APPENDIX B-1
AMEC Laboratory Test Results

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PROJECT:	Gooseberry Mine	JOB NO:	6417000720
LOCATION:	Nevada Division of Environmental Protection	WORK ORDER NO:	
MATERIAL:	Clayey Sand with Gravel (SC)	LAB NO:	G-6002
SAMPLE SOURCE:	Composite 1	DATE SAMPLED:	02/28/2006

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATES (ASTM C136/C117)
LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS (ASTM D4318)

MECHANICAL ANALYSIS

SIEVE SIZE	% PASSING	SPECIFICATIONS
6in.	100	
4in.	100	
3in.	100	
2in.	100	
1 1/2in.	98	
1 1/4in.	98	
1in.	93	
3/4in.	89	
1/2in.	85	
3/8in.	82	
1/4in.	82	
#4	70	
#8	58	
#10	55	
#16	46	
#30	38	
#40	35	
#50	32	
#100	28	
#200	23.0	

ATTERBERG

LL:	34
PL:	22
PI:	12
USCS:	SC

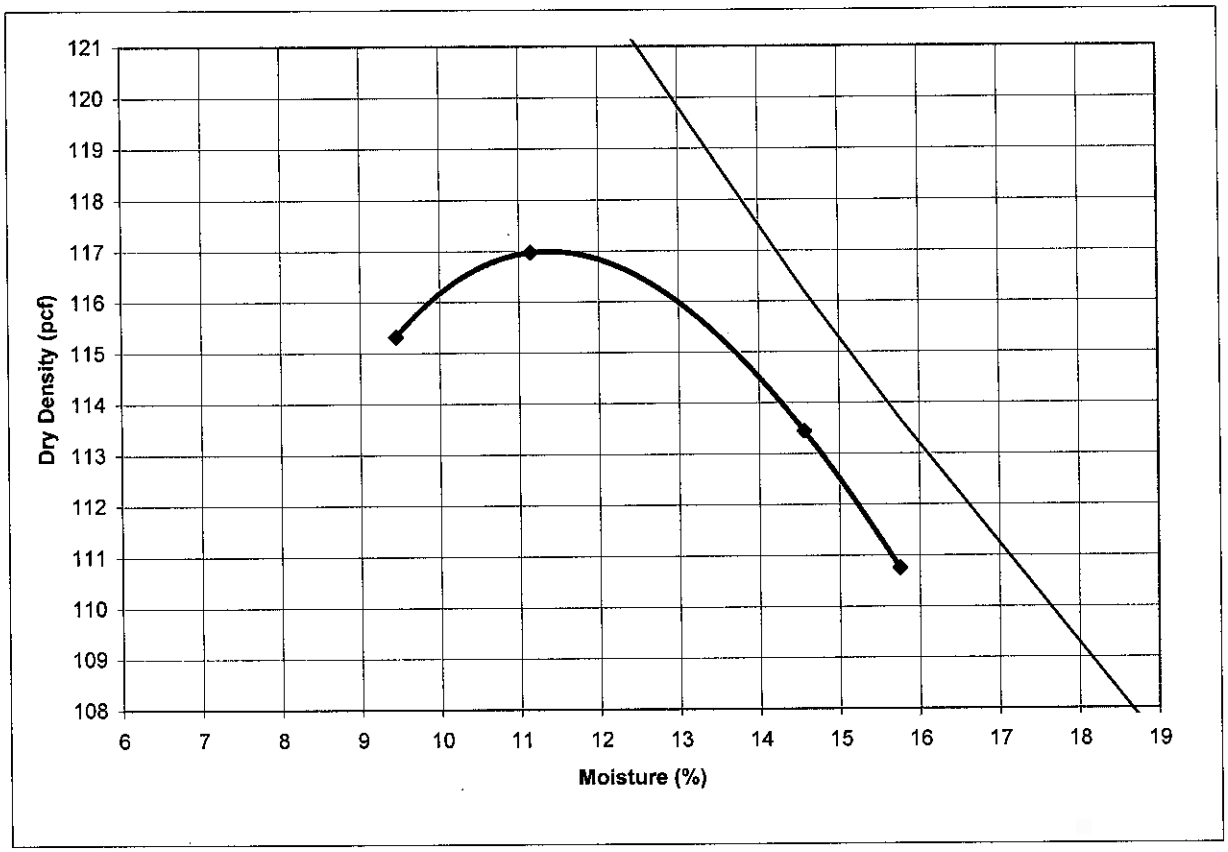
Michael Hawe, C.E.T.
Laboratory Supervisor

Norm Davis
Manager, Materials Department

PROJECT:	Gooseberry Mine	**JOB NO:**	6417000720
CLIENT:	Nevada Division of Environmental Protection	**WORK ORDER NO:**	
COLOR/TYPE MATERIAL:	Silty Sand with Gravel (SM)	**LAB NO:**	G-6002
SAMPLE SOURCE:	Composite 2	**SAMPLED BY:**	TJ
		DATE SAMPLED:	2/28/2006

LABORATORY COMPACTION CHARACTERISTICS OF SOILS USING MODIFIED EFFORTS (56,000ft-lb-ft/cu.ft) (ASTMD1557C)

Type of Rammer: Mechanical



Point No:	#1	#2	#3	#4	
Dry Density(lbs/ft3):	115.3	117.0	113.4	110.8	
Moisture Content (%):	9.4	11.1	14.6	15.8	

MAXIMUM DRY DENSITY (pcf): (Rock Corrected)	**117.0**
OPTIMUM MOISTURE (%): (Rock Corrected)	**11.5**

NOTE: THE ZERO AIR VOIDS CURVE REPRESENTS A SPECIFIC GRAVITY OF: 2.56 ASSUMED.

Michael Hawe, C.E.T.
Laboratory Supervisor

Norm Davis
Manager, Materials Department

amec

PROJECT:	Gooseberry Mine	**JOB NO:**	6417000720
LOCATION:	Nevada Division of Environmental Protection	**WORK ORDER NO:**	
MATERIAL:	Silty Sand with Gravel (SM)	**LAB NO:**	G-6002
SAMPLE SOURCE:	Composite 2	**DATE SAMPLED:**	02/28/2006

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATES (ASTM C136/C117)
LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS (ASTM D4318)

MECHANICAL ANALYSIS

SIEVE SIZE	% PASSING	SPECIFICATIONS
6in.	100	
4in.	100	
3in.	100	
2in.	100	
1 1/2in.	97	
1 1/4in.	97	
1in.	88	
3/4in.	86	
1/2in.	81	
3/8in.	78	
1/4in.	78	
#4	70	
#8	60	
#10	58	
#16	50	
#30	43	
#40	39	
#50	35	
#100	29	
#200	23.0	

ATTERBERG

LL:	NV
PL:	
PI:	NP
USCS:	SM

Michael Hawe, C.E.T.
Laboratory Supervisor

Norm Davis
Manager, Materials Department

APPENDIX B-2

Daniel B Stephens and Associates
Test Results

Laboratory Report for

AMEC Earth & Environmental, Inc.

Project #6-417-000720

April 21, 2006

Daniel B. Stephens & Associates, Inc.

6020 Academy NE, Suite 100 • Albuquerque, New Mexico 87109

April 21, 2006

Mr. Todd Johnson
AMEC Earth & Environmental, Inc.
780 Vista Blvd., Suite 100
Sparks, NV 89434
(775)331-2375

Re: DBS&A Laboratory Report for AMEC Earth & Environmental, Inc.
Project # 6-417-000720

Dear Mr. Johnson:

Enclosed is the final report for the Fluor AMEC Earth & Environmental, Inc. Project # 6-417-000720. 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 employs 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 all the testing undertaken by us, and the final report provided, constitutes 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 AMEC Earth & Environmental, Inc. 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
Laboratory Supervising Manager

Enclosure

Daniel B. Stephens & Associates, Inc.
6020 Academy NE, Suite 100 505-822-9400
Albuquerque, NM 87109 FAX 505-822-8877

Summaries

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	Air Permeability	1/3, 15 Bar Points and Water Holding Capacity	Atterberg Limits	Proctor Compaction
		Flexwall FH	HC	PP	TH	WP	RH		DS	WS	H					
Composite #1	X	X	X	X		X	X	X								
Composite #2	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

Summary of Sample Preparation

Sample Number	Proctor Data (Provided by AMEC)			Target Remold Moisture Content, 10% < Optimum	Target Remold Density, 80% of Maximum Dry Bulk Density		Actual Remold Data			
	Optimum Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm^3)	(pcf)	Target Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm^3)	(pcf)	Gravimetric Moisture Content (%, g/g)	Dry Bulk Density (g/cm^3)	(pcf)	Percent of Max. Dry Bulk Density (%)
Composite #1	16.0	1.79	111.6	14.4	1.43	89.3	13.5	1.44	89.9	80.6%
Composite #2	12.5	1.84	114.8	11.3	1.47	91.8	11.3	1.49	93.0	81.0%

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

Sample Number	Moisture Content: As Received Gravimetric (%, g/g)	Moisture Content: As Received Volumetric (%, cm^3/cm^3)	Moisture Content: Remolded Gravimetric (%, g/g)	Moisture Content: Remolded Volumetric (%, cm^3/cm^3)	Dry Bulk Density (g/cm^3)	Wet Bulk Density (g/cm^3)	Calculated Porosity (%)	*Estimated Average Measured Settled Density: Average Settled Dry Bulk Density (g/cm^3)	*Estimated Average Measured Settled Density: Average % Settled (%)
Composite #1	12.6	NA	13.5	19.5	1.44	1.64	45.5	1.52	5.6
Composite #2	11.0	NA	11.3	16.9	1.49	1.65	43.9	NS	NS

*Measured Settled Density: The sample settled during saturated hydraulic conductivity testing and continued settling throughout the unsaturated hydraulic conductivity testing. The settled dimensions and dry bulk density were estimated based upon the average of the measurements obtained after saturated hydraulic conductivity testing and throughout unsaturated hydraulic conductivity testing.

