GEOTECHNICAL SUBSURFACE INVESTIGATION DATA REPORT

CGG Combined Operating License (COL) Project – Phase 2
Calvert Cliffs Nuclear Power Plant
Calvert County, Maryland

February 19, 2009

Prepared By:

SCHNABEL ENGINEERING, LLC
Gaithersburg, Maryland
(Schnabel Project No. 06120048)

Submitted To:

BECHTEL POWER CORPORATION
Frederick, Maryland
(Bechtel Subcontract No. 25237-103-HC4-CY00-00001)

Binder No. 2 of 2

Including:

Appendix D:	**Groundwater Observation Wells**
Appendix E:	**Cone Penetration Testing (CPT)**
Appendix F:	**Pressuremeter Testing (PM)**
Appendix G:	**Dilatometer Testing (DMT)**
Appendix H:	**Borehole Geophysics**
Appendix I:	**SPT Hammer Energy Study**

Schnabel

Schnabel Engineering, LLC

APPENDIX D

GROUNDWATER OBSERVATION WELLS

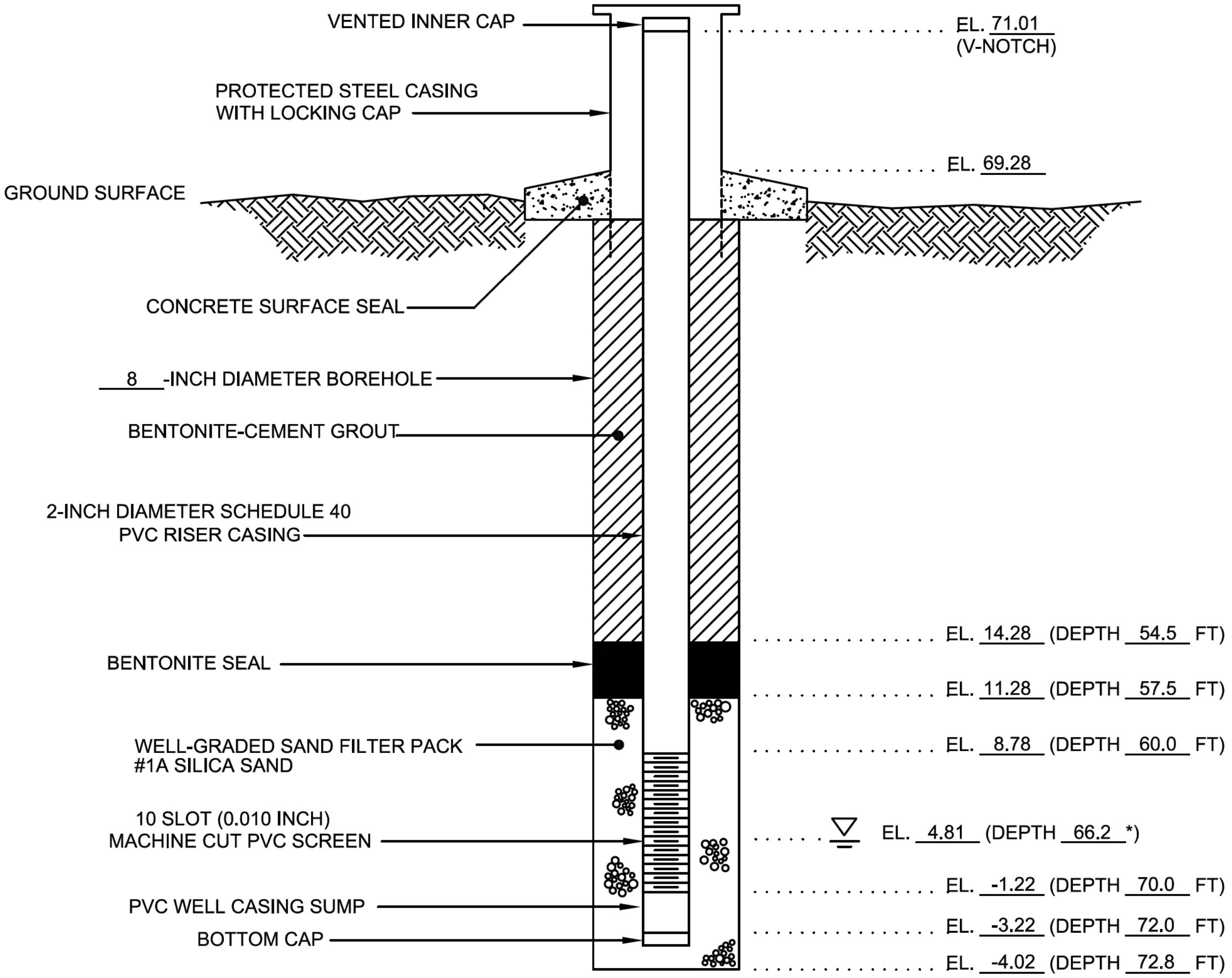
Well Construction Logs
Hydraulic Conductivity Analysis
Well Sampling Records
Traceability Records

WELL CONSTRUCTION LOGS
(15 Pages)

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-17-08	66.2	4.81
7-28-08	36.2	34.81
11-25-08	37.2	33.85

WELL NO. : OW-304

DATE COMPLETED : 07-17-08
NORTHING: 217158.10
EASTING: 960920.80
GROUND SURFACE ELEVATION: 68.78±



NOTES AND DRILLING OBSERVATIONS:

1) DRILLING METHOD AND DESCRIPTION:

ADVANCED $4\frac{1}{4}$" I.D. HOLLOW STEM AUGER (HSA) TO DEPTH OF 72.8 FT. WOODEN PLUG INSERTED IN LEAD AUGER TO PREVENT CUTTINGS FROM ENTERING AUGERS. WOODEN PLUG REMOVED BEFORE PROCEEDING WITH WELL INSTALLATION.

2) DEVELOPMENT METHOD AND DESCRIPTION:

WELL DEVELOPED BY LOWERING PUMP TO ABOUT 1 FT. ABOVE BOTTOM OF WELL. WELL WATER PUMPED OUT OF WELL TO PROMOTE DEVELOPMENT. SEE WELL DEVELOPMENT ATTACHMENT FOR ADDITIONAL DESCRIPTIONS.

3) NO. CENTRALIZERS USED: 0

4) * = GROUND WATER DEPTH MEASURED FROM V-NOTCH

Schnabel
Schnabel Engineering

CCNPP 2008 Subsurface Investigation
Calvert County, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

Bechtel Job No. 25237
Schnabel Project No. 06120048

Well Development Record
CCNPP 2008 Subsurface Investigation
Calvert County, MD

By: B. Glass	Date: 7/28/08	Sheet No. 1 of 1
Chkd by: TAH	Date: 8/15/08	Job No.: 06120048

OW-304 - Well Development

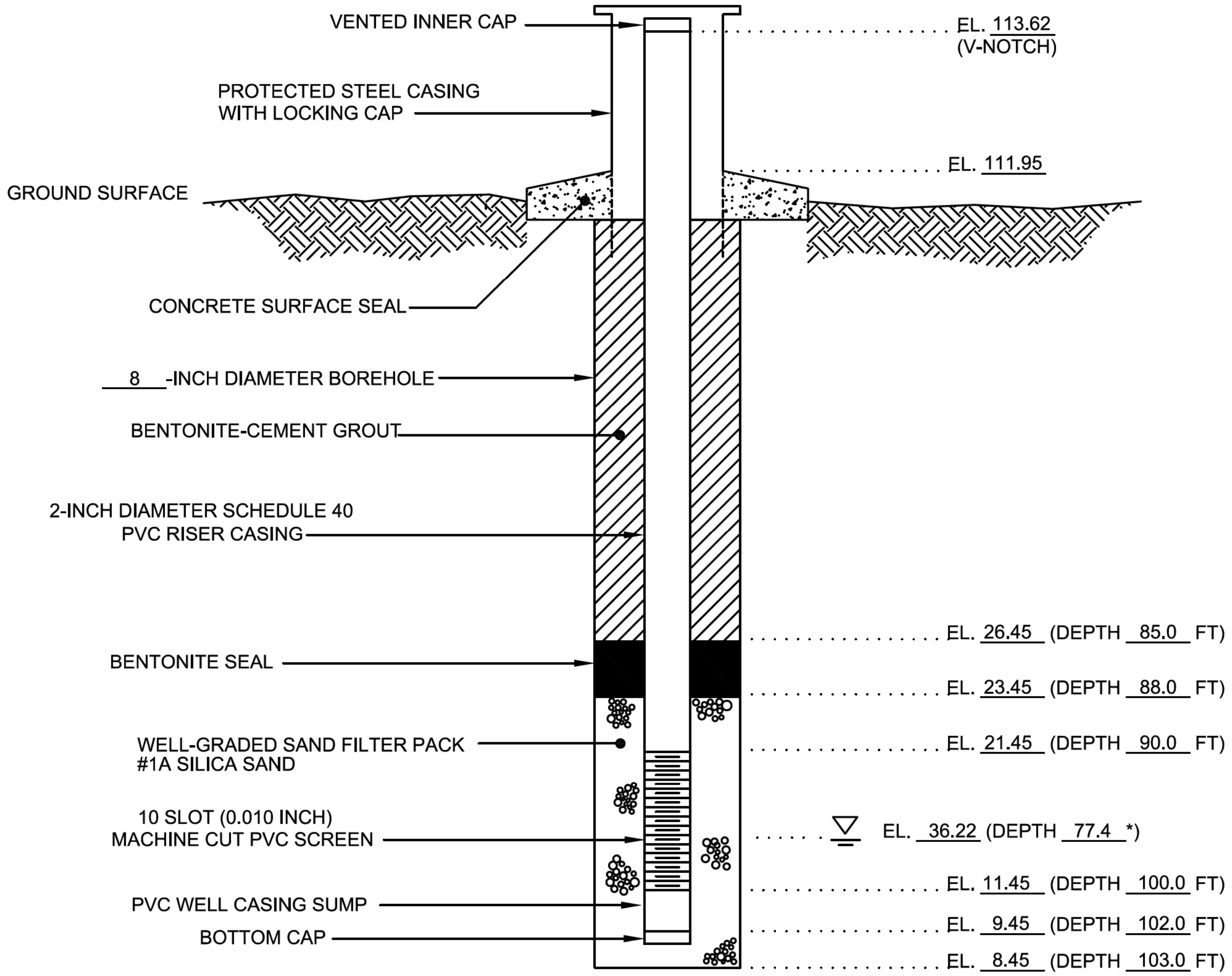
Well developed on 7/28/08.

Development Method:	Well water pumped and surged. Surging was conducted in the bottom 10 ft of the well by repeatedly lifting and dropping the pump through the length of the screen (pump used as surge block). Well developed for 1 hour. Well was surged at least three times during development.
Pump Depth:	Approximately 74.0 ft (from V-Notch), about 0.5 ft from bottom of well.
Timeline:	3:04 – Begin pumping water / water at 36.2 ft (from V-Notch), water cloudy, dark gray 3:15 – Water clear 4:04 – Development complete / water at 41.0 ft (from V-Notch)

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-17-08	77.4	36.22
7-28-08	77.4	36.22
11-25-08	78.0	35.60

WELL NO. : OW-308

DATE COMPLETED : 07-17-08
NORTHING: 216928.00
EASTING: 960750.00
GROUND SURFACE ELEVATION: 111.45±



NOTES AND DRILLING OBSERVATIONS:

1) DRILLING METHOD AND DESCRIPTION:

ADVANCED $4\frac{1}{4}$" I.D. HOLLOW STEM AUGER (HSA) TO DEPTH OF 103 FT. WOODEN PLUG INSERTED IN LEAD AUGER TO PREVENT CUTTINGS FROM ENTERING AUGERS. WOODEN PLUG REMOVED BEFORE PROCEEDING WITH WELL INSTALLATION.

2) DEVELOPMENT METHOD AND DESCRIPTION:

WELL DEVELOPED BY LOWERING PUMP TO ABOUT 1 FT. ABOVE BOTTOM OF WELL. WELL WATER PUMPED OUT OF WELL TO PROMOTE DEVELOPMENT. WATER ADDED TO WELL TO PROMOTE SURGING. SEE WELL DEVELOPMENT ATTACHMENT FOR ADDITIONAL DESCRIPTION.

3) NO. CENTRALIZERS USED: 0

4) * = GROUND WATER DEPTH MEASURED FROM V-NOTCH

Schnabel
Schnabel Engineering

CCNPP 2008 Subsurface Investigation
Calvert County, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

Bechtel Job No. 25237
Schnabel Project No. 06120048

Well Development Record
CCNPP 2008 Subsurface Investigation
Calvert County, MD

By: B. Glass	Date: 7/28/08	Sheet No. 1 of 1
Chkd by: TAH	Date: 8/15/08	Job No.: 06120048

OW-308 - Well Development

Well developed on 7/28/08.

Development Method: Well water pumped and surged. Surging was conducted in the bottom 10 ft of the well by repeatedly lifting and dropping the pump through the length of the screen (pump used as surge block). One hundred gallons of water pumped into the well to create a head of water to assist in pumping water out of the well from a depth of 100 ft. Pumping water in the top of the well was conducted simultaneously with waster pumped from the bottom of the well. Well developed for 1 hour. Well surged at least three times during development.

Pump Depth: Approximately 104.0 ft (from V-Notch), about 0.5 ft from the bottom of the well.

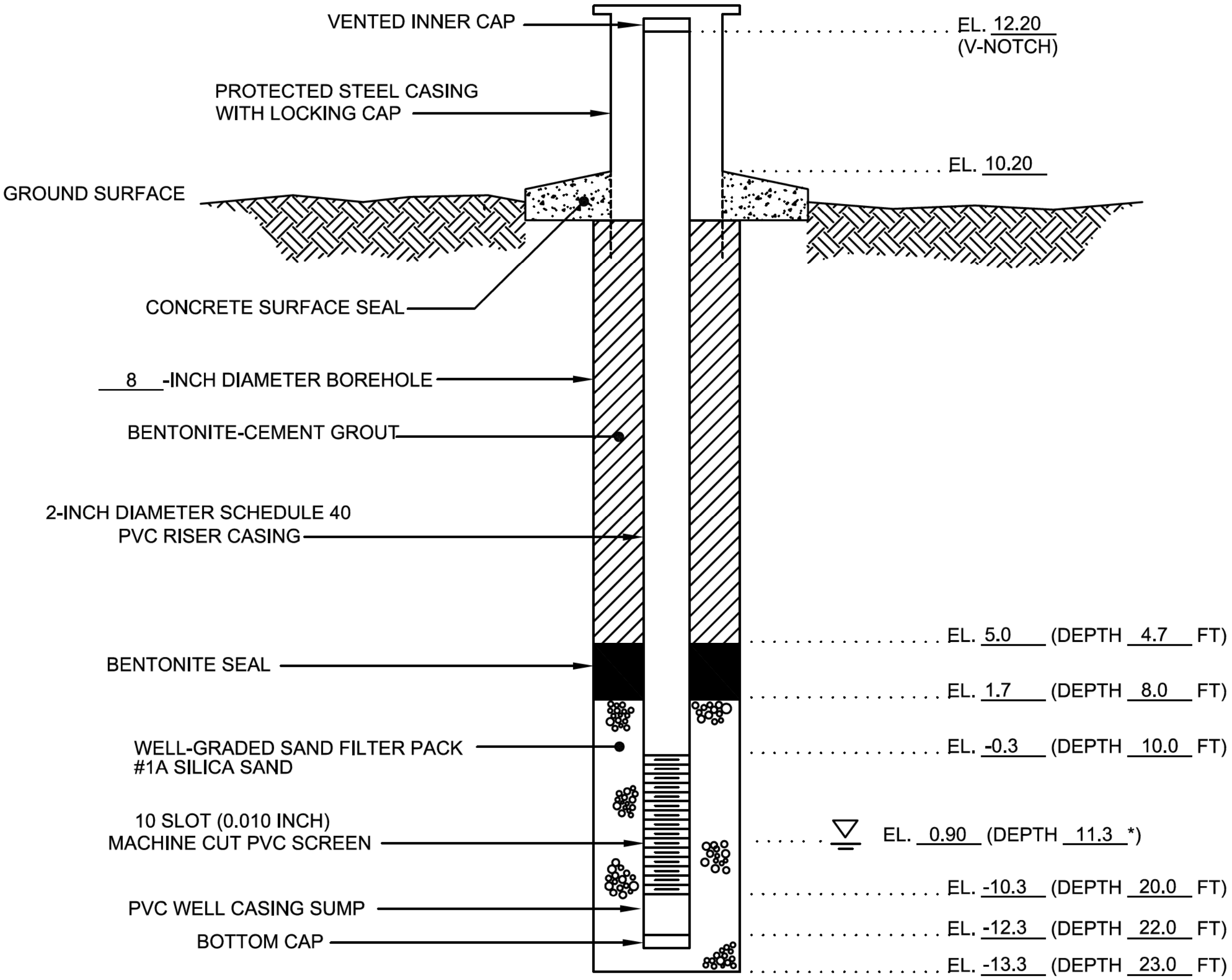
Timeline: 4:15 – Begin pumping water / water at 77.4 ft prior to pumping (from V-Notch)

5:15 – Development complete / water at 73.2 ft (well water clean after about 15 minutes)

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-30-08	11.3	0.9
10-1-08	9.6	2.56
11-26-08	10.5	1.72

WELL NO. : OW-774A

DATE COMPLETED : 07-31-08
NORTHING: 219187.30
EASTING: 961030.50
GROUND SURFACE ELEVATION: 9.7±



NOTES AND DRILLING OBSERVATIONS:

1) DRILLING METHOD AND DESCRIPTION:

ADVANCED 4¼" I.D. HOLLOW STEM AUGER (HSA), HYDRATED BENTONITE WITH 5 GALLONS OF WATER, USED WOODEN PLUG IN LEAD AUGER TO PREVENT CUTTINGS FROM ENTERING THE AUGER. KNOCKED OUT WOODEN PLUG AT BOTTOM OF BORING PRIOR TO SETTING OBSERVATION WELL.

2) DEVELOPMENT METHOD AND DESCRIPTION:

WELL DEVELOPED BY PUMPING WATER FROM WELL. PUMP LOWERED TO BOTTOM OF WELL WITH HOSE ATTACHED. WATER BECAME CLEAR AFTER 40 MINUTES OF DEVELOPMENT OBSERVATION WELL DEVELOPED FOR 1 HOUR. SEE WELL DEVELOPMENT ATTACHMENT FOR ADDITIONAL DESCRIPTION.

3) NO. CENTRALIZERS USED: 0

4) * = GROUND WATER DEPTH MEASURED FROM V-NOTCH

Schnabel
Schnabel Engineering

CCNPP 2008 Subsurface Investigation
Calvert County, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

Bechtel Job No. 25237
Schnabel Project No. 06120048

Well Development Record
CCNPP 2008 Subsurface Investigation
Calvert County, MD

By: B. Glass	Date: 8/01/08	Sheet No. 1 of 1
Chkd by: TAH	Date: 8/15/08	Job No.: 06120048

OW-774A - Well Development

Well developed on 7/31/08.

Development Method:	Well water pumped and surged. Surging was conducted in the bottom 10 ft of the well by repeatedly lifting and dropping the pump through the length of the screen (pump used as surge block). Well development was conducted for 1 hour. Well surged at least three times during development.
Pump Depth:	24.0 ft (from V-Notch), about 0.5 ft from the bottom of the well
Timeline:	2:56 – Begin pumping water / water at 9.8 ft prior to pumping / cloudy, dark gray water 3:20 – Water at 19.8 ft, water beginning to clear up 3:35 – Water became clear 3:56 – Development complete / water at 12.5 ft

WELL NO. : OW-774B

DATE COMPLETED : 07-31-08

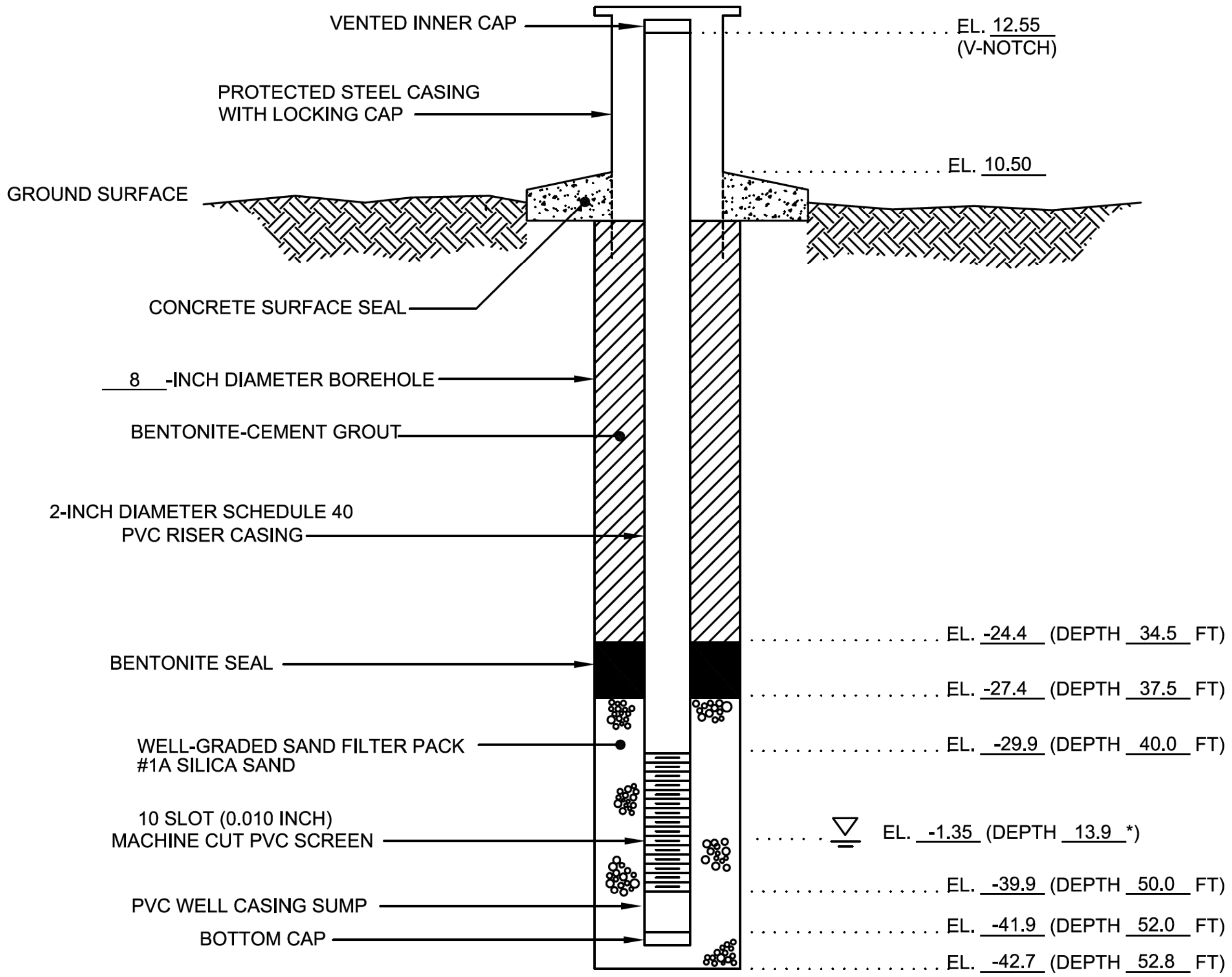
NORTHING: 219176.70

EASTING: 961020.20

GROUND SURFACE ELEVATION: 10.1±

GROUND WATER TABLE OBSERVATIONS

DATE	DEPTH (FT) *	ELEVATION (FT)
7-30-08	13.9	-1.35
10-1-08	9.9	2.70
11-26-08	10.4	216



NOTES AND DRILLING OBSERVATIONS:

1) DRILLING METHOD AND DESCRIPTION:

ADVANCED 4¼" I.D. HOLLOW STEM AUGER (HSA) TO DEPTH OF 52.8 FT. WITH A WOODEN PLUG IN THE LEAD AUGER TO PREVENT CUTTINGS FROM ENTERING AUGERS. KNOCKED OUT WOODEN PLUG AT THE BOTTOM OF BORING PRIOR TO SETTING THE OBSERVATION WELL.

2) DEVELOPMENT METHOD AND DESCRIPTION:

WELL DEVELOPED BY PUMPING WATER FROM WELL. A PUMP WAS LOWERED TO THE BOTTOM WITH A HOSE ATTACHED. WATER BECAME CLEAR AFTER ABOUT 12 MINUTES OF DEVELOPMENT. OBSERVATION WELL DEVELOPED FOR 1 HOUR. SEE WELL DEVELOPMENT ATTACHMENT FOR ADDITIONAL DESCRIPTIONS.

3) NO. CENTRALIZERS USED: 0

4) * = GROUND WATER DEPTH MEASURED FROM V-NOTCH

Schnabel
Schnabel Engineering

CCNPP 2008 Subsurface Investigation Calvert County, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

Bechtel Job No. 25237
Schnabel Project No. 06120048

Well Development Record
CCNPP 2008 Subsurface Investigation
Calvert County, MD

By: B. Glass   Date: 8/01/08   Sheet No. 1 of 1
Chkd by: TAH   Date: 8/15/08   Job No.: 06120048

OW-774B - Well Development

Well developed on 7/31/08.

Development Method: Well water pumped and surged. Surging was conducted in the bottom 10 ft of the well by repeatedly lifting and dropping the pump through the length of the screen (pump used as surge block). Well development was conducted for 1 hour. Well surged at least three times during development.

Pump Depth: 54.0 ft (from V-Notch), about 0.5 ft from the bottom of the well

Timeline: 3:58 – Begin pumping water / water at 10.6 ft (from V-Notch) prior to pumping

4:10 – Water clear

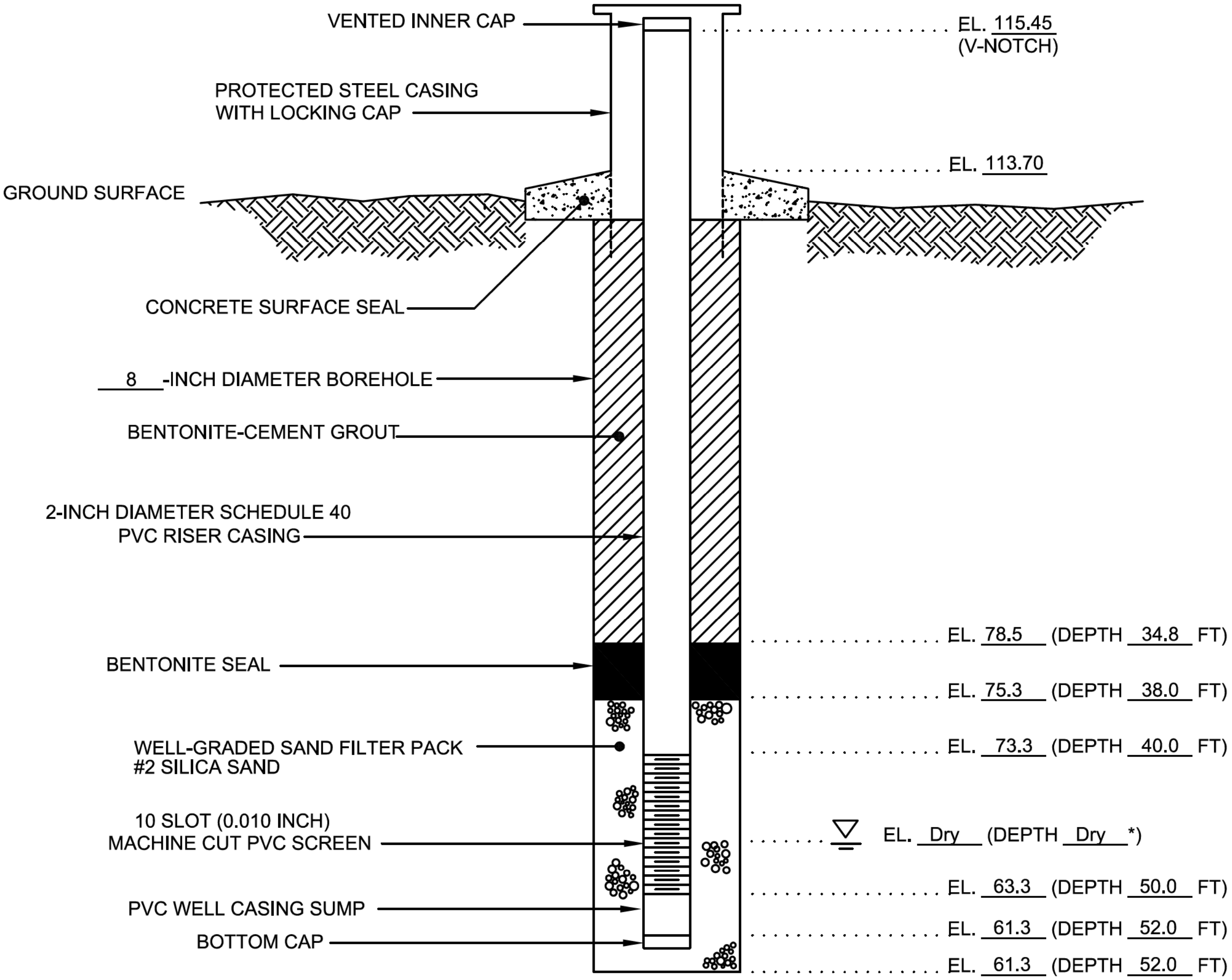
4:24 – Water at 35.2 ft (from V-Notch)

3:56 – Development complete / water at 39.3 ft

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
8-27-08	Dry	Dry
9-10-08	Dry	Dry
11-25-08	Dry	Dry

WELL NO. : OW-778

DATE COMPLETED : 08-27-08
NORTHING: 219100.60
EASTING: 960728.60
GROUND SURFACE ELEVATION: 113.3±



NOTES AND DRILLING OBSERVATIONS:

1) DRILLING METHOD AND DESCRIPTION:

ADVANCED $4\frac{1}{4}$" I.D. HOLLOW STEM AUGER (HSA) TO DEPTH OF 52 WITH A PILOT BIT INSIDE THE AUGERS. THE PILOT BIT WAS USED TO KNOCK OUT PLUG IN THE AUGERS AND THEN REMOVED FROM THE INSIDE OF THE AUGERS PRIOR TO WELL INSTALLATION. BENTONITE SEAL WAS HYDRATED.

2) DEVELOPMENT METHOD AND DESCRIPTION:

THERE WAS NO WATER IN THE WELL FOR DEVELOPEMENT.

3) NO. CENTRALIZERS USED: 0

4) * = GROUND WATER DEPTH MEASURED FROM V-NOTCH

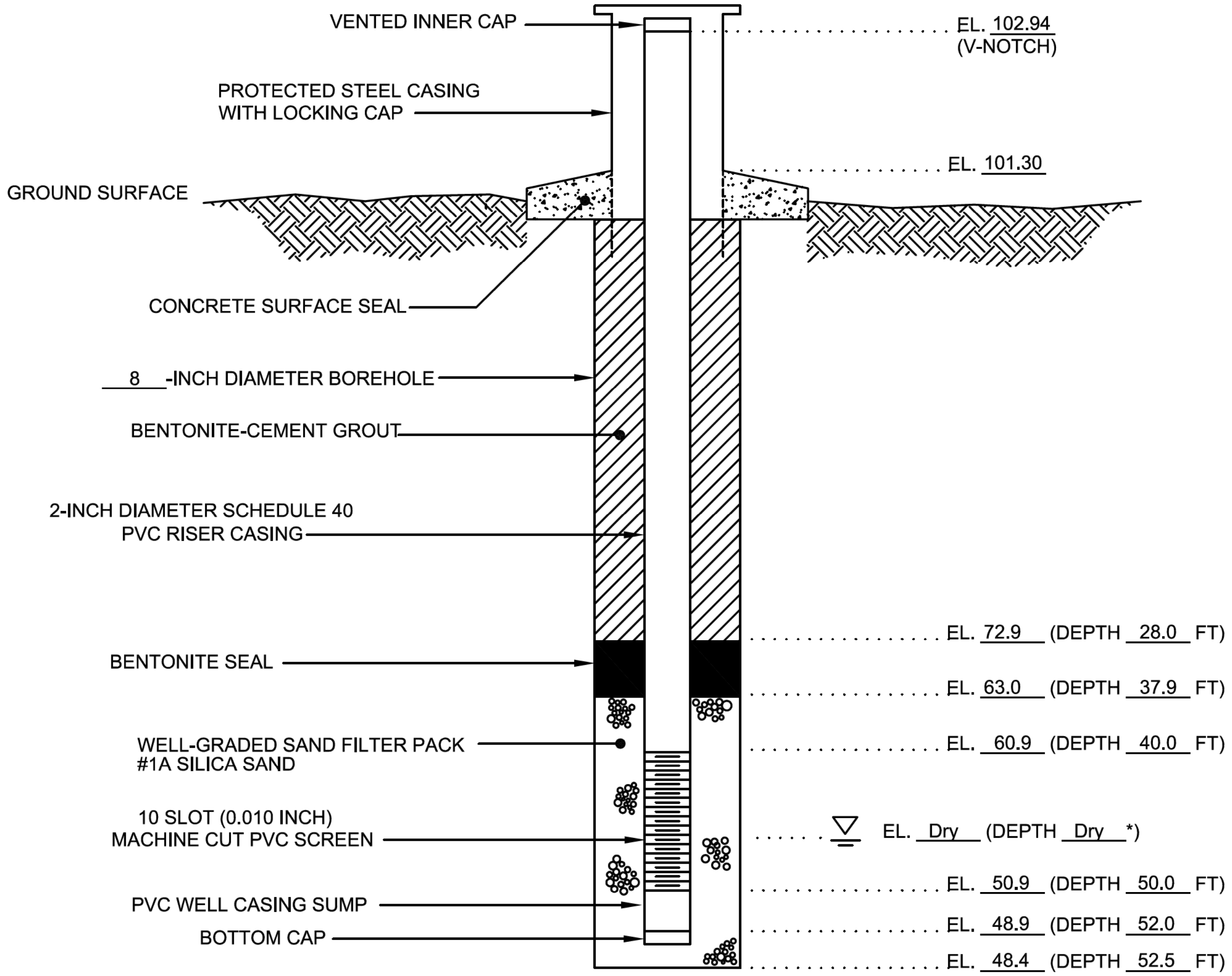
Schnabel Schnabel Engineering	**CCNPP 2008 Subsurface Investigation Calvert County, MD**	GROUND WATER OBSERVATION WELL CONSTRUCTION LOG Bechtel Job No. 25237 Schnabel Project No. 06120048

WELL NO. : OW-779

DATE COMPLETED : 08-27-08
NORTHING: 218958.70
EASTING: 960587.30
GROUND SURFACE ELEVATION: 100.9±

GROUND WATER TABLE OBSERVATIONS

DATE	DEPTH (FT) *	ELEVATION (FT)
8-27-08	Dry	Dry
9-10-08	Dry	Dry
11-25-08	Dry	Dry



NOTES AND DRILLING OBSERVATIONS:

1) DRILLING METHOD AND DESCRIPTION:

ADVANCED $4\frac{1}{4}$" I.D. HOLLOW STEM AUGER (HSA) TO DEPTH OF 52.5 FT WITH A WOODEN PLUG IN THE LEAD AUGER TO PREVENT CUTTINGS FROM ENTERING THE AUGER. THE WOODEN PLUG WAS KNOCKED OUT PRIOR TO INSTALLING THE WELL.

2) DEVELOPMENT METHOD AND DESCRIPTION:

THERE WAS NO WATER IN THE WELL FOR DEVELOPEMENT.

3) NO. CENTRALIZERS USED: 0

4) * = GROUND WATER DEPTH MEASURED FROM V-NOTCH

Schnabel
Schnabel Engineering

CCNPP 2008 Subsurface Investigation
Calvert County, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

Bechtel Job No. 25237
Schnabel Project No. 06120048

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-30-08	10.7	2.17
10-1-08	10.1	2.77
11-26-08	10.8	2.11

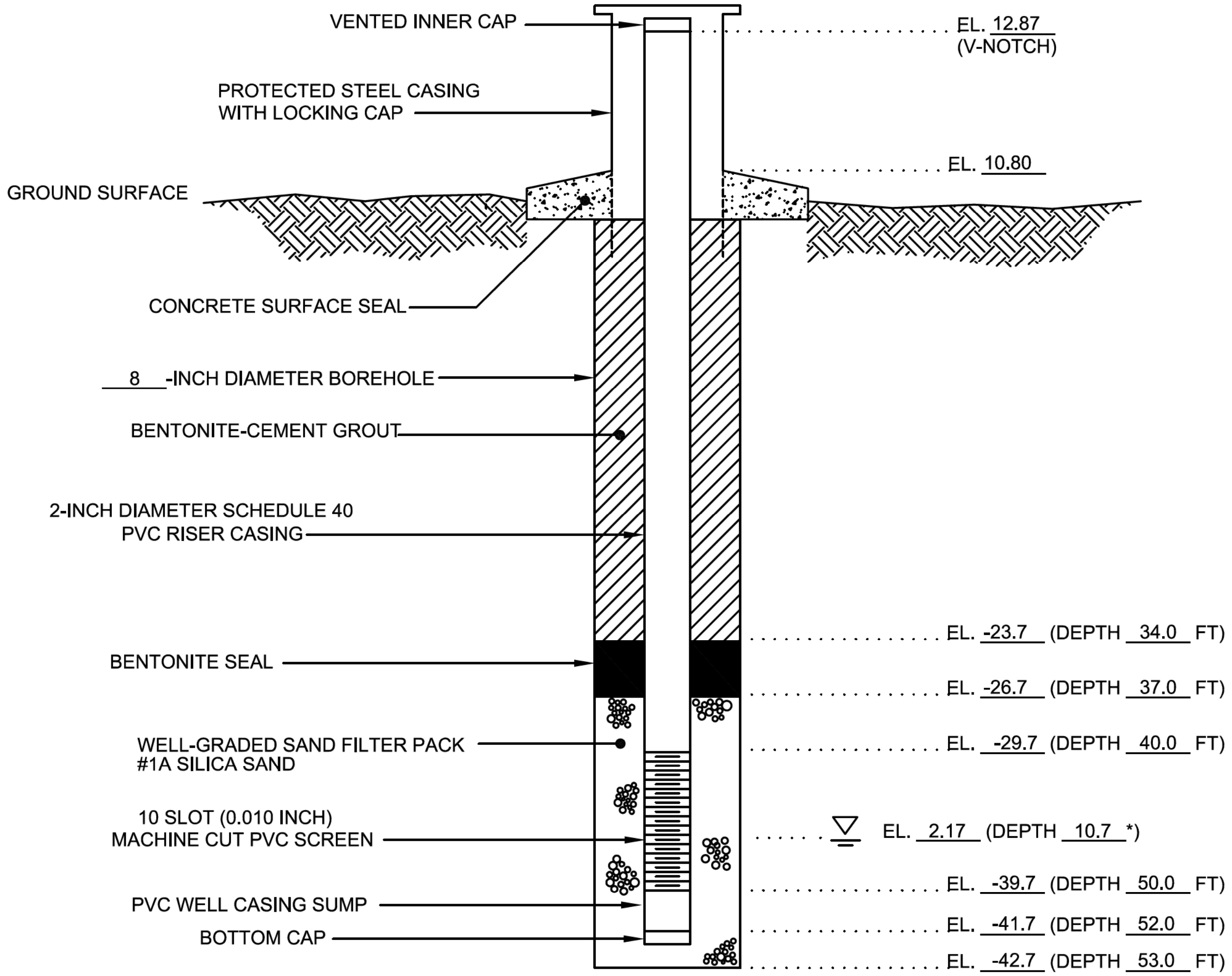
WELL NO. : OW-781

DATE COMPLETED : 07-29-08

NORTHING: 219421.30

EASTING: 960764.40

GROUND SURFACE ELEVATION: 10.3±



NOTES AND DRILLING OBSERVATIONS:

1) DRILLING METHOD AND DESCRIPTION:

ADVANCED $4\frac{1}{4}$" I.D. HOLLOW STEM AUGER (HSA) TO DEPTH OF 53 FT. WOODEN PLUG INSERTED IN LEAD AUGER TO PREVENT CUTTINGS FROM ENTERING AUGERS. WOODEN PLUG REMOVED BEFORE PROCEEDING WITH WELL INSTALLATION.

2) DEVELOPMENT METHOD AND DESCRIPTION:

PLEASE REFER TO WELL DEVELOPMENT ATTACHMENT FOR WELL DEVELOPMENT DESCRIPTIONS AND METHODS.

3) NO. CENTRALIZERS USED: 0

4) * = GROUND WATER DEPTH MEASURED FROM V-NOTCH

Schnabel **Schnabel Engineering**	**CCNPP 2008 Subsurface Investigation Calvert County, MD**	GROUND WATER OBSERVATION WELL CONSTRUCTION LOG Bechtel Job No. 25237 Schnabel Project No. 06120048

Well Development Record

CCNPP 2008 Subsurface Investigation
Calvert County, MD

By: B. Glass	Date: 8/01/08	Sheet No. 1 of 1
Chkd by:	Date:	Job No.: 06120048

<u>OW-781 - Well Development</u>

Well developed on 7/31/08.

Development Method:	Well water pumped and surged. Surging was conducted in the bottom 10 ft of the well by repeatedly lifting and dropping the pump through the bottom 10 ft of the well (pump used as surge block). Well development was conducted for 1 hour.
Pump Depth:	54.0 ft (from V-Notch) about 1.0 ft from the bottom of the well
Timeline:	1:10 – Water at 10.7 ft (from V-Notch) 1:45 – Begin pumping water, water is cloudy, dark gray 2:00 – Water at 48.7 ft (from V-Notch), water beginning to clear up 2:17 - Water clear 2:38 – Well pumped dry / turn off pump / allow well to recharge 2:43 – Attempt to pump water, but very little water in well 2:45 – Development complete / water at 52.0 ft (from V-Notch)

Well Development Record
CCNPP 2008 Subsurface Investigation
Calvert County, MD

By: B. Glass	Date: 8/06/08	Sheet No. 1 of 1
Chkd by:	Date:	Job No.: 06120048

OW-781 - Well Development

Well developed on 8/06/08.

Development Method:	Well developed by pumping and surging. Surging was conducted by raising and dropping the pump through the filter pack interval. Well was surged by lowering the surge block (pump) through the filter pack starting at the top of the filter pack. Surging was conducted slowly because fine grained soils surround the filter pack. Developed for 28 minutes.
Pump Depth:	54.0 ft (from V-Notch)
Flow Rate:	1.67 gallons/minute
Timeline:	5:00 – Water at 11.4 ft (from V-Notch) / begin pumping / water pumped out is cloudy and gray / well surged 5:10 – Pump turned off to regulate the depth of water in well 5:13 – Well surged 5:15 – Pump on / water is cloudy and gray 5:18 – Pump turned off 5:20 – Water at 54.3 ft 5:23 – Well surged 5:25 – Pump turned on / water is cloudy and gray 5:28 – Well is dry 5:34 – Well is dry

Well Development Record
CCNPP 2008 Subsurface Investigation
Calvert County, MD

By: B. Glass	Date: 8/07/08	Sheet No. 1 of 2
Chkd by:	Date:	Job No.: 06120048

OW-781 - Well Development

Well developed on 8/07/08.

Development Method: Observation well was pumped and surged. Surging was performed by repeatedly lifting and lowering the pump through interval of the filter pack. Pump was used as surge block. Pump (surge block) was lowered slowly starting at the top of the filter pack and ending at the bottom of well. Surging was conducted slowly because fine grained soils surround the filter pack. Observation well was developed for 0.5 hour.

Pump Make / Model: Proactive Supertwister (Model No: P-10330)

Pump Depth: 54.5 ft (from V-Notch), about 0.5 ft from the bottom of the sump

Pump Rate: 2 gallons/minute

Timeline: 8:29 – Water at 11.3 ft (from V-Notch) / well surged / begin pumping / water is cloudy and gray

8:33 – Water is mostly clear

8:34 – Pump turned off to regulate pump rate

8:36 – Water at 25.7 ft

8:37 – Well surged

8:39 – Pump turned on

8:41 – Pump turned off

8:43 – Water at 49.0 ft

Well Development Record

CCNPP 2008 Subsurface Investigation
Calvert County, MD

By: B. Glass	Date: 8/07/08	Sheet No. 2 of 2
Chkd by:	Date:	Job No.: 06120048

8:50 – Pump turned on

8:51 – Well surged / water is slightly cloudy

8:55 – Pump off

8:57 – Pump on

8:59 – Development complete / water at 52.0 ft / water is mostly clear

HYDRAULIC CONDUCTIVITY ANAYLYSIS
(25 Pages)

Schnabel
Schnabel Engineering

SLUG TEST FIELD LOG

Project: Calvert Cliffs
Location: Camp Canoy
Schnabel Project No.: 06120048

Well ID: OW-~~303~~ 304
Date: 11/~~18~~ 19/08 PP 11/19/08
Weather / Temperature: clear sky, ~ 40°F

Depth Reference (0.00ft): Vnotch in top of casing

Equipment (Make, Model, SN, and/or Description):
Transducer: 119329 In Situ Level Troll
Vented (circle one): [✓ Yes] or No
Data Logger: Rugged Reader
Water Level Indicator: Solinst # 51787 12/12/08
Slug: Type (circle one): Mechanical or Water
Diameter (d): ~~1.625~~ in; Length (l): ~~60.25~~ in PP 11/19/08
Volume (v): ~~124.96~~ 129.3 in^3 ($= l \times \pi(½ d)^2$) PP 11/19/08

Well Construction:
Inside Diameter (D): Casing 2 in; Screen 2 in
Total Well Length: 74.2 ft
Screen Depth: Top: 62.2 ft; Bottom: 72.2 ft

Pre-Test Setup Data:
Initial water level depth (manual): 37.51 ft
Initial head (transducer): 12.47 ft
Depth of pressure transducer: ~~48.2~~ 49 ft PP 11/19/08
Pre-test data file name: OW304 Pretest
Pre-test data logger start time: 11:47 AM
Pre-test data logger end time: ~~12:30 pm~~ 12:31 PM PP 11/19/08

Comments: ~~for dimensions of slug see OW-794A log~~ PP 11/19/08
Slug Dimensions:
Total length = 5.1 ft
Length without caps = 4.8 ft
Diameter (OD) = 1.625 in
Diameter of Caps = 1.865 in

Pre-Test Check:
Planned depth of slug after insertion: Top: ~~14.97~~ ~~24.97~~ ~~39.9~~ 40.0 ft; Bottom: ~~20~~ ~~30~~ 45.5 ft (*NA for water slug*) PP 11/19/08
Will top of mechanical slug be submerged below the pre-test ref. water level? (circle one): [✓ Yes] or No or NA
Estimated water level rise immediately after slug insertion: ~~39.79~~ 41.1 in ($= v / \pi(½ D)^2$); ~~3.3~~ 3.4 ft
Estimated water level depth immediately after slug insertion: ~~34.21~~ 34.11 ft
Will water be discharged from the well upon slug insertion? (circle one): Yes or [✓ No]

Test Data (Falling Head):
Head before slug insertion = 0.0 ft
Time of slug insertion: 12:40 PM
Head immed. after slug insertion (H): -2.40 ft
Falling head data file name: OW304 Slug In
Falling head data logger start time: 12:34 PM
Falling head data logger end time: 1:48 PM

Falling Head Measurements: (Recovery = $h/H \times 100$)

Time	Head (h)	Recovery
1:46 PM	-0.06 ft	98 %
	ft	%
	ft	%
	ft	%
	ft	%

Test Data (Rising Head):
Head before slug removal: 0.0 ft
Time of slug removal: 1:54 PM
Head immed. after slug removal (H): 2.20 ft
Rising head data file name: OW304 Slug Out
Rising head data logger start time: 1:58 PM
Rising head data logger end time: 2:40 PM

Rising Head Measurements: (Recovery = $h/H \times 100$)

Time	Head (h)	Recovery
2:38 PM	0.0 ft	100 %
	ft	%
	ft	%
	ft	%
	ft	%

Prepared by:
(signature) Pamela Patrick
(print name) Pamela Patrick

Reviewed by:
(signature)
(print name) T. Anthony Harding

AQTESOLV INPUT PARAMETERS FOR SLUG TESTS

Well Analysis Title OW-304 SLUG OUT **Boring ID:** OW-304

By: TAH **Date:** 12/12/08 rev. 2/13/09

Project Title: Calvert Cliffs **Project Number:** 06120048

Step 1: Project Info

AQTESOLV uses the project information to annotate plots and reports.

Company Name: Schnabel Engineering
Client Name: Bechtel
Project Number: 06120048
Location: Calvert Cliffs

Test Well Name: OW-304
Obs. Well Name: OW-304
Date of Test: 11/19/08
Title: OW-304 SLUG OUT

Step 2: General

- **Initial Displacement, H0:**
  - Is the aquifer Confined or Unconfined: Confined
    - If the Aquifer is [✓ Confined]:

      Maximum displacement recorded in Data File = 2.192

    - If the Aquifer is Unconfined:

      A: Maximum displacement recorded in Data File = N/A

      B: Saturated Thickness of Aquifer = N/A

      Enter the smaller value (either A or B) N/A

- **Static Water Column Height, H:** 34.72 ft

  (well detail) (pre-test slug level)
  = Depth to Bottom of Screen – Depth to Static Water Level
  (EL -1.22) (EL 33.5)

- **Well Coordinates:**

  AQTESOLV for Windows uses an x-y coordinate system to **compute distances between the test well and observation wells.**

  X: 0
  Y: 0

Step 3: Aquifer Data

- **Aquifer Saturated Thickness, b:** (see page 1) 22.0
  Aquifer base (per B-304) = EL -9.0; Aquifer top = EL 13.0)
- **Hydraulic Conductivity Anisotropy Ratio, k_v/k_h:** 1.0

Step 4: Well Construction

- **Depth to Top of Screen, d:**
  - Is the Screen Partially Penetrating or Fully Penetrating? Partially

    Is the Aquifer Confined on Unconfined? Confined

    - If the Aquifer is **Confined:**

      d = Depth to Top of Screen (well constr. detail) (EL 8.78) - Depth to Top of Aquifer (B-304) (EL 13.0)

      d = 4.22 ft

    - If the Aquifer is **Unconfined**:

      d = Depth to Top of Screen - Depth to Static Water Level

      d = N/A

- **Length of Screen, L:** 10.0 ft
- **Transducer Depth, T:** 0

Step 5: Radius Data

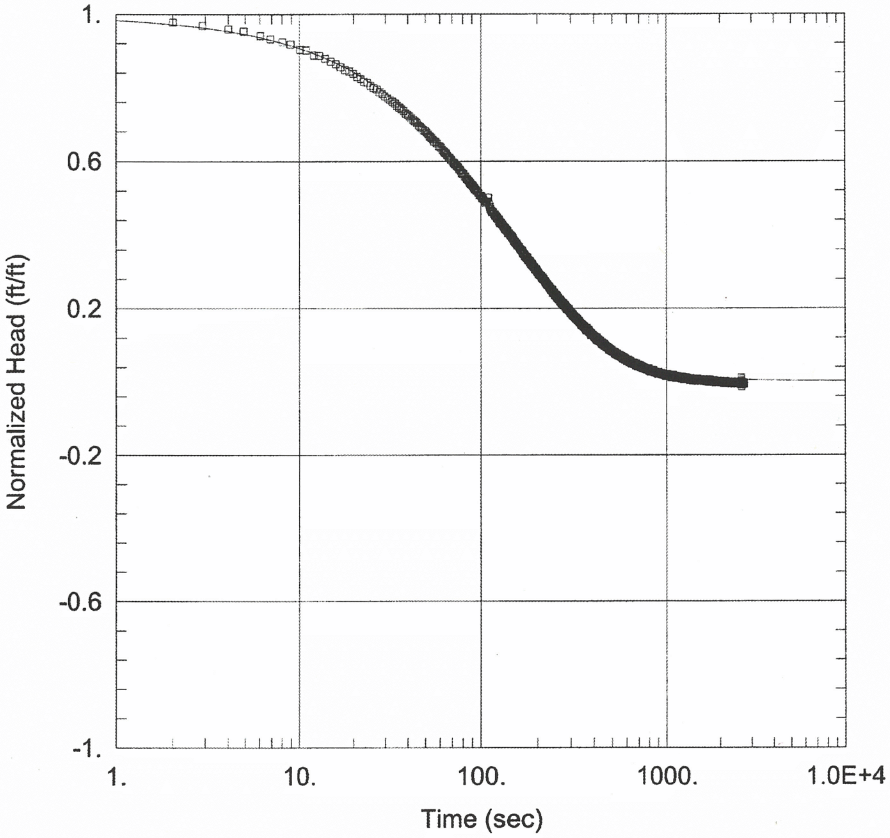
- **Casing Radius, r(c):** (see page 1) 0.08 ft
- **Equipment Radius, r(eq):** 0.04 ft
- **Packer Radius, r(p):** 0
- **Well Radius, r(w):** (see page 1) 0.33 ft
- **Well Skin Radius, r(sk):** 0.33 ft

Step 6: Well Corrections

None

Prepared by: Date: 2/13/09

Reviewed by: Date: 2/18/09



OW304 SLUG OUT

Data Set: G:\...\OW-304 Slug Out_KGS_rev.aqt
Date: 02/16/09
Time: 12:32:45

PROJECT INFORMATION

Company: Schnabel
Client: Bechtel
Project: 06120048
Location: Calvert Cliffs
Test Well: OW304 Slug Out
Test Date: 11/19/2008

Prepared by:
Date: 2/13/09

Reviewed by:
Date: 2/18/09

AQUIFER DATA

Saturated Thickness: 22. ft

WELL DATA (OW304)

Initial Displacement: 2.192 ft
Total Well Penetration Depth: 14.22 ft
Casing Radius: 0.08 ft

Static Water Column Height: 34.72 ft
Screen Length: 10. ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Confined

Solution Method: KGS Model

Kr = 0.0001314 cm/sec
Kz/Kr = 1.

Ss = 9.338E-6 ft^{-1}

Diagnostic Statistics

Estimation complete! Parameter change criterion (ETOL) reached.

Aquifer Model: Confined
Solution Method: KGS Model

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
Kr	0.0001314	5.384E-7	+/- 1.056E-6	244.1	cm/sec
Ss	9.338E-6	4.532E-7	+/- 8.887E-7	20.61	ft^{-1}
Kz/Kr	1.	not estimated			

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

T = K*b = 0.08811 cm^2/sec

Parameter Correlations

	Kr	Ss
Kr	1.00	-0.96
Ss	-0.96	1.00

Residual Statistics

for weighted residuals

Sum of Squares . . . . 0.6035 ft^2
Variance . . . . 0.0002228 ft^2
Std. Deviation . . . . 0.01493 ft
Mean . . . . -0.01044 ft
No. of Residuals. 2711
No. of Estimates. 2

Schnabel
Schnabel Engineering

SLUG TEST FIELD LOG

Project: Calvert Cliffs
Location: Camp Canoy
Schnabel Project No.: 06120048

Well ID: OW-308
Date: 12/3/08
Weather / Temperature: Partially cloudy ~35°

Depth Reference (0.00ft): V notch in top of Casing

Well Construction:
Inside Diameter (D): Casing 2 in; Screen 2 in
Total Well Length: 104 ft
Screen Depth: Top: 92 ft; Bottom: 102 ft

Equipment (Make, Model, SN, and/or Description):
Transducer: Level Troll 104213
Vented (circle one): [✓ Yes] or No
Data Logger: Rugged Reader
Water Level Indicator: Solinst 51782
Slug: Type (circle one): [✓ Mechanical] or Water
Diameter (d): 1.25 in; Length (l): 60.5 in
Volume (v): 74.24 in^3 (= $l \times \pi(½ d)^2$)

Pre-Test Setup Data:
Initial water level depth (manual): 78.53 ft
Initial head (transducer): ~~22~~ PP 12/3/08 ft @ 21.46
Depth of pressure transducer: 100 ft
Pre-test data file name: OW308 Pretest
Pre-test data logger start time: 8:23 AM
Pre-test data logger end time: 9:35 AM

Comments:

Pre-Test Check:
Planned depth of slug after insertion: Top: 85 ft; Bottom: 90 ft (*NA for water slug*)
Will top of mechanical slug be submerged below the pre-test ref. water level? (circle one) [✓ Yes] or No or NA
Estimated water level rise immediately after slug insertion: 23.6 in (= $v / \pi(½ D)^2$); 1.96 ft
Estimated water level depth immediately after slug insertion: 76.57 ft
Will water be discharged from the well upon slug insertion? (circle one): Yes or [✓ No]

Test Data (Falling Head):
Head before slug insertion = 0.0 ft
Time of slug insertion: 9:48 AM
Head immed. after slug insertion (H): -2.55 ft
Falling head data file name: OW308 Slug In
Falling head data logger start time: 9:40 AM
Falling head data logger end time: 10:08 AM

Falling Head Measurements: (Recovery = $h/H \times 100$)

Time	Head (h)	Recovery
9:51 AM	-0.29 ft	88 %
10:06 AM	-0.04 ft	98 %
	ft	%
	ft	%
	ft	%

Test Data (Rising Head):
Head before slug removal: 0.0 ft
Time of slug removal: 10:15 AM
Head immed. after slug removal (H): 1.70 ft
Rising head data file name: OW308 Slug Out
Rising head data logger start time: 10:11 AM
Rising head data logger end time: 7:03 PM

Rising Head Measurements: (Recovery = $h/H \times 100$)

Time	Head (h)	Recovery
10:50 AM	0.06 ft	96 %
7:03 PM	-0.01 ft	100 %
	ft	%
	ft	%
	ft	%

Prepared by:
(signature) Pamela Patrick
(print name) Pamela Patrick

Reviewed by:
(signature)
(print name) T. Anthony Harding

AQTESOLV INPUT PARAMETERS FOR SLUG TESTS

Well Analysis Title OW-308 SLUG OUT **Boring ID:** OW-308

By: TAH **Date:** 12/15/08 rev. 2/13/09

Project Title: Calvert Cliffs **Project Number:** 06120048

Step 1: Project Info

AQTESOLV uses the project information to annotate plots and reports.

Company Name:	Schnabel Engineering	Test Well Name:	OW-308
Client Name:	Bechtel	Obs. Well Name:	OW-308
Project Number:	06120048	Date of Test:	12/3/08
Location:	Calvert Cliffs	Title:	OW-308 SLUG OUT

Step 2: General

- **Initial Displacement, H0:**
  - Is the aquifer Confined or Unconfined: Confined ?
    - If the Aquifer is Confined:

      Maximum displacement recorded in Data File = -2.492
    - If the Aquifer is Unconfined:

      A: Maximum displacement recorded in Data File = N/A

      B: Saturated Thickness of Aquifer = N/A

      Enter the smaller value (either A or B) N/A
- **Static Water Column Height, H:** 23.64 ft ?

  (well detail) (pre-test slug level)
  = Depth to Bottom of Screen – Depth to Static Water Level
  (EL 11.45) (EL 35.09)
- **Well Coordinates:**

  AQTESOLV for Windows uses an x-y coordinate system to **compute distances between the test well and observation wells.**

  X: 0
  Y: 0

Step 3: Aquifer Data

- **Aquifer Saturated Thickness, b:** (see page 1) 19.0
  Aquifer base (per B-308) = EL -5; top of Aquifer = EL 14
- **Hydraulic Conductivity Anisotropy Ratio, k_v/k_h:** 1

Step 4: Well Construction

- **Depth to Top of Screen, d:**
  - Is the Screen Partially Penetrating or Fully Penetrating? Partially

    Is the Aquifer Confined on Unconfined? Confined

    - If the Aquifer is **Confined:**

      d = Depth to Top of Screen (well constr. detail) (EL ~~21.45~~ 14) - Depth to Top of Aquifer (B-308) (EL 14) = ~~7.45~~ 0.00; however, screened across aquitard

      d = 0 ✓

    - If the Aquifer is **Unconfined**:

      d = Depth to Top of Screen - Depth to Static Water Level

      d = N/A

- **Length of Screen, L:** (from base of screen to upper confining layer) *10.0 ft
  *2.55 ft = parameter used
- **Transducer Depth, T:** 0

Step 5: Radius Data

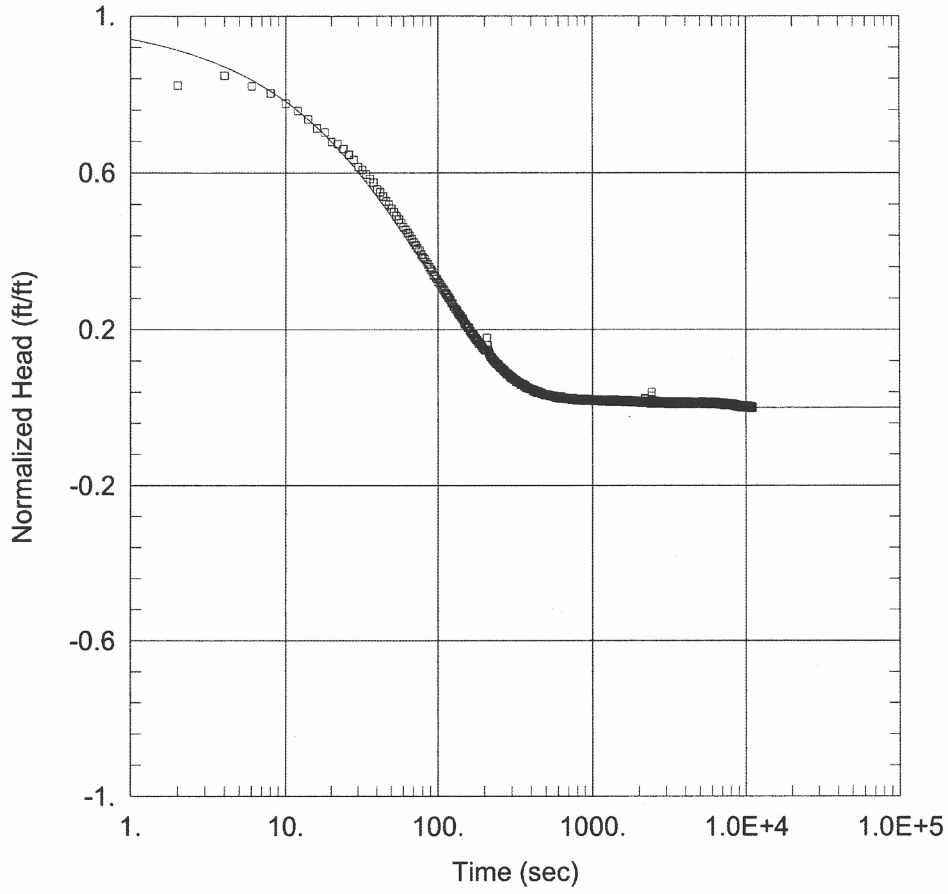
- **Casing Radius, r(c):** (see page 1) 0.08 ft
- **Equipment Radius, r(eq):** 0.04 ft
- **Packer Radius, r(p):** 0
- **Well Radius, r(w):** (see page 1) 0.33 ft
- **Well Skin Radius, r(sk):** 0.33 ft

Step 6: Well Corrections

None

Prepared by: Date: 2/13/09

Reviewed by: Date: 2/18/09



OW308 SLUG OUT

Data Set: G:\...\OW-308 Slug Out_KGS_rev.aqt
Date: 02/16/09
Time: 13:23:44

PROJECT INFORMATION

Company: Schnabel
Client: Bechtel
Project: 06120048
Location: Calvert Cliffs
Test Well: OW308 Slug Out
Test Date: 12/03/2008

Prepared by:
Date: 2/13/09

Reviewed by:
Date: 2/18/09

AQUIFER DATA

Saturated Thickness: 19. ft

WELL DATA (OW308 Slug Out)

Initial Displacement: -2.492 ft
Total Well Penetration Depth: 2.55 ft
Casing Radius: 0.08 ft
Static Water Column Height: 23.64 ft
Screen Length: 2.55 ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.0005711 cm/sec
Kz/Kr = 1.
Ss = 0.0009179 ft^{-1}

Diagnostic Statistics

Estimation complete! Parameter change criterion (ETOL) reached.

Aquifer Model: Confined
Solution Method: KGS Model

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
Kr	0.0005711	2.916E-6	+/- 5.714E-6	195.9	cm/sec
Ss	0.0009179	2.494E-5	+/- 4.888E-5	36.81	ft^{-1}
Kz/Kr	1.	not estimated			

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

T = K*b = 0.3307 cm^2/sec

Parameter Correlations

	Kr	Ss
Kr	1.00	-0.74
Ss	-0.74	1.00

Residual Statistics

for weighted residuals

Sum of Squares . . . . 3.106 ft^2
Variance . . . . 0.0005648 ft^2
Std. Deviation . . . . 0.02377 ft
Mean . . . . -0.01883 ft
No. of Residuals 5502
No. of Estimates 2

Schnabel
Schnabel Engineering

SLUG TEST FIELD LOG

Project: Calvert Cliffs
Location: Intake Area
Schnabel Project No.: 06120048

Well ID: 774A
Date: 12/1/08
Weather / Temperature: cloudy ~40°F

Depth Reference (0.00ft): V notch in top of casing

Equipment (Make, Model, SN, and/or Description):
Transducer: Level Troll 700 119329
Vented (circle one): [✓ Yes] or No
Data Logger: Rugged Reader
Water Level Indicator: ~~Rugg~~ Solinst #51787
Slug: Type (circle one): [✓ Mechanical] or Water
Diameter (d): 1.25 in; Length (l): ~~60.25~~ 60.5 in
Volume (v): ~~73.93~~ 74.24 in^3 ($= l \times \pi(½ d)^2$) PP 12/1/08 PP 12/1/08

Well Construction:
Inside Diameter (D): Casing 2 in; Screen 2 in
Total Well Length: 24.4 ft
Screen Depth: Top: 12.4 ft; Bottom: 22.4 ft

Pre-Test Setup Data:
Initial water level depth (manual): 10.04 ft
Initial head (transducer): 10.30 ft
Depth of pressure transducer: 20 ft
Pre-test data file name: OW774 Pretest 2
Pre-test data logger start time: 8:24 AM 12/1/08
Pre-test data logger end time: 8:45 AM 12/2/08

Comments: Pretest transducer to be left in hole overnight.

Pre-Test Check: 12/2/08
Planned depth of slug after insertion: Top: ~~18~~ 13 PP 12/1/08 ft; Bottom: 18 ft (*NA for water slug*)
Will top of mechanical slug be submerged below the pre-test ref. water level? (circle one): [✓ Yes] or No or NA
Estimated water level rise immediately after slug insertion: 23.6 in ($= v / \pi(½ D)^2$); 1.96 ft
Estimated water level depth immediately after slug insertion: 8.08 ft
Will water be discharged from the well upon slug insertion? (circle one): Yes or [✓ No]

Test Data (Falling Head): 12/2/08
Head before slug insertion = 0.0 ft
Time of slug insertion: 9:01 AM
Head immed. after slug insertion (H): -1.17 ft
Falling head data file name: OW774A Slug In 2
8:55 ~~Falling head data logger start time: OW774A Slug In 2~~
Falling head data logger end time: 10:06 AM PP 12/1/08

Falling Head Measurements: (Recovery = h/H x 100)

Time	Head (h)	Recovery
9:19AM	0.03 ft	102 %
9:47AM	0.05 ft	104 %
10:14AM	0.05 ft	104 %
	ft	%
	ft	%

Test Data (Rising Head):
Head before slug removal: 0.0 ft
Time of slug removal: 10:23 AM
Head immed. after slug removal (H): 1.32 ft
Rising head data file name: OW774 Slug Out 2
Rising head data logger start time: 10:20 AM
Rising head data logger end time: 11:11 AM

Rising Head Measurements: (Recovery = h/H x 100)

Time	Head (h)	Recovery
10:27AM	0.12 ft	90 %
10:56AM	0.02 ft	~~10~~ 98 %
11:10AM	0.04 ft	97 %
	ft	%
	ft	%

Prepared by:
(signature) Pamela Patrick
(print name) Pamela Patrick

Reviewed by:
(signature)
(print name) T. Anthony Harding

AQTESOLV INPUT PARAMETERS FOR SLUG TESTS

Well Analysis Title OW-774A Slug Out **Boring ID:** OW-774A

By: TAH **Date:** 12/15/08 rev. 2/13/09

Project Title: Calvert Cliffs **Project Number:** 06120048

Step 1: Project Info

AQTESOLV uses the project information to annotate plots and reports.

Company Name:	Schnabel Engineering	Test Well Name:	OW-774A
Client Name:	Bechtel	Obs. Well Name:	OW-774A
Project Number:	06120048	Date of Test:	12/1/08
Location:	Calvert Cliffs	Title:	OW-774A Slug Out

Step 2: General

- **Initial Displacement, H0:**
  - Is the aquifer Confined or Unconfined: Unconfined
    - If the Aquifer is Confined:

      Maximum displacement recorded in Data File = N/A
    - If the Aquifer is Unconfined:

      A: Maximum displacement recorded in Data File = -1.647

      B: Saturated Thickness of Aquifer = 5.16 ft

      Aquifer base (per B-774) = EL -3.0; static pretest slug level = EL 2.16

      Enter the smaller value (either A or B)

- **Static Water Column Height, H:** 5.16 ft

  (well constr. detail) (pre-test slug level)

  = Depth to Bottom of Screen – Depth to Static Water Level

  (EL -3) (EL 2.16)

  ↑ note: bottom of screen is at EL -10.3; however bottom of aquifer is EL -3; ∴ H = 2.16 - (-3) = 5.16

- **Well Coordinates:**

  AQTESOLV for Windows uses an x-y coordinate system to **compute distances between the test well and observation wells.**

  X: 0

  Y: 0

Step 3: Aquifer Data

- **Aquifer Saturated Thickness, b:** (see page 1) 5.16 ft
- **Hydraulic Conductivity Anisotropy Ratio, k_v/k_h:** 1

Step 4: Well Construction

- **Depth to Top of Screen, d:**
  - Is the Screen Partially Penetrating or Fully Penetrating? Partially

    Is the Aquifer Confined on Unconfined? Unconfined

    - If the Aquifer is **Confined:**

      d = Depth to Top of Screen - Depth to Top of Aquifer

      d = N/A

    - If the Aquifer is **Unconfined**:

      (well constr. detail) (pre-test slug level)

      d = Depth to Top of Screen - Depth to Static Water Level

      (EL -0.3) (EL 2.16)

      d = 2.46

- **Length of Screen, L:** *10.0 ft

  * 2.7 ft = parameter used
- **Transducer Depth, T:** 0

Step 5: Radius Data

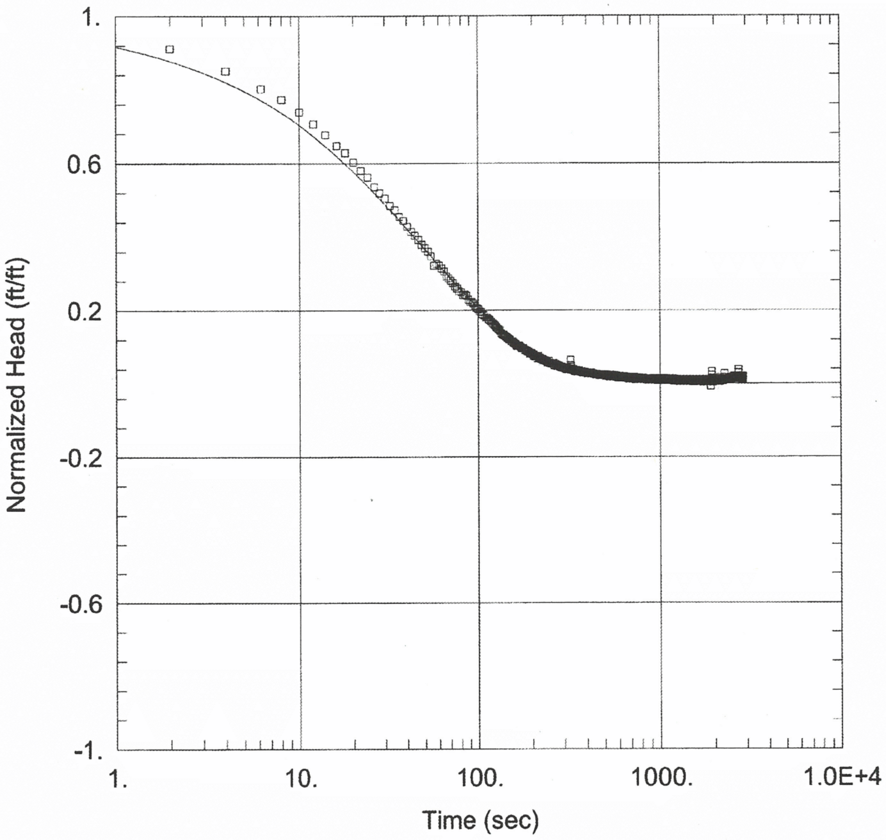
- **Casing Radius, r(c):** (see page 1) 0.08 ft
- **Equipment Radius, r(eq):** 0.04 ft
- **Packer Radius, r(p):** 0
- **Well Radius, r(w):** (see page 1) 0.33 ft
- **Well Skin Radius, r(sk):** 0.33 ft

Step 6: Well Corrections

None

Prepared by: Date: 2/13/08

Reviewed by: Date: 2/18/09



OW774A SLUG OUT

Data Set: G:\...\OW774A Slug Out_KGS_rev.aqt
Date: 02/16/09
Time: 12:38:49

PROJECT INFORMATION

Company: Schnabel
Client: Bechtel
Project: 06120048
Location: Calvert Cliffs
Test Well: OW774A Slug Out
Test Date: 12/01/2008

Prepared by:
Date: 2/13/09

Reviewed by:
Date: 2/18/09

AQUIFER DATA

Saturated Thickness: 5.16 ft

WELL DATA (OW774A Slug Out 2 Uncorrected)

Initial Displacement: -1.647 ft
Total Well Penetration Depth: 5.16 ft
Casing Radius: 0.08 ft

Static Water Column Height: 5.16 ft
Screen Length: 2.7 ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined

Solution Method: KGS Model

Kr = 0.0008297 cm/sec
Kz/Kr = 1.

Ss = 0.001142 ft^{-1}

Diagnostic Statistics

Estimation complete! Parameter change criterion (ETOL) reached.

Aquifer Model: Unconfined
Solution Method: KGS Model

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
Kr	0.0008297	5.339E-6	+/- 1.047E-5	155.4	cm/sec
Ss	0.001142	3.415E-5	+/- 6.7E-5	33.45	ft^{-1}
Kz/Kr	1.	not estimated			

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

T = K*b = 0.1305 cm²/sec

Parameter Correlations

	Kr	Ss
Kr	1.00	-0.66
Ss	-0.66	1.00

Residual Statistics

for weighted residuals

Sum of Squares	0.4241 ft^2
Variance	0.0002961 ft^2
Std. Deviation	0.01721 ft
Mean	-0.01301 ft
No. of Residuals.	1434
No. of Estimates.	2

Schnabel
Schnabel Engineering

SLUG TEST FIELD LOG

Project: Calvert Cliffs
Location: Intake Area
Schnabel Project No.: 06120048

Well ID: OW774B
Date: 12/2/08
Weather / Temperature: mostly cloudy ~35°F

Depth Reference (0.00ft): V notch in top of casing

Well Construction:
Inside Diameter (D): Casing 2 in; Screen 2 in
Total Well Length: 54.5 ft
Screen Depth: Top: 42.5 ft; Bottom: 52.5 ft

Equipment (Make, Model, SN, and/or Description):
Transducer: Level Troll 700 #119329
Vented (circle one): [✓ Yes] or No
Data Logger: Ruggedized reader
Water Level Indicator: Solinst #51787
Slug: Type (circle one): [✓ Mechanical] or Water
Diameter (d): ~~1.2~~ 1.25 in; Length (l): 61 in
Volume (v): 74.8 in^3 ($= l \times \pi(½ d)^2$)

Pre-Test Setup Data:
Initial water level depth (manual): 10.15 ft
Initial head (transducer): 34.90 ft
Depth of pressure transducer: 45 ft
Pre-test data file name: pp 12/2/08 ~~34.9~~ OW774B Pretest 3
Pre-test data logger start time: 11:54 AM 12/2/08
Pre-test data logger end time: 12:21 PM 12/3/08

Comments: Transducer to be left in hole over night for Pretest and Slug Out

pp 12/2/08
Prior to ~~During~~ Slug Out test, accidently jostled transducer. Confirmed that change in head did not exceed 0.01 ft/min prior to pulling slug.

Pre-Test Check: 12/3/08
Planned depth of slug after insertion: Top: 20 ft; Bottom: 15 ft (*NA for water slug*)
Will top of mechanical slug be submerged below the pre-test ref. water level? (circle one): [✓ Yes] or No or NA
Estimated water level rise immediately after slug insertion: 23.81 in ($= v / \pi(½ D)^2$); 1.98 ft
Estimated water level depth immediately after slug insertion: 8.17 ft
Will water be discharged from the well upon slug insertion? (circle one): Yes or [✓ No]

Test Data (Falling Head):
Head before slug insertion = 0.0 ft
Time of slug insertion: 12:37PM
Head immed. after slug insertion (H): ~~0~~ -2.10 ft
Falling head data file name: OW774B Slug In 3
Falling head data logger start time: 12:33PM
Falling head data logger end time: 5:40PM

Falling Head Measurements: (Recovery = h/H x 100)

Time	Head (h)	Recovery
1:21PM	-0.96 ft	54 %
4:08PM	-0.19 ft	91 %
5:12PM	-0.16 ft	92 %
	ft	%
	ft	%

Test Data (Rising Head):
Head before slug removal: 0.0 ft 5:49pm
Time of slug removal: pp 12/2/08 ~~5:42~~ 2.23
Head immed. after slug removal (H): ~~5.44~~ pp 12/2/08 ✓ ft
Rising head data file name: OW774B Slug Out 3
Rising head data logger start time: 5:44PM 12/3/08
Rising head data logger end time: 9:03 pm 12/4/08

Rising Head Measurements: (Recovery = h/H x 100)

Time	Head (h)	Recovery
8:21 AM	0.05 ft	98 %
9:01 AM	0.06 ft	97 %
	ft	%
	ft	%
	ft	%

Prepared by:
(signature) Pamela Patrick
(print name) Pamela Patrick

Reviewed by:
(signature)
(print name) T. Anthony Harding

AQTESOLV INPUT PARAMETERS FOR SLUG TESTS

Well Analysis Title OW-774B Slug Out **Boring ID:** OW-774B

By: TAH **Date:** 12/15/08 rev. 2/13/09

Project Title: Calvert Cliffs **Project Number:** 06120048

Step 1: Project Info

AQTESOLV uses the project information to annotate plots and reports.

Company Name:	Schnabel Engineering	Test Well Name:	OW-774B
Client Name:	Bechtel	Obs. Well Name:	OW-774B
Project Number:	06120048	Date of Test:	12/2/08
Location:	Calvert Cliffs	Title:	OW-774B Slug Out

Step 2: General

- **Initial Displacement, H0:**
  - Is the aquifer Confined or Unconfined: Confined
    - If the Aquifer is Confined:

      Maximum displacement recorded in Data File = 2.216 ft
    - If the Aquifer is Unconfined:

      A: Maximum displacement recorded in Data File = N/A

      B: Saturated Thickness of Aquifer = N/A

      Enter the smaller value (either A or B) N/A
- **Static Water Column Height, H:** 42.3 ft

  (per well constr. detail) (pre-test slug level)

  = Depth to Bottom of Screen – Depth to Static Water Level

  (EL -39.9) (EL 2.4)
- **Well Coordinates:**

  AQTESOLV for Windows uses an x-y coordinate system to **compute distances between the test well and observation wells.**

  X: 0

  Y: 0

Step 3: Aquifer Data

- **Aquifer Saturated Thickness, h:** (see page 1) 32.0 ft
  Base of aquifer (EL -46.9); top of aquifer per B-774 (14.9)
- **Hydraulic Conductivity Anisotropy Ratio, k_v/k_h:** 1

Step 4: Well Construction

- **Depth to Top of Screen, d:**
  - Is the Screen Partially Penetrating or Fully Penetrating? Partially

    Is the Aquifer Confined on Unconfined? Confined

    - If the Aquifer is **Confined:**

      d = Depth to Top of Screen (well Constr. detail) (EL -29.9) - Depth to Top of Aquifer (per B-774) (EL -14.9)

      d = 15.0 ft

    - If the Aquifer is **Unconfined**:

      d = Depth to Top of Screen - Depth to Static Water Level

      d = N/A

- **Length of Screen, L:** 10.0 ft
- **Transducer Depth, T:** 0

Step 5: Radius Data

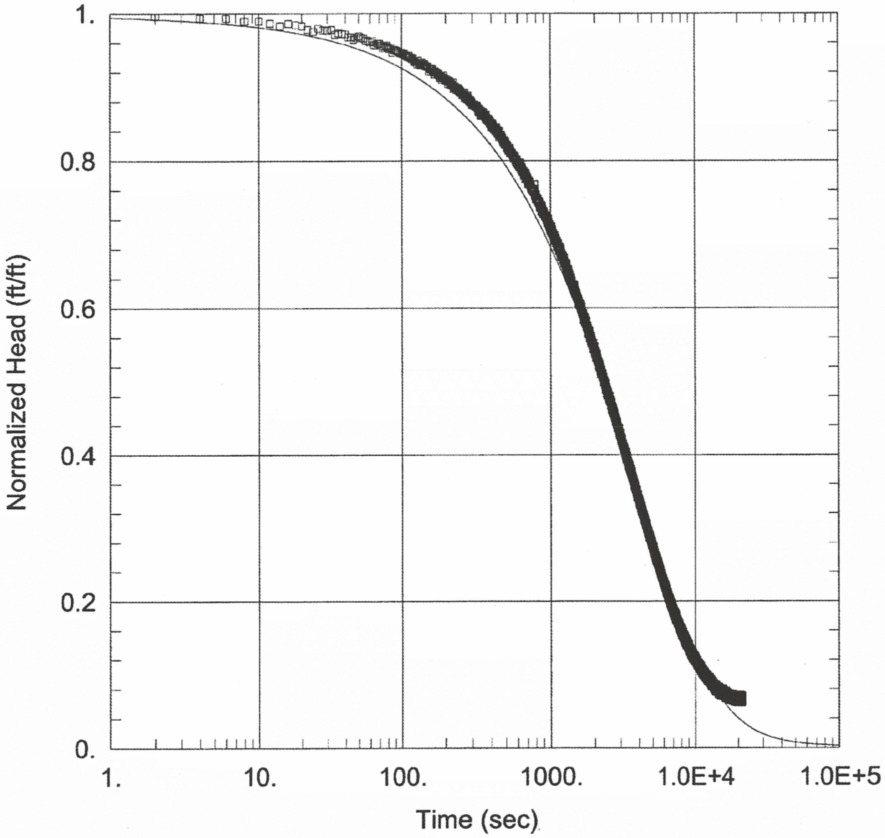
- **Casing Radius, r(c):** (see page 1) 0.08 ft
- **Equipment Radius, r(eq):** 0.04 ft
- **Packer Radius, r(p):** 0
- **Well Radius, r(w):** (see page 1) 0.33 ft
- **Well Skin Radius, r(sk):** 0.33 ft

Step 6: Well Corrections

None

Prepared by: Date: 2/13/08

Reviewed by: Date: 2/18/~~08~~09



OW-774B SLUG OUT

Data Set: G:\...\OW774B Slug Out_KGS_rev.aqt
Date: 02/16/09 Time: 12:41:12

PROJECT INFORMATION

Company: Schnabel
Client: Bechtel
Project: 06120048
Location: Calvert Cliffs
Test Well: 774B Slug Out
Test Date: 11/17/2008

Prepared by: Date: 2/13/09
Reviewed by: Date: 2/18/09

AQUIFER DATA

Saturated Thickness: 32. ft

WELL DATA (OW-774B)

Initial Displacement: 2.216 ft
Total Well Penetration Depth: 25. ft
Casing Radius: 0.08 ft

Static Water Column Height: 42.3 ft
Screen Length: 10. ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 4.384E-6 cm/sec
Ss = 7.723E-5 ft^{-1}
Kz/Kr = 1.

Diagnostic Statistics

Estimation complete! Parameter change criterion (ETOL) reached.

Aquifer Model: Confined
Solution Method: KGS Model

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
Kr	4.384E-6	6.844E-9	+/- 1.341E-8	640.6	cm/sec
Ss	7.723E-5	8.127E-7	+/- 1.593E-6	95.03	ft^{-1}
Kz/Kr	1.	not estimated			

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

T = K*b = 0.004276 cm^2/sec

Parameter Correlations

	Kr	Ss
Kr	1.00	-0.84
Ss	-0.84	1.00

Residual Statistics

for weighted residuals

Sum of Squares	13.12 ft^2
Variance	0.001228 ft^2
Std. Deviation	0.03505 ft
Mean	0.01016 ft
No. of Residuals.	10686
No. of Estimates.	2

Schnabel
Schnabel Engineering

SLUG TEST FIELD LOG

Project: Calvert Cliffs
Location: Intake Area
Schnabel Project No.: 0612004B

Well ID: 781
Date: 12/1/08
Weather / Temperature: cloudy ~40°F

Depth Reference (0.00ft): V notch in top of casing

Well Construction:
Inside Diameter (*D*): Casing 2 in; Screen 2 in
Total Well Length: 54 ft
Screen Depth: Top: 42 ft; Bottom: 52 ft

Equipment (Make, Model, SN, and/or Description):
Transducer: Level Troll 700 #104213
Vented (circle one): [✓ Yes] or No
Data Logger: Rugged Reader
Water Level Indicator: Solinst #51787
Slug: Type (circle one): [✓ Mechanical] or Water
Diameter (*d*): 1.25 in; Length (*l*): 61 in
Volume (*v*): 74.8 in^3 (= $l \times \pi(½ d)^2$)

Pre-Test Setup Data:
Initial water level depth (manual): 10.19 ft
Initial head (transducer): ~~45~~ ft 34.57
Depth of pressure transducer: 45 ft
Pre-test data file name: OW781 Pretest2
Pre-test data logger start time: 7:42AM 12/1/08
Pre-test data logger end time: 7:58AM 12/2/08

Comments: Pretest slug to be left in overnight

Slug Out test left in Overnight

Pre-Test Check: 12/2/08
Planned depth of slug after insertion: Top: 15 ft; Bottom: 20 ft (*NA for water slug*)
Will top of mechanical slug be submerged below the pre-test ref. water level? (circle one): [✓ Yes] or No or NA
Estimated water level rise immediately after slug insertion: 23.8 in (= $v / \pi(½ D)^2$); 1.98 ft
Estimated water level depth immediately after slug insertion: 8.2 ft
Will water be discharged from the well upon slug insertion? (circle one): Yes or [✓ No]

Test Data (Falling Head):
Head before slug insertion = 0.0 ft
Time of slug insertion: 8:18AM
Head immed. after slug insertion (*H*): -2.04 ft
Falling head data file name: OW781 Slug In 2
Falling head data logger start time: 8:11AM
Falling head data logger end time: 10:40AM

Falling Head Measurements: (Recovery = *h*/*H* x 100)

Time	Head (*h*)	Recovery
9:09AM	-0.79 ft	61 %
9:39AM	-0.48 ft	76 %
9:57AM	-0.35 ft	83 %
10:32AM	-0.19 ft	91 %
10:40AM	-0.15 ft	93 %

Test Data (Rising Head):
Head before slug removal: 0.0 ft
Time of slug removal: 10:47AM
Head immed. after slug removal (*H*): 2.15 ft
Rising head data file name: OW781 Slug Out 2
Rising head data logger start time: 10:44AM 12/2/08
Rising head data logger end time: 6:55 AM 12/3/08

Rising Head Measurements: (Recovery = *h*/*H* x 100)

Time	Head (h)	Recovery
12:03PM	0.80 ft	62 %
12:41PM	0.61 ft	72 %
1:04PM	0.55 ft	74 %
4:50PM	0.32 ~~0.33~~ ft	85 %
6:54AM 12/3/08	0.38 ft	82 %

Prepared by:
(signature) Pamela Patrick
(print name) Pamela Patrick

Reviewed by:
(signature)
(print name) T. Anthony Harding

AQTESOLV INPUT PARAMETERS FOR SLUG TESTS

Well Analysis Title OW-781 Slug In **Boring ID:** OW-781

By: TAH **Date:** 12/15/08 rev. 2/13/09

Project Title: Calvert Cliffs **Project Number:** 06120048

Step 1: Project Info

AQTESOLV uses the project information to annotate plots and reports.

Company Name: Schnabel Engineering
Client Name: Bechtel
Project Number: 06120048
Location: Calvert Cliffs

Test Well Name: OW-781
Obs. Well Name: OW-781
Date of Test: 12/1/08
Title: OW-781 Slug In

Step 2: General

- **Initial Displacement, H0:**
  - Is the aquifer Confined or Unconfined: Confined
    - If the Aquifer is Confined:

      Maximum displacement recorded in Data File = −2.06 ft

    - If the Aquifer is Unconfined:

      A: Maximum displacement recorded in Data File = N/A

      B: Saturated Thickness of Aquifer = N/A

      Enter the smaller value (either A or B) N/A

- **Static Water Column Height, H:** 42.38 ft

  (well constr. detail) (pre-test slug level)
  = Depth to Bottom of Screen – Depth to Static Water Level
  (EL −39.7) (EL 2.68)

- **Well Coordinates:**

  AQTESOLV for Windows uses an x-y coordinate system to **compute distances between the test well and observation wells.**

  X: 0
  Y: 0

Step 3: Aquifer Data

- **Aquifer Saturated Thickness, b:** (see page 1) 15.3 ft
  top of aquifer (EL -31.6); base of aquifer (-46.9)
- **Hydraulic Conductivity Anisotropy Ratio, k_v/k_h:** 1

Step 4: Well Construction

- **Depth to Top of Screen, d:**
  - Is the Screen Partially Penetrating or Fully Penetrating? Partially

    Is the Aquifer Confined on Unconfined? Confined

    - If the Aquifer is **Confined:**

      d = Depth to Top of Screen - Depth to Top of Aquifer
      (well Constr. detail) (EL -29.7) (per B-78D) (EL -31.6)

      d = 0

      Lscreen is above top of aquifer; therefore d = 0
    - If the Aquifer is **Unconfined**:

      d = Depth to Top of Screen - Depth to Static Water Level

      d = N/A
- **Length of Screen, L:** *10.0 ft
  (from base of screen to top of upper confining layer)
  *8.0 ft = parameter used
- **Transducer Depth, T:** 0
  Lnormalized, appx 45 ft

Step 5: Radius Data

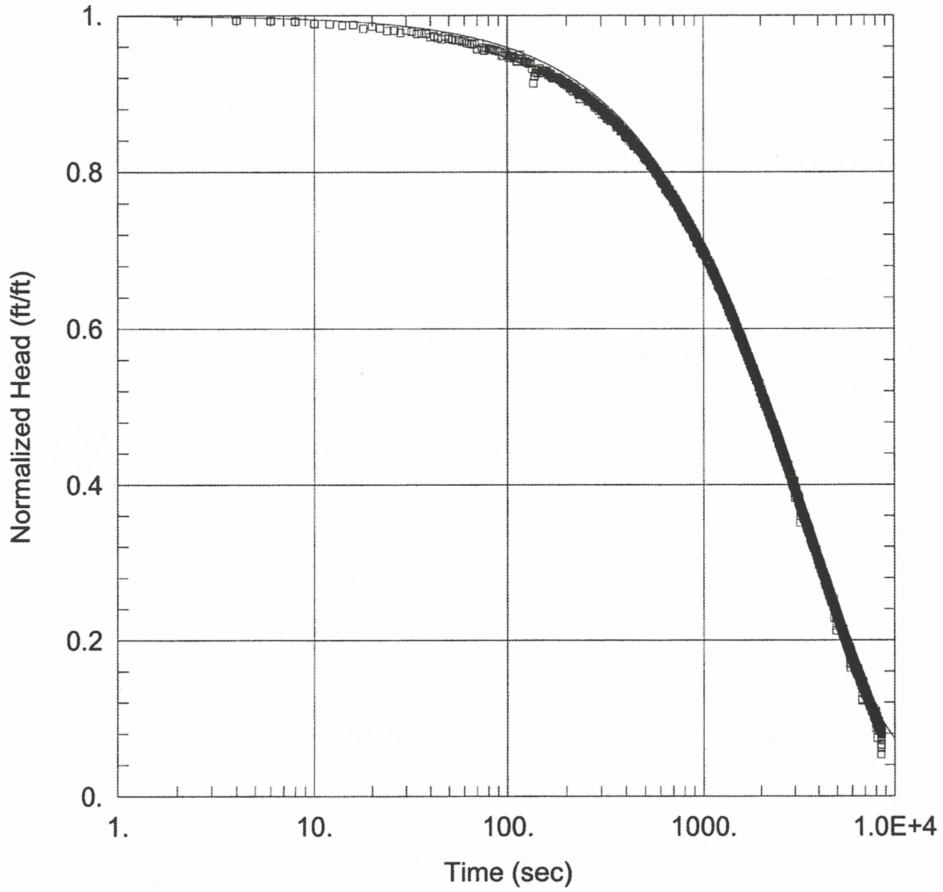
- **Casing Radius, r(c):** (see page 1) 0.08 ft
- **Equipment Radius, r(eq):** 0.04 ft
- **Packer Radius, r(p):** 0
- **Well Radius, r(w):** (see page 1) 0.33 ft
- **Well Skin Radius, r(sk):** 0.33 ft

Step 6: Well Corrections

None

Prepared by: Date: 2/13/08

Reviewed by: Date: 2/18/09



OW781 SLUG IN

Data Set: G:\...\OW781 Slug In _KGS_rev.aqt
Date: 02/16/09 Time: 12:43:23

PROJECT INFORMATION

Company: Schnabel
Client: Bechtel
Project: 06120048
Location: Calvert Cliffs
Test Well: OW781 Slug In
Test Date: 12/01/2008

Prepared by: Date: 2/13/09
Reviewed by: Date: 2/18/09

AQUIFER DATA

Saturated Thickness: 15.3 ft

WELL DATA (OW781 Slug In)

Initial Displacement: -2.06 ft
Total Well Penetration Depth: 8. ft
Casing Radius: 0.08 ft
Static Water Column Height: 42.38 ft
Screen Length: 8. ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model
Kr = 1.222E-5 cm/sec
Ss = 1.67E-7 ft^{-1}
Kz/Kr = 1.

Diagnostic Statistics

Estimation complete! Parameter change criterion (ETOL) reached.

Aquifer Model: Confined
Solution Method: KGS Model

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
Kr	1.222E-5	7.726E-8	+/- 1.514E-7	158.2	cm/sec
Ss	1.67E-7	1.652E-8	+/- 3.238E-8	10.11	ft^{-1}
Kz/Kr	1.	not estimated			

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

T = K*b = 0.005701 cm^2/sec

Parameter Correlations

	Kr	Ss
Kr	1.00	-1.00
Ss	-1.00	1.00

Residual Statistics

for weighted residuals

Sum of Squares	1.117 ft^2
Variance	0.0002605 ft^2
Std. Deviation	0.01614 ft
Mean	0.003402 ft
No. of Residuals	4289
No. of Estimates	2

WELL SAMPLING RECORDS
(30 Pages)

Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.:
OW-301

WELL SAMPLING RECORD

JOB NO.:
016120048

SITE:
Calvert Cliffs

PREPARED BY: M. Ker / K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 11/12/08
WEATHER: Overcast
TEMPERATURE: 50° F
INITIAL WATER LEVEL: 60.91 Ft
FINAL WATER LEVEL: 61.09 Ft

DATE OF SAMPLING: 11/12/08
TIME OF SAMPLING: 17:15
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: ND

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 48272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

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

1 ft^3 = 7.48 gal

$V_w = \Pi \, (\frac{d_w}{24}) \, 2 \, h * 7.48$

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

$V_w = 3.14 * (2/24)^2 * 19.09 * 7.48 = 3.11$

$V_s = 3.14(4/24)^2 * 19 * (.3) * 7.48 = 3.71$

$V_w + V_s = 6.82$ gal

Checked by: KP

FLOW RATE CALCULATION: 1 gal/151 sec*60 sec/min = 0.38 gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Tempature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
16:15	16:33	6.82	58.07	7.37	351.3	-114	0.01	8.2	
16:33	16:51	6.82	57.81	7.40	349.1	-133	0.01	8.21	
16:51	17:00	3.42	57.88	7.41	349.2	-137	0.01	8.11	
17:00	17:10	3.80	58.01	7.41	350.2	-141	0.01	9.32	

Equipment Calibration Performed By: K. Powell

Number of Sample Containers Collected: _ 4

Schnabel
Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.:
OW-304

WELL SAMPLING RECORD

JOB NO.:
016120048

SITE:
Calvert Cliffs

PREPARED BY: M. Ker / K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 11/13/08
WEATHER: Cloudy
TEMPERATURE: 50° F
INITIAL WATER LEVEL: 37.46 Ft
FINAL WATER LEVEL: 42.83 Ft

DATE OF SAMPLING: 11/13/08
TIME OF SAMPLING: 10:00
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: 55 Ft

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 48272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

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

1 ft^3 = 7.48 gal

$V_w = \Pi\ (\frac{d_w}{24})\ 2\ h * 7.48$

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

$V_w = 3.14(2/24)^2 * 35.34 * 7.48 = 5.76$

$V_s = 3.14(4/24)^2 * (15.3)(.3) * 7.48 = 2.99$

$V_w + V_s = 8.75$ gal

Checked by: KP

FLOW RATE CALCULATION: 1 gal/230 sec*60 sec/min = 0.26 gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Tempature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
7:53 AM	8:00 AM	1.82	57.90	9.59	312.5	-126	2.38	39.18	
8:00 AM	8:26 AM	6.76	58.25	7.69	366.9	-172	0.02	27.14	
8:26 AM	8:59 AM	8.75	58.30	70.72	381.2	-175	0.02	24.27	
8:59 AM	9:09 AM	2.6	58.37	7.65	386.7	-170	0.01	23.53	
9:09 AM	9:19 AM	2.6	58.35	7.68	387.8	-152	0.06	23.48	
9:19 AM	9:29 AM	2.6	58.43	7.66	390.9	-161	0.01	23.52	
9:29 AM	9:39 AM	2.6	58.42	7.65	391.5	-163	0.01	23.24	
9:39 AM	9:49 AM	2.6	58.39	7.72	387.3	-174	0.02	24.42	
9:49 AM	9:54 AM	1.3	58.39	7.78	391.7	-172	0.02	24.06	
9:54 AM	9:59 AM	1.3	58.36	7.75	390.4	-171	0.03	23.88	

Equipment Calibration Performed By: K. Powell / M. Ker
Number of Sample Containers Collected: _ 4

Schnabel
Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.:
OW-308

WELL SAMPLING RECORD

JOB NO.:
016120048

SITE:
Calvert Cliffs

PREPARED BY: M. Ker / K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 11/13/08
WEATHER: Raining
TEMPERATURE: 50° F
INITIAL WATER LEVEL: 78.35 Ft
FINAL WATER LEVEL: ND

DATE OF SAMPLING: 11/13/08
TIME OF SAMPLING: 15:05
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: ND

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 48272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

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

1 ft^3 = 7.48 gal

$V_w = \Pi \left(\frac{d_w}{24}\right) 2\ h * 7.48$

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

$V_w = \pi(2/24)^2(24.65)(7.48) = 4.02$

$V_s = \pi(4/24)^2(15)(0.3)(7.48) = 2.93$

$V_T = 6.95$ gal

Checked by: KP

FLOW RATE CALCULATION: 1 gal/186 sec*60 sec/min = 0.32 gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Tempature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
13:48	13:52	1.28	58.79	8.60	349.5	-240	0.02	40.35	
13:52	14:12	6.4	58.97	8.00	338.2	-210	0.01	33.33	
14:12	14:34	6.95	59.18	8.03	351.0	-210	0.01	34.46	
14:34	14:44	3.2	59.22	7.99	349.6	-206	0.01	29.25	
14:44	14:49	1.6	59.23	7.97	348.4	-206	0.01	28.11	
14:49	14:54	1.6	59.18	7.98	346.2	-207	0.01	28.9	
14:54	14:59	1.6	59.14	7.98	344.0	-208	0.01	27.7	

Equipment Calibration Performed By: K. Powell / M. Ker
Number of Sample Containers Collected: 4

Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.:
OW-313A

WELL SAMPLING RECORD

JOB NO.:
016120048

SITE:
Calvert Cliffs

PREPARED BY: M. Ker / K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 11/13/08
WEATHER: Overcast
TEMPERATURE: 50^o F
INITIAL WATER LEVEL: 21.76 Ft
FINAL WATER LEVEL: ND

DATE OF SAMPLING: 11/13/08
TIME OF SAMPLING:
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: 35 Ft

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 48272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

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

1 ft^3 = 7.48 gal

$V_w = \pi \, (\frac{d_w}{24}) \, 2 \, h * 7.48$

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

$V_w = 3.14 * (2/24)^2 * 35.54 * 7.48 = 5.79$

$V_s = 3.14 * (4/24)^2 * 22.3 * .3 * 7.48 = 4.36$

$V_w + V_s = 10.15$ gal

Checked by: KP

FLOW RATE CALCULATION: 1 gal/192 sec*60 sec/min = 0.31 gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Tempature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
5:55	6:35	10.15	55.85	7.65	263.1	-106	0.71	44.31	
6:35	6:59	10.15	56.02	7.71	268.1	-166	0.01	35.48	
6:59	7:09	3.1	56.03	7.70	268.8	-170	0.01	36.20	
7:09	7:19	3.1	56.09	7.69	270.1	-172	0.01	34.90	
7:19	7:31	3.7	56.11	7.69	271.2	-174	0.01	34.90	

Equipment Calibration Performed By: K. Powell / M. Ker

Number of Sample Containers Collected: _ 4

Schnabel
Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.:
OW-319A

WELL SAMPLING RECORD

JOB NO.:
016120048

SITE:
Calvert Cliffs

PREPARED BY: M. Ker / K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 11/11/08
WEATHER: Clear
TEMPERATURE: 45° F
INITIAL WATER LEVEL: 26.86 Ft
FINAL WATER LEVEL: ND

DATE OF SAMPLING: 11/11/08
TIME OF SAMPLING: 11:50
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: ND

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 48272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

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

$1 \text{ ft}^3 = 7.48$ gal

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

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

$V_w = 3.14 * (2/24)^2 * 8.14 * 7.48 = 1.33$

$V_s = 3.14 * (4/24)^{2} * 8.14 * .3 * 7.48 = 1.59$

$V_w + V_s = 2.92$ gal

Checked by: KP

FLOW RATE CALCULATION: 1 gal/252 sec*60 sec/min = 0.24 gal/min

COMMENTS:
Well pumped dry, allowed to recover and samples collected

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Tempature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
11:00	11:15	3.57							
11:30	11:30	0.0	56.65	6.69	125.4	10	5.35	44.17	

Equipment Calibration Performed By: K. Powell
Number of Sample Containers Collected: _ 4

Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.:
OW-319B

WELL SAMPLING RECORD

JOB NO.:
016120048

SITE:
Calvert Cliffs

PREPARED BY: M. Ker / K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 11/11/08
WEATHER: Clear
TEMPERATURE: 38° F
INITIAL WATER LEVEL: 69.72 Ft
FINAL WATER LEVEL: ND

DATE OF SAMPLING: 11/11/08
TIME OF SAMPLING: 10:40
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: 80 Ft

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 48272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

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

$1 \text{ ft}^3 = 7.48$ gal

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

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

$V_w = (3.14)(2/24)^2(15.28)(7.48) = 2.49$

$V_s = 3.14(4/24)^2(15.28)(.3)(7.48) = 2.99$

$V_w + V_s = 5.48$ gal

Checked by: KP

FLOW RATE CALCULATION: 1 gal/265 sec*60 sec/min = 0.23 gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Tempature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
9:13	10:01	11.04	58.56	7.85	386.1	-164	0.04	11.37	
10:01	10:06	1.13	58.56	7.85	386.1	-164	0.04	11.37	
10:06	10:11	1.13	58.71	7.88	386.5	-164	0.03	3.94	
10:11	10:16	1.13	58.40	7.91	385.5	-166	0.02	7.853	
10:16	10:21	1.13	58.89	7.91	385.5	-166	0.02	8.383	
10:21	10:28	1.13	58.75	7.93	387.4	-166	0.02	8.655	
10:28	10:33	1.13	58.87	7.94	388.6	-166	0.03	10.55	
10:33	10:38	1.13	58.76	7.93	386.7	-166	0.03	11.13	

Equipment Calibration Performed By: K. Powell

Number of Sample Containers Collected: 4

Schnabel Engineering, LLC

	PROJECT: Calvert Cliffs Power Plant		WELL NO.: OW-323A
WELL SAMPLING RECORD	JOB NO.: 016120048	SITE: Calvert Cliffs	PREPARED BY: M. Ker / K. Powell

PURGE METHOD: Sub-pump

SAMPLING METHOD: Grab

PURGING CRITERIA: Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 11/11/08
WEATHER: Sunny
TEMPERATURE: 40° F
INITIAL WATER LEVEL: 29.51 Ft
FINAL WATER LEVEL: ND

DATE OF SAMPLING: 11/11/08
TIME OF SAMPLING: 16:10
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: 35 Ft

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 48272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

$V_w = 3.14 * (2/24)^2 * 14 * 7.48 = 2.28$

$V_s = 3.14 * (4/24)^2 * 14 * .3 * 7.48 = 2.74$

$V_w + V_s = 5.02$ gal

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

1 ft^3 = 7.48 gal

$V_w = \Pi\ (\frac{d_w}{24})\ 2\ h * 7.48$

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

Checked by: KP

FLOW RATE CALCULATION: 1 gal/275 sec*60 sec/min = 0.22 gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Tempature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
14:43	15:29	10.12	57.10	5.45	50.71	-331	6.23	24.19	
15:29	15:34	1.1	57.69	5.45	50.57	-332	6.29	24.31	
15:34	15:39	1.1	57.66	5.45	50.40	-332	6.33	24.25	
15:39	15:44	1.1	57.63	5.45	50.22	-333	6.38	24.31	
15:44	15:49	1.1	57.58	5.46	50.01	-334	6.42	24.31	
15:49	15:54	1.1	57.61	5.46	50.10	-334	6.43	24.29	

Equipment Calibration Performed By: K. Powell

Number of Sample Containers Collected: _ 4

Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.:
OW-328

WELL SAMPLING RECORD

JOB NO.:
016120048

SITE:
Calvert Cliffs

PREPARED BY: M. Ker / K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 11/13/08
WEATHER: Raining
TEMPERATURE: 50° F
INITIAL WATER LEVEL: 42.71 Ft
FINAL WATER LEVEL: 50.39 Ft

DATE OF SAMPLING: 11/13/08
TIME OF SAMPLING: 13:30
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: 60 Ft

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 48272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

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

1 ft^3 = 7.48 gal

$$V_w = \Pi\ (\frac{d_w}{24})\ 2\ h * 7.48$$

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

$V_w = 3.14 * (2/24)^2 * 29.29 * 7.48 = 4.78$

$V_s = 3.14 * (4/24)^2 * 15.5 * (.3) * (7.48) = 3.03$

$V_w + V_s = 7.81$ gal

Checked by: KP

FLOW RATE CALCULATION: 1 gal/179 sec*60 sec/min = 0.34 gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Tempature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
11:43	13:52	7.48	56.63	7.55	295.4	-125	0.00	1794	
12:05	12:29	8.16	56.51	7.53	294.5	-132	0.01	400.0	
12:29	12:44	5.1	56.38	7.52	293.2	-132	0.01	238.8	
10:33	12:52	2.72	56.35	7.52	293.3	-133	0.01	141.0	
12:52	12:57	1.7	56.51	7.51	293.8	-130	0.01	95.66	
12:57	13:07	3.4	56.66	7.51	295.0	-133	0.01	55.73	
13:07	13:17	3.4	56.60	7.51	294.9	-133	0.01	50.95	
13:17	13:27	3.4	56.50	7.50	294.7	-134	0.01	53.28	

Equipment Calibration Performed By: K. Powell / M. Ker

Number of Sample Containers Collected: _ 4

Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.:
OW-336

WELL SAMPLING RECORD

JOB NO.:
016120048

SITE:
Calvert Cliffs

PREPARED BY: M. Ker / K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 11/12/08
WEATHER: Overcast
TEMPERATURE: 45° F
INITIAL WATER LEVEL: 62.95 Ft
FINAL WATER LEVEL: 63.28 Ft

DATE OF SAMPLING: 11/12/08
TIME OF SAMPLING: 14:45
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: ND

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 48272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

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

1 ft^3 = 7.48 gal

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

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

$V_w = 3.14(2/24)^2 * 11.05 * 7.48 = 1.8$

$V_s = 3.14 * (4/24)^2 * 11.05 * .3 * 7.48 = 2.16$

$V_w + V_s = 3.96$ gal

Checked by: KP

FLOW RATE CALCULATION: 1 gal/179 sec*60 sec/min = 0.34 gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Tempature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
14:00	14:05	1.7	57.52	7.47	346	-79	1.07	720.4	
14:05	14:12	2.38	57.42	7.46	339.9	-114	0.05	115.5	
14:12	14:24	3.96	57.58	7.48	336.5	-134	0.02	6.53	
14:24	14:29	1.7	57.58	7.48	332.9	-140	0.02	6.09	
14:29	14:34	1.7	57.60	7.48	334.1	-140	0.02	6.45	
14:34	14:39	1.7	57.49	7.48	333.2	-140	0.03	6.12	

Equipment Calibration Performed By: K. Powell
Number of Sample Containers Collected: _ 4

Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.:
OW-423

WELL SAMPLING RECORD

JOB NO.:
016120048

SITE:
Calvert Cliffs

PREPARED BY: M. Ker / K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 11/12/08
WEATHER: Overcast
TEMPERATURE: 43° F
INITIAL WATER LEVEL: 32.05 Ft
FINAL WATER LEVEL: ND

DATE OF SAMPLING: 11/12/08
TIME OF SAMPLING: 7:10
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: 40 Ft

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 48272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

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

1 ft^3 = 7.48 gal

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

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

$V_w = 3.14 * (2/24)^2 * 10.95 * 7.48 = 1.79$

$V_s = 3.14 * (4/24)^2 * 10.95 * .3 * 7.48 = 2.14$

$V_w + V_s = 3.93$ gal

Checked by: KP

FLOW RATE CALCULATION: 1 gal/210 sec*60 sec/min = 0.29 gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Tempature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
6:08	6:36	8.12	58.57	5.06	193.4	-290	5.82	16.53	
6:36	6:46	2.9	58.57	5.07	192.3	-295	5.83	19.88	
6:46	6:56	2.9	58.60	5.07	192.2	-298	5.83	20.53	
6:56	7:06	2.9	58.64	5.08	189.9	-297	5.80	21.29	

Equipment Calibration Performed By: K. Powell

Number of Sample Containers Collected: _ 4

Schnabel
Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.:
OW-705

WELL SAMPLING RECORD

JOB NO.:
016120048

SITE:
Calvert Cliffs

PREPARED BY: M. Ker / K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 11/13/08
WEATHER: Raining
TEMPERATURE: 55^o F
INITIAL WATER LEVEL: 22.43 Ft
FINAL WATER LEVEL: 23.16 Ft

DATE OF SAMPLING: 11/13/08
TIME OF SAMPLING: 11:35
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: 33 Ft

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 48272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

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

1 ft^3 = 7.48 gal

$V_w = \Pi\ (\frac{d_w}{24})\ 2\ h * 7.48$

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

$V_w = 3.14(2/24)^2 * 29.57 * 7.48 = 4.82$

$V_s = 3.14(4/24)^2 * 17 * (.3) * 7.48 = 3.33$

$V_w + V_s = 8.15$ gal

Checked by: KP

FLOW RATE CALCULATION: 1 gal/167 sec*60 sec/min = 0.36 gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Tempature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
10:22	10:30	2.88	58.56	7.92	1.336	30	9.55	23.78	
10:30	10:45	5.4	58.56	7.92	1.336	30	9.55	23.75	
10:45	11:08	8.15	58.56	7.92	1.336	30	9.55	23.78	
11:08	11:18	3.6	58.56	7.92	1.336	30	9.55	23.70	
11:18	11:31	4.68	58.56	7.92	1.336	30	9.55	23.78	

Equipment Calibration Performed By: K. Powell / M. Ker
Number of Sample Containers Collected: _ 4

Schnabel
Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.:
OW-754

WELL SAMPLING RECORD

JOB NO.:
016120048

SITE:
Calvert Cliffs

PREPARED BY: M. Ker / K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 11/11/08
WEATHER: Clear
TEMPERATURE: 40° F
INITIAL WATER LEVEL: 33.14 Ft
FINAL WATER LEVEL: ND

DATE OF SAMPLING: 11/11/08
TIME OF SAMPLING: 14:30
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: 42 Ft

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 48272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

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

$1\ ft^3 = 7.48$ gal

$V_w = \Pi\ (\frac{d_w}{24})\ 2\ h * 7.48$

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

$V_w = 3.14 * (2/24)^2 * 10.86 * 7.48 = 1.77$

$V_s = 3.14 * (4/24)^2 * 10.86 * 7.48 * (0.3) = 2.13$

$V_w + V_s = 3.90$ gal

Checked by: KP

FLOW RATE CALCULATION: 1 gal/295 sec*60 sec/min = 0.20 gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Tempature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
13:17	13:55	7.6	57.28	7.42	1393	26	1.42	19.76	
13:55	14:00	1.0	57.34	7.49	1396	20	1.41	20.10	
14:00	14:05	1.0	57.30	7.52	1397	21	1.24	21.52	
14:05	14:10	1.0	57.32	7.54	1398	22	1.43	21.77	
14:10	14:15	1.0	57.30	7.56	1396	21	1.50	21.34	
14:15	14:20	1.0	57.33	7.56	1403	22	1.40	20.27	
14:20	14:25	1.0	57.31	7.57	1402	20	1.55	21.40	

Equipment Calibration Performed By: K. Powell
Number of Sample Containers Collected: _ 4

Schnabel
Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.:
OW-756

WELL SAMPLING RECORD

JOB NO.:
016120048

SITE:
Calvert Cliffs

PREPARED BY: M. Ker / K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 11/12/08
WEATHER: Overcast
TEMPERATURE: 45° F
INITIAL WATER LEVEL: 31.88 Ft
FINAL WATER LEVEL: 32.09 Ft

DATE OF SAMPLING: 11/12/08
TIME OF SAMPLING: 16:00
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: ND

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 48272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

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

1 ft^3 = 7.48 gal

V_w=Ⅱ ($\underline{d_w}$) 2 h * 7.48
24

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

$V_w = 3.14 * (2/24)^2 * 10.12 * 7.68 = 1.69$

$V_s = 3.14 * (4/24)^2 * 10.12 * (.3)(7.68) = 2.03$

$V_w + V_s = 3.72$ gal

Checked by: KP

FLOW RATE CALCULATION: 1 gal/192 sec*60 sec/min = 0.31 gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Tempature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
15:05	15:12	2.19	57.30	5.66	37.14	75	7.86	197.3	
15:12	15:17	1.55	57.30	5.41	37.00	118	7.77	25.35	
15:17	15:29	3.72	57.40	5.31	36.86	159	7.79	12.86	
15:29	15:41	3.72	57.34	5.29	36.74	195	7.81	16.11	
15:41	15:46	1.55	57.38	5.28	36.68	203	7.81	16.77	
15:46	15:51	1.55	57.39	5.29	36.69	213	7.81	16.25	
15:51	15:56	1.55	57.38	5.28	36.68	220	7.81	17.11	

Equipment Calibration Performed By: K. Powell
Number of Sample Containers Collected: _ 4

Schnabel
Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.:
OW-774A

WELL SAMPLING RECORD

JOB NO.:
016120048

SITE:
Calvert Cliffs

PREPARED BY: M. Ker / K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 11/12/08
WEATHER: Overcast
TEMPERATURE: 45° F
INITIAL WATER LEVEL: 10.45 Ft
FINAL WATER LEVEL: 12.99 Ft

DATE OF SAMPLING: 11/12/08
TIME OF SAMPLING: 13:30
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: 21 Ft

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 48272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

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

1 ft ^{3} = 7.48 gal

$V_w = Ⅱ\ (\frac{d_w}{24})\ 2\ h * 7.48$

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

$V_w = 3.14 * (2/24)^2 * 12.55 * 7.48 = 2.04$

$V_s = 3.14 * (4/24)^{2\,*}\ 12.55 *.3 * 7.48 = 2.46$

$V_w + V_s = 4.5$ gal

Checked by: KP

FLOW RATE CALCULATION: 1 gal/169 sec*60 sec/min = 0.35 gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Tempature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
12:35	12:40	1.75	62.84	6.81	919.3	-60	0.14	1461	
12:40	12:53	4.55	62.93	6.76	990.8	-91	0.01	1.795	
12:53	13:06	4.55	63.07	6.75	1013	-97	0.01	11.22	
13:06	13:11	1.75	62.98	6.75	1017	-99	0.01	19.92	
13:11	13:16	1.75	62.80	6.76	1013	-101	0.01	19.71	
13:16	13:21	1.75	62.75	6.76	1014	-101	0.01	18.77	
13:21	13:26	1.75	62.76	6.76	1014	-102	0.01	18.62	

Equipment Calibration Performed By: K. Powell
Number of Sample Containers Collected: _ 4

Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.:
OW-774B

WELL SAMPLING RECORD

JOB NO.:
016120048

SITE:
Calvert Cliffs

PREPARED BY: M. Ker / K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 11/12/08
WEATHER: Overcast
TEMPERATURE: 45° F
INITIAL WATER LEVEL: 10.30 Ft
FINAL WATER LEVEL: 36.10 Ft

DATE OF SAMPLING: 11/12/08
TIME OF SAMPLING: 12:30
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: 37 Ft

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 48272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

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

1 ft^3 = 7.48 gal

$V_w = \Pi\ (\frac{\underline{d_w}}{24})\ 2\ h * 7.48$

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

$V_w = 3.14(2/24)^2 * 42.5 * 7.48 = 6.93$

$V_s = 3.14(4/24)^2 * 15.3 * .3 * 7.48 = 2.99$

$V_w + V_s = 9.92$ gal

Checked by: KP

FLOW RATE CALCULATION: 1 gal/348 sec*60 sec/min = 0.17 gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Tempature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
9:35	11:24	19.84	58.17	7.49	420.5	-145	1.11	21.21	
11:24	11:34	1.7	58.66	7.40	447.2	-164	0.16	15.10	
11:34	11:44	1.7	58.37	7.38	447.6	-170	0.82	5.72	
11:44	11:54	1.7	58.48	7.37	449.5	-181	0.10	3.93	
11:54	12:04	1.7	58.53	7.37	448.5	-187	0.09	7.85	
12:04	12:14	1.7	58.54	7.36	447.0	-192	0.08	14.68	
12:14	12:19	0.85	58.67	7.36	446.2	-194	0.05	14.99	
12:19	12:26	1.19	58.69	7.36	448.0	-195	0.04	15.79	

Equipment Calibration Performed By: K. Powell

Number of Sample Containers Collected: _ 4

Schnabel
Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.: OW-301

WELL SAMPLING RECORD

JOB NO.:
06120048

SITE:
Calvert Cliffs

PREPARED BY: K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 1/20/09
WEATHER: Cold-overcast
TEMPERATURE: 20°
INITIAL WATER LEVEL: 59.60'
FINAL WATER LEVEL: 60.02'

DATE OF SAMPLING: 1/20/09
TIME OF SAMPLING: 06:40
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: ~73'

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 47272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

$V_w=\Pi\ (2/24)^2\ [80-59.60](7.48)$

$=3.3$ gal

$V_s=\Pi[(4/24)^2-(2/24)^2][80-61](7.48)(0.3)$

$=2.79$gal Vt=6gal

dw - well diameter (in)
h-well depths (ft)
n-porosity (0.3)
d_b - Boring diameter

$1\ ft^3 = 7.48$ gal

$V_w=\Pi\ (\underline{dw/24})^2 * h * 7.48$

$V_s = \Pi\ [(\underline{db/24})^2-(\underline{dw/24})^2] * h * 7.48 * n$

$V_t = V_w+V_s$

Checked by: KMP

FLOW RATE CALCULATION: (1gal/7.5 min) = 0.667 gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temperature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
6:00	6:20	13.3	57.67	7.49	361.6	-121.0	0.02	9.882	
6:20	6:30	6.7	57.67	7.48	361.8	-129.0	0.03	3.055	
6:30	6:35	3.3	57.77	7.48	362.4	-131.0	0.03	3.805	
6:35	6:40	3.3	57.78	7.48	362.7	-131.0	0.03	3.627	

Equipment Calibration Performed By: Kibby Powell For DO, pH, turbidity, conductivity and ORP

Number of Sample Containers Collected: 4

Schnabel Engineering, LLC

PROJECT: Calvert Cliffs Power Plant

WELL NO.: OW-304

WELL SAMPLING RECORD

JOB NO.: 06120048

SITE: Calvert Cliffs

PREPARED BY: K. Powell

PURGE METHOD: Sub-pump

SAMPLING METHOD: Grab

PURGING CRITERIA: Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 1/19/09
WEATHER: Cold-cloudy
TEMPERATURE: 35°
INITIAL WATER LEVEL: 36.43'
FINAL WATER LEVEL: 41.41'

DATE OF SAMPLING: 1/19/09
TIME OF SAMPLING: 13:30
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET:~ 56'

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 47272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

$Vw=\pi\ (2/24)^2\ [72.8-36.43](7.48)$

$=5.9$ gal

$Vs=\pi[(4/24)^2-(2/24)^2][72.8-57.5](7.48)(0.3)=2.24$

Vt=8.1gal

dw - well diameter (in)
h-well depths (ft)
n-porosity (0.3)
d_b - Boring diameter

$1\ ft^3 = 7.48$ gal

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

$V_s = \pi\ [(\underline{db/24})^2-(\underline{dw/24})^2] * h * 7.48 * n$

$V_t = V_w+V_s$

Checked by: KMP

FLOW RATE CALCULATION: (5gal/11min) = 0.45gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temperature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
9:10	10:23	32.9	56.55	9.26	304.5	-76	2.38	2782	
10:23	11:36	32.9	57.58	7.63	389.6	-166	0.04	10.37	
11:36	12:13	16.7	57.76	7.61	381.7	-165	0.02	2.776	
12:13	12:50	16.7	57.66	7.61	382.2	-165	0.02	3.012	
12:50	13:27	16.7	57.60	7.61	379.5	-165	0.02	2.719	

Equipment Calibration Performed By: Kibby Powell For DO, pH, turbidity, conductivity and ORP

Number of Sample Containers Collected: 4

Schnabel
Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.: OW-308

WELL SAMPLING RECORD

JOB NO.:
06120048

SITE:
Calvert Cliffs

PREPARED BY: K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 1/20/09
WEATHER: Cold/windy/overcast
TEMPERATURE: 25°
INITIAL WATER LEVEL: 77.23'
FINAL WATER LEVEL: 79.46'

DATE OF SAMPLING: 1/20/09
TIME OF SAMPLING: 07:45
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: ~88'

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 47272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

$Vw=\Pi (2/24)^2 [103-77.23](7.48)$

$=4.20$ gal

$Vs=\Pi[(4/24)^2-(2/24)^2][103-88](.03)(7.48)$

$=2.20$gal Vt=6.4gal

dw - well diameter (in)
h-well depths (ft)
n-porosity (0.3)
d_b - Boring diameter

$1\ ft^3 = 7.48$ gal

$V_w=\Pi\ (\underline{dw/24})^2 * h * 7.48$

$V_s = \Pi\ [(\underline{db/24})^2-(\underline{dw/24})^2] * h *7.48 * n$

$V_t = V_w+V_s$

Checked by: KMP

FLOW RATE CALCULATION: (1gal/1.5min) = 0.667gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temperature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
6:55	7:15	13.3	58.65	7.89	310.8	-171	0.01	67.33	
7:15	7:25	6.7	58.75	7.78	314.9	-170	0.02	31.11	
7:30	7:35	3.3	58.66	7.77	313.9	-172	0.02	31.54	
7:35	7:40	3.3	58.66	7.76	313.6	-173	0.02	31.07	

Equipment Calibration Performed By: Kibby Powell For DO, pH, turbidity, conductivity and ORP
Number of Sample Containers Collected: 4

Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.: OW-313A

WELL SAMPLING RECORD

JOB NO.:
06120048

SITE:
Calvert Cliffs

PREPARED BY: K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 1/19/09
WEATHER: Cold-clear
TEMPERATURE: 35°
INITIAL WATER LEVEL: 20.55'
FINAL WATER LEVEL: 27.78

DATE OF SAMPLING: 1/19/09
TIME OF SAMPLING: 08:50
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: ~38'

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 47272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

$Vw=\pi\,(2/24)^2\,[57.5-20.55](7.48)$

=6.0 gal

$Vs=\pi[(4/24)^2-(2/24)^2][57.5-35](0.3)(7.48)$

=3.3gal Vt=9.3gal

dw - well diameter (in)
h-well depths (ft)
n-porosity (0.3)
d_b - Boring diameter

$1\ ft^3 = 7.48$ gal

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

$V_s = \pi\,[\underline{(db/24)^2-(dw/24)^2}] * h * 7.48 * n$

$V_t = V_w+V_s$

Checked by: KMP

FLOW RATE CALCULATION: (5gal/575s)(60s/1min) = 0.52gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Tempature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
7:45	8:10	13	55.33	7.73	249.5	-89	2.63	ND	
8:10	8:27	8.8	56.14	7.71	273.6	-159	0.01	2.126	
8:27	8:37	5.2	56.19	7.69	276.4	-170	0.01	0.0104	
8:37	8:47	5.2	56.20	7.68	276.7	-176	0.01	0.0281	
8:47	8:50	1.56	56.18	7.68	278.4	-174	0.00	0.1264	

Equipment Calibration Performed By: Kibby Powell For DO, pH, turbidity, conductivity and ORP
Number of Sample Containers Collected: 4

Schnabel
Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.: 319A

WELL SAMPLING RECORD

JOB NO.:
06120048

SITE:
Calvert Cliffs

PREPARED BY: K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 1/20/09
WEATHER: Cold-clear
TEMPERATURE: 35°
INITIAL WATER LEVEL: 26.25'
FINAL WATER LEVEL: ND

DATE OF SAMPLING: 1/20/09
TIME OF SAMPLING: 14:00
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: ~32'

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 47272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

$Vw=\pi\ (2/24)^2[35-26.25]\ (7.48)$

=1.4 gal

$Vs=\pi[(4/24)^2-(2/24)^2][35-26.25](0.3)(7.48)$

=1.3gal Vt=2.8gal

dw - well diameter (in)
h-well depths (ft)
n-porosity (0.3)
d_b - Boring diameter

$1\ ft^3 = 7.48$ gal

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

$V_s = \pi\ [(\underline{db/24})^2-(\underline{dw/24})^2] * h *7.48 * n$

$V_t = V_w+V_s$

Checked by: KMP

FLOW RATE CALCULATION: Could not calculate, well would not stabilize

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temperature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
13:40	13:43	ND	57.69	6.86	111.7	-32	6.38	2341	*Well pumped dry,
									could not maintain
									flow rate

Equipment Calibration Performed By: Kibby Powell For DO, pH, turbidity, conductivity and ORP
Number of Sample Containers Collected: 4

Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.: OW-319B

WELL SAMPLING RECORD

JOB NO.:
06120048

SITE:
Calvert Cliffs

PREPARED BY: K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 1/20/09
WEATHER: Cold-clear
TEMPERATURE: 35°
INITIAL WATER LEVEL: 68.38'
FINAL WATER LEVEL: 68.85'

DATE OF SAMPLING: 1/20/09
TIME OF SAMPLING: 13:30
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: ~75'

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 47272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

$Vw=\pi\ (2/24)^2[85-68.38]\ (7.48)$

$=2.71$ gal

$Vs=\pi[(4/24)^2-(2/24)^2][85-68.38](0.3)(7.48)$

$=2.44$gal $\qquad$ $Vt=5.15$gal

dw - well diameter (in)
h-well depths (ft)
n-porosity (0.3)
d_b - Boring diameter

$1\ ft^3 = 7.48$ gal

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

$V_s = \pi\ [(\underline{db/24})^2-(\underline{dw/24})^2] * h * 7.48 * n$

$V_t = V_w+V_s$

Checked by: KMP

FLOW RATE CALCULATION: (1gal/110s)(60s/1min) = 0.54gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temperature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
12:45	13:07	12.00	56.46	6.62	364.70	37	3.51	869.1	
13:07	13:13	3.30	57.58	7.17	370.60	-137	0.02	7.152	
13:13	13:19	3.30	57.56	7.17	371.60	-138	0.02	7.457	
13:19	13:25	3.30	57.69	7.18	371.90	-139	0.02	7.168.	

Equipment Calibration Performed By: Kibby Powell For DO,pH, turbidity, conductivity and ORP

Number of Sample Containers Collected: 4

Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.: OW-323A

WELL SAMPLING RECORD

JOB NO.:
16120048

SITE:
Calvert Cliffs

PREPARED BY: K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 1/20/09
WEATHER: Cold-sunny
TEMPERATURE: 25°
INITIAL WATER LEVEL: 29.54'
FINAL WATER LEVEL: 30.05'

DATE OF SAMPLING: 1/20/09
TIME OF SAMPLING: 09:50
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: ~35'

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 47272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

$Vw=\pi\ (2/24)^2[43.5-29.54]\ (7.48)$

=2.3 gal

$Vs=\pi[(4/24)^2-(2/24)^2][43.5-29.542](0.3)(7.48)$

=2.05gal Vt=4.3

dw - well diameter (in)
h-well depths (ft)
n-porosity (0.3)
d_b - Boring diameter

$1\ ft^3 = 7.48\ gal$

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

$V_s = \pi\ [(\underline{db/24})^2-(\underline{dw/24})^2] * h *7.48 * n$

$V_t = V_w+V_s$

Checked by: KMP

FLOW RATE CALCULATION: (1gal/1 min40s) = 0.6gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temperature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
9:15	9:31	9.6	57.02	4.81	48.47	289	6.19	0.000	
9:31	9:36	3.0	57.01	4.80	48.42	293	6.22	0.030	
9:36	9:41	3.0	56.99	4.81	48.16	300	6.28	0.2364	
9:41	9:46	3.0	56.99	4.81	48.22	303	6.30	0.2126	

Equipment Calibration Performed By: Kibby Powell For DO, pH, turbidity, conductivity and ORP

Number of Sample Containers Collected: 4

Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.: OW-328

WELL SAMPLING RECORD

JOB NO.:
06120048

SITE:
Calvert Cliffs

PREPARED BY: K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 1/19/09
WEATHER: Cold-overcast
TEMPERATURE: 35°
INITIAL WATER LEVEL: 49.52'
FINAL WATER LEVEL: 52.50'

DATE OF SAMPLING: 1/19/09
TIME OF SAMPLING: 15:05
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: ~60'

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 47272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

$Vw=\pi (2/24)^2 [72-49.52](7.48)$

$=3.7$ gal

$Vs=\pi[(4/24)^2-(2/24)^2][72-56.5](7.48)(0.3)$

$=2.276$gal Vt=5.8gal

dw - well diameter (in)
h-well depths (ft)
n-porosity (0.3)
d_b - Boring diameter

$1 \text{ ft}^3 = 7.48$ gal

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

$V_s = \pi \underline{[(db/24)^2-(dw/24)^2]} * h * 7.48 * n$

$V_t = V_w+V_s$

Checked by: KMP

FLOW RATE CALCULATION: (5gal/8.5min)=0.588gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temperature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
14:25	14:35	5.9	57.40	7.73	298.7	-92	0.11	58.94	
14:35	14:45	5.9	57.66	7.54	300.3	-130	0.01	58.77	
14:45	14:50	3.0	57.79	7.53	301.3	-110	0.00	51.00	
14:50	14:55	3.0	57.79	7.53	301.4	-114	0.00	51.5	
14:55	15:00	3.0	57.79	7.53	301.6	-116	0.01	50.83	

Equipment Calibration Performed By: Kibby Powell For DO, pH, turbidity, conductivity and ORP

Number of Sample Containers Collected: 4

G:\2006\06120048 Calvert Cliffs\CALVERT PHASE 2\Field Documents\Groundwater Sampling\OW-328 1-19-09

Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.: OW-336

WELL SAMPLING RECORD

JOB NO.:
06120048

SITE:
Calvert Cliffs

PREPARED BY: K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 1/20/09
WEATHER: Cold-clear
TEMPERATURE: 25°
INITIAL WATER LEVEL: 61.82'
FINAL WATER LEVEL: 62.45'

DATE OF SAMPLING: 1/20/09
TIME OF SAMPLING: 08:45
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: ND

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 47272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

$Vw=\pi\ (2/24)^2[74-61.82]\ (7.48)$

$=1.98$ gal

$Vs=\pi[(4/24)^2-(2/24)^2][74-61.82](0.3)(7.48)$

$=1.78$gal Vt=3.6

dw - well diameter (in)

h-well depths (ft)

n-porosity (0.3)

d_b - Boring diameter

$1\ ft^3 = 7.48$ gal

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

$V_s = \pi\ [\underline{(db/24)^2-(dw/24)^2}] * h * 7.48 * n$

$V_t = V_w+V_s$

Checked by: KMP

FLOW RATE CALCULATION: 1gal/1 min 25s = 0.705gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temperature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
8:00	8:20	14.1	57.49	7.63	306.3	-95	0.15	816.5	
8:20	8:30	7.1	57.57	7.56	308.5	-123	0.08	8.721	
8:30	8:35	3.5	57.58	7.56	309.3	-124	0.10	8.725	
8:35	8:40	3.5	57.58	7.56	309.1	-124	0.11	8.727	

Equipment Calibration Performed By: Kibby Powell For DO, pH, turbidity, conductivity and ORP

Number of Sample Containers Collected: 4 @ well and 4 samples for duplicate

Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.: OW-423

WELL SAMPLING RECORD

JOB NO.:
06120048

SITE:
Calvert Cliffs

PREPARED BY: K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 1/20/09
WEATHER: Cold-clear
TEMPERATURE: 35°
INITIAL WATER LEVEL: 32.05'
FINAL WATER LEVEL: 32.73

DATE OF SAMPLING: 1/20/09
TIME OF SAMPLING: 15:00
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: ~40'

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 47272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

$Vw=\pi\ [43-32.05](2/24)^2\ (7.48)$

$=1.79$ gal

$Vs=\pi[(4/24)^2-(2/24)^2][43-32.05](0.3)(7.48)$

$=1.6$gal $Vt=3.4$gal

dw - well diameter (in)
h-well depths (ft)
n-porosity (0.3)
d_b - Boring diameter

$1\ ft^3 = 7.48$ gal

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

$V_s = \pi\ [\underline{(db/24)^2-(dw/24)^2}] * h * 7.48 * n$

$V_t = V_w+V_s$

Checked by: KMP

FLOW RATE CALCULATION: (1gal/102s)(60s/min) = 0.588gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temperature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
14:15	14:29	8.2	56.89	5.67	252.7	102	10.84	834.5	
14:29	14:36	4.1	59.17	5.15	175.0	247	5.45	13.96	
14:36	14:43	4.1	59.25	5.15	178.8	251	5.46	13.93	
14:43	14:50	4.1	59.47	5.15	178.6	254	5.45	13.02	

Equipment Calibration Performed By: Kibby Powell For DO, pH, turbidity, conductivity and ORP

Number of Sample Containers Collected: 4

Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.: OW-705

WELL SAMPLING RECORD

JOB NO.:
06120048

SITE:
Calvert Cliffs

PREPARED BY: K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 1/19/09
WEATHER: Cold-overcast
TEMPERATURE: 35°
INITIAL WATER LEVEL: 21.02'
FINAL WATER LEVEL: 29.75'

DATE OF SAMPLING: 1/19/09
TIME OF SAMPLING: 14:15
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: ~35'

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 47272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

$Vw=\Pi\ (2/24)^2\ [52-21.02](7.48)$

=5.1gal

$Vs=\Pi[(4/24)^2-(2/24)^2][52-35](7.48)(0.3)$

=2.5gal Vt 7.5gal

dw - well diameter (in)
h-well depths (ft)
n-porosity (0.3)
d_b - Boring diameter

$1\ ft^3 = 7.48$ gal

$V_w=\Pi\ \underline{(dw/24)}^2 * h * 7.48$

$V_s = \Pi\ [\underline{(db/24)^2-(dw/24)^2}] * h * 7.48 * n$

$V_t = V_w+V_s$

Checked by: KMP

FLOW RATE CALCULATION: (5gal/8min) = 0.625gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temperature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
13:40	13:50	6.25	56.13	7.52	378.2	-75	3.39	269.7	
13:50	14:00	6.25	56.70	7.47	374.2	-125	0.01	140.3	
14:00	14:05	3.13	56.73	7.47	375.0	-128	0.02	80.77	
14:05	14:10	3.13	56.68	7.46	379.1	-129	0.01	83.49	
14:10	14:15	3.13	56.68	7.46	378.7	-129	0.01	81.48	

Equipment Calibration Performed By: Kibby Powell For DO, pH, turbidity, conductivity and ORP

Number of Sample Containers Collected: A 4

G:\2006\06120048 Calvert Cliffs\CALVERT PHASE 2\Field Documents\Groundwater Sampling\OW-705 1-19-09

Schnabel
Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.: OW-754

WELL SAMPLING RECORD

JOB NO.:
06120048

SITE:
Calvert Cliffs

PREPARED BY: K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 1/20/09
WEATHER: Cold-clear
TEMPERATURE: 30°
INITIAL WATER LEVEL: 37.03'
FINAL WATER LEVEL: 34.52'

DATE OF SAMPLING: 1/20/09
TIME OF SAMPLING: 10:50
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: ~41'

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 47272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

$Vw=\pi\ (2/24)^2[44-37.03]\ (7.48)$

$=1.1$ gal

$Vs=\pi[(4/24)^2-(2/24)^2][44-37.03](0.3)(7.48)$

$=1.0$gal Vt=2.16gal

dw - well diameter (in)
h-well depths (ft)
n-porosity (0.3)
d_b - Boring diameter

$1\ ft^3 = 7.48$ gal

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

$V_s = \pi\ [(\underline{db/24})^2-(\underline{dw/24})^2] * h * 7.48 * n$

$V_t = V_w+V_s$

Checked by: KMP

FLOW RATE CALCULATION: (1gal/168s)(60s/1min) = 0.357gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temperature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
10:15	10:21	2.1	53.98	6.65	1365	69	2.23	440.6	
10:21	10:27	2.1	56.26	7.81	1398	-151	0.38	361.6	
									* Well pumped dry

Equipment Calibration Performed By: Kibby Powell For DO, pH, turbidity, conductivity and ORP
Number of Sample Containers Collected: 4

Schnabel
Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.: OW-774A

WELL SAMPLING RECORD

JOB NO.:
016120048

SITE:
Calvert Cliffs

PREPARED BY:

Kibby Powell

PURGE METHOD:
Sub-pump

SAMPLING
METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 1/26/09
WEATHER: Cold-overcast
TEMPERATURE: 30°
INITIAL WATER LEVEL: 10.53'
FINAL WATER LEVEL: N/A

DATE OF SAMPLING: 1/26/09
TIME OF SAMPLING: 11:30
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: 18'

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 47272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

$Vw=\pi\ (2/24)^2[23-10.53]\ (7.48)$

$= 2.0$ gal

$Vs=\pi[(4/24)^2-(2/24)^2][23-10.53](0.3)(7.48)$

$= 1.8$gal Vt=3.8gal

dw - well diameter (in)
h-well depths (ft)
n-porosity (0.3)
d_b - Boring diameter

$1\ ft^3 = 7.48$ gal

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

$V_s = \pi\ [\underline{(db/24)^2-(dw/24)^2}] * h * 7.48 * n$

$V_t = V_w+V_s$

Checked by: KMP

FLOW RATE CALCULATION: Well would not stabilize long enough to calculat

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temperature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
10:15	10:18	ND	52.36	6.87	951.5	-14	0.32	2411	
10:25	10:30	ND	53.16	6.85	975.0	-38	0.09	92.01	Well pumped dry/
									lowered pump rate
10:56	11:15	ND	53.68	6.83	992.3	-43	0.02	24.90	Pumped dry

Equipment Calibration Performed By: Kibby Powell For DO, pH, turbidity, conductivity and ORP
Number of Sample Containers Collected: 4

Schnabel
Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.: OW-774B

WELL SAMPLING RECORD

JOB NO.:
06120048

SITE:
Calvert Cliffs

PREPARED BY: Kibby Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 1/26/09
WEATHER: Cold-overcast
TEMPERATURE: 30°
INITIAL WATER LEVEL: 10.45'
FINAL WATER LEVEL: N/A

DATE OF SAMPLING: 1/26/09
TIME OF SAMPLING: 10:00
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: 45'

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 47272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

$Vw=\pi\ (2/24)^2[52.8-10.45]\ (7.48)$

$=6.9$ gal

$Vs=\pi[(4/24)^2-(2/24)^2][52.8-37.5](0.3)(7.48)$

$=2.2$gal Vt=9.1gal

dw - well diameter (in)
h-well depths (ft)
n-porosity (0.3)
d_b - Boring diameter

$1\ ft^3 = 7.48$ gal

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

$V_s = \pi\ [(\underline{db/24})^2\underline{-(dw/24})^2] * h * 7.48 * n$

$V_t = V_w+V_s$

Checked by: KMP

FLOW RATE CALCULATION: Would not stabilize long enough to calculate

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temperature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
08:30	08:45	ND	51.24	7.50	384.8	-67	2.67	156.3	* Well pump dry, would
08:55	09:03	ND	55.10	7.44	420.4	-88	1.33	42.95	not maintain a flow rate
09:15	09:18	ND	52.21	7.46	406.3	-91	0.70	41.22	* Dry

Equipment Calibration Performed By: Kibby Powell For DO, pH, turbidity, conductivity and ORP

Number of Sample Containers Collected: 4

Schnabel Engineering, LLC

PROJECT:
Calvert Cliffs Power Plant

WELL NO.: OW-756

WELL SAMPLING RECORD

JOB NO.:
06120048

SITE:
Calvert Cliffs

PREPARED BY: K. Powell

PURGE METHOD:
Sub-pump

SAMPLING METHOD:
Grab

PURGING CRITERIA:
Volume & Stabilization

PUMP TYPE: Proactive S.S. Mega Monsoon

PURGING DATE: 1/20/09
WEATHER: Cold-clear
TEMPERATURE: 32°
INITIAL WATER LEVEL: 31.99'
FINAL WATER LEVEL: 32.30'

DATE OF SAMPLING: 1/20/09
TIME OF SAMPLING: 13:17
SAMPLE MATRIX: Groundwater
DEPTH PUMP SET: ~39'

EQUIPMENT WITH SERIAL NUMBERS:
In-Situ Troll 9500 (SN: 47272)
Solnist Water Level Indicator (SN: 51787)

PUMPING VOLUME CALCULATION

$Vw=\Pi\ (2/24)^2[42-31.99]\ (7.48)$

$=1.63$ gal

$Vs=\Pi[(4/24)^2-(2/24)^2][42-31.99](0.3)(7.48)$

$=1.47$gal Vt=3.1gal

dw - well diameter (in)
h-well depths (ft)
n-porosity (0.3)
d_b - Boring diameter

$1\ ft^3 = 7.48$ gal
$V_w=\Pi\ (\underline{dw/24})^2 * h * 7.48$
$V_s = \Pi\ [(\underline{db/24})^2-(\underline{dw/24})^2] * h * 7.48 * n$
$V_t = V_w+V_s$

Checked by: KMP

FLOW RATE CALCULATION: (1gal/92s)(60s/min) = 0.65gal/min

COMMENTS

Time Begin (hrs)	Time Finish (hrs)	Water Removal (gal)	Temperature (°F)	pH (± 0.1)	Conductivity (u sie/cm) (± 3%)	ORP (mV) (± 10mV)	DO (mg/L) (± 0.3mg/L)	Turbidity (NTU) (± 1 or 10%)	Comments
11:45	11:55	6.5	55.06	8.12	40.34	36	7.70	2755	
11:55	12:00	3.3	57.36	5.63	36.69	163	7.41	29.7	
12:00	12:05	3.3	57.29	5.38	36.38	228	7.46	2.579	
12:05	12:10	3.3	57.26	5.38	36.33	232	7.46	2.215	
12:10	12:15	3.3	57.37	5.37	36.35	238	7.47	2.274	

Equipment Calibration Performed By: Kibby Powell For DO, pH, turbidity, conductivity and ORP
Number of Sample Containers Collected: 4

G:\2006\06120048 Calvert Cliffs\CALVERT PHASE 2\Field Documents\Groundwater Sampling\OW-756 1-20-09

TRACEABILITY RECORDS
(17 Pages)

TRACEABILITY RECORD

Project: Calvert Cliffs Project No. ________
Shipped By: Kibby Powell Hazardous Materials
Shipped To: Ivan Vania Suspected? (Yes [✓ No])

Sampling Point	Location	Field I.D.	Date	Sample Type	No. of Containers	Test(s) Required
OW-319B	Calvert Cliff	OW-319B	11/11/08	GW	4	TDS, ALK, Ammon, Metals,
						CO2/Carb/Bicarb/Cation
OW-319A	Calvert Cliff	OW-319A	11/11/08	GW	4	"
OW-754	Calvert Cliff	OW-754	11/11/08	GW	4	"
OW-323	Calvert Cliff	OW-323	11/11/08	GW	4	"
OW-323 Dup	Calvert Cliff	OW-323	11/11/08	GW	4	"

Field I.D.	Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
		11/11/08				

Shipment Prepared By: K. Powell Date/Time: 11/11/08 5:30 pm
Signature:

Received for Lab By: Date/Time: 11.12.08 0915
Signature:

Comments: ____________________

Note: Receiving lab – return original form after signing for receipt of samples.

Schnabel Engineering, Inc.

Chain of Custody Record

TAL-4124 (1007)

Temperature on Receipt ______

Drinking Water? Yes ☐ No ☐

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Client: Schnabel

Project Manager: Kibby Powell

Date: 11/11/08

Chain of Custody Number: 101532

Address: 656 Quince Orchard Road, Suite 700

Telephone Number (Area Code)/Fax Number: 240-793-5683

Lab Number:

Page 1 of 1

City: Gaithersburg

State: MD

Zip Code: 20878

Site Contact:

Lab Contact: Ivan Vania

Project Name and Location (State): Calvert Cliff, Maryland

Carrier/Waybill Number:

Contract/Purchase Order/Quote No.:

			Matrix					Containers & Preservatives							Analysis (Attach list if more space is needed)												Special Instructions/ Conditions of Receipt
Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Air	Aqueous	Sed.	Soil		Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH		Sulfide	Anion	Alk	TDS	NH3	Metals							
OW-319B	11/11/08	10:40		X					X	X			X		✓	✓	✓	✓	✓	✓							2x500P, 2x250P (1M)
OW-319 A	11/11/08	11:50		X					X	X			X		✓	✓	✓	✓	✓	✓							
OW-754	11/11/08	2:30		X					X	X			X		✓	✓	✓	✓	✓	✓							
OW-323	11/11/08	4:10		X					X	X			X		✓	✓	✓	✓	✓	✓							
OW-323 Dup	11/11/08	4:10		X					X	X			X		✓	✓	✓	✓	✓	✓							

500P w/

Possible Hazard Identification

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal

☐ Return To Client ☑ Disposal By Lab ☐ Archive For ______ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required

☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☑ Other standard

QC Requirements (Specify)

1. Relinquished By: Date 11/11/08 Time 5:30pm
1. Received By: Date 11.12.08 Time 0915
2. Relinquished By: Date Time
2. Received By: Date Time
3. Relinquished By: Date Time
3. Received By: Date Time

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

TRACEABILITY RECORD

Project: Calvert Cliff
Project No. ________
Shipped By: Kibby Powell, Schnabel
Hazardous Materials Suspected? (Yes [✓ No])
Shipped To: Ivan Vania

Sampling Point	Location	Field I.D.	Date	Sample Type	No. of Containers	Test(s) Required
OW-423	CCLIFF	OW-423	11/12/08	GW	4	Metals, Anions, Alk, TDS Sulfide, Ammonia
OW-774B	CCLIFF	OW-774B	11/12/08	GW	4	
OW-774A	CCLIFF	OW-774A	11/12/08	GW	4	
OW-336	C CLIFF	OW-336	11/12/08	GW	4	
OW-756	C CLIFF	OW-756	11/12/08	GW	4	
OW-361	C CLIFF	OW-301	11/12/08	GW	4	
EB	C CLIFF	EB	11/12/08	GW	4	

Field I.D.	Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time

Shipment Prepared By: K. Powell
Date/Time: 11/12/08 17:40
Signature:

Received for Lab By: AngelaBoon
Date/Time: 11/13/08 9:30
Signature:

Comments: ______________________

Note: Receiving lab – return original form after signing for receipt of samples.

Schnabel Engineering, Inc.

Chain of Custody Record

Temperature on Receipt ______

Drinking Water? Yes ☐ No ☑

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TAL-4124 (1007)

Client: Schnabel

Project Manager: Kibby Powell

Date: 11/12/08

Chain of Custody Number: 101533

Address: 656 Quince Orchard Road, suite 700

Telephone Number (Area Code)/Fax Number: 240-793-5683

Lab Number:

Page 1 of 1

City: Gaithersburg

State: MD

Zip Code: 20878

Site Contact:

Lab Contact: Ivan Vania

Project Name and Location (State): Calvert Cliff

Carrier/Waybill Number: Fed Ex

Contract/Purchase Order/Quote No.:

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil		Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Analysis (Attach list if more space is needed): Metals	Anions	Alk	TDS	Sulfide	NH3						Special Instructions/ Conditions of Receipt
OW-423	11/12/08	7:10		X					X	X		X	X	✓	✓	✓	✓	✓	✓	2X500	2X250	1 metal			AB 11-13-08 [illegible] in [illegible]
OW-774 A	11/12/08	13:30		X					X	X		X	X	✓	✓	✓	✓	✓	✓						
OW-774 B	11/12/08	12:30		X					X	X		X	X	✓	✓	✓	✓	✓	✓						
OW-336	11/12/08	14:45		X					X	X		X	X	✓	✓	✓	✓	✓	✓						
OW-756	11/12/08	16:00		X					X	X		X	X	✓	✓	✓	✓	✓	✓						
OW-301	11/12/08	17:15		X					X	X		X	X	✓	✓	✓	✓	✓	✓						
EB	11/12/08	17:30		X					X	X		X	X	✓	✓	✓	✓	✓	✓						

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ______ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☑ Other Standard

QC Requirements (Specify)

1. Relinquished By	Date 11/12/08	Time 17:40	1. Received By Angie Boon	Date 11/13/08	Time 9:30
2. Relinquished By	Date	Time	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

TRACEABILITY RECORD

Project: Calvert Cliff
Project No. ________
Shipped By: Kibby Powell / Schnabel Engin
Hazardous Materials
Shipped To: Ivan Vania / Test America
Suspected? (Yes [✓ No])

Sampling Point	Location	Field I.D.	Date	Sample Type	No. of Containers	Test(s) Required
OW-313A	Calvert Cliff	OW-313A	11/13/08	GW	4	Metals, Anions, Alk, Nitrate,
—	—	—	—	—	—	Nitrite, TDS, Sulfid, Amo
OW-304	Calvert CLIFF	OW-304	11/13/08	GW	4	
OW-705	Calvert CLIFF	OW-705	11/13/08	GW	4	
OW-328	Calvert CLIFF	OW-328	11/13/08	GW	4	
OW-308	Calvert CLIFF	OW-308	11/13/08	GW	4	

Field I.D.	Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time

Shipment Prepared By: K. Powell / M. Ker
Date/Time: 11/13/08/16:30
Signature:

Received for Lab By: Angela Boon
Date/Time: 11/14/08 9:15
Signature:

Comments: ______________________

Note: Receiving lab – return original form after signing for receipt of samples.

Schnabel Engineering, Inc.

18

Chain of Custody Record

Temperature on Receipt ______

Drinking Water? Yes ☐ No ☒

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TAL-4124 (1007)

Client: Schnabel Engineering

Project Manager: Kibby Powell

Date: 11/13/08

Chain of Custody Number: 101534

Address: 656 Quince Orchard Rd, Suite 700

Telephone Number (Area Code)/Fax Number: 240-793-5683 / 301-417-2400

Lab Number:

Page 1 of 1

City: Gaithersburg

State: MD

Zip Code: 20878

Site Contact:

Lab Contact: Ivan Vania

Project Name and Location (State): Calvert Cliff, Lusby, MD

Carrier/Waybill Number: Fed Ex

Contract/Purchase Order/Quote No.

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil		Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH		Analysis: Metals	Anions	Alk	TDS	Sulfides	Amon/Nitrate	Nitrite						Special Instructions/ Conditions of Receipt
OW-313A	11/13/08	07:35		X				X	X	X		X	X		X	X	X	X	X	X	X						
DW-304	11/13/08	10:00		X				X	X	X		X	X		X	X	X	X	X	X	X						
OW-705	11/13/08	11:35		X				X	X	X		X	X		X	X	X	X	X	X	X						
OW-328	11/13/08	13:30		X				X	X	X		X	X		X	X	X	X	X	X	X						
DW-308	11/13/08	15:05		X				X	X	X		X	X		X	X	X	X	X	X	X						

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☒ Disposal By Lab ☐ Archive For ______ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☒ Other Stnd

QC Requirements (Specify)

1. Relinquished By	Date 11/13/08	Time 16:30	1. Received By Angela Boon	Date 11/14/08	Time 9:15
2. Relinquished By	Date	Time	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

Traceability Record

CCNPP 2008 Subsurface Investigation
Bechtel Job No. 25237
Schnabel Project No. 06120048

Sample ID	Sample Location Description	Sample Type	No. of Containers	Notes
OW-313A-1	OW-313A	GW	1	
OW-313A-2	OW-313A	GW	1	
OW-313A-3	OW 313A	GW	1	
OW-313A-4	OW-313A	GW	1	
OW-304-1	OW-304	GW	1	
OW-304-2	OW-304	GW	1	
OW-304-3	OW-304	GW	1	
OW-304-4	OW-304	GW	1	
OW-705-1	OW-705	GW	1	
OW-705-2	OW-705	GW	1	
OW-705-3	OW-705	GW	1	
OW-705-4	OW705	GW	1	
OW-328-1	OW-328	GW	1	
OW-328-2	OW-328	GW	1	
OW-328-3	OW-328	GW	1	
OW-328-4	OW-328	GW	1	

Notes:

Relinquished by: (Signature/Date) 1/19/09

Notes:

Received by: (Signature/Date) 1/20/09

Notes:

Relinquished by: (Signature/Date)

Notes:

Received by: (Signature/Date)

Notes:

Relinquished by: (Signature/Date)

Notes:

Received by: (Signature/Date)

Notes:

Relinquished by: (Signature/Date)

Notes:

Received by: (Signature/Date)

Notes:

[redacted]

Chain of Custody Record

CUR 258

Temperature on Receipt ______

Drinking Water? Yes ☐ No ☒

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TAL-4124 (1007)

Client: Bechtel Corporation

Project Manager: David Murphy

Date: 1/19/09

Chain of Custody Number: 101817

Address: 5275 Westview Dr

Telephone Number (Area Code)/Fax Number: 301-228-6587

Lab Number:

Page 1 of 2

City: Frederick

State: MD

Zip Code: 21703

Site Contact: Kibby Powell Schnabel

Lab Contact: Ivan

Project Name and Location (State): Calvert Cliffs, Lusby, MD

~~Carrier/Waybill Number~~ → 301-417-2400

Contract/Purchase Order/Quote No.

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix					Containers & Preservatives							Analysis (Attach list if more space is needed)												Special Instructions/ Conditions of Receipt
			Air	Aqueous	Sed.	Soil		Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH		Sulfide	Anions	Alk/TDS	NH3	Metals	500P in W/C							
DW-313A-1	1/19/09	0850		X				X								X	X										2X500P, 2X250P for all
DW-313A-2	1/19/09	0850		X								~~X~~	X		X												
DW-313A-3	1/19/09	0850		X					X	~~X~~								X									
DW-313A-4	1/19/09	0850		X						X	~~X~~								X								
DW-304-1	1/19/09	1330		X				X								X	X										
DW-304-2	1/19/09	1330		X									X		X												
DW-304-3	1/19/09	1330		X					X									X									
DW-304-4	1/19/09	1330		X						X									X								
DW-705-1	1/19/09	1415		X				X								X	X										
DW-705-2	1/19/09	1415		X									X		X												
DW-705-3	1/19/09	1415		X					X									X									
DW-705-4	1/19/09	1415		X						X									X								

Possible Hazard Identification

☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal

☐ Return To Client ☒ Disposal By Lab ☐ Archive For ______ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required

☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other______

QC Requirements (Specify)

1. Relinquished By	Date	Time	1. Received By	Date 01/20/09	Time 915
2. Relinquished By	Date	Time	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

Chain of Custody Record

CUR268

Temperature on Receipt ______

Drinking Water? Yes ☐ No ☒

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TAL-4124 (1007)

Client: Bechtel Corporation
Address: 5275 Westview Dr
City: Frederick
State: MD
Zip Code: 21703
Project Name and Location (State): Calvert Cliffs
Contract/Purchase Order/Quote No.:

Project Manager: David Murphy
Telephone Number (Area Code)/Fax Number: 301-228-6587
Site Contact: Kibby Powell Schaefel
Lab Contact: Ivan
Carrier/Waybill Number:

Date:
Lab Number:
Chain of Custody Number: 101820
Page 2 of 2

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Analysis: Sulfide	Anions	Alk/TDS	NH3	Metals	Special Instructions/ Conditions of Receipt
DW-328-1	1/19/09	1505		X			X							X	X			
DW 328-2	1/19/09	1505		X								X	X					
DW-328-3	1/19/09	1505		X				X								X		
DW-328-4	1/9/09	1505		X					X								X	

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ______ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other______

QC Requirements (Specify)

1. Relinquished By
Date
Time

1. Received By Lena [illegible]
Date 01/20/09
Time 915

2. Relinquished By
Date
Time

2. Received By
Date
Time

3. Relinquished By
Date
Time

3. Received By
Date
Time

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

Traceability Record

CCNPP 2008 Subsurface Investigation
Bechtel Job No. 25237
Schnabel Project No. 06120048

Sample ID	Sample Location Description	Sample Type	No. of Containers	Notes
OW-301-1	OW-301	GW	1	
OW-301-2	OW-301	GW	1	
OW-301-3	OW-301	GW	1	
OW-301-4	OW-301	GW	1	
OW-308-1	OW-308	GW	1	
OW-308-2	OW-308	GW	1	
OW-308-3	OW-308	GW	1	
OW-308-4	OW-308	GW	1	
OW-336-1	OW-336	GW	1	
OW-336-2	OW-336	GW	1	
OW-336-3	OW-336	GW	1	
OW-336-4	OW-336	GW	1	
OW-336-1-DUP	OW-336	GW	1	
OW-336-2-DUP	OW-336	GW	1	
OW-336-3-DUP	OW-336	GW	1	
OW-336-4-DUP	OW-336	GW	1	
OW-323-1	OW-323	GW	1	
OW-323-2	OW-323	GW	1	
OW-323-3	OW-323	GW	1	
OW-323-4	OW-323	GW	1	

Notes:

Relinquished by: (Signature/Date) 1/20/09 Notes:	Received by: (Signature/Date) 01.21.09 0930 Notes:
Relinquished by: (Signature/Date) Notes:	Received by: (Signature/Date) Notes:
Relinquished by: (Signature/Date) Notes:	Received by: (Signature/Date) Notes:
Relinquished by: (Signature/Date) Notes:	Received by: (Signature/Date) Notes:

Traceability Record

CCNPP 2008 Subsurface Investigation
Bechtel Job No. 25237
Schnabel Project No. 06120048

Sample ID	Sample Location Description	Sample Type	No. of Containers	Notes
OW-754-1	OW-754	GW	1	
OW-754-2	OW-754	GW	1	
OW-754-3	OW-754	GW	1	
OW-754-4	OW-754	GW	1	
OW-756-1	OW-756	GW	1	
OW-756-2	OW-756	GW	1	
OW-756-3	OW-756	GW	1	
OW-756-4	OW-756	GW	1	
OW-319B-1	OW-319B	GW	1	
OW-319B-2	OW-319B	GW	1	
OW-319B-3	OW-319B	GW	1	
OW-319B-4	OW-319B	GW	1	
OW-319A-1	OW-319A	GW	1	
OW-319A-2	OW-319A	GW	1	
OW-319A-3	OW-319A	GW	1	
OW-319A-4	OW-319A	GW	1	
OW-423-1	OW-423	GW	1	
OW-423-2	OW-423	GW	1	
OW-423-3	OW-423	GW	1	
OW-423-4	OW-423	GW	1	

Notes:

Relinquished by: (Signature/Date) 1/20/09 Notes:	Received by: (Signature/Date) 01.21.09 0930 Notes:
Relinquished by: (Signature/Date) Notes:	Received by: (Signature/Date) Notes:
Relinquished by: (Signature/Date) Notes:	Received by: (Signature/Date) Notes:
Relinquished by: (Signature/Date) Notes:	Received by: (Signature/Date) Notes:

Chain of Custody Record

cut 260

Temperature on Receipt ______

Drinking Water? Yes ☐ No ☒

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TAL-4124 (1007)

Client: Bechtel Corporation

Project Manager: David Murphy

Date: 1/20/09

Chain of Custody Number: 101818

Address: 5275 Westview Dr

Telephone Number (Area Code)/Fax Number: 301-228-6587

Lab Number

Page 1 of 4

City: Frederick

State: MD

Zip Code: 21703

Site Contact: Kibby Powell Schnabel

Lab Contact: Ivan

Project Name and Location (State): Calvert Cliffs, Lusby, MD

Carrier/Waybill Number

Contract/Purchase Order/Quote No.

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Analysis: Sulfide	Anions	Alk/TDS	NH3	Metals	Special Instructions/ Conditions of Receipt 500P ea. in w/c
OW-301-1	1/20/09	0640		X			X							X	X			
OW-301-2	1/20/09	0640		X								X	X					
OW-301-3	1/20/09	0640		X					X								X	
OW-301-4	1/20/09	0640		X				X								X		
OW-308-1	1/20/09	0745		X			X							X	X			
OW-308-2	1/20/09	0745		X								X	X					
OW-308-3	1/20/09	0745		X					X								X	
OW-308-4	1/20/09	0745		X				X								X		
OW-336-1	1/20/09	0845		X			X							X	X			
OW-336-2	1/20/09	0845		X								X	X					
OW-336-3	1/20/09	0845		X					X								X	
OW-336-4	1/20/09	0845		X				X								X		

Possible Hazard Identification

☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal

☐ Return To Client ☒ Disposal By Lab ☐ Archive For ______ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required

☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other______

QC Requirements (Specify)

1. Relinquished By — Date: 1/20/09 — Time: 1615
1. Received By — Date: 01.21.09 — Time: 0930
2. Relinquished By — Date — Time
2. Received By — Date — Time
3. Relinquished By — Date — Time
3. Received By — Date — Time

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

[redacted]

Chain of Custody Record

TAL-4124 (1007)

Temperature on Receipt ______

Drinking Water? Yes ☐ No ☒

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Client Bechtel Corporation	Project Manager David Murphy	Date	Chain of Custody Number 101819
Address 5275 Westview Dr	Telephone Number (Area Code)/Fax Number 301-228-6587	Lab Number	Page 2 of 4

City Frederick	State MD	Zip Code 21703	Site Contact Kibby Powell Schnabel	Lab Contact Ivan	Analysis (Attach list if more space is needed)
Project Name and Location (State) Calvert Cliff, Lusby, MD			Carrier/Waybill Number		
Contract/Purchase Order/Quote No.					

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Sulfide	Anions	Alk/TDS	NH3	Metals	Special Instructions/ Conditions of Receipt
OW-336-1-Dup	1/20/09	0845		X			X							X	X			
OW-336-2-Dup	1/20/09	0845		X								X	X					
OW-336-3-Dup	1/20/09	0845		X					X								X	
OW-336-4-Dup	1/20/09	0845		X				X								X		
OW-323-1	1/20/09	0950		X			X							X	X			
OW-323-2	1/20/09	0950		X								X	X					
OW-323-3	1/20/09	0950		X					X								X	
OW-323-4	1/20/09	0950		X				X								X		
OW-754-1	1/20/09	1050		X			X							X	X			
OW-754-2	1/20/09	1050		X								X	X					
OW-754-3	1/20/09	1050		X					X								X	
OW-754-4	1/20/09	1050		X			~~X~~	X								X		

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ______ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☒ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other______

QC Requirements (Specify)

1. Relinquished By	Date 1/20/09	Time 1615	1. Received By	Date 01-21-09	Time 0930
2. Relinquished By	Date	Time	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

Chain of Custody Record

Temperature on Receipt ______

Drinking Water? Yes ☐ No ☒

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TAL-4124 (1007)

Client: Bechtel Corporation

Project Manager: David Murphy

Date: 1/20/09

Chain of Custody Number: 101819

Address: 5275 Westview Dr

Telephone Number (Area Code)/Fax Number: 301-228-6587

Lab Number:

Page 3 of 4

City: Frederick

State: MD

Zip Code: 21703

Site Contact: Kibby Powell Schnabel

Lab Contact: Ivan

Project Name and Location (State):

Carrier/Waybill Number:

Contract/Purchase Order/Quote No.:

Analysis (Attach list if more space is needed)

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Sulfide	Anions	Alk/TDS	NH3	Metals	Special Instructions/ Conditions of Receipt
OW-756-1	1/20/09	1217		X			X							X	X			
OW-756-2	1/20/09	1217		X								X	X					
OW-756-3	1/20/09	1217		X					X								X	
OW-756-4	1/20/09	1217		X				X								X		
OW-319B-1	1/20/09	1330		X			X							X	X			
OW-319B-2	1/20/09	1330		X								X	X					
OW-319B-3	1/20/09	1330		X					X								X	
OW-319B-4	1/20/09	1330		X				X								X		
OW-319A-1	1/20/09	1400		X			X							X	X			
OW-319A-2	1/20/09	1400		X								X	X					
OW-319A-3	1/20/09	1400		X					X								X	
OW-319A-4	1/20/09	1400		X				X								X		

Possible Hazard Identification

☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal

☐ Return To Client ☒ Disposal By Lab ☐ Archive For ______ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required

☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other______

QC Requirements (Specify)

1. Relinquished By: Date 1/20/09 Time 1615
1. Received By: Date 01·21·09 Time 0930
2. Relinquished By: Date Time
2. Received By: Date Time
3. Relinquished By: Date Time
3. Received By: Date Time

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

[redacted]

Chain of Custody Record

Temperature on Receipt ______

Drinking Water? Yes ☐ No ☒

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TAL-4124 (1007)

Client: Bechtel Corporation

Project Manager: David Murphy

Date:

Chain of Custody Number: 101819

Address: 5275 Westview Dr

Telephone Number (Area Code)/Fax Number: 301-228-6587

Lab Number:

Page 4 of 4

City: Frederick

State: MD

Zip Code: 21703

Site Contact: Schnabel Kibby Powell

Lab Contact: Ivan

Project Name and Location (State): Calvert Cliffs, Lusby, MD

Carrier/Waybill Number:

Contract/Purchase Order/Quote No.:

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix					Containers & Preservatives							Analysis (Attach list if more space is needed)												Special Instructions/ Conditions of Receipt
			Air	Aqueous	Sed.	Soil		Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH		Sulfide	Anions	Alk/TDS	NH3	Metals								
OW-423-1	1/20/09	1500		X				X								X	X										
OW-423-2	1/20/09	1500		X									X		X												
OW-423-3	1/20/09	1500		X						X									X								
OW-423-4	1/20/09	1500		X					X									X									

Possible Hazard Identification

☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal

☐ Return To Client ☒ Disposal By Lab ☐ Archive For ______ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required

☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other______

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished By	1/20/09	1615	1. Received By	01.21.09	0930
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

Traceability Record

CCNPP 2008 Subsurface Investigation
Bechtel Job No. 25237
Schnabel Project No. 06120048

Sample ID	Sample Location Description	Sample Type	No. of Containers	Notes
OW-774B-1	OW-774B	GW	1	
OW-774B-2	OW-774B	GW	1	
OW-774B-3	OW-774B	GW	1	
OW-774B-4	OW-774B	GW	1	
EB-1	Equipment blank	water	1	
EB-2	Equipment blank	water	1	
EB-3	Equipment blank	water	1	
EB-4	Equipment blank	water	1	
OW-774A-1	OW-774A	GW	1	
OW-774A-2	OW-774A	GW	1	
OW-774A-3	OW-774A	GW	1	
OW-774A-4	OW-774A	GW	1	

Notes:

Relinquished by: (Signature/Date) 1/29/09

Notes:

Received by: (Signature/Date) Lisa Dietz 1/27/09

Notes:

Relinquished by: (Signature/Date)

Notes:

Received by: (Signature/Date)

Notes:

Relinquished by: (Signature/Date)

Notes:

Received by: (Signature/Date)

Notes:

Relinquished by: (Signature/Date)

Notes:

Received by: (Signature/Date)

Notes:

CUR 277

Chain of Custody Record

Temperature on Receipt ______

Drinking Water? Yes ☐ No ☒

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TAL-4124 (1007)

Client: Bechtel Corporation

Project Manager: David Murphy

Date: 1/26/09

Chain of Custody Number: 101819

Address: 5275 Westview Dr

Telephone Number (Area Code)/Fax Number: 301-228-6587

Lab Number:

Page 1 of 1

City: Frederick

State: MD

Zip Code: 21703

Site Contact: Schnabel Kibby Powell

Lab Contact: Ivan

Project Name and Location (State): Calvert Cliffs, Lusby, MD

Carrier/Waybill Number:

Contract/Purchase Order/Quote No.:

			Matrix					Containers & Preservatives							Analysis (Attach list if more space is needed)								Special Instructions/ Conditions of Receipt
Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Air	Aqueous	Sed.	Soil		Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH		Sulfide	Anions	Alk/TDS	NH3	Metals				
OW-774B-1	1/26/09	10:00		X				X								X	X					500p	
OW-774B-2	1/26/09	10:00		X									X		X							500p	
OW-774B-3	1/26/09	10:00		X						X									X			250p	
OW-774B-4	1/26/09	10:00		X					X									X				250p	
EB-1	1/26/09	10:10		X				X								X	X					500p	
EB-2	1/26/09	10:10		X									X		X							500p	
EB-3	1/26/09	10:10		X						X									X			250p	
EB-4	1/26/09	10:10		X					X									X				250p	
OW-774A-1	1/26/09	11:30		X				X								X	X					500p	
OW-774A-2	1/26/09	11:30		X									X		X							500p	
OW-774A-3	1/26/09	11:30		X						X									X			250p	
OW-774A-4	1/26/09	11:30		X					X									X				250p	

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ______ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other ______

QC Requirements (Specify)

1. Relinquished By	Date 1/29/09	Time 12:30	1. Received By	Date 1/27/09	Time 0948
2. Relinquished By	Date	Time	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

APPENDIX E

CONE PENETRATION TESTING (CPT)

CPT Report

CPT REPORT

Presentation of In Situ Testing Program Results (COL), Revision 1
ConeTec, Inc.
February 10, 2009

PRESENTATION OF IN SITU TESTING PROGRAM RESULTS
Revision 1

Calvert Cliffs Nuclear Power Plant- Unit 3
Combined Operating License (COL)
Calvert County, Maryland
August 4 through 21, 2008

Prepared for:

Schnabel Engineering
Gaithersburg, MD

Prepared by:

ConeTec Inc.
Charles City, Virginia

February 10, 2009

1.0 INTRODUCTION. 3

2.0 FIELD EQUIPMENT AND PROCEDURES 4

2.1 CONE PENETRATION TESTING 4
2.2 PORE PRESSURE DISSIPATION TESTS 6

3.0 CONE PENETRATION TEST DATA AND INTERPRETATION 8

3.1 ANALYSIS OF PIEZOCONE DATA - GENERAL 8
3.2 CONE PLOTS 9
3.3 PORE PRESSURE DISSIPATION TEST RESULTS 9
3.4 SHEAR WAVE VELOCITY MEASUREMENTS 10
3.5 CPT DATA PROCESSING 10

5.0 REFERENCES 11

TABLES

TABLE 1 Sounding Information Table
TABLE 2 Dissipation Test Summary

FIGURES

FIGURE 1 Typical Cone Penetrometer
FIGURE 2 Schematic of Shear Wave Testing Configuration
FIGURE 3 Typical Dissipation Tests

APPENDICES

APPENDIX A CPT Plots
APPENDIX B Shear Wave Velocity Test Data
APPENDIX C Pore Pressure Dissipation Tests
APPENDIX D CPT Interpretation Methods

1.0 INTRODUCTION

This report presents the results of a peizo cone penetrometer testing (CPTU) program carried out at the site of the proposed nuclear power plant structure adjacent to the existing Calvert Cliffs Nuclear Power Plant. The work was performed under subcontract to Schnabel Engineering, Inc. of Gaithersburg, Maryland. The CPTU program took place during the period of August 4th through 21st, 2008.

CPTU and SCPTU soundings were completed at eleven selected locations. The majority of the CPT soundings encountered refusal conditions before the target termination depth was achieved. In those locations, pre-drilling operations were conducted and the CPT was continued below the refusal depths. The CPT testing was performed to evaluate in situ geotechnical as well as seismic criteria. CPT sounding locations were selected and numbered under the direction of Mr. Kenneth Megginson of Schnabel Engineering.

2.0 FIELD EQUIPMENT AND PROCEDURES

2.1 CONE PENETRATION TESTING

The cone penetrometer tests were carried out using an integrated electronic seismic piezo cone. The piezo cone used was a compression model cone penetrometer with a 15 cm^2 tip and a 225 cm^2 friction sleeve. The cone is designed with an equal end area friction sleeve and a tip end area ratio of 0.80. The piezo cone dimensions and the operating procedure were in accordance with ASTM Standard D-5778-07. A diagram of the cone penetrometer used for this project is shown as Figure 1.

Pore pressure filter elements, made of porous plastic, were saturated under a vacuum using silicone oil as the saturating fluid. The pore pressure element was six millimeters thick and was located immediately behind the tip (the U_2 location) for all soundings.

The cone was advanced using a 25-ton truck mounted- and a 15-ton track mounted CPT rig. The following data were recorded every five centimeters (approximately every 2 inches) as the cone was advanced into the ground:

- Tip Resistance (qc)
- Sleeve Friction (fs)
- Dynamic Pore Pressure (U)

The field data recorded is included on the attached CD.

Before each sounding a complete set of analog baseline readings are taken with an integated multi-meter and compared with the digitized value on the computer screen. This provides a check on the analog to digital conversion board.

Evaluation of the analog baselines is key to consistent readings. The baseline data should be stable and should not wander excessively during the course of a sounding. Baseline data can be used to apply corrections to the cone data where necessary. For this project, the baseline shift from sounding to sounding was small, typically less than 0.1% of full scale, and no data corrections were applied.

During seismic testing, the seismic signals were recorded using a geophone mounted in the cone as shown in Figure 1 and an up-hole integrated digital oscilloscope. A sledge hammer hit against a beam was used for the seismic source. Normal reaction for the beam was provided by the dead weight of the rig placed upon the beam. A schematic of the shear wave testing configuration is shown in Figure 2.

