PERCHED MONITORING WELL INSTALLATION AND TESTING AT THE WHITE MESA URANIUM MILL APRIL THROUGH JUNE 2005

Prepared for:

International Uranium Corporation
1050 17th Street, Suite 950
Denver, Colorado 80265

Prepared by:

HYDRO GEO CHEM, INC.
51 West Wetmore, Suite 101
Tucson, Arizona 85705
(520) 293-1500

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HYDRO GEO CHEM, INC.

Environmental Science & Technology

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1. INTRODUCTION

This report describes the installation, development, and testing of eight new perched zone groundwater monitoring wells and three new temporary perched zone wells at the White Mesa Uranium Mill site during April through June, 2005. Work during this time also included installation of a replacement (MW-3A) for well MW-3. The positioning of the new wells and the well installation procedures were generally based on the work plan submitted by International Uranium (USA) Corporation (IUSA) (IUSA, 2005). Figure 1 is a map showing the approximate locations of the new wells. MW-3A, located approximately 10 feet south of MW-3, is not shown because of its close proximity to MW-3.

Six of the borings were core drilled, and all borings were video logged prior to casing installation. After completion, wells were developed by surging and bailing. Existing wells TW4-15 (now designated as MW-26) and TW4-17 (now designated as MW-32) were also developed at this time.

Hydraulic testing consisted of slug tests and was performed on existing well TW4-17 (now designated as MW-32), and all new wells (except MW-24 due to insufficient water in the well) during the week of June 13, 2005. Data were analyzed to estimate perched zone hydraulic properties in the vicinity of each new well. Slug testing and analysis procedures were similar to those used in previous testing at the site during July 2002 as described in Hydro Geo Chem, Inc. (HGC), 2002.

2. WELL INSTALLATION

All drilling and well construction activities were performed by Bayles Exploration. Mr. Lawrence Casebolt, under contract to IUSA, provided drilling, well construction, and development oversight and was responsible for lithologic logging of all borings. Mr. Stewart Smith of HGC provided additional oversight during the drilling phase, and Mr. Dean Henderson of the Utah Department of Environmental Quality (UDEQ) was present during a portion of the drilling (the week of June 13). Matt and Janice Johnson, of Widdison Turbine Company under contract to IUSA, performed the video logging of all borings just prior to casing installation. The construction of all wells except TW4-21 and MW-3A was similar to that of temporary wells TW4-15, TW4-16, and TW4-17 as described in HGC (2002), with one exception: 10-20 Colorado Silica Sand was used as a filter pack instead of pea gravel. Figures 2 through 13 are well construction schematics for the new wells based on diagrams provided by Mr. Casebolt. The static water levels shown in the construction schematics were those measured at the time of installation.

2.1 Drilling Methods

All wells were installed by air rotary using water and/or foam when needed to maintain circulation. A 12 3/4-inch-diameter tricone bit was used to drill a boring of sufficient diameter to install an 8-inch-diameter, schedule-40 polyvinyl chloride (PVC) surface casing. This surface casing extended to a depth of approximately 49 feet below land surface (ft bls) in all installations except

TW4-21 and MW-3A, where the surface casing extended only approximately 9 ft bls. All surface casings were grouted in place using portland cement prior to drilling (or reaming) to the total depth (TD).

Borings were advanced to TD using a 6 3/4-inch-diameter tricone bit, or cored using a 20-foot long, 2-inch inside diameter core barrel, then reamed with the 6 3/4-inch tricone bit. Except at MW-3A, coring generally began near the top of the Dakota Sandstone, encountered at depths of approximately 13 to 42 ft bls. The large diameter (12 3/4-inch) boring was initially advanced to a depth just below the contact, coring to TD performed, then the large diameter boring was advanced (if needed) to approximately 50 ft bls. The surface casing was then installed, followed by reaming to TD using the 6 3/4-inch tricone bit. Borings MW-23, MW-24, MW-28, and TW4-22 were continuously cored to TD starting at depths between 20 and 50 ft bls. MW-3A was cored between 70 ft bls and TD, and MW-30 from 20 to 60 ft bls.

All drill cuttings were logged at 2 1/2-foot depth intervals and samples were collected in labeled, self-sealing, plastic bags and labeled, plastic, cuttings storage boxes. The core was logged then stored in labeled, cardboard core boxes. Copies of lithologic logs, core logs, and photographs of the core submitted by Mr. Casebolt are provided in Appendix A.

Fluids and cuttings brought to the surface during drilling were routed to pits excavated for that purpose adjacent to the borings. In general, air was used as a drilling fluid until poor cuttings

retrieval necessitated the use of water and/or foam.

All borings were advanced into the Brushy Basin member of the Morrison Formation. In general, if a boring was drilled more than a few feet into the Brushy Basin, it was backfilled with cuttings and/or bentonite to a depth just below the contact prior to well casing installation.

2.2 Video Logging

Video logging was performed by Widdison Turbine Co. between April 19 and April 22, 2005. Video logs are available from IUSA's corporate offices.

2.3 Well Construction

All wells were constructed using 4-inch-diameter, schedule-40, flush-threaded PVC casing and 0.02-slot, factory-slotted PVC screen. Screened sections extended from just below the Brushy Basin contact to a depth above the static water level in the borings. 10-20 Colorado Silica Sand was used as a filter pack and installed to a depth of 3 to 5 feet above the screened interval. The annular space above the filter pack was then sealed with 3 to 5 feet of bentonite and grouted to the surface using portland cement.

2.4 Well Development

All new perched monitoring wells and existing wells TW4-15 (now MW-26) and TW4-17 (now MW-32) were developed by surging and bailing under the supervision of IUSA personnel and/or Mr. Casebolt. Mr. Stewart Smith, of HGC, and Mr. Dean Henderson, of UDEQ, were onsite during development of TW4-15 and TW4-17. Wells were surged using a vented, 4-inch-diameter surge block and then bailed. Bailing was conducted with a 3-inch-diameter-by-20-foot bailer having a maximum capacity of approximately 7.5 gallons. The time spent surging and bailing each of the wells was based in part on the length of the water column in the well. Wells MW-23, MW-24, and MW-3A could not be surged or bailed due to insufficient water levels. Details of the well development procedures and results are provided in a separate report submitted by IUSA.

3. HYDRAULIC TESTING

HGC personnel conducted hydraulic testing during the week of June 13, 2005. The hydraulic tests consisted of slug tests performed in the same manner as described in HGC (2002). Hydraulic tests were attempted at all new perched well installations (except MW-3A) and at existing well TW4-17 (now MW-26). MW-24 was not tested due to insufficient water in the well. The purpose of the tests was to estimate hydraulic parameters (primarily hydraulic conductivity) in the vicinity of each new well. The same slugs and electric water level meter were used in both the current testing event and the July 2002 testing event. The only difference between equipment used in the current and previous testing was that submersible Mini-Troll™ pressure transducers and data loggers were used in the current tests instead of the Geo Kon™ equipment used during the July 2002 tests.

3.1 Data Collection

Two slugs consisting of sealed, pea-gravel-filled, schedule-80 PVC pipe, one approximately 3 feet long, and one approximately 4 feet long, as described in HGC (2002), were used for the tests. The 3-foot slug had a larger diameter and displaced approximately 0.75 gallons of water. The 4-foot slug had a smaller diameter and displaced approximately 0.47 gallons. Typically, the 3-foot, 0.75-gallon displacement slug was used. If a test used the 3-foot slug and was slow due to low permeability conditions, a concurrent test was started in the next well using the 4-foot, 0.47-gallon

slug. Two Mini-Troll™ data loggers were available to allow two wells to be tested simultaneously.

In all cases, water level data were collected automatically using a Mini-Troll™ data logger and by hand using the electric water level meter. Automatically logged data were collected at 3-second intervals. Hand-collected data were obtained more frequently in the first few minutes of each test when water levels were changing rapidly, then more slowly as the rate of water level change diminished.

Prior to each test, the static water level in each well was measured by hand using the Mini-Troll™ electric water level meter. The meter was then lowered to a depth of approximately 8 to 10 feet below the static water level, and pressure readings were allowed to stabilize for several minutes prior to beginning a test. The slug and electric water level meter sensor were then suspended in the well just above the static water level. Each test commenced by lowering the slug to a depth of approximately 2 feet below the static water level over a period of a few seconds and taking water level readings by hand as soon as possible afterwards. Upon completion, equipment pulled from each well was rinsed with clean water prior to its use in the next test. Automatically logged data were checked, backed up on the hard drive of a personal computer, and then saved to a floppy disk prior to conducting the next test.

3.2 Data Analysis

Data were analyzed using Aqtesolv™ (HydroSOLVE, 2000), a computer program developed and marketed by HydroSOLVE, Inc. In preparing the automatically logged data for analysis, the total number of records was reduced. In general, all data collected in the first 30 seconds were retained, then every 2nd, then 3rd, then 4th, etc. record was retained for analysis. For example, if the first 10 records were retained (30 seconds of data at 3-second intervals), the next records to be retained would be the 12th, the 15th, the 19th, the 24th, etc. Displacements were calculated based on the maximum water level recorded by the Mini-Troll™ after lowering the slug into the well. In general, the maximum measured rise in water levels was about what would be expected considering the slug volume, the volume in the 4-inch-diameter casing, and the volume in the annular space between the casing and the 6 3/4-inch-diameter bore. Assuming a 30% effective porosity for the filter pack, the expected rise in water level is approximately 1 foot per gallon. The maximum expected rise for the 3-foot, 0.75-gallon slug is therefore about 0.75 feet, and for the 4-foot, 0.47-gallon slug, is about 0.47 feet.

Data were analyzed using two solution methods: the KGS unconfined method (Hyder et al., 1994) and the Bouwer-Rice unconfined method (Bouwer and Rice, 1976). When filter pack porosities were required by the analytical method, a value of 30% was used. The saturated thickness was taken to be the difference between the static water level measured just prior to the test and the depth to the Brushy Basin contact as defined in the drilling logs. In all cases, because the static water

level was below the top of the screened interval, the saturated thickness was also the effective screen length. Therefore, no corrections for partial penetration were required.

Barometric pressure was recorded throughout each test using a BaroTroll™ pressure transducer and logger. In all cases, except at MW-23, the test duration was short enough that the impact of changing barometric pressure could be ignored. However, a second test at MW-23 (labeled MW-23b), conducted overnight, required correction. The factor for correcting changes in water levels based on changes in barometric pressure was estimated via a trial-and-error approach. Assuming that changes in water levels were -60% of changes in barometric pressure seemed to provide the best correction, allowing interpretation of more of the data. Furthermore, good agreement exists between hydraulic conductivity estimates made by different solution methods when using this correction. The interpretation is complicated at this location by the extremely low hydraulic conductivity, the consequent small rate of change in water levels during the test, and by the likelihood that the relationship between changes in water level and changes in barometric pressure was not constant over the test.

The behavior of water levels at this location in relation to changes in barometric pressure is consistent with the discussion in HGC, 2004a. Water level changes in the perched wells are impacted by instantaneous transmission of barometric pressure changes down the well casings and delayed (lagged and attenuated) transmission of pressure changes to the water table at locations remote from the wells. The lag and attenuation at remote locations result from vertically downward

propagation of pressure changes through the low permeability vadose materials.

The KGS solution allows estimation of both specific storage and hydraulic conductivity, while the Bouwer-Rice solution allows estimation of only the hydraulic conductivity. The Bouwer-Rice solution is valid only for the straight-line portion of the data that results when the log of displacement is plotted against time. Typically, only the later-time data are interpretable. The KGS solution generally allows a fit to both early and late time data, and is sensitive to storage. Both solutions were used for comparison. Automatically logged and hand-collected data were analyzed separately using both solution methods. The hand-collected data, therefore, served as an independent data set and a check on the accuracy of the automatically logged data.

3.3 Results

The results of the analyses are provided in Table 1 and Appendix B. Appendix B contains plots generated by Aqtesolve™ that show the quality of fit between measured and simulated results, and reproduce the parameters used in each solution. Estimates of hydraulic conductivity range from 3.2×10^{-8} to 1.9×10^{-4} centimeters per second (cm/s). The value of 3.2×10^{-8} cm/s estimated for the first of two tests at MW-23 using the KGS solution is lower than any value previously estimated for the perched zone. Except for the low hydraulic conductivity estimates at MW-23, values are within the range previously measured at the site.

In general, the agreement between hydraulic conductivities estimated from the KGS and Bouwer-Rice solutions is good, and values agree within a factor of 2 except at TW4-21, where the estimates differed by a factor of about 5, and at the first test at MW-23, where the estimates differed by more than an order of magnitude. The KGS and Bouwer-Rice estimates for the second test at MW-23 (labeled MW-23b), however, were within 10%, suggesting that these are more reliable, although the data needed to be corrected for barometric pressure variation.

The agreement between estimates obtained from automatically logged and hand-collected data is also good. In all cases, the estimates based on automatically logged and hand-collected data using the KGS solution are within a factor of 2, and in all but three cases, are either identical or within 10% of one another. Estimates obtained from automatically logged and hand-collected data using the Bouwer-Rice solution are also close: identical or within approximately 25% in all cases except at TW4-21, where the estimates differ by a factor between 3 and 4. Late-time noise in the automatically logged data at TW4-21 did, however, make interpretation difficult using the Bouwer-Rice solution.

4. SITE HYDROGEOLOGY

The site hydrogeology is described in detail in Titan (1994). Updated descriptions of the perched zone hydrogeology based on work performed since Titan (1994), are provided in HGC (2003) and HGC (2004a). HGC (2004a) compares the hydrogeology of the perched zone in the vicinity of the chloroform investigation with downgradient areas. The results of the installation and testing of wells described in this report add detail to the hydrogeologic understanding of the perched zone, but do not fundamentally change the hydrogeologic interpretation of the site.

As indicated in the drilling logs, the Dakota and Burro Canyon formations, which host the perched water beneath the site, typically consist of very fine to coarse-grained, variably cemented quartz sandstone, with local layers and lenses of conglomerate, siltstone, shale, and claystone. The lithology of the new borings is generally similar to previous site borings, with no striking dissimilarities evident.

Except for the exceptionally low hydraulic conductivity of 3.2×10^{-8} cm/s estimated from the first slug test at MW-23 using the KGS solution, hydraulic conductivity estimates from the new wells are within the range previously reported for the site. In general (except for MW-23), the hydraulic conductivities estimated at the new wells are intermediate within the previously reported range. Perched zone hydraulic conductivities are highest in the area immediately northeast (upgradient) of Tailings Cell #2, and lowest in the areas south and southwest (downgradient) of the

tailings cells.

Figure 14 is a contour map of the upper surface of the Brushy Basin member of the Morrison Formation that includes data from the new wells. The upper surface of the Brushy Basin forms the base of the perched zone at the site. Ordinary linear kriging with a linear variogram was used to grid the raw data. Although additional detail is provided in the vicinity of the tailings cells by the new borings, the surface still shows a general dip to the south-southwest beneath the tailings cells. Possible paleo-ridge and channel features trending generally northeast-southwest, subparallel to the general dip, are evident in the contoured data. The depth to the Brushy Basin contact in the vicinity of MW-3, as defined by MW-3A, is 92.5 ft bls. This depth is between the reported TD of MW-3 (96 ft bls) and the bottom of the screened interval (87 ft bls).

Figure 15 is a contour map of second quarter 2005 perched water level data, including data from the new wells. This map was also generated by gridding the raw data using ordinary linear kriging with a linear variogram. The general direction of perched water flow inferred from the water level contours is to the southwest beneath the tailings cells. The general direction of groundwater flow and average magnitude of the hydraulic gradient are similar to previously reported values. Additional detail regarding local hydraulic gradients beneath the tailings cells is provided by the new installations.

Table 2 calculates the average perched water pore (interstitial) velocities in the vicinities of

the new wells and MW-32 based on hydraulic conductivity estimates and the estimated hydraulic gradients shown on Figure 16. Hydraulic conductivities shown in Table 2 are averages of estimates shown in Table 1. An effective porosity of 18% was used in the calculations. The heavy black lines in Figure 16 indicate the positions and lengths over which the perched zone hydraulic gradients were calculated. The method of calculation is substantially the same as described in HGC, 2004b.

As indicated, the calculated interstitial velocities range from 0.010 feet per year (ft/yr) at MW-23 to 49.5 ft/yr at TW4-21. Calculated velocities at MW-25, MW-30, TW4-20, TW4-21, and TW4-22 are greater than 10 ft/yr; velocities at MW-27, MW-29, MW-31, and MW-32 are between 1 and 10 ft/yr; and velocities at MW-23 and MW-28 are less than 1 ft/yr.

5. CONCLUSIONS

Data collected from new wells installed, developed, and tested between April and June 2005 provide additional detail regarding the perched zone hydrogeology at the site. The lithology of the new borings is similar to that of previous borings. Hydraulic conductivity estimates based on slug tests at the new wells range from 3.2×10^{-8} cm/s to 1.9×10^{-4} cm/s. The value of 3.2×10^{-8} cm/s, based on the first of two tests conducted at MW-23 and obtained using the KGS solution, is lower than any previously reported value for the perched zone. Except for estimates obtained at MW-23, the range of hydraulic conductivities estimated for the new wells is generally intermediate in the range of values previously reported for the site. Perched zone hydraulic conductivities are highest in the area immediately northeast (upgradient) of Tailings Cell #2, and lowest in the areas south and southwest (downgradient) of the tailings cells.

Data from the new borings has provided additional detail regarding the elevation of the Brushy Basin contact and hydraulic gradients beneath the tailings cells. However, the general interpretation of perched zone hydrogeology has not fundamentally changed based on the new data.

Perched water pore (interstitial) velocities in the vicinities of the new wells and MW-32 are calculated to range from 0.010 ft/yr at MW-23 to 49.5 ft/yr at TW4-21. Calculated velocities at MW-25, MW-30, TW4-20, TW4-21, and TW4-22 are greater than 10 ft/yr; velocities at MW-27,

MW-29, MW-31, and MW-32 are between 1 and 10 ft/yr; and velocities at MW-23 and MW-28 are less than 1 ft/yr.

Well development efforts (detailed in a separate IUSA report) resulted in clean water with no visible sediment at all new installations having sufficient water for development to be performed. Development efforts at existing wells MW-26 (TW4-15) and MW-32 (TW4-17), installed in 2002, did not result in sediment-free water. Sediment in these wells is believed to result from fines present in the perched water in those areas, that passes directly through the filter pack and well screens.

6. LIMITATIONS

The opinions and recommendations presented in this report are based upon the scope of services and information obtained through the performance of the services, as agreed upon by HGC and the party for whom this report was originally prepared. Results of any investigations, tests, or findings presented in this report apply solely to conditions existing at the time HGC's investigative work was performed and are inherently based on and limited to the available data and the extent of the investigation activities. No representation, warranty, or guarantee, express or implied, is intended or given. HGC makes no representation as to the accuracy or completeness of any information provided by other parties not under contract to HGC to the extent that HGC relied upon that information. This report is expressly for the sole and exclusive use of the party for whom this report was originally prepared and for the particular purpose that it was intended. Reuse of this report, or any portion thereof, for other than its intended purpose, or if modified, or if used by third parties, shall be at the sole risk of the user.

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TABLES

TABLE 1
Slug Test Results

		Automatically Logged Data			Hand Collected Data		
		KGS		Bouwer-Rice	KGS		Bouwer-Rice
Test	Saturated Thickness	K (cm/s)	Ss (1/ft)	K (cm/s)	K (cm/s)	Ss (1/ft)	K (cm/s)
MW-23	12	3.2×10^{-8}	1×10^{-1}	1.6×10^{-6}	NI	NI	NI
MW-23b	12	2.3×10^{-7}	2.3×10^{-3}	2.5×10^{-7}	NI	NI	2.0×10^{-7}
MW-25	33	1.1×10^{-4}	3.0×10^{-4}	7.4×10^{-5}	1.7×10^{-4}	2.0×10^{-4}	1.0×10^{-4}
MW-27	36	8.2×10^{-5}	5.3×10^{-4}	3.6×10^{-5}	1.4×10^{-4}	8.7×10^{-5}	3.1×10^{-5}
MW-28	23	1.7×10^{-6}	2.0×10^{-2}	1.7×10^{-6}	1.7×10^{-6}	2.0×10^{-2}	2.0×10^{-6}
MW-29	18	1.1×10^{-4}	1.9×10^{-4}	9.3×10^{-5}	1.3×10^{-4}	2.1×10^{-4}	1.0×10^{-4}
MW-30	24	1.0×10^{-4}	2.9×10^{-4}	6.4×10^{-5}	1.1×10^{-4}	1.4×10^{-4}	5.1×10^{-5}
MW-31	53	7.1×10^{-5}	2.5×10^{-5}	6.9×10^{-5}	7.4×10^{-5}	7.2×10^{-6}	6.9×10^{-5}
MW-32	46	3.0×10^{-5}	8.8×10^{-5}	2.6×10^{-5}	2.8×10^{-5}	2.5×10^{-4}	3.0×10^{-5}
TW4-20	43	5.9×10^{-5}	1.6×10^{-5}	4.2×10^{-5}	7.0×10^{-5}	1.2×10^{-5}	5.3×10^{-5}
TW4-21	63	1.9×10^{-4}	1.1×10^{-4}	3.2×10^{-5}	1.9×10^{-4}	3.2×10^{-5}	9.4×10^{-6}
TW4-22	55	1.3×10^{-4}	6.8×10^{-6}	1.1×10^{-4}	1.3×10^{-4}	4.5×10^{-6}	1.1×10^{-4}

Notes:

Bouwer-Rice = Unconfined Bouwer-Rice solution method in Aqtesolv™
cm/s = Centimeters per second
ft = Feet
K = hydraulic conductivity
KGS = Unconfined KGS solution method in Aqtesolv™
Ss= specific storage
NI= Not interpretable due to insufficient sensitivity.

TABLE 2
Estimated Perched Zone Pore Velocities

Well	Hydraulic Conductivity[a]		Hydraulic Gradient	Pore Velocity[b]
	(cm/s)	(ft/yr)	(ft/ft)	(ft/yr)
MW-23	2.2×10^{-7}	0.22	0.008	0.010
MW-25	1.1×10^{-4}	112	0.023	14.3
MW-27	7.2×10^{-5}	74	0.022	9.0
MW-28	1.8×10^{-6}	1.8	0.029	0.29
MW-29	1.1×10^{-4}	112	0.013	8.1
MW-30	8.1×10^{-5}	83	0.027	12.4
MW-31	7.1×10^{-5}	73	0.024	9.7
MW-32	2.9×10^{-5}	29	0.021	3.38
TW4-20	5.6×10^{-5}	57	0.037	11.7
TW4-21	1.9×10^{-4} [c]	194	0.046	49.5
TW4-22	1.2×10^{-4}	123	0.029	19.8

Notes:

[a] *Average of estimates; value for MW-23 based on second test at MW-23.*

[b] *Assumes effective porosity of 0.18*

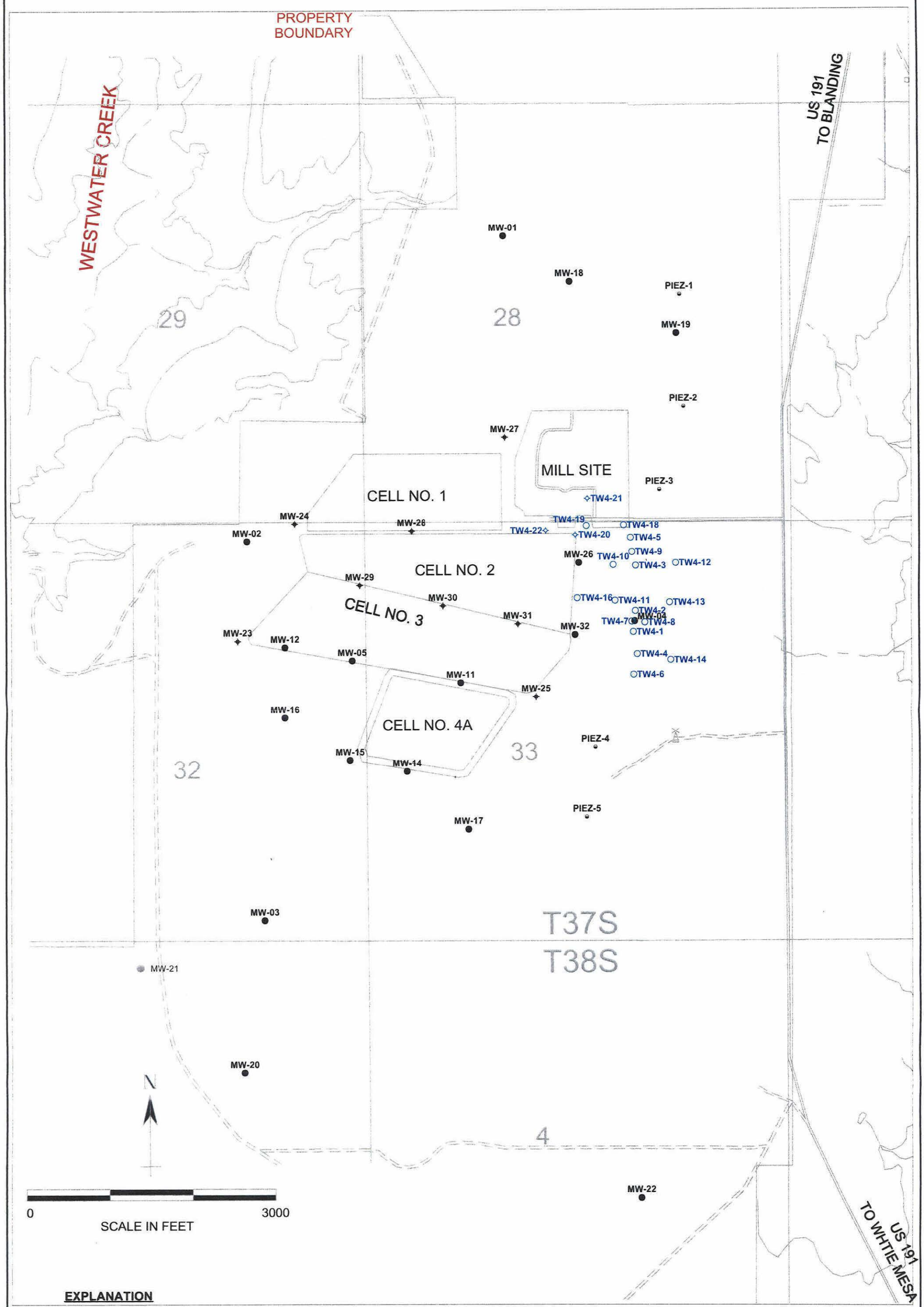
[c] *Estimates from Bouwer-Rice method not included in average*

cm/s = Centimeters per second

ft/ft = Feet per foot

ft/yr = Feet per year

FIGURES



EXPLANATION

MW-20	perched monitoring well
TW4-19	temporary perched monitoring well
PIEZ-1	perched piezometer
MW-31	new perched monitoring well (installed April, 2005)
TW4-20	new temporary perched monitoring well (installed April,2005)

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PERCHED WELL LOCATIONS
IUSA WHITE MESA

APPROVED	DATE	REFERENCE	FIGURE
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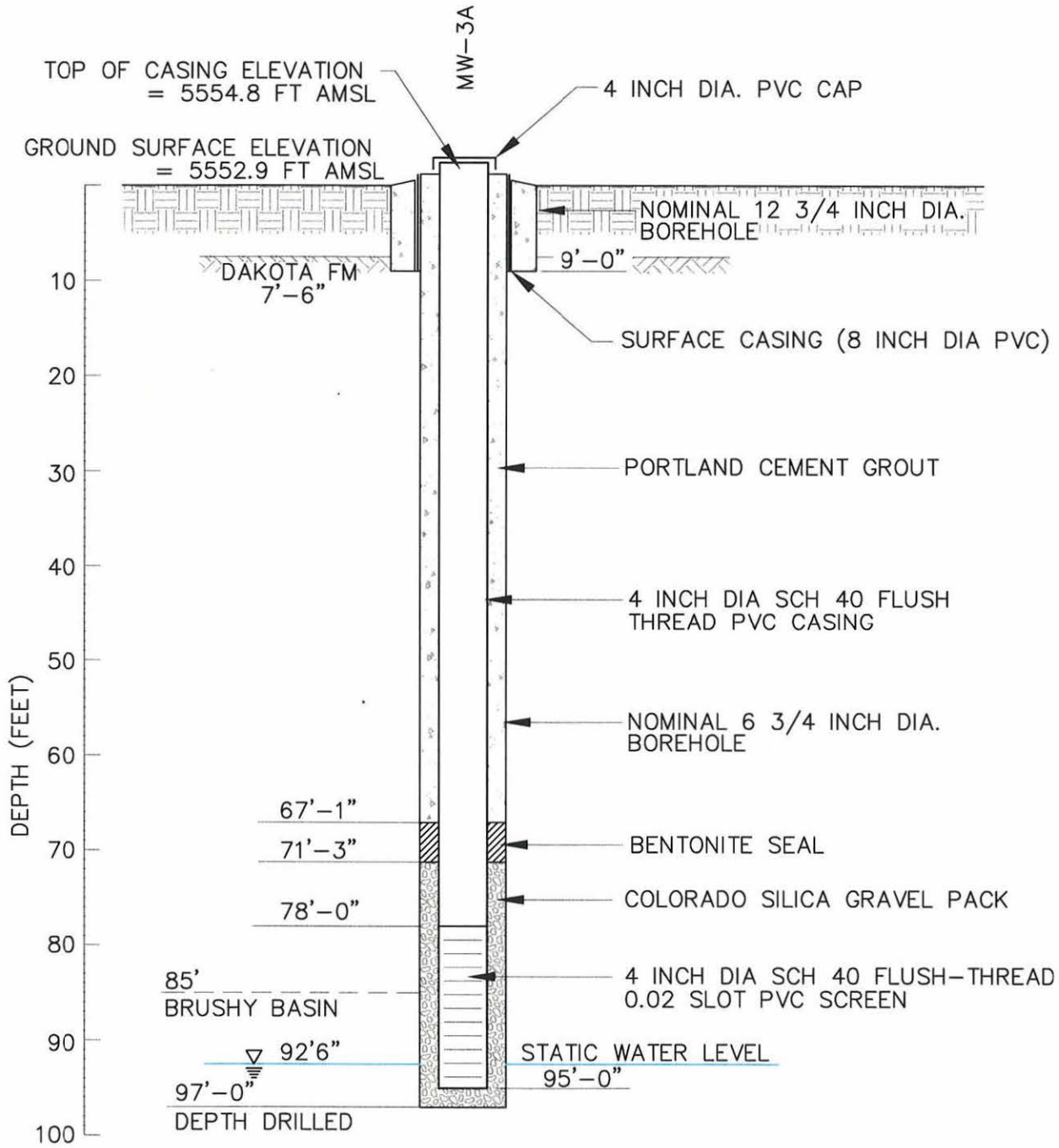
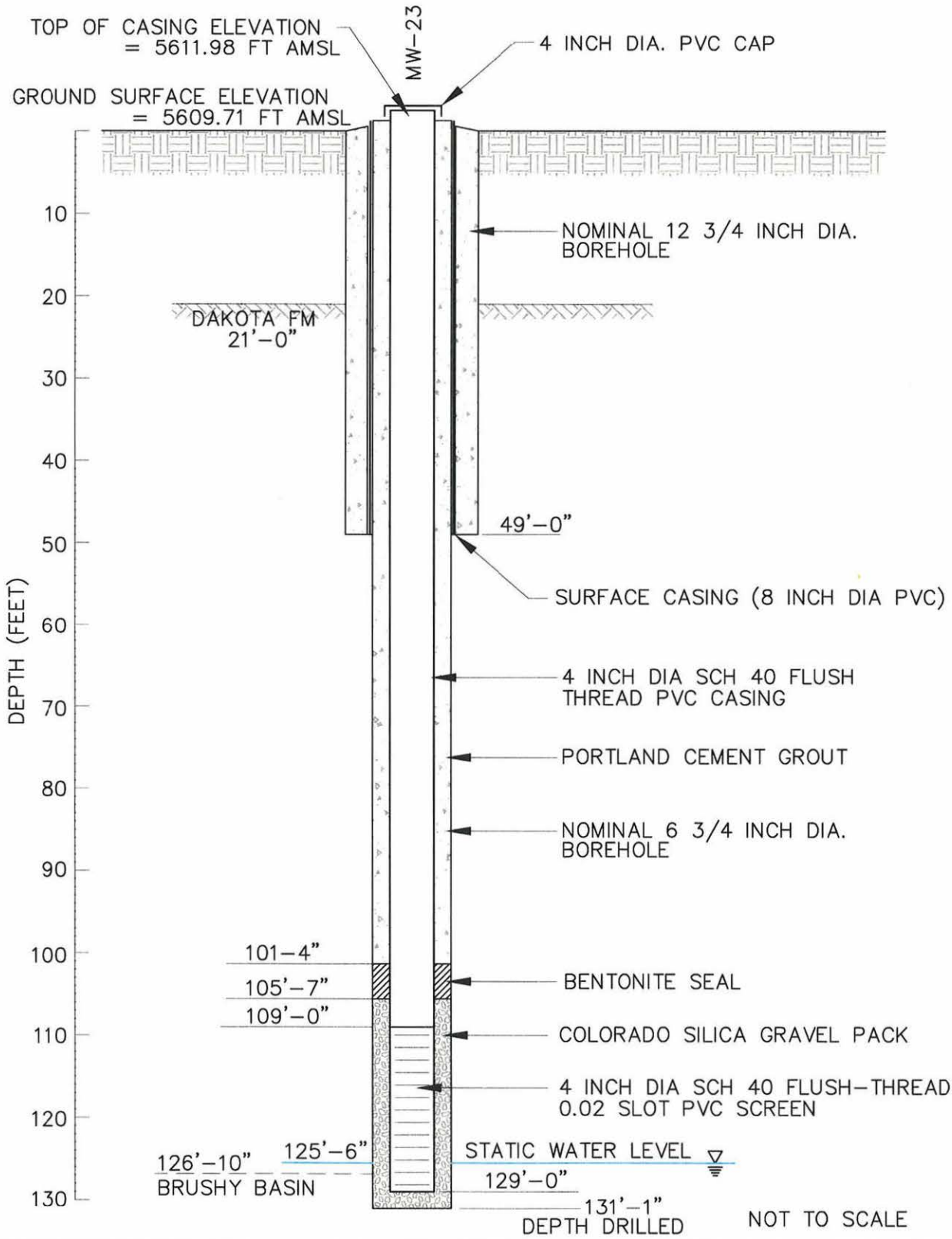


NOT TO SCALE

HYDRO GEO CHEM, INC.

MW-3A
AS-BUILT WELL CONSTRUCTION SCHEMATIC

Approved	Date	Revised	Date	Reference:	FIG.
SS	8/01/05			7180210A	2



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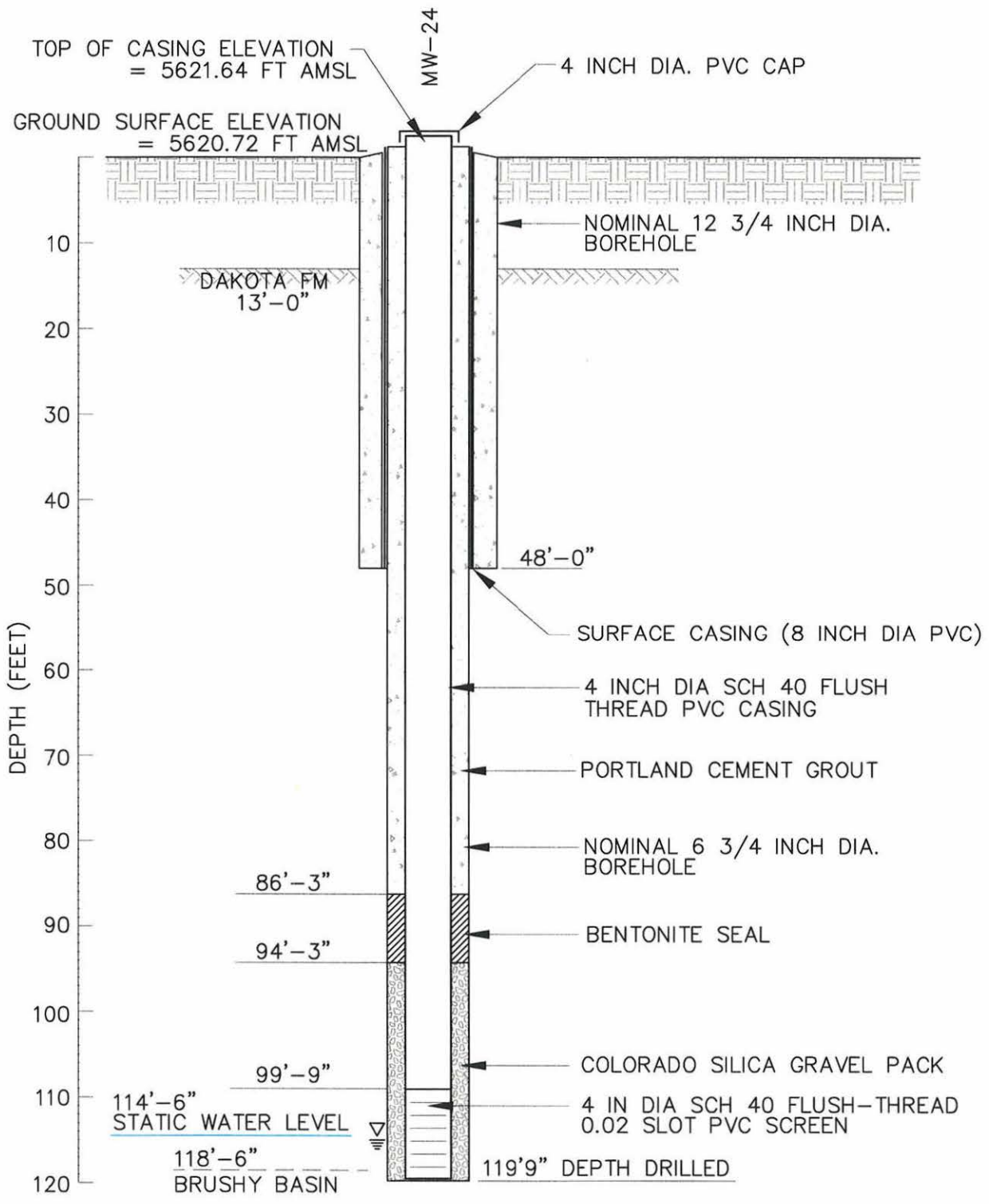
MW-23
AS-BUILT WELL CONSTRUCTION SCHEMATIC

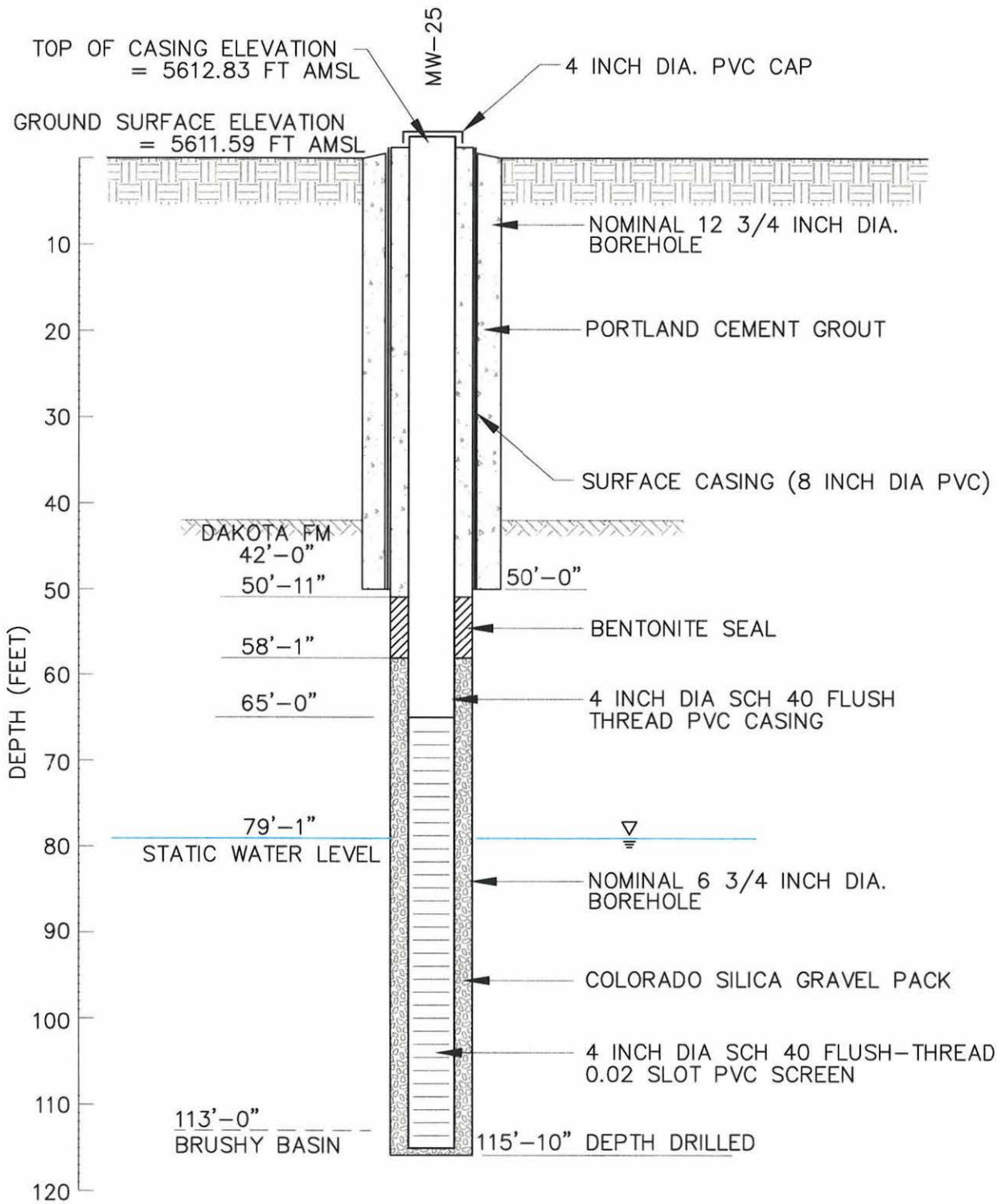
Approved	Date	Revised	Date	Reference:	FIG.
SS	8/01/05			7180211A	3



HYDRO GEO CHEM, INC.

MW-24
AS-BUILT WELL CONSTRUCTION SCHEMATIC

Approved	Date	Revised	Date	Reference:	FIG.
SS	8/01/05			7180212A	4

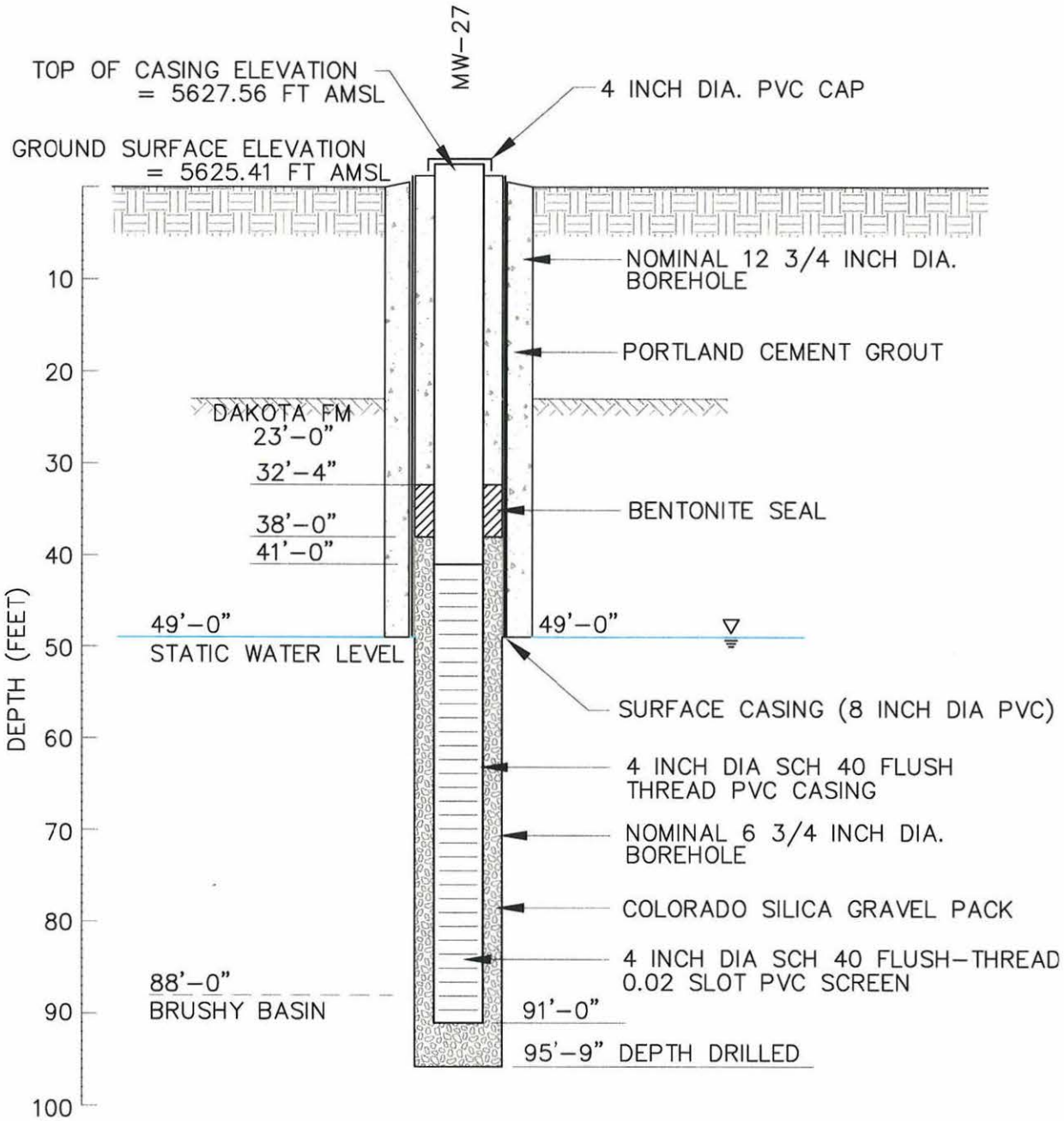


NOT TO SCALE

HYDRO
GEO
CHEM, INC.

