

**Attachment Referenced in Response to DOE Comment # 2 - Part III**

**APPENDIX B1.2 FROM PRE-DESIGN STUDIES REPORT (MWH, 2014)  
GEOTECHNICAL TEST RESULTS  
ADVANCED TERRA TESTING**

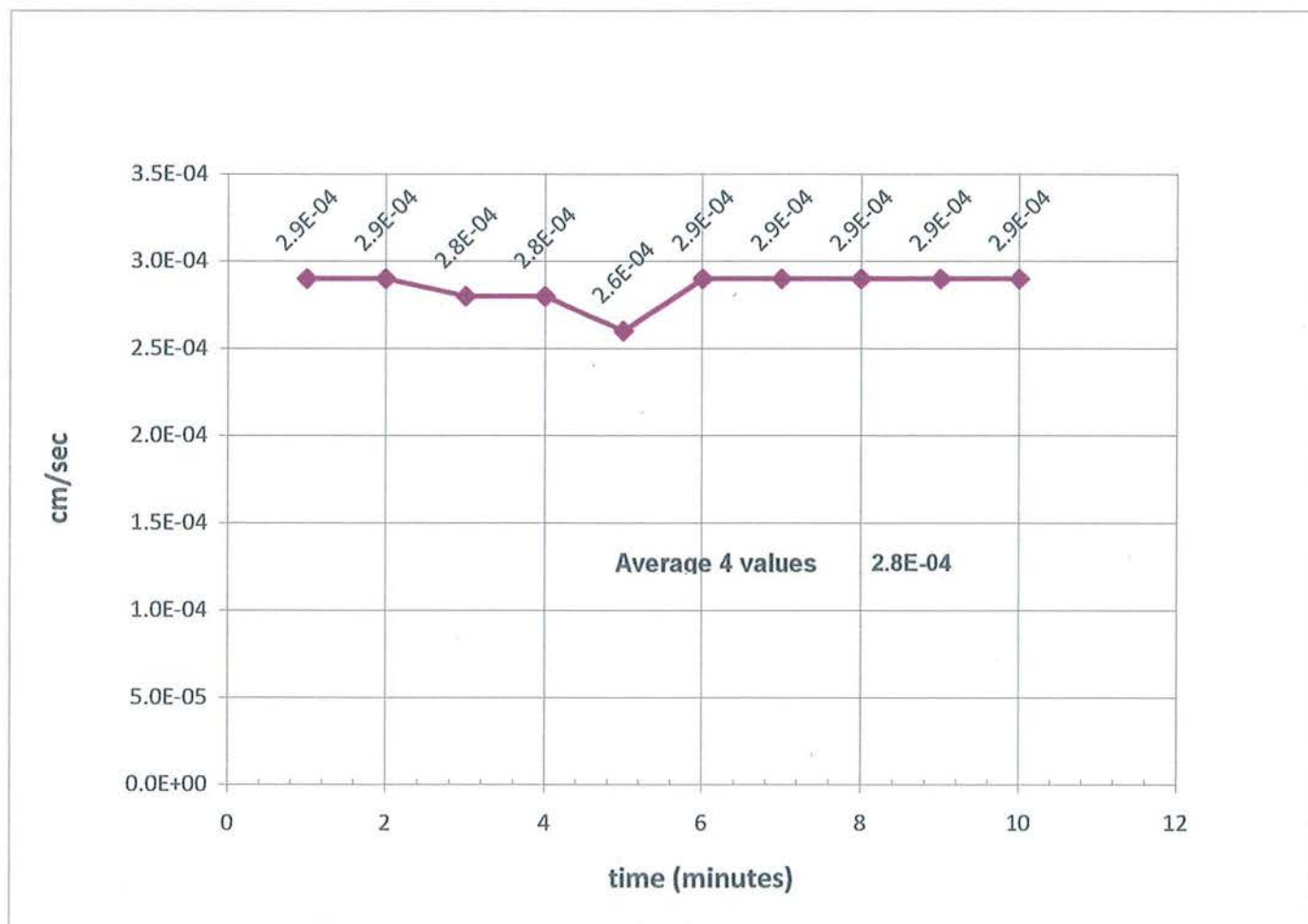


# Preliminary Flow Pump Test Data ASTM D5084


Client: MWH  
Job Number: 2512-77  
Project: --  
Location: Church Rock  
Project Number: --

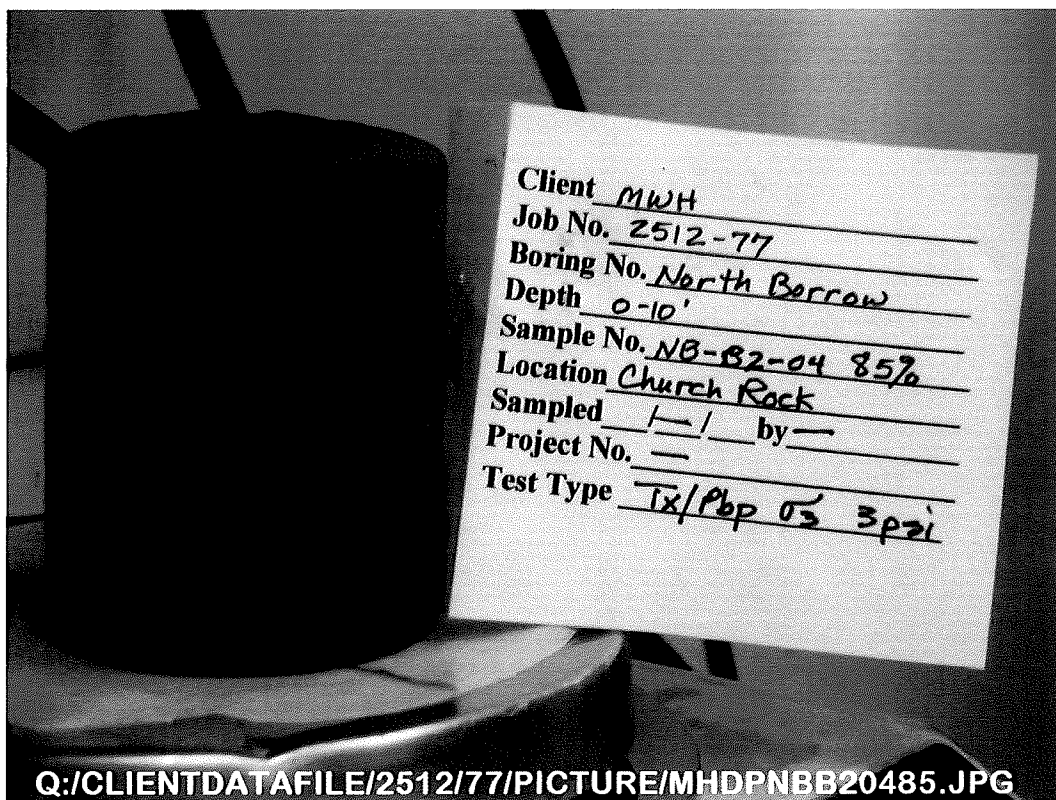
Boring Number: North Borrow  
Depth: 0-10'  
Sample Number: NB-B2-04 85%  
Sampled Date: --  
Test Date: 4/8/2014

Sampled By: --  
Technician: CAL



Data Entered By: CAL  
Date: 4/8/2014  
File Name: 2512\_77\_PrelimPerm\_ASTMD-5084-methodD\_17.xls

Checked By:   
Date: 4/9/14



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**PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO.	West Borrow	SAMPLED	--
DEPTH	5-10'	TEST STARTED	03/20/14 CAL
SAMPLE NO.	WB-B1-06 85%	TEST FINISHED	04/07/14 DPM
LOCATION	Church Rock	CELL NUMBER	12P
PROJECT NO.	--	SATURATED TEST	Yes
SOIL DESCR.	Remolded -#4	TEST TYPE	TX/Pbp/Tap Water
		CONF. PRES. PSF	432

MOISTURE/DENSITY DATA	BEFORE TEST	AFTER TEST
Wt. Soil + Moisture (g)	370.9	435.4
Wt. Wet Soil & Pan (g)	377.9	442.4
Wt. Dry Soil & Pan (g)	351.0	351.0
Wt. Lost Moisture (g)	27.0	91.4
Wt. of Pan Only (g)	7.0	7.0
Wt. of Dry Soil (g)	344.0	344.0
Moisture Content %	7.8	26.6
Wet Density PCF	103.5	128.3
Dry Density PCF	96.0	101.3

Init. Diameter (in)	2.405	(cm)	6.109
Init. Area (sq in)	4.543	(sq cm)	29.310
Init. Height (in)	3.005	(cm)	7.633
Vol. Bef. Consol. (cu ft)	0.00790		
Vol. After Consol. (cu ft)	0.00748		
Porosity %	43.15		

**FLOW PUMP CALCULATIONS**

Pump Setting (gear number)	3
Percentage of Pump setting	100
Q (cc/s)	2.33E-02
Height	2.990
Diameter	2.346
Pressure (psi)	0.155
Area after consol. (cm*cm)	27.897
Gradient	1.435
Permeability k (cm/s)	5.8E-04
Permeability k (m/s)	5.8E-06
Back Pressure (psi)	98.0
Cell Pressure (psi)	101.0
Ave. Effective Stress (psi)	2.923
Average temperature degree C:	22.5

Data entry by: DAW/SKL Date: 04/09/2014  
 Checked by: DPmrcac Date: 4/9/14  
 FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084\_R1\_15.xls

**TRIAXIAL TEST DATA**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO.	West Borrow	SAMPLED	--
DEPTH	5-10'	TEST STARTED	03/20/14 CAL
SAMPLE NO.	WB-B1-06 85%	TEST FINISHED	04/07/14 DPM
LOCATION	Church Rock	SETUP NO.	12P
PROJECT NO.	--	SATURATED TEST	Yes
SOIL DESCR.	Remolded -#4	TEST TYPE	TX/Pbp/Tap Water
		CONF. PRES. PSF	432

**SATURATION DATA**

Cell Pres. (PSI)	Back Pres. (PSI)	Burette Reading (CC)		Pore Pressure (PSI)		Change	B
		Close	Open	Close	Open		
		Close	Open	Close	Open		
40.0	38.0	2.2	15.5				
50.0	48.0	17.2	18.6	37.6	45.1	7.5	0.75
60.0	58.0	18.9	19.8	47.8	55.7	7.9	0.79
70.0	68.0	20.0	20.9	58.0	66.2	8.2	0.82
80.0	78.0	21.1	21.8	67.7	76.3	8.6	0.86
90.0	88.0	22.1	22.9	77.6	86.6	9.0	0.90
100.0	98.0	23.4	24.2	88.2	97.4	9.2	0.92
110.0		24.3	24.4	98.4	107.9	9.5	0.95

**CONSOLIDATION DATA**

Elapsed Time (Min)	SQRT Time (Min)	Burette Reading (CC)	Volume Defl. (cc)
0.00	0.00	0.10	0.00
0.25	0.50	0.45	-0.35
0.5	0.71	0.45	-0.35
1	1.00	0.45	-0.35
2	1.41	0.50	-0.40
4	2.00	0.50	-0.40
9	3.00	0.50	-0.40
16	4.00	0.50	-0.40
30	5.48	0.50	-0.40
60	7.75	0.50	-0.40
120	10.95	0.50	-0.40
240	15.49	0.50	-0.40
360	18.97	0.50	-0.40

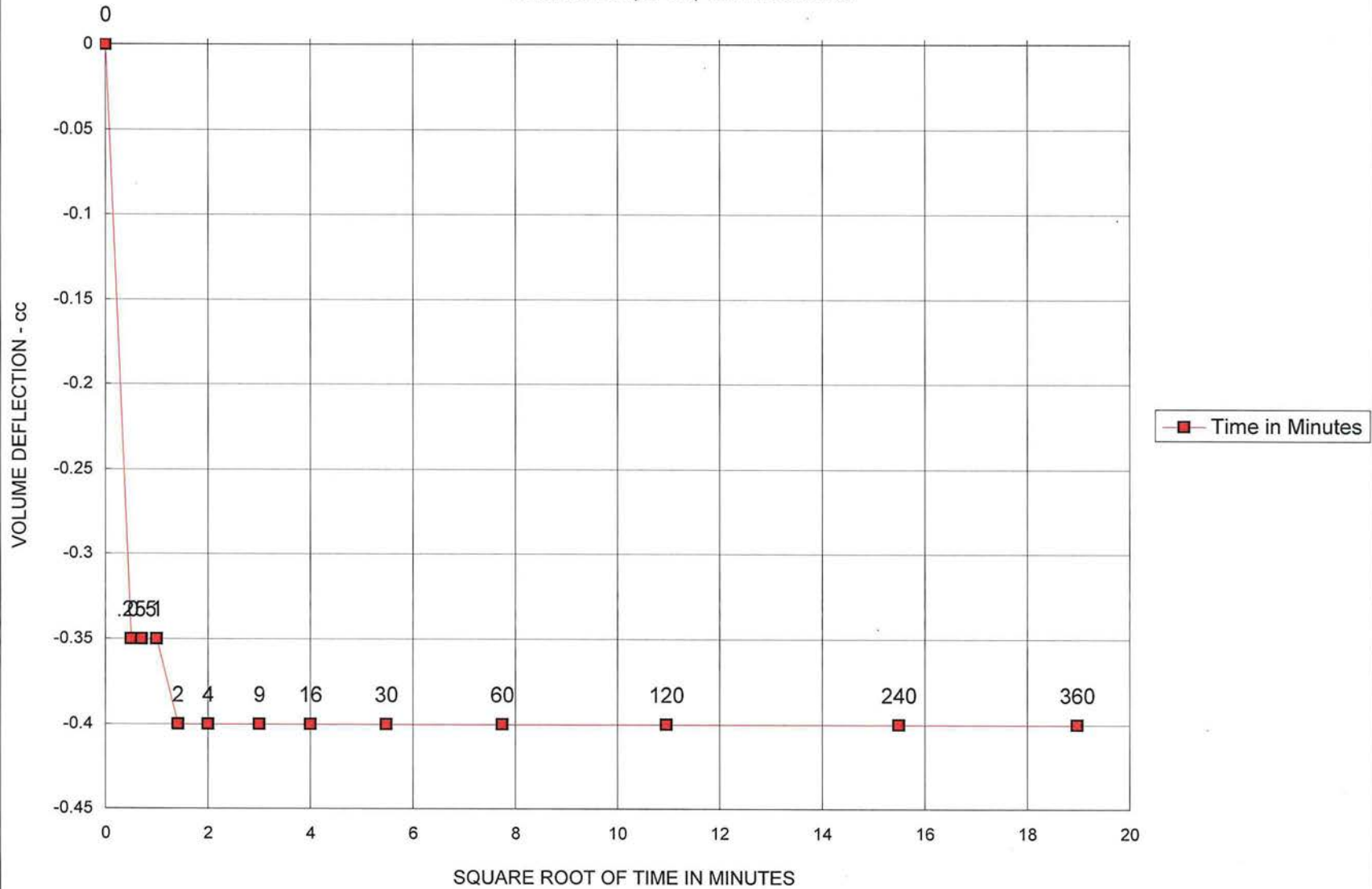
Initial Height (in)	3.005	Init. Vol. (CC)	223.740
Height Change (in)	0.015	Vol. Change (CC)	23.500
Ht. After Cons. (in)	2.990	Cell Exp. (CC)	11.668
Initial Area (sq in)	4.543	Net Change (CC)	11.833
Area After Cons. (sq in)	4.324	Cons. Vol. (CC)	211.907

Data entry by: DAW/SKL Date: 04/09/2014  
 Checked by: CH VDP Date: 4/09/14  
 FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084\_R1\_15.xls



# CONSOLIDATION DATA

West Borrow, 5-10', WB-B1-06 85%



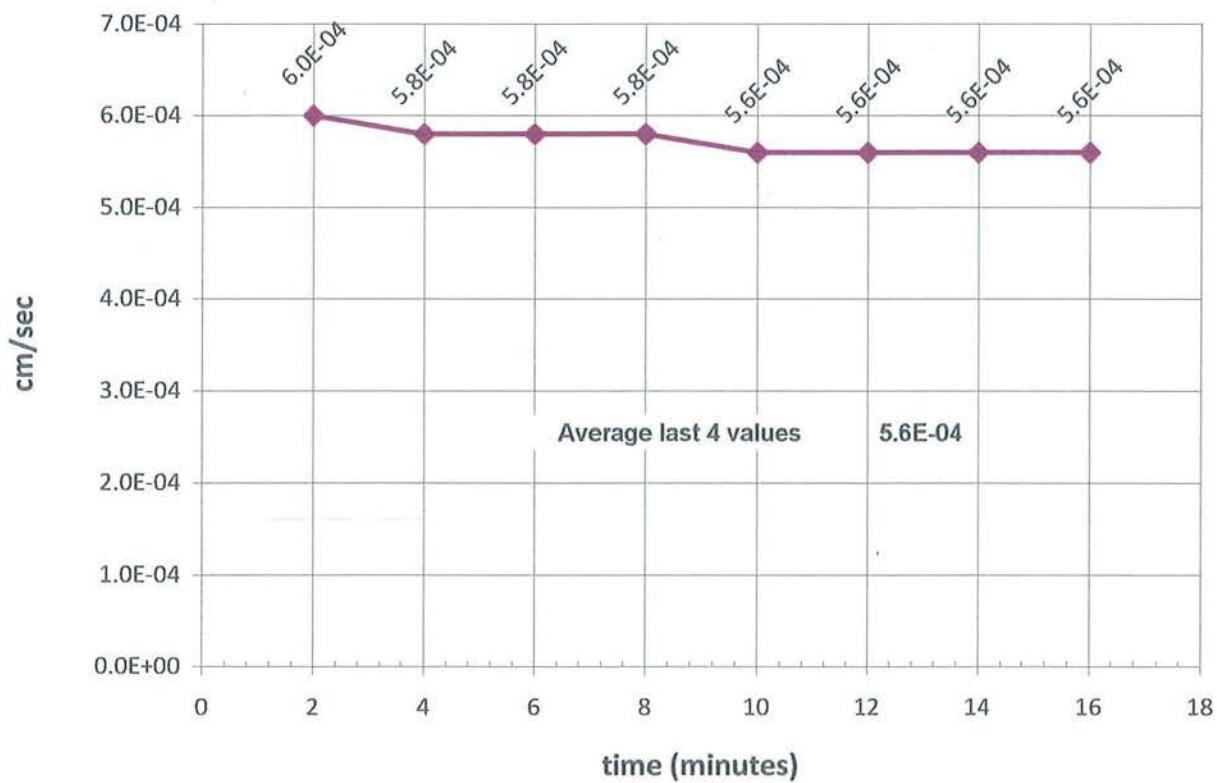


# Preliminary Flow Pump Test Data ASTM D5084

Client: MWH  
Job Number: 2512-77  
Project: --  
Location: Church Rock  
Project Number: --

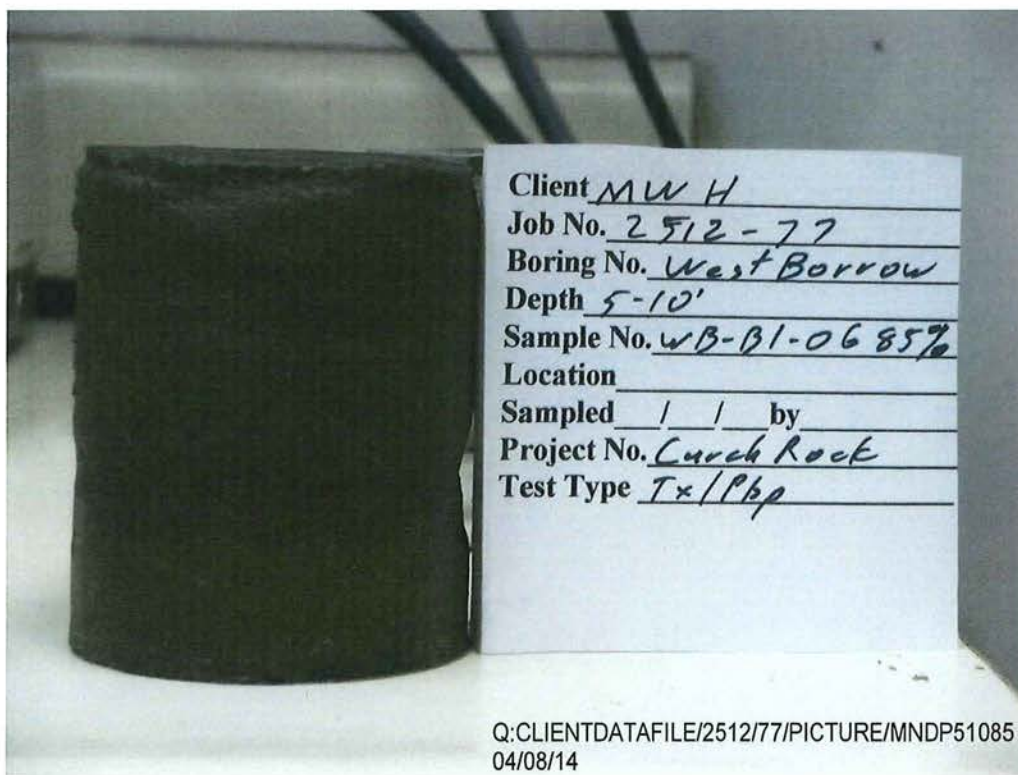
Boring Number: West Borrow  
Depth: 5-10'  
Sample Number: WB-B1-06 85%  
Sampled Date: --  
Test Date: 4/7/2014

Sampled By: --  
Technician: DPM



Data Entered By: DPM  
Date: 4/7/2014  
File Name: 2512\_77\_PrelimPerm\_ASTMD-5084-methodD\_14.xls

Checked By:   
Date: 4/9/14



Q:CLIENTDATAFILE/2512/77/PICTURE/MNDP51085  
04/08/14

**PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO. Dilco Hill  
DEPTH 35-45'  
SAMPLE NO. DH-B1-10 85%  
LOCATION Church Rock  
PROJECT NO. --  
SOIL DESCR. Remolded -#4

SAMPLED --  
TEST STARTED 03/18/14 CAL  
TEST FINISHED 04/04/14 CAL  
CELL NUMBER 8P  
SATURATED TEST Yes  
TEST TYPE TX/Pbp/Tap Water  
CONF. PRES. PSF 432

MOISTURE/DENSITY DATA	BEFORE TEST	AFTER TEST
Wt. Soil + Moisture (g)	401.9	435.3
Wt. Wet Soil & Pan (g)	408.9	442.3
Wt. Dry Soil & Pan (g)	363.8	363.8
Wt. Lost Moisture (g)	45.1	78.5
Wt. of Pan Only (g)	7.0	7.0
Wt. of Dry Soil (g)	356.8	356.8
Moisture Content %	12.6	22.0
Wet Density PCF	112.0	121.2
Dry Density PCF	99.5	99.3

Init. Diameter (in)	2.404	(cm)	6.106
Init. Area (sq in)	4.539	(sq cm)	29.286
Init. Height (in)	3.011	(cm)	7.648
Vol. Bef. Consol. (cu ft)	0.00791		
Vol. After Consol. (cu ft)	0.00792		
Porosity %	34.99		

**FLOW PUMP CALCULATIONS**

Pump Setting (gear number)	7
Percentage of Pump setting	100
Q (cc/s)	1.14E-03
Height	2.983
Diameter	2.417
Pressure (psi)	0.165
Area after consol. (cm*cm)	29.606
Gradient	1.531
Permeability k (cm/s)	2.5E-05
Permeability k (m/s)	2.5E-07
Back Pressure (psi)	68.0
Cell Pressure (psi)	71.0
Ave. Effective Stress (psi)	2.918
Average temperature degree C:	22.7

Data entry by: DAW/SKL Date: 04/09/2014  
Checked by: DAW Date: 4/09/14  
FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-R1\_12.xls

**TRIAXIAL TEST DATA**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO. Dilco Hill  
DEPTH 35-45'  
SAMPLE NO. DH-B1-10 85%  
LOCATION Church Rock  
PROJECT NO. --  
SOIL DESCR. Remolded -#4

SAMPLED --  
TEST STARTED 03/18/14 CAL  
TEST FINISHED 04/04/14 CAL  
SETUP NO. 8P  
SATURATED TEST Yes  
TEST TYPE TX/Pbp/Tap Water  
CONF. PRES. PSF 432

**SATURATION DATA**

Cell Pres. (PSI)	Back Pres. (PSI)	Burette Reading (CC)	Pore Pressure (PSI)		Change		B
		Close Open	Close Open				
40.0	38.0	2.6	11.9				
50.0	48.0	12.6	13.7	38.1	45.9	7.8	0.78
60.0	58.0	13.4	14.2	48.0	57.1	9.1	0.91
70.0	68.0	14.4	15.2	59.0	68.1	9.1	0.91
80.0		15.4	15.5	68.3	78.1	9.8	0.98

**CONSOLIDATION DATA**

Elapsed Time (Min)	SQRT Time (Min)	Burette Reading (CC)	Volume Defl. (cc)
0.00	0.00	0.20	0.00
0.25	0.50	0.80	-0.60
0.5	0.71	0.80	-0.60
1	1.00	0.80	-0.60
2	1.41	0.80	-0.60
4	2.00	0.80	-0.60
9	3.00	0.80	-0.60
16	4.00	0.80	-0.60
30	5.48	0.85	-0.65
60	7.75	0.85	-0.65
120	10.95	0.90	-0.70
240	15.49	0.90	-0.70
360	18.97	0.90	-0.70

Initial Height (in)	3.011	Init. Vol. (CC)	224.000
Height Change (in)	0.028	Vol. Change (CC)	14.200
Ht. After Cons. (in)	2.983	Cell Exp. (CC)	14.560
Initial Area (sq in)	4.539	Net Change (CC)	-0.360
Area After Cons. (sq in)	4.589	Cons. Vol. (CC)	224.360

Data entry by: DAW/SKL Date: 04/09/2014

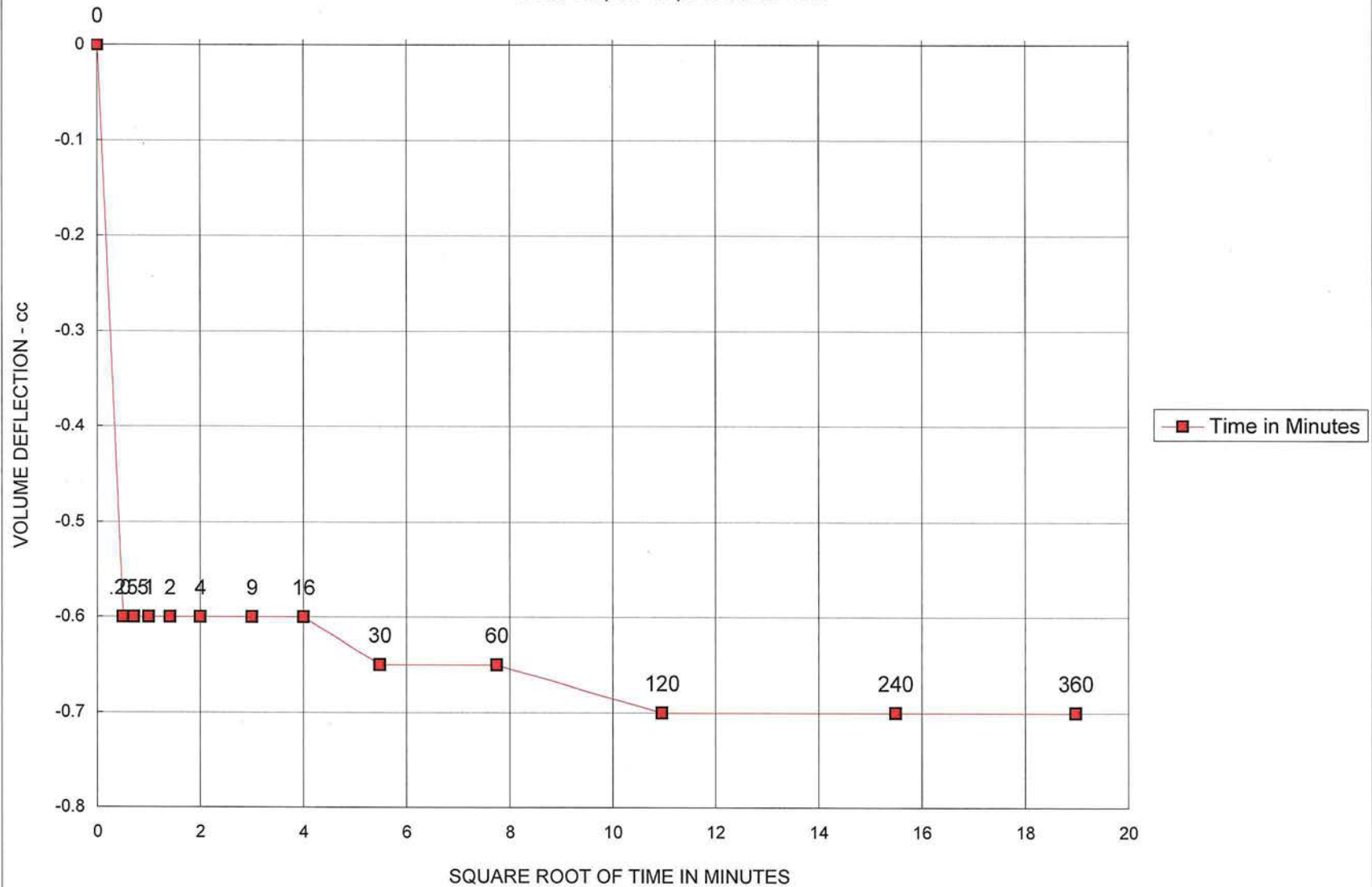
Checked by: CU Date: 4/09/14

FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-R1\_12.xls



## CONSOLIDATION DATA

Dilco Hill, 35-45', DH-B1-10 85%



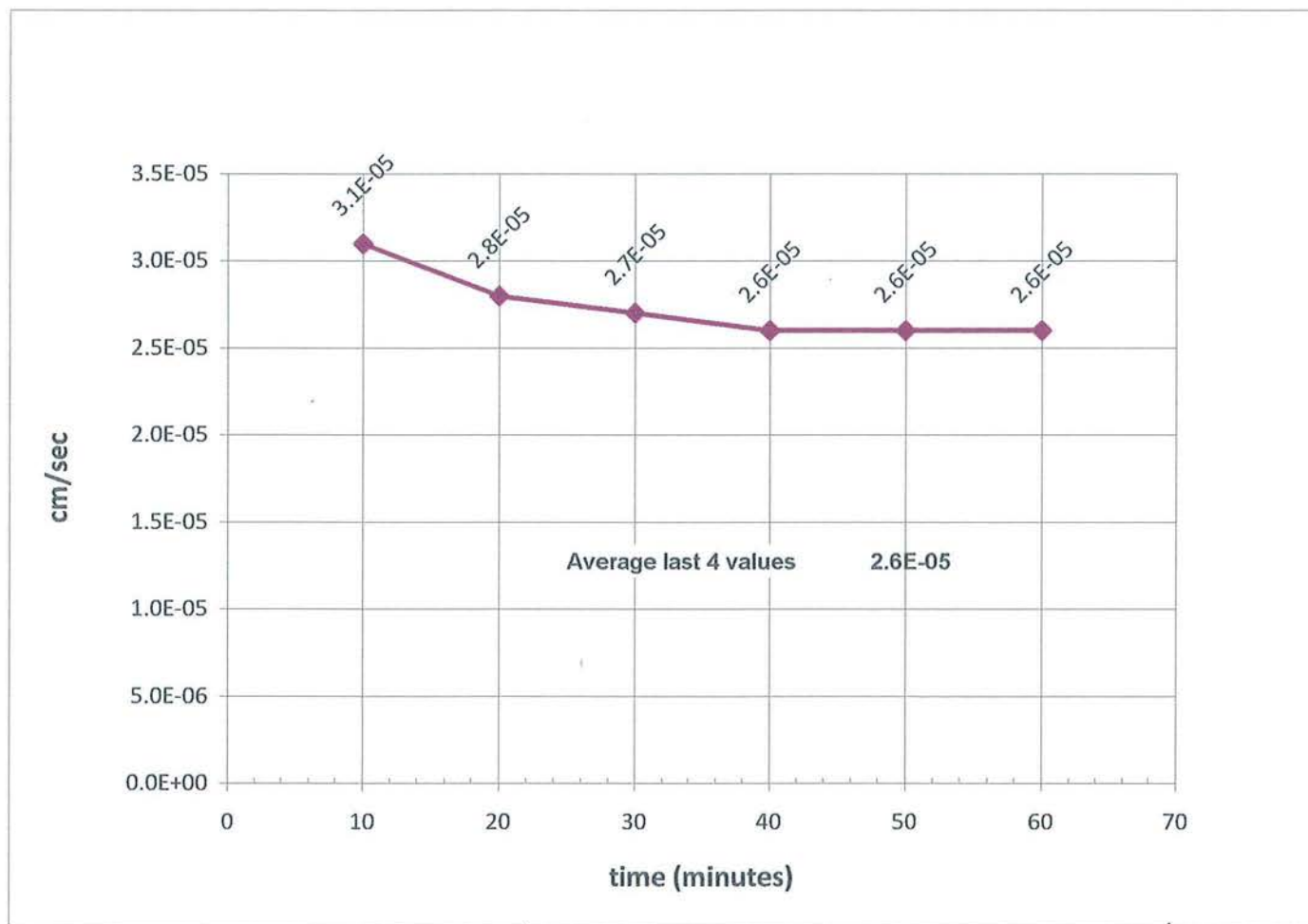


# Preliminary Flow Pump Test Data ASTM D5084

Client: MWH  
Job Number: 2512-77  
Project: --  
Location: Church Rock  
Project Number: --

Boring Number: Dilco Hill  
Depth: 35-45'  
Sample Number: DH-B1-10 85%  
Sampled Date: --  
Test Date: 4/4/2014

Sampled By: --  
Technician: CAL



Data Entered By: CAL  
Date: 4/4/2014  
File Name: 2512\_77\_PrelimPerm\_ASTMD-5084-methodD\_12.xls

Checked By: DAL  
Date: 04/08/14



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**PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO. East Borrow  
DEPTH 10-20'  
SAMPLE NO. EB-B4-06 85%  
LOCATION Church Rock  
PROJECT NO. --  
SOIL DESCR. Remolded -#4

SAMPLED --  
TEST STARTED 03/20/14 CAL  
TEST FINISHED 04/04/14 CAL  
CELL NUMBER 10P  
SATURATED TEST Yes  
TEST TYPE TX/Pbp/Tap Water  
CONF. PRES. PSF 432

MOISTURE/DENSITY DATA	BEFORE TEST	AFTER TEST
Wt. Soil + Moisture (g)	387.1	446.8
Wt. Wet Soil & Pan (g)	394.1	453.7
Wt. Dry Soil & Pan (g)	366.6	366.6
Wt. Lost Moisture (g)	27.5	87.2
Wt. of Pan Only (g)	6.9	6.9
Wt. of Dry Soil (g)	359.6	359.6
Moisture Content %	7.6	24.2
Wet Density PCF	108.0	137.7
Dry Density PCF	100.3	110.8

Init. Diameter (in)	2.405	(cm)	6.109
Init. Area (sq in)	4.543	(sq cm)	29.310
Init. Height (in)	3.006	(cm)	7.635
Vol. Bef. Consol. (cu ft)	0.00790		
Vol. After Consol. (cu ft)	0.00715		
Porosity %	43.02		

**FLOW PUMP CALCULATIONS**

Pump Setting (gear number)	3
Percentage of Pump setting	100
Q (cc/s)	2.33E-02
Height	2.980
Diameter	2.298
Pressure (psi)	0.104
Area after consol. (cm*cm)	26.766
Gradient	0.966
Permeability k (cm/s)	9.0E-04
Permeability k (m/s)	9.0E-06
Back Pressure (psi)	98.0
Cell Pressure (psi)	101.0
Ave. Effective Stress (psi)	2.948

Average temperature degree C: 21.8

Data entry by: DAW Date: 04/09/2014  
Checked by: DAW Date: 4/09/14  
FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084-R1\_11.xls



**TRIAXIAL TEST DATA**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO.	East Borrow	SAMPLED	--
DEPTH	10-20'	TEST STARTED	03/20/14 CAL
SAMPLE NO.	EB-B4-06 85%	TEST FINISHED	04/04/14 CAL
LOCATION	Church Rock	SETUP NO.	10P
PROJECT NO.	--	SATURATED TEST	Yes
SOIL DESCR.	Remolded -#4	TEST TYPE	TX/Pbp/Tap Water
		CONF. PRES. PSF	432

**SATURATION DATA**

Cell Pres. (PSI)	Back Pres. (PSI)	Burette Reading (CC)		Pore Pressure (PSI)		Change	B
		Close	Open	Close	Open		
40.0	38.0	2.3	15.8				
50.0	48.0	27.7	28.9	38.2	45.4	7.2	0.72
60.0	58.0	29.0	29.8	49.0	56.7	7.7	0.77
70.0	68.0	30.1	30.9	58.5	66.7	8.2	0.82
80.0	78.0	31.1	31.7	68.9	77.6	8.7	0.87
90.0	88.0	32.1	32.8	78.9	88.0	9.1	0.91
100.0	98.0	33.2	33.9	88.9	98.3	9.4	0.94
110.0		34.1	34.1	98.9	108.5	9.6	0.96

**CONSOLIDATION DATA**

Elapsed Time (Min)	SQRT Time (Min)	Burette Reading (CC)	Volume Defl. (cc)
0.00	0.00	0.90	0.00
0.25	0.50	1.35	-0.45
0.5	0.71	1.40	-0.50
1	1.00	1.40	-0.50
2	1.41	1.40	-0.50
4	2.00	1.45	-0.55
9	3.00	1.45	-0.55
16	4.00	1.45	-0.55
30	5.48	1.45	-0.55
60	7.75	1.45	-0.55
120	10.95	1.50	-0.60
240	15.49	1.50	-0.60
360	18.97	1.50	-0.60

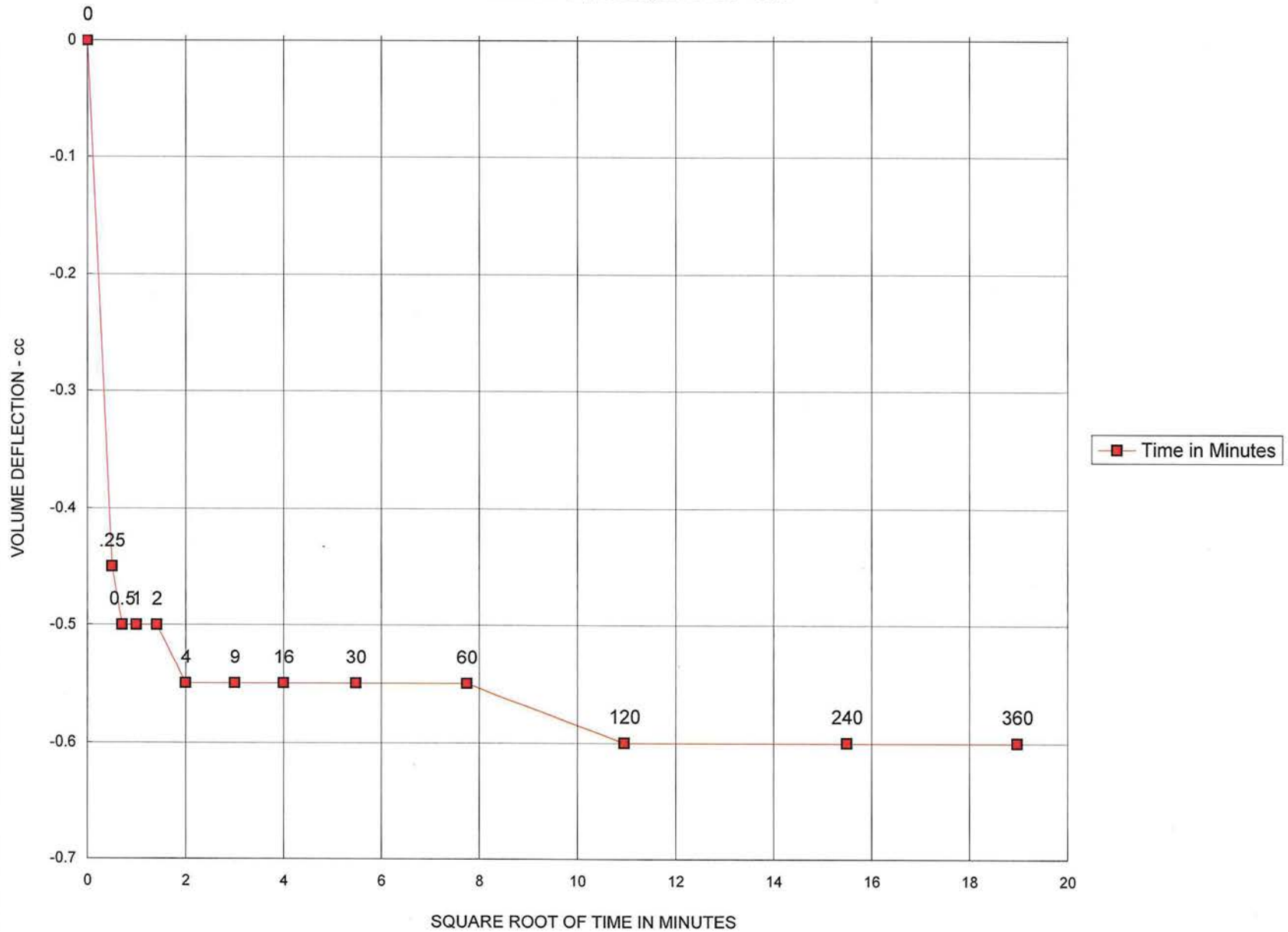
Initial Height (in)	3.006	Init. Vol. (CC)	223.814
Height Change (in)	0.026	Vol. Change (CC)	32.900
Ht. After Cons. (in)	2.980	Cell Exp. (CC)	11.717
Initial Area (sq in)	4.543	Net Change (CC)	21.183
Area After Cons. (sq in)	4.149	Cons. Vol. (CC)	202.631