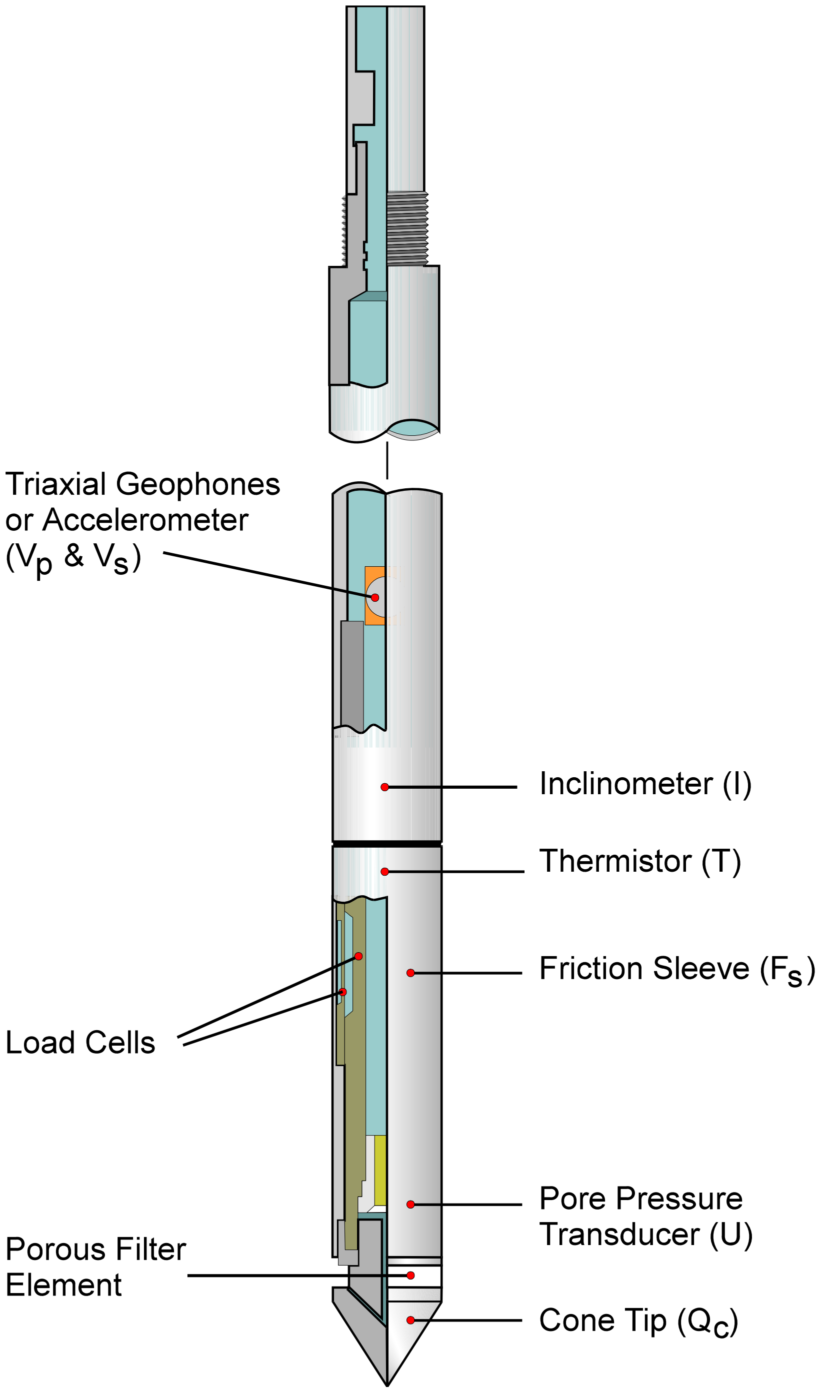


FIGURE 1 - TYPICAL CONE PENETROMETER

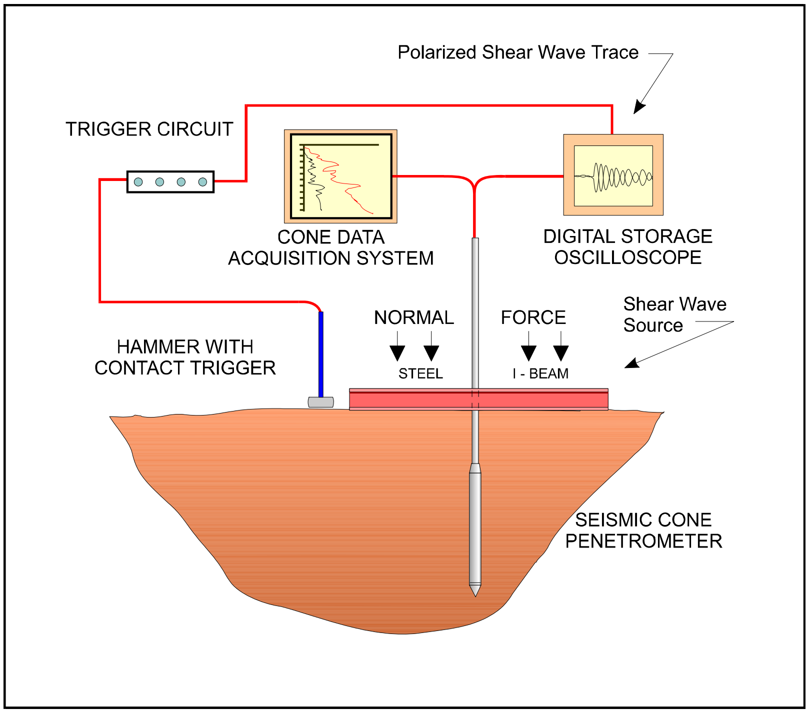


FIGURE 2 - SCHEMATIC OF SHEAR WAVE TESTING CONFIGURATION

2.2 PORE PRESSURE DISSIPATION TESTS

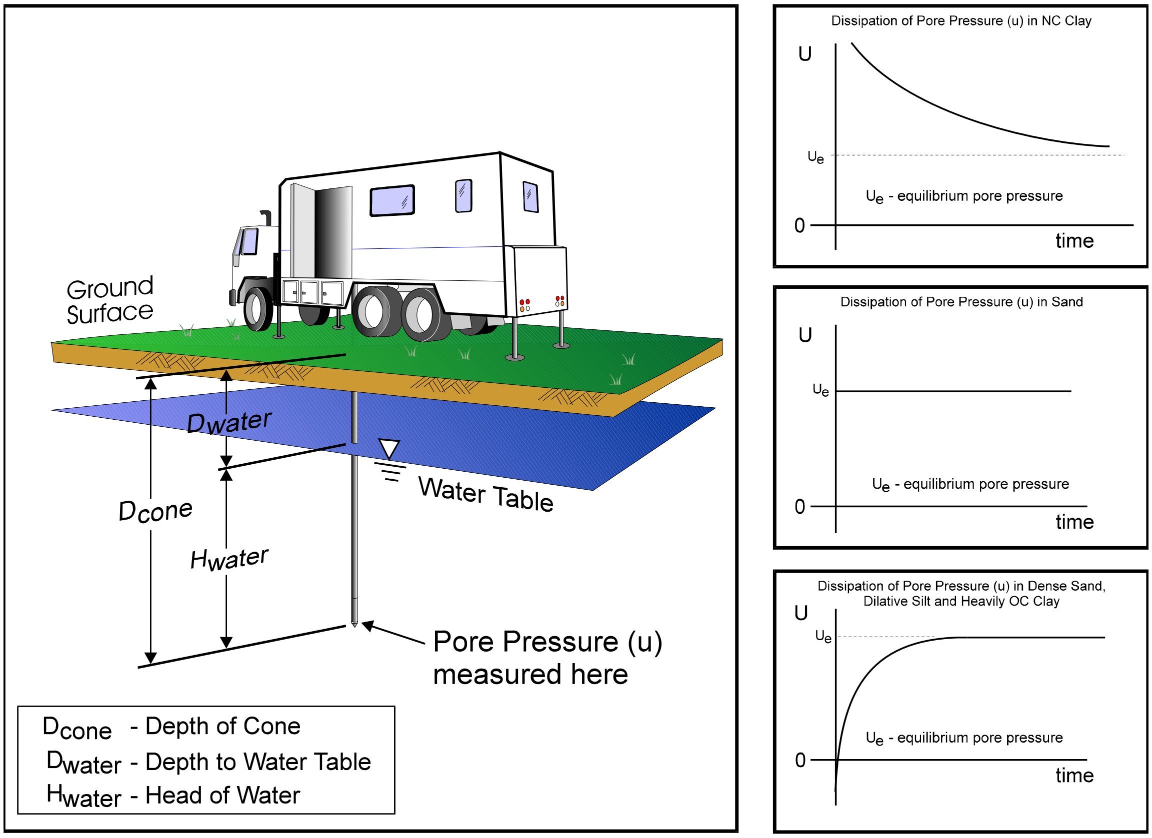
When cone penetration is stopped, the piezo cone essentially becomes a piezometer. While stopped, pore water pressures are automatically recorded at five-second intervals and the readings are stored in a dissipation file. Dissipation data can then be plotted onto a dissipation curve consisting of pore water pressure (U) verses time (t). The shapes of dissipation curves are very useful in evaluating soil type, drainage and in situ static water level.

A flat curve that stabilizes quickly (i.e. less than 30 seconds) is typical of a free draining sand. In this case, the final measured pore water pressure is the static in situ water pressure.

Soils that generate excess dynamic pore water pressure during penetration will dissipate this excess pressure when penetration stops. The shape of the dissipation curve and the time of dissipation can be used to estimate c_h, the coefficient of consolidation that can in turn be used to calculate K_h, the horizontal permeability.

Figure 3 shows some idealized shapes of various pore water pressure dissipation curves. The reader is referred Robertson et. al., 1992 to reference dissipation test data analytical techniques.

Estimation of Ground Water Table from CPT Dissipation Tests



Water Table Calculation

$$D_{water} = D_{cone} - H_{water}$$

where $H_{water} = U_e$ (depth units)

Useful Conversion Factors:

1psi = 0.704m = 2.31 feet (water)
1tsf = 0.958 bar = 13.9 psi
1m = 3.28 feet

FIGURE 3 - TYPICAL DISSIPATION TESTS

3.0 CONE PENETRATION TEST DATA AND INTERPRETATION

3.1 ANALYSIS OF PIEZOCONE DATA - GENERAL

A total of eight CPTU test locations and three SCPTU test locations were completed to depths up to approximately 150 ft below existing grade. Several of the test locations required drill outs to be performed when the CPT rig encountered refusal conditions. Once the drill out was completed, the CPT rig was repositioned over the sounding location and a separate data file was created for the next interval of penetration. The sounding number was given a numerical identifier to indicate the drill out sequence. For example, the interval after the first drill out was labeled with a -1 and the interval after the second drill out was labeled with a -2. For soundings performed at a location offset from the original proposed location, an “a” designation was added to the sounding number.

The interpretation of cone data is based on the relationship between cone bearing, qc, sleeve friction, fs, and penetration pore water pressure, U. The friction ratio, Rf , (sleeve friction divided by cone bearing) is a calculated parameter which is used to infer soil behavior type. Generally, saturated cohesive soils have low tip resistance, high friction ratios and generate large excess pore water pressures. Cohesionless soils have higher tip resistances, lower friction ratios and do not generate significant excess pore water pressure.

The interpretation of soils encountered on this project was carried out using established correlations presented in Appendix D. It should be noted that it is not always possible to clearly identify a soil type based on qc, fs and U. Occasionally soils will fall within different soil categories on the classification charts. In these situations, experience and judgment and an assessment of the pore pressure dissipation data should be used to infer the soil behavior type. Computer tabulations of the interpreted soil types along with certain other geotechnical parameters for each cone hole is presented in the .xls files on the data CD.

Each of the parameters measured in the sounding is discussed briefly below. A detailed explanation of CPTU testing and interpretation of the results can be found in Robertson et. al. 1992.

TIP RESISTANCE (q_c): The resistance to penetration, measured at the cone tip, provides an accurate profile of subsurface strata. The recorded tip resistance is a composite of the penetration resistance of the soils located five to ten cone diameters (8 to 18 inches) in front of and behind the tip. The actual resistance "sensed" by the tip depends on the soil properties and on the relative stiffness of the layers encountered. Tip resistance is often corrected for pore pressure effects when testing in soft saturated cohesive soils.

For this project the correction was made and the tip resistance shown, q_t is the corrected tip resistance.

The correction used is: $q_t = q_c + (1\text{-}a)U$

Where:
q_t = corrected tip resistance
q_c = measured tip resistance
a = net area ratio for cone (0.80 for this project)
U = dynamic pore water pressure measured behind tip

SLEEVE FRICTION (f_s) The resistance recorded on the friction sleeve, is a measure of the remolded strength of the soil. Values of sleeve friction in very soft soils (such as peat) may fluctuate due to the measured force being small relative to the capacity of the measuring load cell.

FRICTION RATIO (R_f) The ratio of sleeve friction to tip resistance expressed as a percentage, is an indicator of soil type. Cohesive soils generally have friction ratios that are greater than two, while sands and non-plastic silts have friction ratios that are lower than two.

PORE PRESSURE (U*)* Dynamic pore water pressure is measured during penetration. Dynamic pore water pressure data can be found in the .cor and .xls files. Static pore water pressure is measured when cone penetration is stopped. The measured dynamic pore water pressure changes with the location of the porous filter and negative readings are possible when the filter is located behind the tip.

It is important to note that the CPT classifies soil by physical behavior, not by grain size; therefore, the CPT classification should be verified against samples obtained from a conventional drilling program. While the CPT soil classification may not always be accurate in terms of the actual label it applies to a particular soil, it is very accurate in grouping soils with similar mechanical properties.

Table 1 in Appendix A presents a summary of the CPT soundings, including sounding depth and estimated depth of ground water table.

3.2 CONE PLOTS

The data from the soundings was plotted using the computer program ScreenZW. The CPT plots are included in Appendix A. ScreenZW was developed by ConeTec Inc. and it incorporates soil behavior type (SBT) classification as part of the plot. The soil classification is based on the classification chart reproduced chart in Appendix D.

3.3 PORE PRESSURE DISSIPATION TEST RESULTS

When conducting CPT investigations, pore water pressure dissipations are automatically recorded during pauses in penetration. The pore water pressure data is recorded at five second intervals. In sounding C-727, several pore pressure dissipation tests were conducted at depths specified by the Schnabel representative on site. Pore pressure dissipation test plots are included in Appendix C. The water table depths used in the data interpretation are derived from the pore water pressure dissipation tests below the water table.

3.4 SHEAR WAVE VELOCITY MEASUREMENTS

Shear wave velocity measurements were conducted in three CPT locations. The shear wave measurements were taken on approximately 1-meter intervals in the soundings. Tabular summaries of the results, shear wave velocity plots and plots of the individual traces are presented in Appendix B.

Calculation of the interval velocities are performed by picking a common feature on all of the recorded wave sets and taking the difference in ray path divided by the difference in time to feature. Typically, this feature is either the first arrival, first peak (or trough), or first crossover. For this project, we preferred using the first crossover in our calculations. Ray path is defined as the distance from the seismic source to the geophone mounted inside the cone. To calculate the ray path, the cone tip depth, the geophone offset (0.2 meters for the cones used on this project) and the source offset is required. The ray path equals the hypotenuse of the triangle created by the source, the entry point of the cone into the ground and the geophone.

For the test locations that required drill outs, the interval shear wave velocity was not calculated for the drill out interval.

3.5 CPT DATA PROCESSING

The electronic data files were processed using the program ScreenZW. ScreenZW is a program developed by ConeTec to calculate common engineering parameters from CPT data. The processed data files are included on the data CD. The calculations used are summarized in the table in Appendix D. Each calculation is derived according to the referenced article.

For this project, a piezometric surface depths used in the data interpretation calculations are given in Appendix A on Table 1, as well as in the header of each .xls file.

Several pore pressure dissipation tests were conducted at this site. The dissipation test summary is presented in Appendix A on Table 2, and the plots are presented in Appendix C.

5.0 REFERENCES

Houlsby, G.T. and Teh, C.I., 1988, ISPOPT-1, Volume 2 pp 777-784

Lunne, T., Robertson, P.K., and Powell, J.J.M., 1997, *Cone penetration Testing in Geotechnical Practice*, Spon Press. NY

Mayne, P.W., 1995,"Profiling Yield Stresses in Clays by In Situ Tests", TRR No. 1479. National Academy Press, Washington D.C.

Mayne, P.W., Christopher, B. R., DeJong, J., (2001), Manual on Subsurface Exploration, National Highway Institute Publication # FHWA NHI-01-031, Washington D.C.

Robertson, P.K., 1989, "Soil Classification using the Cone Penetration Test", Canadian Geotechnical Journal, vol. 27, pages 151-158.

Robertson, P.K., Sully, J., Woeller, D.G., Lunne, T., Powell, J.M., and Gillespie, D.J., 1992, "Estimating Coefficient of Consolidation from Piezocone Tests", Canadian Geotechnical Journal, vol. 29, pages 539-550.

APPENDIX A

CPT Plots

Table 1: Sounding Information Table

Sounding	Filename	Depth (ft)	Estimated GWT (ft)	Northing (ft)	Easting (ft)	Elevation (ft)	Date	Comments
C-724	965CP10	13.29	8	219309.8	960973.5	7.9	08/06/08	Seismic
C-724-1	965CP17	85.30	8	219309.8	960973.5	7.9	08/07/08	Drillout, Seismic
C-724-2	965CP18	113.68	8	219309.8	960973.5	7.9	08/07/08	Drillout, Seismic
C-724-3	965CP19	152.23	8	219309.8	960973.5	7.9	08/08/08	Drillout, Seismic
C-724a	965CP14	12.63	8	219309.3	960973.9	7.9	08/06/08	Seismic
C-725	965CP03	131.72	8	219157.7	961143.9	8.2	08/05/08	Seismic
C-725-1	965CP16	152.39	8	219157.7	961143.9	8.2	08/07/08	Drillout, Seismic
C-726	965CP09	52.49	8	219479.9	960691.8	9.2	08/06/08	
C-727	965CP08	91.70	6	219368.3	960914.9	8.2	08/06/08	PPD
C-727-1	965CP20	101.05	6	219368.3	960914.9	8.2	08/11/08	Drillout, PPD
C-728	965CP02	52.82	8	218975.5	961193	10	08/05/08	
C-747	965CP01	17.72	5	218860.2	961248.5	9.1	08/04/08	
C-747-1	965CP15	52.82	5	218860.2	961248.5	9.1	08/06/08	Drillout
C-748	965CP33	41.34	19	218521.4	960909.8	32.4	08/20/08	
C-748a	965CP34	52.00	19	218518.9	960908.7	32.3	08/21/08	
C-749	965CP32	18.37	8	218344.5	960737.8	62.3	08/20/08	
C-749a	965CP36	18.04	8	218346.4	960740	62.3	08/21/08	
C-749a-1	965CP37	41.17	8	218346.4	960740	62.3	08/21/08	Drillout

Table 2: Dissipation Test Summary

Sounding	Depth (ft)	Duration (sec)	ch* (cm2/min)
C-727	15.1	535	**
C-727	20.0	480	**
C-727	30.5	1625	29.6
C-727	35.1	595	30.2
C-727	40.0	630	11.9
C-727	45.3	865	40.8
C-727	50.2	600	46.5
C-727	70.1	370	12.1
C-727	75.1	1180	3.73
C-727	80.1	315	4.38
C-727	85.1	295	4.30
C-727	90.1	305	3.23
C-727	100.1	295	4.32

*Using Ir = 100 and GWT depths given in Table 1

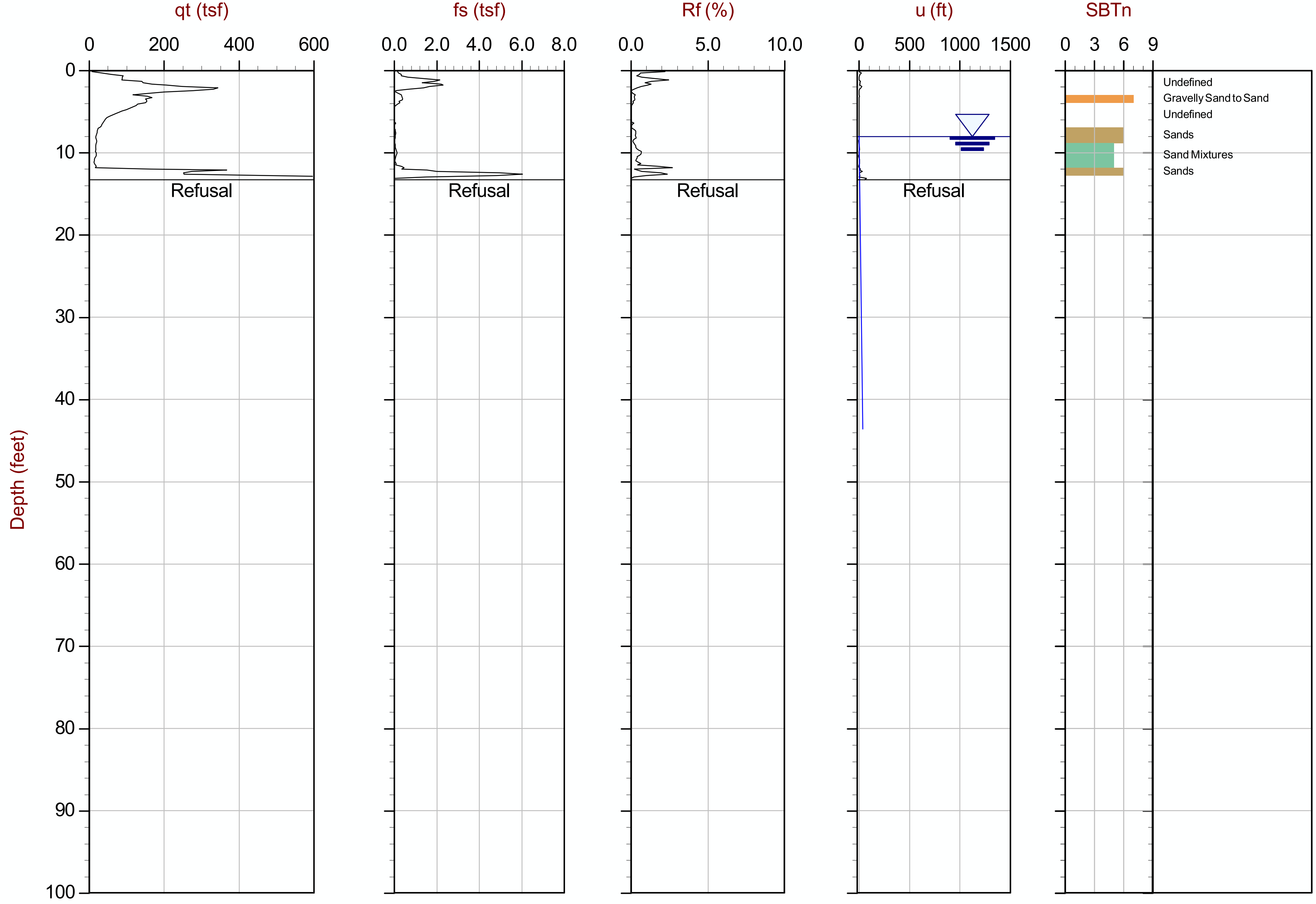
** Pore pressure dissipation test performed in a relatively freely draining layer

CONETEC

Schnabel

Job No: 08-965
Date: 08:06:08 15:17
Site: CCNPP

Sounding: C-724
Cone: STD 20T AD214



Max Depth: 4.050 m / 13.29 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

File: 965CP10.COR
Unit Wt: SBT Chart Soil Zones

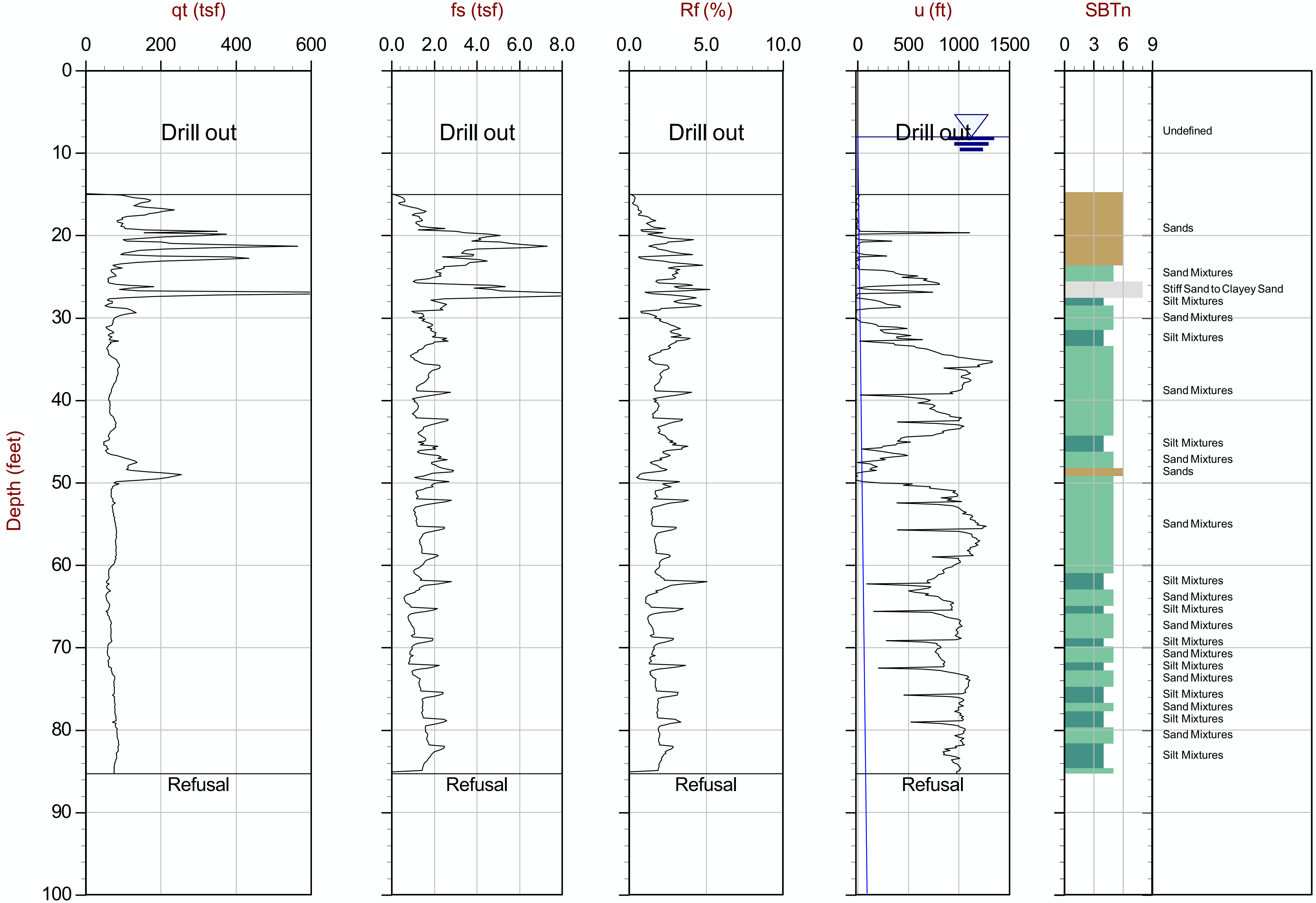
SBT: Lunne, Robertson and Powell, 1997
Coords: N: 219309.80 E: 960973.50 Elev: 7.90
Page No: 1 of 1

CONETEC

Schnabel

Job No: 08-965
Date: 08:07:08 12:25
Site: CCNPP

Sounding: C-724-1
Cone: STD 20T AD214



Max Depth: 26.000 m / 85.30 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

File: 965CP17.COR
Unit Wt: SBT Chart Soil Zones

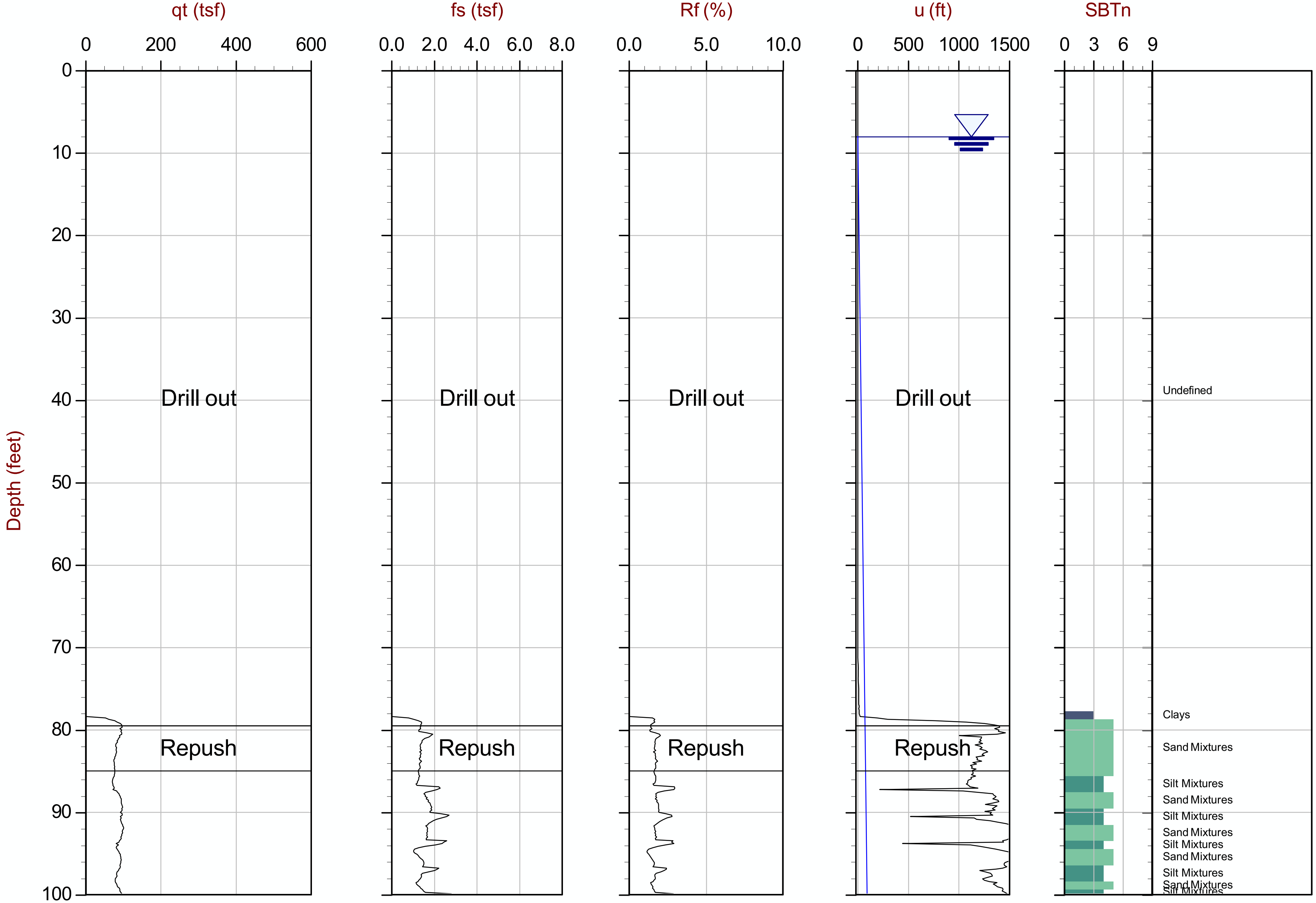
SBT: Lunne, Robertson and Powell, 1997
Coords: N: 219309.80 E: 960973.50 Elev: 7.90
Page No: 1 of 1

ConeTec

Schnabel

Job No: 08-965
Date: 08:07:08 16:10
Site: CCNPP

Sounding: C-724-2
Cone: STD 20T AD214



Max Depth: 34.650 m / 113.68 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

File: 965CP18.COR
Unit Wt: SBT Chart Soil Zones

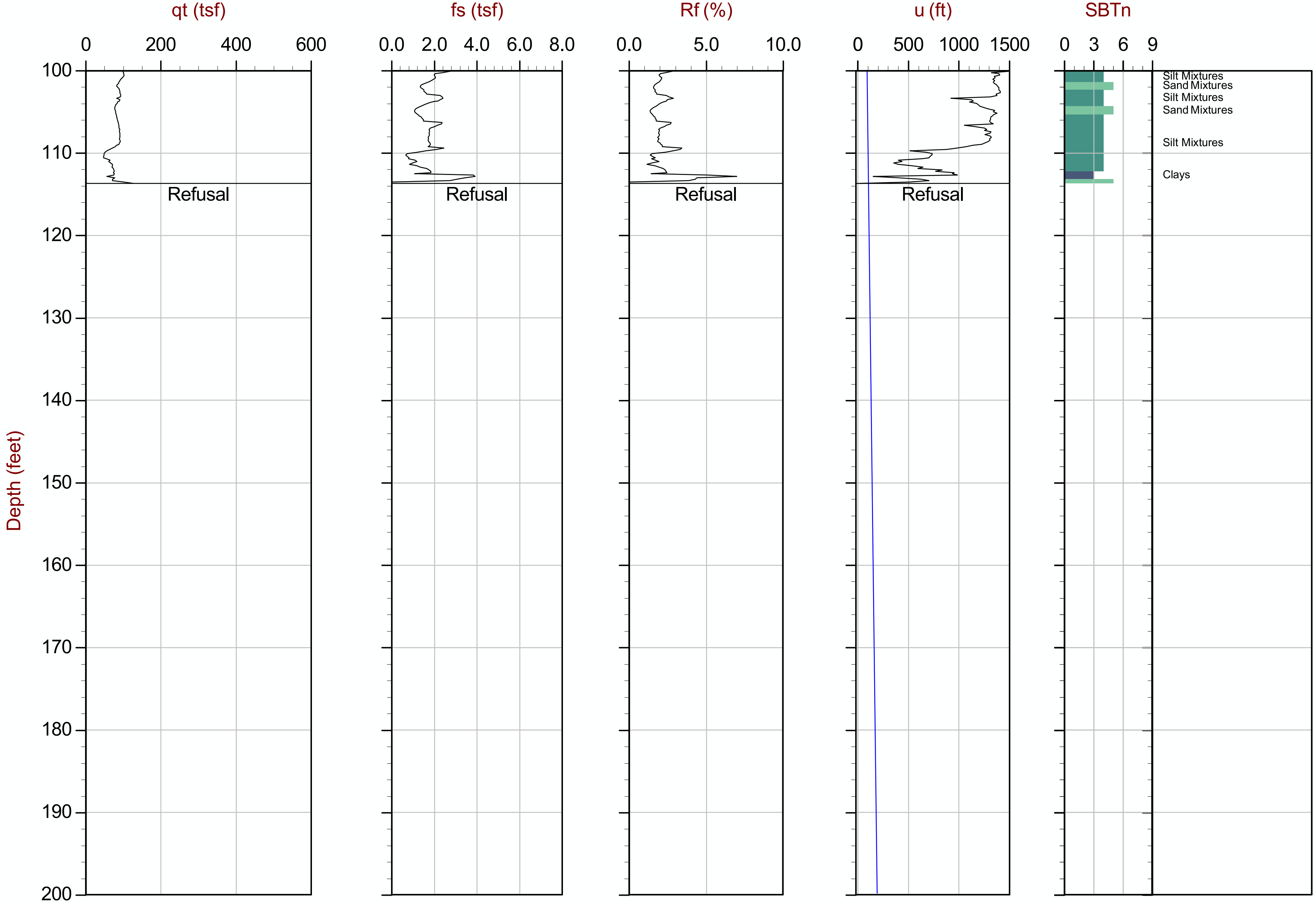
SBT: Lunne, Robertson and Powell, 1997
Coords: N: 219309.80 E: 960973.50 Elev: 7.90
Page No: 1 of 2

CONETEC

Schnabel

Job No: 08-965
Date: 08:07:08 16:10
Site: CCNPP

Sounding: C-724-2
Cone: STD 20T AD214



Max Depth: 34.650 m / 113.68 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

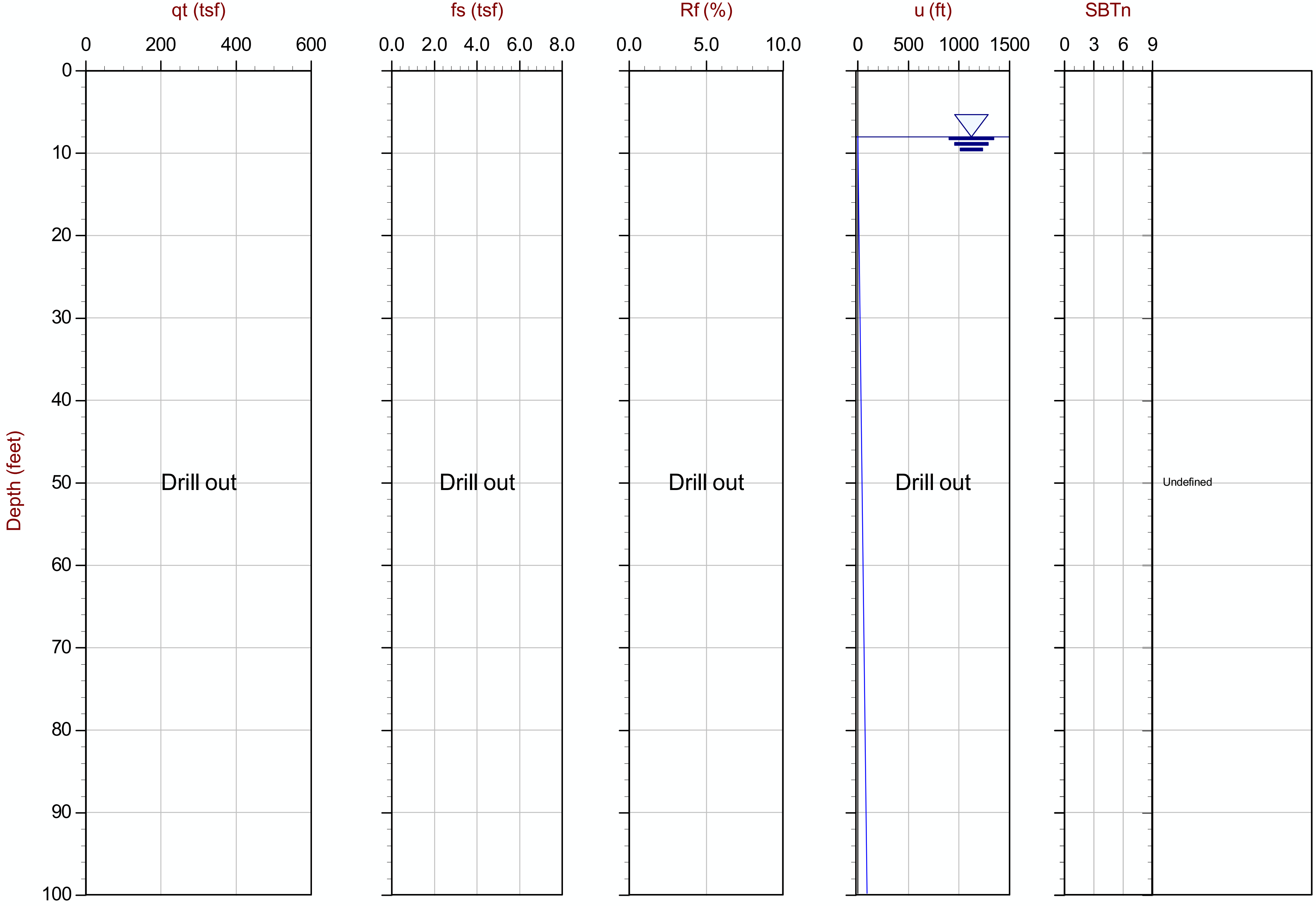
File: 965CP18.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997
Coords: N: 219309.80 E: 960973.50 Elev: 7.90
Page No: 2 of 2

Schnabel

Job No: 08-965
Date: 08:08:08 08:35
Site: CCNPP

Sounding: C-724-3
Cone: STD 20T AD214



Max Depth: 46.400 m / 152.23 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

File: 965CP19.COR
Unit Wt: SBT Chart Soil Zones

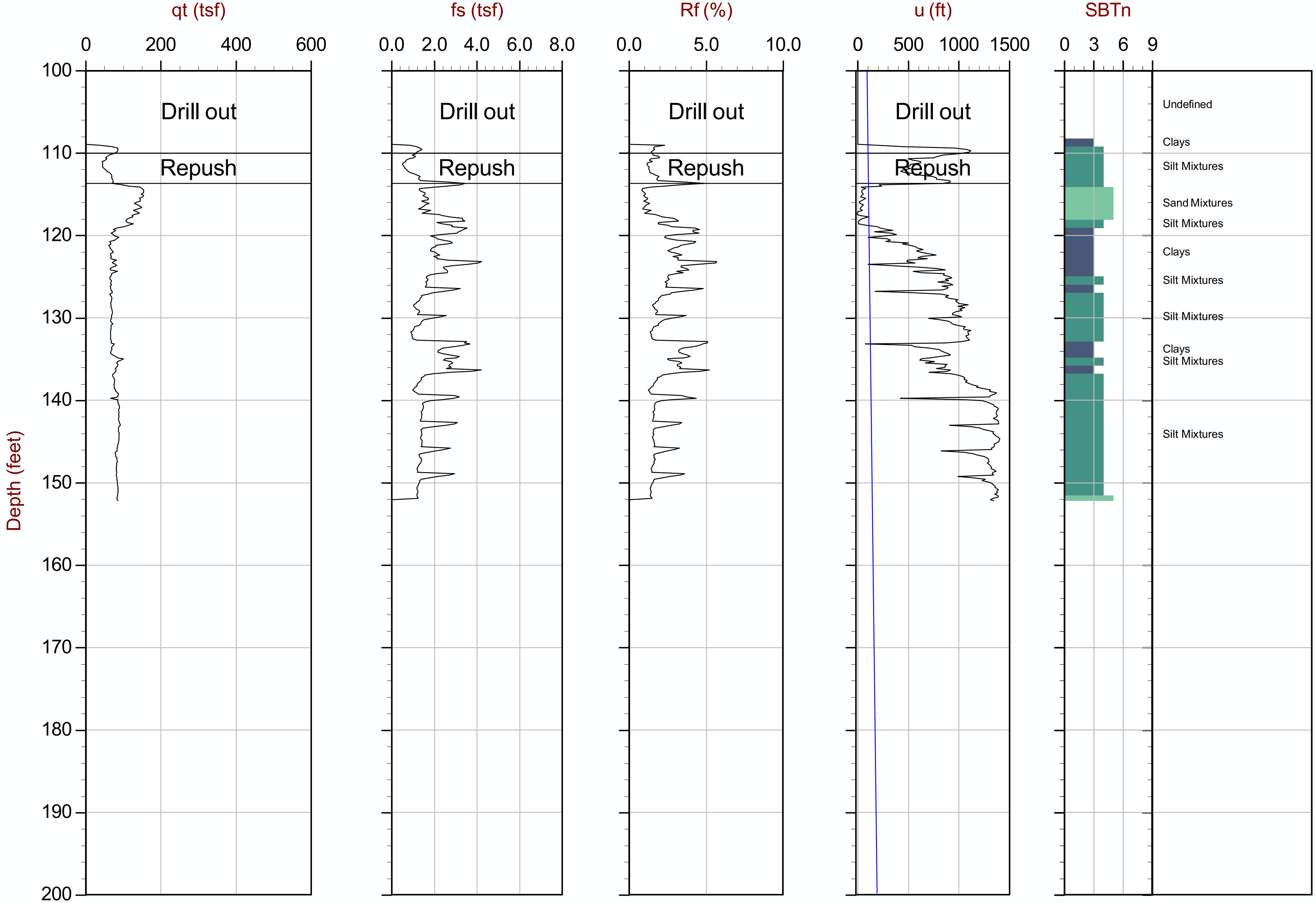
SBT: Lunne, Robertson and Powell, 1997
Coords: N: 219309.80 E: 960973.50 Elev: 7.90
Page No: 1 of 2

CONETEC

Schnabel

Job No: 08-965
Date: 08:08:08 08:35
Site: CCNPP

Sounding: C-724-3
Cone: STD 20T AD214



Max Depth: 46.400 m / 152.23 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

File: 965CP19.COR
Unit Wt: SBT Chart Soil Zones

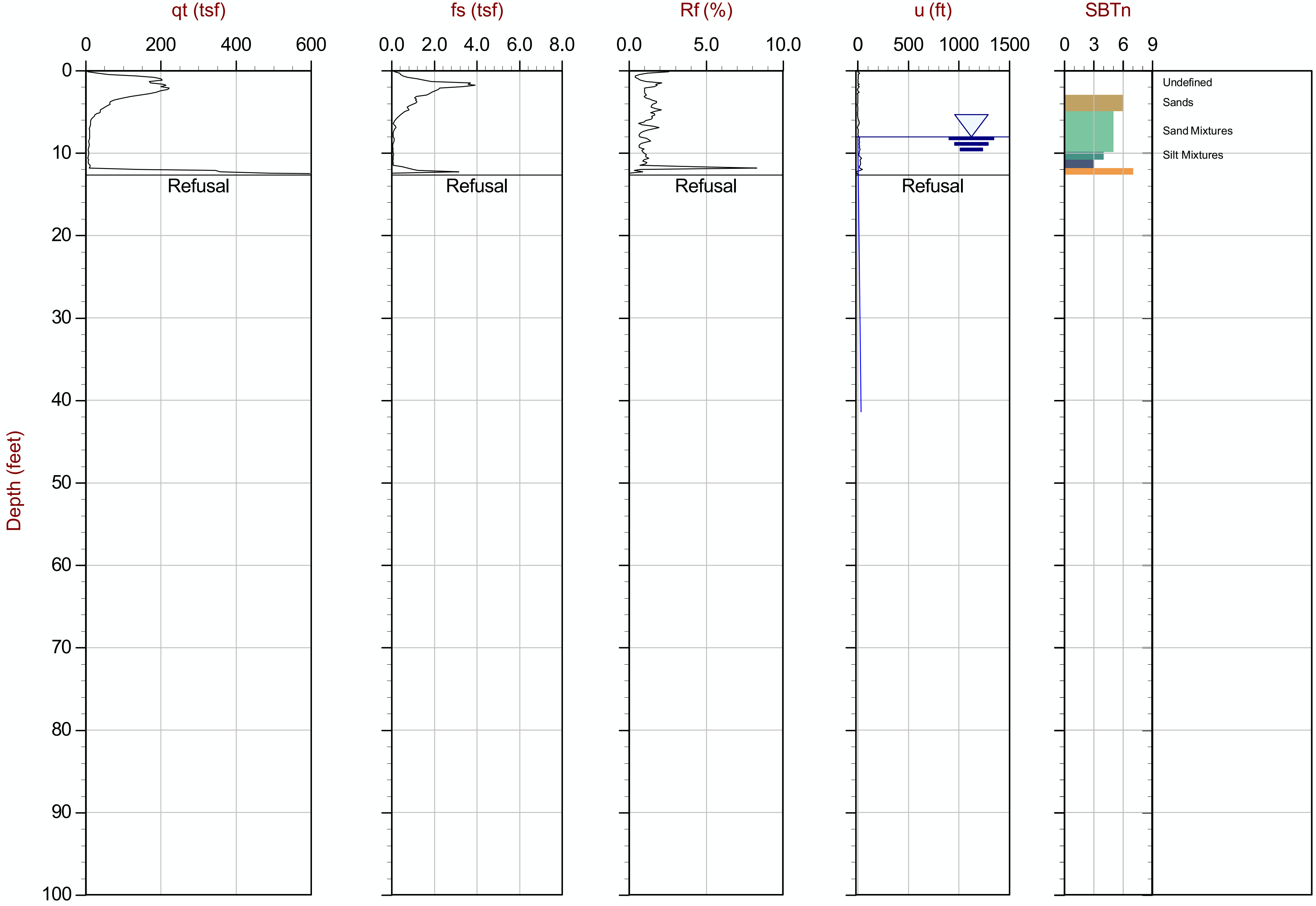
SBT: Lunne, Robertson and Powell, 1997
Coords: N: 219309.80 E: 960973.50 Elev: 7.90
Page No: 2 of 2

CONETEC

Schnabel

Job No: 08-965
Date: 08:06:08 16:23
Site: CCNPP

Sounding: C-724a
Cone: STD 20T AD214



Max Depth: 3.850 m / 12.63 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

File: 965CP14.COR
Unit Wt: SBT Chart Soil Zones

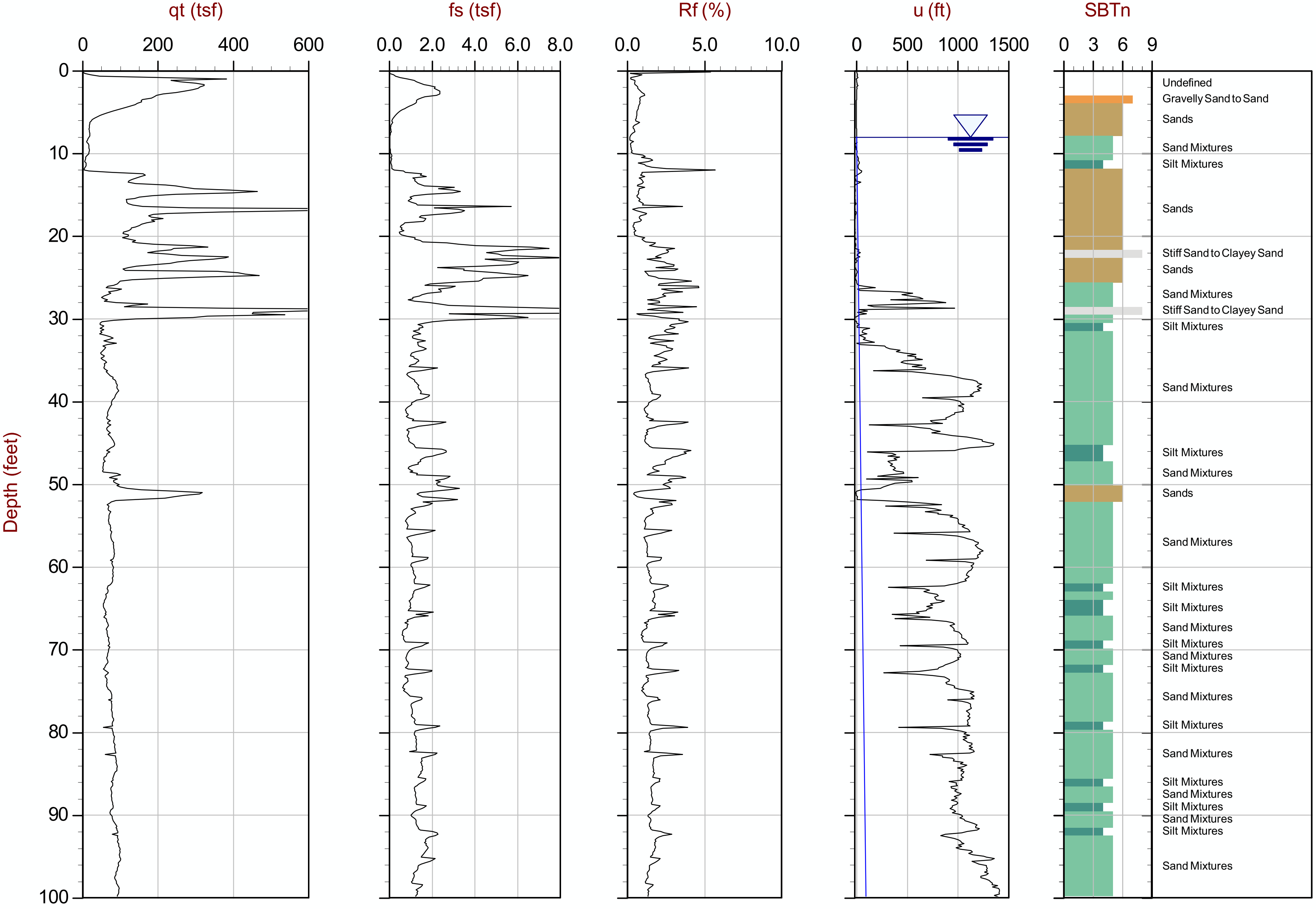
SBT: Lunne, Robertson and Powell, 1997
Coords: N: 219309.30 E: 960973.90 Elev: 7.90
Page No: 1 of 1

CONETEC

Schnabel

Job No: 08-965
Date: 08:05:08 08:30
Site: CCNPP

Sounding: C-725
Cone: STD 20T AD184



Max Depth: 40.150 m / 131.72 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

File: 965CP03.COR
Unit Wt: SBT Chart Soil Zones

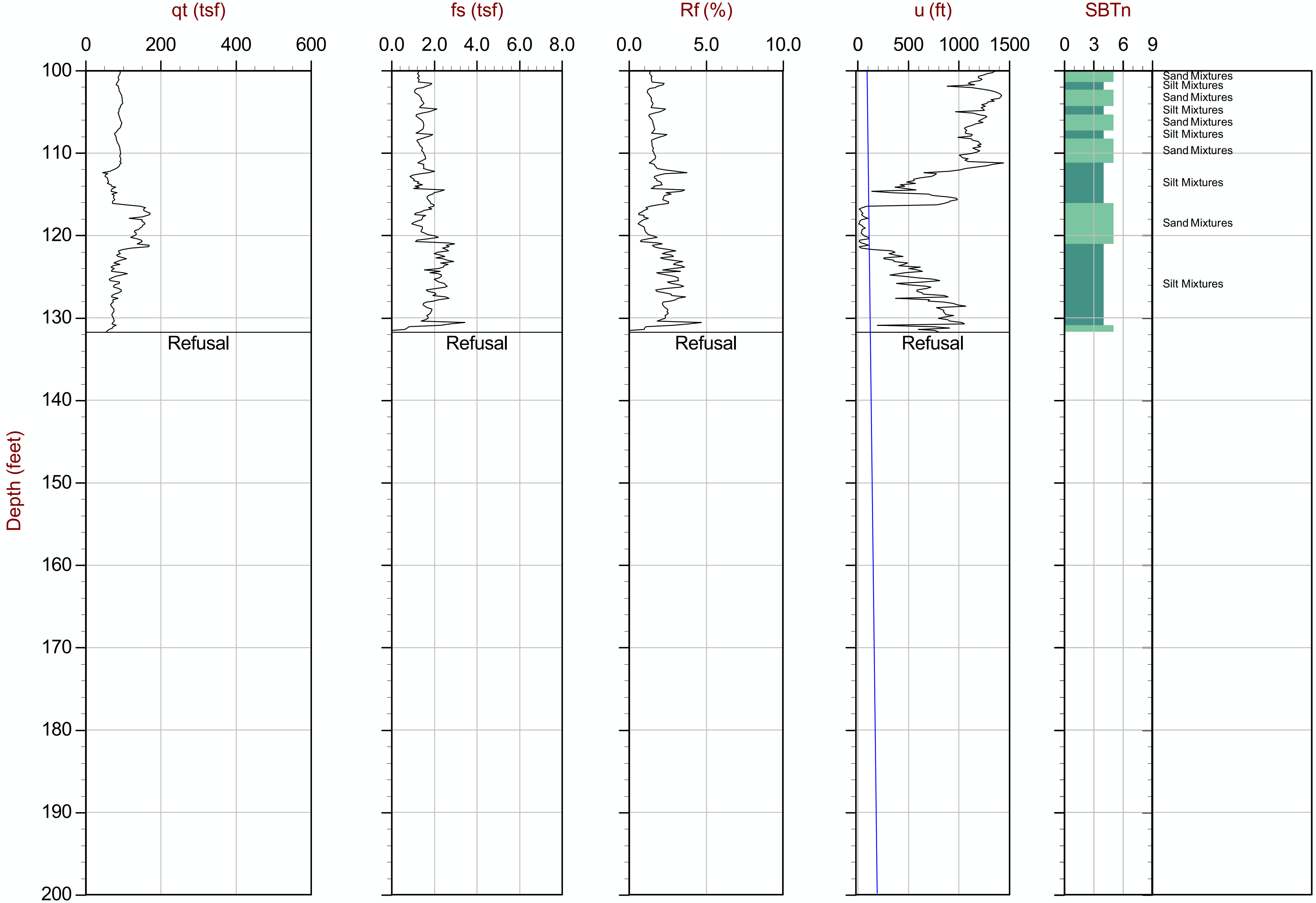
SBT: Lunne, Robertson and Powell, 1997
Coords: N: 219157.70 E: 961143.90 Elev: 8.20
Page No: 1 of 2

CONETEC

Schnabel

Job No: 08-965
Date: 08:05:08 08:30
Site: CCNPP

Sounding: C-725
Cone: STD 20T AD184



Max Depth: 40.150 m / 131.72 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

File: 965CP03.COR
Unit Wt: SBT Chart Soil Zones

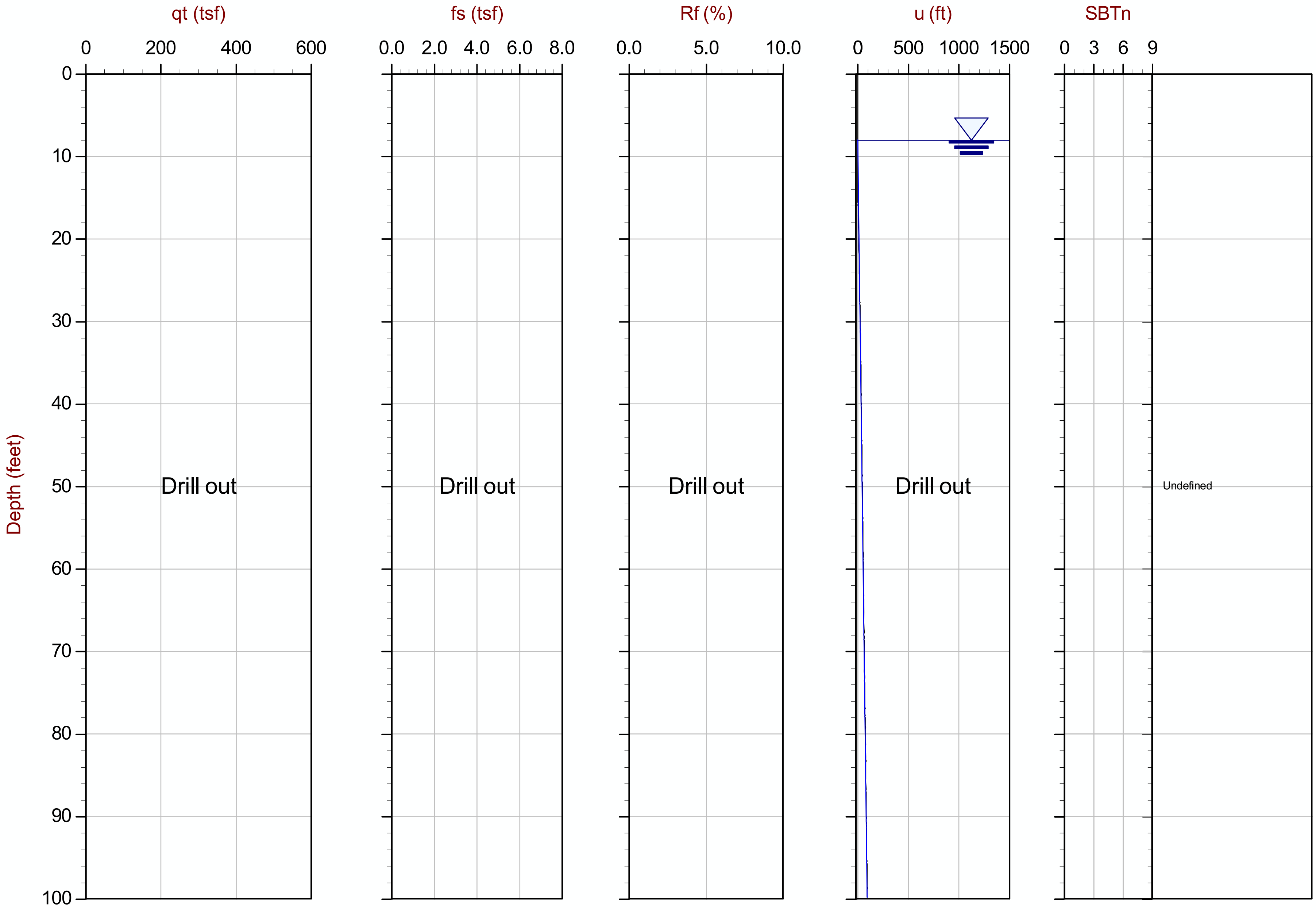
SBT: Lunne, Robertson and Powell, 1997
Coords: N: 219157.70 E: 961143.90 Elev: 8.20
Page No: 2 of 2

ConeTec

Schnabel

Job No: 08-965
Date: 08:07:08 07:49
Site: CCNPP

Sounding: C-725-1
Cone: STD 20T AD214



Max Depth: 46.450 m / 152.39 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

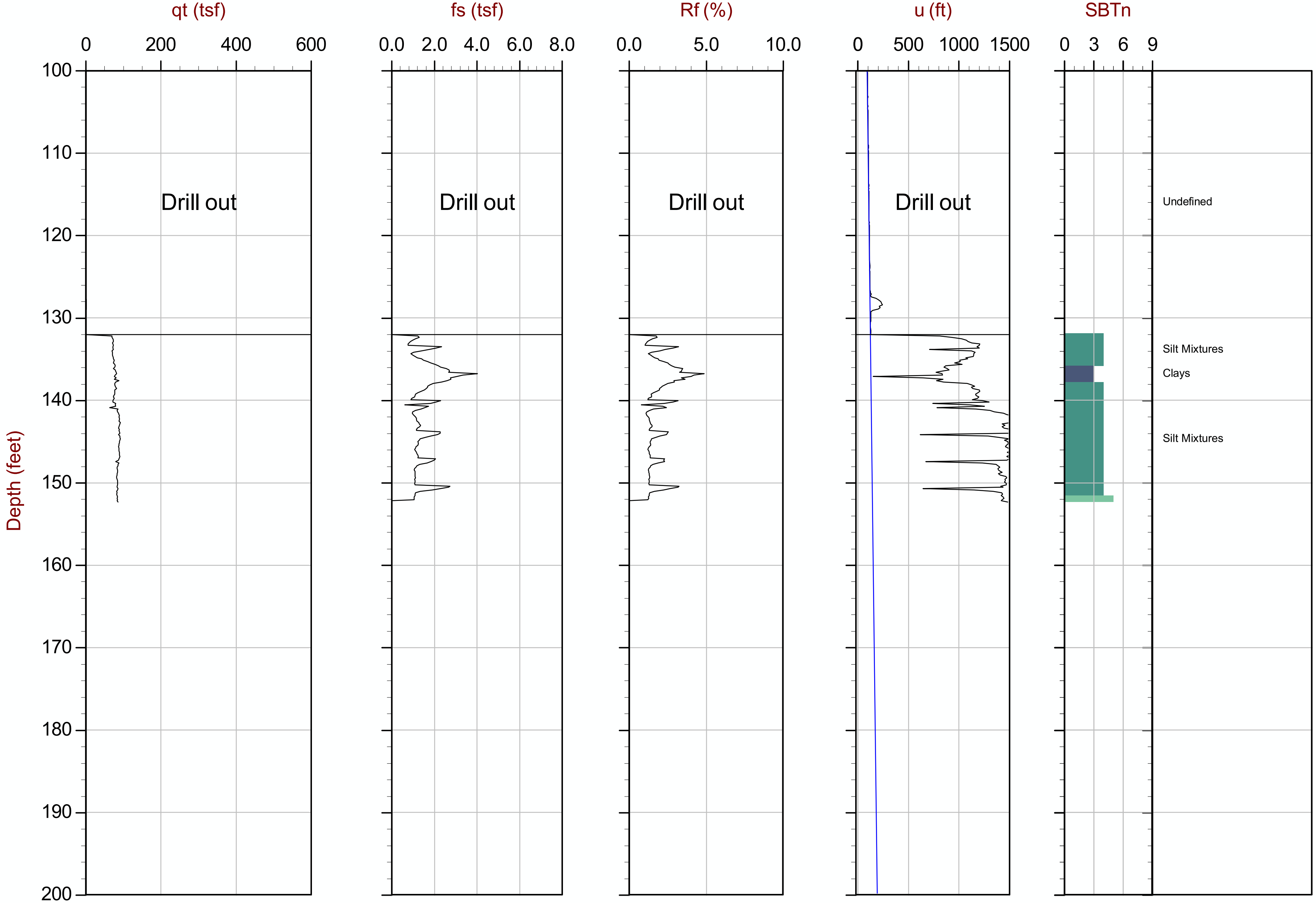
File: 965CP16.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997
Coords: N: 219157.70 E: 961143.90 Elev: 8.20
Page No: 1 of 2

Schnabel

Job No: 08-965
Date: 08:07:08 07:49
Site: CCNPP

Sounding: C-725-1
Cone: STD 20T AD214



Max Depth: 46.450 m / 152.39 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

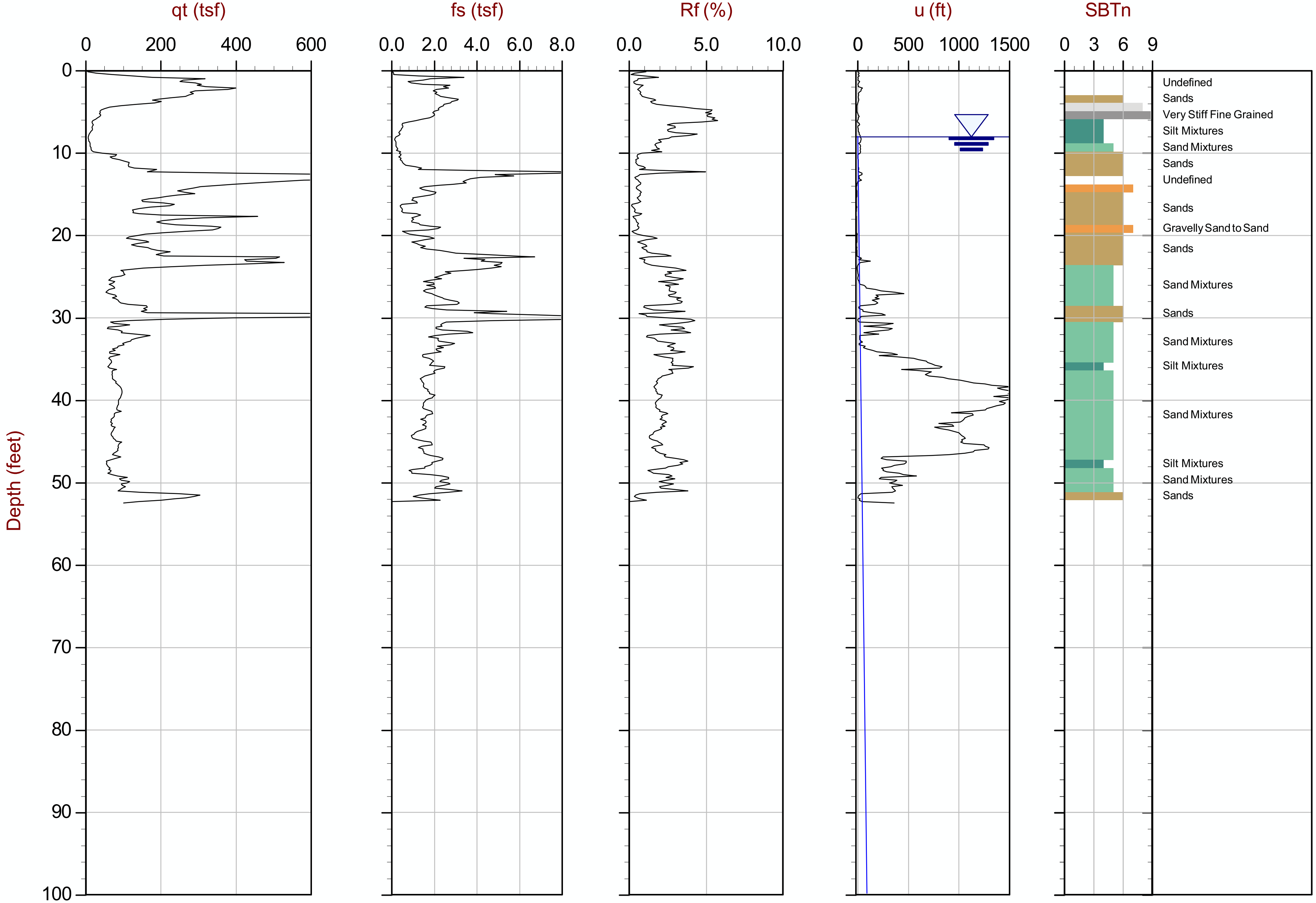
File: 965CP16.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997
Coords: N: 219157.70 E: 961143.90 Elev: 8.20
Page No: 2 of 2

Schnabel

Job No: 08-965
Date: 08:06:08 13:30
Site: CCNPP

Sounding: C-726
Cone: STD 20T AD214



Max Depth: 16.000 m / 52.49 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

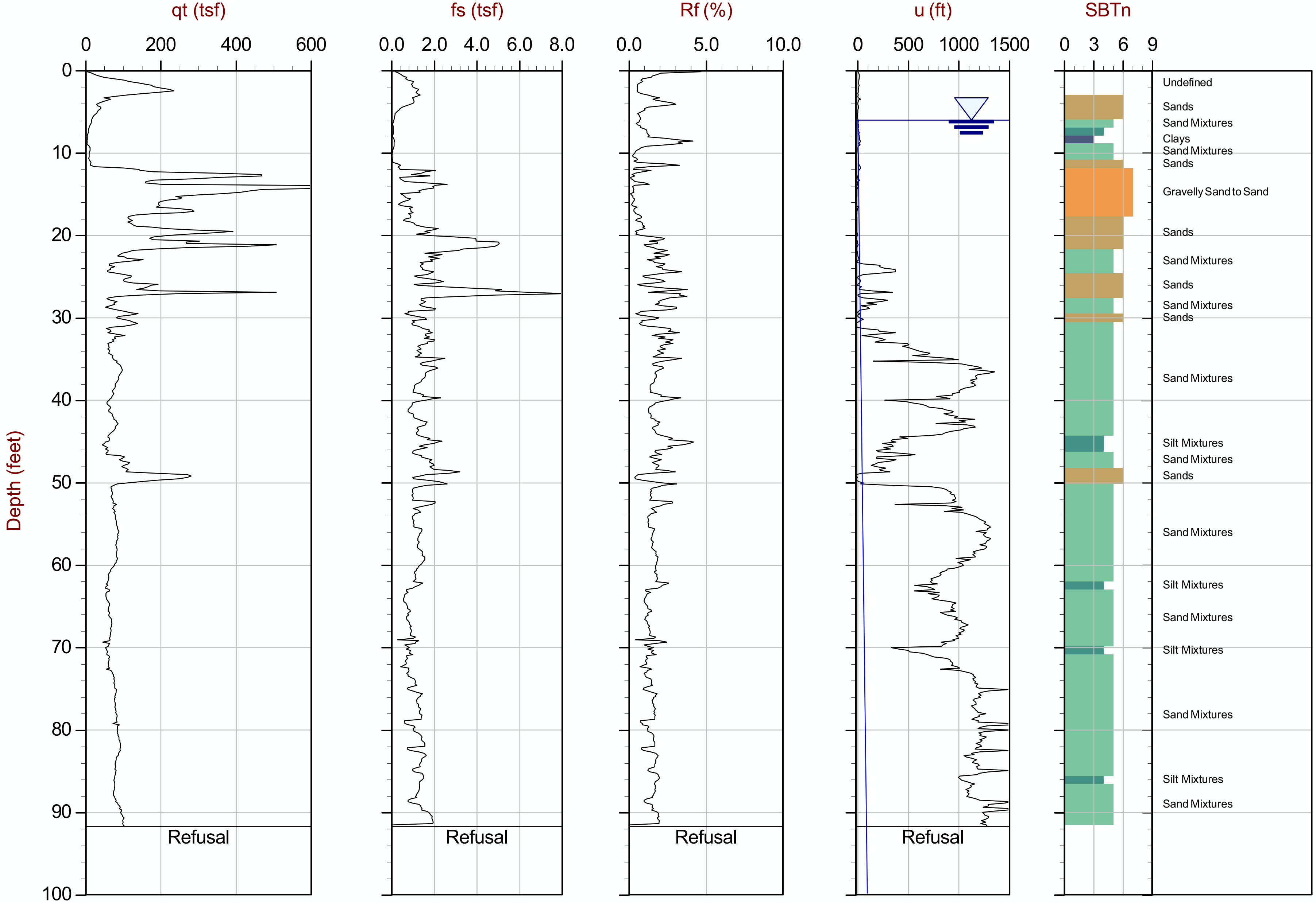
File: 965CP09.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997
Coords: N: 219479.90 E: 960691.80 Elev: 9.20
Page No: 1 of 1

Schnabel

Job No: 08-965
Date: 08:06:08 09:50
Site: CCNPP

Sounding: C-727
Cone: STD 20T AD214



Max Depth: 27.950 m / 91.70 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

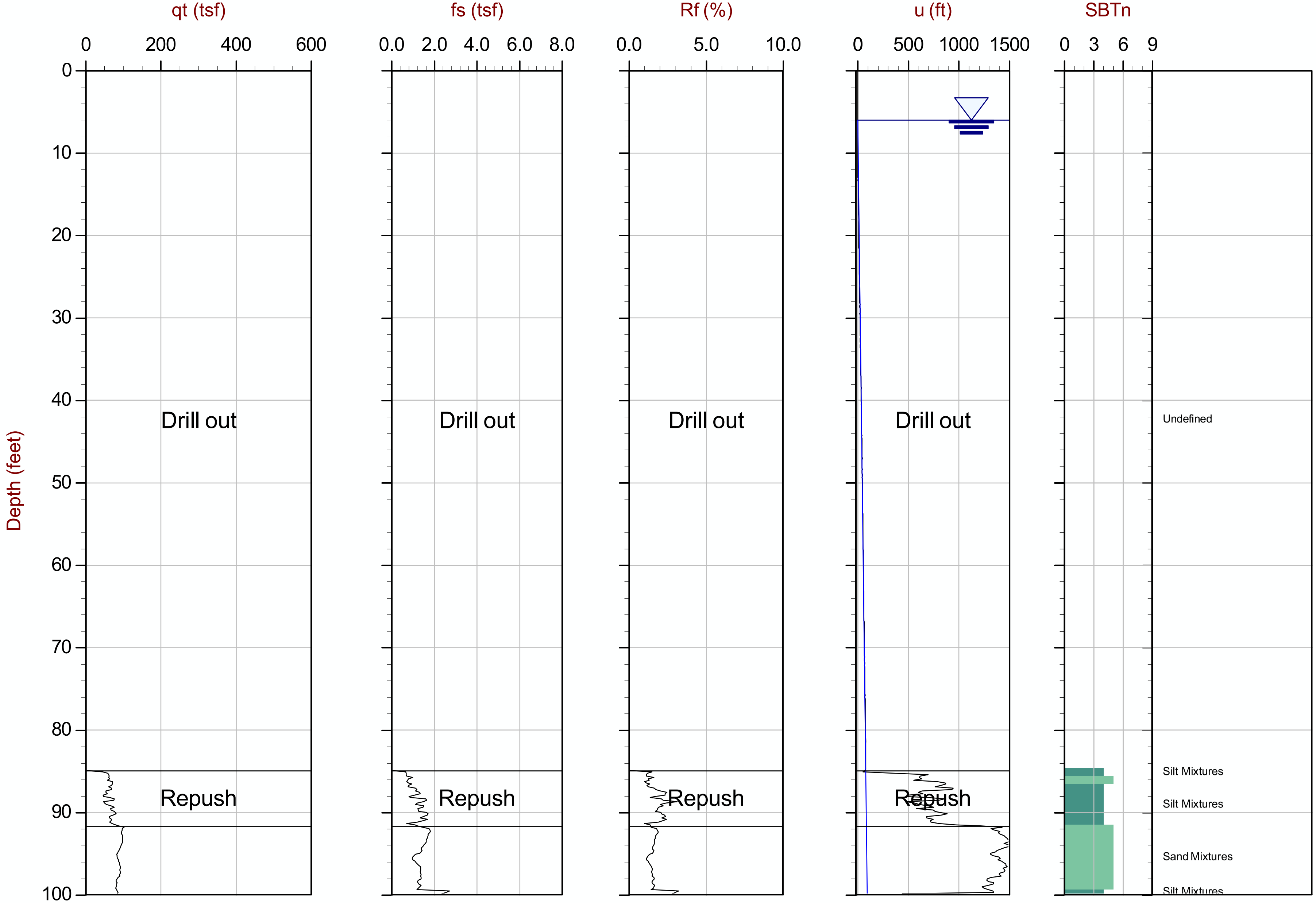
File: 965CP08.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997
Coords: N: 219368.30 E: 960914.90 Elev: 8.20
Page No: 1 of 1

Schnabel

Job No: 08-965
Date: 08:11:08 11:46
Site: CCNPP

Sounding: C-727-1
Cone: STD 20T AD214



Max Depth: 30.800 m / 101.05 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

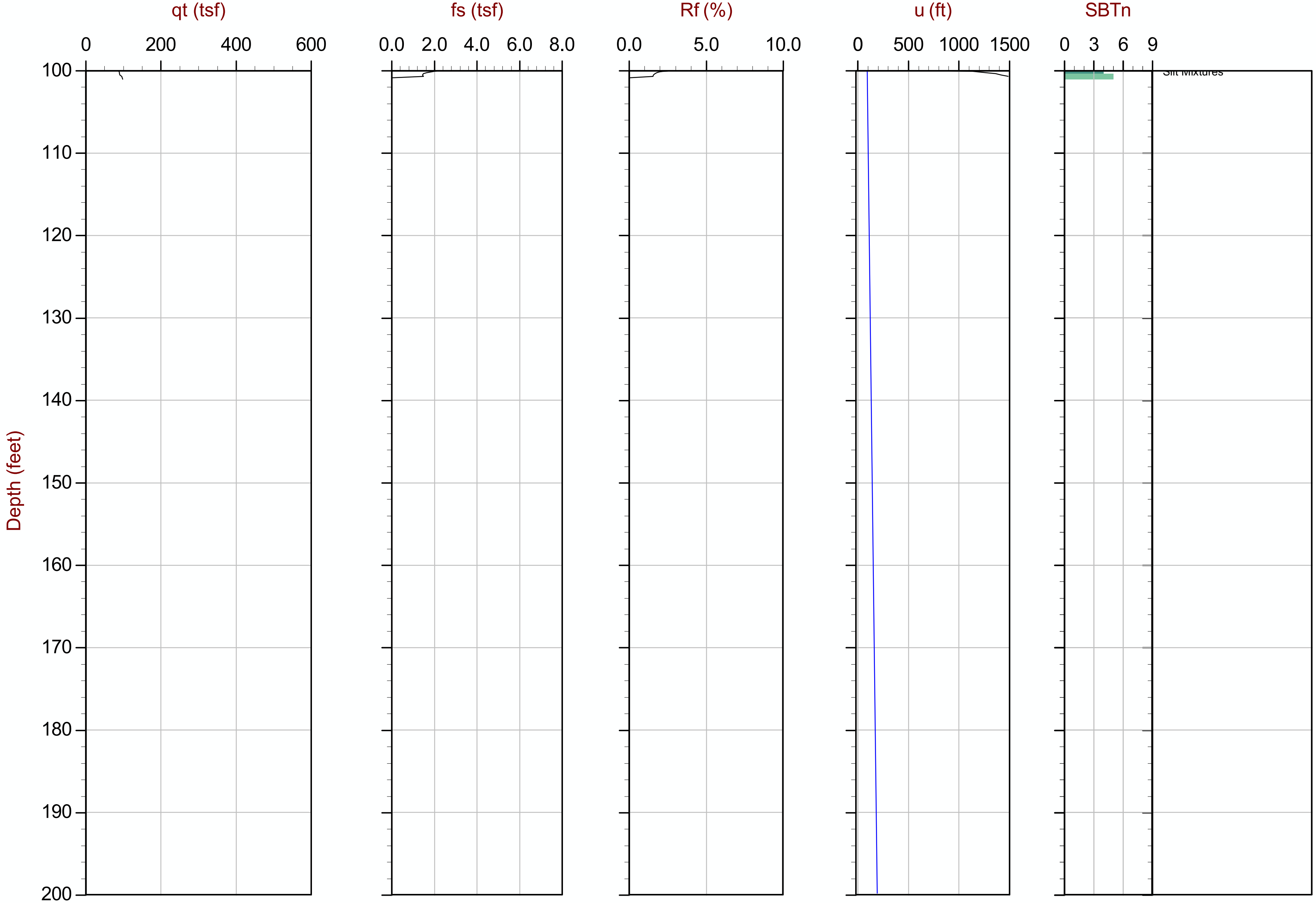
File: 965CP20.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997
Coords: N: 219368.30 E: 960914.90 Elev: 8.20
Page No: 1 of 2

Schnabel

Job No: 08-965
Date: 08:11:08 11:46
Site: CCNPP

Sounding: C-727-1
Cone: STD 20T AD214



Max Depth: 30.800 m / 101.05 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

File: 965CP20.COR
Unit Wt: SBT Chart Soil Zones

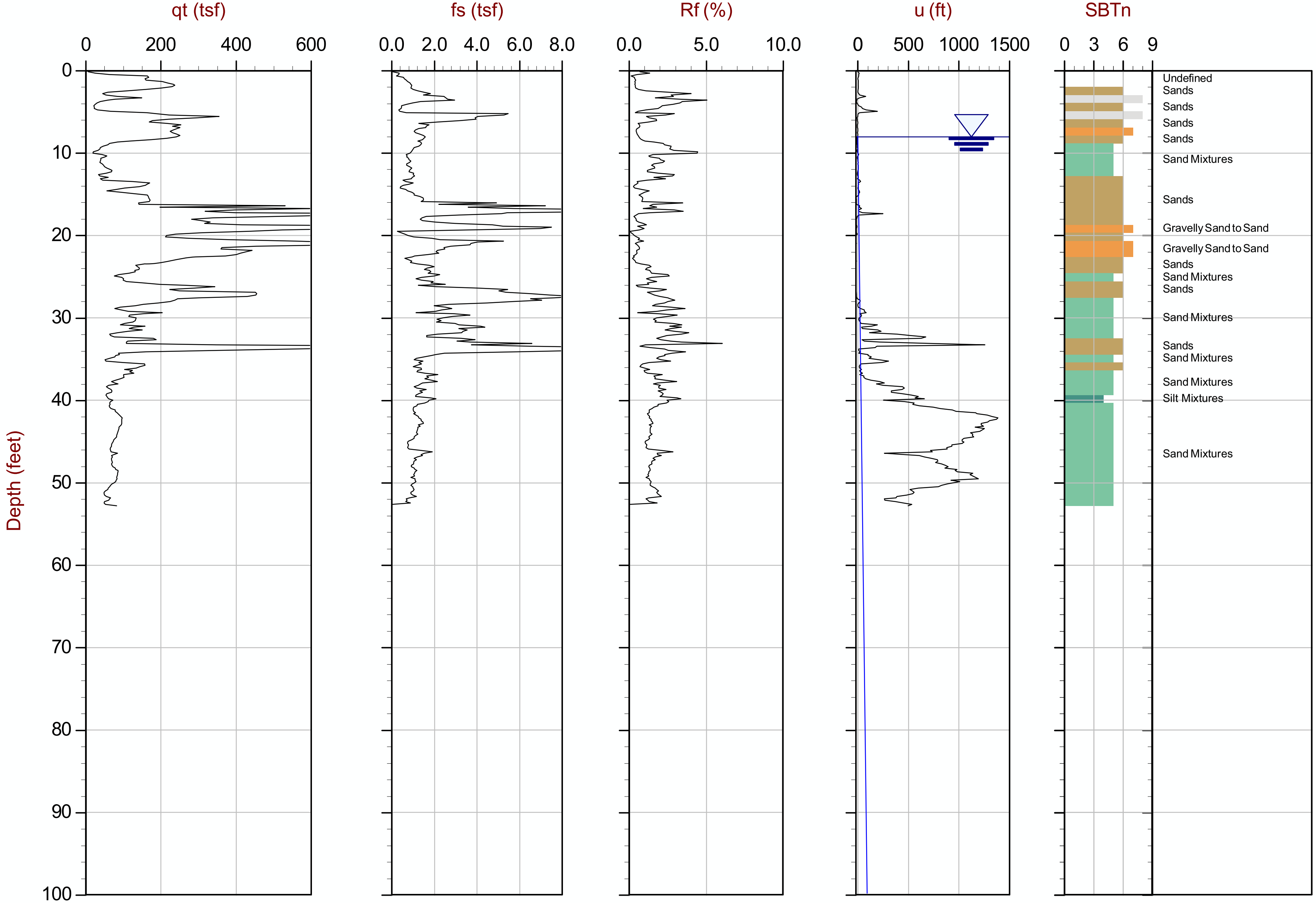
SBT: Lunne, Robertson and Powell, 1997
Coords: N: 219368.30 E: 960914.90 Elev: 8.20
Page No: 2 of 2

CONETEC

Schnabel

Job No: 08-965
Date: 08:05:08 07:37
Site: CCNPP

Sounding: C-728
Cone: STD 20T AD184



Max Depth: 16.100 m / 52.82 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

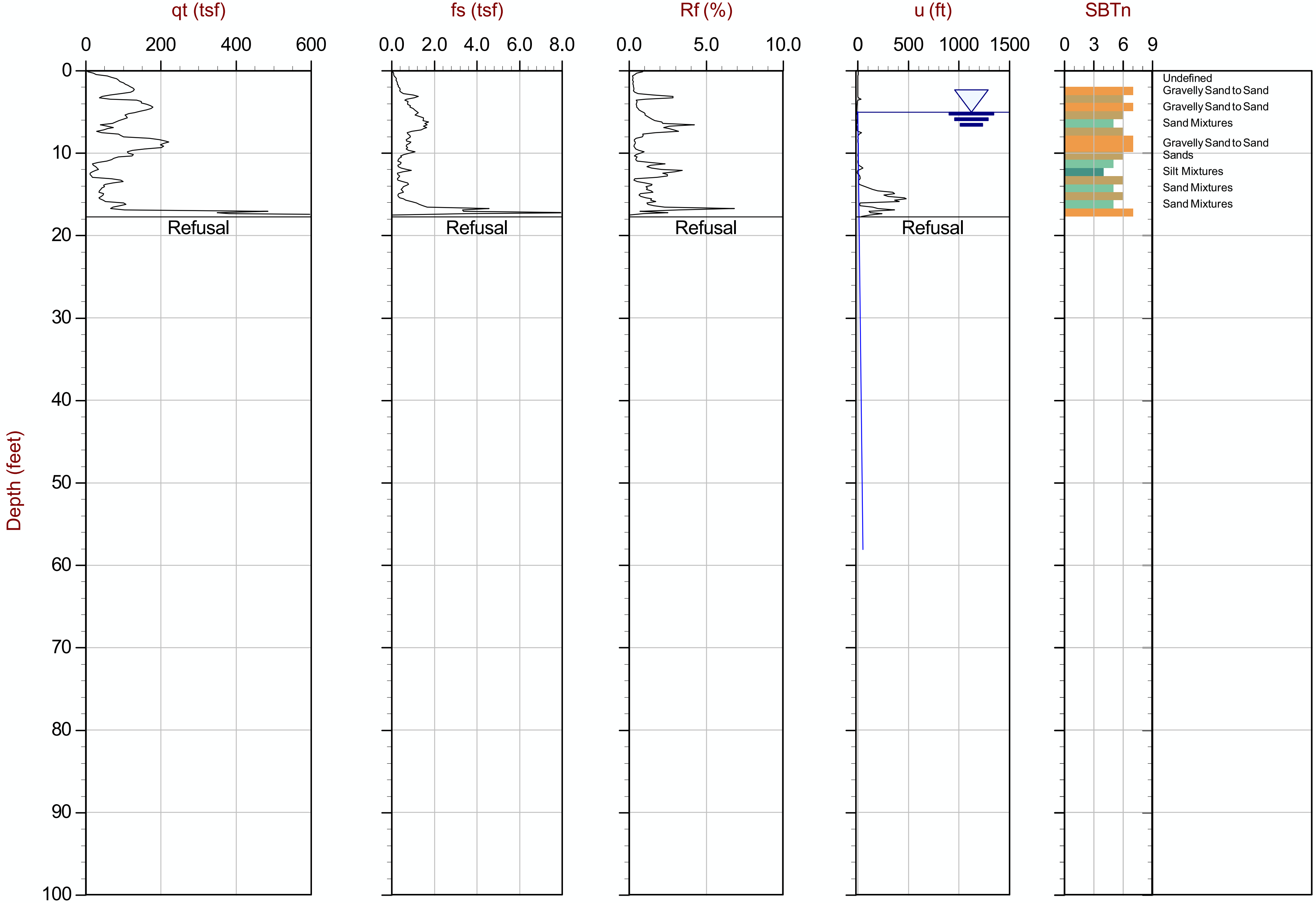
File: 965CP02.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997
Coords: N: 218975.50 E: 961193.00 Elev: 10.00
Page No: 1 of 1

Schnabel

Job No: 08-965
Date: 08:04:08 17:43
Site: CCNPP

Sounding: C-747
Cone: STD 20T AD184



Max Depth: 5.400 m / 17.72 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

File: 965CP01.COR
Unit Wt: SBT Chart Soil Zones

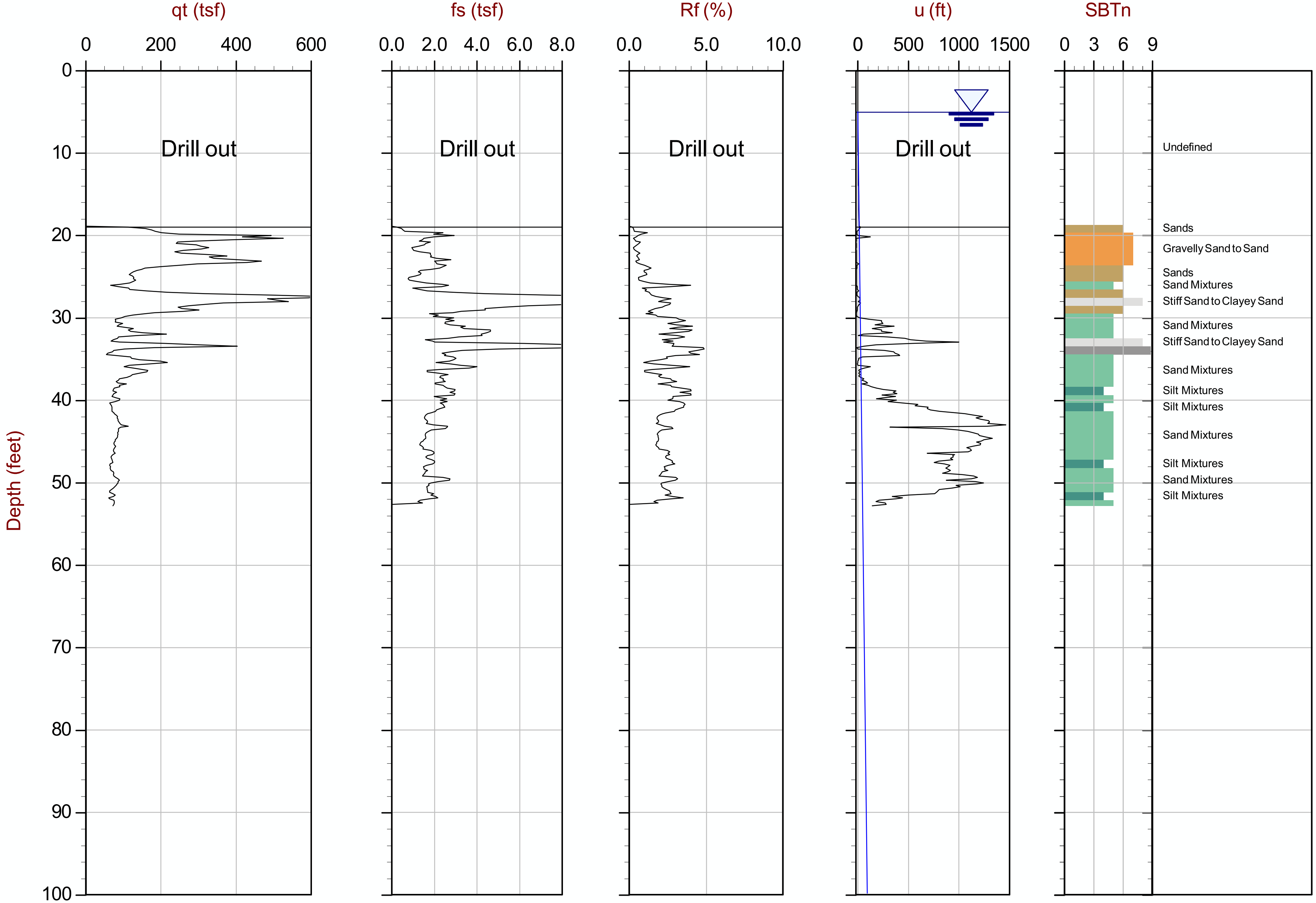
SBT: Lunne, Robertson and Powell, 1997
Coords: N: 218860.20 E: 961248.50 Elev: 9.10
Page No: 1 of 1

CONETEC

Schnabel

Job No: 08-965
Date: 08:06:08 17:02
Site: CCNPP

Sounding: C-747-1
Cone: STD 20T AD214



Max Depth: 16.100 m / 52.82 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

File: 965CP15.COR
Unit Wt: SBT Chart Soil Zones

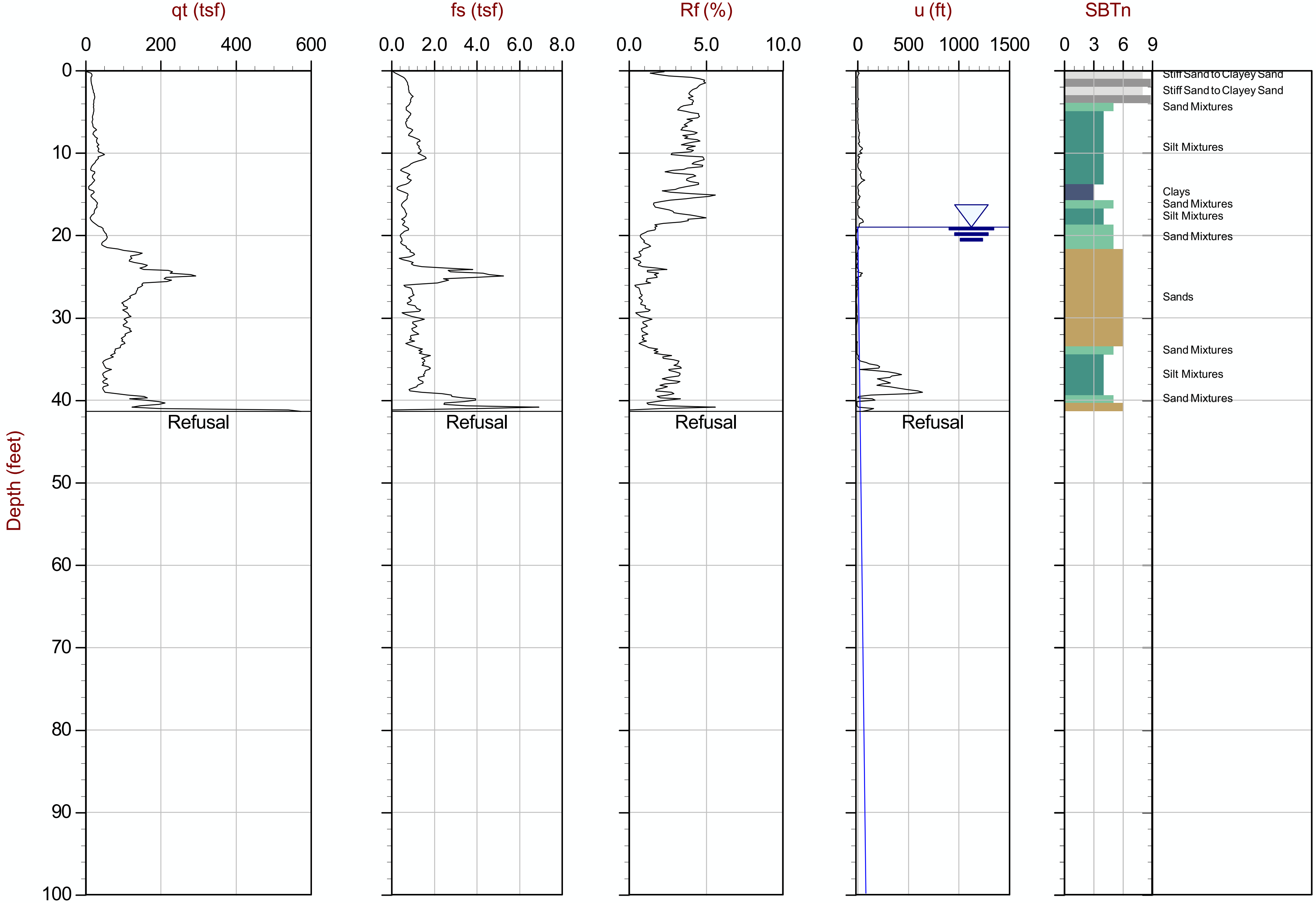
SBT: Lunne, Robertson and Powell, 1997
Coords: N: 218860.20 E: 961248.50 Elev: 9.10
Page No: 1 of 1

CONETEC

Schnabel

Job No: 08-965
Date: 08:20:08 13:16
Site: CCNPP

Sounding: C-748
Cone: STD 20T AD-214



Max Depth: 12.600 m / 41.34 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

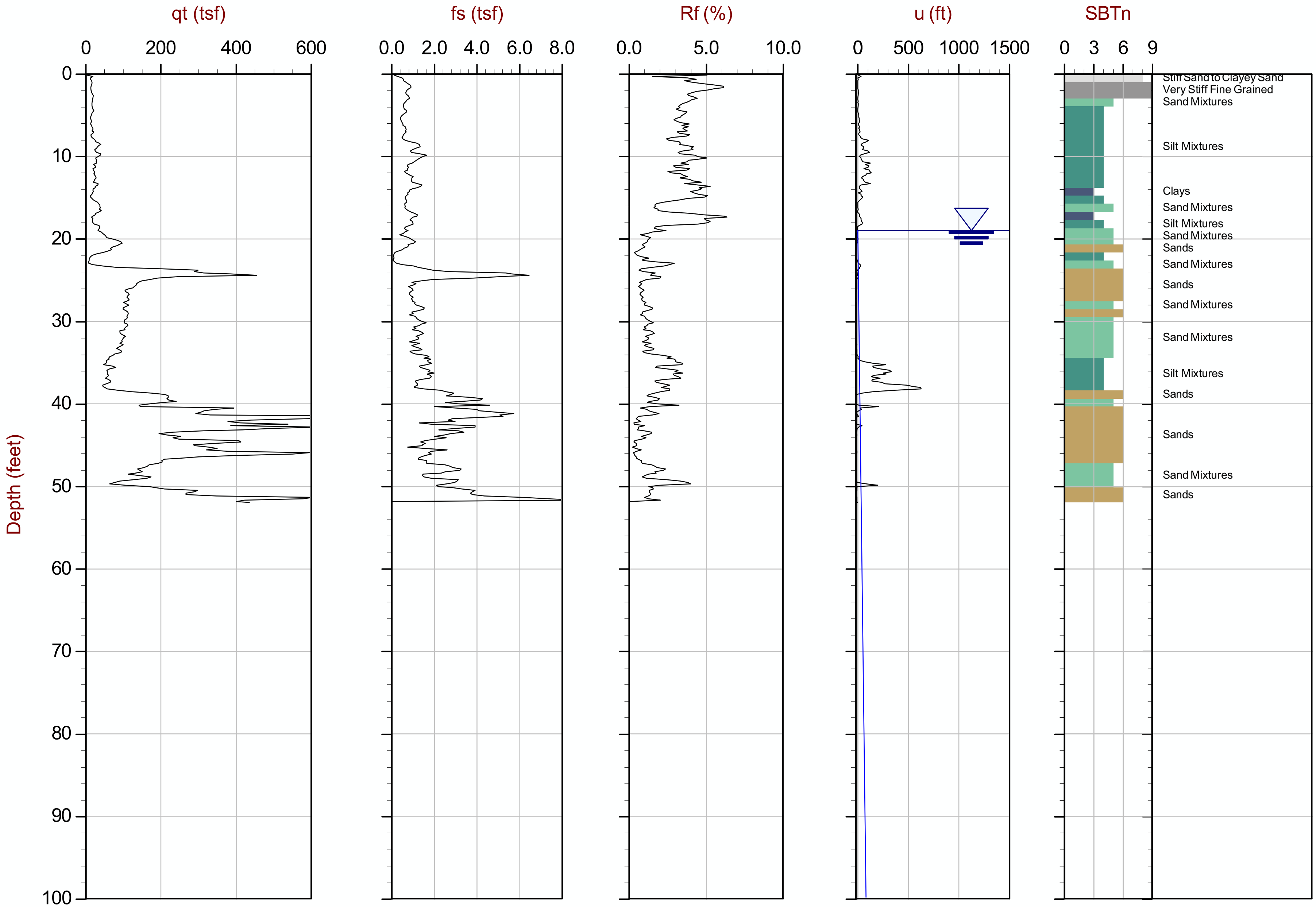
File: 965CP33.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997
Coords: N: 218521.40 E: 960909.80 Elev: 32.40
Page No: 1 of 1

Schnabel

Job No: 08-965
Date: 08:21:08 10:44
Site: CCNPP

Sounding: C-748a
Cone: STD 20T AD-214



Max Depth: 15.850 m / 52.00 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

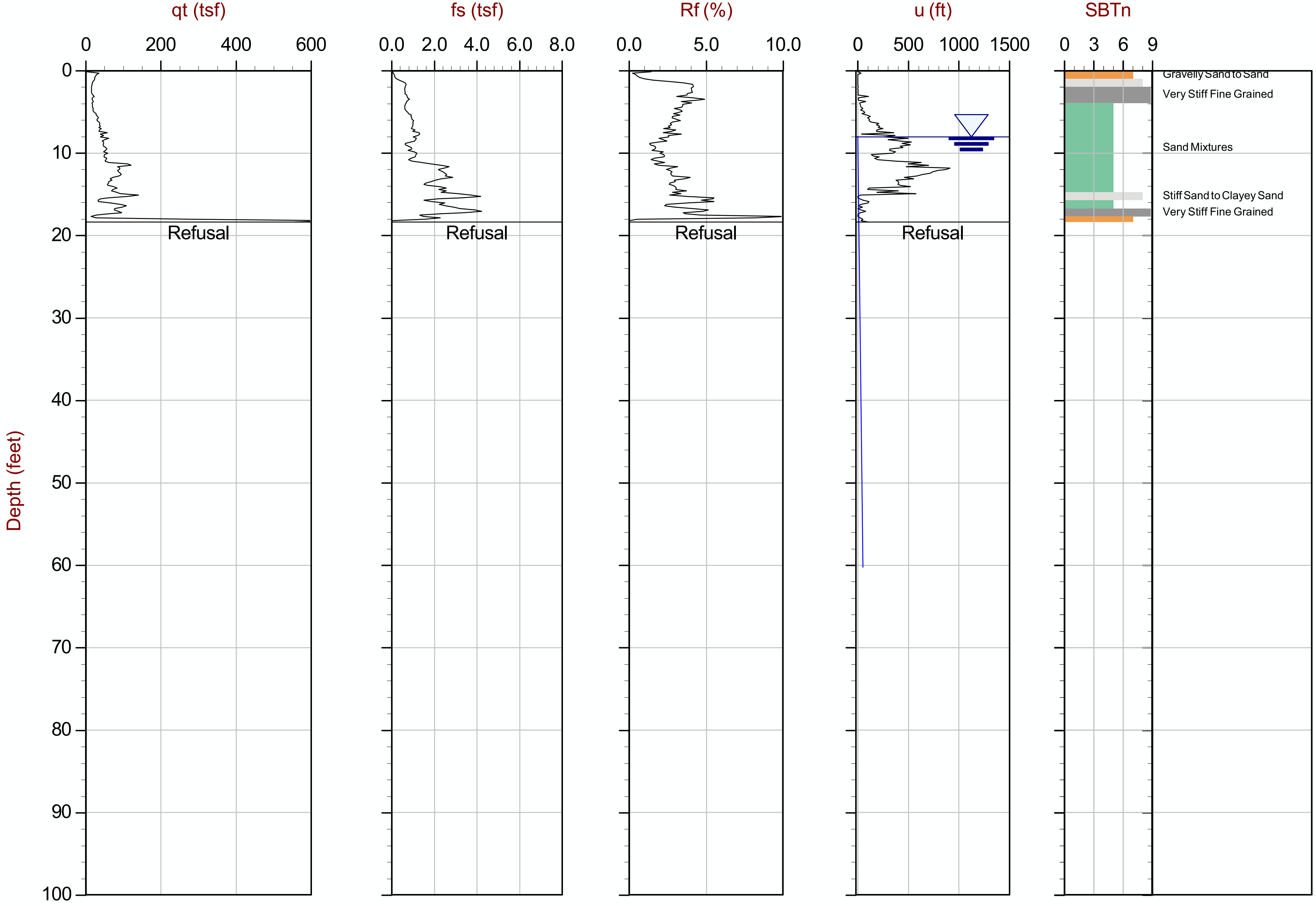
File: 965CP34.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997
Coords: N: 218518.90 E: 960908.70 Elev: 32.30
Page No: 1 of 1

Schnabel

Job No: 08-965
Date: 08:20:08 12:32
Site: CCNPP

Sounding: C-749
Cone: STD 20T AD-214



Max Depth: 5.600 m / 18.37 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

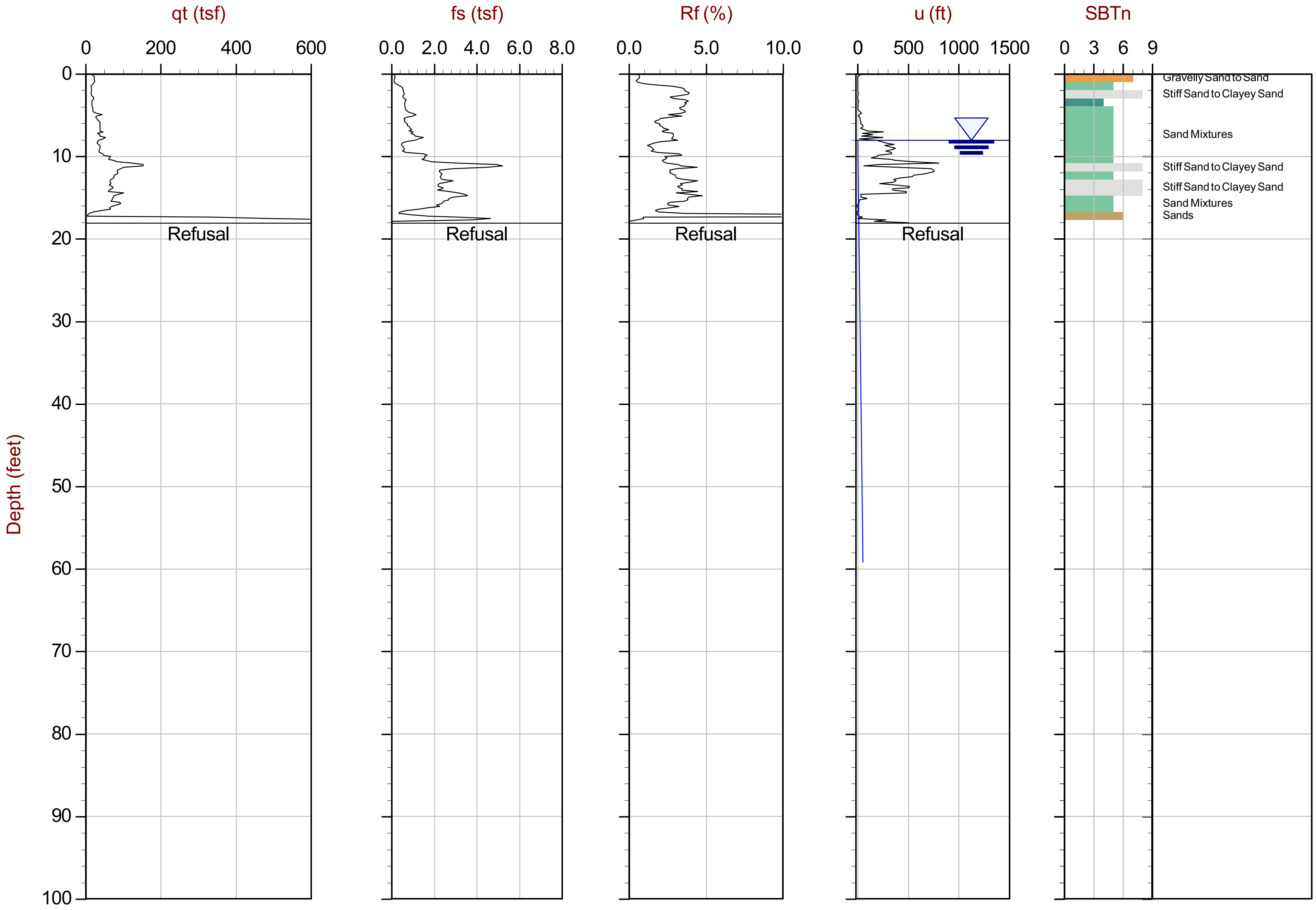
File: 965CP32.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997
Coords: N: 218344.50 E: 960737.80 Elev: 62.30
Page No: 1 of 1

Schnabel

Job No: 08-965
Date: 08:21:08 11:57
Site: CCNPP

Sounding: C-749a
Cone: STD 20T AD-214



Max Depth: 5.500 m / 18.04 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

File: 965CP36.COR
Unit Wt: SBT Chart Soil Zones

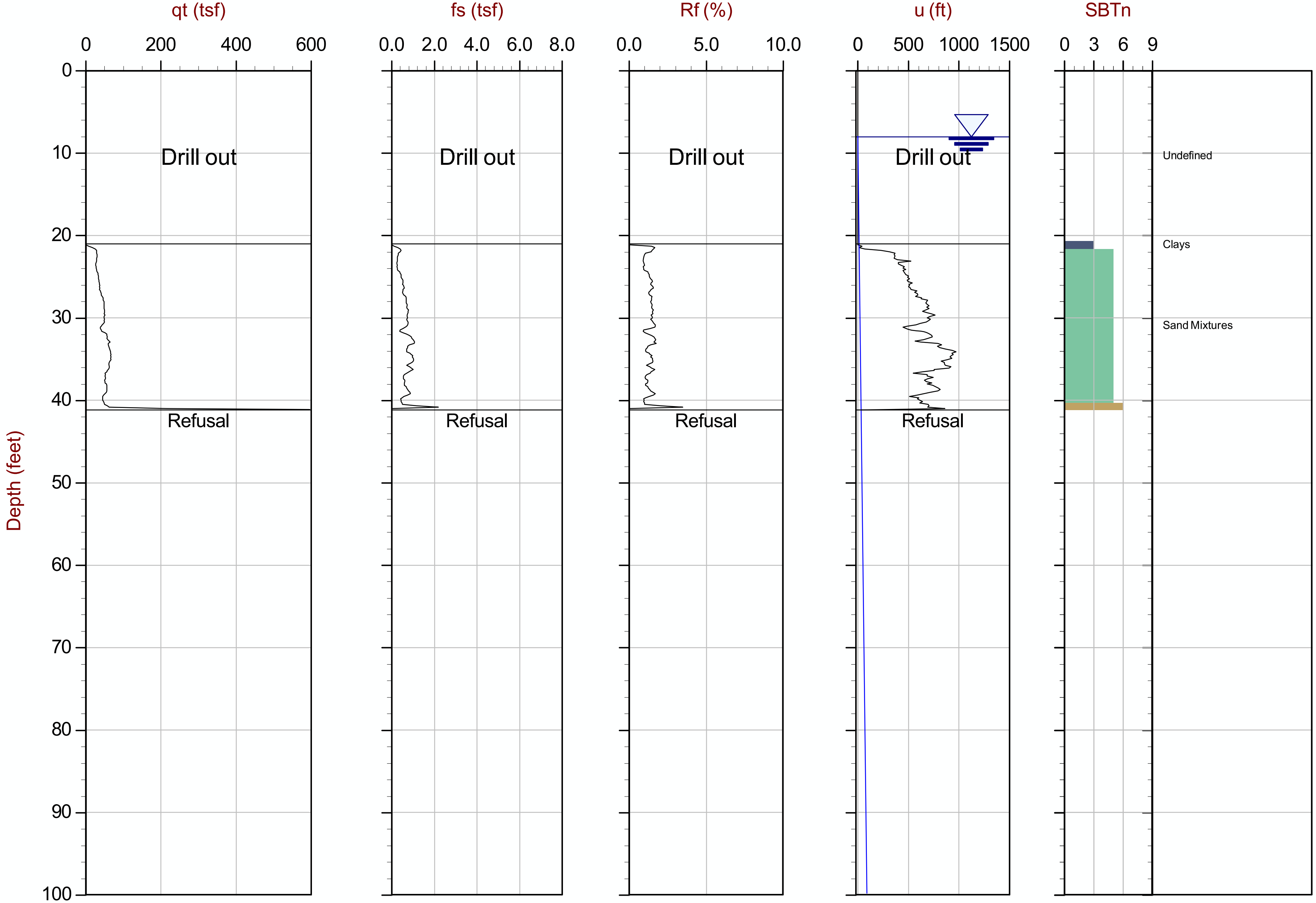
SBT: Lunne, Robertson and Powell, 1997
Coords: N: 218346.40 E: 960740.00 Elev: 62.30
Page No: 1 of 1

CONETEC

Schnabel

Job No: 08-965
Date: 08:21:08 13:17
Site: CCNPP

Sounding: C-749a-1
Cone: STD 20T AD-214



Max Depth: 12.550 m / 41.17 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.300 m

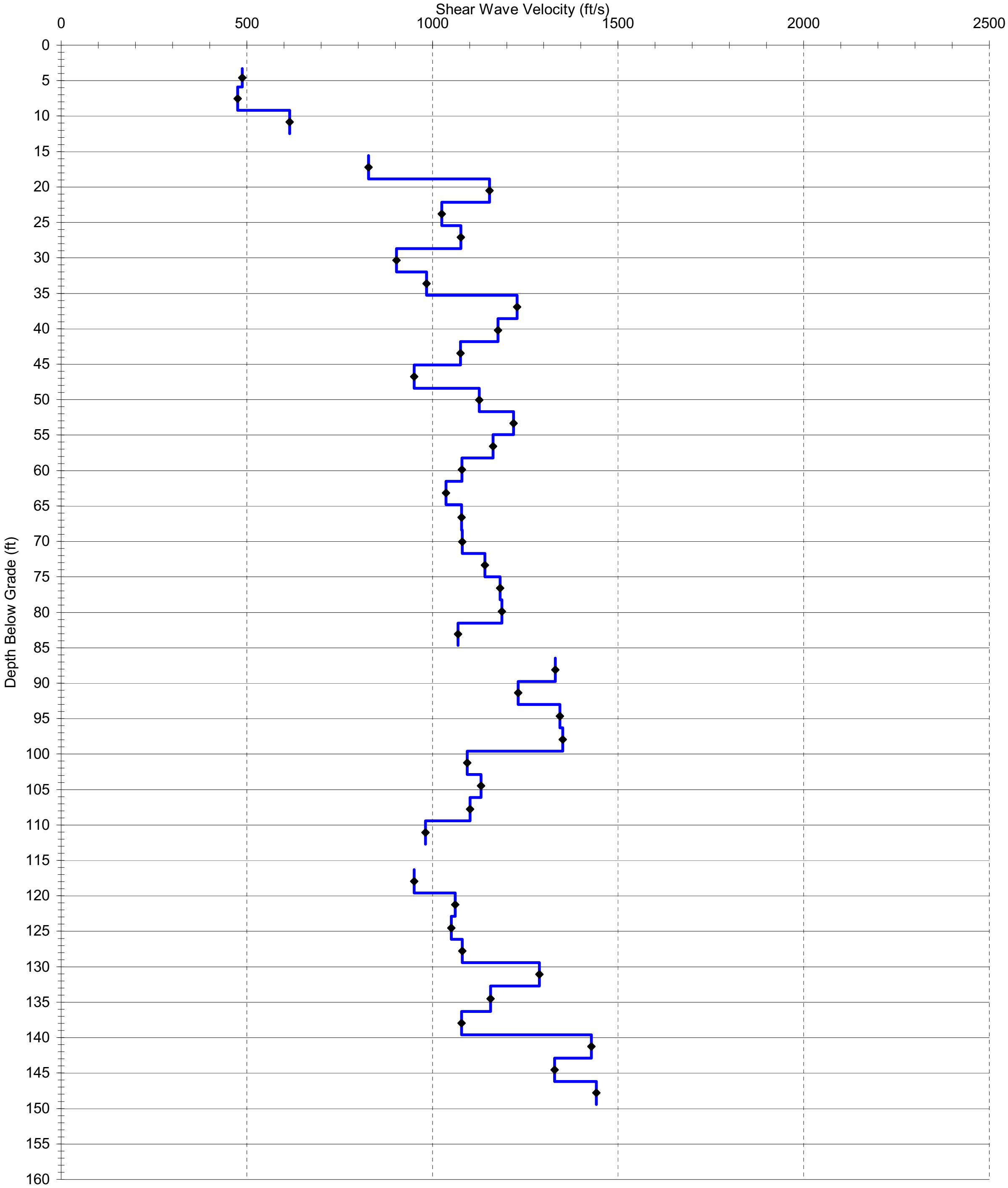
File: 965CP37.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997
Coords: N: 218346.40 E: 960740.00 Elev: 62.30
Page No: 1 of 1

APPENDIX B

Shear Wave Velocity Test Data

Shear Wave Velocity- C-724
Calvert Cliffs Nuclear Power Plant
08-965
August 6 through 8, 2008



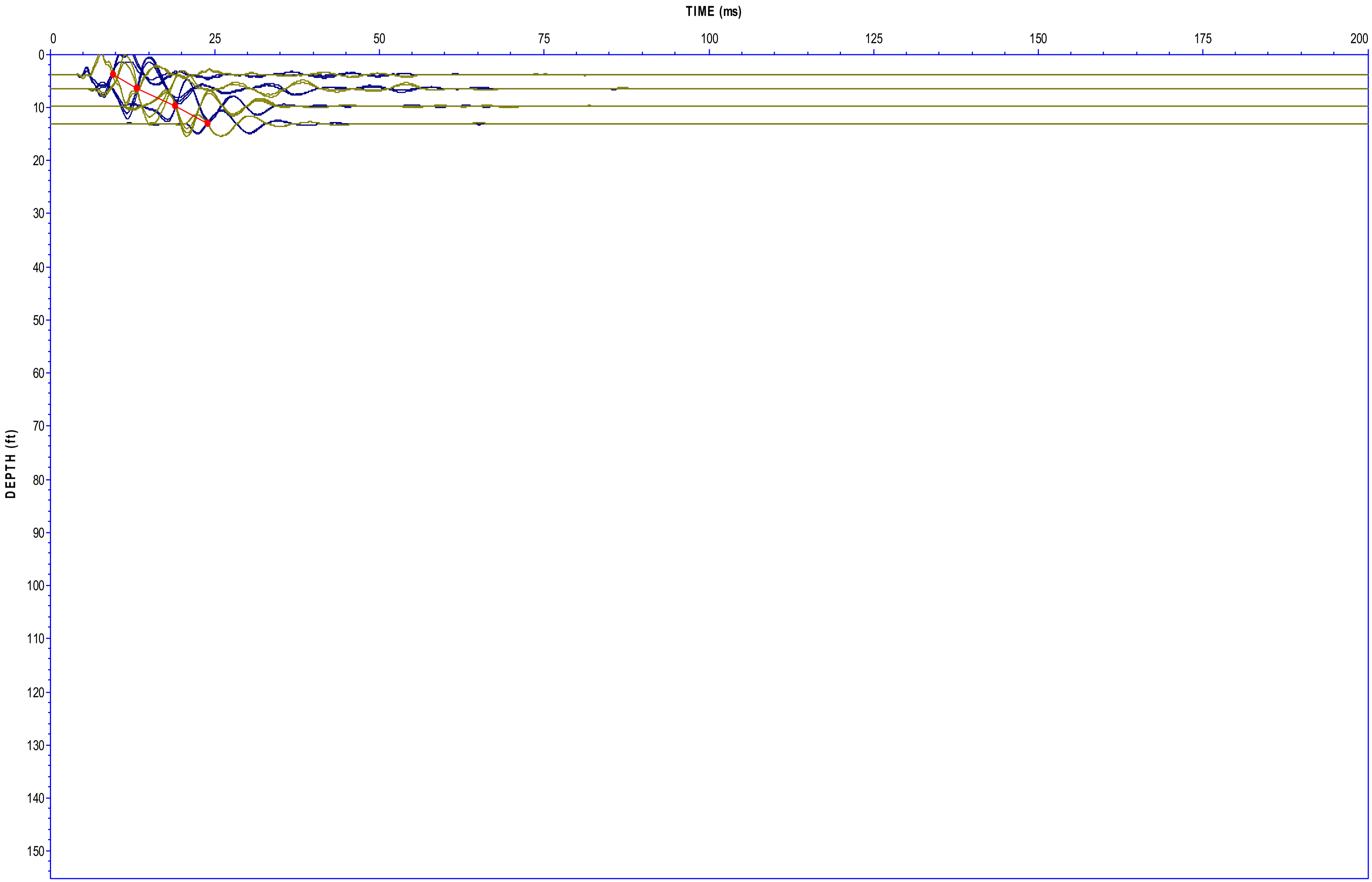
ConeTec Shear Wave Velocity Data Reduction Sheet

Hole: C-724
Location: Calvert Cliffs Nuclear Power Plant
Cone: AD214
Date: August 6 through 8, 2008
Source: Beam

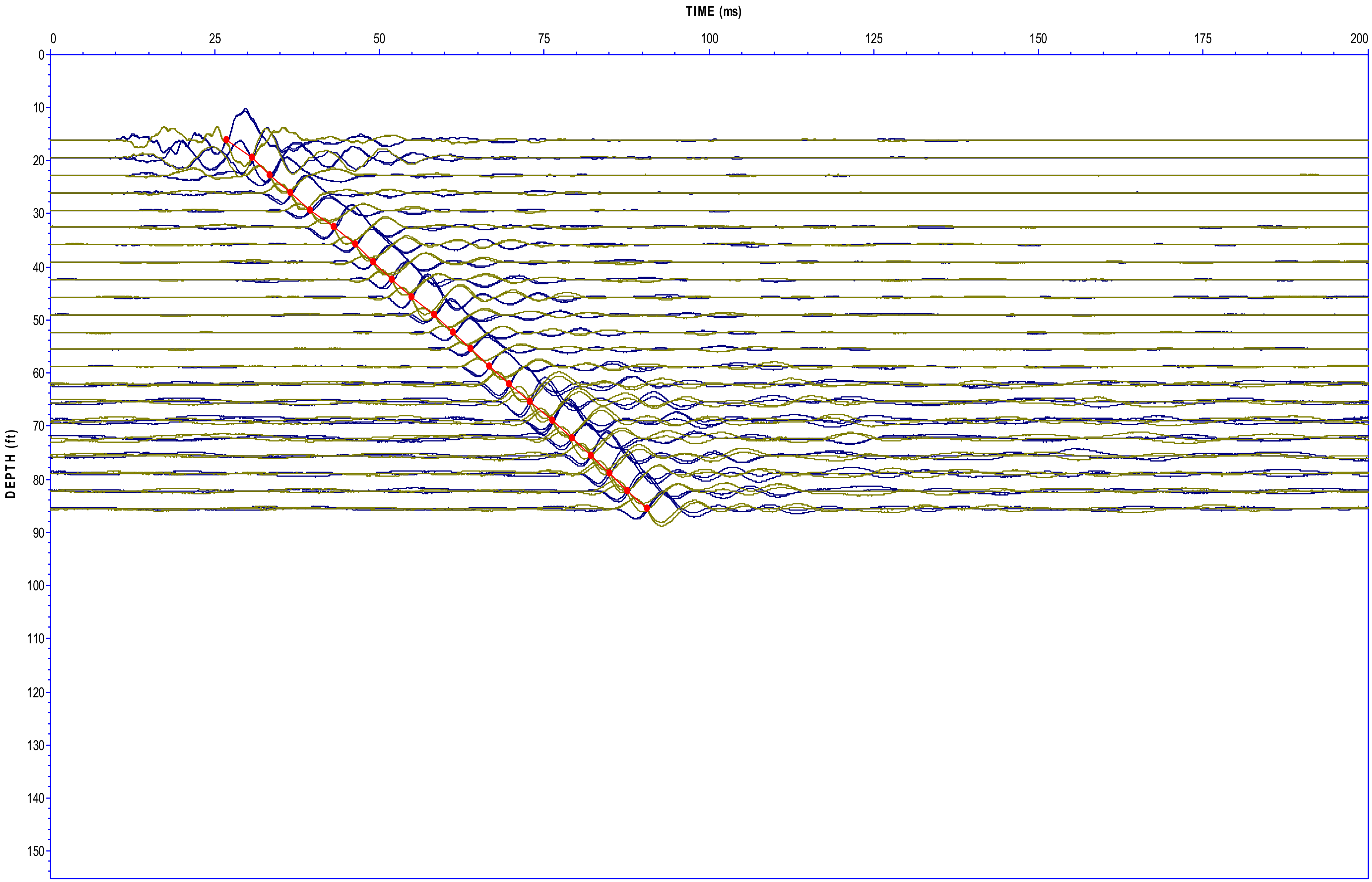
Source Depth	0.00	m
Source Offset	1.45	m

Tip Depth (m)	Geophone Depth(m)	Travel Path (m)	Interval time (ms)	Velocity (m/s)	Velocity (ft/s)	Interval Depth (m)	Interval Depth (ft)
0.00							
1.20	1.00	1.76					
2.00	1.80	2.31	3.70	148.6	487.6	1.40	4.59
3.00	2.80	3.15	5.81	144.8	475.0	2.30	7.55
4.00	3.80	4.07	4.87	187.7	615.8	3.30	10.83
4.95	4.75	4.97					
5.95	5.75	5.93	3.82	252.3	827.7	5.25	17.22
6.95	6.75	6.90	2.77	351.7	1153.9	6.25	20.50
7.95	7.75	7.88	3.14	312.4	1025.1	7.25	23.79
8.95	8.75	8.87	3.00	328.2	1076.8	8.25	27.07
9.95	9.75	9.86	3.59	275.3	903.3	9.25	30.35
10.95	10.75	10.85	3.30	300.0	984.2	10.25	33.63
11.95	11.75	11.84	2.65	374.2	1227.6	11.25	36.91
12.95	12.75	12.83	2.77	358.6	1176.5	12.25	40.19
13.95	13.75	13.83	3.03	327.9	1075.7	13.25	43.47
14.95	14.75	14.82	3.43	289.9	951.1	14.25	46.75
15.95	15.75	15.82	2.90	343.3	1126.2	15.25	50.03
16.95	16.75	16.81	2.68	371.4	1218.4	16.25	53.31
17.95	17.75	17.81	2.81	354.6	1163.5	17.25	56.59
18.95	18.75	18.81	3.03	329.1	1079.8	18.25	59.87
19.95	19.75	19.80	3.16	315.9	1036.3	19.25	63.16
21.05	20.85	20.90	3.34	328.7	1078.3	20.30	66.60
22.05	21.85	21.90	3.03	329.4	1080.8	21.35	70.04
23.05	22.85	22.90	2.87	347.8	1141.0	22.35	73.33
24.05	23.85	23.89	2.77	360.4	1182.4	23.35	76.61
25.05	24.85	24.89	2.76	361.7	1186.6	24.35	79.89
26.00	25.80	25.84	2.91	325.9	1069.1	25.32	83.09
26.55	26.35	26.39					
27.55	27.35	27.39	2.46	405.8	1331.4	26.85	88.09
28.55	28.35	28.39	2.66	375.2	1231.0	27.85	91.37
29.55	29.35	29.39	2.44	409.5	1343.6	28.85	94.65
30.55	30.35	30.38	2.43	411.9	1351.3	29.85	97.93
31.55	31.35	31.38	3.00	333.3	1093.5	30.85	101.21
32.55	32.35	32.38	2.90	344.8	1131.3	31.85	104.49
33.55	33.35	33.38	2.98	335.7	1101.3	32.85	107.77
34.55	34.35	34.38	3.34	299.1	981.1	33.85	111.05
35.65	35.45	35.48					
36.65	36.45	36.48	3.45	289.8	950.7	35.95	117.94
37.65	37.45	37.48	3.09	323.4	1061.0	36.95	121.23
38.65	38.45	38.48	3.12	320.4	1051.2	37.95	124.51
39.65	39.45	39.48	3.03	329.4	1080.8	38.95	127.79
40.65	40.45	40.48	2.55	392.5	1287.8	39.95	131.07
41.75	41.55	41.58	3.12	352.5	1156.4	41.00	134.51
42.75	42.55	42.57	3.04	328.8	1078.7	42.05	137.96
43.75	43.55	43.57	2.30	435.3	1428.2	43.05	141.24
44.75	44.55	44.57	2.47	405.0	1328.7	44.05	144.52
45.75	45.55	45.57	2.28	439.3	1441.3	45.05	147.80

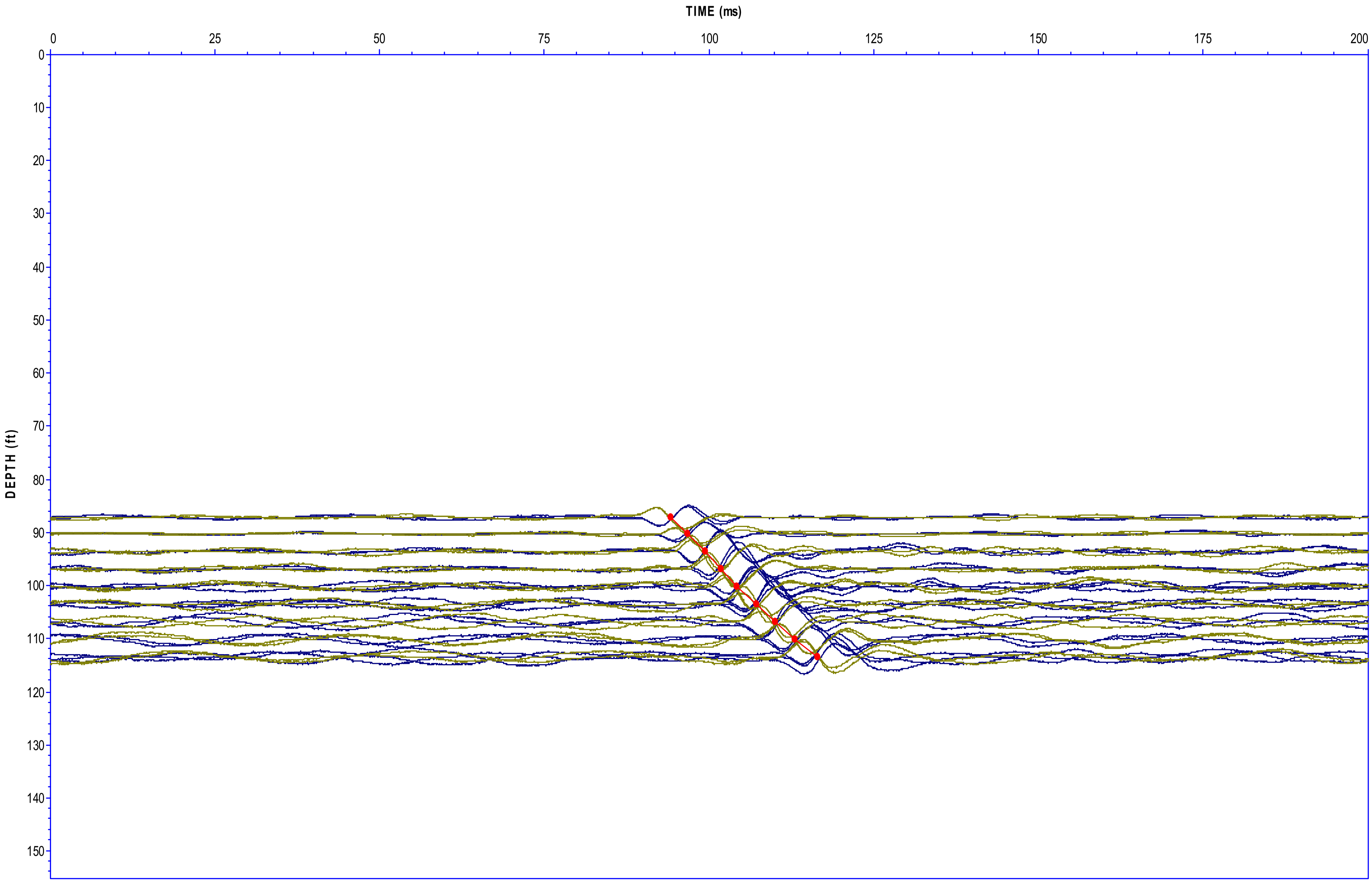
Job No: 08-965 Client: Schnabel Project Title: CCNPP Operator: BH-RH-JE Hole: C-724 Site: CCNPP Date: 08:06:08 15:17 Oversite: STD 20T AD214



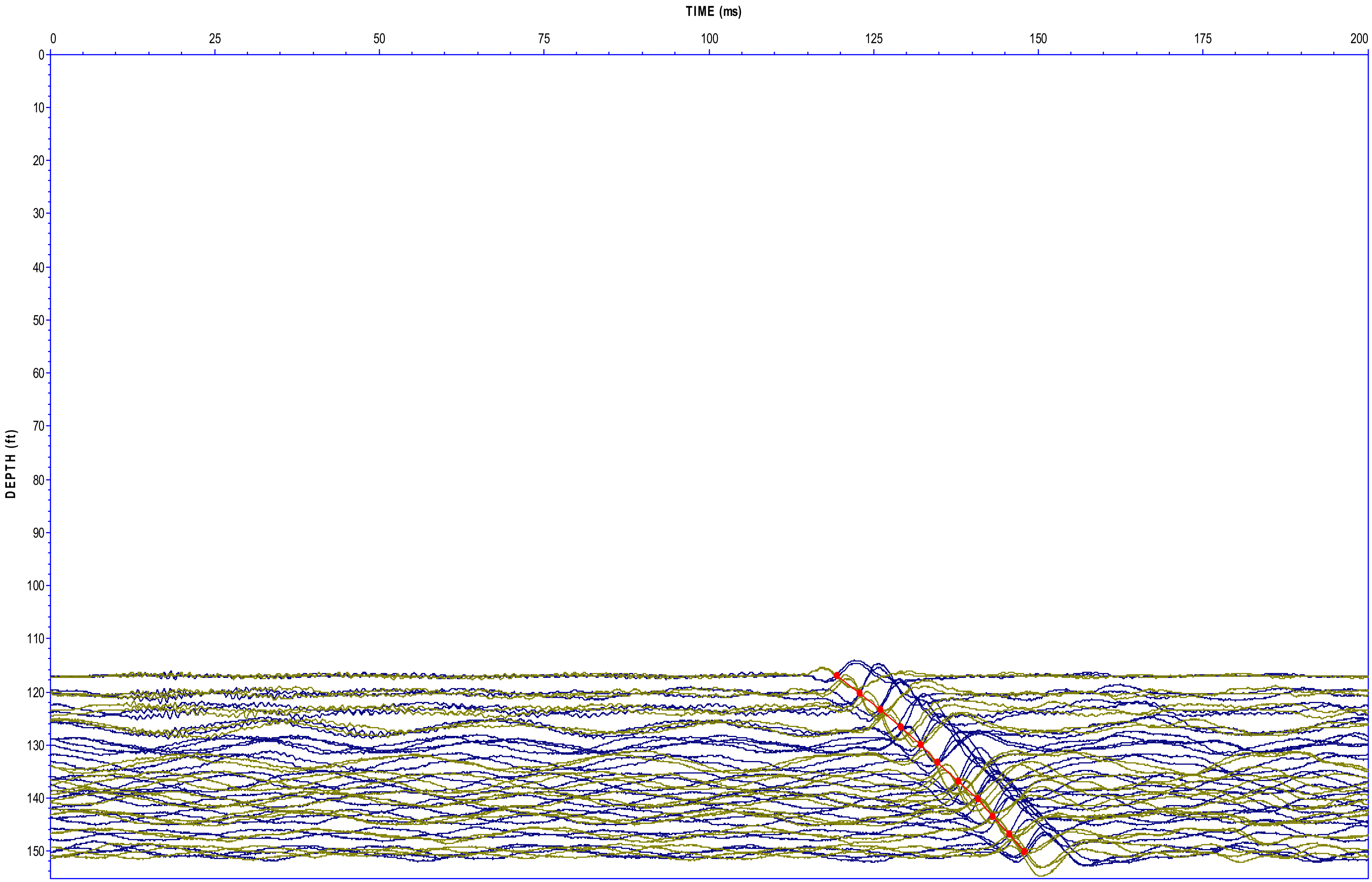
Job No: 08-965
Client: Schnabel
Project Title: CCNPP
Operator: BH-RH-JE
Hole: C-724
Site: CCNPP
Date: 08:07:08 12:25
Oversite: STD 20T AD214



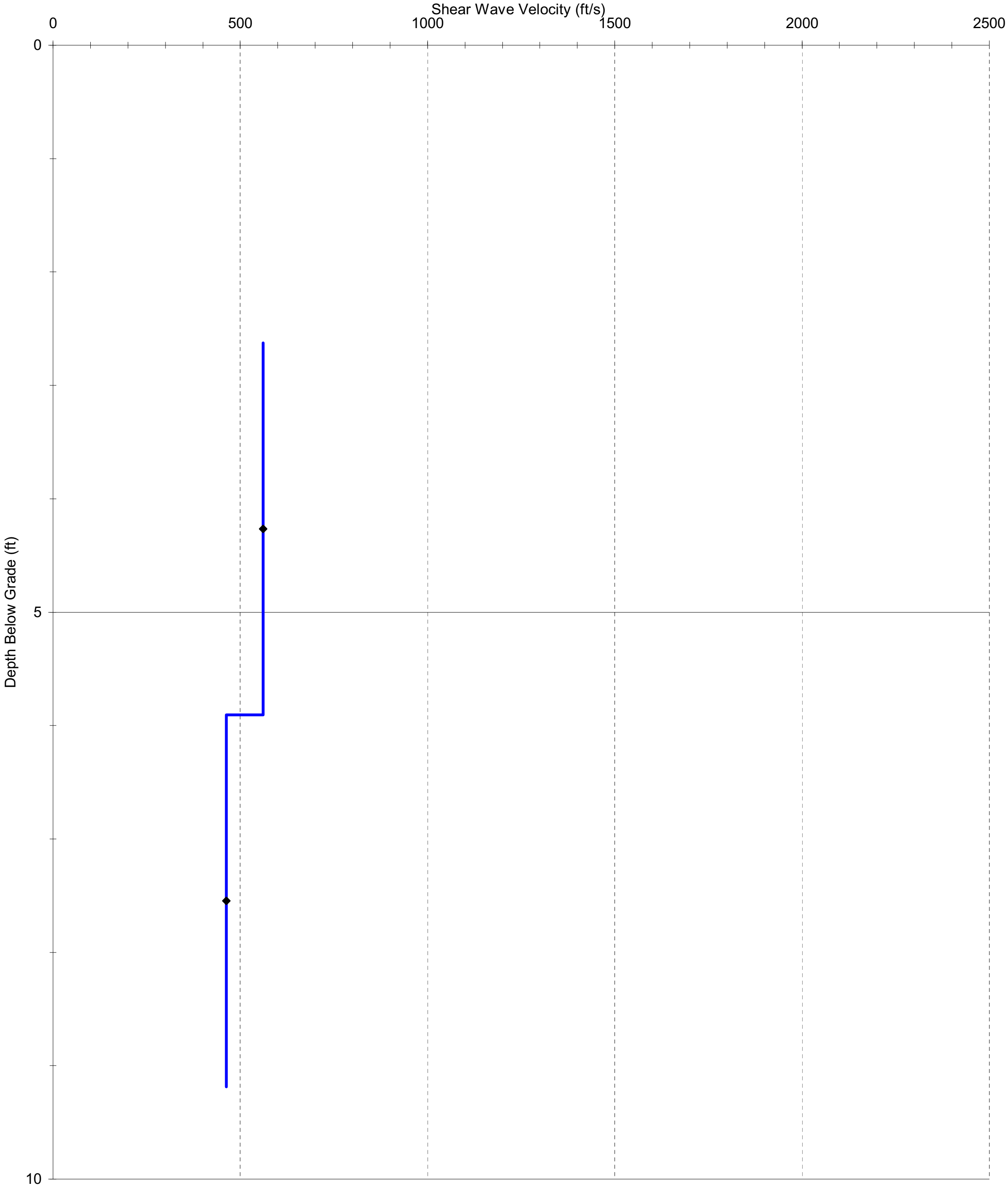
Job No: 08-965 Client: Schnabel Project Title: CCNPP Operator: BH-RH-JE Hole: C-724 Site: CCNPP Date: 08:07:08 16:10 Oversite: STD 20T AD214



Job No: 08-965 Client: Schnabel Project Title: CCNPP Operator: BH-RH-JE Hole: C-724 Site: CCNPP Date: 08:08:08 08:35 Oversite: STD 20T AD214



Shear Wave Velocity- C-724a
Calvert Cliffs Nuclear Power Plant
08-965
August 6, 2008



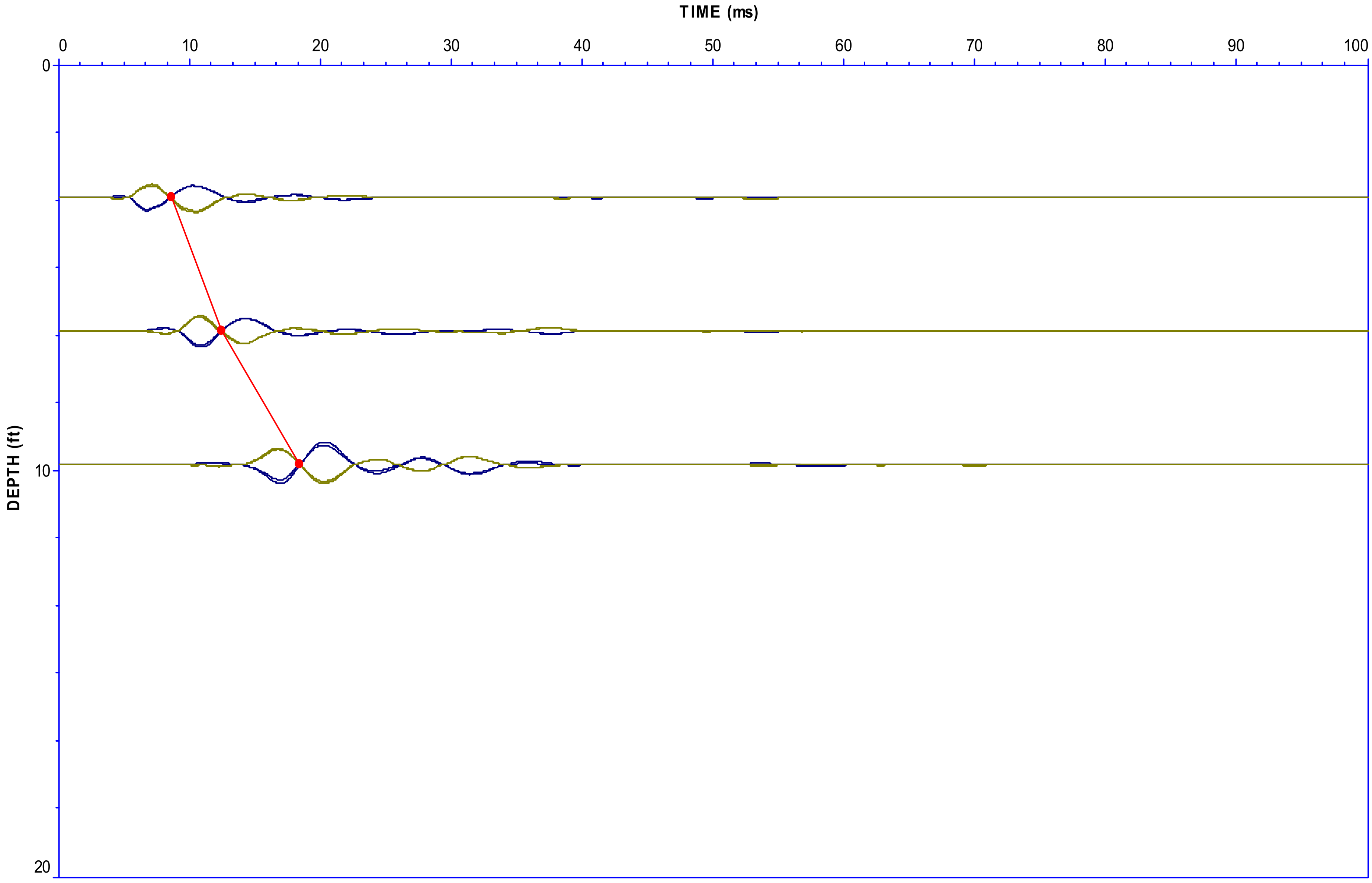
ConeTec Shear Wave Velocity Data Reduction Sheet

Hole:	C-724a
Location:	Calvert Cliffs Nuclear Power Plant
Cone:	AD214
Date:	6-Aug-08
Source:	Beam

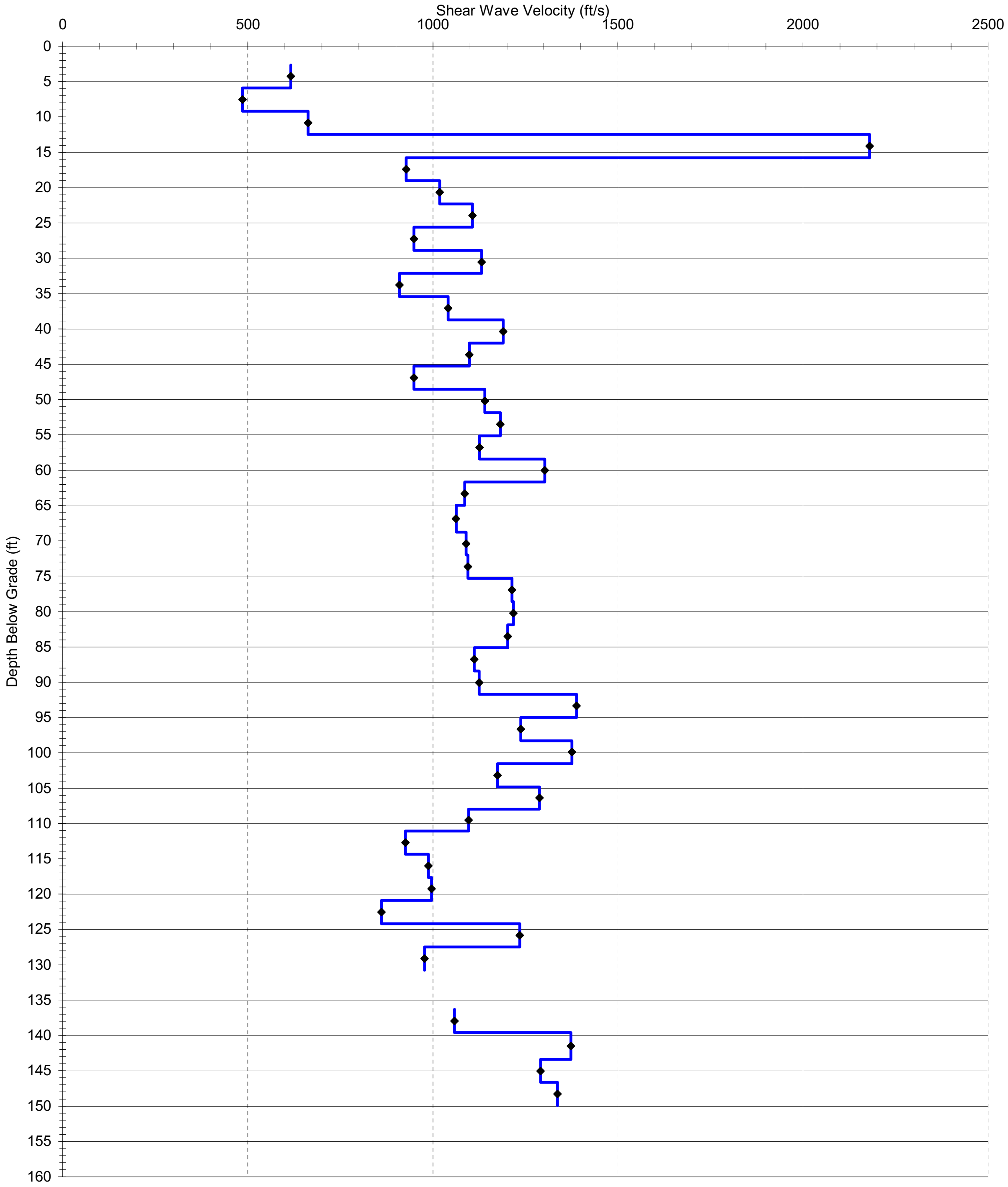
Source Depth	0.00	m
Source Offset	1.45	m

Tip Depth (m)	Geophone Depth(m)	Travel Path (m)	Interval time (ms)	Velocity (m/s)	Velocity (ft/s)	Interval Depth (m)	Interval Depth (ft)
0.00							
1.00	0.80	1.66					
2.00	1.80	2.31	3.83	171.0	561.1	1.30	4.27
3.00	2.80	3.15	5.96	141.2	463.1	2.30	7.55

Job No: 08-965
Date: 08:06:08 16:23
Client: Schnabel
Cone: STD 20T AD214
Project Title: CCNPP
Operator: BH-RH-JE
Hole: C-724a
Site: CCNPP



Shear Wave Velocity- C-725
Calvert Cliffs Nuclear Power Plant
08-965
August 5 through 7, 2008

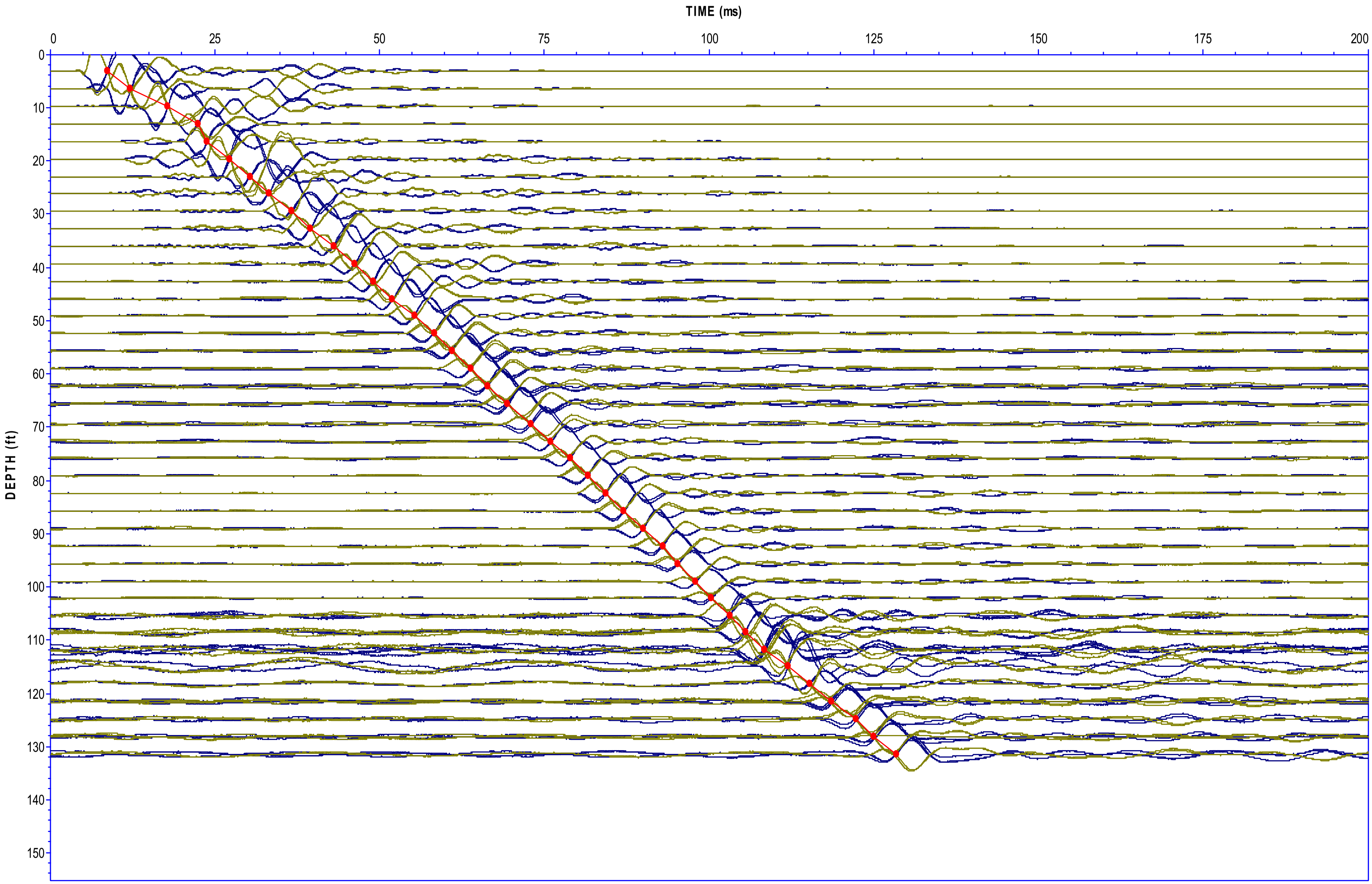


ConeTec Shear Wave Velocity Data Reduction Sheet

Hole:	C-725
Location:	Calvert Cliffs Nuclear Power Plant
Cone:	AD214
Date:	August 5 through 7, 2008
Source:	Beam
Source Depth	0.00 m
Source Offset	1.45 m

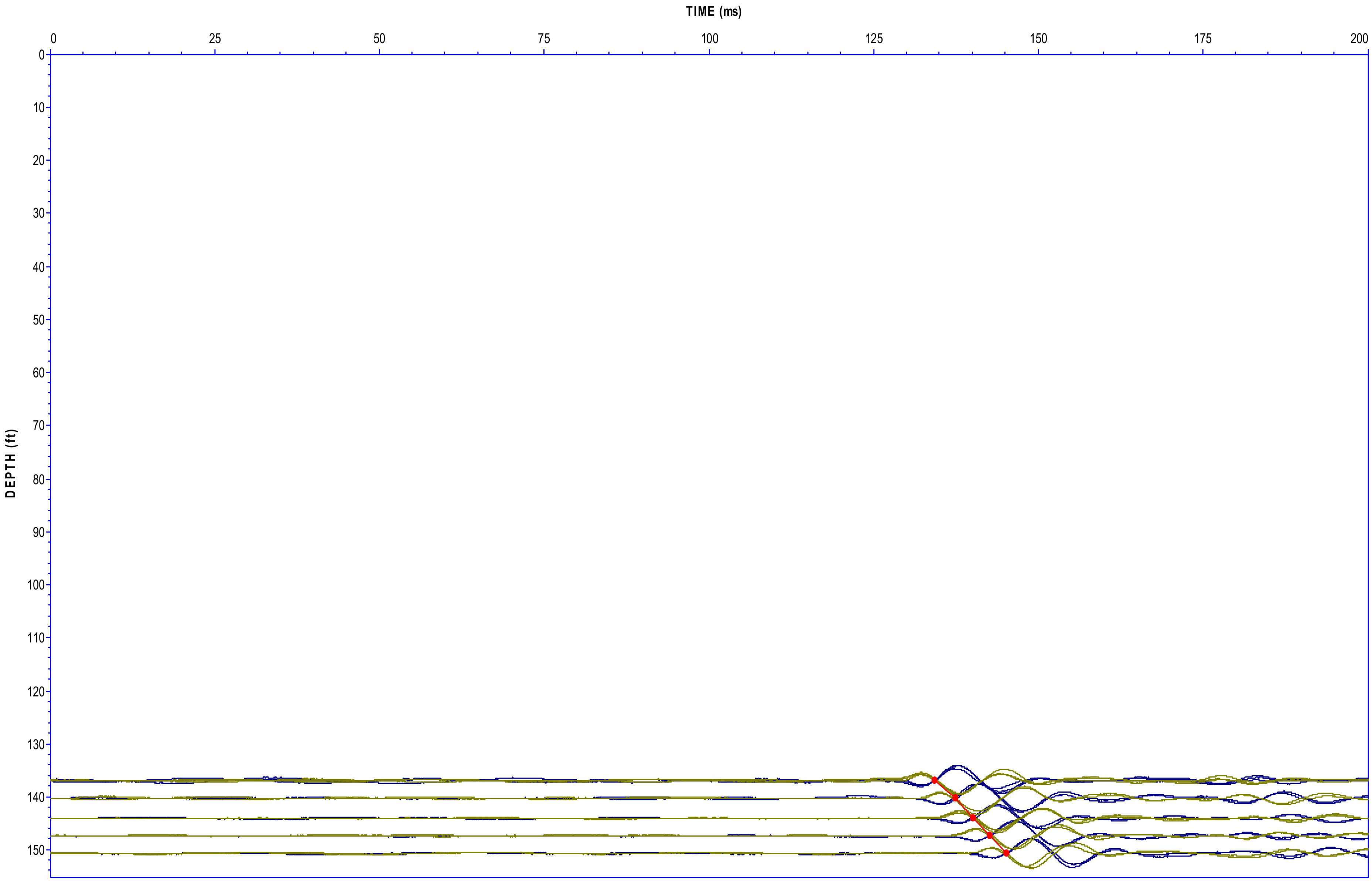
Tip Depth (m)	Geophone Depth(m)	Travel Path (m)	Interval time (ms)	Velocity (m/s)	Velocity (ft/s)	Interval Depth (m)	Interval Depth (ft)
0.00							
1.00	0.80	1.66					
2.00	1.80	2.31	3.49	187.9	616.4	1.30	4.27
3.00	2.80	3.15	5.69	148.0	485.5	2.30	7.55
4.00	3.80	4.07	4.52	202.1	663.1	3.30	10.83
5.00	4.80	5.01	1.43	664.4	2179.9	4.30	14.11
6.00	5.80	5.98	3.41	282.8	927.7	5.30	17.39
7.00	6.80	6.95	3.14	310.5	1018.7	6.30	20.67
8.00	7.80	7.93	2.91	337.4	1107.0	7.30	23.95
9.00	8.80	8.92	3.41	289.1	948.6	8.30	27.23
10.00	9.80	9.91	2.86	345.1	1132.2	9.30	30.51
11.00	10.80	10.90	3.57	277.4	910.1	10.30	33.79
12.00	11.80	11.89	3.13	317.3	1041.1	11.30	37.07
13.00	12.80	12.88	2.74	362.7	1189.9	12.30	40.35
14.00	13.80	13.88	2.97	334.8	1098.4	13.30	43.63
15.00	14.80	14.87	3.44	289.4	949.4	14.30	46.92
16.00	15.80	15.87	2.86	347.7	1140.8	15.30	50.20
17.00	16.80	16.86	2.76	360.3	1182.1	16.30	53.48
18.00	17.80	17.86	2.90	343.1	1125.7	17.30	56.76
19.00	18.80	18.86	2.51	397.1	1302.7	18.30	60.04
20.00	19.80	19.85	3.01	331.1	1086.3	19.30	63.32
21.15	20.95	21.00	3.54	323.9	1062.8	20.37	66.85
22.15	21.95	22.00	3.00	332.1	1089.6	21.45	70.37
23.15	22.95	23.00	2.99	333.8	1095.1	22.45	73.65
24.15	23.95	23.99	2.70	370.1	1214.1	23.45	76.93
25.15	24.95	24.99	2.69	371.1	1217.6	24.45	80.22
26.15	25.95	25.99	2.73	366.4	1202.0	25.45	83.50
27.15	26.95	26.99	2.95	338.8	1111.6	26.45	86.78
28.15	27.95	27.99	2.91	343.0	1125.2	27.45	90.06
29.15	28.95	28.99	2.36	423.1	1388.1	28.45	93.34
30.15	29.95	29.98	2.65	377.3	1237.9	29.45	96.62
31.15	30.95	30.98	2.38	419.5	1376.1	30.45	99.90
32.15	31.95	31.98	2.79	358.1	1174.9	31.45	103.18
33.10	32.90	32.93	2.42	392.5	1287.7	32.42	106.38
34.05	33.85	33.88	2.84	334.2	1096.5	33.37	109.50
35.05	34.85	34.88	3.54	282.2	925.8	34.35	112.70
36.05	35.85	35.88	3.32	301.1	987.7	35.35	115.98
37.05	36.85	36.88	3.29	303.6	996.2	36.35	119.26
38.05	37.85	37.88	3.81	262.6	861.5	37.35	122.54
39.05	38.85	38.88	2.65	376.5	1235.2	38.35	125.82
40.05	39.85	39.88	3.35	297.9	977.4	39.35	129.10
41.75	41.55	41.58					
42.75	42.55	42.57	3.10	322.7	1058.7	42.05	137.96
43.90	43.70	43.72	2.75	418.4	1372.7	43.13	141.48
44.90	44.70	44.72	2.54	393.5	1291.1	44.20	145.01
45.90	45.70	45.72	2.45	407.4	1336.6	45.20	148.29

Job No: 08-965
Client: Schnabel
Project Title: CCNPP
Operator: BH-RH-JE
Hole: C-725
Site: CCNPP
Date: 08:05:08 08:30
Oversite: STD 20T AD184



CONETEC

Job No: 08-965 | Client: Schnabel | Project Title: CCNPP | Operator: BH-RH-JE | Hole: C-725 | Site: CCNPP | Date: 08:07:08 07:49 | Oversite: STD 20T AD214



APPENDIX C

Pore Pressure Dissipation Tests

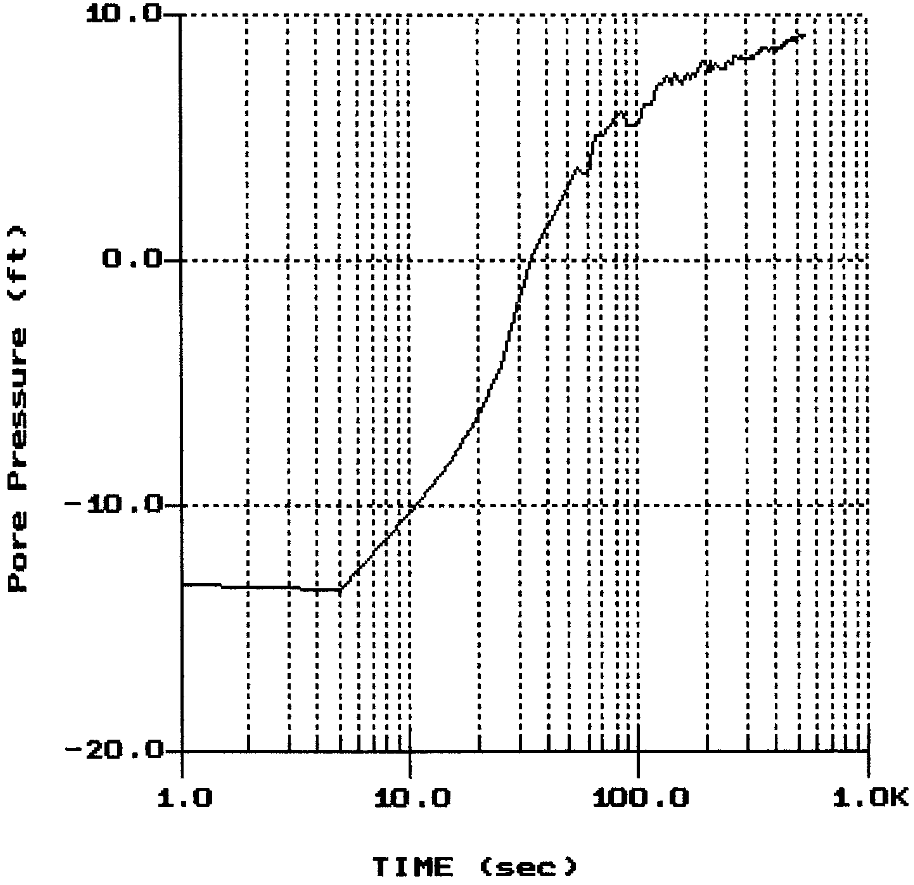
Schnabel

Hole: C-727
Location:CCNPP

Cone:STD 20T AD214
Date:08:06:08 09:50

File: 965CP08.PPD
Depth (m): 4.60
(ft): 15.09
Duration : 535.0s
U-min: -13.46 5.0s
U-max: 9.20 535.0s

PORE PRESSURE DISSIPATION RECORD



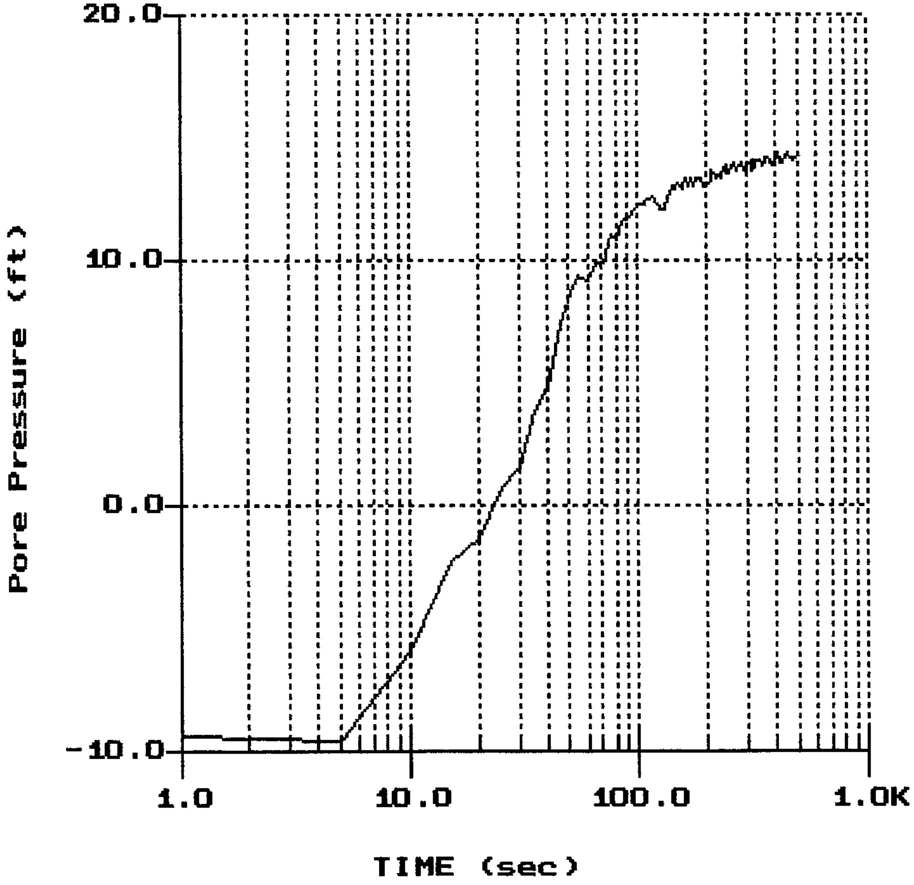
Schnabel

Hole: C-727
Location:CCNPP

Cone:STD 20T AD214
Date:08:06:08 09:50

File: 965CP08.PPD
Depth (m): 6.10
(ft): 20.01
Duration : 480.0s
U-min: -9.53 5.0s
U-max: 14.38 445.0s

PORE PRESSURE DISSIPATION RECORD



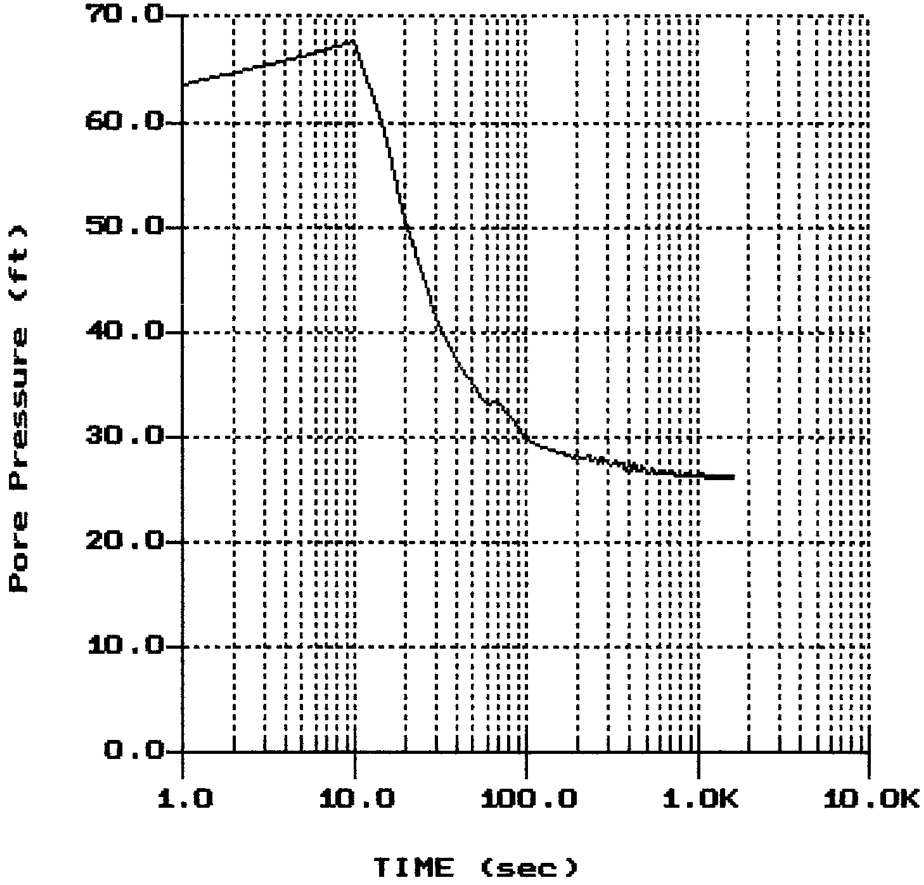
Schnabel

Hole: C-727
Location:CCNPP

Cone:STD 20T AD214
Date:08:06:08 09:50

File: 965CP08.PPD
Depth (m): 9.30
(ft): 30.51
Duration : 1625.0s
U-min: 6.67 0.0s
U-max: 67.58 10.0s

PORE PRESSURE DISSIPATION RECORD

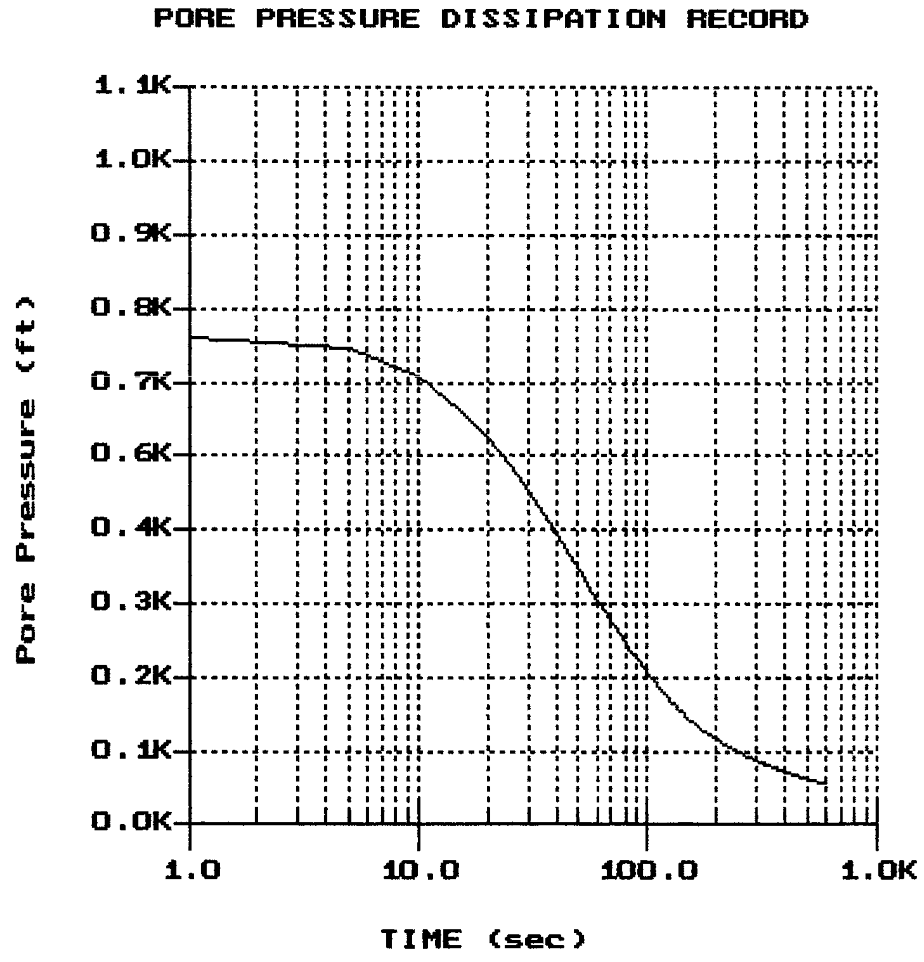


Schnabel

Hole: C-727
Location:CCNPP

Cone:STD 20T AD214
Date:08:06:08 09:50

File: 965CP08.PPD
Depth (m): 10.70
(ft): 35.10
Duration : 595.0s
U-min: 59.97 595.0s
U-max: 1061.56 0.0s

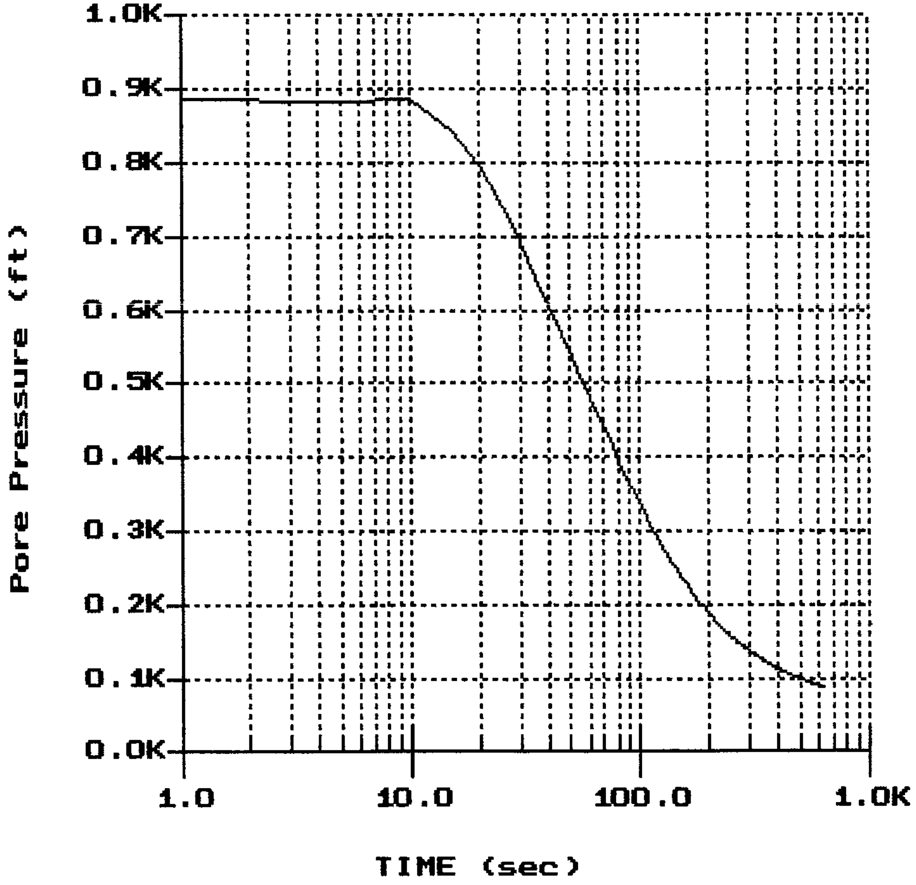


Schnabel

Hole: C-727
Location:CCNPP

Cone:STD 20T AD214
Date:08:06:08 09:50

PORE PRESSURE DISSIPATION RECORD



File: 965CP08.PPD
Depth (m): 12.20
(ft): 40.03
Duration : 630.0s
U-min: 86.37 630.0s
U-max: 919.48 0.0s