MW-25
AS-BUILT WELL CONSTRUCTION SCHEMATIC

Approved	Date	Revised	Date	Reference:	FIG.
SS	8/01/05			7180213A	5

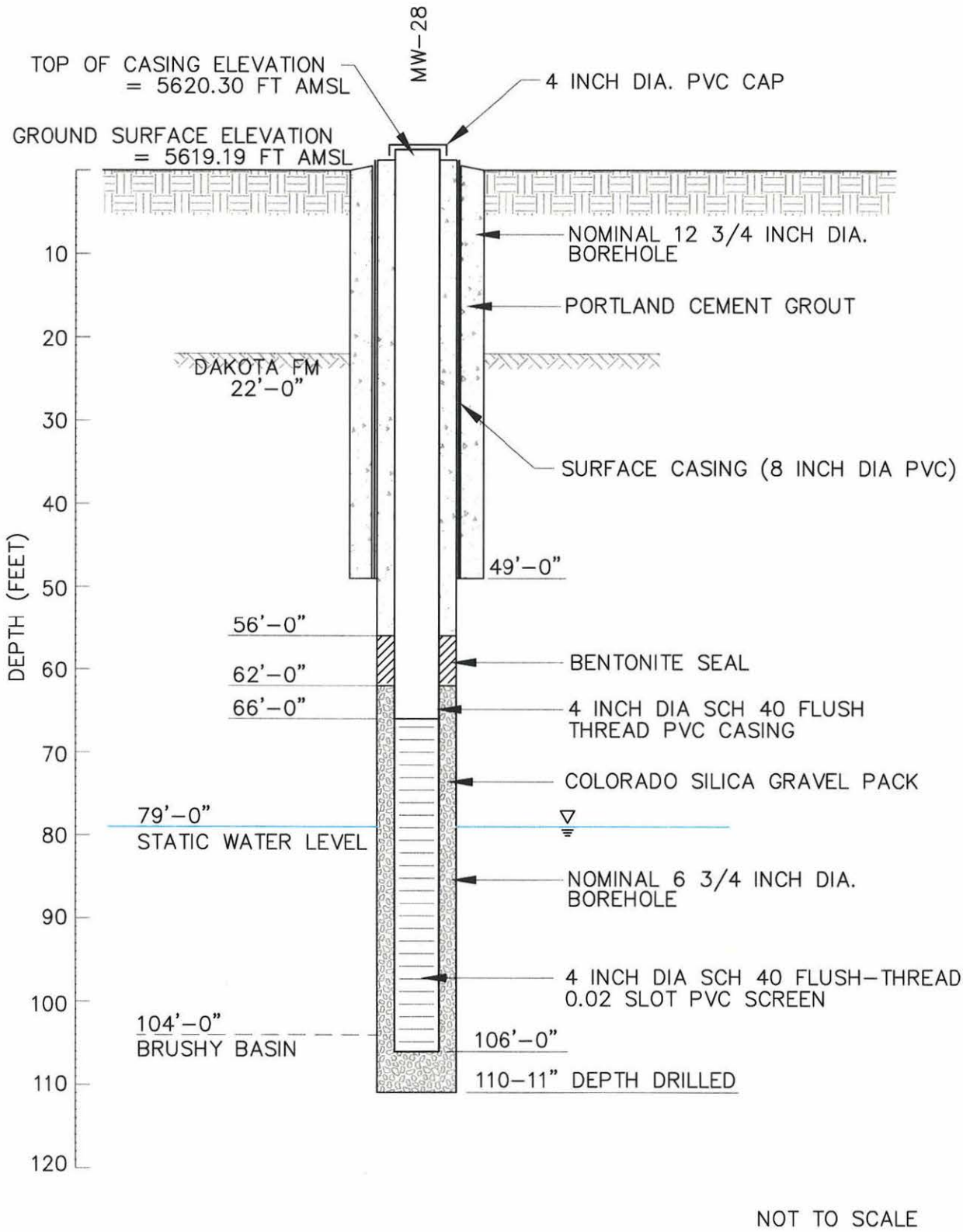


NOT TO SCALE

HYDRO
GEO
CHEM, INC.

MW-27
AS-BUILT WELL CONSTRUCTION SCHEMATIC

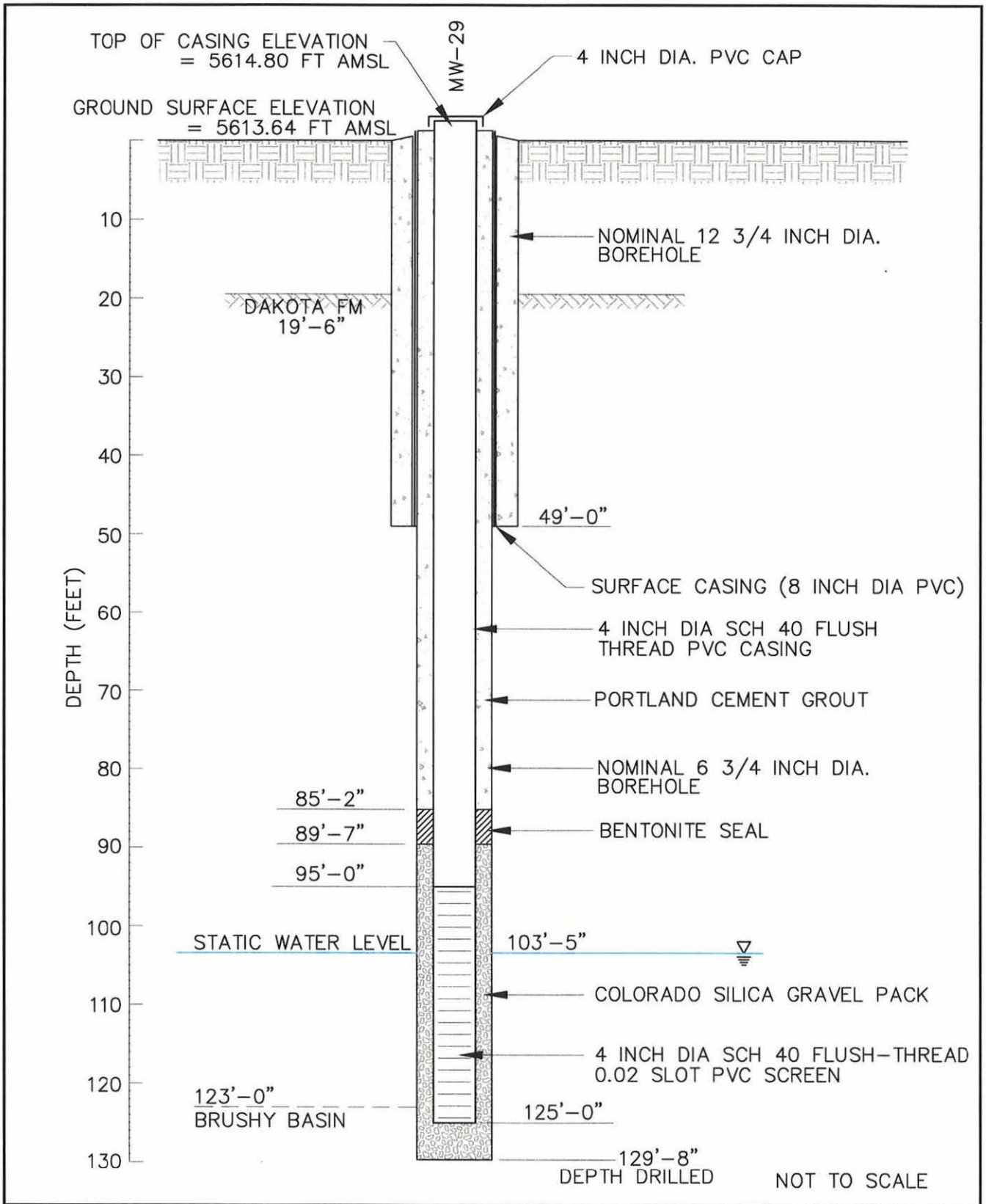
Approved	Date	Revised	Date	Reference:	FIG.
SS	8/01/05			7180214A	6



HYDRO
GEO
CHEM, INC.

MW-28
AS-BUILT WELL CONSTRUCTION SCHEMATIC

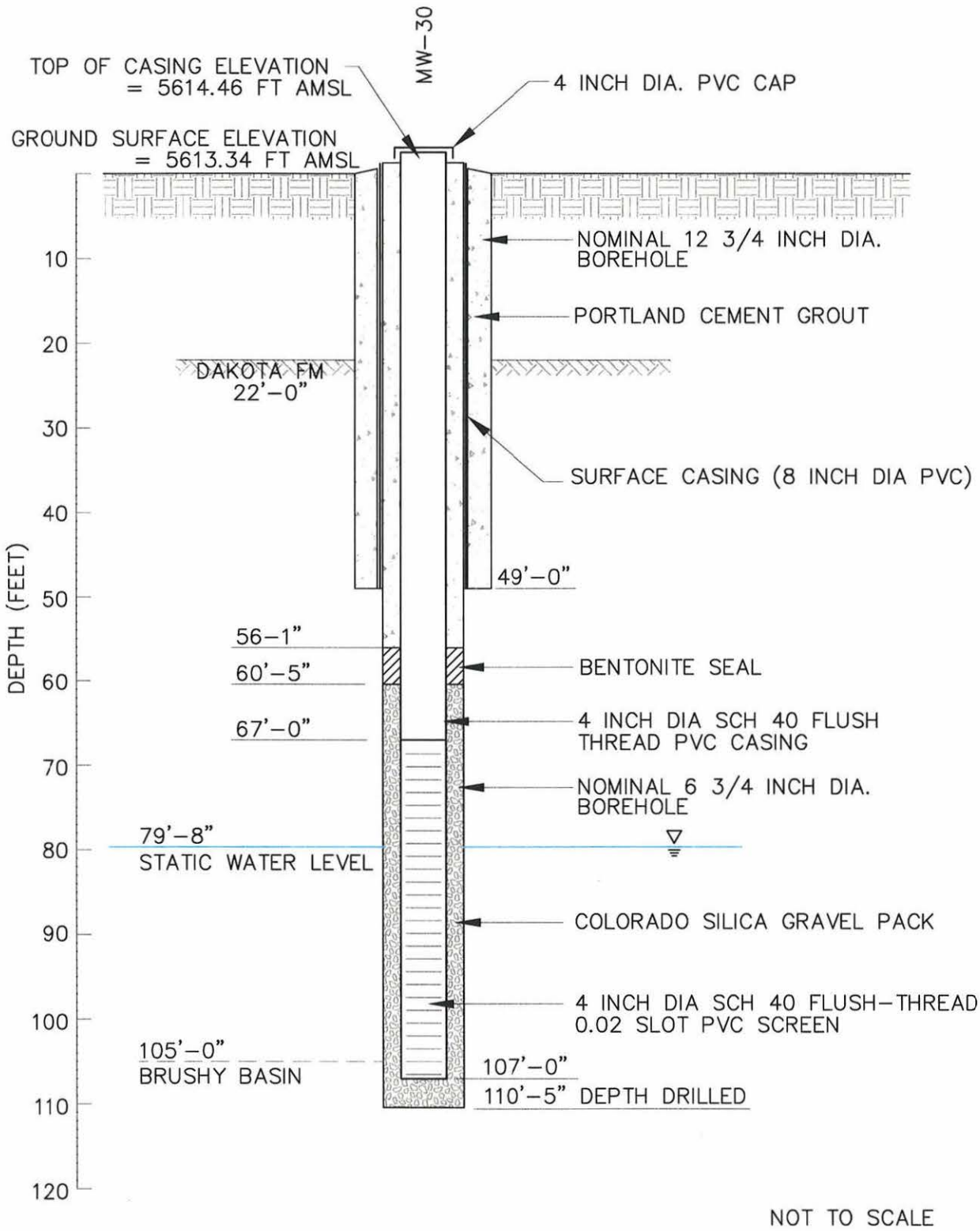
Approved	Date	Revised	Date	Reference:	FIG.
SS	8/01/05			7180215A	7



HYDRO GEO CHEM, INC.

MW-29
AS-BUILT WELL CONSTRUCTION SCHEMATIC

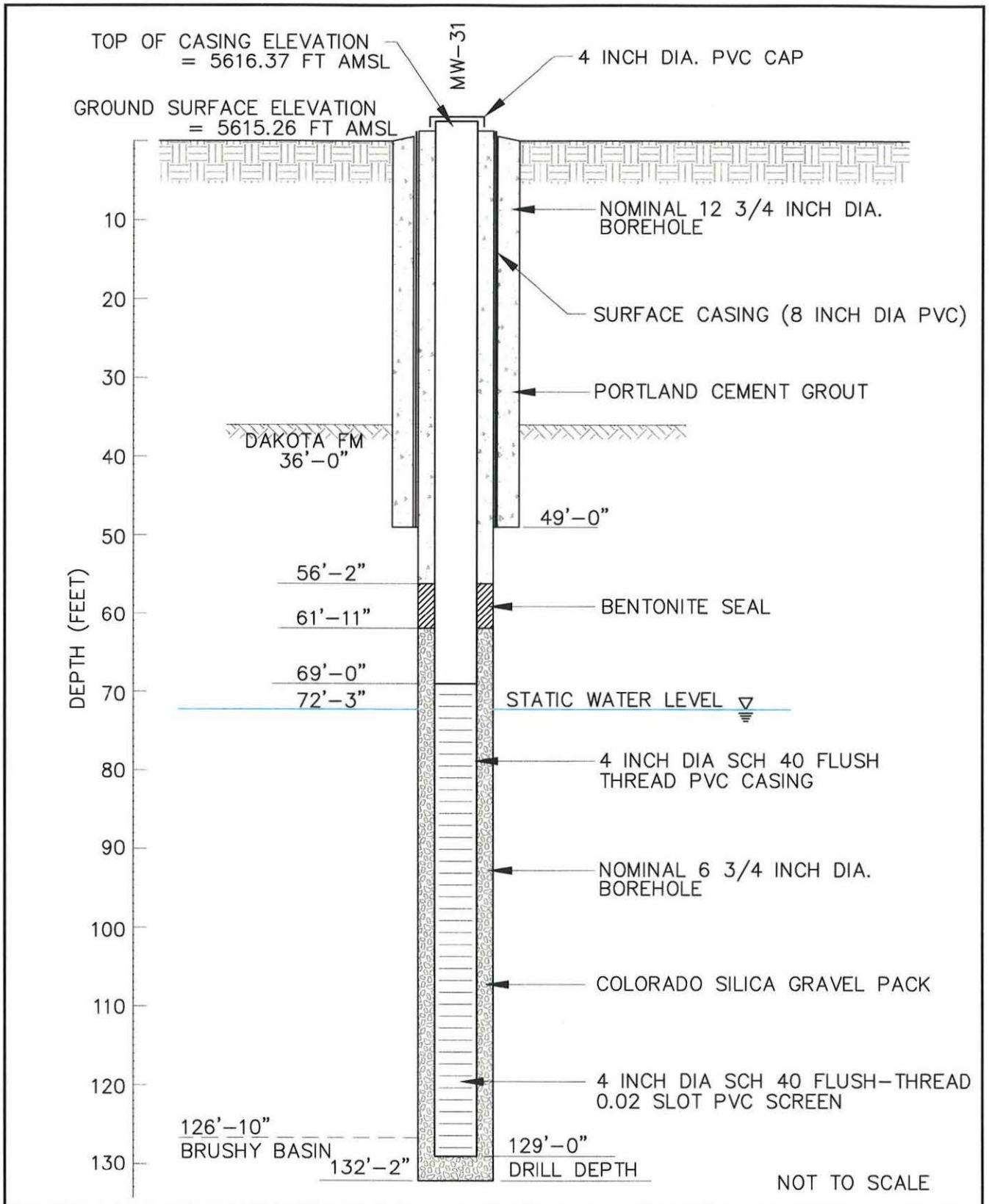
Approved	Date	Revised	Date	Reference:	FIG.
SS	8/01/05			7180216A	8



HYDRO
GEO
CHEM, INC.

MW-30
AS-BUILT WELL CONSTRUCTION SCHEMATIC

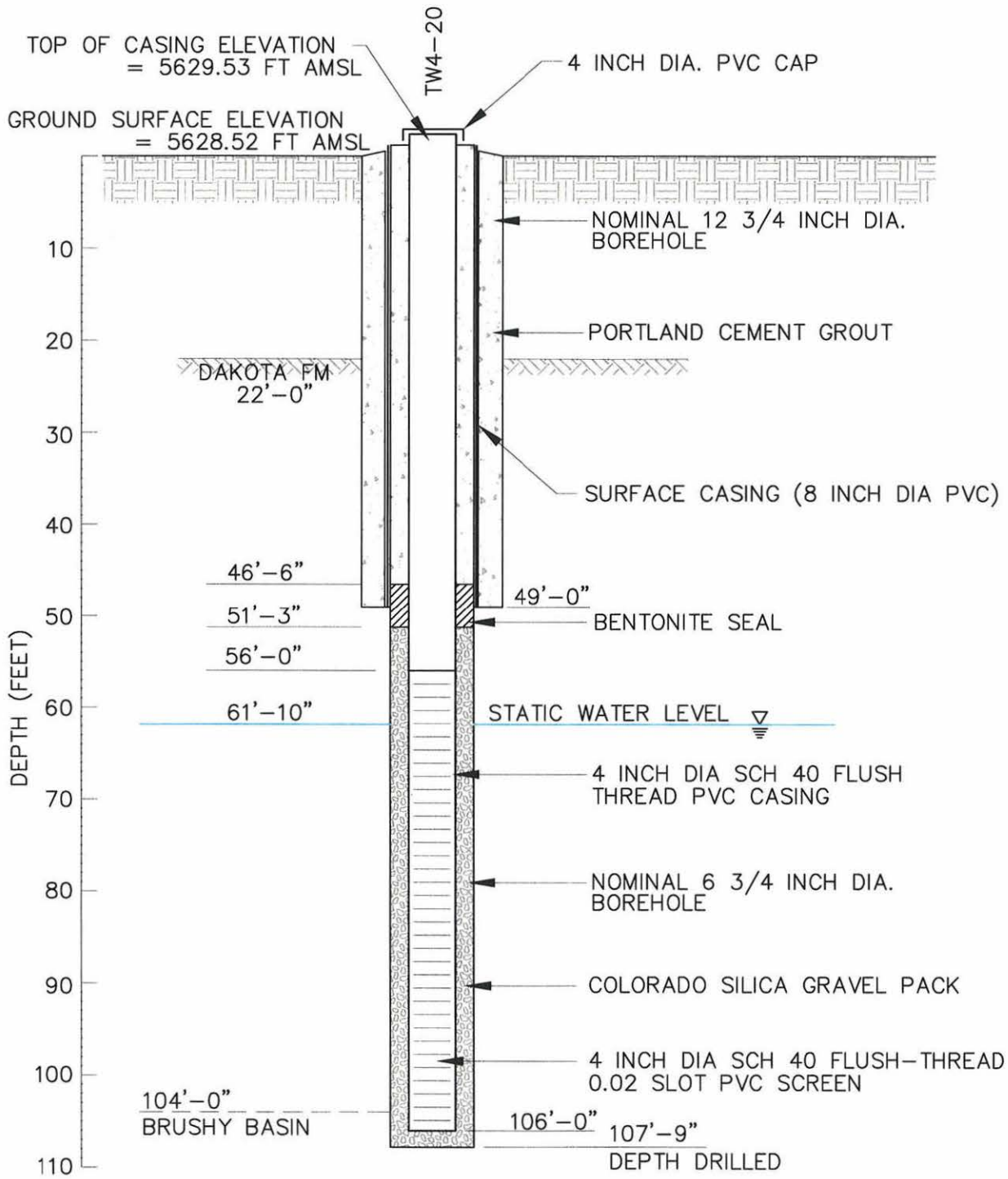
Approved	Date	Revised	Date	Reference:	FIG.
SS	8/01/05			7180217A	9



HYDRO
GEO
CHEM, INC.

MW-31
AS-BUILT WELL CONSTRUCTION SCHEMATIC

Approved	Date	Revised	Date	Reference:	FIG.
SS	8/01/05			7180218A	10

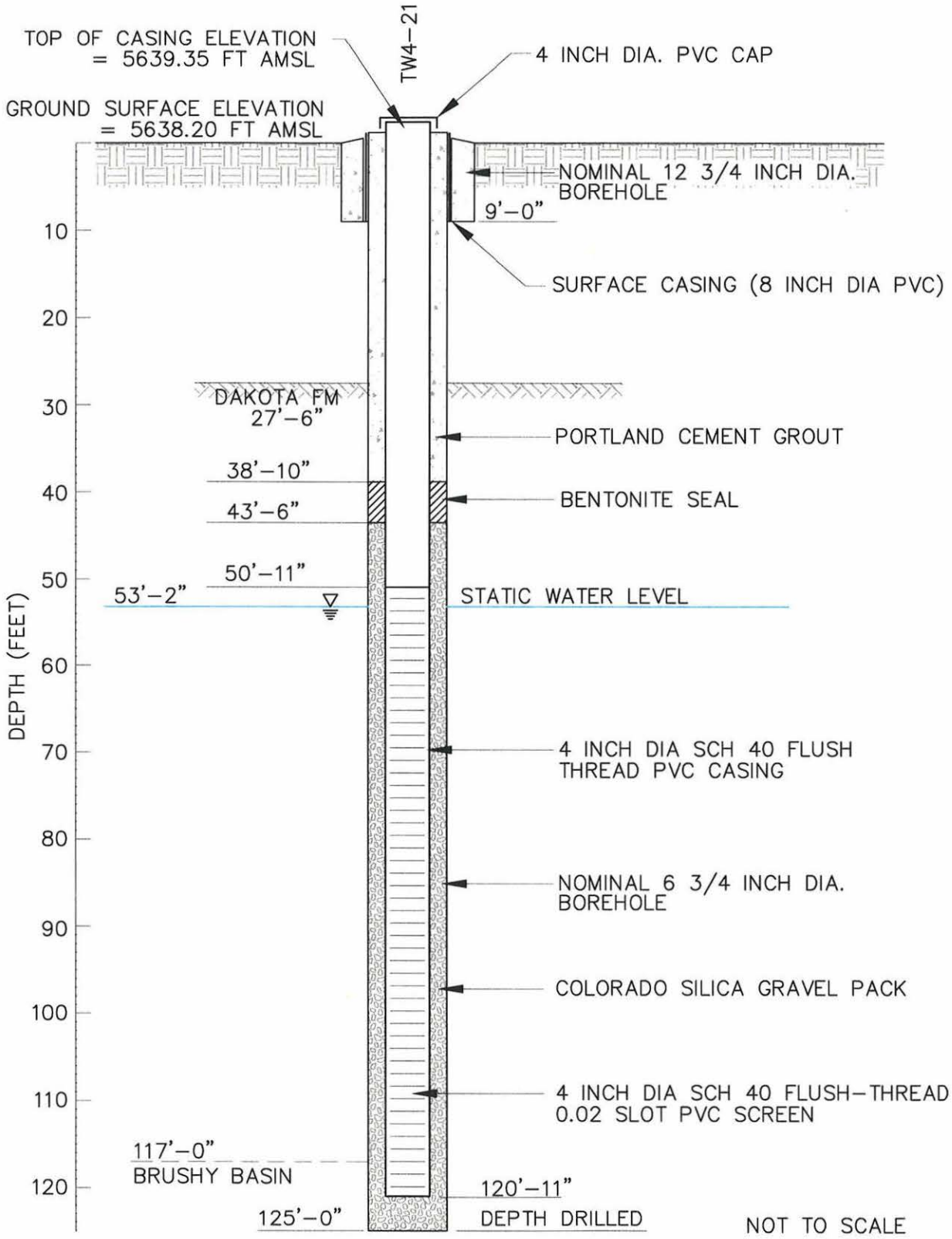


NOT TO SCALE

HYDRO GEO CHEM, INC.

TW4-20
AS-BUILT WELL CONSTRUCTION SCHEMATIC

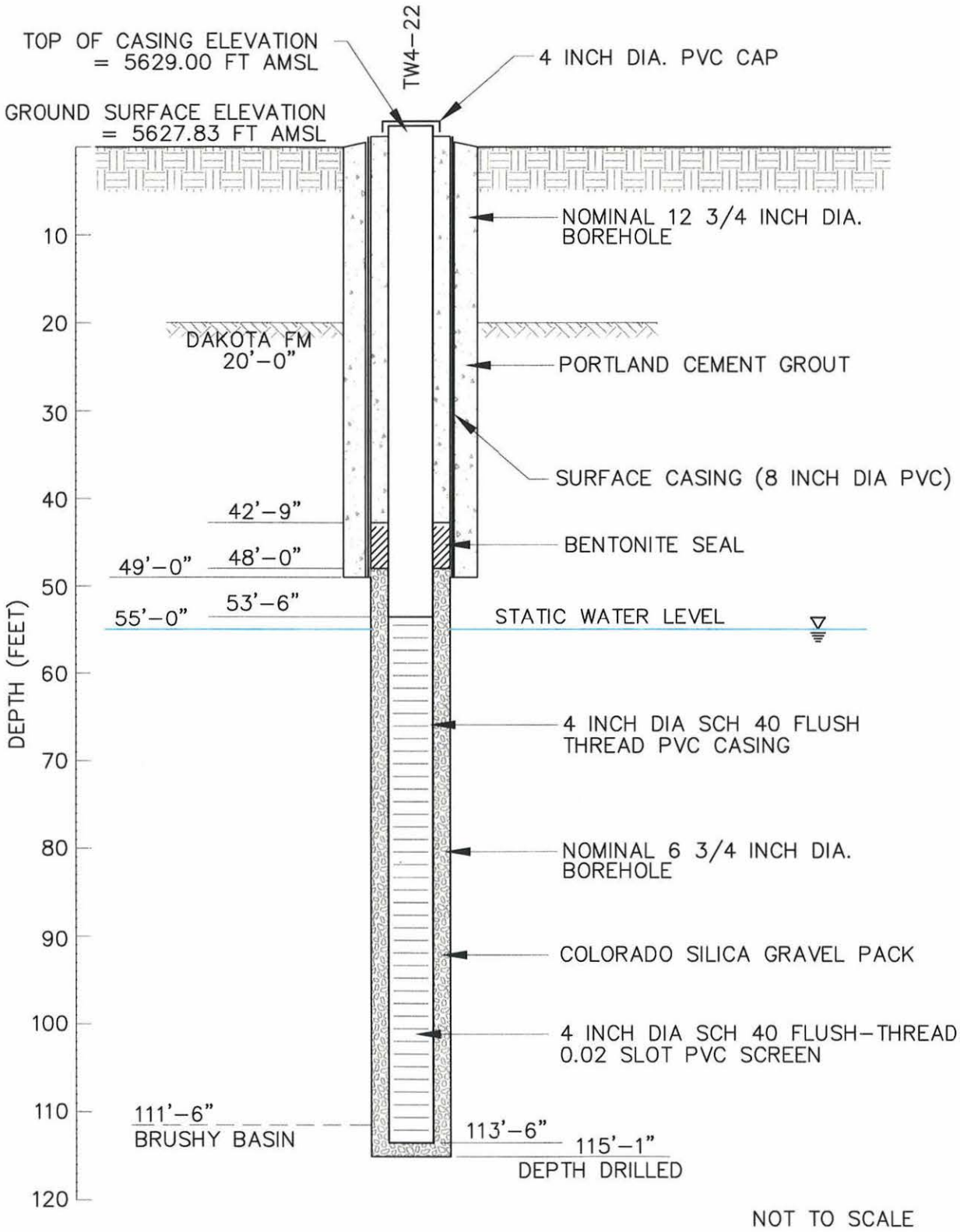
Approved	Date	Revised	Date	Reference:	FIG.
SS	8/01/05			7180219A	11



HYDRO
GEO
CHEM, INC.

TW4-21
AS-BUILT WELL CONSTRUCTION SCHEMATIC

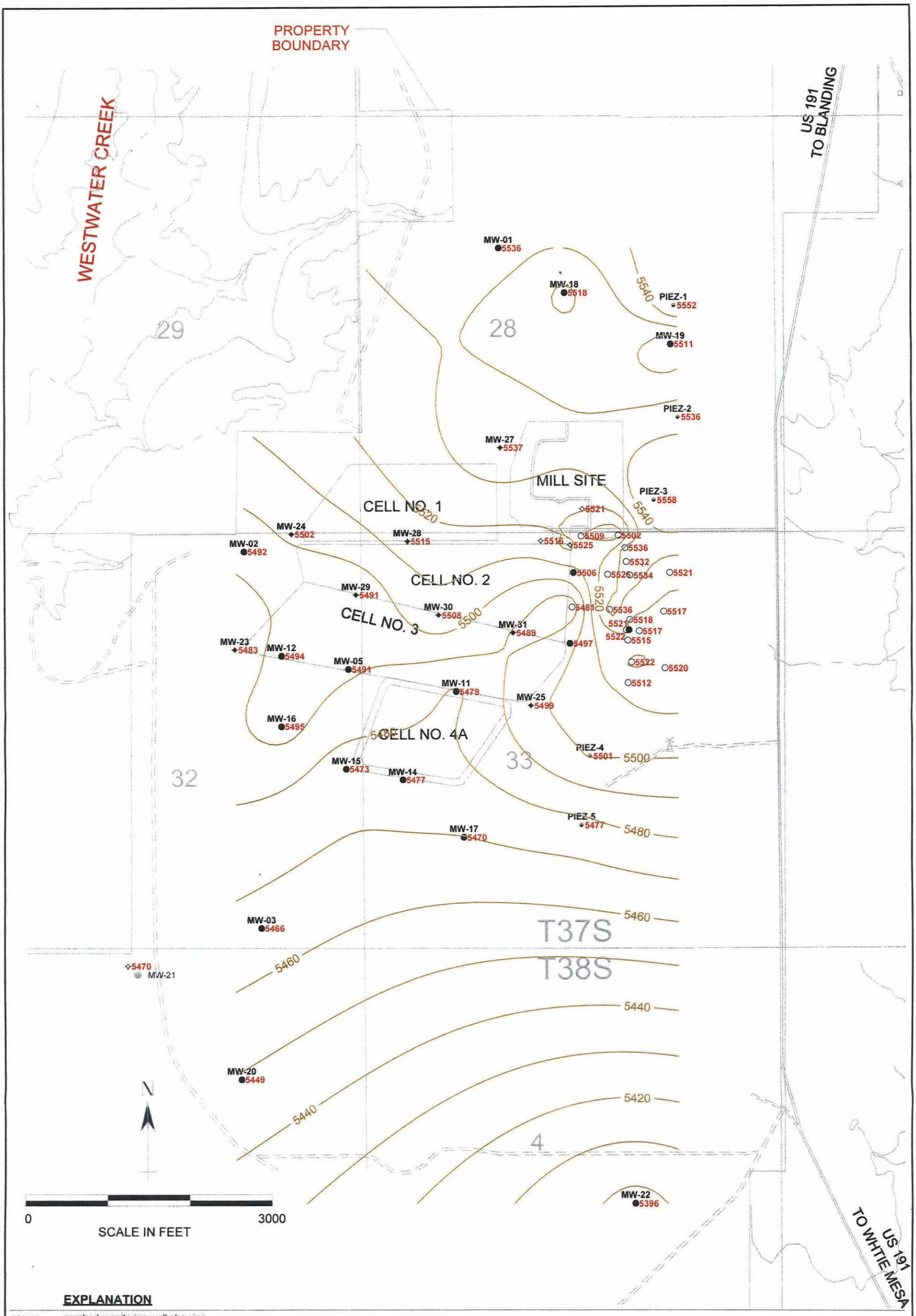
Approved	Date	Revised	Date	Reference:	FIG.
SS	8/01/05			7180220A	12



HYDRO
GEO
CHEM, INC.

TW4-22
AS-BUILT WELL CONSTRUCTION SCHEMATIC

Approved	Date	Revised	Date	Reference:	FIG.
SS	8/01/05			7180221A	13



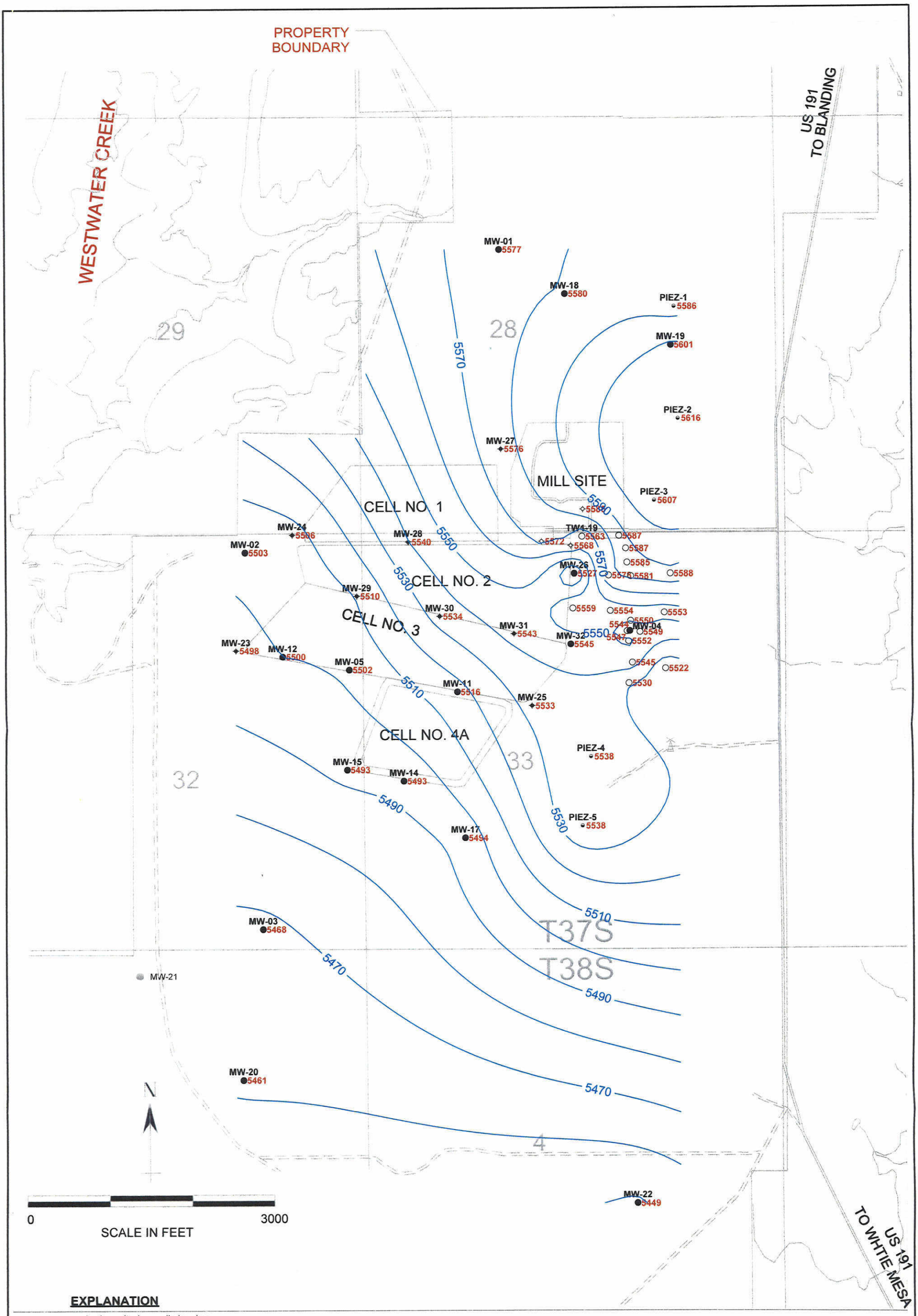
EXPLANATION

MW-20 5449	perched monitoring well showing elevation in feet amsl
5481	temporary perched monitoring well showing elevation in feet amsl
PIEZ-1 5552	perched piezometer showing elevation in feet amsl
MW-31 5489	new perched monitoring well showing elevation in feet amsl
5525	new temporary perched monitoring well showing elevation in feet amsl

HYDRO GEO CHEM, INC.

KRIGED BRUSHY BASIN CONTACT ELEVATIONS
IUSA WHITE MESA

APPROVED	DATE	REFERENCE	FIGURE
		H:/718000/hydtst05/hydgeol/bbel0705.srf	14



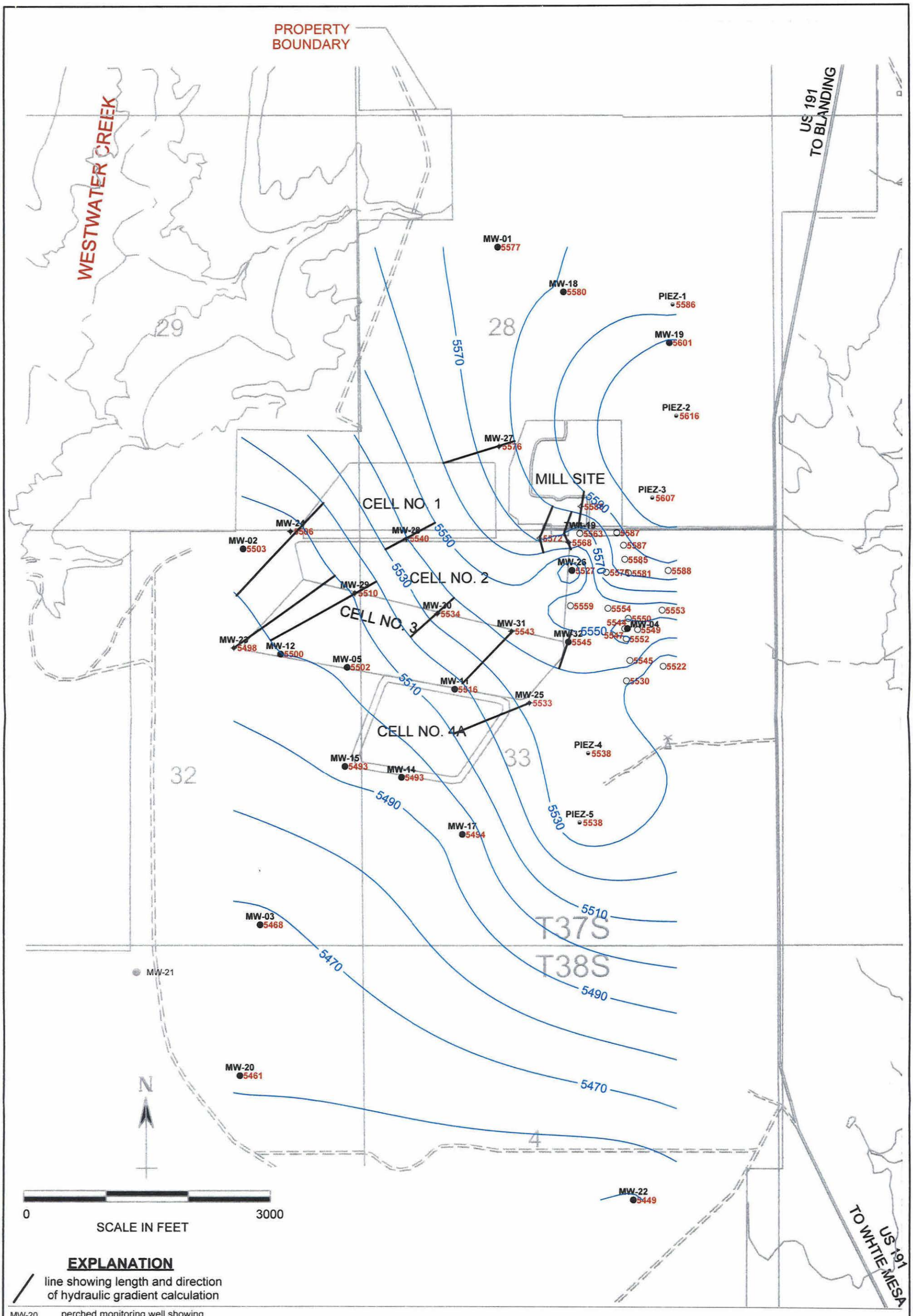
EXPLANATION

MW-20 ● 5461	perched monitoring well showing elevation in feet amsl
○ 5551	temporary perched monitoring well showing elevation in feet amsl
PIEZ-1 ⊖ 5586	perched piezometer showing elevation in feet amsl
MW-31 ✦ 5543	new perched monitoring well showing elevation in feet amsl
✧ 5568	new temporary perched monitoring well showing elevation in feet amsl

HYDRO GEO CHEM, INC.

KRIGED JUNE, 2005 WATER LEVELS
IUSA WHITE MESA

APPROVED	DATE	REFERENCE	FIGURE
		H:/718000/hydtst05/hydgeol/wl0705.srf	15



EXPLANATION

line showing length and direction of hydraulic gradient calculation

MW-20 ● 5461	perched monitoring well showing elevation in feet amsl
○ 5551	temporary perched monitoring well showing elevation in feet amsl
PIEZ-1 ⊖ 5586	perched piezometer showing elevation in feet amsl
MW-31 ✦ 5543	new perched monitoring well showing elevation in feet amsl
✧ 5568	new temporary perched monitoring well showing elevation in feet amsl

HYDRO GEO CHEM, INC.

KRIGED JUNE, 2005 WATER LEVEL MAP SHOWING LOCATIONS OF HYDRAULIC GRADIENT COMPUTATIONS IUSA WHITE MESA

APPROVED	DATE	REFERENCE	FIGURE
		H:/718000/hydtst05/hydgeol/grad0705.srf	16

APPENDIX A

LITHOLOGIC AND CORE LOGS

Date 4-19-05 Geologist L. Casebolt Drilling Co. Bayles Exploration Co. Hole No. MW-3A
Property White Mesa Mill Project _____ Unit No. _____ Sec. _____ Twp. _____ Rge. _____
County San Juan State Utah Location _____ Elev. _____

PAGE 1 OF 1
T.D. PROBE _____
T.D. DRILL 95.0
FLUID LEVEL _____

Depth	Sample Taken	Graphic Log	Alteration	Gamma Anomaly	Breccia Pipe	Lithology	Color of Wet Sample	Grain Size	Sorting	Angularity	Cement Matrix	Iron Oxide	Pyrite Amount	Pyrite Habit	Pyrite Alter.	Metallic	Non-Metallic	React.-10% HCL	Carbon Amount	Carbon Type	Remarks
0																					
2.5						Sndy sh	rdbn	vf-m	p									vs			Surface soil/Shale
5.0						Sndy sh	rdbn-tn	vf-m	p									vs			
7.5						ss-sltst	rdbn	vf-f	m									vs			
10.0						qtz ss	vltgy-wh	f	w	sa								w			Upper Dakota Fm Ct @ approx 7.5 ft.
12.5						qtz ss	lttn	f	w	sr								N			
15.0						qtz ss	ltgytn	f-cr	p	sr								N			sparse pk-wh chert grains
17.5						qtz ss	ltgytn	f-m	p	sr								N			
20.0						qtz ss	ltgytn	f-m	p	sr								N			
22.5						qtz ss	ltgytn	f	w	sr								N			
25.0						qtz ss	lttn	f-m	p	sr								N			sparse multicolor chert grains
27.5						qtz ss	lttn	f-m	w	sr								N			
30.0						qtz ss	tn	m-v cr	p	sa								N			abnt. multi color chert grains
						qtz ss-peb	tn	m-v cr	p	a								N			congl. zone abnt chert frags.
35.0						qtz ss-sh	tn-blgy	m cr	p	sr								N			blgy shale frags.
37.5						qtz ss, sh, l	blgy-tn	m-v cr	p	sa								N			blgy shale frags, chert frags, congl. zone
40.0						qtz ss	tn	vf-v cr	p	sa								N			chert frags
42.5						qtz ss	tn	m-v cr	p	sr								N			
45.0						qtz ss, cgl	tn	f-v cr	p	sr								N			congl. zone
47.5						qtz ss, cgl	tn	f-v cr	p	sr								N			congl. zone
50.0						qtz ss	tn	m-v cr	p	sr								N			
52.5						cgl, qtz ss	dkgytn	cr-v cr	p	a								N			cgl. zone abnt. chert frags
55.0						qtz ss	tn	f-m	p	sr								N			
57.5						qtz ss, sh	vltgy	vf	w	r								N			sparse blgy sh
60.0						sltst, ss, cgl	ltblgy	f-peb	p	sa								N			cgl. zone, sparse chert frags
62.5						qtz ss	lttn	f-cr	p	sr								N			some chert frags
65.0						qtz ss	ltgytn	f-v cr	m	r								N			" " "
67.5						qtz ss	ltgytn	f-v cr	m	r								N			" " "
70.0						qtz ss	ltgytn	f-v cr	p	sr								N			qtz ss, begin coring
72.5						qtz ss	dkgybn	m-v cr	f	sr		LT						N			abnt. chert frags
75.0						qtz ss	dkgybn	m-v cr	f	sr		LT						N			
77.5						qtz ss	ltgy	vf-m	p	sa								N			abnt. wh chert grains
80.0						qtz ss	ltgy	vf-cr	p	sa								N			
82.5						qtz ss	ltgy	f-cr	p	sr								N			
85						qtz ss	ltgy	f-m	f	sr								N			
87.5						qtz ss	ltgy	m-vcr	p	sa								VW			25% chert frags, trace blgy sh
90.0						qtz, ss	gytn	vcr-peb	p	sa								VW			
92.5						cgl, qtz ss	gytn	vcr-peb	p	sa								N			Upper Brushy Basin Mbr. Ct @ 92.5 ft (from core)
95.0						sh, cgl	gybl-bn	cr-peb	p	sa								N			95.0 T.D.

