DBS0067
F04-008

Celebrating 20 Years

December 22, 2004

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Steve Trent
Fluor Hanford, Inc.
2430 Stevens Drive
PO Box 1000
Richland, WA 99352
(509) 373-5869

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Dear Mr. Trent:

Enclosed is the final report for the Flour Hanford, Inc - Area C Fine-Grained Soils Characterization samples. Please review this report and provide any comments as samples will be held for a maximum of 30 days. After 30 days samples will be returned or disposed of in an appropriate manner.

All testing results were evaluated subjectively for consistency and reasonableness, and the results appear to be reasonably representative of the material tested. However, DBS&A does not assume any responsibility for interpretations or analyses based on the data enclosed, nor can we guarantee that these data are fully representative of the undisturbed materials at the field site. We recommend that careful evaluation of these laboratory results be made for your particular application.

The testing utilized to generate the enclosed final report use methods that are standard for the industry. The results do not constitute a professional opinion by DBS&A, nor can the results affect any professional or expert opinions rendered with respect thereto by DBS&A. You have acknowledged that the all testing undertaken by us, and the final report provided, constitute mere test results using standardized methods, and cannot be used to disqualify DBS&A from rendering any professional or expert opinion, having waived any claim of conflict of interest by DBS&A.

We are pleased to provide this service to Flour Hanford and look forward to future laboratory testing on other projects. If you have any questions about the enclosed data, please do not hesitate to call.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.
LABORATORY / TESTING FACILITY

Joleen Hines

Joleen Hines, Laboratory Supervising Manager
Enclosure

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Daniel B. Stephens & Associates, Inc.

6020 Academy NE, Suite 100 505-822-9400
Albuquerque, NM 87109 FAX 505-822-8877

Daniel B. Stephens & Associates, Inc.

Summary of Tests Performed

Laboratory Sample Number	Initial Soil Properties[1] (θ, ρ_d, ϕ)	Saturated Hydraulic Conductivity[2]		Moisture Characteristics[3]					Unsaturated Hydraulic Conductivity	Particle Size[4]			Effective Porosity	Particle Density	Air Permeability	1/3, 15 Bar Points and Water Holding Capacity	Atterberg Limits	Proctor Compaction
		CH	FH	HC	PP	TH	WP	RH		DS	WS	H						
B18DD3/B18DD2 Composite	X	X		X	X		X	X	X		X	X		X				X
B18DD4/B18DF7 Composite	X	X		X	X		X	X	X		X	X		X				X
B18DF8	X	X		X	X		X	X	X		X	X		X				
B18DF6	X	X		X	X		X	X	X		X	X		X				
B18DF9	X		X	X	X		X	X	X		X	X		X				
B18DD5	X		X	X	X		X	X	X		X	X		X				
B18DD6	X	X		X	X		X	X	X		X	X		X				
B18DF2	X	X		X	X		X	X	X		X	X		X				
B18DF4	X	X		X	X		X	X	X		X	X		X				
B18DF5	X	X		X	X		X	X	X		X	X		X				

[1] θ = Initial moisture content, ρ_d = Dry bulk density, ϕ = Calculated porosity
[2] CH = Constant head, FH = falling head
[3] HC = Hanging column, PP = Pressure plate, TH = Thermocouple psychrometer, WP = Water activity meter, RH = Relative humidity box
[4] DS = Dry sieve, WS = Wet sieve, H = Hydrometer

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Sample Prep Summary

Sample Number	Proctor Data		Target Remold Densities at 85% of DD3/DD2 Comp Maximum Dry Bulk Density	Actual Remold Values	
	Optimum Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm^3)	Dry Bulk Density (g/cm^3)	Moisture Content (%, g/g)	Dry Bulk Density (g/cm^3)
B18DD3/B18DD2 Comp	14.5	1.74	1.48	13.3	1.50
B18DD4/B18DF7 Comp	14.8	1.74	1.48	11.9	1.51
B18DF8			1.48	13.6	1.49
B18DF6			1.48	17.6	1.45
B18DF9			1.48	13.6	1.50
B18DD5	(14.5)	(1.74)	1.48	13.6	1.49
B18DD6			1.48	13.8	1.49
B18DF2			1.48	14.9	1.48
B18DF4			1.48	14.4	1.48
B18DF5			1.48	14.5	1.48

Summary of Initial Moisture Content, Dry Bulk Density Wet Bulk Density and Calculated Porosity

Sample Number	Initial Moisture Content Gravimetric (%, g/g)	Initial Moisture Content Volumetric (%, cm^3/cm^3)	Dry Bulk Density (g/cm^3)	Wet Bulk Density (g/cm^3)	Calculated Porosity (%)
B18DD3/B18DD2 Composite	13.3	20.0	1.50	1.70	40.5
B18DD4/B18DF7 Composite	11.9	18.0	1.51	1.69	40.4
B18DF8	13.6	20.2	1.49	1.69	41.7
B18DF6	17.6	25.6	1.45	1.71	45.9
B18DF9	13.6	20.2	1.49	1.69	42.2
B18DD5	13.6	20.4	1.49	1.70	39.7
B18DD6	13.8	20.6	1.49	1.69	42.2
B18DF2	14.9	22.0	1.48	1.70	42.3
B18DF4	14.4	21.3	1.48	1.69	42.9
B18DF5	14.5	21.4	1.48	1.69	43.9

Summary of Saturated Hydraulic Conductivity Tests

Sample Number	K_{sat} (cm/sec)	Method of Analysis	
		Constant Head	Falling Head
B18DD3/B18DD2 Composite	4.0E-05	X	
B18DD4/B18DF7 Composite	4.8E-05	X	
B18DF8	3.9E-05	X	
B18DF6	1.1E-03	X	
B18DF9	3.0E-06		X
B18DD5	1.8E-06		X
B18DD6	2.5E-05	X	
B18DF2	3.9E-05	X	
B18DF4	1.0E-05	X	
B18DF5	1.6E-05	X	

Summary of Moisture Characteristics of the Initial Drainage Curve

Sample Number	Pressure Head (-cm water)	Moisture Content (%, cm^3/cm^3)
B18DD3/B18DD2 Composite	0	40.9
	20	37.2
	53	34.5
	151	25.9
	510	19.9
	13257	5.6
	851293	2.3
B18DD4/B18DF7 Composite	0	43.6
	26	39.8
	53	38.8
	154	27.5
	510	18.0
	7649	8.5
	851293	1.8
B18DF8	0	45.9
	21	43.3
	51	42.3
	144	26.8
	510	18.9
	18968	5.9
	851293	2.1
B18DF6	0	31.8
	11	29.5
	40	28.1
	73	24.6
	255	11.2
	14787	4.9
	851293	0.9

Summary of Moisture Characteristics of the Initial Drainage Curve (Continued)

Sample Number	Pressure Head (-cm water)	Moisture Content (%, cm^3/cm^3)
B18DF9	0	46.1
	29	44.0
	129	42.1
	510	36.6
	7037	12.5
	17235	9.3
	851293	4.7
B18DD5	0	43.4
	28	43.0
	128	41.4
	510	27.4
	7139	10.1
	14787	7.0
	851293	2.3
B18DD6	0	43.9
	22	41.3
	54	40.2
	154	37.9
	510	22.4
	4589	11.0
	851293	2.5
B18DF2	0	48.1
	24	46.6
	53	45.8
	154	43.9
	510	33.3
	8770	10.2
	851293	2.6

Summary of Moisture Characteristics of the Initial Drainage Curve (Continued)

Sample Number	Pressure Head (-cm water)	Moisture Content (%, cm^3/cm^3)
B18DF4	0	42.4
	25	39.7
	124	36.9
	510	32.0
	7852	9.1
	12442	7.6
	851293	2.4
B18DF5	0	44.7
	19	41.6
	53	39.1
	155	36.4
	510	26.5
	18356	4.8
	851293	2.1

Summary of Calculated Unsaturated Hydraulic Properties

Sample Number	α (cm^{-1})	N (dimensionless)	θ_r	θ_s
B18DD3/B18DD2 Composite	0.0197	1.3324	0.0027	0.4048
B18DD4/B18DF7 Composite	0.0161	1.4253	0.0173	0.4374
B18DF8	0.0152	1.5060	0.0259	0.4640
B18DF6	0.0113	2.0593	0.0281	0.3073
B18DF9	0.0018	1.6090	0.0415	0.4465
B18DD5	0.0039	1.5284	0.0214	0.4388
B18DD6	0.0055	1.5408	0.0259	0.4298
B18DF2	0.0030	1.5157	0.0178	0.4739
B18DF4	0.0021	1.5794	0.0171	0.4039
B18DF5	0.0049	1.4763	0.0074	0.4266

Summary of Particle Size Characteristics

Sample Number	d_{10} (mm)	d_{50} (mm)	d_{60} (mm)	C_u	C_c	Method	ASTM Classification	USDA Classification
B18DD3/B18DD2 Composite	0.0057	0.072	0.092	16	3.2	WS/H	Classification by ASTM 2487 requires Atterberg test	Sandy Loam
B18DD4/B18DF7 Composite	0.0035	0.051	0.064	18	2.6	WS/H	Classification by ASTM 2487 requires Atterberg test	Loam
B18DF8	0.0047	0.072	0.088	19	3.7	WS/H	Classification by ASTM 2487 requires Atterberg test	Sandy Loam
B18DF6	0.019	0.18	0.23	12	2.3	WS/H	Classification by ASTM 2487 requires Atterberg test	Loamy Sand
B18DF9	0.0024	0.022	0.033	14	1.3	WS/H	Classification by ASTM 2487 requires Atterberg test	Silt Loam
B18DD5	0.00071	0.015	0.021	30	3.4	WS/H	Classification by ASTM 2487 requires Atterberg test	Silt Loam
B18DD6	0.0053	0.042	0.051	9.6	2.1	WS/H	Classification by ASTM 2487 requires Atterberg test	Silt Loam
B18DF2	0.00019	0.019	0.027	142	13	WS/H	Classification by ASTM 2487 requires Atterberg test	Silt Loam
B18DF4	0.0024	0.041	0.056	23	1.7	WS/H	Classification by ASTM 2487 requires Atterberg test	Loam
B18DF5	0.0051	0.031	0.048	9.4	1.5	WS/H	Classification by ASTM 2487 requires Atterberg test	Silt Loam

d_{50} = Median particle diameter

Est = Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

$$C_u = \frac{d_{60}}{d_{10}}$$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

DS = Dry sieve

H = Hydrometer

WS = Wet sieve

† Greater than 10% of sample is coarse material

0 0 0 0 0 0 0 1 0

Summary of Particle Density Tests

Sample Number	Particle Density (g/cm^3)
B18DD3/B18DD2 Composite	2.51
B18DD4/B18DF7 Composite	2.53
B18DF8	2.56
B18DF6	2.68
B18DF9	2.58
B18DD5	2.48
B18DD6	2.57
B18DF2	2.56
B18DF4	2.59
B18DF5	2.63

Summary of Proctor Compaction Tests

Sample Number	Optimum Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm^3)
B18DD3/B18DD2 Composite	14.5	1.74
B18DD4/B18DF7 Composite	14.8	1.74

Raw Laboratory Data and Graphical Plots

Summary of Initial Moisture Content, Dry Bulk Density Wet Bulk Density and Calculated Porosity

Sample Number	Initial Moisture Content Gravimetric (%, g/g)	Initial Moisture Content Volumetric (%, cm^3/cm^3)	Dry Bulk Density (g/cm^3)	Wet Bulk Density (g/cm^3)	Calculated Porosity (%)
B18DD3/B18DD2 Composite	13.3	20.0	1.50	1.70	40.5
B18DD4/B18DF7 Composite	11.9	18.0	1.51	1.69	40.4
B18DF8	13.6	20.2	1.49	1.69	41.7
B18DF6	17.6	25.6	1.45	1.71	45.9
B18DF9	13.6	20.2	1.49	1.69	42.2
B18DD5	13.6	20.4	1.49	1.70	39.7
B18DD6	13.8	20.6	1.49	1.69	42.2
B18DF2	14.9	22.0	1.48	1.70	42.3
B18DF4	14.4	21.3	1.48	1.69	42.9
B18DF5	14.5	21.4	1.48	1.69	43.9

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DD3/B18DD2 Composite
Ring Number: NA
Depth: NA

Test Date: 13-Nov-04

Field weight of sample* (g): 164.30
Tare weight, ring (g): 43.56
Tare weight, cap/plate/epoxy (g): 0.00

Dry weight of sample (g): 106.53
Sample volume (cm^3): 71.20
Measured particle density: 2.51

Initial Volumetric Moisture Content (% vol):	20.0
Initial Gravimetric Moisture Content (% g/g):	13.3
Dry bulk density (g/cm^3):	1.50
Wet bulk density (g/cm^3):	1.70
Calculated Porosity (% vol):	40.5
Percent Saturation:	49.3

Comments:

* Weight including tares

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DD4/B18DF7 Composite
Ring Number: NA
Depth: NA

Test Date: 13-Nov-04

Field weight of sample* (g): 169.38
Tare weight, ring (g): 44.54
Tare weight, cap/plate/epoxy (g): 0.00

Dry weight of sample (g): 111.55
Sample volume (cm^3): 73.80
Measured particle density: 2.53

Initial Volumetric Moisture Content (% vol):	18.0
Initial Gravimetric Moisture Content (% g/g):	11.9
Dry bulk density (g/cm^3):	1.51
Wet bulk density (g/cm^3):	1.69
Calculated Porosity (% vol):	40.4
Percent Saturation:	44.6

Comments:

* Weight including tares

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF8
Ring Number: NA
Depth: NA
Test Date: 13-Nov-04

Field weight of sample* (g): 181.60
Tare weight, ring (g): 47.33
Tare weight, cap/plate/epoxy (g): 0.00

Dry weight of sample (g): 118.24
Sample volume (cm^3): 79.32
Measured particle density: 2.56

Initial Volumetric Moisture Content (% vol): 20.2
Initial Gravimetric Moisture Content (% g/g): 13.6
Dry bulk density (g/cm^3): 1.49
Wet bulk density (g/cm^3): 1.69
Calculated Porosity (% vol): 41.7
Percent Saturation: 48.4

Comments:

* Weight including tares

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF6
Ring Number: NA
Depth: NA

Test Date: 13-Nov-04

Field weight of sample* (g): 172.72
Tare weight, ring (g): 45.25
Tare weight, cap/plate/epoxy (g): 0.00

Dry weight of sample (g): 108.35
Sample volume (cm^3): 74.70
Measured particle density: 2.68

Initial Volumetric Moisture Content (% vol): 25.6
Initial Gravimetric Moisture Content (% g/g): 17.6
Dry bulk density (g/cm^3): 1.45
Wet bulk density (g/cm^3): 1.71
Calculated Porosity (% vol): 45.9
Percent Saturation: 55.7

Comments:

* Weight including tares

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF9
Ring Number: NA
Depth: NA

Test Date: 13-Nov-04

Field weight of sample* (g): 156.78
Tare weight, ring (g): 41.19
Tare weight, cap/plate/epoxy (g): 0.00

Dry weight of sample (g): 101.79
Sample volume (cm^3): 68.41
Measured particle density: 2.58

Initial Volumetric Moisture Content (% vol): 20.2
Initial Gravimetric Moisture Content (% g/g): 13.6
Dry bulk density (g/cm^3): 1.49
Wet bulk density (g/cm^3): 1.69
Calculated Porosity (% vol): 42.2
Percent Saturation: 47.8

Comments:

* Weight including tares

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DD5
Ring Number: NA
Depth: NA

Test Date: 13-Nov-04

Field weight of sample* (g): 162.43
Tare weight, ring (g): 42.64
Tare weight, cap/plate/epoxy (g): 0.00

Dry weight of sample (g): 105.43
Sample volume (cm^3): 70.52
Measured particle density: 2.48

Initial Volumetric Moisture Content (% vol):	20.4
Initial Gravimetric Moisture Content (% g/g):	13.6
Dry bulk density (g/cm^3):	1.49
Wet bulk density (g/cm^3):	1.70
Calculated Porosity (% vol):	39.7
Percent Saturation:	51.3

Comments:

* Weight including tares

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DD6
Ring Number: NA
Depth: NA

Test Date: 13-Nov-04

Field weight of sample* (g): 172.63
Tare weight, ring (g): 45.29
Tare weight, cap/plate/epoxy (g): 0.00

Dry weight of sample (g): 111.88
Sample volume (cm^3): 75.16
Measured particle density: 2.57

Initial Volumetric Moisture Content (% vol):	20.6
Initial Gravimetric Moisture Content (% g/g):	13.8
Dry bulk density (g/cm^3):	1.49
Wet bulk density (g/cm^3):	1.69
Calculated Porosity (% vol):	42.2
Percent Saturation:	48.8

Comments:

* Weight including tares

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF2
Ring Number: NA
Depth: NA

Test Date: 13-Nov-04

Field weight of sample* (g): 166.48
Tare weight, ring (g): 43.71
Tare weight, cap/plate/epoxy (g): 0.00

Dry weight of sample (g): 106.86
Sample volume (cm^3): 72.33
Measured particle density: 2.56

Initial Volumetric Moisture Content (% vol):	22.0
Initial Gravimetric Moisture Content (% g/g):	14.9
Dry bulk density (g/cm^3):	1.48
Wet bulk density (g/cm^3):	1.70
Calculated Porosity (% vol):	42.3
Percent Saturation:	52.0

Comments:

* Weight including tares

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF4
Ring Number: NA
Depth: NA

Test Date: 13-Nov-04

Field weight of sample* (g): 165.67
Tare weight, ring (g): 43.65
Tare weight, cap/plate/epoxy (g): 0.00

Dry weight of sample (g): 106.65
Sample volume (cm^3): 72.02
Measured particle density: 2.59

Initial Volumetric Moisture Content (% vol): 21.3
Initial Gravimetric Moisture Content (% g/g): 14.4
Dry bulk density (g/cm^3): 1.48
Wet bulk density (g/cm^3): 1.69
Calculated Porosity (% vol): 42.9
Percent Saturation: 49.8

Comments:

* Weight including tares

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF5
Ring Number: NA
Depth: NA

Test Date: 13-Nov-04

Field weight of sample* (g): 139.88
Tare weight, ring (g): 36.79
Tare weight, cap/plate/epoxy (g): 0.00

Dry weight of sample (g): 90.01
Sample volume (cm^3): 61.01
Measured particle density: 2.63

Initial Volumetric Moisture Content (% vol): 21.4
Initial Gravimetric Moisture Content (% g/g): 14.5
Dry bulk density (g/cm^3): 1.48
Wet bulk density (g/cm^3): 1.69
Calculated Porosity (% vol): 43.9
Percent Saturation: 48.8

Comments:

* Weight including tares

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Summary of Saturated Hydraulic Conductivity Tests

Sample Number	K_{sat} (cm/sec)	Method of Analysis	
		Constant Head	Falling Head
B18DD3/B18DD2 Composite	4.0E-05	X	
B18DD4/B18DF7 Composite	4.8E-05	X	
B18DF8	3.9E-05	X	
B18DF6	1.1E-03	X	
B18DF9	3.0E-06		X
B18DD5	1.8E-06		X
B18DD6	2.5E-05	X	
B18DF2	3.9E-05	X	
B18DF4	1.0E-05	X	
B18DF5	1.6E-05	X	

Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity
Constant Head Method

Job name:	Fluor Hanford	*Type of water used:*	TAP
Job number:	LB04.0220.00	*Collection vessel tare* (g):	11.30
Sample number:	B18DD3/B18DD2 Composite	*Sample length* (cm):	3.75
Ring Number:	NA	*Sample diameter* (cm):	4.92
Depth:	NA	*Sample x-sectional area* (cm^2):	19.00

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm^3)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
16-Nov-04	08:58:13	18.5	14.4	14.5	3.2	1101	4.0E-05	4.1E-05
16-Nov-04	09:16:34							
Test # 2:								
17-Nov-04	15:46:49	19.0	14.4	18.0	6.7	2365	3.9E-05	3.9E-05
17-Nov-04	16:26:14							
Test # 3:								
18-Nov-04	11:09:16	18.5	14.4	12.4	1.1	389	3.7E-05	3.8E-05
18-Nov-04	11:15:45							

***Average Ksat* (cm/sec):** **4.0E-05**

Comments:

Laboratory analysis by: M. Devine
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity
Constant Head Method

Job name:	Fluor Hanford	*Type of water used:*	TAP
Job number:	LB04.0220.00	*Collection vessel tare* (g):	11.25
Sample number:	B18DD4/B18DF7 Composite	*Sample length* (cm):	3.88
Ring Number:	NA	*Sample diameter* (cm):	4.92
Depth:	NA	*Sample x-sectional area* (cm^2):	19.02

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm^3)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
15-Nov-04	11:44:00	18.5	13.1	18.2	7.0	2315	4.7E-05	4.8E-05
15-Nov-04	12:22:35							
Test # 2:								
15-Nov-04	15:59:08	18.0	13.1	18.1	6.9	2305	4.7E-05	4.8E-05
15-Nov-04	16:37:33							
Test # 3:								
16-Nov-04	08:59:35	18.5	13.1	14.5	3.2	1076	4.6E-05	4.8E-05
16-Nov-04	09:17:31							

***Average Ksat* (cm/sec):** **4.8E-05**

Comments:

Laboratory analysis by: M. Devine
Data entered by: M. Devine
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity
Constant Head Method

Job name:	Fluor Hanford	*Type of water used:*	TAP
Job number:	LB04.0220.00	*Collection vessel tare* (g):	6.59
Sample number:	B18DF8	*Sample length* (cm):	4.13
Ring Number:	NA	*Sample diameter* (cm):	4.95
Depth:	NA	*Sample x-sectional area* (cm^2):	19.22

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm^3)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
15-Nov-04	11:45:30	18.5	14.8	12.6	6.0	2192	3.9E-05	4.1E-05
15-Nov-04	12:22:02							
Test # 2:								
15-Nov-04	15:59:37	18.0	14.8	12.5	5.9	2277	3.7E-05	3.9E-05
15-Nov-04	16:37:34							
Test # 3:								
16-Nov-04	08:59:35	18.5	14.8	9.4	2.8	1107	3.7E-05	3.8E-05
16-Nov-04	09:18:02							

***Average Ksat* (cm/sec):** **3.9E-05**

Comments:

Laboratory analysis by: M. Devine
Data entered by: M. Devine
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity
Constant Head Method

Job name: Fluor Hanford
Job number: LB04.0220.00
Sample number: B18DF6
Ring Number: NA
Depth: NA

Type of water used: TAP
Collection vessel tare (g): 6.36
Sample length (cm): 3.92
Sample diameter (cm): 4.92
Sample x-sectional area (cm^2): 19.04

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm^3)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
16-Nov-04	08:58:00	18.5	13.8	24.2	17.9	249	1.1E-03	1.1E-03
16-Nov-04	09:02:09							
Test # 2:								
17-Nov-04	15:46:27	19.0	13.8	13.7	7.4	100	1.1E-03	1.1E-03
17-Nov-04	15:48:07							
Test # 3:								
18-Nov-04	11:08:47	18.5	13.8	12.3	6.0	80	1.1E-03	1.1E-03
18-Nov-04	11:10:07							

***Average Ksat* (cm/sec):** **1.1E-03**

Comments:

Laboratory analysis by: M. Devine
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity
Falling Head Method

Job name: Fluor Hanford
Job number: LB04.0220.00
Sample number: B18DF9
Ring Number: NA
Depth: NA

Type of water used: TAP
Backpressure (psi): 0.0
Offset (cm): 1.0
Sample length (cm): 3.59
Sample x-sectional area (cm^2): 19.05
Reservoir x-sectional area (cm^2): 0.70

Date	Time	Temp (°C)	Reservoir head (cm)	Corrected head (cm)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:							
19-Nov-04	09:33:11	18.5	111.5	110.5	2081	3.1E-06	3.1E-06
19-Nov-04	10:07:52	18.5	106.3	105.3			
Test # 2:							
19-Nov-04	10:07:52	18.5	106.3	105.3	20587	2.8E-06	3.0E-06
19-Nov-04	15:50:59	17.5	68.6	67.6			
Test # 3:							
22-Nov-04	10:37:50	19.5	47.3	46.3	15600	2.9E-06	3.0E-06
22-Nov-04	14:57:50	18.5	33.8	32.8			

***Average Ksat* (cm/sec):** **3.0E-06**

Comments:

Laboratory analysis by: M. Devine
Data entered by: M. Devine
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity
Falling Head Method

Job name:	Fluor Hanford	*Type of water used:*	TAP
Job number:	LB04.0220.00	*Backpressure* (psi):	0.0
Sample number:	B18DD5	*Offset* (cm):	0.4
Ring Number:	NA	*Sample length* (cm):	3.72
Depth:	NA	*Sample x-sectional area* (cm^2):	18.97
		Reservoir x-sectional area (cm^2):	0.70

Date	Time	Temp (°C)	Reservoir head (cm)	Corrected head (cm)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:							
18-Nov-04	11:13:00	18.5	76.0	75.6	9014	1.8E-06	1.8E-06
18-Nov-04	13:43:14	18.5	67.6	67.2			
Test # 2:							
18-Nov-04	13:43:14	18.5	67.6	67.2	6094	1.7E-06	1.8E-06
18-Nov-04	15:24:48	18.5	62.6	62.2			
Test # 3:							
18-Nov-04	15:24:48	18.5	62.6	62.2	65314	1.7E-06	1.8E-06
19-Nov-04	09:33:22	18.5	28.1	27.7			

***Average Ksat* (cm/sec):** **1.8E-06**

Comments:

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity
Constant Head Method

Job name:	Fluor Hanford	*Type of water used:*	TAP
Job number:	LB04.0220.00	*Collection vessel tare* (g):	10.84
Sample number:	B18DD6	*Sample length* (cm):	3.96
Ring Number:	NA	*Sample diameter* (cm):	4.92
Depth:	NA	*Sample x-sectional area* (cm^2):	18.99

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm^3)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
15-Nov-04	11:54:55	18.5	13.4	13.2	2.3	1489	2.4E-05	2.5E-05
15-Nov-04	12:19:44							
Test # 2:								
15-Nov-04	16:20:25	18.0	13.4	12.1	1.3	739	2.7E-05	2.8E-05
15-Nov-04	16:32:44							
Test # 3:								
16-Nov-04	08:57:19	18.5	13.4	12.2	1.3	895	2.3E-05	2.3E-05
16-Nov-04	09:12:14							

***Average Ksat* (cm/sec):** **2.5E-05**

Comments:

Laboratory analysis by: M. Devine
Data entered by: M. Devine
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity
Constant Head Method

Job name:	Fluor Hanford	*Type of water used:*	TAP
Job number:	LB04.0220.00	*Collection vessel tare* (g):	10.85
Sample number:	B18DF2	*Sample length* (cm):	3.80
Ring Number:	NA	*Sample diameter* (cm):	4.93
Depth:	NA	*Sample x-sectional area* (cm^2):	19.05

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm^3)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
22-Nov-04	11:01:30	18.0	69.7	46.7	35.9	2634	3.9E-05	4.1E-05
22-Nov-04	11:45:24							
Test # 2:								
22-Nov-04	14:59:26	18.0	69.7	22.6	11.8	885	3.8E-05	4.0E-05
22-Nov-04	15:14:11							
Test # 3:								
23-Nov-04	15:54:46	18.0	69.7	13.4	2.6	207	3.6E-05	3.7E-05
23-Nov-04	15:58:13							

***Average Ksat* (cm/sec):** **3.9E-05**

Comments:

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. HInes

Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity
Constant Head Method

Job name:	Fluor Hanford	*Type of water used:*	TAP
Job number:	LB04.0220.00	*Collection vessel tare* (g):	11.54
Sample number:	B18DF4	*Sample length* (cm):	3.80
Ring Number:	NA	*Sample diameter* (cm):	4.91
Depth:	NA	*Sample x-sectional area* (cm^2):	18.94

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm^3)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
16-Nov-04	08:56:15	18.5	13.3	12.2	0.7	945	1.1E-05	1.1E-05
16-Nov-04	09:12:00							
Test # 2:								
17-Nov-04	15:47:10	19.0	13.3	13.1	1.5	2386	9.7E-06	9.9E-06
17-Nov-04	16:26:56							
Test # 3:								
18-Nov-04	11:08:39	18.5	13.3	17.3	5.8	9258	9.4E-06	9.6E-06
18-Nov-04	13:42:57							

***Average Ksat* (cm/sec):** **1.0E-05**

Comments:

Laboratory analysis by: M. Devine
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity
Constant Head Method

Job name: Fluor Hanford
Job number: LB04.0220.00
Sample number: B18DF5
Ring Number: NA
Depth: NA

Type of water used: TAP
Collection vessel tare (g): 11.93
Sample length (cm): 3.20
Sample diameter (cm): 4.93
Sample x-sectional area (cm^2): 19.07

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm^3)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
15-Nov-04	11:45:55	18.5	18.2	15.6	3.6	2127	1.6E-05	1.6E-05
15-Nov-04	12:21:22							
Test # 2:								
15-Nov-04	16:00:11	18.0	18.2	15.8	3.9	2296	1.6E-05	1.6E-05
15-Nov-04	16:38:27							
Test # 3:								
16-Nov-04	09:00:43	18.5	18.2	13.7	1.8	1103	1.5E-05	1.5E-05
16-Nov-04	09:19:06							

***Average Ksat* (cm/sec):** **1.6E-05**

Comments:

Laboratory analysis by: M. Devine
Data entered by: M. Devine
Checked by: J. Hines

Summary of Moisture Characteristics of the Initial Drainage Curve

Sample Number	Pressure Head (-cm water)	Moisture Content (%, cm^3/cm^3)
B18DD3/B18DD2 Composite	0	40.9
	20	37.2
	53	34.5
	151	25.9
	510	19.9
	13257	5.6
	851293	2.3
B18DD4/B18DF7 Composite	0	43.6
	26	39.8
	53	38.8
	154	27.5
	510	18.0
	7649	8.5
	851293	1.8
B18DF8	0	45.9
	21	43.3
	51	42.3
	144	26.8
	510	18.9
	18968	5.9
	851293	2.1
B18DF6	0	31.8
	11	29.5
	40	28.1
	73	24.6
	255	11.2
	14787	4.9
	851293	0.9

Summary of Moisture Characteristics of the Initial Drainage Curve (Continued)

Sample Number	Pressure Head (-cm water)	Moisture Content (%, cm^3/cm^3)
B18DF9	0	46.1
	29	44.0
	129	42.1
	510	36.6
	7037	12.5
	17235	9.3
	851293	4.7
B18DD5	0	43.4
	28	43.0
	128	41.4
	510	27.4
	7139	10.1
	14787	7.0
	851293	2.3
B18DD6	0	43.9
	22	41.3
	54	40.2
	154	37.9
	510	22.4
	4589	11.0
	851293	2.5
B18DF2	0	48.1
	24	46.6
	53	45.8
	154	43.9
	510	33.3
	8770	10.2
	851293	2.6

Summary of Moisture Characteristics of the Initial Drainage Curve (Continued)

Sample Number	Pressure Head (-cm water)	Moisture Content (%, cm^3/cm^3)
B18DF4	0	42.4
	25	39.7
	124	36.9
	510	32.0
	7852	9.1
	12442	7.6
	851293	2.4
B18DF5	0	44.7
	19	41.6
	53	39.1
	155	36.4
	510	26.5
	18356	4.8
	851293	2.1

Summary of Calculated Unsaturated Hydraulic Properties

Sample Number	α (cm^{-1})	N (dimensionless)	θ_r	θ_s
B18DD3/B18DD2 Composite	0.0197	1.3324	0.0027	0.4048
B18DD4/B18DF7 Composite	0.0161	1.4253	0.0173	0.4374
B18DF8	0.0152	1.5060	0.0259	0.4640
B18DF6	0.0113	2.0593	0.0281	0.3073
B18DF9	0.0018	1.6090	0.0415	0.4465
B18DD5	0.0039	1.5284	0.0214	0.4388
B18DD6	0.0055	1.5408	0.0259	0.4298
B18DF2	0.0030	1.5157	0.0178	0.4739
B18DF4	0.0021	1.5794	0.0171	0.4039
B18DF5	0.0049	1.4763	0.0074	0.4266

Daniel B. Stephens & Associates, Inc.

Moisture Retention Data

Hanging Column/Pressure Plate/Thermocouple

(Main Drainage Curve)

Job Name:	Fluor Hanford	*Dry wt. of sample* (g):	106.53
Job Number:	LB04.0220.00	*Tare wt., screen & clamp* (g):	23.04
Sample Number:	B18DD3/B18DD2 Composite	*Tare wt., ring* (g):	43.56
Ring Number:	NA	*Tare wt., epoxy* (g):	0.00
Depth:	NA	*Sample volume* (cm^3):	71.20

Saturated weight at 0 cm tension* (g): 202.23
Volume of water[T] in saturated sample (cm^3): 29.10
Saturated moisture content (% vol): 40.87
Sample bulk density (g/cm^3): 1.50

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content[T] (% vol)
Hanging column:	19-Nov-04 / 05:40	202.23	0.00	40.87
	22-Nov-04 / 14:50	199.64	20.00	37.23
	26-Nov-04 / 09:10	197.71	53.30	34.52
	30-Nov-04 / 13:20	191.58	150.80	25.91
Pressure plate:	06-Dec-04 / 14:30	187.28	509.90	19.87

Comments:

* Weight including tares
[T] Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: M. Devine
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Moisture Retention Data

Water Activity Meter/Relative Humidity Box

(Main Drainage Curve)

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DD3/B18DD2 Composite
Ring Number: NA
Depth: NA

Dry weight of water activity meter sample* (g): 155.56
Tare weight, jar (g): 113.98
Sample bulk density (g/cm^3): 1.50

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Water Activity Meter:	13-Dec-04 / 15:10	157.12	13257.4	5.61

Dry weight of relative humidity box sample* (g): 71.71
Tare weight (g): 40.04
Sample bulk density (g/cm^3): 1.50

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Relative humidity box:	07-Dec-04 / 09:00	72.20	851293	2.33

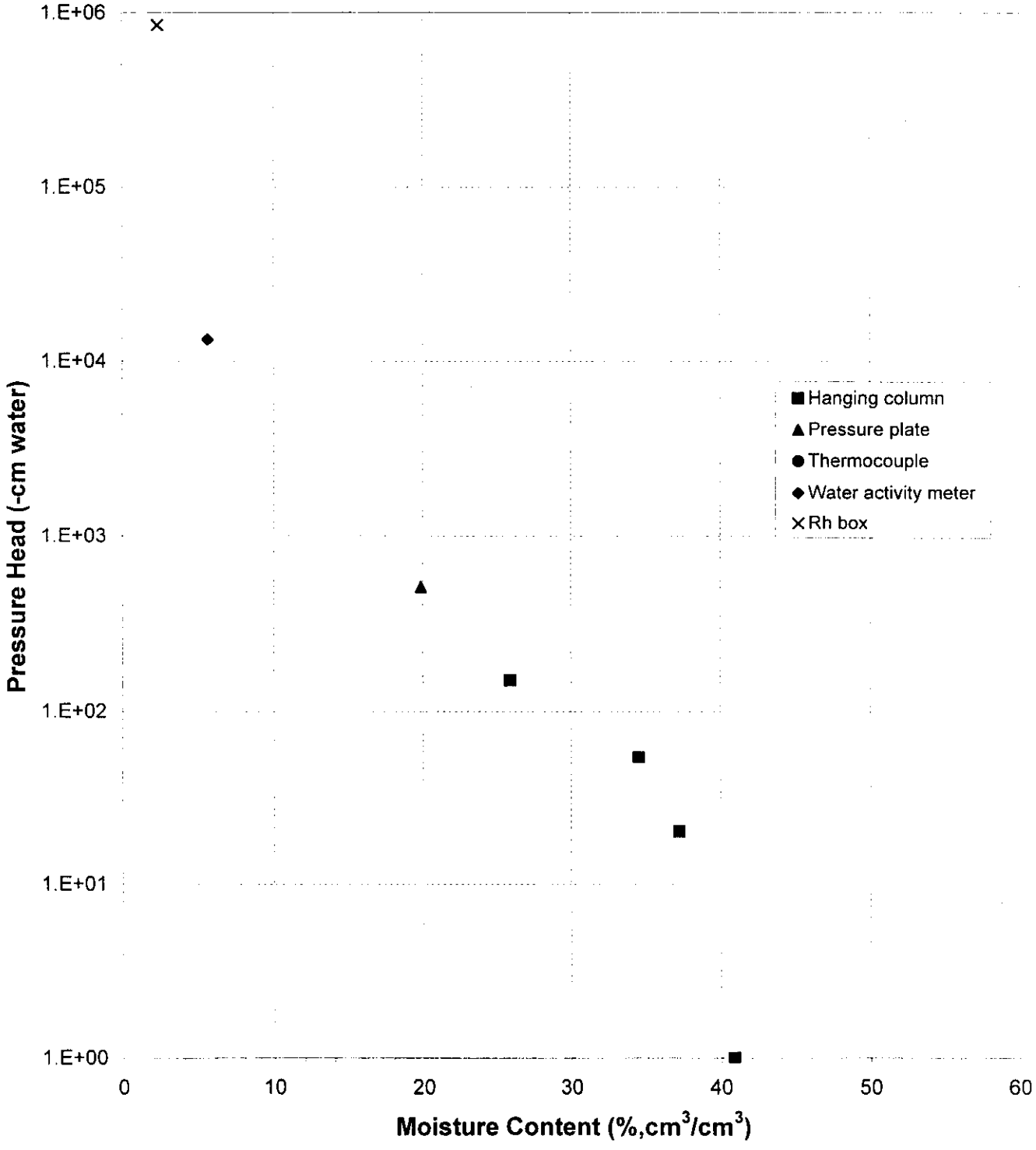
Comments:

* Weight including tares
† Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: M. Devine/D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Water Retention Data Points

Sample Number: B18DD3/B18DD2 Composite



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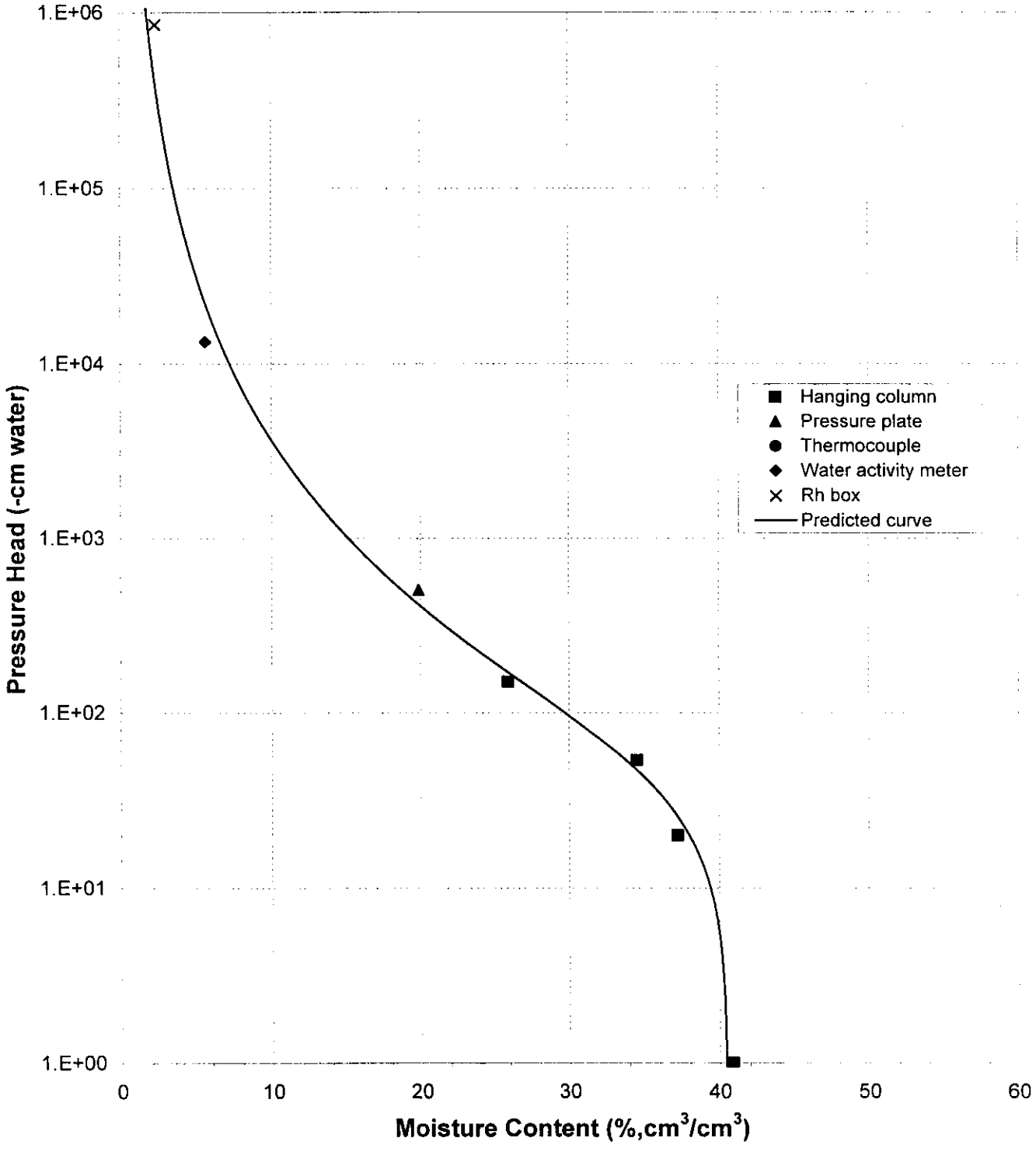
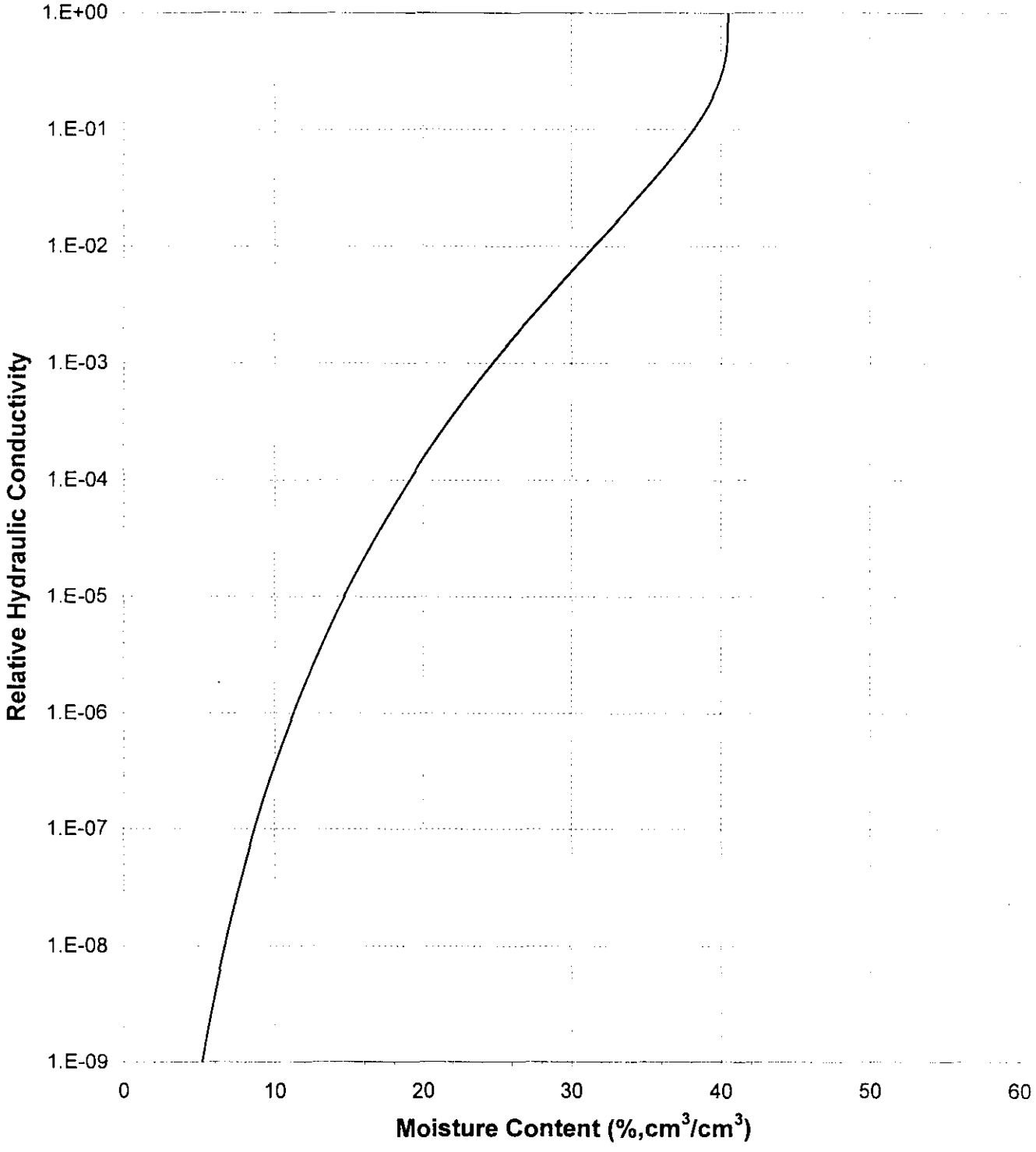
Predicted Water Retention Curve and Data Points

Sample Number: B18DD3/B18DD2 Composite



Plot of Relative Hydraulic Conductivity vs Moisture Content

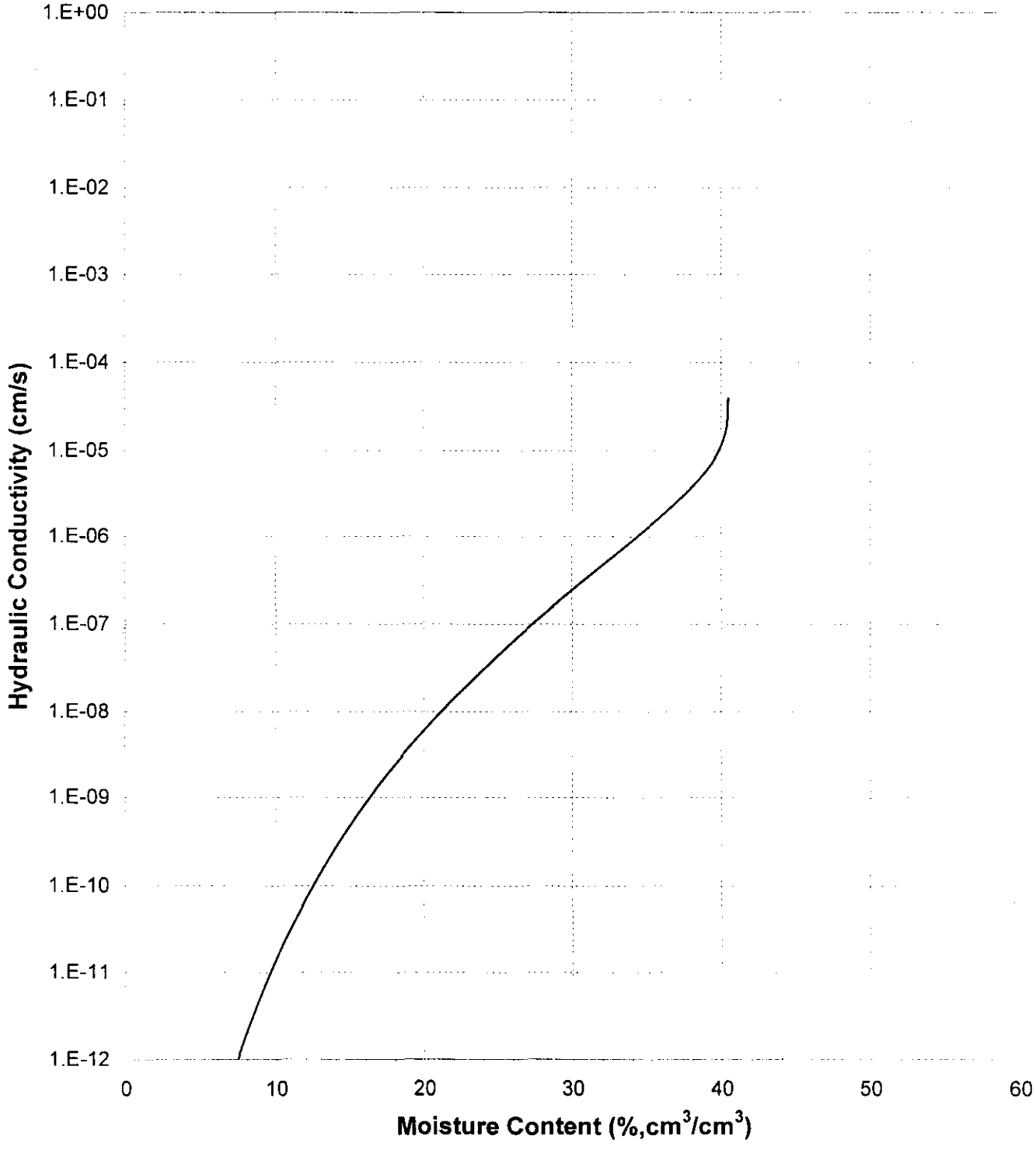
Sample Number: B18DD3/B18DD2 Composite



Daniel B. Stephens & Associates, Inc.