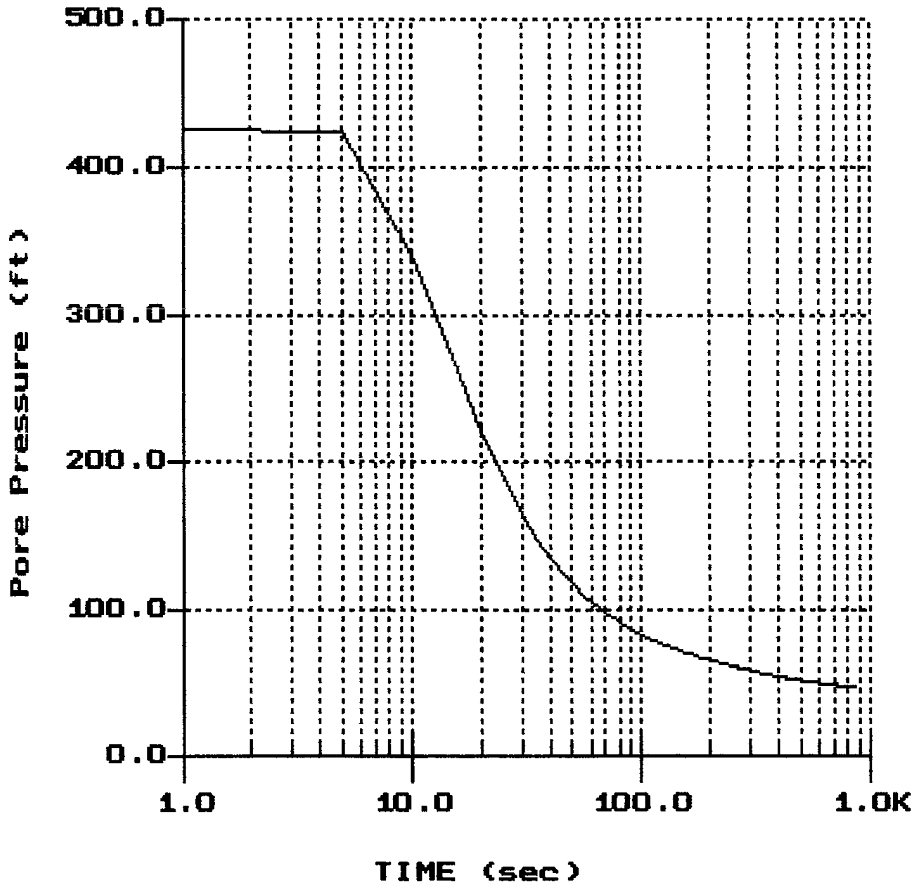
Schnabel

Hole: C-727
Location:CCNPP

Cone:STD 20T AD214
Date:08:06:08 09:50

File: 965CP08.PPD
Depth (m): 13.80
(ft): 45.28
Duration : 865.0s
U-min: 46.32 865.0s
U-max: 450.80 0.0s

PORE PRESSURE DISSIPATION RECORD

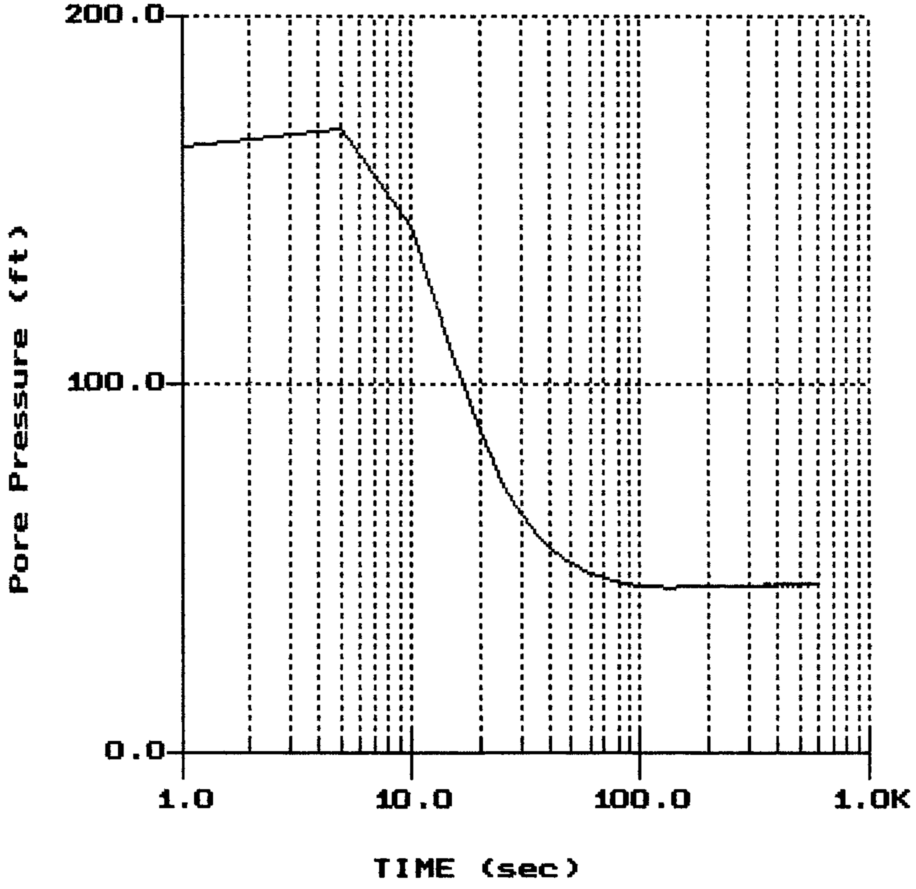


Schnabel

Hole: C-727
Location:CCNPP

Cone:STD 20T AD214
Date:08:06:08 09:50

PORE PRESSURE DISSIPATION RECORD



File: 965CP08.PPD
Depth (m): 15.30
(ft): 50.20
Duration : 600.0s
U-min: 44.75 140.0s
U-max: 169.65 5.0s

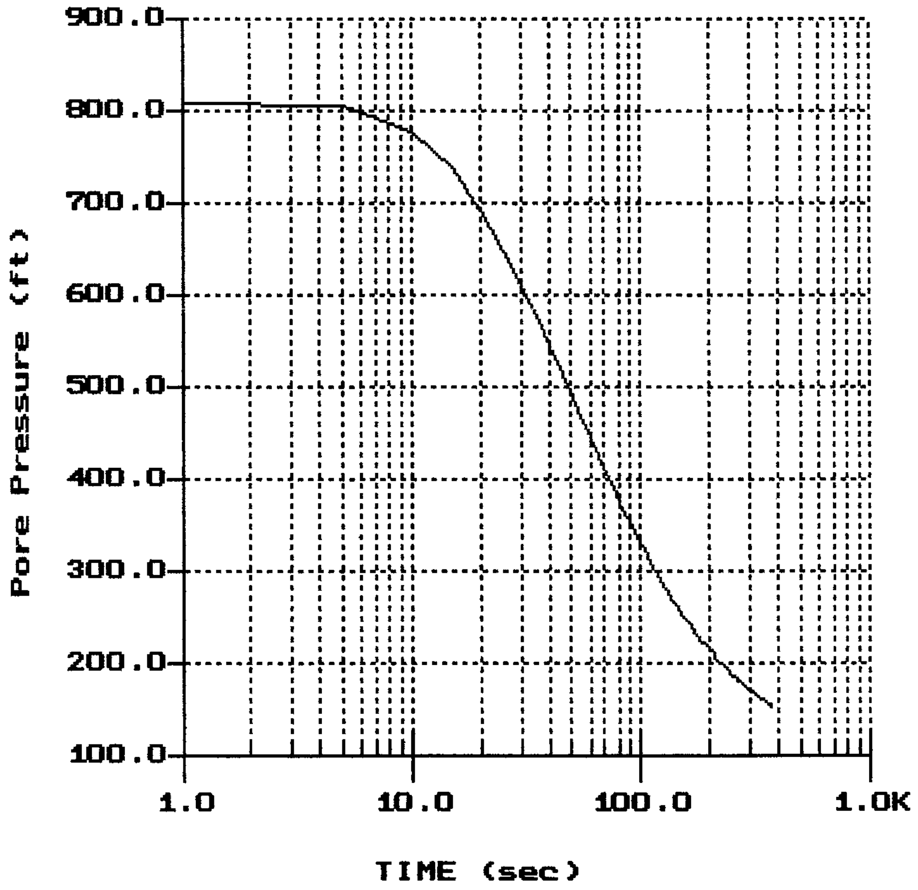
Schnabel

Hole: C-727
Location:CCNPP

Cone:STD 20T AD214
Date:08:06:08 09:50

File: 965CP08.PPD
Depth (m): 21.35
(ft): 70.05
Duration : 370.0s
U-min: 153.60 370.0s
U-max: 831.78 0.0s

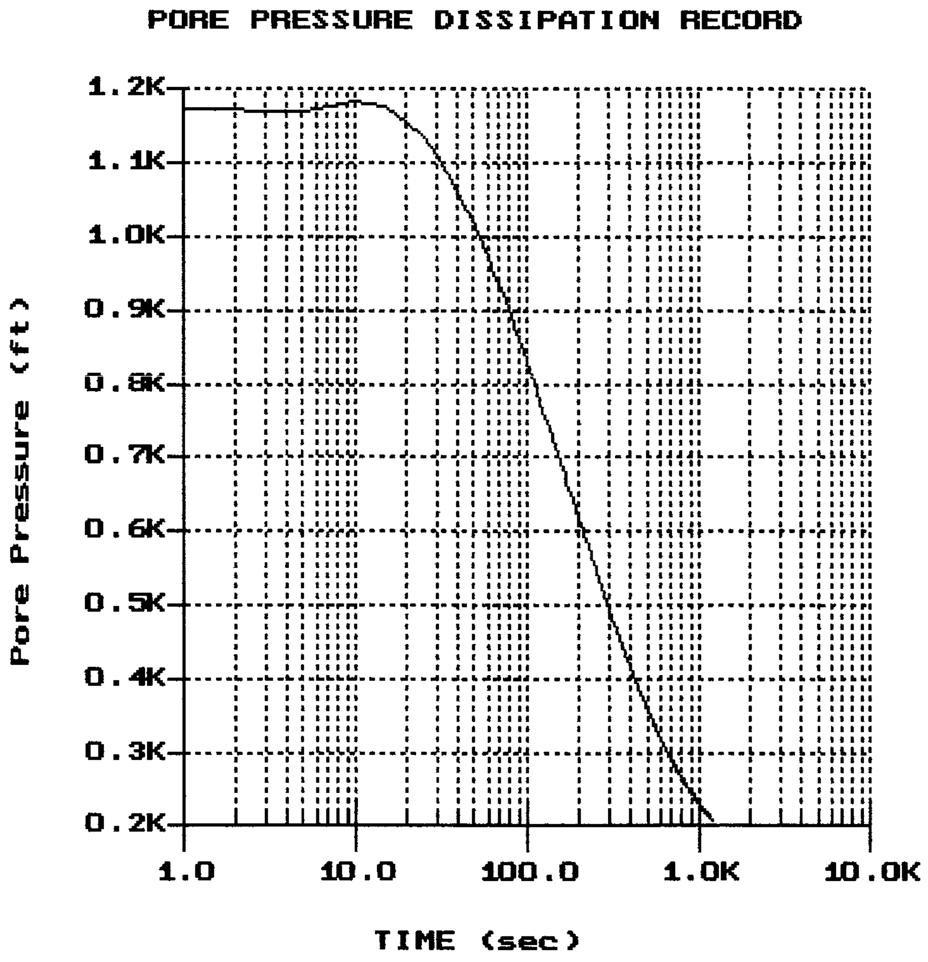
PORE PRESSURE DISSIPATION RECORD



Schnabel

Hole: C-727
Location:CCNPP

Cone:STD 20T AD214
Date:08:06:08 09:50



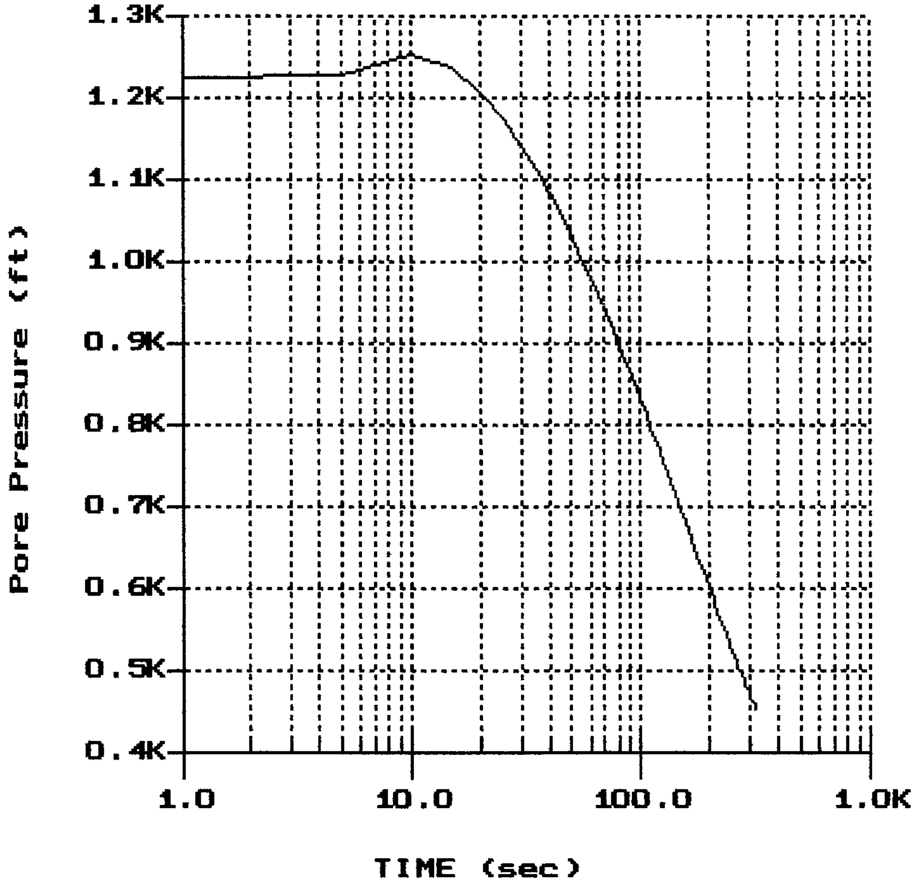
File: 965CP08.PPD
Depth (m): 22.90
(ft): 75.13
Duration : 1180.0s
U-min: 207.30 1180.0s
U-max: 1188.33 0.0s

Schnabel

Hole: C-727
Location:CCNPP

Cone:STD 20T AD214
Date:08:06:08 09:50

PORE PRESSURE DISSIPATION RECORD



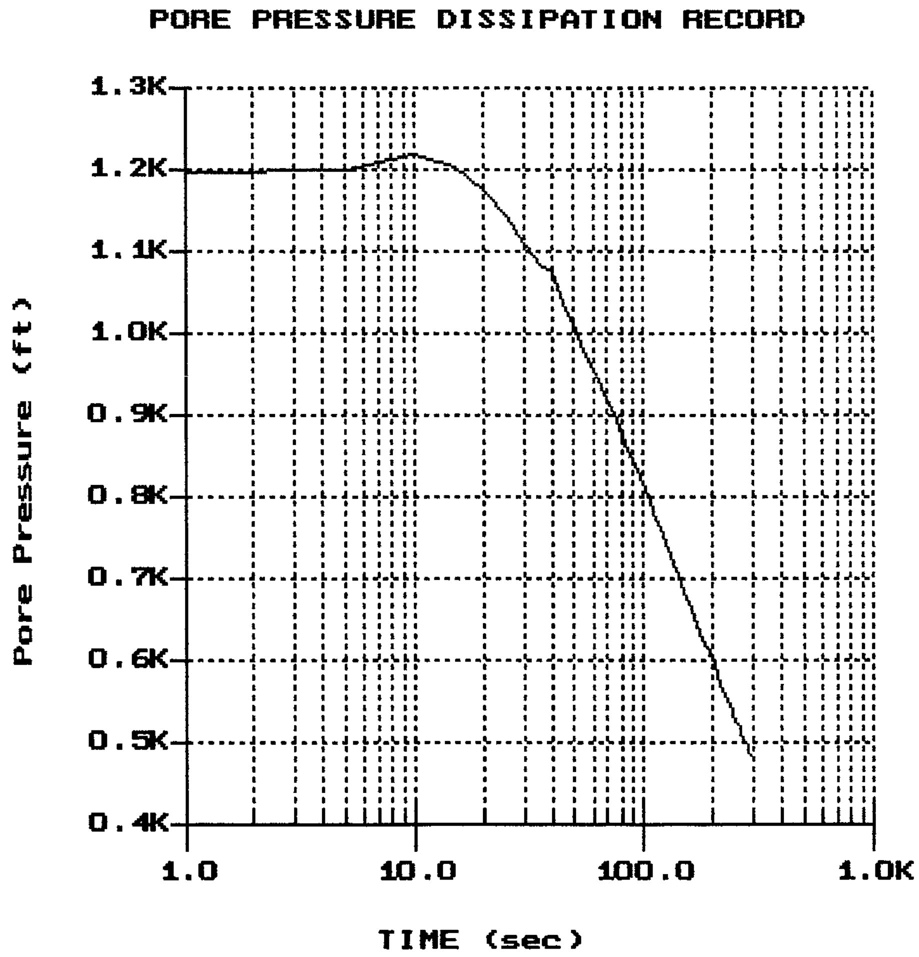
File: 965CP08.PPD
Depth (m): 24.40
(ft): 80.05
Duration : 315.0s
U-min: 452.83 315.0s
U-max: 1252.51 10.0s

Schnabel

Hole: C-727
Location:CCNPP

Cone:STD 20T AD214
Date:08:06:08 09:50

File: 965CP08.PPD
Depth (m): 25.95
(ft): 85.14
Duration : 295.0s
U-min: 479.21 295.0s
U-max: 1220.21 10.0s



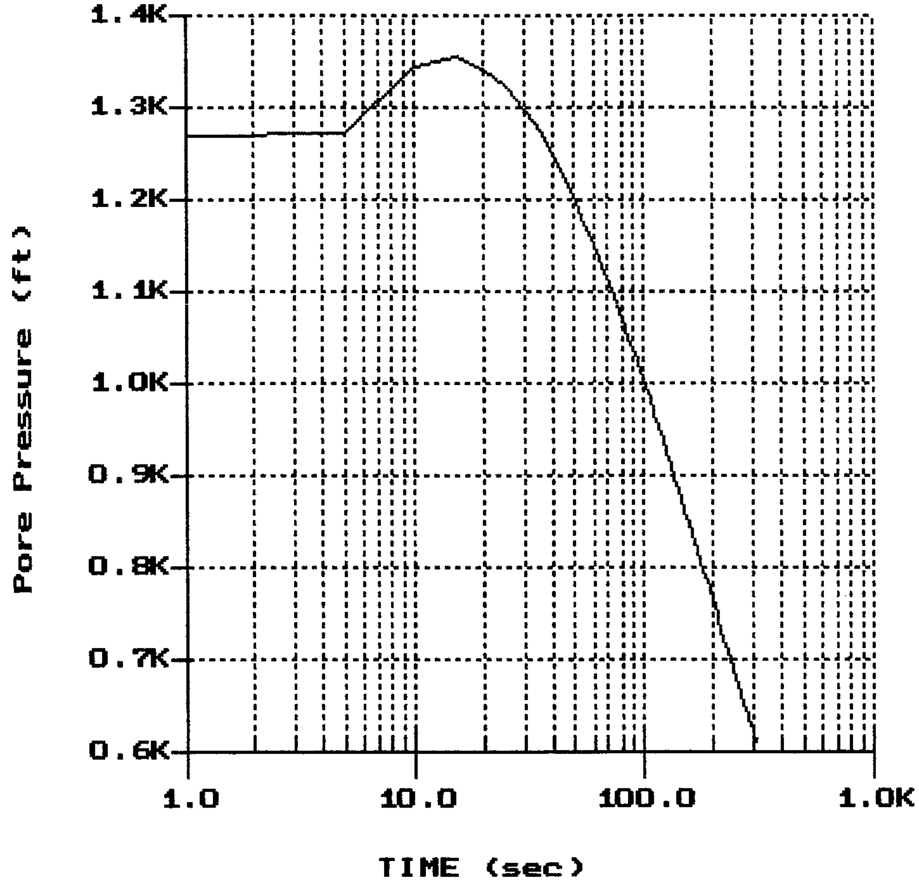
Schnabel

Hole: C-727
Location:CCNPP

Cone:STD 20T AD214
Date:08:06:08 09:50

File: 965CP08.PPD
Depth (m): 27.45
(ft): 90.06
Duration : 305.0s
U-min: 610.40 305.0s
U-max: 1356.13 15.0s

PORE PRESSURE DISSIPATION RECORD



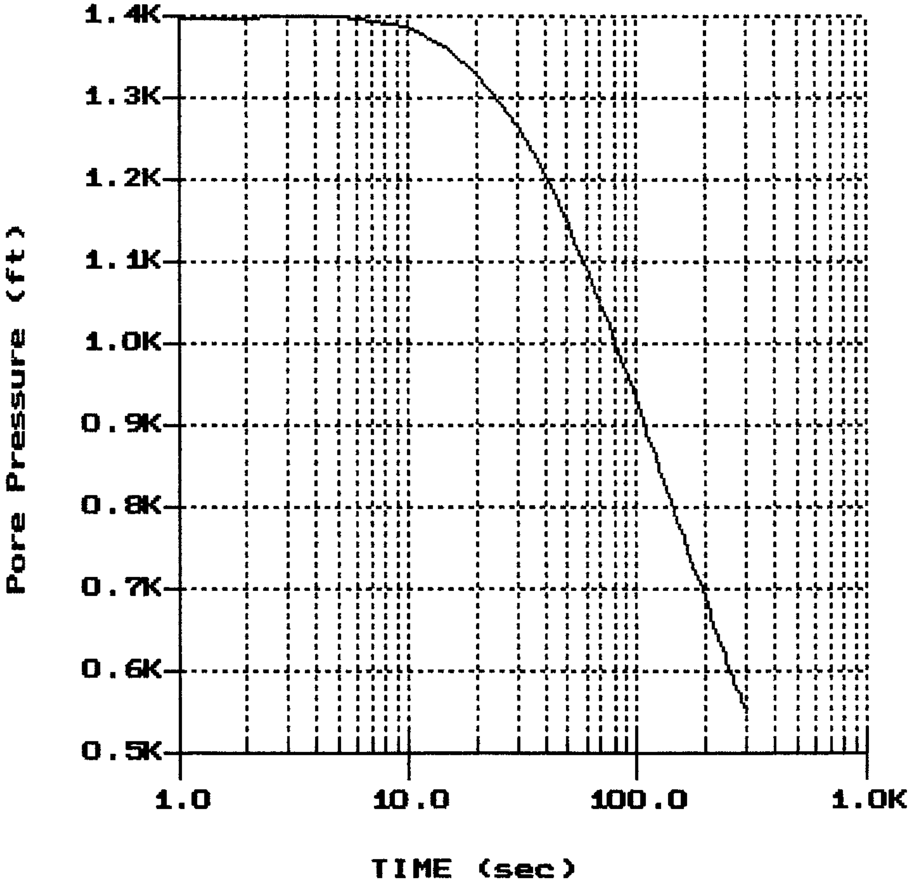
Schnabel

Hole: C-727
Location:CCNPP

Cone:STD 20T AD214
Date:08:11:08 11:46

File: 965CP20.PPD
Depth (m): 30.50
(ft): 100.07
Duration : 295.0s
U-min: 551.11 295.0s
U-max: 1398.45 5.0s

PORE PRESSURE DISSIPATION RECORD

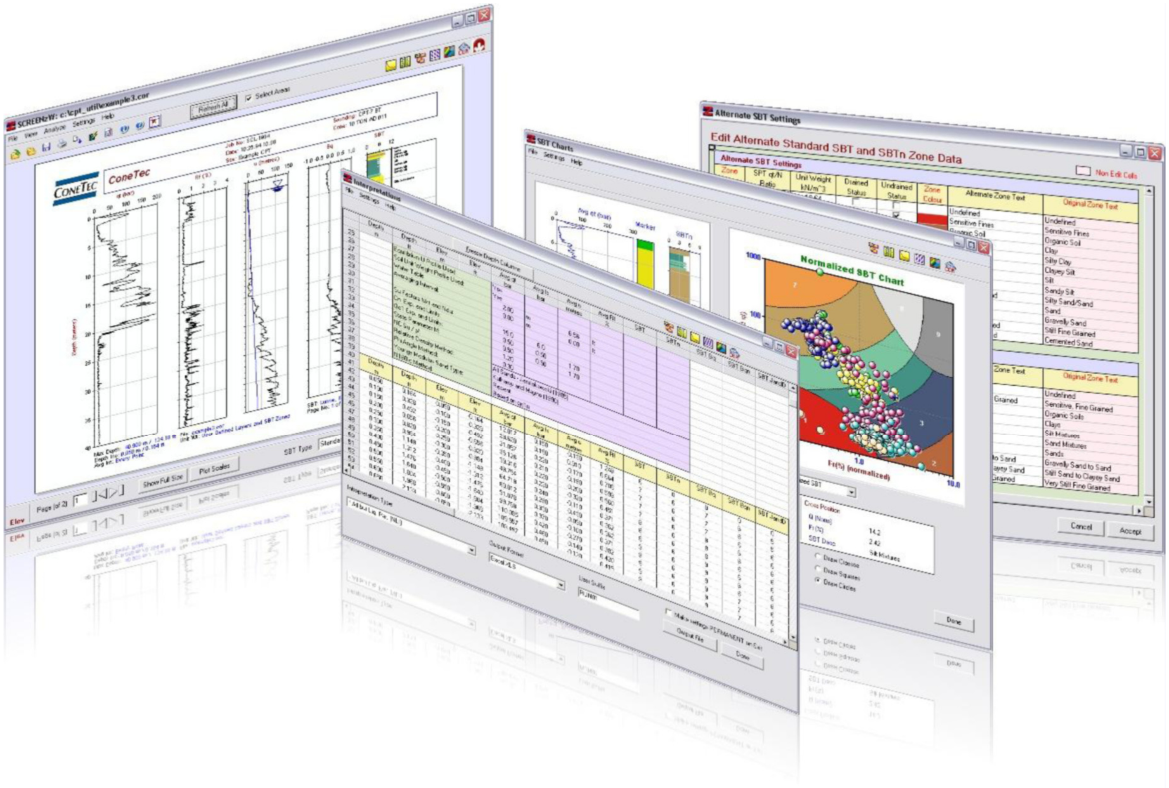


APPENDIX D

CPT Interpretation Methods

CONETEC INTERPRETATION METHODS

A Detailed Description of the Methods Used in ConeTec's CPT Interpretation and Plotting Software



Revision SZW-Rev 03-EC
February 10, 2009

Prepared by Jim Greig

ConeTec

ConeTec Interpretations as of March 12, 2008 (revised text February 10, 2009)

ConeTec's interpretation routine provides a tabular output of geotechnical parameters based on current published CPT correlations and is subject to change to reflect the current state of practice. The interpreted values are not considered valid for all soil types. The interpretations are presented only as a guide for geotechnical use and should be carefully scrutinized for consideration in any geotechnical design. Reference to current literature is strongly recommended. ConeTec does not warranty the applicability of any of the geotechnical parameters interpreted by the program and does not assume liability for any use of the results in any design or review. Representative hand calculations should be made for any parameter that is critical for design purposes. The end user of the interpreted output should also be fully aware of the techniques and the limitations of any method used in this program. The purpose of this document is to inform the user as to which methods were used and what the appropriate papers and/or publications are for further reference.

The CPT interpretations are based on values of tip, sleeve friction and pore pressure averaged over a user specified interval (e.g. 0.20m). Note that q_t is the tip resistance corrected for pore pressure effects and q_c is the recorded tip resistance. Since all ConeTec cones have equal end area friction sleeves, pore pressure corrections to sleeve friction, f_s, are not required.

The tip correction is: $q_t = q_c + (1-a) \bullet u_2$

where: q_t is the corrected tip resistance
q_c is the recorded tip resistance
u_2 is the recorded dynamic pore pressure behind the tip (u_2 position)
a is the Net Area Ratio for the cone (typically 0.80 for ConeTec cones)

The total stress calculations are based on soil unit weights that have been assigned to the Soil Behavior Type zones, from a user defined unit weight profile or by using a single value throughout the profile. Effective vertical overburden stresses are calculated based on a hydrostatic distribution of equilibrium pore pressures below the water table or from a user defined equilibrium pore pressure profile (this can be obtained from CPT dissipation tests). For over water projects the effects of the column of water have been taken into account as has the appropriate unit weight of water. How this is done depends on where the instruments were zeroed (i.e. on deck or at mud line).

Details regarding the interpretation methods for all of the interpreted parameters are provided in Table 1. The appropriate references cited in Table 1 are listed in Table 2. Where methods are based on charts or techniques that are too complex to describe in this summary the user should refer to the cited material.

The estimated Soil Behavior Types (normalized and non-normalized) are based on the charts developed by Robertson and Campanella shown in Figures 1 and 2. The Bq classification charts are not reproduced in this document but can be reviewed in Lunne, Robertson and Powell (1997) or Robertson (1990).

Where the results of a calculation/interpretation are declared *'invalid'* the value will be represented by the text strings "-9999" or "-9999.0". In some cases the value 0 will be used. Invalid results will occur because of (and not limited to) one or a combination of:

1. Invalid or undefined CPT data (e.g. drilled out section or data gap).
2. Where the interpretation method is inappropriate, for example, drained parameters in an undrained material (and vice versa).
3. Where interpretation input values are beyond the range of the referenced charts or specified limitations of the interpretation method.
4. Where pre-requisite or intermediate interpretation calculations are invalid.

The parameters selected for output from the program are often specific to a particular project. As such, not all of the interpreted parameters listed in Table 1 may be included in the output files delivered with this report.

The output files are provided in Microsoft Excel XLS format. The ConeTec software has several options for output depending on the number or types of interpreted parameters desired. Each output file will be named using the original COR file basename followed by a three or four letter indicator of the interpretation set selected (e.g. BSC, TBL, NLI or IFI) and possibly followed by an operator selected suffix identifying the characteristics of the particular interpretation run.

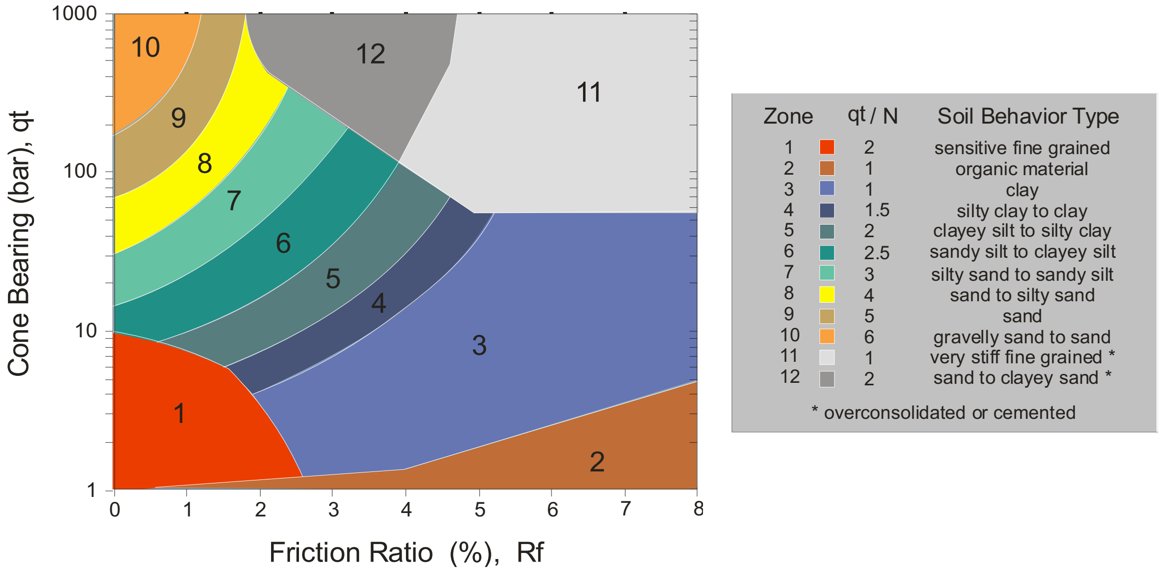
Table 1
CPT Interpretation Methods

Interpreted Parameter	Description	Equation	Ref
Depth	Mid Layer Depth *(where interpretations are done at each point then Mid Layer Depth = Recorded Depth)*	*Depth (Layer Top) + Depth (Layer Bottom) / 2.0*	
Elevation	Elevation of Mid Layer based on sounding collar elevation supplied by client	Elevation = Collar Elevation - Depth	
Avgqc	Averaged recorded tip value (q_c)	$Avgqc = \frac{1}{n}\sum_{i=1}^{n} q_c$ *n=1 when interpretations are done at each point*	
Avgqt	Averaged corrected tip (q_t) where: $q_t = q_c + (1 - a) \bullet u$	$Avgqt = \frac{1}{n}\sum_{i=1}^{n} q_t$ *n=1 when interpretations are done at each point*	
Avgfs	Averaged sleeve friction (f_s)	$Avgfs = \frac{1}{n}\sum_{i=1}^{n} fs$ *n=1 when interpretations are done at each point*	
AvgRf	Averaged friction ratio (Rf) where friction ratio is defined as: $Rf = 100\% \bullet \frac{fs}{qt}$	$AvgRf = 100\% \bullet \frac{Avgfs}{Avgqt}$ *n=1 when interpretations are done at each point*	
Avgu	Averaged dynamic pore pressure *(u)*	$Avgu = \frac{1}{n}\sum_{i=1}^{n} u_i$ *n=1 when interpretations are done at each point*	
AvgRes	Averaged Resistivity (this data is not always available since it is a specialized test requiring an additional module)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} RESISTIVITY_i$ *n=1 when interpretations are done at each point*	
AvgUVIF	Averaged UVIF ultra-violet induced fluorescence (this data is not always available since it is a specialized test requiring an additional module)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} UVIF_i$ *n=1 when interpretations are done at each point*	
AvgTemp	Averaged Temperature (this data is not always available since it is a specialized test)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} TEMPERATURE_i$ *n=1 when interpretations are done at each point*	
AvgGamma	Averaged Gamma Counts (this data is not always available since it is a specialized test requiring an additional module)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} GAMMA_i$ *n=1 when interpretations are done at each point*	
SBT	Soil Behavior Type as defined by Robertson and Campanella	See Figure 1	2, 5

Interpreted Parameter	Description	Equation	Ref
U.Wt.	Unit Weight of soil determined from one of the following user selectable options: 1) uniform value 2) value assigned to each SBT zone 3) user supplied unit weight profile	See references	5
T. Stress σ_v	Total vertical overburden stress at Mid Layer Depth. *A layer is defined as the averaging interval specified by the user. For data interpreted at each point the Mid Layer Depth is the same as the recorded depth.*	$TStress = \sum_{i=1}^{n} \gamma_i h_i$ where γ_i is layer unit weight h_i is layer thickness	
E. Stress σ_v'	Effective vertical overburden stress at Mid Layer Depth	*Estress = Tstress -* u_{eq}	
Ueq	Equilibrium pore pressure determined from one of the following user selectable options: 1) hydrostatic from water table depth 2) user supplied profile	For hydrostatic option: $u_{eq} = \gamma_w \bullet (D - D_{wt})$ where u_{eq} is equilibrium pore pressure γ_w is unit weight of water D is the current depth D_{wt} is the depth to the water table	
Cn	SPT N_{60} overburden correction factor	$Cn=(\sigma_v')^{-0.5}$ where σ_v' *is in tsf* $0.5 < C_n < 2.0$	
N_{60}	SPT N value at 60% energy calculated from qt/N ratios assigned to each SBT zone. This method has abrupt N value changes at zone boundaries.	*See Figure 1*	4, 5
$(N_1)_{60}$	SPT N_{60} value corrected for overburden pressure	$(N_1)_{60} = Cn \bullet N_{60}$	4
$N_{60}I_c$	SPT N_{60} values based on the Ic parameter	$(qt/pa)/ N_{60} = 8.5 (1 – Ic/4.6)$	5
$(N_1)_{60}Ic$	SPT N_{60} value corrected for overburden pressure (using N_{60} $I_{c)}$. User has 2 options.	1) $(N_1)_{60}Ic= Cn \bullet (N_{60}\, Ic)$ 2) $q_{c1n}/ (N_1)_{60}Ic = 8.5 (1 – Ic/4.6)$	4 5
$(N_1)_{60cs}Ic$	Clean sand equivalent SPT $(N_1)_{60}Ic$. User has 3 options.	1) $(N_1)_{60cs}Ic = \alpha + \beta((N_1)_{60}Ic)$ 2) $(N_1)_{60cs}Ic = K_{SPT} * ((N_1)_{60}Ic)$ 3) $q_{c1ncs})/ (N_1)_{60cs}Ic = 8.5 (1 – Ic/4.6)$ FC ≤ 5%: $\alpha = 0$, $\beta=1.0$ FC ≥ 35% $\alpha = 5.0$, $\beta=1.2$ 5% < FC < 35% $\alpha = \exp[1.76 – (190/FC^2)]$ $\beta = [0.99 + (FC^{1.5}/1000)]$	10 10 5
Su	Undrained shear strength - N_{kt} is user selectable	$Su = \frac{qt - \sigma_v}{N_{kt}}$	1, 5
k	Coefficient of permeability (assigned to each SBT zone)		5
Bq	Pore pressure parameter	$Bq = \frac{\Delta u}{qt - \sigma_v}$ *where:* $\Delta u = u - u_{eq}$ *and u = dynamic pore pressure* u_{eq} *= equilibrium pore pressure*	1, 5
Q_t	Normalized q_t for Soil Behavior Type classification as defined by Robertson, 1990	$Qt = \frac{qt - \sigma_v}{\sigma_v'}$	2, 5

Interpreted Parameter	Description	Equation	Ref
F_r	Normalized Friction Ratio for Soil Behavior Type classification as defined by Robertson, 1990	$Fr = 100\% \bullet \frac{fs}{qt - \sigma_v}$	2, 5
SBTn	Normalized Soil Behavior Type as defined by Robertson and Campanella	See Figure 2	2, 5
SBT-BQ	Non-normalized soil behavior type based on the Bq parameter	See Figure 5.7 (reference 5)	2, 5
SBT-BQn	Normalized Soil Behavior base on the Bq parameter	See Figure 5.8 (reference 5) or Figure 3 (reference 2)	2, 5
I_c	Soil index for estimating grain characteristics	$Ic = [(3.47 – \log_{10}Q)^2 + (\log_{10} Fr + 1.22)^2]^{0.5}$ *Where:* $Q = \left(\frac{qt - \sigma_v}{P_{a2}}\right)\left(\frac{P_a}{\sigma'_v}\right)^n$ *And* *Fr is in percent* P_a *= atmospheric pressure* P_{a2} *= atmospheric pressure* *n varies from 0.5 to 1.0 and is selected in an iterative manner based on the resulting* I_c	3, 8
FC	Apparent fines content (%)	$FC=1.75(Ic^{3.25}) - 3.7$ $FC=100$ *for* $Ic > 3.5$ $FC=0$ *for* $Ic < 1.26$ $FC = 5\%$ *if* $1.64 < Ic < 2.6$ *AND* $F_r<0.5$	3
Ic Zone	This parameter is the Soil Behavior Type zone based on the Ic parameter (valid for zones 2 through 7 on SBTn chart)	$Ic < 1.31$ Zone = 7 $1.31 < Ic < 2.05$ Zone = 6 $2.05 < Ic < 2.60$ Zone = 5 $2.60 < Ic < 2.95$ Zone = 4 $2.95 < Ic < 3.60$ Zone = 3 $Ic > 3.60$ Zone = 2	3
PHI ϕ	Friction Angle determined from one of the following user selectable options: a) Campanella and Robertson b) Durgunoglu and Mitchel c) Janbu d) Kulhawy and Mayne	See reference	5 5 5 11
Dr	Relative Density determined from one of the following user selectable options: a) Ticino Sand b) Hokksund Sand c) Schmertmann 1976 d) Jamiolkowski - All Sands	See reference	5
OCR	Over Consolidation Ratio	a) Based on Schmertmann's method involving a plot of $S_u/\sigma_v' / (S_u/\sigma_v')_{NC}$ and OCR where the Su/p' ratio for NC clay is user selectable	9
State Parameter	The state parameter is used to describe whether a soil is contractive (SP is positive) or dilative (SP is negative) at large strains based on the work by Been and Jefferies	See reference	8, 6, 5
Es/qt	Intermediate parameter for calculating Young's Modulus, E, in sands. It is the Y axis of the reference chart.	Based on Figure 5.59 in the reference	5

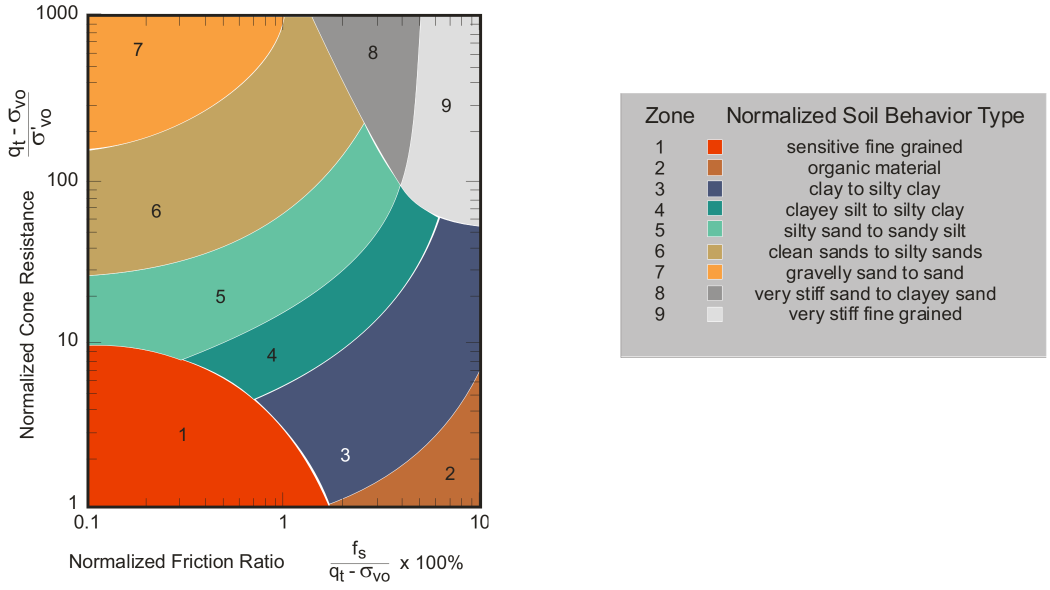
Interpreted Parameter	Description	Equation	Ref
Young's Modulus E	Young's Modulus based on the work done in Italy. There are three types of sands considered in this technique. The user selects the appropriate type for the site from: a) OC Sands b) Aged NC Sands c) Recent NC Sands Each sand type has a family of curves that depend on mean normal stress. The program calculates mean normal stress and linearly interpolates between the two extremes provided in the Es/qt chart.	Mean normal stress is evaluated from: $\sigma'_m = \frac{1}{3} \bullet (\sigma'_v + \sigma'_h + \sigma'_h)^3$ where σ_v'= vertical effective stress σ_h'= horizontal effective stress and $\sigma_h = K_o * \sigma_v'$ with Ko assumed to be 0.5	5
q_{c1}	q_t normalized for overburden stress used for seismic analysis	$q_{c1} = q_t \bullet (Pa/\sigma_v')^{0.5}$ where: Pa = atm. Pressure q_t is in Mpa	3
q_{c1n}	q_{c1} in dimensionless form used for seismic analysis	$q_{c1n} = (q_{c1} / Pa)(Pa/\sigma_v')$ where: Pa = atm. Pressure and n ranges from 0.5 to 0.75 based on Ic.	3
K_{SPT}	Equivalent clean sand factor for $(N_1)60$	$K_{SPT} = 1 + ((0.75/30) * (FC – 5))$	10
K_{CPT}	Equivalent clean sand correction for q_{c1N}	$K_{cpt} = 1.0$ for $I_c \leq 1.64$ $K_{cpt} = f(I_c)$ for $I_c > 1.64$ (see reference)	10
q_{c1ncs}	Clean sand equivalent q_{c1n}	$q_{c1ncs} = q_{c1n} \bullet K_{cpt}$	3
CRR	Cyclic Resistance Ratio (for Magnitude 7.5)	$q_{c1ncs} < 50$: $CRR_{7.5} = 0.833 [(q_{c1ncs}/1000] + 0.05$ $50 \leq q_{c1ncs} < 160$: $CRR_{7.5} = 93 [(q_{c1ncs}/1000]^3 + 0.08$	10
CSR	Cyclic Stress Ratio	$CSR = (\tau_{av}/\sigma_v') = 0.65 (a_{max} / g) (\sigma_v / \sigma_v') r_d$ $r_d = 1.0 – 0.00765 z$ $z \leq 9.15m$ $r_d = 1.174 – 0.0267 z$ $9.15 < z \leq 23m$ $r_d = 0.744 – 0.008 z$ $23 < z \leq 30m$ $r_d = 0.50$ $z > 30m$	10
MSF	Magnitude Scaling Factor	See Reference	10
FofS	Factor of Safety against Liquefaction	$FS = (CRR_{7.5} / CSR) MSF$	10
Liquefaction Status	Statement indicating possible liquefaction	Takes into account FofS and limitations based I_c and q_{c1ncs}.	10



Zone		qt / N	Soil Behavior Type
1	■	2	sensitive fine grained
2	■	1	organic material
3	■	1	clay
4	■	1.5	silty clay to clay
5	■	2	clayey silt to silty clay
6	■	2.5	sandy silt to clayey silt
7	■	3	silty sand to sandy silt
8	■	4	sand to silty sand
9	■	5	sand
10	■	6	gravelly sand to sand
11	■	1	very stiff fine grained *
12	■	2	sand to clayey sand *

* overconsolidated or cemented

Figure 1 Non-Normalized Behavior Type Classification Chart



Zone		Normalized Soil Behavior Type
1	■	sensitive fine grained
2	■	organic material
3	■	clay to silty clay
4	■	clayey silt to silty clay
5	■	silty sand to sandy silt
6	■	clean sands to silty sands
7	■	gravelly sand to sand
8	■	very stiff sand to clayey sand
9	■	very stiff fine grained

Figure 2 Normalized Behavior Type Classification Chart

Table 2 References

No.	References
1	Robertson, P.K., Campanella, R.G., Gillespie, D. and Greig, J., 1986, “Use of Piezometer Cone Data”, Proceedings of InSitu 86, ASCE Specialty Conference, Blacksburg, Virginia.
2	Robertson, P.K., 1990, “Soil Classification Using the Cone Penetration Test”, Canadian Geotechnical Journal, Volume 27.
3	Robertson, P.K. and Fear, C.E., 1998, “Evaluating cyclic liquefaction potential using the cone penetration test”, Canadian Geotechnical Journal, 35: 442-459.
4	Robertson, P.K. and Wride, C.E., 1998, “Cyclic Liquefaction and its Evaluation Based on SPT and CPT”, NCEER Workshop Paper, January 22, 1997
5	Lunne, T., Robertson, P.K. and Powell, J. J. M., 1997, “ Cone Penetration Testing in Geotechnical Practice,” Blackie Academic and Professional.
6	Plewes, H.D., Davies, M.P. and Jefferies, M.G., 1992, “CPT Based Screening Procedure for Evaluating Liquefaction Susceptibility”, 45th Canadian Geotechnical Conference, Toronto, Ontario, October 1992.
7	Jefferies, M.G. and Davies, M.P., 1993. “Use of CPTu to Estimate equivalent N_{60}”, Geotechnical Testing Journal, 16(4): 458-467.
8	Been, K. and Jefferies, M.P., 1985, “A state parameter for sands”, Geotechnique, 35(2), 99-112.
9	Schmertmann, 1977, “Guidelines for Cone Penetration Test Performance and Design”, Federal Highway Administration Report FHWA-TS-78-209, U.S. Department of Transportation
10	Proceedings of theNCEER Workshop on Evaluation of Liquefaction Resistance of Soils, Salt LakeCity, 1996. Chaired by Leslie Youd. 11
11	Kulhawy, F.H. and Mayne, P.W. ,1990, Manual on Estimating Soil Properties for Foundation Design, *Report No. EL-6800*, Electric Power Research Institute, Palo Alto, CA, August 1990, 306 p.

APPENDIX F

PRESSUREMETER TESTING (PM)

PM Report

PM REPORT

Final Report of In Situ Pressuremeter Geotechnical Testing (COL)
InSitu Engineering
February 13, 2009

Final Report of In Situ Pressuremeter Geotechnical Testing

Conducted at the

Calvert Cliffs Nuclear Power Plant for the

Combined Operating License (COL)

2008 Subsurface Investigation.

Submitted to

Schnabel Engineering LLC.

In Situ Engineering Project Number 765

February 13, 2009

Testing conducted and report prepared by

In Situ Engineering

6232 195th Avenue SE

Snohomish, WA 98290 360-568-2807

nwcone@verizon.net

TABLE OF CONTENTS

1.0 INTRODUCTION....4
2.0 PURPOSE....4
3.0 PRESSUREMETER....4
4.0 HOLE FORMATION....6
5.0 TEST PROCEDURE....8
6.0 QUALITY OF THE DATA....9
7.0 FORMS OF PRESSUREMETER DATA....11
8.0 STANDARD METHOD OF ANALYSIS OF THE SHEAR MODULUS....12
9.0 DETERMINATION OF THE LIMIT PRESSURE....14
10.0 DETERMINATION OF THE STRENGTH PROPERTIES....19
11.0 CONCLUSIONS....24
12.0 REFERENCES....24

FIGURES

Fig. 1. Drilling Crew Holding Instrument after Completion of Test....3
Fig. 2. Schematic details of the pressuremeter....5
Fig. 3. Test CC91 in hole PM301 at 328.5 ft....9
Fig. 4. Adjacent pressuremeter tests in same pilot hole at 130 ft....10
Fig. 5. Adjacent pressuremeter tests in same pilot hole at 120 ft....11
Fig. 6. Test in cohesive materials....11
Fig. 7. Test in cemented sands/clays....12
Fig. 8. Modulus determination for Test CC46 at 101 ft in Hole PM301....14
Fig. 9. Limit Pressure determination for CC46 (1% Zero shift)....16
Fig. 10. Simple constant shear strength model analysis for test CC46....20
Fig. 11. Ideal friction model compared with Test CC40....21

TABLES

Table 1A Pressuremeter Test depth and Material Description: PM701....6
Table 1A (cont) Pressuremeter Test depth and Material Description: PM701....7
Table 1-B Pressuremeter Test depth and Material Description: PM 301....7
Table 1-B (cont.) Pressuremeter Test depth and Material Description: PM 301....8
Table 2-A Limit Pressure Shear Modulus and Shear Strength (log method) PM701....17
Table 2-B Limit Pressure shear modulus and Shear strength (log method): PM301....18
Table 2-B (cont) Limit Pressure shear modulus and Shear strength (log method): PM301....19
Table 3-A Material strength properties from Model Analysis PM701....22
Table 3-B Material properties from Model Analysis PM301....23
Table 3-B (cont) Material properties from Model Analysis PM301....24
Figure A1 Calibration of membranes in Air.....25

APPENDICES

I Calibration of Pressuremeter

II Data and Interpretation

Fig. 1. Drilling Crew Holding Instrument after Completion of Test

1.0 INTRODUCTION

This report presents the results of a pressuremeter study, conducted from August 26, 2008 to September 18, 2008 in two test holes PM701 and PM301. The pressuremeter testing (PMT) was conducted by In Situ Engineering, Snohomish, WA under contract to Schnabel Engineering LLC, Gaithersburg, MD. The drilling and deployment of the pressuremeter was accomplished by GeoServices, Inc., Forestville, MD, using a CME 75 truck mounted, mud rotary rig for both test holes (Figure 1). In PM701 which was completed first, 29 tests were completed. In PM301, 67 tests were completed. All the tests produced some useful data, although not all tests could be completely analyzed for all possible parameters. In instances were not all parameters could be determined, this was due to borehole disturbance or uneven expansion of the instrument resulting in less than complete information on the soil. The borehole name, test depths and preliminary material descriptions are presented in Table 1A and 1B.

The pressuremeter used was a digital electronic instrument of the Cambridge design and is a much more sensitive instrument than the Menard type as specified by ASTM. A standard procedure was submitted by In Situ Engineering for this instrument prior to field work.

The pressuremeter data was analyzed to determine the pressuremeter modulus and limit pressure as determined by ASTM D4719. These analyses are further discussed in Sections 8 and 9 of this report. Additional analyses were performed to determine the unload/reload modulus which usually included one to three cycles per tests at various strain levels. Strength parameters were determined using modeling techniques. Modeling techniques are discussed in Section 10.

2.0 PURPOSE

The purpose of this study was to evaluate the *in-situ* material properties of the soil materials on the site of the proposed Calvert Cliffs Nuclear Power project under the reactor (Hole PM301) and the water intake (Hole PM701). The material consists primarily of clays and sands. Some of these zones are cemented. The work was performed in support of engineering submittals for the Combined Operating License (COL).

3.0 PRESSUREMETER

The pressuremeter used for this study was a prebored monocell pressuremeter. Three electronic displacement sensors, spaced 120 degrees apart are located at the center of the pressuremeter. The flexible membrane is placed over the sensors, and is clamped at each end. The membrane is covered by a protective shield of stainless steel strips. The unit is pressurized using compressed nitrogen to deform the adjacent material. The electronic signals from displacement sensors and the pressure sensor are transmitted by cable to the surface. During the test, the average expansion strain versus pressure is displayed on a computer screen. The pressuremeter is expanded by regulating the flow of compressed nitrogen to the PMT unit. Prior to the project the pressuremeter, No 6, which was used throughout the project, was calibrated in our office for pressure and displacement. The results of this calibration are presented in Appendix 1. Figure 2 presents the essential details of the pressuremeter.

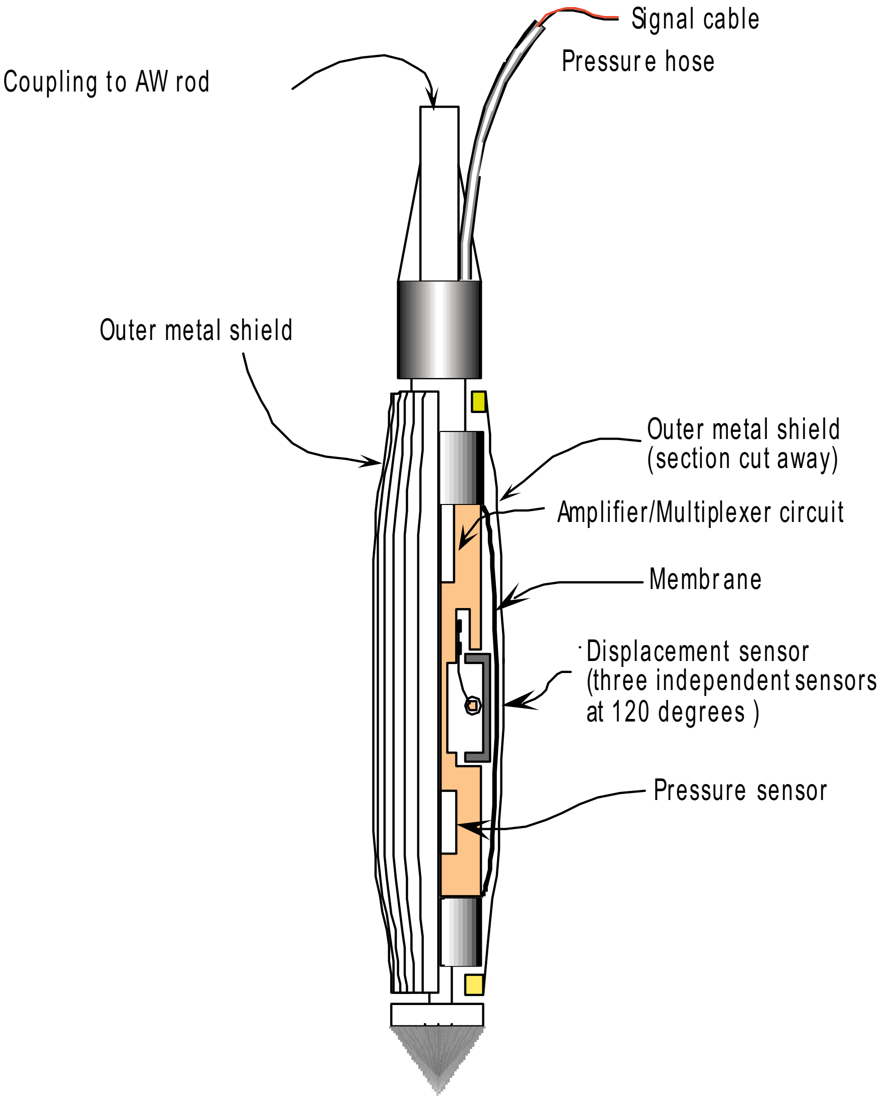


Fig. 2. Schematic details of the pressuremeter

4.0 HOLE FORMATION

At the top of each hole a 5 inch ID casing was set through the surface materials ranging from approximately 9 ft to 14 ft depending on the particular hole and material encountered. The hole was advanced to just above the pressuremeter test pocket level using a five inch tricone bit or 5 inch wing bit dependant upon the material encountered. The test pocket for the pressuremeter was then drilled, five to six feet long, using a 2 $^{15}/_{16}$ inch tricone bit. For most of the locations this method of drilling the pilot hole produced a satisfactory hole for the pressuremeter. Although in a few instances the holes were slightly oversize, particularly in the sands, as a result of washing out from the drilling mud. In instances where the hole was oversize, the test had to be terminated before a complete data curve could be developed which limited the analysis. Examination of test cc59 in the appendix of this report shows a test where the oversize hole allowed the instrument to expand to approximately 13% before the sidewall was engaged. In this test we could determine a modulus, but insufficient information was available to perform either ASTM or modeling strength analyses. Further discussion of the limitations of disturbed borehole analysis is included in Section 10.

The drillers were particularly careful with the bentonite drilling mud. It was changed regularly and kept thick which provided good sidewall stability in boreholes PM-301 and PM-701 which were advanced to 360 ft and 150 ft respectively.

Table 1A and 1B below lists the details of the test depth and the estimated sample description. The sample descriptions are based on the drilling of the borehole, not direct sampling.

Table 1A Pressuremeter Test depth and Material Description: PM701

Date	Test	Depth (ft)	Material
8/26/2008	CC01	8	fill, silty, sandy
8/26/2008	CC02	11.2	fill, sandy, gravels
8/26/2008	none	-	interbedded silts, sand, some gravel
8/26/2008	CC03	23.5	interbedded silts, sand, some gravel
8/26/2008	CC04	30.7	silty sand, trace clay, shell fragments
8/26/2008	CC05	29.2	silty sand, trace clay, shell fragments
8/26/2008	CC06	40.9	sandy clay, silt
8/26/2008	CC07	39.3	sandy clay, silt
8/27/2008	CC08	51	silty sand, shell fragments
8/27/2008	CC09	49.5	silty sand, shell fragments
8/27/2008	CC10	60.5	elastic silt, clay + sand
8/27/2008	CC11	59	elastic silt, clay + sand
8/27/2008	CC12	70.5	silty sand, trace clay, shell fragments
8/27/2008	CC13	69	silty sand, trace clay, shell fragments
8/27/2008	CC14	80.7	sandy silt, some clay
8/27/2008	CC15	79.2	sandy silt, some clay
8/27/2008	CC16	90.6	elastic silt, clay + sand
8/27/2008	CC17	89.1	elastic silt, clay + sand
8/28/2008	CC18	100.5	silty sand, trace clay, shell fragments
8/28/2008	CC19	99	silty sand, trace clay, shell fragments
8/28/2008	CC20	110.7	sandy elastic silt, clay
8/28/2008	CC21	109.2	sandy elastic silt, clay
8/28/2008	CC22	120.1	silty sand, some clay
8/28/2008	CC23	118.6	silty sand, some clay
8/28/2008	CC24	130.8	silty sand
8/28/2008	CC25	129.3	silty sand
8/29/2008	CC26	140.8	silty sand to sandy silt, some clay

Table 1A (cont) Pressuremeter Test depth and Material Description: PM701

Date	Test	Depth (ft)	Material
8/29/2008	CC27	139.3	silty sand to sandy silt, some clay
8/29/2008	CC28	150.9	sandy elastic silt
8/29/2008	CC29	149.4	sandy elastic silt

Table 1-B Pressuremeter Test depth and Material Description: PM 301

Date	Test	Depth (ft)	Material
9/2/2008	CC30	9	sand, some gravels
9/2/2008	CC31	18	sand, some gravels
9/2/2008	CC32	29.5	clayey sand, silt
9/2/2008	CC33	28	clayey sand, silt
9/3/2008	CC34	41	sandy clay, lean clay
9/3/2008	CC35	39.5	sandy clay, lean clay
9/3/2008	CC36	51	interbedded fat clay with silty sand
9/3/2008	CC37	49.5	interbedded fat clay with silty sand
9/3/2008	CC38	60.8	clayey sand, some cementation
9/3/2008	CC39	59.3	clayey sand to sand
9/3/2008	CC40	70.4	interbedded cemented sand, silt
9/3/2008	CC41	68.9	interbedded cemented sand, silt
9/4/2008	CC42	80.9	interbedded sand and clay
9/4/2008	CC43	79.4	interbedded sand and clay
9/4/2008	CC44	91	interbedded cemented sand, silt
9/4/2008	CC45	89.5	interbedded cemented sand, silt
9/5/2008	CC46	101	silty sand, some cementation
9/5/2008	CC47	99.5	silty sand
9/5/2008	CC48	111	silty sand, trace clay, cementation
9/5/2008	CC49	109.5	silty sand, trace clay
9/5/2008	CC50	120.8	interbedded silty sand, sandy clay
9/5/2008	CC51	119.3	interbedded cemented sand, silt
9/5/2008	CC52	131	sandy clay, clayey sand, silt
9/5/2008	CC53	129.5	sandy clay, clayey sand, silt
9/8/2008	CC54	141	clayey sand, sandy clay
9/8/2008	CC55	139.5	clayey sand, sandy clay
9/8/2008	CC56	151	sandy clay
9/8/2008	CC57	149.5	sandy clay
9/8/2008	CC58	161	interbedded silty sand, sandy clay
9/8/2008	CC59	159.5	interbedded silty sand, sandy clay
9/9/2008	CC60	171	clayey sand, sandy clay
9/9/2008	CC61	169.5	clayey sand, sandy clay
9/9/2008	CC62	181	sandy elastic silt, trace clay
9/9/2008	CC63	179.5	sandy elastic silt, trace clay
9/9/2008	CC64	191	sandy elastic silt
9/9/2008	CC65	189.5	sandy elastic silt
9/10/2008	CC66	201	sandy elastic silt, clay
9/10/2008	CC67	199.5	sandy elastic silt, clay
9/10/2008	CC68	210.9	interbedded clayey sand, silty sand
9/10/2008	CC69	209.4	interbedded clayey sand, silty sand
9/10/2008	CC70	221	clayey sand to sandy clay
9/10/2008	CC71	219.5	clayey sand to sandy clay
9/11/2008	CC72	231	clayey sand to sandy clay
9/11/2008	CC73	229.5	clayey sand to sandy clay
9/11/2008	CC74	241	clayey sand
9/11/2008	CC75	239.5	clayey sand
9/11/2008	CC76	251	clay to sandy clay
9/11/2008	CC77	249.5	clay to sandy clay
9/12/2008	CC78	261	interbedded clay and sandy silt

Table 1-B (cont.) Pressuremeter Test depth and Material Description: PM 301

Date	Test	Depth (ft)	Material
9/12/2008	CC79	259.5	interbedded clay and sandy silt
9/12/2008	CC80	271	interbedded clay and sandy silt
9/12/2008	CC81	269.5	interbedded clay and sandy silt
9/15/2008	CC82	281	elastic silt, trace sand
9/15/2008	CC83	279.5	elastic silt, trace sand
9/15/2008	CC84	291	interbedded elastic silt and clay
9/15/2008	CC85	289.5	interbedded elastic silt and clay
9/15/2008	CC86	301	interbedded elastic silt and clay
9/15/2008	CC87	299.5	interbedded elastic silt and clay
9/16/2008	CC88	310.7	cemented sand, behaved like rock
9/16/2008	CC89	321	interbedded clayey sand, clay
9/16/2008	CC90	319.5	interbedded clayey sand, clay
9/17/2008	CC91	328.5	cemented sand, behaved like rock
9/17/2008	CC92	338.5	clayey sand
9/18/2008	CC93	350	clayey sand
9/18/2008	CC94	348.5	clayey sand
9/18/2008	CC95	361	clayey sand
9/18/2008	CC96	359.5	clayey sand

5.0 TEST PROCEDURE

The membrane was expanded by controlling the flow of compressed nitrogen into the pressuremeter, increasing the pressure in small steps until the membrane starts to expand against the borehole wall. Once the average strain of the wall was greater than about 1.5% the pressure is reduced to no more than 40% of the maximum past pressure, then increased again.

The resulting unload-reload loop can be used to evaluate the elastic behavior of the material. In materials which behave in a linear manner such as sands and cemented materials, the loops will exhibit little hysteretic behavior. That is, the linear unloading path will follow the reloading path. The loops will be very tight. In soft cohesive materials hysteretic effects are usually present; as a result the unload reload loops exhibit a non linear behavior.

The pressure is then advanced in steps until the strain is increased a further 3% or the pressure has increased over 200 psi before completing a second unload-reload cycle. In many tests the procedure is repeated until a third or fourth unload reload loop is completed. If the disturbance is small, the slope of the loops will tend to be parallel. Figure 3, Test CC91, is a typical example.

In some tests the pressure is held constant for three minutes prior to the unloading phase. In Figure 3 this has occurred immediately before the second unload reload loop. The purpose of the holding phase it to give a qualitative indication of any creep or consolidation effects. This is used later on in analysis to qualitatively estimate the validity of which model is appropriate for analysis.

After the strain exceeds 12%, (or the pressure is at the limit of the gas bottle pressure at the time of the test, usually in excess of 1,400 psi) the pressure is reduced to zero. In some tests the pressure is reduced if the strain on one of the arms is much more than the other two arms. The maximum pressure that is applied is a judgment call, based on the operator's experience of the variation of material types at the location of the test.

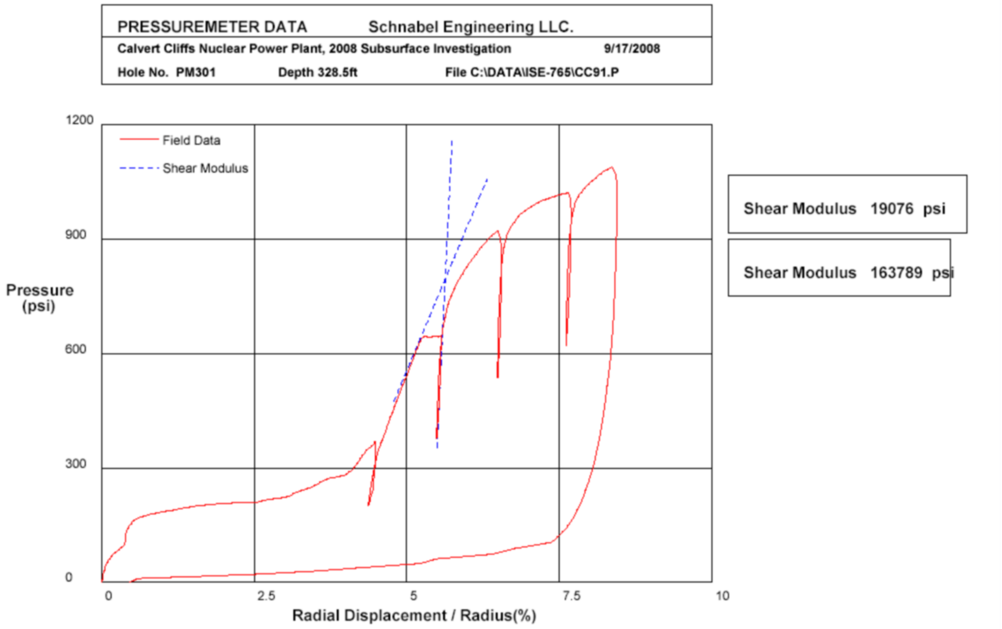


Fig. 3. Test CC91 in hole PM301 at 328.5 ft

6.0 QUALITY OF THE DATA

In general, the pressuremeter testing should reflect the material being tested. Tests should not be influenced by significant disturbance effects as a result of the hole formation. In an attempt to get a qualitative idea of the reliability of the material properties an attempt was made to obtain tests in pairs, in each five to six foot long pilot hole. The tests within a pilot hole were 1.5 ft apart, as close as possible without interfering with each other.

An ideal test will probably have a form similar to that shown in Figure 3. After the pressuremeter is pushed to the desired depth the membrane starts to expand against the slough in the hole as the pressure is applied. The borehole wall is not influenced by the membrane until the membrane has expanded about 4%. The general shape of the curve should follow a smooth curve with decreasing curvature. The slope of successive unload reload loops should then be parallel. In most instances the slope of the first loop is usually a little softer as a result of initial disturbance as evidenced in Figure 3.

If the materials are relatively uniform, then adjacent tests in the same test pocket should be similar in form. If adjacent tests are distinctly different it is likely that there is a material change or there is a problem with the test.

Hence in a qualitative manner the results can be assessed as to whether the data reflects the *in-situ* material properties. In Figure 4 are two adjacent tests at 130.8 and 129.3 ft in Hole PM701, in the same test pocket. The data shown in the left hand figure was obtained at the bottom of the test pocket. The right hand data was obtained 1.5 ft higher up the hole. This second test was conducted approximately 30 minutes after the first test. In that time the material surrounding the hole could have changed properties as it swelled and took on additional water.

The maximum pressure reached in both tests is similar in the order of 400 psi. Hence the "Limit Pressure", the pressure at which large expansion can occur, at both test locations is of the same order. The shear modulus values are remarkably similar. Both these pieces of data would suggest the material at both locations is probably the same; therefore the data reflects the behavior of the material at that depth. In contrast consider the tests shown in Figure 5. The deepest test shown on the left is definitely much weaker and softer than the upper test at 1.5 ft. higher. Hence there is probably a material change between these two tests.

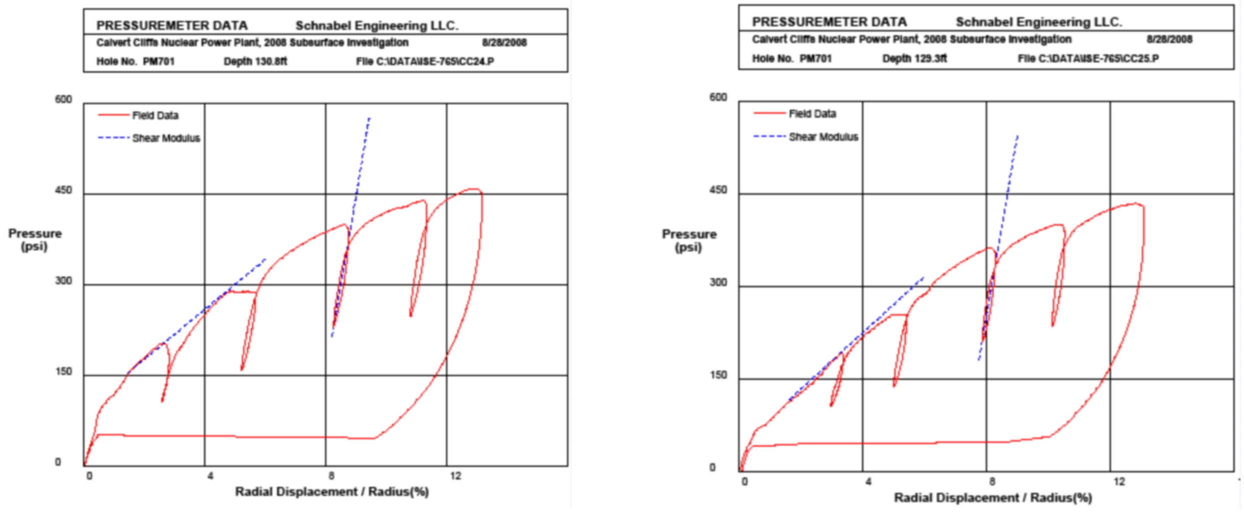


Fig. 4. Adjacent pressuremeter tests in same pilot hole at 130 ft

(CC24 at 130.8 ft and CC25 at 129.3 ft in Hole PM701)

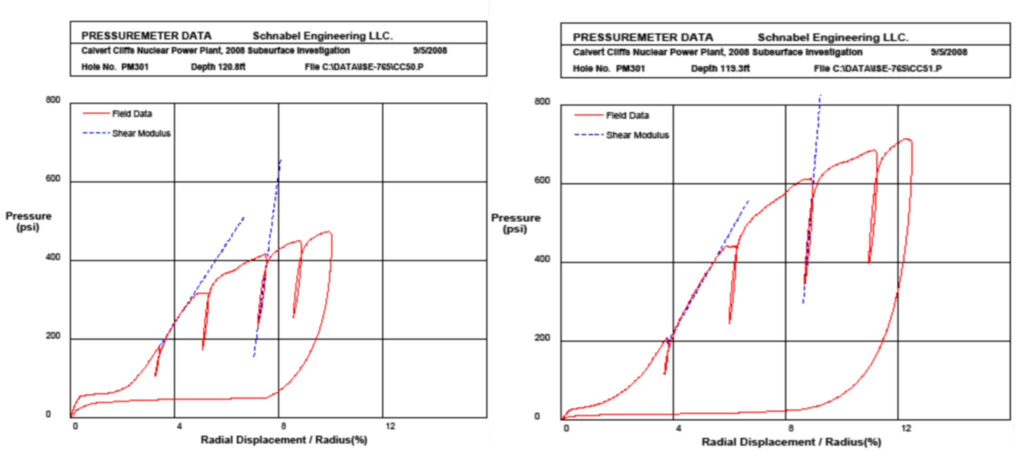


Fig. 5. Adjacent pressuremeter tests in same pilot hole at 120 ft

(CC50 at 120.8 ft and CC51 at 119.3 ft in Hole PM301)

7.0 FORMS OF PRESSUREMETER DATA

In this testing program essentially two typical pressuremeter test shapes can be seen. These typical forms of pressuremeter tests are shown in Figures 6 and 7.

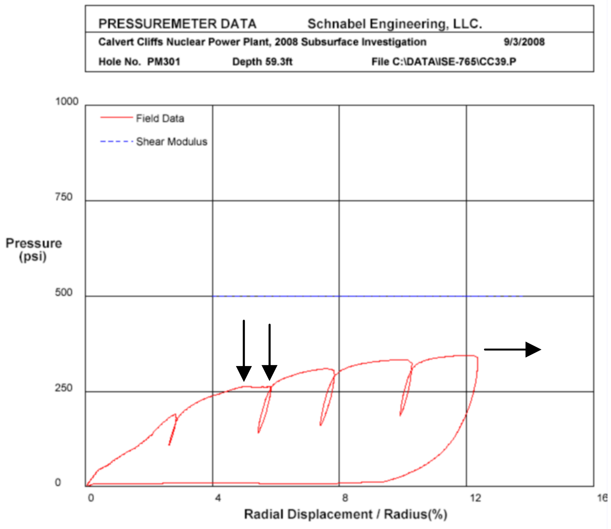


Fig. 6. Test in cohesive materials
(Test CC39 at 59.3 ft in hole PM 301)

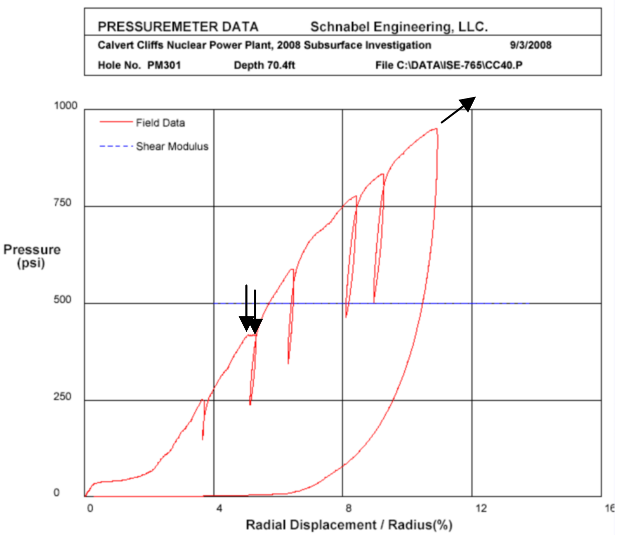


Fig. 7. Test in cemented sands/clays
(Test CC40 at 70.4 ft in hole PM 301)

The test shown in Figure 6 is a typical test in cohesive material. As the pressure increases, the strain rate increases, and the curvature of the pressure expansion curve decreases. Hence there is a clear limit to the pressure that can be applied to the material. A “Limit Pressure” can be established at which the strains tend to infinity. If the pressure is held constant at some point during the test the strains will increase under constant pressure as the material creeps or consolidates. Just prior to the second unload reload loop the pressure is held constant for three minutes. (see vertical down arrows in Figure 6) In that time about 1% strain occurred. The unload-reload loops tend to show hysteretic behavior, that is the loops have a width to them. In contrast the test shown in Figure 7 is typical of a frictional or cemented material. As the pressure increases the effective stress increases in the surrounding material, and as a result the material becomes stronger. In that situation the pressure does not tend to a limiting condition as rapidly as a cohesive material. The creep components are small. (The creep movement before the second unload reload loop is less than 0.2%). The slope of the unload-reload loops are steeper than in cohesive materials.

8.0 STANDARD METHOD OF ANALYSIS OF THE SHEAR MODULUS

If the material surrounding the pressuremeter is assumed to extend to infinity, and assumed to behave as an idealized linear elastic, homogeneous material, which does not fail under shear or tension, then the displacement on the boundary of the pressuremeter, u_a, for a given pressure, P, is given by:

$$u_a = P(a)(1+\mu) / E \qquad 1)$$

where “E” is the Young’s Modulus, “a” the radius of the pressuremeter cavity, and “μ“ the Poisson’s ratio. As the shear modulus, “G”, and the Young’s modulus, “E”, are related by the following relationship:

$$E=2(G)(1+\mu) \qquad 2)$$

Equation 1 reduces to:

$$u_a = 0.5P(a) / G \qquad 3)$$

Hence, the shear modulus G is given by:

$$G = 0.5 * \Delta \text{ Pressure} / \Delta(\text{radial displacement/radius}) \qquad 4)$$

The modulus for the average slope of the initial part of the pressuremeter curve (**A** in Fig.8) expressed as a Young’s modulus (assuming a Poisson's ratio of 0.33) is the same as the “pressuremeter modulus” defined in the American Society for Testing and Materials (ASTM) D4719, Section 9.5. In many tests a straight section in this part of the curve is not well defined enough to enable the modulus to be determined. However, the modulus determined from the unload-reload loops (**B** in Fig. 8), which is often higher than the initial loading modulus, is more accurately defined and is probably more representative of the modulus for the *in-situ* material.

This data is summarized in Tables 2-A and 2-B.

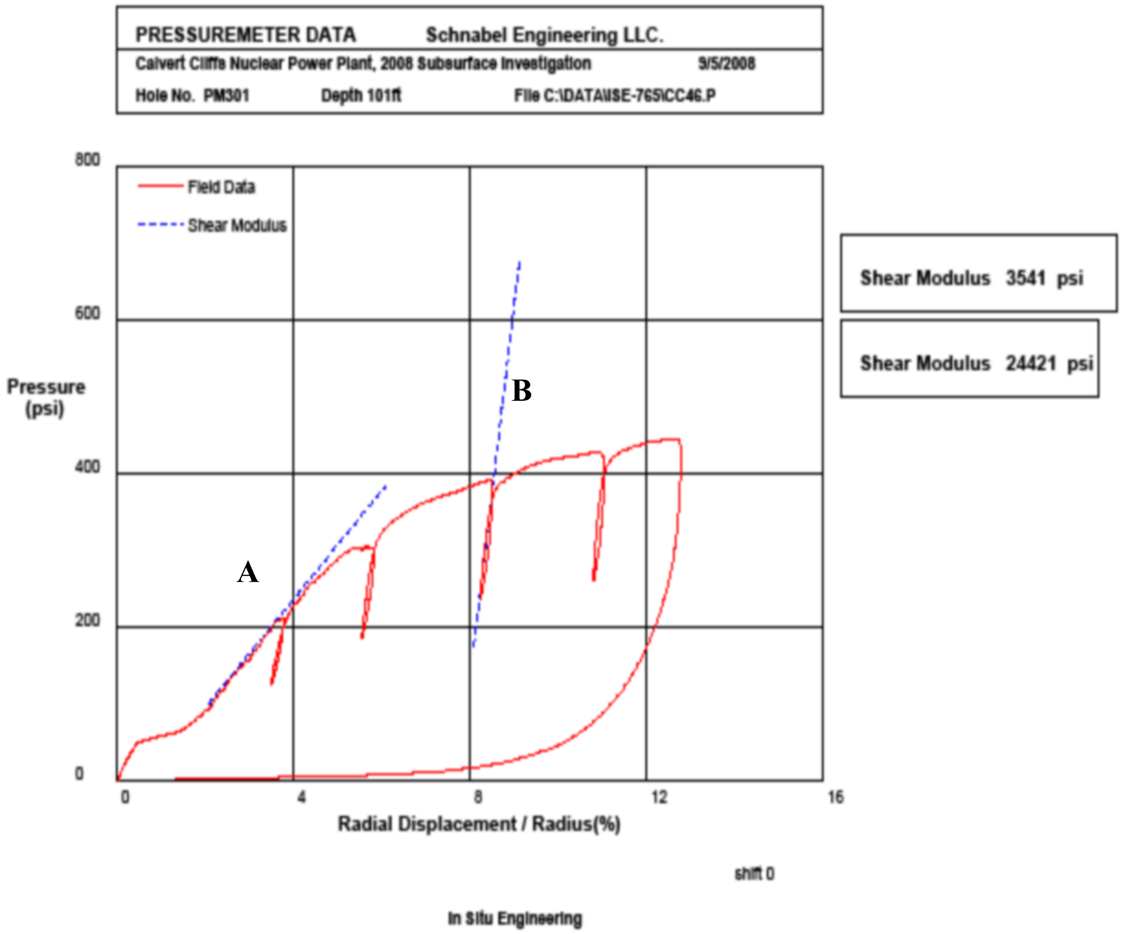


Fig. 8. Modulus determination for Test CC46 at 101 ft in Hole PM301

9.0 DETERMINATION OF THE LIMIT PRESSURE

From a visual inspection of the typical pressuremeter curve of the clay shown in Fig. 8, the pressure tends to a limit. For Test CC46 this limit pressure is in the range of 450 psi. However, to make this limit pressure a quantitative measurement, the limit pressure is defined in ASTM D4719 as that pressure which occurs when the volume of the pressuremeter has doubled, which is a strain of approximately 41%. However, few pressuremeter tests ever actually expand this far before reaching the limit of the strain sensing system. The pressuremeters used in this investigation will only expand to about 20% strain before the displacement limit is reached.

If the material being tested is assumed to behave as an elastic cohesive material, then the equation governing the pressure-displacement curve is given by:

$$P = P_L + (c)\log_e (u_a/_a) \qquad 5)$$

$P_L = P_o + c + (c)\log_e [G/c]$ 6)

Where:

P_L" is the theoretical limit pressure at infinite expansion

"c" is the undrained cohesive strength,

"P_O" is the total *in-situ* lateral stress, and "G" is the shear modulus.

From Equation 5, a plot of pressure P against the log of u_a/a will be a straight line, provided the shear strength remains constant with strain. The slope of this line will provide a measure of the undrained shear strength, c. The Limit Pressure, as defined by the ASTM code D4719, Section 10.6, is the pressure at which the cavity has doubled in size. This doubling in size occurs when u_a/a is equal to 41%. (The origin of the strain used in the log/normal plots is the assumed origin at the *in-situ* stress state). If any disturbance is present, the above method of determining the cohesive strength usually provides an overly optimistic value of the shear strength. In Fig. 9, Test CC46 is plotted in the above manner with a value of the strain origin at 1%.

The above method applies to cohesive materials. However it can be used in granular materials to give an indication of the maximum or limit pressure that can be applied to the ground for the design of foundations. In some instances the pressure at 10% strain might be a more useful parameter as this is a pressure that can almost always be directly read from the graph and is more directly related to the bearing pressure of a footing. (It can be also calculated from the Limit Pressure and the shear strength determined by the log method $P_{10} = P_L - 1.411*c$)

The shear strength determined by this method is not appropriate in granular materials.

In estimating the origin of the pressuremeter curve to allow for the *in-situ* stress state judgment is required. From an examination of the basis data as shown in Figure 8 for test cc46, the pressure at which the membrane starts to move the soil is about 1 % strain (i.e. between 50 and 70 psi). In Figure 9 which is the log plot of the same test, the strain origin is taken as 1% and provides a Limit Pressure of 612 psi. The strain origin does not have a significant influence on the value of the Limit Pressure. However it is more significant on the derived shear strength. The values derived from the ASTM method are tabulated in Tables 2-A and 2-B.

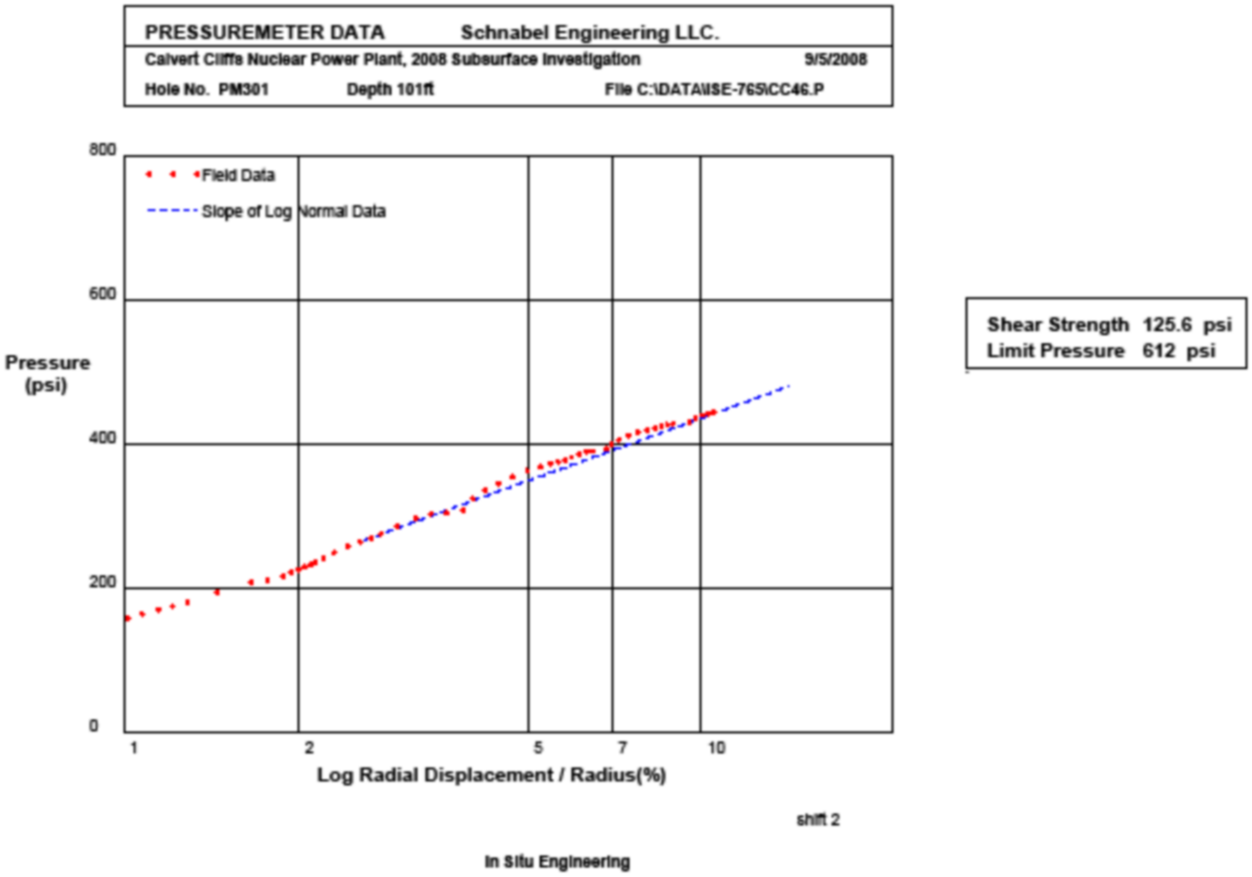


Fig. 9. Limit Pressure determination for CC46 (1% Zero shift)

Table 2-A Limit Pressure Shear Modulus and Shear Strength (log method) PM701

Name	**Depth**	**Shear Modulus** (Menard Method) **(initial modulus)**	**Unload-reload Shear Modulus M1**	**Unload-reload Shear Modulus M2**	**Limit Pressure**	**Shear strength (Log Method)**
	ft	**psi**	**psi**	**psi**	**psi**	**psi**
CC01	8	N/A	400	763	31	4.4
CC02	11.2	N/A	63	N/A	N/A	N/A
CC03	23.5	4013	27500	N/A	704	152.9
CC04	30.7	3428	27500	N/A	632	126.2
CC05	29.2	2656	16388	N/A	502	102.8
CC06	40.9	2656	11283	N/A	612	111.8
CC07	39.3	4234	18316	N/A	829	170.7
CC08	51	2400	13437	N/A	417	82.0
CC09	49.5	2400	23653	N/A	510	102.8
CC10	60.5	5295	14788	N/A	766	164.6
CC11	59	6339	23653	N/A	708	126.2
CC12	70.5	2282	12723	N/A	619	136.4
CC13	69	2525	16388	N/A	621	136.4
CC14	80.7	2794	11283	N/A	682	136.4
CC15	79.2	5295	12282	N/A	674	121.3
CC16	90.6	2656	8960	N/A	578	102.8
CC17	89.1	5614	11283	N/A	687	126.2
CC18	100.5	1959	13437	N/A	771	136.4
CC19	99	6339	18316	N/A	779	141.8
CC20	110.7	4471	13437	N/A	774	141.8
CC21	109.2	3255	11283	N/A	582	111.8
CC22	120.1	4234	10411	N/A	424	63.5
CC23	118.6	2656	12282	N/A	453	82.0
CC24	130.8	2062	14788	N/A	637	141.8
CC25	129.3	2282	14788	N/A	617	147.2
CC26	140.8	2062	10411	N/A	603	121.3
CC27	139.3	4013	13437	N/A	599	116.5
CC28	150.9	3428	14221	N/A	713	126.2
CC29	149.4	2939	14788	N/A	785	197.0

N/A indicates that this test analysis was not performed, was inappropriate or not applicable due to poor quality of results.

Table 2-B Limit Pressure shear modulus and Shear strength (log method): PM301

Name	**Depth**	**Shear Modulus** (Menard Method) **(initial modulus)**	**Unload-reload Shear Modulus M1**	**Limit Pressure**	**Shear strength (Log Method)**
	ft	**psi**	**psi**	**psi**	**psi**
CC30	9	265	437	54	8.3
CC31	18	1031	6893	294	72.9
CC32	29.5	559	5462	159	34.2
CC33	28	723	6893	156	30.0
CC34	41	1521	4298	288	42.3
CC35	39.5	1600	4047	300	57.3
CC36	51	3530	12210	456	90.9
CC37	49.5	3150	6940	343	60.0
CC38	60.8	5962	24421	899	137.1
CC39	59.3	3974	13787	462	87.5
CC40	70.4	6688	66666	1719	499.1
CC41	68.9	4424	45833	1529	465.5
CC42	80.9	4471	32672	639	136.4
CC43	79.4	1770	21781	428	74.5
CC44	91	4341	36666	775	168.3
CC45	89.5	5074	68245	918	196.3
CC46	101	3541	24421	612	125.6
CC47	99.5	3530	15769	498	94.5
CC48	111	7060	43563	801	155.3
CC49	109.5	5074	19717	583	104.3
CC50	120.8	5074	24421	671	114.7
CC51	119.3	6301	43563	1044	227.6
CC52	131	3541	16376	579	99.2
CC53	129.5	3150	13787	584	126.7
CC54	141	2893	17916	779	175.0
CC55	139.5	3541	13881	650	131.3
CC56	151	3919	17916	733	131.3
CC57	149.5	3201	13881	631	114.7
CC58	161	5137	15769	707	136.0
CC59	159.5	5137	12210	N/A	N/A
CC60	171	3541	16376	666	114.7
CC61	169.5	4341	15045	762	161.7
CC62	181	5350	16376	811	143.0
CC63	179.5	4814	15821	827	155.3
CC64	191	6301	17916	952	168.3
CC65	189.5	4814	13881	744	120.1
CC66	201	4814	13881	744	120.1
CC67	199.5	5074	15045	700	99.2
CC68	210.9	5074	12857	804	131.3
CC69	209.4	5350	13881	847	149.1
CC70	221	2893	21851	546	89.5
CC71	219.5	2612	15045	576	104.3
CC72	231	2481	12857	622	94.3
CC73	229.5	2481	13881	634	120.1
CC74	241	3201	12857	661	104.3
CC75	239.5	2893	11947	716	137.1
CC76	251	3541	12857	828	155.3
CC77	249.5	4814	13881	787	131.3
CC78	261	2749	15045	861	181.9
CC79	259.5	2749	11947	817	168.3
CC80	271	2893	11134	839	175.0
CC81	269.5	4814	16376	853	143.0
CC82	281	3541	11947	802	125.6

N/A indicates that this test analysis was not performed, was inappropriate or not applicable due to poor quality of results.

Table 2-B (cont) Limit Pressure shear modulus and Shear strength (log method): PM301

Name	Depth	Shear Modulus (Menard Method) (initial modulus)	Unload-reload Shear Modulus M1	Limit Pressure	Shear strength (Log Method)
	ft	psi	psi	psi	psi
CC83	279.5	4341	12857	899	175.0
CC84	291	3201	11947	742	131.3
CC85	289.5	3725	10404	736	114.7
CC86	301	4124	17916	911	161.7
CC87	299.5	3201	16376	877	168.3
CC88	310.7	50714	409473	N/A	N/A
CC89	321	7611	26875	1210	214.5
CC90	319.5	8469	32777	1296	283.6
CC91	328.5	19076	163789	1726	272.9
CC92	338.5	8026	24565	849	148.9
CC93	350	5603	24780	995	164.1
CC94	348.5	5330	27564	913	171.4
CC95	360.7	6872	22446	867	136.8
CC96	359.2	4828	24780	876	143.4

N/A indicates that this test analysis was not performed, was inappropriate or not applicable due to poor quality of results.

10.0 DETERMINATION OF THE STRENGTH PROPERTIES

The PMT data can some times be used directly to determine the *in-situ* material properties such as the cohesive strength and the friction angle. To do so, a material model and failure mechanism must be assumed. If it is assumed that the material behaves in an ideal manner, in that the material deforms at constant volume throughout the test, i.e. it does not consolidate or dilate, and the shear strength remains constant, the pressuremeter curve can be interpreted by simple analytical means. The slope of the plot of pressure against the log of the strain can be used to give a direct measure of the shear strength, as discussed in Section 8. Unfortunately, real materials do not quite behave in this manner, and the shear strength determined by this method may not be accurate, particularly in disturbed material, in materials which degrade or partial tests in an enlarged hole. The user of this report may compare the shear strength results derived from the log method as presented in Tables 2-A and 2-B with the shear strength (cohesion) results presented in Tables 3-A and 3-B. Where significant discrepancies occur, this could be attributed to borehole disturbance having an effect on the log method of strength analysis. The shear strength determined by plotting on a log scale is not appropriate in frictional materials. However, this method of analysis often forms a basis of rating all materials.

A more realistic method of determining the shear strength in clays is to compare the field PMT data with an ideal model pressuremeter curve based on an assumed set of material parameters. If, for instance, the material is assumed to be cohesive and fails at constant shear strength and volume, then the material parameters required for this model are the shear strength, total horizontal lateral stress, and shear modulus. Adjustments can be made to those three parameters until a mathematical curve can be fitted to the field data. (Fig. 10 is and example for test CC46)

Judgment is required to adjust these three parameters to determine the best fit to the data, particularly if there is disturbance present.

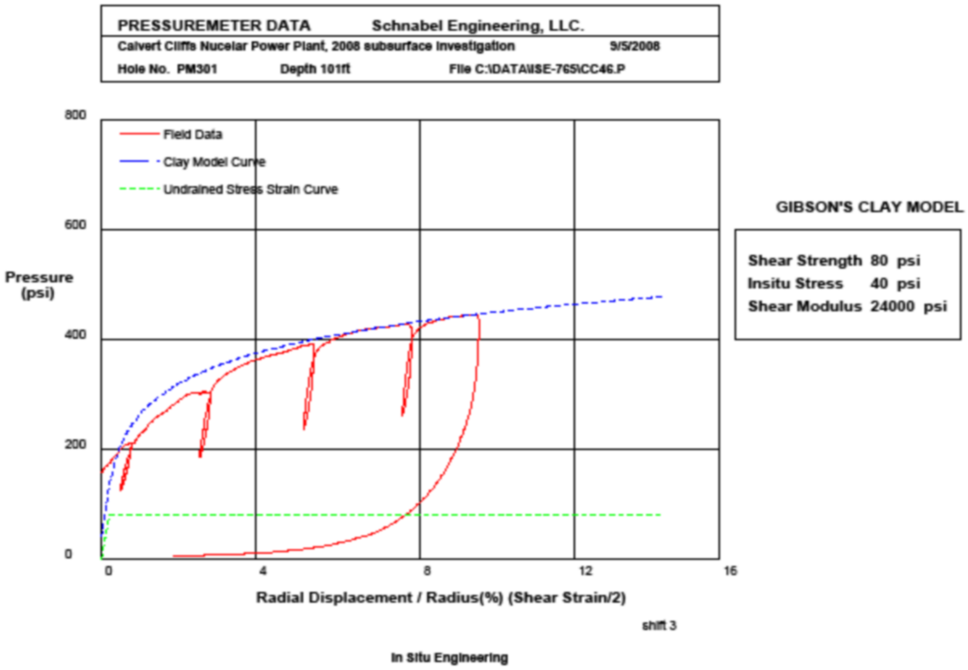


Fig. 10. Simple constant shear strength model analysis for test CC46

Zero shift of 3%

In the frictional materials if it is assumed that the material has a constant friction angle and no cohesion then a simple model can be used to compare the data. Test CC40 at 70.4 ft depth in hole PM301, shown in Figure 11, is a typical example of a frictional model analysis. This model uses water pressure, friction angle, critical friction angle, total horizontal lateral stress and shear modulus as inputs.

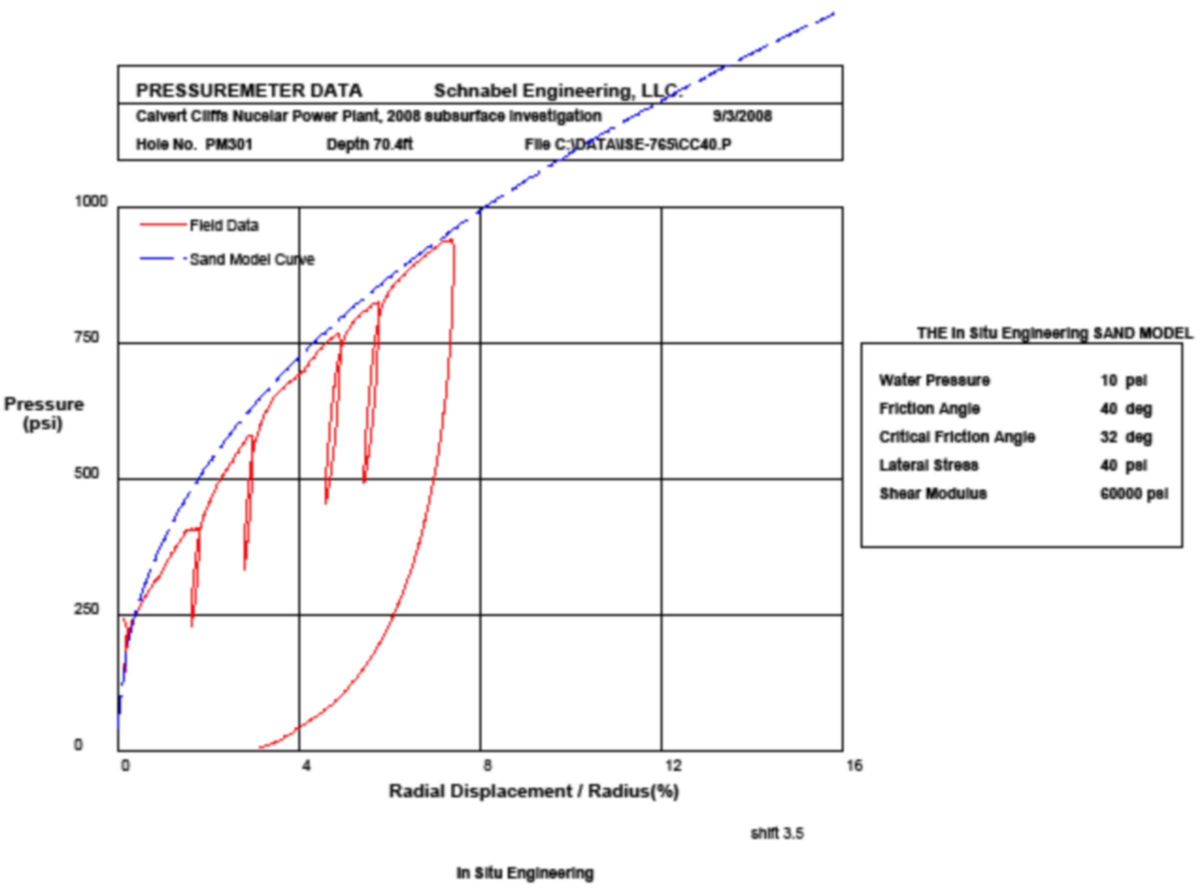


Fig. 11. Ideal friction model compared with Test CC40

Modeling analysis identifies a set of parameters for an ideal model (we have used a Gibson cohesive model and the In Situ Engineering sand friction model) that when overlaid on quality pressuremeter data yield a reasonable result. It should be noted that by varying the parameters, another set of data could also match the pressuremeter curve and yield reasonable results. In both Figures 10 and 11 the lateral stress has been roughly estimated from the pressuremeter curve. In Figure 11, the data is plotted in terms of effective stress where the water pressure has been "guessed" based on the return pressure (the final unloading of the pressuremeter curve, assuming it is a free draining material). A purely friction material is then superimposed on the data; the parameters used are "guessed". The result is a set of parameters which were combined in a frictional model to match the field data. It must be stressed that the value of any one of the parameters might not be correct but the set will be appropriate. Improved analysis of data can be achieved once other methods of testing provide a more comprehensive picture of the material properties. In this way, one of the variables can be provided as a given (or known constant) which then provides better confidence in the other variables. This "second look" at the pressuremeter data is not within the scope of this task order.

In our modeling analysis, we input the modulus based upon the unload-reload cycles and estimate and adjust the in situ stress from what we know of the water table and soil stratigraphy. After reviewing the initial overlay, we then adjust the various parameters to achieve a "best" fit. This method gives us reasonable confidence in strength parameters. Less weight should be placed on lateral stress derived from this process, particularly in cohesive materials.

In Table 3-A and 3-B are tabulated the cohesion and friction angles derived from the model analysis. In tests where both a friction angle and cohesion are shown, it should be noted that both do not apply. In one case we modeled the soil as a frictional material with no cohesion, and in the other case as a cohesive material with no friction. In some cases, the cohesion is noted with a greater than (>) symbol in front of the value. The > symbol is indicative that due to washout or hole disturbance, the instrument could not be expanded sufficiently to measure the complete strength envelope of the soil. In these cases, our modeling strength is limited to analyzing the data collected and we can say "it has at least this much" cohesion.

Table 3-A Material strength properties from Model Analysis PM701

Name	Depth	Model cohesion	Model Friction
	ft	psi	degrees
CC01	8	5	
CC02	11.2	70	
CC03	23.5	70	44
CC04	30.7	60	42
CC05	29.2	50	42
CC06	40.9	110	
CC07	39.3	120	
CC08	51	50	42
CC09	49.5	60	40
CC10	60.5	110	
CC11	59	100	36
CC12	70.5	100	
CC13	69	90	
CC14	80.7	120	
CC15	79.2	120	
CC16	90.6	110	
CC17	89.1	110	
CC18	100.5	130	
CC19	99	120	
CC20	110.7	130	
CC21	109.2	70	40
CC22	120.1	65	32
CC23	118.6	65	
CC24	130.8	85	
CC25	129.3	80	
CC26	140.8	90	
CC27	139.3	85	
CC28	150.9	110	
CC29	149.4	110	

Table 3-B Material properties from Model Analysis PM301

Name	Depth	Model Cohesion	Model Friction
	ft	psi	Degrees
CC30	9	10	
CC31	18	>45	42
CC32	29.5	>25	36
CC33	28	>20	36
CC34	41	55	
CC35	39.5	50	
CC36	51	75	
CC37	49.5	60	
CC38	60.8	150	
CC39	59.3	65	
CC40	70.4	>180	40
CC41	68.9	>170	40
CC42	80.9	75	
CC43	79.4	>50	36
CC44	91	100	
CC45	89.5	110	
CC46	101	80	
CC47	99.5	65	
CC48	111	100	
CC49	109.5	85	
CC50	120.8	90	
CC51	119.3	135	
CC52	131	90	
CC53	129.5	80	
CC54	141	120	
CC55	139.5	100	
CC56	151	110	
CC57	149.5	100	
CC58	161	100	
CC59	159.5		
CC60	171	100	
CC61	169.5	110	
CC62	181	125	
CC63	179.5	125	
CC64	191	160	
CC65	189.5	130	
CC66	201	130	
CC67	199.5	125	
CC68	210.9	140	
CC69	209.4	150	
CC70	221	70	
CC71	219.5	80	
CC72	231	100	
CC73	229.5	90	
CC74	241	105	
CC75	239.5	125	
CC76	251	105	
CC77	249.5	115	
CC78	261	105	

Table 3-B (cont) Material properties from Model Analysis PM301

Name	Depth	Model Cohesion	Model Friction
	ft	psi	Degrees
CC79	259.5	120	
CC80	271	130	
CC81	269.5	130	
CC82	281	140	
CC83	279.5	140	
CC84	291	110	
CC85	289.5	110	
CC86	301	115	
CC87	299.5	115	
CC88	310.7	500	
CC89	321	190	
CC90	319.5	170	
CC91	328.5	220	
CC92	338.5	100	
CC93	350	130	
CC94	348.5	110	
CC95	360.7	115	
CC96	359.2	115	

11.0 CONCLUSIONS

The material tested are sands and clays with varying amounts of cementation. In some zones the cementation is particularly high. However these high strength zones are of a very limited extent. There a few zones which are dominated by sands. These sand zones are thicker than the highly cemented zones. The friction angle is in the range of 40 degrees. In general, the overall material strength is governed by the properties of the weakly cemented material clays and silts.

12.0 REFERENCES

Mair, R.J. and Wood, D.M. 1987. Pressuremeter testing: methods and interpretation. CIRIA Ground Engineering Report. Butterworths, London.

ASTM D4719. 2007. Standard test method for pressuremeter testing in soils.

Appendix 1

Calibration of membrane

In this investigation two membranes were. One was used for the first 170 tests and the other for the last 28 tests. The initial calibration of the first membrane was done in the office prior to the start of the project. The second membrane was calibrated in the field after installation.

The membrane has to be calibrated for two effects: air calibration and rigid tube calibration.

Air Calibration.

The first effect is the strength of the membrane. This effect influences the pressure that is applied to the soil. This calibration is undertaken by expanding the pressuremeter in air as shown in Figure A1.

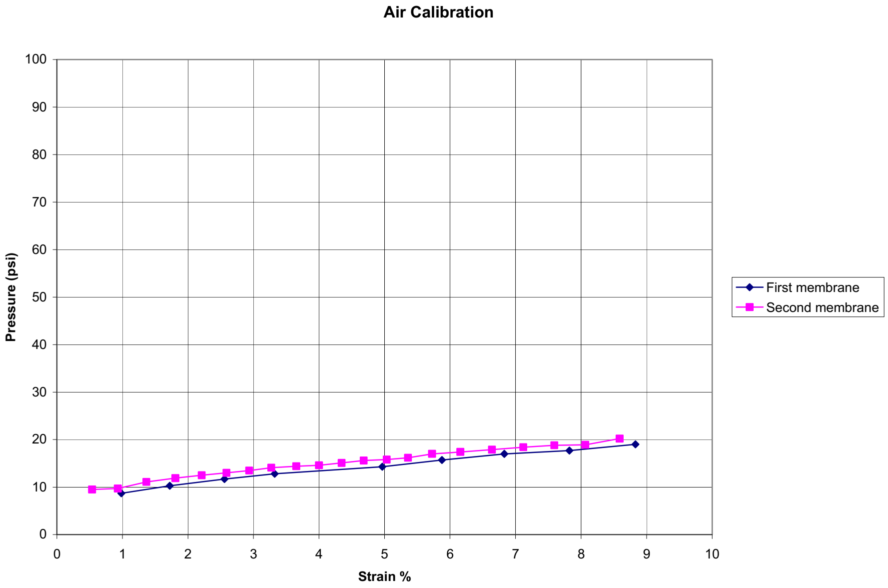


Figure A1 Calibration of membranes in Air.

The pressure on the soil Pc is given by:

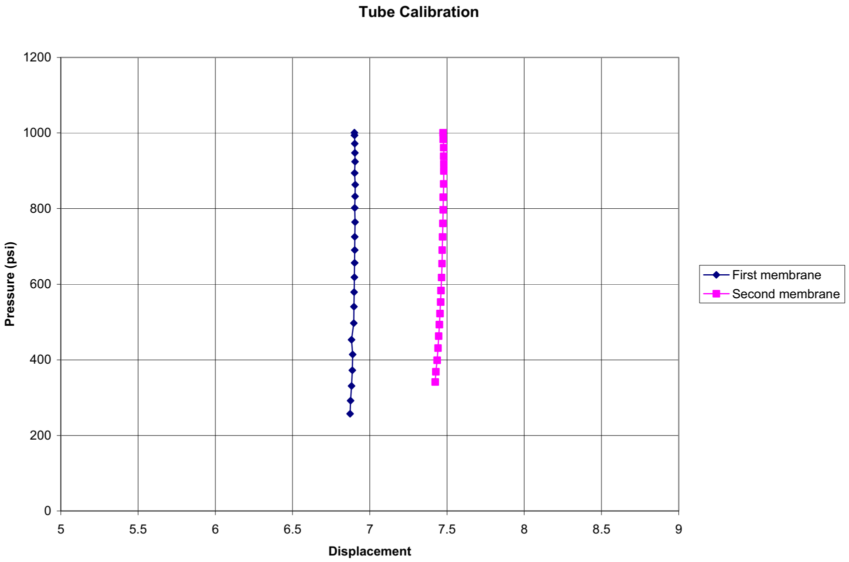
P c = Pm – 6 -1.15*(strain %)

P c = Pm – 10 -1.15*(strain %)

Where Pm is the measured pressure inside the pressuremeter.

The Rigid Tube Calibration

The second calibration is to determine the compressibility of the membrane. To do this the membrane is blown up inside a thick walled steel tube (0.5 inches thick) as shown in Figure A2.



1000 psi pressure (Pm) compresses the membrane 0.034 % for both membranes

Instrument Calibration

The instruments three displacement arms and its pressure transducer were calibrated in In Situ Engineering's shop prior to mobilization the site. The instrument sensors output were compared against reference instruments which are NIST traceable. Following is the results our shop calibration and documents for the calibration of the NIST traceable reference instruments.

Digital Pressuremeter Calibration Sheet Date: 7/25/2008

Instrument Number: PMT00006
Reference Pressure Gauge: 27375-02-001 3000 psi test ga Date NIST Traceable Calibrated: 1/28/2008
Reference Micrometer #1: HUG-001 0-1" x .001 Date NIST Traceable Calibrated: 1/28/2008
Reference Micrometer #2: HUG-002 0-1" x. 001 Date NIST Traceable Calibrated: 1/28/2008
Calibrating Individual: K. Brown
Calibration Next Due: 7/25/2009

Procedure:

The digital instrument uses a two point calibration, one point at zero and another point near the high end of the instrument.
With the arms, the first point is with the arm all the way in or zero displacement.
The double micrometer saddle is placed on the arm and the micrometers are placed so the follower is centered underneath with the gauges equally spaced. The micrometers are run all the way in and the reading is recorded.
The micrometers are then both run out the same incremental distance near their maximum extent and the zero is set at the maximum limit.
The micrometer measures in inches. The computer input data is in millimeters.
The pressure gauge measures in psi and the computer input is in psi.

Displ. (inch)	Arm 1		displ.	Reading	Arm 2		displ.	Reading	Arm 3		displ.	Reading
	Micr. 1	Micr. 2	(mm)	(bits)	Micr. 1	Micr. 2	(mm)	(bits)	Micr. 1	Micr. 2	(mm)	(bits)
0.000	0.137	0.127	**0.00**	**-3649176**	0.133	0.121	**0.00**	**1016011**	0.131	0.120	**0.00**	**-2529998**
0.050	0.187	0.177	1.27	-3158700	0.183	0.171	1.27	1482500	0.181	0.170	1.27	-2090800
0.100	0.237	0.227	2.54	-2694100	0.233	0.221	2.54	1947800	0.231	0.220	2.54	-1643000
0.150	0.287	0.277	3.81	-2219400	0.283	0.271	3.81	2420600	0.281	0.270	3.81	-1197200
0.200	0.337	0.327	5.08	-1775200	0.333	0.321	5.08	2892000	0.331	0.320	5.08	-749000
0.250	0.387	0.377	**6.35**	**-1277666**	0.383	0.371	**6.35**	**3358597**	0.381	0.370	**6.35**	**-307151**

The instrument meets the required accuracy of 1% full scale on the pressure transducer and 3% full scale on the strain arms.
The instrument response is linear with hysteresis within the above limits.
Full scale for the pressure transducer is 5000 psi and the arms is .300 inch.

Pressure Transducer	
Press.	Reading
(psi)	bits
0	**10739**
200	50500
400	91050
600	132300
800	173600
1000	**215311**

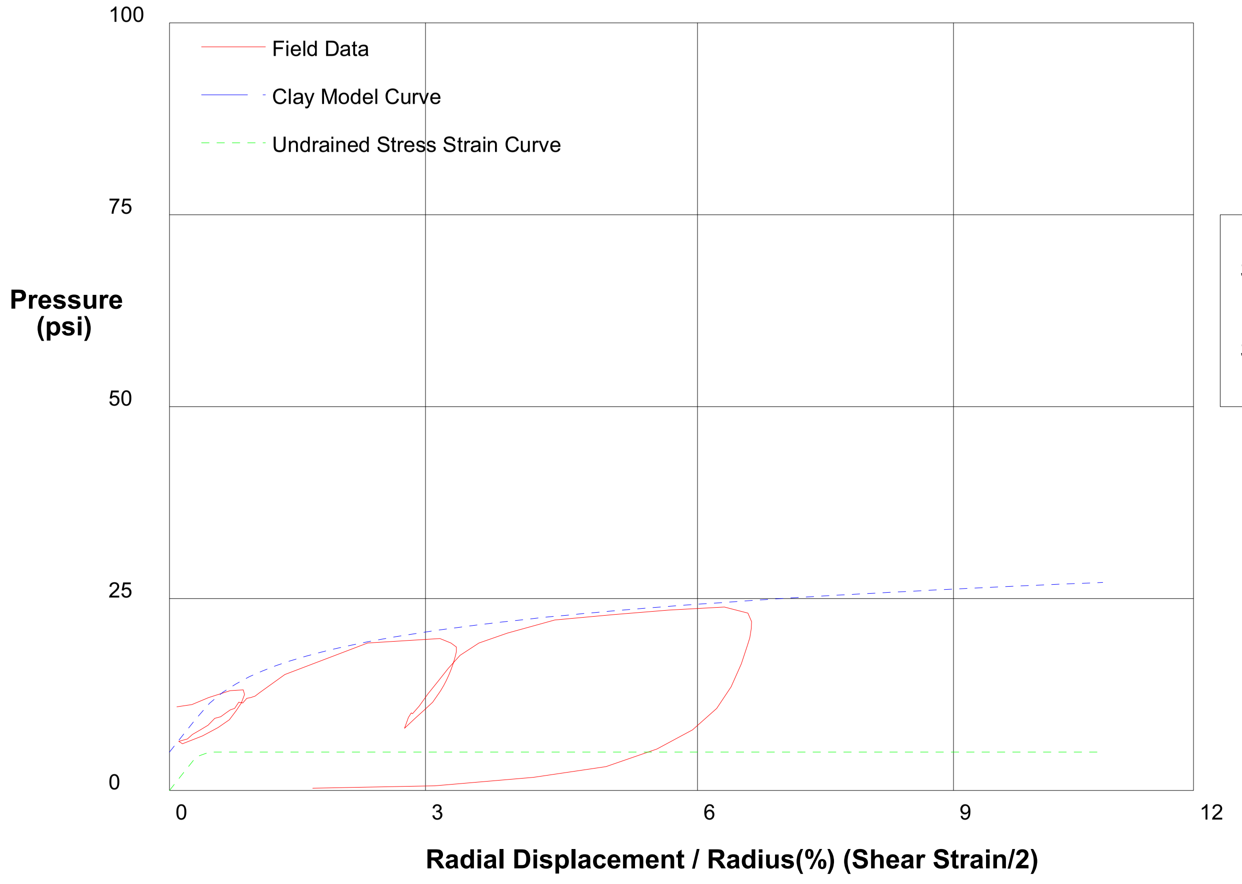
Note: Bold values are input into the instrument memory.

Appendix II Data and Interpretation

PRESSUREMETER DATA Schnabel Engineering, LLC.

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/26/2008**

Hole No. PM701 **Depth 8ftft** **File C:\DATA\ISE-765\CC01.P**



GIBSON'S CLAY MODEL

Shear Strength 5 psi
Insitu Stress 5 psi
Shear Modulus 700 psi

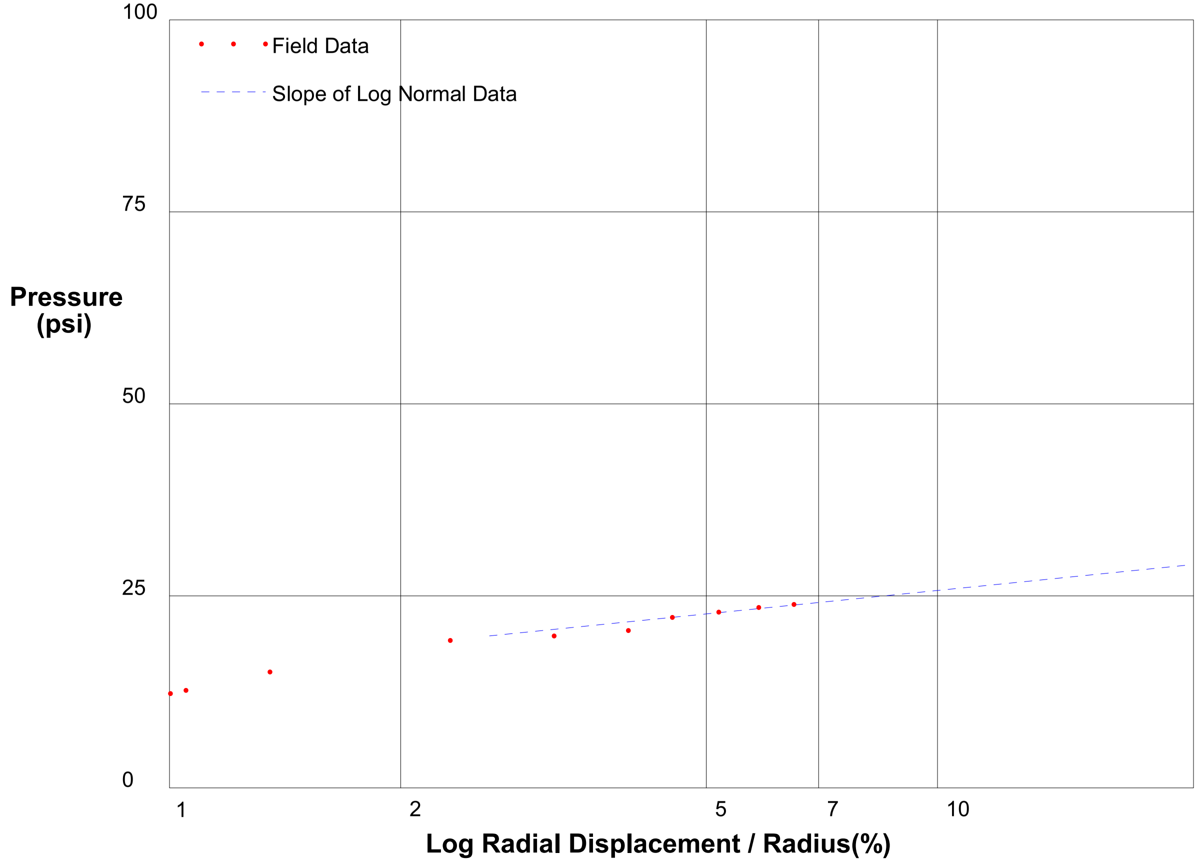
shift 6

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/26/2008**

Hole No. PM701 **Depth 8ftft** **File C:\DATA\ISE-765\CC01.P**



Shear Strength 4.4 psi
Limit Pressure 31 psi

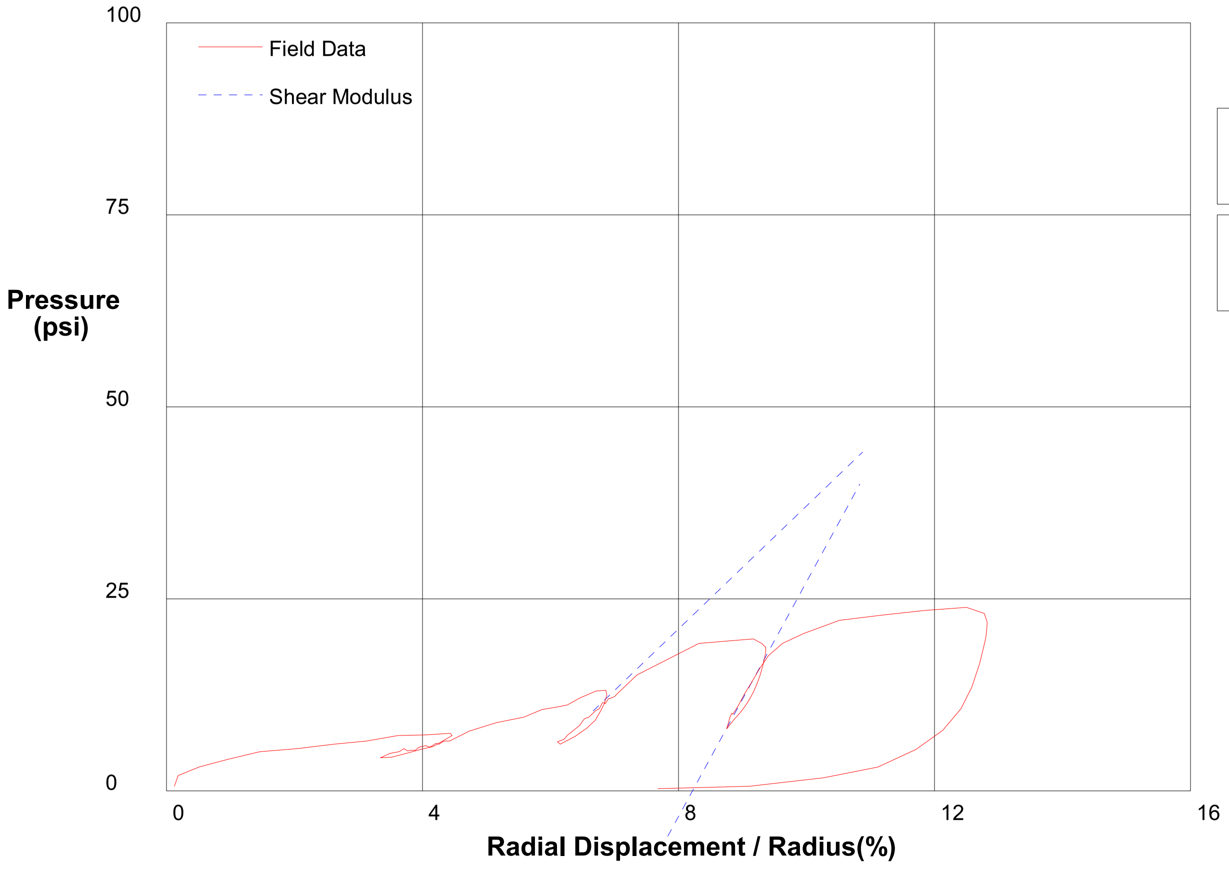
shift 6

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/26/2008**

Hole No. PM701 **Depth 8ftft** **File C:\DATA\ISE-765\CC01.P**



Shear Modulus 400 psi

Shear Modulus 763 psi

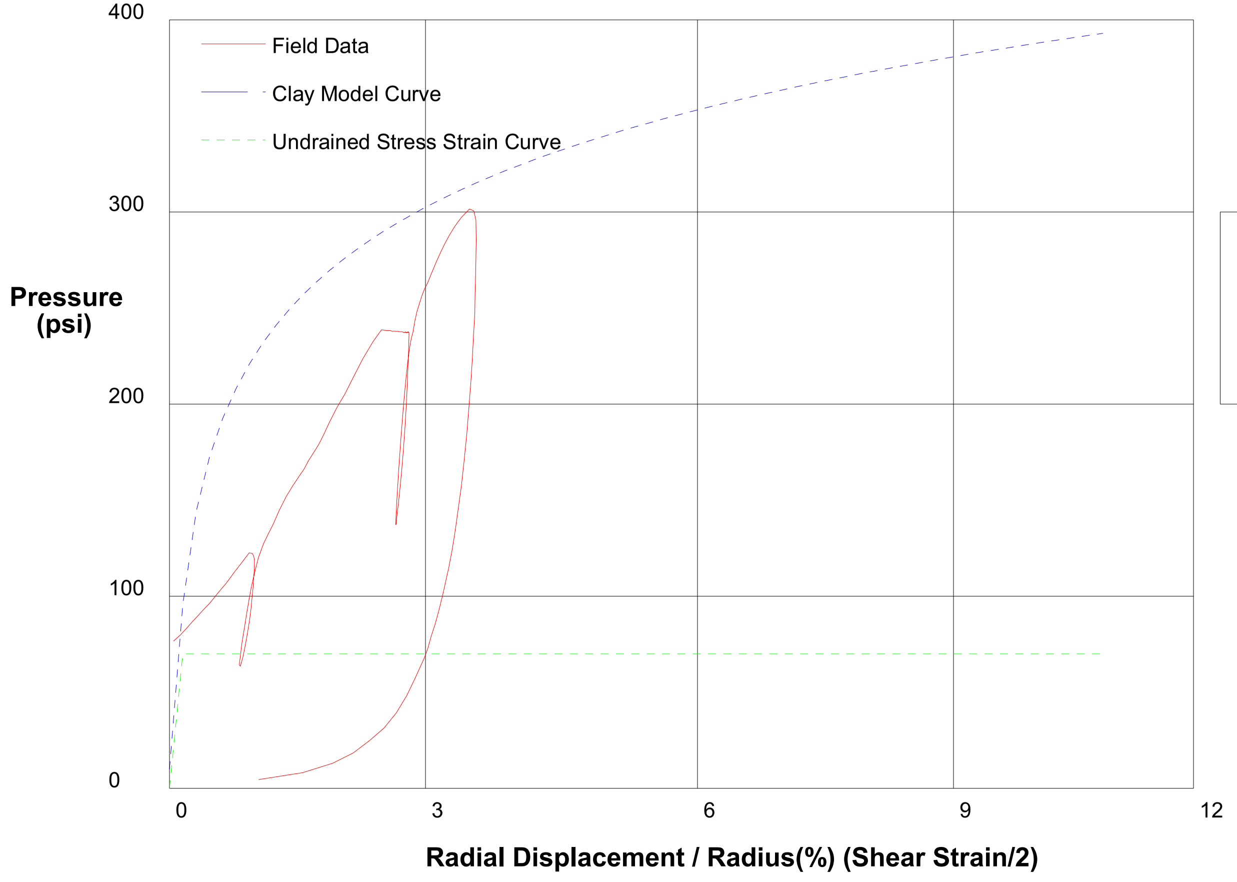
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/26/2008**

Hole No. PM701 **Depth 23.5ft** **File C:\DATA\ISE-765\CC03.P**



GIBSON'S CLAY MODEL

Shear Strength 70 psi
Insitu Stress 10 psi
Shear Modulus 28000 psi

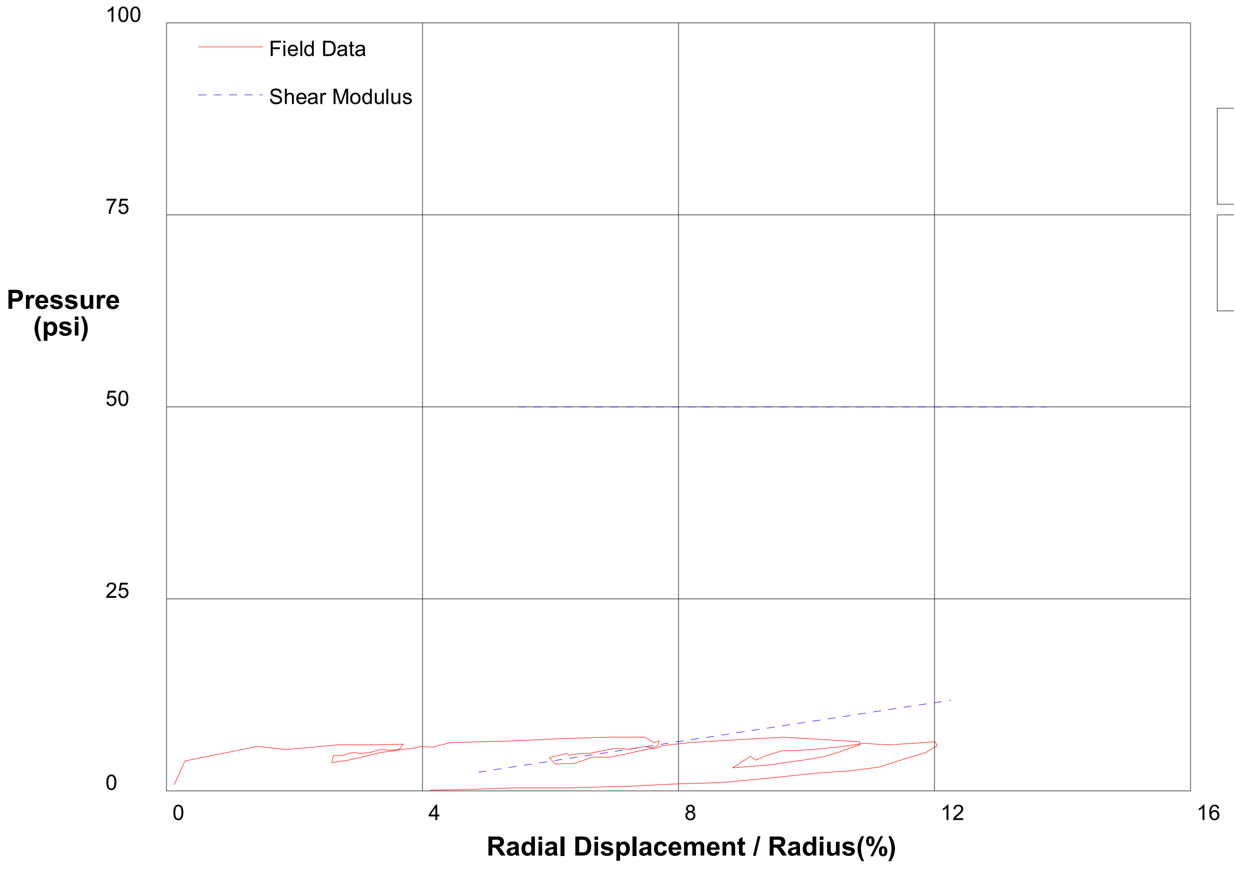
shift 4

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/26/2008**

Hole No. PM701 **Depth 11.2ft** **File C:\DATA\ISE-765\CC02.P**



Shear Modulus 0 psi

Shear Modulus 63 psi

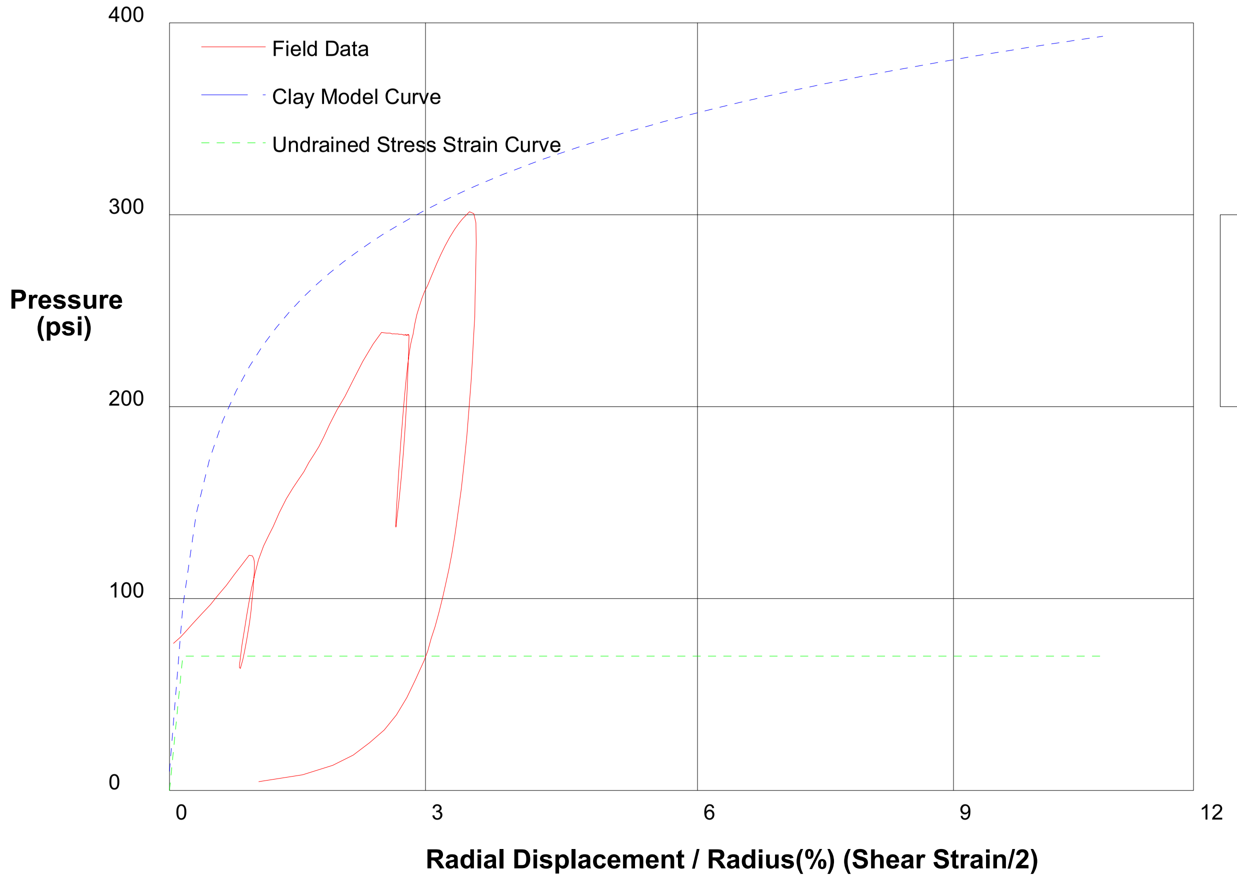
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/26/2008**

Hole No. PM701 **Depth 23.5ft** **File C:\DATA\ISE-765\CC03.P**



GIBSON'S CLAY MODEL

Shear Strength 70 psi
Insitu Stress 10 psi
Shear Modulus 28000 psi

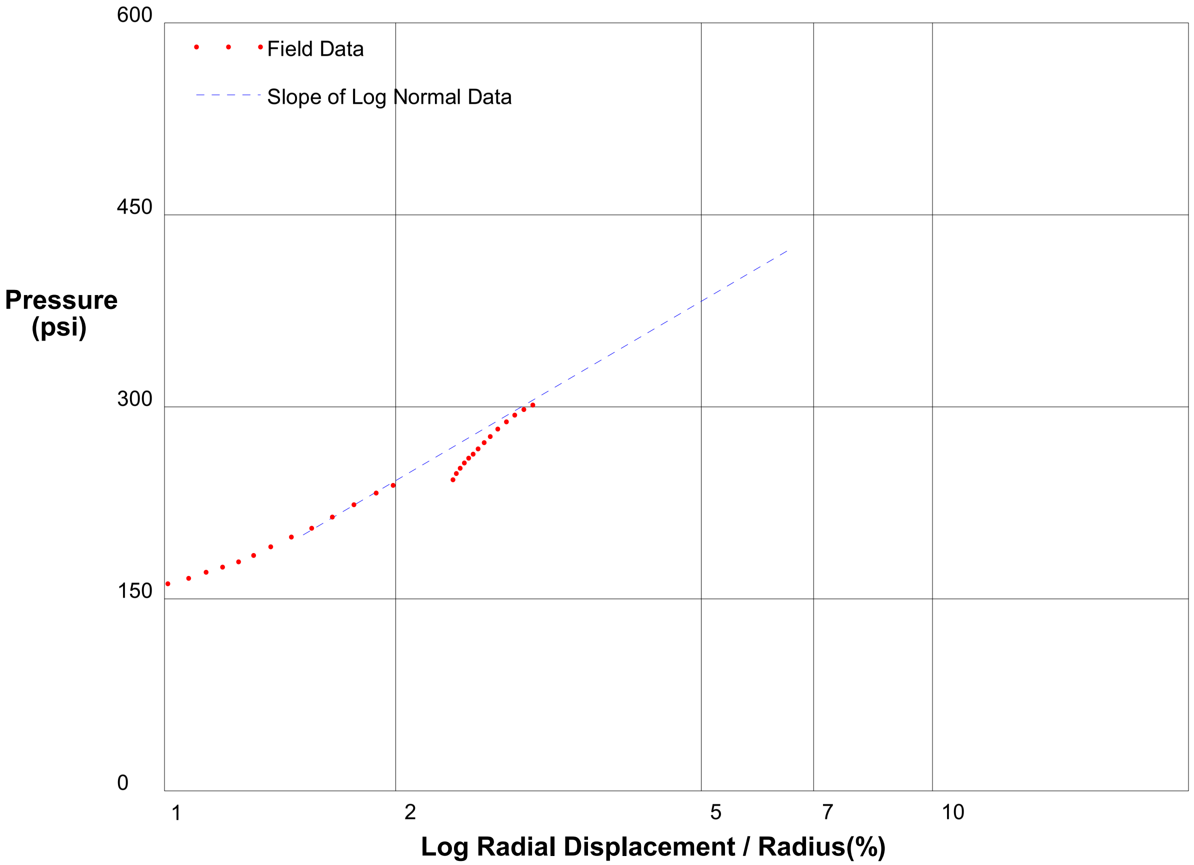
shift 4

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/26/2008**

Hole No. PM701 **Depth 23.5ft** **File C:\DATA\ISE-765\CC03.P**



Shear Strength 152.9 psi
Limit Pressure 704 psi

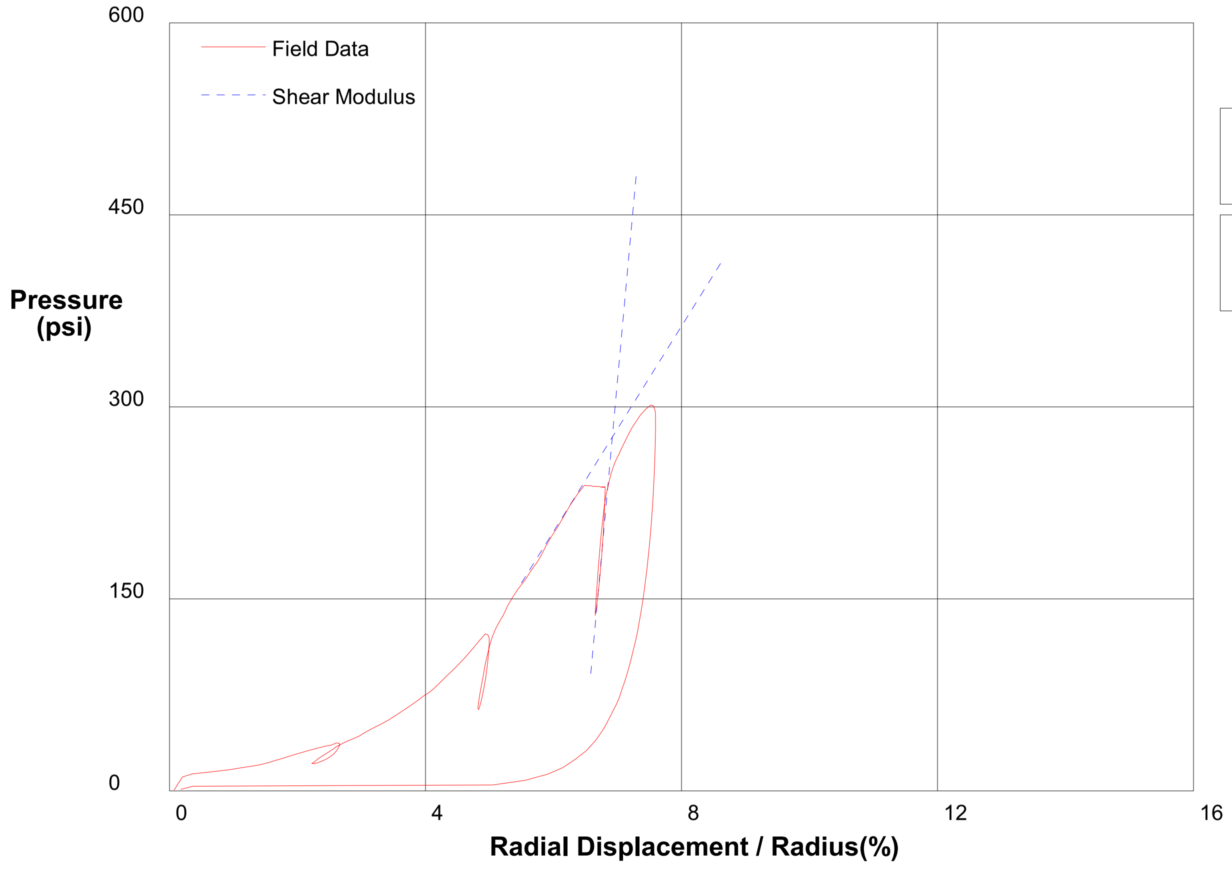
shift 4.5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/26/2008**

Hole No. PM701 **Depth 23.5ft** **File C:\DATA\ISE-765\CC03.P**



Shear Modulus 4013 psi

Shear Modulus 27500 psi

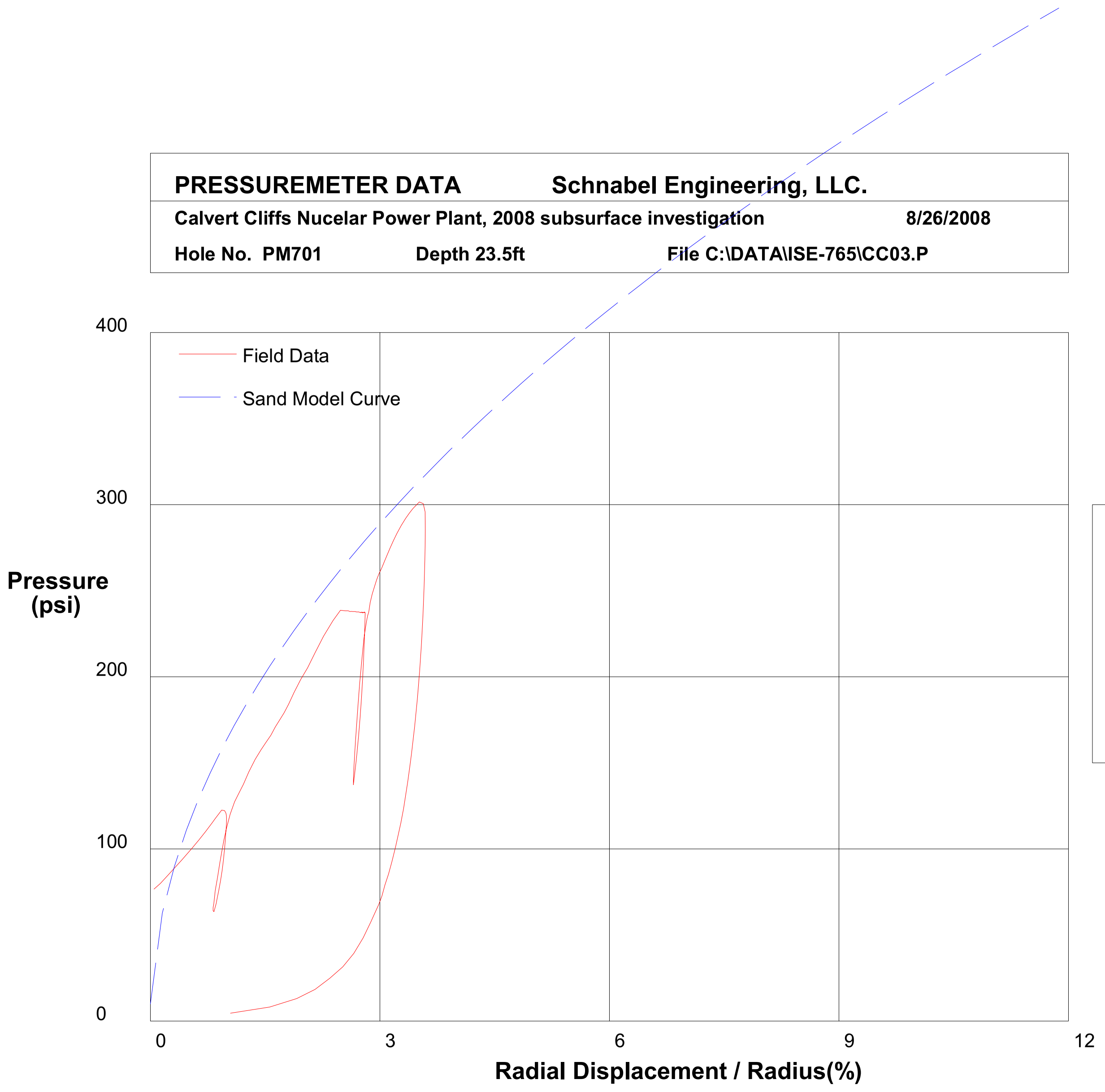
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/26/2008**

Hole No. PM701 **Depth 23.5ft** **File C:\DATA\ISE-765\CC03.P**



THE In Situ Engineering SAND MODEL

Water Pressure	**0 psi**
Friction Angle	**44 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**10 psi**
Shear Modulus	**28000 psi**

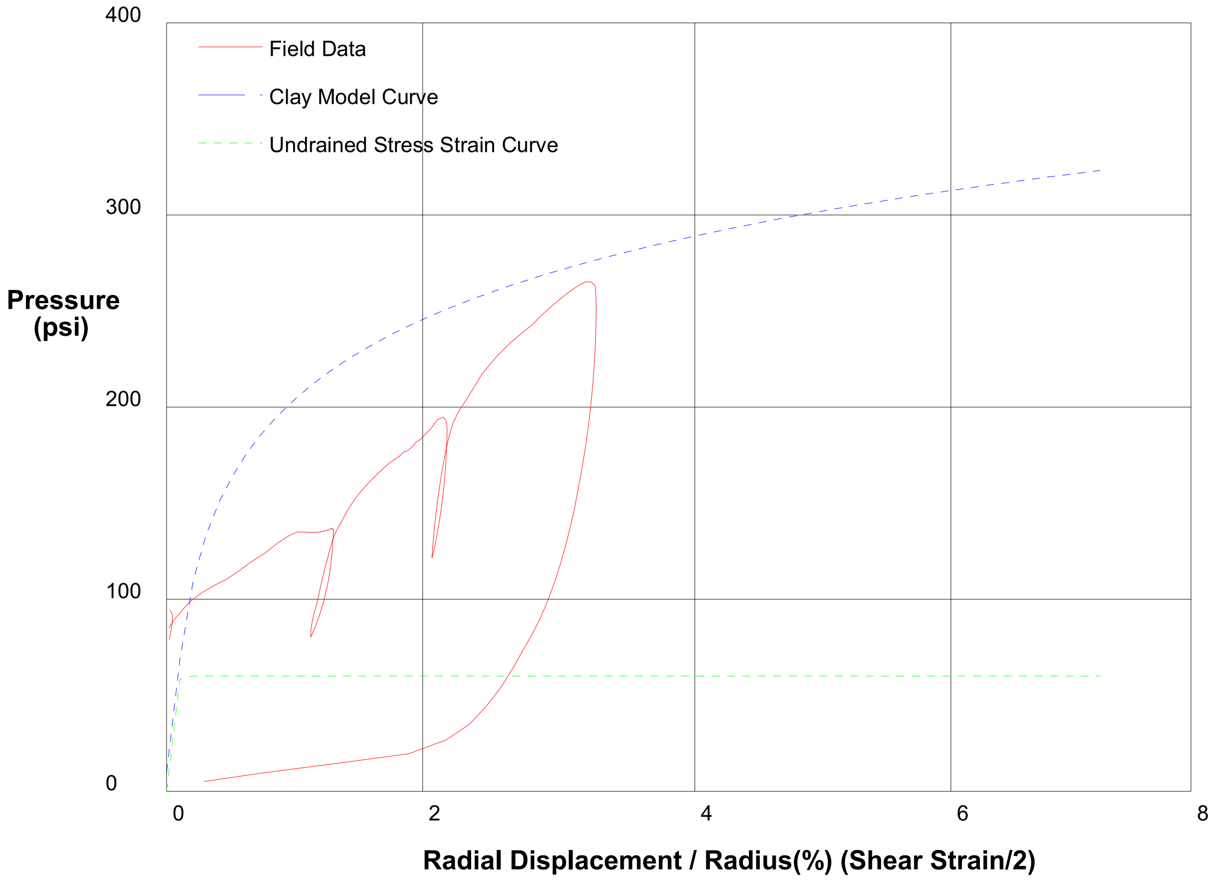
shift 4

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/26/2008**

Hole No. PM701 **Depth 30.7ft** **File C:\DATA\ISE-765\CC04.P**



GIBSON'S CLAY MODEL

Shear Strength 60 psi
Insitu Stress 10 psi
Shear Modulus 28000 psi

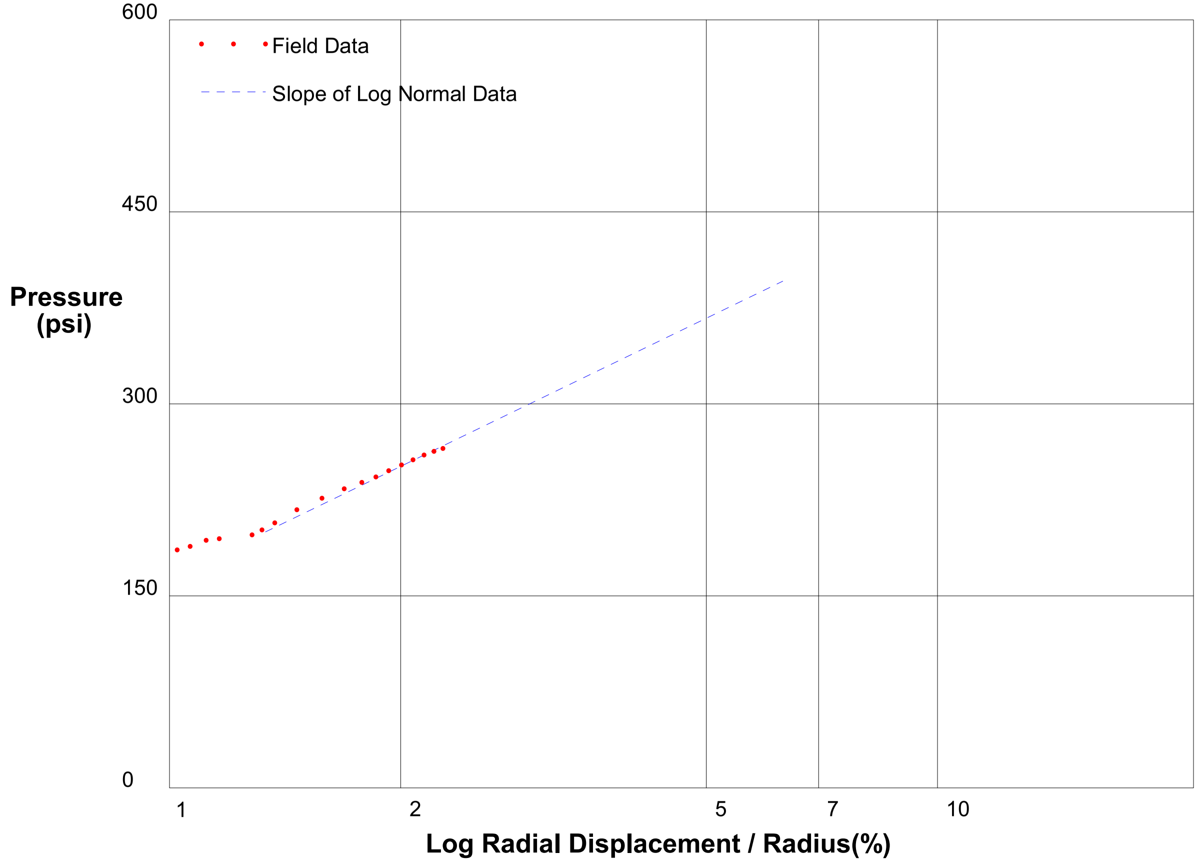
shift 8

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/26/2008**

Hole No. PM701 **Depth 30.7ft** **File C:\DATA\ISE-765\CC04.P**



Shear Strength 126.2 psi
Limit Pressure 632 psi

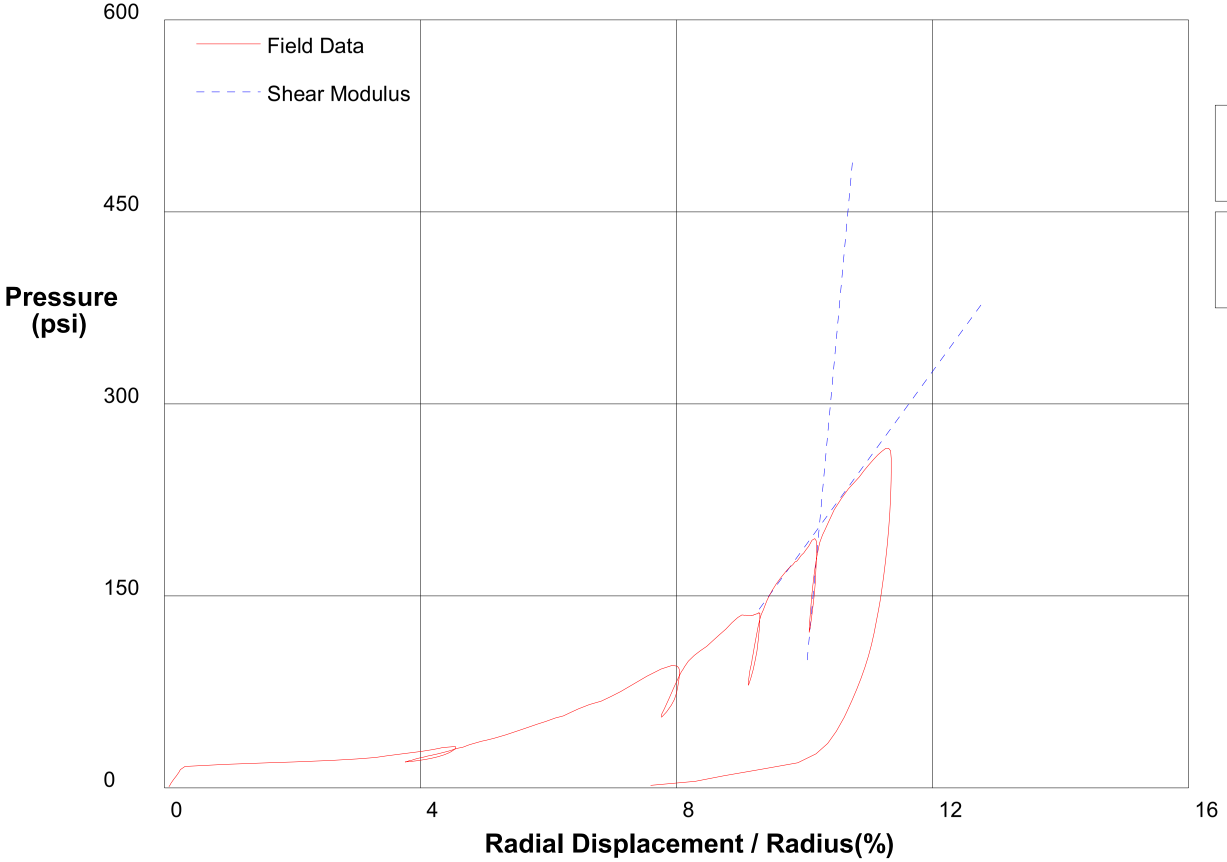
shift 9

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/26/2008**

Hole No. PM701 **Depth 30.7ft** **File C:\DATA\ISE-765\CC04.P**



Shear Modulus 3428 psi

Shear Modulus 27500 psi

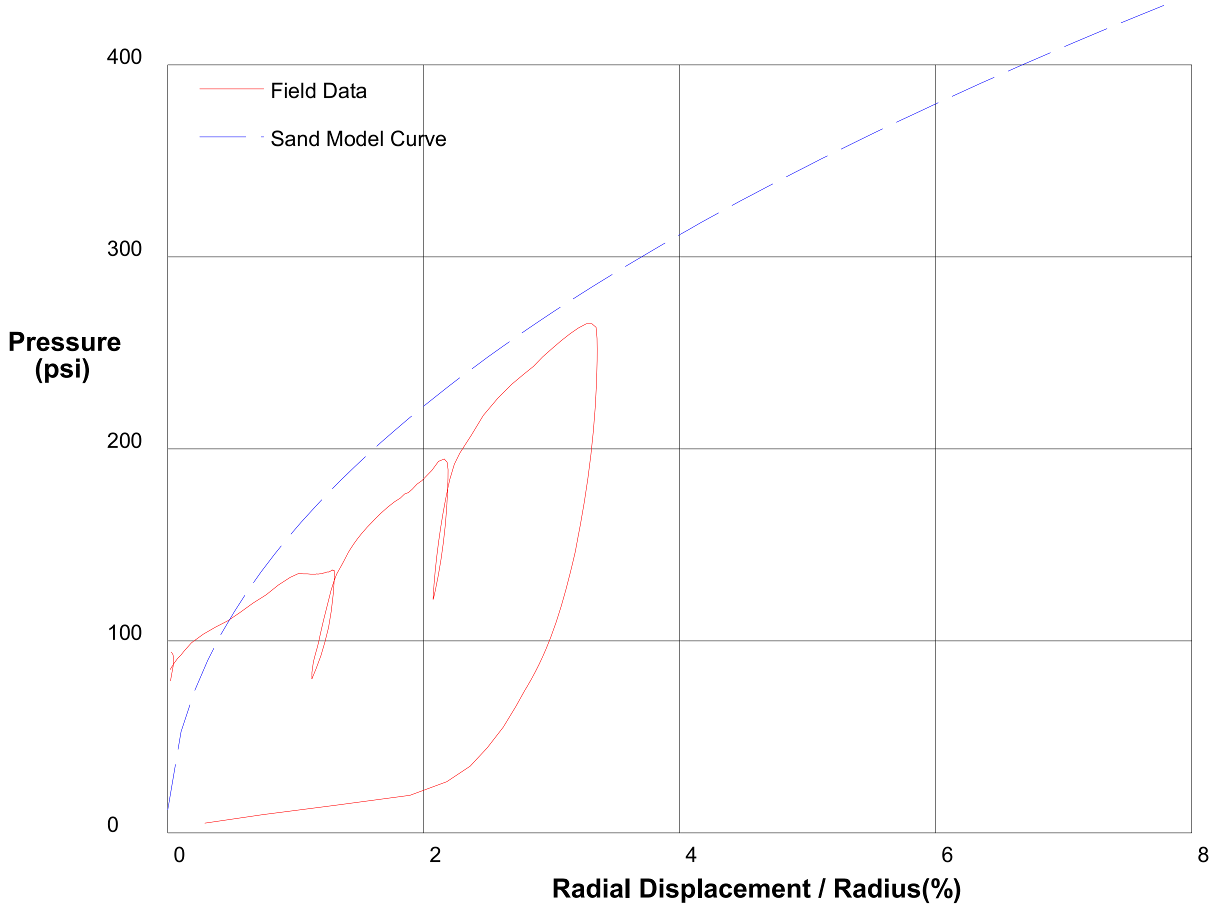
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/26/2008**

Hole No. PM701 **Depth 30.7ft** **File C:\DATA\ISE-765\CC04.P**



THE In Situ Engineering SAND MODEL

Water Pressure	**0 psi**
Friction Angle	**42 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**12 psi**
Shear Modulus	**28000 psi**

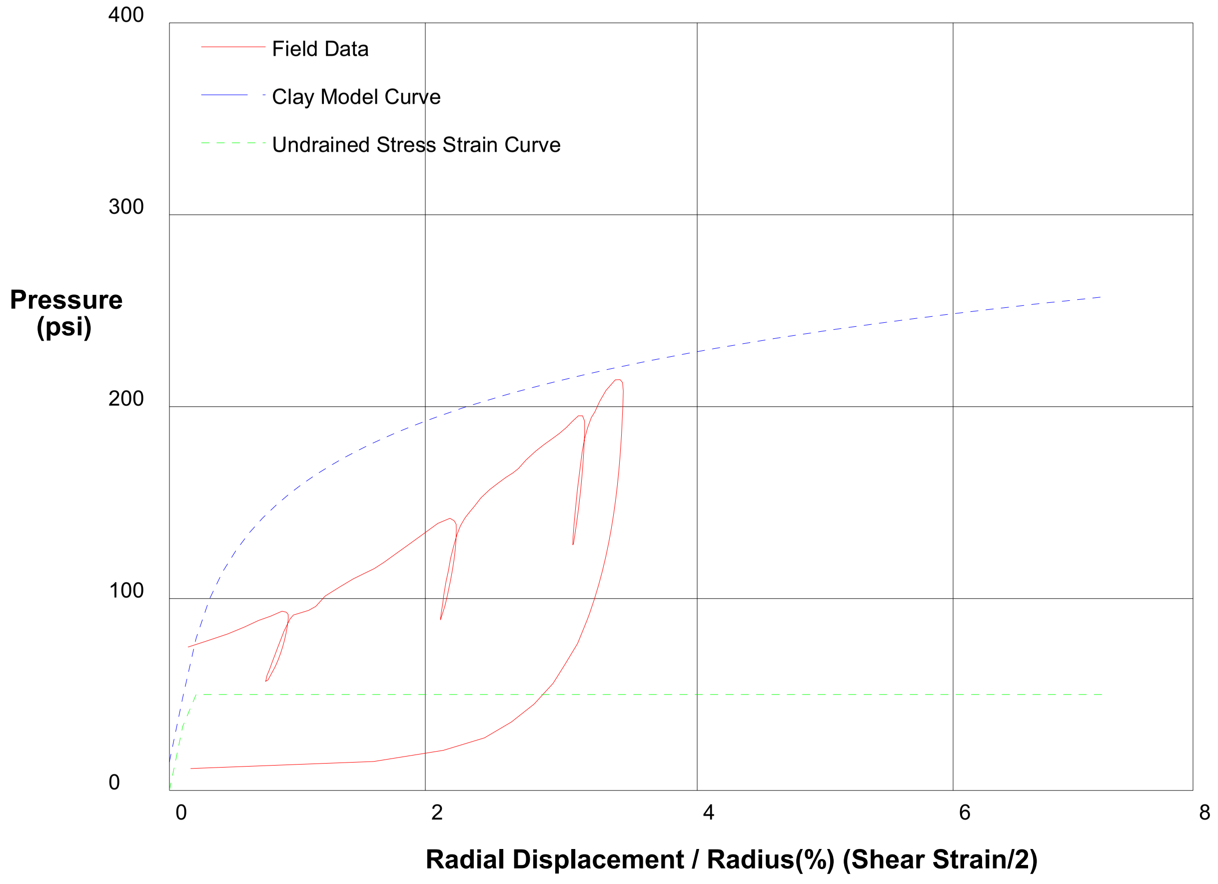
shift 8

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/26/2008**

Hole No. PM701 **Depth 29.2ft** **File C:\DATA\ISE-765\CC05.P**



GIBSON'S CLAY MODEL

Shear Strength	**50 psi**
Insitu Stress	**15 psi**
Shear Modulus	**16000 psi**

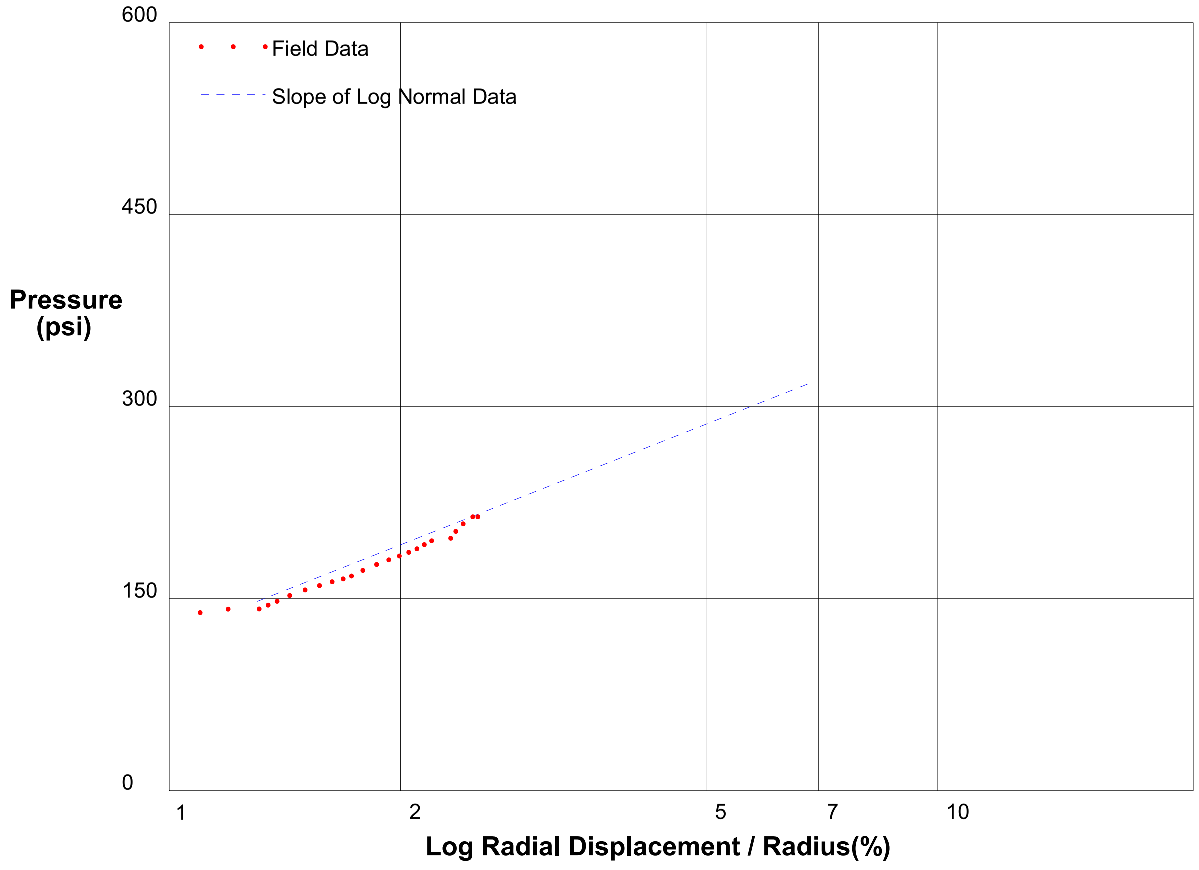
shift 7

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/26/2008**

Hole No. PM701 **Depth 29.2ft** **File C:\DATA\ISE-765\CC05.P**



Shear Strength 102.8 psi
Limit Pressure 502 psi

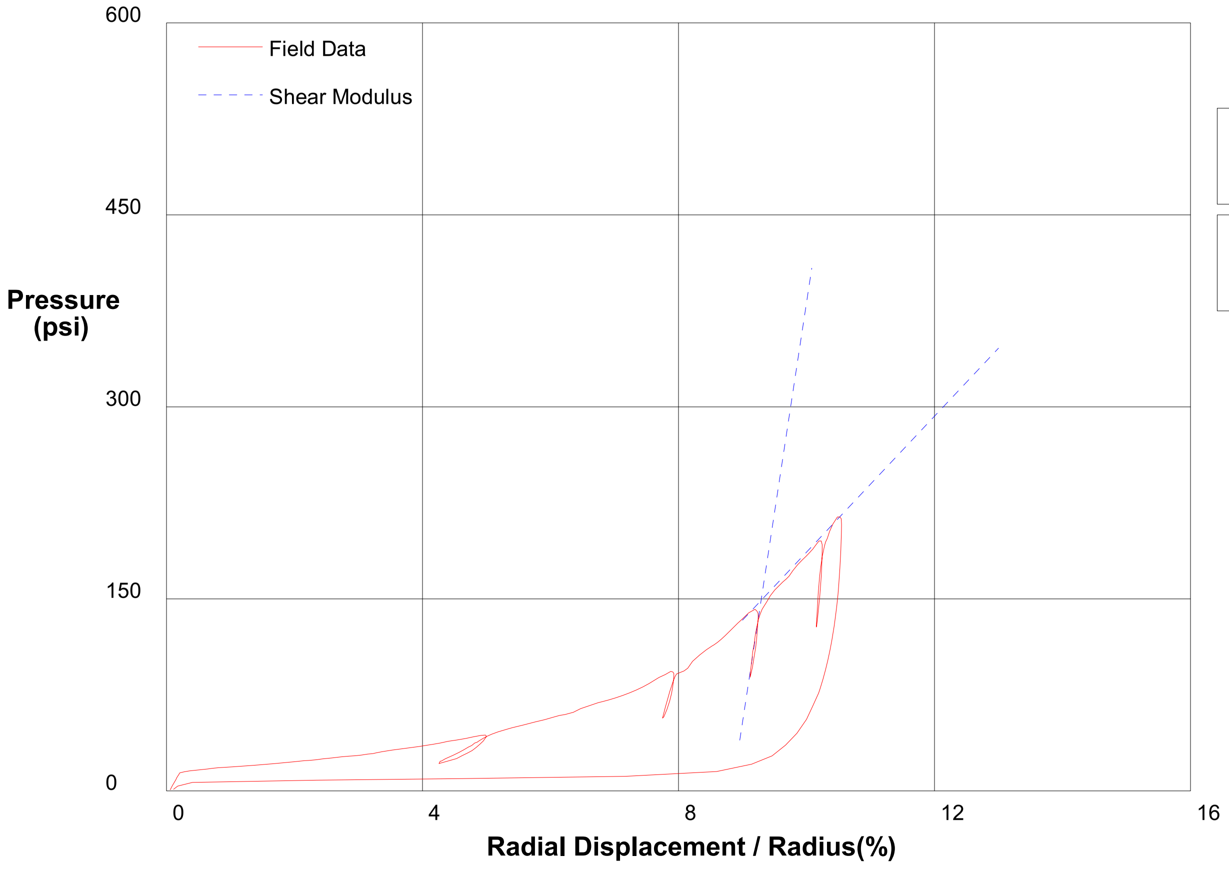
shift 8

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/26/2008**

Hole No. PM701 **Depth 29.2ft** **File C:\DATA\ISE-765\CC05.P**



Shear Modulus 2656 psi

Shear Modulus 16388 psi

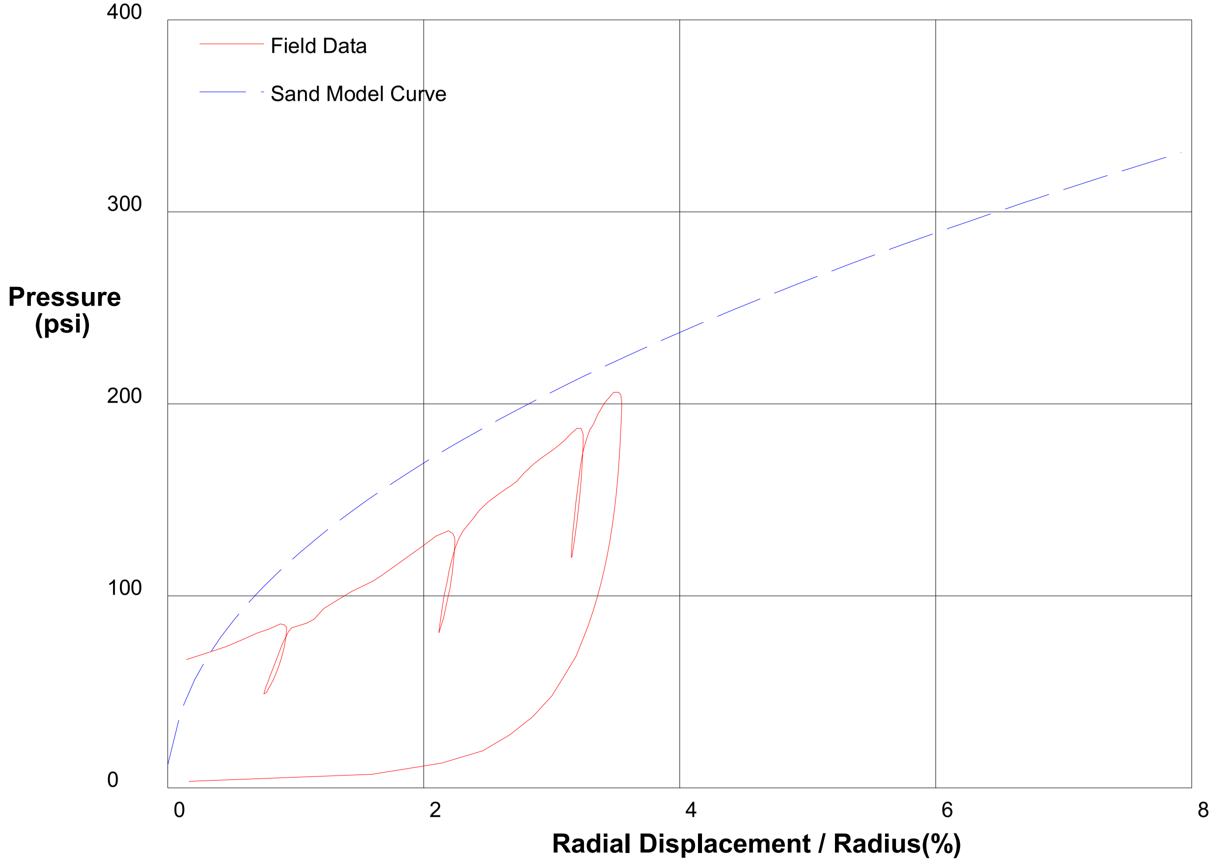
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/26/2008**

Hole No. PM701 **Depth 29.2ft** **File C:\DATA\ISE-765\CC05.P**



THE In Situ Engineering SAND MODEL

Water Pressure	**8 psi**
Friction Angle	**42 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**12 psi**
Shear Modulus	**16000 psi**

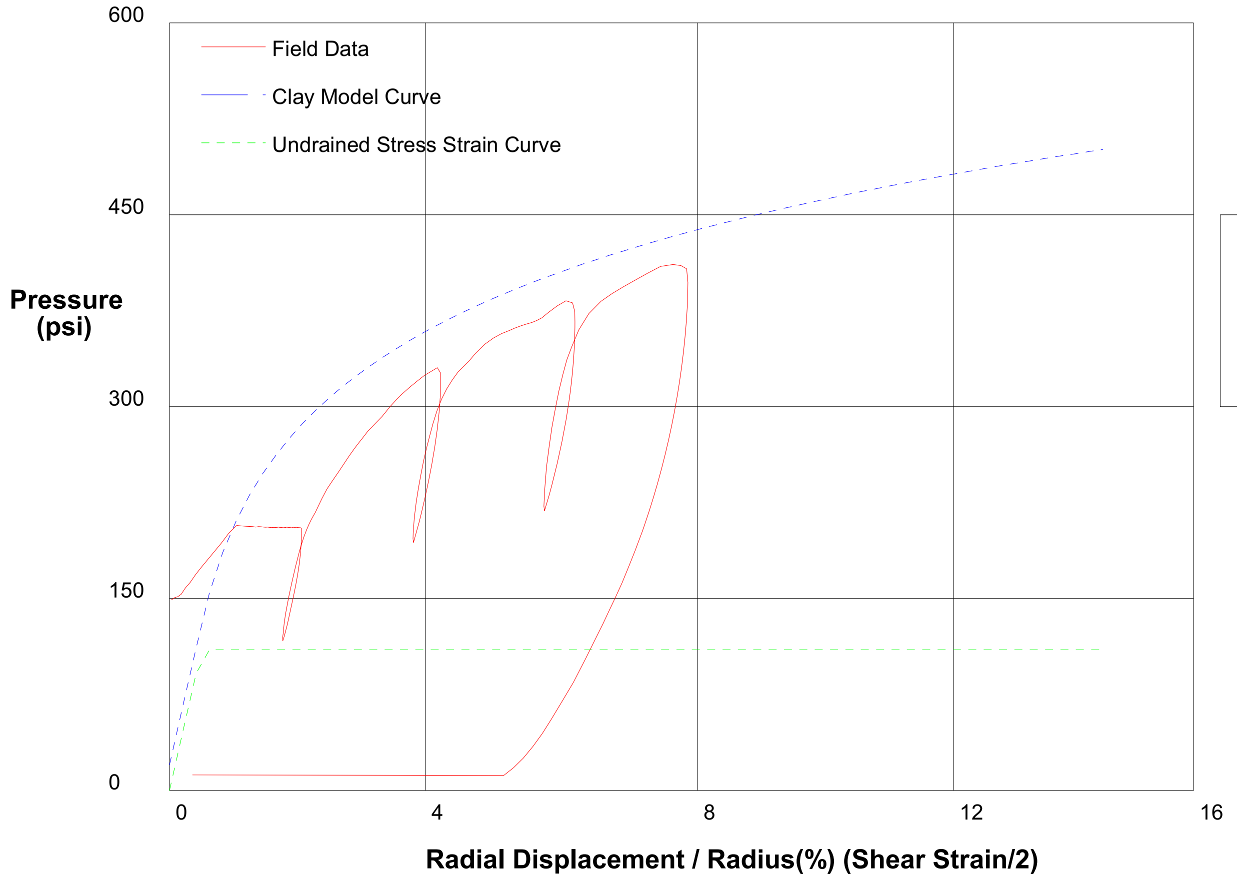
shift 7

In Situ Engineering

PRESSUREMETER DATA Schnabel Engineering, LLC.

