
KLEINFELDER

November 1, 2007
Revised: November 29, 2007
Project No: 83173.15

Ranjit (Ron) Sahu, Ph.D., CEM
Director of Environmental Services
Basic Remediation Company
875 West Warm Springs Road
Henderson, Nevada 89011

**Subject: Slug Test Results
 BMI Common Area
 Henderson, Nevada**

Dear Dr. Sahu:

This revised letter report describes the results of slug tests performed in ten monitoring wells located within the BMI Common Area. The slug tests were conducted using the SOP guidelines outlined in the Aquifer Testing Work Plan submitted to the Nevada Department of Environmental Protection (NDEP) in 2006. This report has been revised per NDEP's November 26, 2007 comments (see Appendix C).

Kleinfelder performed aquifer slug tests in ten locations selected from the new monitoring wells installed during the 2007 field season. The locations for the monitoring wells tested were determined based on the lateral spacing between the wells and the formations screened in the wells. The slug tested wells included screened intervals in both the alluvial sediments and the underlying Muddy Creek Formation.

The slug tests were performed using either a 10-foot displacement slug or 5-foot displacement slug. These displacement slugs were made by filling 2-inch diameter PVC pipe with sand and sealing both ends. The slug was quickly lowered into the wells creating rapid changes in groundwater levels that were recorded until groundwater levels had returned to or near the original or pre-test levels. Both the slug-in and slug-out responses to groundwater level changes were recorded. Two complete slug-in and slug-out test cycles were completed on the monitoring wells with the exception of wells that had very slow recovery responses in which only one slug-in and slug-out sequence was performed.

An In-Situ Troll 700 data logger was used to record the water level changes occurring in the well during the test. The data logger was programmed to record water level changes once per second during the testing period. The groundwater level changes recorded by the data logger during the tests were uploaded for analysis into Aquifer Test Pro software from Waterloo Hydrogeologic. The Bouwer-Rice solution in Aquifer Test Pro was used to calculate the hydraulic conductivities listed in Table 1.

The Bouwer & Rice Equation is:

$$K = \frac{R_c \cdot R_c \cdot \ln(R_e/R_w)}{2 \cdot L_e} \cdot \frac{1}{T} \cdot \ln(Y_1/Y_2)$$

A) For partially penetrating wells the term $\ln(R_e/R_w)$ is:

$$\ln(R_e/R_w) = \frac{1}{\left(\frac{1.1}{\ln(L_w/R_w)} + \frac{A + B \cdot \ln\{(H - L_w)/R_w\}}{L_e/R_w} \right)}$$

B) For fully penetrating wells the term $\ln(R_e/R_w)$ is:

$$\ln(R_e/R_w) = \frac{1}{\left(\frac{1.1}{\ln(L_w/R_w)} + \frac{C}{L_e/R_w} \right)}$$

where K = hydraulic conductivity

R_c = radius of well/screen casing

R_e = effective radial distance over which Δy is dissipated

R_w = borehole radius

H = saturated thickness of aquifer

A = the Bouwer and Rice 'A' parameter

B = the Bouwer and Rice 'B' parameter

C = the Bouwer and Rice 'C' parameter

L_w = depth below water table to bottom of screen

L_e = length of wetted screen

Y_1 = drawdown (or up) at time T_1

Y_2 = drawdown (or up) at time T_2

T = time between T_1 and T_2

Plots of the test data are shown in Appendix A. Boring logs for the wells tested are provided in Appendix B.

Table 1. Slug Test Results for the BMI Common Area, Henderson, Nevada

Well Number	Test	Slug Length	Hydraulic Conductivity (feet/day)	Screened Lithology
AA-23R	Slug In 1	10 feet	8.84	Sand, Silty Sand, and Silt (Alluvium)
AA-23R	Slug Out 1		10.00	
AA-23R	Slug In 2		8.60	
AA-23R	Slug Out 2		12.5	
DBMW-2	Slug In 1	10 feet	0.043	Sandy Clay, Clayey Sand (Alluvium and MCF ¹)
DBMW-2	Slug Out 1		0.060	
DBMW-4	Slug In 1	10 feet	2.00	Well Graded Sand with Gravel, Silty Sand (Alluvium and MCF)
DBMW-4	Slug Out 1		2.10	
DBMW-4	Slug In 2		1.90	
DBMW-4	Slug Out 2		2.00	
DBMW-8	Slug In 1	10 feet	0.50	Sandy Clay, Silty Sand, Silt with Clay (MCF)
DBMW-8	Slug Out 1		0.59	
DBMW-8	Slug In 2		0.52	
DBMW-8	Slug Out 2		0.59	
DBMW-9	Slug In 1	5 feet	0.080	Silty Clay (MCF)
DBMW-9	Slug Out 1		0.079	
DBMW-16	Slug In 1	10 feet	0.87	Silty Sand, Clay, Clay with Silt (Alluvium and MCF)
DBMW-16	Slug Out 1		0.38	
DBMW-19	Slug In 1	10 feet	1.35	Well Graded Sand, Silty Clay, Clayey Silt (Alluvium)
DBMW-19	Slug Out 1		2.75	
DBMW-19	Slug In 2		0.83	
DBMW-19	Slug Out 2		2.90	
DBMW-22	Slug In 1	10 feet	0.06	Silt with Sand (MCF)
DBMW-22	Slug Out 1		0.08	
AA-26	Slug In 1	5 feet	4.10	Poorly Graded Sand with Gravel (Alluvium)
AA-26	Slug Out 1		1.58	
AA-26	Slug In 2		2.45	
AA-26	Slug Out 2		1.65	
AA-08B	Slug In 1	10 feet	50.00	Silty Sand with Gravel (Alluvium)
AA-08B	Slug Out 1		70.10	
AA-08B	Slug In 2		40.00	
AA-08B	Slug Out 2		62.10	

¹ MCF – Muddy Creek Formation

Comparison of the slug-in and slug-out test results indicates consistent results with only small variations in the resultant hydraulic conductivities. The tested hydraulic conductivities for each monitoring well generally correlates favorably with the screened lithologies.

Several of the monitoring wells are screened across two or more lithologies as in DBMW-4, where the aquifer occurs in a well-graded gravel and silty clay. The slug test in DBMW-4 resulted in values ranging from 1.9 to 2.10 feet/day. The hydraulic conductivity values in DBMW-4, which are generally lower than normally associated with gravel and a little high for silty sand, may be an aggregate value for the two lithologies.

Monitoring well DBMW-2 is screened from 20 to 50 feet below ground surface (bgs). The lithologies found in the upper part of the screen include silty sand from 20 to 31 feet bgs and clayey sand/sandy clay from 31 to 44.5 feet bgs. Both of these units have been interpreted as alluvial sediment. The clayey sand/sandy clay from 31 to 44.5 feet bgs has a reddish-brown color commonly associated with Muddy Creek Formation units. The clayey sand/sandy clay unit may represent reworked sediments derived from the Muddy Creek Formation commonly interbedded within the alluvium in the Henderson area. The lithology from 44.5 to 50 feet bgs is a silty, clayey sandstone of the Muddy Creek Formation. The tested hydraulic conductivities in DBMW-2 are 0.043 and 0.060 feet/day which suggests a response commonly associated with clayey sands.

Monitoring well DBMW-8 is screened across sandy clay, silty sand, and silt with clay. The range of test results for monitoring well DBMW-8 is a hydraulic conductivity of 0.50 to 0.59 feet/day that matches the value commonly associated with silty sands and is not characteristic of silt with clay.

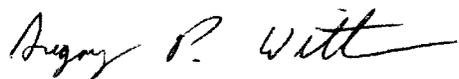
The range of hydraulic conductivities tested in monitoring well DBMW-16 is similar to values associated with silty sands and is not typical of clay and clay with silt present in the screened section of the well. Monitoring well DBMW-16 is screened from 85 to 110 feet bgs. The screened interval includes 10 feet of alluvial silty sands from 85 to 95 feet bgs. The screened interval from 95 to 110 feet bgs includes interlayered clays and silty clays of the Muddy Creek formation. The screened interval crosses the Alluvial/Muddy Creek Formation contact. Groundwater first occurs at 94 feet bgs in the alluvial silty sands in this monitoring well. The hydraulic conductivities for the two slug tests in DBMW-16 were 0.87 and 0.38 feet/day which is within the range of expected values for silty sands found in the upper section of the screen. The MCF silts and clays screened in the lower section of the well should have a value within the 10^{-3} to 10^{-6} feet/day range.

The range of hydraulic conductivity values of 0.83 to 2.90 feet/day from the tests performed in monitoring well DBMW-19 is more commonly associated with well graded sands and not the silty clay or clayey silt within the screened interval.

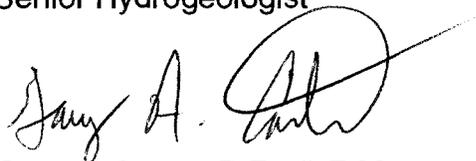
We sincerely appreciate the opportunity to be of service. If you have any questions regarding the enclosed information, please contact us.

Respectfully submitted,

KLEINFELDER



Gregory P. Wittman, P.G.
Senior Hydrogeologist



Gary A. Carter, P.E., C.E.M.
Environmental Group Manager

GPW/jrs

Appendix A
Appendix B
Appendix C

APPENDIX A

Kleinfelder West, Inc
 2315 S. Cobalt Point Way
 Meridian, Idaho 83642
 (208) 893-9700

Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: AA-23R Slug Test

Test Well: AA23R

Test conducted by: G.P. Wittman

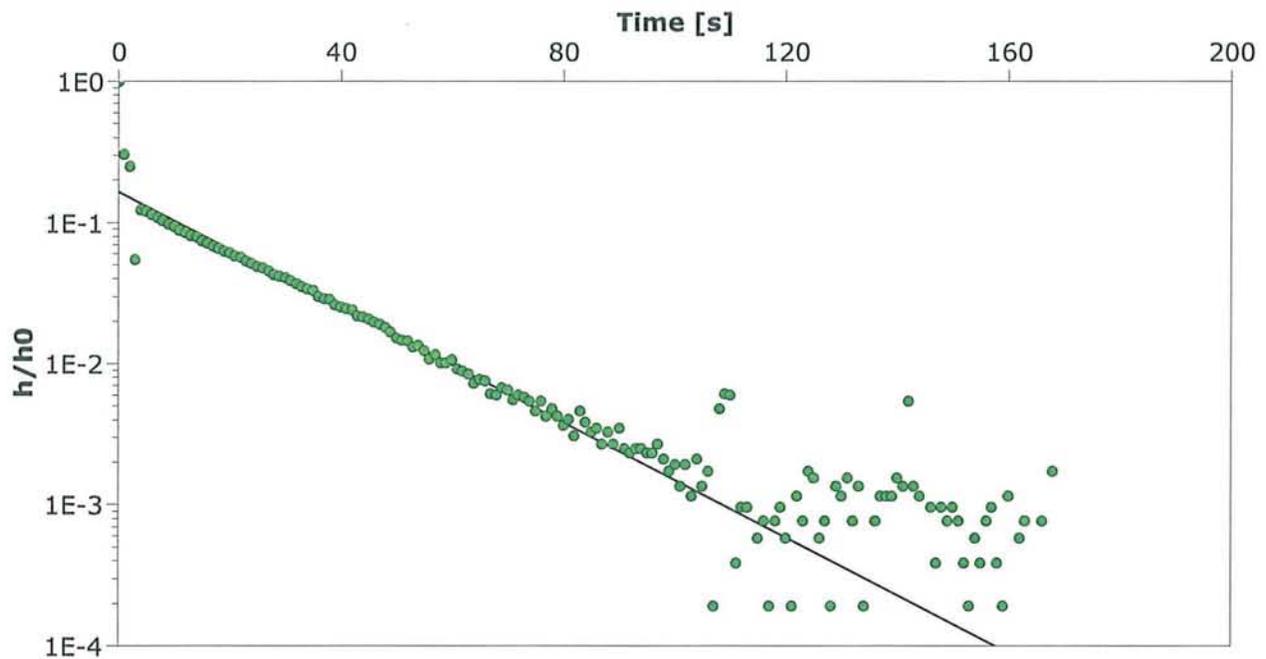
Test date: 10/23/2007

Analysis performed by: G.P. Wittman

AA-23R Slug In 1

Date: 10/23/2007

Aquifer Thickness: 25.00 ft



Calculation after Bouwer & Rice

Observation well

K
 [ft/d]

AA23R

8.84×10^0

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Client:

Location: Henderson, Nevada

Slug Test: AA-23R Slug Test

Test Well: AA23R

Test conducted by:

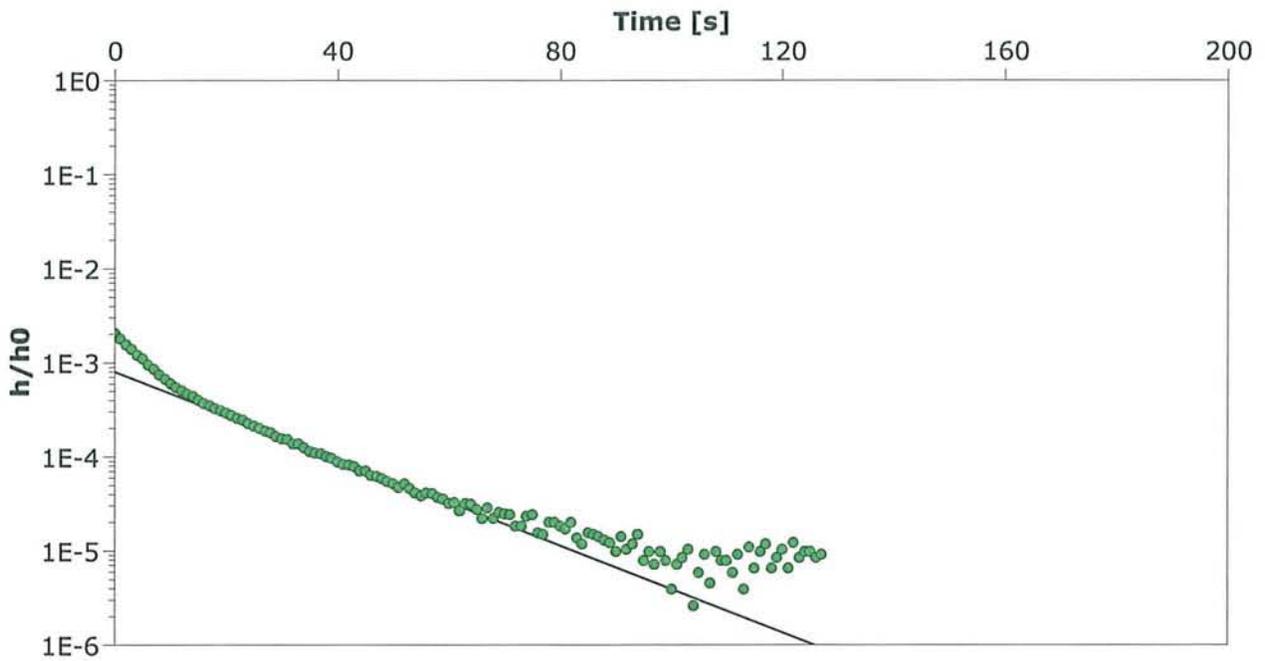
Test date: 10/23/2007

Analysis performed by: G. P. Wittman

AA-23R Slug Out 1

Date: 10/23/2007

Aquifer Thickness: 25.00 ft



Calculation after Bouwer & Rice

Observation well	K [ft/d]
AA23R	1.00×10^1

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Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: AA-23R SlugTest

Test Well: AA23R

Test conducted by:

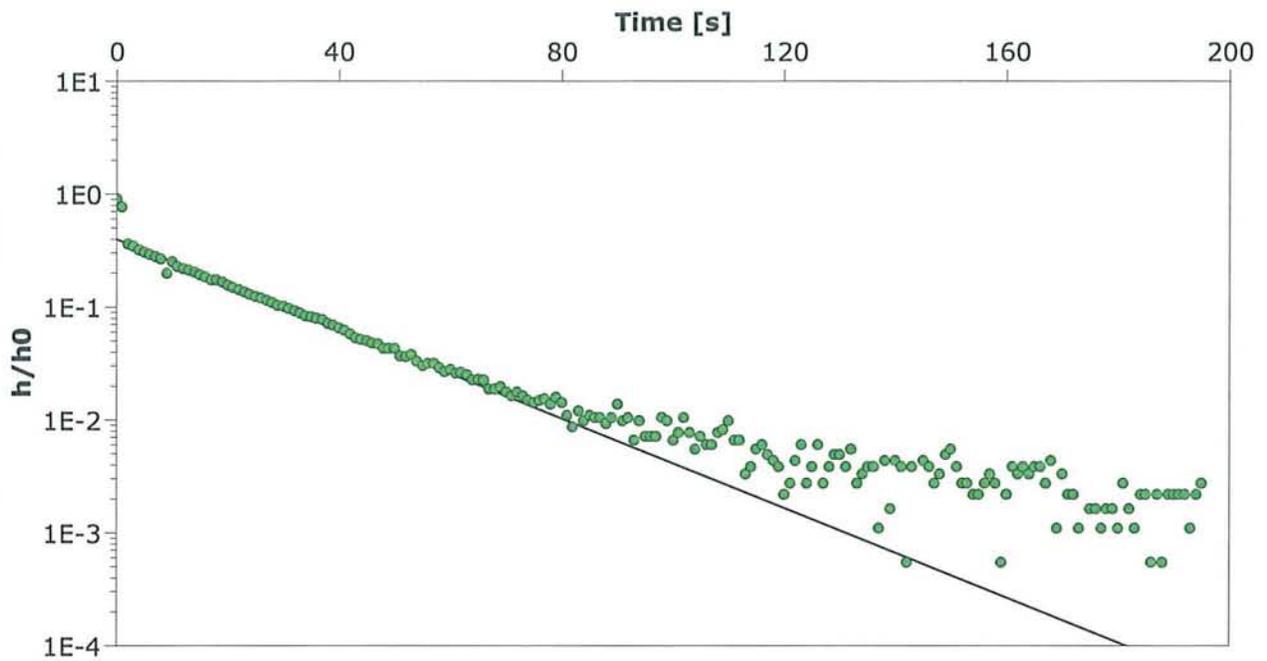
Test date: 10/23/2007

Analysis performed by: G. P. Wittman

AA-23R Slug In 2

Date: 10/23/2007

Aquifer Thickness: 25.00 ft



Calculation after Bouwer & Rice

Observation well	K [ft/d]
AA23R	8.60×10^0

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Slug Test Analysis Report

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Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: AA-23R Slug Test

Test Well: AA23R

Test conducted by:

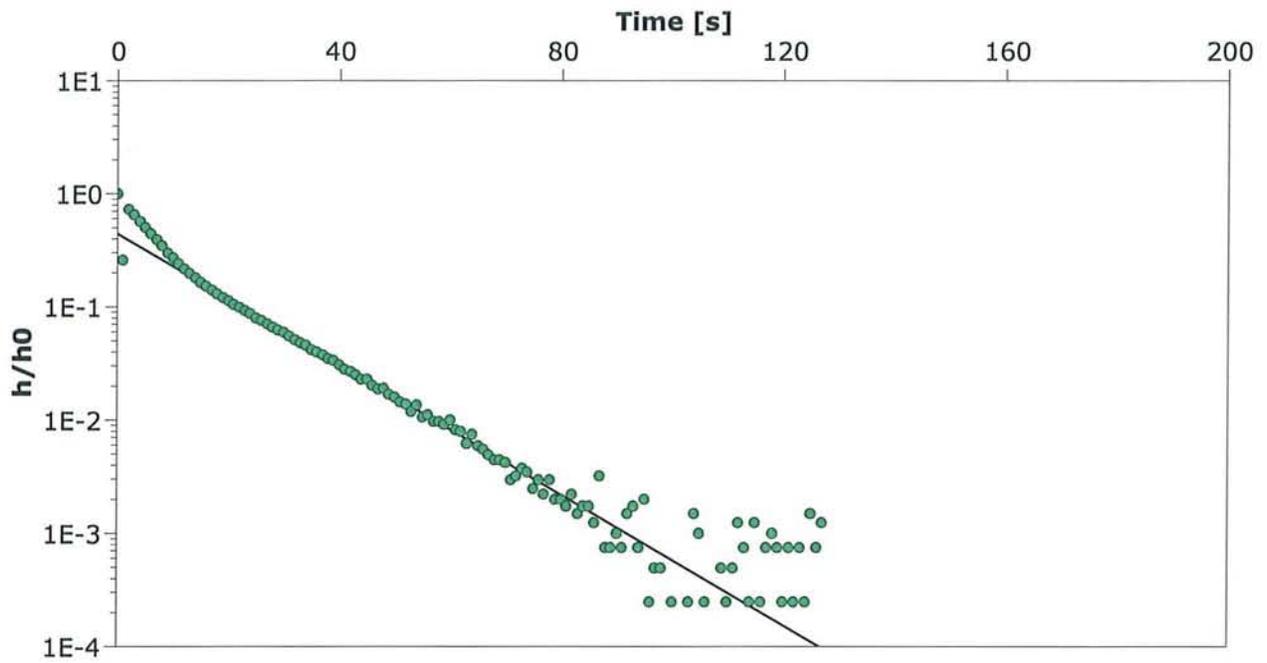
Test date: 10/23/2007

Analysis performed by: G. P. Wittman

AA-23R Slug Out 2

Date: 10/23/2007

Aquifer Thickness: 25.00 ft



Calculation after Bouwer & Rice

Observation well	K [ft/d]
AA23R	1.25×10^1

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Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: DBMW-2 Slug Test

Test Well: DBMW-2

Test conducted by: G. P. Wittman

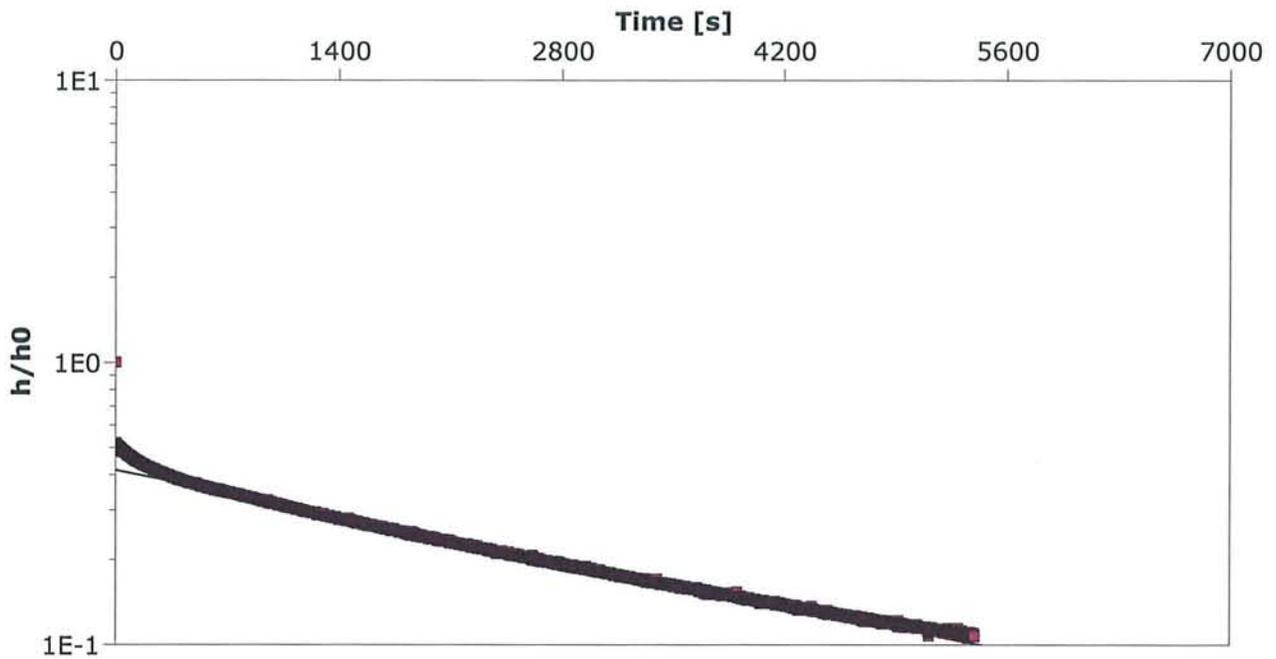
Test date: 10/24/2007

Analysis performed by: G. P. Wittman

DBMW-2 Slug In 1

Date: 10/24/2007

Aquifer Thickness: 18.00 ft



Calculation after Bouwer & Rice

Observation well

K

[ft/d]

DBMW-2

4.28×10^{-2}

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Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: DBMW-2

Test Well: DBMW-2

Test conducted by: G. P. Wittman

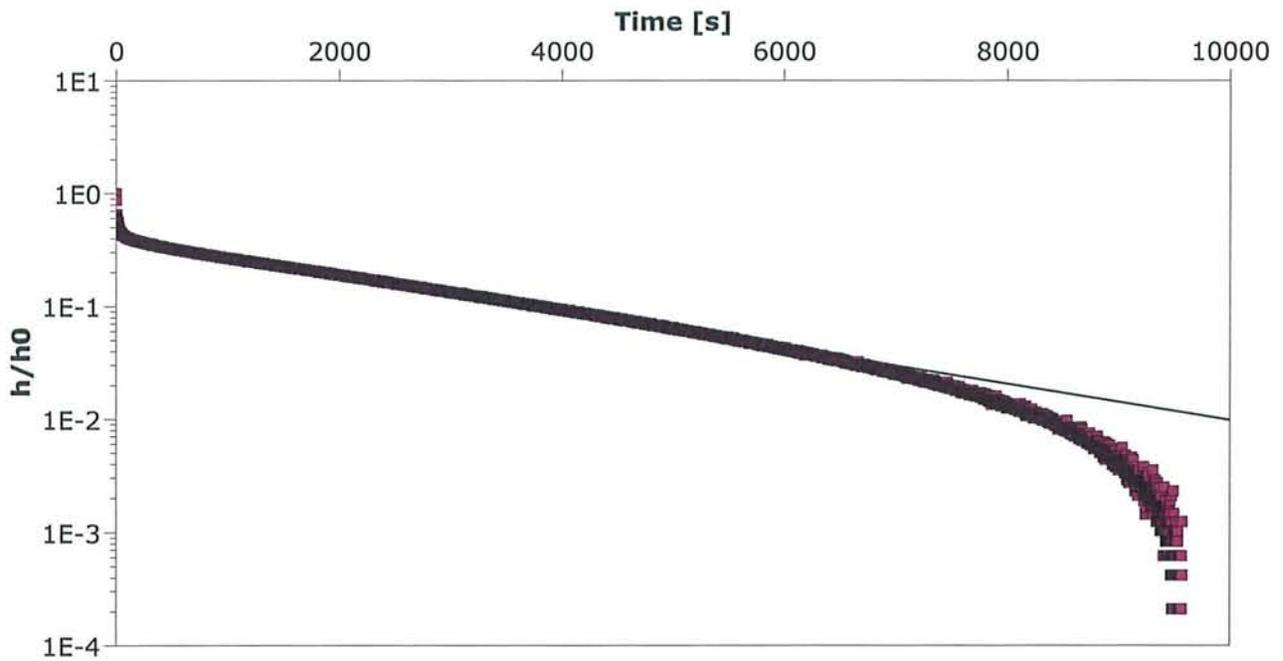
Test date: 10/24/2007

Analysis performed by: G. P. Wittman

DBMW-2 Slug Out 1

Date: 10/24/2007

Aquifer Thickness: 18.00 ft



Calculation after Bouwer & Rice

Observation well	K [ft/d]
DBMW-2	6.00×10^{-2}

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Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: DBMW-4 Slug Test

