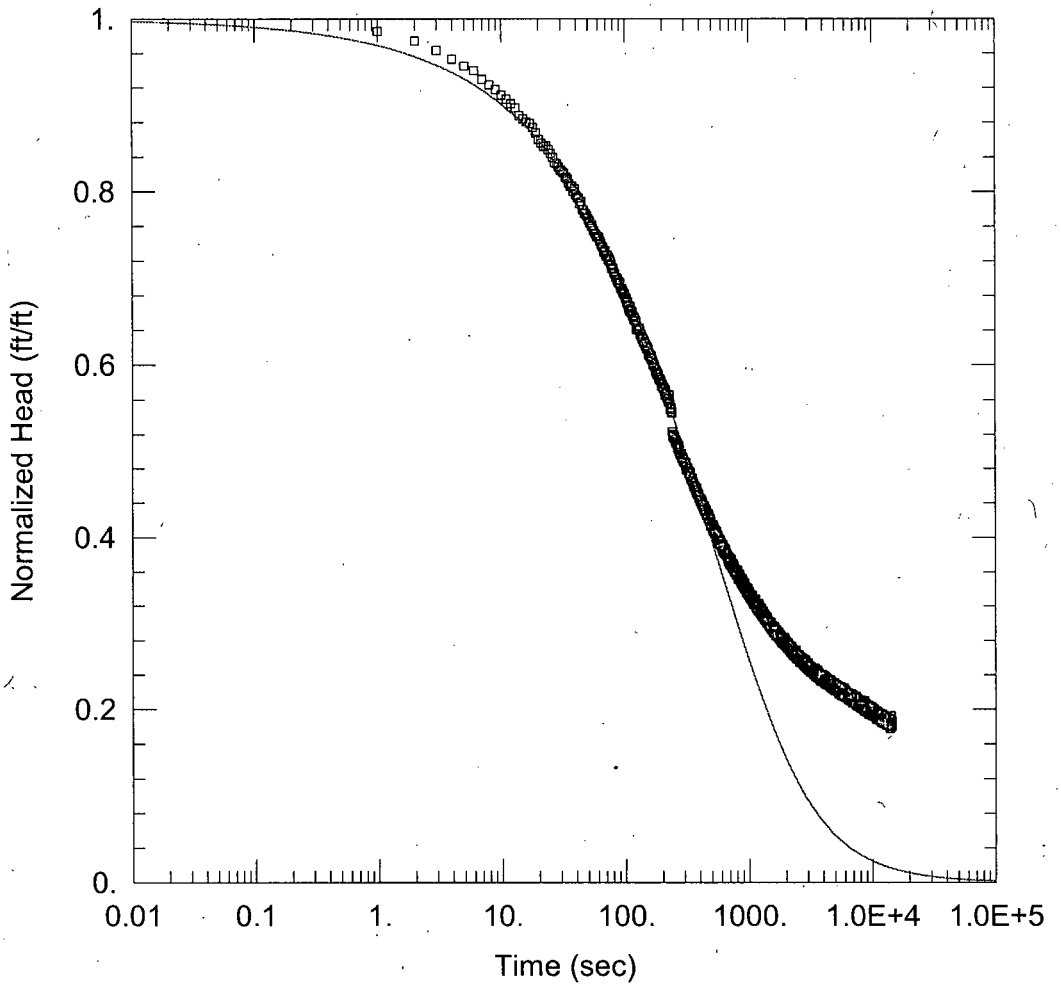
Saturated Thickness: 34.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-01I)

Initial Displacement: 1.097 ft
Total Well Penetration Depth: 21.7 ft
Casing Radius: 0.083 ft
Static Water Column Height: 42.05 ft
Screen Length: 13.2 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 0.1649 gal/day/ft^2
y0 = 0.4774 ft



JPG-DU-01I TEST1RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-01I\JPG-DU-01I Test1rh KGS.aqt
Date: 07/26/10 Time: 13:13:02

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 34.5 ft

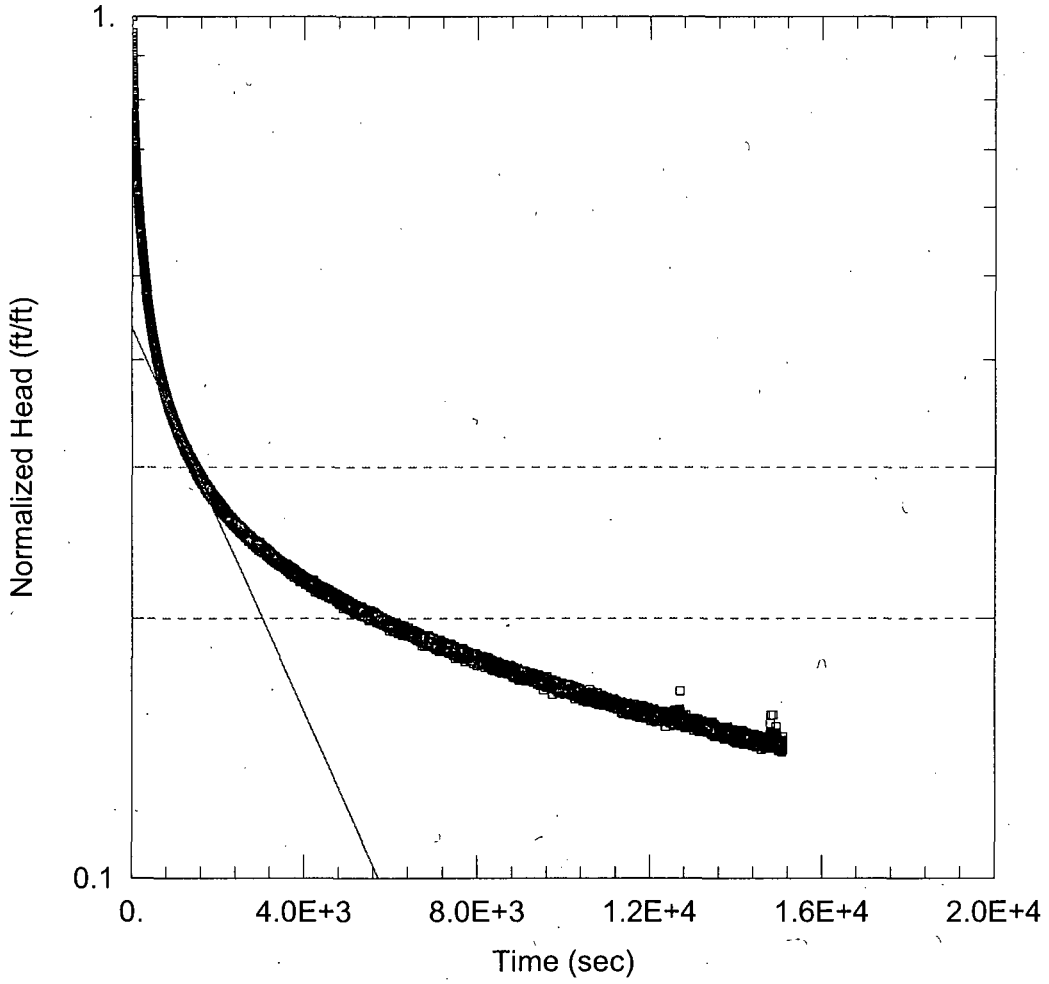
WELL DATA (JPG-DU-01I)

Initial Displacement: 1.097 ft
Total Well Penetration Depth: 21.7 ft
Casing Radius: 0.083 ft
Static Water Column Height: 42.05 ft
Screen Length: 13.2 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.3664 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.012 ft^{-1}



JPG-DU-01I TEST2FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-01I\JPG-DU-01I Test2fh B-R.aqt
Date: 07/26/10 Time: 13:19:01

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

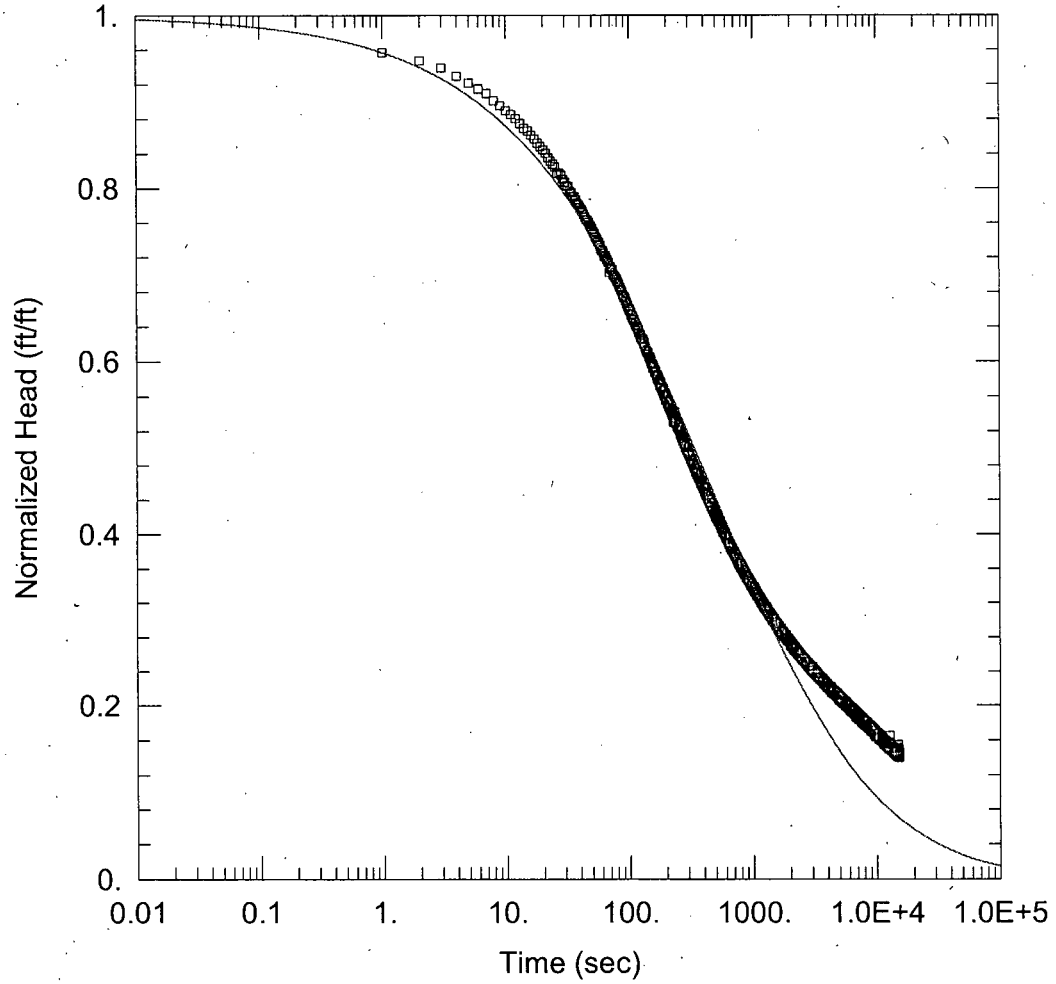
Saturated Thickness: 34.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-01I)

Initial Displacement: 2.07 ft
Total Well Penetration Depth: 21.7 ft
Casing Radius: 0.083 ft
Static Water Column Height: 41.85 ft
Screen Length: 13.2 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 0.161 gal/day/ft^2
y0 = 0.9031 ft



JPG-DU-01I TEST2FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-01I\JPG-DU-01I Test2fh KGS.aqt
Date: 07/26/10 Time: 13:21:15

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 34.5 ft

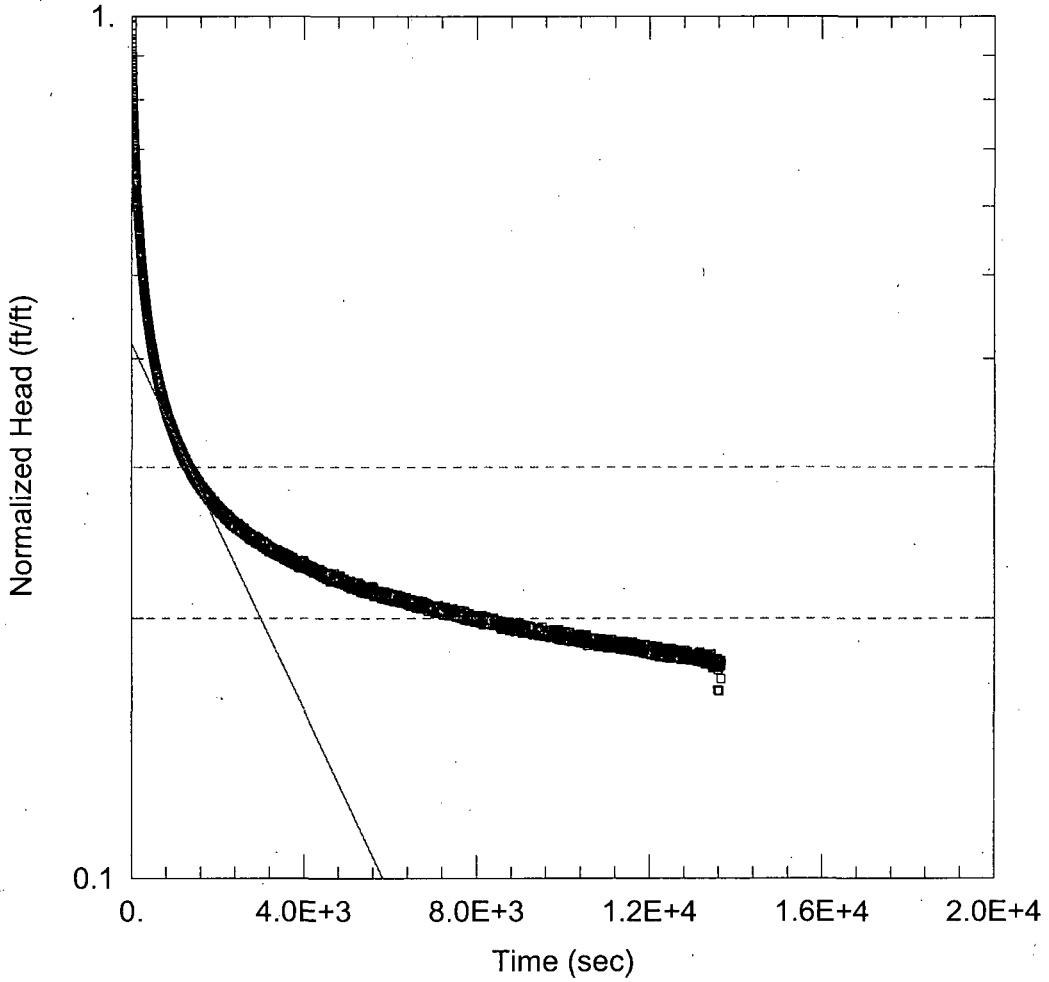
WELL DATA (JPG-DU-01I)

Initial Displacement: 2.07 ft
Total Well Penetration Depth: 21.7 ft
Casing Radius: 0.083 ft
Static Water Column Height: 41.85 ft
Screen Length: 13.2 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.04596 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.2045 ft^{-1}



JPG-DU-01I TEST2RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-01I\JPG-DU-01I Test2rh B-R.aqt
Date: 07/26/10 Time: 13:23:06

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

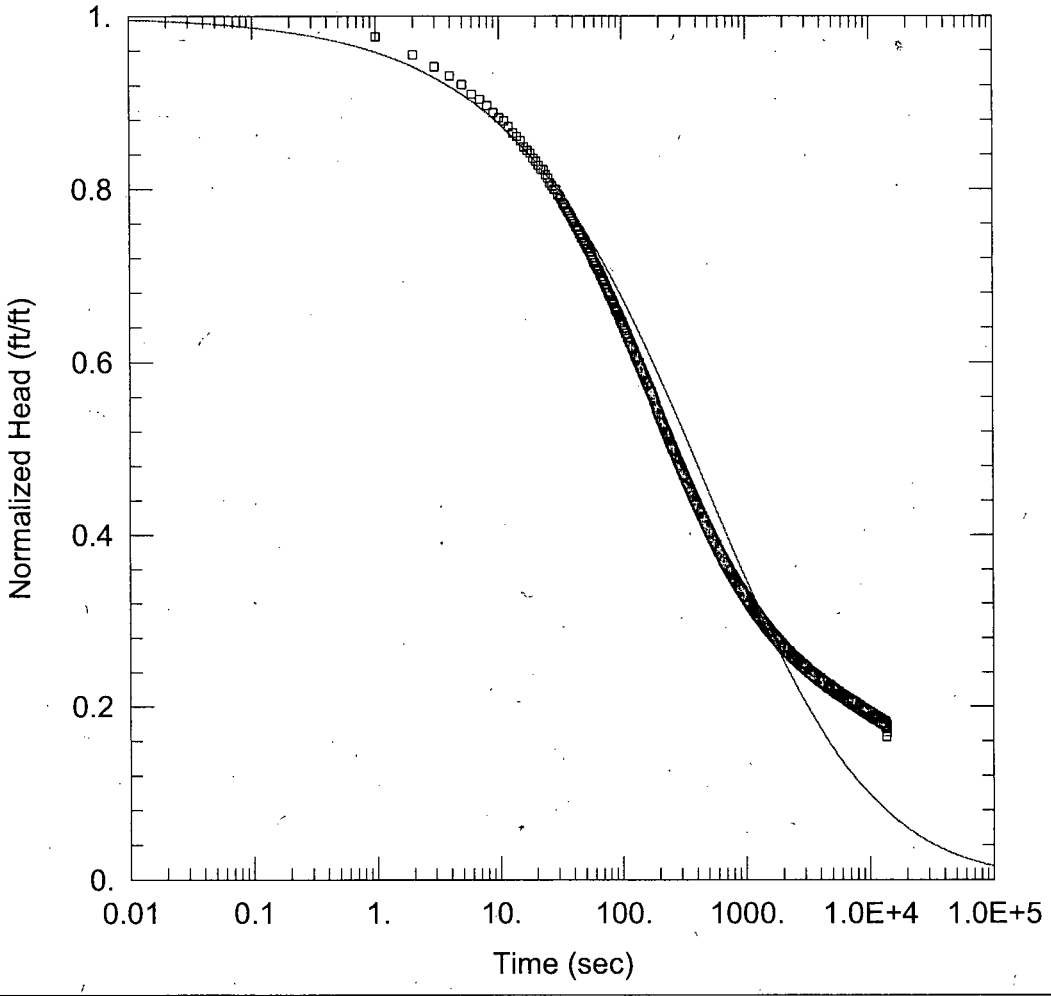
Saturated Thickness: 34.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-01I)

Initial Displacement: 2.207 ft
Total Well Penetration Depth: 21.9 ft
Casing Radius: 0.083 ft
Static Water Column Height: 42.14 ft
Screen Length: 13.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 0.1513 gal/day/ft^2
y0 = 0.9189 ft



JPG-DU-01I TEST2RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-01I\JPG-DU-01I Test2rh KGS.aqt
Date: 07/26/10 Time: 13:25:41

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 34.5 ft

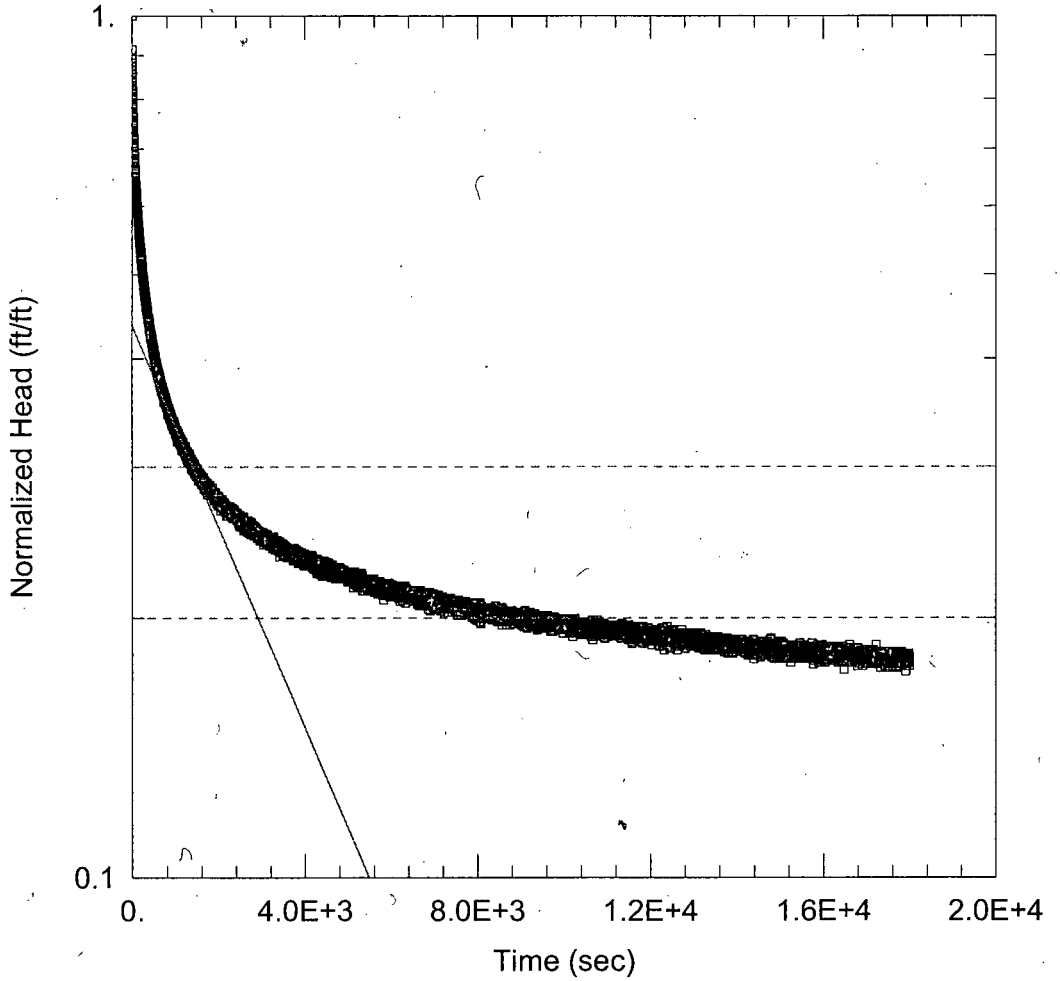
WELL DATA (JPG-DU-01I)

Initial Displacement: 2.207 ft
Total Well Penetration Depth: 21.9 ft
Casing Radius: 0.083 ft
Static Water Column Height: 42.14 ft
Screen Length: 13.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.04198 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.2045 ft^{-1}



JPG-DU-01I TEST3FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-01I\JPG-DU-01I Test3fh B-R.aqt
Date: 07/26/10 Time: 13:27:50

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

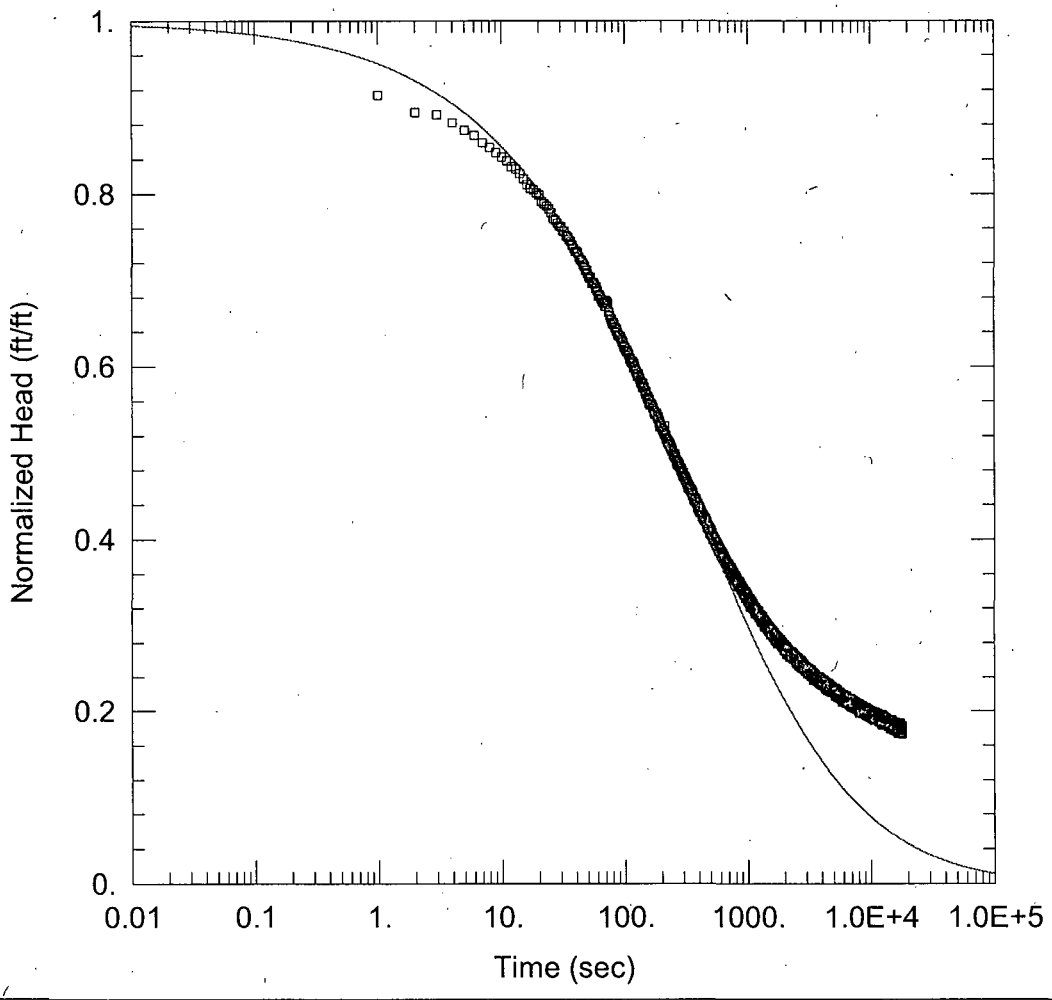
Saturated Thickness: 34.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-01I)

Initial Displacement: 1.162 ft
Total Well Penetration Depth: 21.9 ft
Casing Radius: 0.083 ft
Static Water Column Height: 41.71 ft
Screen Length: 13.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 0.1663 gal/day/ft^2
y0 = 0.5074 ft



JPG-DU-01I TEST3FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-01I\JPG-DU-01I Test3fh KGS.aqt
Date: 07/26/10 Time: 13:29:44

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 34.5 ft

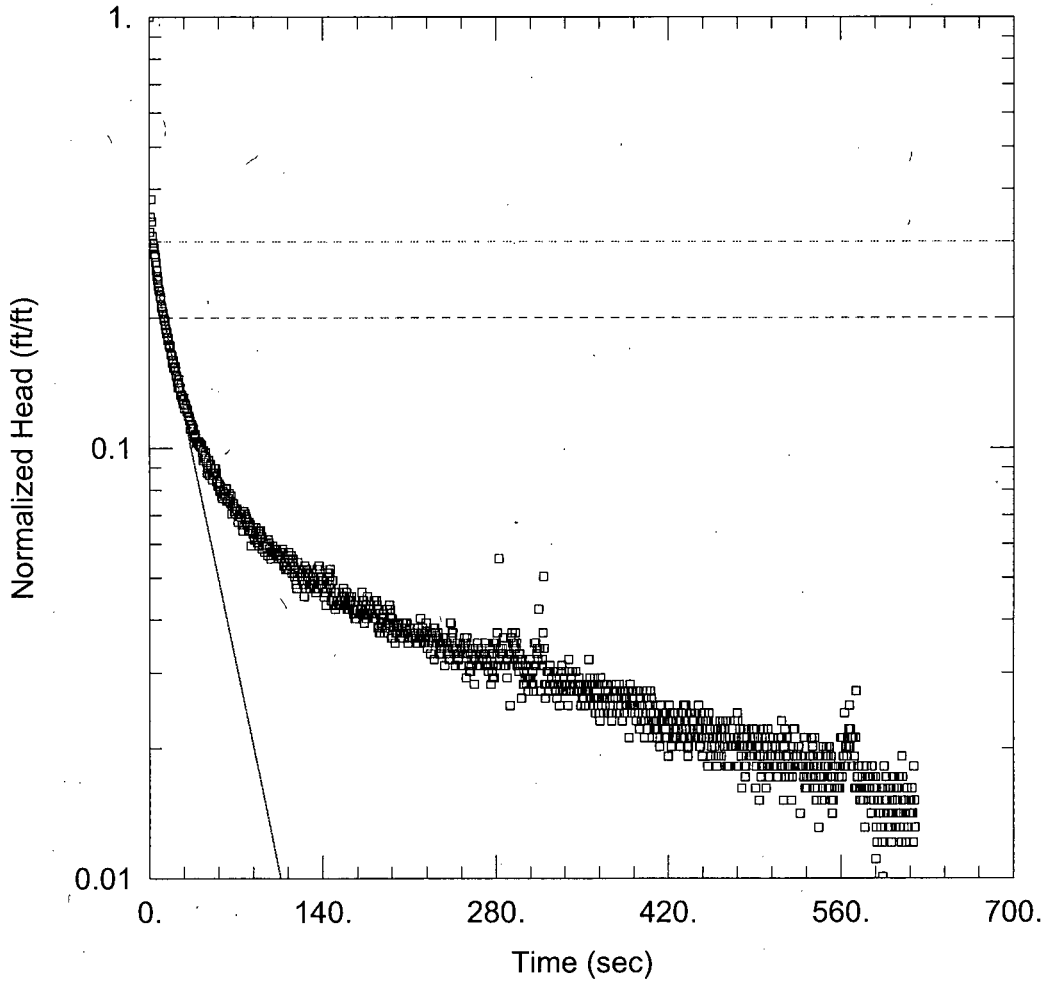
WELL DATA (JPG-DU-01I)

Initial Displacement: 1.162 ft
Total Well Penetration Depth: 21.9 ft
Casing Radius: 0.083 ft
Static Water Column Height: 41.71 ft
Screen Length: 13.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.05949 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.2045 ft^{-1}



JPG-DU-02I TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-02I\JPG-DU-02I Test1fh B-R.aqt
Date: 07/26/10 Time: 13:32:00

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

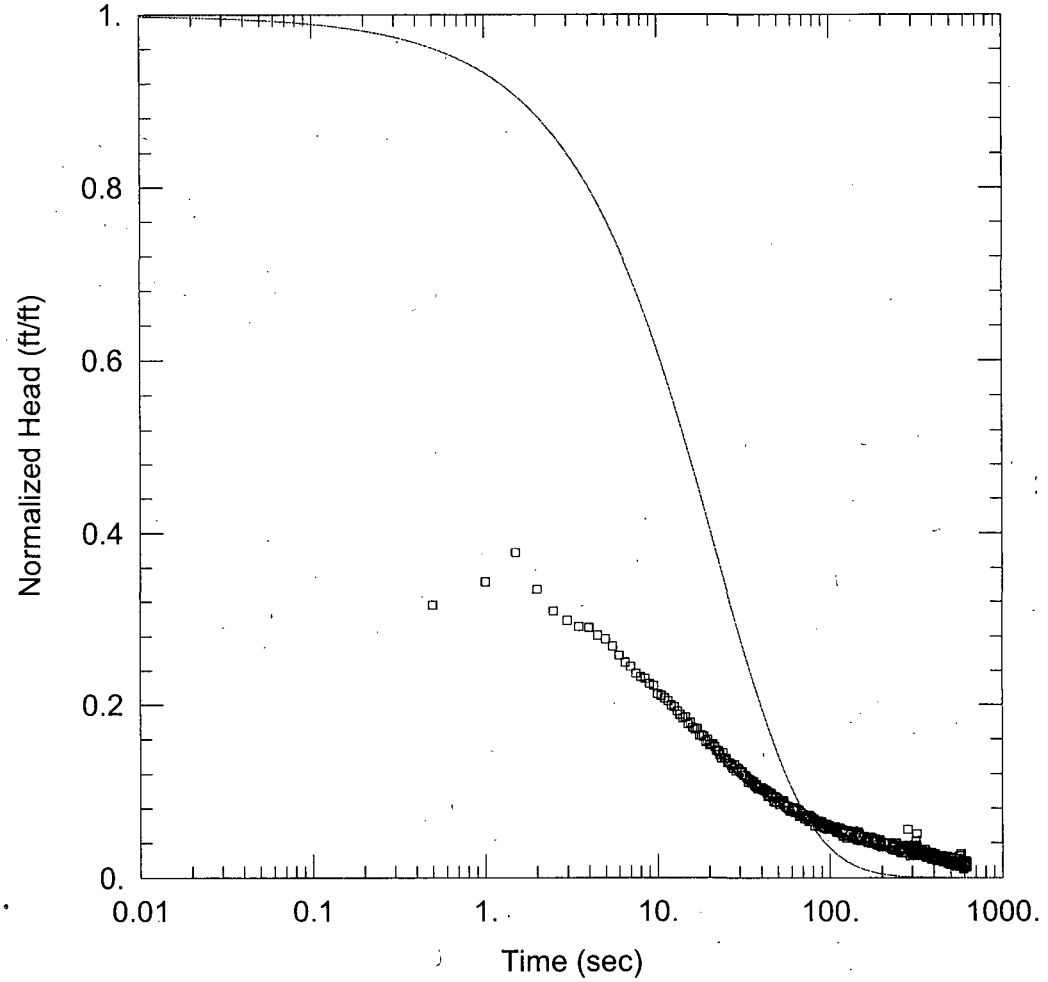
Saturated Thickness: 22.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-02I)

Initial Displacement: 0.993 ft
Total Well Penetration Depth: 19. ft
Casing Radius: 0.083 ft
Static Water Column Height: 14.72 ft
Screen Length: 17. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 16.04 gal/day/ft^2
y0 = 0.2908 ft



JPG-DU-02I TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-02I\JPG-DU-02I Test1fh KGS.aqt
Date: 07/26/10 Time: 13:32:58

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 22.5 ft

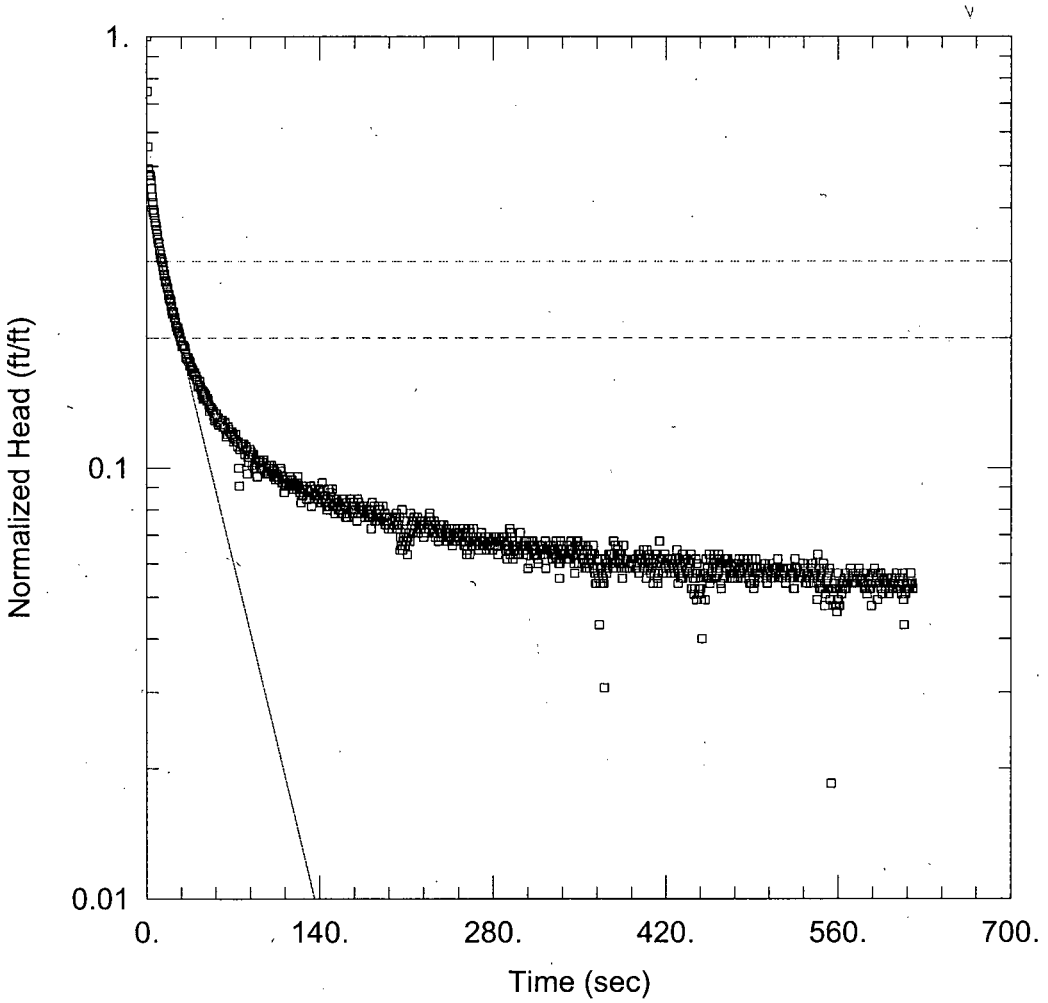
WELL DATA (JPG-DU-02I)

Initial Displacement: 0.993 ft
Total Well Penetration Depth: 19. ft
Casing Radius: 0.083 ft
Static Water Column Height: 14.72 ft
Screen Length: 17. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 3.138 ft/day
Kz/Kr = 1.
Ss = 2.5E-5 ft^{-1}



JPG-DU-02I TEST1RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-02I\JPG-DU-02I Test1rh. B-R.aqt
Date: 07/26/10 Time: 13:33:40

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

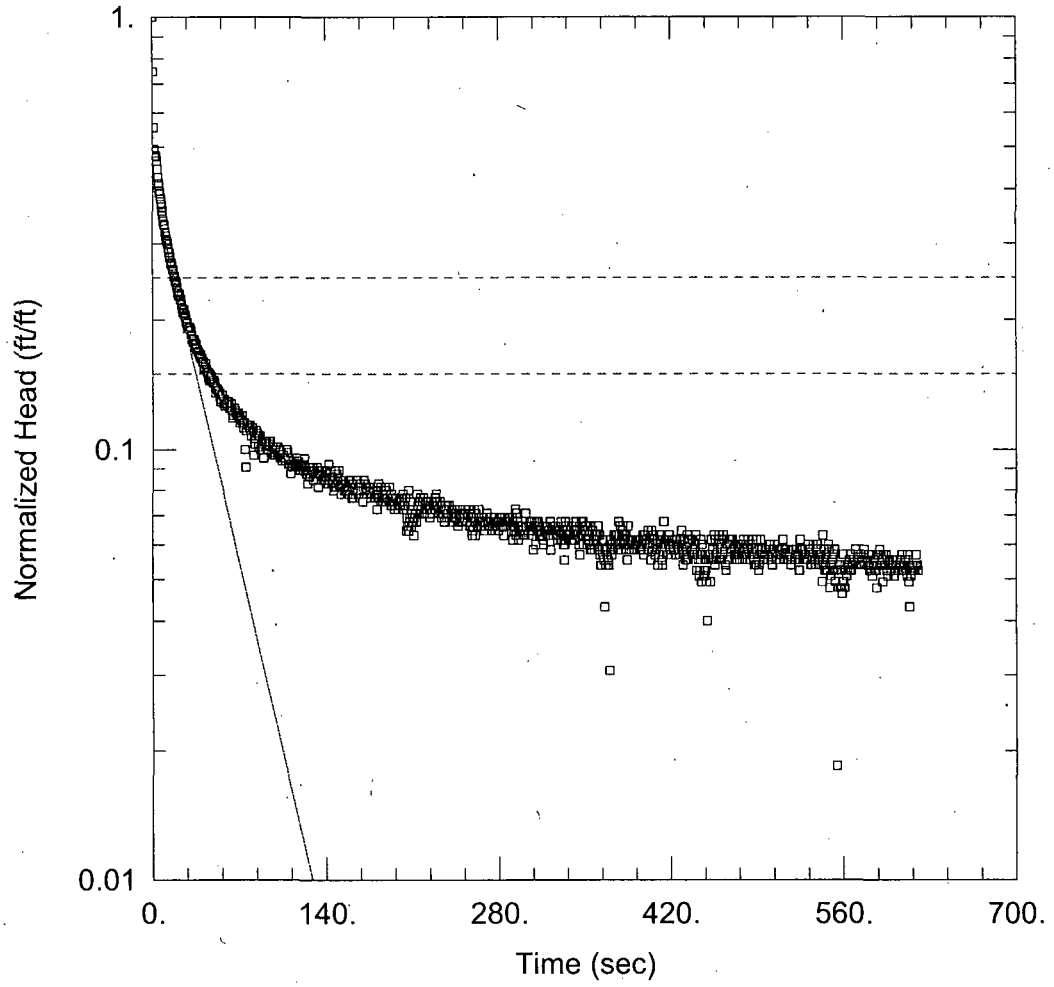
Saturated Thickness: 22.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-02I)

Initial Displacement: 0.65 ft
Total Well Penetration Depth: 19. ft
Casing Radius: 0.083 ft
Static Water Column Height: 14.74 ft
Screen Length: 17. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 13.75 gal/day/ft^2
y0 = 0.2655 ft



JPG-DU-02I TEST1RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-02I\JPG-DU-02I Test1rh. Horslev.aqt
Date: 07/26/10 Time: 13:36:20

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

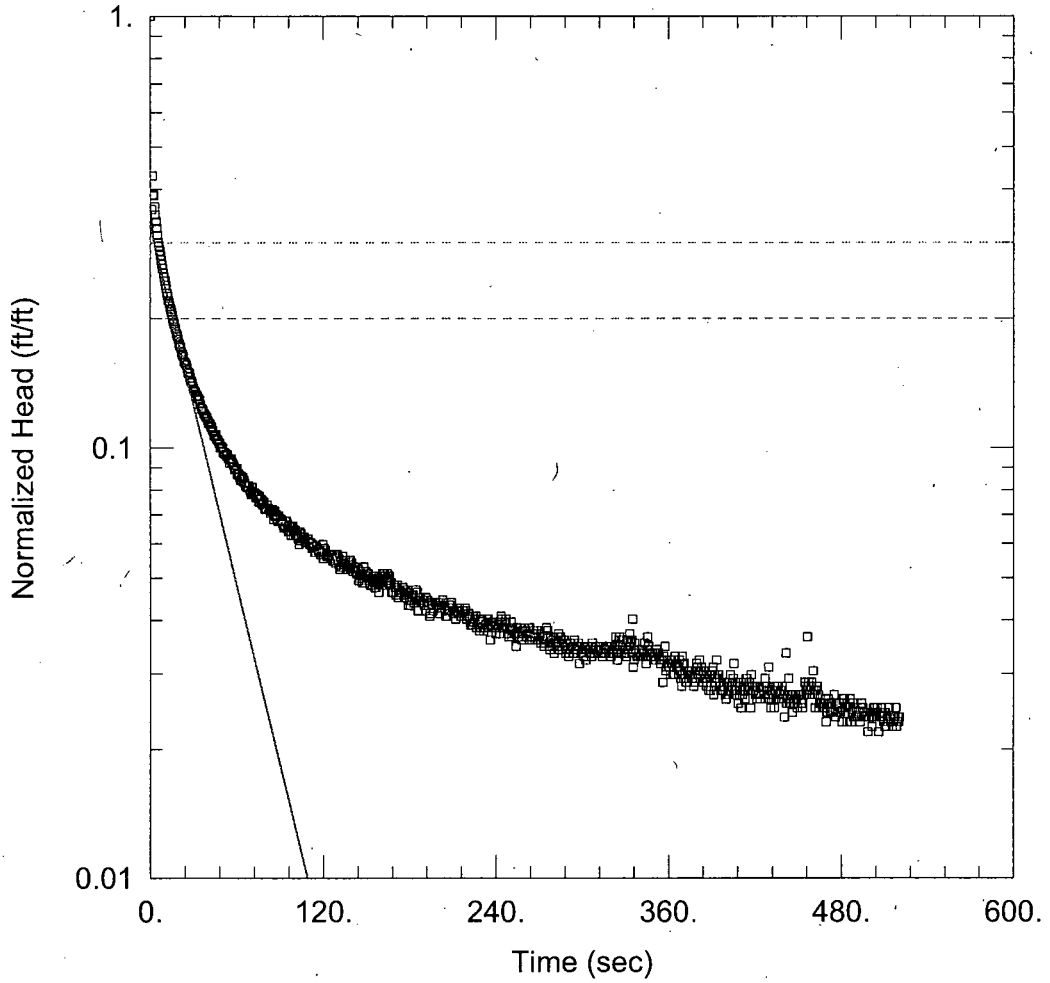
Saturated Thickness: 22.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-02I)

Initial Displacement: 0.65 ft
Total Well Penetration Depth: 19. ft
Casing Radius: 0.083 ft
Static Water Column Height: 14.74 ft
Screen Length: 17. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 19.67 gal/day/ft^2
y0 = 0.2676 ft



JPG-DU-02I TEST2FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-02I\JPG-DU-02I Test2fh B-R.aqt
Date: 07/26/10 Time: 13:37:20

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

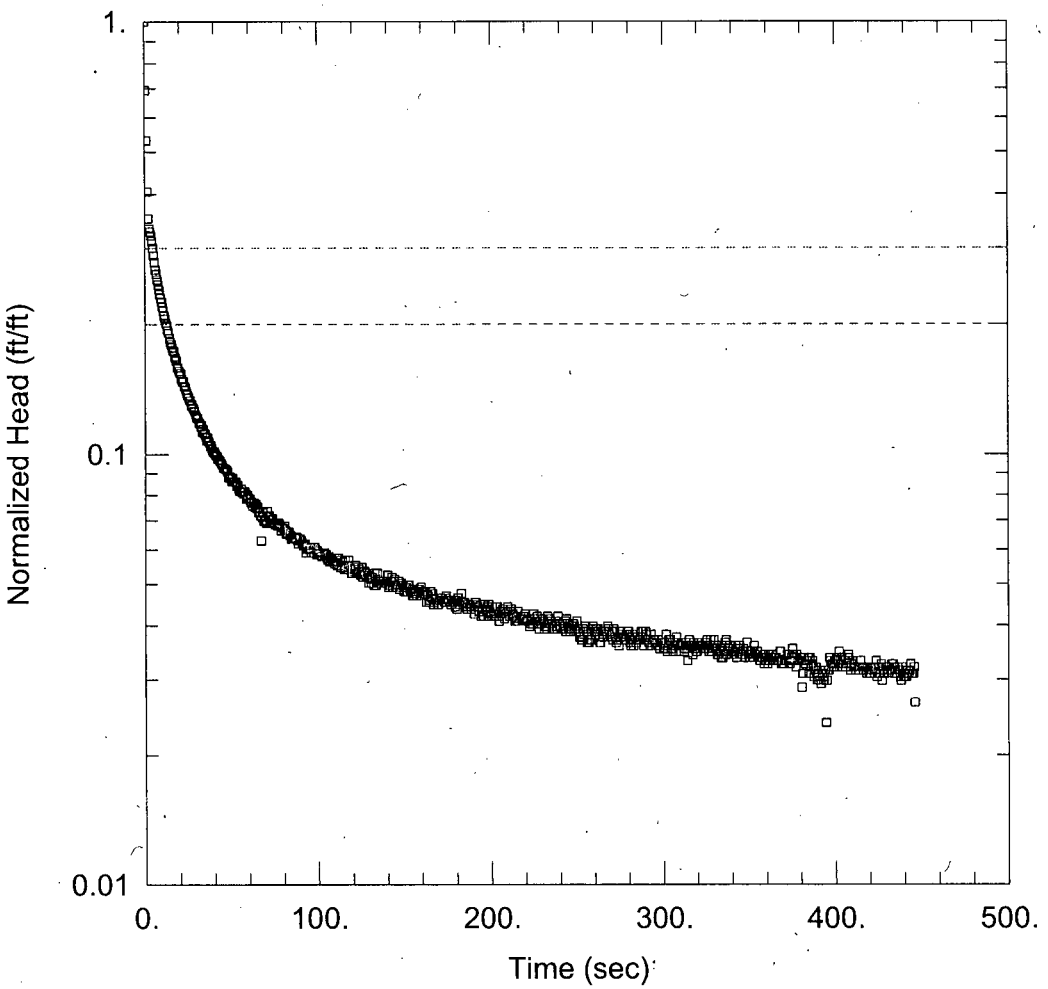
Saturated Thickness: 22.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-02I)

Initial Displacement: 1.64 ft
Total Well Penetration Depth: 19. ft
Casing Radius: 0.083 ft
Static Water Column Height: 14.69 ft
Screen Length: 17. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 16.14 gal/day/ft^2
y0 = 0.5374 ft



