A Comparative Analysis of Two Slug Test Methods in Puget Lowland Glacio-Fluvial Sediments near Coupeville, WA

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Abstract

Two different slug test field methods are conducted in wells completed in a Puget Lowland aquifer and are examined for systematic error resulting from water column displacement techniques. Slug tests using the standard slug rod and the pneumatic method were repeated on the same wells and hydraulic conductivity estimates were calculated according to Bouwer & Rice and Hvorslev before using a non-parametric statistical test for analysis. Practical considerations of performing the tests in real life settings are also considered in the method comparison. Statistical analysis indicates that the slug rod method results in up to 90% larger hydraulic conductivity values than the pneumatic method, with at least a 95% certainty that the error is method related. This confirms the existence of a slug-rod bias in a real world scenario which has previously been demonstrated by others in synthetic aquifers. In addition to more accurate values, the pneumatic method requires less field labor, less decontamination, and provides the ability to control the magnitudes of the initial displacement, making it the superior slug test procedure.

1.0 Introduction

Slug tests are a method of determining the hydraulic conductivity or transmissivity of an aquifer by observing the rise of the water level after removing a quantity water from the well. These tests are often used instead of Theis-based pump tests for their relatively low equipment and labor costs and have become standard aquifer testing procedure. It is safe to say that tens of thousands of these tests are performed in this country each year (Butler, 1998). The removal of water can be accomplished by using a bailer, simulated by inserting and removing a slug rod, or by pressurizing the well casing and depressing the water column. Two of the commonly used solutions to rising-head slug test data (Hvorslev, 1951; Bouwer & Rice, 1976) treat all of these methods as equivalent, though this seems not to have been thoroughly studied in real world settings. Since these field methods use very different mechanisms to change the water level it should be determined if any particular test will introduce systematic error into the resulting data sets.

Determining aquifer properties such as hydraulic conductivity are important for a host of hydrogeological applications including environmental remediation, contaminant transport, and groundwater modeling. Introducing an avoidable source of systematic error would unnecessarily dilute the effectiveness of all the above techniques in making representative assessments. Therefore, if one field method is more appropriate for a particular setting than it should be adopted to ensure the accuracy of the results. Presently, the slug rod method (mechanical method) is, by far the most common method used in the industry because it is inexpensive and doesn't require the disposal of water if used in a contaminated aquifer like the bailer does. The pneumatic method was developed more recently after the slug rod had been adopted as standard practice and, as such is, not as widely used.

For this paper I have conducted 48 slug tests on eight wells using the slug rod and the pneumatic methods in glacio-fluvial sediments typically found in the Puget Lowland. All of the wells are located at the Island County Solid Waste Facility (ICSWF) on Whidbey Island near Coupeville, WA (see fig. 1) because of the abundance of wells in close proximity to each other. Many of the wells are known to be contaminated by a volatile organic compound (VOC) plume originating beneath the landfill, thereby making standard pump tests prohibitively expensive. Slug tests were performed taking the appropriate safety precautions.

2.0 Geological Setting

The ICSWF is located in the Puget Lowland, a north-south trending forearc basin between the Olympic Mountains to the west and Cascade Mountain Range to the east. It is subject to the compressional forces from the subduction of the Juan de Fuca plate moving eastward and the lateral movement northward of the Pacific Plate, both pushing against the North American Plate. These forces produce regional faults that trend northwest-southeast (Troost and Booth, 2008). The primary faults impacting Whidbey Island are the Devil's Mountain (DMF), South Whidbey Island (SWIF), the Strawberry Point (SPF), and Utsalady Point (UPF) Faults. The DMF is considered a left-lateral, oblique slip fault zone that extends from the Cascade Foothills to just offshore of Vancouver Island (Johnson et al, 2001). The SWIF is a transpressional fault zone up to 7 km-wide that extends from across Possession Sound to the eastern Strait of Juan de Fuca (Johnson et al, 2004). The SPF is a west-northwest-trending, subvertical fault that is at least 22km long and cuts across northern Whidbey Island. It is the northern boundary of an uplift segment of pre-Tertiary bedrock (Johnson, 2001). The UPF is a northwest-trending, subvertical fault with a minimum length of 28 km, and forms the southern boundary of the pre-Tertiary uplift mentioned above (Johnson, 2003).

Topography in the Puget Lowland is the product of cyclic glacial and interglacial periods during the Quaternary period. The ICSWF sits upon the topset and underlying forset beds of the Partridge outwash gravels (see fig. 2) deposited in the early Everson Interstade by a short lived re-advance of the Cordilleran Ice Sheet. Glacio-fluvial deposits are commonly channelized, stratified, and spatially variant conducive to preferential paths of groundwater flow. The Partridge Gravel ranges in thickness from 100 feet to 250 feet and is described as sand, gravel, and sand-gravel mixes with interlayered silt deposits. This unit serves as a local, unconfined aquifer (aquifer 1) around the site. Underlying the Partridge Gravel is the undivided Pleistocene deposits which is at least 150 feet thick and is a gray, medium to fine-grained sand that is poorly sorted and compacted. This unit comprises sediments that could be either glacial or interglacial deposits (Polenz, et al., 2005), and serves as the island's primary aquifer

(aquifer 2) for drinking water. At depths of up to 1500 feet lies a pre-tertiary bedrock unit that is exposed on the northern end of Whidbey Island.

2.1.0 Site and Well Information

All wells included in this testing program are located around within and around the perimeter of the ICSWF and monitoring wells used for groundwater flow (see fig. 3) and chemical analysis. The naming system of the wells use a prefix letter indicating its location relative to the landfill (N for north, SE for southeast), a number to identify it, and a letter suffix indicating which aquifer it is screened in (D for deep aquifer, S for shallow). The shallow wells are partially penetrating, completed with artificial sand pack in the unconfined aquifer 1with screen lengths ranging between 5 and 8 feet, and casing diameters of 2 inches. The confining layer below pinches out at some distance beyond the facility so the aquifer is local to the site. The deep wells are completed in the confined aquifer 2 at up to 210 feet bgs with screens lengths ranging from 5 to 9 feet and casing diameters of either 2 inches or 4 inches. (Site and Well Information adapted from SCS Engineers, 2004).

Aquifer 1 is composed of gravels, sand, silts, and clay with sediments fining with depth and ranges in thickness from 2 to 20 thick depending on the nature of the confining layer below. Ground water seeps down from aquifer 1 through the confining layer and recharges aquifer 2. It has a hydraulic conductivity estimated at 12 ft/day (6×10^{-3} cm/s) from grain-size analysis and averaging results from the Shepherd (1987) and Zhang & Brusseau (1999) methods. Aquifer 2 is at least 40 feet thick and almost entirely made up of fine sub-rounded to sub-angular sand with some silt. It exhibits a moderate conductivity of 16.6 feet/day (7.76×10^{-2} cm/s) and dimensionless storativity of 0.001, both calculated by Papadopoulos-Cooper analysis of a 24 hour pump test performed on site outside of the contamination plume. This hydraulic conductivity is used with porosity values from soil sample analysis to estimate groundwater flows of approximately 4 ft/day (linear velocity) from the south to the northeast with a possible flow component to the northwest as well (see fig. 4, SCS Engineers, 2004).

3.0 Methods

3.1.0 Field Methods

In this paper I present a quantitative comparison between two different field methods of rising head or "slug-out" tests and conduct statistical analyses to determine if the chosen method has an effect on the data. The mechanical method involves submerging a rod into the well water and pulling it out as quickly as possible, while the pneumatic method uses a compressed gas to push the well water down before releasing the pressure. Both methods simulate a near-instantaneous removal of a quantity of water, before observing the well equilibrate to its previous static level using a pressure transducer and data logger. Using this data I can calculate the hydraulic conductivity of the aquifer within a small radius of the well.

A pressure transducer is an instrument that employs a diaphragm to convert fluid pressure into an analog electric signal which is then interpreted as a pressure measurement. This is accompanied by a data logger (which is often integrated into the unit) that records pressure measurements at specified intervals. For both slug tests I used two recently calibrated, 25 psi-rated transducer/logger units recording continuously (at either 8/second or 10/second). One unit was suspended by a cable capable of transmitting data to a field computer in real-time to ensure well recovery before repeating the test, and the other suspended by fishing line and data was downloaded at the end of the tests. Depth-to-water (DTW) measurements were made with an electric water-tape relative to the top of the well casing (TOC). Tests were conducted using the real-time transducer to estimate recovery times for the use of the "blind" transducer to ensure re-equilibration of the wells between tests. Three tests were conducted at each well, using both field methods for a total of 6 slug tests per well on eight wells. In the few cases where the data showed evidence of procedural error (e.g. the slug is withdrawn too slowly, see fig. 5) those data sets were not considered in the calculations. Barometric pressure was recorded, but not considered because it would have no effect over the time scale of each individual test (Spane, 2002).

3.1.1 Slug Rod Test

To perform the mechanical slug test I used two different diameter PVC slug-rods to maximize the water displacement in the 2 inch and 4inch wells. The wells are made of schedule 80 PVC pipe and therefore have inside diameters significantly less than two or four inches. The slug rod for 2 inch wells is 5.6 feet long and 1" in diameter, the larger rod is 5.0 feet long and uses 1.25 diameter PVC pipe. Both rods are filled with clean sand and capped and I suspended the rod into the well using 175 feet of polypropylene rope (USGS, 2010). Since many of the wells in the paper are being actively monitored for contaminants, I allowed the PVC glue to off-gas for at least two days before beginning tests.

Slug rod tests were conducted as per the procedures for instantaneous change in head tests outlined in the American Society for Testing and Materials (ATSM) guidelines D4044. The pressure transducer is lowered into the water column below the reach of the slug rod, and tied off at the surface. The rod is then lowered into the well and fully submerged in the water column before allowing the well to re-equilibrate to within 5% of the original static level (Butler, 1998). It is then, as quickly as possible, pulled up out of the water and the recovery of the well is recorded by the transducer. This process is repeated at least three times at each well.

3.1.2 Pneumatic Slug Test

To pneumatically induce a change of head, I constructed a device that would allow me to pressurize the well with compressed gas (see fig. 6). This device is made of PVC pipe in the shape of a 'y' which tightly attaches to the well casing. One stem of the 'y' is fitted with a metal nipple for the attachment of the gas hose and a hole for the insertion of the transducer while the other has a 2-inch, lubricated ball valve for releasing the pressure. For these tests I use compressed nitrogen gas to avoid interacting with the aquifer's water chemistry and the gas tank is fitted with a regulator to maintain steady pressure throughout the test. The gas is used to push the water level of the well down and letting it re-equilibrate to within 5% of the original static level (Butler, 1998) before releasing the pressure and measuring its recovery. Since the regulator has a range of 10 psi to 250 psi I selected a psi-rating as low as possible, but not at the gauge's minimum to ensure an accurate reading. This resulted in a constant 12 psi for each test depressing the water column at up 18 feet. The ball valve allows the pressure to be released near-instantaneously, and the well's recovery is recorded by the transducer. Using a two inch ball-valve with a four inch well will result in a longer depressurization time (though still shorter than pulling up a slug rod), but this has been shown to have no effect on hydraulic conductivity estimates (Rosberg, 2010).

3.2.0 Calculation Methods

To calculate hydraulic conductivity (K) values from the test data I used two industry-standard procedures for over-damped well response: the Hvorslev (1951), and the Bouwer & Rice (1976 & Bouwer, 1989) methods. In the case of well N5D, I used the Van der Kamp (1976) procedure for determining K values due to its high transmissivity. Although the Papadopoulos-Cooper is commonly known to be more accurate, it cannot be used for partially penetrating wells such as these. Data analysis followed ATSM 4104 for slug tests and multiple approaches were used to ensure statistical differences between field methods are not due to calculation sensitivity to data. Data sets for each well are exactly identical for both the Hvorslev and Bouwer & Rice methods.

3.2.1 Bouwer & Rice

The Bouwer & Rice (B&R) method of determining hydraulic conductivity assumes the aquifer is in a steady state to use a modified Theim equation:

$$Q = 2\pi KL \frac{y}{\ln (R_e/r_w)}$$

Where: Q = flow into the well
K = Hydraulic Conductivity
L = Height of the screen
y = vertical distance between water level in the well and the water table
R_e = effective radius over which 'y' is dissipated
r_w = horizontal distance from well center to original aquifer

This equation is rearranged and integrated with limits y_0 at t=0 and y_t at t resulting in the working formula:

$$K = \frac{r_c^{\ 2} \ln (R_e/r_w)}{2L} \frac{1}{t} \ln \frac{y_0}{y_t}$$

Where: r_c = inside radius of the well casing

The value for the term: $\left(\frac{1}{t}\right) \ln \left(\frac{y0}{yt}\right)$ is found by matching the line to a graph of ln y versus t. Values for the effective radius, R_e , were determined empirically in the original study using electrical resistance network analog for different constant values (Bouwer & Rice, 1976) and therefore represent standard estimated values. The original method was developed for unconfined aquifers, but has been shown to apply to confined and leaky confined aquifers as well (Bouwer, 1989). It has more recently been shown that the B&R method tends to underestimate K with errors ranging from 10% to 100%, but still considered to be superior to results from the Hvorslev method. This is due to the fact that the effective radius (R_e) is not a constant, as it is treated here, but is time dependent (Brown et al., 1995).

For my calculations I used an excel spreadsheet created by the USGS that uses this procedure to produce values of K by graphing the log of the recovery by time, determining the resulting slope, and plugging the value into the above equation. All assumptions that are associated with the Bouwer & Rice method are considered met to the degree of standard hydrogeological practice.

3.2.2 Hvorslev

Also commonly used is the Hvorslev model which, like B&R, uses the concept of estimating K from the semi-log recovery curve but uses different well parameters. The fundamental equation for calculating is as follows:

$$K = \frac{r^2 \ln \left(\frac{L_e}{R}\right)}{2L_e t_{37}}$$

Where: K = hydraulic conductivity
r = radius of well casing

R = radius of well screen or sandpack
L_e = length of well screen
T_{37} = time it takes for the water level to rise to 37% of the initial change
(Fetter, 1994)

With this the log percentage of recharge is graphed against time, showing recharge as a straight line. A value of 't' is selected for where the slope crosses 37% recharge and plugged into the equation to calculate K. For these tests I used an Excel spreadsheet calculator created by Earth Science Strategies Consulting, Inc. using identical data sets to those used in the Bouwer & Rice calculations.

3.2.3 Van der Kamp

The Van der Kamp slug test method was developed in 1976 to calculate transmissivity (T) values for under-damped well responses typical of high-transmissivity wells. The recovery of the water column is rapid enough to produce enough inertia as to over-compensate, fall, and quickly rise again, oscillating around the static, equilibrium level. Such well responses require transducers capable of taking several measurements per second to accurately capture the wavelength and amplitudes of the oscillations. This method is calculates 'T' values by graphing the recovery of the well against time, and fitting a sloped line to the maximum amplitudes of each period. This slope represents the damping coefficient (γ), and is used with the period of oscillation (ω) in the equations:

$$T = b + 2.3\, a \log_{10}(T)$$

Where:

$$a = \frac{(\gamma^2 + \omega^2) r_c^2}{8\gamma}$$

$$b = -2.3a \log_{10}(0.79 r_w^2 S \sqrt{\gamma^2 + \omega^2})$$

r_c is the casing radius (L), and

r_w is the wellbore radius (L).

The Van der Kamp method assumes that the aquifer is homogenous, the well is fully penetrating, and (γ) and (ω) remain constant (Van der Kamp, 1976). For wells exhibiting under-damped response (see fig.9) I used a spreadsheet calculator provided by the USGS.

3.3.0 Statistical Analysis

3.3.1 Wilcoxon Signed Rank Test

The Wilcoxon Signed Rank Test is a non-parametric test used to measure the probability that the differences between two paired sample groups are due to chance. The fact that this statistical method is designed for paired sample groups and does not require the data to be normally distributed makes it appropriate for this analysis. The test involves ranking the differences between the two populations (n) from lowest (1) to highest (n) and attaching the sign of the difference to the rank (see table 1). These rankings convert non-parametric samples into a normal distribution centered at 0 where there is no difference between the pairs. The positively signed ranks are added together to create a quantity symbolized as W_+. W_+ has a mean and standard deviation:

$$\mu_{W+} = \frac{n(n+1)}{4}$$

$$\sigma_{W+} = \sqrt{\frac{n(n+1)(2n+1)}{24}}$$

These values are used to calculate Z, which is used to find a probability (p) value in tabulated reference tables. Z is found by:

$$Z = \frac{W_+ - \mu W_+}{\sigma W_+}$$

The value of ‘p’ indicates the likely hood that the observed differences are the result of chance and not related to a systematic difference between methodologies. A commonly accepted critical value of ‘p’ is 0.05 indicating that chance is not a significant factor (Moore, 2006). Stricter critical values include $p = 0.025$ and $p = 0.01$ to emphasize the insignificance of chance. The application of this statistical analysis will show whether or not the differences in in K values derived by each field method is likely the product of chance or procedure since the aquifer characteristics are constant for each series of tests at each well.

4.0 Results

As you can see in figures 7 and 8, plotting the semi-log of water column displacement against time results in straight slopes typical of slug tests. Most slug tests look similar to these figures. The time needed for a well to fully recover to its static level ranges from 60 seconds to over 5 minutes. Initial displacements during pneumatic tests reached as high as 18 feet, while those in the mechanical tests were typically around 2.5 feet. The pneumatic test curves also show consistently more distinct test initiations in the first few seconds of the test. Some log-head plots show concave upwards trends instead of true straight lines see (fig. 10). After visual analysis of the data was complete the tests were entered into the appropriate spreadsheet calculators.

The resulting values for hydraulic conductivity were taken from the spreadsheets and tabulated into tables for statistical analysis (see Table 1). K-values derived using the B&R and Hvorslev methods range from 0.4 to 98.3 ft./day (10^{-4} to 10^{-2} cm/s) with Hvorslev giving consistently higher estimates. K values from mechanical slug rod tests are also larger than those resulting from the pneumatic method with an average percentage difference of about 30%. Only well NE1D gives a lower slug rod K value when estimated with B&R. There was no correlation observed between displacement size and differences in K values.

The absolute differences between the two field methods were calculated, ranked, and signed as per the Wilcoxon Signed-Rank test. This analysis produced W-values of 3 (B&R) and 0 (Hvorslev) which were compared to tabulated critical p-values for small sample populations (Moore, 2006). The tables indicate that the null-hypothesis can be rejected in that there is 95% certainty that chance (random variability) did not play a significant chance in the production of K-values using the Bouwer and Rice method. For Hvorslev, estimates indicate 99% certainty that chance was not a significant factor.

5.0 Discussion

The K values (table 1) are consistent (within the same orders of magnitude) with values typically found in aquifers units of the Puget Lowland such as Qva, QAc, etc. (DHI, 2009). The table indicates that those estimates derived from the Hvorslev method are consistently larger (up to 100% larger) than those from B&R. This field data confirms trends found in synthetic slug tests that show this to be the case (Brown, et al., 1995). Both methods use the same conceptual framework of multiplying the slope of the recovery curve with various shape factors and both ignore specific storage, therefore both are susceptible to many of the same types of errors. They differ mostly in that the shape factors used by B&R are empirically derived, where Hvorslev uses approximated analytical solutions. While both methods are shown to introduce error into the estimates of K, B&R's empirical approach (resulting in errors of 10% to 100%) is shown to perform better (Brown, et al. 1995).

As you can see in Figures 7 and 8 the pneumatic test initiation gives a clearer, undisturbed curve in the first few seconds than the traditional slug rod. The disturbance in the mechanical test is due to time it takes to withdraw the slug rod from the water column, which is known to cause shifts in phase and magnitude of the response data resulting in low estimates (Zurbuchen et al., 2002). When using solutions that use infer the initial displacement by back-tracing the recovery slope to the y-intercept, the mechanical slug test will give biased estimates due to slug removal time shifting the data. The higher the hydraulic conductivity of an aquifer, the faster the slug must be removed or it will cause these disturbances. For wells exhibiting under-damped responses, the pneumatic method should always be used (Butler, 1998).

The magnitude of water level displacements in slug tests is known to have an effect on hydraulic conductivity estimates in the case of critically over-damped response (Weeks, 2013). In these cases the response of the well during re-equilibration lies within a borderline region between over-damped (straight line in semi-log) and under-damped (water level oscillates around its static level). Semi-log graphs of critically over-damped well response exhibits a concave-downward trend to the data in the early-time region of the graph (< 15s; Butler, 1998) due to the effect of the water column's inertia during recovery. If very small water displacements are used the graph will have characteristics similar to under-damped response. Since inertial effects are usually considered only in solutions for under-damped, oscillatory well responses, methods for over-damped calculations will likely over estimate K (Weeks, 2013). None of the tested wells clearly show signs of critical damping, but many of the mechanical slug tests have too much noise in the early data (caused by pulling the slug out of the water column) to make a clear analysis. Alternatively, water displacements via compressed gas are so large that indications of near-critical over-damping (if present) could likely be washed out so that it appears to be over-damped. This can lead to an underestimation of K to a factor of 4 (Butler, 1998). If the water column displacement is too large, this underestimation can be approximately resolved using the Hvorslev method on the semi-log, over-damped graph due to its insensitivity to well parameters (Weeks 2013). In regimes like this one, it is essential to monitor data in the field if possible for signs of near-critical flow in order to select the appropriate methodology.

The estimated storage coefficient (of 0.001) is on the higher end of those typical for confined aquifers (Fetter, 1994). Storativity is not formally accounted for by either Bouwer and Rice and Hvorslev for K-value calculations (Butler, 1998), but can be seen on few head-recovery graphs (see fig. 10). This is assumed to have no effect on the relative differences between tests, even though it is shown to be a source of error in absolute K values (see Calculation Methods above), especially if is seen in the near time region (first 15 seconds). Since there is no early time concave-upward trend or double-line effect in the data points storativity is not a significant factor in K value estimates (Butler, 1998).

5.1.0 Practical Considerations

Some of the data gathered during the mechanical slug test had to be discarded due to interference caused by pulling the slug out of the water column or by the lines getting tangled (see fig 5). These interferences violate the assumption of instantaneous head change to the degree that the data is not reliable. The data from the pneumatic slug test show much more defined test initiation points than the mechanical counterparts, because of the near-instantaneous release in casing pressure. This is especially important in early time (<5 seconds) data analysis, which is used to determine wellbore storage, storativity, and critical damping effects (Butler, 1998). Also, since wells on this site are at least 200 feet deep the likelihood of wrapping the line suspending the transducer and the line suspending the slug was significant. Even though entanglement is not an issue with the pneumatic slug tests, you must take precautions against leaky casings or a water table that crosses the screen making the test impossible.

The pneumatic field method was performed at the same pressure for all tests which gave initial displacements of up to 18 feet. In wells with 20 foot or less water columns this can be problematic since pushing the level below the top of the screen or transducer would greatly complicate K-value estimations and reduces the certainty of the result. Large displacements are also a problem in critically damped well responses as discussed above. According to Butler (1998 and 2003) it is important to use a variety of initial displacements to eliminate a K value dependency on slug size. For adequate control of the slug test parameters, I recommend using a small air-gas tank fitted with a regulator that can make fine adjustments at low psi's, and use a different pressure at each test.

Other practical considerations include the process of performing the tests in the field. In the case of deep wells such as these (>200 feet), winding enough rope up and down the well is cumbersome and time consuming. If the wells are polluted, the entire length of rope must be decontaminated as well as the rod to prevent disturbing chemical analysis programs. With the pneumatic method only the transducer needs to be rinsed and there is no rope winding.

6.0 Summary and Conclusions

After performing multiple slug tests using both field methods on a number of wells, hydraulic conductivities were estimated and statistically analyzed. The analysis shows with confidence ranging from 95% to 99% that the difference in K-values using each of the two methods is systematic, resulting in higher values attributed to the mechanical slug test. These differences are consistent, even though they are relatively small enough that the spatial variability of the aquifer is a more significant factor by one or two orders of magnitude. While this can mean that the aquifer's anisotropic conditions can over shadow those errors, the practical considerations involved with slug testing and the quality of the data consistently favors the pneumatic method.

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Figures

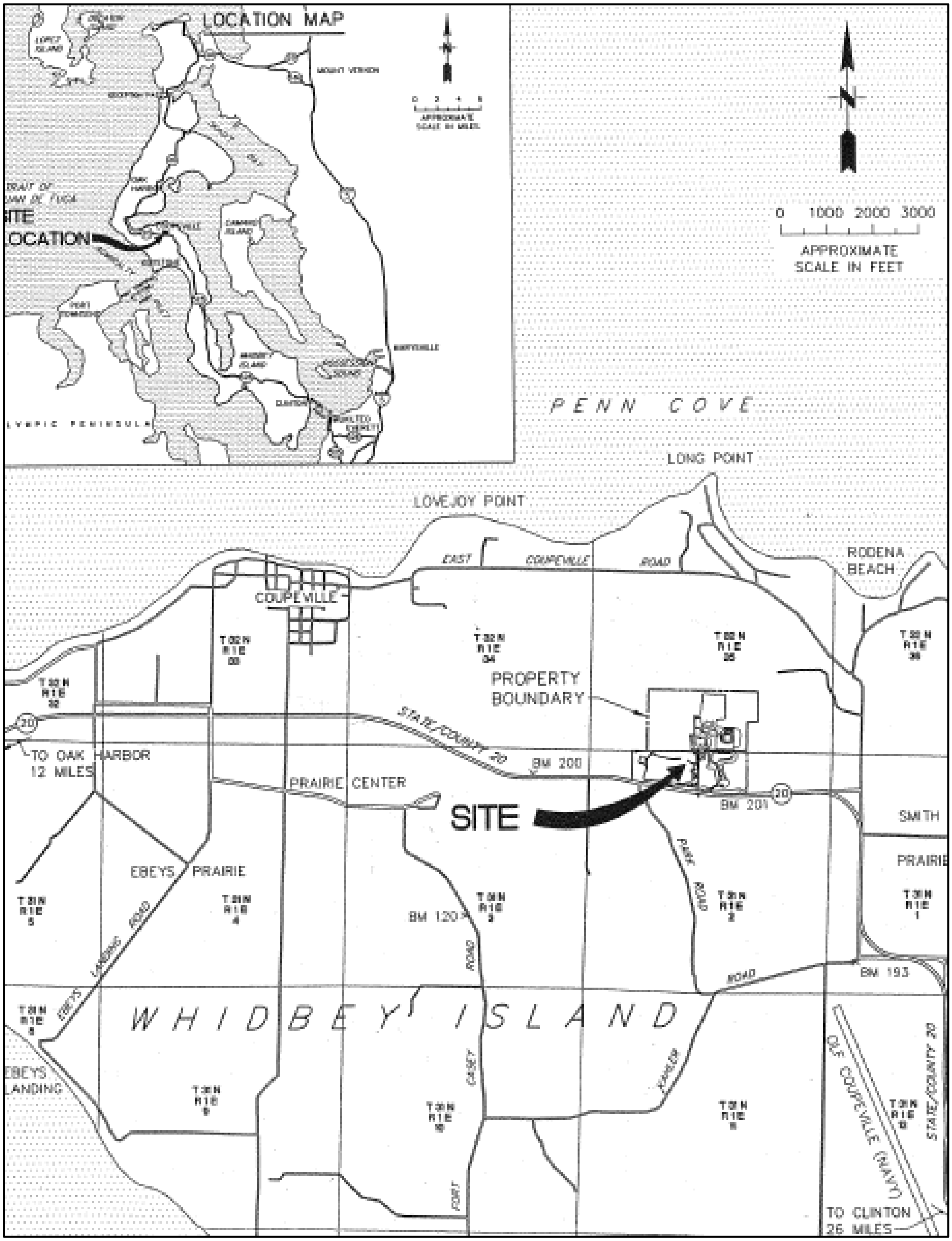


Figure 1: Location map of ICSWF on Whidbey Island, WA. (Adapted from SCS Engineers.)

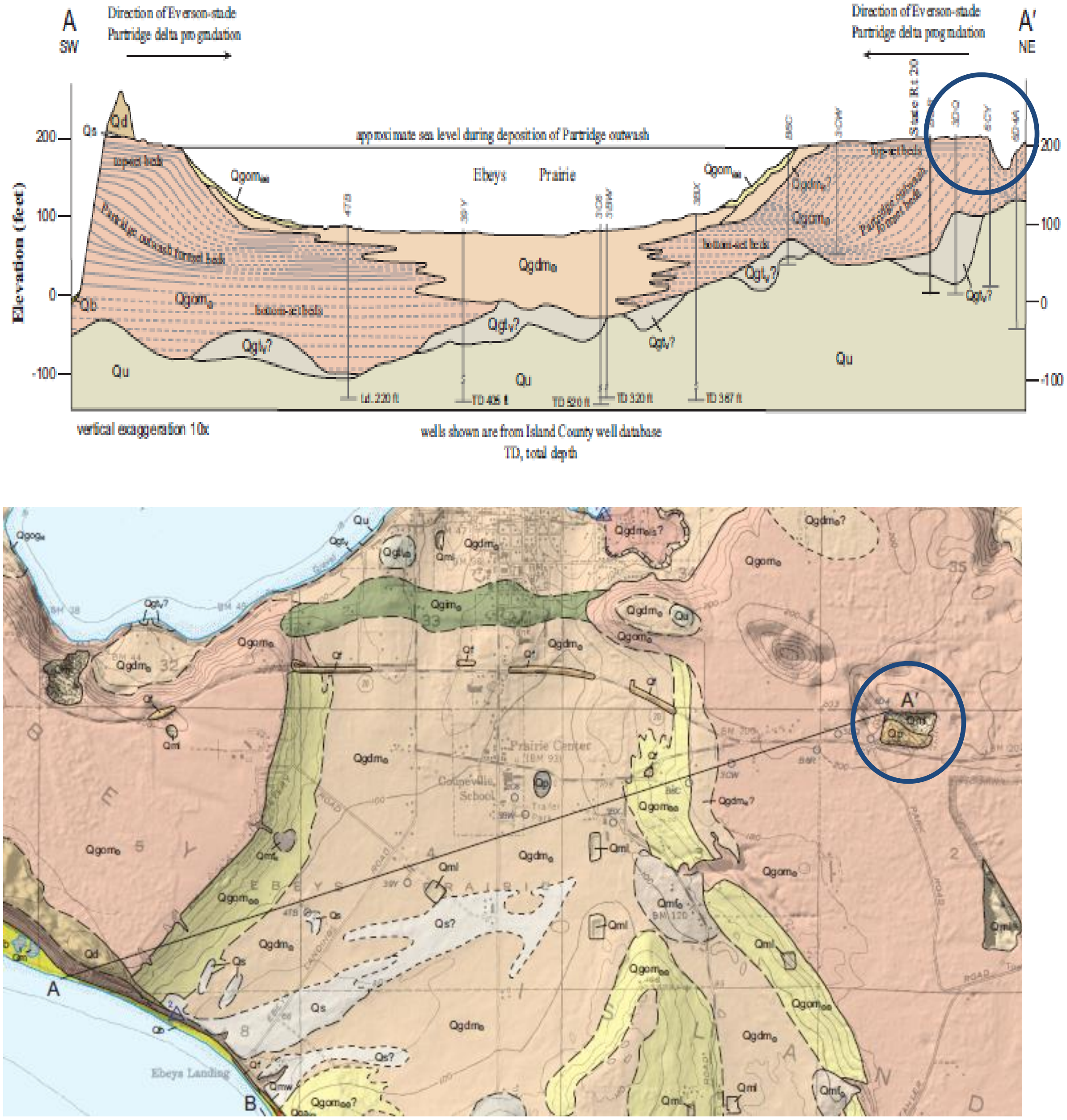


Figure 2 shows a cross section of the deltaic deposits near the site (circled at A′, from Polenz, 2005)

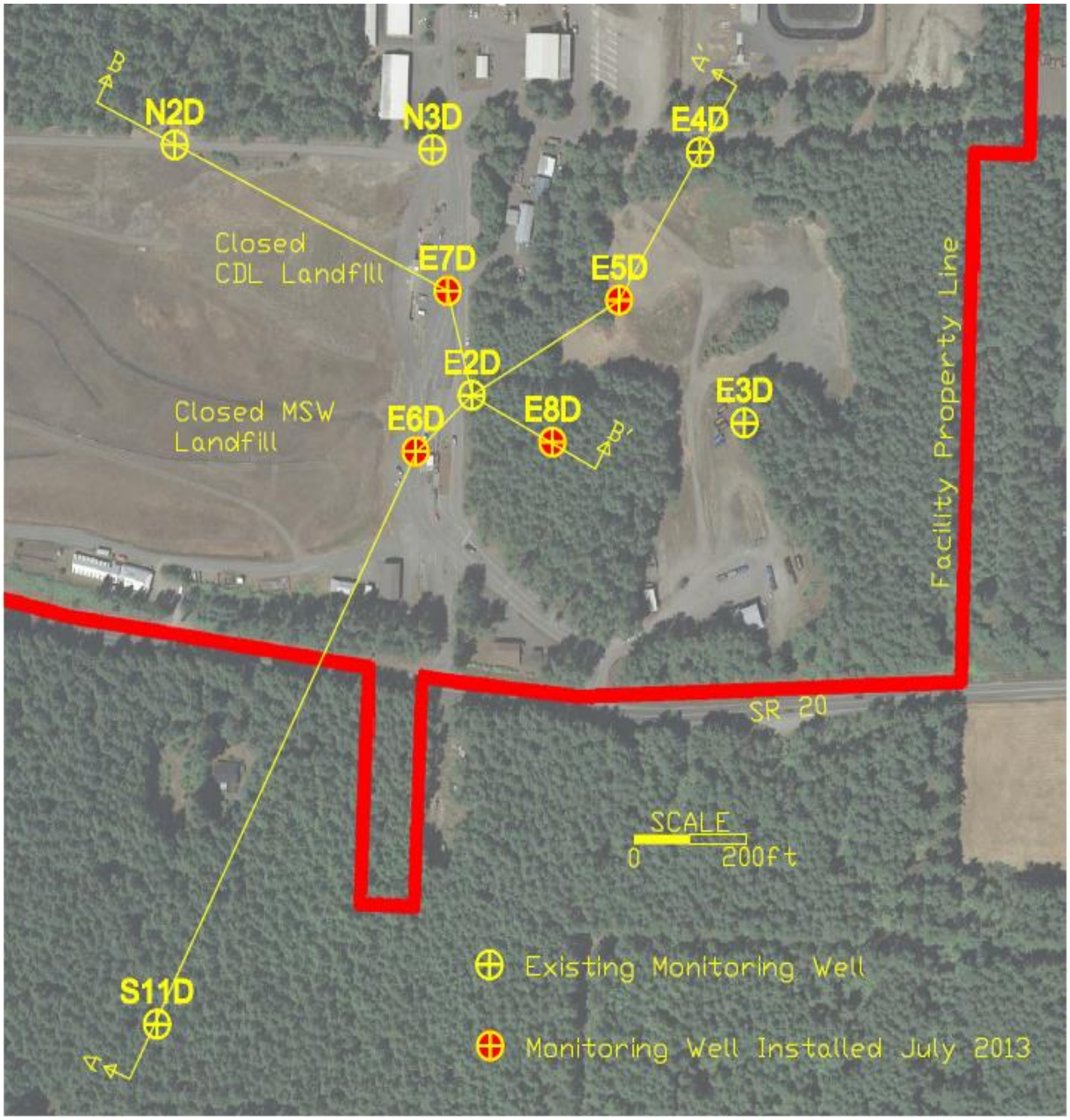


Figure 3: Well location map at the ICSWF on Whidbey Island, WA.
Adapted from Earth Science Strategies Consulting, Inc.