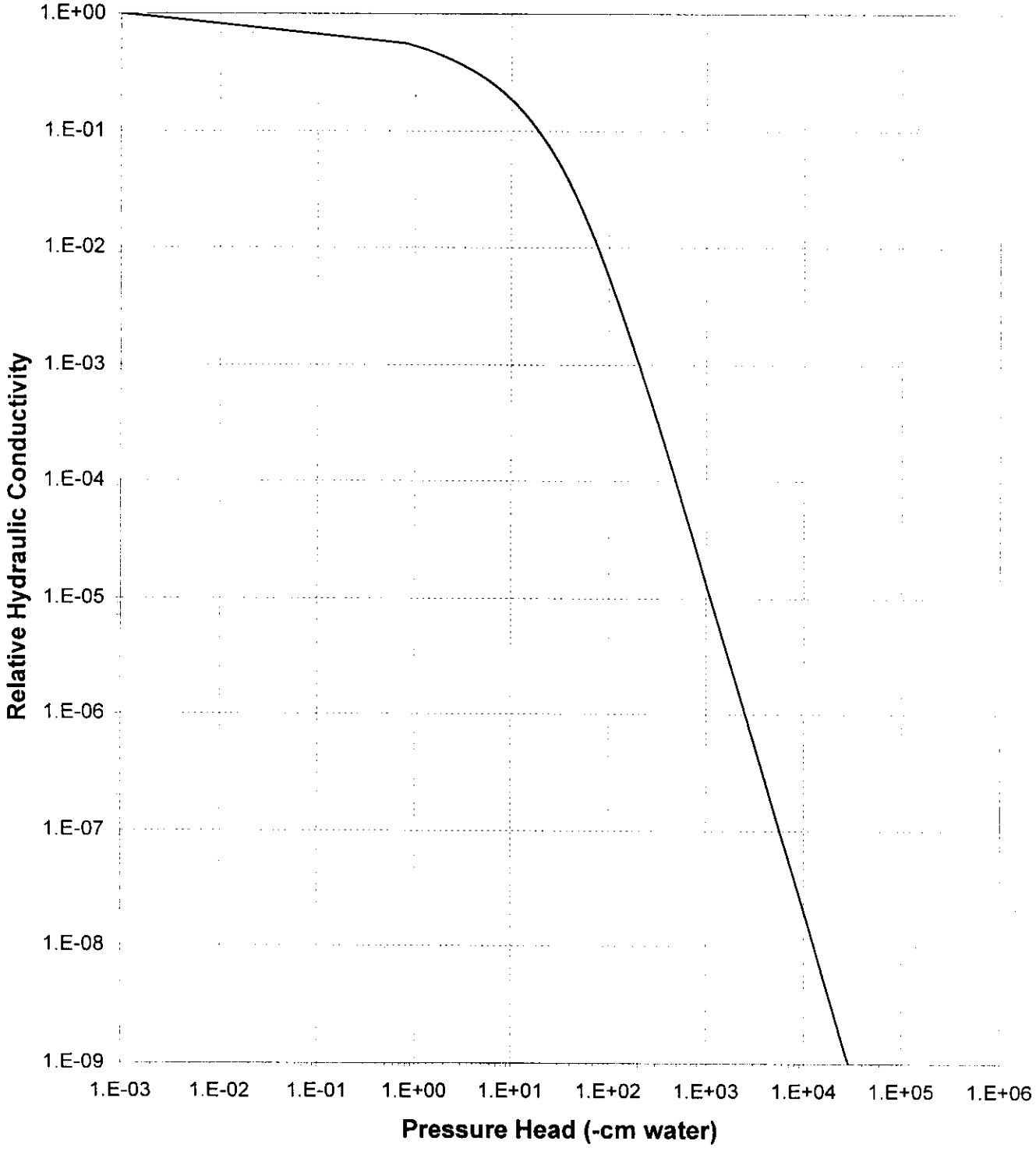
Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: B18DD3/B18DD2 Composite



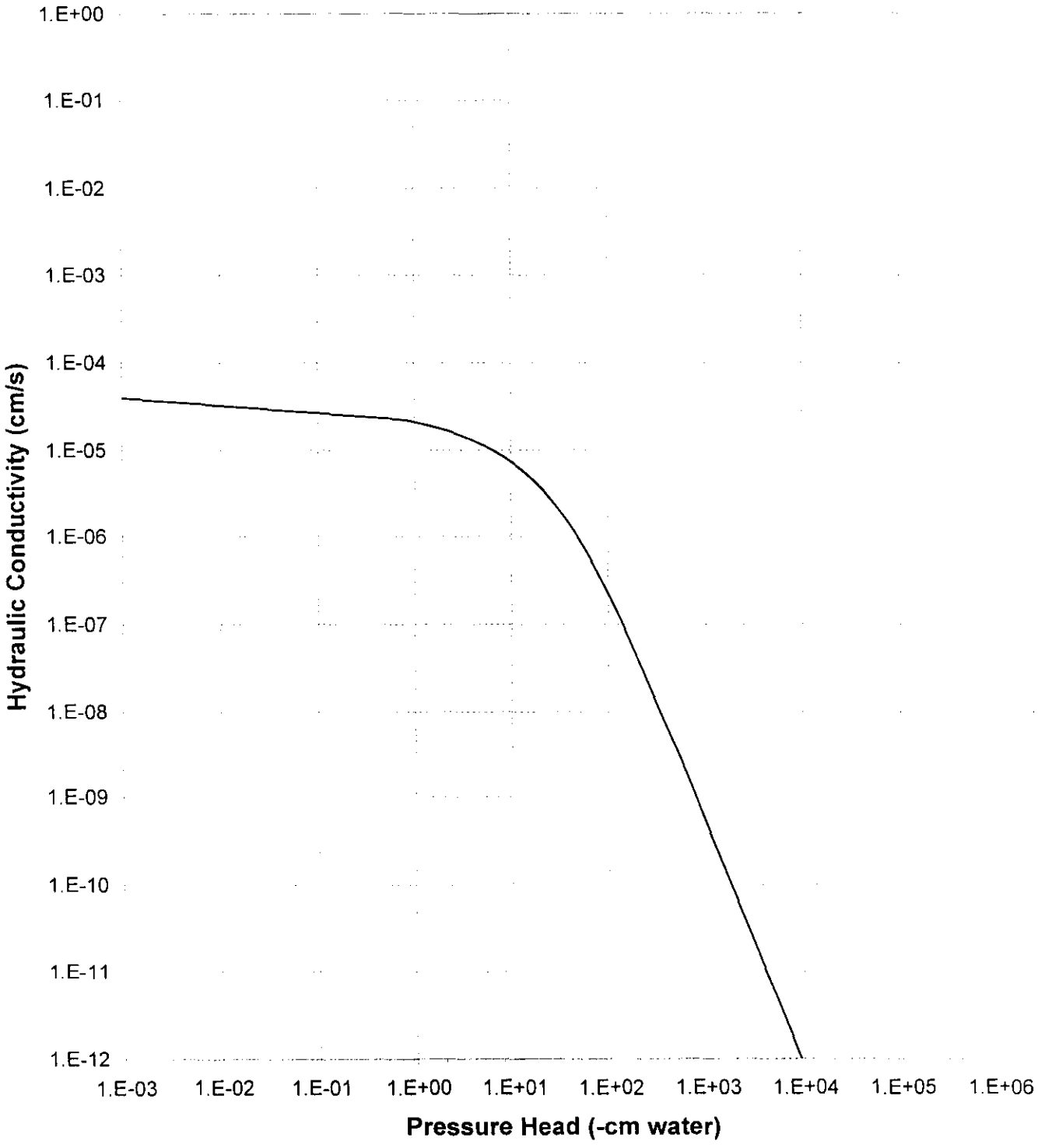
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: B18DD3/B18DD2 Composite



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: B18DD3/B18DD2 Composite



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Moisture Retention Data

Hanging Column/Pressure Plate/Thermocouple

(Main Drainage Curve)

Job Name:	Fluor Hanford	*Dry wt. of sample* (g):	111.55
Job Number:	LB04.0220.00	*Tare wt., screen & clamp* (g):	23.24
Sample Number:	B18DD4/B18DF7 Composite	*Tare wt., ring* (g):	44.54
Ring Number:	NA	*Tare wt., epoxy* (g):	0.00
Depth:	NA	*Sample volume* (cm^3):	73.80

Saturated weight at 0 cm tension* (g): 211.52
Volume of water[T] in saturated sample (cm^3): 32.19
Saturated moisture content (% vol): 43.62
Sample bulk density (g/cm^3): 1.51

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content[T] (% vol)
Hanging column:	22-Nov-04 / 15:45	211.52	0.00	43.62
	26-Nov-04 / 09:10	208.73	26.40	39.84
	29-Nov-04 / 12:15	207.95	53.20	38.78
	08-Dec-04 / 14:35	199.62	153.70	27.49
Pressure plate:	15-Dec-04 / 09:40	192.58	509.90	17.96

Comments:

* Weight including tares
[T] Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: M. Devine
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Moisture Retention Data

Water Activity Meter/Relative Humidity Box

(Main Drainage Curve)

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DD4/B18DF7 Composite
Ring Number: NA
Depth: NA

Dry weight of water activity meter sample* (g): 158.01
Tare weight, jar (g): 115.07
Sample bulk density (g/cm^3): 1.51

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Water Activity Meter:	14-Dec-04 / 09:15	160.42	7648.5	8.48

Dry weight of relative humidity box sample* (g): 66.93
Tare weight (g): 41.62
Sample bulk density (g/cm^3): 1.51

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Relative humidity box:	07-Dec-04 / 09:00	67.23	851293	1.76

Comments:

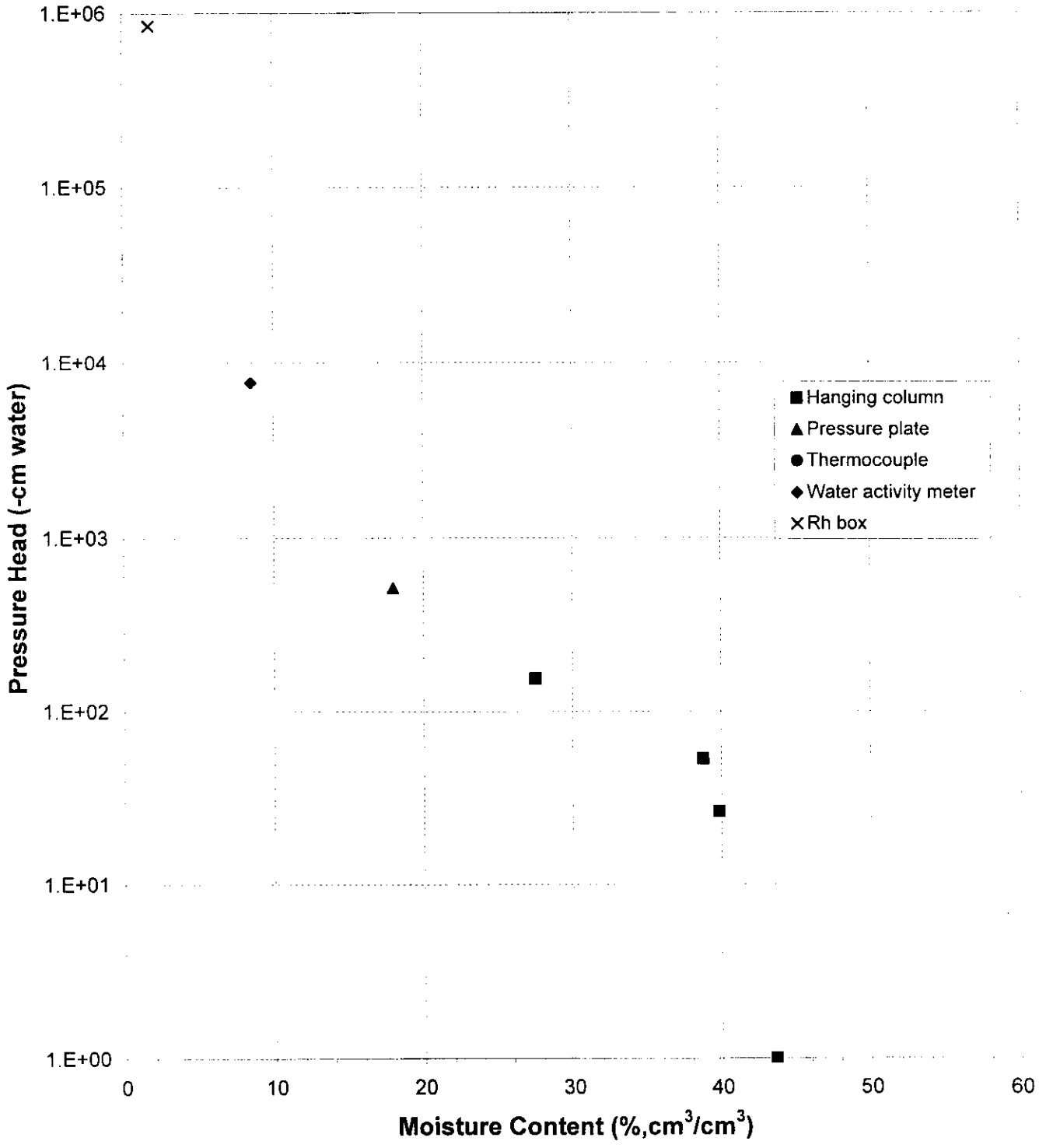
* Weight including tares
† Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Water Retention Data Points

Sample Number: B18DD4/B18DF7 Composite



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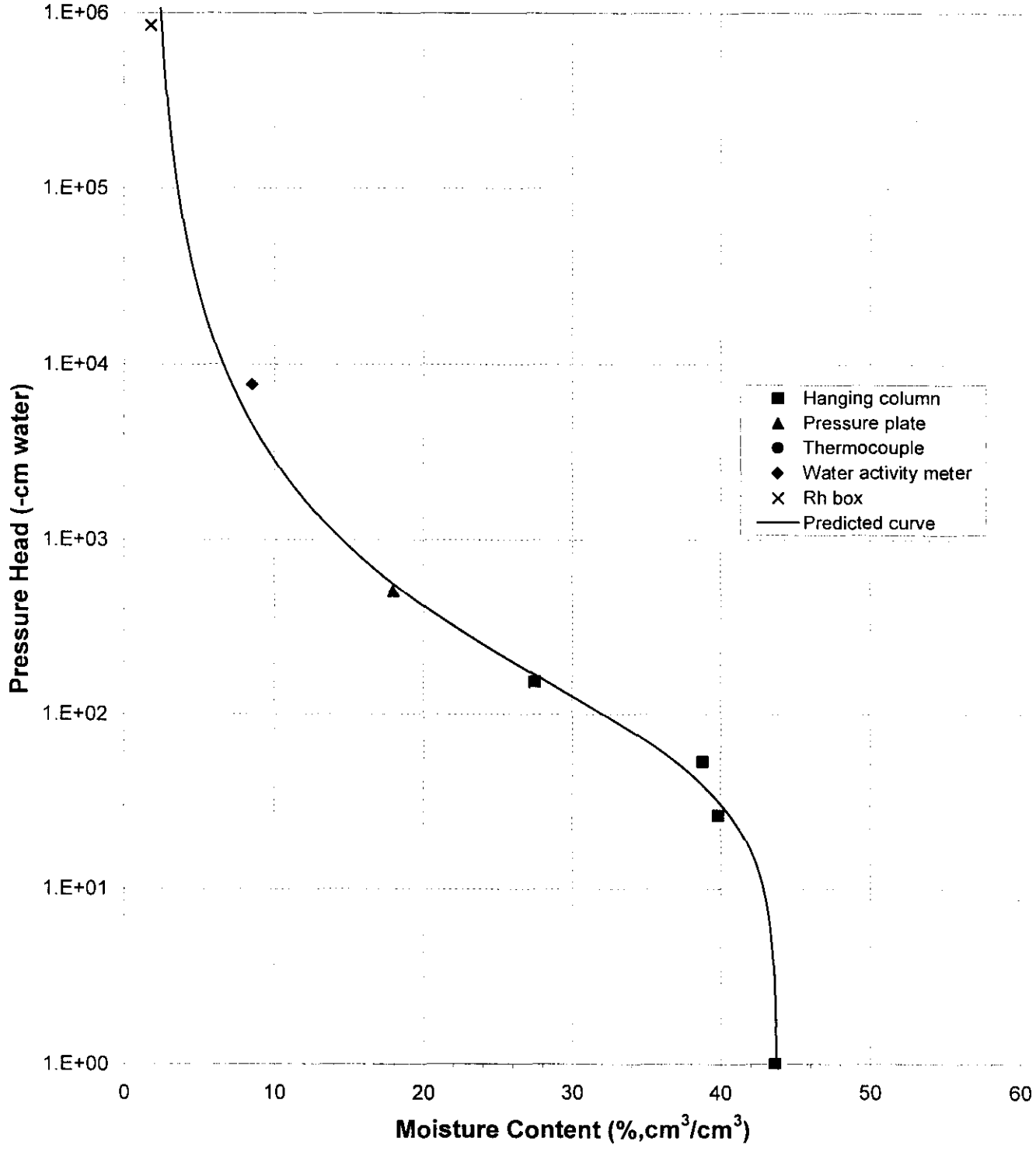
Daniel B. Stephens & Associates, Inc.

Predicted Water Retention Curve and Data Points

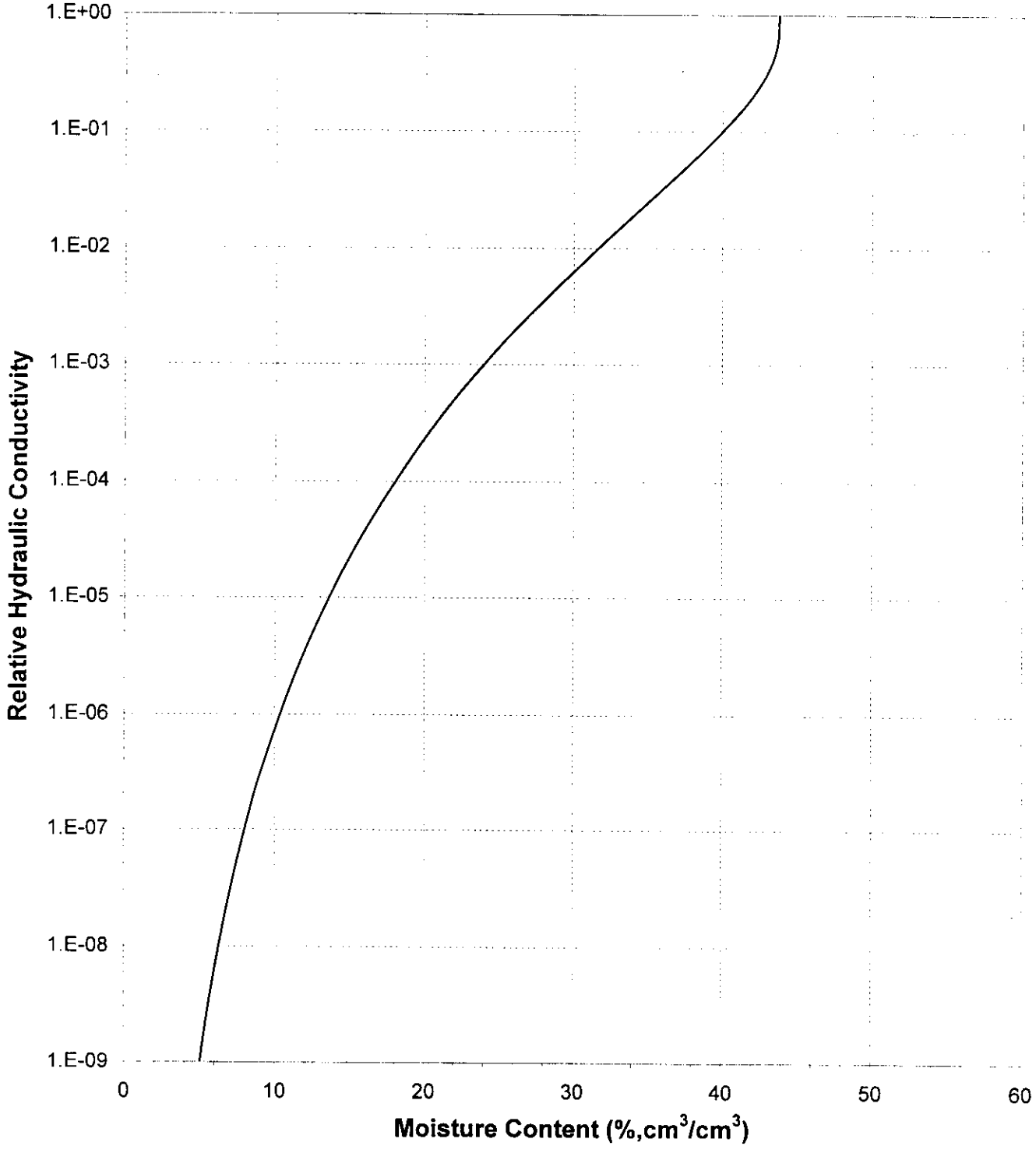
Sample Number: B18DD4/B18DF7 Composite



Daniel B. Stephens & Associates, Inc.

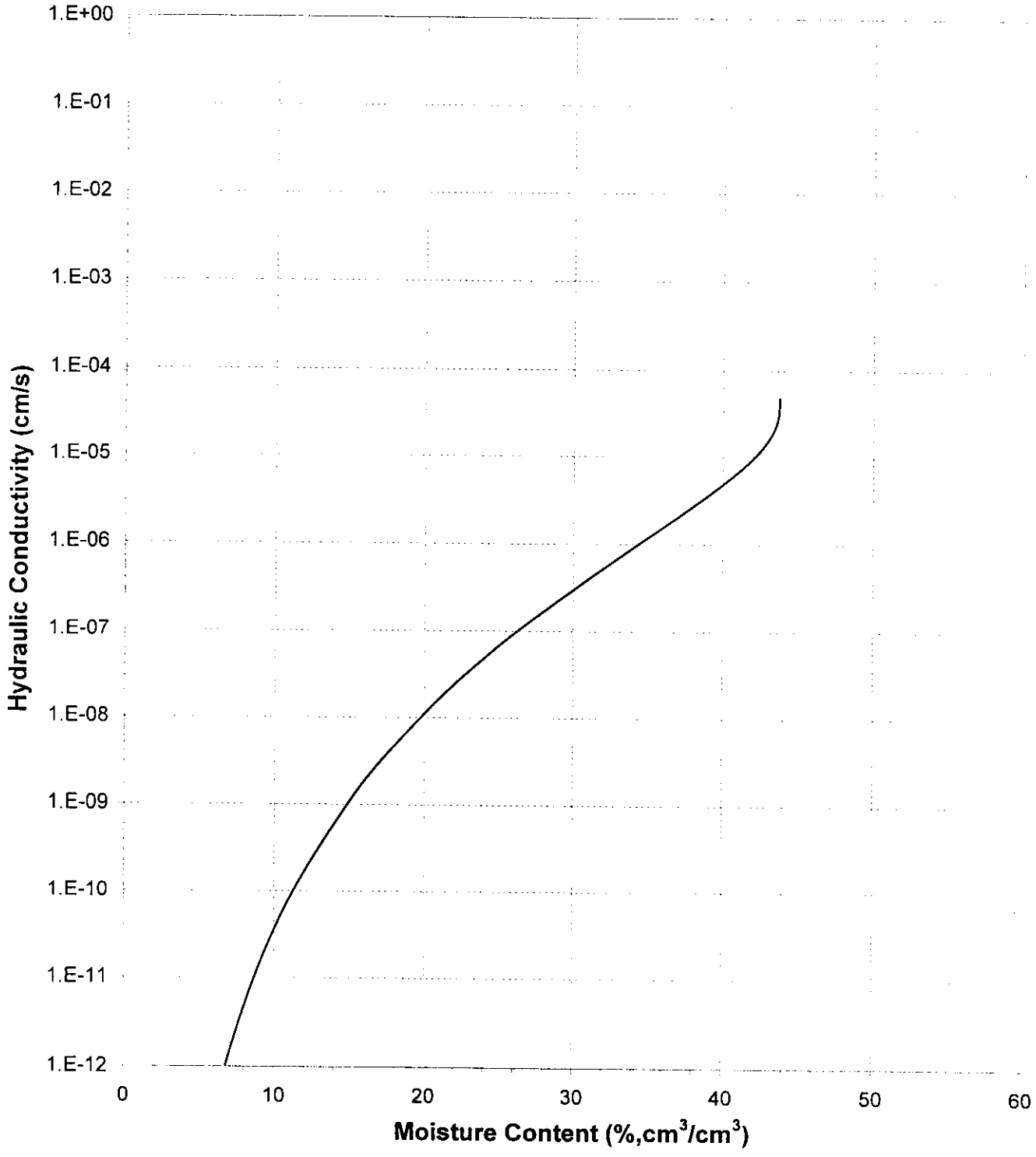
Plot of Relative Hydraulic Conductivity vs Moisture Content

Sample Number: B18DD4/B18DF7 Composite



Plot of Hydraulic Conductivity vs Moisture Content

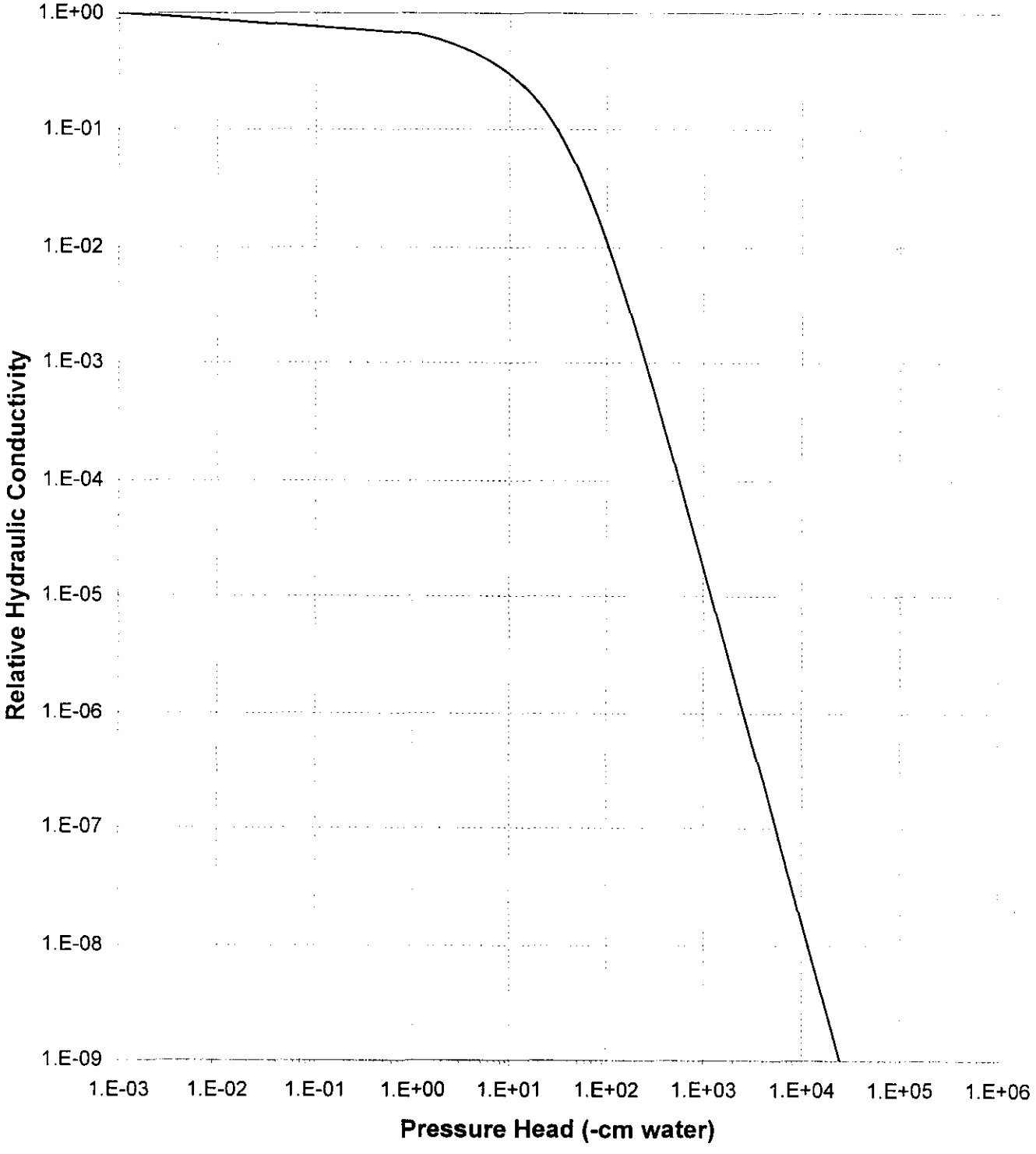
Sample Number: B18DD4/B18DF7 Composite



Daniel B. Stephens & Associates, Inc.

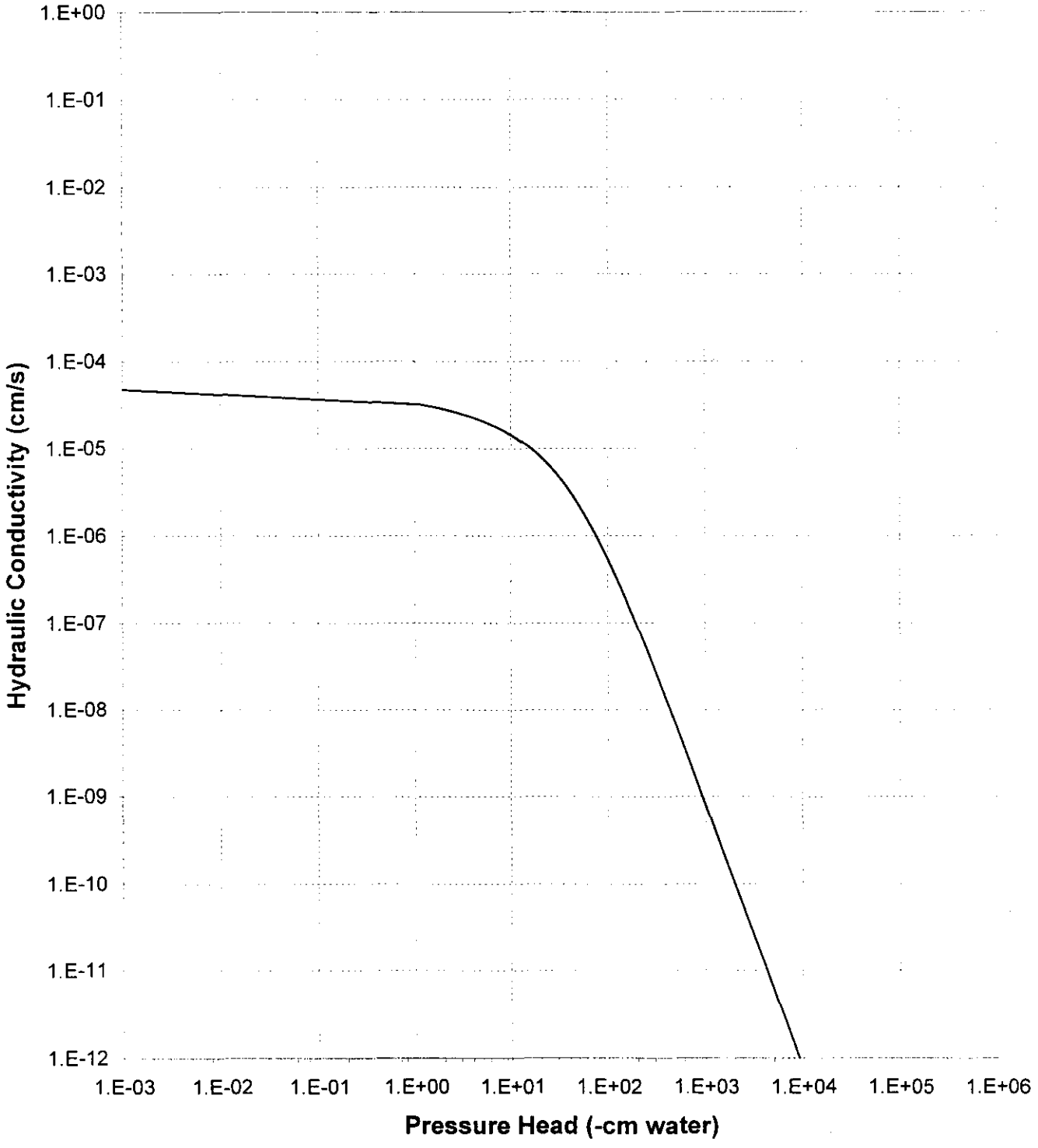
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: B18DD4/B18DF7 Composite



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: B18DD4/B18DF7 Composite



Daniel B. Stephens & Associates, Inc.

Moisture Retention Data

Hanging Column/Pressure Plate/Thermocouple

(Main Drainage Curve)

Job Name:	Fluor Hanford	*Dry wt. of sample* (g):	118.24
Job Number:	LB04.0220.00	*Tare wt., screen & clamp* (g):	23.10
Sample Number:	B18DF8	*Tare wt., ring* (g):	47.33
Ring Number:	NA	*Tare wt., epoxy* (g):	0.00
Depth:	NA	*Sample volume* (cm^3):	79.32

Saturated weight at 0 cm tension* (g): 225.07
Volume of water[T] *in saturated sample* (cm^3): 36.40
Saturated moisture content (% vol): 45.89
Sample bulk density (g/cm^3): 1.49

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content[T] (% vol)
Hanging column:	22-Nov-04 / 11:45	225.07	0.00	45.89
	26-Nov-04 / 09:00	223.04	21.20	43.33
	29-Nov-04 / 12:00	222.24	50.80	42.32
	08-Dec-04 / 14:30	209.96	143.50	26.84
Pressure plate:	15-Dec-04 / 09:35	203.70	509.90	18.95

Comments:

* Weight including tares
[T] Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: M. Devine
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Moisture Retention Data

Water Activity Meter/Relative Humidity Box

(Main Drainage Curve)

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF8
Ring Number: NA
Depth: NA

Dry weight of water activity meter sample* (g): 139.94
Tare weight, jar (g): 112.95
Sample bulk density (g/cm^3): 1.49

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Water Activity Meter:	08-Dec-04 / 14:15	141.01	18968.3	5.91

Dry weight of relative humidity box sample* (g): 68.19
Tare weight (g): 40.78
Sample bulk density (g/cm^3): 1.49

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Relative humidity box:	07-Dec-04 / 09:00	68.57	851293	2.11

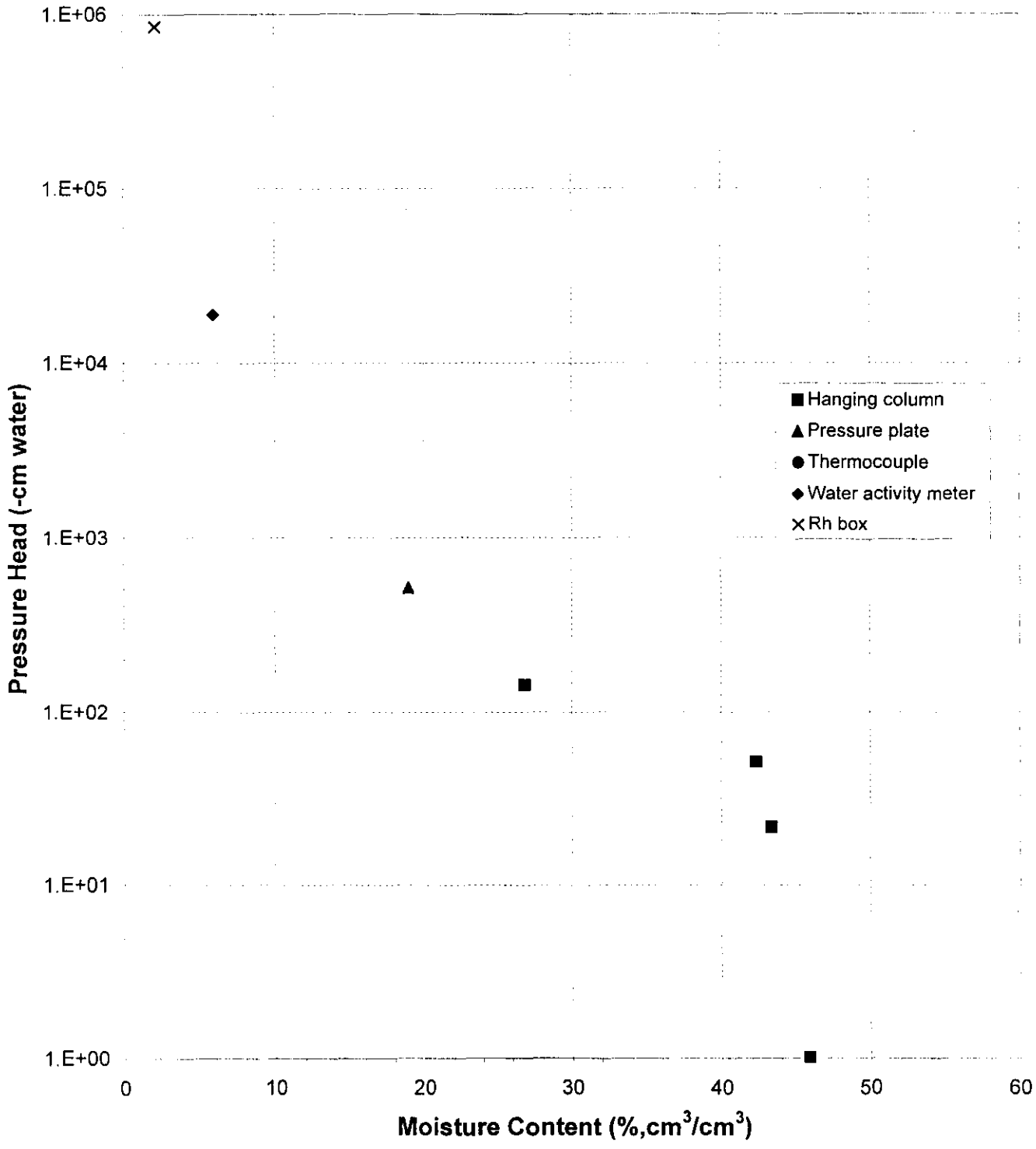
Comments:

* Weight including tares
† Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Water Retention Data Points

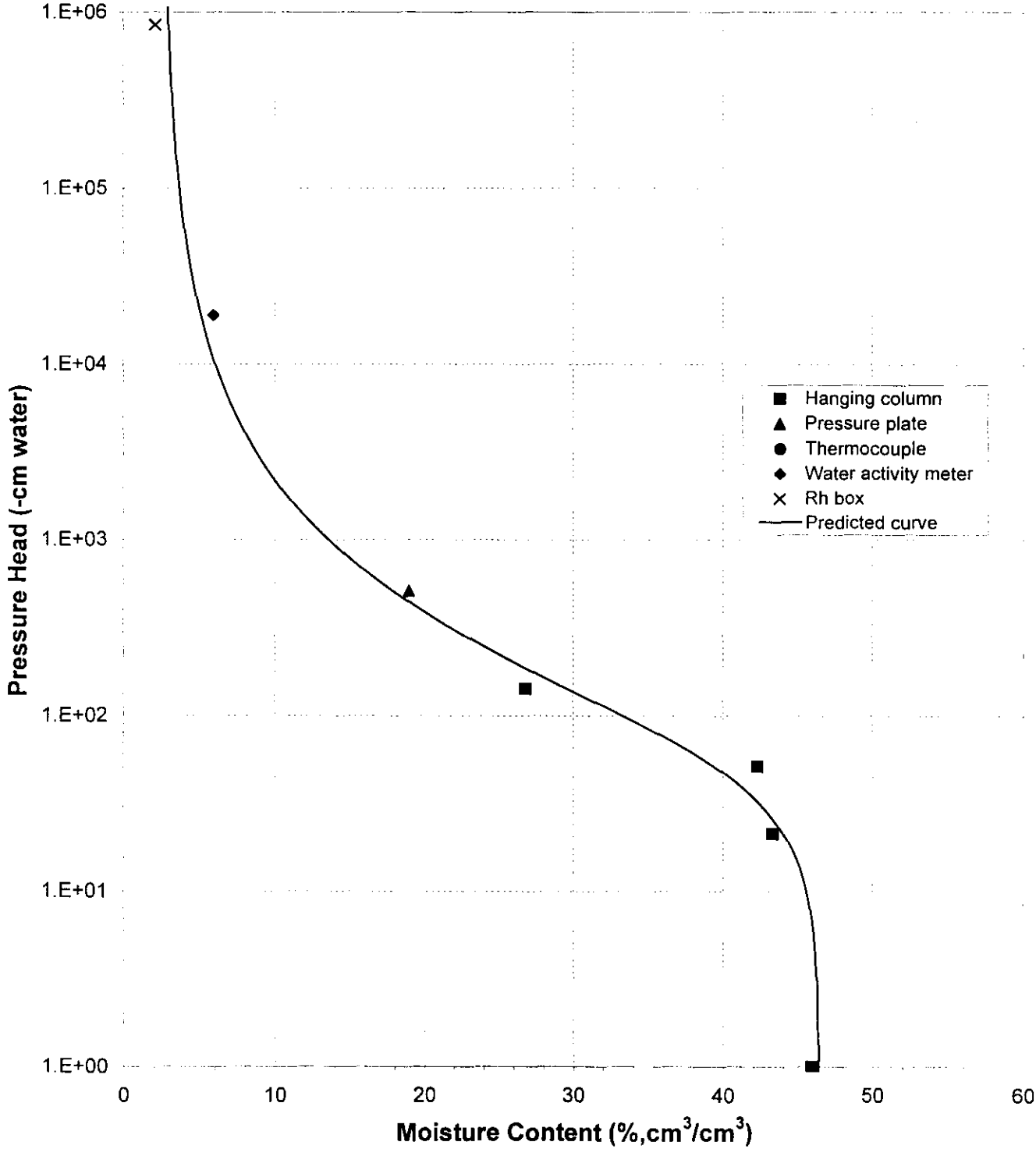
Sample Number: B18DF8



Daniel B. Stephens & Associates, Inc.