JPG-DU-02I TEST2RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-02I\JPG-DU-02I Test2rh B-R.aqt
Date: 07/26/10 Time: 13:38:44

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

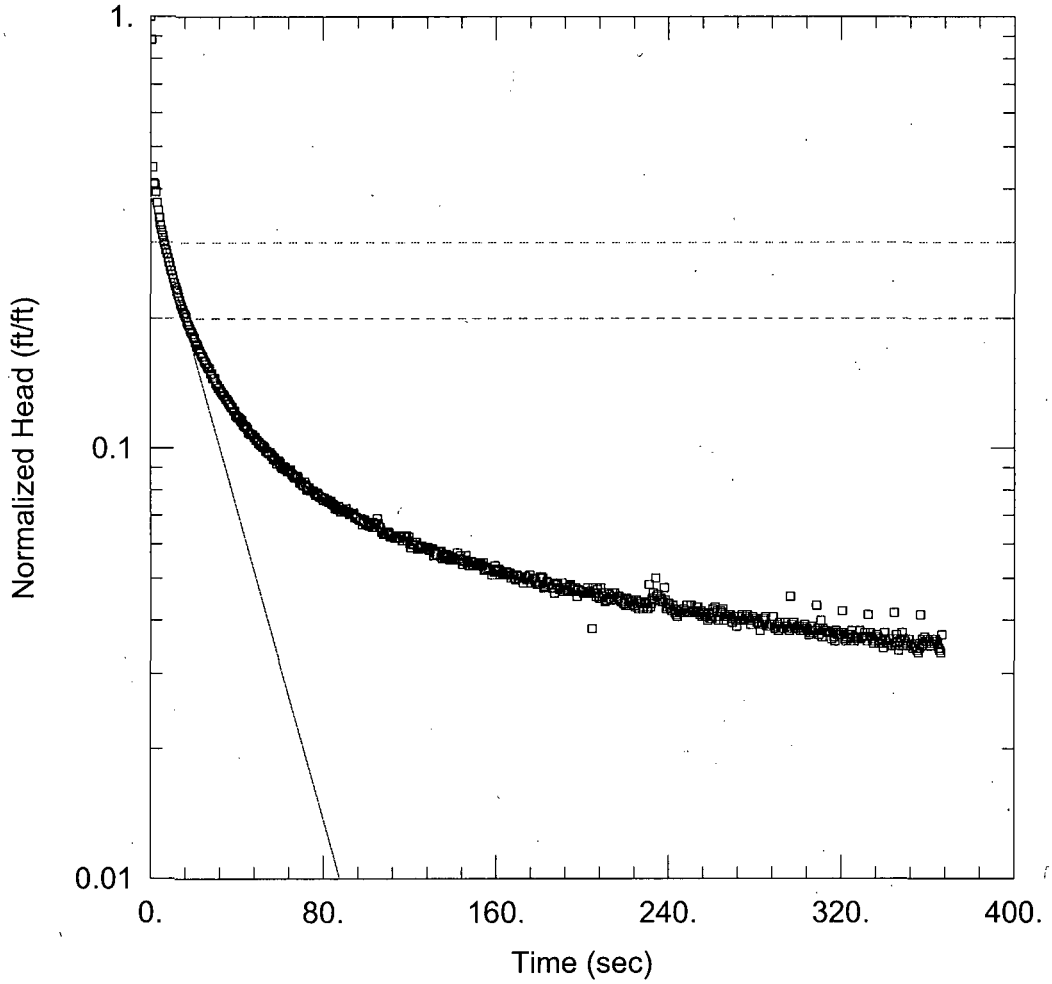
Saturated Thickness: 22.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-02I)

Initial Displacement: 1.81 ft
Total Well Penetration Depth: 19. ft
Casing Radius: 0.083 ft
Static Water Column Height: 14.74 ft
Screen Length: 17. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 20.67 gal/day/ft^2
y0 = 0.5918 ft



JPG-DU-02I TEST3FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-02I\JPG-DU-02I Test3fh B-R.aqt
Date: 07/26/10 Time: 13:40:27

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

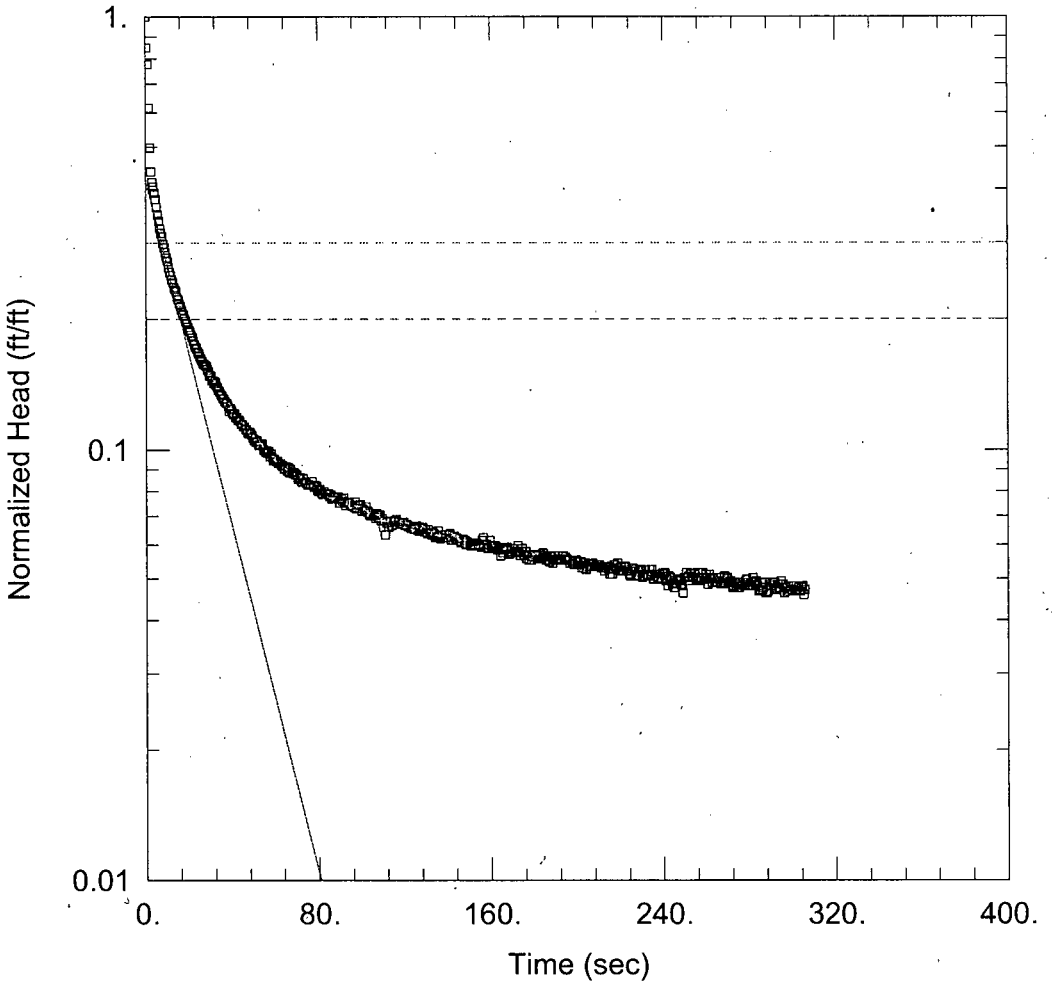
Saturated Thickness: 22.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-02I)

Initial Displacement: 2.355 ft
Total Well Penetration Depth: 19. ft
Casing Radius: 0.083 ft
Static Water Column Height: 14.77 ft
Screen Length: 17. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 20.97 gal/day/ft^2
y0 = 0.9031 ft



JPG-DU-02I TEST3RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-02I\JPG-DU-02I Test3rh B-R.aqt
Date: 07/26/10 Time: 13:41:27

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

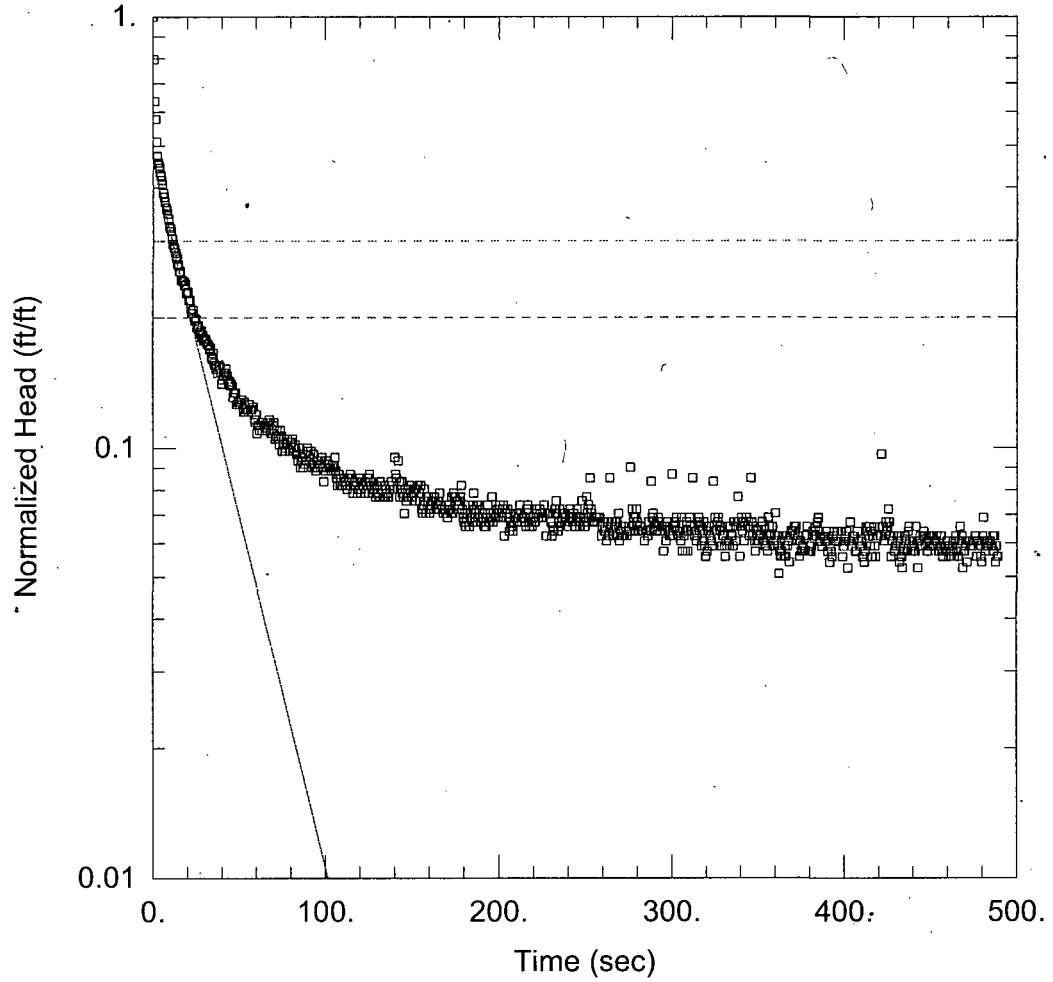
Saturated Thickness: 22.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-02I)

Initial Displacement: 2.226 ft
Total Well Penetration Depth: 19. ft
Casing Radius: 0.083 ft
Static Water Column Height: 14.77 ft
Screen Length: 17. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 23.3 gal/day/ft^2
y0 = 0.9328 ft



JPG-DU-02I TEST4FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-02I\JPG-DU-02I Test4fh B-R.aqt
Date: 07/26/10 Time: 13:42:27

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

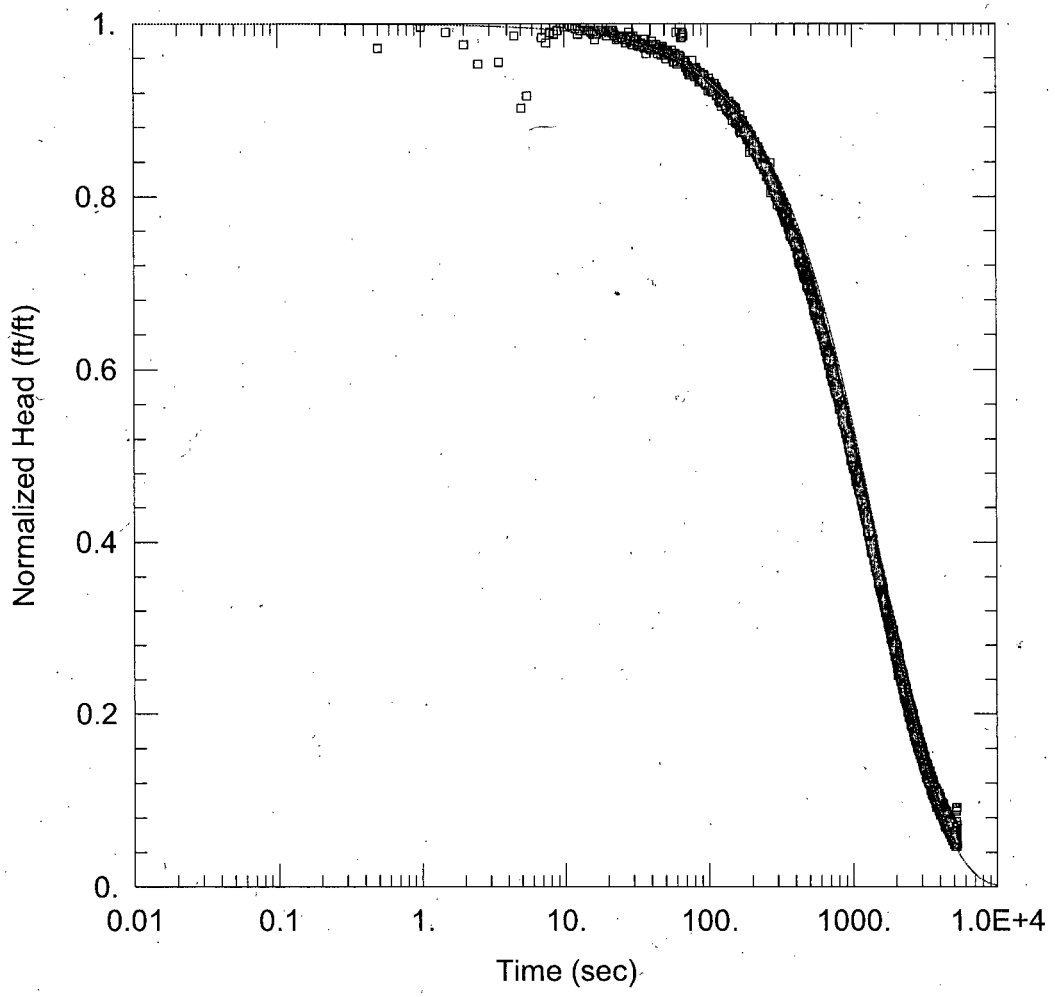
Saturated Thickness: 22.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-02I)

Initial Displacement: 0.61 ft
Total Well Penetration Depth: 19. ft
Casing Radius: 0.083 ft
Static Water Column Height: 14.67 ft
Screen Length: 17. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 18.98 gal/day/ft^2
y0 = 0.2783 ft



MW-2 TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-2\MW-2 Test1fh - KGS.aqt
Date: 07/26/10 Time: 16:16:48

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

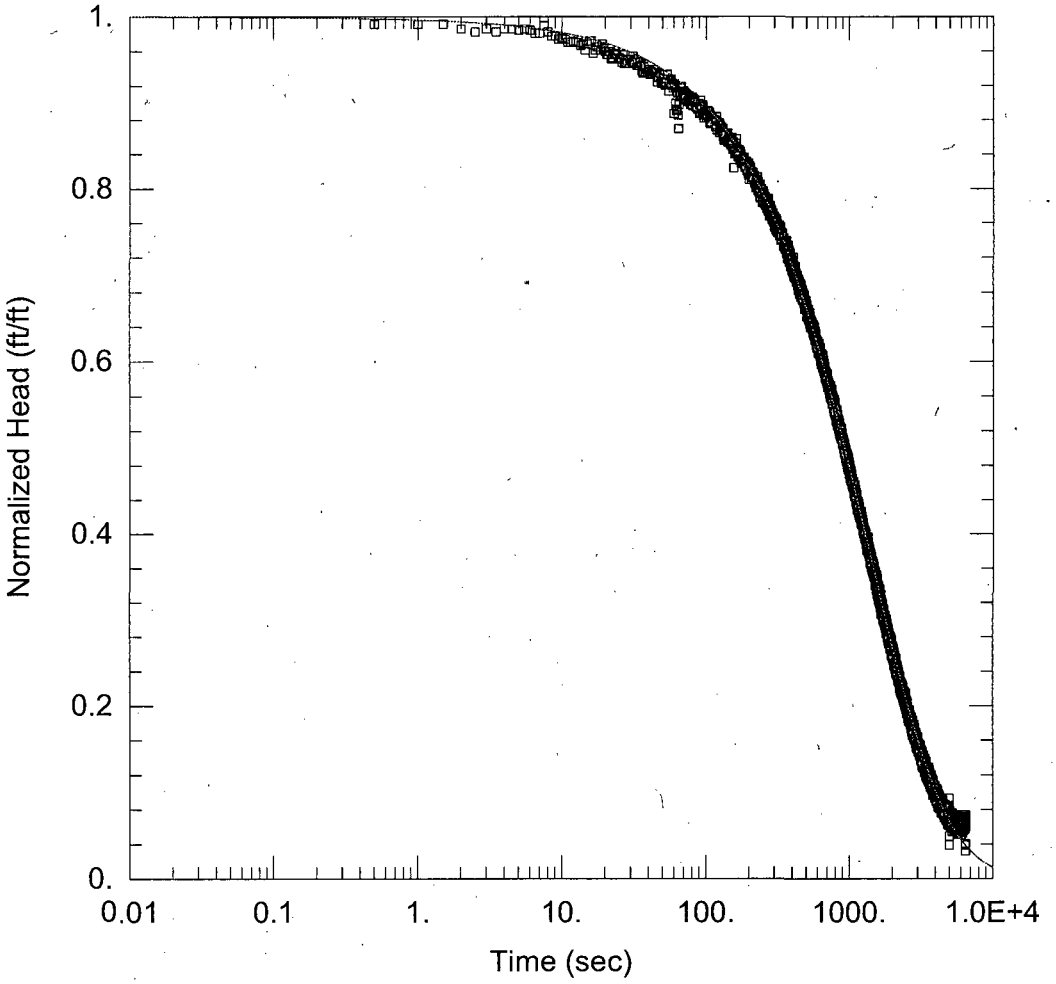
WELL DATA (MW-2)

Initial Displacement: 0.491 ft
Total Well Penetration Depth: 17.9 ft
Casing Radius: 0.083 ft
Static Water Column Height: 16.31 ft
Screen Length: 11.2 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.5294 gal/day/ft^2
Kz/Kr = 1.
Ss = 1.0E-6 ft^{-1}



MW-2 TEST1RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-2\MW-2 Test1rh.aqt
Date: 07/26/10 Time: 16:17:51

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

WELL DATA (MW-2)

Initial Displacement: 0.568 ft
Total Well Penetration Depth: 17.9 ft
Casing Radius: 0.083 ft

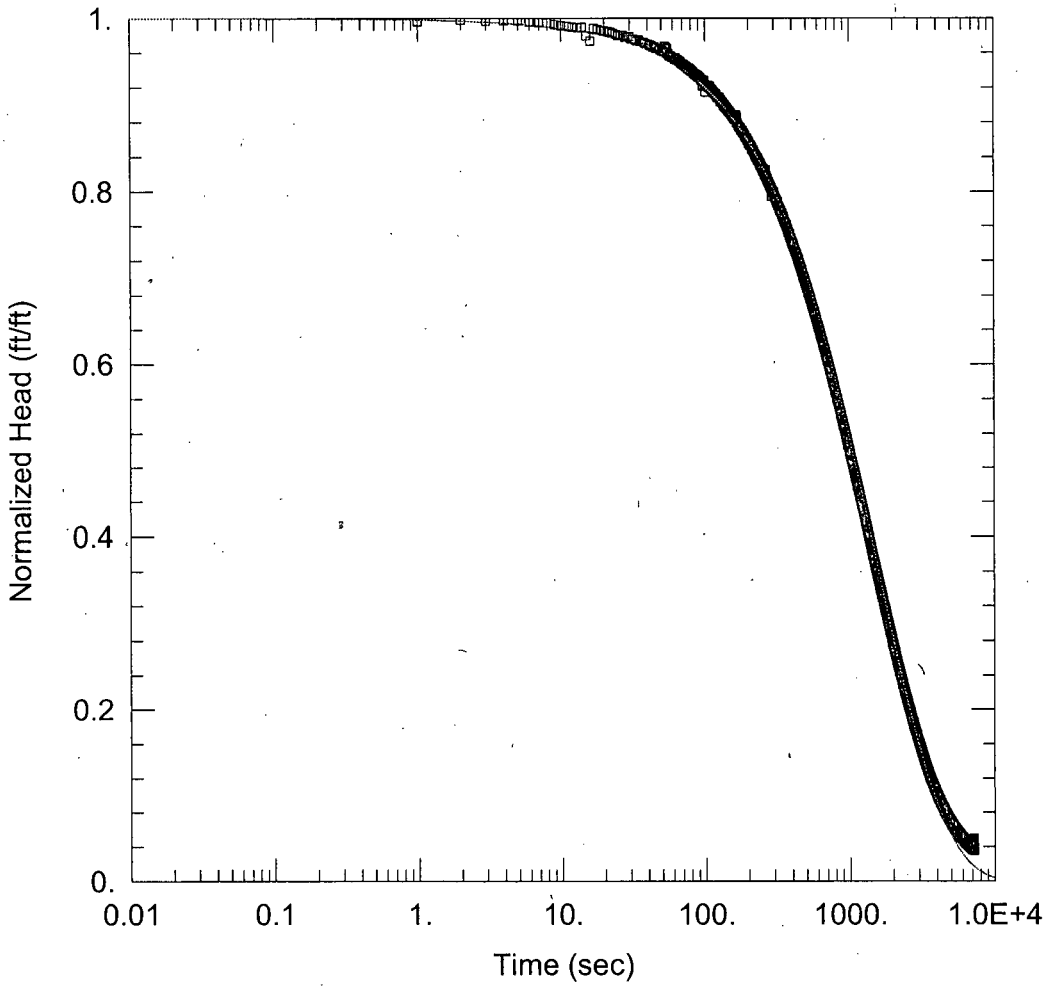
Static Water Column Height: 16.34 ft
Screen Length: 11.2 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.4991 gal/day/ft^2
Kz/Kr = 1.

Ss = 0.0001 ft^{-1}



MW-2 TEST2FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-2\MW-2 Test2fh - KGS.aqt
Date: 07/26/10 Time: 16:21:11

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

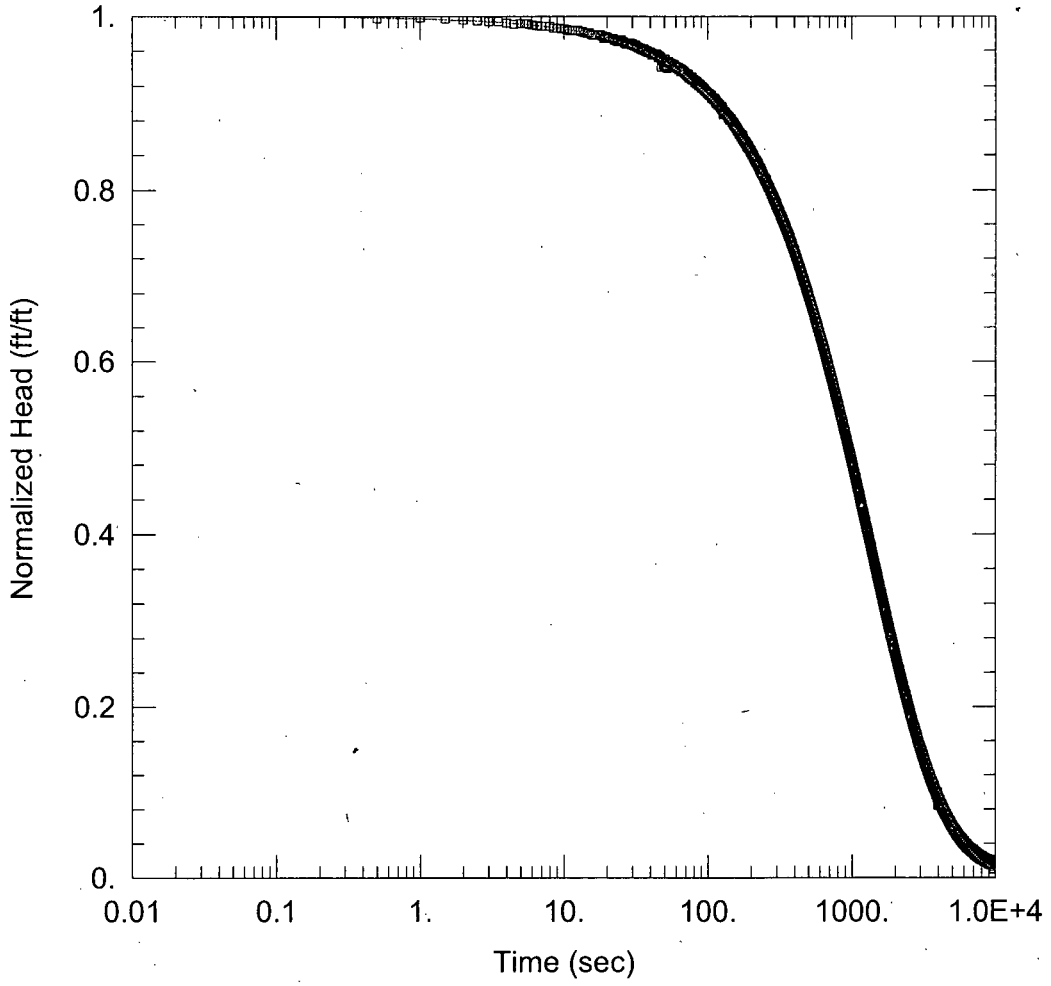
WELL DATA (MW-2)

Initial Displacement: 2.257 ft
Total Well Penetration Depth: 17.9 ft
Casing Radius: 0.083 ft
Static Water Column Height: 16.29 ft
Screen Length: 11.2 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.5339 gal/day/ft^2
Kz/Kr = 1.
Ss = 1.0E-5 ft^{-1}



MW-2 TEST2RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-2\MW-2 Test2rh - KGS.aqt
Date: 07/26/10 Time: 16:22:16

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

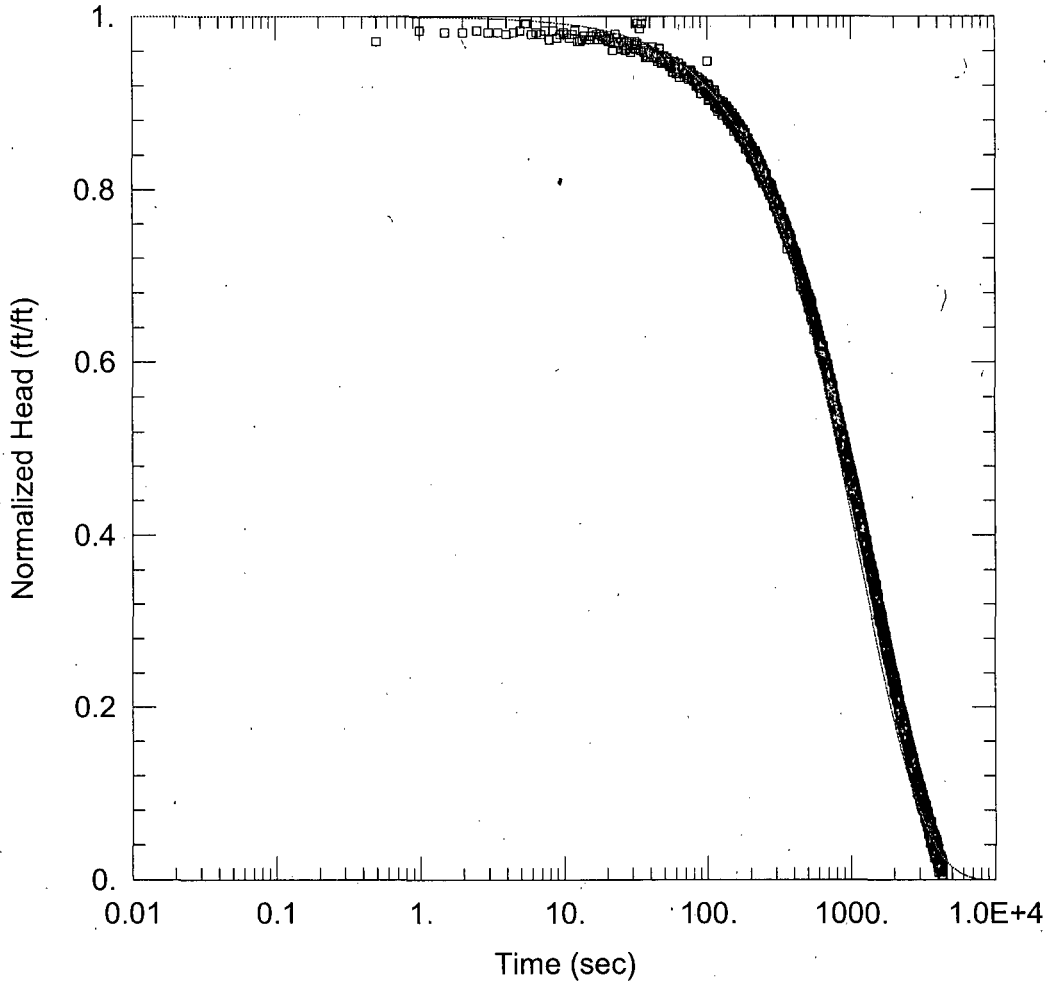
WELL DATA (MW-2)

Initial Displacement: 2.162 ft
Total Well Penetration Depth: 17.9 ft
Casing Radius: 0.083 ft
Static Water Column Height: 16.34 ft
Screen Length: 11.2 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.5041 gal/day/ft^2
Kz/Kr = 1.
Ss = 4.266E-5 ft^{-1}



MW-2 TEST4FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-2\MW-2 Test4fh - KGS.aqt
Date: 07/26/10 Time: 16:23:21

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

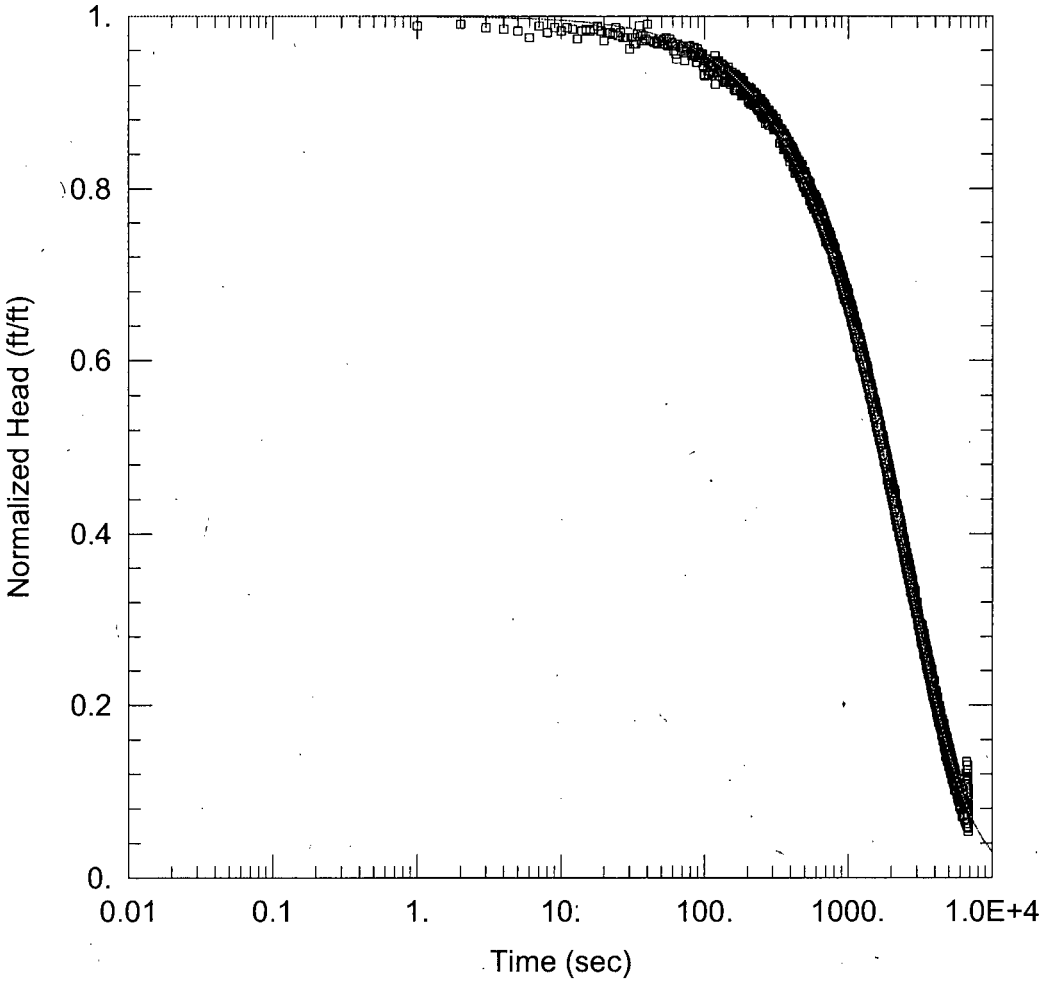
WELL DATA (MW-2)

Initial Displacement: 0.482 ft
Total Well Penetration Depth: 17.9 ft
Casing Radius: 0.083 ft
Static Water Column Height: 16.16 ft
Screen Length: 11.2 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.7368 gal/day/ft^2
Kz/Kr = 1.
Ss = 3.333E-12 ft^{-1}



MW-3 TEST1FH

Data Set: P:\...\MW-3 Test1fh KGS Con.aqt
Date: 07/27/10 Time: 10:37:57

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

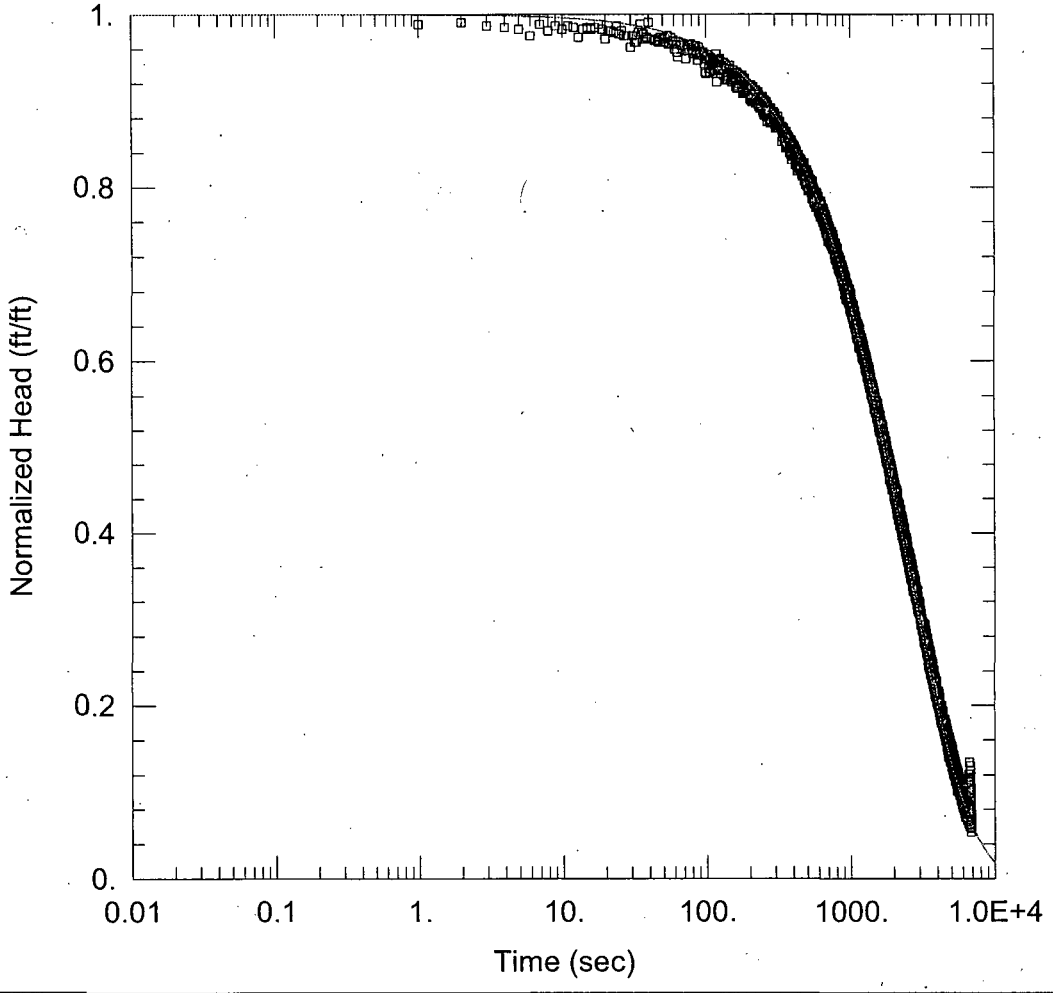
WELL DATA (MW-3)

Initial Displacement: 0.522 ft
Total Well Penetration Depth: 26.1 ft
Casing Radius: 0.083 ft
Static Water Column Height: 37.11 ft
Screen Length: 11.8 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.54 gal/day/ft^2
Kz/Kr = 1.
Ss = 2.0E-11 ft^{-1}



MW-3 TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-3\MW-3 Analysis\MW-3 Test1fh KGS.aqt
Date: 07/27/10 Time: 10:39:08

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

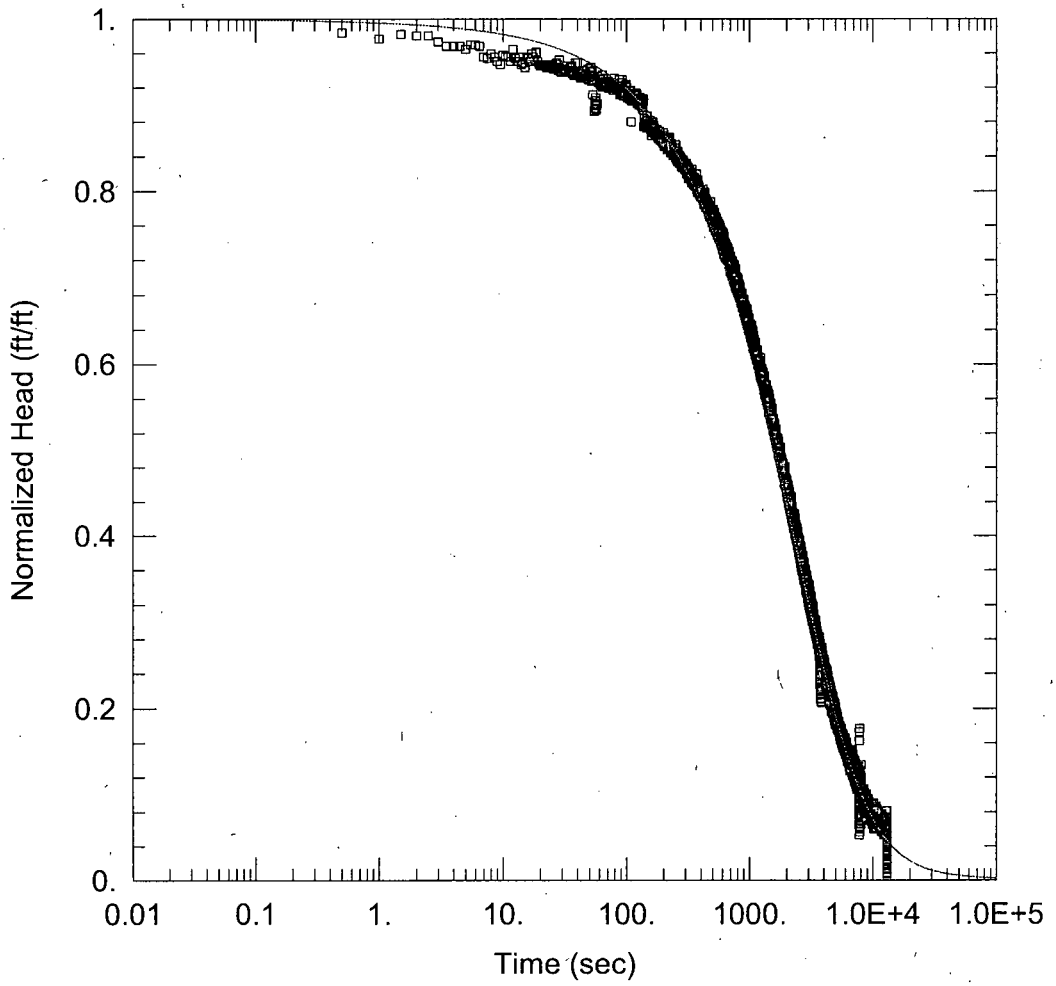
WELL DATA (MW-3)

Initial Displacement: 0.522 ft
Total Well Penetration Depth: 26.1 ft
Casing Radius: 0.083 ft
Static Water Column Height: 37.11 ft
Screen Length: 11.8 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.3546 gal/day/ft^2
Kz/Kr = 1.
Ss = 2.0E-11 ft^{-1}



MW-3 TEST1RH

Data Set: P:\...\MW-3 Test1rh KGS Con.aqt
Date: 07/27/10 Time: 10:40:17

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

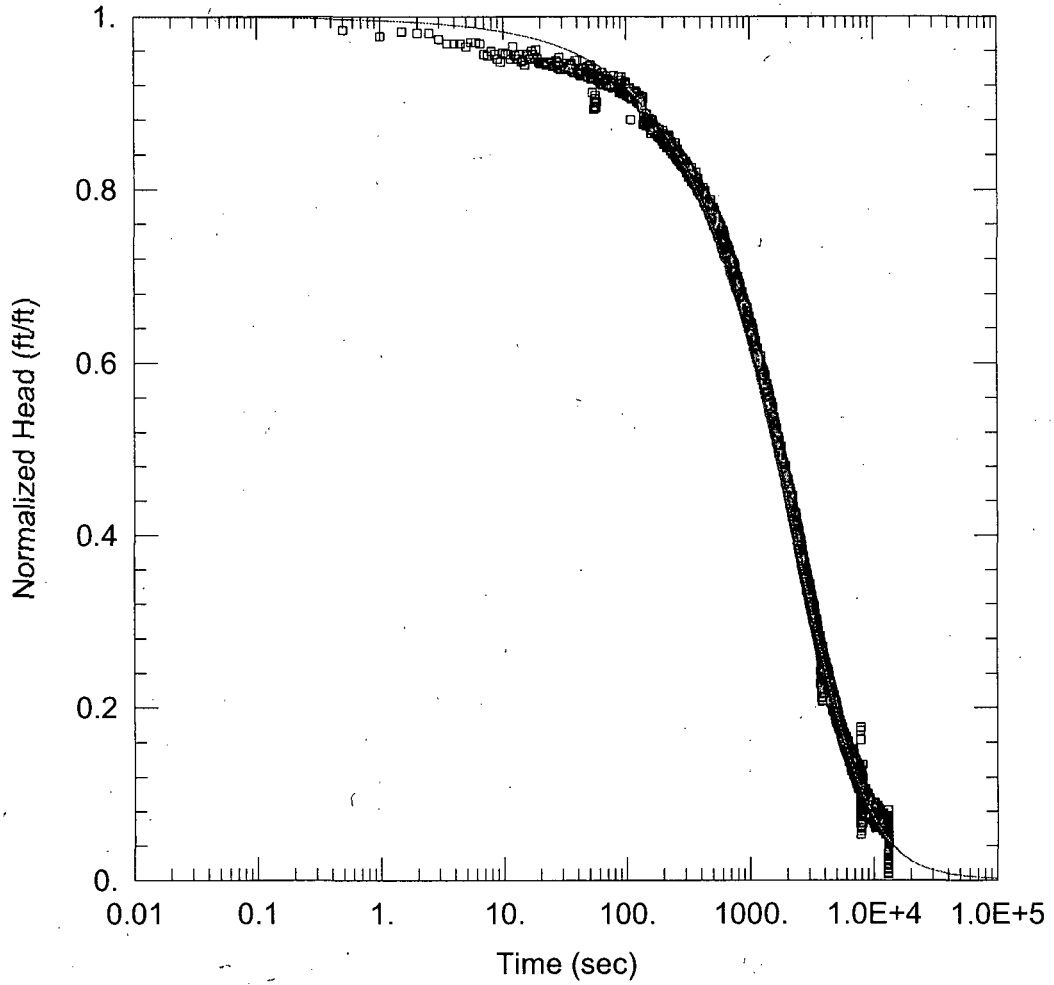
WELL DATA (MW-3)

Initial Displacement: 0.566 ft
Total Well Penetration Depth: 26.1 ft
Casing Radius: 0.083 ft
Static Water Column Height: 37.15 ft
Screen Length: 11.8 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.2207 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.0004365 ft^{-1}



MW-3 TEST1RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-3\MW-3 Analysis\MW-3 Test1rh KGS.aqt
Date: 07/27/10 Time: 10:41:29

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

WELL DATA (MW-3)

Initial Displacement: 0.566 ft
Total Well Penetration Depth: 26.1 ft
Casing Radius: 0.083 ft

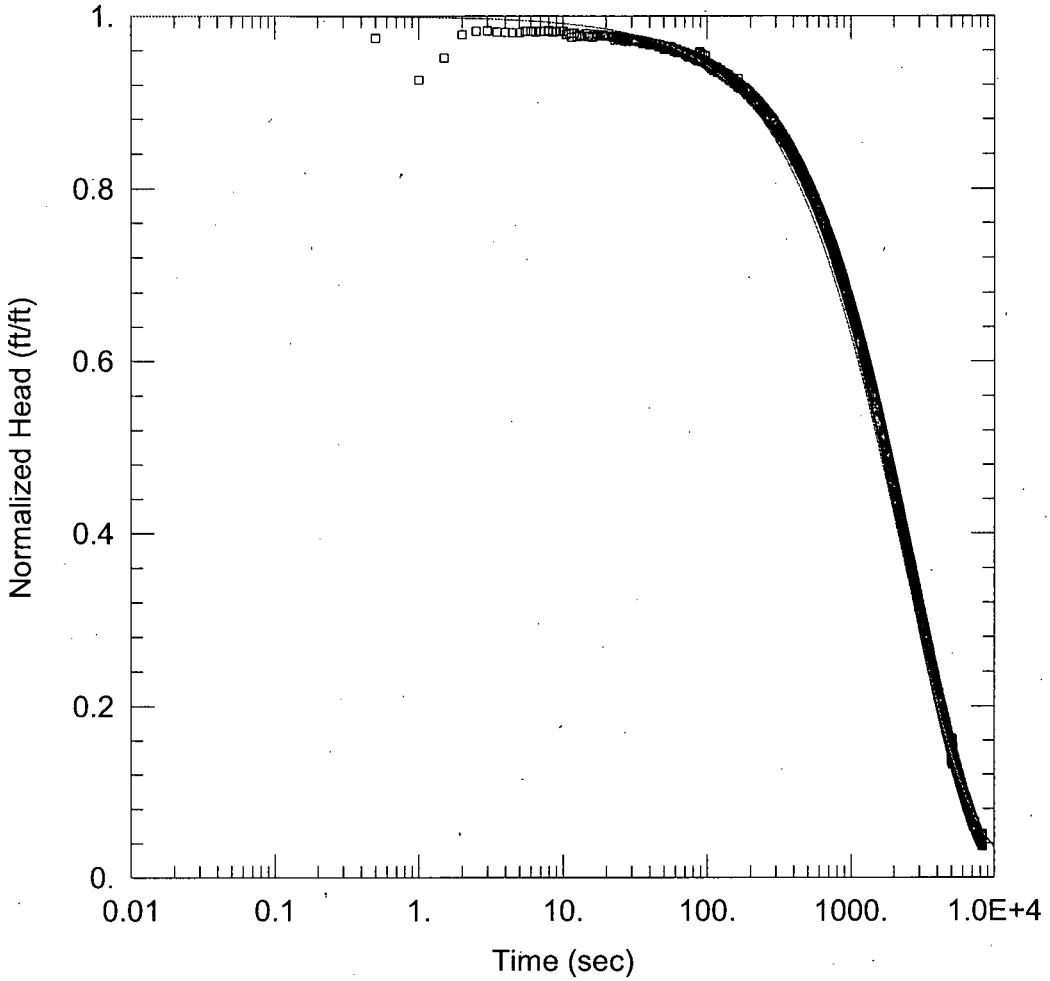
Static Water Column Height: 37.15 ft
Screen Length: 11.8 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.2207 gal/day/ft^2
Kz/Kr = 1.