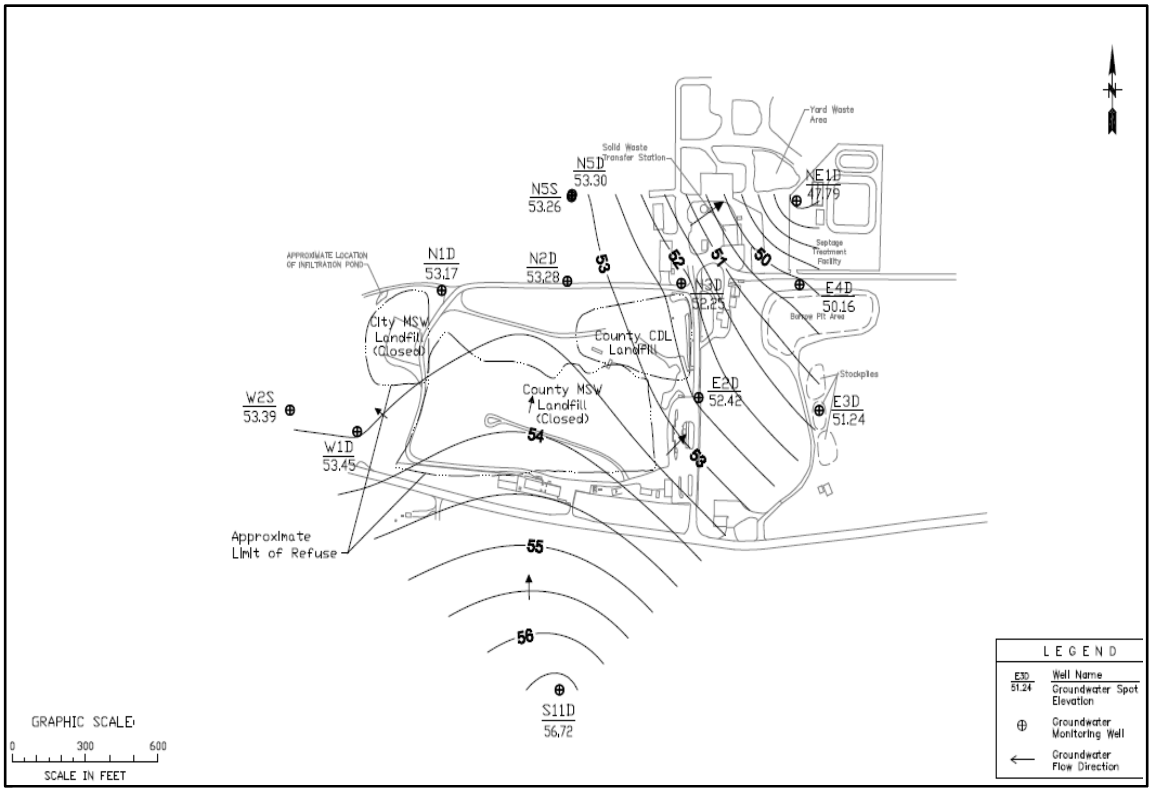


Figure 4: Showing a groundwater elevation contour map with flow direction (SCS Engineers, 2004).

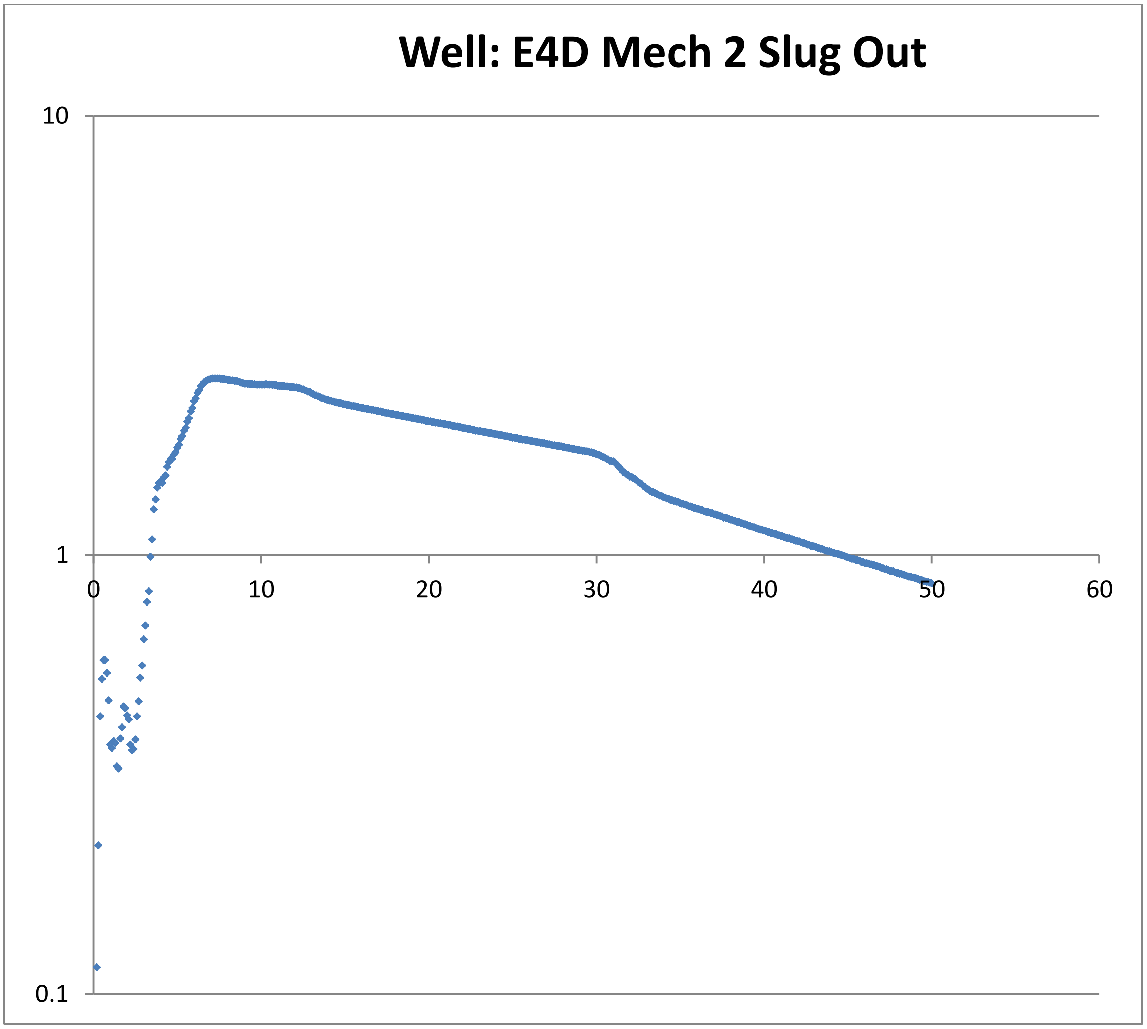


Figure 5: Semi-log recovery graph indicating field test errors within the first 10 seconds

Figure 6: Pneumatic slug test device with blue transducer cable and red/white gas release valve to the right.

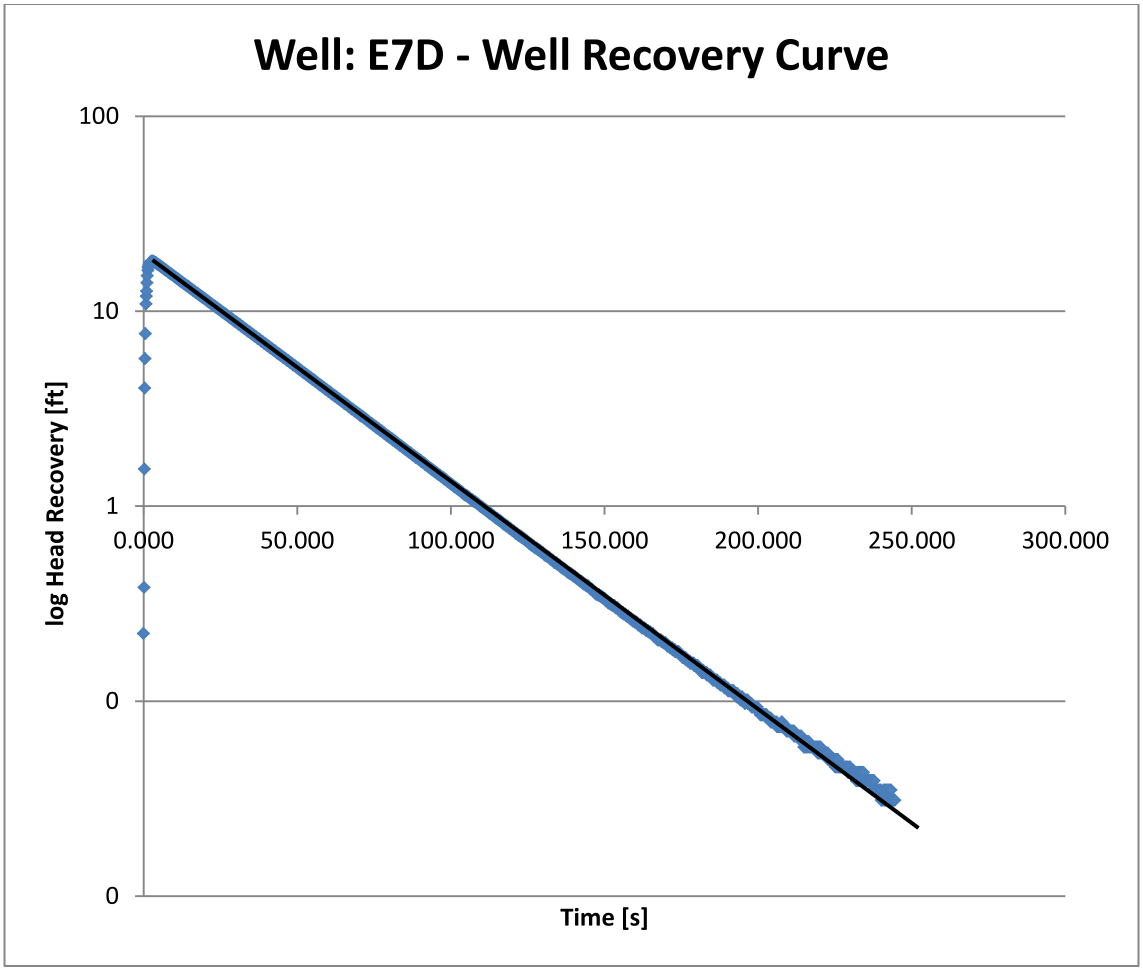


Figure 7: Well recovery semi-log plot using pneumatic slug test.

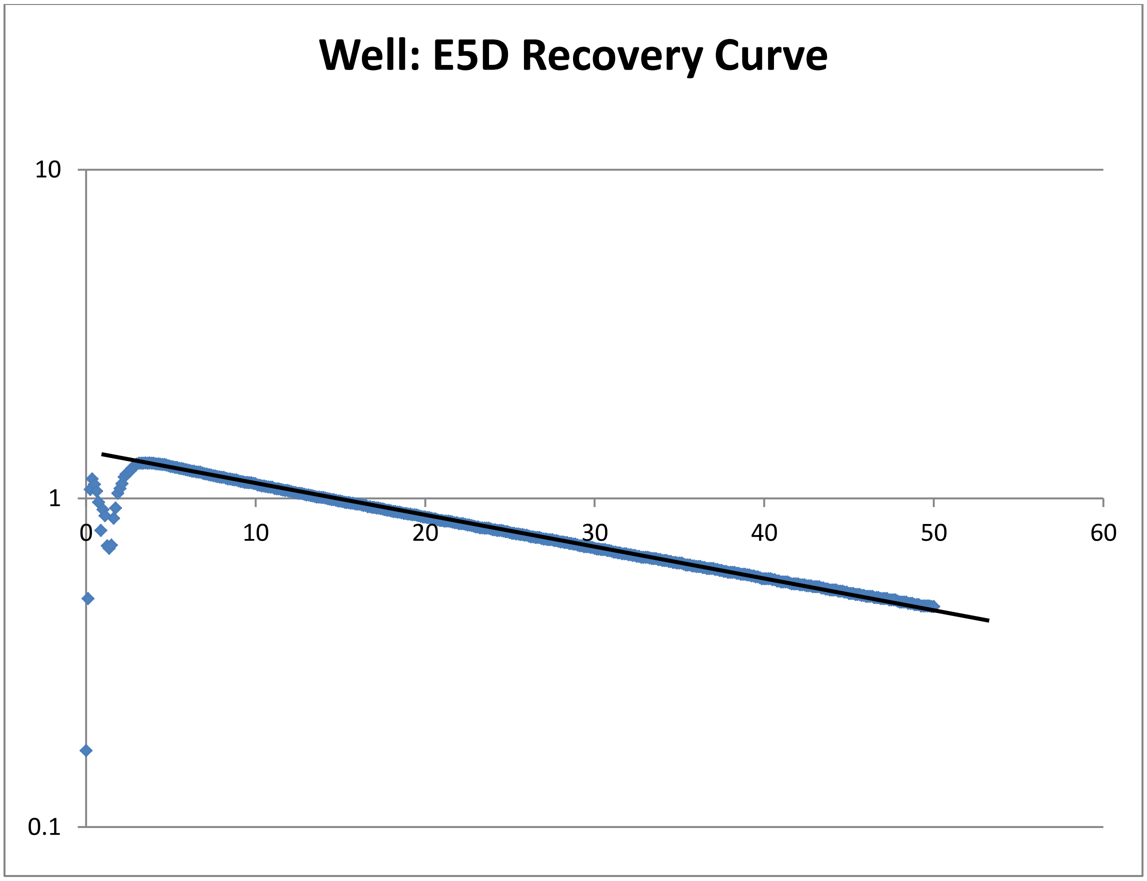


Figure 8: Well recovery semi-log plot using mechanical slug rod.

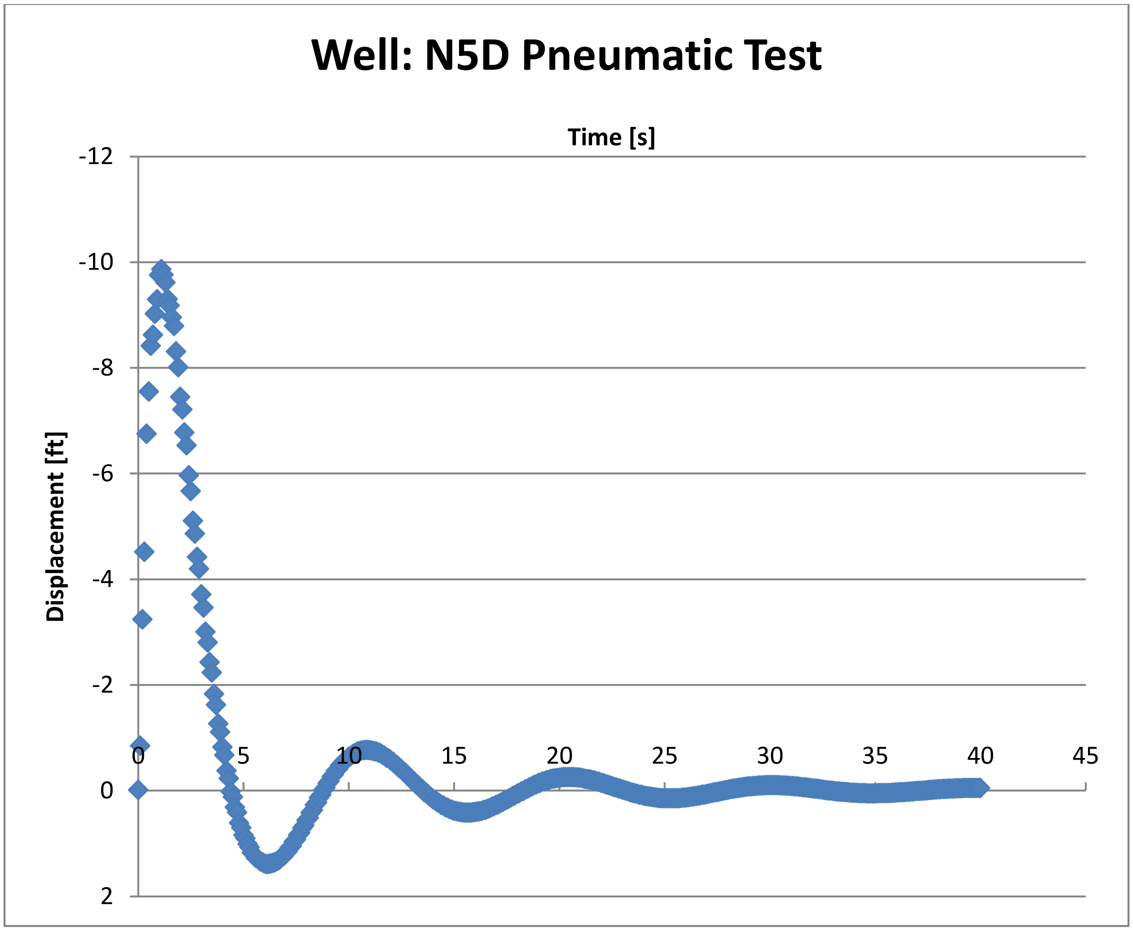


Figure 9: Well recovery semi-log plot of an under-damped response
(negative indicates movement upward.)

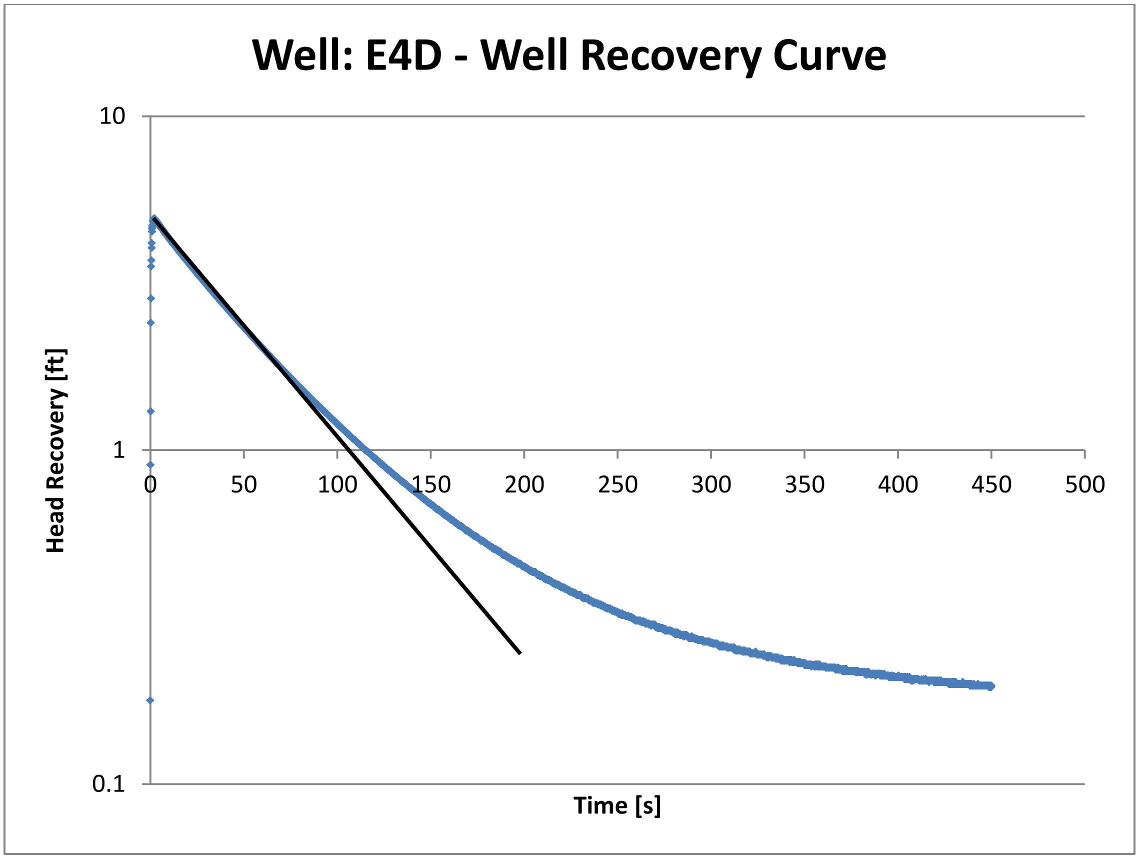


Figure 10: Well recovery semi-log plot using pneumatic slug test indicating storativity and other effects

Tables

Bouwer & Rice **[ft/day]**

Well	Avg Mech [ft/day]	Avg Pneumatic [ft/day]	Difference [ft/day]	% Difference	Absolute Difference [ft/day]	Signed Rank	Nitro Displacement [ft]
E4D	3.6	2.1	1.49	53%	1.49	5	4.5
E4S	4.6	4.3	0.28	6%	0.28	2	5.7
E5D	8.9	6.6	2.39	31%	2.39	7	16
E6D	1.7	0.7	1.04	89%	1.04	4	1.5
E7D	4.7	3.0	1.72	45%	1.72	6	18
N5D	98.3	86.1	12.28	13%	12.28	8	6.5
NE1D	1.1	1.5	-0.41	-32%	0.41	-3	12
S11D	0.6	0.4	0.20	42%	0.20	1	15
				31%			

n:	8	Sum:	18.99	W+	33
df:	7	Mean:	2.37	W-	-3
W:	33	sd:	4.104		
Z:	2.10	mean W+:	18		
p(2):	0.050	sd W+:	7.1414284		
p(1):	0.250				

$$\mu_{W+} = \frac{n(n+1)}{4}$$

$$\sigma_{W+} = \sqrt{\frac{n(n+1)(2n+1)}{24}}$$

$$Z = \frac{W_+ - \frac{n(n+1)}{4}}{\sqrt{\frac{n(n+1)(2n+1)}{24}}}$$

Hvorslev **[ft/day]**

Well	Mech [ft/day]	Pneumatic [ft/day]	Difference [ft/day]	% Difference	Absolute Difference [ft/day]	Signed Rank
E4D	4.1	2.6	1.48	45%	1.48	6
E4S	6.9	6.7	0.13	2%	0.13	1
E5D	10.9	7.7	3.23	35%	3.23	7
E6D	2.3	1.6	0.67	34%	0.67	4
E7D	4.3	3.5	0.84	21%	0.84	5
N5D	98.3	86.1	12.28	13%	12.28	8
NE1D	2.0	1.8	0.28	15%	0.28	3
S11D	0.7	0.4	0.25	45%	0.25	2
			AVG:	26%		

n:	8	Sum:	19.16	W+	36
df:	7	Mean:	2.39	W-	0
W:	36	sd:	4.12		
Z:	2.52	mean W+:	18		
p(2):	0.010	sd W+:	7.1414284		
p(1):	<.01				

Table 1. Tables of Hydraulic Conductivity Values and Statistical Analysis

Appendix A: Hydraulic Conductivity Estimates for Each Test

Mechanical Slug Test

Well ID	Bouwer & Rice [ft/day]	Hvorslev [ft/day]	Van der Kamp [ft/day]	Well Avg B & R	Well Avg Hvor	Well Avg - Van der Kamp	Stan. Dev. B&R	Stan. Dev. Hvor
E4D	3.55	4.01						
E4D	3.59	4.10		**3.57**	**4.05**		**0.02**	**0.04**
E4S	4.57	6.43						
E4S	4.61	6.93						
E4S	4.67	7.29		**4.62**	**6.87**		**0.04**	**0.35**
E5D	9.00	11.00						
E5D	8.90	10.80		**8.95**	**10.90**		**0.05**	**0.10**
E6D	1.49	2.11						
E6D	1.91	2.48		**1.69**	**2.29**		**0.21**	**0.19**
E7D	4.48	4.22						
E7D	4.75	4.36						
E7D	4.91	4.45		**4.71**	**4.34**		**0.18**	**0.09**
N5D			101					
N5D			81.9					
N5D			115			**98.3**	**13.57**	
NE1D	1.08	2.16						
NE1D	1.08	2.00						
NE1D	1.03	1.95		**1.06**	**2.04**		**0.02**	**0.09**
S11D	0.41	0.47						
S11D	0.84	1.00		**0.59**	**0.69**		**0.22**	**0.27**

Pneumatic Slug Test

Well ID	Bouwer&Rice [ft/day]	Hvorslev [ft/day]	Van der Kamp [ft/day]	Well Avg B & R	Well Avg Hvor	Well Avg - Van der Kamp	Stan. Dev. B&R	Stan. Dev. Hvor
E4D	2.14	2.64						
E4D	2.16	2.64						
E4D	1.94	2.44		**2.08**	**2.57**		**0.10**	**0.09**
E4S	4.09	6.46						
E4S	4.76	6.90						
E4S	4.19	6.87		**4.34**	**6.74**		**0.30**	**0.20**
E5D	8.20	9.90						
E5D	6.90	7.60						
E5D	5.00	6.00		**6.56**	**7.67**		**1.31**	**1.60**
E6D	0.65	2.48						
E6D	0.65	1.06		**0.65**	**1.62**		**0.00**	**0.71**
E7D	3.29	3.83						
E7D	2.72	3.21		**2.99**	**3.51**		**0.29**	**0.31**
N5D			90.1					
N5D			91.2					
N5D			77.6			**86.1**	**6.17**	
NE1D	1.50	1.79						
NE1D	1.51	1.81						
NE1D	1.40	1.67		**1.47**	**1.76**		**0.05**	**0.06**
S11D	0.40	0.48						
S11D	0.39	0.48						
S11D	0.36	0.35		**0.38**	**0.43**		**0.02**	**0.06**

****Appendix B can be found in the electronic version of this report in the UW Library System****

Appendix B: Output of spreadsheet calculators

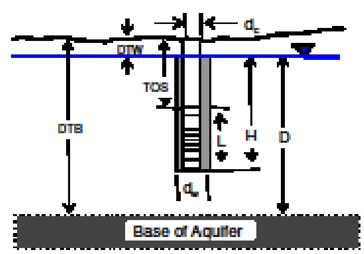
Bouwer & Rice Method (1976)

WELL ID: E4D Mech 1

Local ID: E4D
Date: 9/16/2013
Time: 10:02

INPUT

Construction:		
Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	6	Inch
Screen Length (L)	6	Feet
Depths to:		
water level (DTW)	155	Feet
top of screen (TOS)	215	Feet
Base of Aquifer (DTB)	250	Feet
Annular Fill:		
across screen -- Fine Sand		
above screen -- Bentonite		
Aquifer Material -- Fine Sand		



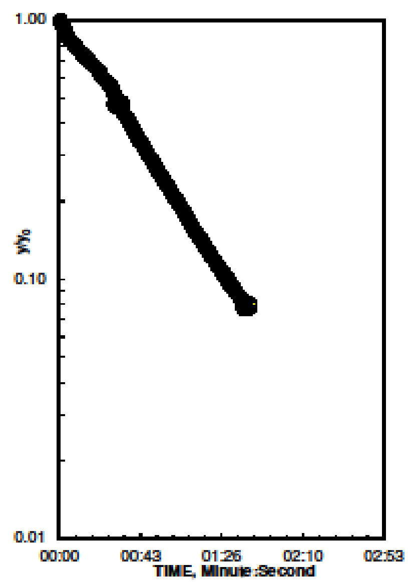
COMPUTED

L_{wetted}	6	Feet
D =	95	Feet
H =	66	Feet
L/r_w =	24.00	
$y_{0\text{-DISPLACEMENT}}$ =	2.67	Feet
$y_{0\text{-SLUG}}$ =	2.19	Feet
From look-up table using L/r_w		
Partial penetrate A =	2.334	
B =	0.376	
ln(Re/rw) =	2.709	
Re =	3.75	Feet
Slope =	0.01141	$\log_{10}$/sec
$t_{90\%}$ recovery =	88	sec

Input is consistent.

K = 3.55 Feet/Day

Adjust slope of line to estimate K



REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E4D Mech 2

Local ID: E4D
Date: 9/16/2013
Time: 10:31

INPUT

Construction:

Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch
Screen Length (L)	6 Feet

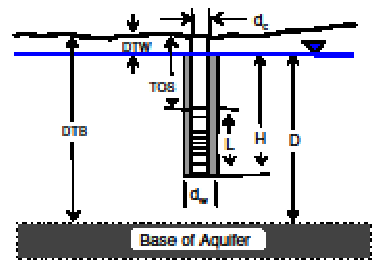
Depths to:

water level (DTW)	155 Feet
top of screen (TOS)	215 Feet
Base of Aquifer (DTB)	250 Feet

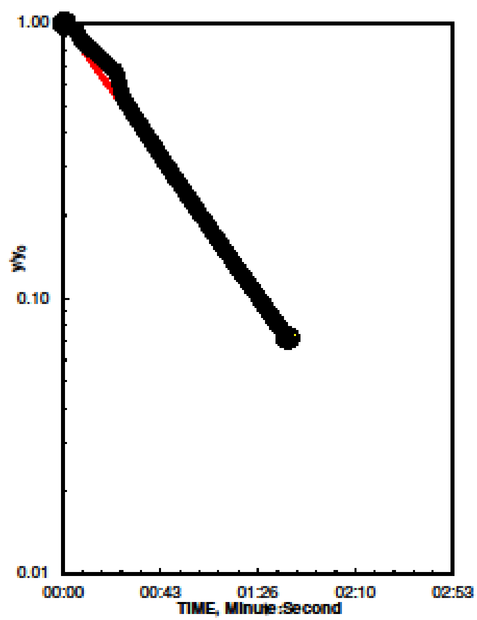
Annular Fill:

across screen -- Fine Sand
above screen -- Bentonite

Aquifer Material -- Fine Sand



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	6 Feet
D =	95 Feet
H =	66 Feet
L/r_w =	24.00
$y_{0\text{-DISPLACEMENT}}$ =	2.49 Feet
$y_{0\text{-SLUG}}$ =	2.19 Feet

From look-up table using L/r_w

Partial penetrate A =	2.334
B =	0.376
ln(Re/rw) =	2.709
Re =	3.75 Feet
Slope =	0.01153 $\log_{10}$/sec
$t_{90\%}$ recovery =	87 sec

Input is consistent.

K =	3.59 Feet/Day

REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E4D Nitro 1

Local ID: E4D
Date: 8/20/2013
Time: 11:00

INPUT

Construction:

Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch
Screen Length (L)	6 Feet

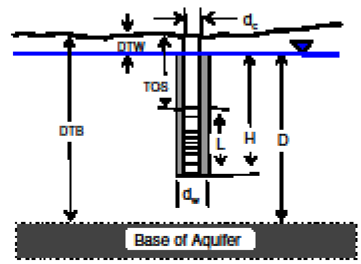
Depths to:

water level (DTW)	155.55 Feet
top of screen (TOS)	215 Feet
Base of Aquifer (DTB)	250 Feet

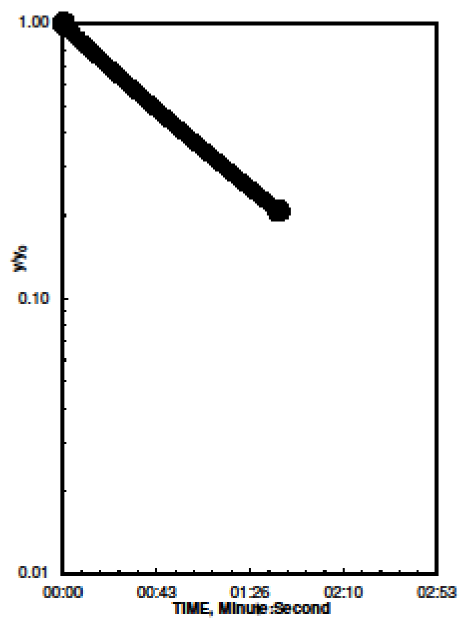
Annular Fill:

across screen -- Medium Sand
above screen -- Bentonite

Aquifer Material -- Fine Sand



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	6 Feet
D =	94.45 Feet
H =	65.45 Feet
L/r_w =	24.00
$y_{0\text{-DISPLACEMENT}}$ =	4.06 Feet
$y_{0\text{-SLUG}}$ =	4.06 Feet

From look-up table using L/r_w

Partial penetrate A =	2.334
B =	0.376
ln(Re/rw) =	2.707
Re =	3.75 Feet
Slope =	0.006881 $\log_{10}$/sec
$t_{90\%}$ recovery =	145 sec

Input is consistent.

K = 2.14 Feet/Day

K= 2.14 is less than likely minimum of 3 for Fine Sand

REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E4D Nitro 2

Local ID: E4D
Date: 8/20/2013
Time: 11:18

INPUT

Construction:

Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch
Screen Length (L)	6 Feet

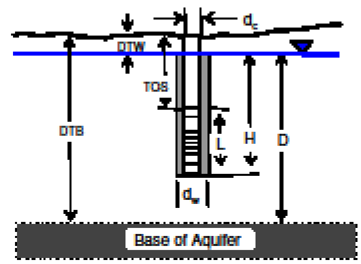
Depths to:

water level (DTW)	155.55 Feet
top of screen (TOS)	215 Feet
Base of Aquifer (DTB)	250 Feet

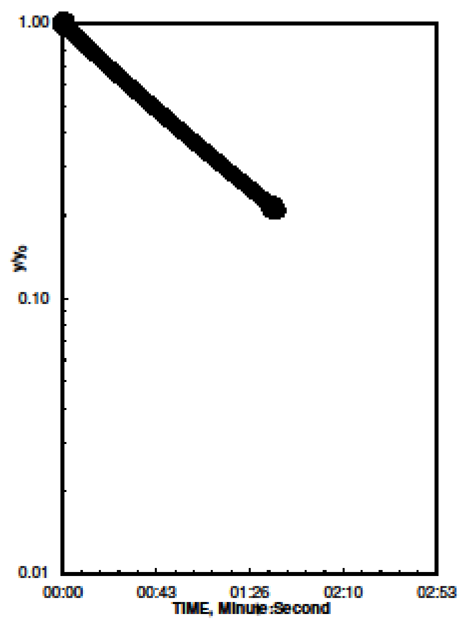
Annular Fill:

across screen -- Medium Sand
above screen -- Bentonite

Aquifer Material -- Fine Sand



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	6 Feet
D =	94.45 Feet
H =	65.45 Feet
L/r_w =	24.00
$y_{0\text{-DISPLACEMENT}}$ =	4.32 Feet
$y_{0\text{-SLUG}}$ =	4.32 Feet

From look-up table using L/r_w

Partial penetrate A =	2.334
B =	0.376
ln(Re/rw) =	2.707
Re =	3.75 Feet
Slope =	0.006939 $\log_{10}$/sec
$t_{90\%}$ recovery =	144 sec

Input is consistent.