Data entry by: DAW Date: 04/09/2014  
 Checked by: CA Date: 4/09/14  
 FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084-R1\_11.xls



# CONSOLIDATION DATA

East Borrow, 10-20', EB-B4-06 85%



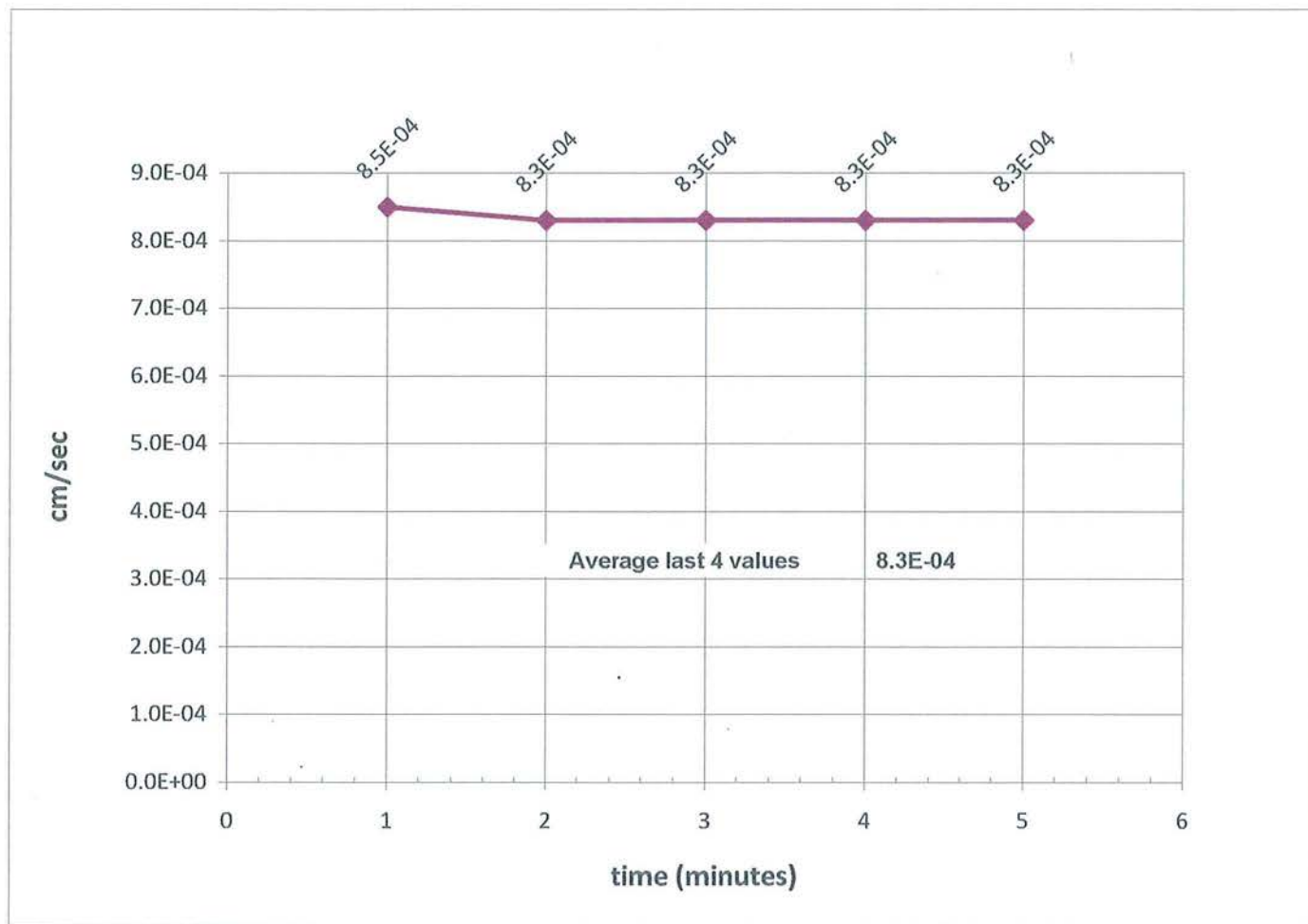


# Preliminary Flow Pump Test Data ASTM D5084

Client: MWH  
Job Number: 2512-77  
Project: --  
Location: Church Rock  
Project Number: --

Boring Number: East Borrow  
Depth: 10-20'  
Sample Number: EB-B4-06 85%  
Sampled Date: --  
Test Date: 4/4/2014

Sampled By: --  
Technician: CAL



Data Entered By: CAL  
Date: 4/4/2014  
File Name: 2512\_77\_PrelimPerm\_ASTMD-5084-methodD\_13.xls

Checked By: DTW  
Date: 04/08/14



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**PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO.	East Borrow	SAMPLED	-
DEPTH	10-20'	TEST STARTED	4/05/14 CAL
SAMPLE NO.	EB-B4-06 90%	TEST FINISHED	4/18/14 CAL
LOCATION	Church Rock	CELL NUMBER	8P
PROJECT NO.	-	SATURATED TEST	Yes
SOIL DESCR.	Remolded -#4	TEST TYPE	TX/Pbp/Tap Water
		CONF. PRES. PSF	432

MOISTURE/DENSITY DATA	BEFORE TEST	AFTER TEST
Wt. Soil + Moisture (g)	409.8	462.9
Wt. Wet Soil & Pan (g)	416.8	469.9
Wt. Dry Soil & Pan (g)	385.5	385.5
Wt. Lost Moisture (g)	31.3	84.4
Wt. of Pan Only (g)	7.0	7.0
Wt. of Dry Soil (g)	378.5	378.5
Moisture Content %	8.3	22.3
Wet Density PCF	114.4	129.4
Dry Density PCF	105.7	105.8

Init. Diameter (in)	2.407	(cm)	6.114
Init. Area (sq in)	4.550	(sq cm)	29.359
Init. Height (in)	2.999	(cm)	7.617
Vol. Bef. Consol. (cu ft)	0.00790		
Vol. After Consol. (cu ft)	0.00789		
Porosity %	37.78		

**FLOW PUMP CALCULATIONS**

Pump Setting (gear number)	4
Percentage of Pump setting	100
Q (cc/s)	1.16E-02
Height	2.990
Diameter	2.409
Pressure (psi)	0.098
Area after consol. (cm*cm)	29.403
Gradient	0.907
Permeability k (cm/s)	4.4E-04
Permeability k (m/s)	4.4E-06
Back Pressure (psi)	108.0
Cell Pressure (psi)	111.0
Ave. Effective Stress (psi)	2.951
Average temperature degree C:	22.0

Data entry by: SKL Date: 04/21/2014  
 Checked by: CAC Date: 4/22/14  
 FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084-R1\_20.xls

**TRIAXIAL TEST DATA**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO.	East Borrow	SAMPLED	-
DEPTH	10-20'	TEST STARTED	4/05/14 CAL
SAMPLE NO.	EB-B4-06 90%	TEST FINISHED	4/18/14 CAL
LOCATION	Church Rock	SETUP NO.	8P
PROJECT NO.	-	SATURATED TEST	Yes
SOIL DESCR.	Remolded -#4	TEST TYPE	TX/Pbp/Tap Water
		CONF. PRES. PSF	432

**SATURATION DATA**

Cell Pres. (PSI)	Back Pres. (PSI)	Burette Reading (CC)		Pore Pressure (PSI)		Change	B
		Close	Open	Close	Open		
40.0	38.0	2.2	11.0				
50.0	48.0	13.0	14.1	38.5	45.0	6.5	0.65
60.0	58.0	14.1	15.0	49.0	56.1	7.1	0.71
70.0	68.0	15.2	16.0	58.4	66.4	8.0	0.80
80.0	78.0	16.3	17.1	68.3	77.0	8.7	0.87
90.0	88.0	17.6	18.4	78.4	87.6	9.2	0.92
100.0	98.0	18.5	19.2	88.4	97.8	9.4	0.94
110.0	108.0	19.3	20.0	98.5	107.9	9.4	0.94
120.0		20.4	20.8	108.9	118.5	9.6	0.96

**CONSOLIDATION DATA**

Elapsed Time (Min)	SQRT Time (Min)	Burette Reading (CC)	Volume Defl. (cc)
0.00	0.00	0.30	0.00
0.25	0.50	0.60	-0.30
0.5	0.71	0.65	-0.35
1	1.00	0.65	-0.35
2	1.41	0.65	-0.35
4	2.00	0.65	-0.35
9	3.00	0.70	-0.40
16	4.00	0.70	-0.40
30	5.48	0.70	-0.40
60	7.75	0.70	-0.40
120	10.95	0.80	-0.50
240	15.49	0.80	-0.50
360	18.97	0.80	-0.50

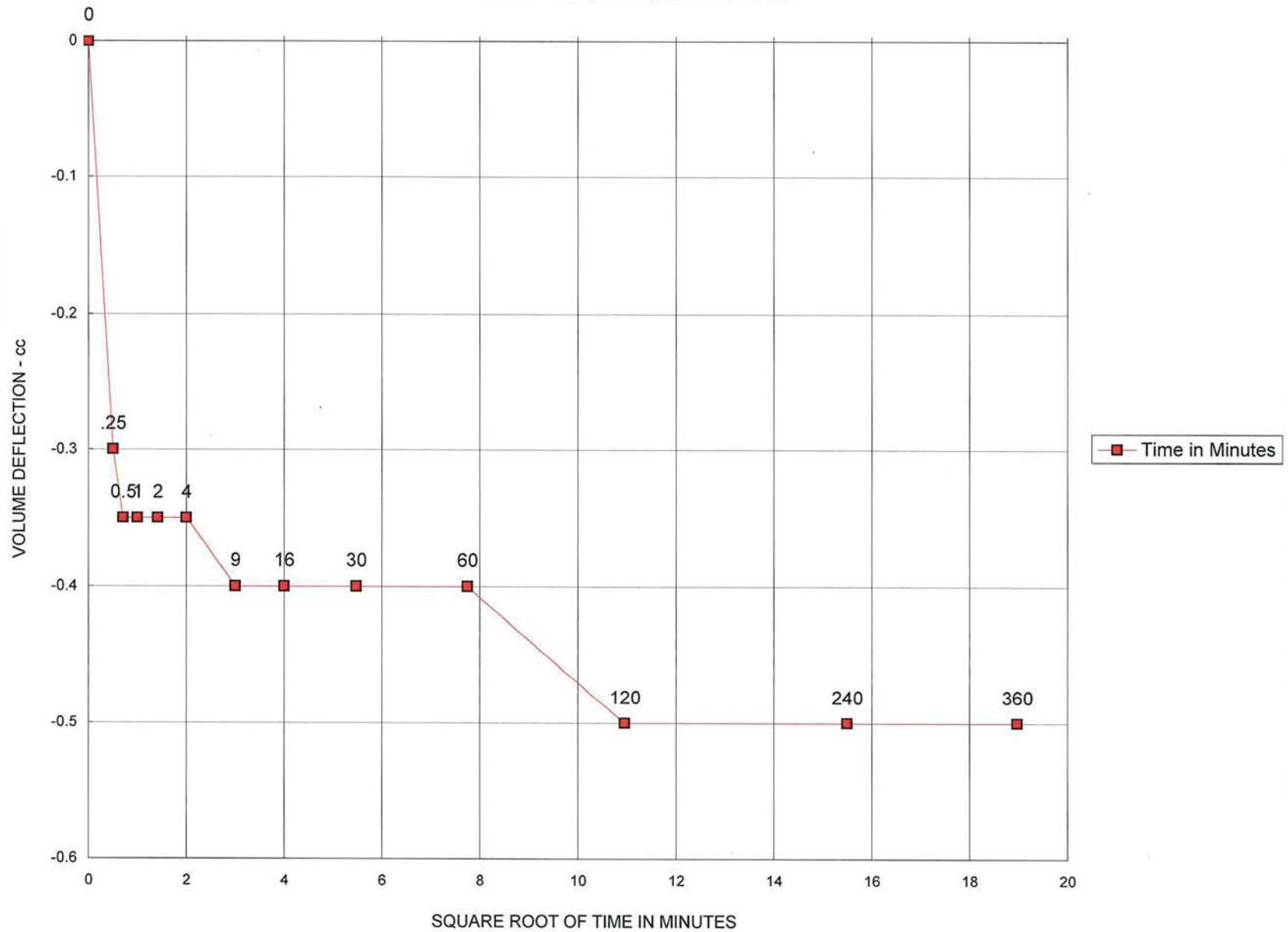
Initial Height (in)	2.999	Init. Vol. (CC)	223.665
Height Change (in)	0.009	Vol. Change (CC)	19.000
Ht. After Cons. (in)	2.990	Cell Exp. (CC)	18.680
Initial Area (sq in)	4.550	Net Change (CC)	0.320
Area After Cons. (sq in)	4.557	Cons. Vol. (CC)	223.344

Data entry by: SKL Date: 04/21/2014  
 Checked by: CAK Date: 4/22/14  
 FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084-R1\_20.xls



# CONSOLIDATION DATA

East Borrow, 10-20', EB-B4-06 90%

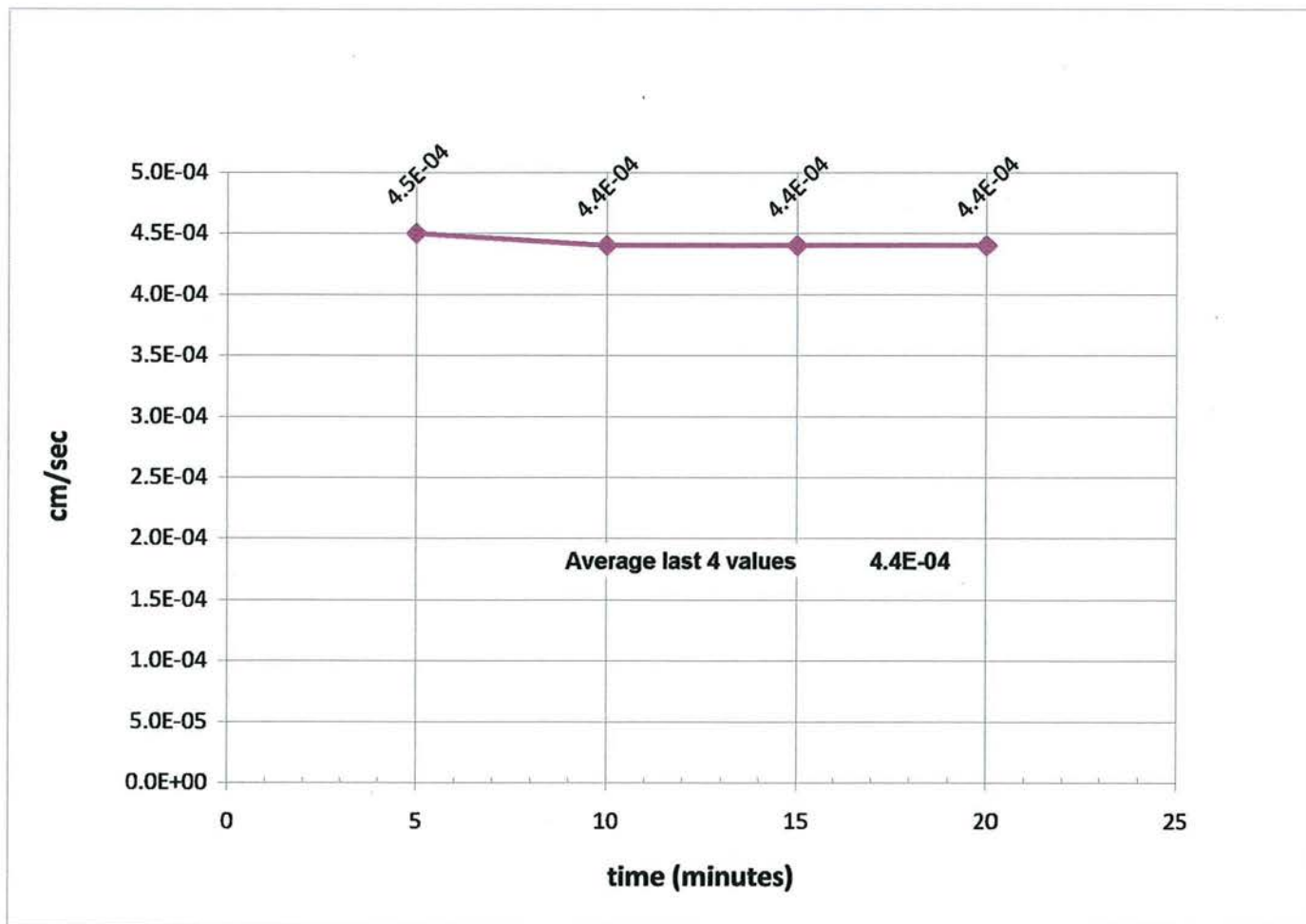


# Preliminary Flow Pump Test Data ASTM D5084

Client: MWH  
Job Number: 2512-77  
Project: --  
Location: Church Rock  
Project Number: --

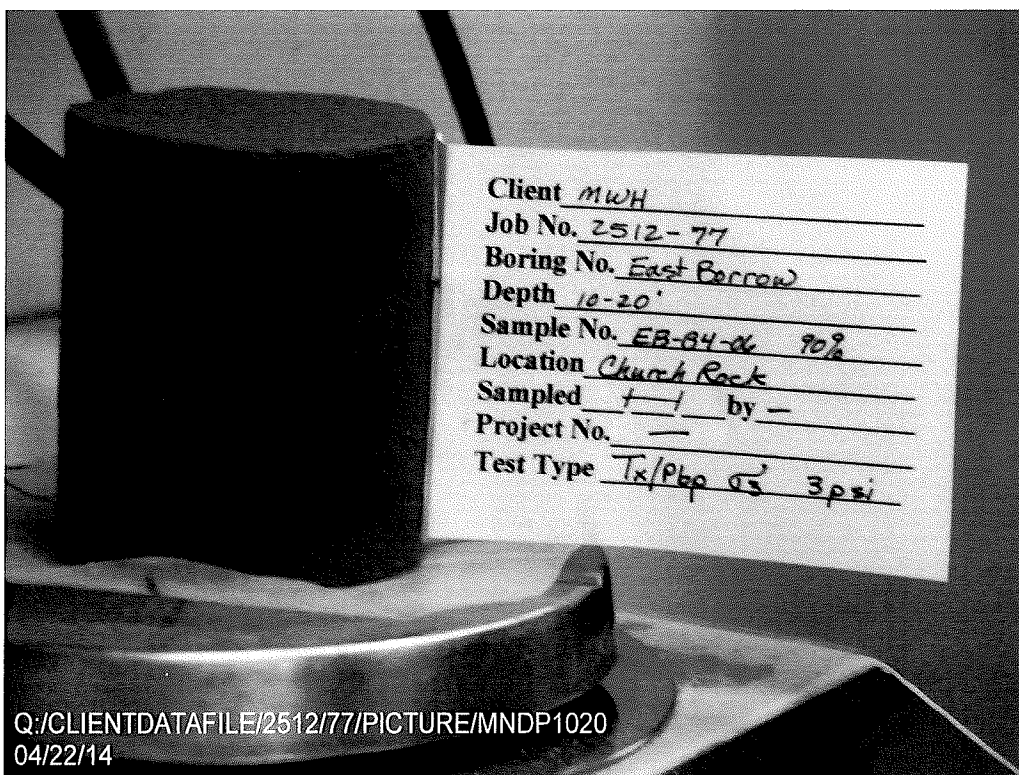
Boring Number: East Borrow  
Depth: 10-20'  
Sample Number: EB-B4-06 90%  
Sampled Date: --  
Test Date: 4/18/2014

Sampled By: --  
Technician: CAL



Data Entered By: CAL  
Date: 4/29/2014  
File Name: 2512\_77\_PrelimPerm\_ASTMD-5084-methodD\_22.xls

Checked By: CAL  
Date: 4/29/14



Client MWH  
Job No. 2512-77  
Boring No. East Borrow  
Depth 10-20'  
Sample No. EB-84-06 70%  
Location Church Rock  
Sampled 4-1 by -  
Project No. -  
Test Type Tx/Plp 03 3psi

Q:/CLIENTDATAFILE/2512/77/PICTURE/MNDP1020  
04/22/14

**PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO.	West Borrow	SAMPLED	--
DEPTH	5-10'	TEST STARTED	04/08/14 CAL
SAMPLE NO.	WB-B1-06 90%	TEST FINISHED	04/21/14 CAL
LOCATION	Church Rock	CELL NUMBER	12P
PROJECT NO.	--	SATURATED TEST	Yes
SOIL DESCR.	Remolded -#4	TEST TYPE	TX/Pbp/Tap Water
		CONF. PRES. PSF	432

MOISTURE/DENSITY DATA	BEFORE TEST	AFTER TEST
Wt. Soil + Moisture (g)	392.3	452.2
Wt. Wet Soil & Pan (g)	399.3	459.2
Wt. Dry Soil & Pan (g)	371.6	371.6
Wt. Lost Moisture (g)	27.8	87.6
Wt. of Pan Only (g)	7.0	7.0
Wt. of Dry Soil (g)	364.6	364.6
Moisture Content %	7.6	24.0
Wet Density PCF	109.9	128.4
Dry Density PCF	102.1	103.5

Init. Diameter (in)	2.405	(cm)	6.109
Init. Area (sq in)	4.543	(sq cm)	29.310
Init. Height (in)	2.995	(cm)	7.607
Vol. Bef. Consol. (cu ft)	0.00787		
Vol. After Consol. (cu ft)	0.00777		
Porosity %	39.84		

**FLOW PUMP CALCULATIONS**

Pump Setting (gear number)	4
Percentage of Pump setting	100
Q (cc/s)	1.16E-02
Height	2.987
Diameter	2.392
Pressure (psi)	0.205
Area after consol. (cm*cm)	28.987
Gradient	1.900
Permeability k (cm/s)	2.1E-04
Permeability k (m/s)	2.1E-06
Back Pressure (psi)	98.0
Cell Pressure (psi)	101.0
Ave. Effective Stress (psi)	2.898

Average temperature degree C: 22.6

Data entry by: DAW Date: 04/23/2014  
 Checked by: cm Date: 4/23/14  
 FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084-R1\_22.xls

**TRIAXIAL TEST DATA**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO.	West Borrow	SAMPLED	--
DEPTH	5-10'	TEST STARTED	04/08/14 CAL
SAMPLE NO.	WB-B1-06 90%	TEST FINISHED	04/21/14 CAL
LOCATION	Church Rock	SETUP NO.	12P
PROJECT NO.	--	SATURATED TEST	Yes
SOIL DESCR.	Remolded -#4	TEST TYPE	TX/Pbp/Tap Water
		CONF. PRES. PSF	432

**SATURATION DATA**

Cell Pres. (PSI)	Back Pres. (PSI)	Burette Reading (CC)		Pore Pressure (PSI)		Change	B
		Close	Open	Close	Open		
40.0	38.0	2.1	9.2				
50.0	48.0	9.2	10.5	38.3	44.2	5.9	0.59
60.0	58.0	10.9	12.1	47.6	55.0	7.4	0.74
70.0	68.0	12.4	13.0	57.8	66.1	8.3	0.83
80.0	78.0	13.3	14.0	68.4	77.2	8.8	0.88
90.0	88.0	14.0	14.7	78.3	87.4	9.1	0.91
100.0	98.0	15.0	15.8	88.3	97.7	9.4	0.94
110.0		15.8	16.0	98.2	107.8	9.6	0.96

**CONSOLIDATION DATA**

Elapsed Time (Min)	SQRT Time (Min)	Burette Reading (CC)	Volume Defl. (cc)
0.00	0.00	15.90	0.00
0.25	0.50	16.20	-0.30
0.5	0.71	16.20	-0.30
1	1.00	16.20	-0.30
2	1.41	16.20	-0.30
4	2.00	16.20	-0.30
9	3.00	16.20	-0.30
16	4.00	16.20	-0.30
30	5.48	16.25	-0.35
60	7.75	16.25	-0.35
120	10.95	16.25	-0.35
240	15.49	16.25	-0.35
360	18.97	16.25	-0.35

Initial Height (in)	2.995	Init. Vol. (CC)	222.995
Height Change (in)	0.008	Vol. Change (CC)	14.700
Ht. After Cons. (in)	2.987	Cell Exp. (CC)	11.668
Initial Area (sq in)	4.543	Net Change (CC)	3.033
Area After Cons. (sq in)	4.493	Cons. Vol. (CC)	219.963

Data entry by: DAW Date: 04/22/2014

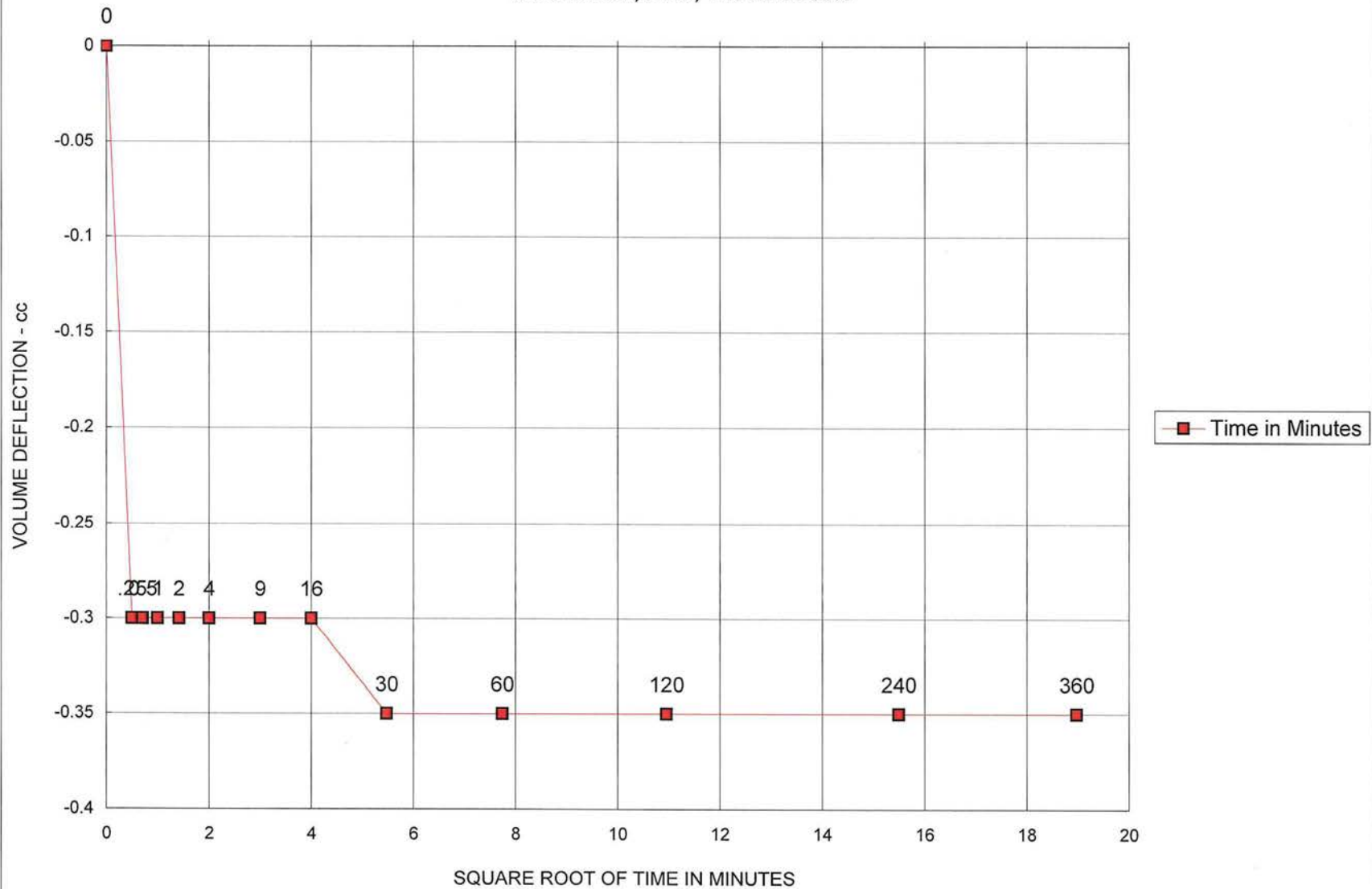
Checked by: ca Date: 4/23/14

FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084-R1\_22.xls



## CONSOLIDATION DATA

West Borrow, 5-10', WB-B1-06 90%



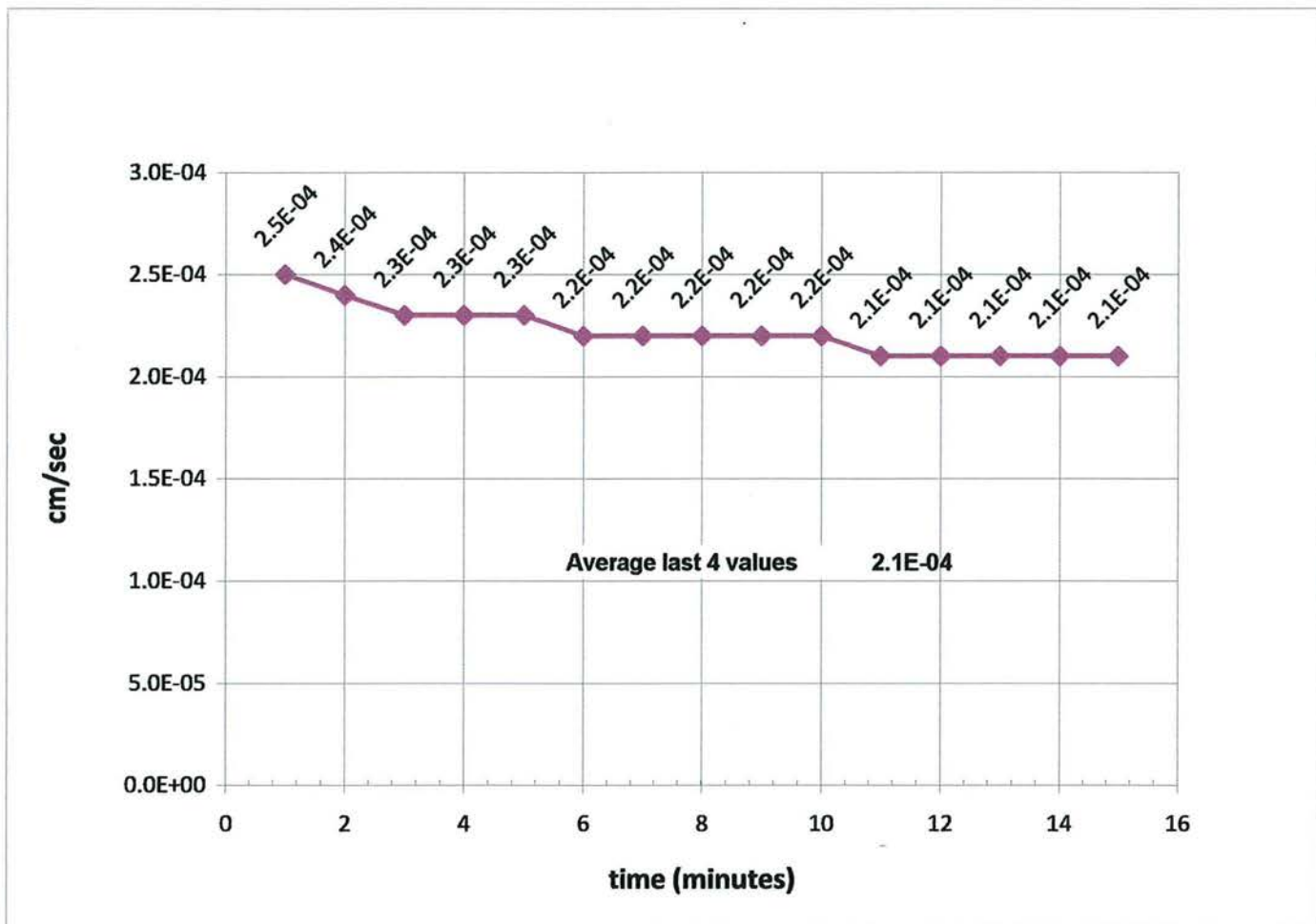


# Preliminary Flow Pump Test Data ASTM D5084

Client: MWH  
Job Number: 2512-77  
Project: --  
Location: Church Rock  
Project Number: --

Boring Number: West Borrow  
Depth: 5-10'  
Sample Number: WB-B1-06 90%  
Sampled Date: --  
Test Date: 4/21/2014

Sampled By: --  
Technician: CAL



Data Entered By: CAL  
Date: 4/21/2014  
File Name: 2512\_77\_PrelimPerm\_ASTMD-5084-methodD\_23.xls

Checked By: DAW  
Date: 04/23/14

Client MWH  
Job No. 2512-77  
Boring No. West Borrow  
Depth 5-10'  
Sample No. WB-B1-06 902  
Location Church Rock  
Sampled 1-1 by -  
Project No. -  
Test Type 1x/Plap 0.3 3psi

Q:/CLIENTDATAFILE/2512/77/PICTURE/MNDP5109  
04/22/14

**PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO. Dilco Hill  
DEPTH 35-45'  
SAMPLE NO. DH-B1-10 90%  
LOCATION Church Rock  
PROJECT NO. -  
SOIL DESCR. Remolded -#4

SAMPLED -  
TEST STARTED 4/05/14 CAL  
TEST FINISHED 4/18/14 CAL  
CELL NUMBER 10P  
SATURATED TEST Yes  
TEST TYPE TX/Pbp/Tap Water  
CONF. PRES. PSF 432

MOISTURE/DENSITY DATA	BEFORE TEST	AFTER TEST
Wt. Soil + Moisture (g)	425.3	451.3
Wt. Wet Soil & Pan (g)	432.3	458.3
Wt. Dry Soil & Pan (g)	387.9	387.9
Wt. Lost Moisture (g)	44.4	70.4
Wt. of Pan Only (g)	7.0	7.0
Wt. of Dry Soil (g)	380.9	380.9
Moisture Content %	11.6	18.5
Wet Density PCF	117.6	131.7
Dry Density PCF	105.4	111.1

\* Note:  
Unable to achieve requested  
density (very dense), further  
compaction attempts bend  
mold.

