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Schnabel Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 27, 2006
WEATHER/ TEMP: 90, humid

PROJECT NO.: 06120048
CLIENT: Bechtel Power Corporation

TEST INFORMATION	
Type of Test:	(~~Falling Head~~ / Rising Head)
Slug Type:	(~~Mechanical~~ / Water)
Approximate Volume of Slug:	~~0.32 GAL~~ 0.625 GAL
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	109213
Slug S/N:	Slug-003

WELL INFORMATION	
WELL ID:	OW-313A
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	52.9
Screen Interval Depth (ft, TOC):	40-50
Riser Height (ft):	2.0

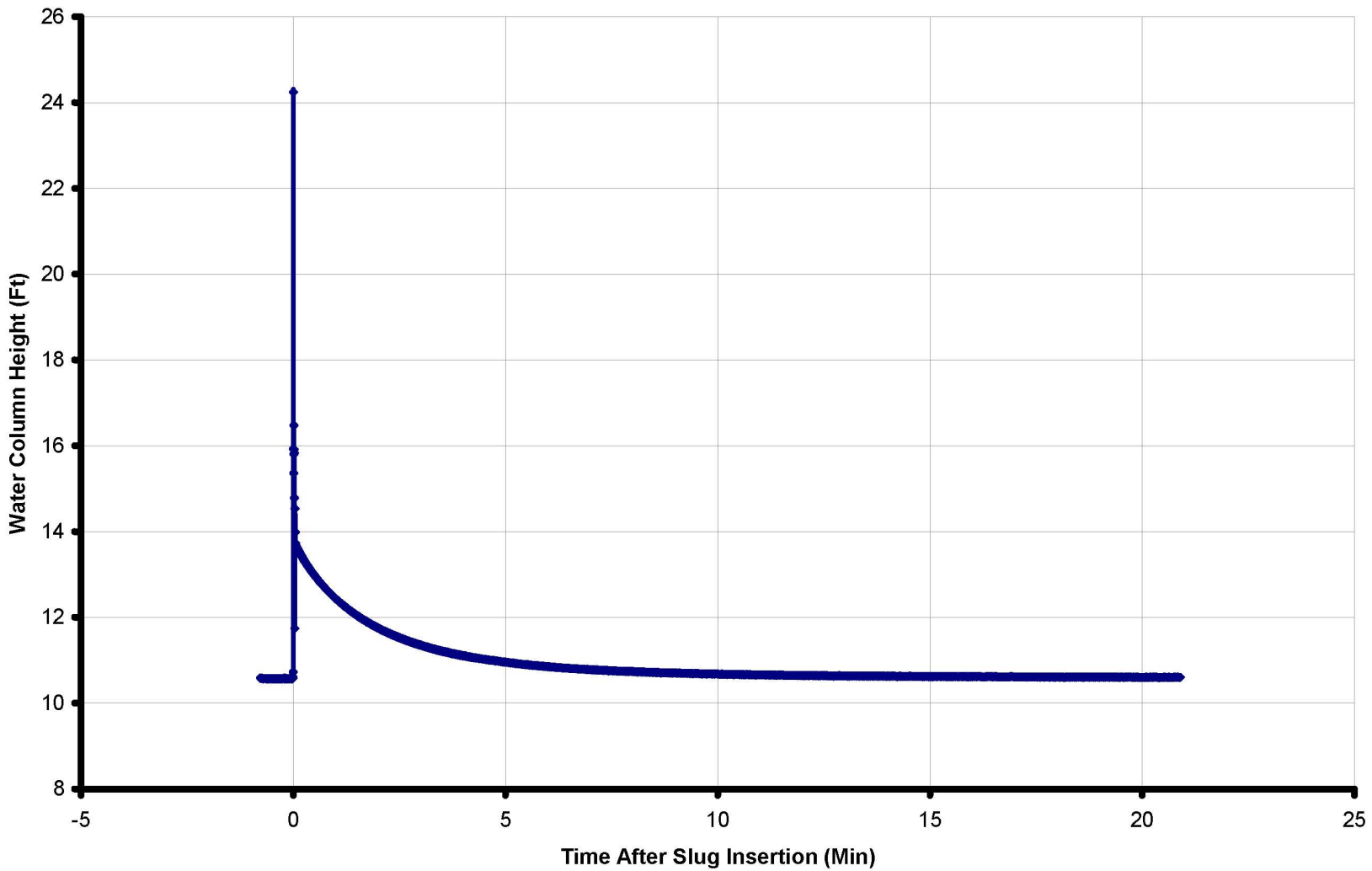
1	Pre-Test Water Level (ft, TOC)/ Time :	19.69 ft/4:10 PM
2	Water Level after Probe Insertion (ft, TOC)/ Time:	19.70 ft/4:45 PM
3	Transducer Depth:	30 ft
4	Calc. Pre-Test Head over Transducer:	10.30 ft
5	Measured Pre-Test Head over Transducer:	10.53 ft
6	Time Test Started: Slug-test	4:48 PM
7	Time Test Ended:	5:10 PM
8	~~Percent Recovery~~ Head at End of Test:	10.58 ft
9	Datalogger File Name:	06120048-PTD-OW-313A-SLUG

Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White **Date:** July 27, 2006
Approved By: [signature] **Date:** 9/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

OW-313A Permeability Test



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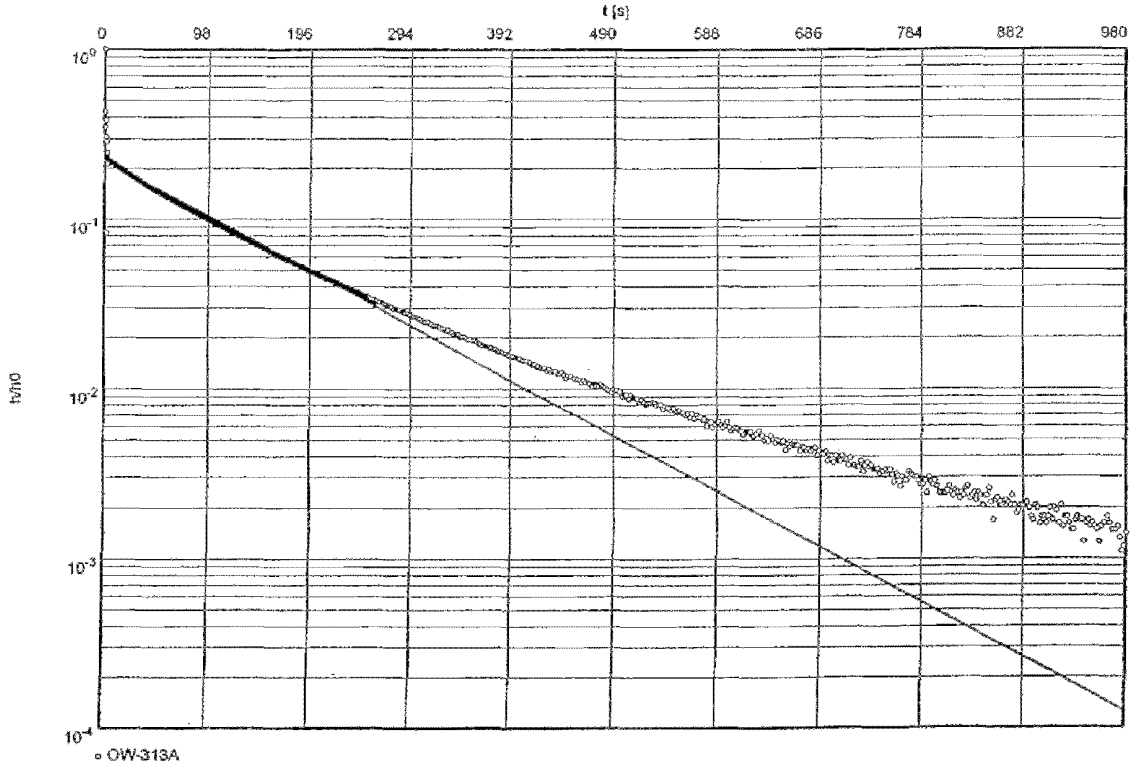
Schnabel Engineering North, LLC 656 Quince Orchard Road, Suite 700 Gaithersburg, MD 20878 (301) 417-2400	slug/bail test analysis BOUWER-RICE's method	Date: 11/6/2006	Page 1
		Project: Calvert Cliffs	
		Evaluated by: patrick	

Slug Test No. 313A	Test conducted on: 7/27/2003
OW-313A	



Hydraulic conductivity [ft/s]: 7.50×10^{-6}

INPUT PARAMETERS
Static Water Level = 10.60 ft
Depth to Bottom of Aquifer = 62.00 ft
Length of Screen = 10.00 ft
Radius of Casing = 0.08 ft
Radius of Influence = 0.25 ft
Evaluated by: Pamela Patrick
Pamela Patrick
Reviewed by: Christopher Krenzis

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Geotechnical Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 27, 2006
WEATHER/ TEMP: [illegible]

PROJECT NO.: 0912004B
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	~~0.25 Gallon~~ 0.625 GAL
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	104259
Slug S/N:	SLUG-002

WELL INFORMATION	
WELL ID:	OW-3B3S
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	110
Screen Interval Depth (ft, TOC):	95-105
Riser Height (ft):	1.7'

1. Pre-Test Water Level (ft, TOC)/ Time: 23.09 ft / 7:50 AM
2. Water Level after Probe Insertion (ft, TOC)/ Time: 22.91 ft / 8:52 AM
3. Transducer Depth: 40 ft
4. Calc. Pre-Test Head over Transducer: 17.08 ft
5. Measured Pre-Test Head over Transducer: 17.08 ft
6. Time Test Started: "Rising Head" / Slug Insert 7:55 / 8:56 AM
7. Time Test Ended: 12:00 pm
8. Percent Recovery at End of Test: 17.63
9. Datalogger File Name: 0612004B-PTD-OW-3B3S-SLUG

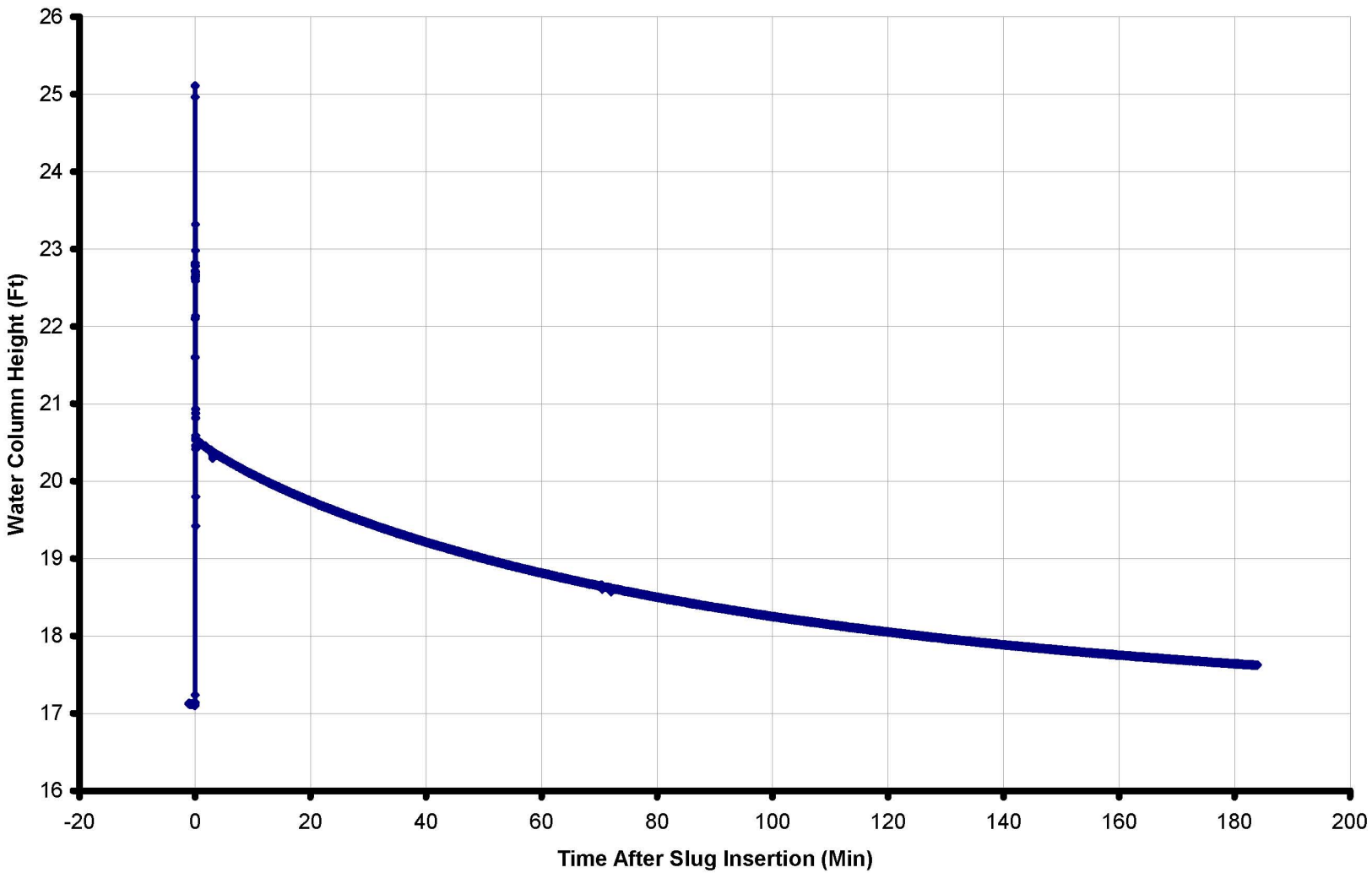
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 28, 2006
Approved By: [illegible] Date: 9/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

OW-313B Permeability Test



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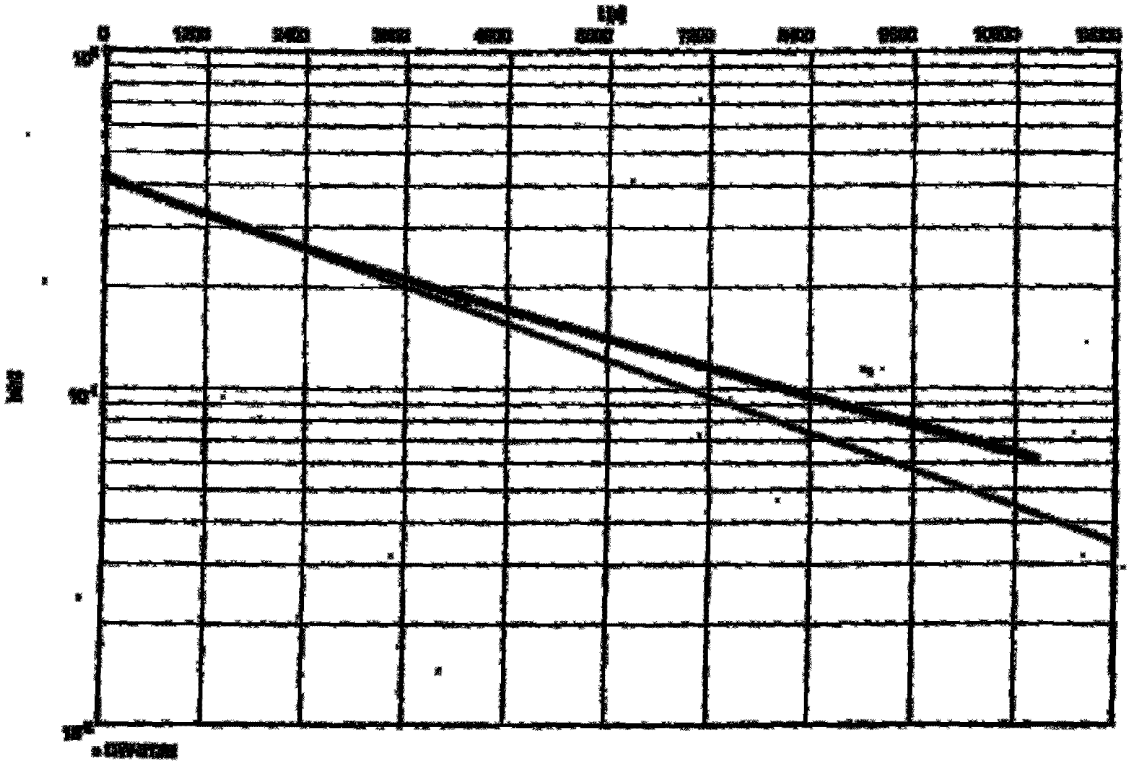
[illegible]	[illegible]	[illegible]	Page 1
		Project: [illegible]	
		Evaluated by: [illegible]	
Slug Test No. [illegible]		Test conducted on: [illegible]	
[illegible]			



Hydraulic conductivity (avg): [illegible]

[illegible]
Static Water Level = [illegible] ft
Depth to Bottom of Aquifer = [illegible] ft
Length of Screen = [illegible] ft
Radius of Casing = [illegible] ft
Radius of Screen = [illegible] ft
Evaluated by: [illegible]
Reviewed by: [illegible]

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Technical Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP GOLA Project
LOCATION: Lusby, MD
DATE: 7/21/06
WEATHER/ TEMP: 9-Cloudy 90°

PROJECT NO.: 0012048
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	~~[illegible]~~ 0.625 GAL
Manual Water Level Meter S/N:	1010-001
Transducer S/N:	104805
Slug S/N:	Slug-001

WELL INFORMATION	
WELL ID:	OW-319A
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	54.13
Screen Interval Depth (ft, TOC):	44.5'-54.5'
Riser Height (ft):	18" = 1'2"

1 Pre-Test Water Level (ft, TOC)/ Time: 26.55' / 11:15 AM
2 Water Level after Probe Insertion (ft, TOC)/ Time: 26.96' / 11:42 AM
3 Transducer Depth: [illegible] 32'
4 Calc. Pre-Test Head over Transducer: [illegible] 5.46
5 Measured Pre-Test Head over Transducer: 5.96'
6 Time Test Started: Slug-test 11:48 AM
7 Time Test Ended: 1:13 PM
8 Remaining Recovery at End of Test: 5.59
9 Datalogger File Name: 06120048-PID-OW-319A-SLUG

Step 1 0-5 min @ 4 sec
75 @ 2 sec

NOTE: Bottom of slug @ 33 ft depth, may not be fully submerged

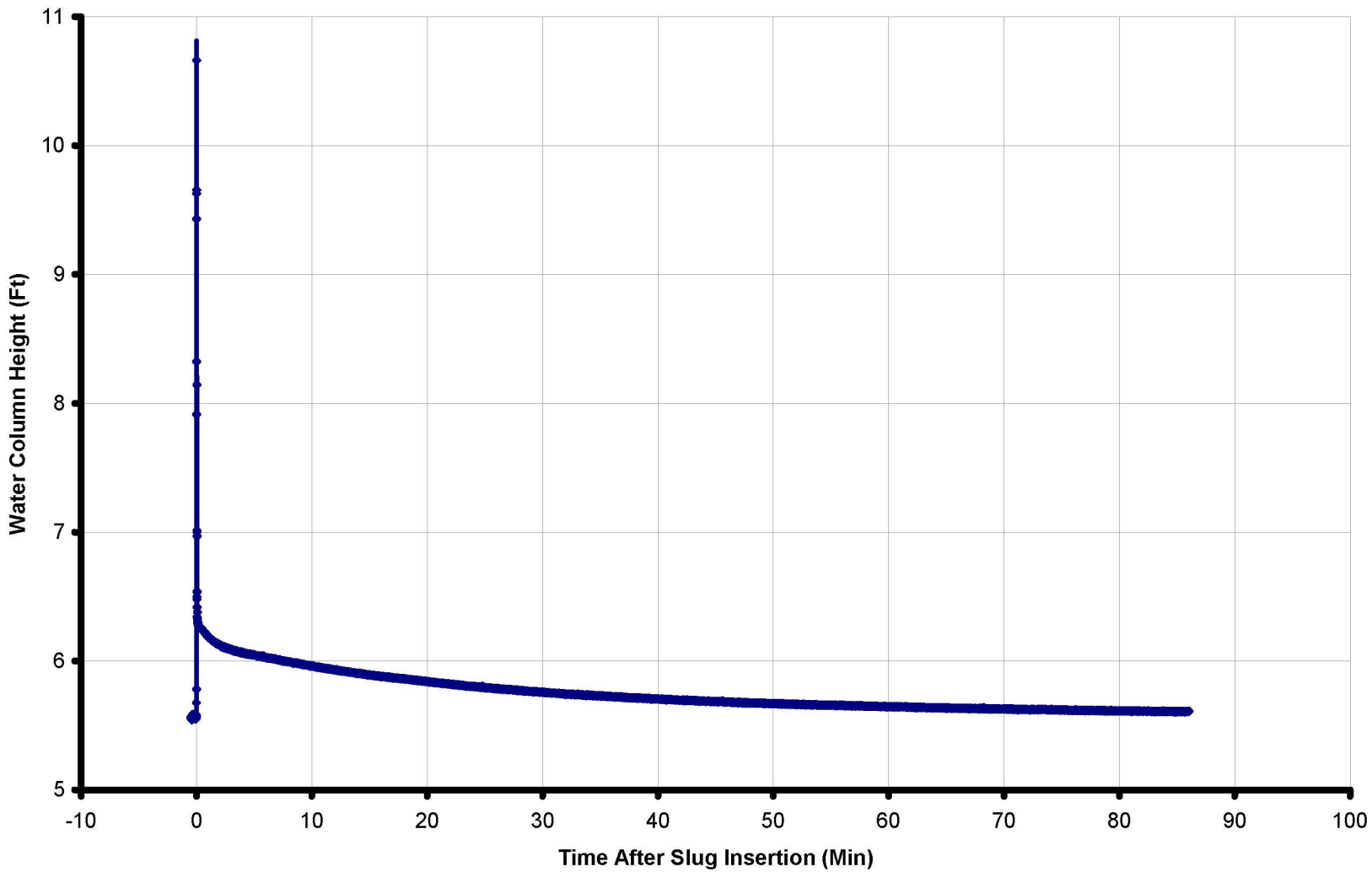
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 21, 2006
Approved By: [illegible] Date: 9/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

OW-319A Permeability Test



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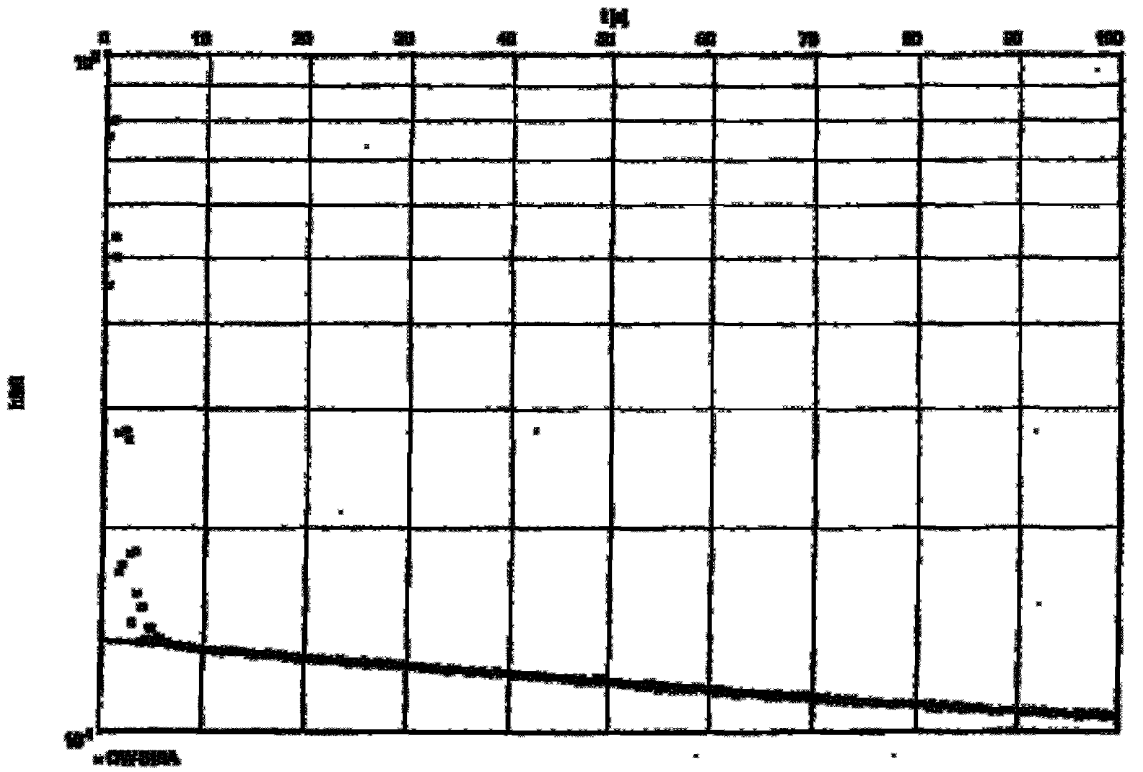
[illegible] Engineering North, LLC [illegible]	[illegible]	Date: [illegible] Page 1
[illegible]	[illegible]	Project: [illegible]
[illegible]	[illegible]	Evaluated by: [illegible]

Slug Test No. [illegible]	Test conducted on: [illegible]
[illegible]	



Hydraulic conductivity [ft/d]: [illegible]

INPUT PARAMETERS
Static Water Level = [illegible] ft
Depth to Bottom of Aquifer = [illegible] ft
Length of Screen = [illegible] ft
Radius of Casing = [illegible] ft
Radius of Screen = [illegible] ft
Evaluated by: [illegible]
Reviewed by: [illegible]

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PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 27, 2006
WEATHER TEMP: 90, humid

PROJECT NO.: [illegible]
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	~~[illegible]~~ 0.625 GAL
Manual Water Level Meter S/N:	[illegible]
Transducer S/N:	01259
Slug S/N:	SLUG-002

WELL INFORMATION	
WELL ID:	OW-3MB
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	77.15 ft
Screen Interval Depth (ft, TOC):	70-80'
Riser Height (ft):	[illegible] ft

1. Pre-Test Water Level (ft, TOC)/ Time: 67.43 ft / 7:10 AM
2. Water Level after Probe Insertion (ft, TOC)/ Time: 67.42 ft / 7:25 AM
3. Transducer Depth: 75 ft
4. Calc. Pre-Test Head over Transducer: 7.58 ft
5. Measured Pre-Test Head over Transducer: ~~[illegible]~~ 7.98 ft
6. Time Test Started: Pre-test / Slug test 7:15 / 7:30 AM
7. Time Test Ended: 7:36 AM
8. ~~Percent Recovery~~ Head at End of Test: 7.99
9. Datalogger File Name: DL1004B-PTD-OW-3MB-SLUG

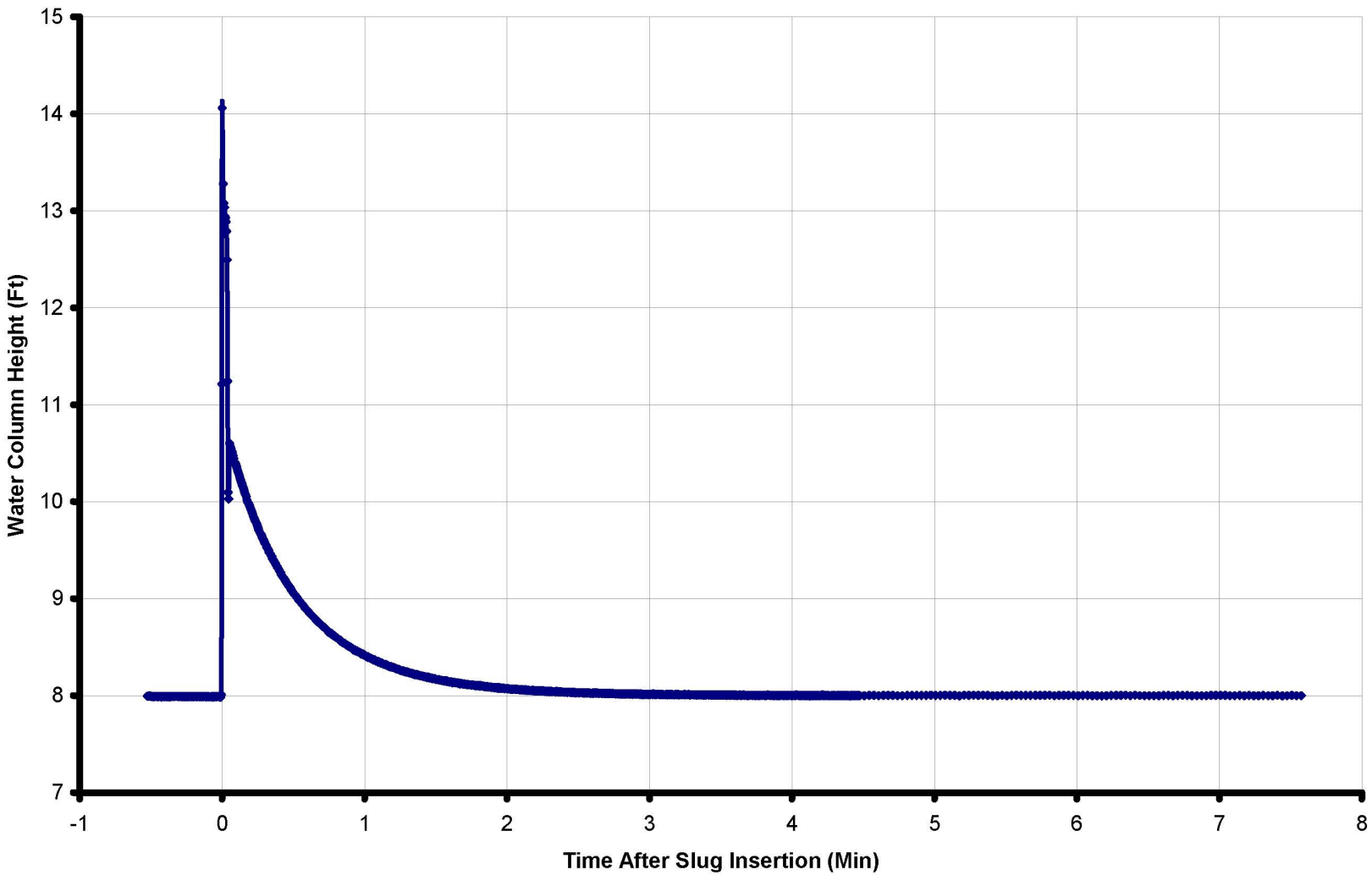
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 27, 2006
Approved By: [illegible] Date: 9/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

OW-319B Permeability Test



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[illegible]	[illegible]	[illegible]	Page 1
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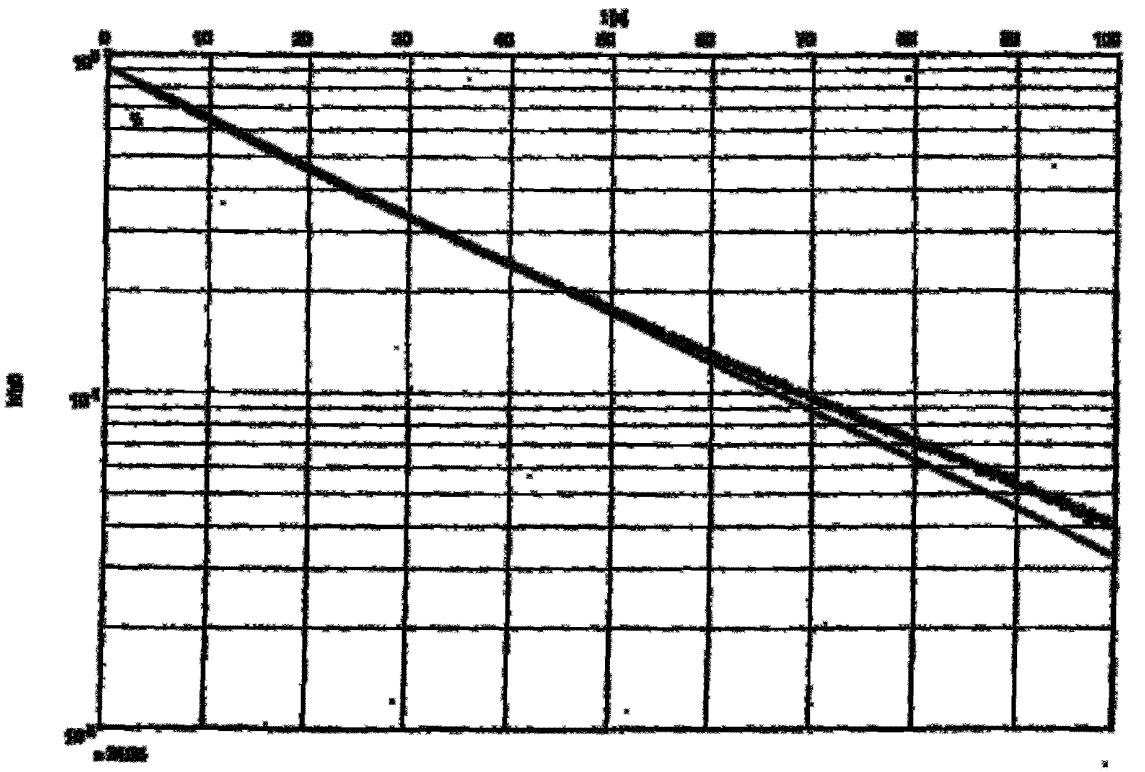
[illegible]		[illegible]	

[illegible]	[illegible]
[illegible]	



Hydraulic conductivity (K): [illegible]

[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

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PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 26, 2010
WEATHER TEMP: 85, Partly Cloudy

PROJECT NO.: [illegible]
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Displacement / Water)
Approximate Volume of Slug:	0.625 Gal
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	109255
Slug S/N:	SLUG-001

WELL INFORMATION	
WELL ID:	OW-323
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	49.61
Screen Interval Depth (ft, TOC):	30-40
Riser Height (ft):	1.5'

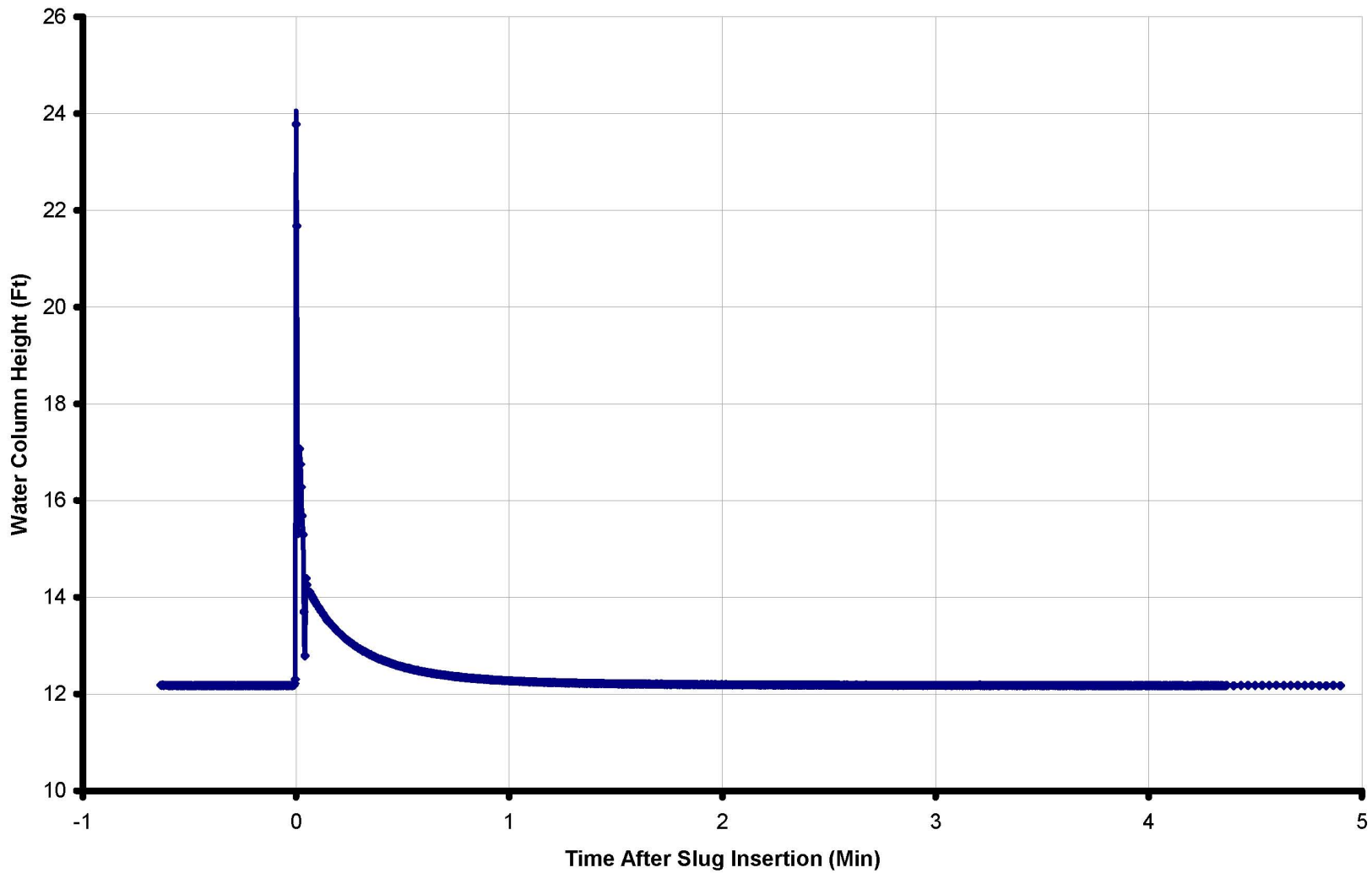
1	Pre-Test Water Level (ft, TOC)/ Time:	22.76 ft / 12:18 pm
2	Water Level after Probe Insertion (ft, TOC)/ Time:	22.76 ft / 12:25 pm
3	Transducer Depth:	40 ft
4	Calc. Pre-Test Head over Transducer:	12.24 ft
5	Measured Pre-Test Head over Transducer:	12.15 ft
6	Time Test Started: Rebound / Slug test	12:20 / 12:29 pm
7	Time Test Ended:	12:34 pm
8	Percent Recovery at End of Test:	12.[illegible]
9	Datalogger File Name:	06170048-PID-OW-323-SLUG

Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 26, 2010
Approved By: [illegible] Date: 9/21/10

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

OW-323 Permeability Test



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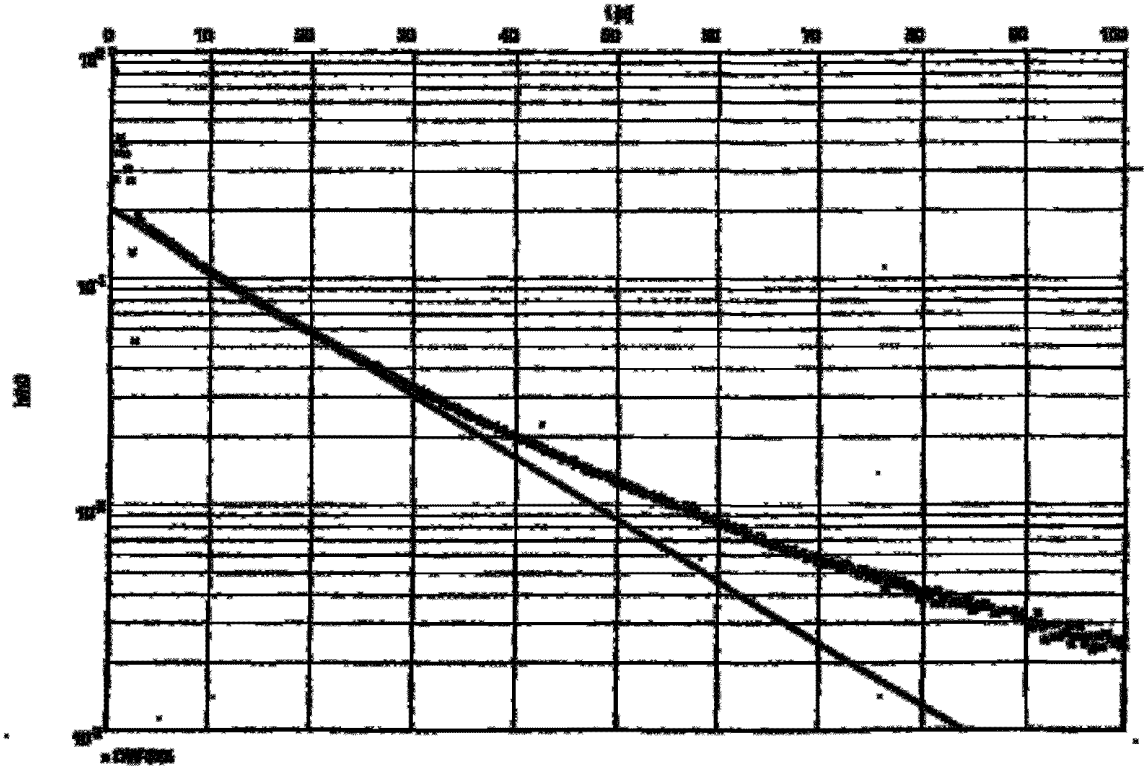
[illegible]	[illegible]	[illegible]	Page 1
		Project: [illegible]	
		Evaluated by: [illegible]	

[illegible]	Test conducted on: [illegible]
[illegible]	


[illegible]
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[illegible]
[illegible]
[illegible]

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PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 21, 2006
WEATHER/TEMP: 90° humid

PROJECT NO.: [illegible]
CLIENT: Nuclear Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	[illegible] 0.4250 GAL
Manual Water Level Meter S/N:	WLF-001
Transducer S/N:	D425.5
Slug S/N:	SLUG-001

WELL INFORMATION	
WELL ID:	OW-328
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft. TOC):	70.5
Screen Interval Depth (ft. TOC):	60-70'
Riser Height (ft):	2'

1 Pre-Test Water Level (ft. TOC)/ Time: 20.86 ft / 8:15 AM
2 Water Level after Probe Insertion (ft. TOC)/ Time: 20.85 ft / 8:37 AM
3 Transducer Depth: 48 ft
4 Calc. Pre-Test Head over Transducer: 7.15
5 Measured Pre-Test Head over Transducer: 7.28
6 Time Test Started: Pre-test / Slug test 8:38 AM / 8:41 AM
7 Time Test Ended: 10:14 AM
8 ~~Percent Recovery~~ Head at End of Test: 7.26 ft
9 . Datalogger File Name: 06120048-PT3-OW-328-SLUG

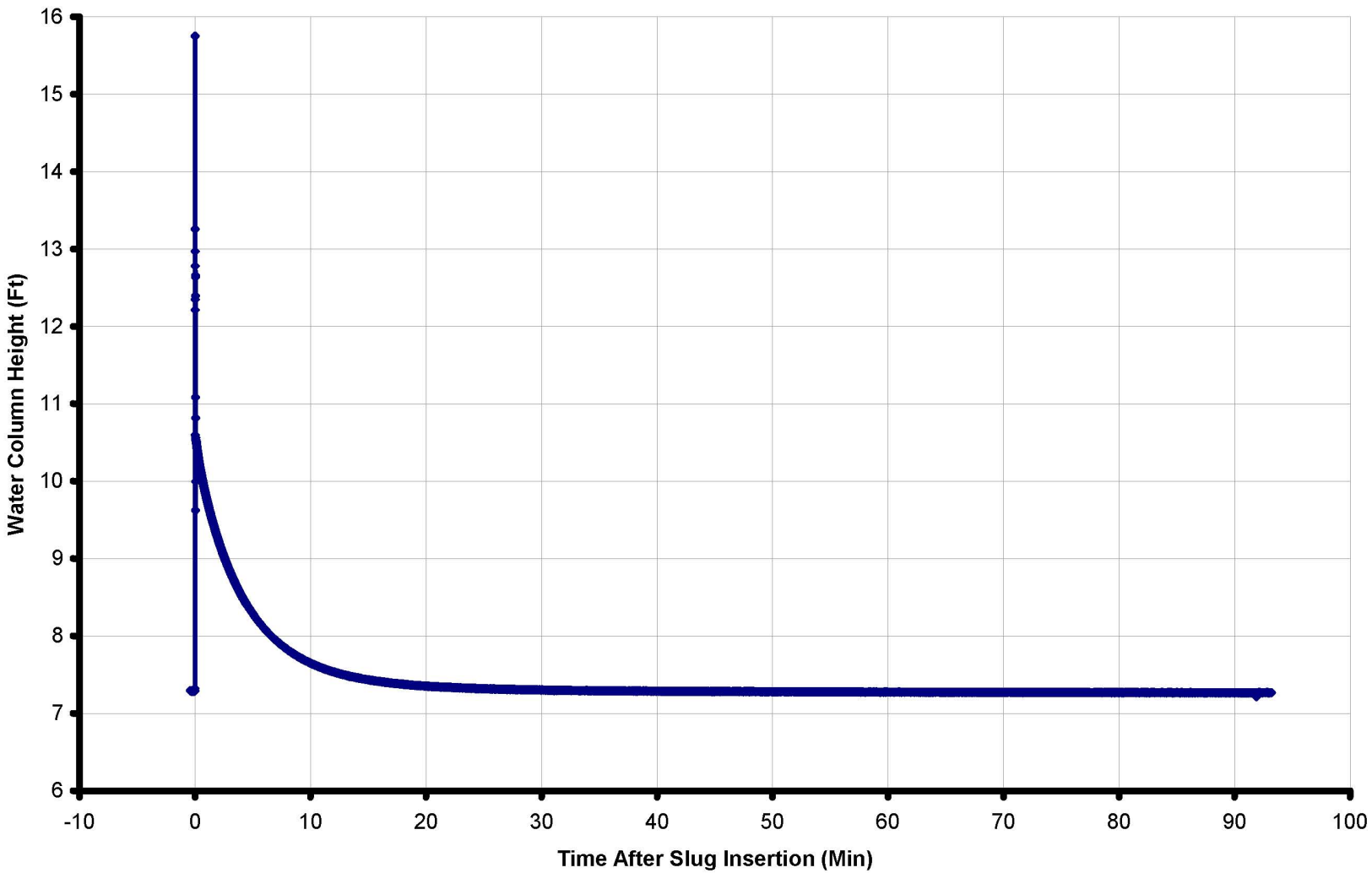
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 21, 2006
Approved By: [illegible] Date: 7/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