K = 2.16 Feet/Day

K= 2.16 is less than likely minimum of 3 for Fine Sand

REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E4D Nitro 3

Local ID: E4D
Date: 8/20/2013
Time: 11:41

INPUT

Construction:

Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch
Screen Length (L)	6 Feet

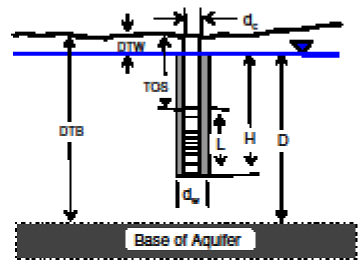
Depths to:

water level (DTW)	155.55 Feet
top of screen (TOS)	215 Feet
Base of Aquifer (DTB)	250 Feet

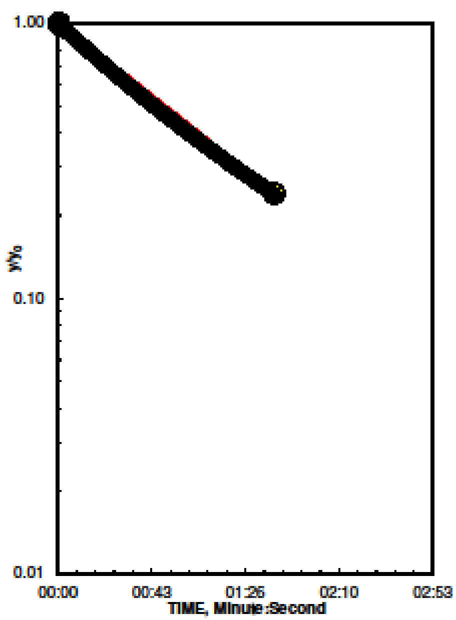
Annular Fill:

across screen -- Medium Sand
above screen -- Bentonite

Aquifer Material -- Fine Sand



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	6 Feet
D =	94.45 Feet
H =	65.45 Feet
L/r_w =	24.00
$y_{0\text{-DISPLACEMENT}}$ =	4.94 Feet
$y_{0\text{-SLUG}}$ =	4.94 Feet

From look-up table using L/r_w

Partial penetrate A =	2.334
B =	0.376
ln(Re/rw) =	2.707
Re =	3.75 Feet
Slope =	0.006236 $\log_{10}$/sec
$t_{90\%}$ recovery =	160 sec

Input is consistent.

K = 1.94 Feet/Day

K= 1.94 is less than likely minimum of 3 for Fine Sand

REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

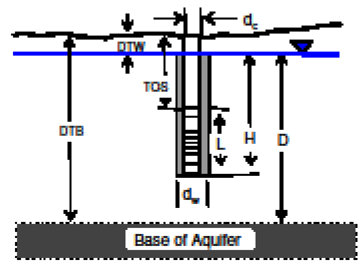
Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E4S Mech 1

Local ID: E4S
Date: 9/16/2013
Time: 14:02

INPUT

Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch
Screen Length (L)	7 Feet
Depths to:	
water level (DTW)	142.35 Feet
top of screen (TOS)	149 Feet
Base of Aquifer (DTB)	158 Feet
Annular Fill:	
across screen --	Fine Sand
above screen --	Bentonite
Aquifer Material --	Fine Sand



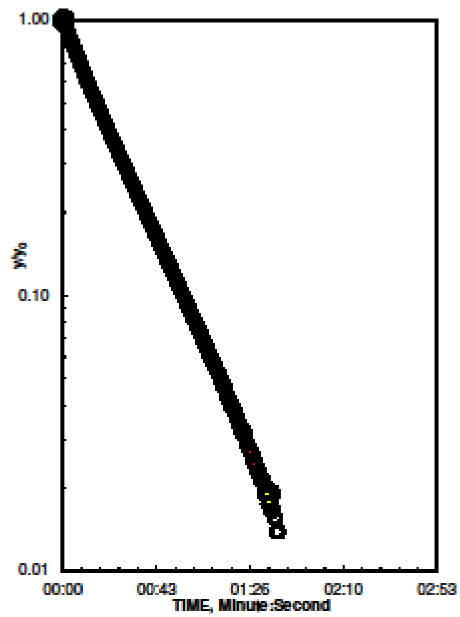
COMPUTED

L_{wetted}	7 Feet
D =	15.65 Feet
H =	13.65 Feet
L/r_w =	28.00
$y_{0\text{-DISPLACEMENT}}$ =	1.87 Feet
$y_{0\text{-SLUG}}$ =	2.19 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.446
B =	0.403
ln(Re/rw) =	2.549
Re =	3.20 Feet
Slope =	0.018176 $\log_{10}$/sec
$t_{90\%}$ recovery =	55 sec

Input is consistent.

K =	4.57 Feet/Day

Adjust slope of line to estimate K



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E4S Mech 2

Local ID: E4S
Date: 9/16/2013
Time: 14:28

INPUT

Construction:

Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch
Screen Length (L)	7 Feet

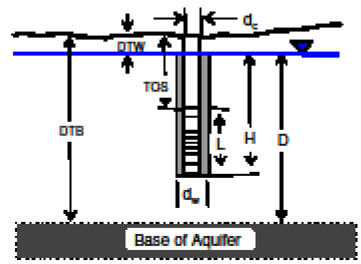
Depths to:

water level (DTW)	142.35 Feet
top of screen (TOS)	149 Feet
Base of Aquifer (DTB)	158 Feet

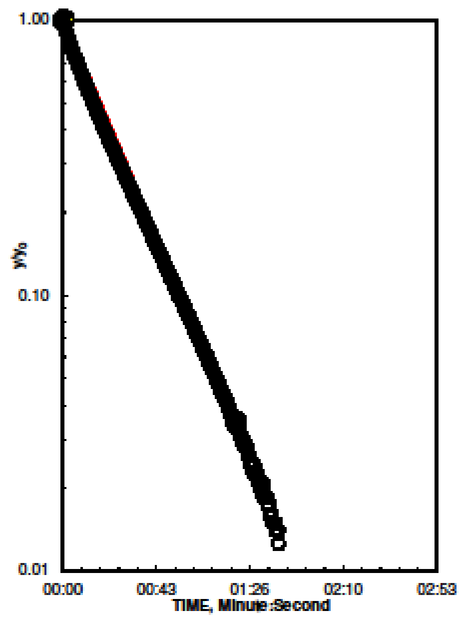
Annular Fill:

across screen -- Fine Sand
above screen -- Bentonite

Aquifer Material -- Fine Sand



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	7 Feet
D =	15.65 Feet
H =	13.65 Feet
L/r_w =	28.00
$y_{0\text{-DISPLACEMENT}}$ =	2.07 Feet
$y_{0\text{-SLUG}}$ =	2.19 Feet

From look-up table using L/r_w

Partial penetrate A =	2.446
B =	0.403
ln(Re/rw) =	2.549
Re =	3.20 Feet
Slope =	0.01836 $\log_{10}$/sec
$t_{90\%}$ recovery =	54 sec

Input is consistent.

K = 4.61 Feet/Day

REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

Aquifer is a silty, fine SAND in the Puget Lowland.

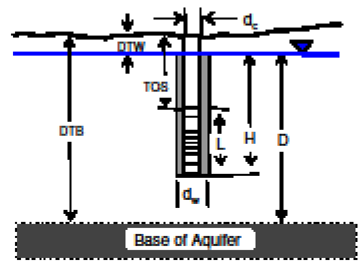
Slug_Bouwer-Rice_E4S 2_mech

WELL ID: E4S Mech 3

Local ID: E4S
Date: 9/16/2013
Time: 14:55

INPUT

Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch
Screen Length (L)	7 Feet
Depths to:	
water level (DTW)	142.35 Feet
top of screen (TOS)	149 Feet
Base of Aquifer (DTB)	158 Feet
Annular Fill:	
across screen --	Fine Sand
above screen --	Bentonite
Aquifer Material --	Fine Sand



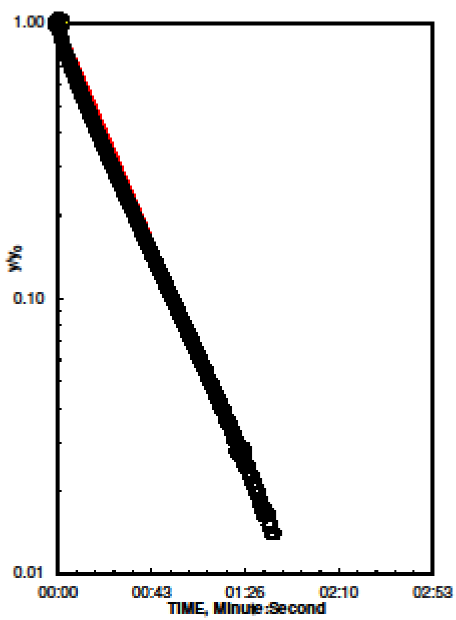
COMPUTED

L_{wetted}	7 Feet
D =	15.65 Feet
H =	13.65 Feet
L/r_w =	28.00
$y_{0\text{-DISPLACEMENT}}$ =	2.20 Feet
$y_{0\text{-SLUG}}$ =	2.19 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.446
B =	0.403
ln(Re/rw) =	2.549
Re =	3.20 Feet
Slope =	0.018575 log_{10}/sec
$t_{90\%}$ recovery =	54 sec

Input is consistent.

K =	4.67 Feet/Day

Adjust slope of line to estimate K



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E4S Nitro 1

Local ID: E4S
Date: 9/16/2013
Time: 12:27

INPUT

Construction:

Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	6	Inch
Screen Length (L)	7	Feet

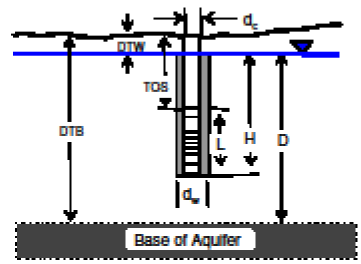
Depths to:

water level (DTW)	142.35	Feet
top of screen (TOS)	149	Feet
Base of Aquifer (DTB)	158	Feet

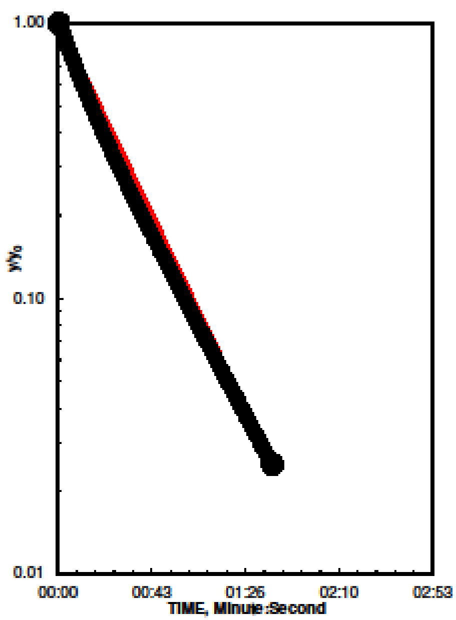
Annular Fill:

across screen -- Fine Sand
above screen -- Bentonite

Aquifer Material -- Fine Sand



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	7	Feet
D =	15.65	Feet
H =	13.65	Feet
L/r_w =	28.00	
$y_{0\text{-DISPLACEMENT}}$ =	5.26	Feet
$y_{0\text{-SLUG}}$ =	5.26	Feet

From look-up table using L/r_w

Partial penetrate A =	2.446	
B =	0.403	
ln(Re/rw) =	2.549	
Re =	3.20	Feet
Slope =	0.016265	$\log_{10}$/sec
$t_{90\%}$ recovery =	61	sec

Input is consistent.

K = 4.09 Feet/Day

REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

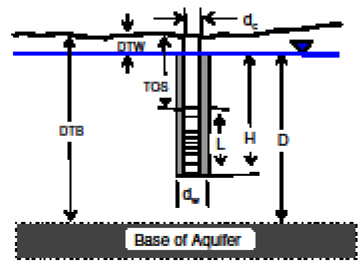
Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E4S Nitro 2

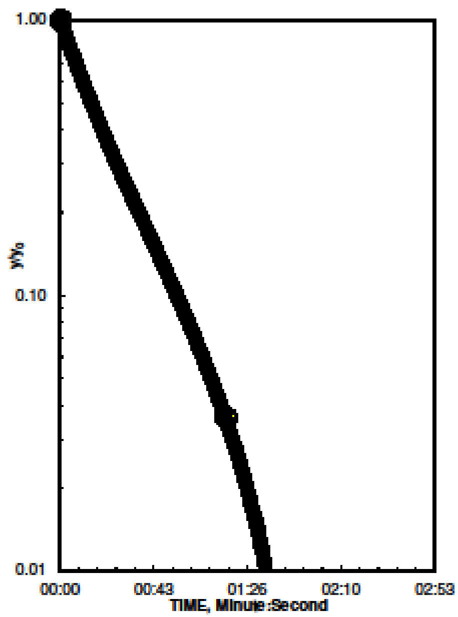
Local ID: E4S
Date: 9/16/2013
Time: 12:47

INPUT

Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch
Screen Length (L)	7 Feet
Depths to:	
water level (DTW)	142.35 Feet
top of screen (TOS)	149 Feet
Base of Aquifer (DTB)	158 Feet
Annular Fill:	
across screen --	Fine Sand
above screen --	Bentonite
Aquifer Material --	Fine Sand



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	7 Feet
D =	15.65 Feet
H =	13.65 Feet
L/r_w =	28.00
$y_{0\text{-DISPLACEMENT}}$ =	5.64 Feet
$y_{0\text{-SLUG}}$ =	5.64 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.446
B =	0.403
ln(Re/rw) =	2.549
Re =	3.20 Feet
Slope =	0.018946 $\log_{10}$/sec
$t_{90\%}$ recovery =	53 sec

Input is consistent.

K =	4.76 Feet/Day

REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E4S Nitro 3

Local ID: E4S
Date: 9/16/2013
Time: 13:02

INPUT

Construction:

Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch
Screen Length (L)	7 Feet

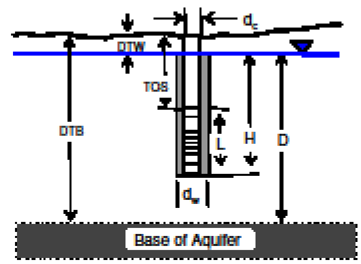
Depths to:

water level (DTW)	142.35 Feet
top of screen (TOS)	149 Feet
Base of Aquifer (DTB)	158 Feet

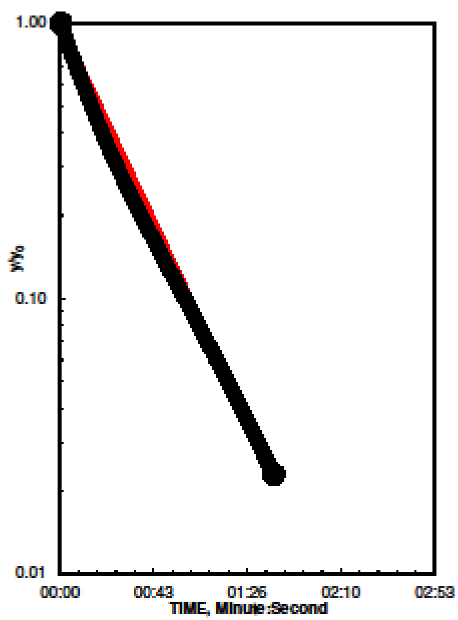
Annular Fill:

across screen -- Fine Sand
above screen -- Bentonite

Aquifer Material -- Fine Sand



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	7 Feet
D =	15.65 Feet
H =	13.65 Feet
L/r_w =	28.00
$y_{0\text{-DISPLACEMENT}}$ =	6.18 Feet
$y_{0\text{-SLUG}}$ =	6.18 Feet

From look-up table using L/r_w

Partial penetrate A =	2.446
B =	0.403
ln(Re/rw) =	2.549
Re =	3.20 Feet
Slope =	0.016683 $\log_{10}$/sec
$t_{90\%}$ recovery =	60 sec

Input is consistent.

K = 4.19 Feet/Day

REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E5D Mech 1

Local ID: E5D
Date: 8/20/2013
Time: 11:45

INPUT

Construction:

Casing dia. (d_c)	4	Inch
Annulus dia. (d_w)	8	Inch
Screen Length (L)	8	Feet

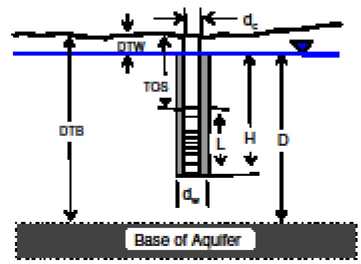
Depths to:

water level (DTW)	146.54	Feet
top of screen (TOS)	206.3	Feet
Base of Aquifer (DTB)	250	Feet

Annular Fill:

across screen -- Fine Sand
above screen -- Bentonite

Aquifer Material -- Fine Sand



COMPUTED

L_{wetted}	8	Feet
D =	103.46	Feet
H =	67.76	Feet
L/r_w =	24.00	
$y_{0\text{-DISPLACEMENT}}$ =	1.24	Feet
$y_{0\text{-SLUG}}$ =	1.11	Feet

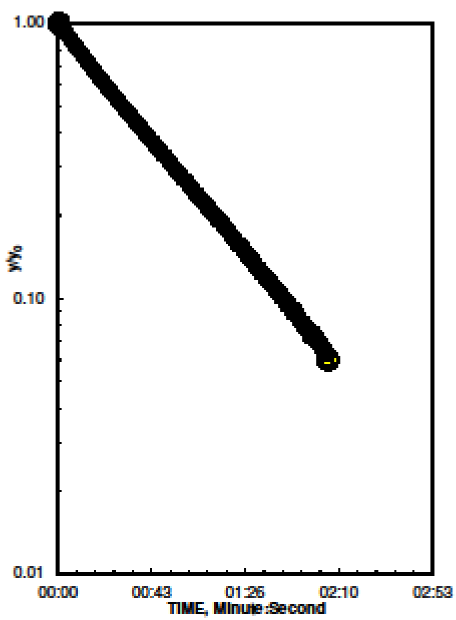
From look-up table using L/r_w

Partial penetrate A =	2.334	
B =	0.376	
ln(Re/rw) =	2.649	
Re =	4.71	Feet
Slope =	0.009854	$\log_{10}$/sec
$t_{90\%}$ recovery =	101	sec

Input is consistent.

K = 9 Feet/Day

Adjust slope of line to estimate K



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E5D Mech 2

Local ID: E5D
Date: 8/20/2013
Time: 11:53

INPUT

Construction:

Casing dia. (d_c)	4	Inch
Annulus dia. (d_w)	8	Inch
Screen Length (L)	8	Feet

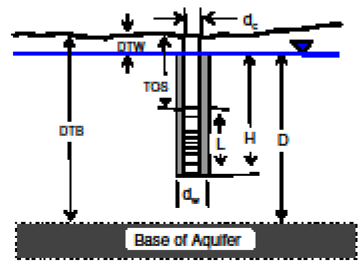
Depths to:

water level (DTW)	146.54	Feet
top of screen (TOS)	206.3	Feet
Base of Aquifer (DTB)	250	Feet

Annular Fill:

across screen -- Fine Sand
above screen -- Bentonite

Aquifer Material -- Fine Sand



COMPUTED

L_{wetted}	8	Feet
D =	103.46	Feet
H =	67.76	Feet
L/r_w =	24.00	
$y_{0\text{-DISPLACEMENT}}$ =	1.26	Feet
$y_{0\text{-SLUG}}$ =	1.11	Feet

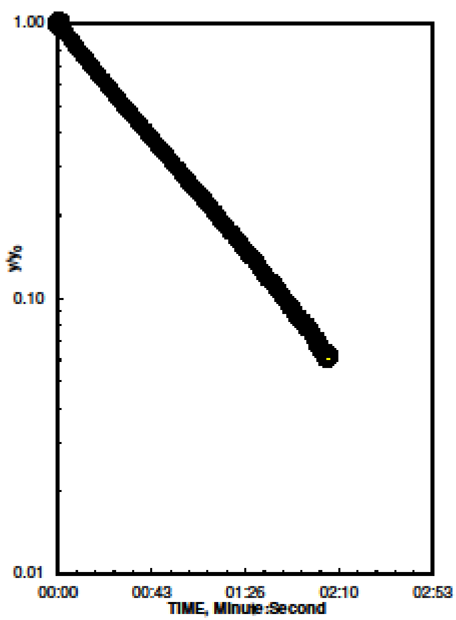
From look-up table using L/r_w

Partial penetrate A =	2.334	
B =	0.376	
ln(Re/rw) =	2.649	
Re =	4.71	Feet
Slope =	0.00977	$\log_{10}$/sec
$t_{90\%}$ recovery =	102	sec

Input is consistent.

K = 8.93 Feet/Day

Adjust slope of line to estimate K



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

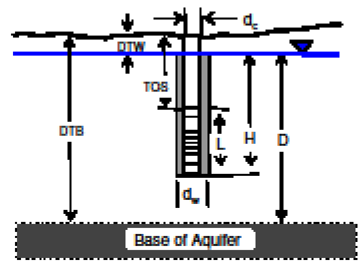
Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E5D Nitro 1

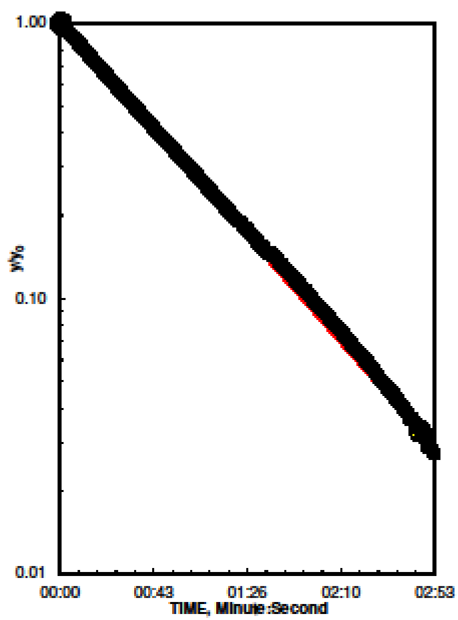
Local ID: E5D
Date: 8/20/2013
Time: 15:03

INPUT

Construction:	
Casing dia. (d_c)	4 Inch
Annulus dia. (d_w)	8 Inch
Screen Length (L)	8 Feet
Depths to:	
water level (DTW)	146.54 Feet
top of screen (TOS)	206.3 Feet
Base of Aquifer (DTB)	250 Feet
Annular Fill:	
across screen --	Medium Sand
above screen --	Bentonite
Aquifer Material --	Fine Sand



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	8 Feet
D =	103.46 Feet
H =	67.76 Feet
L/r_w =	24.00
$y_{0\text{-DISPLACEMENT}}$ =	4.27 Feet
$y_{0\text{-SLUG}}$ =	4.27 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.334
B =	0.376
ln(Re/rw) =	2.649
Re =	4.71 Feet
Slope =	0.008952 $\log_{10}$/sec
$t_{90\%}$ recovery =	112 sec

Input is consistent.

K =	8.18 Feet/Day

REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

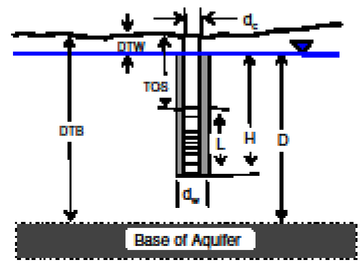
Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E5D Nitro 2

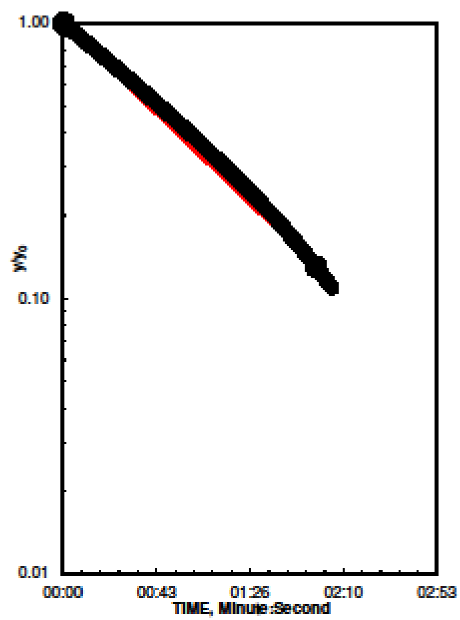
Local ID: E5D
Date: 8/20/2013
Time: 15:55

INPUT

Construction:	
Casing dia. (d_c)	4 Inch
Annulus dia. (d_w)	8 Inch
Screen Length (L)	8 Feet
Depths to:	
water level (DTW)	146.54 Feet
top of screen (TOS)	206.3 Feet
Base of Aquifer (DTB)	250 Feet
Annular Fill:	
across screen --	Medium Sand
above screen --	Bentonite
Aquifer Material --	Fine Sand



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	8 Feet
D =	103.46 Feet
H =	67.76 Feet
L/r_w =	24.00
$y_{0\text{-DISPLACEMENT}}$ =	20.14 Feet
$y_{0\text{-SLUG}}$ =	20.14 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.334
B =	0.376
ln(Re/rw) =	2.649
Re =	4.71 Feet
Slope =	0.007577 $\log_{10}$/sec
$t_{90\%}$ recovery =	132 sec

Input is consistent.

K =	6.92 Feet/Day

REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

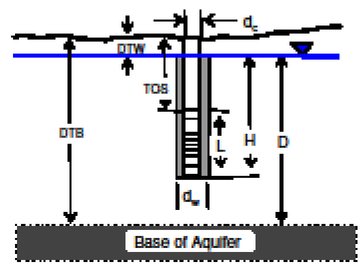
Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E5D Nitro 3

Local ID:	E5D
Date:	8/20/2013
Time:	16:13

INPUT

Construction:	
Casing dia. (d_c)	4 Inch
Annulus dia. (d_w)	8 Inch
Screen Length (L)	8 Feet
Depths to:	
water level (DTW)	146.54 Feet
top of screen (TOS)	206.3 Feet
Base of Aquifer (DTB)	250 Feet
Annular Fill:	
across screen --	Medium Sand
above screen --	Bentonite
Aquifer Material --	Fine Sand



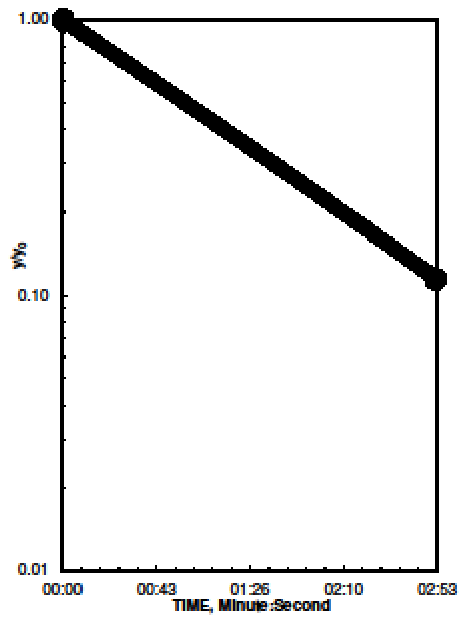
COMPUTED

L_{wetted}	8 Feet
D =	103.46 Feet
H =	67.76 Feet
L/r_w =	24.00
$y_{0\text{-DISPLACEMENT}}$ =	21.76 Feet
$y_{0\text{-SLUG}}$ =	20.85 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.334
B =	0.376
ln(Re/rw) =	2.649
Re =	4.71 Feet
Slope =	0.005477 $\log_{10}$/sec
$t_{90\%}$ recovery =	183 sec

Input is consistent.

K =	5 Feet/Day

Adjust slope of line to estimate K



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

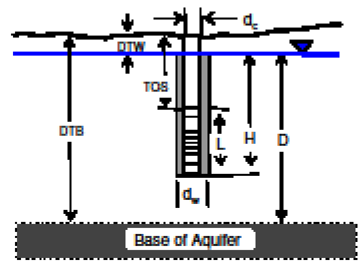
Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E6D Mech 1

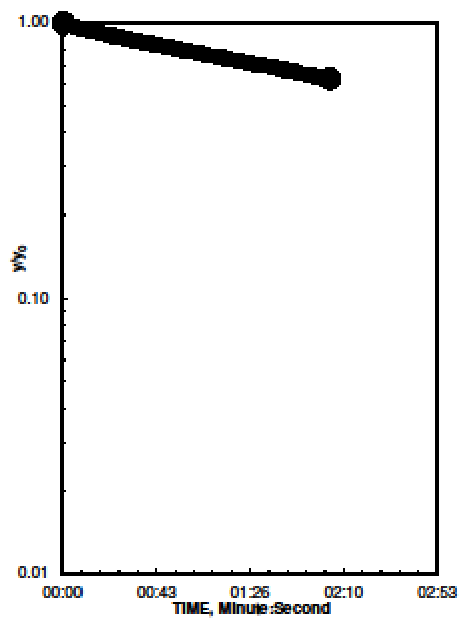
Local ID: E6D
Date: 9/16/2013
Time: 16:08

INPUT

Construction:	
Casing dia. (d_c)	4 Inch
Annulus dia. (d_w)	8 Inch
Screen Length (L)	8 Feet
Depths to:	
water level (DTW)	149 Feet
top of screen (TOS)	202 Feet
Base of Aquifer (DTB)	250 Feet
Annular Fill:	
across screen --	Medium Sand
above screen --	Bentonite
Aquifer Material --	Fine Sand



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	8 Feet
D =	101 Feet
H =	61 Feet
L/r_w =	24.00
$y_{0\text{-DISPLACEMENT}}$ =	0.62 Feet
$y_{0\text{-SLUG}}$ =	0.70 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.334
B =	0.376
ln(Re/rw) =	2.607
Re =	4.52 Feet
Slope =	0.001655 $\log_{10}$/sec
$t_{90\%}$ recovery =	604 sec

Input is consistent.

K =	1.49 Feet/Day

K= 1.49 is less than likely minimum of 3 for Fine Sand

REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

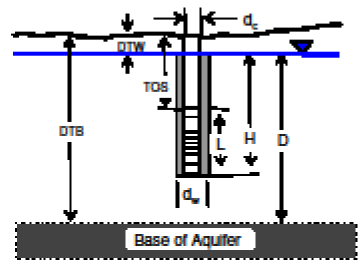
Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E6D Mech 2

Local ID: E6D
Date: 9/16/2013
Time: 16:21

INPUT

Construction:	
Casing dia. (d_c)	4 Inch
Annulus dia. (d_w)	8 Inch
Screen Length (L)	8 Feet
Depths to:	
water level (DTW)	146.54 Feet
top of screen (TOS)	202 Feet
Base of Aquifer (DTB)	250 Feet
Annular Fill:	
across screen --	Fine Sand
above screen --	Bentonite
Aquifer Material --	Fine Sand



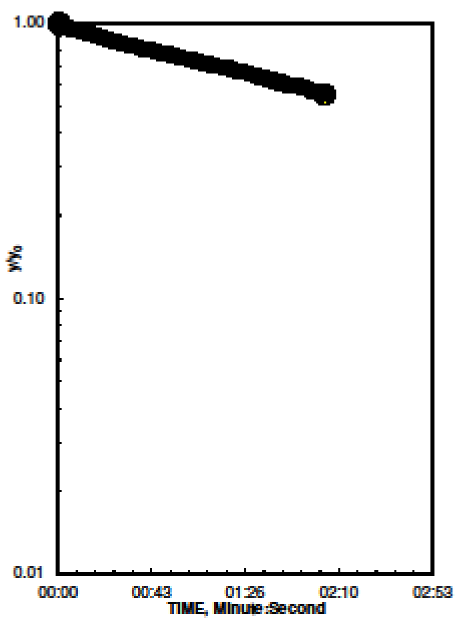
COMPUTED

L_{wetted}	8 Feet
D =	103.46 Feet
H =	63.46 Feet
L/r_w =	24.00
$y_{0\text{-DISPLACEMENT}}$ =	0.43 Feet
$y_{0\text{-SLUG}}$ =	0.70 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.334
B =	0.376
ln(Re/rw) =	2.618
Re =	4.57 Feet
Slope =	0.002115 $\log_{10}$/sec
$t_{90\%}$ recovery =	473 sec

Input is consistent.

K =	1.91 Feet/Day

Adjust slope of line to estimate K



K= 1.91 is less than likely minimum of 3 for Fine Sand

REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E6D Nitro 2

Local ID: E6D
Date: 8/19/2013
Time: 15:13

INPUT

Construction:

Casing dia. (d_c)	4	Inch
Annulus dia. (d_w)	8	Inch
Screen Length (L)	8	Feet

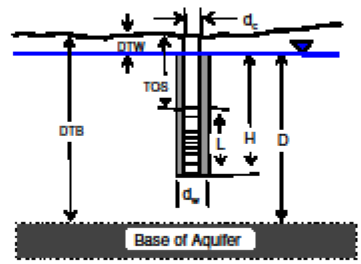
Depths to:

water level (DTW)	149	Feet
top of screen (TOS)	202	Feet
Base of Aquifer (DTB)	250	Feet

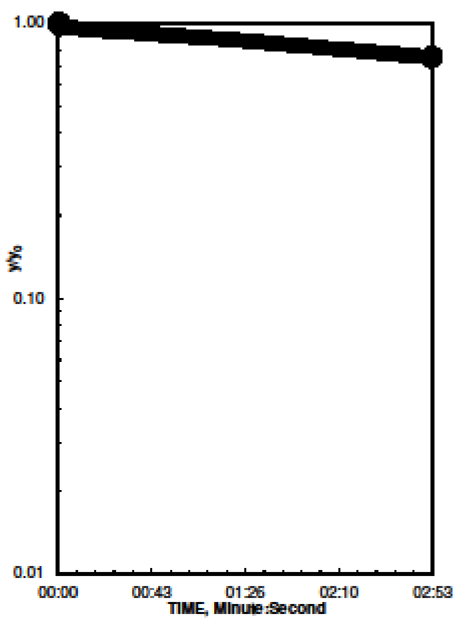
Annular Fill:

across screen -- Medium Sand
above screen -- Bentonite

Aquifer Material -- Fine Sand



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	8	Feet
D =	101	Feet
H =	61	Feet
L/r_w =	24.00	
$y_{0\text{-DISPLACEMENT}}$ =	1.39	Feet
$y_{0\text{-SLUG}}$ =	1.39	Feet

From look-up table using L/r_w

Partial penetrate A =	2.334	
B =	0.376	
ln(Re/rw) =	2.607	
Re =	4.52	Feet
Slope =	0.000717	$\log_{10}$/sec
$t_{90\%}$ recovery =	1395	sec

Input is consistent.