NS = No Settling ws observed

--- = This sample was not remolded

Summary of Saturated Hydraulic Conductivity Tests

Sample Number	K_{sat} (cm/sec)	Oversized Correction (cm/sec)	Method of Analysis: Falling Head Flexible Wall
Composite #1	3.32E-04	2.91E-04	X
Composite #2	6.71E-04	5.59E-04	X

Summary of Moisture Characteristics of the Initial Drainage Curve

Sample Number	Pressure Head (-cm water)	Moisture Content (%, cm^3/cm^3)
Composite #1	0	40.8
	10	38.5
	31	37.7
	103	30.1
	510	24.8
	6017	18.3
	851293	7.6
Composite #2	0	42.6
	10	38.5
	31	36.4
	103	28.9
	510	24.2
	10708	15.4
	851293	6.7

Summary of Calculated Unsaturated Hydraulic Properties

Sample Number	α (cm^{-1})	N (dimensionless)	θ_r (% vol)	θ_s (% vol)	Oversize Corrected θ_r (% vol)	Oversize Corrected θ_s (% vol)
Composite #1	0.0475	1.1522	0.00	40.87	0.00	37.93
Composite #2	0.0825	1.1560	0.00	42.45	0.00	38.11

— = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NA = Not analyzed

Laboratory Data and Graphical Plots

Initial Properties

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

Sample Number	Moisture Content: As Received Gravimetric (%, g/g)	Moisture Content: As Received Volumetric (%, cm^3/cm^3)	Moisture Content: Remolded Gravimetric (%, g/g)	Moisture Content: Remolded Volumetric (%, cm^3/cm^3)	Dry Bulk Density (g/cm^3)	Wet Bulk Density (g/cm^3)	Calculated Porosity (%)	*Estimated Average Measured Settled Density: Average Settled Dry Bulk Density (g/cm^3)	*Estimated Average Measured Settled Density: Average % Settled (%)
Composite #1	12.6	NA	13.5	19.5	1.44	1.64	45.5	1.52	5.6
Composite #2	11.0	NA	11.3	16.9	1.49	1.65	43.9	NS	NS

*Measured Settled Density: The sample settled during saturated hydraulic conductivity testing and continued settling throughout the unsaturated hydraulic conductivity testing. The settled dimensions and dry bulk density were estimated based upon the average of the measurements obtained after saturated hydraulic conductivity testing and throughout unsaturated hydraulic conductivity testing.

NS = No Settling ws observed

--- = This sample was not remolded

Daniel B. Stephens & Associates, Inc.

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

Job Name: AMEC 3-06
Job Number: LB06.0048.00
Sample Number: Composite #1
Date/ Time Collected: 2/28/2006
Location: Gooseberry Mine

	As Received	Remolded
Test Date:	15-Mar-06	15-Mar-06
Field weight of sample* (g):	435.87	1225.08
Tare weight, ring (g):	0.00	163.04
Tare weight, pan/plate (g):	114.92	50.62
Tare weight, other (g):	0.00	0.00
Dry weight of sample (g):	285.02	891.26
Sample volume (cm^3):	NA	616.87
Assumed particle density (g/cm^3):	2.62	2.62
Gravimetric Moisture Content (% g/g):	12.6	13.5
Volumetric Moisture Content (% vol):	NA	19.5
Dry bulk density (g/cm^3):	NA	1.44
Wet bulk density (g/cm^3):	NA	1.64
Calculated Porosity (% vol):	NA	44.9
Percent Saturation:	NA	43.4
Laboratory analysis by:	T. Bowekaty	T. Bowekaty
Data entered by:	T. Bowekaty	T. Bowekaty
Checked by:	J. Hines	J. Hines

Comments:

* Weight including tares
NA = Not analyzed
— = This sample was not remolded

Daniel B. Stephens & Associates, Inc.

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

Job Name: AMEC 3-06
Job Number: LB06.0048.00
Sample Number: Composite #2
Date/ Time Collected: 2/28/2006
Location: Gooseberry Mine

	As Received	Remolded
Test Date:	15-Mar-06	15-Mar-06
Field weight of sample* (g):	387.12	1249.32
Tare weight, ring (g):	0.00	166.47
Tare weight, pan/plate (g):	107.11	36.97
Tare weight, other (g):	0.00	0.00
Dry weight of sample (g):	252.15	939.32
Sample volume (cm^3):	NA	632.25
Assumed particle density (g/cm^3):	2.62	2.62
Gravimetric Moisture Content (% g/g):	11.0	11.3
Volumetric Moisture Content (% vol):	NA	16.9
Dry bulk density (g/cm^3):	NA	1.49
Wet bulk density (g/cm^3):	NA	1.65
Calculated Porosity (% vol):	NA	43.3
Percent Saturation:	NA	38.9
Laboratory analysis by:	T. Bowekaty	T. Bowekaty
Data entered by:	T. Bowekaty	T. Bowekaty
Checked by:	J. Hines	J. Hines

Comments:

* Weight including tares
NA = Not analyzed
— = This sample was not remolded

Saturated Hydraulic Conductivity

Summary of Saturated Hydraulic Conductivity Tests

Sample Number	K_{sat} (cm/sec)	Oversized Correction (cm/sec)	Method of Analysis: Falling Head Flexible Wall
Composite #1	3.32E-04	2.91E-04	X
Composite #2	6.71E-04	5.59E-04	X

Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job name: AMEC
Job number: LB06.0048.00
Sample number: Composite #1
Date/Time sampled: 2/28/06
Depth: N/A

Remolded or Initial Sample Properties	
Initial Mass (g):	1010.3
Diameter (cm):	10.126
Length (cm):	7.66
Area (cm^2):	80.53
Volume (cm^3):	616.87
Dry Density (g/cm^3):	1.42
Dry Density (pcf):	88.72
Water Content (%, g/g):	15.3
Water Content (%, vol):	21.7
Porosity (%, vol):	45.8
Saturation (%):	47.4

Final (Post Test) Sample Properties	
Saturated Mass (g):	1157.47
Dry Mass (g):	876.63
Diameter (cm):	10.126
Length (cm):	7.66
Area (cm^2):	80.53
Volume (cm^3):	616.87
Dry Density (g/cm^3):	1.42
Dry Density (pcf):	88.72
Water Content (%, g/g):	32.0
Water Content (%, vol):	45.5
Porosity (%, vol):	45.8
Saturation (%):	99.5

Test and Sample Conditions	
Permeant liquid used:	Water
Sample Preparation:	☐ In situ sample, extruded ☑ Remolded Sample
Number of Lifts:	3
Split:	3/4"
Percent Coarse Material (%):	11
Particle Density(g/cm^3):	2.62 ☑ Assumed ☐ Measured
Cell pressure (PSI):	32.0
Influent pressure (PSI):	30.0
Effluent pressure (PSI):	30.0
Panel Used:	☑ A ☐ B ☐ C
Reading:	☑ Annulus ☑ Pipette
B-Value (% saturation) prior to test:	0.95
Date/Time:	3/20/06 1300

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

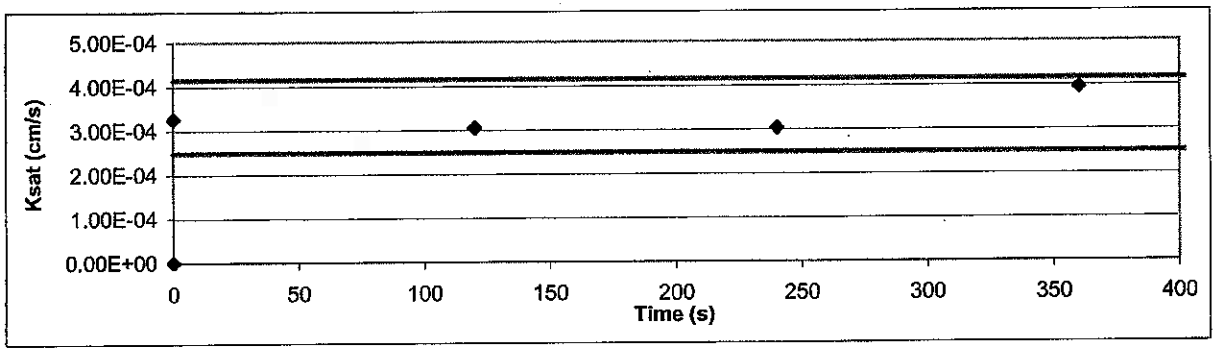
Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job name: AMEC
Job number: LB06.0048.00
Sample number: Composite #1
Date/Time sampled: 2/28/06
Depth: N/A

Date	Time	Temp (°C)	Influent Pipette Reading	Effluent Pipette Reading	Gradient (ΔH/ΔL)	Average Flow (cm^3)	Elapsed Time (s)	Ratio (outflow to inflow)	Change in Head (Not to exceed 25%)	k_{sat} T°C (cm/s)	k_{sat} Corrected (cm/s)
Test # 1:											
20-Mar-06	14:24:00	21.7	3.80	20.30	2.49	3.39	60	1.00	8%	3.40E-04	3.27E-04
20-Mar-06	14:25:00	21.7	4.50	19.60	2.28						
Test # 2:											
20-Mar-06	14:25:00	21.7	4.50	19.60	2.28	2.90	60	1.00	8%	3.18E-04	3.05E-04
20-Mar-06	14:26:00	21.7	5.10	19.00	2.10						
Test # 3:											
20-Mar-06	14:26:00	21.7	5.10	19.00	2.10	2.66	60	0.83	8%	3.16E-04	3.04E-04
20-Mar-06	14:27:00	21.7	5.70	18.50	1.93						
Test # 4:											
20-Mar-06	14:27:00	21.7	5.70	18.50	1.93	3.15	60	1.17	10%	4.11E-04	3.94E-04
20-Mar-06	14:28:00	21.7	6.30	17.80	1.73						

***Average Ksat* (cm/sec):** **3.32E-04**
Calculated Gravel Corrected Average Ksat (cm/sec): 2.91E-04



ASTM Required Range (+/- 25%)

Ksat (-25%) (cm/s): 2.49E-04

Ksat (+25%) (cm/s): 4.15E-04

Daniel B. Stephens & Associates, Inc.