PERCENTAGE COMPOSITION IMAGE

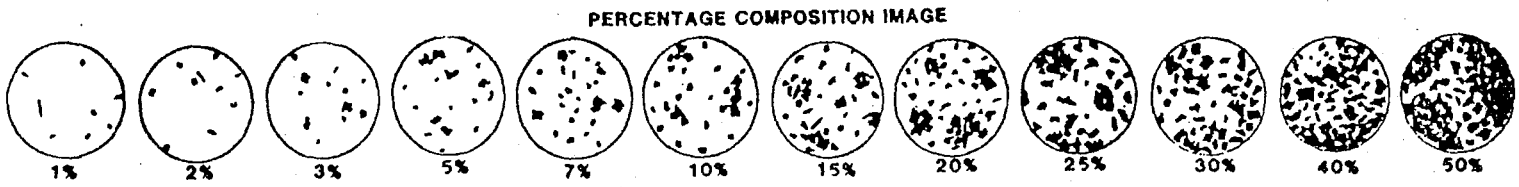
Date 4-4-05 Geologist L Casebolt Drilling Co. Bayles Exploration Hole No. MW-23
Property White Mesa Project MW-23 Unit No. _____ Sec. 32 Twp. _____ Rge. _____
County San Juan State Utah Location _____ Elev. ≈ 5608

PAGE 1 OF 2
T.D. PROBE _____
T.D. DRILL 132
FLUID LEVEL _____

REMARKS drilled with foam & air

Depth	Sample Taken	Graphic Log	Alteration	Gamma Anomaly	Breccia Pipe	Lithology	Color of Wet Sample	Grain Size	Sorting	Angularity	Cement Matrix	Iron Oxide	Pyrite Amount	Pyrite Habit	Pyrite Alter.	Metallic	Non-Metallic	React.-10% HCL	Carbon Amount	Carbon Type	Remarks
0																					
2.5						sltst	ltrdbn											m			Surface soil.
5.0						Sndy sltst	ltrdbn											vs			
7.5						Sndy sltst	ltrdbn											s			
10.0						qtz ss, sltst	ltpkbn											vs			
12.5						sltst, sh	ltpkbn											vs			
15.0						slty sh	ltpk.bn											vs			
17.5						slty sh	ltpk.bn											s			
20.0						sndy sh	ltpkbn											vs			
22.5						qtz ss, sltst	ltbn	f-m	p	sa								vs			Upper Dakota Fm. ct @ approx 21.0 ft
25.0						qtz ss	ltqybn	f	f	sa								vs			
27.5						qtz ss	ltqybn	f-m	f	sa		l						s			
						qtz ss, sh	qybn	vf-m	f	sa		l						vs			
32.5						qtz ss	ltqybn	m-cr	p	sa								s			
35.0						qtz ss	ltorbn	m-vcr	p	sa								m			
37.5						qtz ss	ltpkbn	m-cr	p	sa		l						s			
40.0						qtz ss	ltpkbn	m-cr	p	sa		l						m			
42.5						qtz ss	tn	m-vcr	p	a		l						m			abnt. light colored chert frags
45.0						qtz ss	tn	m-cr	f	sa		l						m			" light-dk chert frags.
47.5						qtz ss	tn	m-cr	f	sa		l						m			
50.0						qtz ss	tn	m-cr	f	sa		l						m			
52.5						qtz ss	lttn	vf-f	w	sa								s			very clean sand.
55.0						qtz ss	lttn	vf-m	w	sa								m			sparse chert fragments
57.5						qtz ss	ltqytn	f	w	sa								w			
60.0						qtz ss	ltqytn	f	w	sr								vw			
62.5						qtz ss	lttn	f-m	w	sr								N			
65.0						qtz ss	lttn	f-m	w	sr								N			
67.5						qtz ss	lttn	m-vcr	f	sa								N			abunt. light colored chert grains
70.0						qtz ss	lttn	f-vcr	f	sa								N			
72.5						qtz ss	lttn	f-m	f	sa								N			
75.0						qtz ss	ltqytn	f-m	f	sa								N			
77.5						qtz ss	ltqytn	f-m	f	sa								N			
80.0						qtz ss	ltqytn	m	w	sr								m			
82						qtz ss	ltqy	m	w	sr								N			
85.0						qtz ss	ltqybn	f-m	f	sr								N			
87.5						qtz-ss	ltqybn	m	w	sr								N			
90.0						qtz ss	ltqybn	m	w	sa								N			
92.5						qtz ss	ltbn	m-cr	f	sa								N			abunt. light colored chert grains
95.0						qtz ss	ltbn	m	f	sa								N			
97.5						qtz ss	tn	f	w	sr								N			
100.0						qtz ss	ywtn	m	w	sr								N			
102.5						qtz ss	ywtn	f-m	f	sr								N			
105.0						qtz ss	ywtn	f	w	sr								N			
107.5						qtz ss	yewtn	vf-f	f	sr								N			
110.0						qtz ss	ywtn	f	w	sr								N			
112.5																					
115																					
117.5																					
120.0																					
122.5																					
125.0																					

PERCENTAGE COMPOSITION IMAGE



Date 4-4-05 Geologist L. Casebolt Drilling Co. Bayles Exploration Hole No. MW-23
Property White Mesa Mill Project MW-23 Unit No. _____ Sec. 32 Twp. _____ Rge. _____
County San Juan State Utah Location _____ Elev. _____

PAGE 2 OF 2
T.D. PROBE _____
T.D. DRILL 132
FLUID LEVEL _____

DEPTH	SAMPLE TAKEN	GRAPHIC LOG	ALTERATION	GAMMA ANOMALY	BRECCIA PIPE	LITHOLOGY	COLOR OF WET SAMPLE	GRAIN SIZE	SORTING	ANGULARITY	CEMENT MATRIX	IRON OXIDE	PYRITE AMOUNT	PYRITE HABIT	PYRITE ALTER.	METALLIC	NON-METALLIC	REACT.-10% HCL	CARBON AMOUNT	CARBON TYPE	REMARKS
125.0																					
127.5																					Upper Brushy Basin Mbr. ct @ approx 126.8'
130.0																					(from core log - no cuttings below 110.0')
132.0																					

PERCENTAGE COMPOSITION IMAGE

Date 4-7-05 Geologist L. Casebolt Drilling Co. Bayles Exploration Hole No. MW-24
Property White Mesa Mill Project _____ Unit No. _____ Sec. 32 Twp. 37S Rge. _____
County San Juan State Utah Location _____ Elev. ≈ 5620

PAGE 1 OF 1
T.D. PROBE _____
T.D. DRILL 120 ft.
FLUID LEVEL _____

DEPTH	SAMPLE TAKEN	GRAPHIC LOG	ALTERATION	GAMMA ANOMALY	BRECCIA PIPE	LITHOLOGY	COLOR OF WET SAMPLE	GRAIN SIZE	SORTING	ANGULARITY	CEMENT MATRIX	IRON OXIDE	PYRITE AMOUNT	PYRITE HABIT	PYRITE ALTER.	PYRITE METALLIC	NON-METALLIC	REACT.-10% HCL	CARBON AMOUNT	CARBON TYPE	REMARKS
0																					
2.5						slty sh	orbn											S			
5.0						slty sh	wh-ltorbn											VS			
7.5						slty sh	ltrdbn											VS			
10.0						slty sh	lt tn-ltrdbn											VS			
12.5						slty sh	ltpk-gyh											VS			
15.0						slty sh, qtz ss	ltorbn	f-cr	P	a								M			Upper contact Dakota Fm. @ approx 13.0 ft.
17.5						qtz ss	tn	m	W	sr		L						N			
20.0						sh	ltpogy											N			
22.5						qtz ss	ltgytn	vf-f	f	sa		L						N			Note coring began @ 20.0'
25.0						qtz ss, sh	ltgytn-wh	f-m	f	sa								N			
27.5						qtz ss, sh	ltgytn-wh	vf-m	P	sa								N			
30.0						qtz ss	lttn	vf-f	f	sa								N			
32.5						qtz ss	ltgy	vf	w	sa								N			
35.0						qtz ss	ltgy	vf-f	f	sa								N			
37.5						qtz ss	ltgy	f-m	f	sr								VW			
40.0						qtz ss	ltgy	f-cr	f	sr								VW			
42.5						qtz ss	ltgy	m	W	sr								N			
45.0						qtz ss	ltgy	m-cr	f	sr								N			
47.5						qtz ss	ltgy	m-cr	f	sr								N			
50.0						qtz ss	ltgy	m	W	r								N			
52.5						qtz ss	ltgytn	m-cr	f	sr								N			
55.0						qtz ss	ltorbn	m-cr	f	sa								N			multi colored chert frags as grains
57.5						qtz ss, sh	ltgygn-ltbn	m-cr	p	sa								N			
60.0						qtz ss	gy	vf-f	f	sr								N			
62.5						qtz ss, sh	gybn	vf-f	f	sr								N			
65.0						qtz ss, sh	ltgybn	vf-f	f	sr								N			
67.5						qtz ss	ltgybn	f	w	sr								N			
70.0						qtz ss	gybn	f	w	sr								N			
72.5						qtz ss	gybn	f	w	sr								N			
75.0						qtz ss	gybn	f	c	P	sa							N			some chert fragments as sand grains
77.5						qtz ss, sh	gy	vf	f	p	sr							VW			
80.0						qtz ss	ltgy	f-m	f	sr								VW			
82.5						qtz ss	ltgy	f	f	sr								N			
85.0						qtz ss	ltgytn	m-cr	f	sr								N			
87.5						qtz ss	ltgy	m-cr	f	sr								S			
90.0						qtz ss	tnbn	f-m	f	sr		L						S			
92.5						qtz ss	ltgytn	m-cr	f	sr								W			
95.0						qtz ss	ltgy	m-vcr	P	sr								VW			Some light colored chert frags. as grains
97.5						qtz ss	ltgy	m-cr	w	r								VW			" " " " " " "
100.0						qtz ss	ltgy	m-cr	w	r								VW			" " " " " " "
102.5						qtz ss	ltorgy	m-cr	f	sa								N			" " " " " " "
105.0						qtz ss	ltgy	m-cr	f	sr								N			" " " " " " "
107.5						qtz ss	lt tn	f	w	sr								N			
110.0						qtz ss	lt tn	f-m	w	sr								N			
112.5						qtz ss	lttn	f-m	w	sr								N.			
115.0						qtz ss	ltgytn	m	w	sr								N.			
117.5						qtz ss	ltgytn	m	w	r								N			
120						qtz ss, sh	ltgytn-gn											VW			upper Brushy Basin Ct. @ 118.5 ft.
T.D.																					

PERCENTAGE COMPOSITION IMAGE

Date 4-9-05 Geologist L. Casebolt Drilling Co. Bayles Exploration Co. Hole No. MW-25

Property White Mesa Mill Project _____ Unit No. _____ Sec. 33 Twp. _____ Rge. _____

County San Juan State Utah Location _____ Elev. ≈ 5610

PAGE 1 OF 1

T.D. PROBE _____

T.D. DRILL 115.0

FLUID LEVEL _____

Depth	Sample Taken	Graphic Log	Alteration	Gamma Anomaly	Breccia Pipe	Lithology	Color of Wet Sample	Grain Size	Sorting	Angularity	Cement Matrix	Iron Oxide	Pyrite Amount	Pyrite Habit	Pyrite Alter.	Metallic	Non-Metallic	React.-10% HCL	Carbon Amount	Carbon Type	Remarks
0																					
2.5						Sndy sltst	rdbn	vf-f	p	sa								M			Surface soil
5.0						Sndy sltst	rdbn	vf-f	p	sa								M			Mancos Shale
7.5						Sndy sltst	rdbn	vf-f	p	sa								N			
10.0						Sndy sltst	rdbn	vf-m	p	sa								M			
12.5						sltst, sh	rdbn-vlttn											VS			
15.0						sltst, sh	rdbn-vlttn											VS			
17.5						sh	lt pk tn											VS			
20.0						sh	lt yw tn											VS			
22.5						sh	lt yw tn											VS			
25.0						sh	lt yw tn					L	T					VS			
27.5						sh	lt yw gy											S			
30.0						sh	lt yw gy											VS			
32.5						sh	lt yw gy											M			Sparse selenite (gyp) xls
35.0						Sndy sltst	yw gy	vf-f	p	sa		L	T					VW			Sparse selenite (gyp) xls
37.5						Sndy sltst	yw gy	vf-f	p	sa		L	M					N			Sparse selenite (gyp) xls
40.0						Sndy sltst	yw gy	vf-f	p	sa		L	M					N			Sparse Selenite (gyp) xls.
42.5						sltst, qtz ss	yw gy	f-m	f	sa		L	M					N			Upper Dakota Fm contact @ approx 42.0 ft.
45.0						qtz ss, chert	tn bn	f-vcr	p	sa		L	T					N			
47.5						sh, qtz ss	gy-tn	m	p	sa								N			Sparse selenite xls.
50.0						slty sh	gy-ortn					L/H	T					N			
52.5						qtz ss	tn	f-m	f	sa		L	T					N			
55.0						qtz ss, chert	tn	m-vcr	p	sa								N			
57.5						qtz ss, chert	tn bn	m-vcr	p	sa								N			
60.0						qtz ss	ortn	f-cr	f	sa		L	T					N			
62.5						qtz ss	vlttn	f-m	f	sr								N			
65.0						qtz ss	vlttn	f-m	f	sr								N			
67.5						qtz ss	tn	m-cr	f	sr		L	M					N			
70.0						qtz ss	tn	vf-m	f	sa								N			
72.5						qtz ss	tn	m	w	sr								N			
75.0						qtz ss	tn	m	w	sr								N			
77.5						qtz ss	tn	m	w	sr								N			
80.0						qtz ss	tn	m-cr	f	sr								VW			
82.5						qtz ss, sh	tn-gy	f-m	f	sa								VW			
85.0						qtz ss.	tn	f-cr	f	r								VW			
87.5						qtz ss	tn-blgy	f-m	f	sr								S			Sparse blgy sh frags.
90.0						qtz ss	vlt blgy	vf-f	f	sr								VW			weakly cemented
92.5						qtz ss	vlt blgy-wh	vf-f	f	sr								VW			" "
95.0						qtz ss, cgl	vlt blgy-wh	vf-peb	p	sa								VW			sparse dk gy chert pebbles
97.5						qtz ss	vlttn	vf-f	f	sa								N			
100.0						qtz ss	vlttn-wh	vf-f	f	sa								N			
102.5						qtz ss	wh	f-m	f	sr								N			
105.0						qtz ss, cgl	lt gy tn	f-peb	p	sr								N			abnt. multi colored chert pebbles & frags.
107.5						qtz ss.	vlt gy-wh	m	w	r								W			moisture first noted
110.0						qtz ss	vlttn-wh	vf-m	f	sr								W			
112.5						qtz ss, cgl	vlttn-wh	f-m	w	sr								W			sparse dk chert frags.
115.0						qtz ss, cgl, sh	wh-blgn	f-peb	p	r								N			upper Brushy Basin Ct. @ approx 113.0 ft.
																					T.D.

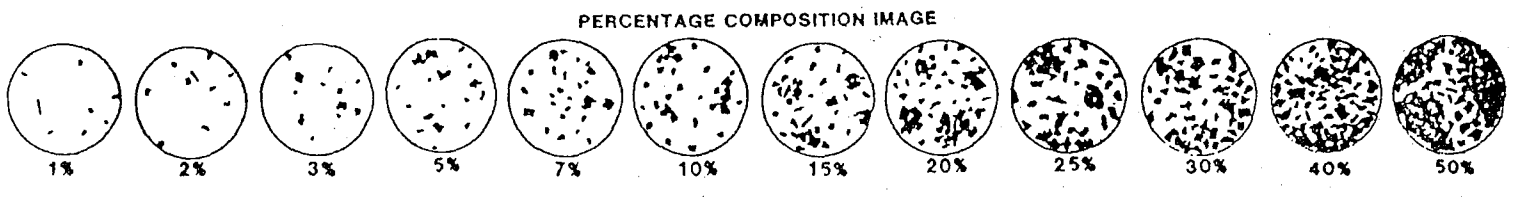
PERCENTAGE COMPOSITION IMAGE

Date 4-5-05 Geologist L. Casebolt Drilling Co. Boyles Exploration Co. Hole No. MW-27
Property White Mesa Mill Project _____ Unit No. _____ Sec. 28 Twp. 37S Rge. _____
County San Juan State Utah Location _____ Elev. ≈5625

PAGE 1 OF 1
T.D. PROBE _____
T.D. DRILL 95.0
FLUID LEVEL _____

Depth	Sample Taken	Graphic Log	Alteration	Gamma Anomaly	Breccia Pipe	Lithology	Color of Wet Sample	Grain Size	Sorting	Angularity	Cement Matrix	Iron Oxide	Pyrite Amount	Pyrite Habit	Pyrite Alter.	Metallic	Non-Metallic	React.-10% HCL	Carbon Amount	Carbon Type	Remarks
0																					
2.5						Sndy Sltst	rdbn	vf	cr	p	a							N			Surface soil.
5.0						Sndy Sltst	rdbn	vf	cr	p	a							W			
7.5						Sltst	rdbn											W			
10.0						Sltst, ss	ywbn	f-m	p	p	sa							S			
12.5						qtz ss	tn	m	w	sr		LT						VW			
15.0						qtz ss, sh	vltgy-ltpk	vf-m	p	p	sa		LT					N			
17.5						sltst	vltgy-wh											N			
20.0						sltst	vltgy-wh											N			
22.5						sltst	vltgy-wh											N			
25.0						qtz ss, chert	ltpktn	vf	vcr	p	a							N			Upper contact Dakota Fm @ approx. 23.0 ft.
27.5						qtz ss	lttn	f-m	w	sr								N			Moisture first noted 27.0'
30.0						qtz ss	ltpktn	f-m	w	sr		LT						N			
32.5						qtz ss, chert	ltpktn	f-vcr	p	a								N			
35						qtz ss	lttn	f-vcr	p	a		LT						N			
37.5						qtz ss, chert	ltgytn	f-vcr	p	a		LT						N			
40.0						qtz ss, chert	gytn	f-vcr	p	a		LT						N			abnt. multicolored chert frags.
42.5						qtz ss, chert	gytn	f-vcr	p	a								N			" " " " "
45.0						qtz ss	tn	m-cr	f	sa								N			
47.5						qtz ss	tn	m-cr	f	sa								N			
50.0						qtz ss	vlttn-wh	f-cr	p	sa								N			
52.5						qtz ss cgl.	tn-ltgy	m-peb	p	sa								N			abnt. multicolored chert frags. & pebbles
55.0						qtz ss	tn	m-cr	w	sr								N			
57.5						qtz ss, cgl.	tn-gy	m-peb	p	a		LT						N			
60.0						qtz ss	lttn	m-cr	w	sr								N			
62.5						qtz ss, sltst	tn-gy	vf-cr	p	sa								N			trace manganese dendrites
65.0						sh	ppgy											N			
67.5						sh, qtz ss	blgy-wh	vf	f	w	sa							N			
70.0						qtz ss, sh	wh-vltgy	vf-f	f	f	sa		T	C				N			
72.5						qtz ss	wh	m	w	sr								N			
75.0						qtz ss	wh	f	m	f	sr							N			
77.5						qtz ss	wh	vf	f	f	sr							N			
80.0						qtz ss	wh	m	cr	f	sr		T	C				N			
82.5						qtz ss, chert	vlttn	m	cr	f	sr		T	C				N			sparse dk chert frags & grains
85.0						qtz ss	vlttn-wh		m	w	sr							N			
87						qtz ss	vltgytn	m	cr	f	sr		A	C				N			
90.0						qtz ss, sh	ltgy-blgy	f-vcr	p	p	sr							M			upper Brushy Basin Ct @ approx. 88.0 ft.
92.5						sh, sltst	gygn											N			
95.0						sh	gygn											N			TD

PERCENTAGE COMPOSITION IMAGE

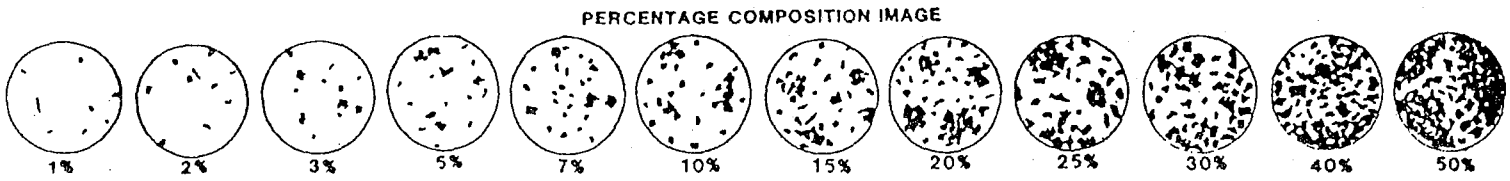


Date 4-5-05 Geologist L. Casebolt Drilling Co. Bayles Exploration Co Hole No. MW-28
Property White Mesa Mill Project _____ Unit No. _____ Sec. 33 Twp. 37S Rge. _____
County San Juan State Utah Location _____ Elev. ≈ 5618

PAGE 1 OF 1
T.D. PROBE _____
T.D. DRILL 110.0
FLUID LEVEL _____

Depth	Sample Taken	Graphic Log	Alteration	Gamma Anomaly	Breccia Pipe	Lithology	Color of Wet Sample	Grain Size	Sorting	Angularity	Cement Matrix	Iron Oxide	Pyrite Amount	Pyrite Habit	Pyrite Alter.	Metallic	Non-Metallic	React.-10% HCL	Carbon Amount	Carbon Type	Remarks
0																					
2.5						sltst-sh	lt tn-gy											VS			
5.0						sltst-sh	lt rd bn											VS			
7.5						sltysh	lt rd bn											VS			
10.0						sltysh	lt rd bn											VS			
12.5						sltysh	lt rd bn											VS			
15.0						sltysh	lt rd bn											VS			abunt. selenite xls (gypsum)
17.5						sltysh	dk rd br											VS			
20.0						sh	rd br-lt ywgy											S			Significant Color Change
22.5						sh-qtz ss	vlt gy-wh	vf	f	f	sa							M			Upper Dakota Fm Contact @ approx 22.0 ft.
25.0						qtz ss	vlt tn-wh	f-	m	f	sa							N			
27.5						qtz ss	wh-lt tn	vf-	f	f	sa		L					N			
30.0						qtz ss sltst	lt gy-lt tn	m-	cr	f	sa		L					N			
3						qtz ss	tn	m-	cr	w	sr							N			
35.0						qtz ss	ywtn	f-	m	f	sa							N			
37.5						qtz ss	lt tn	f-	m	f	sr							N			
40.0						qtz ss	lt ywtn		m	w	sr							N			
42.5						qtz ss	ywtn	m-	cr	f	sr							N			
45.0						qtz ss	lt gy tn	f-	vcr	p	sa							N			
47.5						qtz ss	lt tn	m-	cr	f	sr							N			
50.0						qtz ss	lt ywtn	f-	m	f	sr							N			Moisture first noticed
52.5						qtz ss	ywtn	f-	m	f	sa							VW			
55.0						qtz ss	ywtn		m	w	sr							N			
57.5						qtz ss	ywtn		m	w	sr							N			
60.0						qtz ss	tn	f-	m	f	sr							N			
62.5						qtz ss	tn	m-	cr	f	sr							N			multi colored chert frags.
65.0						qtz ss-sh	tn-lt bn	m-	cr	f	sr							N			
67.5						qtz ss-sh	tn-lt bn	f-	m	f	sr							N			
70.0						qtz ss-cgl.	tn-gy	m-	grit	p	sa							W			abunt multicolored chert frags.
72.5						grit st. cgl.	rd gy tn	cr-	grit	p	a							N			" " " " "
75.0						grit st, cgl	rd gy tn	m-	grit	p	a							N			
77.5						qtz ss, grit	rd gy tn	m-	grit	p	a							N			
80.0						qtz ss	tn rd gy	f-	vcr	p	sa							N			
82.5						qtz ss	tn	f-	cr	p	sa							N			
85						qtz ss	tn		m	f	sr							N			
87						qtz ss	tn	m-	cr	f	sr							N			
90.0																		X			No cuttings
92.5						qtz ss	tn	f-	m	f	sr							N			
95.0						qtz ss	tn		m	w	sr							N			
97.5						qtz ss	tn	m-	cr	w	r							N			
100.0						qtz ss	tn	m-	cr	w	r							N			
102.5						qtz ss cgl	tn-gy	m-	grit	p	a							N			
105.0						qtz ss cgl sh	tn-gy	m-	grit	p	a							N			upper Brushy Basin Ct @ approx 104.0 ft.
107.5						qtz ss, sh	tn-gy	m-	vcr	p	a							N			(note contact from core)
110.0						qtz ss, sh	tn-gn	m-	cr	f	sr							N			T.D.

PERCENTAGE COMPOSITION IMAGE

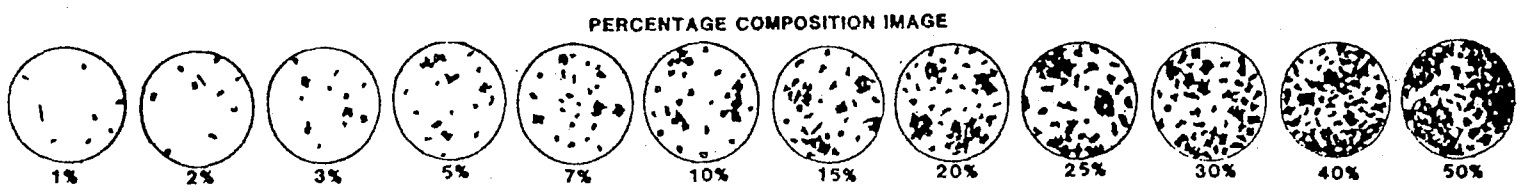


Date 4-4-05 Geologist L. Caseboll Drilling Co. Bayles Exploration Co. Hole No. MW-29
Property White Mesa Mill Project _____ Unit No. _____ Sec. 32 Twp. _____ Rge. _____
County San Juan State Utah Location _____ Elev. ≈ 5612

PAGE 1 OF 2
T.D. PROBE _____
T.D. DRILL 130.0
FLUID LEVEL _____

DEPTH	SAMPLE TAKEN	GRAPHIC LOG	ALTERATION	GAMMA ANOMALY	BRECCIA PIPE	LITHOLOGY	COLOR OF WET SAMPLE	GRAIN SIZE	SORTING	ANGULARITY	CEMENT MATRIX	IRON OXIDE	PYRITE AMOUNT	PYRITE HABIT	PYRITE ALTER.	METALLIC	NON-METALLIC	REACT.-10% HCL	CARBON AMOUNT	CARBON TYPE	REMARKS
0																					
2.5						sndy sh	lt ywbn	vf													Dike fill material
5.0						sndy sh	lt tn	vf													Dike fill material
7.5						sndy sh	lt pk tn	vf													Dike fill material
10.0						sndy sh	lt tn	vf													Dike fill material
12.5						sndy sh	lt tn	vf													Possible in place material
15.0						Sndy sh	lt bn	vf f													
17.5						Sndy sh	lt tn	vf f													
20.0						Sndy sh, ss	lt tn	vf f													Upper Dakota Fm Ct @ approx 19.5 ft.
22.5						qtz ss, sh	tn bn	m-cr	p	sa											
25.0						qtz ss	tn	m-vcr	p	sa		La									
27.5						qtz ss	ywtn	m-cr	p	sa		La									
30.0						qtz ss, cgl	gytn	m-peb	p	sa											Some dk gy-blk chert frag.
32.5						qtz ss, cgl.	ywtn	f-peb	p	sa											" " " " "
0						qtz ss	tn	f-m	f	sa											
37.5						qtz ss, cgl	gytn	f-vcr	p	sa											
40.0						qtz ss, cgl	ltgytn	f-vcr	p	sa											
42.5						qtz ss	lt tn-wh	vf-cr	p	sa											
45.0						qtz ss	lt tn-wh	vf-m	p	sa											
47.5						qtz ss	vlt tn	f-m	f	sr											
50.0						qtz ss	vlt tn-wh	vf-m	f	sr											
52.5						qtz ss	wh	m	w	r							N				sparse frag. blgn sh.
55.0						qtz ss	vlt gy	m-cr	f	sr							N				some multicolored chert frag.
57.5						qtz ss	vlt gy	m	w	sr							N				
60.0						qtz ss	vlt gy-wh	m	f	sr							N				
62.5						qtz ss	gy-pk	m-cr	f	sa							N				30% chert frags. & grains
65.0						qtz ss	ltgytn	f-cr	p	sa		LT					N				
67.5						qtz ss	ltywgy	f-peb	p	sa							N				some dk gy chert frags.
70.0						qtz ss	ltgy	f-m	f	sa							N				
72.5						qtz ss	ltgy	f-m	w	sr							N				
75.0						qtz ss	ltgy	m	w	sr							N				
77.5						qtz ss	gy	m	f	sa							N				
80.0						qtz ss, cgl.	gy	m-peb	p	sa							N				cgl. zone, dk chert frags.
82.5						qtz ss	ltywgy	m-cr	f	sr							N				
85.0						qtz ss	ltgy	vf-m	f	sr		LT					N				
87						qtz ss	ltgy	m-cr	f	sr							N				some chert frags.
90.0						qtz ss, cgl.	ltgytn	m-peb	p	sa							N				cgl. zone, chert frag.
92.5						qtz ss	ltgytn	f-cr	p	sa							N				abnt. chert grains
95.0						qtz ss	vltgy	m	w	sr							N				
97.5						qtz ss	vltgy-wh	m	w	sr							N				
00.0						qtz ss	ltgytn	f-m	f	sr		LT					N				
02.5						qtz ss	vltgytn	m-vcr	p	sa							N				some multicolored chert frags.
05.0						qtz ss	vltgy	m-vcr	p	sa							N				some multicolored chert frags
07.5						qtz ss	wh	f-cr	f	sr							N				
10.0						qtz ss	wh	m	w	r							N				
12.5						qtz ss	wh	f-m	w	r							N				
15.0						qtz ss	wh-vltgy	f-m	w	sr							N				
17.5						qtz ss	wh	f-m	w	r							N				
20.0						qtz ss	wh	f-m	w	r							N				
22.5						qtz ss	wh	f-m	w	r							N				
25.0						Sh, qtz ss	dk gy bl-pp	m	p	sr			T	C			N				Upper Brushy Basin Mbr. Ct @ approx 123.0 tr. pyrite

PERCENTAGE COMPOSITION IMAGE

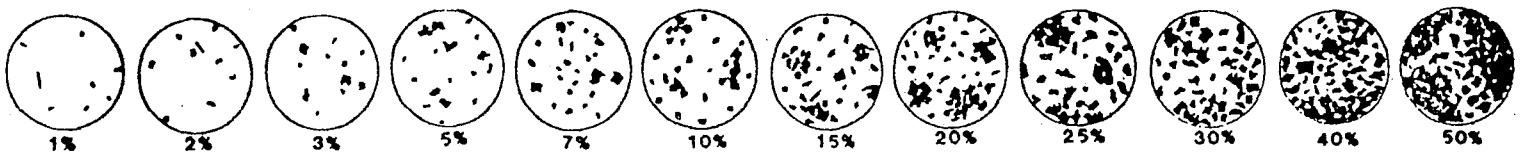


Date 4-12-05 Geologist L. Casebolt Drilling Co. Bayles Exploration Co. Hole No. MW-29
Property White Mesa Mill Project _____ Unit No. _____ Sec. 32 Twp. _____ Rge. _____
County San Juan State Utah Location _____ Elev. ≈ 5612

PAGE 2 OF 2
T.D. PROBE _____
T.D. DRILL 130
FLUID LEVEL _____

DEPTH	SAMPLE TAKEN	GRAPHIC LOG	ALTERATION	GAMMA ANOMALY	BRECCIA PIPE	LITHOLOGY	COLOR OF WET SAMPLE	GRAIN SIZE	SORTING	ANGULARITY	CEMENT MATRIX	IRON OXIDE	PYRITE AMOUNT	PYRITE HABIT	PYRITE ALTER.	METALLIC	NON-METALLIC	REACT.-10% HCL	CARBON AMOUNT	CARBON TYPE	REMARKS
125.0																					
127.5						Sh	ltpp-ltgybn										N				
130.0						Sh	ltpp-ltrdbn										N				TD.

PERCENTAGE COMPOSITION IMAGE

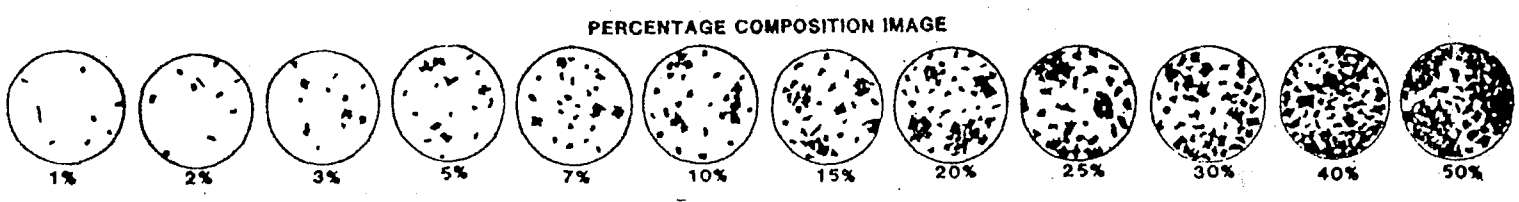


Date 4-6-05 Geologist L. Casebolt Drilling Co. Bayles Exploration Co. Hole No. MW-30
Property White Mesa Mill Project _____ Unit No. _____ Sec. 33 Twp. 37S Rge. _____
County San Juan State Utah Location _____ Elev. ≈5612

PAGE 1 OF 1
T.D. PROBE _____
T.D. DRILL 110.0
FLUID LEVEL _____

Depth	Sample Taken	Graphic Log	Alteration	Gamma Anomaly	Breccia Pipe	Lithology	Color of Wet Sample	Grain Size	Sorting	Angularity	Cement Matrix	Iron Oxide	Pyrite Amount	Pyrite Habit	Pyrite Alter.	Metallic	Non-Metallic	React.-10% HCL	Carbon Amount	Carbon Type	Remarks
0																					
2.5						sndy sh	lt ywbn											VS			Surface soil/fill, frags. of flyash from mill
5.0						Sndy sh	lt bn											VS			Possible fill material
7.5						Sndy sh	lt ywbn											VS			Possible fill material
10.0						Sh	lt yw											VS			possible bedrock contact, abnt. gyp. (selenite) frags.
12.5						Slty sh	lt bn											VS			trace selenite
15.0						Sh	lt gnyw											VS			trace selenite
17.5						Sh	lt yw-gy											VS			
20.0						Sh	lt ywgy											S			trace selenite
22.5						Sh, qtz ss	lt pp bn-	vf	m	p	sa							S			upper Dakota Fm. ct. @ approx 22.0 ft.
25.0						qtz ss	lt yw tn	f-	m	f	sa							S			
27.5						qtz ss, cgl	wh-lt tn bn	f-	vcr	p	sa							S			dk chert fragments.
30.0						qtz ss, cgl	lt tn-dk gy	m-	vcr	f	sr							S			note: some contamination with flyash
						qtz ss, cgl	lt gy-lt tn	f-	vcr	f	sr							S			
35.0						qtz ss	lt gy tn.	m-	vcr	w	sr							S			
37.5						sltst, sh.	lt tn-lt gy		vf									N			
40.0						sltst, sh	lt gy-vlt tn		vf									W			
42.5						sltst, qtz ss	wh-vlt gy	vf-	f									M			
45.0						qtz ss,	vlt gy-wh		f									M			
47.5						sltst-qtz ss	lt gy	vf-	f									M			
50.0						qtz ss	vlt bn		vf									M			
52.5						Sndy sltst	lt pp bn	vf	f	p	sa							VS			
55.0						sltst, qtz ss	rd bn-lt gy	vf	m	p	sa							S			
57.5						sltst, qtz ss	rd bn-gy	vf	m	p	sa							S			
60.0						qtz ss, cgl	tn-gy	f-	peb	p	sa							W			abnt. multicolored chert frags. & pebbles
62.5						qtz ss, cgl.	gy tn	m-	peb	p	sa							VW			" " " " "
65.0						qtz ss	or tn	m-	vcr	p	sa		L	T				N			" " " " "
67.5						sltst, sh, ss	yw tn-gy	vf	f	f	sa		L	T				N			
70.0						sltst, sh, ss	gy bn	vf	f	f	sa		L	T				N			
72.5						qtz ss-sltst	vlt gy	vf	f	f	sa							N			
75.0						qtz ss-	wh	vf	f	f	sa							N			
77.5						qtz ss	wh-vlt gy	vf-	f	f	sa							N			frags. very soft & friable
80.0						qtz ss	lt tn	f-	m	f	sa							N			
82.5						qtz ss, sh	lt gy gn-rd	f-	m	p	sa							N			frags soft & friable
						qtz ss, sh	lt gy gn-wh	f-	m	p	sa							N			
85.0						qtz ss	vlt tn-wh	f-	m	f	sr							N			
90.0						qtz ss	vlt tn-wh	f-	m	w	sr							N			some dk chert grains
92.5						qtz ss	wh	f-	m	w	sr							N			
95.0						qtz ss	wh	f-	m	w	sr							N			
97.5						qtz ss	wh	f-	m	w	sr							N			
100.0						qtz ss	wh	f	m	w	sr							N			
102.5						qtz ss	wh	f	m	w	sr							N			
105.0						qtz ss cgl	vlt gy wh	m-	peb	p	sa							N			abnt dk chert frags.
107.5						sh	blgn											N			Upper Brushy Basin Mbr @ approx 105.0 ft.
110.0						sh	blgn											N			T.D.

PERCENTAGE COMPOSITION IMAGE

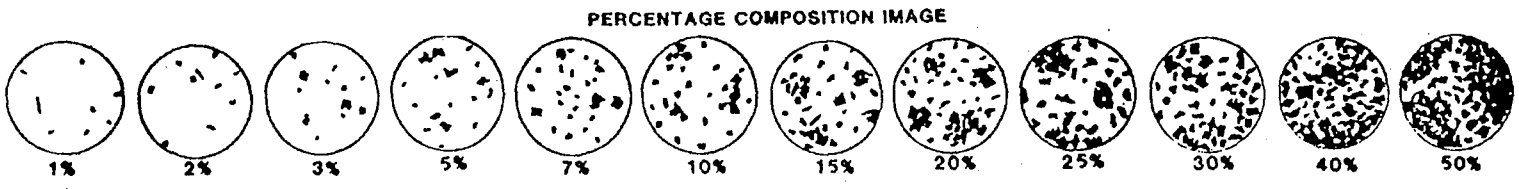


Date 4-5-05 Geologist L. Casebolt Drilling Co. Bayles Exploration Co. Hole No. MW-31
Property White Mesa Mill Project _____ Unit No. _____ Sec. 33 Twp. 37S Rge. _____
County San Juan State Utah Location _____ Elev. ≈ 5614

PAGE 1 OF 2
T.D. PROBE _____
T.D. DRILL 130
FLUID LEVEL _____

Depth	Sample Taken	Graphic Log	Alteration	Gamma Anomaly	Breccia Pipe	Lithology	Color of Wet Sample	Grain Size	Sorting	Angularity	Cement Matrix	Iron Oxide	Pyrite Amount	Pyrite Habit	Pyrite Alter.	Metallic	Non-Metallic	React.-10% HCL	Carbon Amount	Carbon Type	Remarks
0																					
2.5						sndy sltst	lt rdbn	vf-m	p	sa								S			possible fill material from dike
5.0						sndy sltst	lt pktn	vf-m	p	sa								S			possible fill material from dike
7.5						sndy sh, 95	lt pktn	vf-m	p	sa								S			possible fill material from dike
10.0						sndy sh,	lt pk-v lt tn	vf m	p	sa								S			possible fill material from dike
12.5						sndy sh,	lt pktn	vf-m	p	sa								vs			Mancos Shale Fm.
15.0						sndy sh	rdbn-ywtn	f-m	f	sa								vs			
17.5						sltysh	rdbn-ywtn	vf f	p	sa								S			
20.0						Sh	ywgy-lt pk											S			
22.5						Sh	ywgy-lt pk											m			
25.0						Sh	ywgy											S			
						Sh	ywgy											m			
30.0						qtz ss, sh	ywgy	vf-f	p	sa		Lm						vw			
32.5						sndy sltst	gybn	vf f	p	sa								W			
35.0						sndy sltst	gybn	vf f	p	sa								W			
37.5						qtz ss, sh	gy-tn	vf-m	f	sa								vw			Upper contact Dakota Fm. @ approx 36.0
40.0						qtz ss	tn	m	f	sa		Lm						N			
42.5						qtz ss	tn	m-cr	f	sa		LT						N			
45.0						qtz ss	gytn	m-vcr	p	a								N			
47.5						qtz ss	lt bn	m-vcr	p	a								N			sparse chert frags.
50.0						qtz ss	lt bn	m-vcr	p	a								N			sparse chert frags.
52.5						qtz ss	lt ywbn	m-peb	p	a								N			abnt. chert frags.
55.0						qtz ss	lt tn	m	w	sr								N			
57.5						qtz ss	lt tn	m	w	sa								N			
60.0						qtz ss	lt tn	m	w	sr								N			
62.5						qtz ss	lt tn	m-cr	f	sa								N			
65.0						qtz ss	lt tn	m	f	sa								N			sparse wh chert grains
67.5						qtz ss	lt tn	m	f	sr								N			
70.0						qtz ss	lt tn	m-cr	f	sa								N			some dk gy chert grains
72.5						qtz ss	lt tn	m-cr	f	sa								N			" " " " "
75.0						qtz ss, cgl.	lt tn	m-peb	p	sa								W			" " " " pebbles
77.5						qtz ss, cgl	ywgy	m-peb	p	a								W			" " " " "
80						qtz ss, cgl	lt tn	m-vcr	p	sr								N			abnt. multicolored chert frags & pebbles
82.5						qtz ss cgl	gytn	m-peb	p	a								W			" " " " " "
85.0						qtz ss, cgl	gytn	m-peb	p	a								W			" " " " " "
87.5						qtz ss, cgl	gytn	cr-peb	p	a								W			" " " " " "
90.0						qtz ss	tn	m	w	sr								N			
92.5						qtz ss, sltst	lt gy-lt blgy	f-m	f	sr								N			
95.0						qtz ss, sltst	lt tn-lt blgy	vf m	f	sr								N			
97.5						qtz ss	v lt tn-wh	f-m	f	sr		LT	T	C				N			
100.0						qtz ss	v lt tn-wh	m	w	sr								N			
102.5						qtz ss	v lt tn	m-cr	f	sr								N			dk gr chert frags.
105.0						qtz ss	v lt tn	m-cr	f	r								N			" " " "
107.5						qtz ss	v lt tn-wh	m	w	r								N			
110						qtz ss	v lt tn-wh	m	w	r								N			
112.5						qtz ss	v lt tn-wh	m	w	r								N			
115.0						qtz ss	v lt tn-wh	m	w	r								N			
117.5						qtz ss	v lt tn-wh	m	w	r								N			
120.0						qtz ss, chert	lt tn-dk gy	cr-peb	p	a								N			cgl. zone multicolored chert frags & pebbles
122.5						qtz ss, chert	lt tn-tn	m-peb	p	a								N			" " " " " " "
125.0						qtz ss, chert	lt tn-tn	vcr	p	sr			T	C				N			" " " " " " "

PERCENTAGE COMPOSITION IMAGE



ate 4-1-05 Geologist L. Casebolt Drilling Co. Bayles Exploration Co. Hole No. MW-31

Property White Mesa Mill Project _____ Unit No. _____ Sec. 33 Twp. 37S Rge. _____

County San Juan State Utah Location _____ Elev. ≈ 5614

PAGE 2 OF 2

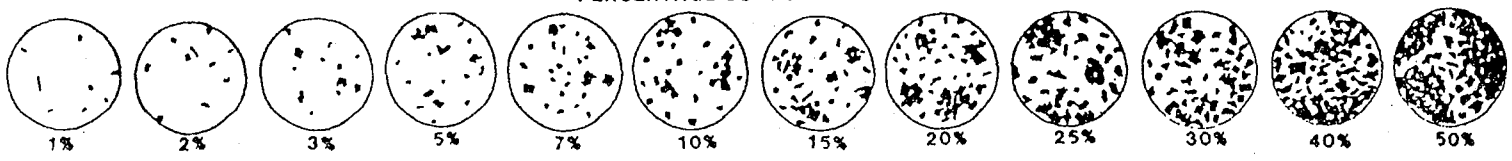
T.D. PROBE _____

T.D. DRILL 130

FLUID LEVEL _____

DEPTH	SAMPLE TAKEN	GRAPHIC LOG	ALTERATION	GAMMA ANOMALY	BRECCIA PIPE	LITHOLOGY	COLOR OF WET SAMPLE	GRAIN SIZE	SORTING	ANGULARITY	CEMENT MATRIX	IRON OXIDE	PYRITE AMOUNT	PYRITE HABIT	PYRITE ALTER.	METALLIC	NON-METALLIC	REACT.-10% HCL	CARBON AMOUNT	CARBON TYPE	REMARKS
125.0																					
127.5						qtz ss, cgl, sh	wh-gy gn	m-peb	p	d							m				Upper Brushy Basin Mbr Ct @ approx. 126.0 ft.
130.0						sh	gy gn-pp bn										w				

PERCENTAGE COMPOSITION IMAGE

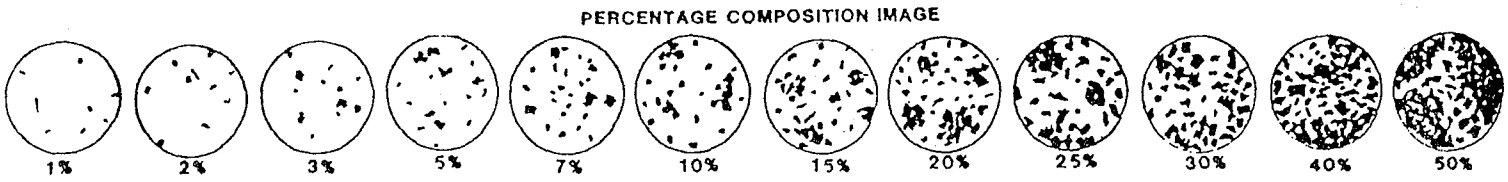


Date 4-9-05 Geologist L. Casebolt Drilling Co. Bayles Exploration Co. Hole No. TW4-20
Property White Mesa Mill Project _____ Unit No. _____ Sec. _____ Twp. _____ Rge. _____
County San Juan State Utah Location _____ Elev. ≈ 5627