Ss = 0.0004365 ft^{-1}



MW-3 TEST2FH

Data Set: P:\...\MW-3 Test2fh KGS Con.aqt
Date: 07/27/10 Time: 10:43:26

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

WELL DATA (MW-3)

Initial Displacement: 2.264 ft
Total Well Penetration Depth: 26.1 ft
Casing Radius: 0.083 ft

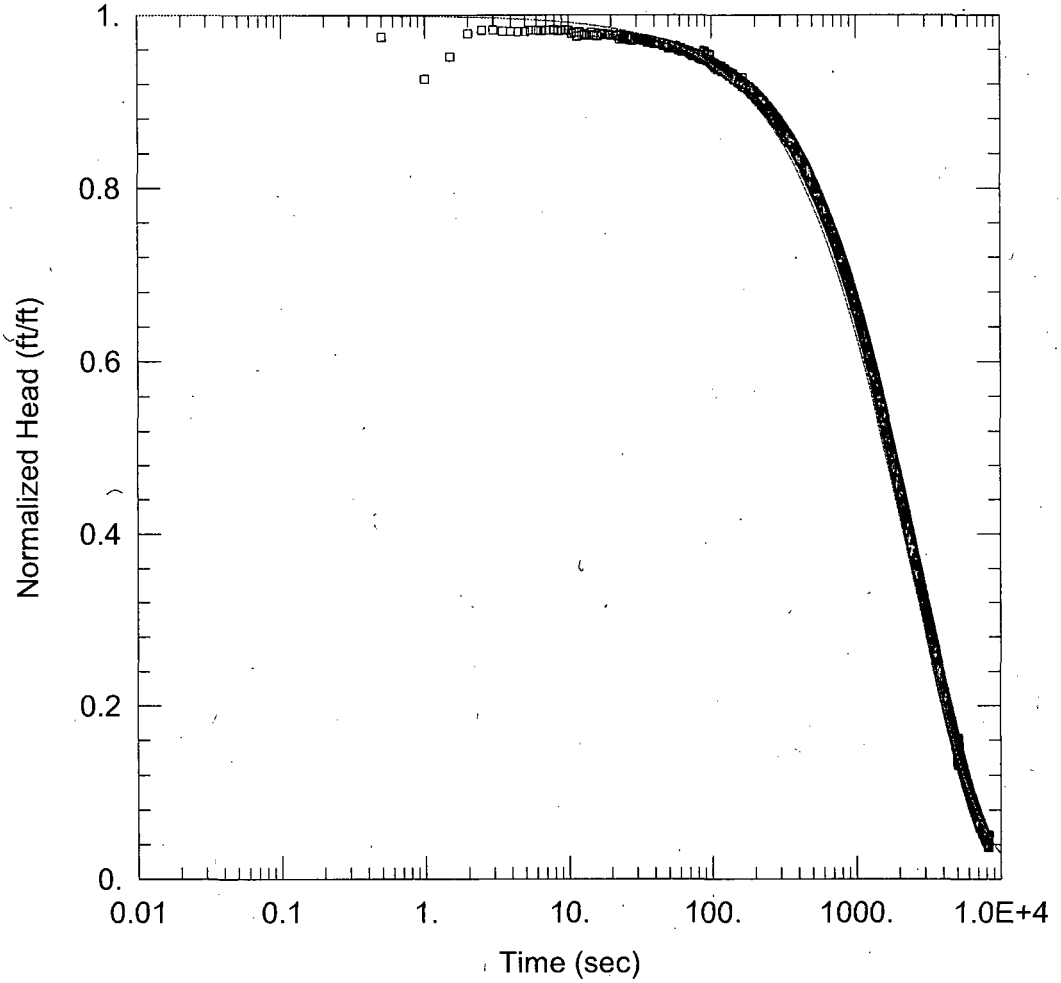
Static Water Column Height: 37.1 ft
Screen Length: 11.8 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.3467 gal/day/ft^2
Kz/Kr = 1.

Ss = 1.0E-5 ft^{-1}



MW-3 TEST2FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-3\MW-3 Analysis\MW-3 Test2fh KGS.aqt
Date: 07/27/10 Time: 10:45:05

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

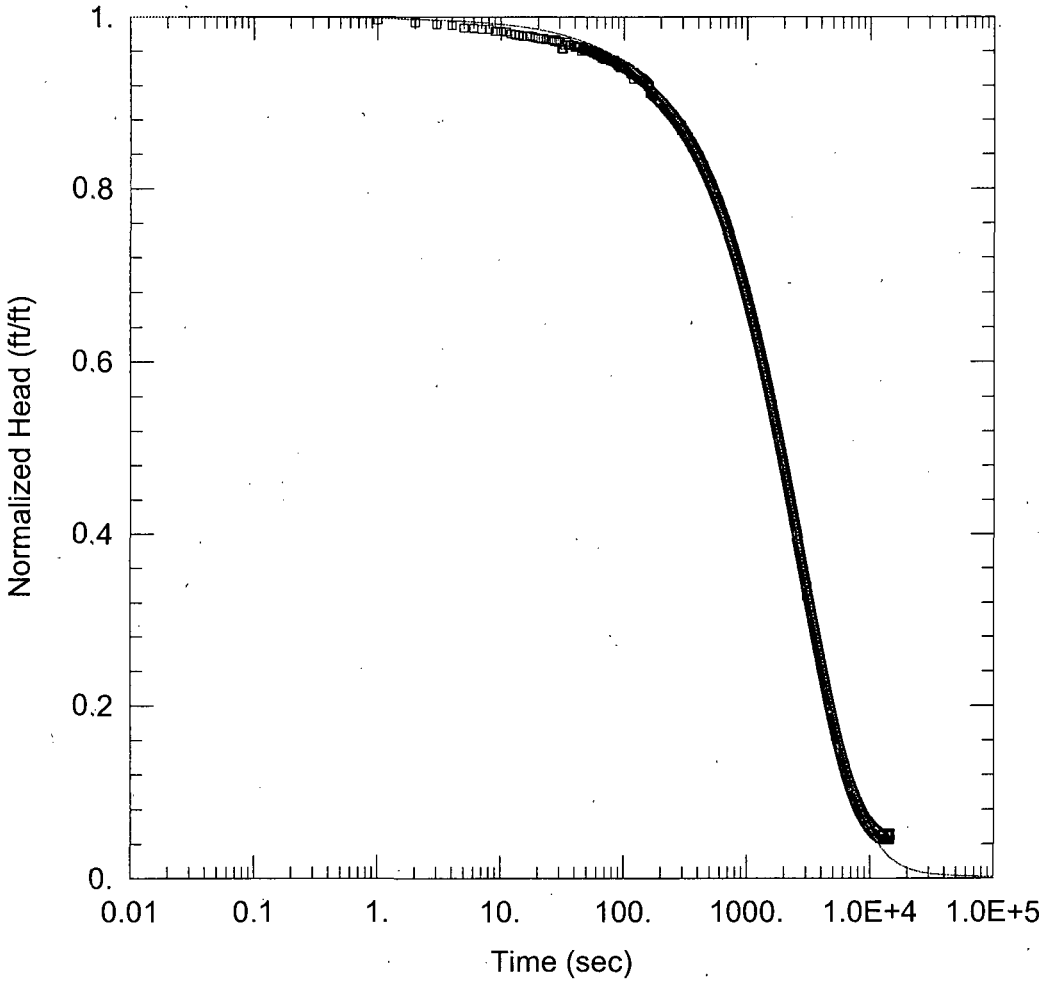
WELL DATA (MW-3)

Initial Displacement: 2.264 ft
Total Well Penetration Depth: 26.1 ft
Casing Radius: 0.083 ft
Static Water Column Height: 37.1 ft
Screen Length: 11.8 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.3467 gal/day/ft^2
Kz/Kr = 1.
Ss = 1.0E-5 ft^{-1}



MW-3 TEST2RH

Data Set: P:\...\MW-3 Test2rh KGS Con.aqt
Date: 07/27/10 Time: 10:46:31

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

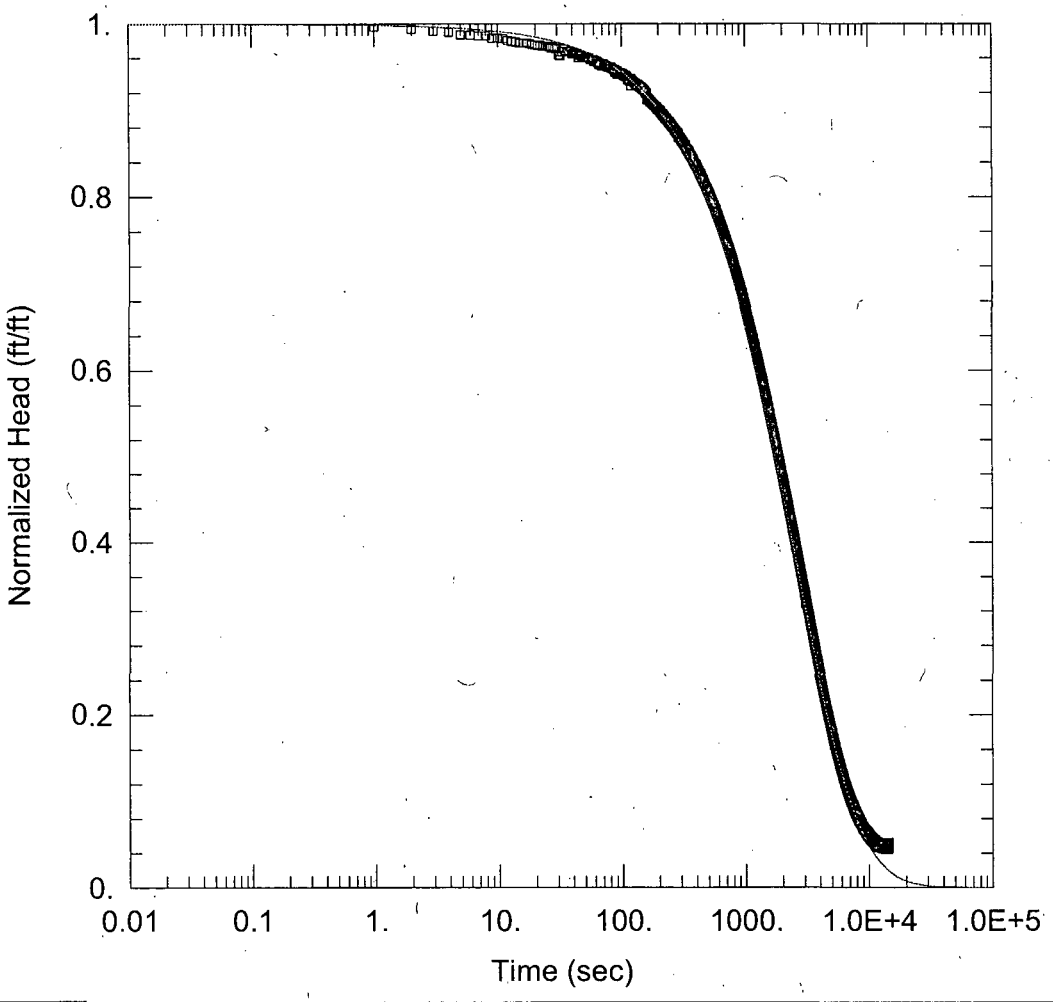
WELL DATA (MW-3)

Initial Displacement: 2.331 ft
Total Well Penetration Depth: 26.1 ft
Casing Radius: 0.083 ft
Static Water Column Height: 37.19 ft
Screen Length: 11.8 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.274 gal/day/ft^2
Kz/Kr = 1.
Ss = 2.291E-5 ft^{-1}



MW-3 TEST2RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-3\MW-3 Analysis\MW-3 Test2rh KGS.aqt
Date: 07/27/10 Time: 10:48:40

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

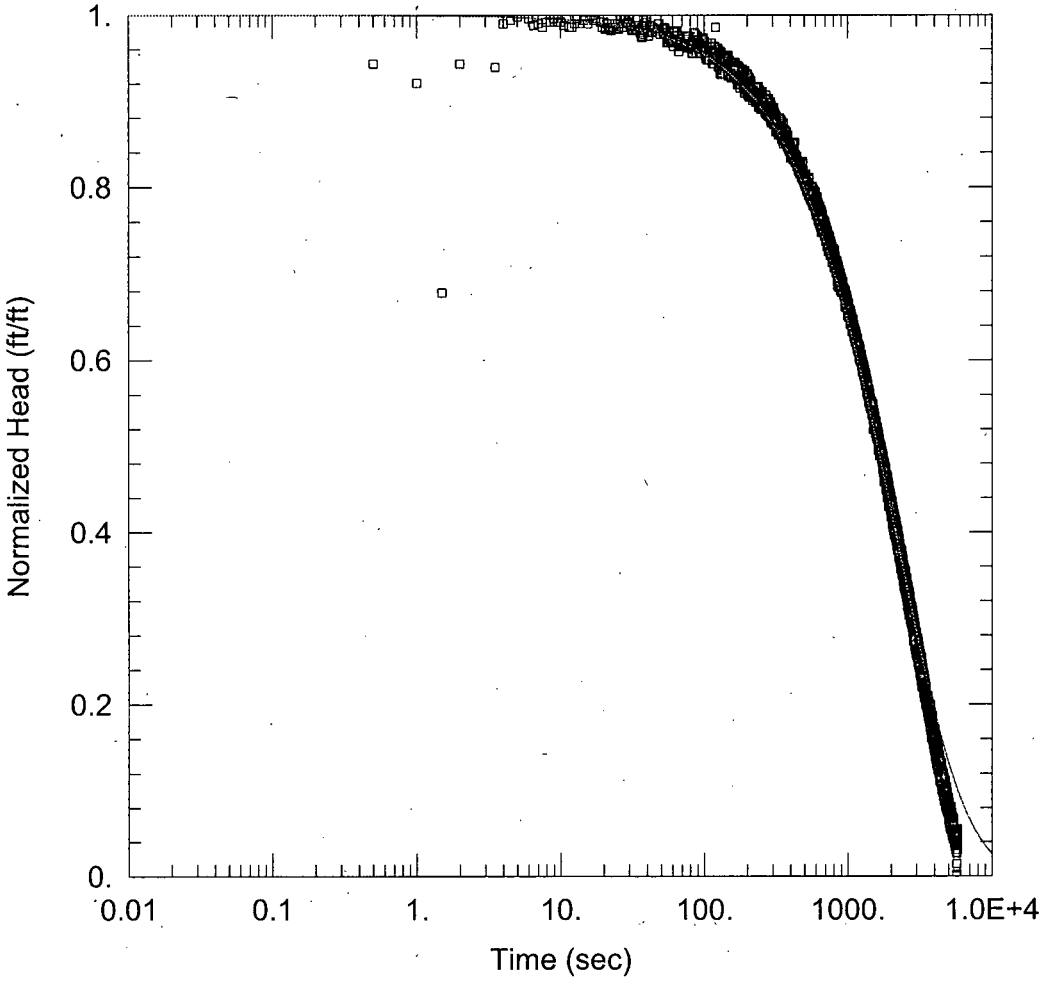
WELL DATA (MW-3)

Initial Displacement: 2.331 ft
Total Well Penetration Depth: 26.1 ft
Casing Radius: 0.083 ft
Static Water Column Height: 37.19 ft
Screen Length: 11.8 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.2939 gal/day/ft^2
Kz/Kr = 1.
Ss = 2.291E-5 ft^{-1}



MW-3 TEST3FH

Data Set: P:\...\MW-3 Test3fh KGS Con.aqt
Date: 07/27/10 Time: 10:49:35

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

WELL DATA (MW-3)

Initial Displacement: 0.491 ft
Total Well Penetration Depth: 26.1 ft
Casing Radius: 0.083 ft

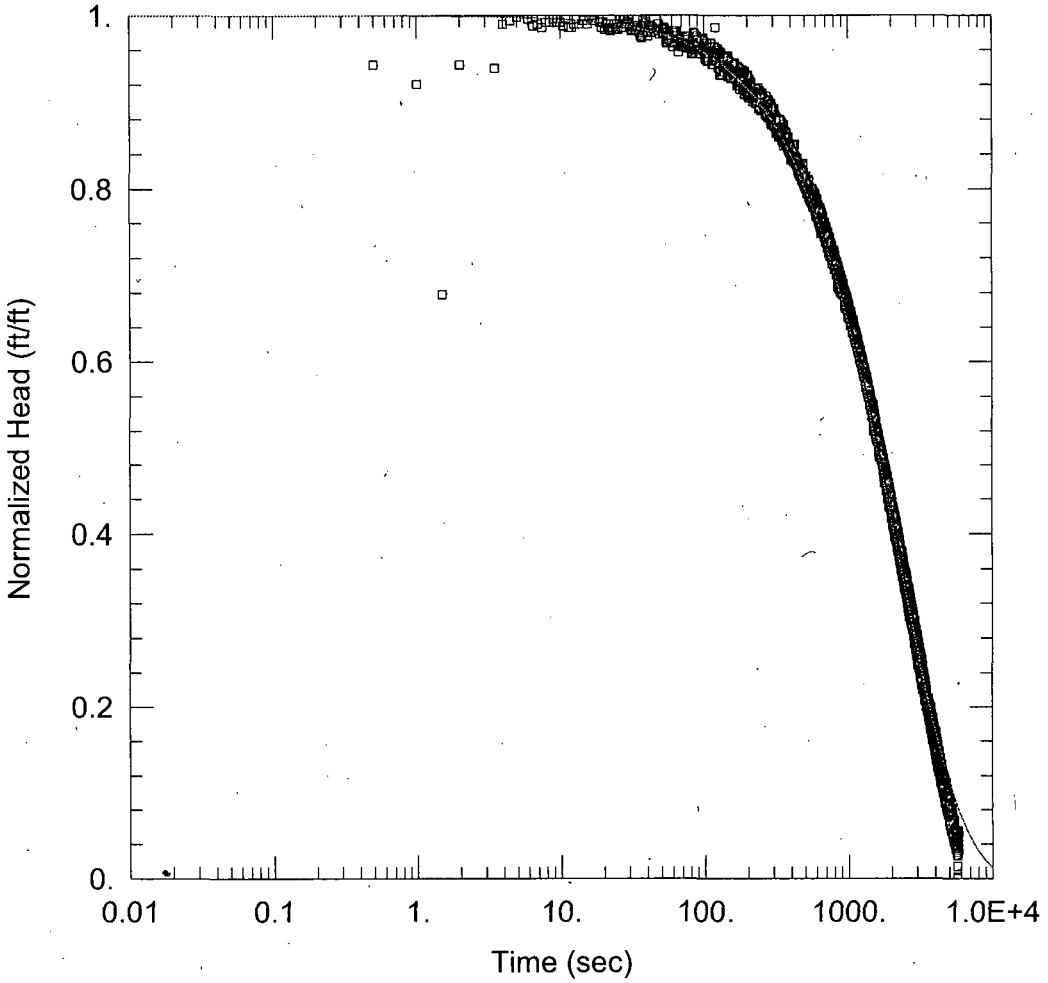
Static Water Column Height: 37.01 ft
Screen Length: 11.8 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.6025 gal/day/ft^2
Kz/Kr = 1.

Ss = 2.0E-12 ft^{-1}



MW-3 TEST3FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-3\MW-3 Analysis\MW-3 Test3fh KGS.aqt
Date: 07/27/10 Time: 10:50:31

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

WELL DATA (MW-3)

Initial Displacement: 0.491 ft
Total Well Penetration Depth: 26.1 ft
Casing Radius: 0.083 ft

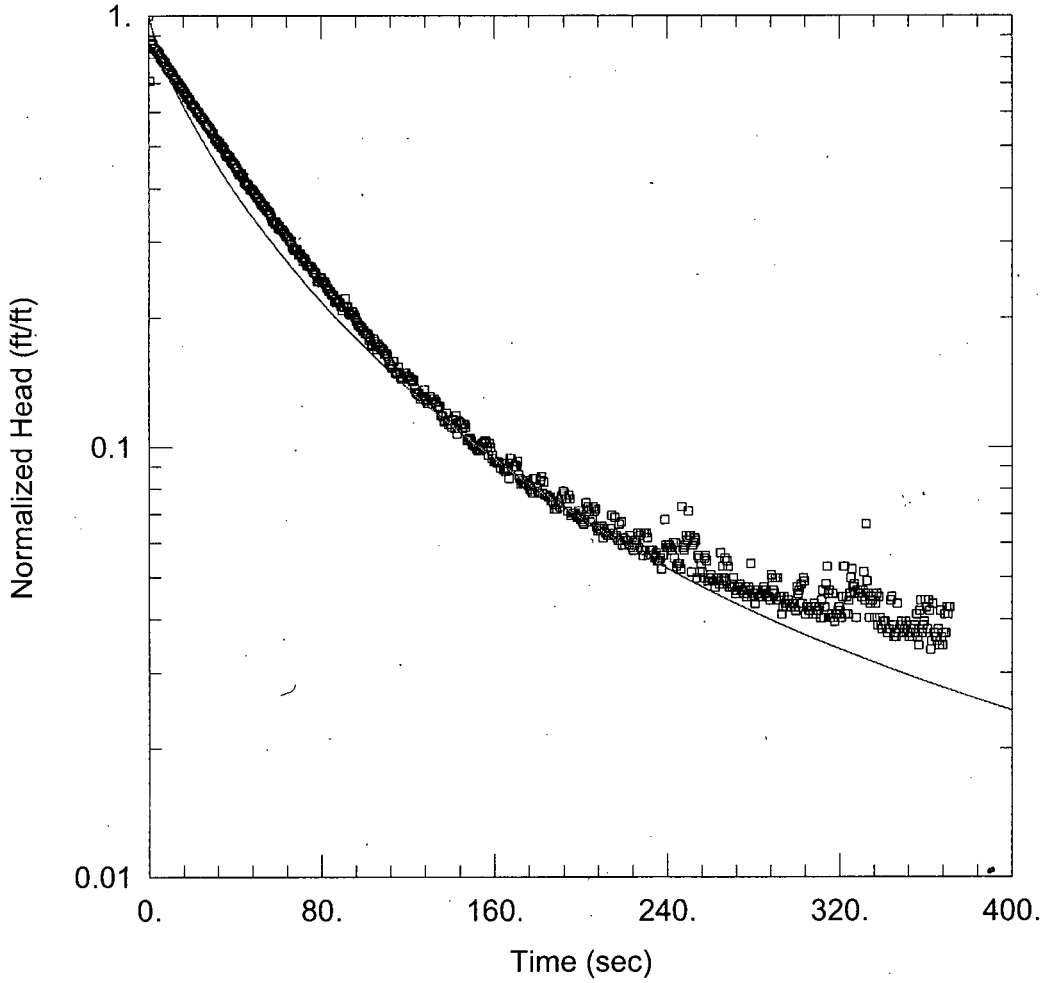
Static Water Column Height: 37.01 ft
Screen Length: 11.8 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.384 gal/day/ft^2
Kz/Kr = 1.

Ss = 2.0E-12 ft^{-1}



JPG-DU-04I TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-04I\JPG-DU-04I Test1fh - KGS.aqt
Date: 07/19/10 Time: 12:39:28

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 20. ft

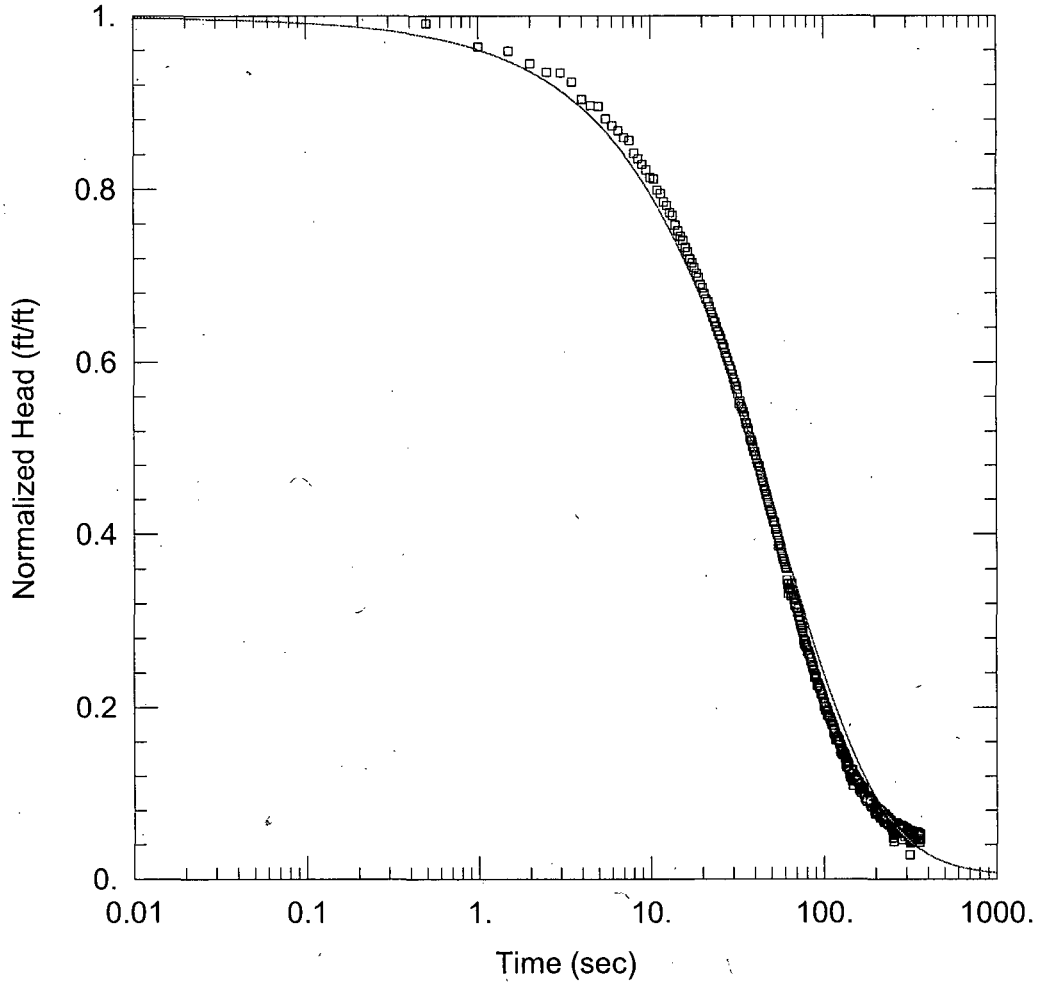
WELL DATA (JPG-DU-04I)

Initial Displacement: 1.266 ft
Total Well Penetration Depth: 18.5 ft
Casing Radius: 0.083 ft
Static Water Column Height: 57.11 ft
Screen Length: 12.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 10.3 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.001082 ft^{-1}



JPG-DU-04I TEST1RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-04I\JPG-DU-04I Test1rh - KGS.aqt
Date: 07/26/10 Time: 15:01:49

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 20. ft

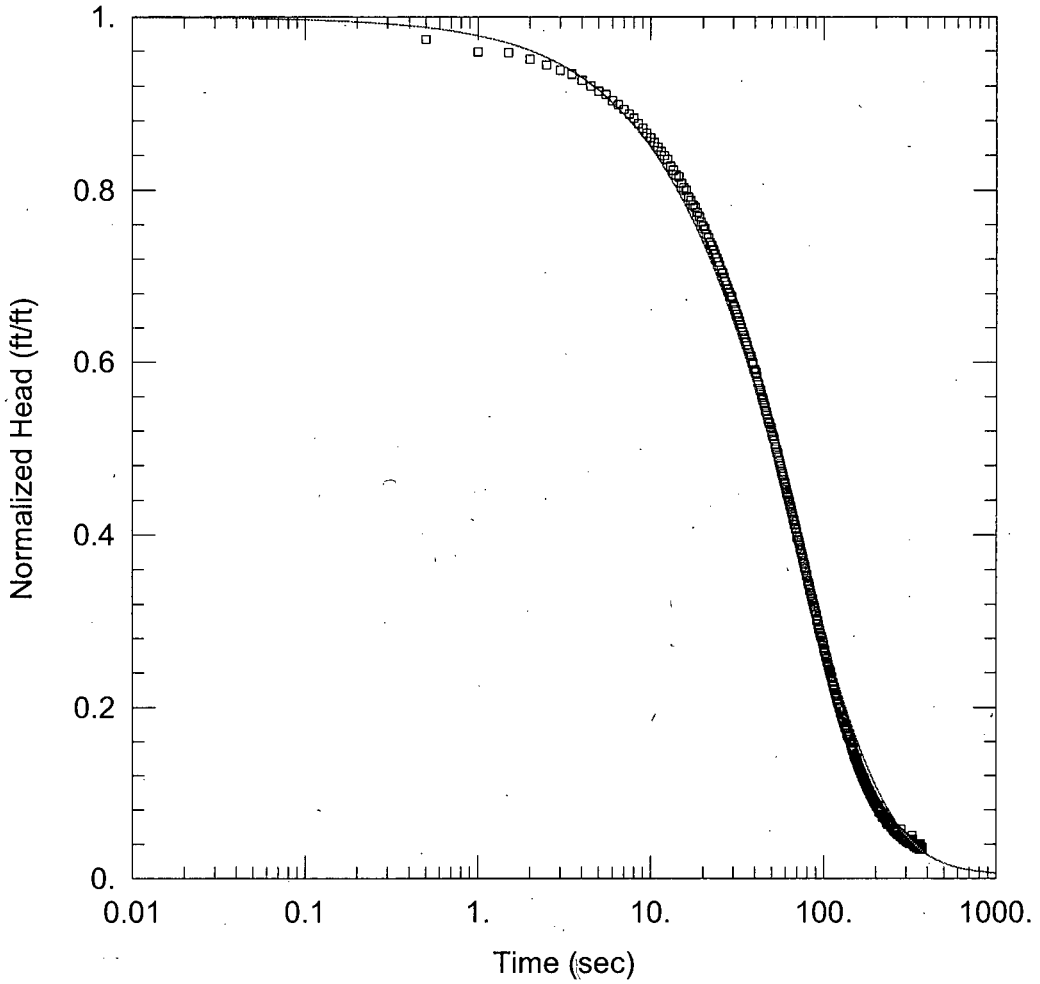
WELL DATA (JPG-DU-04I)

Initial Displacement: 1.242 ft
Total Well Penetration Depth: 18.4 ft
Casing Radius: 0.083 ft
Static Water Column Height: 57.11 ft
Screen Length: 12.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 9.354 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.0002234 ft^{-1}



JPG-DU-04I TEST2FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-04I\JPG-DU-04I Test2fh - KGS.aqt
Date: 07/26/10 Time: 15:03:21

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 20. ft

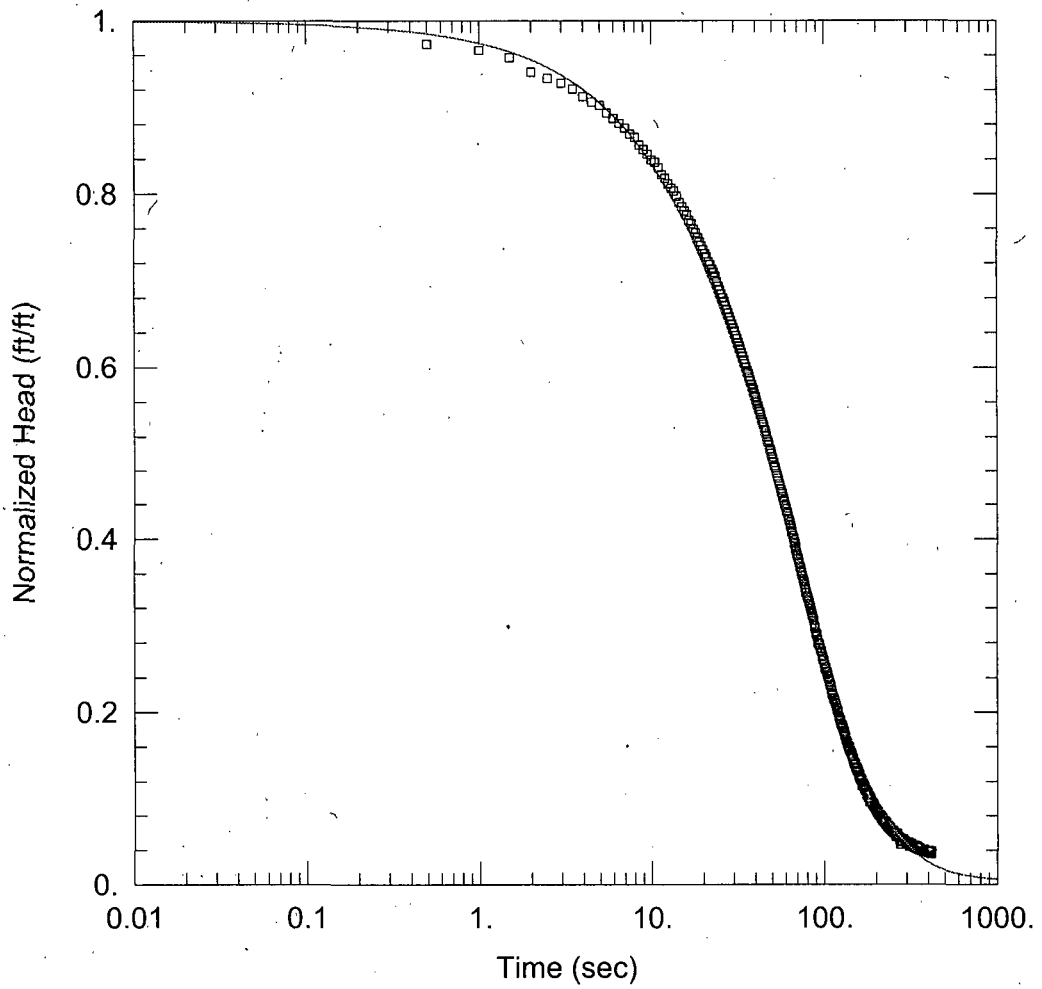
WELL DATA (JPG-DU-04I)

Initial Displacement: 3.248 ft
Total Well Penetration Depth: 18.4 ft
Casing Radius: 0.083 ft
Static Water Column Height: 57.11 ft
Screen Length: 12.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 10.38 gal/day/ft^2
Kz/Kr = 1.
Ss = 1.0E-5 ft^{-1}



JPG-DU-04I TEST2RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-04I\JPG-DU-04I Test2rh - KGS.aqt
Date: 07/26/10 Time: 15:04:23

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 20. ft

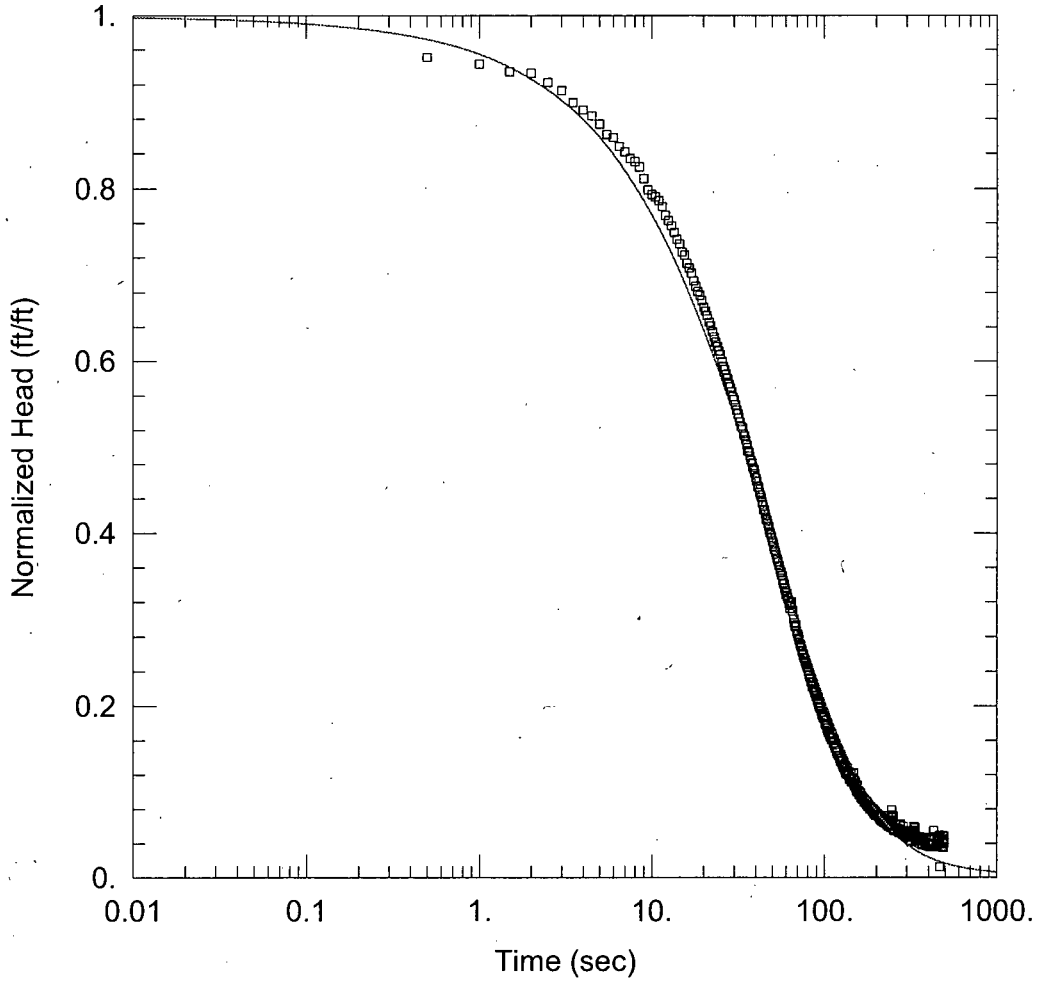
WELL DATA (JPG-DU-04I)

Initial Displacement: 3.48 ft
Total Well Penetration Depth: 18.4 ft
Casing Radius: 0.083 ft
Static Water Column Height: 57.15 ft
Screen Length: 12.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 10.37 gal/day/ft^2
Kz/Kr = 1.
Ss = 2.541E-5 ft^{-1}



JPG-DU-04I TEST3FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-04I\JPG-DU-04I Test3fh - KGS.aqt
Date: 07/26/10 Time: 15:05:27

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 20. ft

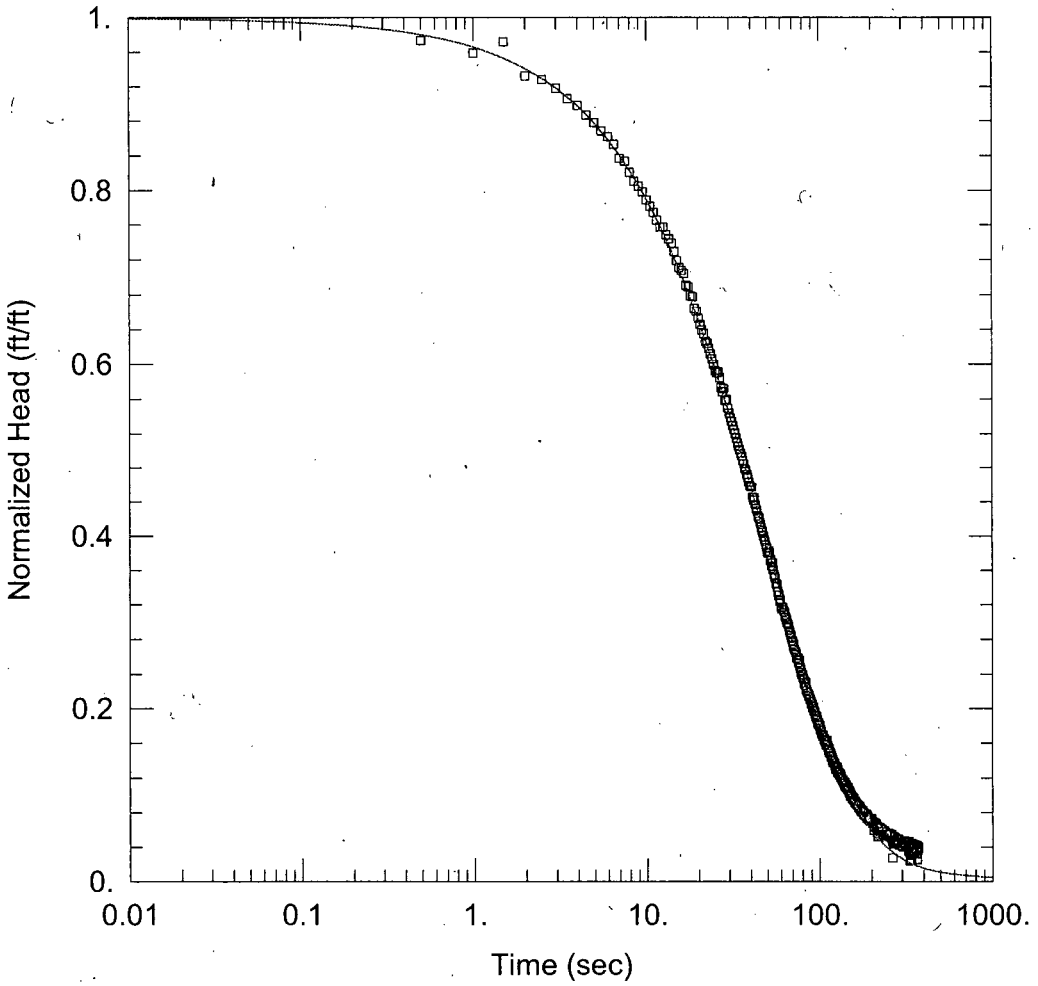
WELL DATA (JPG-DU-04I)

Initial Displacement: 1.152 ft
Total Well Penetration Depth: 18.4 ft
Casing Radius: 0.083 ft
Static Water Column Height: 57.05 ft
Screen Length: 12.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 10.44 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.0002748 ft^{-1}



JPG-DU-04I TEST3RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-04I\JPG-DU-04I Test3rh - KGS.aqt
Date: 07/26/10 Time: 15:05:52

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 20. ft

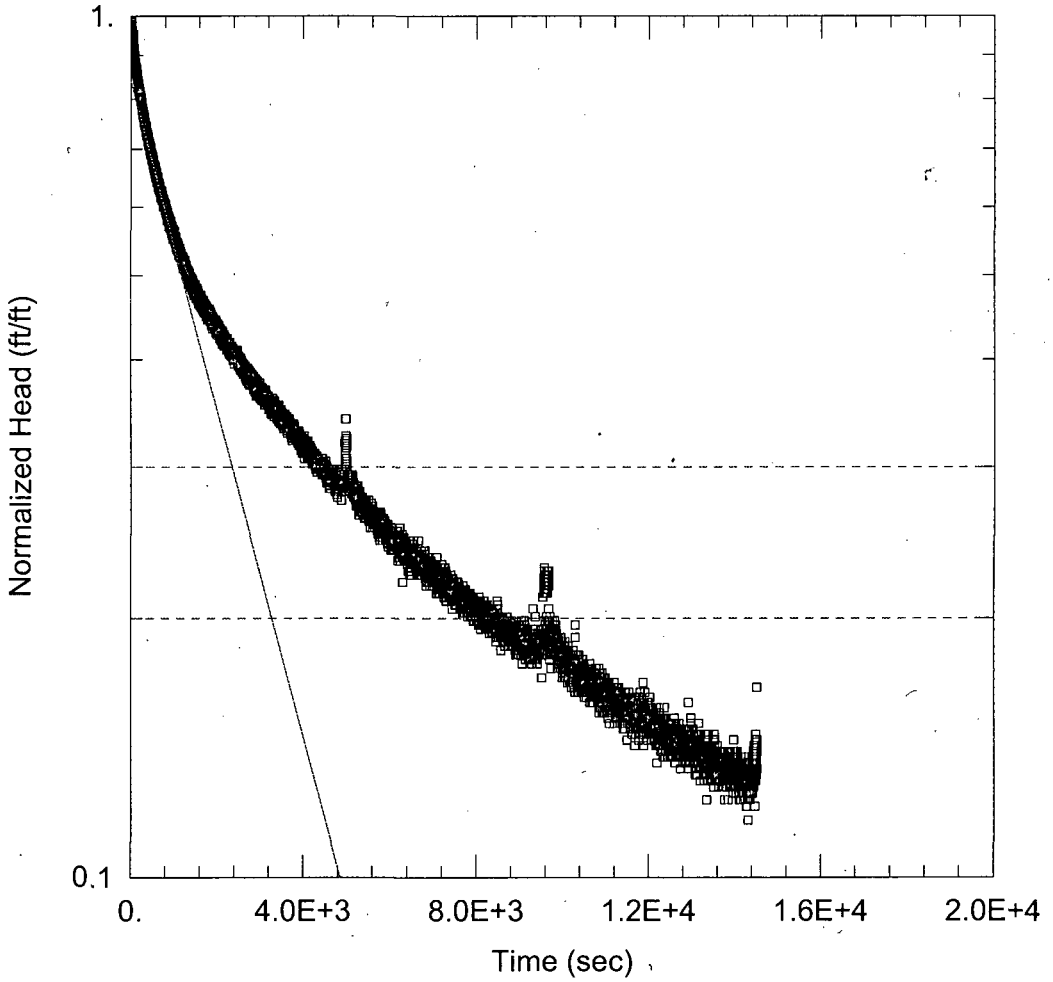
WELL DATA (JPG-DU-04I)

Initial Displacement: 1.245 ft
Total Well Penetration Depth: 18.4 ft
Casing Radius: 0.083 ft
Static Water Column Height: 57.09 ft
Screen Length: 12.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 13.54 gal/day/ft^2
Kz/Kr = 1.
Ss = 3.467E-5 ft^{-1}



MW-5 TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-5\MW-5 Analysis\MW-5 Test1fh B-R.aqt
Date: 07/27/10 Time: 10:19:47

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

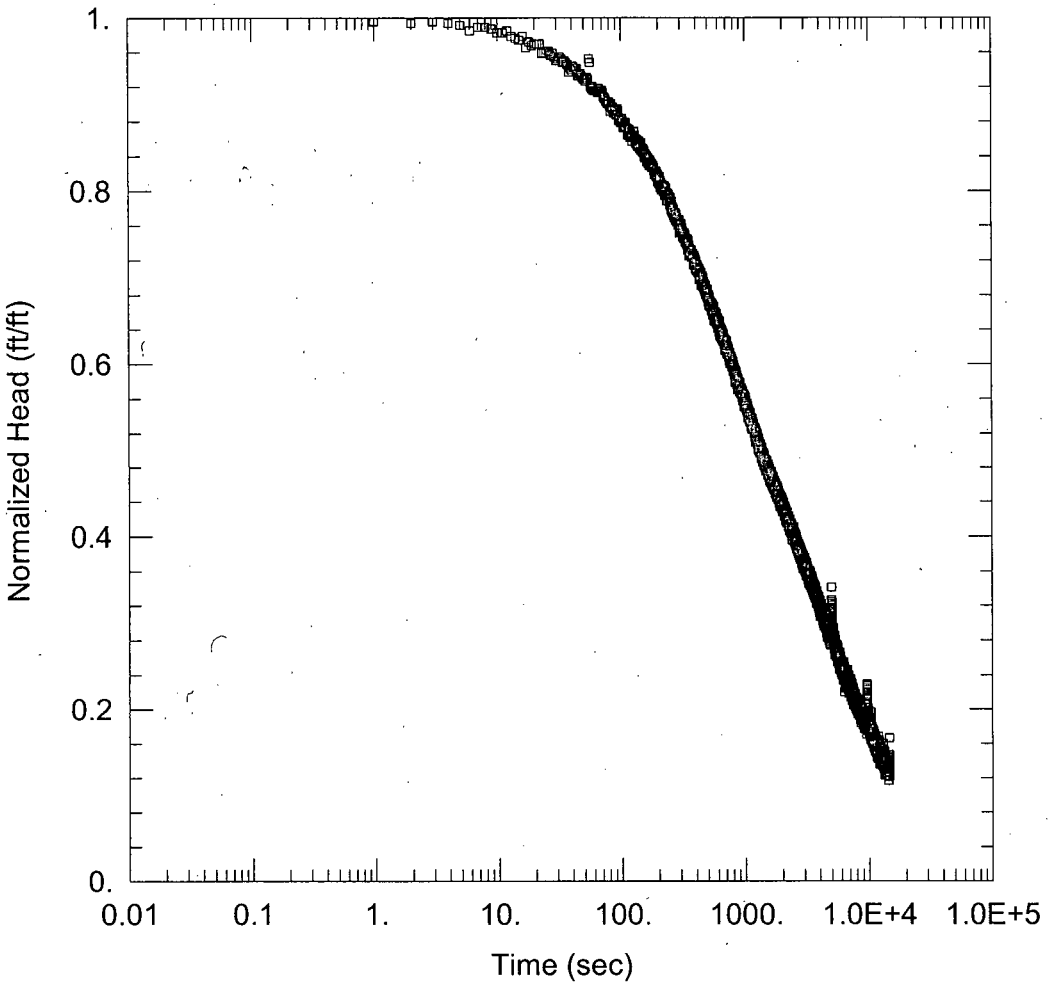
Saturated Thickness: 22. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Casing Radius: 0.083 ft epth: 17.96 ft Well Radius: 0.083 ft ft eight: 16.56 ft