Oversize Correction Data Sheet

Job Name: AMEC 3-06
Job Number: LB06.0048.00
Sample Number: Composite #1
Date/ Time Collected: 2/28/06
Location: Gooseberry Mine

Split (3/4", 3/8", #4): 3/4"
Calculated Porosity of Fines (% vol)*:* 44.9

	Coarse Fraction	Fines Fraction	Composite
Subsample Mass (g)*:*	11.00	89.00	100.00
Bulk Density (g/cm^3)*:*	2.306	1.44	1.51
Volume of Solids (cm^3)*:*	4.77	33.97	38.74
Volume of Voids (cm^3)*:*	0.00	27.63	27.63
Total Volume (cm^3)*:*	4.77	61.60	66.37
Volumetric Fraction (%)*:*	7.19	92.81	100.00
Ksat (cm/sec)*:*	NA	3.32E-04	2.91E-04

— = Oversize correction is unnecessary since coarse fraction < 5% of composite mass
NA = Not analyzed

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

Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job name: AMEC
Job number: LB06.0048.00
Sample number: Composite #2
Date/Time sampled: 2/28/06
Depth: N/A

Remolded or Initial Sample Properties	
Initial Mass (g):	1040.1
Diameter (cm):	10.126
Length (cm):	7.851
Area (cm^2):	80.53
Volume (cm^3):	632.25
Dry Density (g/cm^3):	1.47
Dry Density (pcf):	91.56
Water Content (%, g/g):	12.2
Water Content (%, vol):	17.8
Porosity (%, vol):	44.0
Saturation (%):	40.5

Final (Post Test) Sample Properties	
Saturated Mass (g):	1195.3
Dry Mass (g):	927.33
Diameter (cm):	10.126
Length (cm):	7.851
Area (cm^2):	80.53
Volume (cm^3):	632.25
Dry Density (g/cm^3):	1.47
Dry Density (pcf):	91.56
Water Content (%, g/g):	28.9
Water Content (%, vol):	42.4
Porosity (%, vol):	44.0
Saturation (%):	96.3

Test and Sample Conditions	
Permeant liquid used:	Water
Sample Preparation:	☐ In situ sample, extruded ☑ Remolded Sample
Number of Lifts:	3
Split:	3/4"
Percent Coarse Material (%):	14
Particle Density(g/cm^3):	2.62 ☑ Assumed ☐ Measured
Cell pressure (PSI):	32.0
Influent pressure (PSI):	30.0
Effluent pressure (PSI):	30.0
Panel Used:	☐ A ☑ B ☐ C
Reading:	☑ Annulus ☑ Pipette
B-Value (% saturation) prior to test:	0.95
Date/Time:	3/20/06 1305

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

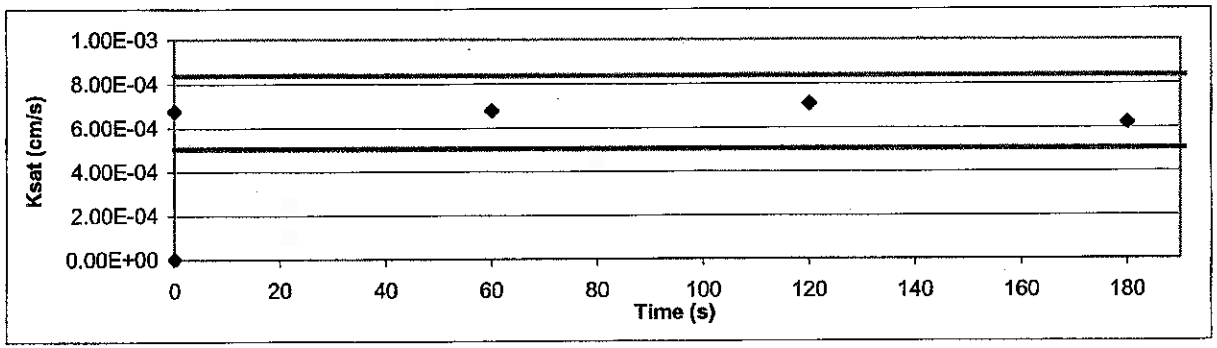
Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity
Flexible Wall Falling Head-Rising Tail Method

Job name: AMEC
Job number: LB06.0048.00
Sample number: Composite #2
Date/Time sampled: 2/28/06
Depth: N/A

Date	Time	Temp (°C)	Influent Pipette Reading	Effluent Pipette Reading	Gradient (ΔH/ΔL)	Average Flow (cm^3)	Elapsed Time (s)	Ratio (outflow to inflow)	Change in Head (Not to exceed 25%)	k_{sat} T°C (cm/s)	k_{sat} Corrected (cm/s)
Test # 1:											
20-Mar-06	13:18:00	21.7	5.90	18.90	1.91	2.69	30	1.09	9%	7.04E-04	6.76E-04
20-Mar-06	13:18:30	21.7	6.45	18.30	1.74						
Test # 2:											
20-Mar-06	13:18:30	21.7	6.45	18.30	1.74	2.46	30	0.91	9%	7.05E-04	6.77E-04
20-Mar-06	13:19:00	21.7	7.00	17.80	1.59						
Test # 3:											
20-Mar-06	13:19:00	21.7	7.00	17.80	1.59	2.34	30	1.00	9%	7.39E-04	7.09E-04
20-Mar-06	13:19:30	21.7	7.50	17.30	1.44						
Test # 4:											
20-Mar-06	13:19:30	21.7	7.50	17.30	1.44	1.87	30	1.00	8%	6.47E-04	6.22E-04
20-Mar-06	13:20:00	21.7	7.90	16.90	1.32						

***Average Ksat* (cm/sec):** **6.71E-04**
Calculated Gravel Corrected Average Ksat (cm/sec): 5.59E-04



ASTM Required Range (+/- 25%)

Ksat (-25%) (cm/s): 5.03E-04

Ksat (+25%) (cm/s): 8.39E-04

Daniel B. Stephens & Associates, Inc.

Oversize Correction Data Sheet

Job Name: AMEC 3-06
Job Number: LB06.0048.00
Sample Number: Composite #2
Date/ Time Collected: 2/28/06
Location: Gooseberry Mine

Split (3/4", 3/8", #4): 3/4"
Calculated Porosity of Fines (% vol): 43.3

	Coarse Fraction	Fines Fraction	Composite
Subsample Mass (g):	14.00	86.00	100.00
Bulk Density (g/cm^3):	2.128	1.49	1.55
Volume of Solids (cm^3):	6.58	32.82	39.40
Volume of Voids (cm^3):	0.00	25.06	25.06
Total Volume (cm^3):	6.58	57.89	64.47
Volumetric Fraction (%):	10.21	89.79	100.00
Ksat (cm/sec):	NA	6.71E-04	5.59E-04

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass
NA = Not analyzed

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

Moisture Retention Characteristics

Summary of Moisture Characteristics of the Initial Drainage Curve

Sample Number	Pressure Head (-cm water)	Moisture Content (%, cm^3/cm^3)
Composite #1	0	40.8
	10	38.5
	31	37.7
	103	30.1
	510	24.8
	6017	18.3
	851293	7.6
Composite #2	0	42.6
	10	38.5
	31	36.4
	103	28.9
	510	24.2
	10708	15.4
	851293	6.7

Summary of Calculated Unsaturated Hydraulic Properties

Sample Number	α (cm^{-1})	N (dimensionless)	θ_r (% vol)	θ_s (% vol)	Oversize Corrected θ_r (% vol)	Oversize Corrected θ_s (% vol)
Composite #1	0.0475	1.1522	0.00	40.87	0.00	37.93
Composite #2	0.0825	1.1560	0.00	42.45	0.00	38.11

— = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NA = Not analyzed

Daniel B. Stephens & Associates, Inc.

Moisture Retention Data

Hanging Column/Pressure Plate/Thermocouple

(Main Drainage Curve)

Job Name: AMEC 3-06
Job Number: LB06.0048.00
Sample Number: Composite #1
Date/ Time Collected: 2/28/06
Location: Gooseberry Mine

Dry wt. of sample (g): 891.26
Tare wt., ring (g): 163.04
Tare wt., screen & clamp (g): 50.62
Sample volume (cm^3): 616.87

Saturated weight at 0 cm tension* (g): 1356.40
Volume of water[T] *in saturated sample* (cm^3): 251.48
Saturated moisture content (% vol): 40.77
Sample bulk density (g/cm^3): 1.44

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content[T] (% vol)
Hanging column:	23-Mar-06 / 10:00	1356.40	0.00	40.77
	29-Mar-06 / 11:30	1342.70	10.00	38.55
	04-Apr-06 / 09:30	1337.50	31.00	37.70
	11-Apr-06 / 11:30	1290.80	103.00	30.13
Pressure plate:	20-Apr-06 / 09:34	1257.90	509.90	24.80

Comments:

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

Laboratory analysis by: M. Carrillo
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: AMEC 3-06
Job Number: LB06.0048.00
Sample Number: Composite #1
Date/ Time Collected: 2/28/06
Location: Gooseberry Mine

Dry weight of water activity meter sample* (g): 236.82
Tare weight, jar (g): 195.62
Sample bulk density (g/cm^3): 1.44

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Water Activity Meter:	03-Apr-06 / 15:30	242.04	6016.8	18.31

Dry weight of relative humidity box sample* (g): 77.24
Tare weight (g): 44.41
Sample bulk density (g/cm^3): 1.44

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Relative humidity box:	22-Mar-06 / 09:01	78.97	851293	7.61