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/26/2008**

Hole No. PM701 **Depth 40.9ft** **File C:\DATA\ISE-765\CC06.P**



shift 3

GIBSON'S CLAY MODEL

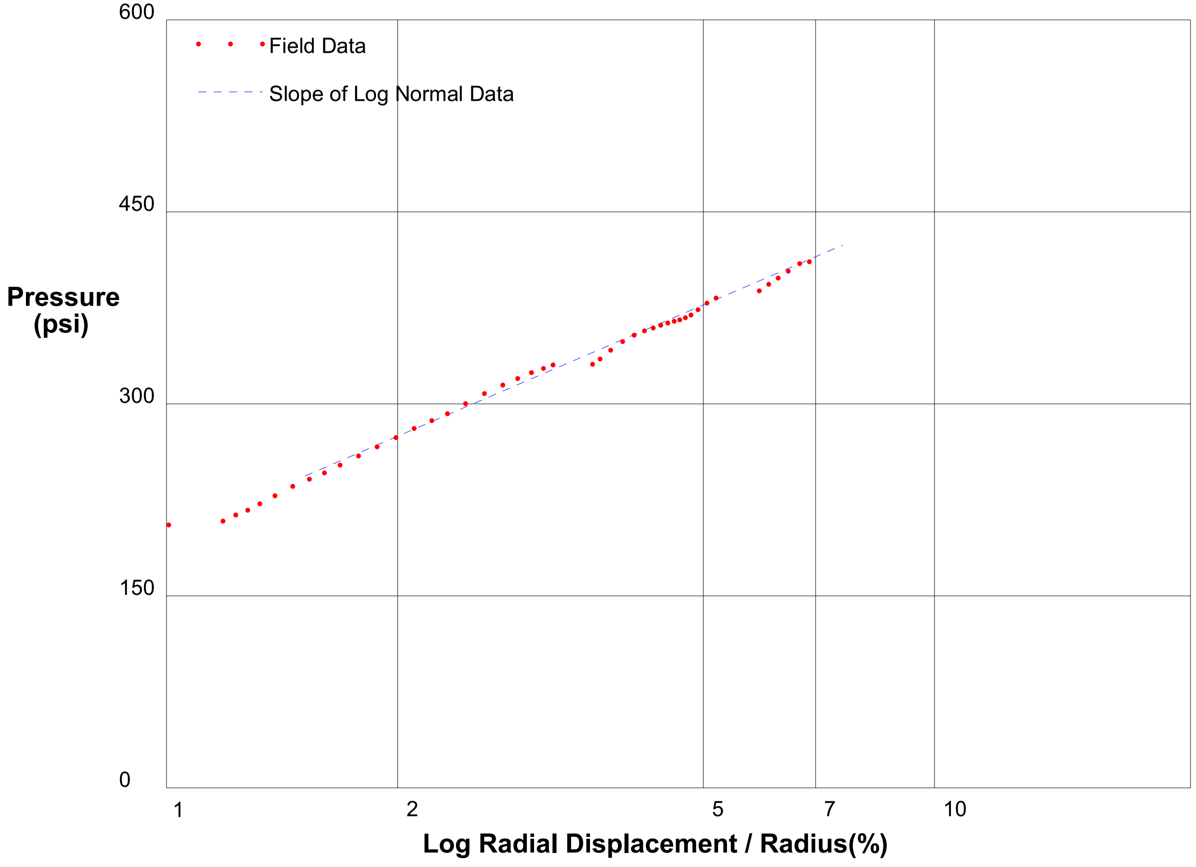
Shear Strength 110 psi
Insitu Stress 20 psi
Shear Modulus 11000 psi

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/26/2008**

Hole No. PM701 **Depth 40.9ft** **File C:\DATA\ISE-765\CC06.P**



Shear Strength 111.8 psi
Limit Pressure 612 psi

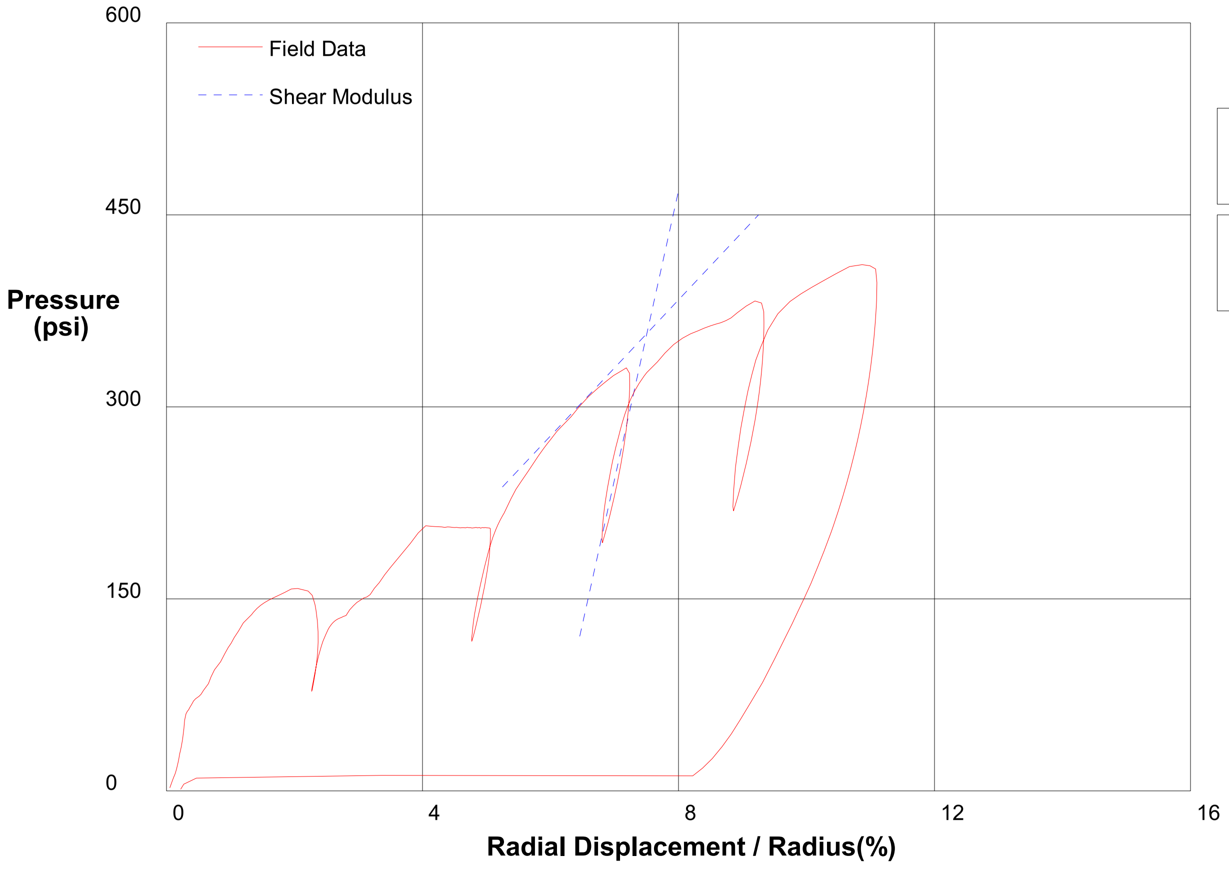
shift 4

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/26/2008**

Hole No. PM701 **Depth 40.9ft** **File C:\DATA\ISE-765\CC06.P**



Shear Modulus 2656 psi

Shear Modulus 11283 psi

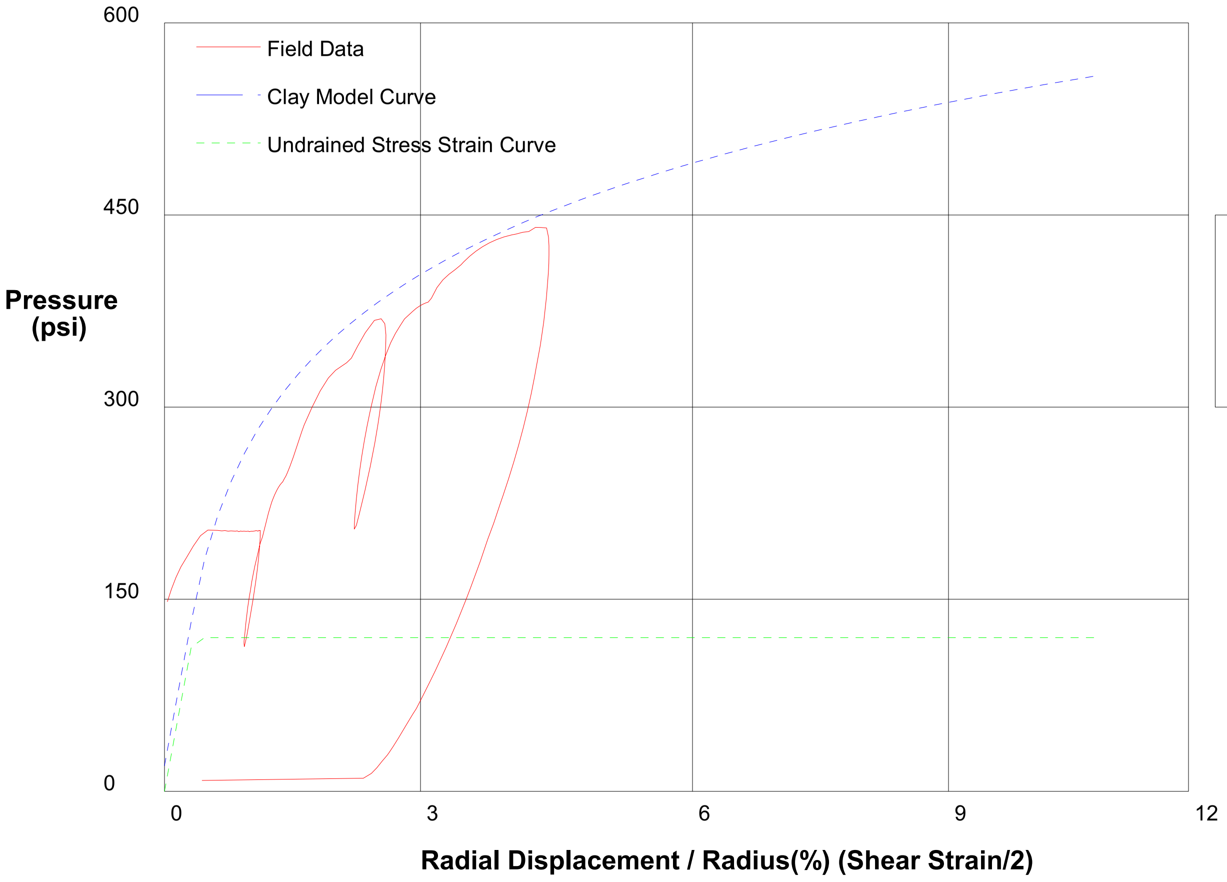
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/26/2008**

Hole No. PM701 **Depth 39.3ft** **File C:\DATA\ISE-765\CC07.P**



GIBSON'S CLAY MODEL

Shear Strength 120 psi
Insitu Stress 20 psi
Shear Modulus 18000 psi

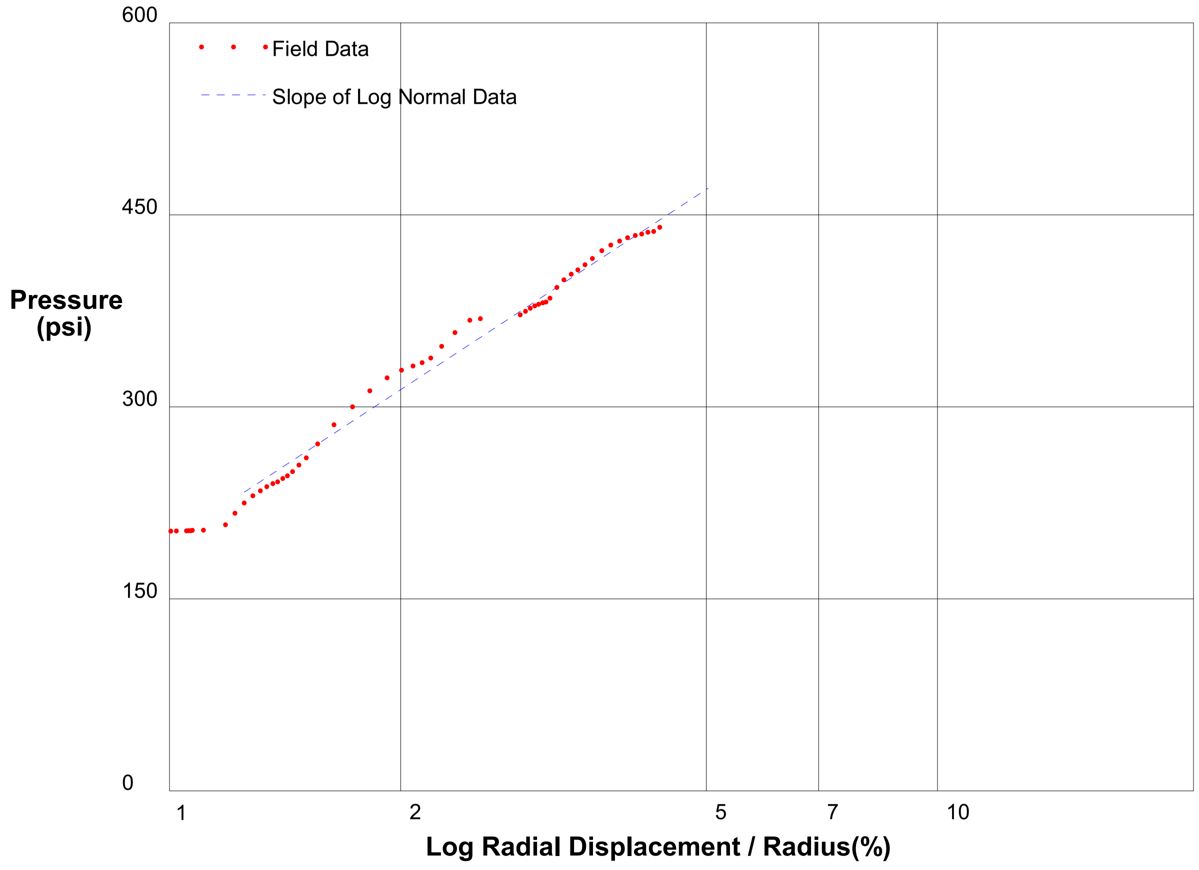
shift 8

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/26/2008**

Hole No. PM701 **Depth 39.3ft** **File C:\DATA\ISE-765\CC07.P**



Shear Strength 170.7 psi
Limit Pressure 829 psi

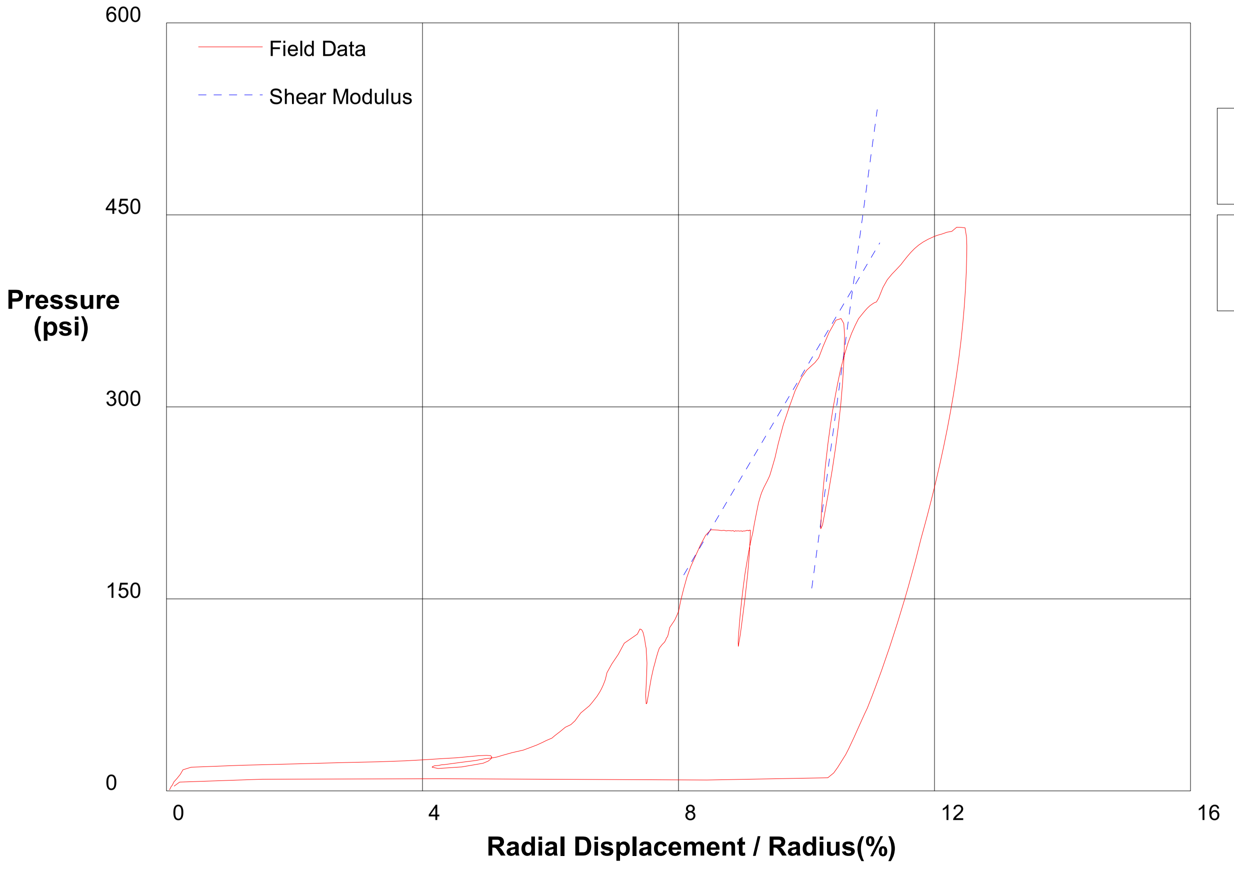
shift 8

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/26/2008**

Hole No. PM701 **Depth 39.3ft** **File C:\DATA\ISE-765\CC07.P**



Shear Modulus 4234 psi

Shear Modulus 18316 psi

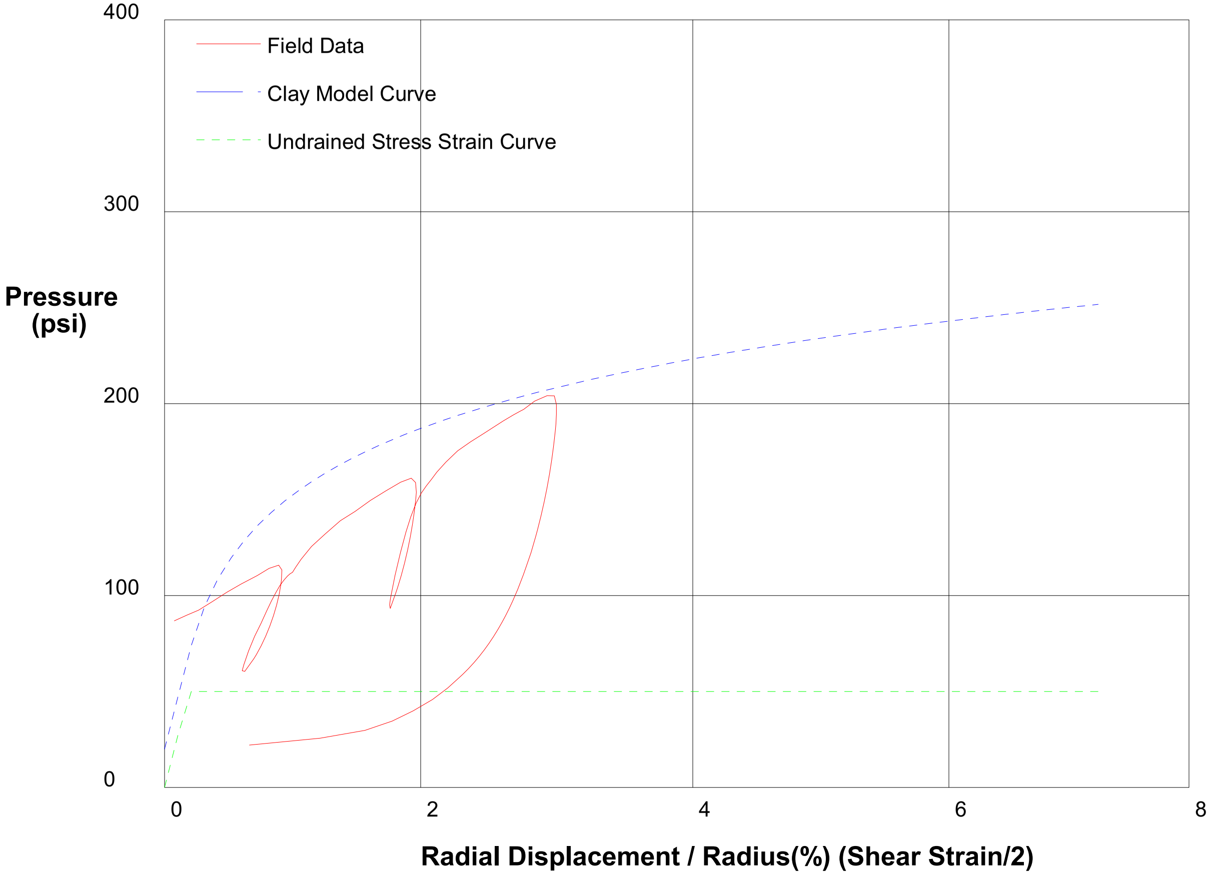
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/27/2008**

Hole No. PM701 **Depth 51ft** **File C:\DATA\ISE-765\CC08.P**



shift 8

GIBSON'S CLAY MODEL

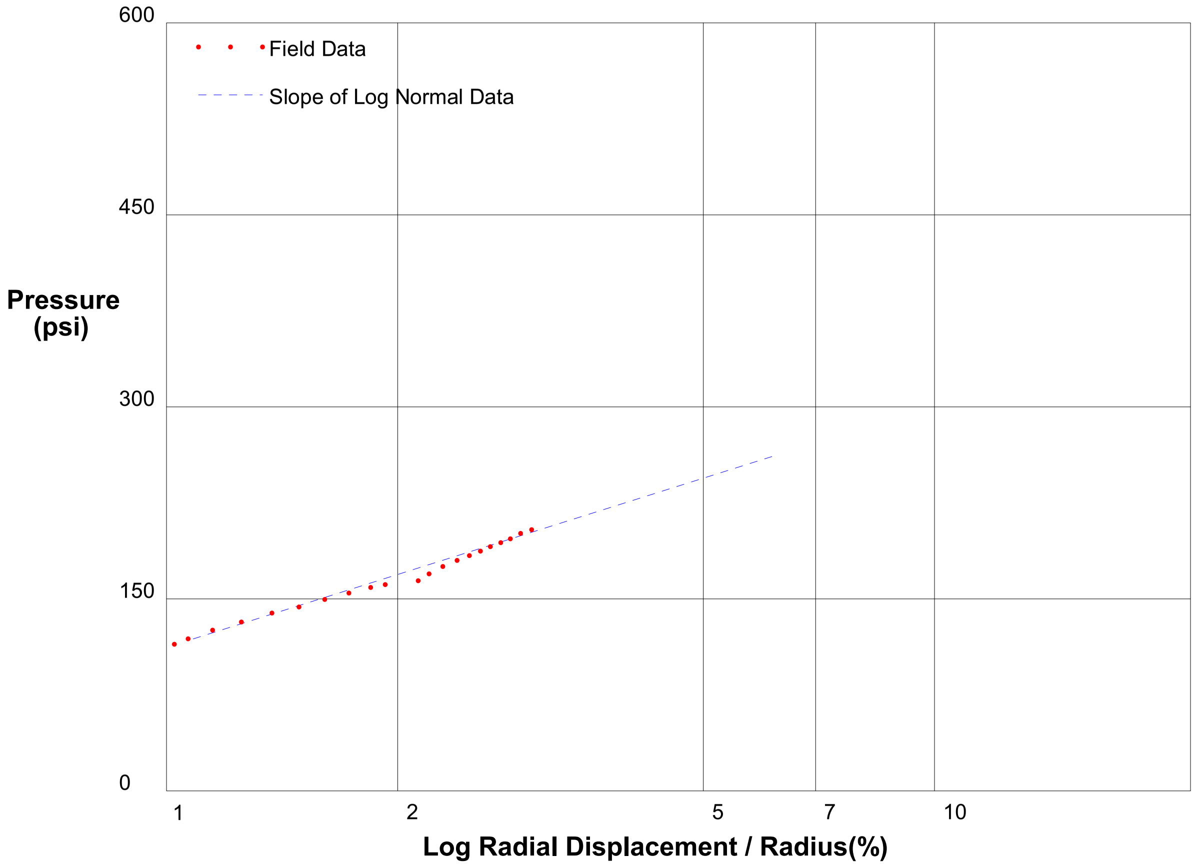
Shear Strength 50 psi
Insitu Stress 20 psi
Shear Modulus 13000 psi

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 51ft** **File C:\DATA\ISE-765\CC08.P**



Shear Strength 82 psi
Limit Pressure 417 psi

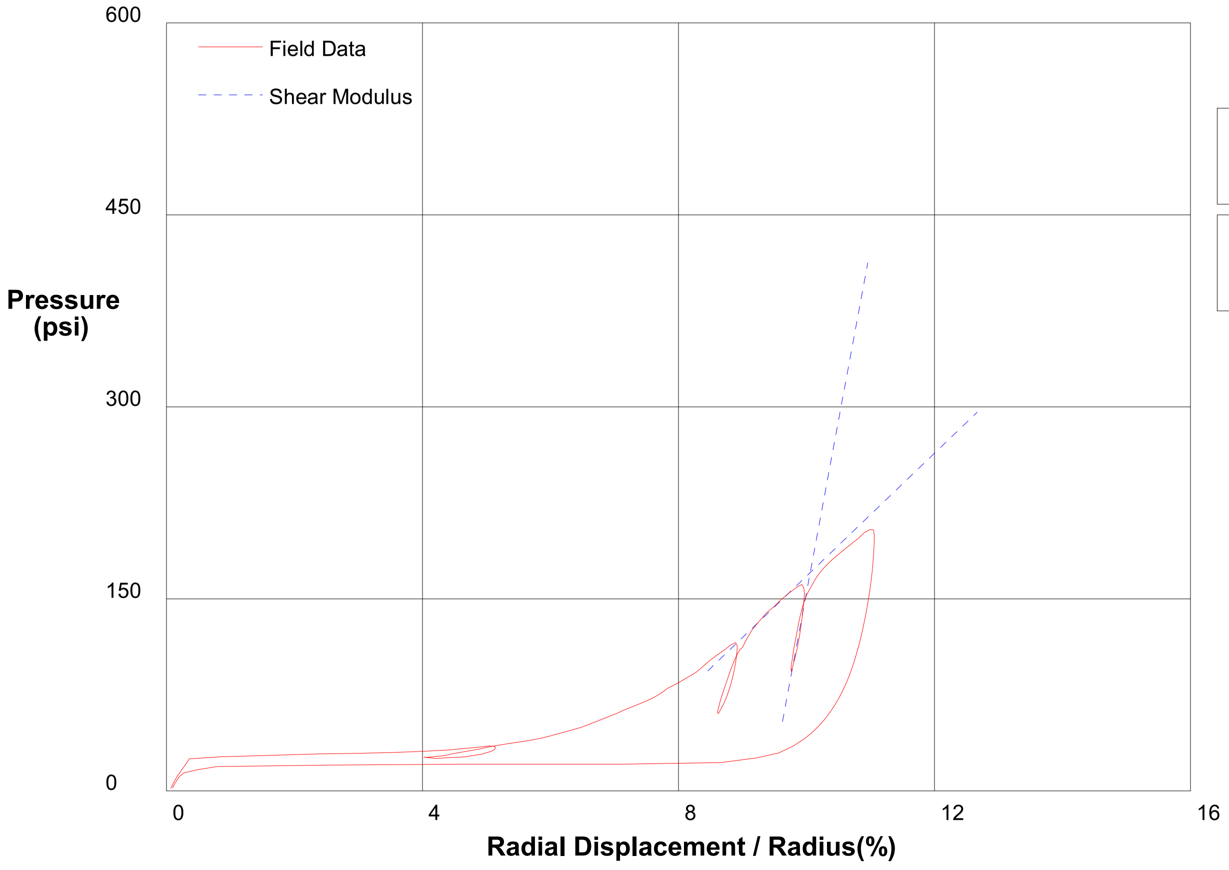
shift 8

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 51ft** **File C:\DATA\ISE-765\CC08.P**



Shear Modulus 2400 psi

Shear Modulus 13437 psi

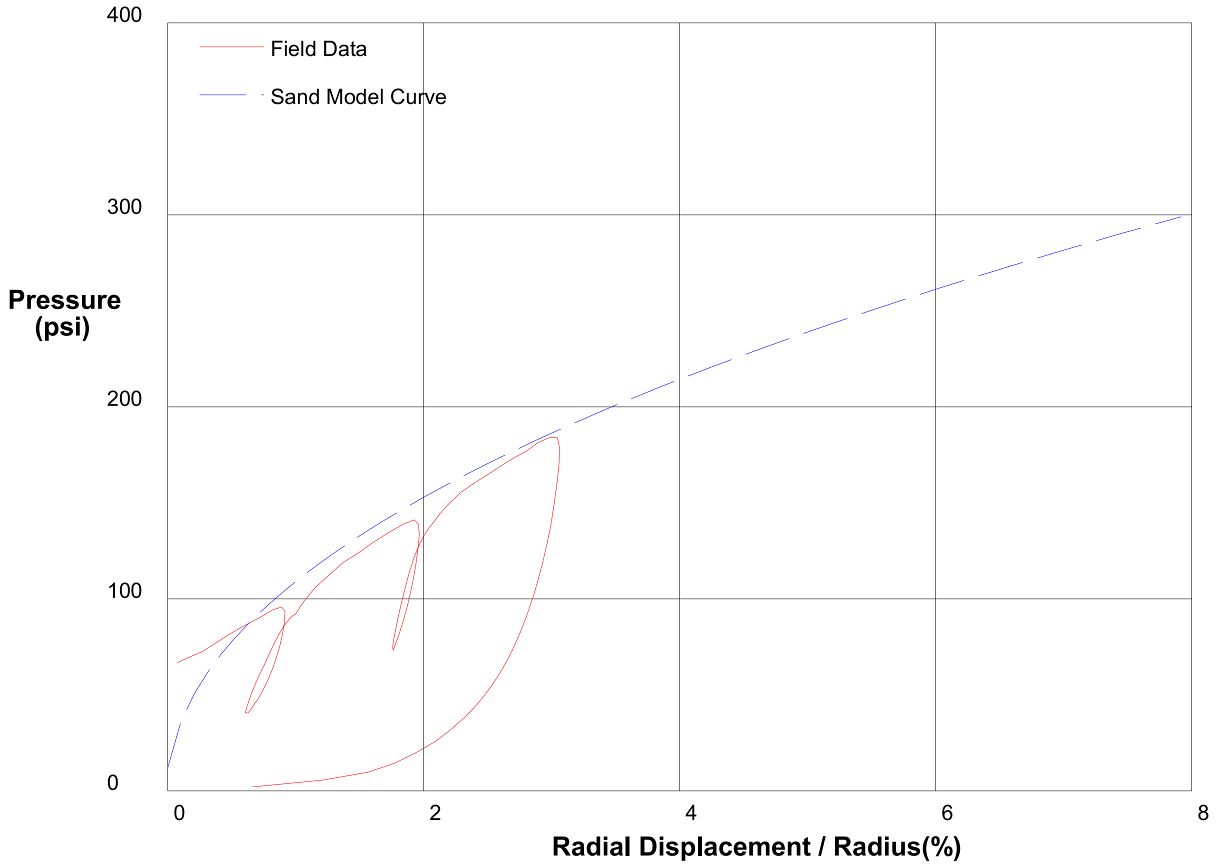
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/27/2008**

Hole No. PM701 **Depth 51ft** **File C:\DATA\ISE-765\CC08.P**



THE In Situ Engineering SAND MODEL

Water Pressure	**20 psi**
Friction Angle	**42 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**12 psi**
Shear Modulus	**13000 psi**

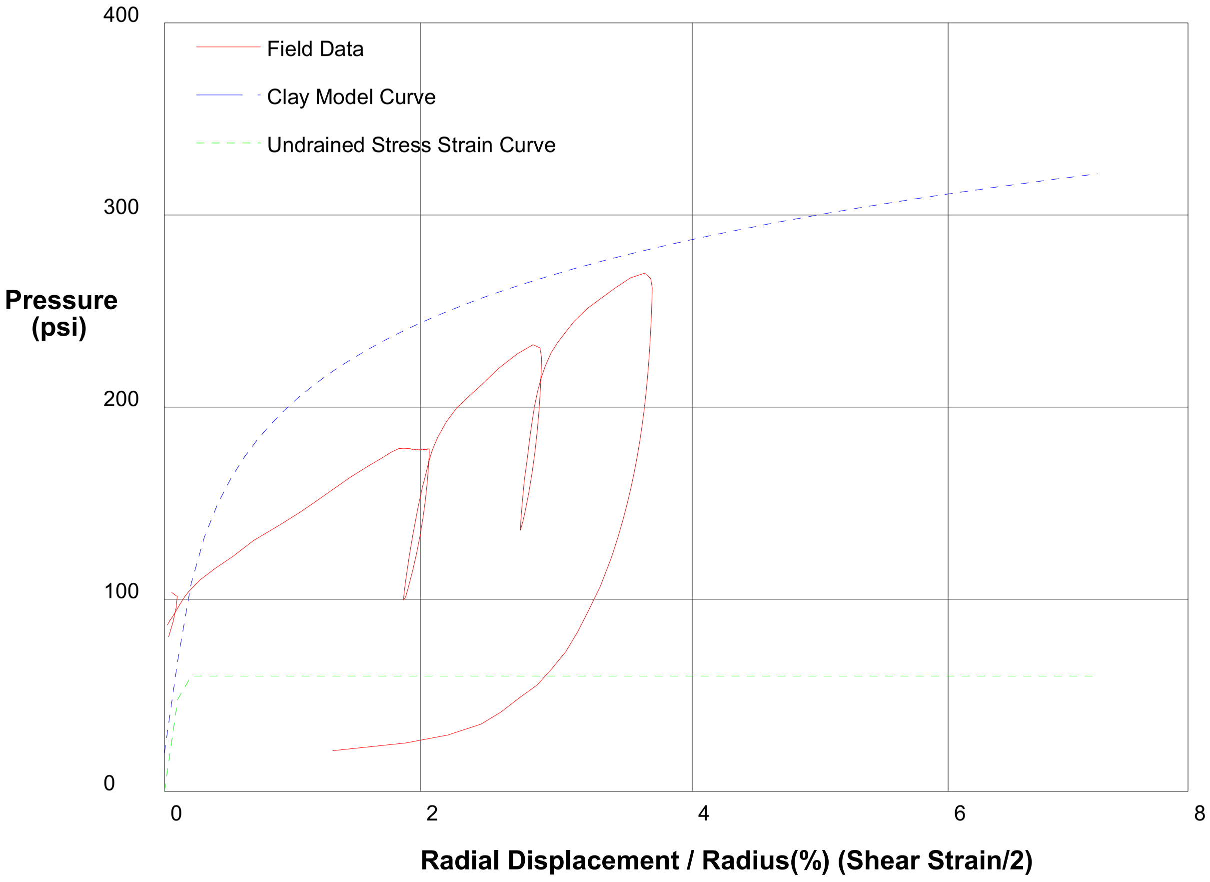
shift 8

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/27/2008**

Hole No. PM701 **Depth 49.5ft** **File C:\DATA\ISE-765\CC09.P**



GIBSON'S CLAY MODEL

Shear Strength 60 psi
Insitu Stress 20 psi
Shear Modulus 23000 psi

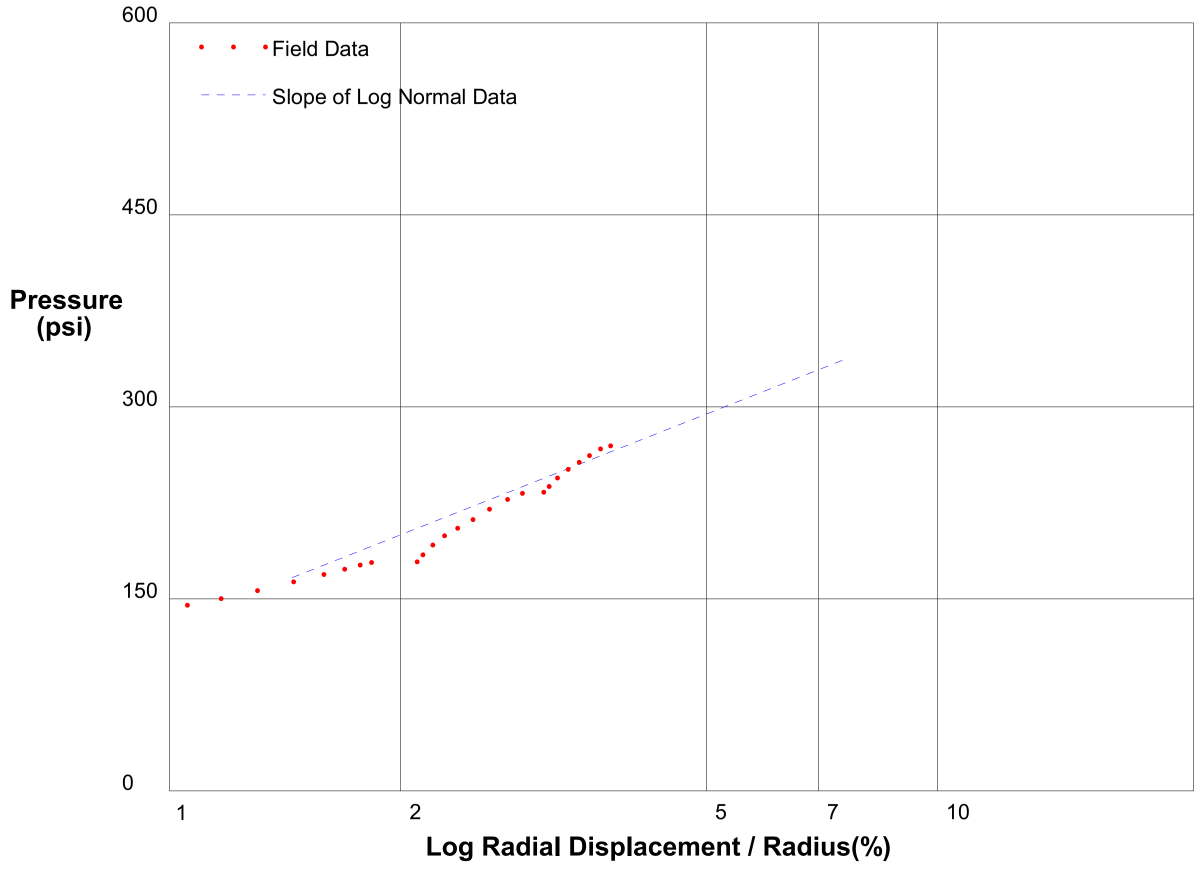
shift 9

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 49.5ft** **File C:\DATA\ISE-765\CC09.P**



Shear Strength 102.8 psi
Limit Pressure 510 psi

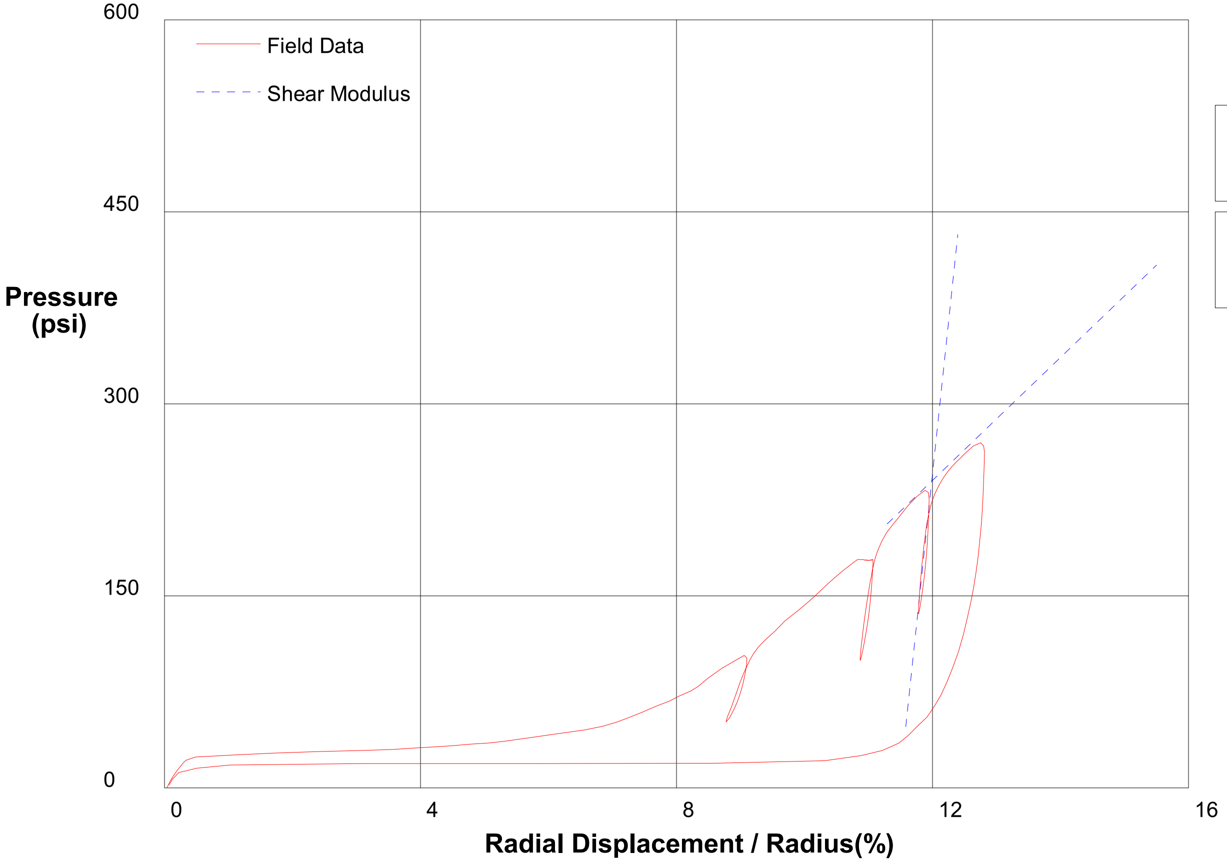
shift 9

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 49.5ft** **File C:\DATA\ISE-765\CC09.P**



Shear Modulus 2400 psi

Shear Modulus 23653 psi

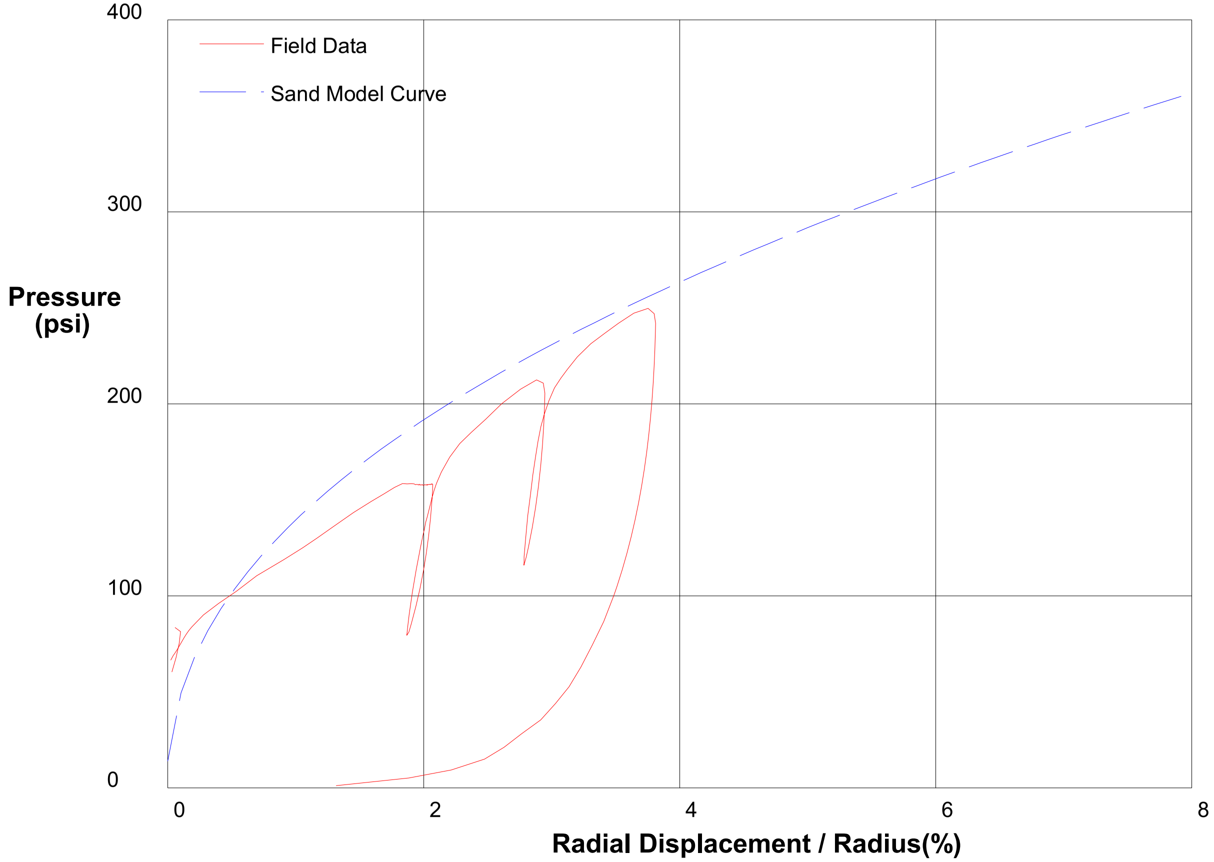
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/27/2008**

Hole No. PM701 **Depth 49.5ft** **File C:\DATA\ISE-765\CC09.P**



THE In Situ Engineering SAND MODEL

Water Pressure	**20 psi**
Friction Angle	**40 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**14 psi**
Shear Modulus	**23000 psi**

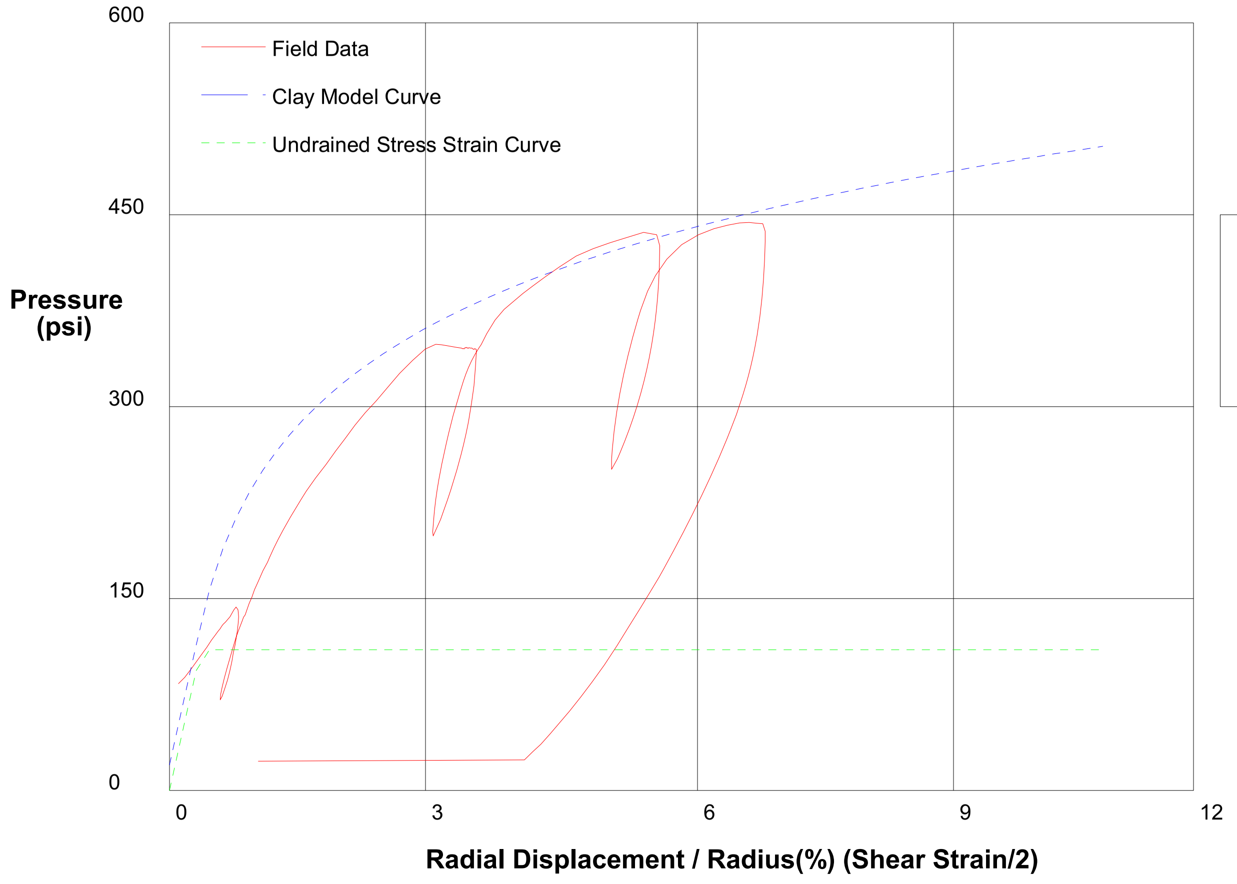
shift 9

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/27/2008**

Hole No. PM701 **Depth 60.5ft** **File C:\DATA\ISE-765\CC10.P**



shift 5

GIBSON'S CLAY MODEL

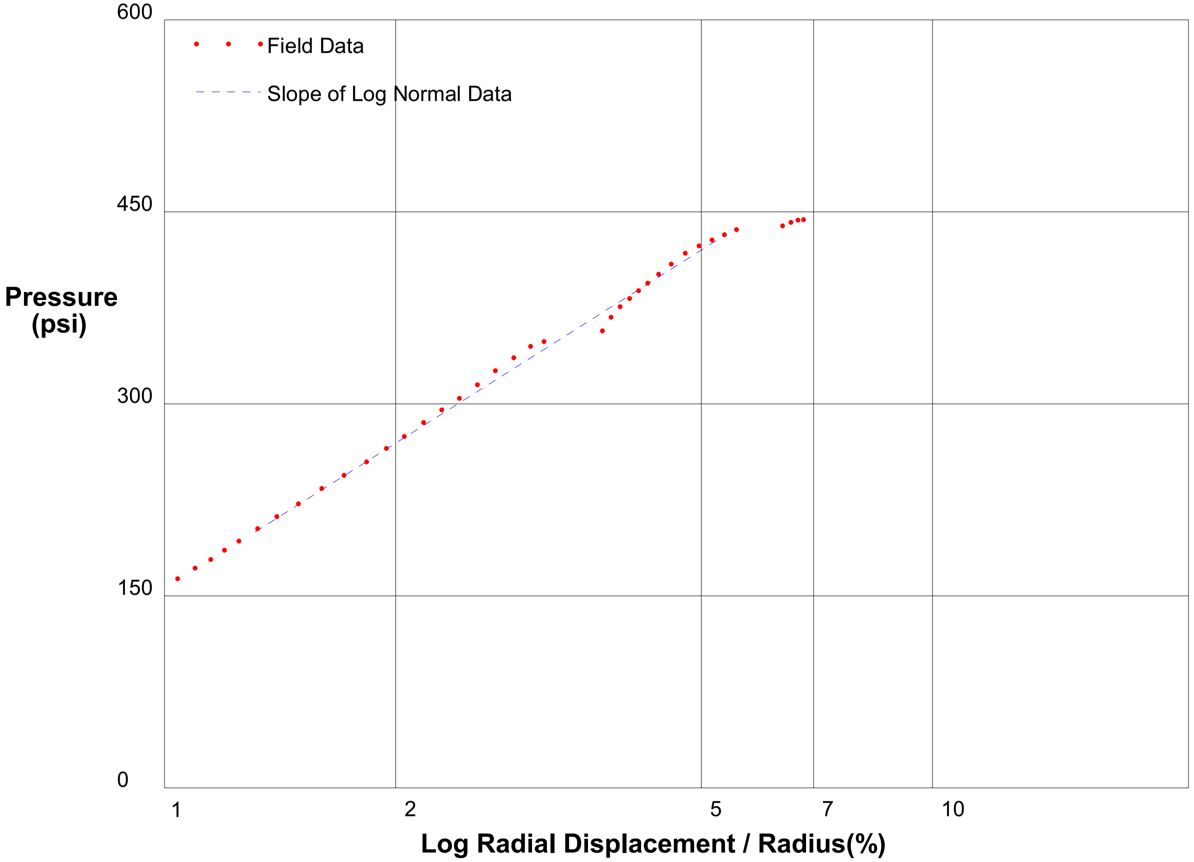
Shear Strength 110 psi
Insitu Stress 20 psi
Shear Modulus 15000 psi

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 60.5ft** **File C:\DATA\ISE-765\CC10.P**



Shear Strength 164.6 psi
Limit Pressure 766 psi

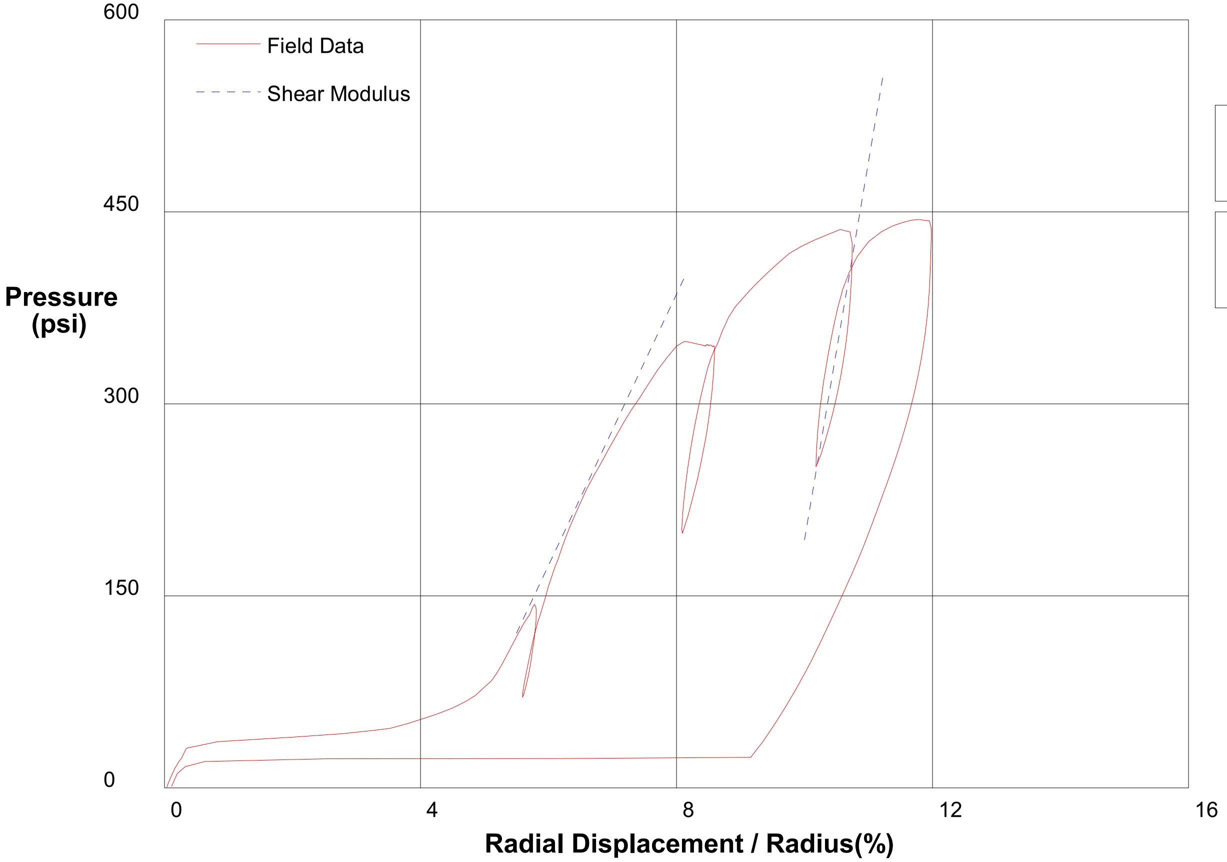
shift 5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 60.5ft** **File C:\DATA\ISE-765\CC10.P**



Shear Modulus 5295 psi

Shear Modulus 14788 psi

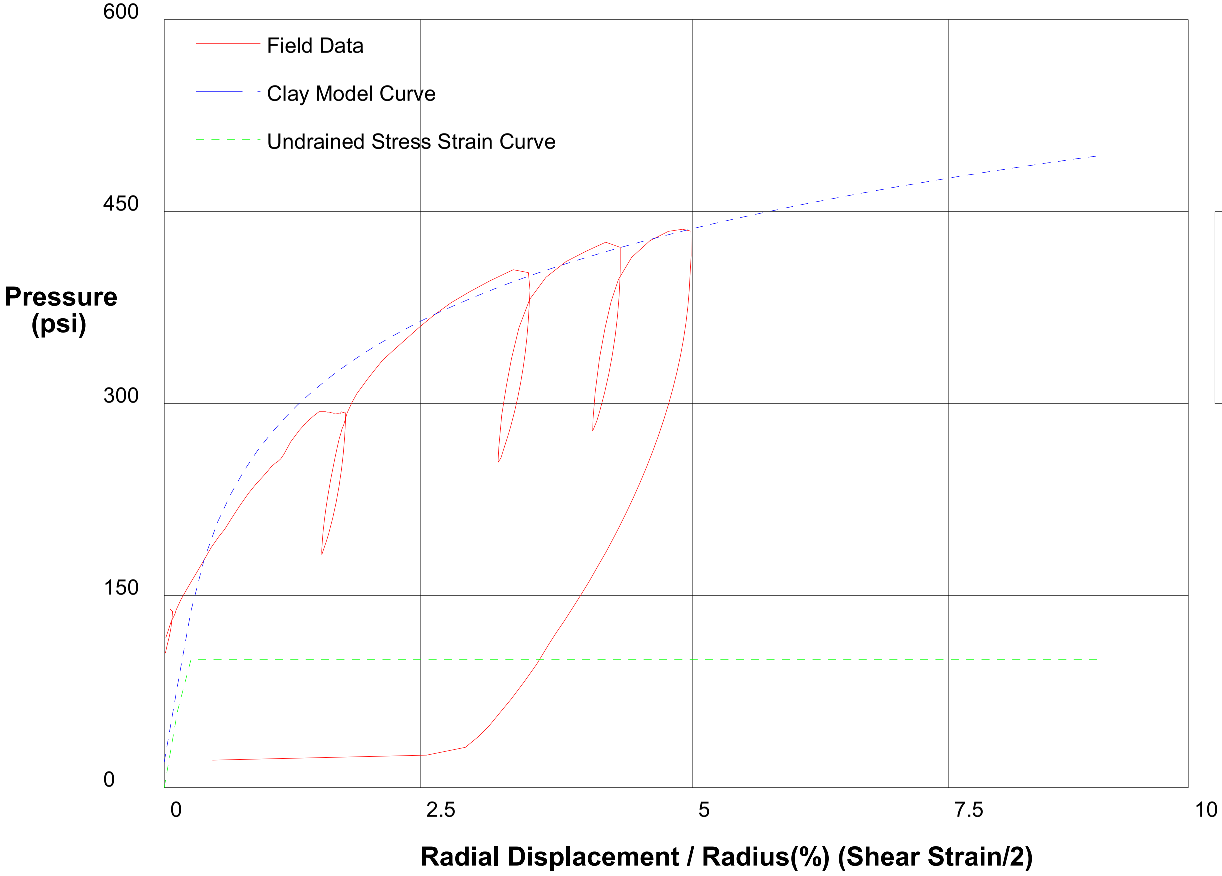
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/27/2008**

Hole No. PM701 **Depth 59ft** **File C:\DATA\ISE-765\CC11.P**



GIBSON'S CLAY MODEL

Shear Strength 100 psi
Insitu Stress 20 psi
Shear Modulus 23000 psi

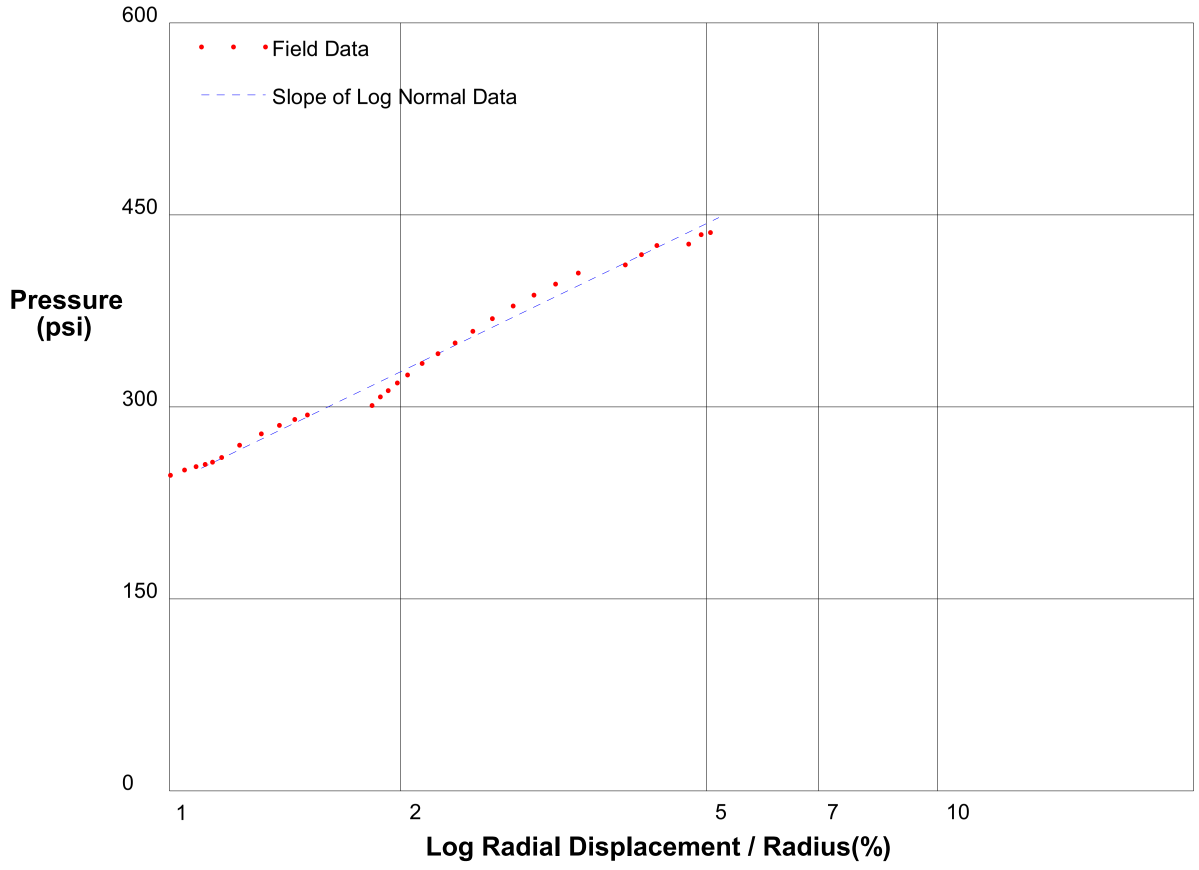
shift 8

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 59ft** **File C:\DATA\ISE-765\CC11.P**



Shear Strength 126.2 psi
Limit Pressure 708 psi

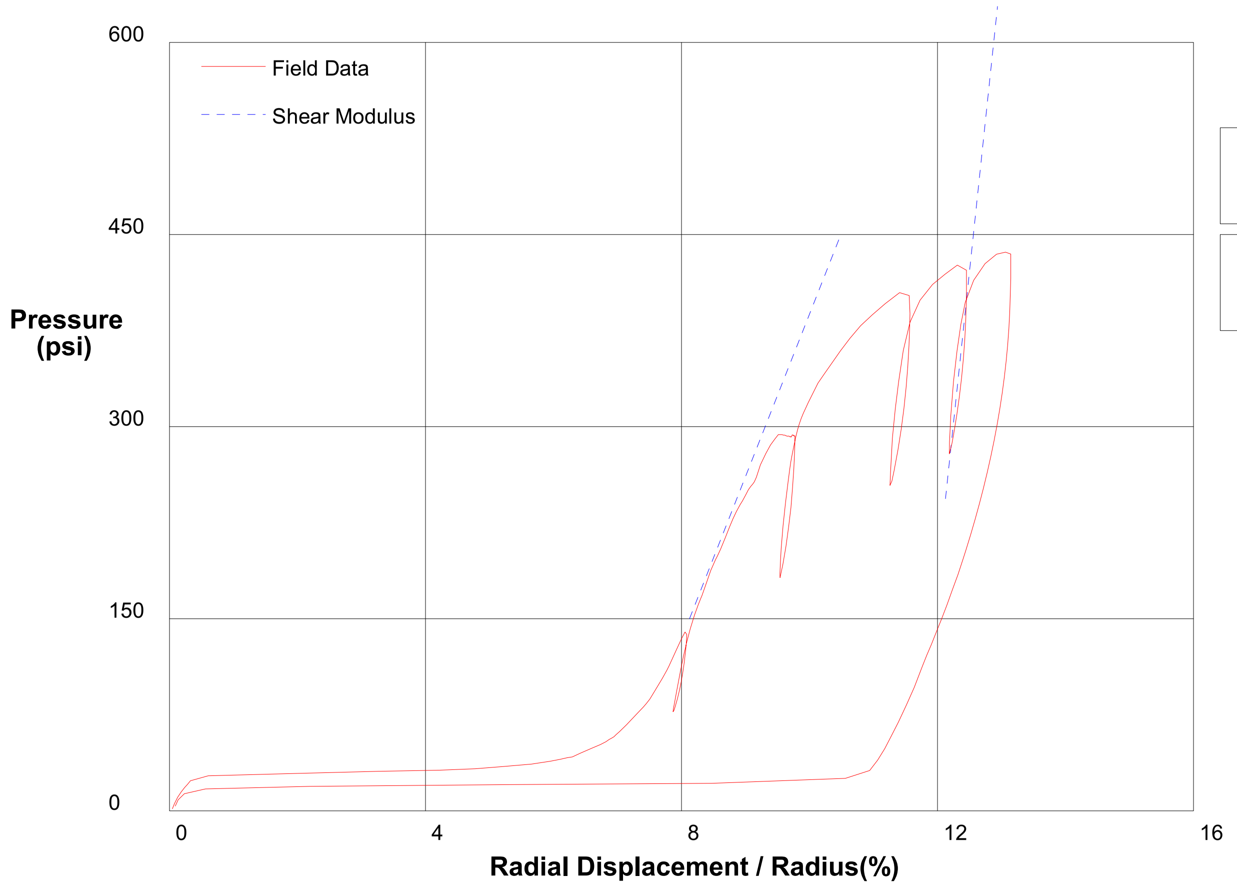
shift 8

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 59ft** **File C:\DATA\ISE-765\CC11.P**



Shear Modulus 6339 psi

Shear Modulus 23653 psi

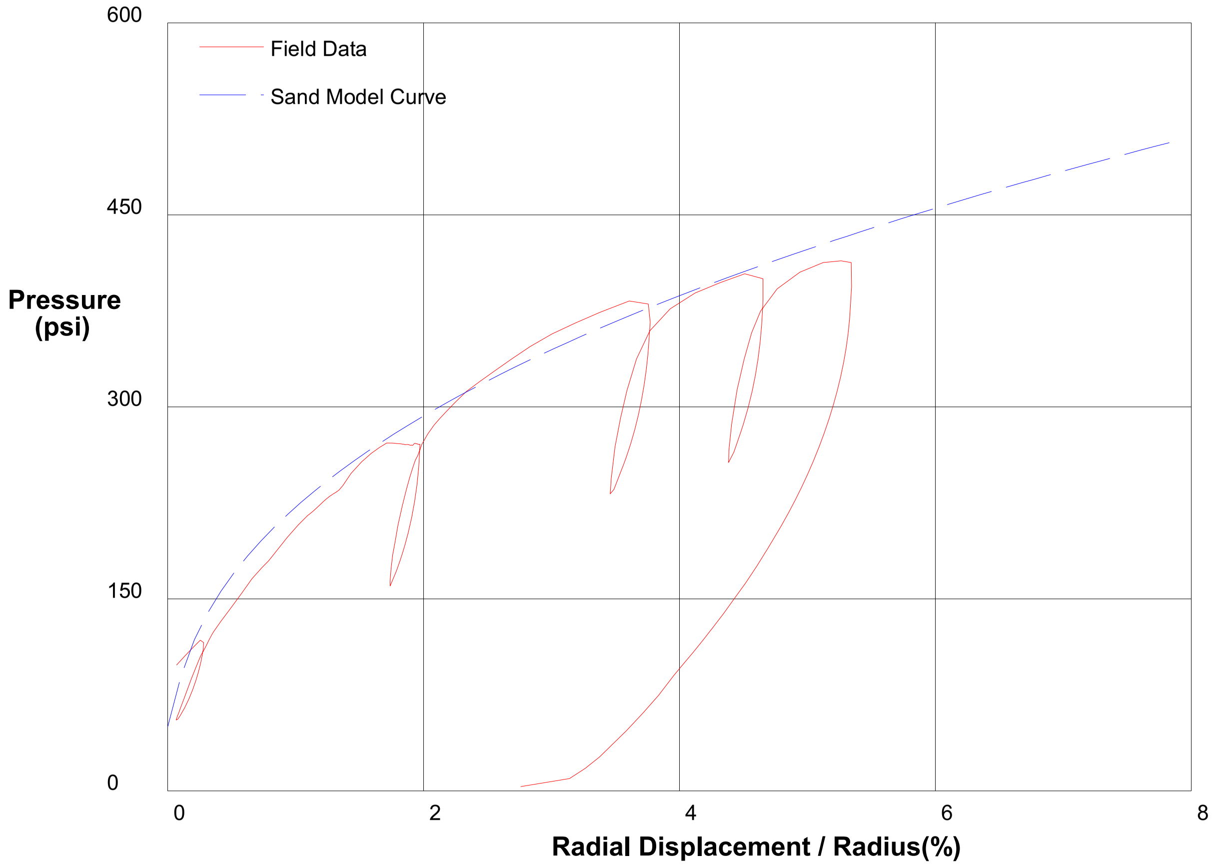
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC**

Calvert Cliffs Nuclear Power Plant, 2008 Sunsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 59ft** **File C:\DATA\ISE-765\CC11.P**



THE In Situ Engineering SAND MODEL

Water Pressure	**22 psi**
Friction Angle	**36 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**50 psi**
Shear Modulus	**19000 psi**

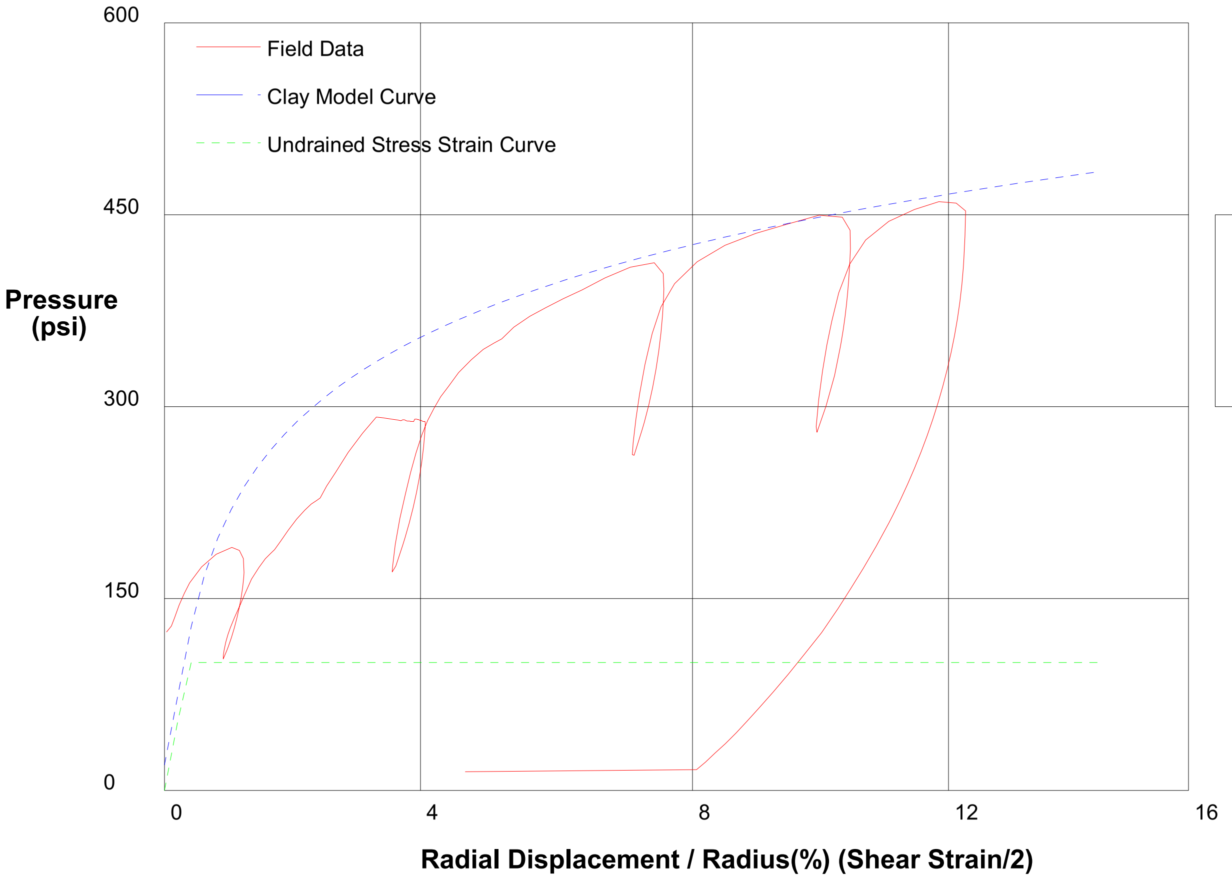
shift 7.8

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/27/2008**

Hole No. PM701 **Depth 70.5ft** **File C:\DATA\ISE-765\CC12.P**



GIBSON'S CLAY MODEL

Shear Strength 100 psi
Insitu Stress 20 psi
Shear Modulus 13000 psi

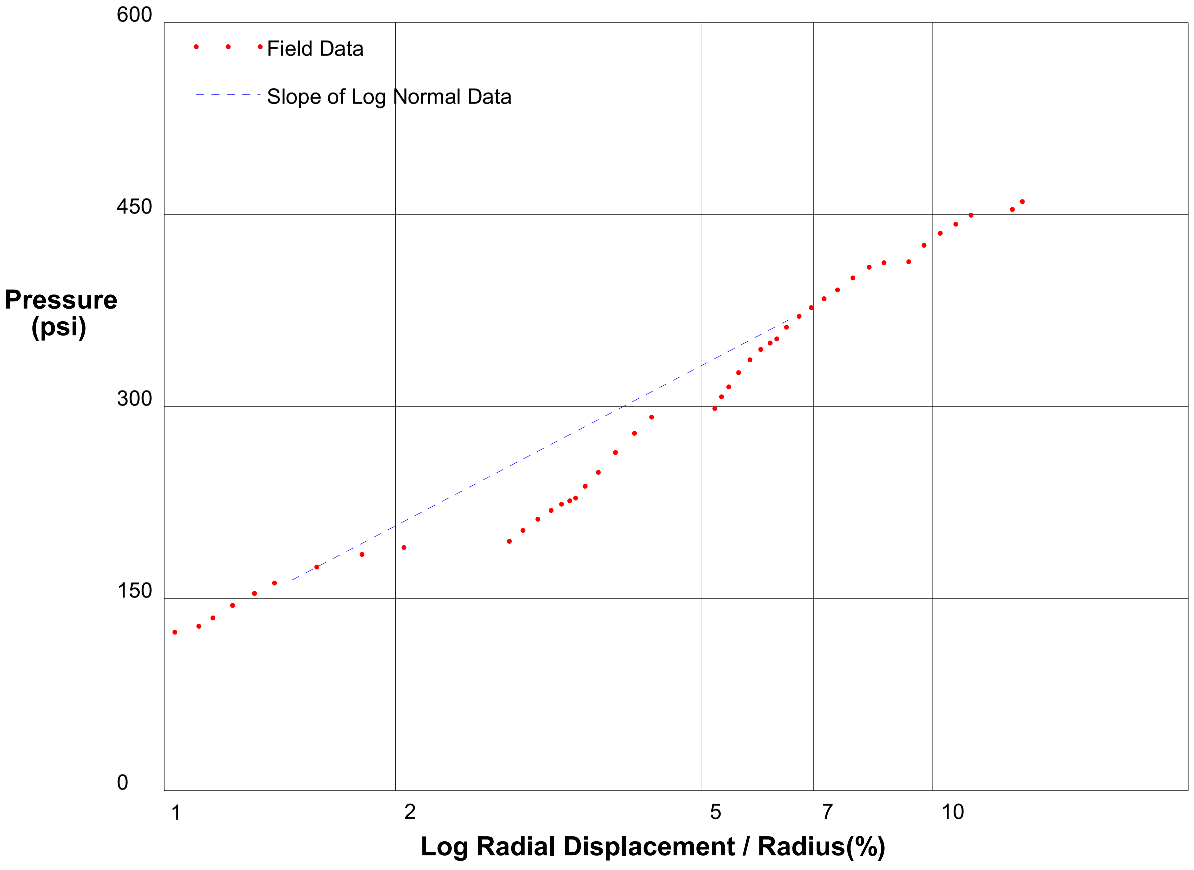
shift 1

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 70.5ft** **File C:\DATA\ISE-765\CC12.P**



Shear Strength 136.4 psi
Limit Pressure 619 psi

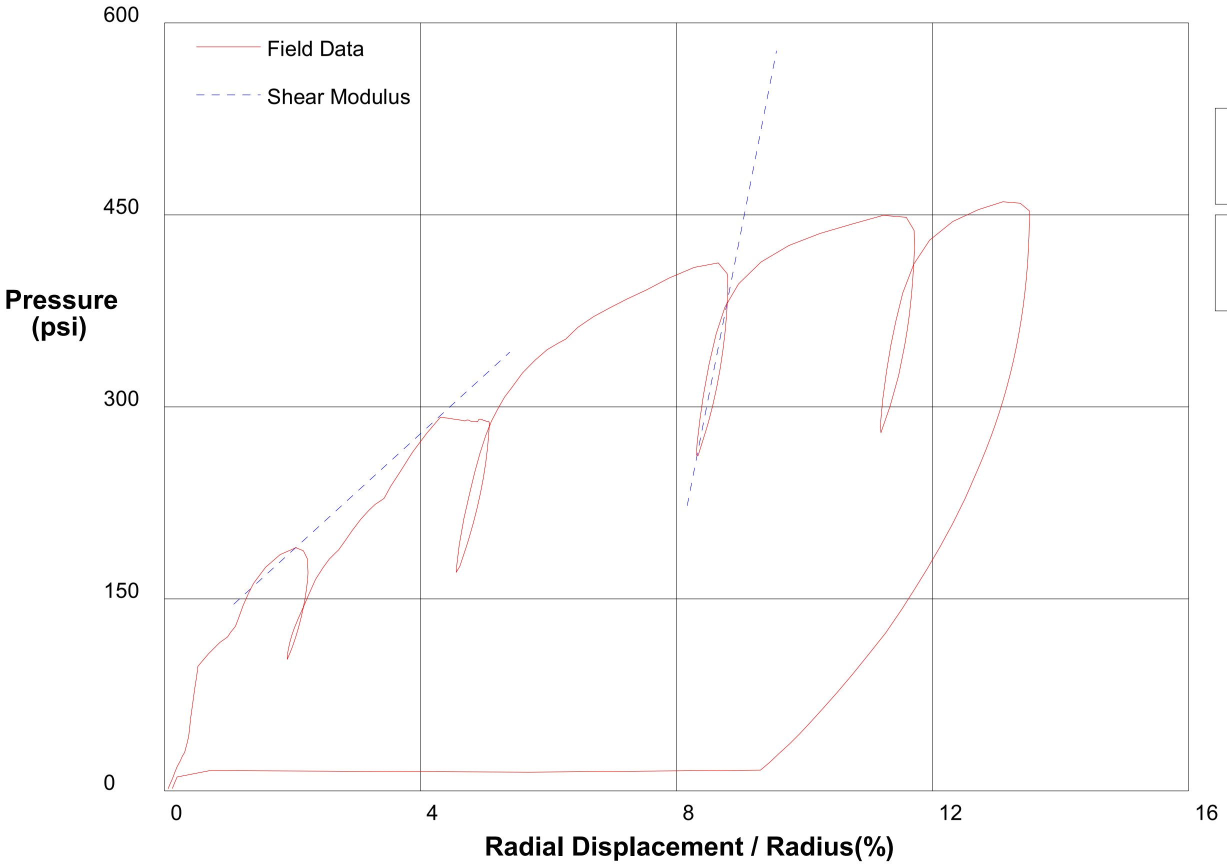
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 70.5ft** **File C:\DATA\ISE-765\CC12.P**



Shear Modulus 2282 psi

Shear Modulus 12723 psi

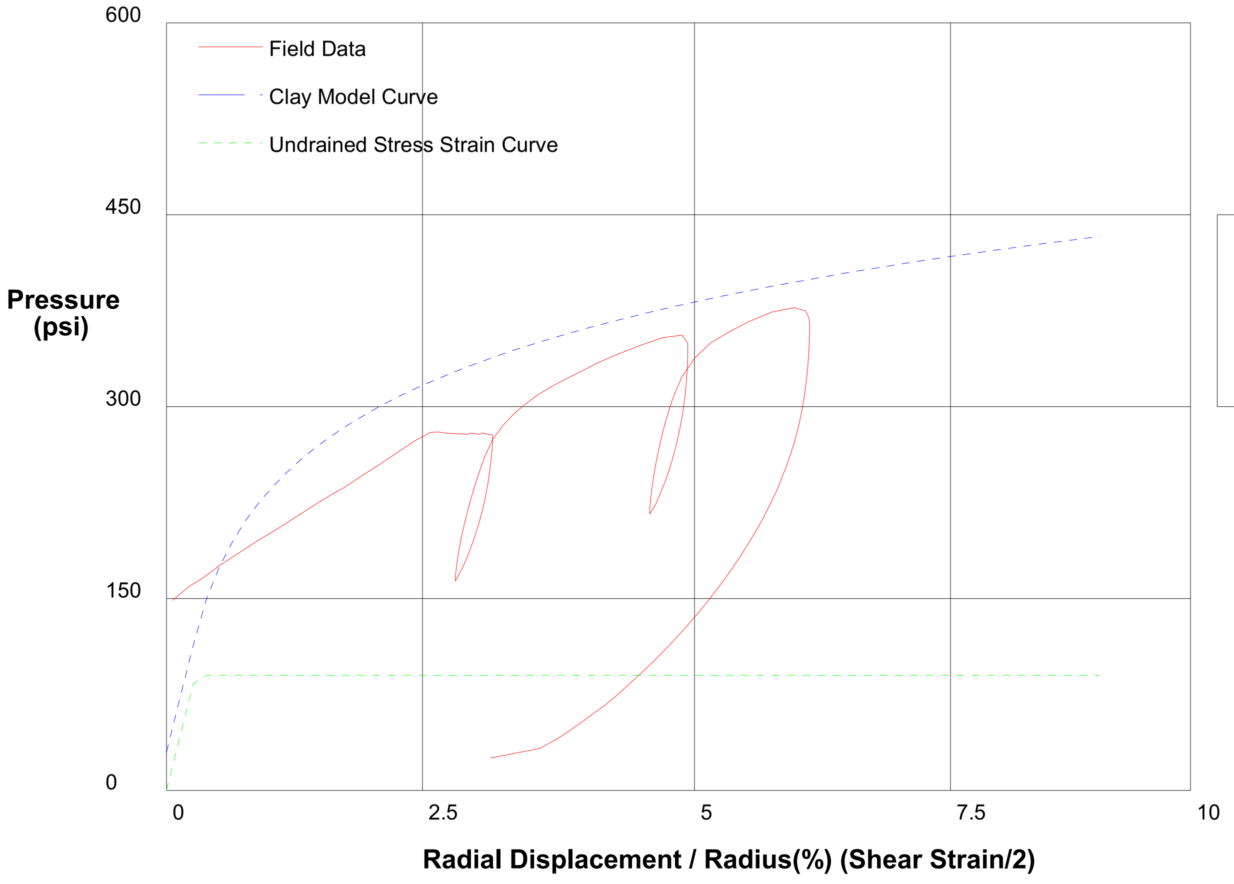
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/27/2008**

Hole No. PM701 **Depth 69ft** **File C:\DATA\ISE-765\CC13.P**



GIBSON'S CLAY MODEL

Shear Strength 90 psi
Insitu Stress 30 psi
Shear Modulus 16000 psi

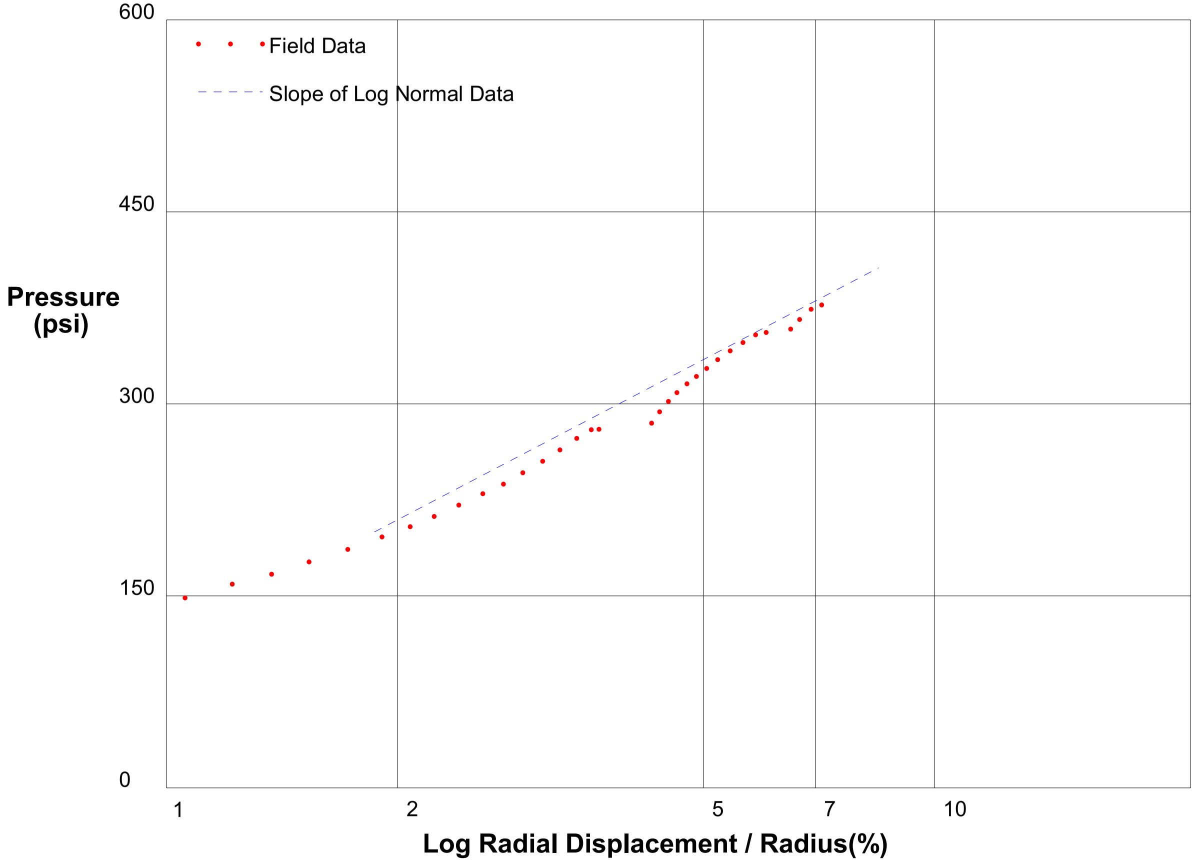
shift 7

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 69ft** **File C:\DATA\ISE-765\CC13.P**



Shear Strength 136.4 psi
Limit Pressure 621 psi

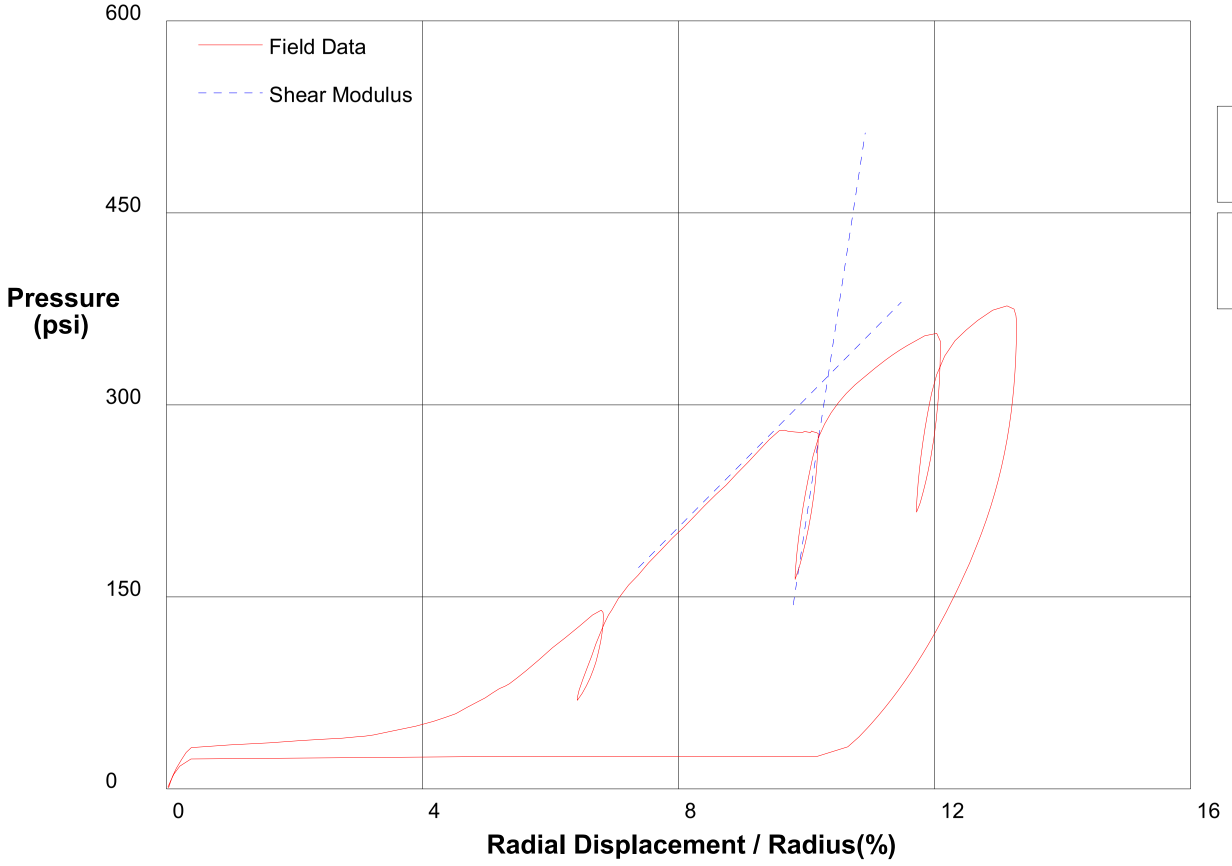
shift 6

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 69ft** **File C:\DATA\ISE-765\CC13.P**



Shear Modulus 2525 psi

Shear Modulus 16388 psi

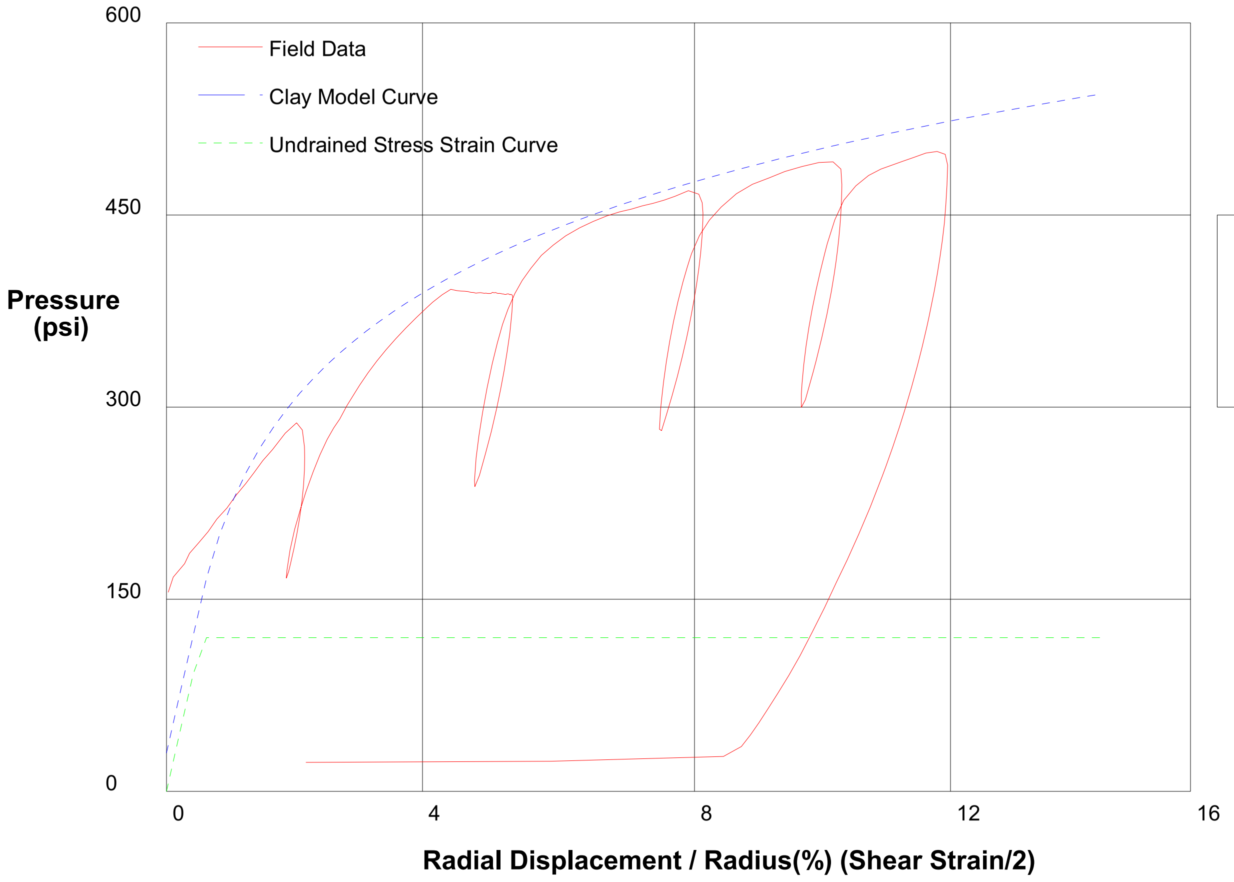
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/27/2008**

Hole No. PM701 **Depth 80.7ftft** **File C:\DATA\ISE-765\CC14.P**



shift .5

GIBSON'S CLAY MODEL

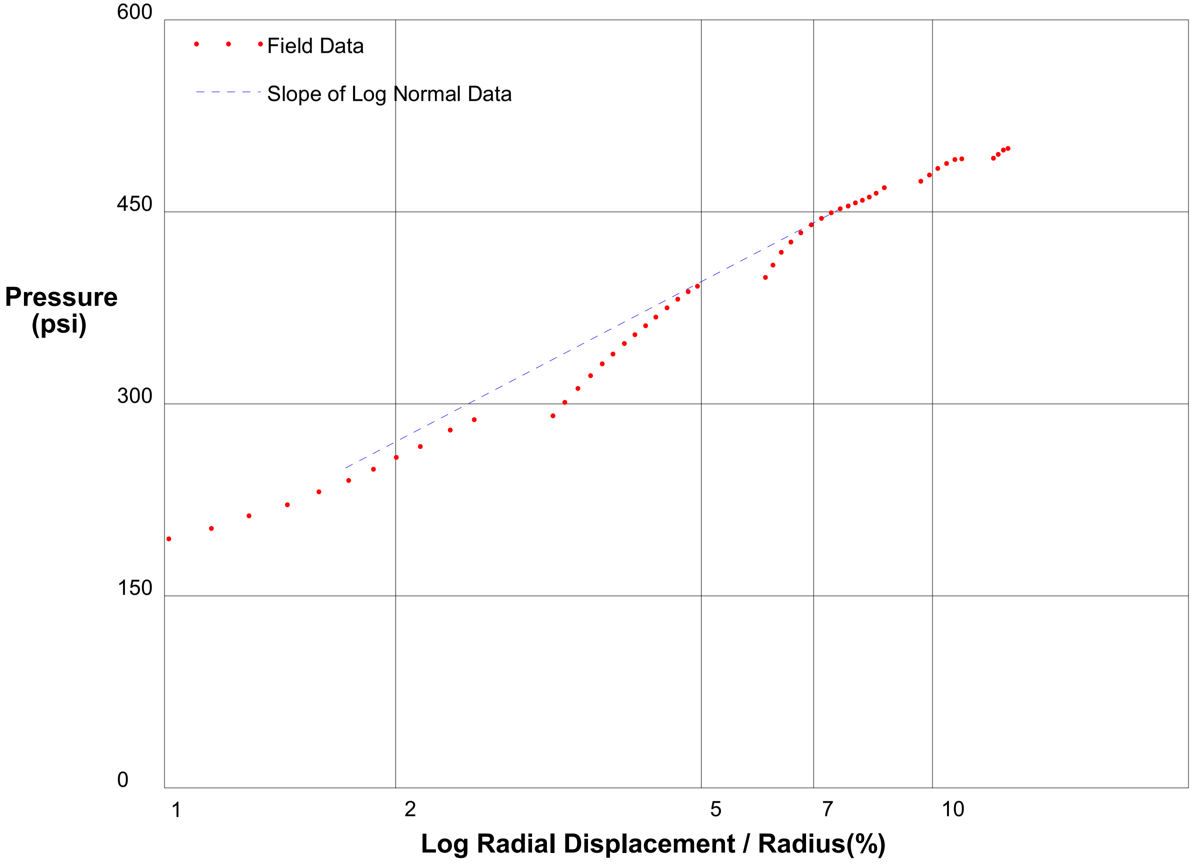
Shear Strength **120 psi**
Insitu Stress **30 psi**
Shear Modulus **11000 psi**

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 80.7ftft** **File C:\DATA\ISE-765\CC14.P**



Shear Strength 136.4 psi
Limit Pressure 682 psi

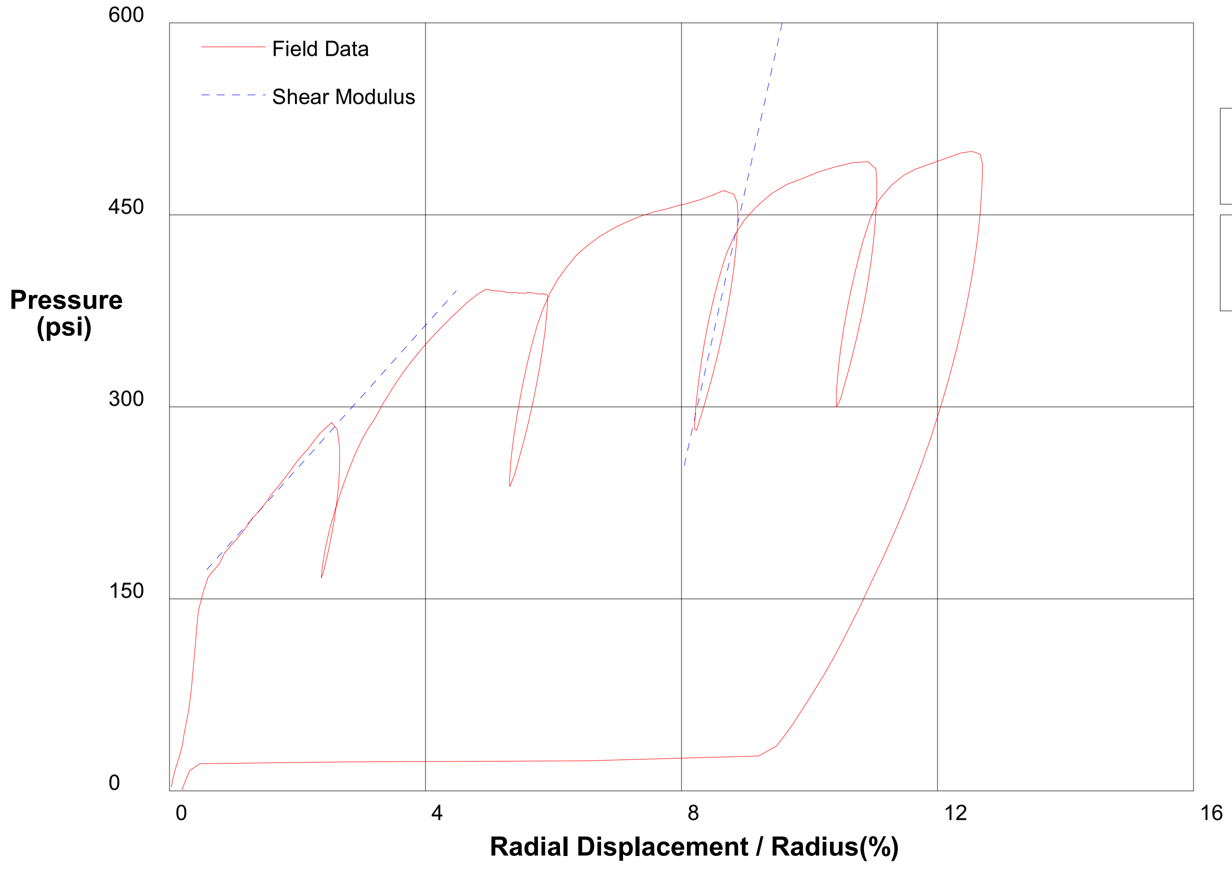
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 80.7ftft** **File C:\DATA\ISE-765\CC14.P**



Shear Modulus 2794 psi

Shear Modulus 11283 psi

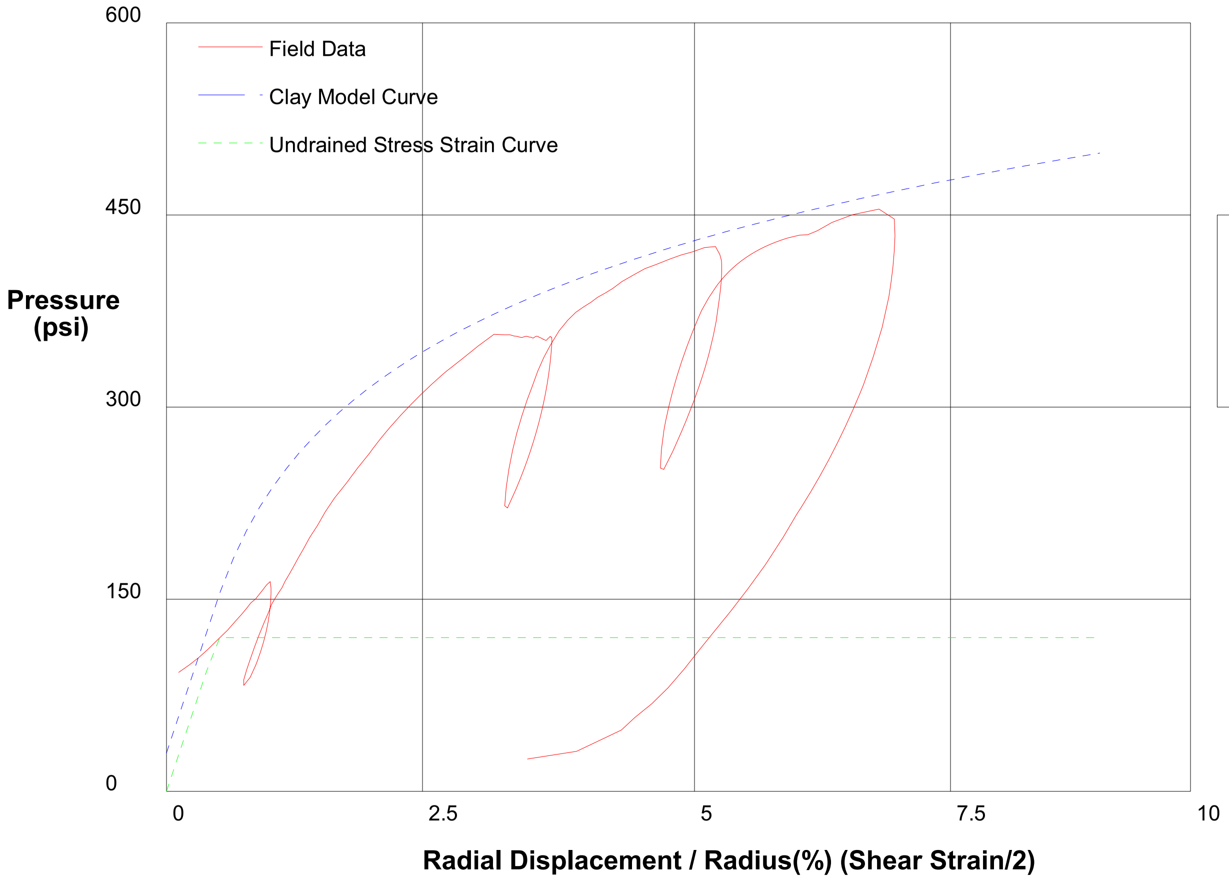
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/27/2008**

Hole No. PM701 **Depth 79.2ft** **File C:\DATA\ISE-765\CC15.P**



GIBSON'S CLAY MODEL

Shear Strength **120 psi**
Insitu Stress **30 psi**
Shear Modulus **12000 psi**

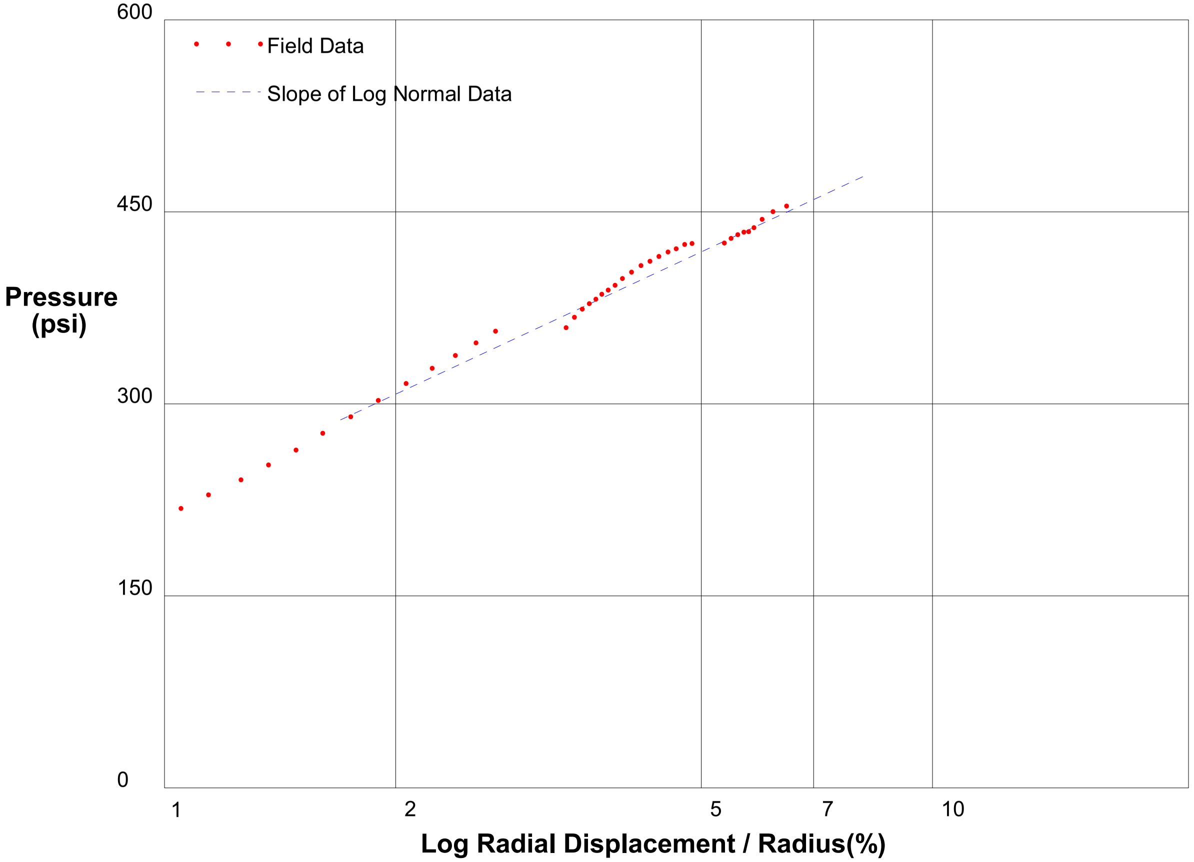
shift 5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 79.2ft** **File C:\DATA\ISE-765\CC15.P**



Shear Strength 121.3 psi
Limit Pressure 674 psi

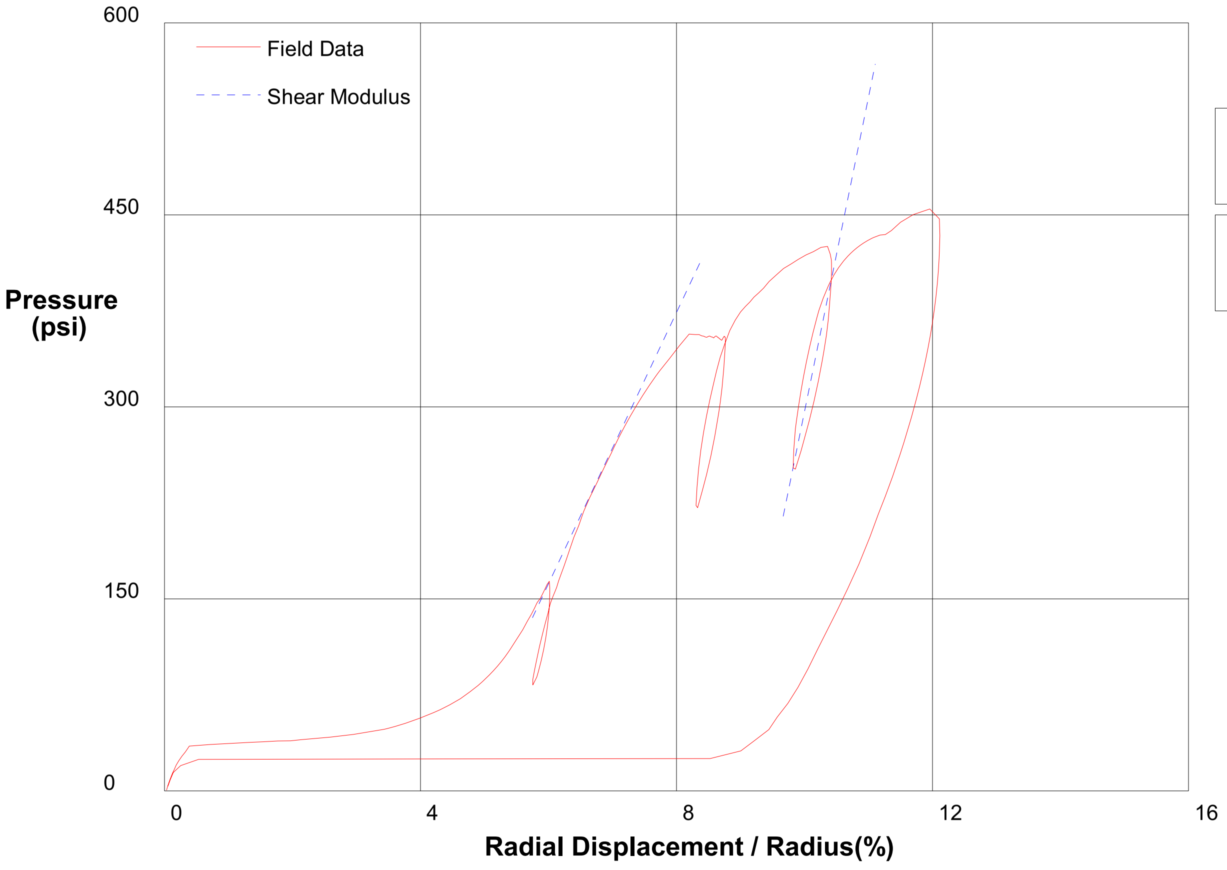
shift 5.5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 79.2ft** **File C:\DATA\ISE-765\CC15.P**



Shear Modulus 5295 psi

Shear Modulus 12282 psi

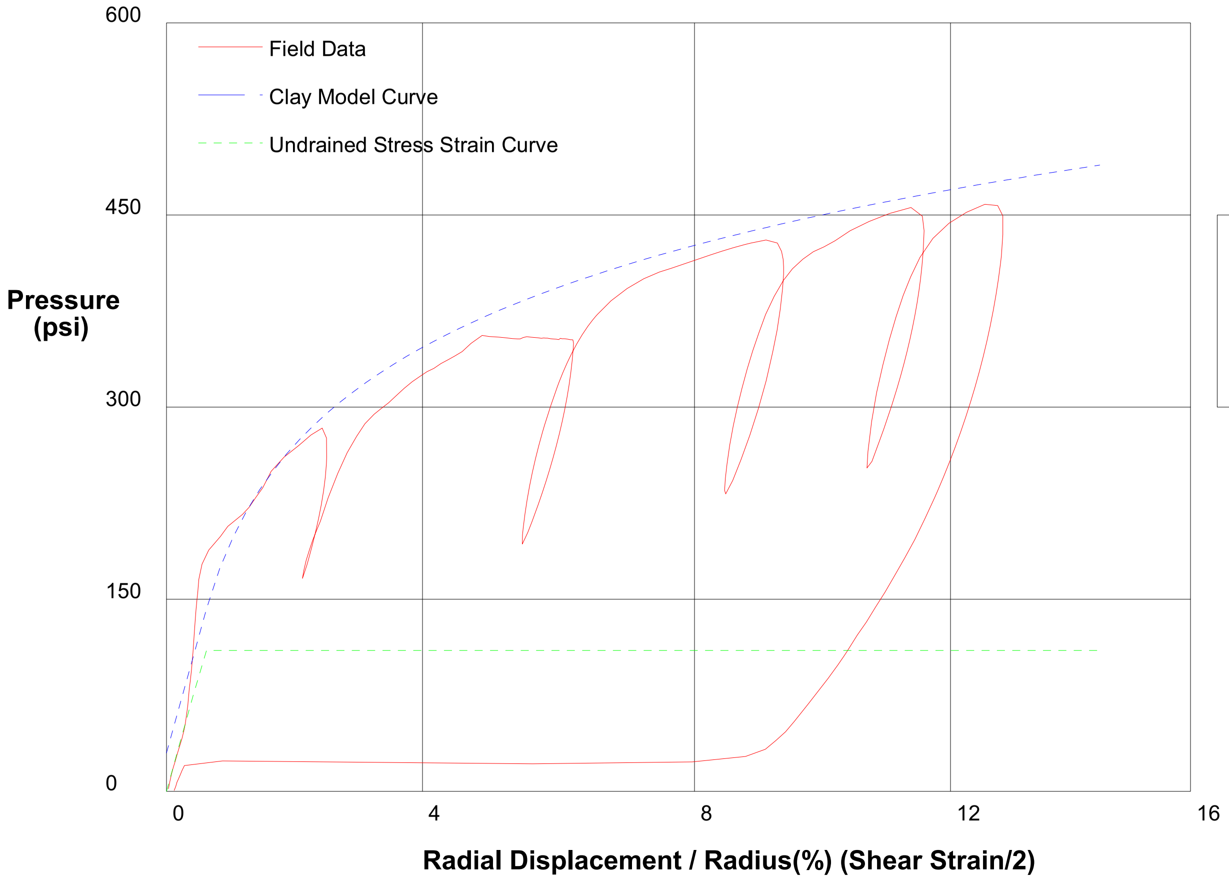
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/27/2008**

Hole No. PM701 **Depth 90.6ft** **File C:\DATA\ISE-765\CC16.P**



shift 0

GIBSON'S CLAY MODEL

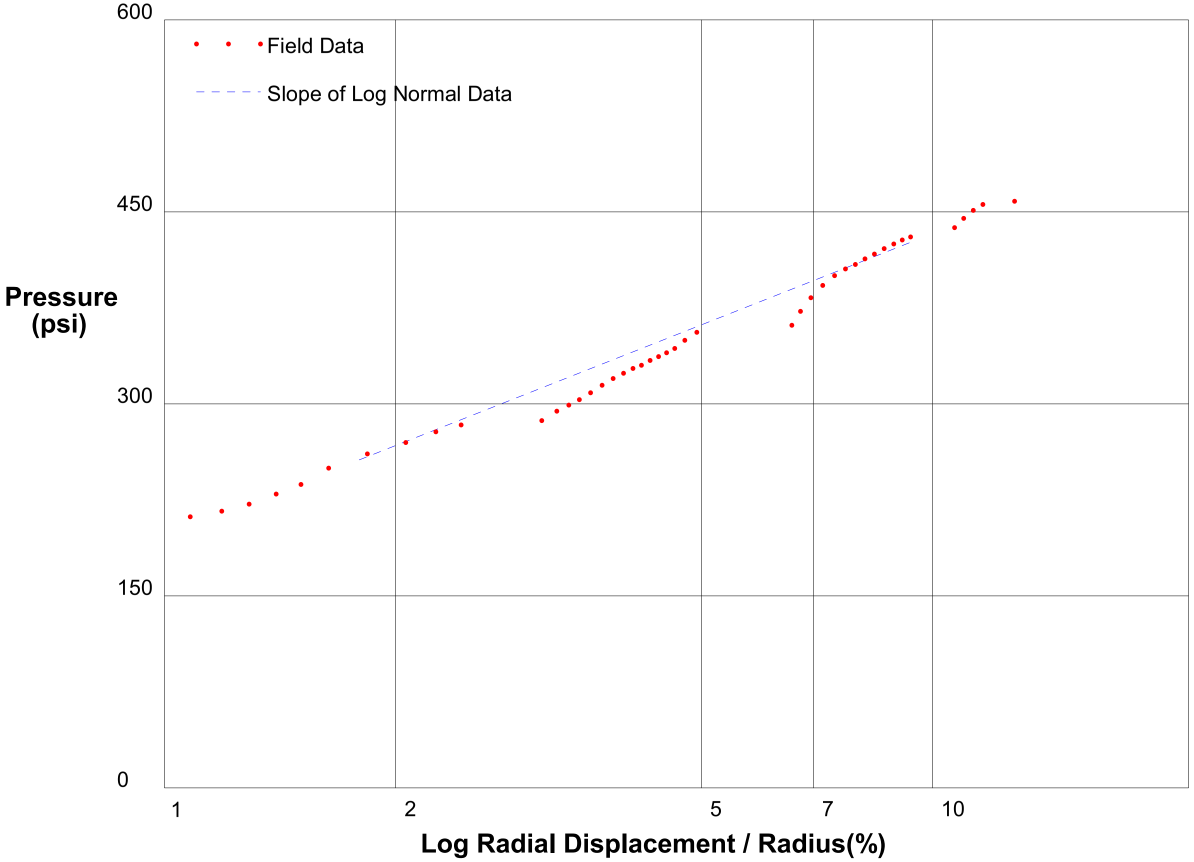
Shear Strength 110 psi
Insitu Stress 30 psi
Shear Modulus 9000 psi

In Situ Engineering

PRESSUREMETER DATA Schnabel Engineering LLC.

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 90.6ft** **File C:\DATA\ISE-765\CC16.P**



Shear Strength 102.8 psi
Limit Pressure 578 psi

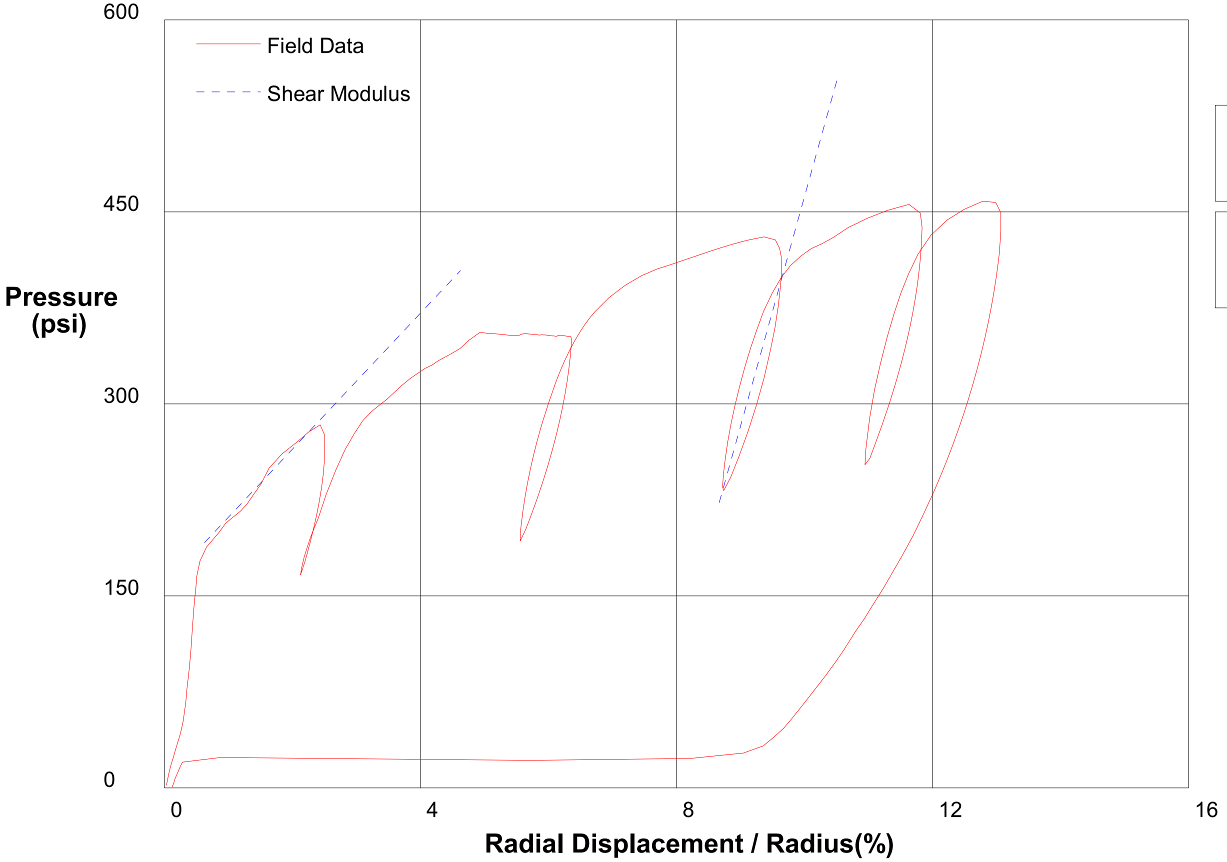
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 90.6ft** **File C:\DATA\ISE-765\CC16.P**



Shear Modulus 2656 psi

Shear Modulus 8960 psi

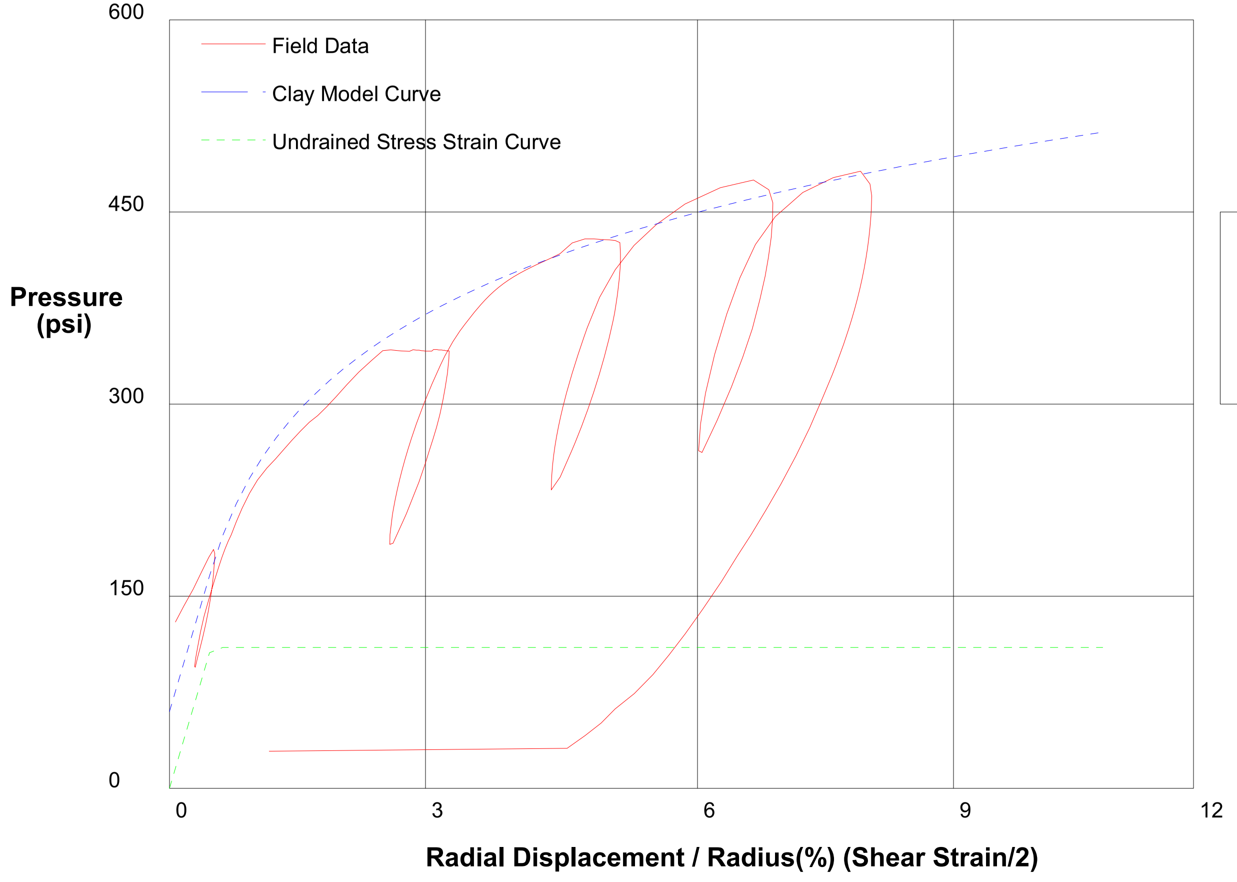
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/27/2008**

Hole No. PM701 **Depth 89.1ft** **File C:\DATA\ISE-765\CC17.P**



GIBSON'S CLAY MODEL

Shear Strength 110 psi
Insitu Stress 60 psi
Shear Modulus 11300 psi

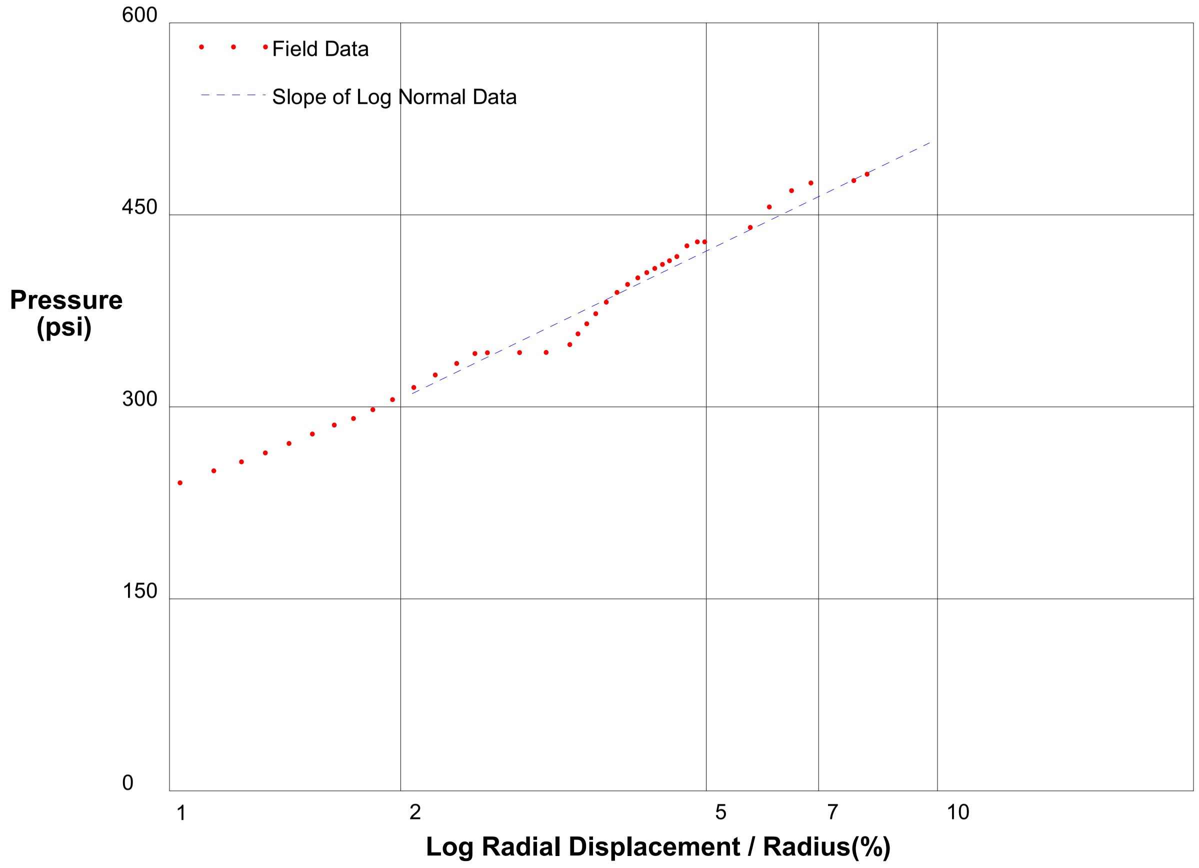
shift 4

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 89.1ft** **File C:\DATA\ISE-765\CC17.P**



Shear Strength 126.2 psi
Limit Pressure 687 psi

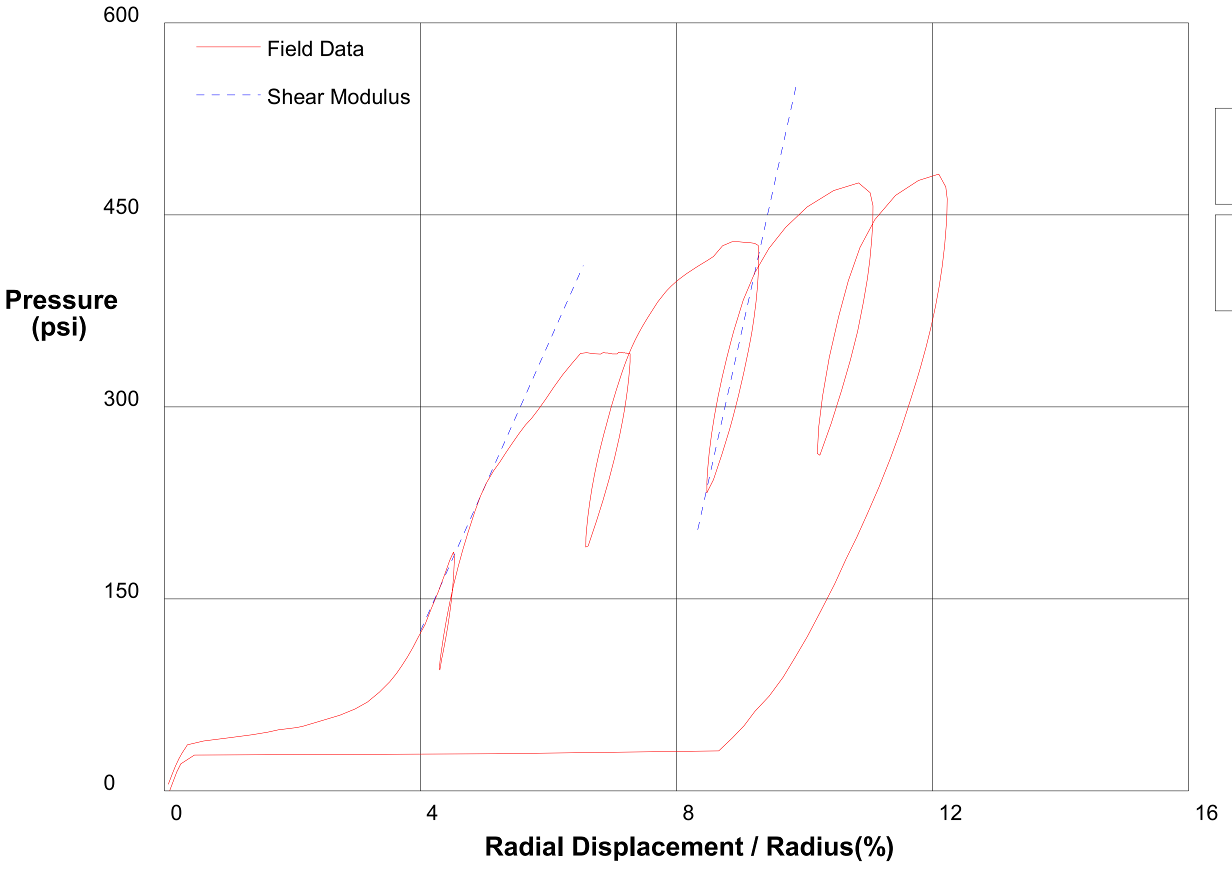
shift 4

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/27/2008**

Hole No. PM701 **Depth 89.1ft** **File C:\DATA\ISE-765\CC17.P**



Shear Modulus 5614 psi

Shear Modulus 11283 psi

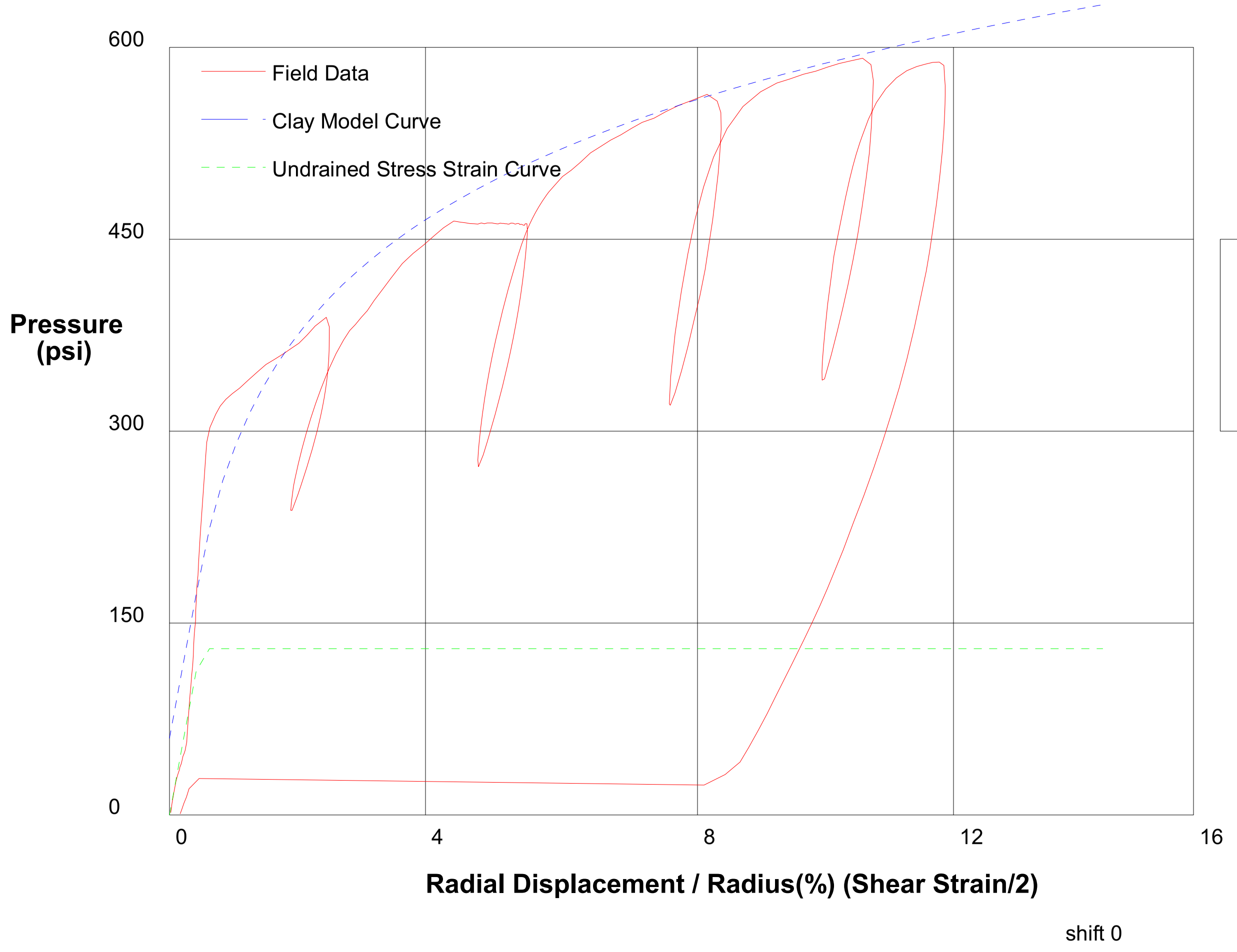
shift 0

In Situ Engineering

PRESSUREMETER DATA Schnabel Engineering, LLC.

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/28/2008**

Hole No. PM701 **Depth 100.5ft** **File C:\DATA\ISE-765\CC18.P**



GIBSON'S CLAY MODEL

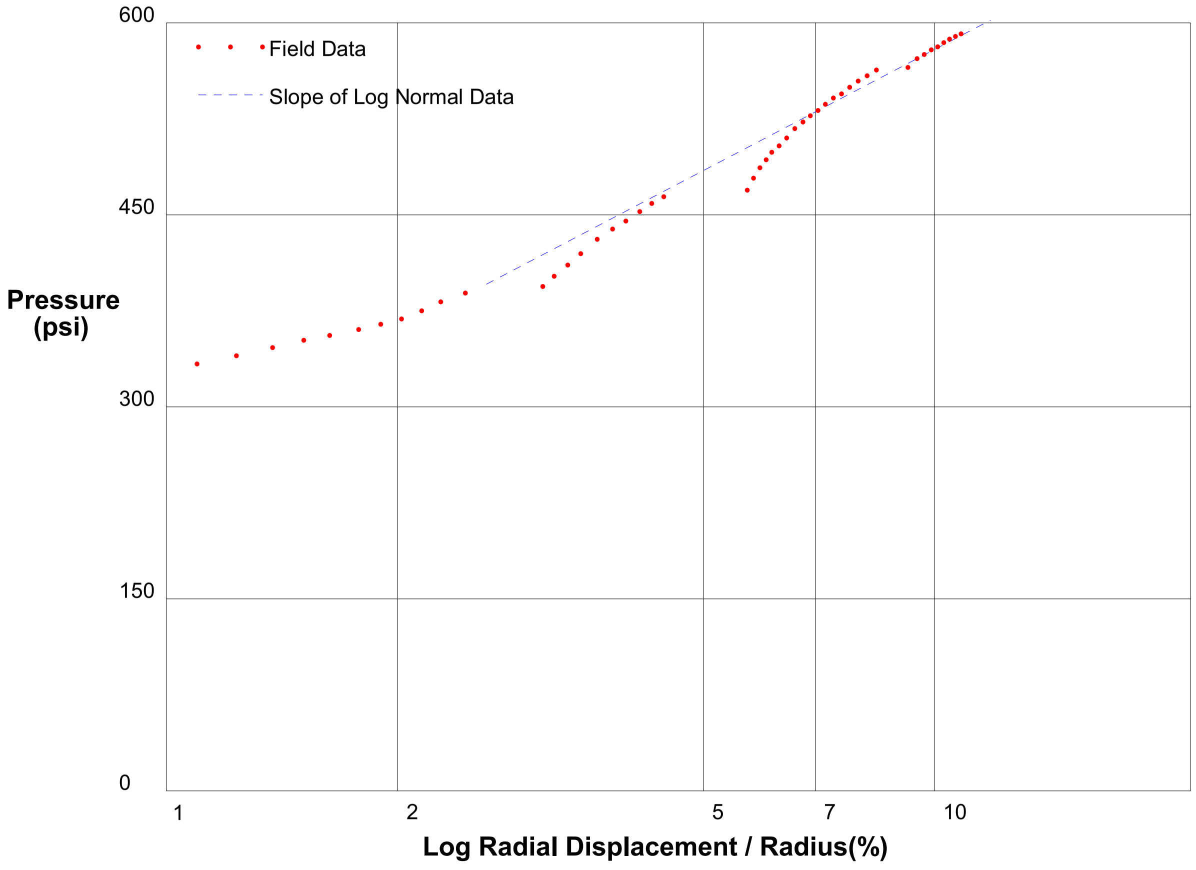
Shear Strength	**130 psi**
Insitu Stress	**60 psi**
Shear Modulus	**13500 psi**

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/28/2008**

Hole No. PM701 **Depth 100.5ft** **File C:\DATA\ISE-765\CC18.P**



shift 0

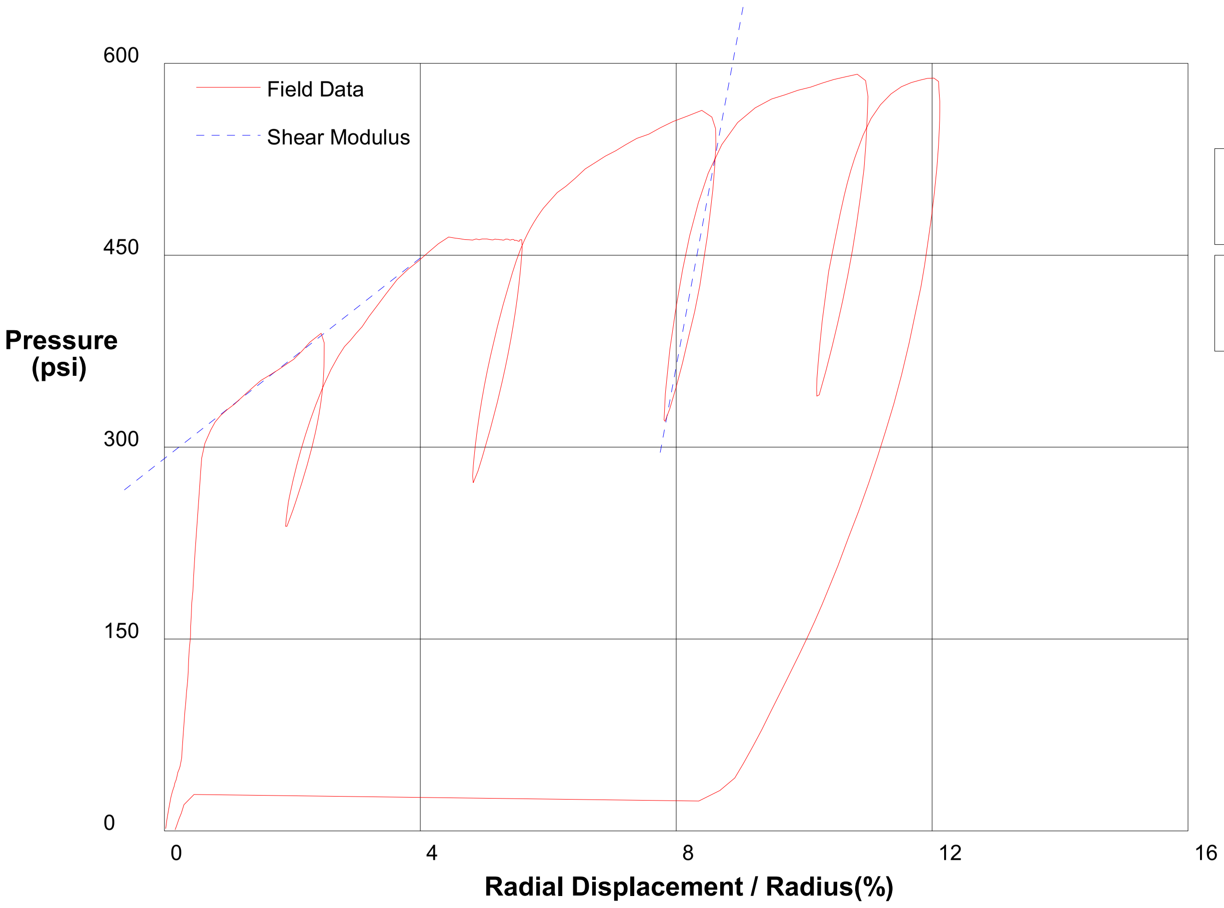
In Situ Engineering

Shear Strength 136.4 psi
Limit Pressure 771 psi

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/28/2008**

Hole No. PM701 **Depth 100.5ft** **File C:\DATA\ISE-765\CC18.P**



Shear Modulus 1959 psi

Shear Modulus 13437 psi

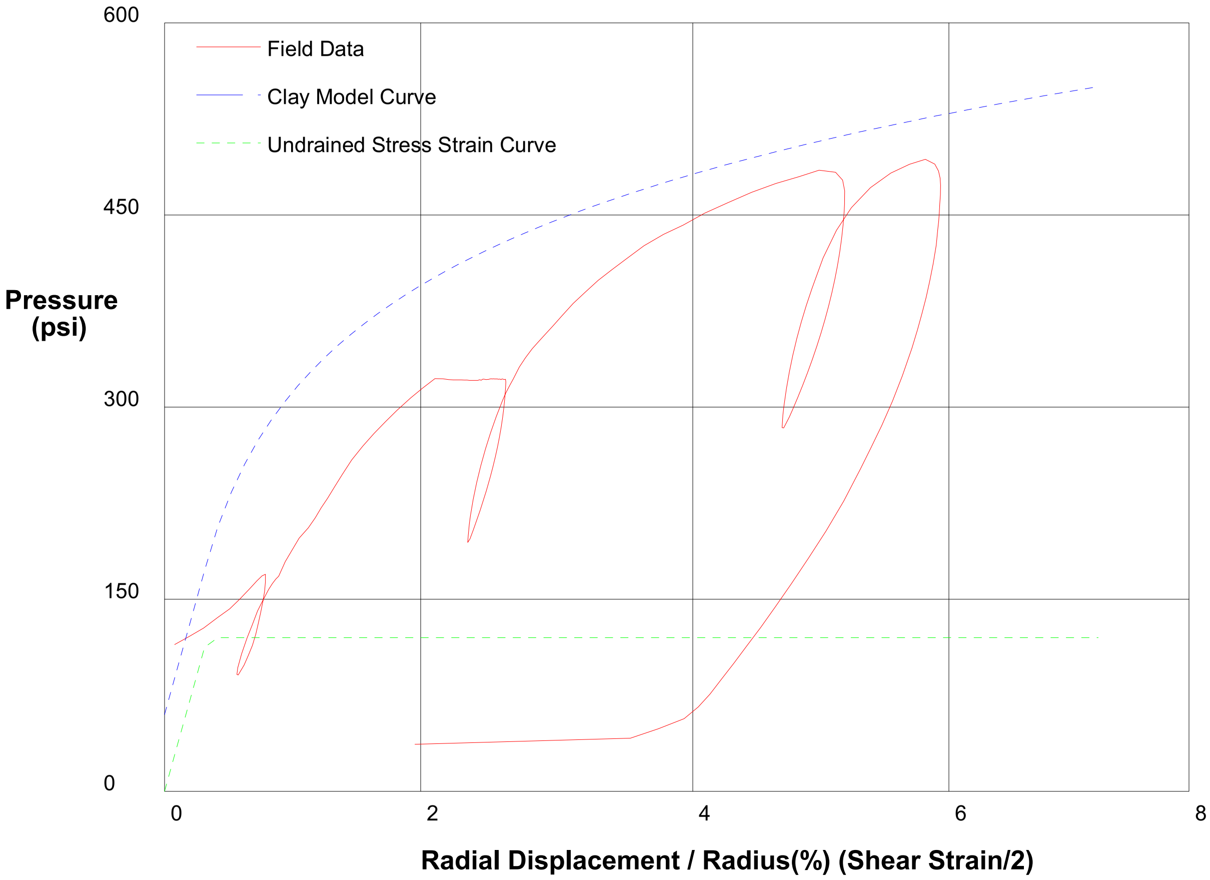
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/28/2008**

Hole No. PM701 **Depth 99ft** **File C:\DATA\ISE-765\CC19.P**



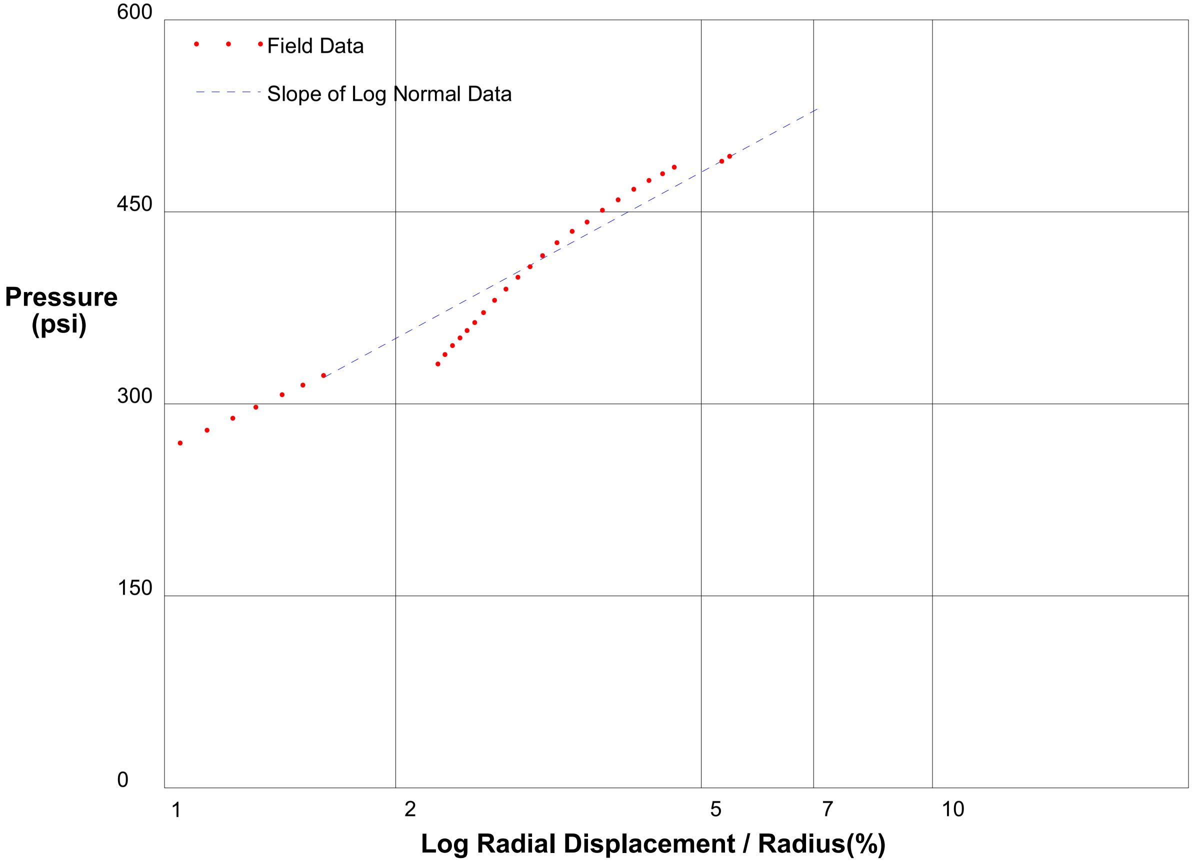
shift 8

GIBSON'S CLAY MODEL

Shear Strength 120 psi
Insitu Stress 60 psi
Shear Modulus 18000 psi

In Situ Engineering

PRESSUREMETER DATA	**Schnabel Engineering LLC.**	
Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation		**8/28/2008**
Hole No. PM701	**Depth 99ft**	**File C:\DATA\ISE-765\CC19.P**



Shear Strength 141.8 psi
Limit Pressure 779 psi

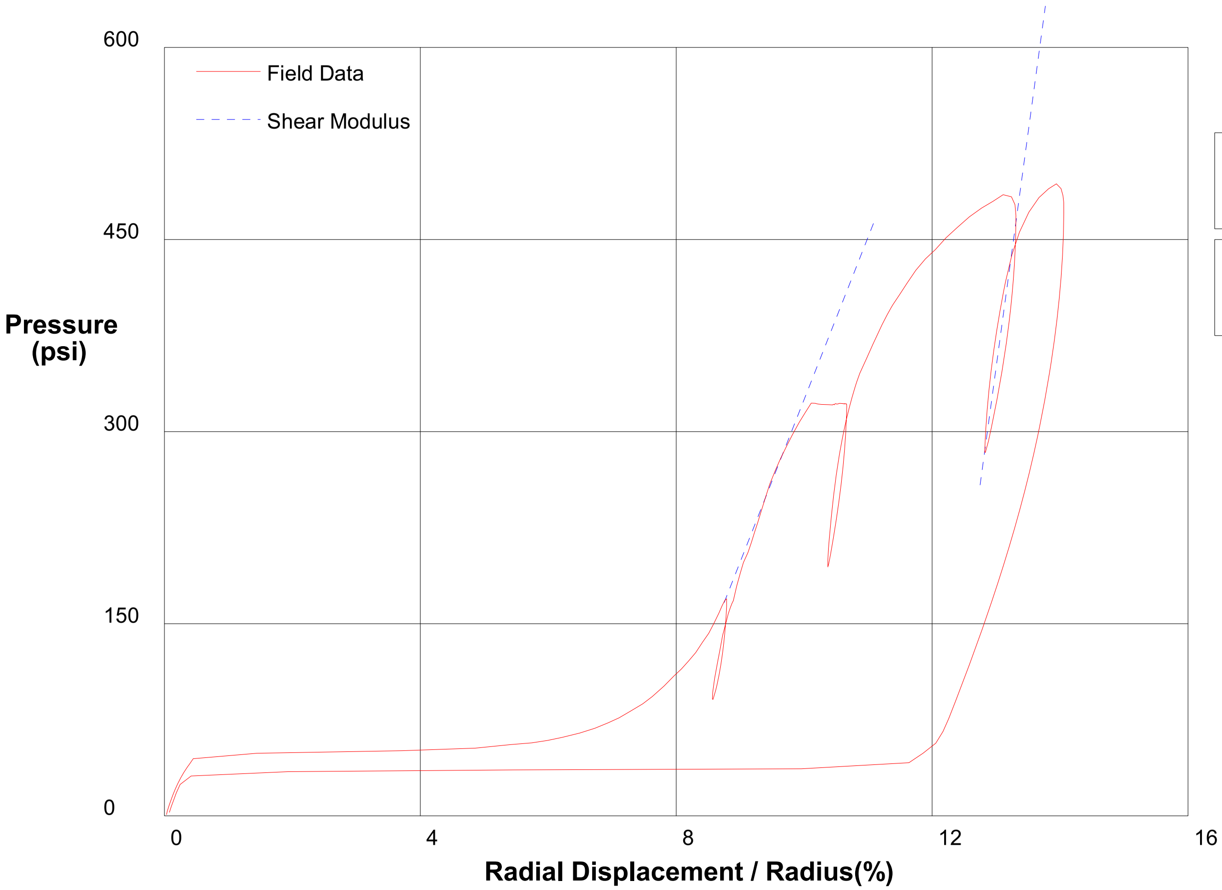
shift 8.5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/28/2008**

Hole No. PM701 **Depth 99ft** **File C:\DATA\ISE-765\CC19.P**



Shear Modulus 6339 psi

Shear Modulus 18316 psi

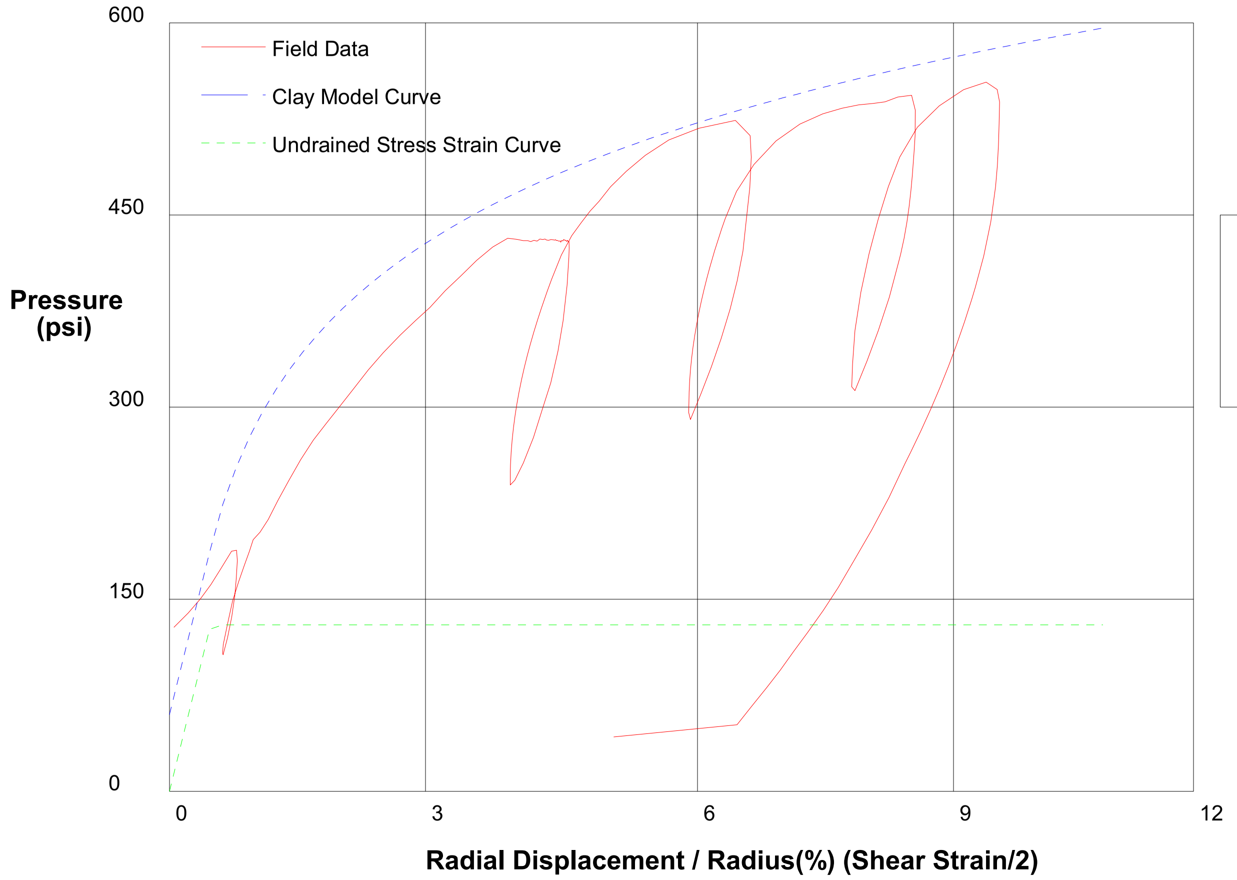
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/28/2008**

Hole No. PM701 **Depth 110.7ft** **File C:\DATA\ISE-765\CC20.P**



shift 4

In Situ Engineering

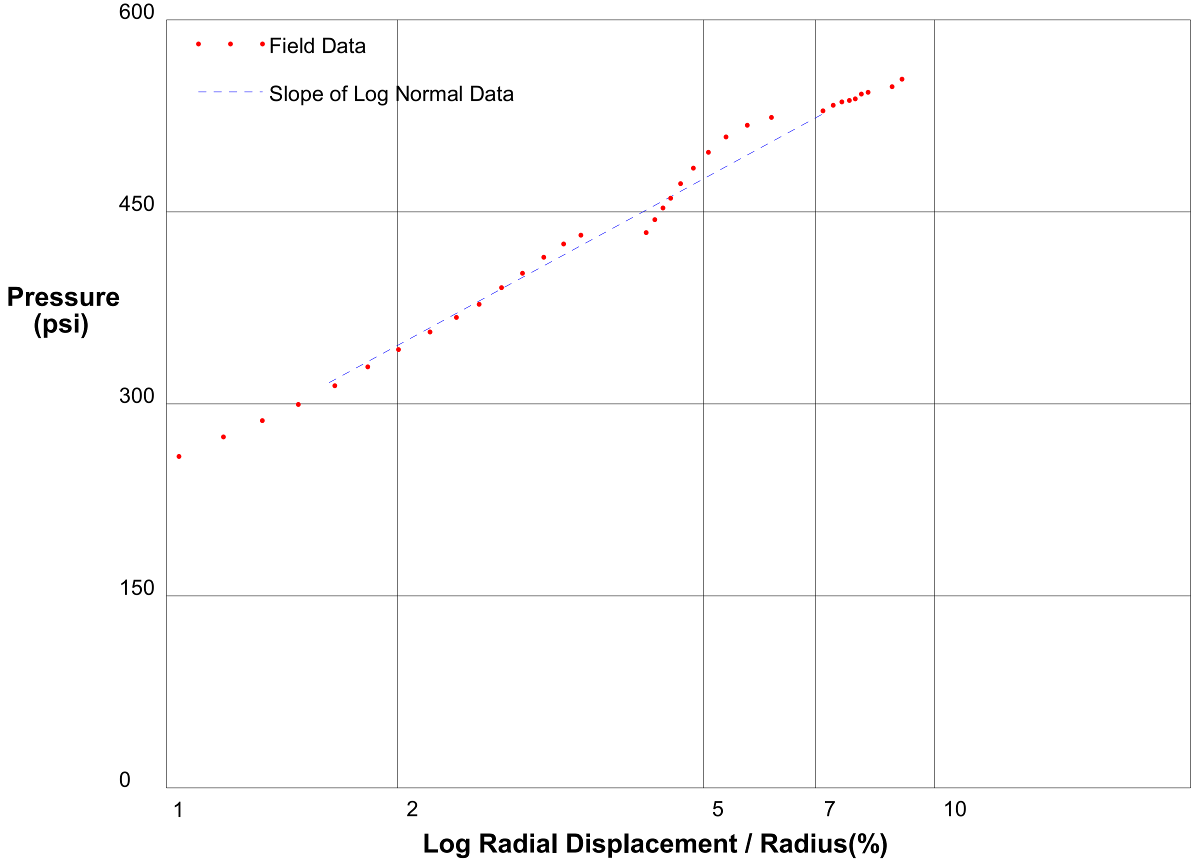
GIBSON'S CLAY MODEL

Shear Strength 130 psi
Insitu Stress 60 psi
Shear Modulus 13500 psi

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/28/2008**

Hole No. PM701 **Depth 110.7ft** **File C:\DATA\ISE-765\CC20.P**



Shear Strength 141.8 psi
Limit Pressure 774 psi

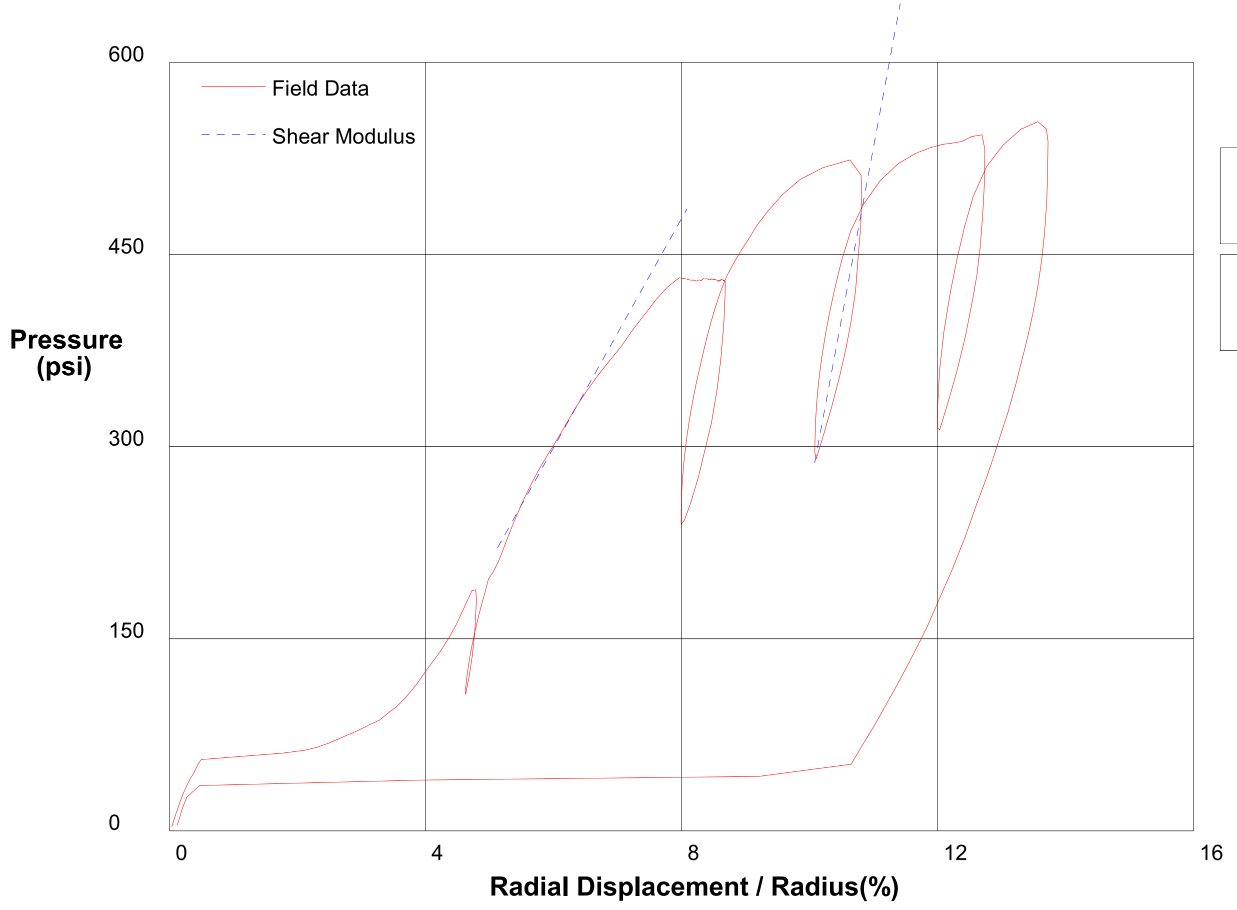
shift 4.5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/28/2008**

Hole No. PM701 **Depth 110.7ft** **File C:\DATA\ISE-765\CC20.P**



Shear Modulus 4471 psi

Shear Modulus 13437 psi

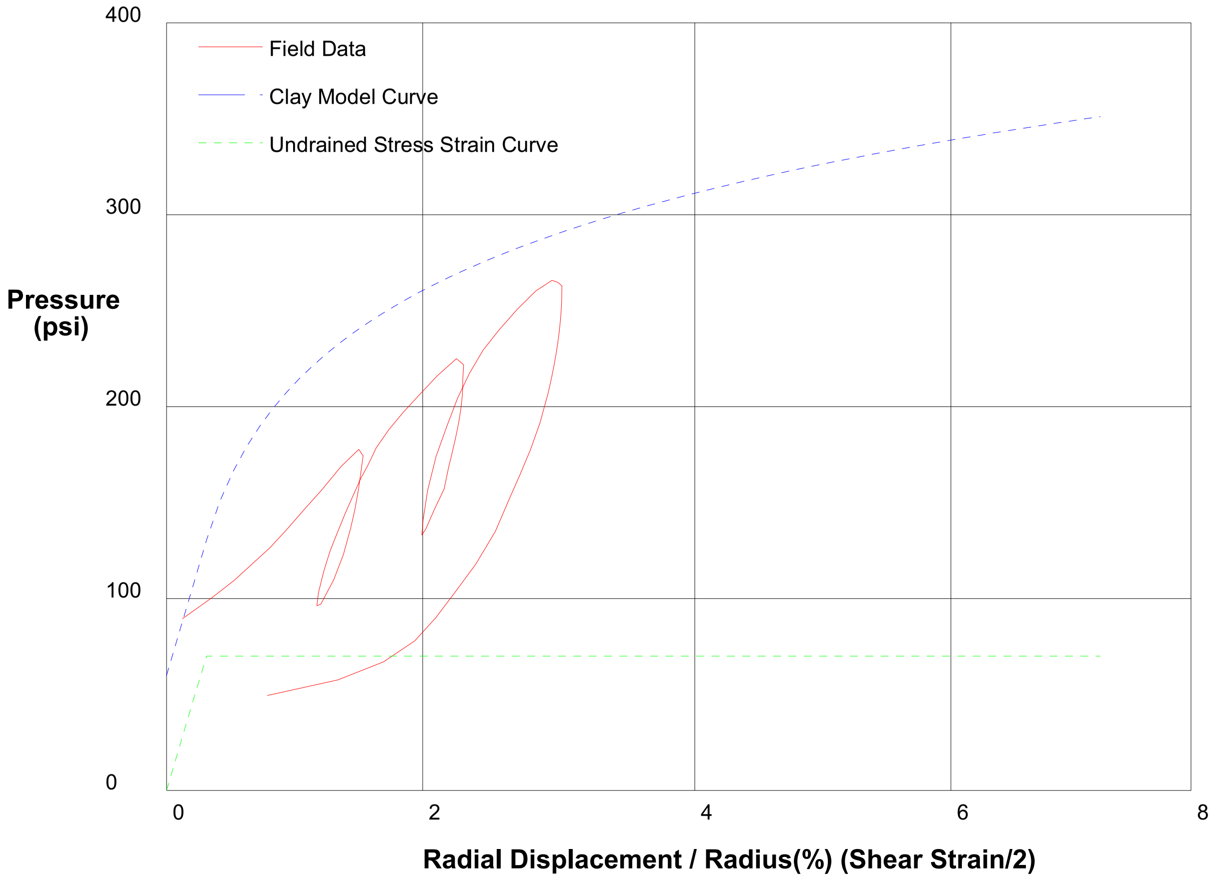
shift 0

In Situ Engineering

PRESSUREMETER DATA Schnabel Engineering, LLC.