SOLUT

Kc = 0.3124 gal/day/ft2 ined y0 = 0.3882 ft od: Bouwer-Rice



MW-5 TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-5\MW-5 Analysis\MW-5 Test1fh KGS.aqt
Date: 07/27/10 Time: 10:20:34

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 22. ft

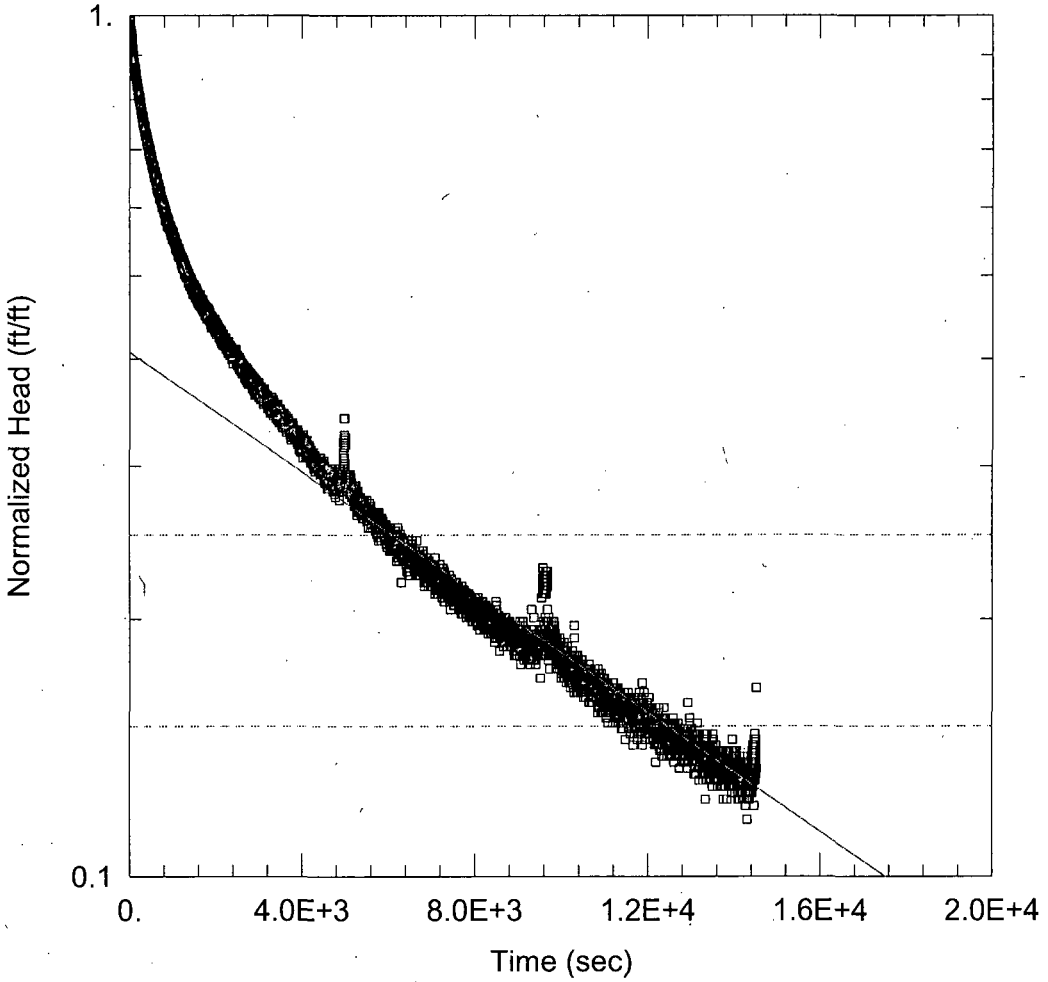
WELL DATA (MW-5)

Initial Displacement: 0.463 ft
Total Well Penetration Depth: 17.96 ft
Casing Radius: 0.083 ft
Static Water Column Height: 16.56 ft
Screen Length: 11.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.068 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.01818 ft^{-1}



MW-5 TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-5\MW-5 Analysis\MW-5 Test1fh.aqt
Date: 07/27/10 Time: 10:21:31

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

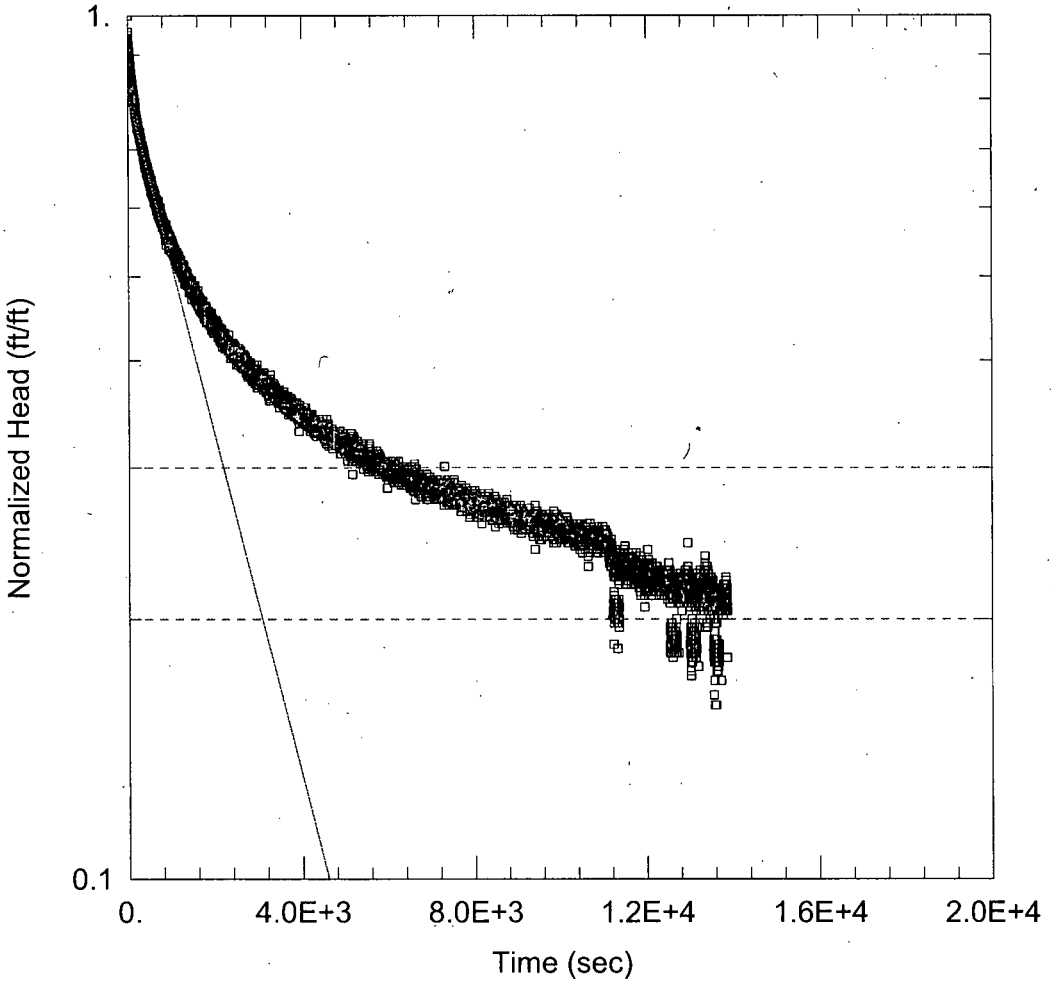
Saturated Thickness: 40. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-5)

Initial Displacement: 0.463 ft
Total Well Penetration Depth: 16.56 ft
Casing Radius: 0.083 ft
Static Water Column Height: 16.56 ft
Screen Length: 10. ft
Well Radius: 0.125 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.07823 gal/day/ft^2
y0 = 0.1886 ft



MW-5 TEST1RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-5\MW-5 Analysis\MW-5 Test1rh B-R.aqt
Date: 07/27/10 Time: 10:23:21

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

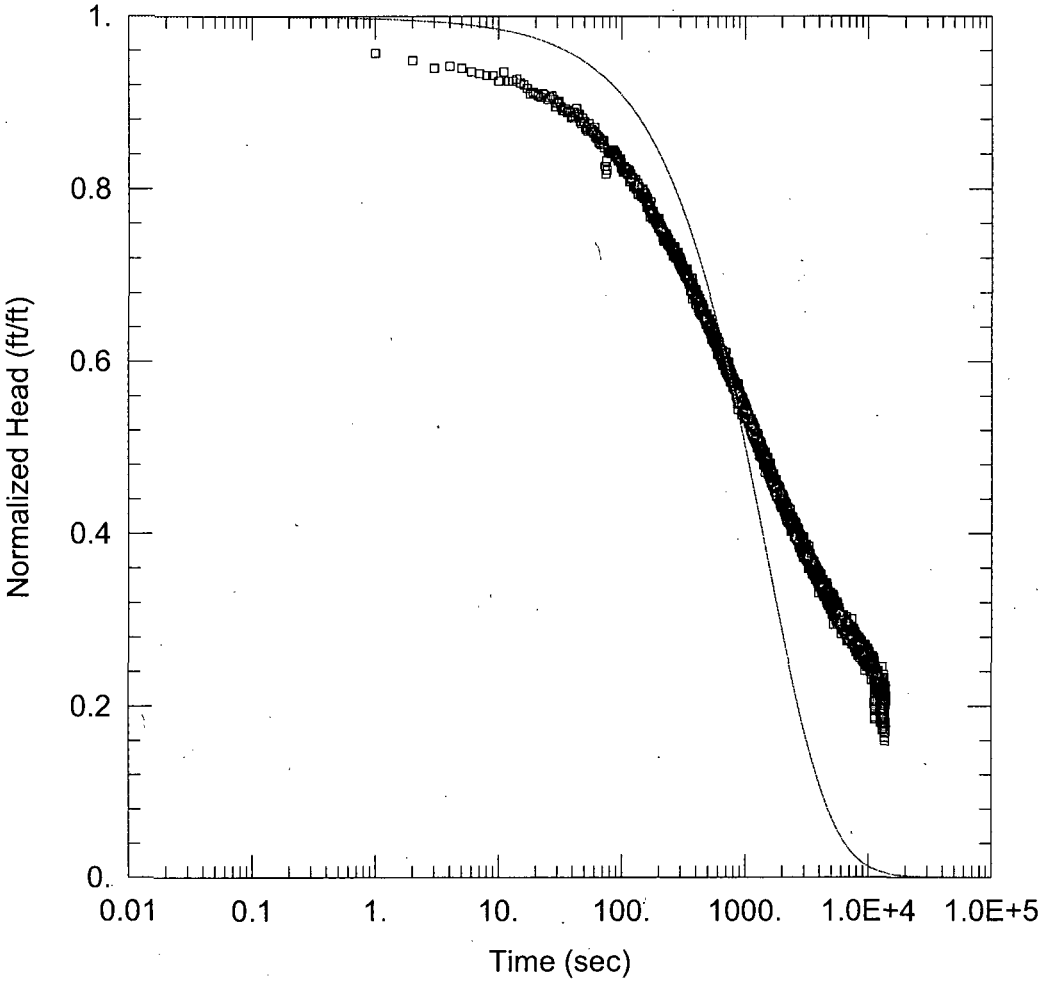
Saturated Thickness: 22. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-5)

Initial Displacement: 0.465 ft
Total Well Penetration Depth: 18. ft
Casing Radius: 0.083 ft
Static Water Column Height: 16.64 ft
Screen Length: 11.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.325 gal/day/ft^2
y0 = 0.3768 ft



MW-5 TEST1RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-5\MW-5 Analysis\MW-5 Test1rh KGS.aqt
Date: 07/27/10 Time: 10:24:59

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 22. ft

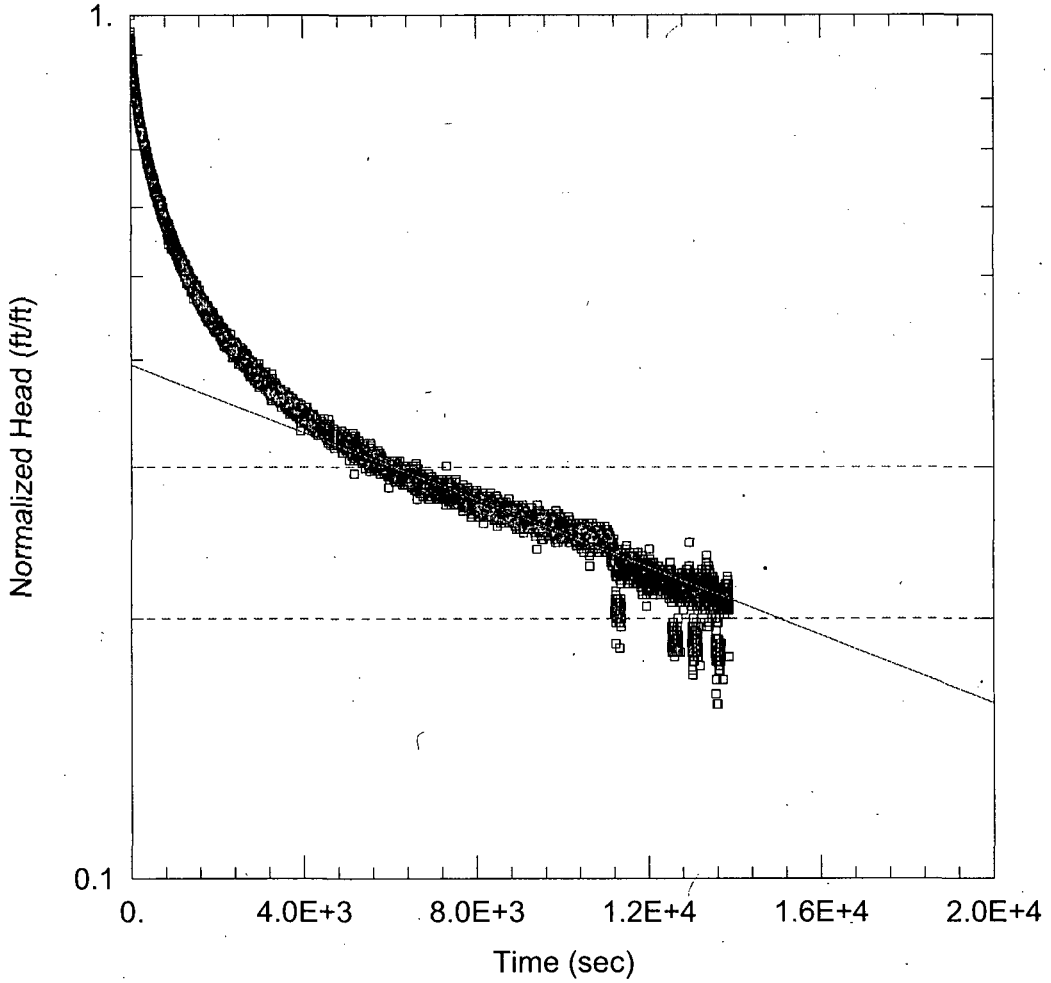
WELL DATA (MW-5)

Initial Displacement: 0.465 ft
Total Well Penetration Depth: 18. ft
Casing Radius: 0.083 ft
Static Water Column Height: 16.64 ft
Screen Length: 11.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.4918 gal/day/ft^2
Kz/Kr = 1.
Ss = 4.545E-5 ft^{-1}



MW-5 TEST1RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-5\MW-5 Analysis\MW-5 Test1rh.aqt
Date: 07/27/10 Time: 10:27:17

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 40. ft
Anisotropy Ratio (Kz/Kr): 1.

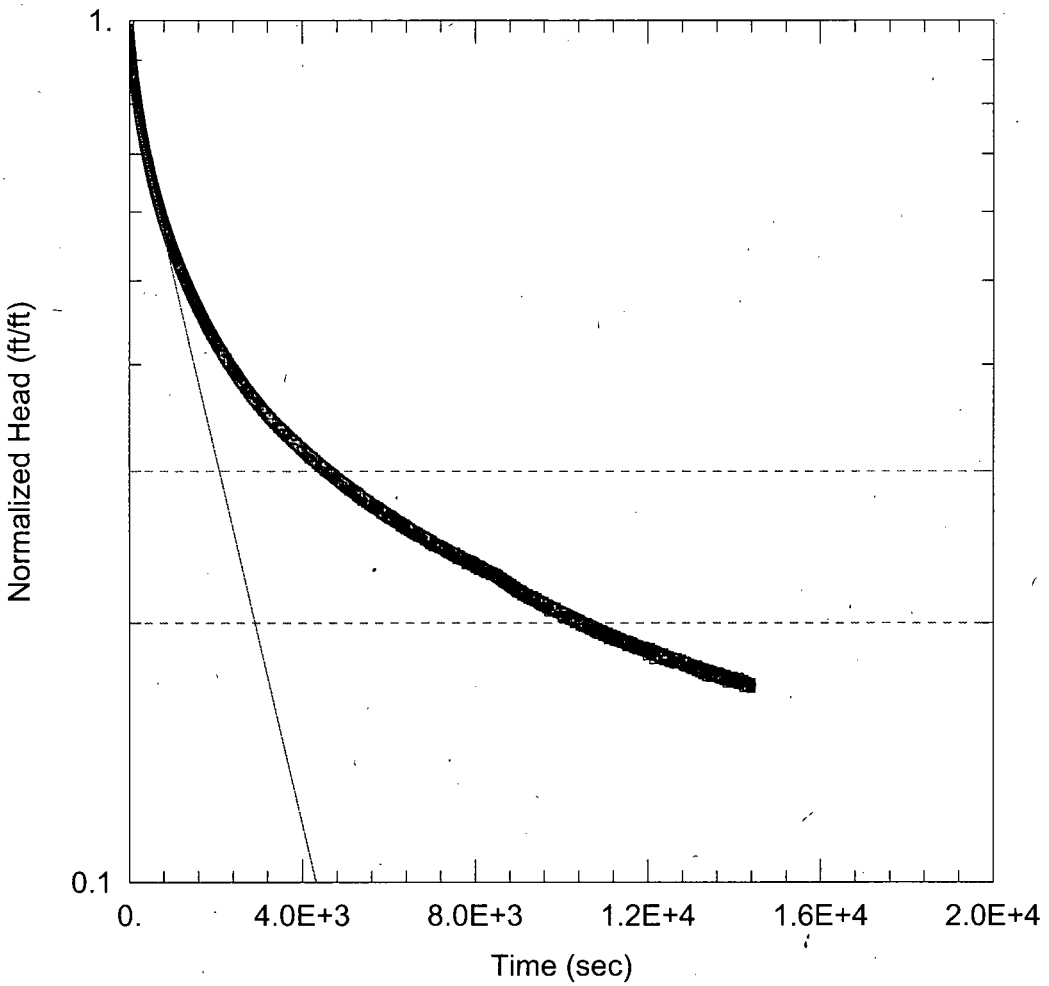
WELL DATA (MW-5)

Initial Displacement: 0.465 ft
Total Well Penetration Depth: 16.64 ft
Casing Radius: 0.083 ft
Static Water Column Height: 16.64 ft
Screen Length: 10. ft
Well Radius: 0.125 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.004274 ft/day
y0 = 0.1836 ft



MW-5 TEST2FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-5\MW-5 Analysis\MW-5 Test2fh B-R.aqt
Date: 07/27/10 Time: 10:28:05

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

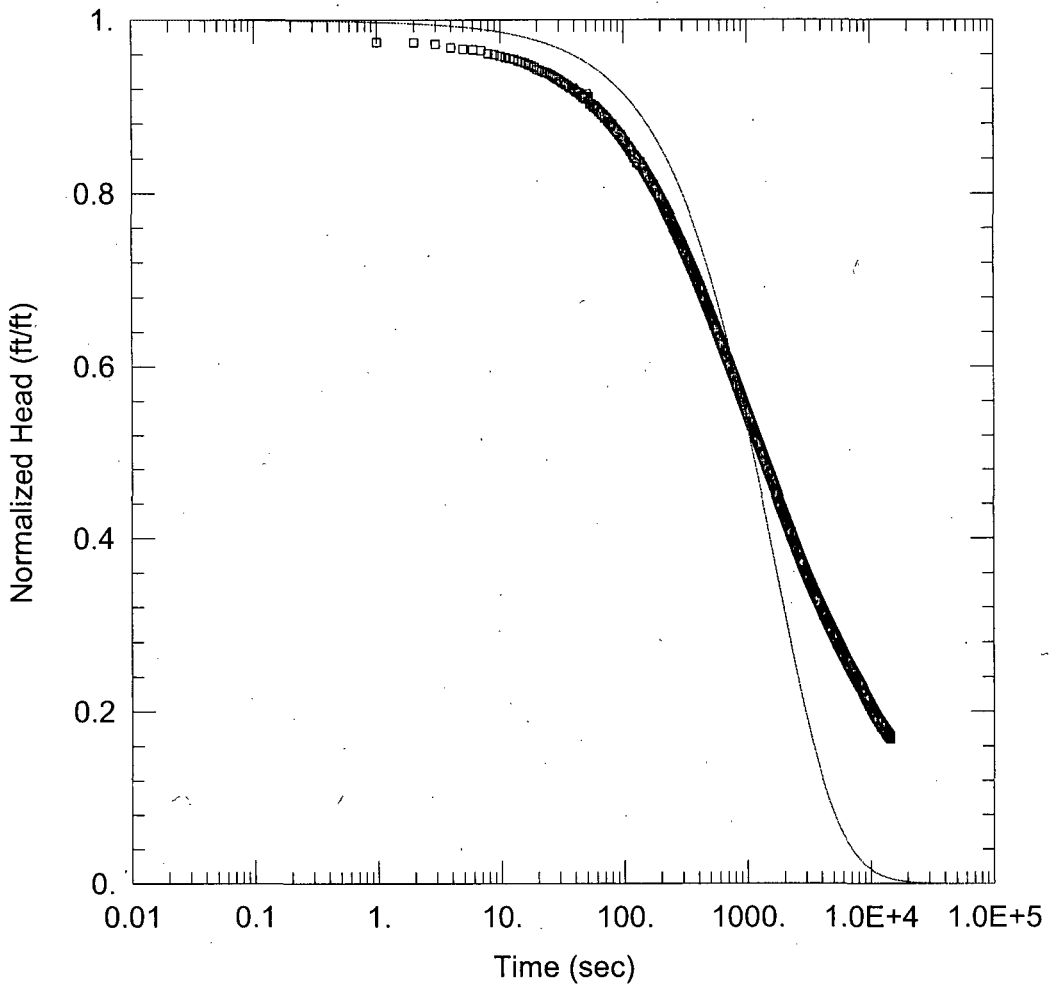
Saturated Thickness: 22. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-5)

Initial Displacement: 2.244 ft
Total Well Penetration Depth: 17.91 ft
Casing Radius: 0.083 ft
Static Water Column Height: 16.51 ft
Screen Length: 11.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.3509 gal/day/ft^2
y0 = 1.877 ft



MW-5 TEST2FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-5\MW-5 Analysis\MW-5 Test2fh KGS.aqt
Date: 07/27/10 Time: 10:30:32

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 22. ft

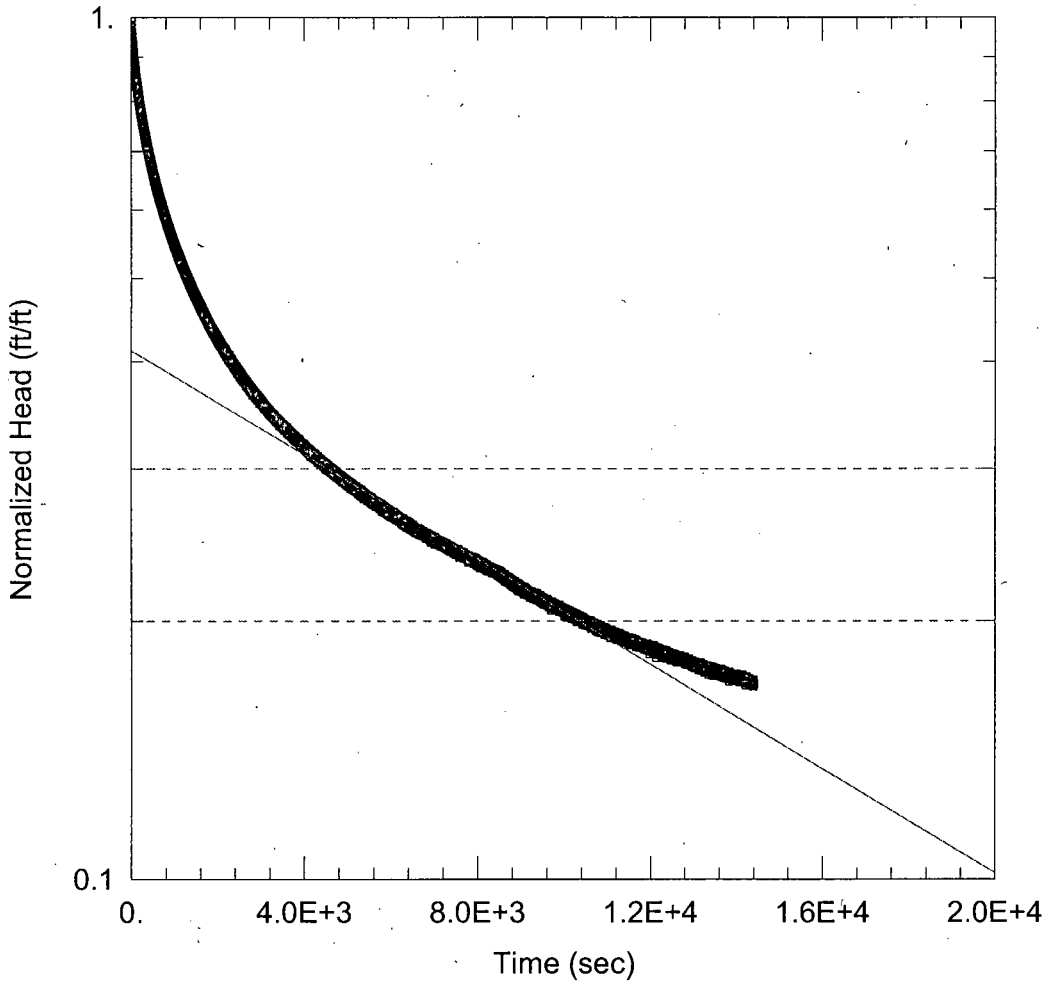
WELL DATA (MW-5)

Initial Displacement: 2.244 ft
Total Well Penetration Depth: 17.91 ft
Casing Radius: 0.083 ft
Static Water Column Height: 16.51 ft
Screen Length: 11.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.4487 gal/day/ft^2
Kz/Kr = 1.
Ss = 4.545E-5 ft^{-1}



MW-5 TEST2FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-5\MW-5 Analysis\MW-5 Test2fh.aqt
Date: 07/27/10 Time: 10:31:42

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

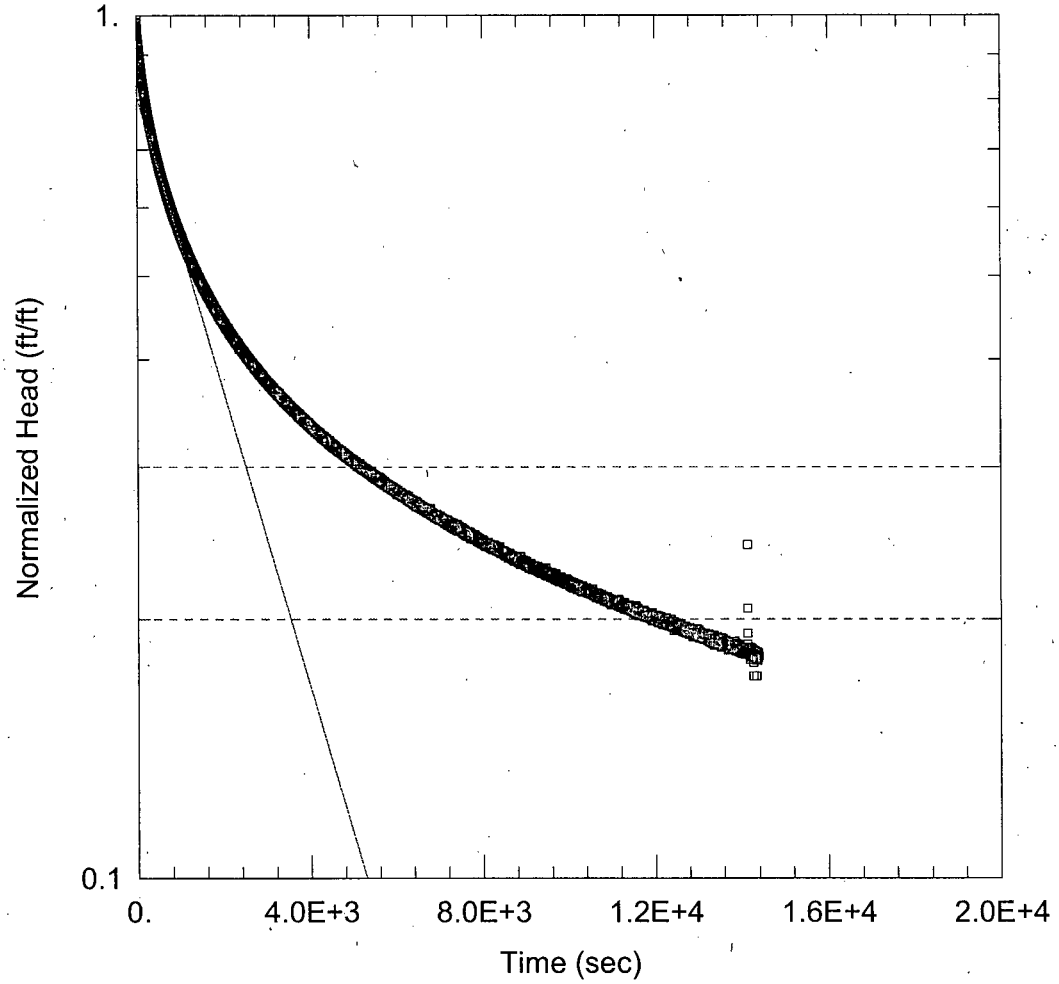
Saturated Thickness: 40. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-5)

Initial Displacement: 2.244 ft
Static Water Column Height: 16.51 ft
Total Well Penetration Depth: 16.51 ft
Screen Length: 10. ft
Casing Radius: 0.083 ft
Well Radius: 0.125 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.006596 ft/day
y0 = 0.9247 ft



MW-5 TEST2RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-5\MW-5 Analysis\MW-5 Test2rh B-R.aqt
Date: 07/27/10 Time: 10:33:41

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

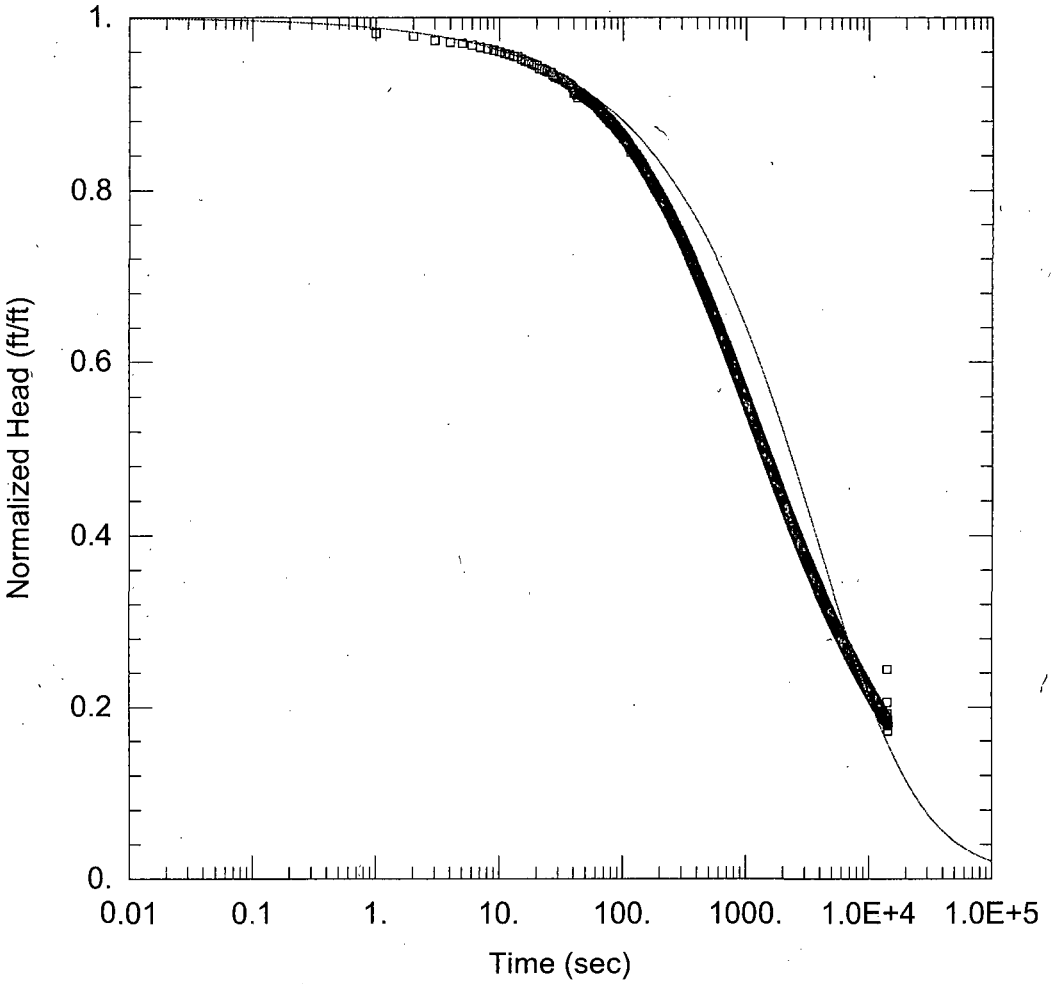
Saturated Thickness: 22. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-5)

Initial Displacement: 2.186 ft
Total Well Penetration Depth: 18.2 ft
Casing Radius: 0.083 ft
Static Water Column Height: 16.8 ft
Screen Length: 11.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.283 gal/day/ft^2
y0 = 1.763 ft



MW-5 TEST2RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-5\MW-5 Analysis\MW-5 Test2rh KGS.aqt
Date: 07/27/10 Time: 10:36:16

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 22. ft

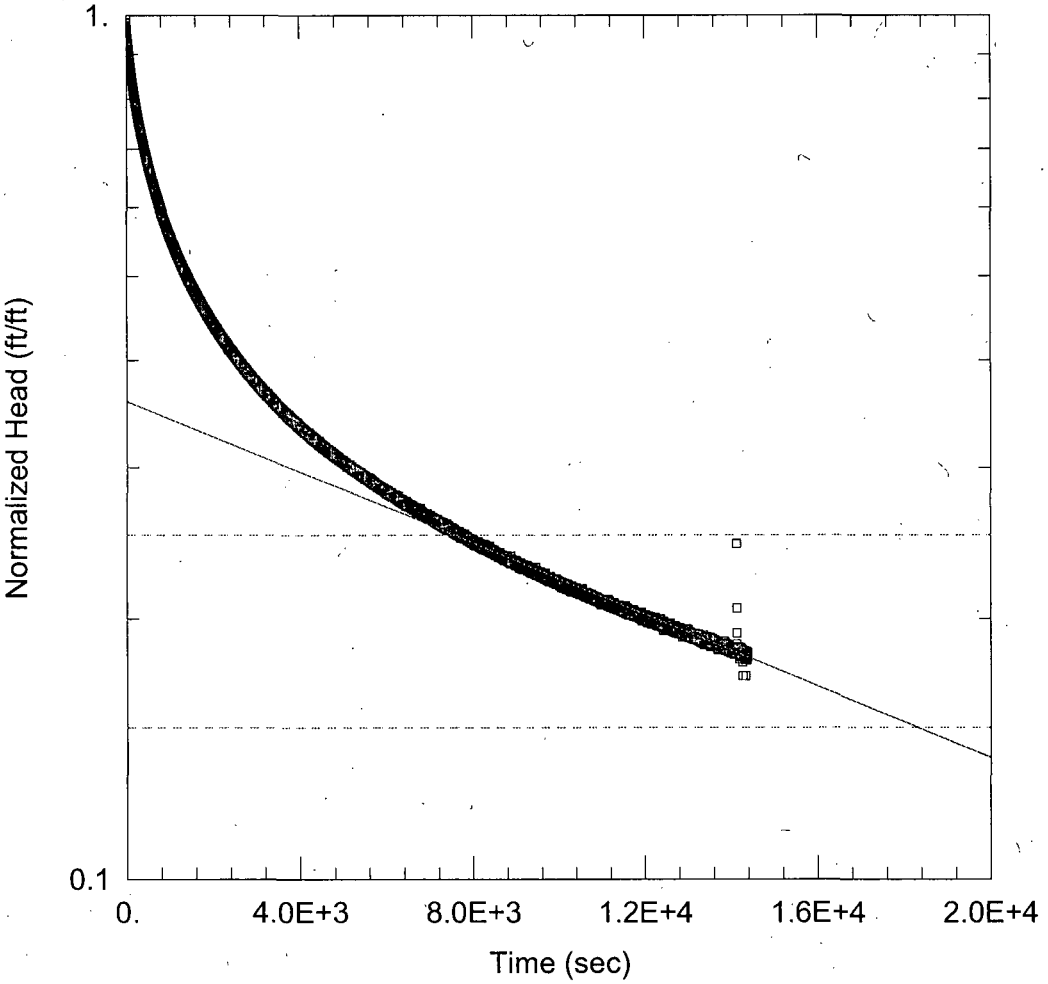
WELL DATA (MW-5)

Initial Displacement: 2.186 ft
Total Well Penetration Depth: 18.2 ft
Casing Radius: 0.083 ft
Static Water Column Height: 16.8 ft
Screen Length: 11.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.04979 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.01818 ft^{-1}



MW-5 TEST2RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-5\MW-5 Analysis\MW-5 Test2rh.aqt
Date: 07/27/10 Time: 10:35:15

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

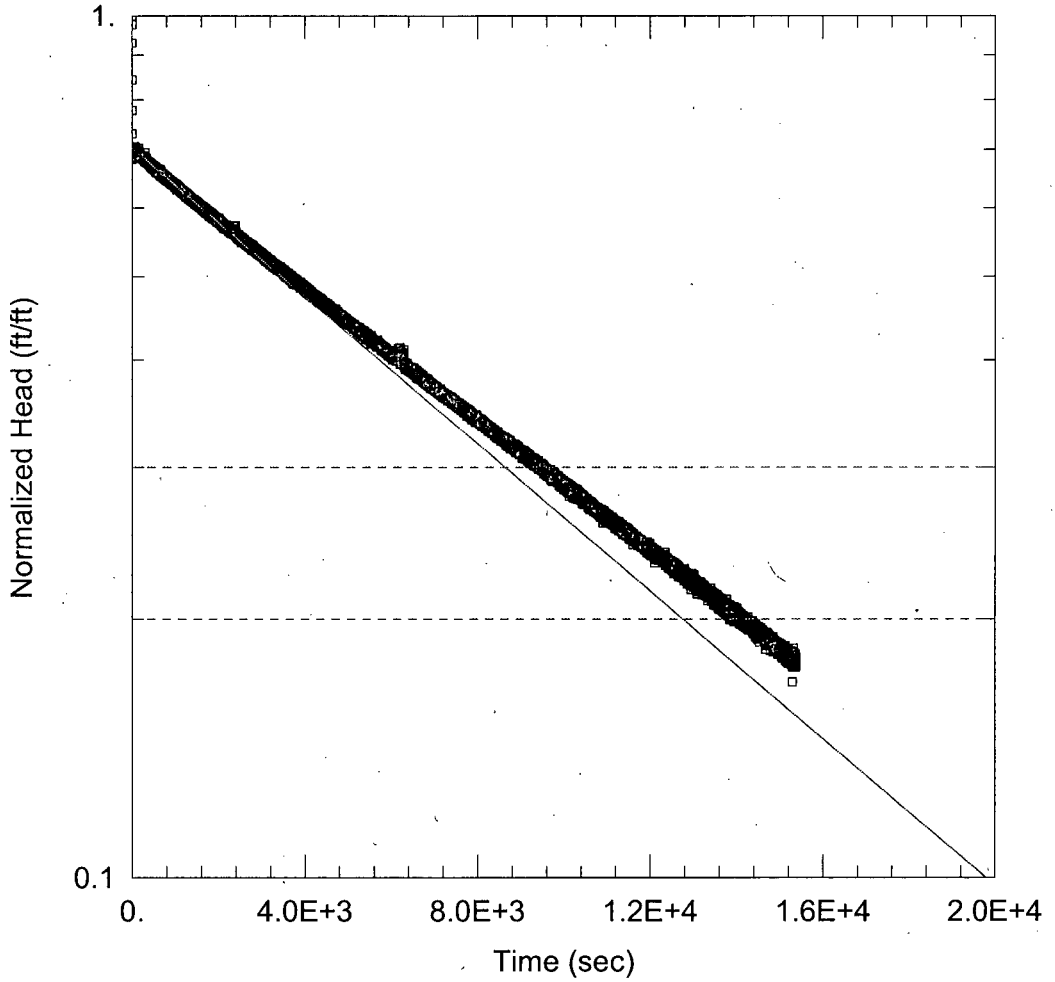
Saturated Thickness: 40. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-5)

Initial Displacement: 2.186 ft
Total Well Penetration Depth: 16.8 ft
Casing Radius: 0.083 ft
Static Water Column Height: 16.8 ft
Screen Length: 10. ft
Well Radius: 0.125 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.04642 gal/day/ft^2
y0 = 0.7837 ft



JPG-DU-05I TEST1FH

Data Set: P:\...\JPG-DU-05I Test1fh B-R.aqt
Date: 07/26/10 Time: 15:19:02

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

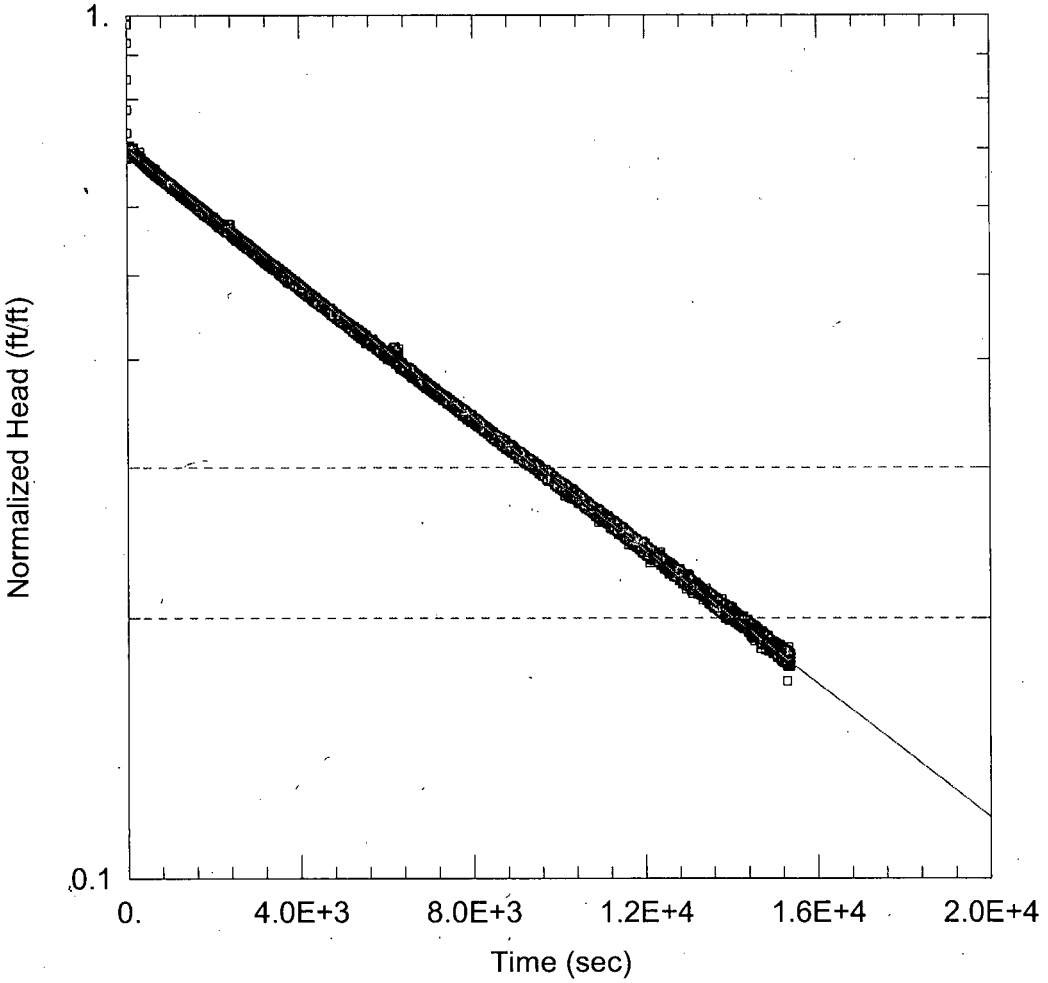
Saturated Thickness: 29. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-05I)

Initial Displacement: 1.632 ft
Total Well Penetration Depth: 35.91 ft
Casing Radius: 0.083 ft
Static Water Column Height: 31.71 ft
Screen Length: 14.2 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0693 gal/day/ft^2
y0 = 1.147 ft



JPG-DU-05I TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-05I Analysis\JPG-DU-05I Test1fh.aqt
Date: 07/26/10 Time: 15:22:59

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

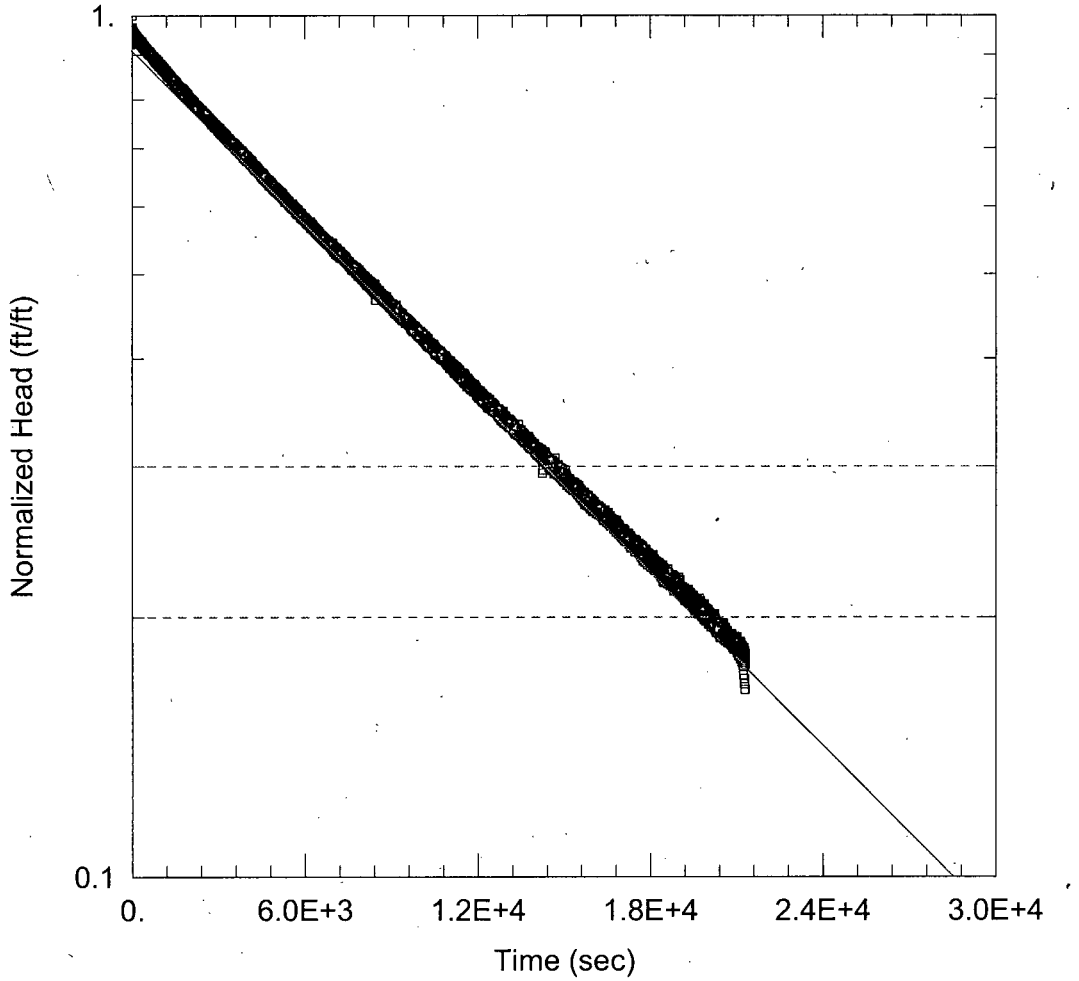
Saturated Thickness: 45. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-05I)