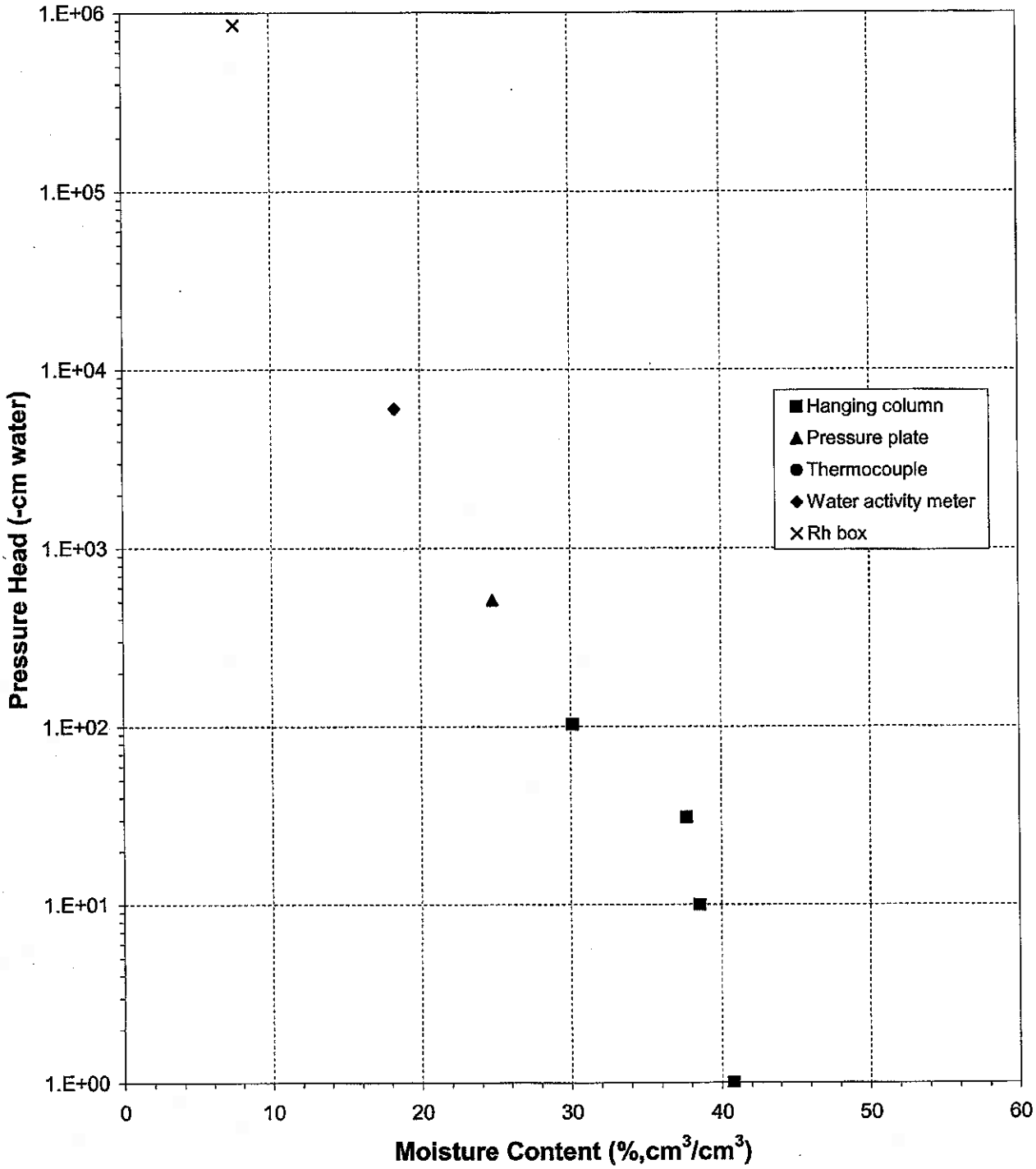
Comments:

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

Laboratory analysis by: M. Carrillo/ T. Bowekaty/T. Bowekaty
Data entered by: D. O'Dowd
Checked by: J. Hines

Water Retention Data Points

Sample Number: Composite #1



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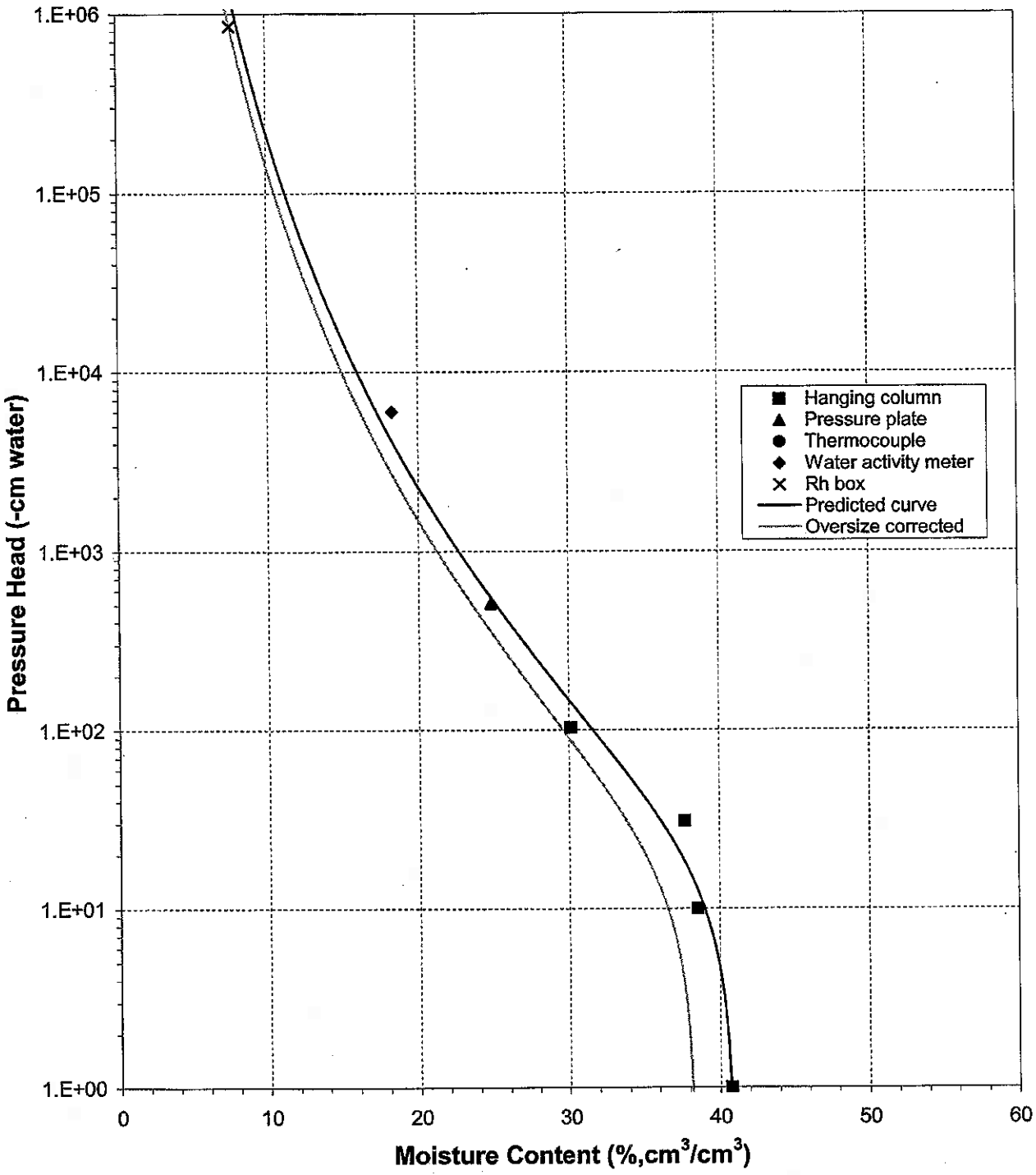
Predicted Water Retention Curve and Data Points

Sample Number: Composite #1



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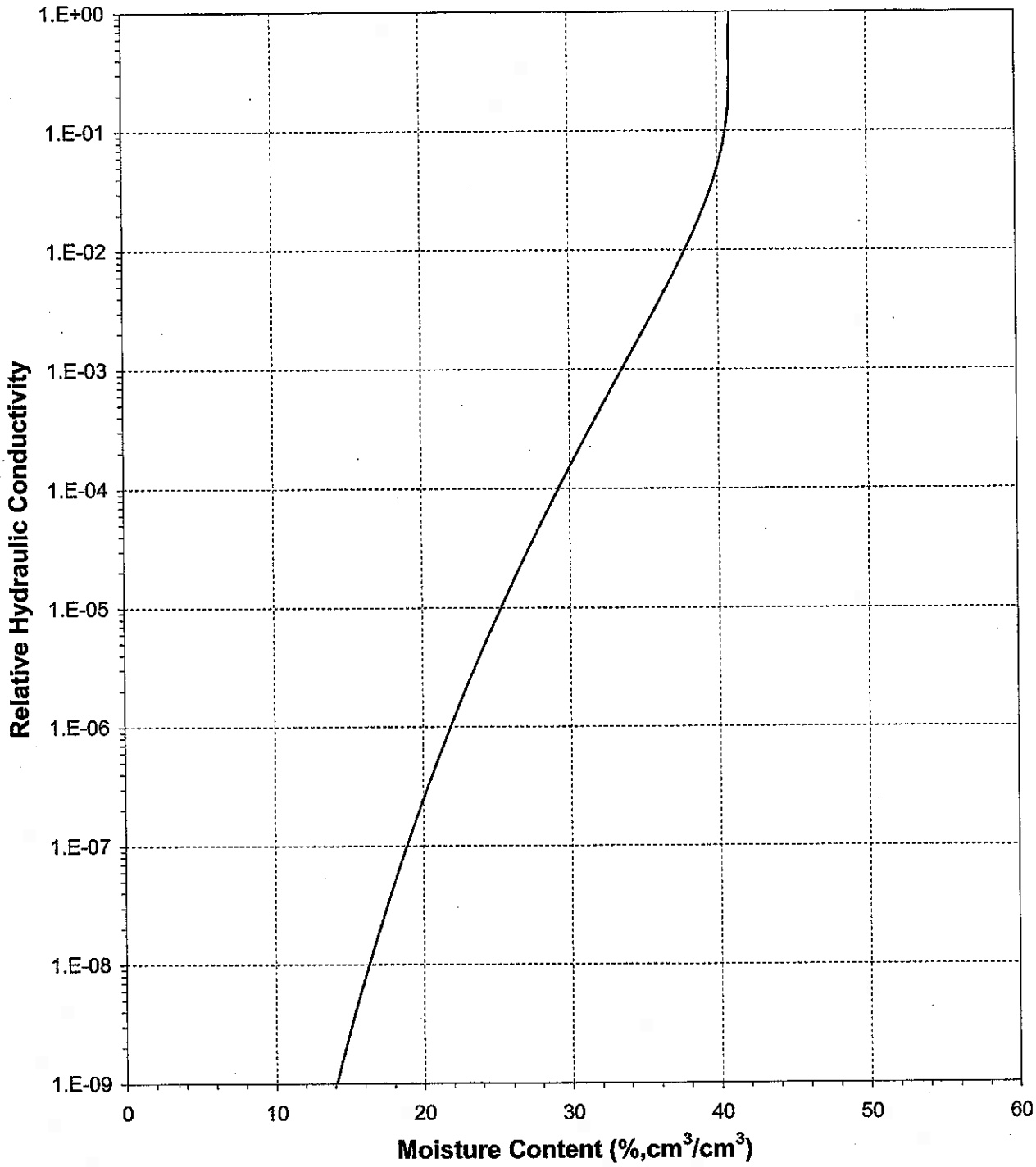
Plot of Relative Hydraulic Conductivity vs Moisture Content