OW-328 Permeability Test



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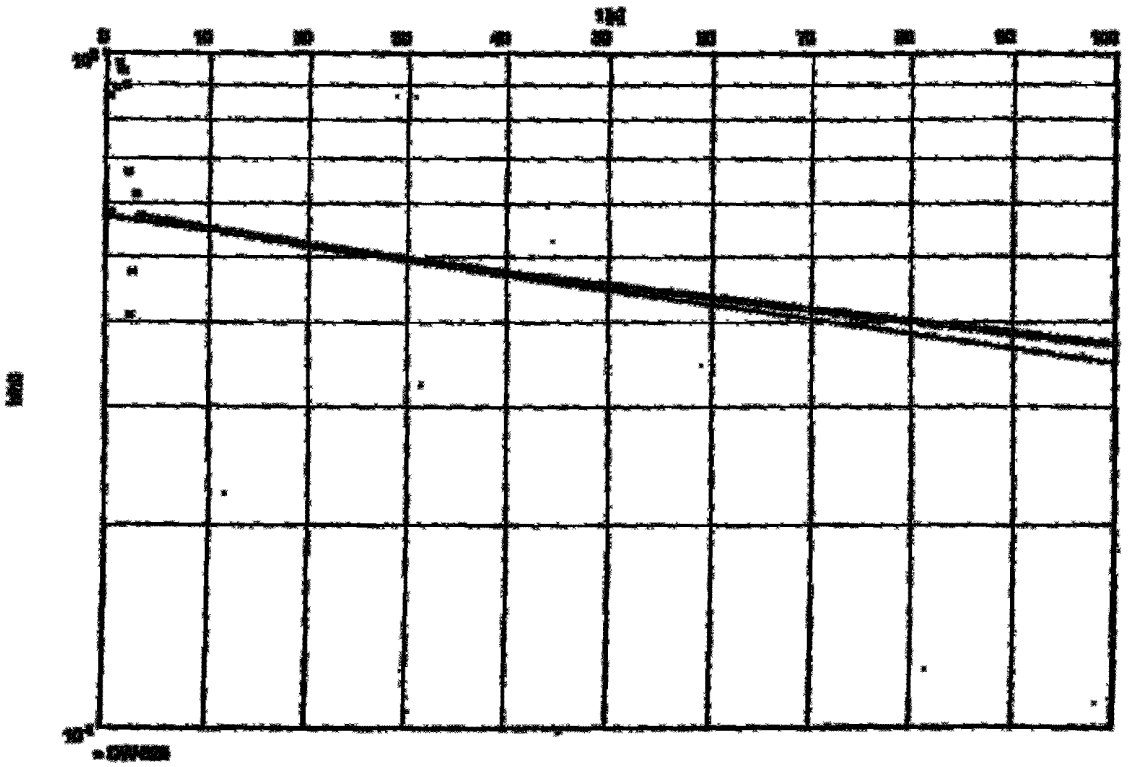
[illegible] Engineering North, LLC [illegible] Dallas [illegible] [illegible] [illegible]	[illegible] analysis [illegible] method	Date [illegible]	Page 1
		Project [illegible]	
		Analyzed by [illegible]	

Slug Test No. [illegible]	Test conducted on [illegible]
[illegible]	



Hydraulic conductivity (m/s): [illegible]

INPUT PARAMETERS
Static Water Level = [illegible] ft
Depth to Bottom of Aquifer = [illegible] ft
Length of Screen = [illegible] ft
Radius of Casing = [illegible] ft
Radius of Screen = [illegible] ft
Evaluated by: [illegible]
Reviewed by: [illegible]

Schnabel Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Calvert Cliffs, MD
DATE: July 31, 2006
WEATHER TEMP: 90-[illegible]

PROJECT NO.: 06120048
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Method of Water Withdrawal/ Injection:	(Mechanical Slug / Water Injection/removal)
Volume of Slug:	0.625 GAL
Water Level Meter Make and Model:	WLP-200
Water Level Meter S/N:	—
Transducer Make and Model:	SLUG-002
Transducer S/N:	104759

WELL INFORMATION	
WELL ID:	OW-336
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Depth of Well (ft. TOC):	75.2
Screened Interval (ft. TOC):	60-70'
Riser Height (ft):	2'

1. Pre-Test Static Depth to Water (ft. TOC): 60.84 ft / 11:36 AM — pre-test 60.83 ft / 11:40 AM
2. Transducer Depth: 74 ft
3. Calc. Pre-Test Head over Transducer: 13.17 ft
4. Measured Pre-Test Head over Transducer: 13.39 ft
5. Time Test Started: Pre-test/slug test 11:45 AM / 12:25 PM
6. Time Test Ended: 13:00
7. Percent Recovery at End of Test: Head 13.39 ft
8. Datalogger File Name: 06120048-TD-OW-336-SL06

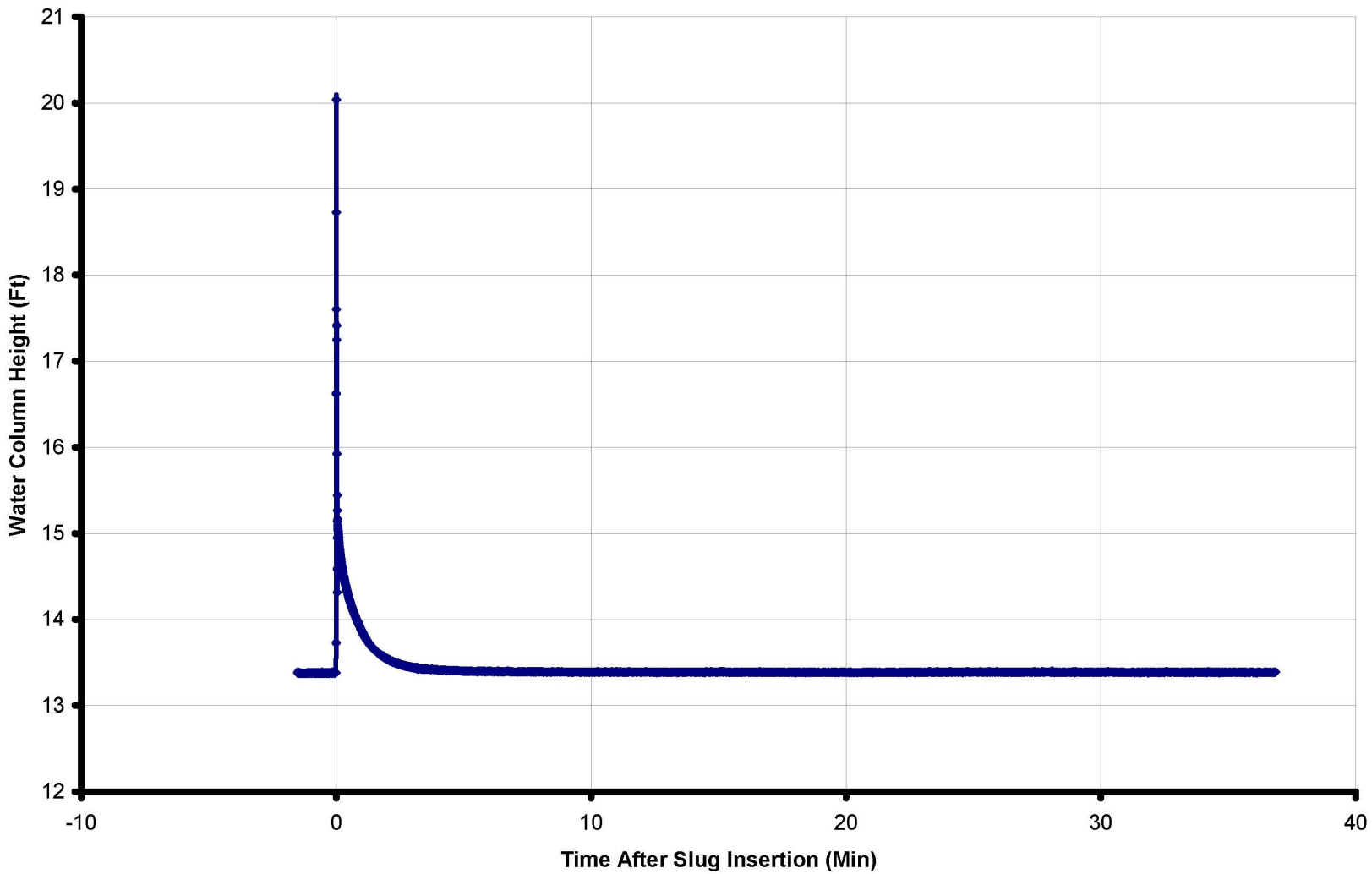
Comments:

NAME: Todd White

SIGNATURE: [signature]

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

OW-336 Permeability Test



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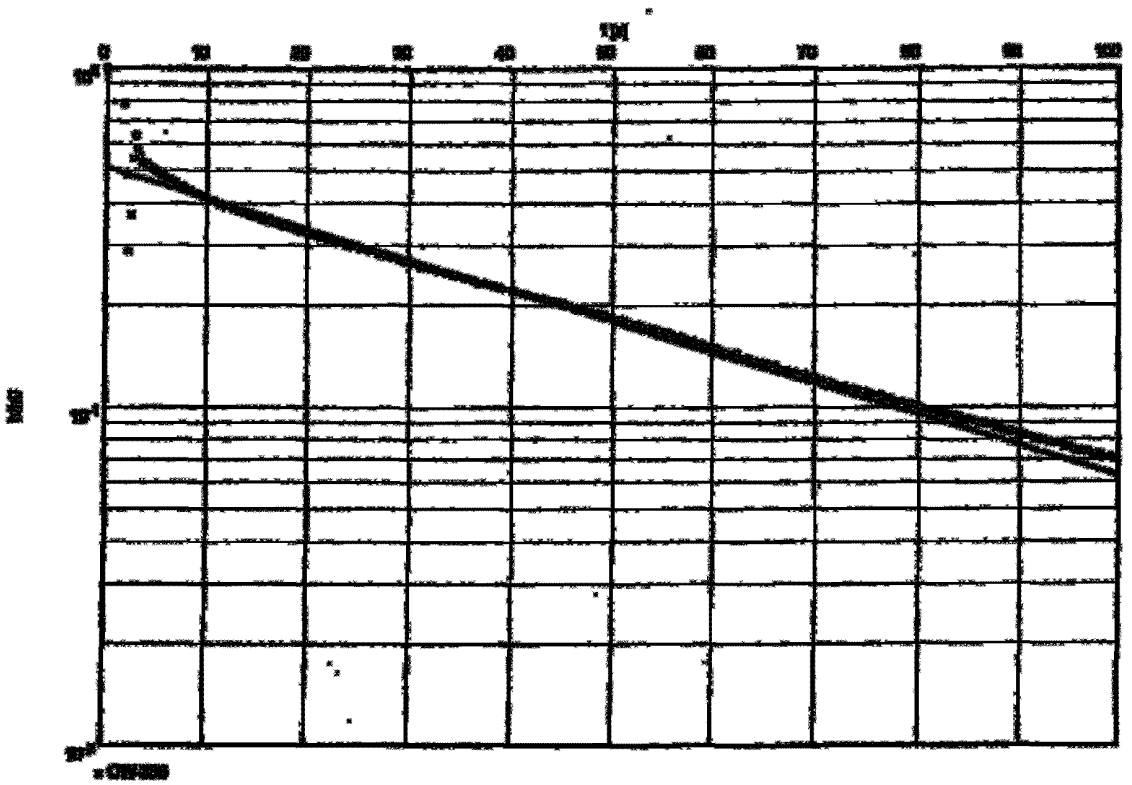
[illegible] Engineering North, LLC [illegible] Cultura Overland Road, Suite 700 [illegible] [illegible]	Graphical test analysis [illegible] method	Date: [illegible] Page: [illegible] Project: Closed Cells Evaluated by: [illegible]
Slug Test No. [illegible]	Test conducted on [illegible]	
CM[illegible]		



Hydraulic conductivity [cm/s]: [illegible]

INPUT PARAMETERS
Static Water Level = [illegible] ft
Depth to Bottom of Aquifer = [illegible] ft
Length of Screen = [illegible] ft
Radius of Casing = [illegible] ft
Radius of Influence = [illegible] ft
Evaluated by: [illegible]
Reviewed by: [illegible]

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PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 28, 2006
WEATHER/ TEMP: 90 - [illegible]

PROJECT NO.: [illegible]
CLIENT: Rockfish Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	([illegible] / Water)
Approximate Volume of Slug:	0.625 GAL
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	104213
Slug S/N:	SLUG-003

WELL INFORMATION	
WELL ID:	OW-401
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft. TOC):	77.55'
Screen Interval Depth (ft. TOC):	63-73
Riser Height (ft):	2.1

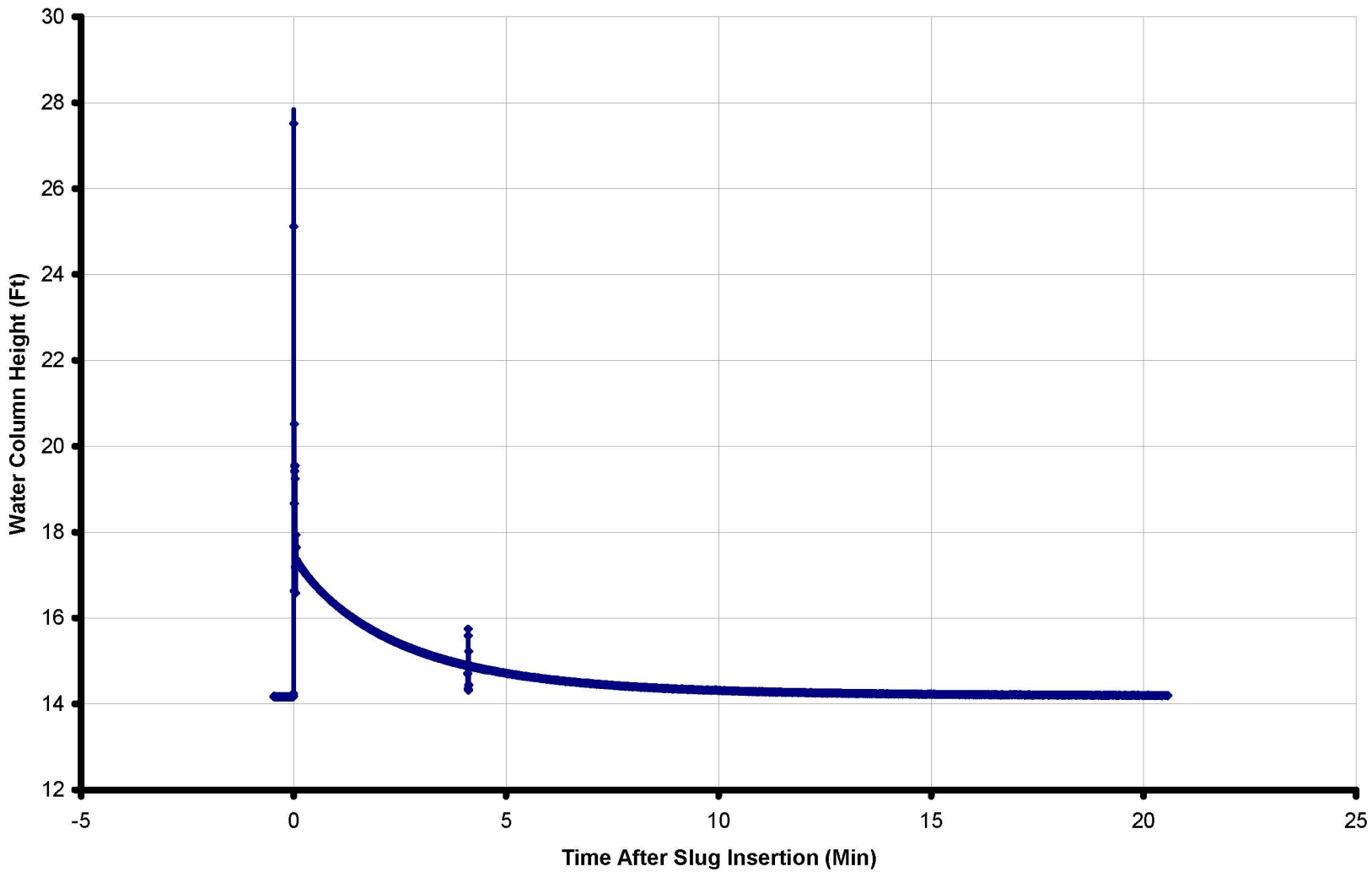
1 Pre-Test Water Level (ft. TOC)/ Time: 94.23 ft / 9:11 AM
2 Water Level after Probe Insertion (ft. TOC)/ Time: 94.22 ft / 9:30 AM
3 Transducer Depth: 45 ft
4 Calc. Pre-Test Head over Transducer: 13.78 ft
5 Measured Pre-Test Head over Transducer: 14.12 ft
6 Time Test Started: Rise test / Slug test 9:15 AM / 9:33 AM
7 Time Test Ended: 9:59 AM
8 *Pressure Head Recovery at End of Test: 14.19 ft
9 Datalogger File Name: 0620018-PTD-OW-401-SLUG

Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 28, 2006
Approved By: [illegible] Date: 7/31/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

OW-401 Permeability Test



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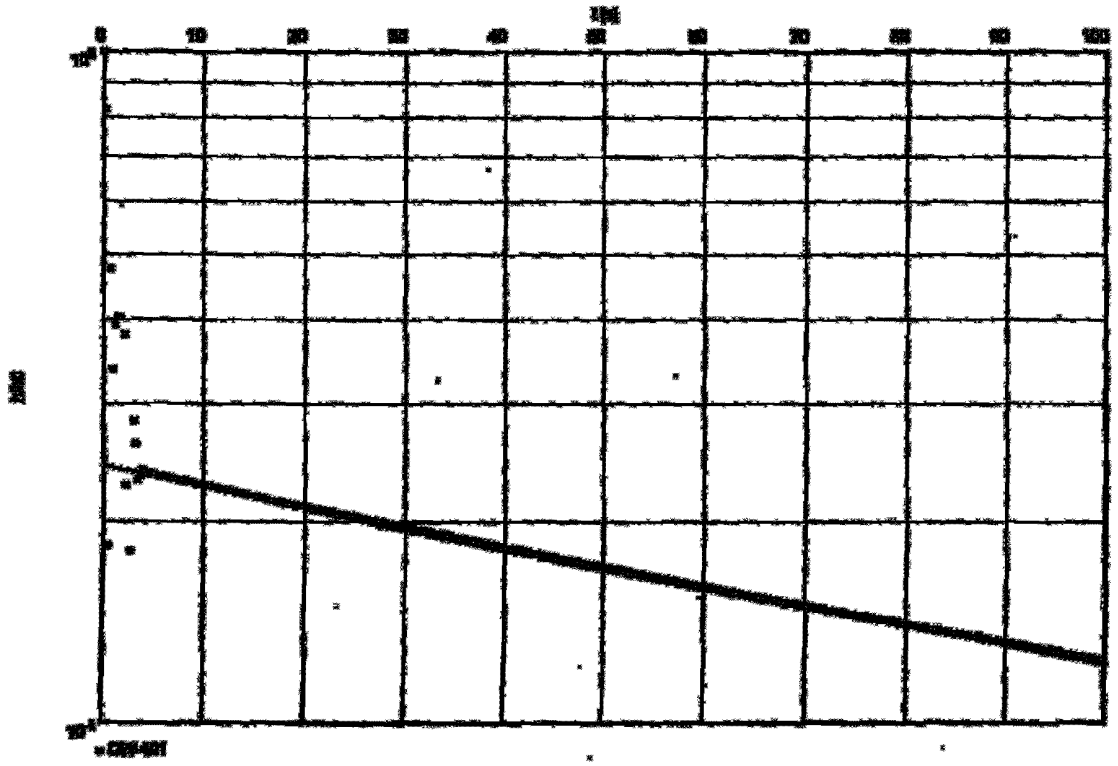
[illegible]	[illegible]	Date: [illegible]	Page 1
		Project: [illegible]	
		Reviewed by: [illegible]	

Slug Test No. 401	Test conducted on: [illegible]
CEI-401	



Hydraulic conductivity (K): [illegible]

INPUT PARAMETERS
Static Water Level = [illegible] ft
Depth to Bottom of Aquifer = [illegible] ft
Length of Screen = [illegible] ft
Radius of Casing = [illegible] ft
Radius of Influence = [illegible] ft
Reviewed by: [illegible]

Schnabel
Geotechnical Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Calvert Cliffs, MD
DATE: 7/5/06
WEATHER/ TEMP: 95 - humid

PROJECT NO.: 06120048
CLIENT: Bechtel Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head) / Rising Head)
Method of Water Withdrawal/ Injection:	(Mechanical Slug / Water Injection/removal)
Volume of Slug:	~~[illegible]~~ 0.625 Gal
Water Level Meter Make and Model:	Solinst WLP-001
Water Level Meter S/N:	
Transducer Make and Model:	
Transducer S/N:	104255 3(LE-001)

WELL INFORMATION	
WELL ID:	DW-13A
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Depth of Well (ft, TOC):	49.19
Screened Interval (ft, TOC):	35'-45'
Riser Height (ft):	2'

1. Pre-Test Static Depth to Water (ft, TOC): 45.86 / 8:55 AM
2. Transducer Depth: 49'
3. Calc. Pre-Test Head over Transducer: 3.12 ft
4. Measured Pre-Test Head over Transducer: 3.16 ft
5. Time Test Started: 9:01 AM / Slug last
6. Time Test Ended: 11:12 AM
7. Measured Head at End of Test: 3.25 ft
8. Datalogger File Name: 06120048-PTD-DW-13A.VDG

PRE-TEST 45.86' / 9:20 AM
NOTE Bottom of slug @ 48' depth. Slug may not be fully submerged!

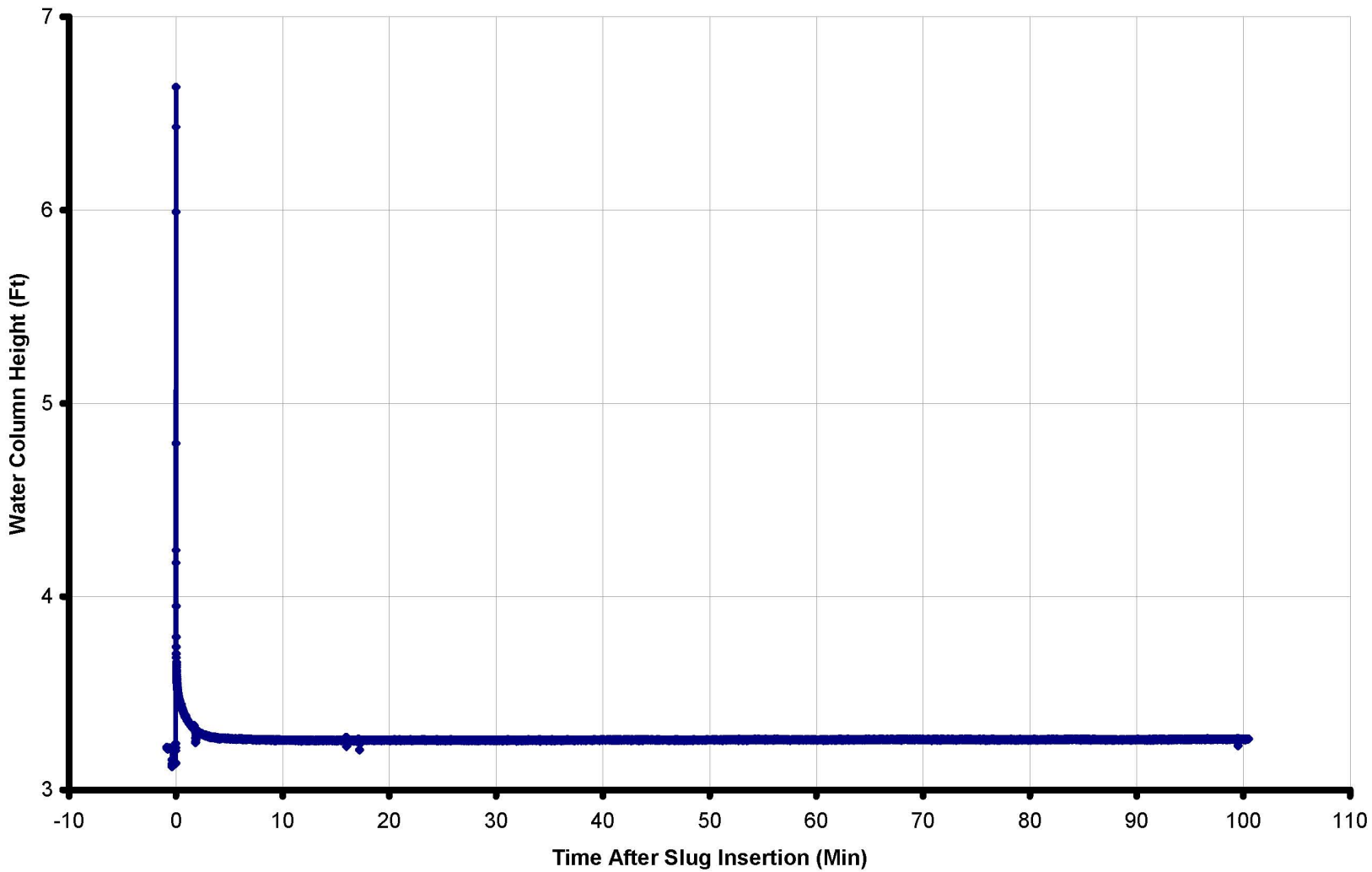
Comments:

NAME: Todd [illegible]
SIGNATURE: [illegible]

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

OW-413A Permeability Test



Schnabel
Schnabel Engineering

[illegible]	[illegible]	Date: [illegible]	Page 1
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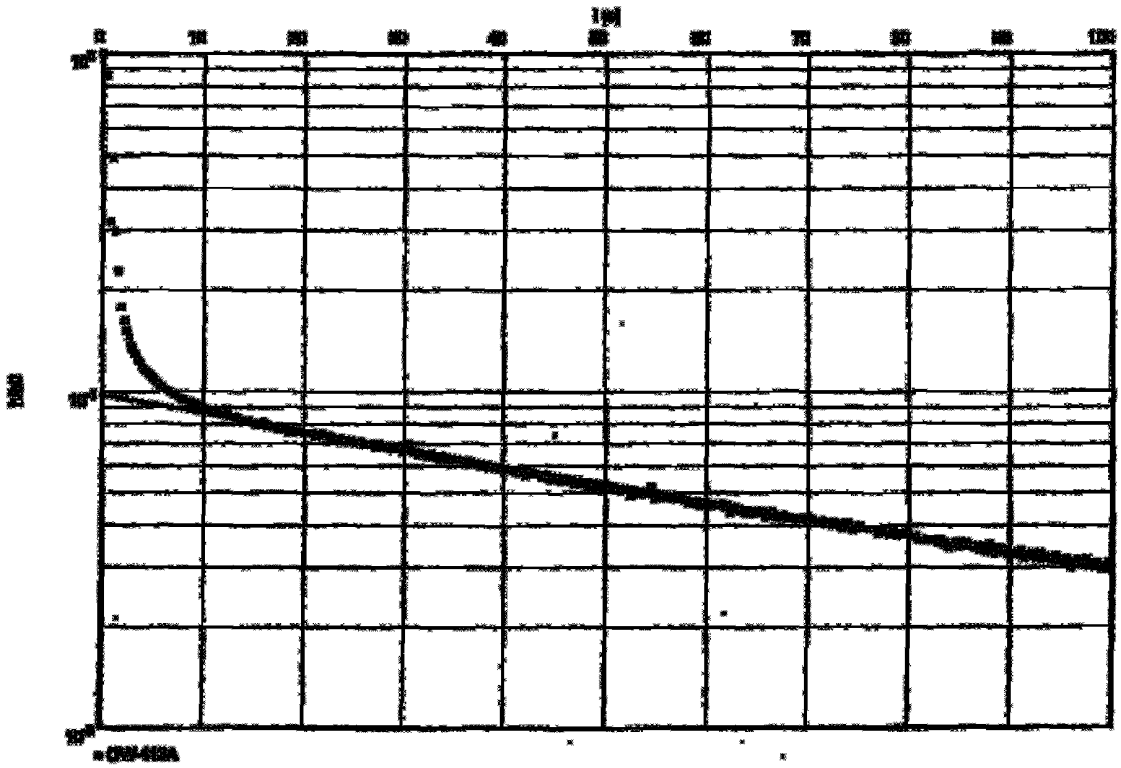
		Evaluated by: [illegible]	
Slug Test No. 4SIA		Test conducted on: [illegible]	
CIM-4SIA			



Hydraulic conductivity (avg): [illegible]

INPUT PARAMETERS
Static Water Level = [illegible] ft
Depth to Bottom of Aquifer = [illegible] ft
Length of Screen = [illegible] ft
Radius of Casing = [illegible] ft
Radius of Influence = [illegible] ft
Evaluated by: [illegible]
Reviewed by: [illegible]

Page 1 of 1

Schnabel
Subsurface Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Calvert Cliffs, MD
DATE: July 21, 2009
WEATHER/ TEMP: [illegible]

PROJECT NO.: 09120048
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Method of Water Withdrawal/ Injection:	(Mechanical Slug / Water Injection/removal)
Volume of Slug:	[illegible] 0.25 GAL
Water Level Meter Make and Model:	
Water Level Meter S/N:	[illegible]
Transducer Make and Model:	
Transducer S/N:	104159 SLUG-002

WELL INFORMATION	
WELL ID:	OW-413B
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Depth of Well (ft, TOC):	>100
Screened Interval (ft, TOC):	110-120'
Riser Height (ft):	2'

1 Pre-Test Static Depth to Water (ft, TOC): 86.55 / 9:00 AM
2 Transducer Depth: 100 ft
3 Calc. Pre-Test Head over Transducer: 13.45 ft
4 Measured Pre-Test Head over Transducer: 13.90 ft
5 Time Test Started: Re-test / Slug test 9:42 AM / 9:47 AM
6 Time Test Ended: 11:09 AM
7 Pressure Transducer at End of Test: 13.88 ft
8 Datalogger File Name: 09120048-PID-OW-413B-SLUG

PRE-TEST 86.55 / 9:41 AM

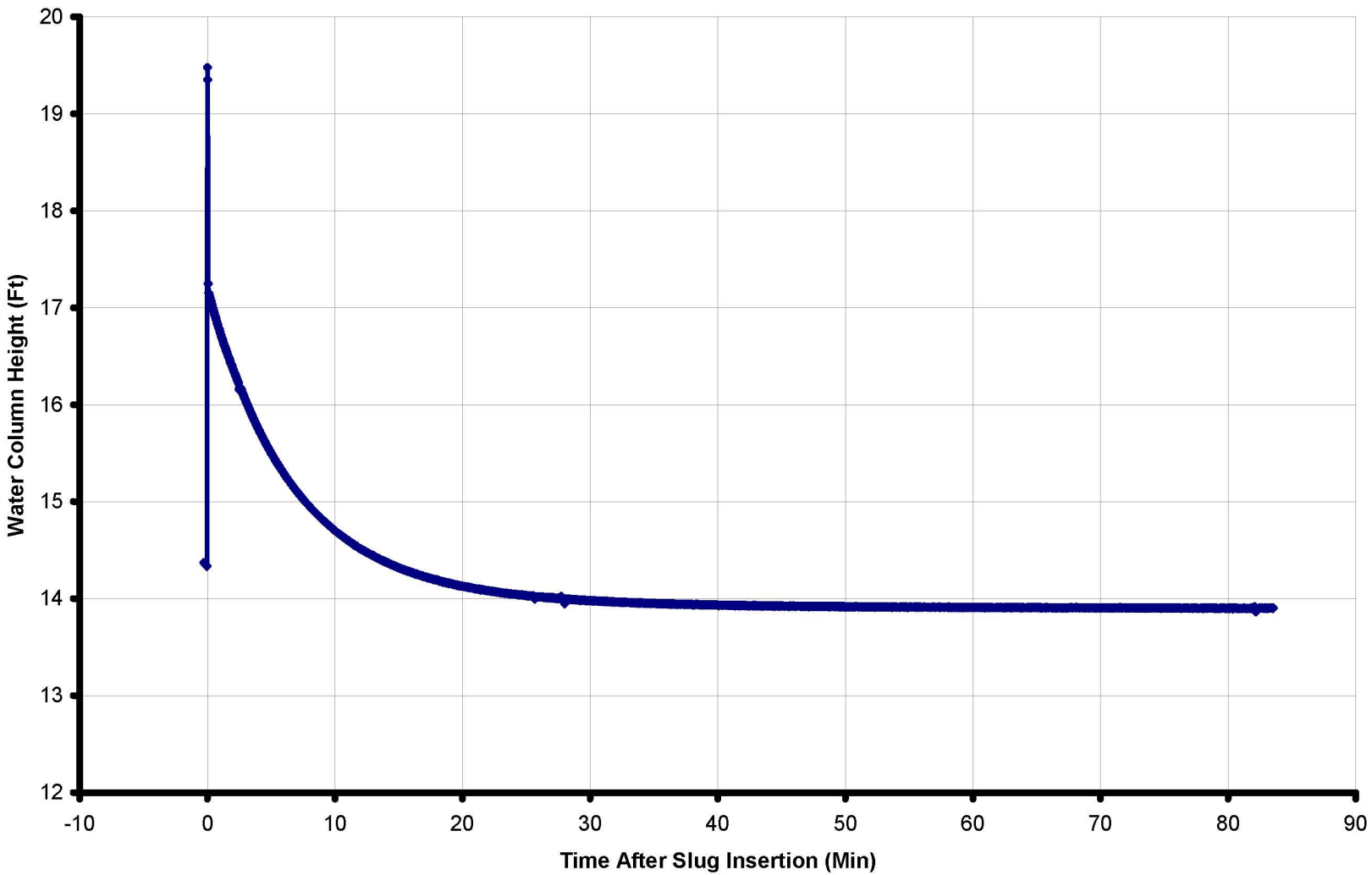
Comments:

NAME: Todd Wilson
SIGNATURE: [signature]

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

OW-413B Permeability Test



Schnabel
Schnabel Engineering

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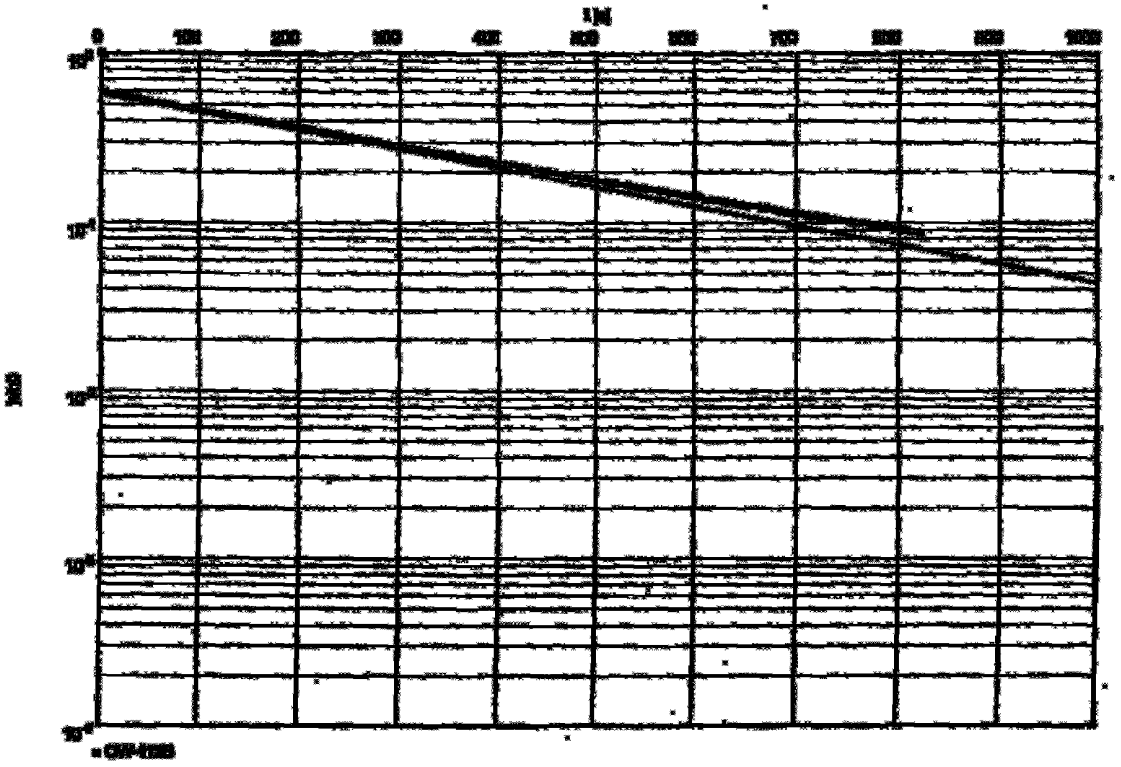
Slug Test File: [illegible]		Test performed on: [illegible]	
CSV-[illegible]			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Schnabel
Distinguished Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Colonial Cliffs NPP GOLA Project
LOCATION: Luling, MD
DATE: July 28, 2006
WEATHER/ TEMP: 85 - humid

PROJECT NO.: 06120048
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	~~[illegible]~~ 0.615 Gal.
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	104255
Slug S/N:	SLUG-001

WELL INFORMATION	
WELL ID:	OW-418A
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	59.45
Screen Interval Depth (ft, TOC):	25-35
Riser Height (ft):	2.2'

1. Pre-Test Water Level (ft, TOC)/ Time: 8.39 ft/10:50 AM
2. Water Level after Probe Insertion (ft, TOC)/ Time: 8.39 ft/11:10 AM
3. Transducer Depth: 20 ft
4. Calc. Pre-Test Head over Transducer: 11.61 ft
5. Measured Pre-Test Head over Transducer: 11.52 ft
6. Time Test Started: (for both slug test) 10:52/11:17 AM
7. Time Test Ended: 11:41 AM
8. Percent Recovered at End of Test: 11.62 ft
9. Datalogger File Name: 06120048-PTD-OW-418A-SLUG

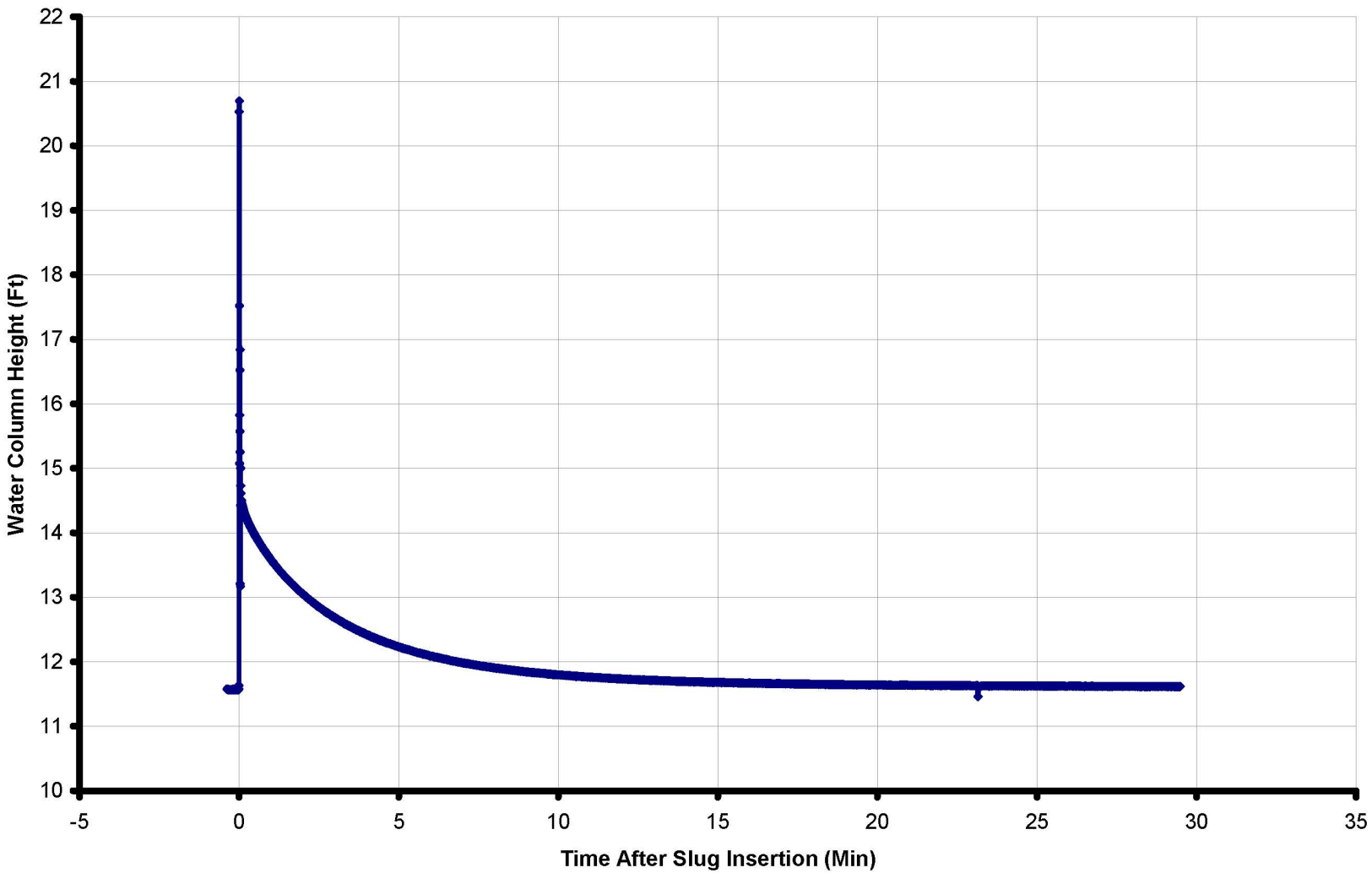
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 28, 2006
Approved By: Mark Dunn Date: 9/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

OW-418A Permeability Test



Schnabel
Schnabel Engineering

[illegible]	[illegible]	Date: [illegible]	Page 1
[illegible]		Project: [illegible]	
		Evaluated by: [illegible]	

Slug Test No. [illegible]	Test conducted on: [illegible]
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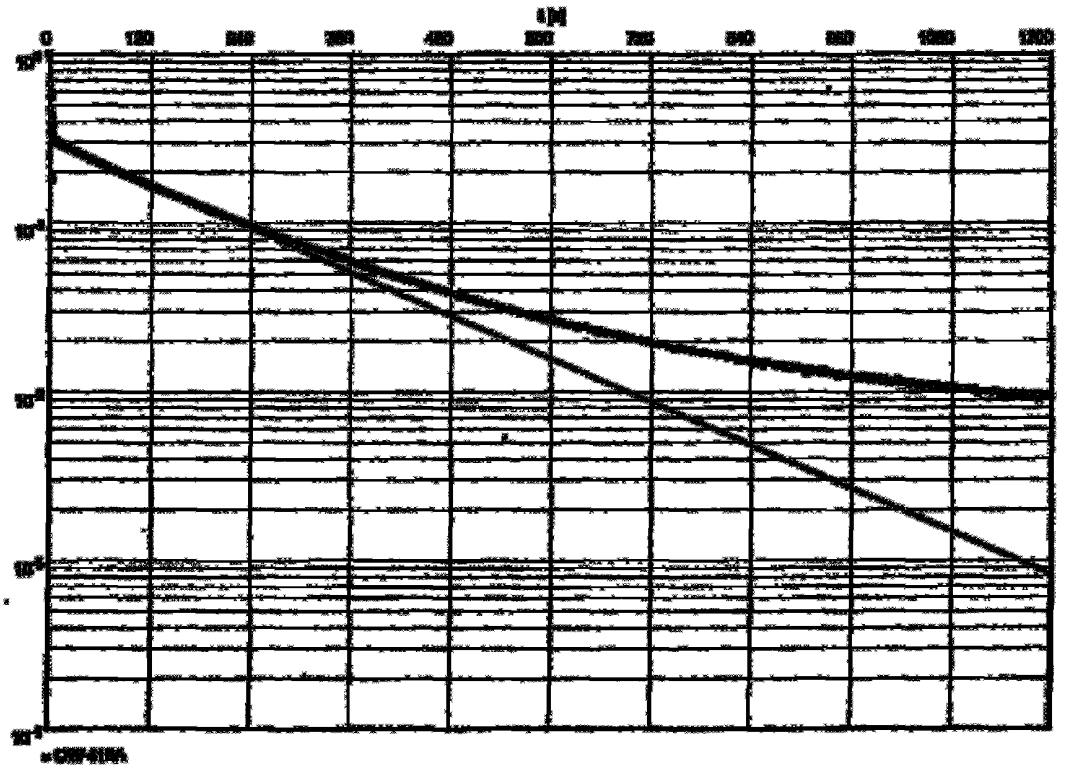