Test Well: DBMW-4

Test conducted by: G. P. Wittman

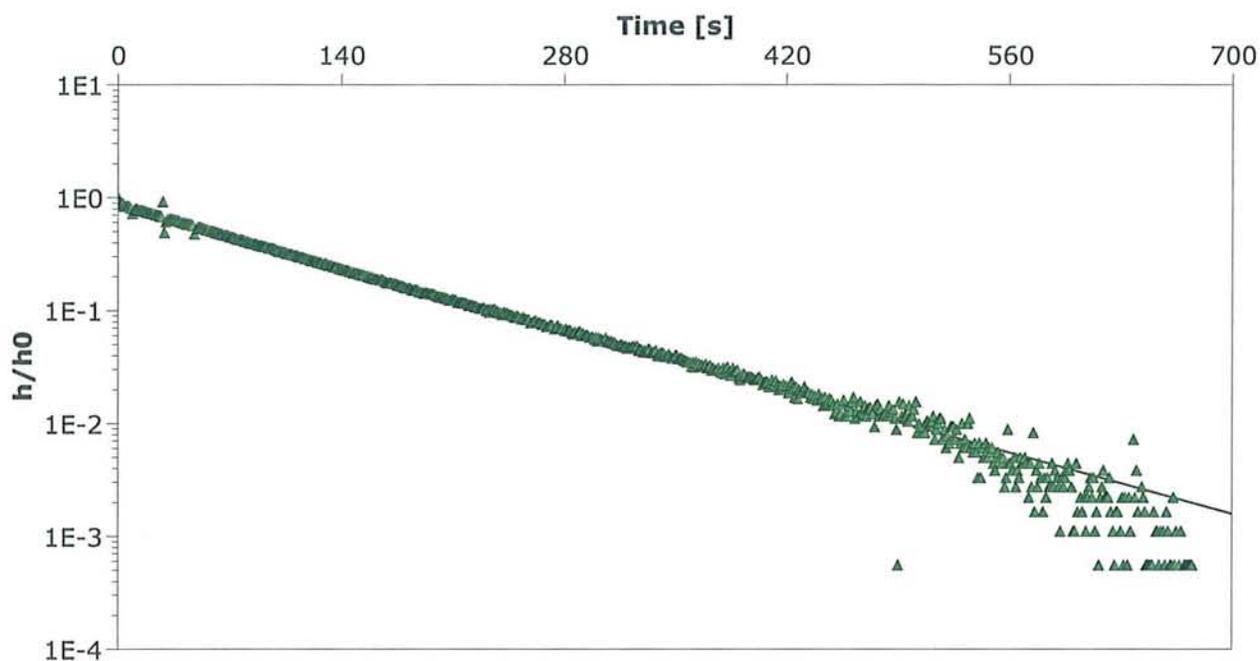
Test date: 10/24/2007

Analysis performed by: G. P. Wittman

DBMW-4 Slug In 1

Date: 10/24/2007

Aquifer Thickness: 20.00 ft



Calculation after Bouwer & Rice

Observation well

K

[ft/d]

DBMW-4

2.00×10^0

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Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: DBMW-4

Test Well: DBMW-4

Test conducted by: G. P. Wittman

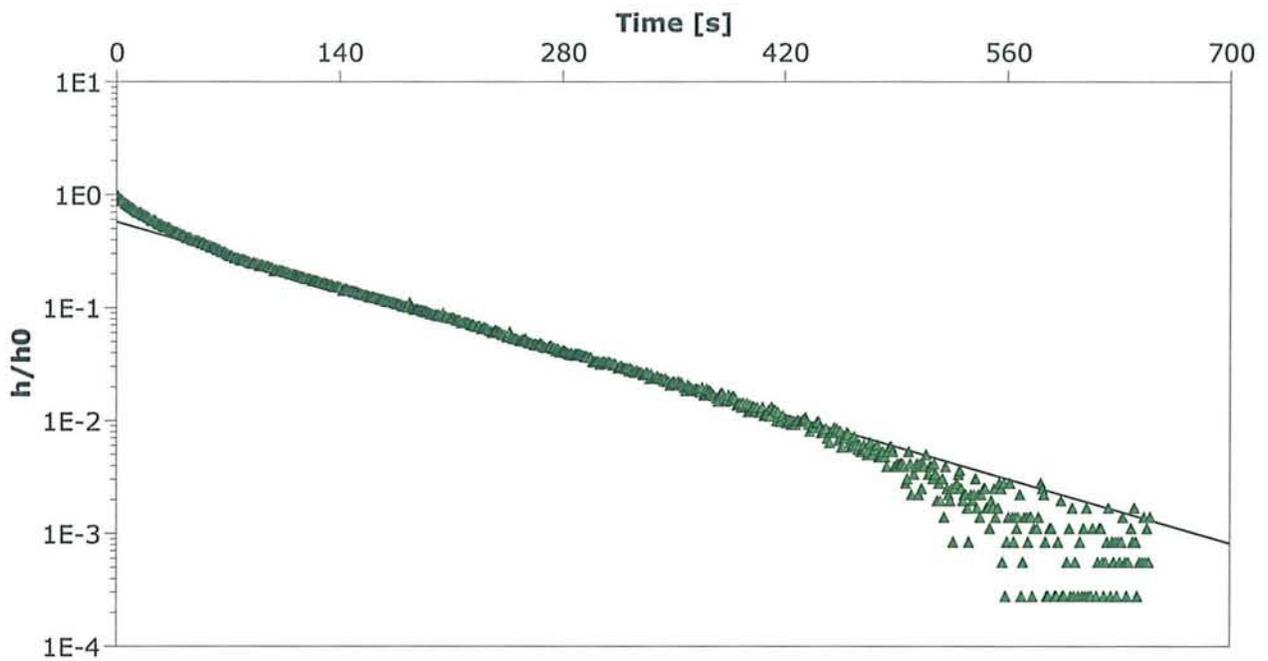
Test date: 10/24/2007

Analysis performed by: G. P. Wittman

DBMW-4 Slug Out 1

Date: 10/24/2007

Aquifer Thickness: 20.00 ft



Calculation after Bouwer & Rice

Observation well

K

[ft/d]

DBMW-4

2.10×10^0

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(208) 893-9700

Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: DNMW-4 Slug Test

Test Well: DBMW-4

Test conducted by: G. P. Wittman

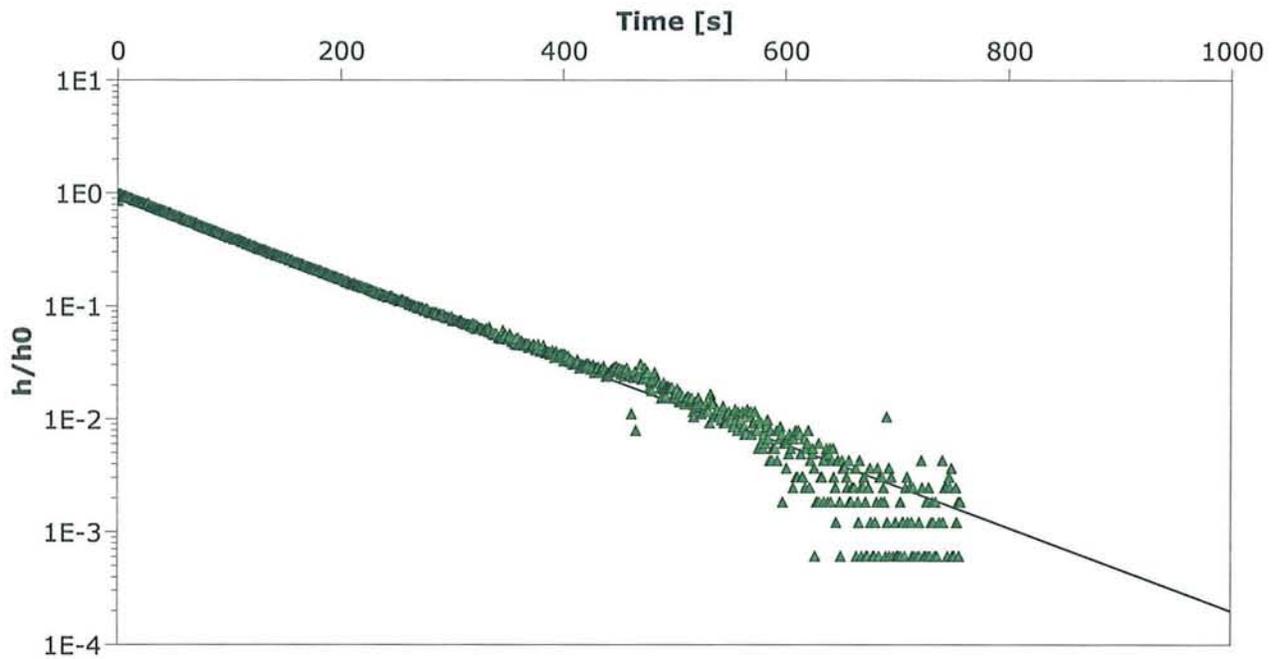
Test date: 10/24/2007

Analysis performed by: G. P. Wittman

DBMW-4 Slug In 2

Date: 10/24/2007

Aquifer Thickness: 20.00 ft



Calculation after Bouwer & Rice

Observation well

K

[ft/d]

DBMW-4

1.90×10^0

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Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: DBMW-4 Slug Test

Test Well: DBMW-4

Test conducted by: G. P. Wittman

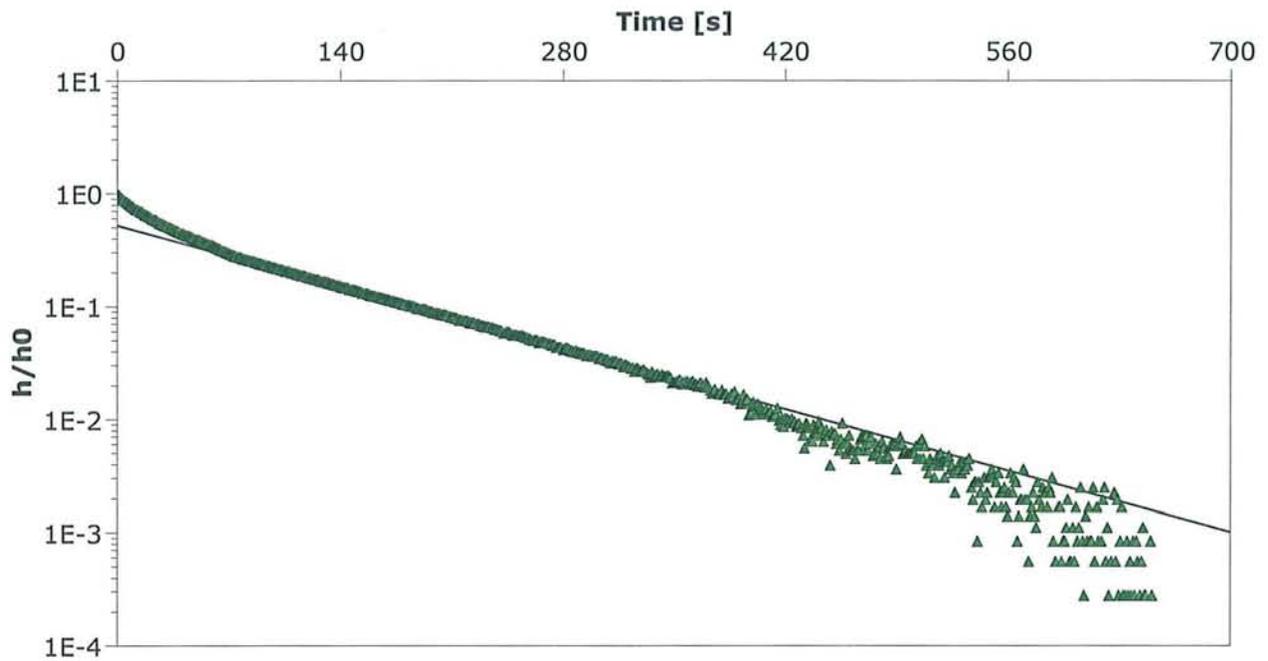
Test date: 10/24/2007

Analysis performed by: G. P. Wittman

DBMW-4 Slug Out 2

Date: 10/24/2007

Aquifer Thickness: 20.00 ft



Calculation after Bouwer & Rice

Observation well	K [ft/d]
DBMW-4	2.00×10^0

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Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: DBMW-8 Slug Test

Test Well: DBNW-8

Test conducted by: G. P. Wittman

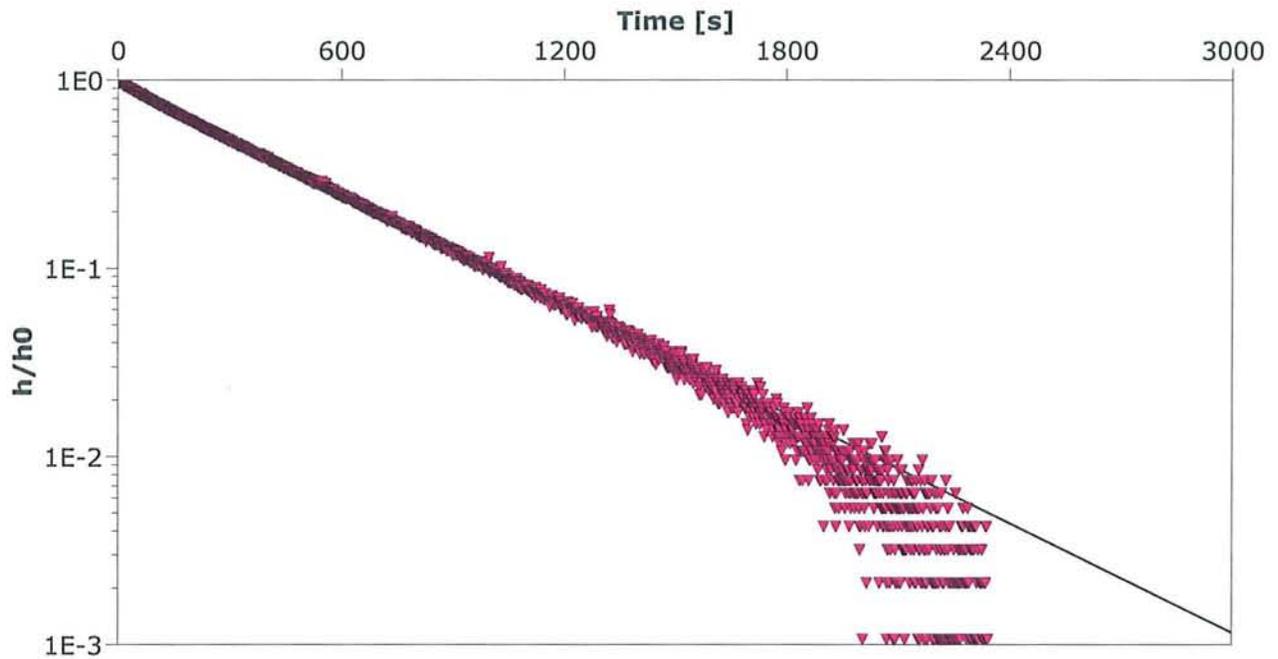
Test date: 10/24/2007

Analysis performed by: G. P. Wittman

DBMW-8 Slug In 1

Date: 10/24/2007

Aquifer Thickness: 17.00 ft



Calculation after Bouwer & Rice

Observation well

K

[ft/d]

DBNW-8

5.00×10^{-1}

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Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: DBMW-8

Test Well: DBNW-8

Test conducted by: G. P. Wittman

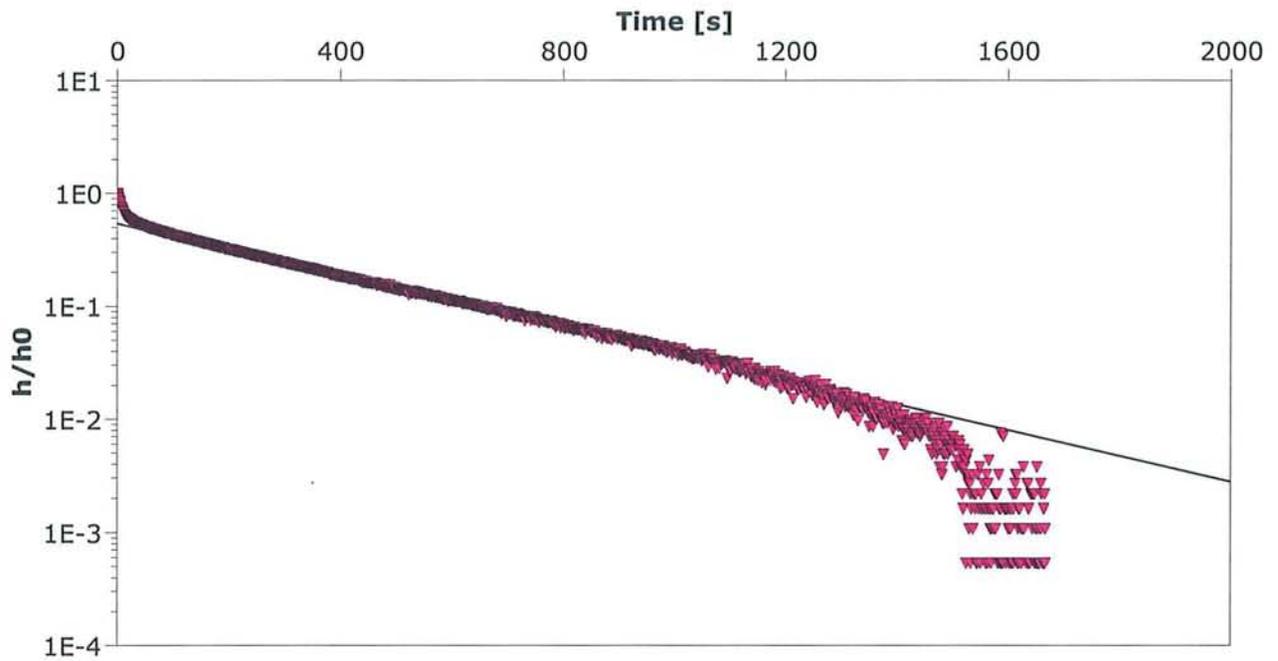
Test date: 10/24/2007

Analysis performed by: G. P. Wittman

DBMW-8 Slug Out 1

Date: 10/24/2007

Aquifer Thickness: 17.00 ft



Calculation after Bouwer & Rice

Observation well	K [ft/d]
DBNW-8	5.90×10^{-1}

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Slug Test Analysis Report

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Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: DBMW-8

Test Well: DBNW-8

Test conducted by: G.P. Wittman

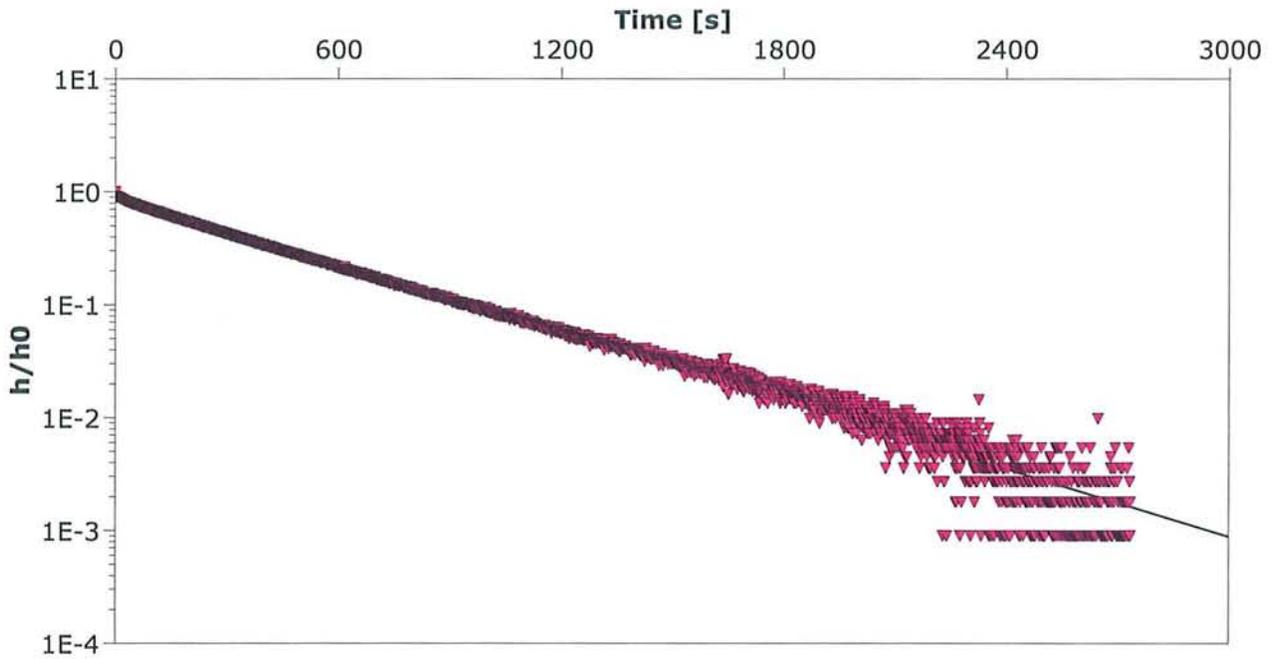
Test date: 10/24/2007

Analysis performed by: G. P. Wittman

DBMW-8 Slug In 2

Date: 10/24/2007

Aquifer Thickness: 17.00 ft



Calculation after Bouwer & Rice

Observation well	K [ft/d]
DBNW-8	5.16×10^{-1}

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Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: DBMW-8

Test Well: DBNW-8

Test conducted by: G. P. Wittman

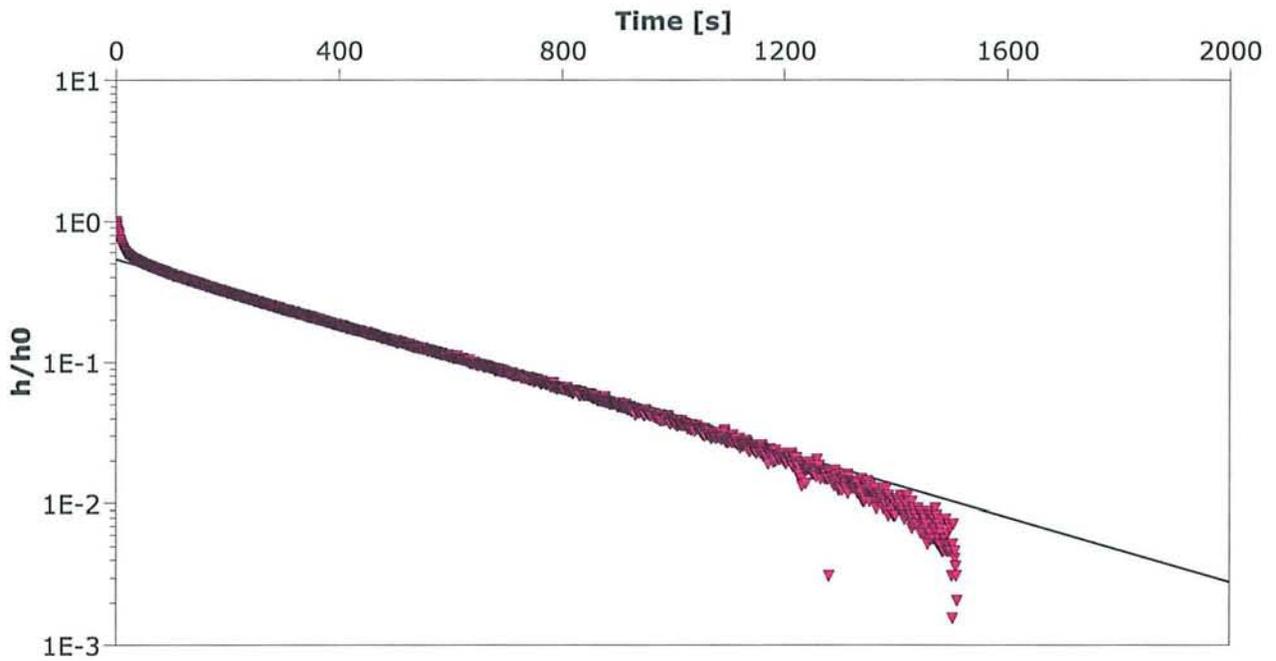
Test date: 10/24/2007

Analysis performed by: G. P. Wittman

DBMW-8 Slug Out 2

Date: 10/24/2007

Aquifer Thickness: 17.00 ft



Calculation after Bouwer & Rice

Observation well	K [ft/d]
DBNW-8	5.90×10^{-1}

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Slug Test Analysis Report

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Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: DBMW-9 Slug Test

Test Well: DBMW-9

Test conducted by:

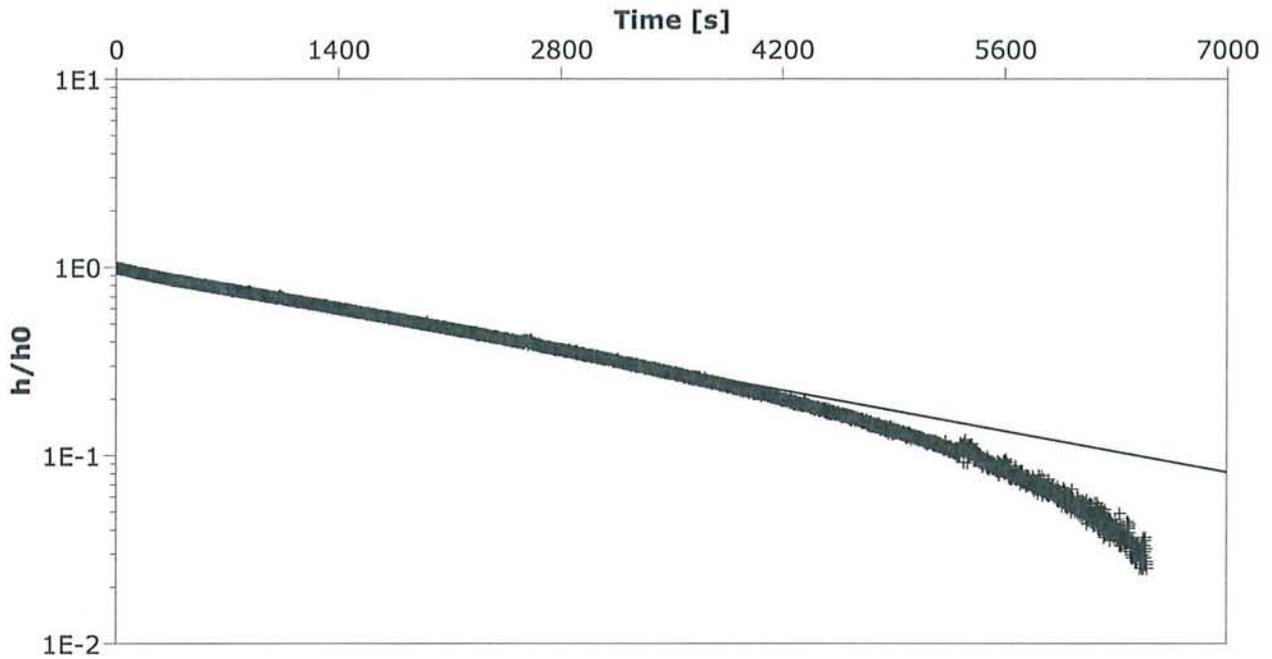
Test date: 10/24/2007

Analysis performed by: G. P. Wittman

DBMW-9 Slug In 1

Date: 10/24/2007

Aquifer Thickness: 13.00 ft



Calculation after Bouwer & Rice

Observation well

K

[ft/d]

DBMW-9

8.00×10^{-2}

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Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: DBMW-9 Slug Test