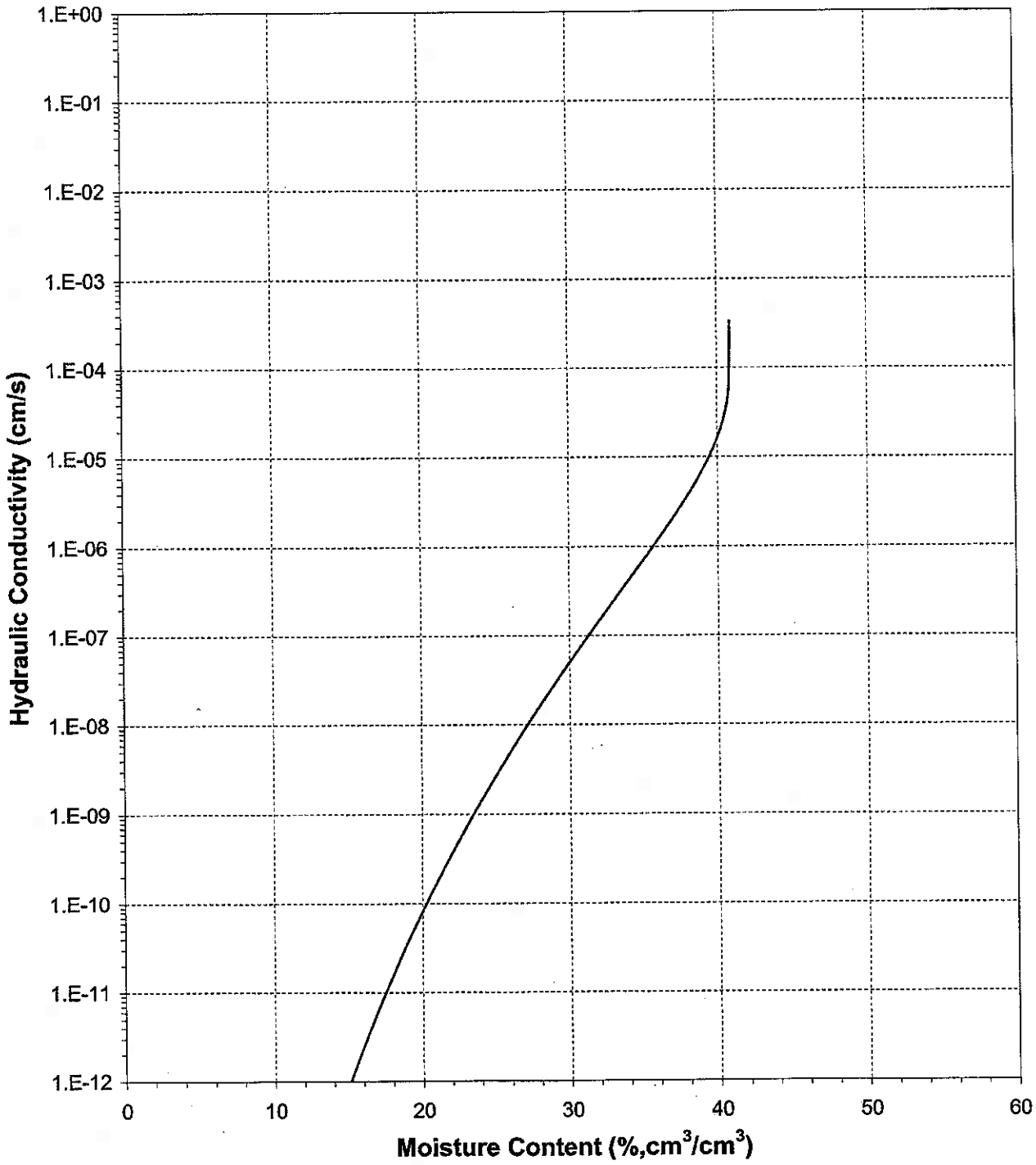
Sample Number: Composite #1



Daniel B. Stephens & Associates, Inc.

Plot of Hydraulic Conductivity vs Moisture Content

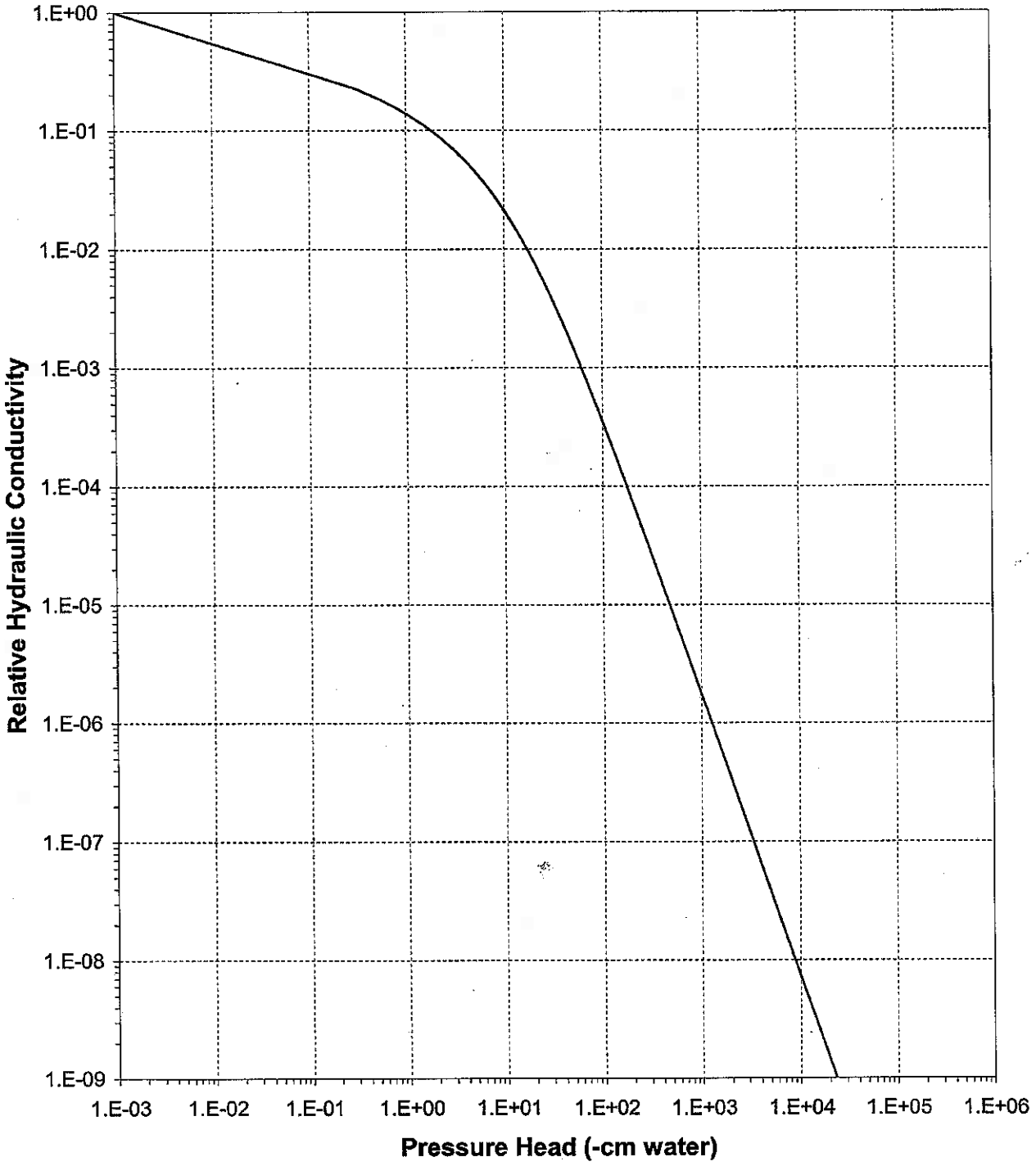
Sample Number: Composite #1



Daniel B. Stephens & Associates, Inc.