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/28/2008**

Hole No. PM701 **Depth 109.2ft** **File C:\DATA\ISE-765\CC21.P**



GIBSON'S CLAY MODEL

Shear Strength 70 psi
Insitu Stress 60 psi
Shear Modulus 11300 psi

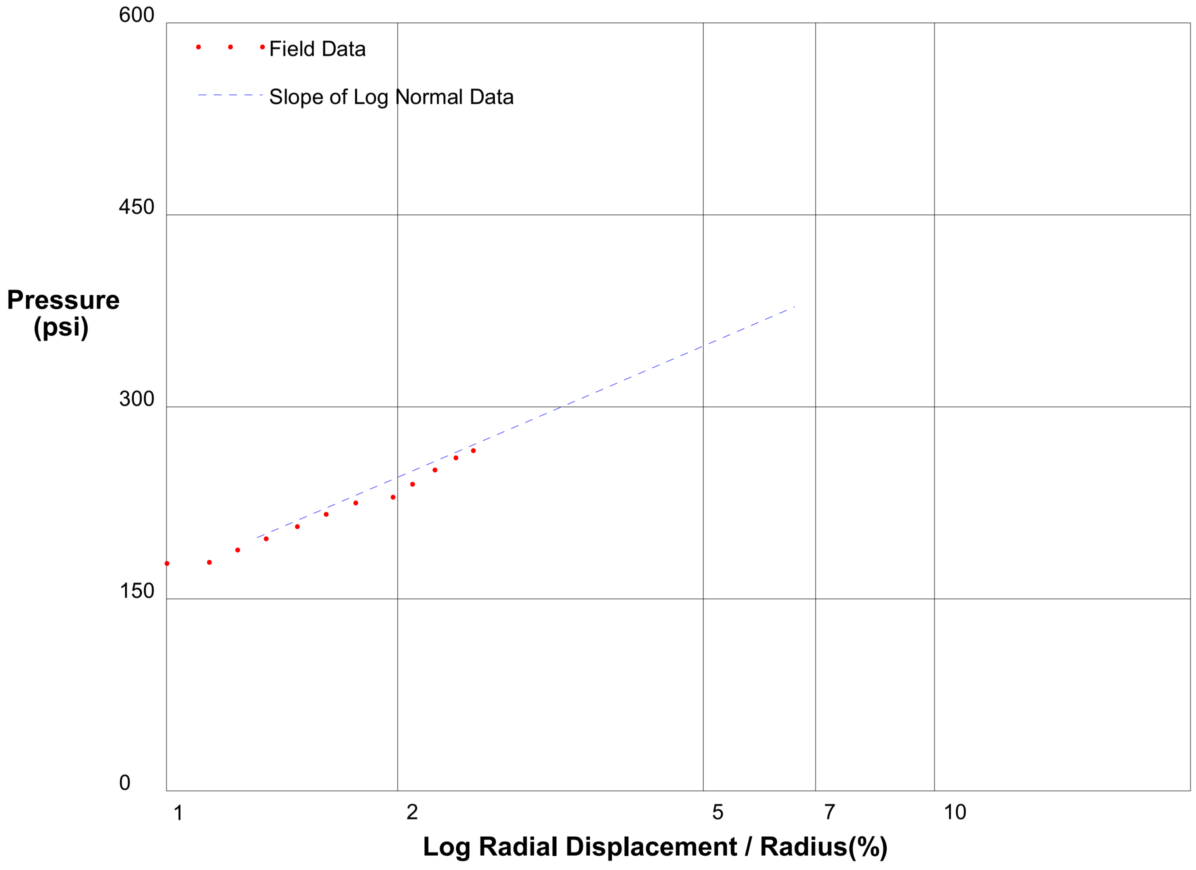
shift 8

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/28/2008**

Hole No. PM701 **Depth 109.2ft** **File C:\DATA\ISE-765\CC21.P**



Shear Strength 111.8 psi
Limit Pressure 582 psi

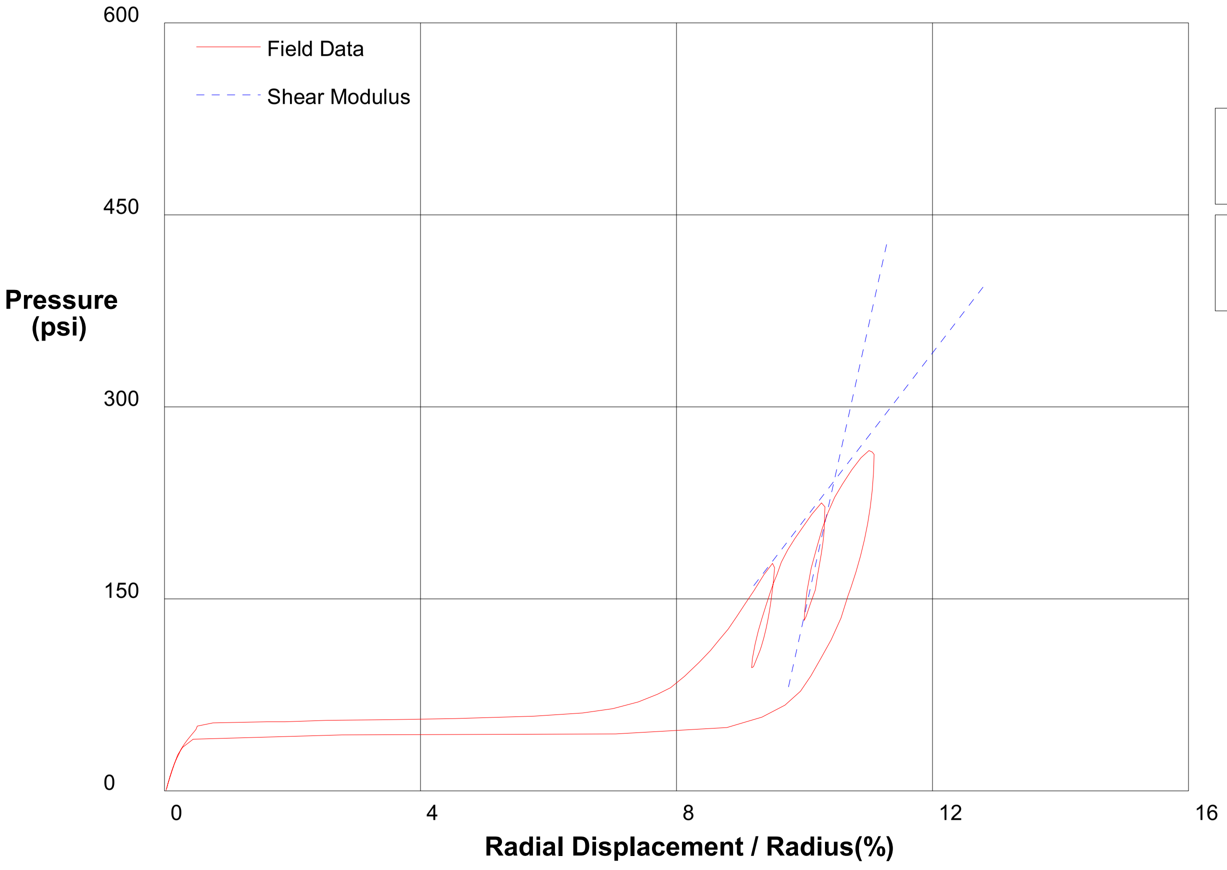
shift 8.5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/28/2008**

Hole No. PM701 **Depth 109.2ft** **File C:\DATA\ISE-765\CC21.P**



Shear Modulus 3255 psi

Shear Modulus 11283 psi

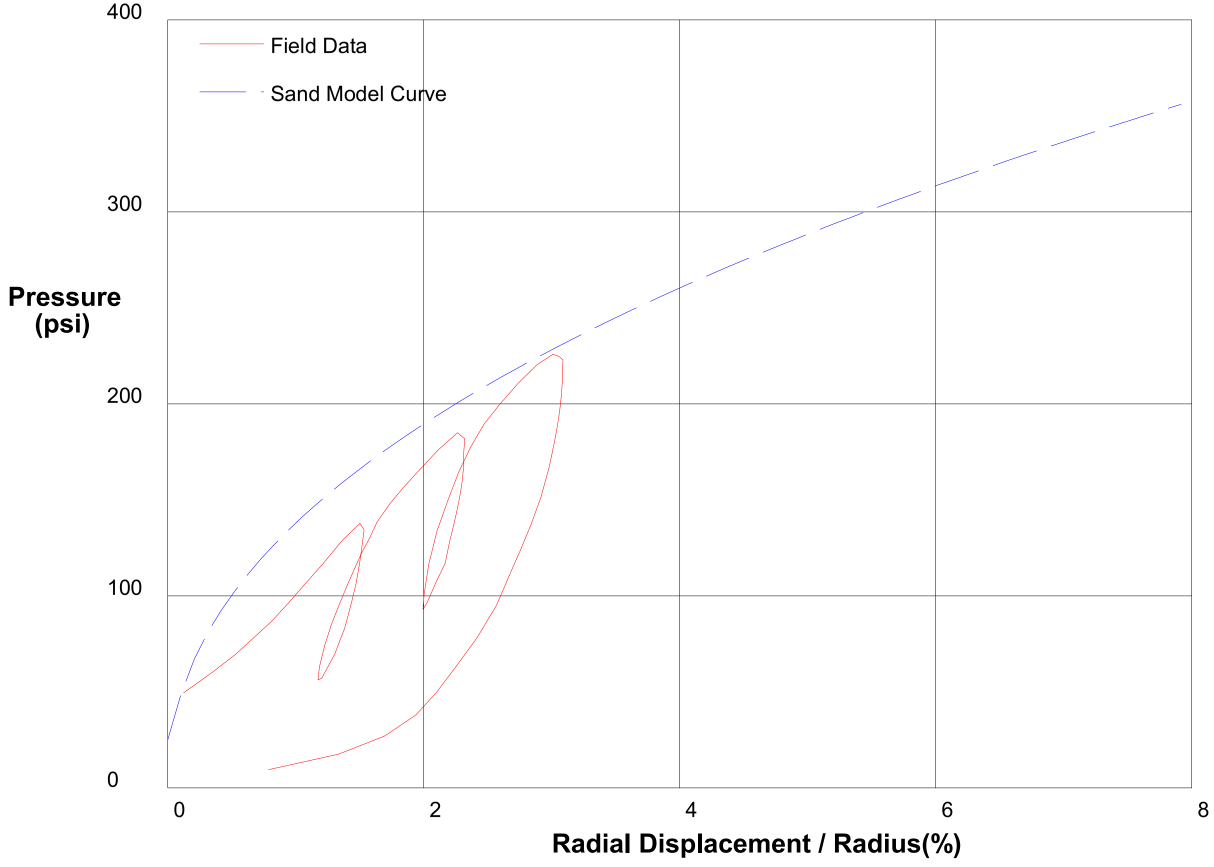
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/28/2008**

Hole No. PM701 **Depth 109.2ft** **File C:\DATA\ISE-765\CC21.P**



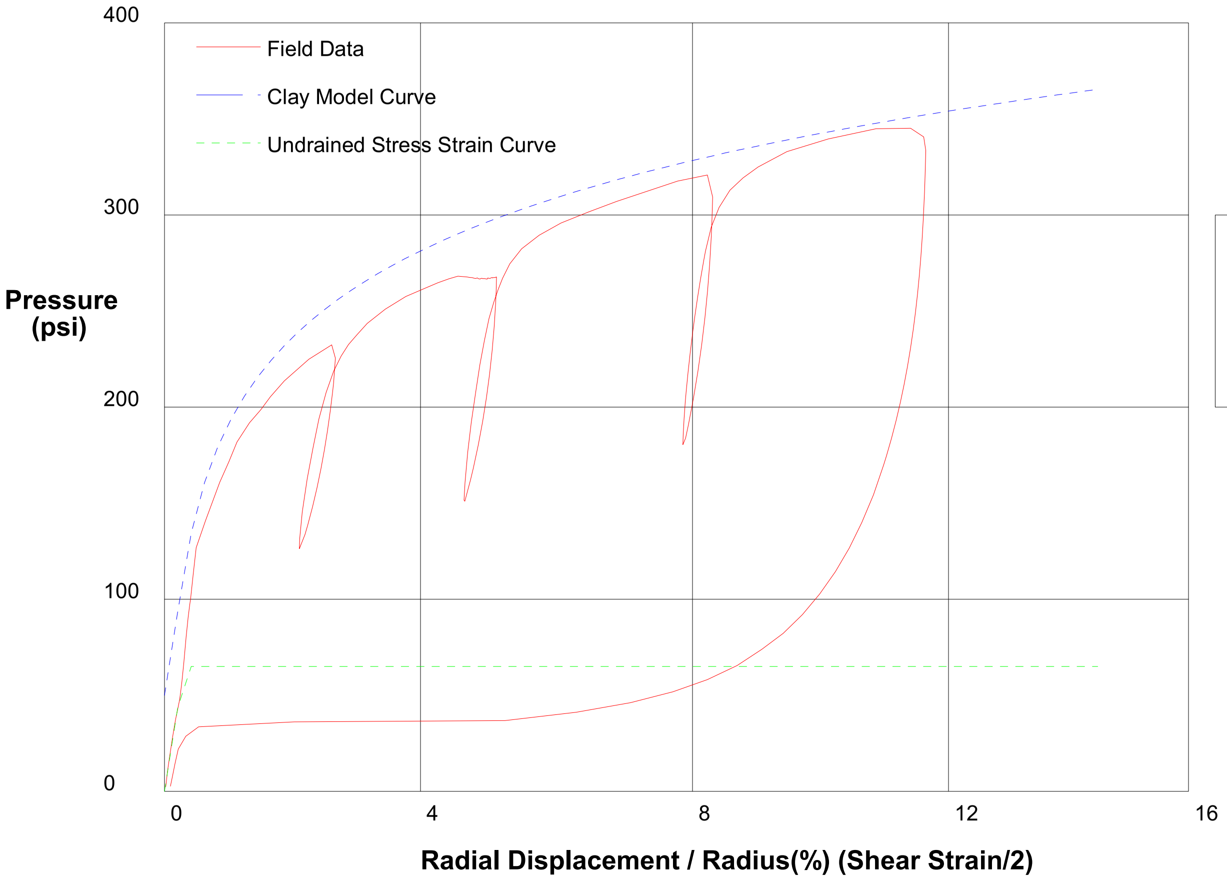
THE In Situ Engineering SAND MODEL

Water Pressure	**40 psi**
Friction Angle	**40 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**25 psi**
Shear Modulus	**11300 psi**

shift 8

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**
Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/28/2008**
Hole No. PM701 **Depth 120.1ft** **File C:\DATA\ISE-765\CC22.P**



GIBSON'S CLAY MODEL

Shear Strength 65 psi
Insitu Stress 50 psi
Shear Modulus 10500 psi

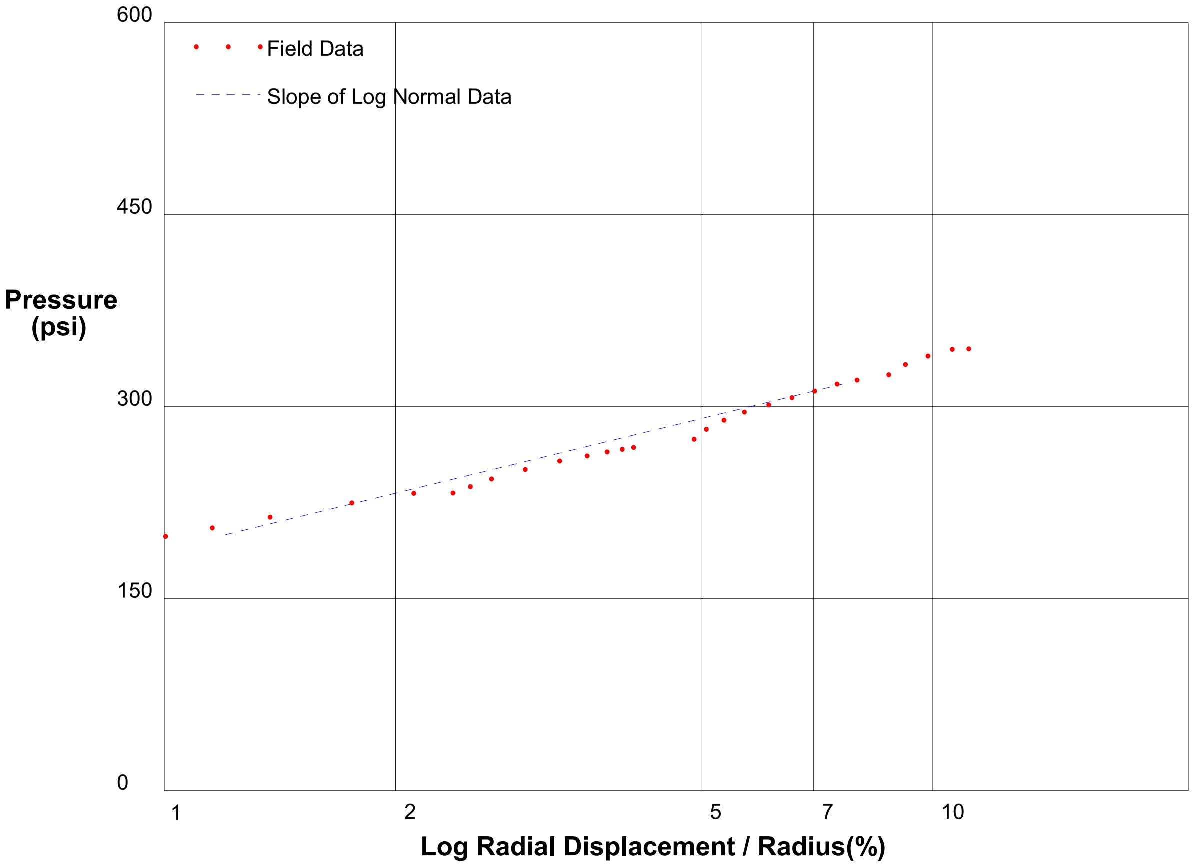
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/28/2008**

Hole No. PM701 **Depth 120.1ft** **File C:\DATA\ISE-765\CC22.P**



Shear Strength 63.5 psi
Limit Pressure 424 psi

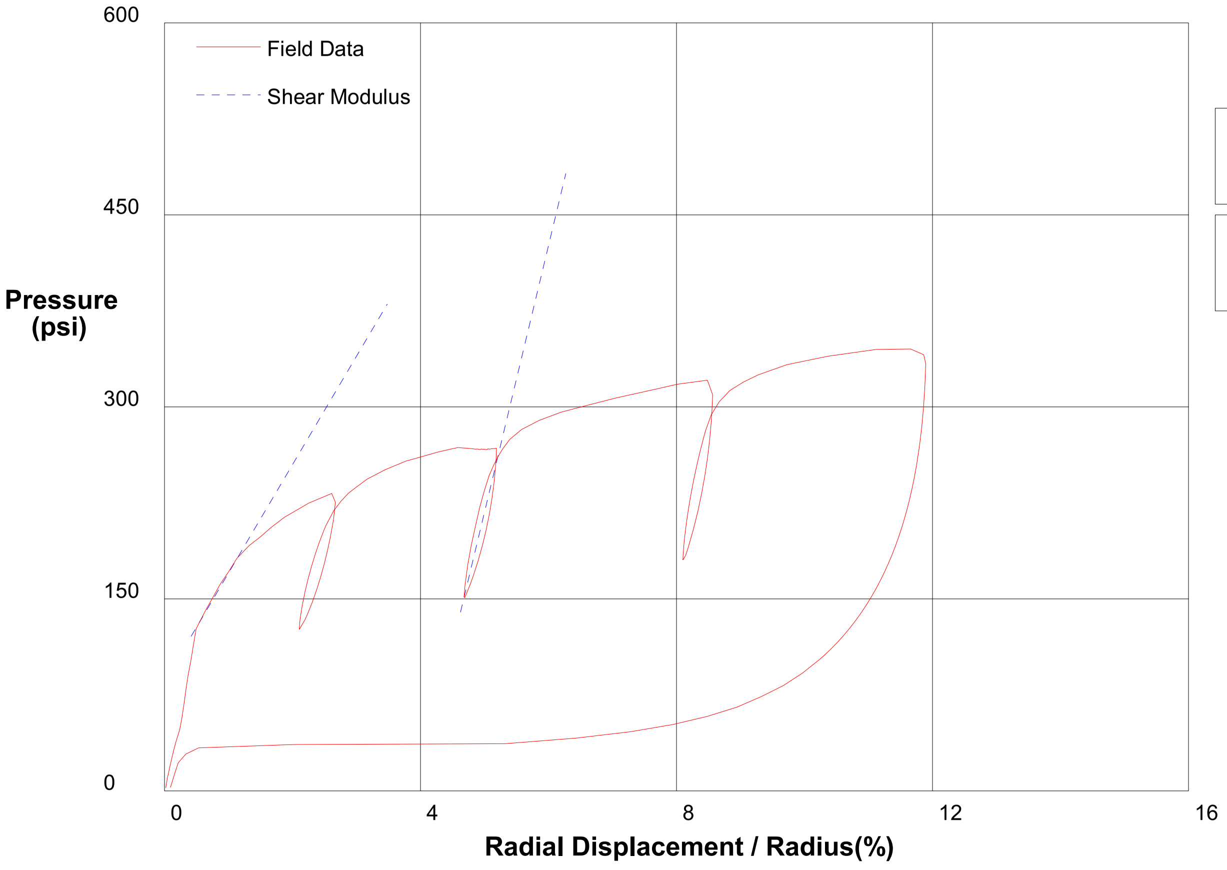
shift .5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/28/2008**

Hole No. PM701 **Depth 120.1ft** **File C:\DATA\ISE-765\CC22.P**



Shear Modulus 4234 psi

Shear Modulus 10411 psi

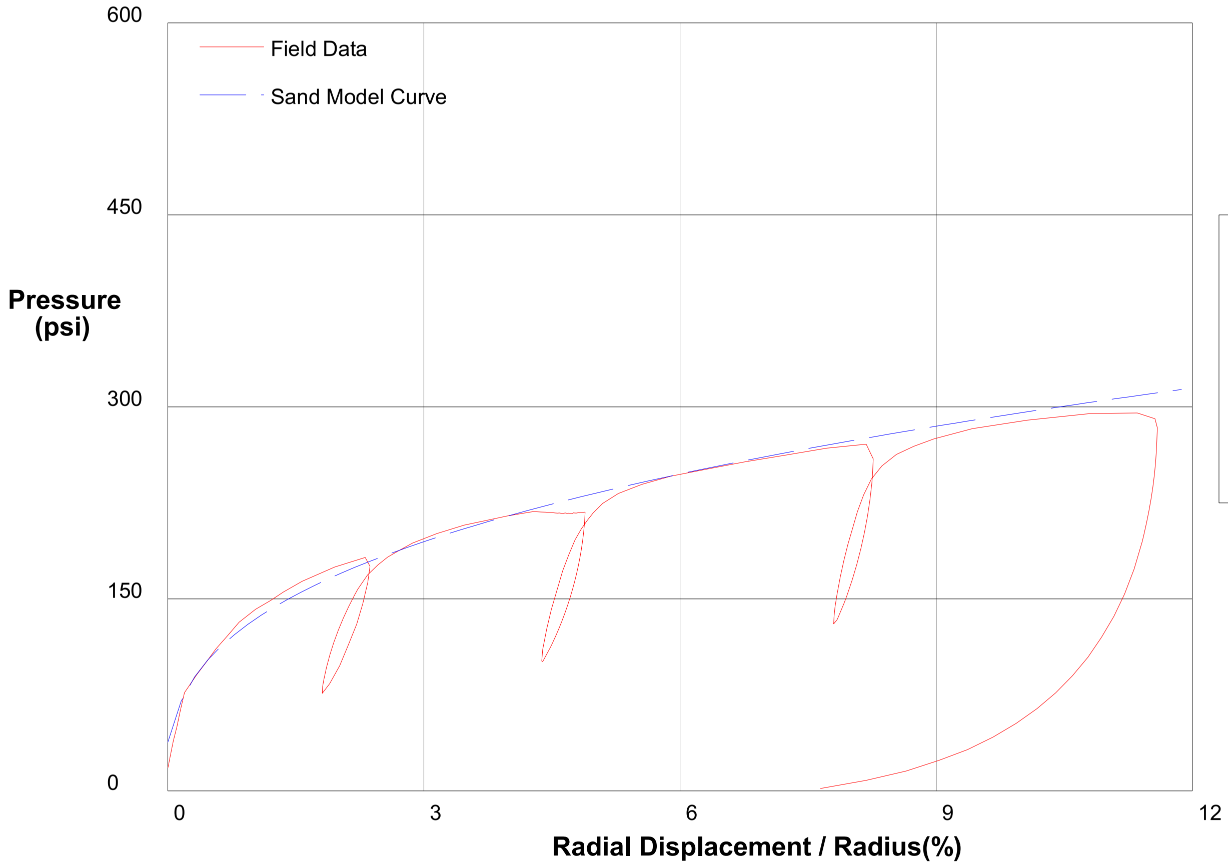
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC**

Calvert Cliffs Nuclear Power Plant, 2008 Sunsurface Investigation **8/28/2008**

Hole No. PM701 **Depth 120.1ft** **File C:\DATA\ISE-765\CC22.P**



THE In Situ Engineering SAND MODEL

Water Pressure	**50 psi**
Friction Angle	**32 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**38 psi**
Shear Modulus	**11000 psi**

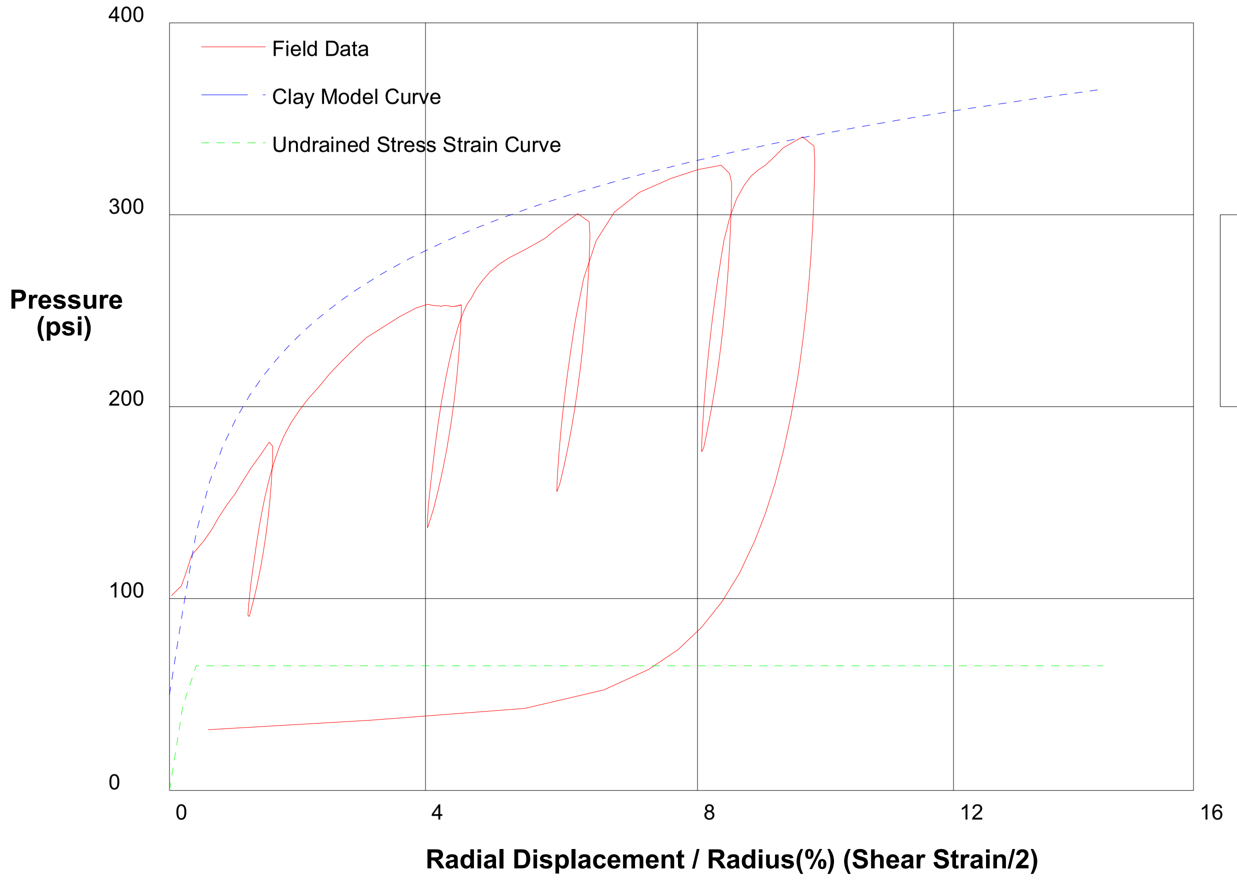
shift .3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/28/2008**

Hole No. PM701 **Depth 118.6ft** **File C:\DATA\ISE-765\CC23.P**



shift 1

GIBSON'S CLAY MODEL

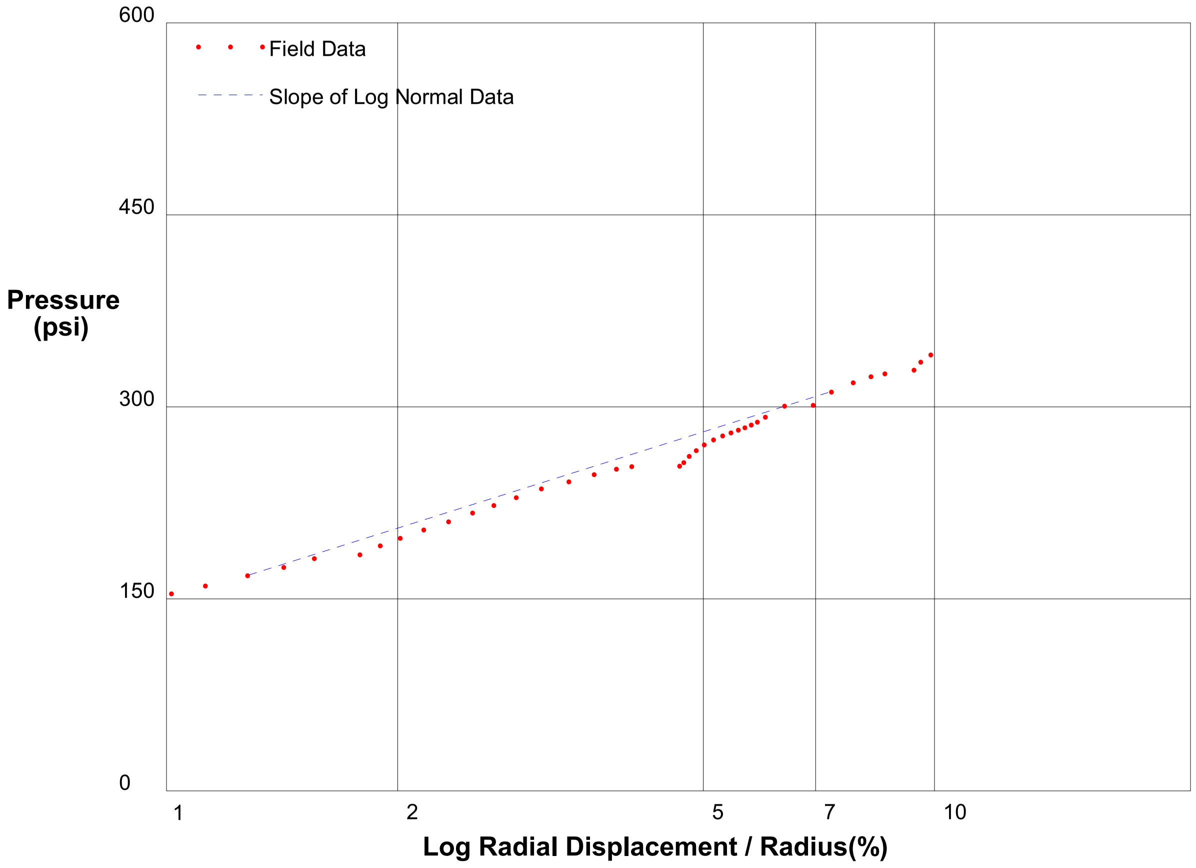
Shear Strength 65 psi
Insitu Stress 50 psi
Shear Modulus 10500 psi

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/28/2008**

Hole No. PM701 **Depth 118.6ft** **File C:\DATA\ISE-765\CC23.P**



Shear Strength 82 psi
Limit Pressure 453 psi

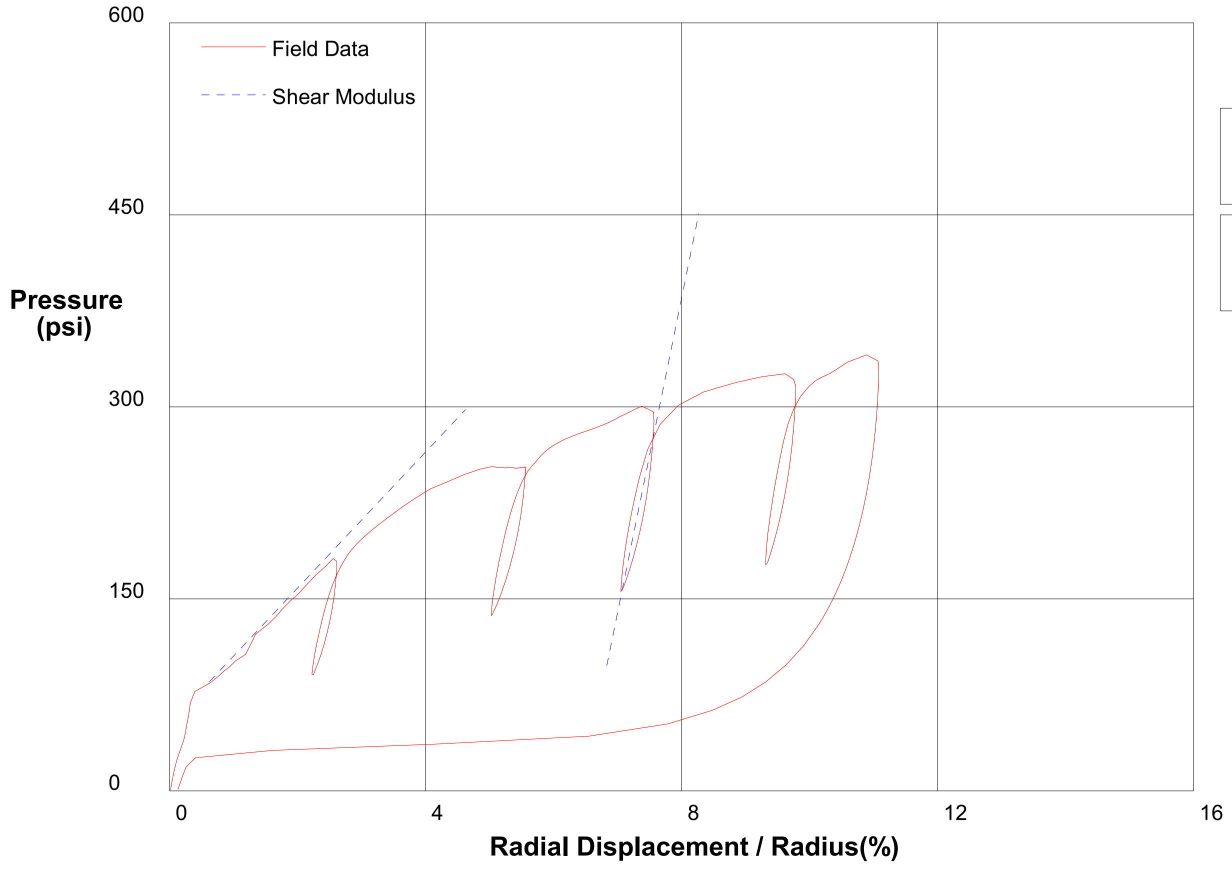
shift 1

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/28/2008**

Hole No. PM701 **Depth 118.6ft** **File C:\DATA\ISE-765\CC23.P**



Shear Modulus 2656 psi

Shear Modulus 12282 psi

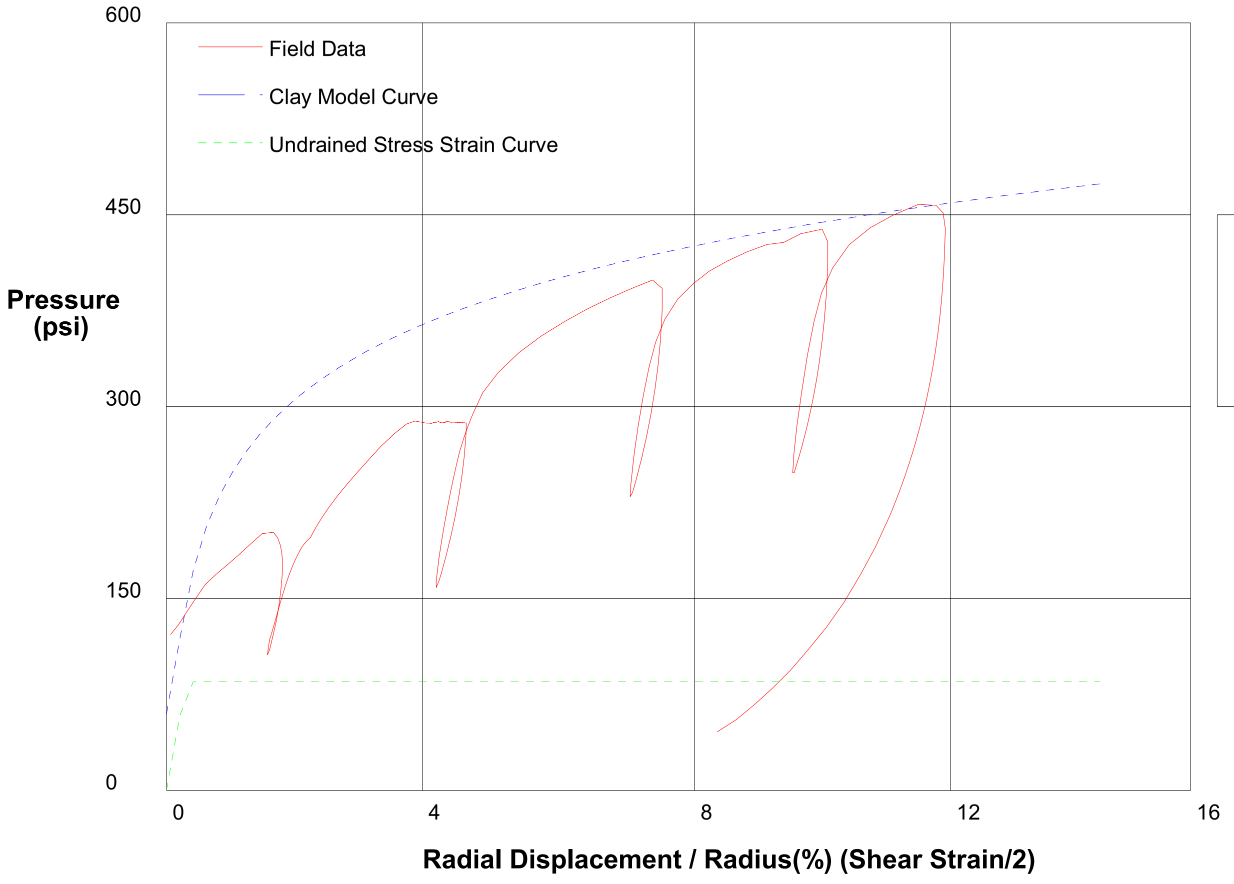
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/28/2008**

Hole No. PM701 **Depth 130.8ft** **File C:\DATA\ISE-765\CC24.P**



shift 1

GIBSON'S CLAY MODEL

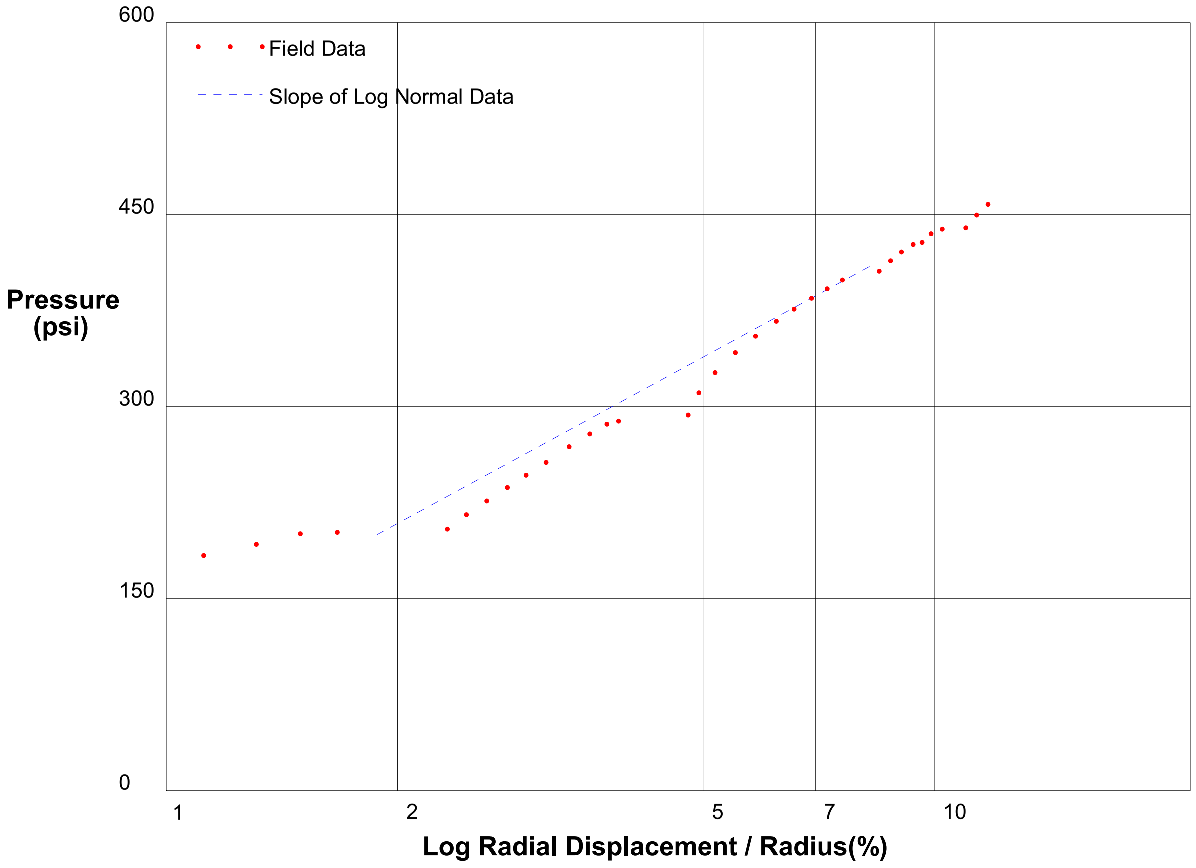
Shear Strength 85 psi
Insitu Stress 60 psi
Shear Modulus 14000 psi

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/28/2008**

Hole No. PM701 **Depth 130.8ft** **File C:\DATA\ISE-765\CC24.P**



Shear Strength 141.8 psi
Limit Pressure 637 psi

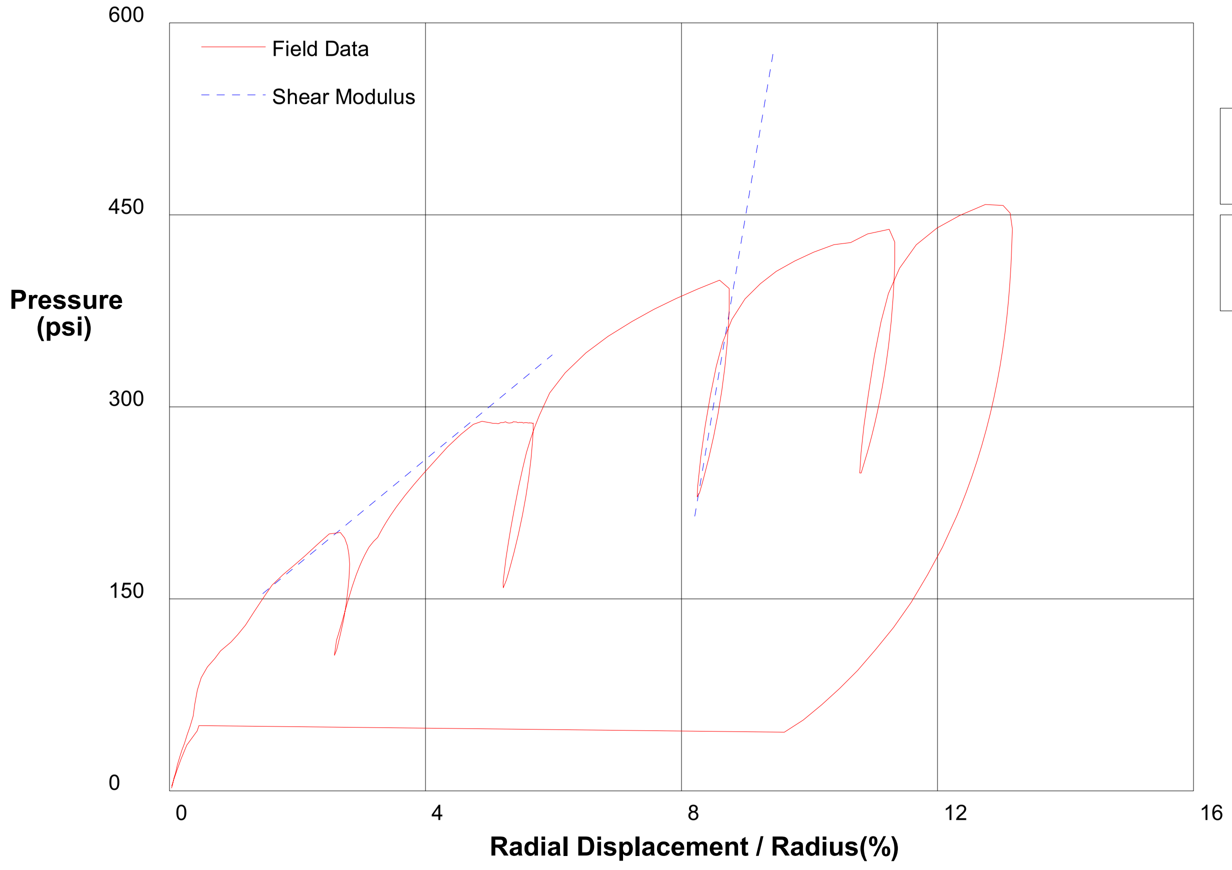
shift 1

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/28/2008**

Hole No. PM701 **Depth 130.8ft** **File C:\DATA\ISE-765\CC24.P**



Shear Modulus 2062 psi

Shear Modulus 14788 psi

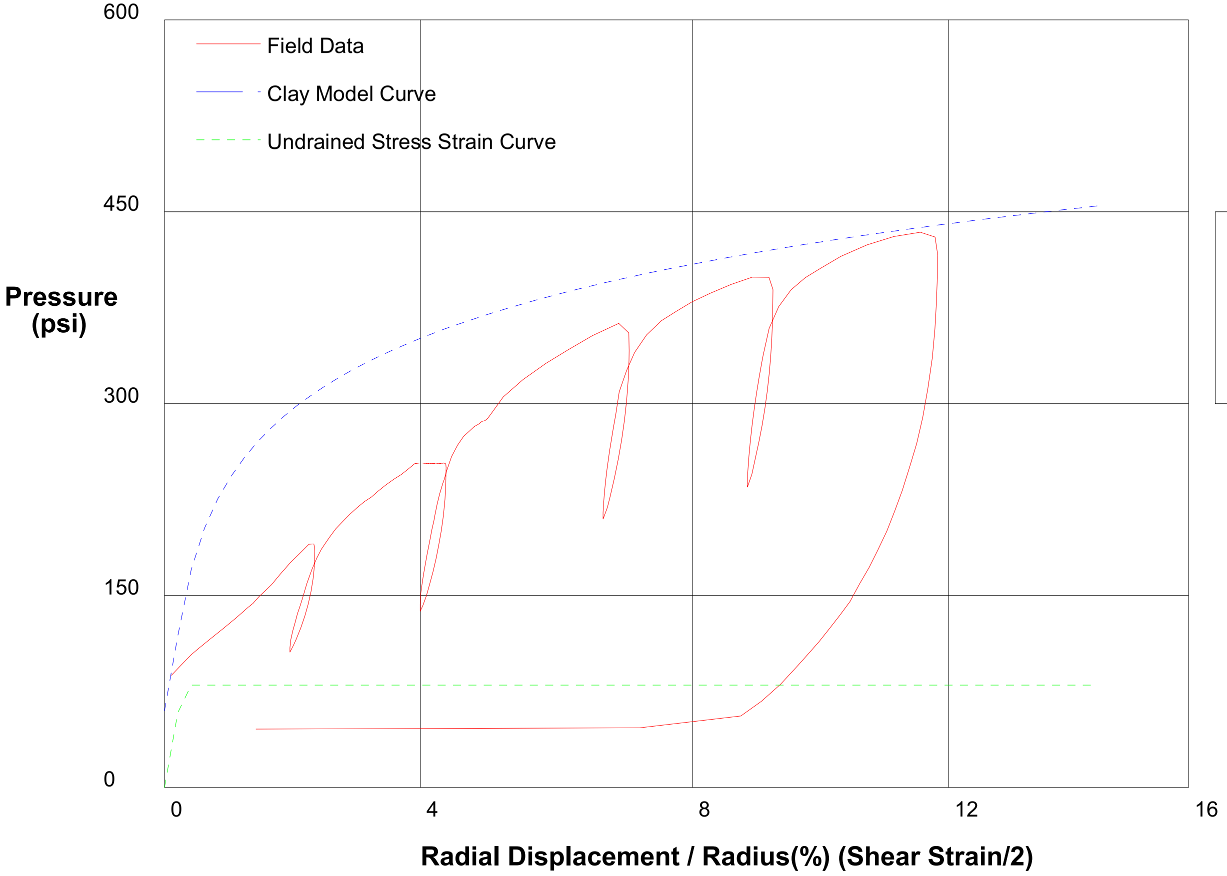
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/28/2008**

Hole No. PM701 **Depth 129.3ft** **File C:\DATA\ISE-765\CC25.P**



GIBSON'S CLAY MODEL

Shear Strength	**80**	**psi**
Insitu Stress	**60**	**psi**
Shear Modulus	**14000**	**psi**

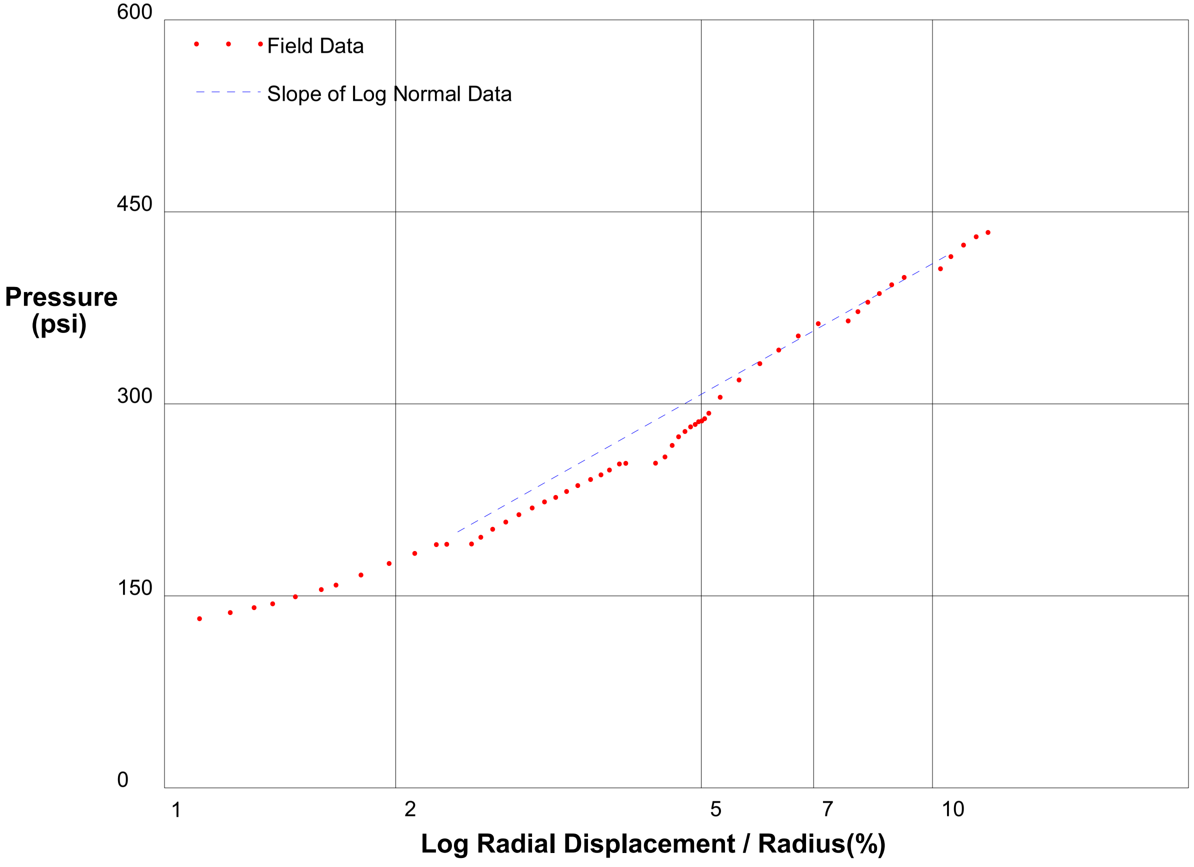
shift 1

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/28/2008**

Hole No. PM701 **Depth 129.3ft** **File C:\DATA\ISE-765\CC25.P**



Shear Strength 147.2 psi
Limit Pressure 617 psi

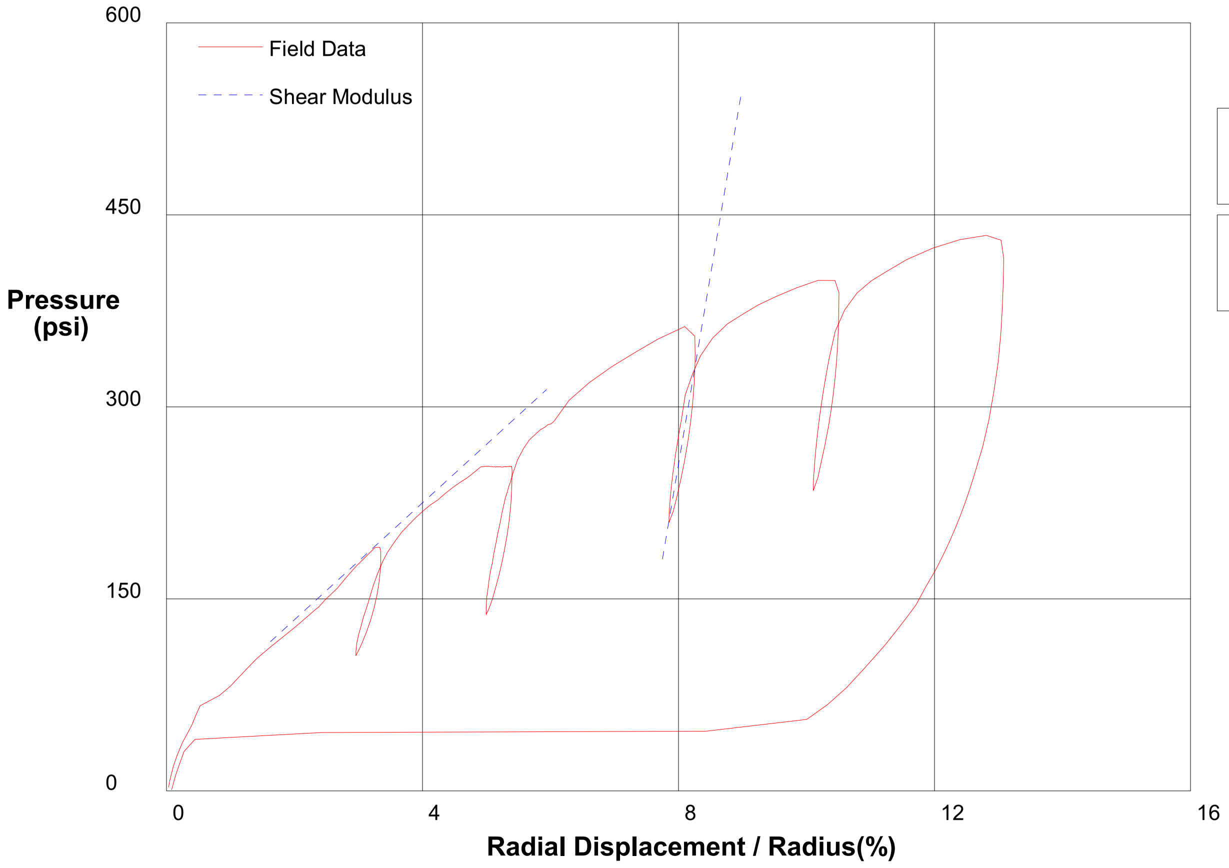
shift 1

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/28/2008**

Hole No. PM701 **Depth 129.3ft** **File C:\DATA\ISE-765\CC25.P**



Shear Modulus 2282 psi

Shear Modulus 14788 psi

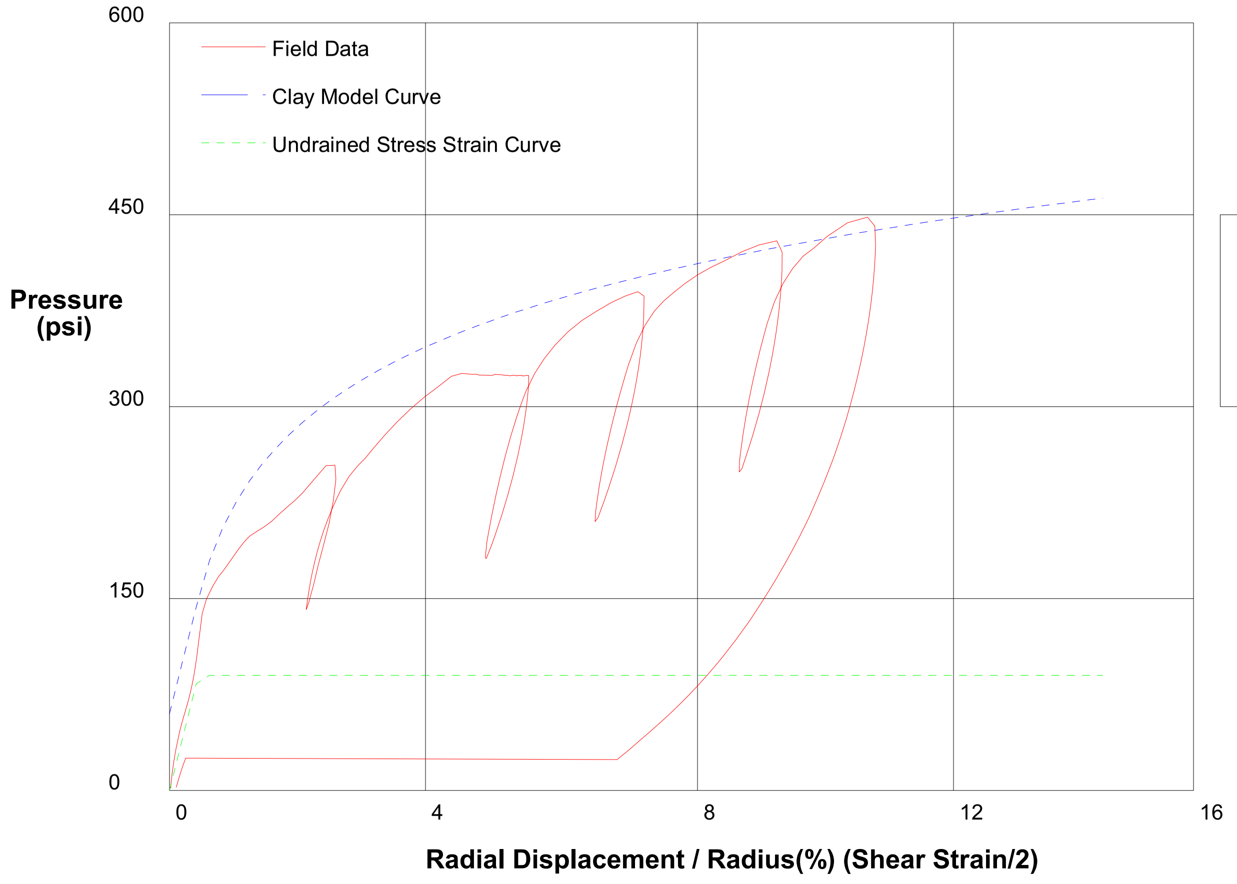
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/29/2008**

Hole No. PM701 **Depth 140.8ft** **File C:\DATA\ISE-765\CC26.P**



GIBSON'S CLAY MODEL

Shear Strength 90 psi
Insitu Stress 60 psi
Shear Modulus 10000 psi

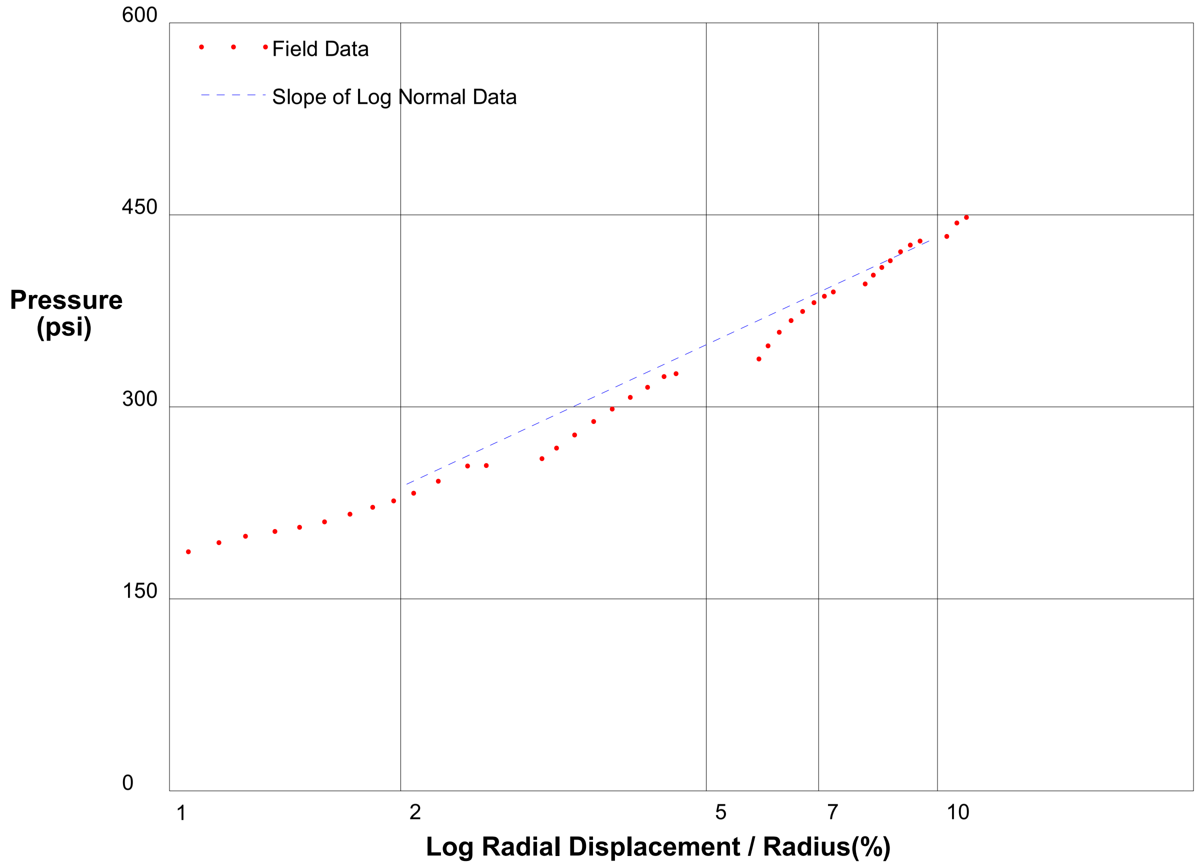
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/29/2008**

Hole No. PM701 **Depth 140.8ft** **File C:\DATA\ISE-765\CC26.P**



Shear Strength 121.3 psi
Limit Pressure 603 psi

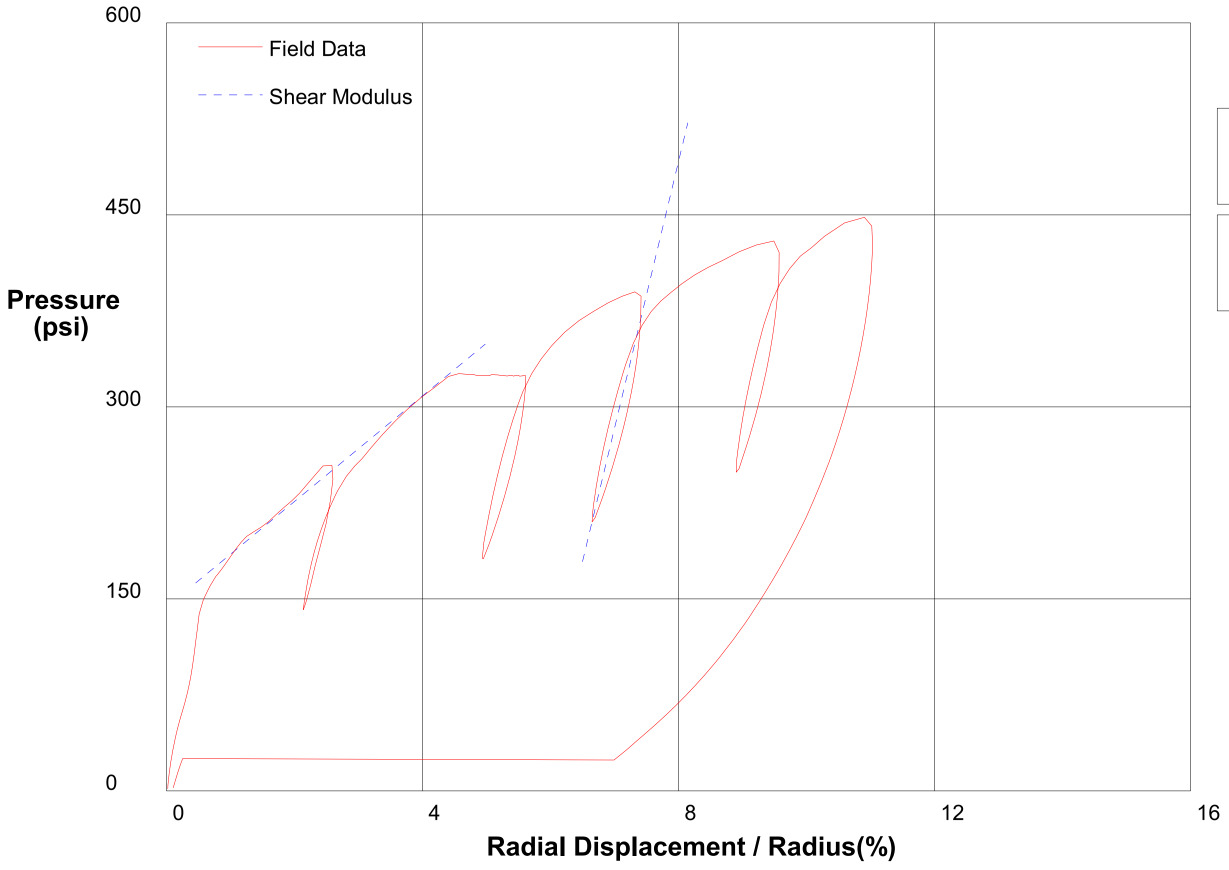
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/29/2008**

Hole No. PM701 **Depth 140.8ft** **File C:\DATA\ISE-765\CC26.P**



Shear Modulus 2062 psi

Shear Modulus 10411 psi

shift 0

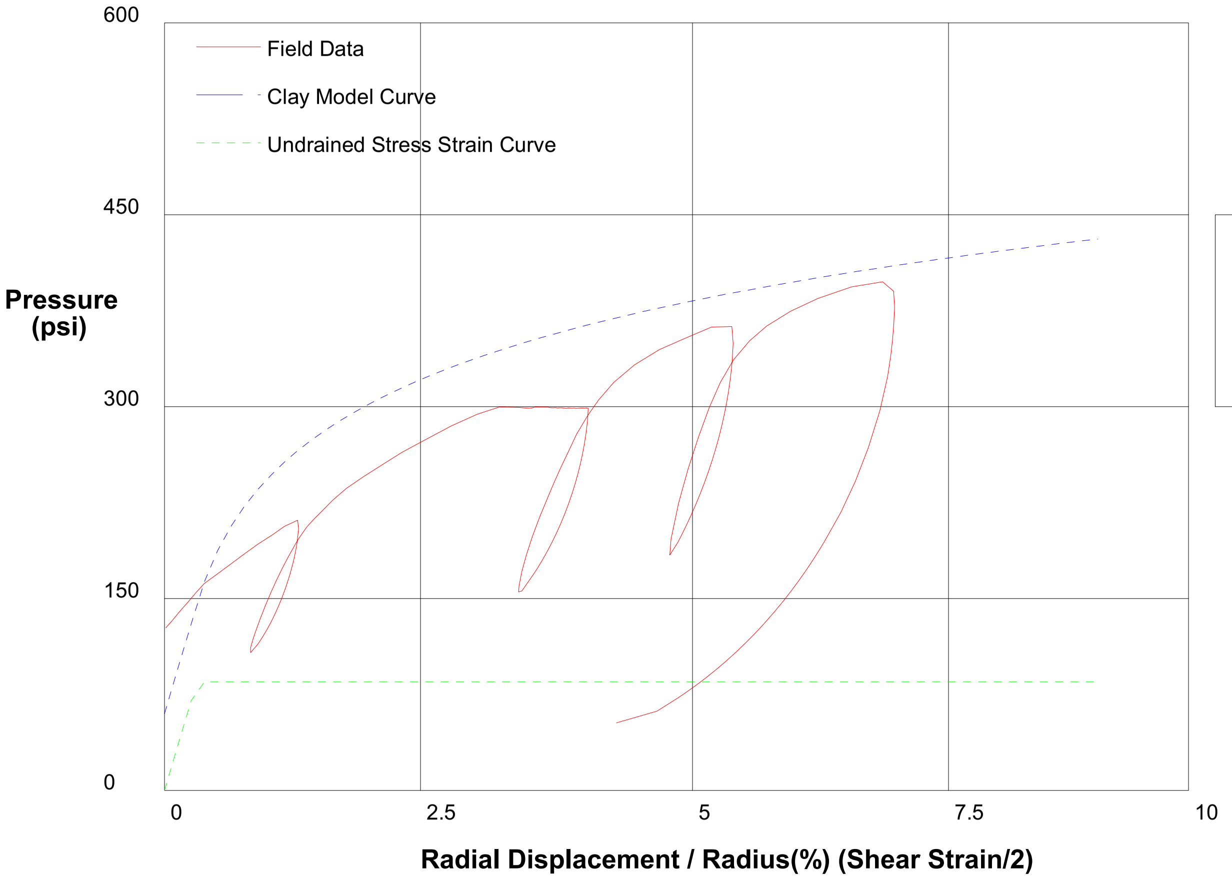
In Situ Engineering

PRESSUREMETER DATA

Schnabel Engineering, LLC.

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/29/2008**

Hole No. PM701 **Depth 139.3ft** **File C:\DATA\ISE-765\CC27.P**



shift 3

In Situ Engineering

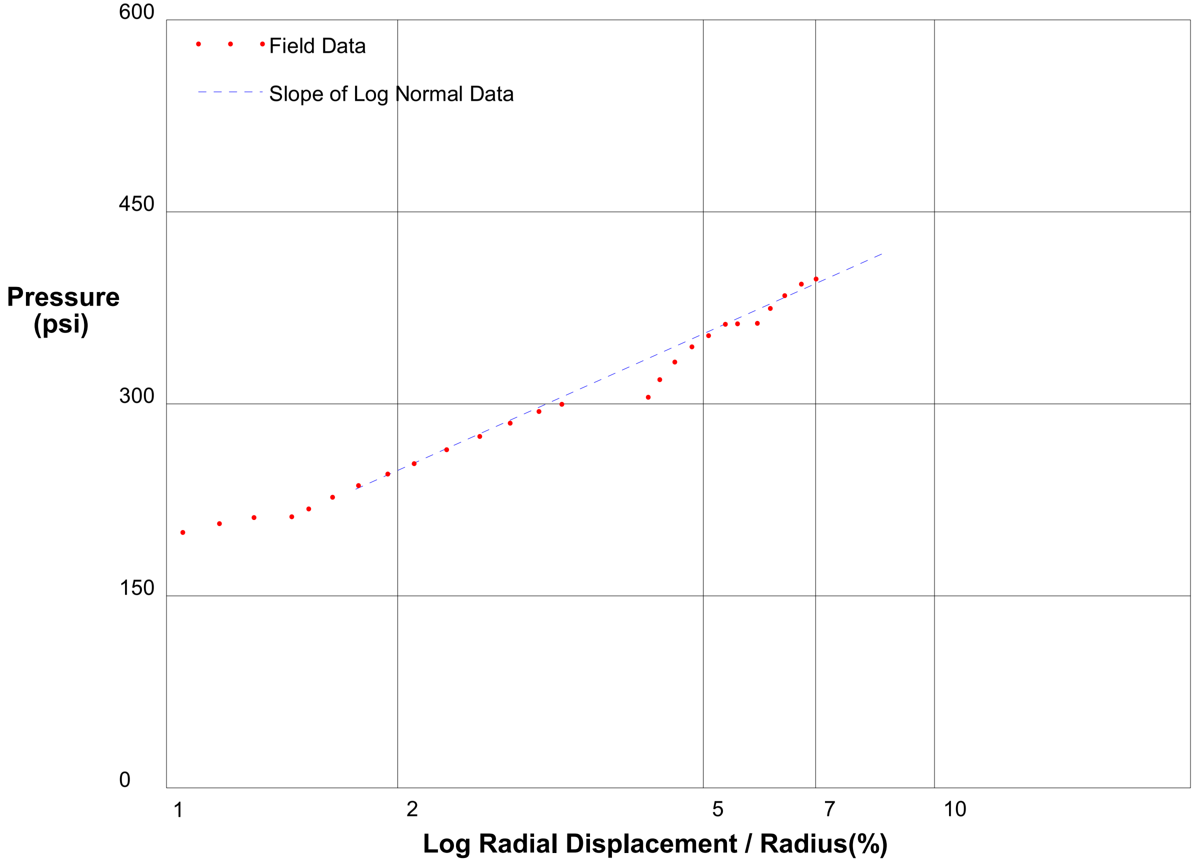
GIBSON'S CLAY MODEL

Shear Strength 85 psi
Insitu Stress 60 psi
Shear Modulus 13500 psi

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/29/2008**

Hole No. PM701 **Depth 139.3ft** **File C:\DATA\ISE-765\CC27.P**



Shear Strength 116.5 psi
Limit Pressure 599 psi

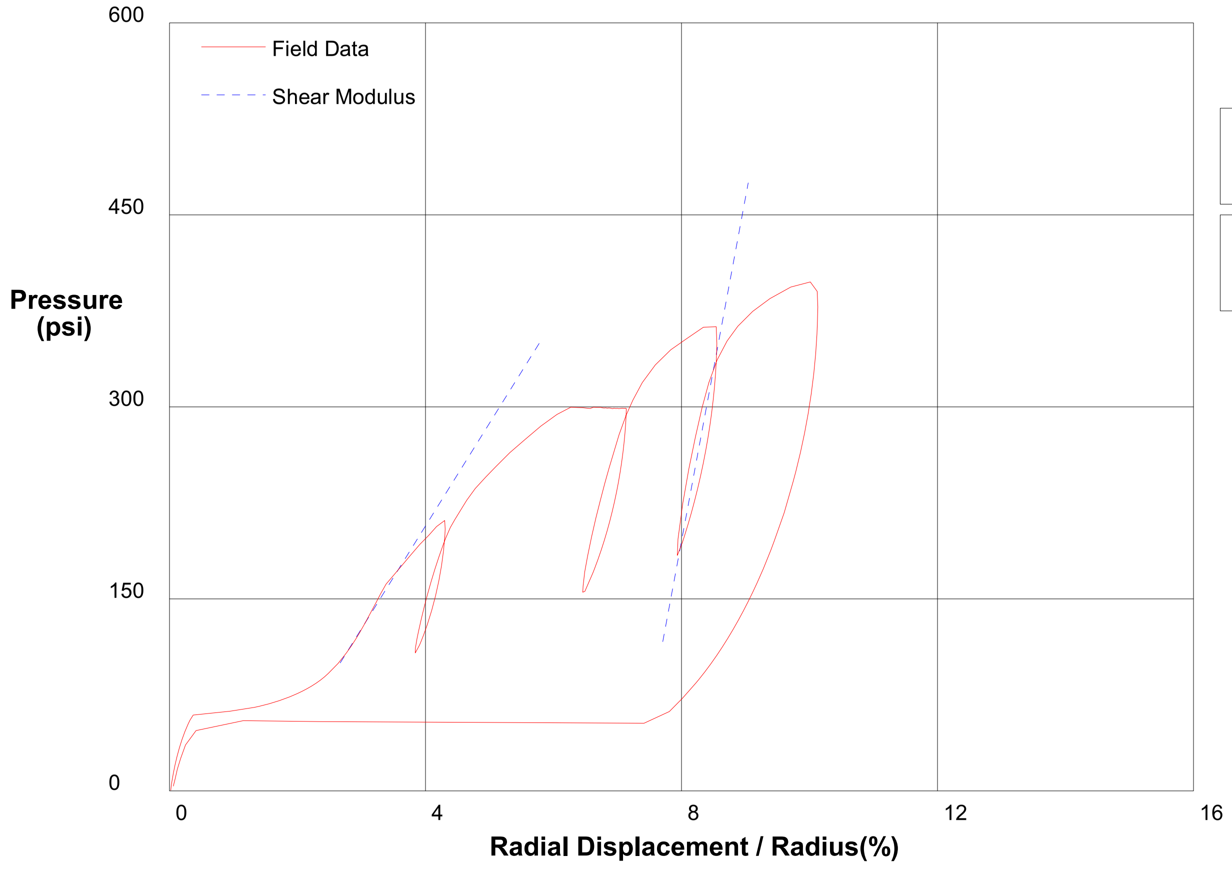
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/29/2008**

Hole No. PM701 **Depth 139.3ft** **File C:\DATA\ISE-765\CC27.P**



Shear Modulus 4013 psi

Shear Modulus 13437 psi

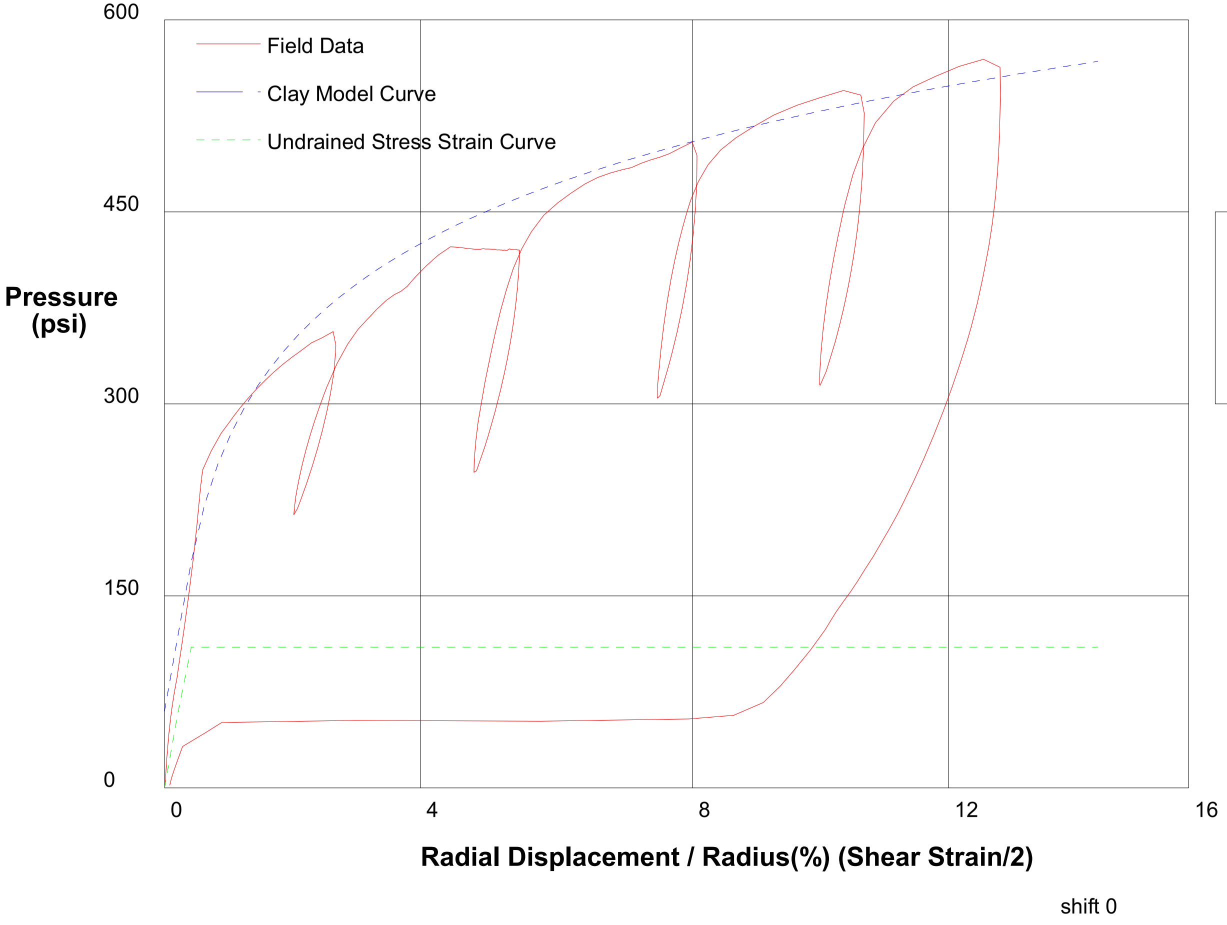
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/29/2008**

Hole No. PM701 **Depth 150.9ft** **File C:\DATA\ISE-765\CC28.P**



GIBSON'S CLAY MODEL

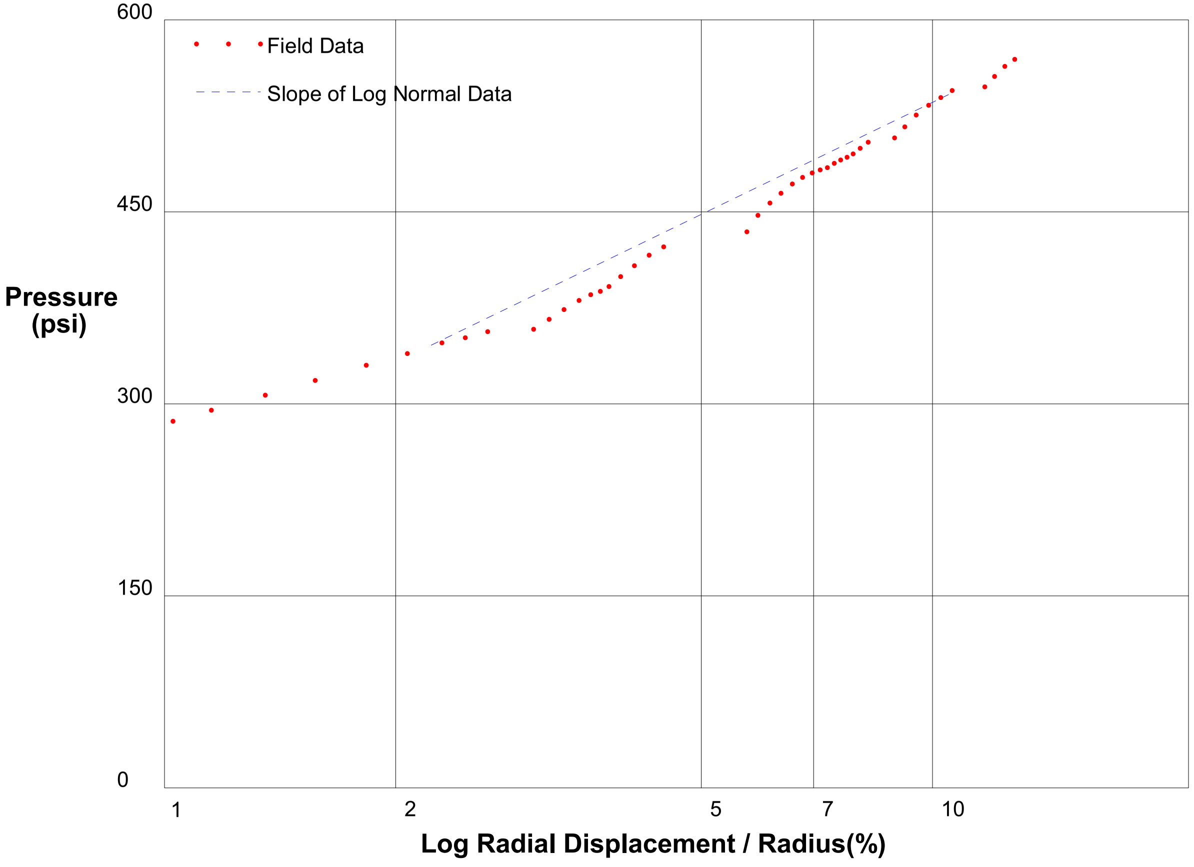
Shear Strength 110 psi
Insitu Stress 60 psi
Shear Modulus 14000 psi

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/29/2008**

Hole No. PM701 **Depth 150.9ft** **File C:\DATA\ISE-765\CC28.P**



Shear Strength 126.2 psi
Limit Pressure 713 psi

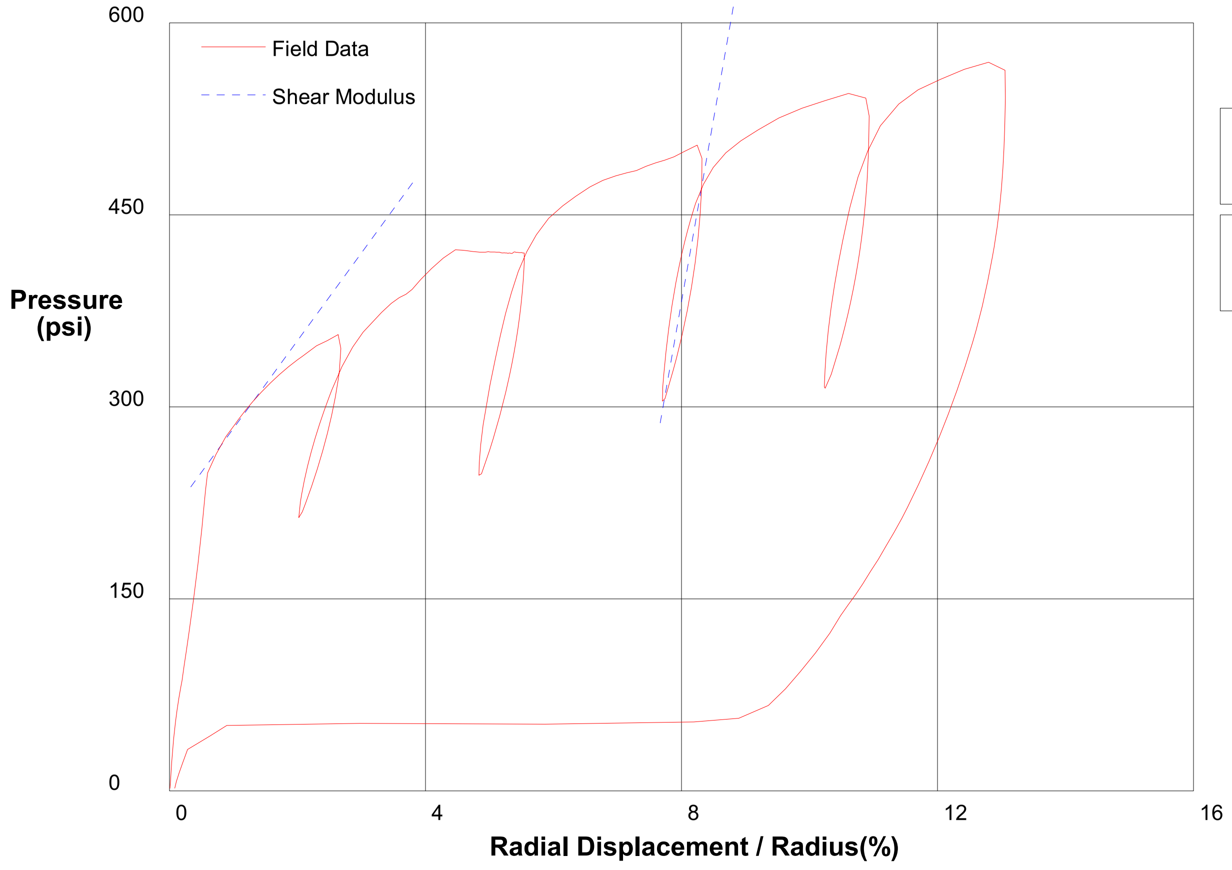
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/29/2008**

Hole No. PM701 **Depth 150.9ft** **File C:\DATA\ISE-765\CC28.P**



Shear Modulus 3428 psi

Shear Modulus 14221 psi

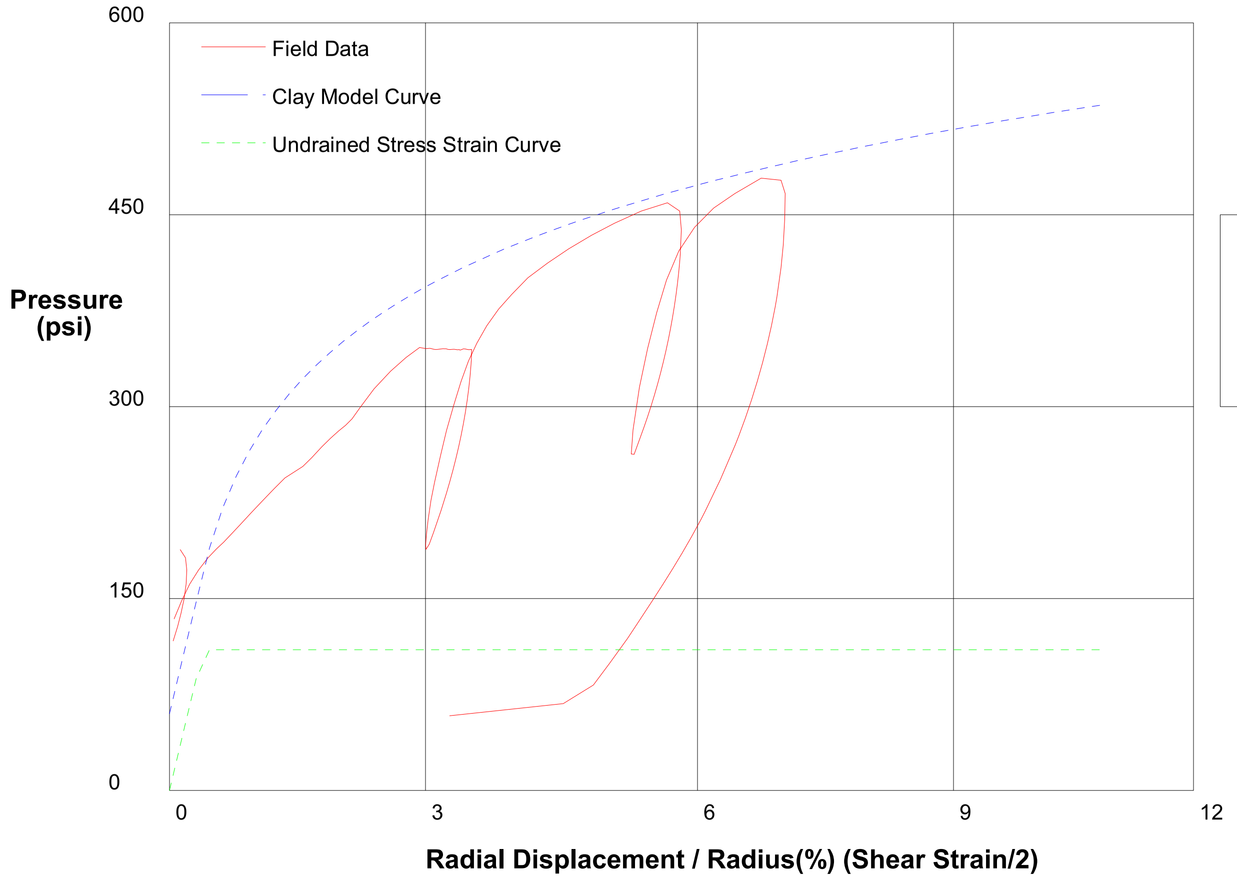
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **8/29/2008**

Hole No. PM701 **Depth 149.4ft** **File C:\DATA\ISE-765\CC29.P**



GIBSON'S CLAY MODEL

Shear Strength 110 psi
Insitu Stress 60 psi
Shear Modulus 14000 psi

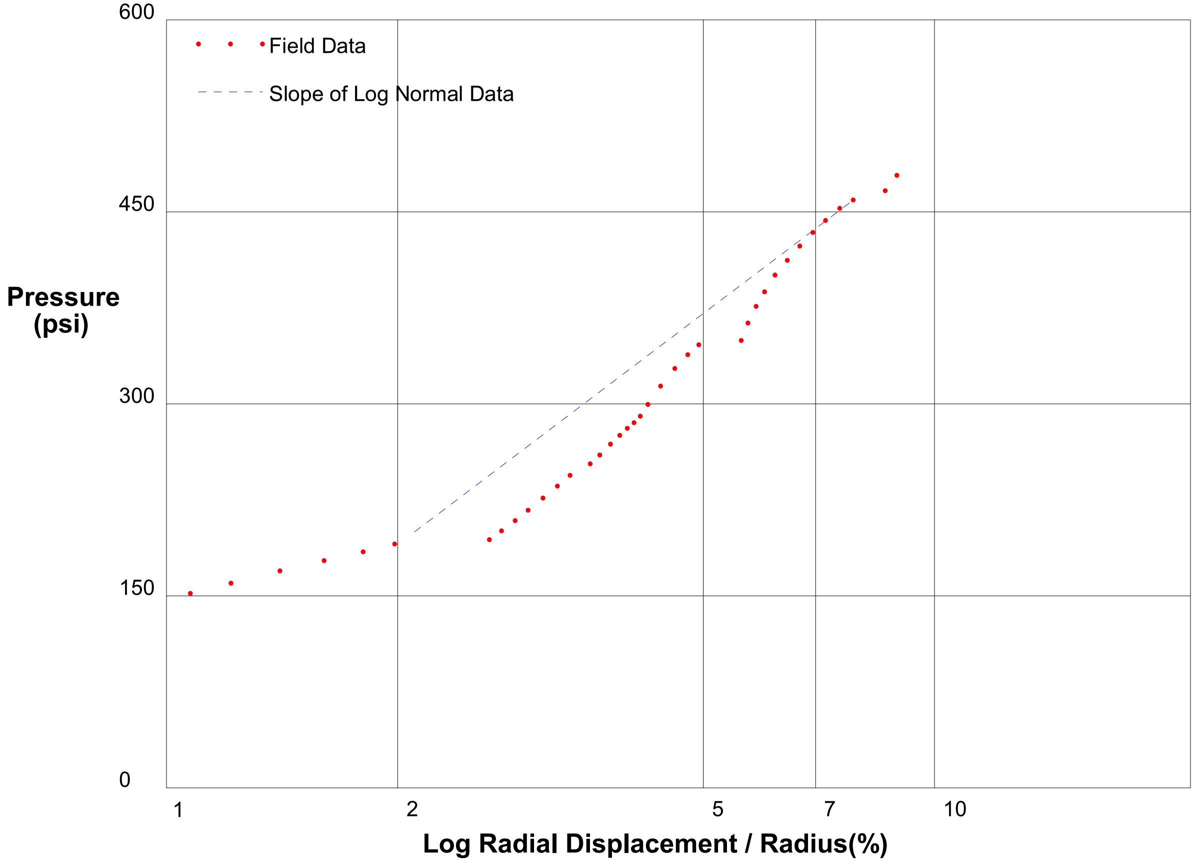
shift 4

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/29/2008**

Hole No. PM701 **Depth 149.4ft** **File C:\DATA\ISE-765\CC29.P**



Shear Strength 197 psi
Limit Pressure 785 psi

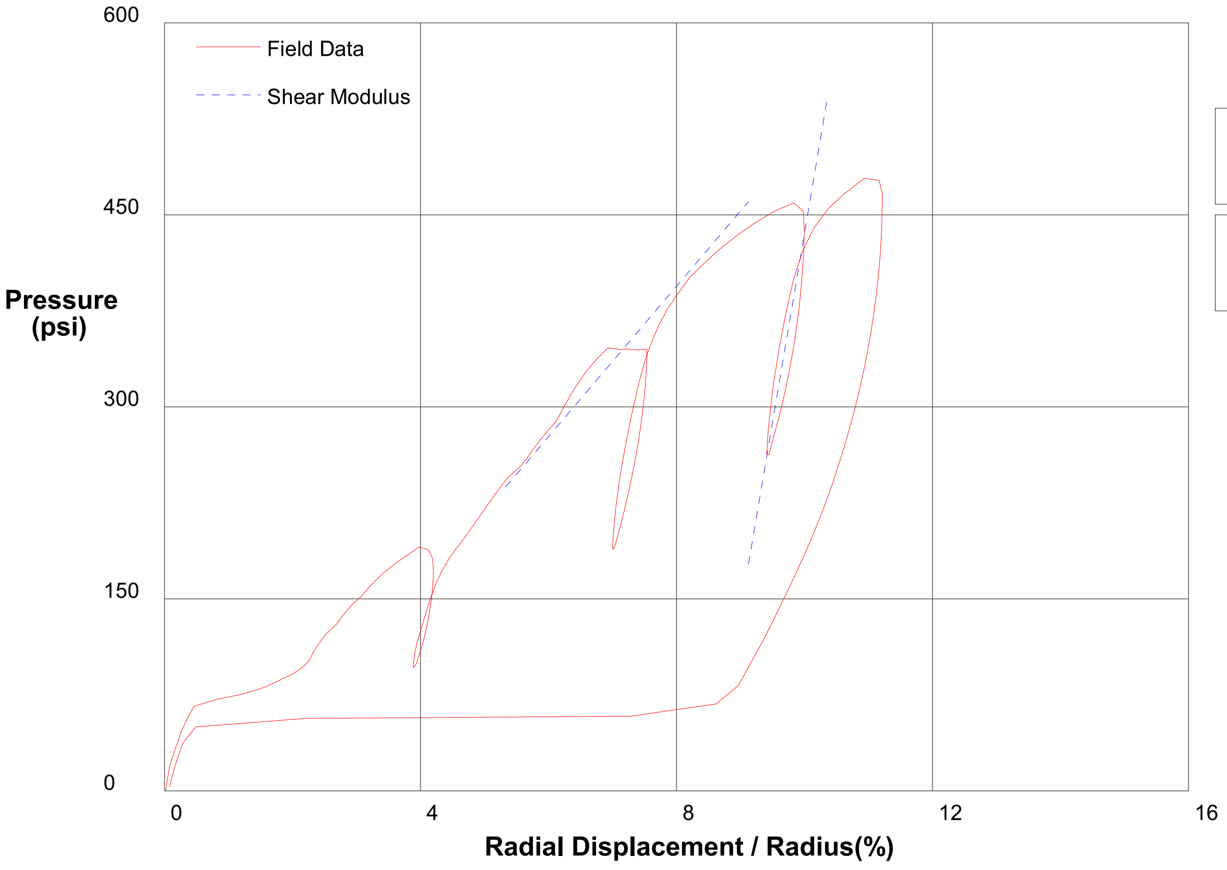
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **8/29/2008**

Hole No. PM701 **Depth 149.4ft** **File C:\DATA\ISE-765\CC29.P**



Shear Modulus 2939 psi

Shear Modulus 14788 psi

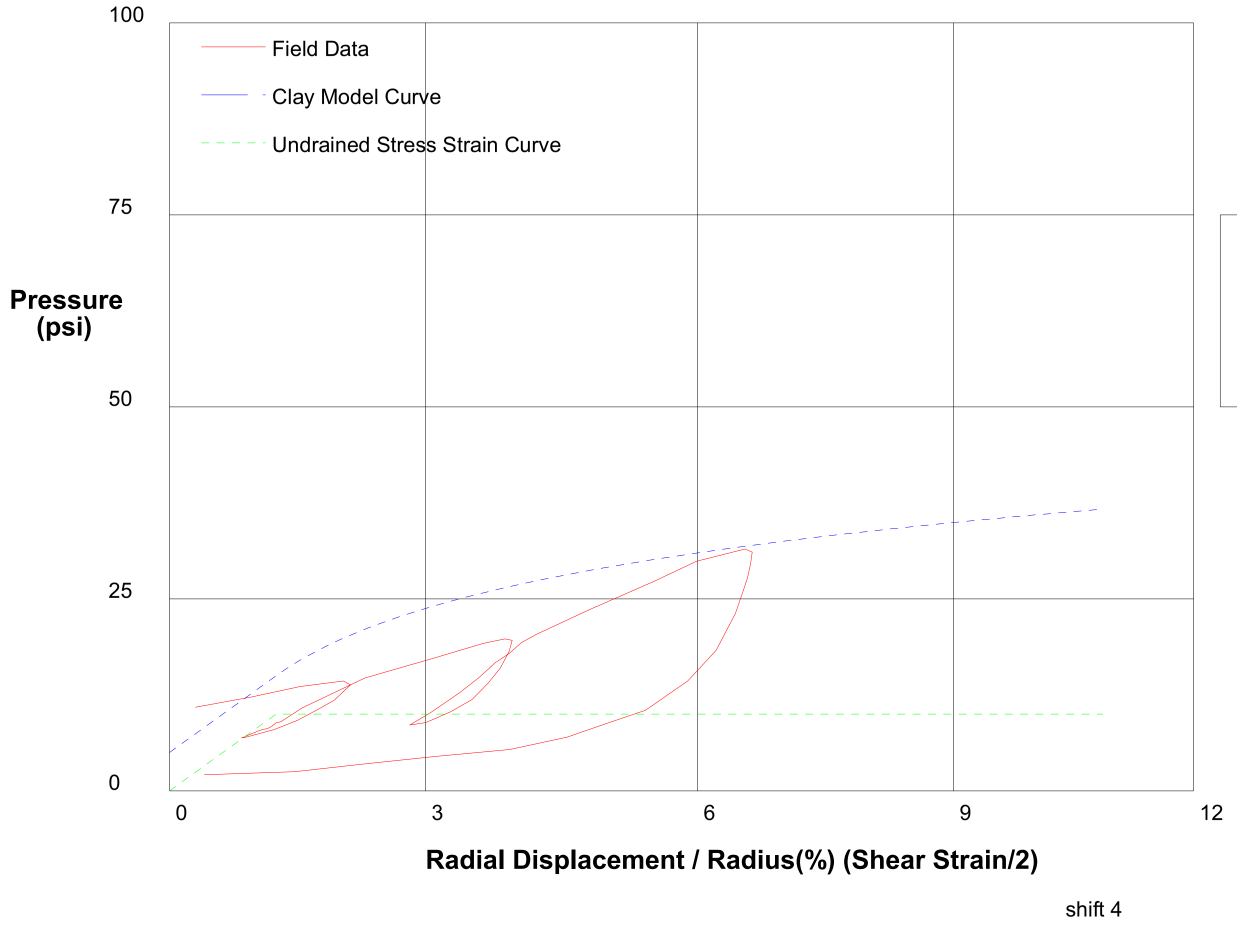
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/2/2008**

Hole No. PM301 **Depth 9ft** **File C:\DATA\ISE-765\CC30.P**

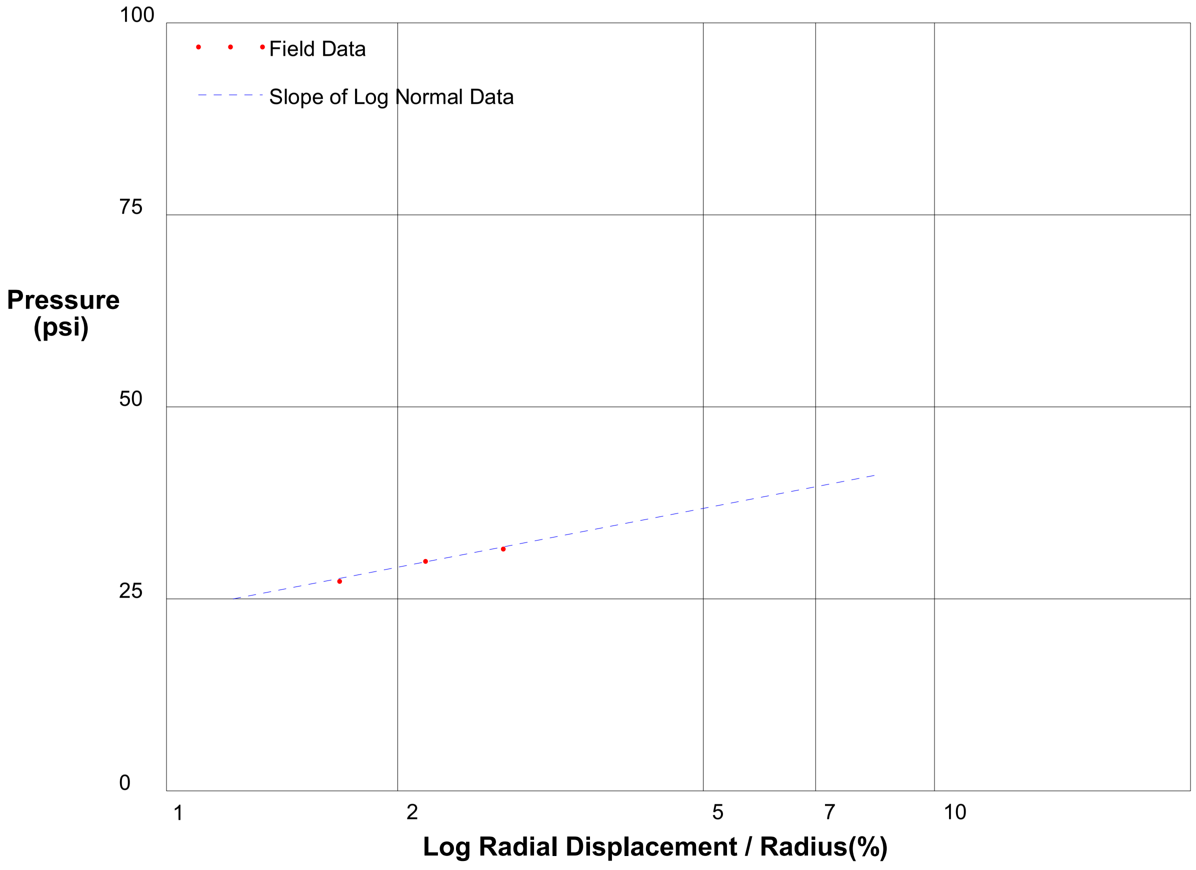


GIBSON'S CLAY MODEL

Shear Strength 10 psi
Insitu Stress 5 psi
Shear Modulus 400 psi

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**
Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/2/2008**
Hole No. PM301 **Depth 9ft** **File C:\DATA\ISE-765\CC30.P**



Shear Strength 8.3 psi
Limit Pressure 54 psi

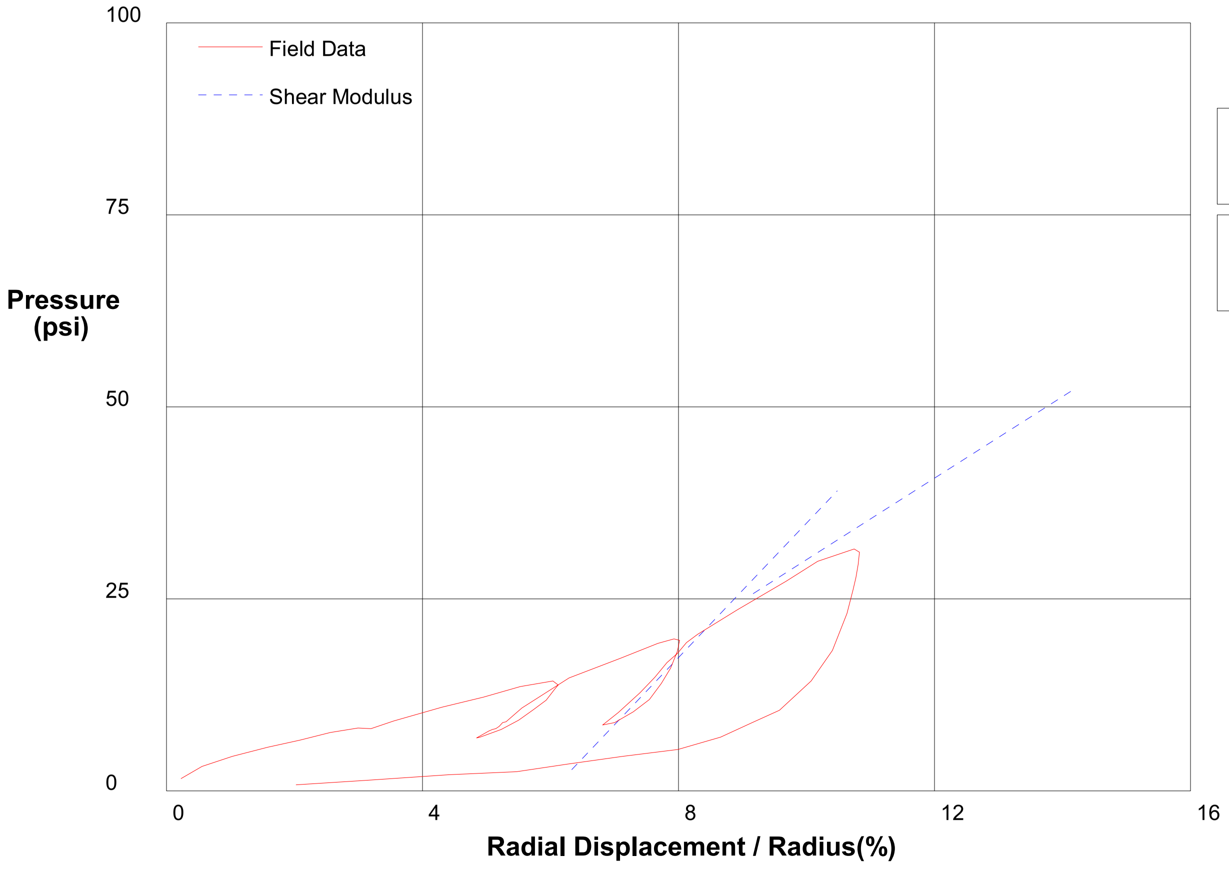
shift 8

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/2/2008**

Hole No. PM301 **Depth 9ft** **File C:\DATA\ISE-765\CC30.P**



Shear Modulus 265 psi

Shear Modulus 437 psi

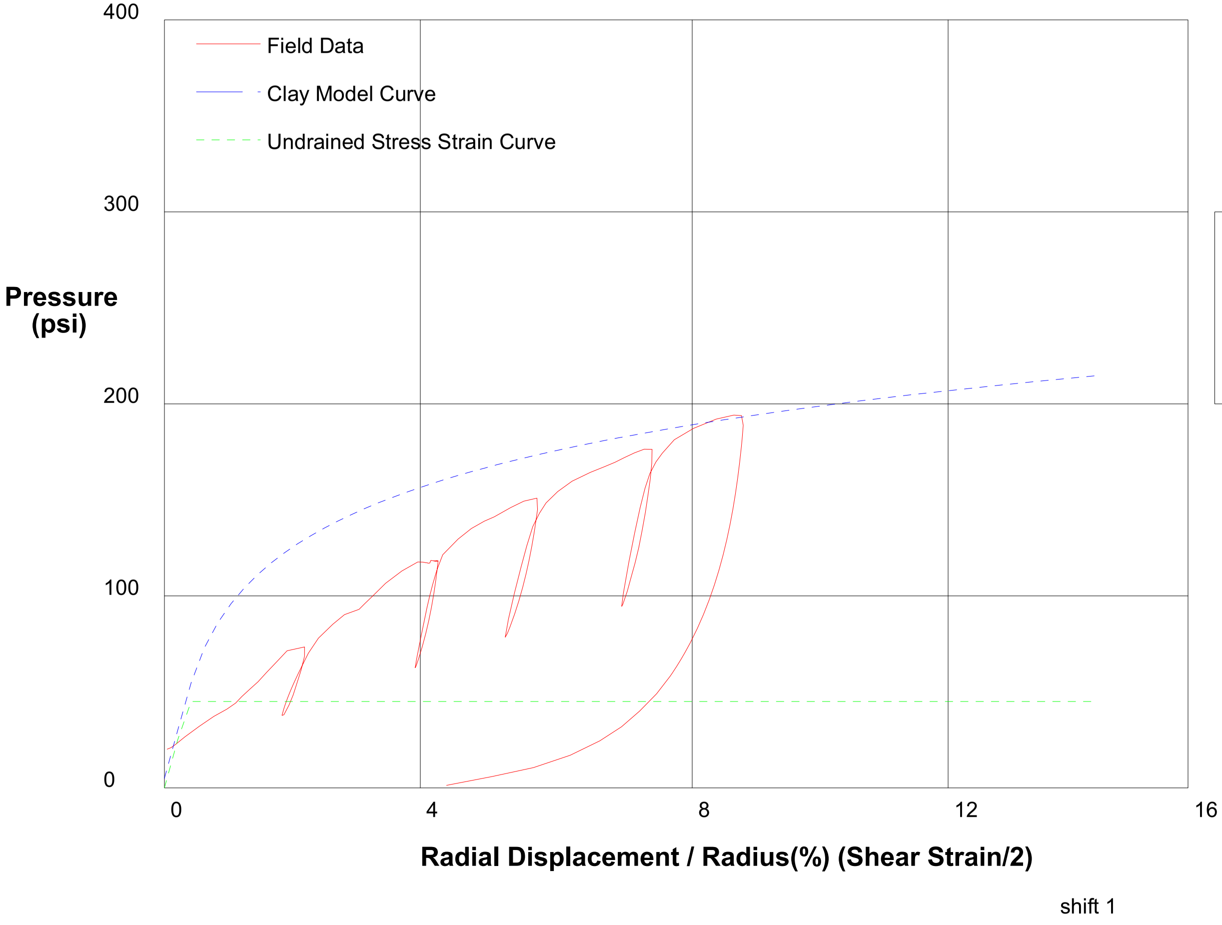
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/2/2008**

Hole No. PM301 **Depth 18ft** **File C:\DATA\ISE-765\CC31.P**



GIBSON'S CLAY MODEL

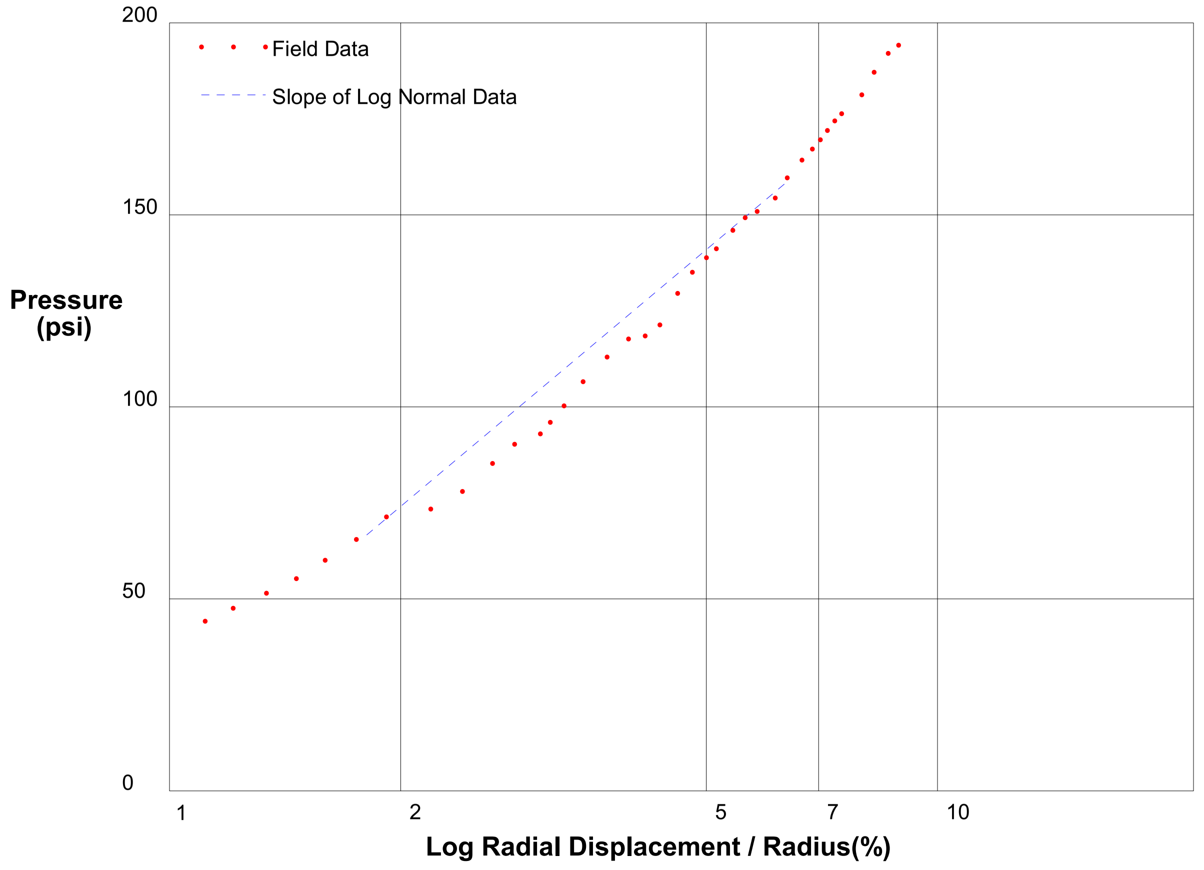
Shear Strength 45 psi
Insitu Stress 5 psi
Shear Modulus 6000 psi

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/2/2008**

Hole No. PM301 **Depth 18ft** **File C:\DATA\ISE-765\CC31.P**



Shear Strength 72.9 psi
Limit Pressure 294 psi

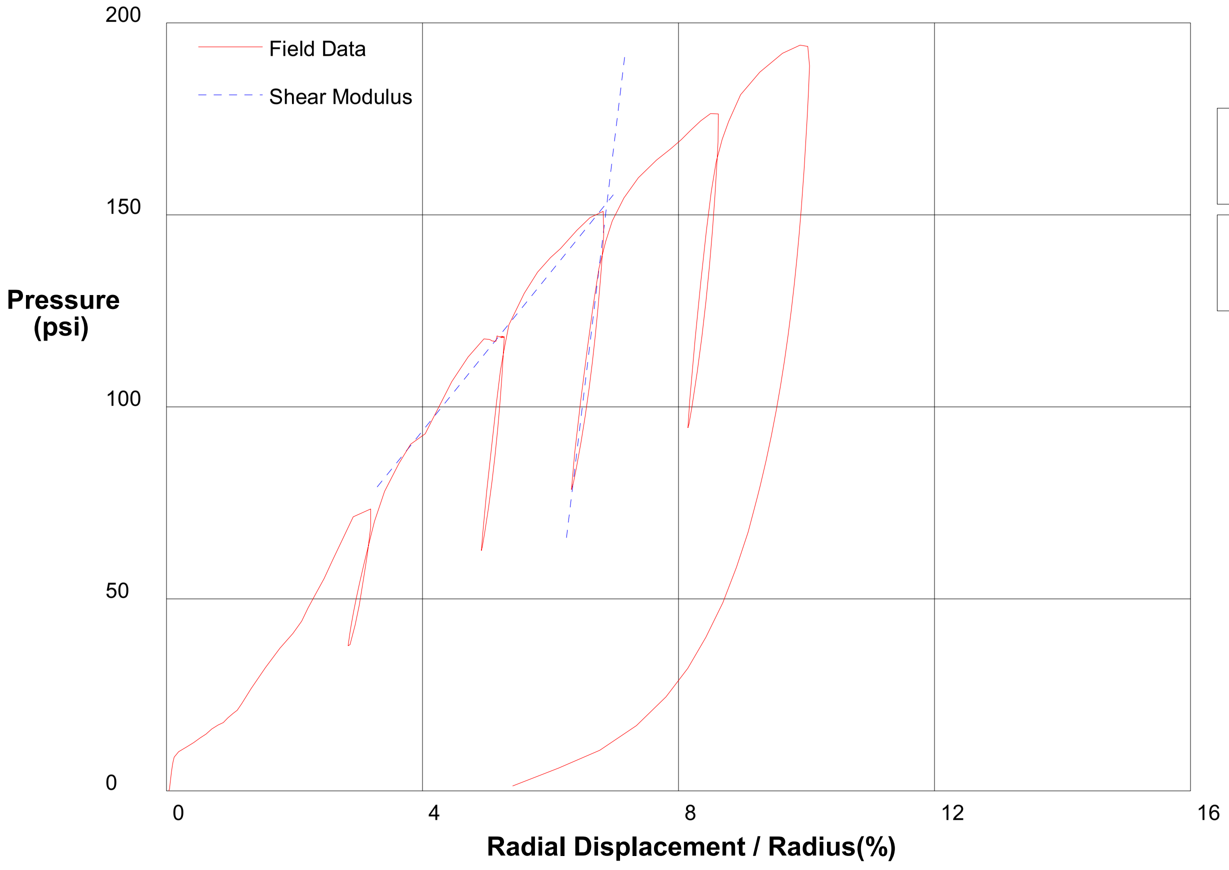
shift 1

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/2/2008**

Hole No. PM301 **Depth 18ft** **File C:\DATA\ISE-765\CC31.P**



Shear Modulus 1031 psi

Shear Modulus 6893 psi

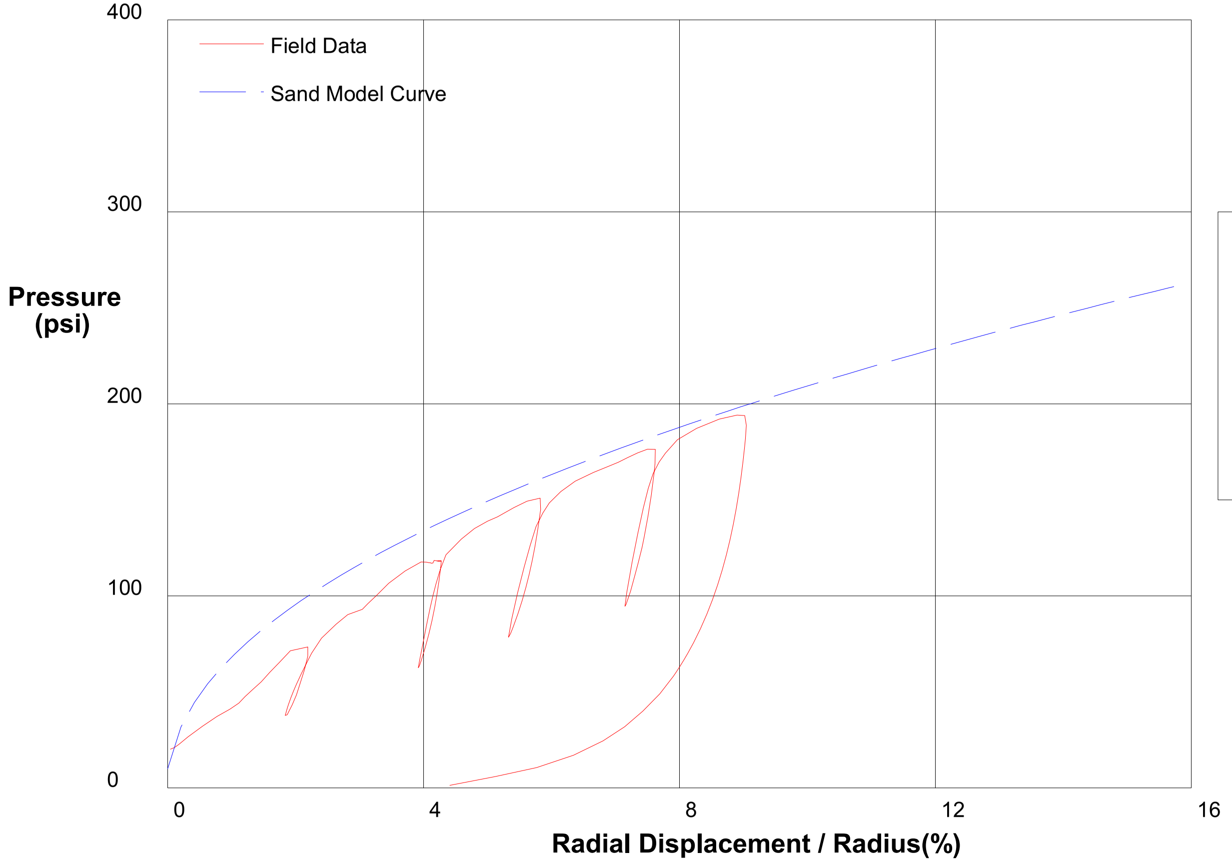
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/2/2008**

Hole No. PM301 **Depth 18ft** **File C:\DATA\ISE-765\CC31.P**



THE In Situ Engineering SAND MODEL

Water Pressure	**0 psi**
Friction Angle	**42 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**10 psi**
Shear Modulus	**6000 psi**

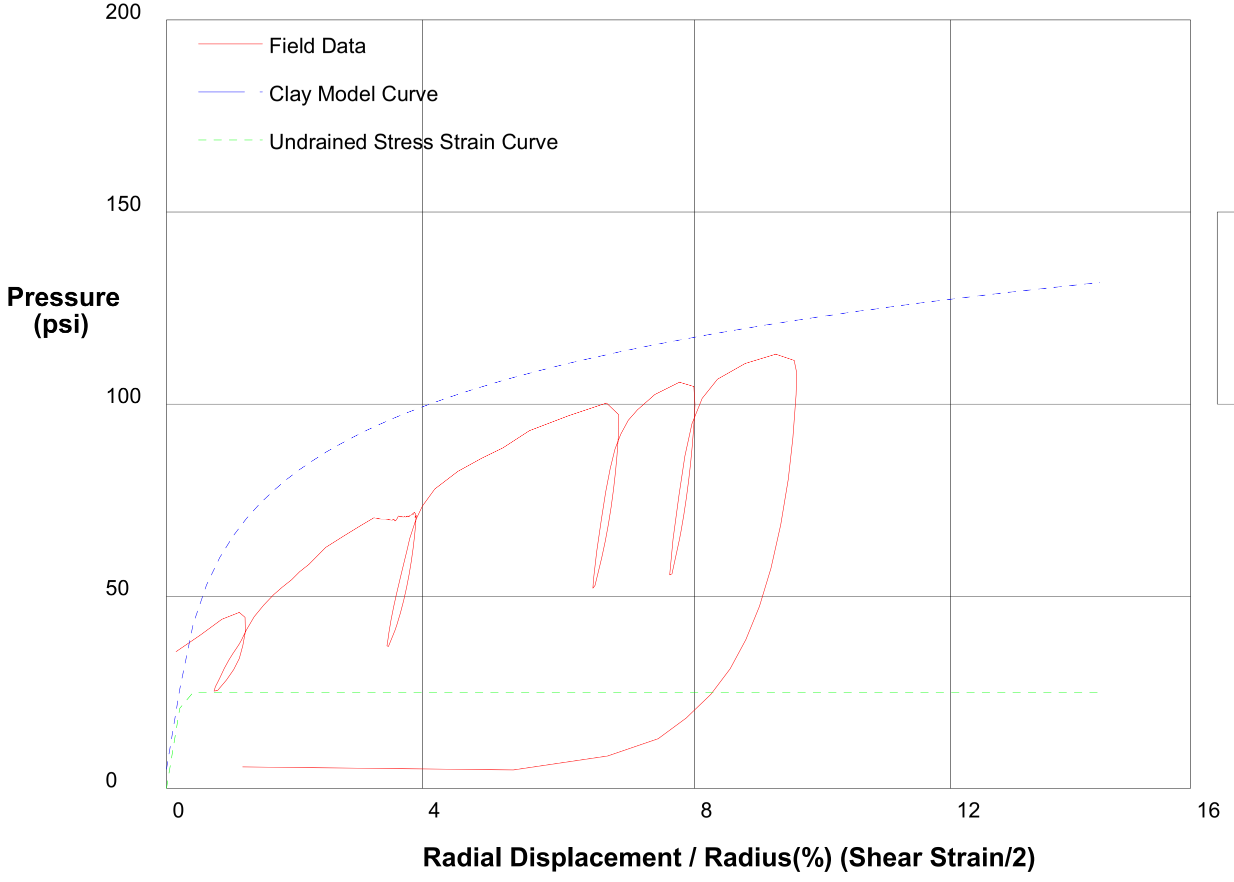
shift 1

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/2/2008**

Hole No. PM301 **Depth 29.5ft** **File C:\DATA\ISE-765\CC32.P**



GIBSON'S CLAY MODEL

Shear Strength 25 psi
Insitu Stress 5 psi
Shear Modulus 5000 psi

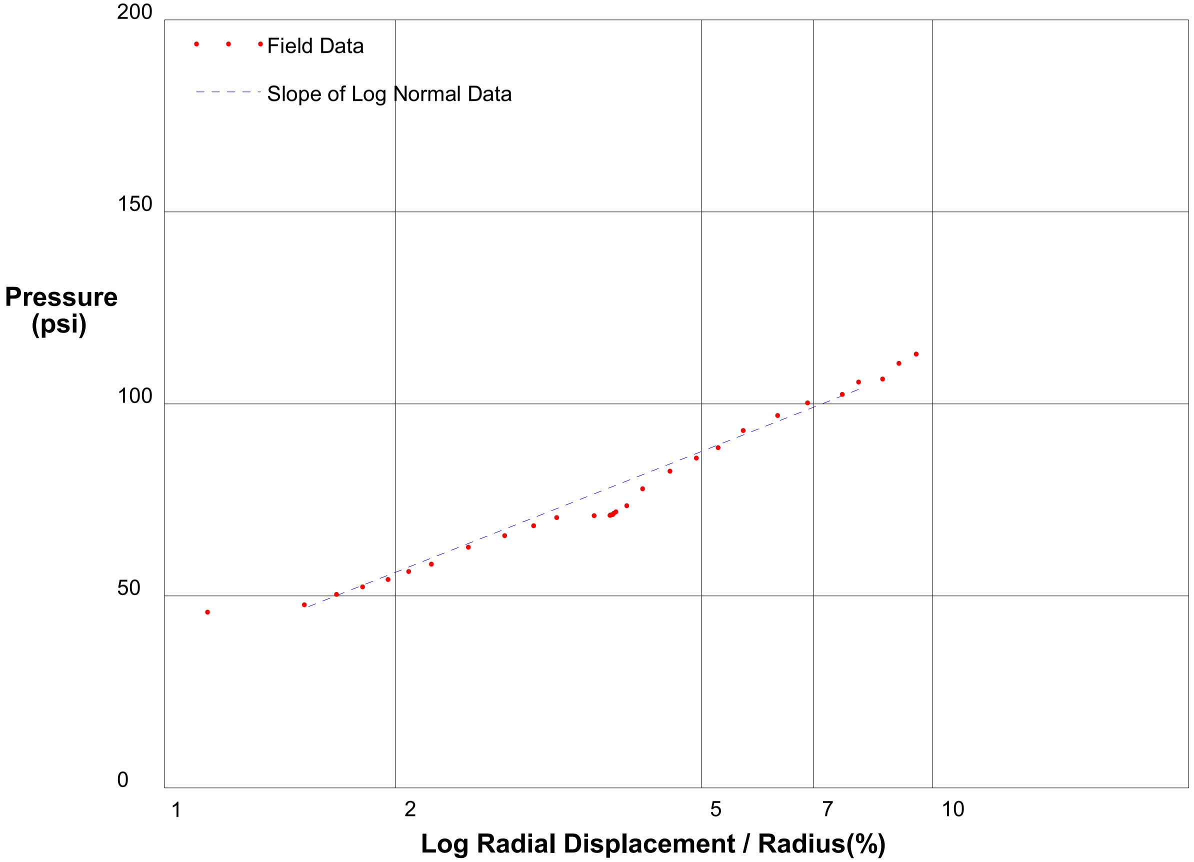
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/2/2008**

Hole No. PM301 **Depth 29.5ft** **File C:\DATA\ISE-765\CC32.P**



Shear Strength 34.2 psi
Limit Pressure 159 psi

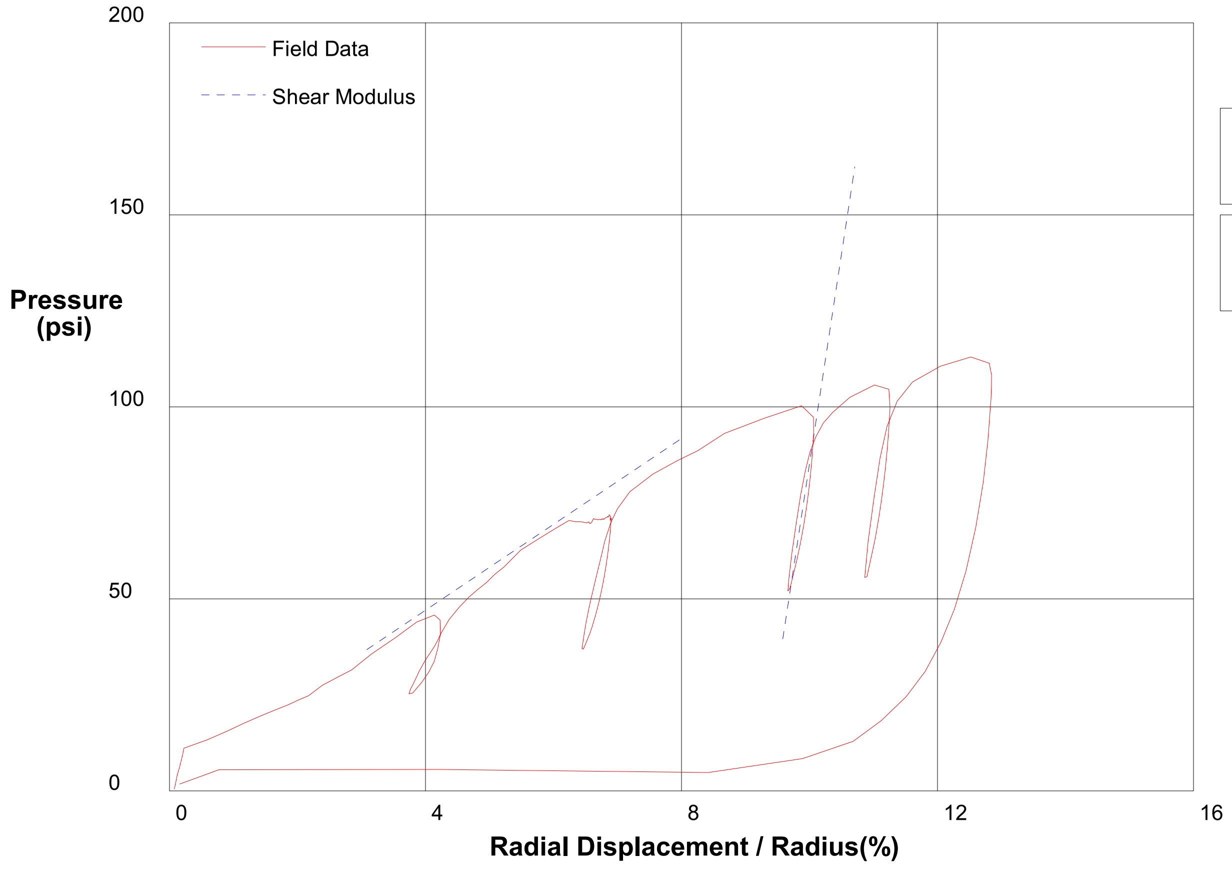
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/2/2008**

Hole No. PM301 **Depth 29.5ft** **File C:\DATA\ISE-765\CC32.P**



Shear Modulus 559 psi

Shear Modulus 5462 psi

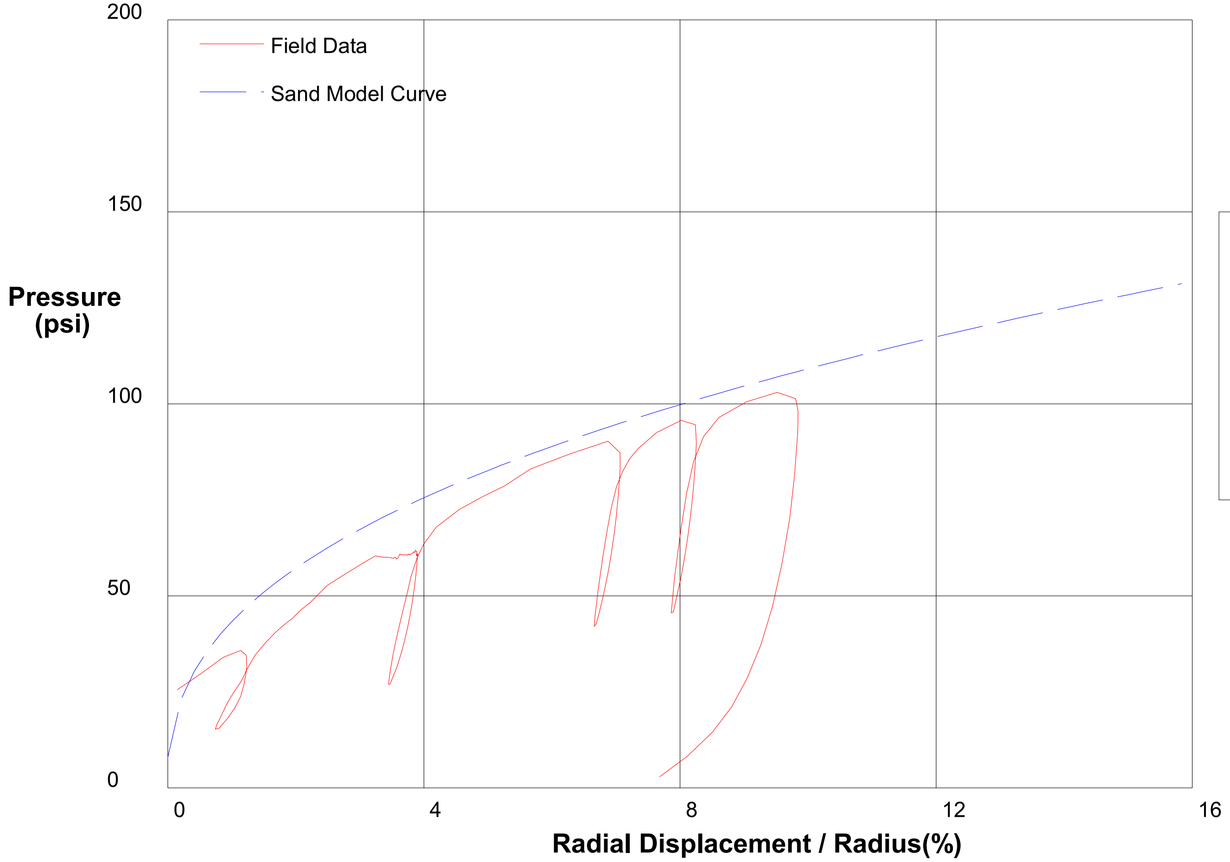
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/2/2008**

Hole No. PM301 **Depth 29.5ft** **File C:\DATA\ISE-765\CC32.P**



THE In Situ Engineering SAND MODEL

Water Pressure	**10 psi**
Friction Angle	**36 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**8 psi**
Shear Modulus	**5000 psi**

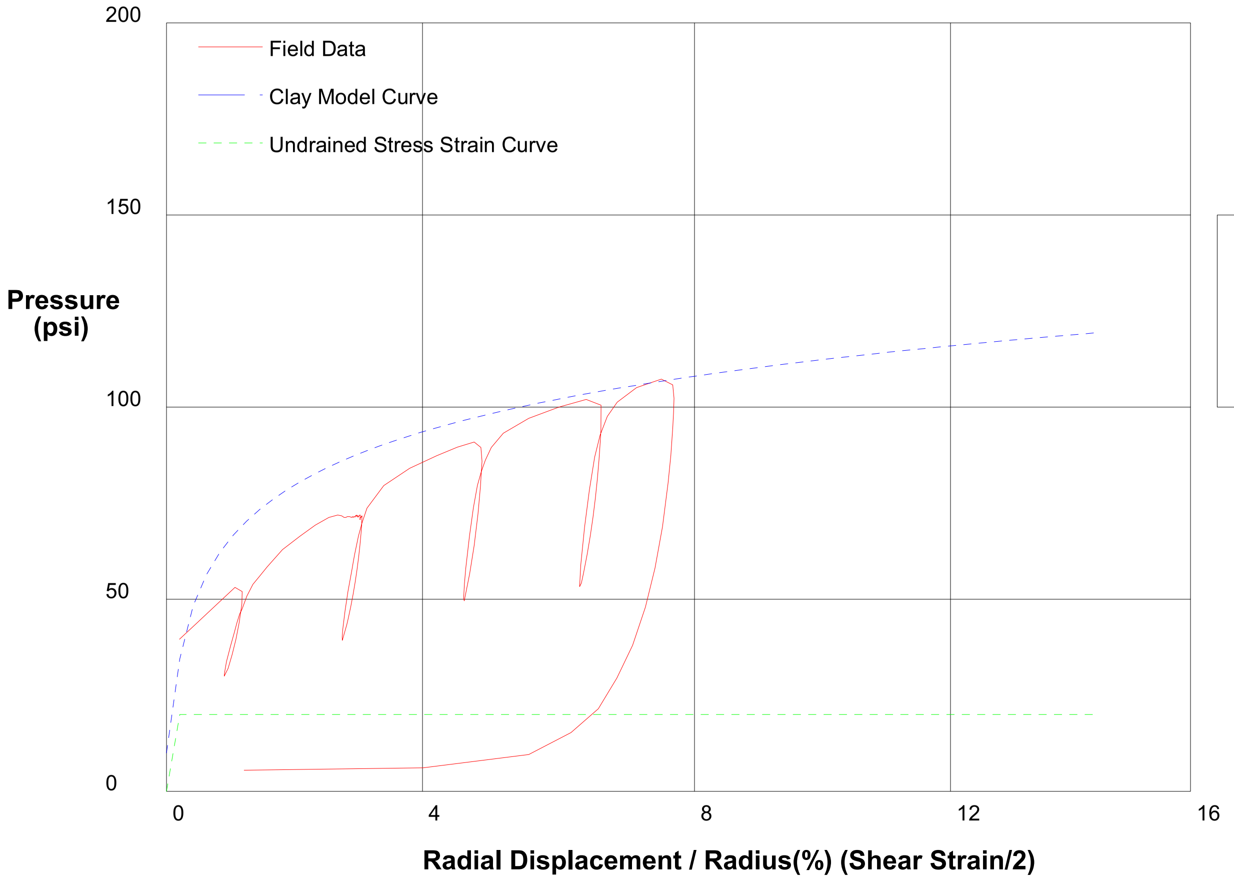
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/2/2008**

Hole No. PM301 **Depth 28ft** **File C:\DATA\ISE-765\CC33.P**



GIBSON'S CLAY MODEL

Shear Strength 20 psi
Insitu Stress 10 psi
Shear Modulus 6000 psi

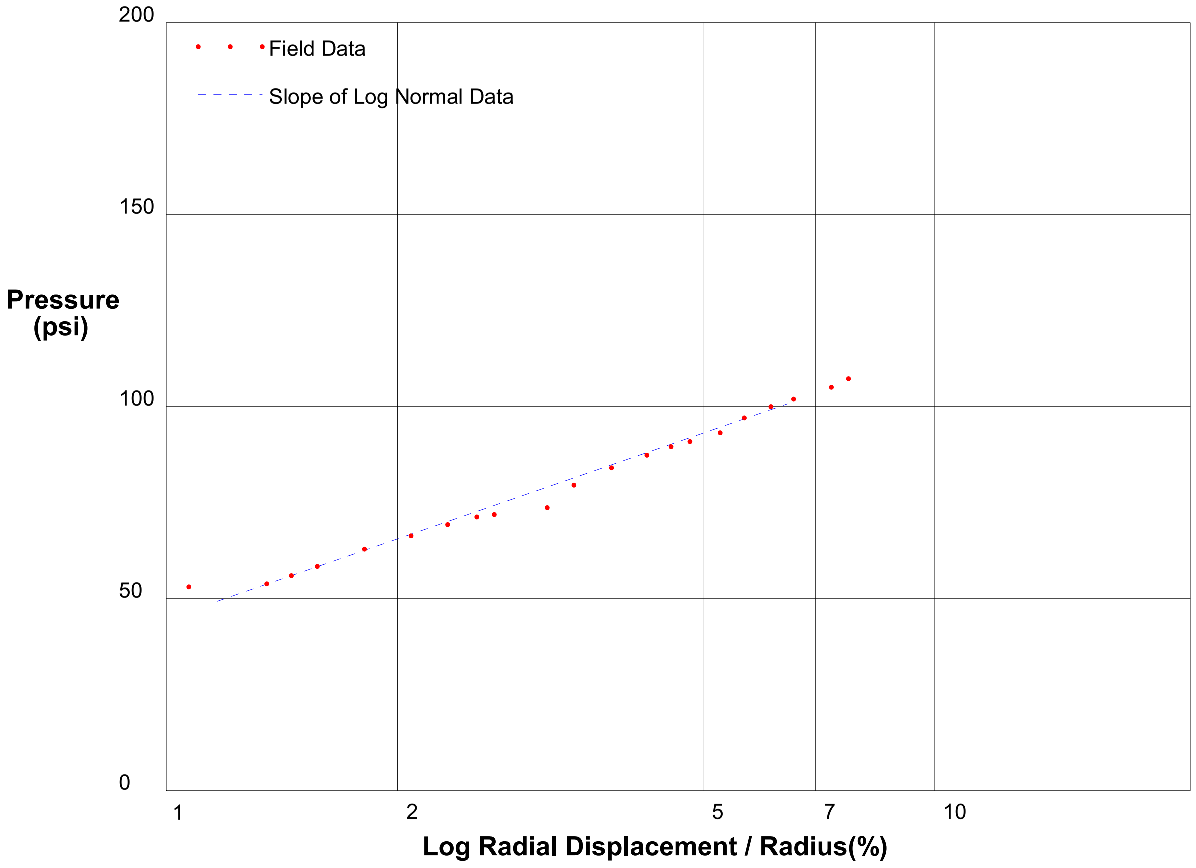
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/2/2008**

Hole No. PM301 **Depth 28ft** **File C:\DATA\ISE-765\CC33.P**



Shear Strength 30 psi
Limit Pressure 156 psi

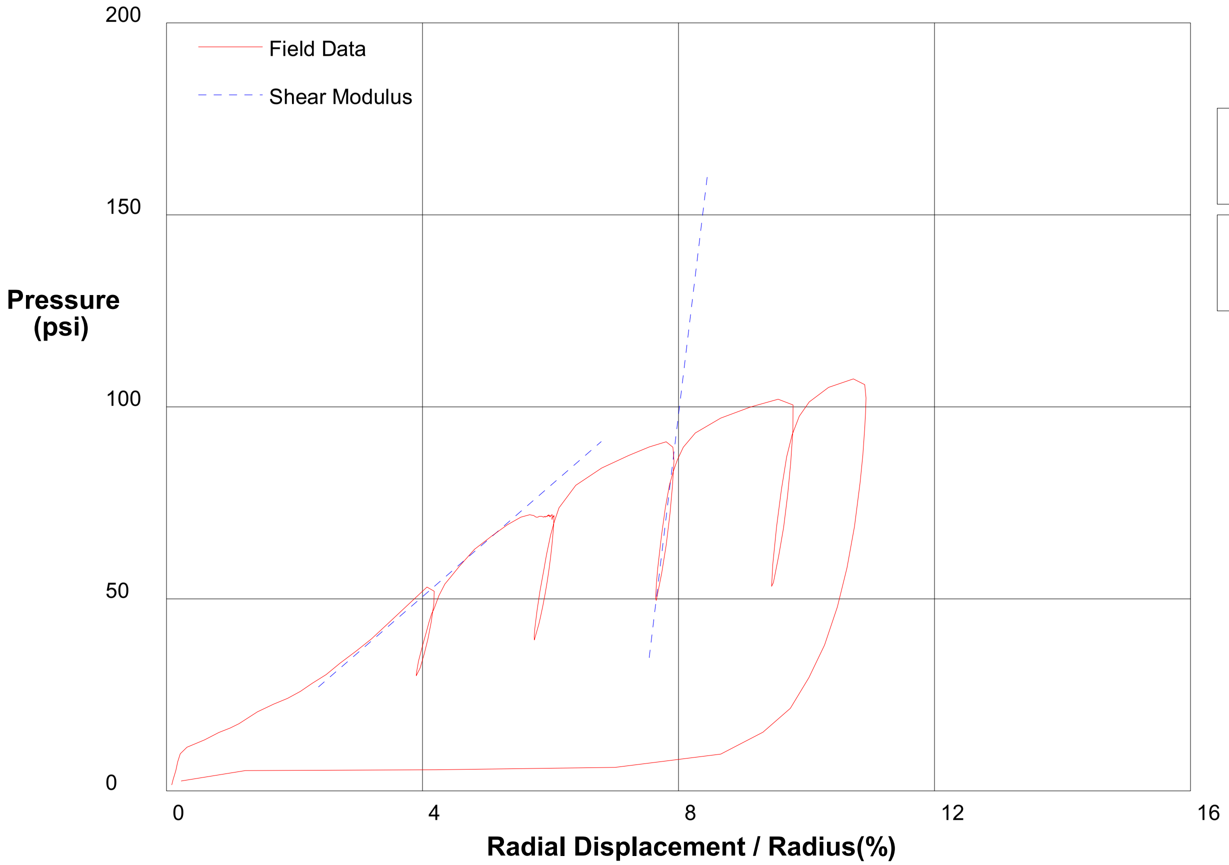
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/2/2008**

Hole No. PM301 **Depth 28ft** **File C:\DATA\ISE-765\CC33.P**



Shear Modulus 723 psi

Shear Modulus 6893 psi

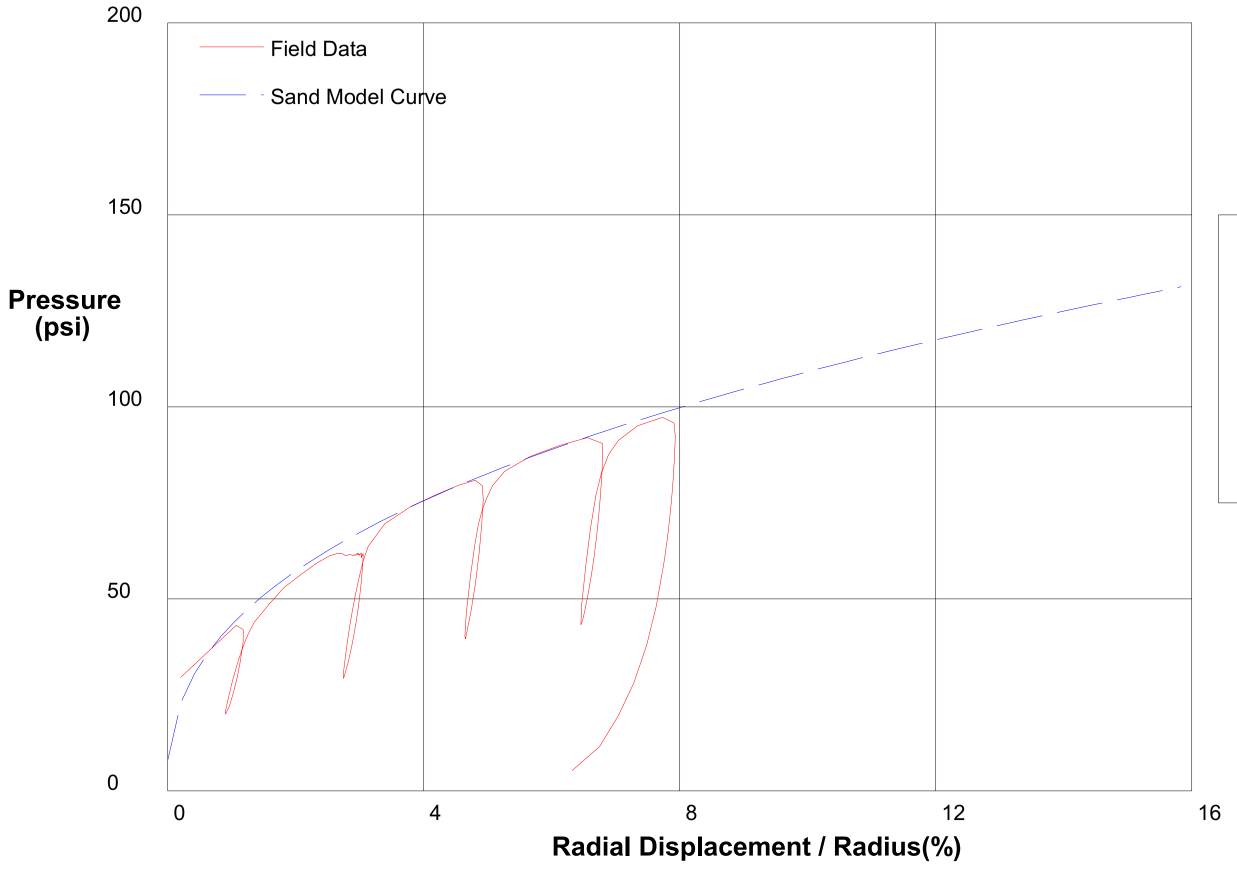
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/2/2008**

Hole No. PM301 **Depth 28ft** **File C:\DATA\ISE-765\CC33.P**



THE In Situ Engineering SAND MODEL

Water Pressure	**10 psi**
Friction Angle	**36 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**8 psi**
Shear Modulus	**5000 psi**

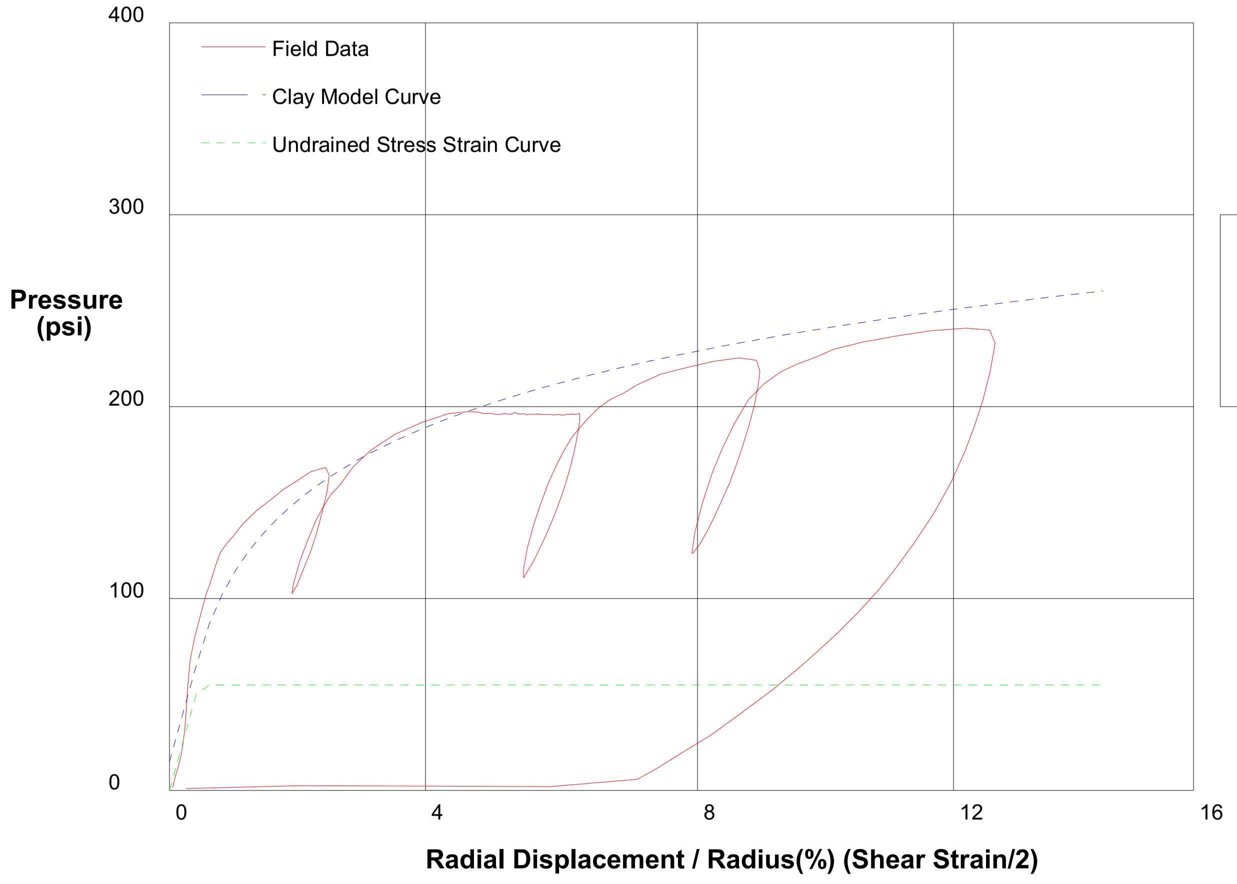
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/3/2008**

Hole No. PM301 **Depth 41ft** **File C:\DATA\ISE-765\CC34.P**



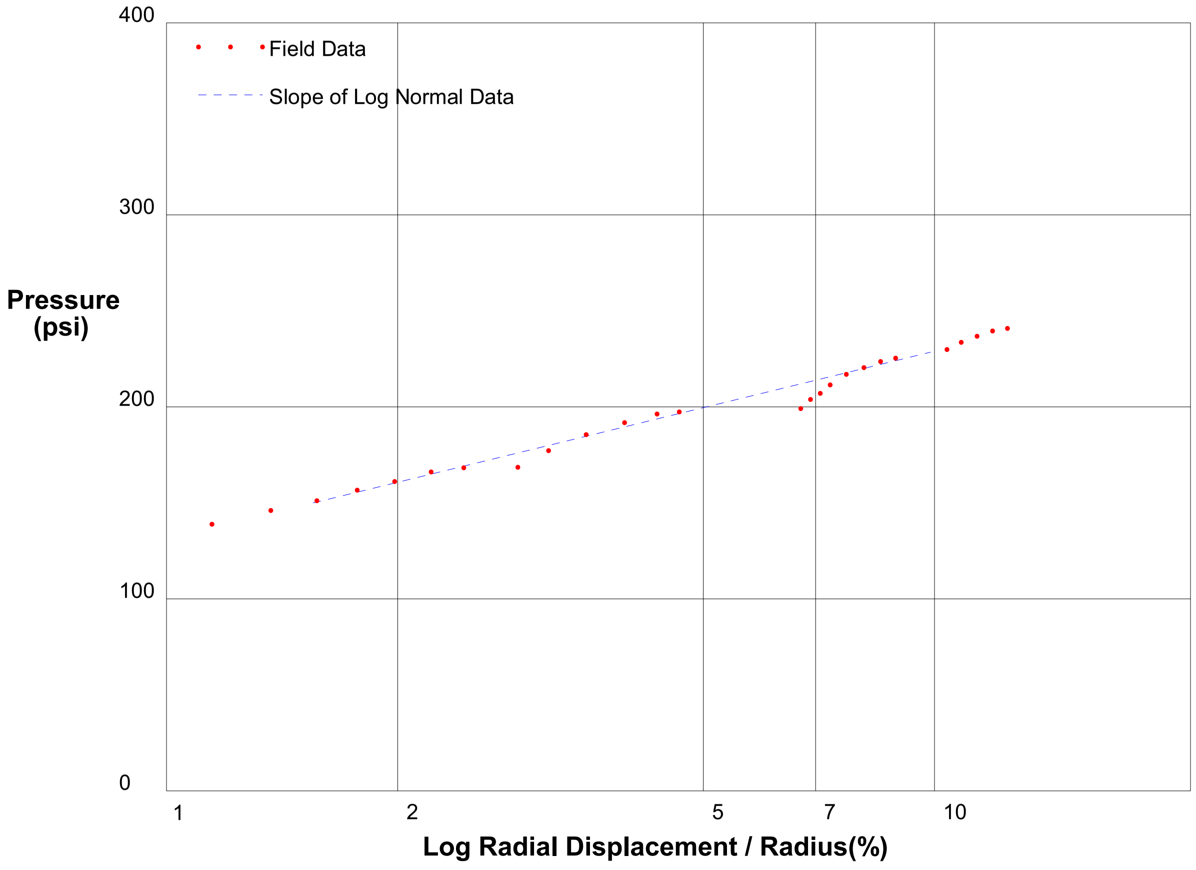
shift 0

GIBSON'S CLAY MODEL

Shear Strength 55 psi
Insitu Stress 15 psi
Shear Modulus 6000 psi

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**
Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/3/2008**
Hole No. PM301 **Depth 41ft** **File C:\DATA\ISE-765\CC34.P**



Shear Strength 42.3 psi
Limit Pressure 288 psi

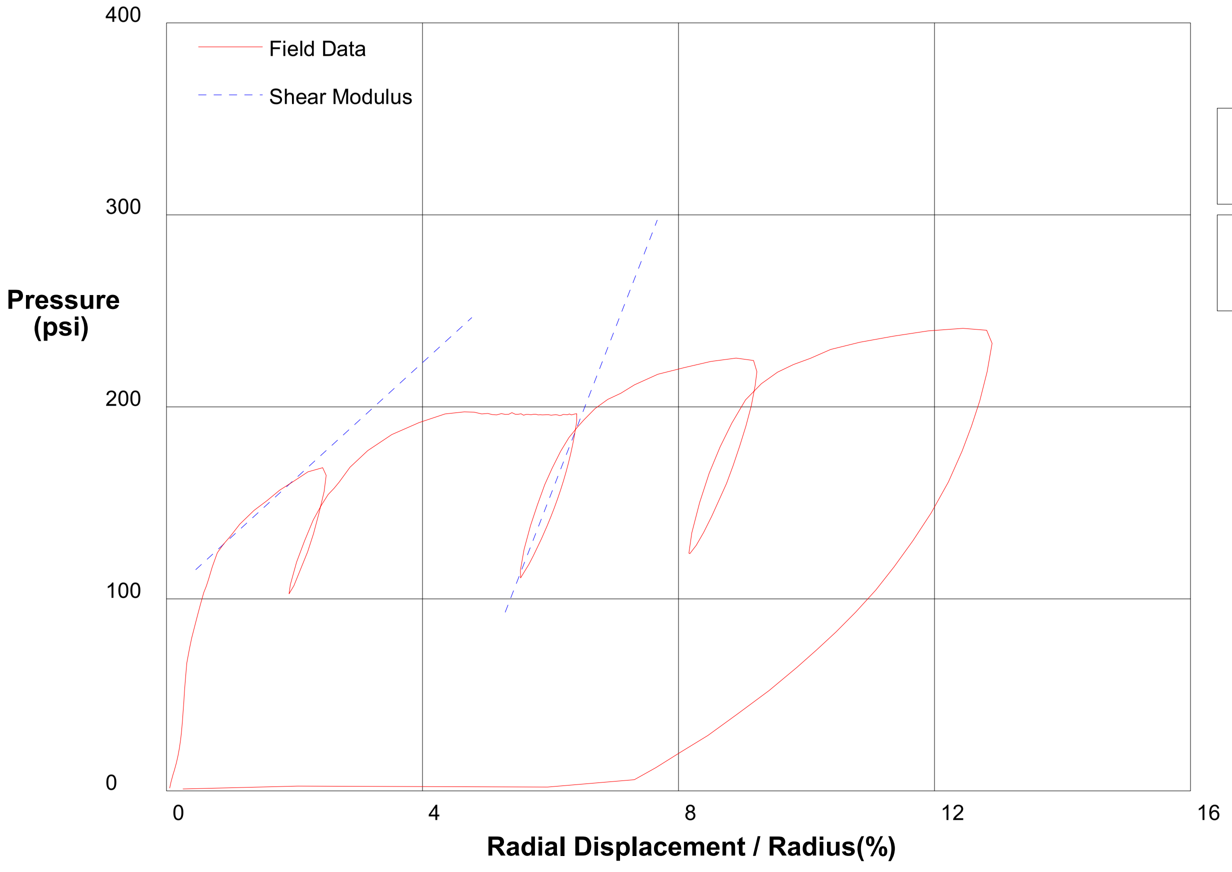
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/3/2008**

Hole No. PM301 **Depth 41ft** **File C:\DATA\ISE-765\CC34.P**



Shear Modulus 1521 psi

Shear Modulus 4298 psi

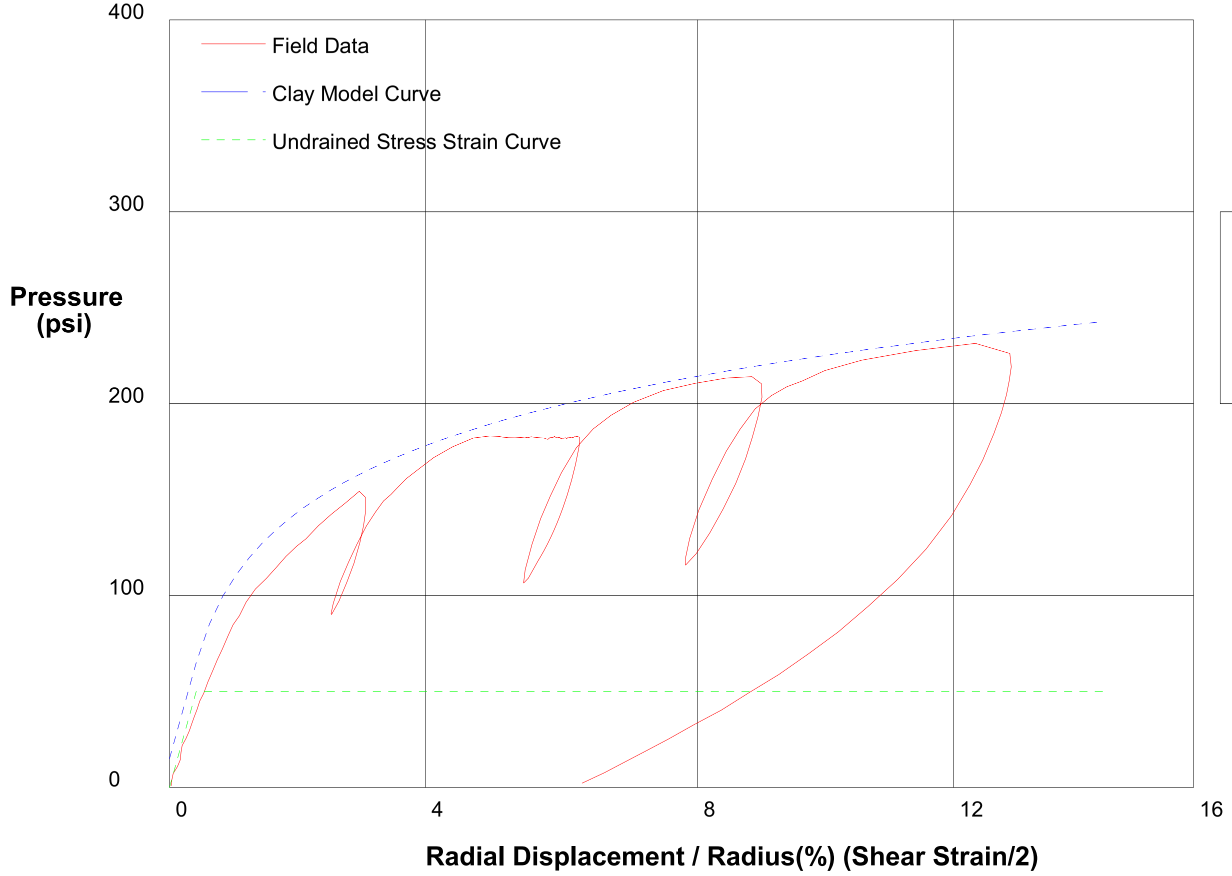
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/3/2008**

Hole No. PM301 **Depth 39.5ft** **File C:\DATA\ISE-765\CC35.P**



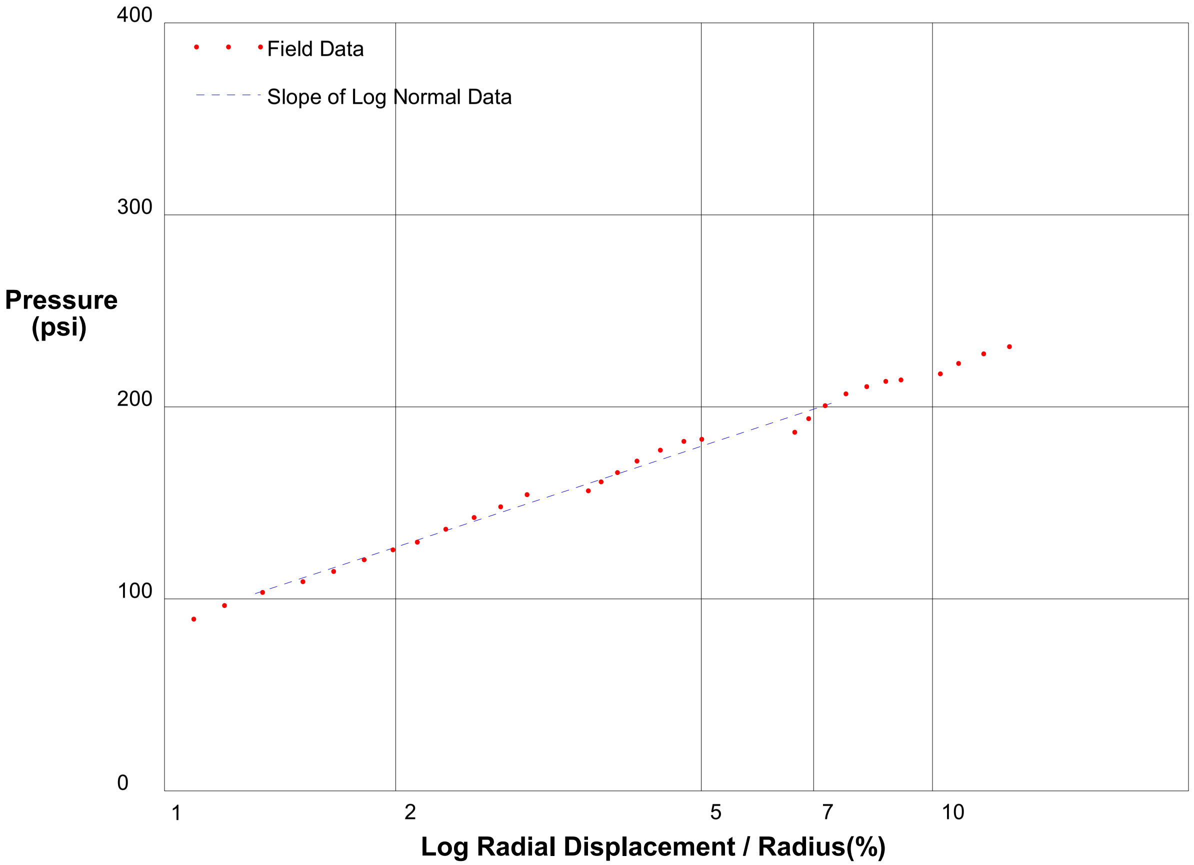
shift 0

GIBSON'S CLAY MODEL

Shear Strength 50 psi
Insitu Stress 15 psi
Shear Modulus 6000 psi

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**
Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/3/2008**
Hole No. PM301 **Depth 39.5ft** **File C:\DATA\ISE-765\CC35.P**



Shear Strength 57.3 psi
Limit Pressure 300 psi

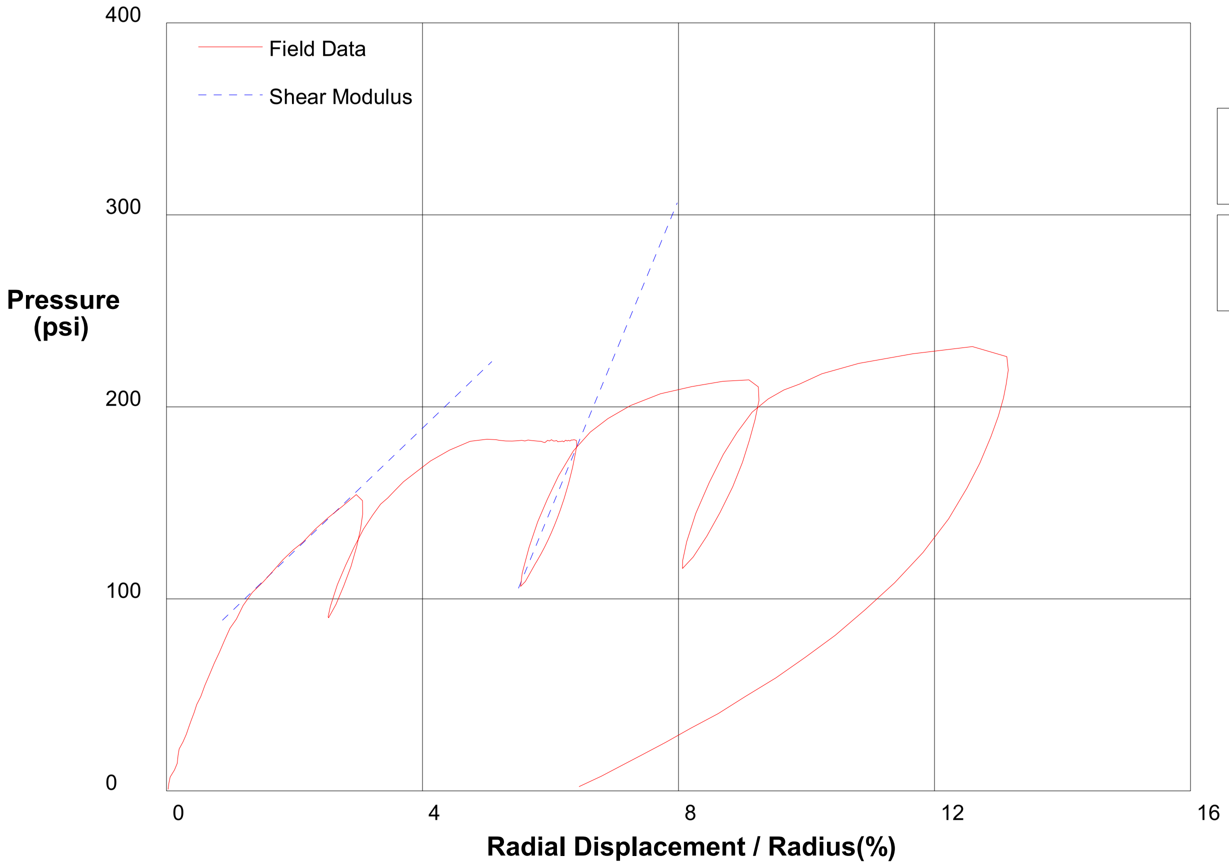
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/3/2008**

Hole No. PM301 **Depth 39.5ft** **File C:\DATA\ISE-765\CC35.P**



Shear Modulus 1600 psi

Shear Modulus 4047 psi

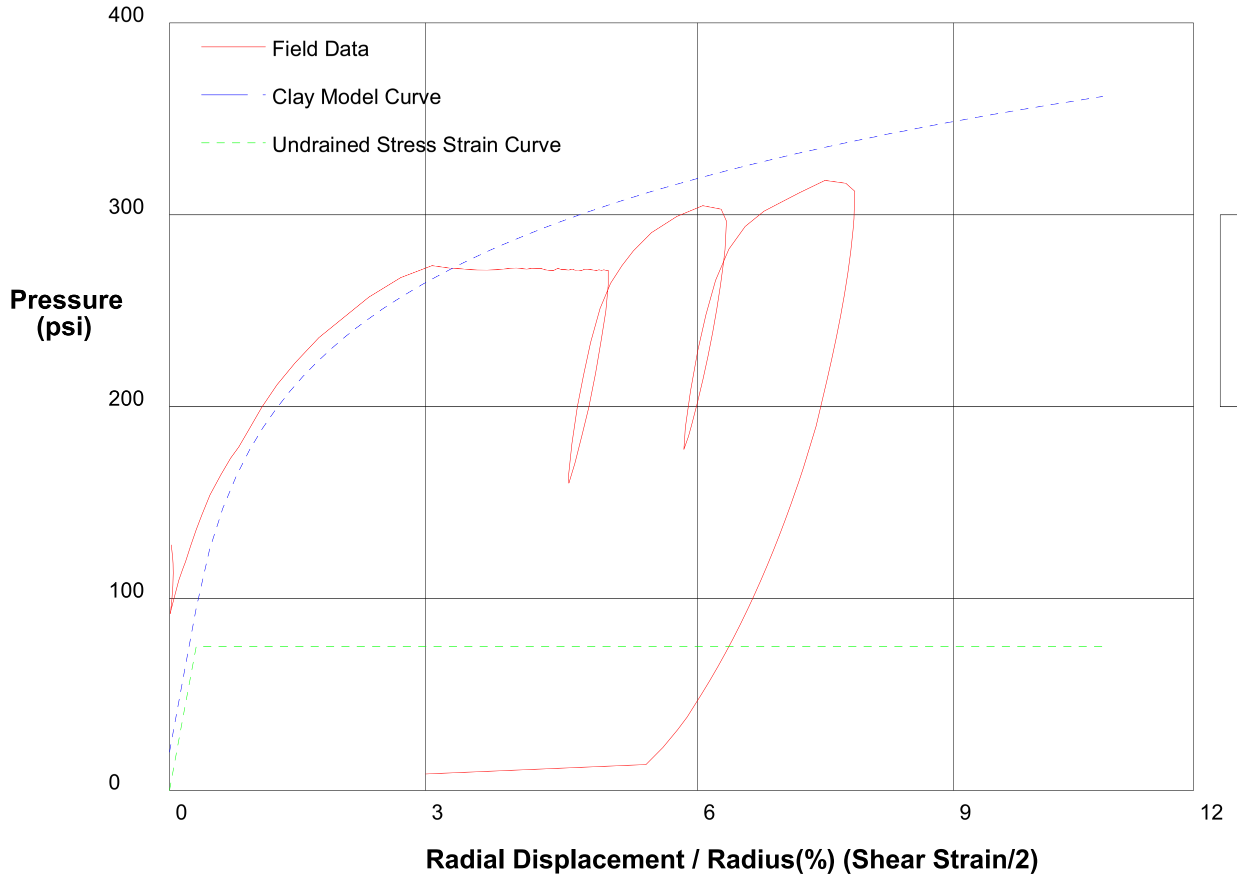
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/3/2008**

Hole No. PM301 **Depth 51ft** **File C:\DATA\ISE-765\CC36.P**



GIBSON'S CLAY MODEL

Shear Strength 75 psi
Insitu Stress 20 psi
Shear Modulus 12000 psi

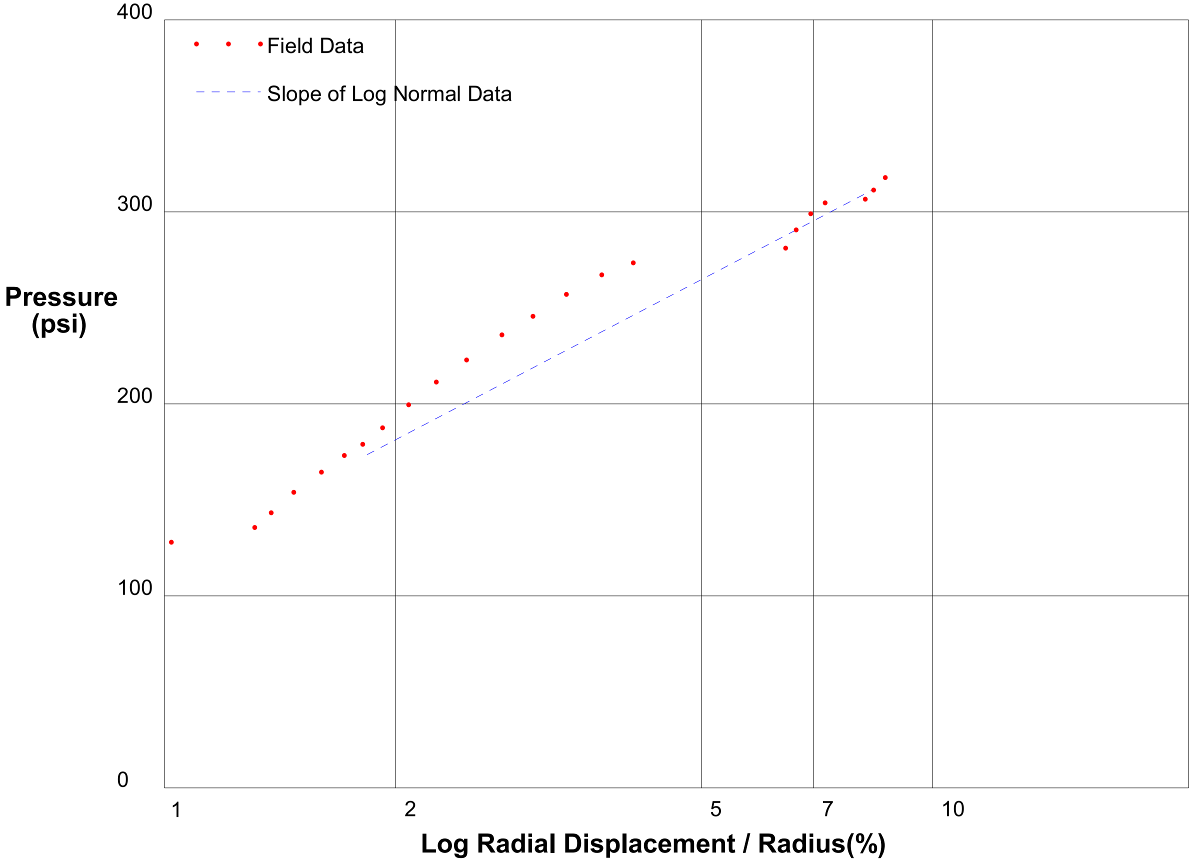
shift 5

In Situ Engineering

PRESSUREMETER DATA Schnabel Engineering LLC.