Initial Displacement: 1.632 ft
Total Well Penetration Depth: 31.71 ft
Casing Radius: 0.083 ft
Static Water Column Height: 31.71 ft
Screen Length: 10. ft
Well Radius: 0.188 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.008417 ft/day
y0 = 1.141 ft



JPG-DU-05I TEST1RH

Data Set: P:\...\JPG-DU-05I Test1rh B-R.aqt
Date: 07/26/10 Time: 15:25:11

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

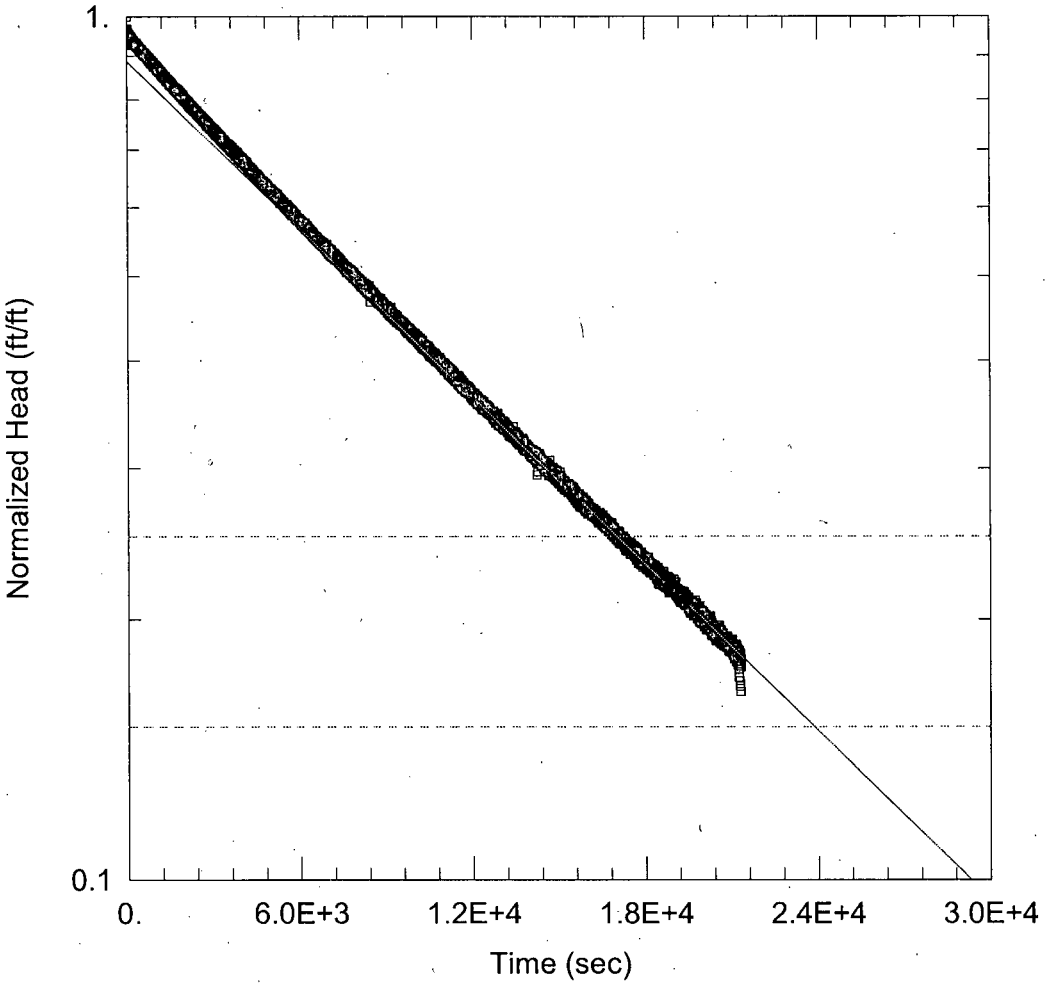
Saturated Thickness: 29. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-05I)

Initial Displacement: 1.239 ft
Total Well Penetration Depth: 35.8 ft
Casing Radius: 0.083 ft
Static Water Column Height: 31.6 ft
Screen Length: 14.2 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.05442 gal/day/ft^2
y0 = 1.127 ft



JPG-DU-05I TEST1RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-05I Analysis\JPG-DU-05I Test1rh.aqt
Date: 07/26/10 Time: 15:26:48

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

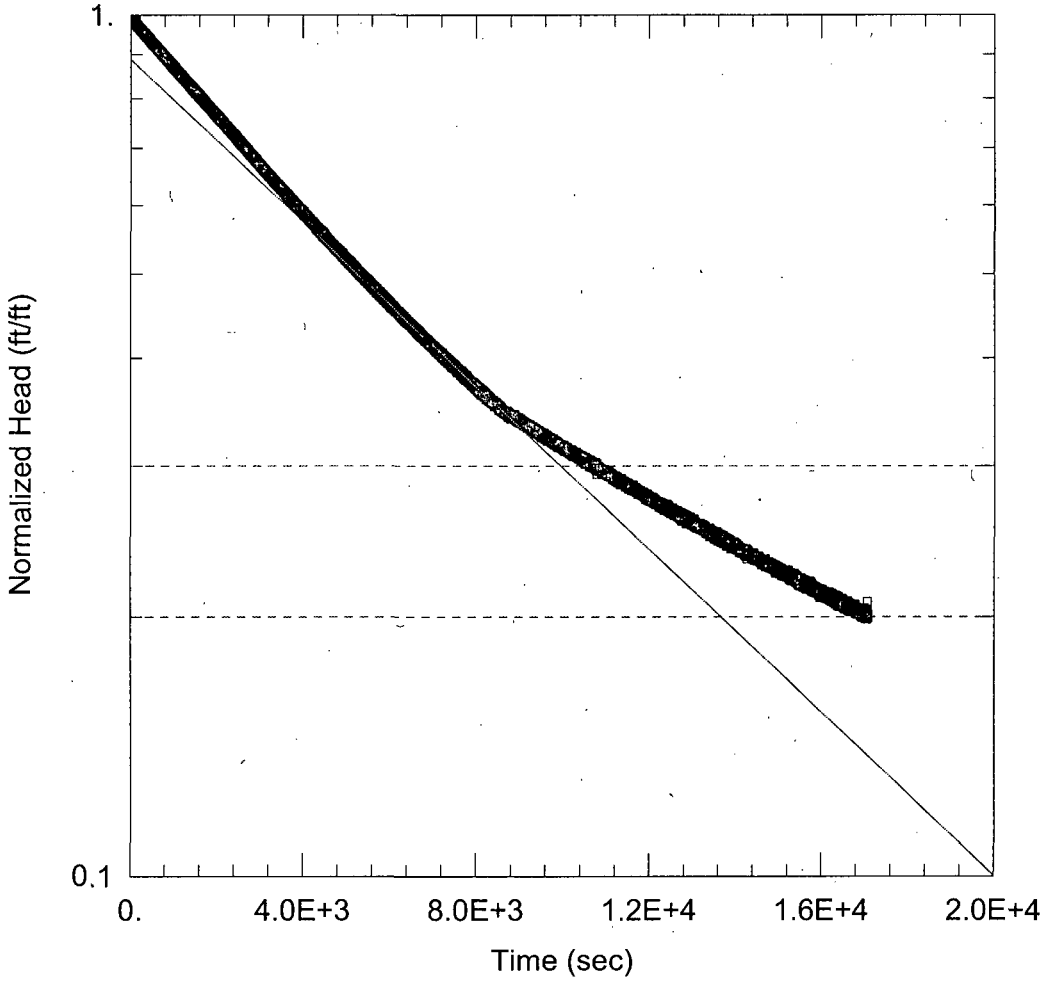
Saturated Thickness: 45. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-05I)

Initial Displacement: 1.239 ft
Total Well Penetration Depth: 31.6 ft
Casing Radius: 0.083 ft
Static Water Column Height: 31.6 ft
Screen Length: 10. ft
Well Radius: 0.188 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.06583 gal/day/ft^2
y0 = 1.097 ft



JPG-DU-05I TEST2FH

Data Set: P:\...\JPG-DU-05I Test2fh B-R.aqt
Date: 07/26/10 Time: 15:27:46

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

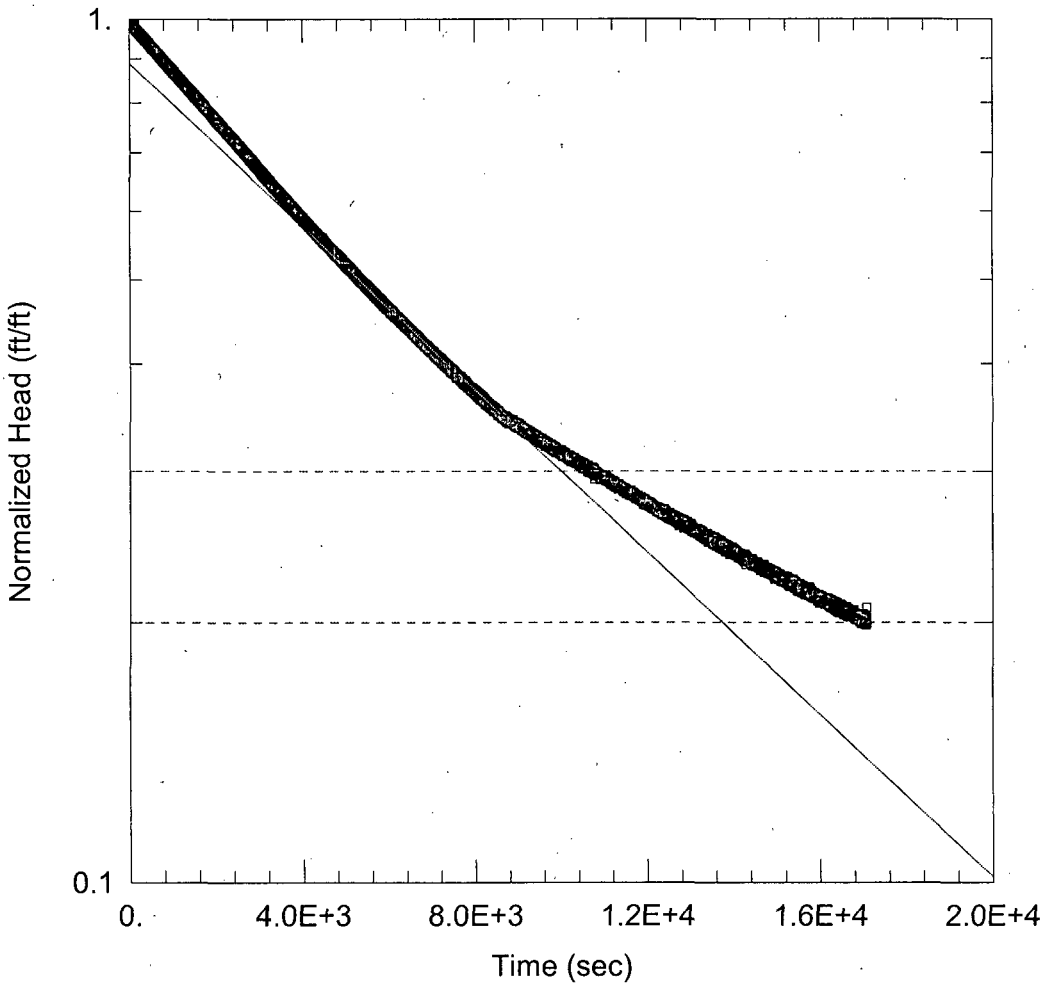
Saturated Thickness: 29. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-05I)

Initial Displacement: 2.19 ft
Total Well Penetration Depth: 36. ft
Casing Radius: 0.083 ft
Static Water Column Height: 31.8 ft
Screen Length: 14.2 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.07676 gal/day/ft^2
y0 = 1.946 ft



JPG-DU-05I TEST2FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-05I Analysis\JPG-DU-05I Test2fh.aqt
Date: 07/26/10 Time: 15:29:53

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 45. ft
Anisotropy Ratio (Kz/Kr): 1.

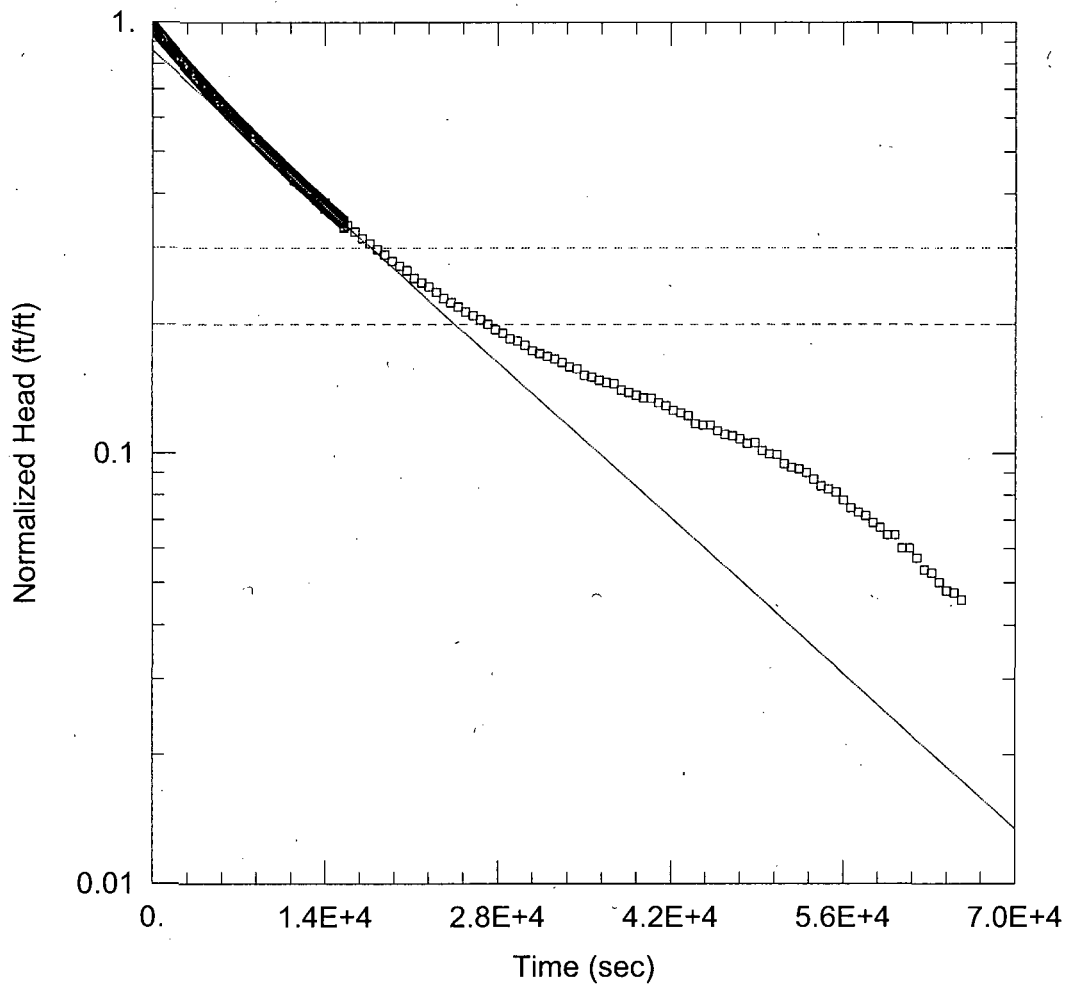
WELL DATA (JPG-DU-05I)

Initial Displacement: 2.19 ft
Total Well Penetration Depth: 31.8 ft
Casing Radius: 0.083 ft
Static Water Column Height: 31.8 ft
Screen Length: 10. ft
Well Radius: 0.188 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.01026 ft/day
y0 = 1.946 ft



JPG-DU-05I TEST2RH_RHB

Data Set: P:\...\JPG-DU-05I Test2rh B-R.aqt
Date: 07/26/10 Time: 15:34:39

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

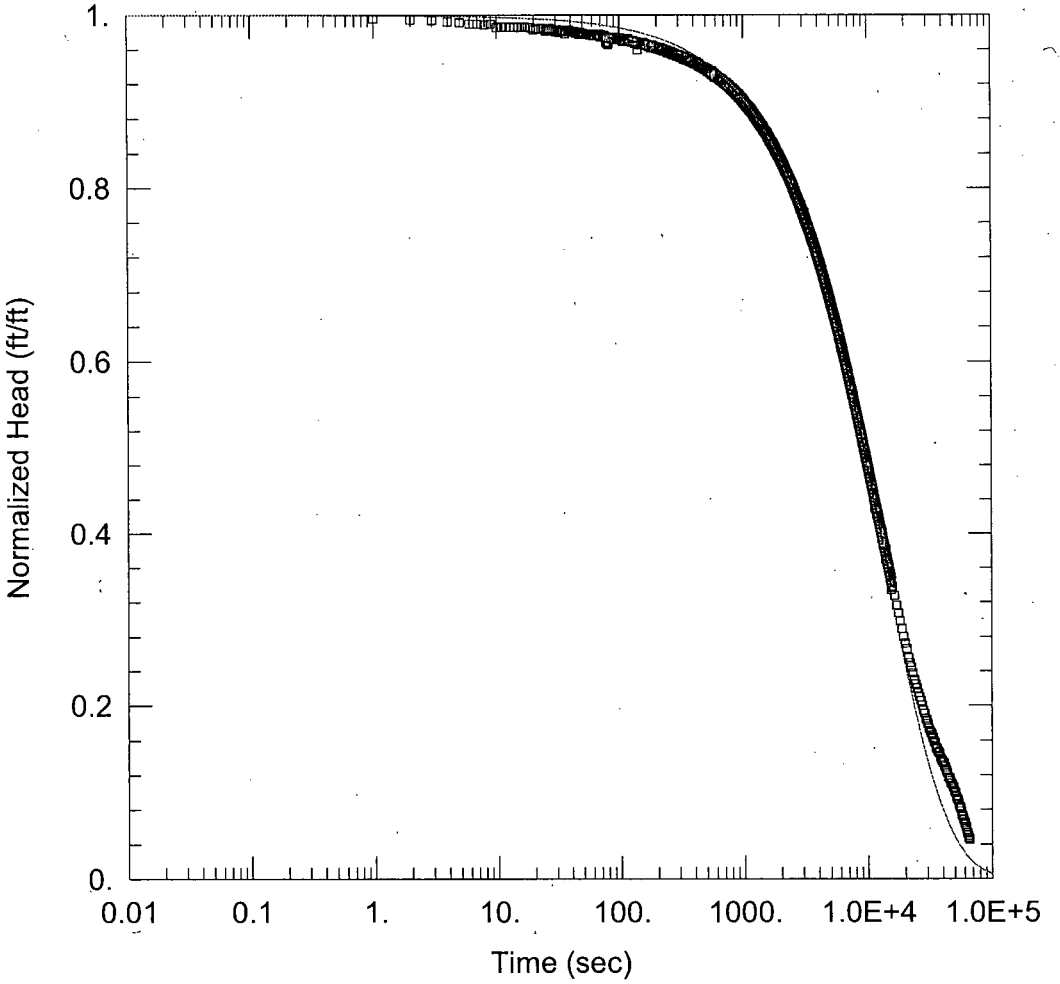
Saturated Thickness: 29. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-05I)

Initial Displacement: 2.276 ft Static Water Column Height: 32.25 ft
Total Well Penetration Depth: 36.45 ft Screen Length: 14.2 ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.04185 gal/day/ft^2 y0 = 1.955 ft



JPG-DU-05I TEST2RH_RHB

Data Set: P:\...\JPG-DU-05I Test2rh KGS.aqt
Date: 07/26/10 Time: 15:36:15

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

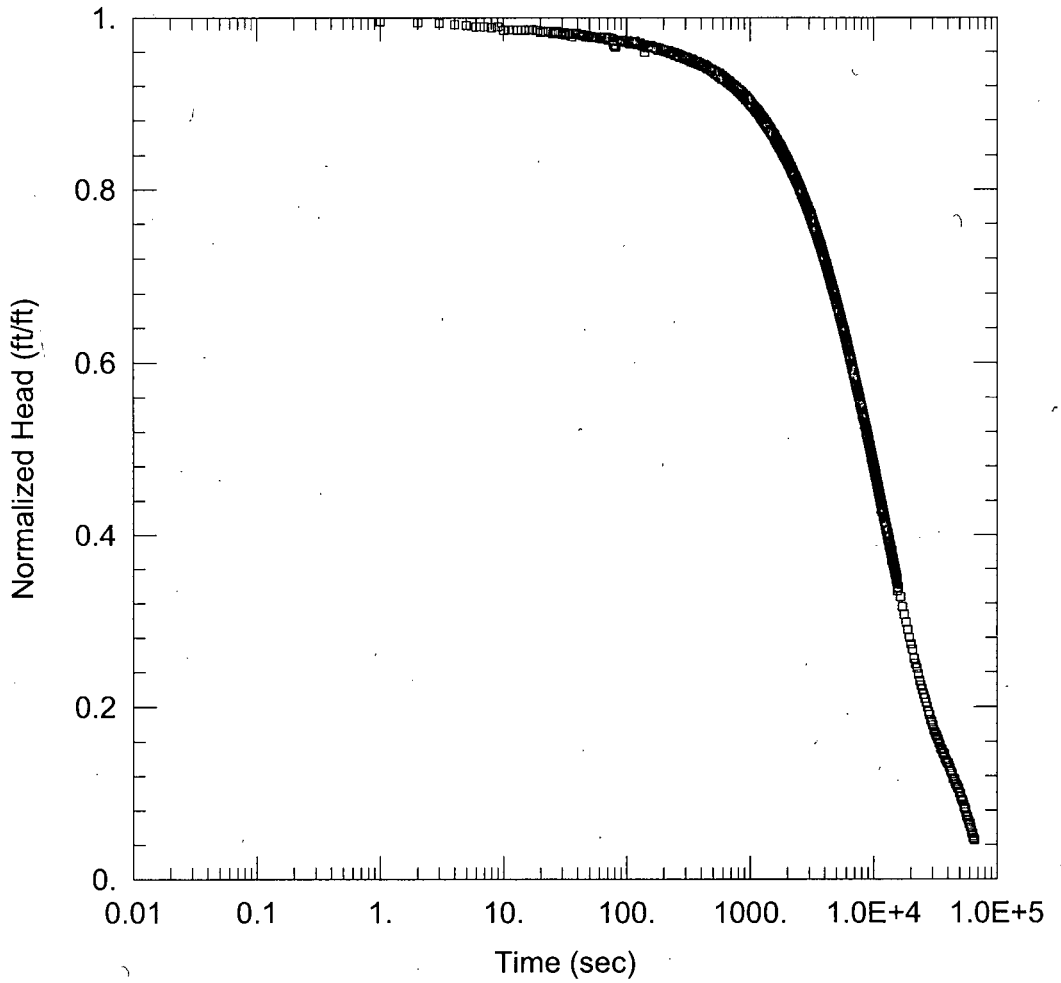
WELL DATA (JPG-DU-05I)

Initial Displacement: 2.276 ft
Total Well Penetration Depth: 36.45 ft
Casing Radius: 0.083 ft
Static Water Column Height: 32.25 ft
Screen Length: 14.2 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.09464 gal/day/ft^2
Kz/Kr = 1.
Ss = 3.467E-5 ft^{-1}



JPG-DU-05I TEST2RH_RHB

Data Set: P:\...\JPG-DU-05I Test2rh_rhb.aqt
Date: 07/26/10 Time: 15:37:24

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 45. ft

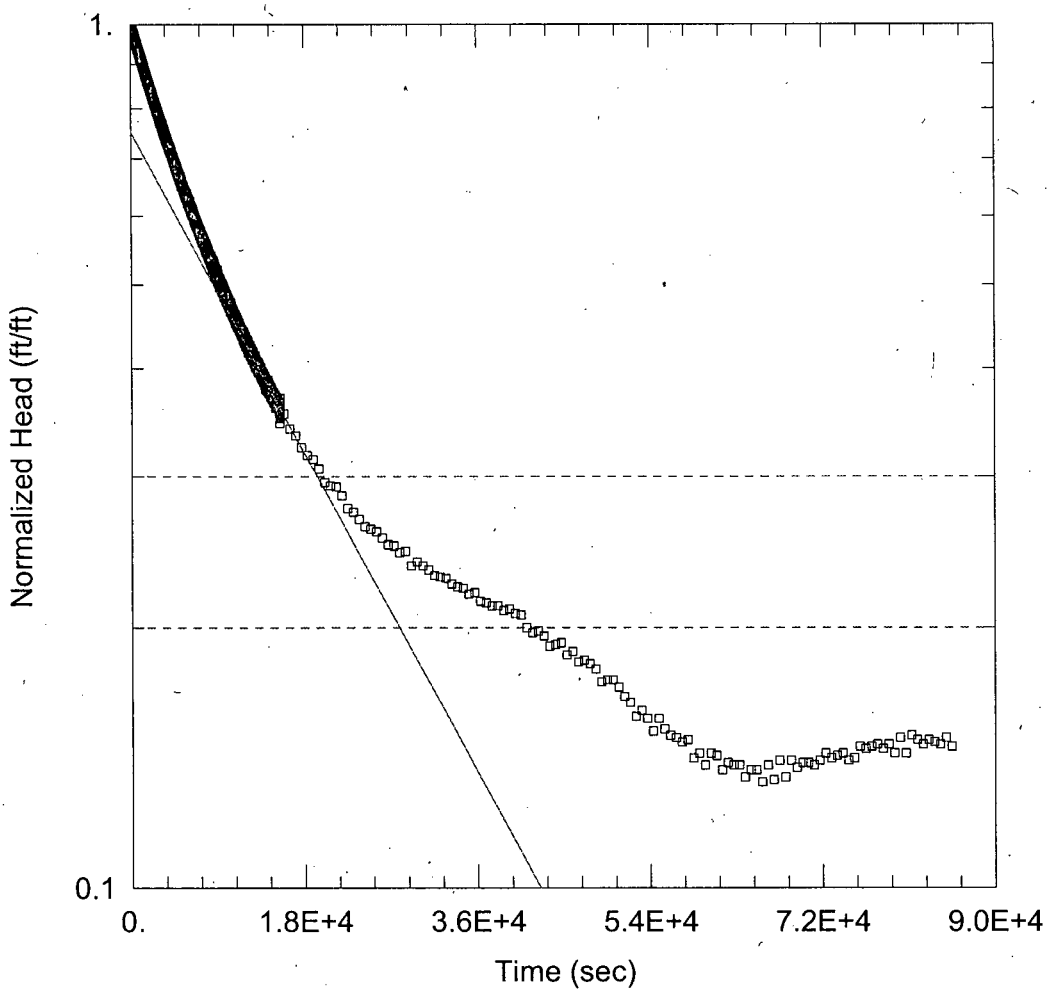
WELL DATA (JPG-DU-05I)

Initial Displacement: 2.276 ft
Total Well Penetration Depth: 32.25 ft
Casing Radius: 0.083 ft
Static Water Column Height: 32.25 ft
Screen Length: 10. ft
Well Radius: 0.188 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.04863 gal/day/ft^2
Kz/Kr = 1.
Ss = 3.467E-5 ft^{-1}



JPG-DU-05I TEST3FH_FHB

Data Set: P:\...\JPG-DU-05I Test3fh B-R.aqt
Date: 07/26/10 Time: 15:39:20

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

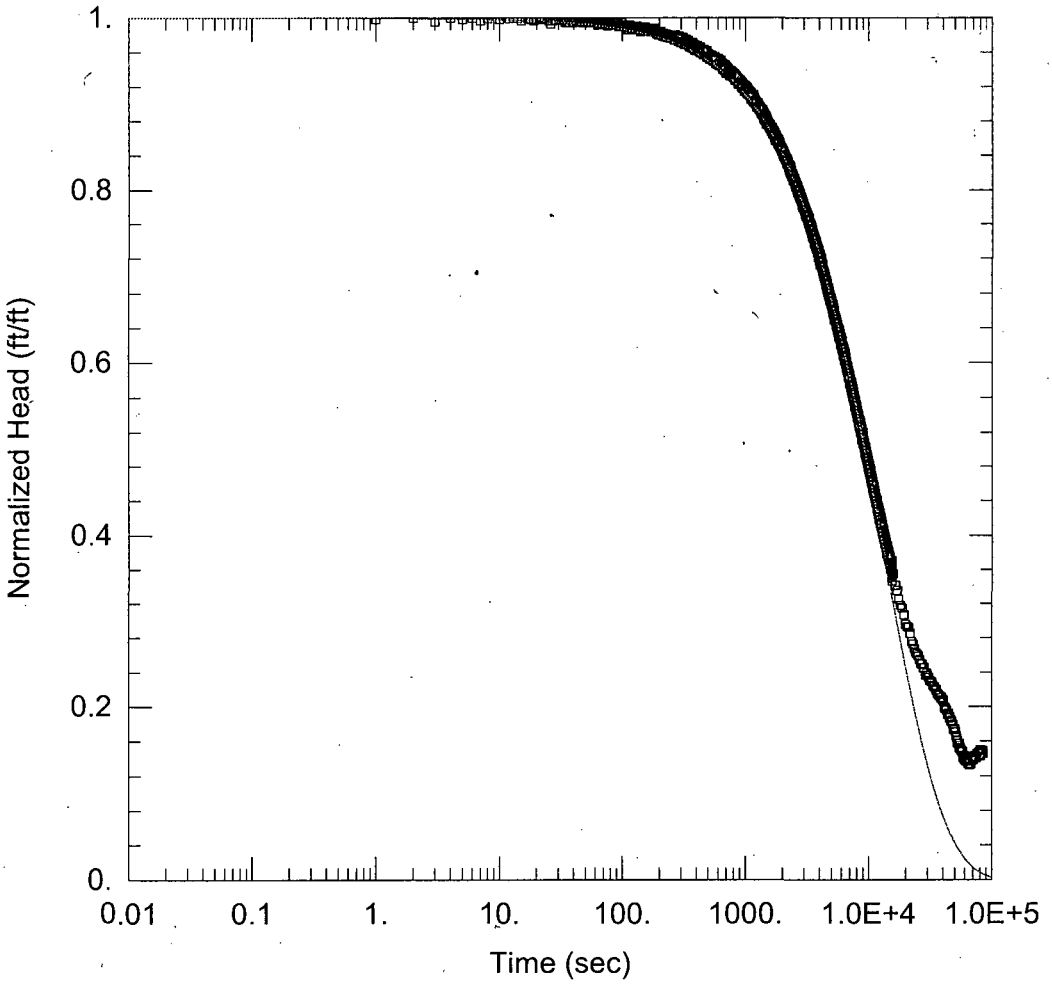
Saturated Thickness: 29. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-05I)

Initial Displacement: 1.155 ft Static Water Column Height: 32.16 ft
Total Well Penetration Depth: 36.36 ft Screen Length: 14.2 ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.03343 gal/day/ft^2 y0 = 0.8673 ft



JPG-DU-05I TEST3FH_FHB

Data Set: P:\...\JPG-DU-05I Test3fh KGS.aqt
Date: 07/26/10 Time: 15:41:14

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

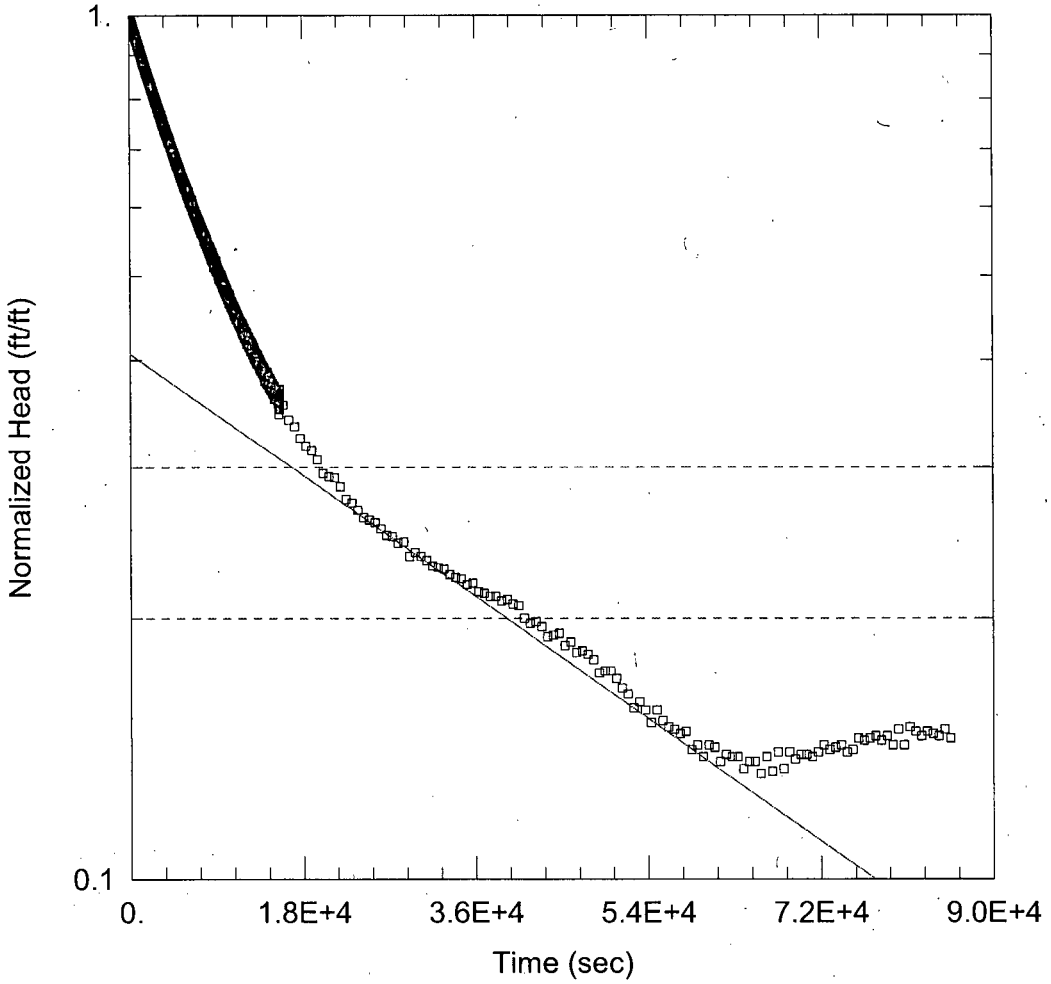
WELL DATA (JPG-DU-05I)

Initial Displacement: 1.155 ft
Total Well Penetration Depth: 36.36 ft
Casing Radius: 0.083 ft
Static Water Column Height: 32.16 ft
Screen Length: 14.2 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.09781 gal/day/ft^2
Kz/Kr = 1.
Ss = 1.552E-5 ft^{-1}



JPG-DU-05I TEST3FH_FHB

Data Set: P:\...\JPG-DU-05I Test3fh_fhb.aqt
Date: 07/26/10 Time: 15:44:23

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 45. ft Anisotropy Ratio (Kz/Kr): 1.

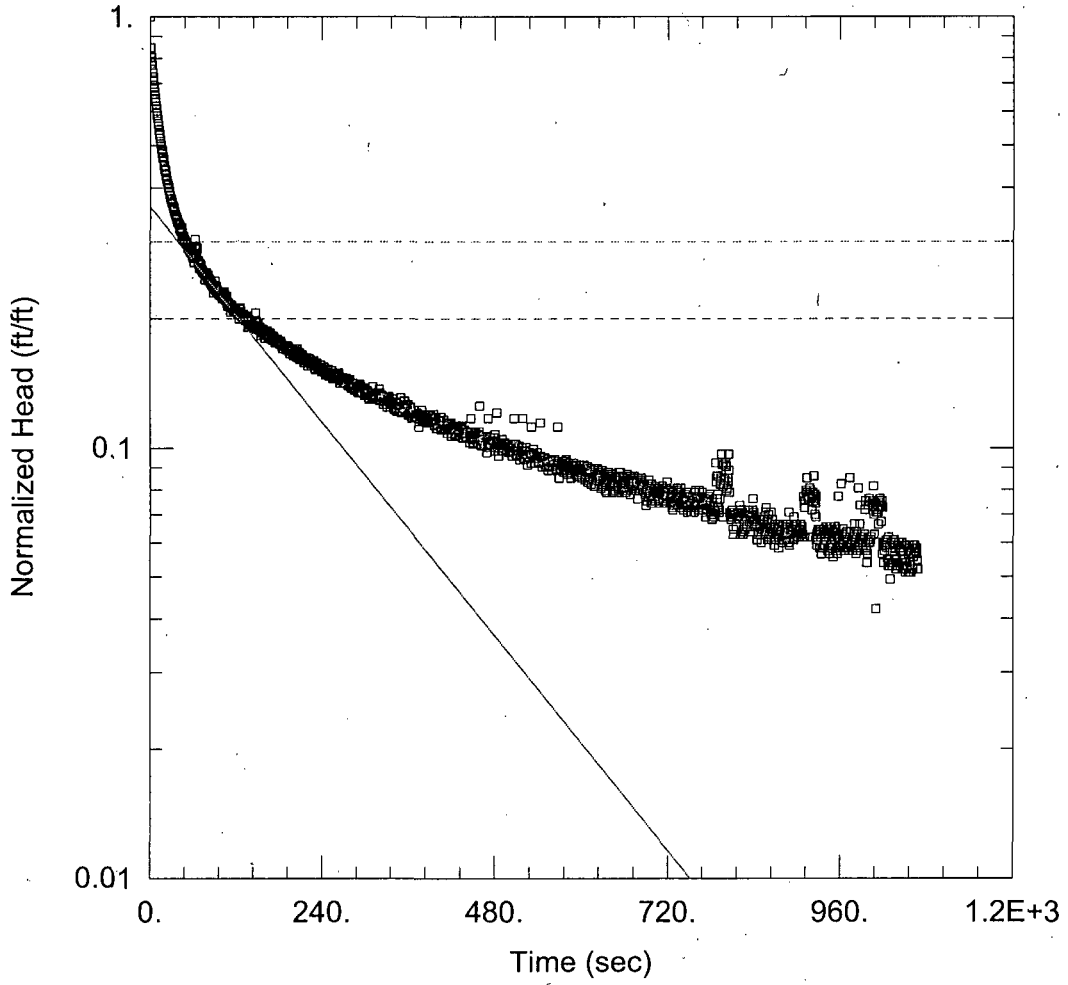
WELL DATA (JPG-DU-05I)

Initial Displacement: 1.155 ft
Total Well Penetration Depth: 32.16 ft
Casing Radius: 0.083 ft
Static Water Column Height: 32.16 ft
Screen Length: 10. ft
Well Radius: 0.188 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.01282 gal/day/ft^2
y0 = 0.4697 ft



JPG-DU-06I TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-06I\JPG-DU-06I Test1fh B-R.aqt
Date: 07/26/10 Time: 15:51:09

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

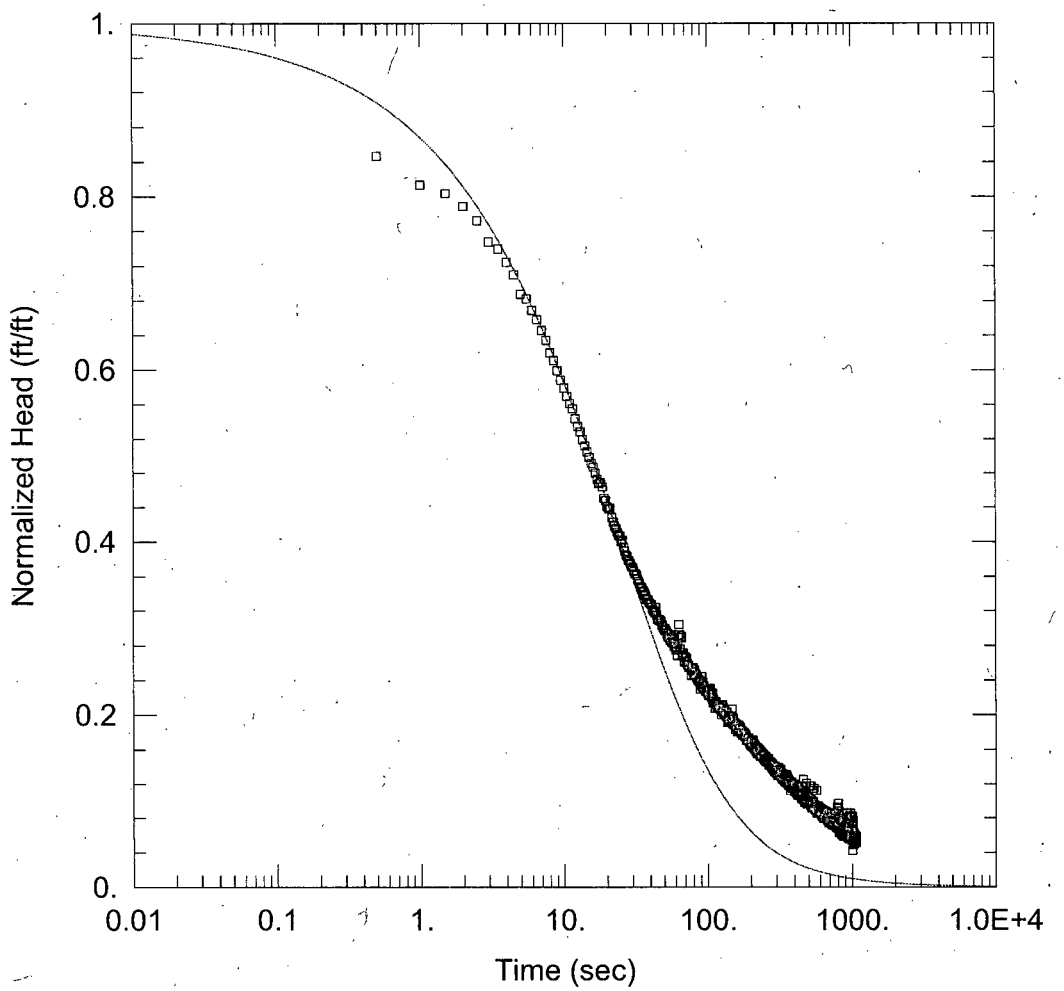
Saturated Thickness: 8.7 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06I)

Initial Displacement: 1.115 ft
Total Well Penetration Depth: 14.4 ft
Casing Radius: 0.083 ft
Static Water Column Height: 42.79 ft
Screen Length: 12.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 4.66 gal/day/ft^2
y0 = 0.4026 ft



JPG-DU-06I TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-06I\JPG-DU-06I Test1fh KGS.aqt
Date: 07/26/10 Time: 15:51:41

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 8.7 ft

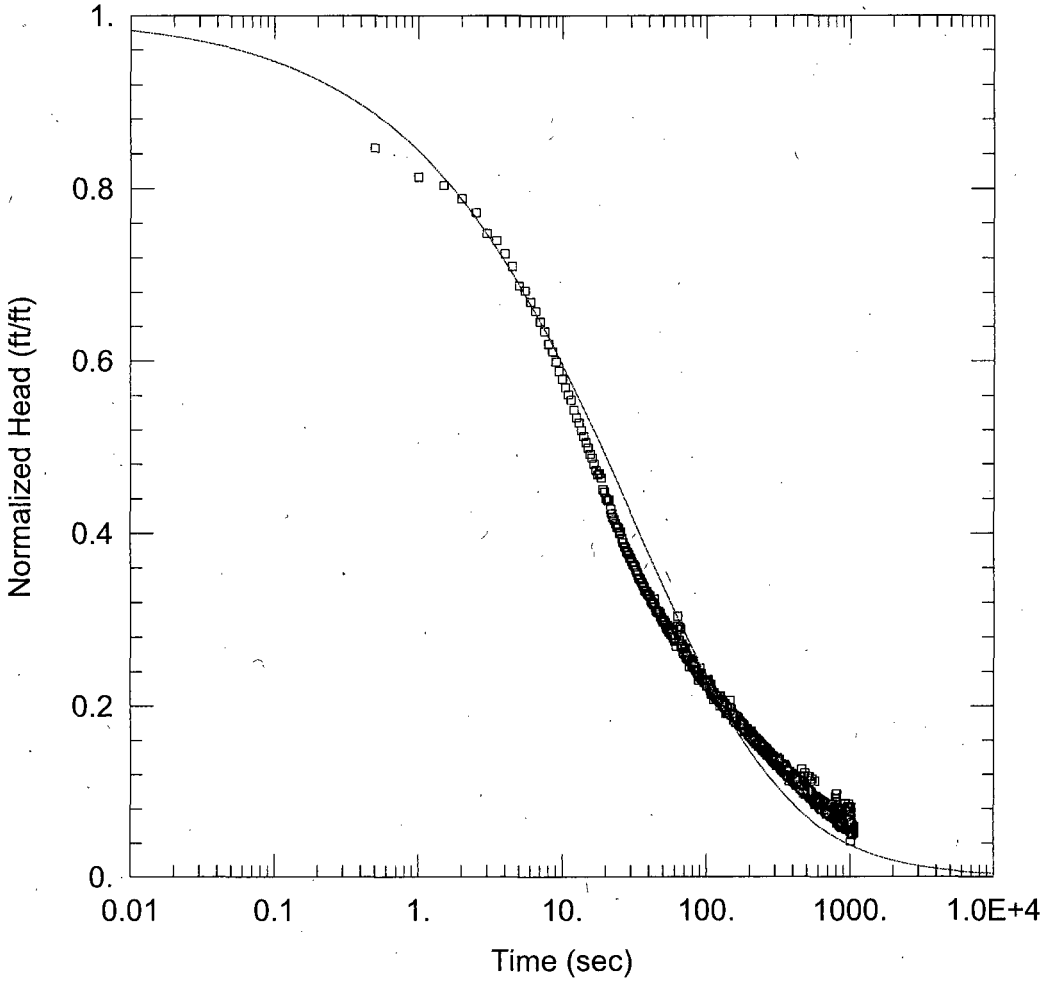
WELL DATA (JPG-DU-06I)

Initial Displacement: 1.115 ft
Total Well Penetration Depth: 14.4 ft
Casing Radius: 0.083 ft
Static Water Column Height: 42.79 ft
Screen Length: 12.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 18.38 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.01907 ft^{-1}



JPG-DU-06I TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-06I\JPG-DU-06I Test1fh.aqt
Date: 07/26/10 Time: 15:52:16