Plot of Relative Hydraulic Conductivity vs Pressure Head

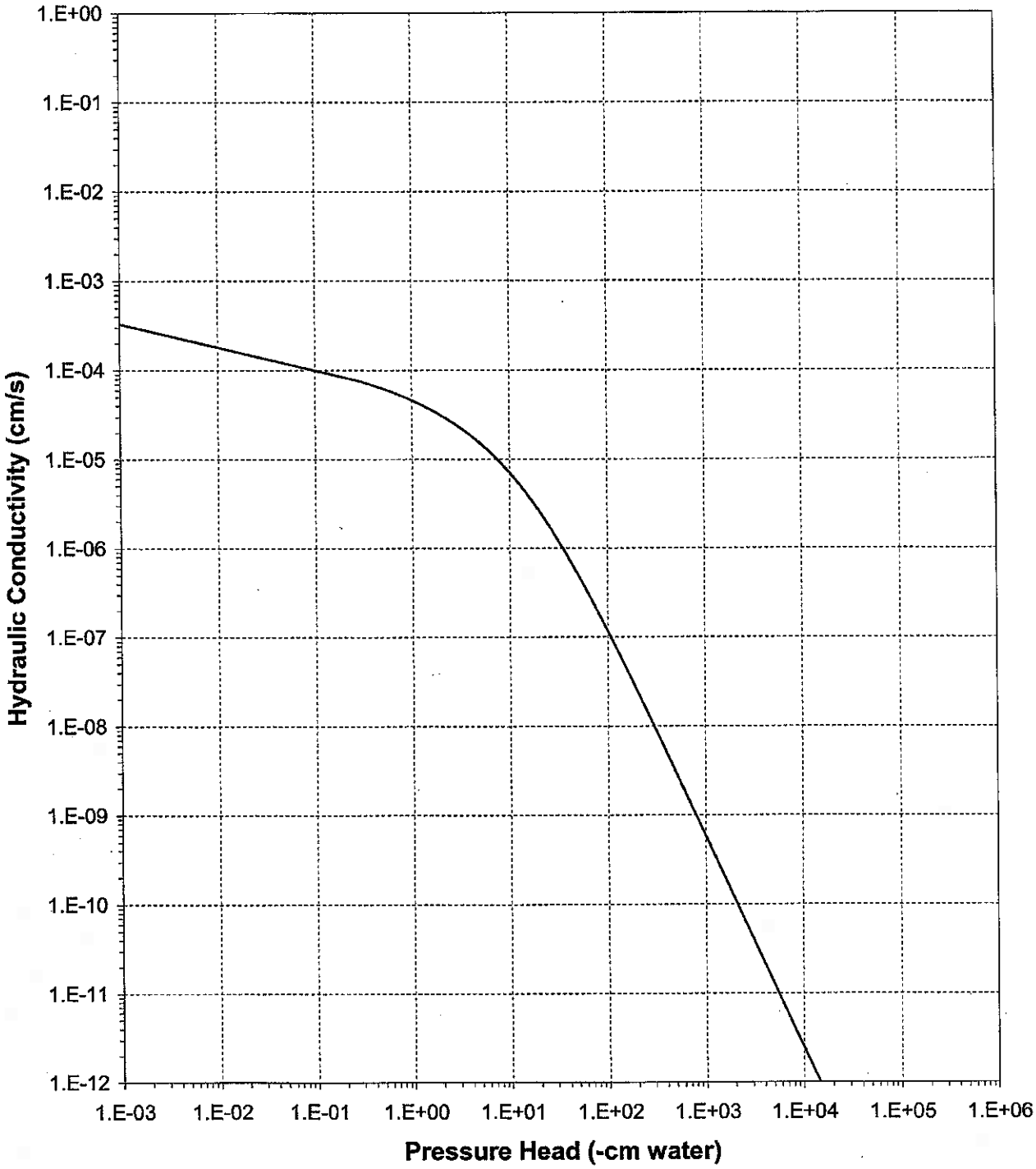
Sample Number: Composite #1



Daniel B. Stephens & Associates, Inc.

Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: Composite #1



Daniel B. Stephens & Associates, Inc.

Oversize Correction Data Sheet

Job Name: AMEC 3-06
Job Number: LB06.0048.00
Sample Number: Composite #1
Date/ Time Collected: 2/28/06
Location: Gooseberry Mine

Split (3/4", 3/8", #4): 3/4"
Calculated Porosity of Fines (% vol)*:* 44.9

	Coarse Fraction	Fines Fraction	Composite
Subsample Mass (g)*:*	11.00	89.00	100.00
Bulk Density (g/cm^3)*:*	2.306	1.44	1.51
Volume of Solids (cm^3)*:*	4.77	33.97	38.74
Volume of Voids (cm^3)*:*	0.00	27.63	27.63
Total Volume (cm^3)*:*	4.77	61.60	66.37
Volumetric Fraction (%)*:*	7.19	92.81	100.00
Initial Moisture Content (% vol)*:*	0.00	19.48	18.08
Saturated Moisture Content (% vol)*:*	0.00	40.87	37.93
Residual Moisture Content (% vol)*:*	0.00	0.00	0.00
Ksat (cm/sec)*:*	NA	3.32E-04	2.91E-04

— = Oversize correction is unnecessary since coarse fraction < 5% of composite mass
NA = Not analyzed

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

Daniel B. Stephens & Associates, Inc.

Moisture Retention Data

Hanging Column/Pressure Plate/Thermocouple

(Main Drainage Curve)

Job Name: AMEC 3-06
Job Number: LB06.0048.00
Sample Number: Composite #2
Date/ Time Collected: 2/28/06
Location: Gooseberry Mine

Dry wt. of sample (g): 939.32
Tare wt., ring (g): 166.47
Tare wt., screen & clamp (g): 36.97
Sample volume (cm^3): 632.25

Saturated weight at 0 cm tension* (g): 1412.20
Volume of water[T] in saturated sample (cm^3): 269.44
Saturated moisture content (% vol): 42.62
Sample bulk density (g/cm^3): 1.49

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content[T] (% vol)
Hanging column:	23-Mar-06 / 10:00	1412.20	0.00	42.62
	29-Mar-06 / 11:30	1386.40	10.00	38.54
	04-Apr-06 / 09:30	1372.60	31.00	36.35
	11-Apr-06 / 11:30	1325.30	103.00	28.87
Pressure plate:	20-Apr-06 / 09:32	1295.60	509.90	24.17

Comments:

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

Laboratory analysis by: M. Carrillo
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: AMEC 3-06
Job Number: LB06.0048.00
Sample Number: Composite #2
Date/ Time Collected: 2/28/06
Location: Gooseberry Mine

Dry weight of water activity meter sample* (g): 234.75
Tare weight, jar (g): 199.77
Sample bulk density (g/cm^3): 1.49

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Water Activity Meter:	03-Apr-06 / 14:40	238.37	10707.9	15.37

Dry weight of relative humidity box sample* (g): 81.34
Tare weight (g): 38.21
Sample bulk density (g/cm^3): 1.49

	Date/Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Relative humidity box:	21-Mar-06 / 11:45	83.28	851293	6.66

Comments:

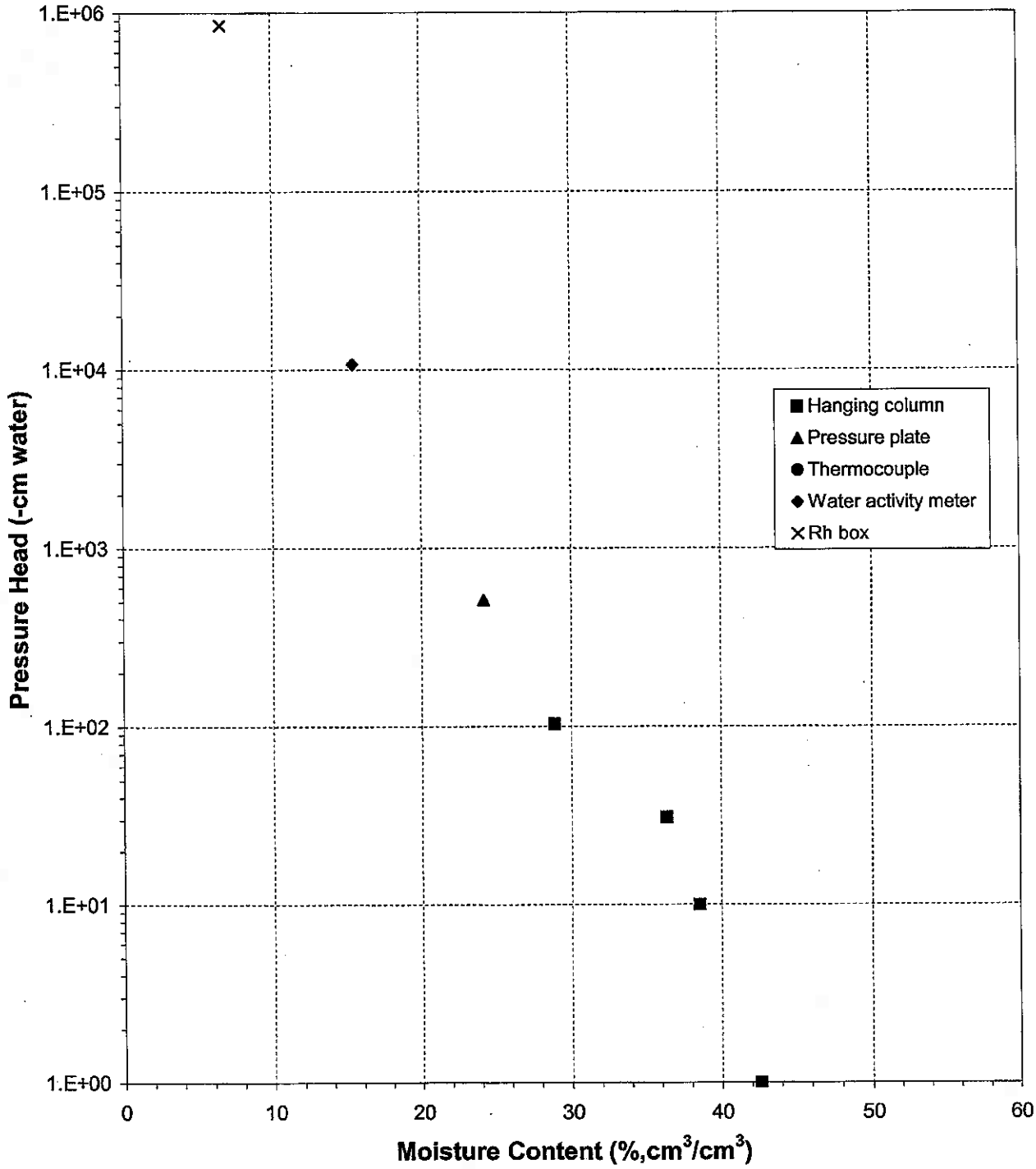
* Weight including tares

† Assumed density of water is 1.0 g/cm^3

Laboratory analysis by: M. Carrillo/ T. Bowekaty/T. Bowekaty
Data entered by: D. O'Dowd
Checked by: J. Hines