Init. Diameter (in)	2.410	(cm)	6.121
Init. Area (sq in)	4.562	(sq cm)	29.432
Init. Height (in)	3.019	(cm)	7.668
Vol. Bef. Consol. (cu ft)	0.00797		
Vol. After Consol. (cu ft)	0.00756		
Porosity %	32.92		

**FLOW PUMP CALCULATIONS**

Pump Setting (gear number)	8
Percentage of Pump setting	100
Q (cc/s)	5.70E-04
Height	3.001
Diameter	2.354
Pressure (psi)	0.695
Area after consol. (cm*cm)	28.068
Gradient	6.410
Permeability k (cm/s)	3.2E-06
Permeability k (m/s)	3.2E-08
Back Pressure (psi)	48.0
Cell Pressure (psi)	51.0
Ave. Effective Stress (psi)	2.653
Average temperature degree C:	23.0

Data entry by: SKL Date: 04/23/2014  
Checked by: OK Date: 4/23/14  
FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084-R1\_21.xls

**TRIAXIAL TEST DATA**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO.	Dilco Hill	SAMPLED	-
DEPTH	35-45'	TEST STARTED	4/05/14 CAL
SAMPLE NO.	DH-B1-10 90%	TEST FINISHED	4/18/14 CAL
LOCATION	Church Rock	SETUP NO.	10P
PROJECT NO.	-	SATURATED TEST	Yes
SOIL DESCR.	Remolded -#4	TEST TYPE	TX/Pbp/Tap Water
		CONF. PRES. PSF	432

**SATURATION DATA**

Cell Pres. (PSI)	Back Pres. (PSI)	Burette Reading (CC)		Pore Pressure (PSI)		Change	B
		Close	Open	Close	Open		
40.0	38.0	3.1	12.6				
50.0	48.0	19.2	20.2	38.7	47.7	9.0	0.90
60.0		20.4	20.4	48.1	57.7	9.6	0.96

**CONSOLIDATION DATA**

Elapsed Time (Min)	SQRT Time (Min)	Burette Reading (CC)	Volume Defl. (cc)
0.00	0.00	1.10	0.00
0.25	0.50	1.20	-0.10
0.5	0.71	1.30	-0.20
1	1.00	1.30	-0.20
2	1.41	1.30	-0.20
4	2.00	1.35	-0.25
9	3.00	1.40	-0.30
16	4.00	1.40	-0.30
30	5.48	1.40	-0.30
60	7.75	1.40	-0.30
120	10.95	1.40	-0.30
240	15.49	1.40	-0.30
360	18.97	1.40	-0.30

Initial Height (in)	3.019	Init. Vol. (CC)	225.718
Height Change (in)	0.018	Vol. Change (CC)	18.600
Ht. After Cons. (in)	3.001	Cell Exp. (CC)	6.867
Initial Area (sq in)	4.562	Net Change (CC)	11.733
Area After Cons. (sq in)	4.350	Cons. Vol. (CC)	213.985

Data entry by: SKL Date: 04/23/2014

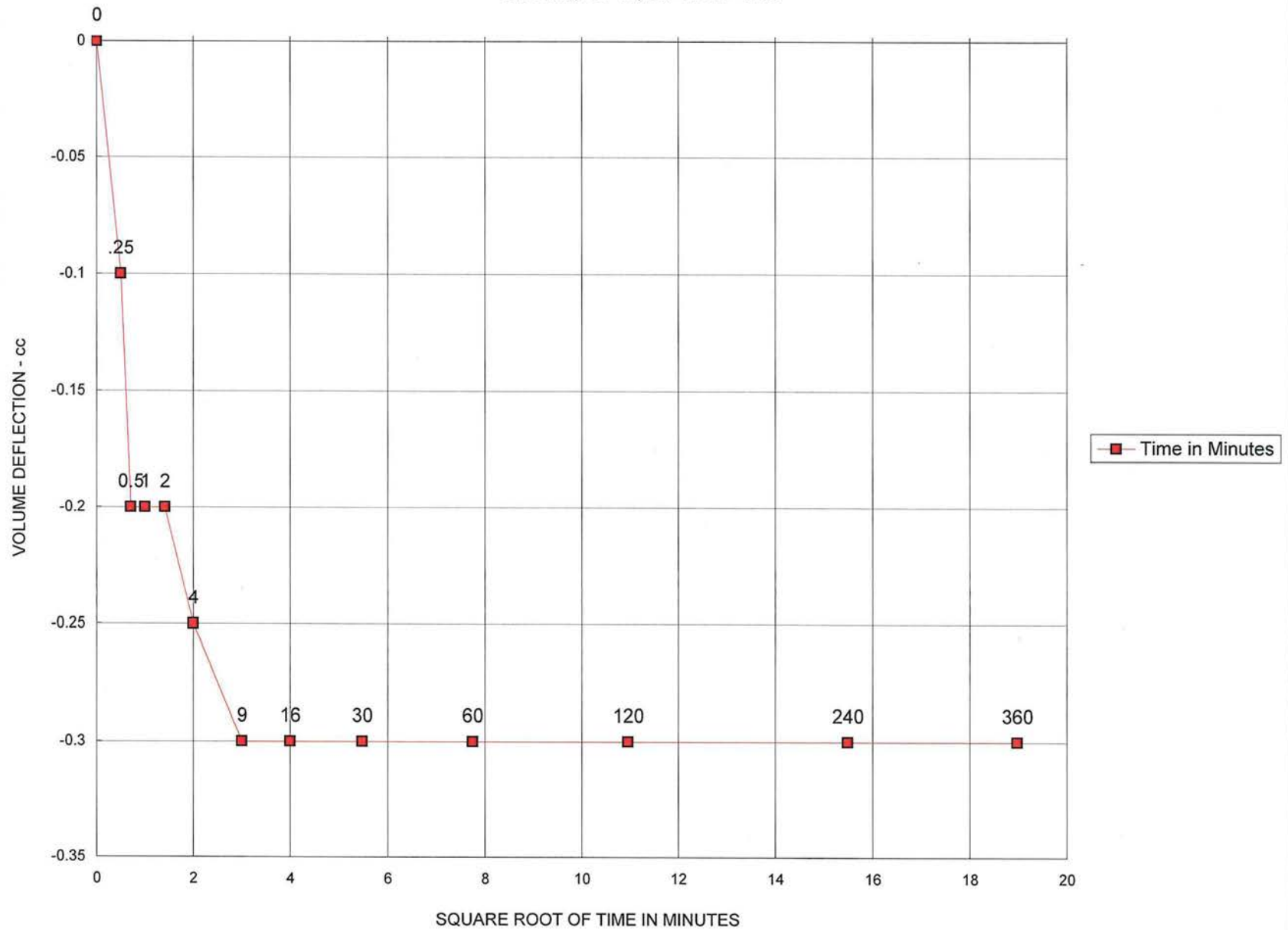
Checked by: CM Date: 4/23/14

FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084-R1\_21.xls



# CONSOLIDATION DATA

Dilco Hill, 35-45', DH-B1-10 90%

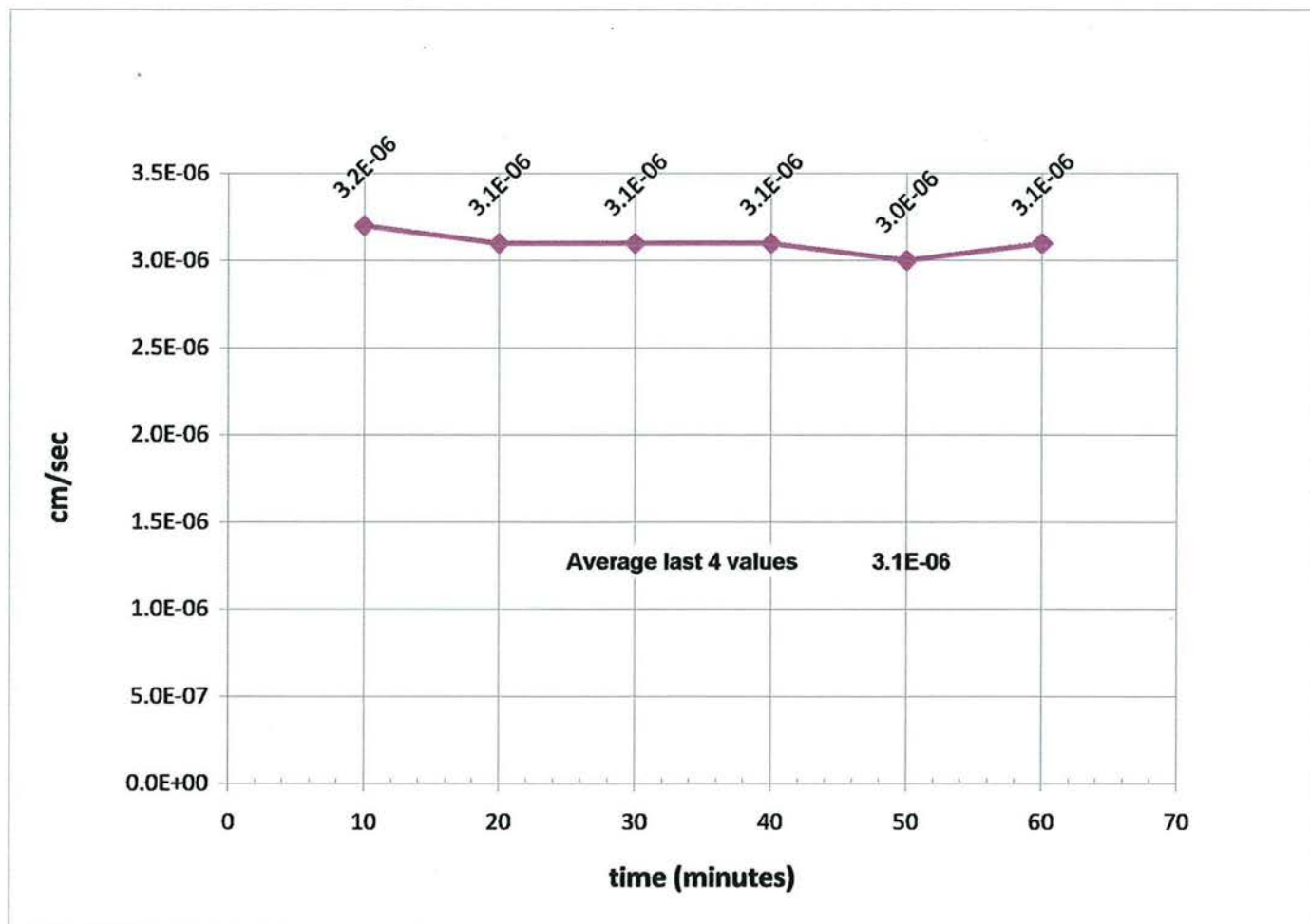


# Preliminary Flow Pump Test Data ASTM D5084

Client: MWH  
Job Number: 2512-77  
Project: --  
Location: Church Rock  
Project Number: --

Boring Number: Dilco Hill  
Depth: 35-45'  
Sample Number: DH-B1-10 90%  
Sampled Date: --  
Test Date: 4/18/2014

Sampled By: --  
Technician: CAL



Data Entered By: CAL  
Date: 4/18/2014  
File Name: 2512\_77\_PrelimPerm\_ASTMD-5084-methodD\_21.xls

Checked By: SIL  
Date: 4/21/14



Q:/CLIENTDATAFILE/2512/77/PICTURE/MNDP3545  
04/22/14

**PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO.	Dilco Hill	SAMPLED	-
DEPTH	0-10'	TEST STARTED	4/08/14 CAL
SAMPLE NO.	DH-B1-03 90%	TEST FINISHED	4/22/14 CAL
LOCATION	Church Rock	CELL NUMBER	5P
PROJECT NO.	-	SATURATED TEST	Yes
SOIL DESCR.	-#4 Remolded	TEST TYPE	TX/Pbp/Tap Water
		CONF. PRES. PSF	432

MOISTURE/DENSITY DATA	BEFORE TEST	AFTER TEST
Wt. Soil + Moisture (g)	398.8	464.1
Wt. Wet Soil & Pan (g)	405.7	471.1
Wt. Dry Soil & Pan (g)	386.6	386.6
Wt. Lost Moisture (g)	19.1	84.5
Wt. of Pan Only (g)	7.0	7.0
Wt. of Dry Soil (g)	379.6	379.6
Moisture Content %	5.0	22.2
Wet Density PCF	112.2	133.5
Dry Density PCF	106.8	109.2

Init. Diameter (in)	2.409	(cm)	6.119
Init. Area (sq in)	4.558	(sq cm)	29.407
Init. Height (in)	2.970	(cm)	7.544
Vol. Bef. Consol. (cu ft)	0.00783		
Vol. After Consol. (cu ft)	0.00766		
Porosity %	38.92		

**FLOW PUMP CALCULATIONS**

Pump Setting (gear number)	4
Percentage of Pump setting	100
Q (cc/s)	1.16E-02
Height	2.953
Diameter	2.389
Pressure (psi)	0.173
Area after consol. (cm*cm)	28.925
Gradient	1.622
Permeability k (cm/s)	2.5E-04
Permeability k (m/s)	2.5E-06
Back Pressure (psi)	108.0
Cell Pressure (psi)	111.0
Ave. Effective Stress (psi)	2.914

Average temperature degree C: 23.2

Data entry by: SKL Date: 04/23/2014  
 Checked by: cm Date: 4/23/14  
 FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084-R1\_23.xls

# TRIAXIAL TEST DATA

ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO.	Dilco Hill	SAMPLED	-
DEPTH	0-10'	TEST STARTED	4/08/14 CAL
SAMPLE NO.	DH-B1-03 90%	TEST FINISHED	4/22/14 CAL
LOCATION	Church Rock	SETUP NO.	5P
PROJECT NO.	-	SATURATED TEST	Yes
SOIL DESCR.	-#4 Remolded	TEST TYPE	TX/Pbp/Tap Water
		CONF. PRES. PSF	432

## SATURATION DATA

Cell Pres. (PSI)	Back Pres. (PSI)	Burette Reading (CC)	Pore Pressure (PSI)	Change	B
		Close Open	Close Open		
40.0	38.0	3.0	9.7		
50.0	48.0	11.0	13.0	37.9	43.7
60.0	58.0	14.7	15.6	47.7	54.4
70.0	68.0	17.0	17.8	57.8	65.4
80.0	78.0	18.2	18.9	67.9	76.1
90.0	88.0	19.3	20.0	77.8	86.3
100.0	98.0	21.1	21.8	87.8	96.7
110.0	108.0	22.2	22.9	97.8	106.9
120.0		24.0	24.1	107.7	117.2

## CONSOLIDATION DATA

Elapsed Time (Min)	SQRT Time (Min)	Burette Reading (CC)	Volume Defl. (cc)
0.00	0.00	0.40	0.00
0.25	0.50	0.60	-0.20
0.5	0.71	0.60	-0.20
1	1.00	0.60	-0.20
2	1.41	0.60	-0.20
4	2.00	0.60	-0.20
9	3.00	0.70	-0.30
16	4.00	0.70	-0.30
30	5.48	0.70	-0.30
60	7.75	0.70	-0.30
120	10.95	0.70	-0.30
240	15.49	0.70	-0.30
360	18.97	0.70	-0.30

Initial Height (in)	2.970	Init. Vol. (CC)	221.870
Height Change (in)	0.017	Vol. Change (CC)	21.700
Ht. After Cons. (in)	2.953	Cell Exp. (CC)	16.825
Initial Area (sq in)	4.558	Net Change (CC)	4.875
Area After Cons. (sq in)	4.483	Cons. Vol. (CC)	216.995

Data entry by: SKL Date: 04/23/2014

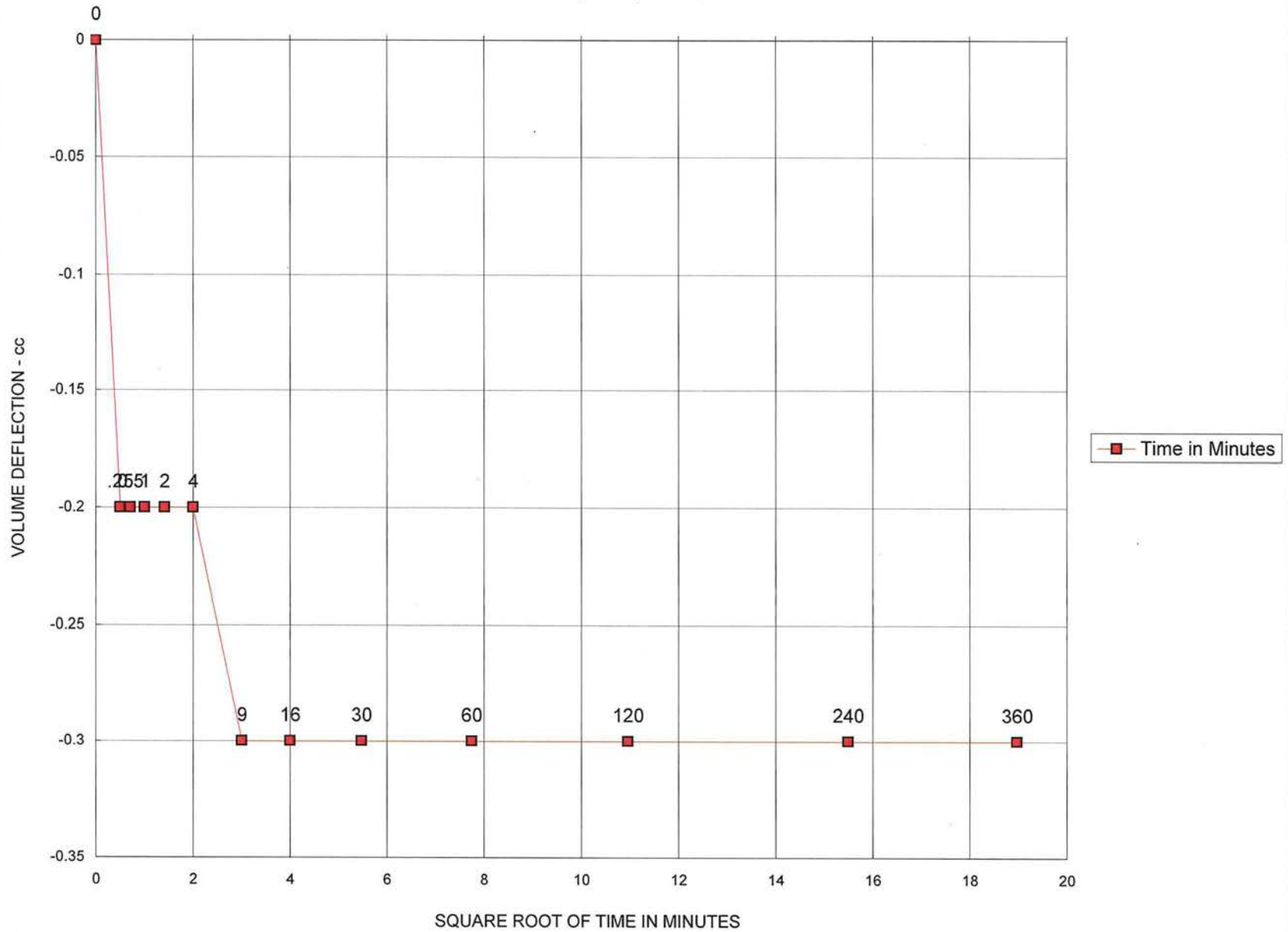
Checked by: cn Date: 4/23/14

FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084-R1\_23.xls



# CONSOLIDATION DATA

Dilco Hill, 0-10', DH-B1-03 90%



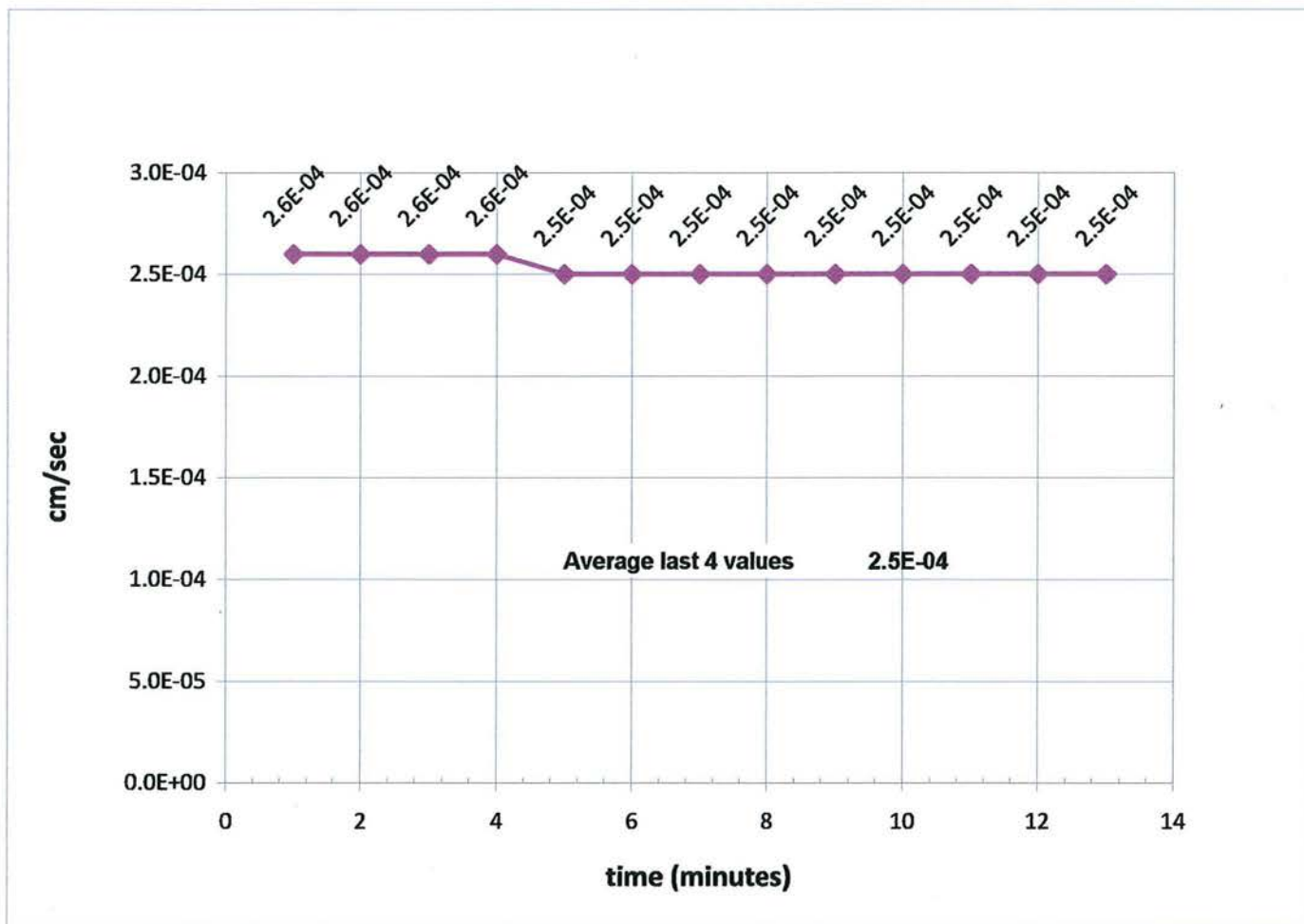


# Preliminary Flow Pump Test Data ASTM D5084

Client: MWH  
Job Number: 2512-77  
Project: --  
Location: Church Rock  
Project Number: --

Boring Number: Dilco Hill  
Depth: 0-10'  
Sample Number: DH-B1-03 90%  
Sampled Date: --  
Test Date: 4/22/2014

Sampled By: --  
Technician: CAL



Data Entered By: CAL  
Date: 4/22/2014  
File Name: 2512\_77\_PrelimPerm\_ASTMD-5084-methodD\_24.xls

Checked By:   
Date: 4/23/14

Client MWH  
Job No. 2512-77  
Boring No. Dilco Hill  
Depth 0-10'  
Sample No. DH-B1-03 90%  
Location Church Rock  
Sampled + + by -  
Project No. -  
Test Type 1x/1bp 0.3 3 psi

Q:/CLIENTDATAFILE/2512/77/PICTURE/MNDPD903  
04/24/14

**PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO.	East Borrow	SAMPLED	-
DEPTH	0-10'	TEST STARTED	4/08/14 CAL
SAMPLE NO.	EB-B6-03 90%	TEST FINISHED	4/22/14 CAL
LOCATION	Church Rock	CELL NUMBER	2P
PROJECT NO.	-	SATURATED TEST	Yes
SOIL DESCR.	-#4 Remolded	TEST TYPE	TX/Pbp/Tap Water
		CONF. PRES. PSF	432

MOISTURE/DENSITY DATA	BEFORE TEST	AFTER TEST
Wt. Soil + Moisture (g)	405.0	462.6
Wt. Wet Soil & Pan (g)	412.0	469.6
Wt. Dry Soil & Pan (g)	378.1	378.1
Wt. Lost Moisture (g)	33.9	91.5
Wt. of Pan Only (g)	7.0	7.0
Wt. of Dry Soil (g)	371.1	371.1
Moisture Content %	9.1	24.6
Wet Density PCF	113.1	129.3
Dry Density PCF	103.6	103.7

Init. Diameter (in)	2.408	(cm)	6.116
Init. Area (sq in)	4.554	(sq cm)	29.383
Init. Height (in)	2.995	(cm)	7.607
Vol. Bef. Consol. (cu ft)	0.00789		
Vol. After Consol. (cu ft)	0.00789		
Porosity %	40.95		

**FLOW PUMP CALCULATIONS**

Pump Setting (gear number)	7
Percentage of Pump setting	100
Q (cc/s)	1.14E-03
Height	2.995
Diameter	2.407
Pressure (psi)	0.145
Area after consol. (cm*cm)	29.361
Gradient	1.340
Permeability k (cm/s)	2.9E-05
Permeability k (m/s)	2.9E-07
Back Pressure (psi)	108.0
Cell Pressure (psi)	111.0
Ave. Effective Stress (psi)	2.928
Average temperature degree C:	23.3

Data entry by: SKL Date: 04/23/2014  
 Checked by: CH Date: 4/23/14  
 FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084-R1\_24.xls

**TRIAXIAL TEST DATA**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO.	East Borrow	SAMPLED	-
DEPTH	0-10'	TEST STARTED	4/08/14 CAL
SAMPLE NO.	EB-B6-03 90%	TEST FINISHED	4/22/14 CAL
LOCATION	Church Rock	SETUP NO.	2P
PROJECT NO.	-	SATURATED TEST	Yes
SOIL DESCR.	-#4 Remolded	TEST TYPE	TX/Pbp/Tap Water
		CONF. PRES. PSF	432

**SATURATION DATA**

Cell Pres. (PSI)	Back Pres. (PSI)	Burette Reading (CC)		Pore Pressure (PSI)		Change	B
		Close	Open	Close	Open		
40.0	38.0	1.3	10.3				
50.0	48.0	9.1	11.2	38.0	45.3	7.3	0.73
60.0	58.0	11.0	12.6	47.9	55.5	7.6	0.76
70.0	68.0	12.6	13.8	58.2	66.4	8.2	0.82
80.0	78.0	13.7	14.9	68.4	77.0	8.6	0.86
90.0	88.0	14.8	16.0	78.3	87.3	9.0	0.90
100.0	98.0	16.2	17.4	88.2	97.3	9.1	0.91
110.0	108.0	17.5	18.6	98.2	107.3	9.1	0.91
120.0		19.3	19.4	107.5	117.0	9.5	0.95

**CONSOLIDATION DATA**

Elapsed Time (Min)	SQRT Time (Min)	Burette Reading (CC)	Volume Defl. (cc)
0.00	0.00	0.60	0.00
0.25	0.50	0.90	-0.30
0.5	0.71	0.90	-0.30
1	1.00	0.90	-0.30
2	1.41	0.90	-0.30
4	2.00	0.90	-0.30
9	3.00	0.90	-0.30
16	4.00	0.95	-0.35
30	5.48	0.95	-0.35
60	7.75	0.95	-0.35
120	10.95	0.95	-0.35
240	15.49	0.95	-0.35
360	18.97	0.95	-0.35

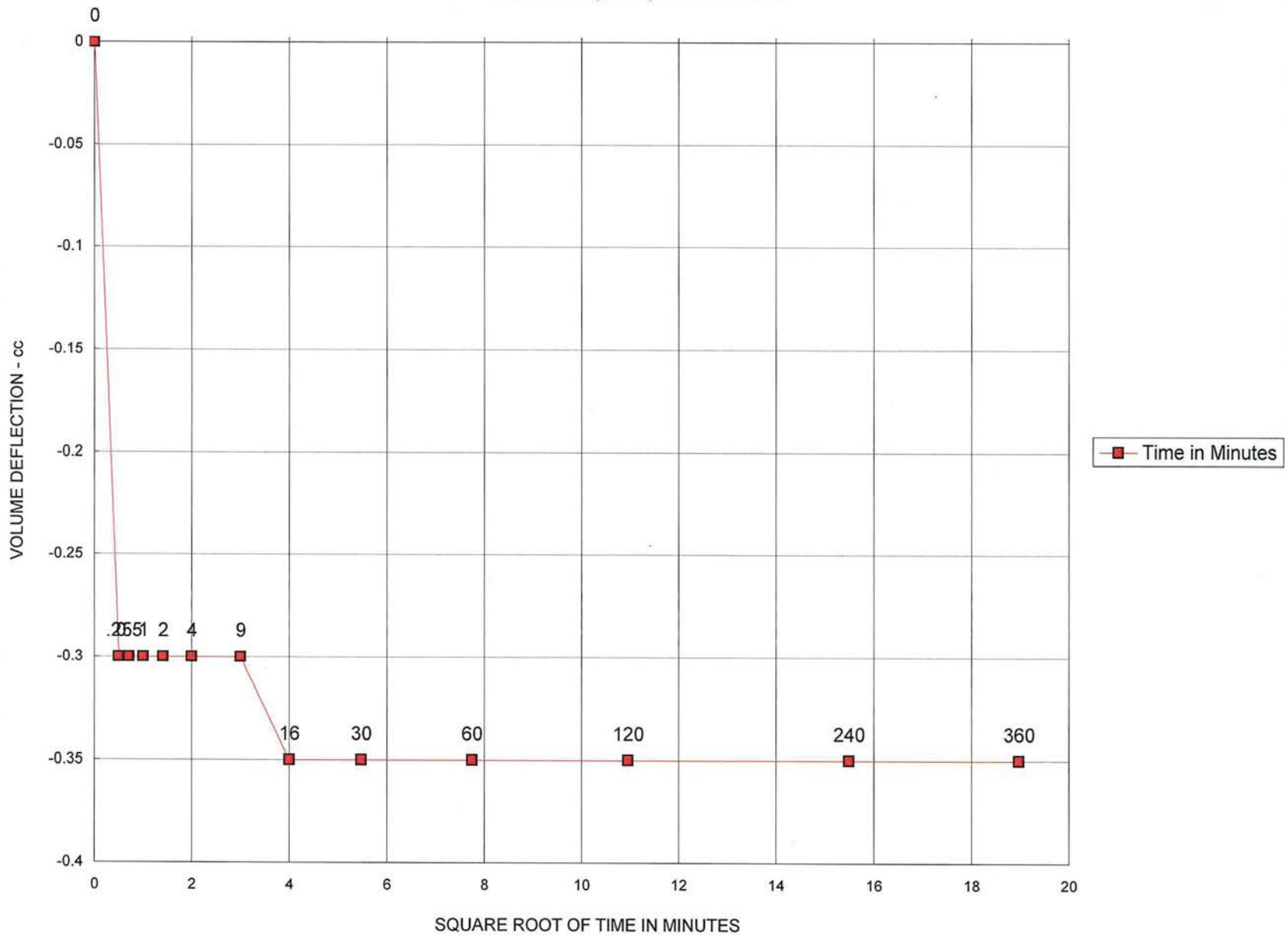
Initial Height (in)	2.995	Init. Vol. (CC)	223.552
Height Change (in)	0.000	Vol. Change (CC)	18.600
Ht. After Cons. (in)	2.995	Cell Exp. (CC)	18.444
Initial Area (sq in)	4.554	Net Change (CC)	0.156
Area After Cons. (sq in)	4.551	Cons. Vol. (CC)	223.396

Data entry by: SKL Date: 04/23/2014  
 Checked by: OK Date: 4/23/14  
 FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084-R1\_24.xls



# CONSOLIDATION DATA

East Borrow, 0-10', EB-B6-03 90%

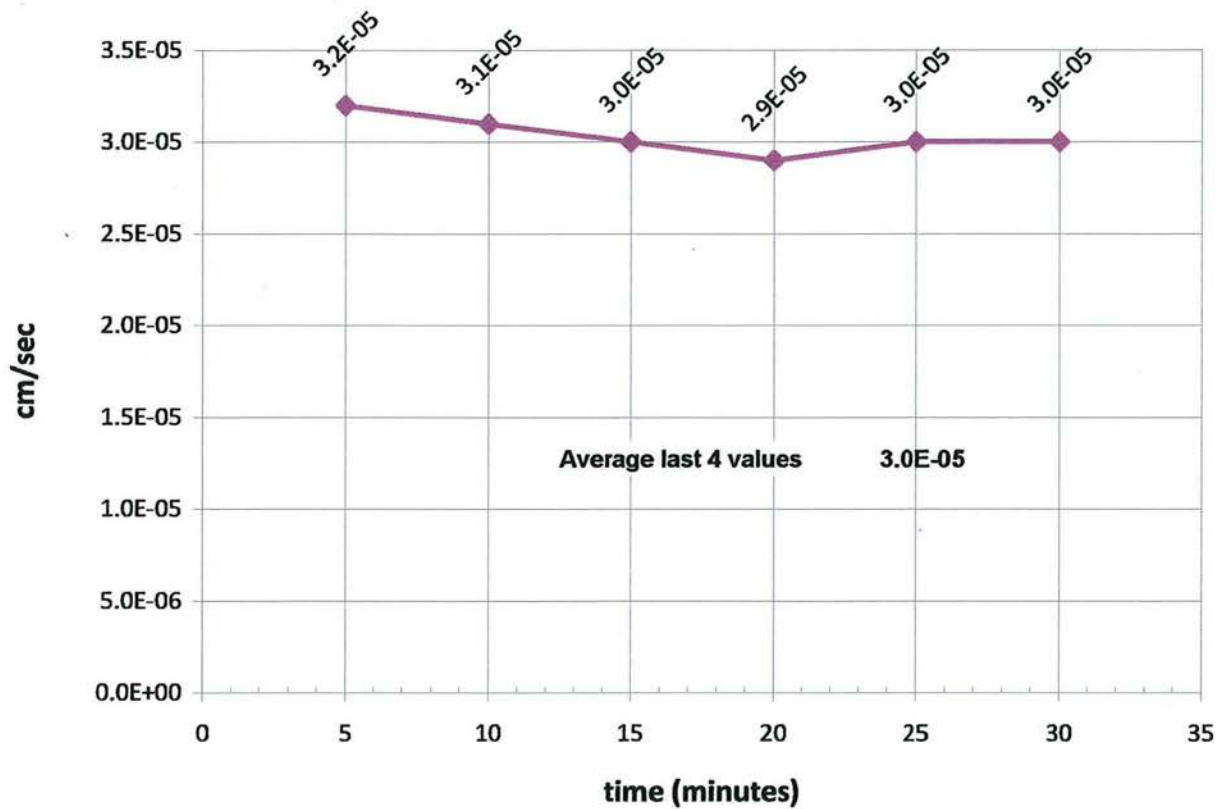


# Preliminary Flow Pump Test Data ASTM D5084

Client: MWH  
Job Number: 2512-77  
Project: --  
Location: Church Rock  
Project Number: --

Boring Number: East Borrow  
Depth: 0-10'  
Sample Number: EB-B6-03 90%  
Sampled Date: --  
Test Date: 4/22/2014

Sampled By: --  
Technician: CAL



Data Entered By: CAL  
Date: 4/23/2014  
File Name: 2512\_77\_PrelimPerm\_ASTMD-5084-methodD\_25.xls

Checked By: SLL  
Date: 4/23/14

Client MWH  
Job No. 2512-77  
Boring No. East Berrow  
Depth 0-10'  
Sample No. EB-B6-03 90%  
Location Church Rock  
Sampled 7-1 by -  
Project No. -  
Test Type Tx/Php 63 3 psi

**PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO. South Borrow  
DEPTH 0-15'  
SAMPLE NO. SB-B-4-01 90%  
LOCATION Church Rock  
PROJECT NO. --  
SOIL DESCR. Remolded -#4

SAMPLED --  
TEST STARTED 04/11/14 CAL  
TEST FINISHED 04/28/14 CAL  
CELL NUMBER 17S  
SATURATED TEST Yes  
TEST TYPE TX/Pbp/Tap Water  
CONF. PRES. PSF 432

MOISTURE/DENSITY DATA	BEFORE TEST	AFTER TEST
Wt. Soil + Moisture (g)	412.0	457.2
Wt. Wet Soil & Pan (g)	418.9	464.2
Wt. Dry Soil & Pan (g)	374.8	374.8
Wt. Lost Moisture (g)	44.1	89.4
Wt. of Pan Only (g)	7.0	7.0
Wt. of Dry Soil (g)	367.8	367.8
Moisture Content %	12.0	24.3
Wet Density PCF	115.7	130.6
Dry Density PCF	103.3	105.1

Init. Diameter (in)	2.403	(cm)	6.104
Init. Area (sq in)	4.535	(sq cm)	29.261
Init. Height (in)	2.991	(cm)	7.597
Vol. Bef. Consol. (cu ft)	0.00785		
Vol. After Consol. (cu ft)	0.00772		
Porosity %	40.89		

**FLOW PUMP CALCULATIONS**

Pump Setting (gear number)	5
Percentage of Pump setting	100
Q (cc/s)	5.81E-03
Height	2.991
Diameter	2.382
Pressure (psi)	0.294
Area after consol. (cm*cm)	28.758
Gradient	2.721
Permeability k (cm/s)	7.4E-05
Permeability k (m/s)	7.4E-07
Back Pressure (psi)	108.0
Cell Pressure (psi)	111.0
Ave. Effective Stress (psi)	2.853
Average temperature degree C:	21.6

Data entry by: DAW Date: 04/29/2014  
Checked by: cm Date: 4/29/14  
FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084\_R1\_28.xls

**TRIAXIAL TEST DATA**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO.	South Borrow	SAMPLED	--
DEPTH	0-15'	TEST STARTED	04/11/14 CAL
SAMPLE NO.	SB-B-4-01 90%	TEST FINISHED	04/28/14 CAL
LOCATION	Church Rock	SETUP NO.	17S
PROJECT NO.	--	SATURATED TEST	Yes
SOIL DESCR.	Remolded -#4	TEST TYPE	TX/Pbp/Tap Water
		CONF. PRES. PSF	432

**SATURATION DATA**

Cell Pres. (PSI)	Back Pres. (PSI)	Burette Reading (CC)		Pore Pressure (PSI)		Change	B
		Close	Open	Close	Open		
		2.4	12.4				
40.0	38.0	12.9	13.1	37.8	45.2	7.4	0.74
50.0	48.0	13.1	14.1	48.3	56.0	7.7	0.77
60.0	58.0	13.8	14.7	58.6	66.8	8.2	0.82
70.0	68.0	14.9	15.7	68.5	77.1	8.6	0.86
80.0	78.0	15.8	16.5	78.5	87.4	8.9	0.89
90.0	88.0	17.0	17.7	87.9	97.0	9.1	0.91
100.0	98.0	17.8	18.5	98.2	107.6	9.4	0.94
110.0	108.0	18.6	18.6	108.1	117.7	9.6	0.96
120.0							

**CONSOLIDATION DATA**

Elapsed Time (Min)	SQRT Time (Min)	Burette Reading (CC)	Volume Defl. (cc)
0.00	0.00	0.10	0.00
0.25	0.50	0.40	-0.30
0.5	0.71	0.40	-0.30
1	1.00	0.40	-0.30
2	1.41	0.40	-0.30
4	2.00	0.40	-0.30
9	3.00	0.40	-0.30
16	4.00	0.40	-0.30
30	5.48	0.45	-0.35
60	7.75	0.45	-0.35
120	10.95	0.45	-0.35
240	15.49	0.45	-0.35
360	18.97	0.45	-0.35

Initial Height (in)	2.991	Init. Vol. (CC)	222.327
Height Change (in)	0.000	Vol. Change (CC)	17.900
Ht. After Cons. (in)	2.991	Cell Exp. (CC)	14.087
Initial Area (sq in)	4.535	Net Change (CC)	3.813
Area After Cons. (sq in)	4.457	Cons. Vol. (CC)	218.515