Predicted Water Retention Curve and Data Points

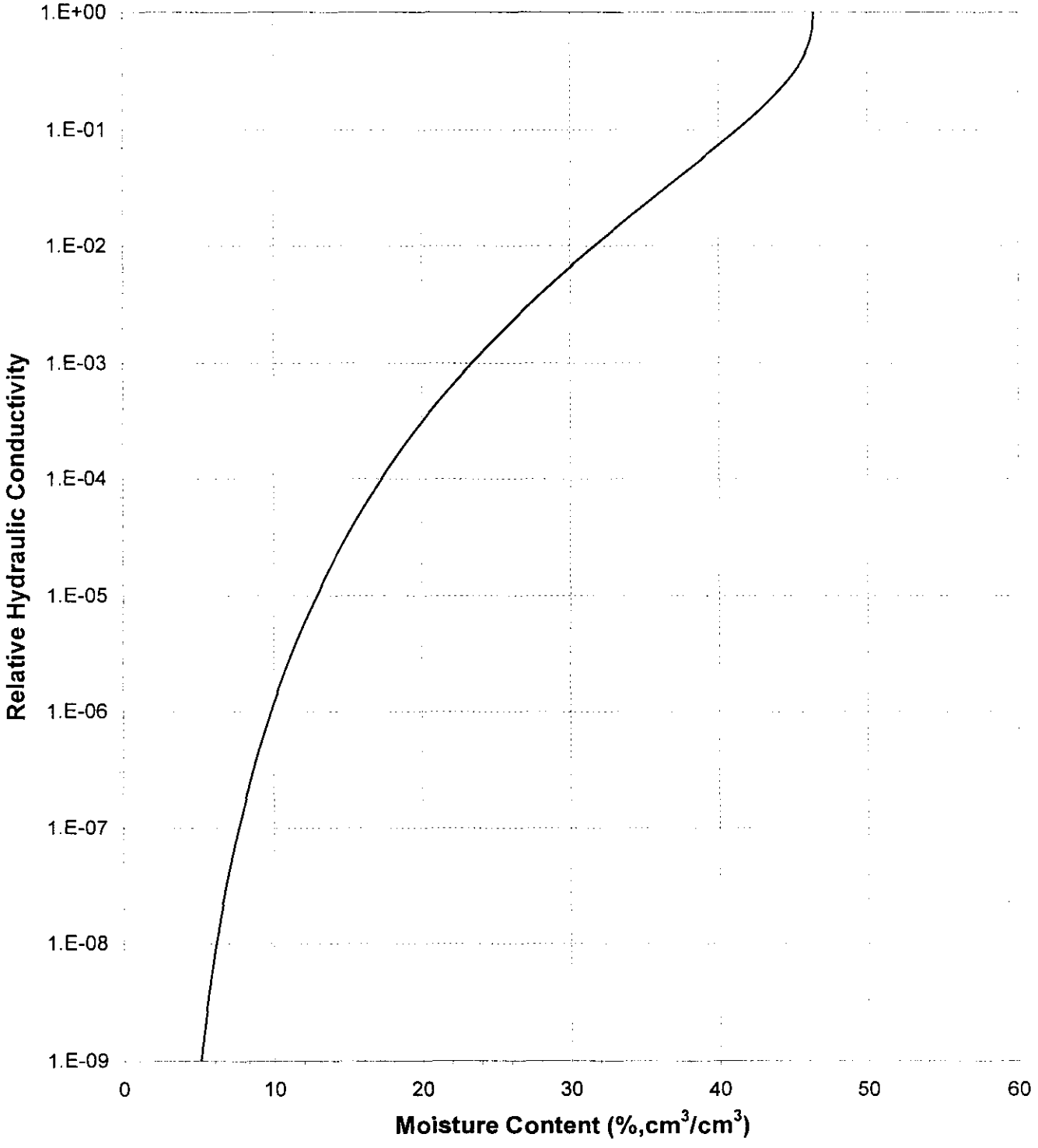
Sample Number: B18DF8



Daniel B. Stephens & Associates, Inc.

Plot of Relative Hydraulic Conductivity vs Moisture Content

Sample Number: B18DF8



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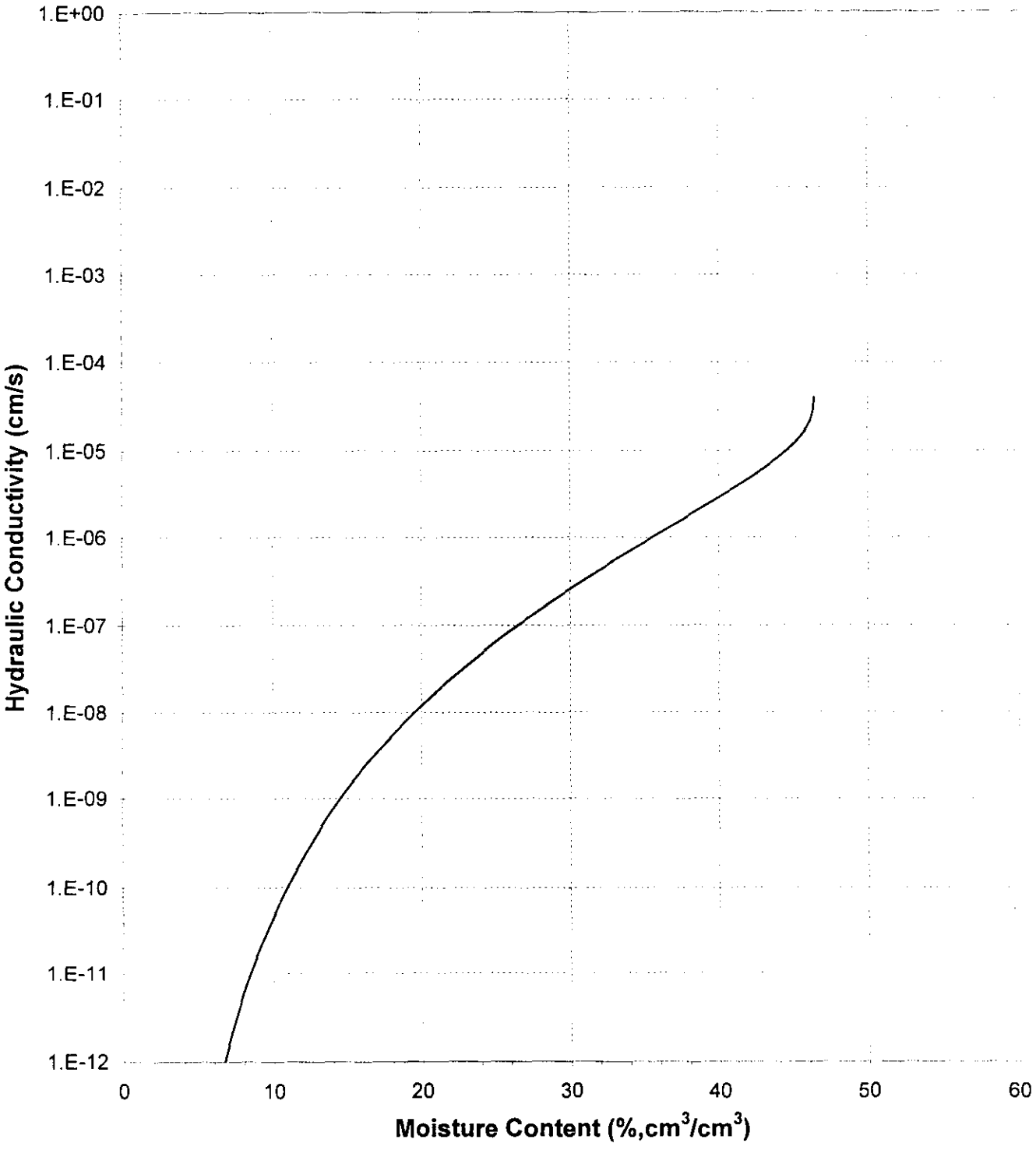
Plot of Hydraulic Conductivity vs Moisture Content

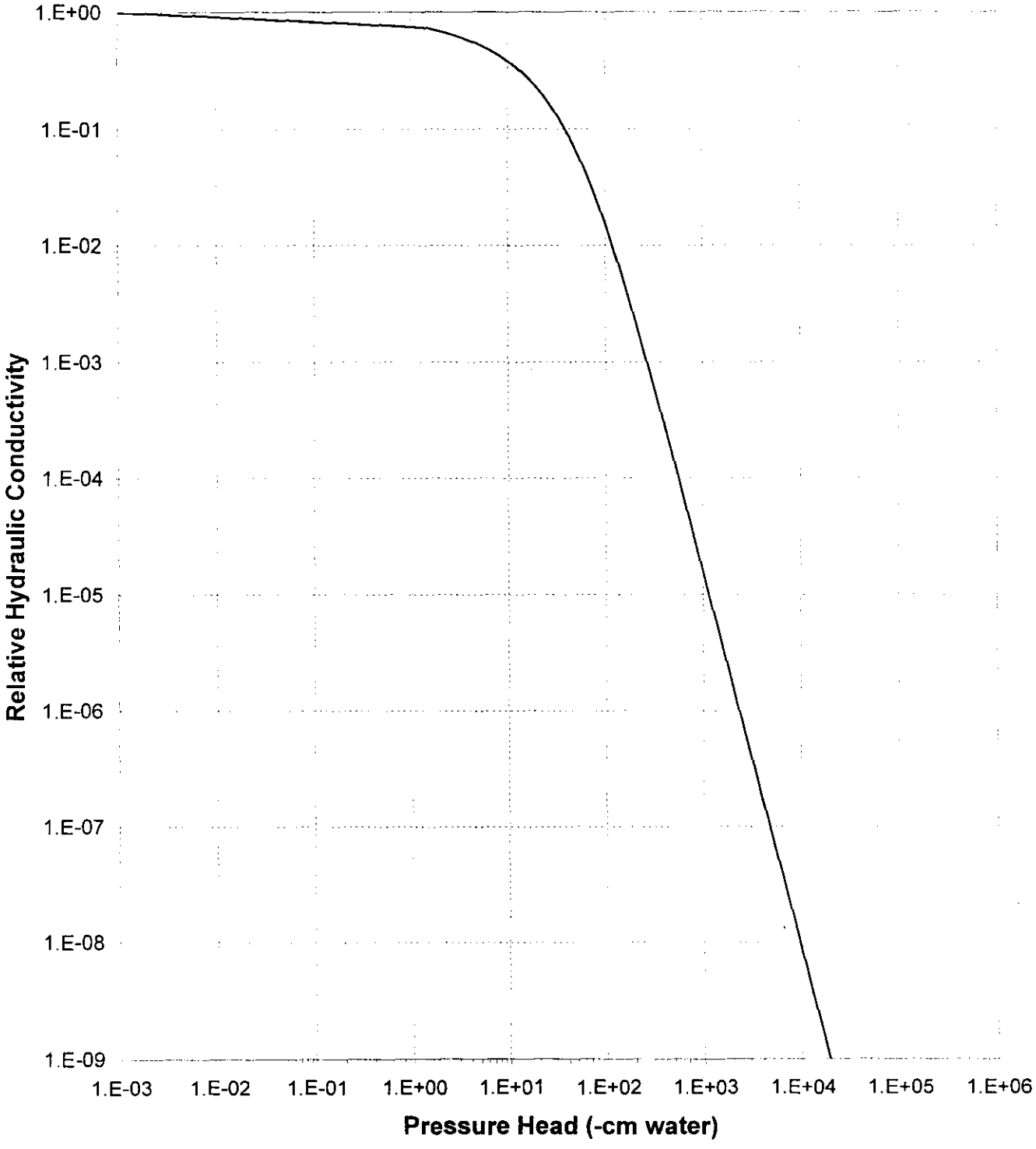
Sample Number: B18DF8



Daniel B. Stephens & Associates, Inc.

Plot of Relative Hydraulic Conductivity vs Pressure Head

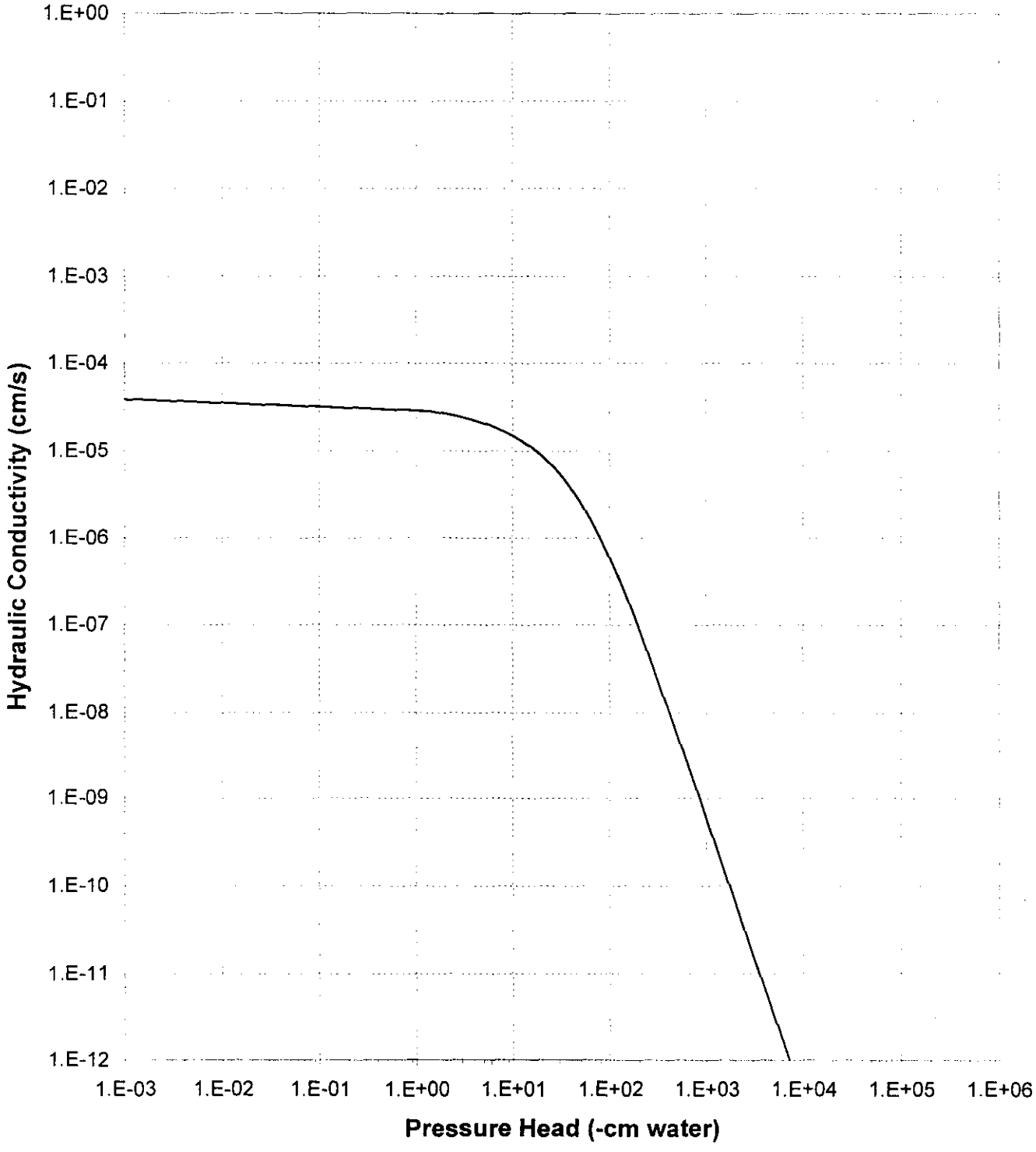
Sample Number: B18DF8



Daniel B. Stephens & Associates, Inc.

Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: B18DF8



Daniel B. Stephens & Associates, Inc.

Moisture Retention Data

Hanging Column/Pressure Plate/Thermocouple

(Main Drainage Curve)

Job Name:	Fluor Hanford	*Dry wt. of sample* (g):	108.35
Job Number:	LB04.0220.00	*Tare wt., screen & clamp* (g):	23.37
Sample Number:	B18DF6	*Tare wt., ring* (g):	45.25
Ring Number:	NA	*Tare wt., epoxy* (g):	0.00
Depth:	NA	*Sample volume* (cm^3):	74.70

Saturated weight at 0 cm tension* (g): 200.71
Volume of water[T] in saturated sample (cm^3): 23.74
Saturated moisture content (% vol): 31.78
Sample bulk density (g/cm^3): 1.45

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content[T] (% vol)
Hanging column:	19-Nov-04 / 15:35	200.71	0.00	31.78
	22-Nov-04 / 14:45	198.99	11.20	29.48
	29-Nov-04 / 12:15	197.94	40.20	28.07
	08-Dec-04 / 14:35	195.37	73.20	24.63
Pressure plate:	13-Dec-04 / 11:00	185.32	254.95	11.18

Comments:

* Weight including tares
[T] Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: M. Devine
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Moisture Retention Data

Water Activity Meter/Relative Humidity Box

(Main Drainage Curve)

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF6
Ring Number: NA
Depth: NA

Dry weight of water activity meter sample* (g): 128.22
Tare weight, jar (g): 112.06
Sample bulk density (g/cm^3): 1.45

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Water Activity Meter:	10-Dec-04 / 10:00	128.77	14787.1	4.94

Dry weight of relative humidity box sample* (g): 52.77
Tare weight (g): 38.34
Sample bulk density (g/cm^3): 1.45

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Relative humidity box:	07-Dec-04 / 09:00	52.86	851293	0.93

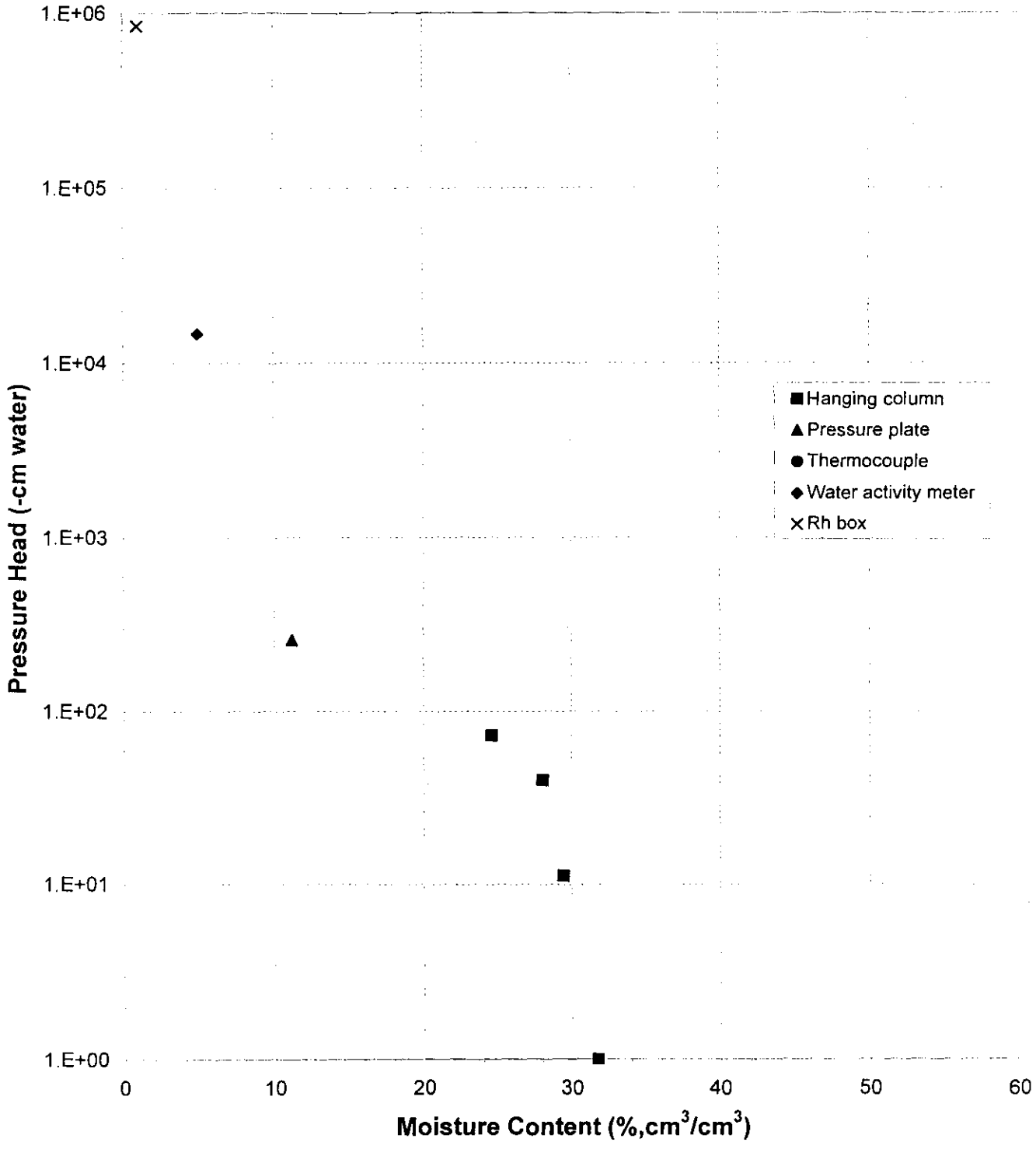
Comments:

* Weight including tares
† Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

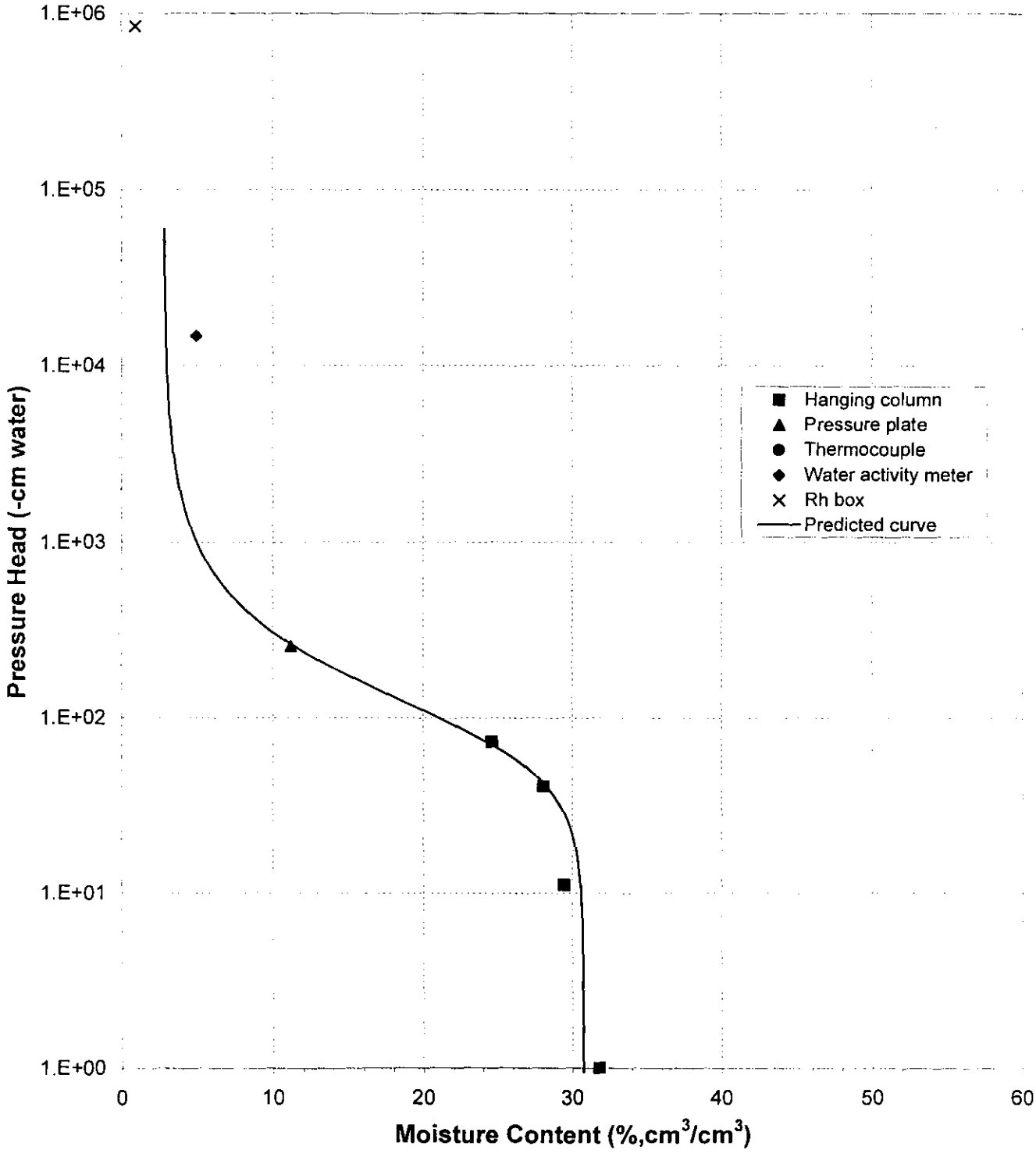
Water Retention Data Points

Sample Number: B18DF6



Predicted Water Retention Curve and Data Points

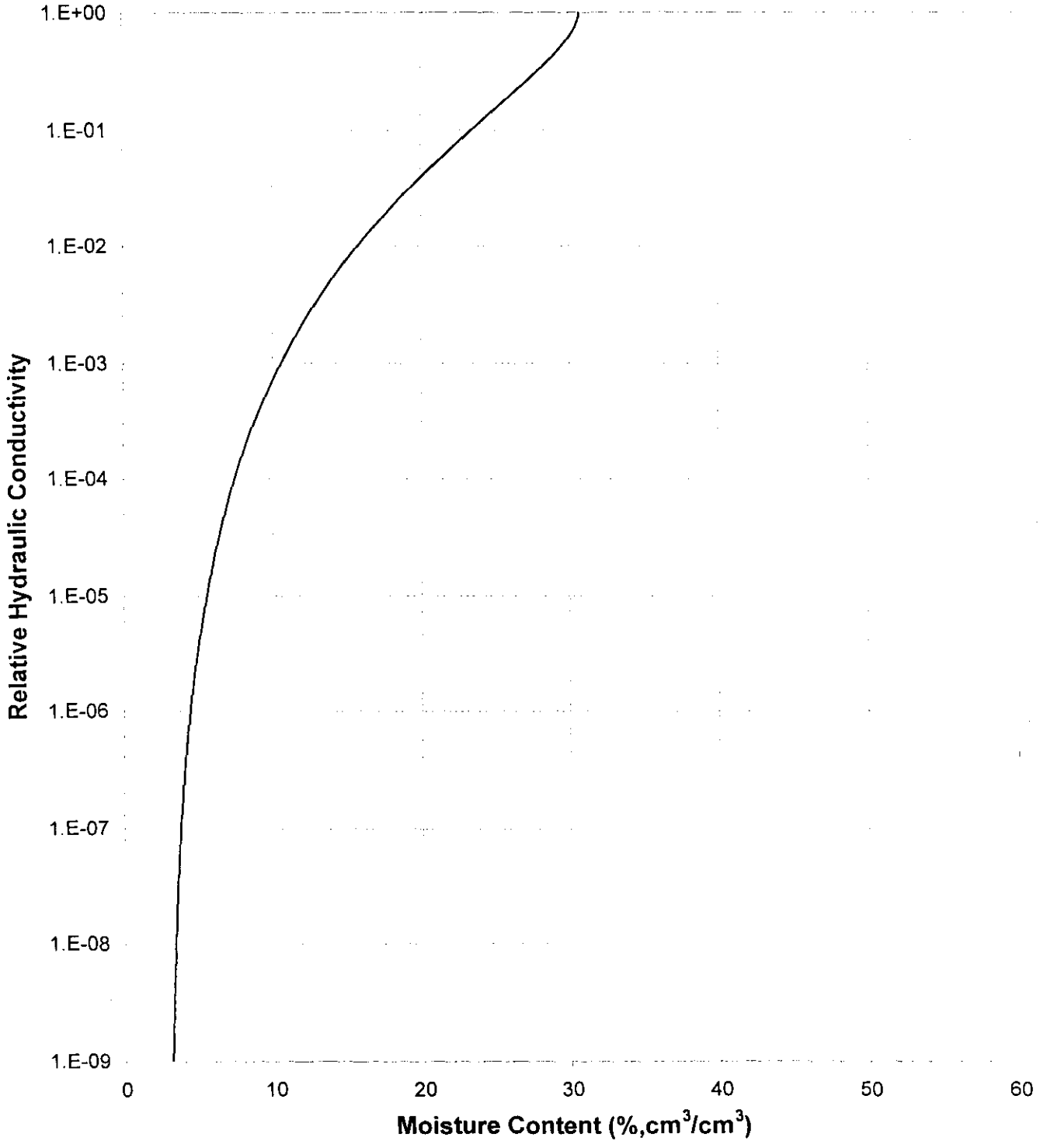
Sample Number: B18DF6



Daniel B. Stephens & Associates, Inc.

Plot of Relative Hydraulic Conductivity vs Moisture Content

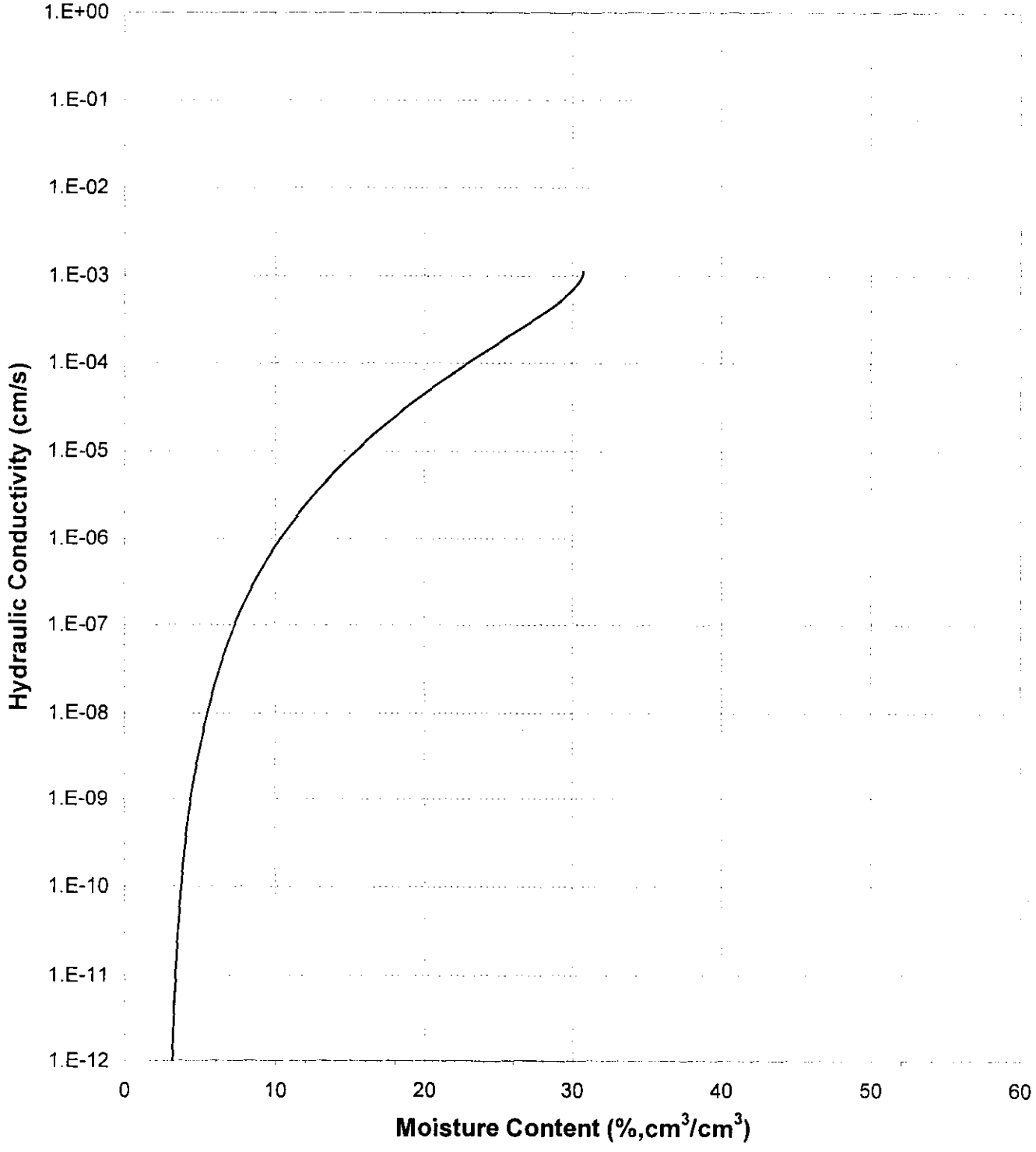
Sample Number: B18DF6



Daniel B. Stephens & Associates, Inc.

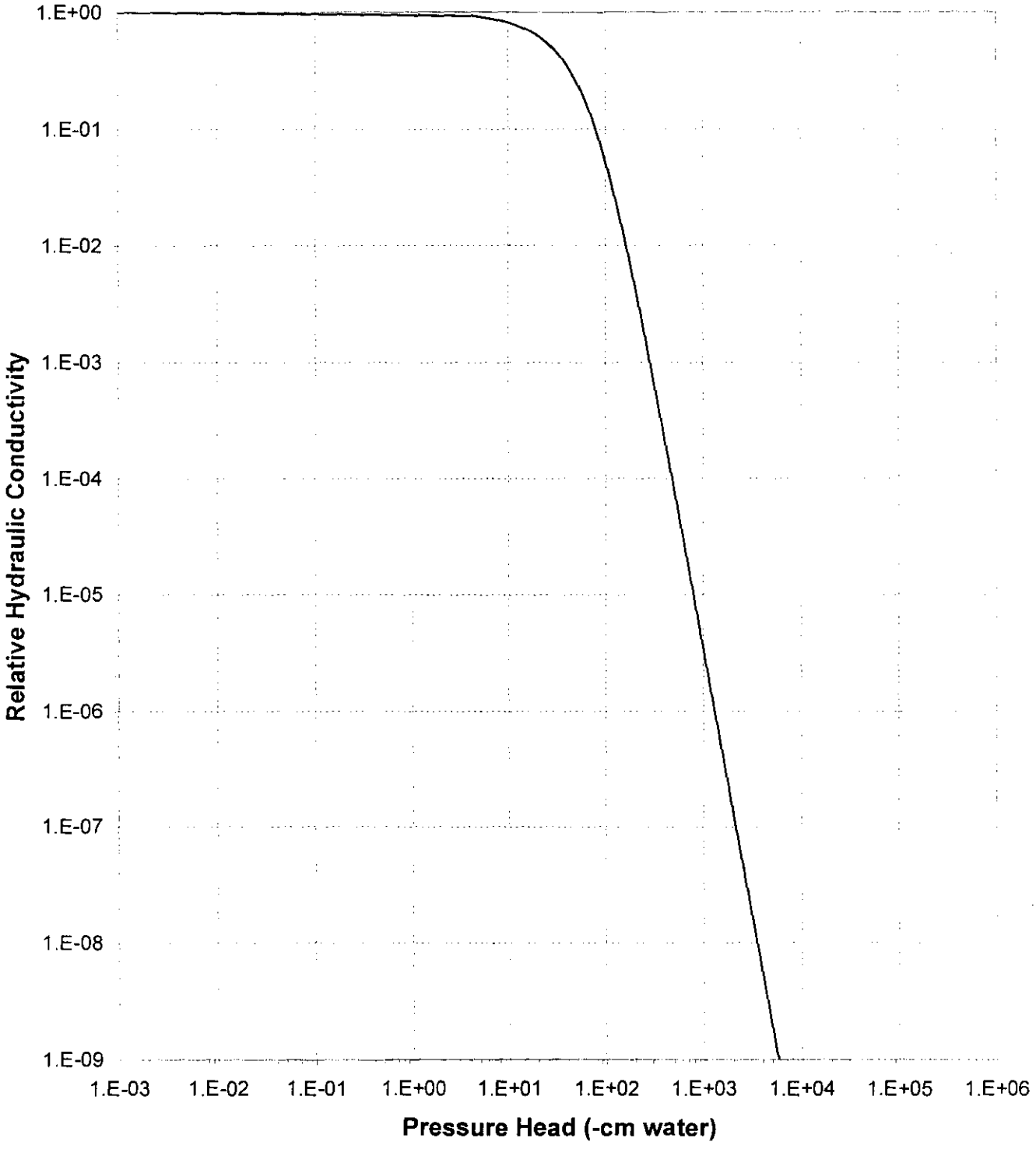
Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: B18DF6



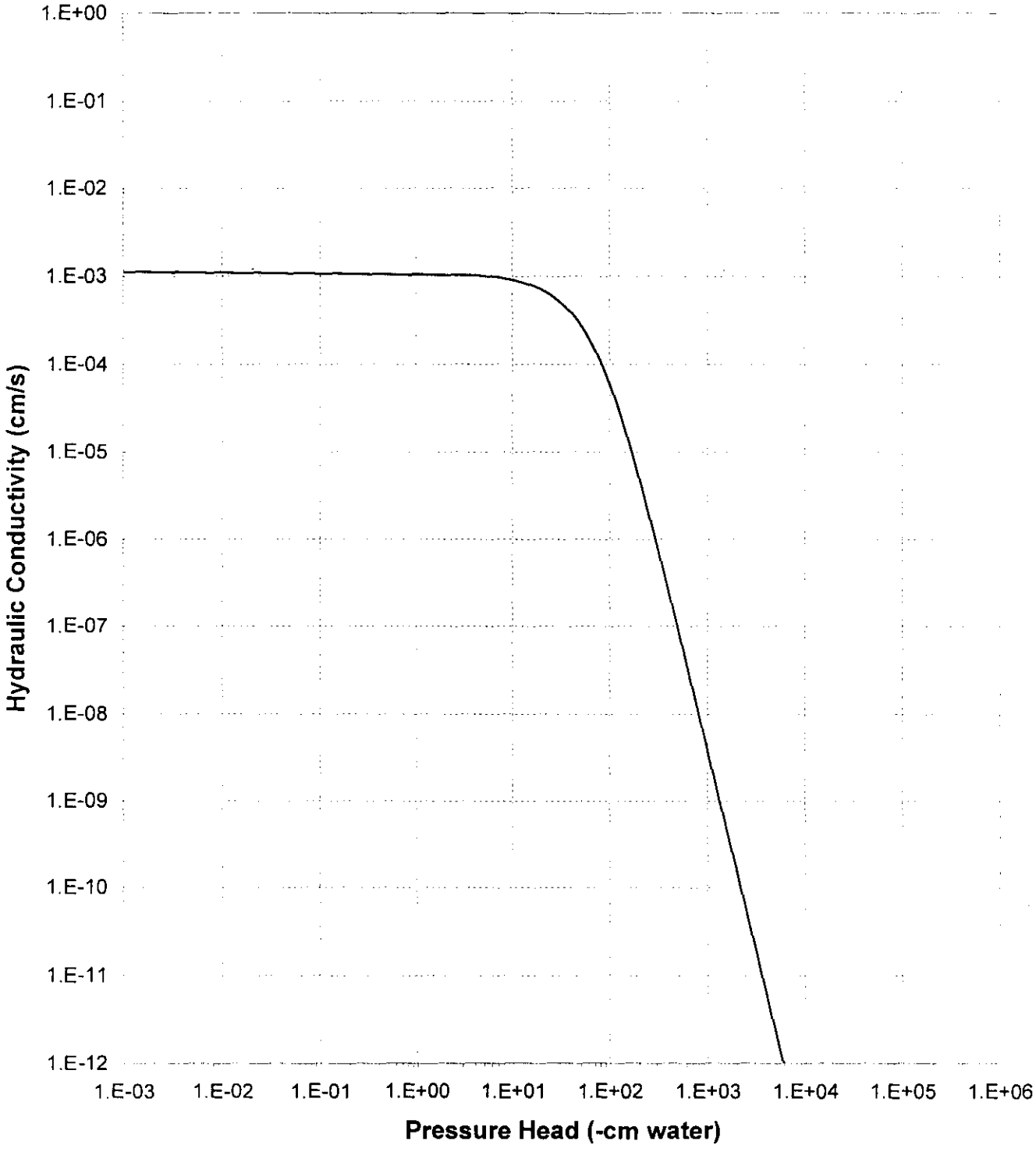
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: B18DF6



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: B18DF6



Daniel B. Stephens & Associates, Inc.

Moisture Retention Data

Hanging Column/Pressure Plate/Thermocouple

(Main Drainage Curve)

Job Name:	Fluor Hanford	*Dry wt. of sample* (g):	101.79
Job Number:	LB04.0220.00	*Tare wt., screen & clamp* (g):	23.32
Sample Number:	B18DF9	*Tare wt., ring* (g):	41.19
Ring Number:	NA	*Tare wt., epoxy* (g):	0.00
Depth:	NA	*Sample volume* (cm^3):	68.41

Saturated weight at 0 cm tension* (g): 197.83
Volume of water[T] in saturated sample (cm^3): 31.53
Saturated moisture content (% vol): 46.09
Sample bulk density (g/cm^3): 1.49

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content[T] (% vol)
Hanging column:	26-Nov-04 / 15:10	197.83	0.00	46.09
	29-Nov-04 / 11:55	196.38	29.00	43.97
	30-Jan-04 / 13:05	195.09	128.80	42.08
Pressure plate:	06-Dec-04 / 14:30	191.34	509.90	36.60

Comments:

* Weight including tares
[T] Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: M. Devine
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Moisture Retention Data

Water Activity Meter/Relative Humidity Box

(Main Drainage Curve)

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF9
Ring Number: NA
Depth: NA

Dry weight of water activity meter sample* (g): 135.75
Tare weight, jar (g): 113.30
Sample bulk density (g/cm^3): 1.49

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Water Activity Meter:	13-Dec-04 / 11:20	137.63	7036.6	12.46
	10-Dec-04 / 16:10	137.16	17234.6	9.35

Dry weight of relative humidity box sample* (g): 63.84
Tare weight (g): 37.74
Sample bulk density (g/cm^3): 1.49

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Relative humidity box:	07-Dec-04 / 09:00	64.66	851293	4.67

Comments:

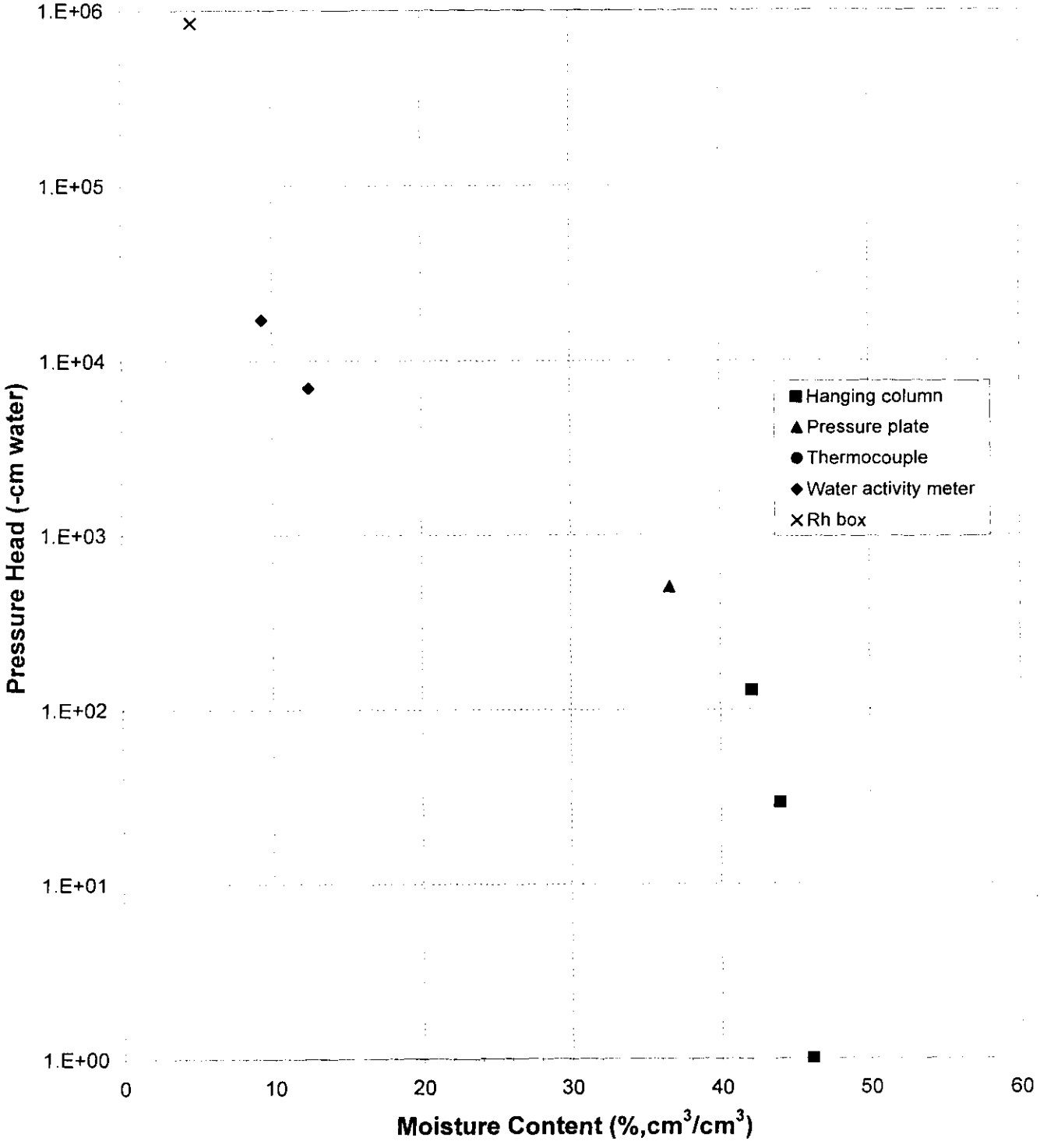
* Weight including tares
† Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: M. Devine/D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Water Retention Data Points

Sample Number: B18DF9



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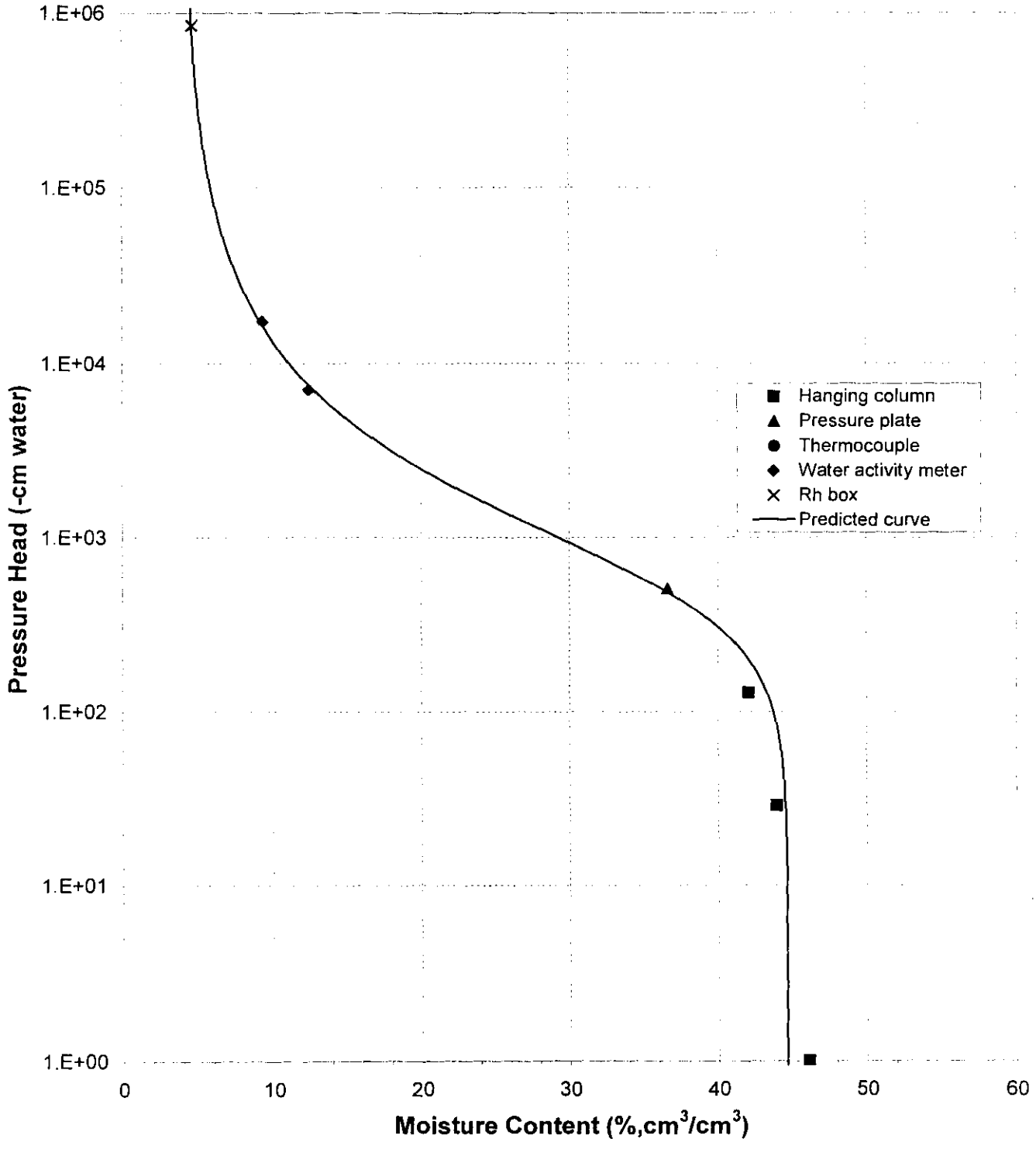
Predicted Water Retention Curve and Data Points

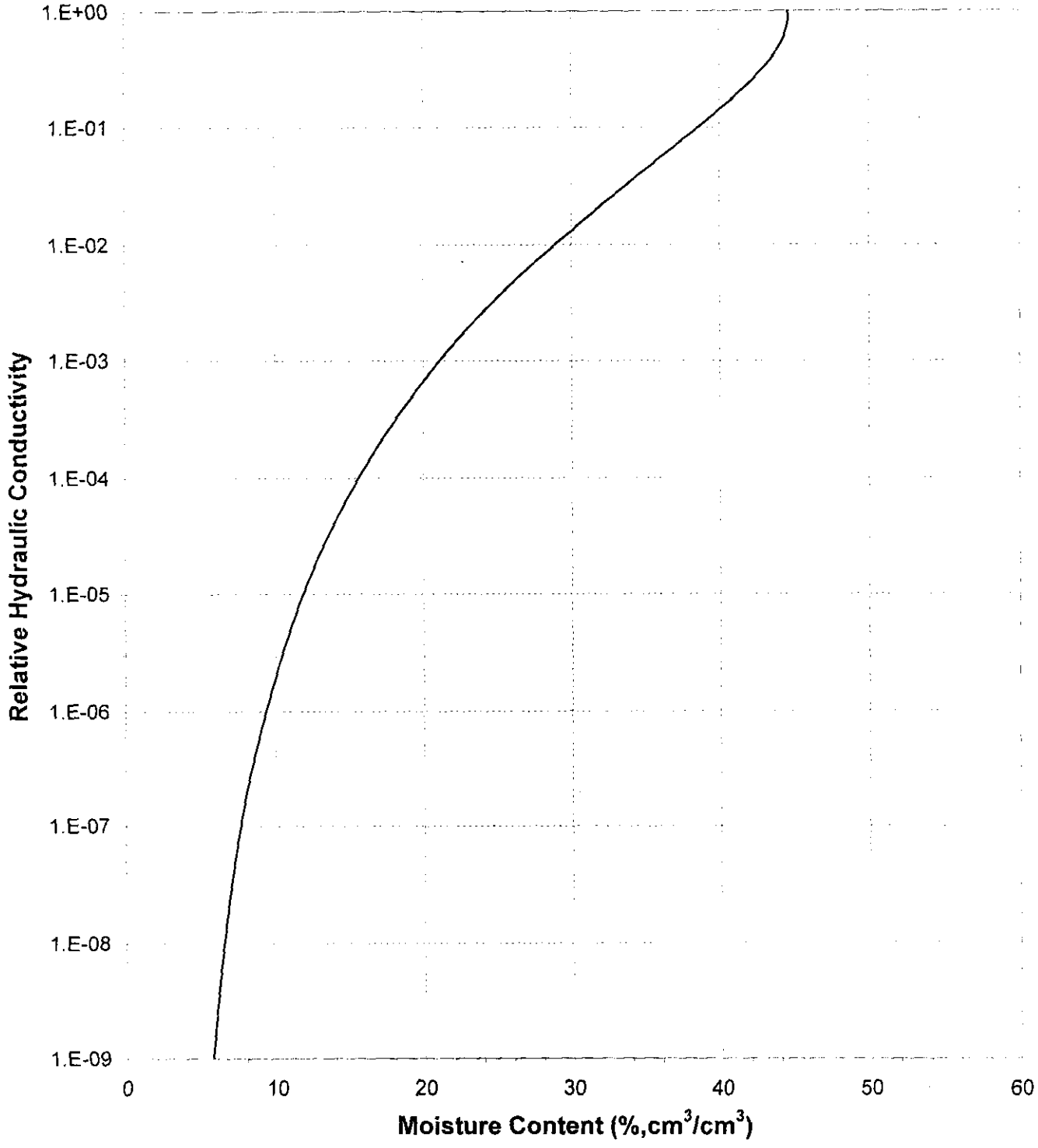
Sample Number: B18DF9



Daniel B. Stephens & Associates, Inc.