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/3/2008**

Hole No. PM301 **Depth 51ft** **File C:\DATA\ISE-765\CC36.P**



Shear Strength 90.9 psi
Limit Pressure 456 psi

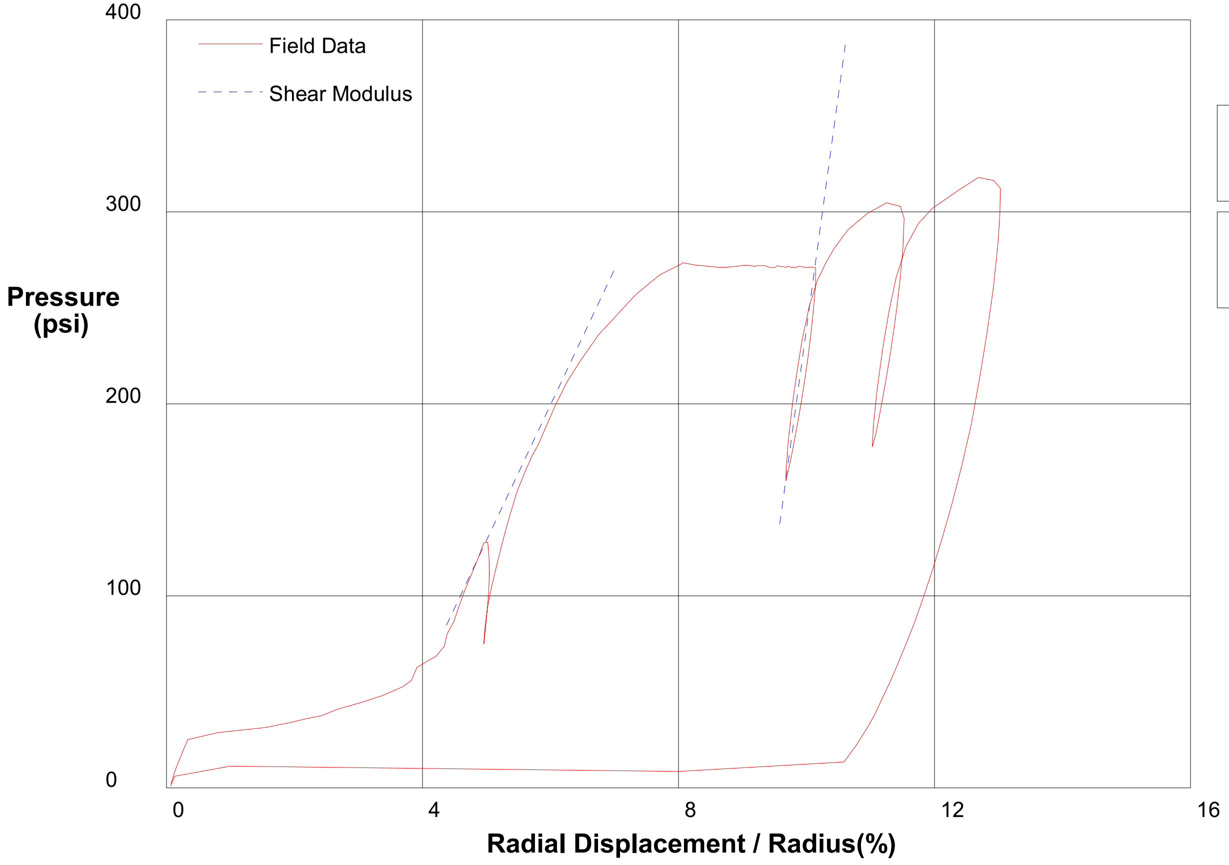
shift 4

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/3/2008**

Hole No. PM301 **Depth 51ft** **File C:\DATA\ISE-765\CC36.P**



Shear Modulus 3530 psi

Shear Modulus 12210 psi

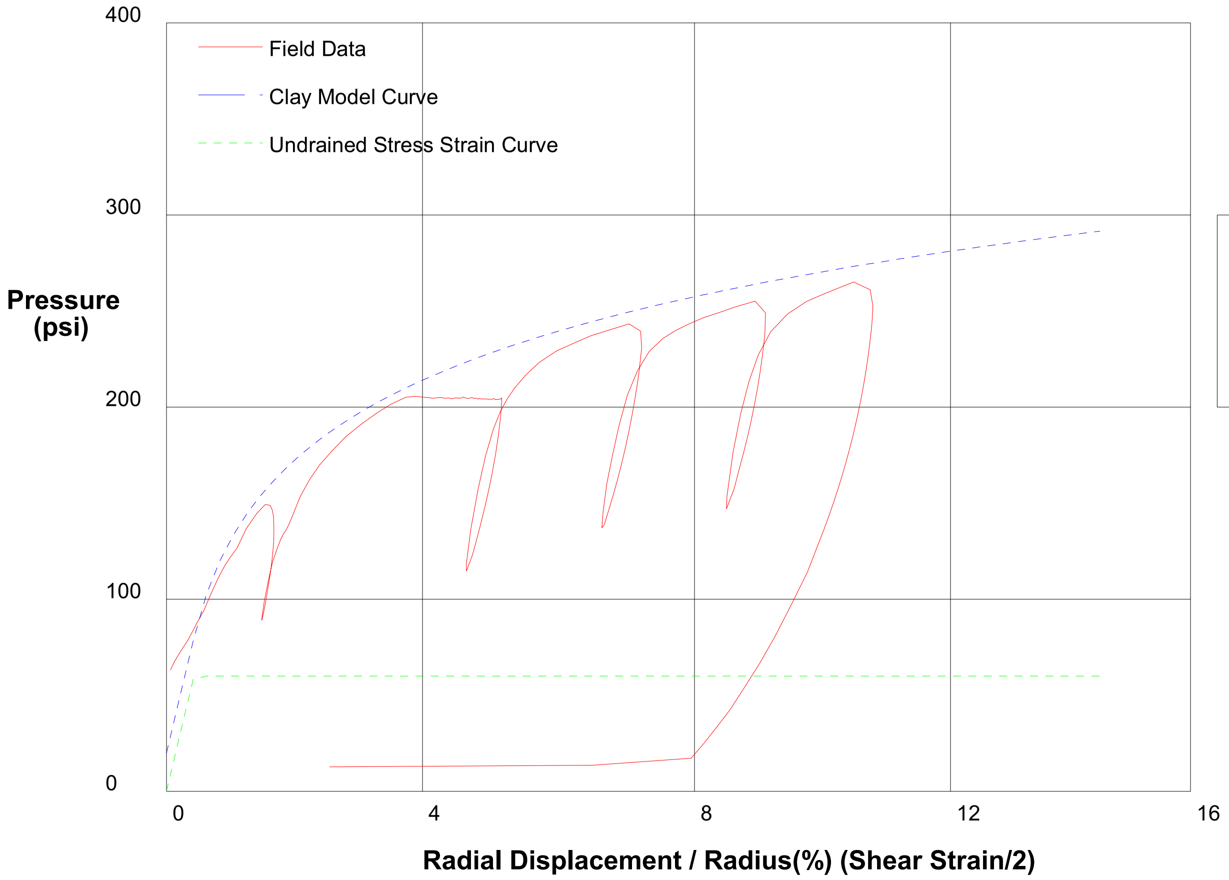
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/3/2008**

Hole No. PM301 **Depth 49.5ft** **File C:\DATA\ISE-765\CC37.P**



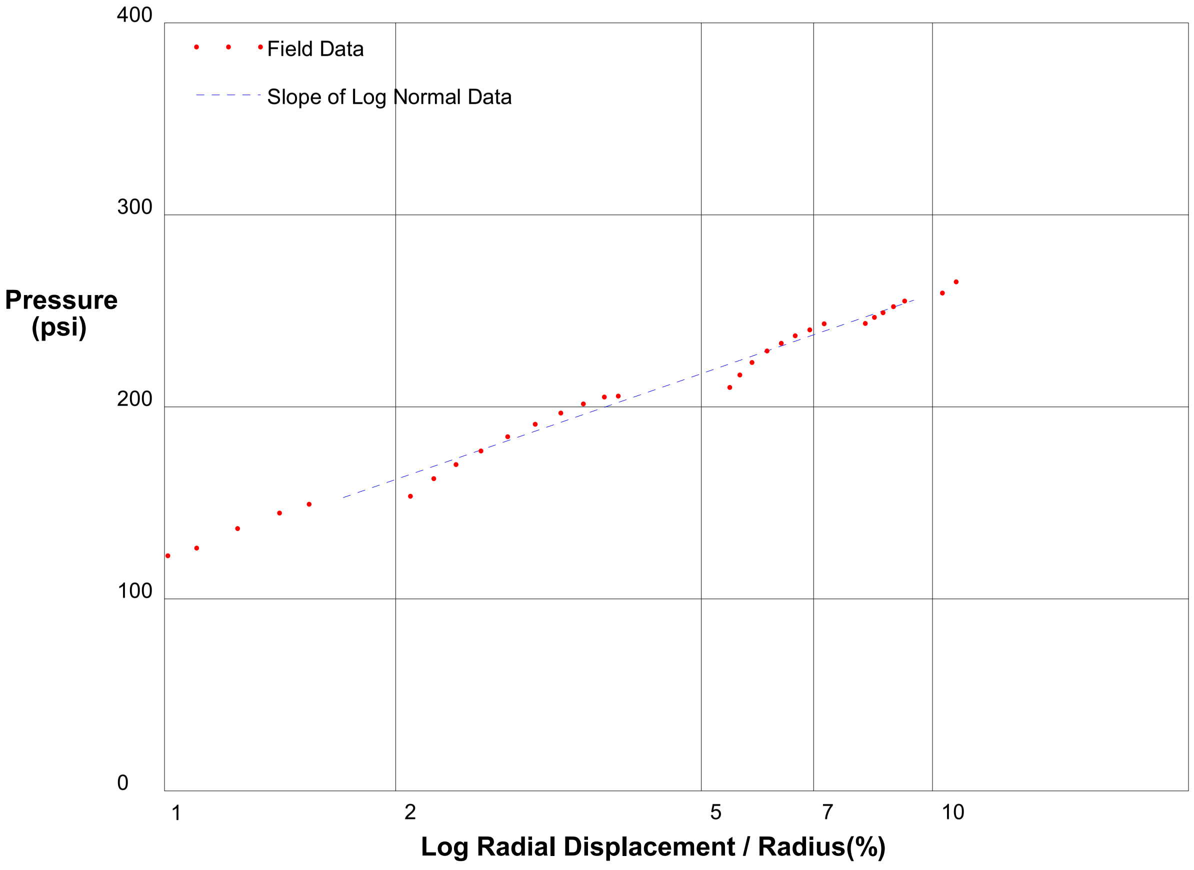
GIBSON'S CLAY MODEL

Shear Strength 60 psi
Insitu Stress 20 psi
Shear Modulus 7000 psi

shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**
Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/3/2008**
Hole No. PM301 **Depth 49.5ft** **File C:\DATA\ISE-765\CC37.P**



Shear Strength 60 psi
Limit Pressure 343 psi

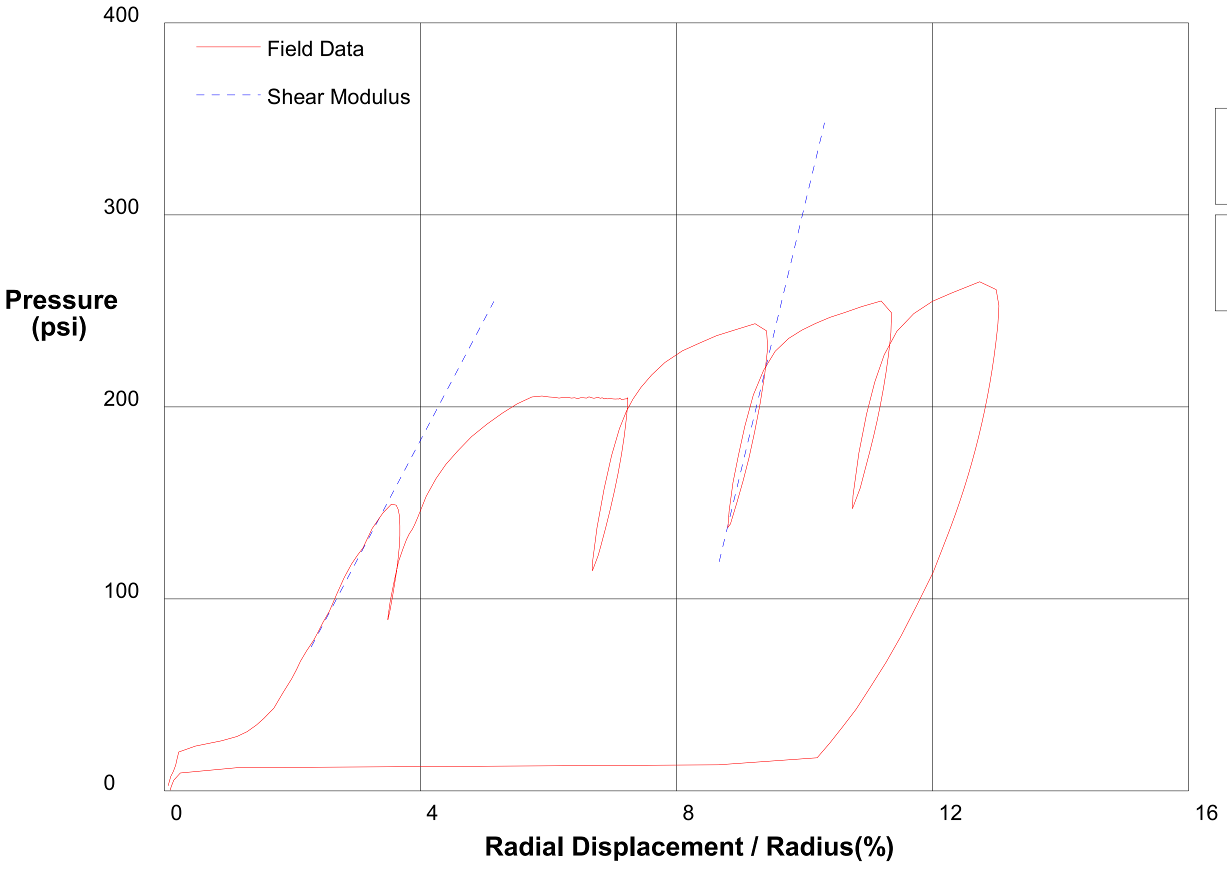
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/3/2008**

Hole No. PM301 **Depth 49.5ft** **File C:\DATA\ISE-765\CC37.P**



Shear Modulus 3150 psi

Shear Modulus 6940 psi

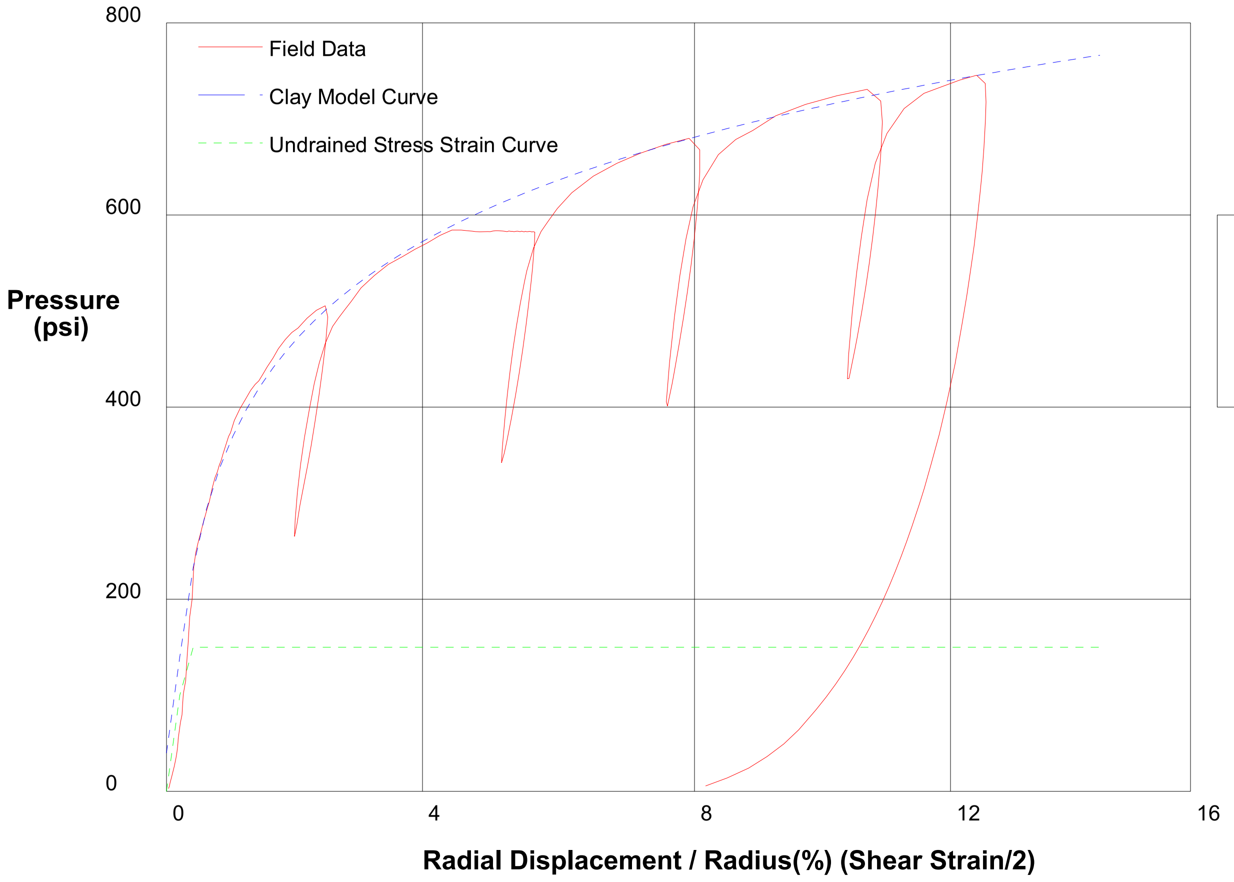
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/3/2008**

Hole No. PM301 **Depth 60.8ft** **File C:\DATA\ISE-765\CC38.P**



shift 0

GIBSON'S CLAY MODEL

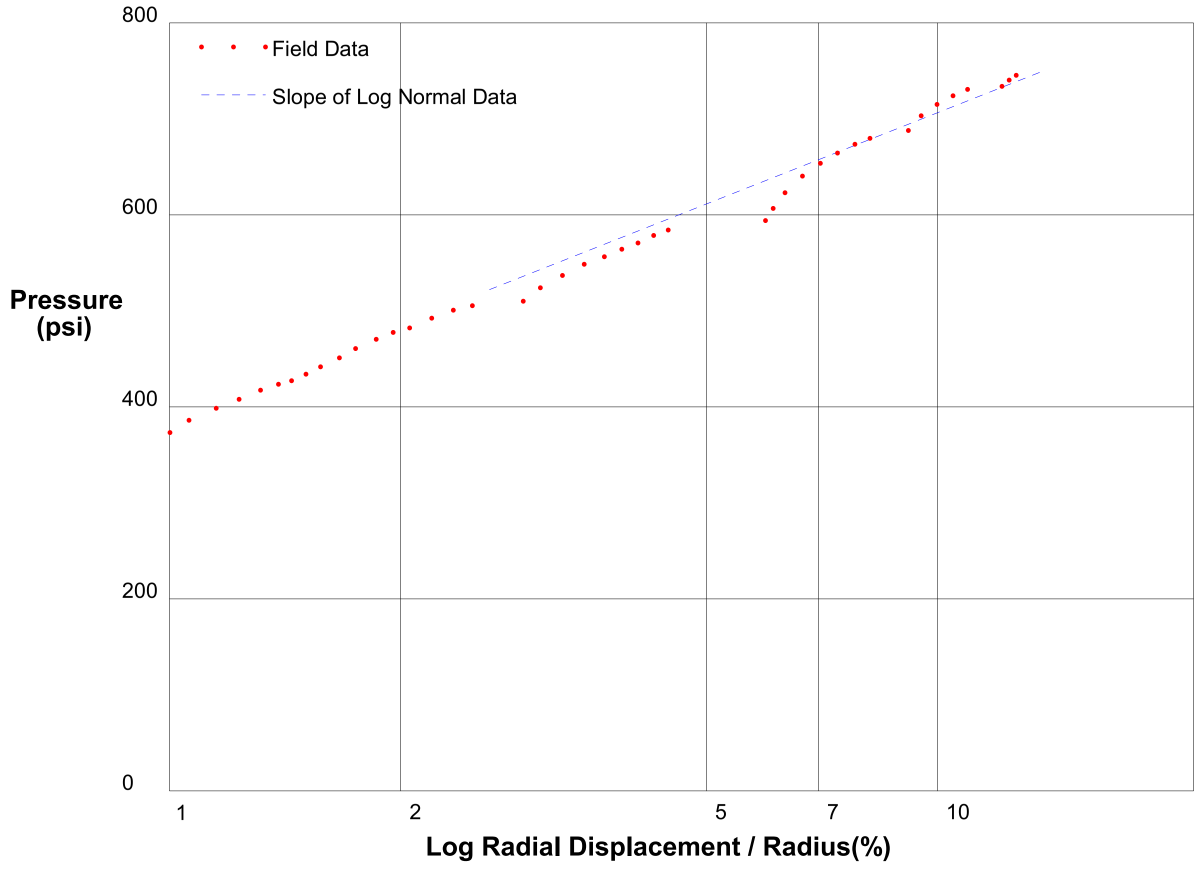
Shear Strength 150 psi
Insitu Stress 40 psi
Shear Modulus 24000 psi

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/3/2008**

Hole No. PM301 **Depth 60.8ft** **File C:\DATA\ISE-765\CC38.P**



shift 0

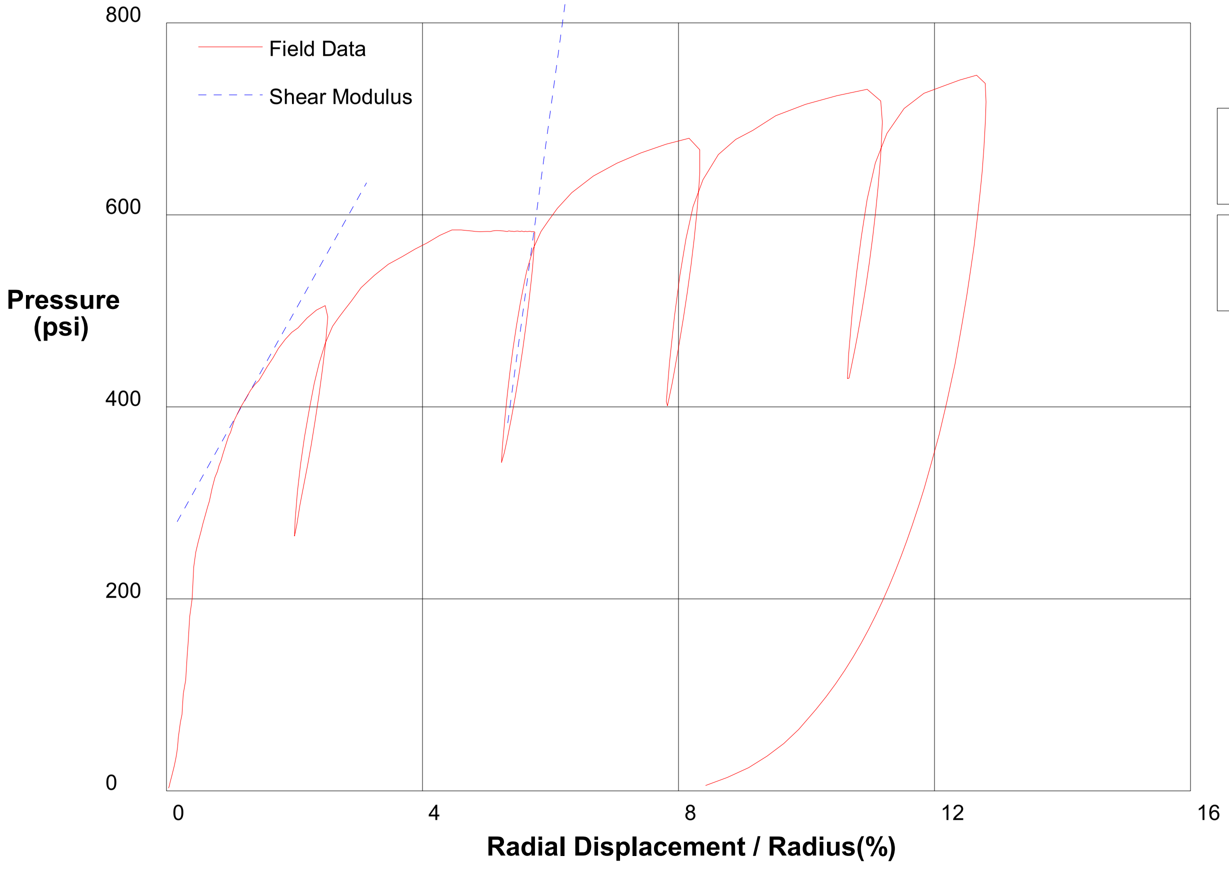
In Situ Engineering

Shear Strength 137.1 psi
Limit Pressure 899 psi

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/3/2008**

Hole No. PM301 **Depth 60.8ft** **File C:\DATA\ISE-765\CC38.P**



Shear Modulus 5962 psi

Shear Modulus 24421 psi

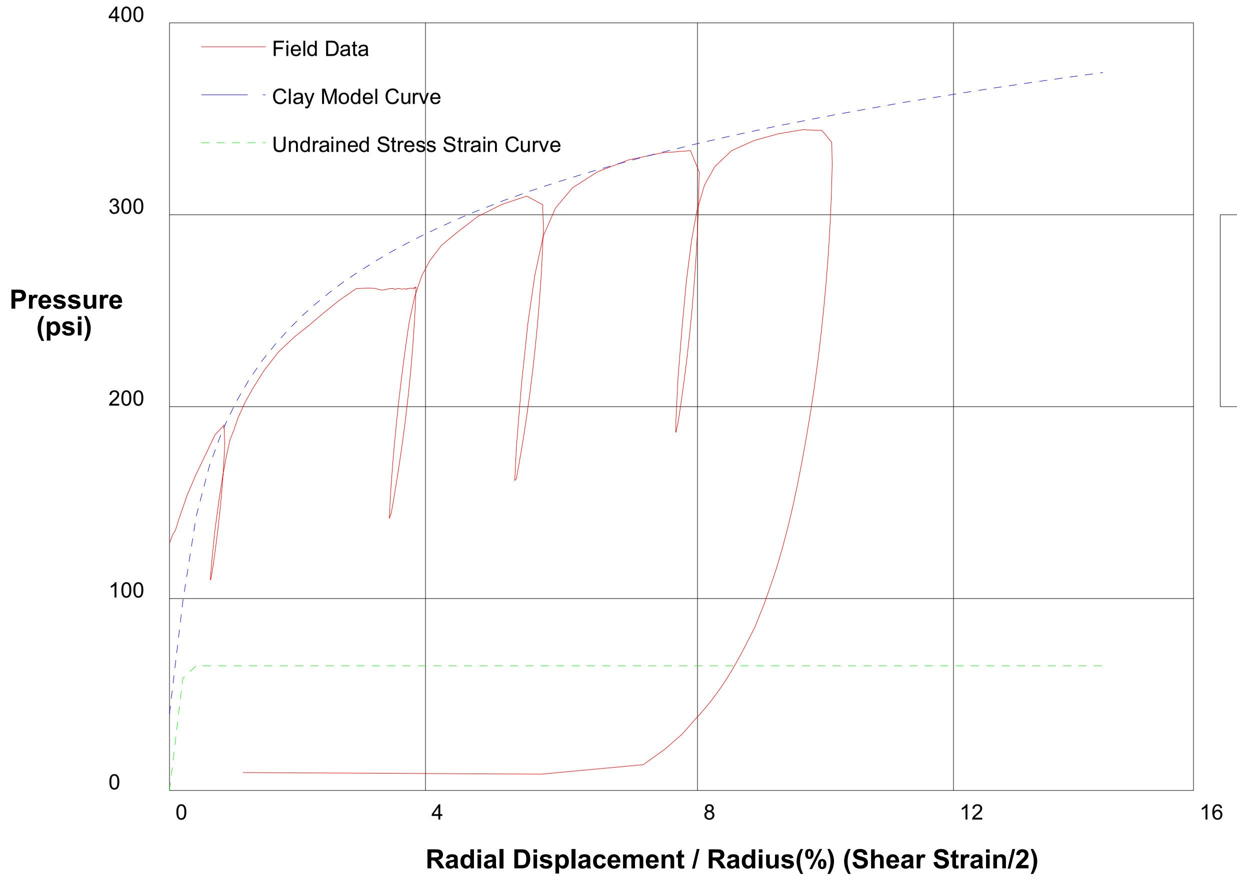
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/3/2008**

Hole No. PM301 **Depth 59.3ft** **File C:\DATA\ISE-765\CC39.P**



GIBSON'S CLAY MODEL

Shear Strength 65 psi
Insitu Stress 40 psi
Shear Modulus 14000 psi

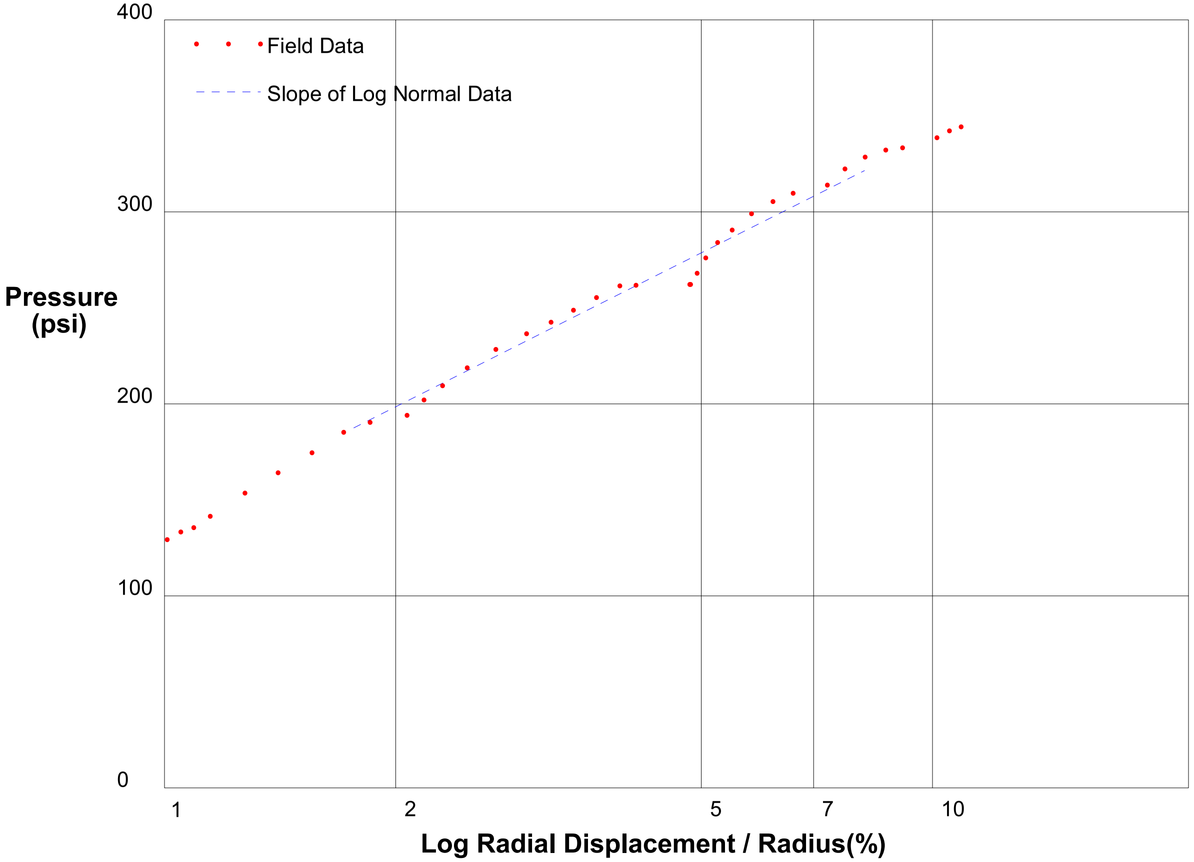
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/3/2008**

Hole No. PM301 **Depth 59.3ft** **File C:\DATA\ISE-765\CC39.P**



Shear Strength 87.5 psi
Limit Pressure 462 psi

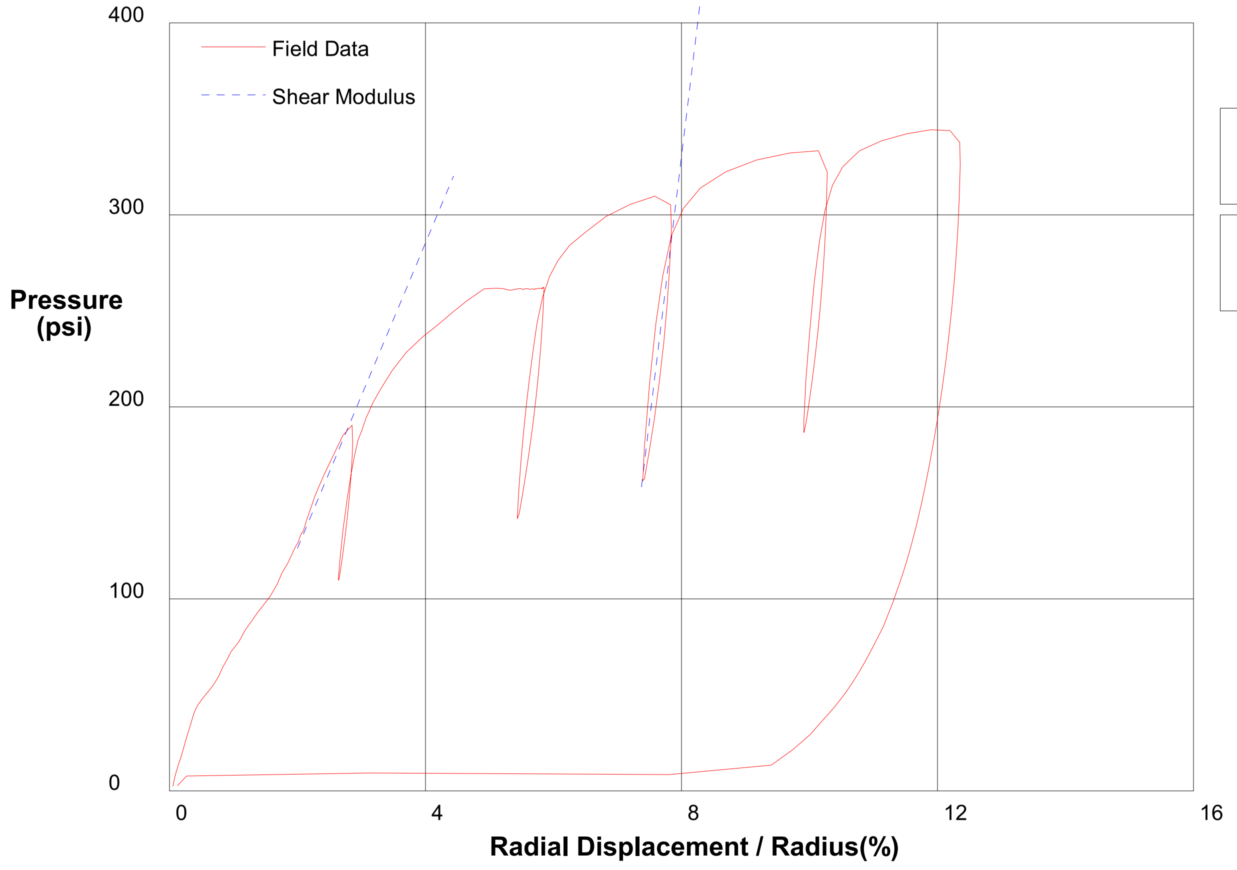
shift 1

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/3/2008**

Hole No. PM301 **Depth 59.3ft** **File C:\DATA\ISE-765\CC39.P**



Shear Modulus 3974 psi

Shear Modulus 13787 psi

shift 0

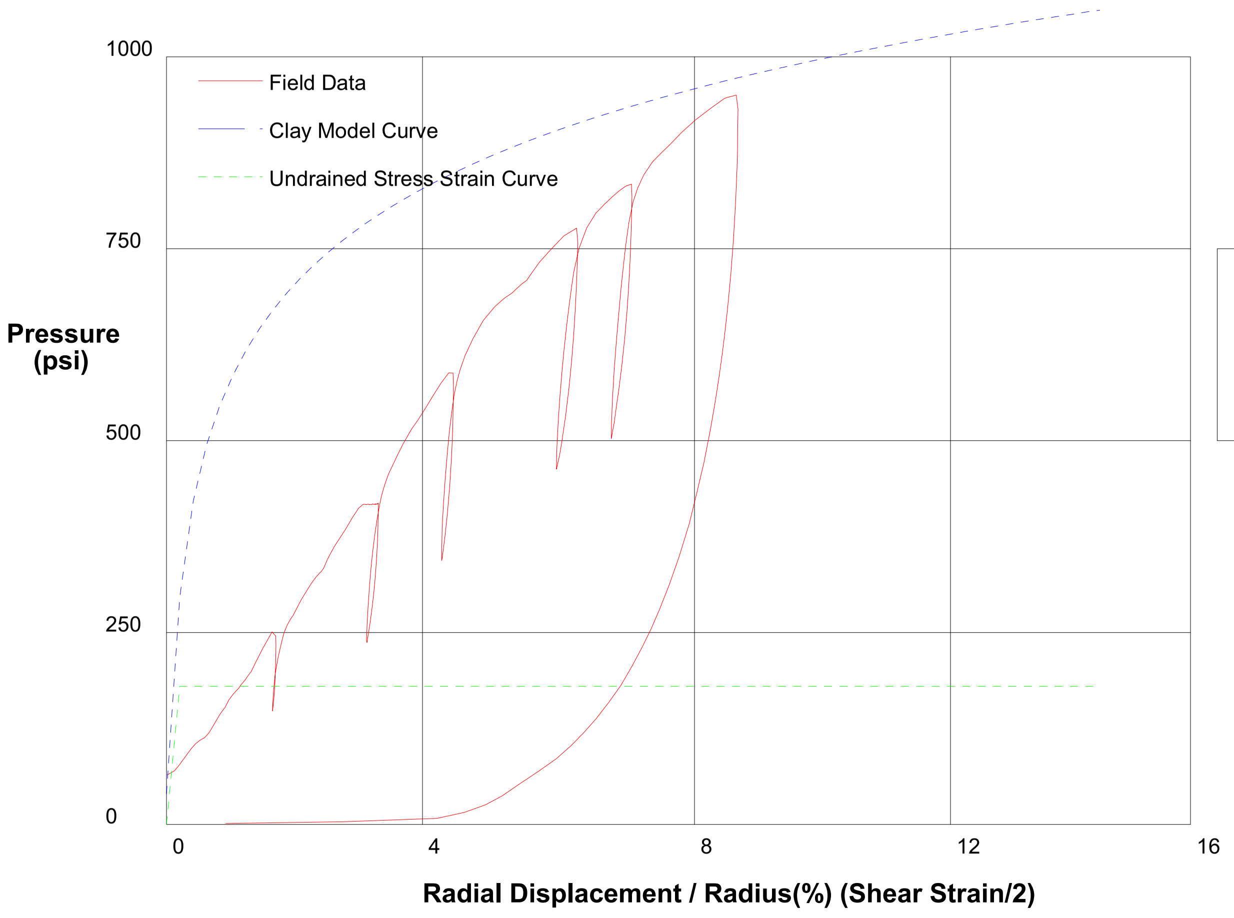
In Situ Engineering

PRESSUREMETER DATA

Schnabel Engineering, LLC.

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/3/2008**

Hole No. PM301 **Depth 70.4ft** **File C:\DATA\ISE-765\CC40.P**



GIBSON'S CLAY MODEL

Shear Strength 180 psi
Insitu Stress 40 psi
Shear Modulus 66000 psi

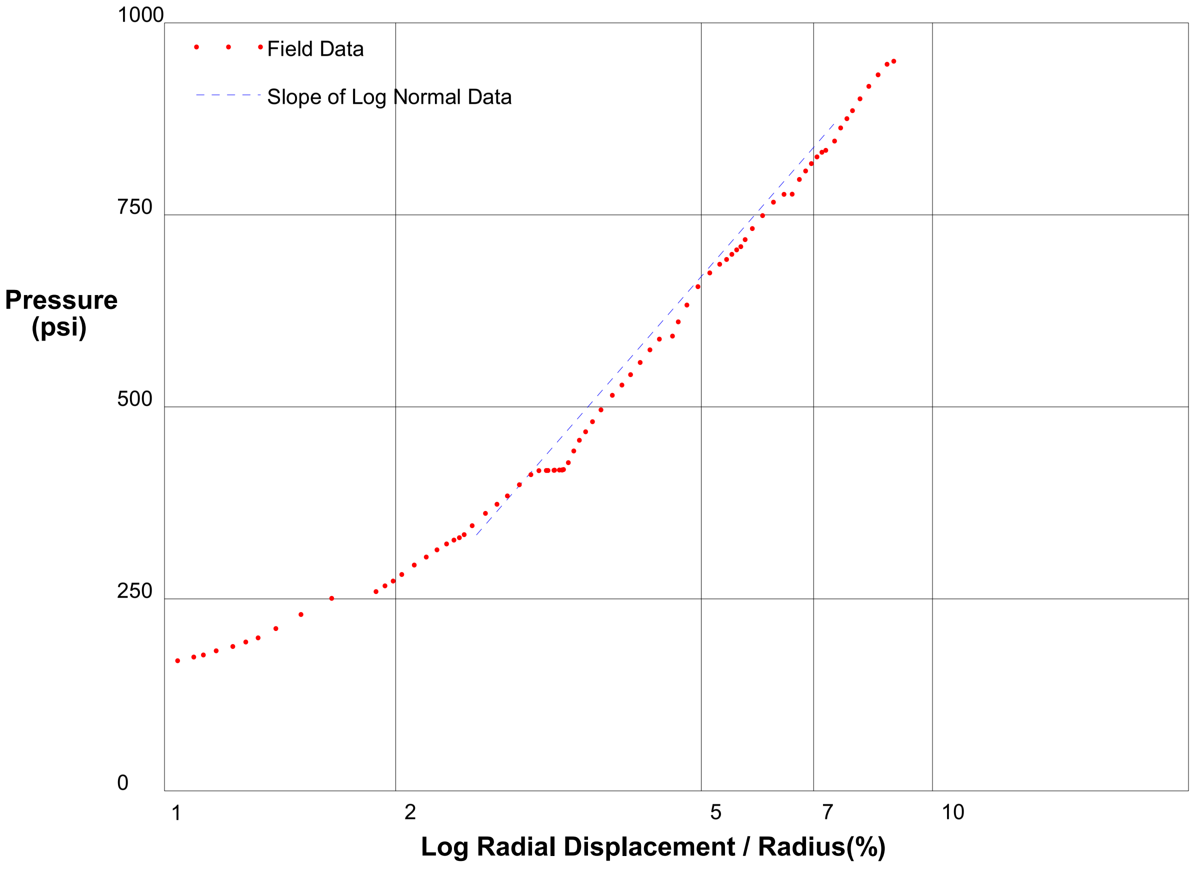
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/3/2008**

Hole No. PM301 **Depth 70.4ft** **File C:\DATA\ISE-765\CC40.P**



Shear Strength 499.1 psi
Limit Pressure 1719 psi

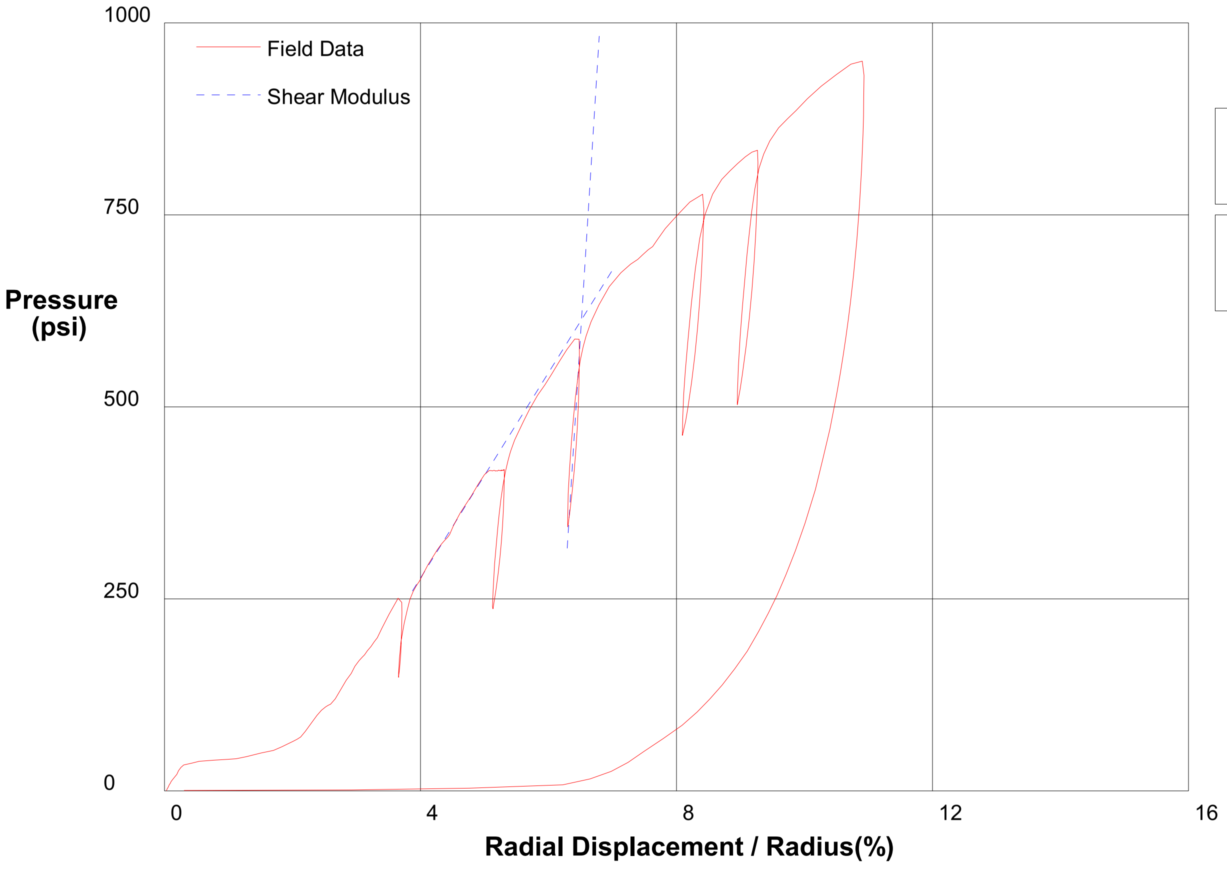
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/3/2008**

Hole No. PM301 **Depth 70.4ft** **File C:\DATA\ISE-765\CC40.P**



Shear Modulus 6688 psi

Shear Modulus 66666 psi

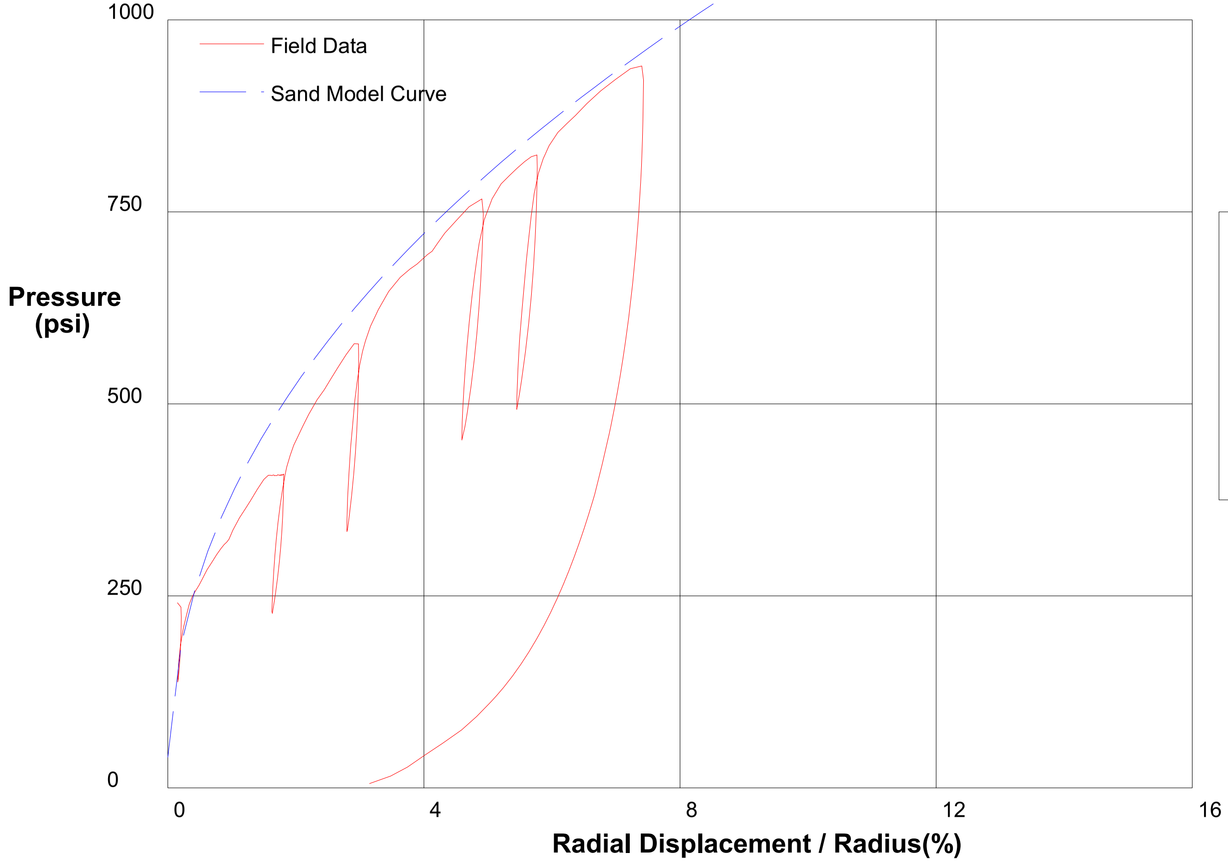
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/3/2008**

Hole No. PM301 **Depth 70.4ft** **File C:\DATA\ISE-765\CC40.P**



THE In Situ Engineering SAND MODEL

Water Pressure	**10 psi**
Friction Angle	**40 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**40 psi**
Shear Modulus	**60000 psi**

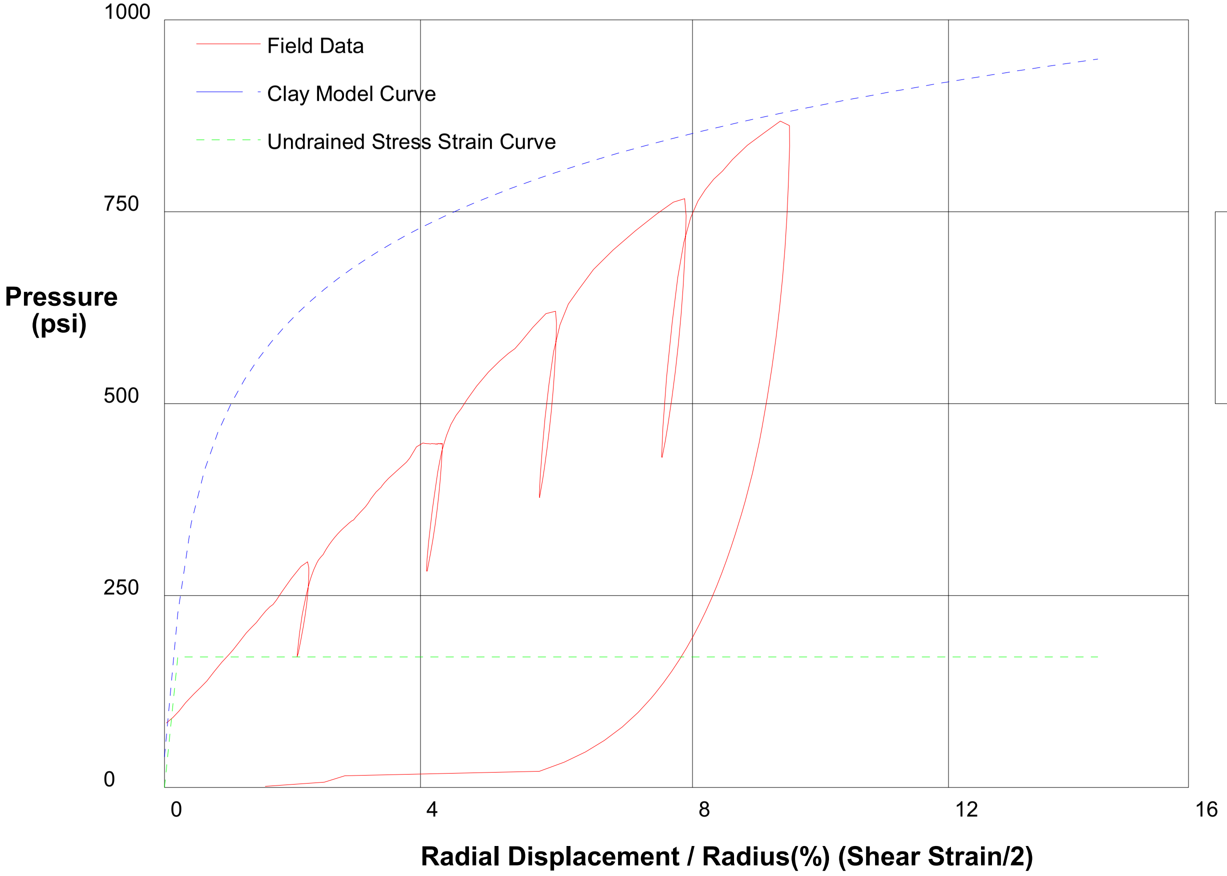
shift 3.5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/3/2008**

Hole No. PM301 **Depth 68.9ft** **File C:\DATA\ISE-765\CC41.P**



GIBSON'S CLAY MODEL

Shear Strength 170 psi
Insitu Stress 40 psi
Shear Modulus 45000 psi

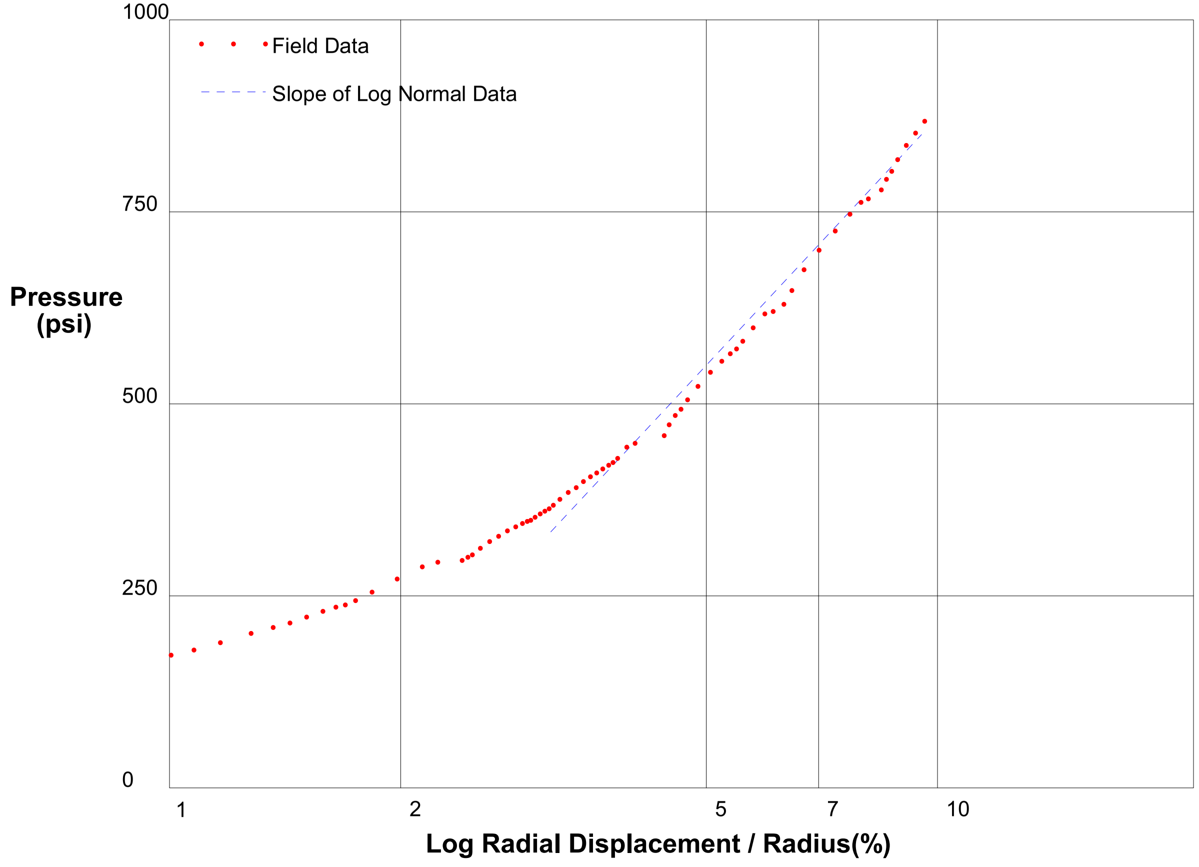
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/3/2008**

Hole No. PM301 **Depth 68.9ft** **File C:\DATA\ISE-765\CC41.P**



Shear Strength 465.5 psi
Limit Pressure 1529 psi

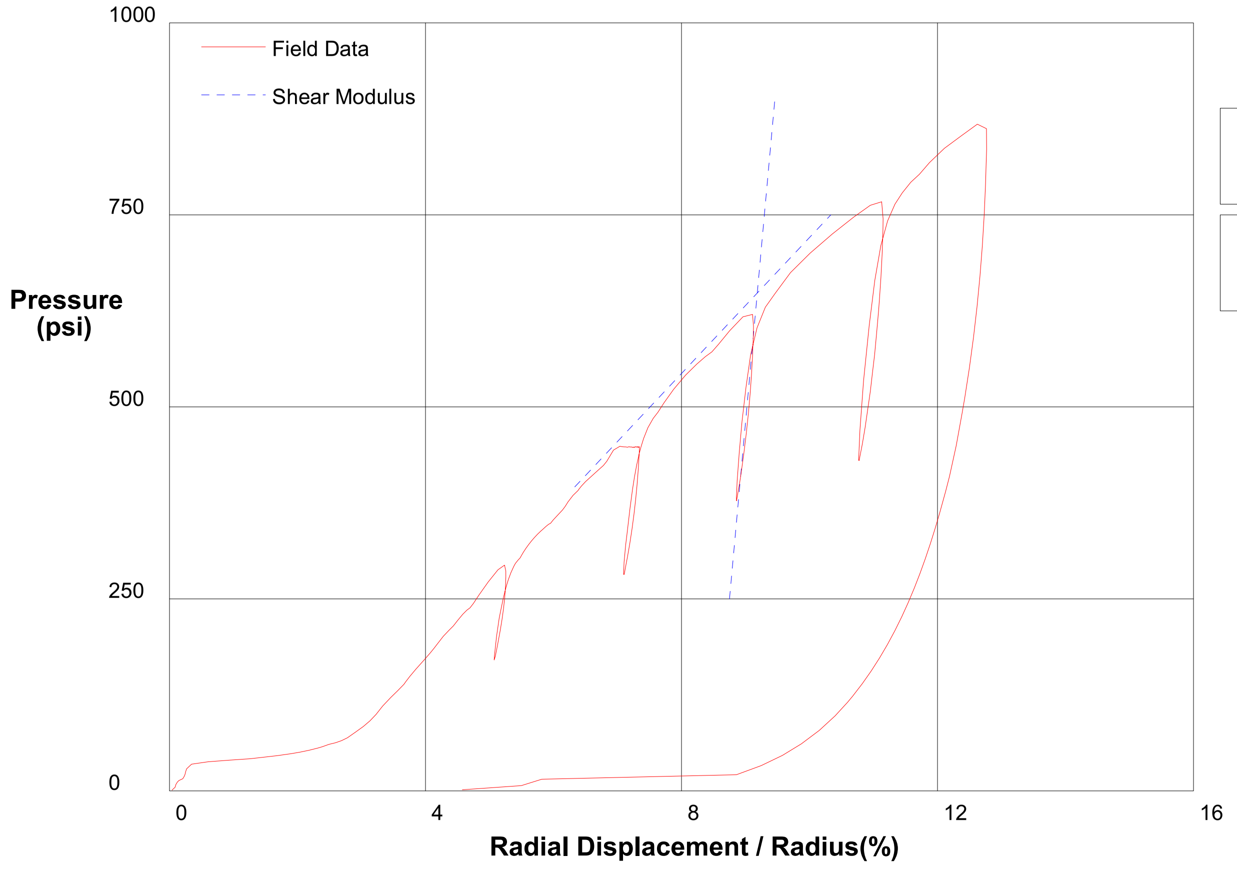
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/3/2008**

Hole No. PM301 **Depth 68.9ft** **File C:\DATA\ISE-765\CC41.P**



Shear Modulus 4427 psi

Shear Modulus 45833 psi

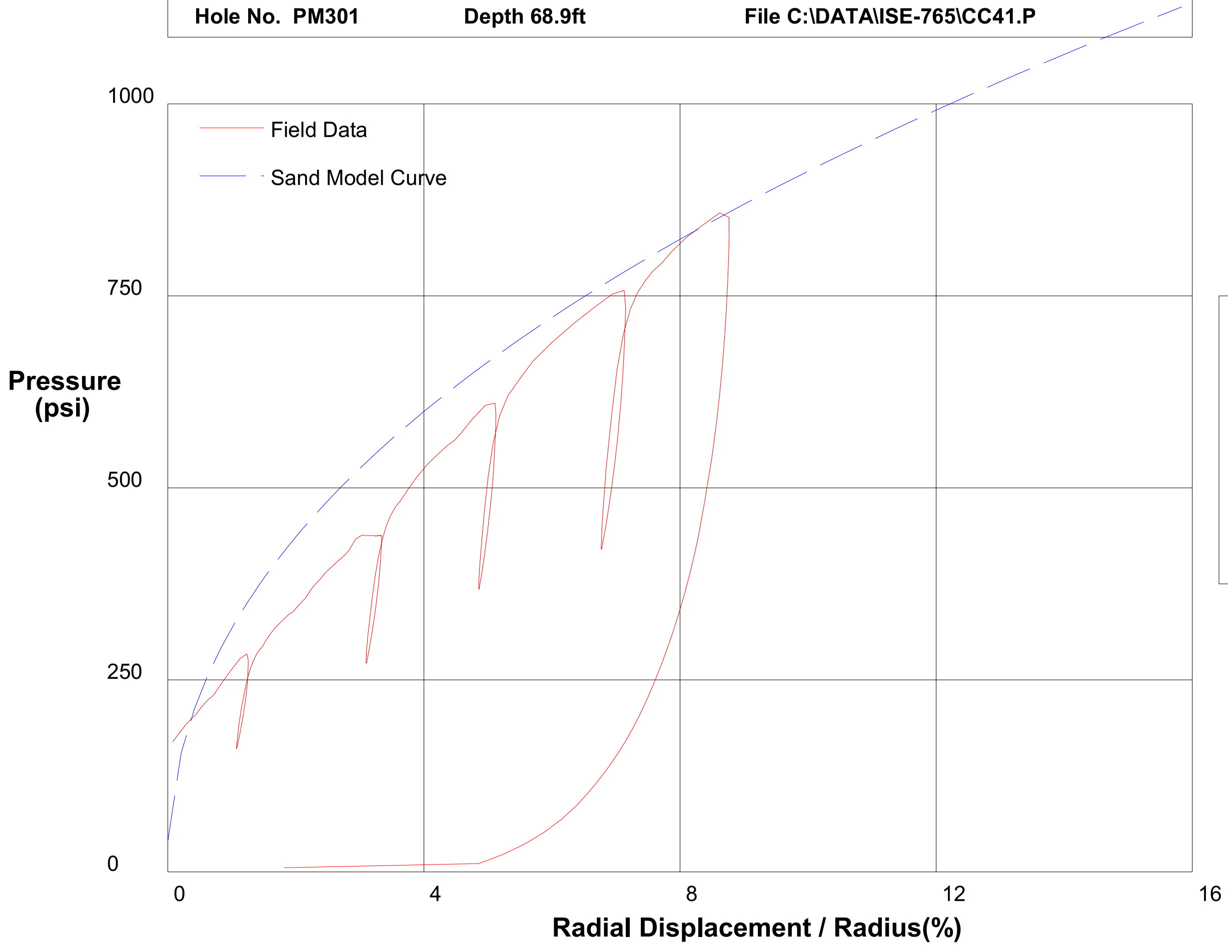
shift 0

In Situ Engineering

PRESSUREMETER DATA Schnabel Engineering, LLC.

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation 9/3/2008

Hole No. PM301 Depth 68.9ft File C:\DATA\ISE-765\CC41.P



THE In Situ Engineering SAND MODEL

Water Pressure	10 psi
Friction Angle	40 deg
Critical Friction Angle	32 deg
Lateral Stress	40 psi
Shear Modulus	40000 psi

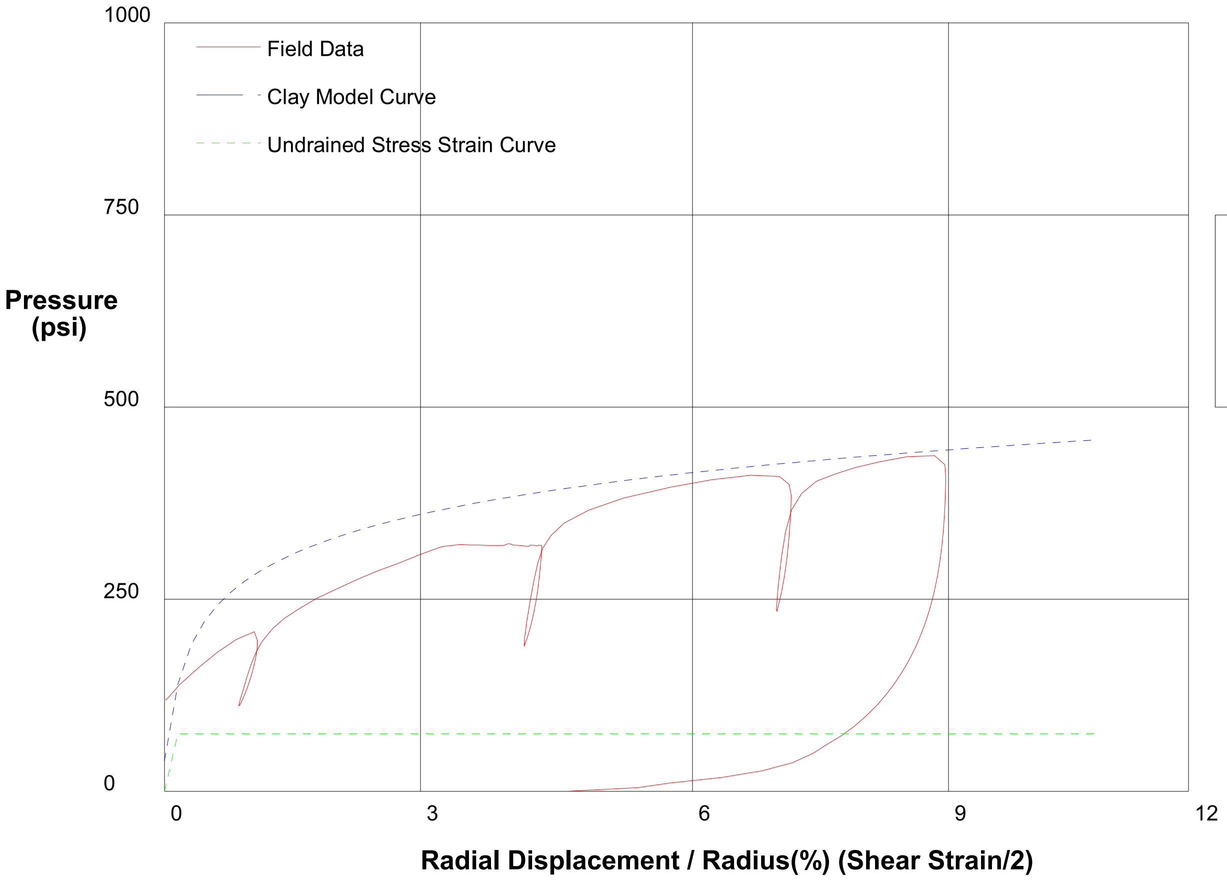
shift 4

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/4/2008**

Hole No. PM301 **Depth 80.9ft** **File C:\DATA\ISE-765\CC42.P**



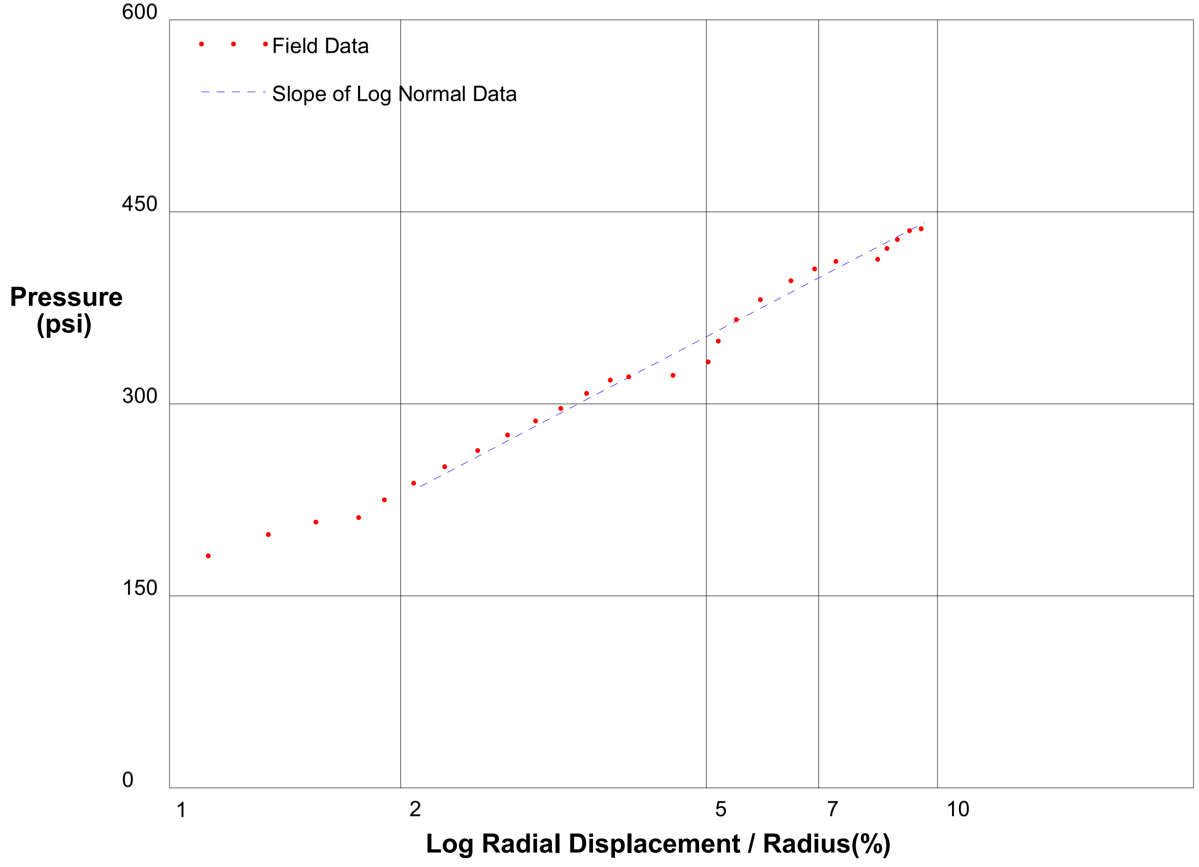
GIBSON'S CLAY MODEL

Shear Strength 75 psi
Insitu Stress 40 psi
Shear Modulus 33000 psi

shift 4

In Situ Engineering

PRESSUREMETER DATA	**Schnabel Engineering LLC.**	
Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation		**9/4/2008**
Hole No. PM301	**Depth 80.9ft**	**File C:\DATA\ISE-765\CC42.P**



Shear Strength 136.4 psi
Limit Pressure 639 psi

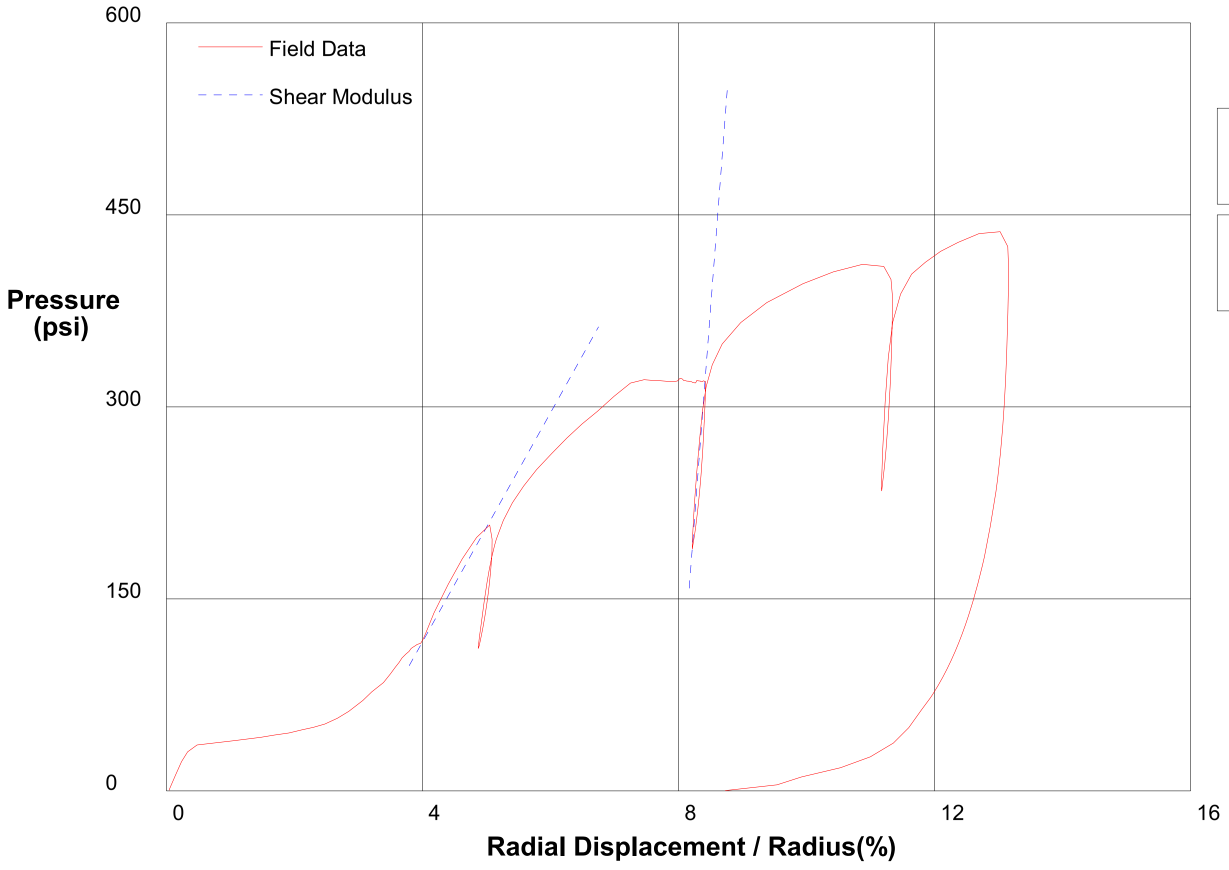
shift 3.5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/4/2008**

Hole No. PM301 **Depth 80.9ft** **File C:\DATA\ISE-765\CC42.P**



Shear Modulus 4471 psi

Shear Modulus 32672 psi

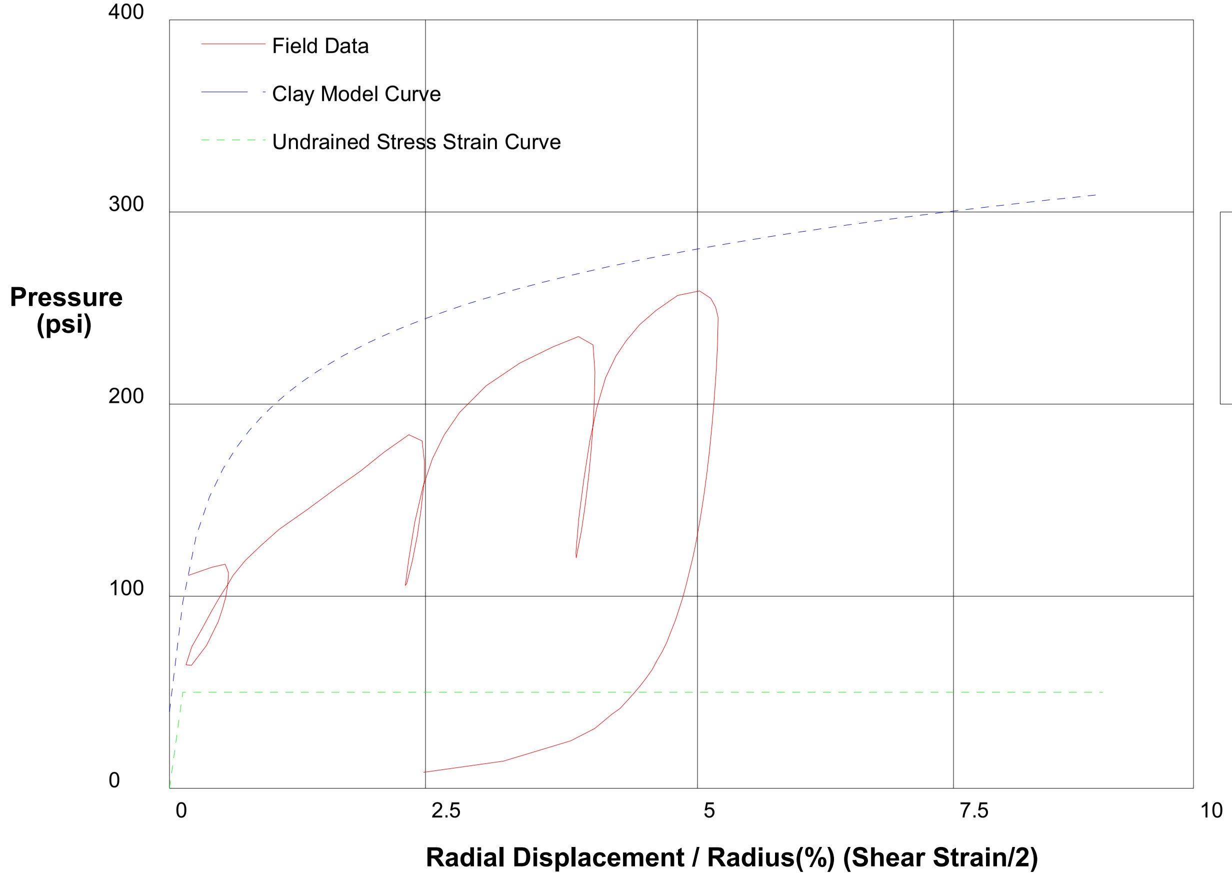
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/4/2008**

Hole No. PM301 **Depth 79.4ft** **File C:\DATA\ISE-765\CC43.P**



GIBSON'S CLAY MODEL

Shear Strength 50 psi
Insitu Stress 40 psi
Shear Modulus 22000 psi

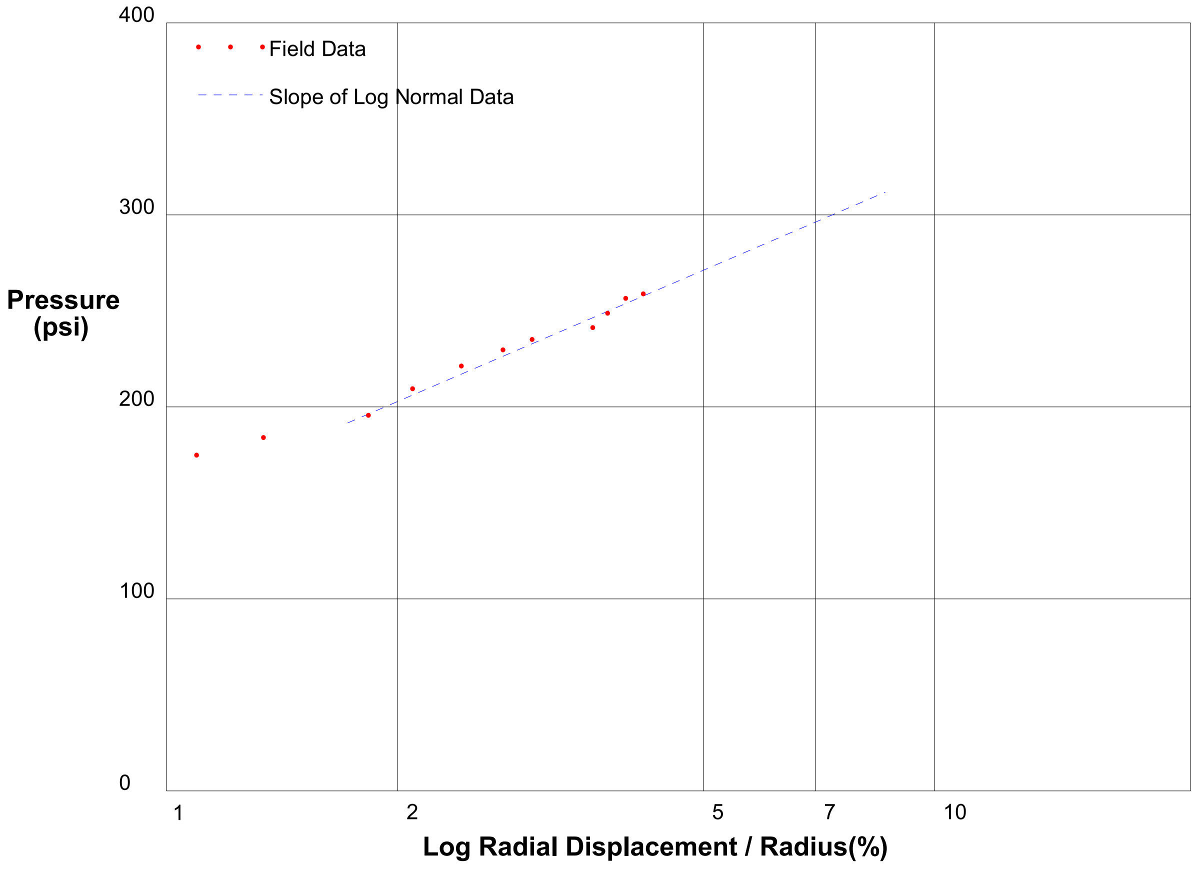
shift 7

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/4/2008**

Hole No. PM301 **Depth 79.4ft** **File C:\DATA\ISE-765\CC43.P**



Shear Strength 74.5 psi
Limit Pressure 428 psi

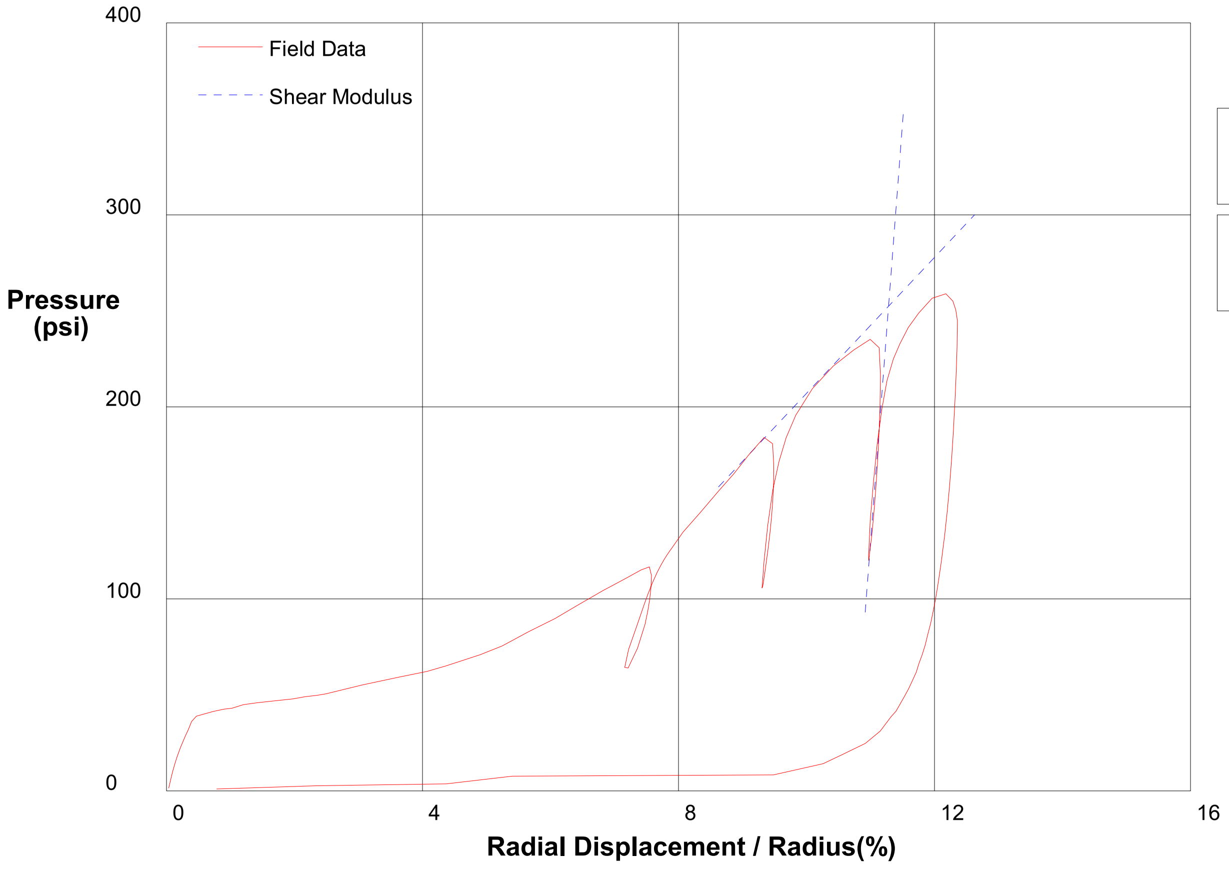
shift 8

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/4/2008**

Hole No. PM301 **Depth 79.4ft** **File C:\DATA\ISE-765\CC43.P**



Shear Modulus 1770 psi

Shear Modulus 21781 psi

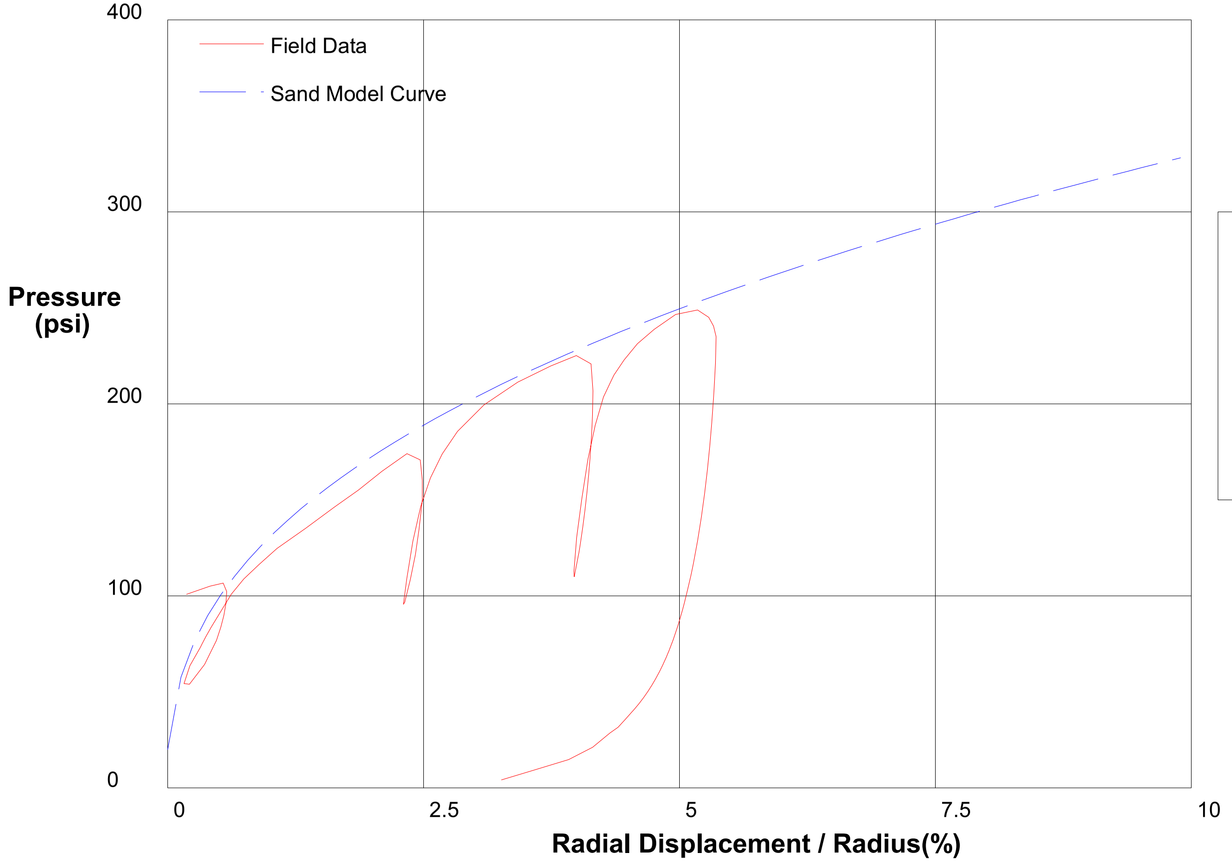
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/4/2008**

Hole No. PM301 **Depth 79.4ft** **File C:\DATA\ISE-765\CC43.P**



THE In Situ Engineering SAND MODEL

Water Pressure	**10 psi**
Friction Angle	**36 deg**
Critical Friction Angle	**32 deg**
Lateral Stress	**20 psi**
Shear Modulus	**20000 psi**

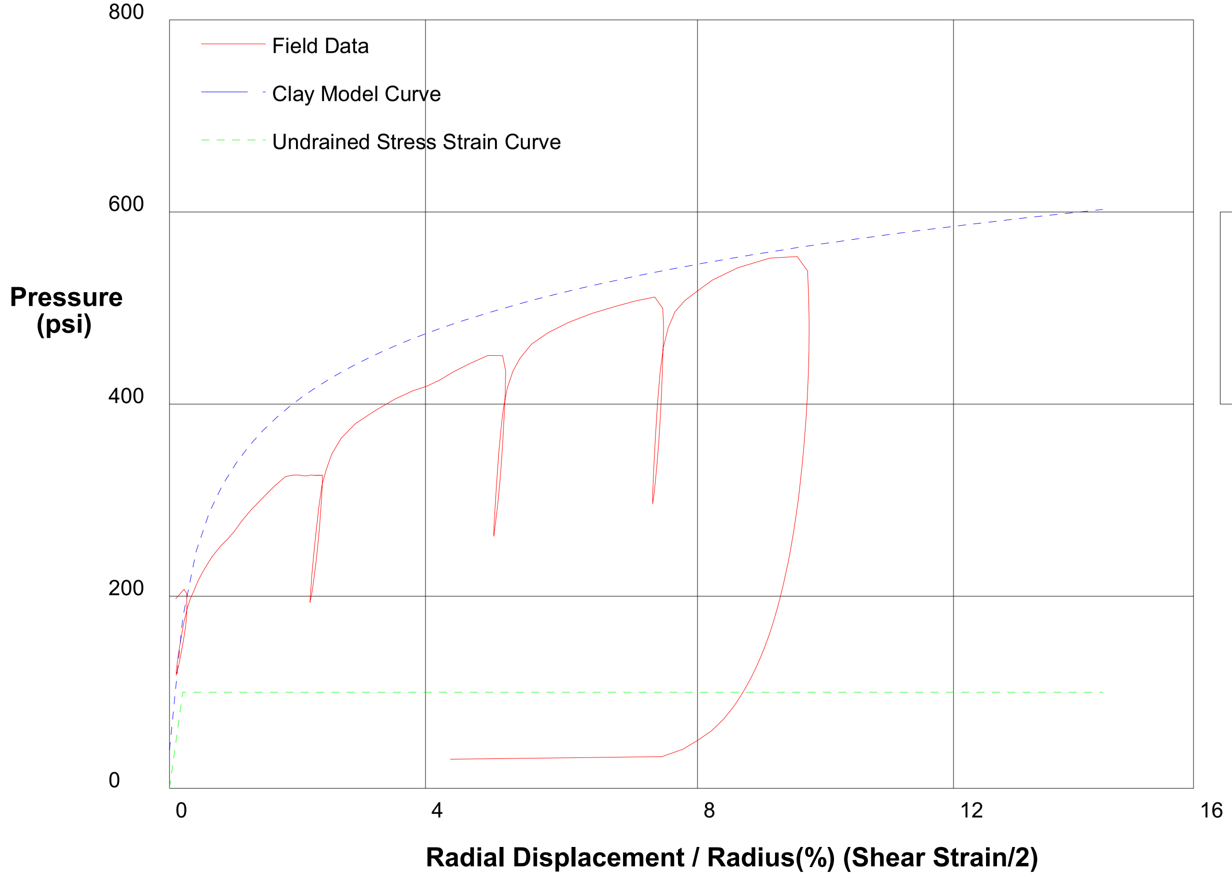
shift 7

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/4/2008**

Hole No. PM301 **Depth 91ft** **File C:\DATA\ISE-765\CC44.P**



GIBSON'S CLAY MODEL

Shear Strength 100 psi

Insitu Stress 40 psi

Shear Modulus 35000 psi

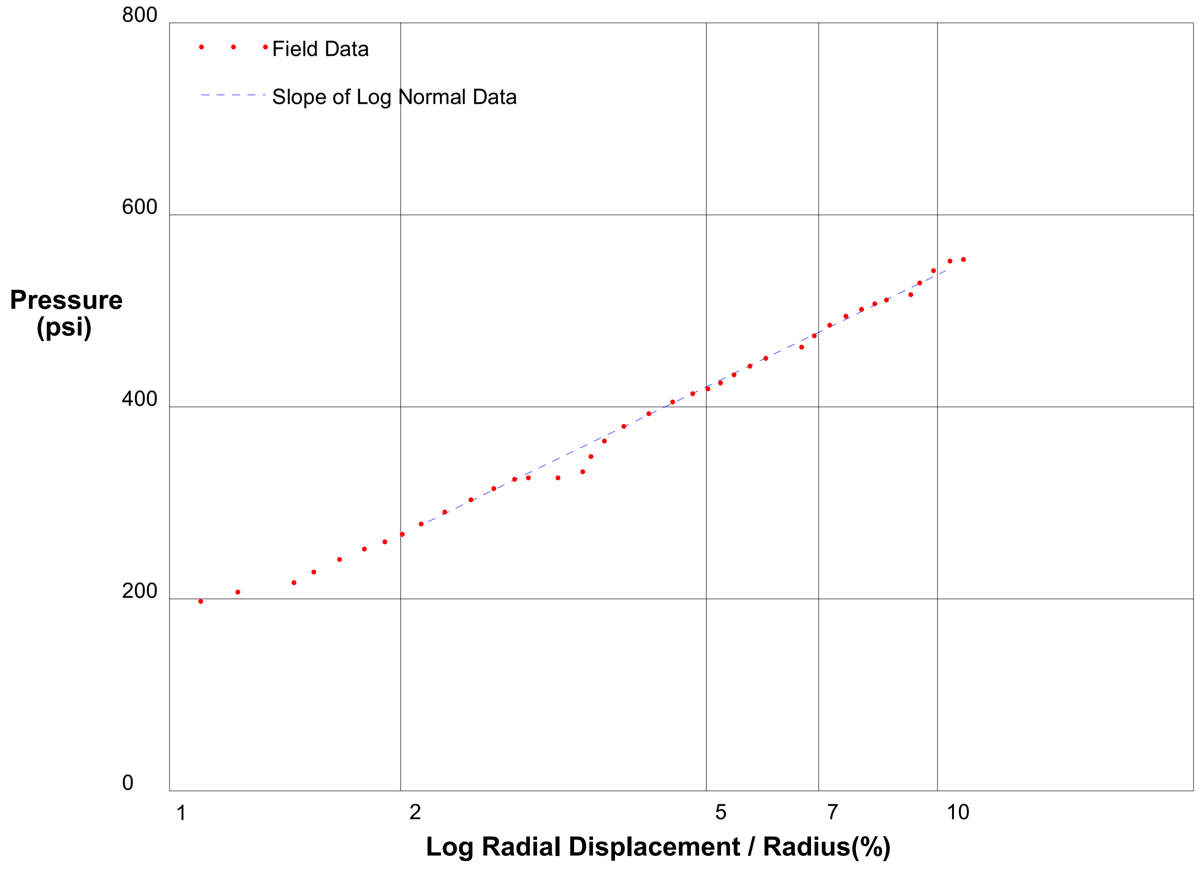
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/4/2008**

Hole No. PM301 **Depth 91ft** **File C:\DATA\ISE-765\CC44.P**



Shear Strength 168.3 psi
Limit Pressure 775 psi

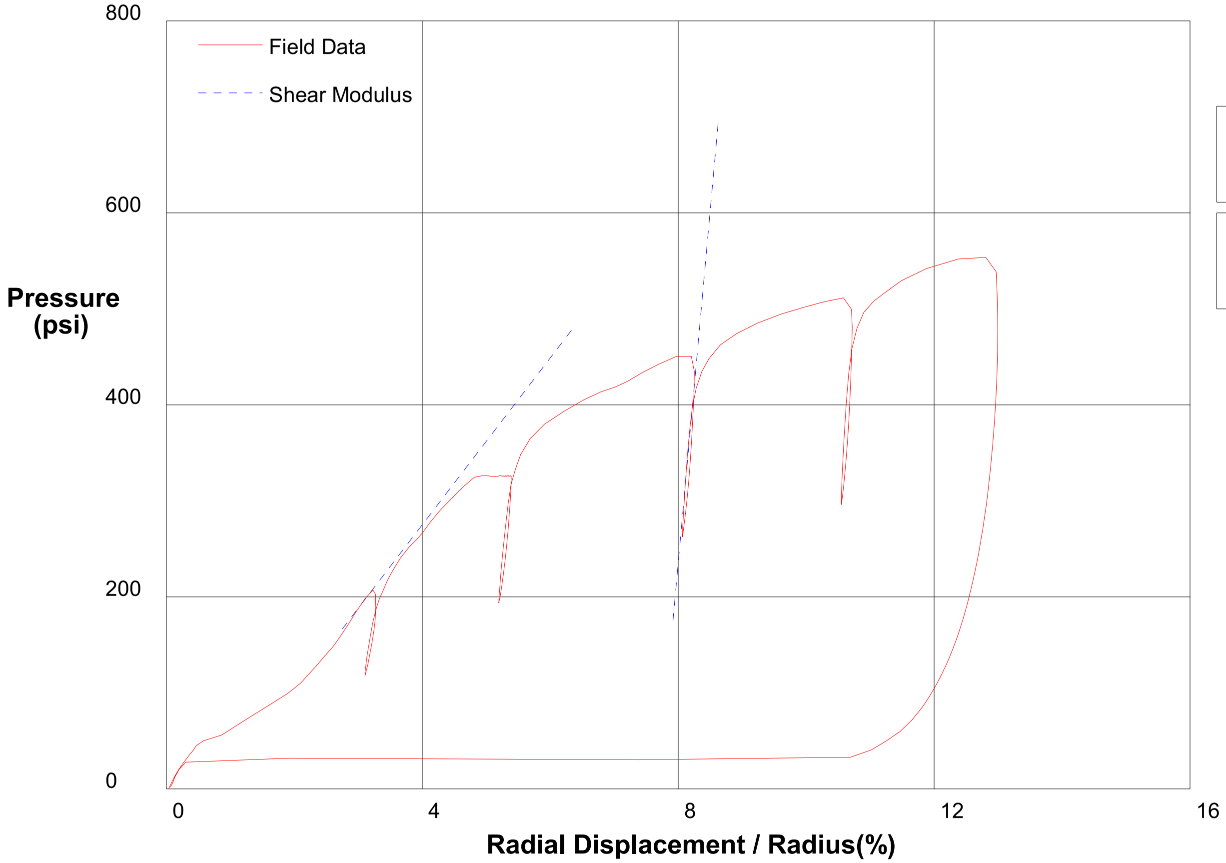
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/4/2008**

Hole No. PM301 **Depth 91ft** **File C:\DATA\ISE-765\CC44.P**



Shear Modulus 4341 psi

Shear Modulus 36666 psi

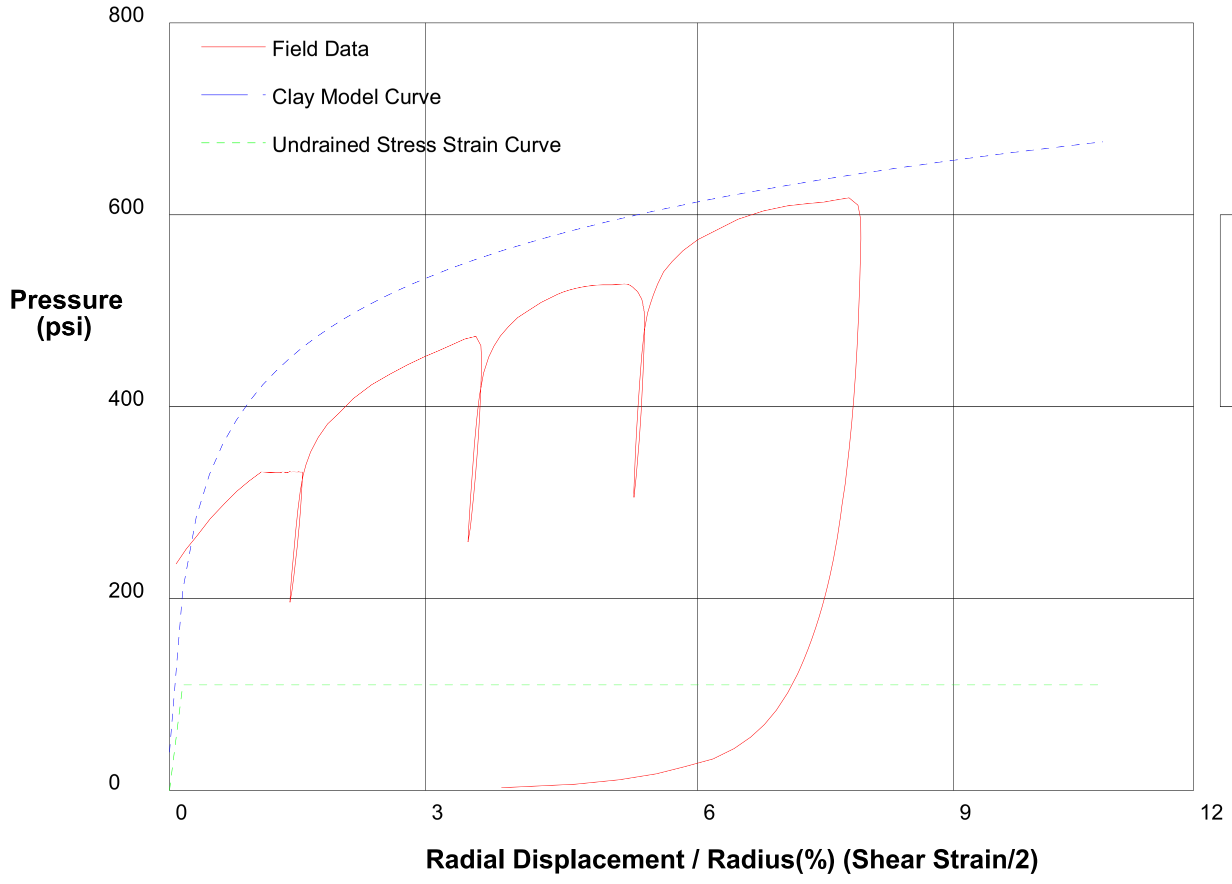
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/4/2008**

Hole No. PM301 **Depth 89.5ft** **File C:\DATA\ISE-765\CC45.P**



GIBSON'S CLAY MODEL

Shear Strength 110 psi
Insitu Stress 40 psi
Shear Modulus 60000 psi

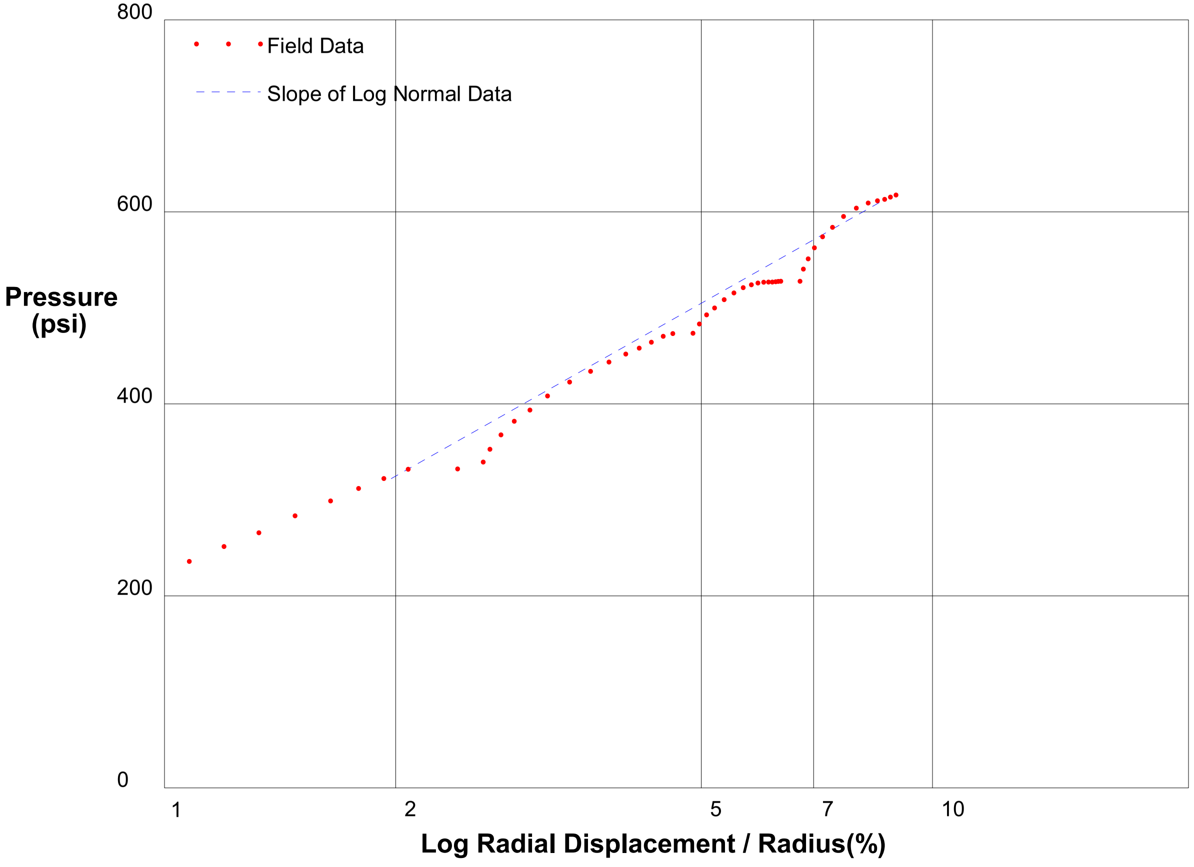
shift 4

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/4/2008**

Hole No. PM301 **Depth 89.5ft** **File C:\DATA\ISE-765\CC45.P**



Shear Strength 196.3 psi
Limit Pressure 918 psi

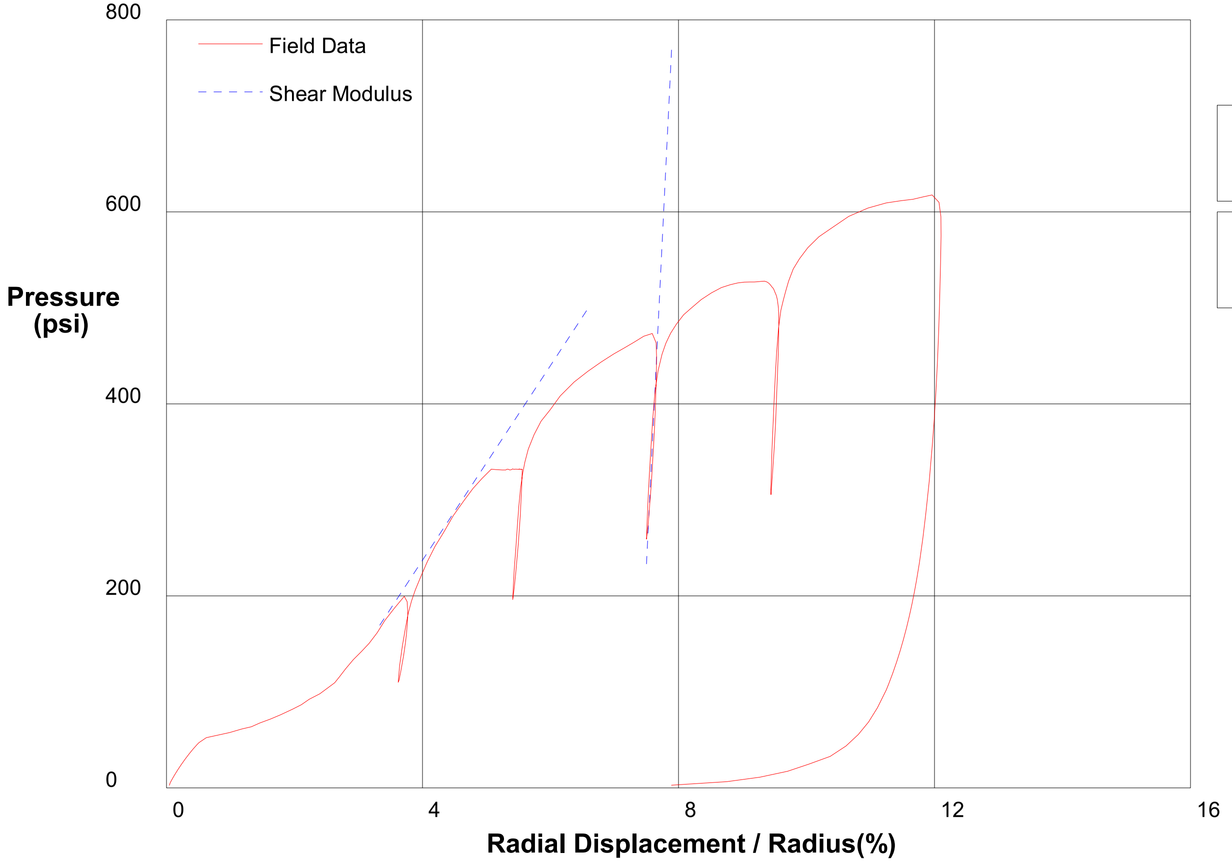
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/4/2008**

Hole No. PM301 **Depth 89.5ft** **File C:\DATA\ISE-765\CC45.P**



Shear Modulus 5074 psi

Shear Modulus 68245 psi

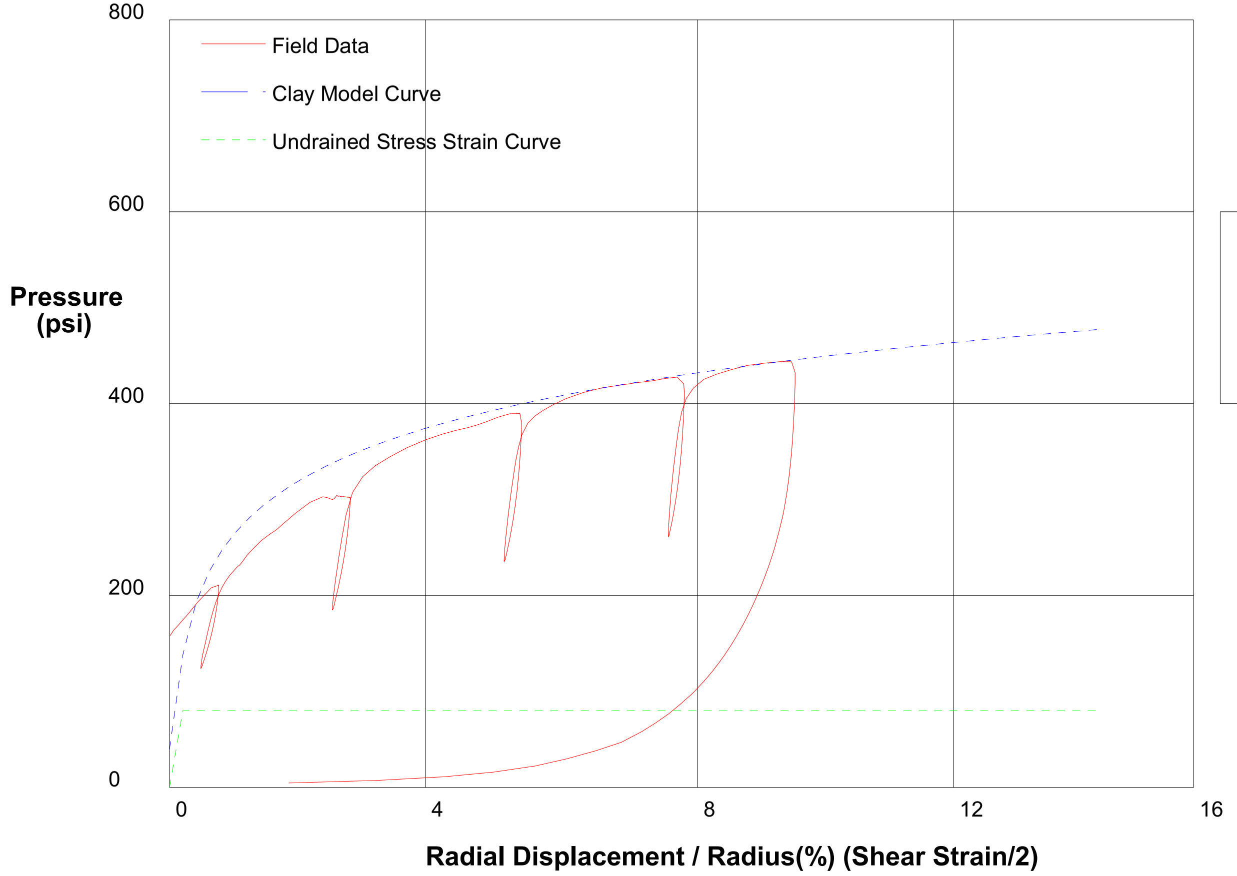
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/5/2008**

Hole No. PM301 **Depth 101ft** **File C:\DATA\ISE-765\CC46.P**



GIBSON'S CLAY MODEL

Shear Strength	**80**	**psi**
Insitu Stress	**40**	**psi**
Shear Modulus	**24000**	**psi**

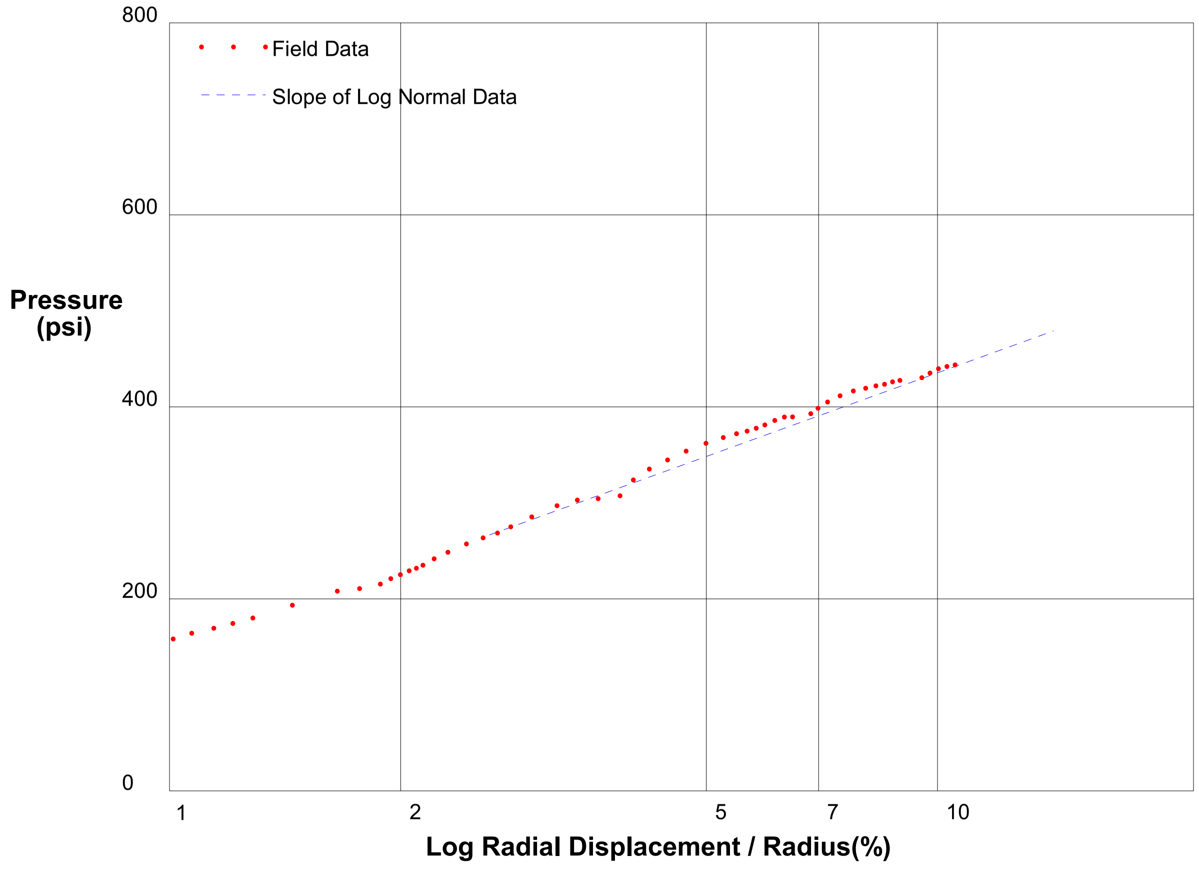
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/5/2008**

Hole No. PM301 **Depth 101ft** **File C:\DATA\ISE-765\CC46.P**



Shear Strength 125.6 psi
Limit Pressure 612 psi

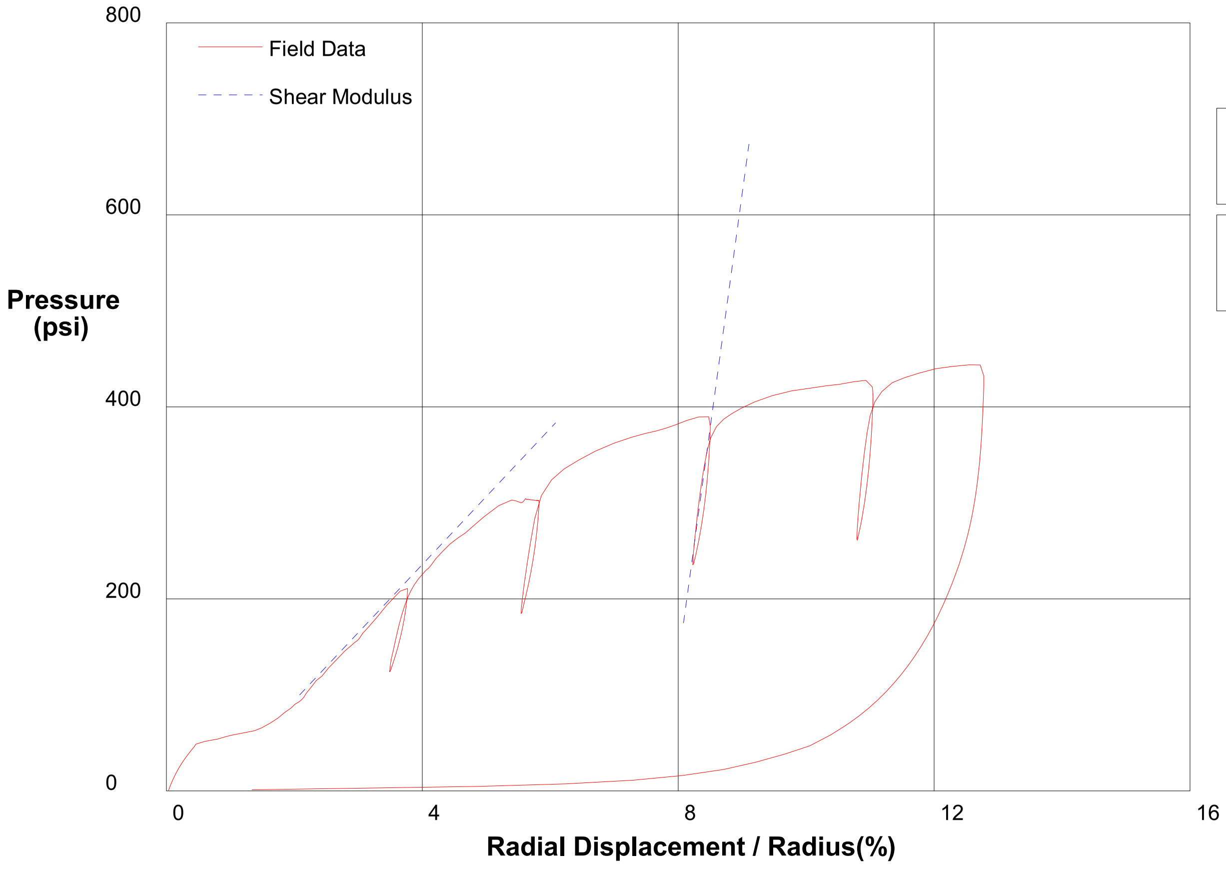
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/5/2008**

Hole No. PM301 **Depth 101ft** **File C:\DATA\ISE-765\CC46.P**



Shear Modulus 3541 psi

Shear Modulus 24421 psi

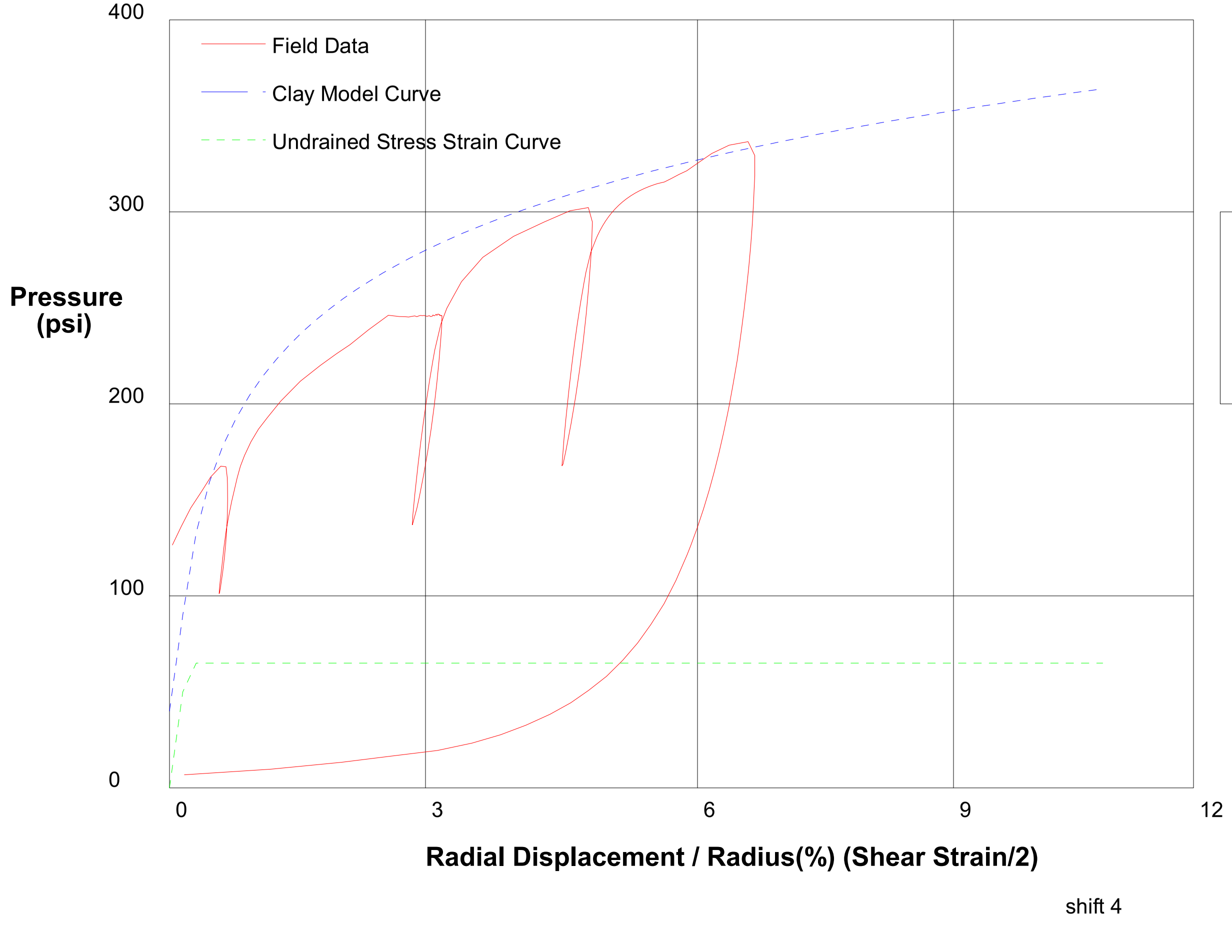
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/5/2008**

Hole No. PM301 **Depth 99.5ft** **File C:\DATA\ISE-765\CC47.P**



GIBSON'S CLAY MODEL

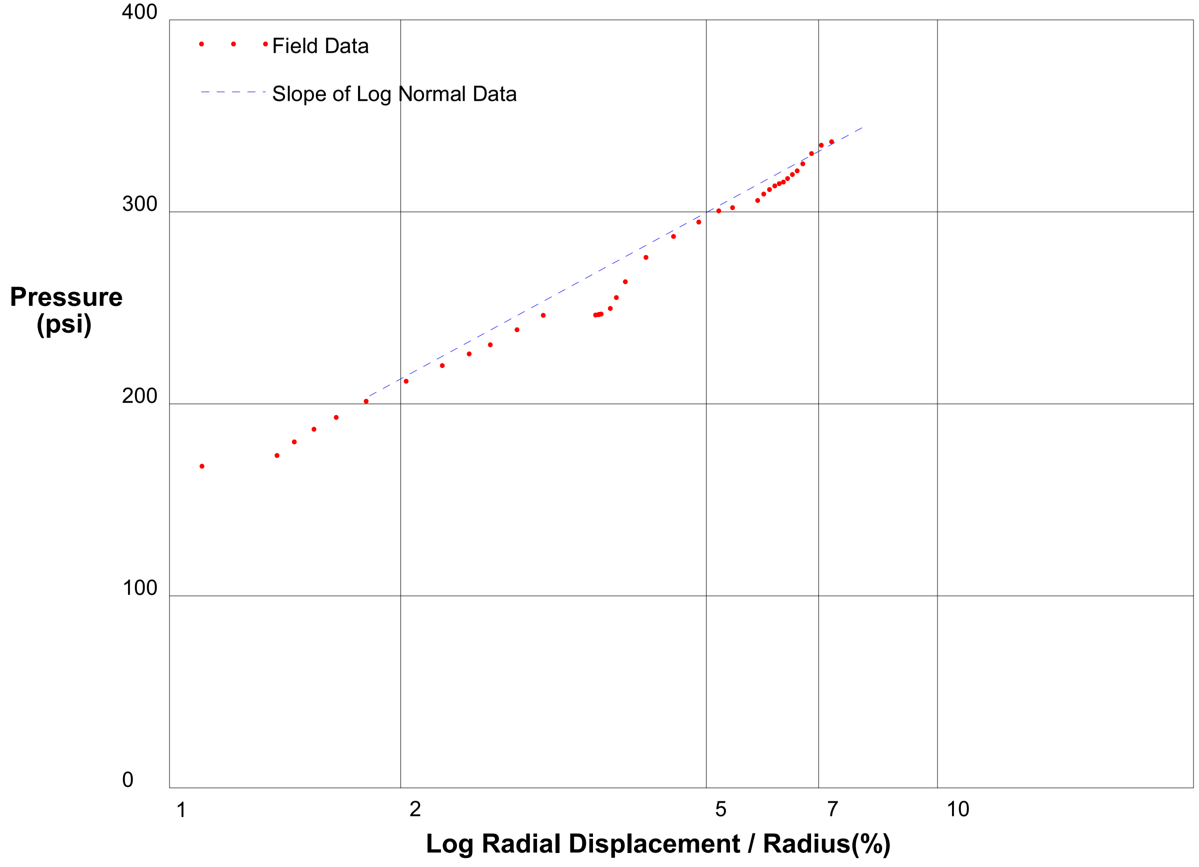
Shear Strength 65 psi
Insitu Stress 40 psi
Shear Modulus 16000 psi

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/5/2008**

Hole No. PM301 **Depth 99.5ft** **File C:\DATA\ISE-765\CC47.P**



Shear Strength 94.5 psi
Limit Pressure 498 psi

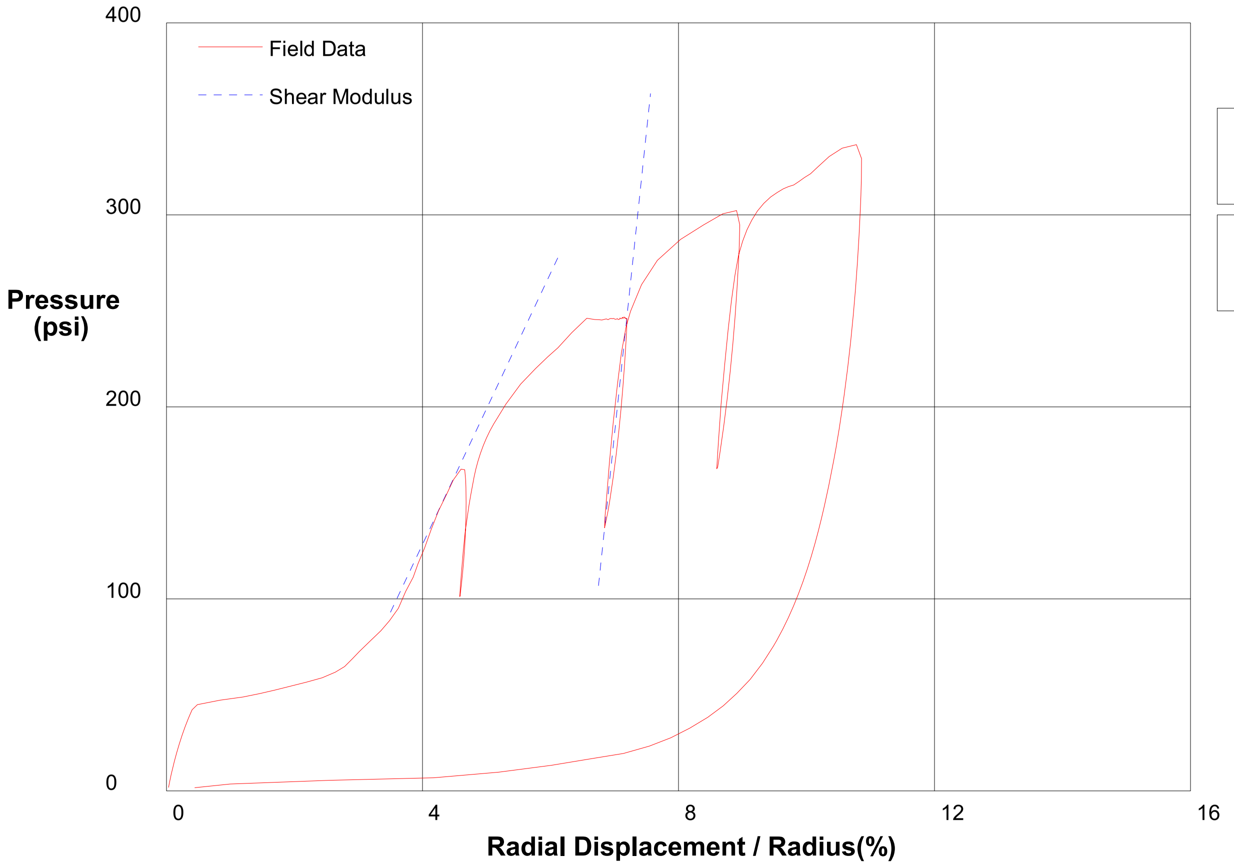
shift 3.5

In Situ Engineering

PRESSUREMETER DATA	**Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/5/2008**

Hole No. PM301 **Depth 99.5ft** **File C:\DATA\ISE-765\CC47.P**



Shear Modulus 3530 psi

Shear Modulus 15769 psi

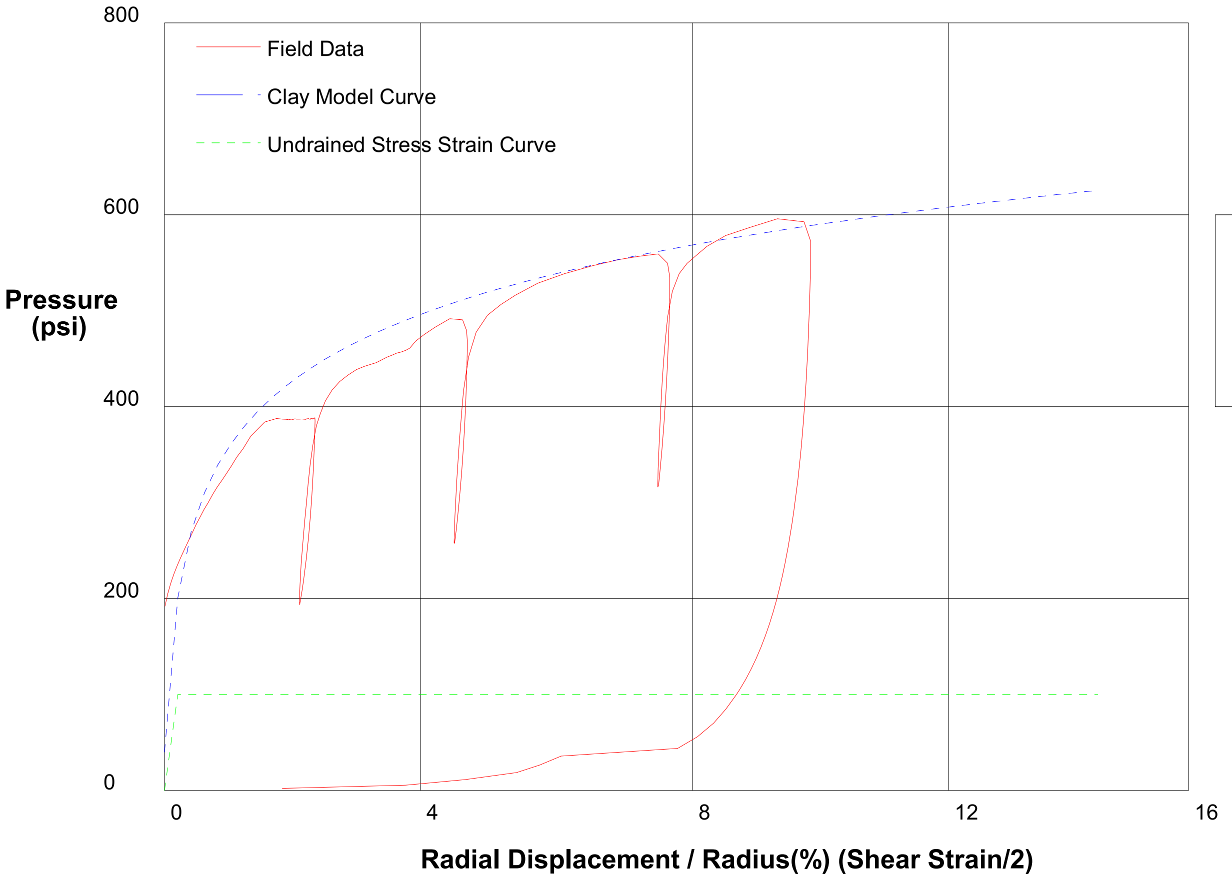
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/5/2008**

Hole No. PM301 **Depth 111ft** **File C:\DATA\ISE-765\CC48.P**



GIBSON'S CLAY MODEL

Shear Strength 100 psi
Insitu Stress 40 psi
Shear Modulus 44000 psi

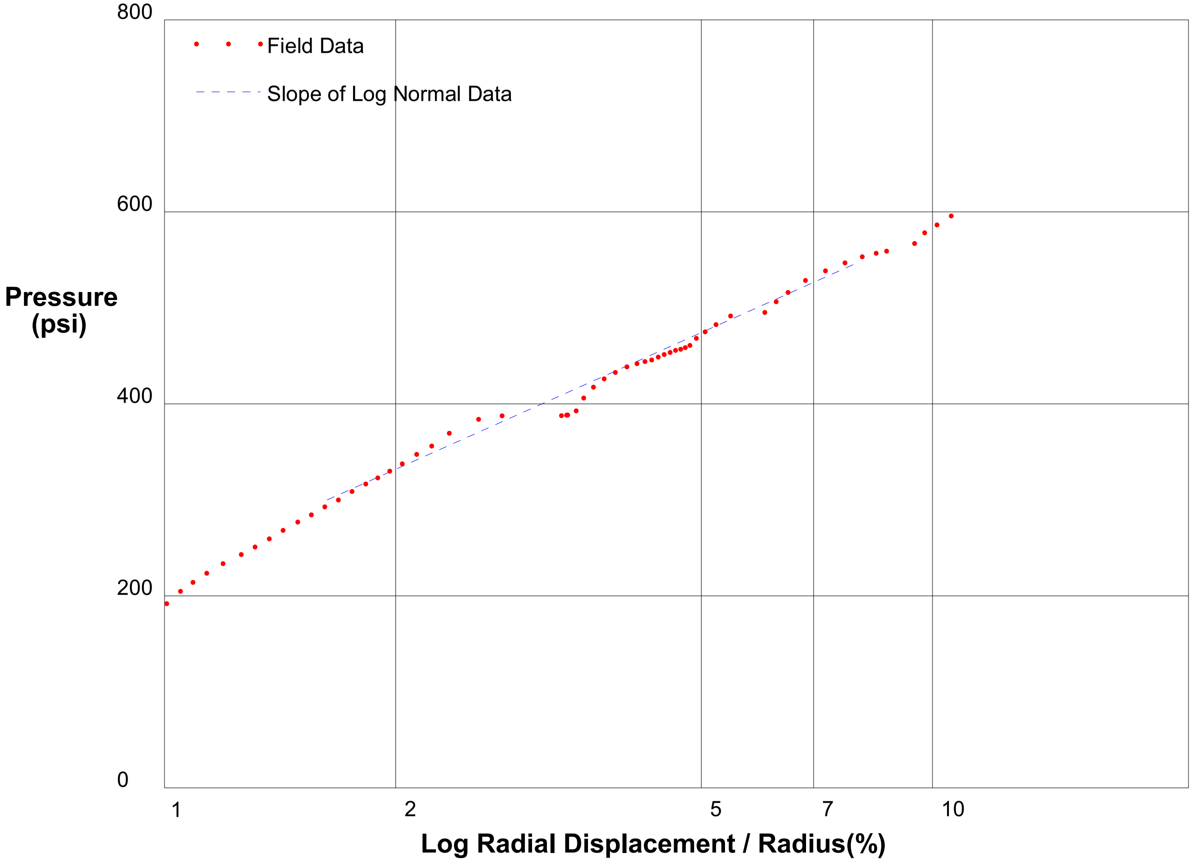
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/5/2008**

Hole No. PM301 **Depth 111ft** **File C:\DATA\ISE-765\CC48.P**



Shear Strength 155.3 psi
Limit Pressure 801 psi

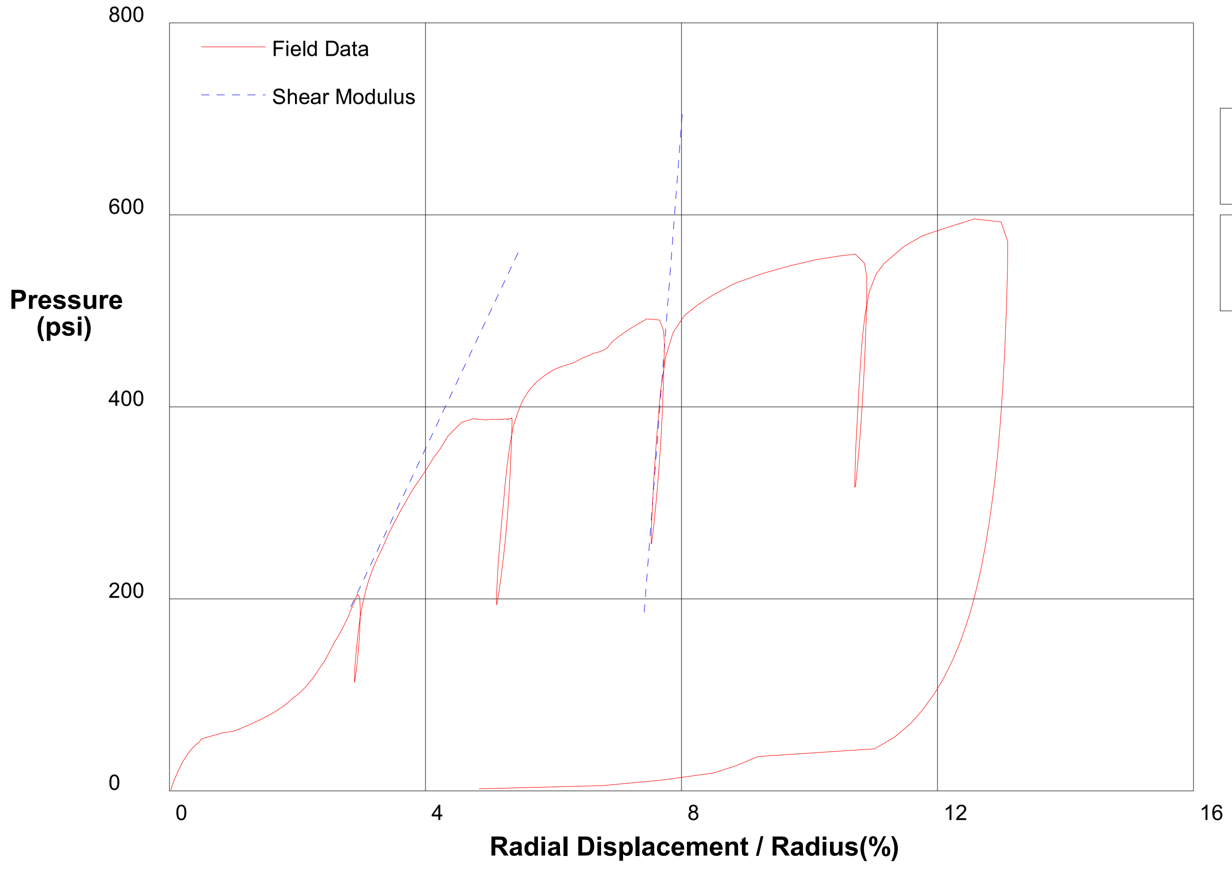
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/5/2008**

Hole No. PM301 **Depth 111ft** **File C:\DATA\ISE-765\CC48.P**



Shear Modulus 7060 psi

Shear Modulus 43563 psi

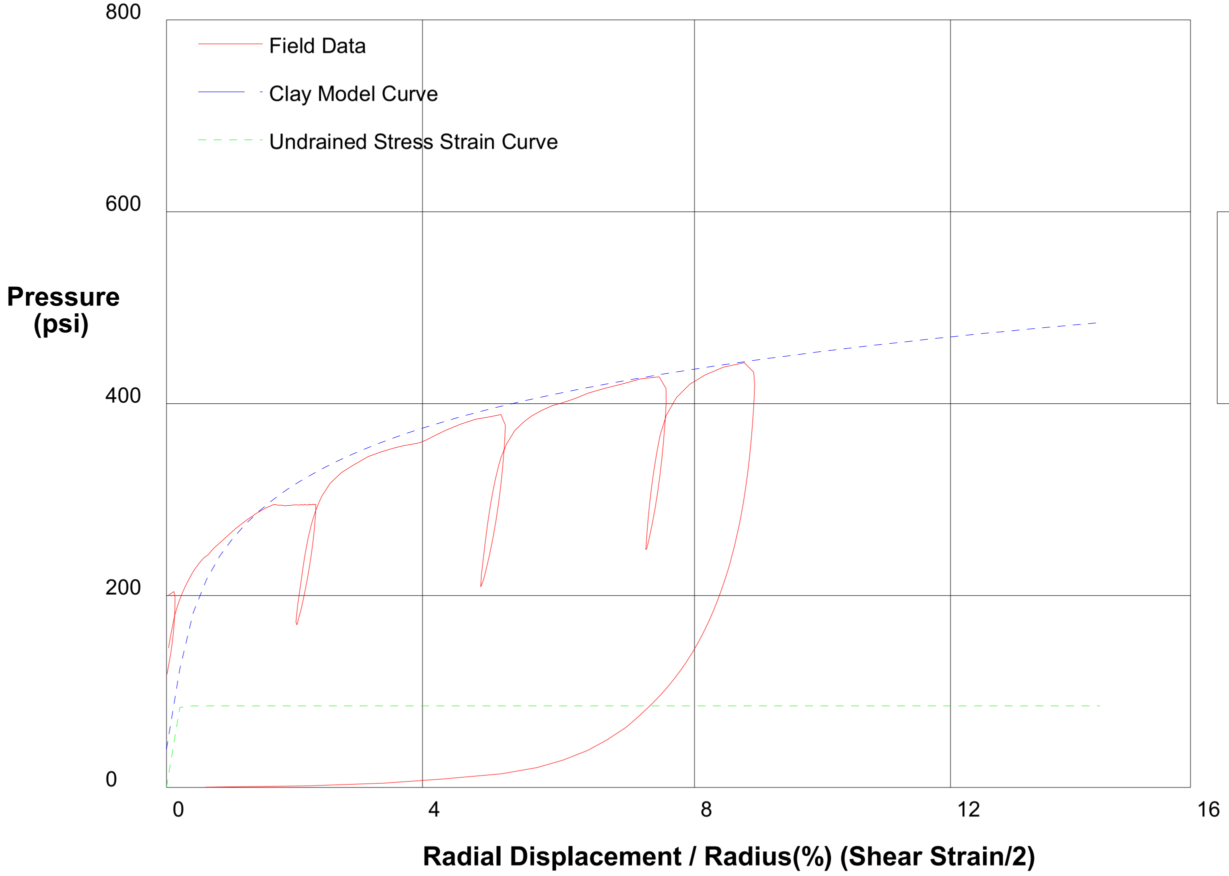
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/5/2008**

Hole No. PM301 **Depth 109.5ft** **File C:\DATA\ISE-765\CC49.P**



shift 3

GIBSON'S CLAY MODEL

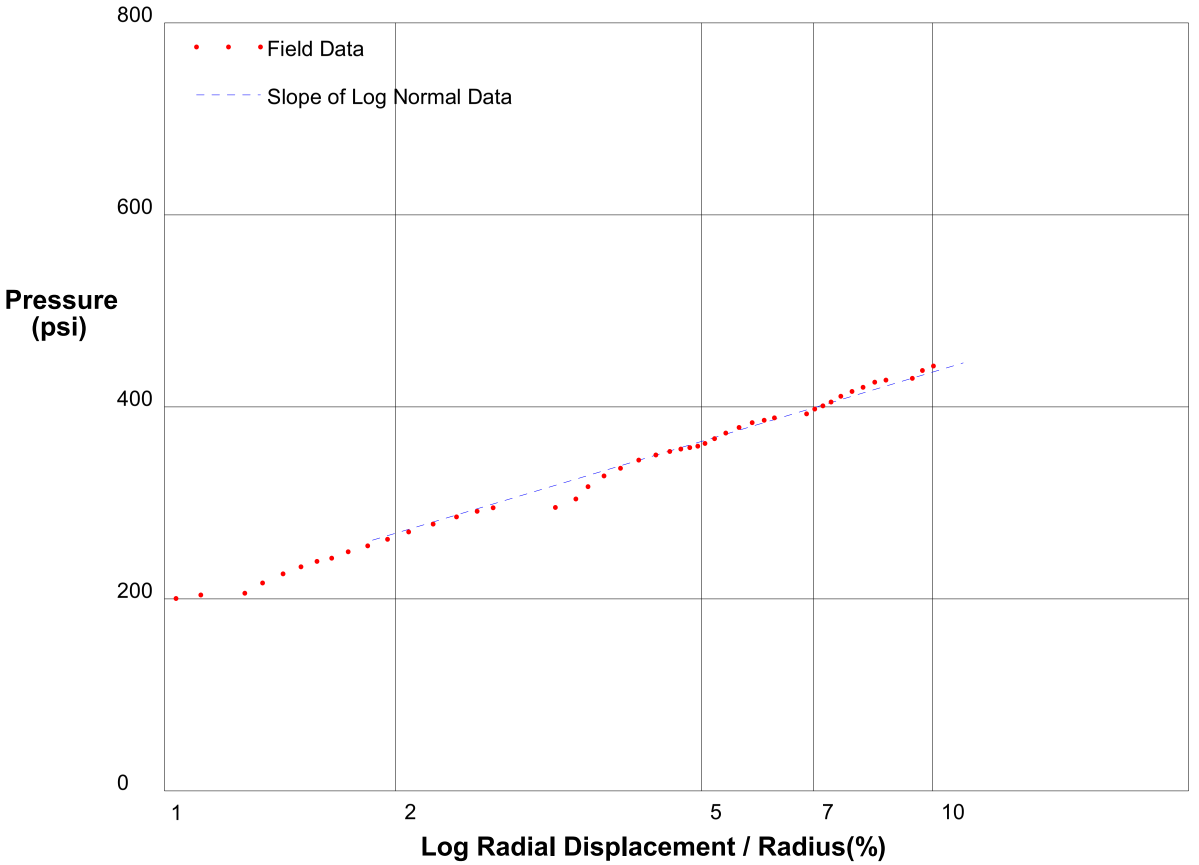
Shear Strength 85 psi
Insitu Stress 40 psi
Shear Modulus 20000 psi

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/5/2008**

Hole No. PM301 **Depth 109.5ft** **File C:\DATA\ISE-765\CC49.P**



Shear Strength 104.3 psi
Limit Pressure 583 psi

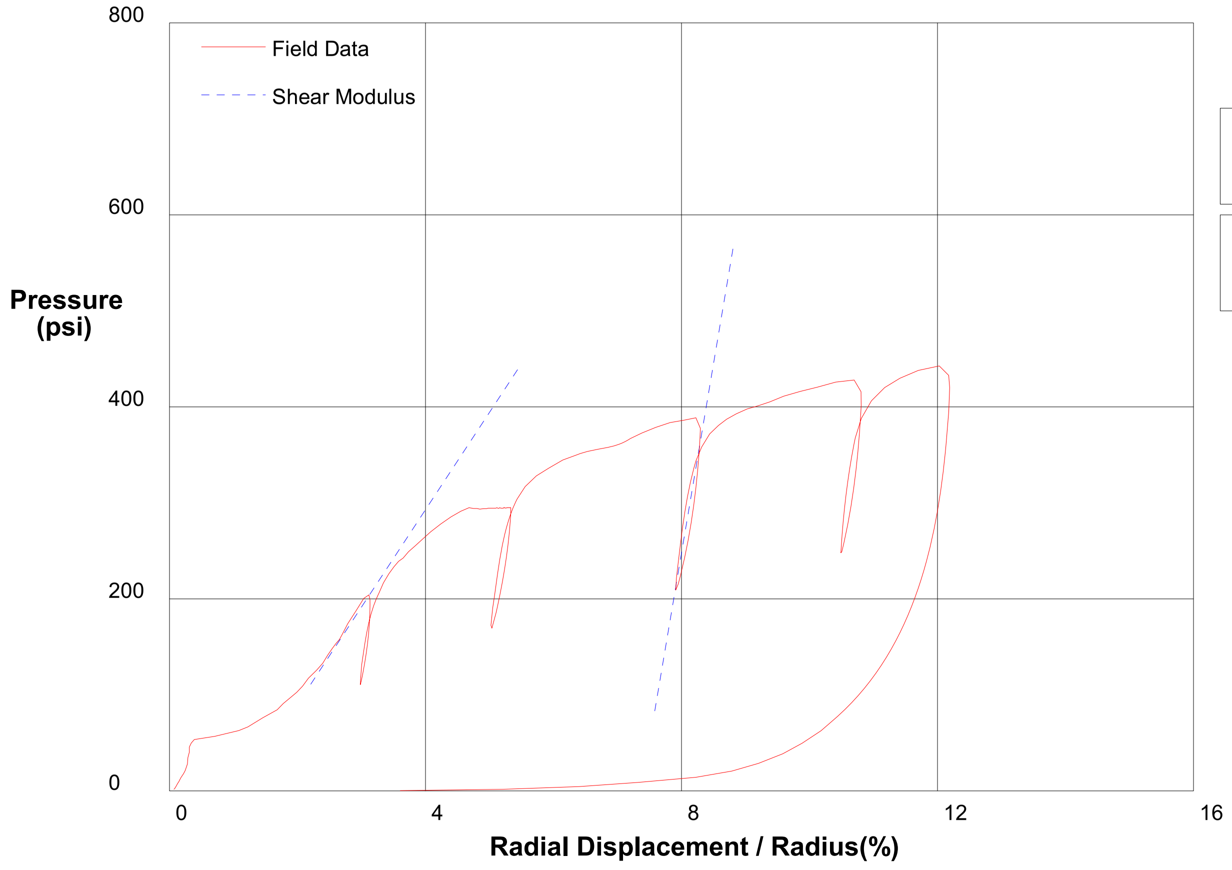
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/5/2008**

Hole No. PM301 **Depth 109.5ft** **File C:\DATA\ISE-765\CC49.P**



Shear Modulus 5074 psi

Shear Modulus 19717 psi

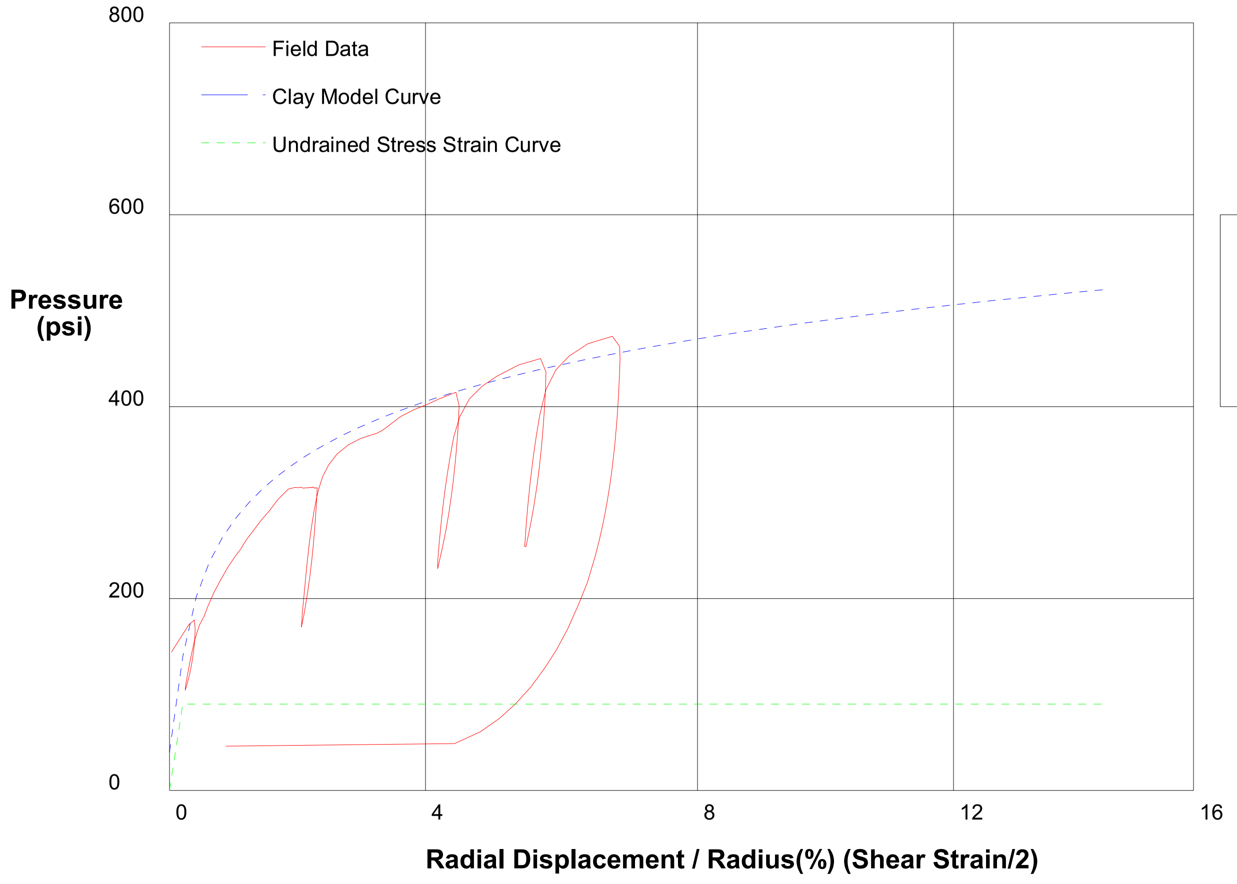
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/5/2008**

Hole No. PM301 **Depth 120.8ft** **File C:\DATA\ISE-765\CC50.P**



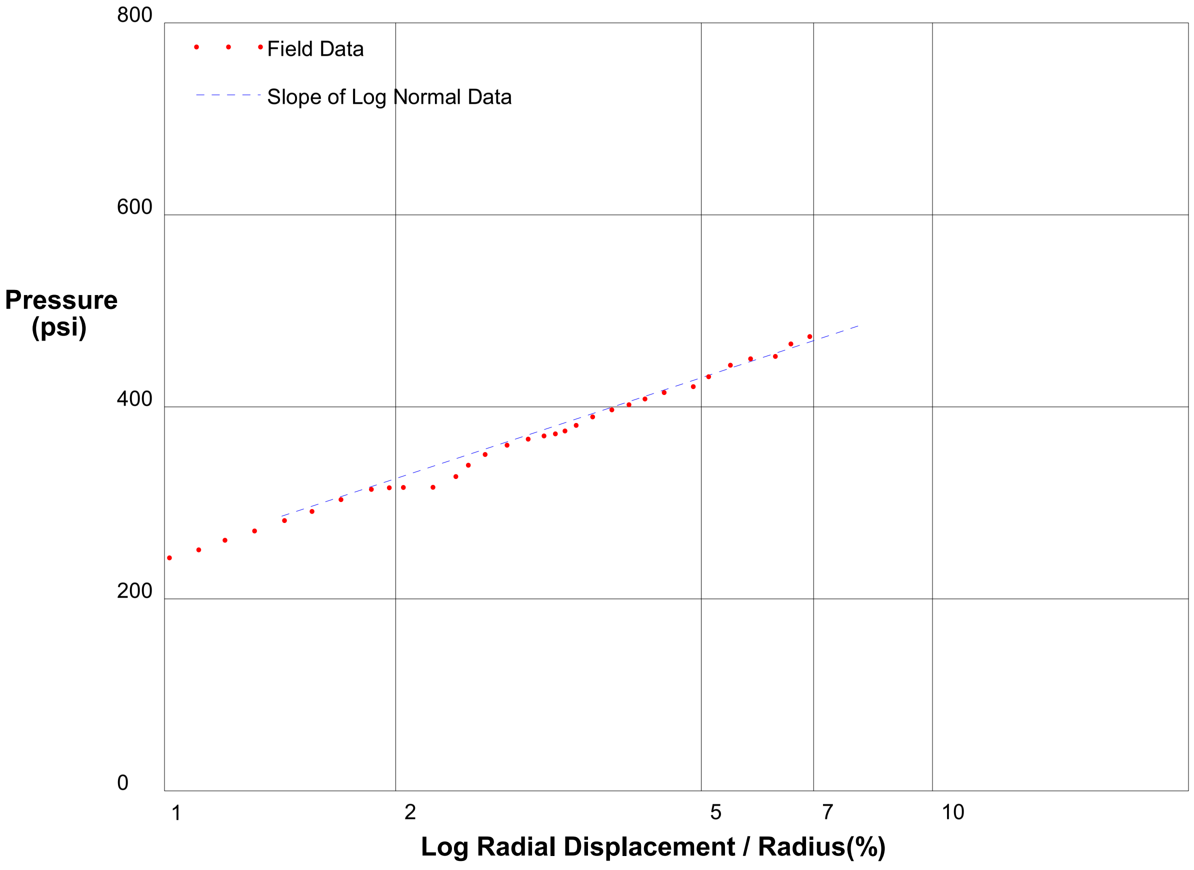
GIBSON'S CLAY MODEL

Shear Strength 90 psi
Insitu Stress 40 psi
Shear Modulus 24000 psi

shift 3

In Situ Engineering

PRESSUREMETER DATA	**Schnabel Engineering LLC.**	
Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation		**9/5/2008**
Hole No. PM301	**Depth 120.8ft**	**File C:\DATA\ISE-765\CC50.P**



Shear Strength 114.7 psi
Limit Pressure 671 psi

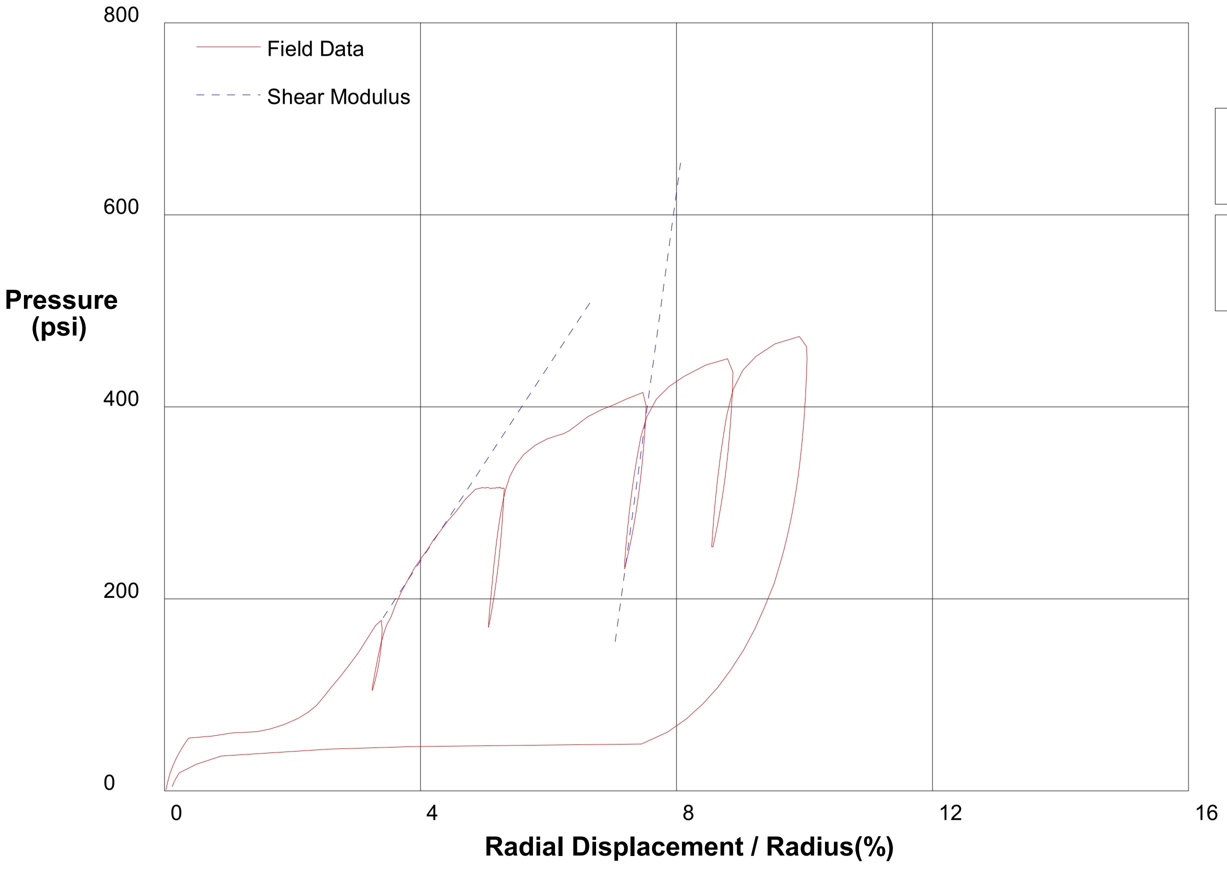
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/5/2008**

Hole No. PM301 **Depth 120.8ft** **File C:\DATA\ISE-765\CC50.P**



Shear Modulus 5074 psi

Shear Modulus 24421 psi

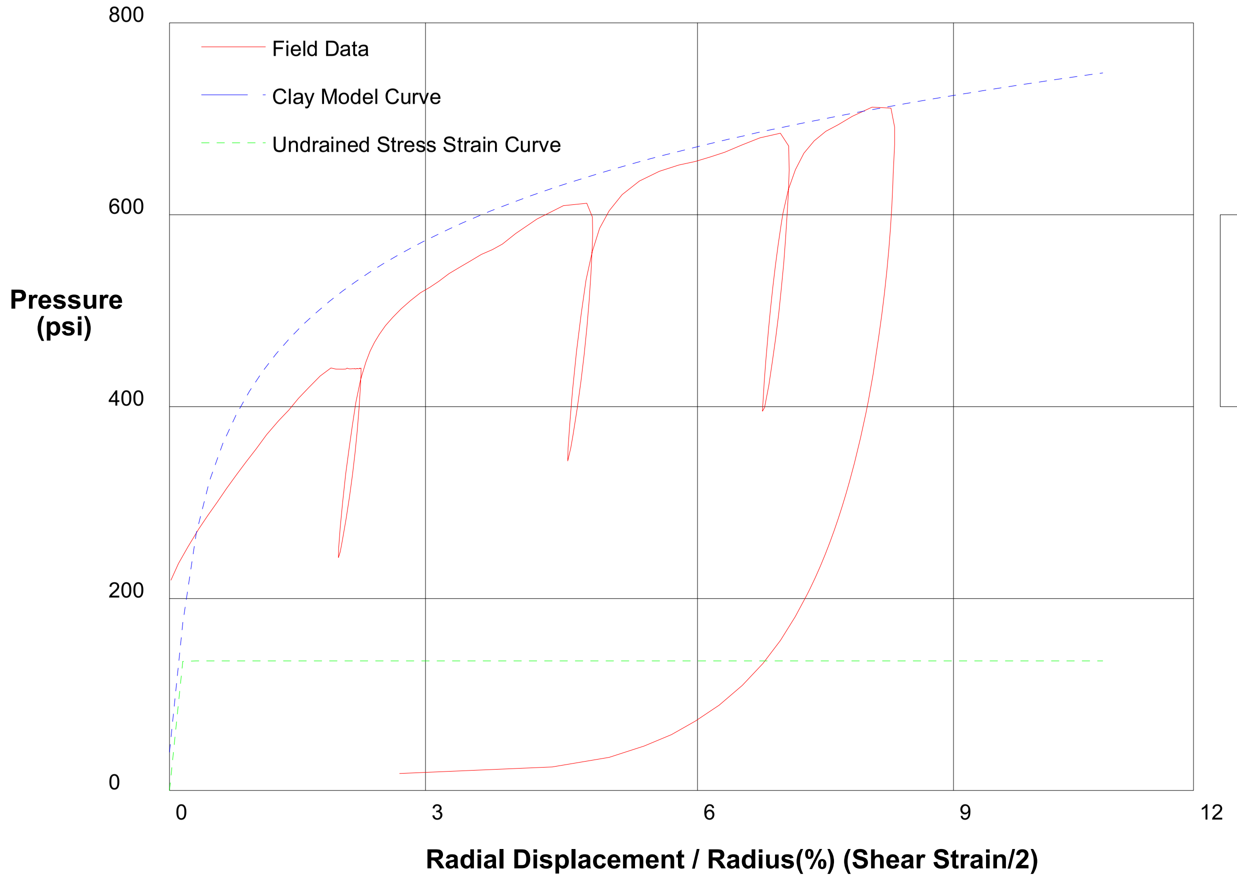
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/5/2008**