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 55. ft

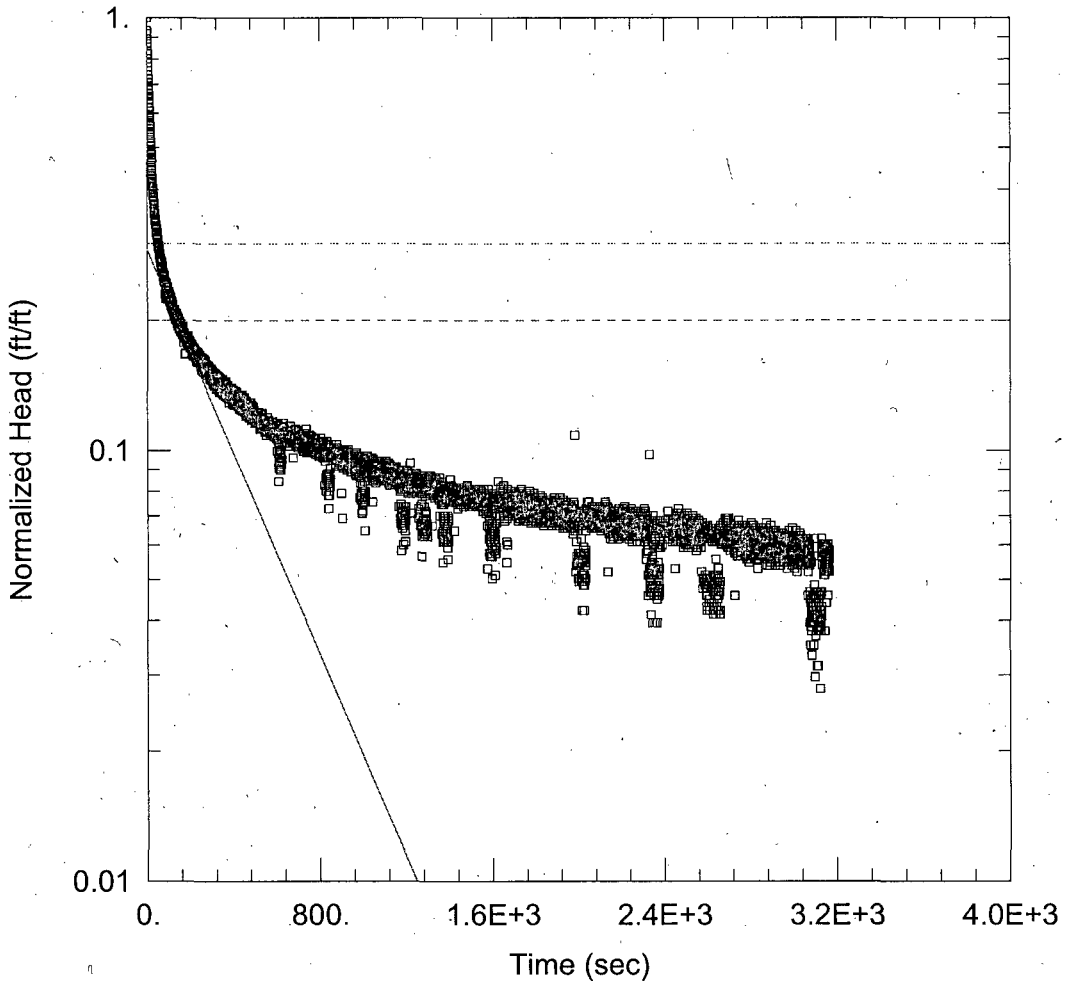
WELL DATA (JPG-DU-06I)

Initial Displacement: 1.115 ft
Total Well Penetration Depth: 42.79 ft
Casing Radius: 0.083 ft
Static Water Column Height: 42.79 ft
Screen Length: 10. ft
Well Radius: 0.188 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 2.61 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.01907 ft^{-1}



JPG-DU-06I TEST1RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-06I\JPG-DU-06I Test1rh B-R.aqt
Date: 07/26/10 Time: 15:53:03

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

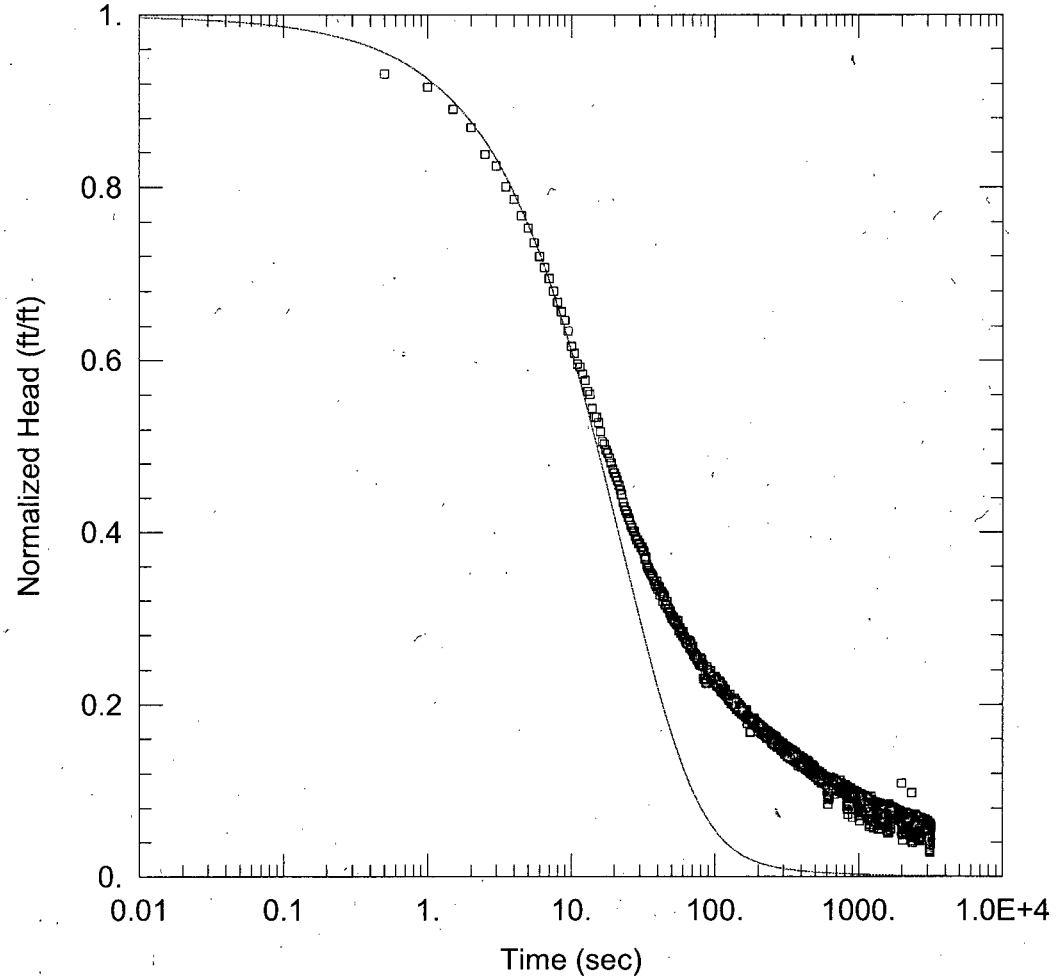
Saturated Thickness: 8.7 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06I)

Initial Displacement: 1.113 ft
Total Well Penetration Depth: 14.4 ft
Casing Radius: 0.083 ft
Static Water Column Height: 42.85 ft
Screen Length: 12.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 2.638 gal/day/ft^2
y0 = 0.3228 ft



JPG-DU-06I TEST1RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-06I\JPG-DU-06I Test1rh KGS.aqt
Date: 07/26/10 Time: 15:53:42

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 8.7 ft

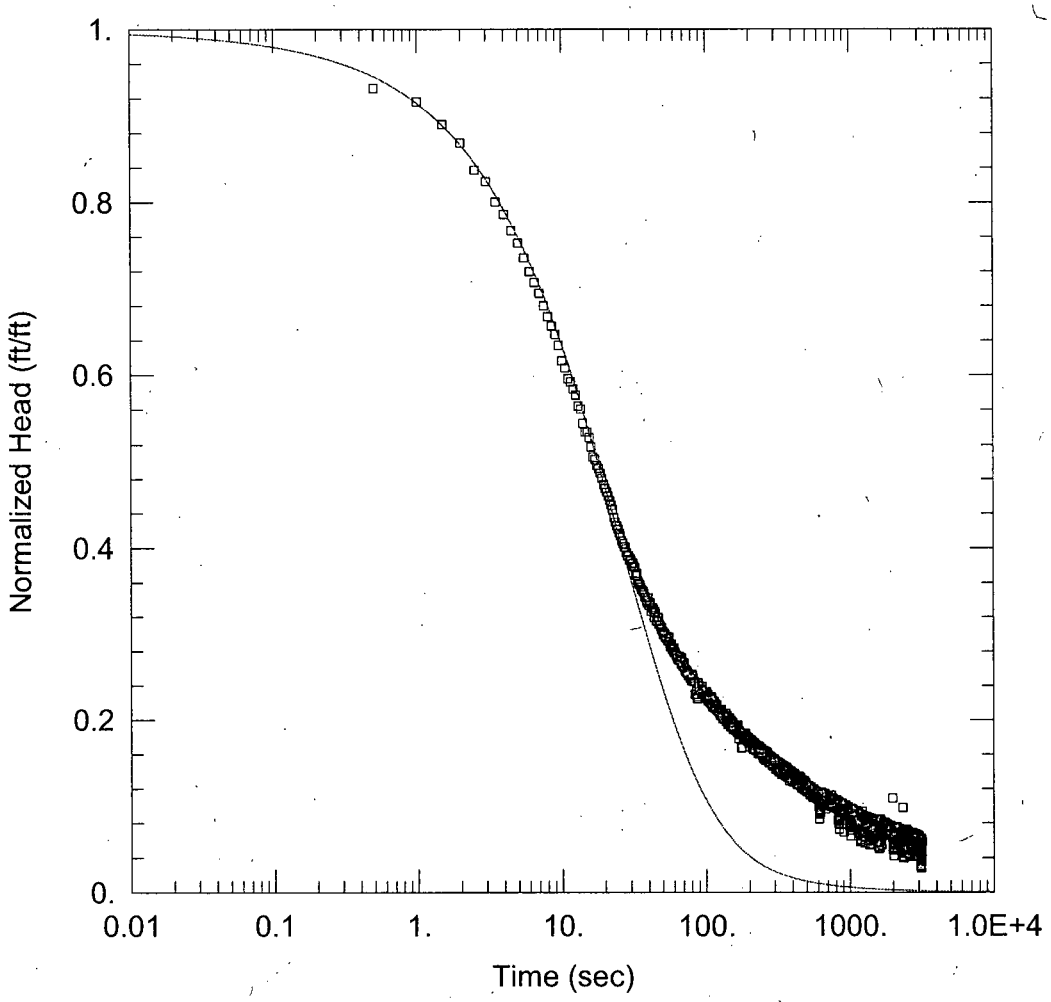
WELL DATA (JPG-DU-06I)

Initial Displacement: 1.113 ft
Total Well Penetration Depth: 14.4 ft
Casing Radius: 0.083 ft
Static Water Column Height: 42.85 ft
Screen Length: 12.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 55.41 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.0002633 ft^{-1}



JPG-DU-06I TEST1RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-06I\JPG-DU-06I Test1rh.aqt
Date: 07/26/10 Time: 15:55:21

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 55. ft
Anisotropy Ratio (Kz/Kr): 1.

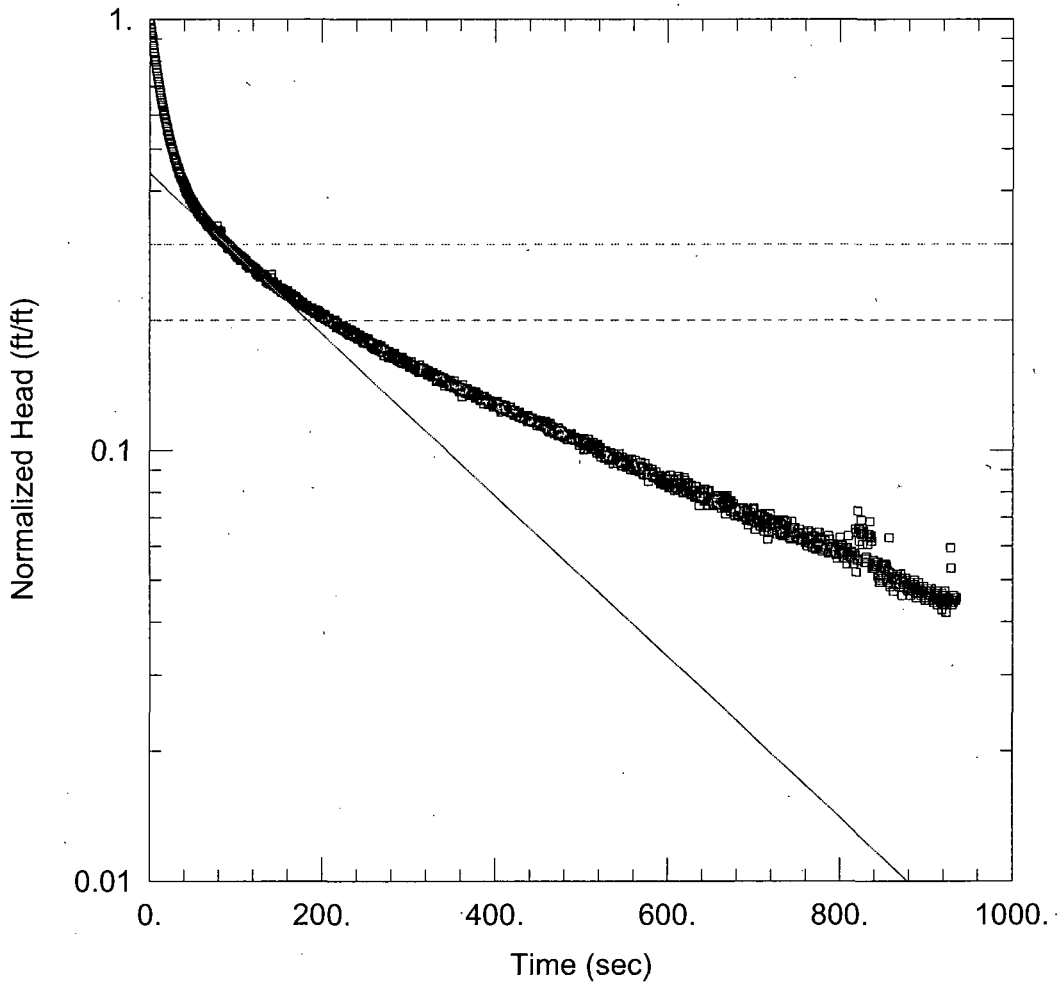
WELL DATA (JPG-DU-06I)

Initial Displacement: 1.113 ft
Total Well Penetration Depth: 42.85 ft
Casing Radius: 0.083 ft
Static Water Column Height: 42.85 ft
Screen Length: 10. ft
Well Radius: 0.188 ft

SOLUTION

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

T = 206.5 gal/day/ft
S = 0.002291



JPG-DU-06I TEST2FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-06I\JPG-DU-06I Test2fh B-R.aqt
Date: 07/26/10 Time: 15:55:55

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

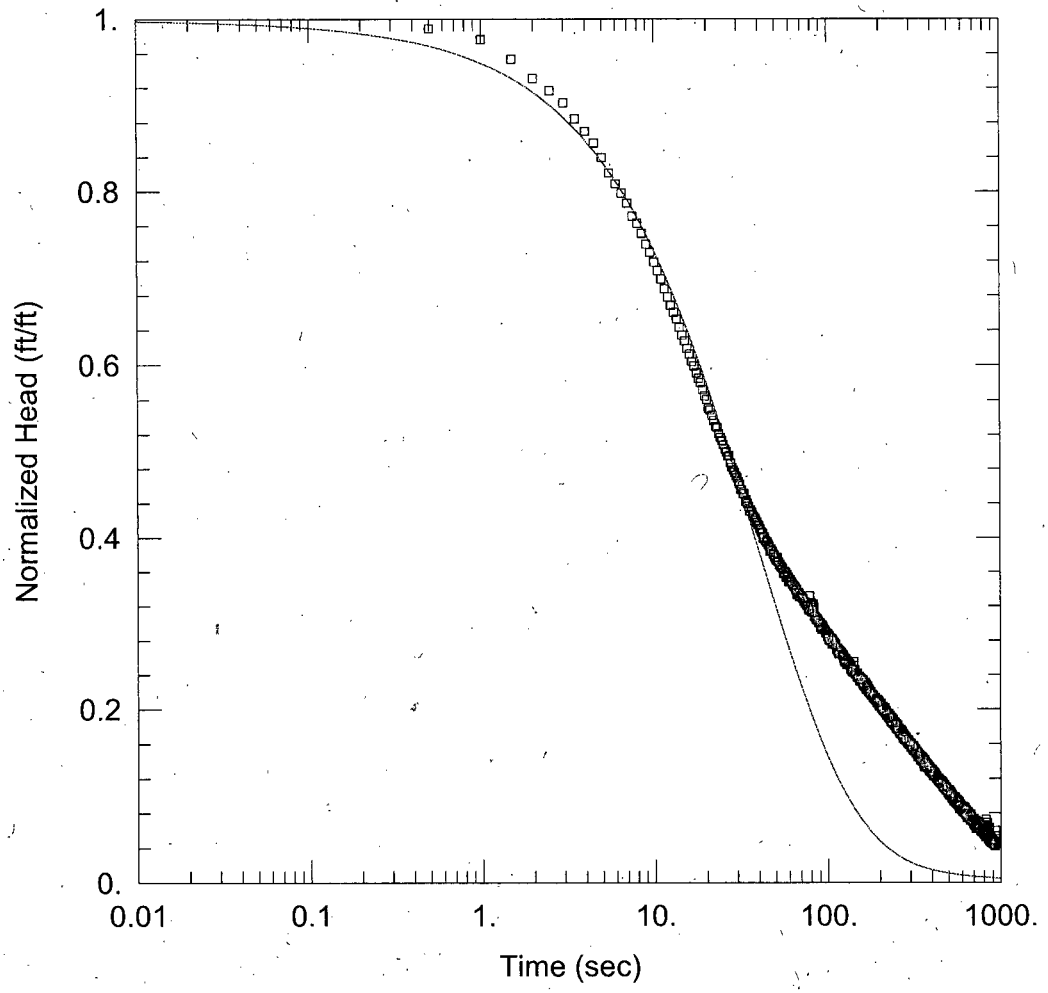
Saturated Thickness: 8.7 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06I)

Initial Displacement: 1.783 ft
Total Well Penetration Depth: 14.4 ft
Casing Radius: 0.083 ft
Static Water Column Height: 42.8 ft
Screen Length: 12.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 4.207 gal/day/ft^2
y0 = 0.7841 ft



JPG-DU-06I TEST2FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-06I\JPG-DU-06I Test2fh KGS.aqt
Date: 07/26/10 Time: 15:58:04

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 8.7 ft

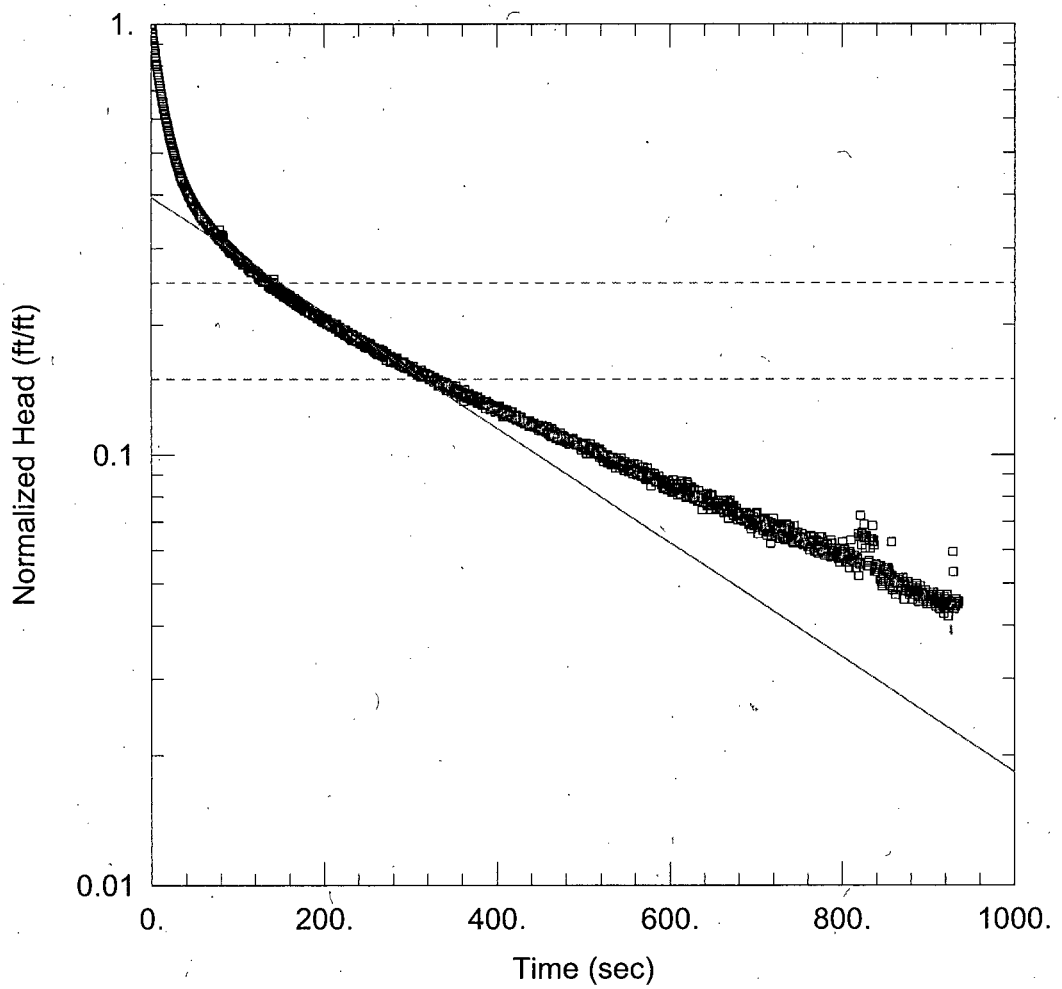
WELL DATA (JPG-DU-06I)

Initial Displacement: 1.783 ft
Total Well Penetration Depth: 14.4 ft
Casing Radius: 0.083 ft
Static Water Column Height: 42.8 ft
Screen Length: 12.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 29.29 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.0004177 ft^{-1}



JPG-DU-06I TEST2FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-06I\JPG-DU-06I Test2fh.aqt
Date: 07/26/10 Time: 15:58:53

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

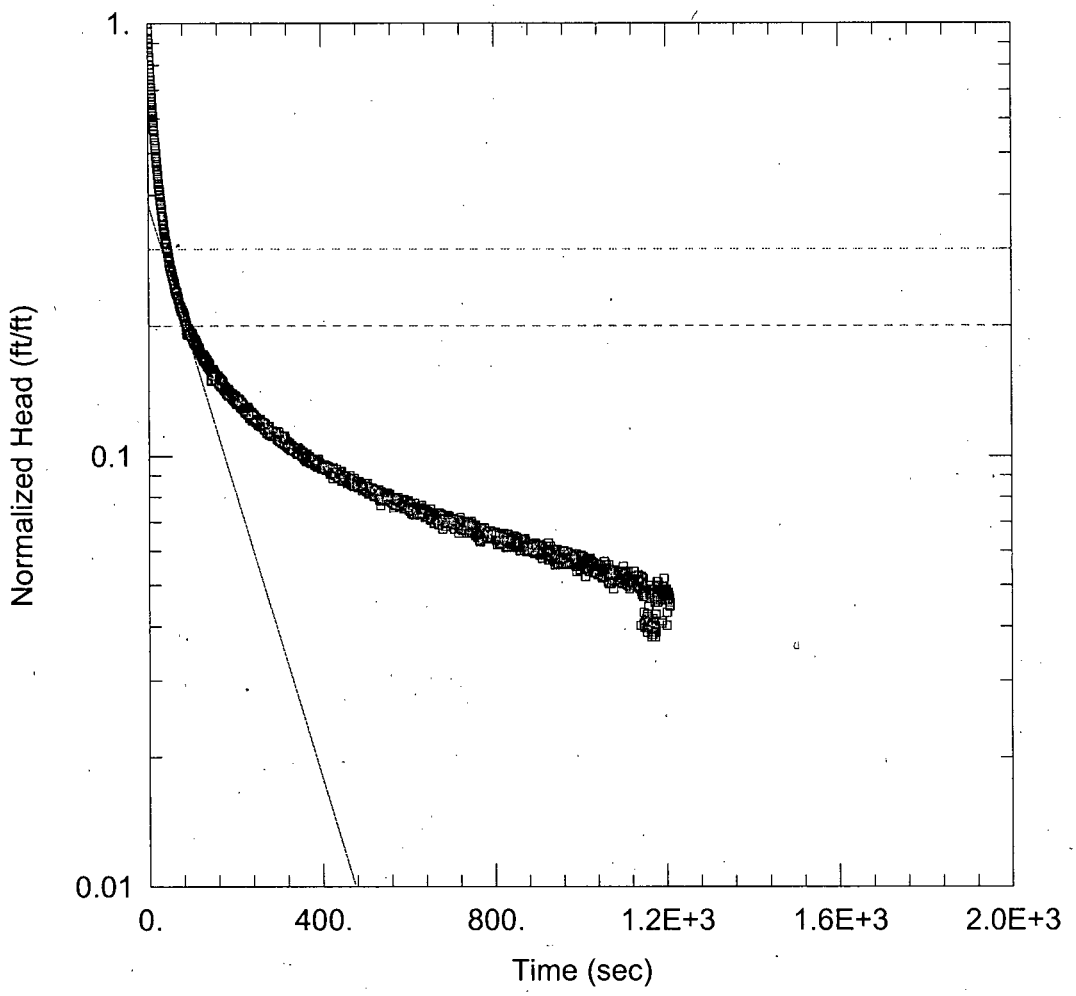
Saturated Thickness: 55. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06I)

Initial Displacement: 1.783 ft
Total Well Penetration Depth: 42.8 ft
Casing Radius: 0.083 ft
Static Water Column Height: 42.8 ft
Screen Length: 10. ft
Well Radius: 0.188 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 2.717 gal/day/ft^2
y0 = 0.7031 ft



JPG-DU-06I TEST2RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-06I\JPG-DU-06I Test2rh B-R.aqt
Date: 07/26/10 Time: 15:59:31

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

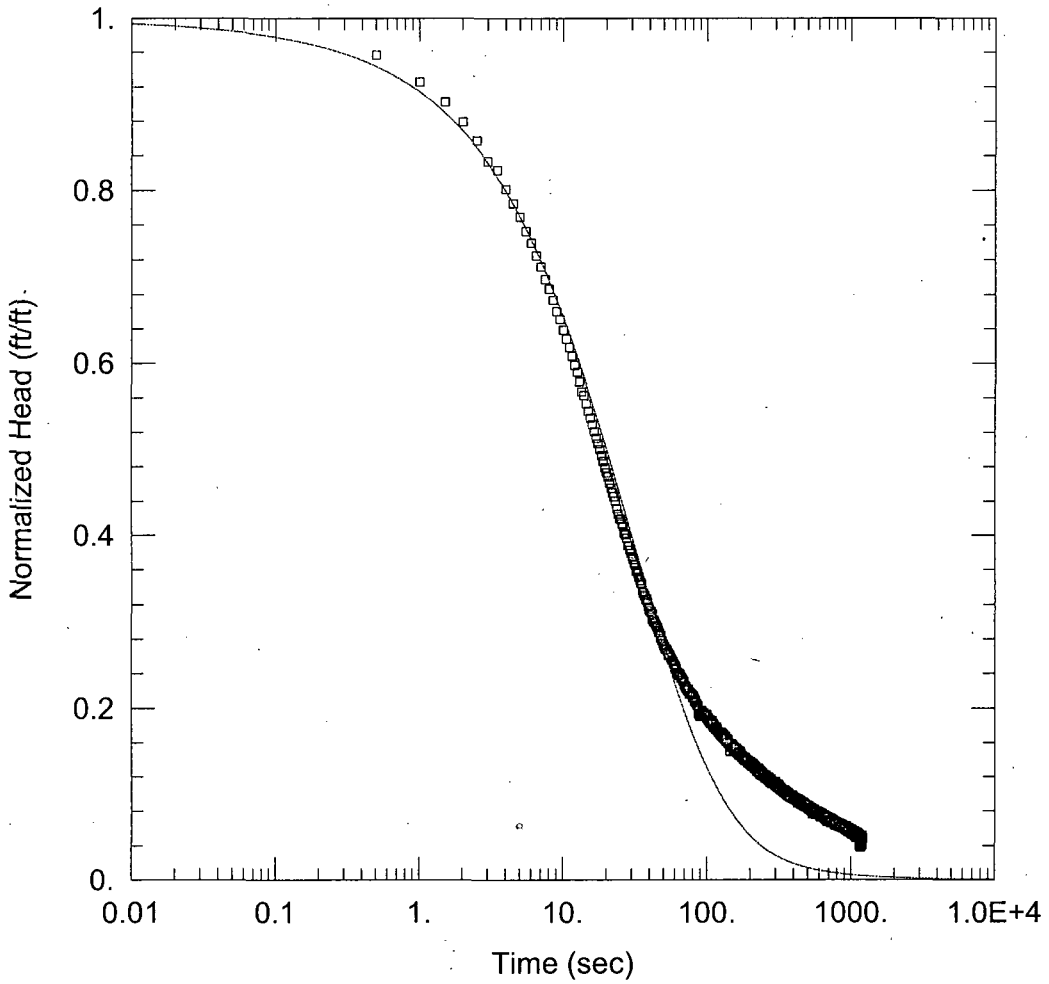
Saturated Thickness: 8.7 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06I)

Initial Displacement: 2.064 ft
Total Well Penetration Depth: 14.4 ft
Casing Radius: 0.083 ft
Static Water Column Height: 42.85 ft
Screen Length: 12.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 7.471 gal/day/ft^2
y0 = 0.7841 ft



JPG-DU-06I TEST2RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-06I\JPG-DU-06I Test2rh KGS.aqt
Date: 07/26/10 Time: 16:01:08

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 8.7 ft

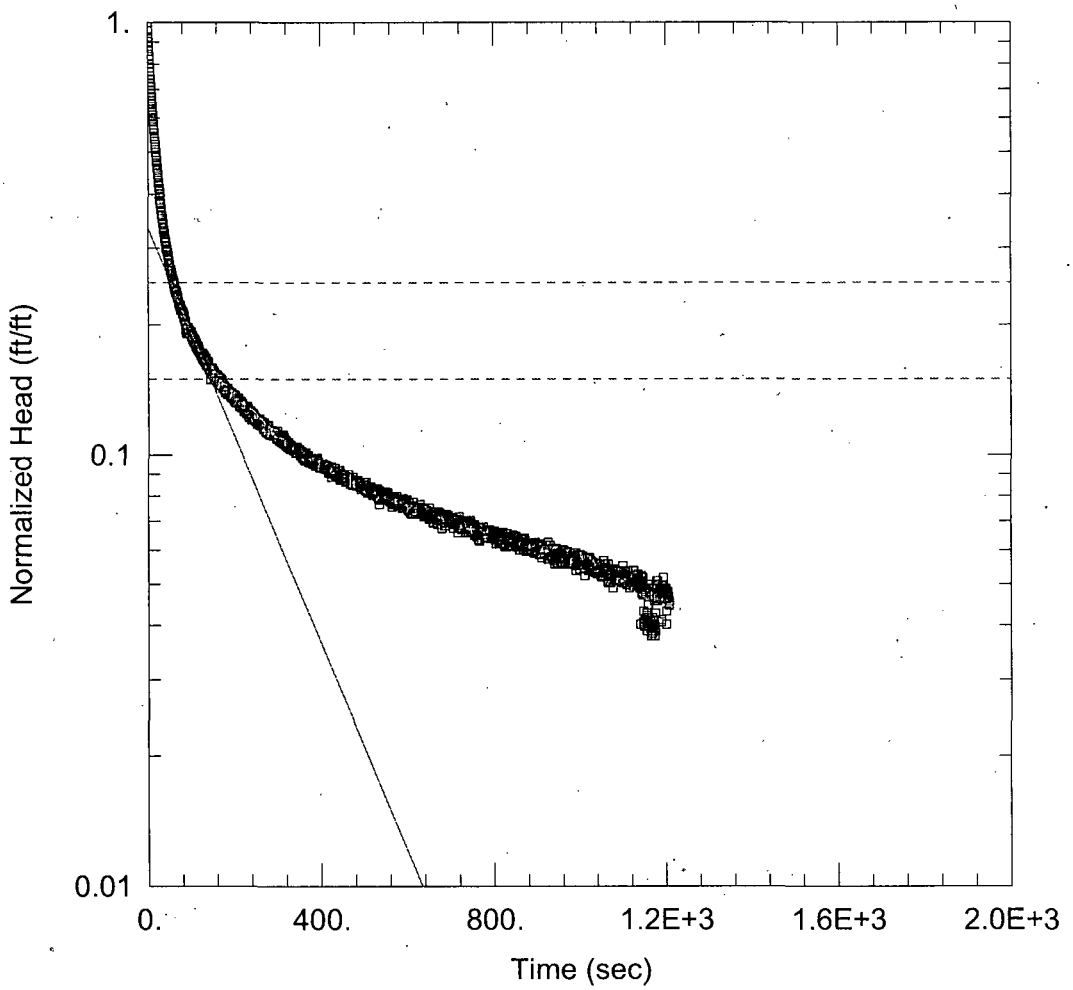
WELL DATA (JPG-DU-06I)

Initial Displacement: 2.064 ft
Total Well Penetration Depth: 14.4 ft
Casing Radius: 0.083 ft
Static Water Column Height: 42.85 ft
Screen Length: 12.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 25.56 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.003395 ft^{-1}



JPG-DU-06I TEST2RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-06I\JPG-DU-06I Test2rh.aqt
Date: 07/26/10 Time: 16:01:55

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

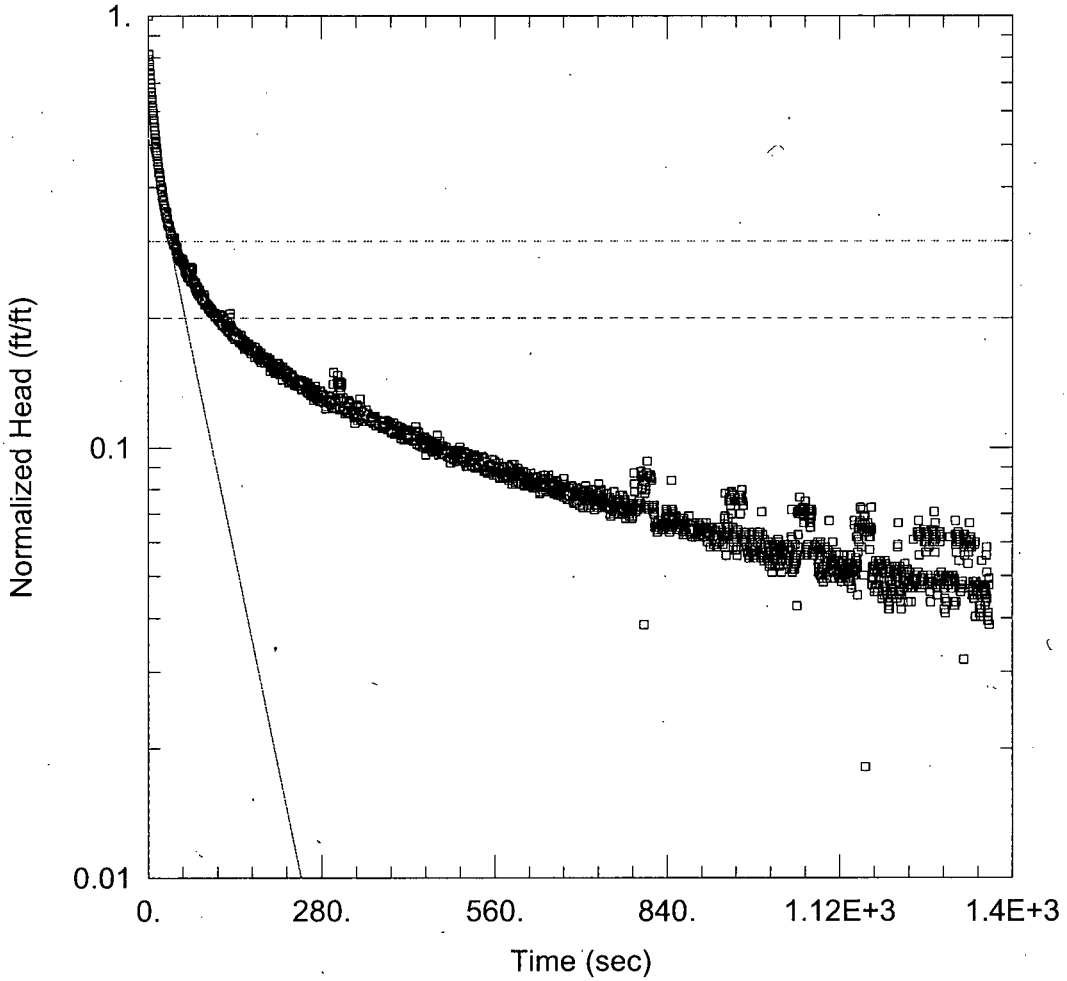
Saturated Thickness: 55. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06I)

Initial Displacement: 2.064 ft
Static Water Column Height: 42.85 ft
Total Well Penetration Depth: 42.85 ft
Screen Length: 10. ft
Casing Radius: 0.083 ft
Well Radius: 0.188 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 4.9 gal/day/ft^2
y0 = 0.6895 ft



JPG-DU-06I TEST3FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-06I\JPG-DU-06I Test3fh B-R.aqt
Date: 07/26/10 Time: 16:03:52

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

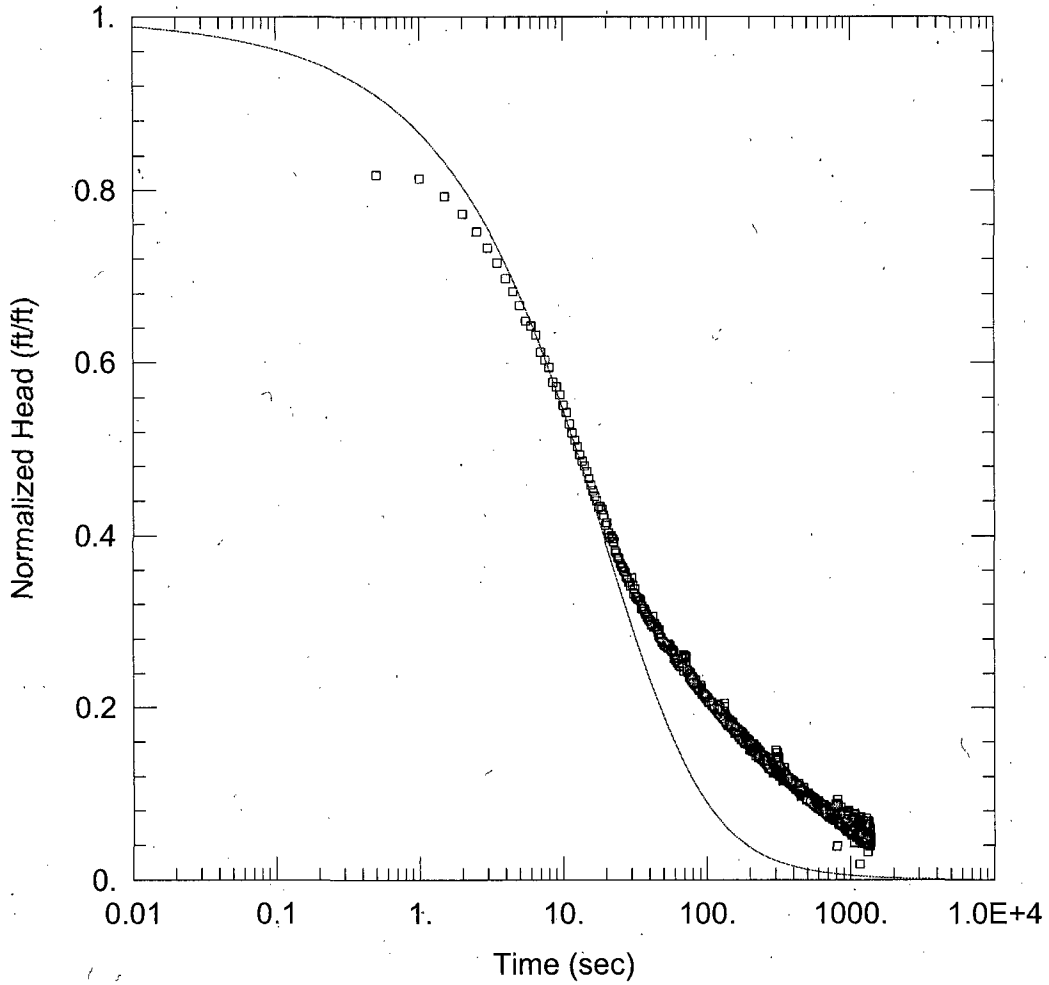
Saturated Thickness: 8.7 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06I)

Initial Displacement: 1.216 ft
Total Well Penetration Depth: 14.4 ft
Casing Radius: 0.083 ft
Static Water Column Height: 42.88 ft
Screen Length: 12.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 15.62 gal/day/ft^2
y0 = 0.6343 ft



JPG-DU-06I TEST3FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-06I\JPG-DU-06I Test3fh KGS.aqt
Date: 07/26/10 Time: 16:04:43

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 8.7 ft

WELL DATA (JPG-DU-06I)

Initial Displacement: 1.216 ft
Total Well Penetration Depth: 14.4 ft
Casing Radius: 0.083 ft

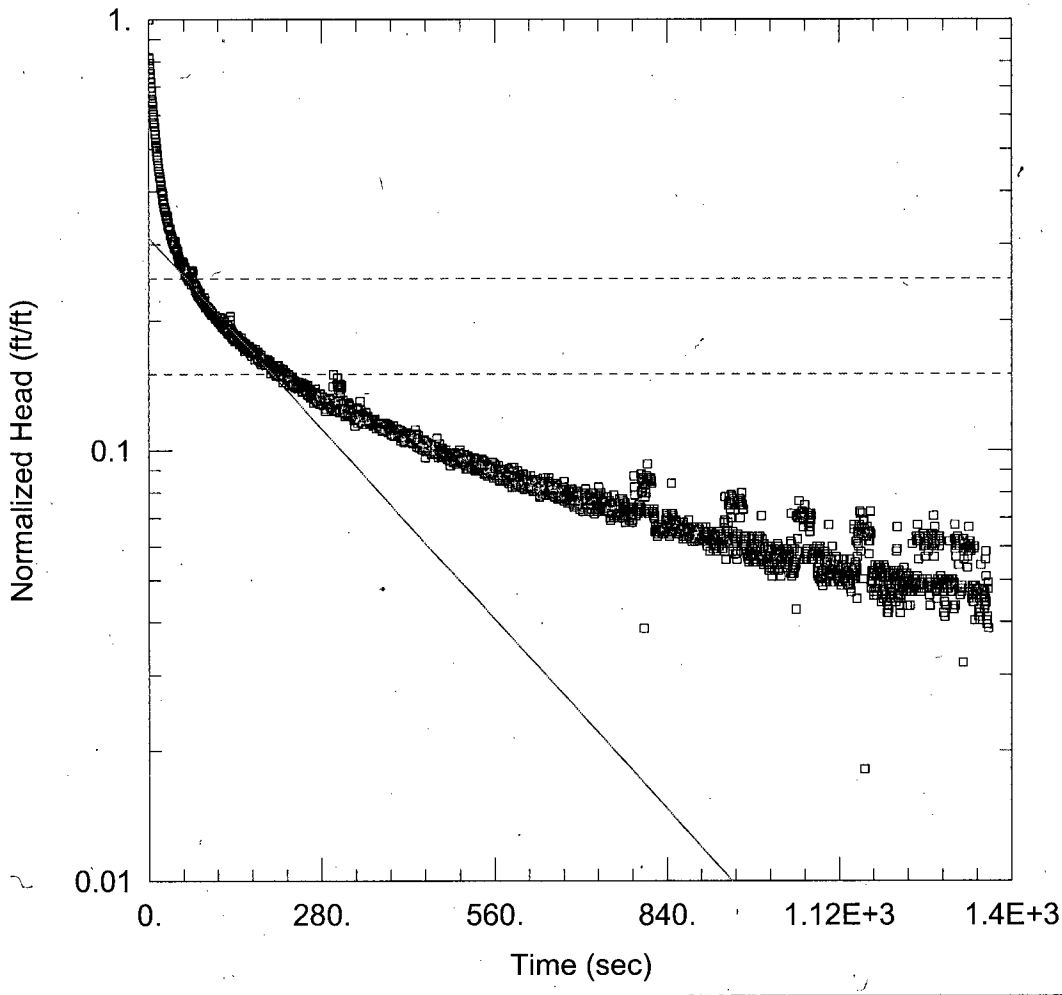
Static Water Column Height: 42.88 ft
Screen Length: 12.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 30.57 gal/day/ft^2
Kz/Kr = 1.