Data entry by: DAW Date: 04/29/2014

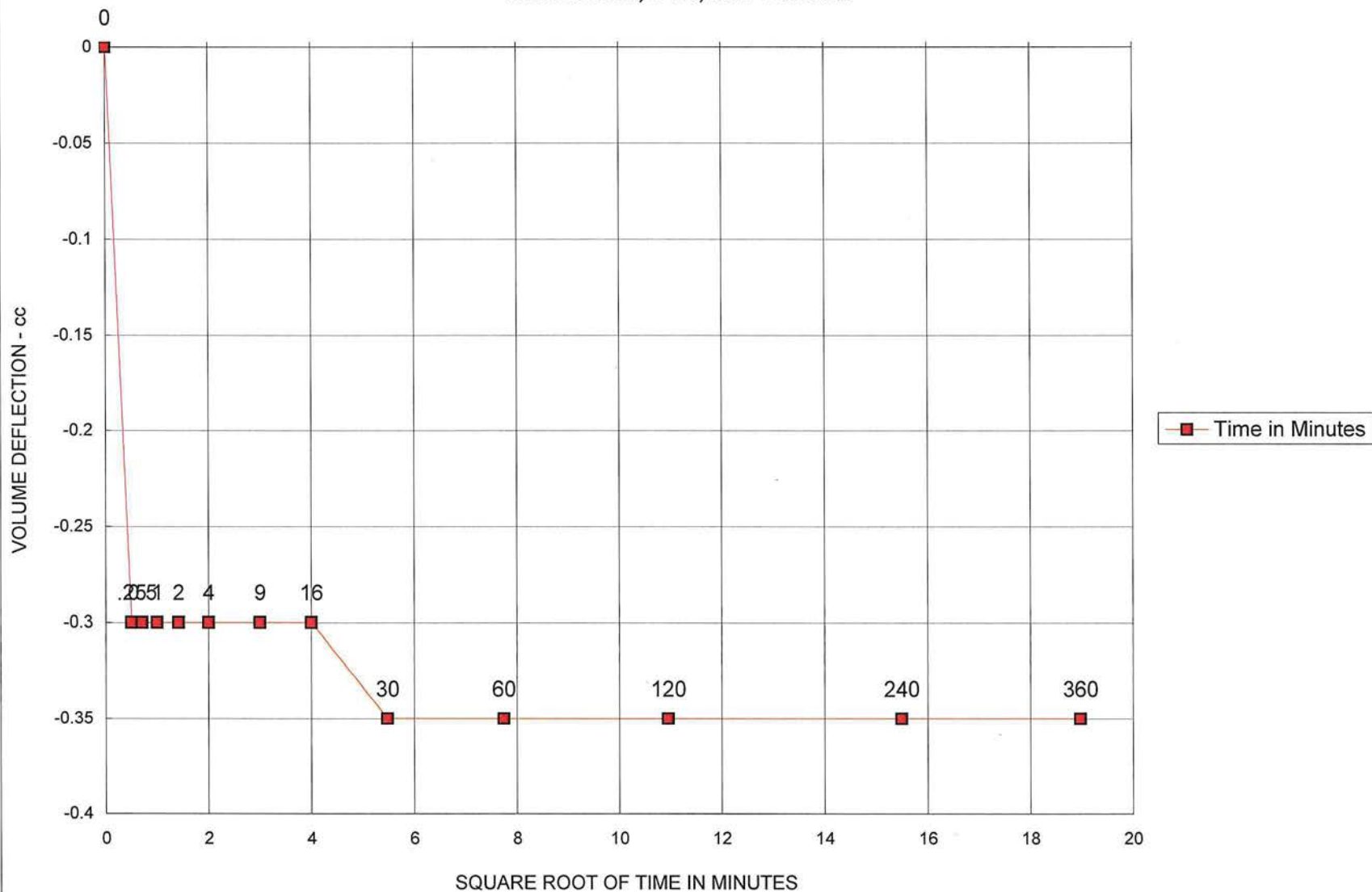
Checked by: awc Date: 4/29/14

FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084\_R1\_28.xls



## CONSOLIDATION DATA

South Borrow, 0-15', SB-B-4-01 90%



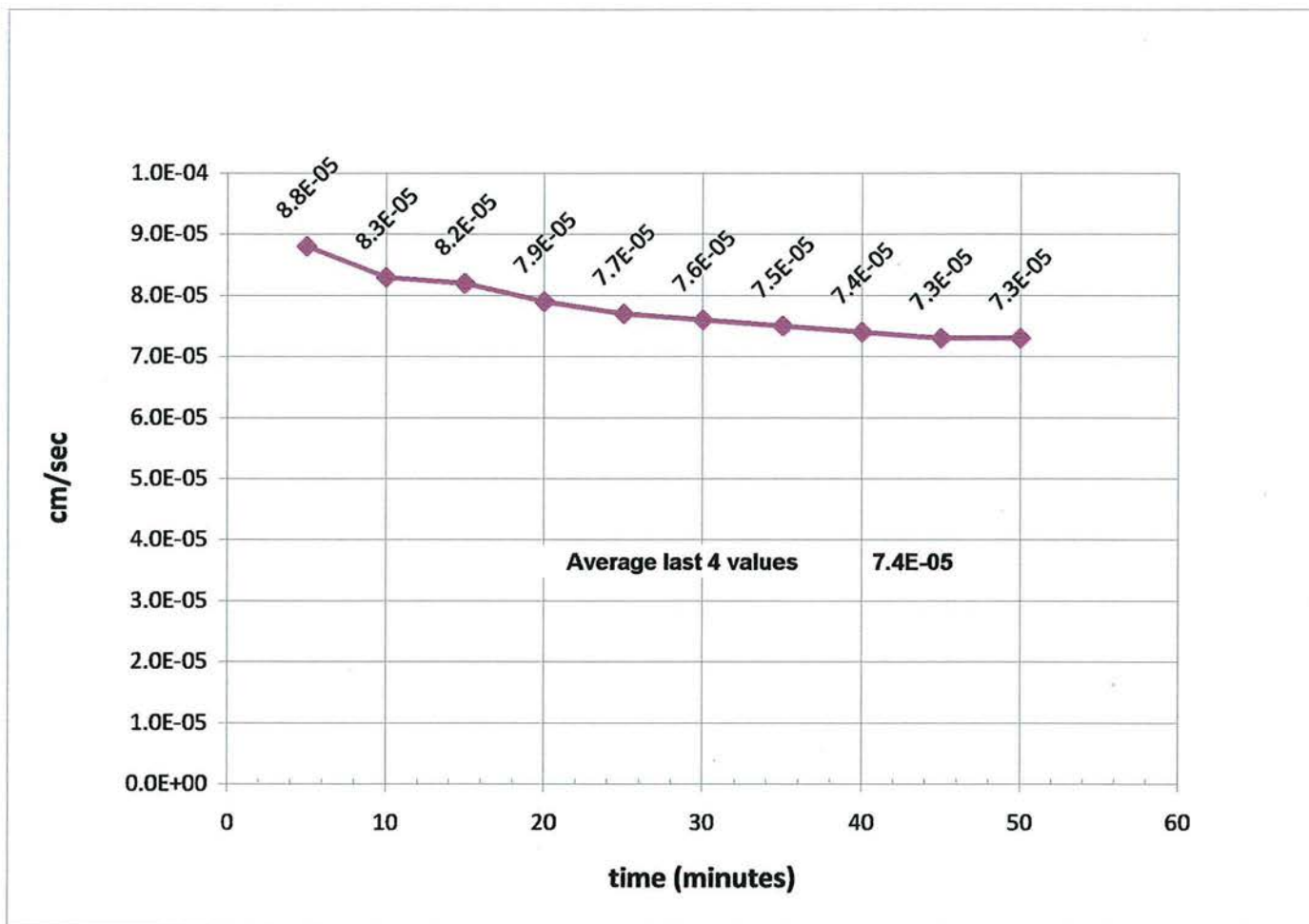


# Preliminary Flow Pump Test Data ASTM D5084

Client: MWH  
Job Number: 2512-77  
Project: --  
Location: Church Rock  
Project Number: --

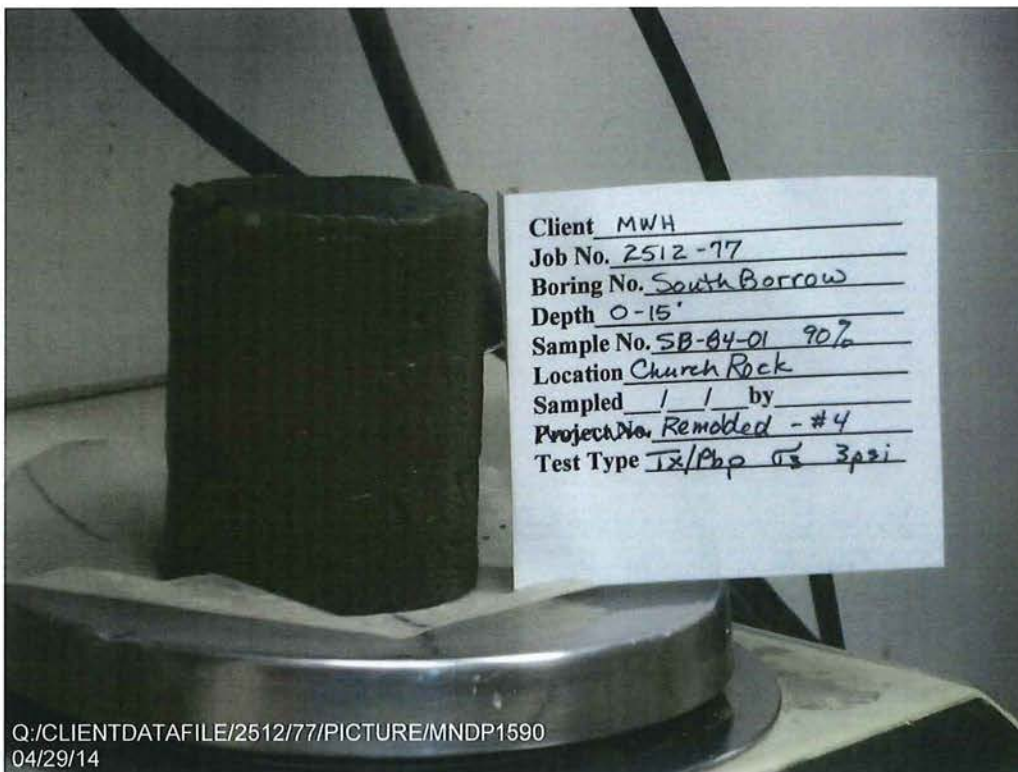
Boring Number: South Borrow  
Depth: 0-15'  
Sample Number: SB-B4-01 90%  
Sampled Date: --  
Test Date: 4/28/2014

Sampled By: --  
Technician: CAL



Data Entered By: CAL  
Date: 4/28/2014  
File Name: 2512\_77\_PrelimPerm\_ASTMD-5084-methodD\_27.xls

Checked By: DAW  
Date: 4/29/14



Q:/CLIENTDATAFILE/2512/77/PICTURE/MNDP1590  
04/29/14

**PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO. North Borrow  
DEPTH 0-10'  
SAMPLE NO. NB-B2-04 90%  
LOCATION Church Rock  
PROJECT NO. --  
SOIL DESCR. Remolded -#4

SAMPLED --  
TEST STARTED 04/08/14 CAL  
TEST FINISHED 04/28/14 CAL  
CELL NUMBER 1P  
SATURATED TEST Yes  
TEST TYPE TX/Pbp/Tap Water  
CONF. PRES. PSF 432

MOISTURE/DENSITY DATA	BEFORE TEST	AFTER TEST
Wt. Soil + Moisture (g)	391.4	456.8
Wt. Wet Soil & Pan (g)	398.4	463.8
Wt. Dry Soil & Pan (g)	374.4	374.4
Wt. Lost Moisture (g)	24.0	89.4
Wt. of Pan Only (g)	7.0	7.0
Wt. of Dry Soil (g)	367.4	367.4
Moisture Content %	6.5	24.3
Wet Density PCF	110.4	127.5
Dry Density PCF	103.7	102.6

Init. Diameter (in)	2.415	(cm)	6.134
Init. Area (sq in)	4.581	(sq cm)	29.554
Init. Height (in)	2.948	(cm)	7.488
Vol. Bef. Consol. (cu ft)	0.00781		
Vol. After Consol. (cu ft)	0.00790		
Porosity %	39.97		

**FLOW PUMP CALCULATIONS**

Pump Setting (gear number)	5
Percentage of Pump setting	100
Q (cc/s)	5.81E-03
Height	2.948
Diameter	2.428
Pressure (psi)	0.277
Area after consol. (cm*cm)	29.868
Gradient	2.601
Permeability k (cm/s)	7.5E-05
Permeability k (m/s)	7.5E-07
Back Pressure (psi)	128.0
Cell Pressure (psi)	131.0
Ave. Effective Stress (psi)	2.862
Average temperature degree C:	22.3

Data entry by: DAW Date: 04/29/2014

Checked by: DAW Date: 4/29/14

FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084-R1\_27.xls

**TRIAXIAL TEST DATA**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO.	North Borrow	SAMPLED	--
DEPTH	0-10'	TEST STARTED	04/08/14 CAL
SAMPLE NO.	NB-B2-04 90%	TEST FINISHED	04/28/14 CAL
LOCATION	Church Rock	SETUP NO.	1P
PROJECT NO.	--	SATURATED TEST	Yes
SOIL DESCR.	Remolded -#4	TEST TYPE	TX/Pbp/Tap Water
		CONF. PRES. PSF	432

**SATURATION DATA**

Cell Pres. (PSI)	Back Pres. (PSI)	Burette Reading (CC)		Pore Pressure (PSI)		Change	B
		Close	Open	Close	Open		
40.0	38.0	1.1	5.9				
50.0	48.0	3.6	5.6	38.5	44.8	6.3	0.63
60.0	58.0	5.5	7.0	47.9	55.1	7.2	0.72
70.0	68.0	7.3	8.6	58.1	66.0	7.9	0.79
80.0	78.0	8.6	9.8	68.2	76.4	8.2	0.82
90.0	88.0	10.0	11.1	78.2	86.6	8.4	0.84
100.0	98.0	11.3	12.4	88.0	96.8	8.8	0.88
110.0	108.0	12.7	13.8	98.1	107.2	9.1	0.91
120.0	118.0	14.5	15.5	108.0	117.2	9.2	0.92
130.0	128.0	15.8	16.9	118.3	127.7	9.4	0.94
140.0		17.1	17.3	128.5	138.1	9.6	0.96

**CONSOLIDATION DATA**

Elapsed Time (Min)	SQRT Time (Min)	Burette Reading (CC)	Volume Defl. (cc)
0.00	0.00	0.20	0.00
0.25	0.50	0.50	-0.30
0.5	0.71	0.50	-0.30
1	1.00	0.50	-0.30
2	1.41	0.50	-0.30
4	2.00	0.50	-0.30
9	3.00	0.60	-0.40
16	4.00	0.60	-0.40
30	5.48	0.60	-0.40
60	7.75	0.60	-0.40
120	10.95	0.60	-0.40
240	15.49	0.60	-0.40
360	18.97	0.60	-0.40

Initial Height (in)	2.948	Init. Vol. (CC)	221.325
Height Change (in)	0.000	Vol. Change (CC)	17.700
Ht. After Cons. (in)	2.948	Cell Exp. (CC)	20.066
Initial Area (sq in)	4.581	Net Change (CC)	-2.366
Area After Cons. (sq in)	4.630	Cons. Vol. (CC)	223.691

Data entry by: DAW Date: 04/29/2014

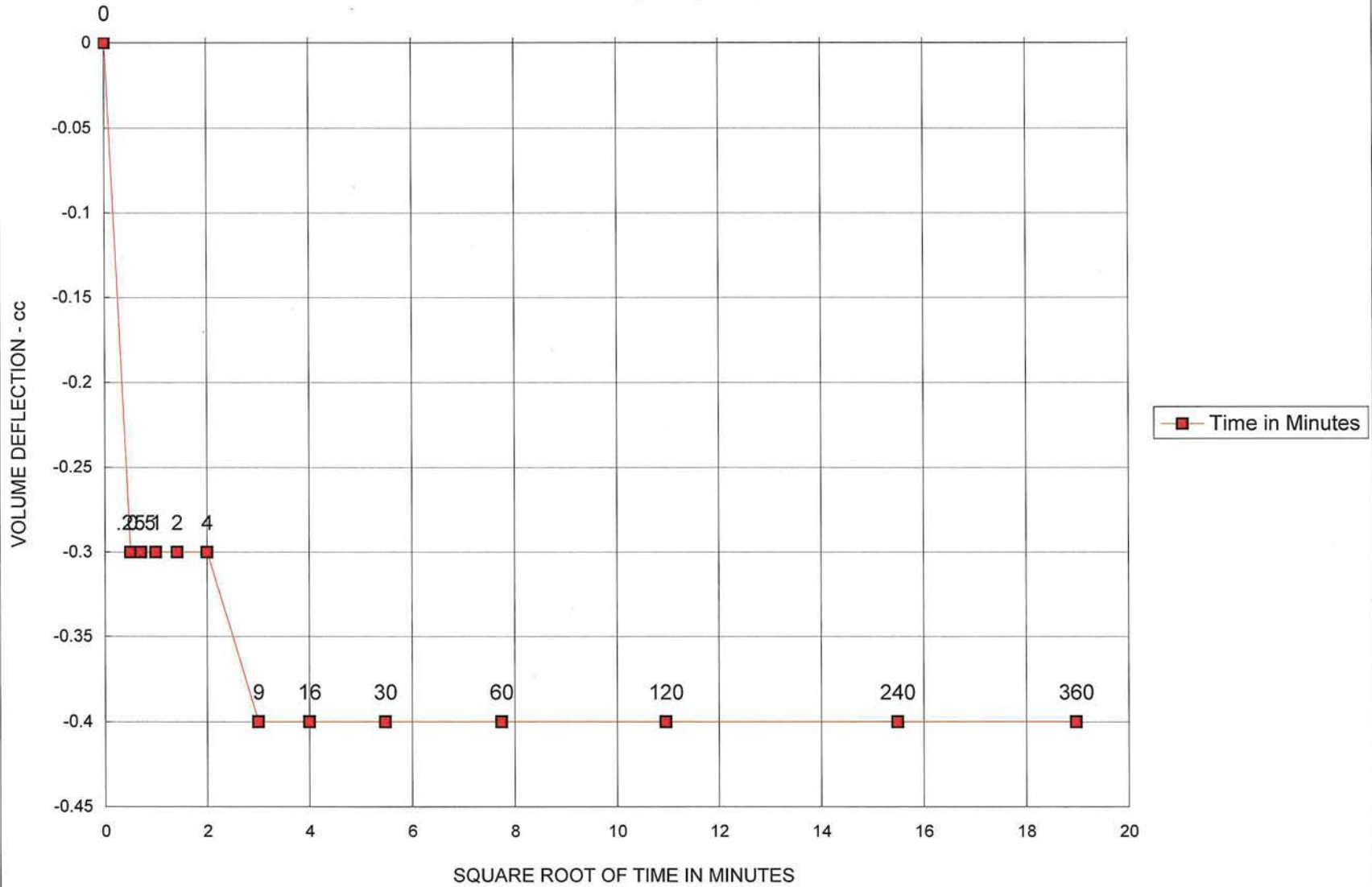
Checked by: cm Date: 4/29/14

FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084-R1\_27.xls



## CONSOLIDATION DATA

North Borrow, 0-10', NB-B2-04 90%



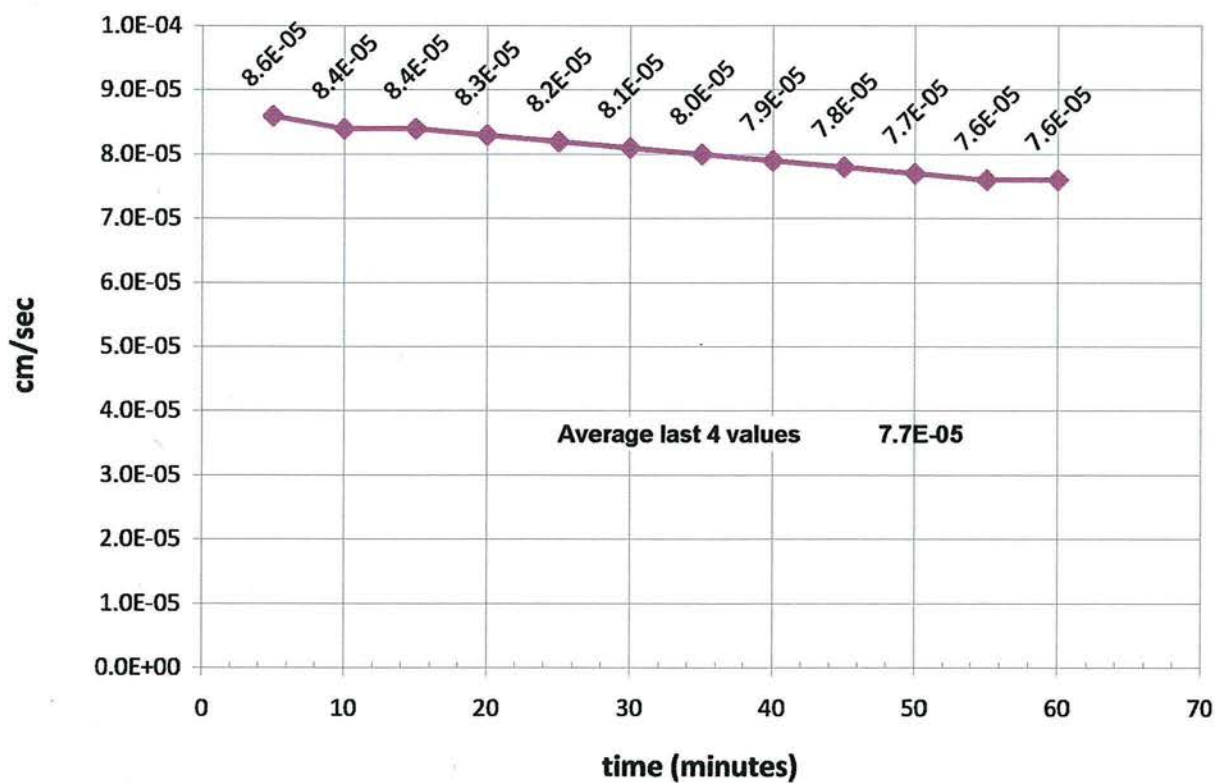


# Preliminary Flow Pump Test Data ASTM D5084

Client: MWH  
Job Number: 2512-77  
Project: --  
Location: Church Rock  
Project Number: --

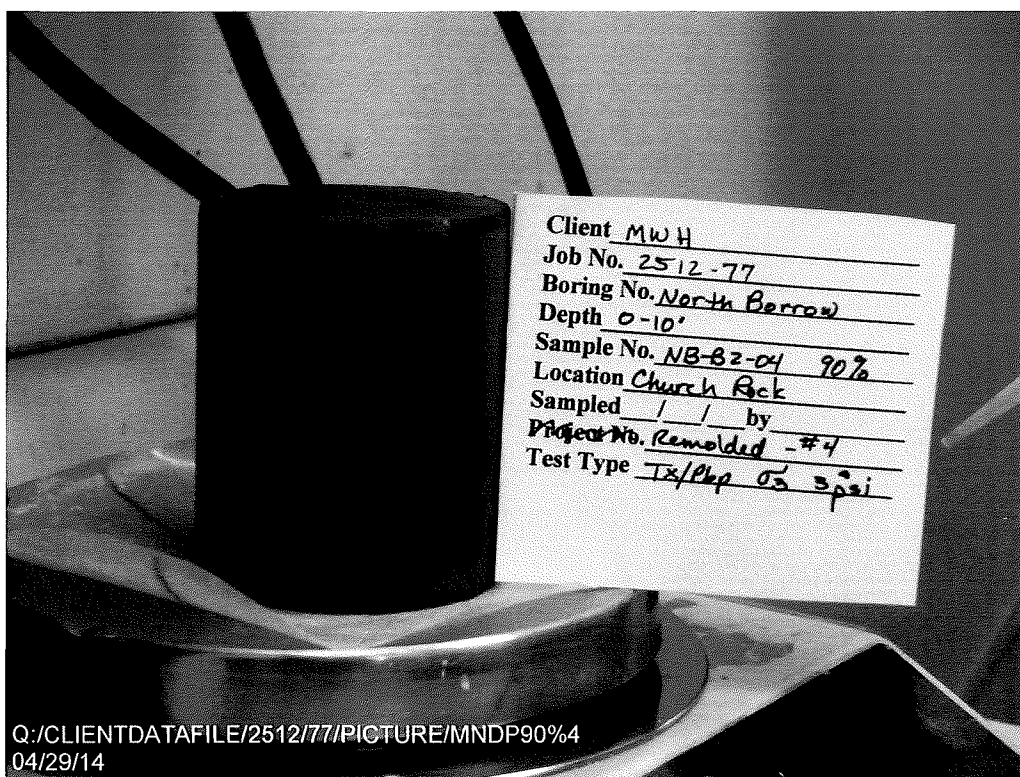
Boring Number: North Borrow  
Depth: 0-10'  
Sample Number: NB-B2-04 90%  
Sampled Date: --  
Test Date: 4/28/2014

Sampled By: --  
Technician: CAL



Data Entered By: CAL  
Date: 4/29/2014  
File Name: 2512\_77\_PrelimPerm\_ASTMD-5084-methodD\_29.xls

Checked By: OK  
Date: 4/29/14



Client MWH  
Job No. 2512-77  
Boring No. North Berrow  
Depth 0-10'  
Sample No. NB-82-04 90%  
Location Church Rock  
Sampled / / by   
~~Project No.~~ Remolded - #4  
Test Type Tx/Php 0.5 psi

Q:/CLIENTDATAFILE/2512/77/PICTURE/MNDP90%4  
04/29/14

**PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO. South Borrow  
DEPTH 0-25'  
SAMPLE NO. SB-B1-04 90%  
LOCATION Church Rock  
PROJECT NO. --  
SOIL DESCR. Remolded -#4

SAMPLED --  
TEST STARTED 04/11/14 CAL  
TEST FINISHED 04/28/14 CAL  
CELL NUMBER 11P  
SATURATED TEST Yes  
TEST TYPE TX/Pbp/Tap Water  
CONF. PRES. PSF 432

MOISTURE/DENSITY DATA	BEFORE TEST	AFTER TEST
Wt. Soil + Moisture (g)	403.4	463.2
Wt. Wet Soil & Pan (g)	410.4	470.1
Wt. Dry Soil & Pan (g)	379.2	379.2
Wt. Lost Moisture (g)	31.2	90.9
Wt. of Pan Only (g)	6.9	6.9
Wt. of Dry Soil (g)	372.2	372.2
Moisture Content %	8.4	24.4
Wet Density PCF	112.8	129.1
Dry Density PCF	104.0	103.7

Init. Diameter (in)	2.403	(cm)	6.104
Init. Area (sq in)	4.535	(sq cm)	29.261
Init. Height (in)	3.005	(cm)	7.633
Vol. Bef. Consol. (cu ft)	0.00789		
Vol. After Consol. (cu ft)	0.00791		
Porosity %	40.59		

**FLOW PUMP CALCULATIONS**

Pump Setting (gear number)	5
Percentage of Pump setting	100
Q (cc/s)	5.81E-03
Height	3.001
Diameter	2.408
Pressure (psi)	0.156
Area after consol. (cm*cm)	29.383
Gradient	1.439
Permeability k (cm/s)	1.4E-04
Permeability k (m/s)	1.4E-06
Back Pressure (psi)	108.0
Cell Pressure (psi)	111.0
Ave. Effective Stress (psi)	2.922
Average temperature degree C:	22.0

Data entry by: DAW Date: 04/29/2014

Checked by: cm Date: 4/29/14

FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084-R1\_26.xls

**TRIAXIAL TEST DATA**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO.	South Borrow	SAMPLED	--
DEPTH	0-25'	TEST STARTED	04/11/14 CAL
SAMPLE NO.	SB-B1-04 90%	TEST FINISHED	04/28/14 CAL
LOCATION	Church Rock	SETUP NO.	11P
PROJECT NO.	--	SATURATED TEST	Yes
SOIL DESCR.	Remolded #4	TEST TYPE	TX/Pbp/Tap Water
		CONF. PRES. PSF	432

**SATURATION DATA**

Cell Pres. (PSI)	Back Pres. (PSI)	Burette Reading (CC)		Pore Pressure (PSI)		Change	B
		Close	Open	Close	Open		
40.0	38.0	2.1	10.6				
50.0	48.0	8.6	9.7	38.1	46.1	8.0	0.80
60.0	58.0	9.6	11.3	48.9	56.7	7.8	0.78
70.0	68.0	11.2	12.1	58.8	67.1	8.3	0.83
80.0	78.0	12.3	13.1	68.7	77.2	8.5	0.85
90.0	88.0	13.2	13.9	78.4	87.3	8.9	0.89
100.0	98.0	14.3	14.9	88.1	97.4	9.3	0.93
110.0	108.0	15.0	15.7	98.7	108.0	9.3	0.93
120.0		15.7	15.7	108.3	117.8	9.5	0.95

**CONSOLIDATION DATA**

Elapsed Time (Min)	SQRT Time (Min)	Burette Reading (CC)	Volume Defl. (cc)
0.00	0.00	0.30	0.00
0.25	0.50	0.60	-0.30
0.5	0.71	0.60	-0.30
1	1.00	0.60	-0.30
2	1.41	0.60	-0.30
4	2.00	0.60	-0.30
9	3.00	0.60	-0.30
16	4.00	0.60	-0.30
30	5.48	0.60	-0.30
60	7.75	0.60	-0.30
120	10.95	0.60	-0.30
240	15.49	0.60	-0.30
360	18.97	0.60	-0.30

Initial Height (in)	3.005	Init. Vol. (CC)	223.368
Height Change (in)	0.004	Vol. Change (CC)	14.900
Ht. After Cons. (in)	3.001	Cell Exp. (CC)	15.546
Initial Area (sq in)	4.535	Net Change (CC)	-0.645
Area After Cons. (sq in)	4.554	Cons. Vol. (CC)	224.013

Data entry by: DAW Date: 04/29/2014  
 Checked by: cm Date: 4/29/14  
 FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084-R1\_26.xls

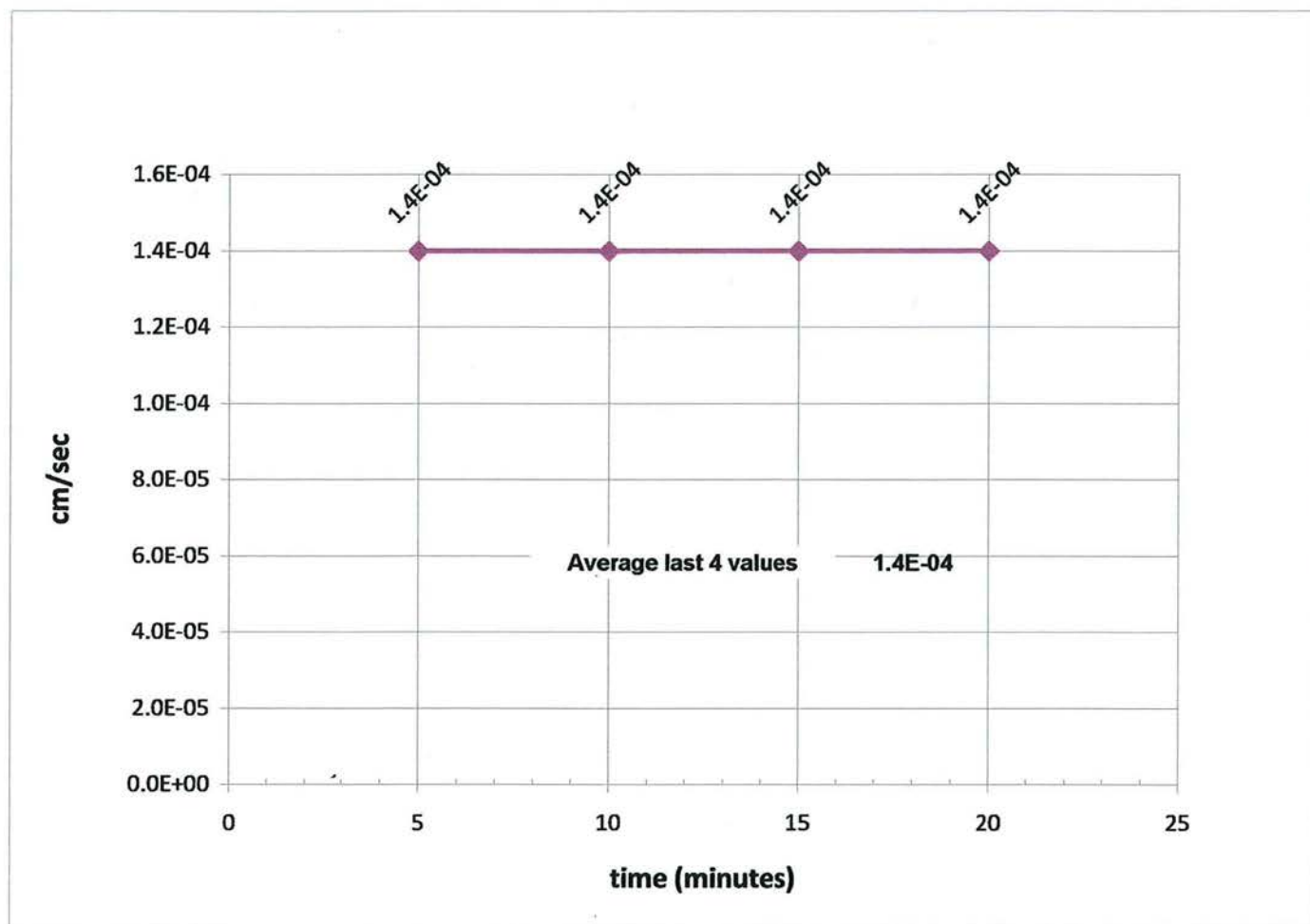


# Preliminary Flow Pump Test Data ASTM D5084

Client: MWH  
Job Number: 2512-77  
Project: --  
Location: Church Rock  
Project Number: --

Boring Number: South Borrow  
Depth: 0-25'  
Sample Number: SB-B1-04 90%  
Sampled Date: --  
Test Date: 4/18/2014

Sampled By: --  
Technician: CAL

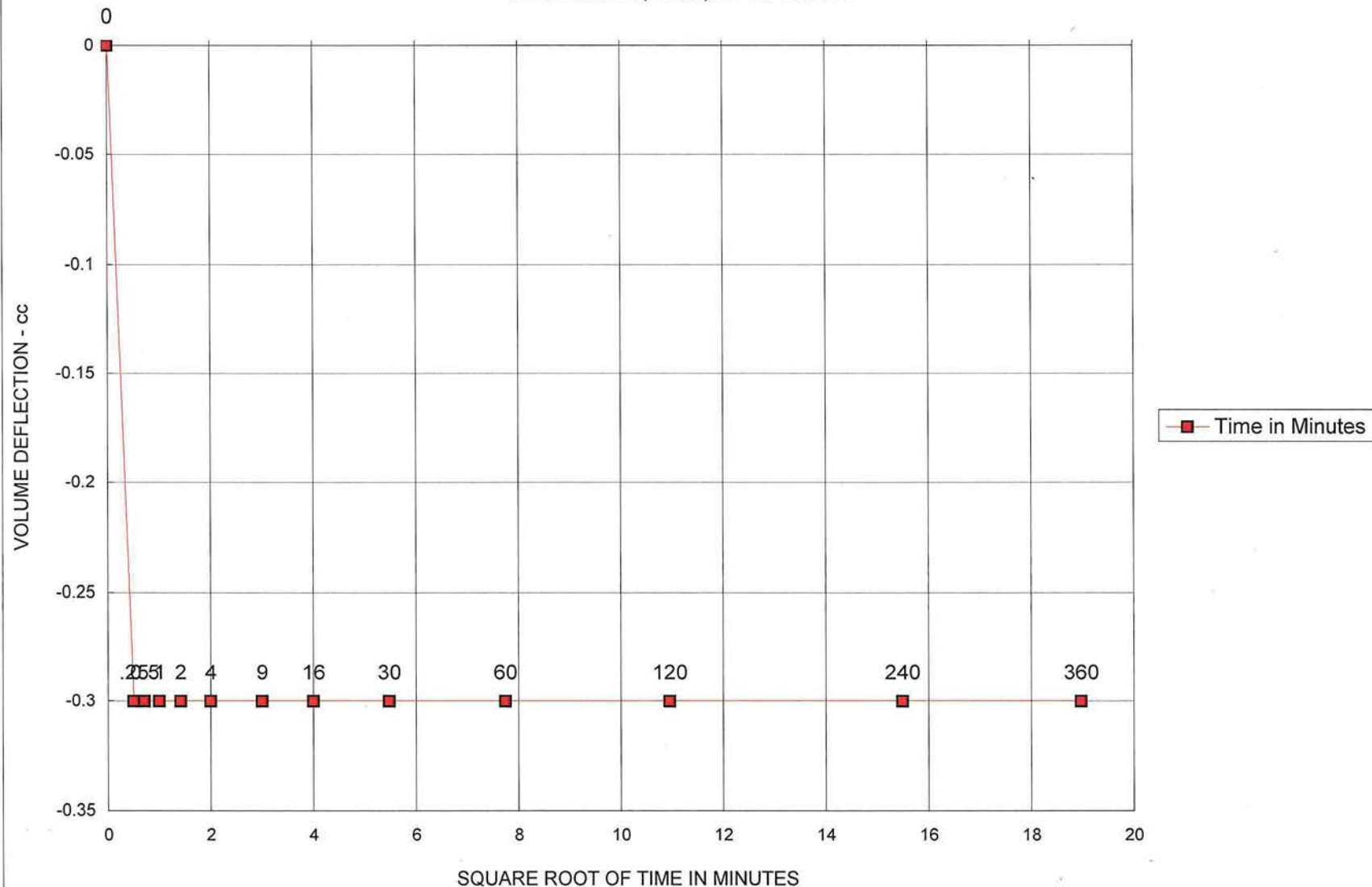


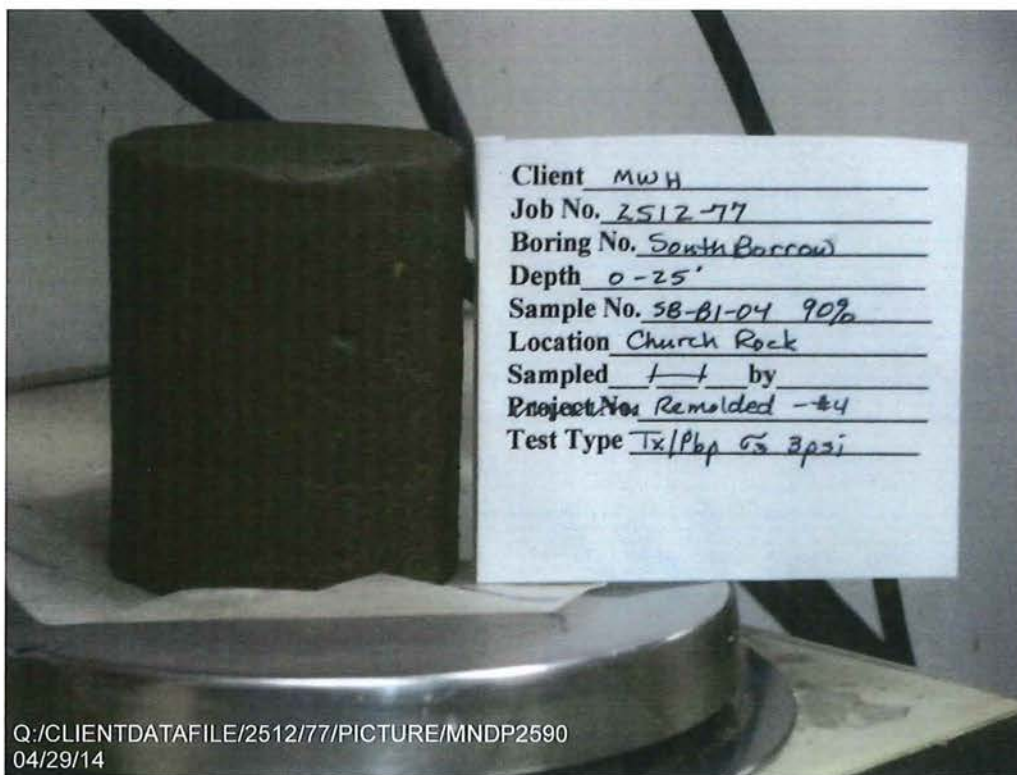
Data Entered By: CAL  
Date: 4/29/2014  
File Name: 2512\_77\_PrelimPerm\_ASTMD-5084-methodD\_28.xls

Checked By: CAL  
Date: 4/29/14

## CONSOLIDATION DATA

South Borrow, 0-25', SB-B1-04 90%





Q:/CLIENTDATAFILE/2512/77/PICTURE/MNDP2590  
04/29/14

**PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO. West Borrow  
DEPTH 10-20'  
SAMPLE NO. WB-B2-05 90%  
LOCATION Church Rock  
PROJECT NO. --  
SOIL DESCR. Remolded -#4

SAMPLED --  
TEST STARTED 04/11/14 CAL  
TEST FINISHED 04/23/14 CAL  
CELL NUMBER 9P  
SATURATED TEST Yes  
TEST TYPE TX/Pbp/Tap Water  
CONF. PRES. PSF 432

MOISTURE/DENSITY DATA	BEFORE TEST	AFTER TEST
Wt. Soil + Moisture (g)	389.3	450.9
Wt. Wet Soil & Pan (g)	396.3	457.9
Wt. Dry Soil & Pan (g)	370.8	370.8
Wt. Lost Moisture (g)	25.5	87.1
Wt. of Pan Only (g)	7.0	7.0
Wt. of Dry Soil (g)	363.8	363.8
Moisture Content %	7.0	23.9
Wet Density PCF	109.1	132.6
Dry Density PCF	101.9	107.0

Init. Diameter (in)	2.405	(cm)	6.109
Init. Area (sq in)	4.543	(sq cm)	29.310
Init. Height (in)	2.993	(cm)	7.602
Vol. Bef. Consol. (cu ft)	0.00787		
Vol. After Consol. (cu ft)	0.00750		
Porosity %	41.00		

**FLOW PUMP CALCULATIONS**

Pump Setting (gear number)	6
Percentage of Pump setting	100
Q (cc/s)	2.31E-03
Height	2.941
Diameter	2.368
Pressure (psi)	0.134
Area after consol. (cm*cm)	28.422
Gradient	1.261
Permeability k (cm/s)	6.4E-05
Permeability k (m/s)	6.4E-07
Back Pressure (psi)	88.0
Cell Pressure (psi)	91.0
Ave. Effective Stress (psi)	2.933
Average temperature degree C:	23.5

Data entry by: DAW Date: 04/25/2014  
Checked by: cm Date: 4/29/14  
FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084-R1\_25.xls

**TRIAXIAL TEST DATA**  
ASTM D 5084

CLIENT MWH

JOB NO. 2512-77

BORING NO.	West Borrow	SAMPLED	--
DEPTH	10-20'	TEST STARTED	04/11/14 CAL
SAMPLE NO.	WB-B2-05 90%	TEST FINISHED	04/23/14 CAL
LOCATION	Church Rock	SETUP NO.	9P
PROJECT NO.	--	SATURATED TEST	Yes
SOIL DESCR.	Remolded -#4	TEST TYPE	TX/Pbp/Tap Water
		CONF. PRES. PSF	432

**SATURATION DATA**

Cell Pres. (PSI)	Back Pres. (PSI)	Burette Reading (CC)		Pore Pressure (PSI)		Change	B
		Close	Open	Close	Open		
40.0	38.0	2.1	19.4				
50.0	48.0	19.4	21.2	38.9	47.1	8.2	0.82
60.0	58.0	21.2	22.4	48.7	56.9	8.2	0.82
70.0	68.0	22.7	23.6	58.7	67.7	9.0	0.90
80.0	78.0	23.8	24.7	68.7	77.8	9.1	0.91
90.0	88.0	25.1	25.9	78.5	88.0	9.5	0.95
100.0		26.1	26.2	88.6	98.2	9.6	0.96