Plot of Relative Hydraulic Conductivity vs Moisture Content

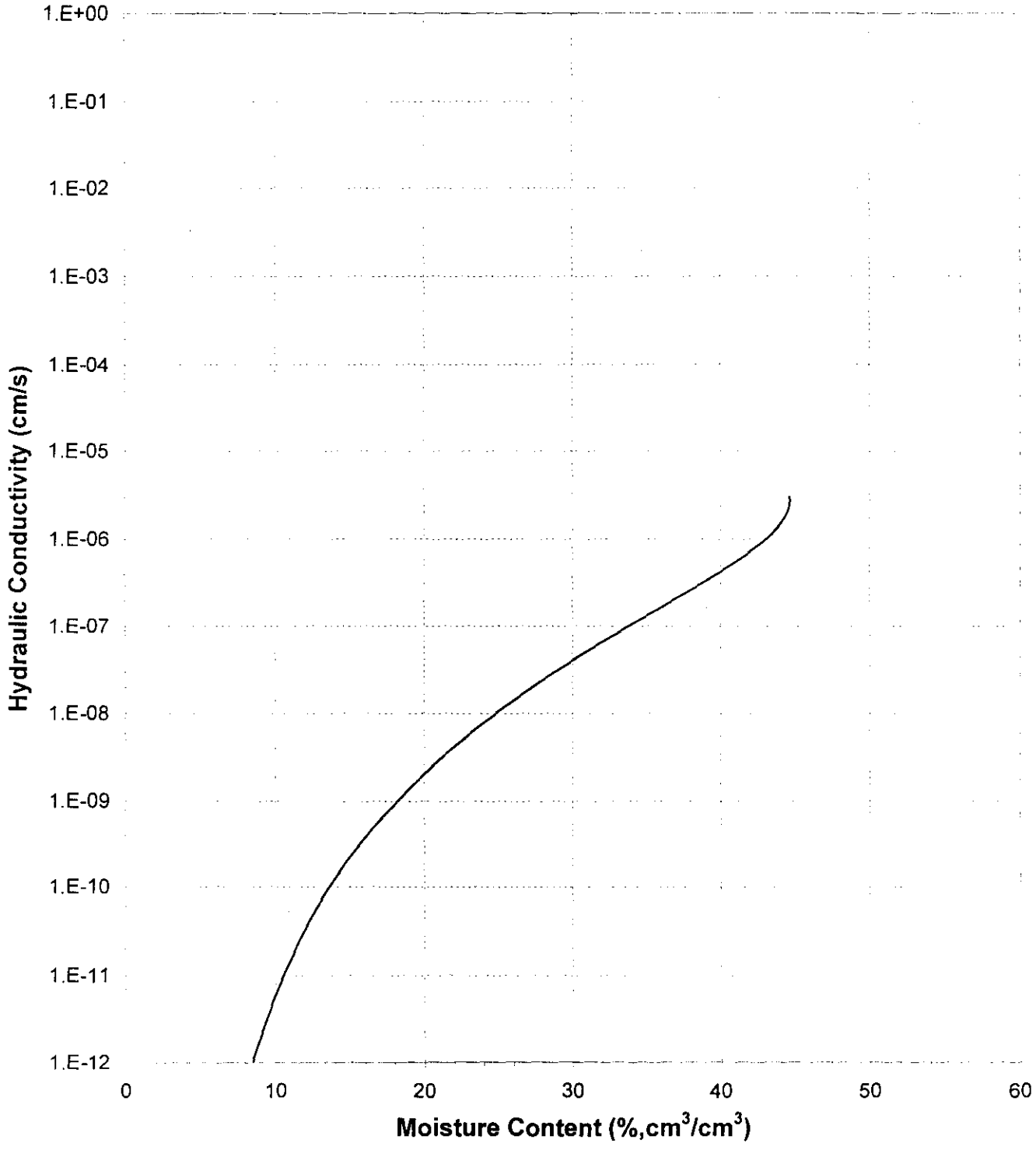
Sample Number: B18DF9



Daniel B. Stephens & Associates, Inc.

Plot of Hydraulic Conductivity vs Moisture Content

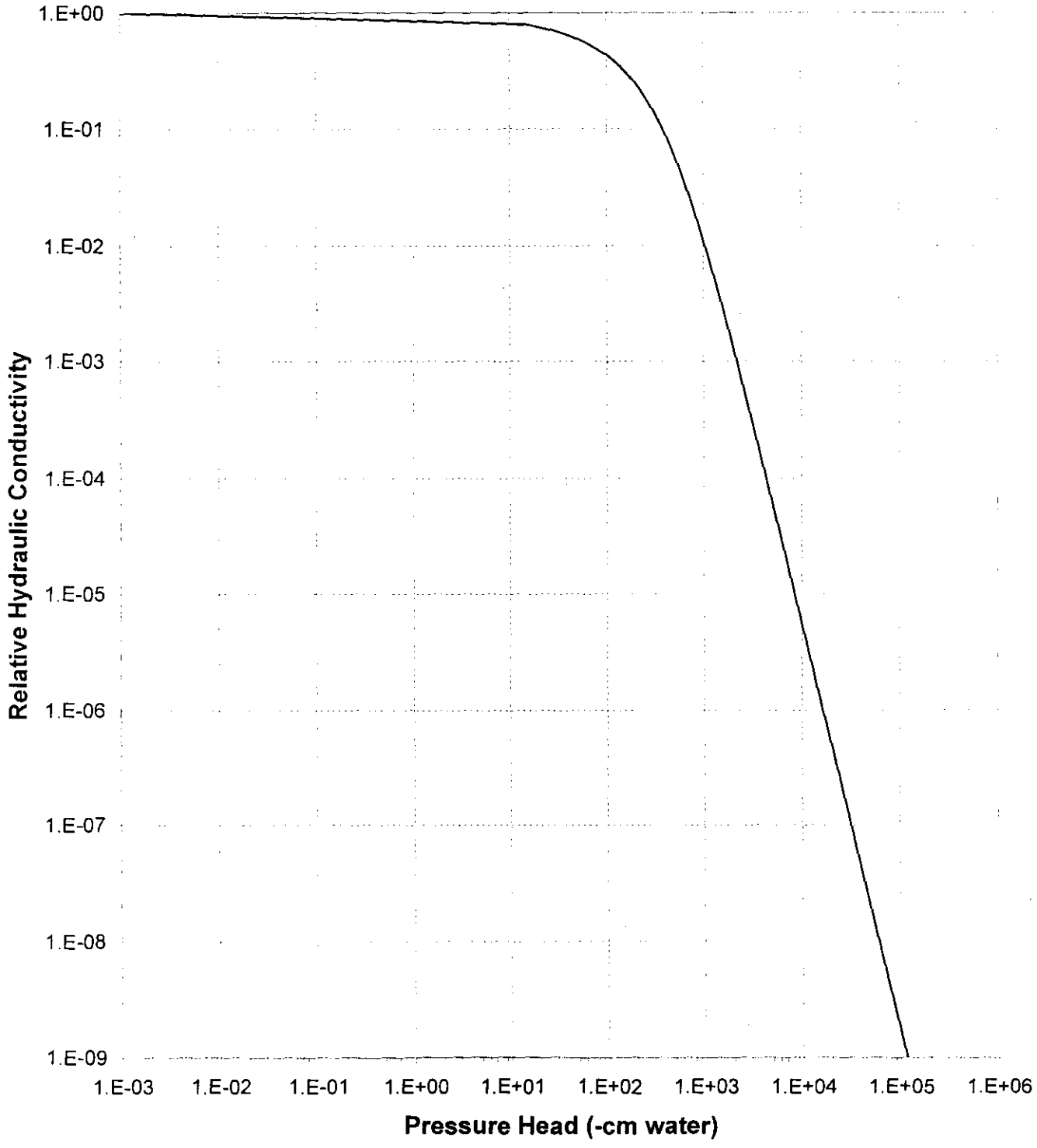
Sample Number: B18DF9



Daniel B. Stephens & Associates, Inc.

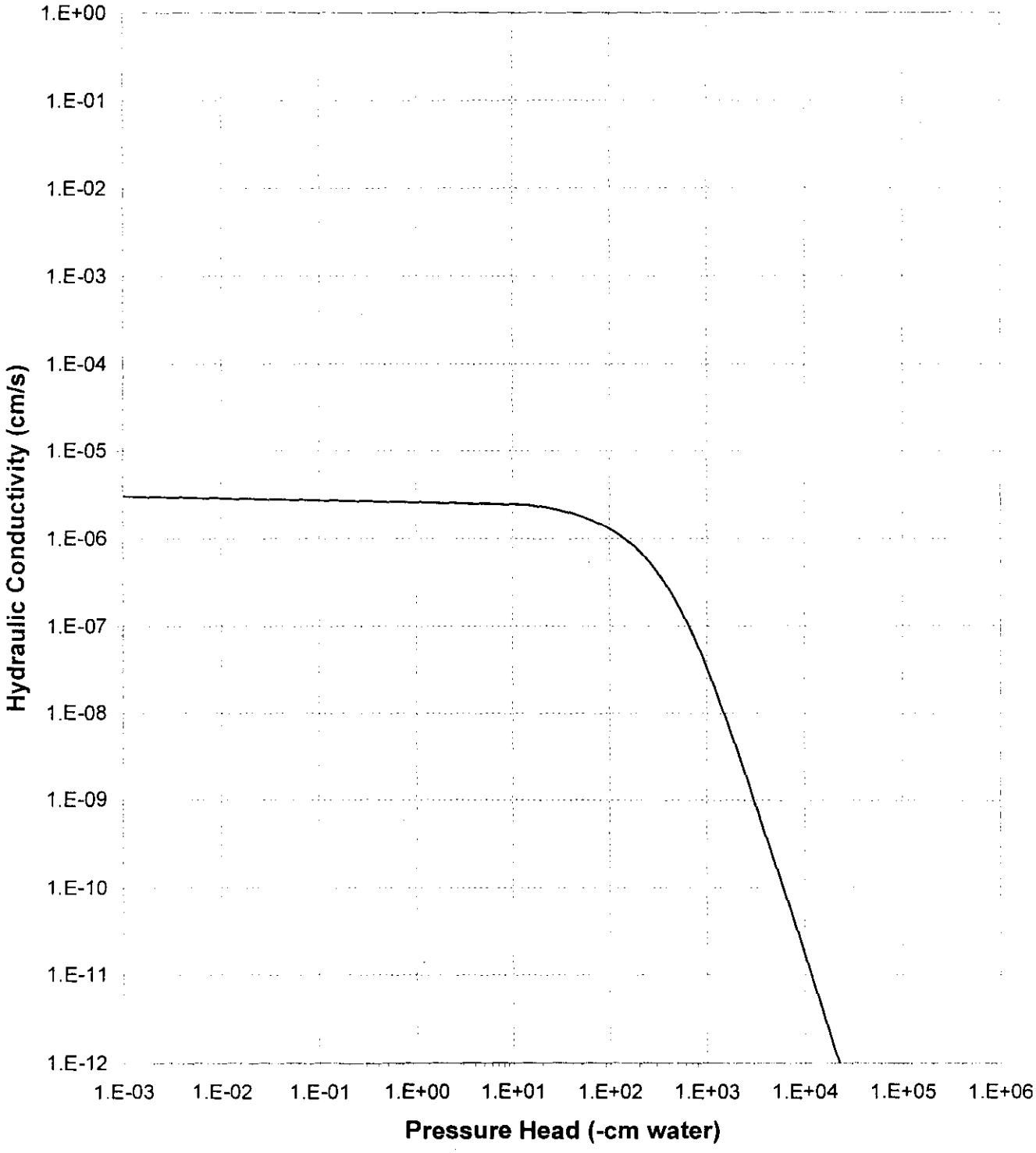
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: B18DF9



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: B18DF9



Daniel B. Stephens & Associates, Inc.

Moisture Retention Data

Hanging Column/Pressure Plate/Thermocouple

(Main Drainage Curve)

Job Name:	Fluor Hanford	*Dry wt. of sample* (g):	105.43
Job Number:	LB04.0220.00	*Tare wt., screen & clamp* (g):	25.47
Sample Number:	B18DD5	*Tare wt., ring* (g):	42.64
Ring Number:	NA	*Tare wt., epoxy* (g):	0.00
Depth:	NA	*Sample volume* (cm^3):	70.52

Saturated weight at 0 cm tension* (g): 204.14
Volume of water[T] in saturated sample (cm^3): 30.60
Saturated moisture content (% vol): 43.39
Sample bulk density (g/cm^3): 1.49

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content[T] (% vol)
Hanging column:	26-Nov-04 / 11:00	204.14	0.00	43.39
	29-Nov-04 / 12:15	203.87	28.30	43.01
	08-Dec-04 / 14:40	202.73	128.20	41.39
Pressure plate:	15-Dec-04 / 09:40	192.84	509.90	27.37

Comments:

* Weight including tares
[T] Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: M. Devine
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Moisture Retention Data

Water Activity Meter/Relative Humidity Box

(Main Drainage Curve)

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DD5
Ring Number: NA
Depth: NA

Dry weight of water activity meter sample* (g): 135.81
Tare weight, jar (g): 113.37
Sample bulk density (g/cm^3): 1.49

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Water Activity Meter:	06-Dec-04 / 09:10	137.33	7138.6	10.13
	06-Dec-04 / 13:00	136.86	14787.1	7.00

Dry weight of relative humidity box sample* (g): 68.34
Tare weight (g): 42.29
Sample bulk density (g/cm^3): 1.49

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Relative humidity box:	07-Dec-04 / 09:00	68.74	851293	2.34

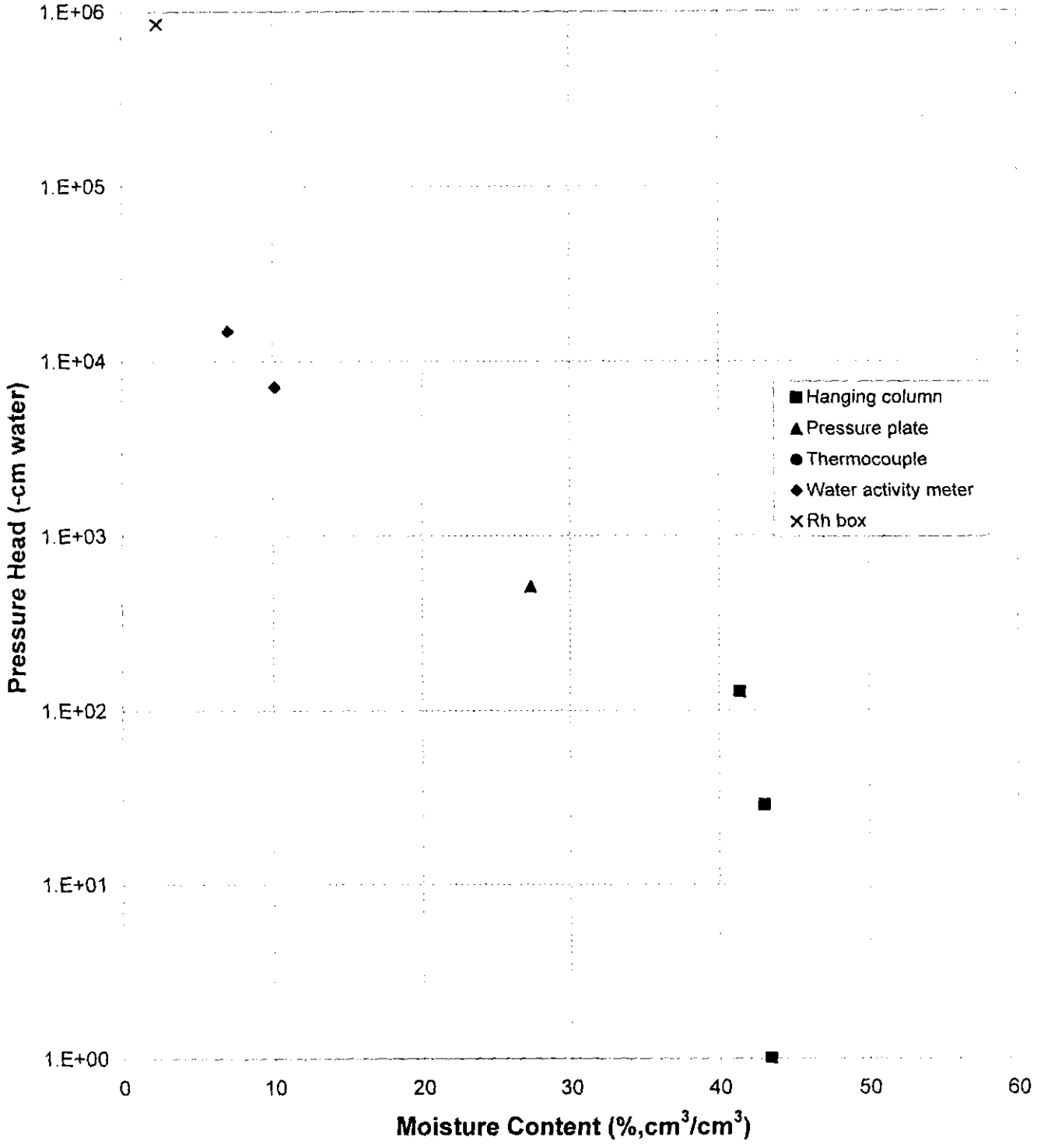
Comments:

* Weight including tares
† Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

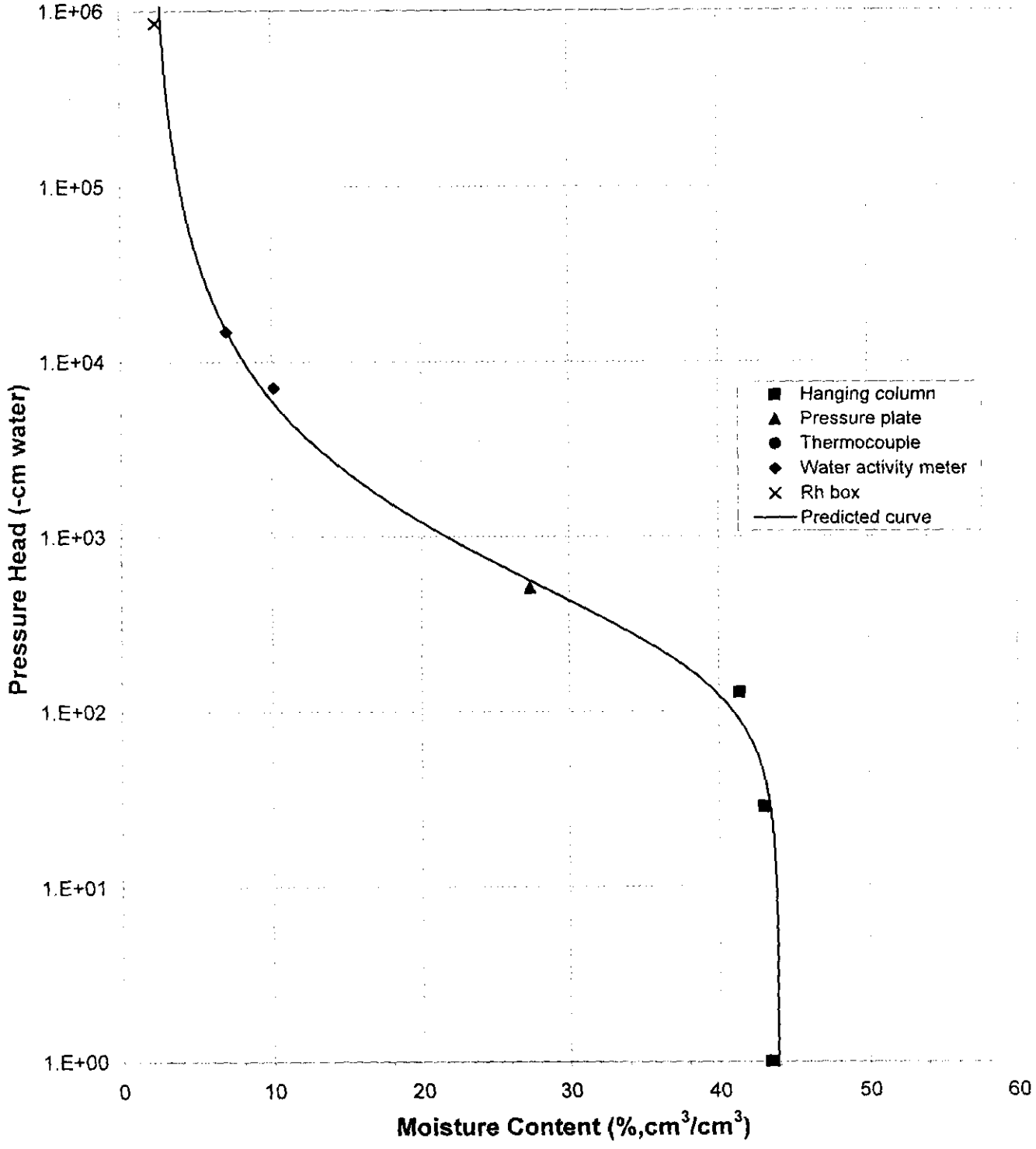
Water Retention Data Points

Sample Number: B18DD5



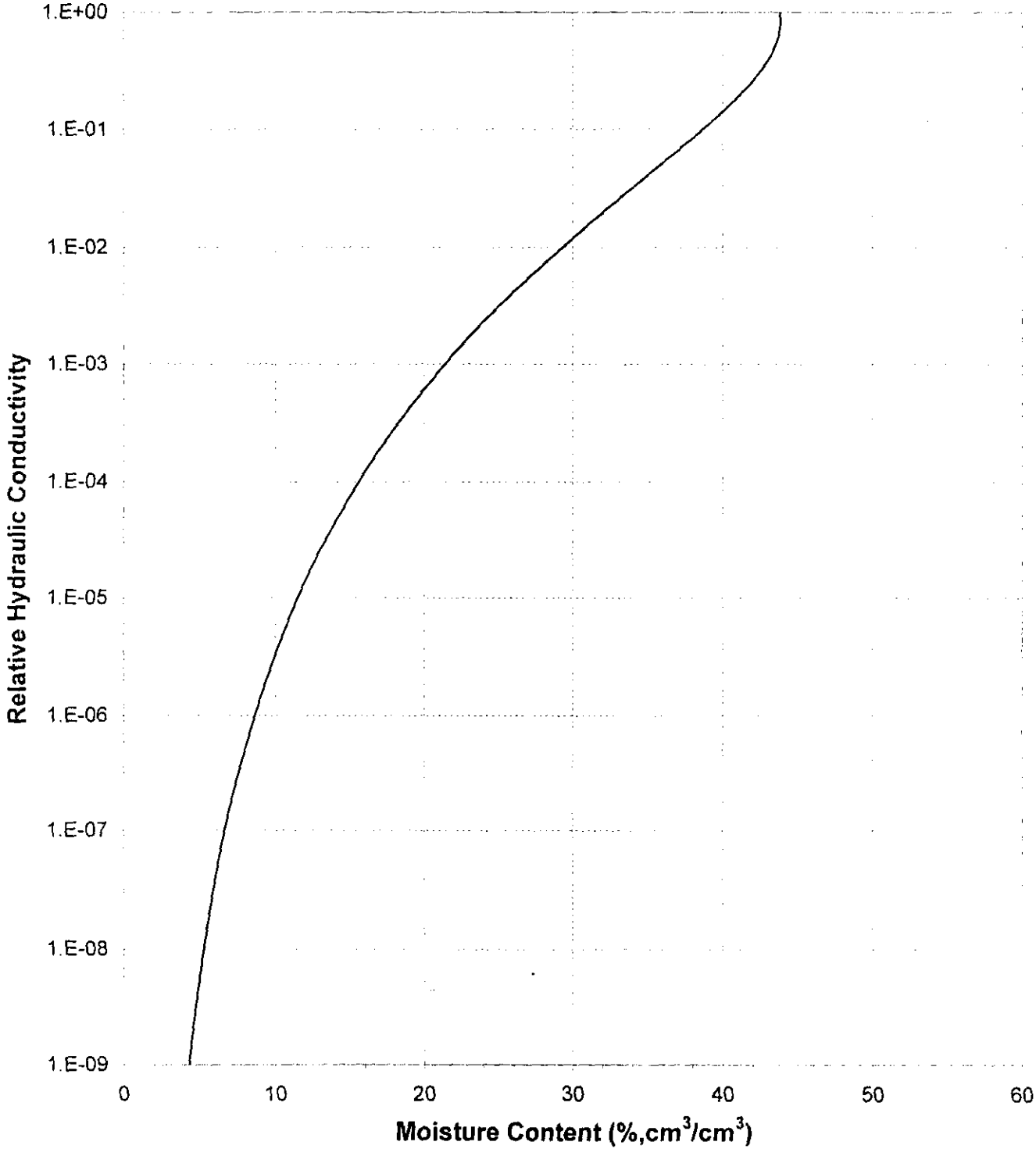
Predicted Water Retention Curve and Data Points

Sample Number: B18DD5



Plot of Relative Hydraulic Conductivity vs Moisture Content

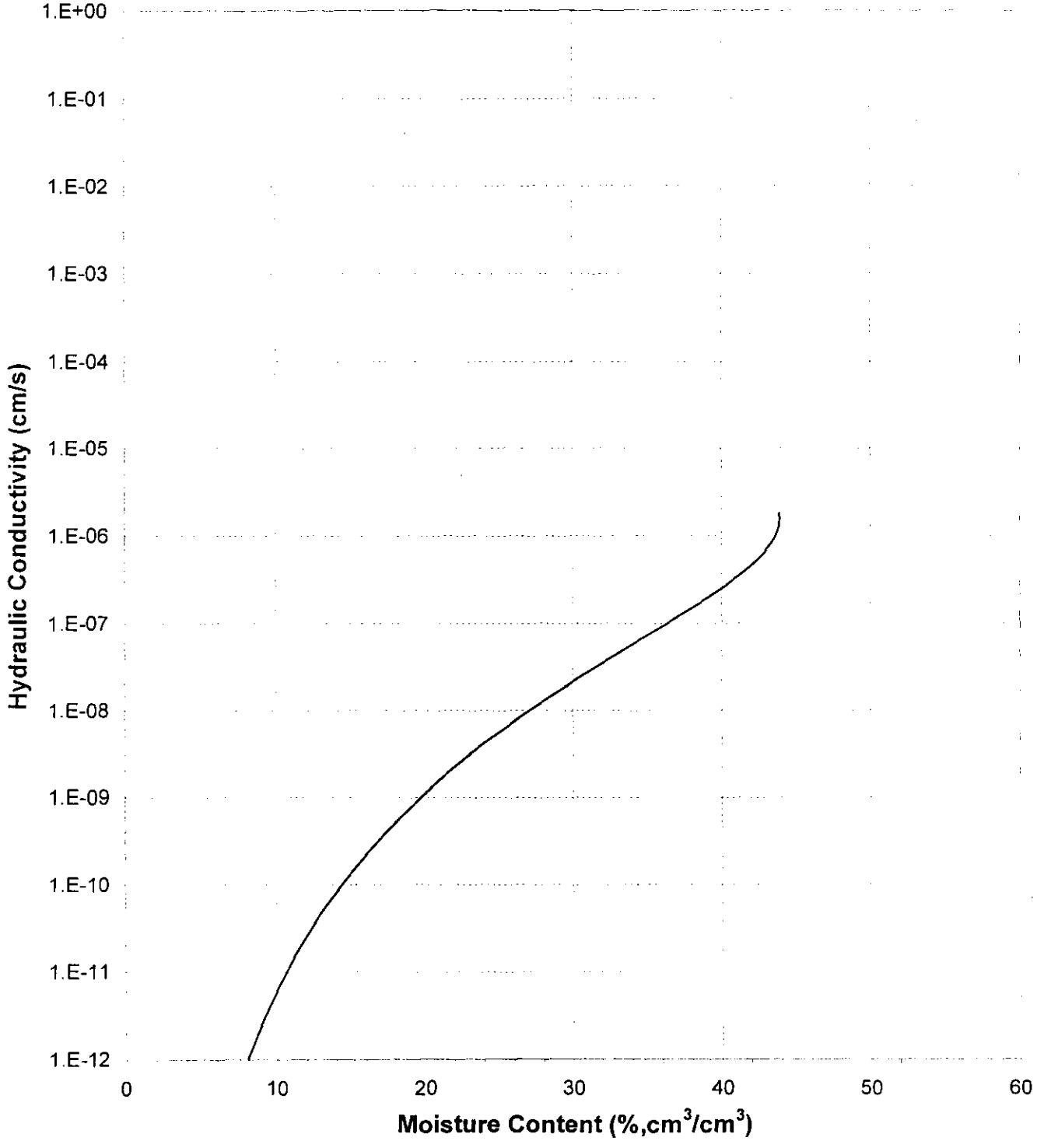
Sample Number: B18DD5



Daniel B. Stephens & Associates, Inc.

Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: B18DD5



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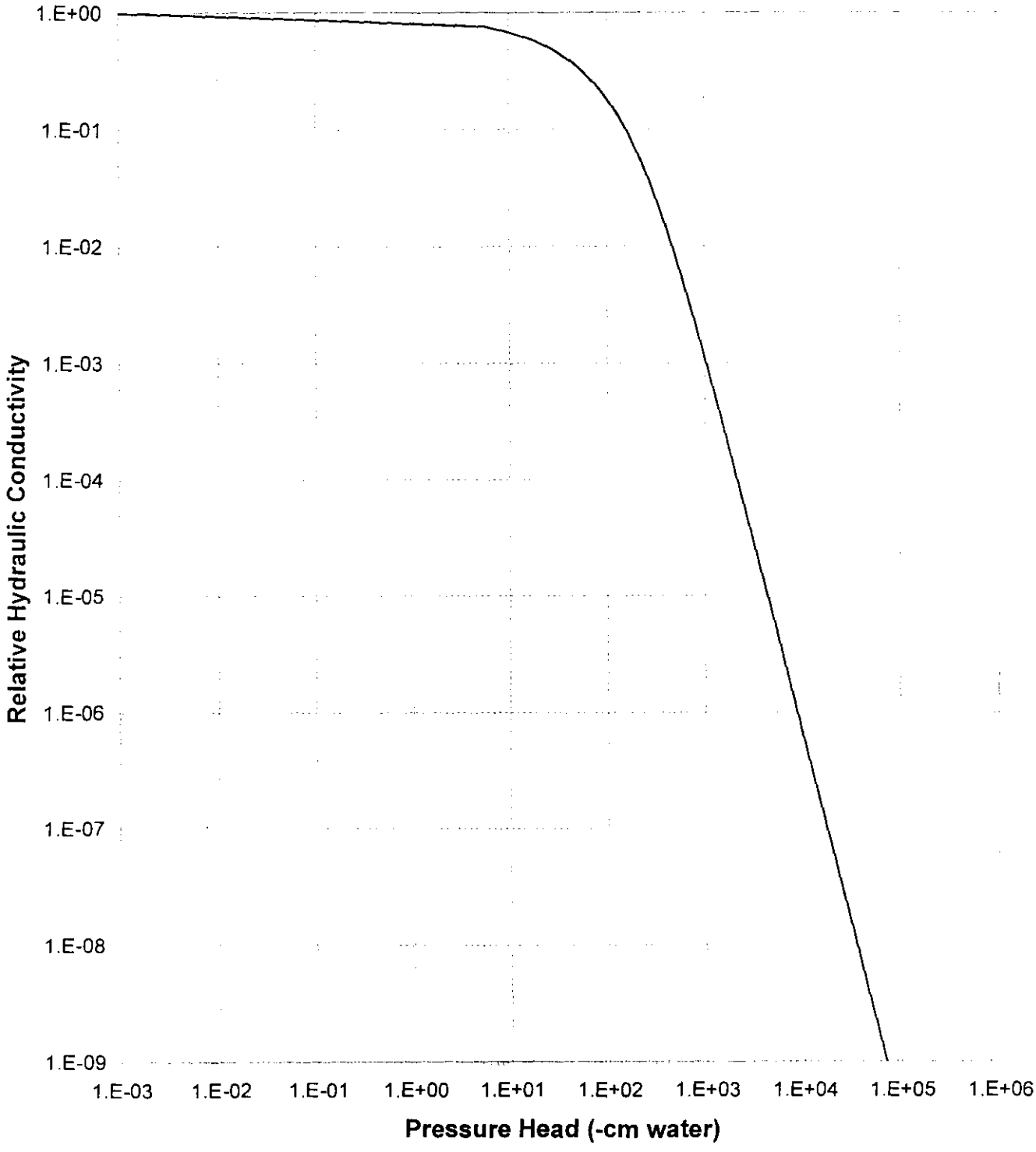
Daniel B. Stephens & Associates, Inc.

Plot of Relative Hydraulic Conductivity vs Pressure Head

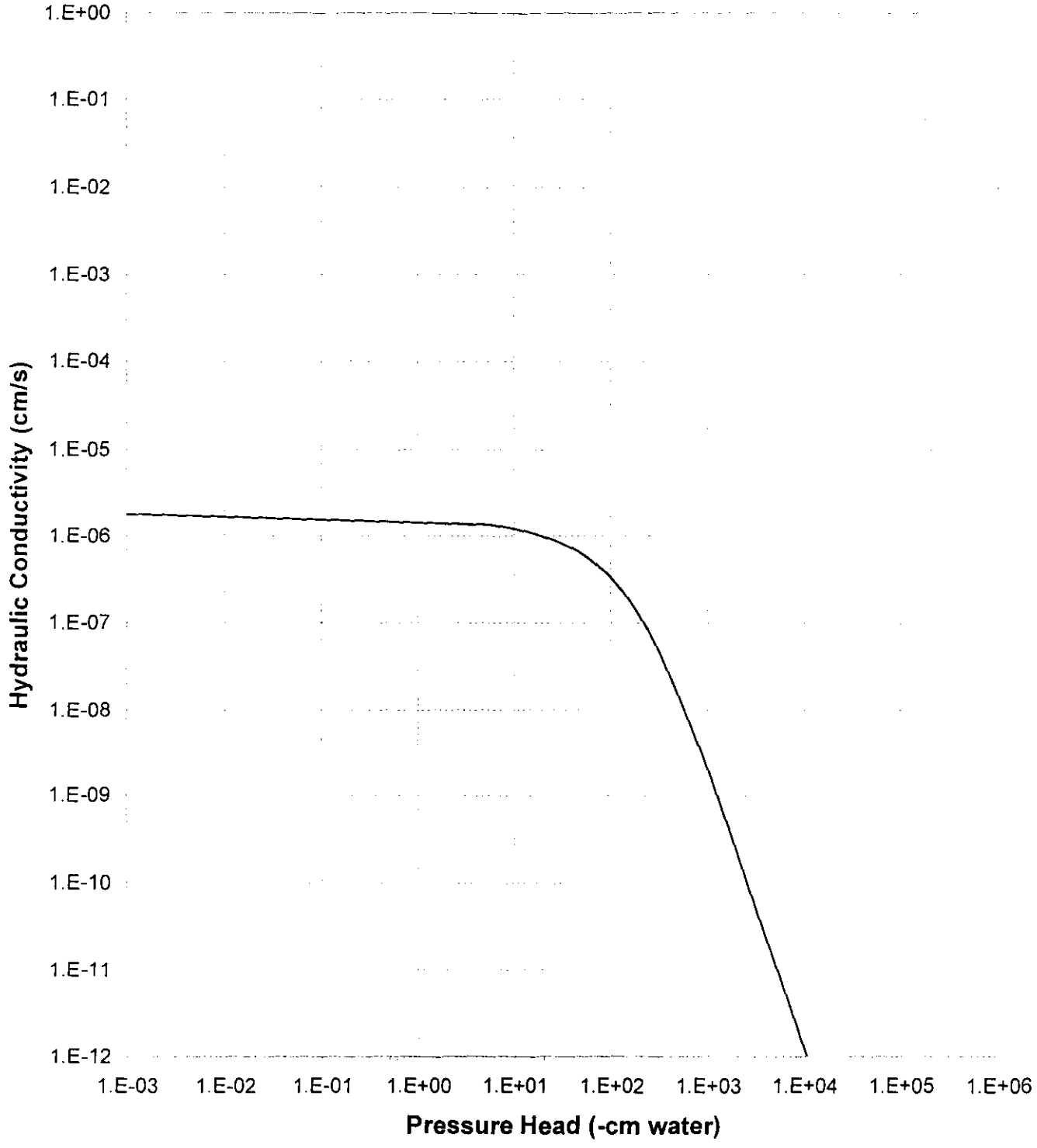
Sample Number: B18DD5



Daniel B. Stephens & Associates, Inc.

Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: B18DD5



Daniel B. Stephens & Associates, Inc.