K = 0.645 Feet/Day

K= 0.645 is less than likely minimum of 3 for Fine Sand

REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

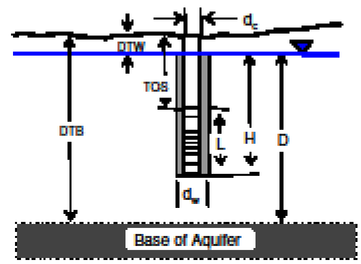
Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E6D Nitro 3

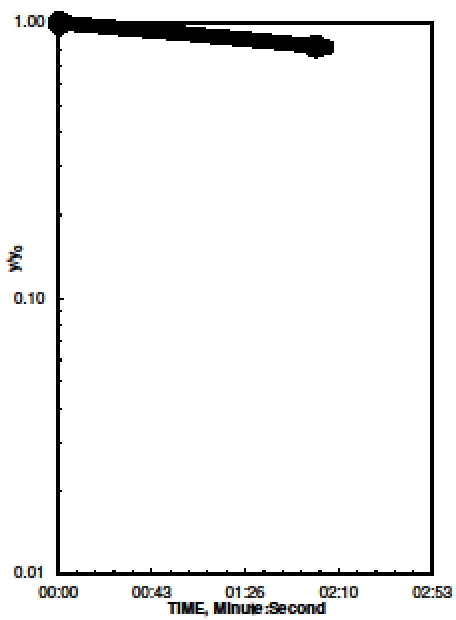
Local ID: E6D
Date: 8/19/2013
Time: 15:46

INPUT

Construction:		
Casing dia. (d_c)	4	Inch
Annulus dia. (d_w)	8	Inch
Screen Length (L)	8	Feet
Depths to:		
water level (DTW)	149	Feet
top of screen (TOS)	202	Feet
Base of Aquifer (DTB)	250	Feet
Annular Fill:		
across screen --	Medium Sand	
above screen --	Bentonite	
Aquifer Material --	Fine Sand	



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	8	Feet
D =	101	Feet
H =	61	Feet
L/r_w =	24.00	
$y_{0\text{-DISPLACEMENT}}$ =	1.74	Feet
$y_{0\text{-SLUG}}$ =	1.74	Feet
From look-up table using L/r_w		
Partial penetrate A =	2.334	
B =	0.376	
ln(Re/rw) =	2.607	
Re =	4.52	Feet
Slope =	0.000722	$\log_{10}$/sec
$t_{90\%}$ recovery =	1385	sec

Input is consistent.

K =	0.65	Feet/Day

K= 0.65 is less than likely minimum of 3 for Fine Sand

REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

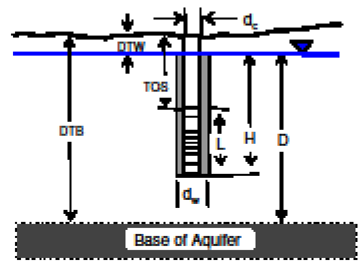
Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E7D Mech 1

Local ID: E6D
Date: 9/16/2013
Time: 10:58

INPUT

Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch
Screen Length (L)	7 Feet
Depths to:	
water level (DTW)	146.82 Feet
top of screen (TOS)	202.5 Feet
Base of Aquifer (DTB)	250 Feet
Annular Fill:	
across screen --	Fine Sand
above screen --	Bentonite
Aquifer Material --	Fine Sand



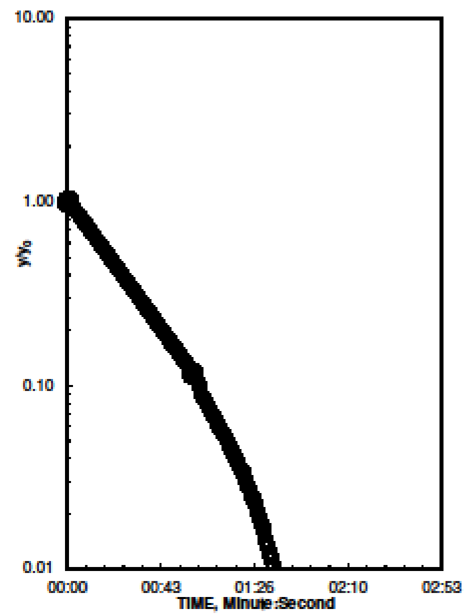
COMPUTED

L_{wetted}	7 Feet
D =	103.18 Feet
H =	62.68 Feet
L/r_w =	28.00
$y_{0\text{-DISPLACEMENT}}$ =	2.46 Feet
$y_{0\text{-SLUG}}$ =	2.19 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.446
B =	0.403
ln(Re/rw) =	2.780
Re =	4.03 Feet
Slope =	0.016356 $\log_{10}$/sec
$t_{90\%}$ recovery =	61 sec

Input is consistent.

K =	4.48 Feet/Day

Adjust slope of line to estimate K



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

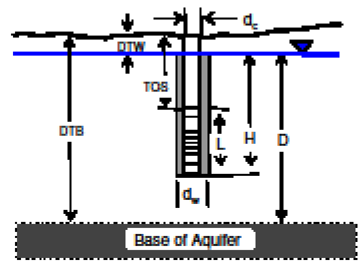
Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E7D Mech 2

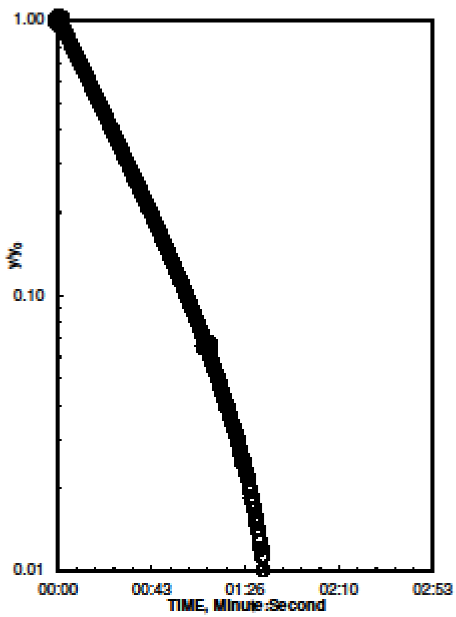
Local ID: E6D
Date: 9/16/2013
Time: 11:30

INPUT

Construction:		
Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	6	Inch
Screen Length (L)	7	Feet
Depths to:		
water level (DTW)	146.82	Feet
top of screen (TOS)	202.5	Feet
Base of Aquifer (DTB)	250	Feet
Annular Fill:		
across screen --	Fine Sand	
above screen --	Bentonite	
Aquifer Material --	Fine Sand	



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	7	Feet
D =	103.18	Feet
H =	62.68	Feet
L/r_w =	28.00	
$y_{0\text{-DISPLACEMENT}}$ =	2.49	Feet
$y_{0\text{-SLUG}}$ =	2.19	Feet
From look-up table using L/r_w		
Partial penetrate A =	2.446	
B =	0.403	
ln(Re/rw) =	2.780	
Re =	4.03	Feet
Slope =	0.017334	$\log_{10}$/sec
$t_{90\%}$ recovery =	58	sec

Input is consistent.

K =	4.75	Feet/Day

REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

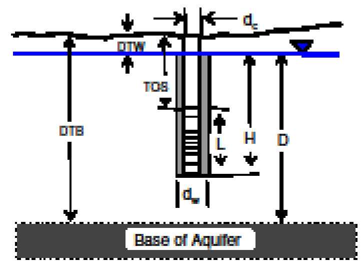
Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E7D Mech 3

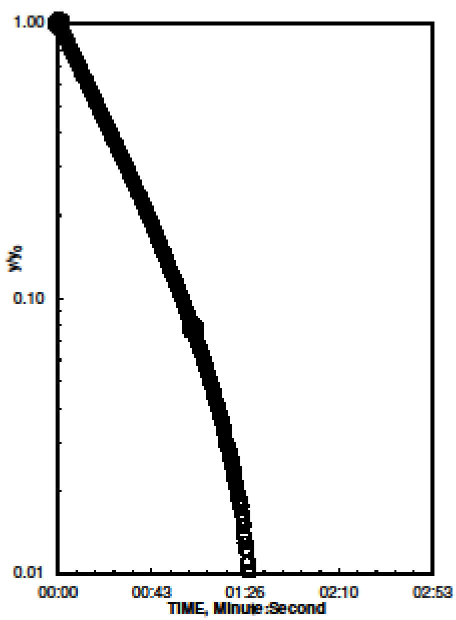
Local ID: E6D
Date: 9/16/2013
Time: 12:02

INPUT

Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch
Screen Length (L)	7 Feet
Depths to:	
water level (DTW)	146.82 Feet
top of screen (TOS)	202.5 Feet
Base of Aquifer (DTB)	250 Feet
Annular Fill:	
across screen --	Fine Sand
above screen --	Bentonite
Aquifer Material --	Fine Sand



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	7 Feet
D =	103.18 Feet
H =	62.68 Feet
L/r_w =	28.00
$y_{0\text{-DISPLACEMENT}}$ =	2.54 Feet
$y_{0\text{-SLUG}}$ =	2.19 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.446
B =	0.403
ln(Re/rw) =	2.780
Re =	4.03 Feet
Slope =	0.017927 $\log_{10}$/sec
$t_{90\%}$ recovery =	56 sec

Input is consistent.

K =	4.91 Feet/Day

REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

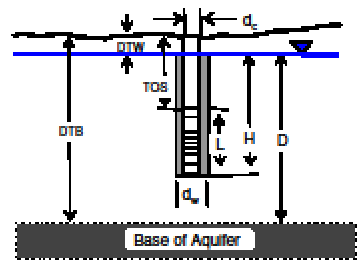
Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E7D Nitro 1

Local ID: E7D
Date: 8/19/2013
Time: 12:32

INPUT

Construction:		
Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	6	Inch
Screen Length (L)	7	Feet
Depths to:		
water level (DTW)	146.82	Feet
top of screen (TOS)	202.5	Feet
Base of Aquifer (DTB)	250	Feet
Annular Fill:		
across screen --	Medium Sand	
above screen --	Bentonite	
Aquifer Material --	Fine Sand	



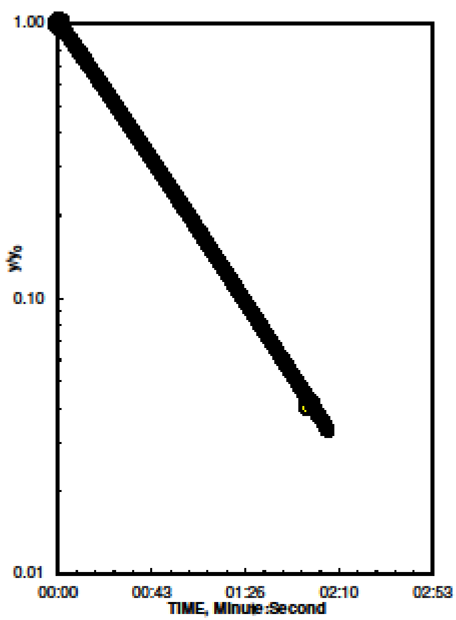
COMPUTED

L_{wetted}	7	Feet
D =	103.18	Feet
H =	62.68	Feet
L/r_w =	28.00	
$y_{0\text{-DISPLACEMENT}}$ =	18.05	Feet
$y_{0\text{-SLUG}}$ =	18.05	Feet
From look-up table using L/r_w		
Partial penetrate A =	2.446	
B =	0.403	
ln(Re/rw) =	2.780	
Re =	4.03	Feet
Slope =	0.012011	$\log_{10}$/sec
$t_{90\%}$ recovery =	83	sec

Input is consistent.

K =	3.29	Feet/Day

Adjust slope of line to estimate K



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

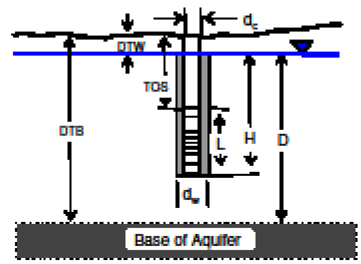
Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: E7D Nitro 2

Local ID: E7D
Date: 8/19/2013
Time: 12:45

INPUT

Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch
Screen Length (L)	7 Feet
Depths to:	
water level (DTW)	146.82 Feet
top of screen (TOS)	202.5 Feet
Base of Aquifer (DTB)	250 Feet
Annular Fill:	
across screen --	Medium Sand
above screen --	Bentonite
Aquifer Material --	Fine Sand



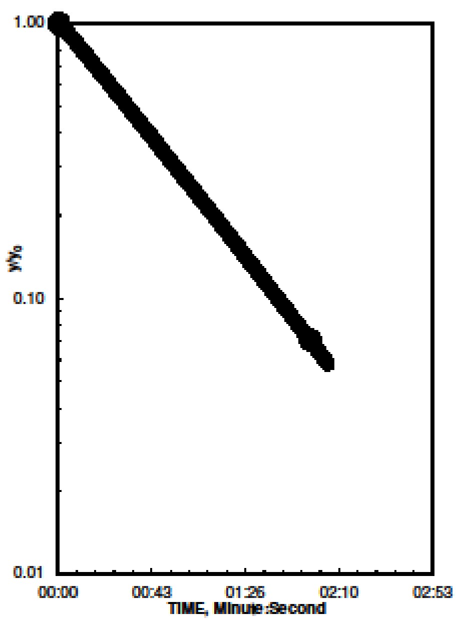
Adjust slope of line to estimate K

COMPUTED

L_{wetted}	7 Feet
D =	103.18 Feet
H =	62.68 Feet
L/r_w =	28.00
$y_{0\text{-DISPLACEMENT}}$ =	20.47 Feet
$y_{0\text{-SLUG}}$ =	20.47 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.446
B =	0.403
ln(Re/rw) =	2.780
Re =	4.03 Feet
Slope =	0.00992 $\log_{10}$/sec
$t_{90\%}$ recovery =	101 sec

Input is consistent.

K = 2.72 Feet/Day



K= 2.72 is less than likely minimum of 3 for Fine Sand

REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: NE1D Mech 1

Local ID: NE1D
Date: 9/17/2013
Time: 15:15

INPUT

Construction:

Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	6	Inch
Screen Length (L)	5	Feet

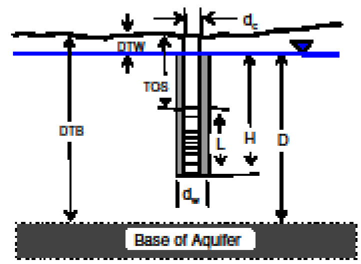
Depths to:

water level (DTW)	158.25	Feet
top of screen (TOS)	211	Feet
Base of Aquifer (DTB)	250	Feet

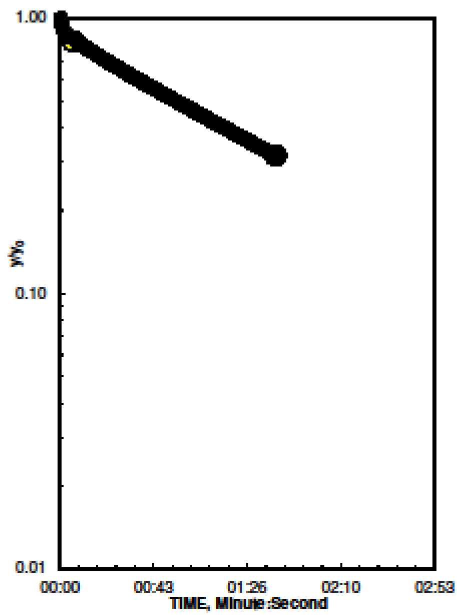
Annular Fill:

across screen -- Fine Sand
above screen -- Bentonite

Aquifer Material -- Fine Sand



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	5	Feet
D =	91.75	Feet
H =	57.75	Feet
L/r_w =	20.00	
$y_{0\text{-DISPLACEMENT}}$ =	2.91	Feet
$y_{0\text{-SLUG}}$ =	2.19	Feet

From look-up table using L/r_w

Partial penetrate A =	2.202	
B =	0.345	
ln(Re/rw) =	2.519	
Re =	3.10	Feet
Slope =	0.004447	$\log_{10}$/sec
$t_{90\%}$ recovery =	225	sec

Input is consistent.

K =	1.55	Feet/Day

K= 1.55 is less than likely minimum of 3 for Fine Sand

REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

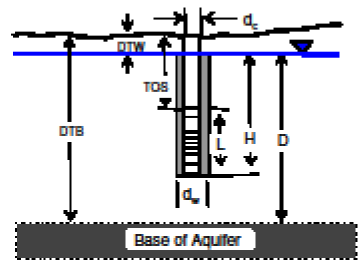
Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: NE1D Mech 2

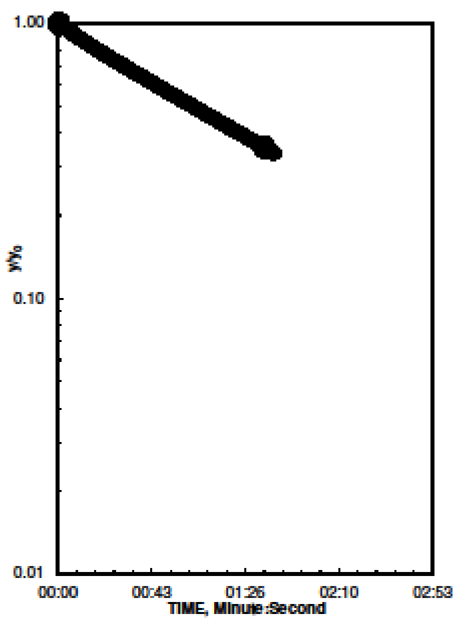
Local ID: NE1D
Date: 9/17/2013
Time: 15:37

INPUT

Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch
Screen Length (L)	5 Feet
Depths to:	
water level (DTW)	158.25 Feet
top of screen (TOS)	211 Feet
Base of Aquifer (DTB)	250 Feet
Annular Fill:	
across screen --	Fine Sand
above screen --	Bentonite
Aquifer Material --	Fine Sand



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	5 Feet
D =	91.75 Feet
H =	57.75 Feet
L/r_w =	20.00
$y_{0\text{-DISPLACEMENT}}$ =	2.54 Feet
$y_{0\text{-SLUG}}$ =	2.19 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.202
B =	0.345
ln(Re/rw) =	2.519
Re =	3.10 Feet
Slope =	0.004754 $\log_{10}$/sec
$t_{90\%}$ recovery =	210 sec

Input is consistent.

K =	1.65 Feet/Day

K= 1.65 is less than likely minimum of 3 for Fine Sand

REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

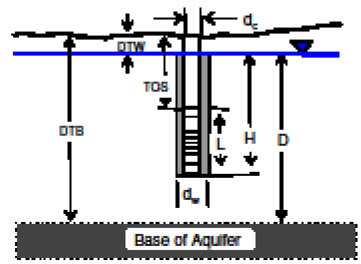
Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: NE1D Mech 3

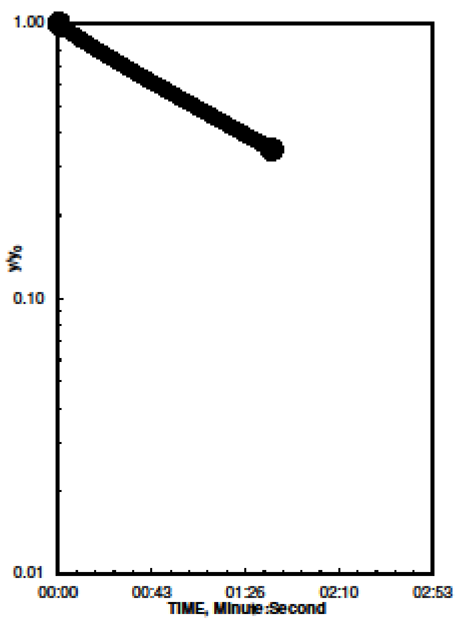
Local ID: NE1D
Date: 9/17/2013
Time: 15:57

INPUT

Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch
Screen Length (L)	5 Feet
Depths to:	
water level (DTW)	158.25 Feet
top of screen (TOS)	211 Feet
Base of Aquifer (DTB)	250 Feet
Annular Fill:	
across screen --	Fine Sand
above screen --	Bentonite
Aquifer Material --	Fine Sand



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	5 Feet
D =	91.75 Feet
H =	57.75 Feet
L/r_w =	20.00
$y_{0\text{-DISPLACEMENT}}$ =	2.56 Feet
$y_{0\text{-SLUG}}$ =	2.19 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.202
B =	0.345
ln(Re/rw) =	2.519
Re =	3.10 Feet
Slope =	0.004681 $\log_{10}$/sec
$t_{90\%}$ recovery =	214 sec

Input is consistent.

K = 1.63 Feet/Day

K= 1.63 is less than likely minimum of 3 for Fine Sand

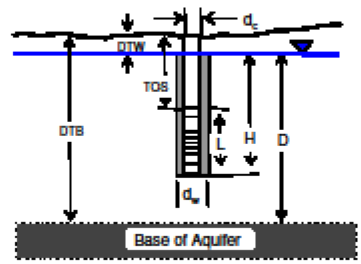
REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

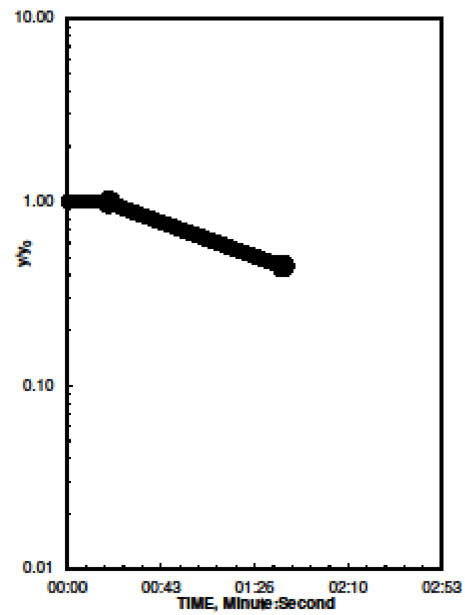
Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: NE1D Nitro 1

Local ID: E4S
Date: 9/16/2013
Time: 14:09



Adjust slope of line to estimate K



INPUT

Construction:		
Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	6	Inch
Screen Length (L)	8	Feet
Depths to:		
water level (DTW)	158.25	Feet
top of screen (TOS)	211	Feet
Base of Aquifer (DTB)	250	Feet
Annular Fill:		
across screen --	Fine Sand	
above screen --	Bentonite	
Aquifer Material --	Fine Sand	

COMPUTED

L_{wetted}	8	Feet
D =	91.75	Feet
H =	60.75	Feet
L/r_w =	32.00	
$y_{0\text{-DISPLACEMENT}}$ =	13.60	Feet
$y_{0\text{-SLUG}}$ =	13.60	Feet
From look-up table using L/r_w		
Partial penetrate A =	2.587	
B =	0.424	
ln(Re/rw) =	2.898	
Re =	4.54	Feet
Slope =	0.00434	$\log_{10}$/sec
$t_{90\%}$ recovery =	230	sec

Input is consistent.

K =	1.08 Feet/Day

K= 1.08 is less than likely minimum of 3 for Fine Sand

REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: NE1D Nitro 2

Local ID: E4S
Date: 9/16/2013
Time: 14:31

INPUT

Construction:

Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	6	Inch
Screen Length (L)	8	Feet

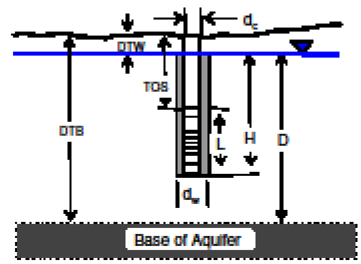
Depths to:

water level (DTW)	158.25	Feet
top of screen (TOS)	211	Feet
Base of Aquifer (DTB)	250	Feet

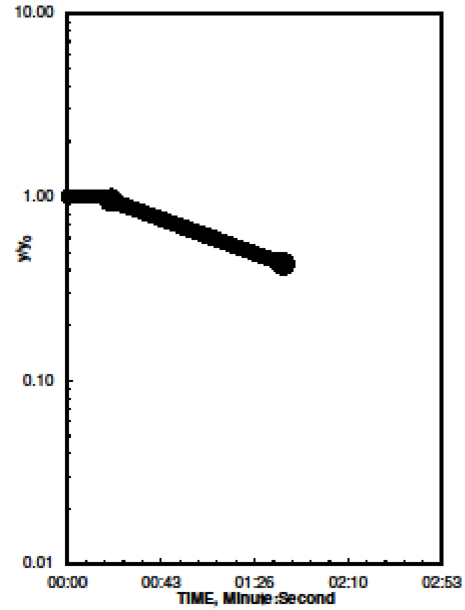
Annular Fill:

across screen -- Fine Sand
above screen -- Bentonite

Aquifer Material -- Fine Sand



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	8	Feet
D =	91.75	Feet
H =	60.75	Feet
L/r_w =	32.00	
$y_{0\text{-DISPLACEMENT}}$ =	10.90	Feet
$y_{0\text{-SLUG}}$ =	10.90	Feet

From look-up table using L/r_w

Partial penetrate A =	2.587	
B =	0.424	
ln(Re/rw) =	2.898	
Re =	4.54	Feet
Slope =	0.004331	$\log_{10}$/sec
$t_{90\%}$ recovery =	231	sec

Input is consistent.

K = 1.08 Feet/Day

K= 1.08 is less than likely minimum of 3 for Fine Sand

REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: NE1D Nitro 3

Local ID: E4S
Date: 9/16/2013
Time: 14:49

INPUT

Construction:

Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	6	Inch
Screen Length (L)	8	Feet

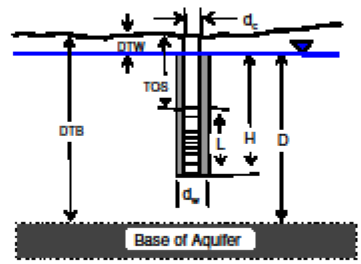
Depths to:

water level (DTW)	158.25	Feet
top of screen (TOS)	211	Feet
Base of Aquifer (DTB)	250	Feet

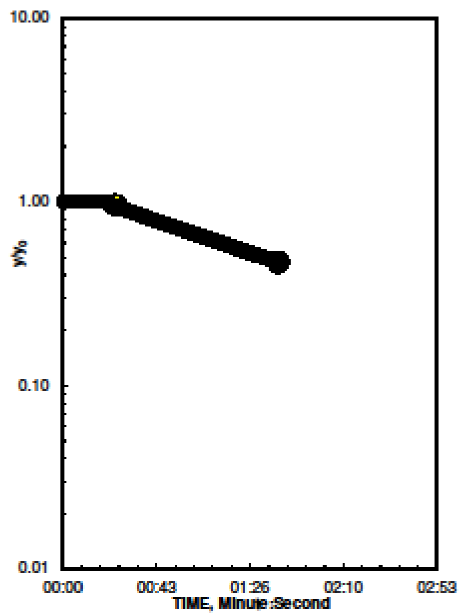
Annular Fill:

across screen -- Fine Sand
above screen -- Bentonite

Aquifer Material -- Fine Sand



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	8	Feet
D =	91.75	Feet
H =	60.75	Feet
L/r_w =	32.00	
$y_{0\text{-DISPLACEMENT}}$ =	13.10	Feet
$y_{0\text{-SLUG}}$ =	13.10	Feet

From look-up table using L/r_w

Partial penetrate A =	2.587	
B =	0.424	
ln(Re/rw) =	2.898	
Re =	4.54	Feet
Slope =	0.004136	$\log_{10}$/sec
$t_{90\%}$ recovery =	242	sec

Input is consistent.

K = 1.03 Feet/Day

K= 1.03 is less than likely minimum of 3 for Fine Sand

REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

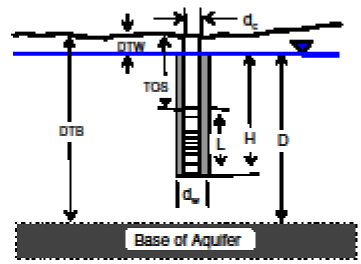
Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: S11D Mech 1

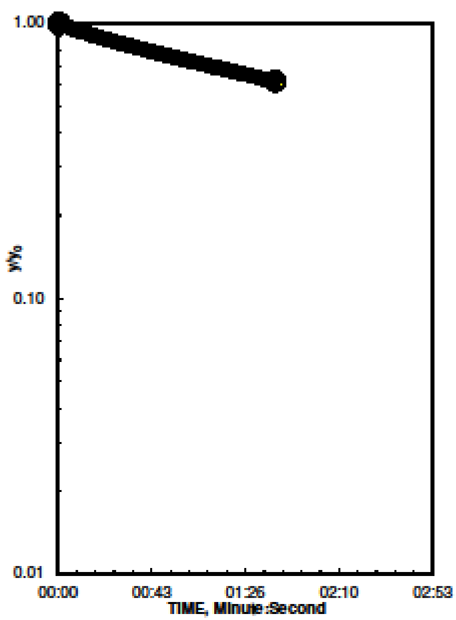
Local ID: S11D
Date: 9/17/2013
Time: 15:28

INPUT

Construction:		
Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	6	Inch
Screen Length (L)	11	Feet
Depths to:		
water level (DTW)	147.12	Feet
top of screen (TOS)	198	Feet
Base of Aquifer (DTB)	250	Feet
Annular Fill:		
across screen --	Fine Sand	
above screen --	Bentonite	
Aquifer Material --	Fine Sand	



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	11	Feet
D =	102.88	Feet
H =	61.88	Feet
L/r_w =	44.00	
$y_{0\text{-DISPLACEMENT}}$ =	2.35	Feet
$y_{0\text{-SLUG}}$ =	2.19	Feet
From look-up table using L/r_w		
Partial penetrate A =	2.947	
B =	0.475	
ln(Re/rw) =	3.110	
Re =	5.60	Feet
Slope =	0.002108	$\log_{10}$/sec
$t_{90\%}$ recovery =	474	sec

Input is consistent.

K =	0.411	Feet/Day

K= 0.411 is less than likely minimum of 3 for Fine Sand

REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: S11D Mech 2

Local ID: S11D
Date: 9/17/2013
Time: 16:08

INPUT

Construction:

Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	6	Inch
Screen Length (L)	11	Feet

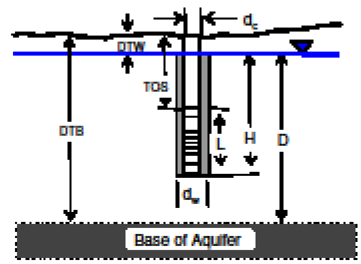
Depths to:

water level (DTW)	147.12	Feet
top of screen (TOS)	198	Feet
Base of Aquifer (DTB)	250	Feet

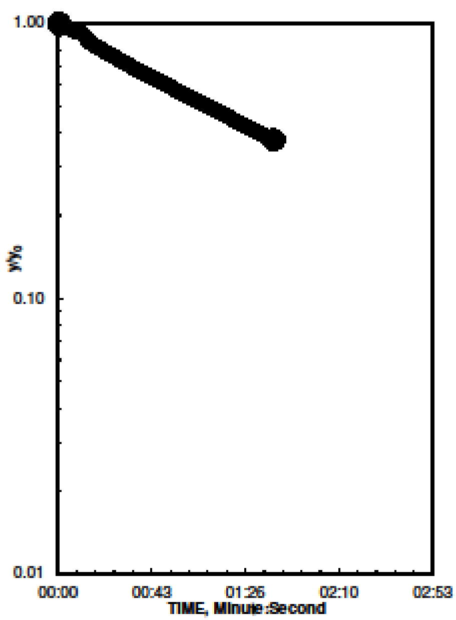
Annular Fill:

across screen -- Fine Sand
above screen -- Bentonite

Aquifer Material -- Fine Sand



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	11	Feet
D =	102.88	Feet
H =	61.88	Feet
L/r_w =	44.00	
$y_{0\text{-DISPLACEMENT}}$ =	2.14	Feet
$y_{0\text{-SLUG}}$ =	2.19	Feet

From look-up table using L/r_w

Partial penetrate A =	2.947	
B =	0.475	
ln(Re/rw) =	3.110	
Re =	5.60	Feet
Slope =	0.004279	$\log_{10}$/sec
$t_{90\%}$ recovery =	234	sec

Input is consistent.

K = 0.835 Feet/Day

K= 0.835 is less than likely minimum of 3 for Fine Sand

REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

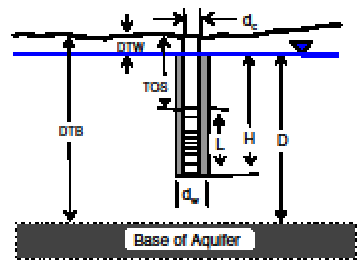
Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: S11D Nitro 1

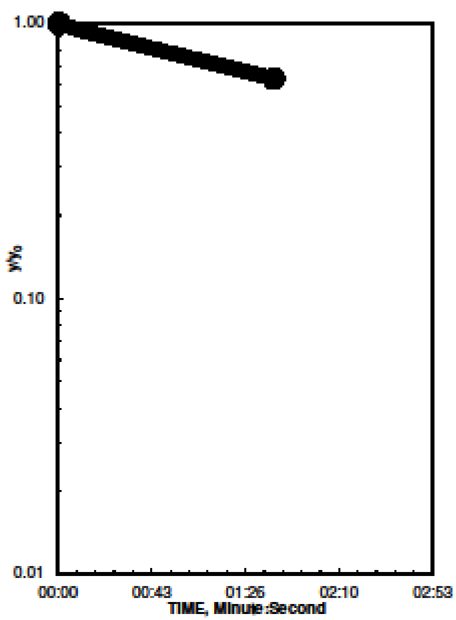
Local ID: S11D
Date: 9/16/2013
Time: 14:01

INPUT

Construction:		
Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	6	Inch
Screen Length (L)	11	Feet
Depths to:		
water level (DTW)	147.12	Feet
top of screen (TOS)	198	Feet
Base of Aquifer (DTB)	250	Feet
Annular Fill:		
across screen --	Fine Sand	
above screen --	Bentonite	
Aquifer Material --	Fine Sand	



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	11	Feet
D =	102.88	Feet
H =	61.88	Feet
L/r_w =	44.00	
$y_{0\text{-DISPLACEMENT}}$ =	14.67	Feet
$y_{0\text{-SLUG}}$ =	14.67	Feet
From look-up table using L/r_w		
Partial penetrate A =	2.947	
B =	0.475	
ln(Re/rw) =	3.110	
Re =	5.60	Feet
Slope =	0.002034	$\log_{10}$/sec
$t_{90\%}$ recovery =	492	sec

Input is consistent.