Test Well: DBMW-9

Test conducted by: G. P. Wittman

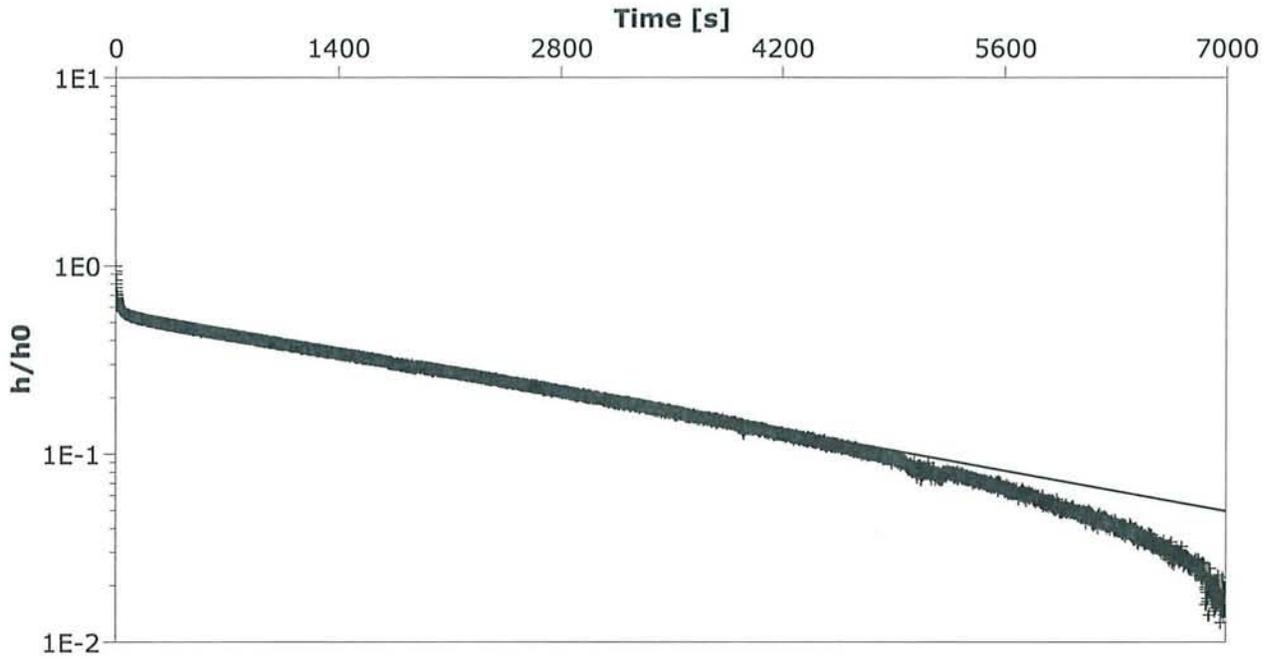
Test date: 10/24/2007

Analysis performed by: G. P. Wittman

DBMW-9 Slug Out 1

Date: 10/24/2007

Aquifer Thickness: 13.00 ft



Calculation after Bouwer & Rice

Observation well

K

[ft/d]

DBMW-9

7.90×10^{-2}

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Slug Test Analysis Report

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Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: DBMW-16 Slug Test

Test Well: DBMW-16

Test conducted by: G. P. Wittman

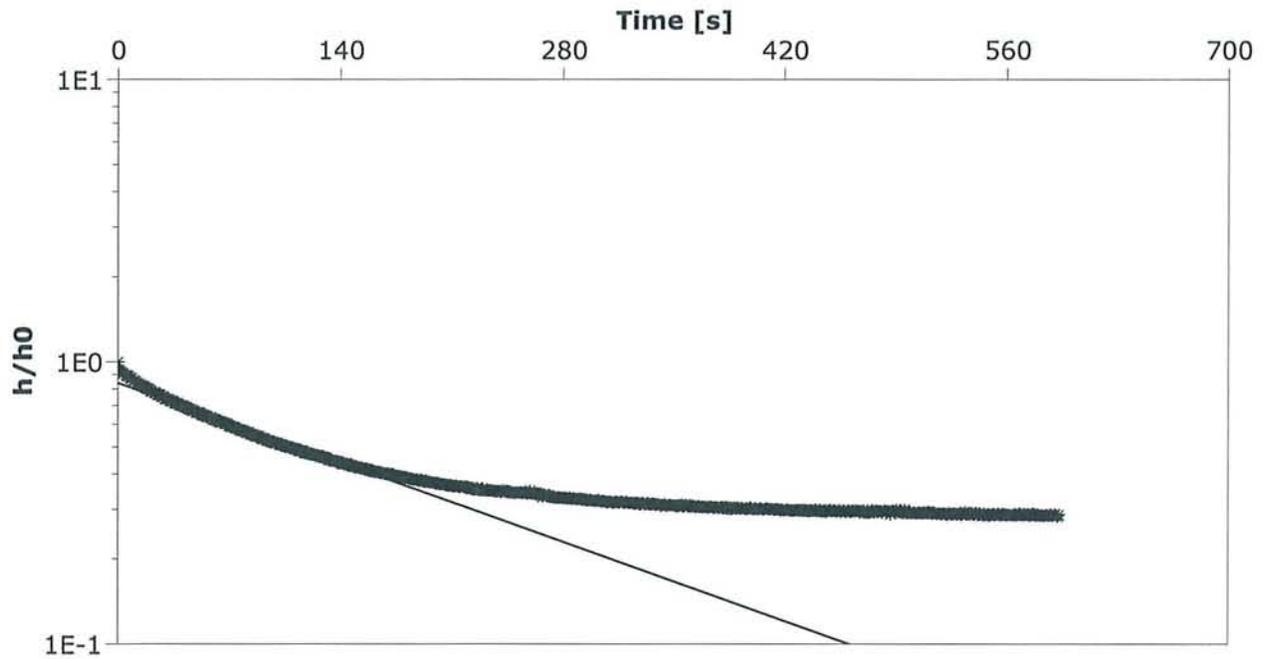
Test date: 10/25/2007

Analysis performed by: G.P. Wittman

DBMW-16 Slug Test In 1

Date: 10/25/2007

Aquifer Thickness: 15.00 ft



Calculation after Bouwer & Rice

Observation well

K

[ft/d]

DBMW-16

8.70×10^{-1}

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Client:

Location: Henderson, Nevada

Slug Test: DBMW-16 Slug Test

Test Well: DBMW-16

Test conducted by: G.P. Wittman

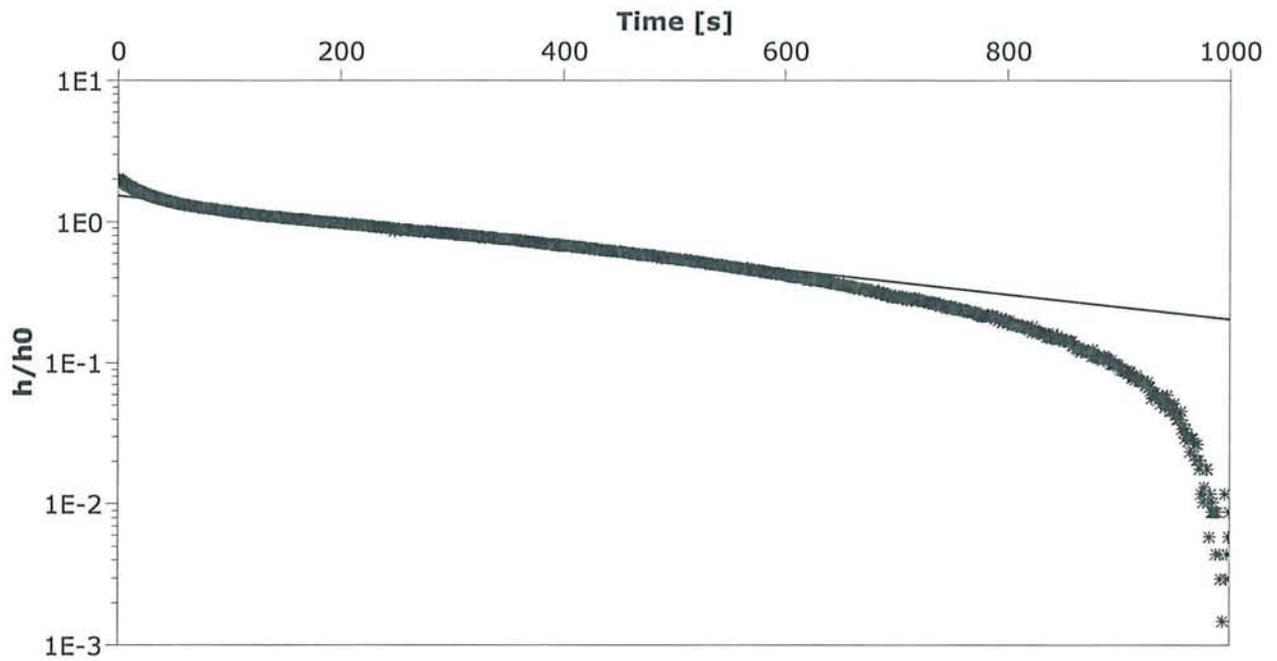
Test date: 10/25/2007

Analysis performed by: G. P. Wittman

DBMW-16 Slug Out 1

Date: 10/25/2007

Aquifer Thickness: 15.00 ft



Calculation after Bouwer & Rice

Observation well	K [ft/d]
DBMW-16	3.80×10^{-1}

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Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: DBMW-19 Slug Test

Test Well: DBMW-19

Test conducted by: G. P. Wittman

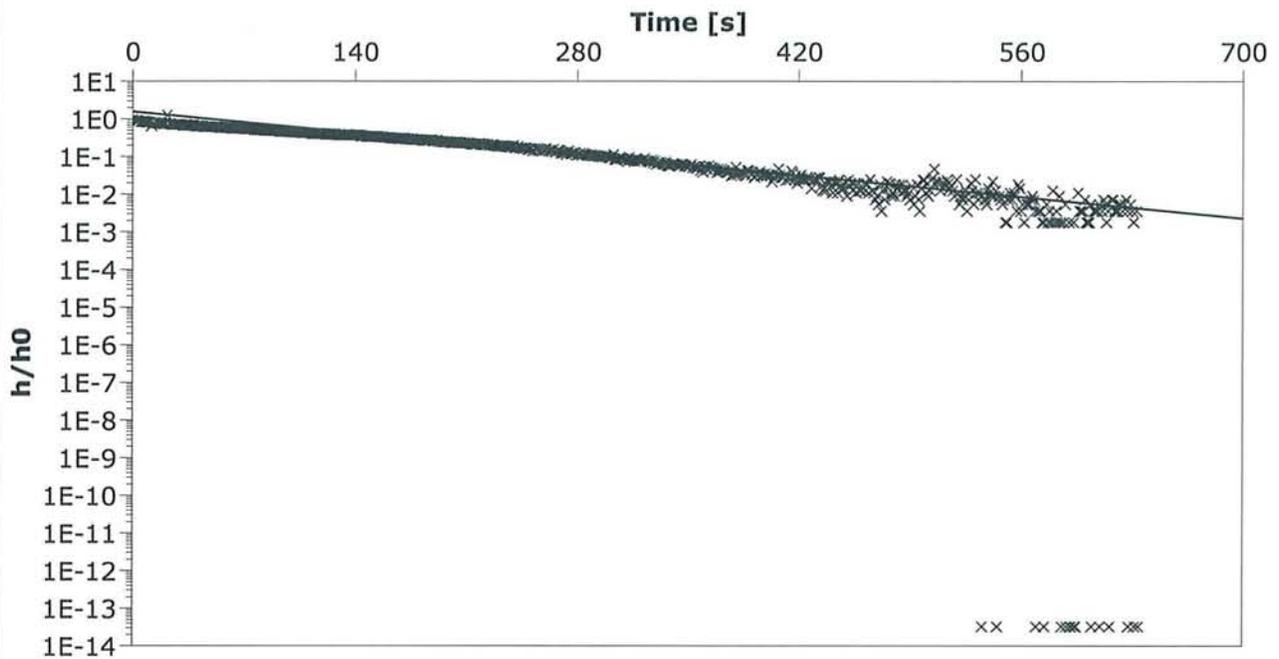
Test date: 10/25/2007

Analysis performed by: G. P. Wittman

DBMW-19 Slug In 1

Date: 10/25/2007

Aquifer Thickness: 18.00 ft



Calculation after Bouwer & Rice

Observation well

K

[ft/d]

DBMW-19

1.35×10^0

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Slug Test Analysis Report

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Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: DBMW-19 Slug Test

Test Well: DBMW-19

Test conducted by: G. P. Wittman

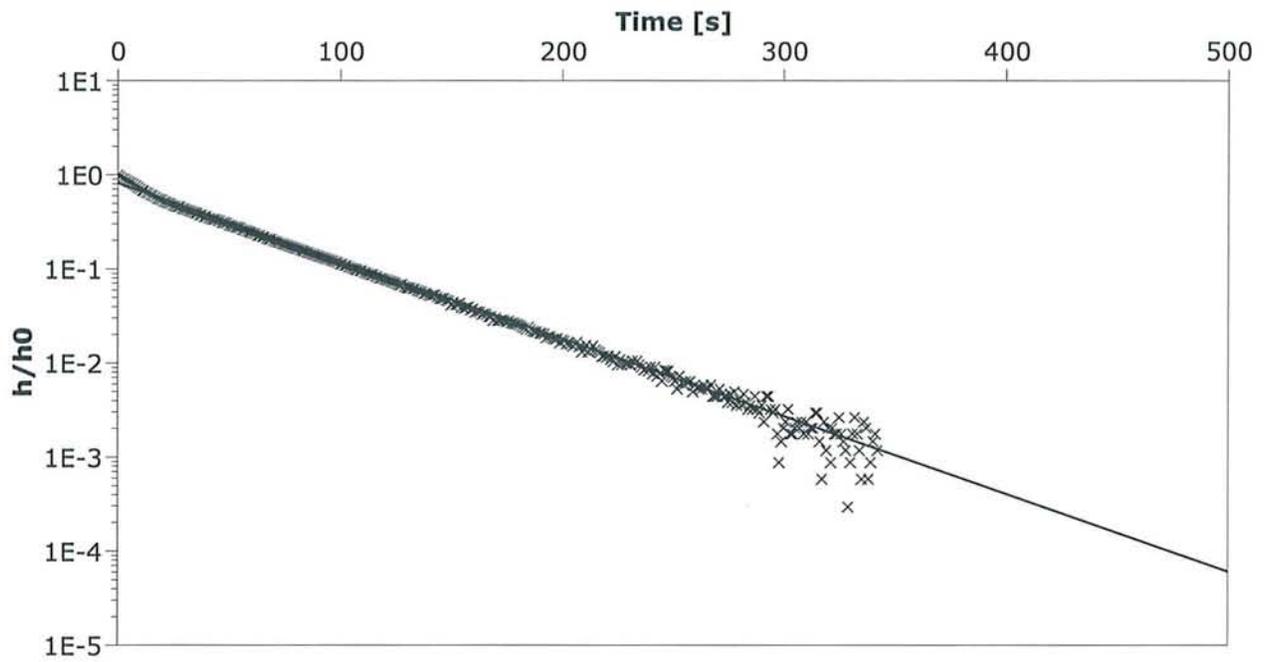
Test date: 10/25/2007

Analysis performed by: G. P. Wittman

DBMW-19 Slug Out 1

Date: 10/25/2007

Aquifer Thickness: 18.00 ft



Calculation after Bouwer & Rice

Observation well	K [ft/d]
DBMW-19	2.75×10^0

Kleinfelder West, Inc
2315 S. Cobalt Point Way
Meridian, Idaho 83642
(208) 893-9700

Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: DBMW-19 Slug Test

Test Well: DBMW-19

Test conducted by: G. P. Wittman

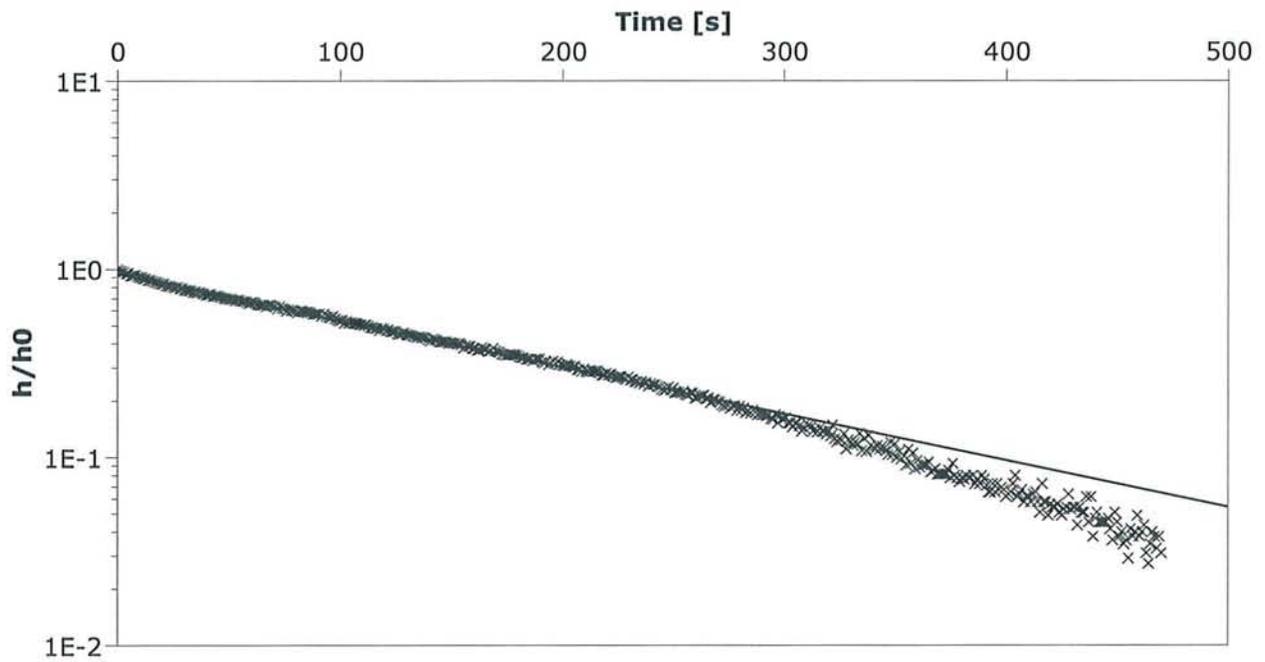
Test date: 10/25/2007

Analysis performed by: G. P. Wittman

DBMW-19 Slug In 2

Date: 10/25/2007

Aquifer Thickness: 18.00 ft



Calculation after Bouwer & Rice

Observation well

K

[ft/d]

DBMW-19

8.25×10^{-1}

Kleinfelder West, Inc
2315 S. Cobalt Point Way
Meridian, Idaho 83642
(208) 893-9700

Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: DBMW-19 Slug Test

Test Well: DBMW-19

Test conducted by: G. P. Wittman

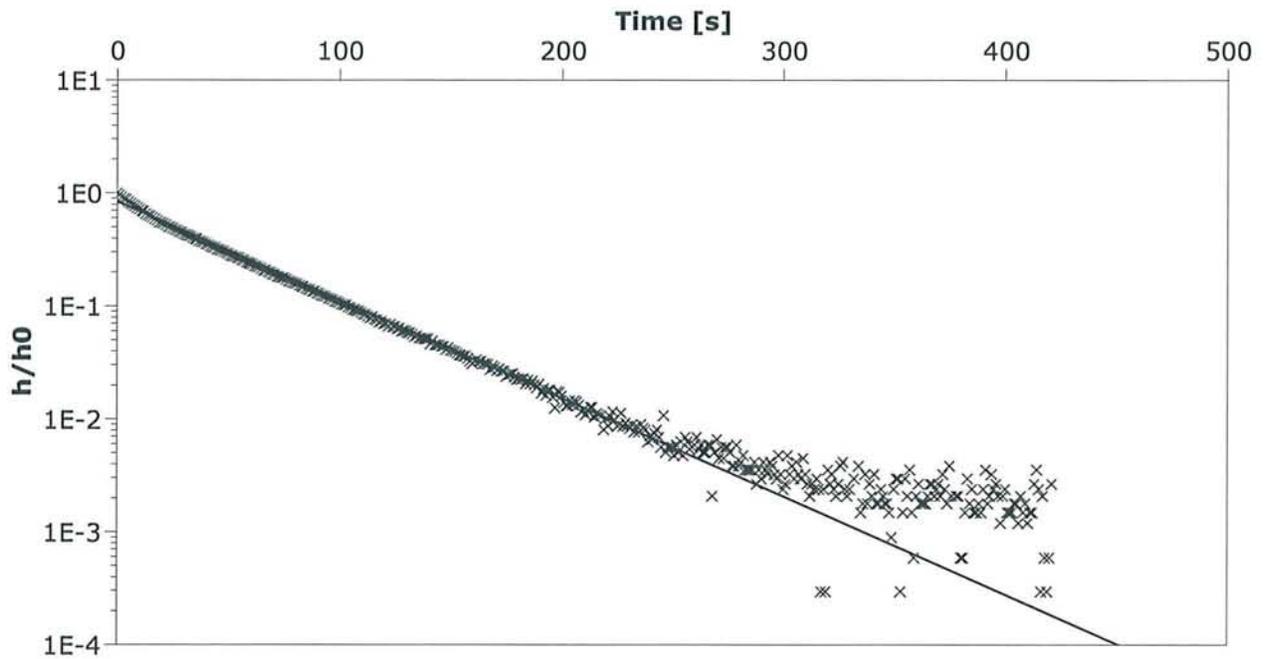
Test date: 10/25/2007

Analysis performed by: G. P. Wittman

DBMW-19 Slug Out 2

Date: 10/25/2007

Aquifer Thickness: 18.00 ft



Calculation after Bouwer & Rice

Observation well

K
[ft/d]

DBMW-19

2.90×10^0

Kleinfelder West, Inc
2315 S. Cobalt Point Way
Meridian, Idaho 83642
(208) 893-9700

Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: DBMW-22 Slug Test

Test Well: DBMW-22

Test conducted by: G. P. Wittman

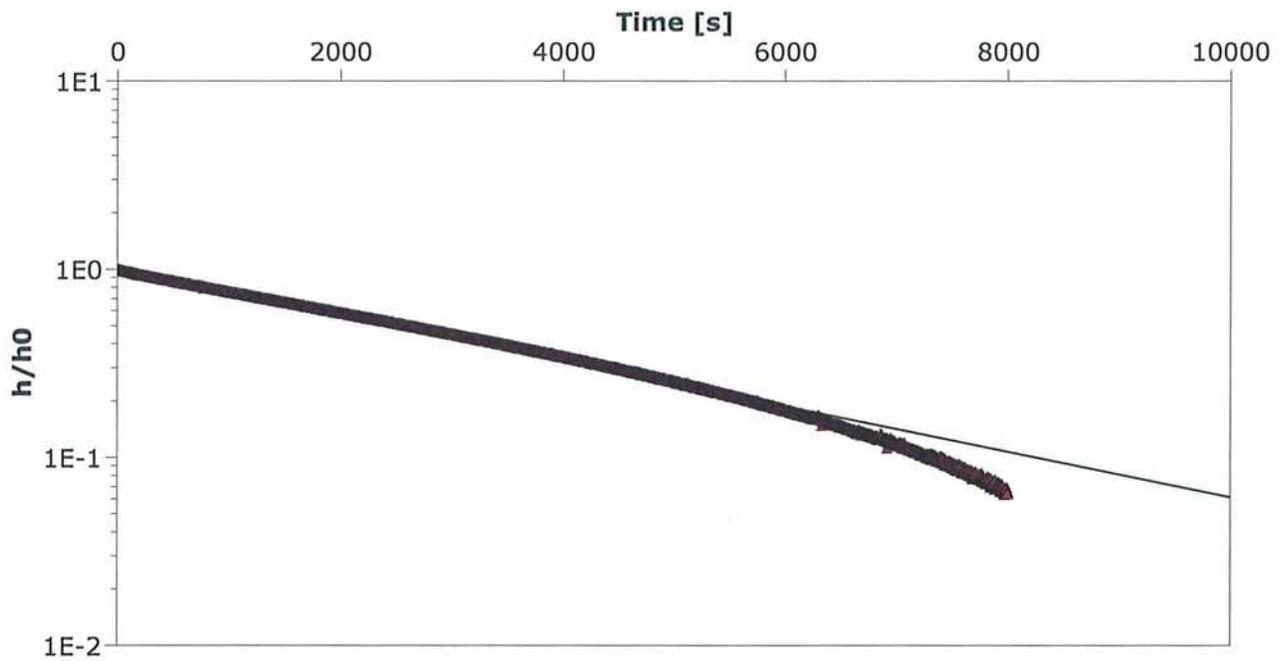
Test date: 10/25/2007

Analysis performed by: G. P. Wittman

DBMW-22 Slug In 1

Date: 10/25/2007

Aquifer Thickness: 18.00 ft



Calculation after Bouwer && Rice

Observation well

K

[ft/d]

DBMW-22

6.25×10^{-2}

Kleinfelder West, Inc
2315 S. Cobalt Point Way
Meridian, Idaho 83642
(208) 893-9700

Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: DBMW-22 Slug Test

Test Well: DBMW-22

Test conducted by: G. P. Wittman

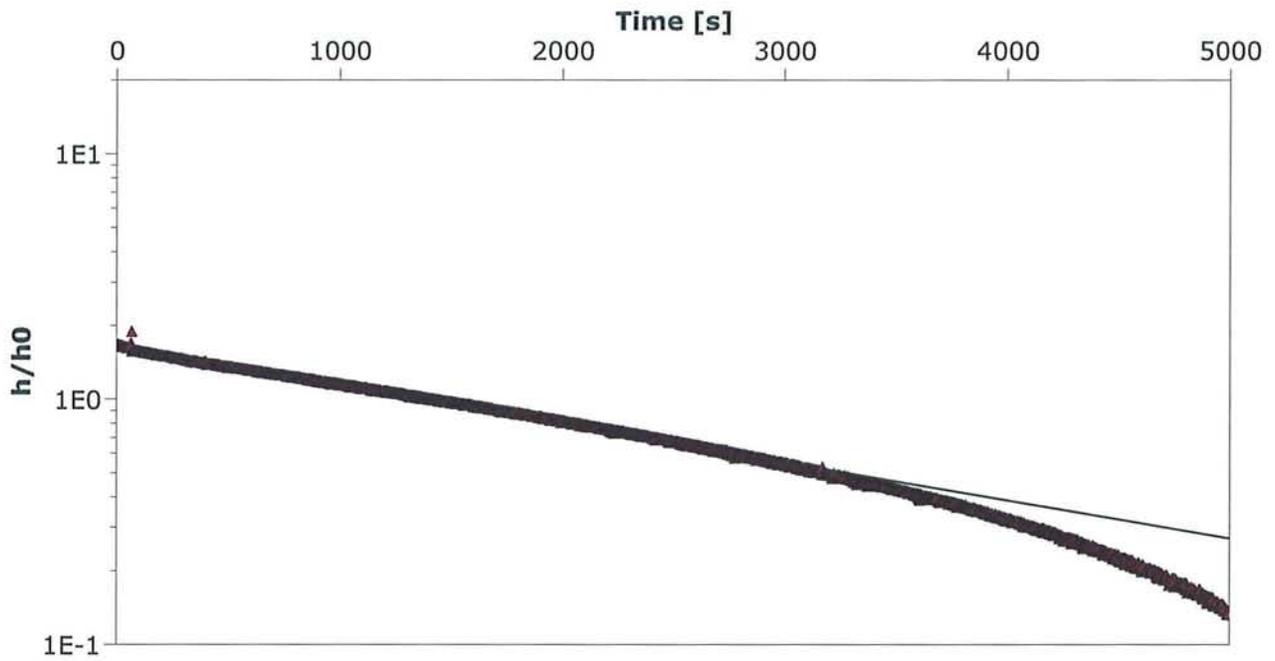
Test date: 10/25/2007

Analysis performed by: G. P. Wittman

DBMW-22 Slug Out 1

Date: 10/25/2007

Aquifer Thickness: 18.00 ft



Calculation after Bouwer & Rice

Observation well	K [ft/d]
DBMW-22	8.01×10^{-2}

Kleinfelder West, Inc
2315 S. Cobalt Point Way
Meridian, Idaho 83642
(208) 893-9700

Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: AA-26 Slug Test

Test Well: BCR-SB-26-B

Test conducted by: G. P. Wittman

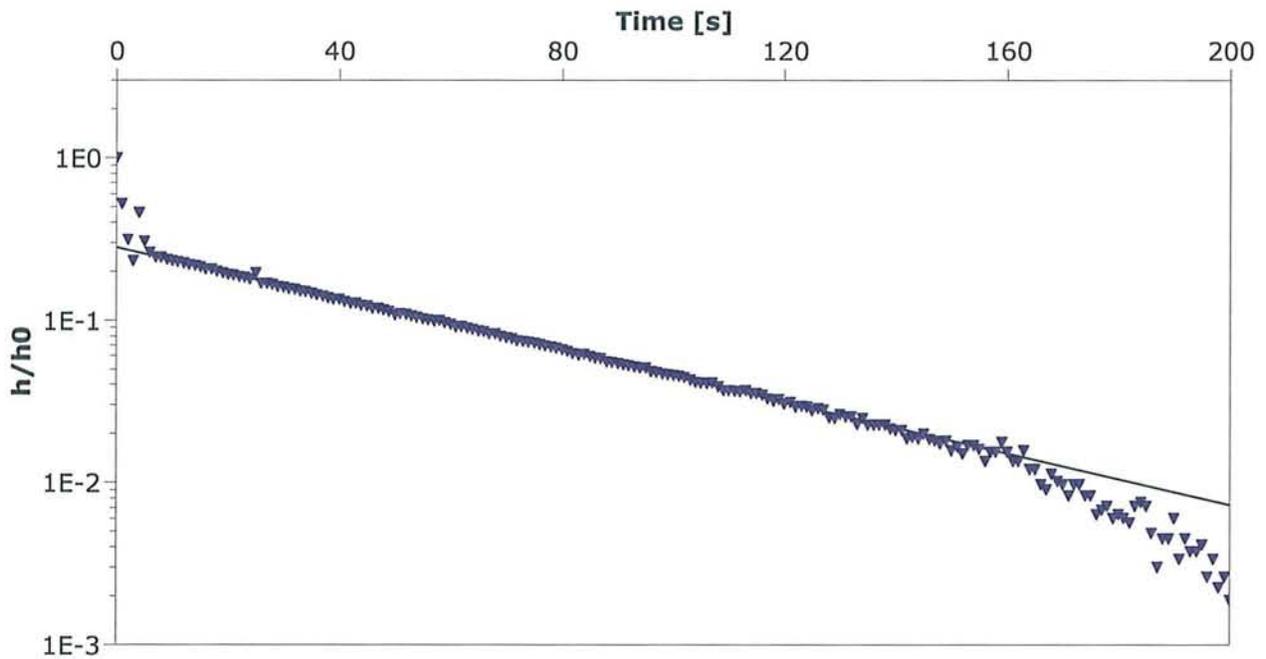
Test date: 10/26/2007

Analysis performed by: G. P. Wittman

AA-26 Slug Test In 1

Date: 10/26/2007

Aquifer Thickness: 18.00 ft



Calculation after Bouwer & Rice

Observation well

K

[ft/d]

BCR-SB-26-B

4.10×10^0

Kleinfelder West, Inc
2315 S. Cobalt Point Way
Meridian, Idaho 83642
(208) 893-9700

Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: AA-26 Slug Test

Test Well: BCR-SB-26-B

Test conducted by: G. P. Wittman

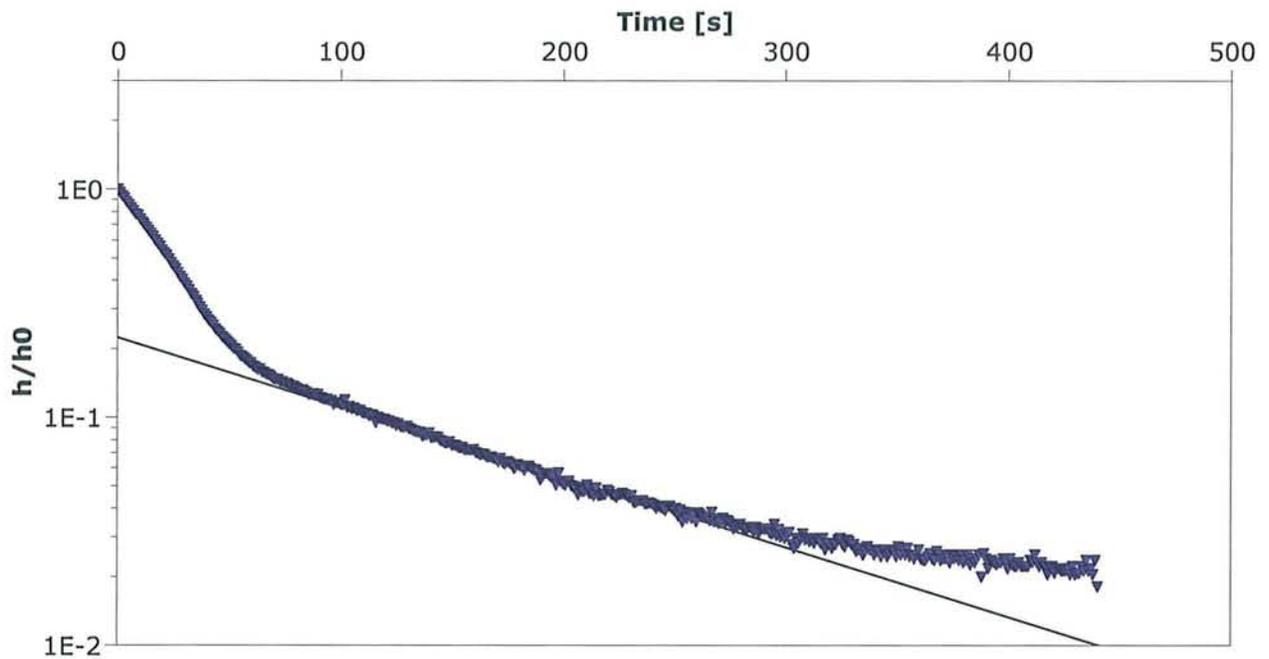
Test date: 10/26/2007

Analysis performed by: G. P. Wittman

AA-26 Slug Out 1

Date: 10/26/2007

Aquifer Thickness: 18.00 ft



Calculation after Bouwer & Rice

Observation well

K

[ft/d]

BCR-SB-26-B

1.58×10^0

Kleinfelder West, Inc
2315 S. Cobalt Point Way
Meridian, Idaho 83642
(208) 893-9700

Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: AA-26 Slug Test

Test Well: BCR-SB-26-B

Test conducted by: G. P Wittman

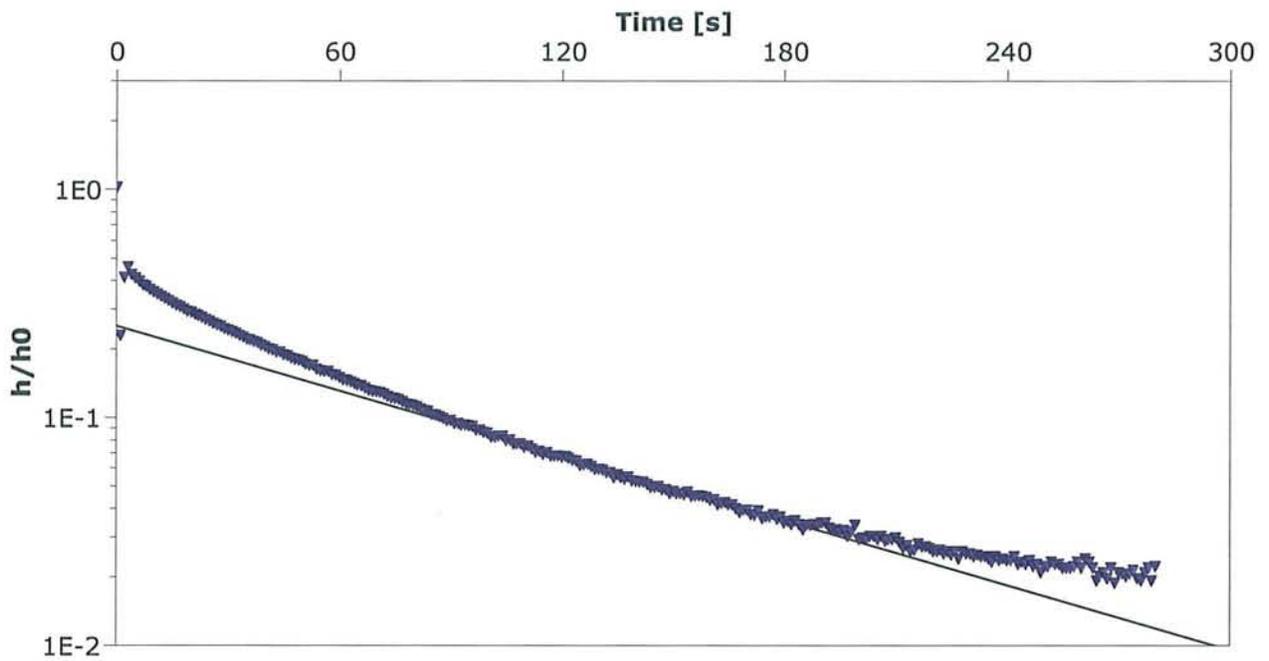
Test date: 10/26/2007

Analysis performed by: G. P. Wittman

AA-26 Slug In 2

Date: 10/26/2007

Aquifer Thickness: 18.00 ft



Calculation after Bouwer & Rice

Observation well

K

[ft/d]

BCR-SB-26-B

2.45×10^0

Kleinfelder West, Inc
2315 S. Cobalt Point Way
Meridian, Idaho 83642
(208) 893-9700

Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: AA-26 Slug Test

Test Well: BCR-SB-26-B

Test conducted by: G. P. Wittman

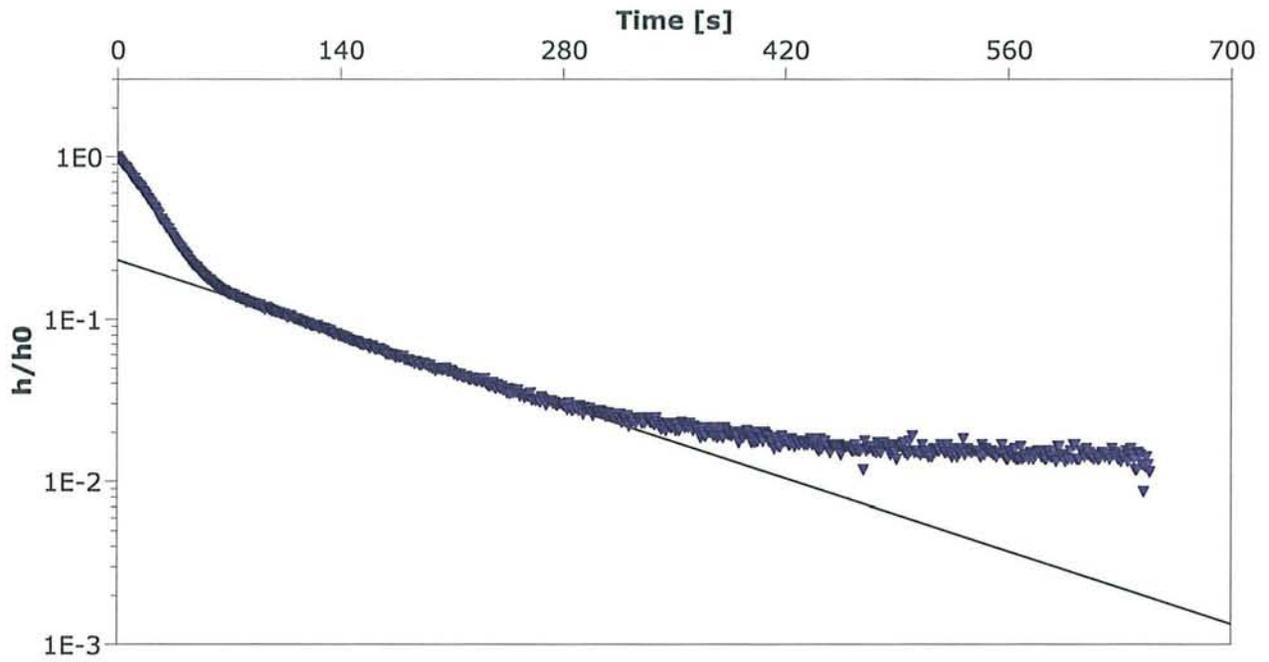
Test date: 10/26/2007

Analysis performed by: G. P. Wittman

AA-26 Slug Out 2

Date: 10/26/2007

Aquifer Thickness: 18.00 ft



Calculation after Bouwer & Rice

Observation well	K [ft/d]
BCR-SB-26-B	1.65×10^0

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Meridian, Idaho 83642
(208) 893-9700

Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: BRC-SB-08-C

Test Well: BRC-SB-08-C

Test conducted by: G.P. WittmanBRC-SB-08-c

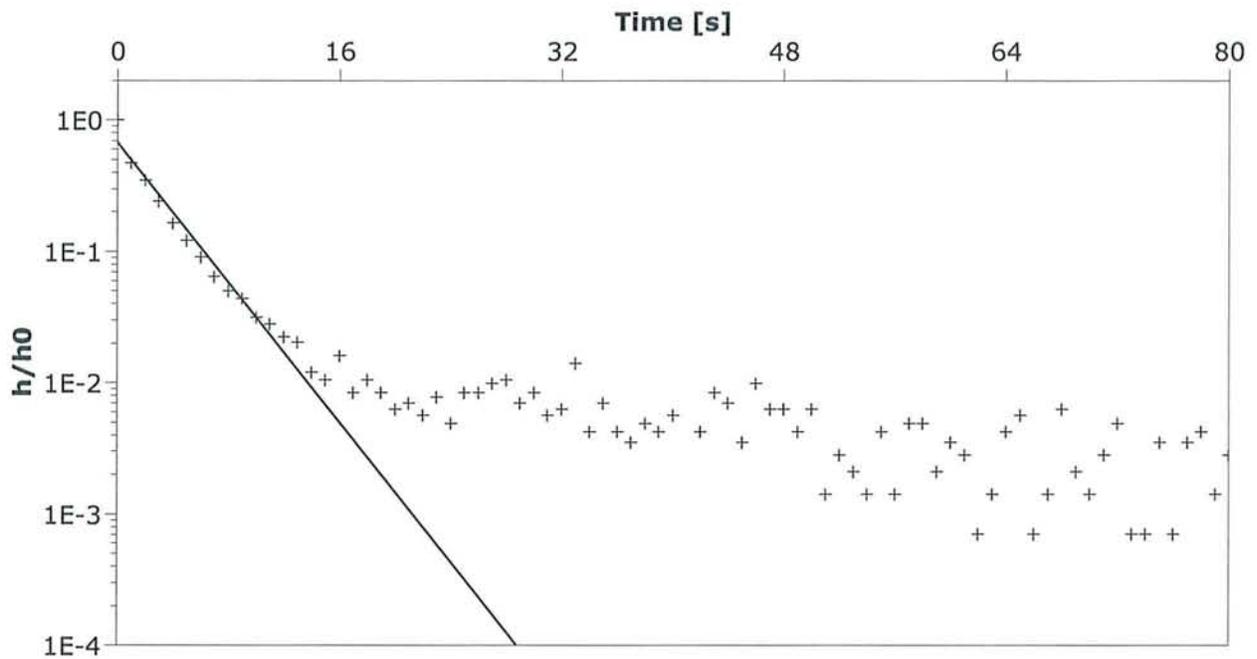
Test date: 10/29/2007

Analysis performed by: G. P. Wittman

AA-08-C Slug In 1

Date: 10/29/2007

Aquifer Thickness: 28.00 ft



Calculation after Bouwer & Rice

Observation well

K

[ft/d]

BRC-SB-08-C

5.00×10^1

Kleinfelder West, Inc
2315 S. Cobalt Point Way
Meridian, Idaho 83642
(208) 893-9700

Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: BRC-SB-08-C

Test Well: BRC-SB-08-C

Test conducted by: G.P. Witman

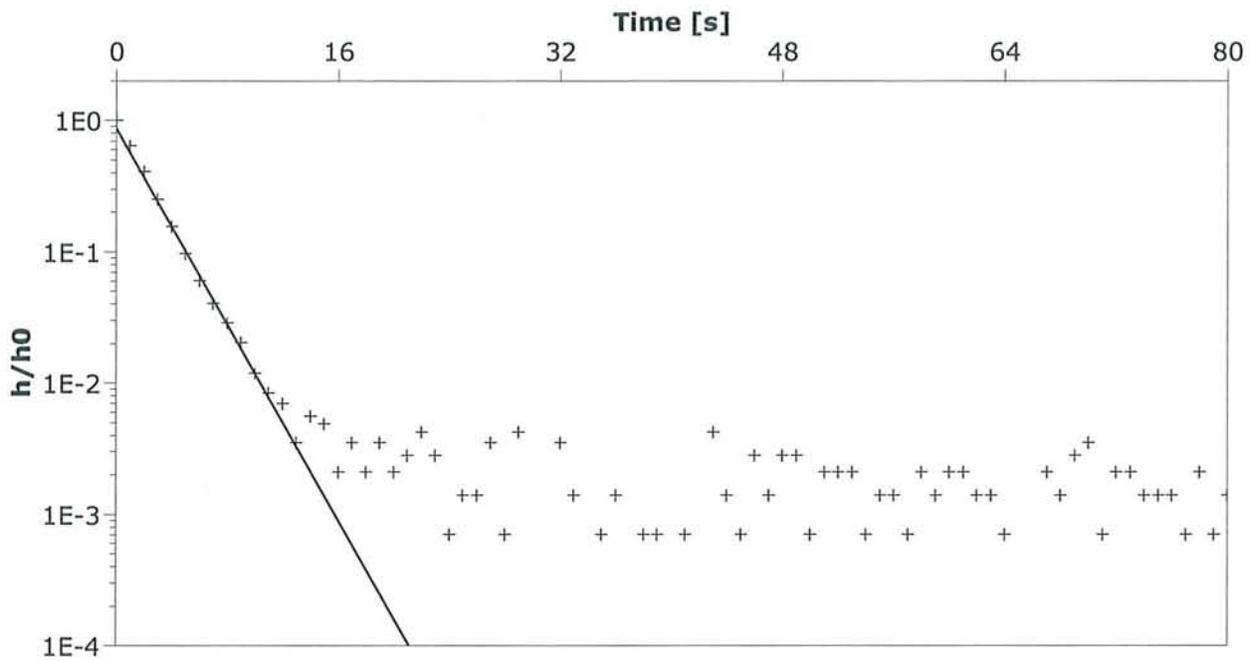
Test date: 10/29/2007

Analysis performed by: G. P. Wittman

AA-08-C Slug Out 1

Date: 10/29/2007

Aquifer Thickness: 28.00 ft



Calculation after Bouwer & Rice

Observation well

K

[ft/d]

BRC-SB-08-C

7.01×10^1

Kleinfelder West, Inc
2315 S. Cobalt Point Way
Meridian, Idaho 83642
(208) 893-9700

Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: BRC-SB-08-C

Test Well: BRC-SB-08-C

Test conducted by: G.P. Wittman

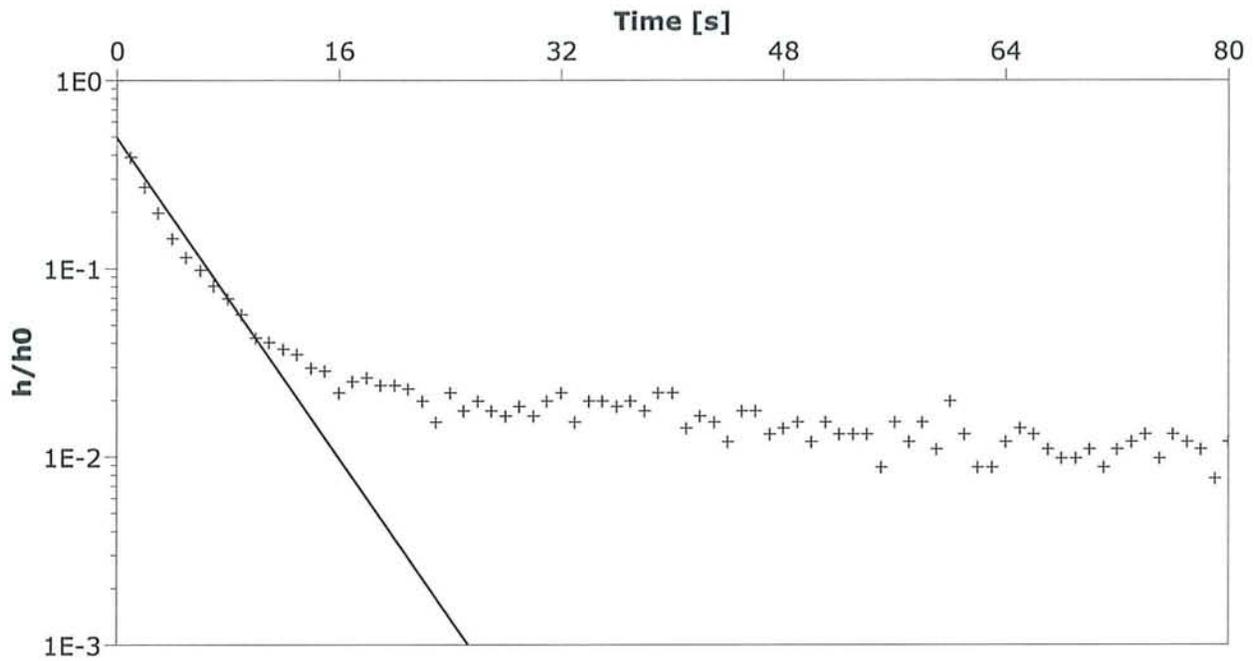
Test date: 10/29/2007

Analysis performed by: G. P. Wittman

AA-08 Slug In 2

Date: 10/29/2007

Aquifer Thickness: 28.00 ft



Calculation after Bouwer & Rice

Observation well

K
[ft/d]

BRC-SB-08-C

4.00×10^1

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2315 S. Cobalt Point Way
Meridian, Idaho 83642
(208) 893-9700

Slug Test Analysis Report

Project: BMI Common Area-Eastside Slug Tests

Number: 83173

Client:

Location: Henderson, Nevada

Slug Test: BRC-SB-08-C

Test Well: BRC-SB-08-C

Test conducted by: G.P. Wittman

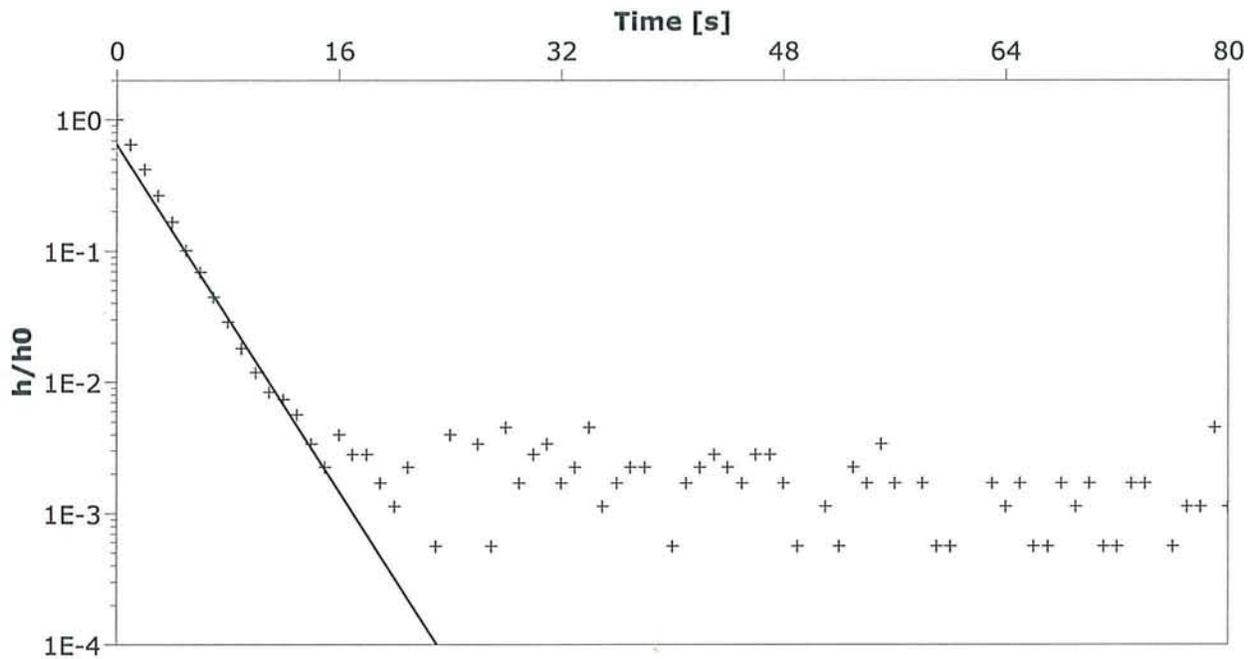
Test date: 10/29/2007

Analysis performed by: G. P. Wittman

AA-08-C Slug Out 2

Date: 10/29/2007

Aquifer Thickness: 28.00 ft



Calculation after Bouwer & Rice

Observation well

K

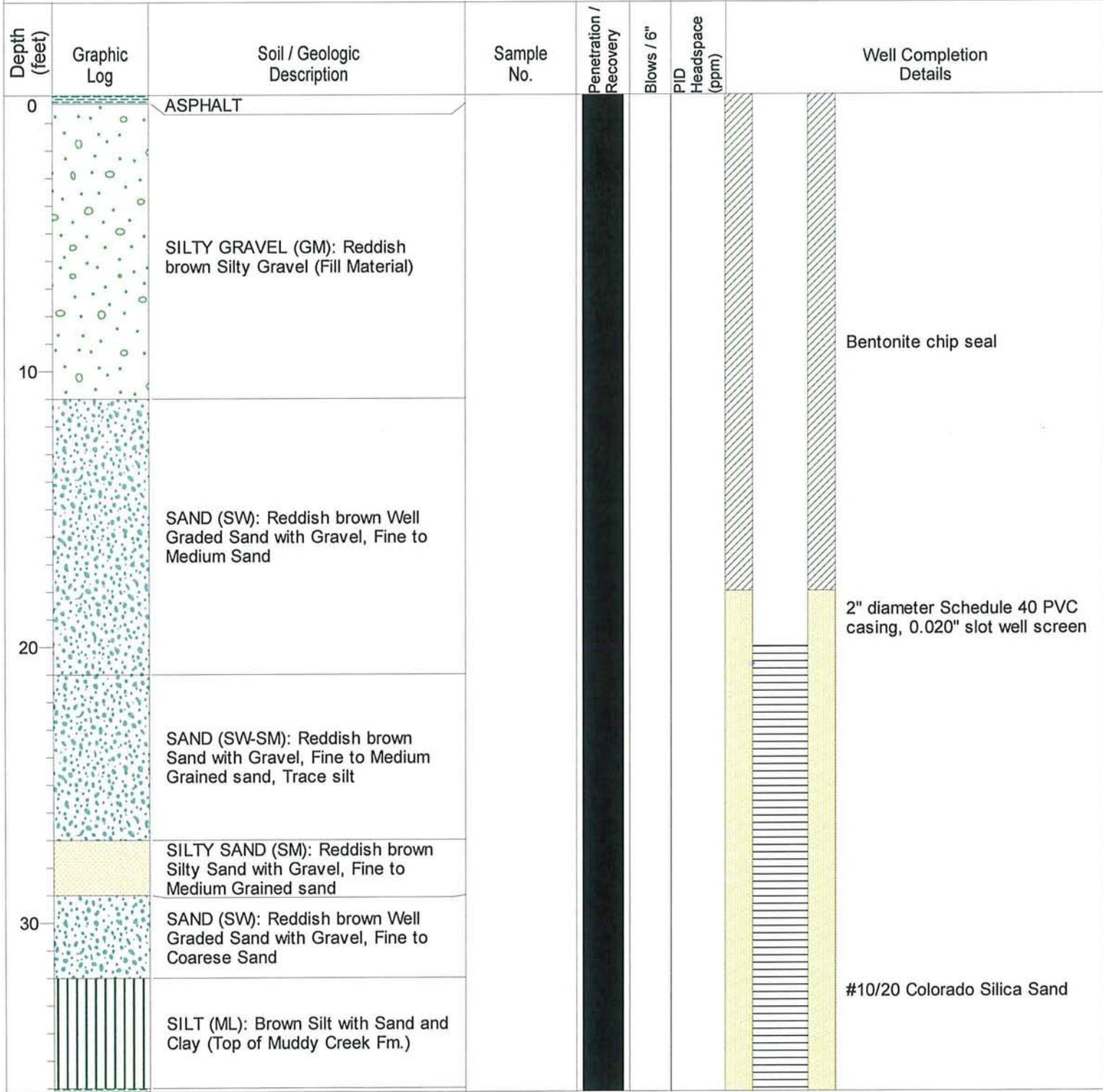
[ft/d]