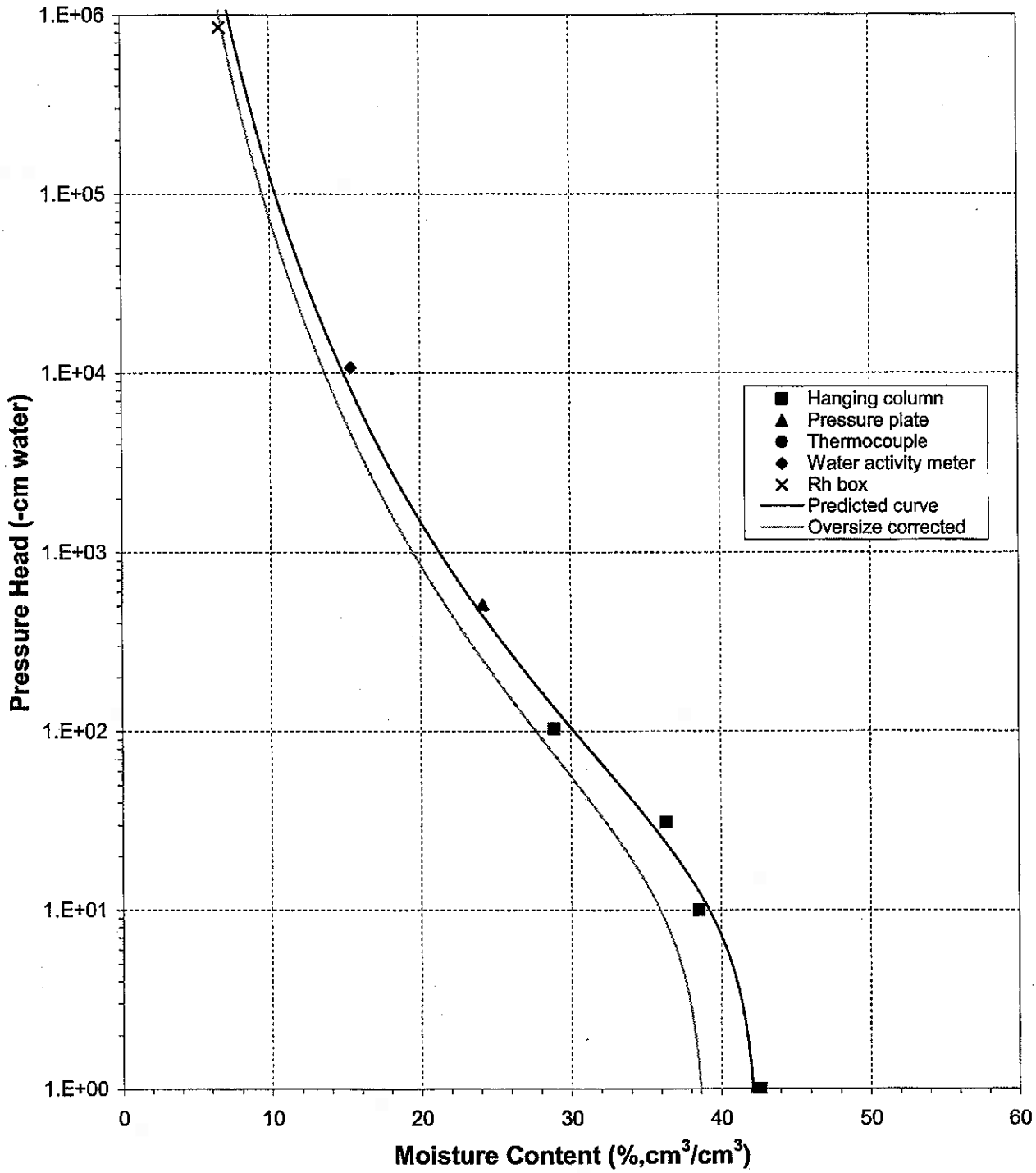
Water Retention Data Points

Sample Number: Composite #2



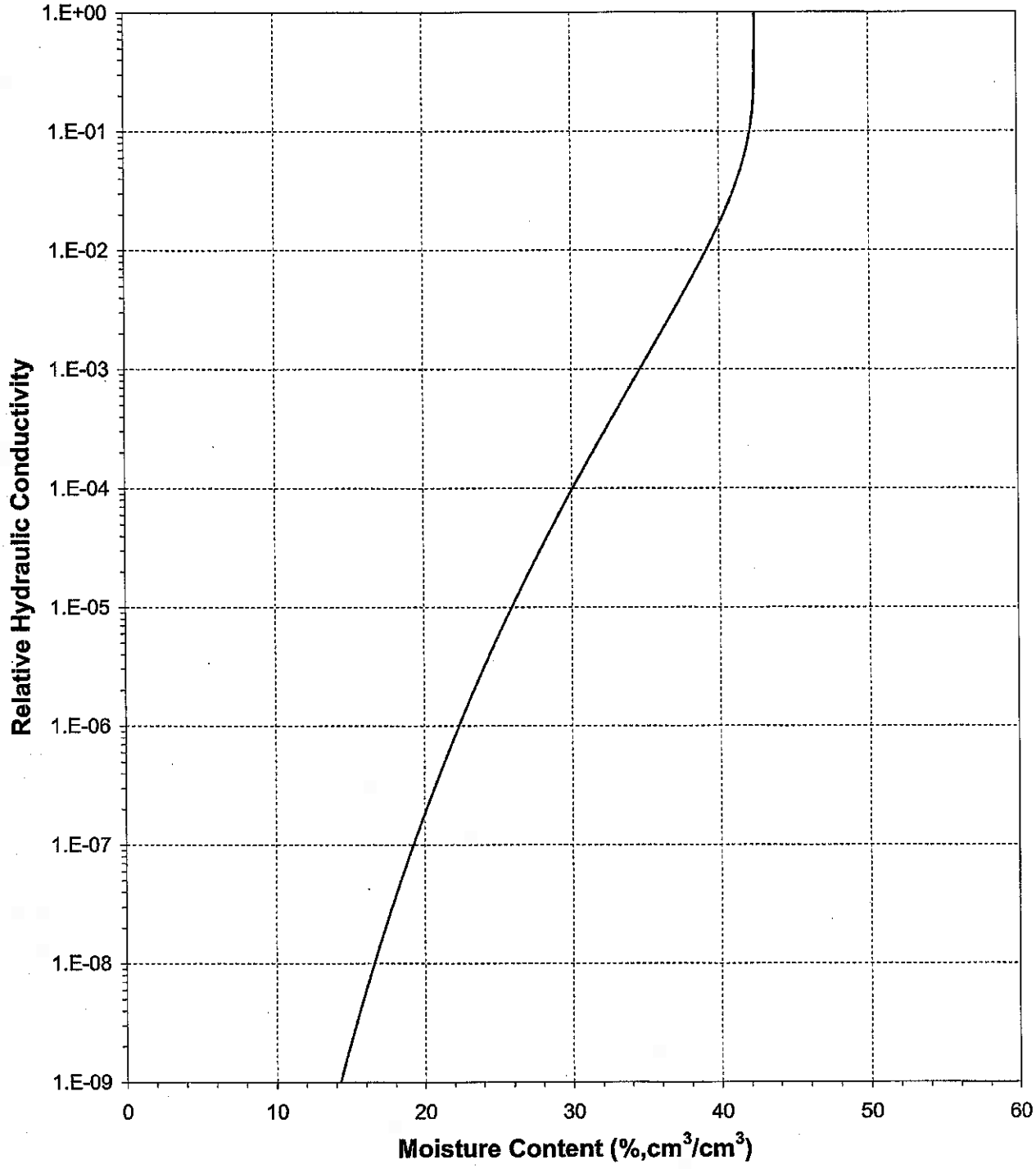
Predicted Water Retention Curve and Data Points

Sample Number: Composite #2



Plot of Relative Hydraulic Conductivity vs Moisture Content

Sample Number: Composite #2



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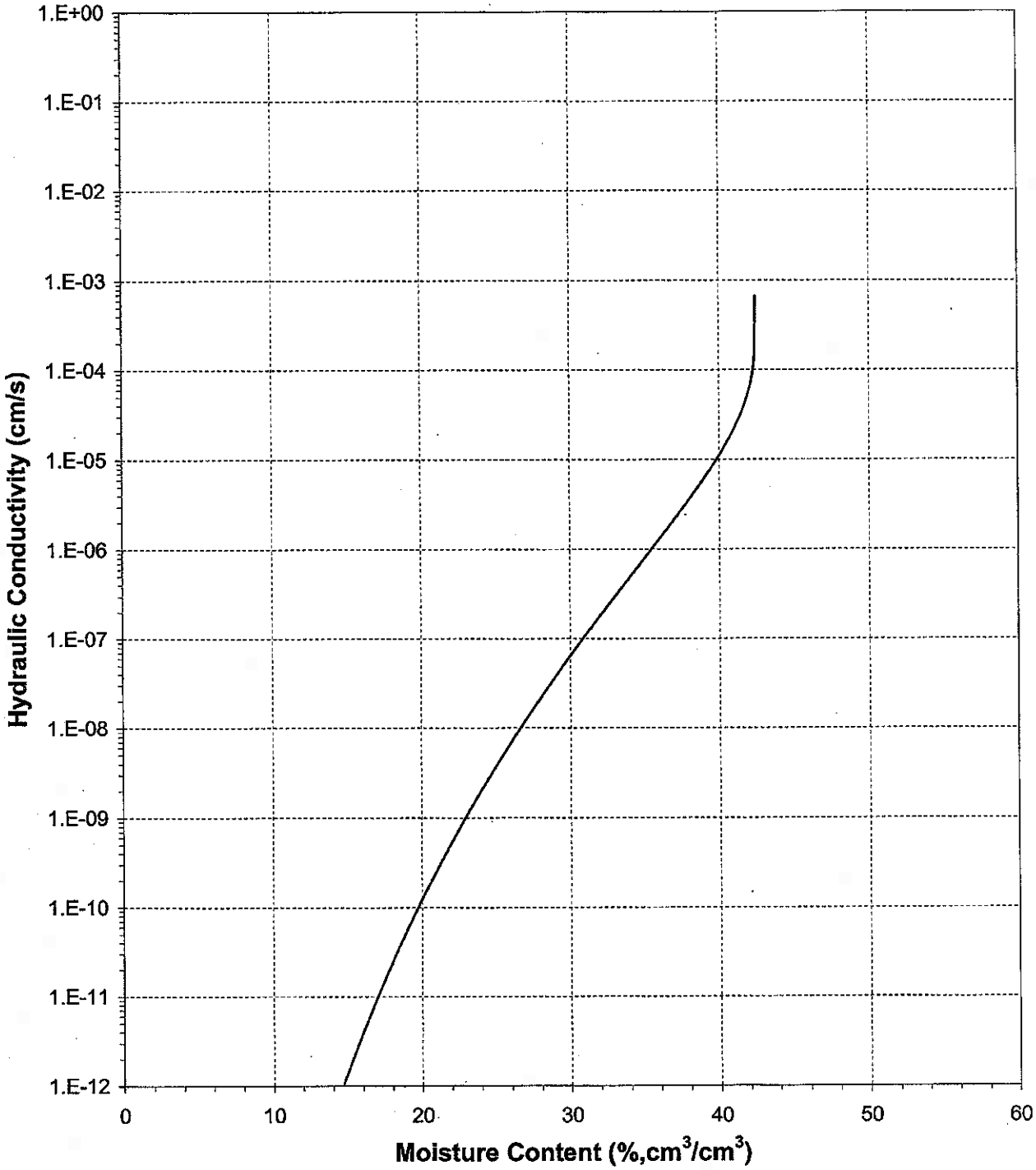
Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: Composite #2