**CONSOLIDATION DATA**

Elapsed Time (Min)	SQRT Time (Min)	Burette Reading (CC)	Volume Defl. (cc)
0.00	0.00	0.20	0.00
0.25	0.50	0.50	-0.30
0.5	0.71	0.50	-0.30
1	1.00	0.50	-0.30
2	1.41	0.60	-0.40
4	2.00	0.60	-0.40
9	3.00	0.60	-0.40
16	4.00	0.70	-0.50
30	5.48	0.75	-0.55
60	7.75	0.80	-0.60
120	10.95	0.90	-0.70
240	15.49	0.90	-0.70
360	18.97	1.00	-0.80

Initial Height (in)	2.993	Init. Vol. (CC)	222.846
Height Change (in)	0.052	Vol. Change (CC)	25.100
Ht. After Cons. (in)	2.941	Cell Exp. (CC)	14.611
Initial Area (sq in)	4.543	Net Change (CC)	10.489
Area After Cons. (sq in)	4.405	Cons. Vol. (CC)	212.358

Data entry by: DAW Date: 04/25/2014

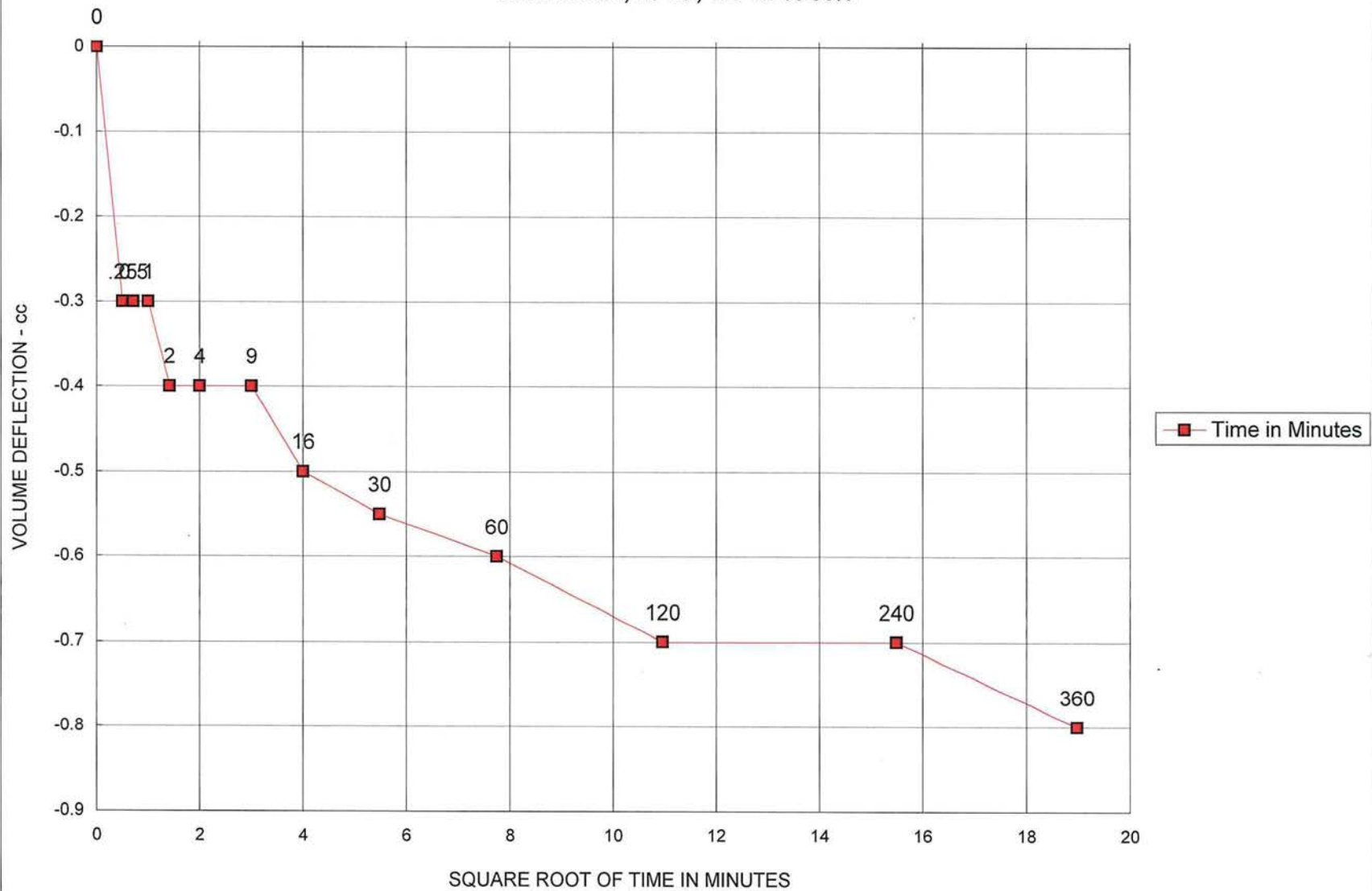
Checked by: CAC Date: 4/29/14

FileName: 2512\_77\_HarvardFlowPump-Perm-ASTMD-5084-R1\_25.xls



## CONSOLIDATION DATA

West Borrow, 10-20', WB-B2-05 90%



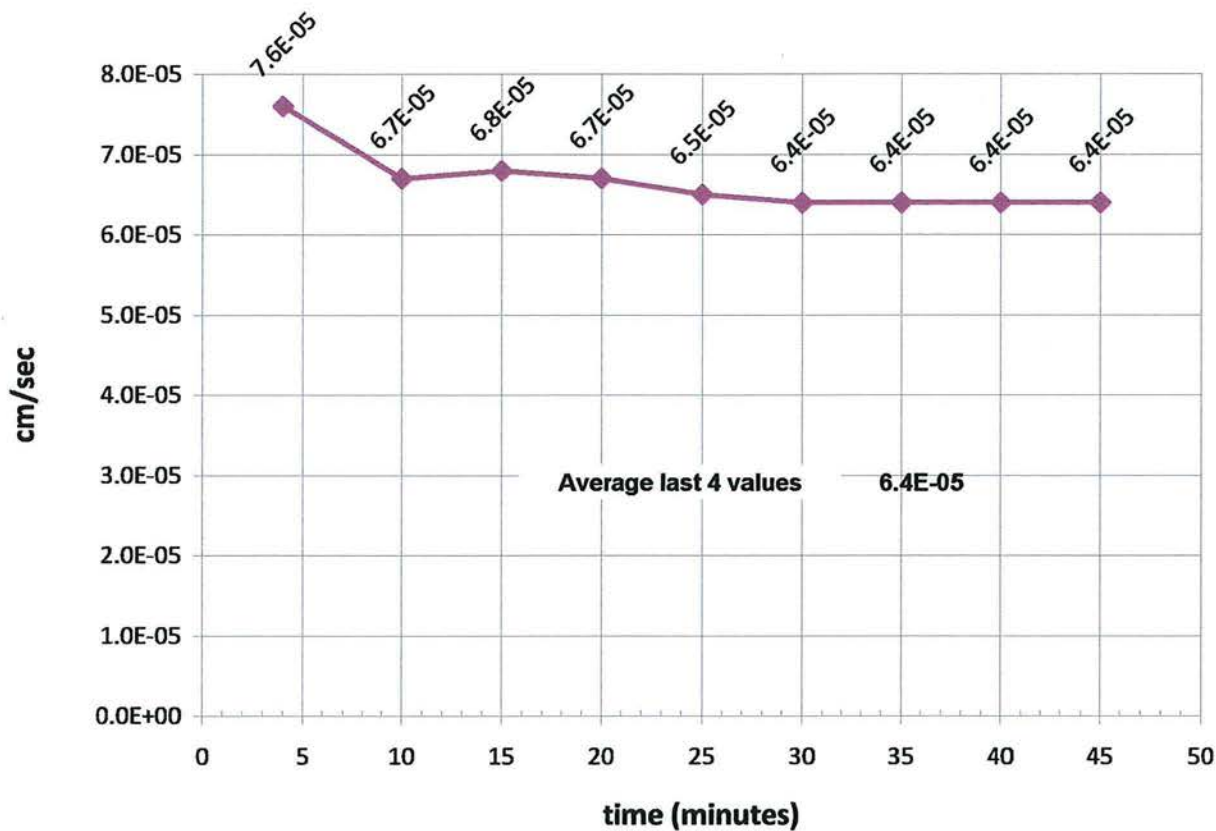


# Preliminary Flow Pump Test Data ASTM D5084

Client: MWH  
Job Number: 2512-77  
Project: --  
Location: Church Rock  
Project Number: --

Boring Number: West Borrow  
Depth: 10-20'  
Sample Number: WB-B2-05 90%  
Sampled Date: --  
Test Date: 4/23/2014

Sampled By: --  
Technician: CAL



Data Entered By: CAL  
Date: 4/23/2014  
File Name: 2512\_77\_PrelimPerm\_ASTMD-5084-methodD\_26.xls

Checked By: DAV  
Date: 04/23/14

Client MWD  
Job No. 2512-77  
Boring No. West Borrow  
Depth 10-20'  
Sample No. WB-B2-05 90%  
Location Church Rock  
Sampled 1-1- by -  
Project No. -  
Test Type Tx/Ph  $\sigma_3$  3psi

**CAPILLARY MOISTURE RETENTION TEST  
ASTM D 3152**

Page 1 of 5

CLIENT	MWH	JOB NO.	2512-77
SAMPLE DATE	--	TEST STARTED	04/09/14 SKL
SOIL DESCR.	Remolded -10	TEST FINISHED	06/20/14 DPM
LOCATION	--		

**MASS DATA**

Sample Description	Ring Mass g	As Rec. Mass g	Sat. Mass g	0.1 Bar Mass g	0.2 Bar Mass g	0.33 Bar Mass g	0.5 Bar Mass g	1 Bar Mass g	3 Bar Mass g	5 Bar Mass g		Dry Mass Filter, Ring, & Dish (g)	Dish Wt. g
<b>Filter Mass g</b>		0.205	0.724	0.551	0.499	0.438	0.381	0.339	0.275	0.247			
DH-B1-03, 0-10'	10.658	43.277	54.246	48.947	47.645	46.436	45.813	45.127	43.029	42.880		43.911	2.348
DH-B1-03, 0-10'-R	10.706	43.313	53.199	49.048	48.006	46.666	46.008	45.335	43.345	43.158		44.157	2.295
DH-B1-10, 35-45'	10.712	45.454	50.444	48.525	47.949	47.296	46.919	46.417	44.180	43.797		44.324	2.370
DH-B1-10, 35-45'-R	10.357	45.185	49.769	48.018	47.500	46.801	46.407	45.975	43.863	43.552		44.009	2.371
EB-B4-06, 10-20'	10.668	44.264	51.823	47.784	47.206	46.300	45.803	45.264	43.439	43.258		44.156	2.374
EB-B4-06, 10-20'-R	10.614	44.166	51.508	47.770	47.100	46.293	45.774	45.267	43.325	43.087		44.126	2.365
EB-B6-03, 0-10'	10.557	43.711	51.409	49.159	48.480	47.562	46.954	46.143	44.725	43.859		43.383	2.401
EB-B6-03, 0-10'-R	10.556	43.689	51.295	48.982	48.424	47.538	46.972	46.180	44.940	43.899		43.416	2.374
NB-B2-04, 0-10'	10.618	42.703	50.229	48.416	47.428	45.966	45.302	44.639	42.515	42.372		43.198	2.350
NB-B2-04, 0-10'-R	10.455	42.524	50.224	48.190	47.403	45.764	45.125	44.442	42.319	42.174		43.079	2.368

Data Entered By: DAW Date: 06/26/2014  
 Data Checked By: *DPM* Date: *6/26/14*  
 Filename: CMRSETE.WK4



**CAPILLARY MOISTURE RETENTION TEST  
ASTM D 3152**

Page 2 of 5

CLIENT	MWH	JOB NO.	2512-77
SAMPLE DATE	--	TEST STARTED	04/09/14 SKL
SOIL DESCR.	Remolded -10	TEST FINISHED	06/20/14 DPM
LOCATION	--		

Moisture Content Data: % D.M. = Moisture Content By Dry Mass; % Vol. = Moisture Content By Volume

Sample Description	Sample Conditions						0.1 Bar			0.2 Bar		
	Dry Mass (g)	Unit Wt. (g/cc)	Sat. Mass (g)	Total H2O (g)	Sat. M.C. % D.M.	Sat. M.C. % Vol.	Retained H2O	% DM	% Vol.	Retained H2O	% DM	% Vol.
DH-B1-03, 0-10'	30.700	1.588	42.864	12.164	39.62	62.91	7.038	22.93	36.40	5.788	18.85	29.93
DH-B1-03, 0-10'-R	30.951	1.601	41.769	10.818	34.95	55.95	6.840	22.10	35.37	5.850	18.90	30.25
DH-B1-10, 35-45'	31.037	1.605	39.008	7.971	25.68	41.22	6.225	20.06	32.19	5.701	18.37	29.48
DH-B1-10, 35-45'-R	31.076	1.607	38.688	7.612	24.49	39.37	6.034	19.42	31.21	5.568	17.92	28.80
EB-B4-06, 10-20'	30.909	1.599	40.431	9.522	30.81	49.24	5.656	18.30	29.25	5.130	16.60	26.53
EB-B4-06, 10-20'-R	30.942	1.600	40.170	9.228	29.82	47.72	5.663	18.30	29.29	5.045	16.30	26.09
EB-B6-03, 0-10'	30.220	1.563	40.128	9.908	32.79	51.24	7.831	25.91	40.50	7.204	23.84	37.26
EB-B6-03, 0-10'-R	30.281	1.566	40.015	9.734	32.15	50.34	7.594	25.08	39.27	7.088	23.41	36.66
NB-B2-04, 0-10'	30.025	1.553	38.887	8.862	29.52	45.83	7.222	24.05	37.35	6.286	20.94	32.51
NB-B2-04, 0-10'-R	30.051	1.554	39.045	8.994	29.93	46.51	7.133	23.74	36.89	6.398	21.29	33.09

Data Entered By: DAW Date: 06/26/2014  
 Data Checked By: *DPM* Date: *6/26/14*  
 Filename: CMRSETE.WK4



**CAPILLARY MOISTURE RETENTION TEST  
ASTM D 3152**

Page 3 of 5

CLIENT MWH

JOB NO. 2512-77

SAMPLE DATE  
SOIL DESCR.  
LOCATION

--  
Remolded -10  
--

TEST STARTED 04/09/14 SKL  
TEST FINISHED 06/20/14 DPM

Moisture Content Data: % D.M. = Moisture Content By Dry Mass; % Vol. = Moisture Content By Volume

Sample Description	0.33 Bar			0.5 Bar			1 Bar			3 Bar		
	Retained H2O	% DM	% Vol.	Retained H2O	% DM	% Vol.	Retained H2O	% DM	% Vol.	Retained H2O	% DM	% Vol.
DH-B1-03, 0-10'	4.640	15.11	24.00	4.074	13.27	21.07	3.430	11.17	17.74	1.396	4.55	7.22
DH-B1-03, 0-10'-R	4.571	14.77	23.64	3.970	12.83	20.53	3.339	10.79	17.27	1.413	4.57	7.31
DH-B1-10, 35-45'	5.109	16.46	26.42	4.789	15.43	24.77	4.329	13.95	22.39	2.156	6.95	11.15
DH-B1-10, 35-45'-R	4.930	15.86	25.50	4.593	14.78	23.75	4.203	13.52	21.74	2.155	6.93	11.15
EB-B4-06, 10-20'	4.285	13.86	22.16	3.845	12.44	19.89	3.348	10.83	17.31	1.587	5.13	8.21
EB-B4-06, 10-20'-R	4.299	13.89	22.23	3.837	12.40	19.84	3.372	10.90	17.44	1.494	4.83	7.73
EB-B6-03, 0-10'	6.347	21.00	32.82	5.796	19.18	29.98	5.027	16.63	26.00	3.673	12.15	19.00
EB-B6-03, 0-10'-R	6.263	20.68	32.39	5.754	19.00	29.76	5.004	16.53	25.88	3.828	12.64	19.80
NB-B2-04, 0-10'	4.885	16.27	25.26	4.278	14.25	22.12	3.657	12.18	18.91	1.597	5.32	8.26
NB-B2-04, 0-10'-R	4.820	16.04	24.93	4.238	14.10	21.92	3.597	11.97	18.60	1.538	5.12	7.95

Data Entered By: DAW Date: 06/26/2014  
Data Checked By: DPM Date: 6/26/14  
Filename: CMRSET.WK4



**CAPILLARY MOISTURE RETENTION TEST  
ASTM D 3152**

Page 4 of 5

CLIENT	MWH	JOB NO.	2512-77
SAMPLE DATE	--	TEST STARTED	04/09/14 SKL
SOIL DESCR.	Remolded -10	TEST FINISHED	06/20/14 DPM
LOCATION	--		

Moisture Content Data: % D.M. = Moisture Content By Dry Mass; % Vol. = Moisture Content By Volume

Sample Description	5 Bar		
	Retained H2O	% DM	% Vol.
DH-B1-03, 0-10'	1.275	4.15	6.59
DH-B1-03, 0-10'-R	1.254	4.05	6.49
DH-B1-10, 35-45'	1.801	5.80	9.31
DH-B1-10, 35-45'-R	1.872	6.02	9.68
EB-B4-06, 10-20'	1.434	4.64	7.42
EB-B4-06, 10-20'-R	1.284	4.15	6.64
EB-B6-03, 0-10'	2.835	9.38	14.66
EB-B6-03, 0-10'-R	2.815	9.30	14.56
NB-B2-04, 0-10'	1.482	4.94	7.66
NB-B2-04, 0-10'-R	1.421	4.73	7.35

Data Entered By: DAW      Date: 06/26/2014  
 Data Checked By: DPM      Date: 6/26/14  
 Filename: CMRSETE.WK4



**CAPILLARY MOISTURE RETENTION TEST  
ASTM D 3152**

Page 5 of 5

CLIENT MWH

JOB NO.

2512-77

SAMPLE DATE --

TEST STARTED

04/09/14 SKL

SOIL DESCR. Remolded -10

TEST FINISHED

06/20/14 DPM

LOCATION --

	Vol. MC % Sat.	Vol. MC % 0.1 Bar	Vol. MC % 0.2 Bar	Vol. MC % 0.33 Bar	Vol. MC % 0.5 Bar	Vol. MC % 1 Bar	Vol. MC % 3 Bar	Vol. MC % 5 Bar
DH-B1-03, 0-10'	62.91	36.40	29.93	24.00	21.07	17.74	7.22	6.59
DH-B1-03, 0-10'-R	55.95	35.37	30.25	23.64	20.53	17.27	7.31	6.49
DH-B1-10, 35-45'	41.22	32.19	29.48	26.42	24.77	22.39	11.15	9.31
DH-B1-10, 35-45'-R	39.37	31.21	28.80	25.50	23.75	21.74	11.15	9.68
EB-B4-06, 10-20'	49.24	29.25	26.53	22.16	19.89	17.31	8.21	7.42
EB-B4-06, 10-20'-R	47.72	29.29	26.09	22.23	19.84	17.44	7.73	6.64
EB-B6-03, 0-10'	51.24	40.50	37.26	32.82	29.98	26.00	19.00	14.66
EB-B6-03, 0-10'-R	50.34	39.27	36.66	32.39	29.76	25.88	19.80	14.56
NB-B2-04, 0-10'	45.83	37.35	32.51	25.26	22.12	18.91	8.26	7.66
NB-B2-04, 0-10'-R	46.51	36.89	33.09	24.93	21.92	18.60	7.95	7.35

	% Saturation							
	Sat.	0.1 Bar	0.2 Bar	0.33 Bar	0.5 Bar	1 Bar	3 Bar	5 Bar
DH-B1-03, 0-10'	100.00	57.86	47.58	38.15	33.49	28.20	11.48	10.48
DH-B1-03, 0-10'-R	100.00	63.23	54.08	42.25	36.70	30.87	13.06	11.59
DH-B1-10, 35-45'	100.00	78.10	71.52	64.09	60.08	54.31	27.05	22.59
DH-B1-10, 35-45'-R	100.00	79.27	73.15	64.77	60.34	55.22	28.31	24.59
EB-B4-06, 10-20'	100.00	59.40	53.88	45.00	40.38	35.16	16.67	15.06
EB-B4-06, 10-20'-R	100.00	61.37	54.67	46.59	41.58	36.54	16.19	13.91
EB-B6-03, 0-10'	100.00	79.04	72.71	64.06	58.50	50.74	37.07	28.61
EB-B6-03, 0-10'-R	100.00	78.02	72.82	64.34	59.11	51.41	39.33	28.92
NB-B2-04, 0-10'	100.00	81.49	70.93	55.12	48.27	41.27	18.02	16.72
NB-B2-04, 0-10'-R	100.00	79.31	71.14	53.59	47.12	39.99	17.10	15.80

Data Entered By: DAW

Date: 06/26/2014

Data Checked By: *DPM*

Date: *6/26/14*

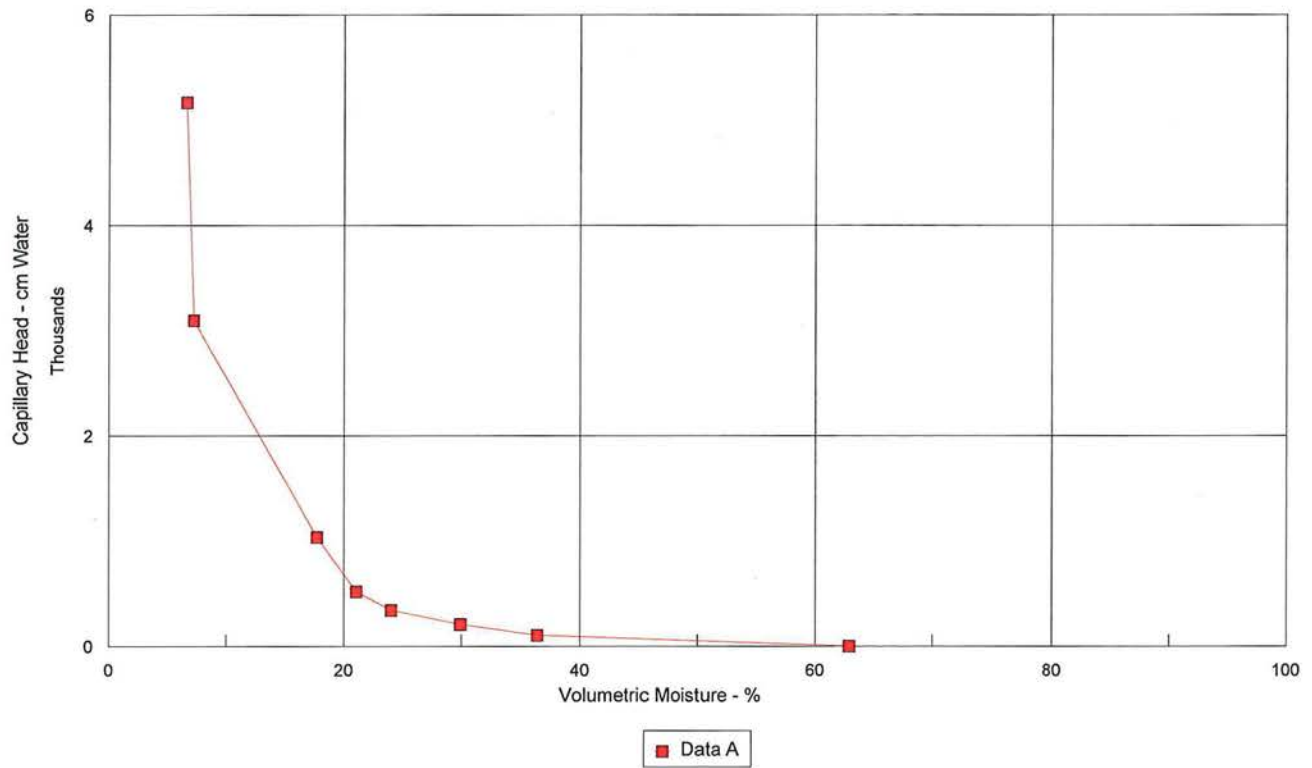
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CMRSETE.WK4



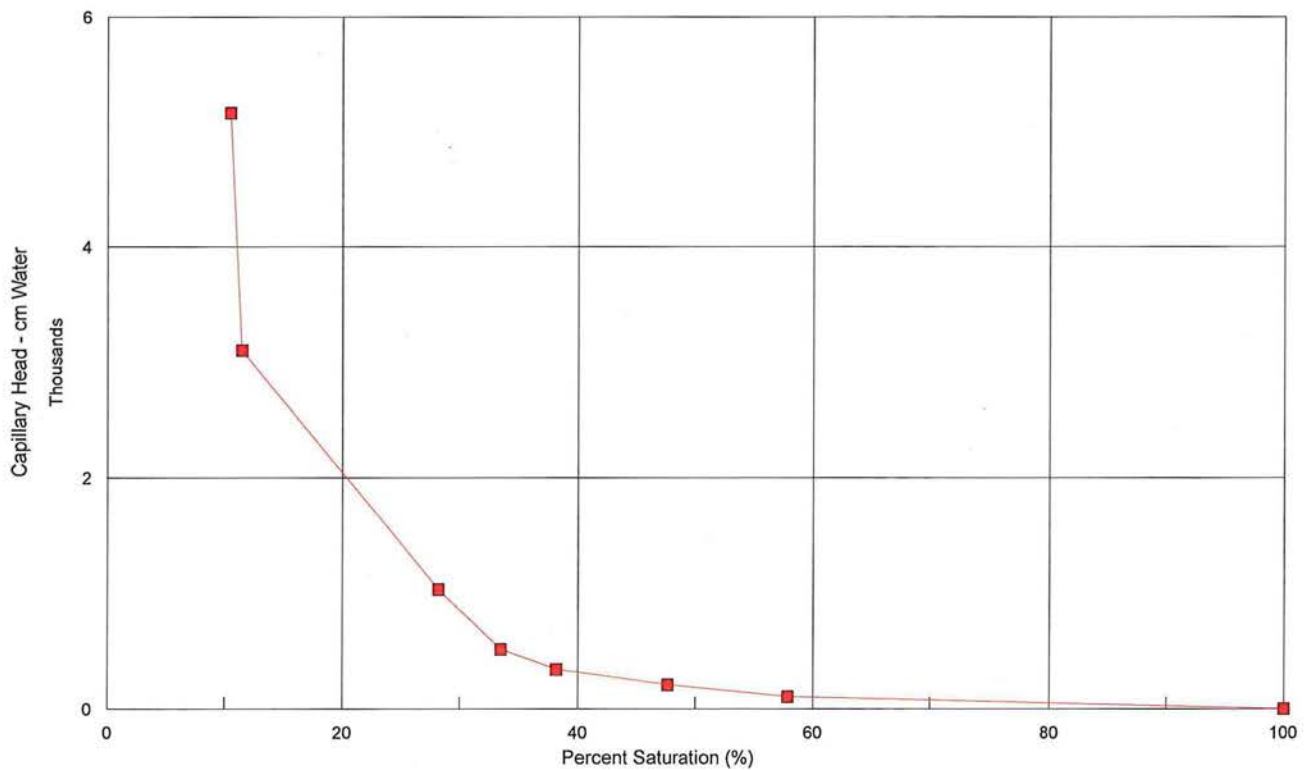
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DH-B1-03, 0-10'



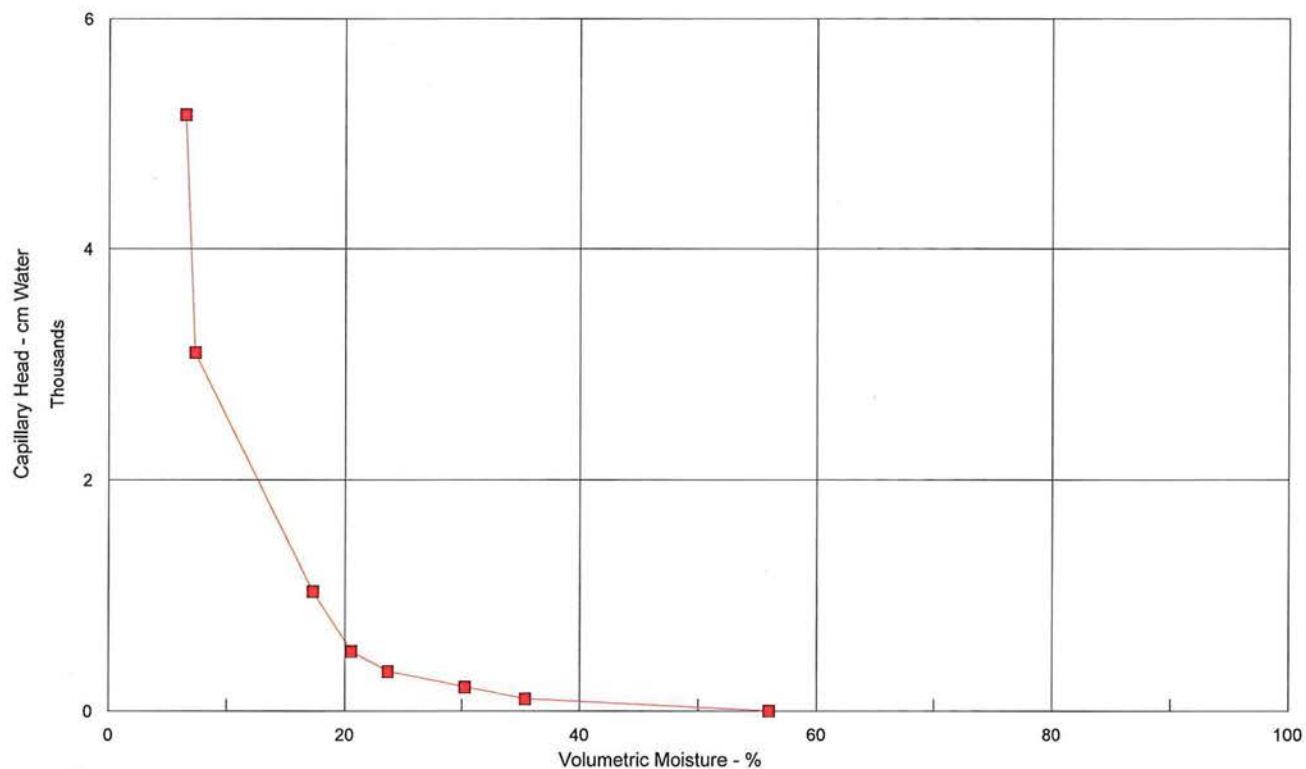
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DH-B1-03, 0-10'



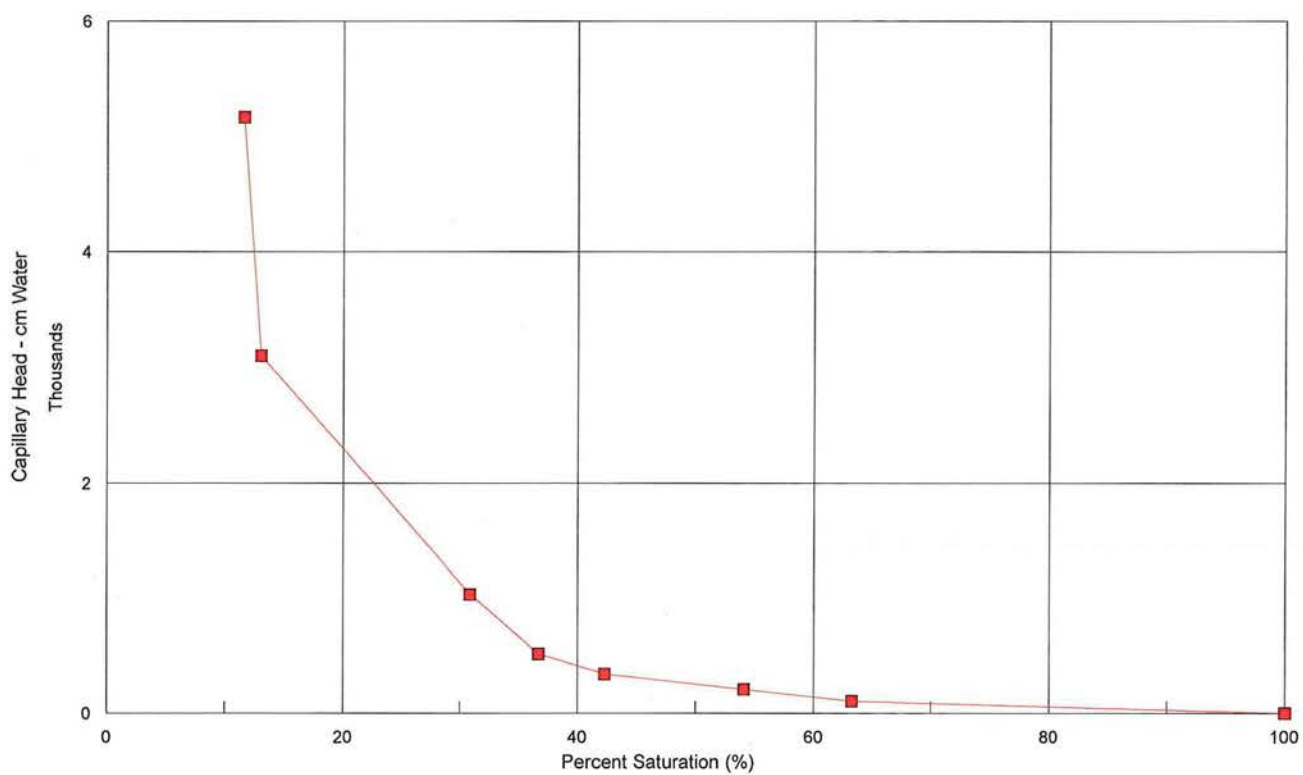
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DH-B1-03, 0-10'-R



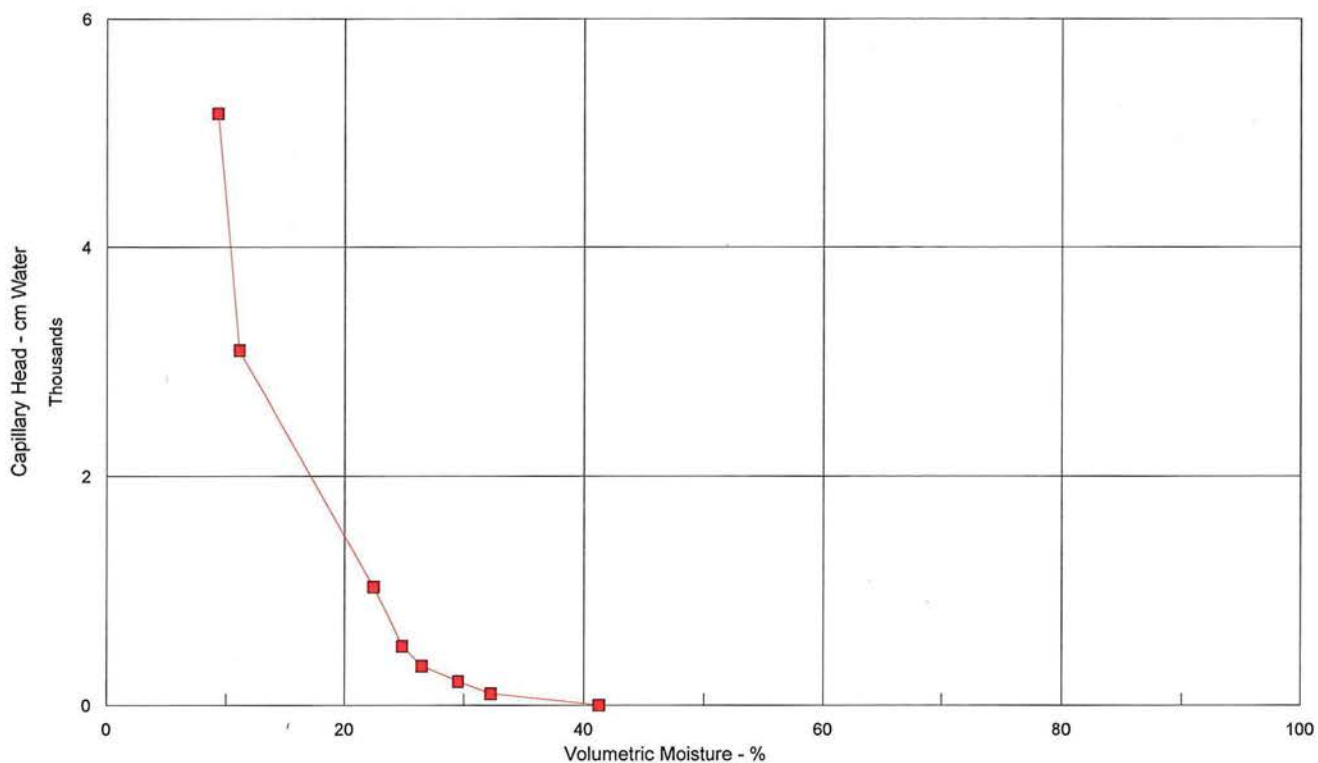
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DH-B1-03, 0-10'-R



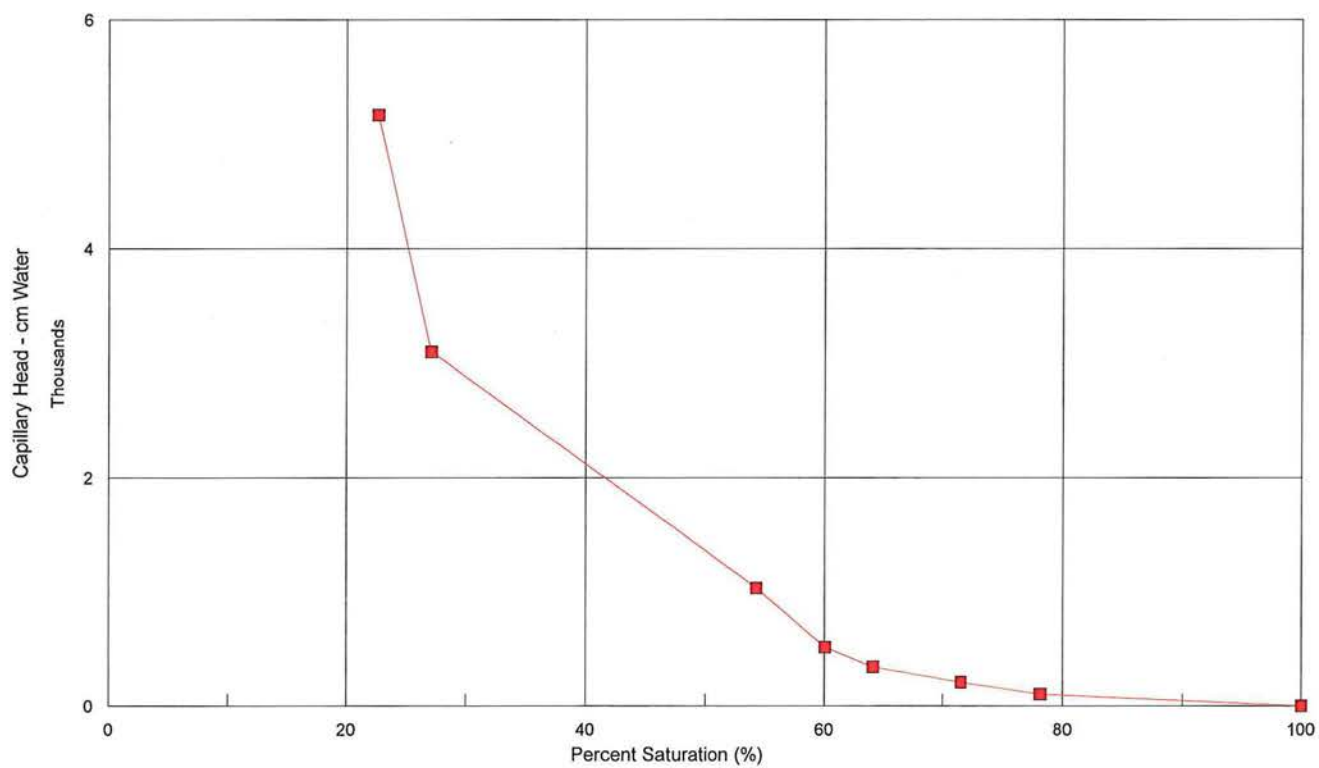
# CAPILLARY MOISTURE CHARACTERISTIC CURVE

DH-B1-10, 35-45'