Ss = 0.009343 ft^{-1}



JPG-DU-06I TEST3FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-06I\JPG-DU-06I Test3fh.aqt
Date: 07/26/10 Time: 16:06:38

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

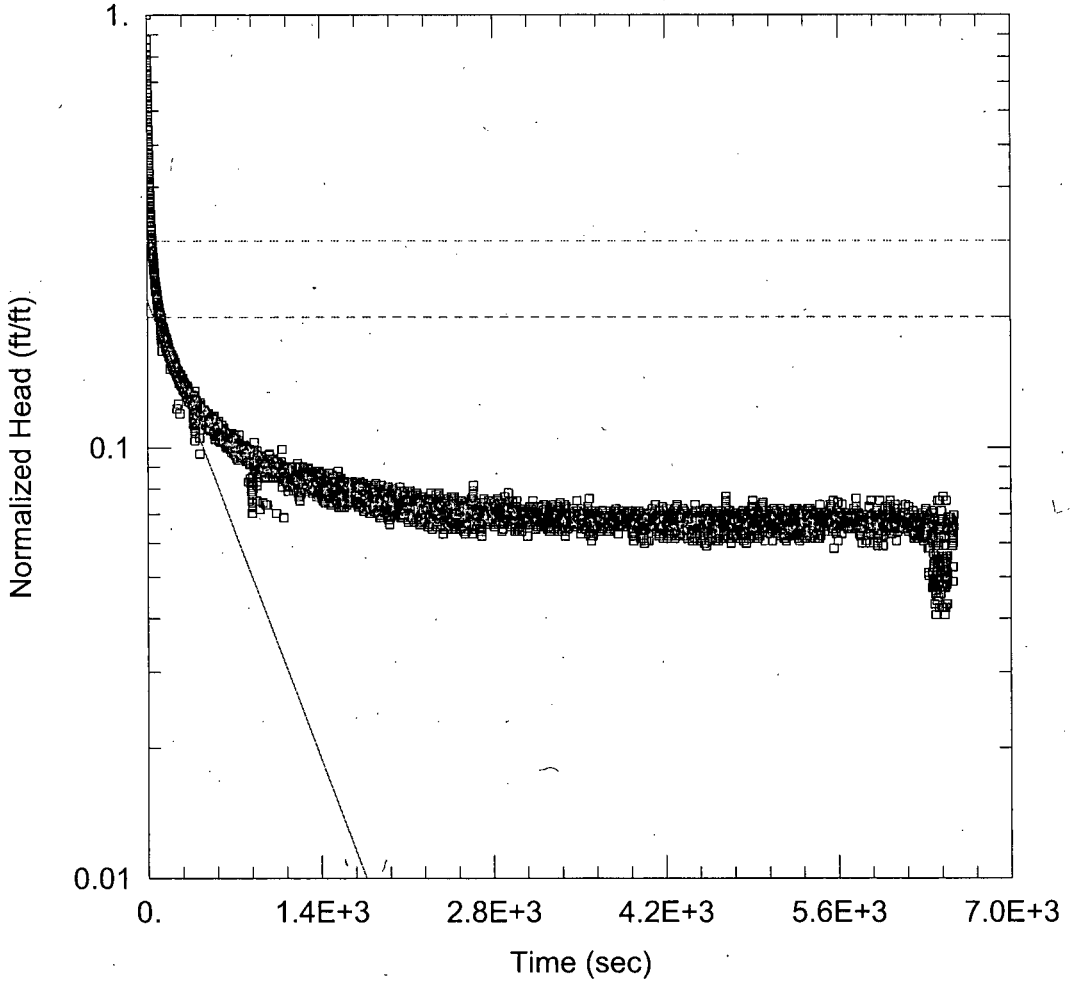
Saturated Thickness: 55. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06I)

Initial Displacement: 1.216 ft
Total Well Penetration Depth: 42.88 ft
Casing Radius: 0.083 ft
Static Water Column Height: 42.88 ft
Screen Length: 10. ft
Well Radius: 0.188 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 3.214 gal/day/ft^2
y0 = 0.3781 ft



JPG-DU-06I TEST3RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-06I\JPG-DU-06I Test3rh B-R.aqt
Date: 07/26/10 Time: 16:07:36

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

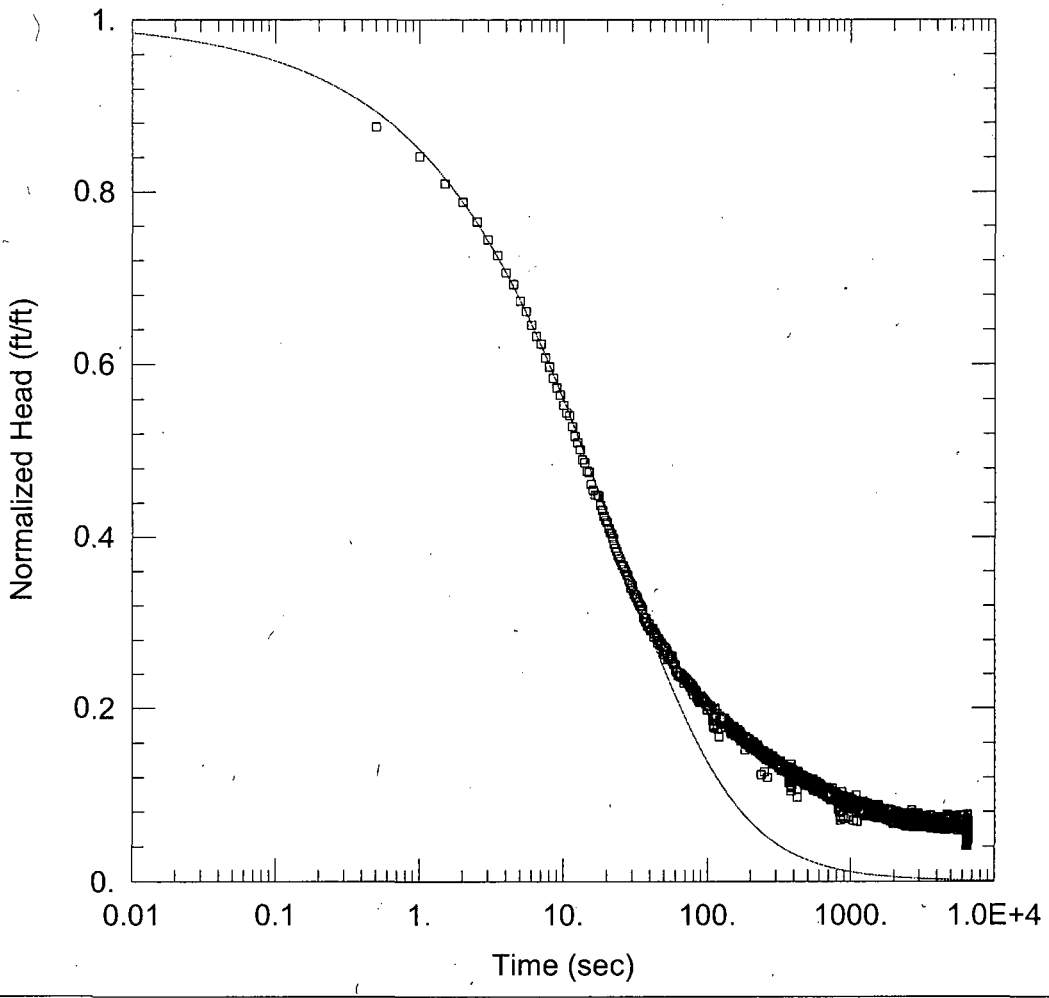
Saturated Thickness: 8.7 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06I)

Initial Displacement: 1.251 ft
Total Well Penetration Depth: 14.4 ft
Casing Radius: 0.083 ft
Static Water Column Height: 42.91 ft
Screen Length: 12.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 1.708 gal/day/ft^2
y0 = 0.2731 ft



JPG-DU-06I TEST3RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-06I\JPG-DU-06I Test3rh KGS.aqt
Date: 07/26/10 Time: 16:08:26

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 8.7 ft

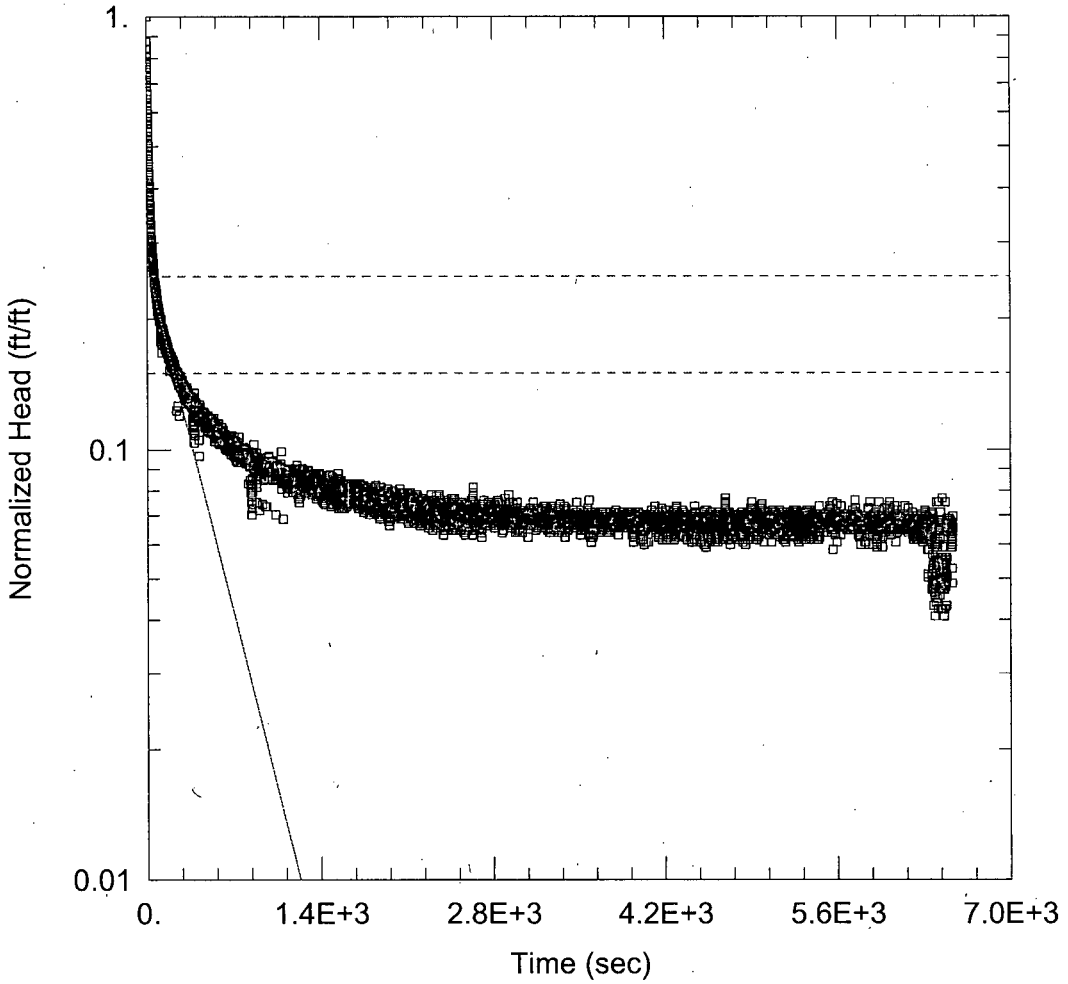
WELL DATA (JPG-DU-06I)

Initial Displacement: 1.251 ft
Total Well Penetration Depth: 14.4 ft
Casing Radius: 0.083 ft
Static Water Column Height: 42.91 ft
Screen Length: 12.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 16.09 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.03251 ft^{-1}



JPG-DU-06I TEST3RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\JPG-DU-06I\JPG-DU-06I Test3rh.aqt
Date: 07/26/10 Time: 16:09:48

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

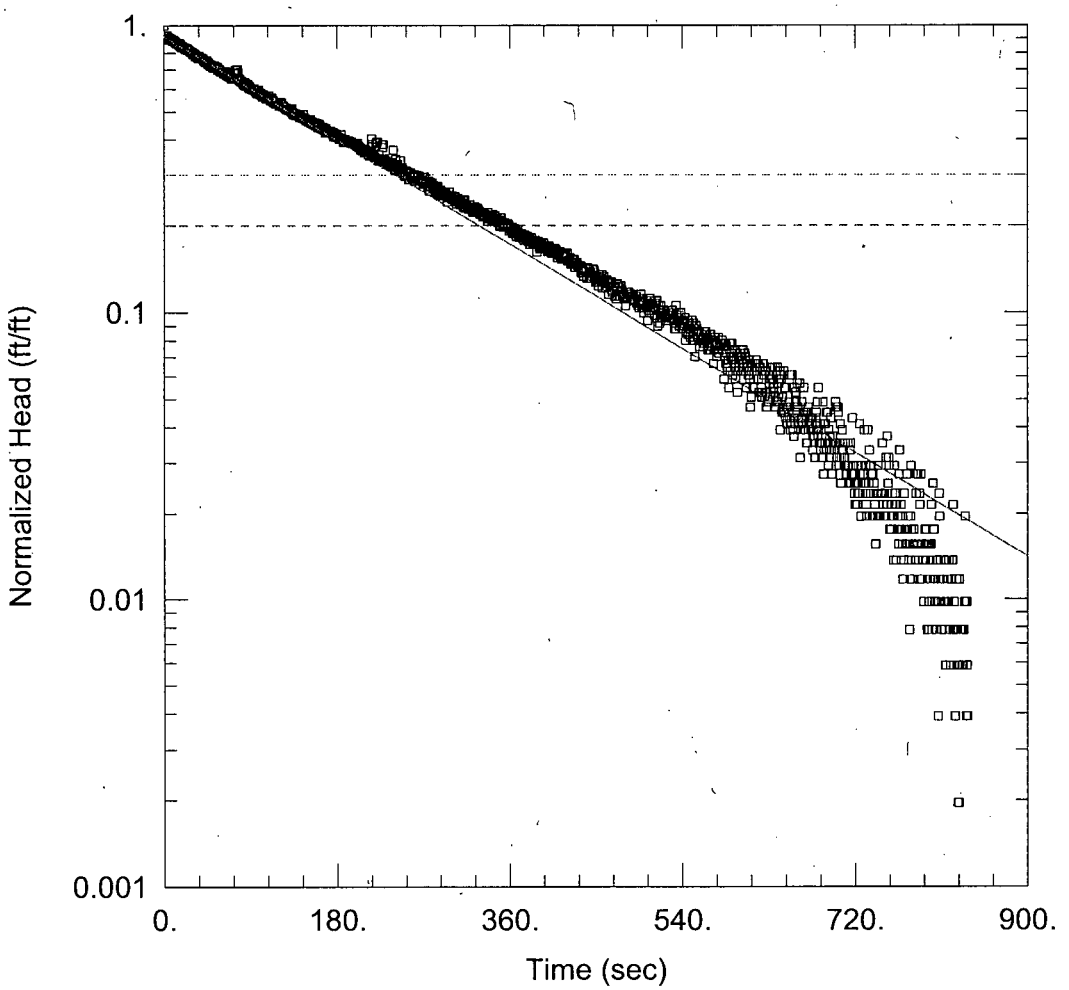
Saturated Thickness: 55. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (JPG-DU-06I)

Initial Displacement: 1.251 ft
Total Well Penetration Depth: 42.91 ft
Casing Radius: 0.083 ft
Static Water Column Height: 42.91 ft
Screen Length: 10. ft
Well Radius: 0.188 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 2.353 gal/day/ft^2
y0 = 0.3328 ft



MW-7 TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-7\MW-7 Test1fh B-R.aqt
Date: 07/27/10 Time: 10:52:39

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

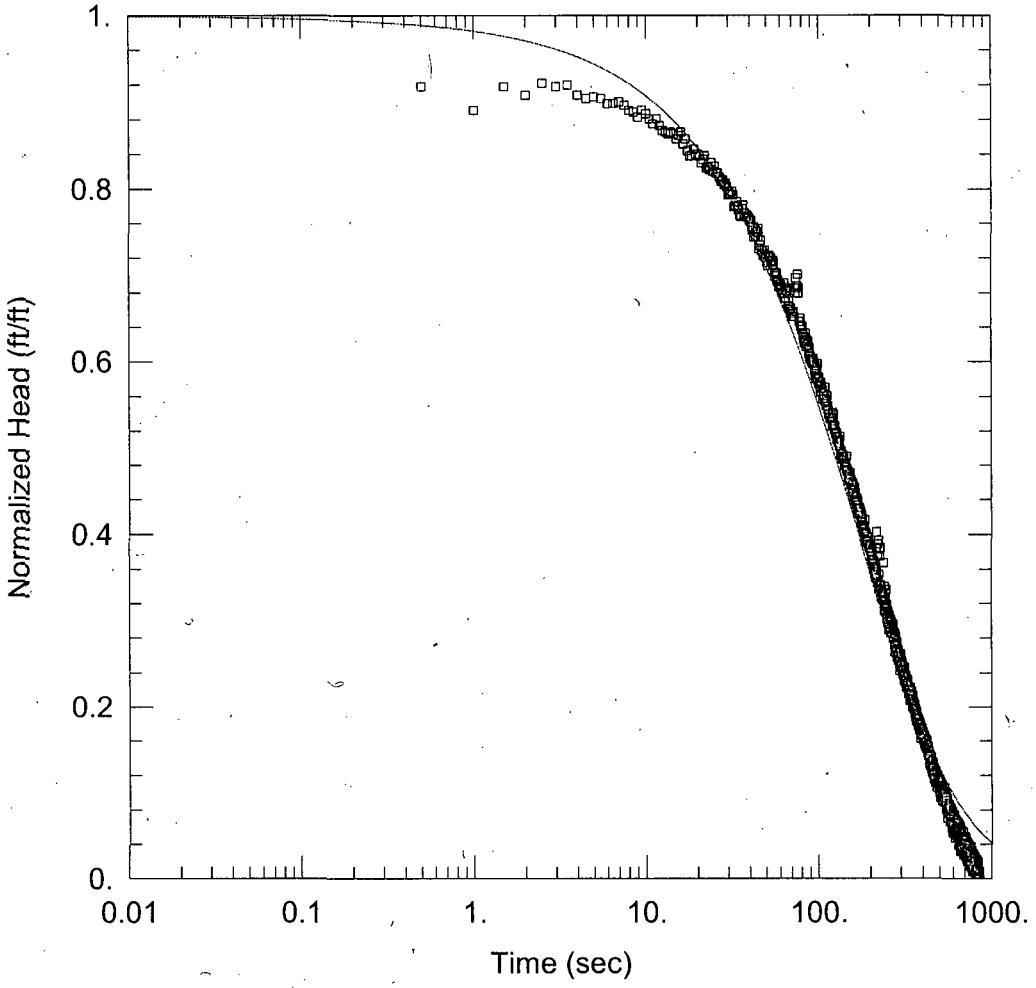
Saturated Thickness: 29. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-7)

Initial Displacement: 0.512 ft
Total Well Penetration Depth: 28.9 ft
Casing Radius: 0.083 ft
Static Water Column Height: 47.49 ft
Screen Length: 11.7 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 3.804 gal/day/ft^2
y0 = 0.4679 ft



MW-7 TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-7\MW-7 Test1fh KGS.aqt
Date: 07/27/10 Time: 10:53:33

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

WELL DATA (MW-7)

Initial Displacement: 0.512 ft
Total Well Penetration Depth: 28.9 ft
Casing Radius: 0.083 ft

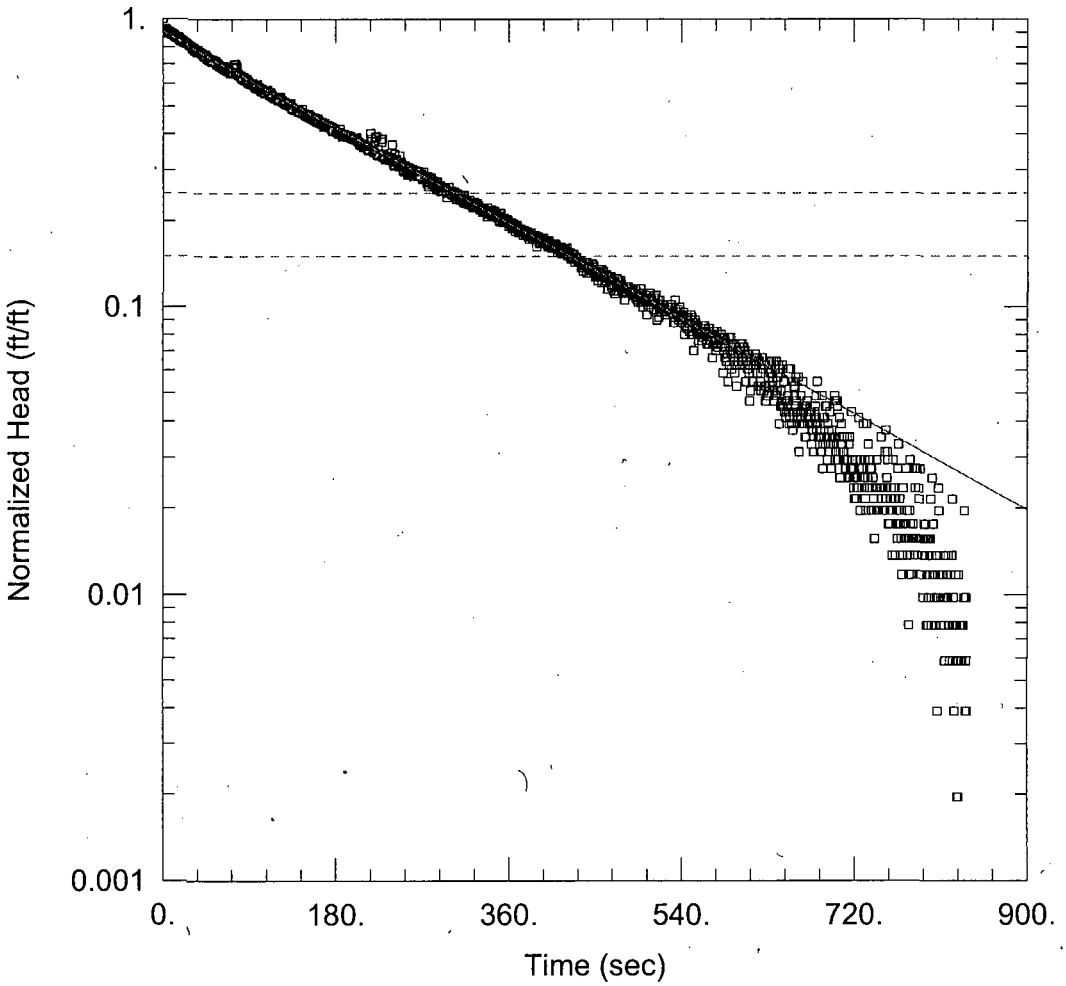
Static Water Column Height: 47.49 ft
Screen Length: 11.7 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 3.395 gal/day/ft^2
Kz/Kr = 1.

Ss = 0.0002069 ft^{-1}



MW-7 TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-7\MW-7 Test1fh.aqt
Date: 07/27/10 Time: 10:54:22

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

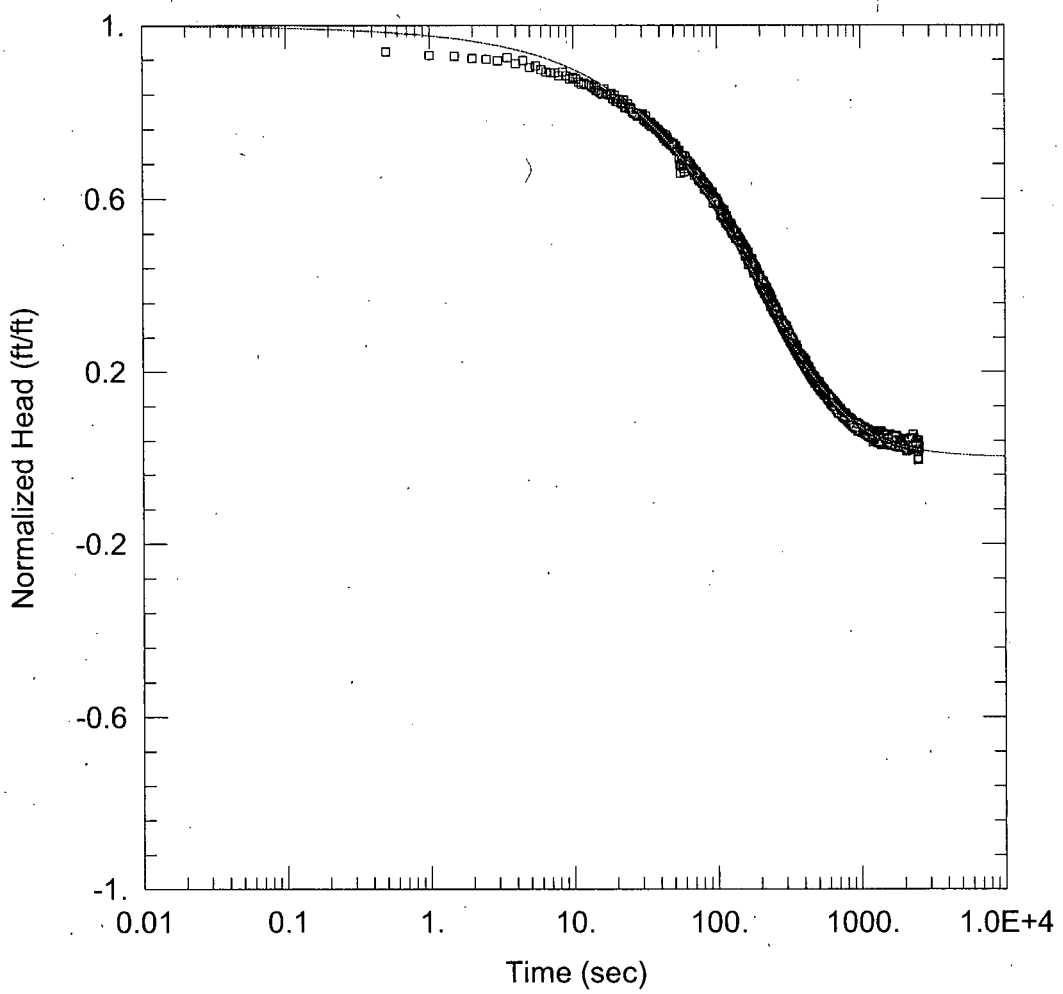
Saturated Thickness: 60. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-7)

Initial Displacement: 0.512 ft
Static Water Column Height: 47.49 ft
Total Well Penetration Depth: 47.49 ft
Screen Length: 10. ft
Casing Radius: 0.083 ft
Well Radius: 0.125 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 4.148 gal/day/ft^2
y0 = 0.4636 ft



MW-7 TEST1RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-7\MW-7 Test1rh KGS.aqt
Date: 07/27/10 Time: 10:55:24

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

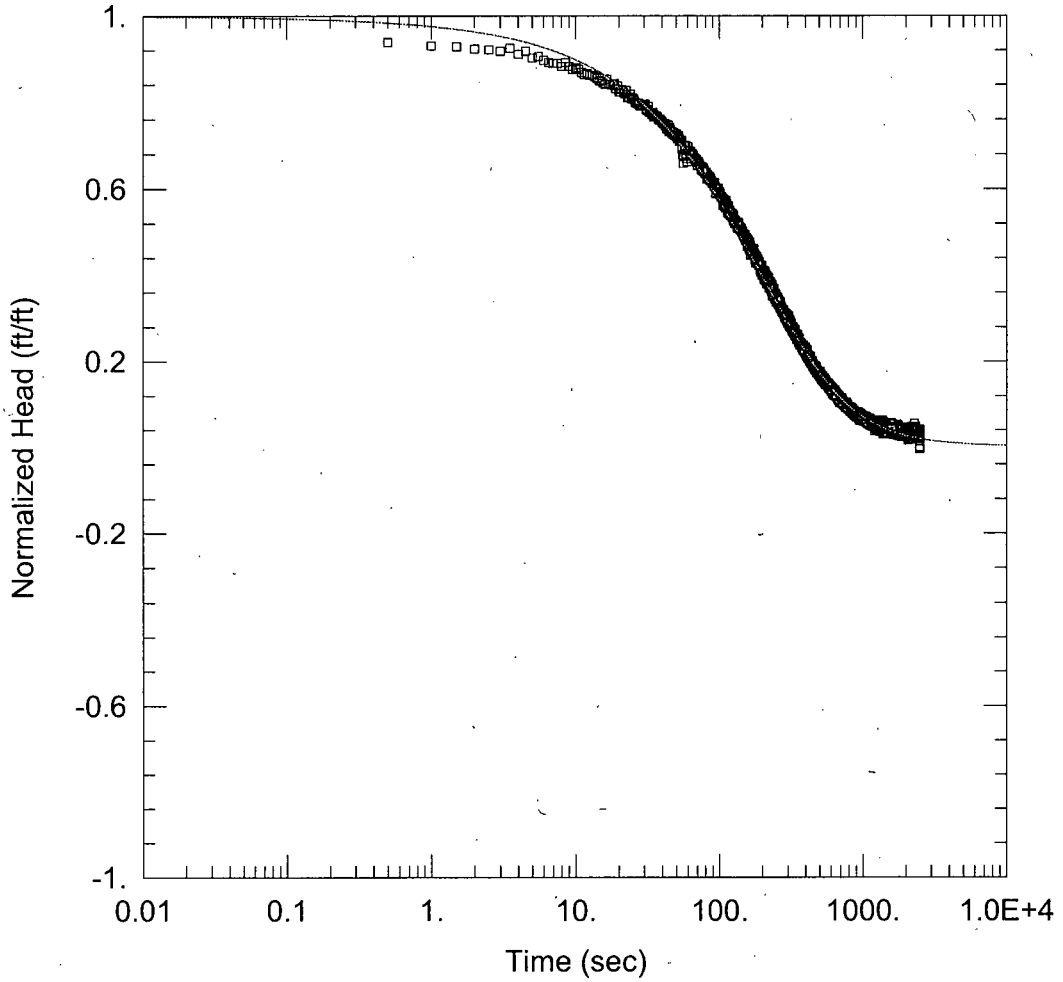
WELL DATA (MW-7)

Initial Displacement: 0.572 ft
Total Well Penetration Depth: 28.9 ft
Casing Radius: 0.083 ft
Static Water Column Height: 47.46 ft
Screen Length: 11.7 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 2.223 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.001 ft^{-1}



MW-7 TEST1RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-7\MW-7 Test1rh.aqt
Date: 07/27/10 Time: 10:56:45

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

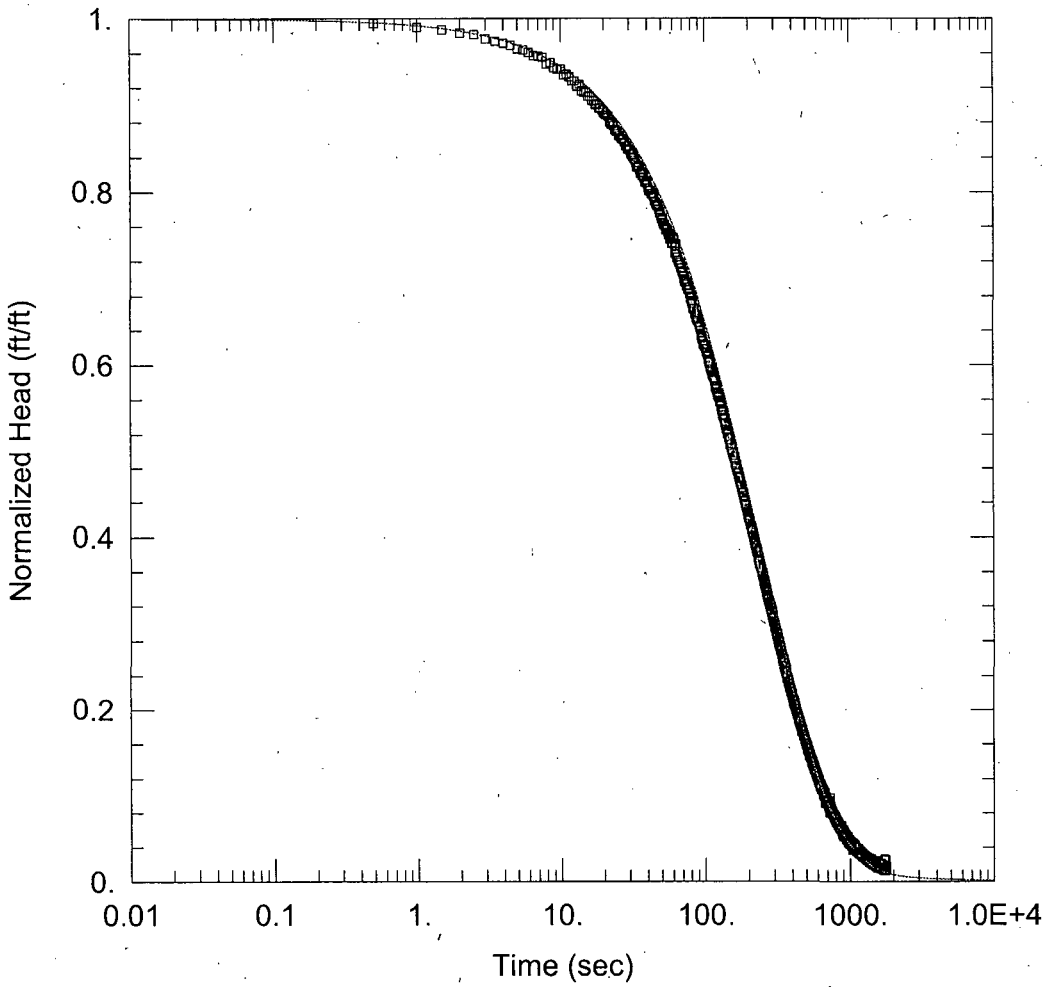
WELL DATA (MW-7)

Initial Displacement: 0.572 ft
Total Well Penetration Depth: 28.9 ft
Casing Radius: 0.083 ft
Static Water Column Height: 47.46 ft
Screen Length: 11.7 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 2.223 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.001 ft^{-1}



MW-7 TEST2FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-7\MW-7 Test2fh KGS.aqt
Date: 07/27/10 Time: 10:57:33

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

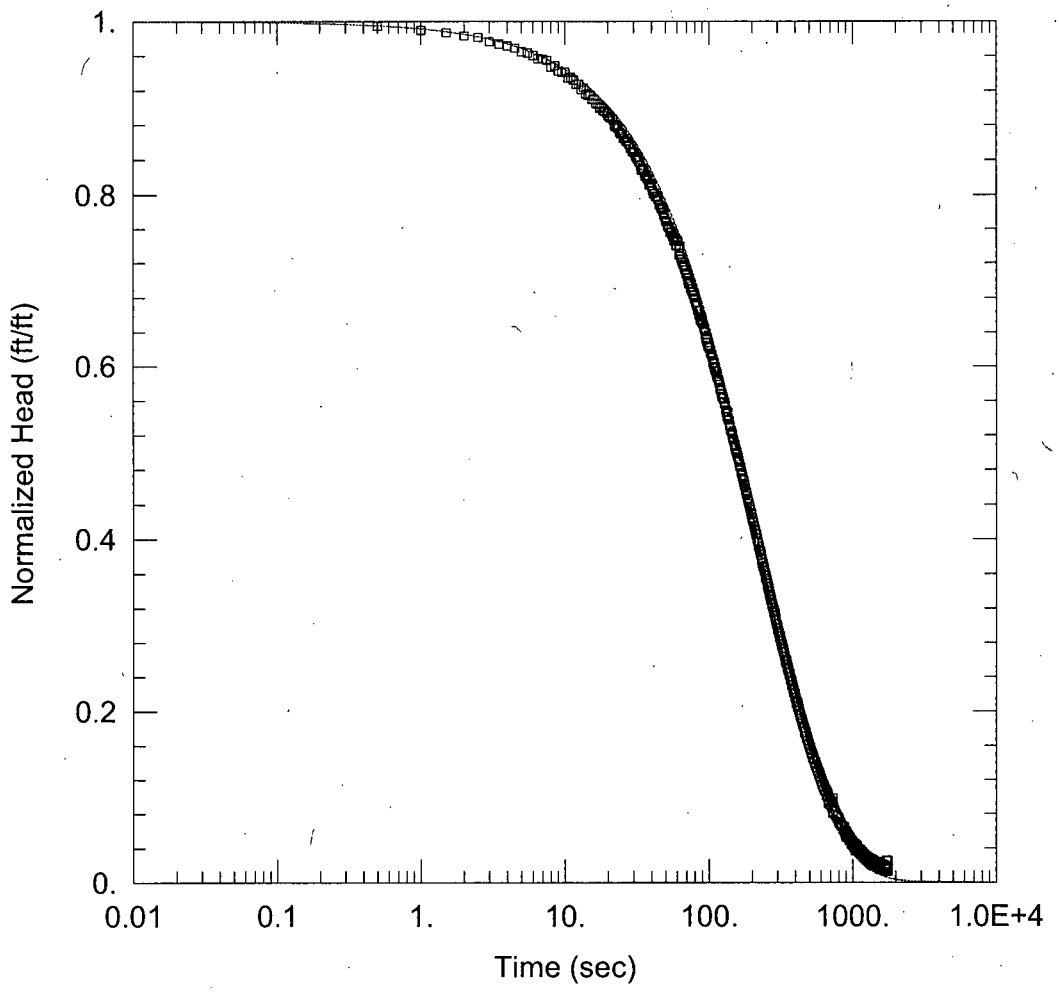
WELL DATA (MW-7)

Initial Displacement: 2.142 ft
Total Well Penetration Depth: 28.6 ft
Casing Radius: 0.083 ft
Static Water Column Height: 47.46 ft
Screen Length: 11.4 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 3.436 gal/day/ft^2
Kz/Kr = 1.
Ss = 1.0E-5 ft^{-1}



MW-7 TEST2FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-7\MW-7 Test2fh.aqt
Date: 07/27/10 Time: 10:58:08

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 60. ft

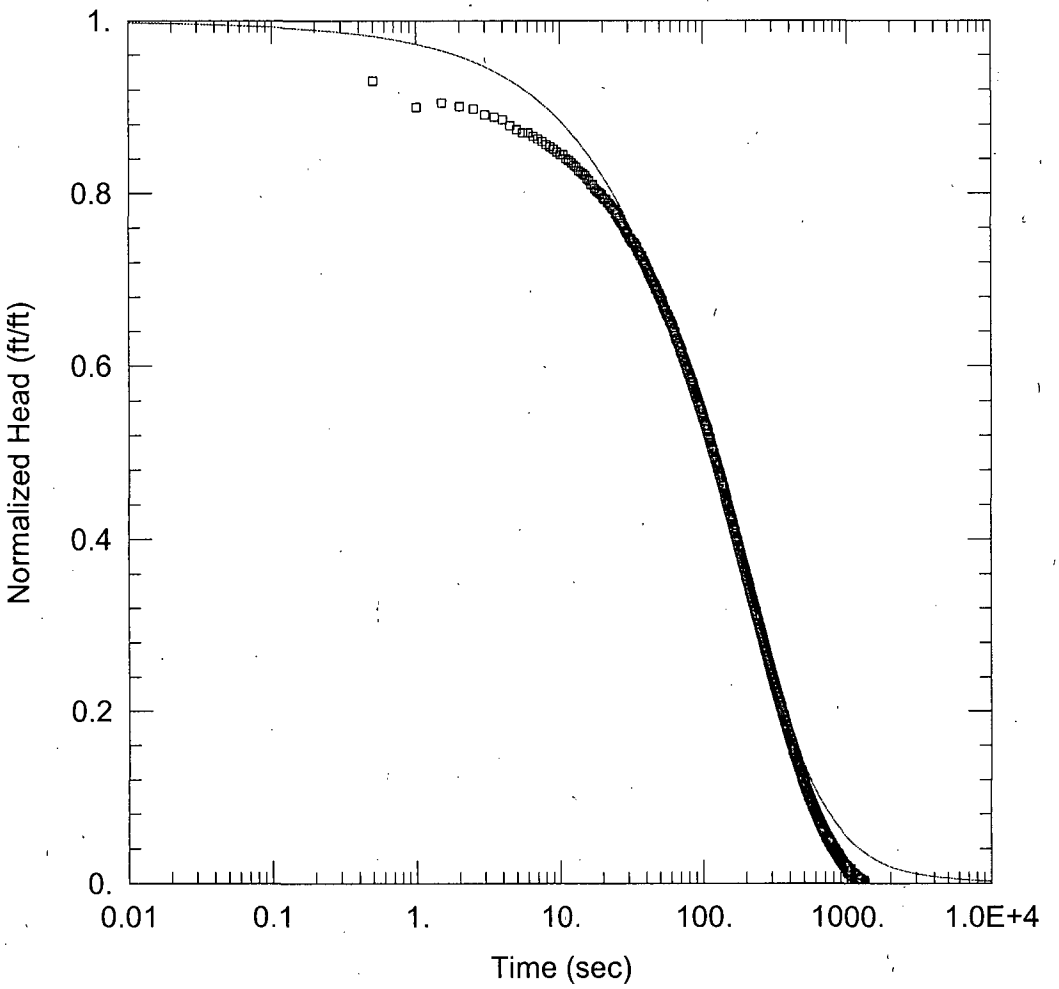
WELL DATA (MW-7)

Initial Displacement: 2.142 ft
Total Well Penetration Depth: 47.46 ft
Casing Radius: 0.083 ft
Static Water Column Height: 47.46 ft
Screen Length: 10. ft
Well Radius: 0.125 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 3.436 gal/day/ft^2
Kz/Kr = 1.
Ss = 1.0E-5 ft^{-1}



MW-7 TEST2RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-7\MW-7 Test2rh KGS.aqt
Date: 07/27/10 Time: 10:58:54

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

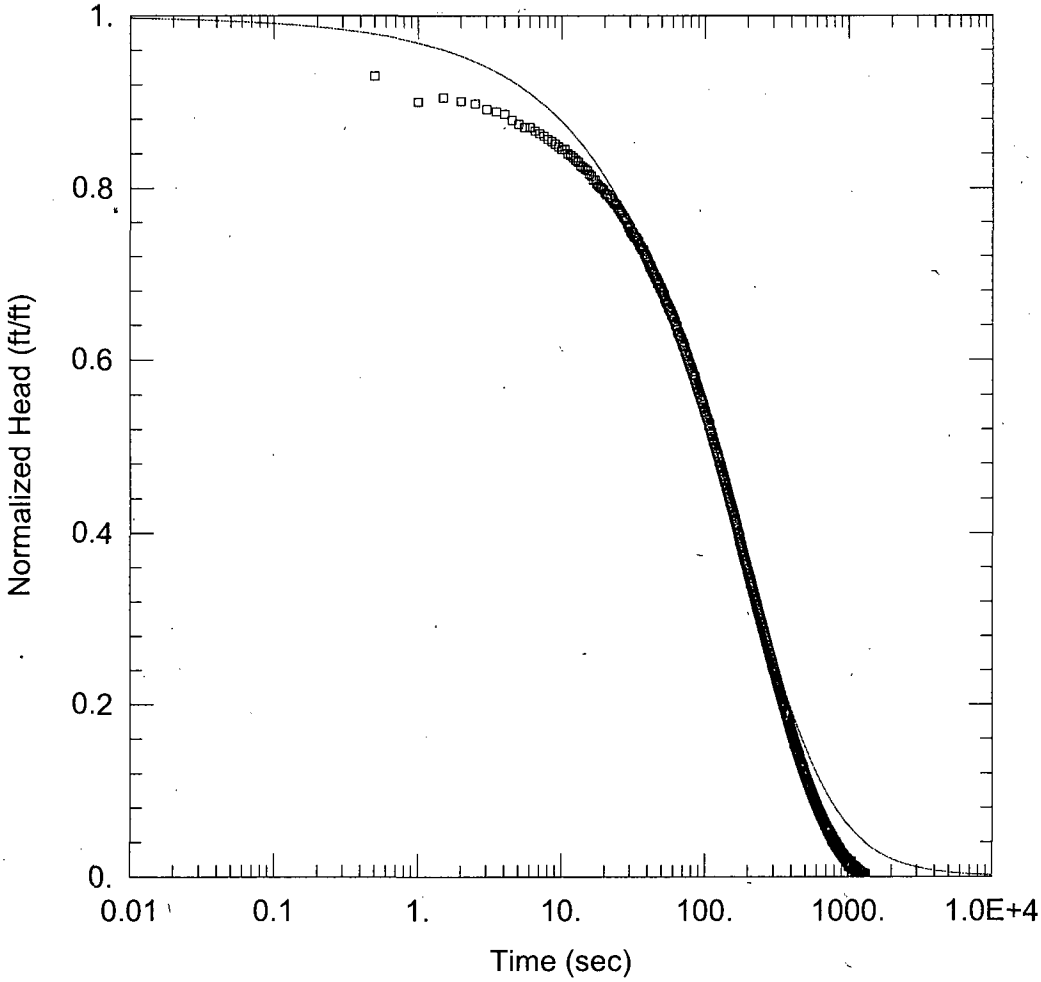
WELL DATA (MW-7)

Initial Displacement: 2.392 ft
Total Well Penetration Depth: 28.9 ft
Casing Radius: 0.083 ft
Static Water Column Height: 47.47 ft
Screen Length: 11.7 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 2.715 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.001 ft^{-1}



MW-7 TEST2RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-7\MW-7 Test2rh.aqt
Date: 07/27/10 Time: 11:01:36

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 60. ft

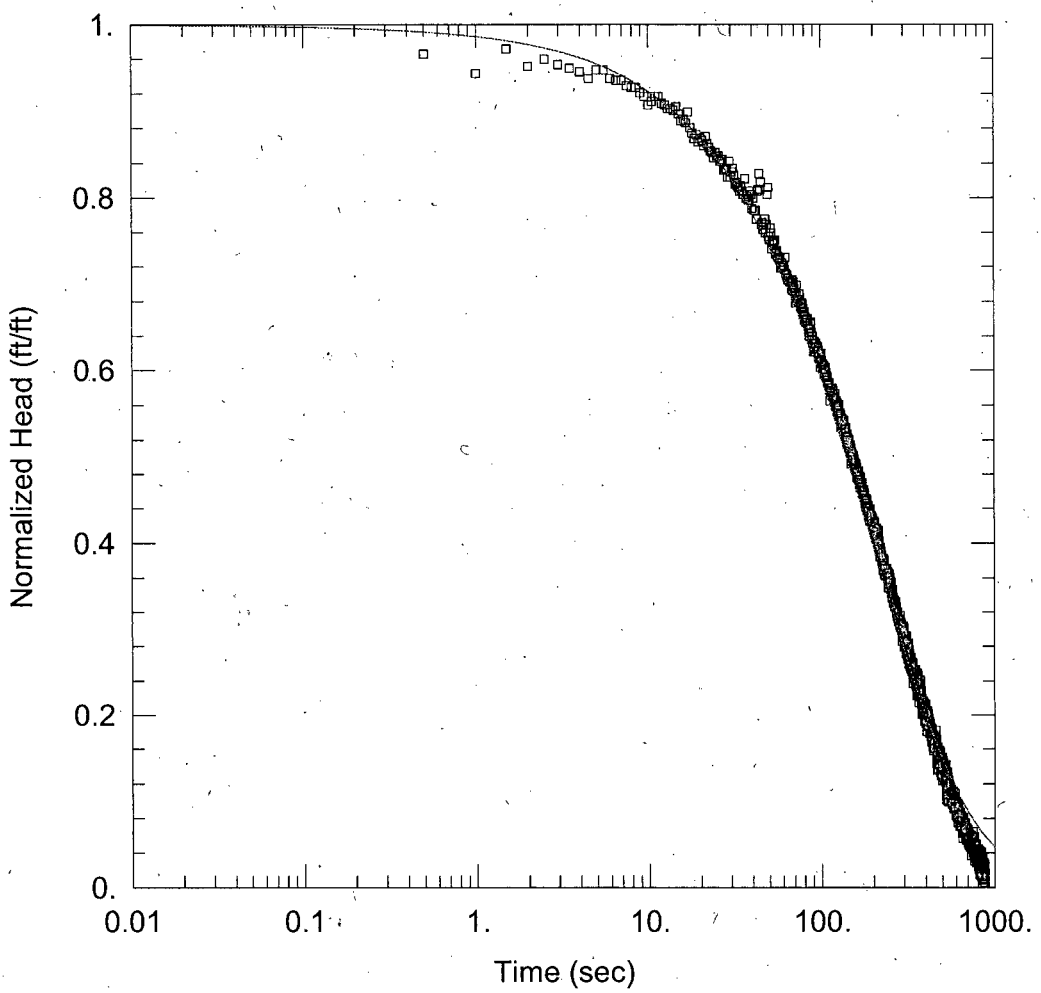
WELL DATA (MW-7)

Initial Displacement: 2.392 ft
Total Well Penetration Depth: 47.47 ft
Casing Radius: 0.083 ft
Static Water Column Height: 47.47 ft
Screen Length: 10. ft
Well Radius: 0.125 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 2.635 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.001 ft^{-1}



MW-7 TEST3FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-7\MW-7 Test3fh KGS.aqt
Date: 07/27/10 Time: 11:02:42

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 29. ft

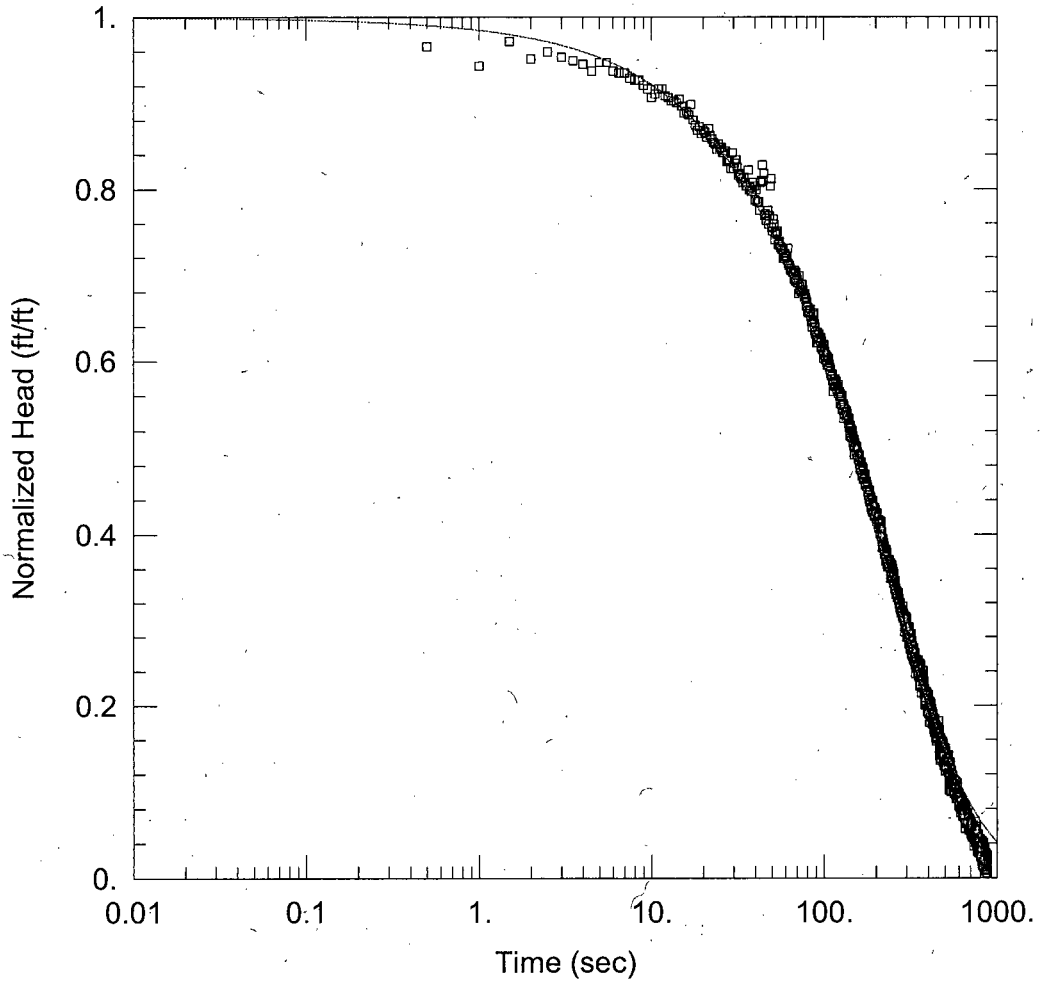
WELL DATA (MW-7)

Initial Displacement: 0.494 ft
Total Well Penetration Depth: 28.9 ft
Casing Radius: 0.083 ft
Static Water Column Height: 47.44 ft
Screen Length: 11.7 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 3.232 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.0001 ft^{-1}



MW-7 TEST3FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-7\MW-7 Test3fh.aqt
Date: 07/27/10 Time: 11:04:04

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-02I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 60. ft