Moisture Retention Data

Hanging Column/Pressure Plate/Thermocouple

(Main Drainage Curve)

Job Name:	Fluor Hanford	*Dry wt. of sample* (g):	111.88
Job Number:	LB04.0220.00	*Tare wt., screen & clamp* (g):	23.29
Sample Number:	B18DD6	*Tare wt., ring* (g):	45.29
Ring Number:	NA	*Tare wt., epoxy* (g):	0.00
Depth:	NA	*Sample volume* (cm^3):	75.16

Saturated weight at 0 cm tension* (g): 213.47
Volume of water[T] in saturated sample (cm^3): 33.01
Saturated moisture content (% vol): 43.92
Sample bulk density (g/cm^3): 1.49

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content[T] (% vol)
Hanging column:	19-Nov-04 / 15:30	213.47	0.00	43.92
	22-Nov-04 / 14:45	211.51	22.20	41.31
	26-Nov-04 / 09:05	210.64	53.70	40.16
	30-Nov-04 / 13:15	208.95	153.60	37.91
Pressure plate:	06-Dec-04 / 14:30	197.28	509.90	22.38

Comments:

* Weight including tares
[T] Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: M. Devine
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Moisture Retention Data

Water Activity Meter/Relative Humidity Box

(Main Drainage Curve)

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DD6
Ring Number: NA
Depth: NA

Dry weight of water activity meter sample* (g): 146.17
Tare weight, jar (g): 113.83
Sample bulk density (g/cm^3): 1.49

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Water Activity Meter:	13-Dec-04 / 15:50	148.55	4589.1	10.96

Dry weight of relative humidity box sample* (g): 60.43
Tare weight (g): 42.91
Sample bulk density (g/cm^3): 1.49

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Relative humidity box:	07-Dec-04 / 09:00	60.72	851293	2.47

Comments:

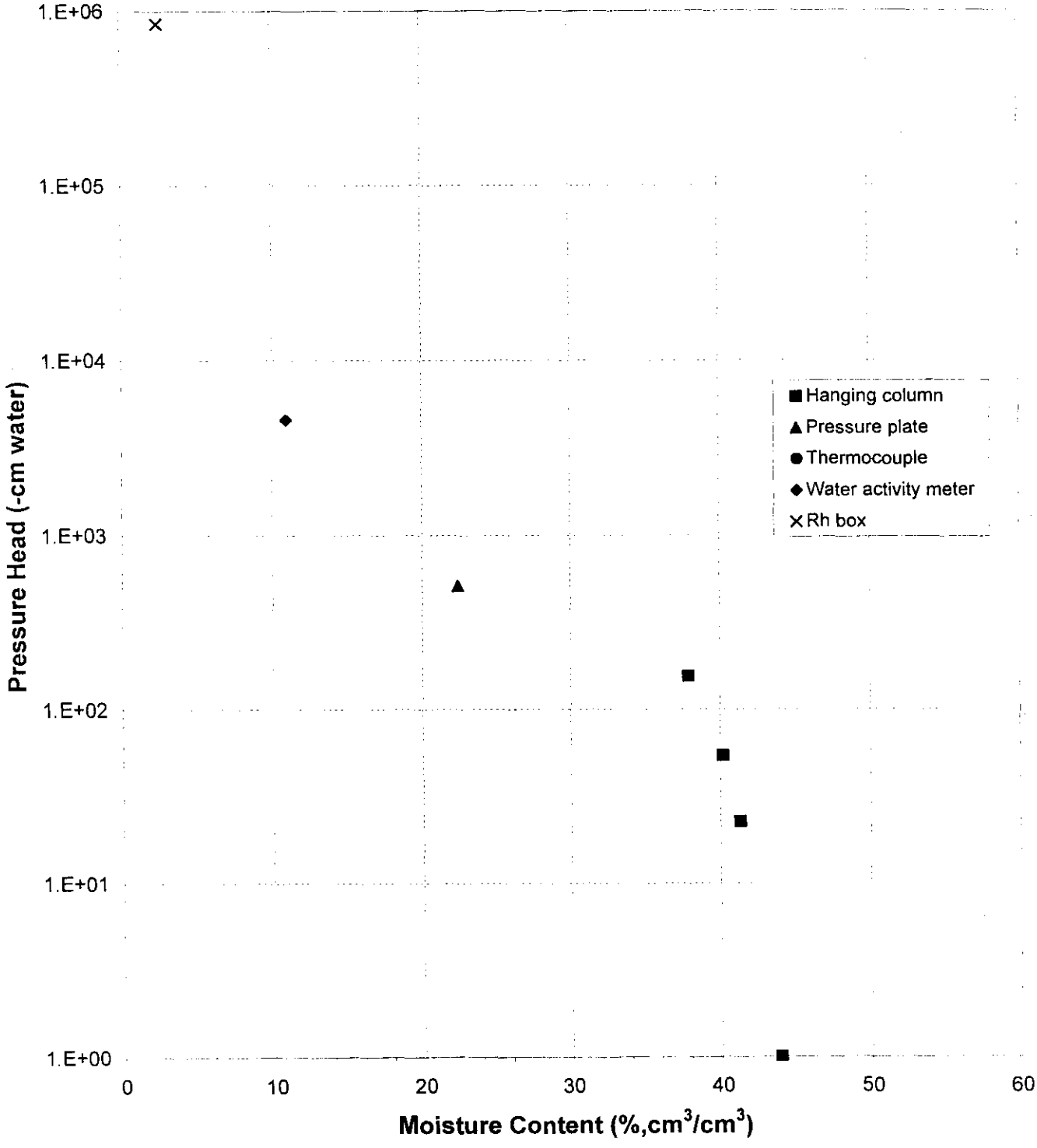
* Weight including tares
† Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: M. Devine/D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Water Retention Data Points

Sample Number: B18DD6



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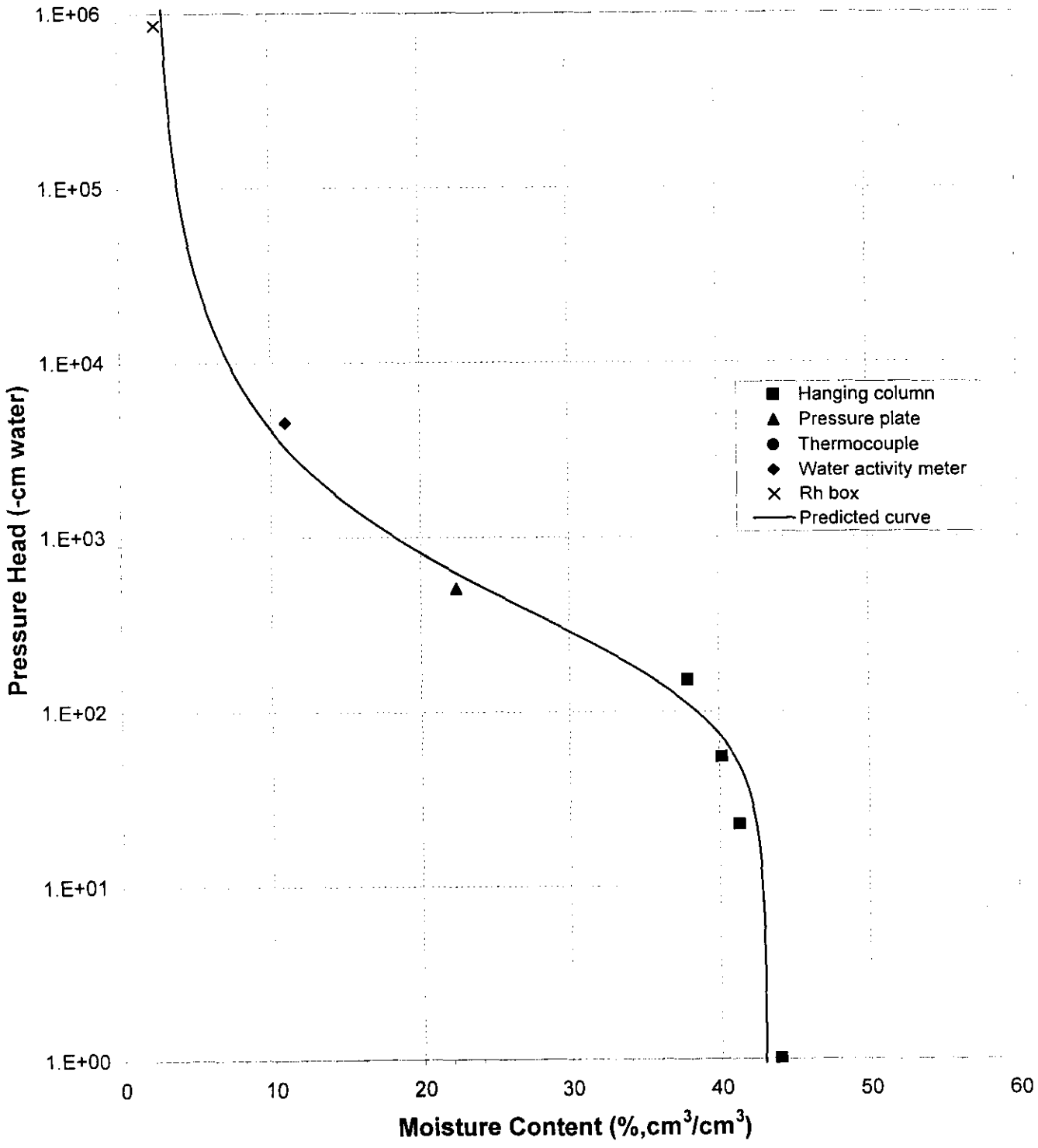
Predicted Water Retention Curve and Data Points

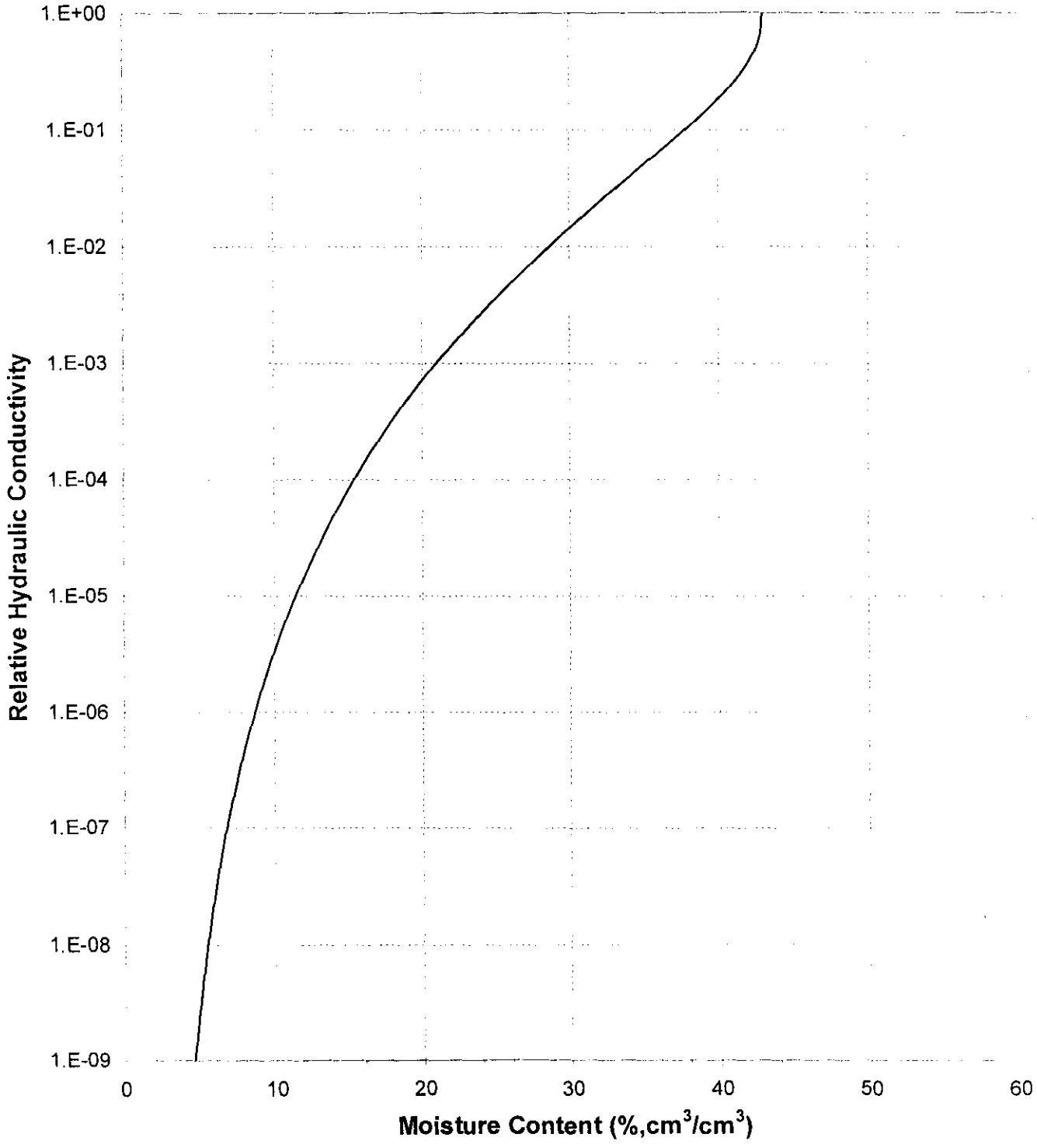
Sample Number: B18DD6



Daniel B. Stephens & Associates, Inc.

Plot of Relative Hydraulic Conductivity vs Moisture Content

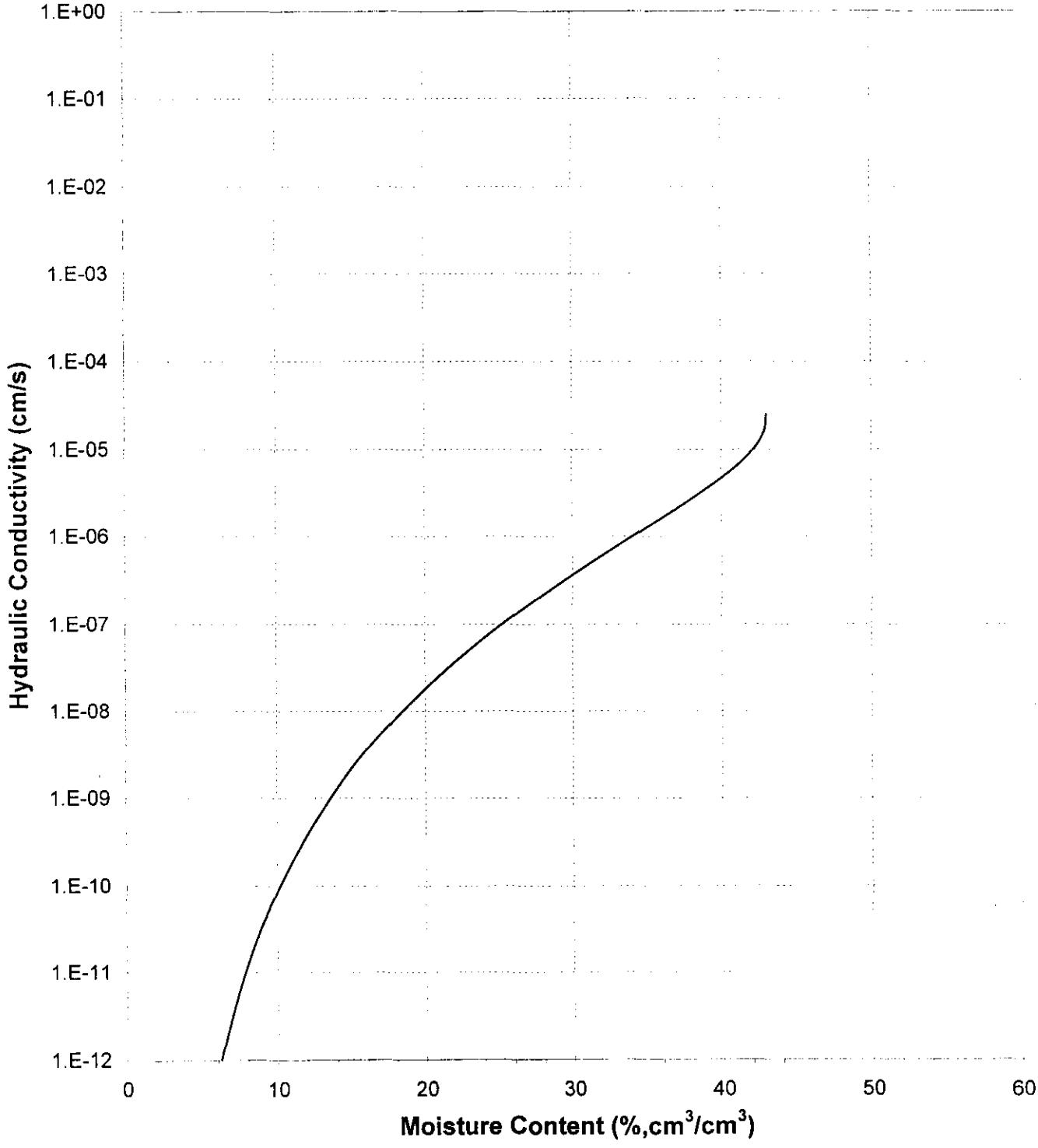
Sample Number: B18DD6



Daniel B. Stephens & Associates, Inc.

Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: B18DD6



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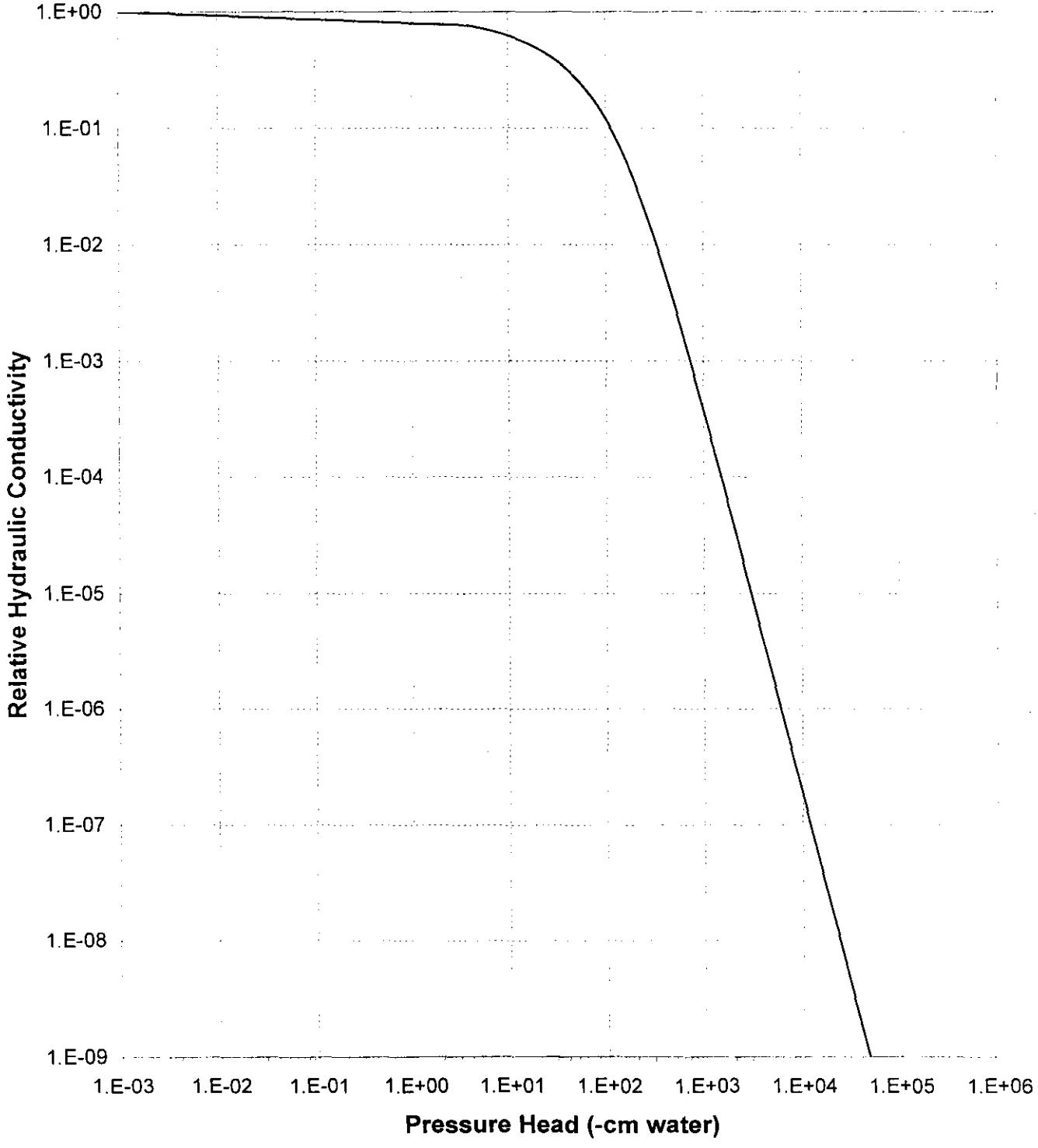
Daniel B. Stephens & Associates, Inc.

Plot of Relative Hydraulic Conductivity vs Pressure Head

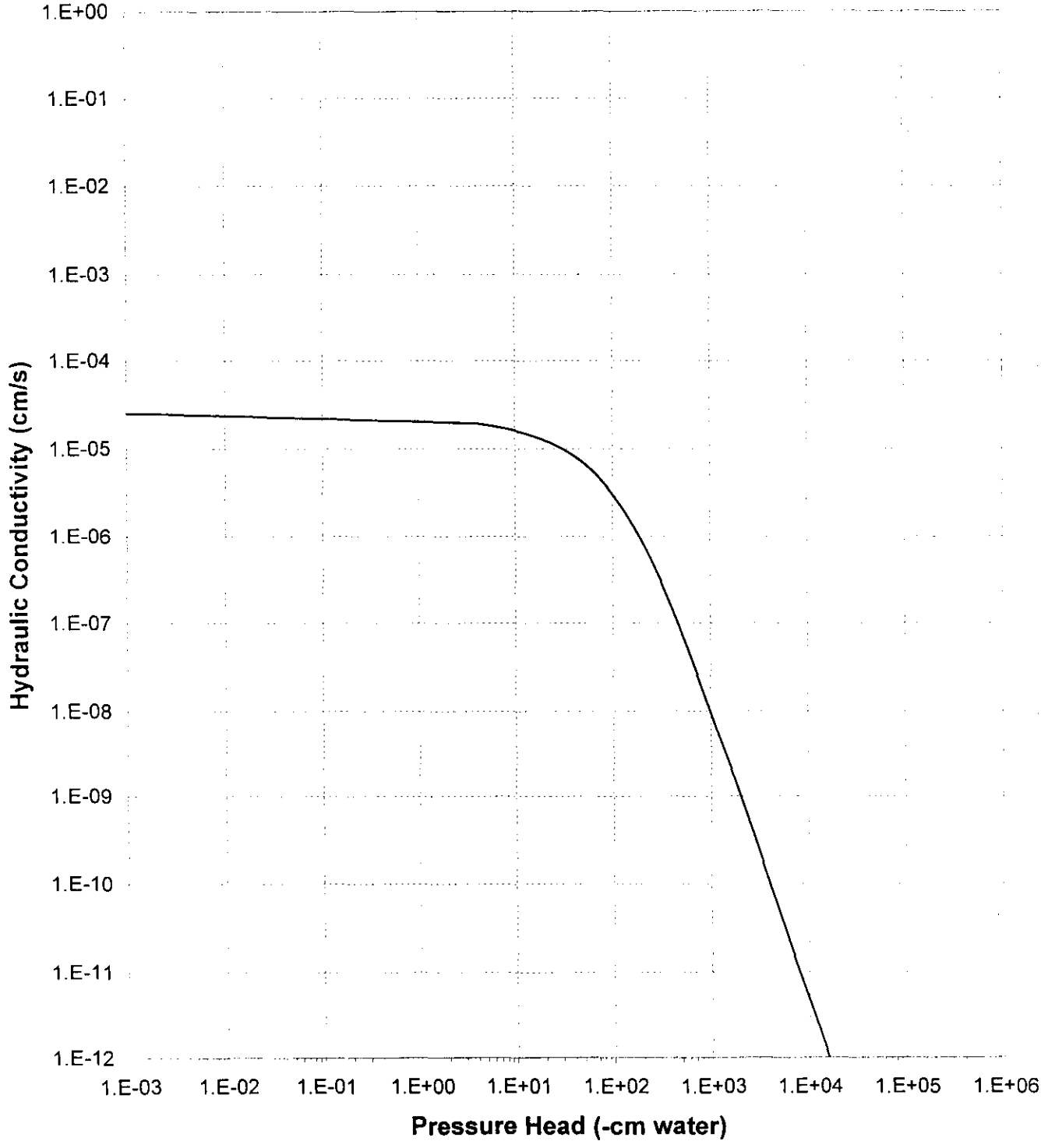
Sample Number: B18DD6



Daniel B. Stephens & Associates, Inc.

Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: B18DD6



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Moisture Retention Data

Hanging Column/Pressure Plate/Thermocouple

(Main Drainage Curve)

Job Name:	Fluor Hanford	*Dry wt. of sample* (g):	106.86
Job Number:	LB04.0220.00	*Tare wt., screen & clamp* (g):	25.10
Sample Number:	B18DF2	*Tare wt., ring* (g):	43.71
Ring Number:	NA	*Tare wt., epoxy* (g):	0.00
Depth:	NA	*Sample volume* (cm^3):	72.33

Saturated weight at 0 cm tension* (g): 210.25
Volume of water[1] in saturated sample (cm^3): 34.58
Saturated moisture content (% vol): 48.12
Sample bulk density (g/cm^3): 1.48

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content[1] (% vol)
Hanging column:	30-Nov-04 / 13:30	210.48	0.00	48.12
	04-Dec-04 / 13:35	209.40	23.50	46.63
	08-Dec-04 / 14:30	208.81	53.10	45.82
	15-Dec-04 / 10:05	207.39	153.50	43.85
Pressure plate:	20-Dec-04 / 11:10	199.73	509.90	33.26

Comments:

* Weight including tares
[1] Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: M. Devine
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Moisture Retention Data

Water Activity Meter/Relative Humidity Box

(Main Drainage Curve)

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF2
Ring Number: NA
Depth: NA

Dry weight of water activity meter sample* (g): 133.86
Tare weight, jar (g): 112.75
Sample bulk density (g/cm^3): 1.48

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Water Activity Meter:	03-Dec-04 / 12:20	135.32	8770.3	10.22

Dry weight of relative humidity box sample* (g): 63.40
Tare weight (g): 37.08
Sample bulk density (g/cm^3): 1.48

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Relative humidity box:	07-Dec-04 / 09:00	63.86	851293	2.55

Comments:

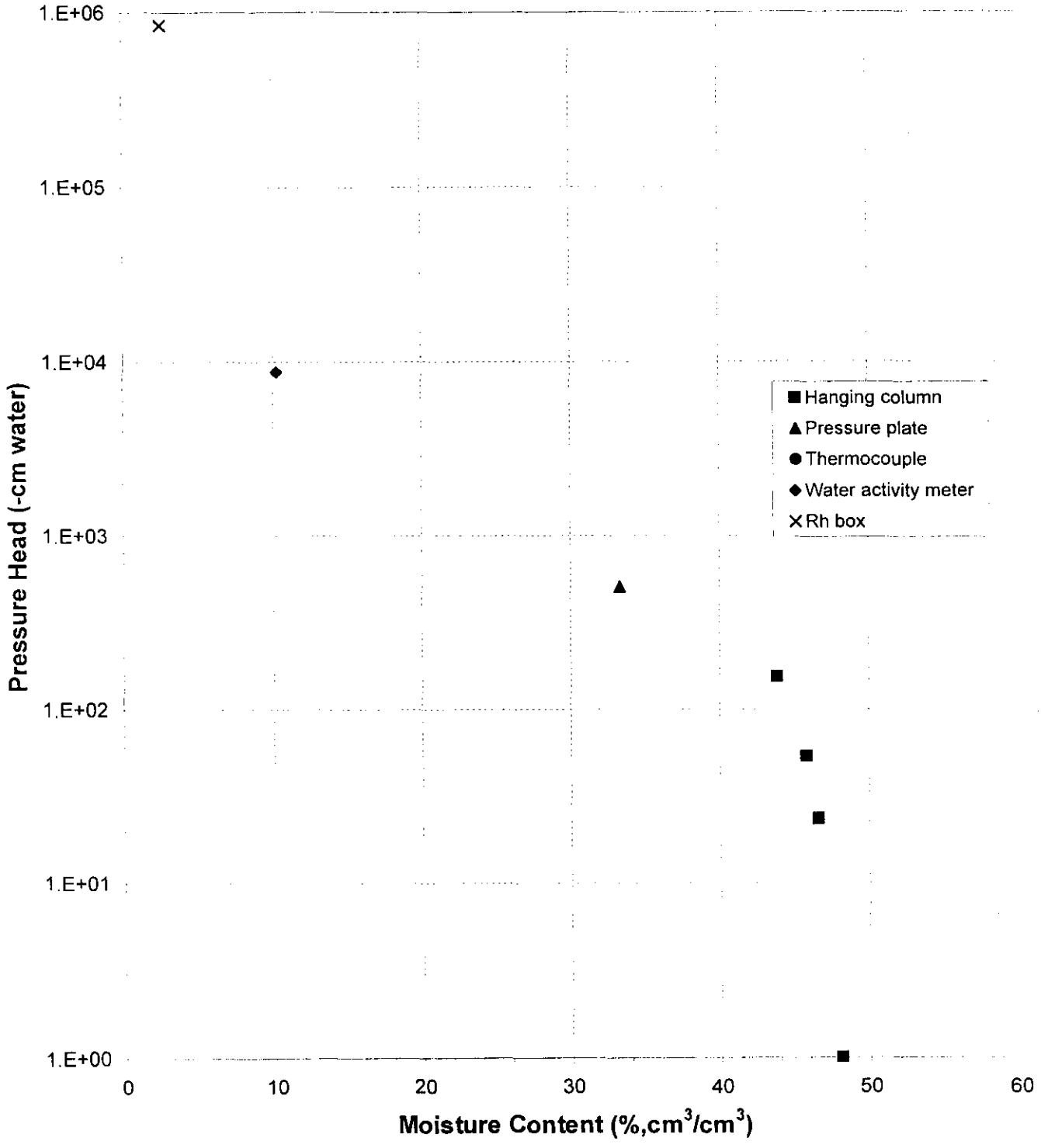
* Weight including tares
† Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Water Retention Data Points

Sample Number: B18DF2



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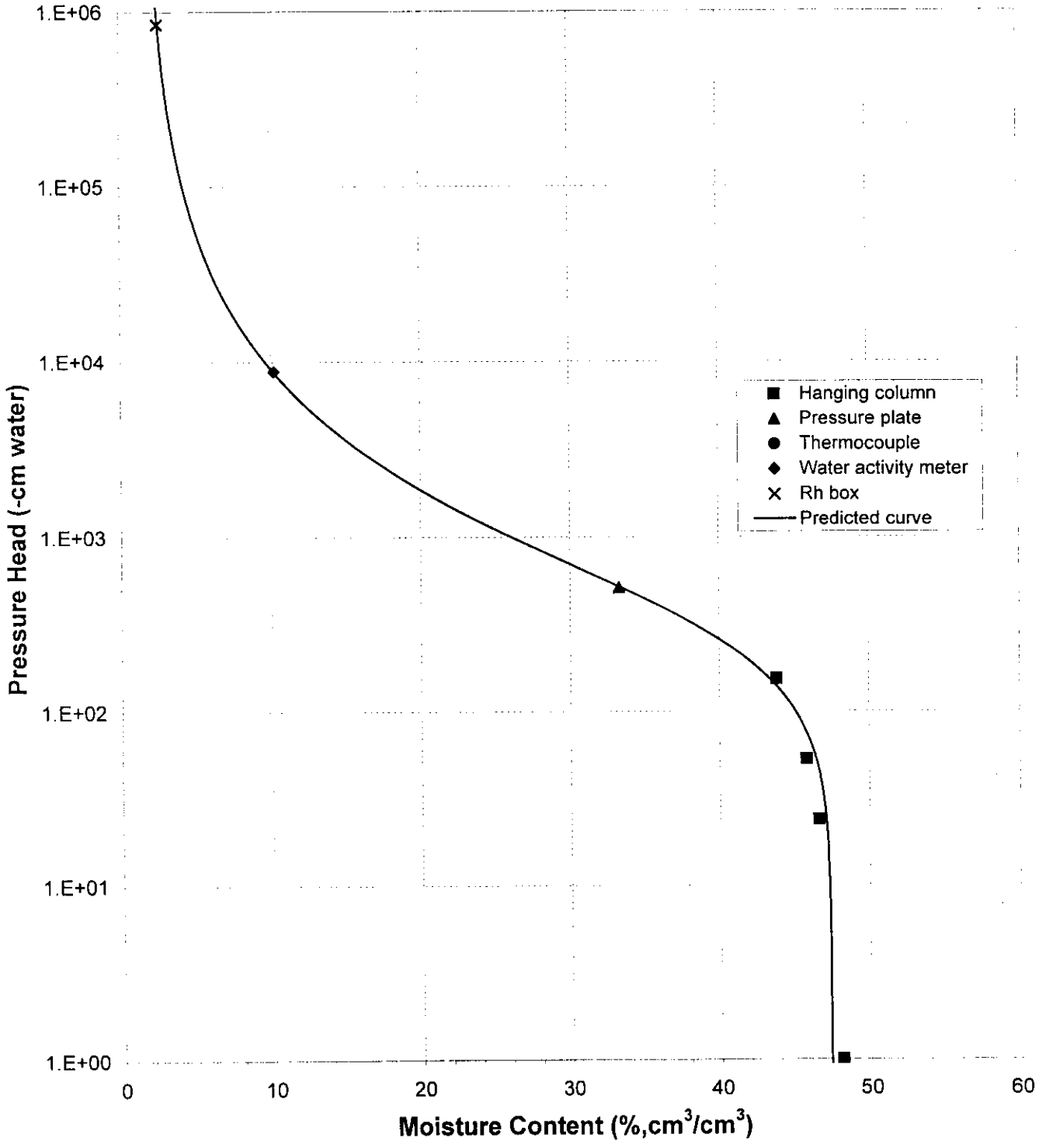
Daniel B. Stephens & Associates, Inc.

Predicted Water Retention Curve and Data Points

Sample Number: B18DF2



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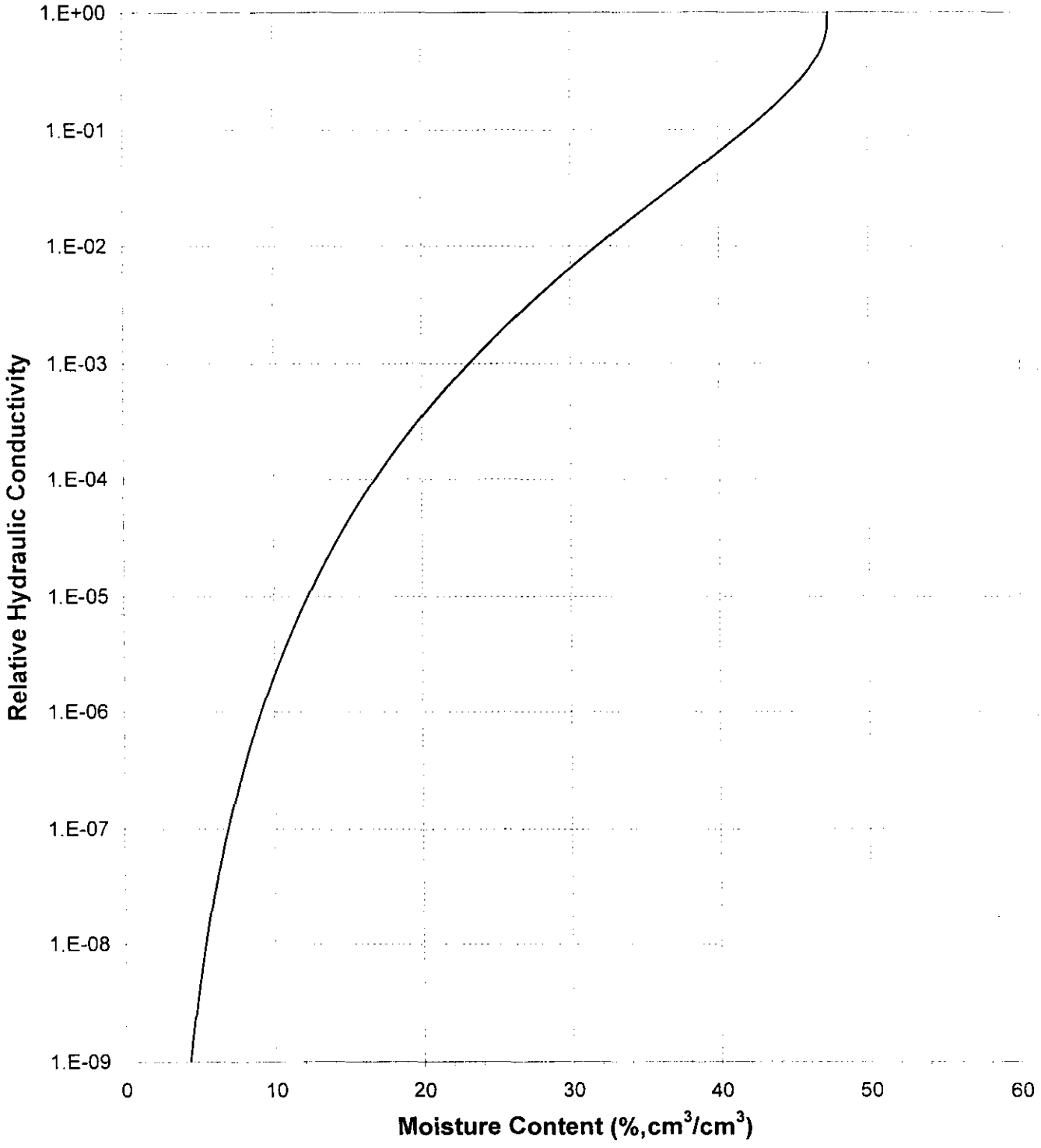
Daniel B. Stephens & Associates, Inc.

Plot of Relative Hydraulic Conductivity vs Moisture Content

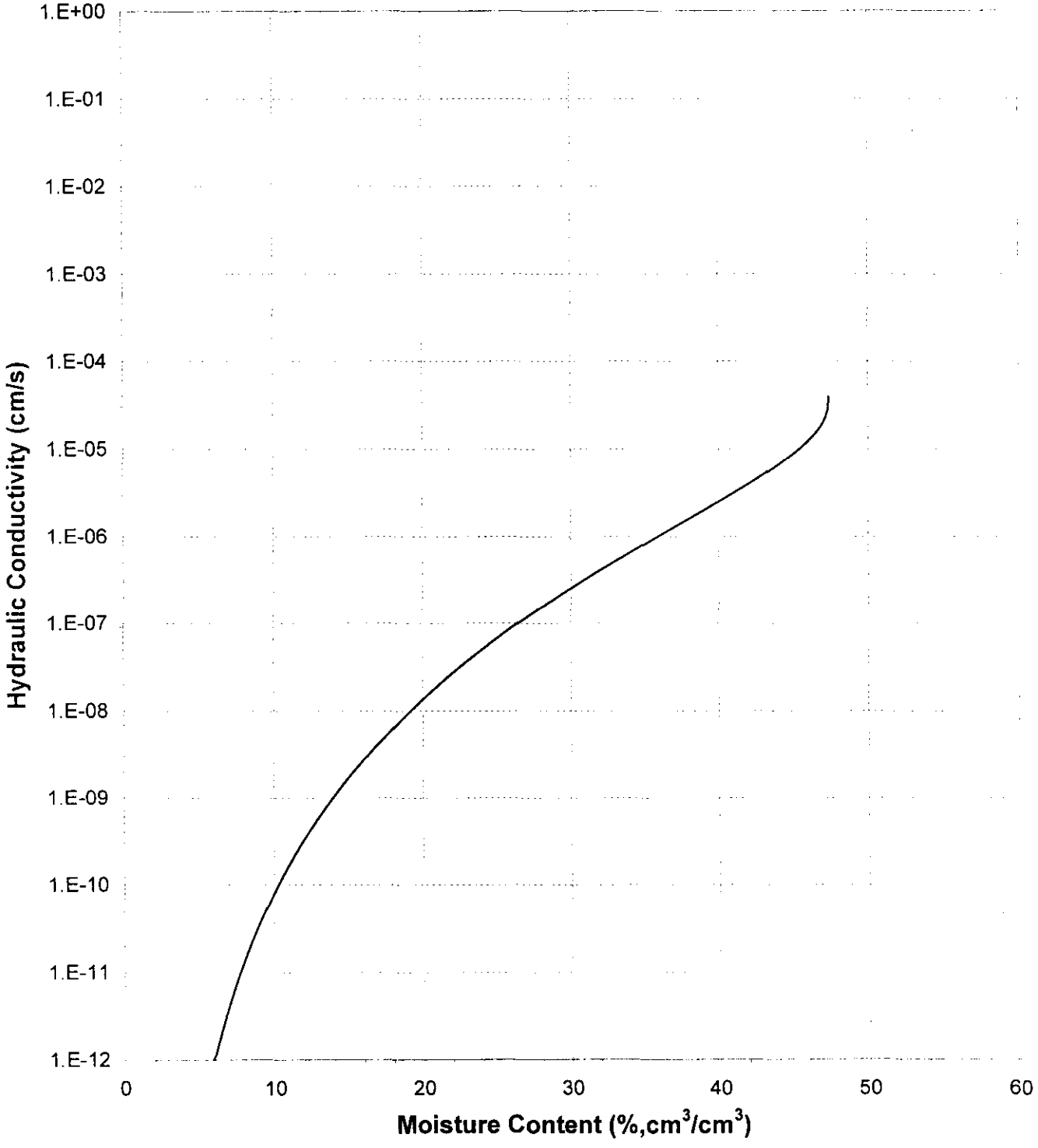
Sample Number: B18DF2



Daniel B. Stephens & Associates, Inc.

Plot of Hydraulic Conductivity vs Moisture Content

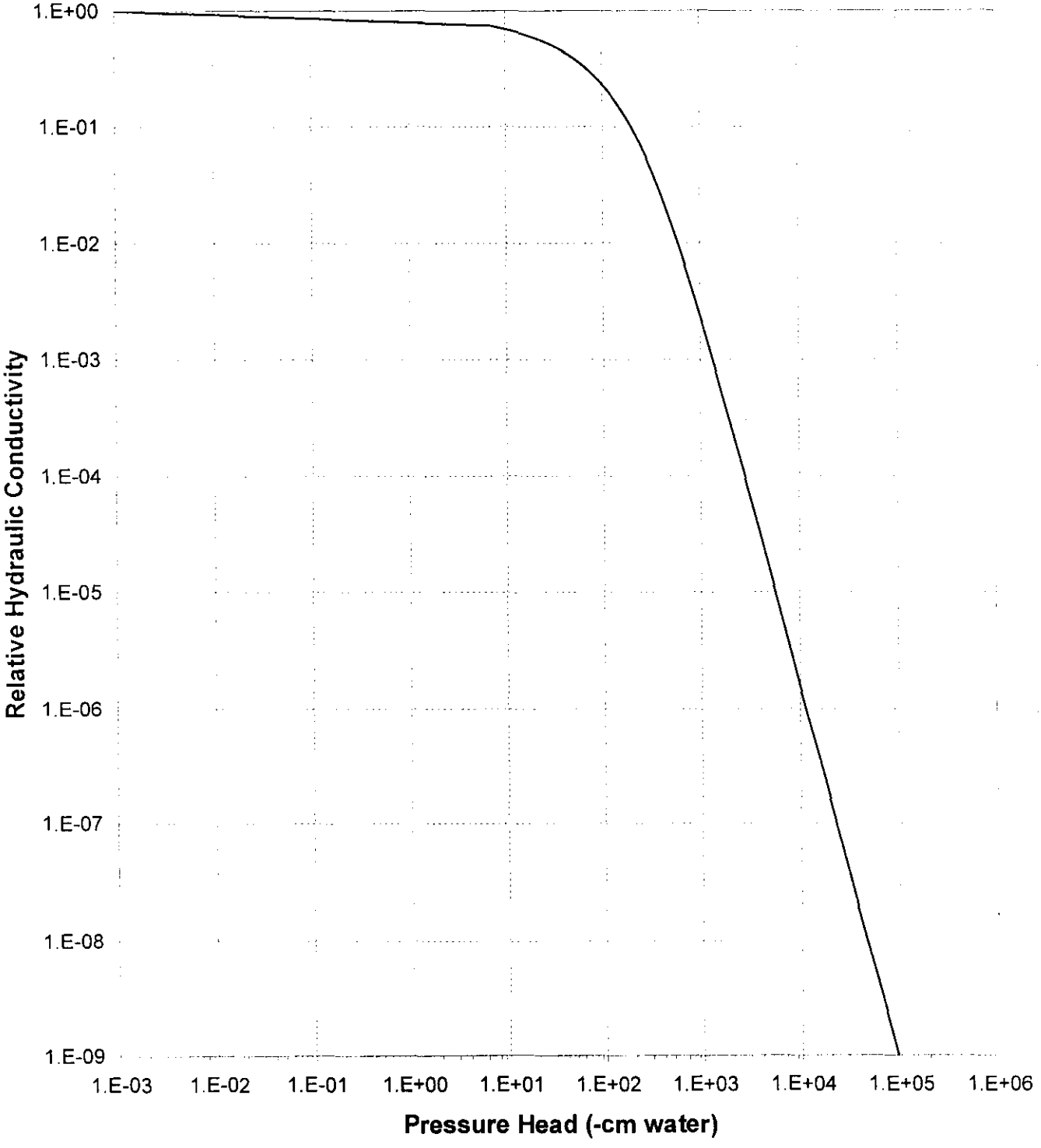
Sample Number: B18DF2



Daniel B. Stephens & Associates, Inc.

Plot of Relative Hydraulic Conductivity vs Pressure Head

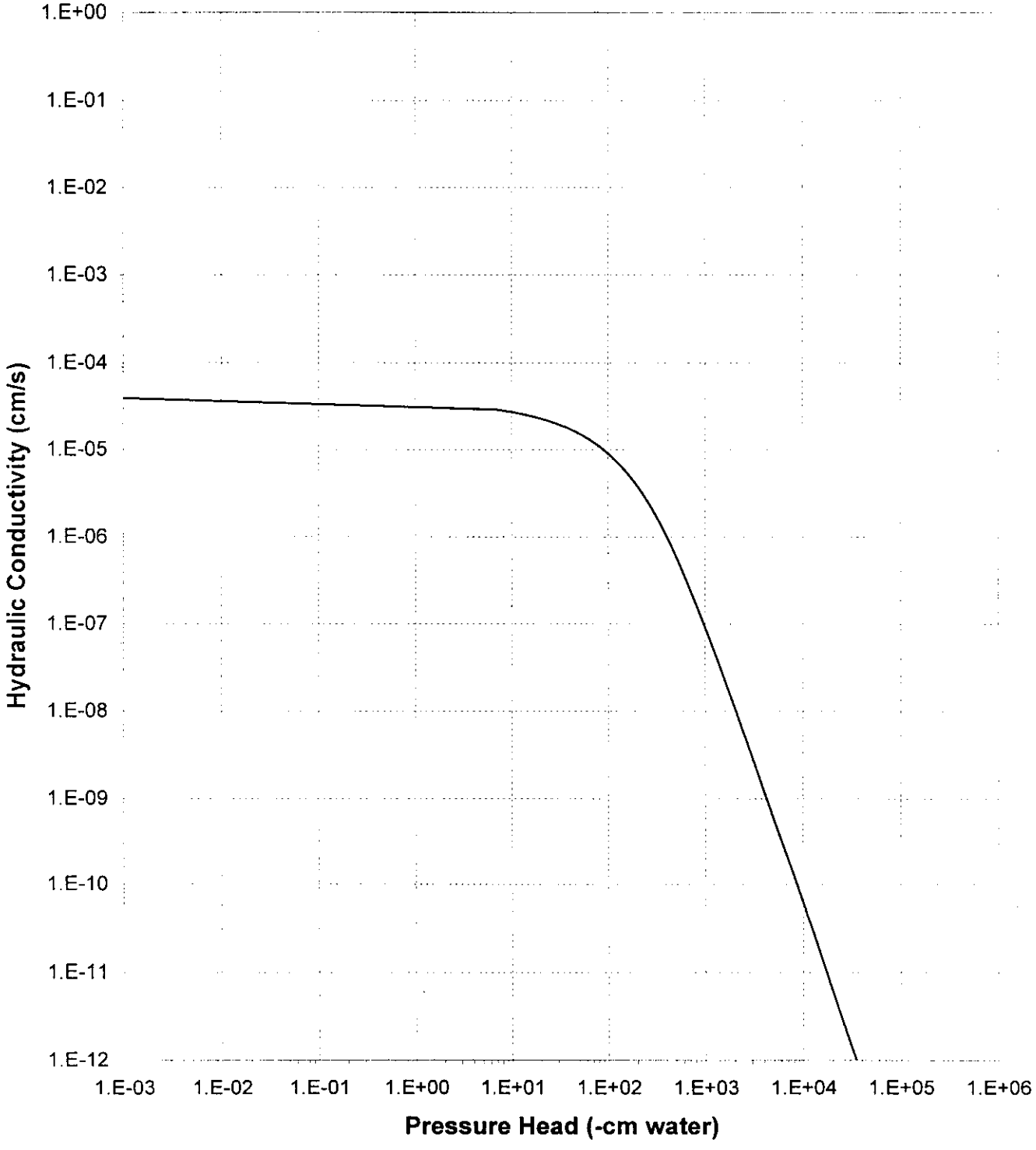
Sample Number: B18DF2



Daniel B. Stephens & Associates, Inc.

Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: B18DF2



Daniel B. Stephens & Associates, Inc.