BRC-SB-08-C

6.21×10^1

APPENDIX B

<i>Project Name:</i> BRC Aquifer Testing	<i>Start Date:</i> 6/02/07	<i>Logged By:</i> Davis
<i>Site Location:</i> Henderson, NV	<i>End Date:</i> 6/02/07	<i>Checked By:</i> G. Carter
<i>Project No.:</i> 83173	<i>Total Hole Depth (ft):</i> 45	<i>Permit No.:</i>
<i>Client:</i> BRC	<i>Hole Diameter (in):</i> 8	
<i>Drilling Company:</i> Boart Longyear	<i>Well Diameter (in):</i> 4	
<i>Drill Rig Type:</i> Boart Longyear	<i>Water Level (Initial, Ft):</i> 23	
<i>Drilling Method:</i> Roto-Sonic	<i>Screen Length (ft):</i> 20 - 45	
<i>Sampling Method:</i> Continuous Core	<i>Ground Surface Elev.:</i> UNK	



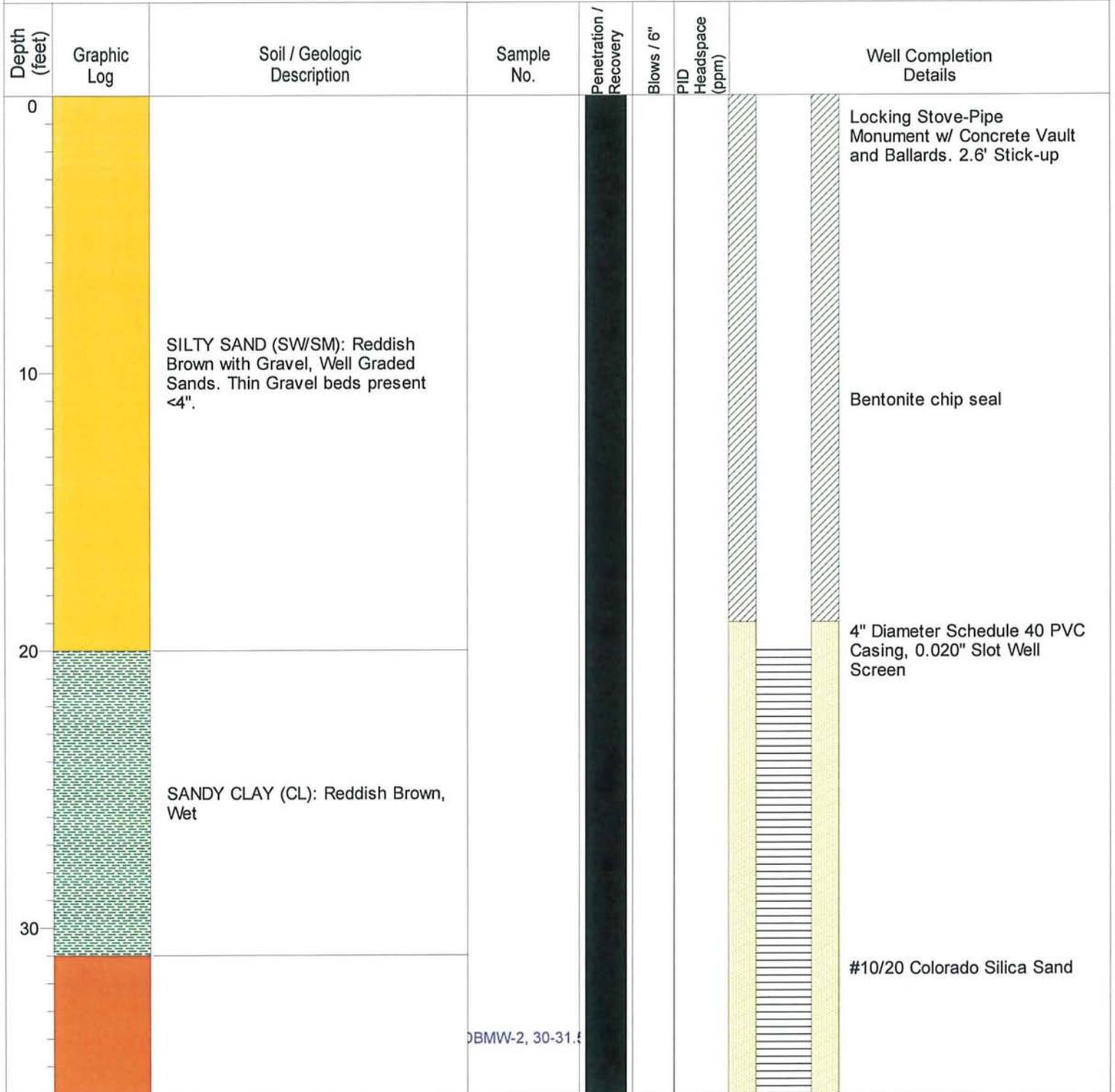
<i>Project Name:</i>	BRC Aquifer Testing	<i>Start Date:</i>	6/02/07	<i>Logged By:</i>	Davis
<i>Site Location:</i>	Henderson, NV	<i>End Date:</i>	6/02/07	<i>Checked By:</i>	G. Carter
<i>Project No:</i>	83173	<i>Total Hole Depth (ft):</i>	45	<i>Permit No.:</i>	
<i>Client:</i>	BRC	<i>Hole Diameter (in):</i>	8		
<i>Drilling Company:</i>	Boart Longyear	<i>Well Diameter (in):</i>	4		
<i>Drill Rig Type:</i>	Boart Longyear	<i>Water Level (Initial, Ft):</i>	23		
<i>Drilling Method:</i>	Roto-Sonic	<i>Screen Length (ft):</i>	20 - 45		
<i>Sampling Method:</i>	Continuous Core	<i>Ground Surface Elev.:</i>	UNK		

Depth (feet)	Graphic Log	Soil / Geologic Description	Sample No.	Penetration / Recovery	Blows / 6"	PID Headspace (ppm)	Well Completion Details
40		SILTY CLAY (CL): Pale Yellow High Plastic Clay					
		SILT (ML): Brown Silt with Sand and Clay					
		SILTY CLAY (CL): Pale Yellow High Plastic Clay					

Project Name: BRC Aquifer Testing
Site Location: Henderson, NV
Project No: 83173
Client: BRC
Drilling Company: Boart Longyear
Drill Rig Type: B.L. - GP24-300RS
Drilling Method: Roto-Sonic
Sampling Method: Continuous Core

Start Date: 6/18/07
End Date: 6/18/07
Total Hole Depth (ft): 50
Hole Diameter (in): 8
Well Diameter (in): 4
Water Level (Initial, Ft): 21
Screen Length (ft): 20-50
Ground Surface Elev.: 1625.16 feet NAVD88

Logged By: Davis
Checked By: G. Carter
Permit No.:



<i>Project Name:</i> BRC Aquifer Testing	<i>Start Date:</i> 6/18/07	<i>Logged By:</i> Davis
<i>Site Location:</i> Henderson, NV	<i>End Date:</i> 6/18/07	<i>Checked By:</i> G. Carter
<i>Project No:</i> 83173	<i>Total Hole Depth (ft):</i> 50	<i>Permit No.:</i>
<i>Client:</i> BRC	<i>Hole Diameter (in):</i> 8	
<i>Drilling Company:</i> Boart Longyear	<i>Well Diameter (in):</i> 4	
<i>Drill Rig Type:</i> B.L. - GP24-300RS	<i>Water Level (Initial, Ft):</i> 21	
<i>Drilling Method:</i> Roto-Sonic	<i>Screen Length (ft):</i> 20-50	
<i>Sampling Method:</i> Continuous Core	<i>Ground Surface Elev.:</i> 1625.16 feet NAVD88	

Depth (feet)	Graphic Log	Soil / Geologic Description	Sample No.	Penetration / Recovery	Blows / 6"	PID	Headspace (ppm)	Well Completion Details
40		CLAYEY SAND/SANDY CLAY (SC/CL): Reddish Brown, Wet						4" Diameter, 0.020" Slot
50		MUDDY CREEK FORMATION (TMC): Silty Clayey Sandstone, Light Reddish Brown to Light Greenish Gray	DBMW-2, 50-51.5					Stop sampling at 50 feet bgs.

Project Name: BRC Aquifer Testing
Site Location: Henderson, NV
Project No: 83173
Client: BRC
Drilling Company: Boart Longyear
Drill Rig Type: B.L. - GP24-300RS
Drilling Method: Roto-Sonic
Sampling Method: Continuous Core

Start Date: 7/23/07
End Date: 7/23/07
Total Hole Depth (ft): 40
Hole Diameter (in): 8
Well Diameter (in): 4
Water Level (Initial, Ft): 11
Screen Length (ft): 10-30
Ground Surface Elev.: 1602.98 feet NAVD88

Logged By: Davis
Checked By: G. Carter
Permit No.:

Depth (feet)	Graphic Log	Soil / Geologic Description	Sample No.	Penetration / Recovery	Blows / 6"	PID Headspace (ppm)	Well Completion Details
0		FILL: Road Fill					Locking Stove-Pipe Monument w/ Concrete Vault and Ballards. 3' Stick-up
0-10		WELL GRADED SAND WITH GRAVEL (SW): Reddish Brown (5YR 4/4), Trace Silt, 75% fine to medium grained sand, 20% gravel <2" subrounded and volcanic, 5% silt, Dry, Non plastic					Bentonite chip seal 4" Diameter Schedule 40 PVC Casing, 0.020" Slot Well Screen
10-20		SILTY SAND WITH GRAVEL (SM): Reddish Brown (5YR 4/4), 65% fine to medium sand, 15% silt, 15% gravel <2" subangular to subrounded/volcanic, trace clay, Wet, Low to medium plasticity, Sandy Facies of Muddy Creek Fm.	DBMW-4, 15-16.5				#10/20 Colorado Silica Sand
20-30		CLAYEY SILT (ML): Muddy Creek Formation, Brown (7.5YR 4/4), Trace gypsum crystals, 75% silt, 25% clay, <2% gypsum crystals up to 2", Wet, Medium plasticity					#10/20 Colorado Silica Sand

KLEINFELDER

6380 Polaris Avenue
Las Vegas, Nevada 89118
(702) 736-2936 Fax (702) 361-9094

DRILLING LOG Well No. DBMW-4

Project Name: BRC Aquifer Testing
Site Location: Henderson, NV
Project No.: 83173
Client: BRC
Drilling Company: Boart Longyear
Drill Rig Type: B.L. - GP24-300RS
Drilling Method: Roto-Sonic
Sampling Method: Continuous Core

Start Date: 7/23/07
End Date: 7/23/07
Total Hole Depth (ft): 40
Hole Diameter (in): 8
Well Diameter (in): 4
Water Level (Initial, Ft): 11
Screen Length (ft): 10-30
Ground Surface Elev.: 1602.98 feet NAVD88

Logged By: Davis
Checked By: G. Carter
Permit No.:

Depth (feet)	Graphic Log	Soil / Geologic Description	Sample No.	Penetration / Recovery	Blows / 6"	PID Headspace (ppm)	Well Completion Details
40			DBMW-4, 40				4" Diameter, 0.020" Slot Stop sampling at 40 feet bgs.

Project Name: BRC Aquifer Testing
Site Location: Henderson, NV
Project No.: 83173
Client: BRC
Drilling Company: Boart Longyear
Drill Rig Type: B.L. - GP24-300RS
Drilling Method: Roto-sonic
Sampling Method: Continuous Core

Start Date: 6/23/07
End Date: 6/24/07
Total Hole Depth (ft): 70
Hole Diameter (in): 8
Well Diameter (in): 4
Water Level (Initial, Ft): 57
Screen Length (ft): 47.5-67.5
Ground Surface Elev.: 1628.95 feet NAVD88

Logged By: Davis
Checked By: G. Carter
Permit No.:

Depth (feet)	Graphic Log	Soil / Geologic Description	Sample No.	Penetration / Recovery	Blows / 6"	PID Headspace (ppm)	Well Completion Details
0		SILTY GRAVEL (GM): Reddish Brown with Sand, 60-80% Fine to Medium Grained Gravel, Fine to Medium Grained Sand, Dry, Non Plastic					Locking Stove-Pipe Monument w/ Concrete Vault and Ballards. 3' Stick-up
		SILTY SAND (SM): Reddish Brown with Gravel, 60-75% Fine to Medium Grained Sand, Dry, Very Low Plasticity					
10		WELL GRADED GRAVEL (GM): With Silt and Sand, 50-60% Medium to Coarse Gravel, 30-40% Sand, Non Plastic					
		WELL GRADED SILTY SAND (SM): Reddish Brown with Gravel, 60-80% Fine to Medium Grained Sand					
20		WELL GRADED GRAVEL (GM): Reddish Brown with Silt and Sand, 50-80% Gravel, Trace Coarse Gravel and Cobbles <4", Non to Very Low Plasticity, Poorly Defined Bedding 2-6" Thick					
		WELL GRADED SILTY SAND (SM): Reddish Brown with Gravel, 60-80% Sand, Dry, Very Low Plasticity					
		WELL GRADED GRAVEL (GM): Reddish Brown with Silt and Sand, 50-80% Gravel, Trace Coarse Gravel and Cobbles <4", Non to Very Low Plasticity, Poorly Defined Bedding 2-6" Thick					
		WELL GRADED SILTY SAND (SM): Reddish Brown with Gravel, 60-80% Sand, Dry, Very Low Plasticity					
30		WELL GRADED GRAVEL (GM): Reddish Brown with Silt and Sand, 50-80% Gravel, Trace Coarse Gravel and Cobbles <4", Non to Very Low Plasticity, Poorly Defined Bedding 2-6" Thick, Sands and Gravels Sub Angular to Sub Rounded and Volcanic Derived					
		WELL GRADED SILTY SAND (SM): Reddish Brown with Gravel, 60-80% Sand, Dry, Very Low Plasticity, Sand					
							Bentonite chip seal

<i>Project Name:</i> BRC Aquifer Testing	<i>Start Date:</i> 6/23/07	<i>Logged By:</i> Davis
<i>Site Location:</i> Henderson, NV	<i>End Date:</i> 6/24/07	<i>Checked By:</i> G. Carter
<i>Project No:</i> 83173	<i>Total Hole Depth (ft):</i> 70	<i>Permit No.:</i>
<i>Client:</i> BRC	<i>Hole Diameter (in):</i> 8	
<i>Drilling Company:</i> Boart Longyear	<i>Well Diameter (in):</i> 4	
<i>Drill Rig Type:</i> B.L. - GP24-300RS	<i>Water Level (Initial, Ft):</i> 57	
<i>Drilling Method:</i> Roto-sonic	<i>Screen Length (ft):</i> 47.5-67.5	
<i>Sampling Method:</i> Continuous Core	<i>Ground Surface Elev.:</i> 1628.95 feet NAVD88	

Depth (feet)	Graphic Log	Soil / Geologic Description	Sample No.	Penetration / Recovery	Blows / 6"	PID	Headspace (ppm)	Well Completion Details
40		and Gravel Subangular to Subrounded and Volcanic Derived WELL GRADED GRAVEL (GM): Reddish Brown with Silt and Sand, 50-80% Gravel, Trace Coarse Gravel and Cobbles <4", Non to Very Low Plasticity, Poorly Defined Bedding 2-6" Thick						
		WELL GRADED SILTY SAND (SM): Reddish Brown with Gravel, 60-80% Sand, Dry, Very Low Plasticity, Sand and Gravel Subangular to Subrounded and Volcanic Derived						
50		CLAY (CL): Light Grayish Green Trace Silt, Moderate to High Plasticity, 15-30% Fine Gypsum <1/8" SANDY CLAY (CL): Mottled Reddish Brown and Pale Greenish Gray Trace Silt, Moderate to High Plasticity, 15-30% Fine Gypsum <1/8", Slightly Moist MUDDY CREEK FORMATION (TMC): Light Brown/Reddish Brown Silty Clayey Sand, 60-80% Fine Sand, Slightly Moist, Moderate to High Plasticity. Trace Fine Grained Gypsum Present.						Bentonite chip seal 4" Diameter Schedule 40 PVC Casing 4" Diameter Schedule 40 PVC Casing, 0.020" Slot Well Screen
60		Silty Sand with Clay, Mottled Reddish Brown and Pale Greenish Gray, 15-40% Fine Grained Gypsum <1/4" Present, Moist to Wet	DBMW-8, 62					#10/20 Colorado Silica Sand
		Silt with Clay, Trace Fine Sand, Light Greenish Gray, 80-90% Fines, 3-8% Fine Grained Gypsum, Low Plasticity.						#10/20 Colorado Silica Sand
70		Silty Sand with Clay, Light Brown/Reddish Brown, Low Plasticity, 15-25% Fine Grained Gypsum	DBMW-8, 70-71.5					4" Diameter, 0.020" Slot Stop sampling at 70 feet bgs.

<i>Project Name:</i> BRC Aquifer Testing	<i>Start Date:</i> 6/25/07	<i>Logged By:</i> Davis
<i>Site Location:</i> Henderson, NV	<i>End Date:</i> 6/25/07	<i>Checked By:</i> G. Carter
<i>Project No:</i> 83173	<i>Total Hole Depth (ft):</i> 75	<i>Permit No.:</i>
<i>Client:</i> BRC	<i>Hole Diameter (in):</i> 8	
<i>Drilling Company:</i> Boart Longyear	<i>Well Diameter (in):</i> 4	
<i>Drill Rig Type:</i> B.L. GP24-300RS	<i>Water Level (Initial, Ft):</i> 62	
<i>Drilling Method:</i> Roto-Sonic	<i>Screen Length (ft):</i> 54-74	
<i>Sampling Method:</i> Continuous Core	<i>Ground Surface Elev.:</i> 1656.83 feet NAVD88	

Depth (feet)	Graphic Log	Soil / Geologic Description	Sample No.	Penetration / Recovery	Blows / 6"	PID Headspace (ppm)	Well Completion Details
0		SILTY SAND (SM): Reddish Brown with Gravel, Dry, Non Plastic					Locking Stove-Pipe Monument w/ Concrete Vault and Ballards. 3' Stick-up
		GRAVEL (GW): With Silt and Sand, 60-80% Fine Grained Gravel					
		SILTY SAND (SM): With Gravel, 60-80% Fine to Coarse Grained Sands, Non to Low Plasticity					Bentonite chip seal
		GRAVEL (GW): Reddish Brown with Silt and Sand					
10		SILTY SAND (SM): With Gravel, 60-80% Fine to Coarse Grained Sand, Non to Low Plasticity					
		GRAVEL (GW): With Silt and Sand					
		SAND (SW/SM): Reddish Brown with Silt and Gravel, 60-75% Medium to Coarse Grained Sand, 10-12% Fine Gravel, Dry, Non Plastic					
		SILTY SAND (SM): Reddish Brown with Gravel, 60-80% Fine to Medium Grained Sands, Non to Low Plasticity.					
		GRAVEL (GW): With Silt and Sand, 50-75% Fine to Medium Gravel					
20		SILTY SAND (SM): With Gravel, 60-80% Fine to Medium Grained Sand, 8-15% Fine to Coarse Gravel <2", Dry, Non to Low Plasticity					
		GRAVEL (GW): Reddish Brown with Silt and Sand, 8-12% Coarse Gravel <2", 40-50% Fine Gravel					
30		SILTY SAND (SM): Reddish Brown with Trace Coarse Gravel 60-80%					

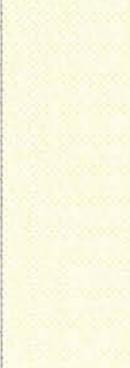
<i>Project Name:</i> BRC Aquifer Testing	<i>Start Date:</i> 6/25/07	<i>Logged By:</i> Davis
<i>Site Location:</i> Henderson, NV	<i>End Date:</i> 6/25/07	<i>Checked By:</i> G. Carter
<i>Project No.:</i> 83173	<i>Total Hole Depth (ft):</i> 75	<i>Permit No.:</i>
<i>Client:</i> BRC	<i>Hole Diameter (in):</i> 8	
<i>Drilling Company:</i> Boart Longyear	<i>Well Diameter (in):</i> 4	
<i>Drill Rig Type:</i> B.L. GP24-300RS	<i>Water Level (Initial, Ft):</i> 62	
<i>Drilling Method:</i> Roto-Sonic	<i>Screen Length (ft):</i> 54-74	
<i>Sampling Method:</i> Continuous Core	<i>Ground Surface Elev.:</i> 1656.83 feet NAVD88	

Depth (feet)	Graphic Log	Soil / Geologic Description	Sample No.	Penetration / Recovery	Blows / 6"	PID Headspace (ppm)	Well Completion Details
40		with trace coarse gravel, 60-80% Fine to Coarse Sand, Dry, Non to Low Plasticity					4" Diameter Schedule 40 PVC Casing
45		MUDDY CREEK FORMATION (TMC): Silty Clayey Sand, Light Yellowish Green, Trace Gravel, 60-80% Fine Sand, 20-40% Fines, Slightly Moist, Low Plasticity					
50		Reddish Brown, 2-5% Fine Grained Gypsum, Trace Crystals <1"					
55		Light Yellowish Green					
60		Reddish Brown, 8-15% Fine Grained Gypsum in Thin Beds <6"					
65		Light Yellowish Green, 5-12% Gypsum, Thin Beds					4" Diameter Schedule 40 PVC Casing, 0.020" Slot Well Screen
70		Reddish Brown/Brown, Moist, Low Plasticity					#10/20 Colorado Silica Sand
75		Light Yellowish Green, Wet					#10/20 Colorado Silica Sand
80		Brown/Reddish Brown, 60-80% Fine Sand, 1-5% Fine Grained Gypsum, Low Plasticity	DBMW-9, 65-66.5				4" Diameter, 0.020" Slot

<i>Project Name:</i>	BRC Aquifer Testing	<i>Start Date:</i>	6/25/07	<i>Logged By:</i>	Davis
<i>Site Location:</i>	Henderson, NV	<i>End Date:</i>	6/25/07	<i>Checked By:</i>	G. Carter
<i>Project No:</i>	83173	<i>Total Hole Depth (ft):</i>	75	<i>Permit No.:</i>	
<i>Client:</i>	BRC	<i>Hole Diameter (in):</i>	8		
<i>Drilling Company:</i>	Boart Longyear	<i>Well Diameter (in):</i>	4		
<i>Drill Rig Type:</i>	B.L. GP24-300RS	<i>Water Level (Initial, Ft):</i>	62		
<i>Drilling Method:</i>	Roto-Sonic	<i>Screen Length (ft):</i>	54-74		
<i>Sampling Method:</i>	Continuous Core	<i>Ground Surface Elev.:</i>	1656.83 feet NAVD88		

Depth (feet)	Graphic Log	Soil / Geologic Description	Sample No.	Penetration / Recovery	Blows / 6"	PID Headspace (ppm)	Well Completion Details
		Mottled Brown and Yellowish Green	DBMW-9, 75-76.5				 Stop sampling at 75 feet bgs.

<i>Project Name:</i> BRC Aquifer Testing	<i>Start Date:</i> 7/19/07	<i>Logged By:</i> Davis
<i>Site Location:</i> Henderson, NV	<i>End Date:</i> 7/22/07	<i>Checked By:</i> G. Carter
<i>Project No:</i> 83173	<i>Total Hole Depth (ft):</i> 110	<i>Permit No.:</i>
<i>Client:</i> BRC	<i>Hole Diameter (in):</i> 8	
<i>Drilling Company:</i> Boart Longyear	<i>Well Diameter (in):</i> 4	
<i>Drill Rig Type:</i> B.L. - GP24-300RS	<i>Water Level (Initial, Ft):</i> 94	
<i>Drilling Method:</i> Roto-Sonic	<i>Screen Length (ft):</i> 85-110	
<i>Sampling Method:</i> Continuous Core	<i>Ground Surface Elev.:</i> 1691.31 feet NAVD88	

Depth (feet)	Graphic Log	Soil / Geologic Description	Sample No.	Penetration / Recovery	Blows / 6"	PID	Headspace (ppm)	Well Completion Details
0		WELL GRADED SAND (SW): Brown (7.5YR 5/4) with Gravel, Trace Silt, 50% Fine to Medium Sand, 15% Gravel Subangular to Subrounded <2" (Volcanic), Dry, Non Plastic						Locking Stove-Pipe Monument w/ Concrete Vault and Ballards. 3' Stick-up
10		INTERBEDDED WELL GRADED SAND (SW): Brown (7.5YR 5/4), Fine and Coarse Grained Sand with Gravel Beds <6" Thick, 80% Fine to Medium Grained Sand, Trace Medium to Coarse Sand, 15% Gravel, Trace Silt, Dry, Non Plastic						Bentonite chip seal
		WELL GRADED SANDY GRAVEL (GW): Brown (7.5YR 5/4), 60% Subangular/Subrounded Volcanic <2" Gravel, 40% Fine to Medium Sand, Dry, Non Plastic						
20		INTERBEDDED WELL GRADED SAND (SW): Brown (7.5YR 5/4), Fine and Medium Grained Sand, Trace Gravel and Silt, Beds <1' consist of 90% Sand, 5% Gravel Subrounded (Volcanic), 5% Silt, Dry, Non Plastic						
		WELL GRADED SANDY GRAVEL (GW): Brown (7.5YR 5/4), 60% Gravel <2" Subangular/Subrounded Volcanics, 40% Fine to Medium Sand, Dry, Non Plastic						
30		WELL GRADED SILTY SAND (SM): Brown (7.5YR 4/3), Trace Gravel, 75% Fine to Medium Sand, 20% Silt, 5% Gravel <1" Subrounded Volcanics, Dry, Non to Low Plasticity						Bentonite chip seal

Project Name: BRC Aquifer Testing
Site Location: Henderson, NV
Project No.: 83173
Client: BRC
Drilling Company: Boart Longyear
Drill Rig Type: B.L. - GP24-300RS
Drilling Method: Roto-Sonic
Sampling Method: Continuous Core

Start Date: 7/19/07
End Date: 7/22/07
Total Hole Depth (ft): 110
Hole Diameter (in): 8
Well Diameter (in): 4
Water Level (Initial, Ft): 94
Screen Length (ft): 85-110
Ground Surface Elev.: 1691.31 feet NAVD88

Logged By: Davis
Checked By: G. Carter
Permit No.:

Depth (feet)	Graphic Log	Soil / Geologic Description	Sample No.	Penetration / Recovery	Blows / 6"	PID Headspace (ppm)	Well Completion Details
40							
		WELL GRADED SAND (SW): Brown (7.5YR 4/3), Trace Gravel, 95% Fine to Coarse Sand; 40% Coarse Sand, 5% Gravel <1/2", Rounded Volcanics, Dry (Zone of Moisture 2" Thick at 46.8'), Non Plastic					
50		SILTY SAND (SM): Brown (7.5YR 5/4), Trace Gravel, 75% Fine to Medium Sand, 20% Silt, 5% Gravel, Dry, Low Plasticity					
		With Gravel, 70% Fine to Medium Sand, 15% Silt, 15% Gravel <2", Subangular/Subrounded (Volcanic), Dry, Low Plasticity					
60							
70		Reddish Brown (5YR 5/4), Trace Clay, 75% Fine to Medium Grained Sand, 20% Silt, 5% Clay, Moderate					Bentonite chip seal 4" Diameter Schedule 40 PVC Casing 4" Diameter Schedule 40 PVC Casing

Project Name: BRC Aquifer Testing
Site Location: Henderson, NV
Project No.: 83173
Client: BRC
Drilling Company: Boart Longyear
Drill Rig Type: B.L. - GP24-300RS
Drilling Method: Roto-Sonic
Sampling Method: Continuous Core

Start Date: 7/19/07
End Date: 7/22/07
Total Hole Depth (ft): 110
Hole Diameter (in): 8
Well Diameter (in): 4
Water Level (Initial, Ft): 94
Screen Length (ft): 85-110
Ground Surface Elev.: 1691.31 feet NAVD88

Logged By: Davis
Checked By: G. Carter
Permit No.:

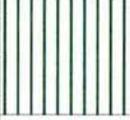
Depth (feet)	Graphic Log	Soil / Geologic Description	Sample No.	Penetration / Recovery	Blows / 6"	PID Headspace (ppm)	Well Completion Details
80		Plasticity. Fine Grained Gypsum Present from 70 to 84'.					
90		Light Brown (7.5YR 6/4), Increase in Sands, 80% Fine to Medium Sands, 15% Silt and 5% Clay, Moist					4" Diameter Schedule 40 PVC Casing, 0.020" Slot Well Screen
		CLAY (CL): Pale Yellow (5Y 8/3) with Silt, 85% Clay and 15% Silt, Wet, Medium to High Plasticity. Muddy Creek Formation					#10/20 Colorado Silica Sand
100		CLAYEY SILT (ML): Reddish Brown (5YR 4/4), 60% Silt and 40% Clay, Trace Fine Sand, Wet, Medium Plasticity. Muddy Creek Formation					4" Diameter, 0.020" Slot
		CLAY (CL): Pale Yellow (5Y 8/3) with Silt, 85% Clay and 15% Silt, Wet, Medium to High Plasticity. Muddy Creek Formation					
		CLAYEY SILT (ML): Reddish Brown (5YR 4/4), 60% Silt and 40% Clay, Trace Fine Sand, Wet, Medium					

DBMW-1

Project Name: BRC Aquifer Testing
Site Location: Henderson, NV
Project No.: 83173
Client: BRC
Drilling Company: Boart Longyear
Drill Rig Type: B.L. - GP24-300RS
Drilling Method: Roto-Sonic
Sampling Method: Continuous Core

Start Date: 7/19/07
End Date: 7/22/07
Total Hole Depth (ft): 110
Hole Diameter (in): 8
Well Diameter (in): 4
Water Level (Initial, Ft): 94
Screen Length (ft): 85-110
Ground Surface Elev.: 1691.31 feet NAVD88

Logged By: Davis
Checked By: G. Carter
Permit No.:

Depth (feet)	Graphic Log	Soil / Geologic Description	Sample No.	Penetration / Recovery	Blows / 6"	PID Headspace (ppm)	Well Completion Details
110		Plasticity. Muddy Creek Formation	DBMW-16, 110-				Stop sampling at 50 feet bgs.