K = 0.397 Feet/Day

K= 0.397 is less than likely minimum of 3 for Fine Sand

REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: S11D Nitro 2

Local ID: E4S
Date: 9/16/2013
Time: 14:26

INPUT

Construction:

Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch
Screen Length (L)	11 Feet

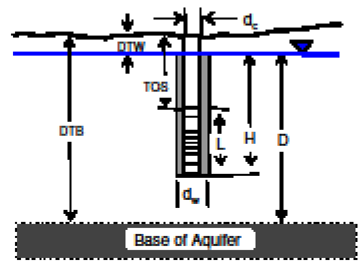
Depths to:

water level (DTW)	147.12 Feet
top of screen (TOS)	198 Feet
Base of Aquifer (DTB)	250 Feet

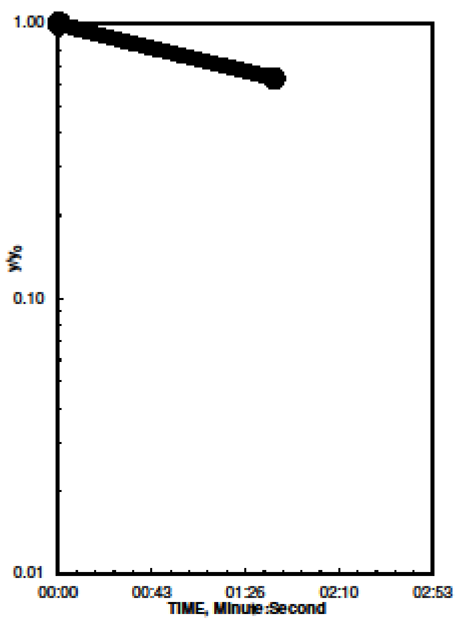
Annular Fill:

across screen -- Fine Sand
above screen -- Bentonite

Aquifer Material -- Fine Sand



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	11 Feet
D =	102.88 Feet
H =	61.88 Feet
L/r_w =	44.00
$y_{0\text{-DISPLACEMENT}}$ =	14.85 Feet
$y_{0\text{-SLUG}}$ =	14.85 Feet

From look-up table using L/r_w

Partial penetrate A =	2.947
B =	0.475
ln(Re/rw) =	3.110
Re =	5.60 Feet
Slope =	0.002013 $\log_{10}$/sec
$t_{90\%}$ recovery =	497 sec

Input is consistent.

K = 0.393 Feet/Day

K= 0.393 is less than likely minimum of 3 for Fine Sand

REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

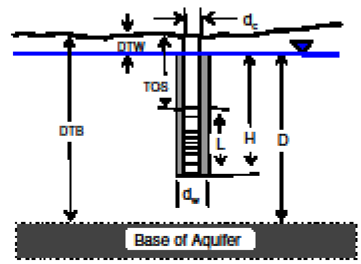
Aquifer is a silty, fine SAND in the Puget Lowland.

WELL ID: S11D Nitro 3

Local ID: E4S
Date: 9/16/2013
Time: 14:57

INPUT

Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch
Screen Length (L)	11 Feet
Depths to:	
water level (DTW)	147.12 Feet
top of screen (TOS)	198 Feet
Base of Aquifer (DTB)	250 Feet
Annular Fill:	
across screen --	Fine Sand
above screen --	Bentonite
Aquifer Material --	Fine Sand



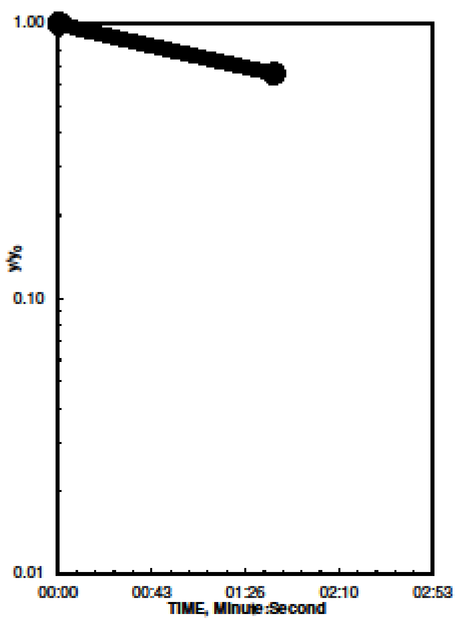
COMPUTED

L_{wetted}	11 Feet
D =	102.88 Feet
H =	61.88 Feet
L/r_w =	44.00
$y_{0\text{-DISPLACEMENT}}$ =	15.57 Feet
$y_{0\text{-SLUG}}$ =	15.57 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.947
B =	0.475
ln(Re/rw) =	3.110
Re =	5.60 Feet
Slope =	0.001849 $\log_{10}$/sec
$t_{90\%}$ recovery =	541 sec

Input is consistent.

K = 0.361 Feet/Day

Adjust slope of line to estimate K



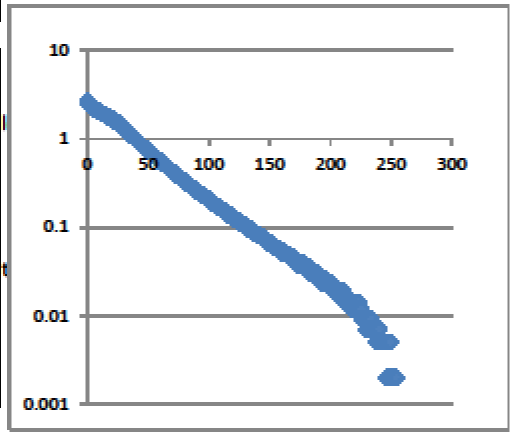
K= 0.361 is less than likely minimum of 3 for Fine Sand

REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

Aquifer is a silty, fine SAND in the Puget Lowland.

Hvorslev (1951) Method

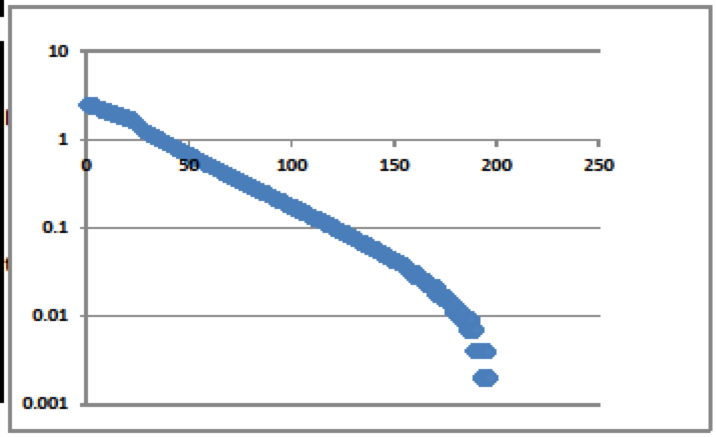
Monitoring Well ID	E4D	Test 1
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	6	ft
Static Water Level - H	47.277	ft
Min Water Level - Ho	44.608	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	39.6	s
Hydraulic Conductivity	4.64432E-05	ft/sec
	4.01269423	**ft/day**
	1.42E-03	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/14/2013 10:02:04.7	44.608	0	2.669	1
8/14/2013 10:02:04.8	44.617	0.1	2.66	0.996628
8/14/2013 10:02:04.9	44.624	0.2	2.653	0.994005
8/14/2013 10:02:05.0	44.648	0.3	2.629	0.985013
8/14/2013 10:02:05.1	44.659	0.4	2.618	0.980892
8/14/2013 10:02:05.2	44.68	0.5	2.597	0.973024
8/14/2013 10:02:05.3	44.69	0.6	2.587	0.969277
8/14/2013 10:02:05.4	44.706	0.7	2.571	0.963282
8/14/2013 10:02:05.5	44.713	0.8	2.564	0.960659
8/14/2013 10:02:05.6	44.723	0.9	2.554	0.956913
8/14/2013 10:02:05.7	44.727	1	2.55	0.955414
8/14/2013 10:02:05.8	44.734	1.1	2.543	0.952791
8/14/2013 10:02:05.9	44.739	1.2	2.538	0.950918
8/14/2013 10:02:06.0	44.751	1.3	2.526	0.946422
8/14/2013 10:02:06.1	44.765	1.4	2.512	0.941176
8/14/2013 10:02:06.2	44.772	1.5	2.505	0.938554
8/14/2013 10:02:06.3	44.772	1.6	2.505	0.938554
8/14/2013 10:02:06.4	44.769	1.7	2.508	0.939678
8/14/2013 10:02:06.5	44.769	1.8	2.508	0.939678
8/14/2013 10:02:06.6	44.772	1.9	2.505	0.938554
8/14/2013 10:02:06.7	44.783	2	2.494	0.934432
8/14/2013 10:02:06.8	44.8	2.1	2.477	0.928063
8/14/2013 10:02:06.9	44.816	2.2	2.461	0.922068
8/14/2013 10:02:07.0	44.84	2.3	2.437	0.913076
8/14/2013 10:02:07.1	44.851	2.4	2.426	0.908955
8/14/2013 10:02:07.2	44.875	2.5	2.402	0.899963
8/14/2013 10:02:07.3	44.884	2.6	2.393	0.89659
8/14/2013 10:02:07.4	44.903	2.7	2.374	0.889472
8/14/2013 10:02:07.5	44.91	2.8	2.367	0.886849

Monitoring Well ID	E4D	Test 2

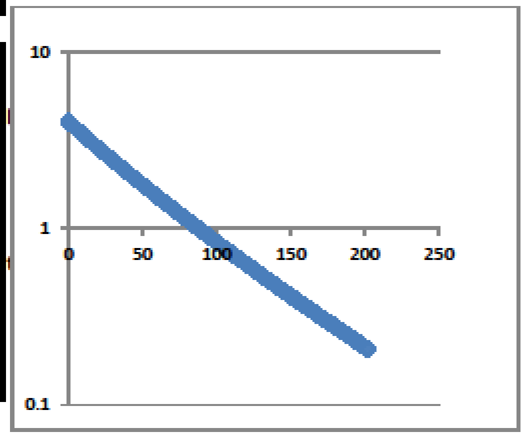
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	6	ft
Static Water Level - H	47.312	ft
Min Water Level - Ho	44.826	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	38.8	s
Hydraulic Conductivity	4.74008E-05	ft/sec
	4.095430194	**ft/day**
	1.44E-03	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/14/2013 10:31:00.9	44.826	0	2.486	1
8/14/2013 10:31:01.0	44.828	0.1	2.484	0.999195
8/14/2013 10:31:01.1	44.828	0.2	2.484	0.999195
8/14/2013 10:31:01.2	44.833	0.3	2.479	0.997184
8/14/2013 10:31:01.3	44.835	0.4	2.477	0.99638
8/14/2013 10:31:01.4	44.837	0.5	2.475	0.995575
8/14/2013 10:31:01.5	44.84	0.6	2.472	0.994368
8/14/2013 10:31:01.6	44.844	0.7	2.468	0.992759
8/14/2013 10:31:01.7	44.847	0.8	2.465	0.991553
8/14/2013 10:31:01.8	44.851	0.9	2.461	0.989944
8/14/2013 10:31:01.9	44.851	1	2.461	0.989944
8/14/2013 10:31:02.0	44.856	1.1	2.456	0.987932
8/14/2013 10:31:02.1	44.858	1.2	2.454	0.987128
8/14/2013 10:31:02.2	44.865	1.3	2.447	0.984312
8/14/2013 10:31:02.3	44.87	1.4	2.442	0.982301
8/14/2013 10:31:02.4	44.882	1.5	2.43	0.977474
8/14/2013 10:31:02.5	44.886	1.6	2.426	0.975865
8/14/2013 10:31:02.6	44.893	1.7	2.419	0.973049
8/14/2013 10:31:02.7	44.896	1.8	2.416	0.971842
8/14/2013 10:31:02.8	44.898	1.9	2.414	0.971038
8/14/2013 10:31:02.9	44.898	2	2.414	0.971038
8/14/2013 10:31:03.0	44.9	2.1	2.412	0.970233
8/14/2013 10:31:03.1	44.901	2.2	2.411	0.969831
8/14/2013 10:31:03.2	44.903	2.3	2.409	0.969027
8/14/2013 10:31:03.3	44.905	2.4	2.407	0.968222
8/14/2013 10:31:03.4	44.908	2.5	2.404	0.967015
8/14/2013 10:31:03.5	44.905	2.6	2.407	0.968222
8/14/2013 10:31:03.6	44.905	2.7	2.407	0.968222
8/14/2013 10:31:03.7	44.908	2.8	2.404	0.967015
8/14/2013 10:31:03.8	44.905	2.9	2.407	0.968222
8/14/2013 10:31:03.9	44.903	3	2.409	0.969027
8/14/2013 10:31:04.0	44.905	3.1	2.407	0.968222
8/14/2013 10:31:04.1	44.905	3.2	2.407	0.968222
8/14/2013 10:31:04.2	44.908	3.3	2.404	0.967015
8/14/2013 10:31:04.3	44.91	3.4	2.402	0.966211
8/14/2013 10:31:04.4	44.912	3.5	2.4	0.965406
8/14/2013 10:31:04.5	44.915	3.6	2.397	0.9642
8/14/2013 10:31:04.6	44.922	3.7	2.39	0.961384
8/14/2013 10:31:04.7	44.922	3.8	2.39	0.961384
8/14/2013 10:31:04.8	44.924	3.9	2.388	0.960579
8/14/2013 10:31:04.9	44.929	4	2.383	0.958568
8/14/2013 10:31:05.0	44.929	4.1	2.383	0.958568
8/14/2013 10:31:05.1	44.931	4.2	2.381	0.957763
8/14/2013 10:31:05.2	44.933	4.3	2.379	0.956959
8/14/2013 10:31:05.3	44.936	4.4	2.376	0.955752

Monitoring Well ID	E4D	Nitro 2

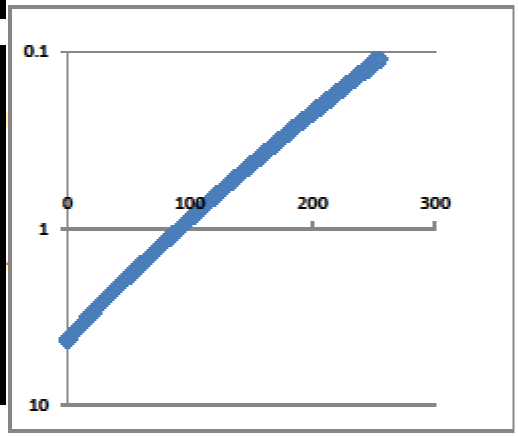
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	6	ft
Static Water Level - H	54.943	ft
Min Water Level - Ho	50.881	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	60.3	s
Hydraulic Conductivity	3.05E-05	ft/sec
	2.635202181	**ft/day**
	9.29E-04	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/15/2013 11:00:40.3	50.881	0	4.062	1
8/15/2013 11:00:40.4	50.925	0.1	4.018	0.989168
8/15/2013 11:00:40.5	50.946	0.2	3.997	0.983998
8/15/2013 11:00:40.6	50.97	0.3	3.973	0.97809
8/15/2013 11:00:40.7	50.953	0.4	3.99	0.982275
8/15/2013 11:00:40.8	50.925	0.5	4.018	0.989168
8/15/2013 11:00:40.9	50.918	0.6	4.025	0.990891
8/15/2013 11:00:41.0	50.951	0.7	3.992	0.982767
8/15/2013 11:00:41.1	50.972	0.8	3.971	0.977597
8/15/2013 11:00:41.2	50.995	0.9	3.948	0.971935
8/15/2013 11:00:41.3	50.986	1	3.957	0.974151
8/15/2013 11:00:41.4	50.97	1.1	3.973	0.97809
8/15/2013 11:00:41.5	50.967	1.2	3.976	0.978828
8/15/2013 11:00:41.6	50.993	1.3	3.95	0.972427
8/15/2013 11:00:41.7	51.009	1.4	3.934	0.968488
8/15/2013 11:00:41.8	51.028	1.5	3.915	0.963811
8/15/2013 11:00:41.9	51.026	1.6	3.917	0.964303
8/15/2013 11:00:42.0	51.016	1.7	3.927	0.966765
8/15/2013 11:00:42.1	51.016	1.8	3.927	0.966765
8/15/2013 11:00:42.2	51.037	1.9	3.906	0.961595
8/15/2013 11:00:42.3	51.049	2	3.894	0.958641
8/15/2013 11:00:42.4	51.068	2.1	3.875	0.953964
8/15/2013 11:00:42.5	51.068	2.2	3.875	0.953964
8/15/2013 11:00:42.6	51.063	2.3	3.88	0.955194
8/15/2013 11:00:42.7	51.066	2.4	3.877	0.954456
8/15/2013 11:00:42.8	51.08	2.5	3.863	0.951009
8/15/2013 11:00:42.9	51.091	2.6	3.852	0.948301
8/15/2013 11:00:43.0	51.108	2.7	3.835	0.944116
8/15/2013 11:00:43.1	51.11	2.8	3.833	0.943624

Monitoring Well ID	E4D	Nitro 2

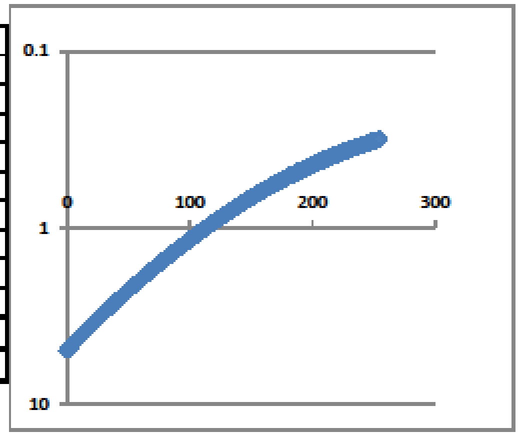
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	6	ft
Static Water Level - H	54.922	ft
Min Water Level - Ho	50.604	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	60.2	s
Hydraulic Conductivity	3.05507E-05	ft/sec
	2.639579593	**ft/day**
	9.31E-04	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/15/2013 11:18:03.1	50.604	0	4.318	1
8/15/2013 11:18:03.2	50.635	0.1	4.287	0.992821
8/15/2013 11:18:03.3	50.682	0.2	4.24	0.981936
8/15/2013 11:18:03.4	50.689	0.3	4.233	0.980315
8/15/2013 11:18:03.5	50.654	0.4	4.268	0.988421
8/15/2013 11:18:03.6	50.64	0.5	4.282	0.991663
8/15/2013 11:18:03.7	50.644	0.6	4.278	0.990736
8/15/2013 11:18:03.8	50.665	0.7	4.257	0.985873
8/15/2013 11:18:03.9	50.705	0.8	4.217	0.97661
8/15/2013 11:18:04.0	50.712	0.9	4.21	0.974988
8/15/2013 11:18:04.1	50.696	1	4.226	0.978694
8/15/2013 11:18:04.2	50.686	1.1	4.236	0.98101
8/15/2013 11:18:04.3	50.693	1.2	4.229	0.979389
8/15/2013 11:18:04.4	50.712	1.3	4.21	0.974988
8/15/2013 11:18:04.5	50.743	1.4	4.179	0.967809
8/15/2013 11:18:04.6	50.752	1.5	4.17	0.965725
8/15/2013 11:18:04.7	50.743	1.6	4.179	0.967809
8/15/2013 11:18:04.8	50.738	1.7	4.184	0.968967
8/15/2013 11:18:04.9	50.745	1.8	4.177	0.967346
8/15/2013 11:18:05.0	50.759	1.9	4.163	0.964104
8/15/2013 11:18:05.1	50.785	2	4.137	0.958082
8/15/2013 11:18:05.2	50.792	2.1	4.13	0.956461
8/15/2013 11:18:05.3	50.789	2.2	4.133	0.957156
8/15/2013 11:18:05.4	50.789	2.3	4.133	0.957156
8/15/2013 11:18:05.5	50.796	2.4	4.126	0.955535
8/15/2013 11:18:05.6	50.806	2.5	4.116	0.953219
8/15/2013 11:18:05.7	50.829	2.6	4.093	0.947893
8/15/2013 11:18:05.8	50.834	2.7	4.088	0.946735
8/15/2013 11:18:05.9	50.836	2.8	4.086	0.946271

Monitoring Well ID	E4D	Nitro 3

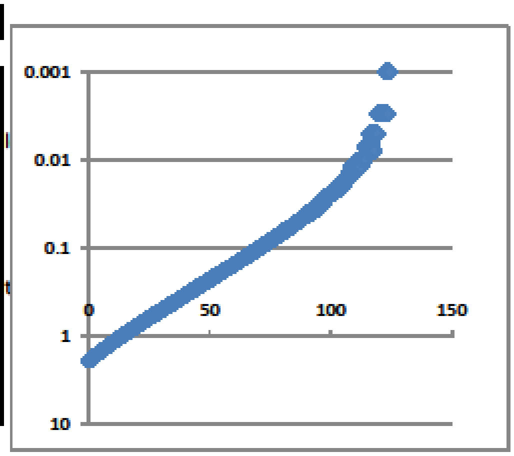
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	6	ft
Static Water Level - H	55.11	ft
Min Water Level - Ho	50.174	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	65.2	s
Hydraulic Conductivity	2.82078E-05	ft/sec
	2.437157845	**ft/day**
	8.60E-04	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/15/2013 11:41:19.7	50.174	0	4.936	1
8/15/2013 11:41:19.8	50.174	0.1	4.936	1
8/15/2013 11:41:19.9	50.206	0.2	4.904	0.993517
8/15/2013 11:41:20.0	50.246	0.3	4.864	0.985413
8/15/2013 11:41:20.1	50.253	0.4	4.857	0.983995
8/15/2013 11:41:20.2	50.22	0.5	4.89	0.990681
8/15/2013 11:41:20.3	50.211	0.6	4.899	0.992504
8/15/2013 11:41:20.4	50.216	0.7	4.894	0.991491
8/15/2013 11:41:20.5	50.239	0.8	4.871	0.986831
8/15/2013 11:41:20.6	50.277	0.9	4.833	0.979133
8/15/2013 11:41:20.7	50.284	1	4.826	0.977715
8/15/2013 11:41:20.8	50.27	1.1	4.84	0.980551
8/15/2013 11:41:20.9	50.263	1.2	4.847	0.981969
8/15/2013 11:41:21.0	50.27	1.3	4.84	0.980551
8/15/2013 11:41:21.1	50.288	1.4	4.822	0.976904
8/15/2013 11:41:21.2	50.319	1.5	4.791	0.970624
8/15/2013 11:41:21.3	50.328	1.6	4.782	0.968801
8/15/2013 11:41:21.4	50.321	1.7	4.789	0.970219
8/15/2013 11:41:21.5	50.319	1.8	4.791	0.970624
8/15/2013 11:41:21.6	50.326	1.9	4.784	0.969206
8/15/2013 11:41:21.7	50.338	2	4.772	0.966775
8/15/2013 11:41:21.8	50.363	2.1	4.747	0.96171
8/15/2013 11:41:21.9	50.373	2.2	4.737	0.959684
8/15/2013 11:41:22.0	50.373	2.3	4.737	0.959684
8/15/2013 11:41:22.1	50.37	2.4	4.74	0.960292
8/15/2013 11:41:22.2	50.38	2.5	4.73	0.958266
8/15/2013 11:41:22.3	50.391	2.6	4.719	0.956037
8/15/2013 11:41:22.4	50.412	2.7	4.698	0.951783
8/15/2013 11:41:22.5	50.42	2.8	4.69	0.950162

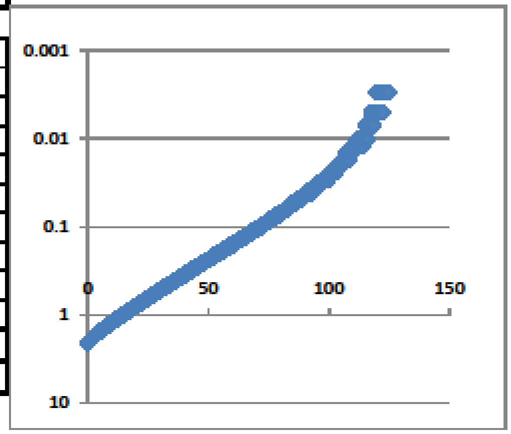
Monitoring Well ID	E4S	Mech 1

Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	7	ft
Static Water Level - H	42.358	ft
Min Water Level - Ho	40.484	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	22.2	s
Hydraulic Conductivity	7.4454E-05	ft/sec
	6.43282724	**ft/day**
	2.27E-03	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/14/2013 14:02:24.7	40.484	0	1.874	1
8/14/2013 14:02:24.8	40.489	0.1	1.869	0.997332
8/14/2013 14:02:24.9	40.494	0.2	1.864	0.994664
8/14/2013 14:02:25.0	40.498	0.3	1.86	0.992529
8/14/2013 14:02:25.1	40.501	0.4	1.857	0.990928
8/14/2013 14:02:25.2	40.51	0.5	1.848	0.986126
8/14/2013 14:02:25.3	40.515	0.6	1.843	0.983458
8/14/2013 14:02:25.4	40.526	0.7	1.832	0.977588
8/14/2013 14:02:25.5	40.533	0.8	1.825	0.973853
8/14/2013 14:02:25.6	40.545	0.9	1.813	0.967449
8/14/2013 14:02:25.7	40.55	1	1.808	0.964781
8/14/2013 14:02:25.8	40.559	1.1	1.799	0.959979
8/14/2013 14:02:25.9	40.564	1.2	1.794	0.957311
8/14/2013 14:02:26.0	40.576	1.3	1.782	0.950907
8/14/2013 14:02:26.1	40.58	1.4	1.778	0.948773
8/14/2013 14:02:26.2	40.594	1.5	1.764	0.941302
8/14/2013 14:02:26.3	40.601	1.6	1.757	0.937567
8/14/2013 14:02:26.4	40.615	1.7	1.743	0.930096
8/14/2013 14:02:26.5	40.62	1.8	1.738	0.927428
8/14/2013 14:02:26.6	40.632	1.9	1.726	0.921025
8/14/2013 14:02:26.7	40.639	2	1.719	0.917289
8/14/2013 14:02:26.8	40.653	2.1	1.705	0.909819
8/14/2013 14:02:26.9	40.658	2.2	1.7	0.90715
8/14/2013 14:02:27.0	40.669	2.3	1.689	0.901281
8/14/2013 14:02:27.1	40.674	2.4	1.684	0.898613
8/14/2013 14:02:27.2	40.686	2.5	1.672	0.892209
8/14/2013 14:02:27.3	40.69	2.6	1.668	0.890075
8/14/2013 14:02:27.4	40.702	2.7	1.656	0.883671
8/14/2013 14:02:27.5	40.704	2.8	1.654	0.882604

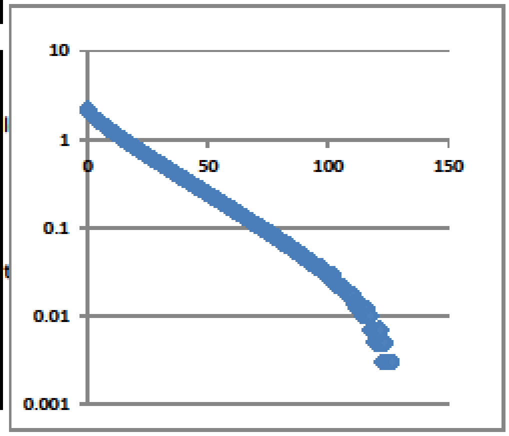
Monitoring Well ID	E4S	Mech 1
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	7	ft
Static Water Level - H	42.358	ft
Min Water Level - Ho	40.285	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	20.6	s
Hydraulic Conductivity	8.02369E-05	ft/sec
	6.932464307	**ft/day**
	2.45E-03	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/14/2013 14:28:52.3	40.285	0	2.073	1
8/14/2013 14:28:52.4	40.302	0.1	2.056	0.991799
8/14/2013 14:28:52.5	40.311	0.2	2.047	0.987458
8/14/2013 14:28:52.6	40.344	0.3	2.014	0.971539
8/14/2013 14:28:52.7	40.356	0.4	2.002	0.96575
8/14/2013 14:28:52.8	40.379	0.5	1.979	0.954655
8/14/2013 14:28:52.9	40.391	0.6	1.967	0.948866
8/14/2013 14:28:53.0	40.407	0.7	1.951	0.941148
8/14/2013 14:28:53.1	40.416	0.8	1.942	0.936807
8/14/2013 14:28:53.2	40.435	0.9	1.923	0.927641
8/14/2013 14:28:53.3	40.442	1	1.916	0.924264
8/14/2013 14:28:53.4	40.452	1.1	1.906	0.91944
8/14/2013 14:28:53.5	40.459	1.2	1.899	0.916064
8/14/2013 14:28:53.6	40.473	1.3	1.885	0.90931
8/14/2013 14:28:53.7	40.48	1.4	1.878	0.905933
8/14/2013 14:28:53.8	40.496	1.5	1.862	0.898215
8/14/2013 14:28:53.9	40.503	1.6	1.855	0.894838
8/14/2013 14:28:54.0	40.519	1.7	1.839	0.88712
8/14/2013 14:28:54.1	40.527	1.8	1.831	0.883261
8/14/2013 14:28:54.2	40.543	1.9	1.815	0.875543
8/14/2013 14:28:54.3	40.55	2	1.808	0.872166
8/14/2013 14:28:54.4	40.566	2.1	1.792	0.864448
8/14/2013 14:28:54.5	40.573	2.2	1.785	0.861071
8/14/2013 14:28:54.6	40.585	2.3	1.773	0.855282
8/14/2013 14:28:54.7	40.592	2.4	1.766	0.851905
8/14/2013 14:28:54.8	40.606	2.5	1.752	0.845152
8/14/2013 14:28:54.9	40.613	2.6	1.745	0.841775
8/14/2013 14:28:55.0	40.627	2.7	1.731	0.835022
8/14/2013 14:28:55.1	40.632	2.8	1.726	0.83261

Monitoring Well ID	E4S	Mech 1

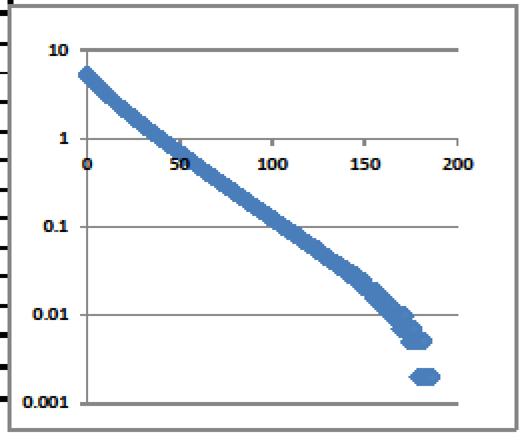
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	7	ft
Static Water Level - H	42.358	ft
Min Water Level - Ho	40.154	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	19.6	s
Hydraulic Conductivity	8.43306E-05	ft/sec
	7.286161465	**ft/day**
	2.57E-03	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/14/2013 14:55:43.4	40.154	0	2.204	1
8/14/2013 14:55:43.5	40.157	0.1	2.201	0.998639
8/14/2013 14:55:43.6	40.187	0.2	2.171	0.985027
8/14/2013 14:55:43.7	40.213	0.3	2.145	0.97323
8/14/2013 14:55:43.8	40.262	0.4	2.096	0.950998
8/14/2013 14:55:43.9	40.281	0.5	2.077	0.942377
8/14/2013 14:55:44.0	40.313	0.6	2.045	0.927858
8/14/2013 14:55:44.1	40.33	0.7	2.028	0.920145
8/14/2013 14:55:44.2	40.358	0.8	2	0.907441
8/14/2013 14:55:44.3	40.372	0.9	1.986	0.901089
8/14/2013 14:55:44.4	40.393	1	1.965	0.891561
8/14/2013 14:55:44.5	40.405	1.1	1.953	0.886116
8/14/2013 14:55:44.6	40.421	1.2	1.937	0.878857
8/14/2013 14:55:44.7	40.428	1.3	1.93	0.875681
8/14/2013 14:55:44.8	40.442	1.4	1.916	0.869328
8/14/2013 14:55:44.9	40.452	1.5	1.906	0.864791
8/14/2013 14:55:45.0	40.47	1.6	1.888	0.856624
8/14/2013 14:55:45.1	40.477	1.7	1.881	0.853448
8/14/2013 14:55:45.2	40.496	1.8	1.862	0.844828
8/14/2013 14:55:45.3	40.503	1.9	1.855	0.841652
8/14/2013 14:55:45.4	40.519	2	1.839	0.834392
8/14/2013 14:55:45.5	40.527	2.1	1.831	0.830762
8/14/2013 14:55:45.6	40.541	2.2	1.817	0.82441
8/14/2013 14:55:45.7	40.548	2.3	1.81	0.821234
8/14/2013 14:55:45.8	40.562	2.4	1.796	0.814882
8/14/2013 14:55:45.9	40.569	2.5	1.789	0.811706
8/14/2013 14:55:46.0	40.583	2.6	1.775	0.805354
8/14/2013 14:55:46.1	40.59	2.7	1.768	0.802178
8/14/2013 14:55:46.2	40.601	2.8	1.757	0.797187

Monitoring Well ID	E4S	Nitro 1

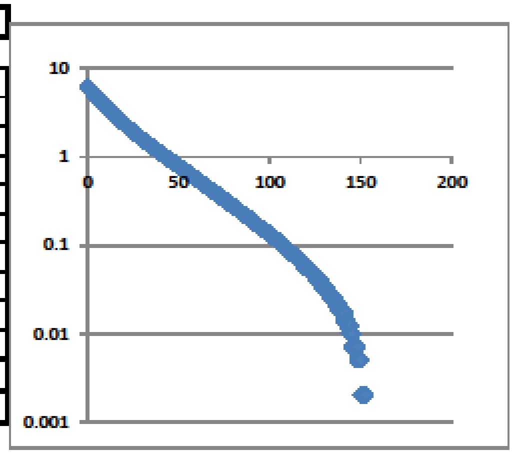
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	7	ft
Static Water Level - H	43.395	ft
Min Water Level - Ho	38.131	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	22.1	s
Hydraulic Conductivity	7.47909E-05	ft/sec
	6.461935055	**ft/day**
	2.28E-03	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/15/2013 12:27:21.7	38.131	0	5.264	1
8/15/2013 12:27:21.8	38.143	0.1	5.252	0.99772
8/15/2013 12:27:21.9	38.267	0.2	5.128	0.974164
8/15/2013 12:27:22.0	38.29	0.3	5.105	0.969795
8/15/2013 12:27:22.1	38.227	0.4	5.168	0.981763
8/15/2013 12:27:22.2	38.169	0.5	5.226	0.992781
8/15/2013 12:27:22.3	38.152	0.6	5.243	0.996011
8/15/2013 12:27:22.4	38.199	0.7	5.196	0.987082
8/15/2013 12:27:22.5	38.307	0.8	5.088	0.966565
8/15/2013 12:27:22.6	38.325	0.9	5.07	0.963146
8/15/2013 12:27:22.7	38.283	1	5.112	0.971125
8/15/2013 12:27:22.8	38.265	1.1	5.13	0.974544
8/15/2013 12:27:22.9	38.297	1.2	5.098	0.968465
8/15/2013 12:27:23.0	38.349	1.3	5.046	0.958587
8/15/2013 12:27:23.1	38.426	1.4	4.969	0.943959
8/15/2013 12:27:23.2	38.435	1.5	4.96	0.942249
8/15/2013 12:27:23.3	38.412	1.6	4.983	0.946619
8/15/2013 12:27:23.4	38.412	1.7	4.983	0.946619
8/15/2013 12:27:23.5	38.466	1.8	4.929	0.93636
8/15/2013 12:27:23.6	38.508	1.9	4.887	0.928381
8/15/2013 12:27:23.7	38.56	2	4.835	0.918503
8/15/2013 12:27:23.8	38.564	2.1	4.831	0.917743
8/15/2013 12:27:23.9	38.56	2.2	4.835	0.918503
8/15/2013 12:27:24.0	38.571	2.3	4.824	0.916413
8/15/2013 12:27:24.1	38.632	2.4	4.763	0.904825
8/15/2013 12:27:24.2	38.663	2.5	4.732	0.898936
8/15/2013 12:27:24.3	38.698	2.6	4.697	0.892287
8/15/2013 12:27:24.4	38.7	2.7	4.695	0.891907
8/15/2013 12:27:24.5	38.712	2.8	4.683	0.889628