Moisture Retention Data

Hanging Column/Pressure Plate/Thermocouple

(Main Drainage Curve)

Job Name:	Fluor Hanford	*Dry wt. of sample* (g):	106.65
Job Number:	LB04.0220.00	*Tare wt., screen & clamp* (g):	23.36
Sample Number:	B18DF4	*Tare wt., ring* (g):	43.65
Ring Number:	NA	*Tare wt., epoxy* (g):	0.00
Depth:	NA	*Sample volume* (cm^3):	72.02

Saturated weight at 0 cm tension* (g): 204.17
Volume of water[T] in saturated sample (cm^3): 30.51
Saturated moisture content (% vol): 42.36
Sample bulk density (g/cm^3): 1.48

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content[T] (% vol)
Hanging column:	19-Nov-04 / 15:00	204.17	0.00	42.36
	22-Nov-04 / 14:50	202.28	25.00	39.74
	26-Nov-04 / 09:00	200.22	124.40	36.88
Pressure plate:	30-Nov-04 / 12:30	196.68	509.90	31.96

Comments:

* Weight including tares
[T] Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: M. Devine
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Moisture Retention Data

Water Activity Meter/Relative Humidity Box

(Main Drainage Curve)

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF4
Ring Number: NA
Depth: NA

Dry weight of water activity meter sample* (g): 140.00
Tare weight, jar (g): 113.02
Sample bulk density (g/cm^3): 1.48

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Water Activity Meter:	10-Dec-04 / 14:50	141.65	7852.5	9.06
	10-Dec-04 / 12:30	141.38	12441.6	7.57

Dry weight of relative humidity box sample* (g): 56.36
Tare weight (g): 38.03
Sample bulk density (g/cm^3): 1.48

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Relative humidity box:	07-Dec-04 / 09:00	56.66	851293	2.43

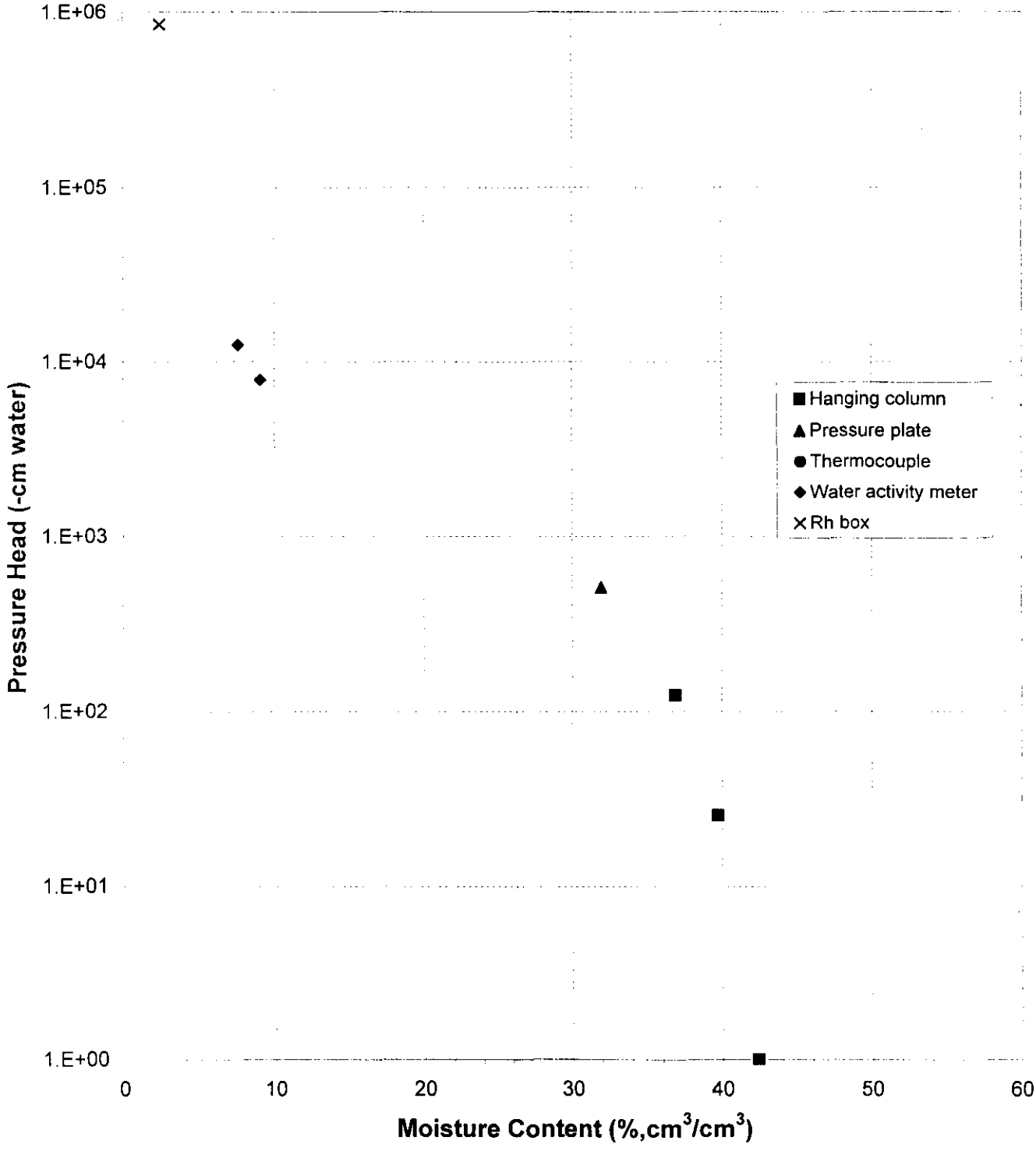
Comments:

* Weight including tares
† Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Water Retention Data Points

Sample Number: B18DF4



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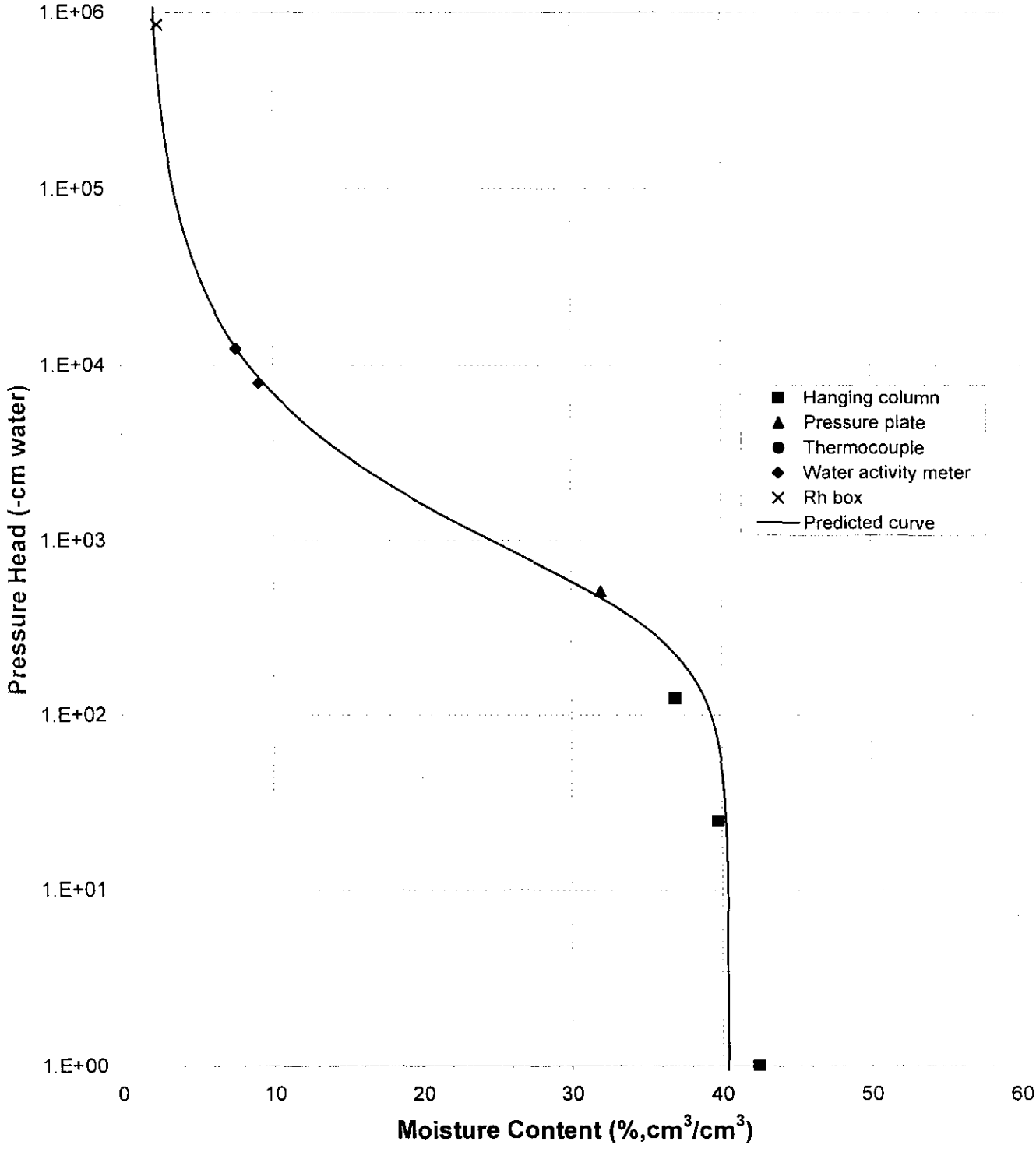
Predicted Water Retention Curve and Data Points

Sample Number: B18DF4



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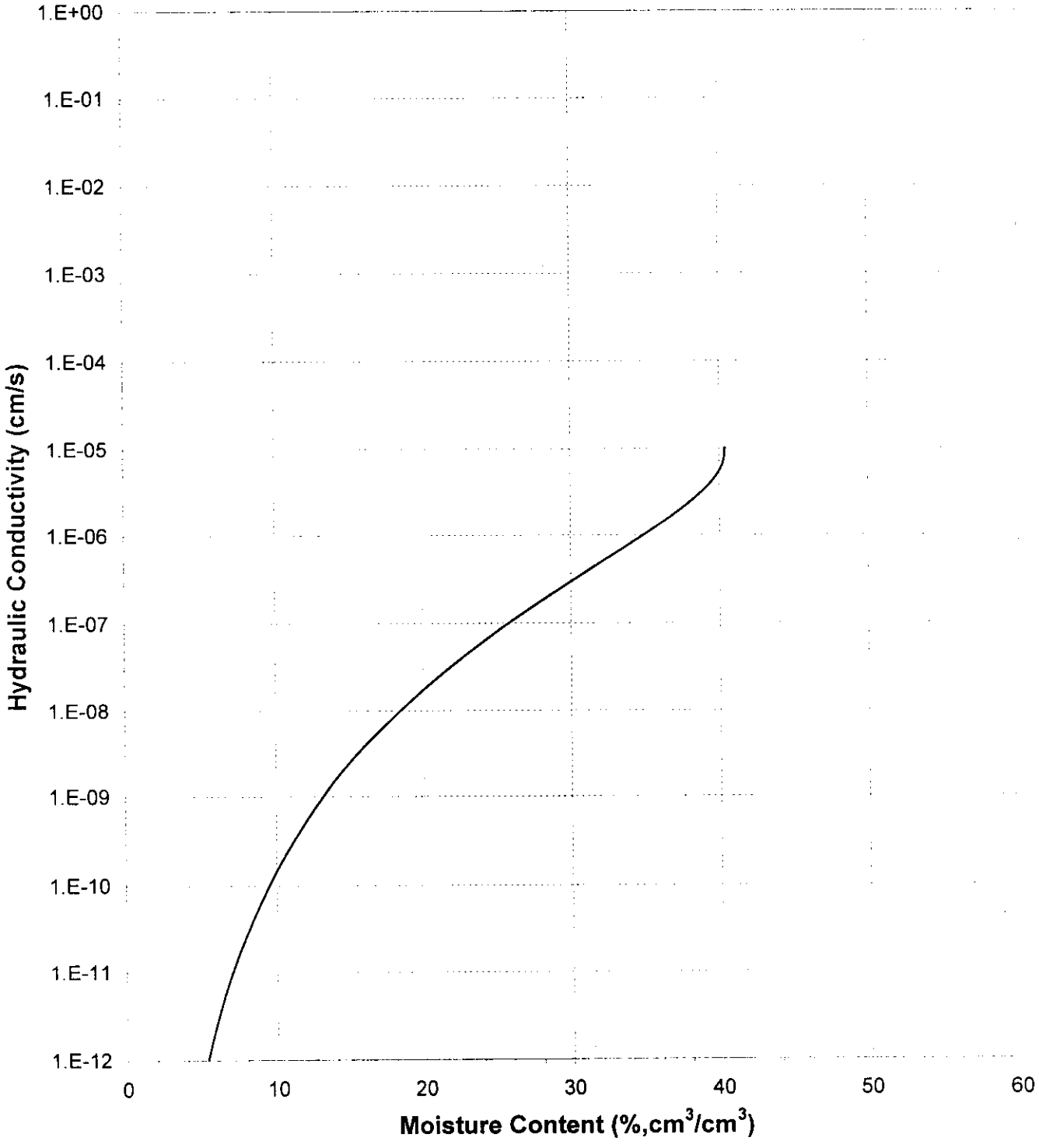
Daniel B. Stephens & Associates, Inc.

Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: B18DF4



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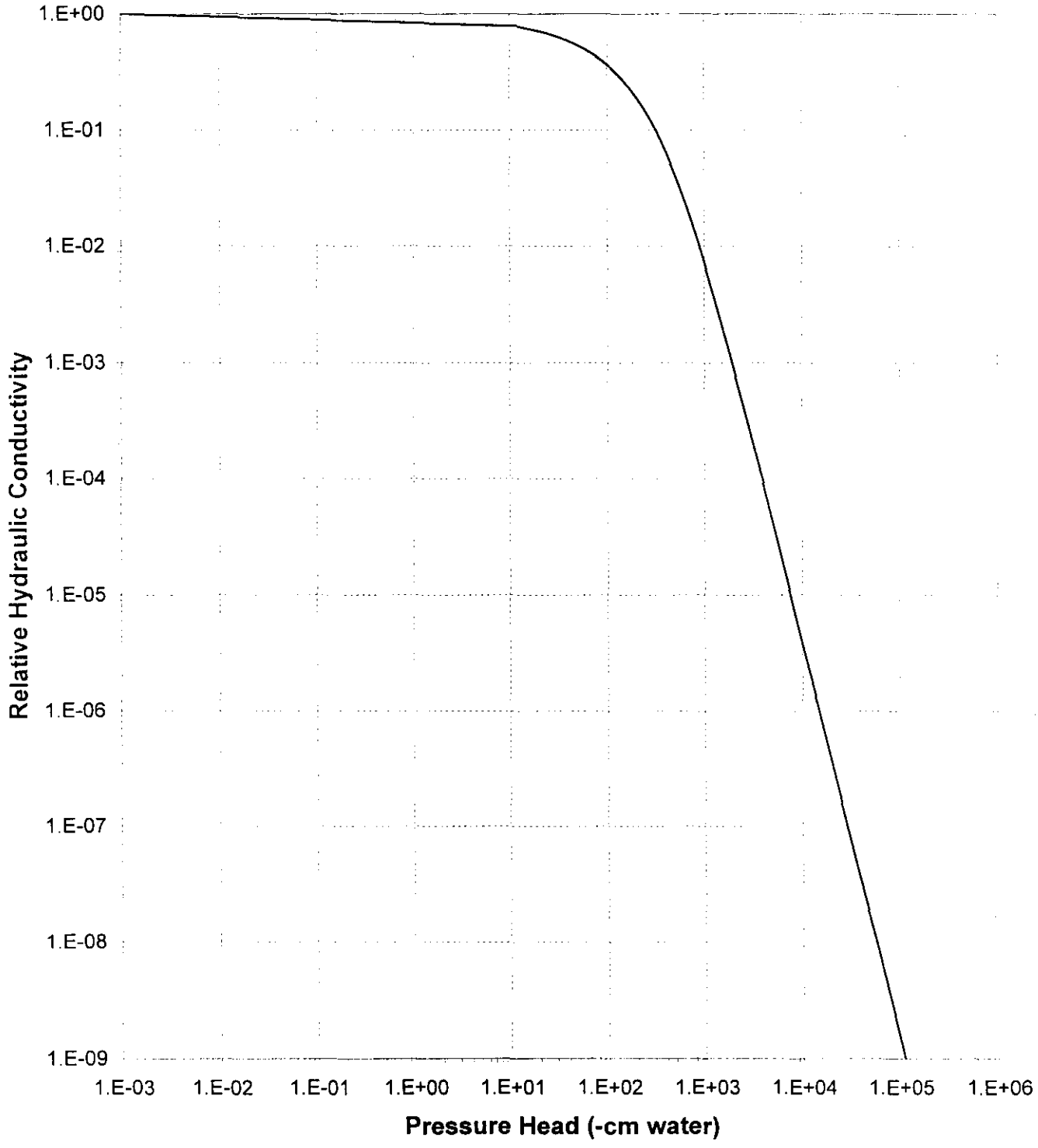
Daniel B. Stephens & Associates, Inc.

Plot of Relative Hydraulic Conductivity vs Pressure Head

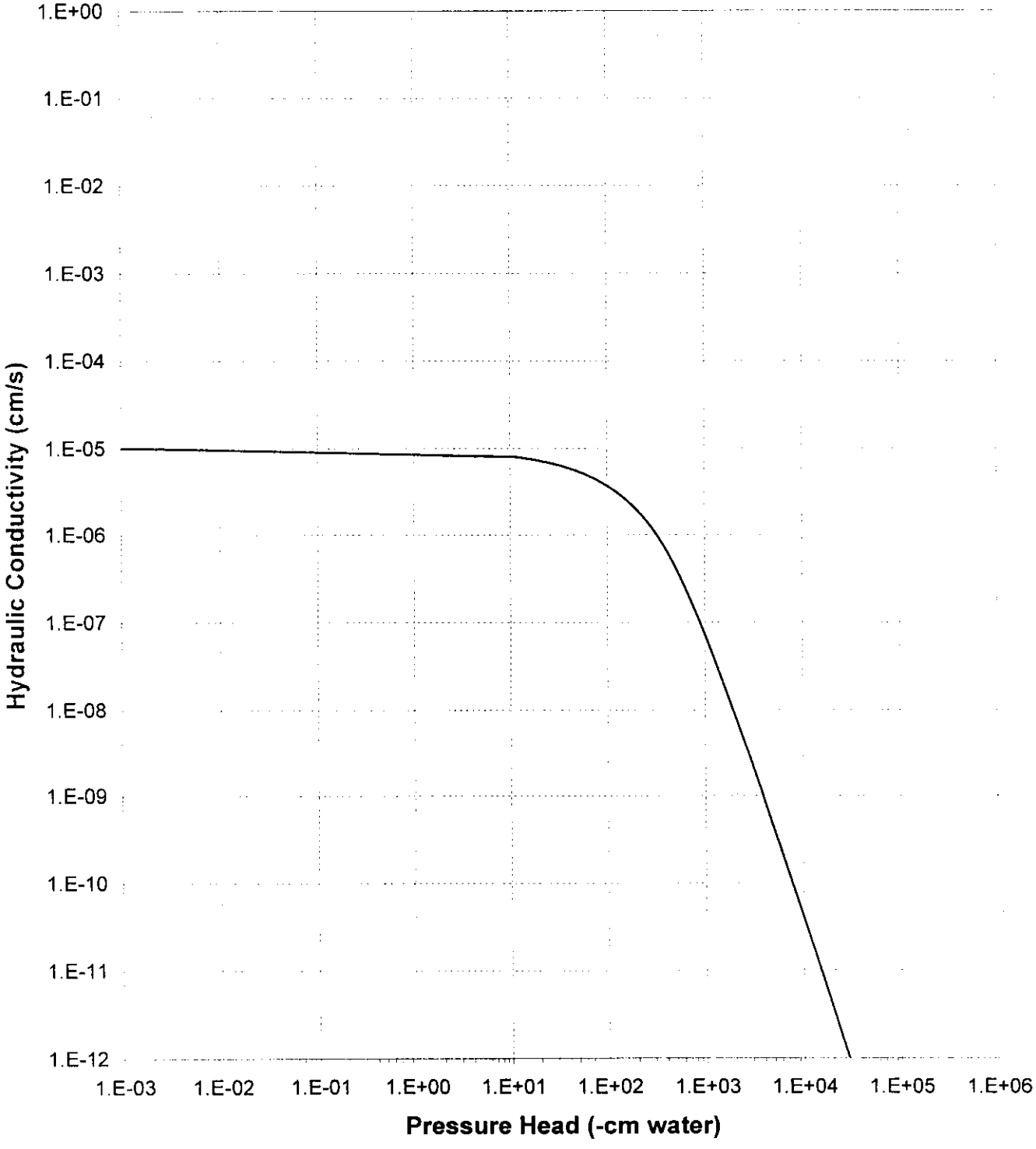
Sample Number: B18DF4



Daniel B. Stephens & Associates, Inc.

Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: B18DF4



Daniel B. Stephens & Associates, Inc.

Moisture Retention Data

Hanging Column/Pressure Plate/Thermocouple

(Main Drainage Curve)

Job Name:	Fluor Hanford	*Dry wt. of sample* (g):	90.01
Job Number:	LB04.0220.00	*Tare wt., screen & clamp* (g):	23.14
Sample Number:	B18DF5	*Tare wt., ring* (g):	36.79
Ring Number:	NA	*Tare wt., epoxy* (g):	0.00
Depth:	NA	*Sample volume* (cm^3):	61.01

Saturated weight at 0 cm tension* (g): 177.24
Volume of water[T] in saturated sample (cm^3): 27.30
Saturated moisture content (% vol): 44.75
Sample bulk density (g/cm^3): 1.48

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content[T] (% vol)
Hanging column:	19-Nov-04 / 11:01	177.24	0.00	44.75
	22-Nov-04 / 14:50	175.30	19.20	41.57
	26-Nov-04 / 09:15	173.80	52.80	39.11
	30-Nov-04 / 13:25	172.12	154.70	36.35
Pressure plate:	06-Dec-04 / 14:30	166.08	509.90	26.45

Comments:

* Weight including tares
[T] Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: M. Devine
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Moisture Retention Data

Water Activity Meter/Relative Humidity Box

(Main Drainage Curve)

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF5
Ring Number: NA
Depth: NA

Dry weight of water activity meter sample* (g): 134.91
Tare weight, jar (g): 114.16
Sample bulk density (g/cm^3): 1.48

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Water Activity Meter:	06-Dec-04 / 14:10	135.58	18356.4	4.76

Dry weight of relative humidity box sample* (g): 72.44
Tare weight (g): 40.73
Sample bulk density (g/cm^3): 1.48

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Relative humidity box:	07-Dec-04 / 09:00	72.90	851293	2.13

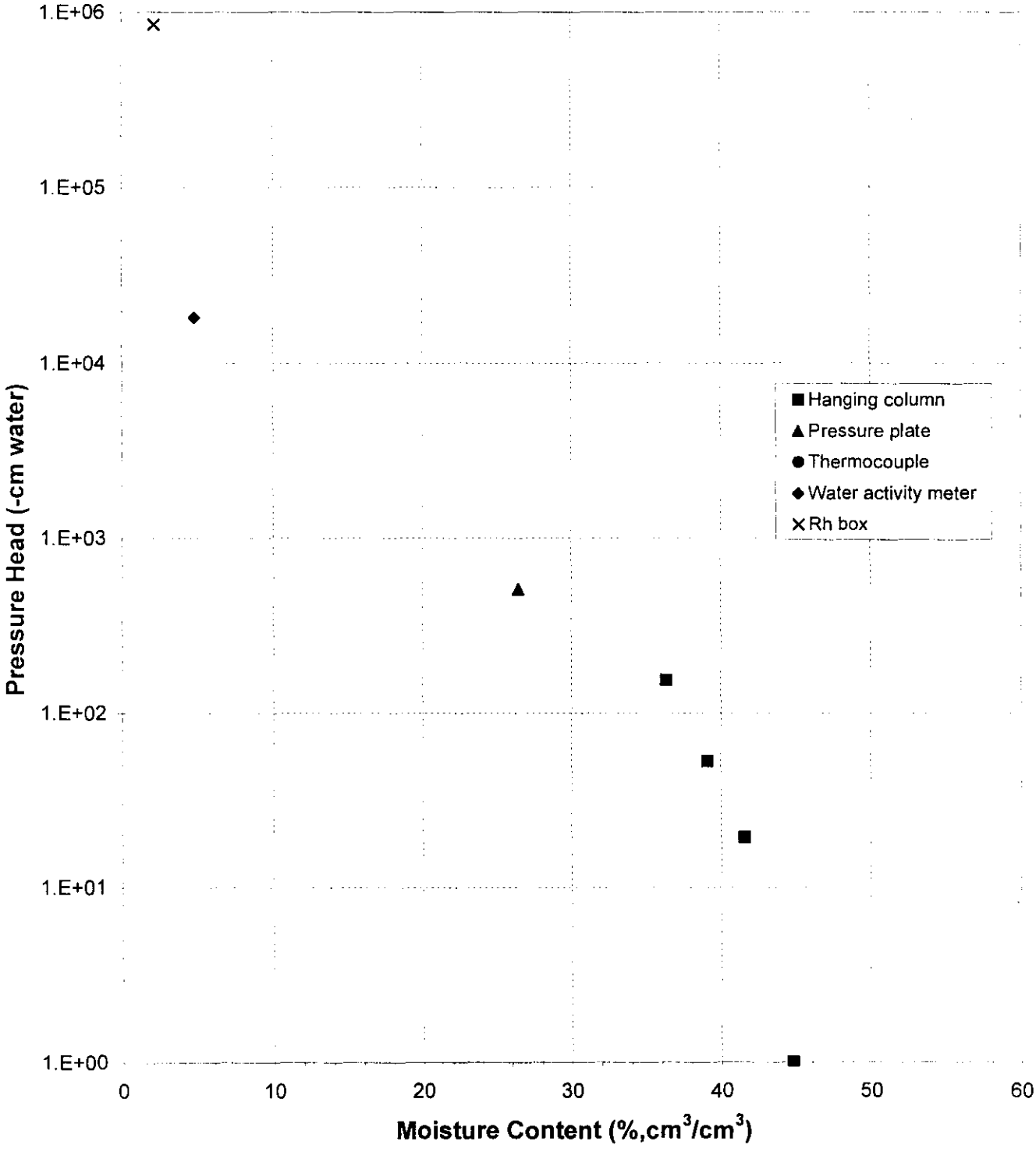
Comments:

* Weight including tares
† Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

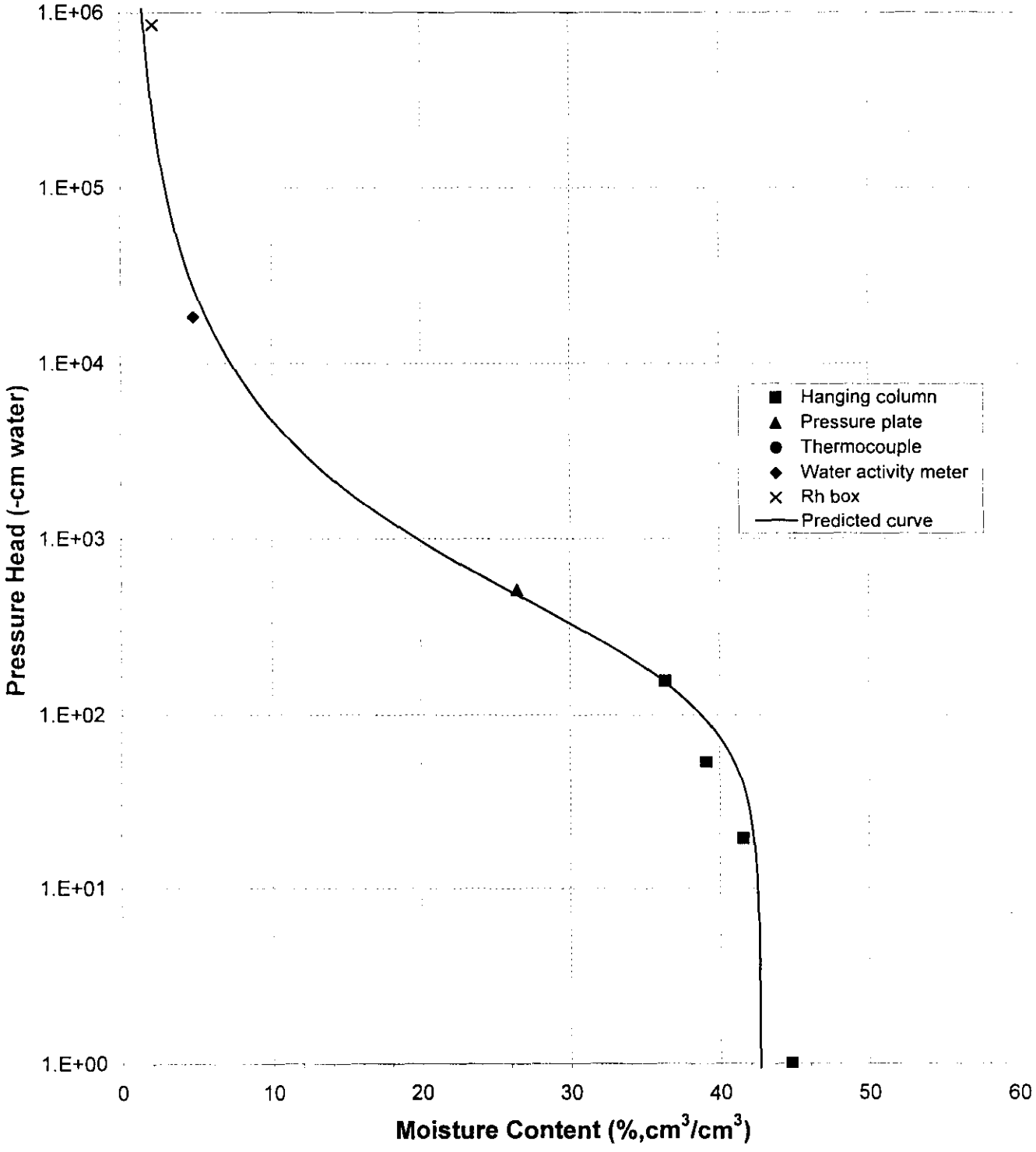
Water Retention Data Points

Sample Number: B18DF5



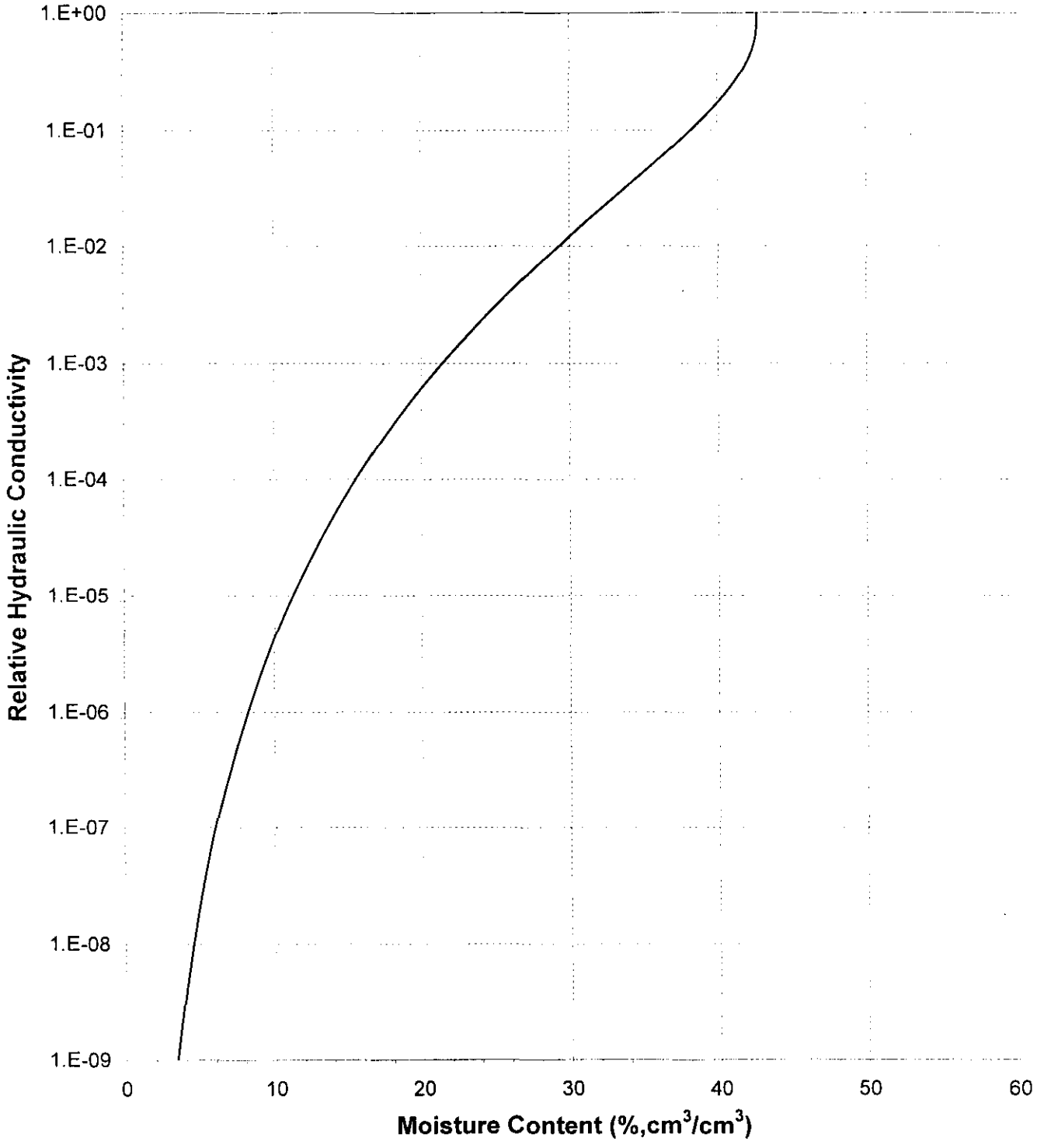
Predicted Water Retention Curve and Data Points

Sample Number: B18DF5



Plot of Relative Hydraulic Conductivity vs Moisture Content

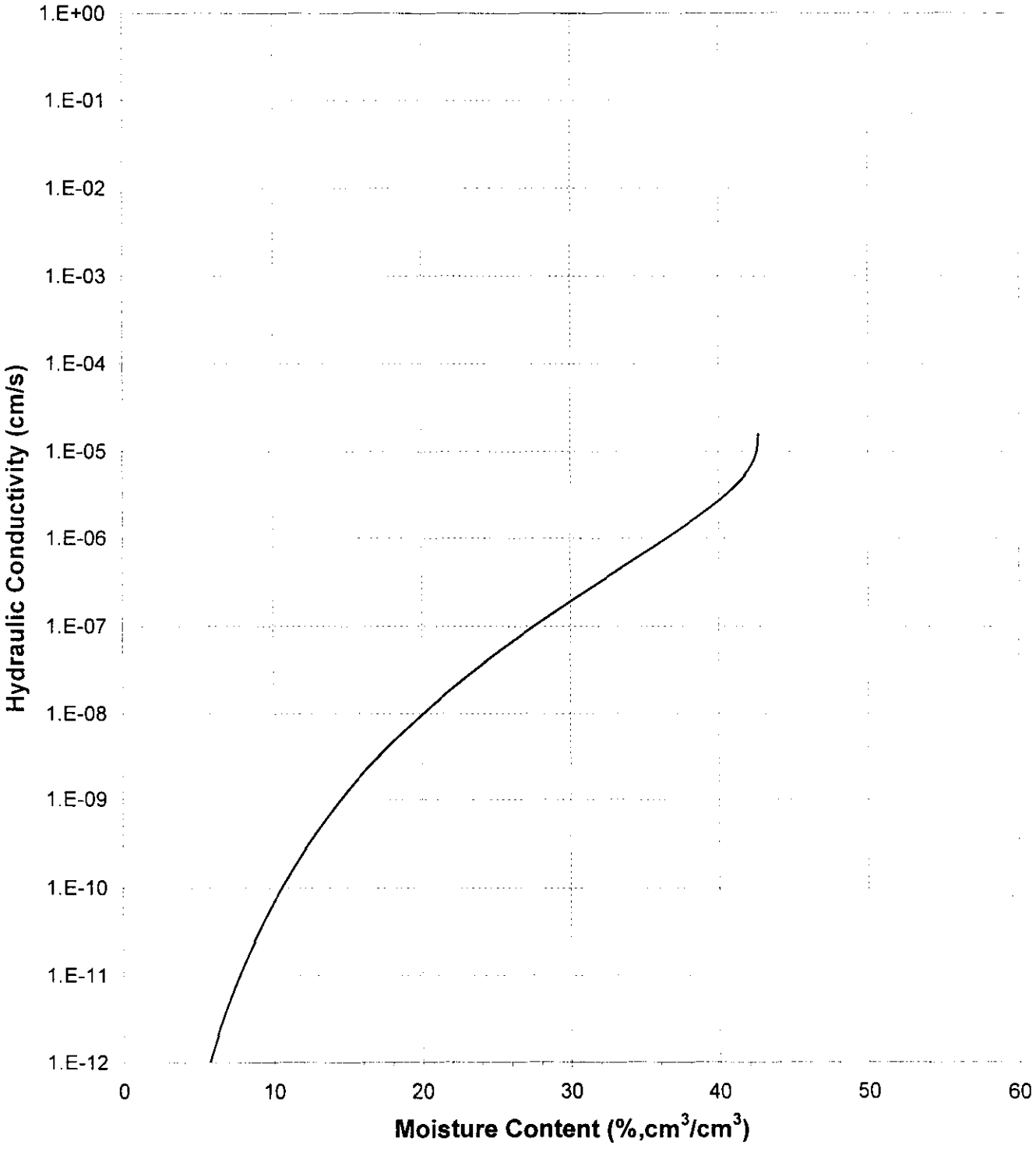
Sample Number: B18DF5



Daniel B. Stephens & Associates, Inc.

Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: B18DF5



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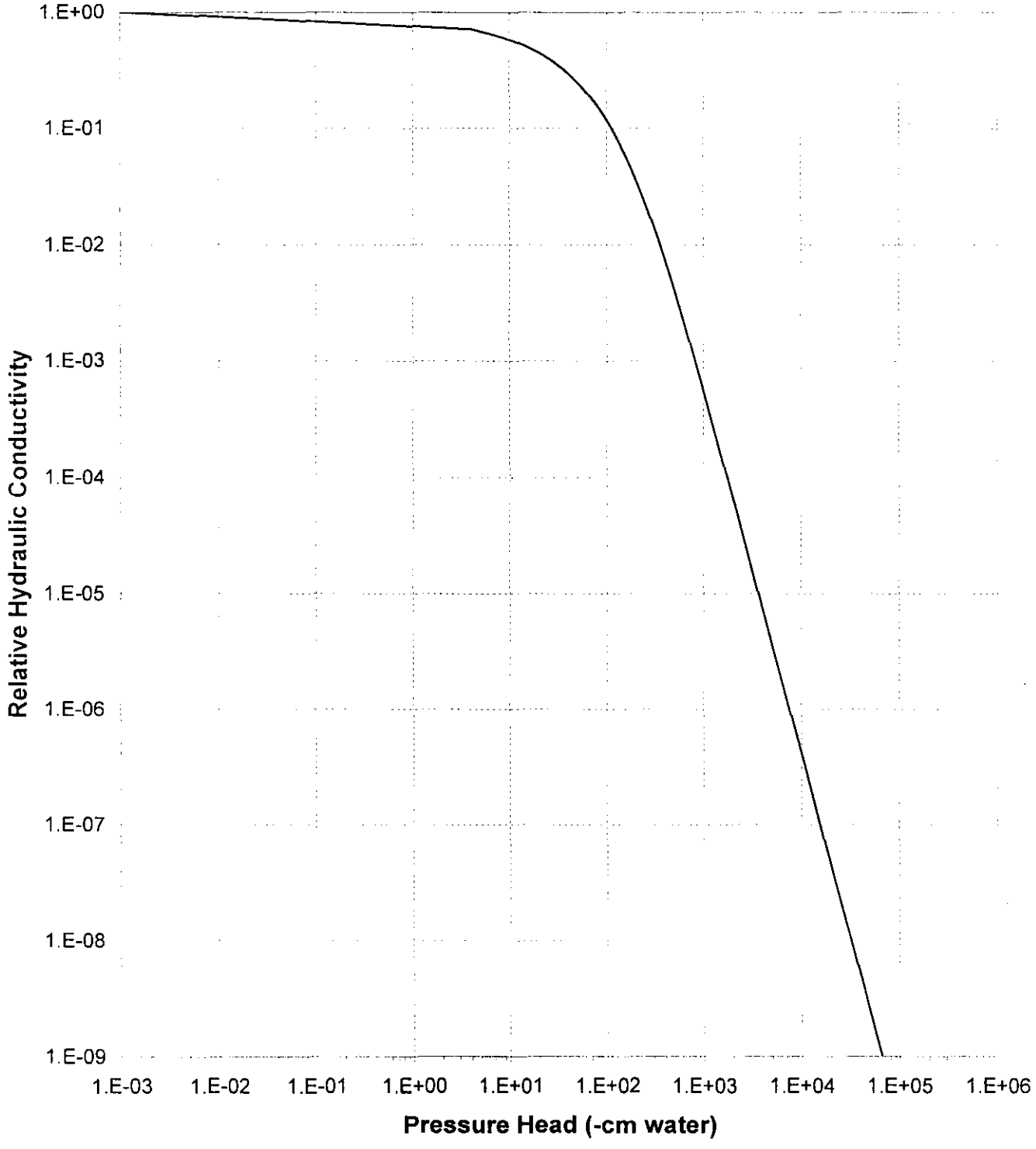
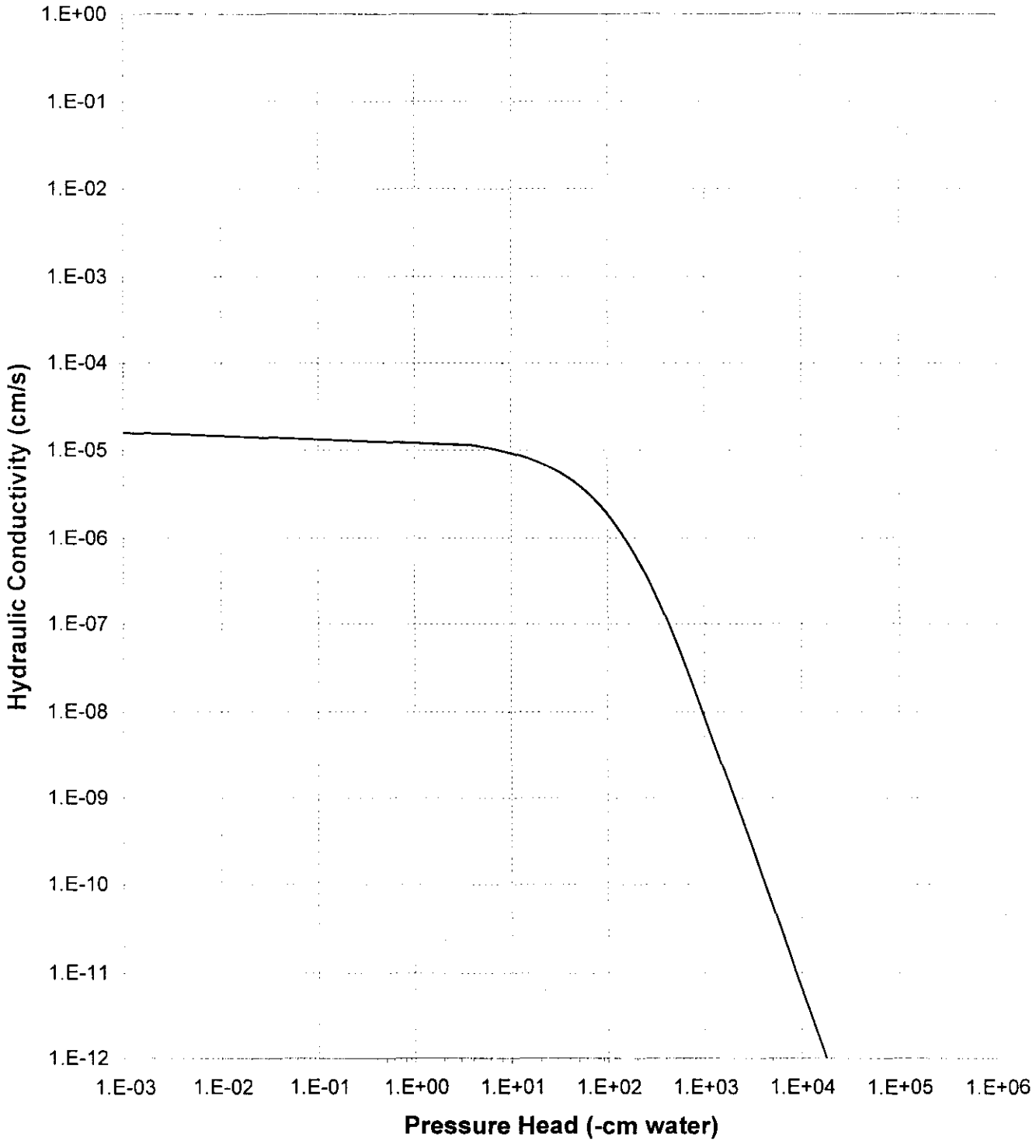
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: B18DF5



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: B18DF5



Summary of Particle Size Characteristics

Sample Number	d_{10} (mm)	d_{50} (mm)	d_{60} (mm)	C_u	C_c	Method	ASTM Classification	USDA Classification
B18DD3/B18DD2 Composite	0.0057	0.072	0.092	16	3.2	WS/H	Classification by ASTM 2487 requires Atterberg test	Sandy Loam
B18DD4/B18DF7 Composite	0.0035	0.051	0.064	18	2.6	WS/H	Classification by ASTM 2487 requires Atterberg test	Loam
B18DF8	0.0047	0.072	0.088	19	3.7	WS/H	Classification by ASTM 2487 requires Atterberg test	Sandy Loam
B18DF6	0.019	0.18	0.23	12	2.3	WS/H	Classification by ASTM 2487 requires Atterberg test	Loamy Sand
B18DF9	0.0024	0.022	0.033	14	1.3	WS/H	Classification by ASTM 2487 requires Atterberg test	Silt Loam
B18DD5	0.00071	0.015	0.021	30	3.4	WS/H	Classification by ASTM 2487 requires Atterberg test	Silt Loam
B18DD6	0.0053	0.042	0.051	9.6	2.1	WS/H	Classification by ASTM 2487 requires Atterberg test	Silt Loam
B18DF2	0.00019	0.019	0.027	142	13	WS/H	Classification by ASTM 2487 requires Atterberg test	Silt Loam
B18DF4	0.0024	0.041	0.056	23	1.7	WS/H	Classification by ASTM 2487 requires Atterberg test	Loam
B18DF5	0.0051	0.031	0.048	9.4	1.5	WS/H	Classification by ASTM 2487 requires Atterberg test	Silt Loam

d_{50} = Median particle diameter

Est = Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

$$C_u = \frac{d_{60}}{d_{10}}$$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

DS = Dry sieve

H = Hydrometer

WS = Wet sieve

† Greater than 10% of sample is coarse material

0.1.0.0.0.1.1.0

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name:	Fluor Hanford	*Initial Dry Weight of Sample (g):*	828.60
Job Number:	LB04.0220.00	*Weight Passing #10 (g):*	827.77
Sample Number:	B18DD3/B18DD2 Composite	*Weight Retained #10 (g):*	0.83
Ring Number:	NA	*Weight of Hydrometer Sample (g):*	50.04
Depth:	NA	*Calculated Weight of Sieve Sample (g):*	50.09
Test Date:	1-Dec-04		

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	828.60	100.00
	1.5"	38.1	0.00	0.00	828.60	100.00
	3/4"	19.0	0.00	0.00	828.60	100.00
	3/8"	9.5	0.00	0.00	828.60	100.00
	4	4.75	0.00	0.00	828.60	100.00
	10	2.00	0.83	0.83	827.77	99.90
-10			(Based on calculated sieve wt.)			
	20	0.85	0.31	0.36	49.73	99.28
	40	0.425	1.75	2.11	47.98	95.79
	60	0.250	3.15	5.26	44.83	89.50
	140	0.106	12.05	17.31	32.78	65.44
	200	0.075	6.75	24.06	26.03	51.97
	dry pan		0.77	24.83	25.26	
	wet pan			25.26	0.00	

d_{10} (mm):	0.0057	d_{50} (mm):	0.072
d_{16} (mm):	0.012	d_{60} (mm):	0.092
d_{30} (mm):	0.041	d_{84} (mm):	0.21

Median Particle Diameter--d_{50} (mm): 0.072

Uniformity Coefficient, Cu--$[d_{60}/d_{10}]$ (mm): 16

Coefficient of Curvature, Cc--$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 3.2

Mean Particle Diameter--$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.098

ASTM Soil Classification: Classification by ASTM 2487 requires Atterberg test

USDA Soil Classification: Sandy Loam

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DD3/B18DD2 Composite
Ring Number: NA
Depth: NA

Test Date: 1-Dec-04
Start Time: 8:30

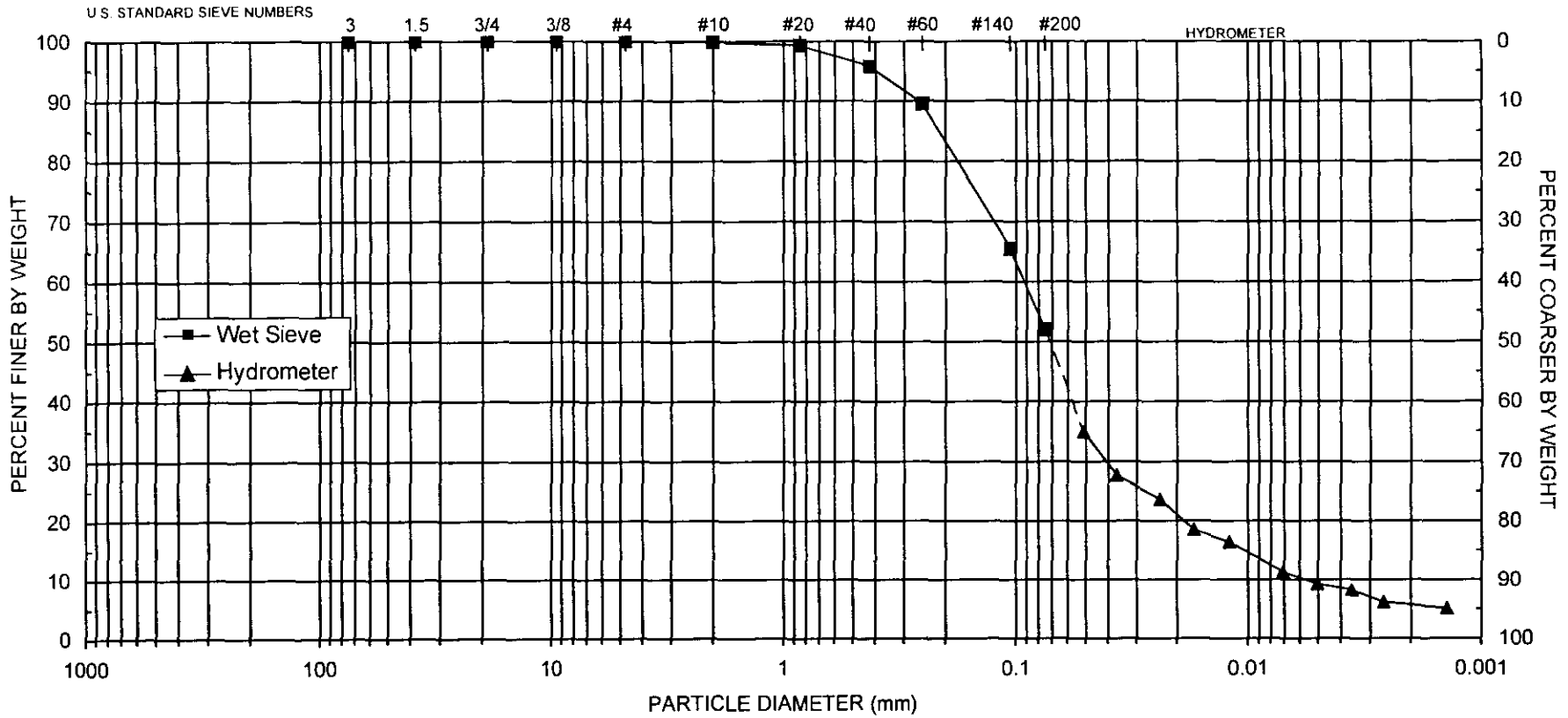
Type of Water Used: DISTILLED
Reaction with H_2O_2: N/A
Dispersant: $(NaPO_3)_6$
Measured particle density: 2.51

Initial Wt. (g): 50.04
Total Sample Wt. (g): 828.60
Wt. Passing #10 (g): 827.77

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
10-Dec-04	1	19.6	21.5	4.5	17.0	12.8	0.05115	35.0	35.0
	2	19.6	18.0	4.5	13.5	13.3	0.03697	27.8	27.8
	5	19.6	16.0	4.5	11.5	13.7	0.02367	23.7	23.6
	10	19.6	13.5	4.5	9.0	14.1	0.01698	18.5	18.5
	20	19.6	12.5	4.5	8.0	14.3	0.01208	16.5	16.5
	60	19.5	10.0	4.5	5.5	14.7	0.00708	11.3	11.3
	120	19.3	9.0	4.5	4.5	14.8	0.00505	9.3	9.3
	240	19.1	8.5	4.5	4.0	14.9	0.00359	8.2	8.2
	454	18.8	8.0	5.0	3.0	15.0	0.00263	6.2	6.2
11-Dec-04	1562	19.8	7.0	4.5	2.5	15.2	0.00141	5.1	5.1

Comments:

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL: Coarse, Fine	SAND: Coarse, Medium, Fine	SILT OR CLAY		
USDA	COBBLES	GRAVEL	SAND: Very coarse, Coarse, Medium, Fine, Very fine	SILT	CLAY	

d_{10} = **0.0057**	d_{30} = **0.041**	d_{50} = **0.072**	d_{60} = **0.092**	C_u = **16**	C_c = **3.2**

SAMPLE NUMBER	DEPTH	ASTM CLASSIFICATION	USDA CLASSIFICATION
B18DD3/B18DD2 Composite	**NA**	**Classification by ASTM 2487 requires Atterberg test**	**Sandy Loam**

Daniel B. Stephens & Associates, Inc.