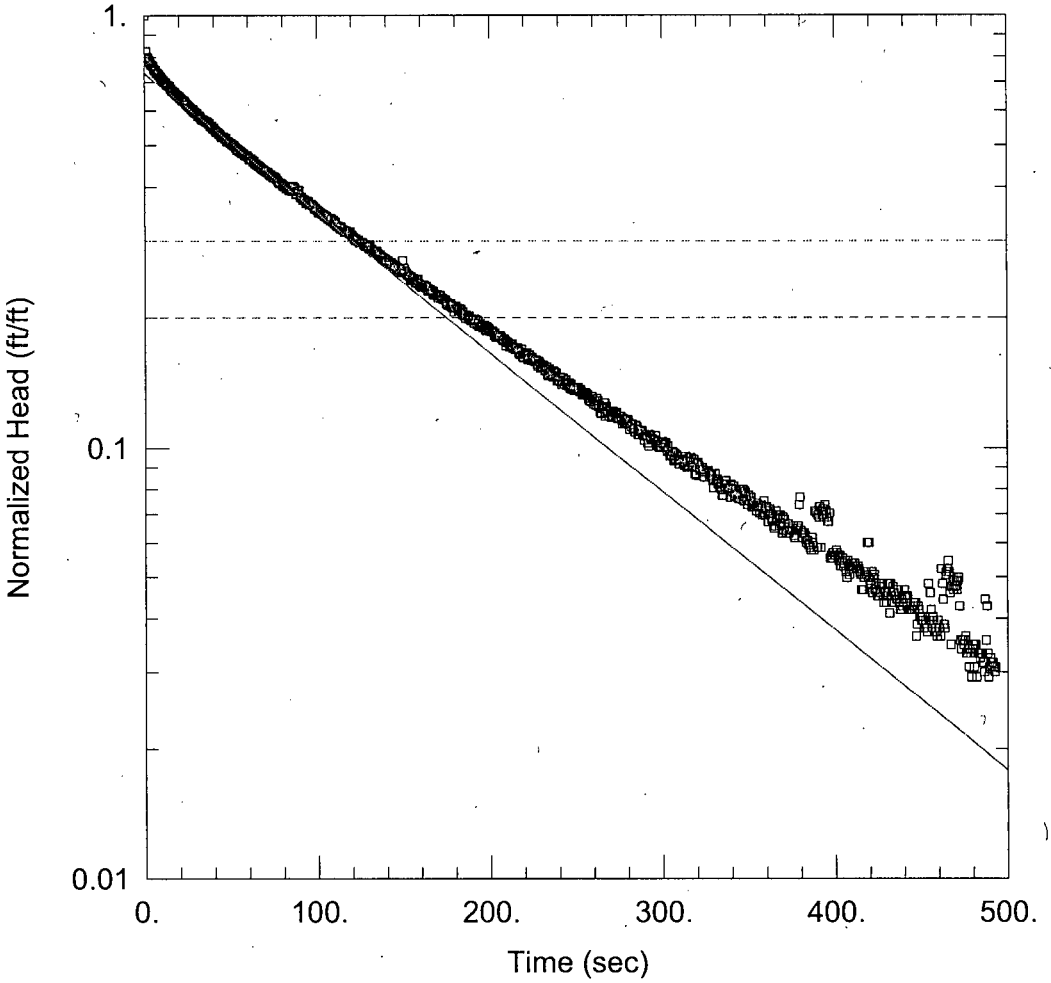
WELL DATA (MW-7)

Initial Displacement: 0.494 ft
Total Well Penetration Depth: 47.44 ft
Casing Radius: 0.083 ft
Static Water Column Height: 47.44 ft
Screen Length: 10. ft
Well Radius: 0.125 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 3.232 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.0001 ft^{-1}



MW-RS2 TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-RS-2\MW-RS2 Test1fh B-R.aqt
Date: 07/27/10 Time: 11:05:28

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

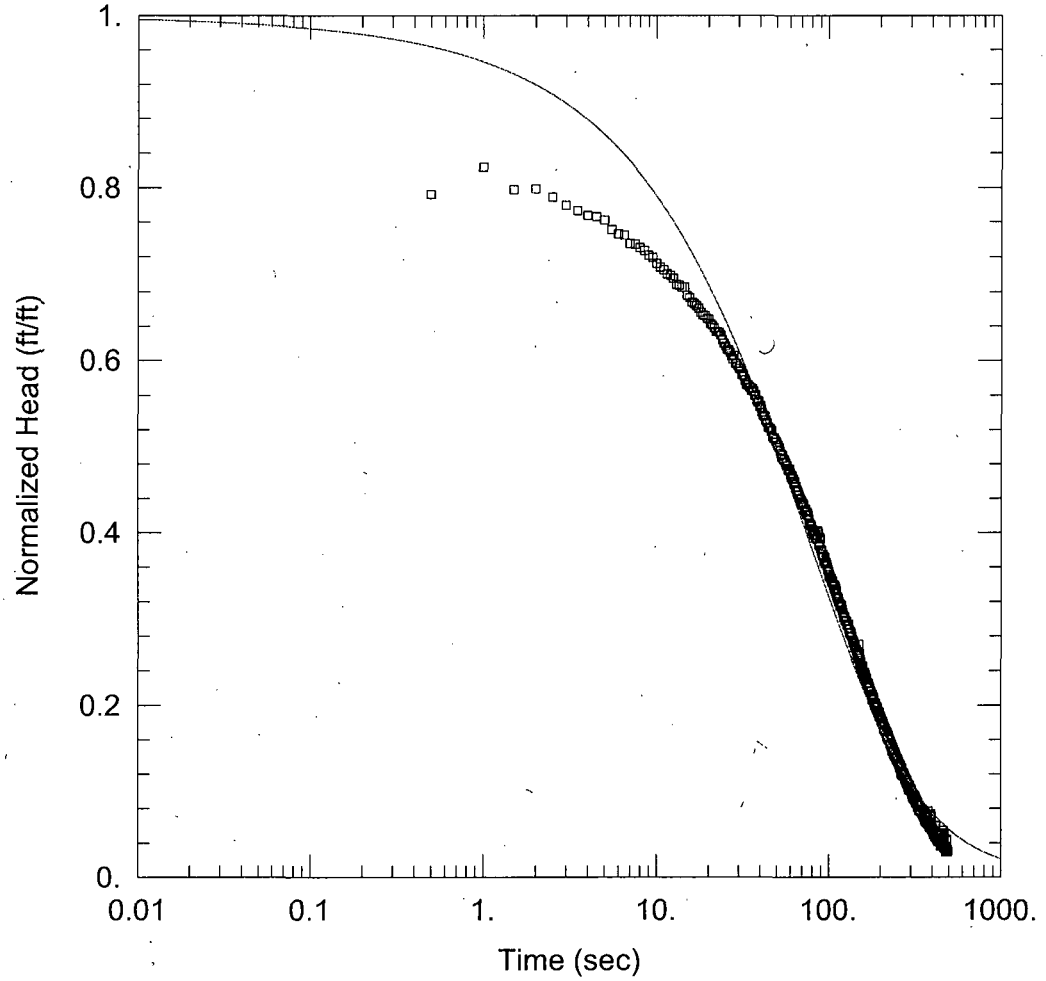
Saturated Thickness: 9. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-RS2)

Initial Displacement: 1.265 ft
Total Well Penetration Depth: 16. ft
Casing Radius: 0.083 ft
Static Water Column Height: 24.13 ft
Screen Length: 10. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 7.141 gal/day/ft^2
y0 = 0.9275 ft



MW-RS2 TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-RS-2\MW-RS2 Test1fh KGS.aqt
Date: 07/27/10 Time: 11:06:23

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 9. ft

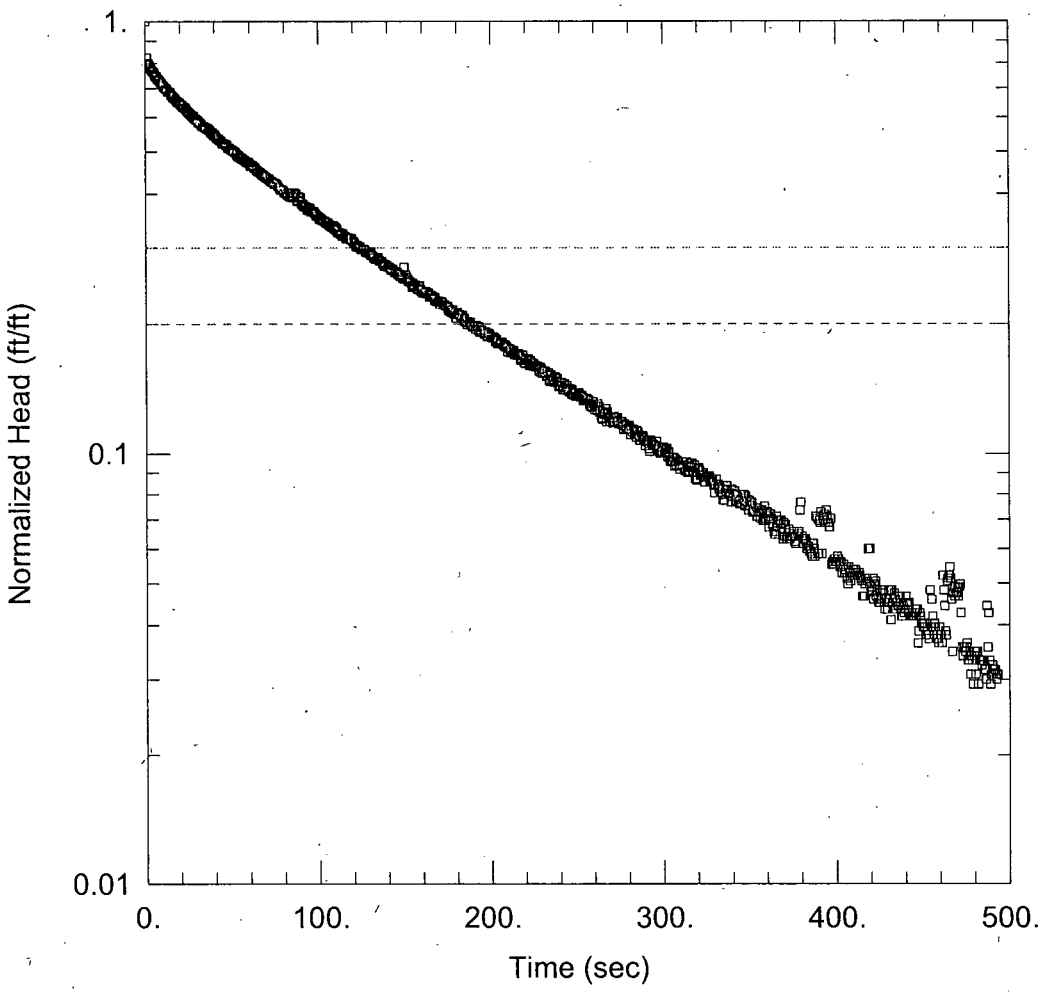
WELL DATA (MW-RS2)

Initial Displacement: 1.265 ft
Total Well Penetration Depth: 16. ft
Casing Radius: 0.083 ft
Static Water Column Height: 24.13 ft
Screen Length: 10. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 10.42 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.00538 ft^{-1}



MW-RS2 TEST1FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-RS-2\MW-RS2 Test1fh.aqt
Date: 07/27/10 Time: 11:07:31

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

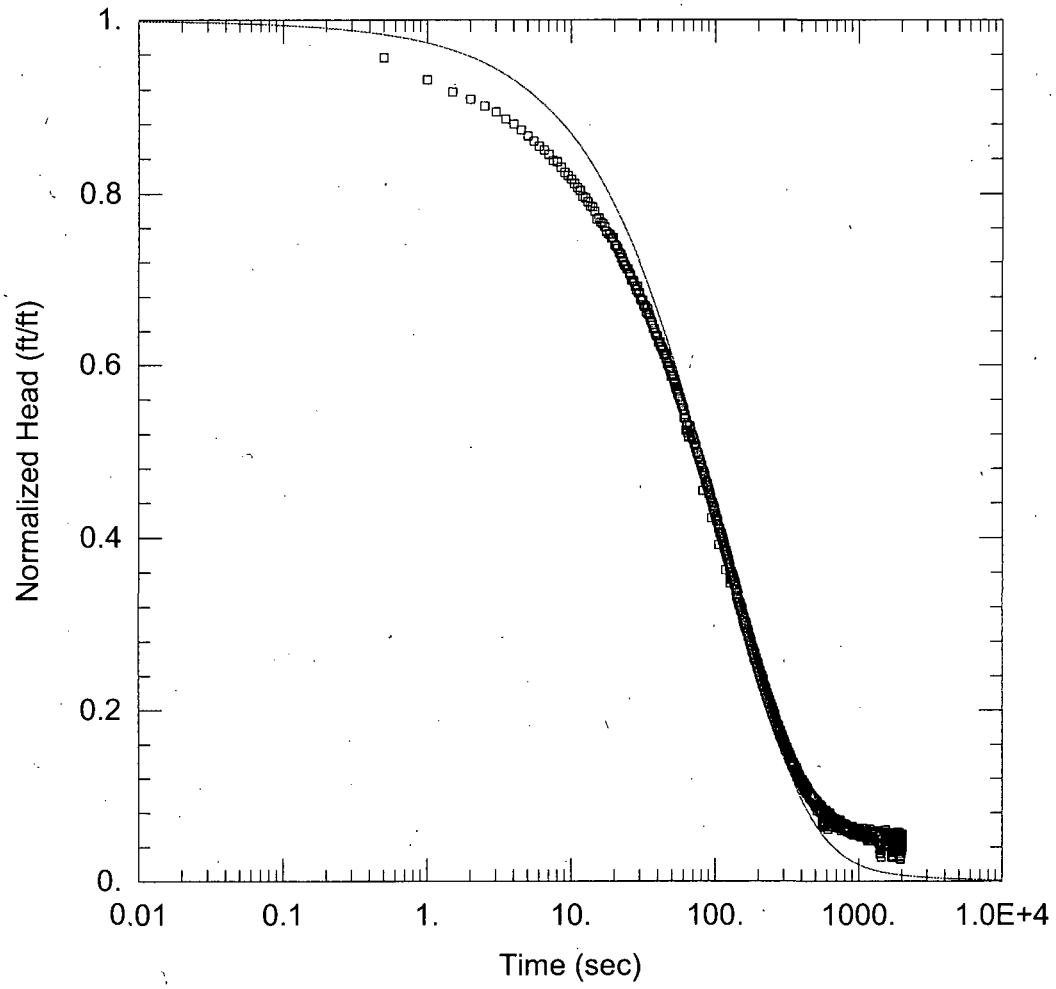
Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-RS2)

Initial Displacement: 1.265 ft
Total Well Penetration Depth: 24.13 ft
Casing Radius: 0.083 ft
Static Water Column Height: 24.13 ft
Screen Length: 10. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.926 gal/day/ft^2
y0 = 0.8201 ft



MW-RS2 TEST1RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-RS-2\MW-RS2 Test1rh KGS.aqt
Date: 07/27/10 Time: 11:08:35

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 9. ft

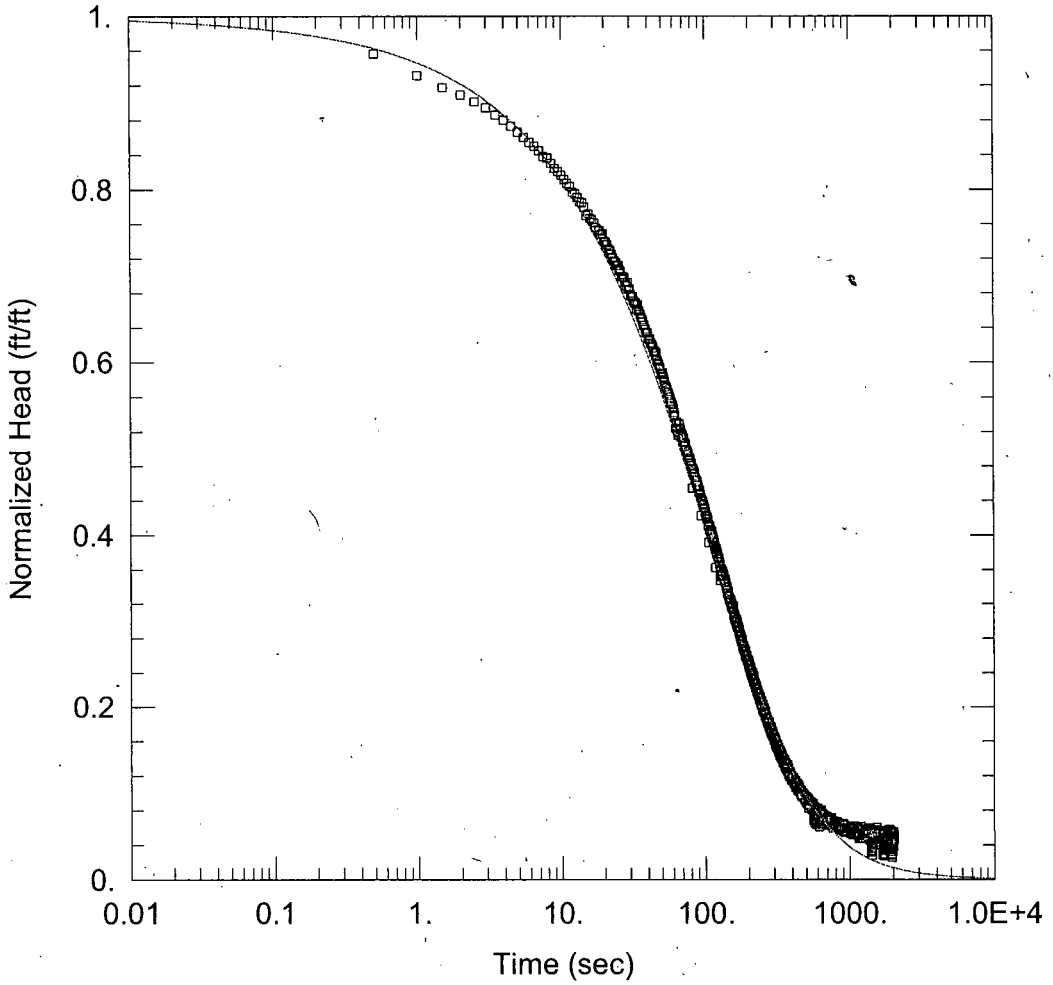
WELL DATA (MW-RS2)

Initial Displacement: 1.167 ft
Total Well Penetration Depth: 16. ft
Casing Radius: 0.083 ft
Static Water Column Height: 24.13 ft
Screen Length: 10. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 10.38 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.0007328 ft^{-1}



MW-RS2 TEST1RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-RS-2\MW-RS2 Test1rh.aqt
Date: 07/27/10 Time: 11:10:55

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 35. ft

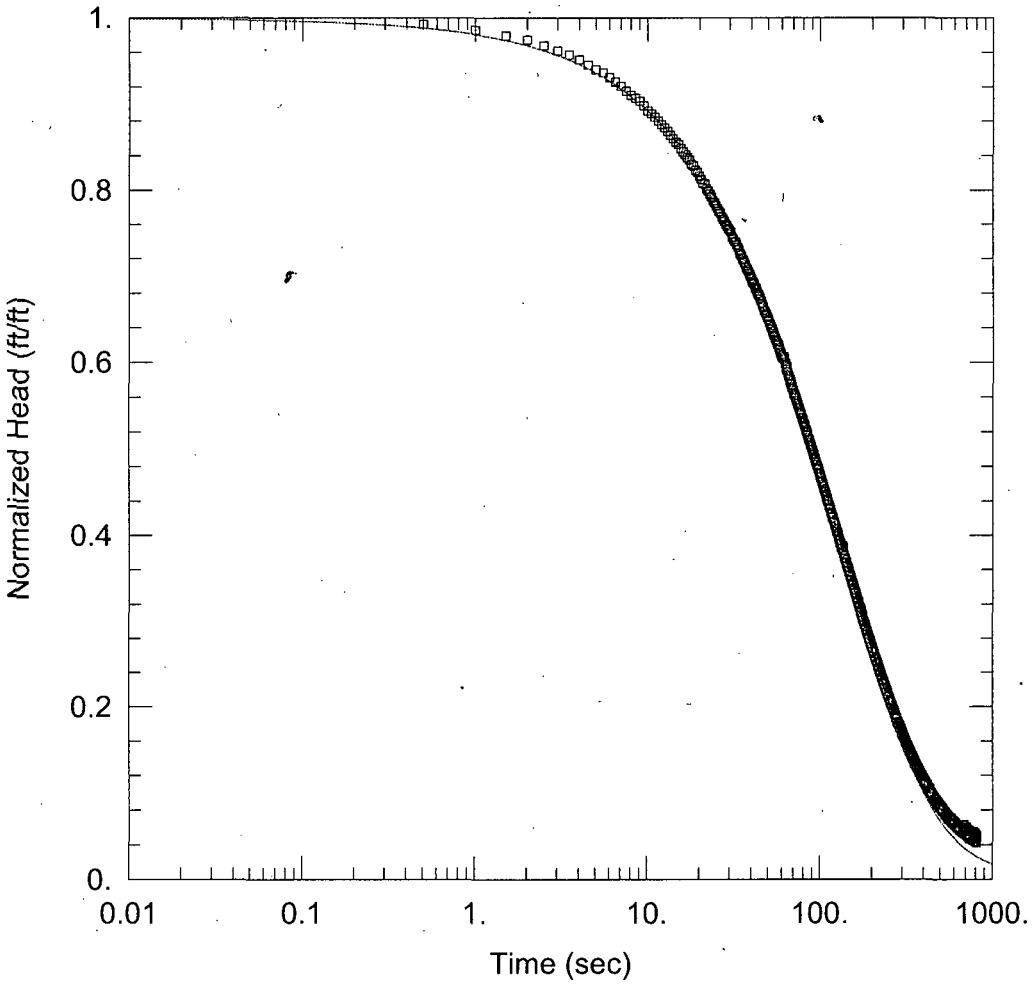
WELL DATA (MW-RS2)

Initial Displacement: 1.167 ft
Total Well Penetration Depth: 24.13 ft
Casing Radius: 0.083 ft
Static Water Column Height: 24.13 ft
Screen Length: 10. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 3.124 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.0007328 ft^{-1}



MW-RS2 TEST2FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-RS-2\MW-RS2 Test2fh KGS.aqt
Date: 07/27/10 Time: 11:11:48

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 9. ft

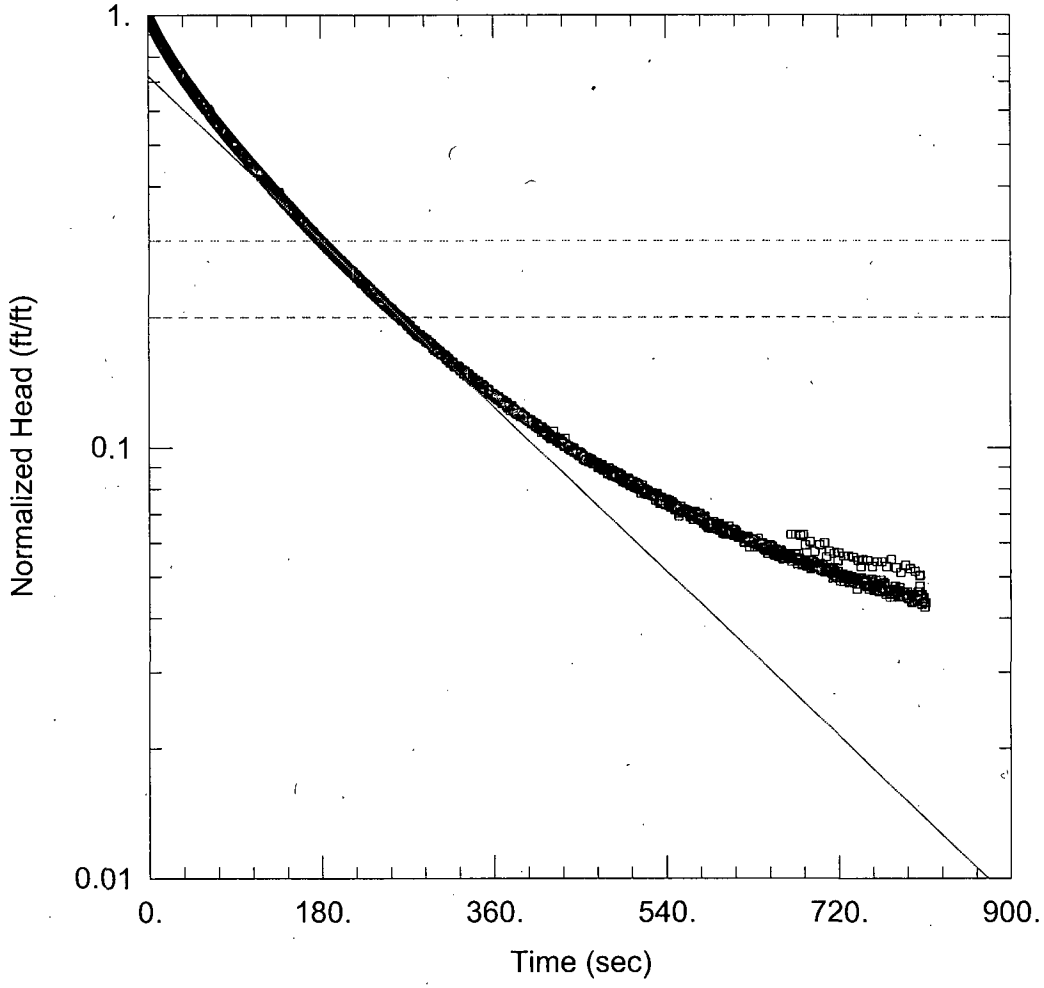
WELL DATA (MW-RS2)

Initial Displacement: 2.949 ft
Total Well Penetration Depth: 16. ft
Casing Radius: 0.083 ft
Static Water Column Height: 24.06 ft
Screen Length: 10. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 10.79 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.0002264 ft^{-1}



MW-RS2 TEST2FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-RS-2\MW-RS2 Test2fh.aqt
Date: 07/27/10 Time: 11:12:45

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

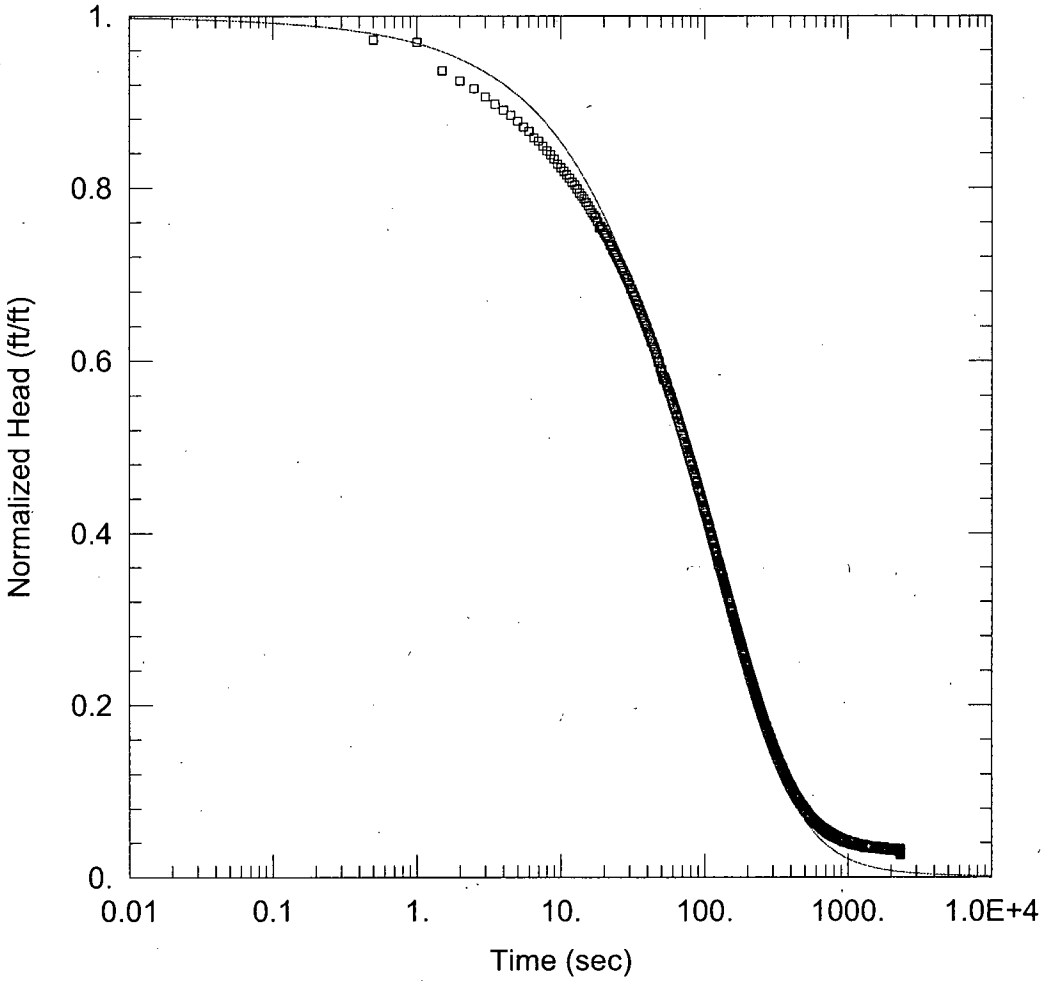
Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-RS2)

Initial Displacement: 2.949 ft
Total Well Penetration Depth: 24.06 ft
Casing Radius: 0.083 ft
Static Water Column Height: 24.06 ft
Screen Length: 10. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.088 gal/day/ft^2
y0 = 2.129 ft



MW-RS2 TEST2RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-RS-2\MW-RS2 Test2rh KGS.aqt
Date: 07/27/10 Time: 11:13:46

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 9. ft

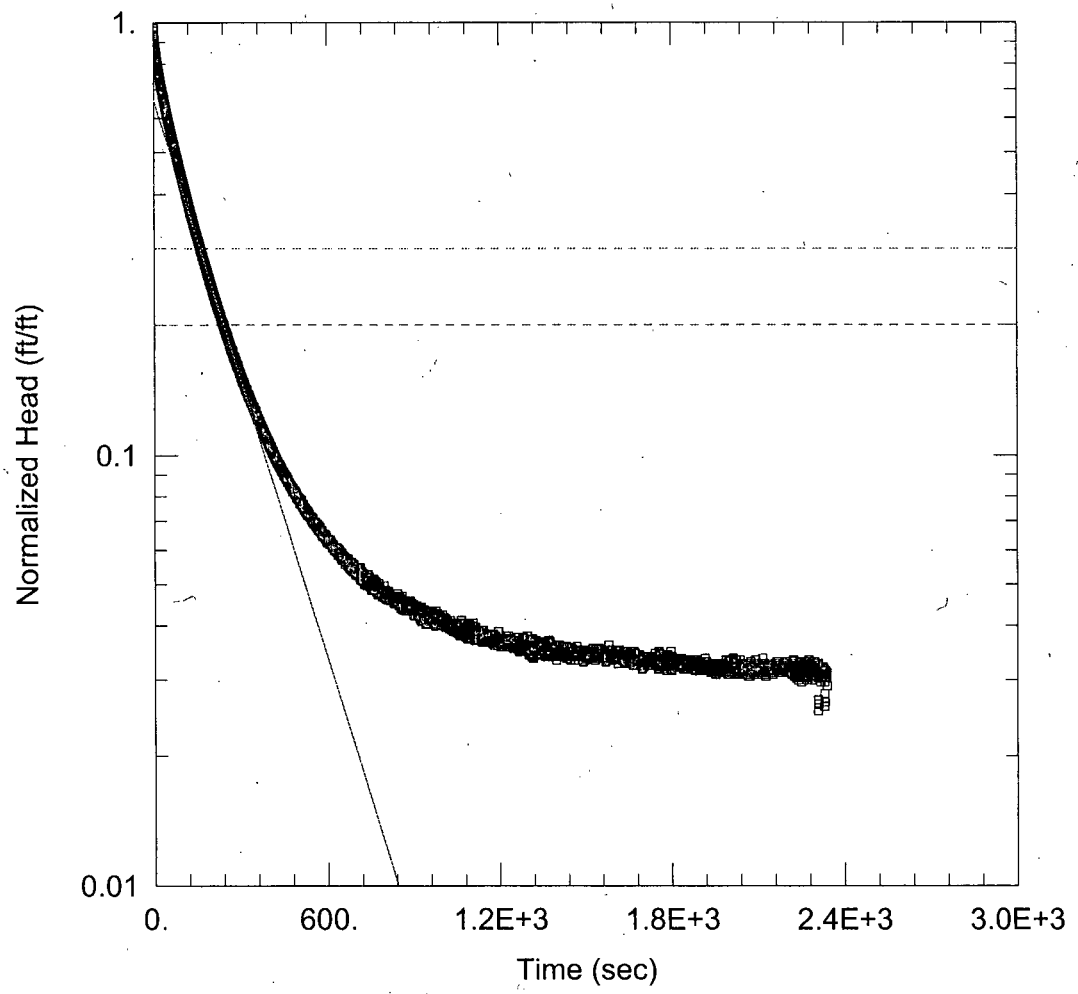
WELL DATA (MW-RS2)

Initial Displacement: 3.302 ft
Total Well Penetration Depth: 16. ft
Casing Radius: 0.083 ft
Static Water Column Height: 24.14 ft
Screen Length: 10. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 10.12 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.001336 ft^{-1}



MW-RS2 TEST2RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-RS-2\MW-RS2 Test2rh.aqt
Date: 07/27/10 Time: 11:14:44

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

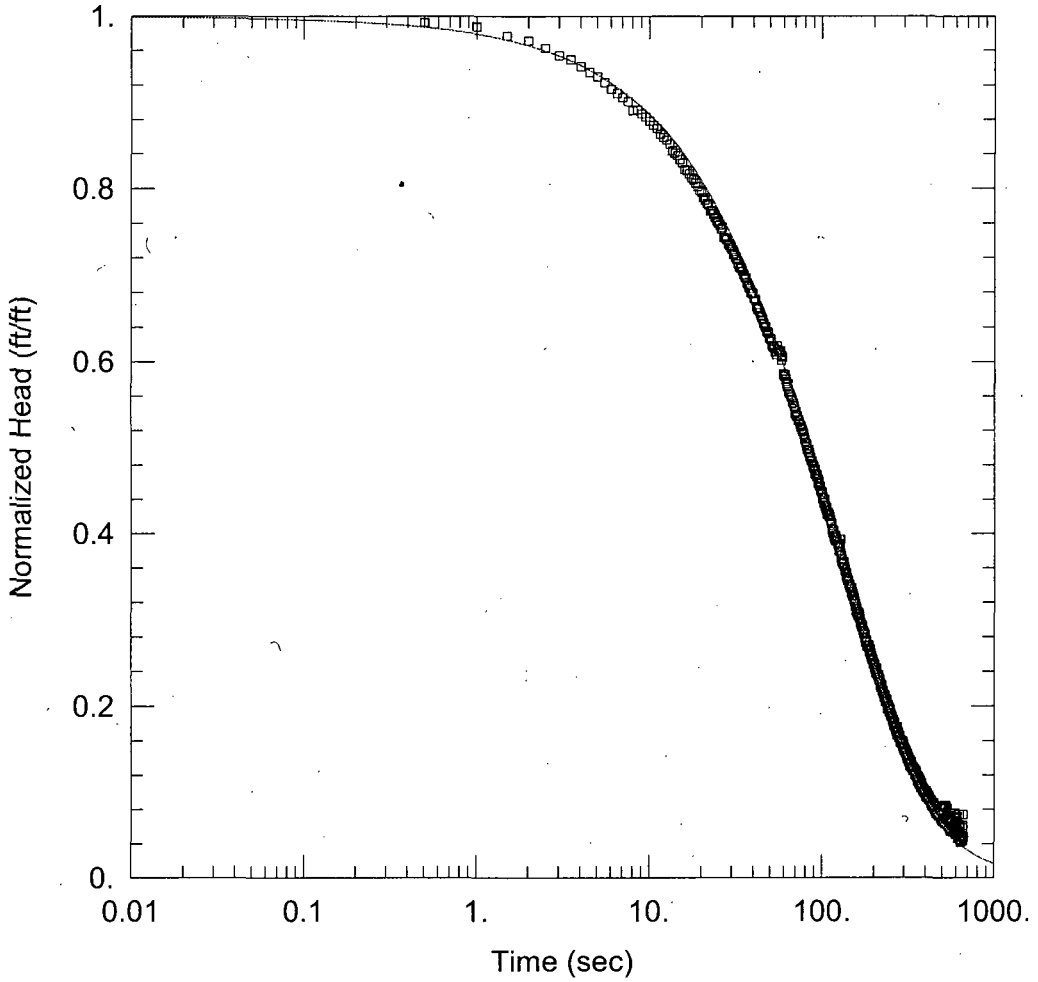
Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-RS2)

Initial Displacement: 3.302 ft
Total Well Penetration Depth: 24.14 ft
Casing Radius: 0.083 ft
Static Water Column Height: 24.14 ft
Screen Length: 10. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.138 gal/day/ft^2
y0 = 2.179 ft



MW-RS2 TEST3FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-RS-2\MW-RS2 Test3fh KGS.aqt
Date: 07/27/10 Time: 11:15:27

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 9. ft

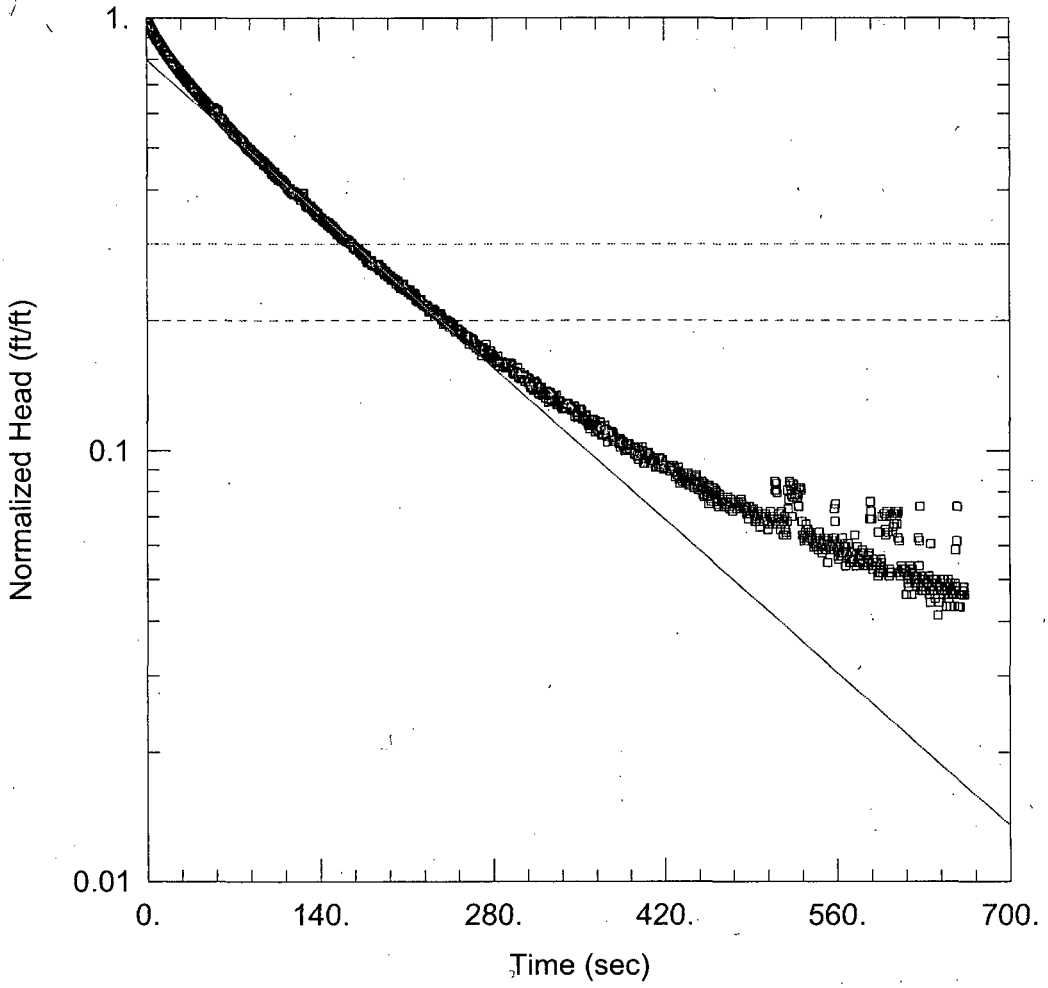
WELL DATA (MW-RS2)

Initial Displacement: 1.041 ft
Total Well Penetration Depth: 16. ft
Casing Radius: 0.083 ft
Static Water Column Height: 24.05 ft
Screen Length: 10. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 11.08 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.0002823 ft^{-1}



MW-RS2 TEST3FH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-RS-2\MW-RS2 Test3fh.aqt
Date: 07/27/10 Time: 11:16:07

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

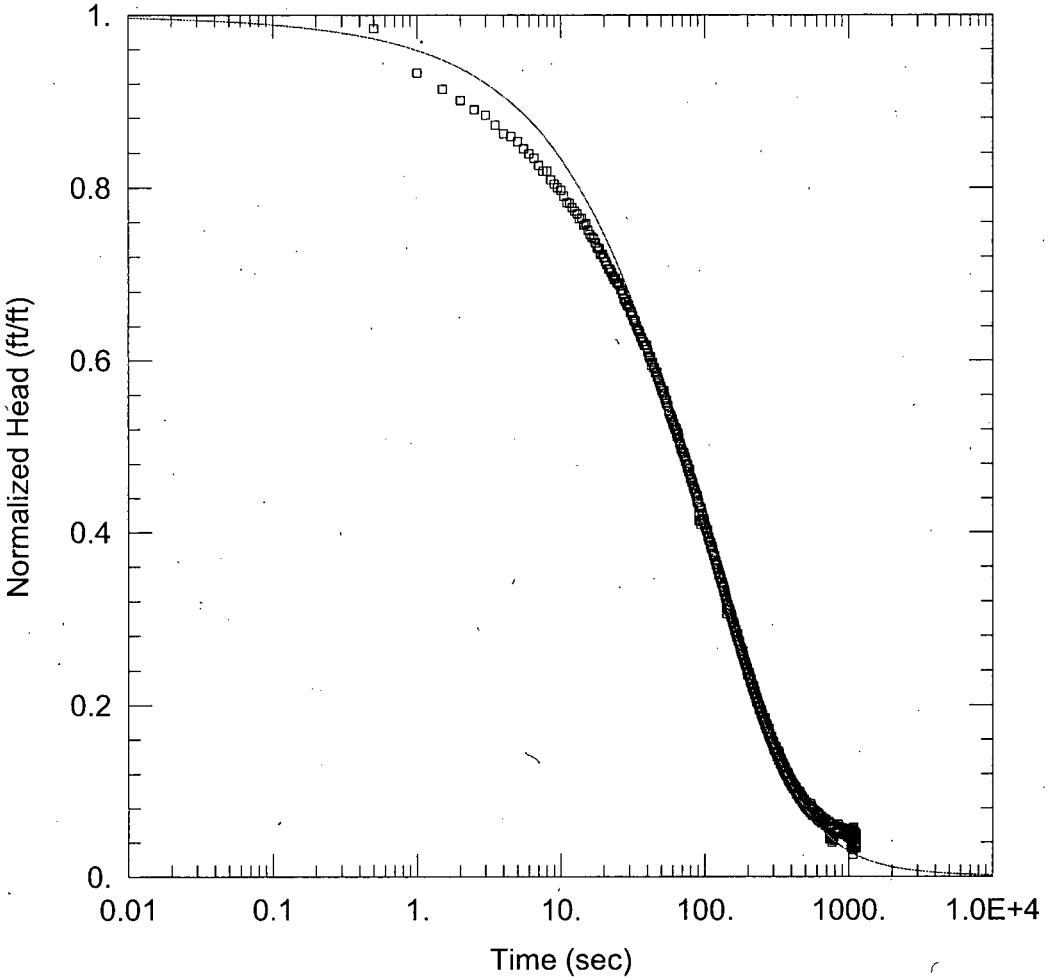
Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-RS2)

Initial Displacement: 1.041 ft
Total Well Penetration Depth: 24.05 ft
Casing Radius: 0.083 ft
Static Water Column Height: 24.05 ft
Screen Length: 10. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.682 gal/day/ft^2
y0 = 0.8301 ft



MW-RS2 TEST3RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-RS-2\MW-RS2 Test3rh KGS.aqt
Date: 07/27/10 Time: 11:16:38

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 9. ft

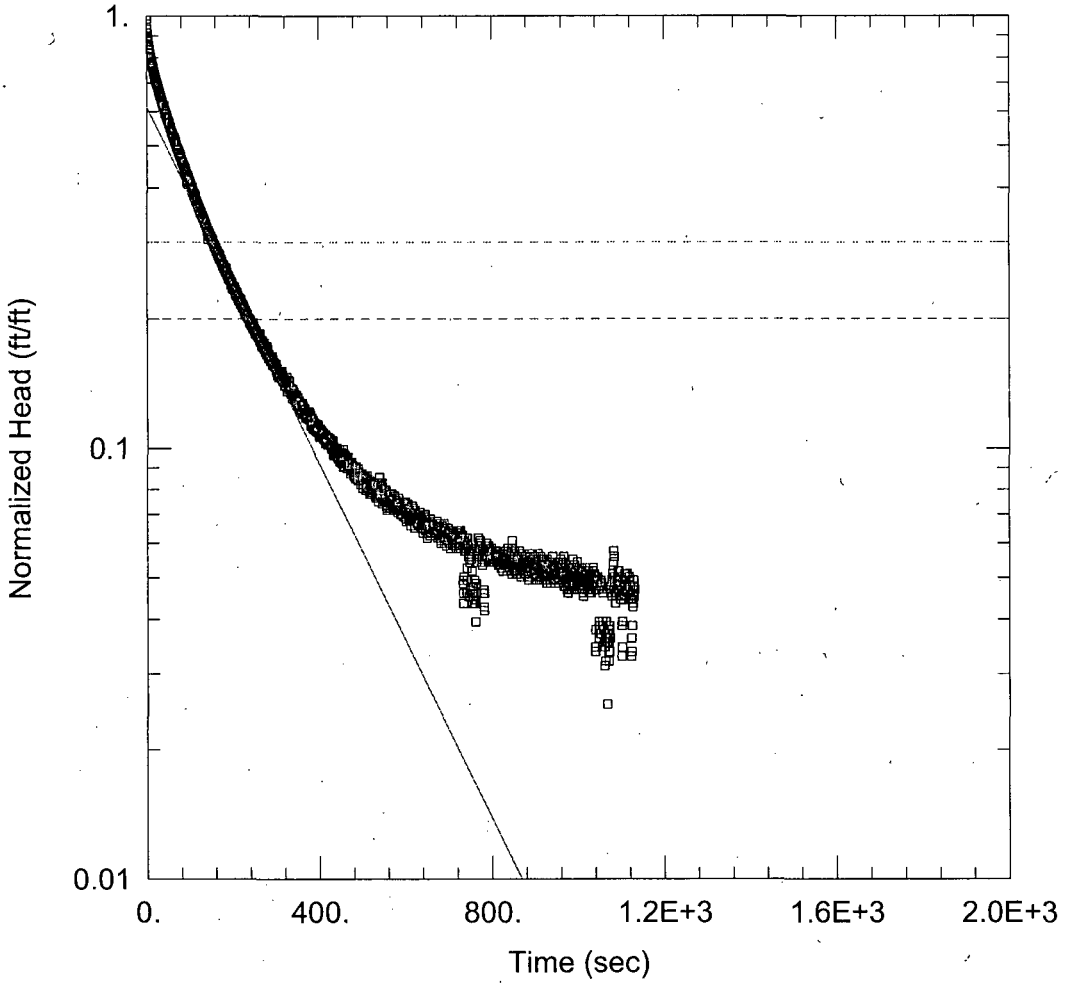
WELL DATA (MW-RS2)

Initial Displacement: 1.216 ft
Total Well Penetration Depth: 16. ft
Casing Radius: 0.083 ft
Static Water Column Height: 24.07 ft
Screen Length: 10. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 8.316 gal/day/ft^2
Kz/Kr = 1.
Ss = 0.003765 ft^{-1}



MW-RS2 TEST3RH

Data Set: P:\HBG\ENV\JPG\Slug Testing\Reanalysis\MW-RS-2\MW-RS2 Test3rh.aqt
Date: 07/27/10 Time: 11:17:19

PROJECT INFORMATION

Company: SAIC
Client: USACE-Lousiville
Project: Jefferson Proving Grounds
Location: Madison, IN
Test Well: JPG-DU-01I
Test Date: 4/16/09

AQUIFER DATA

Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-RS2)

Initial Displacement: 1.216 ft
Total Well Penetration Depth: 24.07 ft
Casing Radius: 0.083 ft
Static Water Column Height: 24.07 ft
Screen Length: 10. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.995 gal/day/ft^2
y0 = 0.7469 ft

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