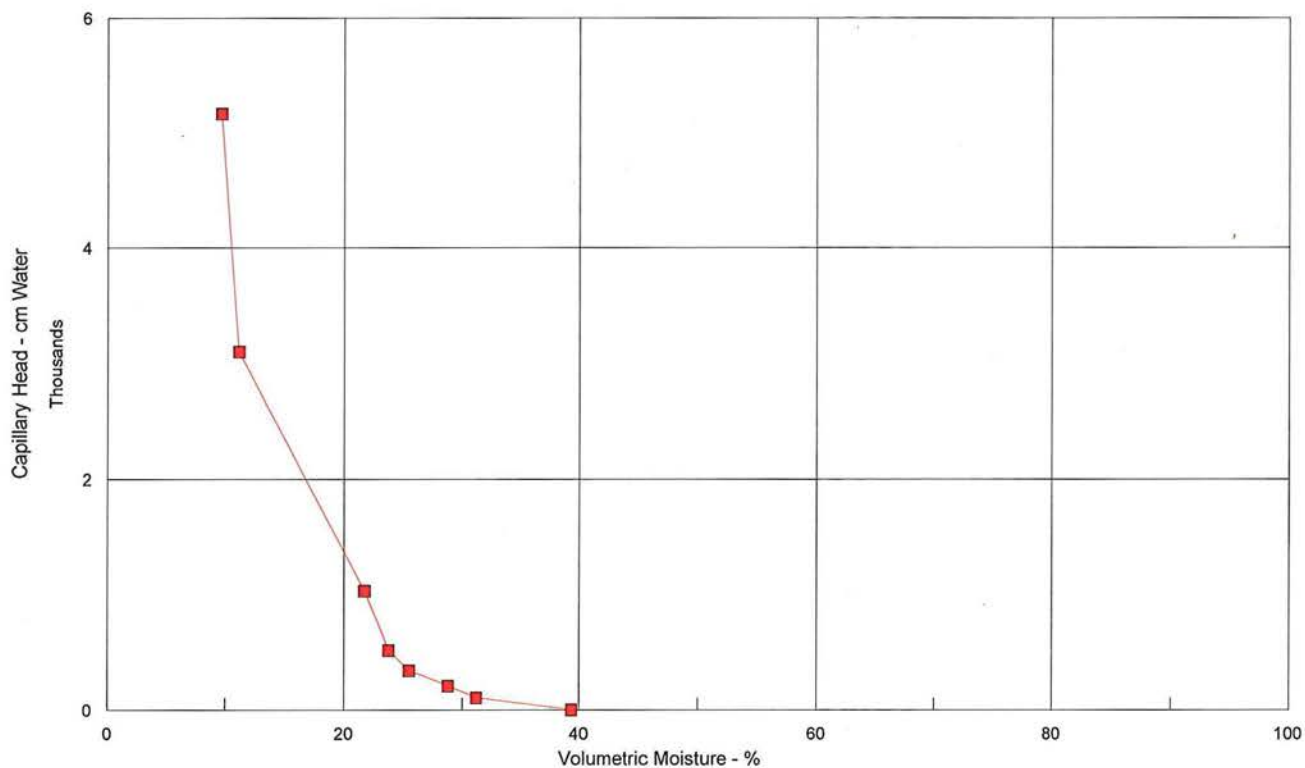
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DH-B1-10, 35-45'



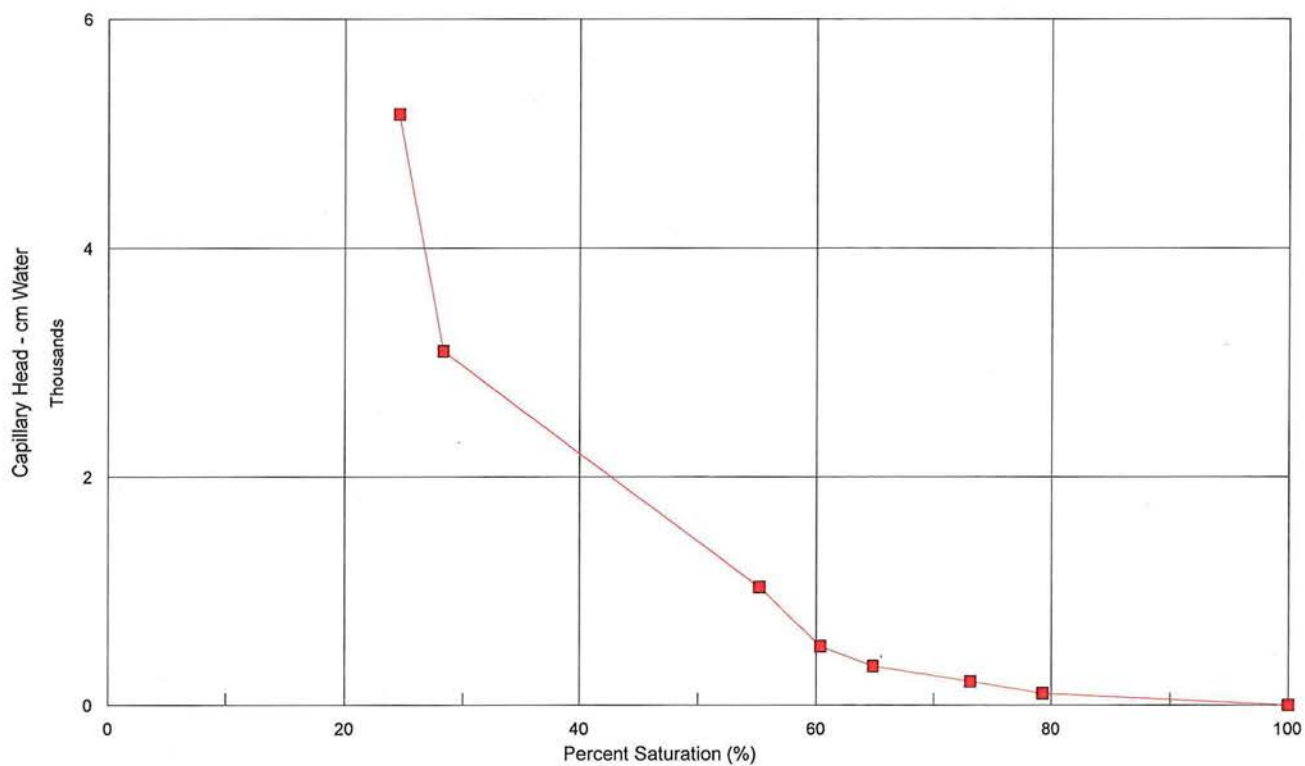
# CAPILLARY MOISTURE CHARACTERISTIC CURVE

DH-B1-10, 35-45'-R



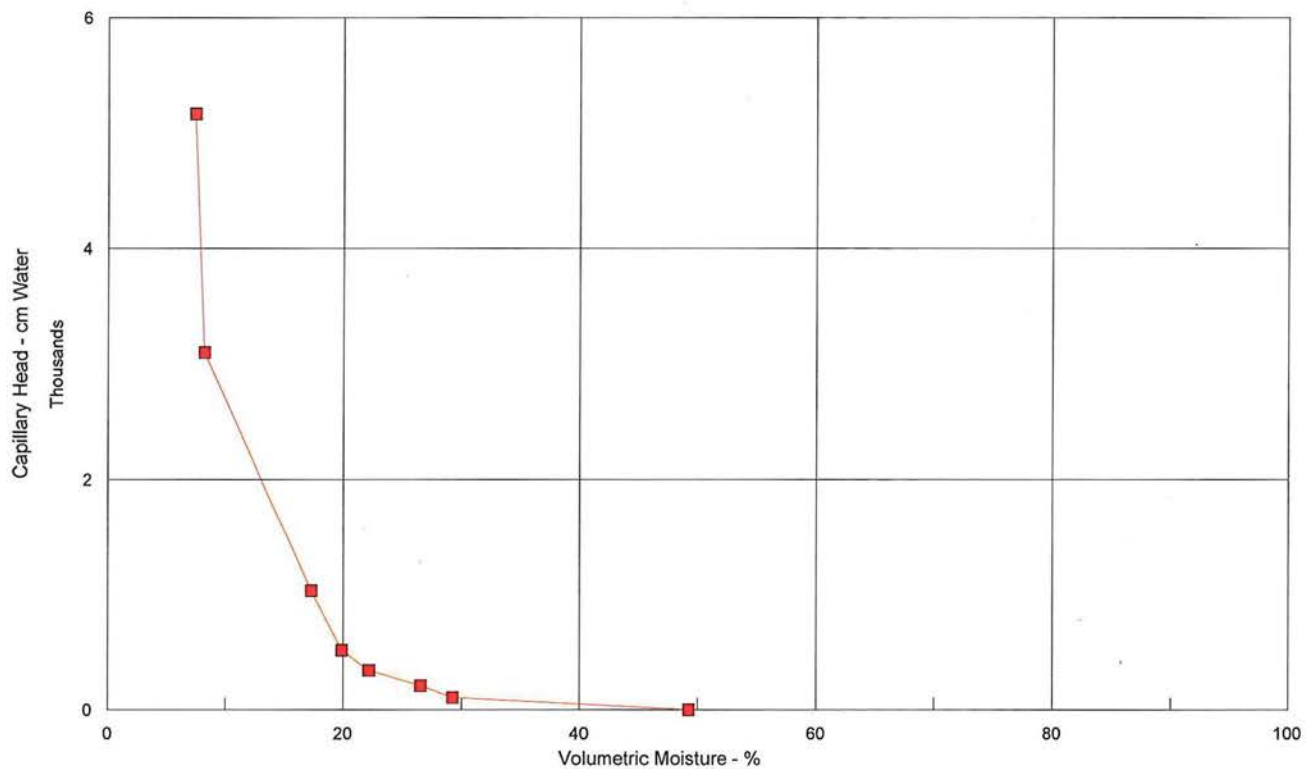
# CAPILLARY MOISTURE CHARACTERISTIC CURVE

DH-B1-10, 35-45'-R



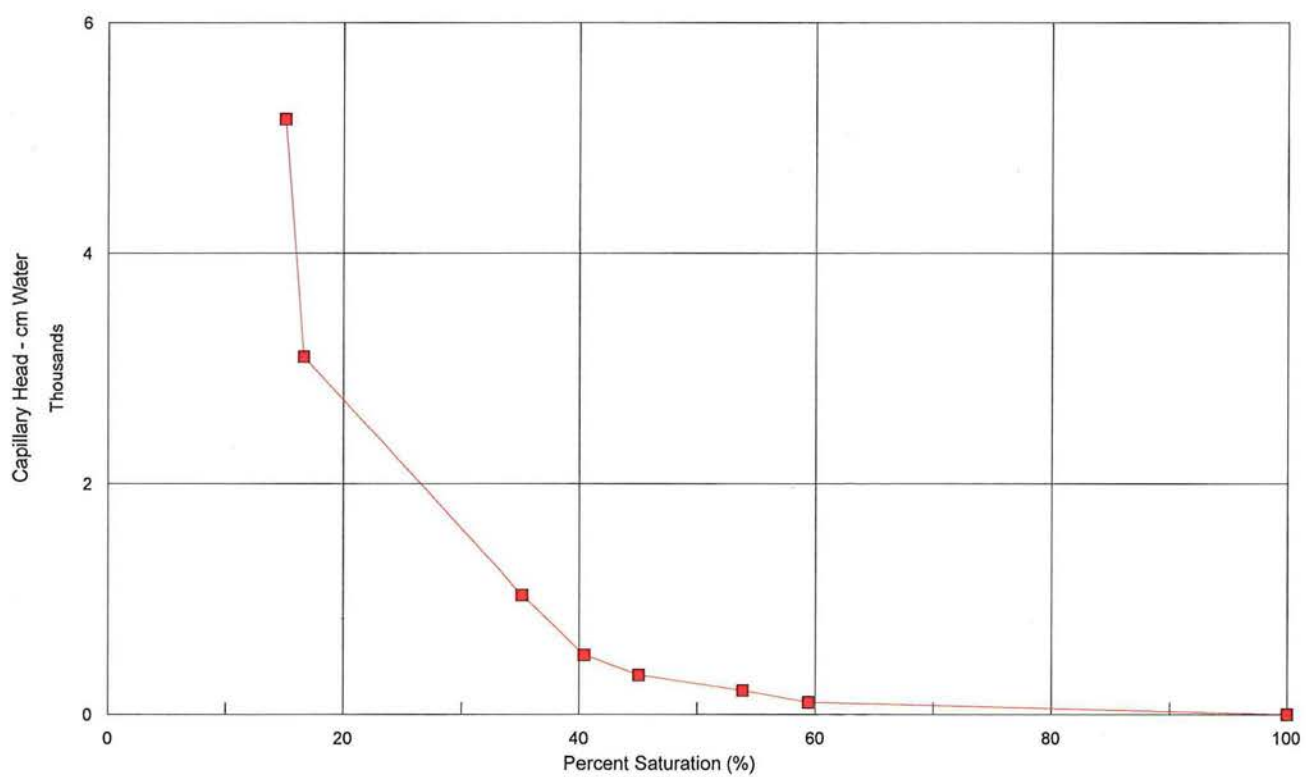
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EB-B4-06, 10-20'



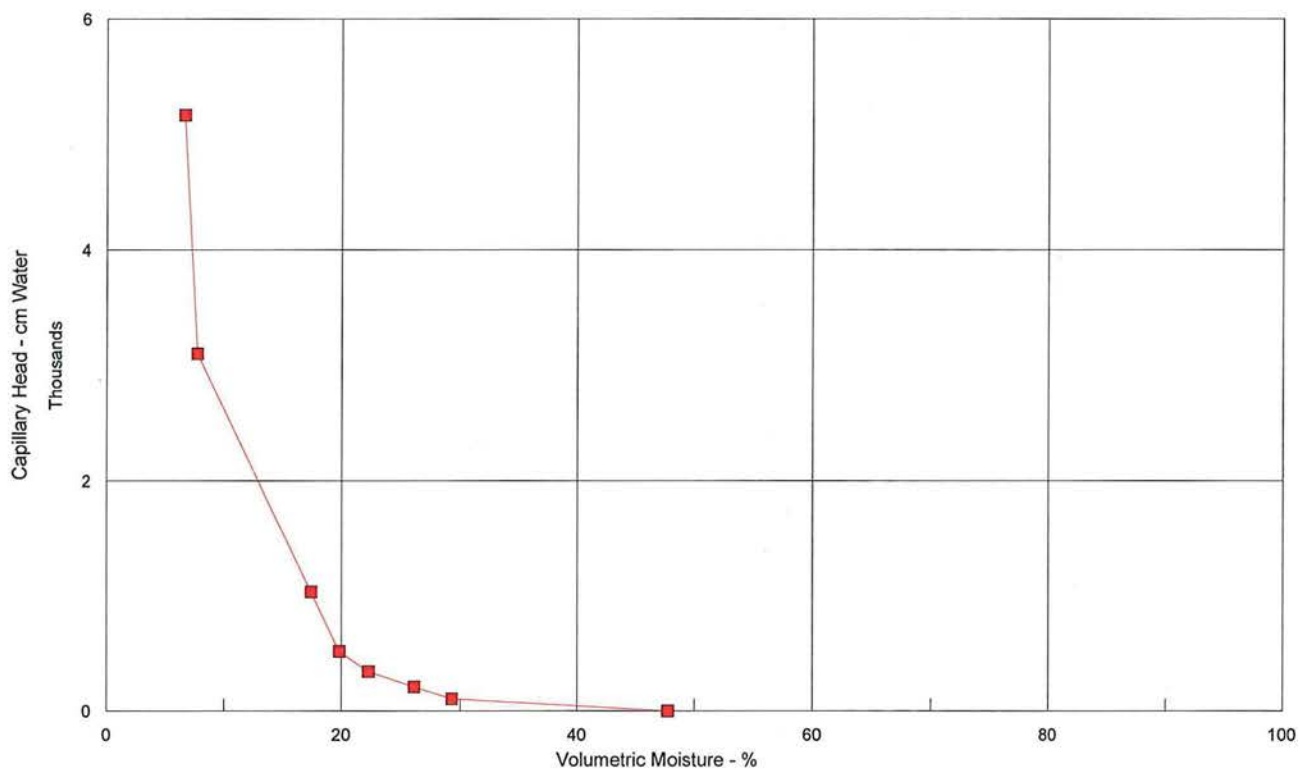
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EB-B4-06, 10-20'



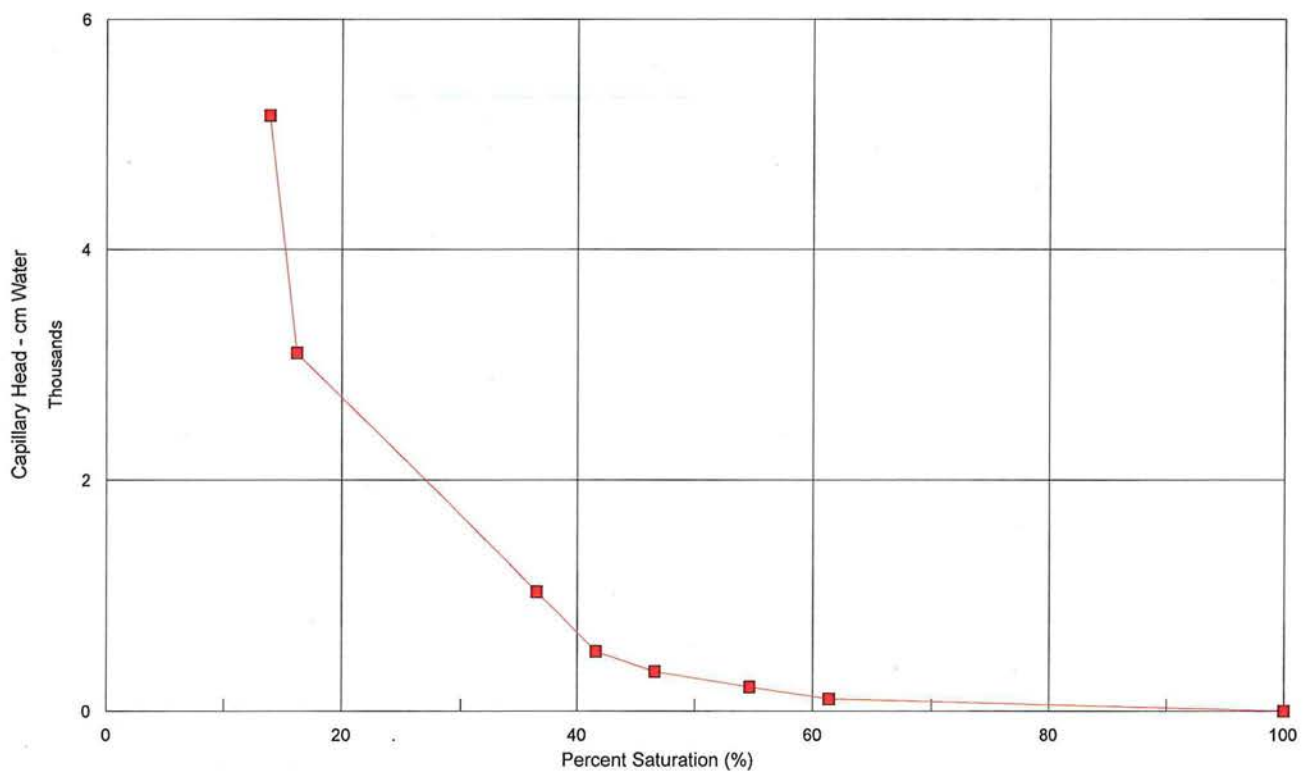
## CAPILLARY MOISTURE CHARACTERISTIC CURVE

EB-B4-06, 10-20'-R



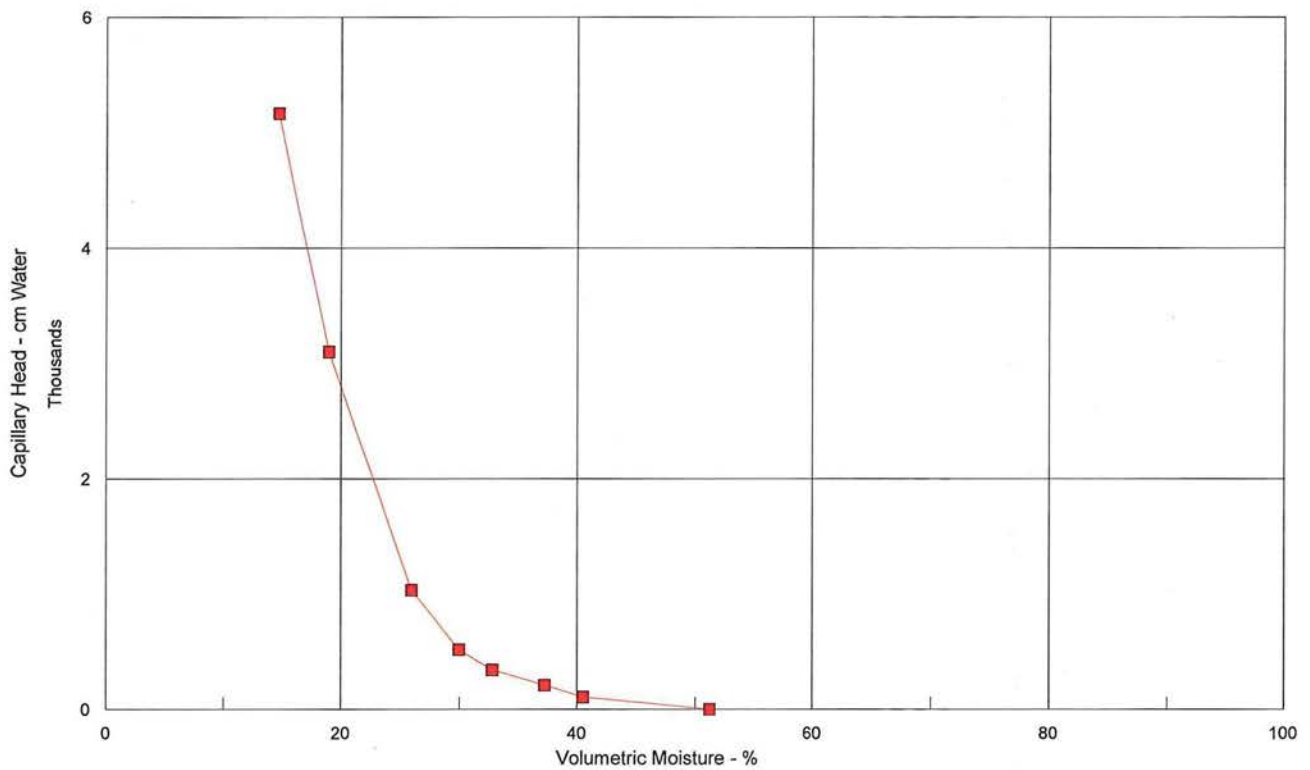
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EB-B4-06, 10-20'-R



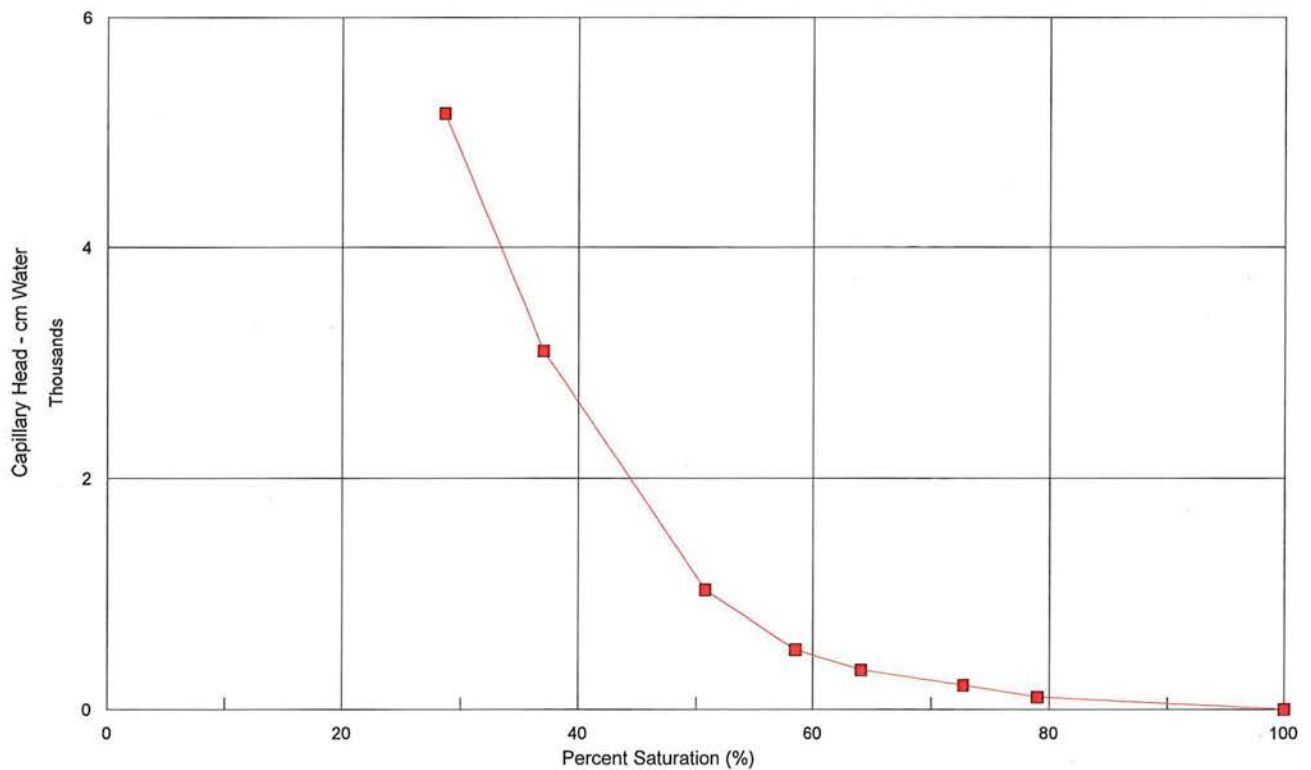
## CAPILLARY MOISTURE CHARACTERISTIC CURVE

EB-B6-03, 0-10'



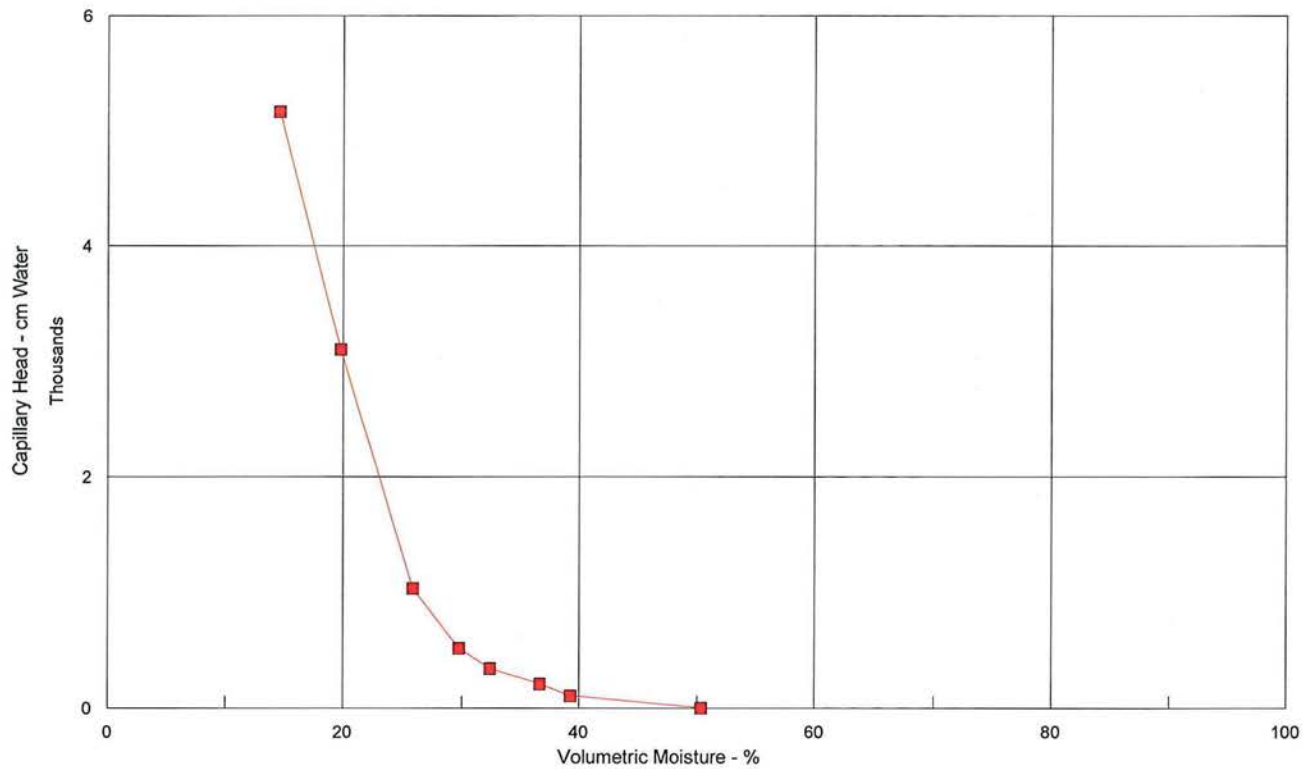
## CAPILLARY MOISTURE CHARACTERISTIC CURVE

EB-B6-03, 0-10'



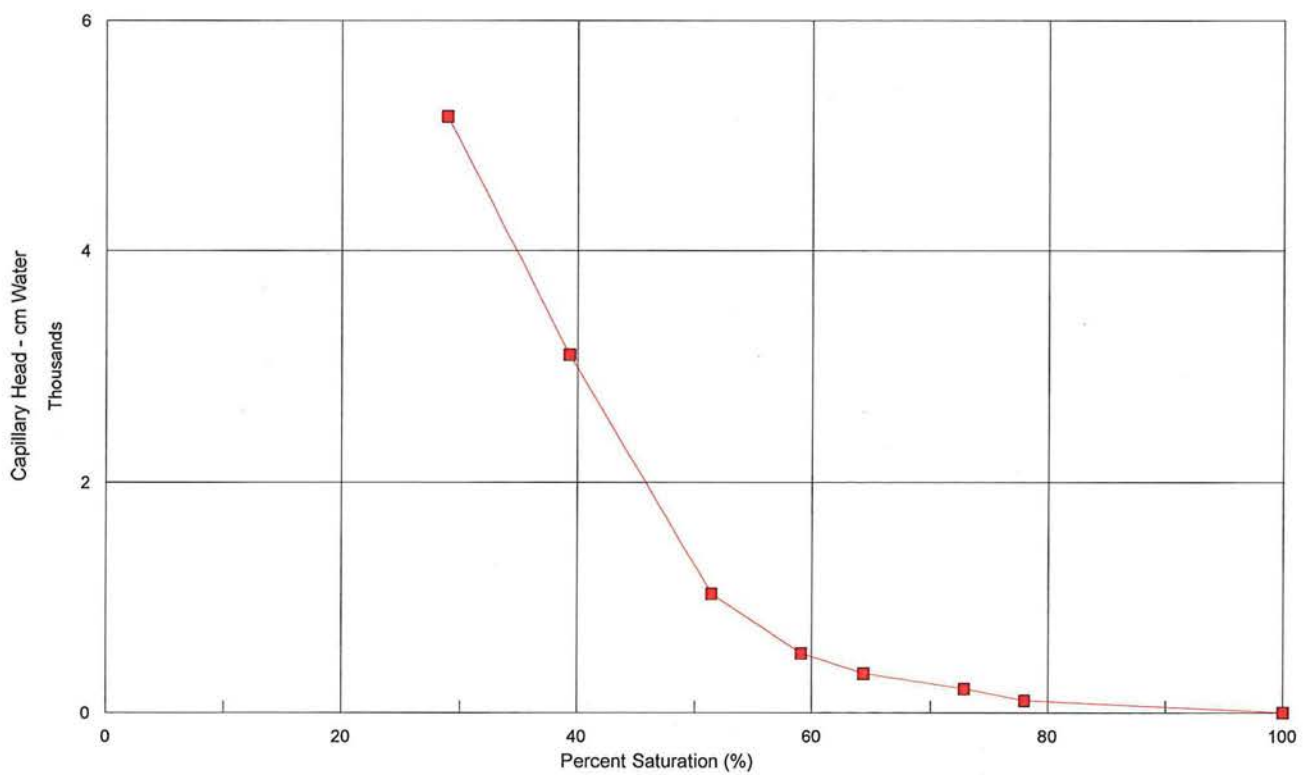
## CAPILLARY MOISTURE CHARACTERISTIC CURVE

EB-B6-03, 0-10'-R



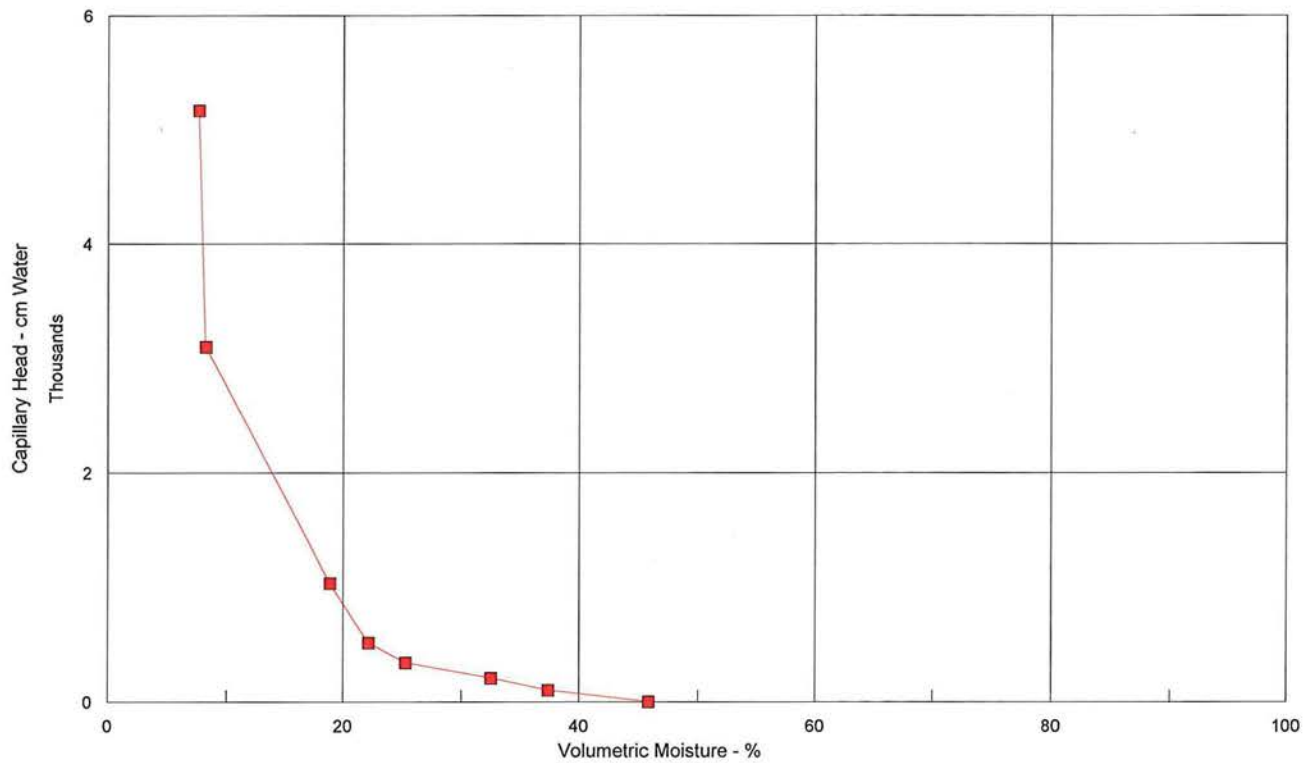
## CAPILLARY MOISTURE CHARACTERISTIC CURVE

EB-B6-03, 0-10'-R



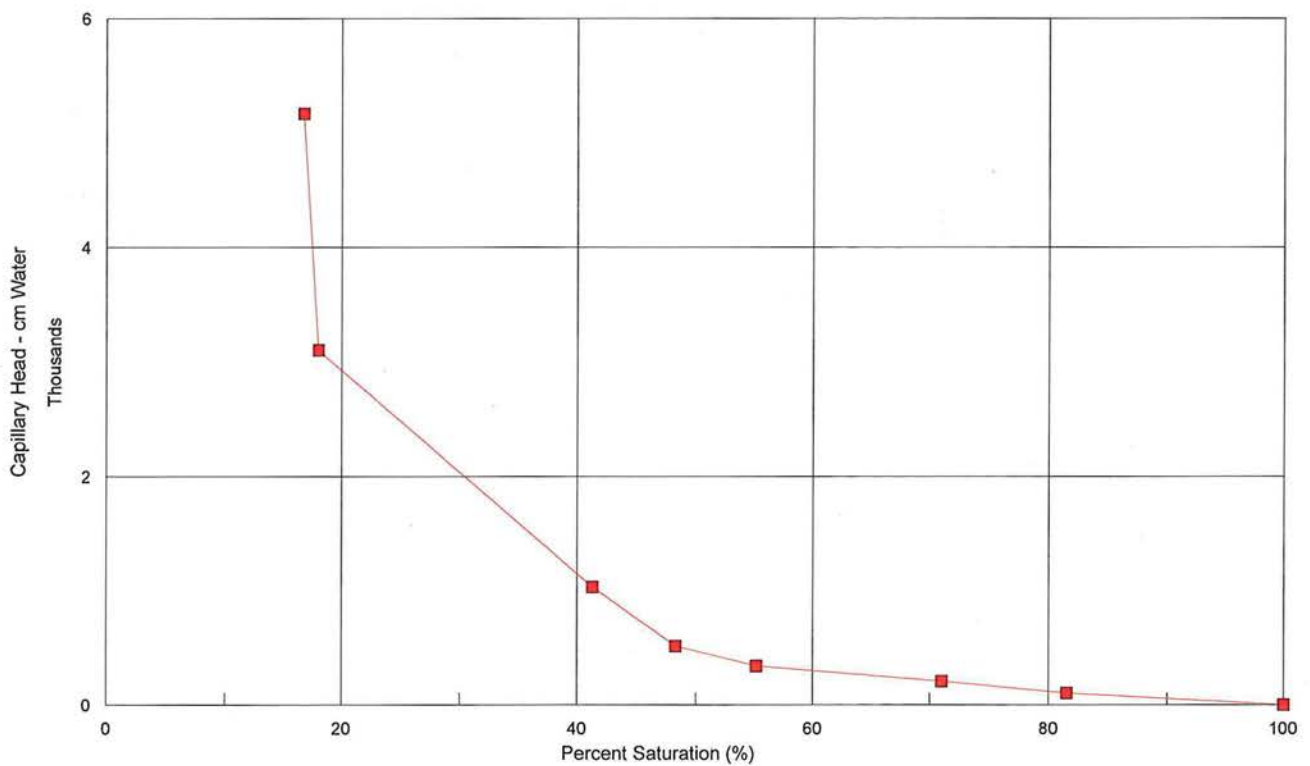
## CAPILLARY MOISTURE CHARACTERISTIC CURVE

NB-B2-04, 0-10'