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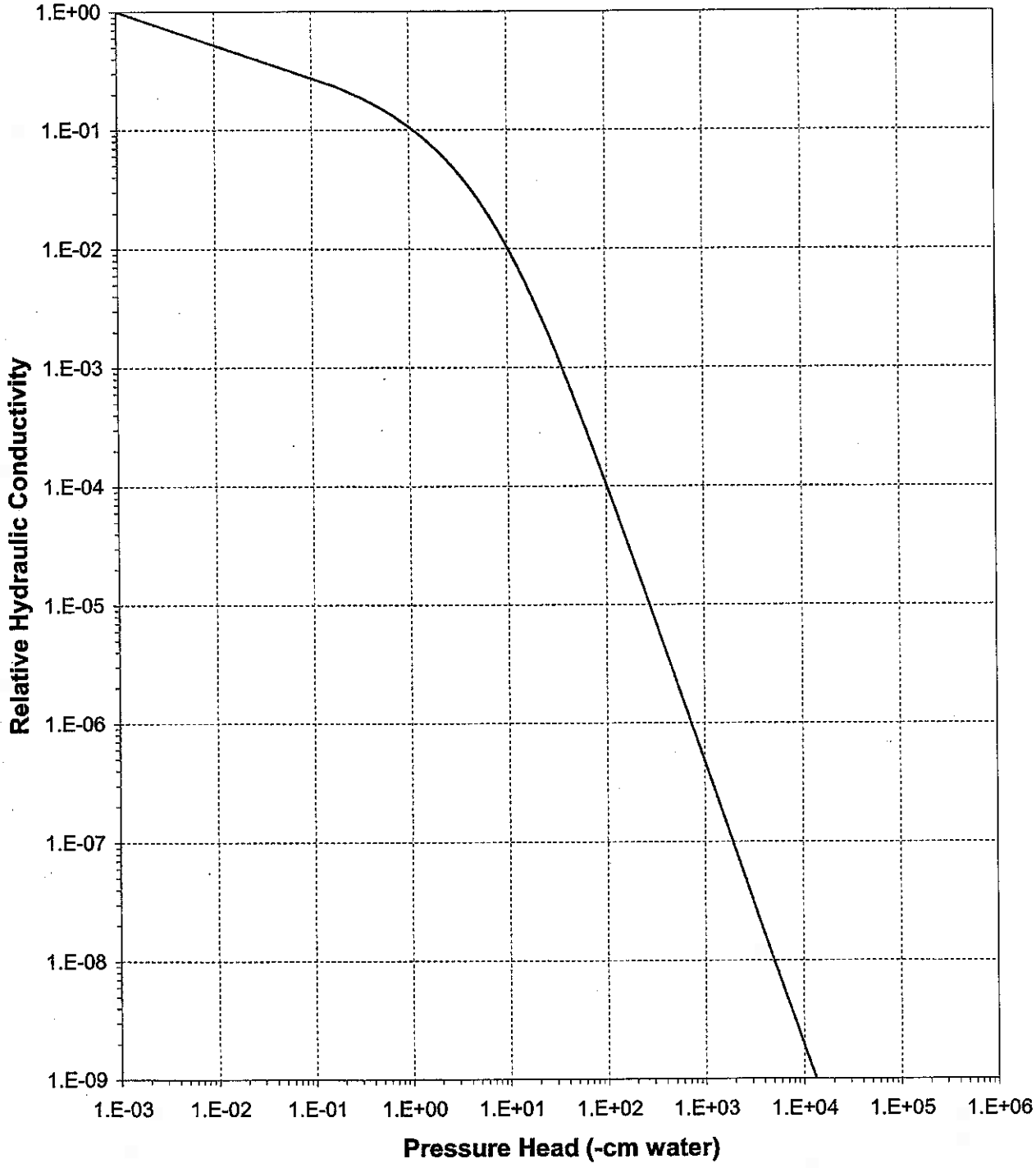
Plot of Relative Hydraulic Conductivity vs Pressure Head

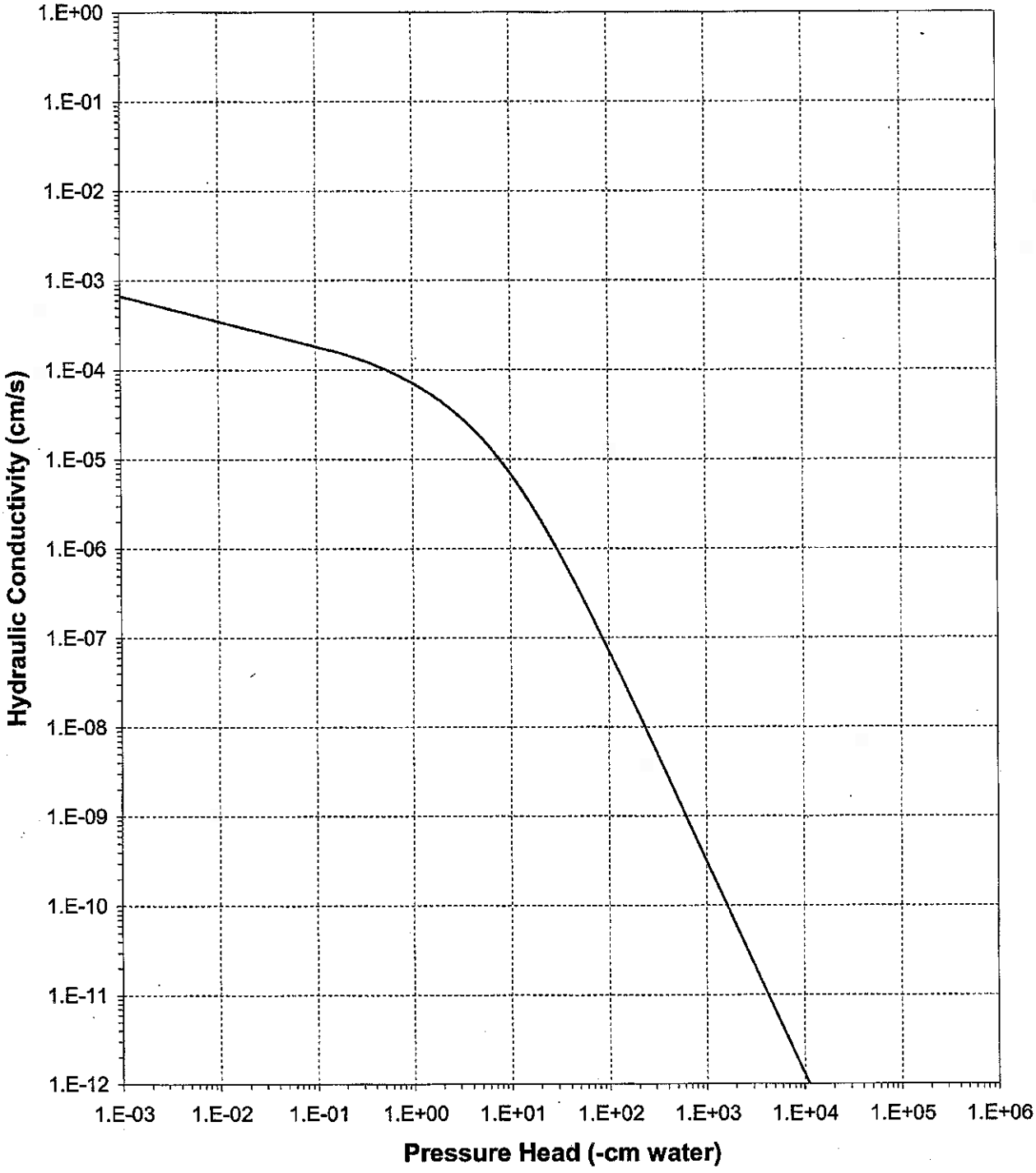
Sample Number: Composite #2



Daniel B. Stephens & Associates, Inc.

Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: Composite #2



Daniel B. Stephens & Associates, Inc.

Oversize Correction Data Sheet

Job Name: AMEC 3-06
Job Number: LB06.0048.00
Sample Number: Composite #2
Date/ Time Collected: 2/28/06
Location: Gooseberry Mine

Split (3/4", 3/8", #4): 3/4"
Calculated Porosity of Fines (% vol): 43.3

	Coarse Fraction	Fines Fraction	Composite
Subsample Mass (g):	14.00	86.00	100.00
Bulk Density (g/cm^3):	2.128	1.49	1.55
Volume of Solids (cm^3):	6.58	32.82	39.40
Volume of Voids (cm^3):	0.00	25.06	25.06
Total Volume (cm^3):	6.58	57.89	64.47
Volumetric Fraction (%):	10.21	89.79	100.00
Initial Moisture Content (% vol):	0.00	16.85	15.13
Saturated Moisture Content (% vol):	0.00	42.45	38.11
Residual Moisture Content (% vol):	0.00	0.00	0.00
Ksat (cm/sec):	NA	6.71E-04	5.59E-04

— = Oversize correction is unnecessary since coarse fraction < 5% of composite mass
NA = Not analyzed

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

Laboratory Tests and Methods

Tests and Methods

Dry Bulk Density:	ASTM D4531; ASTM D6836
Moisture Content:	ASTM D2216; ASTM D6836
Calculated Porosity:	Klute, A. 1986. Porosity. Chp.18-2.1, pp. 444-445, in A. Klute (ed.), Methods of Soil Analysis, American Society of Agronomy, Madison, WI
Saturated K: Falling Head Rising Tail (Flexible Wall):	ASTM D5084
Hanging Column Method:	ASTM D6836; Klute, A. 1986. Porosity. Chp.26, in A. Klute (ed.), Methods of Soil Analysis, American Society of Agronomy, Madison, WI
Pressure Plate Method:	ASTM D6836; ASTM D2325
Water Potential Method:	ASTM D6836; 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; Campbell, G.S. and G.W. Gee, 1986. Water Potential: Miscellaneous Methods. Chp. 25, pp. 631-632, in A. Klute (ed.), Methods of Soil Analysis, Part 1. American Society of Agronomy, Madison, WI.
Calc. Kunsat:	ASTM D6836; Soil Sci. Soc. Am. J. 1980 44:892-898
Course Fraction (Gravel) Correction (calc):	ASTM D4718; Bouwer, H. and Rice, R.C. 1984. Hydraulic Properties of Stony Vadose Zones. Groundwater Vol. 22, No. 6