Project Name: BRC Aquifer Testing
Site Location: Henderson, NV
Project No.: 83173
Client: BRC
Drilling Company: Boart Longyear
Drill Rig Type: B.L. - GP24-300RS
Drilling Method: Roto-Sonic
Sampling Method: Continuous Core

Start Date: 7/24/07
End Date: 7/24/07
Total Hole Depth (ft): 40
Hole Diameter (in): 8
Well Diameter (in): 4
Water Level (Initial, Ft): 18
Screen Length (ft): 15-40
Ground Surface Elev.: 1580.41 feet NAVD88

Logged By: Davis
Checked By: G. Carter
Permit No.:

Depth (feet)	Graphic Log	Soil / Geologic Description	Sample No.	Penetration / Recovery	Blows / 6"	PID Headspace (ppm)	Well Completion Details
0		SILT (ML): Light Brown (7.5YR 6/4), Trace fine sand, 95% silt, 5% fine sand, Dry, Non to low plasticity					Locking Stove-Pipe Monument w/ Concrete Vault and Ballards. 3' Stick-up
0-10		SILTY SAND (SM): Reddish Brown (2.5YR 4/4), 70% Fine sand, 20% Silt, 5% Fine gravel <1" subrounded/volcanic, Dry, Non to Low plasticity					Bentonite chip seal
10-18		Fine grained gypsum, Disseminated					4" Diameter Schedule 40 PVC Casing, 0.020" Slot Well Screen
18-27		Trace clay, Moist, Low to medium plasticity	DBMW-19, 20-2				#10/20 Colorado Silica Sand
27-30		CLAYEY SAND (SC): Brown (7.5YR 4/4), 70% Fine to medium sand, 20% clay, 5% gravel <1" subrounded/volcanic, Wet, Low plasticity					#10/20 Colorado Silica Sand
30-40		CLAY WITH SILT (CL): Pale Olive (5Y 6/3), 90% Clay, 10% Silt, Wet, High plasticity (Muddy Creek)					4" Diameter, 0.020" Slot

Project Name: BRC Aquifer Testing
Site Location: Henderson, NV
Project No.: 83173
Client: BRC
Drilling Company: Boart Longyear
Drill Rig Type: B.L. - GP24-300RS
Drilling Method: Roto-Sonic
Sampling Method: Continuous Core

Start Date: 7/24/07
End Date: 7/24/07
Total Hole Depth (ft): 40
Hole Diameter (in): 8
Well Diameter (in): 4
Water Level (Initial, Ft): 18
Screen Length (ft): 15-40
Ground Surface Elev.: 1580.41 feet NAVD88

Logged By: Davis
Checked By: G. Carter
Permit No.:

Depth (feet)	Graphic Log	Soil / Geologic Description	Sample No.	Penetration / Recovery	Blows / 6"	PID Headspace (ppm)	Well Completion Details
40		High plasticity, (Muddy Creek Formation)	DBMW-19, 40-				Stop sampling at 40 feet bgs.

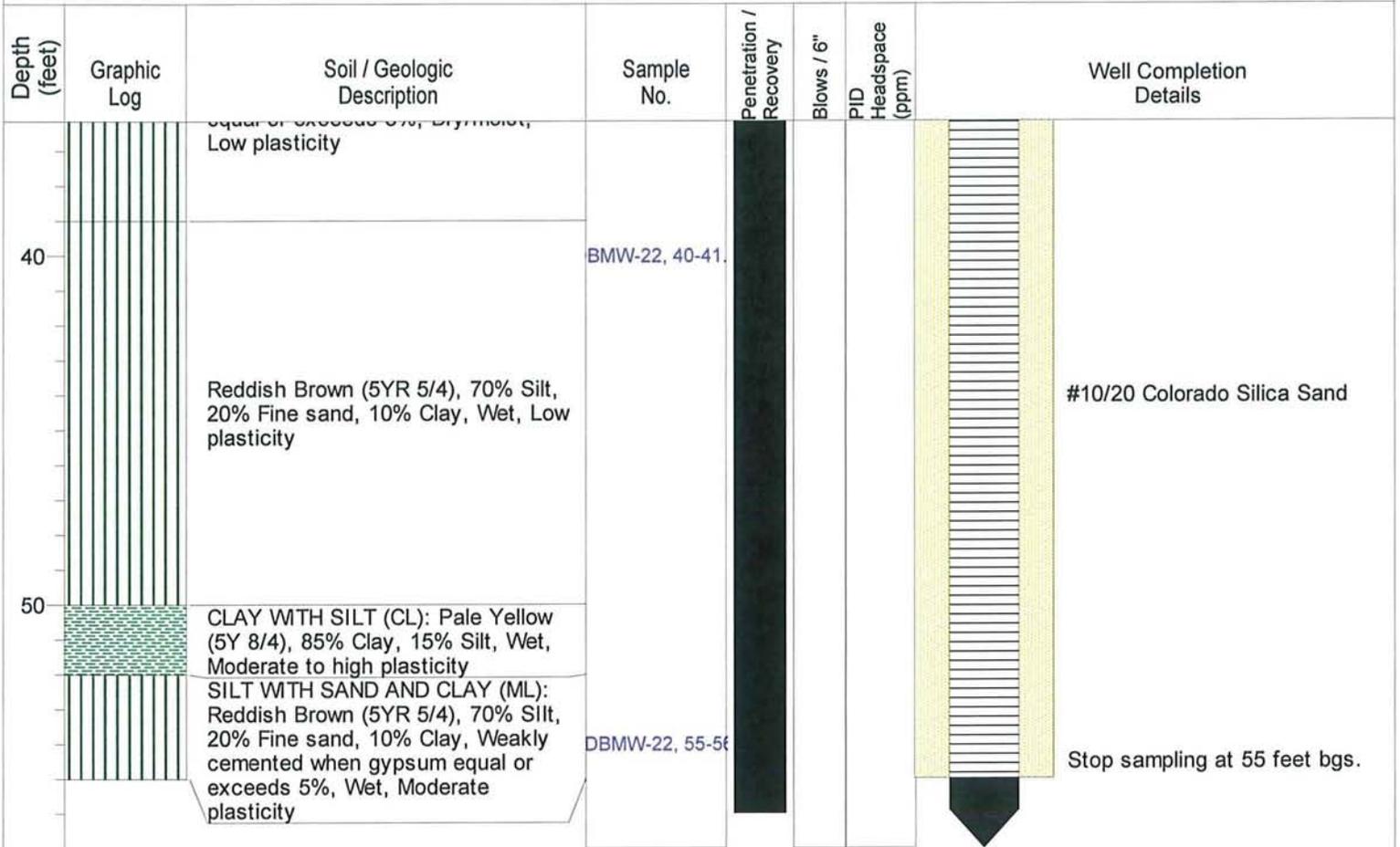
Project Name: BRC Aquifer Testing
Site Location: Henderson, NV
Project No.: 83173
Client: BRC
Drilling Company: Boart Longyear
Drill Rig Type: B.L. - GP24-300RS
Drilling Method: Roto-Sonic
Sampling Method: Continuous Core

Start Date: 8/13/07
End Date: 8/13/07
Total Hole Depth (ft): 55
Hole Diameter (in): 8
Well Diameter (in): 4
Water Level (Initial, Ft): 39
Screen Length (ft): 35-55
Ground Surface Elev.: UNK

Logged By: Davis
Checked By: G. Carter
Permit No.:

Depth (feet)	Graphic Log	Soil / Geologic Description	Sample No.	Penetration / Recovery	Blows / 6"	PID	Headspace (ppm)	Well Completion Details
0		COMPACTED FILL						Locking Stove-Pipe Monument w/ Concrete Vault and Ballards. 3' Stick-up
0-10		WELL GRADED SAND WITH GRAVEL (SW): Brown (7.5YR 5/3), 80% Fine to medium sand, 20% Gravel <2" Subangular to subrounded/volcanic, Dry, Non plastic POORLY GRADED SAND (SP): Brown (7.5YR 5/4), 100% Fine grained sand, Dry, Non plastic						
10-17		WELL GRADED SAND WITH GRAVEL (SW): Brown (7.5YR 5/3), 80% Fine to medium sand, 20% Gravel <2" Subangular to subrounded/volcanic, Dry, Non plastic						Bentonite chip seal
17-22		SILTY CLAY (CL): Pale Olive (5Y 6/3), 80% Clay, 20% Silt, Dry/moist, Moderate to high plasticity. Gypsiferous between 17 and 22 ft.						
22-35		Silty Lenses present, Mottled Light Reddish Brown (5YR 6/4) and Pale Olive (5Y 6/3), Dry/moist, Moderate to high plasticity						Bentonite chip seal 4" Diameter Schedule 40 PVC Casing 4" Diameter Schedule 40 PVC Casing, 0.020" Slot Well Screen
35-55		SILT WITH SAND AND CLAY (ML): Light Reddish Brown (5YR 6/3), 70% Silt, 20% Fine sand, 10% Clay, Weakly cemented when gypsum equal or exceeds 5%. Dry/moist						

Project Name: BRC Aquifer Testing	Start Date: 8/13/07	Logged By: Davis
Site Location: Henderson, NV	End Date: 8/13/07	Checked By: G. Carter
Project No: 83173	Total Hole Depth (ft): 55	Permit No.:
Client: BRC	Hole Diameter (in): 8	
Drilling Company: Boart Longyear	Well Diameter (in): 4	
Drill Rig Type: B.L. - GP24-300RS	Water Level (Initial, Ft): 39	
Drilling Method: Roto-Sonic	Screen Length (ft): 35-55	
Sampling Method: Continuous Core	Ground Surface Elev.: UNK	





Log of Boring No. BRC-SB-08-B

BMI Site - Hydrogeologic Characterization

Henderson, Nevada

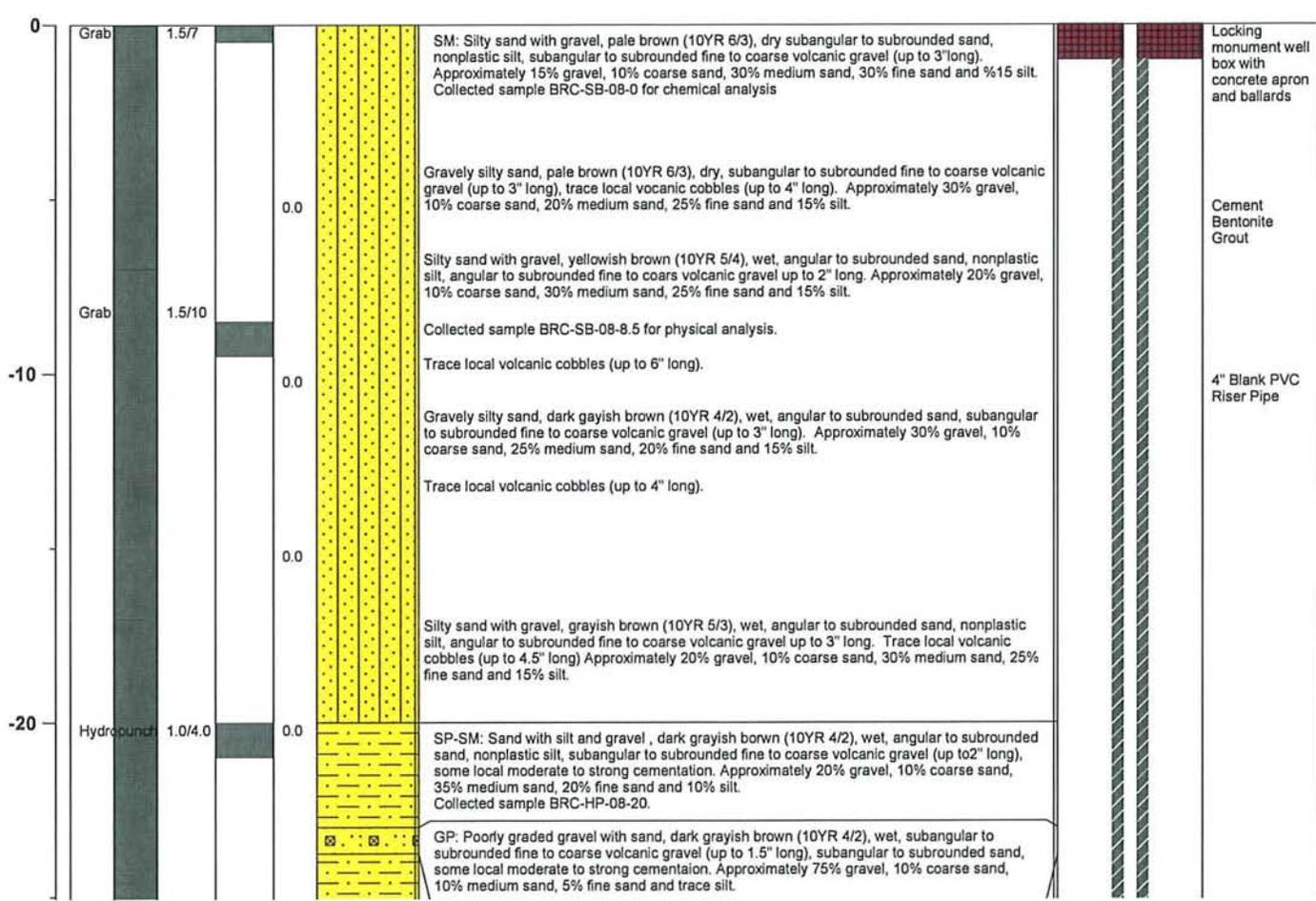
Drilling Method: Rotary Sonic
 Drilling Equipment: Rotary Sonic
 Drilling Contractor: Prosonic Corporation
 Driller: Gerald Sealy

Borehole Total Depth: 400 ft bgs
 Borehole Diameter: 9.5"
 Boring Location: Location 8 (Well ID: MCF-08B)
 Depth to Water (ft. bgs): NA

Sample Type: Rotosonic
 Sample Interval: Continuous
 Logged By: Adam Norris
 Date Started: 5/10/2004
 Date Completed: 5/20/2004

Monitoring Well Construction			
Type of Surface Seal:	Bentonite Grout	Screen Slot Size:	0.010 in
Blank Casing Type/Size:	4" Sch 80 PVC	Top of Screen (ft. bgs):	107.5 ft bgs
Screen Type/Size:	4" Sch 80 PVC	Bottom of Screen (ft. bgs):	137.5 ft bgs
Transition Sand Type:	N/A	Type of Sand Pack:	#2 x 12

Depth Elevation (MSLD)	Sample Type	Sample Interval Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
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Project No. 3850360

Log of Boring: BRC-SB-08-B

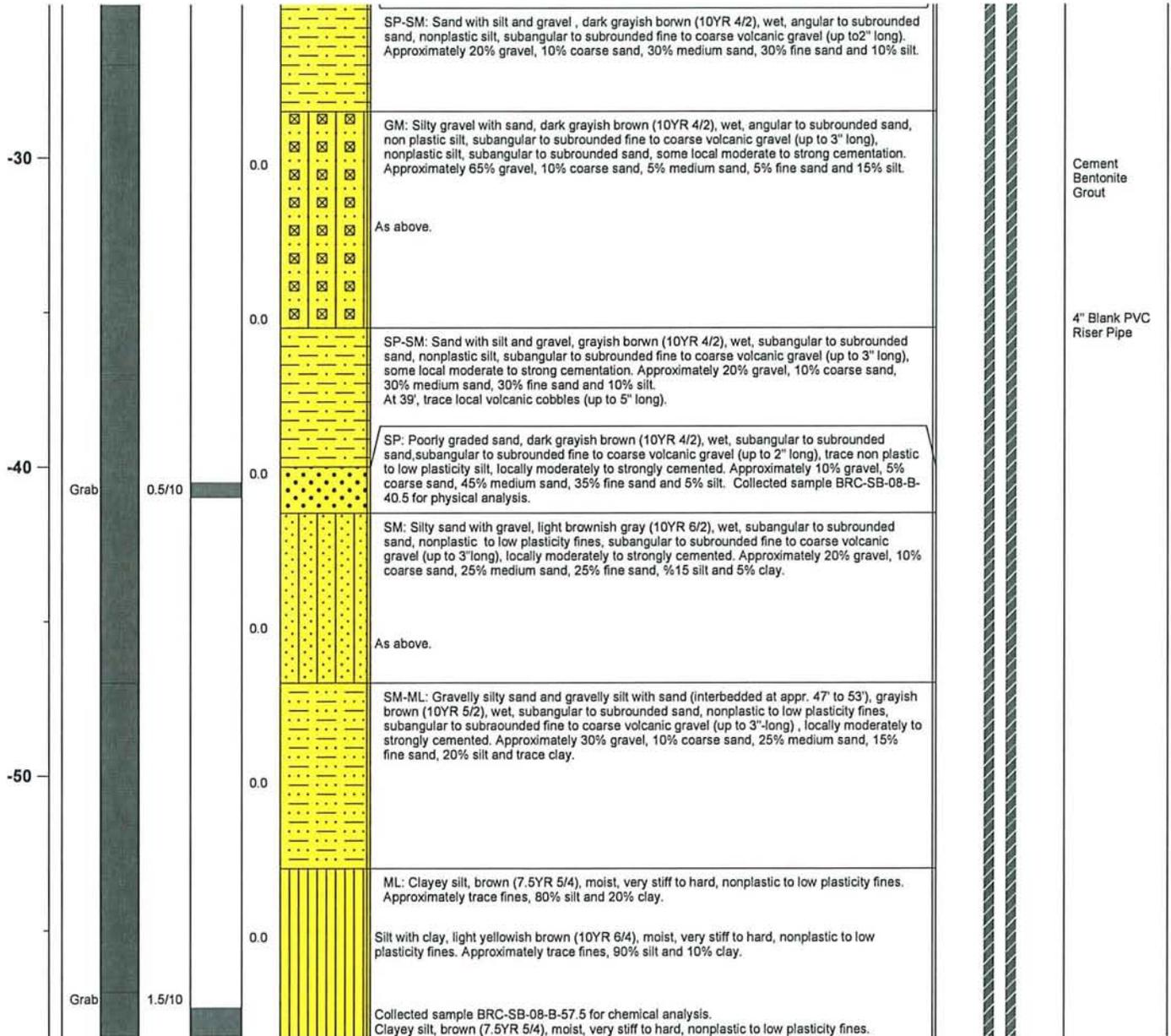


BMI Site - Hydrogeologic Characterization
Henderson, Nevada



Log of Boring No. BRC-SB-08-B

Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
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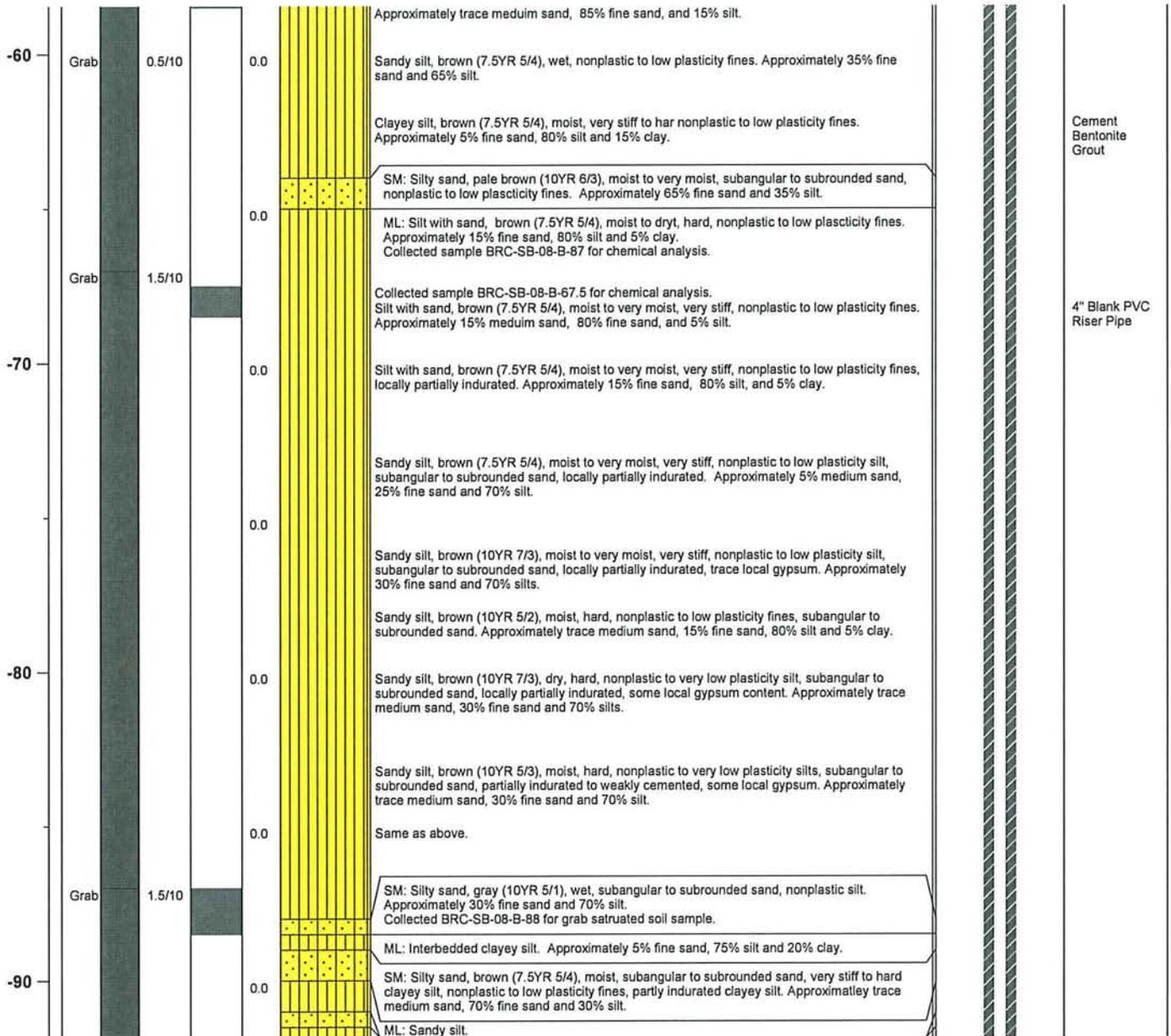


BMI Site - Hydrogeologic Characterization
Henderson, Nevada



Log of Boring No. BRC-SB-08-B

Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
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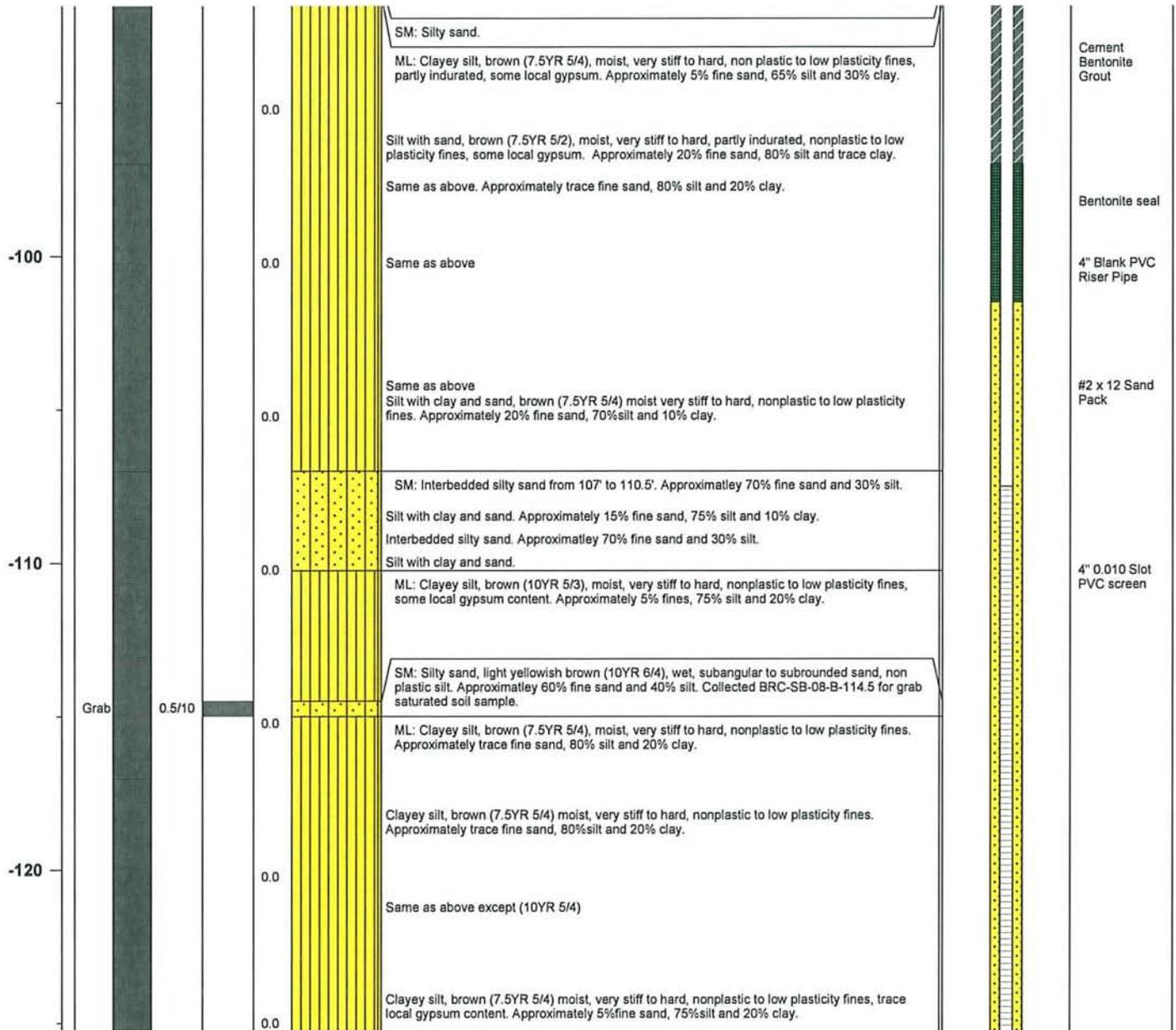
BMI Site - Hydrogeologic Characterization