Monitoring Well ID	E4S	Nitro 3

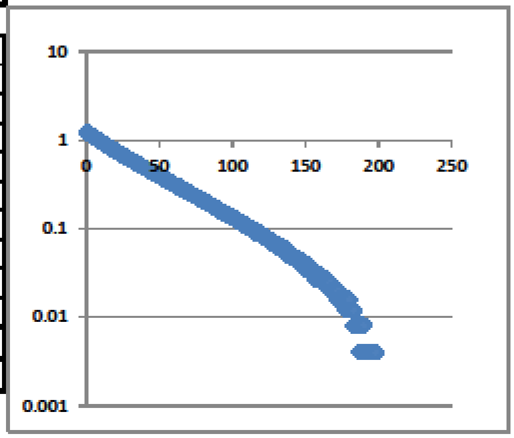
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	7	ft
Static Water Level - H	43.374	ft
Min Water Level - Ho	37.197	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	20.8	s
Hydraulic Conductivity	7.94653E-05	ft/sec
	6.865805996	**ft/day**
	2.42E-03	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/15/2013 13:02:50.8	37.197	0	6.177	1
8/15/2013 13:02:50.9	37.246	0.1	6.128	0.992067
8/15/2013 13:02:51.0	37.312	0.2	6.062	0.981383
8/15/2013 13:02:51.1	37.387	0.3	5.987	0.969241
8/15/2013 13:02:51.2	37.384	0.4	5.99	0.969726
8/15/2013 13:02:51.3	37.337	0.5	6.037	0.977335
8/15/2013 13:02:51.4	37.34	0.6	6.034	0.97685
8/15/2013 13:02:51.5	37.417	0.7	5.957	0.964384
8/15/2013 13:02:51.6	37.471	0.8	5.903	0.955642
8/15/2013 13:02:51.7	37.525	0.9	5.849	0.9469
8/15/2013 13:02:51.8	37.522	1	5.852	0.947385
8/15/2013 13:02:51.9	37.511	1.1	5.863	0.949166
8/15/2013 13:02:52.0	37.529	1.2	5.845	0.946252
8/15/2013 13:02:52.1	37.609	1.3	5.765	0.933301
8/15/2013 13:02:52.2	37.649	1.4	5.725	0.926825
8/15/2013 13:02:52.3	37.684	1.5	5.69	0.921159
8/15/2013 13:02:52.4	37.684	1.6	5.69	0.921159
8/15/2013 13:02:52.5	37.698	1.7	5.676	0.918893
8/15/2013 13:02:52.6	37.724	1.8	5.65	0.914684
8/15/2013 13:02:52.7	37.794	1.9	5.58	0.903351
8/15/2013 13:02:52.8	37.824	2	5.55	0.898494
8/15/2013 13:02:52.9	37.85	2.1	5.524	0.894285
8/15/2013 13:02:53.0	37.852	2.2	5.522	0.893961
8/15/2013 13:02:53.1	37.881	2.3	5.493	0.889267
8/15/2013 13:02:53.2	37.909	2.4	5.465	0.884734
8/15/2013 13:02:53.3	37.97	2.5	5.404	0.874858
8/15/2013 13:02:53.4	37.991	2.6	5.383	0.871459
8/15/2013 13:02:53.5	38.014	2.7	5.36	0.867735
8/15/2013 13:02:53.6	38.023	2.8	5.351	0.866278

Monitoring Well ID	E5D	Mech 1

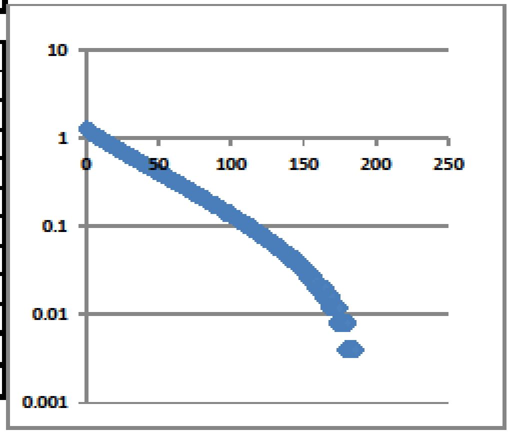
Casing Diamter - d	4	in
Borehole Diameter - D	8	in
Screen Length - L	8	ft
Static Water Level - H	54.798	ft
Min Water Level - Ho	53.558	ft
Casing Radius - r	0.166666667	ft
Borehole Radius - R	0.333333333	ft
Basic Time Lag - To	43.125	s
Hydraulic Conductivity	0.000127941	ft/sec
	11.05410028	**ft/day**
	3.90E-03	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/5/2013 11:45:46.125	53.558	0	1.24	1
8/5/2013 11:45:46.250	53.562	0.125	1.236	0.996774
8/5/2013 11:45:46.375	53.562	0.250	1.236	0.996774
8/5/2013 11:45:46.500	53.57	0.375	1.228	0.990323
8/5/2013 11:45:46.625	53.574	0.500	1.224	0.987097
8/5/2013 11:45:46.750	53.574	0.625	1.224	0.987097
8/5/2013 11:45:46.875	53.578	0.750	1.22	0.983871
8/5/2013 11:45:47.000	53.578	0.875	1.22	0.983871
8/5/2013 11:45:47.125	53.582	1.000	1.216	0.980645
8/5/2013 11:45:47.250	53.586	1.125	1.212	0.977419
8/5/2013 11:45:47.375	53.589	1.250	1.209	0.975
8/5/2013 11:45:47.500	53.593	1.375	1.205	0.971774
8/5/2013 11:45:47.625	53.601	1.500	1.197	0.965323
8/5/2013 11:45:47.750	53.601	1.625	1.197	0.965323
8/5/2013 11:45:47.875	53.609	1.750	1.189	0.958871
8/5/2013 11:45:48.000	53.613	1.875	1.185	0.955645
8/5/2013 11:45:48.125	53.613	2.000	1.185	0.955645
8/5/2013 11:45:48.250	53.621	2.125	1.177	0.949194
8/5/2013 11:45:48.375	53.624	2.250	1.174	0.946774
8/5/2013 11:45:48.500	53.628	2.375	1.17	0.943548
8/5/2013 11:45:48.625	53.632	2.500	1.166	0.940323
8/5/2013 11:45:48.750	53.636	2.625	1.162	0.937097
8/5/2013 11:45:48.875	53.64	2.750	1.158	0.933871
8/5/2013 11:45:49.000	53.64	2.875	1.158	0.933871
8/5/2013 11:45:49.125	53.644	3.000	1.154	0.930645
8/5/2013 11:45:49.250	53.644	3.125	1.154	0.930645
8/5/2013 11:45:49.375	53.648	3.250	1.15	0.927419
8/5/2013 11:45:49.500	53.652	3.375	1.146	0.924194
8/5/2013 11:45:49.625	53.656	3.500	1.142	0.920968

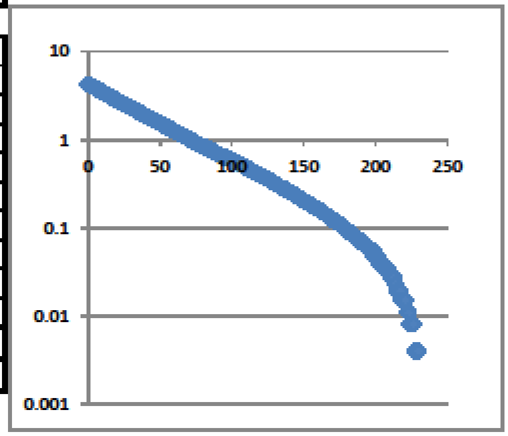
Monitoring Well ID	E5D	Mech 2

Casing Diamter - d	4	in
Borehole Diameter - D	8	in
Screen Length - L	8	ft
Static Water Level - H	54.798	ft
Min Water Level - Ho	53.539	ft
Casing Radius - r	0.166666667	ft
Borehole Radius - R	0.333333333	ft
Basic Time Lag - To	44	s
Hydraulic Conductivity	0.000125397	ft/sec
	10.83427442	**ft/day**
	3.82E-03	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/5/2013 11:53:57.375	53.539	0	1.259	1
8/5/2013 11:53:57.500	53.543	0.125	1.255	0.996823
8/5/2013 11:53:57.625	53.543	0.250	1.255	0.996823
8/5/2013 11:53:57.750	53.547	0.375	1.251	0.993646
8/5/2013 11:53:57.875	53.547	0.500	1.251	0.993646
8/5/2013 11:53:58.000	53.55	0.625	1.248	0.991263
8/5/2013 11:53:58.125	53.554	0.750	1.244	0.988086
8/5/2013 11:53:58.250	53.554	0.875	1.244	0.988086
8/5/2013 11:53:58.375	53.558	1.000	1.24	0.984909
8/5/2013 11:53:58.500	53.566	1.125	1.232	0.978554
8/5/2013 11:53:58.625	53.57	1.250	1.228	0.975377
8/5/2013 11:53:58.750	53.574	1.375	1.224	0.9722
8/5/2013 11:53:58.875	53.578	1.500	1.22	0.969023
8/5/2013 11:53:59.000	53.578	1.625	1.22	0.969023
8/5/2013 11:53:59.125	53.586	1.750	1.212	0.962669
8/5/2013 11:53:59.250	53.589	1.875	1.209	0.960286
8/5/2013 11:53:59.375	53.593	2.000	1.205	0.957109
8/5/2013 11:53:59.500	53.597	2.125	1.201	0.953932
8/5/2013 11:53:59.625	53.601	2.250	1.197	0.950755
8/5/2013 11:53:59.750	53.605	2.375	1.193	0.947577
8/5/2013 11:53:59.875	53.613	2.500	1.185	0.941223
8/5/2013 11:54:00.000	53.613	2.625	1.185	0.941223
8/5/2013 11:54:00.125	53.617	2.750	1.181	0.938046
8/5/2013 11:54:00.250	53.621	2.875	1.177	0.934869
8/5/2013 11:54:00.375	53.621	3.000	1.177	0.934869
8/5/2013 11:54:00.500	53.628	3.125	1.17	0.929309
8/5/2013 11:54:00.625	53.632	3.250	1.166	0.926132
8/5/2013 11:54:00.750	53.636	3.375	1.162	0.922955
8/5/2013 11:54:00.875	53.64	3.500	1.158	0.919778

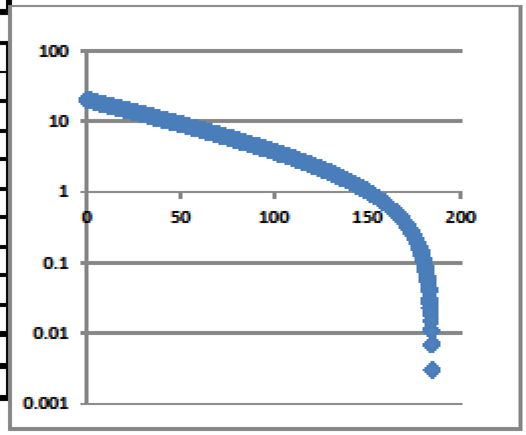
Monitoring Well ID	E5D	Nitro 1
Casing Diamter - d	4	in
Borehole Diameter - D	8	in
Screen Length - L	8	ft
Static Water Level - H	49.192	ft
Min Water Level - Ho	44.924	ft
Casing Radius - r	0.166666667	ft
Borehole Radius - R	0.333333333	ft
Basic Time Lag - To	48	s
Hydraulic Conductivity	0.000114947	ft/sec
	9.93141822	**ft/day**
	3.50E-03	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/5/2013 15:03:16.000	44.924	0	4.268	1
8/5/2013 15:03:17.000	44.994	1.000	4.198	0.983599
8/5/2013 15:03:18.000	45.072	2.000	4.12	0.965323
8/5/2013 15:03:19.000	45.165	3.000	4.027	0.943533
8/5/2013 15:03:20.000	45.255	4.000	3.937	0.922446
8/5/2013 15:03:21.000	45.337	5.000	3.855	0.903233
8/5/2013 15:03:22.000	45.419	6.000	3.773	0.884021
8/5/2013 15:03:23.000	45.497	7.000	3.695	0.865745
8/5/2013 15:03:24.000	45.571	8.000	3.621	0.848407
8/5/2013 15:03:25.000	45.645	9.000	3.547	0.831068
8/5/2013 15:03:26.000	45.723	10.000	3.469	0.812793
8/5/2013 15:03:27.000	45.793	11.000	3.399	0.796392
8/5/2013 15:03:28.000	45.867	12.000	3.325	0.779053
8/5/2013 15:03:29.000	45.933	13.000	3.259	0.76359
8/5/2013 15:03:30.000	46.004	14.000	3.188	0.746954
8/5/2013 15:03:31.000	46.07	15.000	3.122	0.73149
8/5/2013 15:03:32.000	46.132	16.000	3.06	0.716963
8/5/2013 15:03:33.000	46.191	17.000	3.001	0.70314
8/5/2013 15:03:34.000	46.257	18.000	2.935	0.687676
8/5/2013 15:03:35.000	46.315	19.000	2.877	0.674086
8/5/2013 15:03:36.000	46.374	20.000	2.818	0.660262
8/5/2013 15:03:37.000	46.428	21.000	2.764	0.64761
8/5/2013 15:03:38.000	46.487	22.000	2.705	0.633786
8/5/2013 15:03:39.000	46.545	23.000	2.647	0.620197
8/5/2013 15:03:40.000	46.6	24.000	2.592	0.60731
8/5/2013 15:03:41.000	46.651	25.000	2.541	0.595361
8/5/2013 15:03:42.000	46.701	26.000	2.491	0.583646
8/5/2013 15:03:43.000	46.752	27.000	2.44	0.571696
8/5/2013 15:03:44.000	46.799	28.000	2.393	0.560684

Monitoring Well ID	E5D	Nitro 2

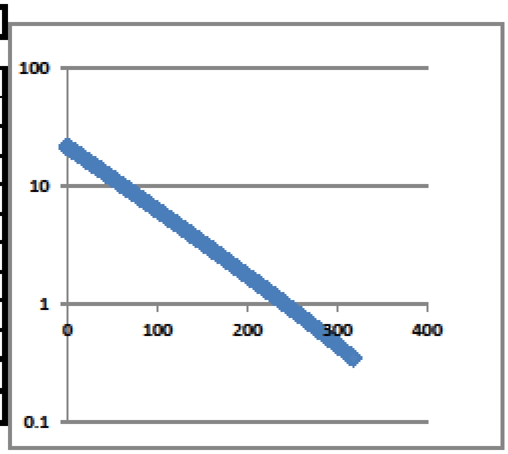
Casing Diamter - d	4	in
Borehole Diameter - D	8	in
Screen Length - L	8	ft
Static Water Level - H	47.656	ft
Min Water Level - Ho	27.515	ft
Casing Radius - r	0.166666667	ft
Borehole Radius - R	0.333333333	ft
Basic Time Lag - To	62.375	s
Hydraulic Conductivity	8.84562E-05	ft/sec
	7.642614422	**ft/day**
	2.70E-03	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/5/2013 15:55:24.125	27.515	0	20.141	1
8/5/2013 15:55:24.250	27.526	0.125	20.13	0.999454
8/5/2013 15:55:24.375	27.554	0.250	20.102	0.998064
8/5/2013 15:55:24.500	27.581	0.375	20.075	0.996723
8/5/2013 15:55:24.625	27.608	0.500	20.048	0.995383
8/5/2013 15:55:24.750	27.62	0.625	20.036	0.994787
8/5/2013 15:55:24.875	27.655	0.750	20.001	0.993049
8/5/2013 15:55:25.000	27.678	0.875	19.978	0.991907
8/5/2013 15:55:25.125	27.702	1.000	19.954	0.990715
8/5/2013 15:55:25.250	27.752	1.125	19.904	0.988233
8/5/2013 15:55:25.375	27.795	1.250	19.861	0.986098
8/5/2013 15:55:25.500	27.838	1.375	19.818	0.983963
8/5/2013 15:55:25.625	27.889	1.500	19.767	0.981431
8/5/2013 15:55:25.750	27.912	1.625	19.744	0.980289
8/5/2013 15:55:25.875	27.959	1.750	19.697	0.977955
8/5/2013 15:55:26.000	27.982	1.875	19.674	0.976813
8/5/2013 15:55:26.125	28.01	2.000	19.646	0.975423
8/5/2013 15:55:26.250	28.037	2.125	19.619	0.974083
8/5/2013 15:55:26.375	28.096	2.250	19.56	0.971153
8/5/2013 15:55:26.500	28.146	2.375	19.51	0.968671
8/5/2013 15:55:26.625	28.193	2.500	19.463	0.966337
8/5/2013 15:55:26.750	28.244	2.625	19.412	0.963805
8/5/2013 15:55:26.875	28.267	2.750	19.389	0.962663
8/5/2013 15:55:27.000	28.314	2.875	19.342	0.96033
8/5/2013 15:55:27.125	28.337	3.000	19.319	0.959188
8/5/2013 15:55:27.250	28.364	3.125	19.292	0.957847
8/5/2013 15:55:27.375	28.419	3.250	19.237	0.955116
8/5/2013 15:55:27.500	28.47	3.375	19.186	0.952584
8/5/2013 15:55:27.625	28.517	3.500	19.139	0.950251

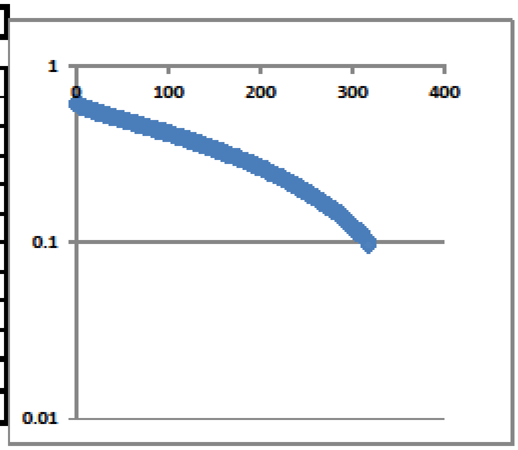
Monitoring Well ID	E5D	Nitro 3

Casing Diamter - d	4	in
Borehole Diameter - D	8	in
Screen Length - L	8	ft
Static Water Level - H	46.994	ft
Min Water Level - Ho	25.238	ft
Casing Radius - r	0.166666667	ft
Borehole Radius - R	0.333333333	ft
Basic Time Lag - To	79.875	s
Hydraulic Conductivity	6.90761E-05	ft/sec
	5.968176207	**ft/day**
	2.11E-03	cm/s



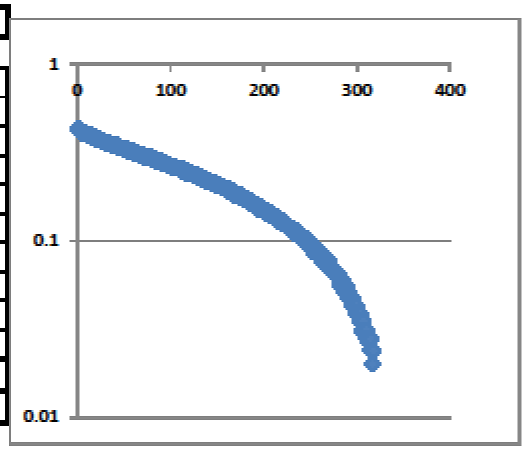
Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/5/2013 16:13:04.750	25.238	0	21.756	1
8/5/2013 16:13:04.875	25.262	0.125	21.732	0.998897
8/5/2013 16:13:05.000	25.41	0.250	21.584	0.992094
8/5/2013 16:13:05.125	25.441	0.375	21.553	0.990669
8/5/2013 16:13:05.250	25.394	0.500	21.6	0.99283
8/5/2013 16:13:05.375	25.332	0.625	21.662	0.995679
8/5/2013 16:13:05.500	25.402	0.750	21.592	0.992462
8/5/2013 16:13:05.625	25.542	0.875	21.452	0.986027
8/5/2013 16:13:05.750	25.597	1.000	21.397	0.983499
8/5/2013 16:13:05.875	25.581	1.125	21.413	0.984234
8/5/2013 16:13:06.000	25.554	1.250	21.44	0.985475
8/5/2013 16:13:06.125	25.585	1.375	21.409	0.98405
8/5/2013 16:13:06.250	25.647	1.500	21.347	0.981201
8/5/2013 16:13:06.375	25.729	1.625	21.265	0.977432
8/5/2013 16:13:06.500	25.722	1.750	21.272	0.977753
8/5/2013 16:13:06.625	25.706	1.875	21.288	0.978489
8/5/2013 16:13:06.750	25.764	2.000	21.23	0.975823
8/5/2013 16:13:06.875	25.815	2.125	21.179	0.973479
8/5/2013 16:13:07.000	25.901	2.250	21.093	0.969526
8/5/2013 16:13:07.125	25.901	2.375	21.093	0.969526
8/5/2013 16:13:07.250	25.897	2.500	21.097	0.96971
8/5/2013 16:13:07.375	25.924	2.625	21.07	0.968468
8/5/2013 16:13:07.500	26.01	2.750	20.984	0.964516
8/5/2013 16:13:07.625	26.072	2.875	20.922	0.961666
8/5/2013 16:13:07.750	26.08	3.000	20.914	0.961298
8/5/2013 16:13:07.875	26.084	3.125	20.91	0.961114
8/5/2013 16:13:08.000	26.1	3.250	20.894	0.960379
8/5/2013 16:13:08.125	26.143	3.375	20.851	0.958402
8/5/2013 16:13:08.250	26.178	3.500	20.816	0.956794

Monitoring Well ID	E6D	Mech 1
Casing Diamter - d	4	in
Borehole Diameter - D	8	in
Screen Length - L	8	ft
Static Water Level - H	37.086	ft
Min Water Level - Ho	36.474	ft
Casing Radius - r	0.166666667	ft
Borehole Radius - R	0.333333333	ft
Basic Time Lag - To	226.125	s
Hydraulic Conductivity	2.44E-05	ft/sec
	2.108161745	**ft/day**
	7.44E-04	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/7/2013 16:08:48.875	36.474	0	0.612	1
8/7/2013 16:08:49.000	36.478	0.125	0.608	0.993464
8/7/2013 16:08:49.125	36.478	0.250	0.608	0.993464
8/7/2013 16:08:49.250	36.478	0.375	0.608	0.993464
8/7/2013 16:08:49.375	36.478	0.500	0.608	0.993464
8/7/2013 16:08:49.500	36.478	0.625	0.608	0.993464
8/7/2013 16:08:49.625	36.478	0.750	0.608	0.993464
8/7/2013 16:08:49.750	36.478	0.875	0.608	0.993464
8/7/2013 16:08:49.875	36.478	1.000	0.608	0.993464
8/7/2013 16:08:50.000	36.482	1.125	0.604	0.986928
8/7/2013 16:08:50.125	36.482	1.250	0.604	0.986928
8/7/2013 16:08:50.250	36.482	1.375	0.604	0.986928
8/7/2013 16:08:50.375	36.482	1.500	0.604	0.986928
8/7/2013 16:08:50.500	36.482	1.625	0.604	0.986928
8/7/2013 16:08:50.625	36.482	1.750	0.604	0.986928
8/7/2013 16:08:50.750	36.482	1.875	0.604	0.986928
8/7/2013 16:08:50.875	36.486	2.000	0.6	0.980392
8/7/2013 16:08:51.000	36.486	2.125	0.6	0.980392
8/7/2013 16:08:51.125	36.486	2.250	0.6	0.980392
8/7/2013 16:08:51.250	36.486	2.375	0.6	0.980392
8/7/2013 16:08:51.375	36.486	2.500	0.6	0.980392
8/7/2013 16:08:51.500	36.486	2.625	0.6	0.980392
8/7/2013 16:08:51.625	36.486	2.750	0.6	0.980392
8/7/2013 16:08:51.750	36.486	2.875	0.6	0.980392
8/7/2013 16:08:51.875	36.49	3.000	0.596	0.973856
8/7/2013 16:08:52.000	36.49	3.125	0.596	0.973856
8/7/2013 16:08:52.125	36.49	3.250	0.596	0.973856
8/7/2013 16:08:52.250	36.49	3.375	0.596	0.973856
8/7/2013 16:08:52.375	36.49	3.500	0.596	0.973856

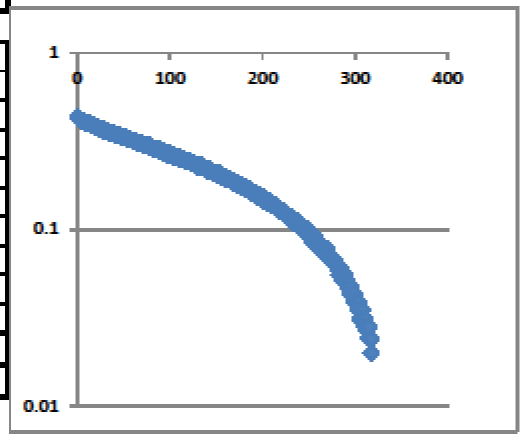
Monitoring Well ID	E6D	Mech 2
Casing Diamter - d	4	in
Borehole Diameter - D	8	in
Screen Length - L	8	ft
Static Water Level - H	37.683	ft
Min Water Level - Ho	37.254	ft
Casing Radius - r	0.166666667	ft
Borehole Radius - R	0.333333333	ft
Basic Time Lag - To	192.125	s
Hydraulic Conductivity	2.8718E-05	ft/sec
	2.481239165	**ft/day**
	8.75E-04	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/7/2013 16:21:08.000	37.254	0	0.429	1
8/7/2013 16:21:08.125	37.254	0.125	0.429	1
8/7/2013 16:21:08.250	37.254	0.250	0.429	1
8/7/2013 16:21:08.375	37.254	0.375	0.429	1
8/7/2013 16:21:08.500	37.254	0.500	0.429	1
8/7/2013 16:21:08.625	37.254	0.625	0.429	1
8/7/2013 16:21:08.750	37.254	0.750	0.429	1
8/7/2013 16:21:08.875	37.254	0.875	0.429	1
8/7/2013 16:21:09.000	37.254	1.000	0.429	1
8/7/2013 16:21:09.125	37.254	1.125	0.429	1
8/7/2013 16:21:09.250	37.254	1.250	0.429	1
8/7/2013 16:21:09.375	37.254	1.375	0.429	1
8/7/2013 16:21:09.500	37.258	1.500	0.425	0.990676
8/7/2013 16:21:09.625	37.258	1.625	0.425	0.990676
8/7/2013 16:21:09.750	37.258	1.750	0.425	0.990676
8/7/2013 16:21:09.875	37.262	1.875	0.421	0.981352
8/7/2013 16:21:10.000	37.262	2.000	0.421	0.981352
8/7/2013 16:21:10.125	37.262	2.125	0.421	0.981352
8/7/2013 16:21:10.250	37.262	2.250	0.421	0.981352
8/7/2013 16:21:10.375	37.262	2.375	0.421	0.981352
8/7/2013 16:21:10.500	37.266	2.500	0.417	0.972028
8/7/2013 16:21:10.625	37.266	2.625	0.417	0.972028
8/7/2013 16:21:10.750	37.266	2.750	0.417	0.972028
8/7/2013 16:21:10.875	37.266	2.875	0.417	0.972028
8/7/2013 16:21:11.000	37.266	3.000	0.417	0.972028
8/7/2013 16:21:11.125	37.27	3.125	0.413	0.962704
8/7/2013 16:21:11.250	37.27	3.250	0.413	0.962704
8/7/2013 16:21:11.375	37.27	3.375	0.413	0.962704
8/7/2013 16:21:11.500	37.27	3.500	0.413	0.962704

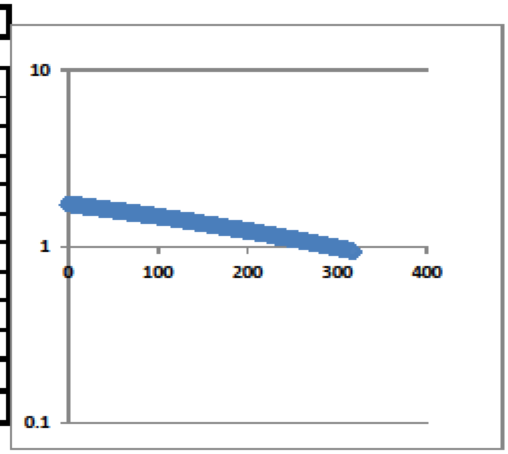
Monitoring Well ID	E6D	Nitro 2

Casing Diamter - d	4	in
Borehole Diameter - D	8	in
Screen Length - L	8	ft
Static Water Level - H	37.683	ft
Min Water Level - Ho	37.254	ft
Casing Radius - r	0.166666667	ft
Borehole Radius - R	0.333333333	ft
Basic Time Lag - To	192.125	s
Hydraulic Conductivity	2.8718E-05	ft/sec
	2.481239165	**ft/day**
	8.75E-04	cm/s



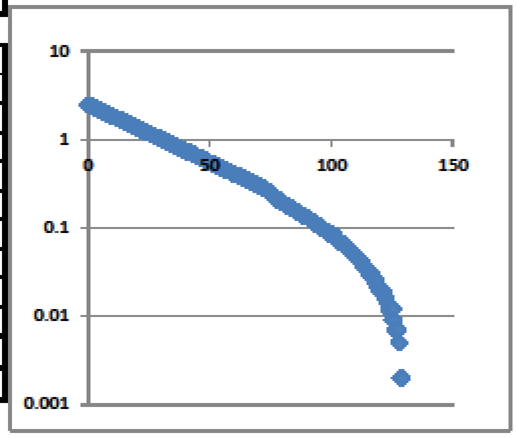
Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/7/2013 16:21:08.000	37.254	0	0.429	1
8/7/2013 16:21:08.125	37.254	0.125	0.429	1
8/7/2013 16:21:08.250	37.254	0.250	0.429	1
8/7/2013 16:21:08.375	37.254	0.375	0.429	1
8/7/2013 16:21:08.500	37.254	0.500	0.429	1
8/7/2013 16:21:08.625	37.254	0.625	0.429	1
8/7/2013 16:21:08.750	37.254	0.750	0.429	1
8/7/2013 16:21:08.875	37.254	0.875	0.429	1
8/7/2013 16:21:09.000	37.254	1.000	0.429	1
8/7/2013 16:21:09.125	37.254	1.125	0.429	1
8/7/2013 16:21:09.250	37.254	1.250	0.429	1
8/7/2013 16:21:09.375	37.254	1.375	0.429	1
8/7/2013 16:21:09.500	37.258	1.500	0.425	0.990676
8/7/2013 16:21:09.625	37.258	1.625	0.425	0.990676
8/7/2013 16:21:09.750	37.258	1.750	0.425	0.990676
8/7/2013 16:21:09.875	37.262	1.875	0.421	0.981352
8/7/2013 16:21:10.000	37.262	2.000	0.421	0.981352
8/7/2013 16:21:10.125	37.262	2.125	0.421	0.981352
8/7/2013 16:21:10.250	37.262	2.250	0.421	0.981352
8/7/2013 16:21:10.375	37.262	2.375	0.421	0.981352
8/7/2013 16:21:10.500	37.266	2.500	0.417	0.972028
8/7/2013 16:21:10.625	37.266	2.625	0.417	0.972028
8/7/2013 16:21:10.750	37.266	2.750	0.417	0.972028
8/7/2013 16:21:10.875	37.266	2.875	0.417	0.972028
8/7/2013 16:21:11.000	37.266	3.000	0.417	0.972028
8/7/2013 16:21:11.125	37.27	3.125	0.413	0.962704
8/7/2013 16:21:11.250	37.27	3.250	0.413	0.962704
8/7/2013 16:21:11.375	37.27	3.375	0.413	0.962704
8/7/2013 16:21:11.500	37.27	3.500	0.413	0.962704

Monitoring Well ID	E6D	Nitro 3
Casing Diamter - d	4	in
Borehole Diameter - D	8	in
Screen Length - L	8	ft
Static Water Level - H	37.492	ft
Min Water Level - Ho	35.749	ft
Casing Radius - r	0.166666667	ft
Borehole Radius - R	0.333333333	ft
Basic Time Lag - To	449.25	s
Hydraulic Conductivity	1.22815E-05	ft/sec
	1.06111981	**ft/day**
	3.74E-04	cm/s



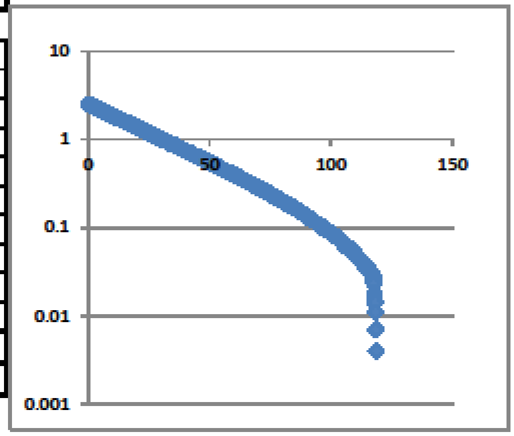
Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/7/2013 15:46:41.250	35.749	0	1.743	1
8/7/2013 15:46:41.375	35.749	0.125	1.743	1
8/7/2013 15:46:41.500	35.749	0.250	1.743	1
8/7/2013 15:46:41.625	35.749	0.375	1.743	1
8/7/2013 15:46:41.750	35.749	0.500	1.743	1
8/7/2013 15:46:41.875	35.749	0.625	1.743	1
8/7/2013 15:46:42.000	35.749	0.750	1.743	1
8/7/2013 15:46:42.125	35.749	0.875	1.743	1
8/7/2013 15:46:42.250	35.749	1.000	1.743	1
8/7/2013 15:46:42.375	35.749	1.125	1.743	1
8/7/2013 15:46:42.500	35.749	1.250	1.743	1
8/7/2013 15:46:42.625	35.749	1.375	1.743	1
8/7/2013 15:46:42.750	35.749	1.500	1.743	1
8/7/2013 15:46:42.875	35.753	1.625	1.739	0.997705
8/7/2013 15:46:43.000	35.753	1.750	1.739	0.997705
8/7/2013 15:46:43.125	35.753	1.875	1.739	0.997705
8/7/2013 15:46:43.250	35.753	2.000	1.739	0.997705
8/7/2013 15:46:43.375	35.753	2.125	1.739	0.997705
8/7/2013 15:46:43.500	35.753	2.250	1.739	0.997705
8/7/2013 15:46:43.625	35.753	2.375	1.739	0.997705
8/7/2013 15:46:43.750	35.753	2.500	1.739	0.997705
8/7/2013 15:46:43.875	35.753	2.625	1.739	0.997705
8/7/2013 15:46:44.000	35.757	2.750	1.735	0.99541
8/7/2013 15:46:44.125	35.757	2.875	1.735	0.99541
8/7/2013 15:46:44.250	35.757	3.000	1.735	0.99541
8/7/2013 15:46:44.375	35.757	3.125	1.735	0.99541
8/7/2013 15:46:44.500	35.757	3.250	1.735	0.99541
8/7/2013 15:46:44.625	35.757	3.375	1.735	0.99541
8/7/2013 15:46:44.750	35.757	3.500	1.735	0.99541