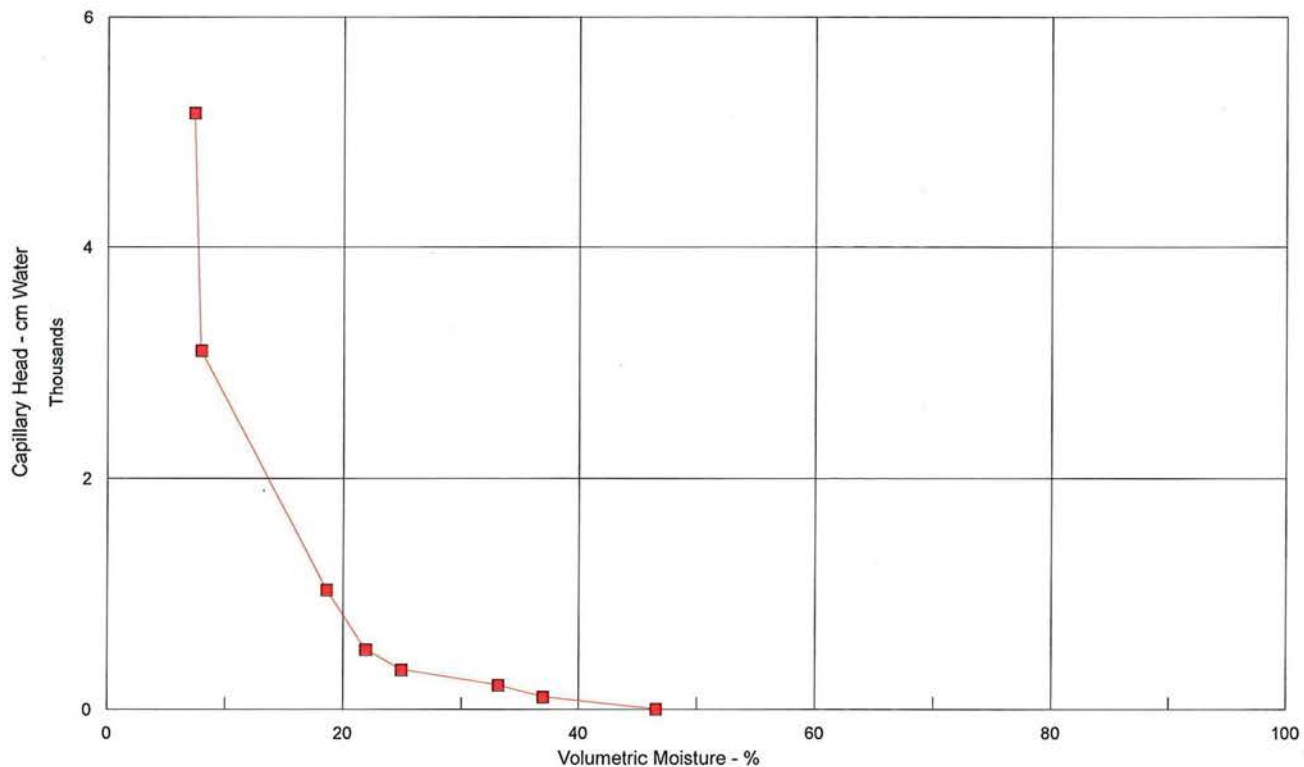
## CAPILLARY MOISTURE CHARACTERISTIC CURVE

NB-B2-04, 0-10'



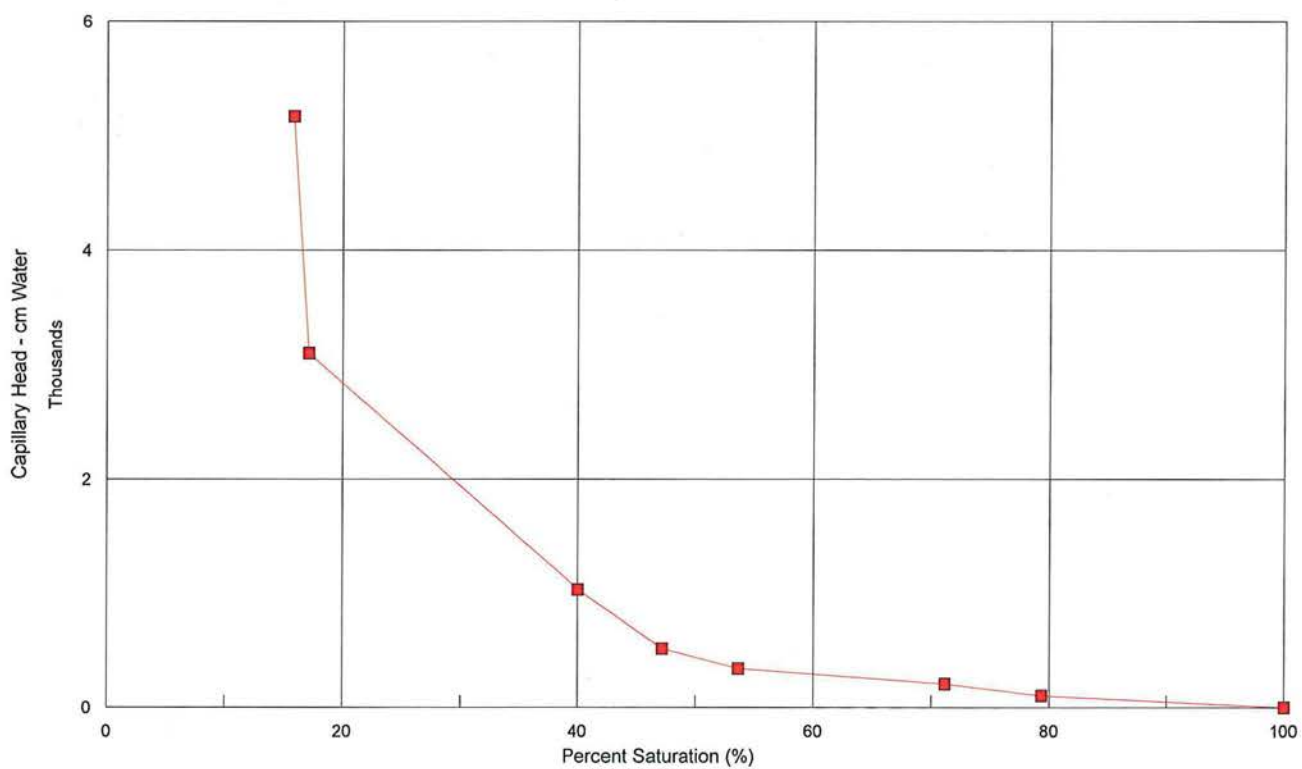
# CAPILLARY MOISTURE CHARACTERISTIC CURVE

NB-B2-04, 0-10'-R



# CAPILLARY MOISTURE CHARACTERISTIC CURVE

NB-B2-04, 0-10'-R



**CAPILLARY MOISTURE RETENTION TEST  
ASTM D 3152**

Page 1 of 5

CLIENT	MWH	JOB NO.	2512-77
SAMPLE DATE	--	TEST STARTED	04/09/14 SKL
SOIL DESCR.	Remolded -10	TEST FINISHED	06/20/14 DPM
LOCATION	--		

**MASS DATA**

Sample Description	Ring Mass g	As Rec. Mass g	Sat. Mass g	0.1 Bar Mass g	0.2 Bar Mass g	0.33 Bar Mass g	0.5 Bar Mass g	1 Bar Mass g	3 Bar Mass g	5 Bar Mass g		Dry Mass Filter, Ring, & Dish (g)	Dish Wt. g
<b>Filter Mass g</b>		0.205	0.724	0.551	0.499	0.438	0.381	0.339	0.275	0.270			
SB-B1-04, 0-25'	10.805	43.877	51.583	48.518	47.971	47.260	46.722	46.118	43.630	43.384		43.747	2.362
SB-B1-04, 0-25'-R	10.638	43.675	50.849	48.536	47.962	47.217	46.667	45.949	43.300	43.002		43.509	2.350
SB-B4-01, 0-15'	10.590	44.322	50.243	47.745	47.263	46.638	46.307	45.644	44.741	43.620		43.201	2.372
SB-B4-01, 0-15'-R	10.731	44.466	51.609	48.252	47.688	46.971	46.709	45.834	44.676	43.668		43.399	2.377
TI-CS01-04A, 11-24"	10.542	50.295	53.522	51.671	51.424	51.154	50.936	50.650	49.441	48.502		47.751	2.294
TI-CS01-04A, 11-24"-R	10.685	50.424	52.535	51.382	51.244	51.042	50.860	50.659	50.081	48.850		47.827	2.364
WB-B1-06, 5-10'	10.679	42.760	49.960	56.073	45.422	44.529	44.110	43.575	42.808	42.176		42.484	2.313
WB-B1-06, 5-10'-R	10.651	42.744	50.498	46.576	45.659	44.694	44.295	43.778	42.666	42.294		42.773	2.367
WB-B2-05, 10-20'	10.341	42.207	49.817	47.014	46.322	45.181	44.642	43.986	42.812	42.119		42.527	2.369
WB-B2-05, 10-20'-R	10.679	42.457	50.587	46.743	45.977	45.116	44.659	44.035	42.954	42.205		42.505	2.316

Data Entered By: DAW Date: 06/26/2014  
 Data Checked By: *DPM* Date: *6/26/14*  
 Filename: CMRSETS.WK4



**CAPILLARY MOISTURE RETENTION TEST  
ASTM D 3152**

Page 2 of 5

CLIENT	MWH	JOB NO.	2512-77
SAMPLE DATE	--	TEST STARTED	04/09/14 SKL
SOIL DESCR.	Remolded -10	TEST FINISHED	06/20/14 DPM
LOCATION	--		

Moisture Content Data: % D.M. = Moisture Content By Dry Mass; % Vol. = Moisture Content By Volume

Sample Description	Sample Conditions						0.1 Bar			0.2 Bar		
	Dry Mass (g)	Unit Wt. (g/cc)	Sat. Mass (g)	Total H <sub>2</sub> O (g)	Sat. M.C. % D.M.	Sat. M.C. % Vol.	Retained H <sub>2</sub> O	% DM	% Vol.	Retained H <sub>2</sub> O	% DM	% Vol.
SB-B1-04, 0-25'	30.375	1.571	40.054	9.679	31.87	50.06	6.787	22.34	35.10	6.292	20.71	32.54
SB-B1-04, 0-25'-R	30.316	1.568	39.487	9.171	30.25	47.43	7.031	23.19	36.36	6.509	21.47	33.66
SB-B4-01, 0-15'	30.034	1.553	38.929	8.895	29.62	46.00	6.570	21.88	33.98	6.140	20.44	31.75
SB-B4-01, 0-15'-R	30.086	1.556	40.154	10.068	33.46	52.07	6.884	22.88	35.60	6.372	21.18	32.95
TI-CS01-04A, 11-24"	34.710	1.795	42.256	7.546	21.74	39.03	5.868	16.91	30.35	5.673	16.34	29.34
TI-CS01-04A, 11-24"-R	34.573	1.788	41.126	6.553	18.95	33.89	5.573	16.12	28.82	5.487	15.87	28.38
WB-B1-06, 5-10'	29.287	1.515	38.557	9.270	31.65	47.94	15.556	53.12	80.45	4.957	16.93	25.64
WB-B1-06, 5-10'-R	29.550	1.528	39.123	9.573	32.40	49.51	5.824	19.71	30.12	4.959	16.78	25.65
WB-B2-05, 10-20'	29.612	1.531	38.752	9.140	30.87	47.27	6.510	21.98	33.67	5.870	19.82	30.36
WB-B2-05, 10-20'-R	29.305	1.516	39.184	9.879	33.71	51.09	6.208	21.18	32.11	5.494	18.75	28.41

Data Entered By: DAW Date: 06/26/2014  
 Data Checked By: DPM Date: 6/26/14  
 Filename: CMRSETS.WK4



**CAPILLARY MOISTURE RETENTION TEST  
ASTM D 3152**

Page 3 of 5

CLIENT MWH

JOB NO. 2512-77

SAMPLE DATE --  
SOIL DESCR. Remolded -10  
LOCATION --

TEST STARTED 04/09/14 SKL  
TEST FINISHED 06/20/14 DPM

Moisture Content Data: % D.M. = Moisture Content By Dry Mass; % Vol. = Moisture Content By Volume

Sample Description	0.33 Bar			0.5 Bar			1 Bar			3 Bar		
	Retained H2O	% DM	% Vol.	Retained H2O	% DM	% Vol.	Retained H2O	% DM	% Vol.	Retained H2O	% DM	% Vol.
SB-B1-04, 0-25'	5.642	18.57	29.18	5.161	16.99	26.69	4.599	15.14	23.78	2.175	7.16	11.25
SB-B1-04, 0-25'-R	5.825	19.21	30.13	5.332	17.59	27.58	4.656	15.36	24.08	2.071	6.83	10.71
SB-B4-01, 0-15'	5.576	18.57	28.84	5.302	17.65	27.42	4.681	15.59	24.21	3.842	12.79	19.87
SB-B4-01, 0-15'-R	5.716	19.00	29.56	5.511	18.32	28.50	4.678	15.55	24.19	3.584	11.91	18.54
TI-CS01-04A, 11-24"	5.464	15.74	28.26	5.303	15.28	27.43	5.059	14.58	26.16	3.914	11.28	20.24
TI-CS01-04A, 11-24"-R	5.346	15.46	27.65	5.221	15.10	27.00	5.062	14.64	26.18	4.548	13.15	23.52
WB-B1-06, 5-10'	4.125	14.08	21.33	3.763	12.85	19.46	3.270	11.17	16.91	2.567	8.76	13.28
WB-B1-06, 5-10'-R	4.055	13.72	20.97	3.713	12.57	19.20	3.238	10.96	16.75	2.190	7.41	11.33
WB-B2-05, 10-20'	4.790	16.18	24.77	4.308	14.55	22.28	3.694	12.47	19.10	2.584	8.73	13.36
WB-B2-05, 10-20'-R	4.694	16.02	24.28	4.294	14.65	22.21	3.712	12.67	19.20	2.695	9.20	13.94

Data Entered By: DAW Date: 06/26/2014  
Data Checked By: *DPM* Date: *6/26/14*  
Filename: CMRSETS.WK4



**CAPILLARY MOISTURE RETENTION TEST  
ASTM D 3152**

Page 4 of 5

CLIENT MWH

JOB NO. 2512-77

SAMPLE DATE --  
SOIL DESCR. Remolded -10  
LOCATION --

TEST STARTED 04/09/14 SKL  
TEST FINISHED 06/20/14 DPM

Moisture Content Data: % D.M. = Moisture Content By Dry Mass; % Vol. = Moisture Content By Volume

Sample Description	5 Bar		
	Retained H2O	% DM	% Vol.
SB-B1-04, 0-25'	1.934	6.37	10.00
SB-B1-04, 0-25'-R	1.778	5.86	9.20
SB-B4-01, 0-15'	2.726	9.08	14.10
SB-B4-01, 0-15'-R	2.581	8.58	13.35
TI-CS01-04A, 11-24"	2.980	8.59	15.41
TI-CS01-04A, 11-24"-R	3.322	9.61	17.18
WB-B1-06, 5-10'	1.940	6.62	10.03
WB-B1-06, 5-10'-R	1.823	6.17	9.43
WB-B2-05, 10-20'	1.896	6.40	9.81
WB-B2-05, 10-20'-R	1.951	6.66	10.09

Data Entered By: DAW Date: 06/26/2014  
Data Checked By: *DPM* Date: *6/26/14*  
Filename: CMRSETS.WK4



**CAPILLARY MOISTURE RETENTION TEST  
ASTM D 3152**

Page 5 of 5

CLIENT MWH

JOB NO.

2512-77

SAMPLE DATE --

TEST STARTED

04/09/14 SKL

SOIL DESCR. Remolded -10

TEST FINISHED

06/20/14 DPM

LOCATION --

	Vol. MC % Sat.	Vol. MC % 0.1 Bar	Vol. MC % 0.2 Bar	Vol. MC % 0.33 Bar	Vol. MC % 0.5 Bar	Vol. MC % 1 Bar	Vol. MC % 3 Bar	Vol. MC % 5 Bar
SB-B1-04, 0-25'	50.06	35.10	32.54	29.18	26.69	23.78	11.25	10.00
SB-B1-04, 0-25'-R	47.43	36.36	33.66	30.13	27.58	24.08	10.71	9.20
SB-B4-01, 0-15'	46.00	33.98	31.75	28.84	27.42	24.21	19.87	14.10
SB-B4-01, 0-15'-R	52.07	35.60	32.95	29.56	28.50	24.19	18.54	13.35
TI-CS01-04A, 11-24"	39.03	30.35	29.34	28.26	27.43	26.16	20.24	15.41
TI-CS01-04A, 11-24"-R	33.89	28.82	28.38	27.65	27.00	26.18	23.52	17.18
WB-B1-06, 5-10'	47.94	80.45	25.64	21.33	19.46	16.91	13.28	10.03
WB-B1-06, 5-10'-R	49.51	30.12	25.65	20.97	19.20	16.75	11.33	9.43
WB-B2-05, 10-20'	47.27	33.67	30.36	24.77	22.28	19.10	13.36	9.81
WB-B2-05, 10-20'-R	51.09	32.11	28.41	24.28	22.21	19.20	13.94	10.09

	% Saturation							
	Sat.	0.1 Bar	0.2 Bar	0.33 Bar	0.5 Bar	1 Bar	3 Bar	5 Bar
SB-B1-04, 0-25'	100.00	70.12	65.01	58.29	53.32	47.52	22.47	19.98
SB-B1-04, 0-25'-R	100.00	76.67	70.97	63.52	58.14	50.77	22.58	19.39
SB-B4-01, 0-15'	100.00	73.86	69.03	62.69	59.61	52.63	43.19	30.65
SB-B4-01, 0-15'-R	100.00	68.38	63.29	56.77	54.74	46.46	35.60	25.64
TI-CS01-04A, 11-24"	100.00	77.76	75.18	72.41	70.28	67.04	51.87	39.49
TI-CS01-04A, 11-24"-R	100.00	85.05	83.73	81.58	79.67	77.25	69.40	50.69
WB-B1-06, 5-10'	100.00	167.81	53.47	44.50	40.59	35.28	27.69	20.93
WB-B1-06, 5-10'-R	100.00	60.84	51.80	42.36	38.79	33.82	22.88	19.04
WB-B2-05, 10-20'	100.00	71.23	64.22	52.41	47.13	40.42	28.27	20.74
WB-B2-05, 10-20'-R	100.00	62.84	55.61	47.51	43.47	37.57	27.28	19.75

Data Entered By: DAW

Date: 06/26/2014

Data Checked By: DPM

Date: 6/26/14

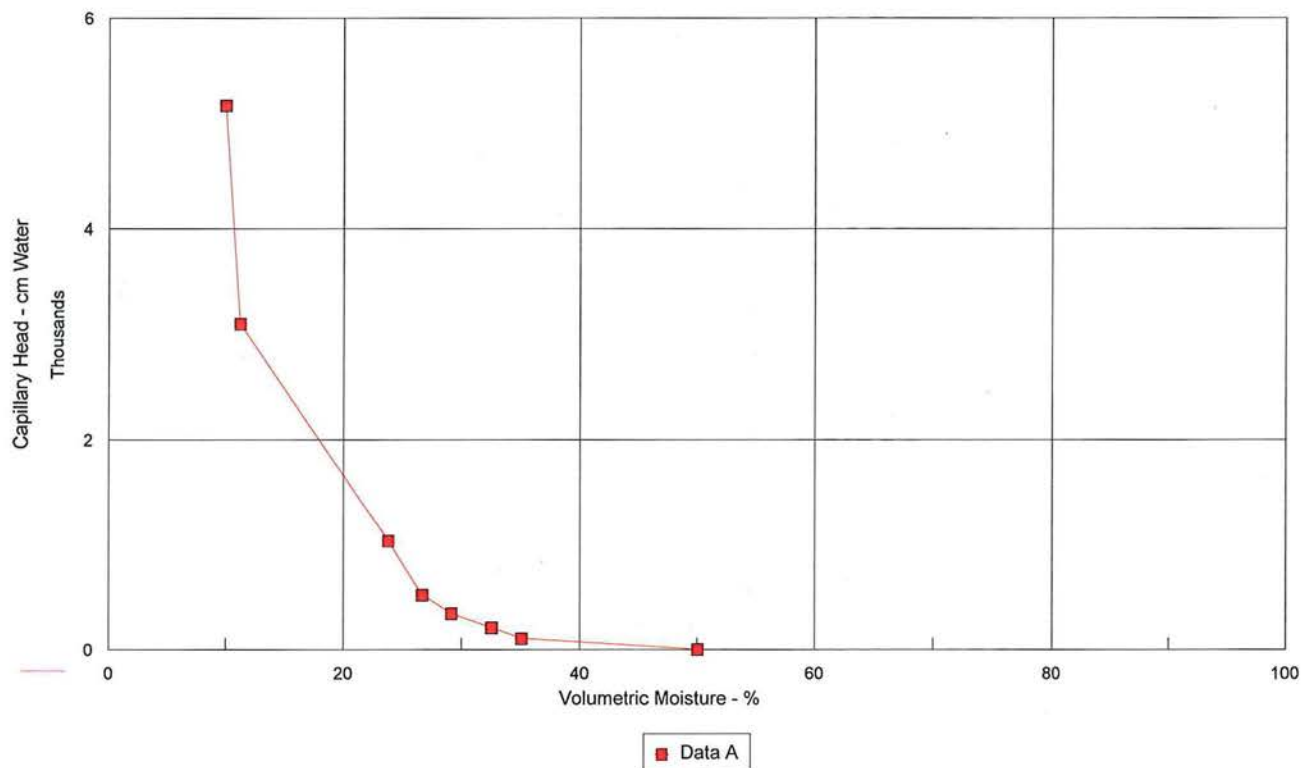
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CMRSETS.WK4



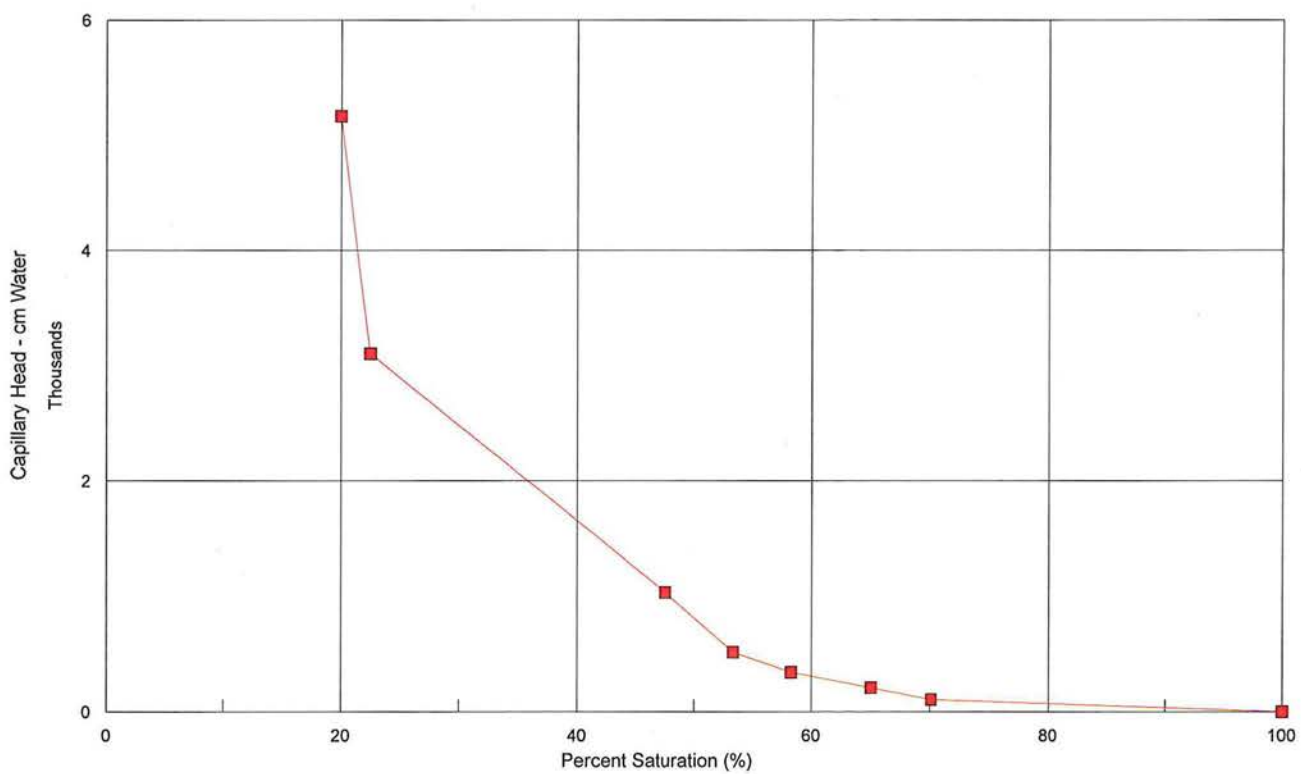
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SB-B1-04, 0-25'



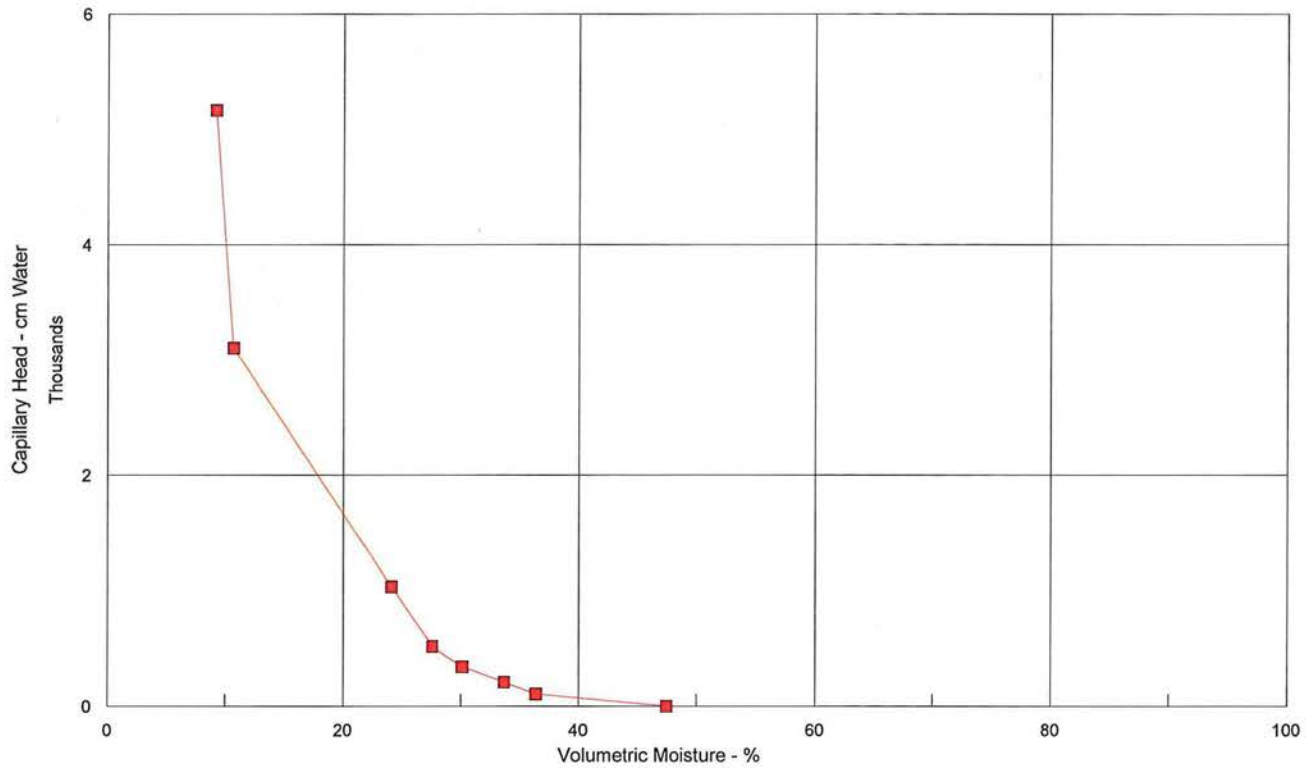
## CAPILLARY MOISTURE CHARACTERISTIC CURVE

SB-B1-04, 0-25'



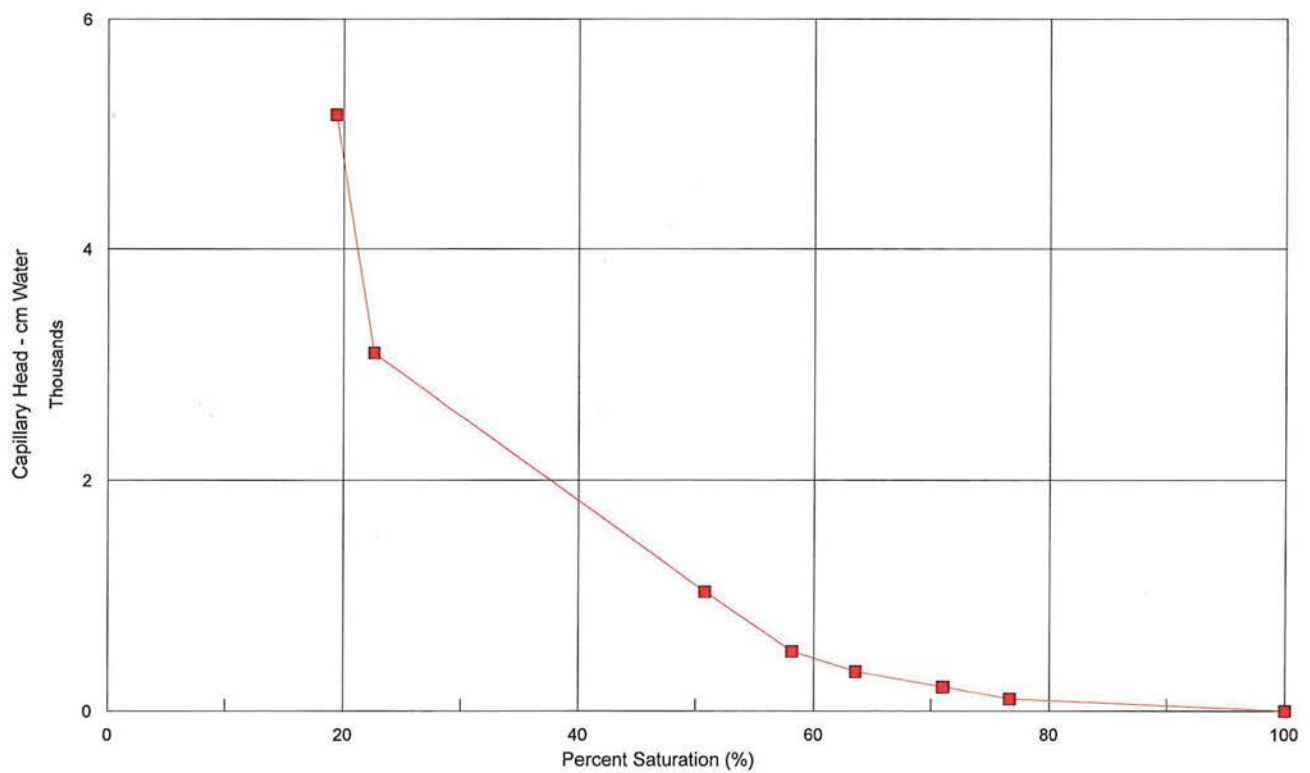
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SB-B1-04, 0-25'-R



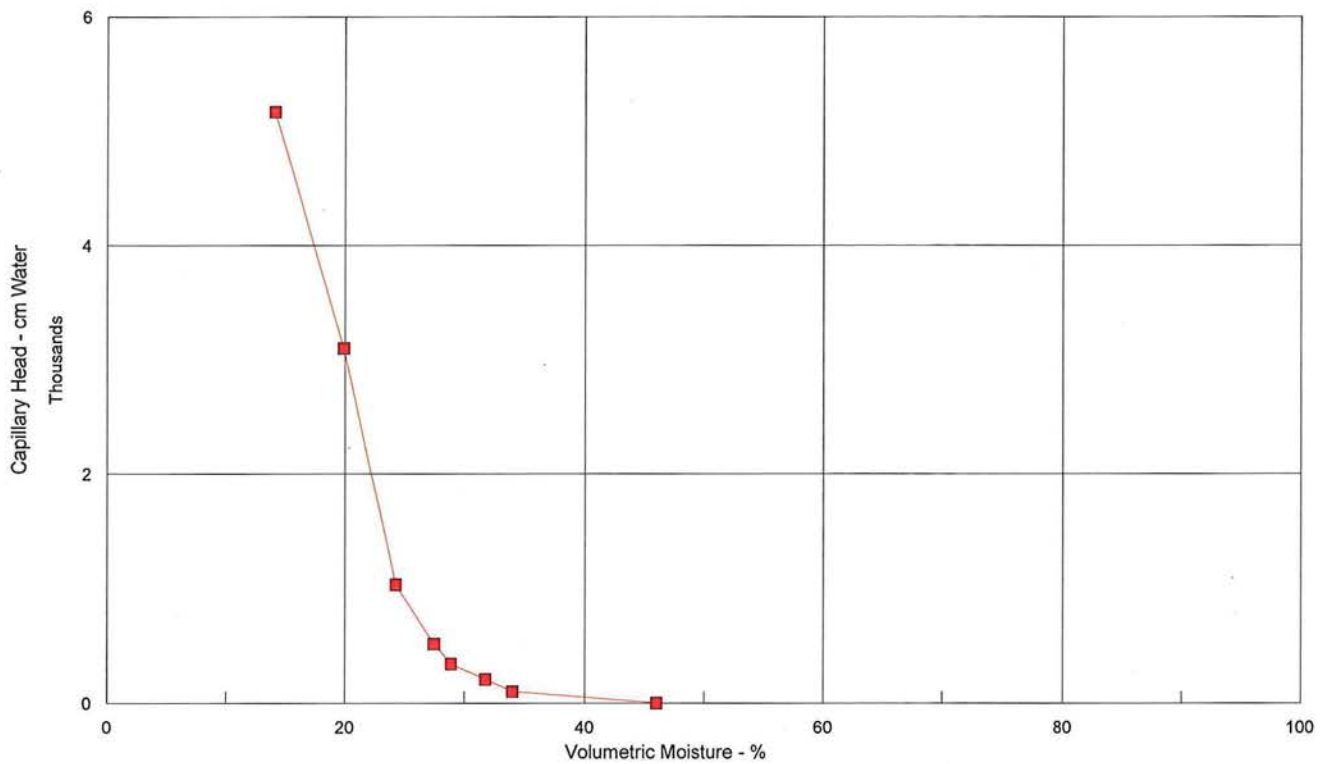
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SB-B1-04, 0-25'-R



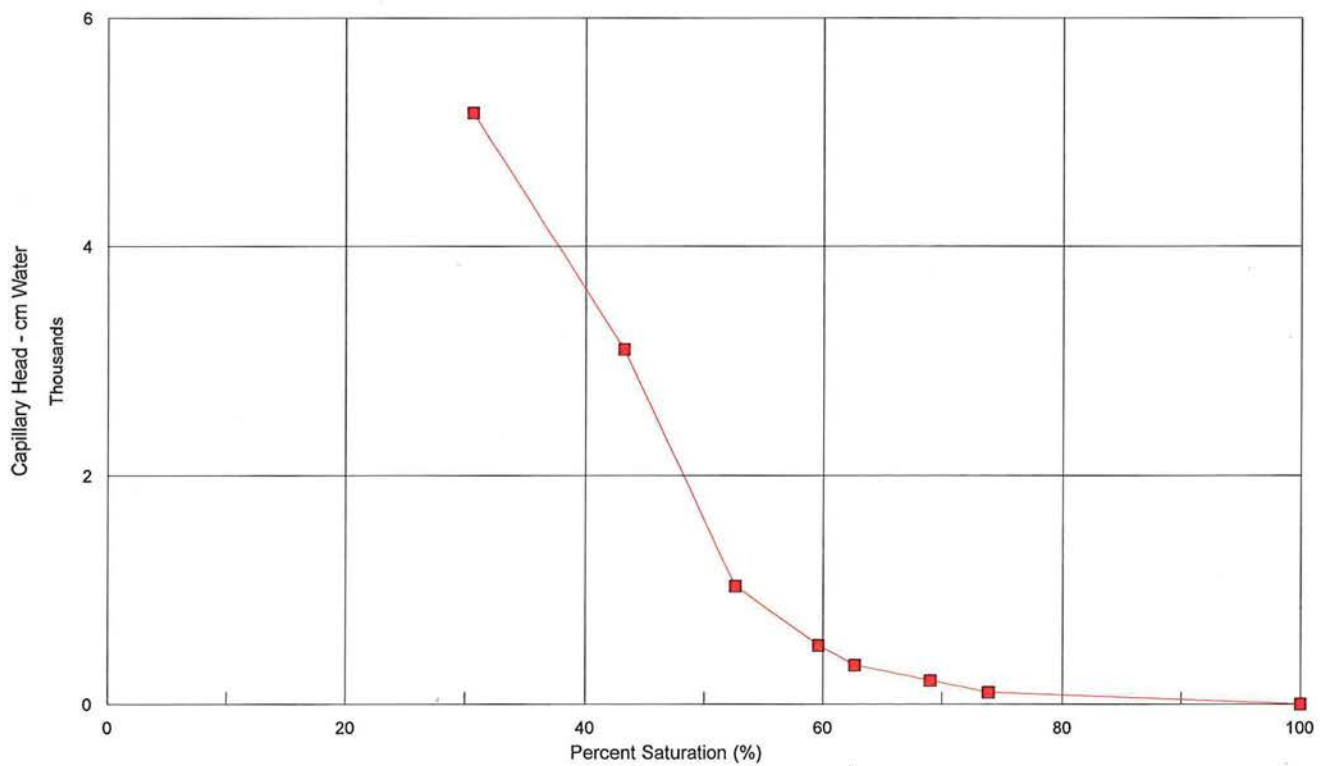
# CAPILLARY MOISTURE CHARACTERISTIC CURVE

SB-B4-01, 0-15'