Henderson, Nevada



Log of Boring No. BRC-SB-08-B

Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
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Project No. 3850360

Log of Boring: BRC-SB-08-B

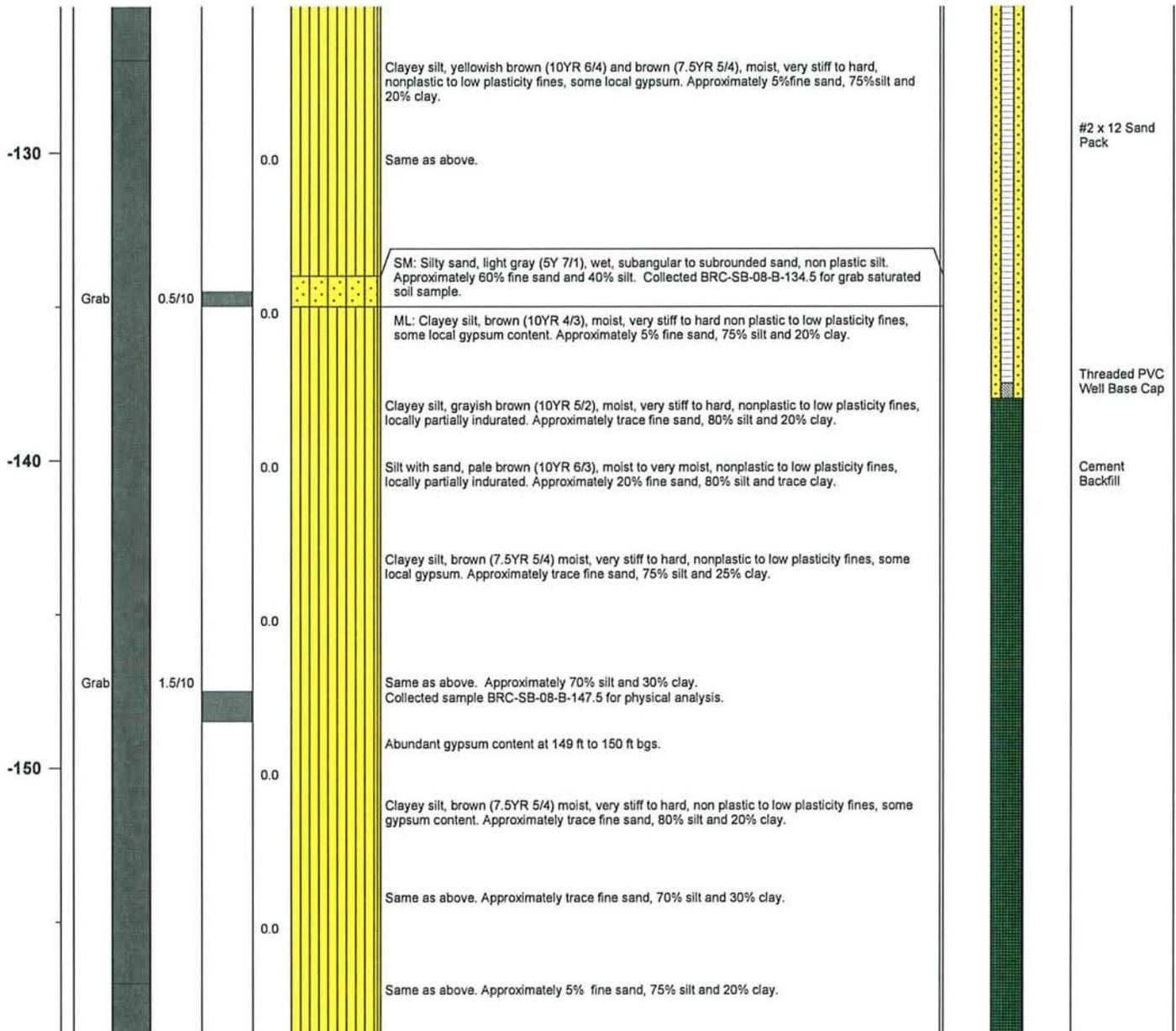


BMI Site - Hydrogeologic Characterization
Henderson, Nevada



Log of Boring No. BRC-SB-08-B

Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
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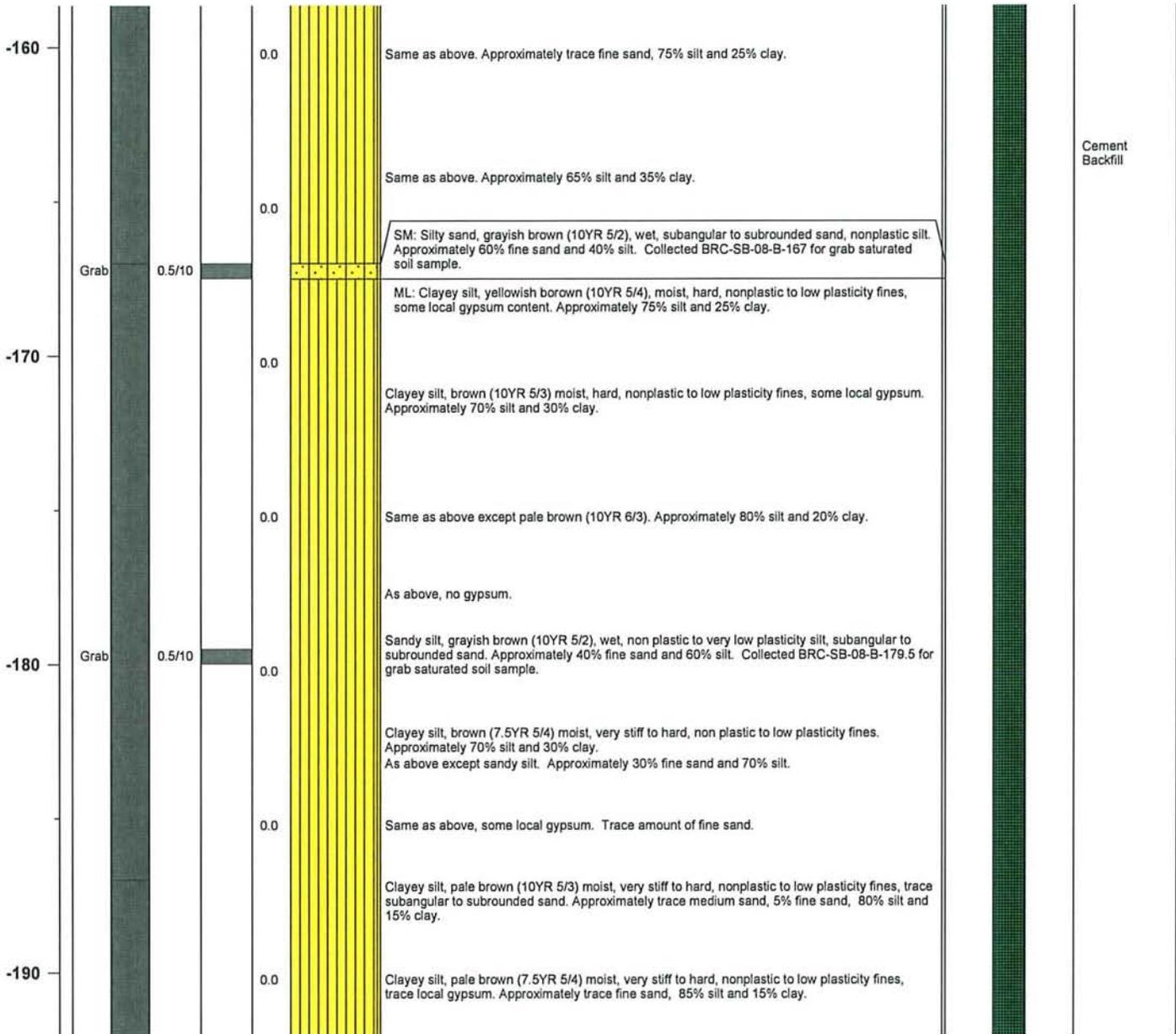


BMI Site - Hydrogeologic Characterization
Henderson, Nevada



Log of Boring No. BRC-SB-08-B

Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
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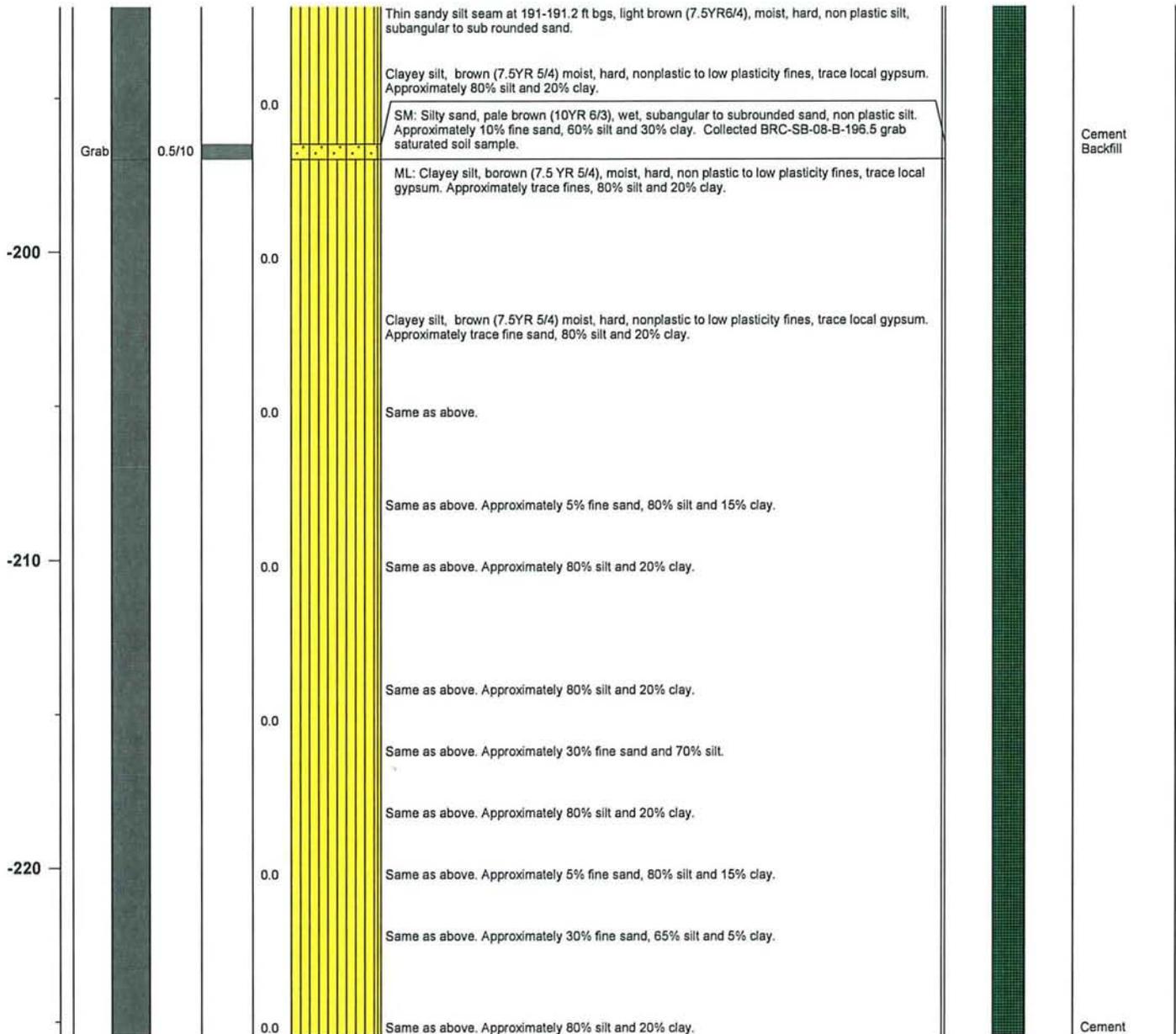


BMI Site - Hydrogeologic Characterization
Henderson, Nevada



Log of Boring No. BRC-SB-08-B

Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
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Project No. 3850360

Log of Boring: BRC-SB-08-B

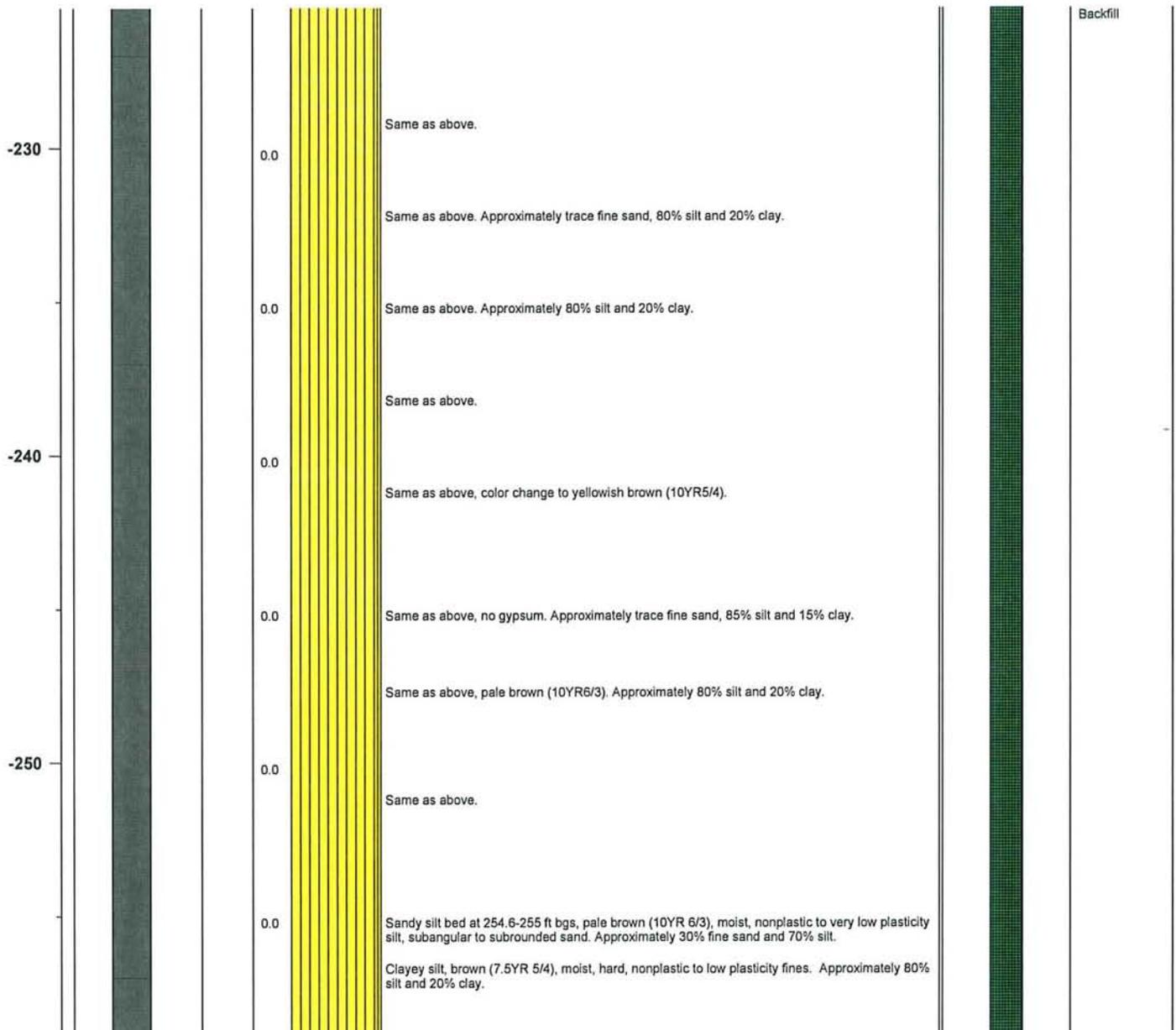


BMI Site - Hydrogeologic Characterization
Henderson, Nevada



Log of Boring No. BRC-SB-08-B

Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
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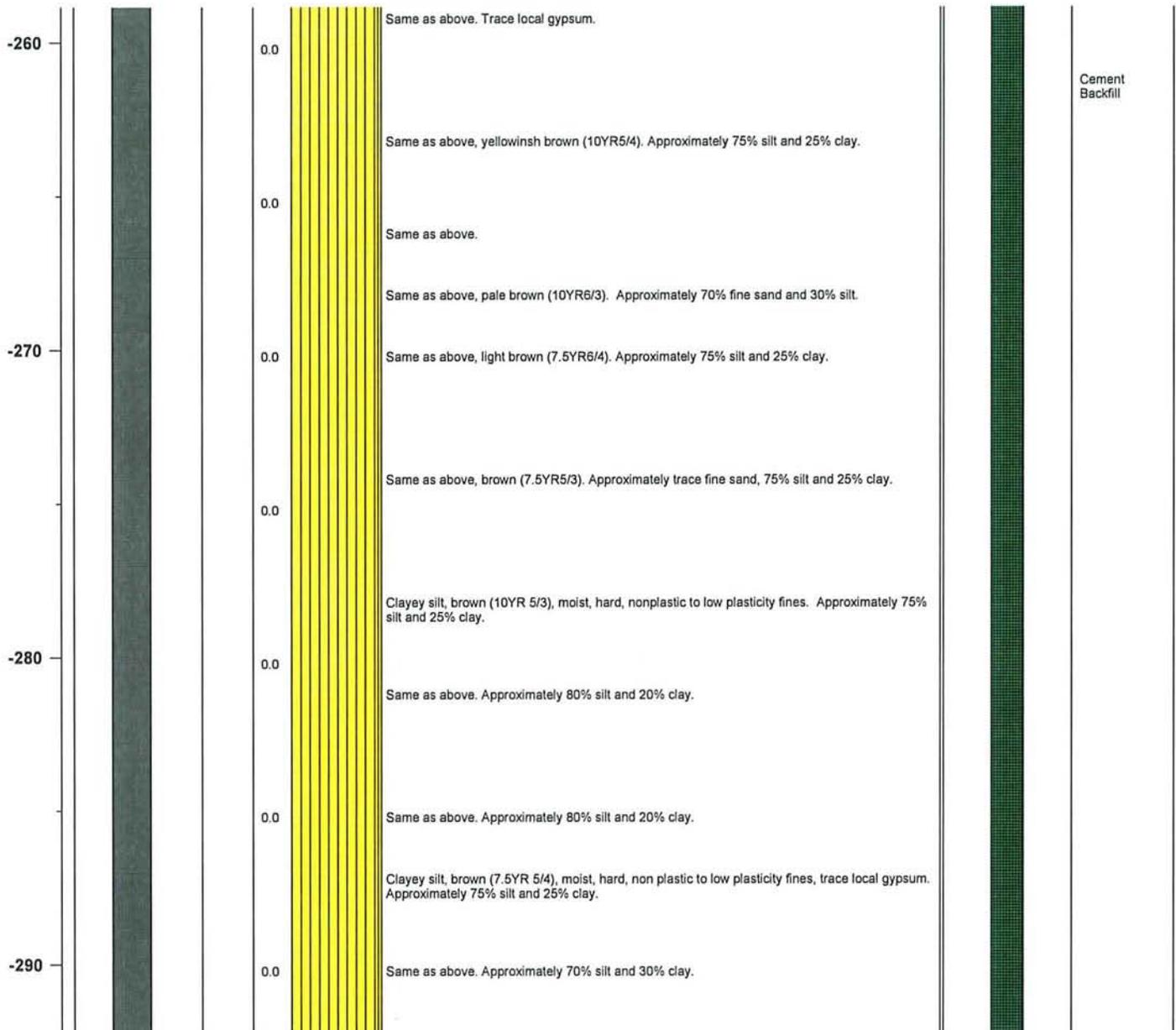


BMI Site - Hydrogeologic Characterization
Henderson, Nevada



Log of Boring No. BRC-SB-08-B

Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
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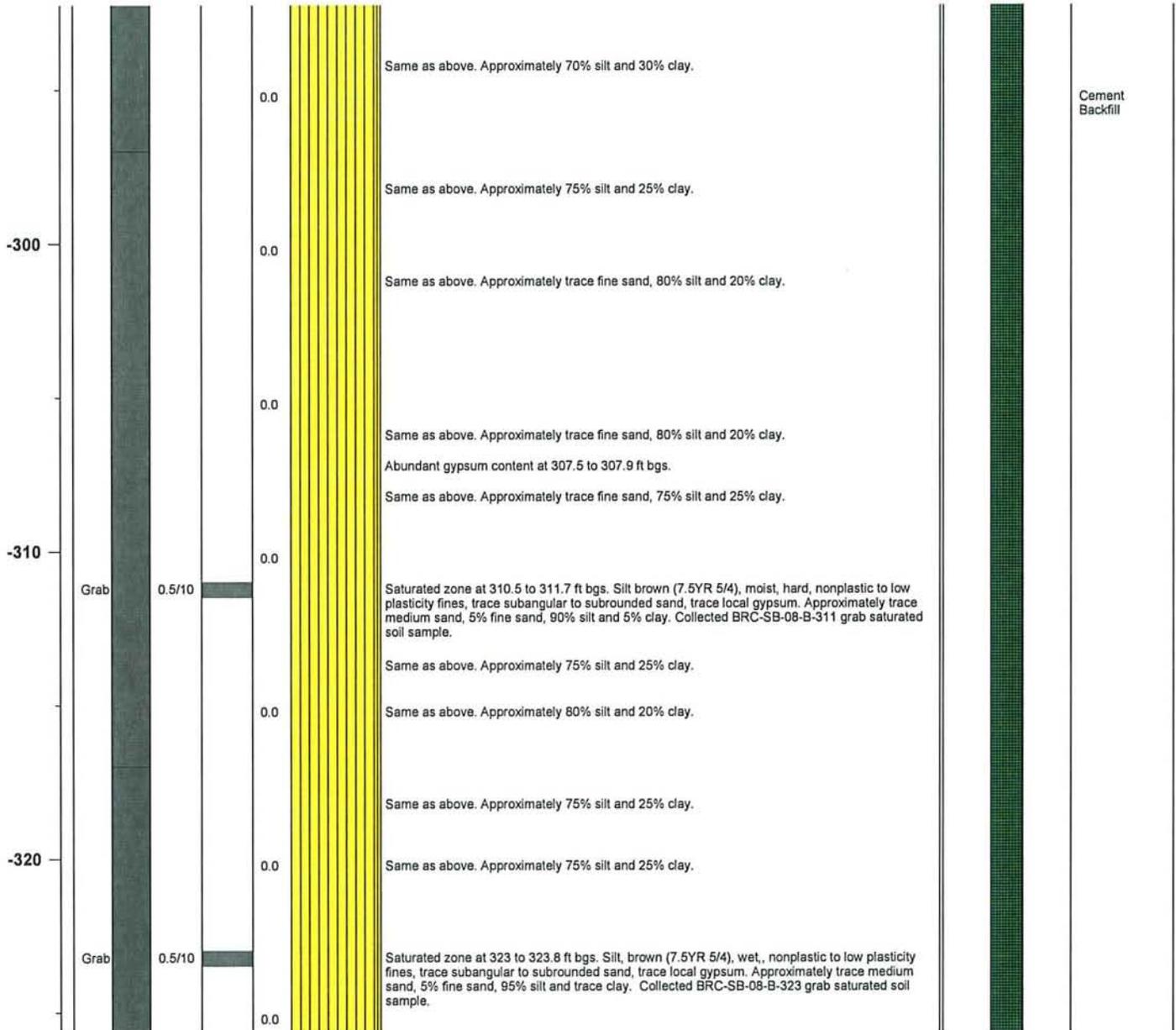


BMI Site - Hydrogeologic Characterization
Henderson, Nevada



Log of Boring No. BRC-SB-08-B

Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
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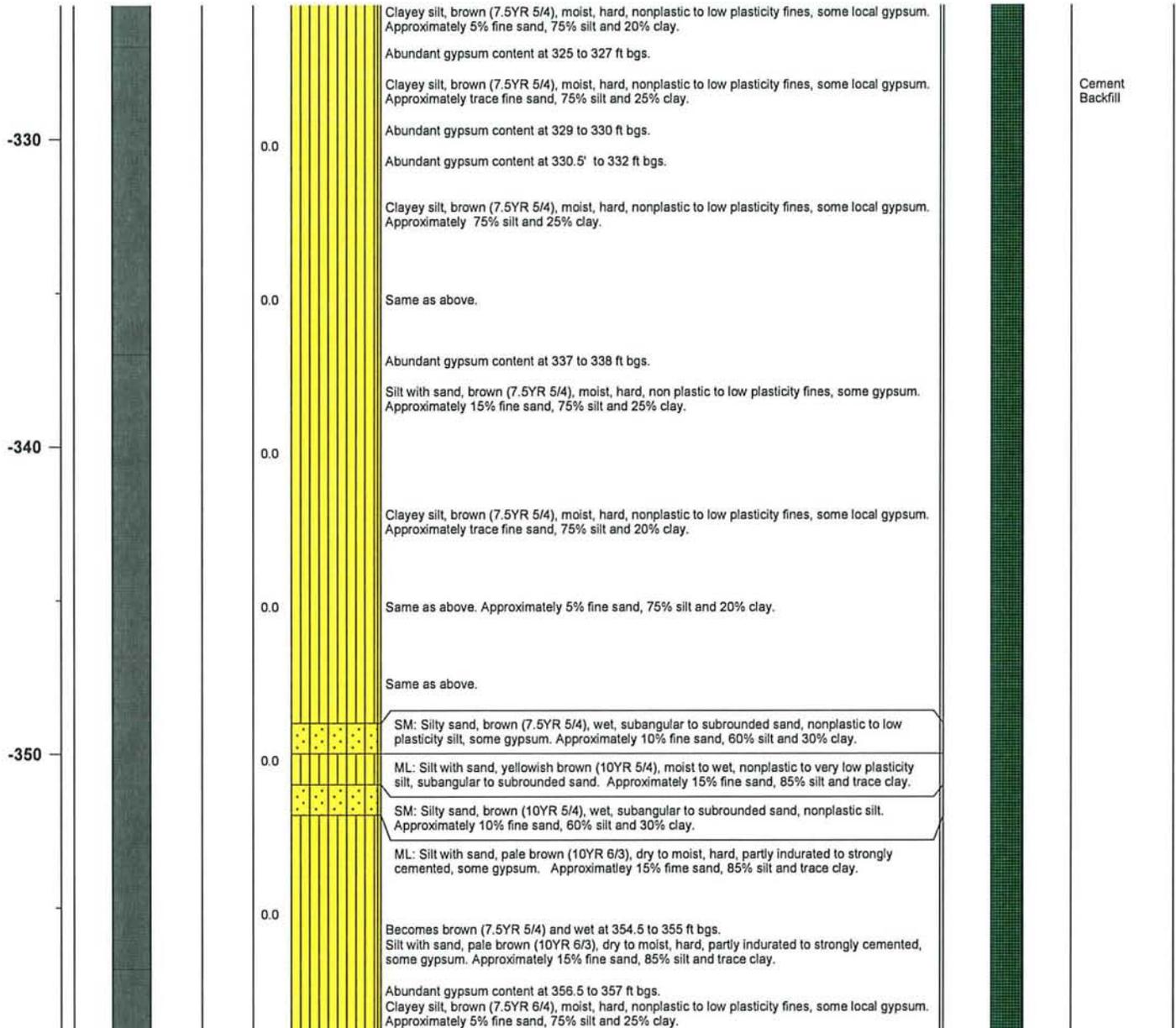