Hole No. PM301 **Depth 119.3ft** **File C:\DATA\ISE-765\CC51.P**



GIBSON'S CLAY MODEL

Shear Strength 135 psi
Insitu Stress 40 psi
Shear Modulus 43000 psi

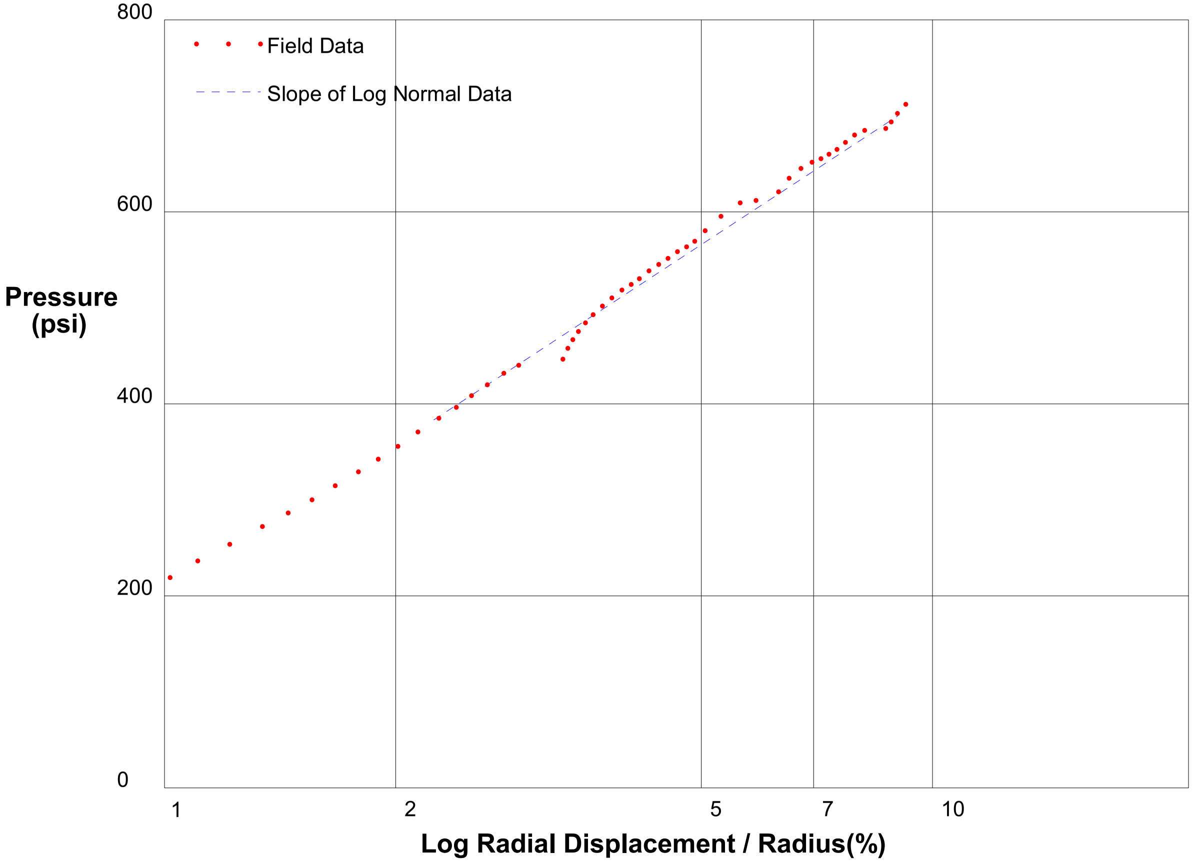
shift 4

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/5/2008**

Hole No. PM301 **Depth 119.3ft** **File C:\DATA\ISE-765\CC51.P**



Shear Strength	**227.6**	**psi**
Limit Pressure	**1044**	**psi**

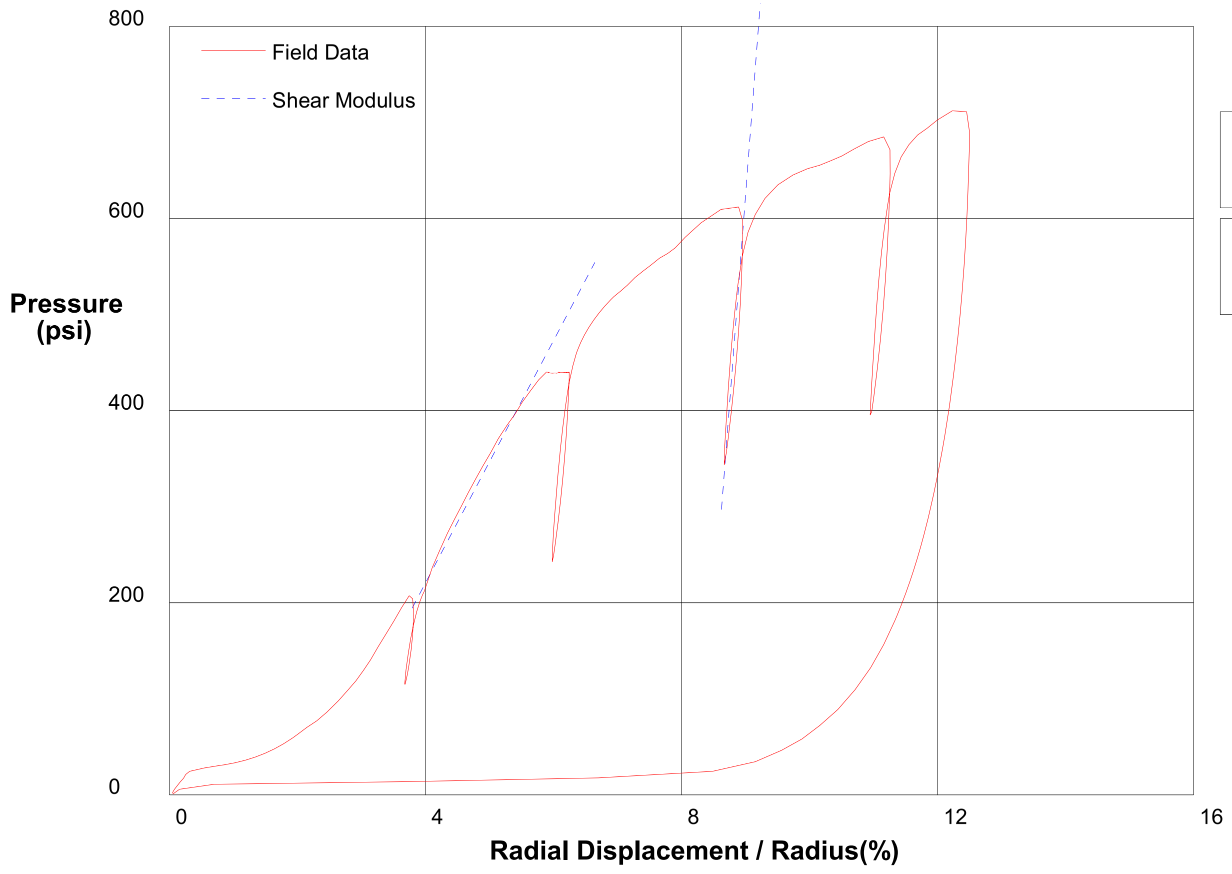
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/5/2008**

Hole No. PM301 **Depth 119.3ft** **File C:\DATA\ISE-765\CC51.P**



Shear Modulus 6301 psi

Shear Modulus 43563 psi

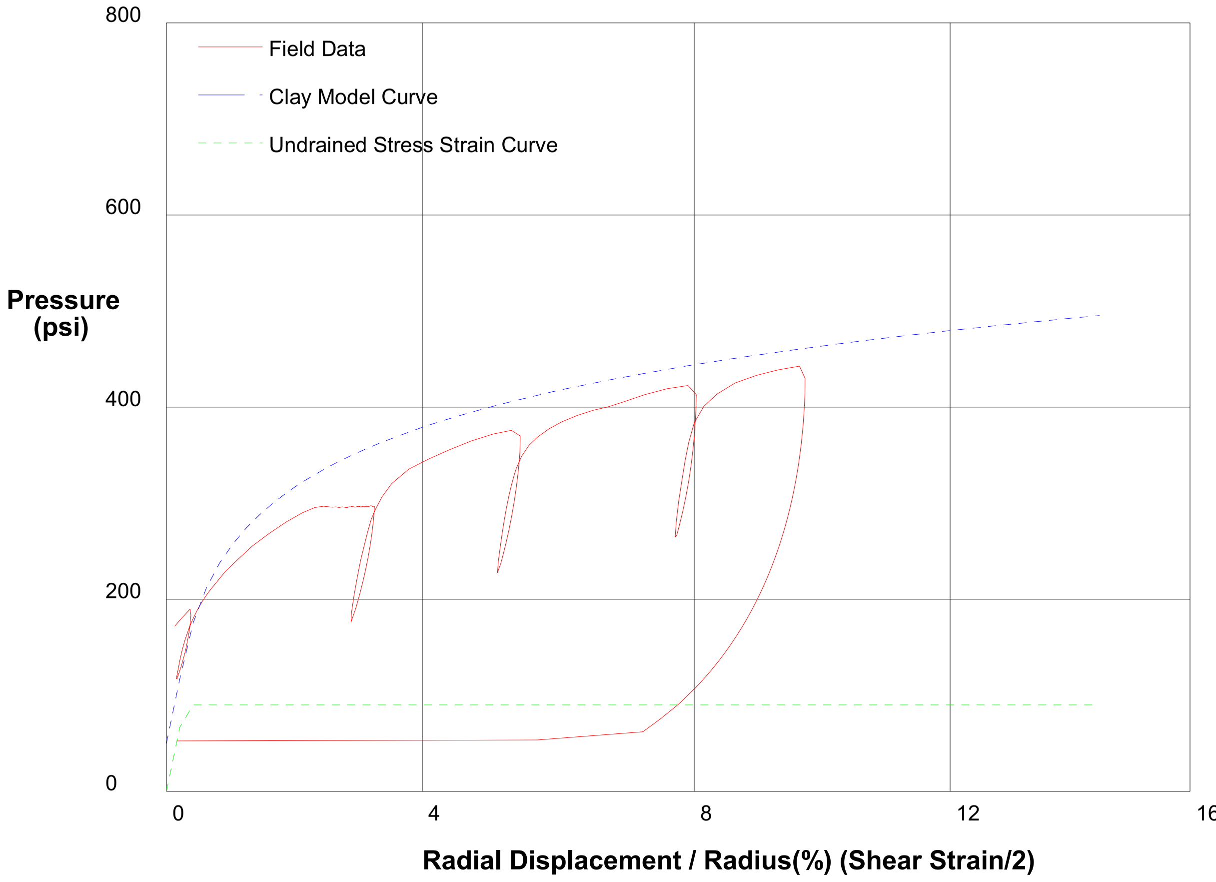
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/5/2008**

Hole No. PM301 **Depth 131ft** **File C:\DATA\ISE-765\CC52.P**



GIBSON'S CLAY MODEL

Shear Strength 90 psi
Insitu Stress 50 psi
Shear Modulus 16000 psi

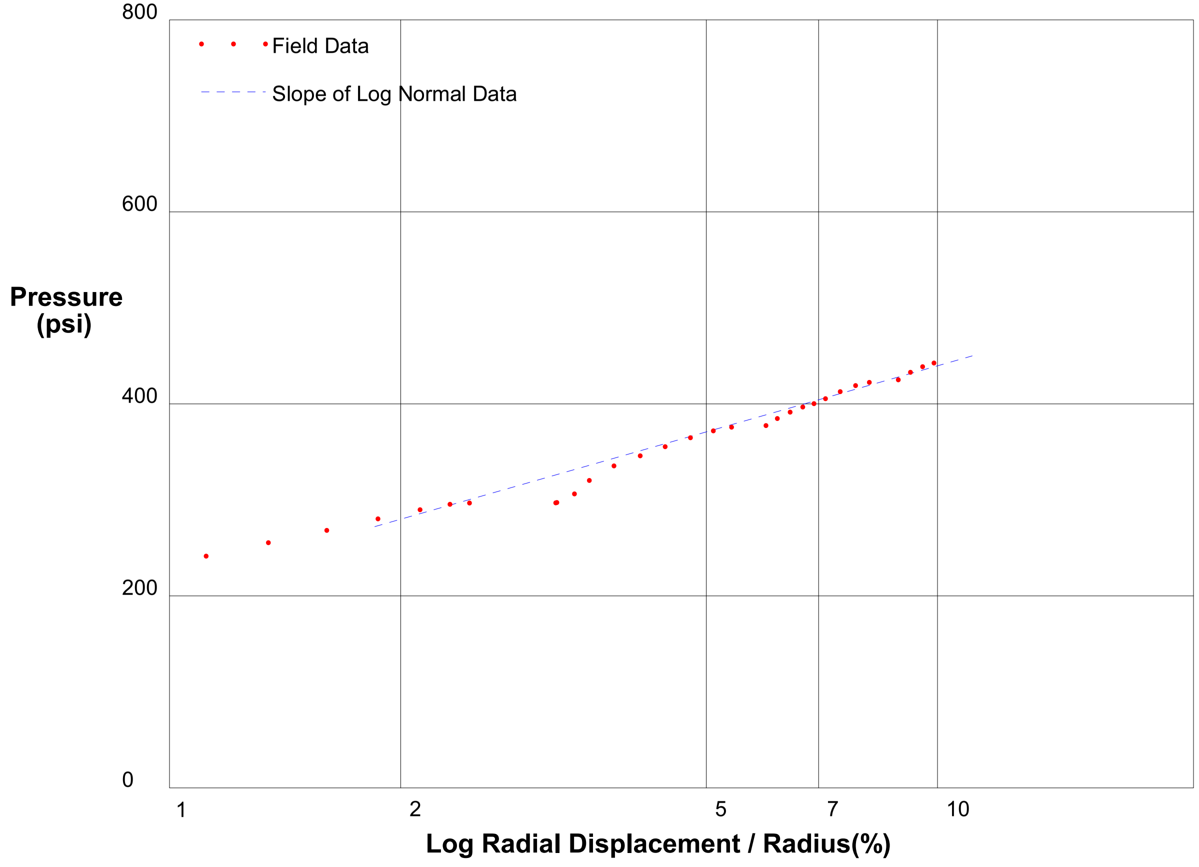
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/5/2008**

Hole No. PM301 **Depth 131ft** **File C:\DATA\ISE-765\CC52.P**



Shear Strength 99.2 psi
Limit Pressure 579 psi

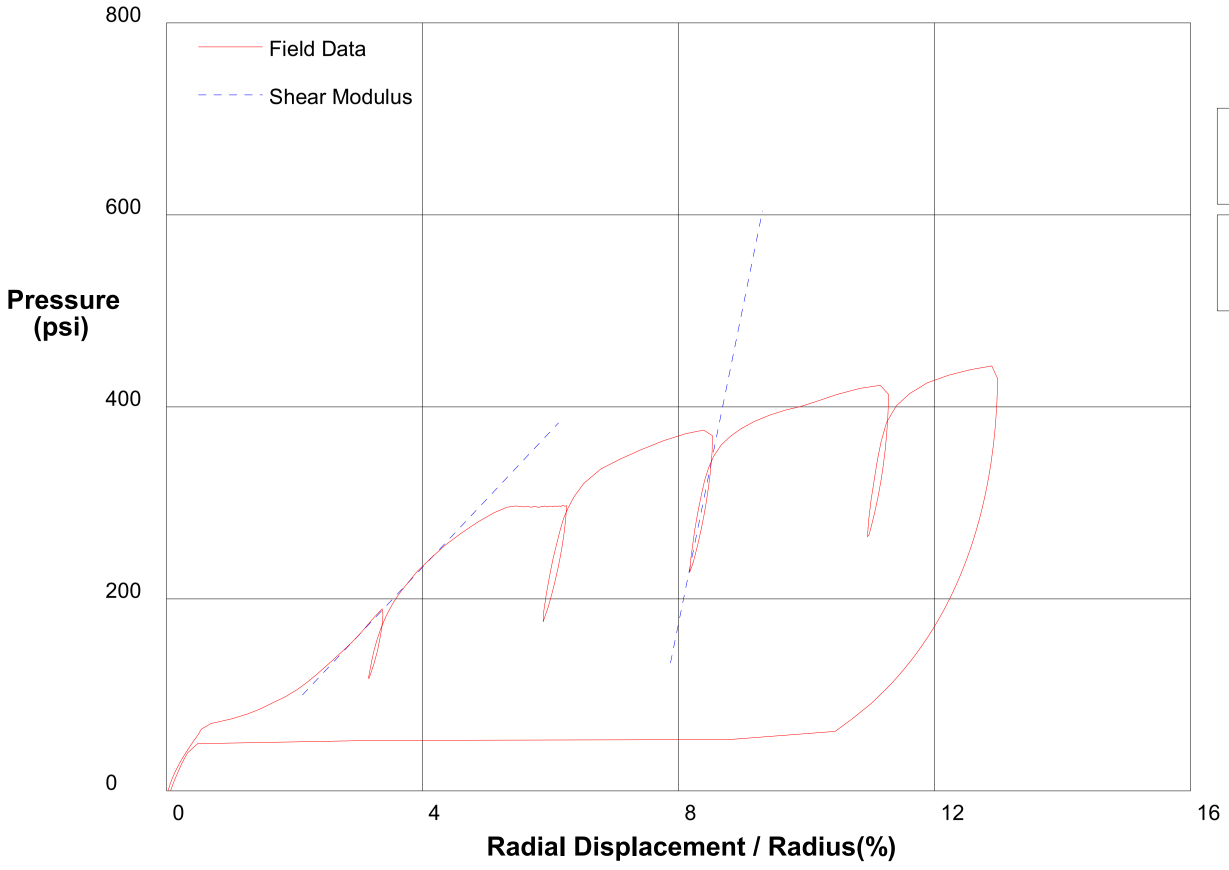
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/5/2008**

Hole No. PM301 **Depth 131ft** **File C:\DATA\ISE-765\CC52.P**



Shear Modulus 3541 psi

Shear Modulus 16376 psi

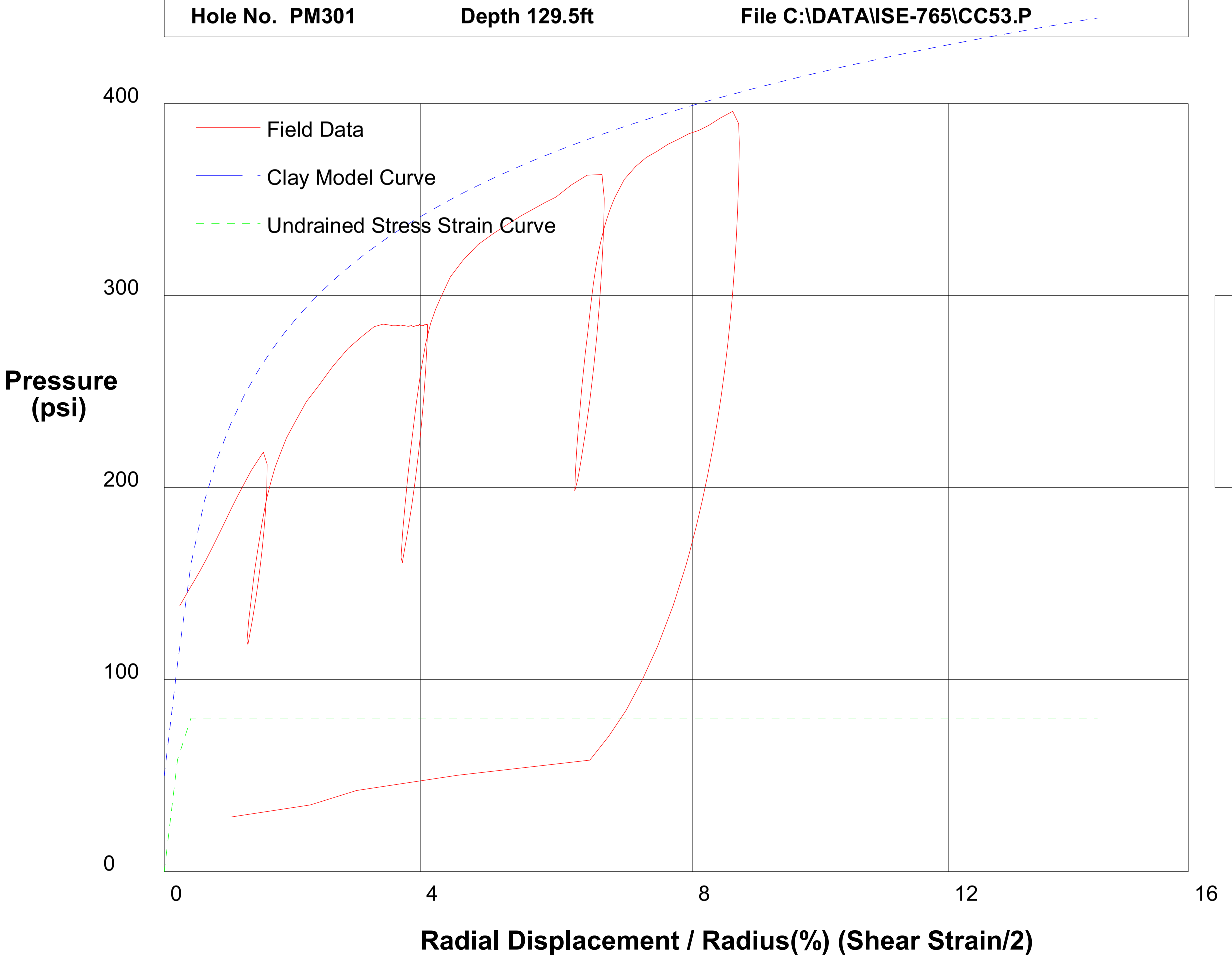
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/5/2008**

Hole No. PM301 **Depth 129.5ft** **File C:\DATA\ISE-765\CC53.P**



GIBSON'S CLAY MODEL

Shear Strength **80 psi**
Insitu Stress **50 psi**
Shear Modulus **14000 psi**

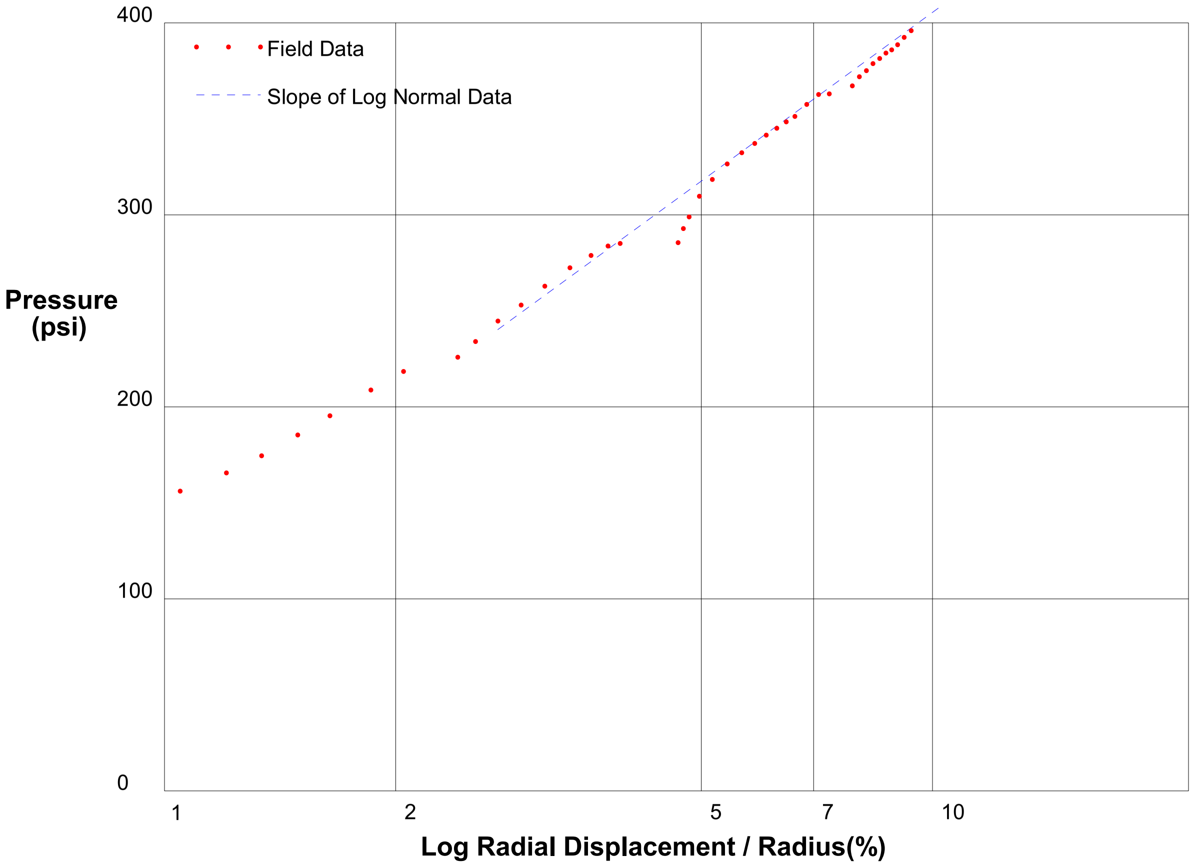
shift 4

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/5/2008**

Hole No. PM301 **Depth 129.5ft** **File C:\DATA\ISE-765\CC53.P**



Shear Strength 126.7 psi
Limit Pressure 584 psi

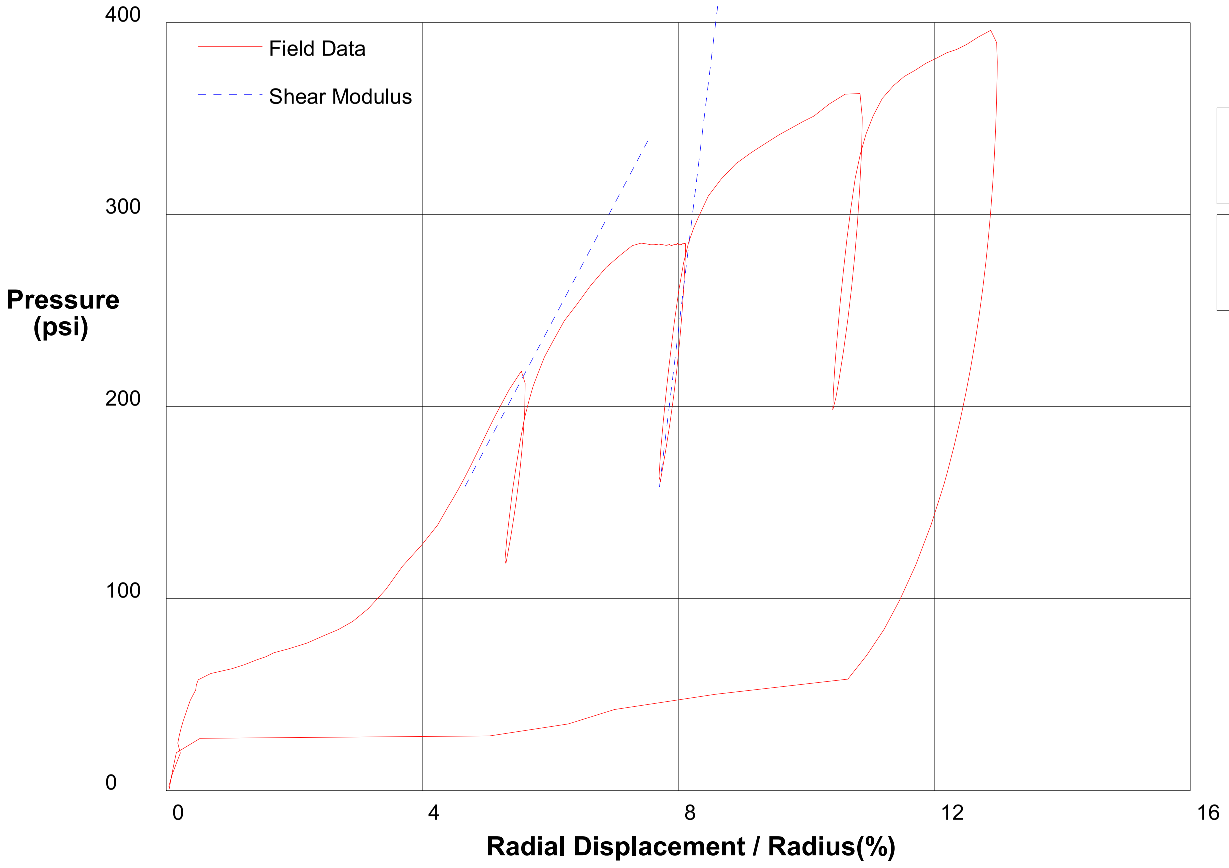
shift 3.5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/5/2008**

Hole No. PM301 **Depth 129.5ft** **File C:\DATA\ISE-765\CC53.P**



Shear Modulus 3150 psi

Shear Modulus 13787 psi

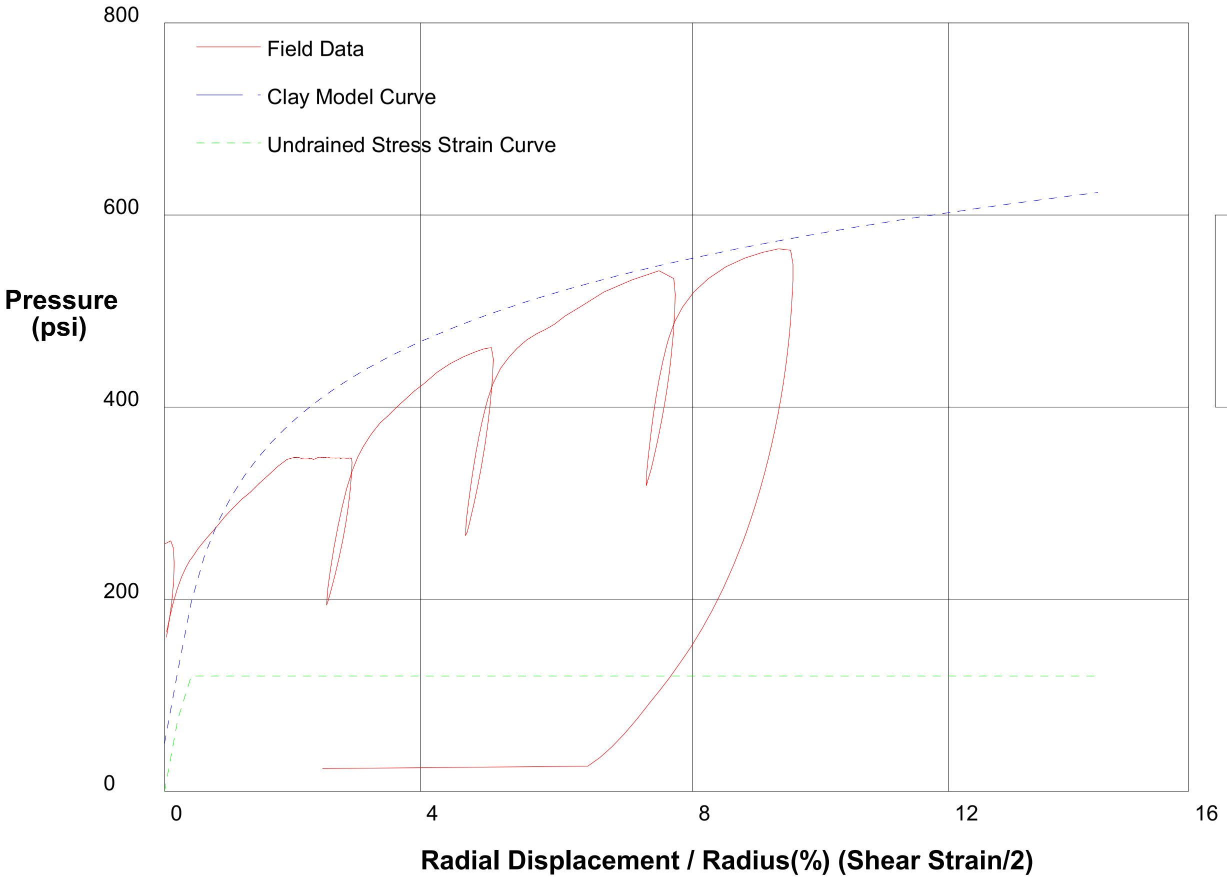
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/8/2008**

Hole No. PM301 **Depth 141ft** **File C:\DATA\ISE-765\CC54.P**



GIBSON'S CLAY MODEL

Shear Strength	**120 psi**
Insitu Stress	**50 psi**
Shear Modulus	**18000 psi**

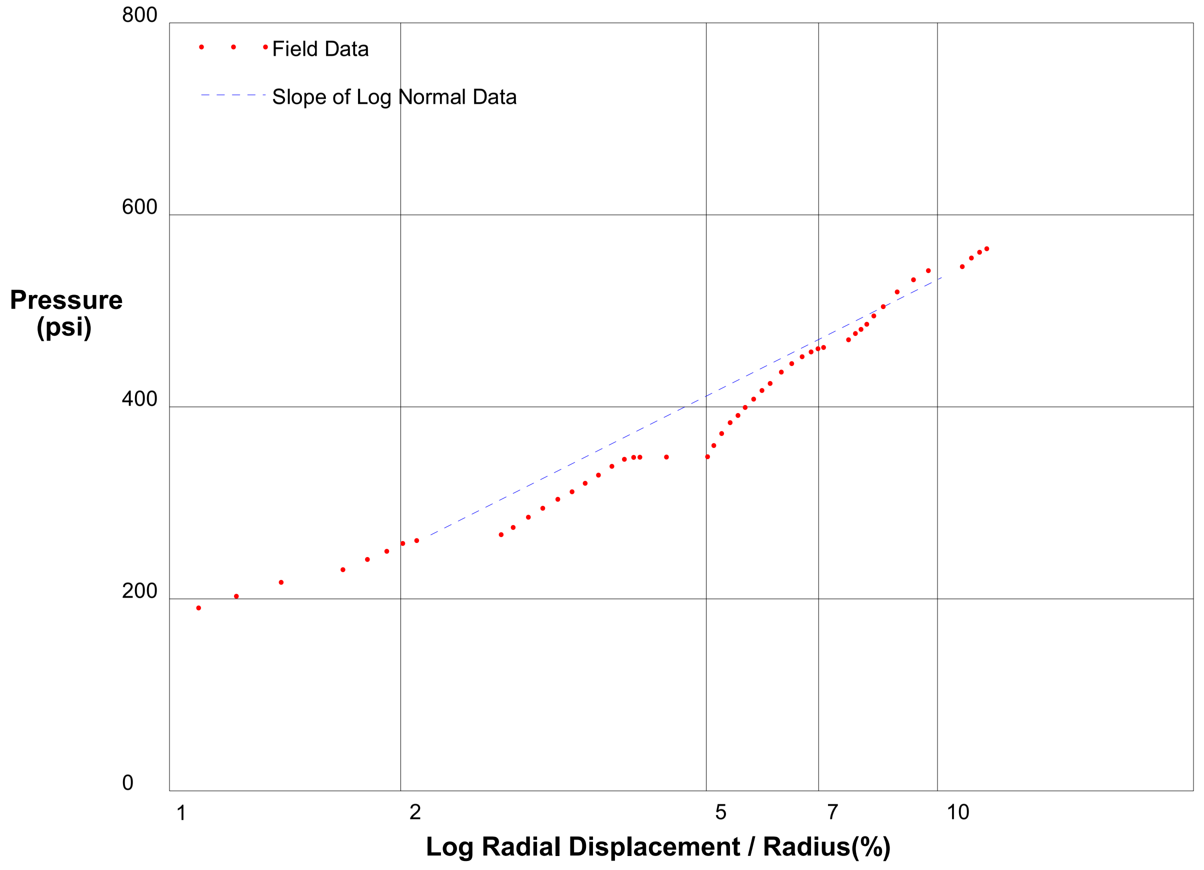
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/8/2008**

Hole No. PM301 **Depth 141ft** **File C:\DATA\ISE-765\CC54.P**



Shear Strength 175 psi
Limit Pressure 779 psi

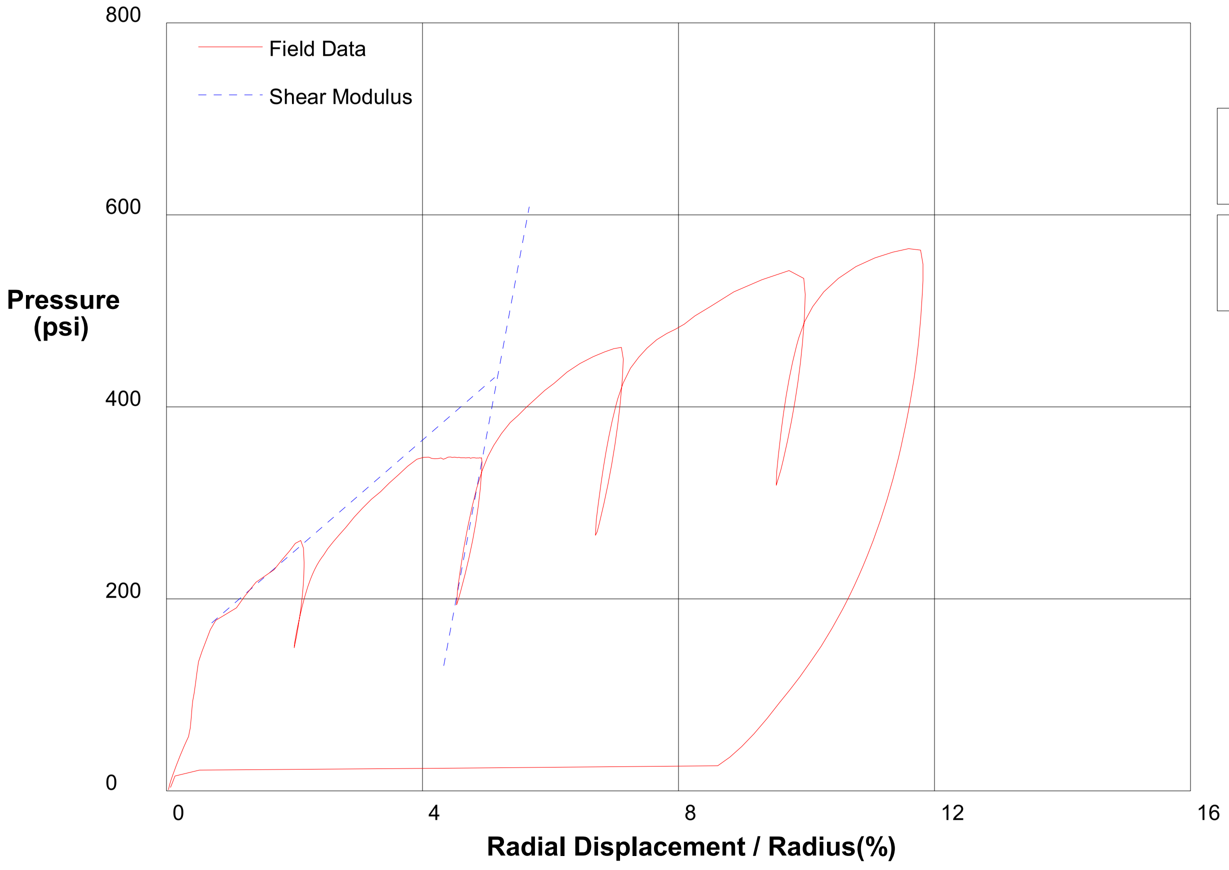
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/8/2008**

Hole No. PM301 **Depth 141ft** **File C:\DATA\ISE-765\CC54.P**



Shear Modulus 2893 psi

Shear Modulus 17916 psi

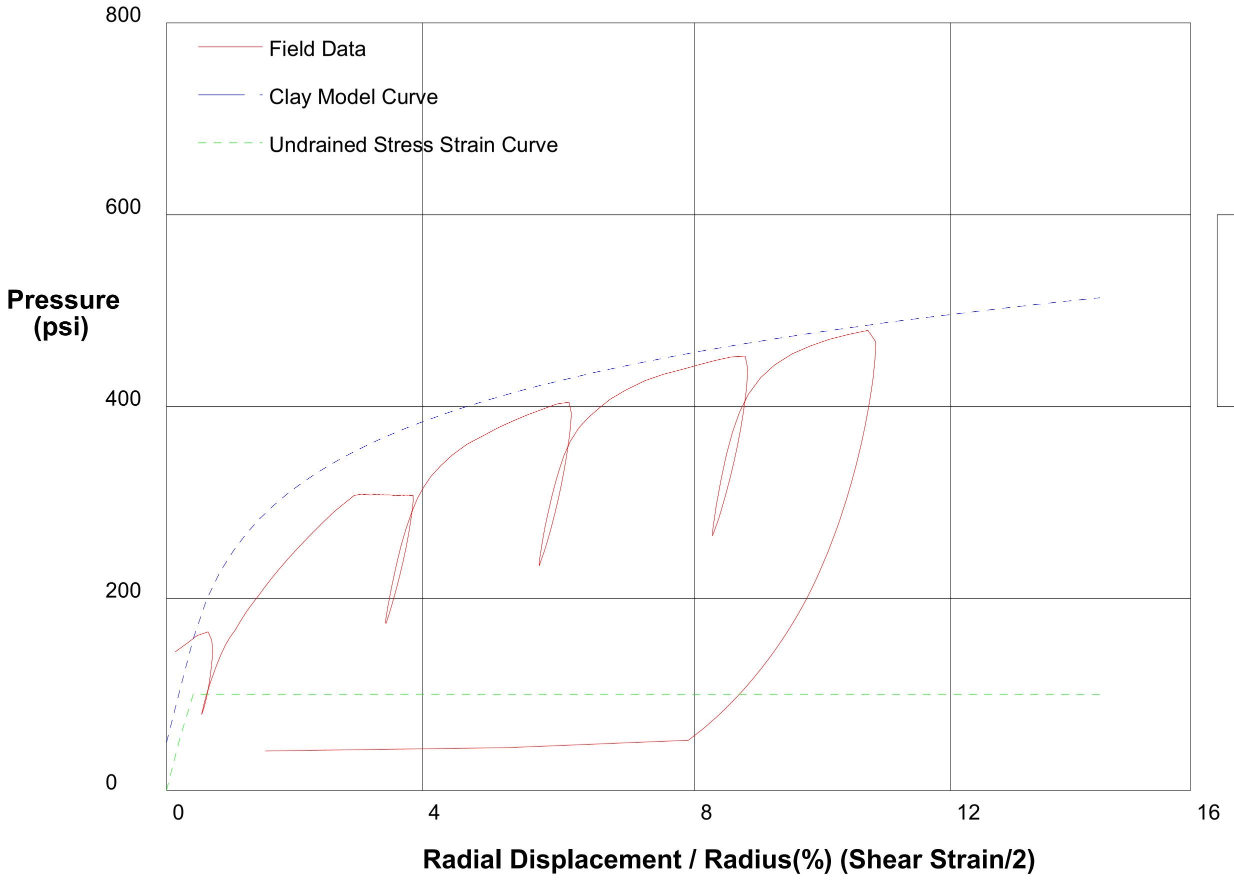
shift 0

In Situ Engineering

PRESSUREMETER DATA　　Schnabel Engineering, LLC.

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/8/2008**

Hole No. PM301 **Depth 139.5ft** **File C:\DATA\ISE-765\CC55.P**



shift 2

GIBSON'S CLAY MODEL

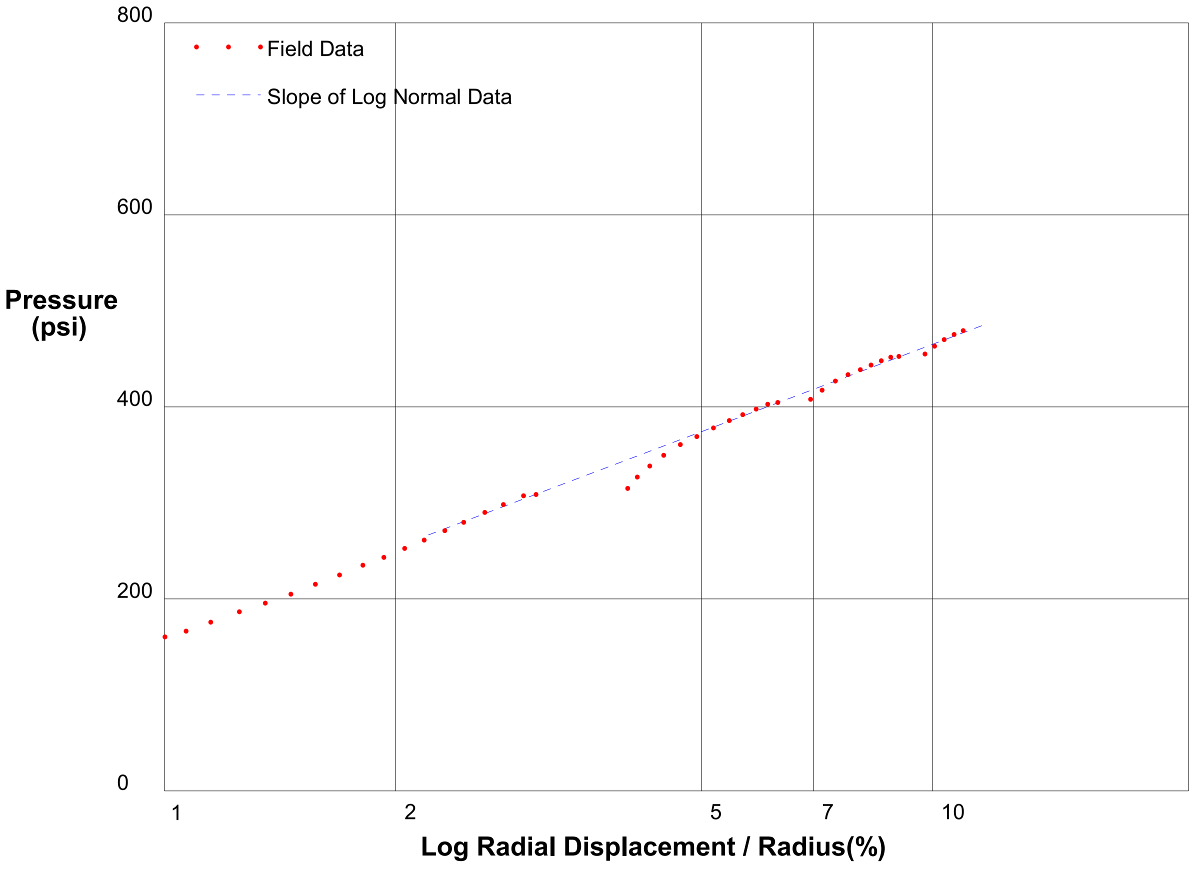
Shear Strength 100 psi
Insitu Stress 50 psi
Shear Modulus 13000 psi

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/8/2008**

Hole No. PM301 **Depth 139.5ft** **File C:\DATA\ISE-765\CC55.P**



Shear Strength 131.3 psi
Limit Pressure 650 psi

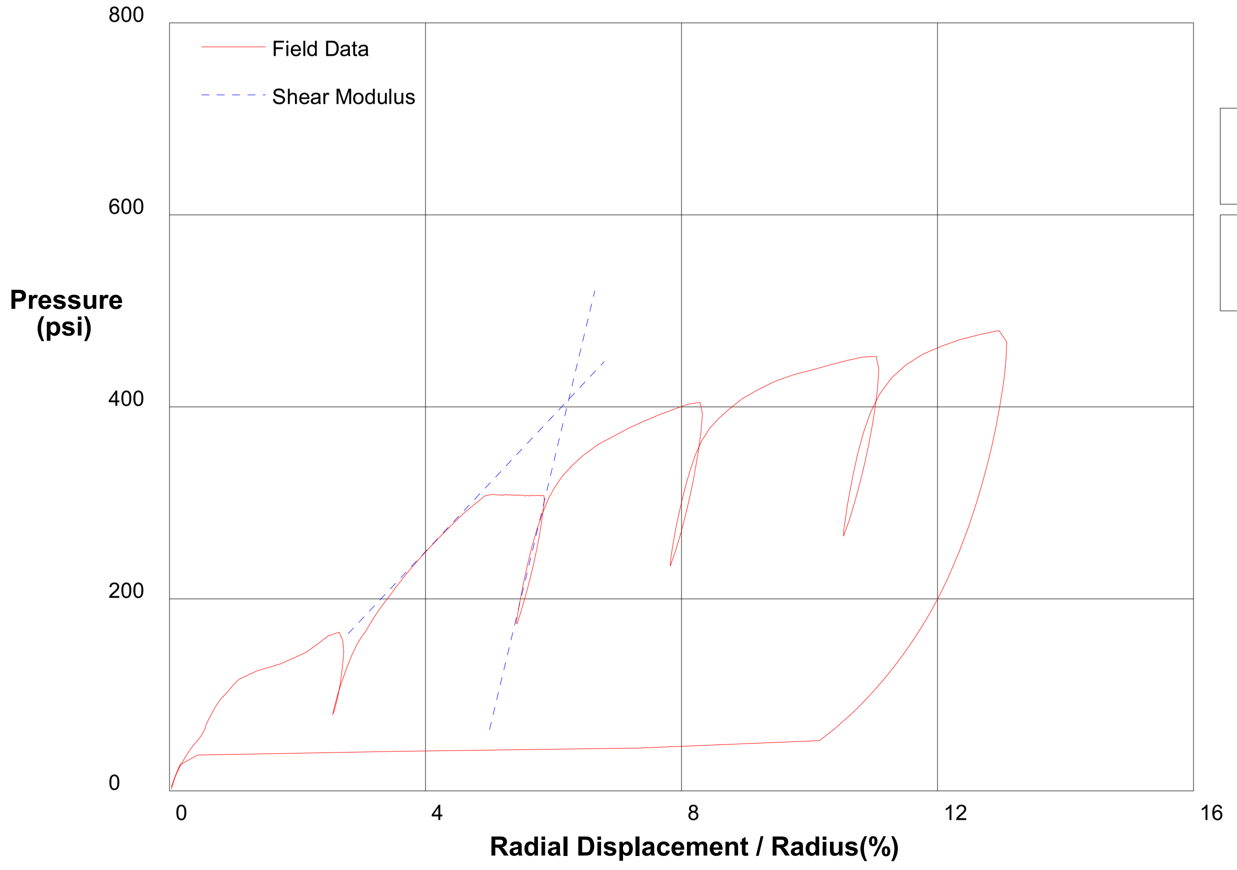
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/8/2008**

Hole No. PM301 **Depth 139.5ft** **File C:\DATA\ISE-765\CC55.P**



Shear Modulus 3541 psi

Shear Modulus 13881 psi

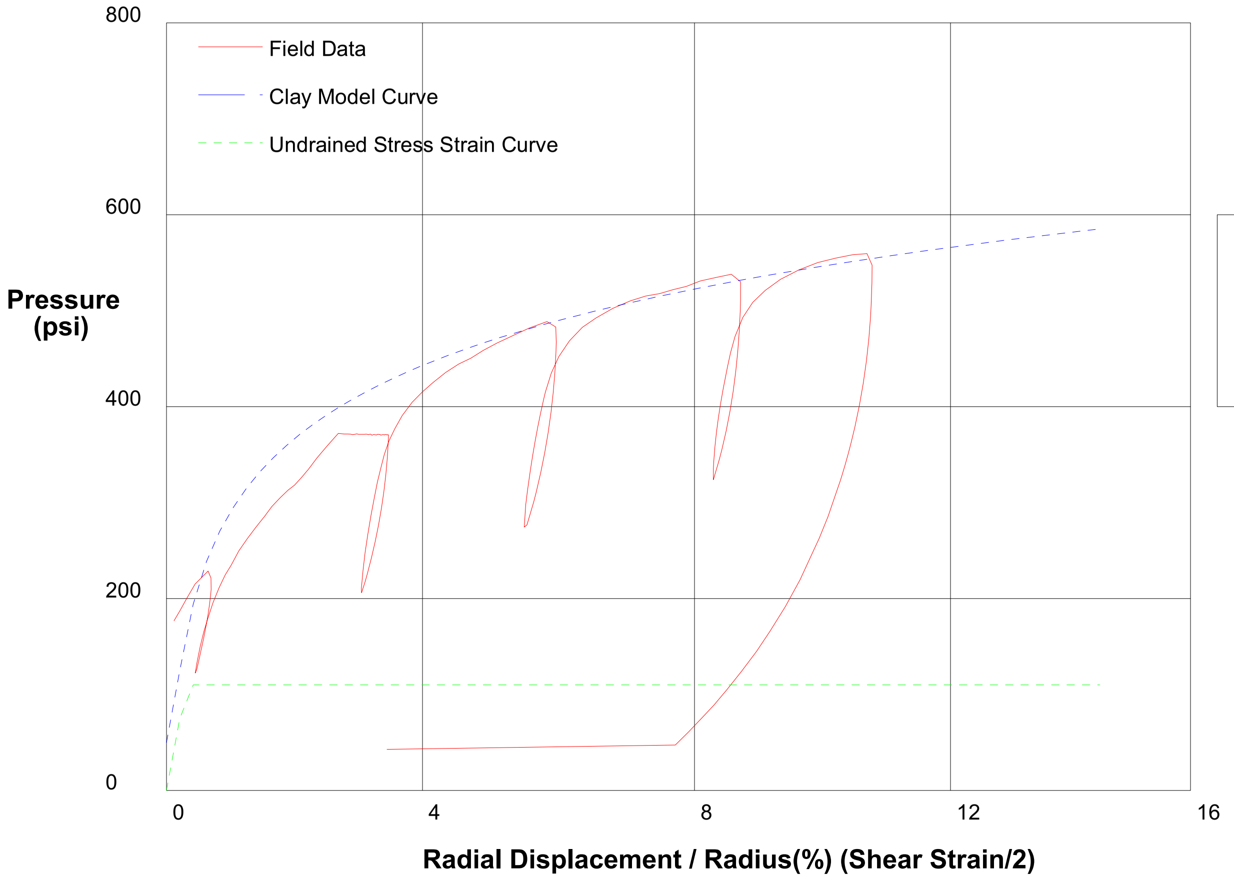
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/8/2008**

Hole No. PM301 **Depth 151ft** **File C:\DATA\ISE-765\CC56.P**



GIBSON'S CLAY MODEL

Shear Strength 110 psi
Insitu Stress 50 psi
Shear Modulus 18000 psi

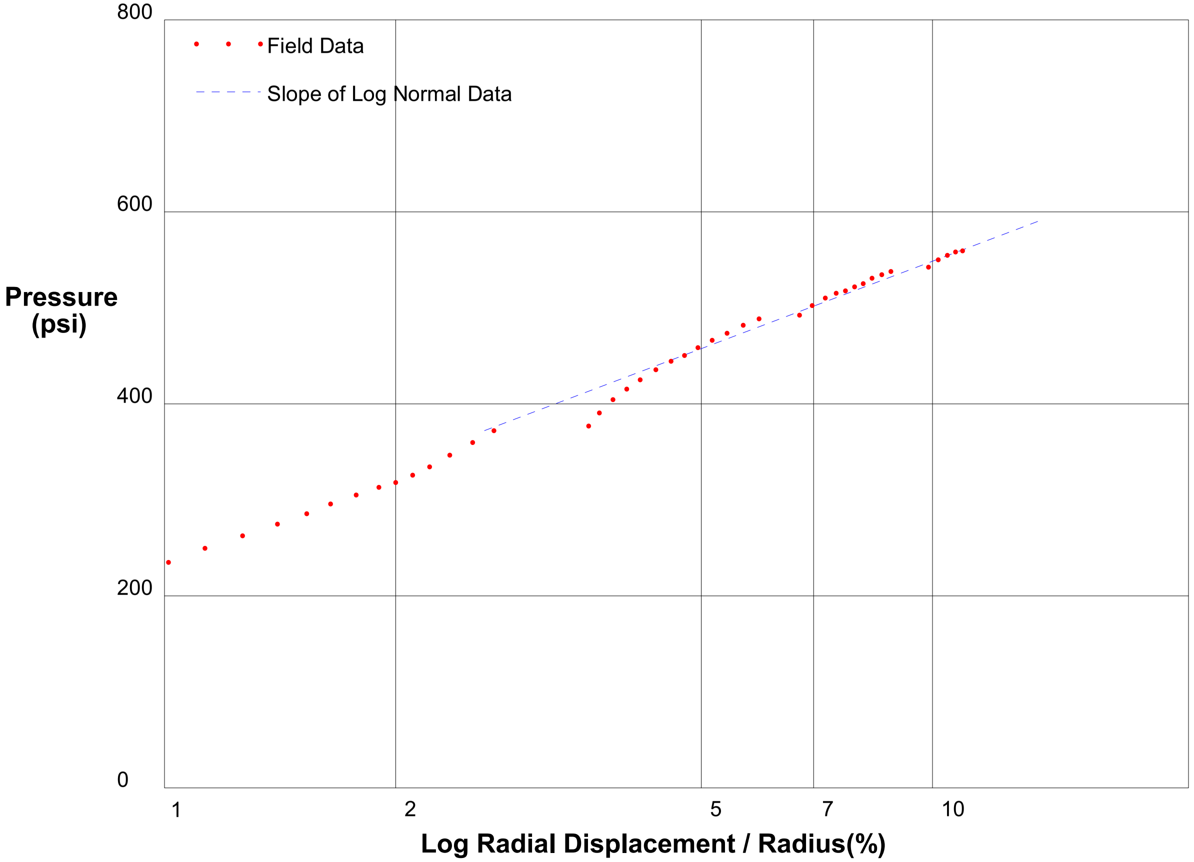
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/8/2008**

Hole No. PM301 **Depth 151ft** **File C:\DATA\ISE-765\CC56.P**



Shear Strength 131.3 psi
Limit Pressure 733 psi

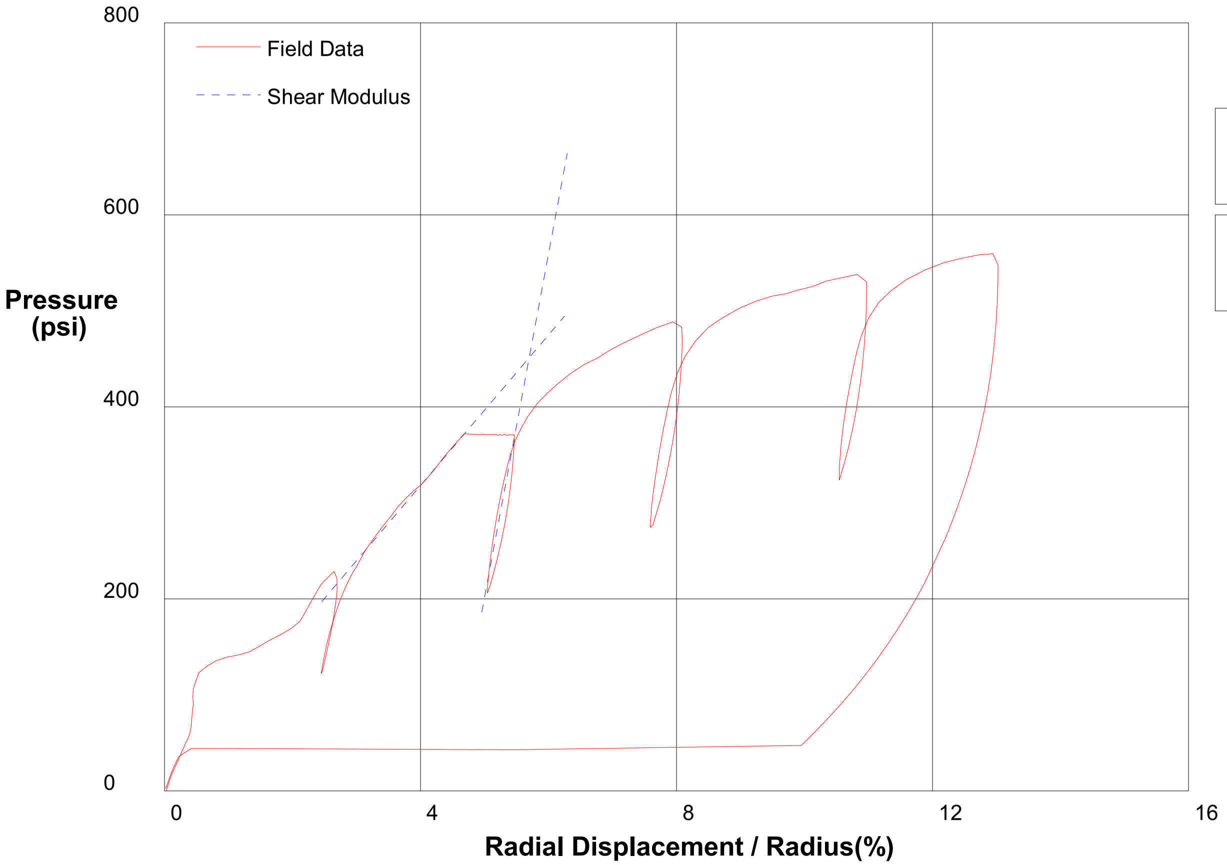
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/8/2008**

Hole No. PM301 **Depth 151ft** **File C:\DATA\ISE-765\CC56.P**



Shear Modulus 3919 psi

Shear Modulus 17916 psi

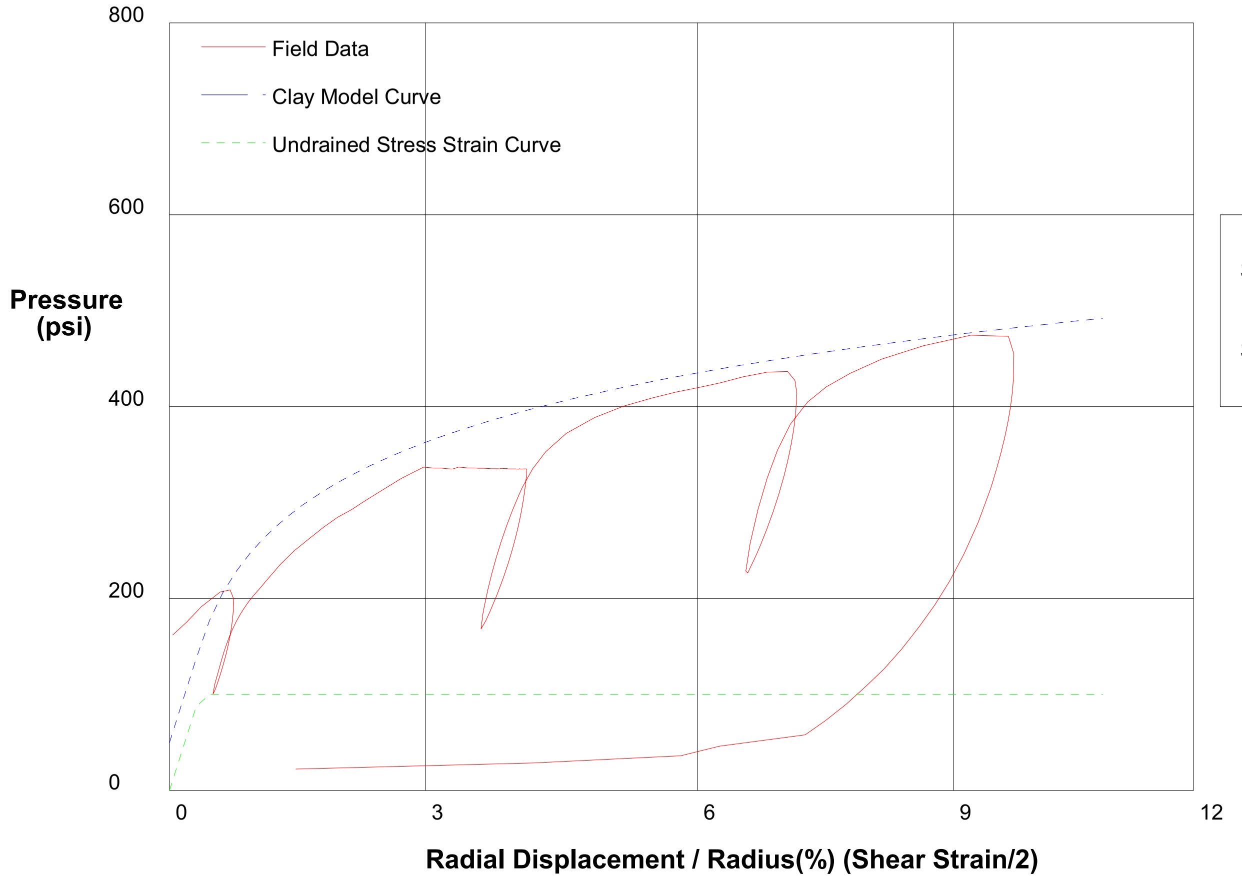
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/8/2008**

Hole No. PM301 **Depth 149.5ft** **File C:\DATA\ISE-765\CC57.P**



GIBSON'S CLAY MODEL

Shear Strength **100 psi**
Insitu Stress **50 psi**
Shear Modulus **14000 psi**

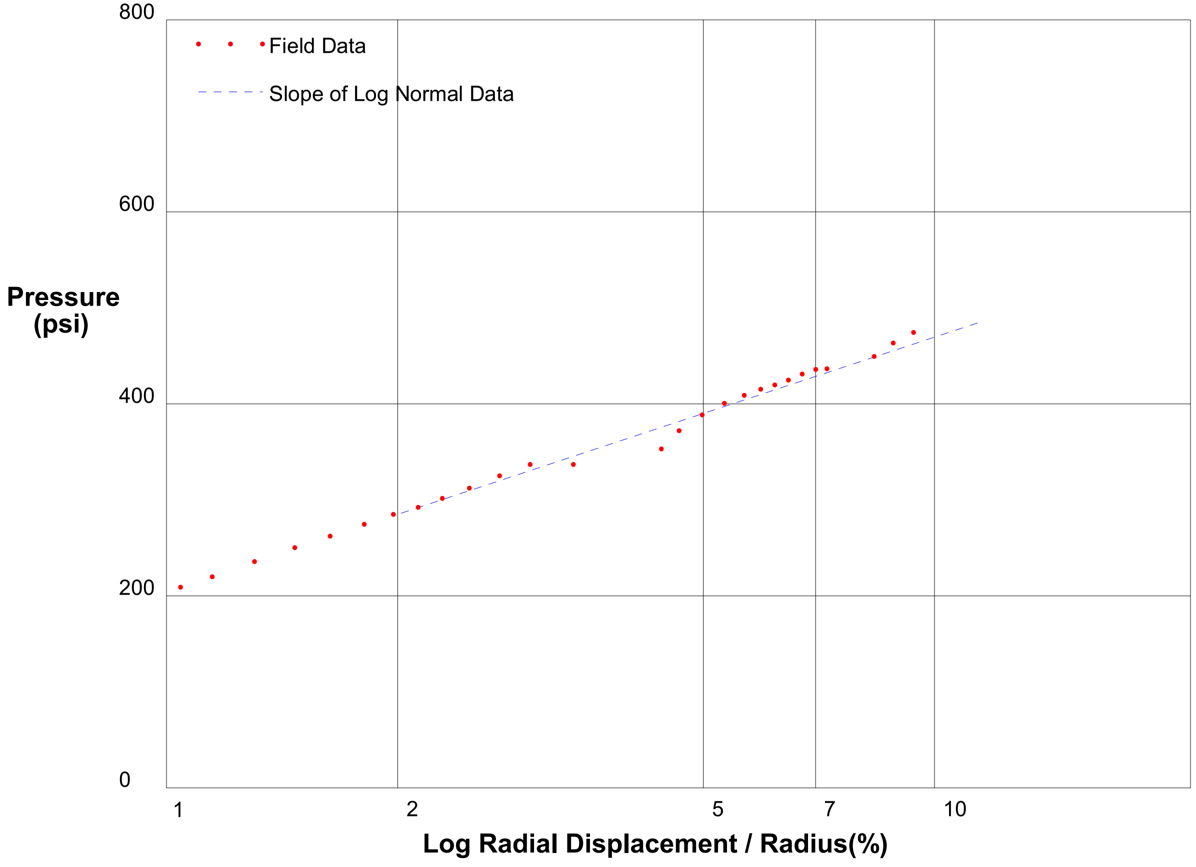
shift 4

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/8/2008**

Hole No. PM301 **Depth 149.5ft** **File C:\DATA\ISE-765\CC57.P**



Shear Strength 114.7 psi
Limit Pressure 631 psi

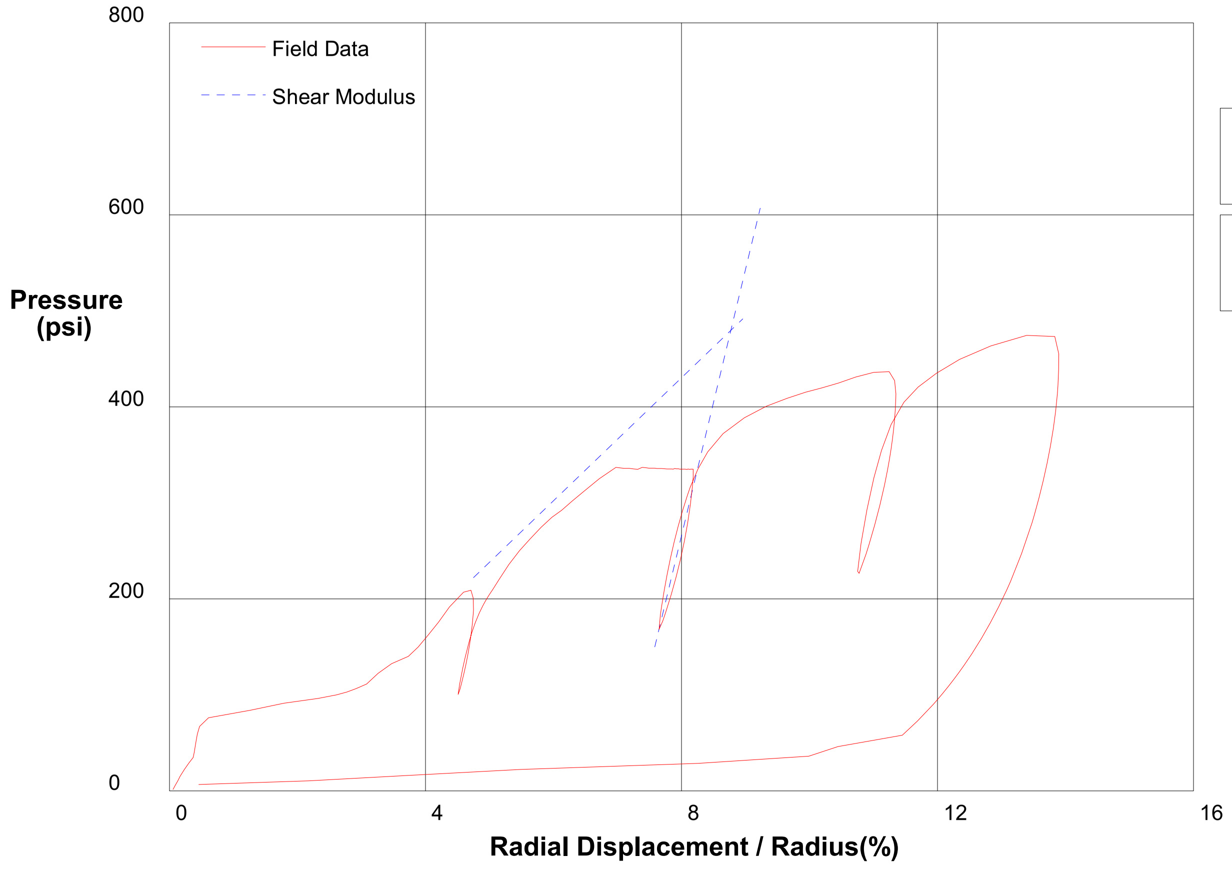
shift 4

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/8/2008**

Hole No. PM301 **Depth 149.5ft** **File C:\DATA\ISE-765\CC57.P**



Shear Modulus 3201 psi

Shear Modulus 13881 psi

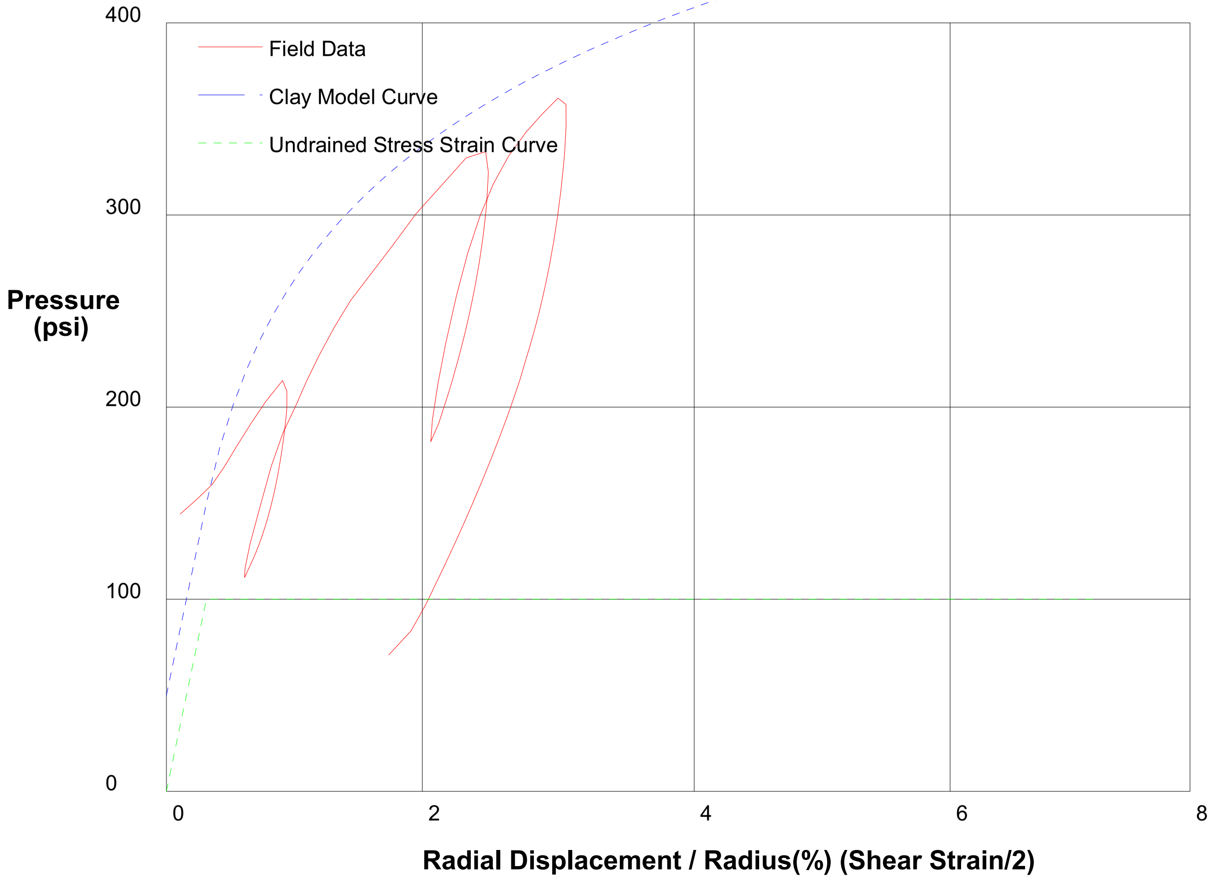
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/8/2008**

Hole No. PM301 **Depth 161ft** **File C:\DATA\ISE-765\CC58.P**



GIBSON'S CLAY MODEL

Shear Strength	100	psi
Insitu Stress	50	psi
Shear Modulus	16000	psi

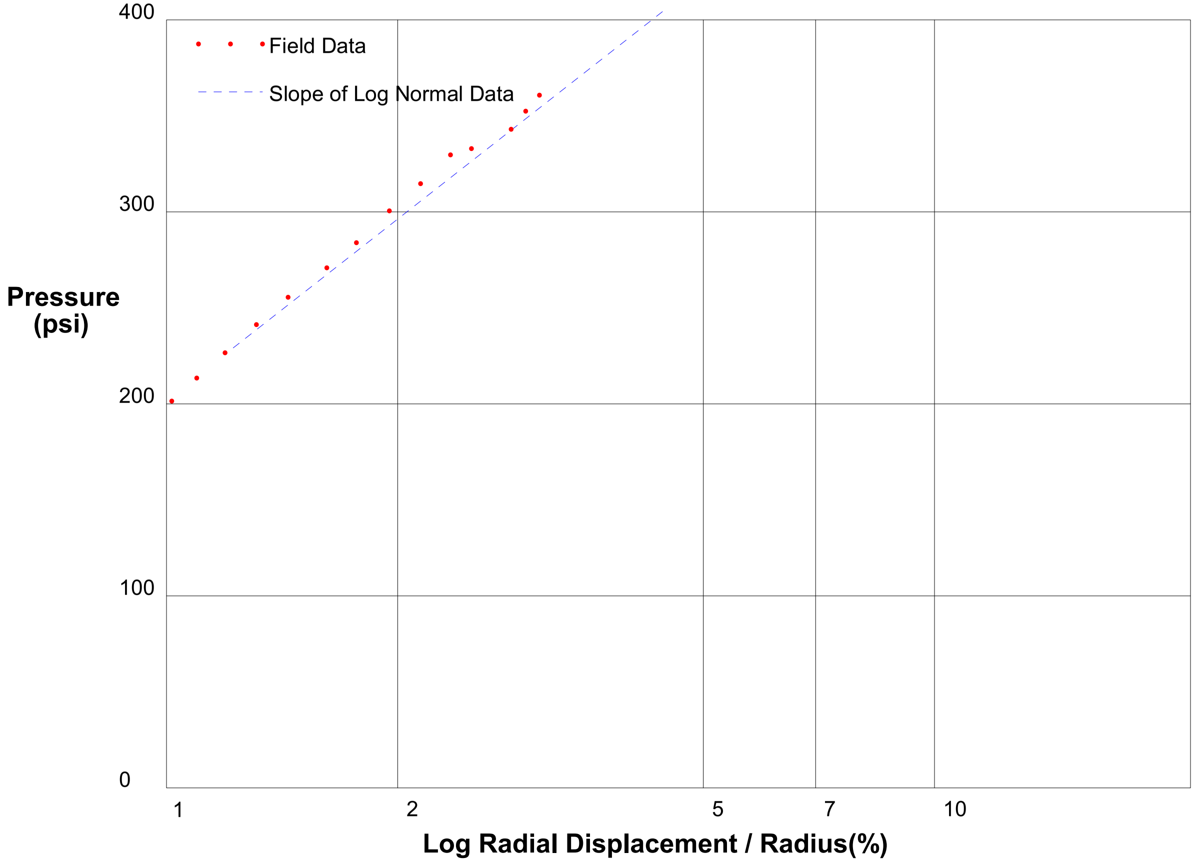
shift 9

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/8/2008**

Hole No. PM301 **Depth 161ft** **File C:\DATA\ISE-765\CC58.P**



Shear Strength 136 psi
Limit Pressure 707 psi

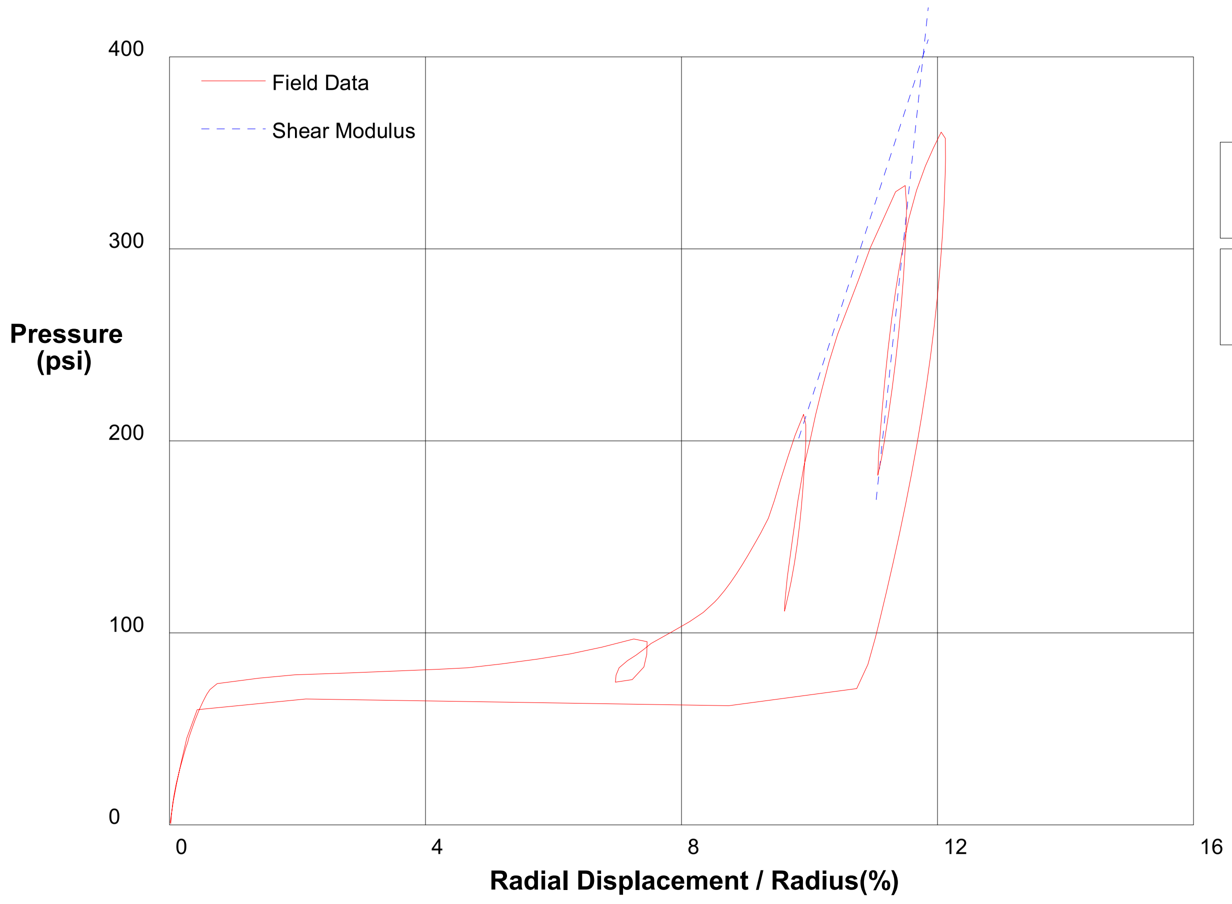
shift 9

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/8/2008**

Hole No. PM301 **Depth 161ft** **File C:\DATA\ISE-765\CC58.P**



Shear Modulus 5137 psi

Shear Modulus 15769 psi

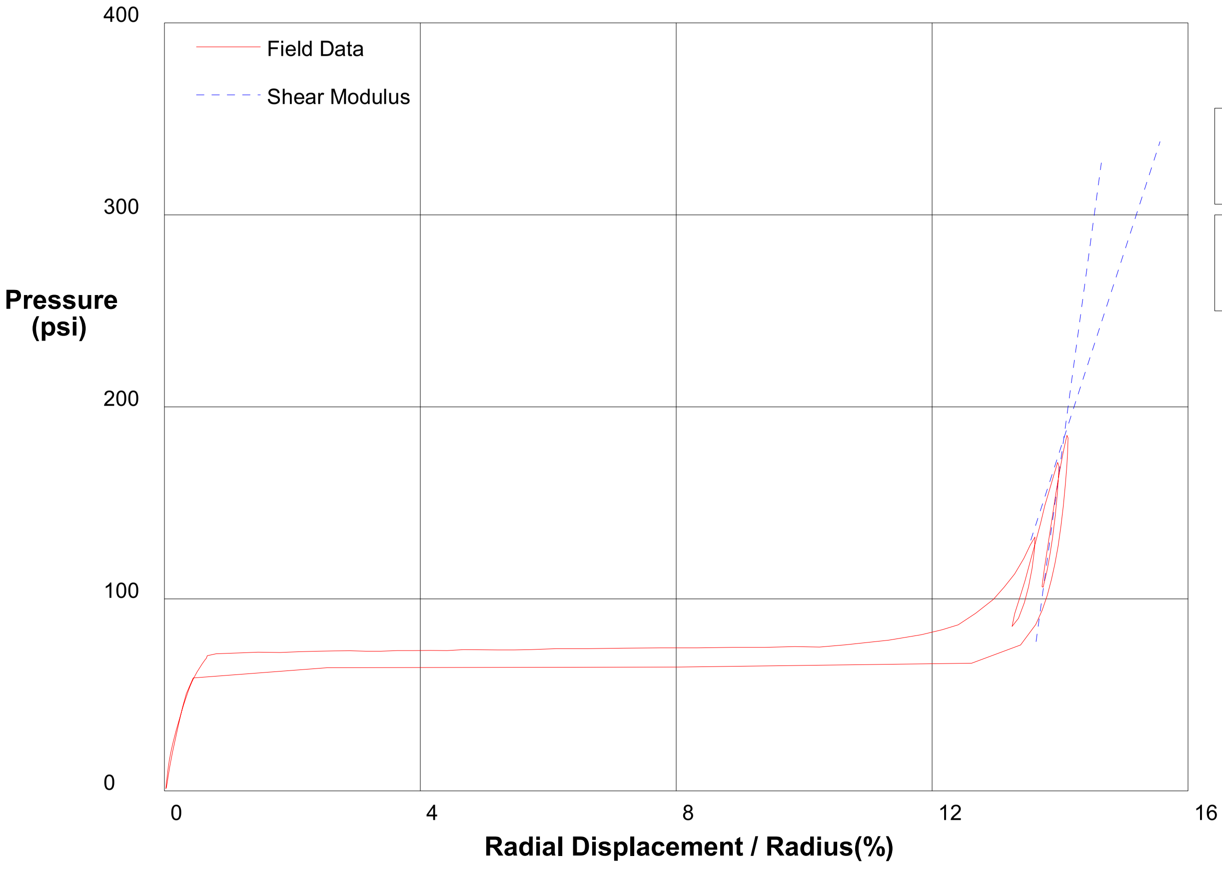
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/8/2008**

Hole No. PM301 **Depth 159.5ft** **File C:\DATA\ISE-765\CC59.P**



Shear Modulus 5137 psi

Shear Modulus 12210 psi

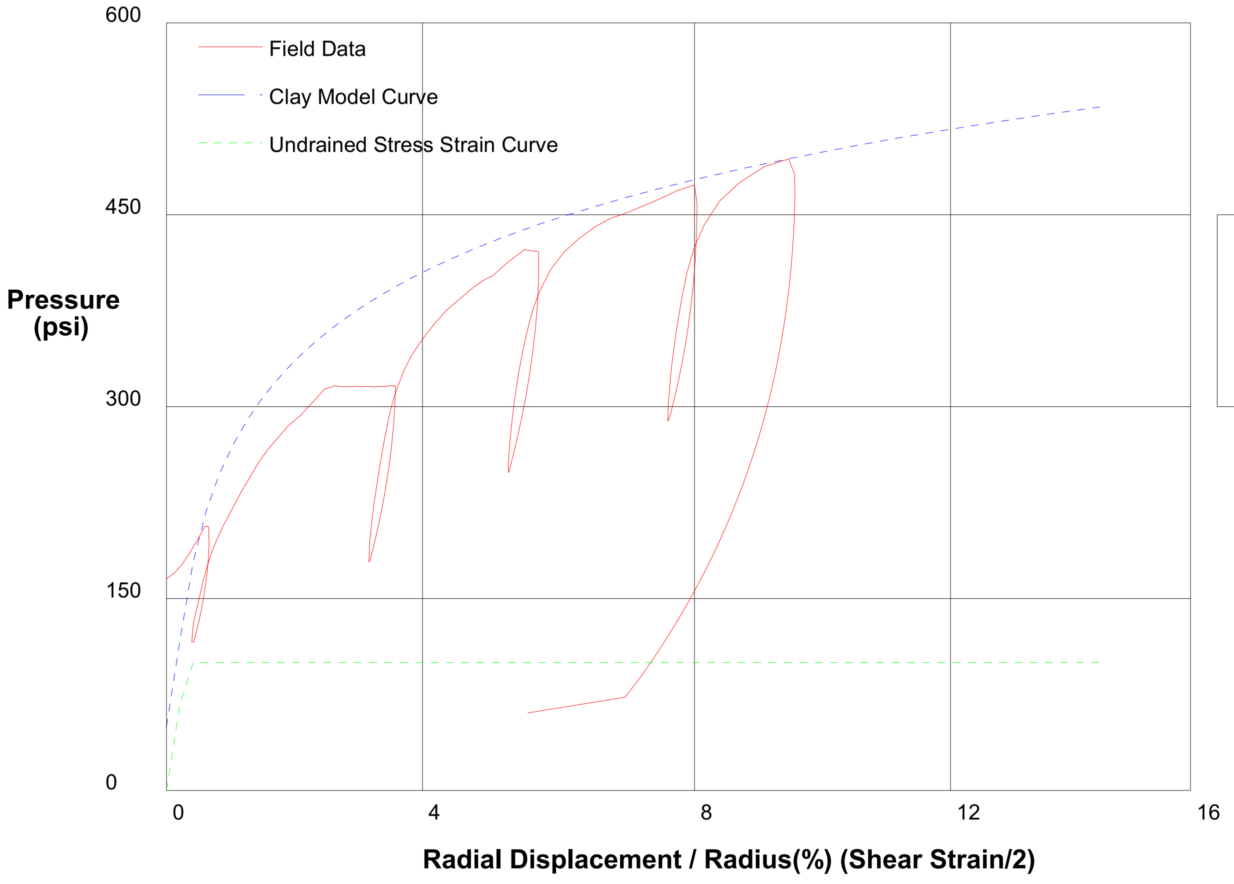
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/9/2008**

Hole No. PM301 **Depth 171ft** **File C:\DATA\ISE-765\CC60.P**



GIBSON'S CLAY MODEL

Shear Strength	**100 psi**
Insitu Stress	**50 psi**
Shear Modulus	**16000 psi**

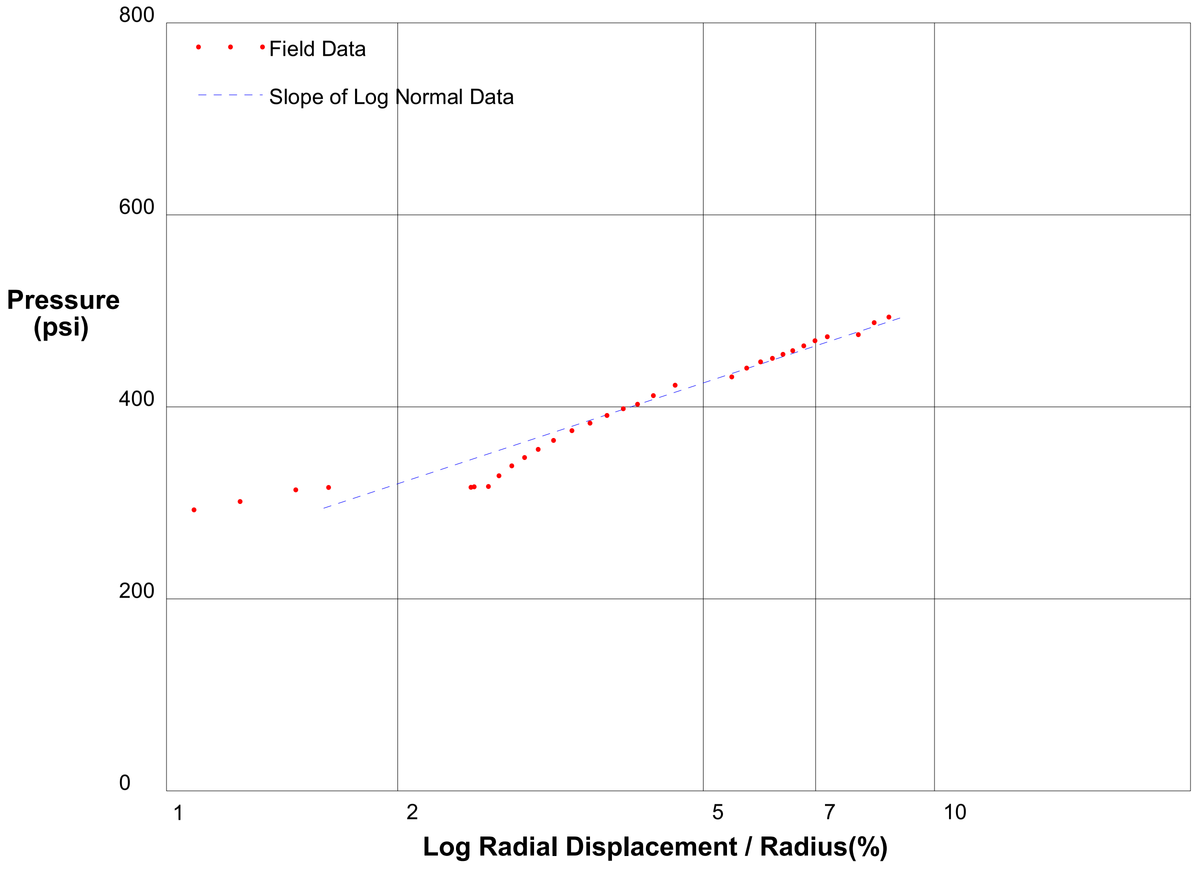
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/9/2008**

Hole No. PM301 **Depth 171ft** **File C:\DATA\ISE-765\CC60.P**



Shear Strength 114.7 psi
Limit Pressure 666 psi

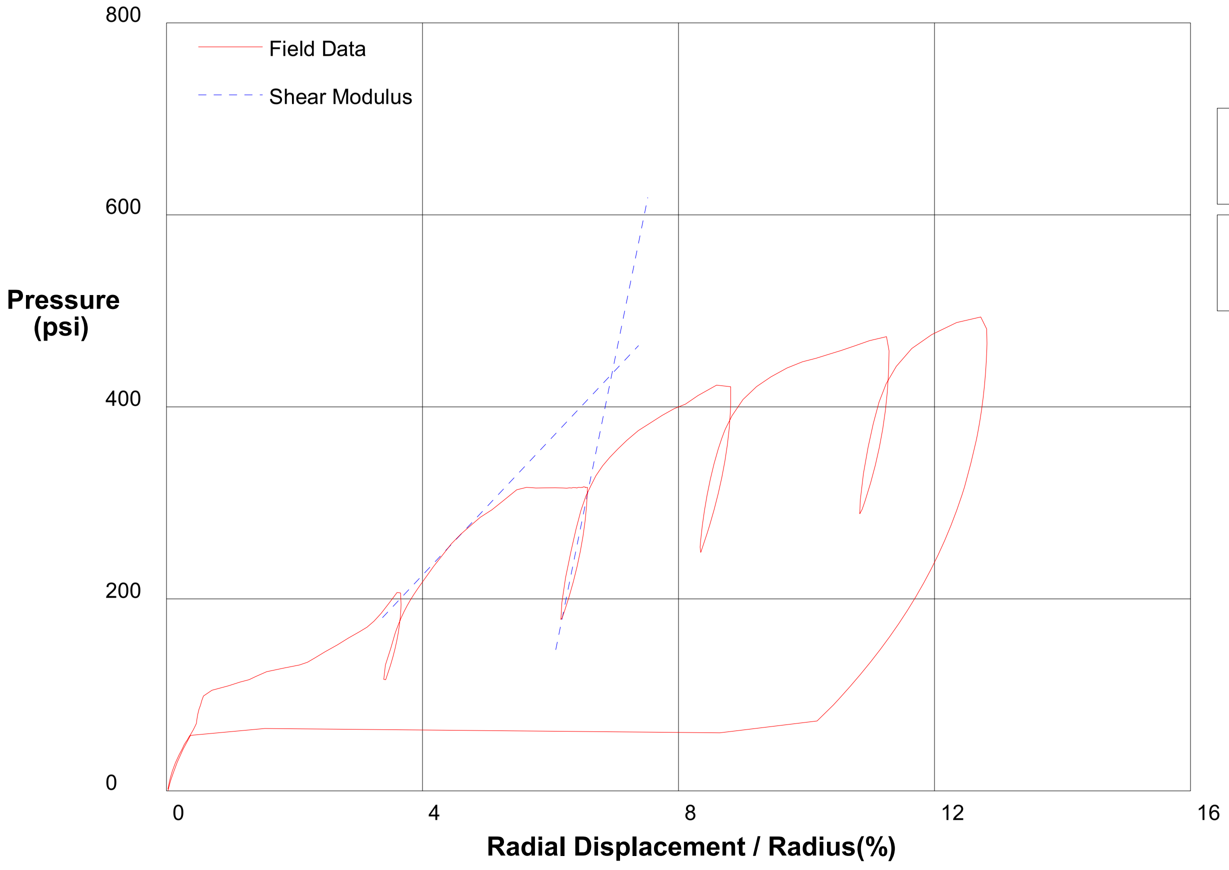
shift 4

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/9/2008**

Hole No. PM301 **Depth 171ft** **File C:\DATA\ISE-765\CC60.P**



Shear Modulus 3541 psi

Shear Modulus 16376 psi

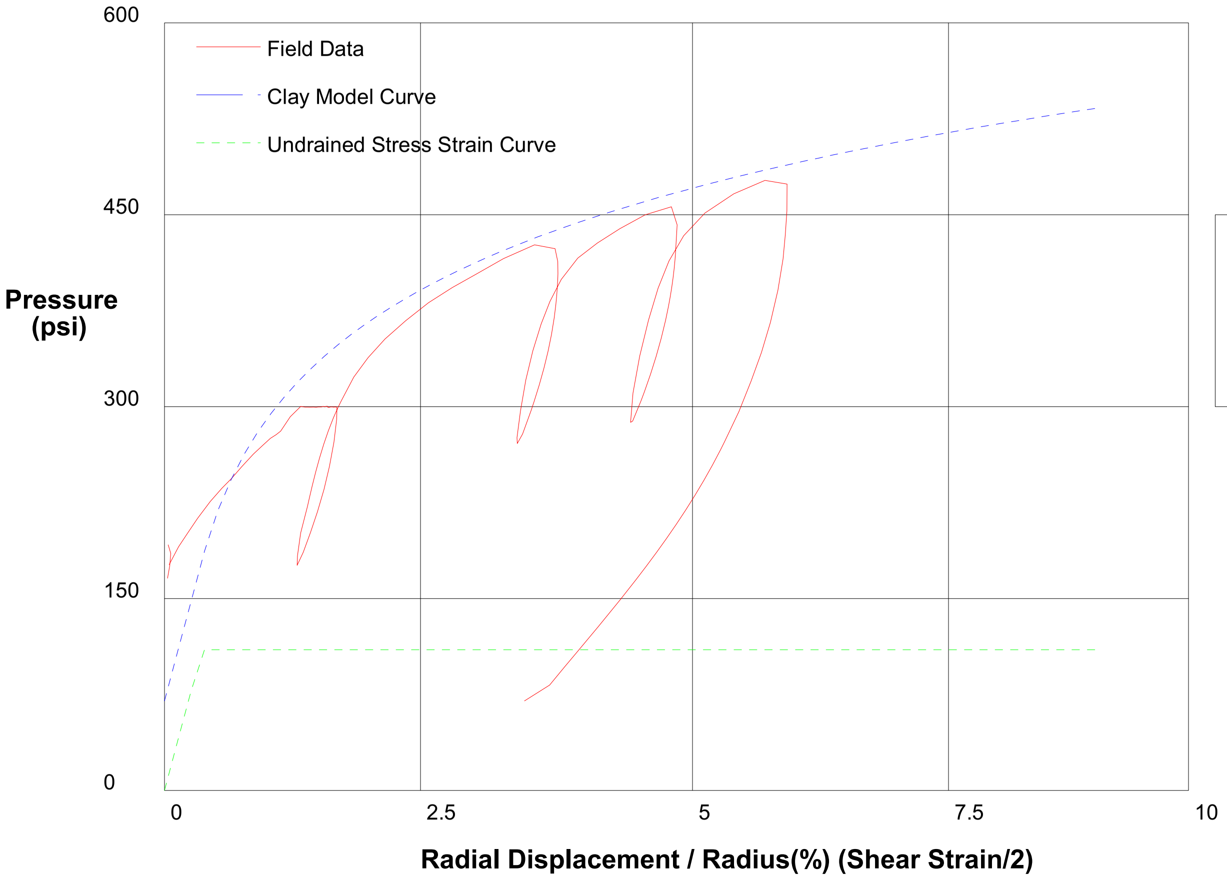
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/9/2008**

Hole No. PM301 **Depth 169.5ft** **File C:\DATA\ISE-765\CC61.P**



GIBSON'S CLAY MODEL

Shear Strength 110 psi
Insitu Stress 70 psi
Shear Modulus 15000 psi

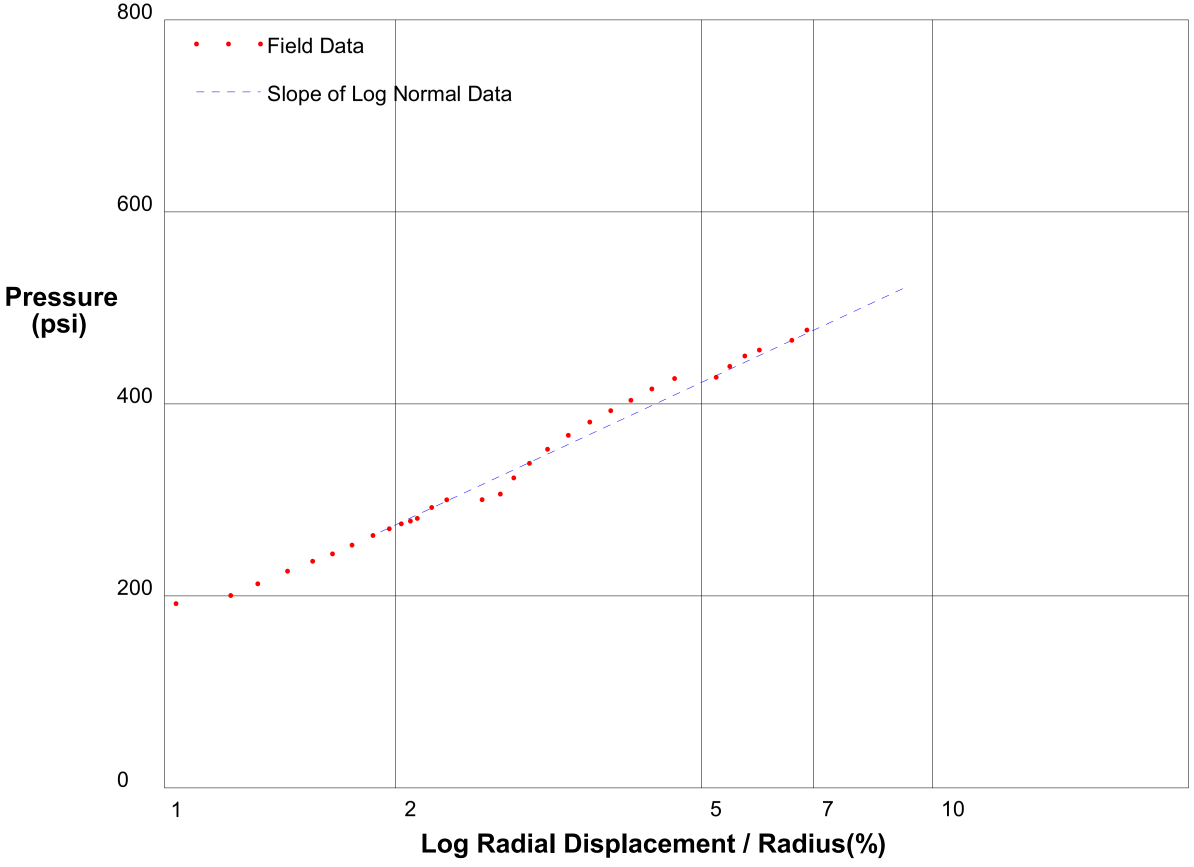
shift 7

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/9/2008**

Hole No. PM301 **Depth 169.5ft** **File C:\DATA\ISE-765\CC61.P**



Shear Strength 161.7 psi
Limit Pressure 762 psi

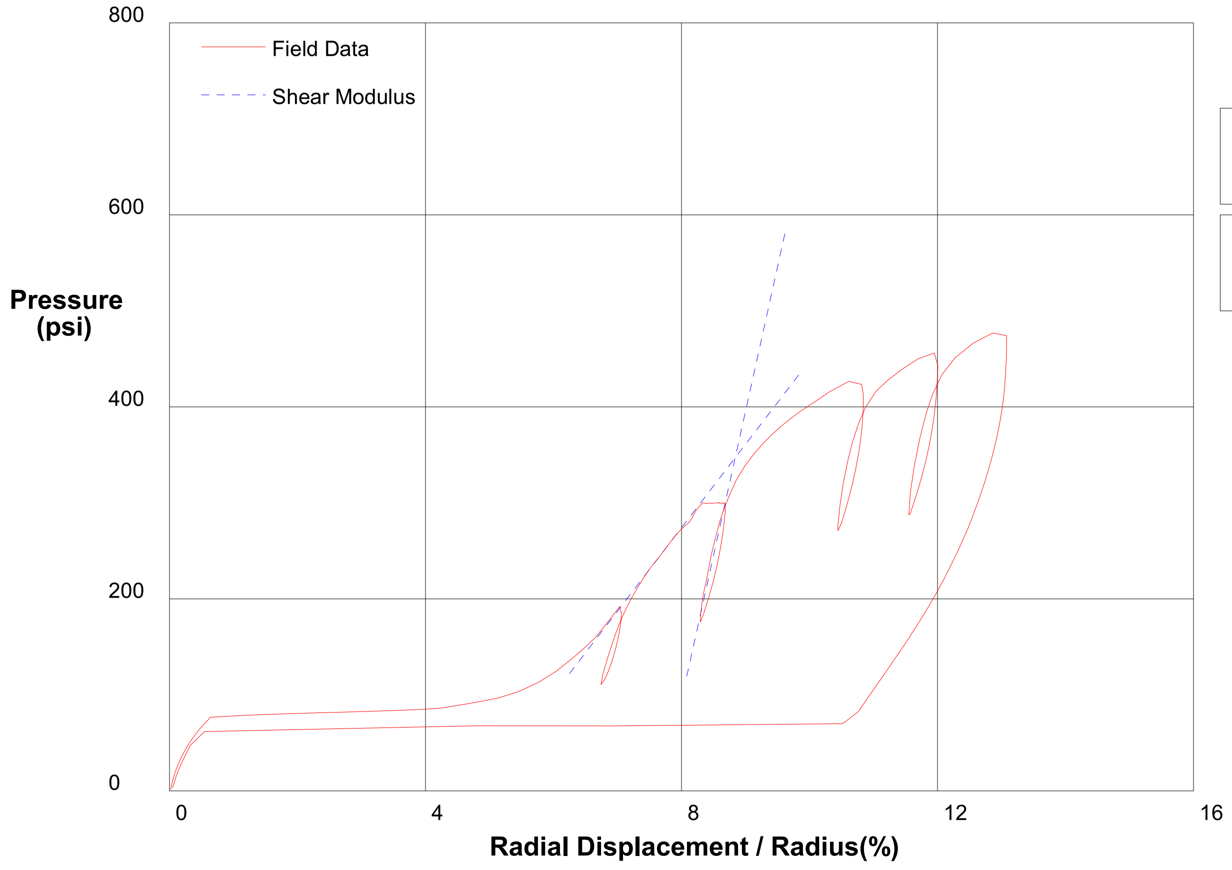
shift 6

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/9/2008**

Hole No. PM301 **Depth 169.5ft** **File C:\DATA\ISE-765\CC61.P**



Shear Modulus 4341 psi

Shear Modulus 15045 psi

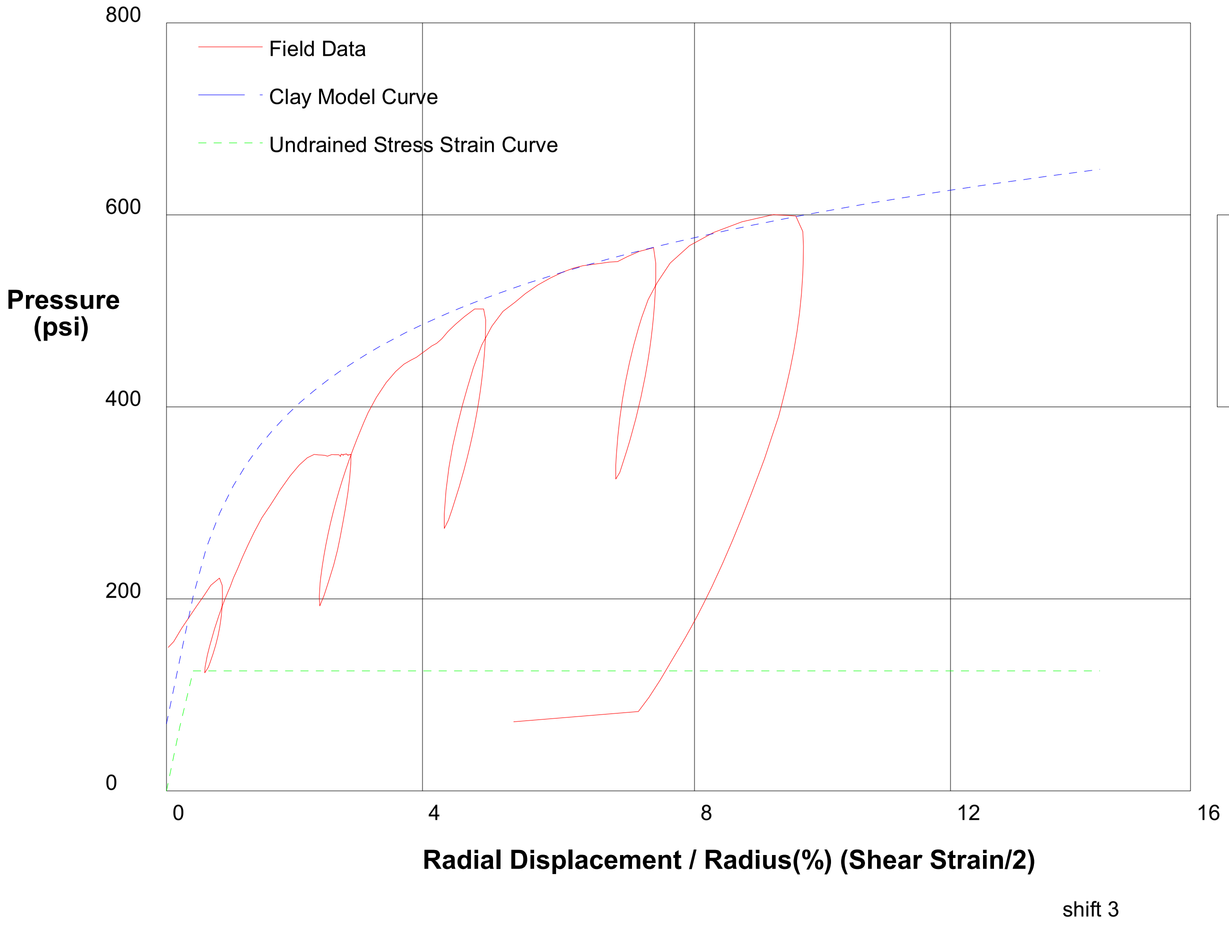
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/9/2008**

Hole No. PM301 **Depth 181ft** **File C:\DATA\ISE-765\CC62.P**



GIBSON'S CLAY MODEL

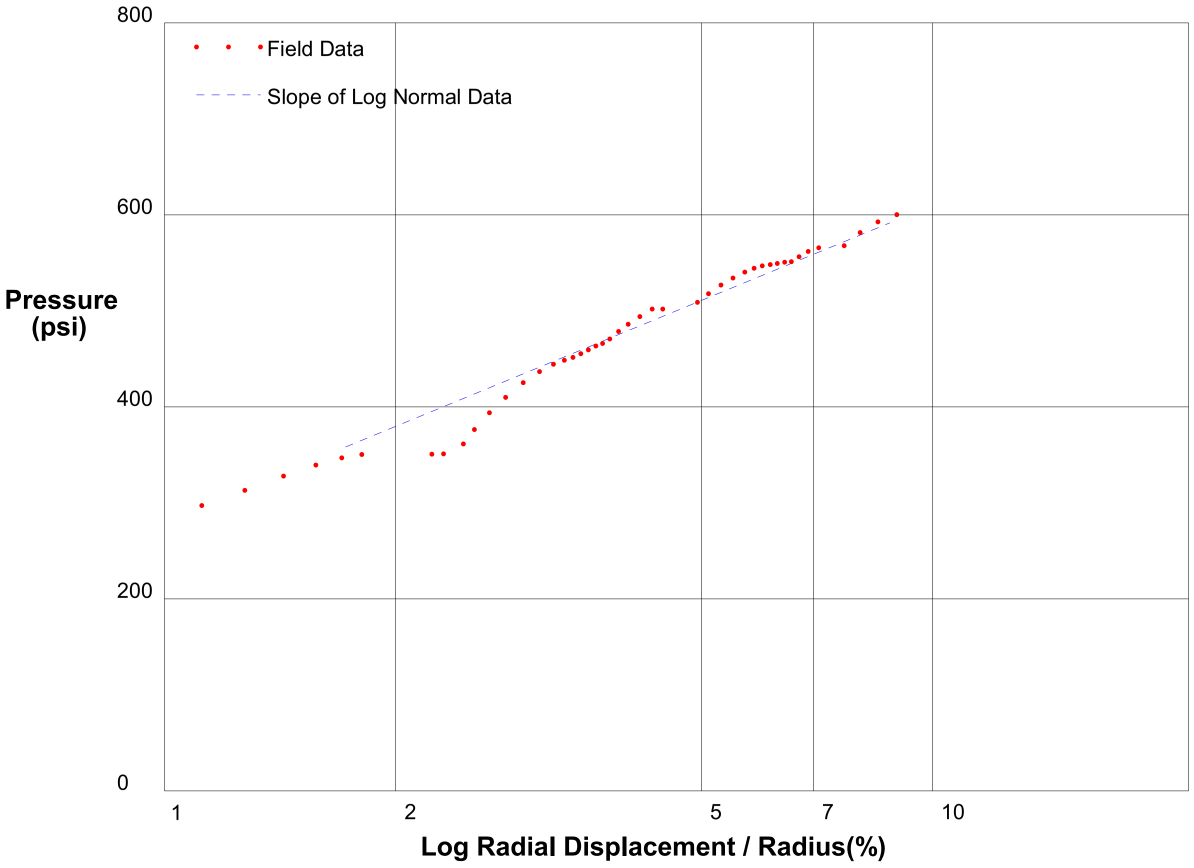
Shear Strength 125 psi
Insitu Stress 70 psi
Shear Modulus 16000 psi

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/9/2008**

Hole No. PM301 **Depth 181ft** **File C:\DATA\ISE-765\CC62.P**



Shear Strength 143 psi
Limit Pressure 811 psi

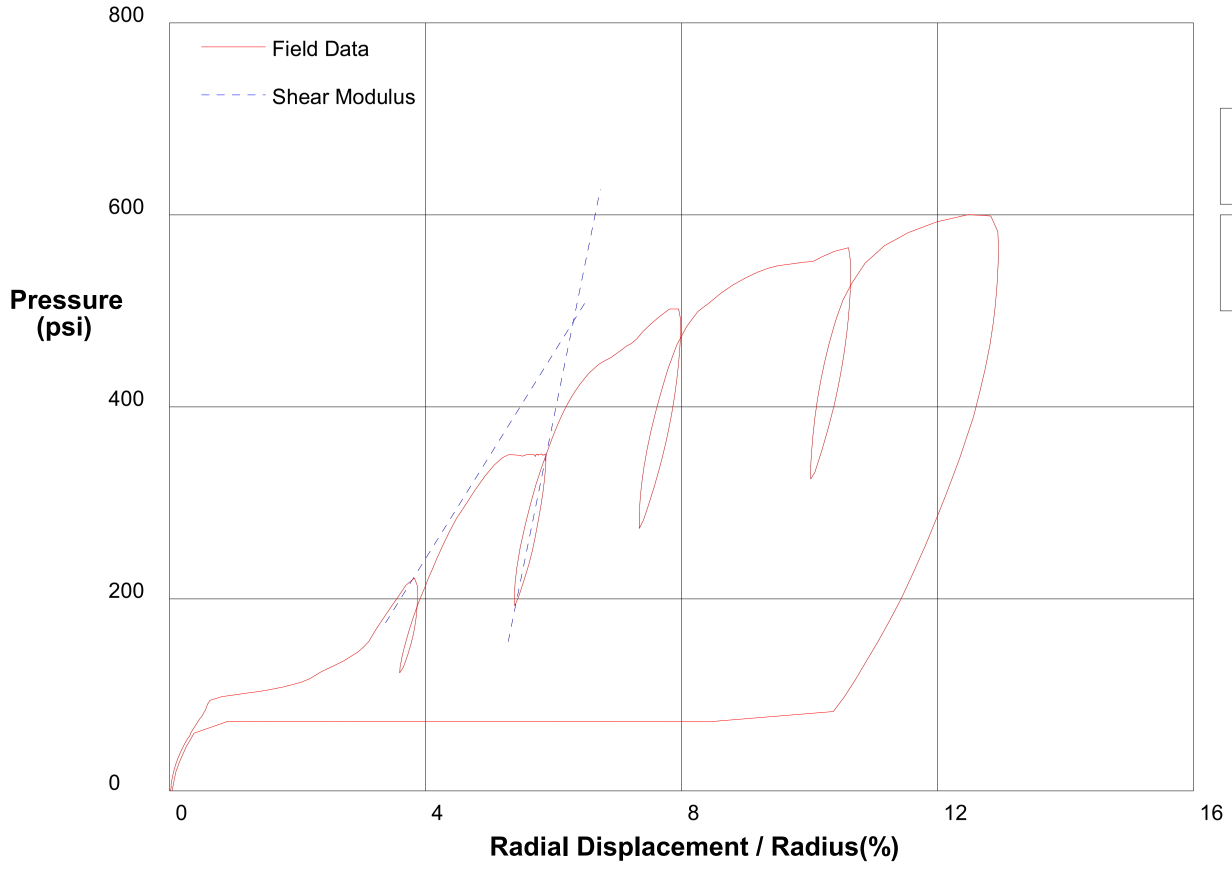
shift 3.5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/9/2008**

Hole No. PM301 **Depth 181ft** **File C:\DATA\ISE-765\CC62.P**



Shear Modulus 5350 psi

Shear Modulus 16376 psi

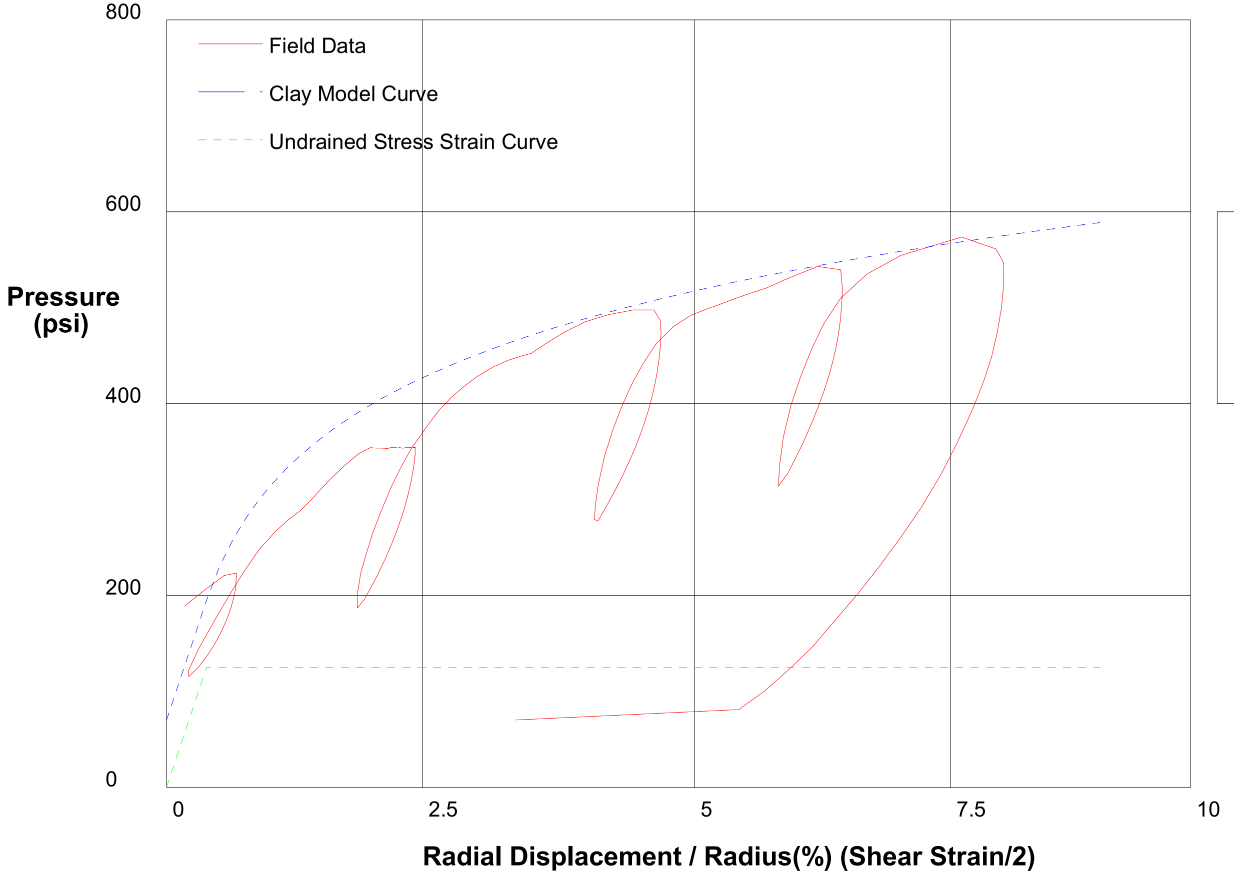
shift 0

In Situ Engineering

## PRESSUREMETER DATA		Schnabel Engineering, LLC.

**Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation		9/9/2008**

**Hole No. PM301		Depth 179.5ft		File C:\DATA\ISE-765\CC63.P**



GIBSON'S CLAY MODEL

Shear Strength 125 psi
Insitu Stress 70 psi
Shear Modulus 16000 psi

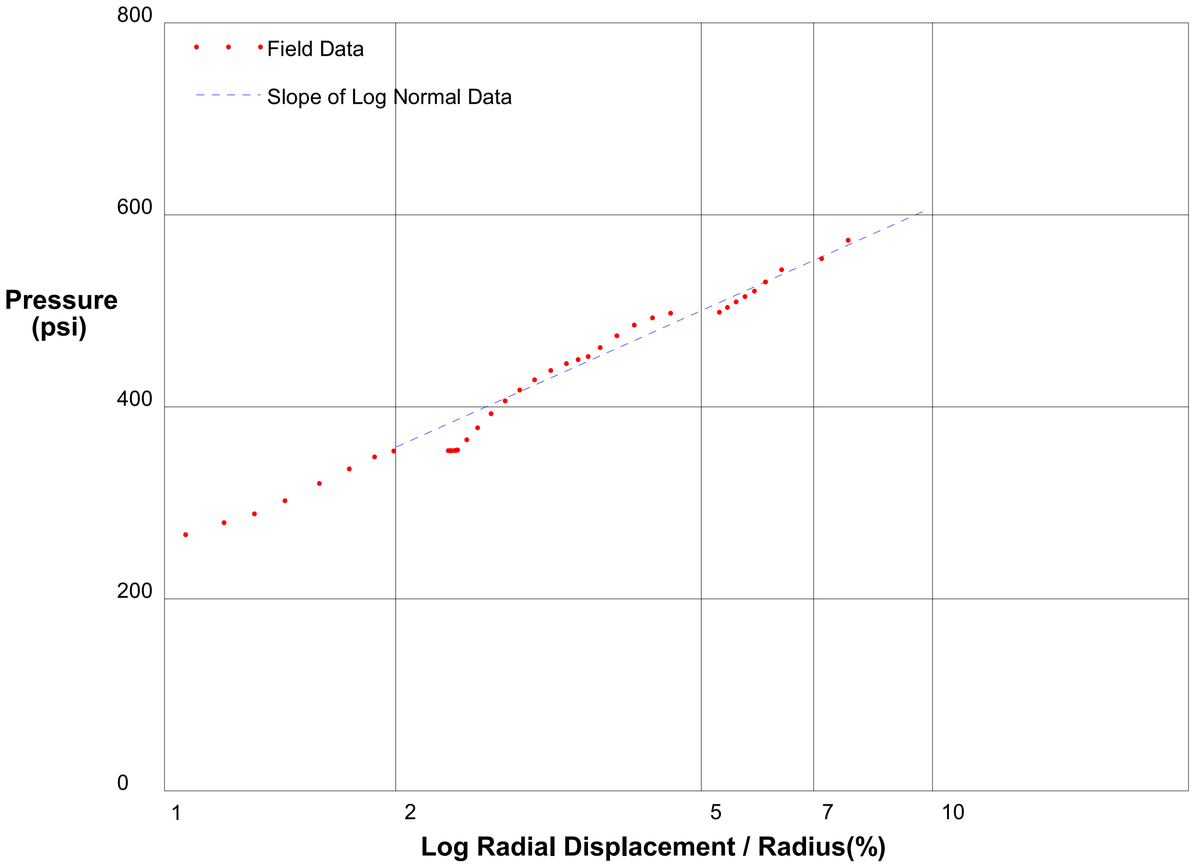
shift 6

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/9/2008**

Hole No. PM301 **Depth 179.5ft** **File C:\DATA\ISE-765\CC63.P**



Shear Strength 155.3 psi
Limit Pressure 827 psi

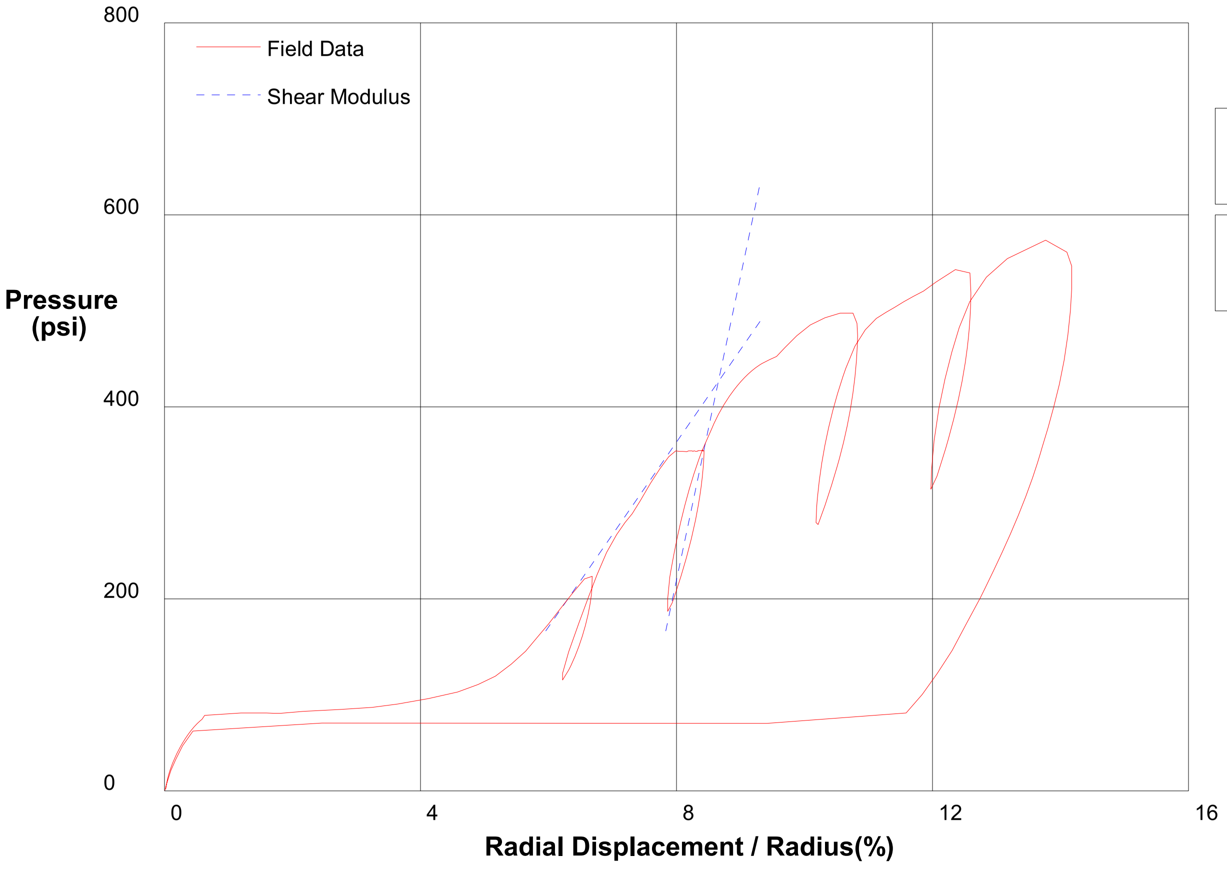
shift 6

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/9/2008**

Hole No. PM301 **Depth 179.5ft** **File C:\DATA\ISE-765\CC63.P**



Shear Modulus 4814 psi

Shear Modulus 15821 psi

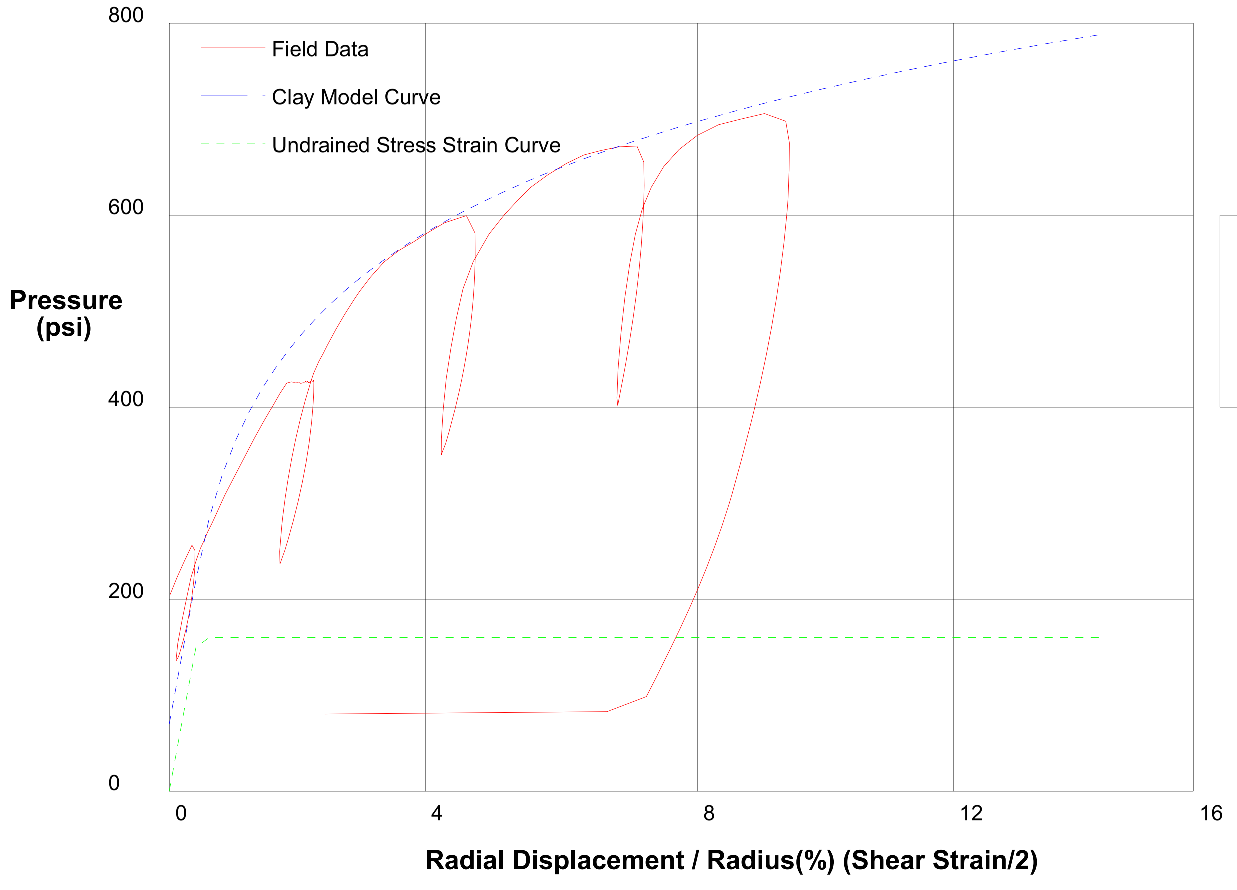
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/9/2008**

Hole No. PM301 **Depth 191ft** **File C:\DATA\ISE-765\CC64.P**



GIBSON'S CLAY MODEL

Shear Strength **160 psi**
Insitu Stress **70 psi**
Shear Modulus **18000 psi**

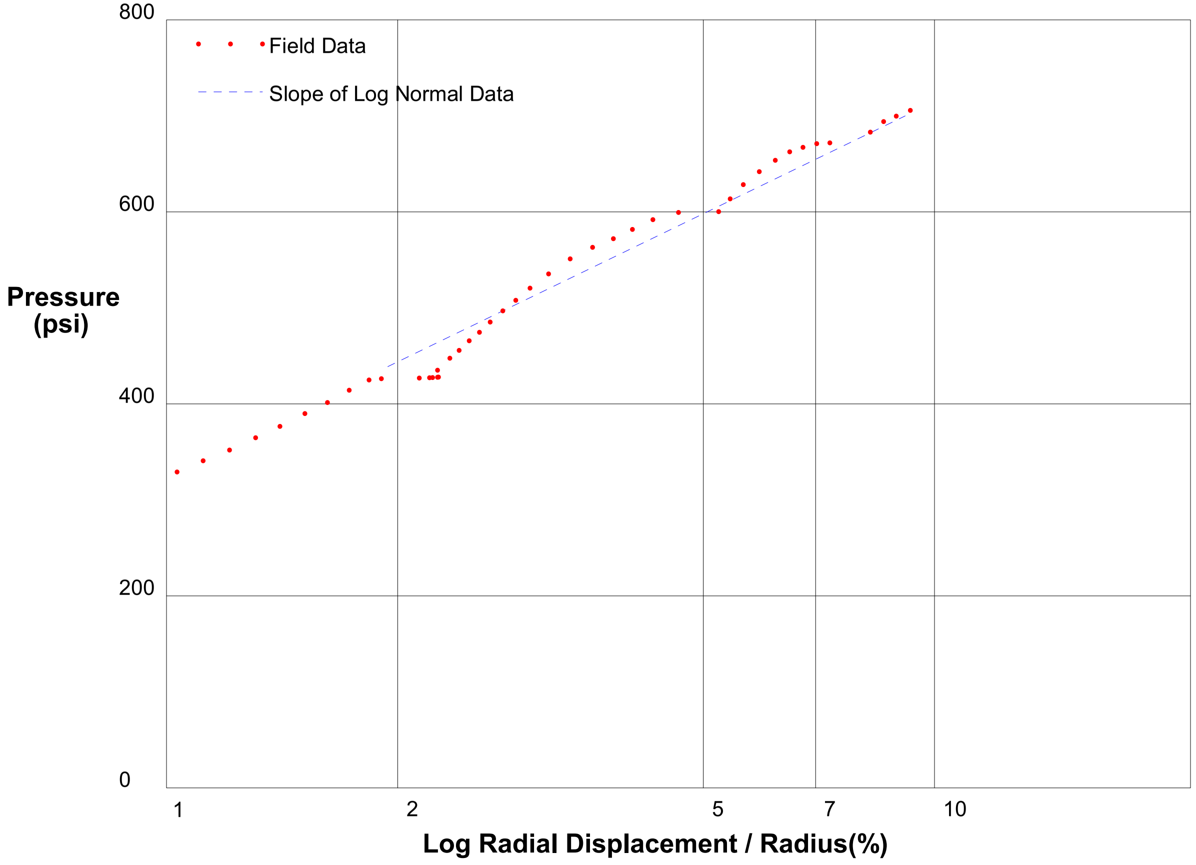
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/9/2008**

Hole No. PM301 **Depth 191ft** **File C:\DATA\ISE-765\CC64.P**



Shear Strength 168.3 psi
Limit Pressure 952 psi

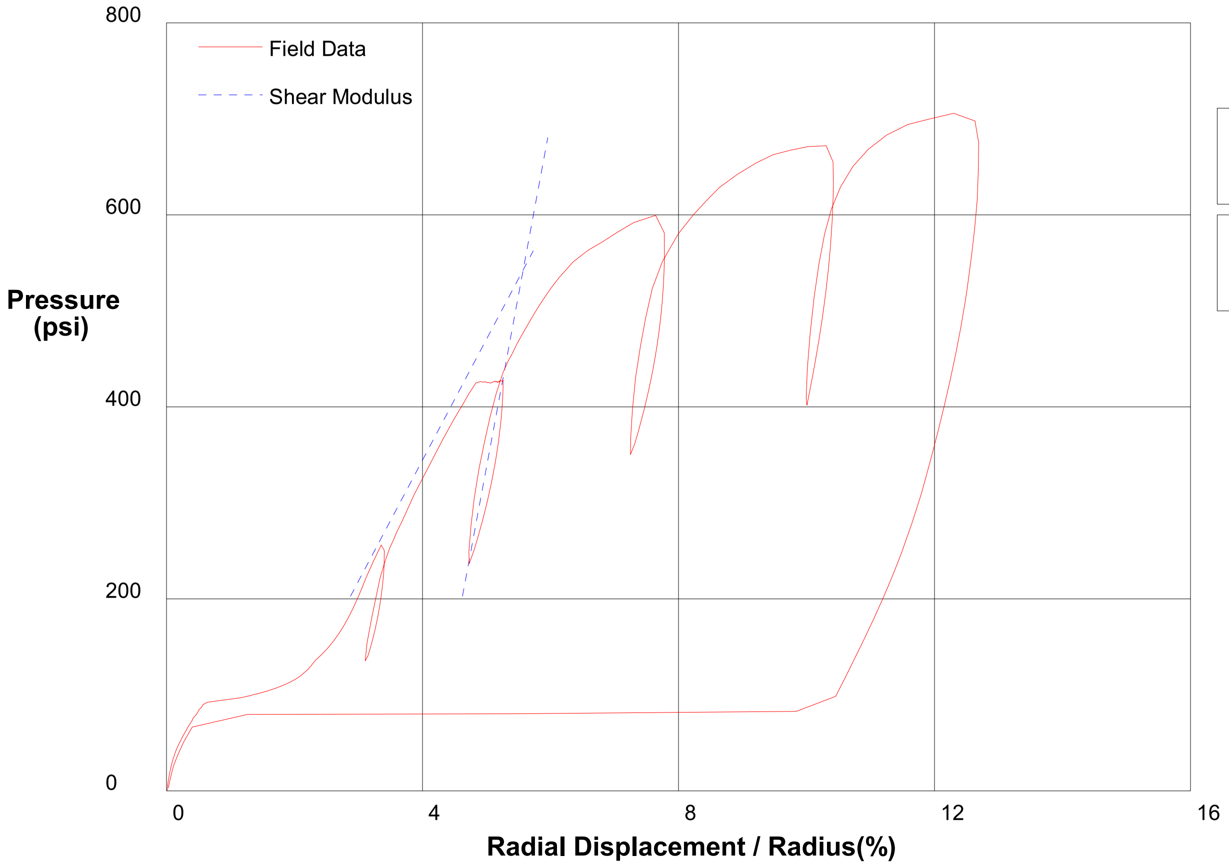
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/9/2008**

Hole No. PM301 **Depth 191ft** **File C:\DATA\ISE-765\CC64.P**



Shear Modulus 6301 psi

Shear Modulus 17916 psi

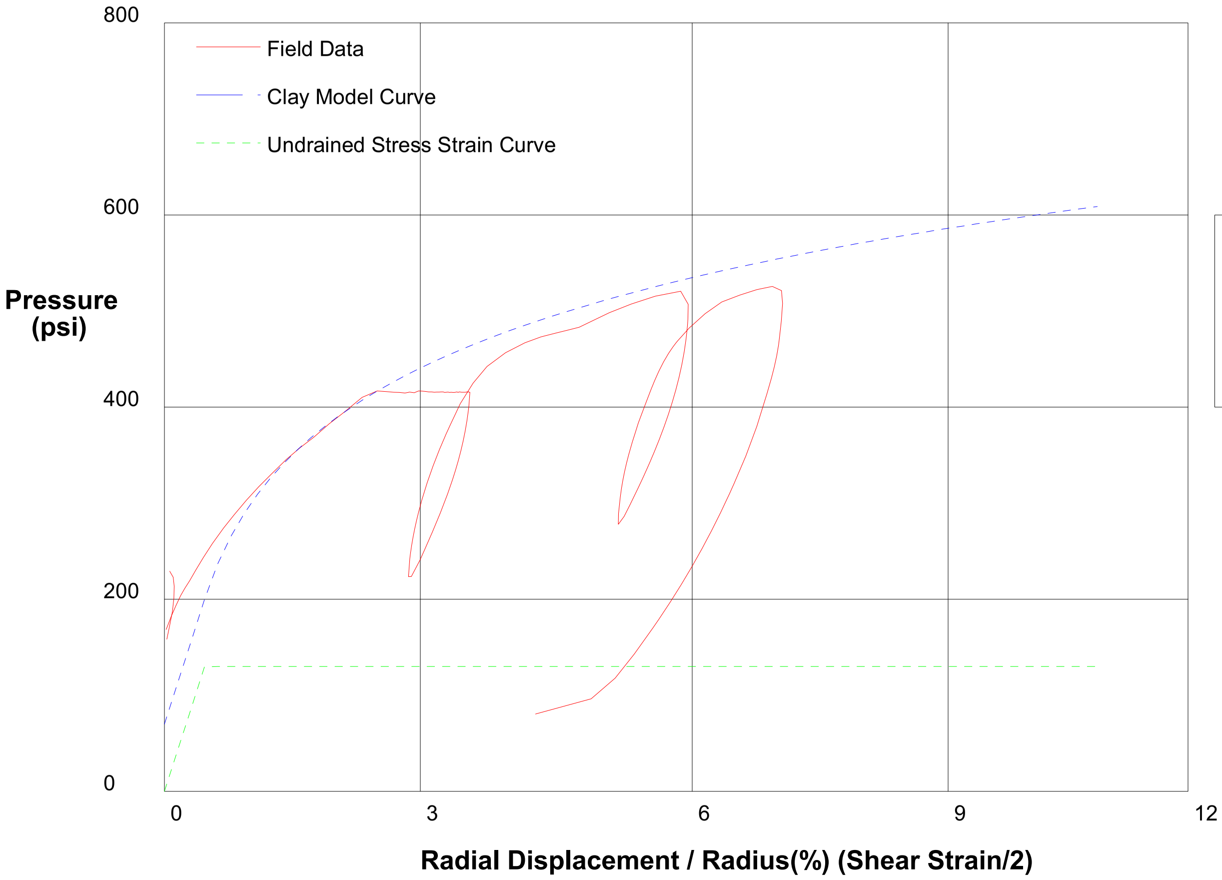
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/9/2008**

Hole No. PM301 **Depth 189.5ft** **File C:\DATA\ISE-765\CC65.P**



GIBSON'S CLAY MODEL

Shear Strength 130 psi
Insitu Stress 70 psi
Shear Modulus 13800 psi

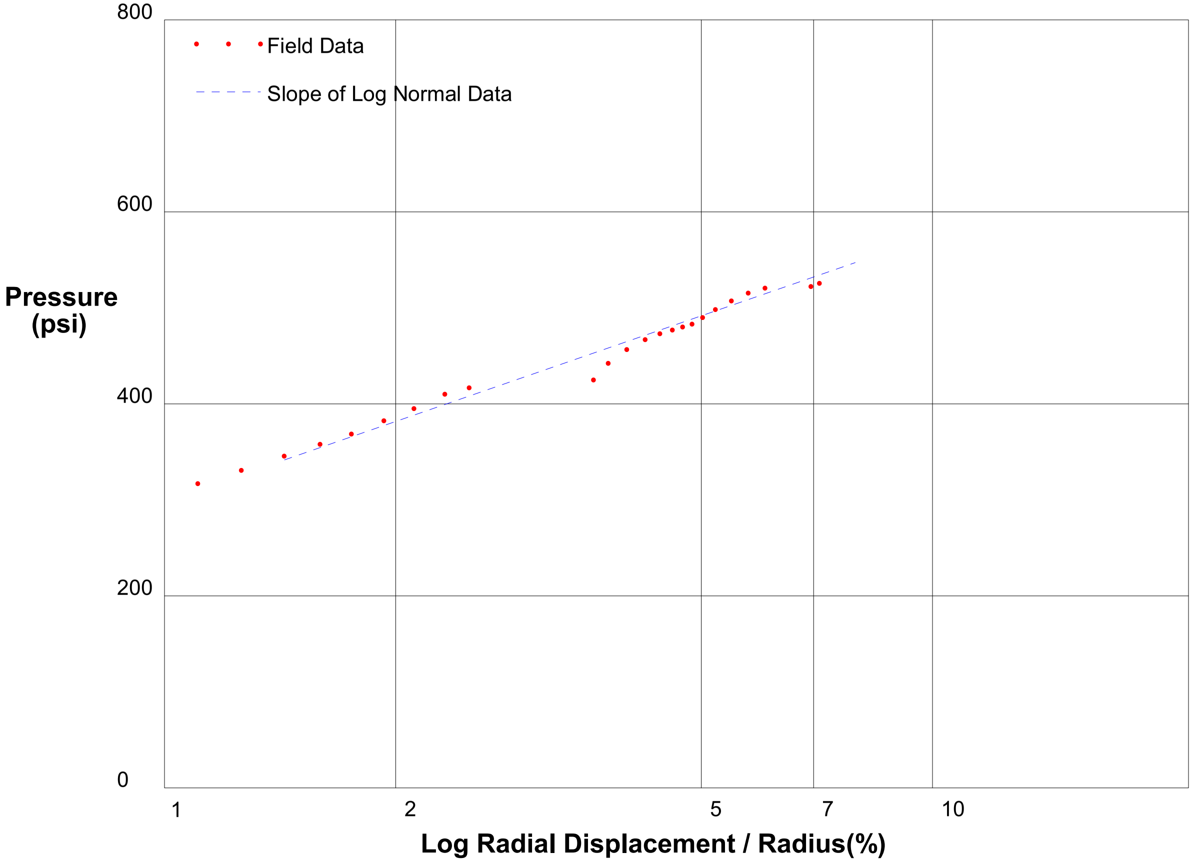
shift 5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/9/2008**

Hole No. PM301 **Depth 189.5ft** **File C:\DATA\ISE-765\CC65.P**



Shear Strength 120.1 psi
Limit Pressure 744 psi

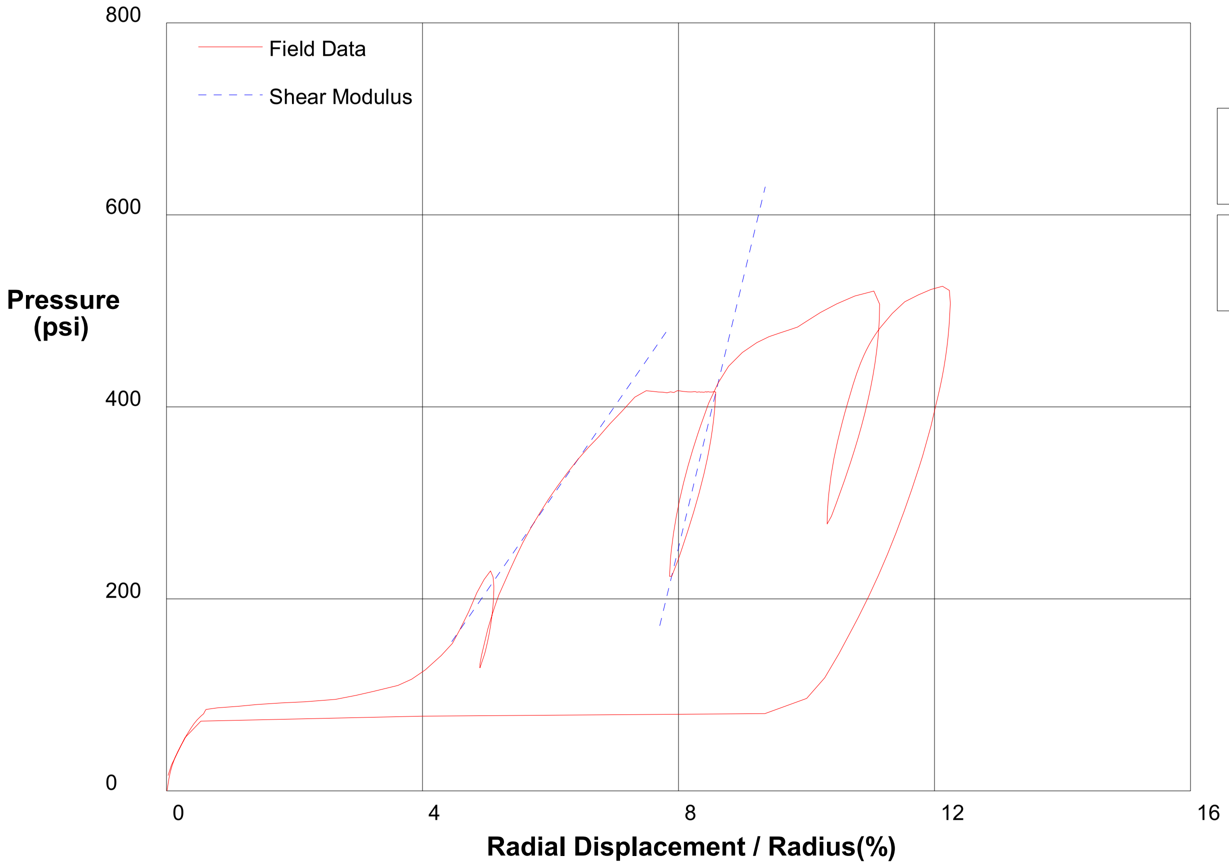
shift 5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/9/2008**

Hole No. PM301 **Depth 189.5ft** **File C:\DATA\ISE-765\CC65.P**



Shear Modulus 4814 psi

Shear Modulus 13881 psi

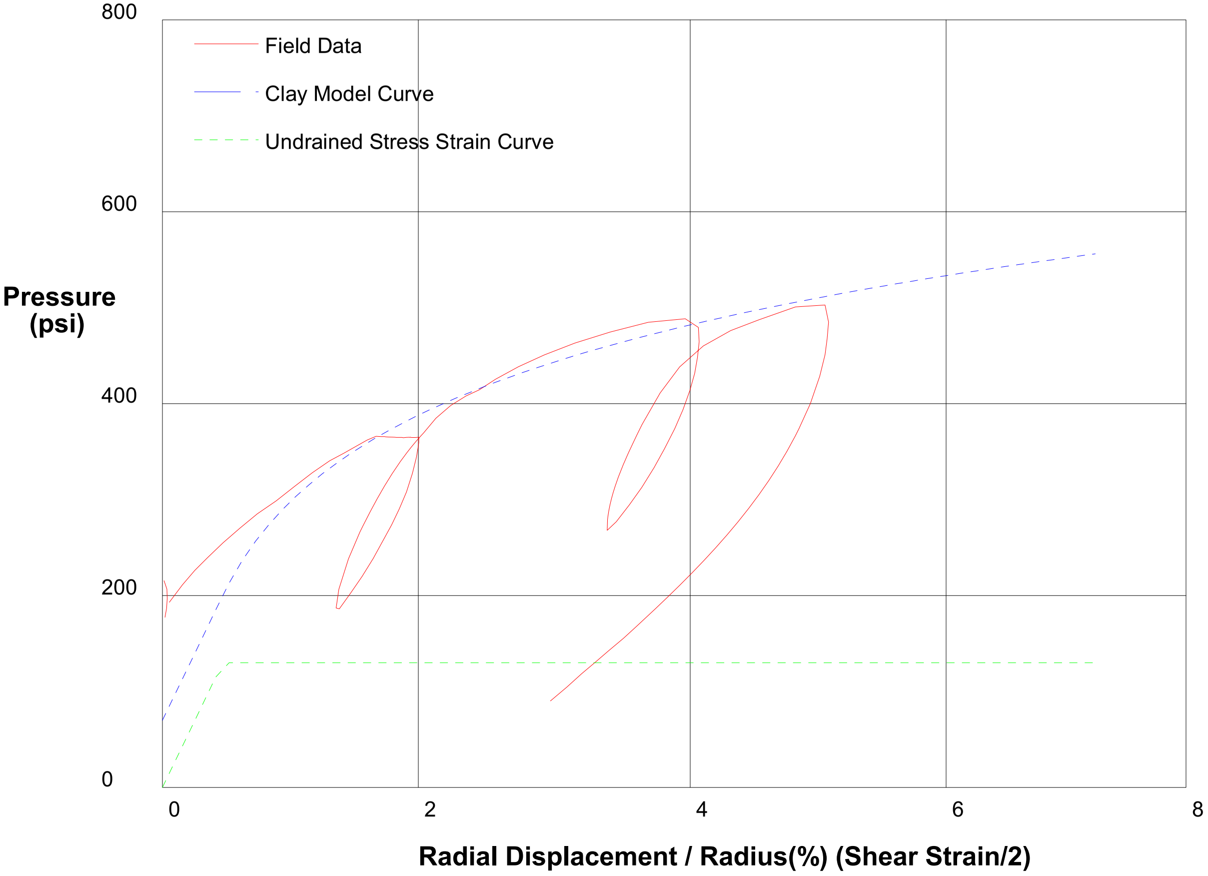
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/10/2008**

Hole No. PM301 **Depth 201ft** **File C:\DATA\ISE-765\CC66.P**



GIBSON'S CLAY MODEL

Shear Strength	**130 psi**
Insitu Stress	**70 psi**
Shear Modulus	**13800 psi**

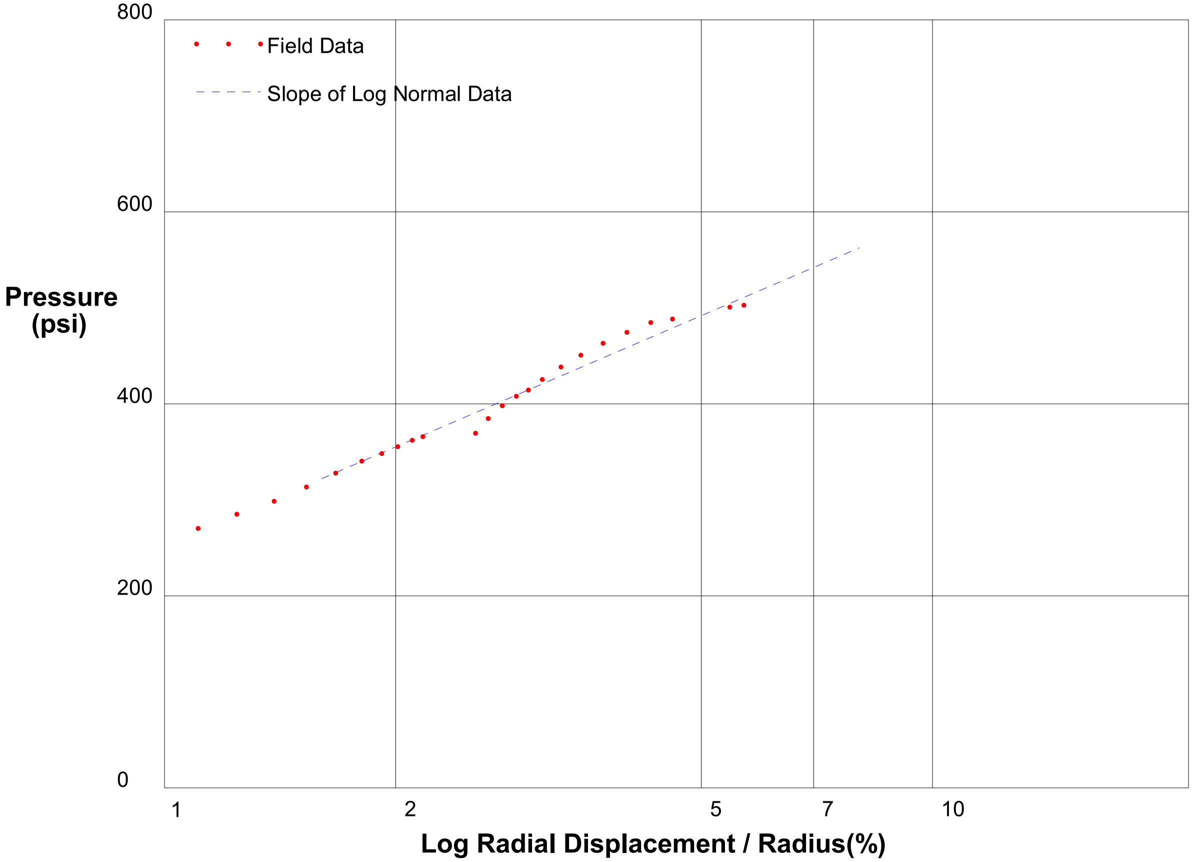
shift 8

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/10/2008**

Hole No. PM301 **Depth 201ft** **File C:\DATA\ISE-765\CC66.P**



Shear Strength 149.1 psi
Limit Pressure 805 psi

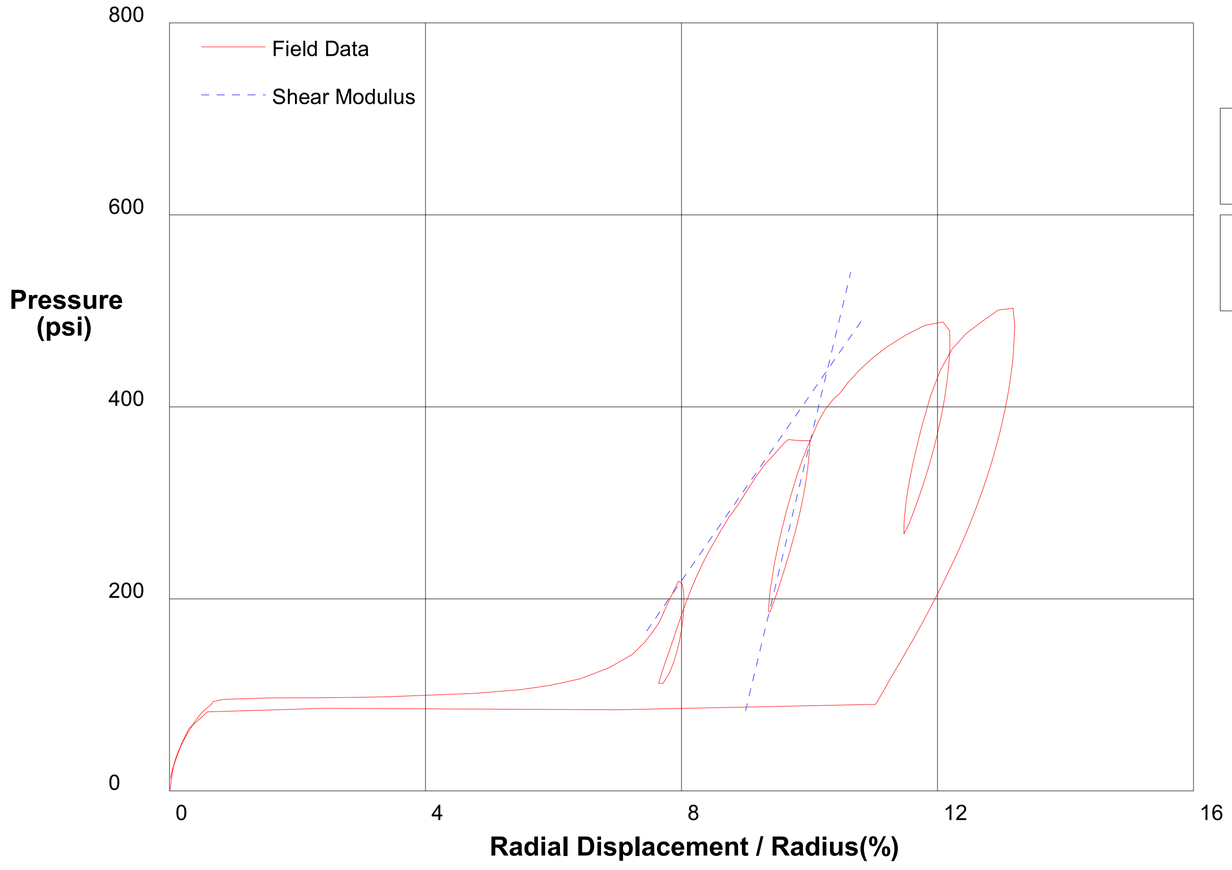
shift 7.5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/10/2008**

Hole No. PM301 **Depth 201ft** **File C:\DATA\ISE-765\CC66.P**



Shear Modulus 4814 psi

Shear Modulus 13881 psi

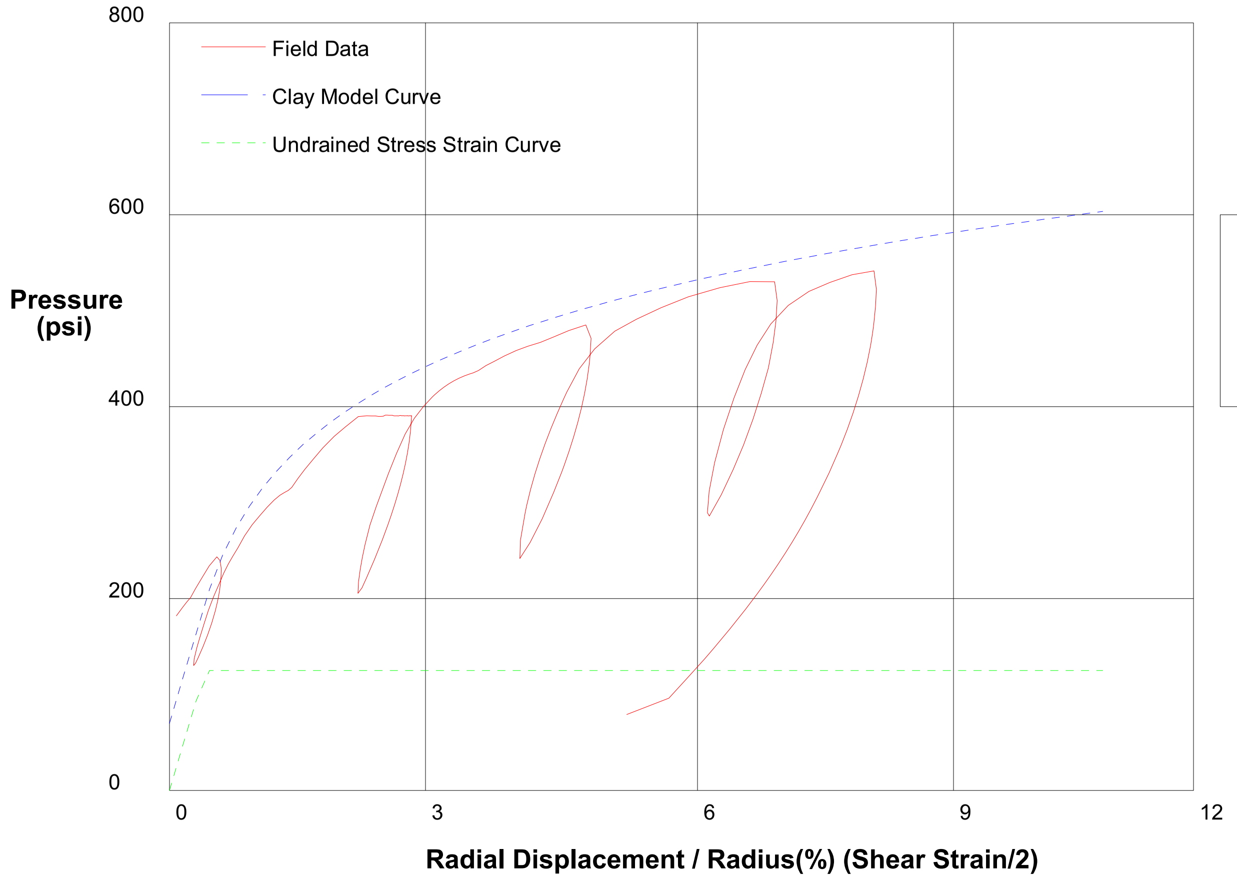
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/10/2008**

Hole No. PM301 **Depth 199.5ft** **File C:\DATA\ISE-765\CC67.P**



shift 5.5

GIBSON'S CLAY MODEL

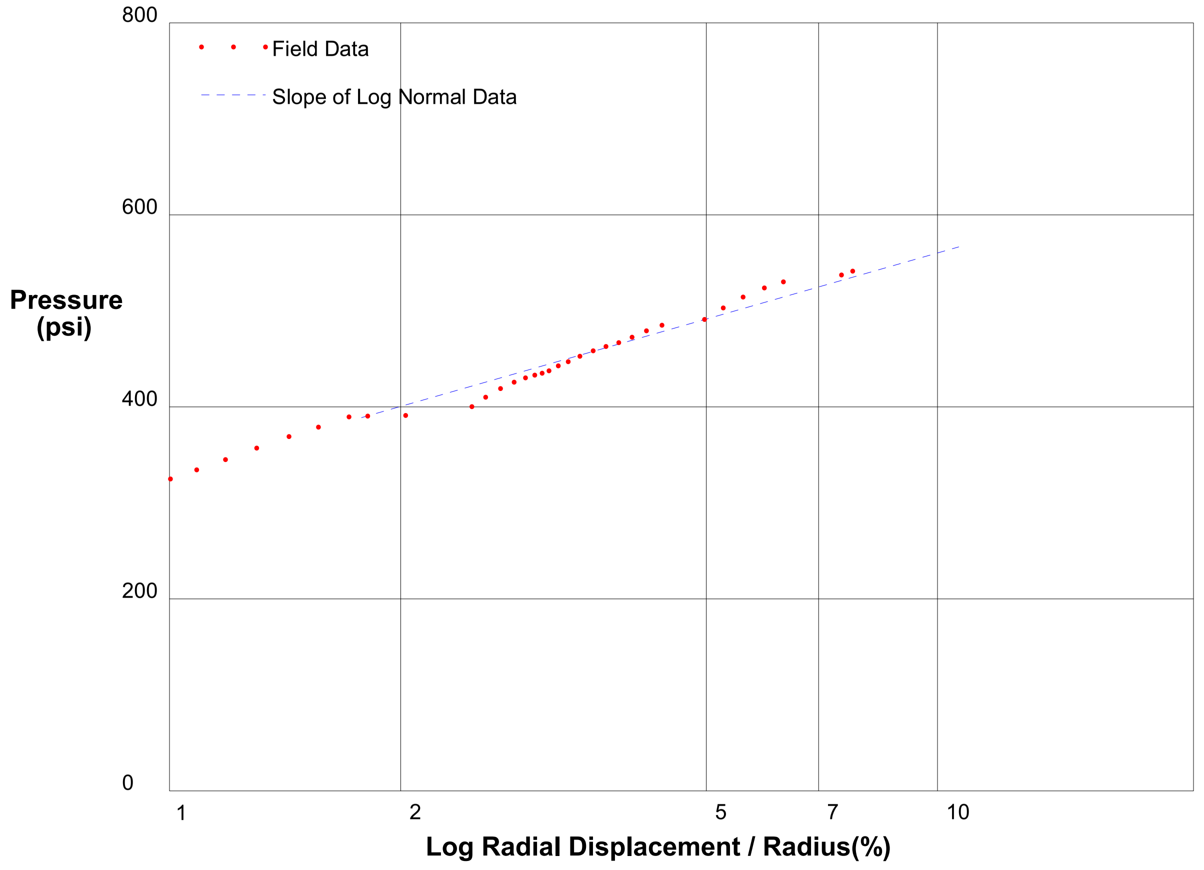
Shear Strength 125 psi
Insitu Stress 70 psi
Shear Modulus 15000 psi

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/10/2008**

Hole No. PM301 **Depth 199.5ft** **File C:\DATA\ISE-765\CC67.P**



Shear Strength 99.2 psi
Limit Pressure 700 psi

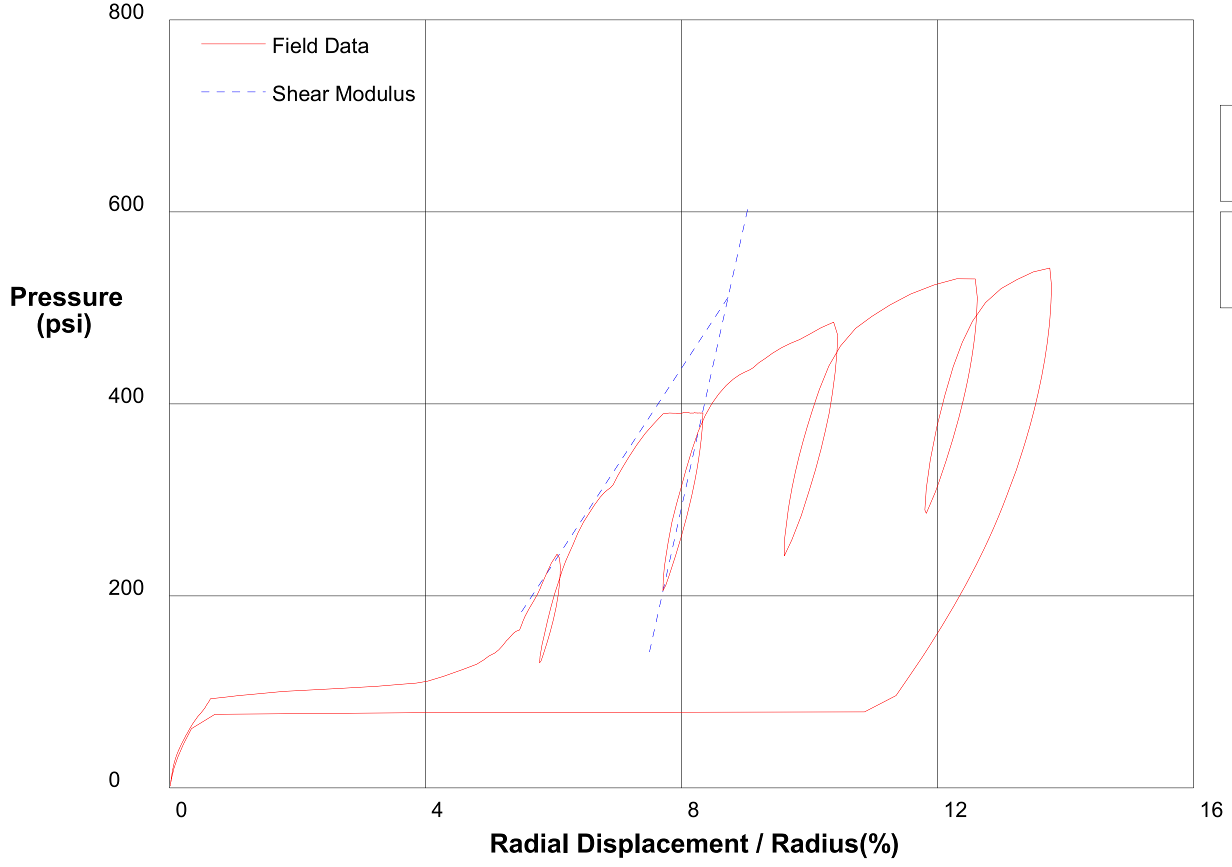
shift 6

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/10/2008**

Hole No. PM301 **Depth 199.5ft** **File C:\DATA\ISE-765\CC67.P**



Shear Modulus 5074 psi

Shear Modulus 15045 psi

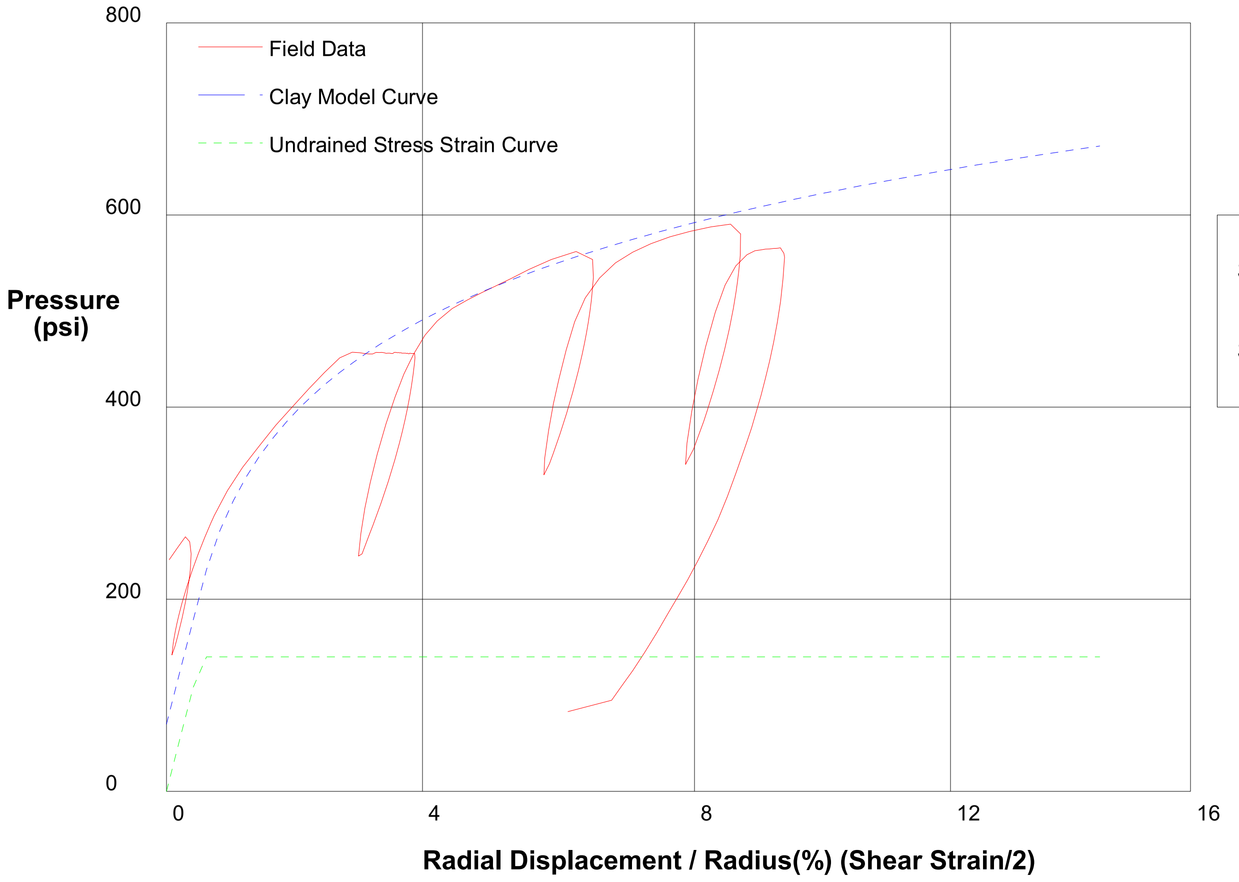
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/10/2008**

Hole No. PM301 **Depth 210.9ft** **File C:\DATA\ISE-765\CC68.P**



shift 2

GIBSON'S CLAY MODEL

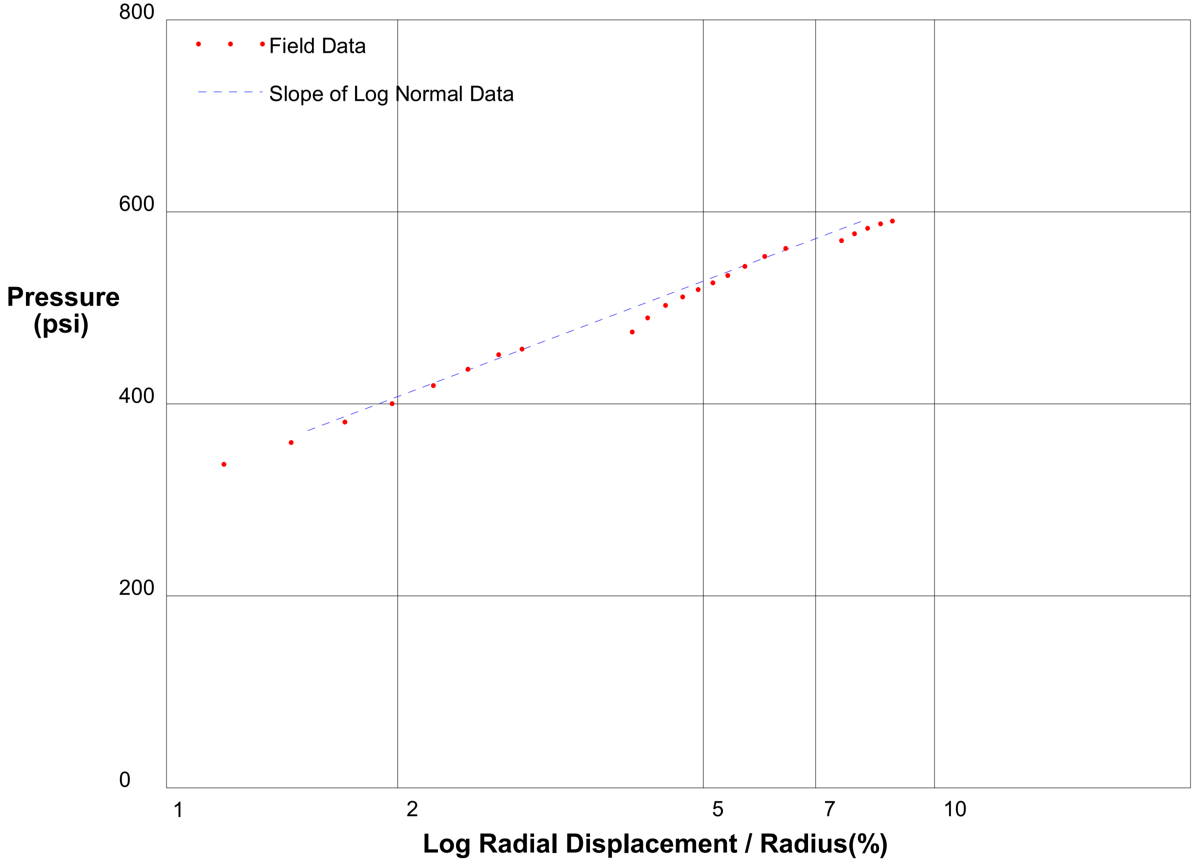
Shear Strength	**140 psi**
Insitu Stress	**70 psi**
Shear Modulus	**13000 psi**

In Situ Engineering

PRESSUREMETER DATA Schnabel Engineering LLC.