Monitoring Well ID	E7D	Mech 1
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	7	ft
Static Water Level - H	46.412	ft
Min Water Level - Ho	43.954	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	33.875	s
Hydraulic Conductivity	4.87935E-05	ft/sec
	4.215756892	**ft/day**
	1.49E-03	cm/s



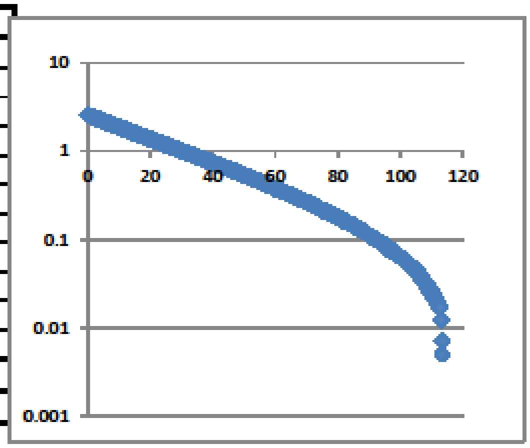
Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/19/2013 10:58:56.6	43.954	0	2.458	1
8/19/2013 10:58:56.7	43.949	0.125	2.463	1.002034
8/19/2013 10:58:56.8	43.949	0.250	2.463	1.002034
8/19/2013 10:58:56.9	43.951	0.375	2.461	1.001221
8/19/2013 10:58:57.0	43.951	0.500	2.461	1.001221
8/19/2013 10:58:57.1	43.956	0.625	2.456	0.999186
8/19/2013 10:58:57.2	43.958	0.750	2.454	0.998373
8/19/2013 10:58:57.3	43.965	0.875	2.447	0.995525
8/19/2013 10:58:57.4	43.97	1.000	2.442	0.993491
8/19/2013 10:58:57.5	43.982	1.125	2.43	0.988609
8/19/2013 10:58:57.6	43.989	1.250	2.423	0.985761
8/19/2013 10:58:57.7	44.001	1.375	2.411	0.980879
8/19/2013 10:58:57.8	44.008	1.500	2.404	0.978031
8/19/2013 10:58:57.9	44.019	1.625	2.393	0.973556
8/19/2013 10:58:58.0	44.024	1.750	2.388	0.971522
8/19/2013 10:58:58.1	44.036	1.875	2.376	0.96664
8/19/2013 10:58:58.2	44.04	2.000	2.372	0.965012
8/19/2013 10:58:58.3	44.052	2.125	2.36	0.96013
8/19/2013 10:58:58.4	44.057	2.250	2.355	0.958096
8/19/2013 10:58:58.5	44.071	2.375	2.341	0.9524
8/19/2013 10:58:58.6	44.076	2.500	2.336	0.950366
8/19/2013 10:58:58.7	44.09	2.625	2.322	0.94467
8/19/2013 10:58:58.8	44.094	2.750	2.318	0.943043
8/19/2013 10:58:58.9	44.108	2.875	2.304	0.937347
8/19/2013 10:58:59.0	44.115	3.000	2.297	0.9345
8/19/2013 10:58:59.1	44.129	3.125	2.283	0.928804
8/19/2013 10:58:59.2	44.134	3.250	2.278	0.92677
8/19/2013 10:58:59.3	44.143	3.375	2.269	0.923108
8/19/2013 10:58:59.4	44.155	3.500	2.257	0.918226

Monitoring Well ID	E7D	Mech 2
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	7	ft
Static Water Level - H	46.407	ft
Min Water Level - Ho	43.916	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	32.75	s
Hydraulic Conductivity	5.04696E-05	ft/sec
	4.360572969	**ft/day**
	1.54E-03	cm/s



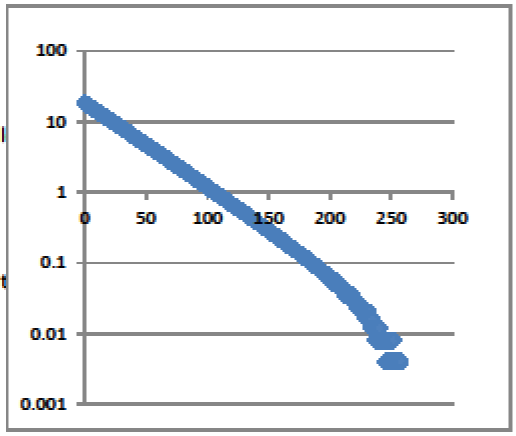
Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/19/2013 11:30:44.0	43.916	0	2.491	1
8/19/2013 11:30:44.1	43.919	0.125	2.488	0.998796
8/19/2013 11:30:44.2	43.921	0.250	2.486	0.997993
8/19/2013 11:30:44.3	43.926	0.375	2.481	0.995986
8/19/2013 11:30:44.4	43.928	0.500	2.479	0.995183
8/19/2013 11:30:44.5	43.935	0.625	2.472	0.992373
8/19/2013 11:30:44.6	43.937	0.750	2.47	0.99157
8/19/2013 11:30:44.7	43.949	0.875	2.458	0.986752
8/19/2013 11:30:44.8	43.954	1.000	2.453	0.984745
8/19/2013 11:30:44.9	43.963	1.125	2.444	0.981132
8/19/2013 11:30:45.0	43.97	1.250	2.437	0.978322
8/19/2013 11:30:45.1	43.982	1.375	2.425	0.973505
8/19/2013 11:30:45.2	43.987	1.500	2.42	0.971497
8/19/2013 11:30:45.3	43.998	1.625	2.409	0.967081
8/19/2013 11:30:45.4	44.005	1.750	2.402	0.964271
8/19/2013 11:30:45.5	44.017	1.875	2.39	0.959454
8/19/2013 11:30:45.6	44.024	2.000	2.383	0.956644
8/19/2013 11:30:45.7	44.036	2.125	2.371	0.951827
8/19/2013 11:30:45.8	44.04	2.250	2.367	0.950221
8/19/2013 11:30:45.9	44.052	2.375	2.355	0.945403
8/19/2013 11:30:46.0	44.057	2.500	2.35	0.943396
8/19/2013 11:30:46.1	44.069	2.625	2.338	0.938579
8/19/2013 11:30:46.2	44.076	2.750	2.331	0.935769
8/19/2013 11:30:46.3	44.087	2.875	2.32	0.931353
8/19/2013 11:30:46.4	44.094	3.000	2.313	0.928543
8/19/2013 11:30:46.5	44.108	3.125	2.299	0.922923
8/19/2013 11:30:46.6	44.115	3.250	2.292	0.920112
8/19/2013 11:30:46.7	44.129	3.375	2.278	0.914492
8/19/2013 11:30:46.8	44.136	3.500	2.271	0.911682

Monitoring Well ID	E7D	Mech 3
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	7	ft
Static Water Level - H	46.41	ft
Min Water Level - Ho	43.867	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	32.125	s
Hydraulic Conductivity	5.14515E-05	ft/sec
	4.445409019	**ft/day**
	1.57E-03	cm/s



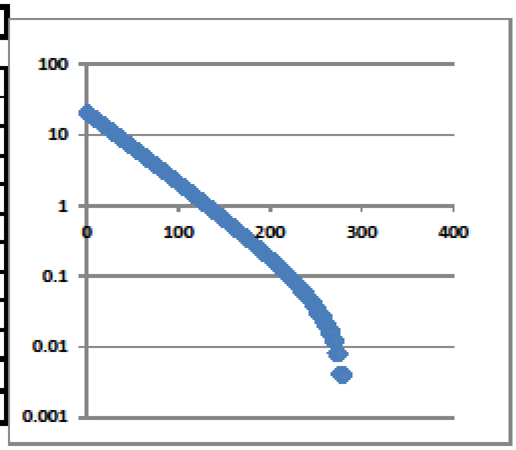
Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/19/2013 12:02:52.1	43.867	0	2.543	1
8/19/2013 12:02:52.2	43.872	0.125	2.538	0.998034
8/19/2013 12:02:52.3	43.879	0.250	2.531	0.995281
8/19/2013 12:02:52.4	43.884	0.375	2.526	0.993315
8/19/2013 12:02:52.5	43.893	0.500	2.517	0.989776
8/19/2013 12:02:52.6	43.9	0.625	2.51	0.987023
8/19/2013 12:02:52.7	43.912	0.750	2.498	0.982304
8/19/2013 12:02:52.8	43.916	0.875	2.494	0.980731
8/19/2013 12:02:52.9	43.928	1.000	2.482	0.976013
8/19/2013 12:02:53.0	43.935	1.125	2.475	0.97326
8/19/2013 12:02:53.1	43.947	1.250	2.463	0.968541
8/19/2013 12:02:53.2	43.954	1.375	2.456	0.965788
8/19/2013 12:02:53.3	43.965	1.500	2.445	0.961463
8/19/2013 12:02:53.4	43.973	1.625	2.437	0.958317
8/19/2013 12:02:53.5	43.987	1.750	2.423	0.952812
8/19/2013 12:02:53.6	43.994	1.875	2.416	0.950059
8/19/2013 12:02:53.7	44.003	2.000	2.407	0.94652
8/19/2013 12:02:53.8	44.012	2.125	2.398	0.942981
8/19/2013 12:02:53.9	44.029	2.250	2.381	0.936296
8/19/2013 12:02:54.0	44.036	2.375	2.374	0.933543
8/19/2013 12:02:54.1	44.047	2.500	2.363	0.929217
8/19/2013 12:02:54.2	44.052	2.625	2.358	0.927251
8/19/2013 12:02:54.3	44.064	2.750	2.346	0.922532
8/19/2013 12:02:54.4	44.069	2.875	2.341	0.920566
8/19/2013 12:02:54.5	44.083	3.000	2.327	0.915061
8/19/2013 12:02:54.6	44.087	3.125	2.323	0.913488
8/19/2013 12:02:54.7	44.097	3.250	2.313	0.909556
8/19/2013 12:02:54.8	44.101	3.375	2.309	0.907983
8/19/2013 12:02:54.9	44.113	3.500	2.297	0.903264

Monitoring Well ID	E7D	Nitro 1
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	7	ft
Static Water Level - H	47.213	ft
Min Water Level - Ho	29.162	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	37.25	s
Hydraulic Conductivity	4.43726E-05	ft/sec
	3.833792342	**ft/day**
	1.35E-03	cm/s



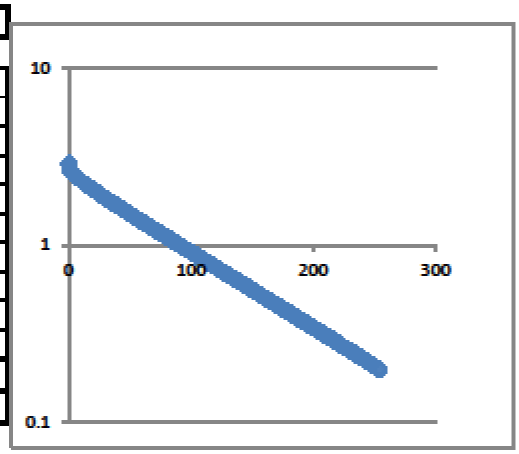
Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/6/2013 12:32:42.625	29.162	0	18.051	1
8/6/2013 12:32:42.750	29.209	0.125	18.004	0.997396
8/6/2013 12:32:42.875	29.244	0.250	17.969	0.995457
8/6/2013 12:32:43.000	29.275	0.375	17.938	0.99374
8/6/2013 12:32:43.125	29.267	0.500	17.946	0.994183
8/6/2013 12:32:43.250	29.302	0.625	17.911	0.992244
8/6/2013 12:32:43.375	29.388	0.750	17.825	0.98748
8/6/2013 12:32:43.500	29.431	0.875	17.782	0.985098
8/6/2013 12:32:43.625	29.493	1.000	17.72	0.981663
8/6/2013 12:32:43.750	29.509	1.125	17.704	0.980777
8/6/2013 12:32:43.875	29.536	1.250	17.677	0.979281
8/6/2013 12:32:44.000	29.583	1.375	17.63	0.976677
8/6/2013 12:32:44.125	29.68	1.500	17.533	0.971304
8/6/2013 12:32:44.250	29.747	1.625	17.466	0.967592
8/6/2013 12:32:44.375	29.797	1.750	17.416	0.964822
8/6/2013 12:32:44.500	29.856	1.875	17.357	0.961553
8/6/2013 12:32:44.625	29.895	2.000	17.318	0.959393
8/6/2013 12:32:44.750	29.973	2.125	17.24	0.955072
8/6/2013 12:32:44.875	30.012	2.250	17.201	0.952911
8/6/2013 12:32:45.000	30.043	2.375	17.17	0.951194
8/6/2013 12:32:45.125	30.109	2.500	17.104	0.947538
8/6/2013 12:32:45.250	30.183	2.625	17.03	0.943438
8/6/2013 12:32:45.375	30.261	2.750	16.952	0.939117
8/6/2013 12:32:45.500	30.327	2.875	16.886	0.935461
8/6/2013 12:32:45.625	30.355	3.000	16.858	0.933909
8/6/2013 12:32:45.750	30.39	3.125	16.823	0.931971
8/6/2013 12:32:45.875	30.46	3.250	16.753	0.928093
8/6/2013 12:32:46.000	30.499	3.375	16.714	0.925932
8/6/2013 12:32:46.125	30.573	3.500	16.64	0.921833

Monitoring Well ID	E7D	Nitro 1
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	7	ft
Static Water Level - H	47.213	ft
Min Water Level - Ho	26.749	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	44.5	s
Hydraulic Conductivity	3.71434E-05	ft/sec
	3.209185724	**ft/day**
	1.13E-03	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/6/2013 12:45:57.375	26.749	0	20.464	1
8/6/2013 12:45:57.500	26.757	0.125	20.456	0.999609
8/6/2013 12:45:57.625	26.792	0.250	20.421	0.997899
8/6/2013 12:45:57.750	26.831	0.375	20.382	0.995993
8/6/2013 12:45:57.875	26.819	0.500	20.394	0.996579
8/6/2013 12:45:58.000	26.815	0.625	20.398	0.996775
8/6/2013 12:45:58.125	26.87	0.750	20.343	0.994087
8/6/2013 12:45:58.250	26.913	0.875	20.3	0.991986
8/6/2013 12:45:58.375	26.952	1.000	20.261	0.99008
8/6/2013 12:45:58.500	26.971	1.125	20.242	0.989152
8/6/2013 12:45:58.625	26.995	1.250	20.218	0.987979
8/6/2013 12:45:58.750	27.057	1.375	20.156	0.984949
8/6/2013 12:45:58.875	27.147	1.500	20.066	0.980551
8/6/2013 12:45:59.000	27.225	1.625	19.988	0.97674
8/6/2013 12:45:59.125	27.275	1.750	19.938	0.974296
8/6/2013 12:45:59.250	27.318	1.875	19.895	0.972195
8/6/2013 12:45:59.375	27.345	2.000	19.868	0.970876
8/6/2013 12:45:59.500	27.388	2.125	19.825	0.968774
8/6/2013 12:45:59.625	27.431	2.250	19.782	0.966673
8/6/2013 12:45:59.750	27.47	2.375	19.743	0.964767
8/6/2013 12:45:59.875	27.536	2.500	19.677	0.961542
8/6/2013 12:46:00.000	27.607	2.625	19.606	0.958073
8/6/2013 12:46:00.125	27.684	2.750	19.529	0.95431
8/6/2013 12:46:00.250	27.759	2.875	19.454	0.950645
8/6/2013 12:46:00.375	27.794	3.000	19.419	0.948935
8/6/2013 12:46:00.500	27.825	3.125	19.388	0.94742
8/6/2013 12:46:00.625	27.86	3.250	19.353	0.94571
8/6/2013 12:46:00.750	27.903	3.375	19.31	0.943608
8/6/2013 12:46:00.875	27.985	3.500	19.228	0.939601

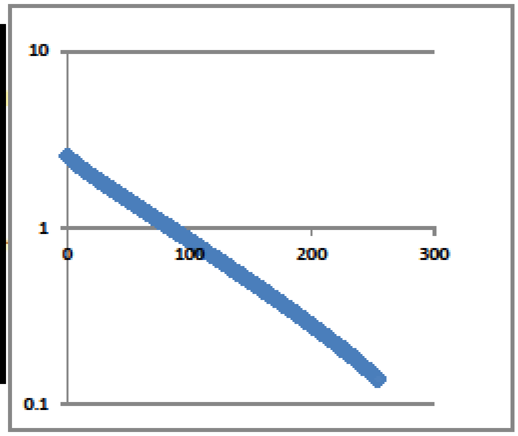
Monitoring Well ID	NE1D	Mech 1
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	5	ft
Static Water Level - H	45.542	ft
Min Water Level - Ho	42.631	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	83.1	s
Hydraulic Conductivity	2.50345E-05	ft/sec
	2.162983591	**ft/day**
	7.63E-04	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/15/2013 15:15:02.2	42.631	0	2.911	1
8/15/2013 15:15:02.3	42.657	0.100	2.885	0.991068
8/15/2013 15:15:02.4	42.704	0.200	2.838	0.974923
8/15/2013 15:15:02.5	42.725	0.300	2.817	0.967709
8/15/2013 15:15:02.6	42.77	0.400	2.772	0.95225
8/15/2013 15:15:02.7	42.791	0.500	2.751	0.945036
8/15/2013 15:15:02.8	42.826	0.600	2.716	0.933013
8/15/2013 15:15:02.9	42.847	0.700	2.695	0.925799
8/15/2013 15:15:03.0	42.87	0.800	2.672	0.917898
8/15/2013 15:15:03.1	42.877	0.900	2.665	0.915493
8/15/2013 15:15:03.2	42.887	1.000	2.655	0.912058
8/15/2013 15:15:03.3	42.894	1.100	2.648	0.909653
8/15/2013 15:15:03.4	42.903	1.200	2.639	0.906561
8/15/2013 15:15:03.5	42.908	1.300	2.634	0.904844
8/15/2013 15:15:03.6	42.917	1.400	2.625	0.901752
8/15/2013 15:15:03.7	42.922	1.500	2.62	0.900034
8/15/2013 15:15:03.8	42.933	1.600	2.609	0.896256
8/15/2013 15:15:03.9	42.938	1.700	2.604	0.894538
8/15/2013 15:15:04.0	42.945	1.800	2.597	0.892133
8/15/2013 15:15:04.1	42.947	1.900	2.595	0.891446
8/15/2013 15:15:04.2	42.954	2.000	2.588	0.889042
8/15/2013 15:15:04.3	42.957	2.100	2.585	0.888011
8/15/2013 15:15:04.4	42.964	2.200	2.578	0.885606
8/15/2013 15:15:04.5	42.966	2.300	2.576	0.884919
8/15/2013 15:15:04.6	42.971	2.400	2.571	0.883202
8/15/2013 15:15:04.7	42.973	2.500	2.569	0.882515
8/15/2013 15:15:04.8	42.98	2.600	2.562	0.88011
8/15/2013 15:15:04.9	42.983	2.700	2.559	0.879079
8/15/2013 15:15:05.0	42.99	2.800	2.552	0.876675

Monitoring Well ID	NE1D	Mech 2

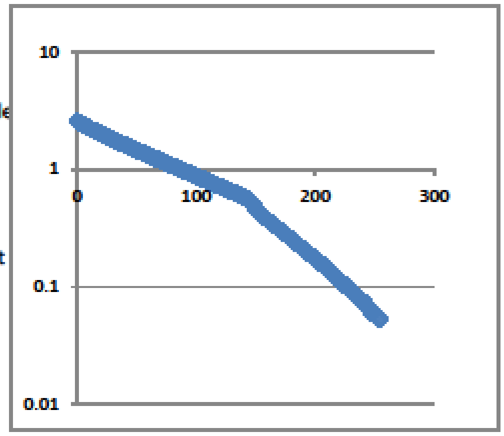
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	5	ft
Static Water Level - H	45.539	ft
Min Water Level - Ho	42.999	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	90	s
Hydraulic Conductivity	2.31152E-05	ft/sec
	1.997154849	**ft/day**
	7.04E-04	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/15/2013 15:37:09.0	42.999	0	2.54	1
8/15/2013 15:37:09.1	43.001	0.100	2.538	0.999213
8/15/2013 15:37:09.2	43.004	0.200	2.535	0.998031
8/15/2013 15:37:09.3	43.006	0.300	2.533	0.997244
8/15/2013 15:37:09.4	43.011	0.400	2.528	0.995276
8/15/2013 15:37:09.5	43.013	0.500	2.526	0.994488
8/15/2013 15:37:09.6	43.018	0.600	2.521	0.99252
8/15/2013 15:37:09.7	43.018	0.700	2.521	0.99252
8/15/2013 15:37:09.8	43.025	0.800	2.514	0.989764
8/15/2013 15:37:09.9	43.027	0.900	2.512	0.988976
8/15/2013 15:37:10.0	43.032	1.000	2.507	0.987008
8/15/2013 15:37:10.1	43.034	1.100	2.505	0.98622
8/15/2013 15:37:10.2	43.041	1.200	2.498	0.983465
8/15/2013 15:37:10.3	43.043	1.300	2.496	0.982677
8/15/2013 15:37:10.4	43.048	1.400	2.491	0.980709
8/15/2013 15:37:10.5	43.05	1.500	2.489	0.979921
8/15/2013 15:37:10.6	43.055	1.600	2.484	0.977953
8/15/2013 15:37:10.7	43.058	1.700	2.481	0.976772
8/15/2013 15:37:10.8	43.062	1.800	2.477	0.975197
8/15/2013 15:37:10.9	43.065	1.900	2.474	0.974016
8/15/2013 15:37:11.0	43.069	2.000	2.47	0.972441
8/15/2013 15:37:11.1	43.072	2.100	2.467	0.97126
8/15/2013 15:37:11.2	43.076	2.200	2.463	0.969685
8/15/2013 15:37:11.3	43.079	2.300	2.46	0.968504
8/15/2013 15:37:11.4	43.083	2.400	2.456	0.966929
8/15/2013 15:37:11.5	43.086	2.500	2.453	0.965748
8/15/2013 15:37:11.6	43.088	2.600	2.451	0.964961
8/15/2013 15:37:11.7	43.09	2.700	2.449	0.964173
8/15/2013 15:37:11.8	43.095	2.800	2.444	0.962205

Monitoring Well ID	NE1D	Mech 3

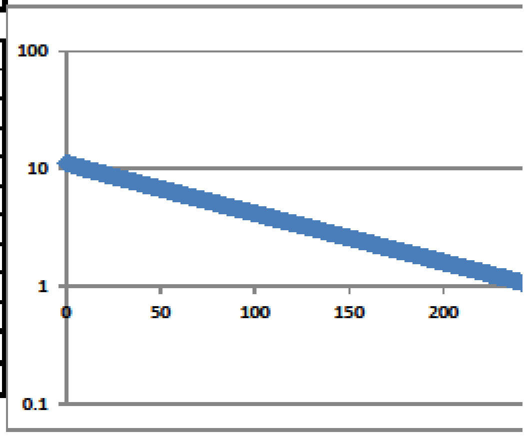
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	5	ft
Static Water Level - H	45.539	ft
Min Water Level - Ho	42.978	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	92.1	s
Hydraulic Conductivity	2.25882E-05	ft/sec
	1.951617116	**ft/day**
	6.88E-04	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/15/2013 15:57:57.8	42.978	0	2.561	1
8/15/2013 15:57:57.9	42.98	0.100	2.559	0.999219
8/15/2013 15:57:58.0	42.982	0.200	2.557	0.998438
8/15/2013 15:57:58.1	42.985	0.300	2.554	0.997267
8/15/2013 15:57:58.2	42.992	0.400	2.547	0.994533
8/15/2013 15:57:58.3	42.997	0.500	2.542	0.992581
8/15/2013 15:57:58.4	42.999	0.600	2.54	0.9918
8/15/2013 15:57:58.5	43.001	0.700	2.538	0.991019
8/15/2013 15:57:58.6	43.004	0.800	2.535	0.989848
8/15/2013 15:57:58.7	43.006	0.900	2.533	0.989067
8/15/2013 15:57:58.8	43.011	1.000	2.528	0.987114
8/15/2013 15:57:58.9	43.011	1.100	2.528	0.987114
8/15/2013 15:57:59.0	43.015	1.200	2.524	0.985553
8/15/2013 15:57:59.1	43.015	1.300	2.524	0.985553
8/15/2013 15:57:59.2	43.02	1.400	2.519	0.9836
8/15/2013 15:57:59.3	43.022	1.500	2.517	0.982819
8/15/2013 15:57:59.4	43.029	1.600	2.51	0.980086
8/15/2013 15:57:59.5	43.029	1.700	2.51	0.980086
8/15/2013 15:57:59.6	43.034	1.800	2.505	0.978134
8/15/2013 15:57:59.7	43.036	1.900	2.503	0.977353
8/15/2013 15:57:59.8	43.041	2.000	2.498	0.9754
8/15/2013 15:57:59.9	43.043	2.100	2.496	0.974619
8/15/2013 15:58:00.0	43.048	2.200	2.491	0.972667
8/15/2013 15:58:00.1	43.05	2.300	2.489	0.971886
8/15/2013 15:58:00.2	43.053	2.400	2.486	0.970715
8/15/2013 15:58:00.3	43.055	2.500	2.484	0.969934
8/15/2013 15:58:00.4	43.06	2.600	2.479	0.967981
8/15/2013 15:58:00.5	43.062	2.700	2.477	0.9672
8/15/2013 15:58:00.6	43.069	2.800	2.47	0.964467

Monitoring Well ID	NE1D	Nitro 1

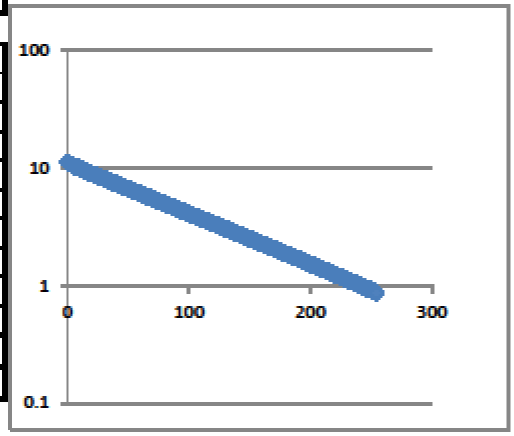
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	5	ft
Static Water Level - H	45.148	ft
Min Water Level - Ho	33.942	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	100.4	s
Hydraulic Conductivity	2.07208E-05	ft/sec
	1.790278251	**ft/day**
	6.31E-04	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/15/2013 14:10:07.6	33.942	0	11.206	1
8/15/2013 14:10:07.7	33.953	0.100	11.195	0.999018
8/15/2013 14:10:07.8	33.958	0.200	11.19	0.998572
8/15/2013 14:10:07.9	33.97	0.300	11.178	0.997501
8/15/2013 14:10:08.0	33.977	0.400	11.171	0.996877
8/15/2013 14:10:08.1	33.993	0.500	11.155	0.995449
8/15/2013 14:10:08.2	34	0.600	11.148	0.994824
8/15/2013 14:10:08.3	34.017	0.700	11.131	0.993307
8/15/2013 14:10:08.4	34.026	0.800	11.122	0.992504
8/15/2013 14:10:08.5	34.042	0.900	11.106	0.991076
8/15/2013 14:10:08.6	34.052	1.000	11.096	0.990184
8/15/2013 14:10:08.7	34.068	1.100	11.08	0.988756
8/15/2013 14:10:08.8	34.078	1.200	11.07	0.987864
8/15/2013 14:10:08.9	34.094	1.300	11.054	0.986436
8/15/2013 14:10:09.0	34.103	1.400	11.045	0.985633
8/15/2013 14:10:09.1	34.122	1.500	11.026	0.983937
8/15/2013 14:10:09.2	34.131	1.600	11.017	0.983134
8/15/2013 14:10:09.3	34.15	1.700	10.998	0.981439
8/15/2013 14:10:09.4	34.159	1.800	10.989	0.980635
8/15/2013 14:10:09.5	34.178	1.900	10.97	0.97894
8/15/2013 14:10:09.6	34.188	2.000	10.96	0.978047
8/15/2013 14:10:09.7	34.206	2.100	10.942	0.976441
8/15/2013 14:10:09.8	34.216	2.200	10.932	0.975549
8/15/2013 14:10:09.9	34.234	2.300	10.914	0.973943
8/15/2013 14:10:10.0	34.241	2.400	10.907	0.973318
8/15/2013 14:10:10.1	34.26	2.500	10.888	0.971622
8/15/2013 14:10:10.2	34.27	2.600	10.878	0.97073
8/15/2013 14:10:10.3	34.288	2.700	10.86	0.969124
8/15/2013 14:10:10.4	34.298	2.800	10.85	0.968231

Monitoring Well ID	NE1D	Nitro 2

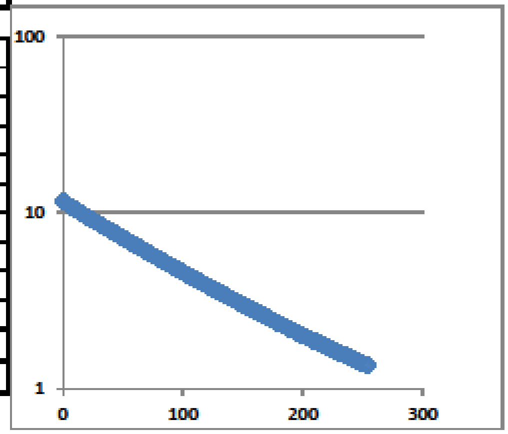
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	5	ft
Static Water Level - H	45.076	ft
Min Water Level - Ho	33.944	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	99.4	s
Hydraulic Conductivity	2.09293E-05	ft/sec
	1.808289099	ft/day
	6.38E-04	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/15/2013 14:31:22.8	33.944	0	11.132	1
8/15/2013 14:31:22.9	33.949	0.100	11.127	0.999551
8/15/2013 14:31:23.0	33.954	0.200	11.122	0.999102
8/15/2013 14:31:23.1	33.965	0.300	11.111	0.998114
8/15/2013 14:31:23.2	33.97	0.400	11.106	0.997664
8/15/2013 14:31:23.3	33.984	0.500	11.092	0.996407
8/15/2013 14:31:23.4	33.994	0.600	11.082	0.995508
8/15/2013 14:31:23.5	34.01	0.700	11.066	0.994071
8/15/2013 14:31:23.6	34.017	0.800	11.059	0.993442
8/15/2013 14:31:23.7	34.033	0.900	11.043	0.992005
8/15/2013 14:31:23.8	34.043	1.000	11.033	0.991107
8/15/2013 14:31:23.9	34.059	1.100	11.017	0.989669
8/15/2013 14:31:24.0	34.068	1.200	11.008	0.988861
8/15/2013 14:31:24.1	34.087	1.300	10.989	0.987154
8/15/2013 14:31:24.2	34.094	1.400	10.982	0.986525
8/15/2013 14:31:24.3	34.113	1.500	10.963	0.984819
8/15/2013 14:31:24.4	34.122	1.600	10.954	0.98401
8/15/2013 14:31:24.5	34.141	1.700	10.935	0.982303
8/15/2013 14:31:24.6	34.15	1.800	10.926	0.981495
8/15/2013 14:31:24.7	34.169	1.900	10.907	0.979788
8/15/2013 14:31:24.8	34.176	2.000	10.9	0.979159
8/15/2013 14:31:24.9	34.195	2.100	10.881	0.977452
8/15/2013 14:31:25.0	34.204	2.200	10.872	0.976644
8/15/2013 14:31:25.1	34.223	2.300	10.853	0.974937
8/15/2013 14:31:25.2	34.232	2.400	10.844	0.974129
8/15/2013 14:31:25.3	34.249	2.500	10.827	0.972602
8/15/2013 14:31:25.4	34.258	2.600	10.818	0.971793
8/15/2013 14:31:25.5	34.277	2.700	10.799	0.970086
8/15/2013 14:31:25.6	34.286	2.800	10.79	0.969278

Monitoring Well ID	NE1D	Nitro 3

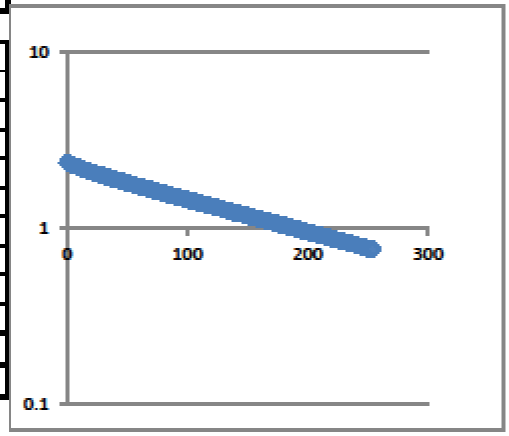
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	5	ft
Static Water Level - H	45.542	ft
Min Water Level - Ho	33.947	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	107.6	s
Hydraulic Conductivity	1.93343E-05	ft/sec
	1.67048268	**ft/day**
	5.89E-04	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/15/2013 14:49:37.6	33.947	0	11.595	1
8/15/2013 14:49:37.7	33.949	0.100	11.593	0.999828
8/15/2013 14:49:37.8	33.954	0.200	11.588	0.999396
8/15/2013 14:49:37.9	33.963	0.300	11.579	0.99862
8/15/2013 14:49:38.0	33.968	0.400	11.574	0.998189
8/15/2013 14:49:38.1	33.982	0.500	11.56	0.996981
8/15/2013 14:49:38.2	33.989	0.600	11.553	0.996378
8/15/2013 14:49:38.3	34.003	0.700	11.539	0.99517
8/15/2013 14:49:38.4	34.01	0.800	11.532	0.994567
8/15/2013 14:49:38.5	34.026	0.900	11.516	0.993187
8/15/2013 14:49:38.6	34.036	1.000	11.506	0.992324
8/15/2013 14:49:38.7	34.052	1.100	11.49	0.990944
8/15/2013 14:49:38.8	34.059	1.200	11.483	0.990341
8/15/2013 14:49:38.9	34.078	1.300	11.464	0.988702
8/15/2013 14:49:39.0	34.087	1.400	11.455	0.987926
8/15/2013 14:49:39.1	34.104	1.500	11.438	0.98646
8/15/2013 14:49:39.2	34.113	1.600	11.429	0.985683
8/15/2013 14:49:39.3	34.132	1.700	11.41	0.984045
8/15/2013 14:49:39.4	34.141	1.800	11.401	0.983269
8/15/2013 14:49:39.5	34.157	1.900	11.385	0.981889
8/15/2013 14:49:39.6	34.167	2.000	11.375	0.981026
8/15/2013 14:49:39.7	34.186	2.100	11.356	0.979388
8/15/2013 14:49:39.8	34.195	2.200	11.347	0.978611
8/15/2013 14:49:39.9	34.211	2.300	11.331	0.977232
8/15/2013 14:49:40.0	34.221	2.400	11.321	0.976369
8/15/2013 14:49:40.1	34.239	2.500	11.303	0.974817
8/15/2013 14:49:40.2	34.249	2.600	11.293	0.973954
8/15/2013 14:49:40.3	34.268	2.700	11.274	0.972316
8/15/2013 14:49:40.4	34.277	2.800	11.265	0.971539