0000012 2

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name:	Fluor Hanford	*Initial Dry Weight of Sample (g):*	634.77
Job Number:	LB04.0220.00	*Weight Passing #10 (g):*	633.98
Sample Number:	B18DD4/B18DF7 Composite	*Weight Retained #10 (g):*	0.79
Ring Number:	NA	*Weight of Hydrometer Sample (g):*	50.28
Depth:	NA	*Calculated Weight of Sieve Sample (g):*	50.34
Test Date:	1-Dec-04		

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	634.77	100.00
	1.5"	38.1	0.00	0.00	634.77	100.00
	3/4"	19.0	0.00	0.00	634.77	100.00
	3/8"	9.5	0.00	0.00	634.77	100.00
	4	4.75	0.00	0.00	634.77	100.00
	10	2.00	0.79	0.79	633.98	99.88
-10			(Based on calculated sieve wt.)			
	20	0.85	0.13	0.19	50.15	99.62
	40	0.425	0.58	0.77	49.57	98.47
	60	0.250	1.70	2.47	47.87	95.09
	140	0.106	8.34	10.81	39.53	78.52
	200	0.075	5.44	16.25	34.09	67.72
	dry pan		1.67	17.92	32.42	
	wet pan			32.42	0.00	

d_{10} (mm):	0.0035	d_{50} (mm):	0.051
d_{16} (mm):	0.0076	d_{60} (mm):	0.064
d_{30} (mm):	0.024	d_{84} (mm):	0.14

Median Particle Diameter--d_{50} (mm): 0.051

Uniformity Coefficient, Cu--$[d_{60}/d_{10}]$ (mm): 18

Coefficient of Curvature, Cc--$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 2.6

Mean Particle Diameter--$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.066

ASTM Soil Classification: Classification by ASTM 2487 requires Atterberg test
USDA Soil Classification: Loam

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DD4/B18DF7 Composite
Ring Number: NA
Depth: NA

Test Date: 1-Dec-04
Start Time: 8:24

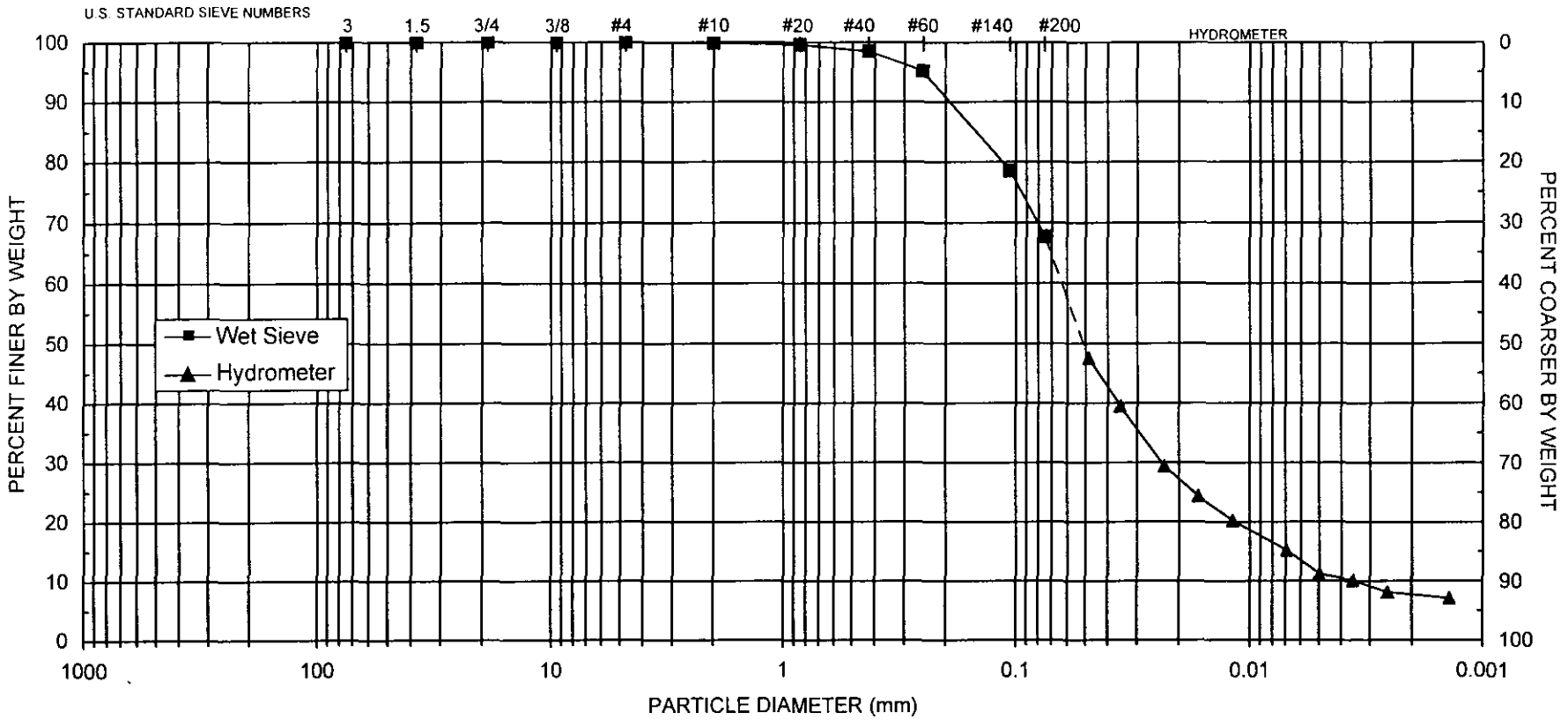
Type of Water Used: DISTILLED
Reaction with H_2O_2*:* N/A
Dispersant: $(NaPO_3)_6$
Measured particle density: 2.53

Initial Wt. (g)*:* 50.28
Total Sample Wt. (g)*:* 634.77
Wt. Passing #10 (g): 633.98

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
10-Dec-04	1	19.6	28.0	4.5	23.5	11.7	0.04862	47.7	47.6
	2	19.6	24.0	4.5	19.5	12.4	0.03533	39.6	39.5
	5	19.6	19.0	4.5	14.5	13.2	0.02307	29.4	29.4
	10	19.6	16.5	4.5	12.0	13.6	0.01657	24.3	24.3
	20	19.6	14.5	4.5	10.0	13.9	0.01185	20.3	20.3
	60	19.5	12.0	4.5	7.5	14.3	0.00695	15.2	15.2
	120	19.3	10.0	4.5	5.5	14.7	0.00498	11.2	11.1
	240	19.1	9.5	4.5	5.0	14.7	0.00354	10.1	10.1
	480	18.8	9.0	5.0	4.0	14.8	0.00252	8.1	8.1
11-Dec-04	1567	19.8	8.0	4.5	3.5	15.0	0.00139	7.1	7.1

Comments:

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY	
		Coarse	Fine	Coarse	Medium	Fine		
USDA	COBBLES	GRAVEL		SAND			SILT	CLAY
				Very coarse	Coarse	Medium	Fine	Very fine

d_{10} = **0.0035**	d_{30} = **0.024**	d_{50} = **0.051**	d_{60} = **0.064**	C_u = **18**	C_c = **2.6**

SAMPLE NUMBER	DEPTH	ASTM CLASSIFICATION	USDA CLASSIFICATION
B18DD4/B18DF7 Composite	**NA**	**Classification by ASTM 2487 requires Atterberg test**	**Loam**

0000125

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF8
Ring Number: NA
Depth: NA
Test Date: 1-Dec-04

Initial Dry Weight of Sample (g): 608.13
Weight Passing #10 (g): 608.13
Weight Retained #10 (g): 0.00
Weight of Hydrometer Sample (g): 50.23
Calculated Weight of Sieve Sample (g): 50.23

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	608.13	100.00
	1.5"	38.1	0.00	0.00	608.13	100.00
	3/4"	19.0	0.00	0.00	608.13	100.00
	3/8"	9.5	0.00	0.00	608.13	100.00
	4	4.75	0.00	0.00	608.13	100.00
	10	2.00	0.00	0.00	608.13	100.00
-10			(Based on calculated sieve wt.)			
	20	0.85	0.09	0.09	50.14	99.82
	40	0.425	0.17	0.26	49.97	99.48
	60	0.250	0.84	1.10	49.13	97.81
	140	0.106	14.14	15.24	34.99	69.66
	200	0.075	9.14	24.38	25.85	51.46
	dry pan		2.50	26.88	23.35	
	wet pan			23.35	0.00	

d_{10} (mm): 0.0047
d_{16} (mm): 0.0097
d_{30} (mm): 0.039
d_{50} (mm): 0.072
d_{60} (mm): 0.088
d_{84} (mm): 0.16

Median Particle Diameter--d_{50} (mm): 0.072
Uniformity Coefficient, Cu--$[d_{60}/d_{10}]$ (mm): 19
Coefficient of Curvature, Cc--$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 3.7
Mean Particle Diameter--$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.081

ASTM Soil Classification: Classification by ASTM 2487 requires Atterberg test
USDA Soil Classification: Sandy Loam

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

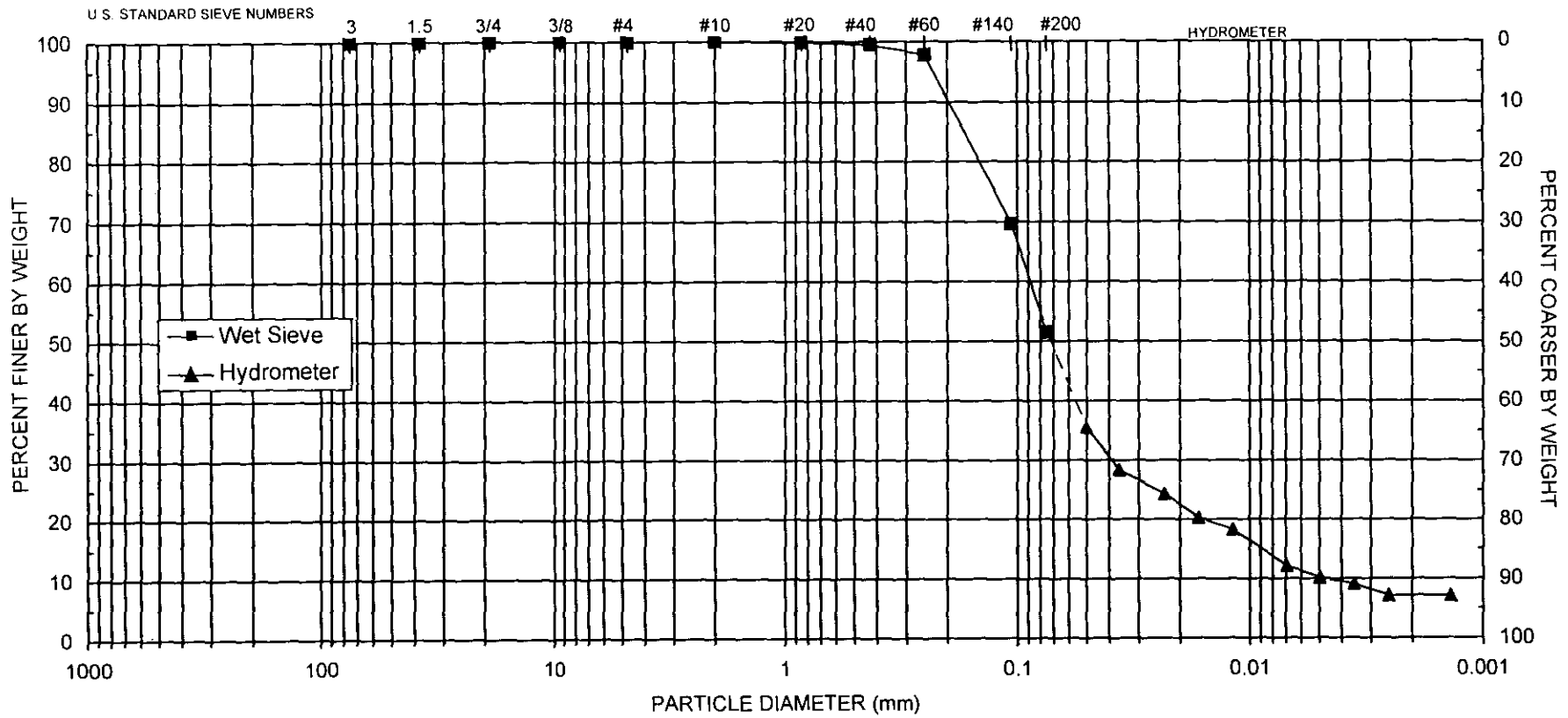
Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF8
Ring Number: NA
Depth: NA
Test Date: 1-Dec-04
Start Time: 8:18

Type of Water Used: DISTILLED
Reaction with H_2O_2: NA
Dispersant: $(NaPO_3)_6$
Measured particle density: 2.56
Initial Wt. (g): 50.23
Total Sample Wt. (g): 608.13
Wt. Passing #10 (g): 608.13

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
10-Dec-04	1	19.6	22.0	4.5	17.5	12.7	0.05023	35.5	35.5
	2	19.6	18.5	4.5	14.0	13.3	0.03631	28.4	28.4
	5	19.6	16.5	4.5	12.0	13.6	0.02325	24.4	24.4
	10	19.6	14.5	4.5	10.0	13.9	0.01664	20.3	20.3
	20	19.6	13.5	4.5	9.0	14.1	0.01183	18.3	18.3
	60	19.5	10.5	4.5	6.0	14.6	0.00696	12.2	12.2
	120	19.3	9.5	4.5	5.0	14.7	0.00496	10.2	10.2
	240	19.1	9.0	4.5	4.5	14.8	0.00353	9.1	9.1
	480	18.8	8.5	5.0	3.5	14.9	0.00251	7.1	7.1
11-Dec-04	1573	19.8	8.0	4.5	3.5	15.0	0.00137	7.1	7.1

Comments:

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL: Coarse, Fine	SAND: Coarse, Medium, Fine	SILT OR CLAY		
USDA	COBBLES	GRAVEL	SAND: Very coarse, Coarse, Medium, Fine, Very fine	SILT	CLAY	

d_{10} = **0.0047**	d_{30} = **0.039**	d_{50} = **0.072**	d_{60} = **0.088**	C_u = **19**	C_c = **3.7**

SAMPLE NUMBER	DEPTH	ASTM CLASSIFICATION	USDA CLASSIFICATION
B18DF8	**NA**	**Classification by ASTM 2487 requires Atterberg test**	**Sandy Loam**

0000012

Daniel B. Stephens & Associates, Inc.

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF6
Ring Number: NA
Depth: NA
Test Date: 14-Dec-04

Initial Dry Weight of Sample (g): 119.76
Weight Passing #10 (g): 118.07
Weight Retained #10 (g): 1.69
Weight of Hydrometer Sample (g): 50.57
Calculated Weight of Sieve Sample (g): 51.29

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	119.76	100.00
	1.5"	38.1	0.00	0.00	119.76	100.00
	3/4"	19.0	0.00	0.00	119.76	100.00
	3/8"	9.5	0.00	0.00	119.76	100.00
	4	4.75	0.00	0.00	119.76	100.00
	10	2.00	1.69	1.69	118.07	98.59
-10			(Based on calculated sieve wt.)			
	20	0.85	2.98	3.70	47.59	92.78
	40	0.425	6.86	10.56	40.73	79.41
	60	0.250	8.78	19.34	31.95	62.29
	140	0.106	15.60	34.94	16.35	31.88
	200	0.075	5.41	40.35	10.94	21.33
	dry pan		0.25	40.60	10.69	
	wet pan			10.69	0.00	

d_{10} (mm): 0.019 d_{50} (mm): 0.18
d_{16} (mm): 0.058 d_{60} (mm): 0.23
d_{30} (mm): 0.100 d_{84} (mm): 0.54

Median Particle Diameter--d_{50} (mm): 0.18
Uniformity Coefficient, Cu--$[d_{60}/d_{10}]$ (mm): 12
Coefficient of Curvature, Cc--$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 2.3
Mean Particle Diameter--$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.26

ASTM Soil Classification: Classification by ASTM 2487 requires Atterberg test
USDA Soil Classification: Loamy Sand

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

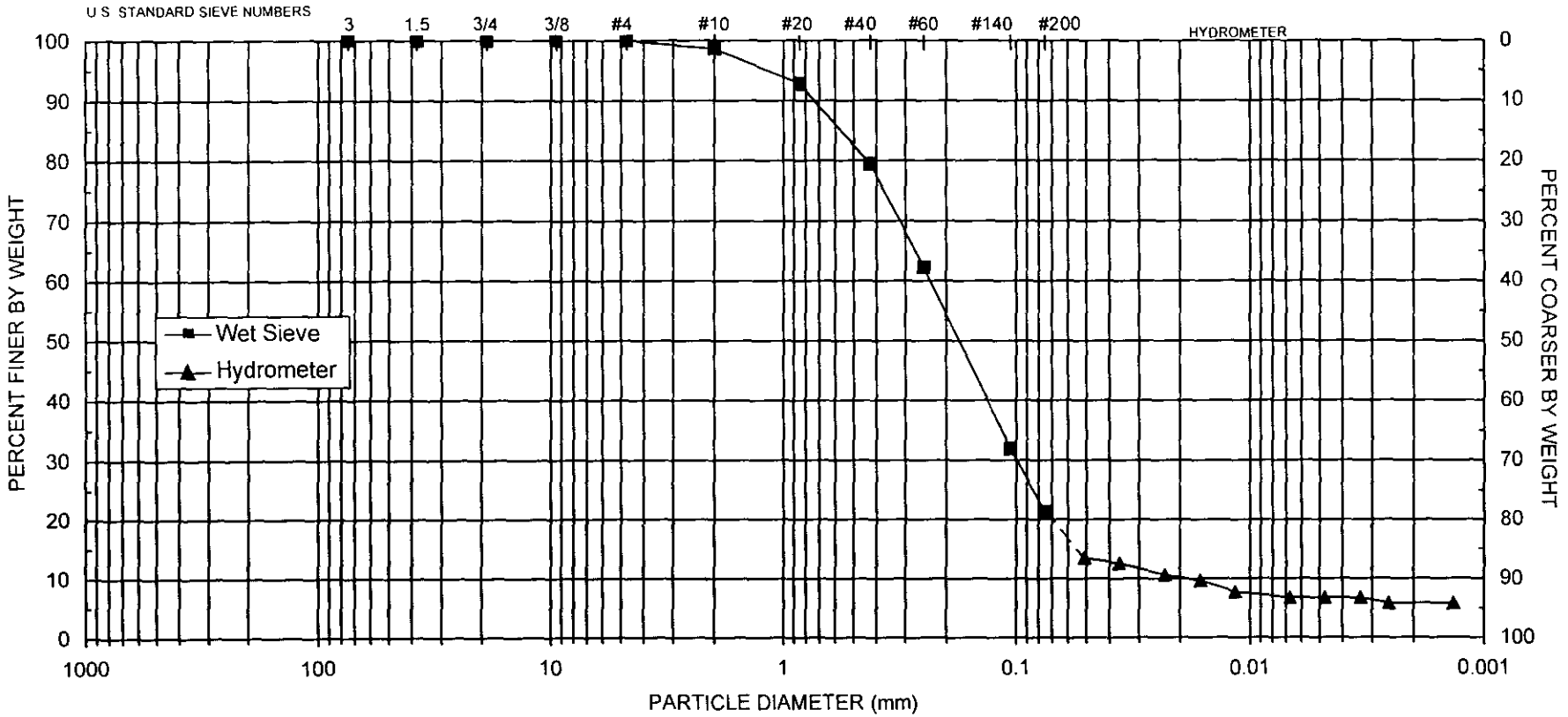
Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF6
Ring Number: NA
Depth: NA
Test Date: 14-Dec-04
Start Time: 9:10

Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant: $(NaPO_3)_6$
Measured particle density: 2.68
Initial Wt. (g): 50.57
Total Sample Wt. (g): 119.76
Wt. Passing #10 (g): 118.07

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
15-Dec-04	1	18.9	14.0	7.0	7.0	14.0	0.05122	13.7	13.5
	2	18.9	13.5	7.0	6.5	14.1	0.03632	12.7	12.5
	5	18.9	12.5	7.0	5.5	14.3	0.02310	10.8	10.6
	10	18.9	12.0	7.0	5.0	14.3	0.01638	9.8	9.7
	20	18.9	11.0	7.0	4.0	14.5	0.01165	7.8	7.7
	60	18.9	10.5	7.0	3.5	14.6	0.00675	6.9	6.8
	120	19.0	10.5	7.0	3.5	14.6	0.00476	6.9	6.8
	240	19.0	10.5	7.0	3.5	14.6	0.00337	6.9	6.8
	410	20.0	10.0	7.0	3.0	14.7	0.00255	5.9	5.8
16-Dec-04	1430	20.9	9.5	6.5	3.0	14.7	0.00135	5.9	5.8

Comments:

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY				
		Coarse	Fine	Coarse	Medium	Fine					
USDA	COBBLES	GRAVEL		SAND				SILT		CLAY	
				Very coarse	Coarse	Medium	Fine	Very fine			

d_{10} = **0.019**	d_{30} = **0.10**	d_{50} = **0.18**	d_{60} = **0.23**	C_u = **12**	C_c = **2.3**

SAMPLE NUMBER	DEPTH	ASTM CLASSIFICATION	USDA CLASSIFICATION
B18DF6	**NA**	**Classification by ASTM 2487 requires Atterberg test**	**Loamy Sand**

Daniel B. Stephens & Associates, Inc.

000001 31

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name:	Fluor Hanford	*Initial Dry Weight of Sample (g):*	189.68
Job Number:	LB04.0220.00	*Weight Passing #10 (g):*	189.68
Sample Number:	B18DF9	*Weight Retained #10 (g):*	0.00
Ring Number:	NA	*Weight of Hydrometer Sample (g):*	52.24
Depth:	NA	*Calculated Weight of Sieve Sample (g):*	52.24
Test Date:	14-Dec-04		

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	189.68	100.00
	1.5"	38.1	0.00	0.00	189.68	100.00
	3/4"	19.0	0.00	0.00	189.68	100.00
	3/8"	9.5	0.00	0.00	189.68	100.00
	4	4.75	0.00	0.00	189.68	100.00
	10	2.00	0.00	0.00	189.68	100.00
-10			(Based on calculated sieve wt.)			
	20	0.85	0.01	0.01	52.23	99.98
	40	0.425	0.06	0.07	52.17	99.87
	60	0.250	0.19	0.26	51.98	99.50
	140	0.106	2.32	2.58	49.66	95.06
	200	0.075	3.41	5.99	46.25	88.53
	dry pan		1.33	7.32	44.92	
	wet pan			44.92	0.00	

d_{10} (mm):	0.0024	d_{50} (mm):	0.022
d_{16} (mm):	0.0042	d_{60} (mm):	0.033
d_{30} (mm):	0.010	d_{84} (mm):	0.066

Median Particle Diameter--d_{50} (mm): 0.022

Uniformity Coefficient, Cu--$[d_{60}/d_{10}]$ (mm): 14

Coefficient of Curvature, Cc--$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 1.3

Mean Particle Diameter--$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.031

ASTM Soil Classification: Classification by ASTM 2487 requires Atterberg test

USDA Soil Classification: Silt Loam

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF9
Ring Number: NA
Depth: NA

Test Date: 14-Dec-04
Start Time: 9:16

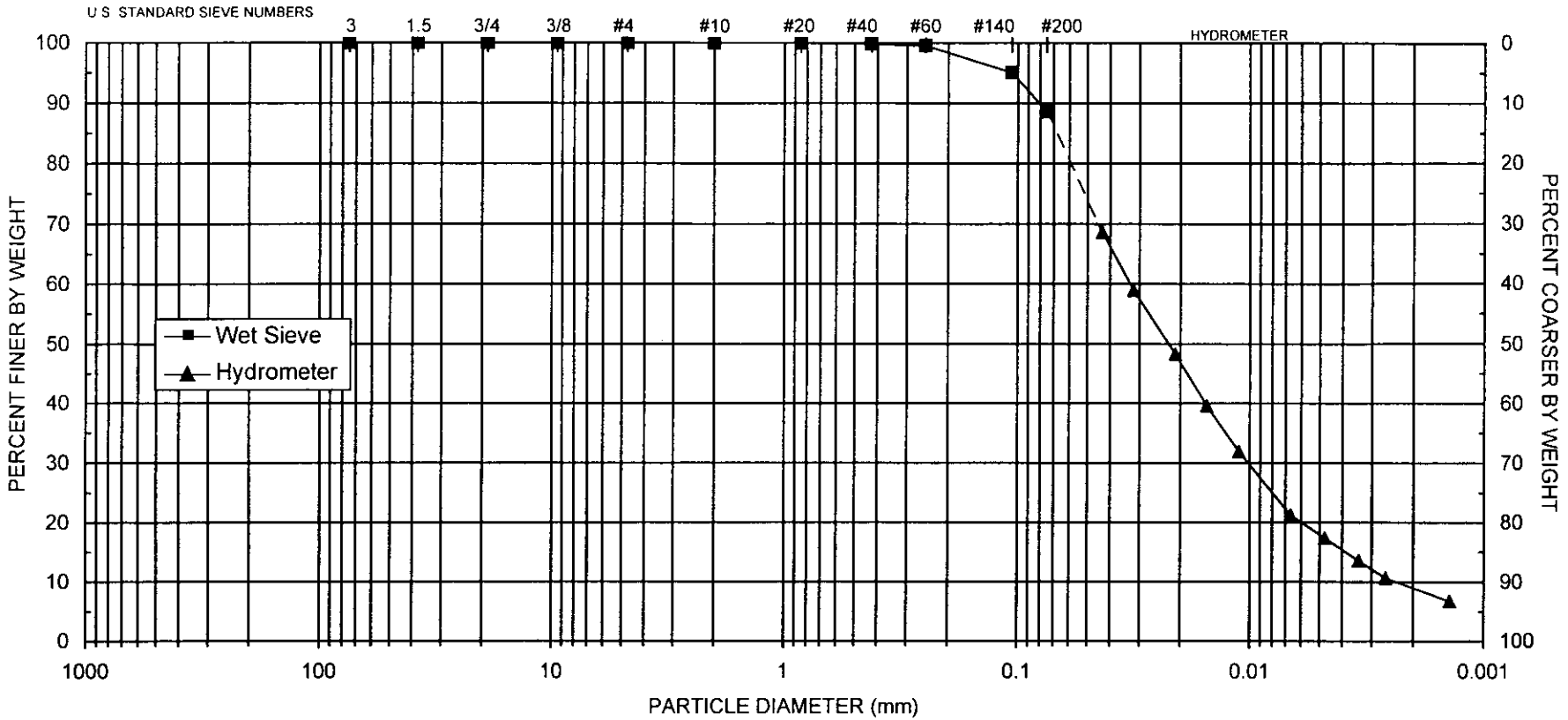
Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant: $(NaPO_3)_6$
Measured particle density: 2.58

Initial Wt. (g)*:* 52.24
Total Sample Wt. (g)*:* 189.68
Wt. Passing #10 (g): 189.68

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
15-Dec-04	1	18.9	42.5	7.0	35.5	9.3	0.04320	68.6	68.6
	2	18.9	37.5	7.0	30.5	10.2	0.03186	59.0	59.0
	5	18.9	32.0	7.0	25.0	11.1	0.02103	48.3	48.3
	10	18.9	27.5	7.0	20.5	11.8	0.01536	39.6	39.6
	20	18.9	23.5	7.0	16.5	12.4	0.01116	31.9	31.9
	60	18.9	18.0	7.0	11.0	13.3	0.00667	21.3	21.3
	120	19.0	16.0	7.0	9.0	13.7	0.00477	17.4	17.4
	240	19.0	14.0	7.0	7.0	14.0	0.00341	13.5	13.5
	404	20.0	12.5	7.0	5.5	14.3	0.00262	10.6	10.6
16-Dec-04	1424	20.9	10.0	6.5	3.5	14.7	0.00140	6.8	6.8

Comments:

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY				
		Coarse	Fine	Coarse	Medium	Fine					
USDA	COBBLES	GRAVEL		SAND				SILT		CLAY	
				Very coarse	Coarse	Medium	Fine	Very fine			

d_{10} = **0.0024**	d_{30} = **0.010**	d_{50} = **0.022**	d_{60} = **0.033**	C_u = **14**	C_c = **1.3**

SAMPLE NUMBER	DEPTH	ASTM CLASSIFICATION	USDA CLASSIFICATION
B18DF9	**NA**	**Classification by ASTM 2487 requires Atterberg test**	**Silt Loam**

Daniel B. Stephens & Associates, Inc.

000001 34

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name:	Fluor Hanford	*Initial Dry Weight of Sample (g):*	627.04
Job Number:	LB04.0220.00	*Weight Passing #10 (g):*	627.04
Sample Number:	B18DD5	*Weight Retained #10 (g):*	0.00
Ring Number:	NA	*Weight of Hydrometer Sample (g):*	50.11
Depth:	NA	*Calculated Weight of Sieve Sample (g):*	50.11
Test Date:	1-Dec-04		

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	627.04	100.00
	1.5"	38.1	0.00	0.00	627.04	100.00
	3/4"	19.0	0.00	0.00	627.04	100.00
	3/8"	9.5	0.00	0.00	627.04	100.00
	4	4.75	0.00	0.00	627.04	100.00
	10	2.00	0.00	0.00	627.04	100.00
-10			(Based on calculated sieve wt.)			
	20	0.85	0.00	0.00	50.11	100.00
	40	0.425	0.01	0.01	50.10	99.98
	60	0.250	0.04	0.05	50.06	99.90
	140	0.106	0.36	0.41	49.70	99.18
	200	0.075	1.32	1.73	48.38	96.55
	dry pan		0.10	1.83	48.28	
	wet pan			48.28	0.00	

d_{10} (mm):	0.00071	d_{50} (mm):	0.015
d_{16} (mm):	0.0023	d_{60} (mm):	0.021
d_{30} (mm):	0.0071	d_{84} (mm):	0.048

Median Particle Diameter--d_{50} (mm): 0.015
Uniformity Coefficient, Cu--$[d_{60}/d_{10}]$ (mm): 30
Coefficient of Curvature, Cc--$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 3.4
Mean Particle Diameter--$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.022

Note: Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

ASTM Soil Classification: Classification by ASTM 2487 requires Atterberg test
USDA Soil Classification: Silt Loam

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DD5
Ring Number: NA
Depth: NA

Test Date: 1-Dec-04
Start Time: 8:12

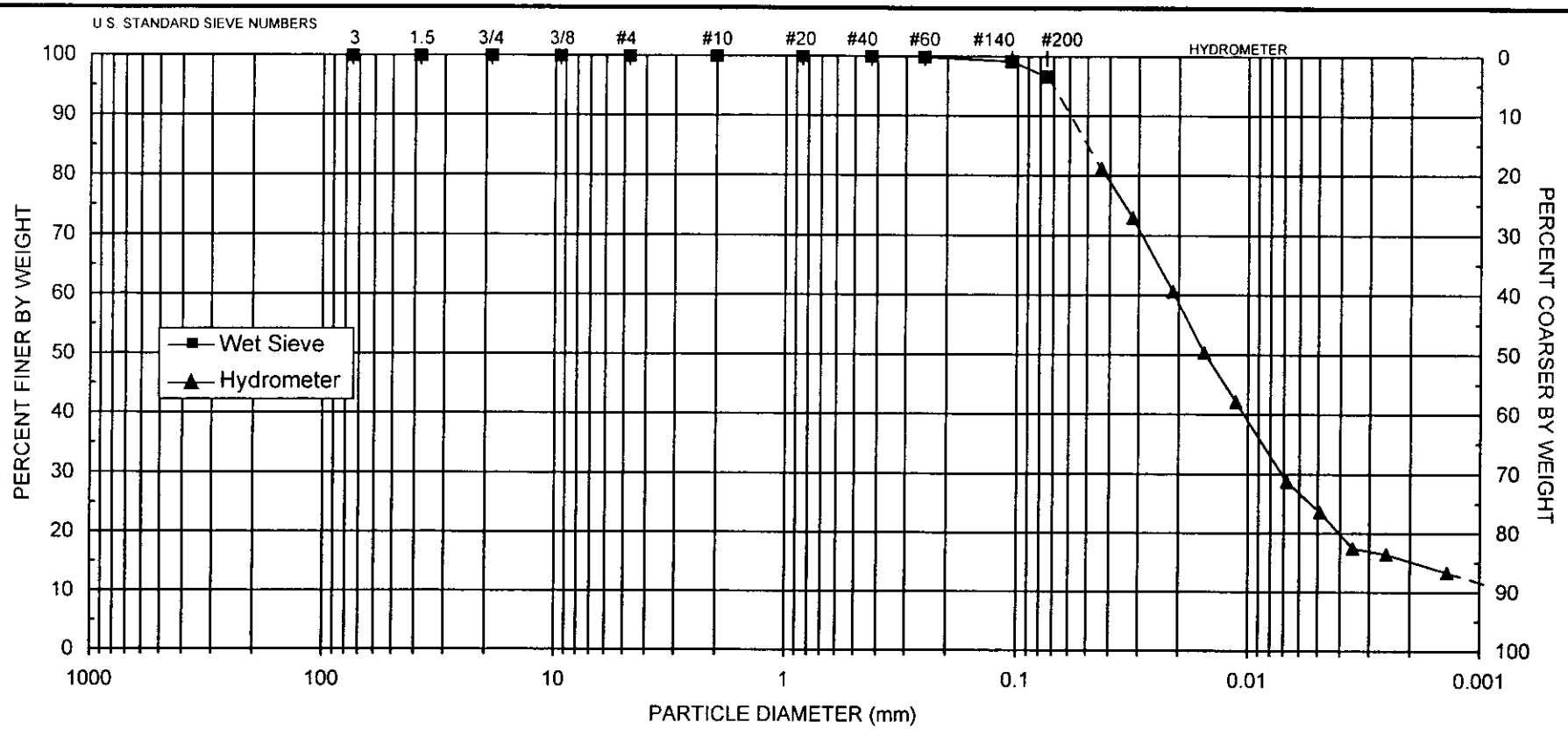
Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant: $(NaPO_3)_6$
Measured particle density: 2.48

Initial Wt. (g)*:* 50.11
Total Sample Wt. (g)*:* 627.04
Wt. Passing #10 (g): 627.04

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
10-Dec-04	1	19.6	44.0	4.5	39.5	9.1	0.04364	81.2	81.2
	2	19.6	40.0	4.5	35.5	9.7	0.03196	73.0	73.0
	5	19.6	34.0	4.5	29.5	10.7	0.02121	60.6	60.6
	10	19.6	29.0	4.5	24.5	11.5	0.01556	50.4	50.4
	20	19.6	25.0	4.5	20.5	12.2	0.01131	42.1	42.1
	60	19.5	18.5	4.5	14.0	13.3	0.00682	28.8	28.8
	120	19.3	16.0	4.5	11.5	13.7	0.00491	23.6	23.6
	240	19.1	13.0	4.5	8.5	14.2	0.00354	17.5	17.5
	469	18.8	13.0	5.0	8.0	14.2	0.00254	16.4	16.4
11-Dec-04	1579	19.8	11.0	4.5	6.5	14.5	0.00138	13.4	13.4

Comments:

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY				
		Coarse	Fine	Coarse	Medium	Fine					
USDA	COBBLES	GRAVEL		SAND				SILT		CLAY	
				Very coarse	Coarse	Medium	Fine	Very fine			

d_{10} = **0.00071**	d_{30} = **0.0071**	d_{50} = **0.015**	d_{60} = **0.021**	C_u = **30**	C_c = **3.4**

SAMPLE NUMBER	DEPTH	ASTM CLASSIFICATION	USDA CLASSIFICATION
B18DD5	**NA**	**Classification by ASTM 2487 requires Atterberg test**	**Silt Loam**

Note: Reported values for d_{10}, C_u, C_c, and ASTM classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Daniel B. Stephens & Associates, Inc.