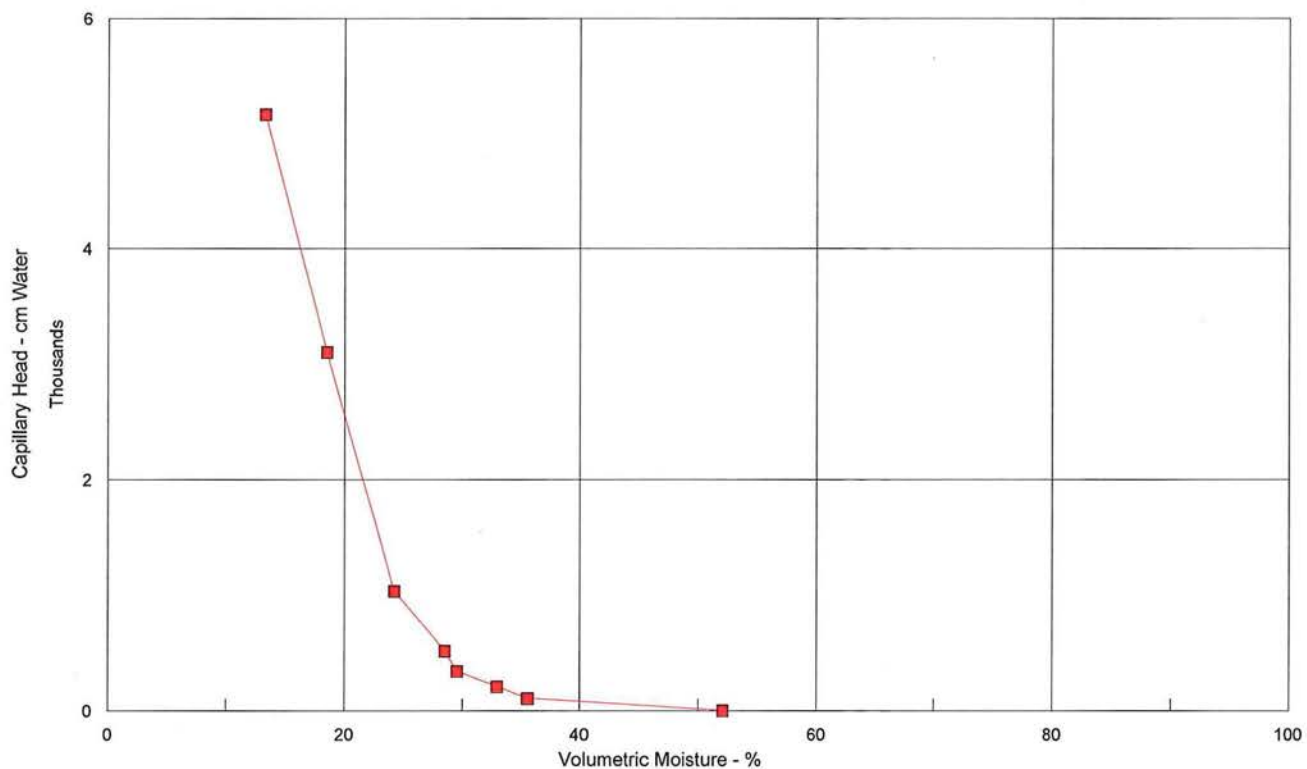


# CAPILLARY MOISTURE CHARACTERISTIC CURVE

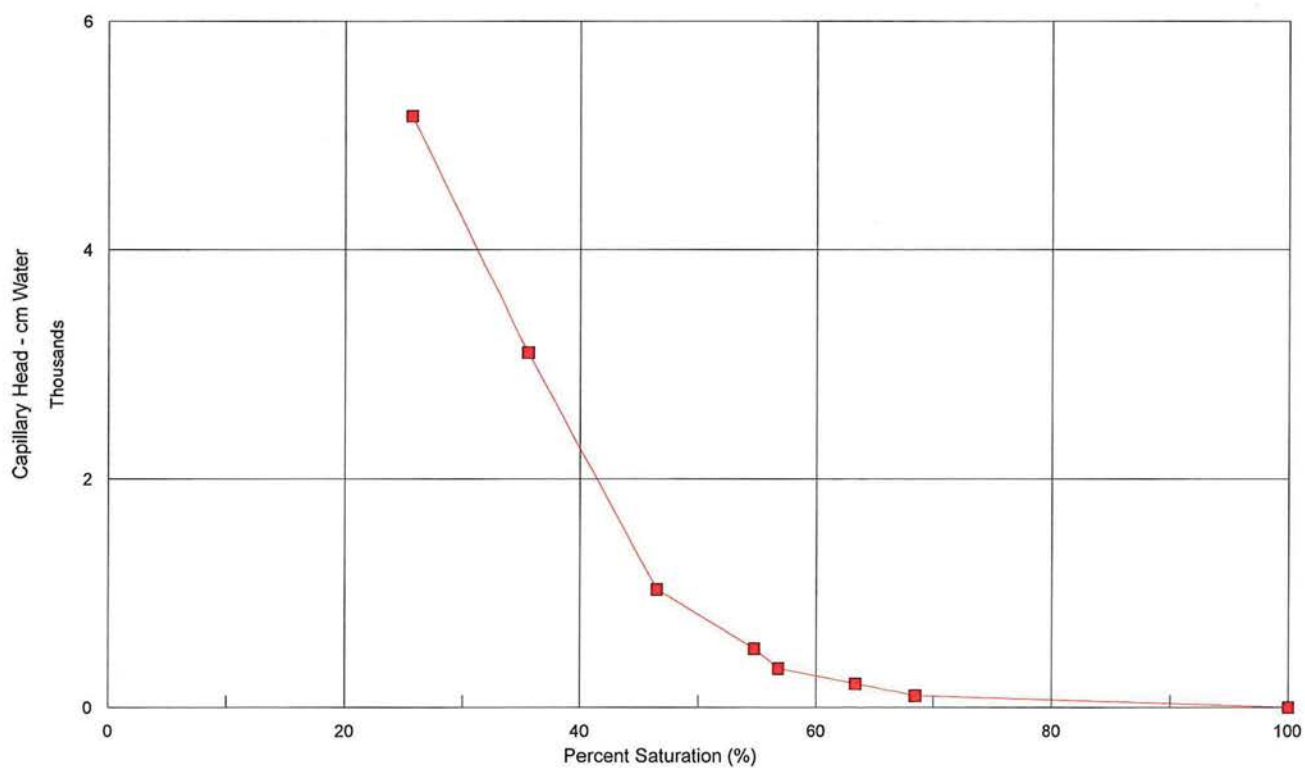
SB-B4-01, 0-15'



**CAPILLARY MOISTURE CHARACTERISTIC CURVE**  
SB-B4-01, 0-15'-R

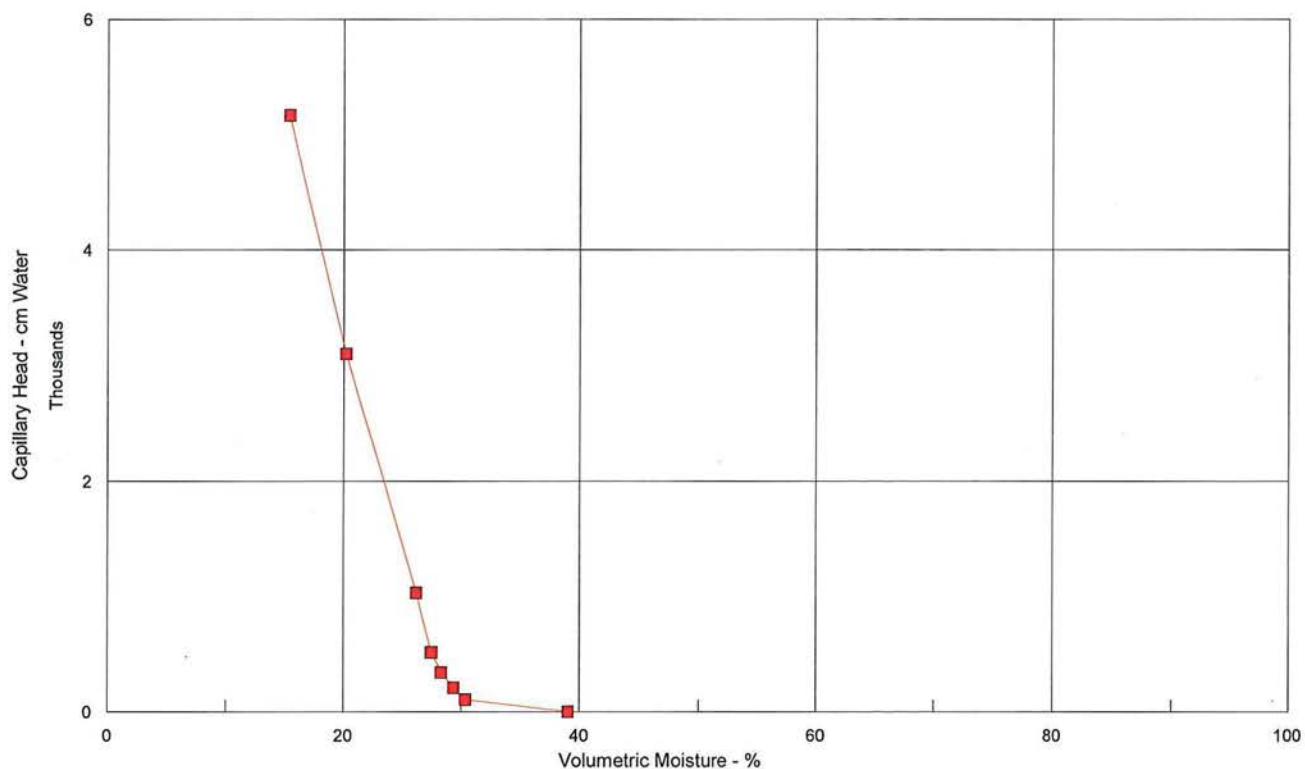


**CAPILLARY MOISTURE CHARACTERISTIC CURVE**  
SB-B4-01, 0-15'-R



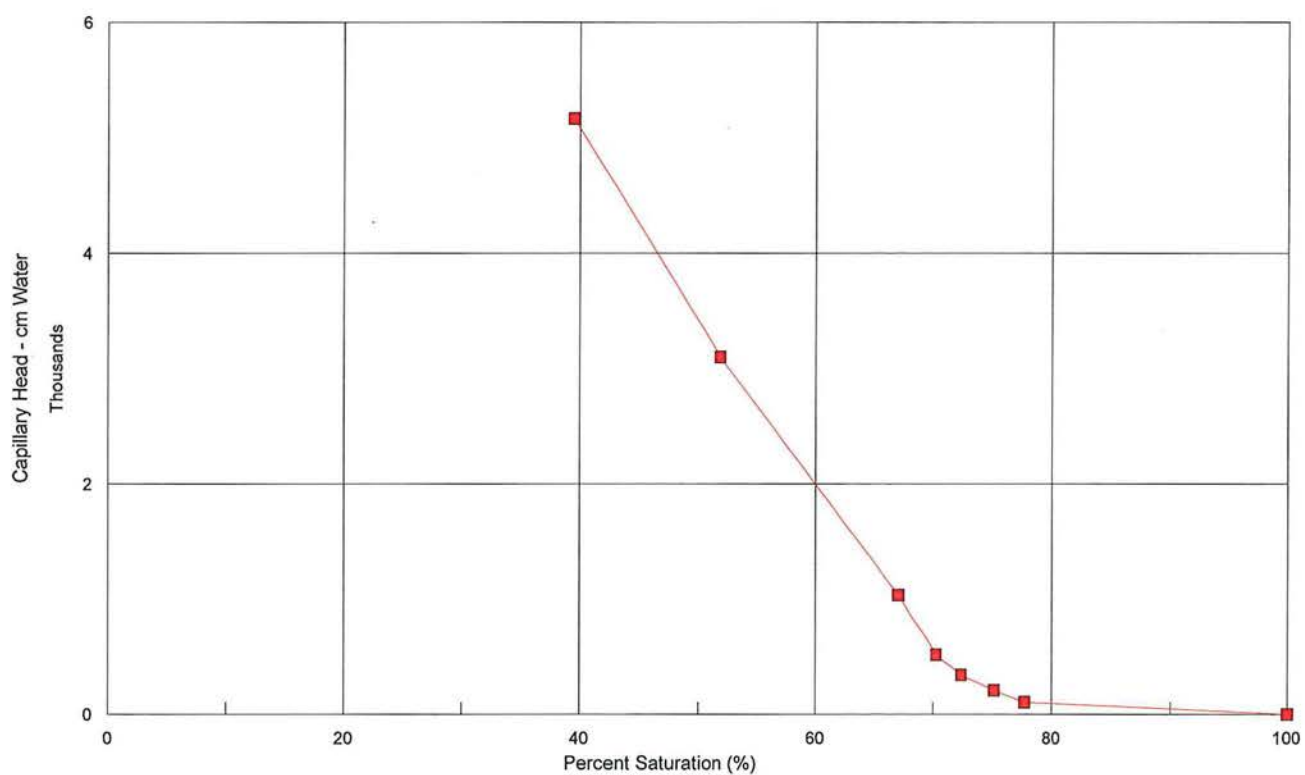
## CAPILLARY MOISTURE CHARACTERISTIC CURVE

TI-CS01-04A, 11-24"



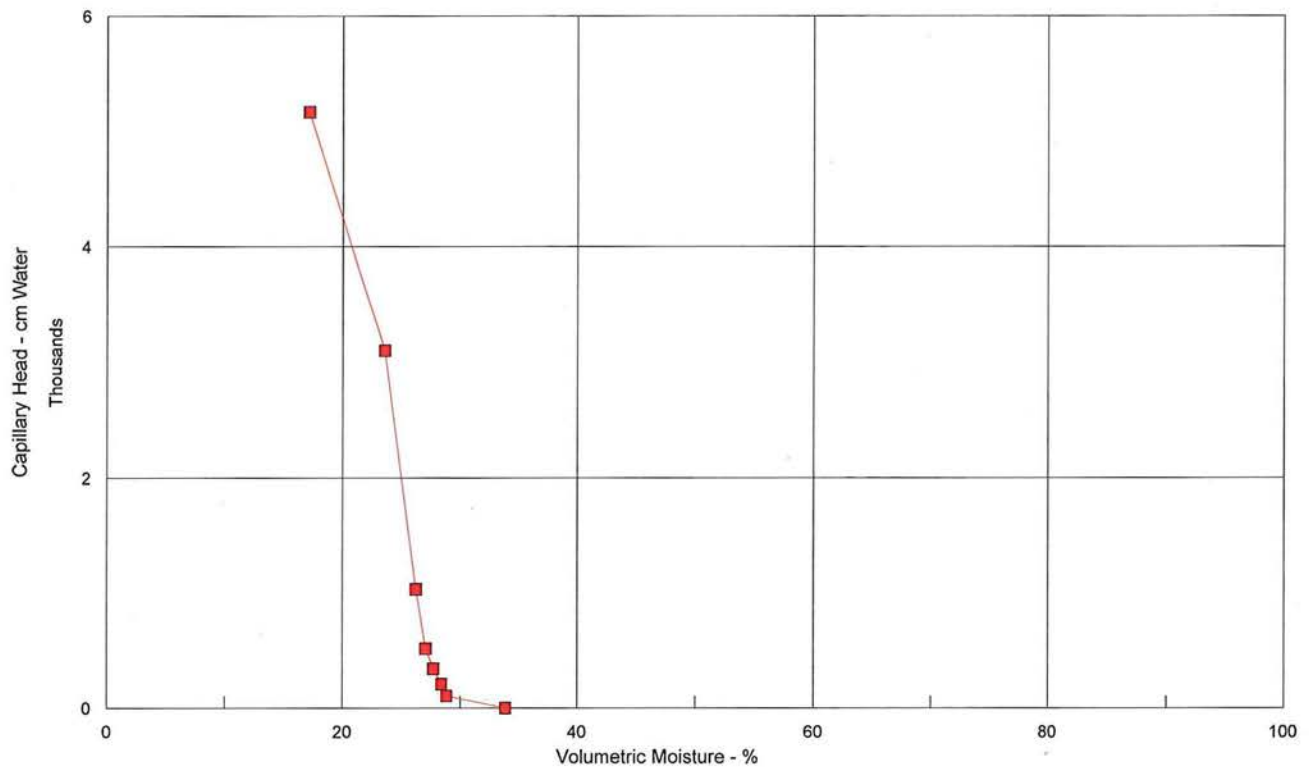
## CAPILLARY MOISTURE CHARACTERISTIC CURVE

TI-CS01-04A, 11-24"



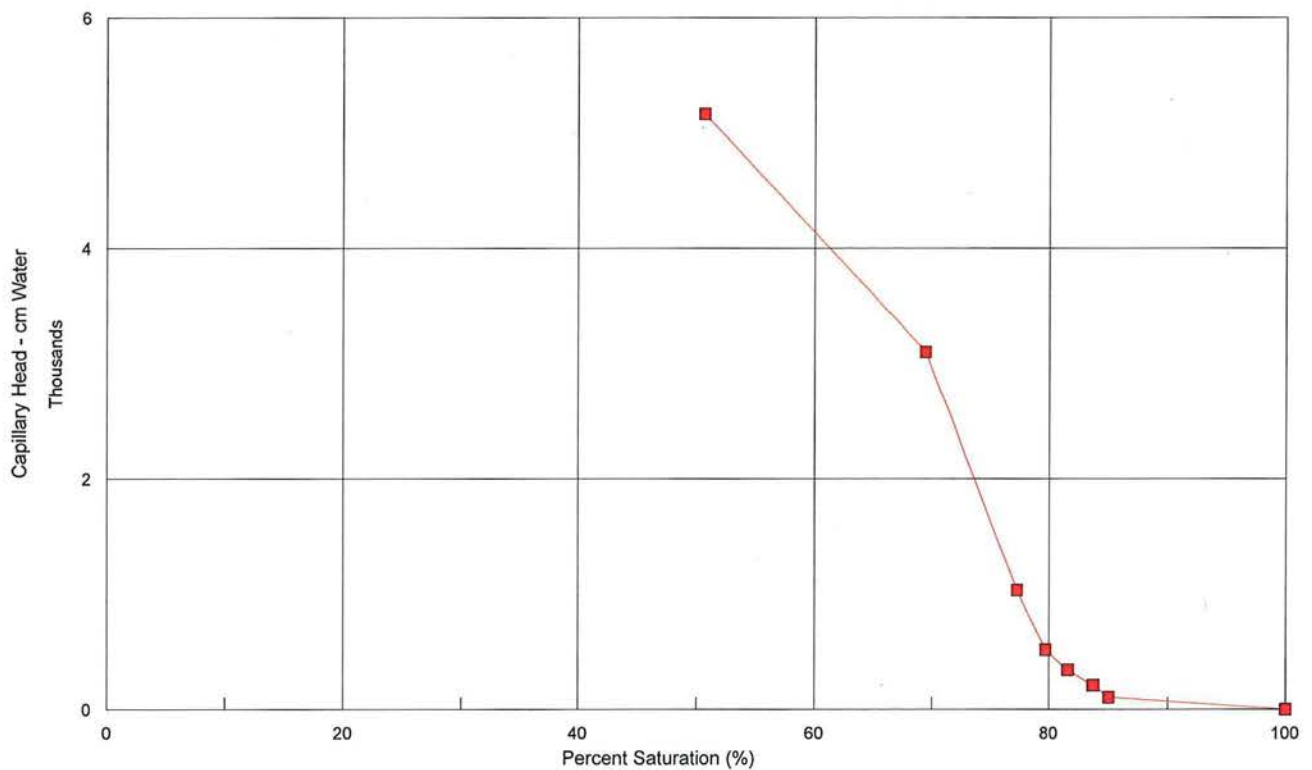
# CAPILLARY MOISTURE CHARACTERISTIC CURVE

TI-CS01-04A, 11-24"-R



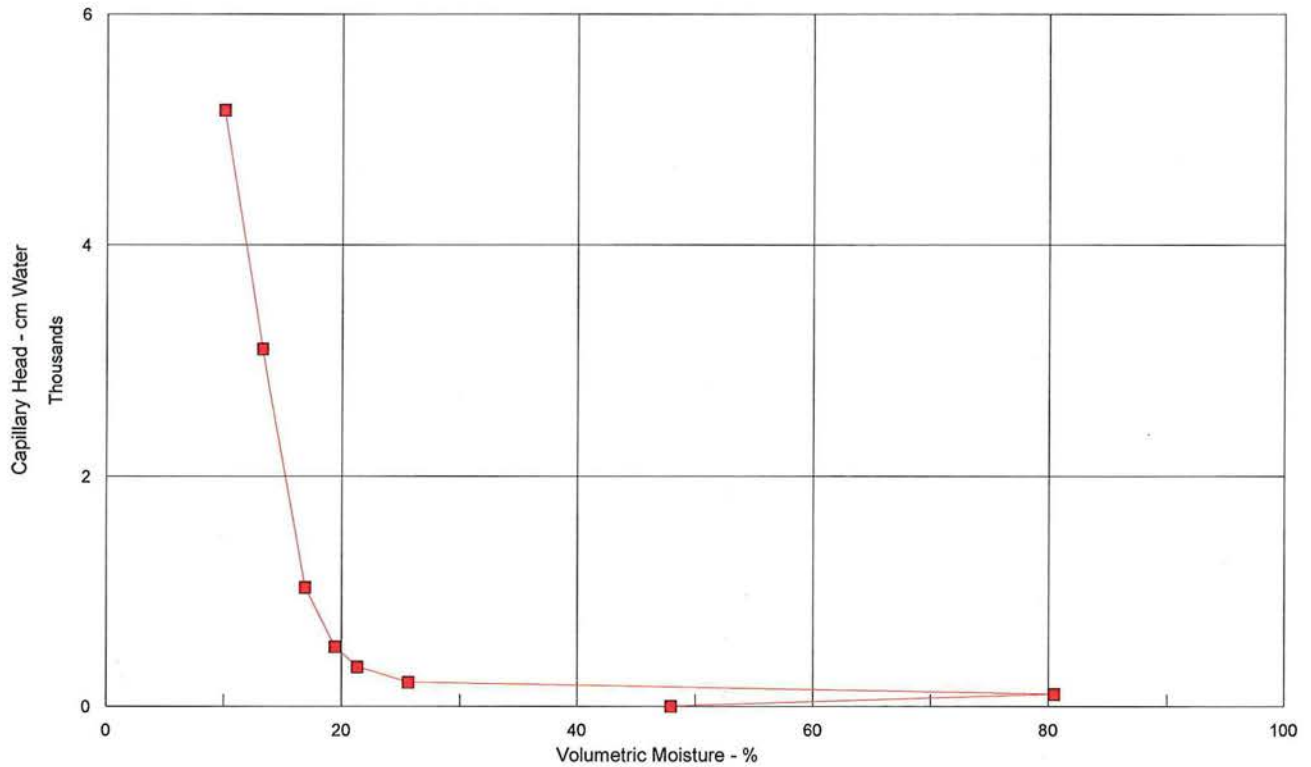
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TI-CS01-04A, 11-24"-R



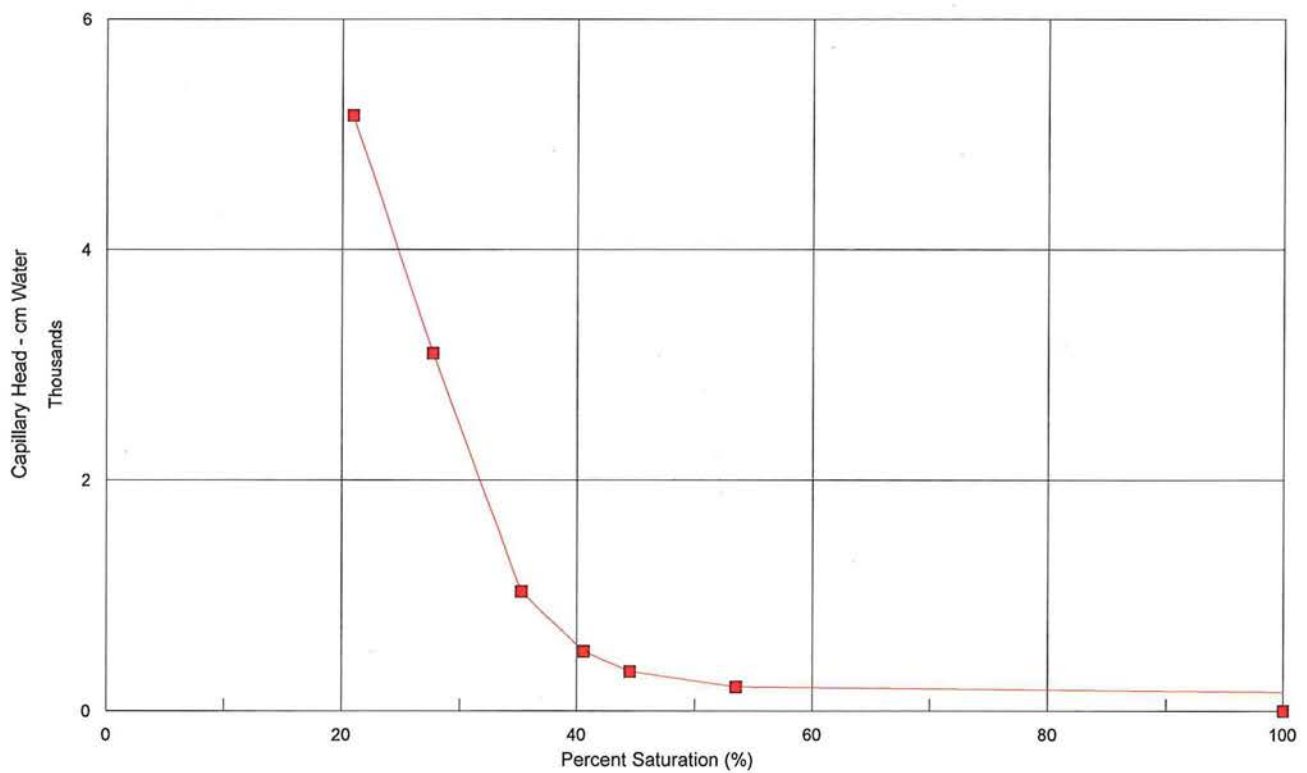
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WB-B1-06, 5-10'



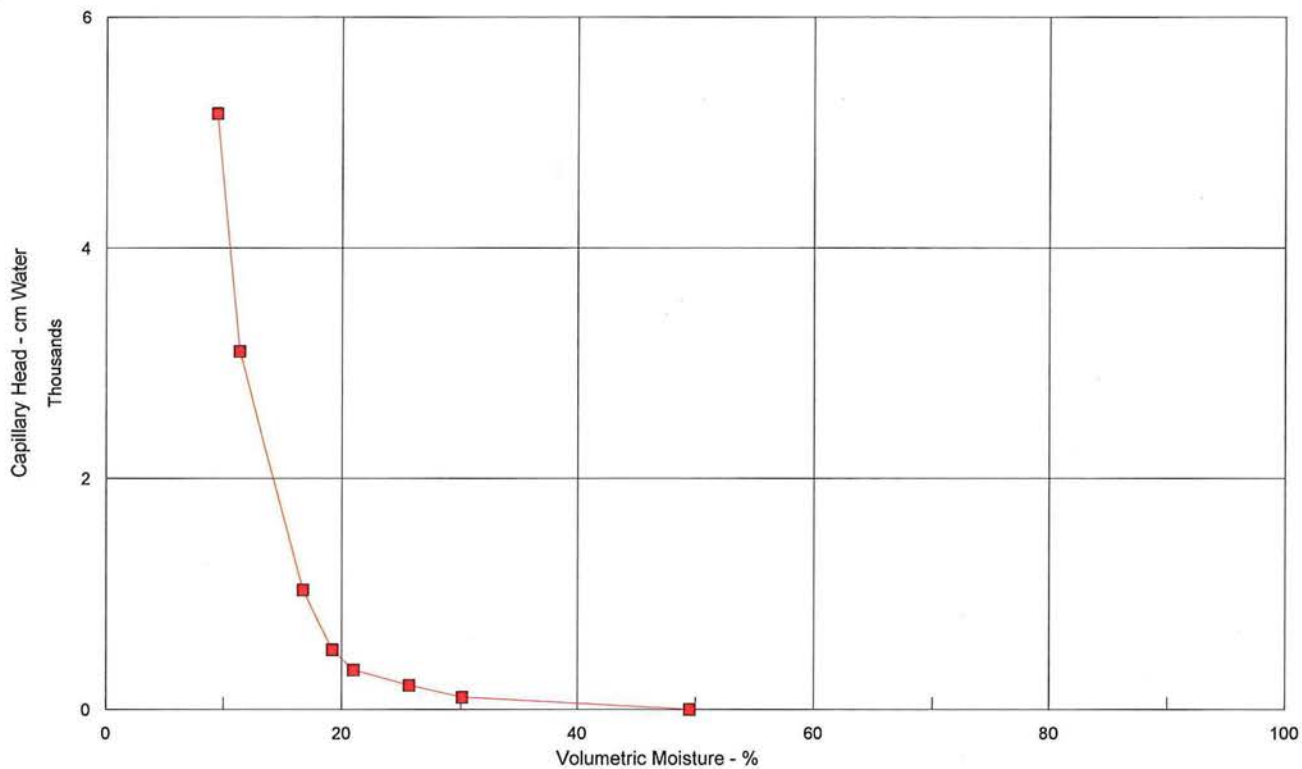
# CAPILLARY MOISTURE CHARACTERISTIC CURVE

WB-B1-06, 5-10'



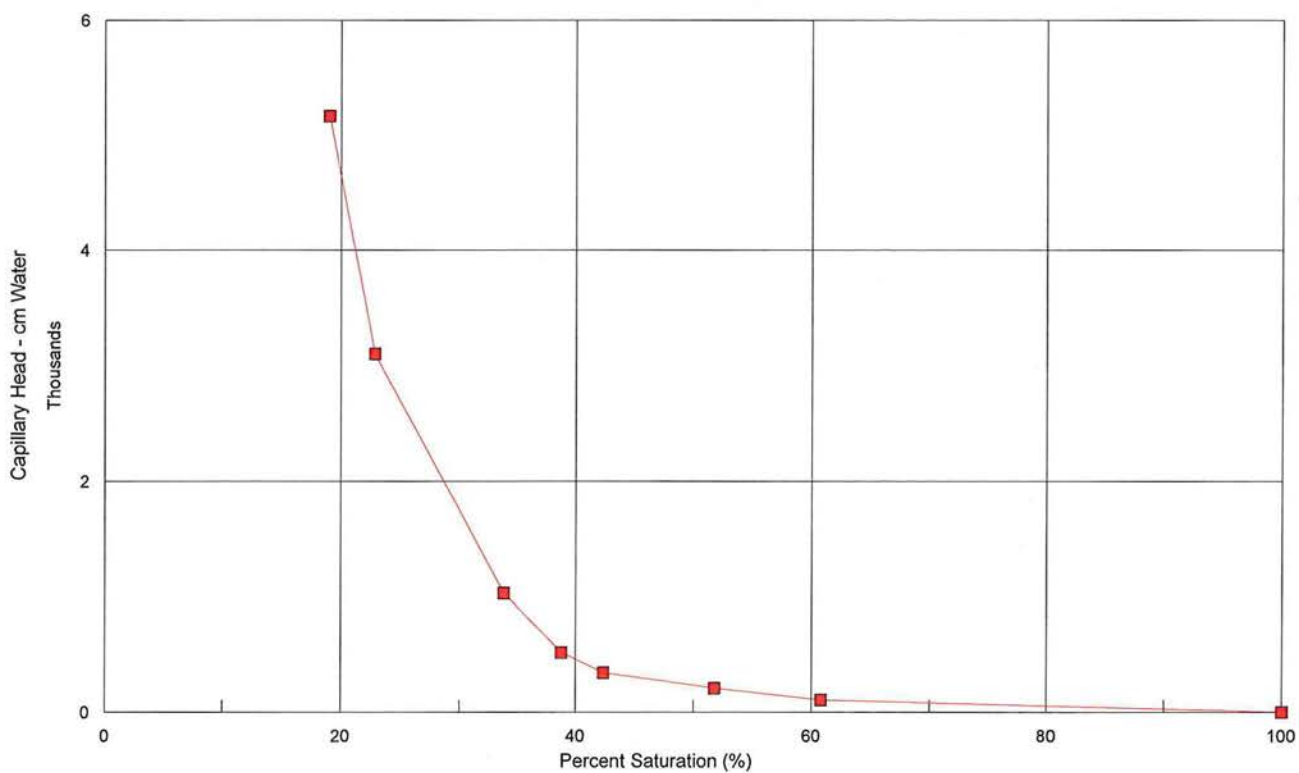
# CAPILLARY MOISTURE CHARACTERISTIC CURVE

WB-B1-06, 5-10'-R



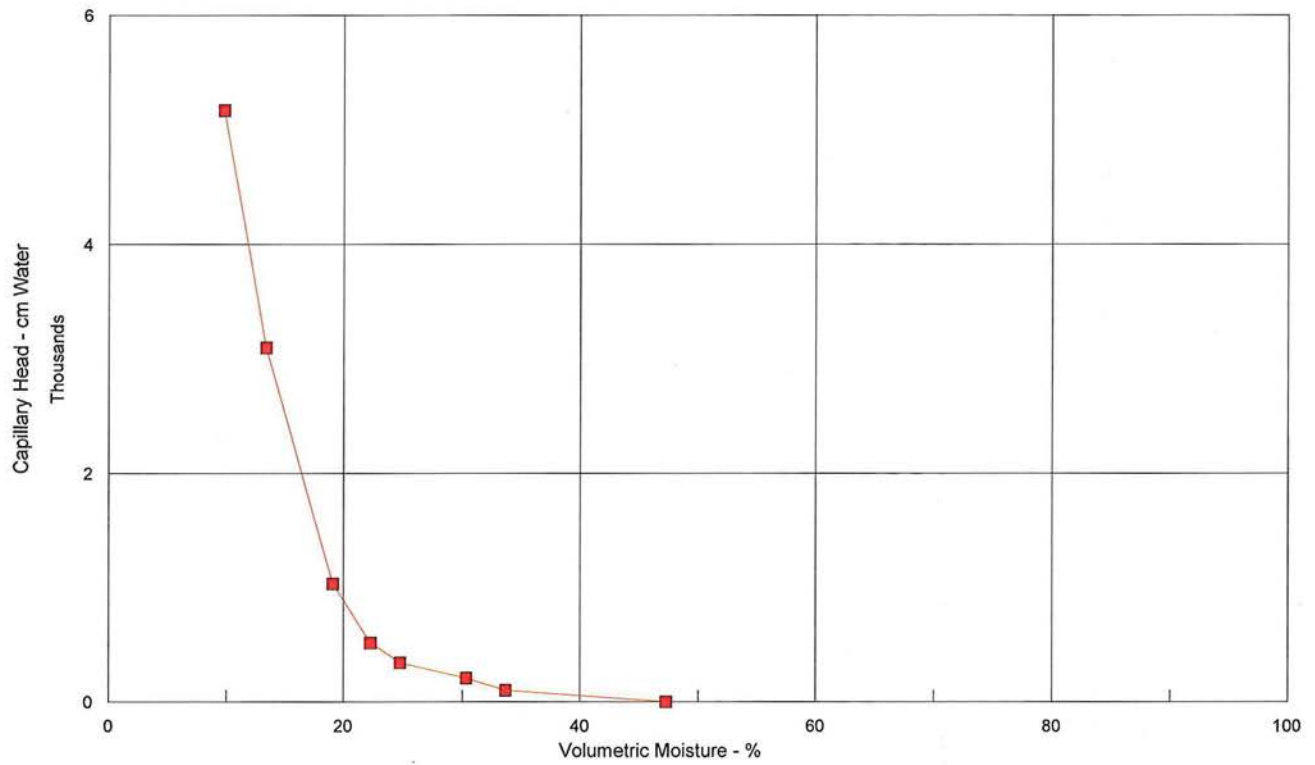
# CAPILLARY MOISTURE CHARACTERISTIC CURVE

WB-B1-06, 5-10'-R



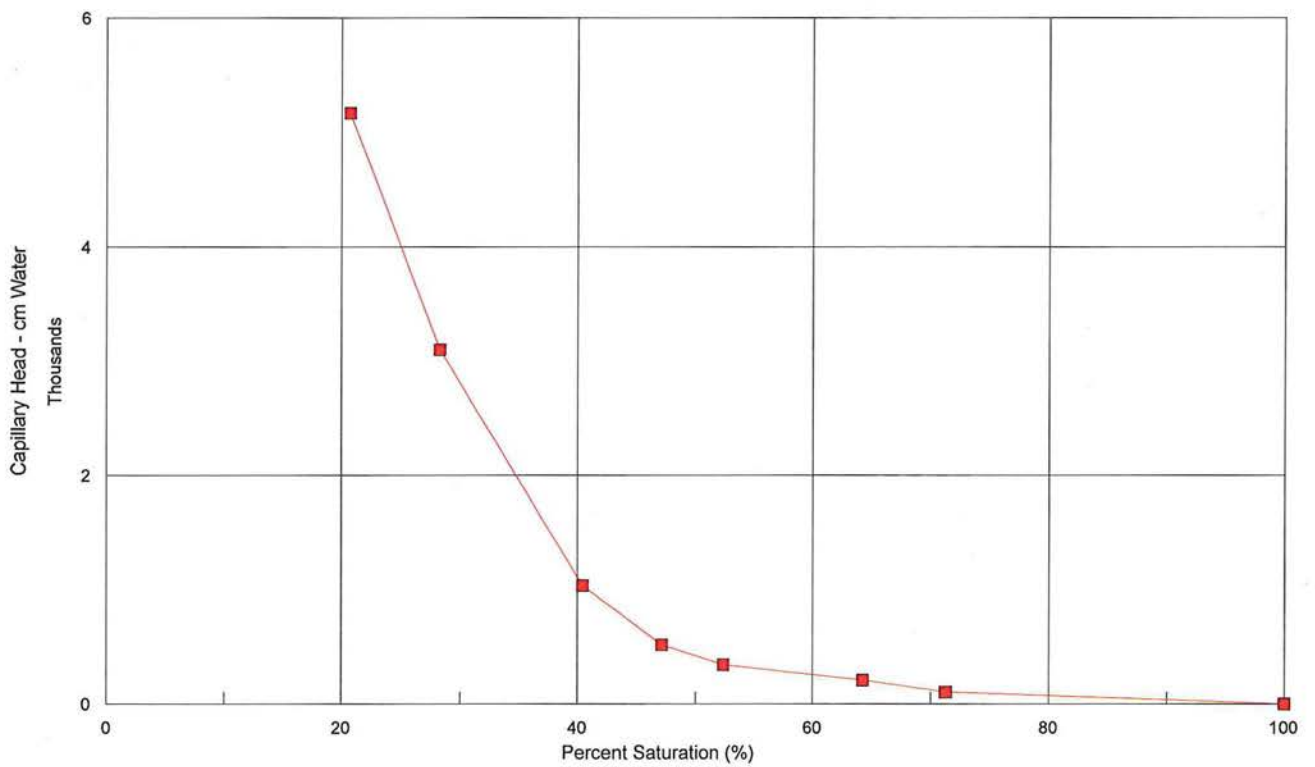
# CAPILLARY MOISTURE CHARACTERISTIC CURVE

WB-B2-05,10-20'



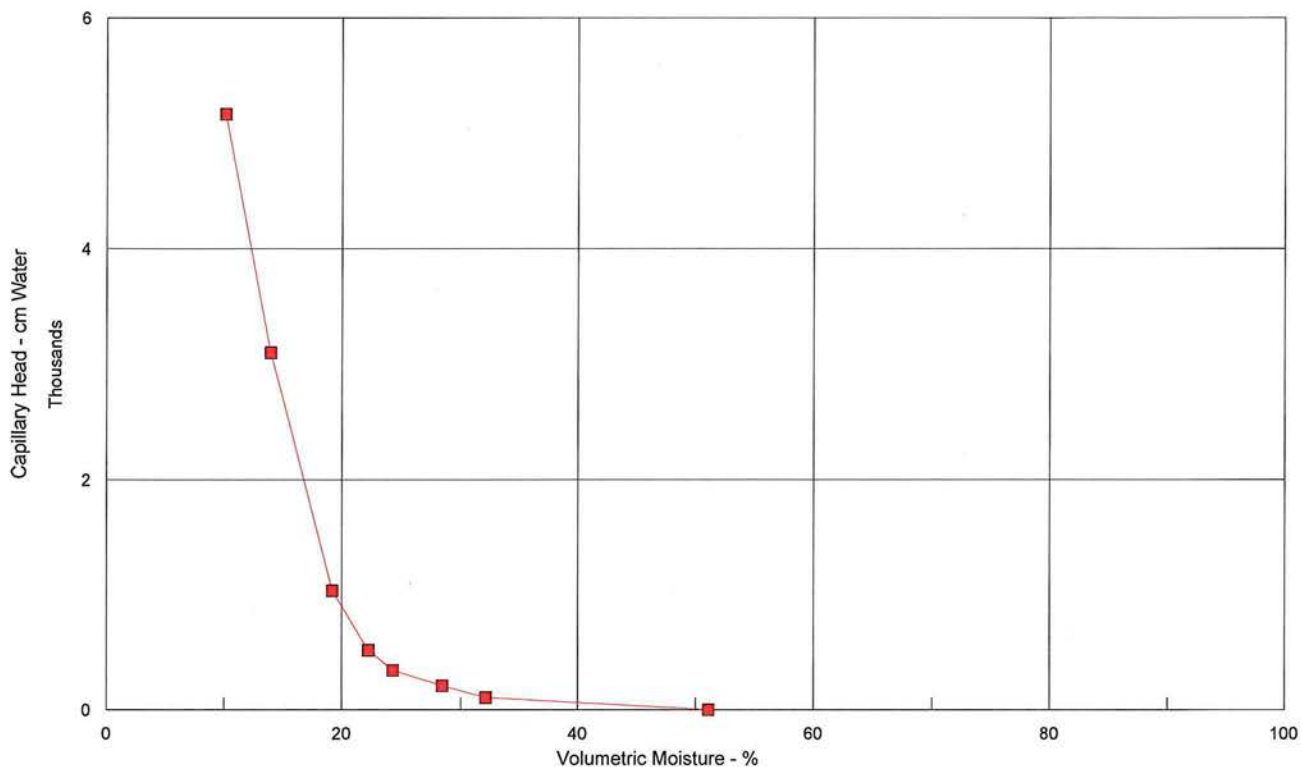
# CAPILLARY MOISTURE CHARACTERISTIC CURVE

WB-B2-05,10-20'



# CAPILLARY MOISTURE CHARACTERISTIC CURVE

WB-B2-05, 10-20'-R



# CAPILLARY MOISTURE CHARACTERISTIC CURVE

WB-B2-05, 10-20'-R