Hydraulic conductivity [illegible]: [illegible]

INPUT PARAMETERS
Static Water Level = [illegible] ft
Depth to Bottom of Aquifer = [illegible] ft
Length of Screen = [illegible] ft
Radius of Casing = [illegible] ft
Radius of Influence = [illegible] ft
Evaluated by: [illegible]
Reviewed by: [illegible]

Schnabel
Schnabel Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs ISFP GDLA Project
LOCATION: Lusby, MD
DATE: July 28, 2006
WEATHER/TEMP: 90 - humid

PROJECT NO.: [illegible]
CLIENT: Nuclear Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	~~[illegible]~~ 0.45 GAL
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	104213
Slug S/N:	SLUG-003

WELL INFORMATION	
WELL ID:	OW-4185
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	35.54
Screen Interval Depth (ft, TOC):	5-35
Riser Height (ft):	2.7

1 Pre-Test Water Level (ft, TOC)/ Time: 12.61 / ~~[illegible]~~ 8:40 AM
2 Water Level after Probe Insertion (ft, TOC)/ Time: 12.55' / 10:00 AM
3 Transducer Depth: 30 FT
4 Calc. Pre-Test Head over Transducer: 17.45 FT
5 Measured Pre-Test Head over Transducer: 17.67 FT
6 Time Test Started: 8:41 AM / 10:05 AM
7 Time Test Ended: 1:09 PM
8 Measured Head at End of Test: 18.04 FT
9 Datalogger File Name: 061208-TD-OW-4185-SLUG

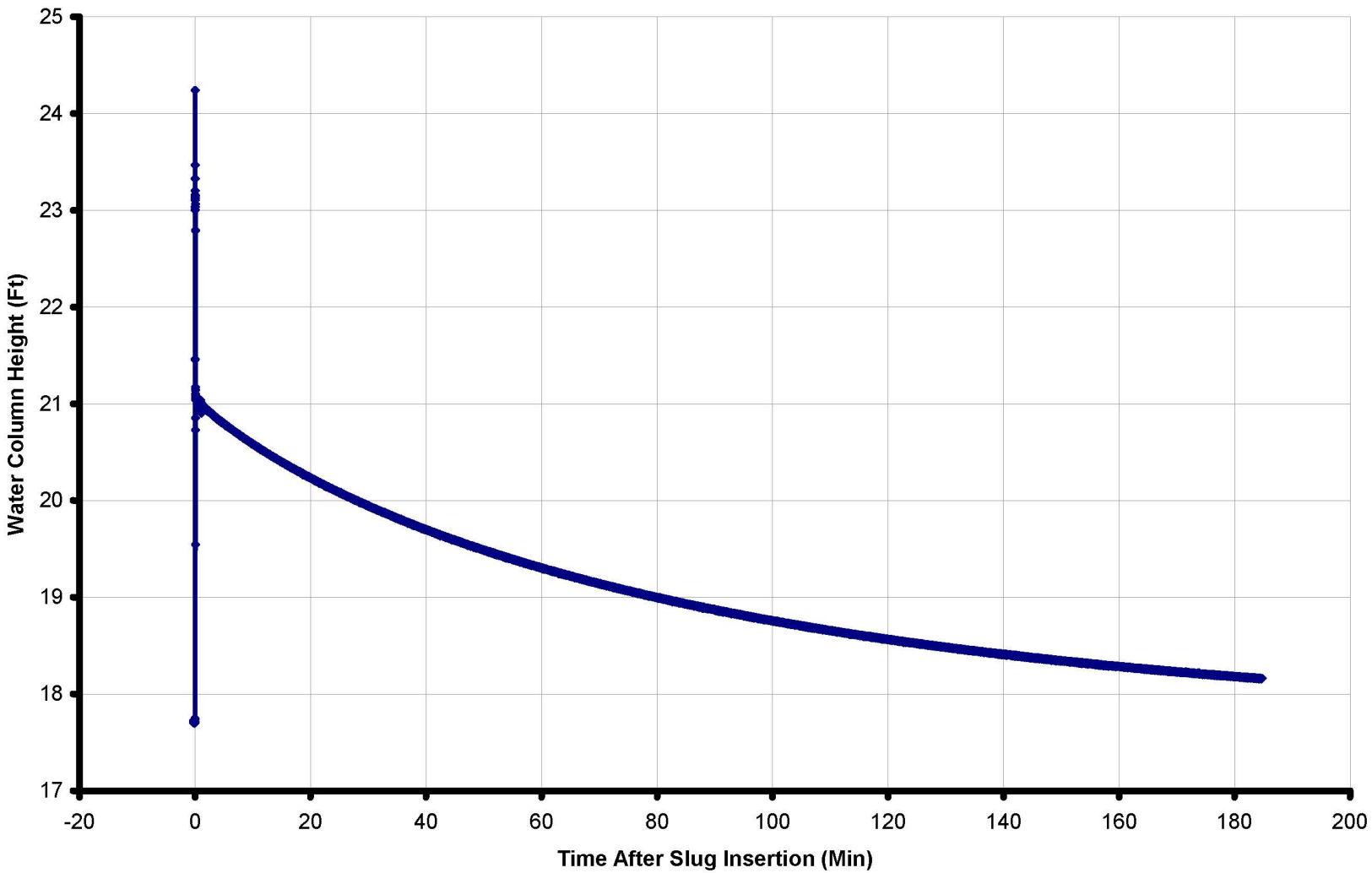
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: 7/28/06
Approved By: [illegible] Date: 9/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

OW-418B Permeability Test



Schnabel
Schnabel Engineering

[illegible]	[illegible]	Date: [illegible]	Page 1
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		Reviewed by: [illegible]	
Slug Test No. [illegible]		Test conducted on: [illegible]	
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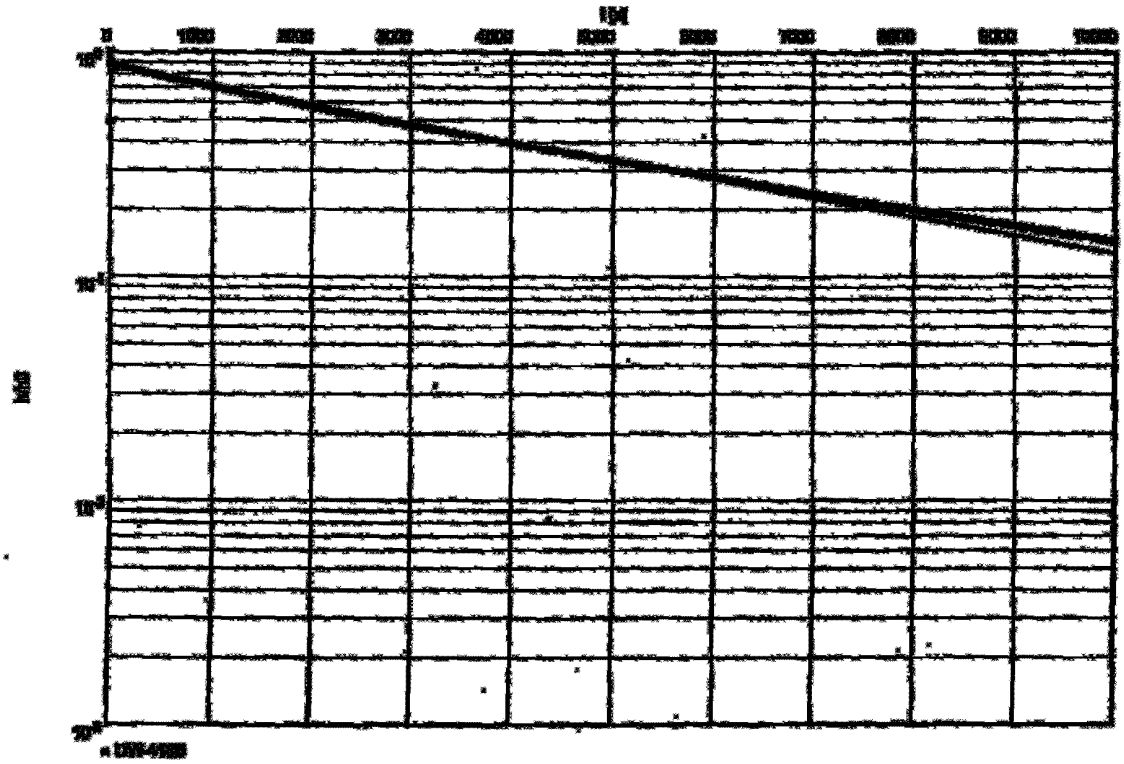
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[illegible]
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Schnabel
Technical Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP GOLA Project
LOCATION: Lusby, MD
DATE: July 24th, 2006
WEATHER/TEMP: 85° clear

PROJECT NO.: [illegible]
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	[illegible] 0.6256 GL
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	104255
Slug S/N:	Slug-001

WELL INFORMATION	
WELL ID:	OW-423
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	42.12
Screen Interval Depth (ft, TOC):	30-40'
Riser Height (ft):	18"

1. Pre-Test Water Level (ft, TOC)/ Time: 29.76 / 3:09 pm
2. Water Level after Probe Insertion (ft, TOC)/ Time: 29.75 / 3:29 pm
3. Transducer Depth: 40 ft
4. Calc. Pre-Test Head over Transducer: 10.25
5. Measured Pre-Test Head over Transducer: 10.10
6. Time Test Started: Pretest / Slug test 15:15 / 15:35
7. Time Test Ended: 15:45
8. Residual Head Delay at End of Test: 10.16
9. Datalogger File Name: 06120048-PTD-OW-423-SLUG

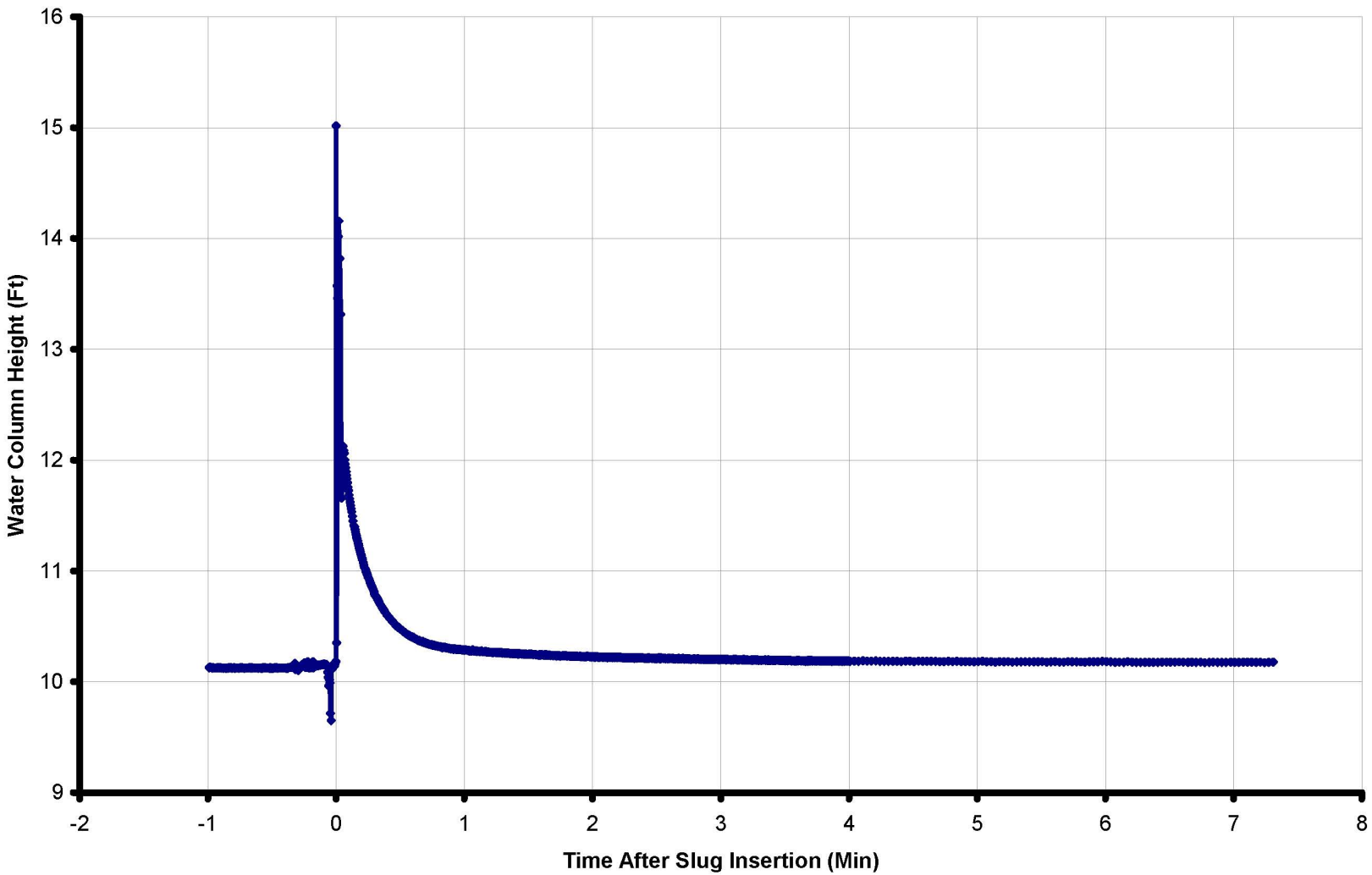
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 24th 2006
Approved By: [illegible] Date: 9/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

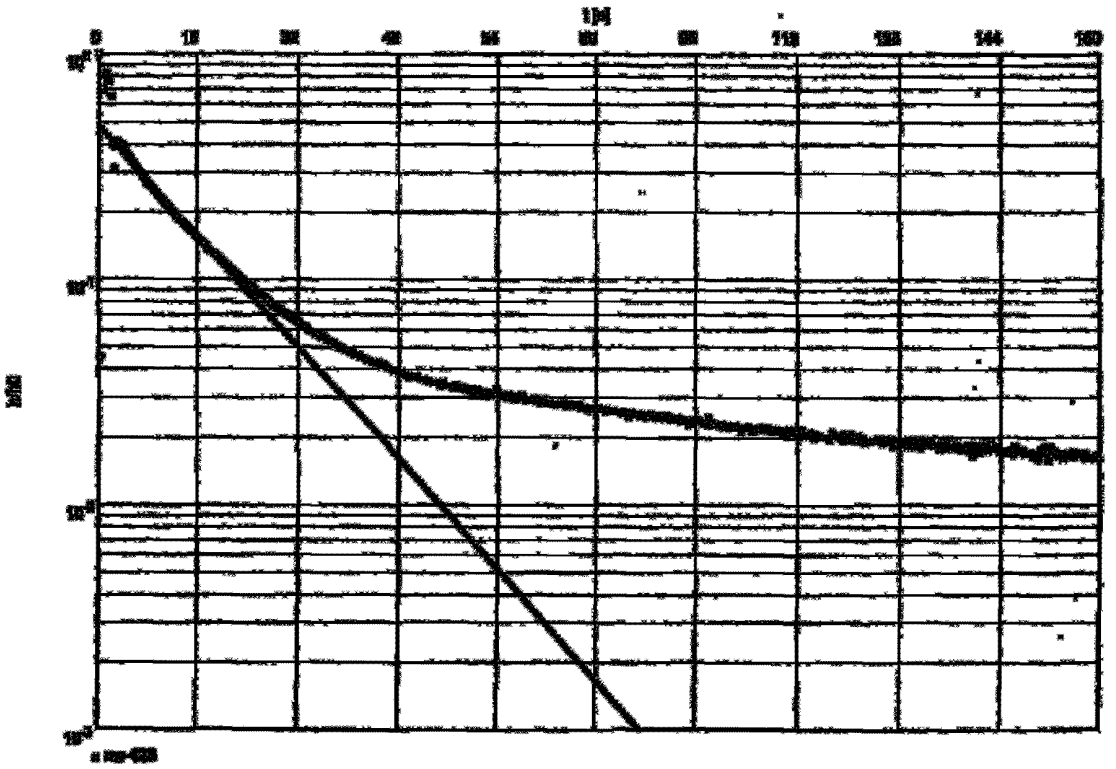
OW-423 Permeability Test



Schnabel
Schnabel Engineering

[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	
		[illegible]	

[illegible]	[illegible]
[illegible]	



Hydraulic conductivity [illegible]: [illegible]

INPUT PARAMETERS
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
Evaluated by: [illegible]
Reviewed by: [illegible]

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Schnabel
Technical Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP CCLA Project
LOCATION: Lusby, MD
DATE: July 24 2006
WEATHER/TEMP: 78° Dry

PROJECT NO.: [illegible]
CLIENT: Nuclear Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	~~[illegible]~~ 0.625 Gal
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	104255
Slug S/N:	SLUG-001

WELL INFORMATION	
WELL ID:	OW-428
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	49.05'
Screen Interval Depth (ft, TOC):	35' - 45'
Riser Height (ft):	1.5' ±

1. Pre-Test Water Level (ft, TOC)/ Time: 37.75 / 1:17 pm
2. Water Level after Probe Insertion (ft, TOC)/ Time: 37.79 / 1:26 pm
3. Transducer Depth: 44 ft
4. Calc. Pre-Test Head over Transducer: 6.25 ft
5. Measured Pre-Test Head over Transducer: 6.12 ft
6. Time Test Started: Pre-test / Slug test 1:20 / 1:43
7. Time Test Ended: 1:50 PM
8. ~~Pneumatic Pressure~~ Water at End of Test: 37.45 LIFT
9. Datalogger File Name: 06120048-PTD-OW-428-SLUG

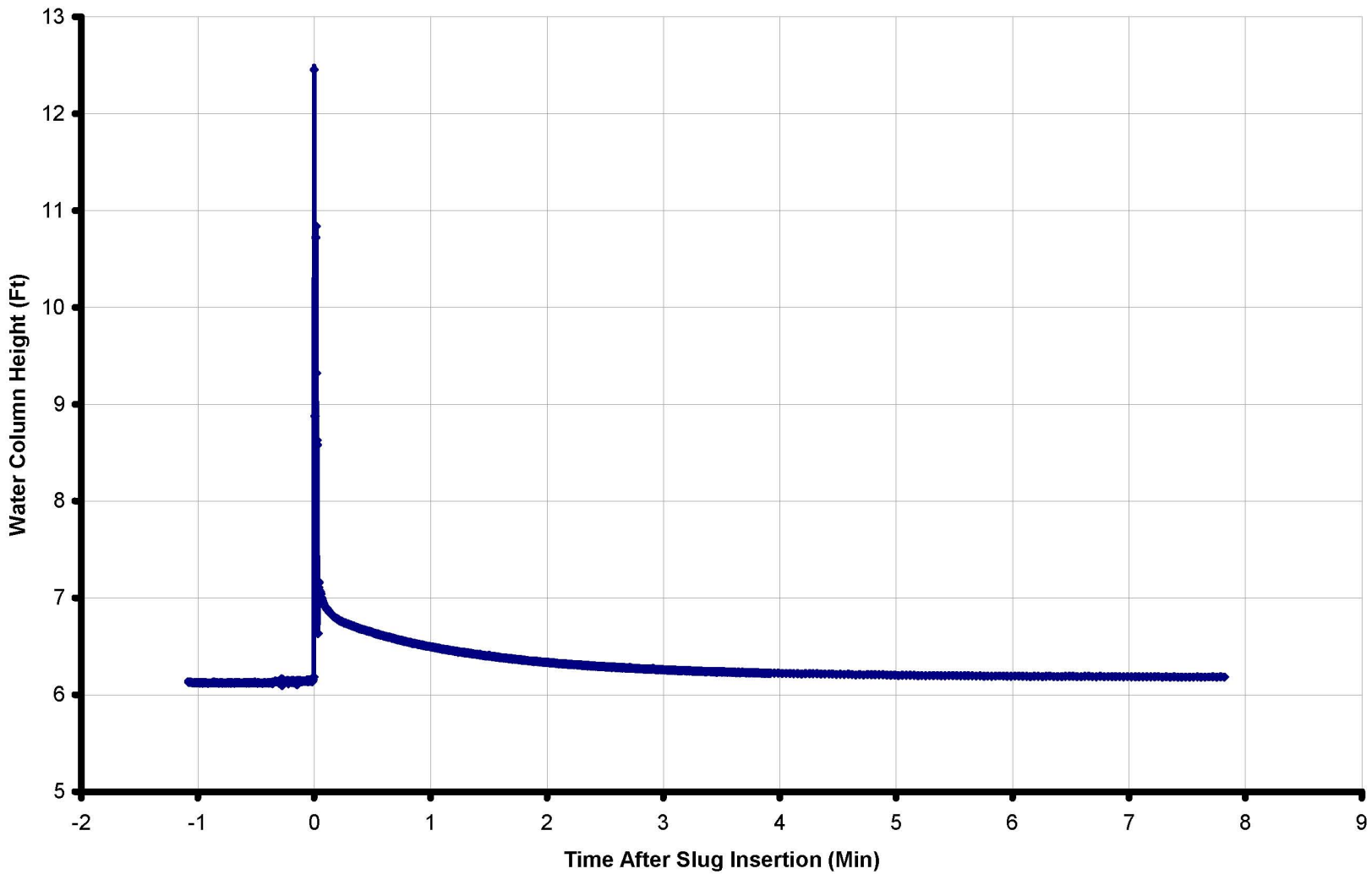
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 24, 2006
Approved By: [illegible] Date: 9/2-1/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

OW-428 Permeability Test



Schnabel
Schnabel Engineering

[illegible]	[illegible]	Date: [illegible] Page 1
		Project: [illegible]
		Evaluated by: [illegible]
Slug Test No. [illegible]		Test conducted on: [illegible]
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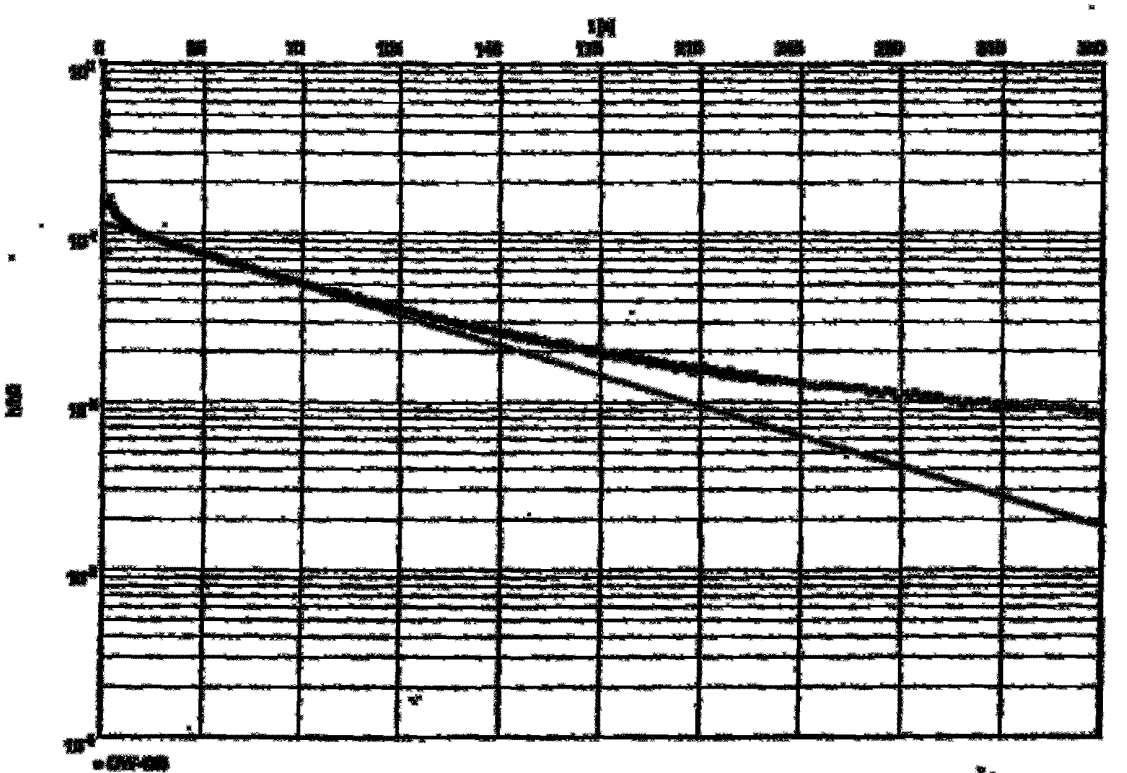


Hydraulic conductivity [m/s]: 1.10 x 10[illegible]

INPUT PARAMETERS

Static Water Level = [illegible] ft

Depth to Bottom of Aquifer = [illegible] ft

Length of Screen = [illegible] ft

Radius of Casing = [illegible] ft

Radius of Screen = [illegible] ft

Evaluated by: [illegible]

Reviewed by: [illegible]

Schnabel
Schnabel Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 25, 2006
WEATHER/ TEMP: 80° Clear

PROJECT NO.: 08120048
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	0.625 Gal. 0.625 Gal
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	104755
Slug S/N:	SLUG-001

WELL INFORMATION	
WELL ID:	OW-436
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	43.5'
Screen Interval Depth (ft, TOC):	23-38'
Riser Height (ft):	22.5"

1. Pre-Test Water Level (ft, TOC)/ Time: 31.62 ft / 8:07 AM
2. Water Level after Probe Insertion (ft, TOC)/ Time: 31.62 ft / 8:35 AM
3. Transducer Depth: 40 ft
4. Calc. Pre-Test Head over Transducer: 8.38 ft
5. Measured Pre-Test Head over Transducer: 8.26 ft
6. Time Test Started: Pre-test Slug test 8:44 / 8:57 AM
7. Time Test Ended: 9:27 AM
8. Head Recovery at End of Test: 8.43
9. Datalogger File Name: 06120048-PH-OW-436-Slug

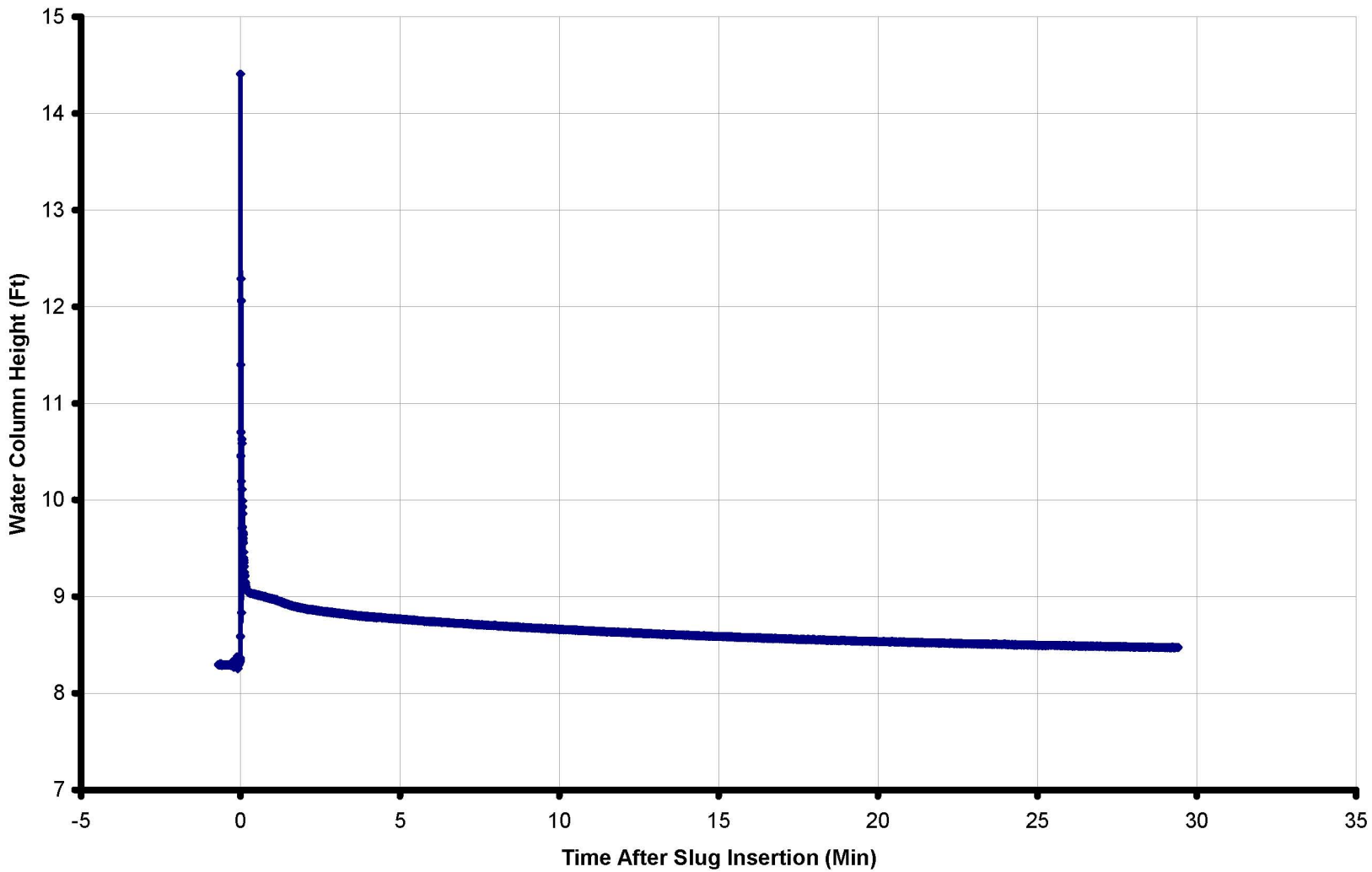
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd Uhler Date: July 25th, 2006
Approved By: [illegible] Date: 4/21/08

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

OW-436 Permeability Test



Schnabel
Schnabel Engineering

[illegible]	[illegible]	[illegible]	Page 1
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		Reviewed by: [illegible]	
Slug Test No. [illegible]		Test conducted on: [illegible]	
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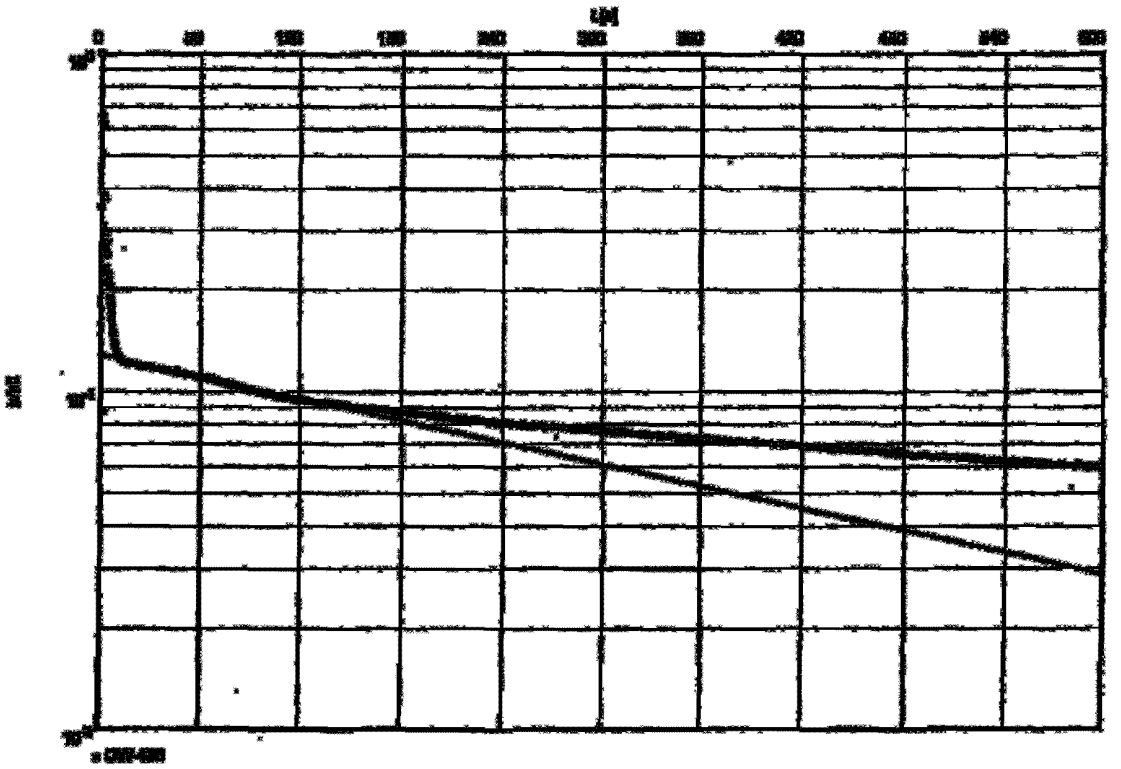


Hydraulic conductivity [m/s]: [illegible]

INPUT PARAMETERS
Static Water Level = [illegible] ft
Depth to Bottom of Aquifer = [illegible] ft
Length of Screen = [illegible] ft
Radius of Casing = [illegible] ft
Radius of Influence = [illegible] ft
Evaluated by: [illegible]
Reviewed by: [illegible]

Schnabel
Schnabel Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 26, 2006
WEATHER/TEMP: 85, humid

PROJECT NO.: [illegible]
CLIENT: Bechtel Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Nitrogen / Water)
Approximate Volume of Slug:	0.625 GAL
Manual Water Level Meter S/N:	L-L P-001
Transducer S/N:	104255
Slug S/N:	SLUG-001

WELL INFORMATION	
WELL ID:	OW-703A
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	48.9
Screen Interval Depth (ft, TOC):	35-45
Riser Height (ft):	2'

1. Pre-Test Water Level (ft, TOC)/ Time: 27.33 ft / 8:10 am
2. Water Level after Probe Insertion (ft, TOC)/ Time: 27.34 ft / 8:36 am
3. Transducer Depth: 40 ft
4. Calc. Pre-Test Head over Transducer: 12.66 ft
5. Measured Pre-Test Head over Transducer: 12.52 ft
6. Time Test Started: Pre test / Slug test 8:15 AM / 8:40 AM
7. Time Test Ended: 9:06 AM
8. ~~Percent Recovery~~ Head at End of Test: 12.57 ft
9. Datalogger File Name: 060709-PTD-OW-703A-SLUG

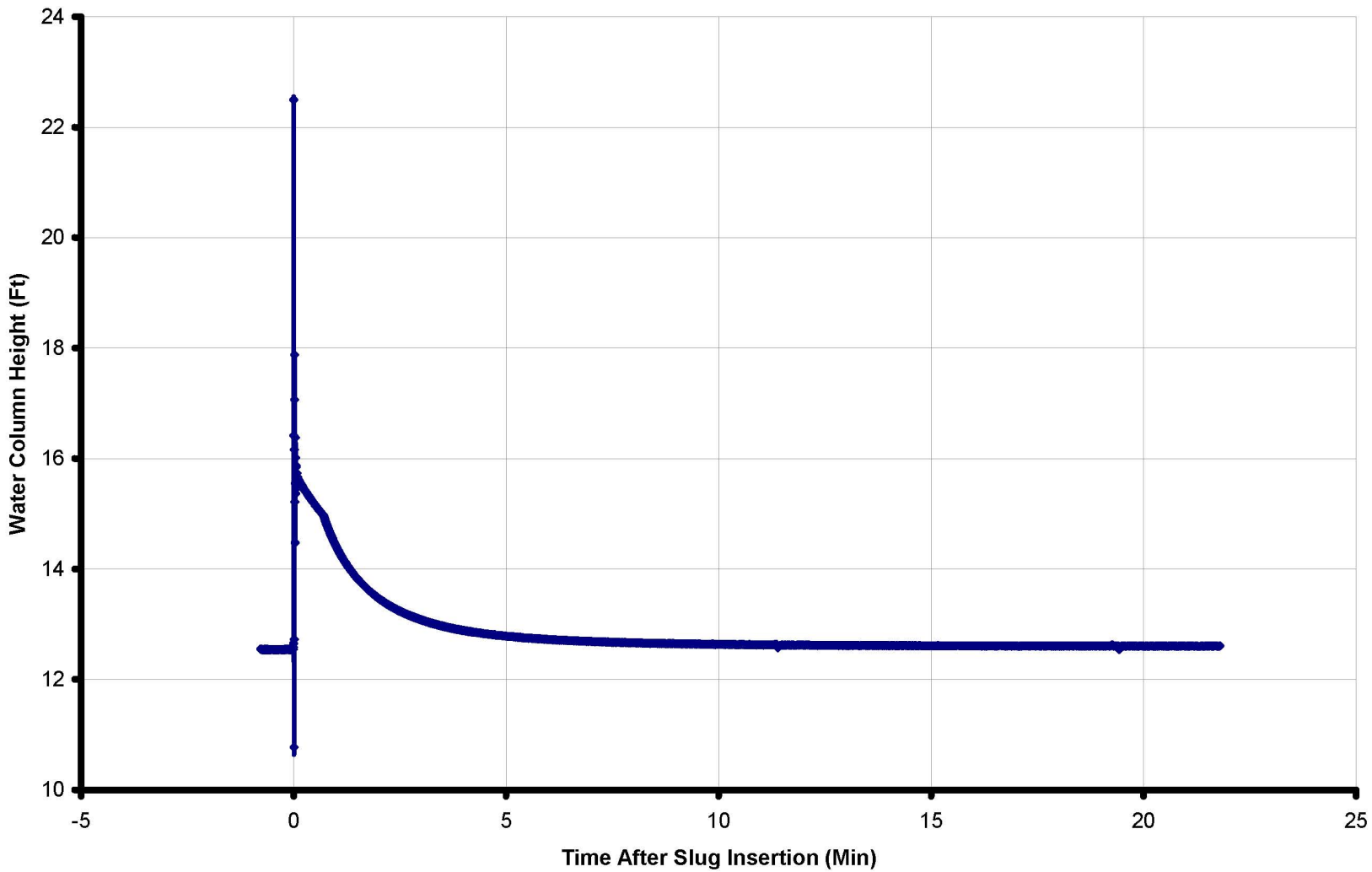
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: [illegible] Date: July 26, 2006
Approved By: [illegible] Date: 9/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

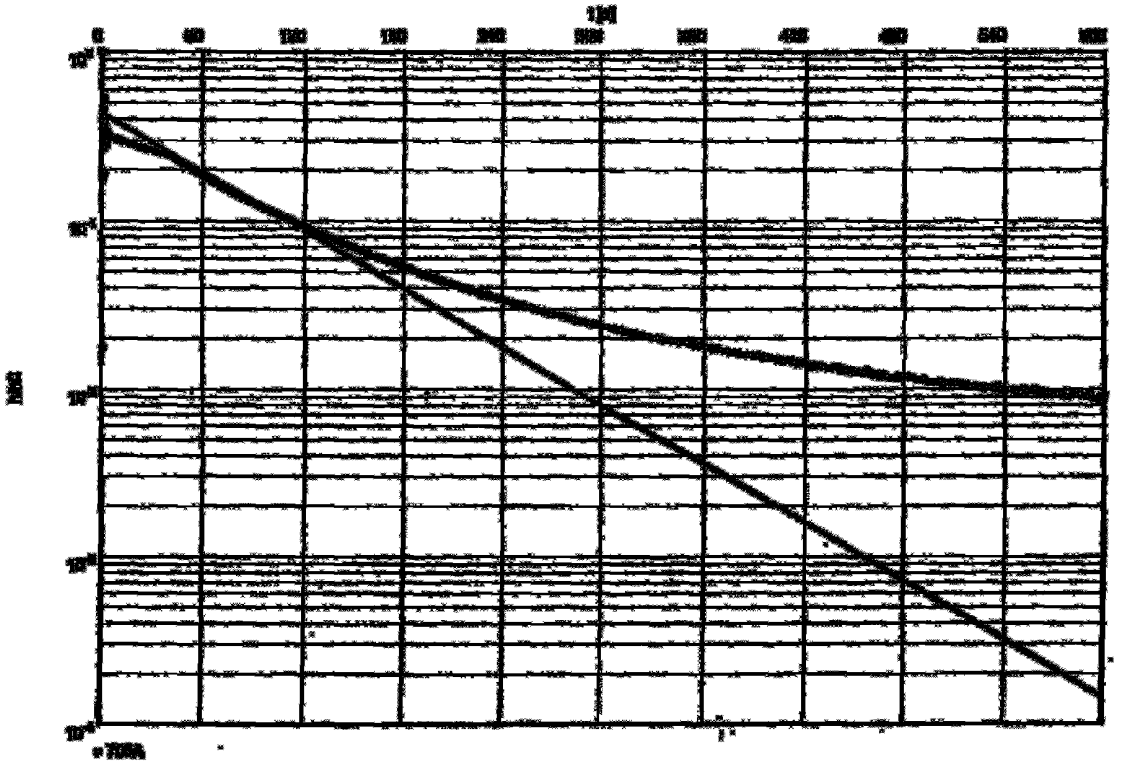
OW-703A Permeability Test



Schnabel
Schnabel Engineering

[illegible]	[illegible]	Date: [illegible]	Page 1
[illegible]		Project Subset [illegible]	
		Reviewed by: [illegible]	

Slug Test No. 2[illegible]	Test performed on [illegible]
[illegible]	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Schnabel
Geotechnical Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 26, 2006
WEATHER/ TEMP: 7 [illegible]

PROJECT NO.: [illegible]
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	[illegible] 0.675 GAL
Manual Water Level Meter S/N:	LL-P-001
Transducer S/N:	101259
Slug S/N:	SLUG-002

WELL INFORMATION	
WELL ID:	OW-703R
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	81.65
Screen Interval Depth (ft, TOC):	68-78
Riser Height (ft):	2'

1. Pre-Test Water Level (ft, TOC)/ Time: 29.30/8:53 AM
2. Water Level after Probe Insertion (ft, TOC)/ Time: 29.27 AM/9:42 AM
3. Transducer Depth: 40 ft
4. Calc. Pre-Test Head over Transducer: 10.73 ft
5. Measured Pre-Test Head over Transducer: 10.69 ft
6. Time Test Started: Pre-test / Slug test 9:01 AM / 9:49 AM
7. Time Test Ended: 11:16 AM
8. Final Head Recovery at End of Test: 10.74 ft
9. Datalogger File Name: 060048-PTD-OW-703R-Slug