PAGE 1 OF 1
T.D. PROBE _____
T.D. DRILL 107.5
FLUID LEVEL _____

Depth	Sample Taken	Graphic Log	Alteration	Gamma Anomaly	Breccia Pipe	Lithology	Color of Wet Sample	Grain Size	Sorting	Angularity	Cement Matrix	Iron Oxide	Pyrite Amount	Pyrite Habit	Pyrite Alter.	Metallic	Non-Metallic	React.-10% HCL	Carbon Amount	Carbon Type	Remarks
0																					
2.5						sltysh	ywbn											S			Surface soil
5.0						sltysh	dkrdbn											m			
7.5						sltysh	dkrdbn-rdbn											VS			
10.0						Sh	ywtn											VS			
12.5						Sh	ywbn											VS			
15.0						Sh	ywbn											VW			
17.5						Sltst	ywbn											VW			
20.0						Sndysltst	gybn	vf	m	sr								m			
22.5						Sndysltst	dkbn-dkgybn	vf	P									N			Upper Dakota Fm Ct. @ Approx 22.0ft.
25.0						qtz ss	ltpktn	vf-m	P	sr								N			
27.5						qtz ss	ywtn	vf-f	f	sr								N			
30.0						qtz ss	lttn	vf-f	f	sr								N			
						qtz ss	lttn	f	cr	P	sr							N			
35.0						qtz ss	lttn	m	cr	m	sr							N			
37.5						qtz ss	ltpktn		M	m	r		sp					N			Coarse Hematite, clay cement?
40.0						qtz ss	lttn		M	W	r							N			
42.5						qtz ss	lttn	f-m	m	r								N			
45.0						qtz ss	vlttn	vf-f	M	r								N			
47.5						qtz ss	vlttn	vf-f	M	sr								N			
50.0						qtz ss, sh	lttn-ltgy	vf-f	P	sr								N			
52.5						qtz ss	vltgy	vf-f	P	sa								N			
55.0						qtz ss	vlttn	f	cr	W	sr							N			dk chert frags.
57.5						qtz ss	vlttn-wh	m	cr	W	r							N			" " "
60.0						qtz ss	vlttn-wh	m	vcr	P	a							N			
62.5						qtz ss	vlttn-wh	m	vcr	P	a							N			30% dk multi colored chert frags
65.0						qtz ss	wh-vlttn	m	vcr	P	a							N			
67.5						qtz ss	wh-vlttn	m	vcr	P	sa							N			
70.0						qtz ss; cgl	lttn-gy	m	vcr	P	a							N			60% multi colored chert frags & peb
72.5						qtz ss cgl.	ortn-gy		vcr	P	sr							N			80% " " " " "
75.0						cgl, qtz ss	or gy		vcr	P	sa							N			80% " " " " "
77.5						cgl, qtz ss	or gy		vcr	P	sa							N			80% " " " " "
80.0						qtz ss	vlttn-wh	vf	f	m	sr							N			
82.5						qtz ss	vlttn-wh	vf	f	m	sr							N			
3						sh, qtz ss (50%, 50%)	wh-ltbl	vf	f	P	sr							N			
37.5						sh, sltst	wh-ltbl		vf	P	sr							N			
90.0						sh, sltst	wh-ltbl		vf	P	sr							N			
92.5						qtz ss	vlttn-wh		vf	W	r							N			
5.0						qtz ss	vlttn-wh		vf	W	r							N			
97.5						qtz ss	vlttn-wh		vf	W	r							N			
00.0						qtz ss	vlttn-wh		vf	W	r							N			
02.5						qtz ss	wh-vlttn	f	m	W	sr							N			
05.0						qtz ss, sh (90%, 10%)	wh-gn	vf	m	P	sr							N			upper Brushy Basin Ct @ 104.0
07.5						Sndy sh	gn-dkgygn		vf	P	Sa							N			Brushy Basin Mbr
D																					

PERCENTAGE COMPOSITION IMAGE

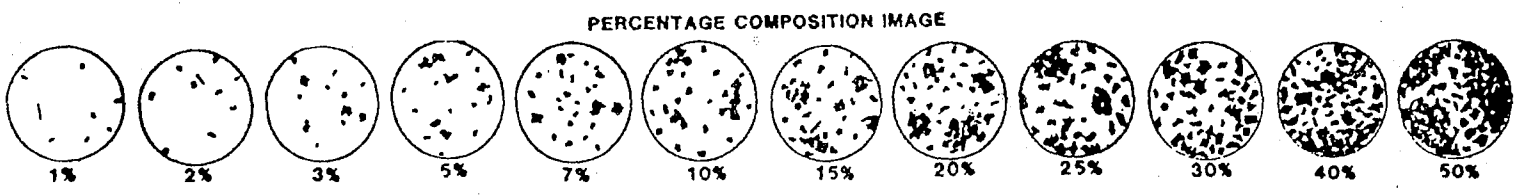


Date 4-19-05 Geologist L. Casebolt Drilling Co. Bayles Exploration Co. Hole No. TW4-21
Property White Mesa Mill Project _____ Unit No. _____ Sec. _____ Twp. _____ Rge. _____
County San Juan State Utah Location _____ Elev. _____

PAGE 1 OF 1
T.D. PROBE _____
T.D. DRILL 125.0
FLUID LEVEL _____

Depth	Sample Taken	Graphic Log	Alteration	Gamma Anomaly	Breccia Pipe	Lithology	Color of Wet Sample	Grain Size	Sorting	Angularity	Cement Matrix	Iron Oxide	Pyrite Amount	Pyrite Habit	Pyrite Alter.	Metallic	Non-Metallic	React.-10% HCL	Carbon Amount	Carbon Type	Remarks
0																					
2.5						Sndy sltst	rd bn	vf-f	P	Sa								VS			Surface soil (mill yard-near change room)
5.0						Sndy sltst	rd bn-lt tn	vf-f	P	Sa								VS			mancos sh.
7.5						sltst	lt pk tn											VS			
10.0						sh	yw gy											VS			
12.5						sh	yw gy											S			
15.0						sh	yw gy											S			abnt. selenite xls. (gyp)
17.5						sh	yw gy											m			" " " "
20.0						sh, sltst	yw gy											W			
22.5						sltst, sh	yw gy											N			abnt. selenite xls.
25.0						sltst, sh	yw gy											N			
27.5						sltst, sh	yw gy											N			
30						qtz ss	tn	f-m	W	sa								N			Upper Ct Dakota Fm @ 27.5'
32.5						qtz ss	or tn	f-m	W	sr		L	M					N			chert frags.
35.0						qtz ss	or tn	m	W	sr								N			
37.5						qtz ss	tn bn	m	W	sa								N			abnt. chert grains
40.0						qtz ss	tn bn	m-cr	W	sr								N			
42.5						qtz ss	tn	m-cr	W	sr								N			
45.0						qtz ss	tn	m cr	W	sr								N			moisture first noticed in cutting
47.5						qtz ss	tn	f m	W	sr								N			
50.0						qtz ss, sh	tn-gy	f-m	W	sr								N			
52.5						qtz ss, sltst	vdkgy-ltgy	vf-f	f	sa								N			
55.0						sltst, sh, ss	vdkgy-vltgy	vf-m	f	sa								N			
57.5						qtz ss	lt pk tn	m	W	sr								N			
60.0						sndy sltst	ltgy bn	f-vcr	f	sa								N			
62.5						qtz ss-grit	ltgy	m-vcr	P	Sr								N			abnt. light colored chert frags.
65.0						qtz ss	ltgy tn	m-cr	f	sr								N			
67.5						qtz ss	ltgy tn	m	W	r								N			
70.0						qtz ss	ltgy tn	m	W	r								N			
72.5						qtz ss-grit	ltgy tn	m-vcr	W	r								N			
75.0						qtz ss-grit	ltgy tn	m-vcr	W	r								N			
77.5						qtz ss-cgl	gy bn	m-peb	P	sr								N			cgl. zone, abnt chert frag. & pebbles
80						qtz ss-grit	gy tn	m-vcr	P	sa								N			
82.5						qtz ss-cgl	dkgy tn	f-peb	P	sa								N			
85.0						qtz ss-sltst	dkgy	vf-cr	P	Sa								N			Silty fg ss @ 84.0 ft.
87.5						qtz ss	gy	vf-f	f	sa								N			
90.0						qtz ss	gy	vf-f	f	sa								N			
92.5						qtz ss	gy	vf-f	f	sa								N			
95.0						qtz ss	gy-wh	vf-f	f	sa								N			
97.5						qtz ss	wh	f-m	f	sa								N			
100.0						qtz ss	wh	f-m	W	sr								N			
102.5						qtz ss	vlt tn-wh	f-m	W	sr								N			
105.0						qtz ss	wh	f-m	W	sr								N			
107.5						qtz ss	wh-ltgn	m-vcr	f	r								N			sparse dk gy chert frag.
110.0						qtz ss	wh	f-m	W	r								N			
1.						qtz ss	wh	f-m	W	sr		T	C					N			
115.0						qtz ss-sh	wh-ltgn	f-m	W	Sr								N			sparse gn sh frag.
117.5						qtz ss-sh	wh-gn	f-m	W	Sr								N			Upper Brushy Basin Ct @ approx 117.0 ft. (116 from video)
120.0						sh	pp-gygn											N			
122.5						sh	pp-gygn											N			
125.0						sh	pp bn-dkgygn											N			TD

PERCENTAGE COMPOSITION IMAGE



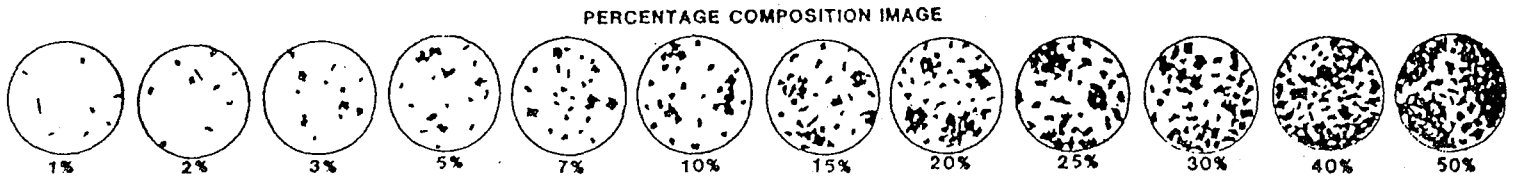
Date 4-9-05 Geologist L. Casebolt Drilling Co. Boyles Exploration Co. Hole No. IW4-22
Property White Mesa Mill Project _____ Unit No. _____ Sec. _____ Twp. _____ Rge. _____
County San Juan State Utah Location _____ Elev. _____

PAGE 1 OF 1
T.D. PROBE _____
T.D. DRILL 115.0
FLUID LEVEL _____

REMARKS cored from 20'-115.0'

Depth	Sample Taken	Graphic Log	Alteration	Gamma Anomaly	Breccia Pipe	Lithology	Color of Wet Sample	Grain Size	Sorting	Angularity	Cement Matrix	Iron Oxide	Pyrite Amount	Pyrite Habit	Pyrite Alter.	Metallic	Non-Metallic	React.-10% HCL	Carbon Amount	Carbon Type	Remarks
0																					
2.5						sndy sltst	or bn	f	m	p	sa							M			Surface soil
5.0						qtz ss	or bn	vf-cr		p	sa							VS			
7.5						qtz ss, sltst	tn bn	vf	m	f	sa							VS			
10.0						sltst, qtz ss	vlt rd bn	vf	p	f	sa							VS			
12.5						sltst, qtz ss	vlt rd bn	vf	f									VS			
15.0						sltst, sh	vlt rd bn											VS			
17.5						sltst, sh	lt yw gy											VW			
20.0						sndy sltst	lt or tn	vf-f		f	sa							W			
22.5						qtz ss	yw tn	f	m	f	sa							N			upper Dakota Fm. ct @ approx 20.0 ft.
25.0						qtz ss	yw tn	f	m	f	sr							N			
27.5						qtz ss	tn		m	w	sr							N			
[illegible]						qtz ss	tn	f-m		f	sr							N			
[illegible]						qtz ss	lt tn	f-m		w	sa							N			
35.0						qtz ss	lt tn	f-m		f	sa							N			
37.5																					No Cuttings
40.0						qtz ss	tn	f-m		f	sa							N			
42.5						qtz ss	tn	f-m		f	sr							N			
45.0						qtz ss	tn		m	w	sa							N			
47.5						qtz ss	tn	f-m		f	sa							N			
50.0						qtz ss	tn		m	w	sr							N			
52.5						qtz ss	yw tn		m	f	sr							N			
55.0						qtz ss	tn		m	f	sr							N			
57.5						qtz ss	gy tn	m-cr		f	sa							N			
60.0						qtz ss	gy tn		f	w	sr							N			
62.5						qtz ss	lt bn	m-vcr		p	sa							N			
65.0						qtz ss	gy tn		f	f	sa							N			
67.5						qtz ss	lt bn		m	w	sr							N			
70.0						qtz ss	lt gy bn	m-cr		f	sr							m			
72.5						qtz ss	or bn	m-vcr		p	sa							S			
75.0						qtz ss, cgl	tn	m-grit		p	a							N			multi colored chert frags. and pebbles
77.5						qtz ss, cgl	tn	m-vcr		p	sa							N			
80.0						qtz ss	tn	f-cr		p	sr							N			
[illegible]						qtz ss	tn	f-m		f	sr							m			
[illegible]						qtz ss	lt tn	f-m		f	sr							N			
87.5						qtz ss	lt tn	f-m		f	sr							N			
90.0						qtz ss	lt tn	f-m		f	sr							W			
92.5						qtz ss, sh	tn-gy bl	f-m		f	sr	L	Tr	C	L			W			sparse shale frags
95.0						qtz ss.	tn	f-m		f	sr							N			
97.5						qtz ss	tn	f-m		w	sr							N			
100.0						qtz ss,	vlt tn-wh	f-vcr		p	sa							N			
102.5						qtz ss, cgl	vlt tn-wh	f-grit		p	sa							N			some multi colored chert pebbles and rock frags.
105.0						qtz ss, cgl	tn	f-grit		p	sa		Tr	C	T			N			
107.5						qtz ss, cgl	dk gy tn	m-grit		p	sa							N			abunt multi colored chert pebbles
110.0						qtz ss, cgl	dk gy tn	m-grit										N			
112.5						sndy sh, cgl	bl gy gn-rd bn	m-cr										N			upper Brushy Basin Ct @ approx 111.5 ft.
[illegible]						sndy sh	bl gy		m	p	sa							N			

PERCENTAGE COMPOSITION IMAGE



Core Log of Well No. MW-3A

Cored Interval 70.0 ft. to 95.0 ft. T.D.

Depth	Description
70.0 - 74.0	Core barrel blocked, 75% core recovery, quartz sandstone, very light tan - white, med. to very coarse grained, chert pebble zone at 71.3 ft., sparse chert grains, calcareous cement at 72.3 - 73.0 ft., abund. hematite/limonite disseminated at 73.2 - 73.8 ft., possible replacement of earlier pyrite.
74.0 - 80.0	Core recovery 67%, quartz sandstone from 76.0 ft.-77.5 ft., white, medium grained, sub rounded, 77.5 ft. - 78.4 ft., quartz sandstone, very light tan, fine to medium grained, sub rounded, 78.4 ft. - 80.0 ft., quartz sandstone, very light tan, fine to medium grained, sub rounded, clay cement.
80.0 - 85.2	Quartz sandstone fine grained subrounded to rounded clay cement (non calcareous) occasional chert pebble, grit size zone from 82.5 - 82.8 and from 84.5 - 84.9 ft..
85.0 - 87.5	No core recovery.
87.5 - 90.0	Quartz sandstone / grit, calcareous cement white to light gray green, coarser zones contain light green shale fragments and chert pebbles, green clay gall noted from 88.0 - 88.2 ft., conglomerate from 89.5 - 90.0 feet.
90.0 - 95.0	Core recovery 97%, quartz sandstone / conglomerate, light gray green, contains abundant chert pebbles and grit, zone from 90.0 - 92.5 ft. contains numerous low angle partings due to friable character of the core, no weathered or mineralized surfaces noted. Upper Brushy Basin contact at 92.5 ft.. Conglomerate in direct contact with undisturbed green shale below. End of Core

NX-NQ TOP
COMPANY IUC
PROPERTY WHITE MESA MILL
NX-NQ HOLE NO MW-3A
BOX NO. 8
INTERVAL 70.0
TO 80.0
R.Q.D.
SAWED
SAMPLED
OTHER
BTM
80.0'
'98 6 15

NX-NQ TOP
COMPANY IUC
PROPERTY WHITE MESA MILL
R.Q.D.
SAWED
SAMPLED
OTHER
NX-NQ HOLE NO. MW-3A
BOX NO. 2
INTERVAL 80.0
TO 90.0
'98 6 15

NX-NQ TOP
COMPANY IUC
PROPERTY WHITE MESA MILL
NX-NQ HOLE NO MW-3A
BOX NO. 3
INTERVAL 90.0
TO 95.0 TD
R.Q.D.
SAWED
SAMPLED
OTHER
95.0'
'98 8 15

Core Log of Well No. MW-23

Cored Interval 49.0 ft. to 132.0 ft. T.D.

Depth	Description
49.0 - 59.5	Core recovery 100%, 49.0 - 59.5 ft., quartz sandstone, fine - medium grained, tan, non calcareous cement, cross-bedded, very uniform, most partings occur along cross beds and are mechanical (broken during drilling), no mineralized or weathered surfaces.
59.5 - 70.0	Core recovery 95%, 59.5 - 61.5 ft., quartz sandstone, fine - medium grained, tan, non calcareous, cross-bedded as above, lower contact is 45 degree angle erosional surface. 61.5 - 64.0 ft., quartz sandstone, very light gray, medium grained, very clean sandstone, no mineralized partings, grades downward into conglomerate. 64.0 - 69.5 ft., quartz sandstone, medium - grit sized grains, very coarse chert pebble conglomerate from 67.0 - 69.5 ft.. 69.5 - 70.0 ft., quartz sandstone, medium - coarse grained, very light gray.
70.0 - 80.0	Core recovery 90%, 70.0 - 70.5 ft., no core recovered, 70.5 - 73.5 ft., siltstone, very light gray- green, soft core, low angle parting with limonite at 73.0 ft.. 73.5 - 80.0 ft., quartz sandstone, light gray-tan to light pink-tan, limonite stained low angle parting at 73.7 ft., grit zone at 75.0 ft., and from 75.5 - 76.5 ft., small limonite blebs after sulfides at 77.5 - 78.0 ft., some manganese dendrites from 78.5 - 79.5 ft., calcareous zone from 78.5 to 79.5 ft..
80.0 - 90.0	Core recovery 87%, 80.0 - 84.5 ft., quartz sandstone, light gray-tan, fine - medium grained, non calcareous cement, no mineralized partings. 84.5 - 85.7 ft., quartz sandstone, pink-tan to yellow orange, medium - grit sized grains, abundant disseminated limonite at 85.5 - 85.7 ft.. 85.7 - 87.0 ft., core not recovered. 87.0 - 89.0 ft., quartz sandstone, pink-tan, medium - grit sized grains. 89.0 - 90.0 ft., quartz sandstone / gritstone, some disseminated limonite.
90.0 - 100.0	Core recovery 40%, 90.0 - 96.0 ft., no core recovered. 96.0 - 100.0 ft., quartz sandstone / gritstone, medium - very coarse, light tan - yellow-orange, abundant disseminated limonite from 97.8 - 98.2 and from 99.5 - 100.0 ft., mechanical partings along un-mineralized bedding planes, non calcareous.
100.0 - 110.0	Core recovery 100%, 100.0 - 102.3 ft., quartz sandstone, fine - medium grained, light yellow-orange to pink-tan, abundant limonite from 100.0 - 101.0, hematite from 101.5 - 102.3. 102.3 - 105.5 ft., quartz sandstone, fine - medium grained, light gray,

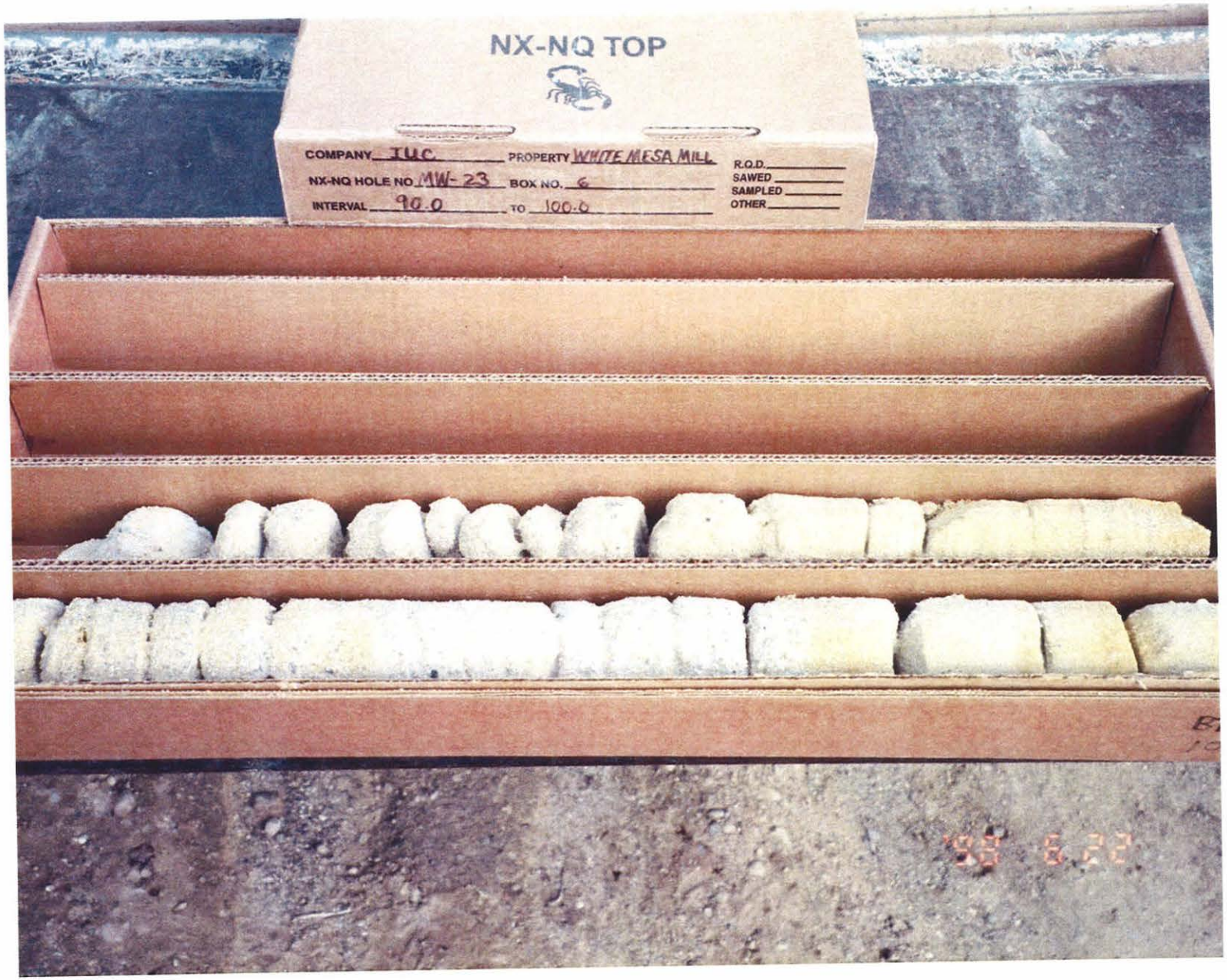
Core log of well MW- 23 Cont.

	unmineralized mechanical partings. 105.5 - 106.0 ft., disseminated limonite zone, yellow-orange. 106.0 - 110.0 ft., quartz sandstone, fine - coarse grained, light gray to orange-yellow.
11.0 - 120.0	Core recovery 100%, 110.0 - 111.2 ft., no core recovered. 111.2 - 113.5 ft., quartz sandstone / conglomerate, fine - grit size grains, light gray to light gray-green, green clay blebs plus dark chert fragments and pebbles. 113.5 - 114.5 ft., quartz sandstone / gritstone, abundant hematite mineralization, yellow-orange. 114.5 - 120.0 ft., quartz sandstone / gritstone, cross-bedded, gray-tan, chert fragments and pebbles at 115.0 - 116.5, 117.5 - 118.5, and 119.0 - 120.0 ft., non calcareous.
120.0 - 130.0	Core recovery 91%, 120.0 - 120.9.0 ft., no core recovered. 120.9 - 126.8 ft., quartz sandstone / gritstone, gray-tan to dark gray, dark gray chert fragments and pebbles, no mineralized partings observed, calcareous zone from 124.2 - 126.8 ft., upper Brushy Basin Mbr. contact at 126.8 ft. 126.8 - 129.7 ft., shale, green. 129.7 - 129.8 ft., gritstone as above.
130.0 - 132.0	Core recovery 100%, shale, green, non calcareous, T.D.

COMPANY TUC
PROPERTY WHITE MESA MILL
R.Q.D.
SAWED
SAMPLED
OTHER
NX-NQ HOLE NO MW-23
BOX NO. 3
INTERVAL 59.5
TO 70.0'
60.0
'98 6 22

NX-NQ TOP
COMPANY IUC
PROPERTY WHITE MESA MILL
R.Q.D.
SAWED
SAMPLED
OTHER
NX-NQ HOLE NO. MW-23
BOX NO. 4
INTERVAL 70.0
TO 50.0

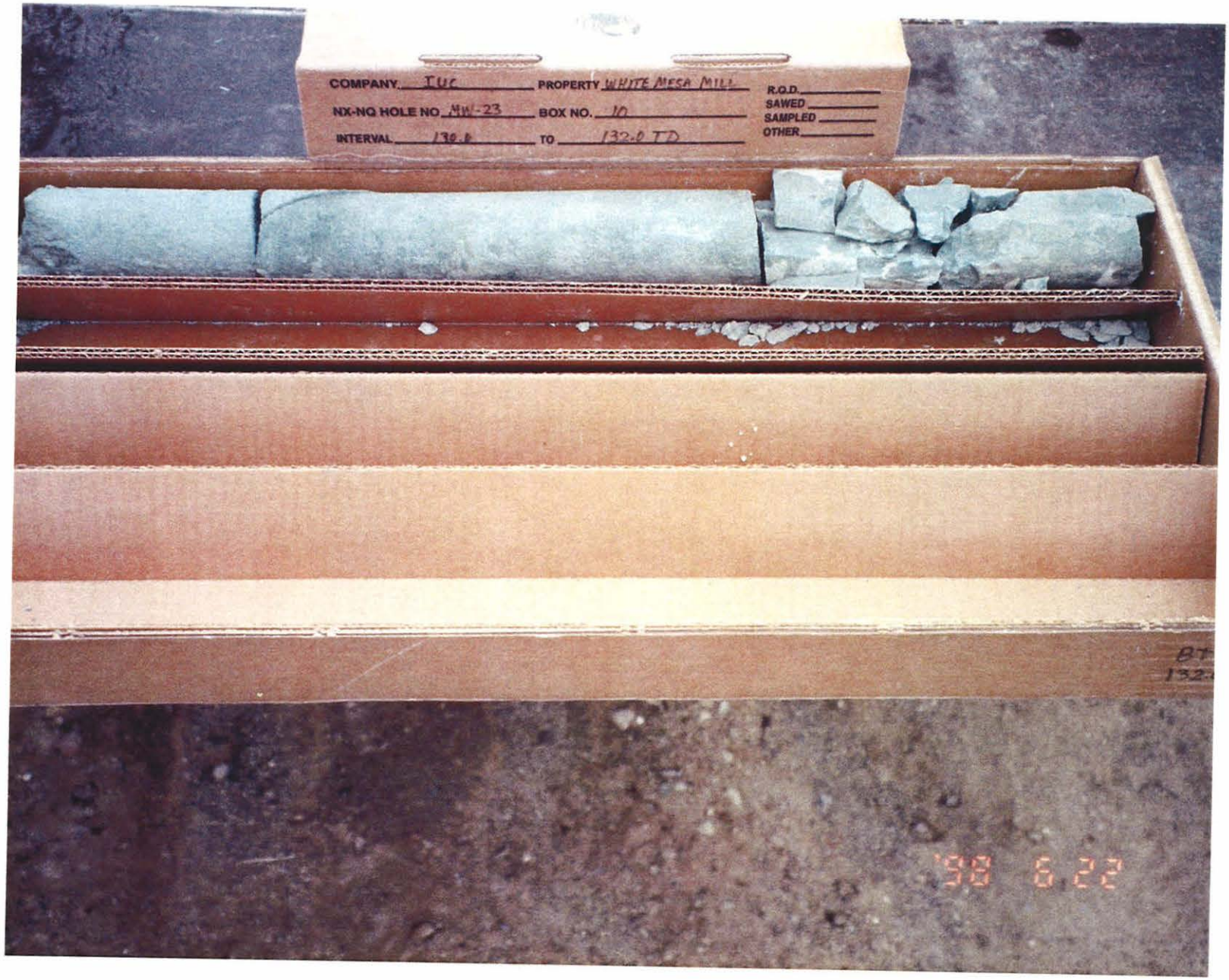
NX-NQ TOP
COMPANY IUC
PROPERTY WHITE MESA MILL
R.Q.D.
NX-NQ HOLE NO MW-23
BOX NO. 5
SAWED
SAMPLED
INTERVAL 80.0
TO 90.0
OTHER


NX-NQ TOP
COMPANY IUC
PROPERTY WHITE MESA MILL
NX-NQ HOLE NO MW-23
BOX NO. 6
INTERVAL 90.0
TO 100.0
R.Q.D.
SAWED
SAMPLED
OTHER

COMPANY IUC
PROPERTY WHITE MESA MILL
NX-NQ HOLE NO. MW-23
BOX NO. 7
INTERVAL 100.0
TO 110.0
F.O.D.
SAWED
SAMPLED
OTHER
'98 6 22

NX-NQ TOP
COMPANY TUC
PROPERTY WHITE MESA MILL
NX-NQ HOLE NO. MW-23
BOX NO. 8
INTERVAL 110.0
TO 120.0
R.Q.D.
SAWED
SAMPLED
OTHER
'98 6 22

COMPANY TUC
PROPERTY WHITE MESA MILL
R.Q.D.
NX-NQ HOLE NO. MW-23
BOX NO. 9
SAWED
SAMPLED
INTERVAL 120.0
TO 130.0
OTHER
'98 6 22


COMPANY TUC
PROPERTY WHITE MESA MILL
R.Q.D.
NX-NQ HOLE NO. MW-23
BOX NO. 10
SAWED
SAMPLED
INTERVAL 130.0
TO 132.0 TD
OTHER
'98 6.22

Core Log of Well No. MW-24

Cored Interval 20.0 ft. to 120.0 ft. T.D.

Depth	Description
20.0 - 29.0	Quartz sandstone, very fine - fine grained, non calcareous cement, some chert pebbles from 20.0 - 20.5 ft.. 20.5 - 23.5 quartz sandstone, very fine - fine grained, gray to light tan brown, weathered contact at 23.5 ft. with hematite/limonite. 23.5 - 27.5 siltstone/shale, very light gray, high angle parting with slickensides at 25.5 ft. 27.5 - 29.0 quartz sandstone, very fine grained, light gray tan, some low angle parting with hematite/limonite coatings.
29.0 - 38.0	Quartz sandstone, very fine - fine grained, light gray with disseminated hematite/limonite staining from 29.0 - 29.2 ft. and from 29.0 - 29.2 and 29.3 - 29.4 ft., also some low angle partings with hematite staining. 30.0 - 34.0 quartz sandstone, very fine - fine grained, light gray tan, non calcareous. 34.0 - 34.5 quartz sandstone, fine - medium grain, abundant disseminated limonite. 34.5 - 38.0 quartz sandstone, fine - medium grained, very light gray tan, non calcareous cement, some low angle partings.
38.0 - 48.0	Core recovery 100%, 38.0 - 39.9 ft., quartz sandstone, very fine grained, very light gray, well sorted. Non calcareous cement. 39.9 - 48.0 quartz sandstone, very light gray - white, medium grained, well sorted, some disseminated limonite patches from 47.0 - 47.5 ft., non calcareous cement. No mineralized partings.
48.0 - 58.0	Core recovery 88%, 48.0 - 51.5 ft., quartz sandstone, light gray, fine - coarse grained, non calcareous cement, disseminated limonite at 48.5 and 50.5 - 51.2 ft. 51.5 - 56.0 ft., quartz sandstone / conglomerate, medium - grit sized grains, consists of chert fragments and pebbles, conglomerate zones at 51.5 - 52.0 ft., 53.7 - 54.0 ft., 55.5 - 56.0 ft., non calcareous. 56.0 - 58.0 ft., siltstone / shale, light gray-green.
58.0 - 69.0	Core recovery 93%, 58.0 - 69.0 ft., quartz sandstone / siltstone, very fine grained, light tan, rounded grains, disseminated limonite from 58.9 - 59.5 ft., and 60.5 - 61.0 ft., low angle partings with hematite / limonite coatings at 62.7 ft., and 66.0 ft., grain size increases to fine from 67.0 - 69.0 ft., two small 2 - 4 cm patches of limonite after pyrite with remnant pyrite in center of patchs at 68.5 ft.
69.0 - 80.0	Core recovery 73%, 69.0 - 70.0 ft., quartz sandstone, fine - medium grained, light tan, very clean sandstone, non calcareous cement. 70.0 - 72.0 ft. core not recovered.

Core log of well MW- 24 Cont.

72.0 - 72.2 ft., green shale.
72.2 - 76.0 ft., quartz sandstone / conglomerate, fine - medium grained, grading downward into conglomerate from 75.0 - 76.0 ft., light gray-tan to tan.
76.0 - 78.0 ft., quartz sandstone, very fine grained, light purple-pink to yellow-tan.
78.0 - 79.5 ft., shale, gray-green, poor recovery.
79.5 - 80.0 ft., quartz sandstone, fine - medium grained, gray, abundant disseminated limonite, some manganese dendrites.

80.0 - 90.0

Core recovery 100%, 80.0 - 80.2 ft., shale, gray-green.
80.2 - 90.0 ft., quartz sandstone, medium - grit size grains, light gray-tan, abundant 2 - 3 cm diameter spherical patches of disseminated black mineral from 80.2 - 83.0 ft., no mineralized partings observed. conlomerate zones at 84.0 - 84.3 ft., 84.5 - 85.0 ft., and 87.7 - 88.2 ft., non calcareous cement.

90.0 - 100.0

Core recovery 90%, 90.0 - 95.0 ft., quartz sandstone, fine - grit sized grains, light gray-tan, conglomerate zones at 90.2 - 91.0 ft., 92.3 - 95.0 ft., non calcareous cement, some disseminated limonite.
95.0 - 97.0 ft., quartz sandstone, fine - medium grained, light gray.
97.0 - 98.0 ft., quartz sandstone, medium - grit sized grains, light yellow-gray, some conglomerate zones.
98.0 - 99.0 ft., core not recovered.
99.0 - 100.0 ft., quartz sandstone, medium grained, light gray-tan, very friable.

100.0 - 110.0

Core recovery 70%, 100.0 - 105.0 ft., quartz sandstone / conglomerate, fine - grit sized grains, light gray to tan, conglomerate zones from 100.0 - 100.2 ft., 102.5 - 103.5 ft.,
103.5 - 105.0 ft., quartz sandstone, medium grained, non calcareous cement.
105.0 - 110.0 ft., quartz sandstone, medium grained, some disseminated limonite, very soft and friable.

110.0 - 120.0

Core recovery 100%, 110.0 - 114.5 ft., quartz sandstone, yellow-tan to gray-pink, medium grained, abundant disseminated limonite in this zone.
114.5 - 116.7 ft., quartz sandstone, medium grained, light gray.
116.7 - 117.5 ft., abundant disseminated limonite.
117.5 - 118.5 ft., quartz sandstone, fine - medium grained, gray, calcareous cement.
118.5 - 118.6 ft., conglomerate / shale, green, upper Brushy Basin Mbr. contact at 118.5 ft., contact is high angle.
118.6 - 120.0 ft., shale, green. T.D.

NX-NQ TOP
COMPANY INC
PROPERTY WHITE MESA MILL
NX-NQ HOLE NO. MW-24
BOX NO. 2
INTERVAL 20.0
TO 29.0
R.Q.D.
SAWED
SAMPLED
OTHER
BTM
29.0
'98 6 22

NX-NQ TOP
COMPANY
PROPERTY WHITE MESA MILL
R.Q.D.
NX-NQ HOLE NO
BOX NO. 3
SAWED
SAMPLED
INTERVAL 290
TO 38.0
OTHER
'98 6 22

NX-NQ TOP
COMPANY IUC
PROPERTY WHITE MESA MILL
NX-NQ HOLE NO MW-24
BOX NO. 4
INTERVAL 38.0
TO 48.0
R.Q.D.
SAWED
SAMPLED
OTHER
'98 6 22

NX-NQ TOP
COMPANY
PROPERTY WHITE MESA MILL
R.Q.D.
NX-NQ HOLE NO MW-24
BOX NO. 5
SAWED
SAMPLED
INTERVAL 48.0
TO 58.0
OTHER
'98 6 22

NX-NQ TOP
COMPANY IUC
PROPERTY WHITE MESA MILL
R.Q.D.
NX-NQ HOLE NO MW-24
BOX NO. 6
SAWED
SAMPLED
INTERVAL 58.0
TO 69.0
OTHER
BT
69.0
'98 6 22

COMPANY IUO
PROPERTY WHITE MESA MILL
R.Q.D.
NX-NQ HOLE NO MW-24
BOX NO.
SAWED
SAMPLED
INTERVAL 69.0
TO 80.0
OTHER
'98 6 22

COMPANY IUC
PROPERTY WHITE MESA MILL
NX-NQ HOLE NO MW-24
BOX NO. 8
INTERVAL 80.0
TO 90.0
R.Q.D.
SAWED
SAMPLED
OTHER
'98 6 22

NX-NQ TOP
COMPANY TUC
PROPERTY WHITE MESA MILL
NX-NQ HOLE NO. MW-24
BOX NO. 9
INTERVAL 90.0
TO 100.0
R.Q.D.
SAWED
SAMPLED
OTHER
'98 6 22

NX-NQ TOP
COMPANY IUC
PROPERTY WHITE MESA MILL
R.Q.D.
NX-NQ HOLE NO. MW-24
BOX NO. 10
SAWED
SAMPLED
INTERVAL 100.0
TO 110.0
OTHER
'98 6 22

MW Core 030.jpg (JPEG Image, 3059x2433 pixels) - Scaled (27%)

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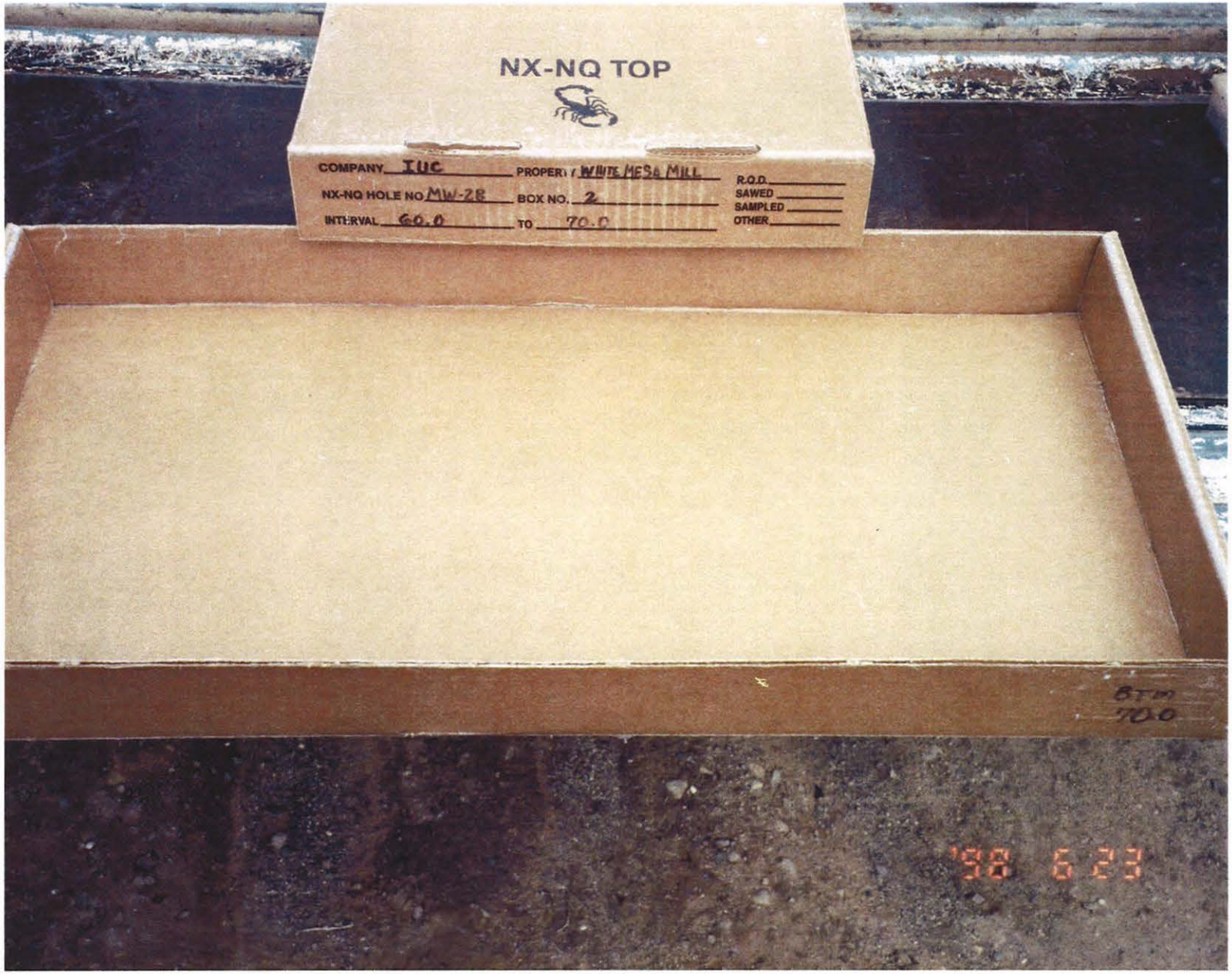
Core Log of Well No. MW-28

Cored Interval 49.0 ft. to 110.0 ft. T.D.

Depth	Description
49.0 - 60.0	Core recovery 55%, 49.0 - 54.0 ft., no core recovered. 54.0 - 54.3 ft., conglomerate, non calcareous. 54.3 - 60.0 ft., quartz sandstone, fine - medium grained, yellow-orange to tan, no mineralized or weathered surfaces, disseminated limonite zones from 55.0 - 56.0 ft., and 57.8 - 59.8 ft..
60.0 - 70.0	No core recovered from this interval.
70.0 - 80.0	Core recovery 22%, 70.0 - 77.8 ft., no core recovered, 77.8 - 80.0 ft., quartz sandstone, fine - medium grained, yellow-tan, cross-bedded with some grit sized grains occuring along bedding planes, very friable, non calcareous.
80.0 - 90.0	Core recovery 63%, 80.0 - 83.8 ft., no core recovered. 83.8 - 86.3 ft., quartz sandstone, medium - grit sized grains, yellow-tan, sharp contact with underlying shale. 86.3 - 86.5 ft., shale, yellow-gray. 86.5 - 90.0 ft., quartz sandstone, medium grained, yellow-tan to gray, non calcareous, very friable.
90.0 - 100.0	Core recovery 82%, 90.0 - 91.7 ft., no core recovered. 91.7 - 93.5 ft., quartz sandstone, fine - medium grained, gray-tan to light tan, several nonmineralized mechanical partings, non calcareous. 93.5 - 100.0 ft., quartz sandstone / gritstone, yellow-gray, grit zone from 95.5 - 97.5 ft., conglomerate zone from 99.9 - 100.0 ft., non calcareous, core becomes almost unconsolidated from 91.7 - 100.0 ft..
100.0 - 110.0	Core recovery 67%, 100.0 - 103.3 ft., no core recovered. 103.3 - 103.5 ft., conglomerate with chert pebbles up to 1 1/2 inch diameter. 103.5 - 104.0 ft., quartz sandstone, fine - medium grained, yellow-gray, some limonite on contact at 104.0 ft., upper Brushy Basin Mbr. contact. 104.0 - 110.0 ft., shale, green to purple-brown, some carbonaceous patches at 105.0 - 105.4 ft., purple -brown mottling from 106.5 - 108.5 ft. End of core at 110.0 ft., T.D.

NX-NQ TOP
COMPANY IUC
PROPERTY WHITE MESA MILL
NX-NQ HOLE NO MW-28
BOX NO. 1
INTERVAL 49.0
TO 60.0
R.Q.D.
SAWED
SAMPLED
OTHER
'98 6 23


NX-NQ TOP
COMPANY IUC
PROPERTY WHITE MESA MILL
R.Q.D.
NX-NQ HOLE NO MW-28
BOX NO. 2
SAWED
SAMPLED
INTERVAL 60.0
TO 70.0
OTHER
BTM
70.0
'98 6 23

NX-NQ TOP
COMPANY IUC
PROPERTY WHITE MESA MILL
R.Q.D.
NX-NQ HOLE NO MW-28
BOX NO. 3
SAWED
SAMPLED
INTERVAL 70.0
TO 80.0
OTHER
'88 6 23

NX-NQ TOP
COMPANY TUC
PROPERTY WHITE MESA MILL
R.Q.D.
NX-NQ HOLE NO MW-28
BOX NO. 4
SAWED
SAMPLED
INTERVAL 80.0
TO 90.0
OTHER
BTM
'98 6 23

COMPANY IUC
PROPERTY WHITE MESA MILL
NX-NQ HOLE NO MW-28
BOX NO. 5
INTERVAL 90.0
TO 100.0
R.Q.D.
SAWED
SAMPLED
OTHER
'98 6 23

NX-NQ TOP
COMPANY TUC
PROPERTY WHITE MESA MILL
R.Q.D.
SAWED
SAMPLED
OTHER
NX-NQ HOLE NO MW-28
BOX NO. 6
INTERVAL 100.0
TO 110.0 TD

Core Log of Well No. MW-30

Cored Interval 20.0 ft. to 60.0 ft.