BMI Site - Hydrogeologic Characterization
Henderson, Nevada



Log of Boring No. BRC-SB-08-B

Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
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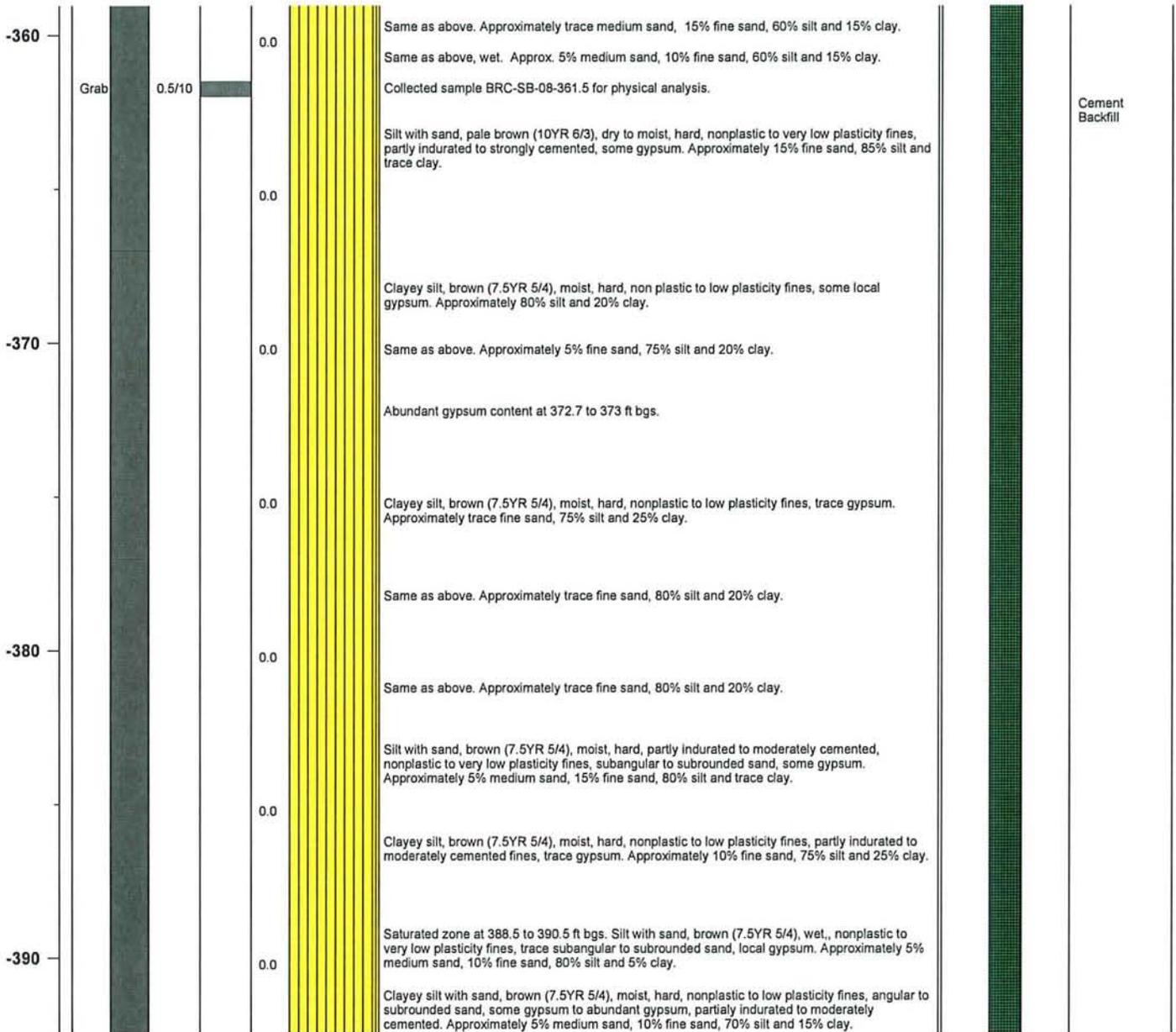


BMI Site - Hydrogeologic Characterization
Henderson, Nevada



Log of Boring No. BRC-SB-08-B

Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
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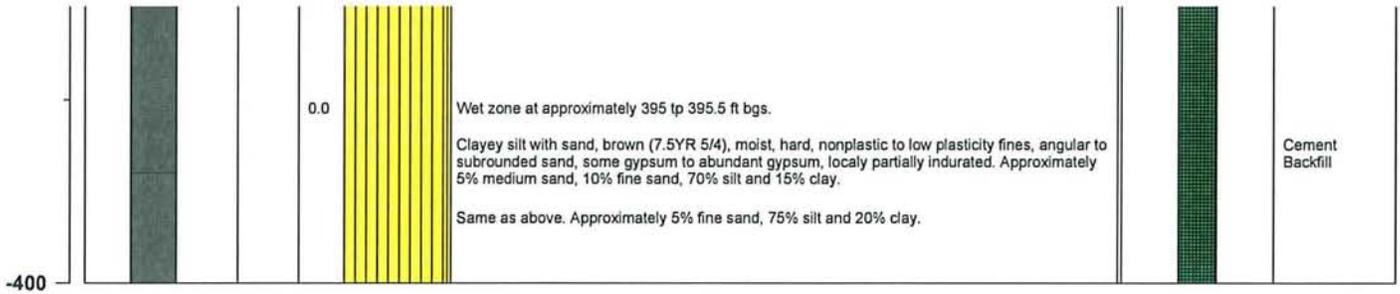


BMI Site - Hydrogeologic Characterization
Henderson, Nevada



Log of Boring No. BRC-SB-08-B

Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
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Log of Boring No. BRC-SB-26-B

BMI Site - Hydrogeologic Characterization

Henderson, Nevada



Drilling Method: Rotary Sonic
 Drilling Equipment: Rotary Sonic
 Drilling Contractor: Prosonic Corporation
 Driller: Geraldo Chavez

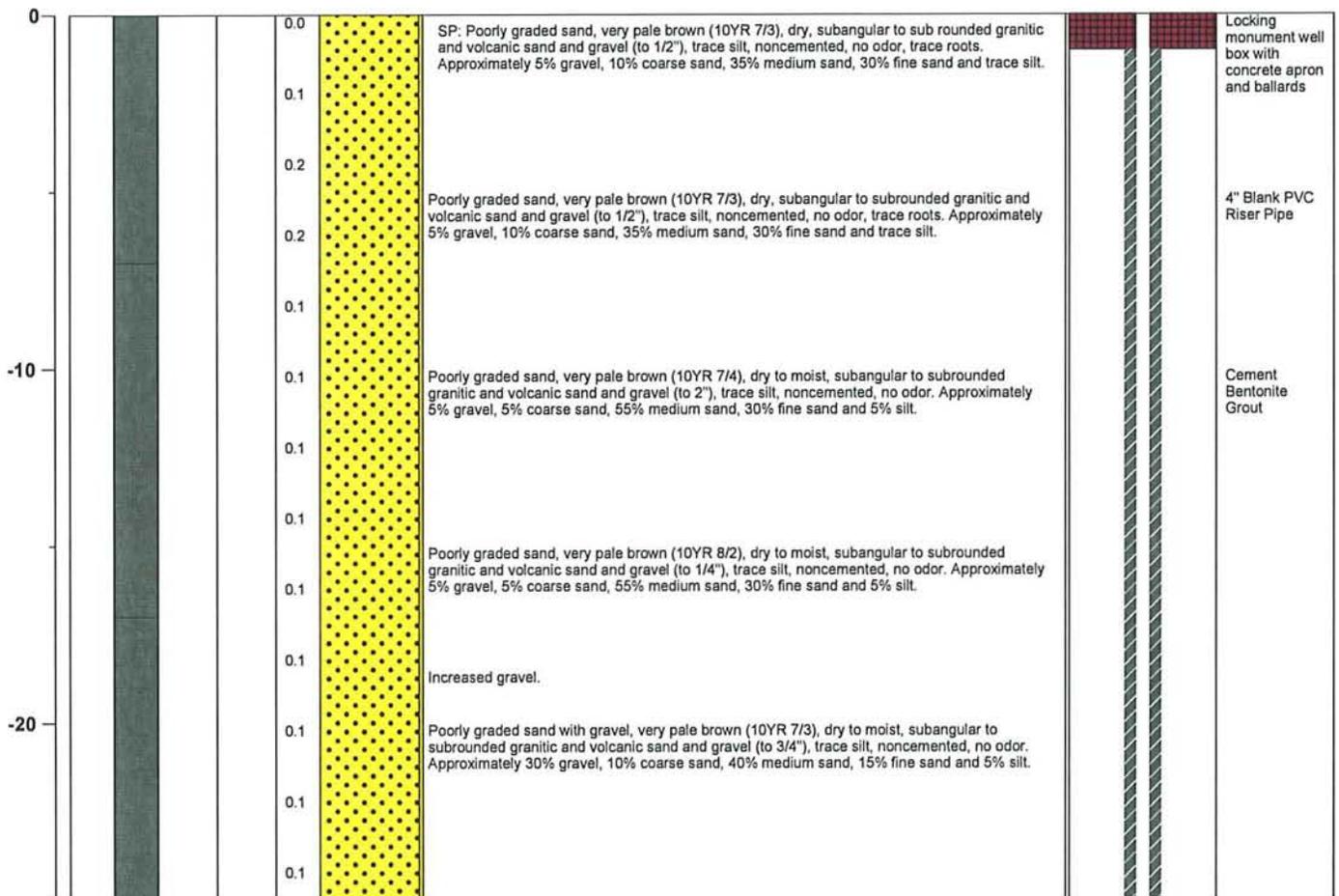
Borehole Total Depth: 120 ft bgs
 Borehole Diameter: 8.5 in
 Boring Location: Location 26 (Well ID: AA-26)
 Depth to Water (ft. bgs): 38 ft bgs

Sample Type: Cont. Core
 Sample Interval: Continuous

Logged By: Jennifer Wiley
 Date Started: 7/14/2004
 Date Completed: 7/14/2004

Monitoring Well Construction			
Type of Surface Seal:	Bentonite Grout	Screen Slot Size:	0.010 in
Blank Casing Type/Size:	4" Sch 80 PVC	Top of Screen (ft. bgs):	32 ft bgs
Screen Type/Size:	4" Sch 80 PVC	Bottom of Screen (ft. bgs):	52 ft bgs
Transition Sand Type:	N/A	Type of Sand Pack:	#2 x 12

Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
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Project No. 3850360

Log of Boring: BRC-SB-26-B

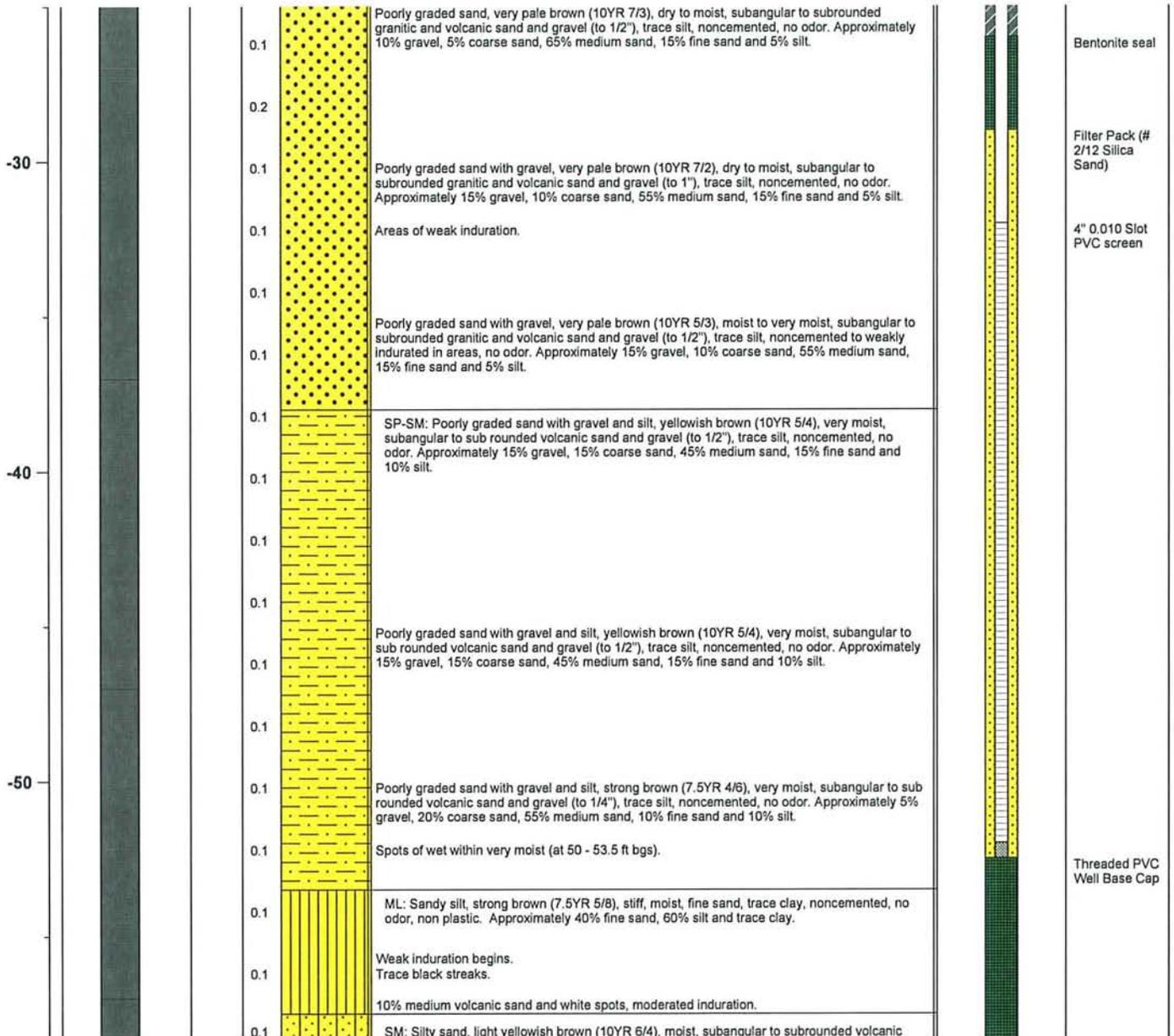


BMI Site - Hydrogeologic Characterization
Henderson, Nevada



Log of Boring No. BRC-SB-26-B

Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
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Project No. 3850360

Log of Boring: BRC-SB-26-B

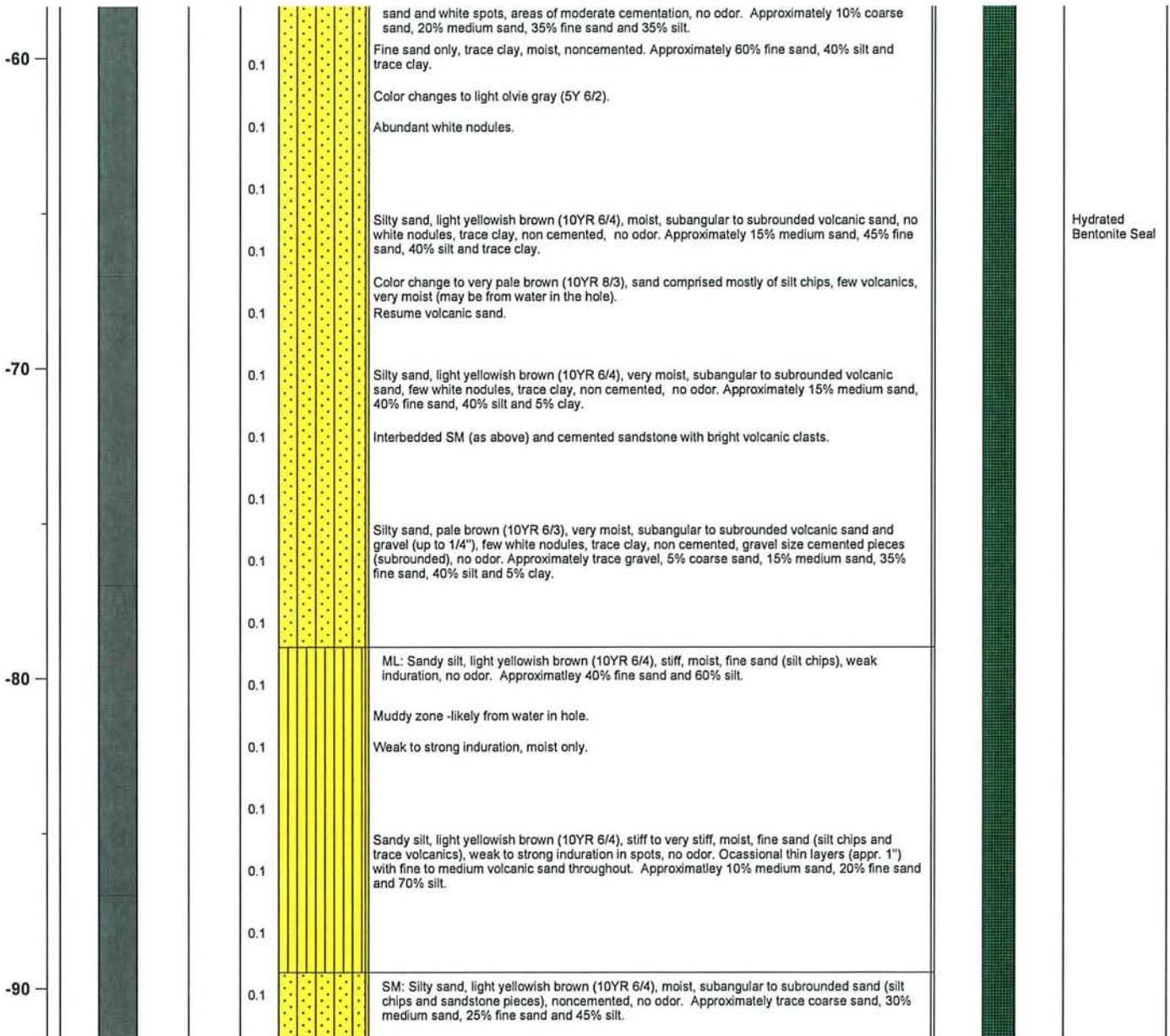


BMI Site - Hydrogeologic Characterization
Henderson, Nevada



Log of Boring No. BRC-SB-26-B

Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
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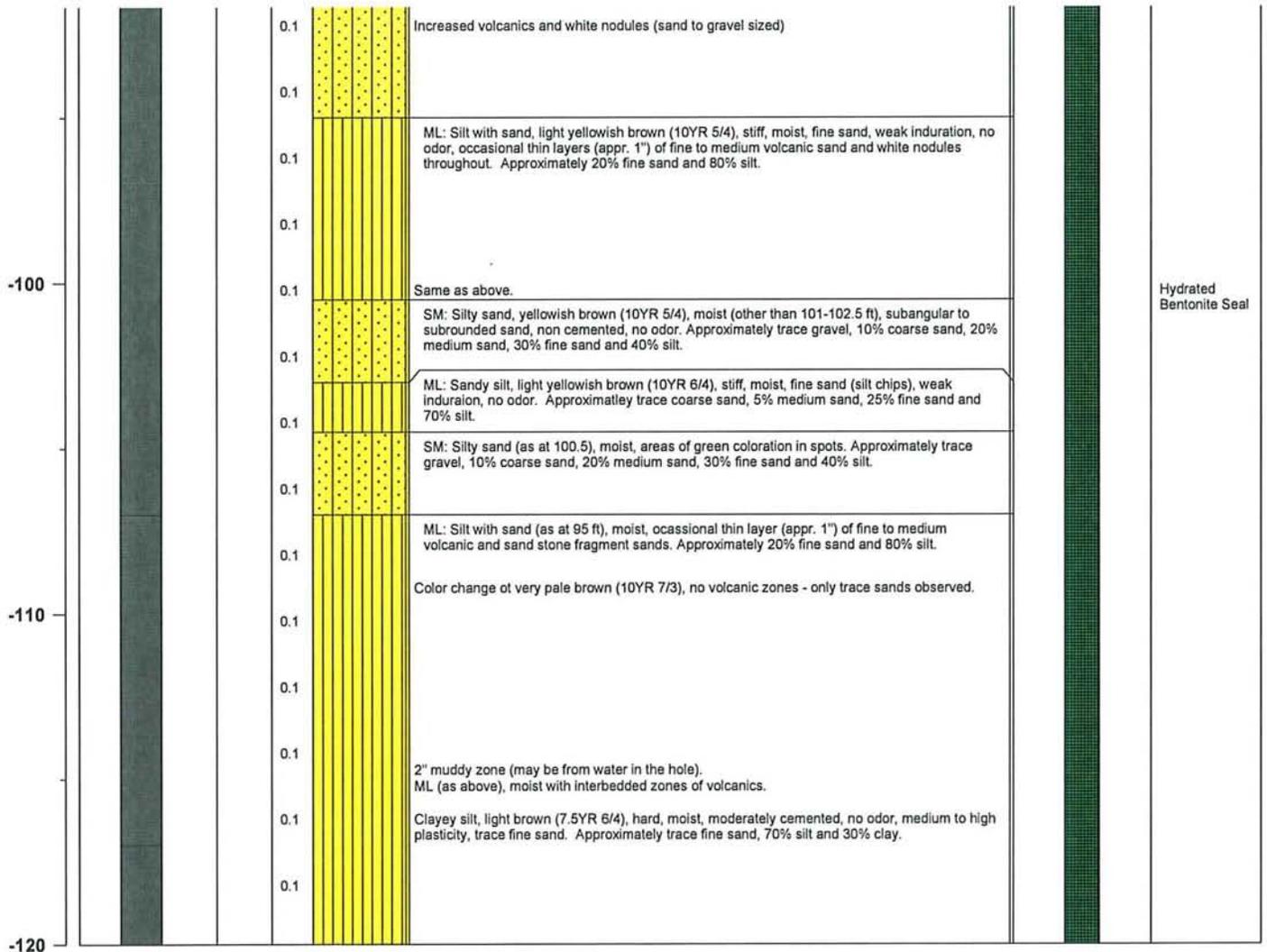


BMI Site - Hydrogeologic Characterization
Henderson, Nevada



Log of Boring No. BRC-SB-26-B

Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
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APPENDIX C

November 26, 2007

Mr. Mark Paris
Basic Remediation Company (BRC)
875 West Warm Springs
Henderson, NV 89011

Re.: Nevada Division of Environmental Protection Response to:
Slug Test Results
dated November 1, 2007 (received November 7, 2007)
NDEP Facility ID# H-000688

Dear Mr. Paris:

The NDEP has received and reviewed BRC's correspondence identified above and provides comments below:

DBMW-16 is tabulated as the Quaternary alluvium (Qal). The boring log indicates that saturated interval is within Muddy Creek formation (MCf). , and the resulting K value is within the expected range for the MCf. This should be corrected in the table.

Monitoring well DBMW-16 is screened from 85 to 110 feet below ground surface (bgs). The screened interval includes 10 feet of alluvial silty sands from 85 to 95 feet bgs. The screened interval from 95 to 110 feet bgs includes interlayered clays and silty clays of the Muddy Creek formation. The screened interval crosses the Alluvial/Muddy Creek Formation contact. Groundwater first occurs at 94 feet bgs in the alluvial silty sands in this monitoring well. The hydraulic conductivities for the two slug tests completed in DBMW-16 were 0.87 and 0.38 feet/day which is within the range of expected values for silty sands. The MCF silts and clays should have a value within the 10^{-3} to 10^{-6} feet/day range. An explanation of the screened material for this well was expanded in the text.

The fourth slug test report is listed as "AA-23R Slug Test" for well "DBMW-2". Please explain which one of these tags is incorrect. The results of this test are tabulated for AA-23R. The aquifer thickness for that test does not match that for the other AA-23R tests, but it does match the aquifer thickness for DBMW-2. After determining which well this is, the analysis should be conducted using the correct aquifer thickness. The resulting K value will be slightly different than listed and this can become significant during modeling.

The fourth slug test for monitoring well AA-23R (Slug-out-2) did have the incorrect aquifer of 18 feet instead of 25 feet as listed in the previous AA-23R slug tests. The aquifer thickness has been corrected and the analysis recalculated with resulting in only a minor change from 1.10 to 1.25 feet/day. Corrections have been made to the appendix with the analysis printouts and to Table 1 in the report.

The lowest K value is reported for DBMW-2, which is described as "Alluvium and MCf" in lithology column; Alluvium and MCf should have distinctly different Ks. The lithology log should be re-checked for Qal-MCf contact identification; and slug test parameters should be adjusted if necessary. Most importantly, the Qal-MCf contact should be verified for modeling purposes.

Monitoring well DBMW-2 is screened from 20 to 50 feet bgs. The lithologies found in the upper part of the screen include silty sand from 20 to 31 feet bgs and clayey sand/sandy clay from 31 to 44.5 feet bgs. Both of these units have been interpreted as alluvial sediment. The clayey sand/sandy clay from 31 to 44.5 feet bgs has a reddish-brown color commonly associated with Muddy Creek Formation units. The clayey sand/sandy clay unit may represent reworked sediments derived from the Muddy Creek Formation commonly interbedded within the alluvium in the Henderson area. The lithology from 44.5 to 50 feet bgs is a silty, clayey sandstone of the Muddy Creek Formation. The tested hydraulic conductivities in DBMW-2 are 0.043 and 0.060 feet/day which suggests a response commonly associated with clayey sands. An expanded discussion of the results of DBMW-2 was added to the text of the report.

The tabulated K value for DBMW-8 roughly equals the K value for DBMW-16, however these two wells lithologies are described respectively as MCf and Qal. The last paragraph in the report addresses this observation. NDEP suggests that BRC reference back to the well logs, double check for contact depth pick, and make sure that the modelers are setting up their layers correctly. The modeler will be setting the layer top or bottom elevations (probably) based on the lithology log picks, so the log picks should be revisited based on these hydraulic results to verify quality of pick. If DBMW-16 is actually screened in MCf rather than Qal, layer thickness error for both units could be propagated over a large area.

The screened interval in monitoring well DBMW-16 includes 10 feet of alluvial silty sands from 85 to 95 feet bgs and interlayered clays and silty clays of the Muddy Creek formation from 95 to 110 feet bgs. The screened interval in DBMW-8 includes silty-clayey sands from 41 to 47 feet bgs, silty sand with clay from 47 to 62 feet bgs, and silt with clay from 62 to 68 feet bgs. The entire screen in monitoring well DBMW-8 is within the Muddy Creek Formation. The slug tests in the two monitoring wells resulted in hydraulic conductivities of 0.87 and 0.38 feet/day for DBMW-16 and 0.50 to 0.59 feet/day in DBMW-8. The similarities in the hydraulic conductivities for the two wells are likely due to the presence of silty sand present in the screened sections of each well. The lithology present within the screened section of the well influences the hydraulic conductivities produced in a slug test and not the formation designation since similar lithologies can be present in both the alluvium and the MCF.

Again, the end user of this data (modeler) is advised to review the well logs in conjunction with the testing results, since many of the wells appear to be screened across both Qal and MCf. DBMW-2 looks

suspiciously low for the Qal, however the log does indicate silt and clay in the Qal at that location. The modelers need to justify usage of low K values in the Qal via the conceptual site model (CSM). For example, explain if the Qal has a significant fine grained member. BRC will need to explain if the model will reflect this via multiple layers, or stochastic techniques. The modelers will need to consider the well logs in addition to the slug test (and aquifer test) results. These tests can be viewed as a "validation" of the borehole log. The borehole and well log should always be reviewed against subsequent data by the end user (modeler). It is expected that these issues will be discussed during model development.

The hydrogeologists working on the aquifer testing and the groundwater modeling team will coordinate efforts to ensure the hydrostratigraphy tested in the field is represented in the conceptual model and the computerized groundwater model.

Please provide a revised report to the NDEP. Should you have any questions or concerns, please do not hesitate to contact me at (702) 486-2850x247 or brakvica@ndep.nv.gov.

Sincerely,

Brian A. Rakvica, P.E.
Supervisor, Special Projects Branch
Bureau of Corrective Actions

BAR:s

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