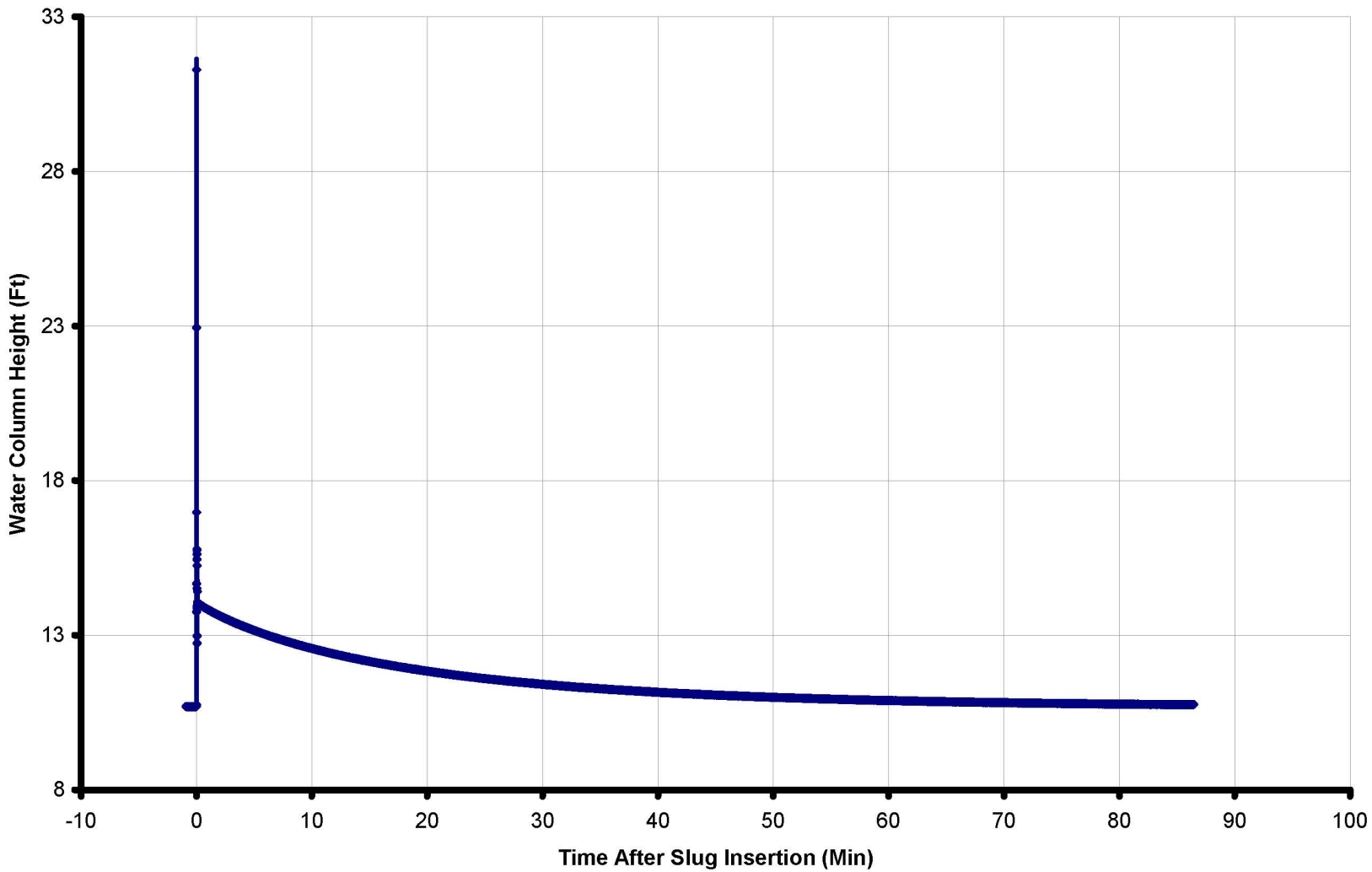
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 26, 2006
Approved By: [illegible] Date: 9/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

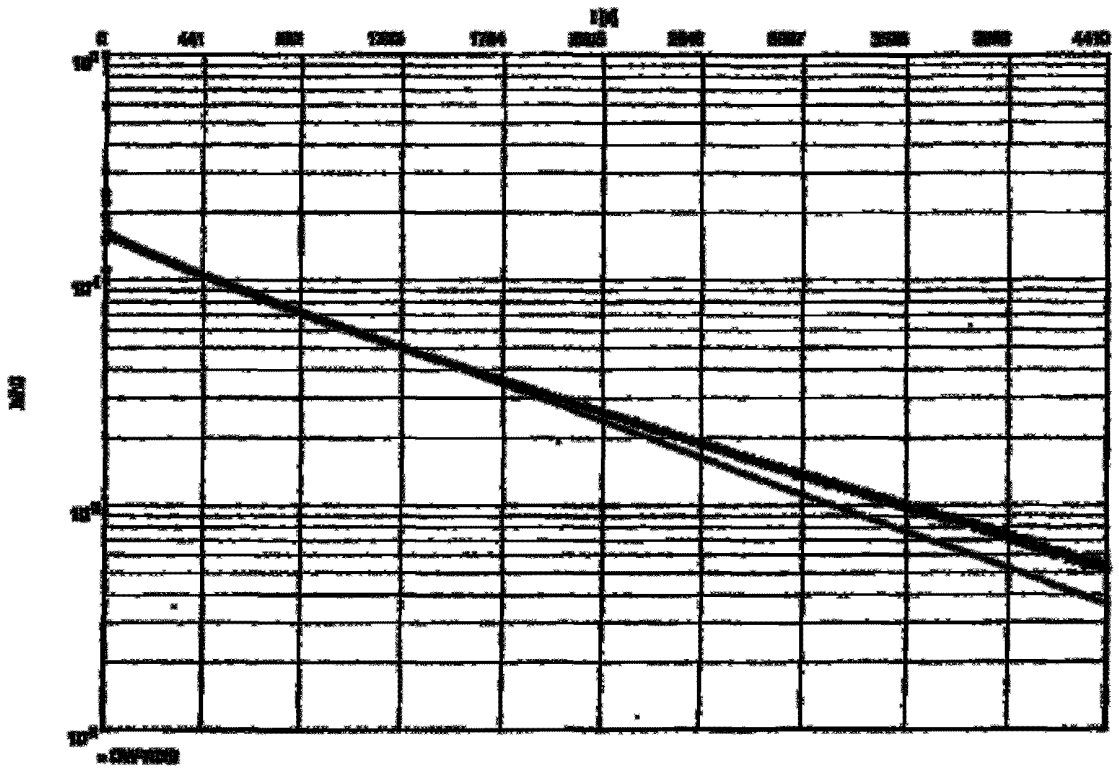
Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

OW-703B Permeability Test



Schnabel
Schnabel Engineering

[illegible]	[illegible]	Date: [illegible]	Page 1
		Project: [illegible]	
		Evaluated by: [illegible]	
Slug Test No. [illegible]		Test conducted on: [illegible]	
[illegible]			



Hydraulic conductivity (K): [illegible]

INPUT PARAMETERS
Static Water Level = [illegible] ft
Depth to Bottom of Aquifer = [illegible] ft
Length of Screen = [illegible] ft
Radius of Casing = [illegible] ft
Radius of Screen = [illegible] ft
Evaluated by: [illegible]

Reviewed by: [illegible]

Schnabel
Schnabel Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 27, 2006
WEATHER/ TEMP: 90's humid

PROJECT NO.: [illegible]
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	~~[illegible]~~ 0.6256 ft
Manual Water Level Meter S/N:	~~[illegible]~~ WLP-001
Transducer S/N:	104255
Slug S/N:	Slug-001

WELL INFORMATION	
WELL ID:	DW-705
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	61.46
Screen Interval Depth (ft, TOC):	40-50
Riser Height (ft):	2' 5"

1. Pre-Test Water Level (ft, TOC)/ Time: 20.28 ft / 2:49 pm
2. Water Level after Probe Insertion (ft, TOC)/ Time: 20.27 ft / 3:16 pm
3. Transducer Depth: 40 ft
4. Calc. Pre-Test Head over Transducer: 19.73
5. Measured Pre-Test Head over Transducer: 19.58
6. Time Test Started: Slug Insert / Slug Insert 2:52 / 3:24 pm
7. Time Test Ended: 4:22 pm
8. Percent Recovery at End of Test: 19.65
9. Datalogger File Name: [illegible]-PID-DW-705-SLUG

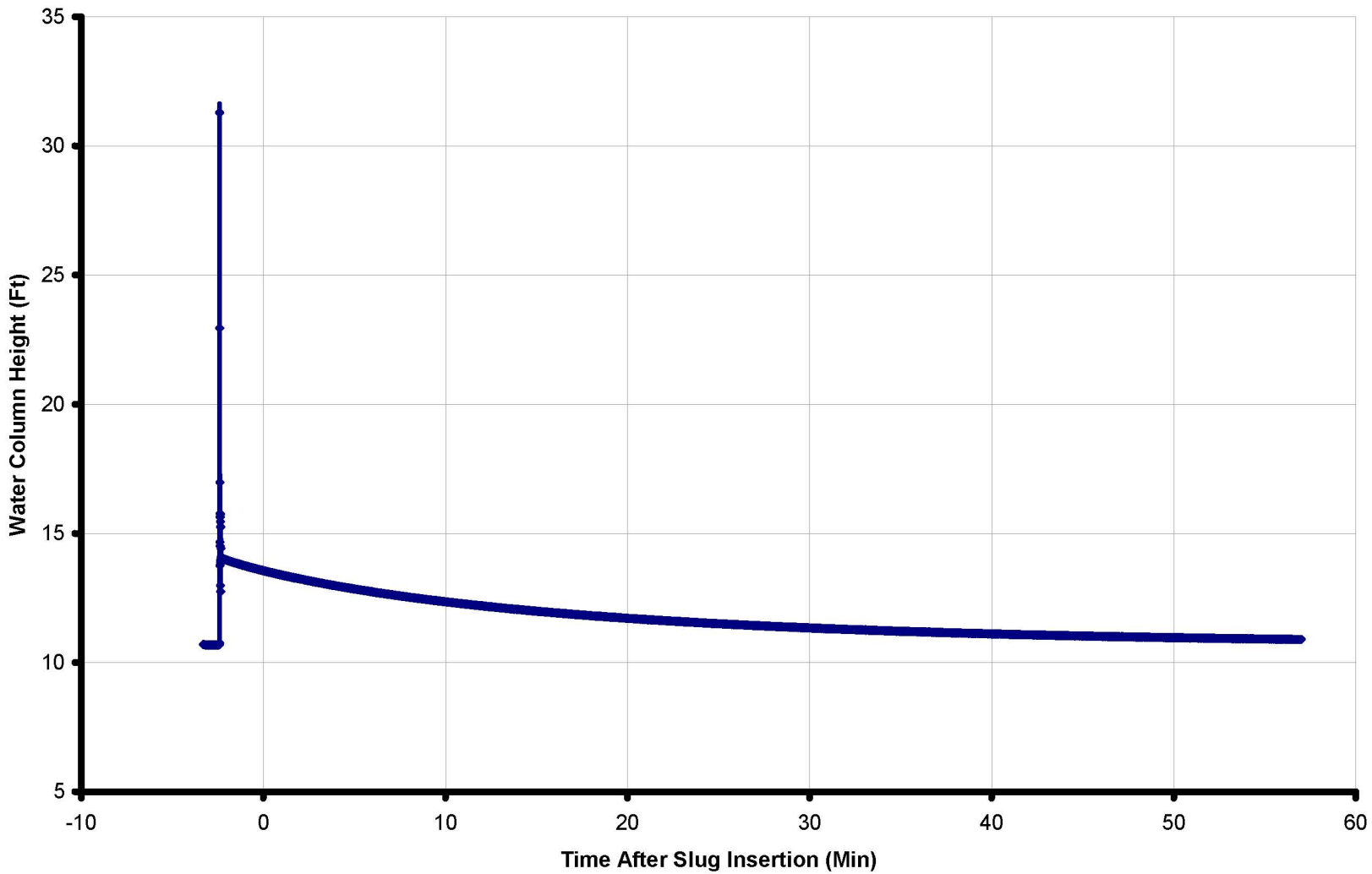
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 27, 2006
Approved By: [illegible] Date: 9/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

OW-705 Permeability Test



Schnabel
Schnabel Engineering

[illegible]	[illegible]	[illegible]	Page 1
		Project: [illegible]	
		Evaluated by: [illegible]	
Slug Test No. [illegible]		Test conducted on: [illegible]	
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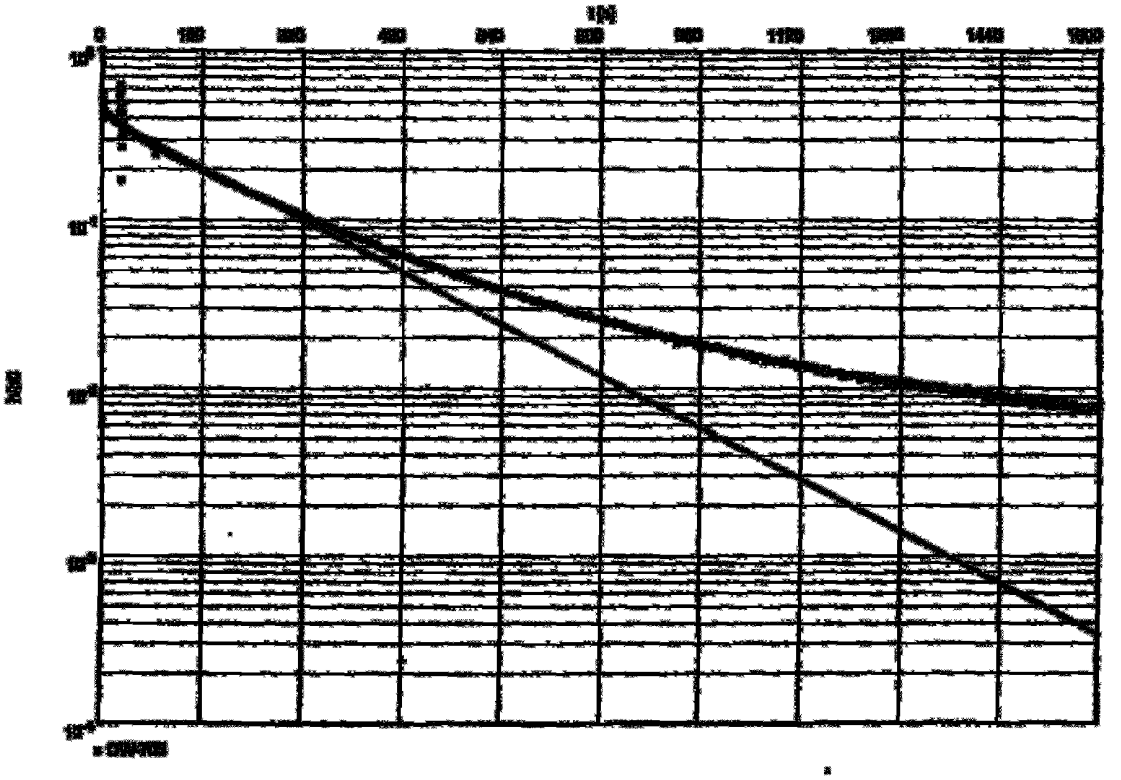
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Schnabel Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 26-27, 2016
WEATHER/ TEMP: 90° Clear

PROJECT NO.: [illegible]
CLIENT: Bechtel Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Deflater)
Approximate Volume of Slug:	[illegible] 0.615 Gal.
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	1047 55
Slug S/N:	SLUG-001

WELL INFORMATION	
WELL ID:	704
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	35.74
Screen Interval Depth (ft, TOC):	22-32'
Riser Height (ft):	22.5

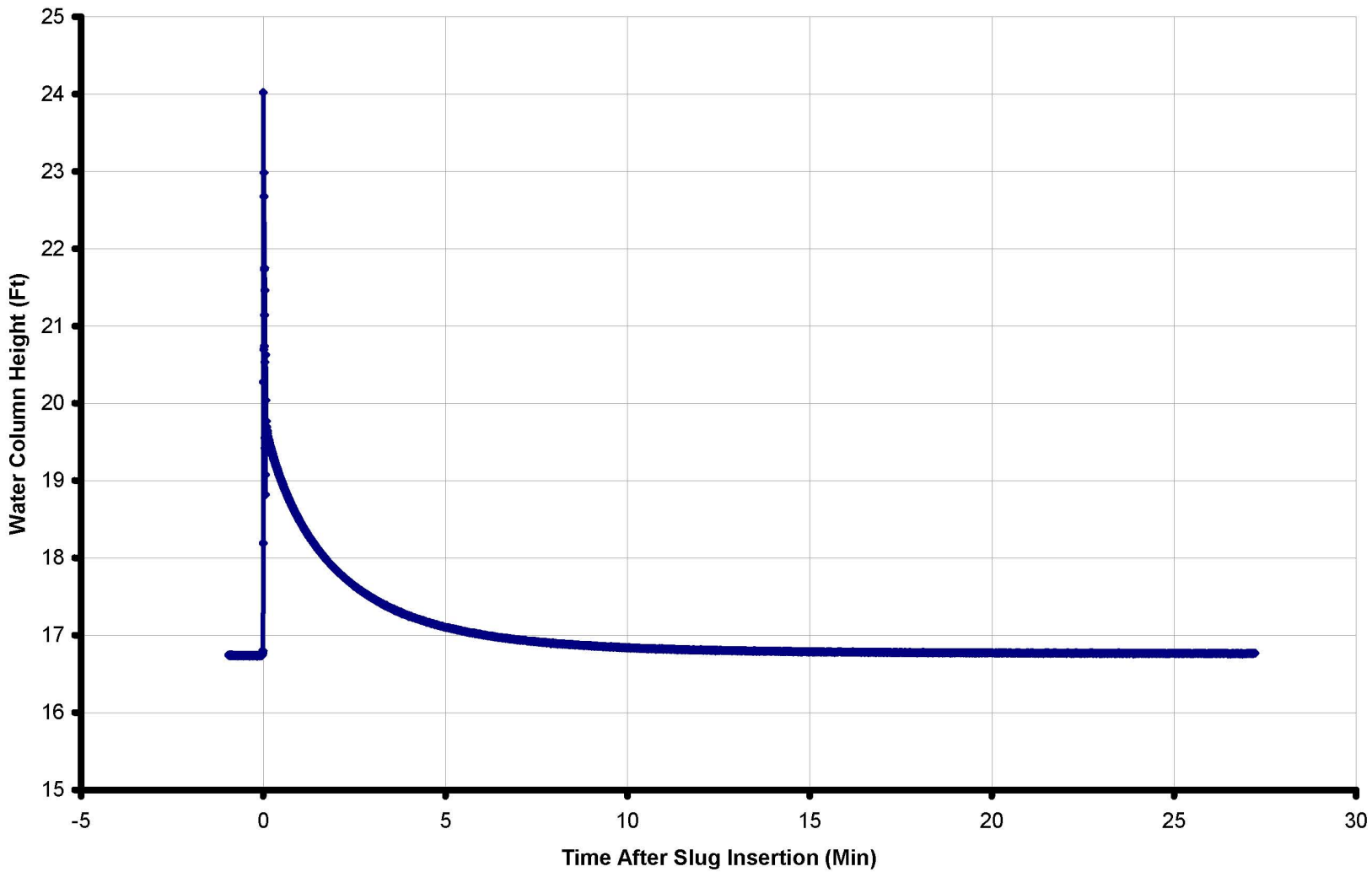
1	Pre-Test Water Level (ft, TOC)/ Time :	13.21 / 10:39 AM
2	Water Level after Probe Insertion (ft, TOC)/ Time:	13.23 / 11:00 AM
3	Transducer Depth:	30 ft
4	Calc. Pre-Test Head over Transducer:	16.79 ft
5	Measured Pre-Test Head over Transducer:	16.77
6	Time Test Started: Re-test / Slug test	10:43 / 11:07 AM
7	Time Test Ended:	11:34 AM
8	Percent Recovery at End of Test:	16.76'
9	Datalogger File Name:	0617CCNP-PTD-001-704-SLUG

Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 27 2016
Approved By: [illegible] Date: 7/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

OW-708 Permeability Test



Schnabel
Schnabel Engineering

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[illegible]		[illegible]	
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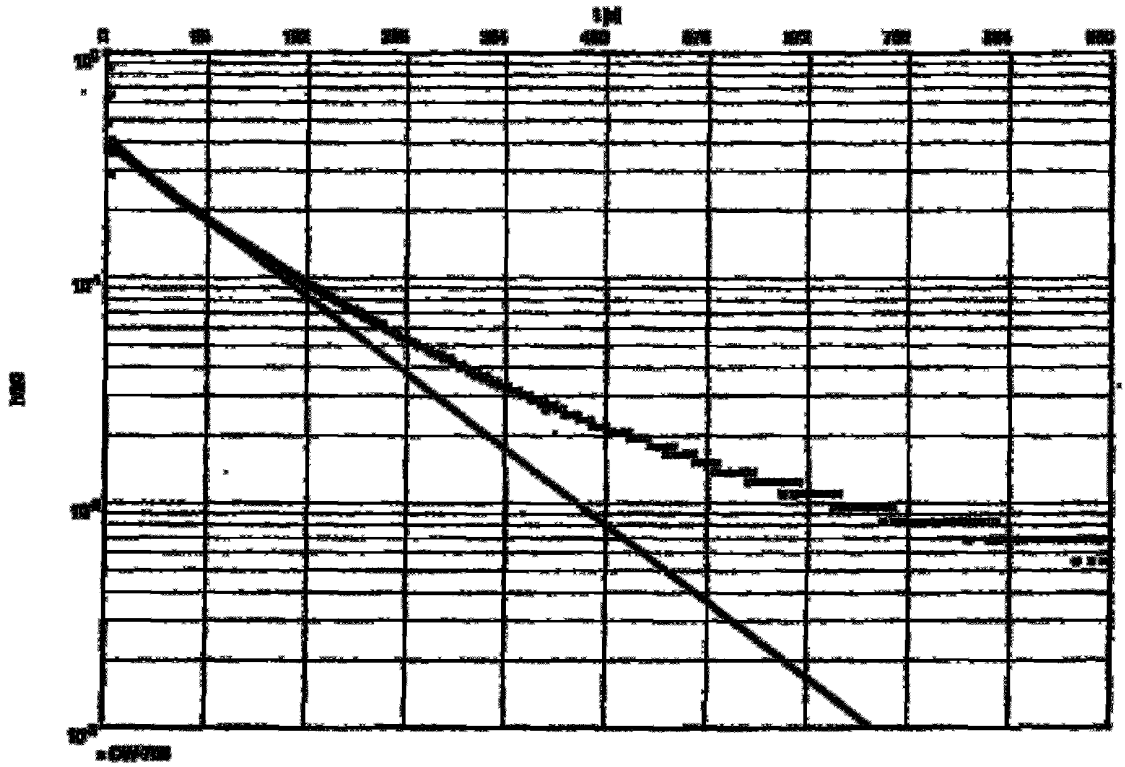
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Page 1 of 1

Schnabel Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 24th 2006
WEATHER/ TEMP: 90° Clear

PROJECT NO.: 08120048
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	~~0.0625 GAL~~ 0.625 GAL
Manual Water Level Meter S/N:	WLR-001
Transducer S/N:	104256
Slug S/N:	Slug-001

WELL INFORMATION	
WELL ID:	[redacted] OW-711
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	49.68
Screen Interval Depth (ft, TOC):	35'-49.5'
Riser Height (ft):	24.5"

1	Pre-Test Water Level (ft, TOC)/ Time :	19.22 / 12:11 pm
2	Water Level after Probe Insertion (ft, TOC)/ Time:	19.12 / 12:20 pm
3	Transducer Depth:	30 ft
4	Calc. Pre-Test Head over Transducer:	10.88 ft
5	Measured Pre-Test Head over Transducer:	10.93 ft
6	Time Test Started: first look / Slug last	12:12 / 12:40 ~~AM~~ PM
7	Time Test Ended:	12:57 PM
8	Percent Recovery at End of Test:	10.90
9	Datalogger File Name:	0612048-BID-OW-711-Slug

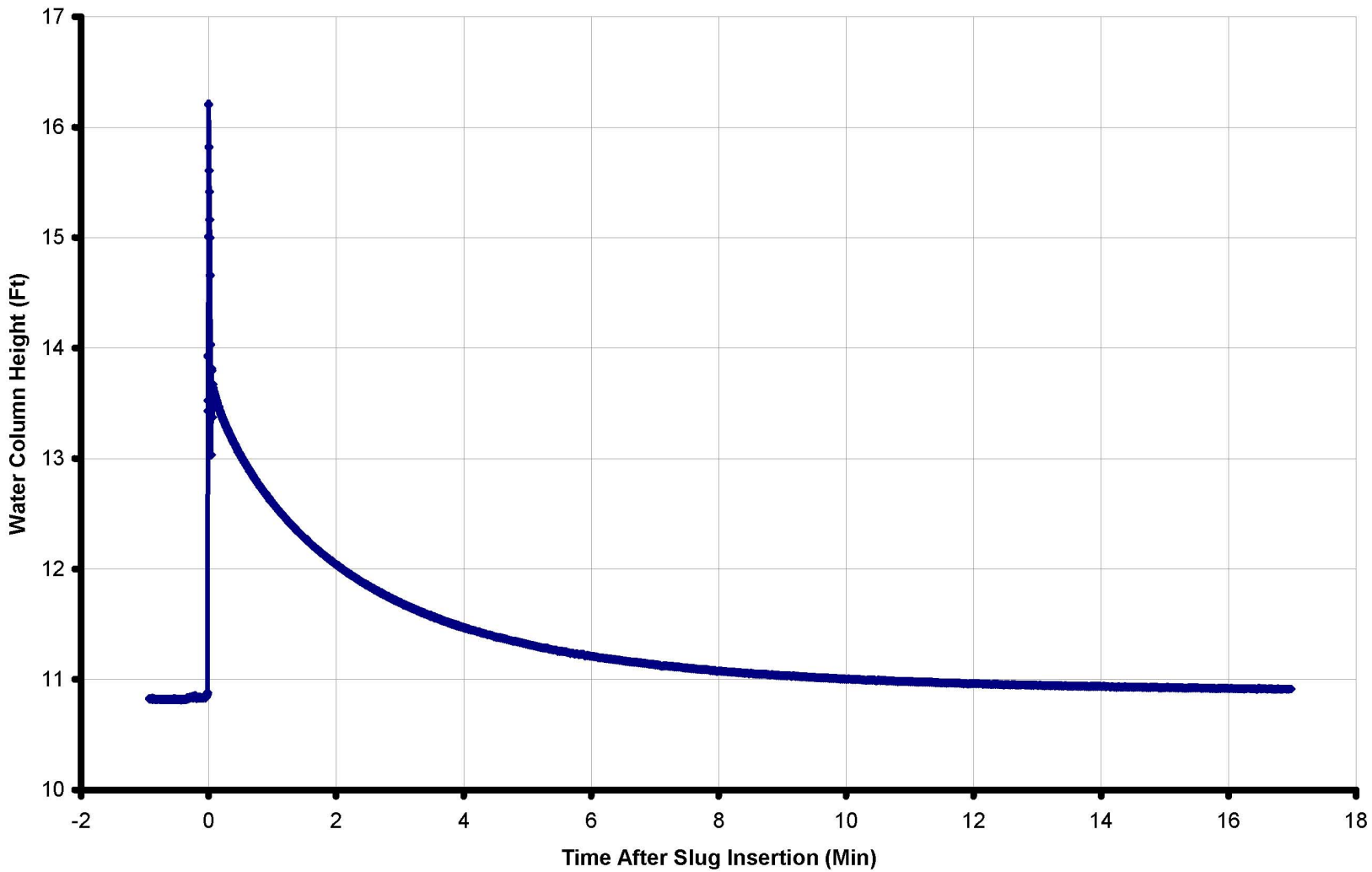
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 24th 2006
Approved By: [signature] Date: 9/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

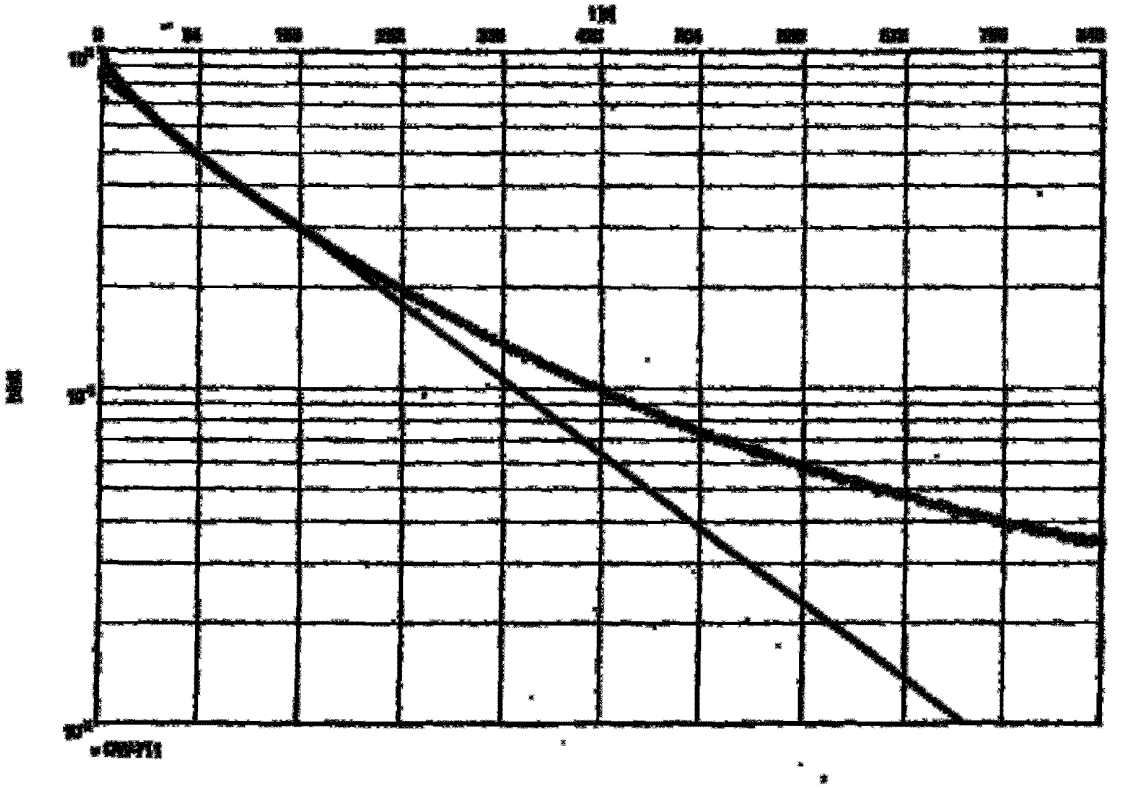
OW-711 Permeability Test



Schnabel
Schnabel Engineering

[illegible]	[illegible]	[illegible]	Page 1
		Project: [illegible]	
		[illegible]	

[illegible]	[illegible]
[illegible]	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Schnabel Technical Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP DCLA Project
LOCATION: Lusby, MD
DATE: July 25, 2006
WEATHER/TEMP: 80 Clear

PROJECT NO.: [illegible]
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	0.0[illegible] cu. ft. 0.625 Gal.
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	19265
Slug S/N:	SLUG-001

WELL INFORMATION	
WELL ID:	OW-714
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft. TOC):	52.2
Screen Interval Depth (ft. TOC):	38 - 48
Riser Height (ft):	2' 2"

1. Pre-Test Water Level (ft. TOC)/ Time: 45.93 / 10:25 AM
2. Water Level after Probe Insertion (ft. TOC)/ Time: 45.92 / 10:42 AM
3. Transducer Depth: 49.0
4. Calc. Pre-Test Head over Transducer: 3.08
5. Measured Pre-Test Head over Transducer: 2.98
6. Time Test Started: Rising head / Slug back 10:39 / 10:57 AM
7. Time Test Ended: 11:36 AM
8. Percent Recovery at End of Test: 3.055
9. Datalogger File Name: 06120048-PID-OW-714-SLUG

NOTE: Bottom of 5' slug at 48' depth. May not be fully submerged!

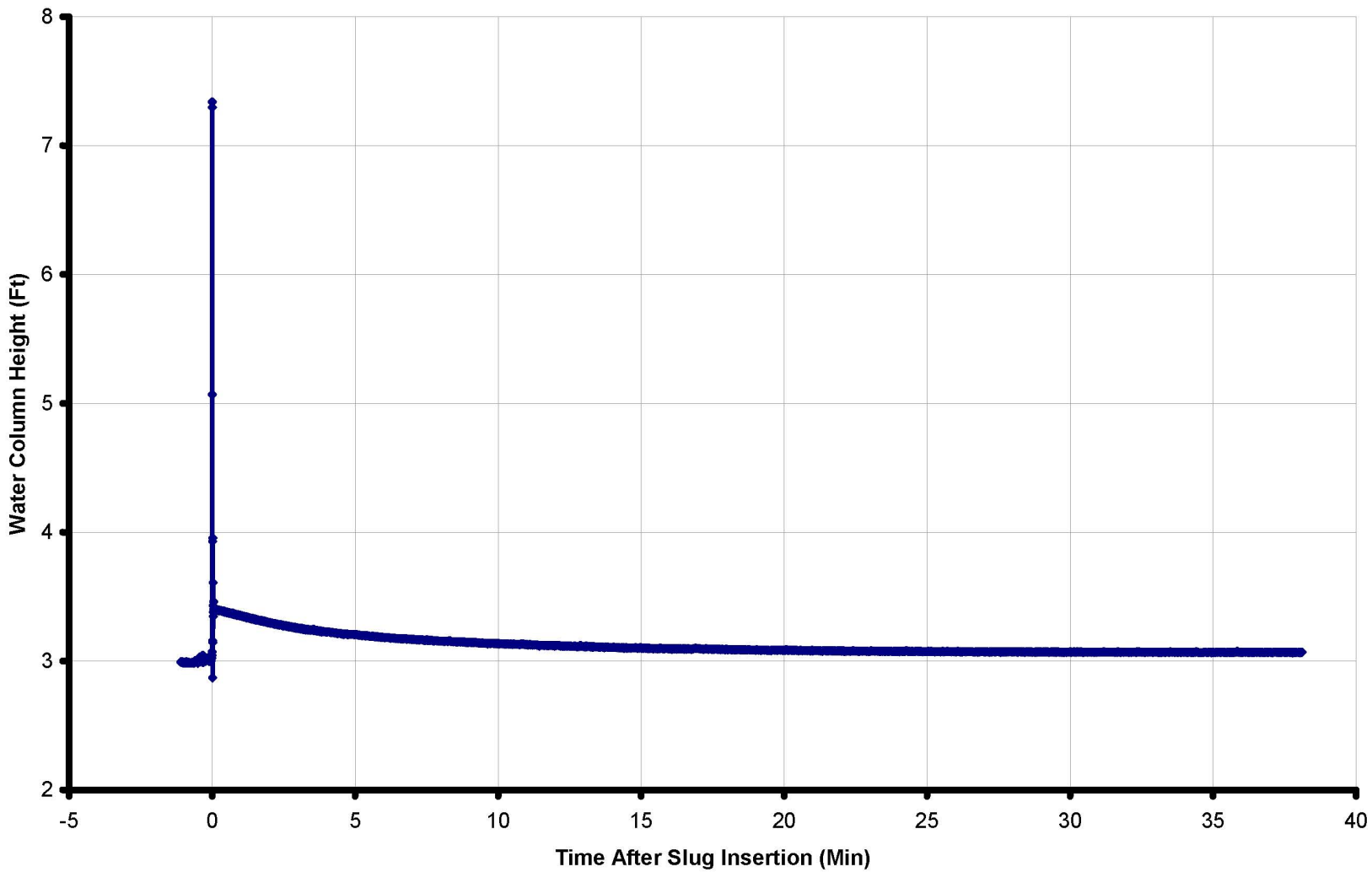
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 25, 2006
Approved By: [illegible] Date: 9/18/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

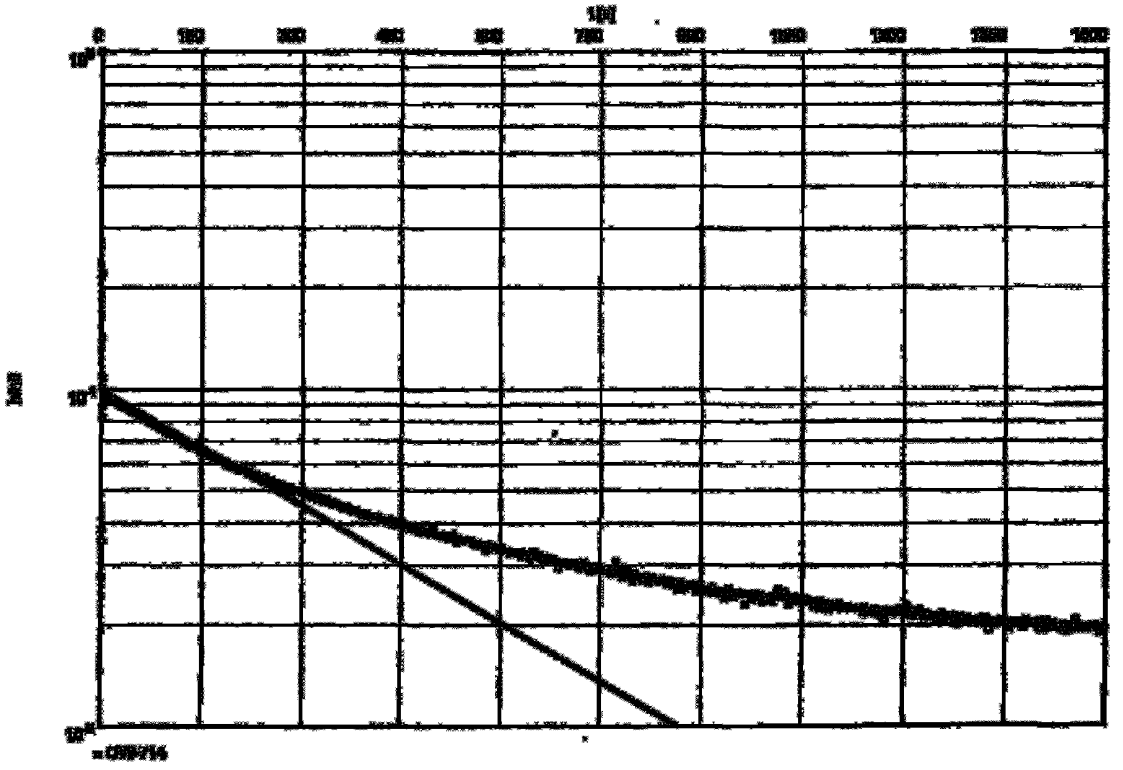
Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

OW-714 Permeability Test



Schnabel
Schnabel Engineering

[illegible] Engineering Works, LLC [illegible] Oxford Road, Suite 700 [illegible] [illegible]	slug test analysis [illegible] method	Date: [illegible]	Page 1
		Project: Oxford Mills	
		Evaluated by: [illegible]	
Slug Test No. 714		Test conducted on: [illegible]	
CSP-714			



Hydraulic conductivity (K): [illegible]

INPUT PARAMETERS
Static Water Level = [illegible] ft
Depth to Bottom of Aquifer = [illegible] ft
Length of Screen = [illegible] ft
Radius of Casing = [illegible] ft
Radius of Influence = [illegible] ft
Evaluated by: [illegible]

Reviewed by: [illegible]

Schnabel
Technical Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 25, 2006
WEATHER/ TEMP: 80, clear

PROJECT NO.: 8012048
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	0.125 gal
Manual Water Level Meter S/N:	LL-P-001
Transducer S/N:	104255
Slug S/N:	Slug-001

WELL INFORMATION	
WELL ID:	OW-718
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	49
Screen Interval Depth (ft, TOC):	30-40
Riser Height (ft):	1' 10"

Bottom of Slug @ 45 ft depth! May not be fully submerged!