Depth	Description
20.0 - 30.0	Core recovery 36%, 20.0 - 20.3 ft., quartz sandstone / siltstone, very fine grained, yellow-pink- tan, calcareous cement. 20.3 - 27.0 ft., no core recovered. 27.0 - 30.0 ft., quartz sandstone, medium grained, pink-tan to tan-brown, disseminated limonite from 27.0 - 28.0 ft..
30.0 - 40.0	Core recovery 100%, 30.0 - 40.0 ft., quartz sandstone, cross-bedded, medium - grit sized grains, tan, non calcareous, grit zone from 31.3 - 31.7, dark gray clay galls from 32.1 - 33.0 ft., no mineralized partings.
40.0 - 50.0	Core recovery 67%, 40.0 - 40.7 ft., quartz sandstone, tan, medium - grit sized grains, grit zone from 40.7 - 41.0 ft., contact with weathered surface at 41.0 ft., manganese dendrites. 41.0 - 45.2 ft., quartz sandstone, light gray, fine - medium grained. 45.2 - 46.6 ft., quartz sandstone, yellow-gray to yellow-tan, low angle limonite mineralized parting at 46.3 ft. 46.6 - 50.0 ft., no core recovered.
50.0 - 60.0	Core recovery 95%, 50.0 - 51.0 ft., siltstone, yellow-gray-tan. 51.0 - 52.5 ft., quartz sandstone / siltstone, dark gray-brown. 52.5 - 55.5 ft., shale, purple-red. 55.5 - 60.0 ft., siltstone, yellow-brown, very soft, lower contact is low angle parting, grades into quartz sandstone to 60.0 ft., tan to yellow-orange conglomerate zones at 57.0 - 57.3 ft., 58.0 - 58.7 ft., and 59.8 - 60.0 ft., end of core.

NX-NQ TOP
COMPANY IUC
PROPERTY WHITE MESA MILL
R.Q.D.
NX-NQ HOLE NO MW-30
BOX NO. 2
SAWED
SAMPLED
INTERVAL 20.0
TO 30.0
OTHER
'98 6 22

NX-NQ TOP
COMPANY IUC
PROPERTY WHITE MESA MILL
R.Q.D.
SAWED
SAMPLED
OTHER
NX-NQ HOLE NO MW-30
BOX NO. 3
INTERVAL 30.0
TO 40.0
'98 6 23

Core Log of Well No. TW4-22

Cored Interval 20.0 ft. to 115.0 ft. T.D.

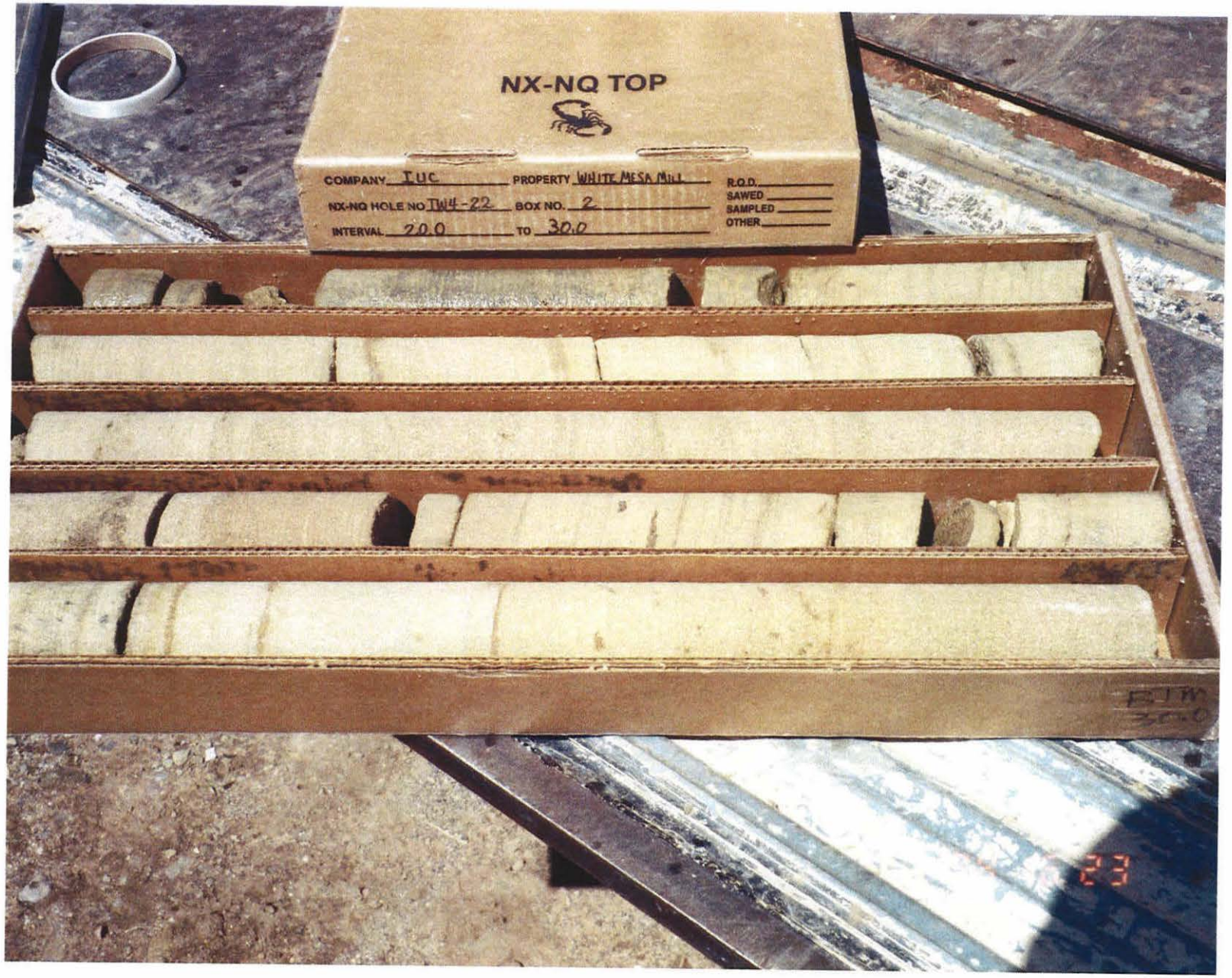
Depth	Description
20.0 - 30.0	Core recovery 95%, 20.0 - 21.4 ft., silty shale, mottled yellow-gray-brown, calcareous from 20.0 - 20.5 ft., low angle contact with sandstone below is nonmineralized. 21.4 - 30.0 ft., quartz sandstone, fine - medium grained, tan to gray-brown, cross-bedded, mechanical partings are low angle, parting with limonite at 23.8 ft., limonite bands and blebs from 28.5 - 30.0 ft..
30.0 - 40.0	Core recovery 100%, 30.0 - quartz sandstone, medium grained, tan to gray-tan, cross-bedded with patch of disseminated limonite from 35.7 - 35.9 ft., non calcareous, no mineralized partings.
40.0 - 49.0	Core recovery 100%, 40.0 - 49.0 ft., quartz sandstone, medium - coarse grained, gray-brown, cross-bedded, Non calcareous cement. Mostly nonmineralized mechanical partings, mineralized partings at 43.2, 43.4 and 43.5 ft..
49.0 - 60.0	Core recovery 86%, 49.0 - 50.0 ft., quartz sandstone, gray-brown, medium grained, cross-bedded, non calcareous cement. 50.0- 52.0 ft., quartz sandstone, medium - coarse grained, orange-tan to tan, strong limonite mineralization follows cross-bedding planes. 52.0 - 55.0 ft., quartz sandstone, medium grained, limonite mineralization concentrated along cross-bedding, non calcareous, no mineralized partings. 55.0 - 60.0 ft., quartz sandstone, light tan, very fine - fine grained, some conglomerate zone from 55.0 - 56.2 ft., no mineralized partings.
60.0 - 70.0	Core recovery 43%, 60.0 - 62.3 ft., quartz sandstone, medium - grit sized grains, tan to pink-orange, cross-bedded. 62.3 - 68.0 ft., no core recovered. 68.0 - 70.0 ft., quartz sandstone, yellow-tan, fine - coarse grained, cross-bedded, no mineralized partings.
70.0 - 80.0	Core recovery 32%, 70.0 - 76.6 ft., core not recovered. 76.6 - 77.5 ft., quartz sandstone / conglomerate, medium - grit sized grains with chert pebbles, orange-gray to dark gray. 77.5 - 77.9 ft., quartz sandstone, light gray. 77.9 - 80.0 ft., quartz sandstone, fine - medium grained, tan, no mineralized partings.
80.0 - 90.0	Core recovery 80%, 80.0 - 82.0 ft., no core recovered. 82.0 - 90.0 ft., quartz sandstone, fine - medium grained, yellow-tan, nearly all unconsolidated sand, very friable.

Core Log of Well TW4-22 Cont.

90.0 - 100.0	Core recovery 93%, 90.0 - 90.6 ft., no core recovered. 90.6 - 91.5 ft., quartz sandstone, fine - medium grained, yellow-tan, very friable, non calcareous cement. 91.5 - 92.0 ft., shale, yellow-gray, very soft. 92.0 - 93.0 ft., quartz sandstone / siltstone, mottled - light gray. 93.0 - 93.2 ft., shale, gray-blue. 93.2 - 100.0 ft., quartz sandstone, very fine - fine grained, light gray-tan, cross-bedded with limonite patches from 94.5 - 95.0 ft., unconsolidated from 99.5 - 100.0 ft., non calcareous.
100.0 - 110.0	Core recovery 47%, 100.0 - 105.3 ft., no core recovered. 105.3 - 110.0 ft., quartz sandstone / gritstone, light gray-green, dark chert fragments.
110.0 - 115.0	Core recovery 72%, 110.0 - 111.4 ft., no core recovered. 111.4 - 111.5 ft., chert pebble conglomerate, upper Brushy Basin Mbr. contact at 111.5 ft. 111.5 - 115.0 ft., shale, green - mottled, T.D.

NX-NQ TOP
COMPANY IUC
PROPERTY WHITE MESA MILL
R.Q.D.
NX-NQ HOLE NO MW-30
BOX NO. 4
SAWED
SAMPLED
INTERVAL 40.0
TO 50.0
OTHER
'88 6 23

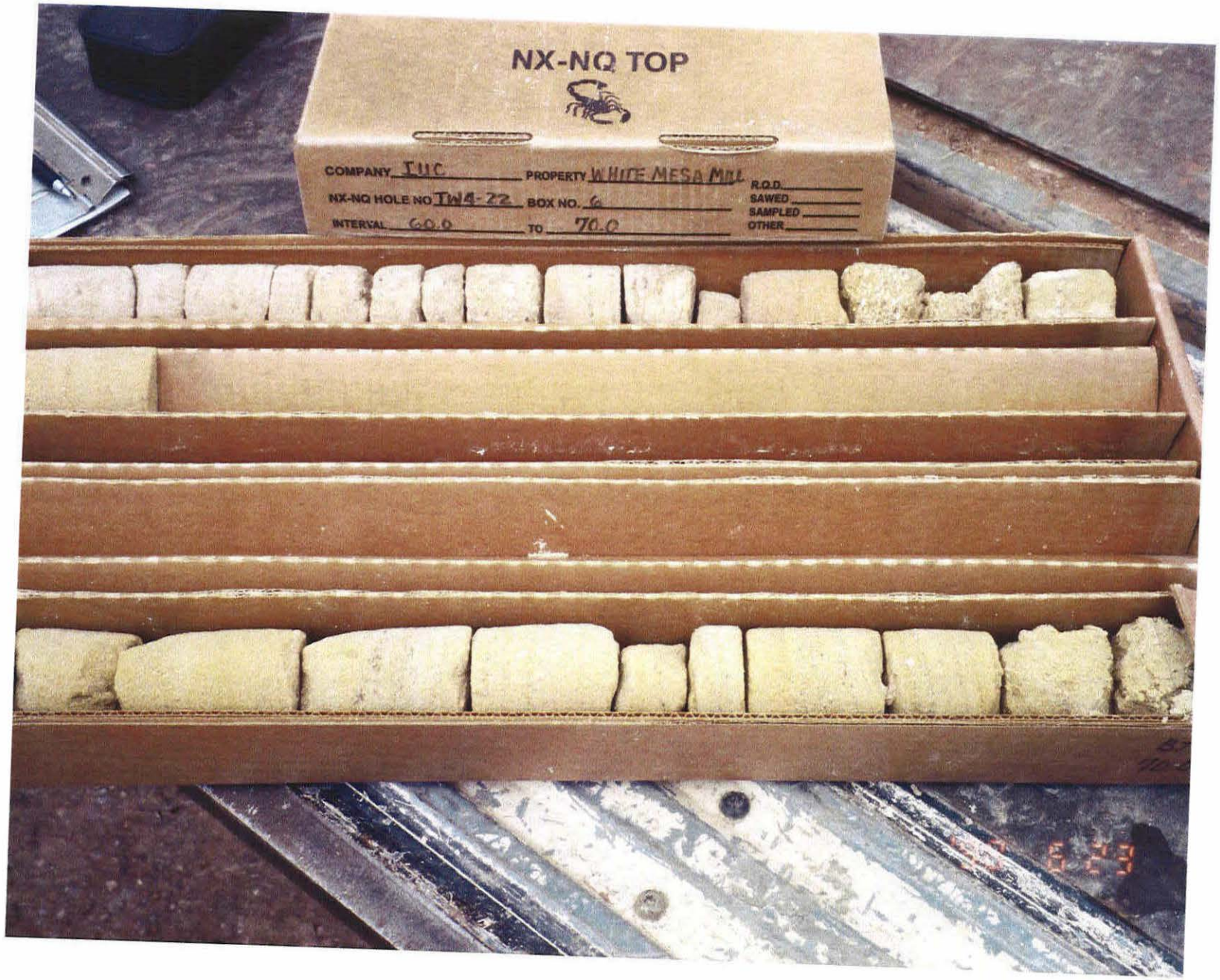
NX-NQ TOP
COMPANY IUC
PROPERTY WHITE MESA MILL
NX-NQ HOLE NO. MW-30
BOX NO. 5
INTERVAL 50.0
TO 60.0
R.Q.D.
SAWED
SAMPLED
OTHER
'98 6 23


NX-NQ TOP
COMPANY IUC
PROPERTY WHITE MESA MILL
R.Q.D.
SAWED
SAMPLED
OTHER
NX-NQ HOLE NO TW4-22
BOX NO. 2
INTERVAL 20.0
TO 30.0
23

NX-NQ TOP
COMPANY TUC
PROPERTY WHITE MESA MILL
NX-NQ HOLE NO TW4-22
BOX NO. 3
INTERVAL 30.0
TO 40.0
R.Q.D.
SAWED
SAMPLED
OTHER
BTM
40.0'

COMPANY Euc
PROPERTY WHITE MESA MILL
NX-NQ HOLE NO TW 4-22
BOX NO. 4
INTERVAL 40.0
TO 49.0
R.Q.D.
SAWED
SAMPLED
OTHER

NX-NQ TOP
COMPANY TUC
PROPERTY WHITE MESA MILL
NX-NQ HOLE NO TW4-22
BOX NO. 5
INTERVAL 49.0
TO 60.0
R.Q.D.
SAWED
SAMPLED
OTHER
50.0


NX-NQ TOP
COMPANY IUC
PROPERTY WHITE MESA MILL
R.Q.D.
NX-NQ HOLE NO TW4-22
BOX NO. 6
SAWED
SAMPLED
INTERVAL 60.0
TO 70.0
OTHER

NX-NQ TOP
COMPANY IUC
PROPERTY WHITE MESA MILL
R.O.D.
NX-NQ HOLE NO TW4-22
BOX NO. 7
SAWED
SAMPLED
INTERVAL 70.0
TO 80.0
OTHER

NX-NQ TOP
COMPANY TUC
PROPERTY WHITE MESA MILL
NX-NQ HOLE NO. TW4-22
BOX NO. 8
INTERVAL 80.0
TO 90.0
R.Q.D.
SAWED
SAMPLED
OTHER

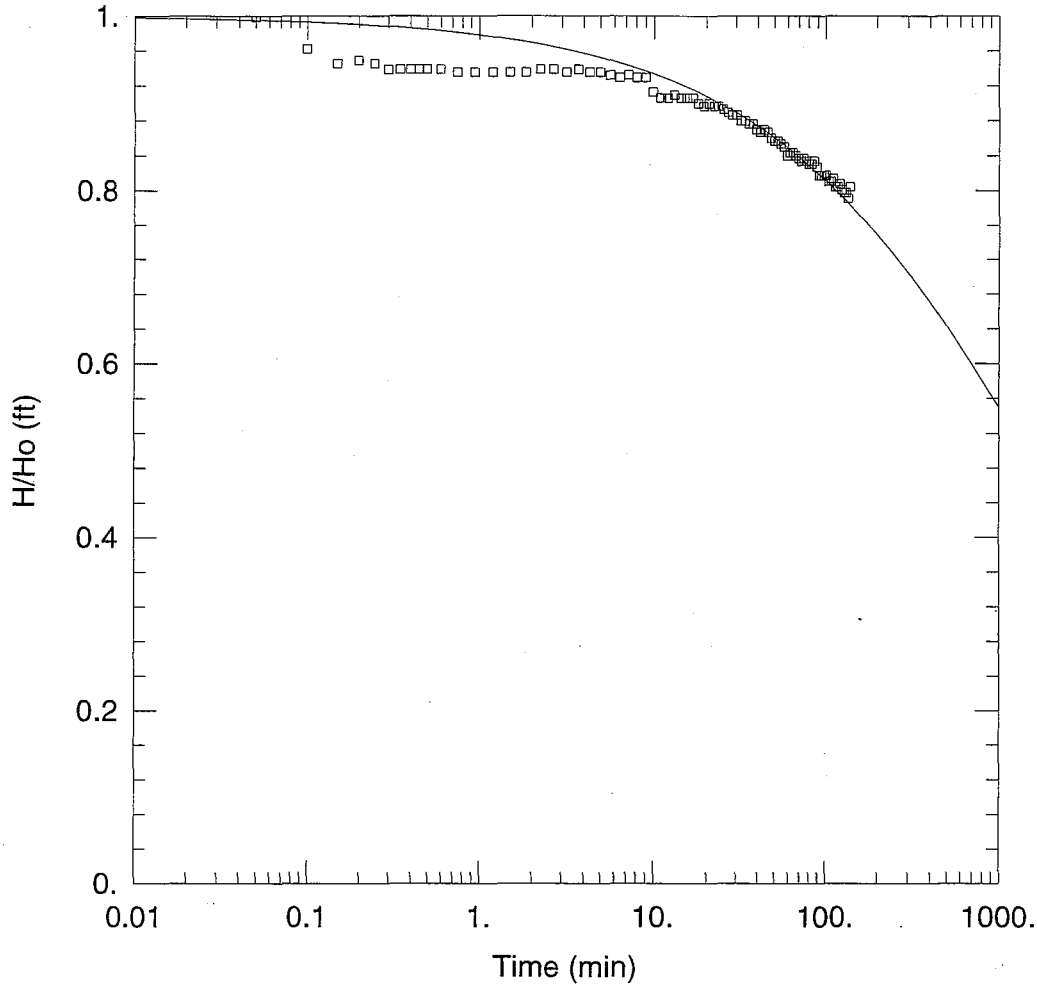
NX-NQ TOP
COMPANY IUC
PROPERTY WHITE MESA MILL
R.Q.D.
NX-NQ HOLE NO. TW4-22
BOX NO. 9
SAWED
SAMPLED
INTERVAL 90.0
TO 100.0
OTHER

COMPANY IUC
PROPERTY WHITE MESA MILL
R.Q.D.
NX-NQ HOLE NO TW4-22
BOX NO. 10
SAWED
SAMPLED
INTERVAL 100.0
TO 110.0
OTHER

NX-NQ TOP
COMPANY
PROPERTY
NX-NQ HOLE NO
BOX NO.
INTERVAL
TO
R.Q.D.
SAWED
SAMPLED
OTHER
115.0
TD
'98 6 23

APPENDIX B

SLUG TEST ANALYSIS PLOTS



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw23\mw23.aqt
Date: 07/13/05 Time: 11:25:53

PROJECT INFORMATION

Client: iuc
Test Well: mw23

AQUIFER DATA

Saturated Thickness: 12. ft

WELL DATA (mw23)

Initial Displacement: 0.7 ft
Wellbore Radius: 0.281 ft
Screen Length: 12. ft
Gravel Pack Porosity: 0.3

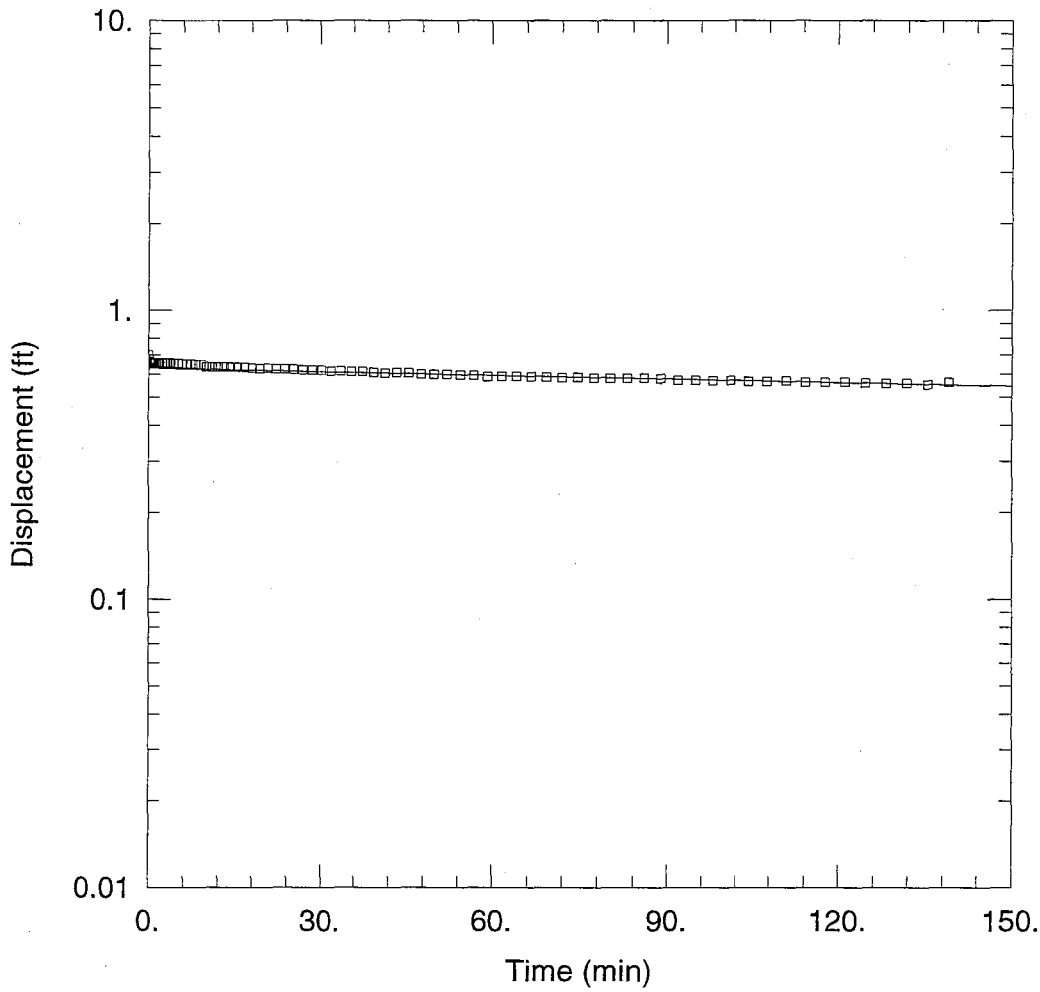
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 12. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 3.236E-08 cm/sec
Kz/Kr = 1.

Ss = 0.1 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw23\mw23br.aqt
Date: 07/13/05 Time: 11:26:08

PROJECT INFORMATION

Client: iuc
Test Well: mw23

AQUIFER DATA

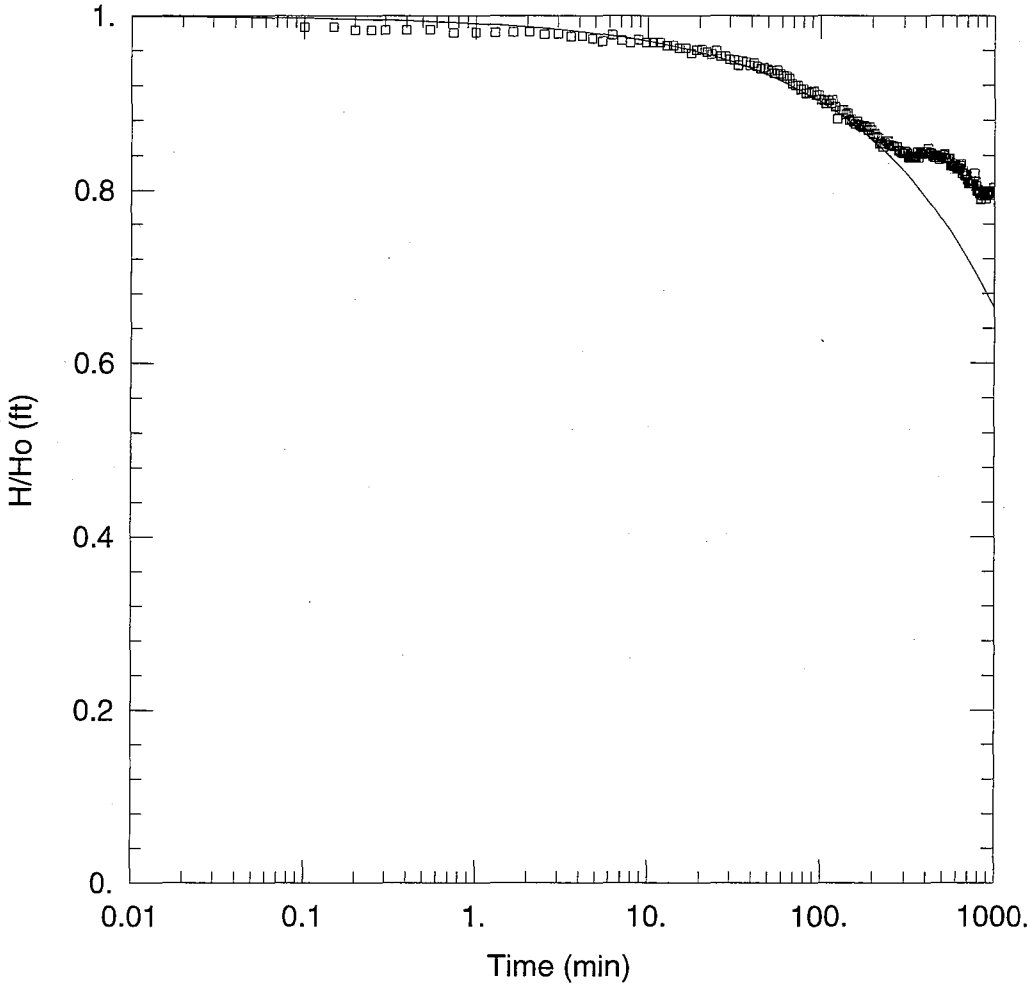
Saturated Thickness: 12. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (mw23)

Initial Displacement: 0.7 ft
Wellbore Radius: 0.281 ft
Screen Length: 12. ft
Gravel Pack Porosity: 0.3
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 12. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.605E-06 cm/sec
y0 = 0.63 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw23b\mw23b.aqt
Date: 07/14/05 Time: 10:57:04

PROJECT INFORMATION

Client: iuc
Test Well: mw23b

AQUIFER DATA

Saturated Thickness: 12. ft

WELL DATA (mw23b)

Initial Displacement: 0.7 ft
Wellbore Radius: 0.281 ft
Screen Length: 12. ft
Gravel Pack Porosity: 0.3

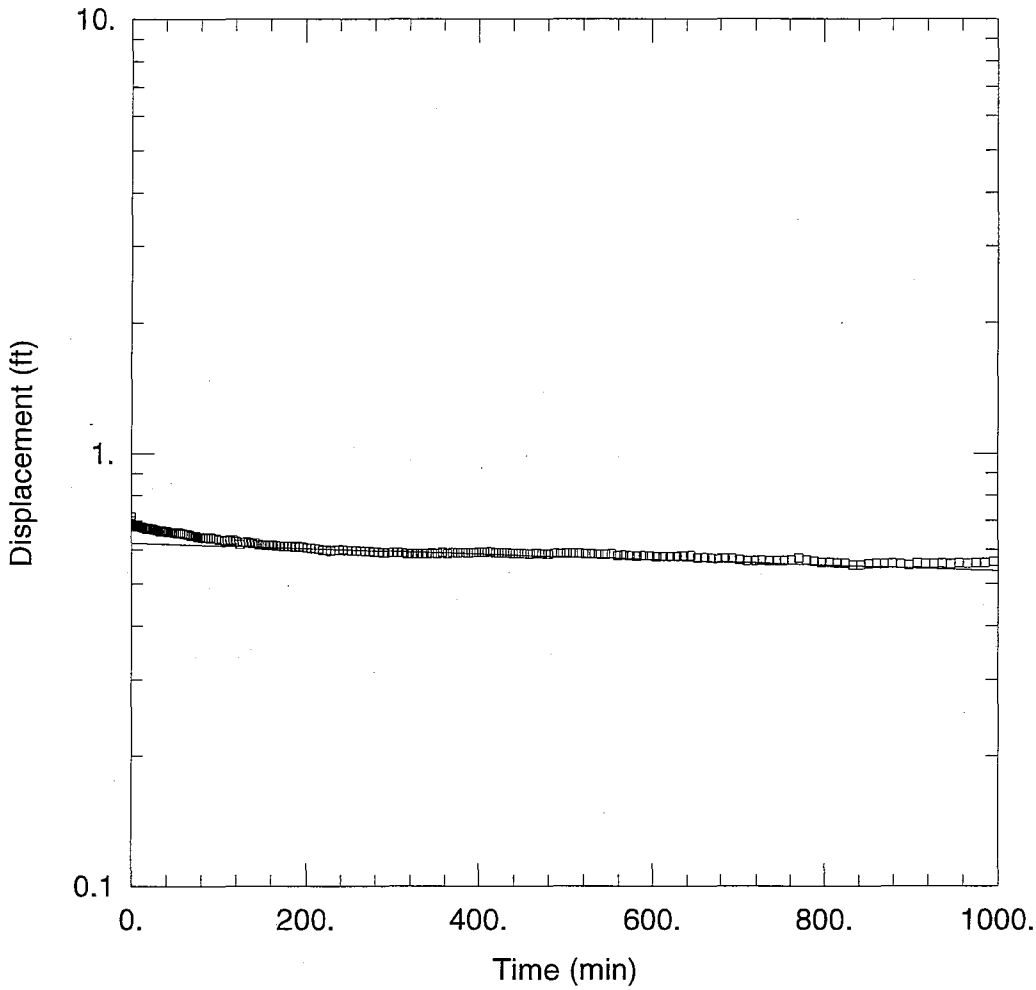
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 12. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 2.256E-07 cm/sec
Kz/Kr = 1.

Ss = 0.002312 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw23b\mw23bbr.aqt
Date: 07/14/05 Time: 10:57:16

PROJECT INFORMATION

Client: iuc
Test Well: mw23b

AQUIFER DATA

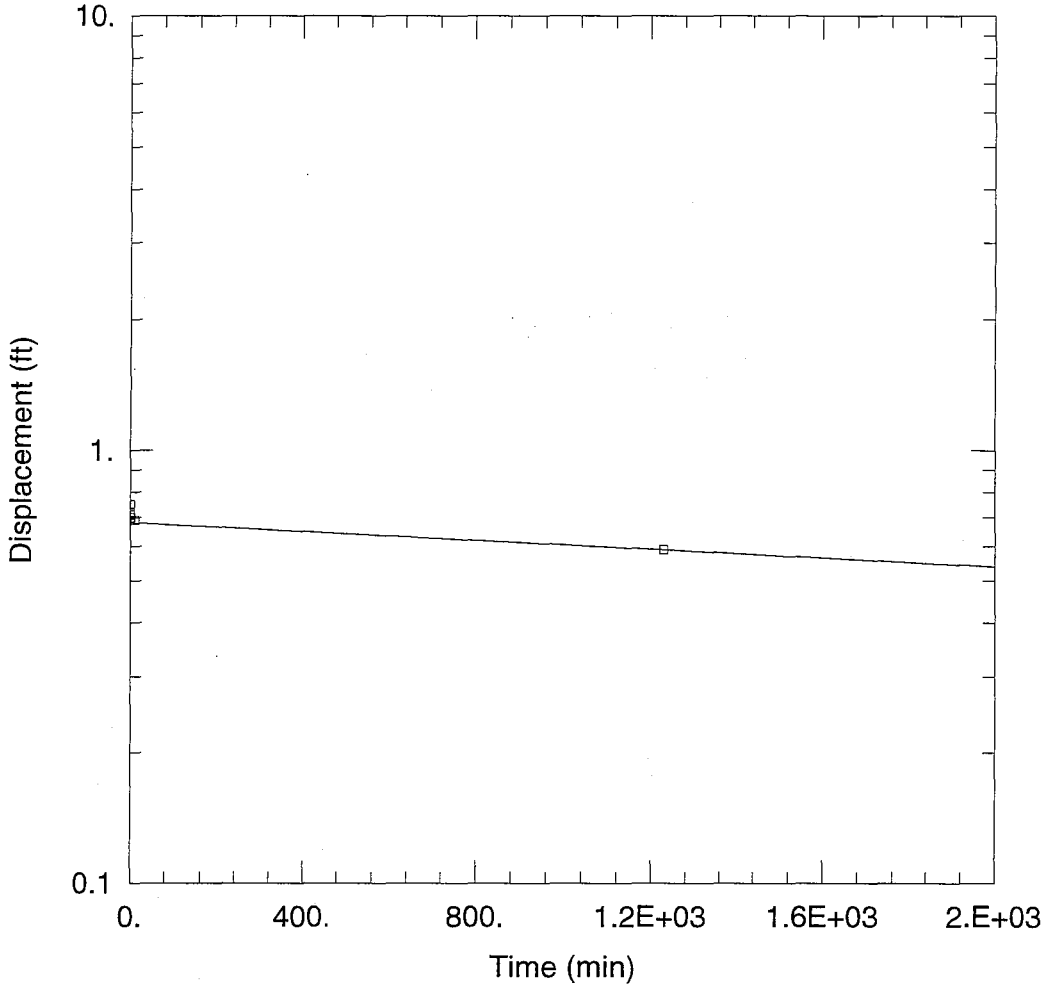
Saturated Thickness: 12. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (mw23b)

Initial Displacement: 0.7 ft
Wellbore Radius: 0.281 ft
Screen Length: 12. ft
Gravel Pack Porosity: 0.3
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 12. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.494E-07 cm/sec
y0 = 0.6211 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw23b\mw23bbrh.aqt
Date: 07/13/05 Time: 11:26:45

PROJECT INFORMATION

Client: iuc
Test Well: mw23bh

AQUIFER DATA

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

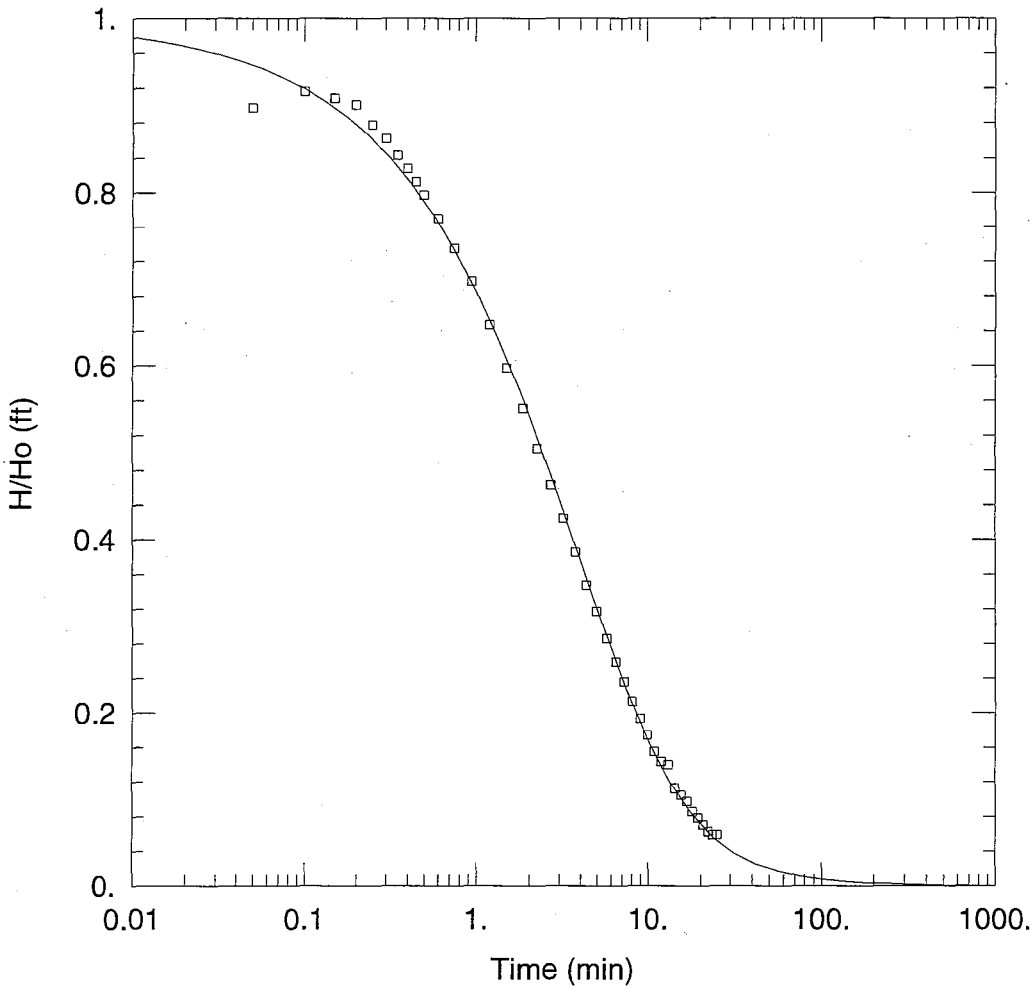
WELL DATA (mw23bh)

Initial Displacement: 0.7 ft
Wellbore Radius: 0.281 ft
Screen Length: 12. ft
Gravel Pack Porosity: 0.3
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 12. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.978E-07 cm/sec
y0 = 0.681 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw25\mw25.aqt
Date: 07/13/05 Time: 11:26:59

PROJECT INFORMATION

Client: iuc
Test Well: mw25

AQUIFER DATA

Saturated Thickness: 33. ft

WELL DATA (mw25)

Initial Displacement: 0.6 ft
Wellbore Radius: 0.281 ft
Screen Length: 33. ft
Gravel Pack Porosity: 0.3

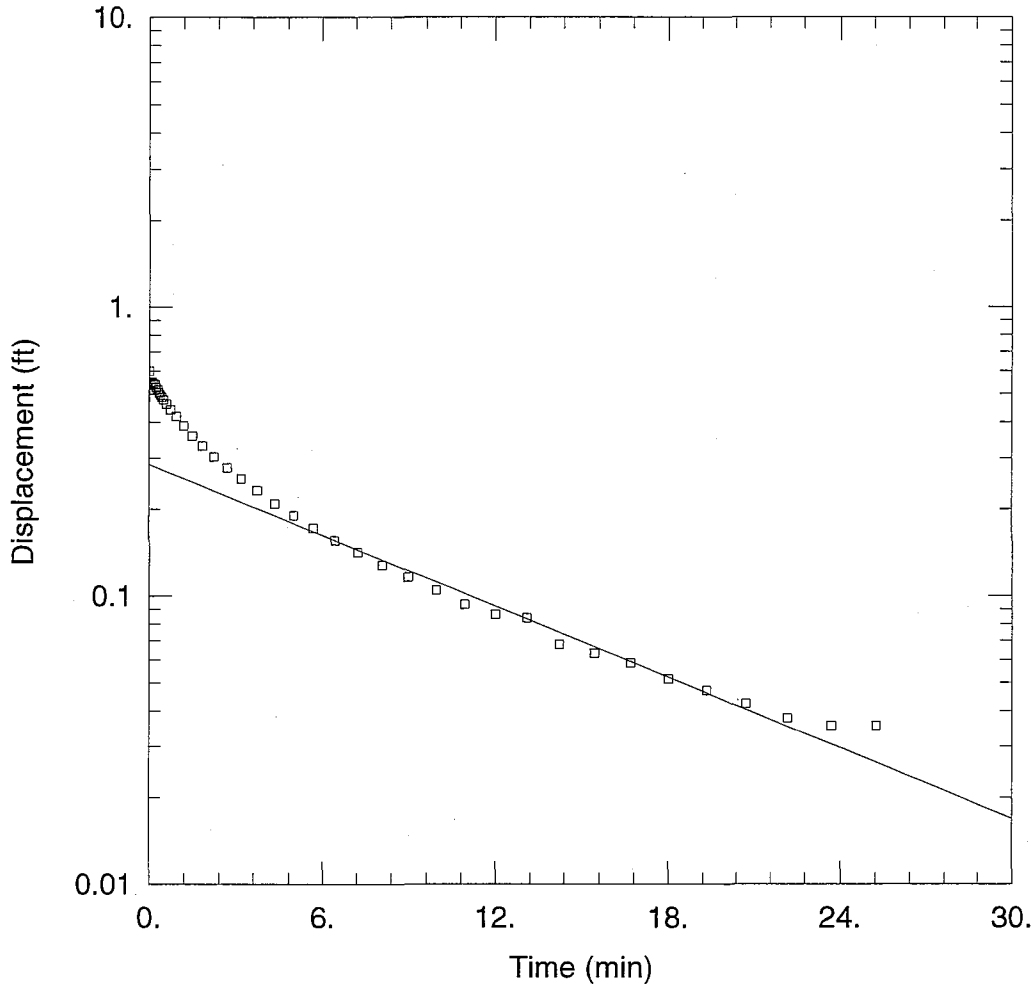
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 33. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.0001133 cm/sec
Kz/Kr = 1.

Ss = 0.0003004 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw25\mw25br.aqt
Date: 07/13/05 Time: 11:27:14

PROJECT INFORMATION

Client: iuc
Test Well: mw25

AQUIFER DATA

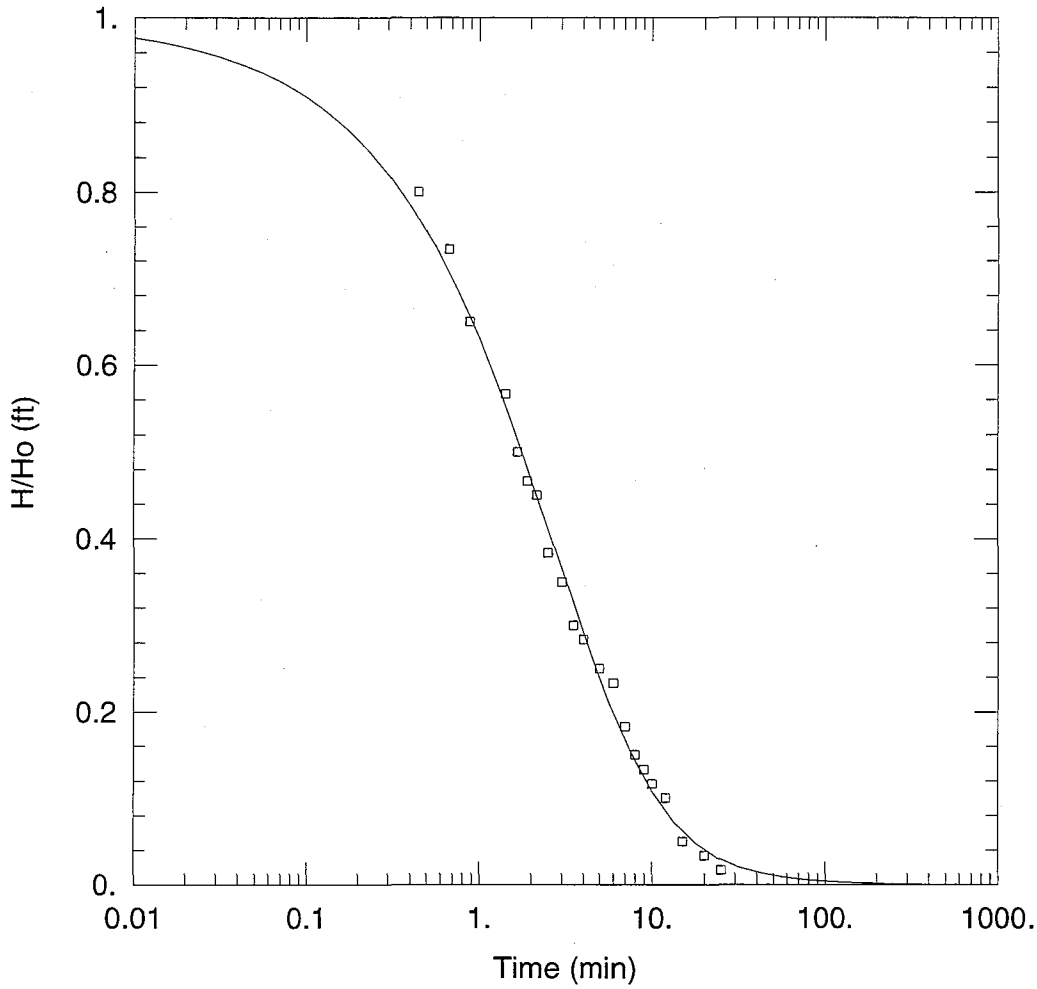
Saturated Thickness: 33. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (mw25)

Initial Displacement: 0.6 ft
Wellbore Radius: 0.281 ft
Screen Length: 33. ft
Gravel Pack Porosity: 0.3
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 33. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 7.437E-05 cm/sec
y0 = 0.2857 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw25\mw25h.aqt
Date: 07/13/05 Time: 11:27:24

PROJECT INFORMATION

Client: iuc
Test Well: mw25h

AQUIFER DATA

Saturated Thickness: 33. ft

WELL DATA (mw25h)

Initial Displacement: 0.6 ft
Wellbore Radius: 0.281 ft
Screen Length: 33. ft
Gravel Pack Porosity: 0.3

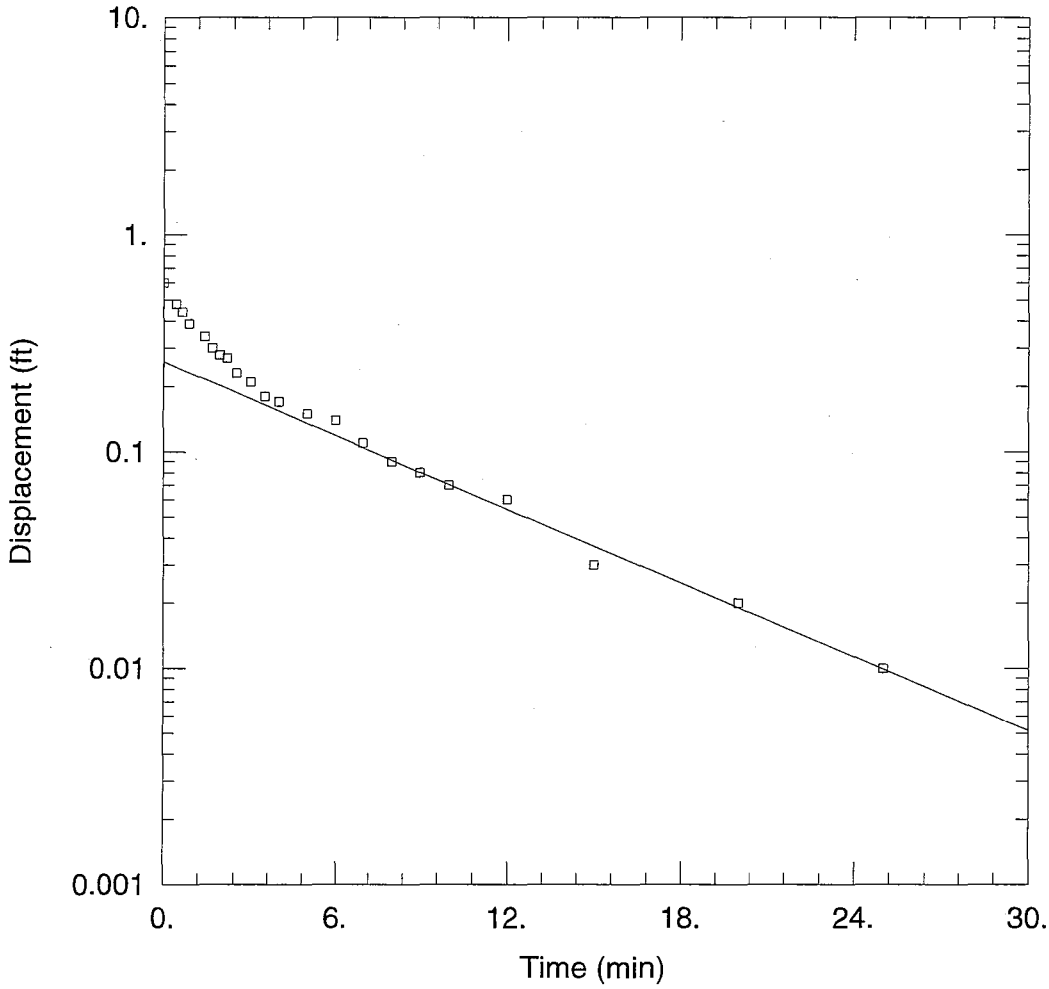
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 33. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.0001733 cm/sec
Kz/Kr = 1.