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Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name:	Fluor Hanford	*Initial Dry Weight of Sample (g):*	456.76
Job Number:	LB04.0220.00	*Weight Passing #10 (g):*	456.76
Sample Number:	B18DD6	*Weight Retained #10 (g):*	0.00
Ring Number:	NA	*Weight of Hydrometer Sample (g):*	50.02
Depth:	NA	*Calculated Weight of Sieve Sample (g):*	50.02
Test Date:	1-Dec-04		

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	456.76	100.00
	1.5"	38.1	0.00	0.00	456.76	100.00
	3/4"	19.0	0.00	0.00	456.76	100.00
	3/8"	9.5	0.00	0.00	456.76	100.00
	4	4.75	0.00	0.00	456.76	100.00
	10	2.00	0.00	0.00	456.76	100.00
-10			(Based on calculated sieve wt.)			
	20	0.85	0.01	0.01	50.01	99.98
	40	0.425	0.12	0.13	49.89	99.74
	60	0.250	0.29	0.42	49.60	99.16
	140	0.106	3.72	4.14	45.88	91.72
	200	0.075	5.40	9.54	40.48	80.93
	dry pan		2.56	12.10	37.92	
	wet pan			37.92	0.00	

d_{10} (mm):	0.0053	d_{50} (mm):	0.042
d_{16} (mm):	0.0088	d_{60} (mm):	0.051
d_{30} (mm):	0.024	d_{84} (mm):	0.083

Median Particle Diameter--d_{50} (mm): 0.042

Uniformity Coefficient, Cu--$[d_{60}/d_{10}]$ (mm): 9.6

Coefficient of Curvature, Cc--$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 2.1

Mean Particle Diameter--$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.045

ASTM Soil Classification: Classification by ASTM 2487 requires Atterberg test

USDA Soil Classification: Silt Loam

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DD6
Ring Number: NA
Depth: NA

Test Date: 1-Dec-04
Start Time: 8:06

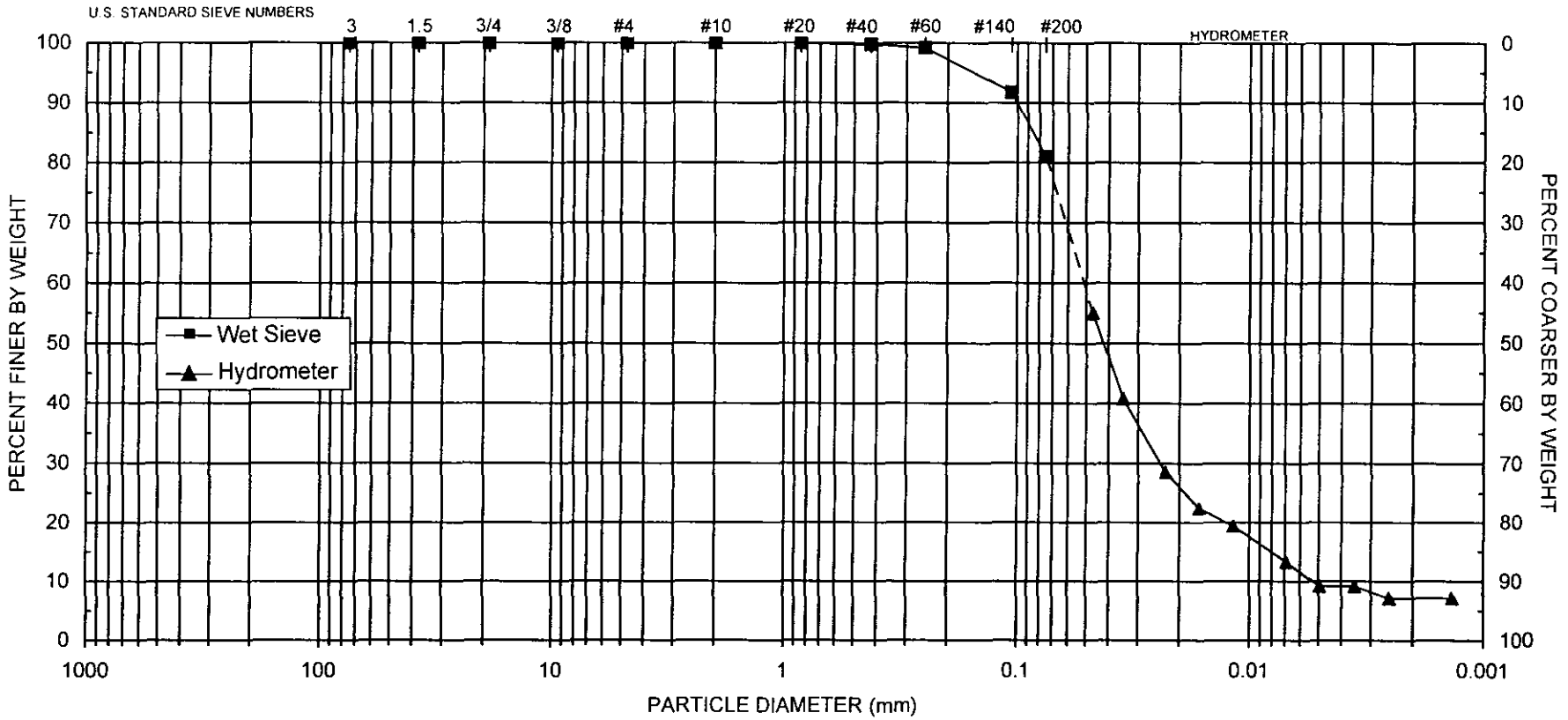
Type of Water Used: DISTILLED
Reaction with H_2O_2: NA
Dispersant: $(NaPO_3)_6$
Measured particle density: 2.57

Initial Wt. (g): 50.02
Total Sample Wt. (g): 456.76
Wt. Passing #10 (g): 456.76

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
10-Dec-04	1	19.6	31.5	4.5	27.0	11.1	0.04682	55.1	55.1
	2	19.6	24.5	4.5	20.0	12.3	0.03477	40.8	40.8
	5	19.6	18.5	4.5	14.0	13.3	0.02285	28.5	28.5
	10	19.6	15.5	4.5	11.0	13.8	0.01646	22.4	22.4
	20	19.6	14.0	4.5	9.5	14.0	0.01174	19.4	19.4
	60	19.5	11.0	4.5	6.5	14.5	0.00690	13.3	13.3
	120	19.3	9.0	4.5	4.5	14.8	0.00495	9.2	9.2
	240	19.1	9.0	4.5	4.5	14.8	0.00351	9.2	9.2
	474	18.8	8.5	5.0	3.5	14.9	0.00251	7.1	7.1
11-Dec-04	1584	19.8	8.0	4.5	3.5	15.0	0.00136	7.1	7.1

Comments:

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY				
		Coarse	Fine	Coarse	Medium	Fine					
USDA	COBBLES	GRAVEL		SAND				SILT		CLAY	
				Very coarse	Coarse	Medium	Fine	Very fine			

d_{10} = **0.0053**	d_{30} = **0.024**	d_{50} = **0.042**	d_{60} = **0.051**	C_u = **9.6**	C_c = **2.1**

SAMPLE NUMBER	DEPTH	ASTM CLASSIFICATION	USDA CLASSIFICATION
B18DD6	**NA**	**Classification by ASTM 2487 requires Atterberg test**	**Silt Loam**

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name:	Fluor Hanford	*Initial Dry Weight of Sample (g):*	536.90
Job Number:	LB04.0220.00	*Weight Passing #10 (g):*	536.90
Sample Number:	B18DF2	*Weight Retained #10 (g):*	0.00
Ring Number:	NA	*Weight of Hydrometer Sample (g):*	50.22
Depth:	NA	*Calculated Weight of Sieve Sample (g):*	50.22
Test Date:	1-Dec-04		

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	536.90	100.00
	1.5"	38.1	0.00	0.00	536.90	100.00
	3/4"	19.0	0.00	0.00	536.90	100.00
	3/8"	9.5	0.00	0.00	536.90	100.00
	4	4.75	0.00	0.00	536.90	100.00
	10	2.00	0.00	0.00	536.90	100.00
-10			(Based on calculated sieve wt.)			
	20	0.85	0.10	0.10	50.12	99.80
	40	0.425	0.11	0.21	50.01	99.58
	60	0.250	0.09	0.30	49.92	99.40
	140	0.106	0.81	1.11	49.11	97.79
	200	0.075	2.17	3.28	46.94	93.47
	dry pan		0.33	3.61	46.61	
	wet pan			46.61	0.00	

d_{10} (mm):	0.00019	d_{50} (mm):	0.019
d_{16} (mm):	0.0029	d_{60} (mm):	0.027
d_{30} (mm):	0.0082	d_{84} (mm):	0.055

Median Particle Diameter--d_{50} (mm): 0.019

Uniformity Coefficient, Cu--[d_{60}/d_{10}] (mm): 142

Coefficient of Curvature, Cc--[$(d_{30})^2/(d_{10}*d_{60})$] (mm): 13

Mean Particle Diameter--[$(d_{16}+d_{50}+d_{84})/3$] (mm): 0.026

Note: Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

ASTM Soil Classification: Classification by ASTM 2487 requires Atterberg test
USDA Soil Classification: Silt Loam

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

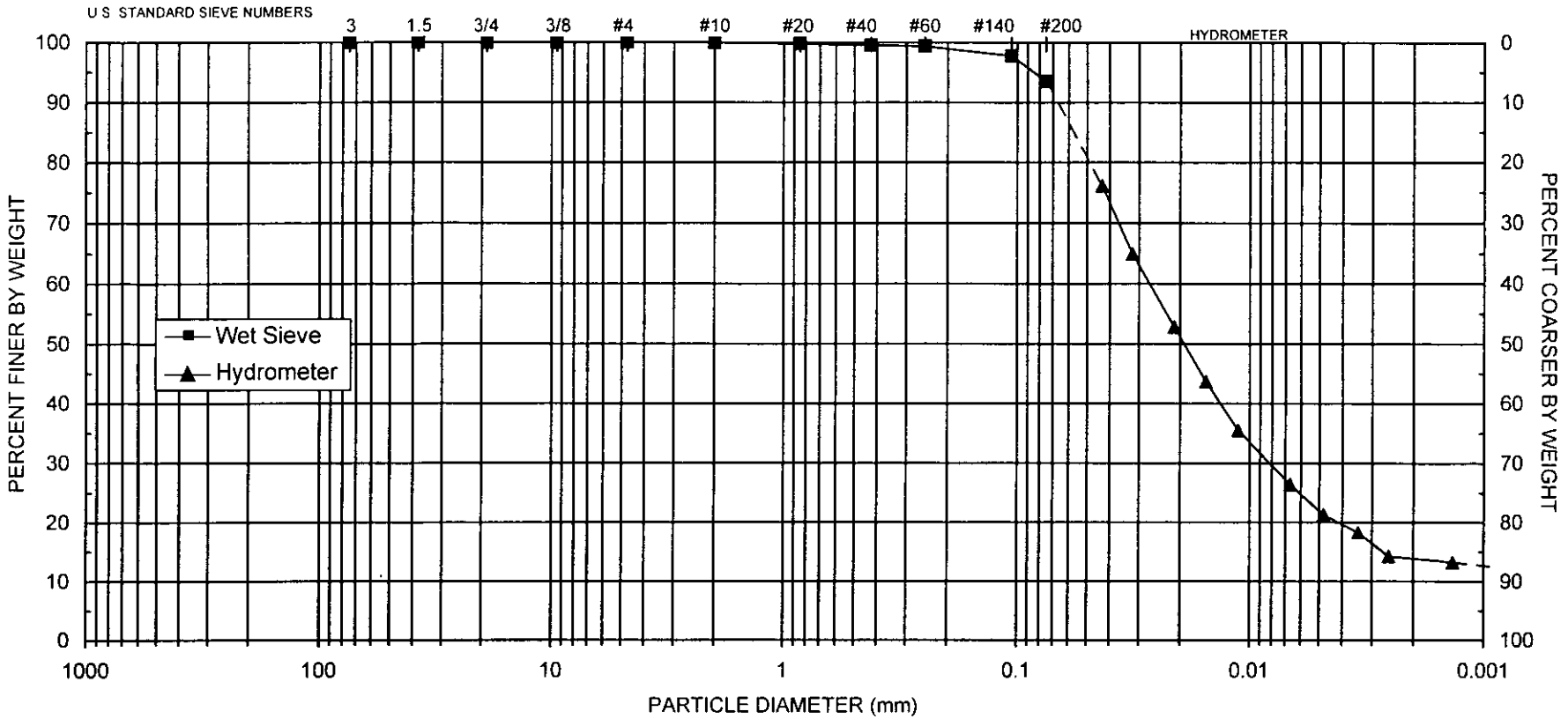
Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF2
Ring Number: NA
Depth: NA
Test Date: 1-Dec-04
Start Time: 8:36

Type of Water Used: DISTILLED
Reaction with H_2O_2: NA
Dispersant: $(NaPO_3)_6$
Measured particle density: 2.56
Initial Wt. (g): 50.22
Total Sample Wt. (g): 536.90
Wt. Passing #10 (g): 536.90

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
10-Dec-04	1	19.6	42.0	4.5	37.5	9.4	0.04325	76.2	76.2
	2	19.6	36.5	4.5	32.0	10.3	0.03201	65.0	65.0
	5	19.6	30.5	4.5	26.0	11.3	0.02119	52.8	52.8
	10	19.6	26.0	4.5	21.5	12.0	0.01547	43.7	43.7
	20	19.6	22.0	4.5	17.5	12.7	0.01123	35.5	35.5
	60	19.5	17.5	4.5	13.0	13.4	0.00668	26.4	26.4
	120	19.3	15.0	4.5	10.5	13.8	0.00481	21.3	21.3
	240	19.1	13.5	4.5	9.0	14.1	0.00344	18.3	18.3
	449	18.8	12.0	5.0	7.0	14.3	0.00254	14.2	14.2
11-Dec-04	1556	19.8	11.0	4.5	6.5	14.5	0.00136	13.2	13.2

Comments:

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



d_{10} = **0.00019**	d_{30} = **0.0082**	d_{50} = **0.019**	d_{60} = **0.027**	C_u = **142**	C_c = **13**

SAMPLE NUMBER	DEPTH	ASTM CLASSIFICATION	USDA CLASSIFICATION
B18DF2	**NA**	**Classification by ASTM 2487 requires Atterberg test**	**Silt Loam**

Note: Reported values for d_{10}, C_u, C_c, and ASTM classification are estimates, since extrapolation was required to obtain the d_{10} diameter

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Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name:	Fluor Hanford	*Initial Dry Weight of Sample (g):*	307.28
Job Number:	LB04.0220.00	*Weight Passing #10 (g):*	307.28
Sample Number:	B18DF4	*Weight Retained #10 (g):*	0.00
Ring Number:	NA	*Weight of Hydrometer Sample (g):*	50.09
Depth:	NA	*Calculated Weight of Sieve Sample (g):*	50.09
Test Date:	1-Dec-04		

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	307.28	100.00
	1.5"	38.1	0.00	0.00	307.28	100.00
	3/4"	19.0	0.00	0.00	307.28	100.00
	3/8"	9.5	0.00	0.00	307.28	100.00
	4	4.75	0.00	0.00	307.28	100.00
	10	2.00	0.00	0.00	307.28	100.00
-10			(Based on calculated sieve wt.)			
	20	0.85	0.01	0.01	50.08	99.98
	40	0.425	0.22	0.23	49.86	99.54
	60	0.250	1.09	1.32	48.77	97.36
	140	0.106	6.64	7.96	42.13	84.11
	200	0.075	5.46	13.42	36.67	73.21
	dry pan		1.46	14.88	35.21	
	wet pan			35.21	0.00	

d_{10} (mm):	0.0024	d_{50} (mm):	0.041
d_{16} (mm):	0.0048	d_{60} (mm):	0.056
d_{30} (mm):	0.015	d_{84} (mm):	0.11

Median Particle Diameter--d_{50} (mm): 0.041

Uniformity Coefficient, Cu--$[d_{60}/d_{10}]$ (mm): 23

Coefficient of Curvature, Cc--$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 1.7

Mean Particle Diameter--$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.052

ASTM Soil Classification: Classification by ASTM 2487 requires Atterberg test

USDA Soil Classification: Loam

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF4
Ring Number: NA
Depth: NA

Test Date: 1-Dec-04
Start Time: 8:42

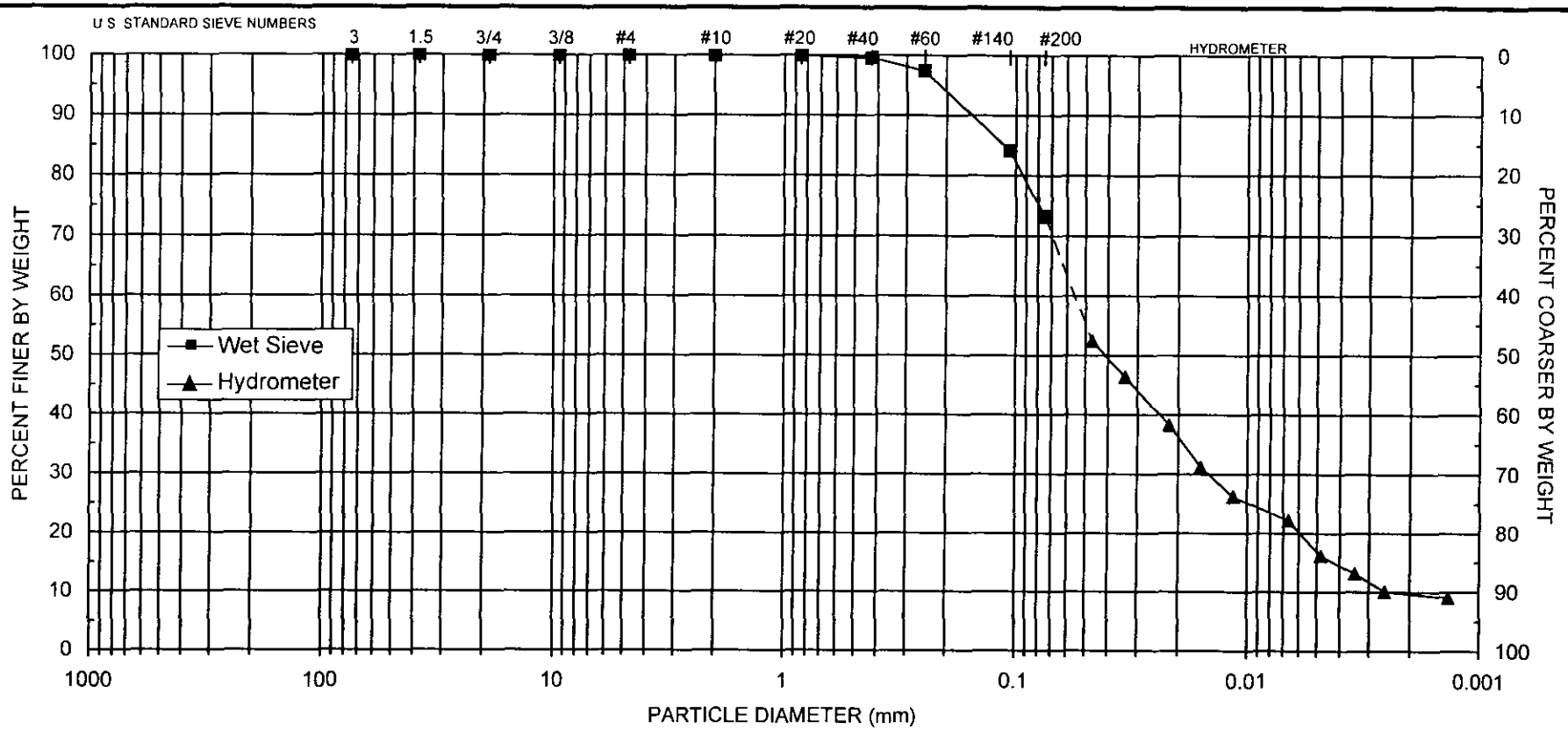
Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant: $(NaPO_3)_6$
Measured particle density: 2.59

Initial Wt. (g)*:* 50.09
Total Sample Wt. (g)*:* 307.28
Wt. Passing #10 (g): 307.28

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
10-Dec-04	1	19.6	30.5	4.5	26.0	11.3	0.04689	52.4	52.4
	2	19.6	27.5	4.5	23.0	11.8	0.03387	46.4	46.4
	5	19.6	23.5	4.5	19.0	12.4	0.02201	38.3	38.3
	10	19.6	20.0	4.5	15.5	13.0	0.01592	31.3	31.3
	20	19.6	17.5	4.5	13.0	13.4	0.01143	26.2	26.2
	60	19.5	15.5	4.5	11.0	13.8	0.00669	22.2	22.2
	120	19.3	12.5	4.5	8.0	14.3	0.00483	16.1	16.1
	240	19.1	11.0	4.5	6.5	14.5	0.00345	13.1	13.1
	443	18.8	10.0	5.0	5.0	14.7	0.00256	10.1	10.1
11-Dec-04	1551	19.8	9.0	4.5	4.5	14.8	0.00136	9.1	9.1

Comments:

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL: Coarse, Fine	SAND: Coarse, Medium, Fine	SILT OR CLAY		
USDA	COBBLES	GRAVEL	SAND: Very coarse, Coarse, Medium, Fine, Very fine	SILT	CLAY	

d_{10} = **0.0024**	d_{30} = **0.015**	d_{50} = **0.041**	d_{60} = **0.056**	C_u = **23**	C_c = **1.7**

SAMPLE NUMBER	DEPTH	ASTM CLASSIFICATION	USDA CLASSIFICATION
B18DF4	**NA**	**Classification by ASTM 2487 requires Atterberg test**	**Loam**

Daniel B. Stephens & Associates, Inc.

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Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF5
Ring Number: NA
Depth: NA
Test Date: 1-Dec-04

Initial Dry Weight of Sample (g): 343.28
Weight Passing #10 (g): 343.28
Weight Retained #10 (g): 0.00
Weight of Hydrometer Sample (g): 50.14
Calculated Weight of Sieve Sample (g): 50.14

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	343.28	100.00
	1.5"	38.1	0.00	0.00	343.28	100.00
	3/4"	19.0	0.00	0.00	343.28	100.00
	3/8"	9.5	0.00	0.00	343.28	100.00
	4	4.75	0.00	0.00	343.28	100.00
	10	2.00	0.00	0.00	343.28	100.00
-10			(Based on calculated sieve wt.)			
	20	0.85	0.02	0.02	50.12	99.96
	40	0.425	0.20	0.22	49.92	99.56
	60	0.250	0.49	0.71	49.43	98.58
	140	0.106	4.24	4.95	45.19	90.13
	200	0.075	6.17	11.12	39.02	77.82
	dry pan		1.15	12.27	37.87	
	wet pan			37.87	0.00	

d_{10} (mm): 0.0051
d_{16} (mm): 0.0074
d_{30} (mm): 0.019
d_{50} (mm): 0.031
d_{60} (mm): 0.048
d_{84} (mm): 0.089

Median Particle Diameter--d_{50} (mm): 0.031
Uniformity Coefficient, Cu--$[d_{60}/d_{10}]$ (mm): 9.4
Coefficient of Curvature, Cc--$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 1.5
Mean Particle Diameter--$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.042

ASTM Soil Classification: Classification by ASTM 2487 requires Atterberg test
USDA Soil Classification: Silt Loam

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF5
Ring Number: NA
Depth: NA

Test Date: 1-Dec-04
Start Time: 8:00

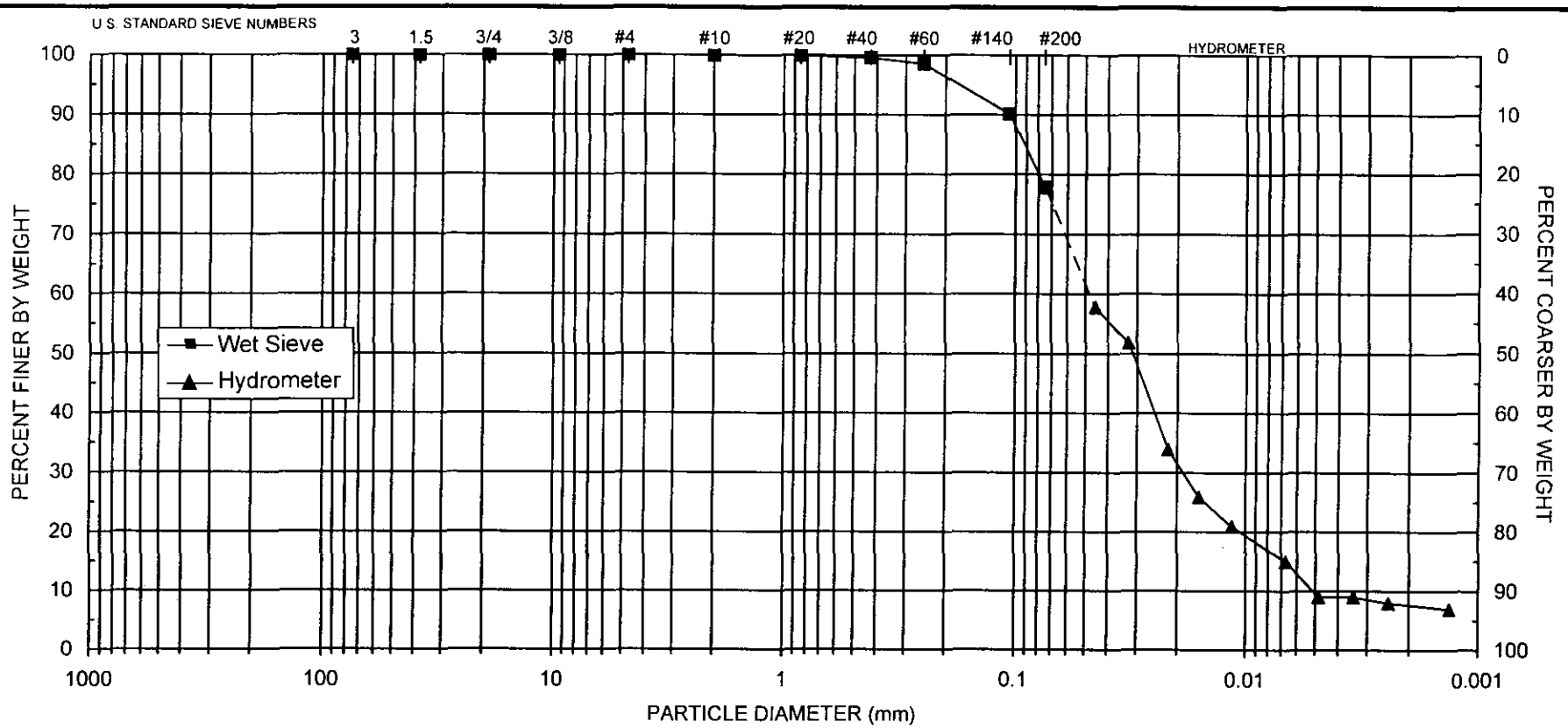
Type of Water Used: DISTILLED
Reaction with H_2O_2: NA
Dispersant: $(NaPO_3)_6$
Measured particle density: 2.63

Initial Wt. (g): 50.14
Total Sample Wt. (g): 343.28
Wt. Passing #10 (g): 343.28

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
10-Dec-04	1	19.6	33.5	4.5	29.0	10.8	0.04529	57.8	57.8
	2	19.6	30.5	4.5	26.0	11.3	0.03275	51.9	51.9
	5	19.6	21.5	4.5	17.0	12.8	0.02202	33.9	33.9
	10	19.6	17.5	4.5	13.0	13.4	0.01597	25.9	25.9
	20	19.6	15.0	4.5	10.5	13.8	0.01146	20.9	20.9
	60	19.5	12.0	4.5	7.5	14.3	0.00674	15.0	15.0
	120	19.3	9.0	4.5	4.5	14.8	0.00486	9.0	9.0
	240	19.1	9.0	4.5	4.5	14.8	0.00345	9.0	9.0
	480	18.8	9.0	5.0	4.0	14.8	0.00245	8.0	8.0
11-Dec-04	1590	19.8	8.0	4.5	3.5	15.0	0.00133	7.0	7.0

Comments:

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY				
		Coarse	Fine	Coarse	Medium	Fine					
USDA	COBBLES	GRAVEL		SAND				SILT		CLAY	
				Very coarse	Coarse	Medium	Fine	Very fine			

d_{10} = **0.0051**	d_{30} = **0.019**	d_{50} = **0.031**	d_{60} = **0.048**	C_u = **9.4**	C_c = **1.5**

SAMPLE NUMBER	DEPTH	ASTM CLASSIFICATION	USDA CLASSIFICATION
B18DF5	**NA**	**Classification by ASTM 2487 requires Atterberg test**	**Silt Loam**

Daniel B. Stephens & Associates, Inc.

000049

Summary of Particle Density Tests

Sample Number	Particle Density (g/cm^3)
B18DD3/B18DD2 Composite	2.51
B18DD4/B18DF7 Composite	2.53
B18DF8	2.56
B18DF6	2.68
B18DF9	2.58
B18DD5	2.48
B18DD6	2.57
B18DF2	2.56
B18DF4	2.59
B18DF5	2.63

Daniel B. Stephens & Associates, Inc.

Particle Density

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DD3/B18DD2 Composite
Ring Number: NA
Depth: NA

Test Date: 8-Dec-04

Trial 1

Weight of pycnometer filled w/air (g):	90.99
Weight of pycnometer filled w/soil (g):	141.04
Weight of pycnometer filled w/soil & water (g):	370.43
Weight of pycnometer filled w/water (g):	340.28
Observed temperature (°C):	19.80
Density of water at observed temperature (g/cm^3):	0.9982
Particle Density (g/cm^3):	2.51
Correction factor, K:	1.0000
Particle Density at 20°C (g/cm^3):	2.51

Trial 2

Weight of pycnometer filled w/air (g):	91.29
Weight of pycnometer filled w/soil (g):	141.26
Weight of pycnometer filled w/soil & water (g):	370.56
Weight of pycnometer filled w/water (g):	340.42
Observed temperature (°C):	19.90
Density of water at observed temperature (g/cm^3):	0.9982
Particle Density (g/cm^3):	2.51
Correction factor, K:	1.0000
Particle Density at 20°C (g/cm^3):	2.51

***Average Particle Density* (g/cm^3):** **2.51**

Comments:

Laboratory analysis by: E. Kruth
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Density

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DD4/B18DF7 Composite
Ring Number: NA
Depth: NA

Test Date: 8-Dec-04

Trial 1

Weight of pycnometer filled w/air (g):	91.08
Weight of pycnometer filled w/soil (g):	141.47
Weight of pycnometer filled w/soil & water (g):	370.90
Weight of pycnometer filled w/water (g):	340.37
Observed temperature (°C):	19.90
Density of water at observed temperature (g/cm^3):	0.9982
Particle Density (g/cm^3):	2.53
Correction factor, K:	1.0000
Particle Density at 20°C (g/cm^3):	2.53

Trial 2

Weight of pycnometer filled w/air (g):	90.66
Weight of pycnometer filled w/soil (g):	140.77
Weight of pycnometer filled w/soil & water (g):	370.07
Weight of pycnometer filled w/water (g):	339.69
Observed temperature (°C):	20.20
Density of water at observed temperature (g/cm^3):	0.9982
Particle Density (g/cm^3):	2.54
Correction factor, K:	1.0000
Particle Density at 20°C (g/cm^3):	2.54

***Average Particle Density* (g/cm^3):** **2.53**

Comments:

Laboratory analysis by: E. Kruth
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Density

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF8
Ring Number: NA
Depth: NA

Test Date: 8-Dec-04

Trial 1

Weight of pycnometer filled w/air (g):	100.51
Weight of pycnometer filled w/soil (g):	150.73
Weight of pycnometer filled w/soil & water (g):	380.32
Weight of pycnometer filled w/water (g):	349.79
Observed temperature (°C):	20.00
Density of water at observed temperature (g/cm^3):	0.9982
Particle Density (g/cm^3):	2.55
Correction factor, K:	1.0000
Particle Density at 20°C (g/cm^3):	2.55

Trial 2

Weight of pycnometer filled w/air (g):	91.45
Weight of pycnometer filled w/soil (g):	142.06
Weight of pycnometer filled w/soil & water (g):	371.50
Weight of pycnometer filled w/water (g):	340.55
Observed temperature (°C):	19.90
Density of water at observed temperature (g/cm^3):	0.9982
Particle Density (g/cm^3):	2.57
Correction factor, K:	1.0000
Particle Density at 20°C (g/cm^3):	2.57

***Average Particle Density* (g/cm^3):** **2.56**

Comments:

Laboratory analysis by: E. Kruth
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Density

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF6
Ring Number: NA
Depth: NA
Test Date: 13-Dec-04

Trial 1

Weight of pycnometer filled w/air (g):	99.31
Weight of pycnometer filled w/soil (g):	151.25
Weight of pycnometer filled w/soil & water (g):	381.19
Weight of pycnometer filled w/water (g):	348.58
Observed temperature (°C):	19.50
Density of water at observed temperature (g/cm^3):	0.9983
Particle Density (g/cm^3):	2.68
Correction factor, K:	1.0001
Particle Density at 20°C (g/cm^3):	2.68

Trial 2

Weight of pycnometer filled w/air (g):	91.53
Weight of pycnometer filled w/soil (g):	141.24
Weight of pycnometer filled w/soil & water (g):	371.98
Weight of pycnometer filled w/water (g):	340.76
Observed temperature (°C):	19.50
Density of water at observed temperature (g/cm^3):	0.9983
Particle Density (g/cm^3):	2.68
Correction factor, K:	1.0001
Particle Density at 20°C (g/cm^3):	2.68

***Average Particle Density* (g/cm^3):** **2.68**

Comments:

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Density

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF9
Ring Number: NA
Depth: NA

Test Date: 13-Dec-04

Trial 1

Weight of pycnometer filled w/air (g):	102.44
Weight of pycnometer filled w/soil (g):	136.56
Weight of pycnometer filled w/soil & water (g):	372.58
Weight of pycnometer filled w/water (g):	351.68
Observed temperature (°C):	20.50
Density of water at observed temperature (g/cm^3):	0.9981
Particle Density (g/cm^3):	2.58
Correction factor, K:	0.9999
Particle Density at 20°C (g/cm^3):	2.58

Trial 2

Weight of pycnometer filled w/air (g):	85.93
Weight of pycnometer filled w/soil (g):	137.50
Weight of pycnometer filled w/soil & water (g):	366.88
Weight of pycnometer filled w/water (g):	335.29
Observed temperature (°C):	19.50
Density of water at observed temperature (g/cm^3):	0.9983
Particle Density (g/cm^3):	2.58
Correction factor, K:	1.0001
Particle Density at 20°C (g/cm^3):	2.58

Average Particle Density **(g/cm^3):** **2.58**

Comments:

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Density

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DD5
Ring Number: NA
Depth: NA
Test Date: 8-Dec-04

Trial 1

Weight of pycnometer filled w/air (g):	99.95
Weight of pycnometer filled w/soil (g):	149.97
Weight of pycnometer filled w/soil & water (g):	379.04
Weight of pycnometer filled w/water (g):	349.22
Observed temperature (°C):	20.20
Density of water at observed temperature (g/cm^3):	0.9982
Particle Density (g/cm^3):	2.47
Correction factor, K:	1.0000
Particle Density at 20°C (g/cm^3):	2.47

Trial 2

Weight of pycnometer filled w/air (g):	102.44
Weight of pycnometer filled w/soil (g):	152.52
Weight of pycnometer filled w/soil & water (g):	381.65
Weight of pycnometer filled w/water (g):	351.69
Observed temperature (°C):	20.20
Density of water at observed temperature (g/cm^3):	0.9982
Particle Density (g/cm^3):	2.48
Correction factor, K:	1.0000
Particle Density at 20°C (g/cm^3):	2.48

***Average Particle Density* (g/cm^3):** **2.48**

Comments:

Laboratory analysis by: E. Kruth
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Density

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DD6
Ring Number: NA
Depth: NA

Test Date: 8-Dec-04

Trial 1

Weight of pycnometer filled w/air (g):	91.50
Weight of pycnometer filled w/soil (g):	141.49
Weight of pycnometer filled w/soil & water (g):	371.36
Weight of pycnometer filled w/water (g):	340.71
Observed temperature (°C):	20.20
Density of water at observed temperature (g/cm^3):	0.9982
Particle Density (g/cm^3):	2.58
Correction factor, K:	1.0000
Particle Density at 20°C (g/cm^3):	2.58

Trial 2

Weight of pycnometer filled w/air (g):	100.10
Weight of pycnometer filled w/soil (g):	150.29
Weight of pycnometer filled w/soil & water (g):	380.09
Weight of pycnometer filled w/water (g):	349.42
Observed temperature (°C):	19.90
Density of water at observed temperature (g/cm^3):	0.9982
Particle Density (g/cm^3):	2.57
Correction factor, K:	1.0000
Particle Density at 20°C (g/cm^3):	2.57

***Average Particle Density* (g/cm^3):** **2.57**

Comments:

Laboratory analysis by: E. Kruth
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Density

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF2
Ring Number: NA
Depth: NA
Test Date: 8-Dec-04

Trial 1

Weight of pycnometer filled w/air (g):	100.88
Weight of pycnometer filled w/soil (g):	150.94
Weight of pycnometer filled w/soil & water (g):	380.65
Weight of pycnometer filled w/water (g):	350.17
Observed temperature (°C):	19.90
Density of water at observed temperature (g/cm^3):	0.9982
Particle Density (g/cm^3):	2.55
Correction factor, K:	1.0000
Particle Density at 20°C (g/cm^3):	2.55

Trial 2

Weight of pycnometer filled w/air (g):	102.03
Weight of pycnometer filled w/soil (g):	152.01
Weight of pycnometer filled w/soil & water (g):	381.89
Weight of pycnometer filled w/water (g):	351.35
Observed temperature (°C):	20.10
Density of water at observed temperature (g/cm^3):	0.9982
Particle Density (g/cm^3):	2.57
Correction factor, K:	1.0000
Particle Density at 20°C (g/cm^3):	2.57

Average Particle Density **(g/cm^3):** **2.56**

Comments:

Laboratory analysis by: E. Kruth
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Density

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF4
Ring Number: NA
Depth: NA

Test Date: 8-Dec-04

Trial 1

Weight of pycnometer filled w/air (g):	100.61
Weight of pycnometer filled w/soil (g):	150.73
Weight of pycnometer filled w/soil & water (g):	380.74
Weight of pycnometer filled w/water (g):	349.89
Observed temperature (°C):	19.90
Density of water at observed temperature (g/cm^3):	0.9982
Particle Density (g/cm^3):	2.60
Correction factor, K:	1.0000
Particle Density at 20°C (g/cm^3):	2.60

Trial 2

Weight of pycnometer filled w/air (g):	93.34
Weight of pycnometer filled w/soil (g):	143.27
Weight of pycnometer filled w/soil & water (g):	373.19
Weight of pycnometer filled w/water (g):	342.52
Observed temperature (°C):	19.90
Density of water at observed temperature (g/cm^3):	0.9982
Particle Density (g/cm^3):	2.59
Correction factor, K:	1.0000
Particle Density at 20°C (g/cm^3):	2.59

***Average Particle Density* (g/cm^3):** **2.59**

Comments:

Laboratory analysis by: E. Kruth
Data entered by: D. O'Dowd
Checked by: J. Hines

Particle Density

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF5
Ring Number: NA
Depth: NA

Test Date: 8-Dec-04

Trial 1

Weight of pycnometer filled w/air (g):	99.92
Weight of pycnometer filled w/soil (g):	150.25
Weight of pycnometer filled w/soil & water (g):	380.28
Weight of pycnometer filled w/water (g):	349.07
Observed temperature (°C):	20.00
Density of water at observed temperature (g/cm^3):	0.9982
Particle Density (g/cm^3):	2.63
Correction factor, K:	1.0000
Particle Density at 20°C (g/cm^3):	2.63

Trial 2

Weight of pycnometer filled w/air (g):	90.84
Weight of pycnometer filled w/soil (g):	140.92
Weight of pycnometer filled w/soil & water (g):	371.13
Weight of pycnometer filled w/water (g):	340.01
Observed temperature (°C):	20.00
Density of water at observed temperature (g/cm^3):	0.9982
Particle Density (g/cm^3):	2.64
Correction factor, K:	1.0000
Particle Density at 20°C (g/cm^3):	2.64

***Average Particle Density* (g/cm^3):** **2.63**

Comments:

Laboratory analysis by: E. Kruth
Data entered by: D. O'Dowd
Checked by: J. Hines

Summary of Proctor Compaction Tests

Sample Number	Optimum Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm^3)
B18DD3/B18DD2 Composite	14.5	1.74
B18DD4/B18DF7 Composite	14.8	1.74

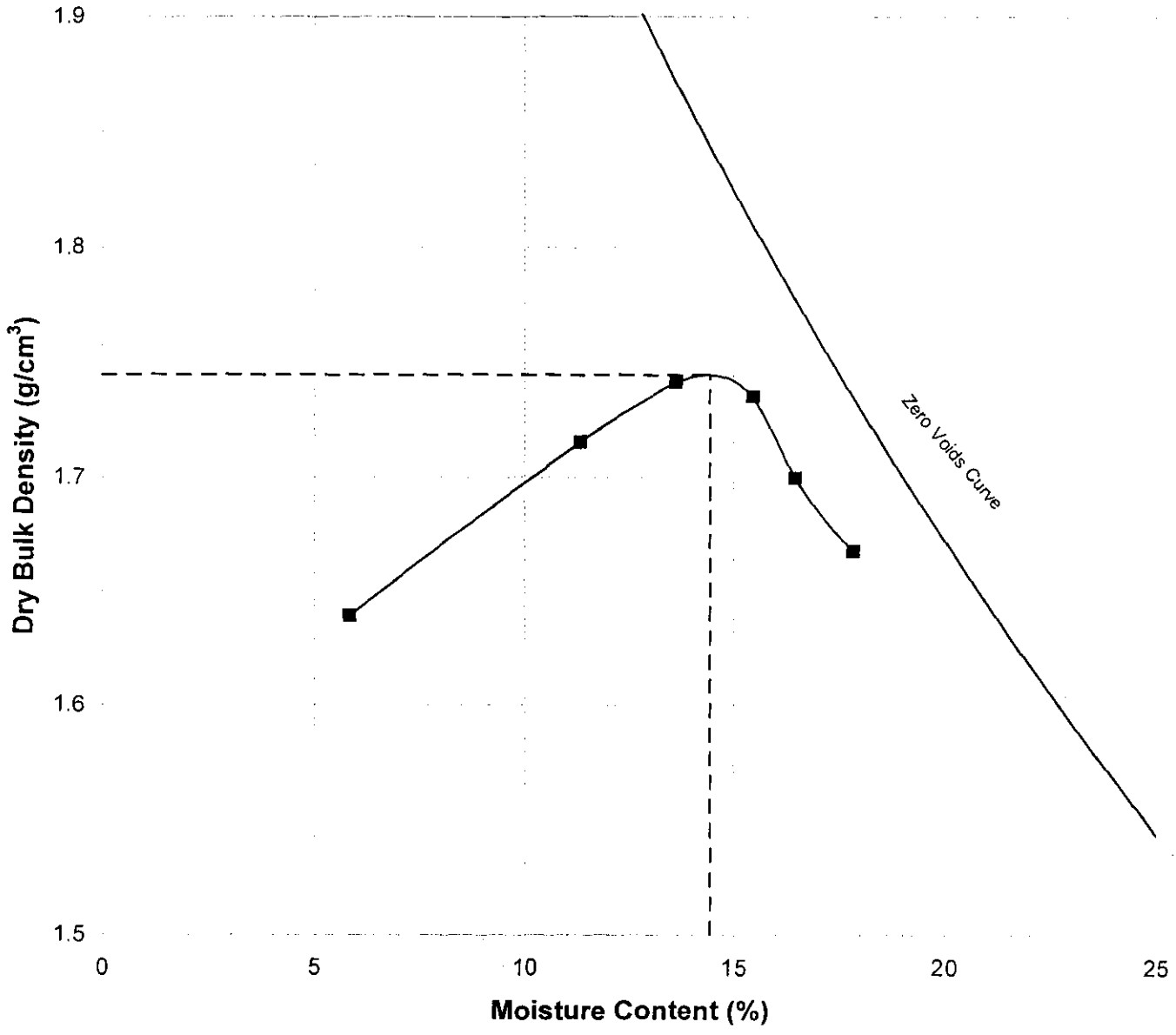
Daniel B. Stephens & Associates, Inc.

Proctor Compaction Data Points with Fitted Curve

Sample Number: B18DD3/B18DD2 Composite

Optimum Moisture Content (%):	14.5
Maximum Dry Bulk Density (g/cm^3):	1.74
Measured particle density (g/cm^3):	2.51

Test Date: 4-Nov-04



Compaction method: Standard A

Laboratory analysis by: M. Mazursky
Data entered by: D. O'Dowd
Checked by: J. Hines

00000162

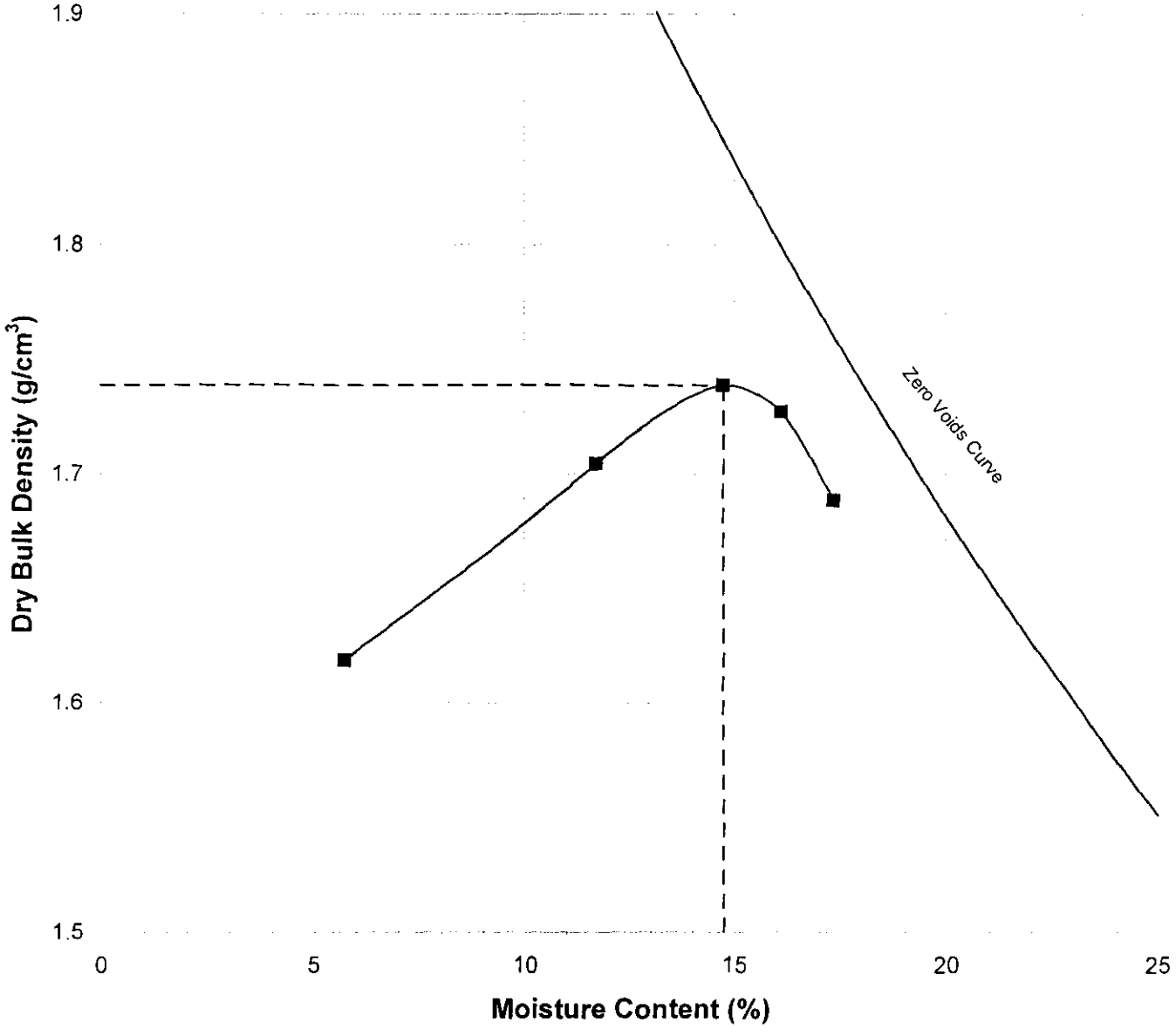
Daniel B. Stephens & Associates, Inc.

Proctor Compaction Data Points with Fitted Curve

Sample Number: B18DD4/B18DF7 Composite

Optimum Moisture Content (%): 14.8
Maximum Dry Bulk Density (g/cm^3): 1.74
Measured particle density (g/cm^3): 2.53

Test Date: 4-Nov-04



Compaction method: Standard A
Laboratory analysis by: M. Mazursky
Data entered by: D. O'Dowd
Checked by: J. Hines

00000163

Laboratory Tests and Methods

Tests And Methods

Dry Bulk Density:	ASTM D 2937
Moisture Content:	ASTM D 2216
Calculated Porosity	Klute, A. 1986. Porosty. Chp.18-2.1, pp. 444-445, in A. Klute (ed.), Methods of Soil Analysis, American Society of Agronomy, Madison, WI
Ksat:	
Constant Head:	ASTM D 2434
Falling Head:	Klute, A. and C. Dirkson. 1986. Hydraulic Conductivity and Diffusivity: Laboratory Methods. Chp. 28, pp. 200-203, in A. Klute (ed.), Methods of Soil Analysis, American Society of Agronomy, Madison, Wi
Hanging Column Method	ASTM D 6836; Klute, A. 1986. Porosty. Chp.26, in A. Klute (ed.), Methods of Soil Analysis, American Society of Agronomy, Madison, WI
Pressure Plate Method	ASTM D 6836; ASTM D 2325
Water Potential Method	ASTM D 6836; Rawlins, S.L. and G.S. Campbell, 1986. Water Potential: Thermocouple Psychrometry.Chp. 24, pp. 597-619, in A. Klute (ed.), Methods of Soil Analysis, Part 1. American Society of Agronomy, Madison, WI.
Relative Humidity Box	Karathanasis & Hajek. 1982. Quantitative Evaluation of Water Adsorption on Soil Clays. SSA Journal 46:1321-1325
Calc. Kunsat	ASTM D6836; Soil Sci. Soc. Am. J. 1980 44:892-898
Proctor Compaction Test	ASTM D698
Particle Density	ASTM D854
Particle Size Analysis	ASTM D422