1 Pre-Test Water Level (ft, TOC)/ Time: 10.36 ft / 15:15
2 Water Level after Probe Insertion (ft, TOC)/ Time: 10.35 ft / 15:15
3 Transducer Depth: [illegible] ft
4 Calc. Pre-Test Head over Transducer: 3.65 ft
5 Measured Pre-Test Head over Transducer: 3.57 ft
6 Time Test Started: Pre-test / Slug test 15:21 / 15:47
7 Time Test Ended: 15:59
8 Pressure Transducer at End of Test: 3626
9 Datalogger File Name: 06120048-PTD-OW-718-Slug

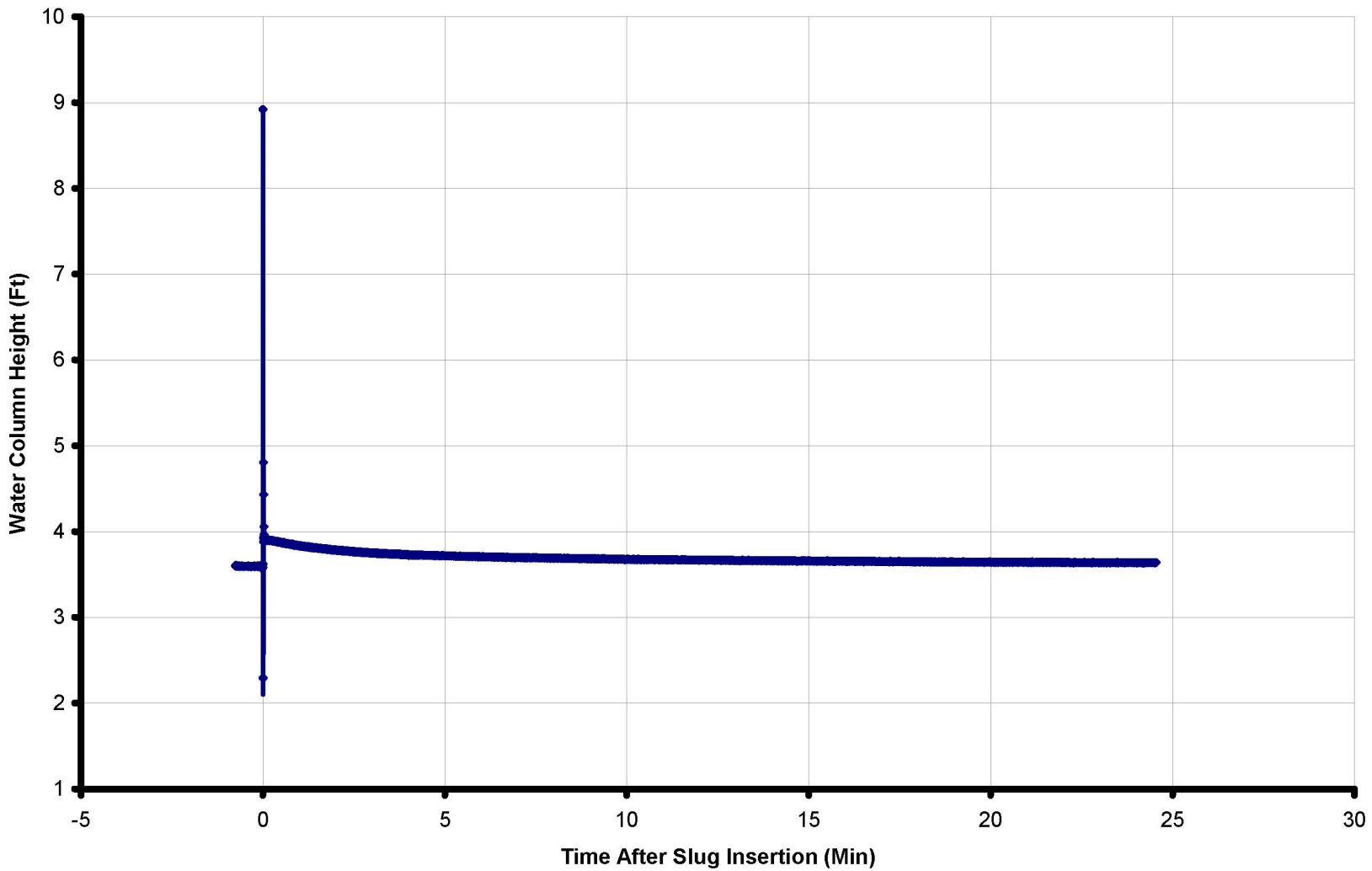
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd Wade Date: July 25, 2006
Approved By: [illegible] Date: 9/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

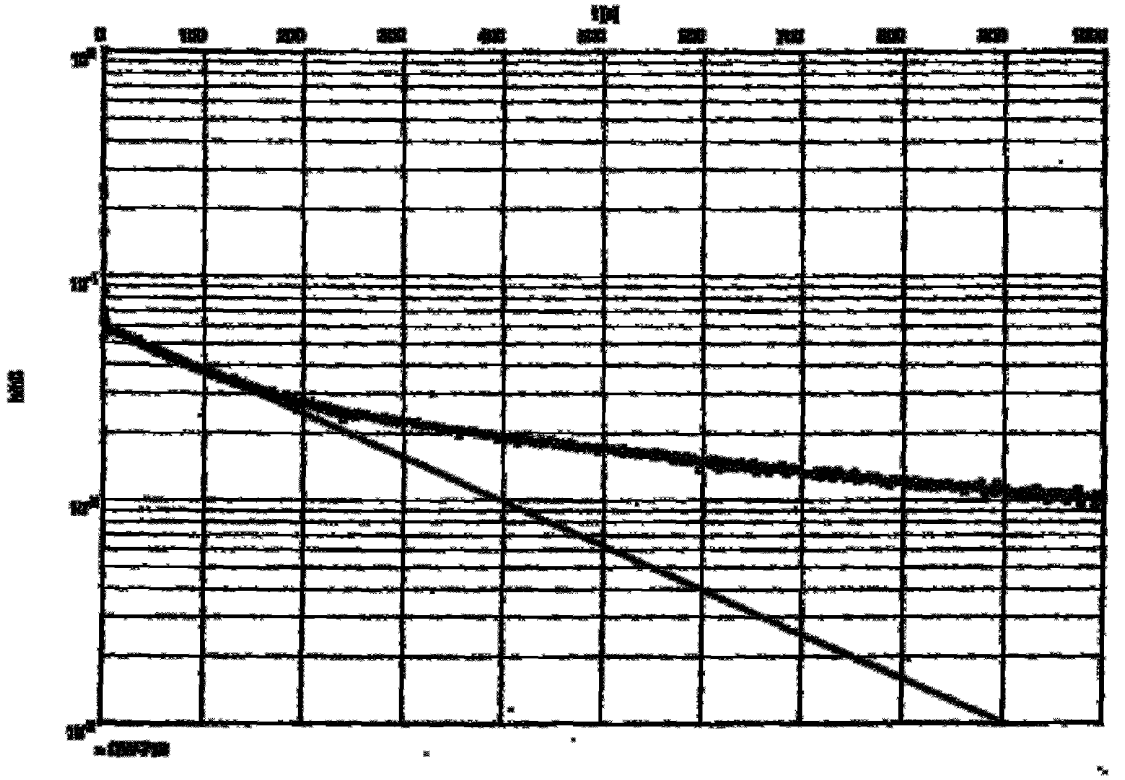
Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

OW-718 Permeability Test



Schnabel
Schnabel Engineering

[illegible]	[illegible]	Date: [illegible]	Page 1
[illegible]		Project: [illegible]	
		Evaluated by: [illegible]	
Slug Test No. [illegible]		Test conducted on: [illegible]	
[illegible]			



Hydraulic conductivity [illegible]: 4.44×10^{-5}

INPUT PARAMETERS
Static Water Level = [illegible]
Depth to Bottom of Aquifer = [illegible] ft
Length of Screen = [illegible]
Radius of Casing = [illegible] ft
Radius of Influence = [illegible] ft
Evaluated by: [illegible]
Reviewed by: [illegible]

Schnabel
Schnabel Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calumet City NPP GDLA Project
LOCATION: Lansing, IN
DATE: July 25, 2006
WEATHER/TEMP: 80 Clear

PROJECT NO.: [illegible]
CLIENT: Exelon Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Aluminum / Water)
Approximate Volume of Slug:	[illegible] 0.625 Gal
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	104265
Slug S/N:	SLUG-001

WELL INFORMATION	
WELL ID:	OW-725
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	61.2
Screen Interval Depth (ft, TOC):	48'-58'
Riser Height (ft, TOC):	1 3/4"

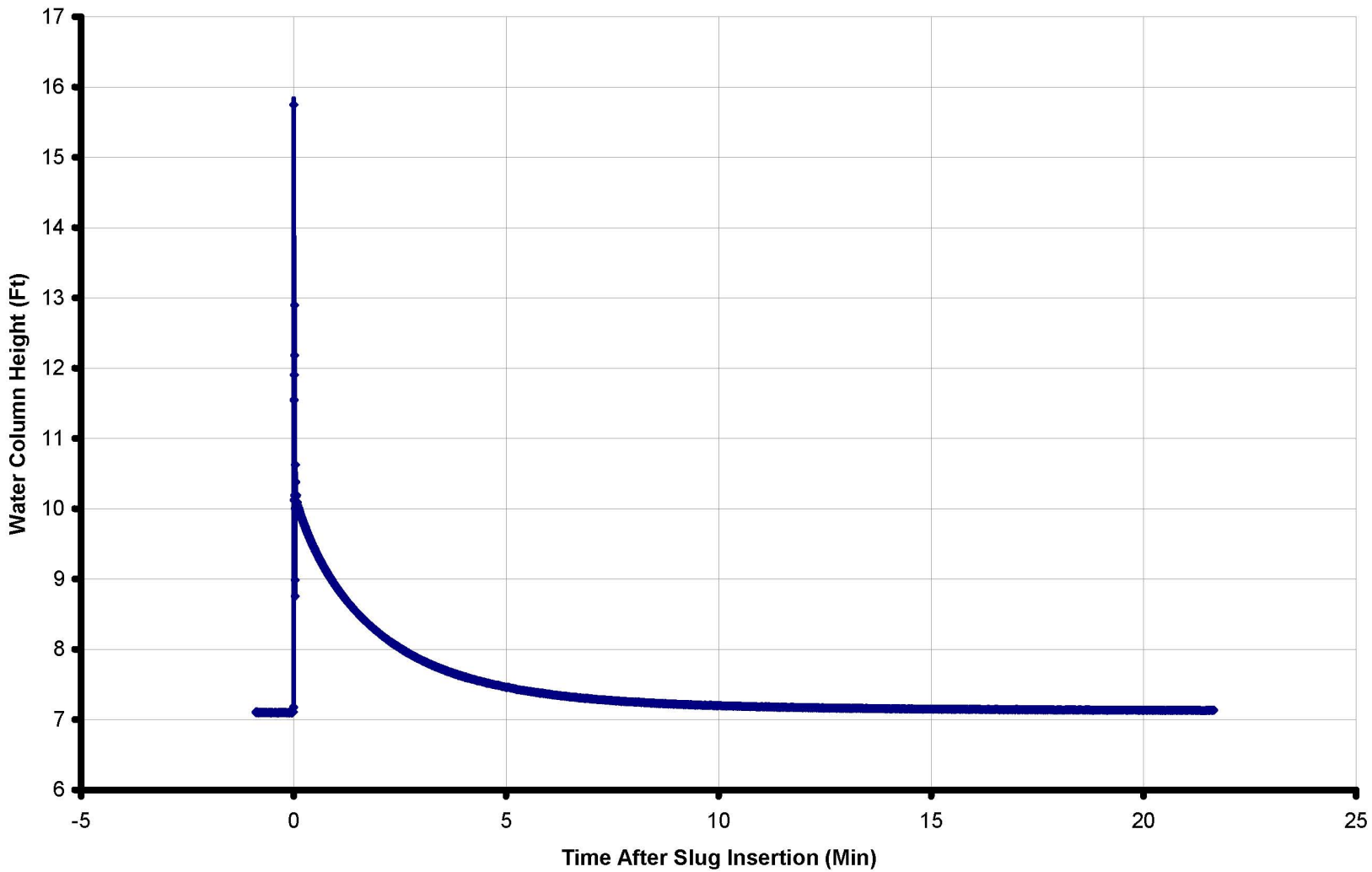
1. Pre-Test Water Level (ft, TOC)/ Time: 32.82 ft / 2:05 PM
2. Water Level after Probe Insertion (ft, TOC)/ Time: 32.83 ft / 2:25 PM
3. Transducer Depth: 40 ft
4. Calc. Pre-Test Head over Transducer: 7.17 ft
5. Measured Pre-Test Head over Transducer: 7.09 ft
6. Time Test Started: Retest / Slug test 2:10 / 2:30 PM
7. Time Test Ended: 2:32 PM
8. ~~Period Remaining~~ Head at End of Test: 7.12
9. Datalogger File Name: 06170048-PTP-OW-725-SLUG

Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: 7/25/06
Approved By: [illegible] Date: 9/21/06

Note: All water level measurements obtained from well measuring point at top of casing.
Reference: ASTM D4044

OW-725 Permeability Test



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Schnabel Engineering

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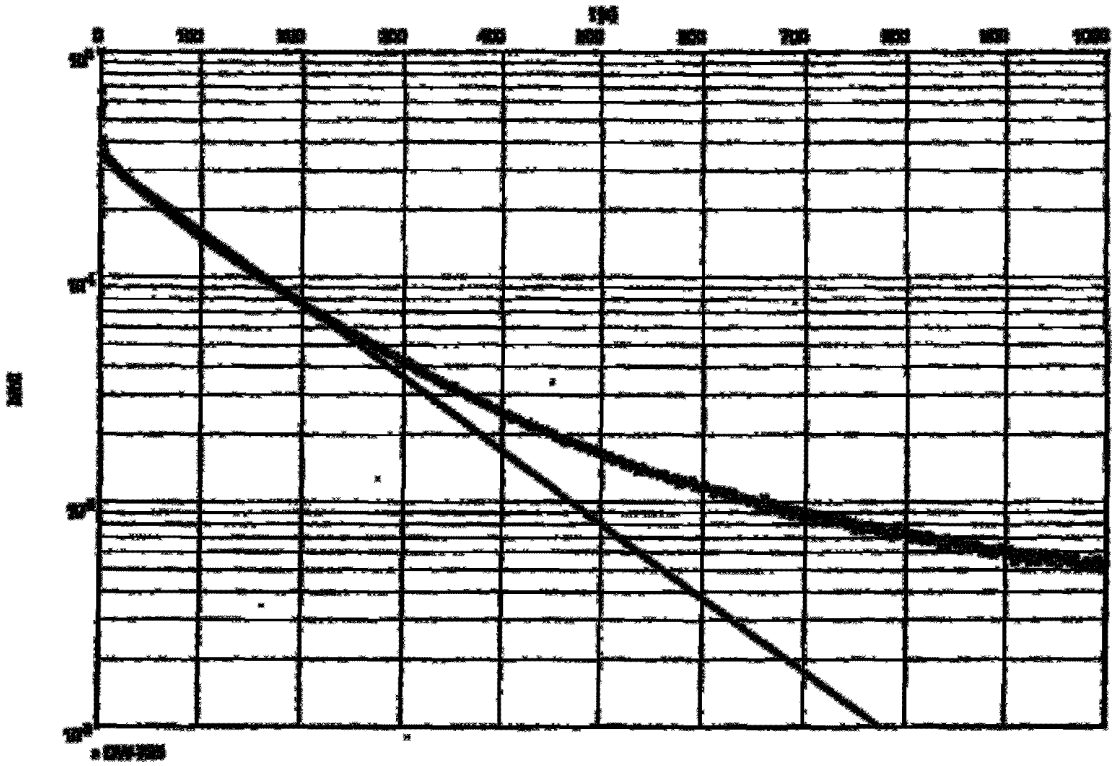

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Schnabel
Subsurface Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 25, 2006
WEATHER/ TEMP: 70 Clear

PROJECT NO.: 0012048
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	1 Gal
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	14256
Slug S/N:	Water

WELL INFORMATION	
WELL ID:	OW-729
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	49.1
Screen Interval Depth (ft, TOC):	30-40
Riser Height (ft):	20' 3/4"

1. Pre-Test Water Level (ft, TOC)/ Time: 41.1 (DRY)
2. Water Level after Probe Insertion (ft, TOC)/ Time: 41.0 (DRY)
3. Transducer Depth: 49 ft
4. Calc. Pre-Test Head over Transducer: 0
5. Measured Pre-Test Head over Transducer: 0
6. Time Test Started: 11:51 / 12:20 PM
7. Time Test Ended: 12:35 pm
8. Percent Recovery at End of Test: 0
9. Datalogger File Name: 0012048-PID-OW-729-SLUG-GW02

1 gallons of Water as Slug
Water dropped and stabilized at 41.79 ft
2nd Slug related
1 gallon of Water

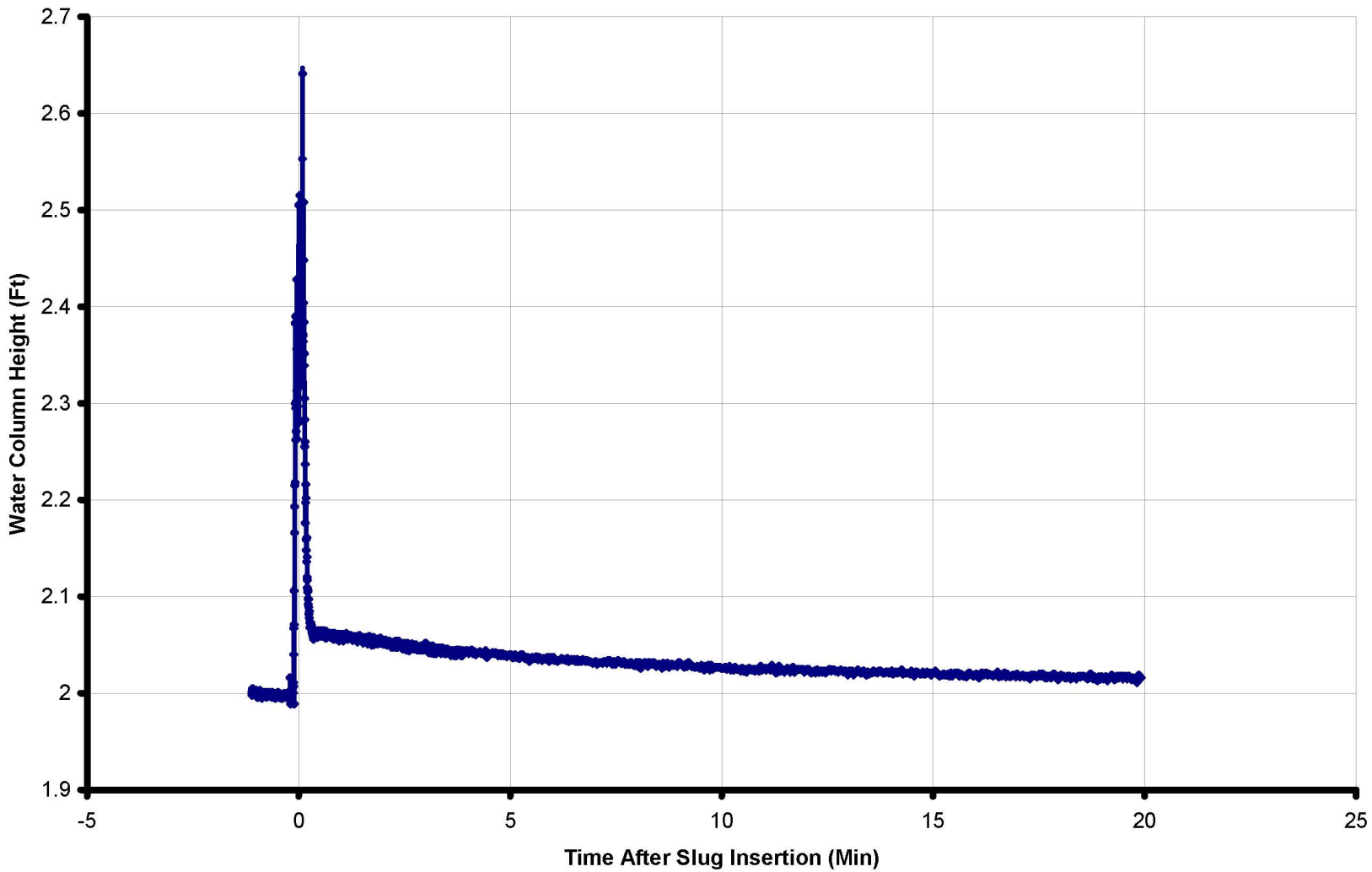
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 25, 2006
Approved By: [illegible] Date: 9/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

OW-729 Permeability Test



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Schnabel Engineering

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Schnabel Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 27, 2006
WEATHER/ TEMP: 75 - humid

PROJECT NO.: [illegible]
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	0.320 Gal. 0.625 Gal.
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	10A259
Slug S/N:	SLUG-002

WELL INFORMATION	
WELL ID:	OW-755
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	75 ft
Screen Interval Depth (ft, TOC):	60-70
Riser Height (ft):	1' 10"

1. Pre-Test Water Level (ft, TOC)/ Time: 54.20 ft / 1147 am
2. Water Level after Probe Insertion (ft, TOC)/ Time: 54.20 / 1355
3. Transducer Depth: 70 ft
4. Calc. Pre-Test Head over Transducer: 15.80
5. Measured Pre-Test Head over Transducer: 16.023
6. Time Test Started: (Pre-test/Slug test) 13:49 / 14:00
7. Time Test Ended: 14:15
8. Pressure Transducer Head at End of Test: 16.03
9. Datalogger File Name: 06JT0049-PD-OW-755-SLUG

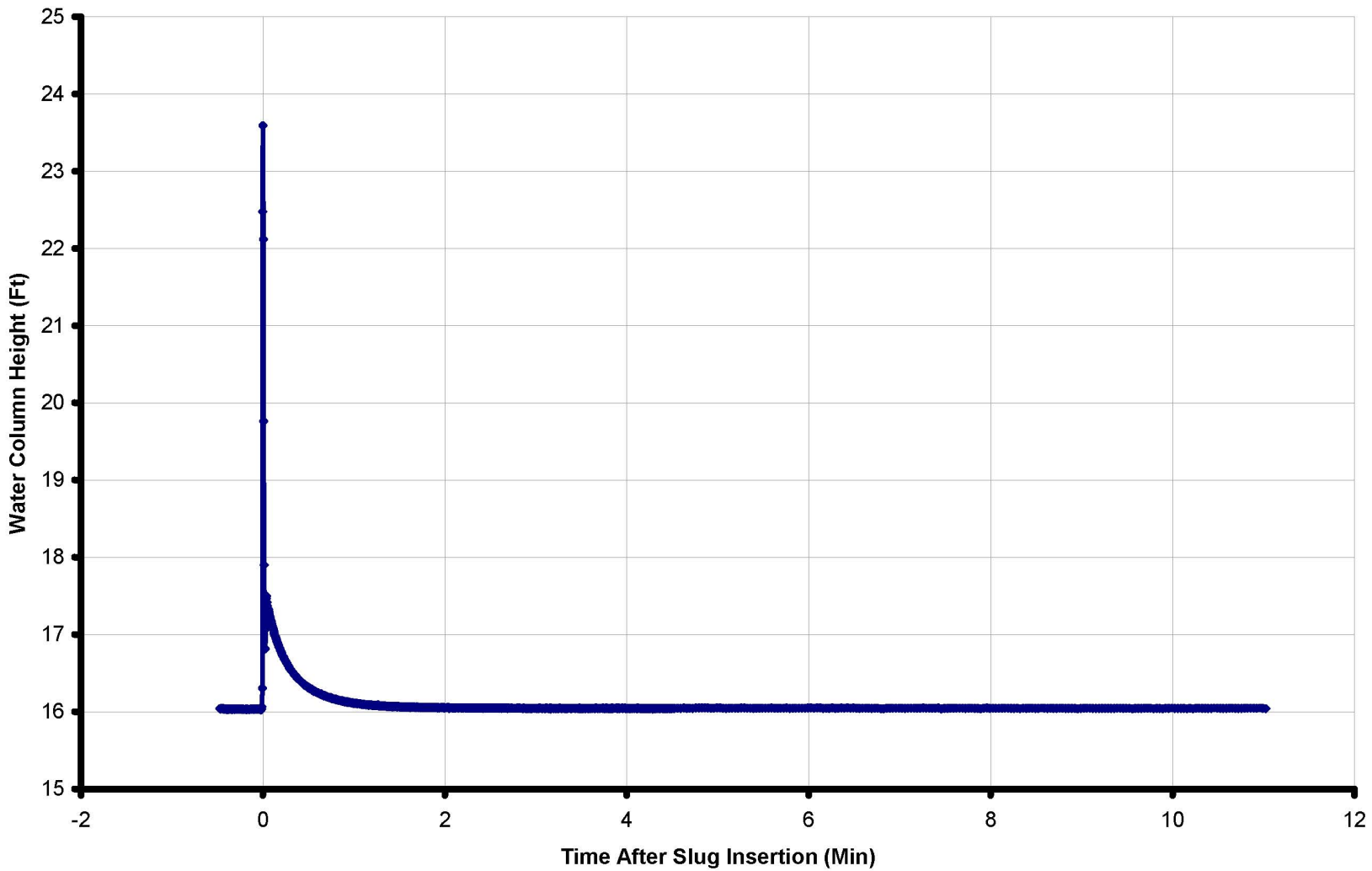
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd Lebrato Date: July 27, 2006
Approved By: [illegible] Date: 8/2/06

Note: All water level measurements obtained from well measurement point at top of casing.
References: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

OW-735 Permeability Test



Schnabel
Schnabel Engineering

[illegible]	[illegible]	Date: [illegible]	Page 1
		Project: [illegible]	
		Evaluated by: [illegible]	
Slug Test No. [illegible]		Test conducted on [illegible]	
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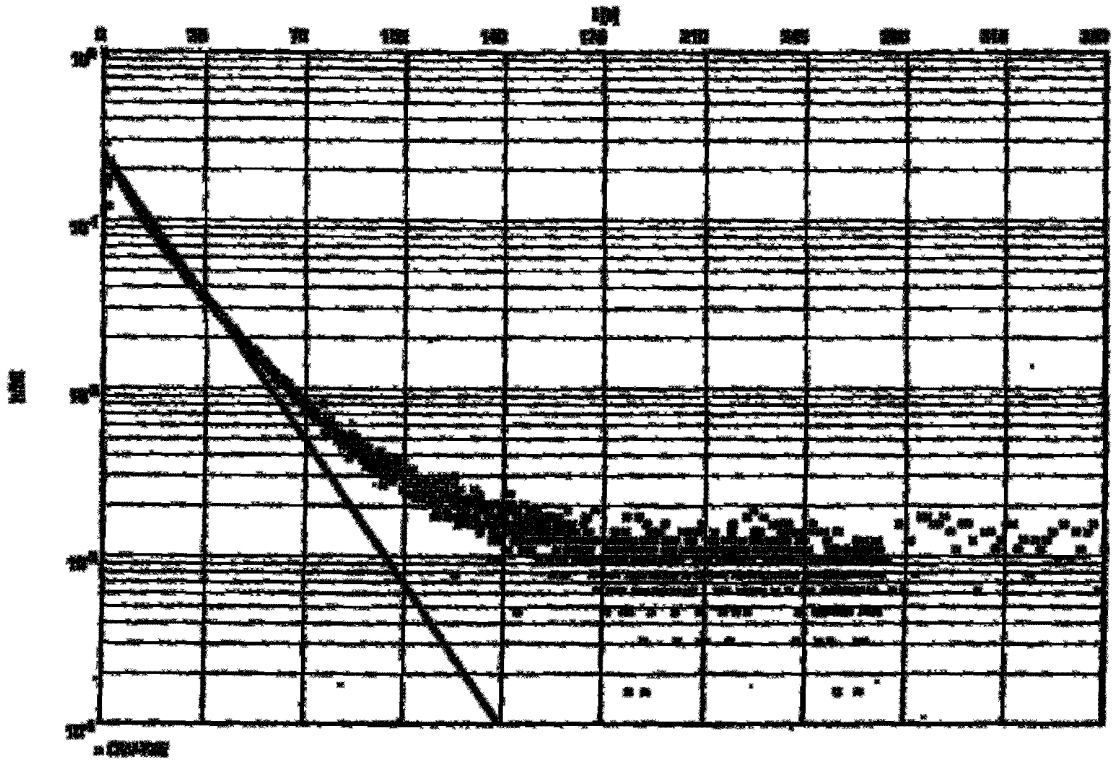

[illegible]
[illegible]
[illegible]

Schnabel
Environmental Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 26, 2006
WEATHER/ TEMP: 85°, humid

PROJECT NO.: [illegible]
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	~~[illegible]~~ GAL 0.625 GAL
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	0412-13
Slug S/N:	SLUG-003

WELL INFORMATION	
WELL ID:	OW-745
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	54
Screen Interval Depth (ft, TOC):	42-52'
Riser Height (ft):	2'

1. Pre-Test Water Level (ft, TOC)/ Time: 37.24 / 5:07 pm
2. Water Level after Probe Insertion (ft, TOC)/ Time: 38.22 / 5:37 pm
3. Transducer Depth: 45 ft
4. Calc. Pre-Test Head over Transducer: 7.78 ft
5. Measured Pre-Test Head over Transducer: 8.77 ft
6. Time Test Started: Pre-test / Slug test 5:40 / 5:42 PM
7. Time Test Ended: 5:45 pm
8. Percent Recovery at End of Test: 8.25
9. Datalogger File Name: 061204R-PTD-OW-745-SLUG

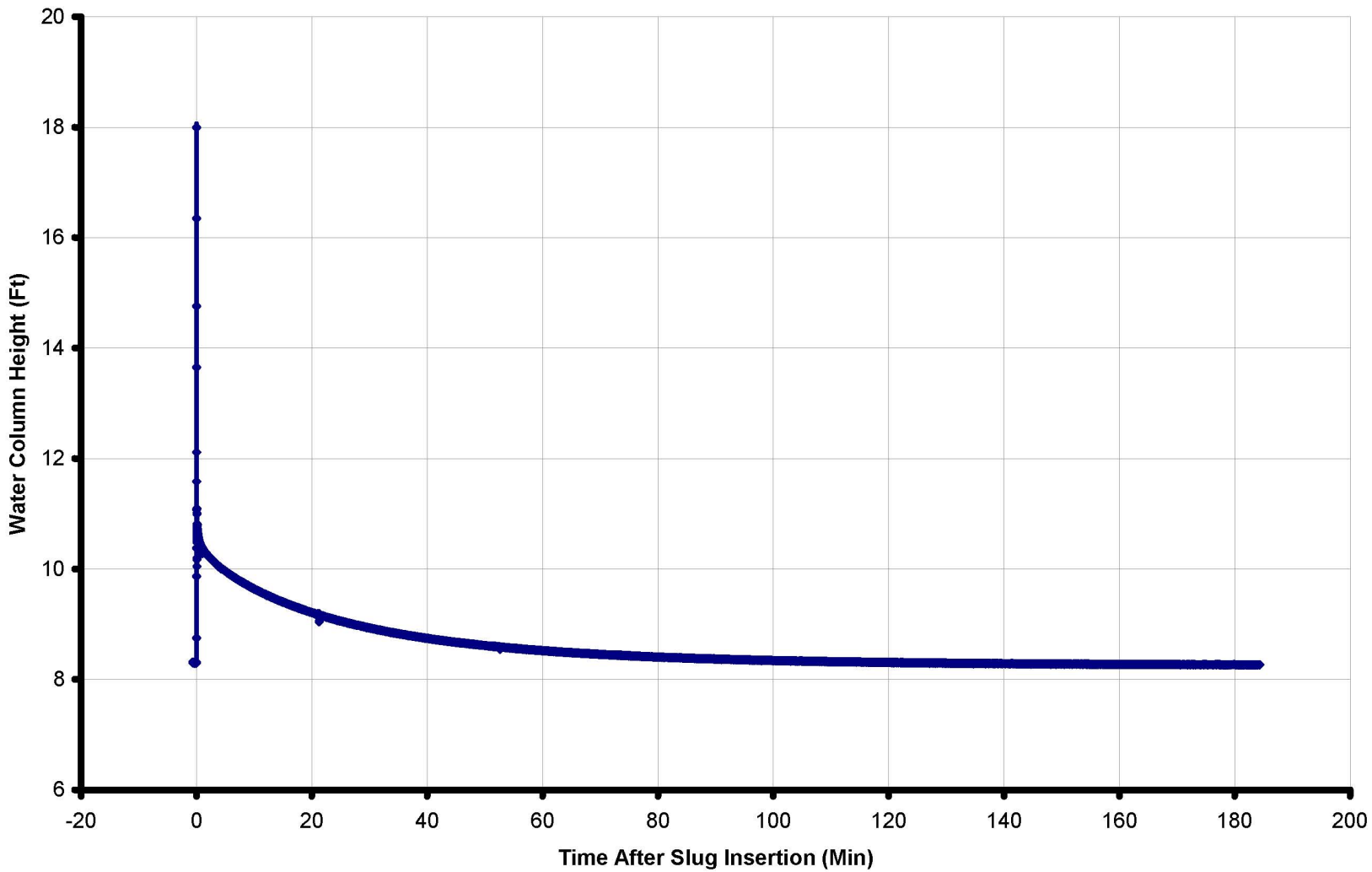
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 26, 2006
Approved By: [illegible] Date: 8/2/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

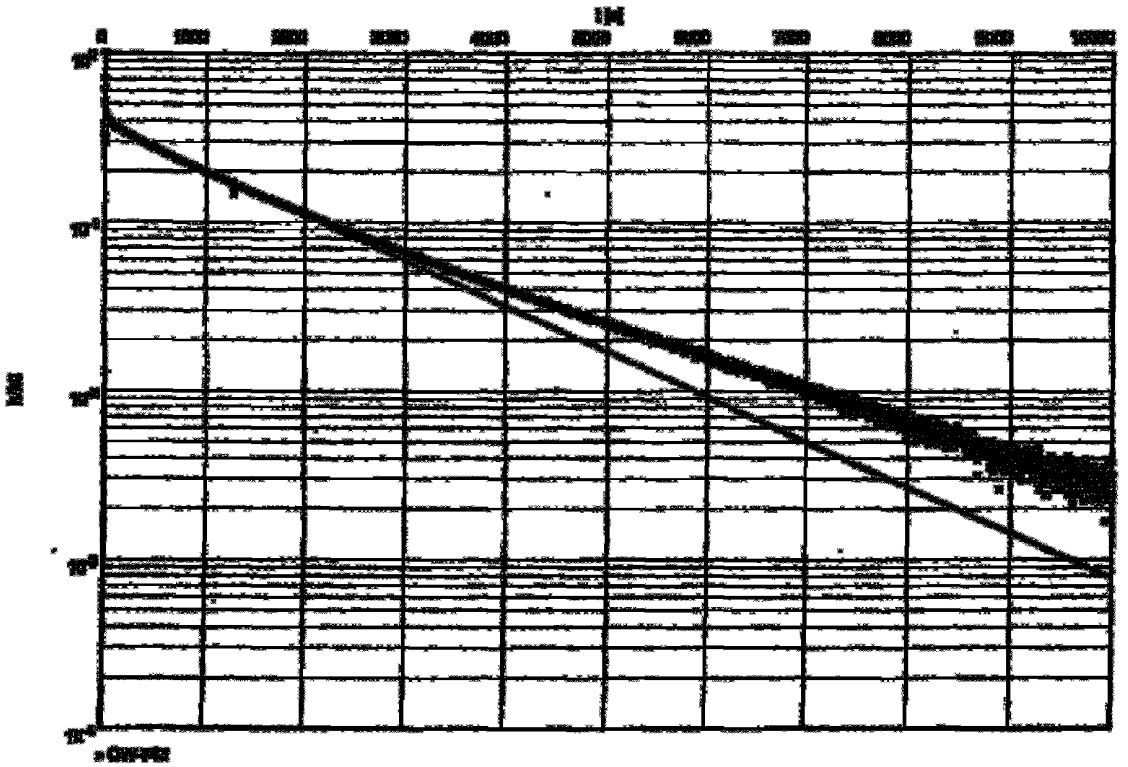
OW-743 Permeability Test



Schnabel
Schnabel Engineering

[illegible]	[illegible]	[illegible]	Page 1
		Project: [illegible]	
		Recorded by: [illegible]	

Slug Test No. [illegible]	Test conducted on: [illegible]
[illegible]	



Hydraulic conductivity (m/s): [illegible]

INPUT PARAMETERS
Static Water Level = [illegible]
Depth to Bottom of Aquifer = [illegible] m
Length of Screen = [illegible] m
Radius of Casing = [illegible] m
Radius of Screen = [illegible] m
Evaluated by: [illegible]
Reviewed by: [illegible]

Schnabel
Technical Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 27, 2006
WEATHER TEMP: 85 - [illegible]

PROJECT NO.: 06120048
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Displacement / Water)
Approximate Volume of Slug:	0.625 Gal. 0.625 Gal.
Manual Water Level Meter S/N:	WLP-03
Transducer S/N:	109213
Slug S/N:	SLUG-003

WELL INFORMATION	
WELL ID:	OW-744
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	52.3
Screen Interval Depth (ft, TOC):	38-48
Riser Height (ft):	1'10"

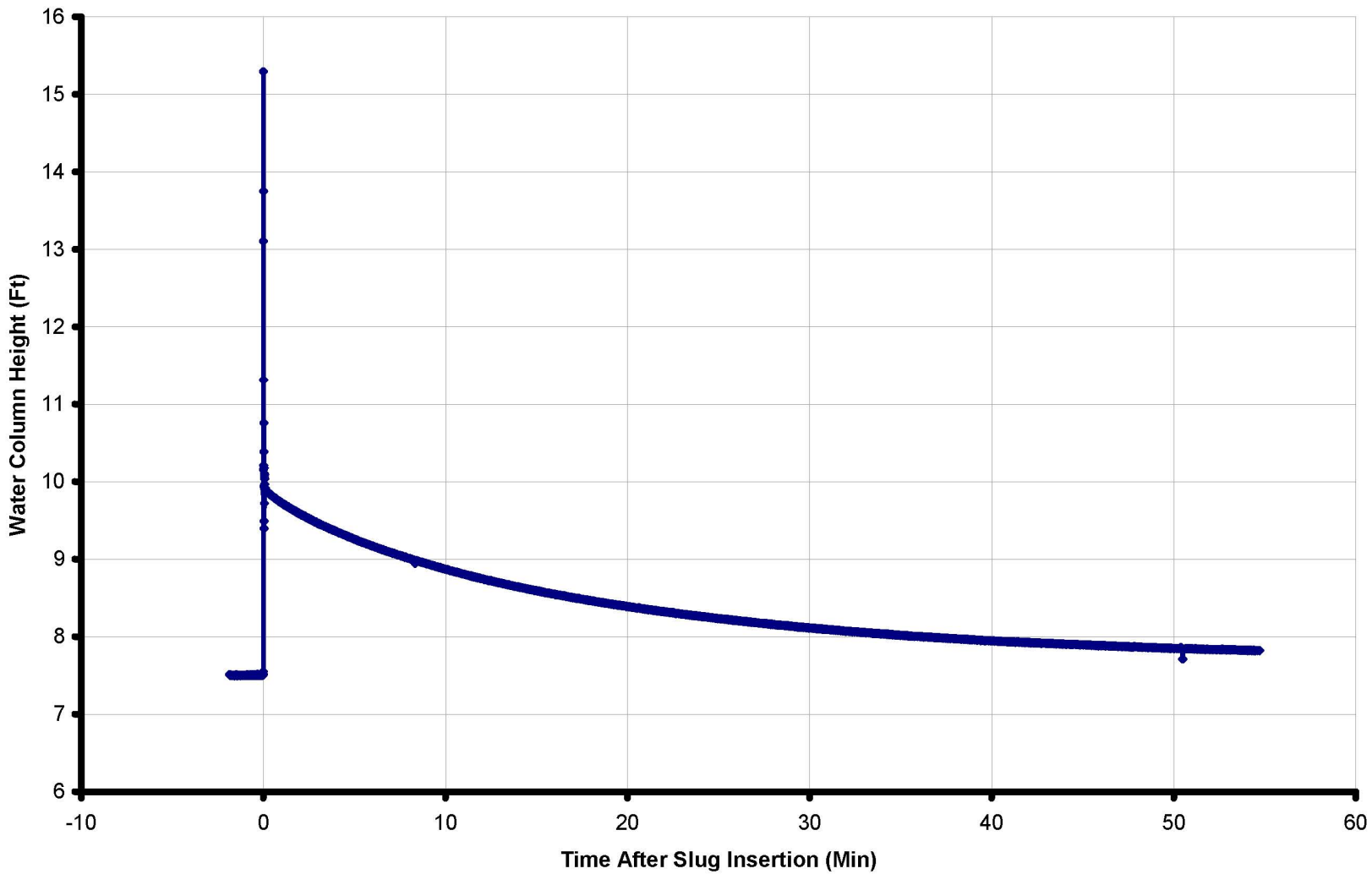
1. Pre-Test Water Level (ft, TOC)/ Time: 33.01 / 9:40 AM
2. Water Level after Probe Insertion (ft, TOC)/ Time: [illegible] 9 / 10:27 AM 32.96
3. Transducer Depth: 40.4
4. Calc. Pre-Test Head over Transducer: 7.09
5. Measured Pre-Test Head over Transducer: 7.15
6. Time Test Started: Release / Slug Out 9:49 / 10:35 AM
7. Time Test Ended: 11:30 AM
8. Pressure Transducer at End of Test: 7.75
9. Datalogger File Name: 06120048-PTD-OW-744-SLUG

Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 27, 2006
Approved By: [illegible] Date: 9/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

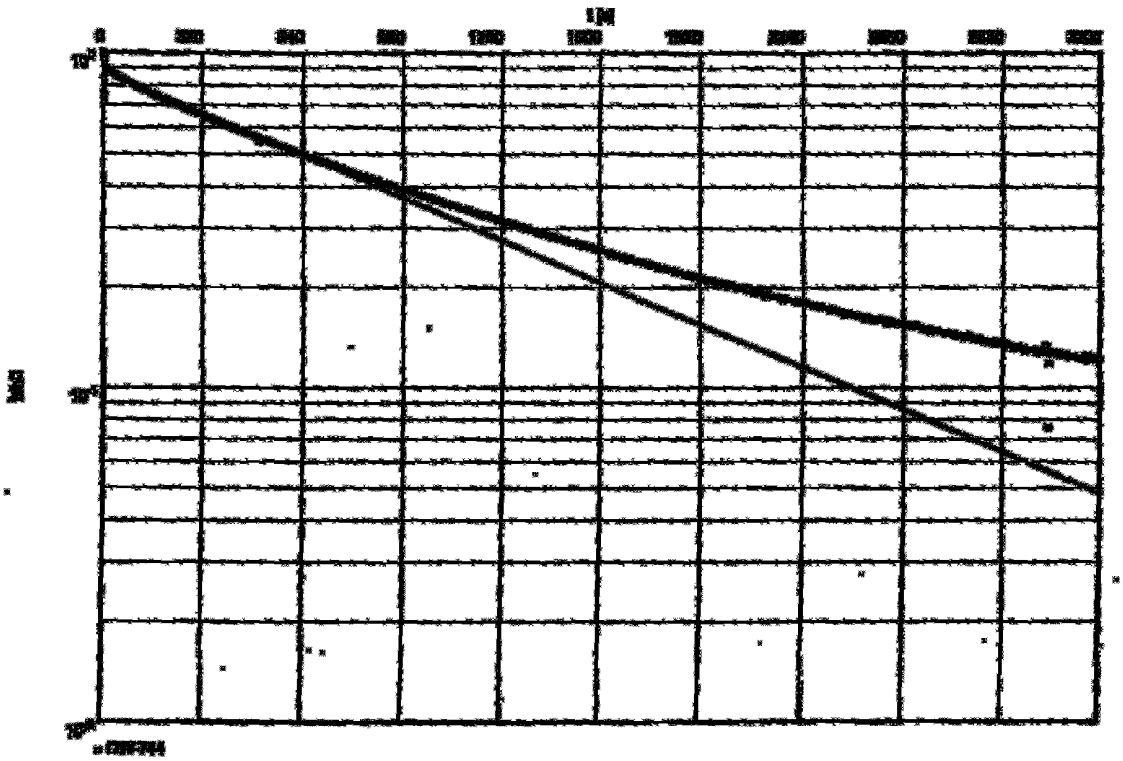
OW-744 Permeability Test



Schnabel
Schnabel Engineering

[illegible]	[illegible]	Date: [illegible] Page 1
[illegible]		Project: [illegible]
		Evaluated by: [illegible]

Step Test No. [illegible]	Test conducted on [illegible]
Offices	



Hydraulic conductivity [m/s]: [illegible]

INPUT PARAMETERS
Static Water Level = [illegible] ft
Depth to Bottom of Aquifer = [illegible] ft
Length of Screen = [illegible] ft
Radius of Casing = [illegible] ft
Radius of Influence = [illegible] ft
Evaluated by: [illegible]
Reviewed by: [illegible]

Schnabel
Multidisciplinary Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP GOLA Project
LOCATION: Lusby, MD
DATE: July 27, 2016
WEATHER/TEMP: [illegible]

PROJECT NO.: [illegible]
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head) / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	[illegible] 0.625 [illegible]
Manual Water Level Meter S/N:	LLP-001
Transducer S/N:	[illegible]
Slug S/N:	SLUG-001

WELL INFORMATION	
WELL ID:	OW-752A
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	38.6
Screen Interval Depth (ft, TOC):	25-35
Riser Height (ft):	1' 10"

1. Pre-Test Water Level (ft, TOC)/ Time: 24.73 / 12:14 pm
2. Water Level after Probe Insertion (ft, TOC)/ Time: 24.67 / 12:25 pm
3. Transducer Depth: 28 ft
4. Calc. Pre-Test Head over Transducer: 13.53 ft
5. Measured Pre-Test Head over Transducer: 13.17 ft
6. Time Test Started: Pre-test/Slug test 12:17 / 12:38 pm
7. Time Test Ended: [illegible] 1:30 pm
8. Recent Piezometer at End of Test: [illegible] 13.28 ft
9. Datalogger File Name: 0512004B-PID-OW-752A-SLUG

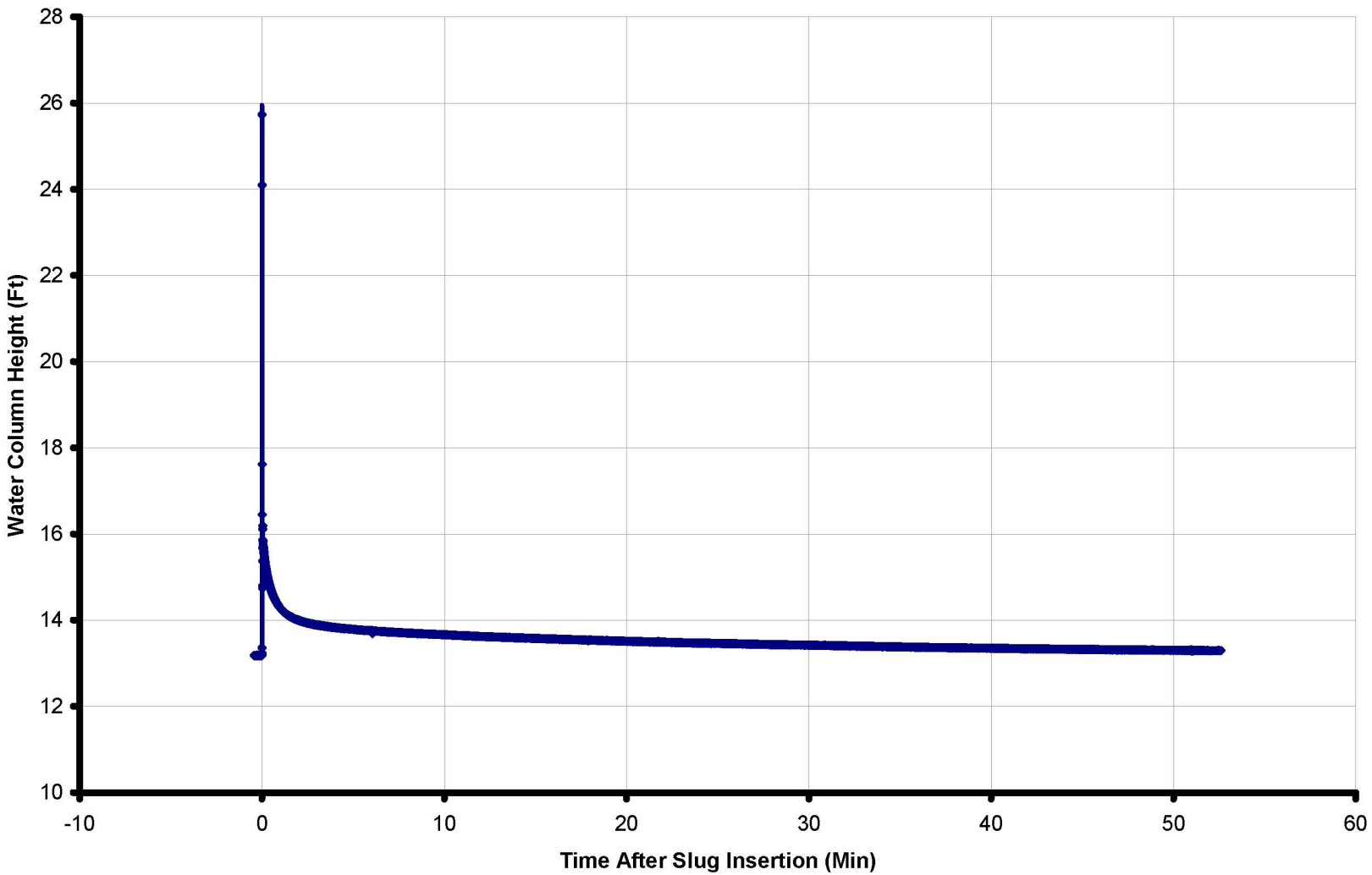
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 27, 2016
Approved By: [illegible] Date: 8/8/16