Ss = 0.0001989 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw25\mw25brh.aqt
Date: 07/13/05 Time: 11:27:34

PROJECT INFORMATION

Client: iuc
Test Well: mw25h

AQUIFER DATA

Saturated Thickness: 33. ft
Anisotropy Ratio (Kz/Kr): 1.

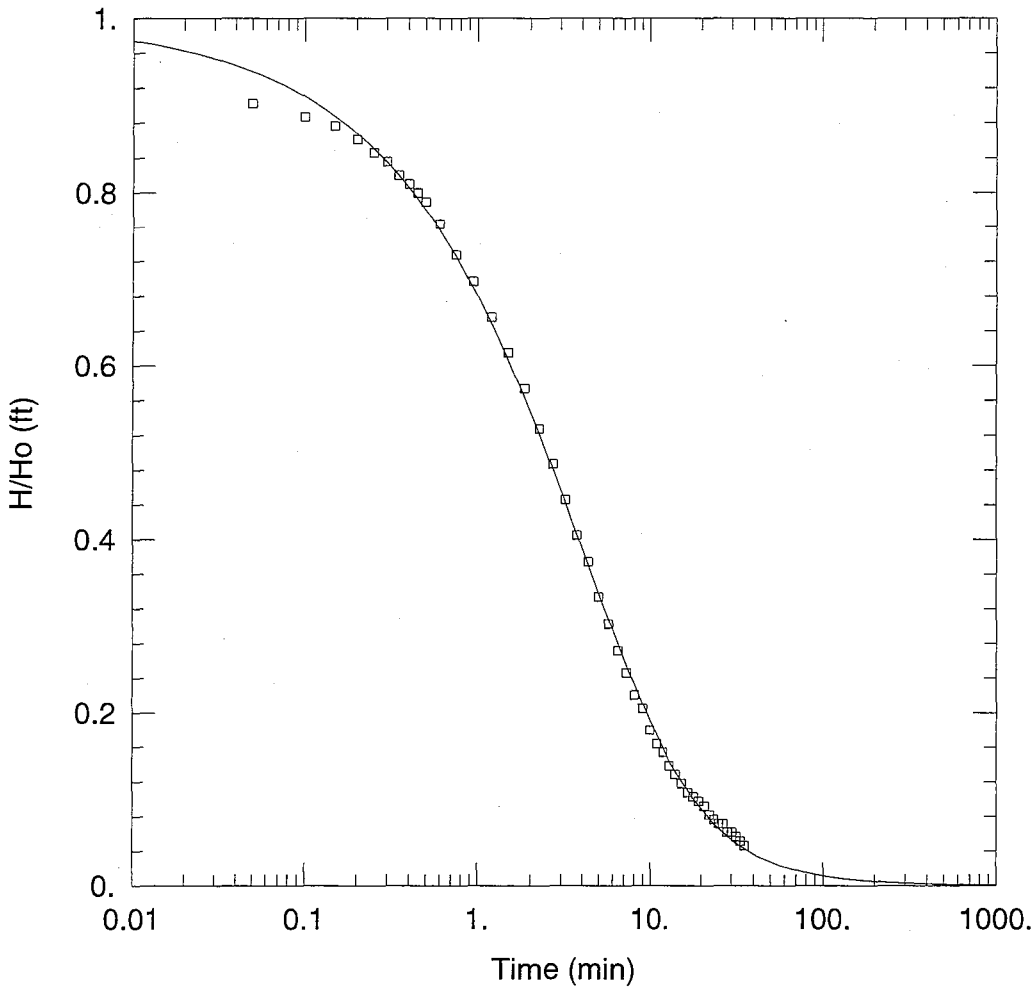
WELL DATA (mw25h)

Initial Displacement: 0.6 ft
Wellbore Radius: 0.281 ft
Screen Length: 33. ft
Gravel Pack Porosity: 0.3
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 33. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001031 cm/sec
y0 = 0.2605 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw27\mw27.aqt
Date: 07/13/05 Time: 11:27:49

PROJECT INFORMATION

Client: iuc
Test Well: mw27

AQUIFER DATA

Saturated Thickness: 36. ft

WELL DATA (mw27)

Initial Displacement: 0.45 ft
Wellbore Radius: 0.281 ft
Screen Length: 36. ft
Gravel Pack Porosity: 0.3

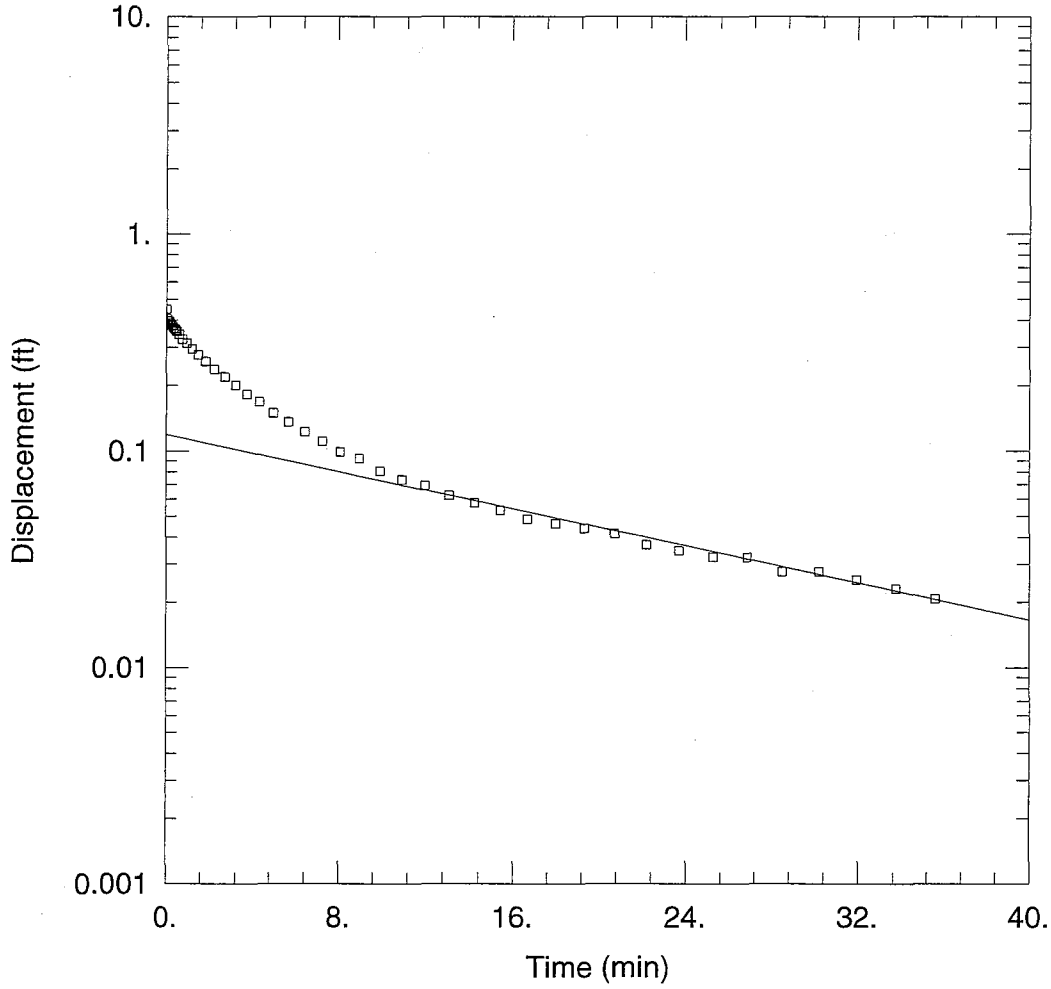
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 36. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 8.238E-05 cm/sec
Kz/Kr = 1.

Ss = 0.0005319 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw27\mw27br.aqt
Date: 07/13/05 Time: 11:27:59

PROJECT INFORMATION

Client: iuc
Test Well: mw27

AQUIFER DATA

Saturated Thickness: 36. ft
Anisotropy Ratio (Kz/Kr): 1.

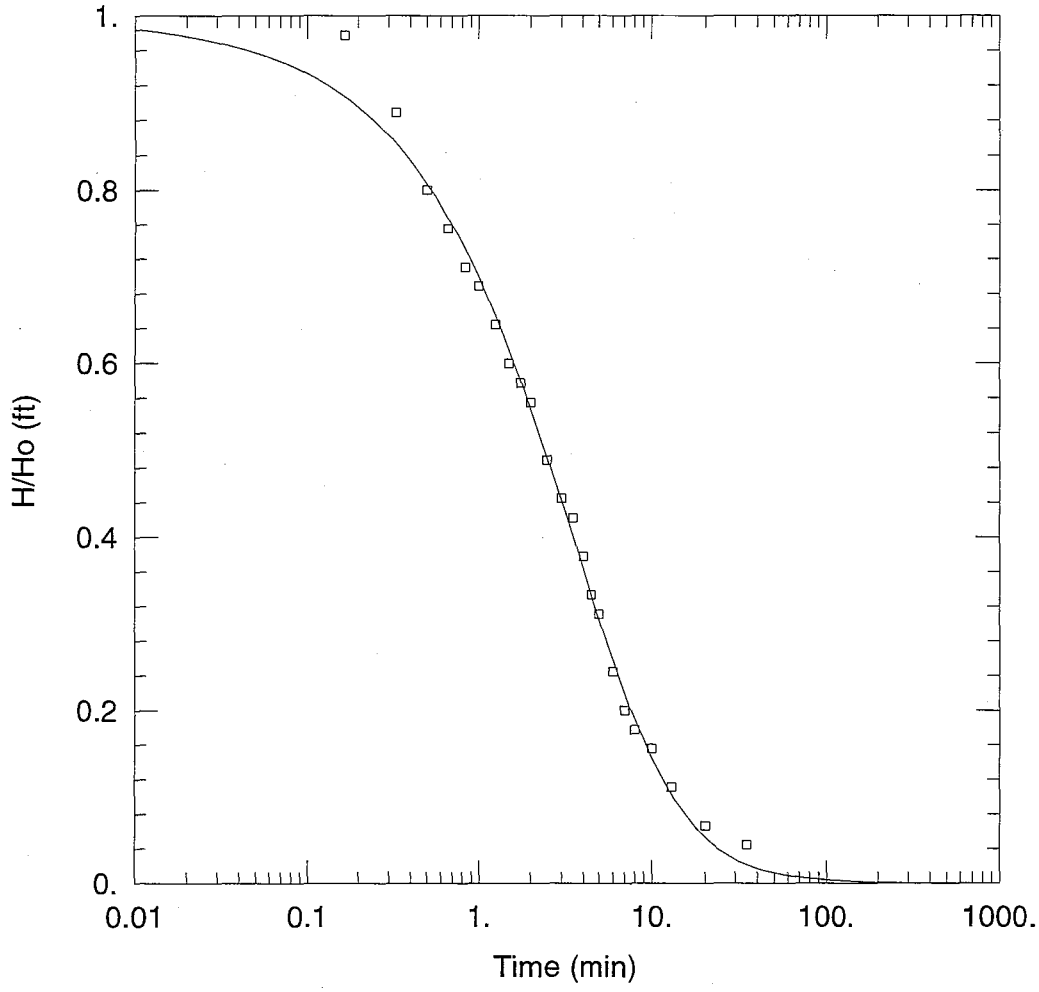
WELL DATA (mw27)

Initial Displacement: 0.45 ft
Wellbore Radius: 0.281 ft
Screen Length: 36. ft
Gravel Pack Porosity: 0.3
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 36. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3.633E-05 cm/sec
y0 = 0.1194 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw27\mw27h.aqt
Date: 07/13/05 Time: 11:28:09

PROJECT INFORMATION

Client: iuc
Test Well: mw27h

AQUIFER DATA

Saturated Thickness: 36. ft

WELL DATA (mw27h)

Initial Displacement: 0.45 ft
Wellbore Radius: 0.281 ft
Screen Length: 36. ft
Gravel Pack Porosity: 0.3

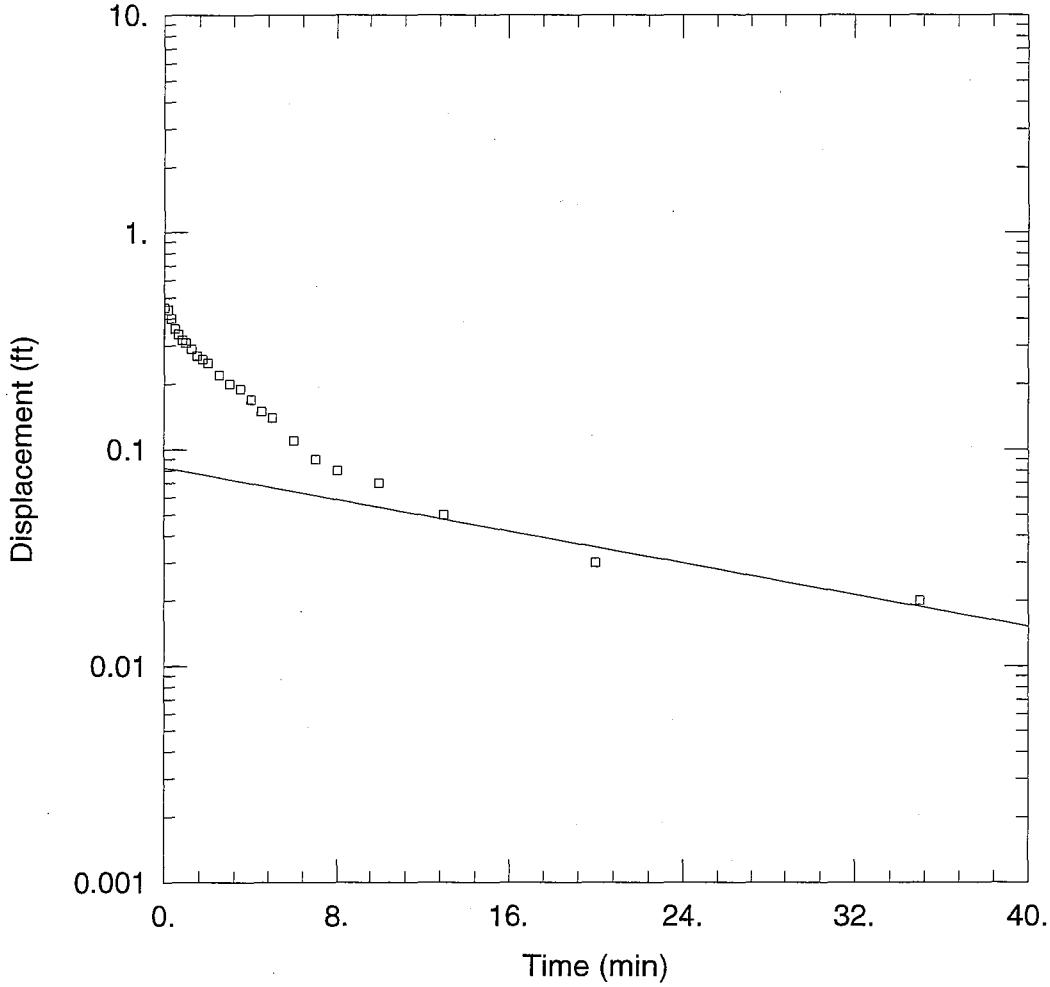
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 36. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.0001385 cm/sec
Kz/Kr = 1.

Ss = 8.702E-05 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw27\mw27brh.aqt
Date: 07/13/05 Time: 11:28:19

PROJECT INFORMATION

Client: iuc
Test Well: mw27h

AQUIFER DATA

Saturated Thickness: 36. ft
Anisotropy Ratio (Kz/Kr): 1.

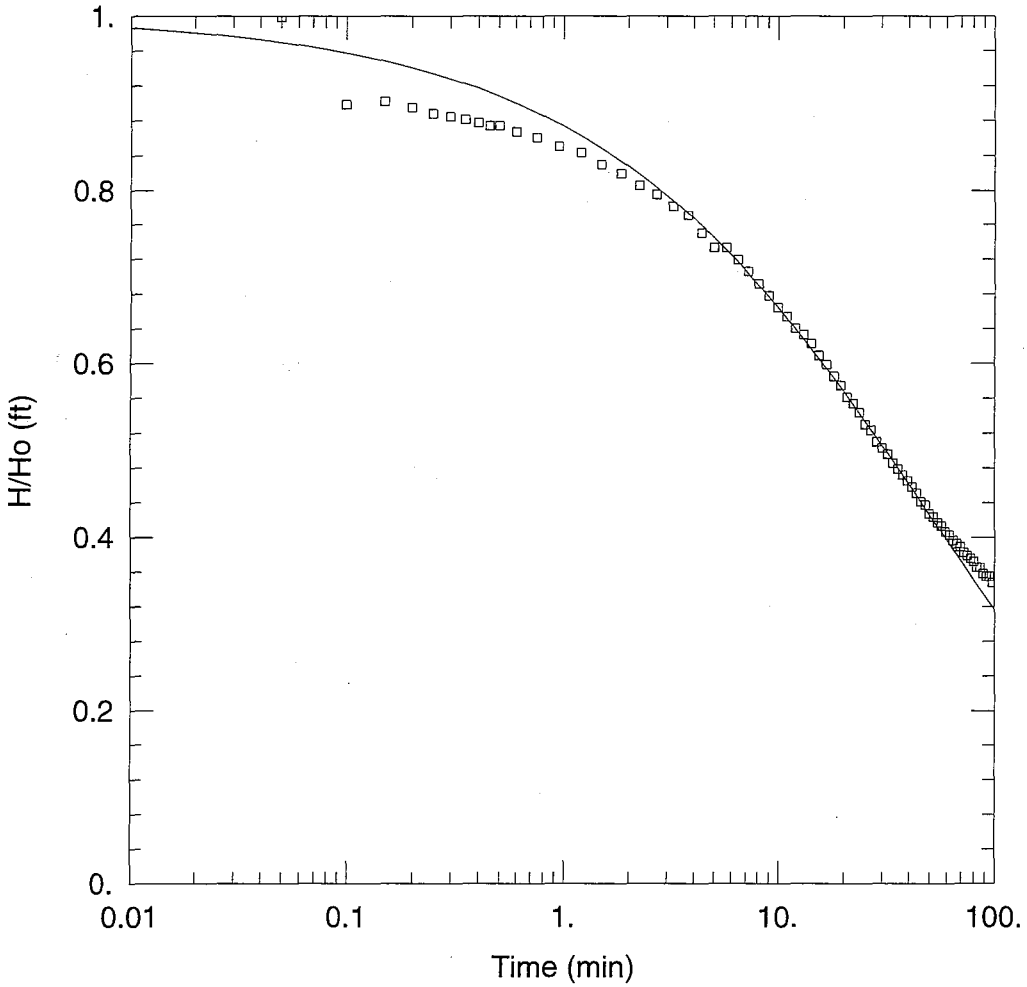
WELL DATA (mw27h)

Initial Displacement: 0.45 ft
Wellbore Radius: 0.281 ft
Screen Length: 36. ft
Gravel Pack Porosity: 0.3
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 36. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3.112E-05 cm/sec
y0 = 0.08258 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw28\mw28.aqt
Date: 07/13/05 Time: 11:28:33

PROJECT INFORMATION

Client: iuc
Test Well: mw28

AQUIFER DATA

Saturated Thickness: 23. ft

WELL DATA (mw28)

Initial Displacement: 0.67 ft
Wellbore Radius: 0.281 ft
Screen Length: 23. ft
Gravel Pack Porosity: 0.3

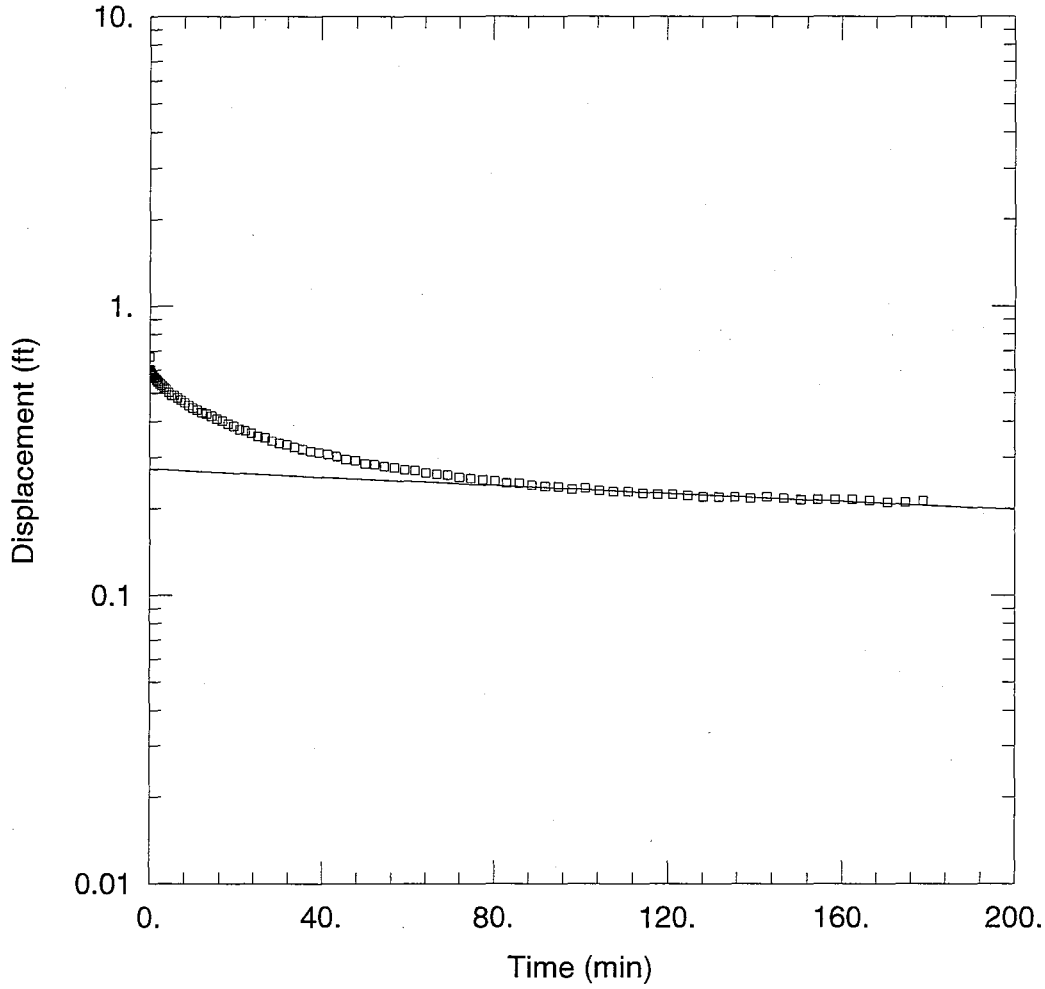
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 23. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 1.731E-06 cm/sec
Kz/Kr = 1.

Ss = 0.02 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw28\mw28br.aqt
Date: 07/13/05 Time: 11:28:46

PROJECT INFORMATION

Client: iuc
Test Well: mw28

AQUIFER DATA

Saturated Thickness: 23. ft
Anisotropy Ratio (Kz/Kr): 1.

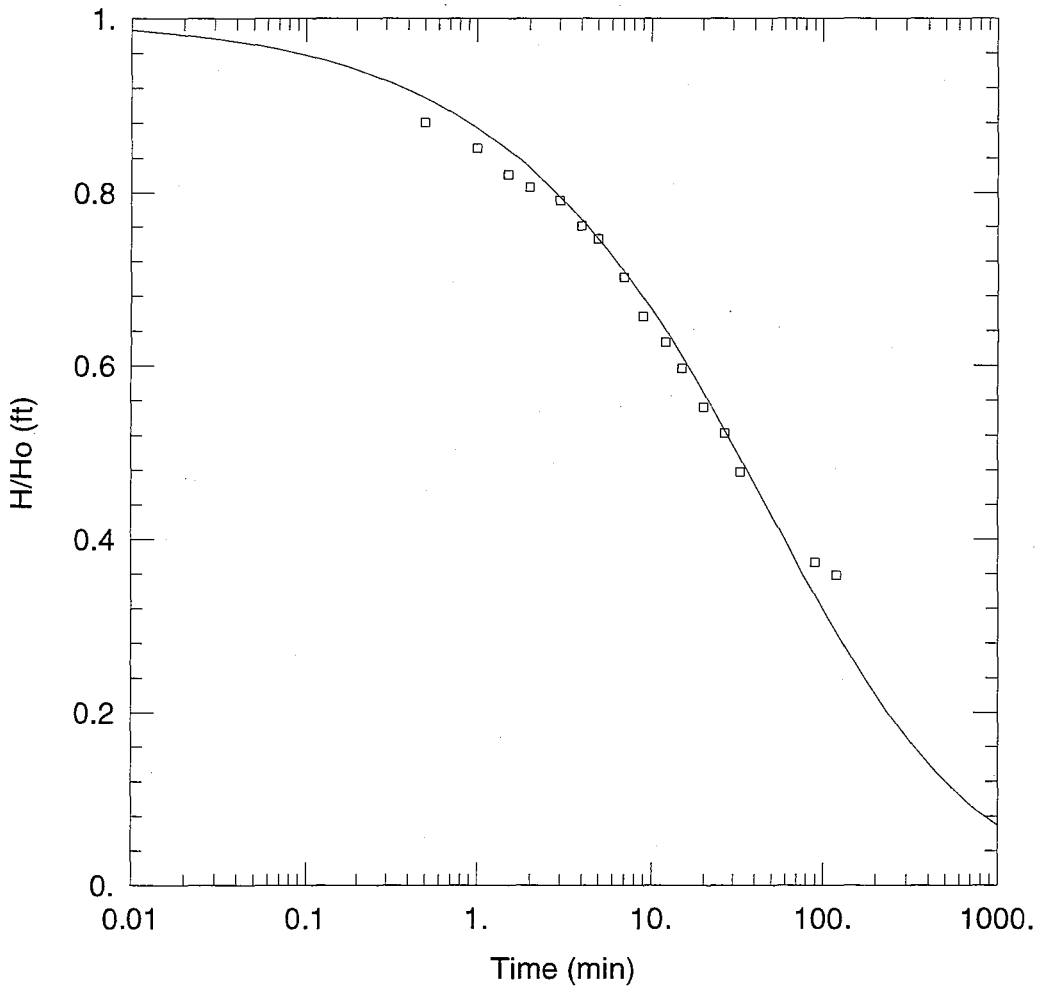
WELL DATA (mw28)

Initial Displacement: 0.67 ft
Wellbore Radius: 0.281 ft
Screen Length: 23. ft
Gravel Pack Porosity: 0.3
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 23. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.681E-06 cm/sec
y0 = 0.2734 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw28\mw28h.aqt
Date: 07/13/05 Time: 11:28:58

PROJECT INFORMATION

Client: iuc
Test Well: mw28h

AQUIFER DATA

Saturated Thickness: 23. ft

WELL DATA (mw28h)

Initial Displacement: 0.67 ft
Wellbore Radius: 0.281 ft
Screen Length: 23. ft
Gravel Pack Porosity: 0.3

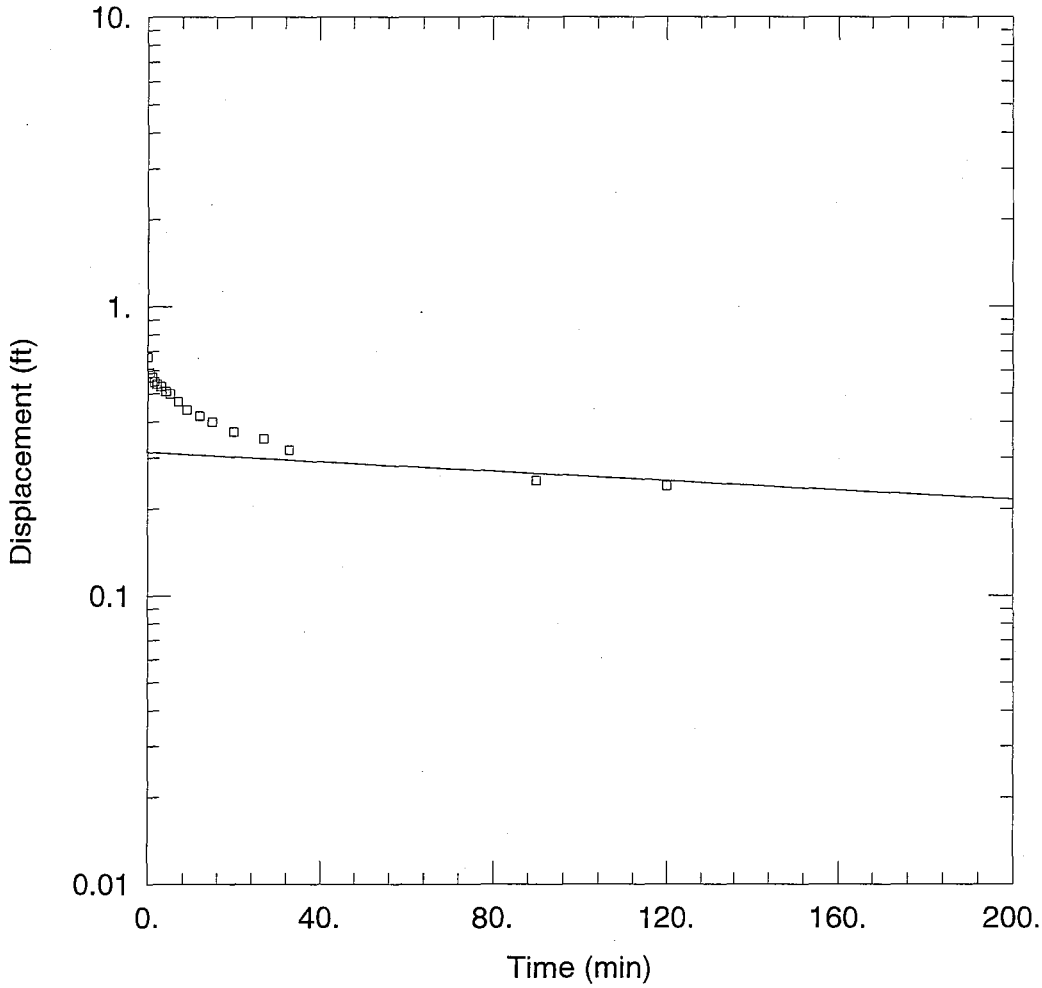
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 23. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 1.709E-06 cm/sec
Kz/Kr = 1.

Ss = 0.02 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw28\mw28brh.aqt
Date: 07/13/05 Time: 11:29:08

PROJECT INFORMATION

Client: iuc
Test Well: mw28h

AQUIFER DATA

Saturated Thickness: 23. ft
Anisotropy Ratio (Kz/Kr): 1.

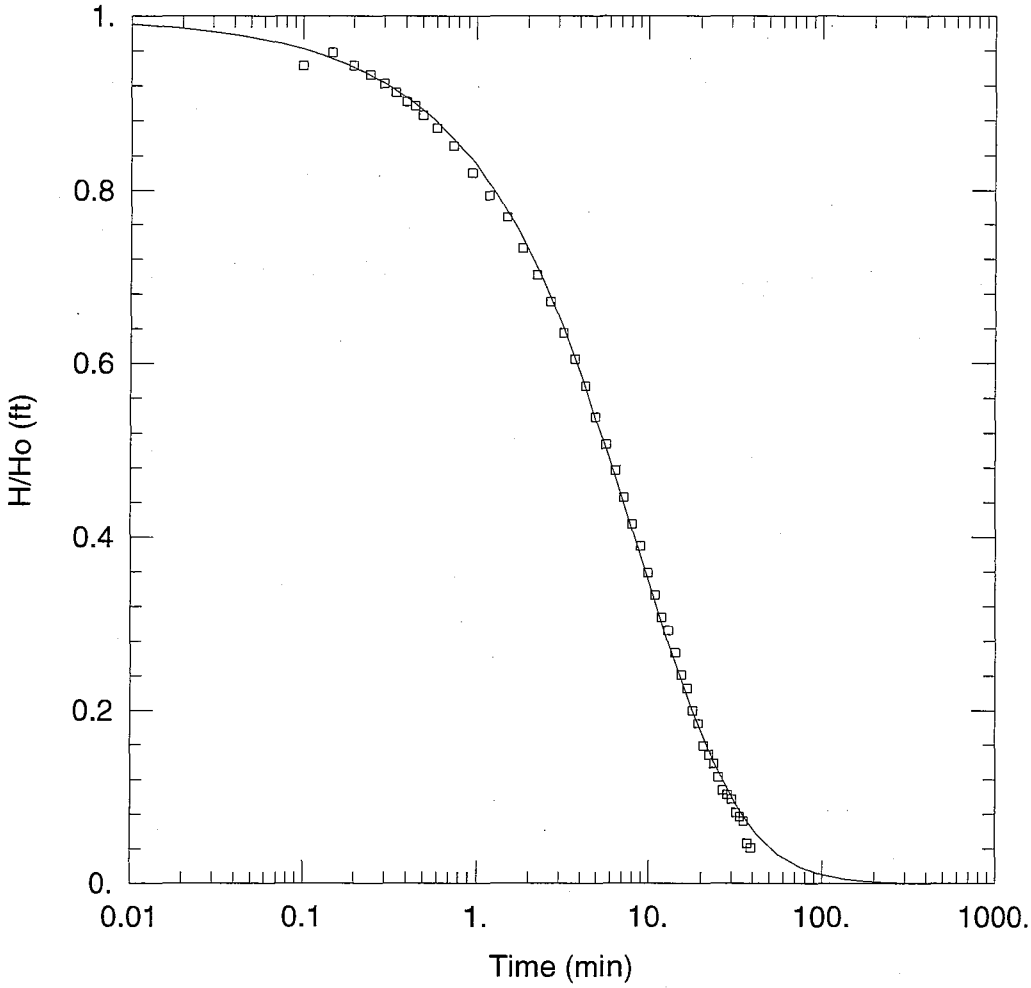
WELL DATA (mw28h)

Initial Displacement: 0.67 ft
Wellbore Radius: 0.281 ft
Screen Length: 23. ft
Gravel Pack Porosity: 0.3
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 23. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.962E-06 cm/sec
y0 = 0.314 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw29\mw29.aqt
Date: 07/13/05 Time: 11:29:26

PROJECT INFORMATION

Client: iuc
Test Well: mw29

AQUIFER DATA

Saturated Thickness: 18. ft

WELL DATA (mw29)

Initial Displacement: 0.45 ft
Wellbore Radius: 0.281 ft
Screen Length: 18. ft
Gravel Pack Porosity: 0.3

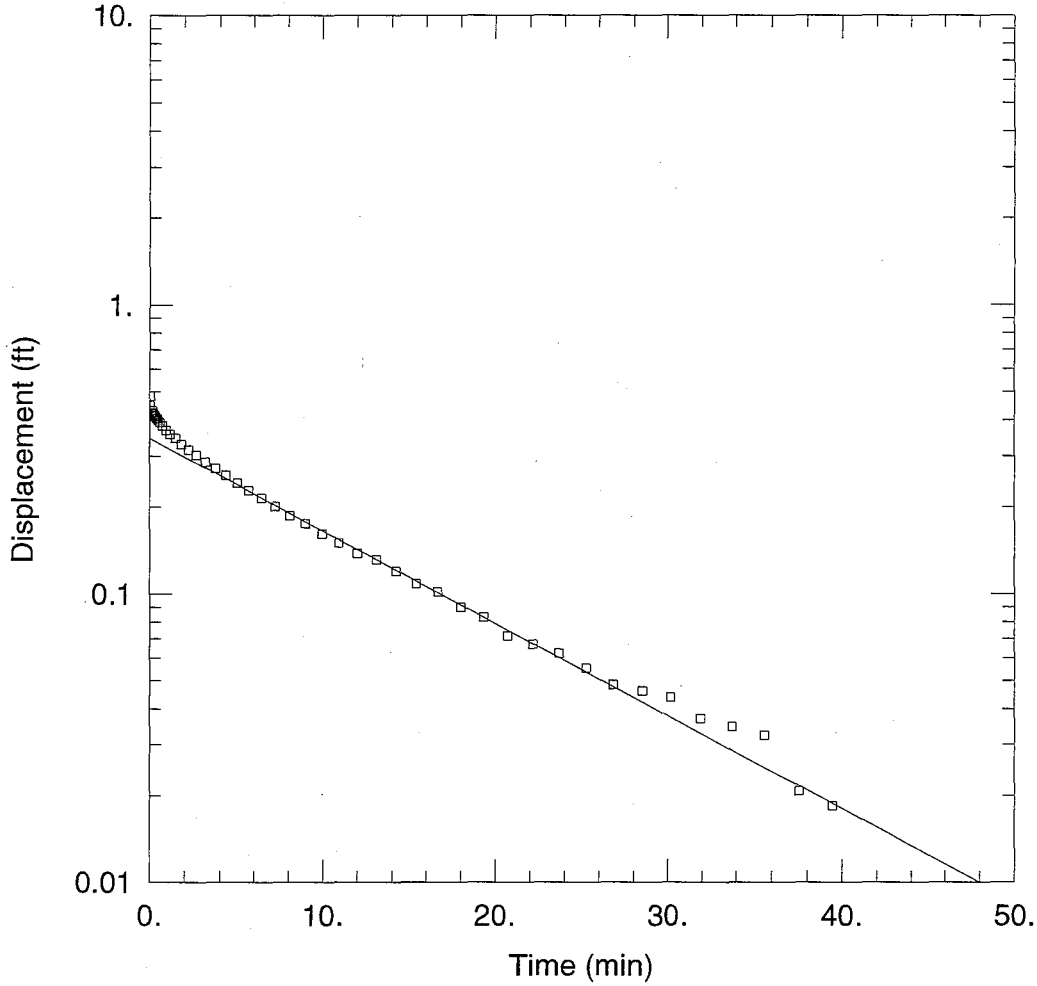
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 18. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.0001109 cm/sec
Kz/Kr = 1.

Ss = 0.0001861 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw29\mw29br.aqt
Date: 07/13/05 Time: 11:29:36

PROJECT INFORMATION

Client: iuc
Test Well: mw29

AQUIFER DATA

Saturated Thickness: 18. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (mw29)

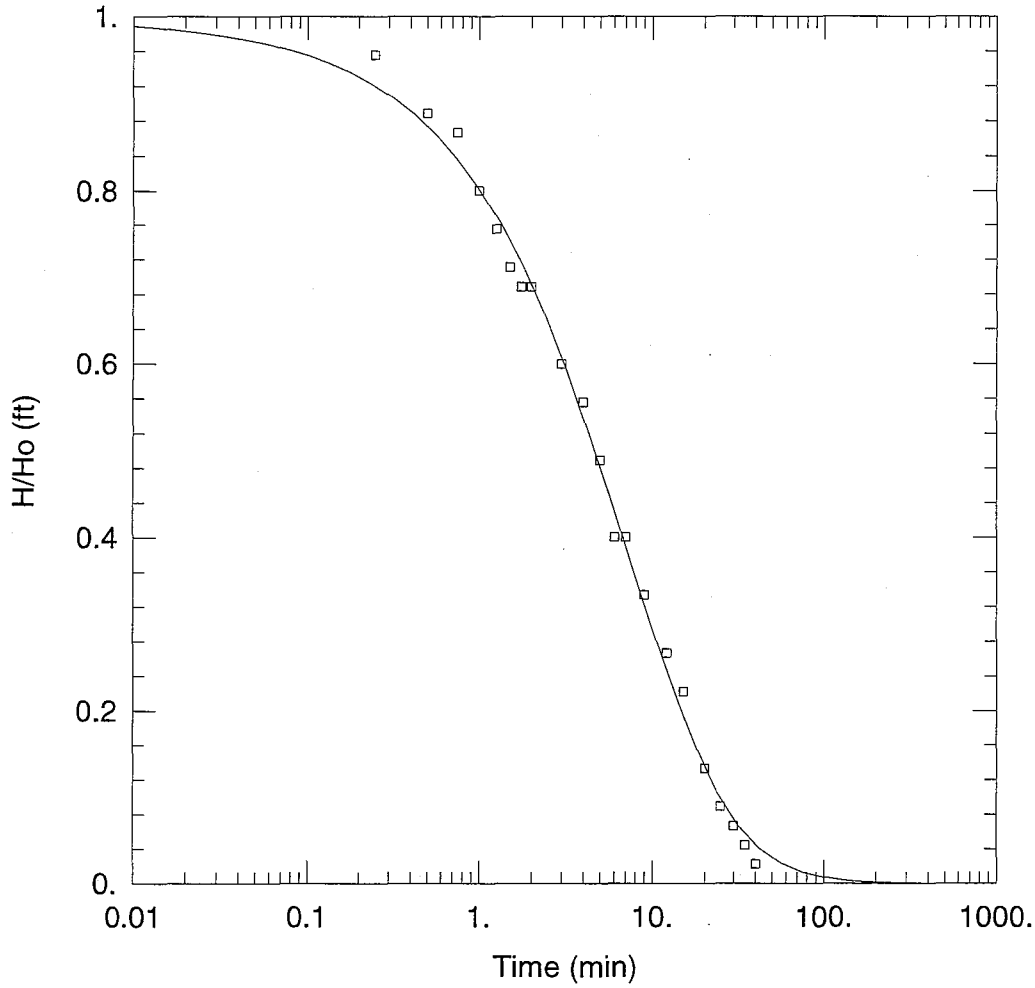
Initial Displacement: 0.45 ft
Wellbore Radius: 0.281 ft
Screen Length: 18. ft
Gravel Pack Porosity: 0.3

Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 18. ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 9.283E-05 cm/sec y0 = 0.3464 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw29\mw29h.aqt
Date: 07/13/05 Time: 11:29:49

PROJECT INFORMATION

Client: iuc
Test Well: mw29h

AQUIFER DATA

Saturated Thickness: 18. ft

WELL DATA (mw29h)

Initial Displacement: 0.45 ft
Wellbore Radius: 0.281 ft
Screen Length: 18. ft
Gravel Pack Porosity: 0.3

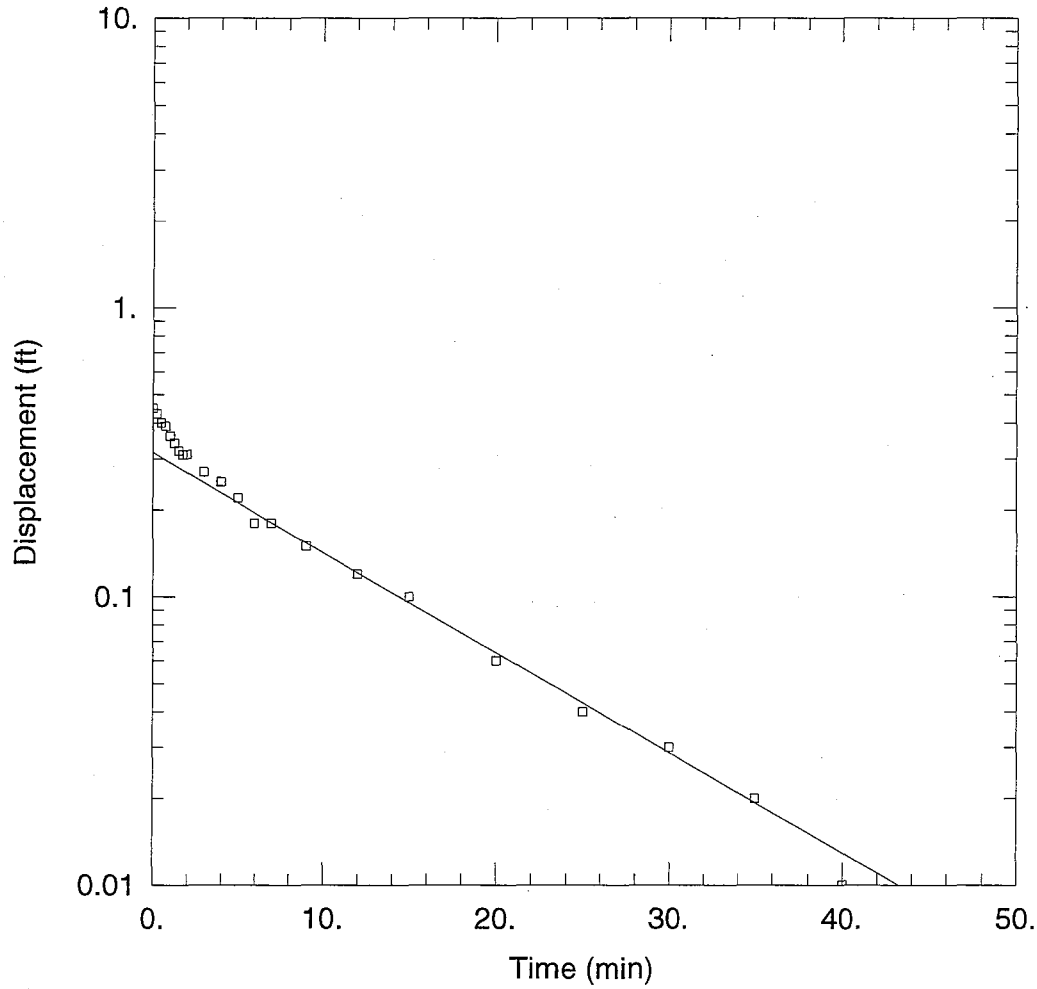
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 18. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.0001336 cm/sec
Kz/Kr = 1.