Monitoring Well ID	S11D	Mech 1

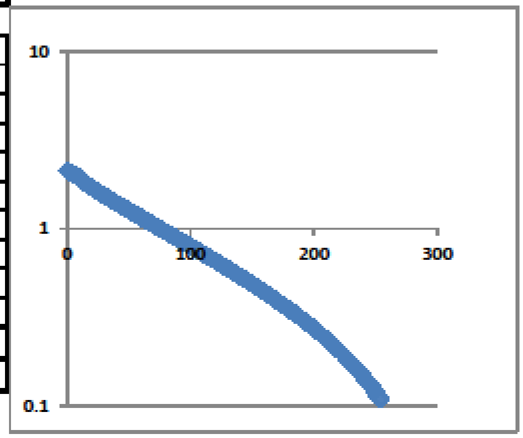
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	11	ft
Static Water Level - H	51.422	ft
Min Water Level - Ho	49.069	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	220.3	s
Hydraulic Conductivity	5.42217E-06	ft/sec
	0.468475587	**ft/day**
	1.65E-04	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/16/2013 15:28:07.7	49.069	0	2.353	1
8/16/2013 15:28:07.8	49.071	0.100	2.351	0.99915
8/16/2013 15:28:07.9	49.071	0.200	2.351	0.99915
8/16/2013 15:28:08.0	49.074	0.300	2.348	0.997875
8/16/2013 15:28:08.1	49.076	0.400	2.346	0.997025
8/16/2013 15:28:08.2	49.076	0.500	2.346	0.997025
8/16/2013 15:28:08.3	49.076	0.600	2.346	0.997025
8/16/2013 15:28:08.4	49.078	0.700	2.344	0.996175
8/16/2013 15:28:08.5	49.081	0.800	2.341	0.9949
8/16/2013 15:28:08.6	49.083	0.900	2.339	0.99405
8/16/2013 15:28:08.7	49.085	1.000	2.337	0.9932
8/16/2013 15:28:08.8	49.085	1.100	2.337	0.9932
8/16/2013 15:28:08.9	49.09	1.200	2.332	0.991075
8/16/2013 15:28:09.0	49.09	1.300	2.332	0.991075
8/16/2013 15:28:09.1	49.092	1.400	2.33	0.990225
8/16/2013 15:28:09.2	49.095	1.500	2.327	0.98895
8/16/2013 15:28:09.3	49.097	1.600	2.325	0.9881
8/16/2013 15:28:09.4	49.097	1.700	2.325	0.9881
8/16/2013 15:28:09.5	49.099	1.800	2.323	0.98725
8/16/2013 15:28:09.6	49.102	1.900	2.32	0.985975
8/16/2013 15:28:09.7	49.104	2.000	2.318	0.985125
8/16/2013 15:28:09.8	49.104	2.100	2.318	0.985125
8/16/2013 15:28:09.9	49.109	2.200	2.313	0.983
8/16/2013 15:28:10.0	49.109	2.300	2.313	0.983
8/16/2013 15:28:10.1	49.111	2.400	2.311	0.98215
8/16/2013 15:28:10.2	49.113	2.500	2.309	0.9813
8/16/2013 15:28:10.3	49.116	2.600	2.306	0.980025
8/16/2013 15:28:10.4	49.116	2.700	2.306	0.980025
8/16/2013 15:28:10.5	49.121	2.800	2.301	0.977901

Monitoring Well ID	S11D	Mech 3

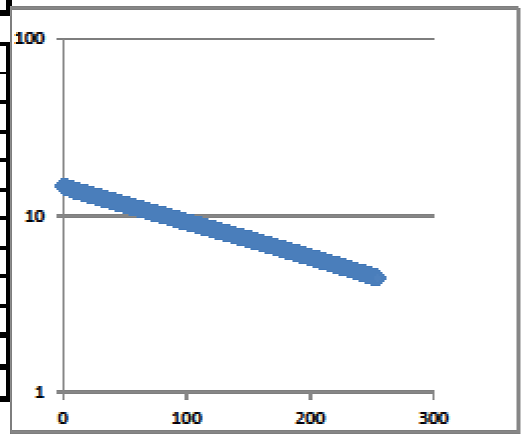
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	11	ft
Static Water Level - H	51.411	ft
Min Water Level - Ho	49.27	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	100.2	s
Hydraulic Conductivity	1.19212E-05	ft/sec
	1.029991735	**ft/day**
	3.63E-04	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/16/2013 16:08:32.0	49.27	0	2.141	1
8/16/2013 16:08:32.1	49.273	0.100	2.138	0.998599
8/16/2013 16:08:32.2	49.275	0.200	2.136	0.997665
8/16/2013 16:08:32.3	49.275	0.300	2.136	0.997665
8/16/2013 16:08:32.4	49.277	0.400	2.134	0.99673
8/16/2013 16:08:32.5	49.277	0.500	2.134	0.99673
8/16/2013 16:08:32.6	49.282	0.600	2.129	0.994395
8/16/2013 16:08:32.7	49.282	0.700	2.129	0.994395
8/16/2013 16:08:32.8	49.287	0.800	2.124	0.99206
8/16/2013 16:08:32.9	49.289	0.900	2.122	0.991126
8/16/2013 16:08:33.0	49.291	1.000	2.12	0.990191
8/16/2013 16:08:33.1	49.291	1.100	2.12	0.990191
8/16/2013 16:08:33.2	49.296	1.200	2.115	0.987856
8/16/2013 16:08:33.3	49.296	1.300	2.115	0.987856
8/16/2013 16:08:33.4	49.301	1.400	2.11	0.985521
8/16/2013 16:08:33.5	49.301	1.500	2.11	0.985521
8/16/2013 16:08:33.6	49.303	1.600	2.108	0.984587
8/16/2013 16:08:33.7	49.305	1.700	2.106	0.983652
8/16/2013 16:08:33.8	49.308	1.800	2.103	0.982251
8/16/2013 16:08:33.9	49.31	1.900	2.101	0.981317
8/16/2013 16:08:34.0	49.313	2.000	2.098	0.979916
8/16/2013 16:08:34.1	49.315	2.100	2.096	0.978982
8/16/2013 16:08:34.2	49.317	2.200	2.094	0.978048
8/16/2013 16:08:34.3	49.32	2.300	2.091	0.976646
8/16/2013 16:08:34.4	49.322	2.400	2.089	0.975712
8/16/2013 16:08:34.5	49.322	2.500	2.089	0.975712
8/16/2013 16:08:34.6	49.327	2.600	2.084	0.973377
8/16/2013 16:08:34.7	49.327	2.700	2.084	0.973377
8/16/2013 16:08:34.8	49.329	2.800	2.082	0.972443

Monitoring Well ID	S11D	Nitro 1

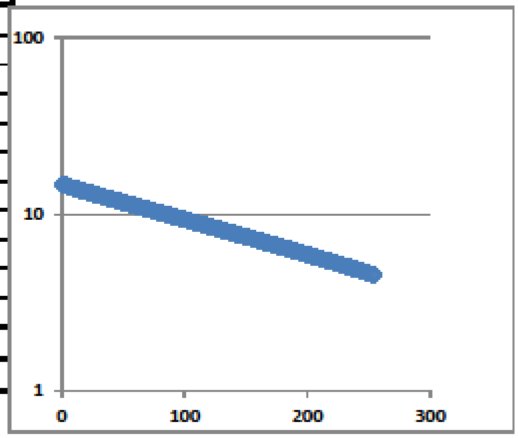
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	11	ft
Static Water Level - H	48.615	ft
Min Water Level - Ho	33.938	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	213.6	s
Hydraulic Conductivity	5.59225E-06	ft/sec
	0.48317028	**ft/day**
	1.70E-04	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/16/2013 14:01:09.5	33.938	0	14.677	1
8/16/2013 14:01:09.6	33.942	0.100	14.673	0.999727
8/16/2013 14:01:09.7	33.945	0.200	14.67	0.999523
8/16/2013 14:01:09.8	33.954	0.300	14.661	0.99891
8/16/2013 14:01:09.9	33.959	0.400	14.656	0.998569
8/16/2013 14:01:10.0	33.968	0.500	14.647	0.997956
8/16/2013 14:01:10.1	33.973	0.600	14.642	0.997615
8/16/2013 14:01:10.2	33.984	0.700	14.631	0.996866
8/16/2013 14:01:10.3	33.989	0.800	14.626	0.996525
8/16/2013 14:01:10.4	34.001	0.900	14.614	0.995708
8/16/2013 14:01:10.5	34.005	1.000	14.61	0.995435
8/16/2013 14:01:10.6	34.017	1.100	14.598	0.994617
8/16/2013 14:01:10.7	34.024	1.200	14.591	0.99414
8/16/2013 14:01:10.8	34.036	1.300	14.579	0.993323
8/16/2013 14:01:10.9	34.041	1.400	14.574	0.992982
8/16/2013 14:01:11.0	34.052	1.500	14.563	0.992233
8/16/2013 14:01:11.1	34.059	1.600	14.556	0.991756
8/16/2013 14:01:11.2	34.071	1.700	14.544	0.990938
8/16/2013 14:01:11.3	34.076	1.800	14.539	0.990598
8/16/2013 14:01:11.4	34.087	1.900	14.528	0.989848
8/16/2013 14:01:11.5	34.094	2.000	14.521	0.989371
8/16/2013 14:01:11.6	34.106	2.100	14.509	0.988554
8/16/2013 14:01:11.7	34.111	2.200	14.504	0.988213
8/16/2013 14:01:11.8	34.125	2.300	14.49	0.987259
8/16/2013 14:01:11.9	34.13	2.400	14.485	0.986918
8/16/2013 14:01:12.0	34.141	2.500	14.474	0.986169
8/16/2013 14:01:12.1	34.148	2.600	14.467	0.985692
8/16/2013 14:01:12.2	34.16	2.700	14.455	0.984874
8/16/2013 14:01:12.3	34.167	2.800	14.448	0.984397

Monitoring Well ID	S11D	Nitro 1

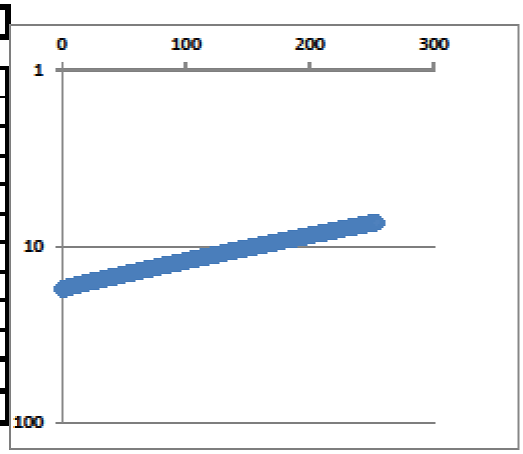
Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	11	ft
Static Water Level - H	48.79	ft
Min Water Level - Ho	33.935	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	215.5	s
Hydraulic Conductivity	5.54294E-06	ft/sec
	0.47891031	**ft/day**
	1.69E-04	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/16/2013 14:26:27.1	33.935	0	14.855	1
8/16/2013 14:26:27.2	33.94	0.100	14.85	0.999663
8/16/2013 14:26:27.3	33.945	0.200	14.845	0.999327
8/16/2013 14:26:27.4	33.952	0.300	14.838	0.998856
8/16/2013 14:26:27.5	33.956	0.400	14.834	0.998586
8/16/2013 14:26:27.6	33.966	0.500	14.824	0.997913
8/16/2013 14:26:27.7	33.97	0.600	14.82	0.997644
8/16/2013 14:26:27.8	33.982	0.700	14.808	0.996836
8/16/2013 14:26:27.9	33.987	0.800	14.803	0.996499
8/16/2013 14:26:28.0	33.999	0.900	14.791	0.995692
8/16/2013 14:26:28.1	34.003	1.000	14.787	0.995422
8/16/2013 14:26:28.2	34.017	1.100	14.773	0.99448
8/16/2013 14:26:28.3	34.022	1.200	14.768	0.994143
8/16/2013 14:26:28.4	34.034	1.300	14.756	0.993336
8/16/2013 14:26:28.5	34.038	1.400	14.752	0.993066
8/16/2013 14:26:28.6	34.05	1.500	14.74	0.992258
8/16/2013 14:26:28.7	34.057	1.600	14.733	0.991787
8/16/2013 14:26:28.8	34.069	1.700	14.721	0.990979
8/16/2013 14:26:28.9	34.073	1.800	14.717	0.99071
8/16/2013 14:26:29.0	34.085	1.900	14.705	0.989902
8/16/2013 14:26:29.1	34.09	2.000	14.7	0.989566
8/16/2013 14:26:29.2	34.102	2.100	14.688	0.988758
8/16/2013 14:26:29.3	34.109	2.200	14.681	0.988287
8/16/2013 14:26:29.4	34.12	2.300	14.67	0.987546
8/16/2013 14:26:29.5	34.125	2.400	14.665	0.98721
8/16/2013 14:26:29.6	34.137	2.500	14.653	0.986402
8/16/2013 14:26:29.7	34.144	2.600	14.646	0.985931
8/16/2013 14:26:29.8	34.153	2.700	14.637	0.985325
8/16/2013 14:26:29.9	34.16	2.800	14.63	0.984854

Monitoring Well ID	S11D	Nitro 3

Casing Diamter - d	2	in
Borehole Diameter - D	6	in
Screen Length - L	11	ft
Static Water Level - H	51.38	ft
Min Water Level - Ho	33.926	ft
Casing Radius - r	0.083333333	ft
Borehole Radius - R	0.25	ft
Basic Time Lag - To	292	s
Hydraulic Conductivity	4.09077E-06	ft/sec
	0.353442369	**ft/day**
	1.25E-04	cm/s



Date/Time	Pressure(Ft H2O)	ET	H-h	H-h/(H-Ho)
8/16/2013 14:57:42.5	33.926	0	17.454	1
8/16/2013 14:57:42.6	33.931	0.100	17.449	0.999714
8/16/2013 14:57:42.7	33.935	0.200	17.445	0.999484
8/16/2013 14:57:42.8	33.945	0.300	17.435	0.998911
8/16/2013 14:57:42.9	33.949	0.400	17.431	0.998682
8/16/2013 14:57:43.0	33.959	0.500	17.421	0.998109
8/16/2013 14:57:43.1	33.963	0.600	17.417	0.99788
8/16/2013 14:57:43.2	33.973	0.700	17.407	0.997307
8/16/2013 14:57:43.3	33.98	0.800	17.4	0.996906
8/16/2013 14:57:43.4	33.989	0.900	17.391	0.996391
8/16/2013 14:57:43.5	33.994	1.000	17.386	0.996104
8/16/2013 14:57:43.6	34.006	1.100	17.374	0.995417
8/16/2013 14:57:43.7	34.01	1.200	17.37	0.995187
8/16/2013 14:57:43.8	34.022	1.300	17.358	0.9945
8/16/2013 14:57:43.9	34.027	1.400	17.353	0.994213
8/16/2013 14:57:44.0	34.038	1.500	17.342	0.993583
8/16/2013 14:57:44.1	34.045	1.600	17.335	0.993182
8/16/2013 14:57:44.2	34.057	1.700	17.323	0.992495
8/16/2013 14:57:44.3	34.062	1.800	17.318	0.992208
8/16/2013 14:57:44.4	34.071	1.900	17.309	0.991692
8/16/2013 14:57:44.5	34.078	2.000	17.302	0.991291
8/16/2013 14:57:44.6	34.088	2.100	17.292	0.990718
8/16/2013 14:57:44.7	34.095	2.200	17.285	0.990317
8/16/2013 14:57:44.8	34.104	2.300	17.276	0.989802
8/16/2013 14:57:44.9	34.111	2.400	17.269	0.989401
8/16/2013 14:57:45.0	34.123	2.500	17.257	0.988713
8/16/2013 14:57:45.1	34.127	2.600	17.253	0.988484
8/16/2013 14:57:45.2	34.139	2.700	17.241	0.987796
8/16/2013 14:57:45.3	34.144	2.800	17.236	0.98751

Van der Kamp Method

WELL ID: N5D Mech 1

Local ID: N5D
Date: 9/20/2013
Time: 11:50

INPUT

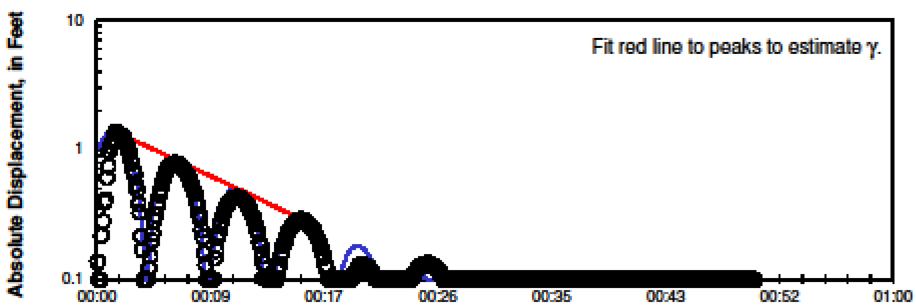
Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch
Depths to:	
water level (DTW)	151.77 Feet
Top of Screen	189 Feet
Base of Screen	227 Feet
Annular Fill:	
across screen --	Fine Sand
above screen --	Bentonite
Aquifer Material --	Sand and Gravel Mixe
ASSUMED S =	1.00E-05 d'less

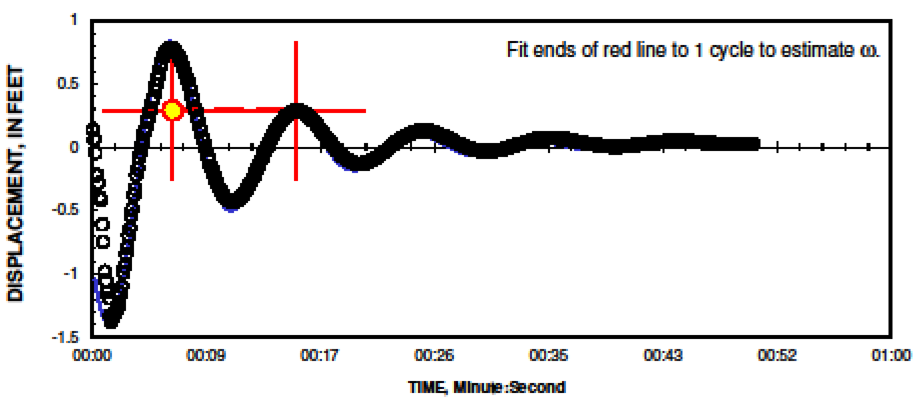
COMPUTED

Aquifer Thickness	37.5 Feet
$y_{0\text{-DISPLACEMENT}}$ =	1.6 Feet
$y_{0\text{-SLUG}}$ =	2.19 Feet
γ =	0.1095121 sec^{-1}
ω =	0.6756113 sec^{-1}
L =	69 Feet

Input is consistent.

T =	3780 $Feet^2$/Day
K =	101 Feet/Day
S =	0.00001 d'less





REMARKS: van der Kamp, 1976 Water Resources Research

Island County Solid Waste Facility, Coueville, WA.
Well is fully penetrating, and has been interpreted as a possible paleo-channel

WELL ID: N5D Mech 2

Local ID:	N5D
Date:	9/20/2013
Time:	12:11

INPUT

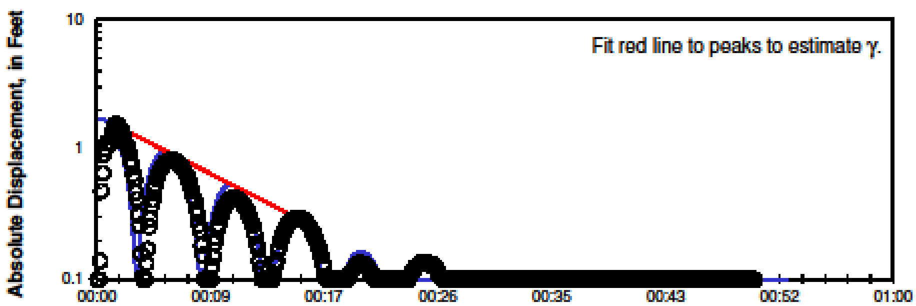
Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch
Depths to:	
water level (DTW)	151.77 Feet
Top of Screen	189 Feet
Base of Screen	227 Feet
Annular Fill:	
across screen --	Fine Sand
above screen --	Bentonite
Aquifer Material --	Sand and Gravel Mixe
ASSUMED S =	1.00E-05 d'less

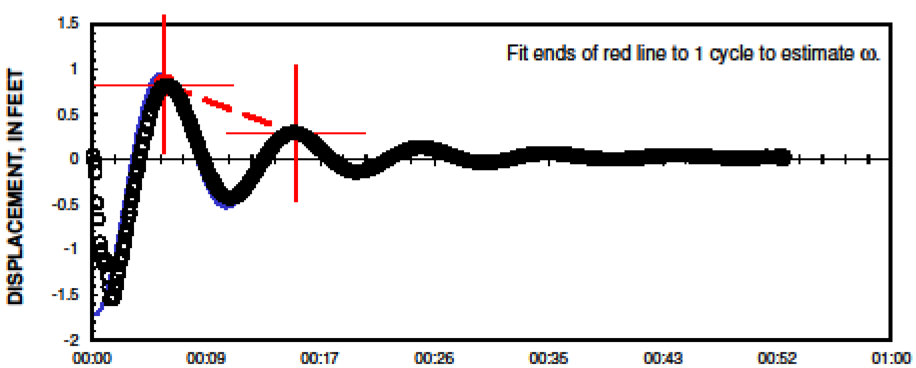
COMPUTED

Aquifer Thickness	37.5 Feet
$y_{0\text{-DISPLACEMENT}}$ =	1.79 Feet
$y_{0\text{-SLUG}}$ =	2.19 Feet
γ =	0.1184949 sec^{-1}
ω =	0.6346652 sec^{-1}
L =	77 Feet

Input is consistent.

T =	3070 $Feet^2/Day$
K =	81.9 Feet/Day
S =	0.00001 d'less





REMARKS: van der Kamp, 1976 Water Resources Research

Island County Solid Waste Facility, Coueville, WA.
Well is fully penetrating, and has been interpreted as a possible paleo-channel

WELL ID: N5D Mech 3

Local ID:	N5D
Date:	9/20/2013
Time:	12:33

INPUT

Construction:

Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch

Depths to:

water level (DTW)	151.77 Feet
Top of Screen	189 Feet
Base of Screen	227 Feet

Annular Fill:

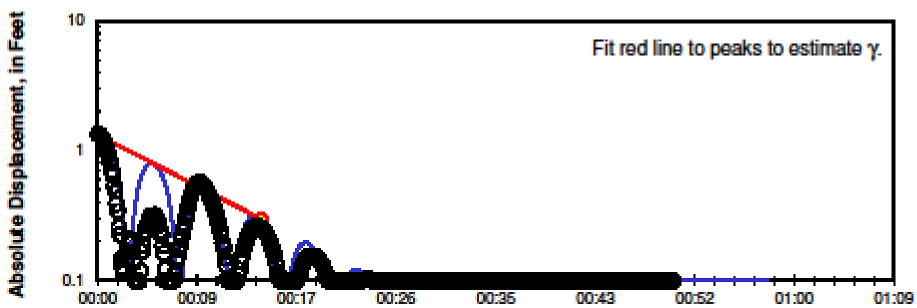
across screen --	Fine Sand
above screen --	Bentonite
Aquifer Material --	Sand and Gravel Mixe
ASSUMED S =	1.00E-05 d'less

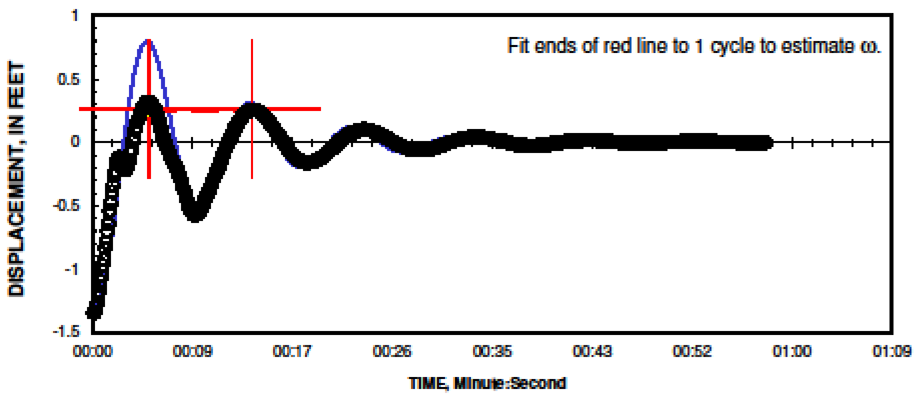
COMPUTED

Aquifer Thickness	37.5 Feet
$y_{0\text{-DISPLACEMENT}}$ =	1.32 Feet
$y_{0\text{-SLUG}}$ =	2.19 Feet
γ =	0.1052119 sec^{-1}
ω =	0.7059759 sec^{-1}
L =	63 Feet

Input is consistent.

T =	4310 Feet²/Day
K =	115 Feet/Day
S =	0.00001 d'less





REMARKS: van der Kamp, 1976 Water Resources Research

Island County Solid Waste Facility, Coueville, WA.
Well is fully penetrating, and has been interpreted as a possible paleo-channel

Slug_van-der-Kamp_N5D Mech 3

WELL ID: N5D Nitro 1

Local ID: N5D
Date: 9/20/2013
Time: 10:19

INPUT

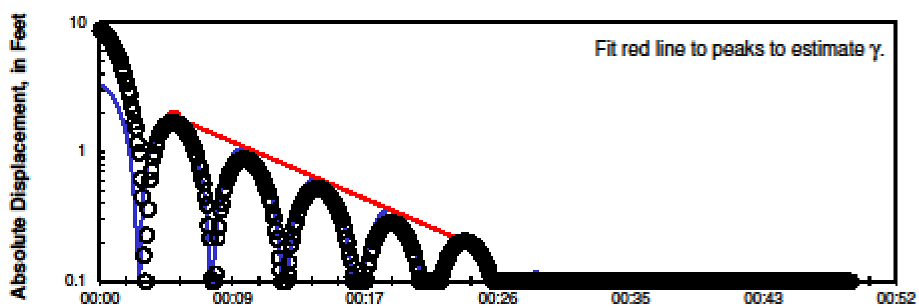
Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch
Depths to:	
water level (DTW)	151.77 Feet
Top of Screen	189 Feet
Base of Screen	227 Feet
Annular Fill:	
across screen --	Fine Sand
above screen --	Bentonite
Aquifer Material --	Sand and Gravel Mixe
ASSUMED S =	1.00E-05 d'less

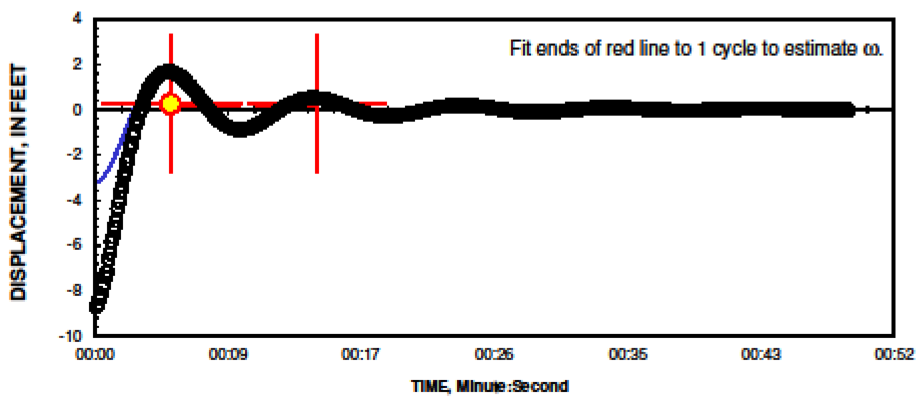
COMPUTED

Aquifer Thickness	37.5 Feet
$y_{0\text{-DISPLACEMENT}}$ =	3.26 Feet
$y_{0\text{-SLUG}}$ =	8.00 Feet
γ =	0.1169211 sec^{-1}
ω =	0.6613879 sec^{-1}
L =	71 Feet

Input is consistent.

T =	3380 $Feet^2$/Day
K =	90.1 Feet/Day
S =	0.00001 d'less





REMARKS: van der Kamp, 1976 Water Resources Research

Island County Solid Waste Facility, Coueville, WA.
Well is fully penetrating, and has been interpreted as a possible paleo-channel

WELL ID: N5D Nitro 2

Local ID: N5D
Date: 9/20/2013
Time: 10:45

INPUT

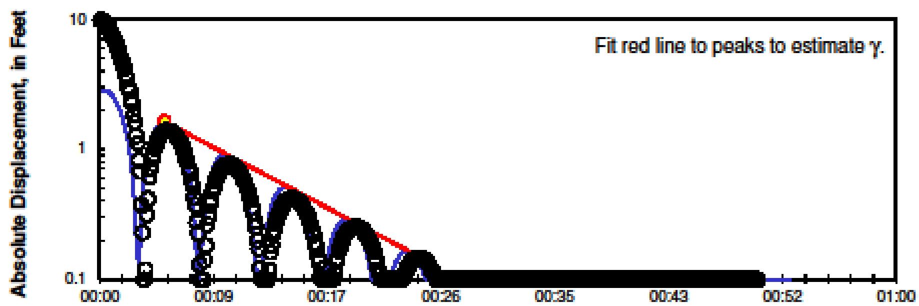
Construction:		
Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	6	Inch
Depths to:		
water level (DTW)	151.77	Feet
Top of Screen	189	Feet
Base of Screen	227	Feet
Annular Fill:		
across screen --	Fine Sand	
above screen --	Bentonite	
Aquifer Material --	Sand and Gravel Mixe	
ASSUMED S =	1.00E-05	d'less

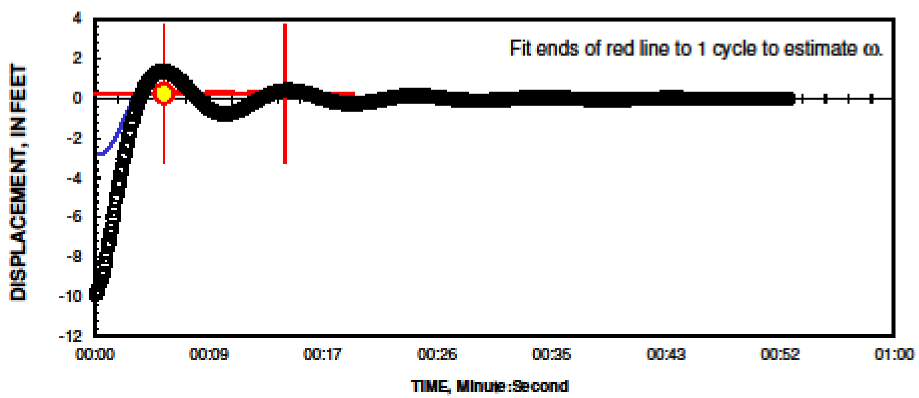
COMPUTED

Aquifer Thickness	37.5	Feet
$y_{0\text{-DISPLACEMENT}}$ =	2.98	Feet
$y_{0\text{-SLUG}}$ =	9.00	Feet
γ =	0.1232164	sec^{-1}
ω =	0.6829549	sec^{-1}
L =	67	Feet

Input is consistent.

T =	3420	$Feet^2/Day$
K =	91.2	Feet/Day
S =	0.00001	d'less





REMARKS: van der Kamp, 1976 Water Resources Research

Island County Solid Waste Facility, Coueville, WA.
Well is fully penetrating, and has been interpreted as a possible paleo-channel

WELL ID: N5D Nitro 3

Local ID:	N5D
Date:	9/20/2013
Time:	11:11

INPUT

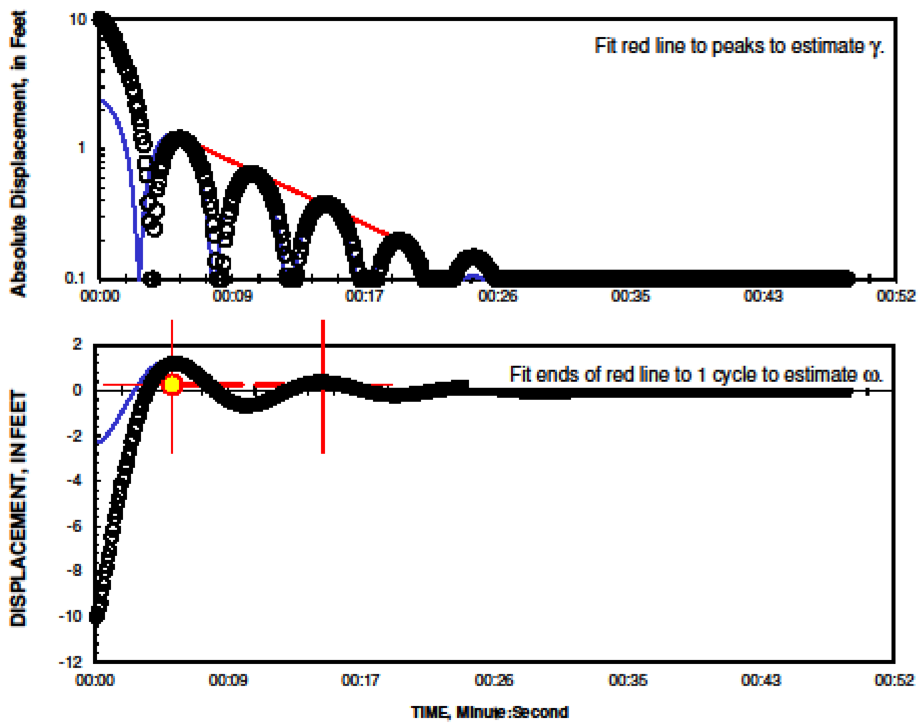
Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	6 Inch
Depths to:	
water level (DTW)	151.77 Feet
Top of Screen	189 Feet
Base of Screen	227 Feet
Annular Fill:	
across screen --	Fine Sand
above screen --	Bentonite
Aquifer Material --	Sand and Gravel Mixe
ASSUMED S =	1.00E-05 d'less

COMPUTED

Aquifer Thickness	37.5 Feet
$y_{0\text{-DISPLACEMENT}}$ =	2.39 Feet
$y_{0\text{-SLUG}}$ =	7.00 Feet
γ =	0.1274238 sec^{-1}
ω =	0.6411414 sec^{-1}
L =	75 Feet

Input is consistent.

T =	2910 $Feet^2$/Day
K =	77.6 Feet/Day
S =	0.00001 d'less



REMARKS: van der Kamp, 1976 Water Resources Research

Island County Solid Waste Facility, Coueville, WA.
Well is fully penetrating, and has been interpreted as a possible paleo-channel

Slug_van-der-Kamp_N5D Nitro 3