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

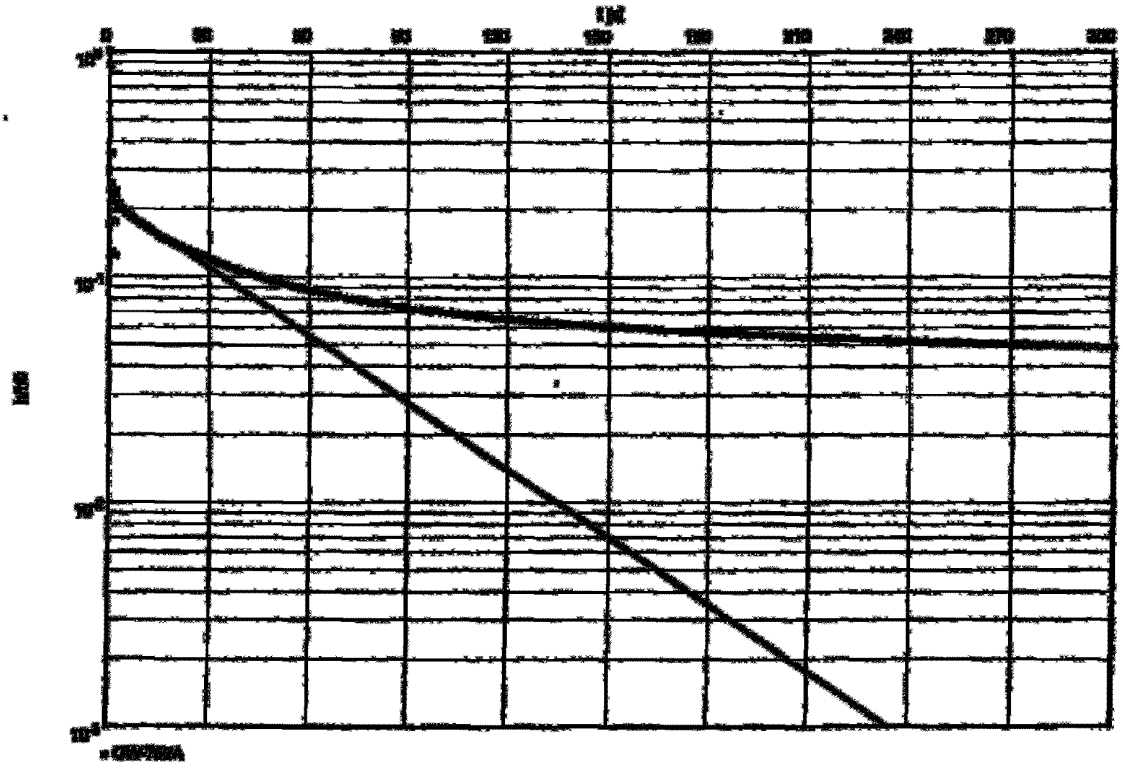
OW-752A Permeability Test



Schnabel
Schnabel Engineering

[illegible]	[illegible]	Date: [illegible]	Page 1
		Project: [illegible]	
		Reviewed by: [illegible]	

Slug Test No. [illegible]	Test conducted on: [illegible]
[illegible]	



Hydraulic conductivity [m/s]: [illegible]

INPUT PARAMETERS
Static Water Level = [illegible] ft
Depth to Bottom of Aquifer = [illegible] ft
Length of Screen = [illegible] ft
Radius of Casing = [illegible] ft
Radius of Screen = [illegible] ft
Reviewed by: [illegible]

Schnabel
Schnabel Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 27, 2006
WEATHER/ TEMP: 85° - humid

PROJECT NO.: [illegible]
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	~~0.002 Gal~~ 0.625 GAL
Manual Water Level Meter S/N:	SWLP-001
Transducer S/N:	104257
Slug S/N:	SLUG-002

WELL INFORMATION	
WELL ID:	OW-752-S
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft. TOC):	97
Screen Interval Depth (ft. TOC):	85-95
Riser Height (ft):	1'10"

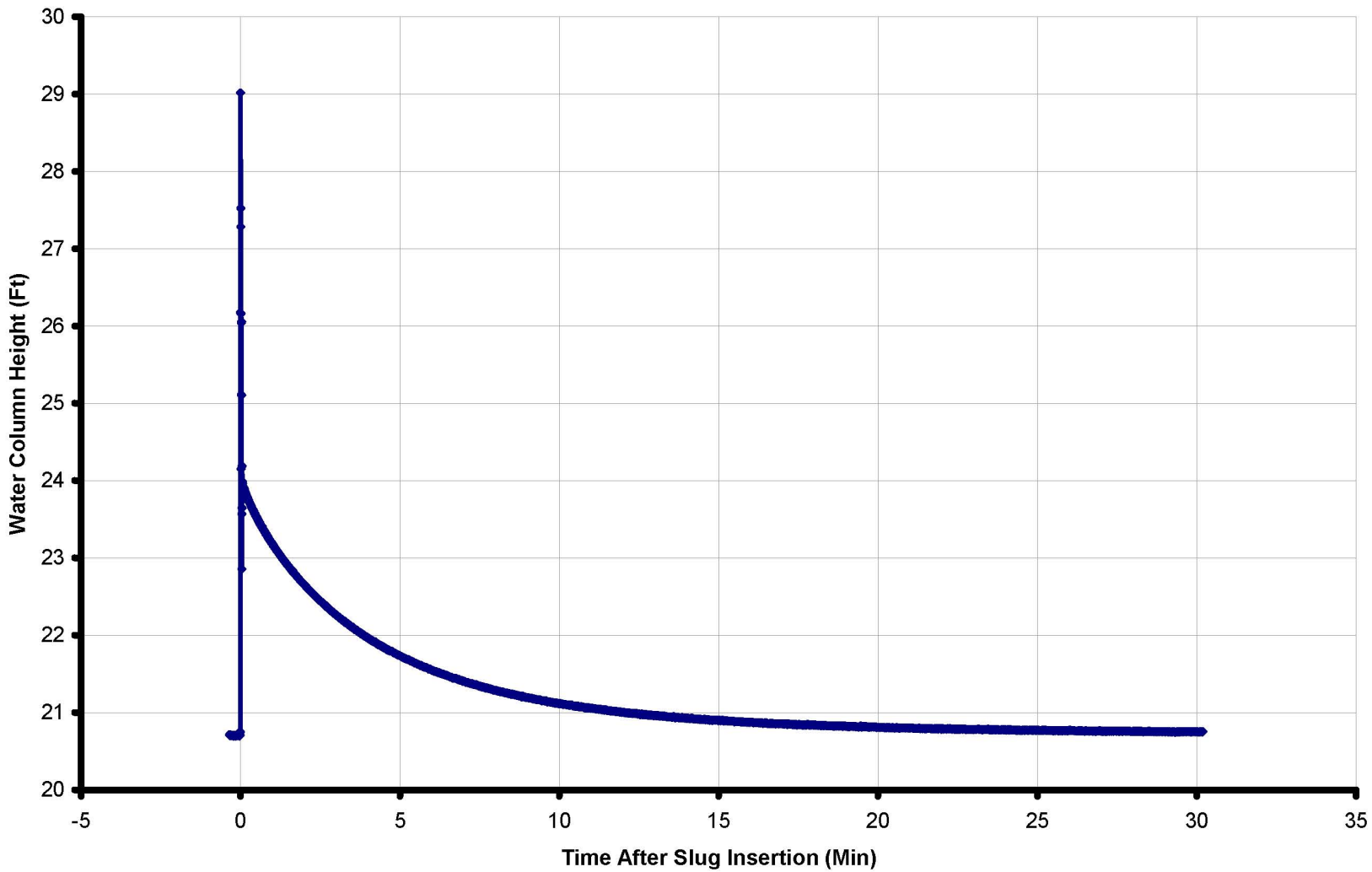
1. Pre-Test Water Level (ft. TOC)/ Time: 59.65 / 12:12 pm
2. Water Level after Probe Insertion (ft. TOC)/ Time: 59.69 / 12:[illegible] pm
3. Transducer Depth: 80 ft
4. Calc. Pre-Test Head over Transducer: 20.39 ft
5. Measured Pre-Test Head over Transducer: 20.69 ft
6. Time Test Started: 12:22 / 12:59 PM
7. Time Test Ended: 1:28 pm
8. Pneumatic Pressure at End of Test: 20.74
9. Datalogger File Name: CC752B-TD-OW-752B-SLUG

Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 27, 2006
Approved By: [illegible] Date: 9/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

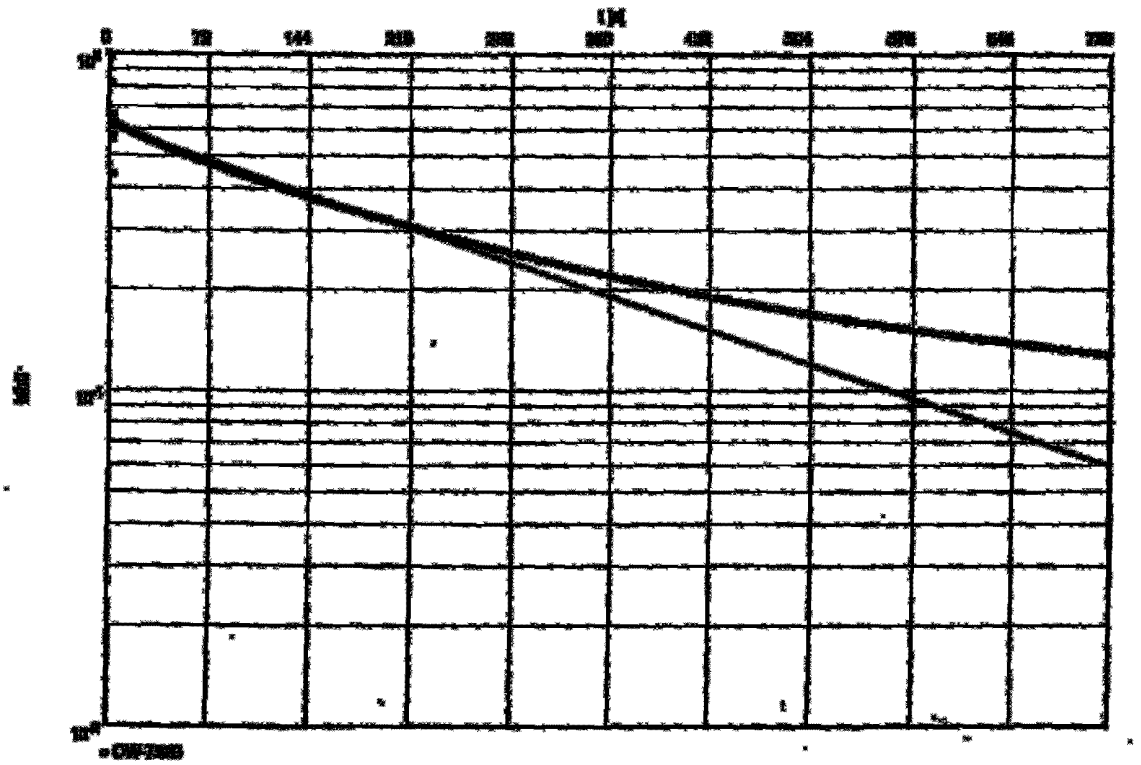
OW-752B Permeability Test



Schnabel
Schnabel Engineering

[illegible]	[illegible]	[illegible]	Page 1
		Project: [illegible]	
		Reviewed by: [illegible]	

Slug Test No. [illegible]	Test material: [illegible]
[illegible]	



Hydraulic conductivity (K): [illegible]

[illegible]
Static Water Level = [illegible] ft
Depth to Bottom of Aquifer = [illegible] ft
Length of Screen = [illegible] ft
Radius of Casing = [illegible] ft
Radius of Filtrasone = [illegible] ft
Evaluated by: [illegible]
Reviewed by: [illegible]

Schnabel
Schnabel Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 26, 2006
WEATHER TEMP: 85s, Humid

PROJECT NO.: [illegible]
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	0.002 0.625 Gal
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	104855
Slug S/N:	SLUG-001

WELL INFORMATION	
WELL ID:	OW-75A
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	56.15
Screen Interval Depth (ft, TOC):	32-42
Riser Height (ft):	1'10"

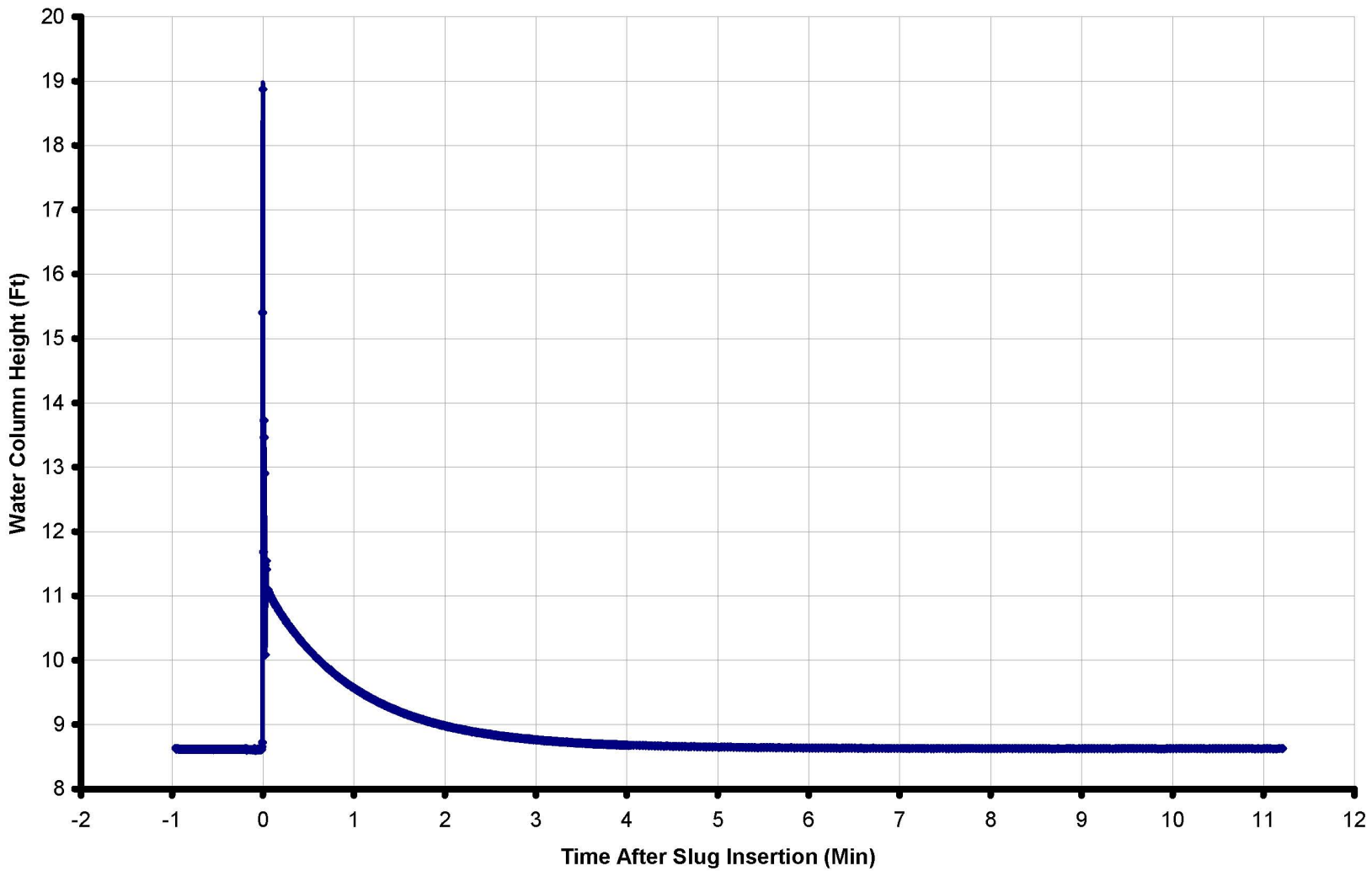
1. Pre-Test Water Level (ft, TOC)/ Time: 31.28 ft / 11:27 AM
2. Water Level after Probe Insertion (ft, TOC)/ Time: 31.28 ft / 11:42 AM
3. Transducer Depth: 40 ft
4. Calc. Pre-Test Head over Transducer: 8.72 ft
5. Measured Pre-Test Head over Transducer: 8.596 ft
6. Time Test Started: Pre test / Slug test 11:30 / 11:49 AM
7. Time Test Ended: 12:00 PM
8. Percent Recovery at End of Test: 86.16 ft
9. Datalogger File Name: 061204X-PID-001-75A-SLUG

Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: [signature] Date: July 26, 2006
Approved By: [signature] Date: 9/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

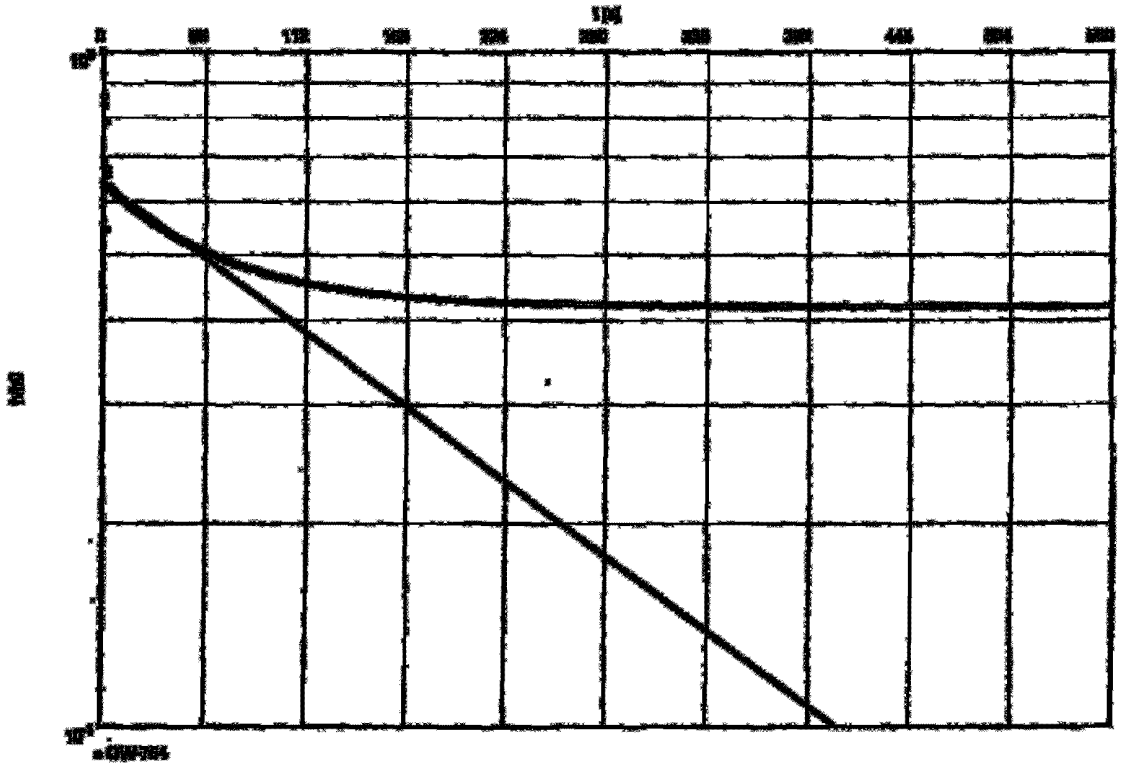
OW-754 Permeability Test



Schnabel
Schnabel Engineering

[illegible]	[illegible]	Date: [illegible] Page 1
		Project Subset [illegible]
		Evaluated by: [illegible]

Slug Test No. [illegible]	Test conducted on: [illegible]
[illegible]	



Hydraulic conductivity (avg): [illegible]

INPUT PARAMETERS
Static Water Level = [illegible] ft
Depth to Bottom of Aquifer = [illegible] ft
Length of Screen = [illegible] ft
Radius of Casing = [illegible] ft
Radius of Screen = [illegible] ft
Evaluated by: [illegible]
Reviewed by: [illegible]

Schnabel
Geotechnical Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 24, 2006
WEATHER/ TEMP: 70 - Clear

PROJECT NO.: 06120048
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	~~0.332~~ 0.625 GAL
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	104255
Slug S/N:	SLUG-001

WELL INFORMATION	
WELL ID:	OW-156
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	42.8
Screen Interval Depth (ft, TOC):	30-40
Riser Height (ft):	19.5"

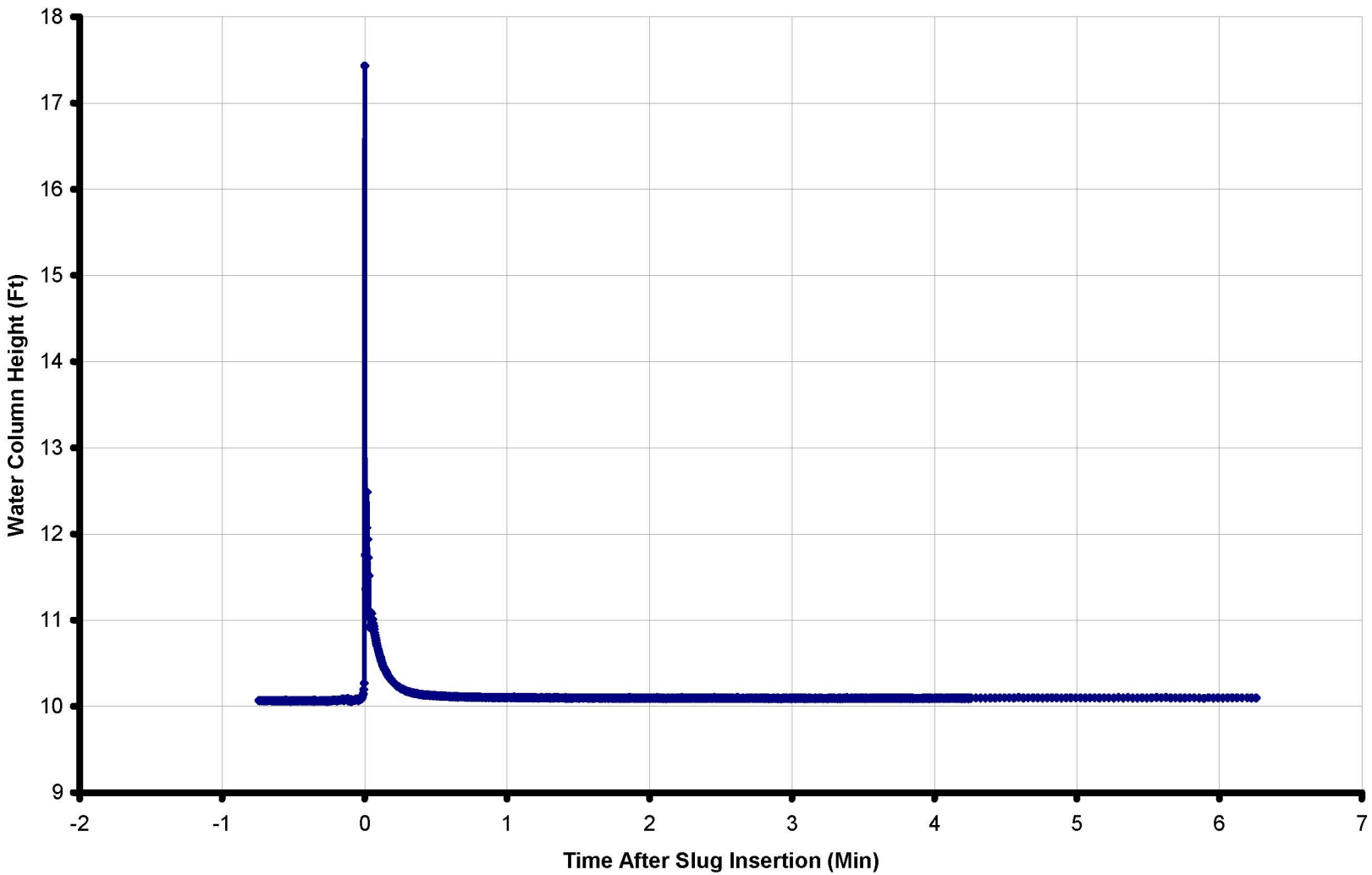
1. Pre-Test Water Level (ft, TOC)/ Time: 29.98 / 4:06 pm
2. Water Level after Probe Insertion (ft, TOC)/ Time: 29.96 / 4:20 pm
3. Transducer Depth: 40 ft
4. Calc. Pre-Test Head over Transducer: 10.14
5. Measured Pre-Test Head over Transducer: 10.05
6. Time Test Started: Pre-test / Slug test 16:30 / 16:31
7. Time Test Ended: 4:40 pm
8. ~~Pressure~~ Head Recovery at End of Test: 10.58
9. Datalogger File Name: 061208-48-PTD-OW-156-SLUG

Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 24, 2006
Approved By: [illegible] Date: 8/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

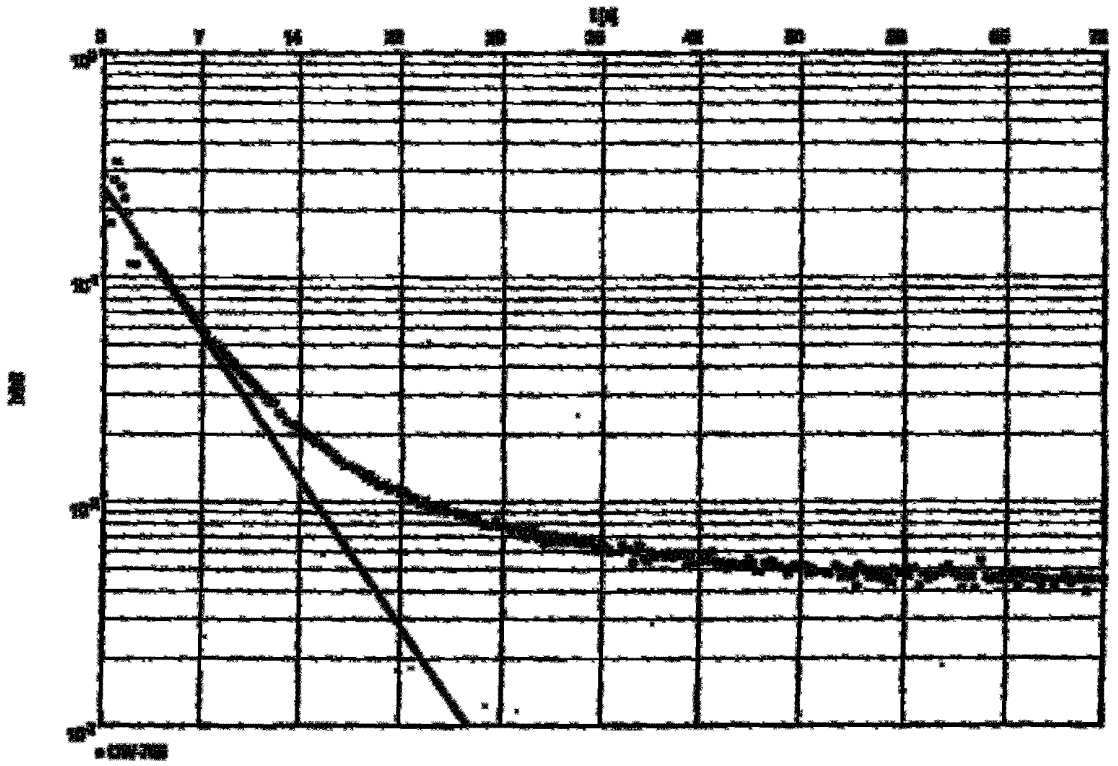
OW-756 Permeability Test



Schnabel
Schnabel Engineering

[illegible]	[illegible]	Date: [illegible]	Page 1
		Project: [illegible]	
		Evaluated by: [illegible]	

Slug Test No. [illegible]	Test conducted on: [illegible]
[illegible]	



Hydraulic conductivity (K): [illegible]

INPUT PARAMETERS
Static Water Level = [illegible]
Depth to Bottom of Aquifer = [illegible]
Length of Screen = [illegible]
Radius of Casing = [illegible]
Radius of Screen = [illegible]
Evaluated by: [illegible]

Evaluated by: [illegible]

Schnabel
Environmental Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 26, 2006
WEATHER/ TEMP: 85-[illegible]

PROJECT NO.: 06120048
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	Falling Head / Rising Head
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	0.062 0.625 GAL
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	104255
Slug S/N:	SLUG-001

WELL INFORMATION	
WELL ID:	OW-757A
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	33.72
Screen Interval Depth (ft, TOC):	28-30
Riser Height (ft):	1.5'

1 Pre-Test Water Level (ft, TOC)/ Time: 26.87 / 2:59 PM
2 Water Level after Probe Insertion (ft, TOC)/ Time: 26.87 / 3:31 PM
3 Transducer Depth: 33.0
4 Calc. Pre-Test Head over Transducer: 6.13 ft
5 Measured Pre-Test Head over Transducer: 6.12 ft
6 Time Test Started: Rebound/Slug test 3:00 / 3:55 PM
7 Time Test Ended: 5:48
8 Pressure Transducer at End of Test: 6.18 ft
9 Datalogger File Name: 06120048-PID-OW-757A-Slug

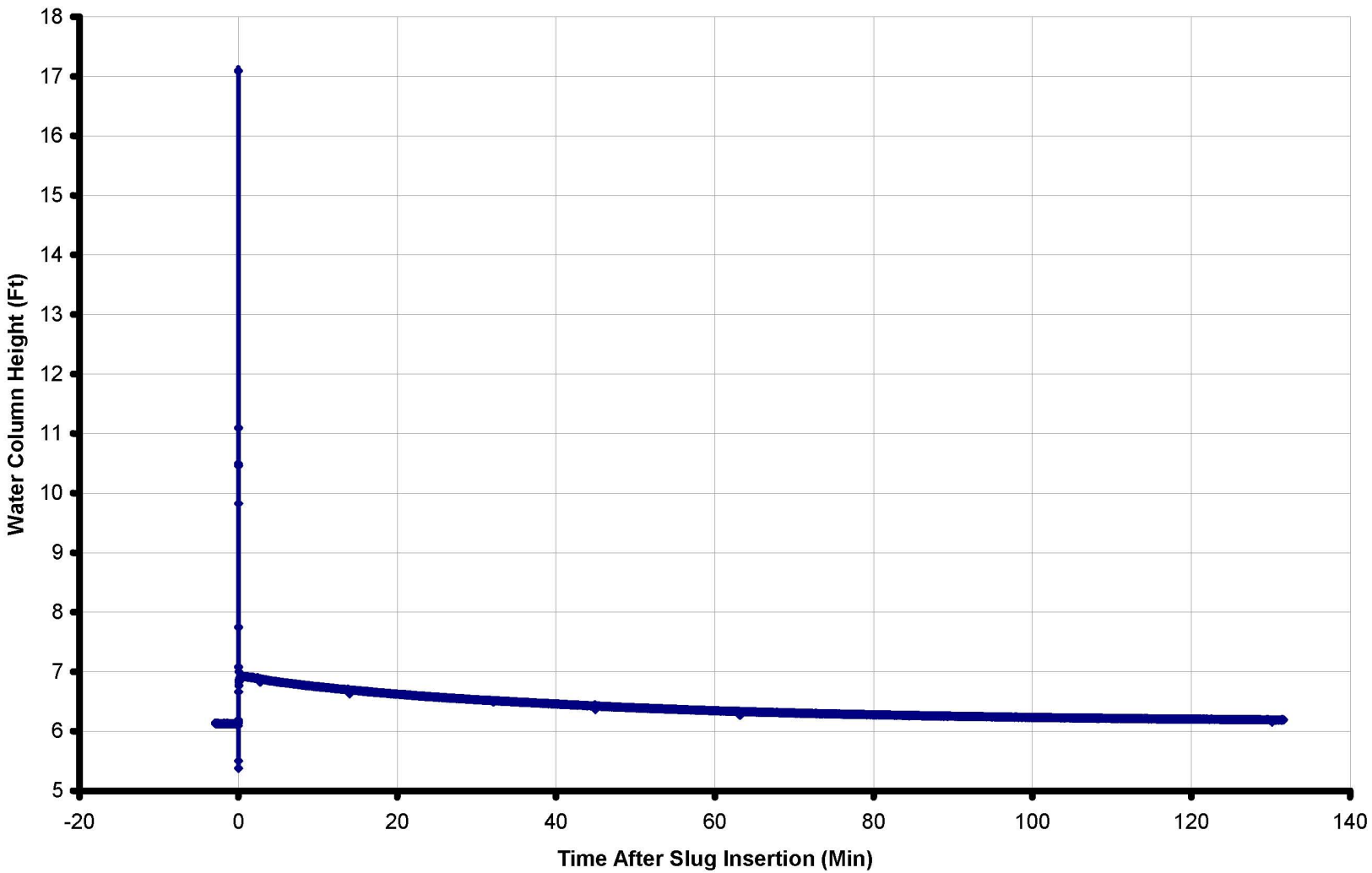
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 26, 2006
Approved By: [illegible] Date: 8/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

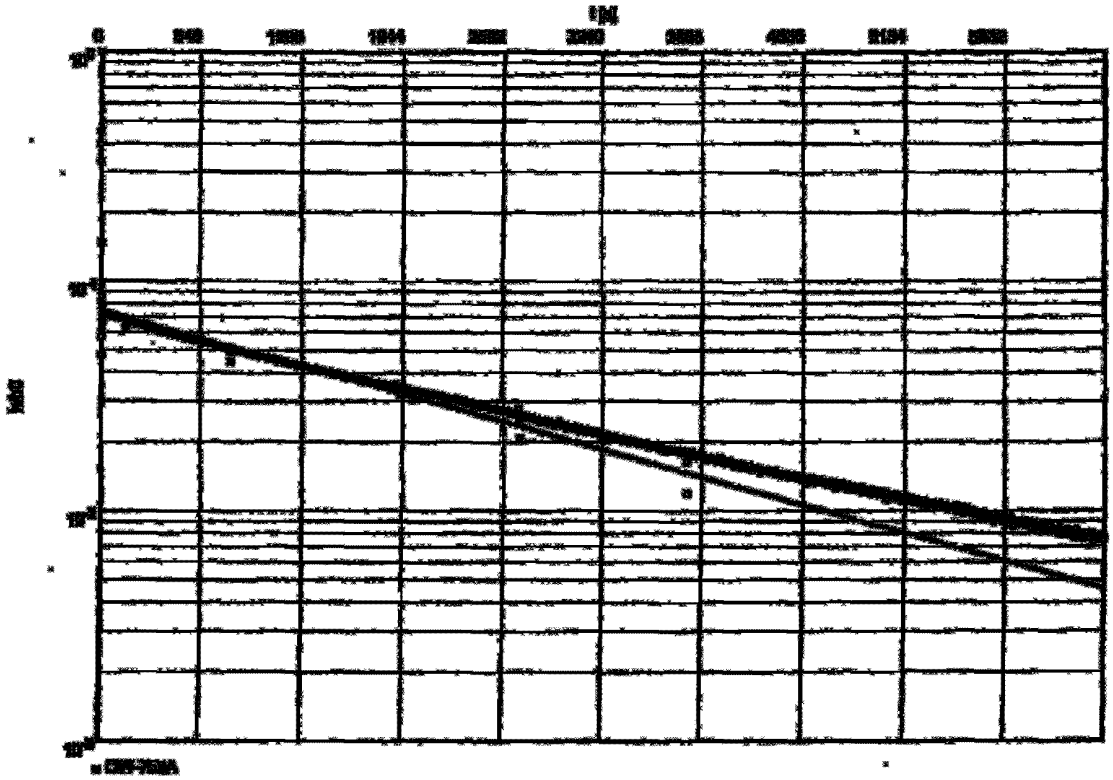
OW-759A Permeability Test



Schnabel
Schnabel Engineering

[illegible] Engineering Health, LLC [illegible] Corporate Overland Road, Suite 700 [illegible] [illegible]	Slug test analysis [illegible]	Date: [illegible]	Page 1
		Project: Colonial Gills	
		Evaluated by: [illegible]	

Slug Test No. 700A	Test conducted on: [illegible]
CRS-[illegible]A	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Schnabel
Schnabel Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 26 2006
WEATHER/ TEMP: 80-Sunny

PROJECT NO.: [illegible]
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	Dia 2 cm - 0.625 GAL
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	109259
Slug S/N:	Slug-002

WELL INFORMATION	
WELL ID:	OW-7595
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	87.7
Screen Interval Depth (ft, TOC):	75-85
Riser Height (ft):	1.5'

1 Pre-Test Water Level (ft, TOC)/ Time: 63.09 ft / 3:00 pm
2 Water Level after Probe Insertion (ft, TOC)/ Time: 63.08 ft / 4:30 pm
3 Transducer Depth: 80 ft
4 Calc. Pre-Test Head over Transducer: 16.92 ft
5 Measured Pre-Test Head over Transducer: 16.96 ft
6 Time Test Started: Pre-test/Slug test 3:01 / 4:38 PM
7 Time Test Ended: 5:59 Pm
8 Percent Recovery at End of Test: 17.01 ft
9 Datalogger File Name: 061200B-RD-OW-7595-SLUG

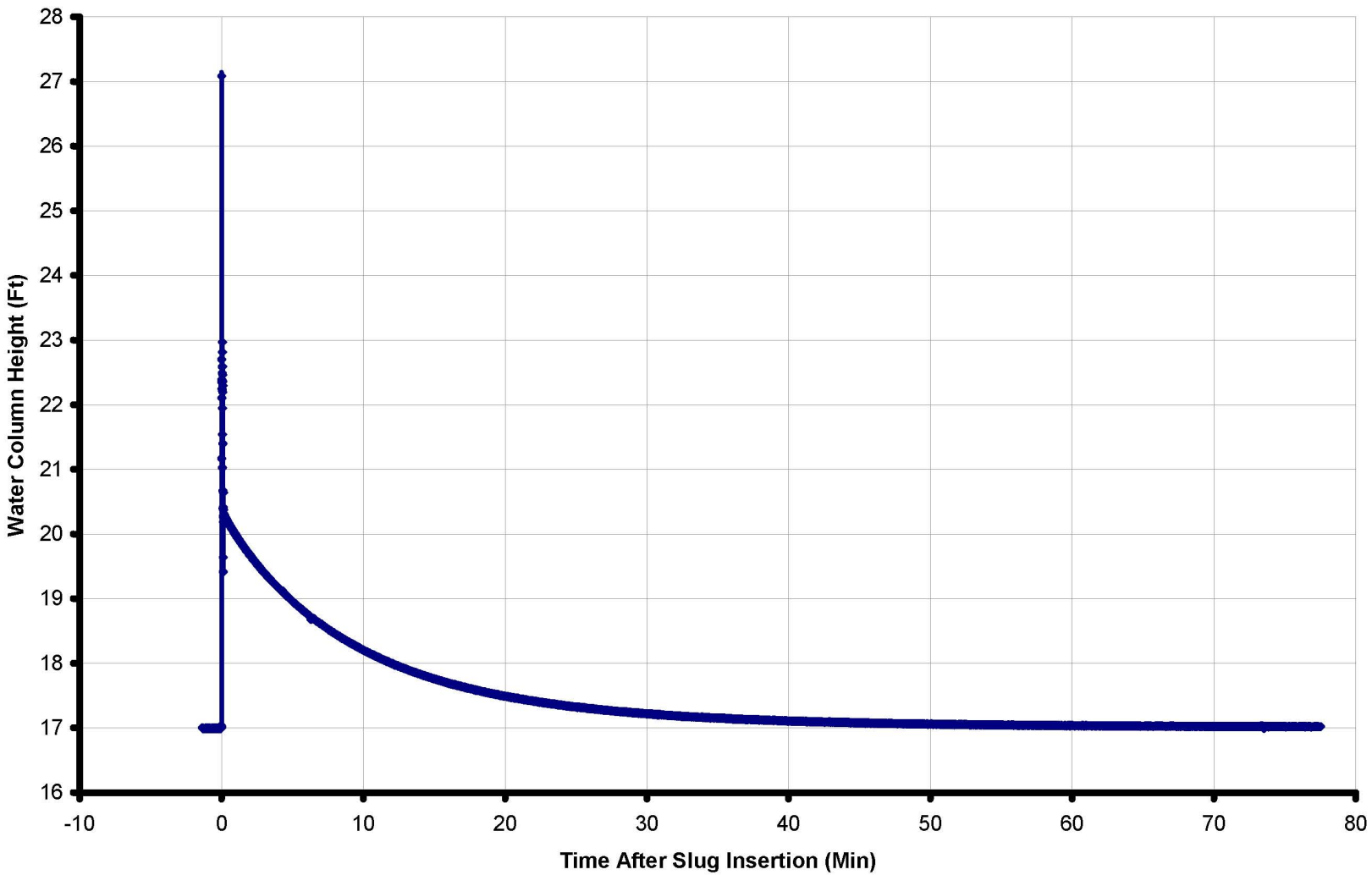
Remarks:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 26, 2006
Approved By: [illegible] Date: 9/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

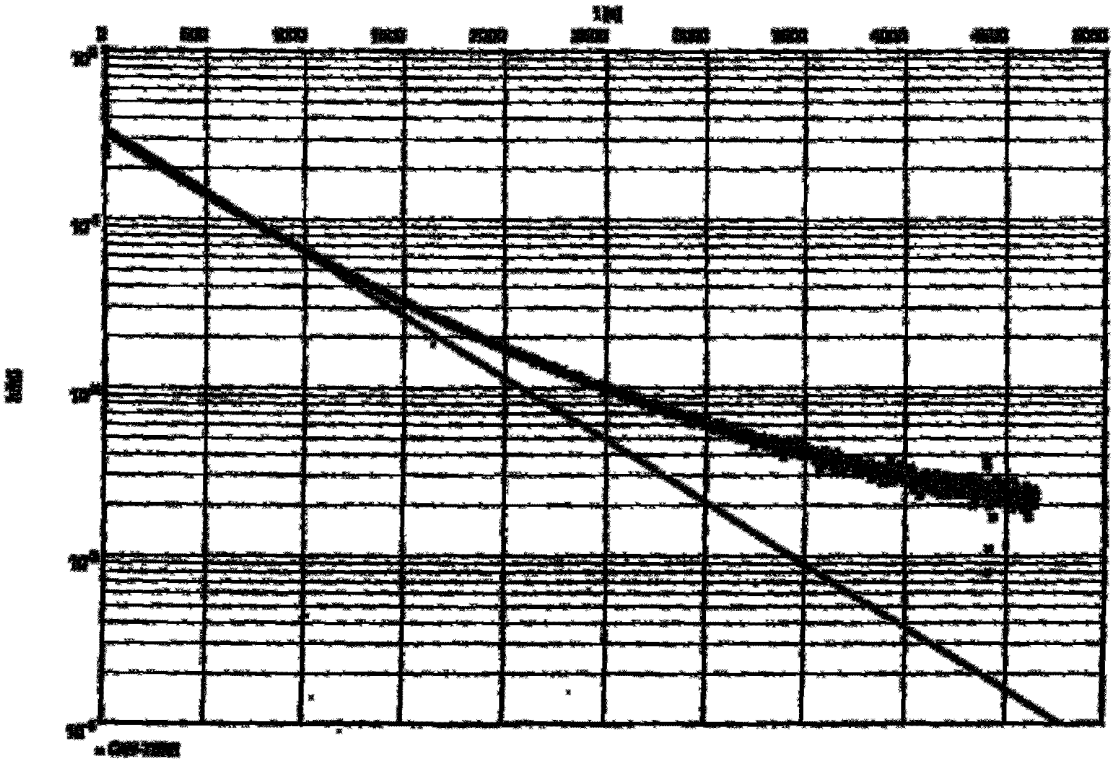
OW-759B Permeability Test



Schnabel
Schnabel Engineering

[illegible]	[illegible]	Date: [illegible]	Page 1
		Project: [illegible]	
		Reviewed by: [illegible]	

Slug Test No. [illegible]	Test conducted on: [illegible]
[illegible]	



Hydraulic conductivity (K): $1.77 \times 10^{-[illegible]}$

INPUT PARAMETERS
Static Water Level = [illegible] ft
Depth to Bottom of Aquifer = [illegible] ft
Length of Screen = [illegible] ft
Radius of Casing = [illegible] ft
Radius of Influence = [illegible] ft
Conducted by: [illegible]
Reviewed by: [illegible]

Schnabel
Multidisciplinary Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 27, 2006
WEATHER/ TEMP: 85° [illegible]

PROJECT NO.: 06120048
CLIENT: Bechtel Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head/ Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	0.623 cu. 0.625 cu
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	109255
Slug S/N:	SLUG-001

WELL INFORMATION	
WELL ID:	OW-765A
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	31
Screen Interval Depth (ft, TOC):	17 - 27'
Riser Height (ft):	2'

1. Pre-Test Water Level (ft, TOC)/ Time: 21.69 / 7:53 AM
2. Water Level after Probe Insertion (ft, TOC)/ Time: 21.69 / 8:20 AM
3. Transducer Depth: 30 ft
4. Calc. Pre-Test Head over Transducer: 8.36 ft
5. Measured Pre-Test Head over Transducer: 8.40 ft
6. Time Test Started: Pre-test / Slug test 8:10 / 8:28 AM
7. Time Test Ended: 9:27 AM
8. Percent Recovery at End of Test: 8.40 ft
9. Datalogger File Name: 06120048-PTD-OW-765A-SLUG