Ss = 0.0002141 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw29\mw29brh.aqt
Date: 07/13/05 Time: 11:30:01

PROJECT INFORMATION

Client: iuc
Test Well: mw29h

AQUIFER DATA

Saturated Thickness: 18. ft
Anisotropy Ratio (Kz/Kr): 1.

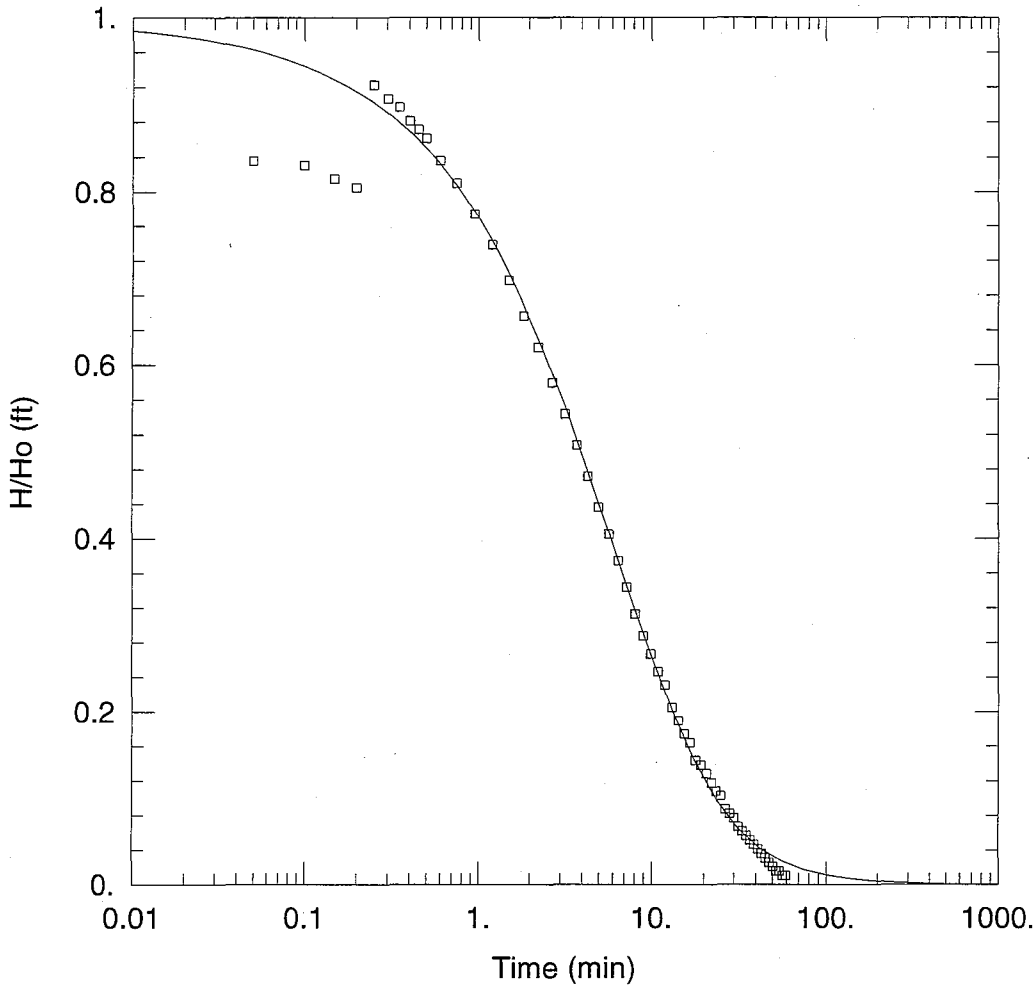
WELL DATA (mw29h)

Initial Displacement: 0.45 ft
Wellbore Radius: 0.281 ft
Screen Length: 18. ft
Gravel Pack Porosity: 0.3
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 18. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001003 cm/sec
y0 = 0.3159 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw30\mw30.aqt
Date: 07/13/05 Time: 11:30:17

PROJECT INFORMATION

Client: iuc
Test Well: mw30

AQUIFER DATA

Saturated Thickness: 24. ft

WELL DATA (mw30)

Initial Displacement: 0.45 ft
Wellbore Radius: 0.281 ft
Screen Length: 24. ft
Gravel Pack Porosity: 0.3

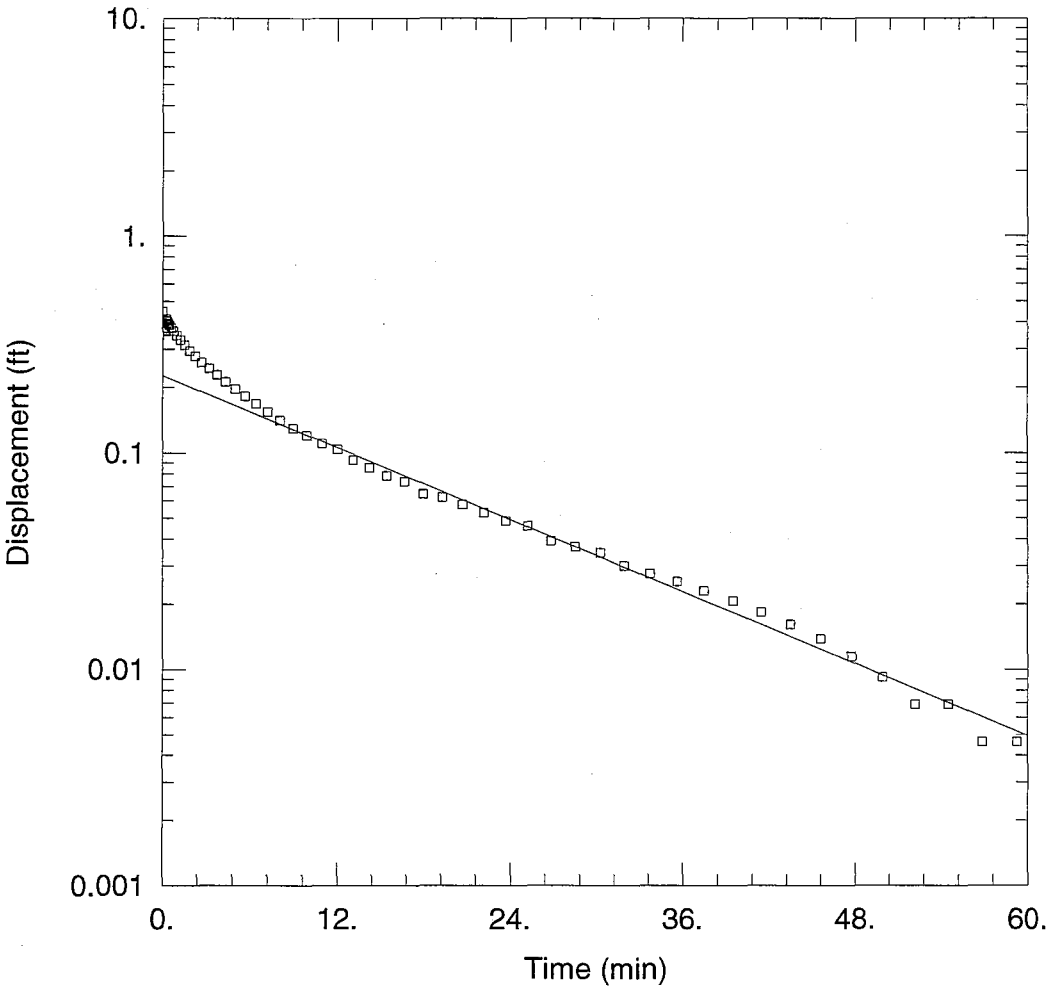
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 24. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.0001042 cm/sec
Kz/Kr = 1.

Ss = 0.0002875 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw30\mw30br.aqt
Date: 07/13/05 Time: 11:30:33

PROJECT INFORMATION

Client: iuc
Test Well: mw30

AQUIFER DATA

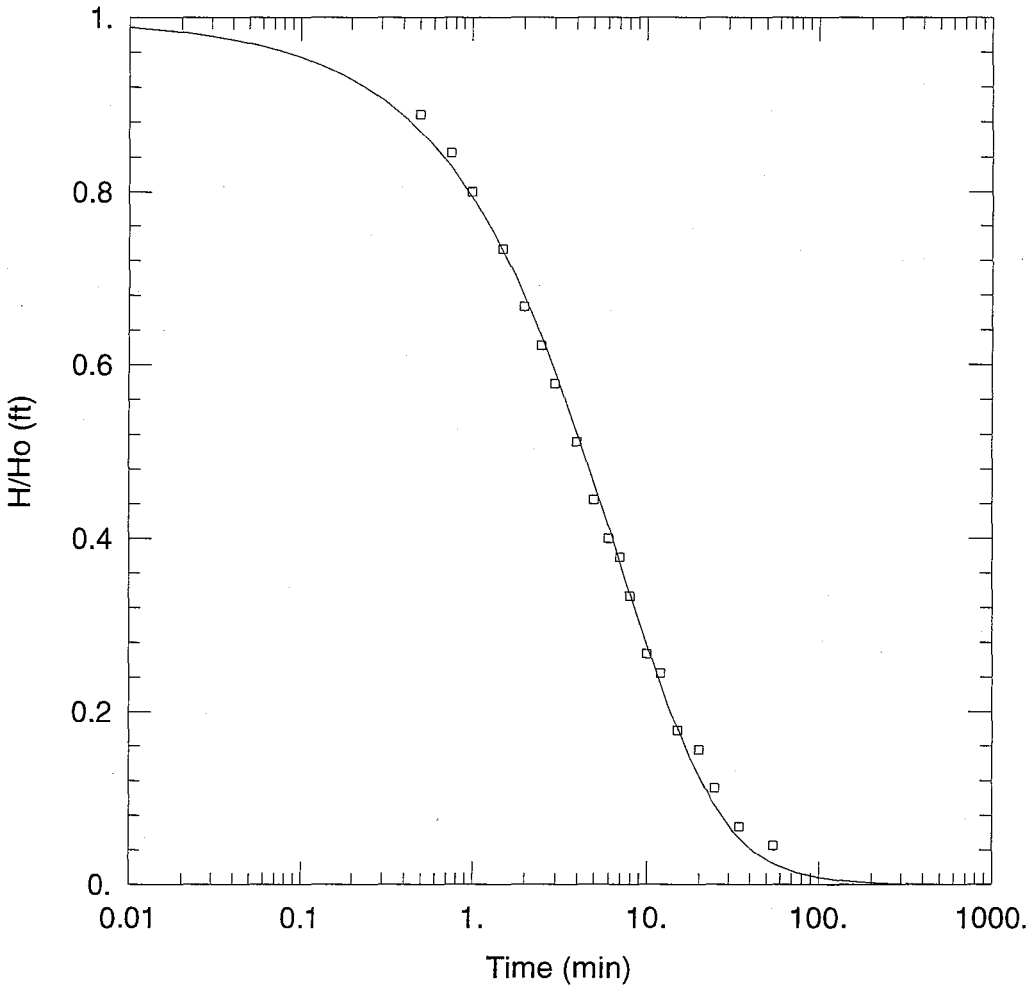
Saturated Thickness: 24. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (mw30)

Initial Displacement: 0.45 ft
Wellbore Radius: 0.281 ft
Screen Length: 24. ft
Gravel Pack Porosity: 0.3
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 24. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 6.437E-05 cm/sec
y0 = 0.2274 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw30\mw30h.aqt
Date: 07/13/05 Time: 11:30:45

PROJECT INFORMATION

Client: iuc
Test Well: mw30h

AQUIFER DATA

Saturated Thickness: 24. ft

WELL DATA (mw30h)

Initial Displacement: 0.45 ft
Wellbore Radius: 0.281 ft
Screen Length: 24. ft
Gravel Pack Porosity: 0.3

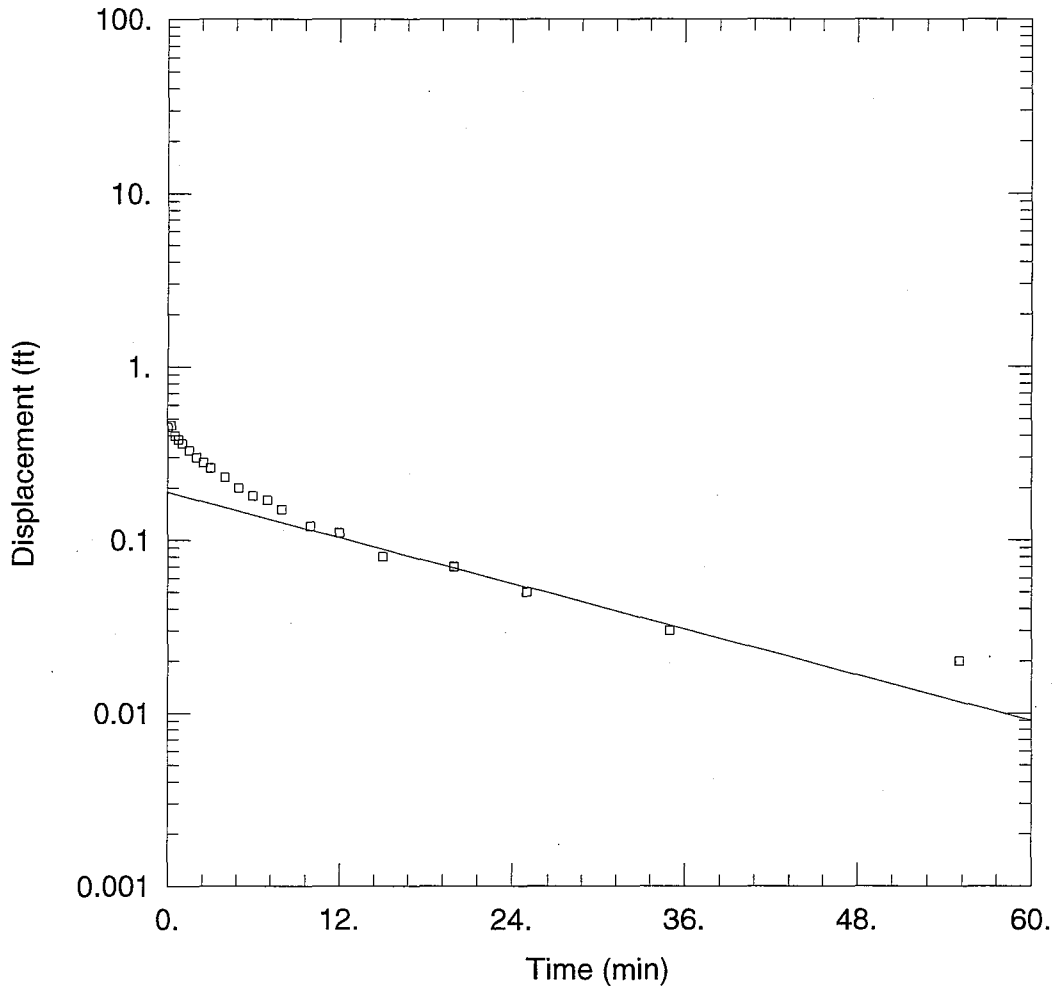
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 24. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.0001113 cm/sec
Kz/Kr = 1.

Ss = 0.0001427 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw30\mw30brh.aqt
Date: 07/13/05 Time: 11:30:55

PROJECT INFORMATION

Client: iuc
Test Well: mw30h

AQUIFER DATA

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

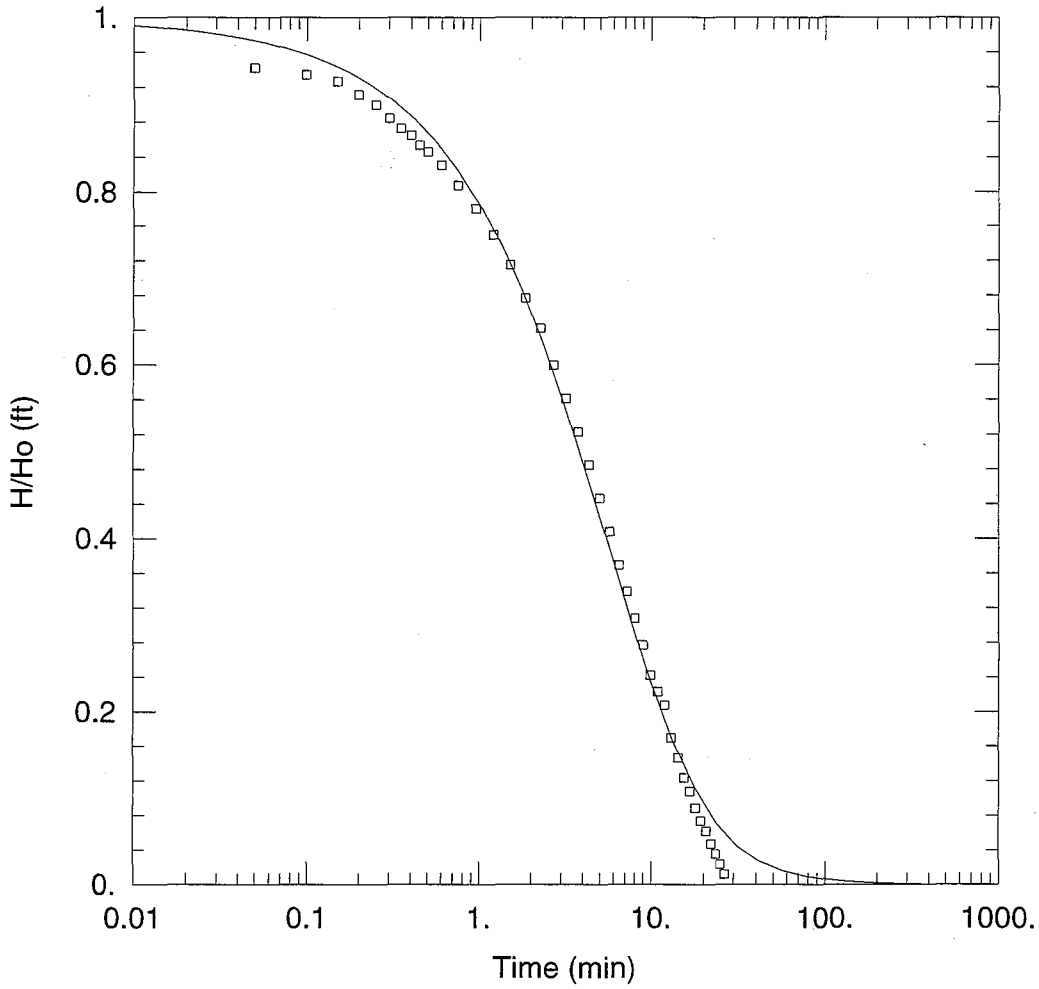
WELL DATA (mw30h)

Initial Displacement: 0.45 ft
Wellbore Radius: 0.281 ft
Screen Length: 24. ft
Gravel Pack Porosity: 0.3
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 24. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 5.105E-05 cm/sec
y0 = 0.1892 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw31\mw31.aqt
Date: 07/13/05 Time: 11:31:11

PROJECT INFORMATION

Client: iuc
Test Well: mw31

AQUIFER DATA

Saturated Thickness: 53. ft

WELL DATA (mw31)

Initial Displacement: 0.6 ft
Wellbore Radius: 0.281 ft
Screen Length: 53. ft
Gravel Pack Porosity: 0.3

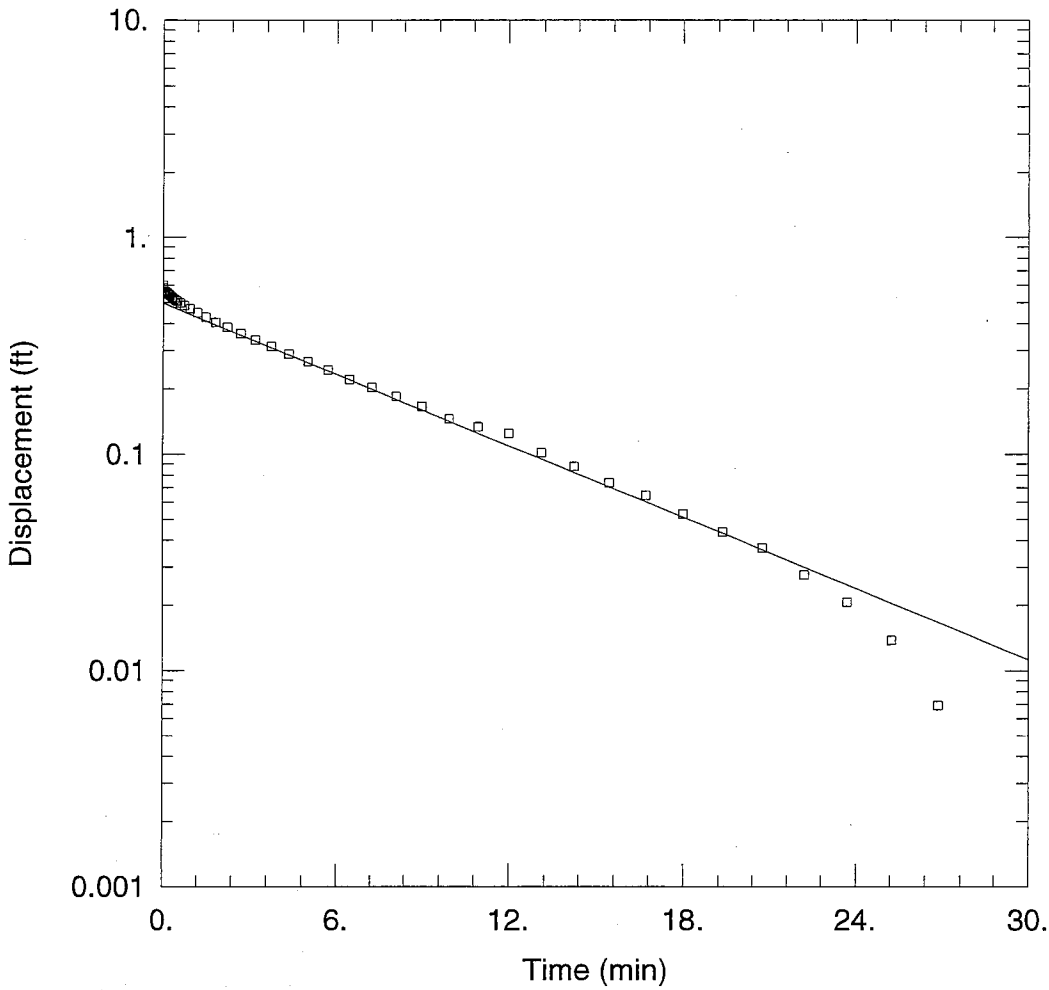
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 53. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 7.084E-05 cm/sec
Kz/Kr = 1.

Ss = 2.52E-05 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw31\mw31br.aqt
Date: 07/13/05 Time: 11:31:21

PROJECT INFORMATION

Client: iuc
Test Well: mw31

AQUIFER DATA

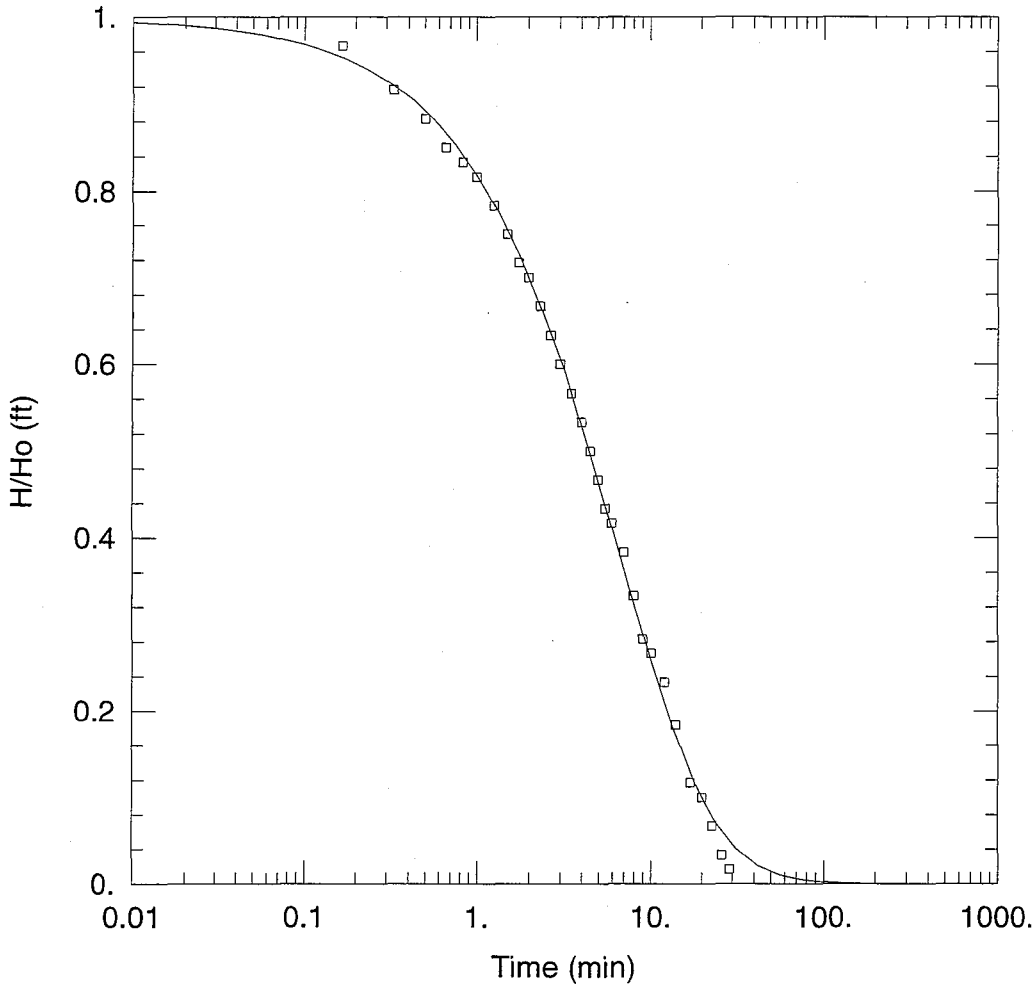
Saturated Thickness: 53. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (mw31)

Initial Displacement: 0.6 ft
Wellbore Radius: 0.281 ft
Screen Length: 53. ft
Gravel Pack Porosity: 0.3
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 53. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 6.886E-05 cm/sec
y0 = 0.4976 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw31\mw31h.aqt
Date: 07/13/05 Time: 11:31:31

PROJECT INFORMATION

Client: iuc
Test Well: mw31h

AQUIFER DATA

Saturated Thickness: 53. ft

WELL DATA (mw31h)

Initial Displacement: 0.6 ft
Wellbore Radius: 0.281 ft
Screen Length: 53. ft
Gravel Pack Porosity: 0.3

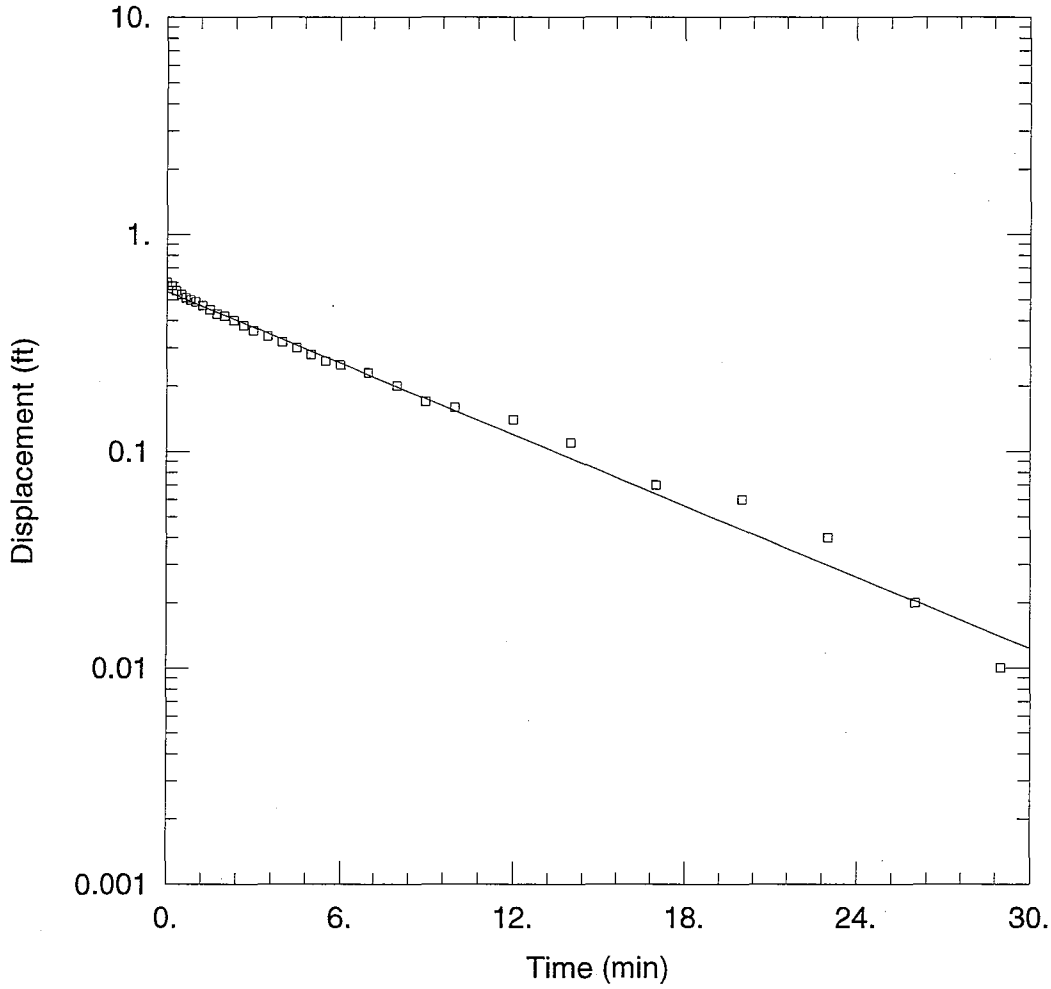
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 53. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 7.353E-05 cm/sec
Kz/Kr = 1.

Ss = 7.227E-06 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw31\mw31brh.aqt
Date: 07/13/05 Time: 11:31:41

PROJECT INFORMATION

Client: iuc
Test Well: mw31h

AQUIFER DATA

Saturated Thickness: 53. ft
Anisotropy Ratio (Kz/Kr): 1.

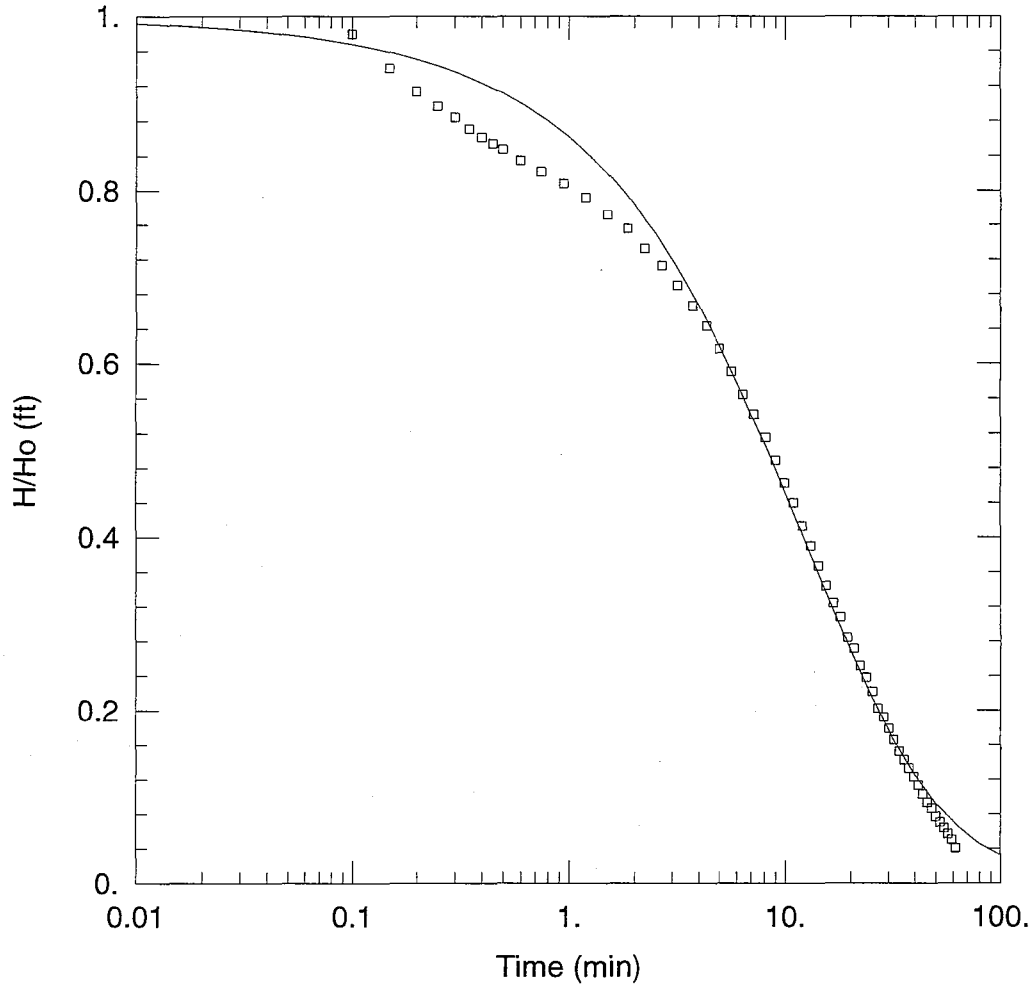
WELL DATA (mw31h)

Initial Displacement: 0.6 ft
Wellbore Radius: 0.281 ft
Screen Length: 53. ft
Gravel Pack Porosity: 0.3
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 53. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 6.886E-05 cm/sec
y0 = 0.5456 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw32\mw32.aqt
Date: 07/13/05 Time: 11:31:56

PROJECT INFORMATION

Client: iuc
Test Well: mw28

AQUIFER DATA

Saturated Thickness: 46. ft

WELL DATA (mw32)

Initial Displacement: 0.7 ft
Wellbore Radius: 0.281 ft
Screen Length: 46. ft
Gravel Pack Porosity: 0.3

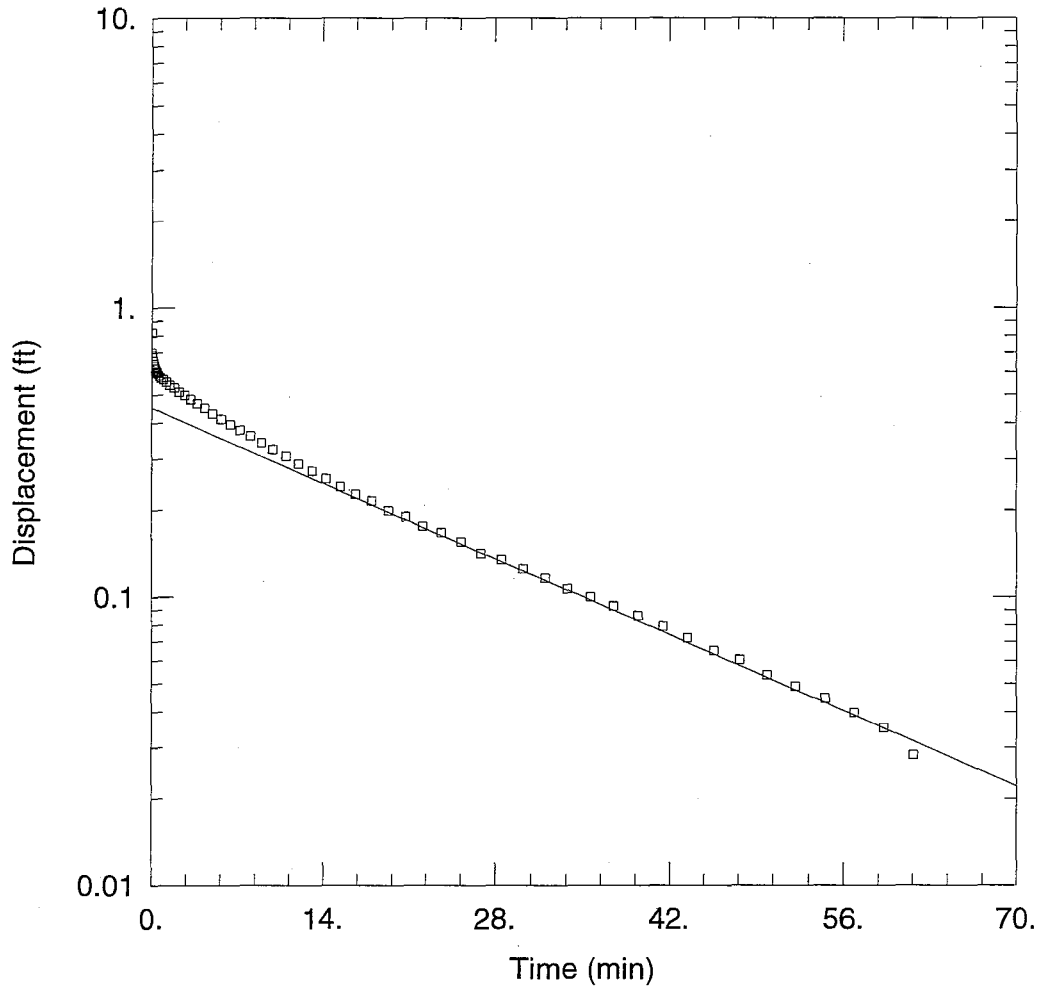
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 46. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 3.001E-05 cm/sec
Kz/Kr = 1.

Ss = 8.812E-05 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw32\mw32br.aqt
Date: 07/13/05 Time: 11:32:08

PROJECT INFORMATION

Client: iuc
Test Well: mw32

AQUIFER DATA

Saturated Thickness: 46. ft
Anisotropy Ratio (Kz/Kr): 1.

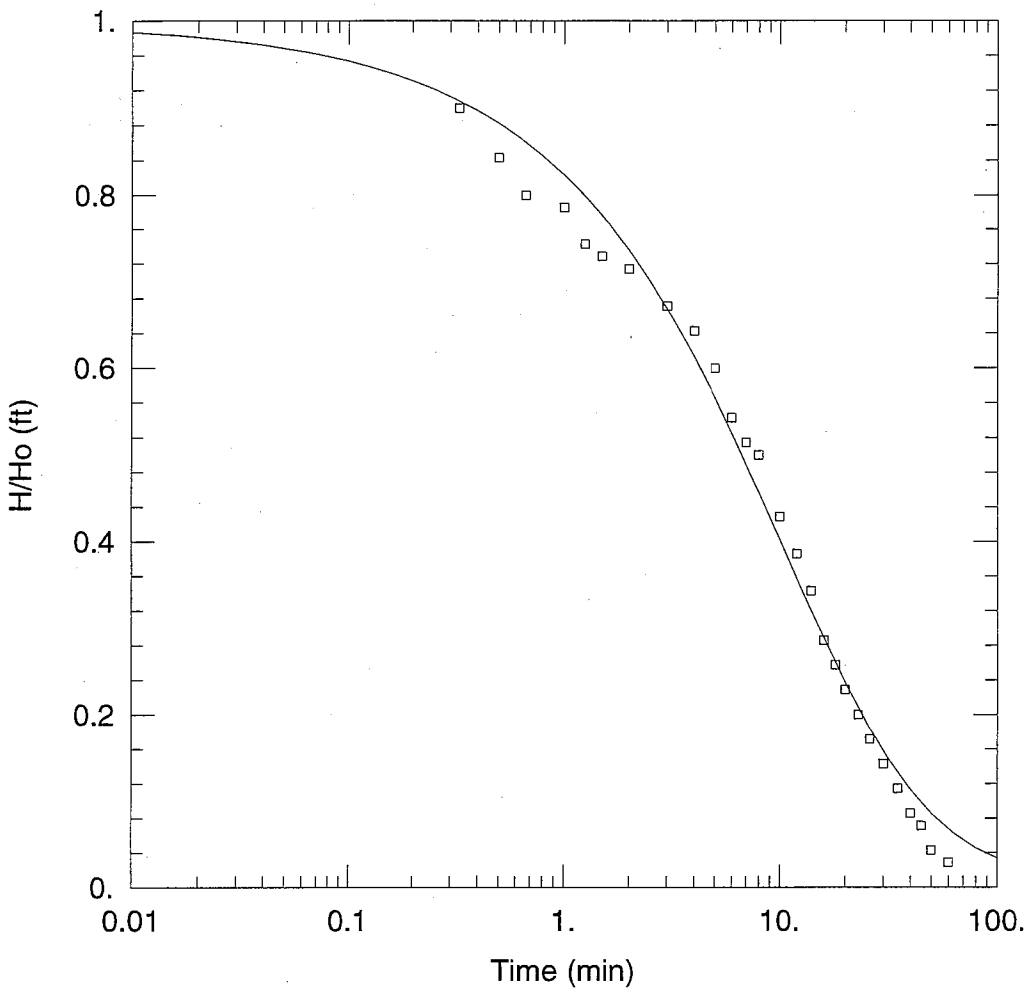
WELL DATA (mw32)

Initial Displacement: 0.7 ft
Wellbore Radius: 0.281 ft
Screen Length: 46. ft
Gravel Pack Porosity: 0.3
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 46. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 2.626E-05 cm/sec
y0 = 0.4528 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw32\mw32h.aqt
Date: 07/13/05 Time: 11:32:21

PROJECT INFORMATION

Client: iuc
Test Well: mw32h

AQUIFER DATA

Saturated Thickness: 46. ft

WELL DATA (mw32h)

Initial Displacement: 0.7 ft
Wellbore Radius: 0.281 ft
Screen Length: 46. ft
Gravel Pack Porosity: 0.3

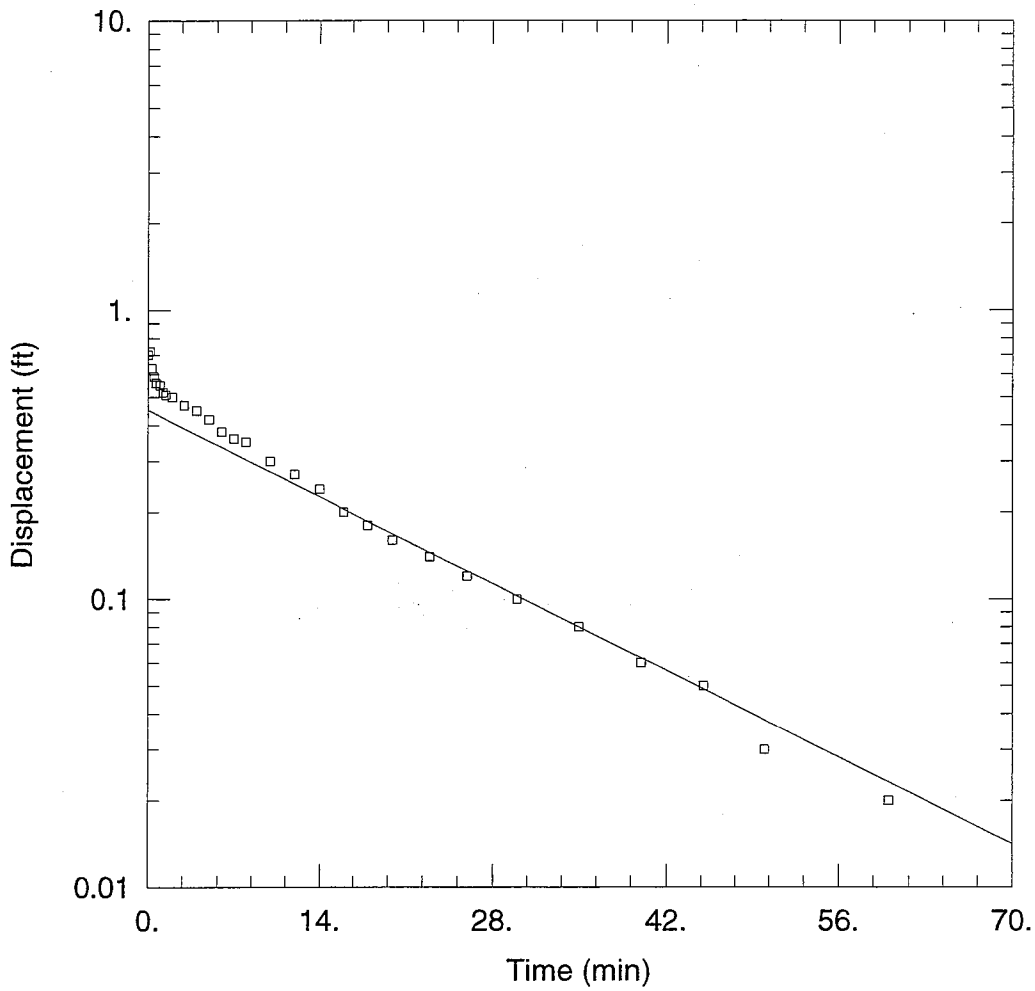
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 46. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 2.84E-05 cm/sec
Kz/Kr = 1.

Ss = 0.0002502 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\mw32\mw32brh.aqt
Date: 07/13/05 Time: 11:32:30

PROJECT INFORMATION

Client: iuc
Test Well: mw32h

AQUIFER DATA

Saturated Thickness: 46. ft
Anisotropy Ratio (Kz/Kr): 1.

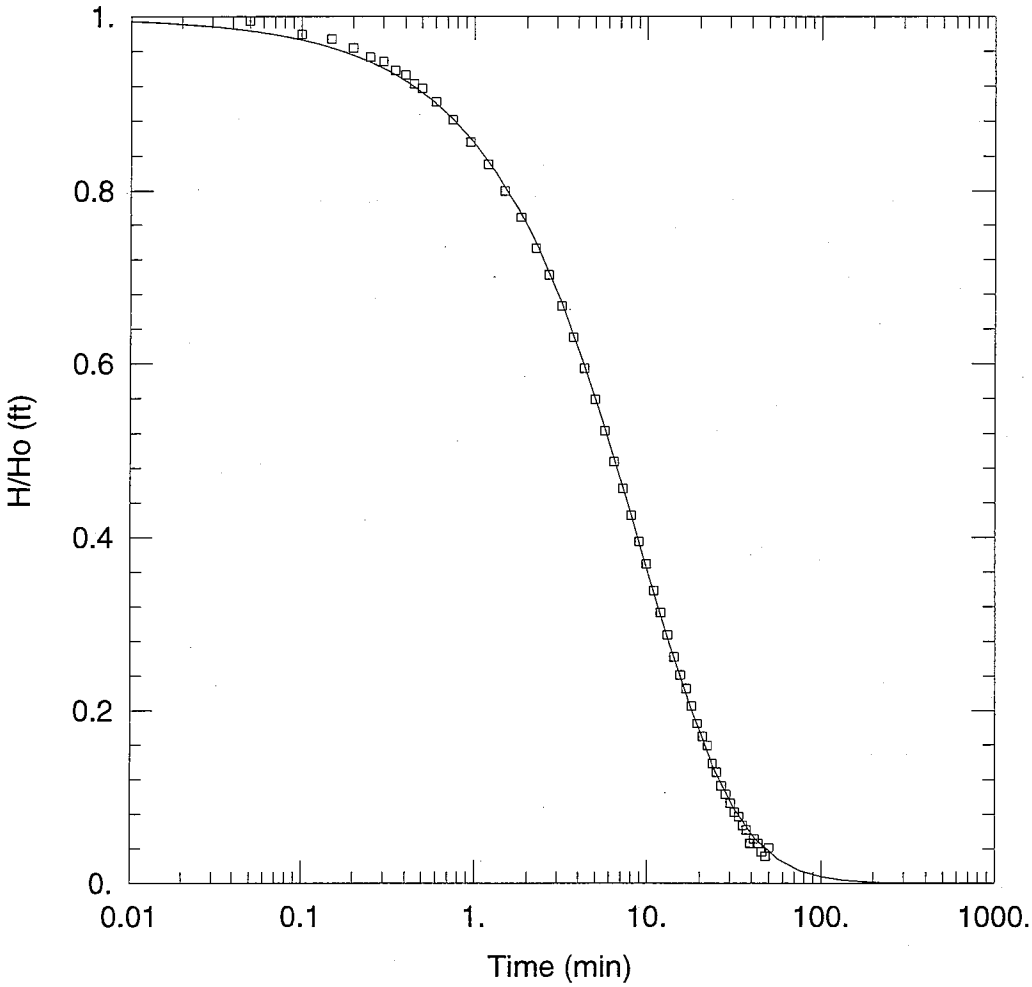
WELL DATA (mw32h)

Initial Displacement: 0.7 ft
Wellbore Radius: 0.281 ft
Screen Length: 46. ft
Gravel Pack Porosity: 0.3
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 46. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3.015E-05 cm/sec
y0 = 0.4528 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\tw20\tw20.aqt
Date: 07/13/05 Time: 11:32:44

PROJECT INFORMATION

Client: iuc
Test Well: tw4-20

AQUIFER DATA

Saturated Thickness: 43. ft

WELL DATA (tw4-20)

Initial Displacement: 0.45 ft
Wellbore Radius: 0.281 ft
Screen Length: 43. ft
Gravel Pack Porosity: 0.3

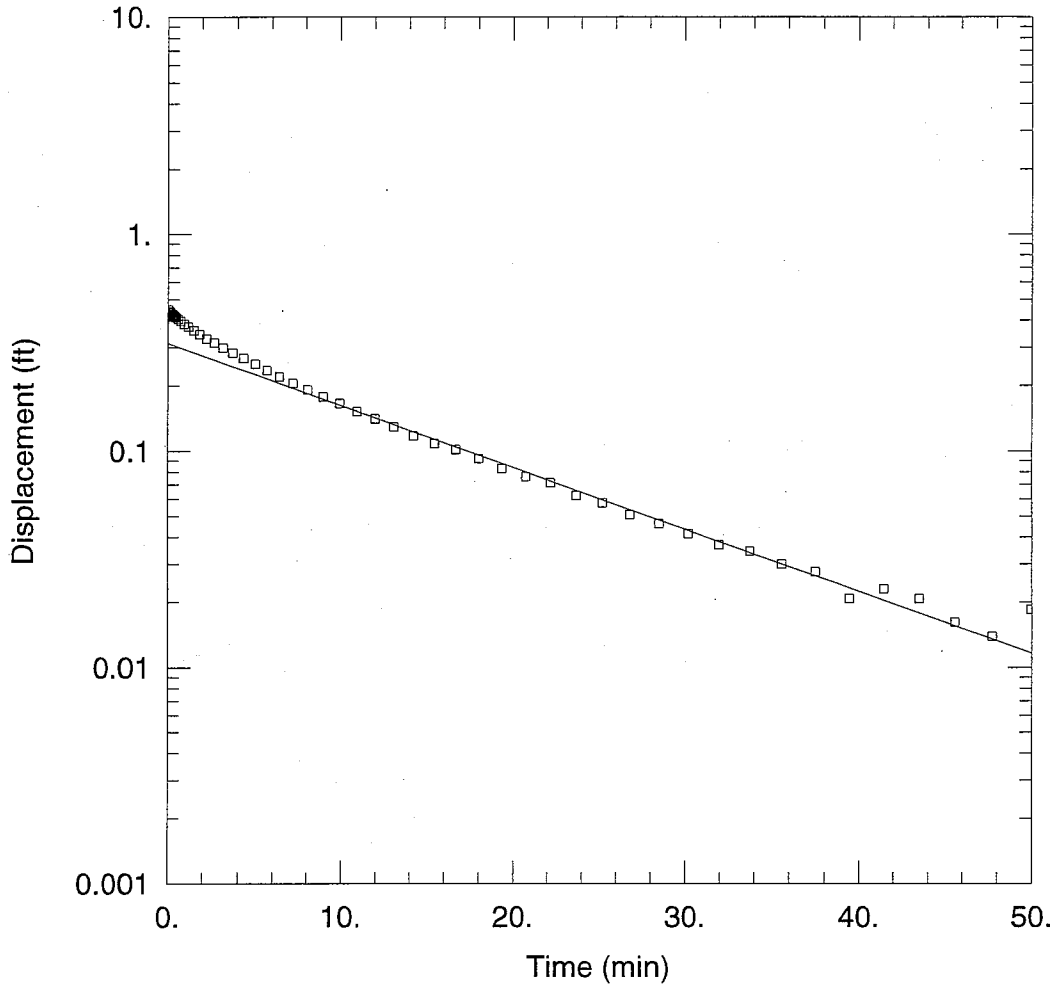
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 43. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 5.882E-05 cm/sec
Kz/Kr = 1.

Ss = 1.595E-05 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\tw20\tw20br.aqt
Date: 07/13/05 Time: 11:32:55

PROJECT INFORMATION

Client: iuc
Test Well: tw4-20

AQUIFER DATA

Saturated Thickness: 43. ft
Anisotropy Ratio (Kz/Kr): 1.

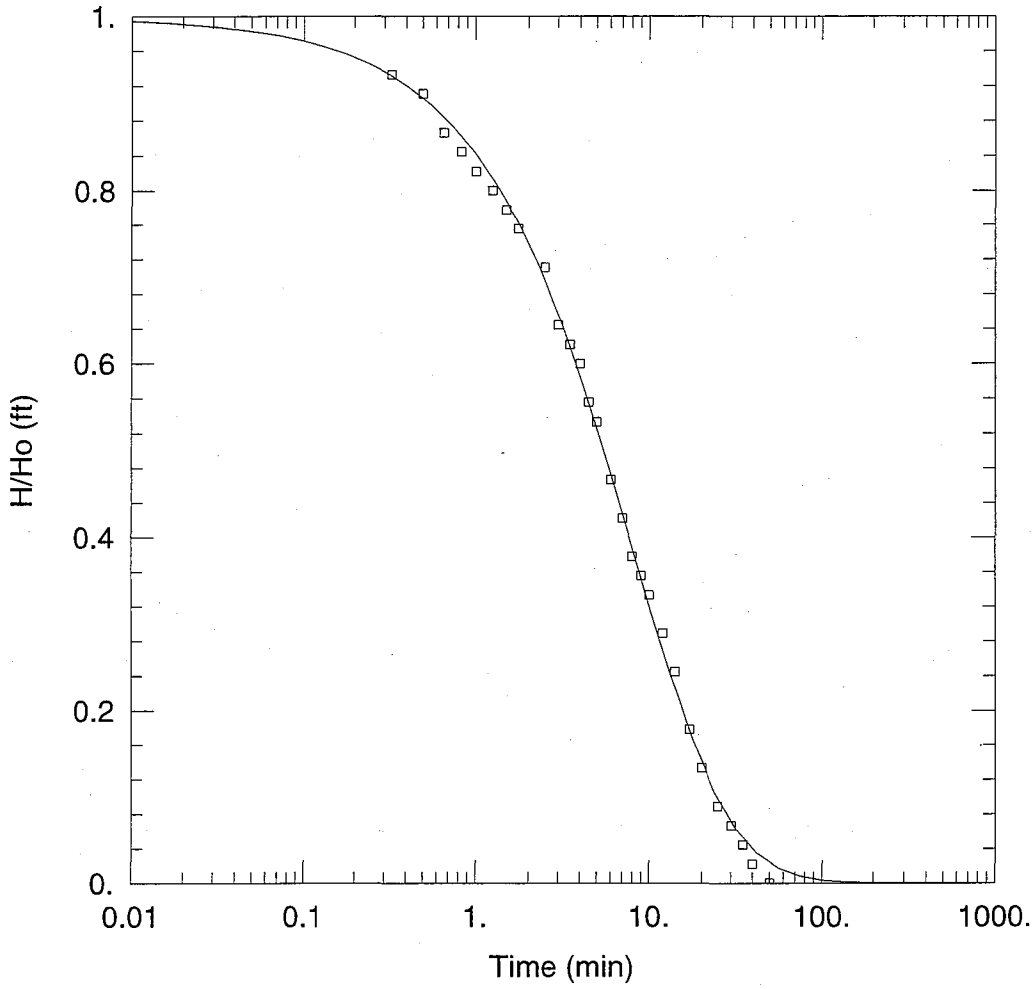
WELL DATA (tw4-20)

Initial Displacement: 0.45 ft
Wellbore Radius: 0.281 ft
Screen Length: 43. ft
Gravel Pack Porosity: 0.3
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 43. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 4.226E-05 cm/sec
y0 = 0.314 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\tw20\tw20h.aqt
Date: 07/13/05 Time: 11:33:05

PROJECT INFORMATION

Client: iuc
Test Well: tw4-20h

AQUIFER DATA

Saturated Thickness: 43. ft

WELL DATA (tw4-20)

Initial Displacement: 0.45 ft
Wellbore Radius: 0.281 ft
Screen Length: 43. ft
Gravel Pack Porosity: 0.3

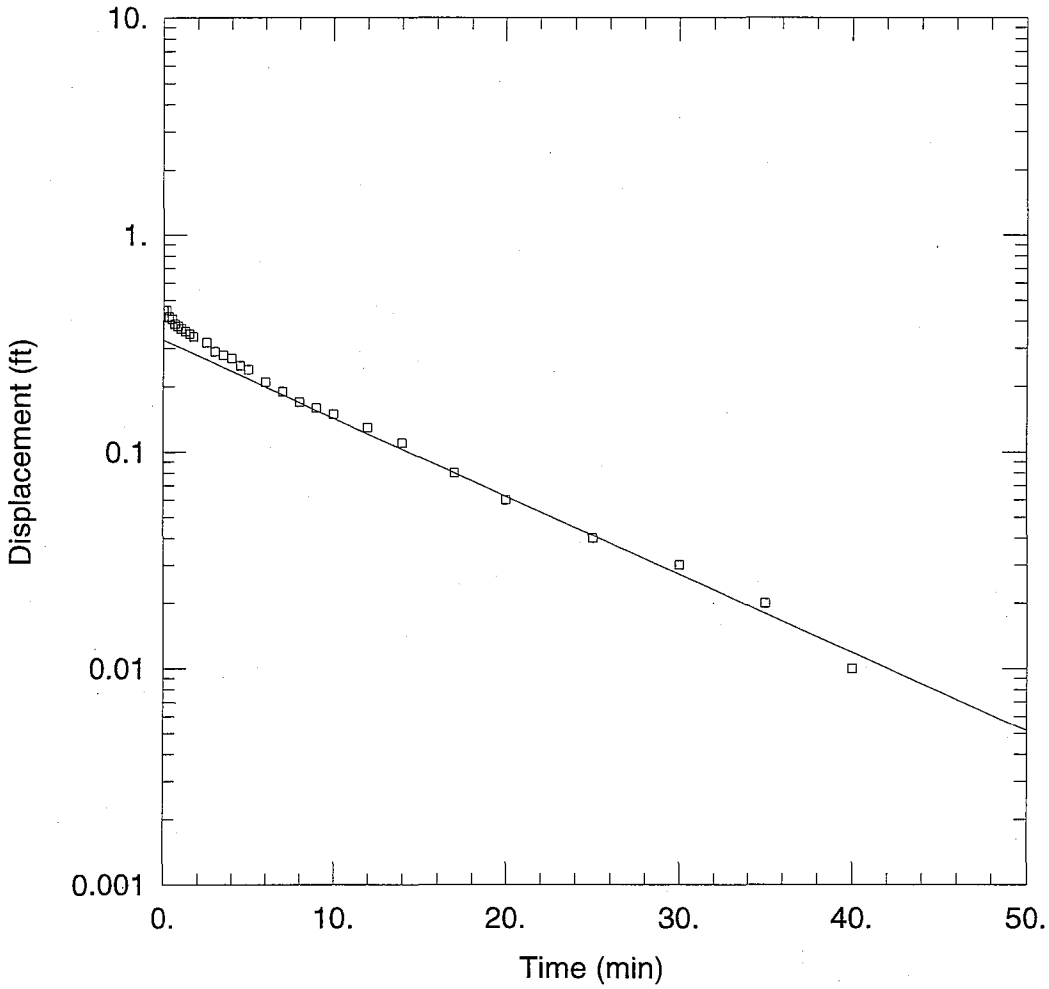
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 43. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 6.994E-05 cm/sec
Kz/Kr = 1.

Ss = 1.207E-05 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\tw20\tw20brh.aqt
Date: 07/13/05 Time: 11:33:15

PROJECT INFORMATION

Client: iuc
Test Well: tw4-20h

AQUIFER DATA

Saturated Thickness: 43. ft
Anisotropy Ratio (Kz/Kr): 1.

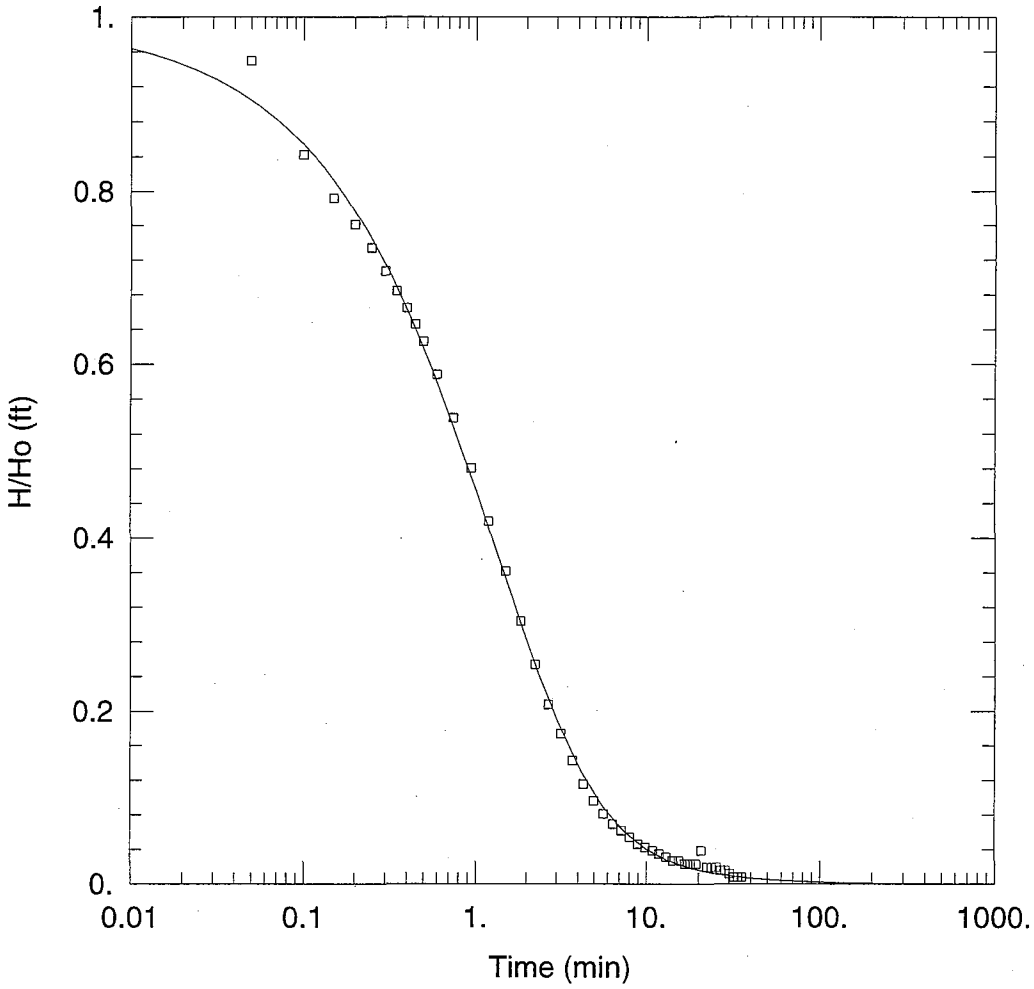
WELL DATA (tw4-20)

Initial Displacement: 0.45 ft
Wellbore Radius: 0.281 ft
Screen Length: 43. ft
Gravel Pack Porosity: 0.3
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 43. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 5.329E-05 cm/sec
y0 = 0.3288 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\tw21\tw21.aqt
Date: 07/13/05 Time: 11:33:34

PROJECT INFORMATION

Client: iuc
Test Well: tw4-21

AQUIFER DATA

Saturated Thickness: 63. ft

WELL DATA (tw4-21)

Initial Displacement: 0.6 ft
Wellbore Radius: 0.281 ft
Screen Length: 63. ft
Gravel Pack Porosity: 0.3

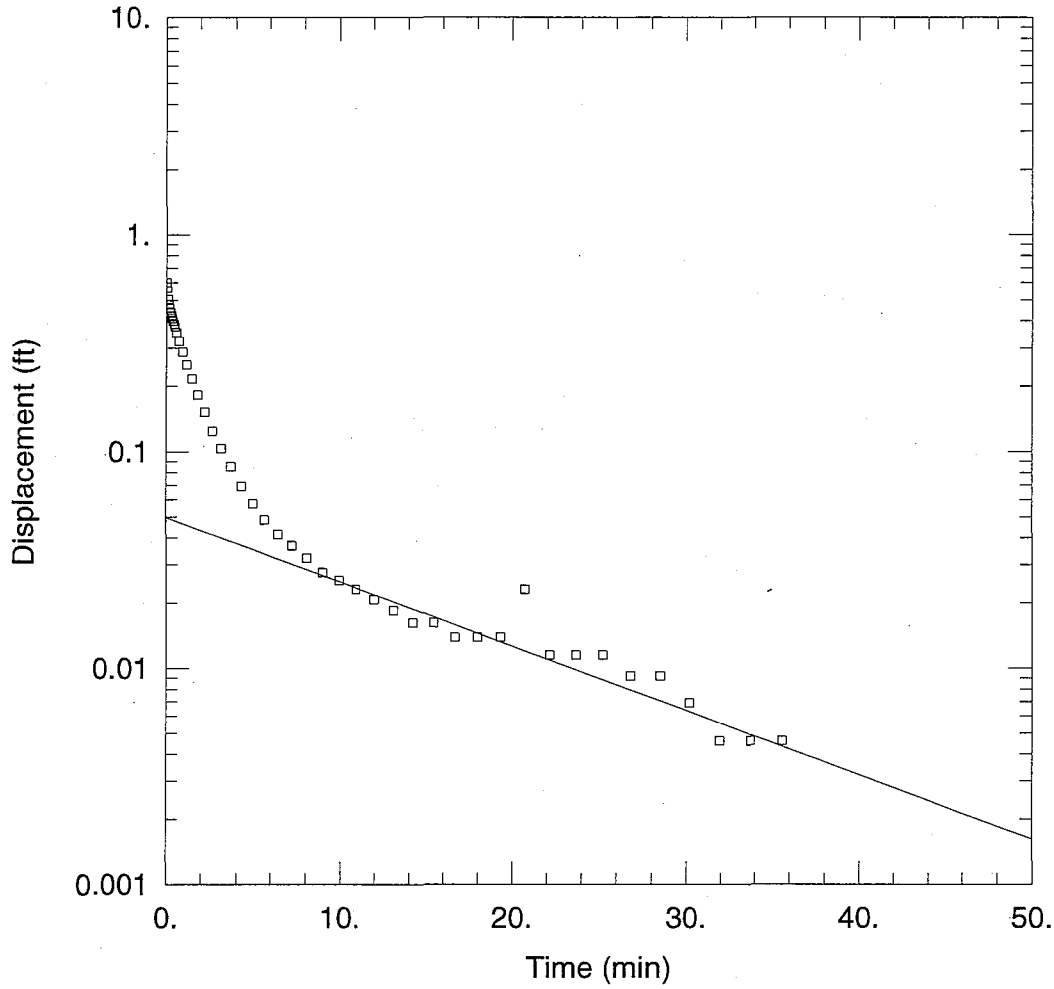
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 63. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.00019 cm/sec
Kz/Kr = 1.

Ss = 0.0001105 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\tw21\tw21br.aqt
Date: 07/13/05 Time: 11:33:50

PROJECT INFORMATION

Client: iuc
Test Well: tw4-21

AQUIFER DATA

Saturated Thickness: 63. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (tw4-21)

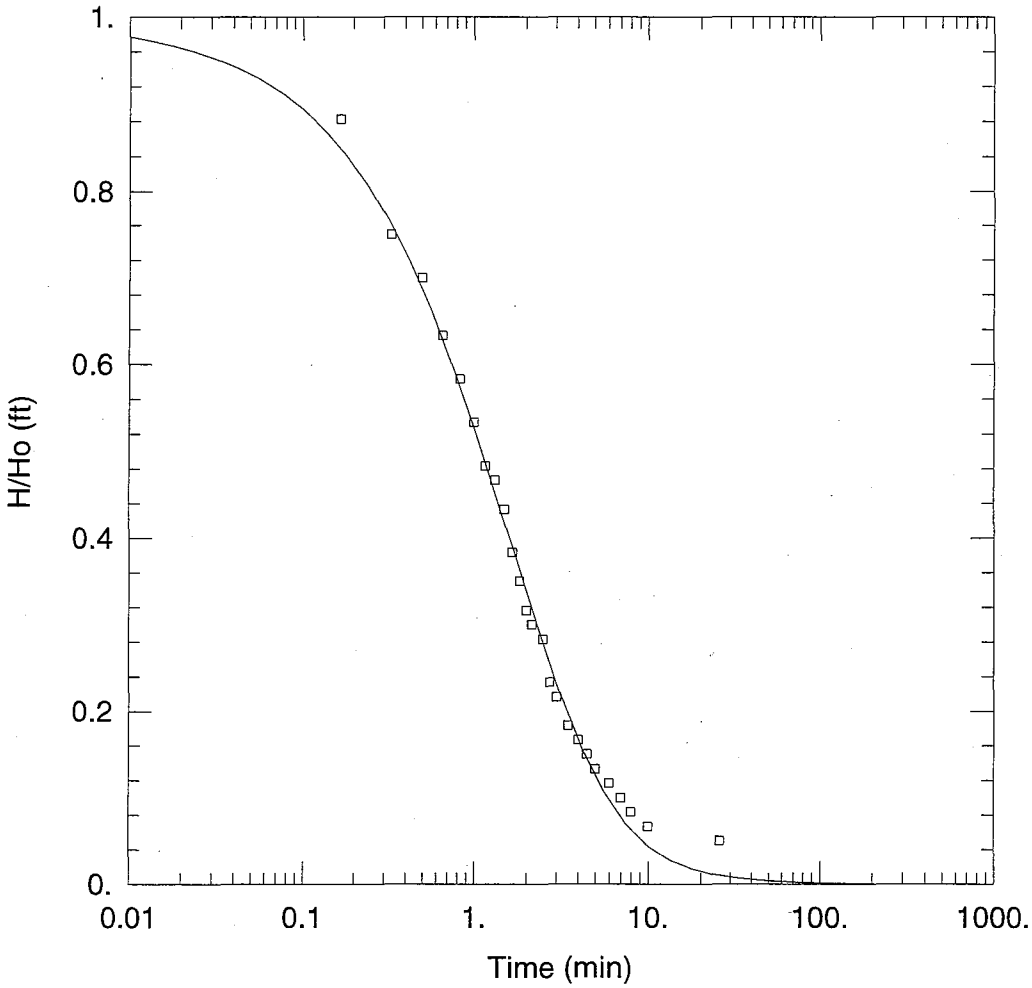
Initial Displacement: 0.6 ft
Wellbore Radius: 0.281 ft
Screen Length: 63. ft
Gravel Pack Porosity: 0.3

Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 63. ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 3.261E-05 cm/sec y0 = 0.04976 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\tw21\tw21h.aqt
Date: 07/13/05 Time: 11:34:12

PROJECT INFORMATION

Client: iuc
Test Well: tw4-21h

AQUIFER DATA

Saturated Thickness: 63. ft

WELL DATA (tw4-21h)

Initial Displacement: 0.6 ft
Wellbore Radius: 0.281 ft
Screen Length: 63. ft
Gravel Pack Porosity: 0.3

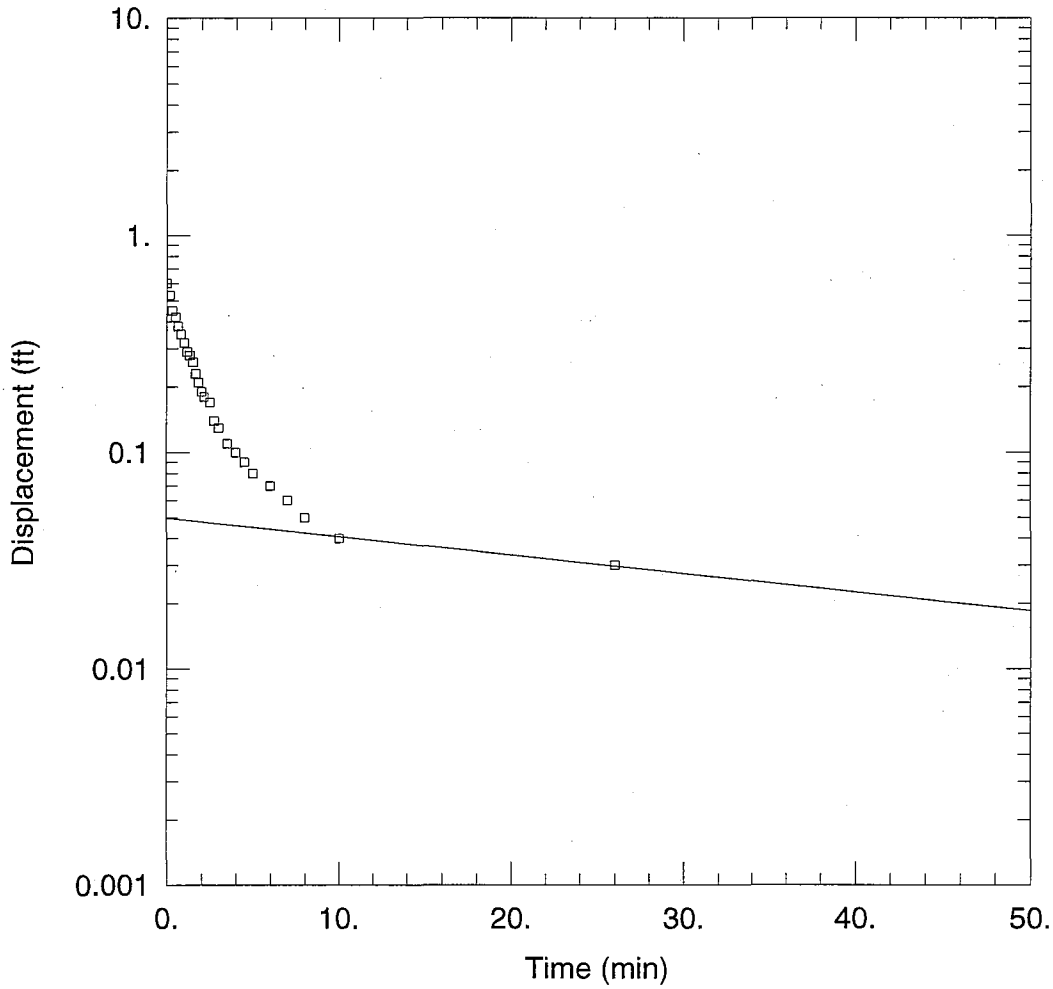
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 63. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.0001908 cm/sec
Kz/Kr = 1.

Ss = 3.208E-05 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\tw21\tw21brh.aqt
Date: 07/13/05 Time: 11:34:23

PROJECT INFORMATION

Client: iuc
Test Well: tw4-21h

AQUIFER DATA

Saturated Thickness: 63. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (tw4-21h)

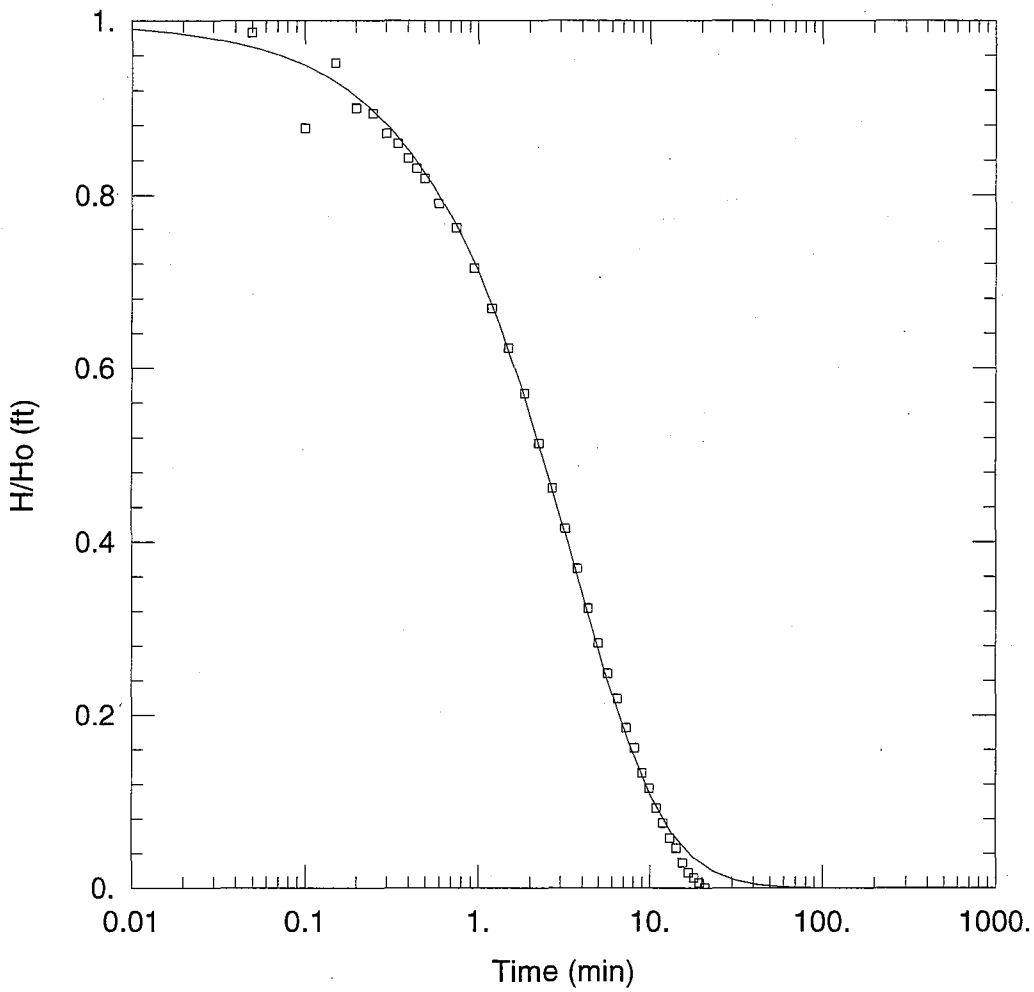
Initial Displacement: 0.6 ft
Wellbore Radius: 0.281 ft
Screen Length: 63. ft
Gravel Pack Porosity: 0.3

Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 63. ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 9.399E-06 cm/sec y0 = 0.04976 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\tw22\tw22.aqt
Date: 07/13/05 Time: 11:34:42

PROJECT INFORMATION

Client: iuc
Test Well: tw4-22

AQUIFER DATA

Saturated Thickness: 55. ft

WELL DATA (tw4-22)

Initial Displacement: 0.4 ft
Wellbore Radius: 0.281 ft
Screen Length: 55. ft
Gravel Pack Porosity: 0.3

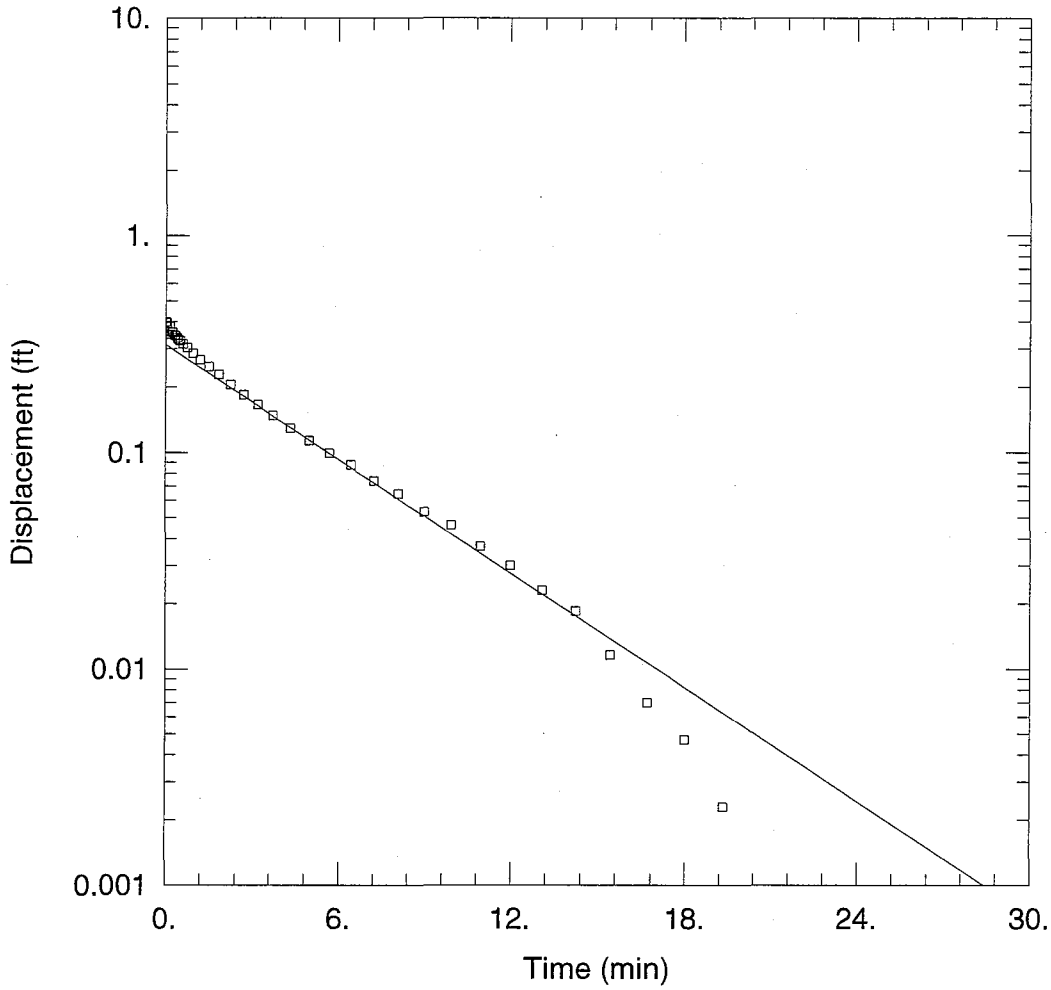
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 55. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.0001348 cm/sec
Kz/Kr = 1.

Ss = 6.75E-06 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\tw22\tw22br.aqt
Date: 07/13/05 Time: 11:34:53

PROJECT INFORMATION

Client: iuc
Test Well: tw4-22

AQUIFER DATA

Saturated Thickness: 55. ft
Anisotropy Ratio (Kz/Kr): 1.

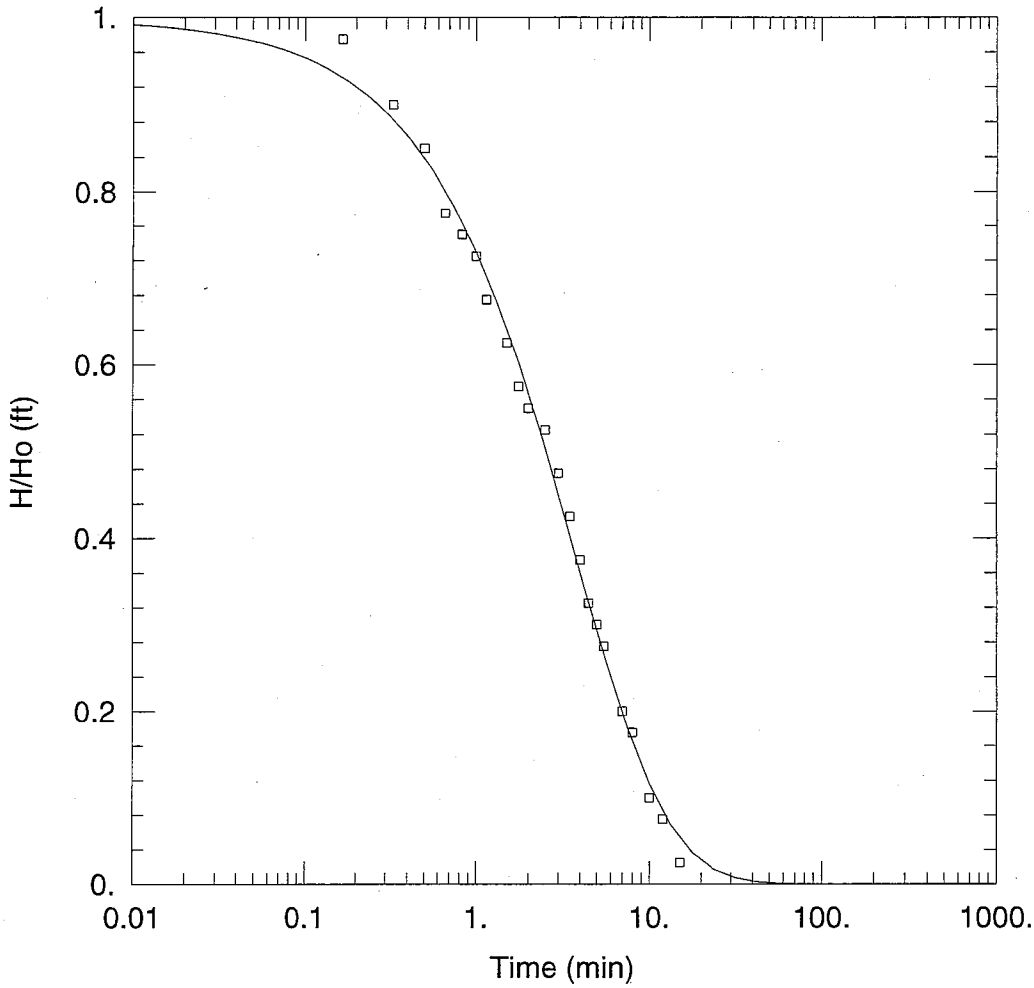
WELL DATA (tw4-22)

Initial Displacement: 0.4 ft
Wellbore Radius: 0.281 ft
Screen Length: 55. ft
Gravel Pack Porosity: 0.3
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 55. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001071 cm/sec
y0 = 0.314 ft



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\tw22\tw22h.aqt
Date: 07/13/05 Time: 11:35:02

PROJECT INFORMATION

Client: iuc
Test Well: tw4-22h

AQUIFER DATA

Saturated Thickness: 55. ft

WELL DATA (tw4-22h)

Initial Displacement: 0.4 ft
Wellbore Radius: 0.281 ft
Screen Length: 55. ft
Gravel Pack Porosity: 0.3

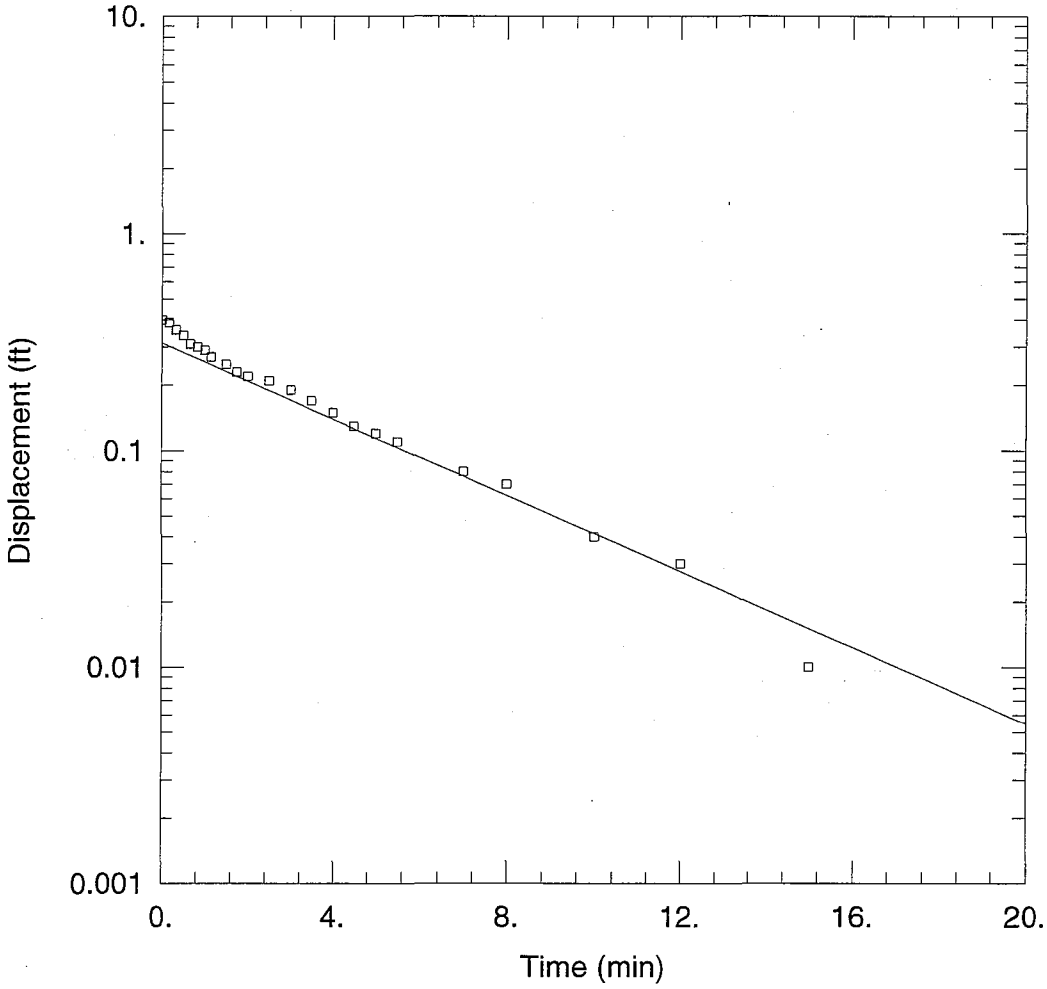
Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 55. ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.0001311 cm/sec
Kz/Kr = 1.

Ss = 4.542E-06 ft^{-1}



WELL TEST ANALYSIS

Data Set: H:\718000\hydtst05\tw22\tw22brh.aqt
Date: 07/13/05 Time: 11:35:12

PROJECT INFORMATION

Client: iuc
Test Well: tw4-22h

AQUIFER DATA

Saturated Thickness: 55. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (tw4-22h)

Initial Displacement: 0.4 ft
Wellbore Radius: 0.281 ft
Screen Length: 55. ft
Gravel Pack Porosity: 0.3

Casing Radius: 0.167 ft
Well Skin Radius: 0.281 ft
Total Well Penetration Depth: 55. ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0001071 cm/sec y0 = 0.314 ft