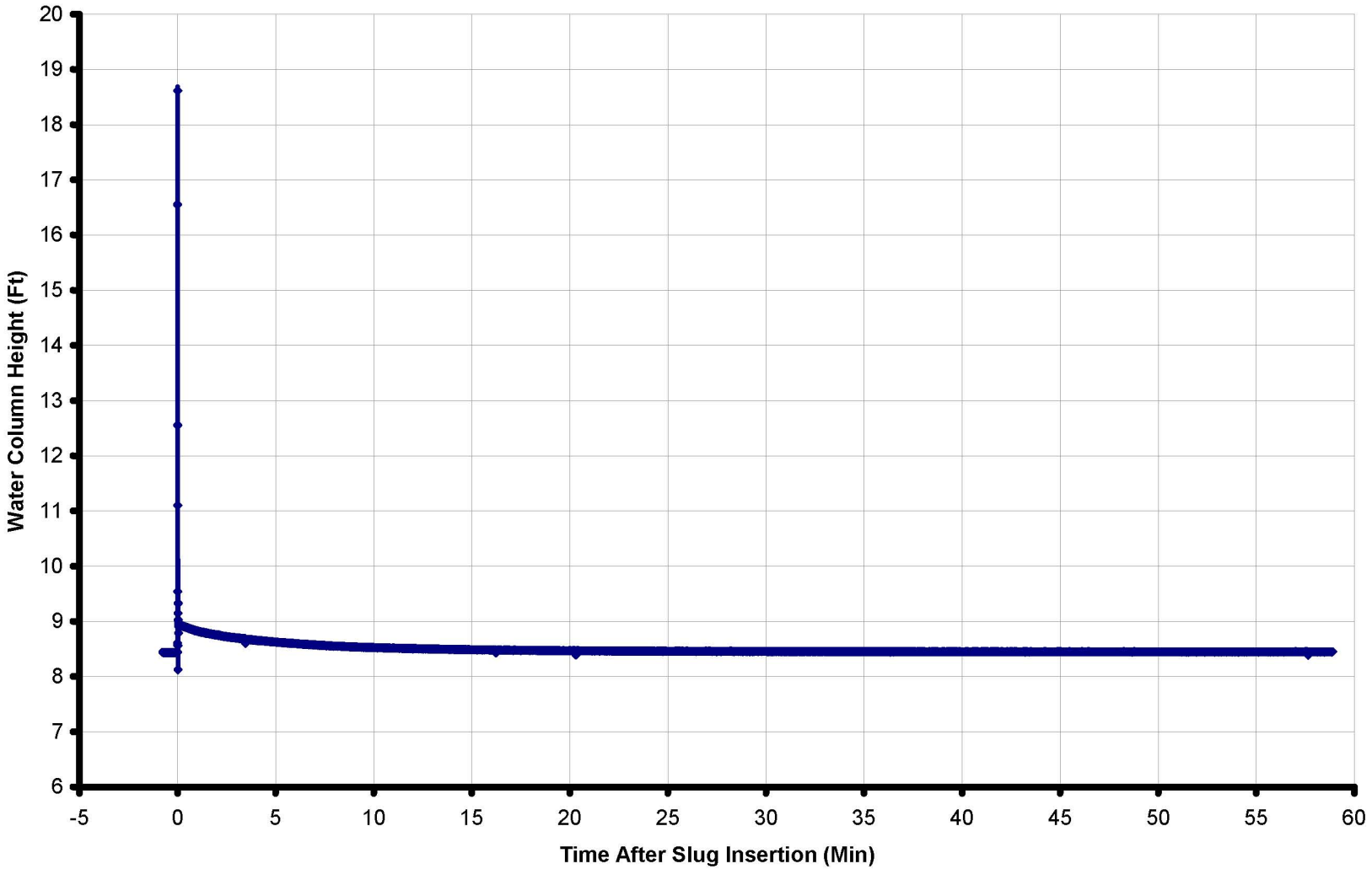
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 27, 2006
Approved By: [illegible] Date: 9/11/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

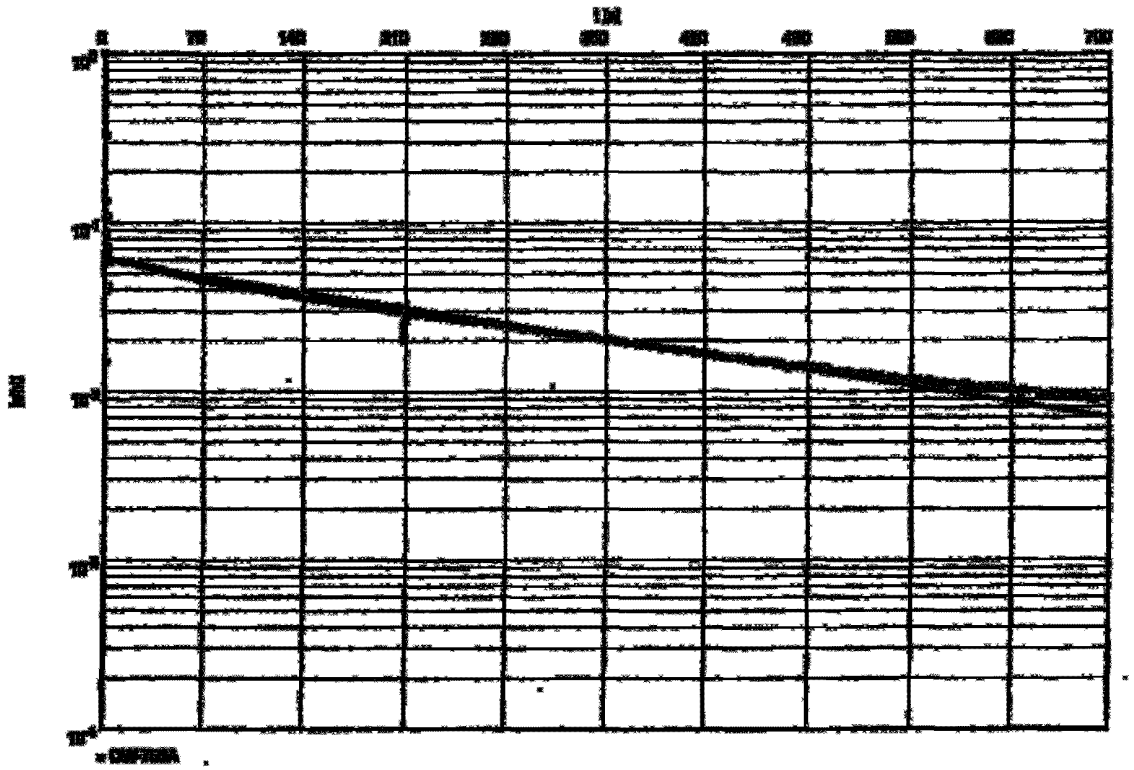
OW-765A Permeability Test



Schnabel
Schnabel Engineering

[illegible]	[illegible]	Date: [illegible]	Page 1
[illegible]		Project Subset [illegible]	
		Reviewed by: [illegible]	

Slug Test No. [illegible]	Test conducted on: [illegible]
[illegible]	


[illegible]
[illegible]
[illegible]

Schnabel
Schnabel Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 27, 2006
WEATHER/ TEMP: 85° - humid

PROJECT NO.: 6120048
CLIENT: Nuclear Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head) / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	ORIGINAL 0.615 GAL
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	104259
Slug S/N:	SLUG-002

WELL INFORMATION	
WELL ID:	OW-765B
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	97
Screen Interval Depth (ft, TOC):	82-92'
Filter Height (ft):	2'

1 Pre-Test Water Level (ft, TOC)/ Time: 60.23 / 8:35 AM
2 Water Level after Probe Insertion (ft, TOC)/ Time: 60.23 / 9:30 AM
3 Transducer Depth: 80.24
4 Calc. Pre-Test Head over Transducer: 19.77
5 Measured Pre-Test Head over Transducer: 20.06
6 Time Test Started: Rising / Slug Test 8:39 AM / 9:35 AM
7 Time Test Ended: 11:20 AM
8 Pressure Head at End of Test: 20.07
9 Datalogger File Name: 6120048.2Th-OW-765B-Slug

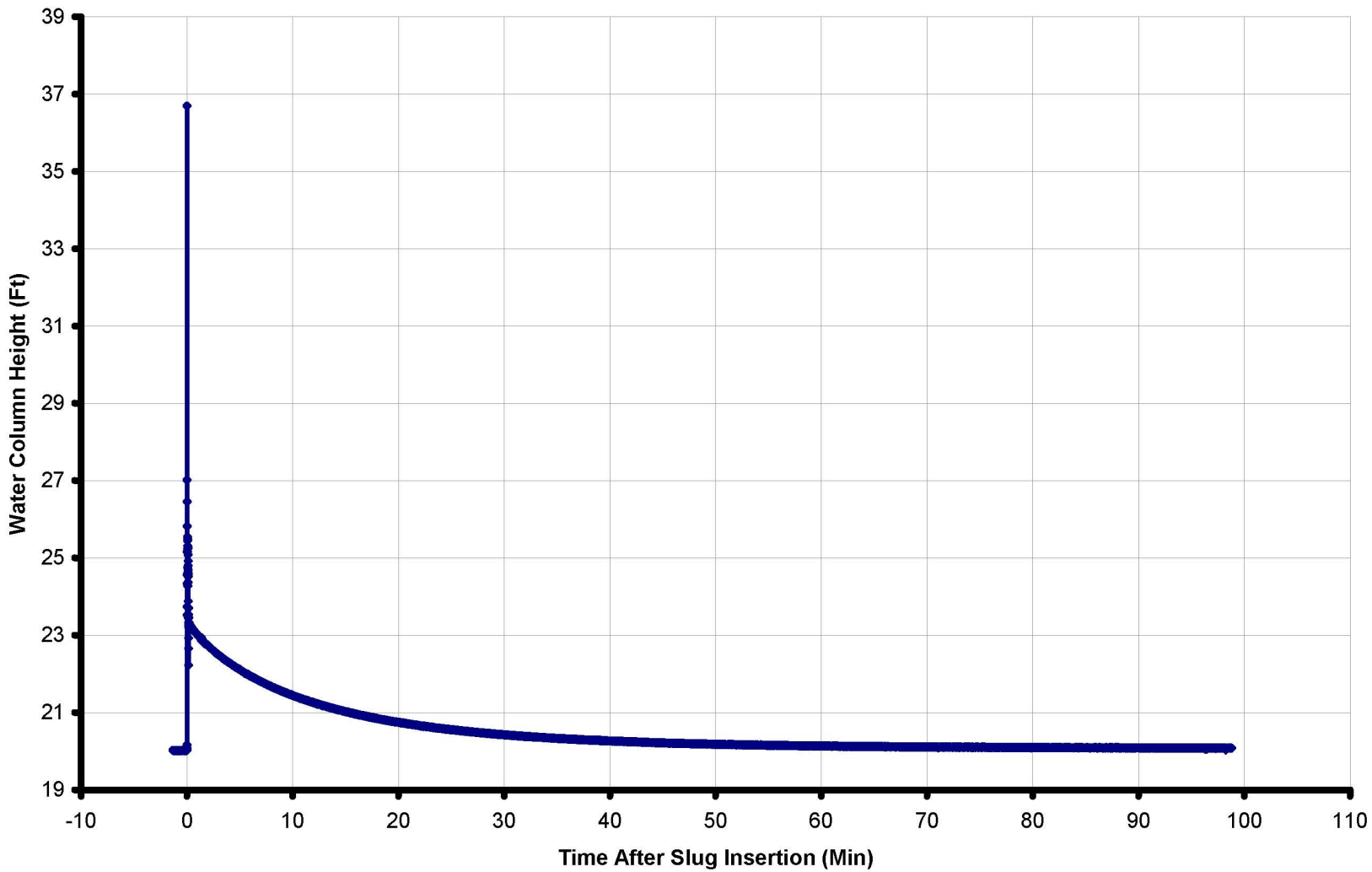
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd [illegible] Date: July 27, 2006
Approved By: [illegible] Date: 9/6/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

OW-765B Permeability Test



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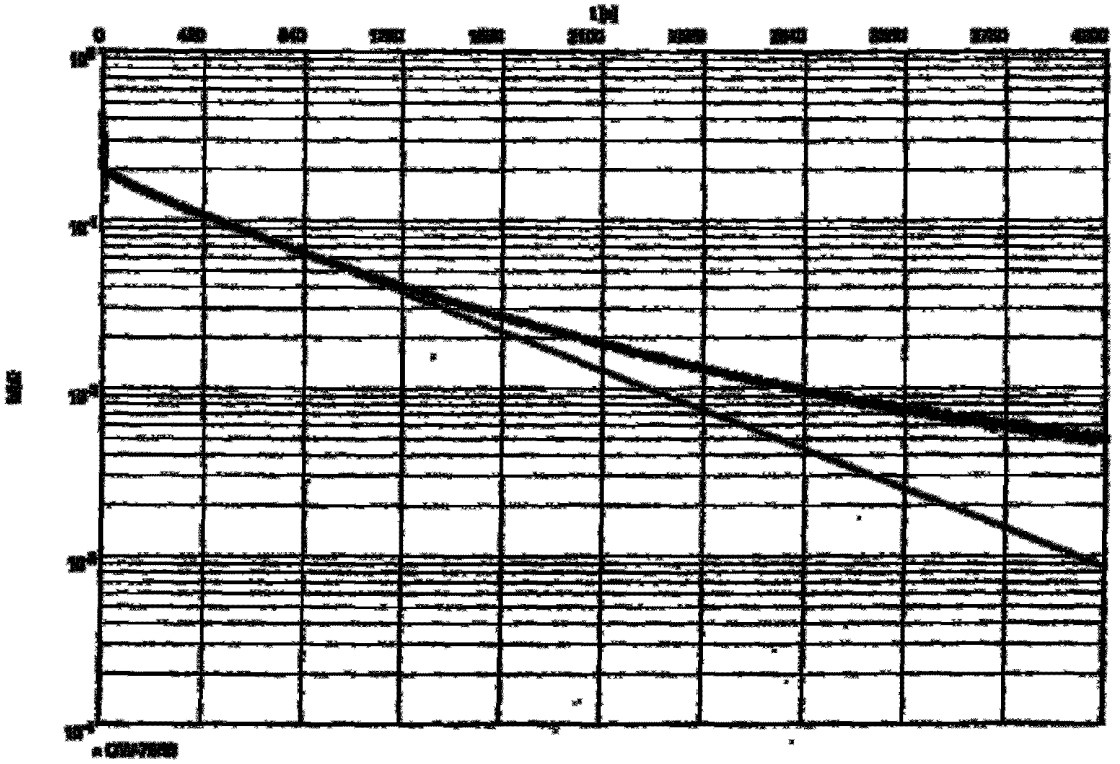
[redacted]	[redacted]	[redacted]	[redacted]
		[redacted]	
		[redacted]	

[redacted]	[redacted]
[redacted]	



Hydraulic conductivity [redacted]: [redacted]

INPUT PARAMETERS
[redacted]
[redacted]
[redacted]
[redacted]
[redacted]
[redacted]
[redacted]
[redacted]

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PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 26, 2006
WEATHER/TEMP: 85, humid

PROJECT NO.: 09120048
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	~~0.25 Gal~~ 0.625 Gal
Manual Water Level Meter S/N:	149-001
Transducer S/N:	147555
Slug S/N:	SL16-001

WELL INFORMATION	
WELL ID:	OW-766
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	34.05'
Screen Interval Depth (ft, TOC):	20-30
Riser Height (ft):	16.25"

1	Pre-Test Water Level (ft, TOC)/ Time :	28.71 ft / 1:51 pm
2	Water Level after Probe Insertion (ft, TOC)/ Time:	29.77 ft / 1:42 pm
3	Transducer Depth:	34 ft
4	Calc. Pre-Test Head over Transducer:	5.23
5	Measured Pre-Test Head over Transducer:	5.21
6	Time Test Started: Pre-test/Slug test	1:32 pm / 13:45
7	Time Test Ended:	1:33 pm
8	Percent Recovery at End of Test:	531
9	Datalogger File Name:	0912004B-PTD-OW-766-SL06

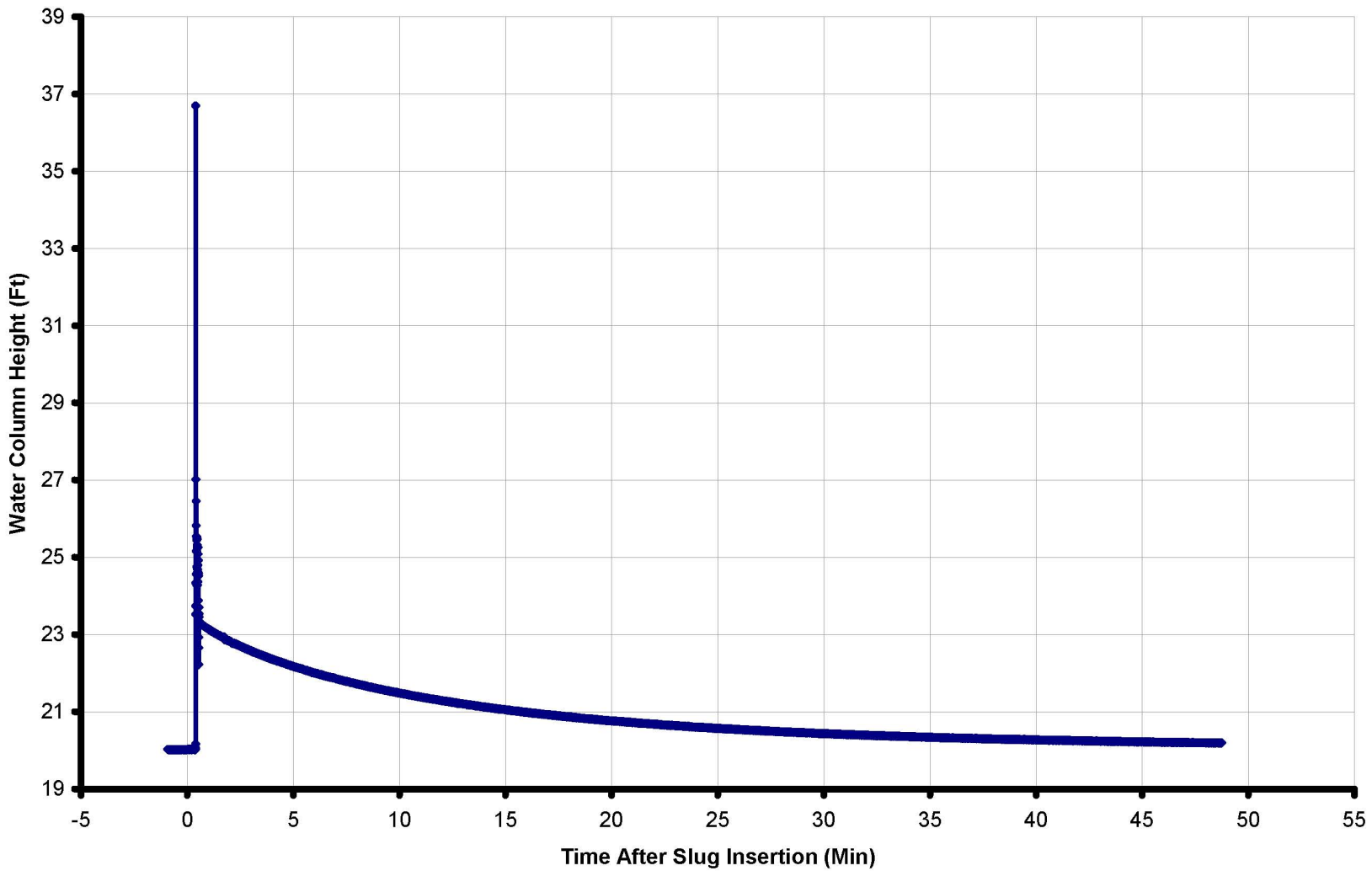
NOTE: Bottom of slug @ 33 ft depth. May not be fully submerged.

Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 26, 2006
Approved By: [signature] Date: 8/2/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

OW-766 Permeability Test



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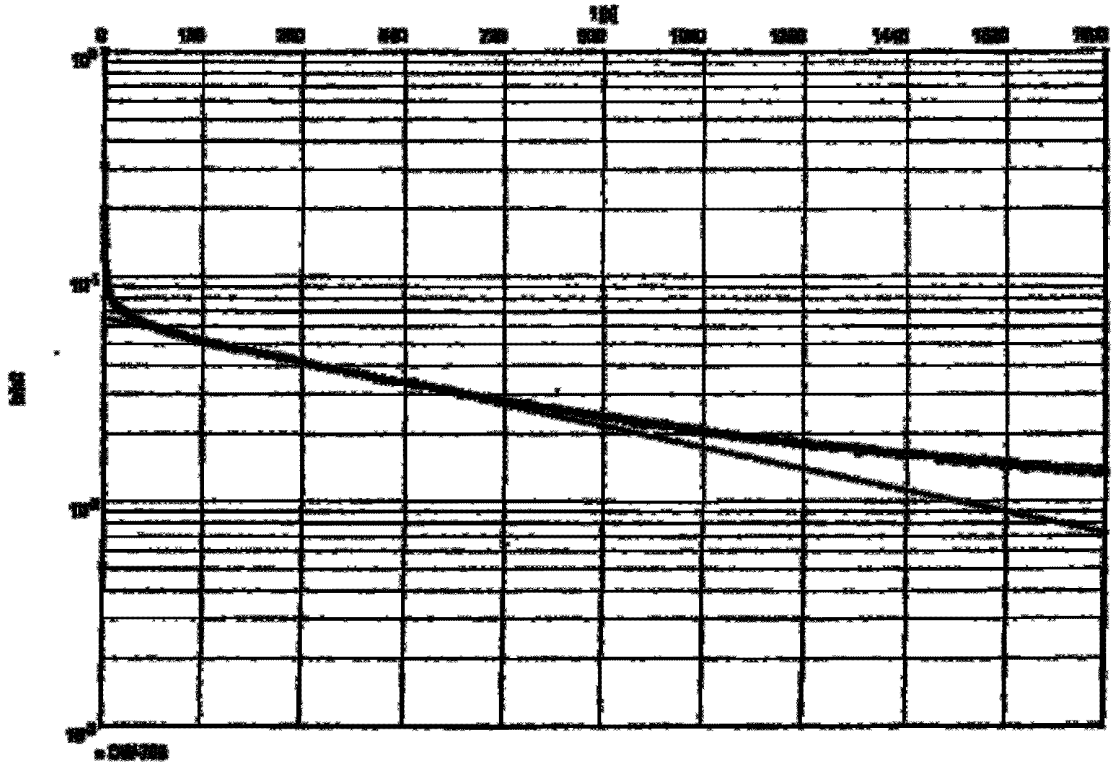
Schnabel Engineering

[illegible] Engineering North, LLC [illegible] Cyclone Ordnance Road, Suite [illegible] [illegible] [illegible]	Graphical test analysis [illegible] method	Date: [illegible]	Page 1
		Project: Colonel Ohio	
		Evaluated by: [illegible]	

Slug Test No. [illegible]	Test evaluated on: [illegible]
[illegible]	


[illegible]
0
[illegible]
[illegible]
[illegible]

Schnabel Geotechnical Engineering

PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calumet Cliffs NPP GCLA Project
LOCATION: Lusby, MD
DATE: July 25, 2006
WEATHER/ TEMP: 90 Clear

PROJECT NO.: 06120049
CLIENT: Rockfish Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Displacement / Water)
Approximate Volume of Slug:	~~[illegible]~~ 0.625 gal
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	104255
Slug S/N:	SLUG-001

WELL INFORMATION	
WELL ID:	OW-768
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	44.15
Screen Interval Depth (ft, TOC):	30-40
Riser Height (ft):	1.5'

1. Pre-Test Water Level (ft, TOC)/ Time: 24.0 ft / 16:45
2. Water Level after Probe Insertion (ft, TOC)/ Time: 23.99 ft / 17:10
3. Transducer Depth: 30.0 ft
4. Calc. Pre-Test Head over Transducer: 16.01 ft
5. Measured Pre-Test Head over Transducer: 15.83 ft
6. Time Test Started: the last / Slug test 16:48 / 17:15
7. Time Test Ended: 17:17
8. Pressure Recovery at End of Test: 16.05
9. Datalogger File Name: 060725-PTD-OW-768

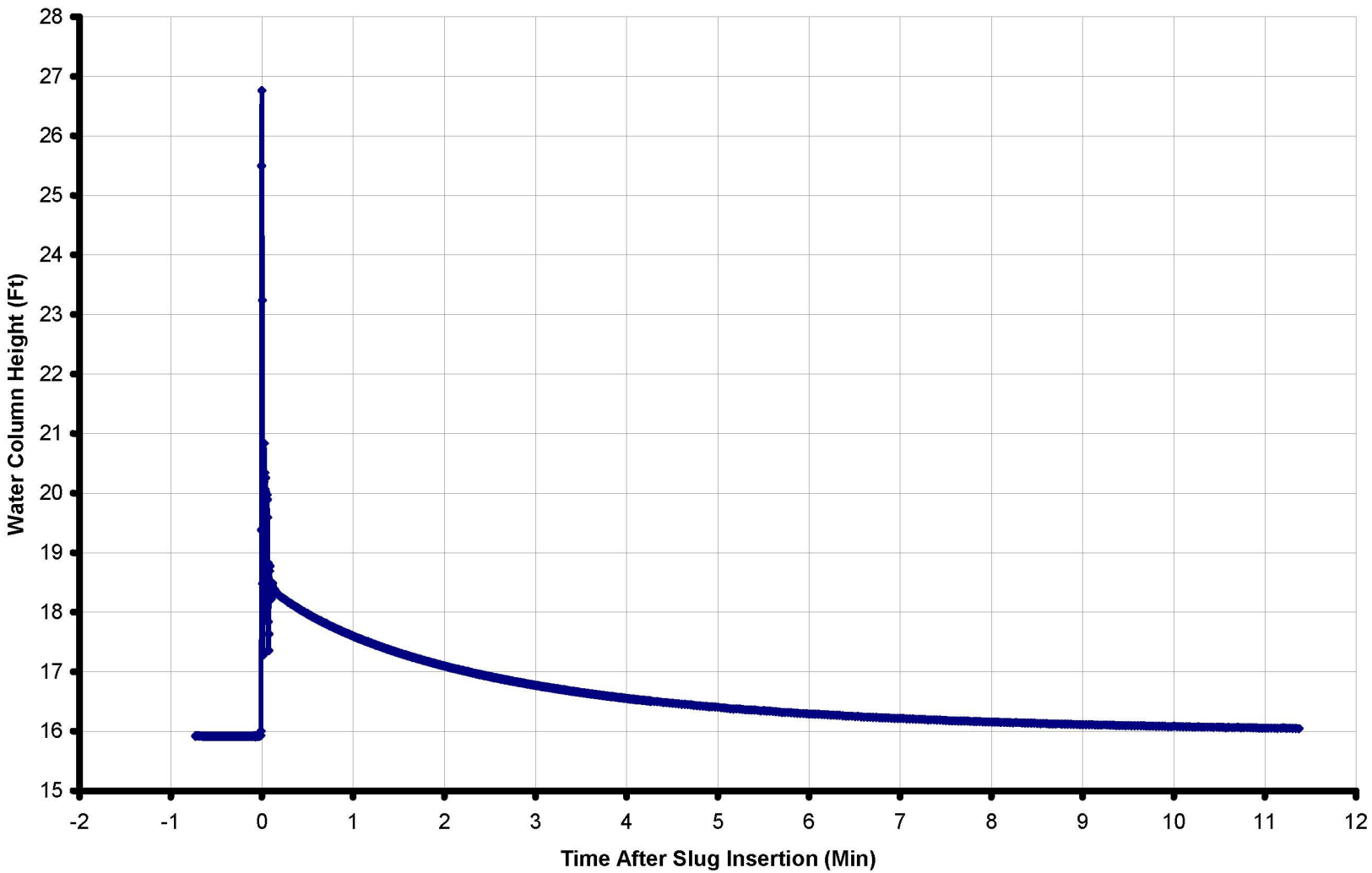
Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 25, 2006
Approved By: [illegible] Date: 9/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

Calvert Cliffs Nuclear Power Plant
Combined Operating License Application (COLA)
Schnabel Engineering Project No. 06120048

OW-768 Permeability Test



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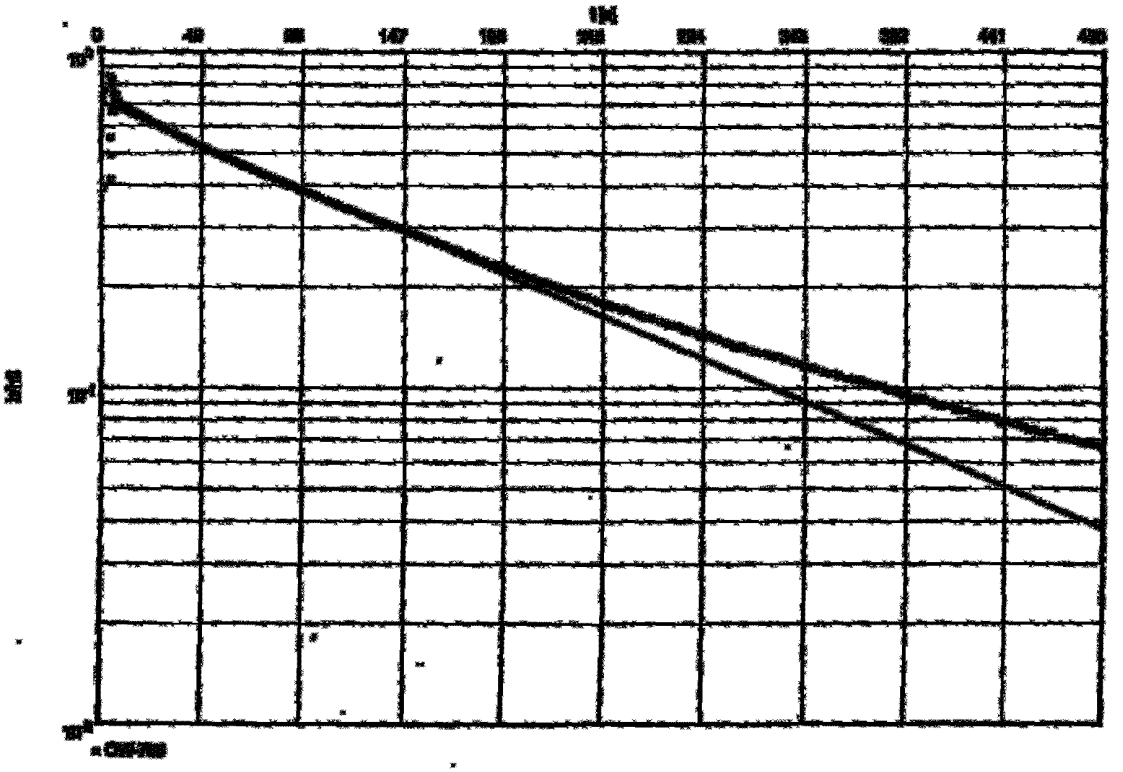
[illegible]	[illegible]	Date: [illegible]	Page 1
[illegible]		Project: [illegible]	
		Evaluated by: [illegible]	

Step Test No. [illegible]	Test conducted on [illegible]
[illegible]	



Hydraulic conductivity (avg): [illegible]

INPUT PARAMETERS
Static Water Level = [illegible]
Depth to Bottom of Aquifer = [illegible]
Length of Screen = [illegible]
Radius of Casing = [illegible]
Radius of Influence = [illegible]
Evaluated by: [illegible]
Reviewed by: [illegible]

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PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP CCLA Project
LOCATION: Lusby, MD
DATE: July 25, 2006
WEATHER/ TEMP: 80, Clear

PROJECT NO.: 06120048
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	~~[illegible]~~ 0.625 gal
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	104252
Slug S/N:	SLUG-001

WELL INFORMATION	
WELL ID:	OW-769
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	45.05
Screen Interval Depth (ft, TOC):	31.10' - 41.10'
Riser Height (ft):	2' 3"

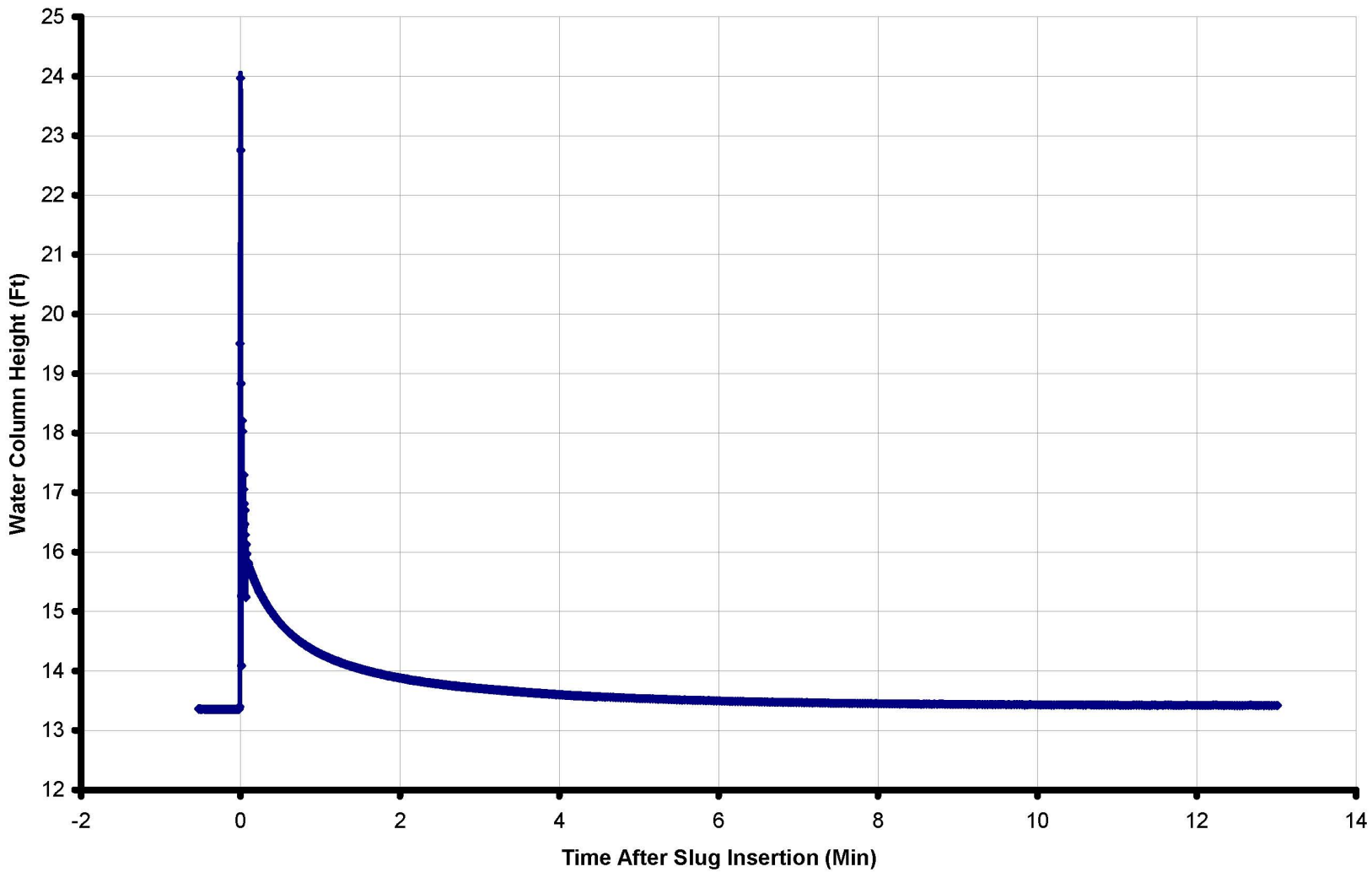
1. Pre-Test Water Level (ft, TOC)/ Time: 26.99 ft / 17:35
2. Water Level after Probe Insertion (ft, TOC)/ Time: 22.48 ft / 18:05
3. Transducer Depth: 40 ft
4. Calc. Pre-Test Head over Transducer: 13.52 ft
5. Measured Pre-Test Head over Transducer: 13.57 ft
6. Time Test Started: Re. test / Playback 17:40 / 18:06
7. Time Test Ended: 18:19
8. Percent Recovery at End of Test: 13.41
9. Datalogger File Name: 06120048-PTD-OW-769-SLUG

Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd Uhler Date: July 25, 2006
Approved By: [illegible] Date: 9/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

OW-769 Permeability Test



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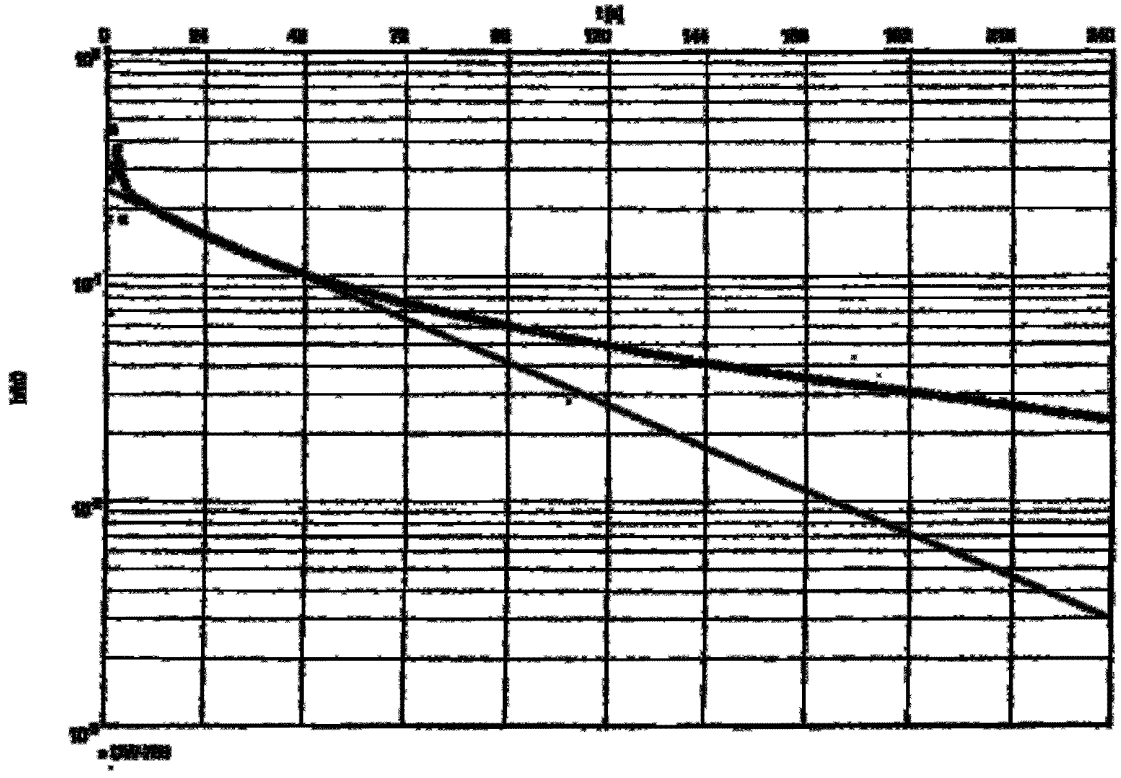
[illegible]	[illegible]	Date: [illegible]	Page 1
[illegible]		Project: [illegible]	
		Reviewed by: [illegible]	

Slug Test No. [illegible]	Test conducted on [illegible]
[illegible]	



Hydraulic conductivity (K): [illegible]

INPUT PARAMETERS
Static Water Level = [illegible]
Depth to Bottom of Aquifer = [illegible]
Length of Screen = [illegible]
Radius of Casing = [illegible]
Radius of Screen = [illegible]
Conducted by: [illegible]
Reviewed by: [illegible]

Page 1 of 1

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PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project
LOCATION: Lusby, MD
DATE: July 25, 2006
WEATHER/TEMP: 90 - Clear

PROJECT NO.: 06120048
CLIENT: Baltimore Power Corporation

TEST INFORMATION	
Type of Test:	(Falling Head / Rising Head)
Slug Type:	(Mechanical / Water)
Approximate Volume of Slug:	3 Gallons
Manual Water Level Meter S/N:	WLP-001
Transducer S/N:	104255
Slug S/N:	—

WELL INFORMATION	
WELL ID:	OW-770
Screen Inside Diameter:	2"
Casing Inside Diameter:	2"
Total Well Depth (ft, TOC):	44.25
Screen Interval Depth (ft, TOC):	30-40
Riser Height (ft):	15' 3¼"

1 Pre-Test Water Level (ft, TOC)/ Time: 0 (Dry)
2 Water Level after Probe Insertion (ft, TOC)/ Time: 0 (Dry)
3 Transducer Depth: 44
4 Calc. Pre-Test Head over Transducer: 0
5 Measured Pre-Test Head over Transducer: -0.03
6 Time Test Started: Pre-test/Slug test - 13:35/13:36
7 Time Test Ended: 1:45 PM
8 Percent Recovery at End of Test: 2 Pt
9 Datalogger File Name: 06120048-PD-OW-770-SLUG

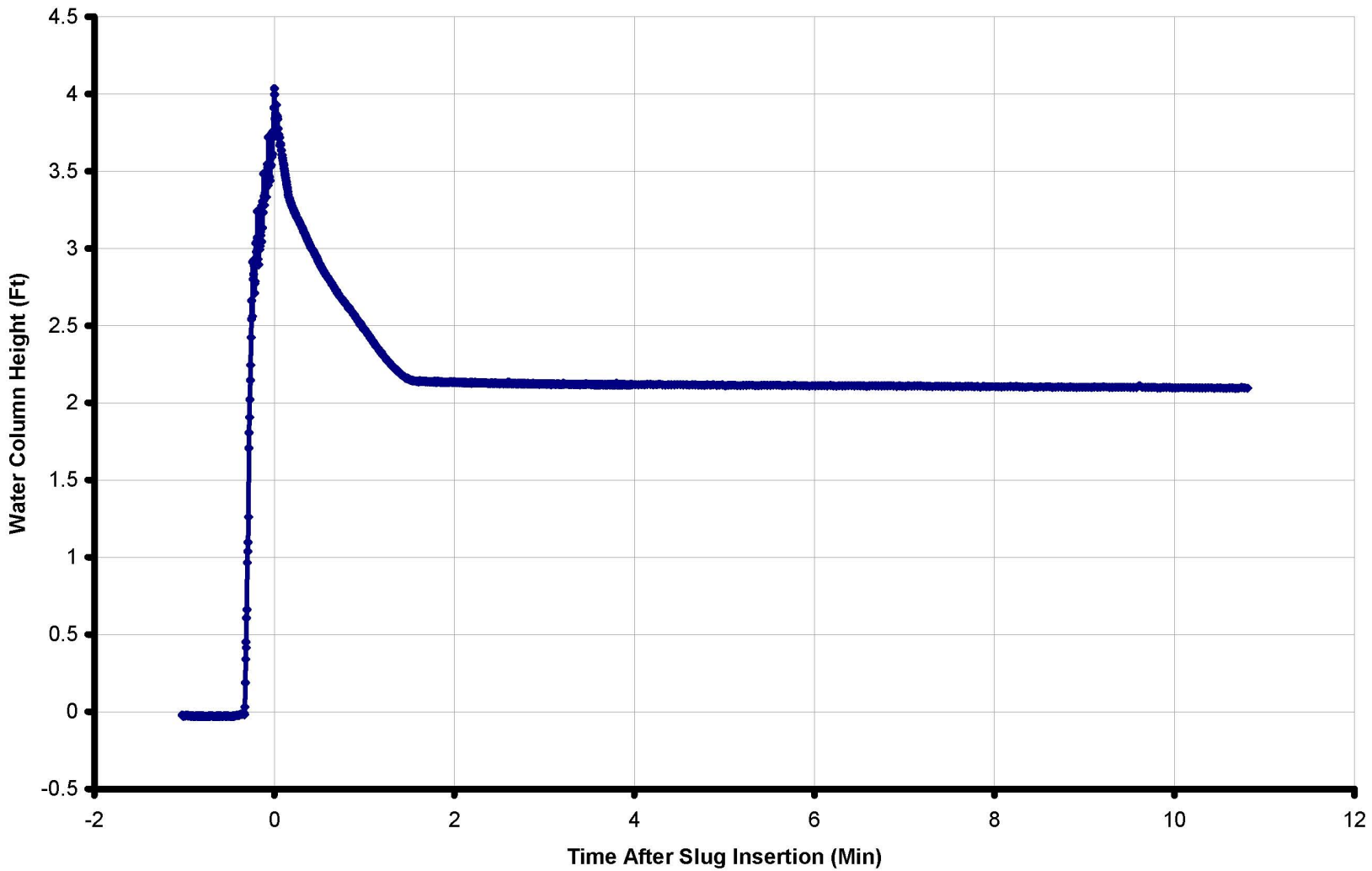
3 gallon water Slug

Comments:
TOC = Bottom of the V-notch at top of casing

Performed By: Todd White Date: July 25 2006
Approved By: [signature] Date: 9/21/06

Note: All water level measurements obtained from well measurement point at top of casing.
Reference: ASTM D4044

OW-770 Permeability Test



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WELL SAMPLING RECORDS

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Schnabel Engineering North, LLC

PROJECT	WELL NO.
CCNPP	OW-301

WELL SAMPLING RECORD	JOB NO.	SITE	PREPARED BY
	06120048	Calvert Cliffs	A Brasko

PURGE METHOD	SAMPLING METHOD	PURGING CRITERIA:
Submersible	Grab	Volume & Stabilization

K Powell

PUMP TYPE	PURGING DATE: 12/20/06	DATE OF SAMPLING: 12/20/06
2" Grundfos	WEATHER: Sunny/Cold TEMPERATURE: 40 INITIAL WATER LEVEL: 56.18	TIME OF SAMPLING: 1455 SAMPLE MATRIX: GROUND WATER:

PUMPING VOLUME CALCULATION

$V_w = (3.14)(\frac{2}{12})^2(21.82)(\frac{7.48}{1})$
$= (3.6)(3) = 10.9$ gal

$V_b = (3.14)(\frac{4}{12})^2(18)(0.3)(\frac{7.48}{1})$
$= 3.7(3) = 11.1$

$V_T = 22.0$

dw - well diameter (in)
h-well depths (ft)
n-porosity
d_b - Boring diameter

1 ft³ = 7.48 gal

$V_w = \pi \frac{(dw)^2}{24} 2h *$

$V_b = \pi \frac{[(db-dw)]^2}{24} * 7.48 * n$

Checked by: [signature]

PURGING DATA			FIELD PARAMETERS				COMMENTS		
Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temp (°C)	pH (S.U.)	Conductivity (u mhos) (± 9%)	ORP (mV) ± 10mV)	DO (mg/L) (± 10%)	Turbidity (NTU) (± 10%)	Comments
1353	1423	164	13.93						
1423	1428	5.5	12.90	6.47	0.460	12.4	6.89	0.3	
1428	1433	5.5	14.31	6.89	0.479	12.4	6.90	1.5	
1433	1438	5.5	14.12	7.09	0.478	12.5	4.90 3.33	1.6	
1438	1443	5.5	14.37	7.14	0.480	12.5	3.03	1.9	
1443	1448	5.5	14.58	7.16	0.477	12.4	1.17	2.7	
1448	1453	5.5	14.13	7.18	0.480	12.5	1.12	2.9	
1453	1453	5.5	14.12	7.19	0.478	12.5	1.11	2.5	

Equipment Calibration Performed By: K Powell

Number of Sample Containers Collected: 3

5 gal / 55 sec

5 gal / 55 sec | 60 sec

Schnabel
Schnabel Engineering North, LLC

PROJECT	WELL NO.
CCNPP	~~OW-325~~ OW-323

WELL SAMPLING RECORD	JOB NO.	SITE	PREPARED BY
	06120048	Calvert Cliffs	ABresko, K Powell

	PURGE METHOD	SAMPLING METHOD	PURGING CRITERIA:
	sub pump	grab	Volume or stabilization

PUMP TYPE	PURGING DATE: 12/12/06	DATE OF SAMPLING: 12/12/06
2" Sub grundfos	WEATHER: Cloudy/Cool	TIME OF SAMPLING: 0918
	TEMPERATURE: 0400	SAMPLE MATRIX: GROUND WATER:
	INITIAL WATER LEVEL: 35.92	

PUMPING VOLUME CALCULATION

$V_w = 3.14(\frac{2}{12})^2(3.48)(\frac{7.48}{1}\frac{gal}{ft^3})$
$= 0.2 gal(3) = 0.6 gal$

$V_b = 3.14(\frac{8.5}{12})^2(12.5)(0.3)\frac{7.48}{1}$
$= 11.4(3) = 34.2 gal$

$V_T = 34.8 gal$

dw - well diameter (in)
h-well depths (ft)
n-porosity
d_b - Boring diameter

$1 ft^3 = 7.48 gal$

$V_w = \pi (\frac{dw}{24})^2 h * n$

$V_b = \pi (\frac{db - dw}{24})^2 * 7.48 * n$

Checked by: [signature]

PURGING DATA	FIELD PARAMETERS	COMMENTS
		13.6' below TOS 43.6' below rim

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temp (°C)	pH (± .01)	Conductivity (µ mhos) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 10%)	Turbidity (NTU) (± 10%)	Comments
0725		57	~~14.96~~						
0750		19	14.38	6.32	0.078	12.4	1.94	24	
0755		19	14.43	5.36	0.068	12.5	1.77	0.2	
0900		19	14.39	5.62	0.067	12.5	1.95	0.5	
0805		19	14.37	5.45	0.0660	12.4	2.03	0.9	
0810		19	14.39	5.46	0.065	12.5	2.09	0.2	
0815	0815	—	14.37	5.43	0.065	12.4	2.12	0.0	

Equipment Calibration Performed By: K Powell

Number of Sample Containers Collected: 3

3 gal / 1:3 min

3.8 gal/min #

Schnabel
Schnabel Engineering North, LLC

PROJECT	WELL NO.
CCNPP	OW-336 ~~OW-705~~

WELL SAMPLING RECORD	JOB NO.	SITE	PREPARED BY
	D6120049	Calvert Cliffs	A Brooks K Powell

PURGE METHOD	SAMPLING METHOD	PURGING CRITERIA:
Submp	Grab	Volume + Stabilization

PUMP TYPE	PURGING DATE:	DATE OF SAMPLING:
2" Grundfos	12/20/04	12/20/04
	WEATHER: Clear	TIME OF SAMPLING: 15:17:50
	TEMPERATURE: 40°	SAMPLE MATRIX: GROUND WATER:
	INITIAL WATER LEVEL: ~~[illegible]~~ 60.36	

PUMPING VOLUME CALCULATION

$V_{w0} = 3.14\left(\frac{2}{24}\right)^2(13.64)\left(\frac{7.48\,gal}{ft^3}\right)$
$= 2.23(3) = 6.7\,gal$

$V_s = 3.14\left(\frac{4}{24}\right)^2(21)(0.30)\left(\frac{7.48}{ft^3}\right)$
$= 4.1(3) = 12.3\,gal$

$V_T = 19.0\,gal$

dw - well diameter (in)
h-well depths (ft)
n-porosity
d_b - Boring diameter

$1\,ft^3 = 7.48\,gal$

$V_w = \pi\left(\frac{dw}{24}\right)^2 h *$

$V_s = \pi\left[\frac{db-dw}{24}\right]^2 * 7.48 * n$

Checked by: [illegible]

PURGING DATA	FIELD PARAMETERS	COMMENTS
		Sample collected @ 68.5' below VL

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temp (°C)	pH (± .01)	Conductivity (µ mhos) (± 3%)	ORP (mV) ± 10mV	DO (mg/L) (± 10%)	Turbidity (NTU) (± 10%)	Comments
1709	~~[illegible]~~	- 36							
1723		12.0	13.78	7.26	0.427	12.5	1.89	~~14.80~~ 19.8	
1729		12.0	14.09	7.29	0.421	12.5	1.00	14.6	
1739		12.0	14.12	7.30	0.422	12.5	0.97	12.4	
1738		12.0	13.93	7.30	0.421	12.5	1.05	13.2	
1743	~~[illegible]~~	—	14.05	7.30	0.420	12.5	1.00	12.2	

Equipment Calibration Performed By: K Powell

Number of Sample Containers Collected: 3

5gal / 2.10 m
2.4 gal/min

Schnabel
Schnabel Engineering North, LLC

PROJECT	WELL NO.
CCNPP	DW-3DT 401

WELL SAMPLING RECORD	JOB NO.	SITE	PREPARED BY
	06120048	Calvert Cliffs	A Brosko, K Powell

	PURGE METHOD	SAMPLING METHOD	PURGING CRITERIA:
	Sub pump	Sub pump	Volume + Stabilization

PUMP TYPE	PURGING DATE: 12/20/06	DATE OF SAMPLING: 12/20/06
Grundfos 2"	WEATHER: Clear/Cold TEMPERATURE: 40° INITIAL WATER LEVEL: 33.60	TIME OF SAMPLING: SAMPLE MATRIX: GROUND WATER:

PUMPING VOLUME CALCULATION

$V_W = 3.14(\frac{3.0}{24})^2(20.75)(13.2)(\frac{7.48}{1})$
$= 7.2(\frac{ft^3}{1}) = 21.6$ gal

$V_S = 3.14(\frac{8}{24})^2(20.5)(0.3)(\frac{7.48}{1})$
$= 4.0(\frac{ft^3}{1}) = 12.0$

$V_T = 33.6$ gal

dw - well diameter (in)
h-well depths (ft)
n-porosity
d_b - Boring diameter

$1\ ft^3 = 7.48$ gal

$V_w = \pi\ (\frac{dw}{24})^2\ h * 7.48$

$V_s = \pi\ [\frac{db - dw}{24}]^2 * 7.48 * n$

Checked by: [signature]

PURGING DATA			FIELD PARAMETERS						COMMENTS
Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temp (°C)	pH (± .01)	Conductivity (µ mhos) (± 3%)	ORP (mV) ± 10mV	DO (mg/L) (± 10%)	Turbidity (NTU) (± 10%)	Comments
0924	0945	40 gal							dry
0949	0948	26 gal							
0949		7 gal	14.84	7.43	0.384	12.4	3.13	30.2	
0954		7 gal	14.57	7.41	0.380	12.5	2.41	20.3	
0959		7 gal	14.82	7.40	0.380	12.5	1.70	11.7	
1004	1004	7 gal	14.52	7.40	0.382	12.5	1.66	6.0	dry

Equipment Calibration Performed By: K Powell

Number of Sample Containers Collected: 3

11 min

$\frac{5 gal}{1.35 min} = 3.7$ gal/min

$\frac{5 GAL = 1.35 min}{5}$ = ~~0.27~~

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PROJECT	WELL NO.
CCNPP	DW-423

WELL SAMPLING RECORD	JOB NO.	SITE	PREPARED BY
PURGE METHOD: Sub pump; SAMPLING METHOD: grab	06B00048	Calvert Cliffs	A Brooks, K Powell
	PURGING CRITERIA: Volume + Stabilization		

PUMP TYPE	PURGING	DATE OF SAMPLING
QED Grunfos	PURGING DATE: 12/22/06 WEATHER: Clear/45°/sunny TEMPERATURE: 49° INITIAL WATER LEVEL: 29.55	DATE OF SAMPLING: 12/20/06 TIME OF SAMPLING: SAMPLE MATRIX: GROUND WATER

PUMPING VOLUME CALCULATION

$V_w = 3.14(\frac{4}{12})^2(13.45) \times \frac{7.48 gal}{1 ft^3}$
$= 7.89 gal \times 3 = 23.7$

$V_b = 3.14(\frac{4}{12})^2(20.0)(0.3) \frac{7.48 gal}{1 ft^3}$
$= 1.25 \times 3 = 3.75$

$V_T = 27.4$ gal

dw - well diameter (in)
h-well depths (ft)
n-porosity
d_b - Boring diameter

$1 ft^3 = 7.48$ gal
$V_w = \pi (\frac{dw}{24})^2 2 h *$
$V_a = \pi [\frac{db-dw}{24}]^2 * 7.48 * n$

Checked by: [illegible]

PURGING DATA	FIELD PARAMETERS	COMMENTS
		Sample collected at 39.7' BGS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temp (°C)	pH (± .01)	Conductivity (µ mhos) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 10%)	Turbidity (NTU) (± 10%)	Comments
1228		19.7							
1254		19.2	14.53	5.10	0.153	12.4	18.71	1.7	
1259		19.2	15.09	5.15	0.156	12.4	18.69	41.2	
1304		19.2	15.19	5.15	0.154	12.4	18.67	8.4	
1309		19.2	15.24	5.17	0.153	12.5	18.66	6.4	
1314		19.2	15.22	5.18	0.153	12.4	18.61	6.8	pumped dry

1 gal = 15 gal

Equipment Calibration Performed By: K Powell

Number of Sample Containers Collected: 3

Set @ 11.7 + 28' = 39.7'

2

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Schnabel Engineering North, LLC

PROJECT	WELL NO.
CCNPP	OW-4 SB

WELL SAMPLING RECORD	JOB NO.	SITE	PREPARED BY
	06120048	Calvert Cliffs	A Brooks K Powell

PURGE METHOD	SAMPLING METHOD	PURGING CRITERIA:
Sub Mat's Pump	Grab	Volume + Stabilization

PUMP TYPE	PURGING DATE: 12/20/06 WEATHER: Clear/Sunny TEMPERATURE: 65 INITIAL WATER LEVEL: 37.97	DATE OF SAMPLING: 12/20/06 TIME OF SAMPLING: SAMPLE MATRIX: GROUND WATER:
2" Carwin fos.		

PUMPING VOLUME CALCULATION

$V_w = 3.14(\frac{2}{24})^2(42.53)(\frac{7.48 gal}{1 ft^3})$

$= 1.96(3) = 5.9 gal$

$V_B = 3.14(\frac{4}{24})^2(20.0)(0.3)(\frac{7.48}{1 ft^3})$

$= 3.9(3) = 11.8 gal$

$V_T = 17.6 gal.$

dw - well diameter (in)
h-well depths (ft)
n-porosity
d_b - Boring diameter

$1 ft^3 = 7.48 gal$

$V_w = \pi (\frac{dw}{24})^2 h$ *

$V_s = \pi [\frac{db-dw}{24}]^2 * 7.48 * n$

Checked by: [signature]

PURGING DATA			FIELD PARAMETERS						COMMENTS: sample collected at 48.3' below TOC
Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temp (°C)	pH (±.01)	Conductivity (µ mhos) (±3%)	ORP (mV) (±10mV)	DO (mg/L) (±10%)	Turbidity (NTU) (±10%)	Comments
1055	1059	20.25							pump dry
1104	1120	25 gal							
1126	1130	5.7	14.54	6.40	0.111	12.5	16.77	4.1	low flow/dry
1131		1	14.29	5.41	0.1235	12.4	23.36	2.5	purge 1 gal
1136		1	14.03	5.22	0.107	12.5	22.27	2.0	
1141	1141	—	14.19	5.14	0.108	12.5	23.74	3.8	pump dry

Equipment Calibration Performed By: K Powell

Number of Sample Containers Collected: 3

1 gal = 20 s
6.75 min

Sample collected @ 48.3' due to static water level

$\frac{1 gal}{20 s} \frac{6.75 min}{} \frac{60 s}{1 min}$

Schnabel
Schnabel Engineering North, LLC

PROJECT	WELL NO.
CCNPP	OW-705

WELL SAMPLING RECORD	JOB NO.	SITE	PREPARED BY
	D6120046	Calvert Cliffs	A. Brosko L. Powell

	PURGE METHOD	SAMPLING METHOD
	Sub pump	grab

PURGING CRITERIA: Volume & stabilization

PUMP TYPE	PURGING DATE / WEATHER / TEMPERATURE / INITIAL WATER LEVEL	DATE OF SAMPLING / TIME OF SAMPLING / SAMPLE MATRIX: GROUND WATER
Grundfos 2"	PURGING DATE: 12/20/06 WEATHER: Clear TEMPERATURE: 40s INITIAL WATER LEVEL: 19.52 (19.52)	DATE OF SAMPLING: 12/20/06 TIME OF SAMPLING: 1635

PUMPING VOLUME CALCULATION

dw - well diameter (in)
h-well depths (ft)
n-porosity - 0.30
d_b - Boring diameter - 6"

1 ft³ = 7.48 gal

$V_w = \pi \left(\frac{dw}{24}\right)^2 2h * 7.48$

$V_s = \pi \left(\frac{db - dw}{24}\right)^2 * 7.48 * n$

V_{w0} - well volume
V_s - sandpack volume

$V_{w0} = 3.14\left(\frac{2}{24}\right)^2 \cdot 32.48 \cdot 7.48 \frac{gal}{ft^3} = 5.3\ gal \times 3 = 15.9\ gal$

$V_s = 3.14\left(\frac{6}{24}\right)^2 \cdot 17.0.3 \cdot 7.48 \frac{gal}{ft^3} = 0.445\ ft^3 \cdot 3 = 3.3$

$V_T = 19.2\ gal.$

Checked by: [illegible]

PURGING DATA			FIELD PARAMETERS				COMMENTS		
Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temp (°C)	pH (± 0.1)	Conductivity (u mhos) (± 3%)	ORP (mV) ± 10mV	DO (mg/L) (± 10%)	Turbidity (NTU) (± 10%)	Comments
1530	1533	6.5							pump dry
1535	1538	3.0							[illegible]
1540	1602	19.0							[illegible]
1602	1607	9.4	13.55	7.20	0.512	12.4	0.12	28.6	
1607		9.4	13.95	7.23	0.515	12.5	0.04	24.4	
1612		9.4	13.88	7.24	0.517	12.5	0.08	19.4	
1617		9.4	13.93	7.24	0.516	12.5	0.02	16.6	
1622		9.4	13.98	7.26	0.510	12.5	0.09	13.8	
1627		9.4	13.97	7.25	0.514	12.4	0.10	13.7	
1632	1632	9.4	14.01	7.25	0.516	12.4	0.13	12.5	

Equipment Calibration Performed By: L. Powell

Number of Sample Containers Collected: 3

Schnabel
Schnabel Engineering South, LLC

PROJECT	WELL NO.
CCNPP	OW-708A

WELL SAMPLING RECORD	JOB NO.	SITE	PREPARED BY
	06120048	Calvert Cliffs	ABrooks K Powell

	PURGE METHOD	SAMPLING METHOD	PURGING CRITERIA:
	sub grnd	grnd	Volume & stabilization

PUMP TYPE		
2" Grundfos	PURGING DATE: 12/19/06 WEATHER: overcast TEMPERATURE: ~40°F INITIAL WATER LEVEL: 12.60	DATE OF SAMPLING: 12/19/06 TIME OF SAMPLING: 1205 SAMPLE MATRIX: GROUND WATER:

PUMPING VOLUME CALCULATION

$V_{ss} = 3.14(\frac{2}{12})^2(21.34)(\frac{7.48}{1})$
$= (3.5)(3) = 10.5$ gal

$V_{S} = 3.14(\frac{4}{12})^2(15)(0.30)(\frac{7.48}{1})$
$= 2.9(3) = 8.7$ gal

$V_T = 19.2$ gal

dw - well diameter (in)
h-well depths (ft)
n-porosity
d_b - Boring diameter

1 ft³ = 7.48 gal

$V_w = \pi (dw)^2 h * 7.48$
24

$V_s = \pi [db-dw]^2 * 7.48 * n$
24

Checked by: [illegible]

PURGING DATA			FIELD PARAMETERS				COMMENTS		
Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temp (°C)	pH (± .01)	Conductivity (µ mhos) (± 3%)	ORP (mV) ± 10mV)	DO (mg/L) (± 10%)	Turbidity (NTU) (± 10%)	Comments
0945	-	1 gal.	16.34	6.79	0.386	12.5	8.56	337.7	dry
~~1055~~		~~3.5~~							Recal DO meter
1055	1059	3.5	16.34	7.07	0.749	12.5	2.31	126.8	dry
1115	1129	2.5 gal	16.30	7.08	0.741	~~[illegible]~~ 12.5	1.74	1231.4	dry
1133	1133	5 gal	16.36	7.39	0.727	12.5	6.01	482.5	low flow
1138	1138	1 gal	16.73	7.21	0.731	12.5	6.11	477.1	
1143	-	1.5 gal	16.83	7.18	~~[illegible]~~ 0.730	12.5	6.12	481.1	

Equipment Calibration Performed By: Kibby Powell

Number of Sample Containers Collected: 3 + 3 composite

CU-1 | 708a
CU-2 | 709a
CU-3 | 708a

~~17.15~~
0750

Schnabel
Schnabel Engineering North, LLC

PROJECT	WELL NO.
CLNPP	OW-711

WELL SAMPLING RECORD	JOB NO.	SITE	PREPARED BY
	01120048	Calvert Cliffs	A Brooks K Powell

	PURGE METHOD	SAMPLING METHOD
	Sub pump	grab

PURGING CRITERIA: Volume & Stabilization

PUMP TYPE	PURGING	DATE OF SAMPLING
Grundfos 2"	PURGING DATE: 12/20/16 WEATHER: Clear/Cold TEMPERATURE: 32° INITIAL WATER LEVEL: 18.34 / 18.50	DATE OF SAMPLING: 12/20/16 TIME OF SAMPLING: 0850 SAMPLE MATRIX: GROUND WATER:

PUMPING VOLUME CALCULATION

$V_w = 3.14(\frac{2}{12})^2(31.5)(\frac{7.48\ gal}{1\ ft^3})$
$= (5.14)3 = 15.4\ gal$
$V_s = 3.14(\frac{4}{12})^2(20)(0.3)(\frac{7.48\ gal}{1\ ft^3})$
$= 3.9(3) = 11.7$
$V_T = 27.1\ gal$

dw - well diameter (in)
h-well depths (ft)
n-porosity
d_b - Boring diameter

$1\ ft^3 = 7.48\ gal$
$V_w = \pi\ (\frac{dw}{24})^2\ h\ *$
$V_s = \pi\ [\frac{db-dw}{24}]^2 * 7.48 * n$

Checked by: [illegible]

PURGING DATA / FIELD PARAMETERS / COMMENTS: Purged dry then retrieved collect sample

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temp (°C)	pH (± .01)	Conductivity (u mhos) (± 3%)	ORP (mV) ± 10mV)	DO (mg/L) (± 10%)	Turbidity (NTU) (± 10%)	Comments
0805	0817	16.5							dry
0820	0824	3.75							1st purge
0826	0831	0.9	12.06	6.75	0.439	12.5 / 12.0	6.77	43.9	dry/slow
0831	0837	0.5	13.92	7.22	0.454	12.5	6.08	12.0	
0837	0842	0.5	14.73	7.33	0.452	12.5	7.07	4.8	
0842	—	—	15.03	7.39	0.452	12.5	5.96	5.2	

Equipment Calibration Performed By: K Powell

Number of Sample Containers Collected: 3 0850

Schnabel
Schnabel Engineering North, LLC

PROJECT	WELL NO.
CCNPP	OW - 725

WELL SAMPLING RECORD	JOB NO.	SITE	PREPARED BY
	D6120048	Calvert Cliffs	A Brecko
PURGE METHOD: sub pump / SAMPLING METHOD: grab	PURGING CRITERIA: Volume + stabilization		K Powell

PUMP TYPE		
2" grundfos	PURGING DATE: 12/21/06 WEATHER: cloudy/cold TEMPERATURE: 43° INITIAL WATER LEVEL: 23.41	DATE OF SAMPLING: 12/21/06 TIME OF SAMPLING: 1435 SAMPLE MATRIX: GROUND WATER:

PUMPING VOLUME CALCULATION

$V_w = 3.14(\frac{3}{24})^2(3.59)(\frac{7.48}{1})$
$= 5.97(3) = 17.9$ gal

$V_s = 3.14(\frac{4}{24})^2(14)(0.30)(\frac{7.48}{1})$
$= 2.74(3) = 8.2$

$V_T = 26.1$ gal

dw - well diameter (in)
h-well depths (ft)
n-porosity
d_b - Boring diameter

1 ft³ = 7.48 gal
$V_w = \pi (\frac{dw}{24})^2 h *$
$V_s = \pi [\frac{db-dw}{24}]^2 * 7.48 * n$

Checked by: [illegible]

PURGING DATA			FIELD PARAMETERS				COMMENTS		
Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temp (°C)	pH (±.01)	Conductivity (u mhos) (±3%)	ORP (mV) (±10mV)	DO (mg/L) (±10%)	Turbidity (NTU) (±10%)	Comments
1320	1324	9.5							dry
1326	1358	30.5							
1358		9.5	14.59	6.66	0.381	73.2	2.52	38.5	
1408		9.5	14.67	6.67	0.386	62.8	2.39	8.0	
1418		9.5	14.61	6.68	0.385	67.3	2.62	8.4	
1428	1428	–	14.58	6.68	0.386	67.1	2.52	8.2	

Equipment Calibration Performed By: K Powell

Number of Sample Containers Collected: 3

5 gal / 5.25

5 gal / 2.1 min

0.95 gal/min

Schnabel
Schnabel Engineering North, LLC

PROJECT	WELL NO.
CC NPP	DW-735

WELL SAMPLING RECORD	JOB NO.	SITE	PREPARED BY
	06120048	Calvert Cliffs	A Bresko K Powell

PURGE METHOD	SAMPLING METHOD	PURGING CRITERIA:
2" Grundfos pump	grab	Volume + stabilization

PUMP TYPE	PURGING DATE:	DATE OF SAMPLING:
2" Grundfos	12/21/06	12/22/06
	WEATHER: Cloudy/Cool	TIME OF SAMPLING: 1123
	TEMPERATURE: 48°	SAMPLE MATRIX: GROUND WATER:
	INITIAL WATER LEVEL: 53.39	

PUMPING VOLUME CALCULATION

$V_w = 3.14(\frac{2}{2\cdot12})^2(18.6)(7.48)$

$= 3.04(3) = 9.1$ gal

$V_s = 3.14(\frac{4}{2\cdot12})^2(14)(0.30)(7.48)$

$= 2.74(3) \approx 8.2$

$V_T = 17.3$ gal

dw - well diameter (in)
h-well depths (ft)
n-porosity
db - Boring diameter

1 ft³ = 7.48 gal

$V_w = \pi (dw)^2 h * 7.48$

$V_s = \pi [db-dw]^2 * 7.48 * n$

Checked by: [illegible]

PURGING DATA / **FIELD PARAMETERS**

COMMENTS: Sample collected at 66.4 ft below 3" notch.

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temp (°C)	pH (± .01)	Conductivity (µ mhos) (± 3%)	ORP (mV) ± 10mV)	DO (mg/L) (± 10%)	Turbidity (NTU) (± 10%)	Comments
~~1031~~ 1025	1105	155							
1105	1110	2.3	13.36	6.21	0.217	21.3	4.97	0.7	
1110	1115	2.3	13.71	6.35	0.215	17.9	3.01	2.7	
1115	1120	2.3	13.72	6.37	0.212	20.4	3.19	2.3	
1120	1120	—	13.79	6.37	0.214	21.6	3.14	2.8	

Equipment Calibration Performed By: K Powell

Number of Sample Containers Collected: 3

5 gal / 1.10 min

Schnabel
Schnabel Engineering North, LLC

PROJECT	WELL NO.
CCNPP	OW-744

WELL SAMPLING RECORD	JOB NO.	SITE	PREPARED BY
PURGE METHOD: sub pump; SAMPLING METHOD: grab	D012D048	Calvert Cliffs	A Brooks, K Powell
	PURGING CRITERIA: Volume + stabilization		

PUMP TYPE		
2" grunfos	PURGING DATE: 12/21/04 WEATHER: cloudy/cool TEMPERATURE: 43° INITIAL WATER LEVEL: 40.75	DATE OF SAMPLING: 12/21/04 TIME OF SAMPLING: 0945 SAMPLE MATRIX: GROUND WATER:

PUMPING VOLUME CALCULATION

$V_w = 3.14(\frac{3}{24})^2(6.75)(\frac{7.48}{1})$
$= 1.10(3) = 3.3$ gal
$V_b = 3.14(\frac{4}{24})^2(14)(0.30)(\frac{7.48}{1})$
$= 2.74(3) = 8.2$
$V_T = 11.5$ gal

dw - well diameter (in)
h-well depths (ft)
n-porosity
d_b - Boring diameter

$1 ft^3 = 7.48$ gal
$V_w = \pi (dw) 2h * \frac{}{24}$
$V_b = \pi [db-dw]^2 * 7.48 * n / 24$

Checked by: _____

PURGING DATA	FIELD PARAMETERS	COMMENTS: Sample collected 47.2' below 'V' notch

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temp (°C)	pH (± .01)	Conductivity (u mhos) (± 5%)	ORP (mV) ± 10mV	DO (mg/L) (± 10%)	Turbidity (NTU) (± 10%)	Comments
0853	0955	7.5							dry
0900	0905	2.5							low flow / dry
0911	0916	2 gal							low flow / dry
0921	0921	1 gal	13.54	5.79	0.104	72.2	7.02	1169.9	mod flow
0931	0938		16.01	6.02	0.104	74.2	6.39	622.8	
0938	0943		14.09	6.15	0.106	68.4	9.99	479.6	dry
0943	0943	—	16.00	6.08	0.108	78.7	5.88	475.6	

Equipment Calibration Performed By: K Powell

Number of Sample Containers Collected: 3

5 gal / 15 min

set below screen

Schnabel Engineering South, LLC

PROJECT	WELL NO.
CCNPP	OW-752

WELL SAMPLING RECORD	JOB NO.	SITE	PREPARED BY
	06120004B	Calvert Cliffs	A Brooks K Powell

PURGE METHOD	SAMPLING METHOD	PURGING CRITERIA:
sub pump	grab	Volume + stabilization

PUMP TYPE		
2" grundfos	PURGING DATE: 12/21/06 WEATHER: Cloudy 60s TEMPERATURE: 48 INITIAL WATER LEVEL: 24.10	DATE OF SAMPLING: 12/21/06 TIME OF SAMPLING: 1225 SAMPLE MATRIX: GROUND WATER:

PUMPING VOLUME CALCULATION

$V_w = 3.14(\frac{2}{12})^2(12.9)(\frac{7.48}{1})$
$= 2.11(3) = 6.3$ gal

$V_b = 3.14(\frac{8}{12})^2(18)(0.30)\frac{7.48}{1}$
$= 3.52(3) = 10.6$ gal

$V_T = 16.9$ gal

dw - well diameter (in)
h-well depths (ft)
n-porosity
d_b - Boring diameter

1 ft³ = 7.48 gal
$V_w = \pi(\frac{dw}{24})^2 * h$
$V_a = \pi[\frac{db-dw}{24}]^2 * 7.48 * n$

Checked by: [illegible]

PURGING DATA			FIELD PARAMETERS						COMMENTS: Sample collected at 33.7' below "V"
Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temp (°C)	pH (± .01)	Conductivity (u mhos) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 10%)	Turbidity (NTU) (± 10%)	Comments
1144	1145	2.4							dry
1147	1148	1.8							dry / slow purge
1149	1150	1							dry / slow purge
1153	1208	2.5							micro purge / dry
1210	1215	.25	15.94	5.77	0.209	33.3	8.03	1257.2	
1215	1220	.25	16.40	5.27	0.210	110.6	6.62	790.9	
1220	1220	—	17.08	5.28	0.207	112.3	4.29	261.9	

Equipment Calibration Performed By: K Powell

Number of Sample Containers Collected: 3

Sample collected @ 33.7 ft below "V" notch.

12:30

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Schnabel Engineering North, LLC

PROJECT	WELL NO.
CLNPP	OW-766A

WELL SAMPLING RECORD	JOB NO.	SITE	PREPARED BY
	06120048	Calvert Cliffs	A Brosko, K Powell

	PURGE METHOD	SAMPLING METHOD	PURGING CRITERIA:
	Sub pump	Grab	Volume + stabilization

PUMP TYPE	PURGING DATE: 12/19/06	DATE OF SAMPLING: 12/19
2" Grundfos	WEATHER: Cold / Windy	TIME OF SAMPLING: 1435
	TEMPERATURE: 64	SAMPLE MATRIX: GROUND WATER:
	INITIAL WATER LEVEL: [redacted] 23.63	

PUMPING VOLUME CALCULATION

$V_w = 3.14(\frac{2}{12})^2(18.37)(\frac{7.48 gal}{ft^3})$

$= (3.0)(3) = 9.0 gal$

$V_b = 3.14(\frac{6}{12})^2(14)(0.3)(\frac{7.48}{1 ft^3})$

$= 2.74 gal (3) = 8.2$

$V_T = 17.2 gal$

dw - well diameter (in)

h-well depths (ft)

n-porosity

d_b - Boring diameter

$1 ft^3 = 7.48 gal$

$V_w = \pi (dw)^2 h * \frac{1}{24}$

$V_b = \pi [db - dw]^2 * 7.48 * n \frac{1}{24}$

Checked by: [signature]

PURGING DATA	FIELD PARAMETERS	COMMENTS: Water purge pump dry

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temp (°C)	pH (±.01)	Conductivity (u mhos) (±3%)	ORP (mV) ±10mV)	DO (mg/L) (±10%)	Turbidity (NTU) (±10%)	Comments
12:30	12:33	15.8							Purge Dry
12:35	~~12:35~~ 12:35	37.7							Low Flow
1425		0.5	12.88	7.47	0.610	12.5	9.64	42.0	low flow/dry
1425		0.5	11.96	7.50	0.418	12.4	9.44	112.10	dry
1430	1430	0.5	13.22	7.52	0.324	12.5	11.81	46.53	dry

Equipment Calibration Performed By: K Powell

Number of Sample Containers Collected: 3

1 GAL = 3.78 liter

1 GAL = 3.78 liter 59 mL = 37.7

1545

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Schnabel Engineering North, LLC

PROJECT	WELL NO.
CCNPP	OW-769

WELL SAMPLING RECORD	JOB NO.	SITE	PREPARED BY
	06120019.15	Calvert Cliffs	A Breske K Powell

	PURGE METHOD	SAMPLING METHOD	PURGING CRITERIA:
	Sub pump	Sub pump	Volume + stabilization

PUMP TYPE	PURGING DATE: 12/19/06 WEATHER: overcast TEMPERATURE: 45° INITIAL WATER LEVEL: 25.72	DATE OF SAMPLING: 12/19/06 TIME OF SAMPLING: 1634 SAMPLE MATRIX: GROUND WATER:
2" Grundfos		

PUMPING VOLUME CALCULATION

$V_{w} = 3.14(\frac{2}{24})^2(16.28)(\frac{7.48 gal}{ft^3})$

$= 0.0872 \times 16.28 \times 3 = 7.9 gal$

$V_s = 3.14(\frac{4}{24})^2(24)(0.3)(\frac{7.48 gal}{ft^3})$

$= 0.4 \times 7 (3) = 14.1$

$V_T = 21.9 gal$

dw - well diameter (in)
h-well depths (ft)
n-porosity
d_b - Boring diameter

$1 ft^3 = 7.48 gal$

$V_w = \pi [\frac{dw}{24}]^2 2 h * 7.48$

$V_s = \pi [\frac{db-dw}{24}]^2 * 7.48 * n$

Checked by: [signature]

PURGING DATA			FIELD PARAMETERS						COMMENTS
Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temp (°C)	pH (± .01)	Conductivity (µ mhos) (± 3%)	ORP (mV) ± 10mV	DO (mg/L) (± 10%)	Turbidity (NTU) (± 10%)	Comments
1525	1531	2							dry
1535	1610	13.8							low flow
~~1540~~	1612	0.8	11.73	7.89	~~1.50~~ 0.478	12.5	12.40	149.0	dry/low flow
1615		0.6	16.31	7.23	0.441	12.5	12.23	152.5	
1622		0.6	13.25	7.16	0.193	12.5	11.05	140.9	
1628	1628	—	14.61	7.00	0.471	12.5	9.92	277.6	

Equipment Calibration Performed By: K Powell

Number of Sample Containers Collected: 3

$17s = 1 gal$

$\frac{17s}{60s} \times 5.5 = 1.9$

$\frac{L}{min} \times \frac{1 gal}{3.8 L} \times \frac{60}{1 min} =$

545 $\frac{13.8 gal}{35 min} = 0.4 gal/min$

APPENDIX E
FIELD ELECTRICAL RESISTIVITY

- Field Electrical Resistivity Test Data

FIELD ELECTRICAL RESISTIVITY TEST DATA

RESISTIVITY SOUNDING DATA SHEET

Schnabel Engineering

Date: June 19, 2006 ***Project:*** Calvert Cliffs COLA ***Representative:*** Todd White

Weather: Sunny, 92 Degrees ***Project Number:*** 06120048 ***Array type:*** Wenner Array

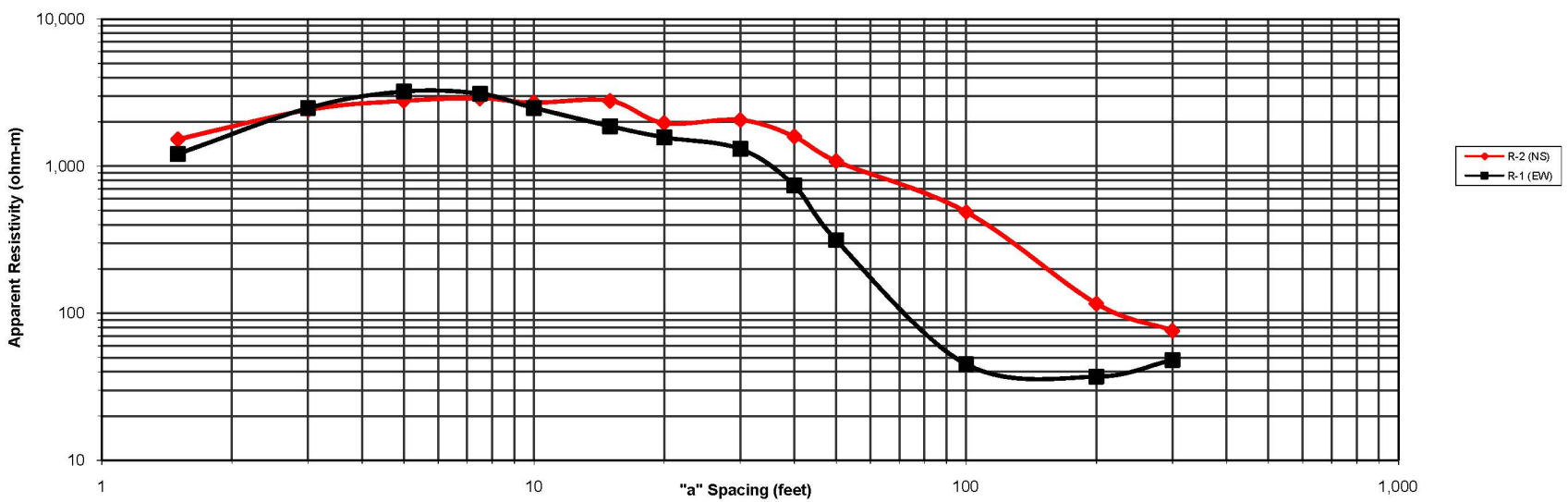
Surficial Soil: Forest litter ***Meter:*** Sting R1 Earth Resistivity Meter S/N 990324

"a" spacing (feet)		1.5	3.0	5.0	7.5	10.0	15.0	20.0	30.0	40.0	50.0	100.0	200.0	300.0
R-1 (EW)	R	419.800	431.4	336.3	216.5	129.9	65.16	40.87	22.87	9.643	3.274	0.2375	0.09787	0.08322
ρ	(ohm-ft)	3,960	8,130	10,570	10,200	8,162	6,141	5,140	4,310	2,424	1,030	149	123	157
ρ	(ohm-m)	1,210	2,480	3,220	3,110	2,490	1,870	1,570	1,310	739	314	45	37	48
ρ	(ohm-cm)	121,000	248,000	322,000	311,000	249,000	187,000	157,000	131,000	73,900	31,400	4,500	3,700	4,800

"a" spacing (feet)		1.5	3.0	5.0	7.5	10.0	15.0	20.0	30.0	40.0	50.0	100.0	200.0	300.0
R-2 (NS)	R	529.800	419.3	290.7	201.4	140.9	96.71	51.12	35.83	20.71	11.3	2.541	0.3023	0.1331
ρ	(ohm-ft)	4,993	7,904	9,133	9,491	8,853	9,115	6,420	6,750	5,205	3,550	1,600	380	250
ρ	(ohm-m)	1,520	2,410	2,780	2,890	2,700	2,780	1,960	2,060	1,590	1,080	487	116	76
ρ	(ohm-cm)	152,000	241,000	278,000	289,000	270,000	278,000	196,000	206,000	159,000	108,000	48,700	11,600	7,600

Notes: Resistivity calculated using the standard equation for the Wenner array as shown:
Electrodes were hammered into the subsurface at various depths
depending on the "a" spacing.

$$\rho = 2\pi a R$$



RESISTIVITY SOUNDING DATA SHEET

Schnabel Engineering

Date: June 19, 2006 ***Project:*** Calvert Cliffs COLA ***Representative:*** Todd White

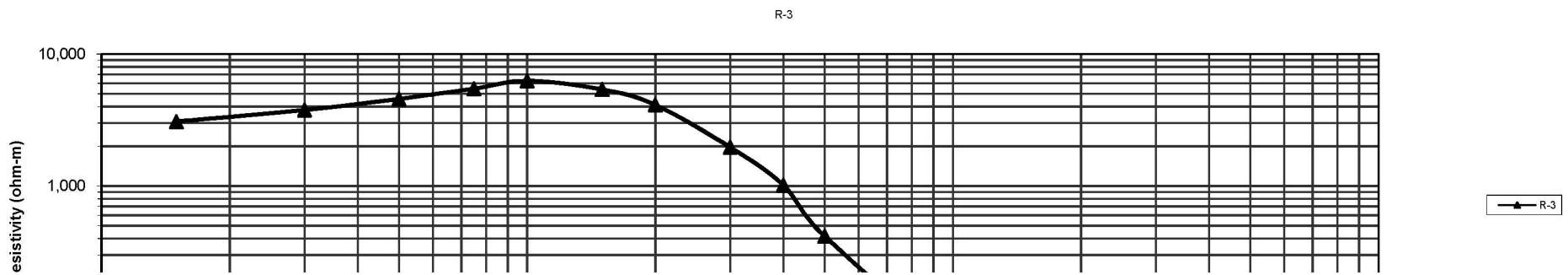
Weather: P-Cloudy,80 Degrees ***Project Number:*** 06120048 ***Array type:*** Wenner Array

Surficial Soil: Forest litter ***Meter:*** Sting R1 Earth Resistivity Meter S/N 990324

"a" spacing (feet)			1.5	3.0	5.0	7.5	10.0	15.0	20.0	30.0	40.0	50.0	100.0	200.0	300.0
R-3 (NS)		R	1069.000	651.8	474.8	378.4	325.7	187	107.1	34.14	13.21	4.338	0.3577	0.1002	0.05408
	ρ	(ohm-ft)	10,080	12,290	14,920	17,830	20,460	17,620	13,460	6,440	3,320	1,360	220	130	100
	ρ	(ohm-m)	3,070	3,750	4,550	5,440	6,240	5,370	4,100	1,960	1,010	415	69	38	31
	ρ	(ohm-cm)	307,000	375,000	455,000	544,000	624,000	537,000	410,000	196,000	101,000	41,500	6,900	3,800	3,100

Notes: Resistivity calculated using the standard equation for the Wenner array as shown:
Electrodes were hammered into the subsurface at various depths
depending on the "a" spacing.

$$\rho = 2\pi a R$$



Schnabel Engineering

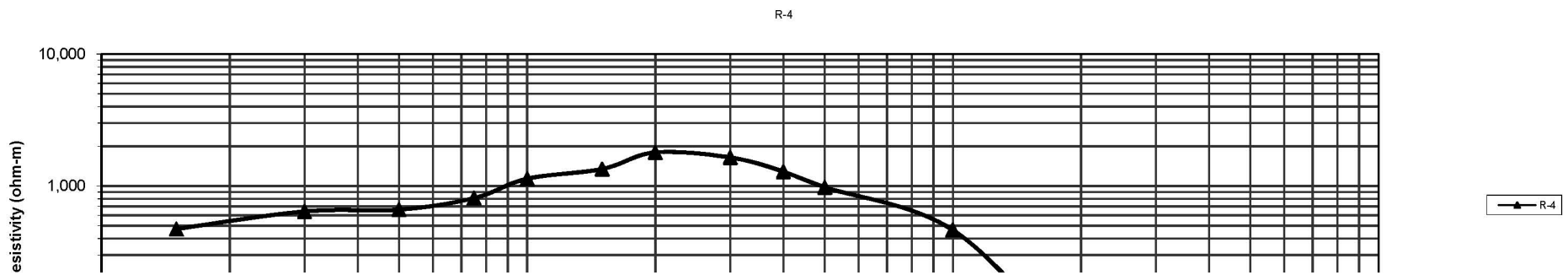
RESISTIVITY SOUNDING DATA SHEET

Date: June 20, 2006 ***Project:*** Calvert Cliffs COLA ***Representative:*** Todd White

Weather: P-Cloudy,80 Degrees ***Project Number:*** 06120048 ***Array type:*** Wenner Array

Surficial Soil: Forest litter ***Meter:*** Sting R1 Earth Resistivity Meter S/N 990324

"a" spacing (feet)			1.5	3.0	5.0	7.5	10.0	15.0	20.0	30.0	40.0	50.0	100.0	200.0	300.0
R-4 (NS)		R	164.000	111.3	68.86	56.1	59.21	46.53	46.73	28.51	16.73	10.18	2.418	0.1492	0.07195
	ρ	(ohm-ft)	1,550	2,100	2,160	2,640	3,720	4,390	5,870	5,370	4,200	3,200	1,520	190	140
	ρ	(ohm-m)	471	640	660	806	1,130	1,340	1,790	1,640	1,280	975	463	57	41
	ρ	(ohm-cm)	47,100	64,000	65,950	80,600	113,000	134,000	179,000	164,000	128,000	97,500	46,300	5,700	4,100

Notes: Resistivity calculated using the standard equation for the Wenner array as shown:
Electrodes were hammered into the subsurface at various depths
depending on the "a" spacing.

$$\rho = 2\pi a R$$