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/10/2008**

Hole No. PM301 **Depth 210.9ft** **File C:\DATA\ISE-765\CC68.P**



Shear Strength 131.3 psi
Limit Pressure 804 psi

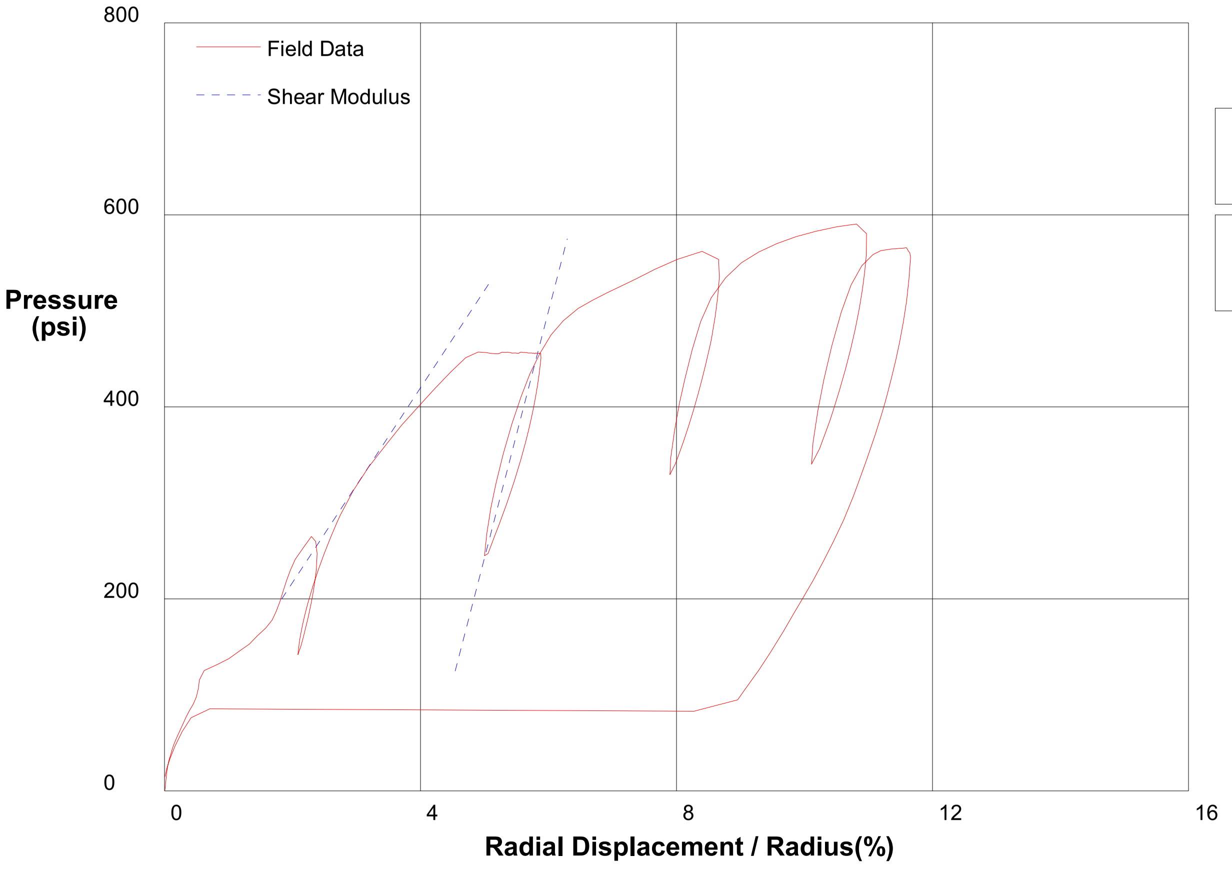
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/10/2008**

Hole No. PM301 **Depth 210.9ft** **File C:\DATA\ISE-765\CC68.P**



Shear Modulus 5074 psi

Shear Modulus 12857 psi

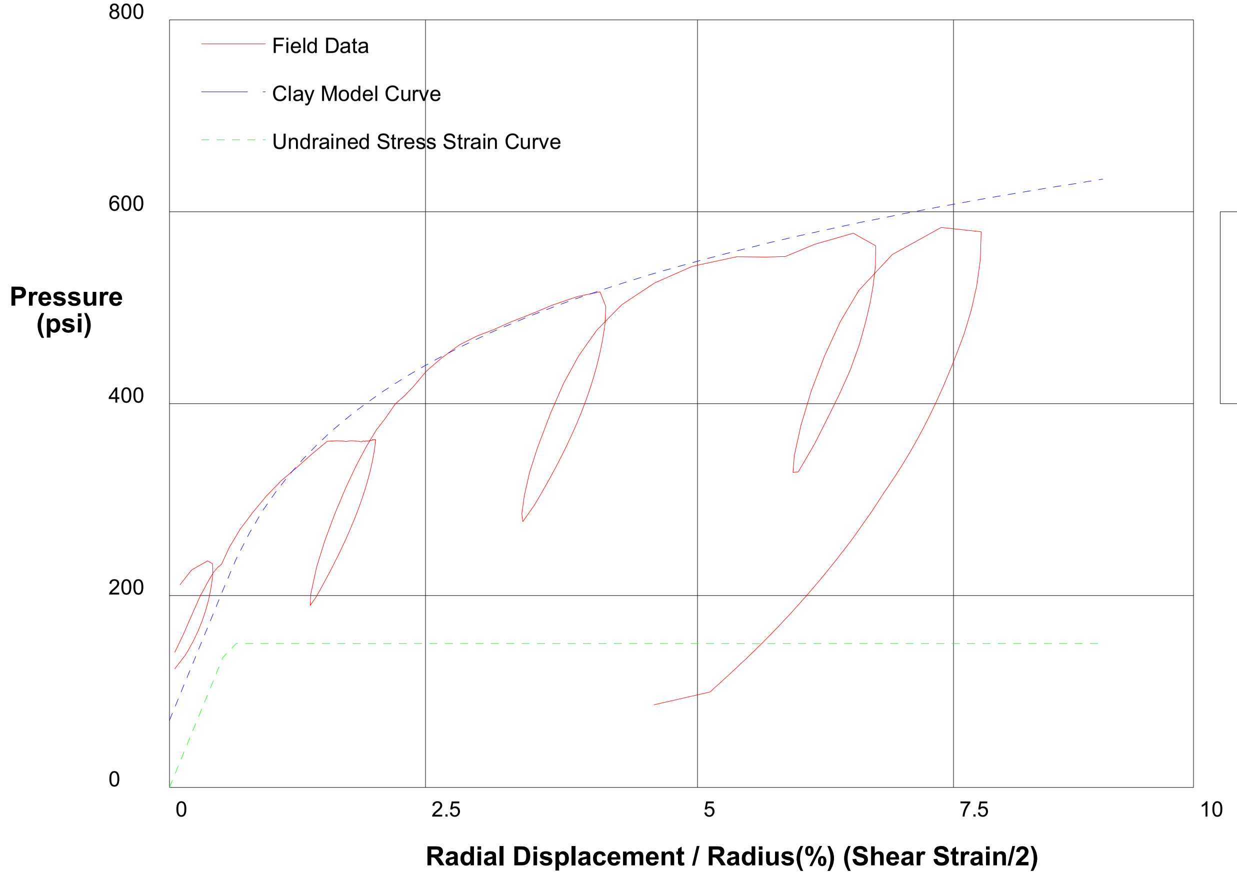
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/10/2008**

Hole No. PM301 **Depth 209.4ft** **File C:\DATA\ISE-765\CC69.P**



shift 6

GIBSON'S CLAY MODEL

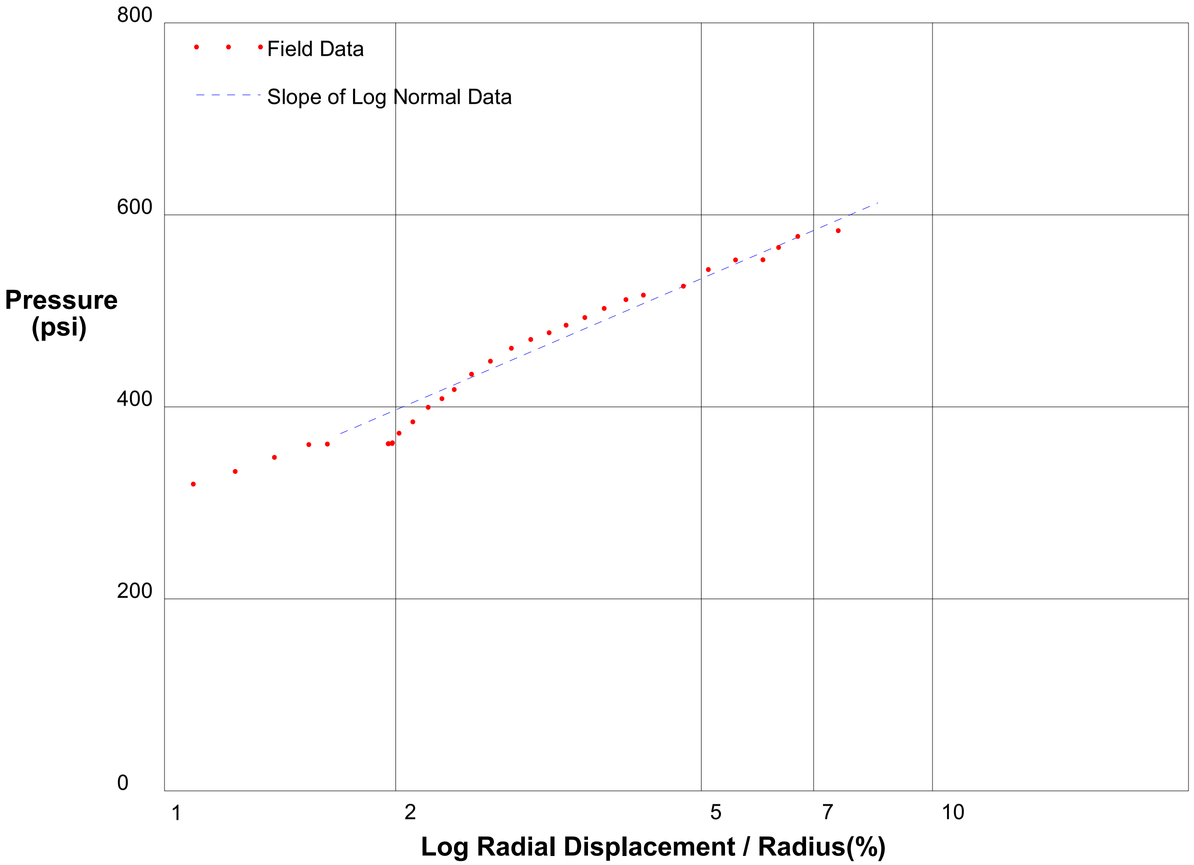
Shear Strength 150 psi
Insitu Stress 70 psi
Shear Modulus 13000 psi

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/10/2008**

Hole No. PM301 **Depth 209.4ft** **File C:\DATA\ISE-765\CC69.P**



Shear Strength 149.1 psi
Limit Pressure 847 psi

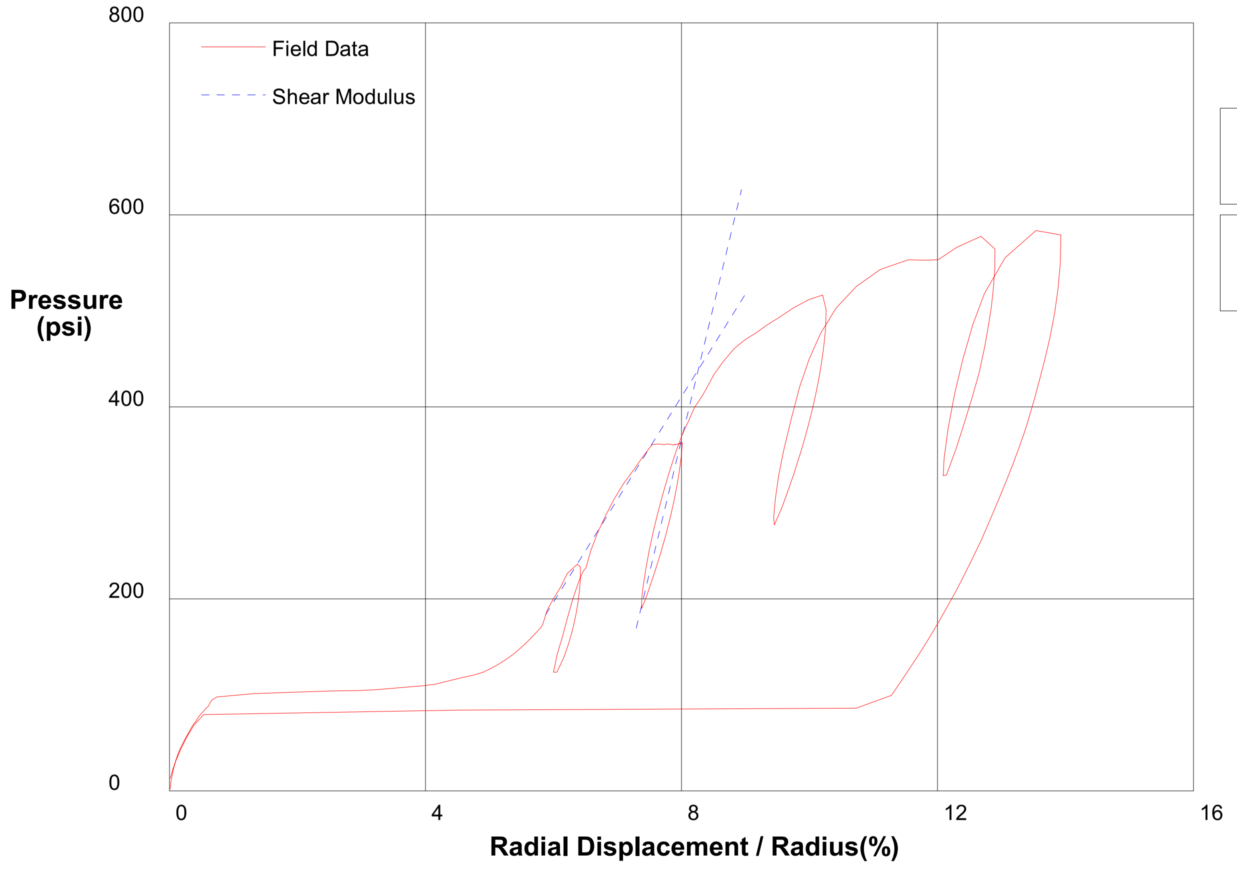
shift 6

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/10/2008**

Hole No. PM301 **Depth 209.4ft** **File C:\DATA\ISE-765\CC69.P**



Shear Modulus 5350 psi

Shear Modulus 13881 psi

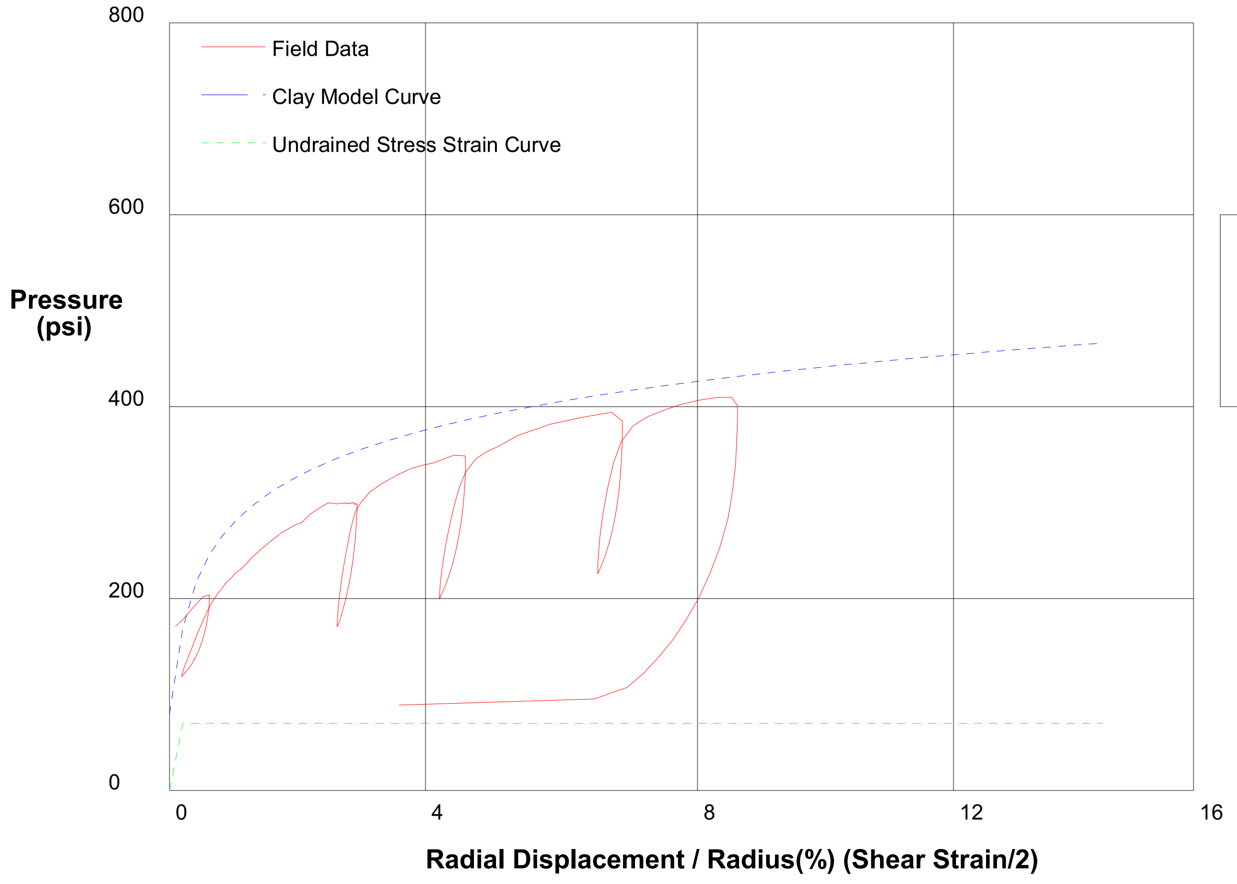
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/10/2008**

Hole No. PM301 **Depth 221ft** **File C:\DATA\ISE-765\CC70.P**



GIBSON'S CLAY MODEL

Shear Strength	**70**	**psi**
Insitu Stress	**80**	**psi**
Shear Modulus	**22000**	**psi**

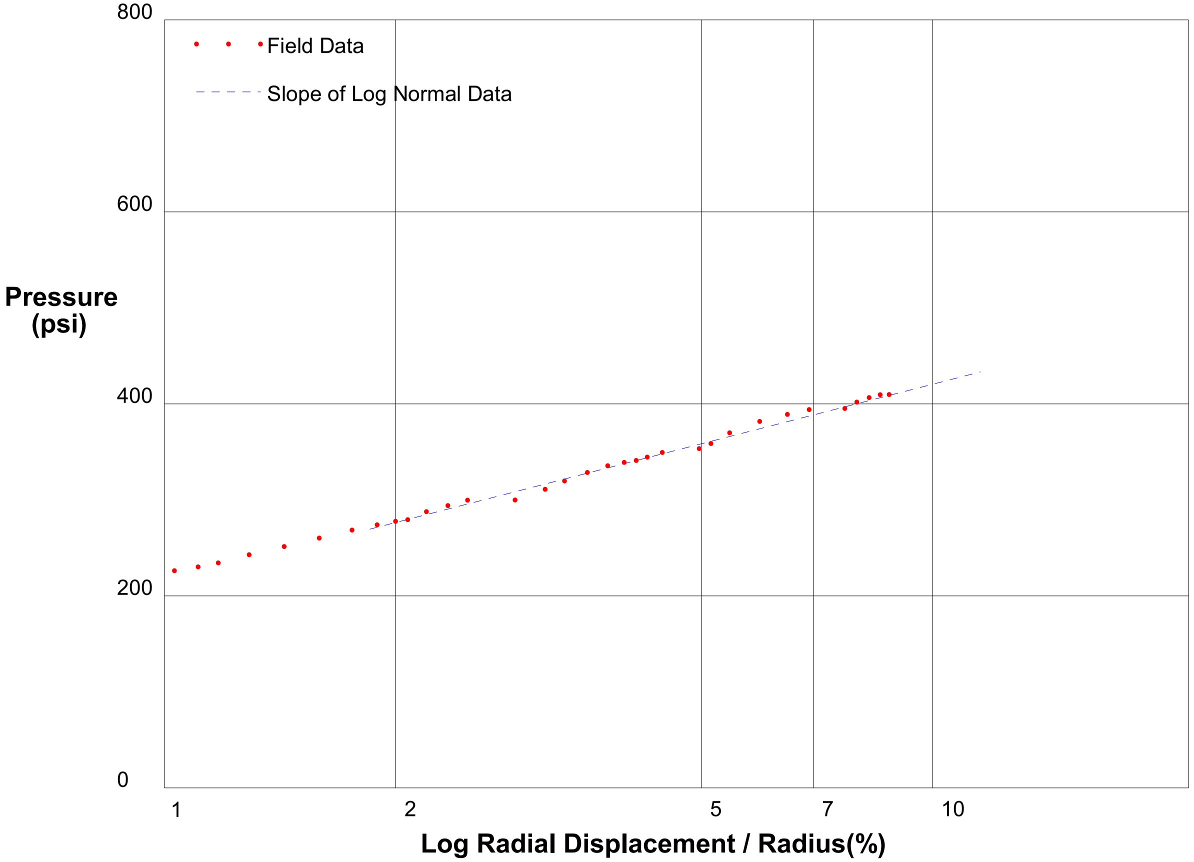
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/10/2008**

Hole No. PM301 **Depth 221ft** **File C:\DATA\ISE-765\CC70.P**



Shear Strength 89.5 psi
Limit Pressure 546 psi

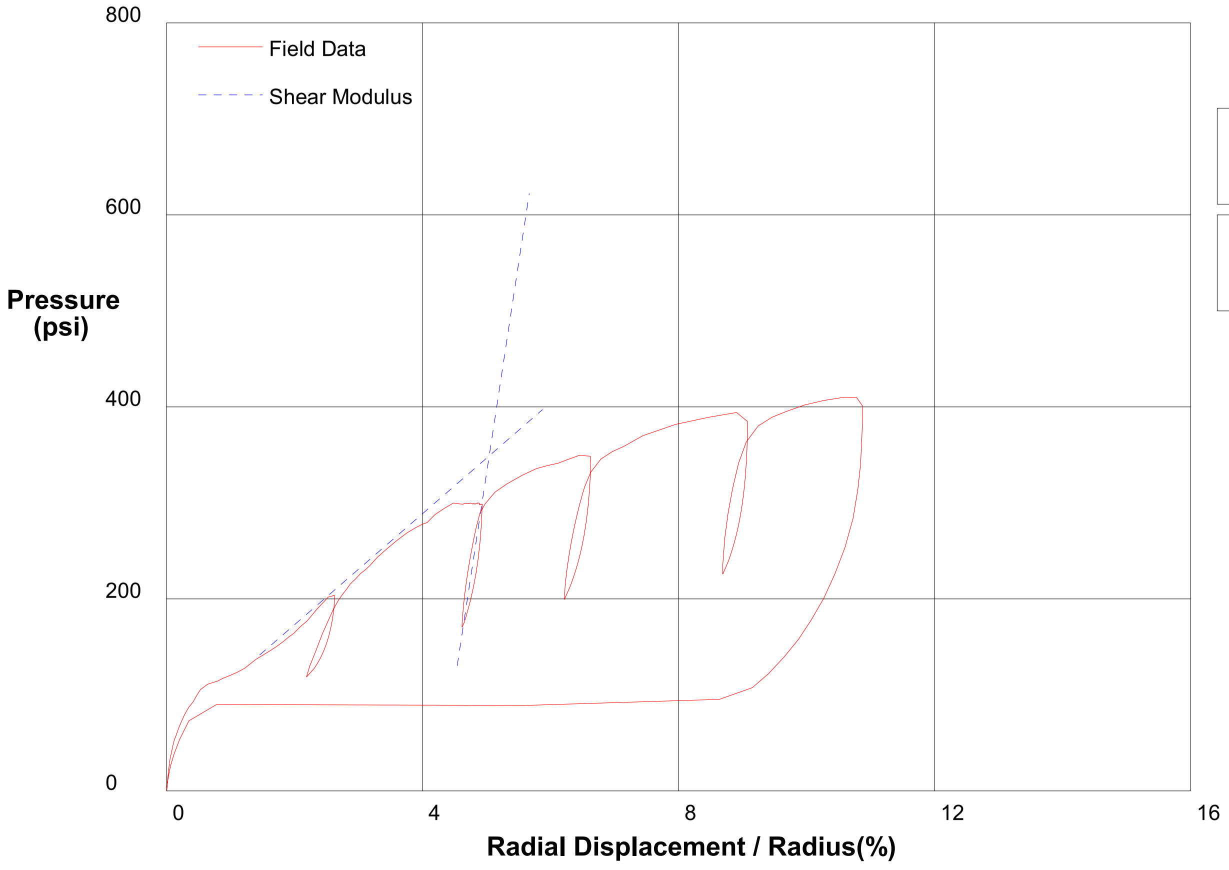
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/10/2008**

Hole No. PM301 **Depth 221ft** **File C:\DATA\ISE-765\CC70.P**



Shear Modulus 2893 psi

Shear Modulus 21851 psi

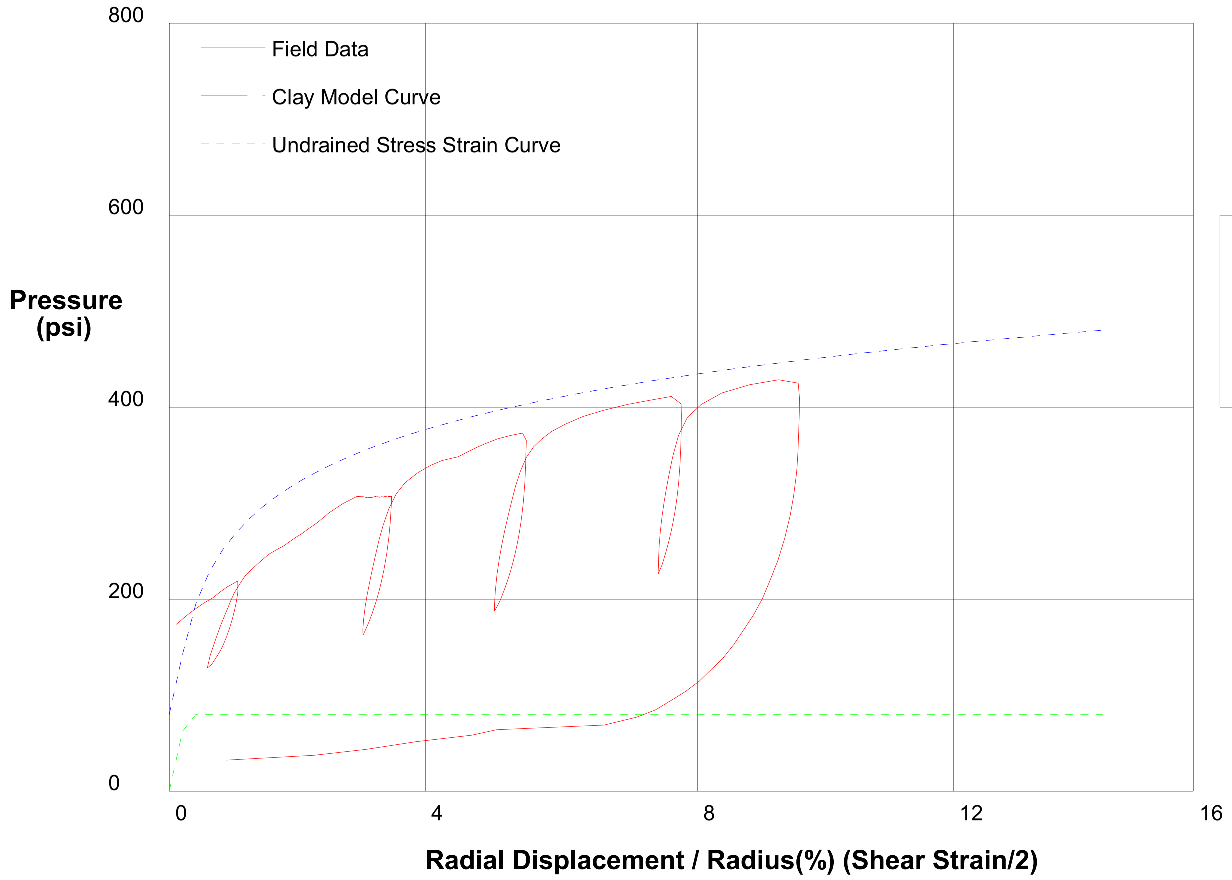
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/10/2008**

Hole No. PM301 **Depth 219.5ft** **File C:\DATA\ISE-765\CC71.P**



GIBSON'S CLAY MODEL

Shear Strength 80 psi
Insitu Stress 80 psi
Shear Modulus 15000 psi

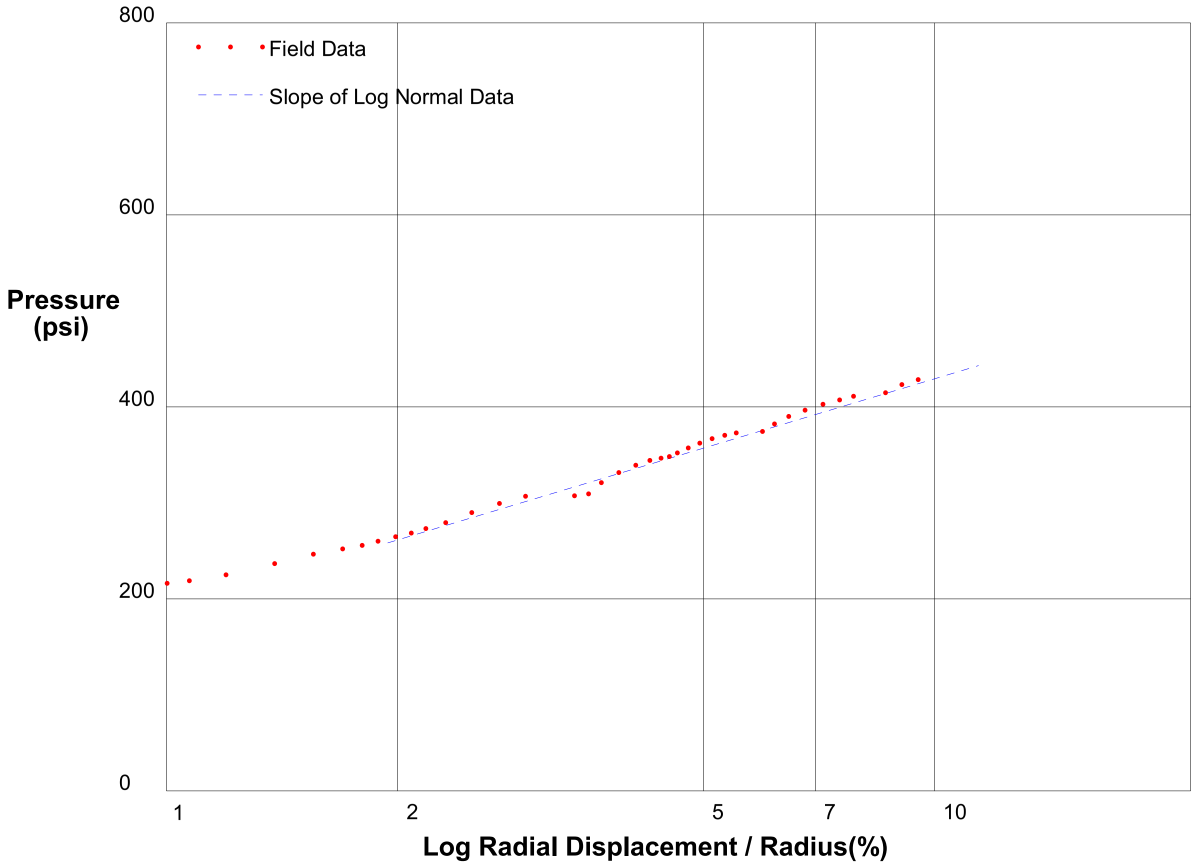
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/10/2008**

Hole No. PM301 **Depth 219.5ft** **File C:\DATA\ISE-765\CC71.P**



Shear Strength 104.3 psi
Limit Pressure 576 psi

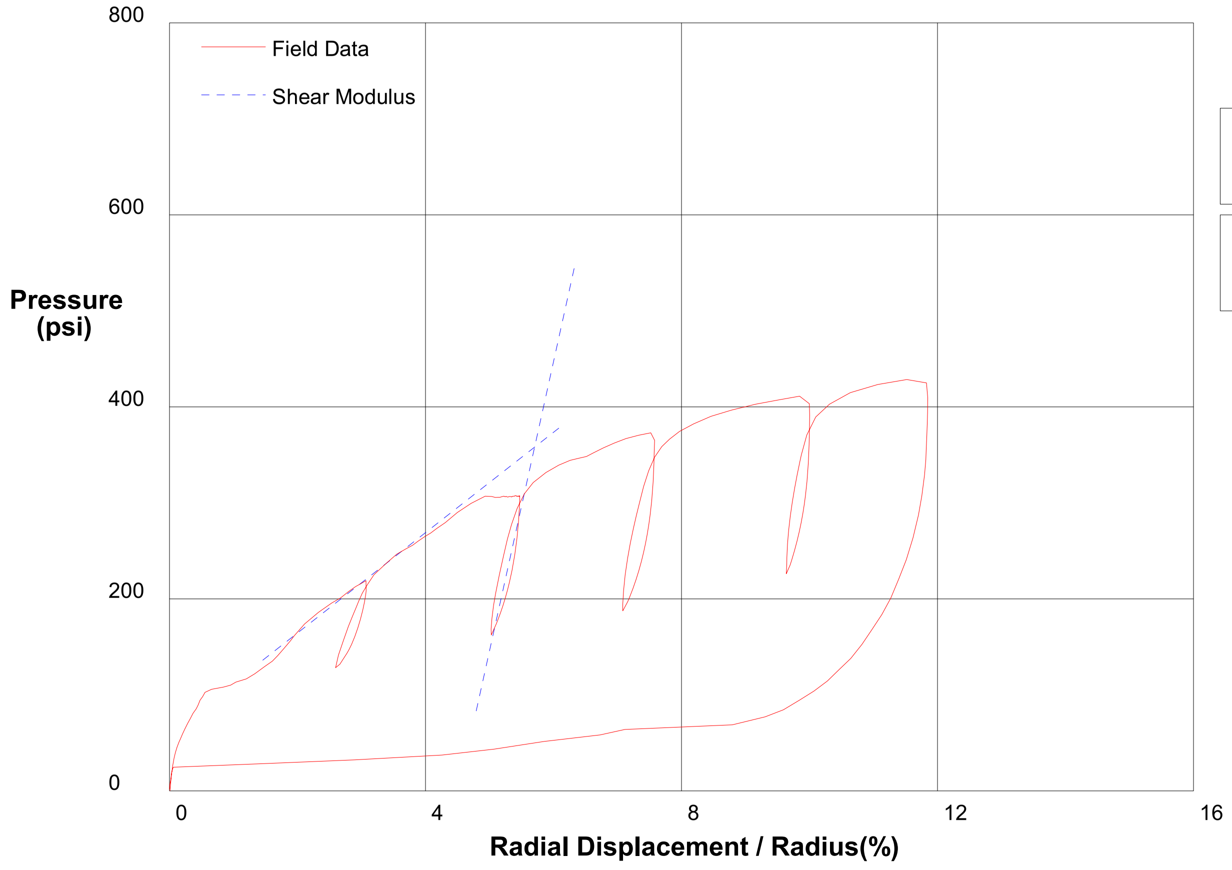
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/10/2008**

Hole No. PM301 **Depth 219.5ft** **File C:\DATA\ISE-765\CC71.P**



Shear Modulus 2612 psi

Shear Modulus 15045 psi

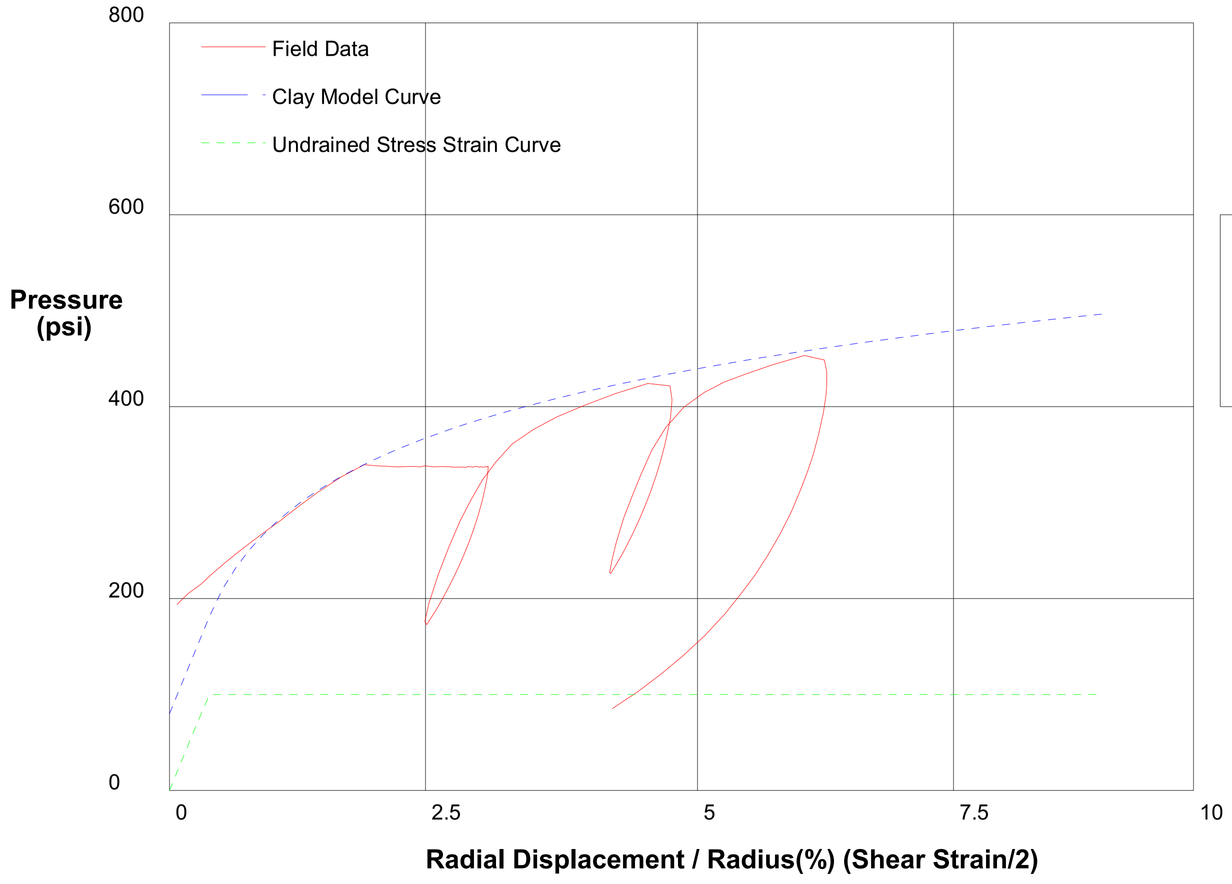
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/11/2008**

Hole No. PM301 **Depth 231ft** **File C:\DATA\ISE-765\CC72.P**



GIBSON'S CLAY MODEL

Shear Strength	**100**	**psi**
Insitu Stress	**80**	**psi**
Shear Modulus	**13000**	**psi**

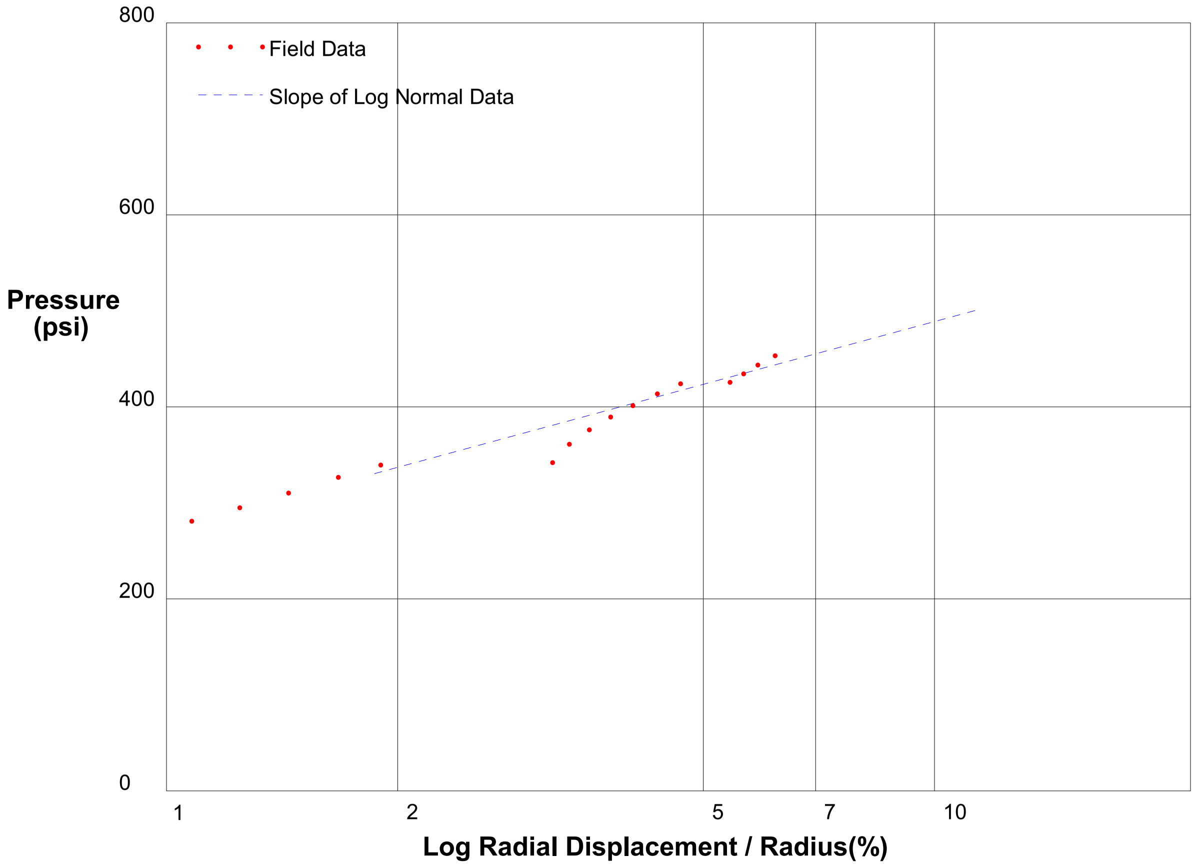
shift 7

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/11/2008**

Hole No. PM301 **Depth 231ft** **File C:\DATA\ISE-765\CC72.P**



Shear Strength 94.3 psi
Limit Pressure 622 psi

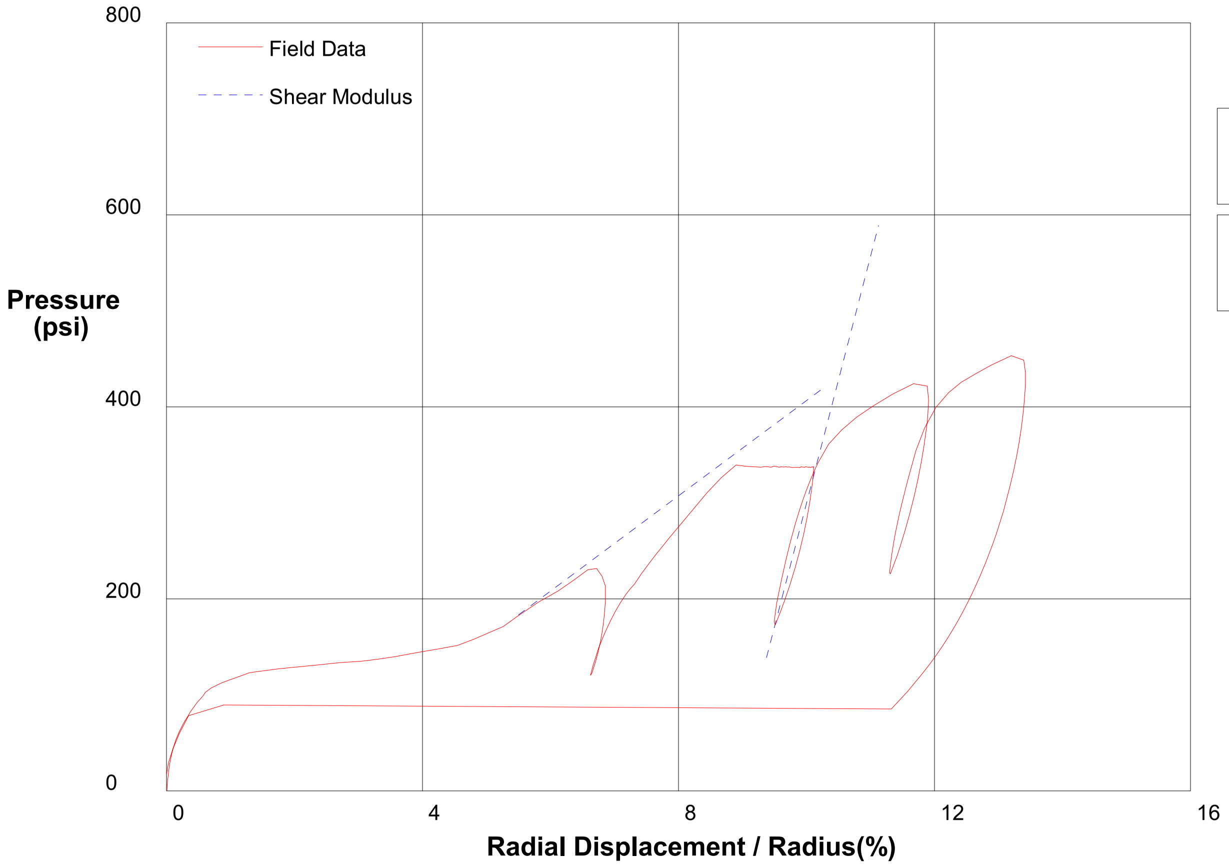
shift 7

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/11/2008**

Hole No. PM301 **Depth 231ft** **File C:\DATA\ISE-765\CC72.P**



Shear Modulus 2481 psi

Shear Modulus 12857 psi

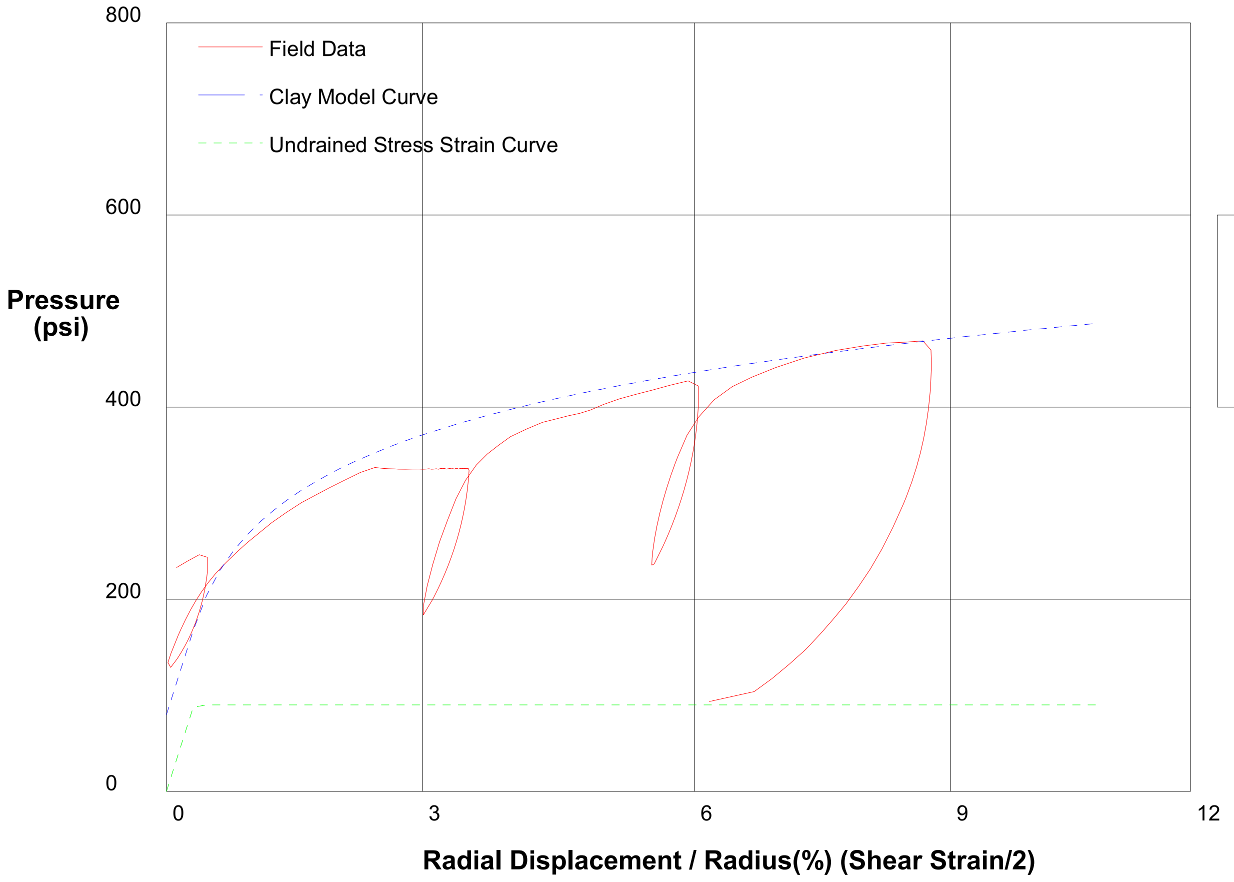
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/11/2008**

Hole No. PM301 **Depth 229.5ft** **File C:\DATA\ISE-765\CC73.P**



GIBSON'S CLAY MODEL

Shear Strength 90 psi
Insitu Stress 80 psi
Shear Modulus 14000 psi

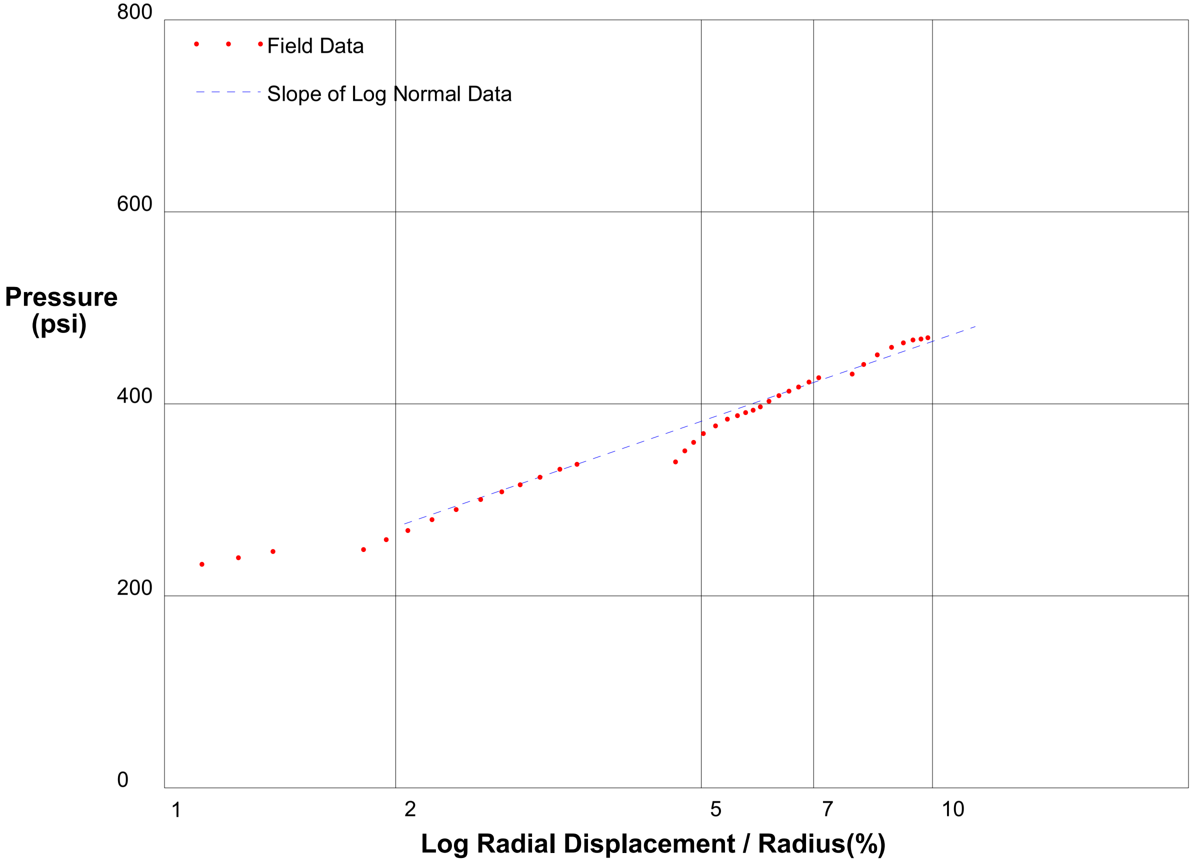
shift 4

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/11/2008**

Hole No. PM301 **Depth 229.5ft** **File C:\DATA\ISE-765\CC73.P**



Shear Strength 120.1 psi
Limit Pressure 634 psi

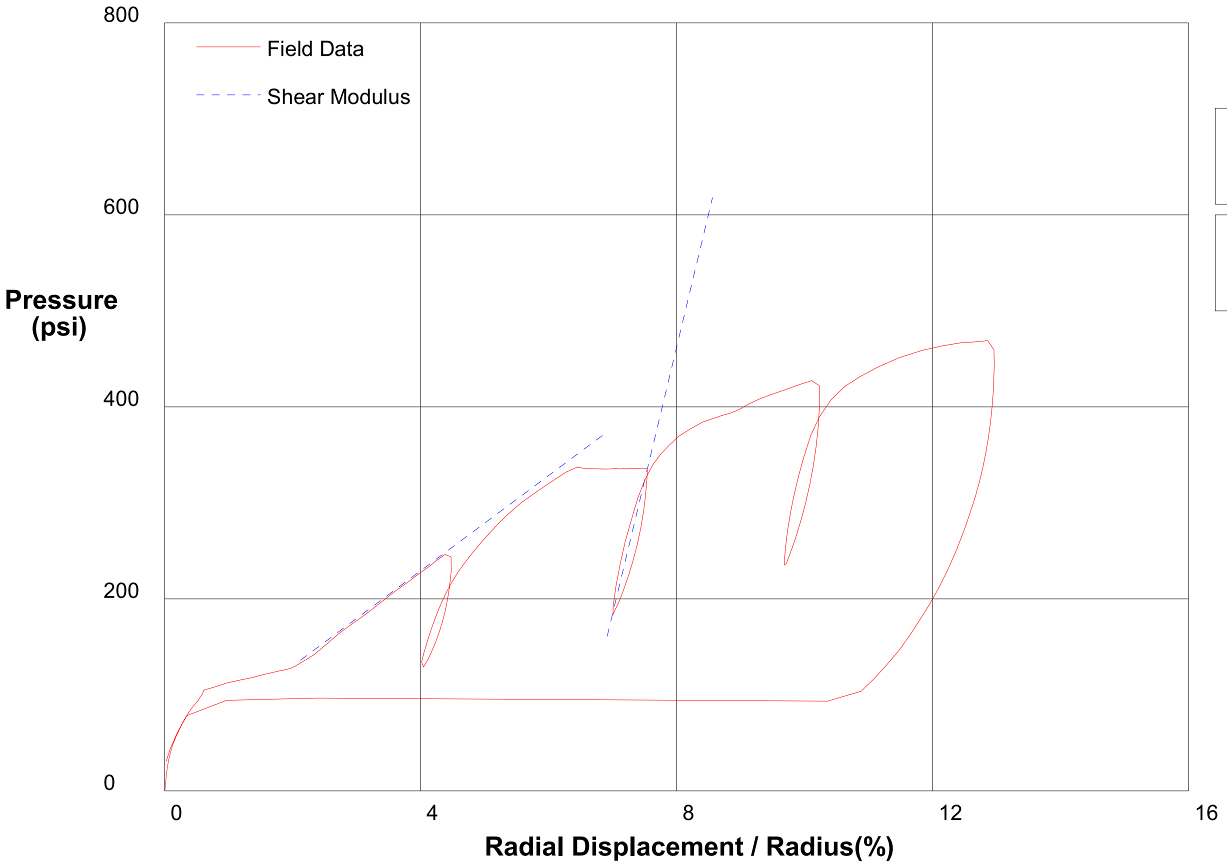
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/11/2008**

Hole No. PM301 **Depth 229.5ft** **File C:\DATA\ISE-765\CC73.P**



Shear Modulus 2481 psi

Shear Modulus 13881 psi

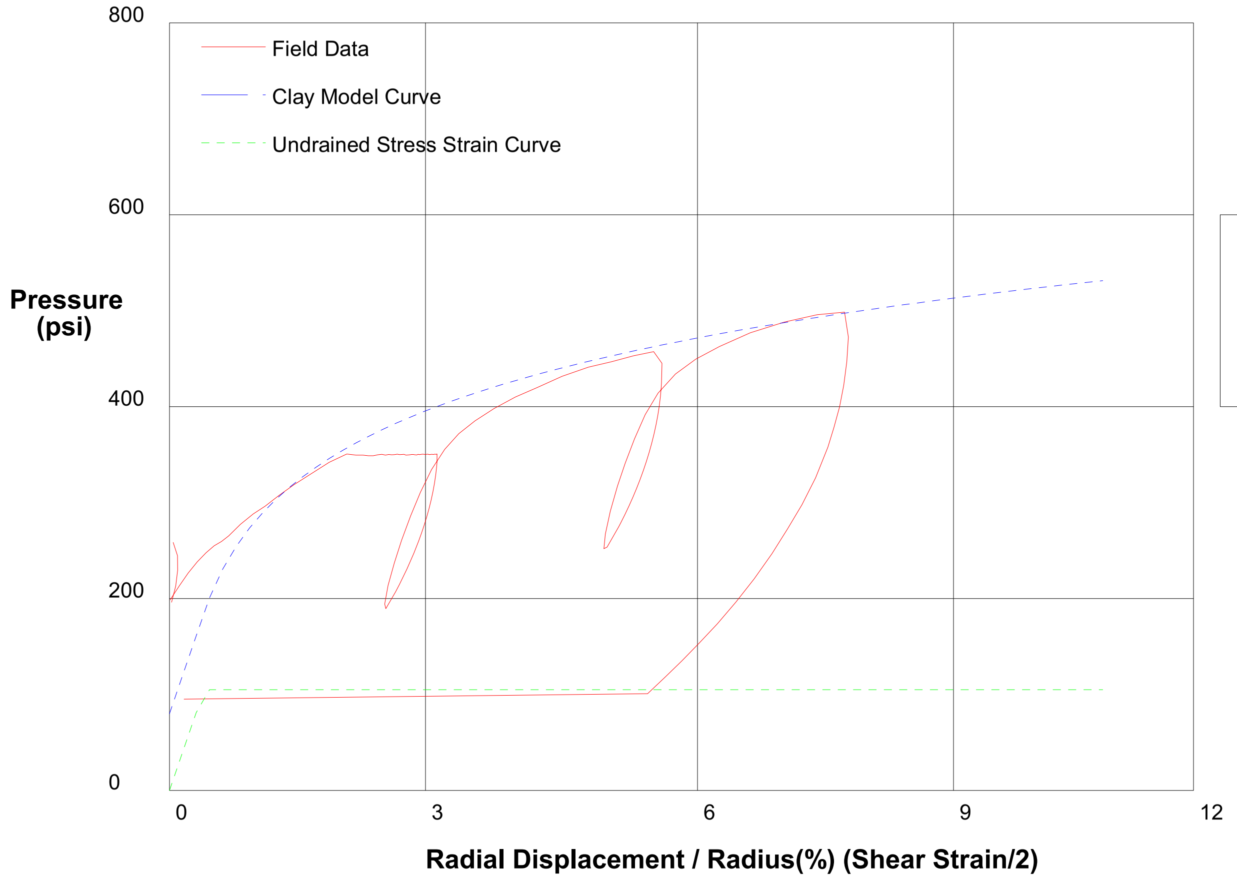
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/11/2008**

Hole No. PM301 **Depth 241ft** **File C:\DATA\ISE-765\CC74.P**



GIBSON'S CLAY MODEL

Shear Strength	**105 psi**
Insitu Stress	**80 psi**
Shear Modulus	**13000 psi**

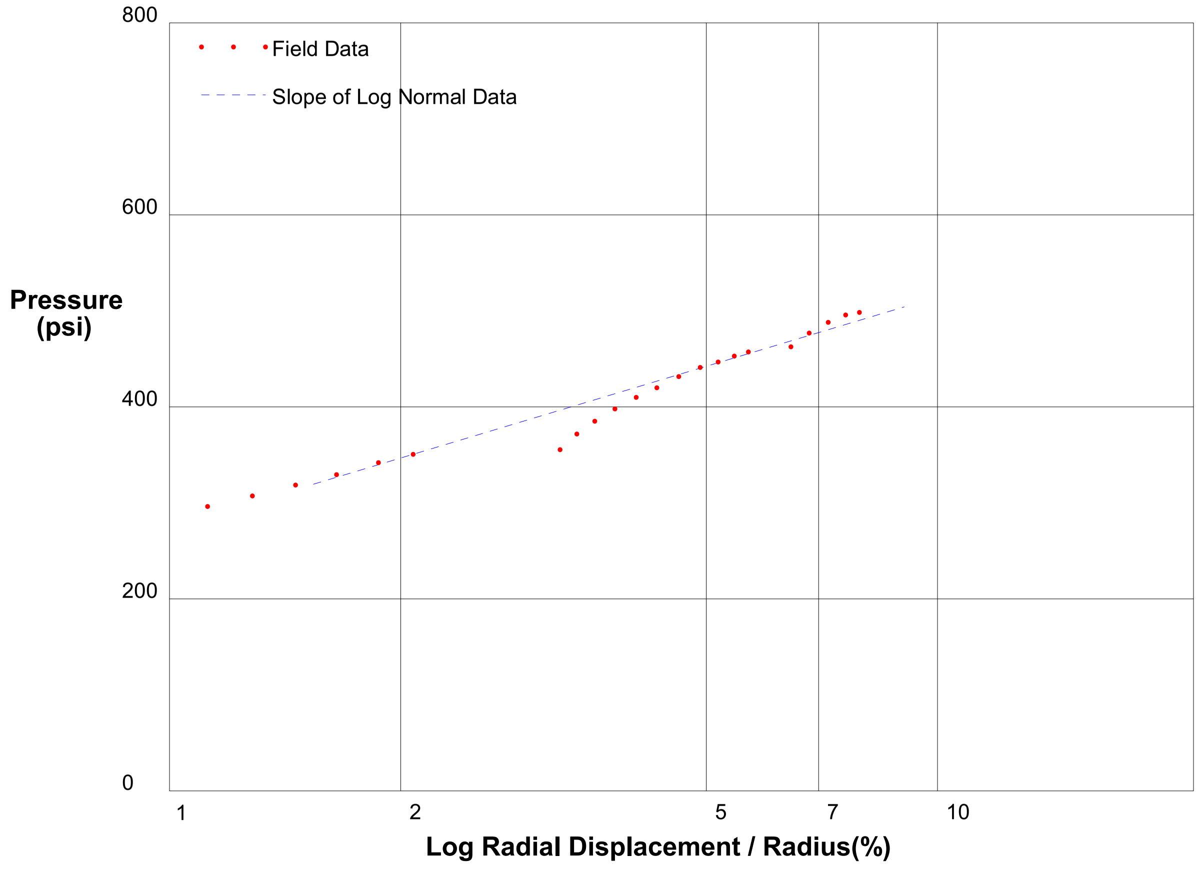
shift 5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/11/2008**

Hole No. PM301 **Depth 241ft** **File C:\DATA\ISE-765\CC74.P**



Shear Strength 104.3 psi
Limit Pressure 661 psi

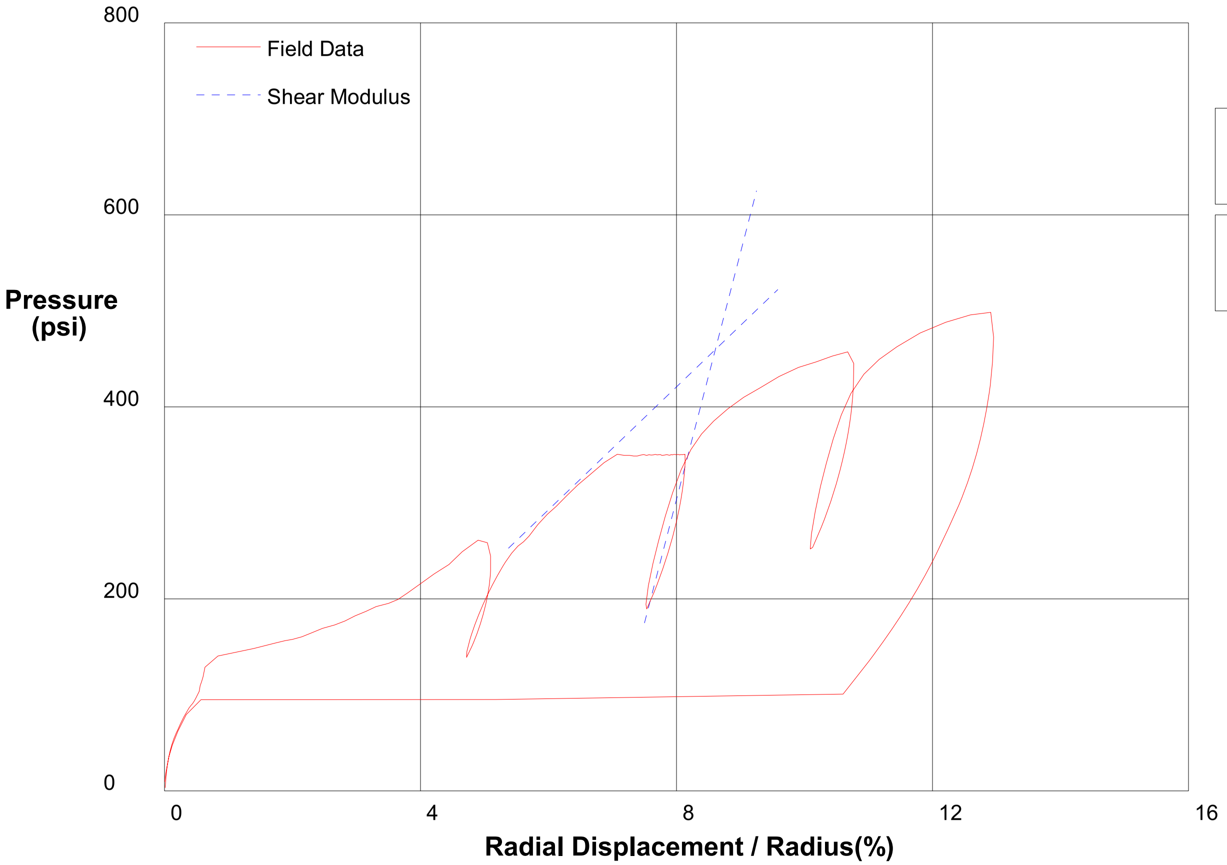
shift 5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/11/2008**

Hole No. PM301 **Depth 241ft** **File C:\DATA\ISE-765\CC74.P**



Shear Modulus 3201 psi

Shear Modulus 12857 psi

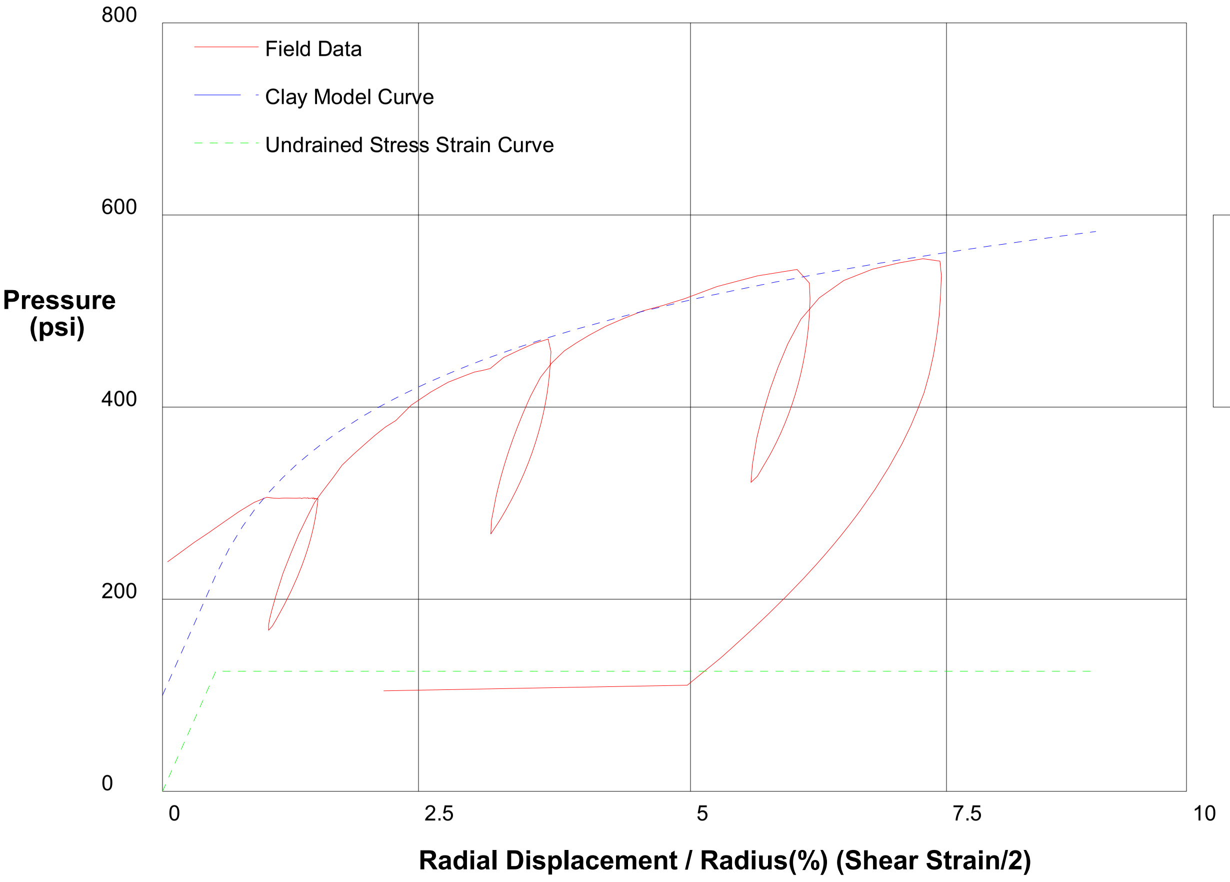
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/11/2008**

Hole No. PM301 **Depth 251ft** **File C:\DATA\ISE-765\CC76.P**



GIBSON'S CLAY MODEL

Shear Strength 125 psi
Insitu Stress 100 psi
Shear Modulus 12000 psi

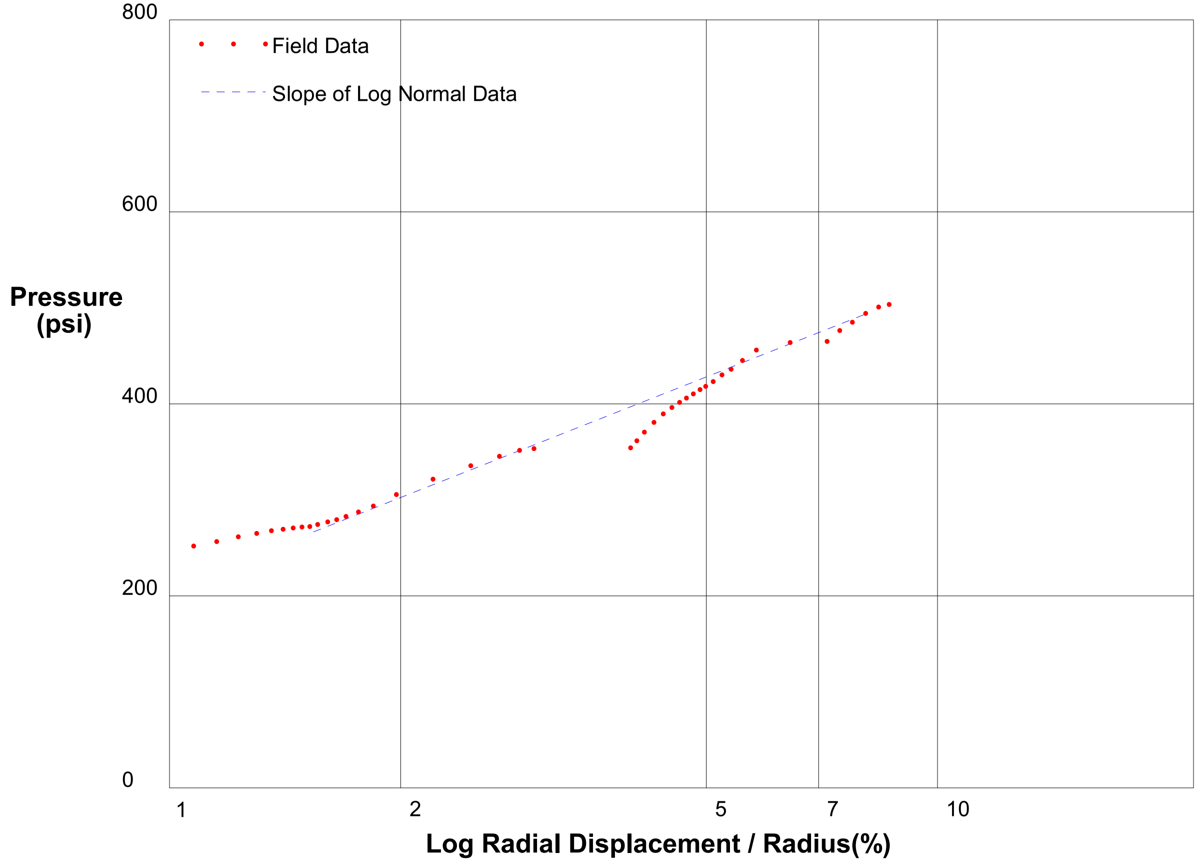
shift 6

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/11/2008**

Hole No. PM301 **Depth 239.5ft** **File C:\DATA\ISE-765\CC75.P**



Shear Strength 137.1 psi
Limit Pressure 716 psi

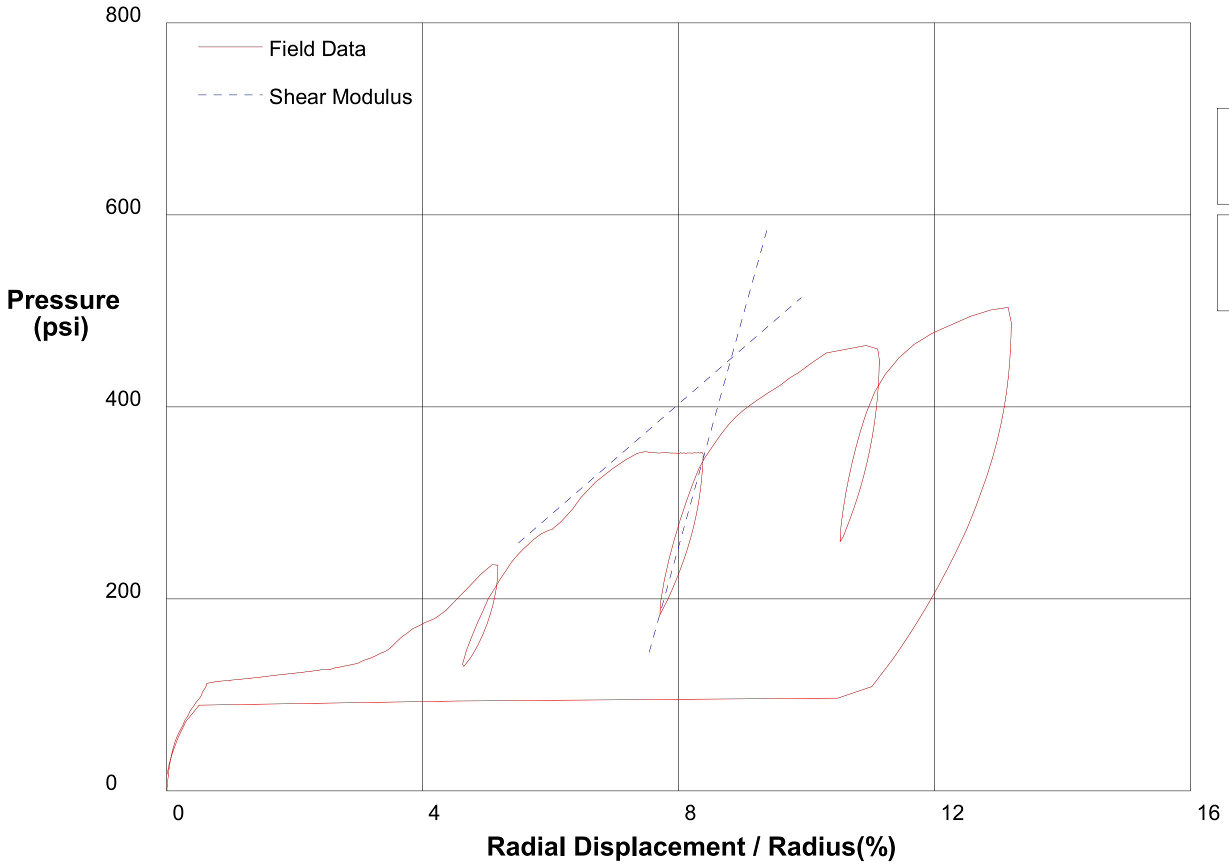
shift 4.5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/11/2008**

Hole No. PM301 **Depth 239.5ft** **File C:\DATA\ISE-765\CC75.P**



Shear Modulus 2893 psi

Shear Modulus 11947 psi

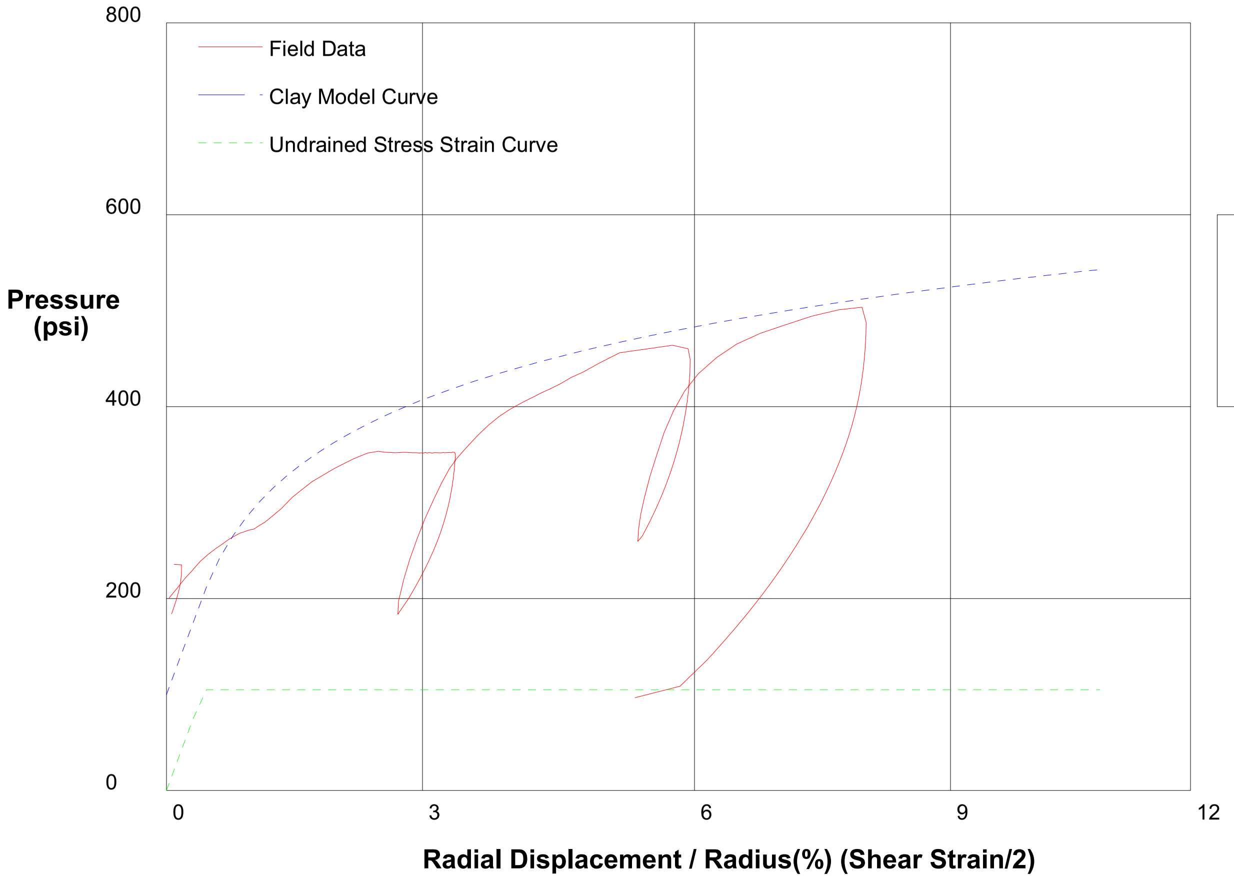
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/11/2008**

Hole No. PM301 **Depth 239.5ft** **File C:\DATA\ISE-765\CC75.P**



GIBSON'S CLAY MODEL

Shear Strength	**105**	**psi**
Insitu Stress	**100**	**psi**
Shear Modulus	**12000**	**psi**

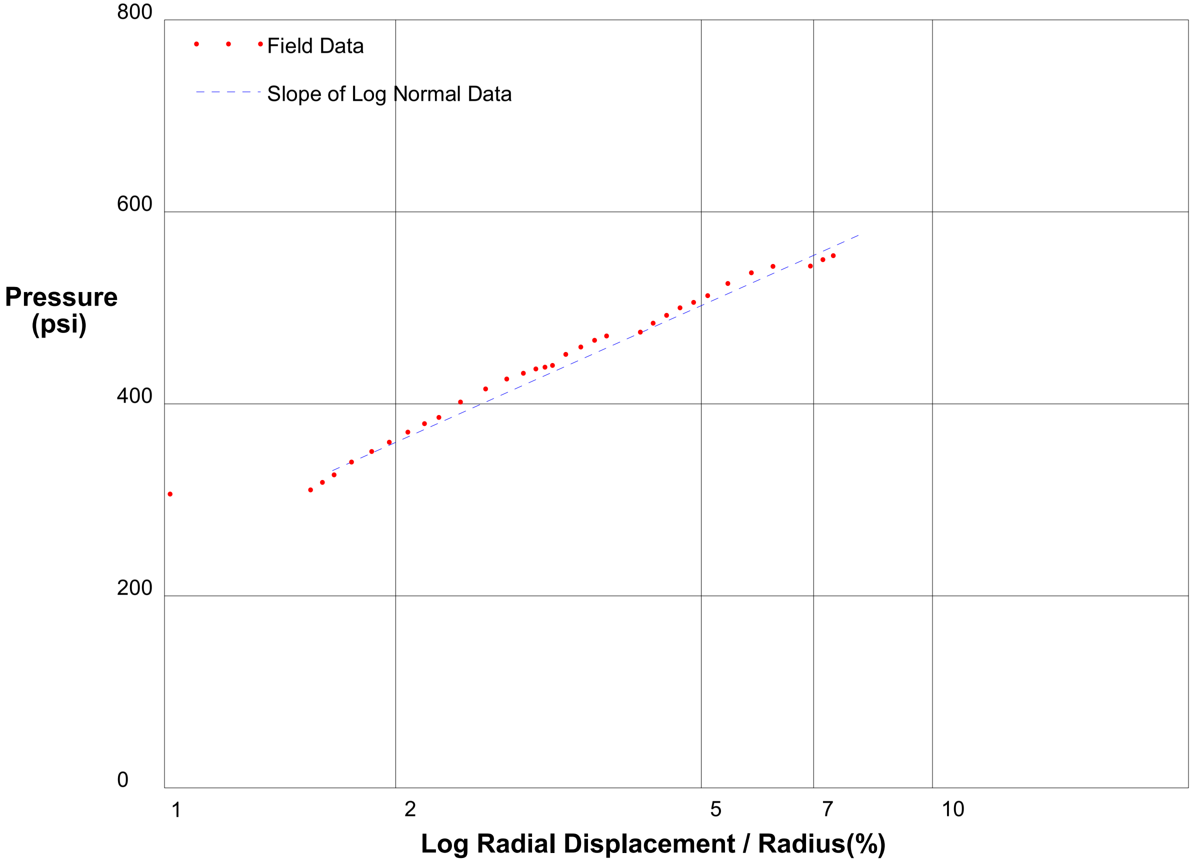
shift 5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/11/2008**

Hole No. PM301 **Depth 251ft** **File C:\DATA\ISE-765\CC76.P**



Shear Strength 155.3 psi
Limit Pressure 829 psi

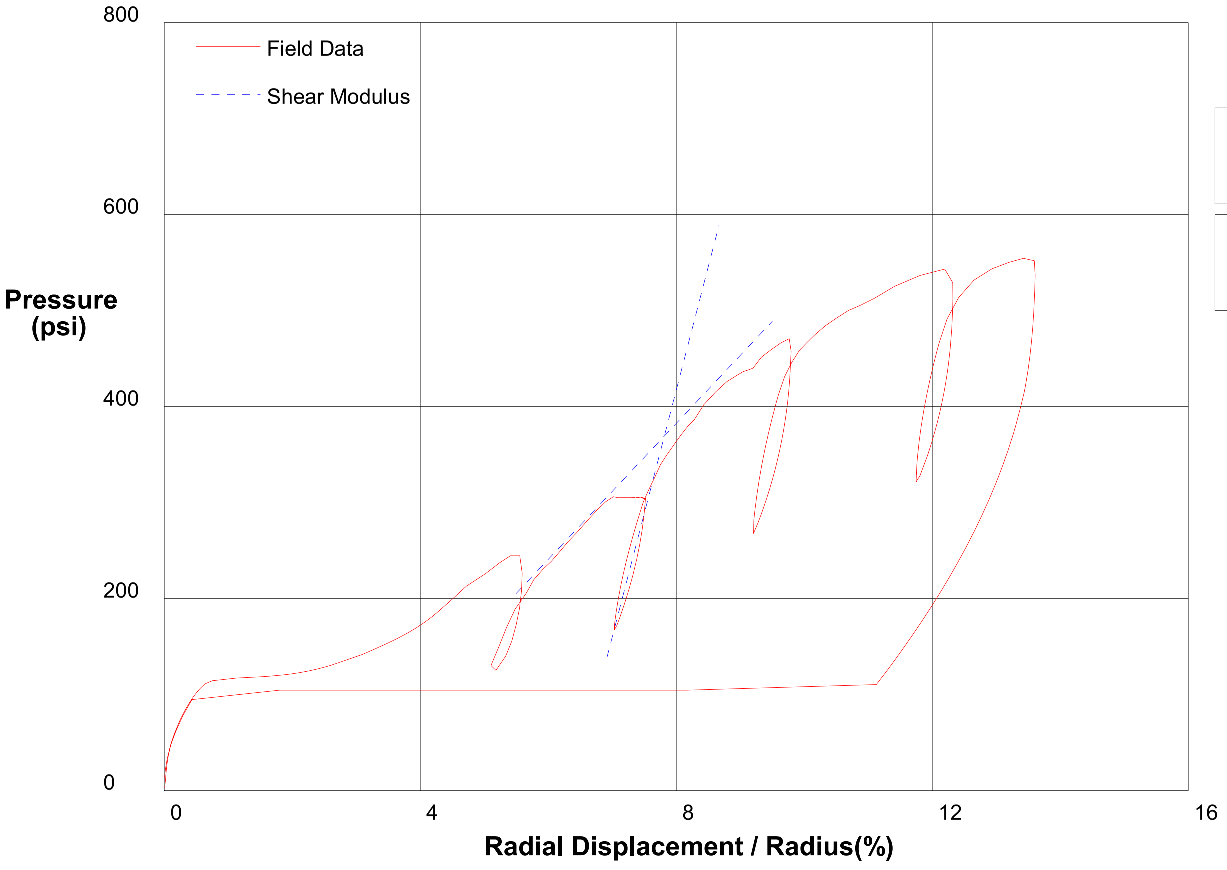
shift 6

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/11/2008**

Hole No. PM301 **Depth 251ft** **File C:\DATA\ISE-765\CC76.P**



Shear Modulus 3541 psi

Shear Modulus 12857 psi

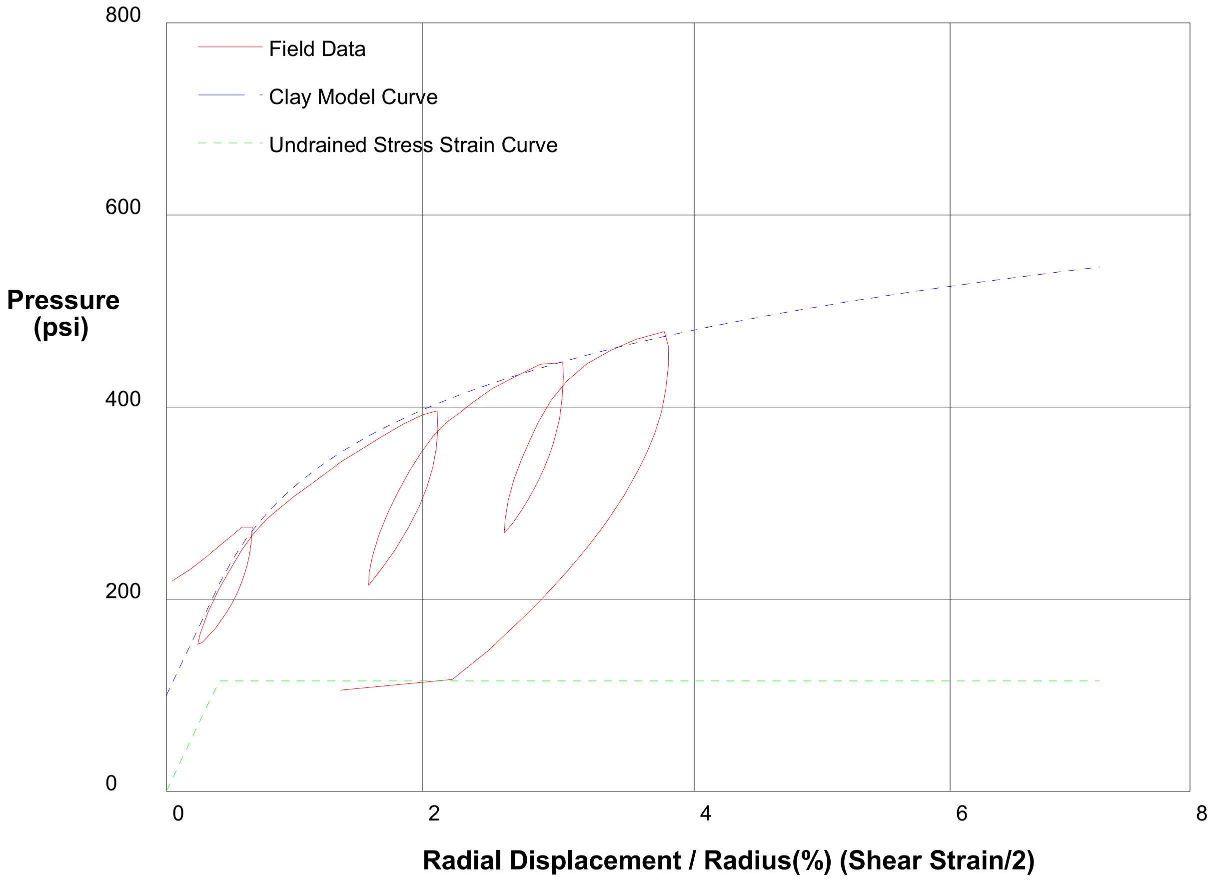
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/11/2008**

Hole No. PM301 **Depth 249.5ft** **File C:\DATA\ISE-765\CC77.P**



GIBSON'S CLAY MODEL

Shear Strength **115 psi**
Insitu Stress **100 psi**
Shear Modulus **14000 psi**

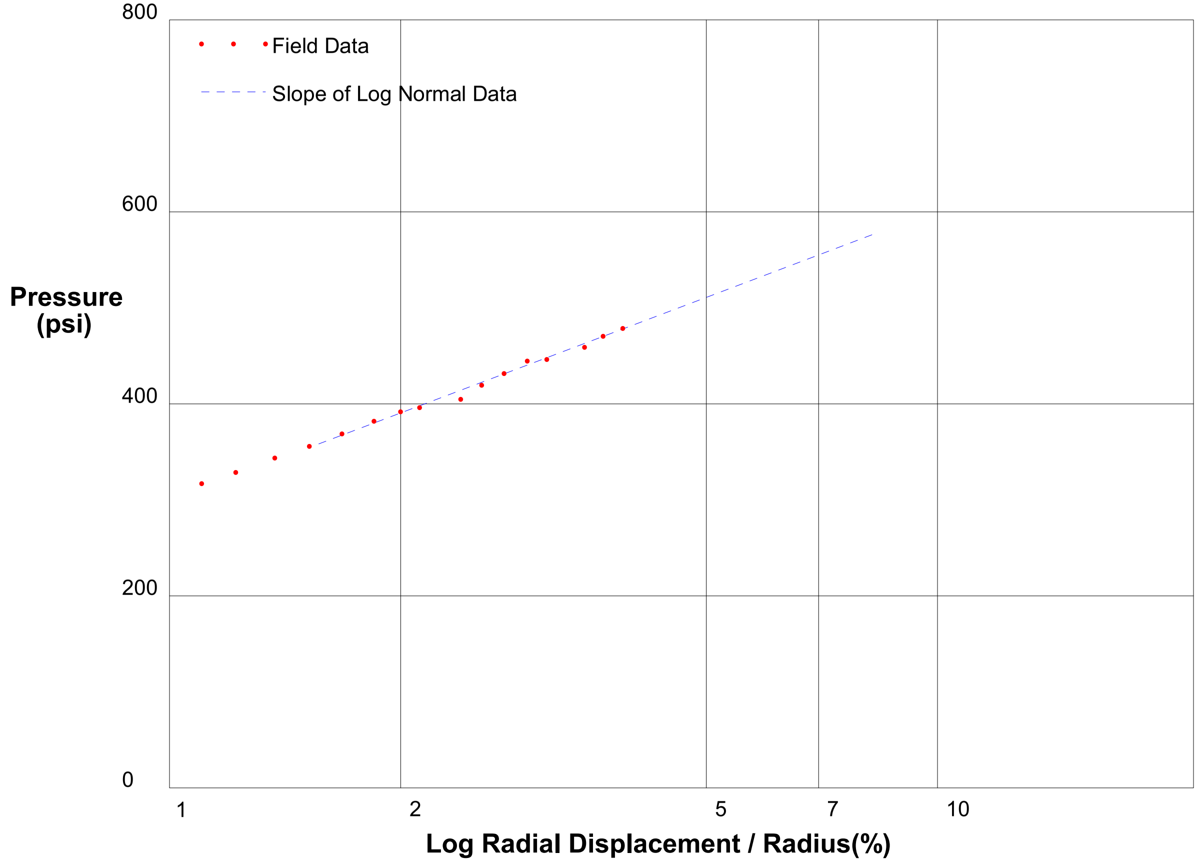
shift 10

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/11/2008**

Hole No. PM301 **Depth 249.5ft** **File C:\DATA\ISE-765\CC77.P**



Shear Strength 131.3 psi
Limit Pressure 787 psi

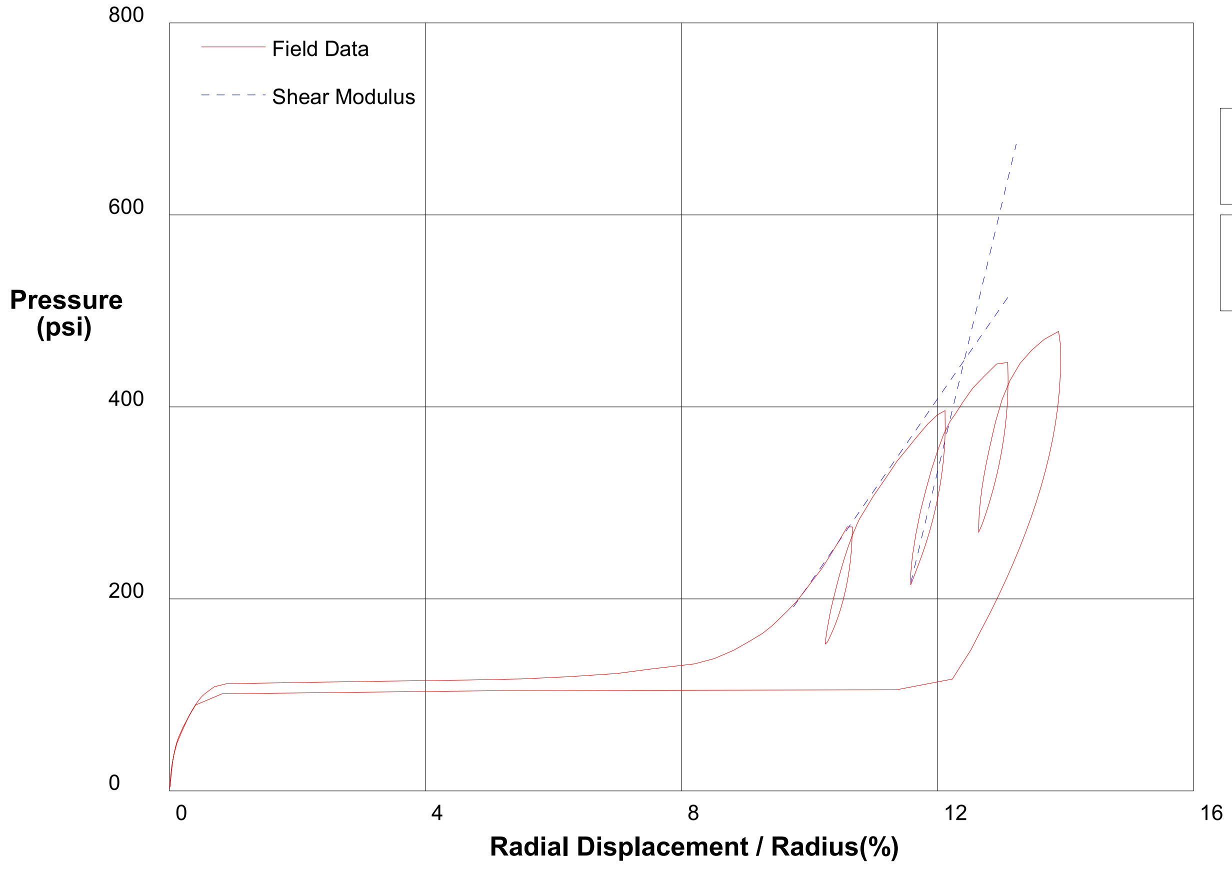
shift 10

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/11/2008**

Hole No. PM301 **Depth 249.5ft** **File C:\DATA\ISE-765\CC77.P**



Shear Modulus 4814 psi

Shear Modulus 13881 psi

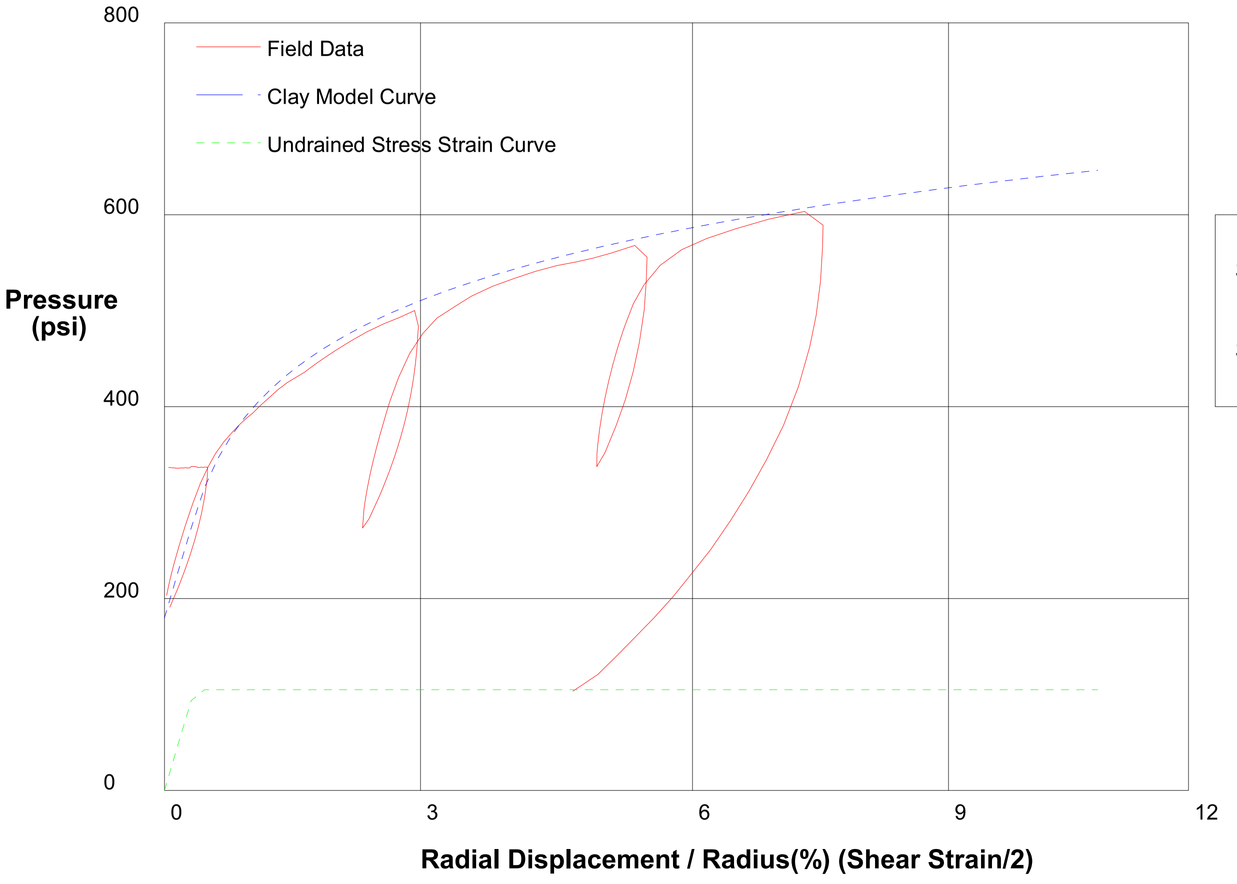
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/12/2008**

Hole No. PM301 **Depth 261ft** **File C:\DATA\ISE-765\CC78.P**



GIBSON'S CLAY MODEL

Shear Strength	**105**	**psi**
Insitu Stress	**180**	**psi**
Shear Modulus	**15000**	**psi**

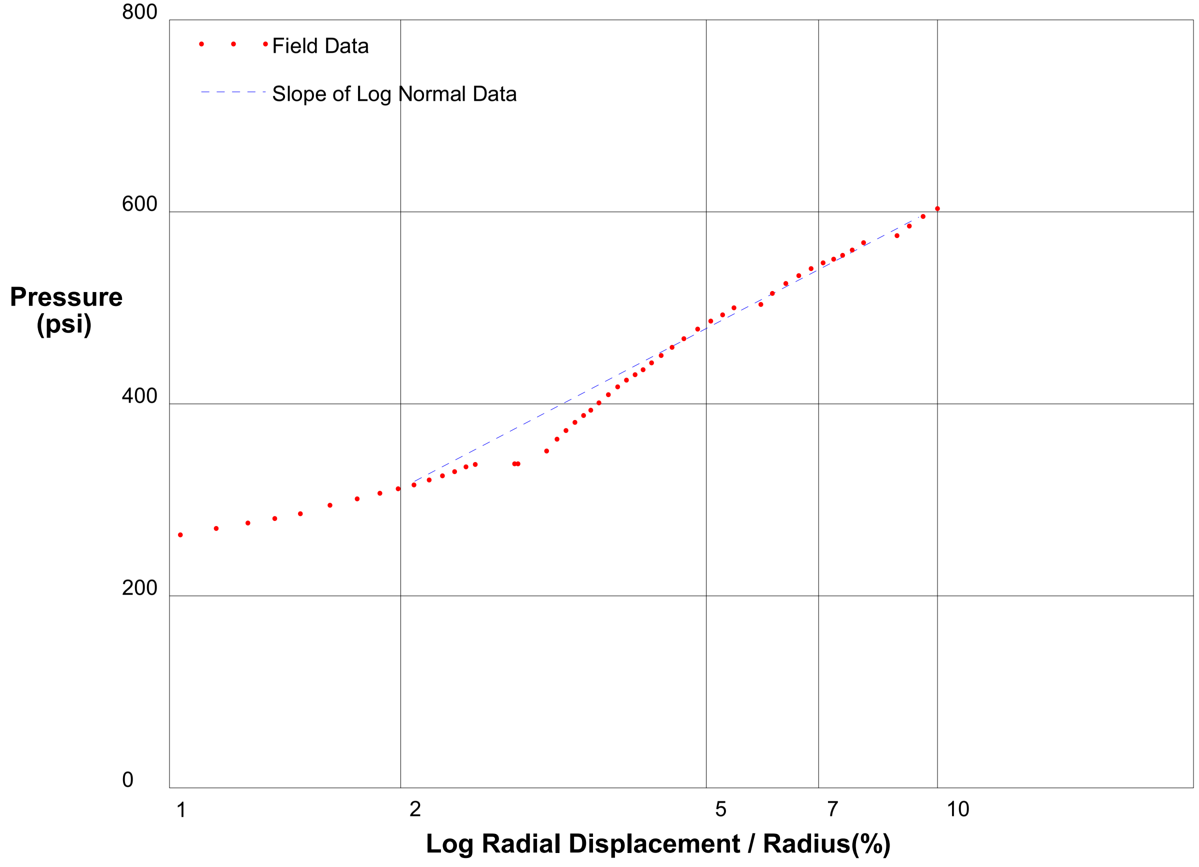
shift 5.5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/12/2008**

Hole No. PM301 **Depth 261ft** **File C:\DATA\ISE-765\CC78.P**



Shear Strength 181.9 psi
Limit Pressure 861 psi

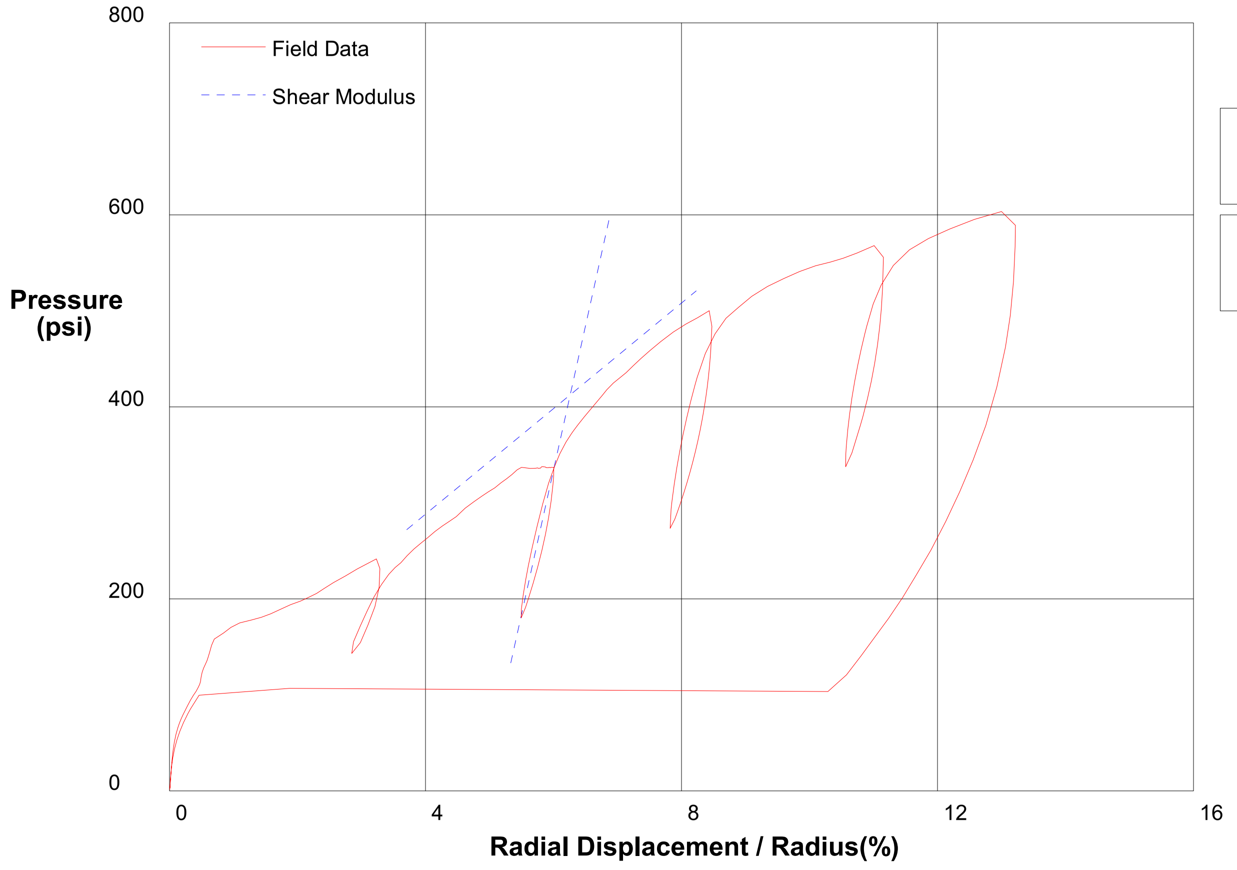
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/12/2008**

Hole No. PM301 **Depth 261ft** **File C:\DATA\ISE-765\CC78.P**



Shear Modulus 2749 psi

Shear Modulus 15045 psi

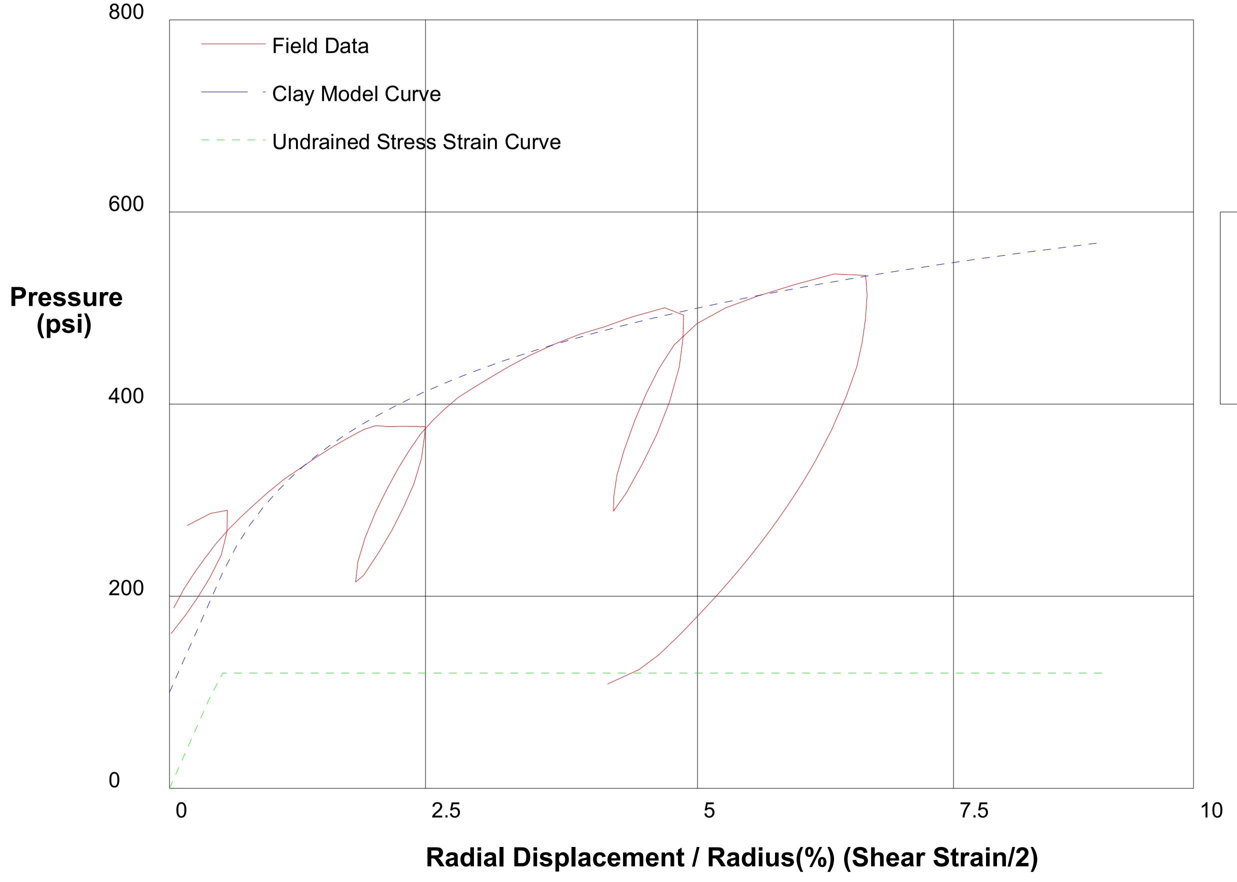
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/12/2008**

Hole No. PM301 **Depth 259.5ft** **File C:\DATA\ISE-765\CC79.P**



shift 7

GIBSON'S CLAY MODEL

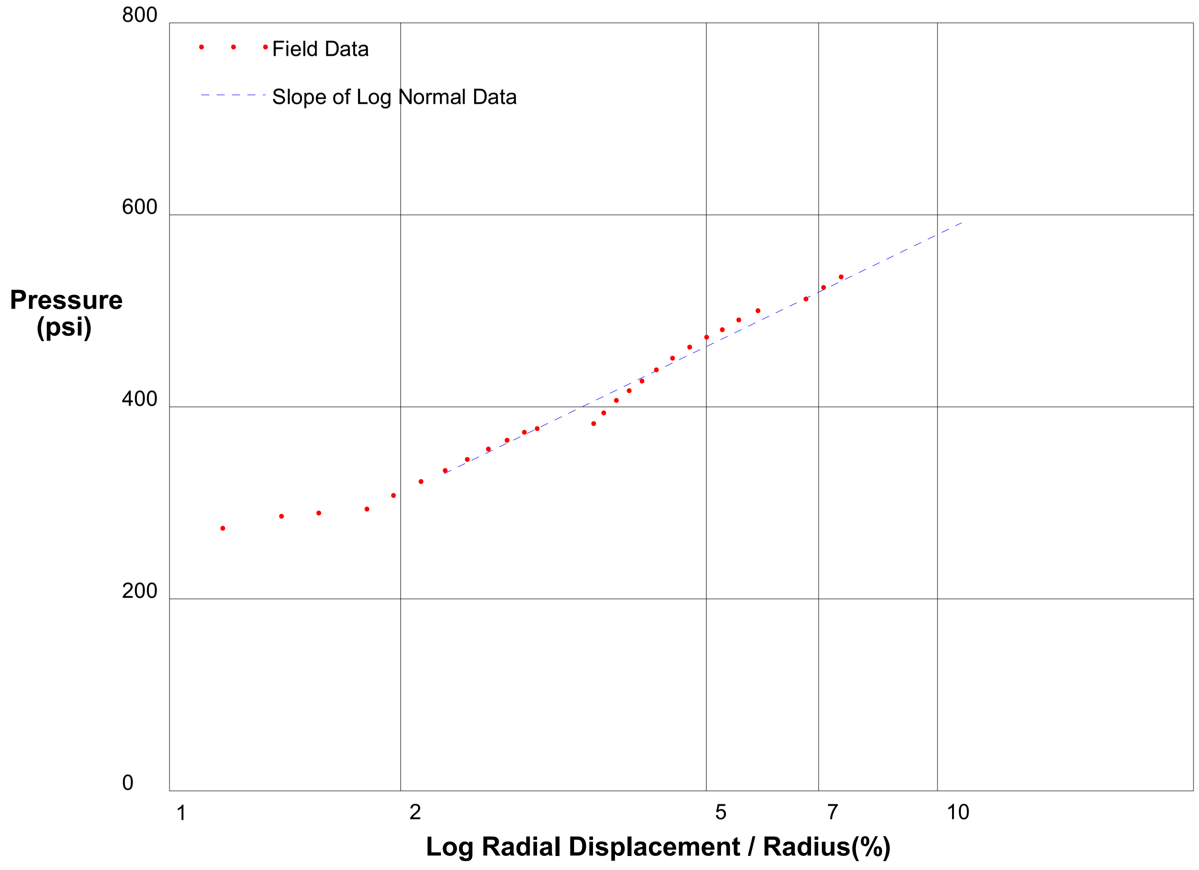
Shear Strength	**120**	**psi**
Insitu Stress	**100**	**psi**
Shear Modulus	**12000**	**psi**

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/12/2008**

Hole No. PM301 **Depth 259.5ft** **File C:\DATA\ISE-765\CC79.P**



Shear Strength 168.3 psi
Limit Pressure 817 psi

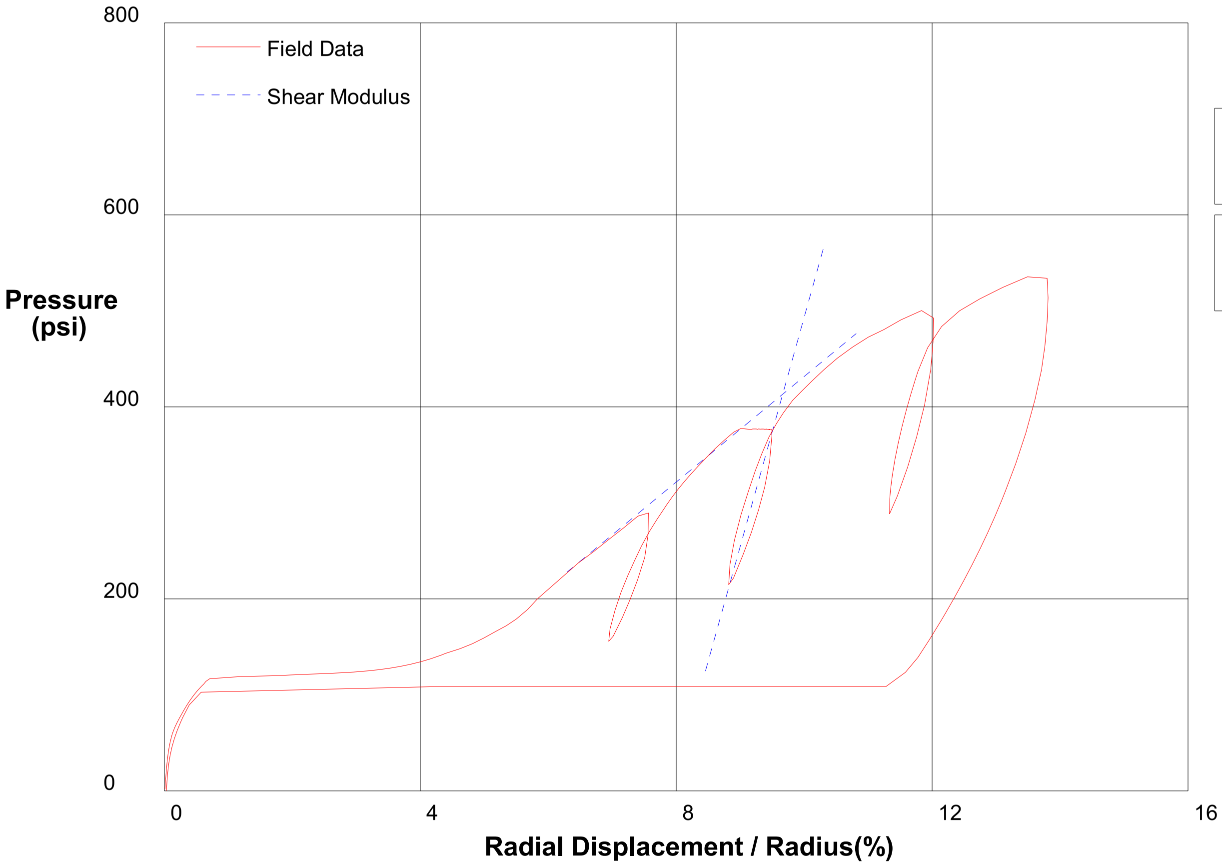
shift 6

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/12/2008**

Hole No. PM301 **Depth 259.5ft** **File C:\DATA\ISE-765\CC79.P**



Shear Modulus 2749 psi

Shear Modulus 11947 psi

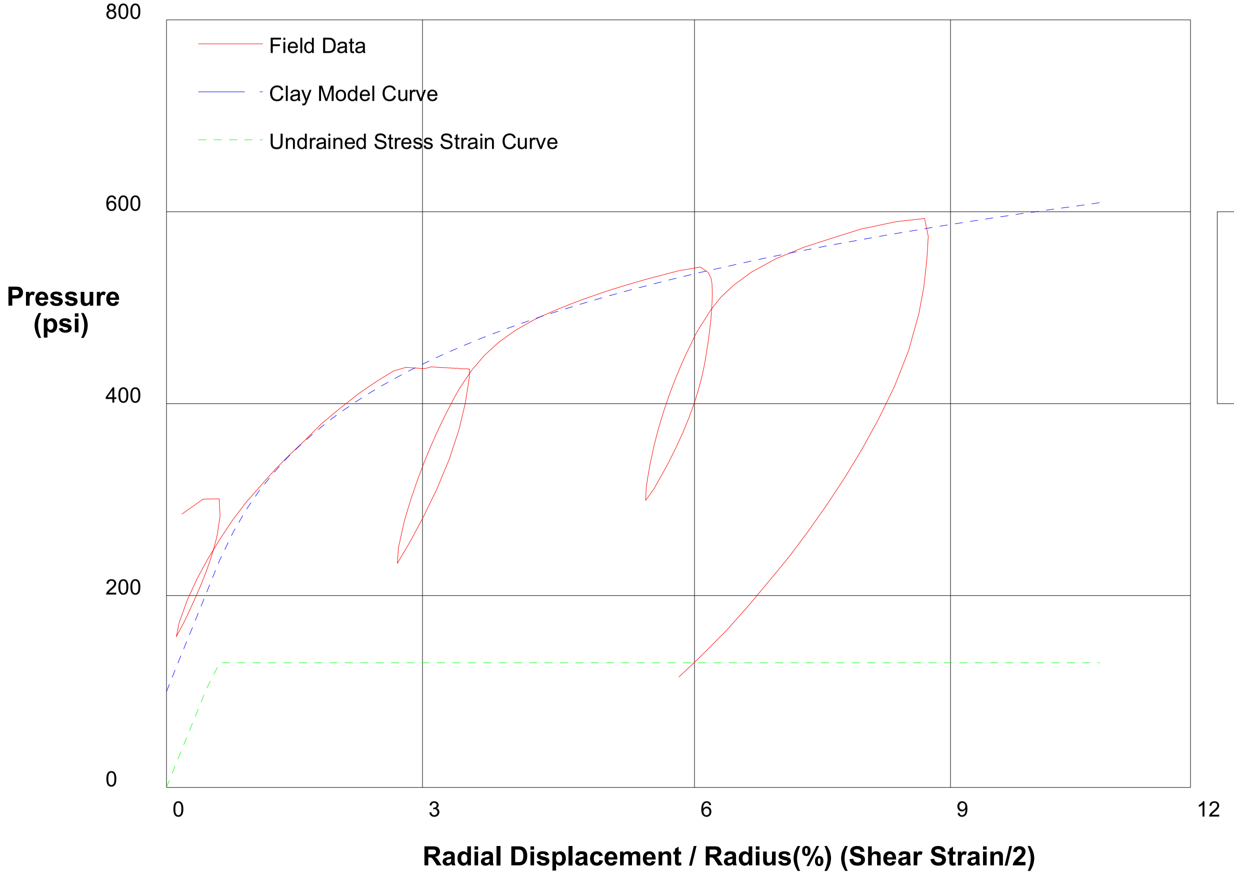
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/12/2008**

Hole No. PM301 **Depth 271ft** **File C:\DATA\ISE-765\CC80.P**



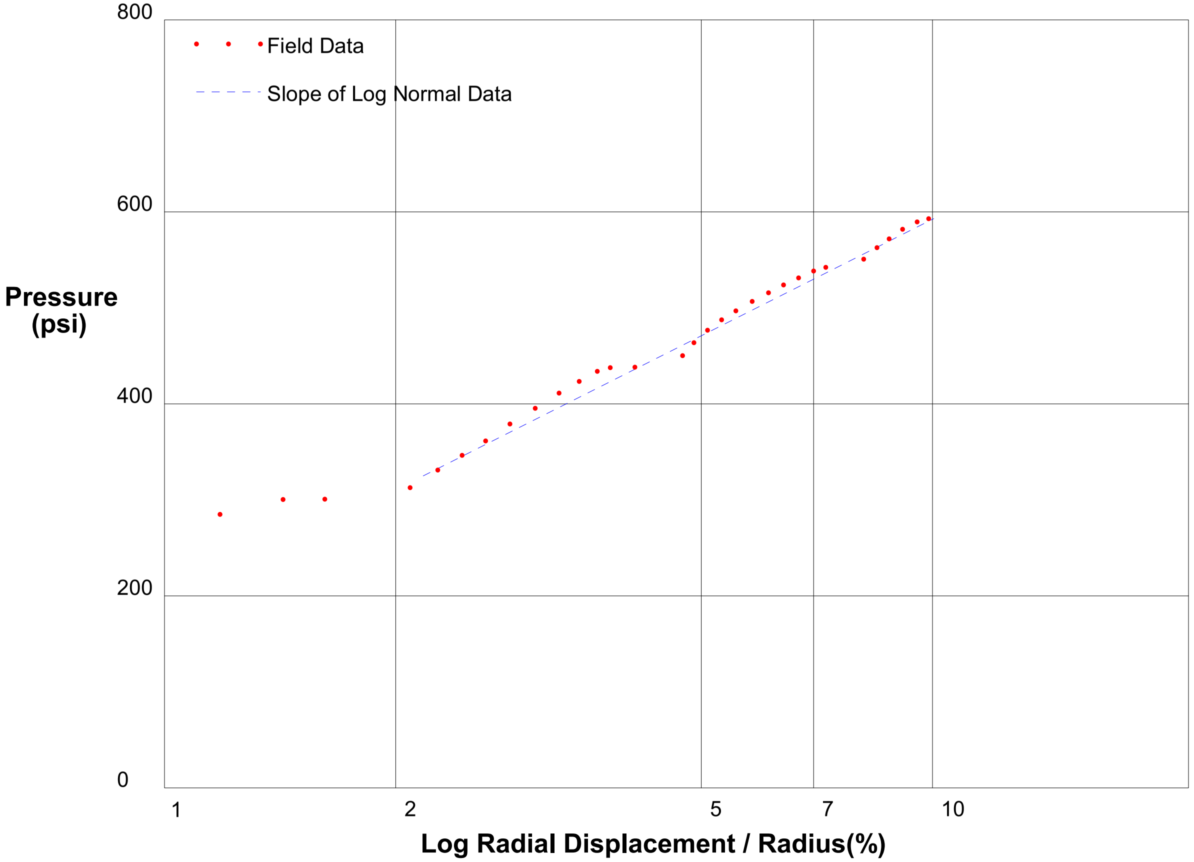
GIBSON'S CLAY MODEL

Shear Strength	**130**	**psi**
Insitu Stress	**100**	**psi**
Shear Modulus	**11000**	**psi**

shift 4

In Situ Engineering

PRESSUREMETER DATA	**Schnabel Engineering LLC.**	
Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation		**9/12/2008**
Hole No. PM301	**Depth 271ft**	**File C:\DATA\ISE-765\CC80.P**



Shear Strength 175 psi
Limit Pressure 839 psi

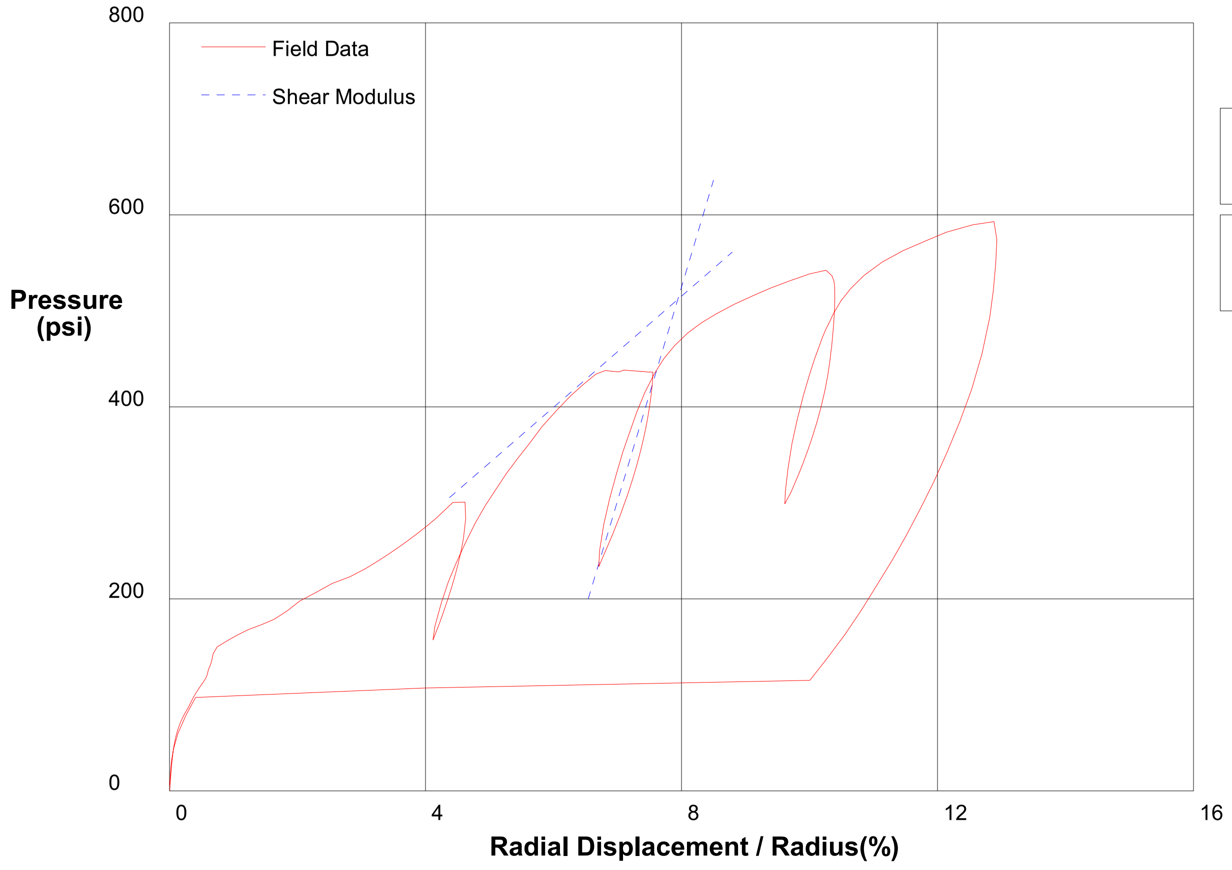
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/12/2008**

Hole No. PM301 **Depth 271ft** **File C:\DATA\ISE-765\CC80.P**



Shear Modulus 2893 psi

Shear Modulus 11134 psi

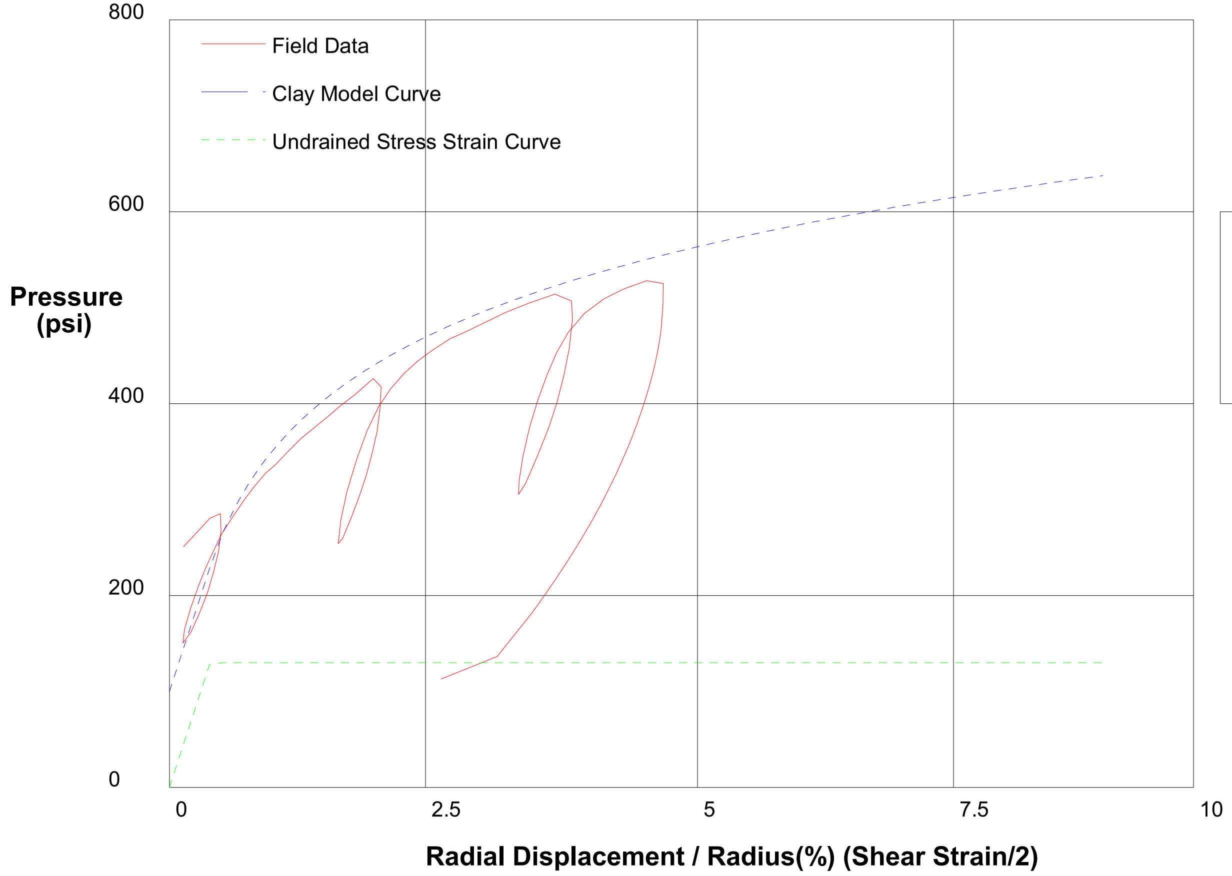
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/12/2008**

Hole No. PM301 **Depth 269.5ft** **File C:\DATA\ISE-765\CC81.P**



GIBSON'S CLAY MODEL

Shear Strength 130 psi
Insitu Stress 100 psi
Shear Modulus 16400 psi

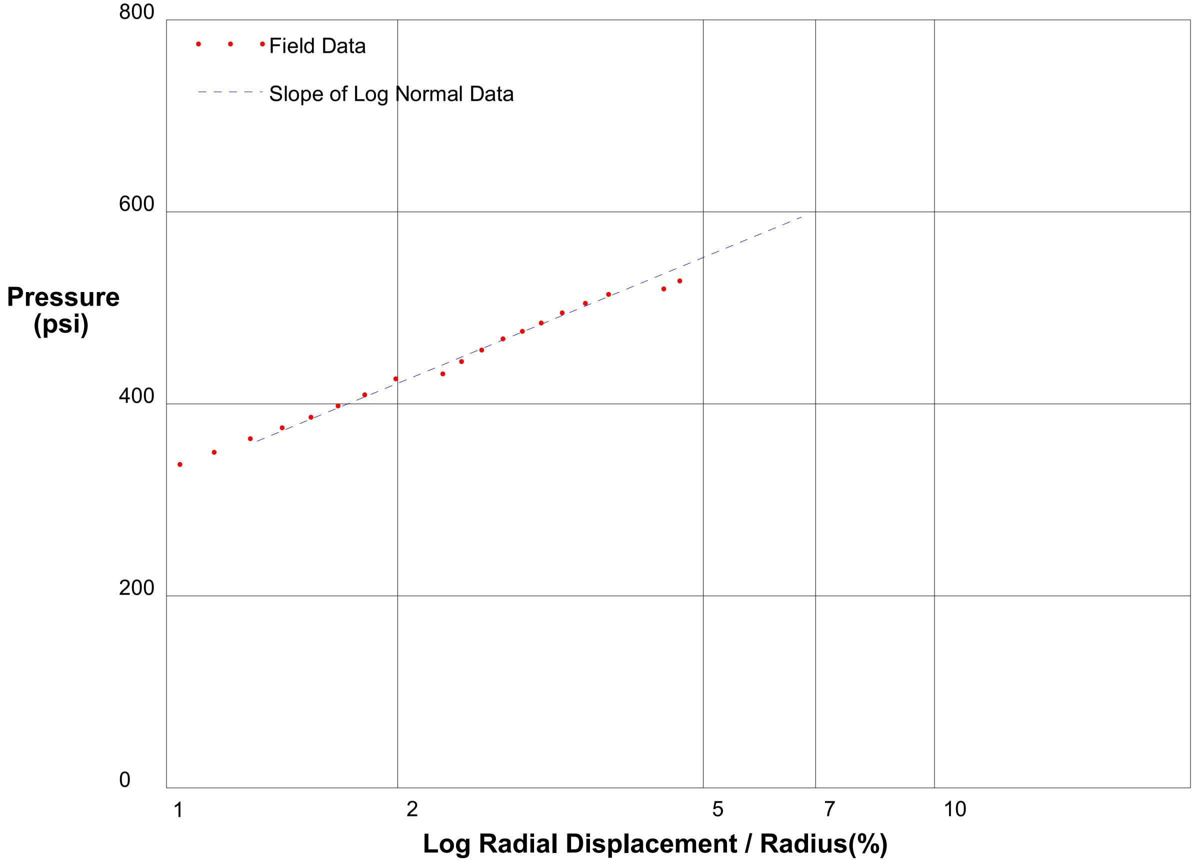
shift 9

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/12/2008**

Hole No. PM301 **Depth 269.5ft** **File C:\DATA\ISE-765\CC81.P**



Shear Strength 143 psi
Limit Pressure 853 psi

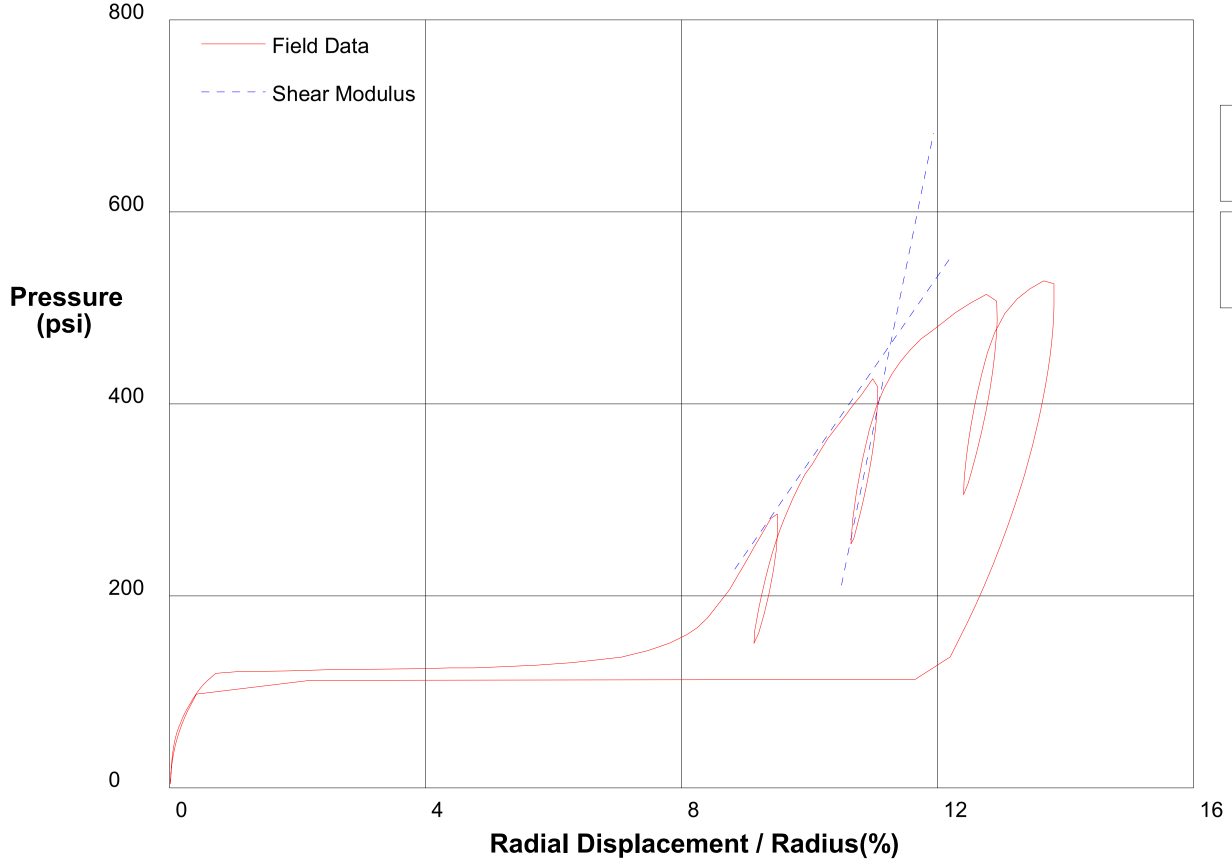
shift 9

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/12/2008**

Hole No. PM301 **Depth 269.5ft** **File C:\DATA\ISE-765\CC81.P**



Shear Modulus 4814 psi

Shear Modulus 16376 psi

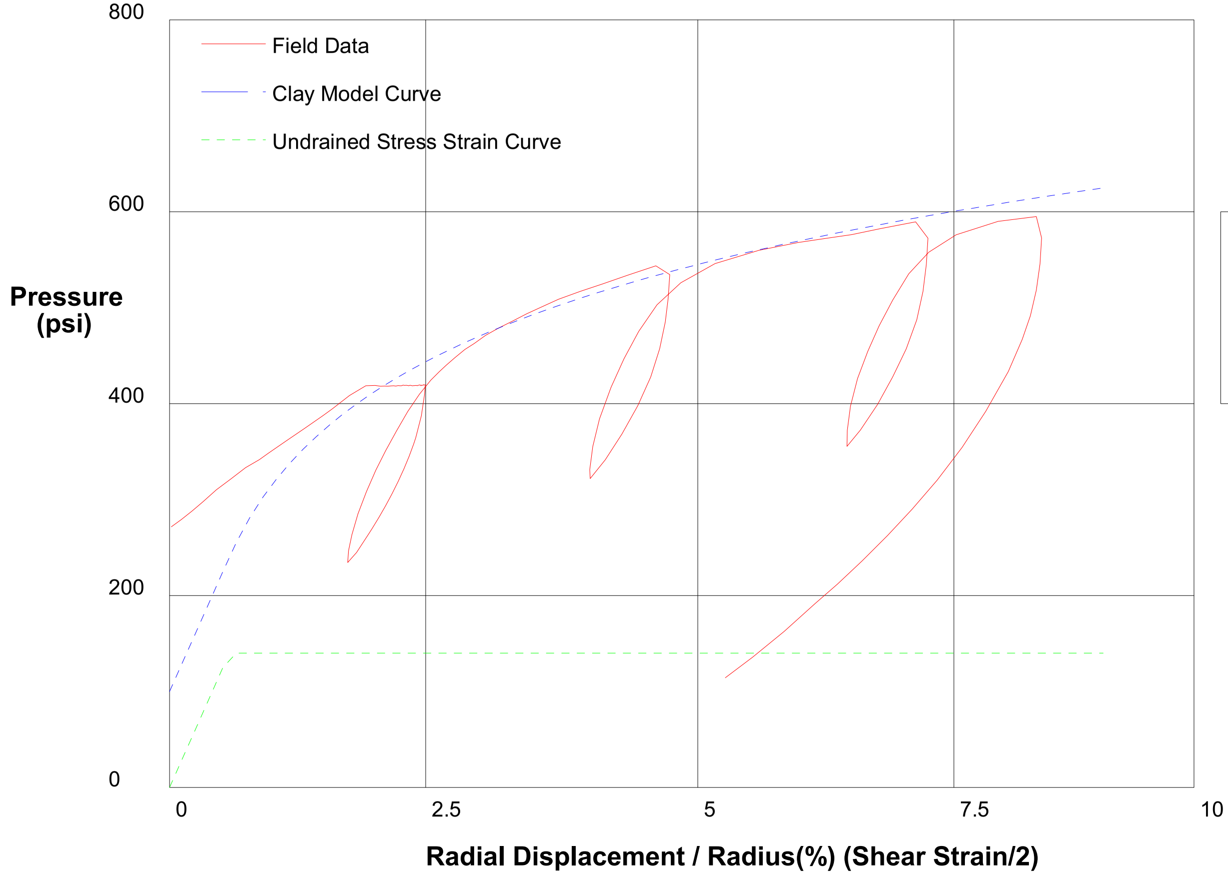
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/15/2008**

Hole No. PM301 **Depth 281ft** **File C:\DATA\ISE-765\CC82.P**



GIBSON'S CLAY MODEL

Shear Strength	**140 psi**
Insitu Stress	**100 psi**
Shear Modulus	**12000 psi**

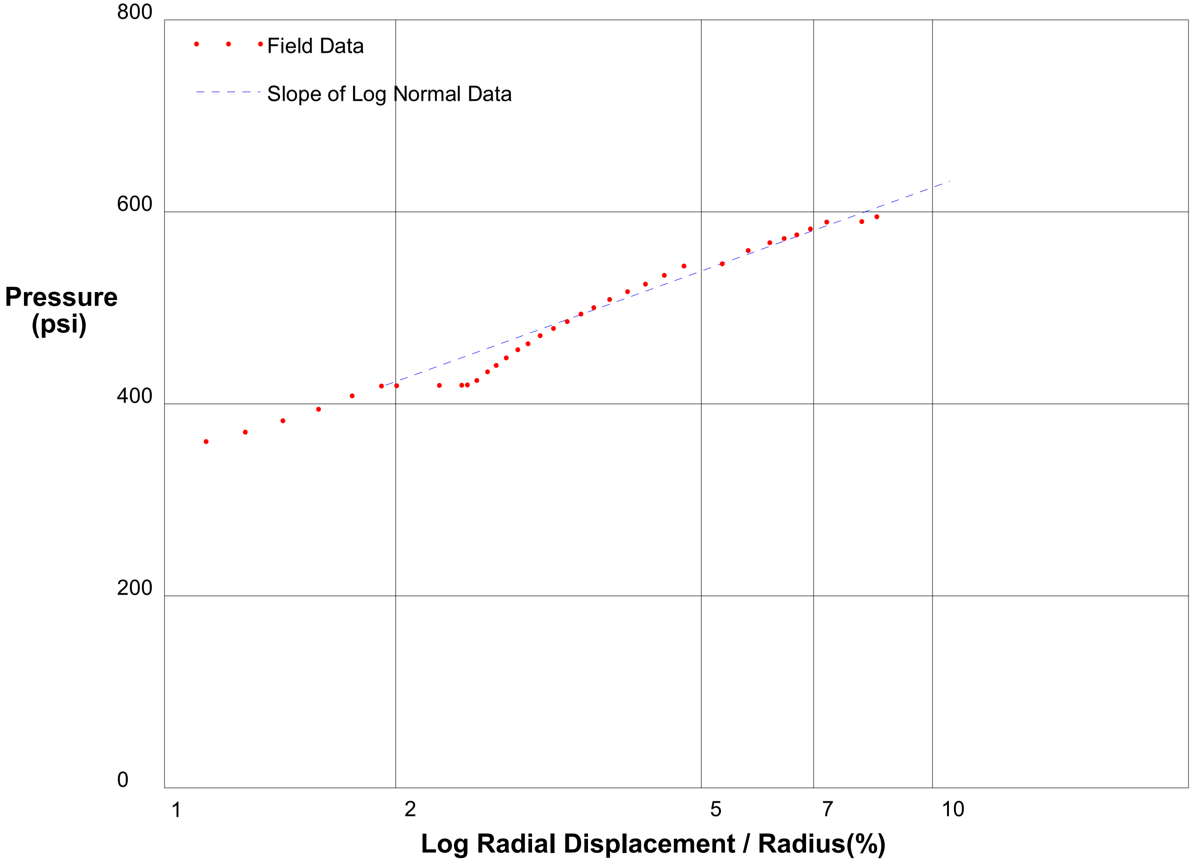
shift 5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/15/2008**

Hole No. PM301 **Depth 281ft** **File C:\DATA\ISE-765\CC82.P**



Shear Strength 125.6 psi
Limit Pressure 802 psi

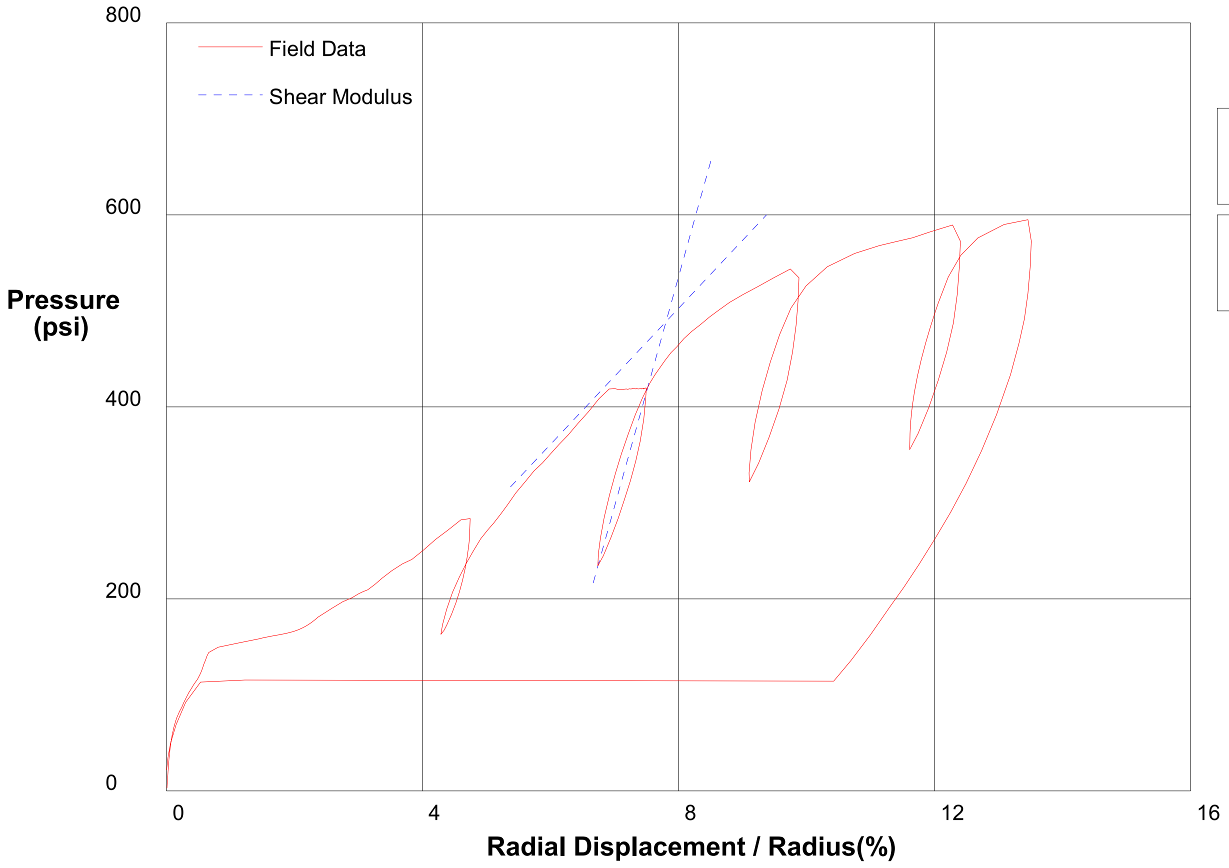
shift 5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/15/2008**

Hole No. PM301 **Depth 281ft** **File C:\DATA\ISE-765\CC82.P**



Shear Modulus 3541 psi

Shear Modulus 11947 psi

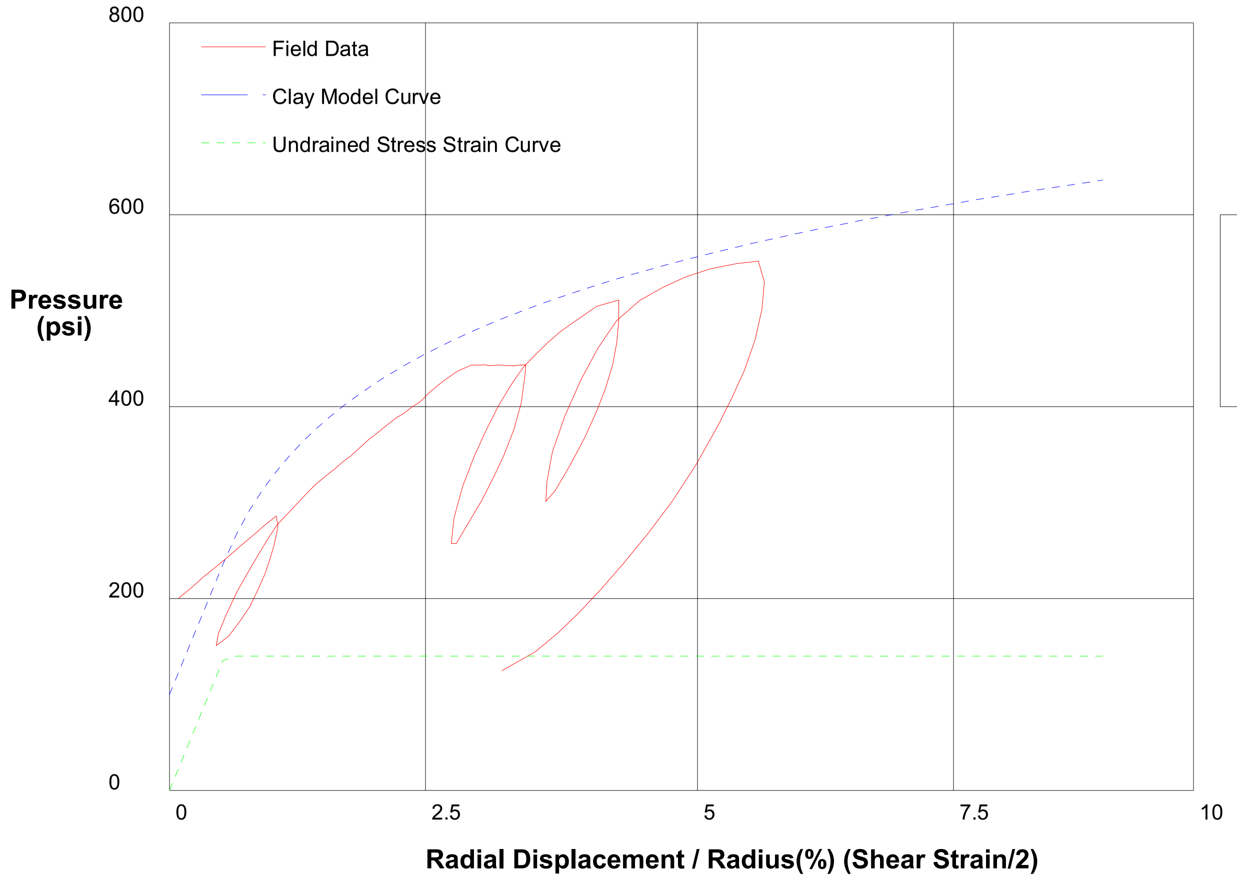
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/15/2008**

Hole No. PM301 **Depth 279.5ft** **File C:\DATA\ISE-765\CC83.P**



GIBSON'S CLAY MODEL

Shear Strength	**140**	**psi**
Insitu Stress	**100**	**psi**
Shear Modulus	**13000**	**psi**

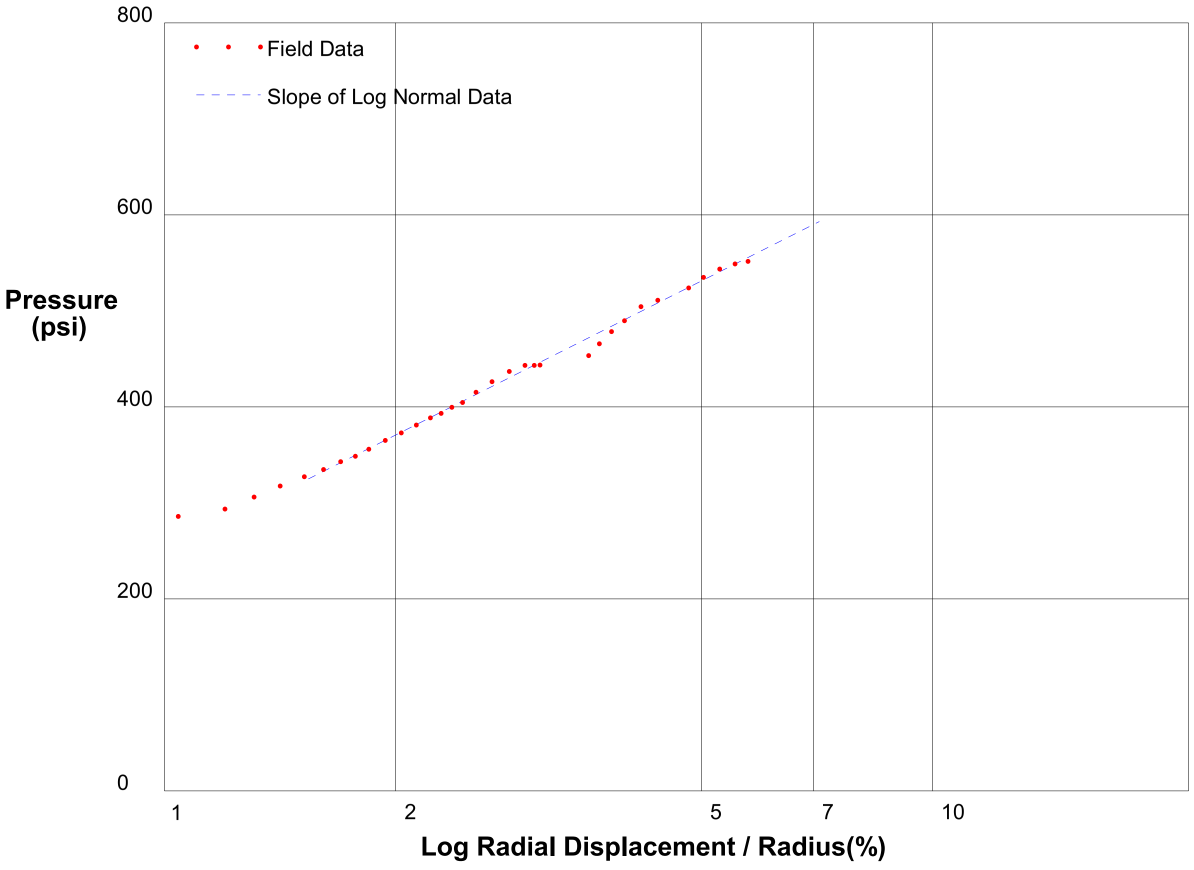
shift 7

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/15/2008**

Hole No. PM301 **Depth 279.5ft** **File C:\DATA\ISE-765\CC83.P**



Shear Strength 175 psi
Limit Pressure 899 psi

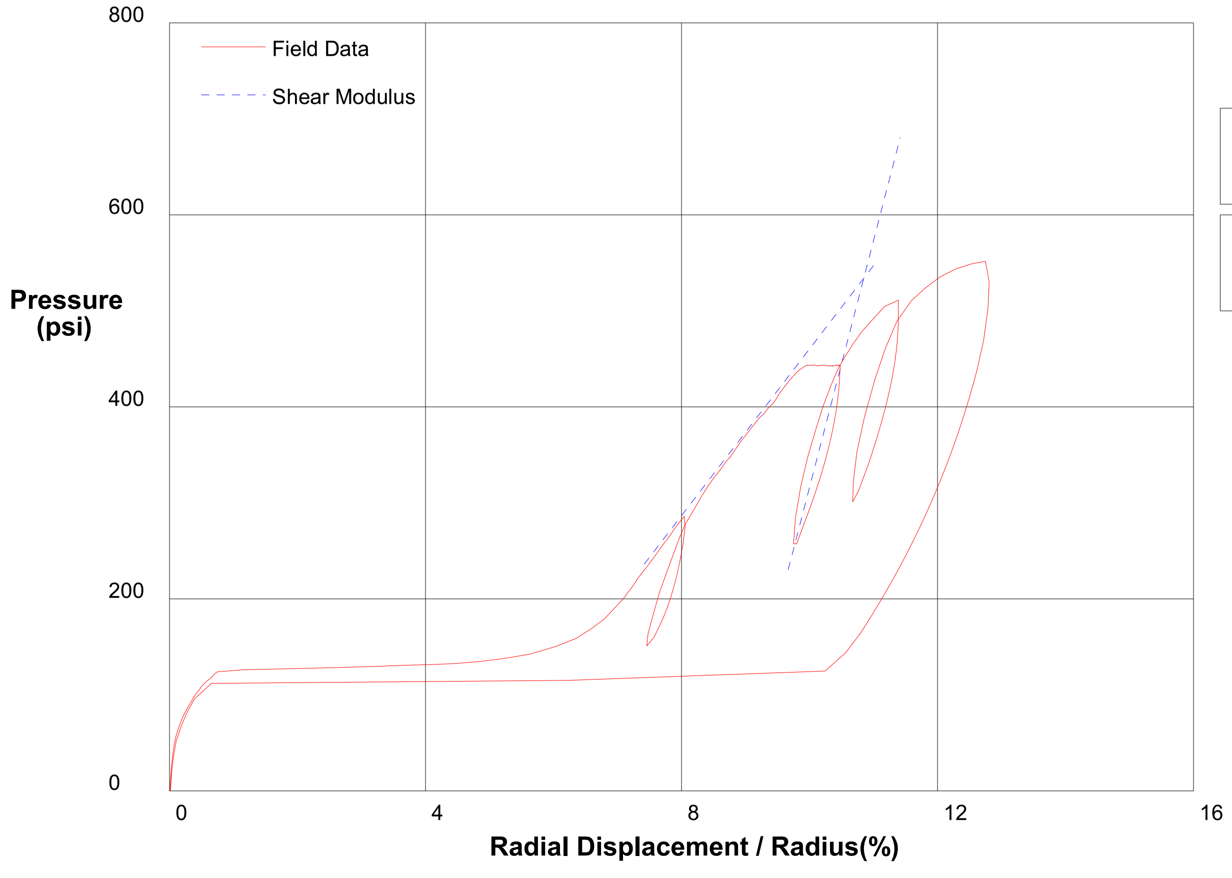
shift 7

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/15/2008**

Hole No. PM301 **Depth 279.5ft** **File C:\DATA\ISE-765\CC83.P**



Shear Modulus 4341 psi

Shear Modulus 12857 psi

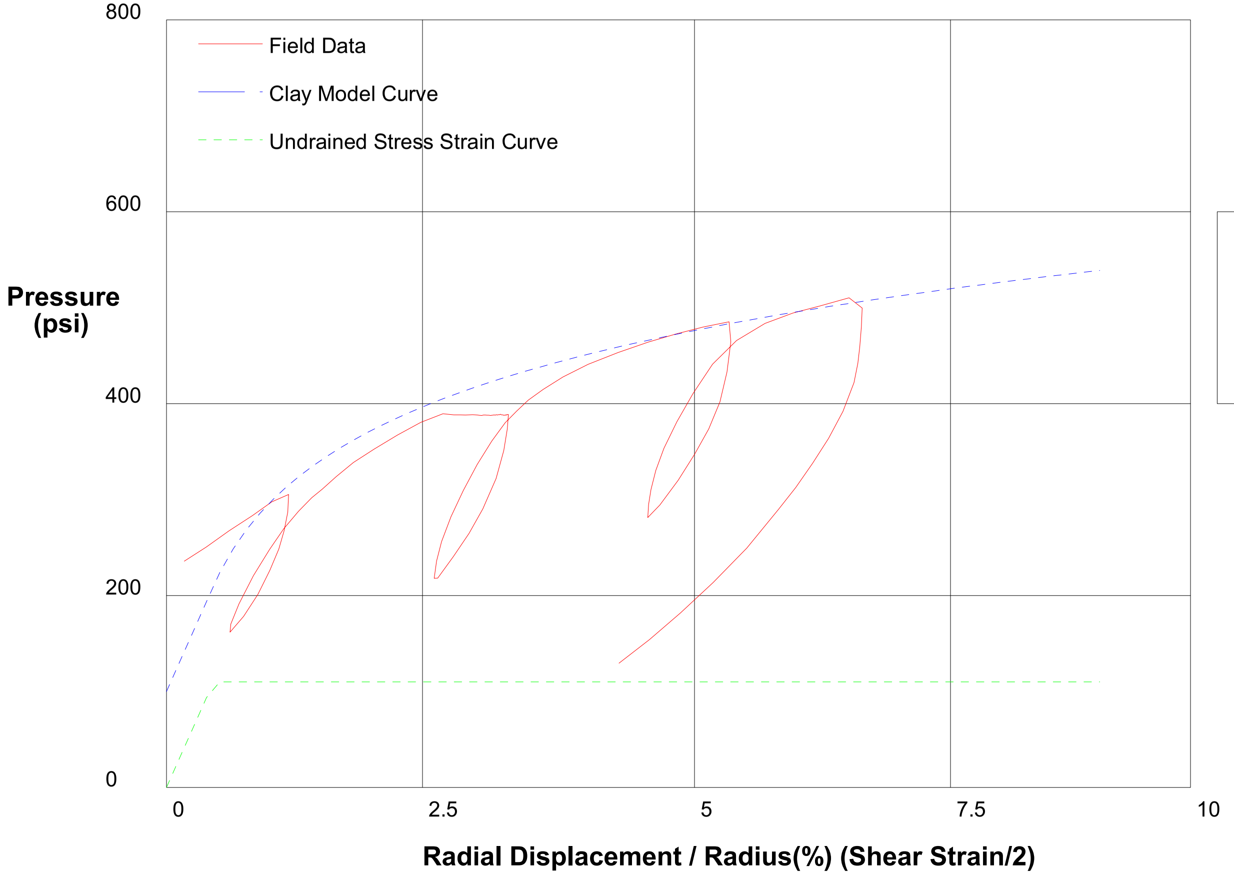
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/15/2008**

Hole No. PM301 **Depth 291ft** **File C:\DATA\ISE-765\CC84.P**



shift 7

In Situ Engineering

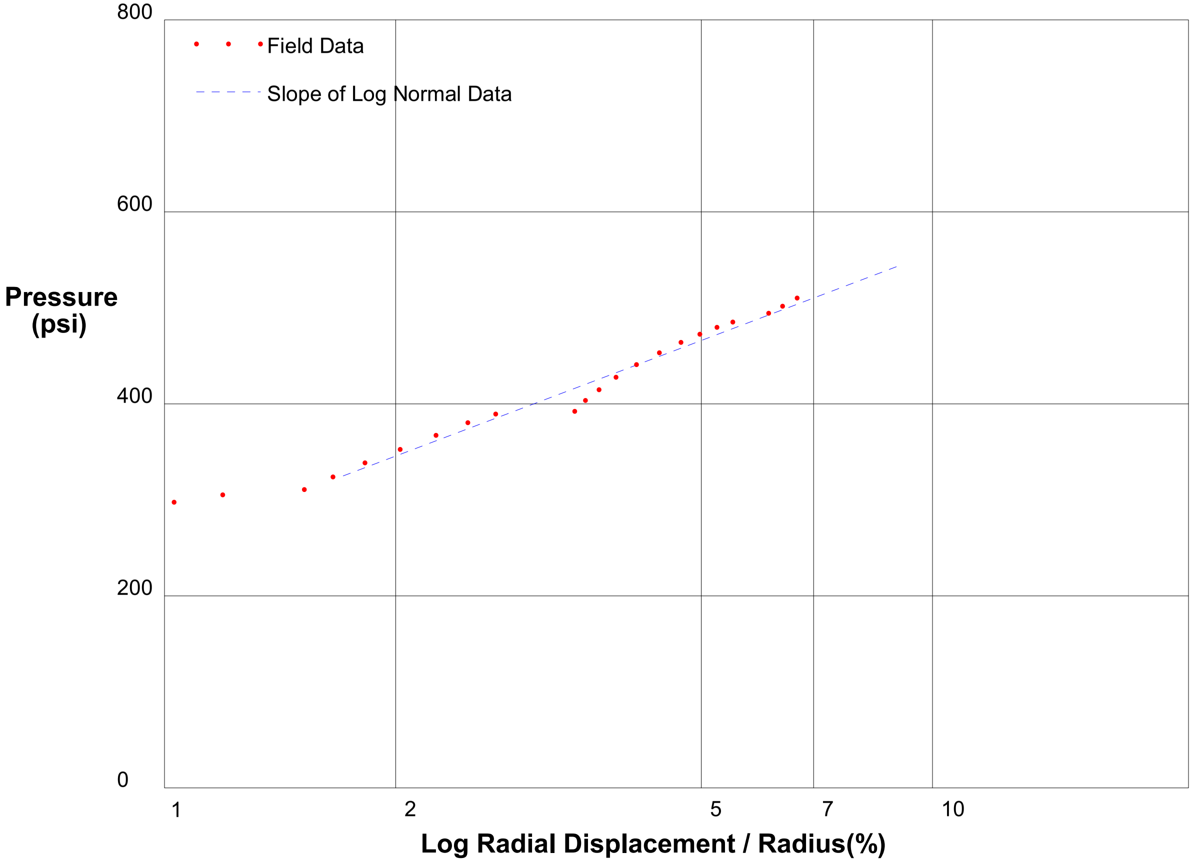
GIBSON'S CLAY MODEL

Shear Strength	**110 psi**
Insitu Stress	**100 psi**
Shear Modulus	**12000 psi**

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/15/2008**

Hole No. PM301 **Depth 291ft** **File C:\DATA\ISE-765\CC84.P**



Shear Strength 131.3 psi
Limit Pressure 742 psi

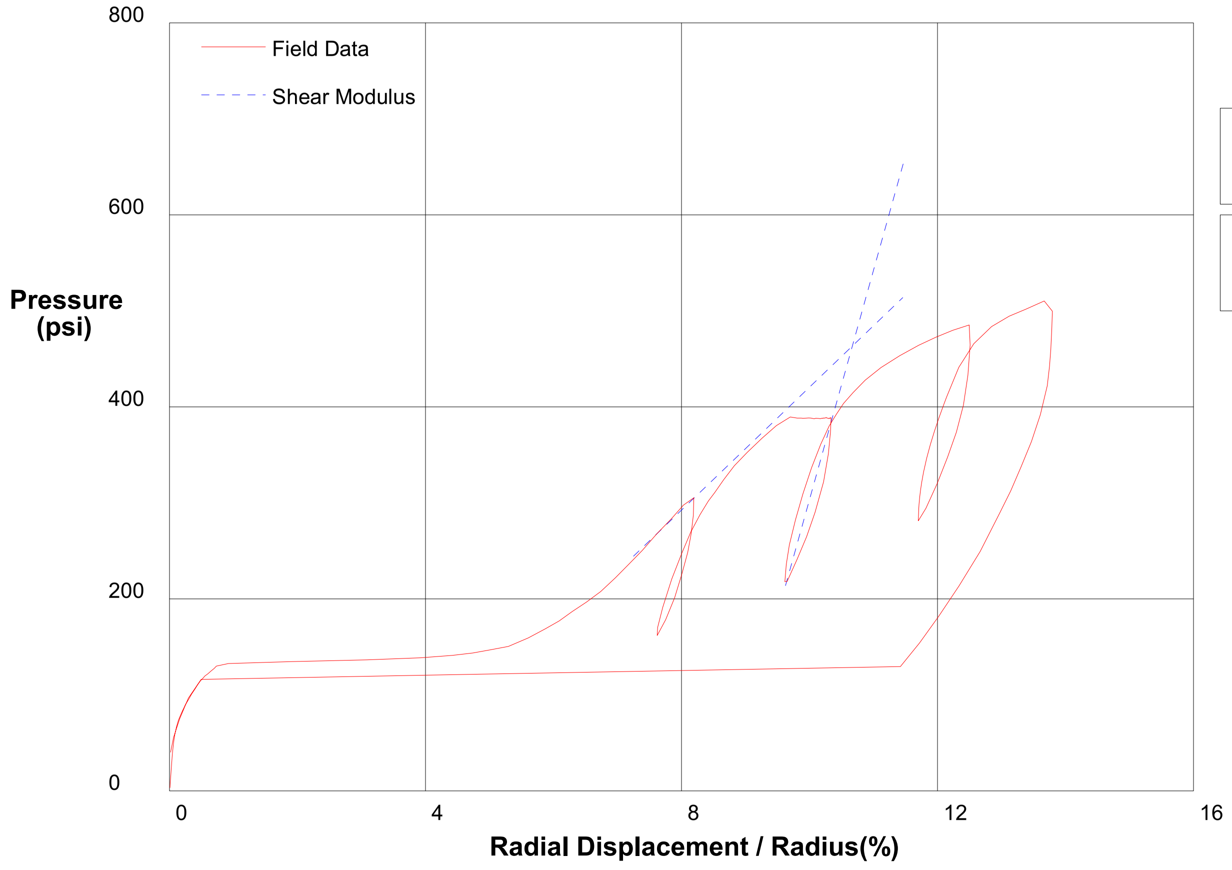
shift 7

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/15/2008**

Hole No. PM301 **Depth 291ft** **File C:\DATA\ISE-765\CC84.P**



Shear Modulus 3201 psi

Shear Modulus 11947 psi

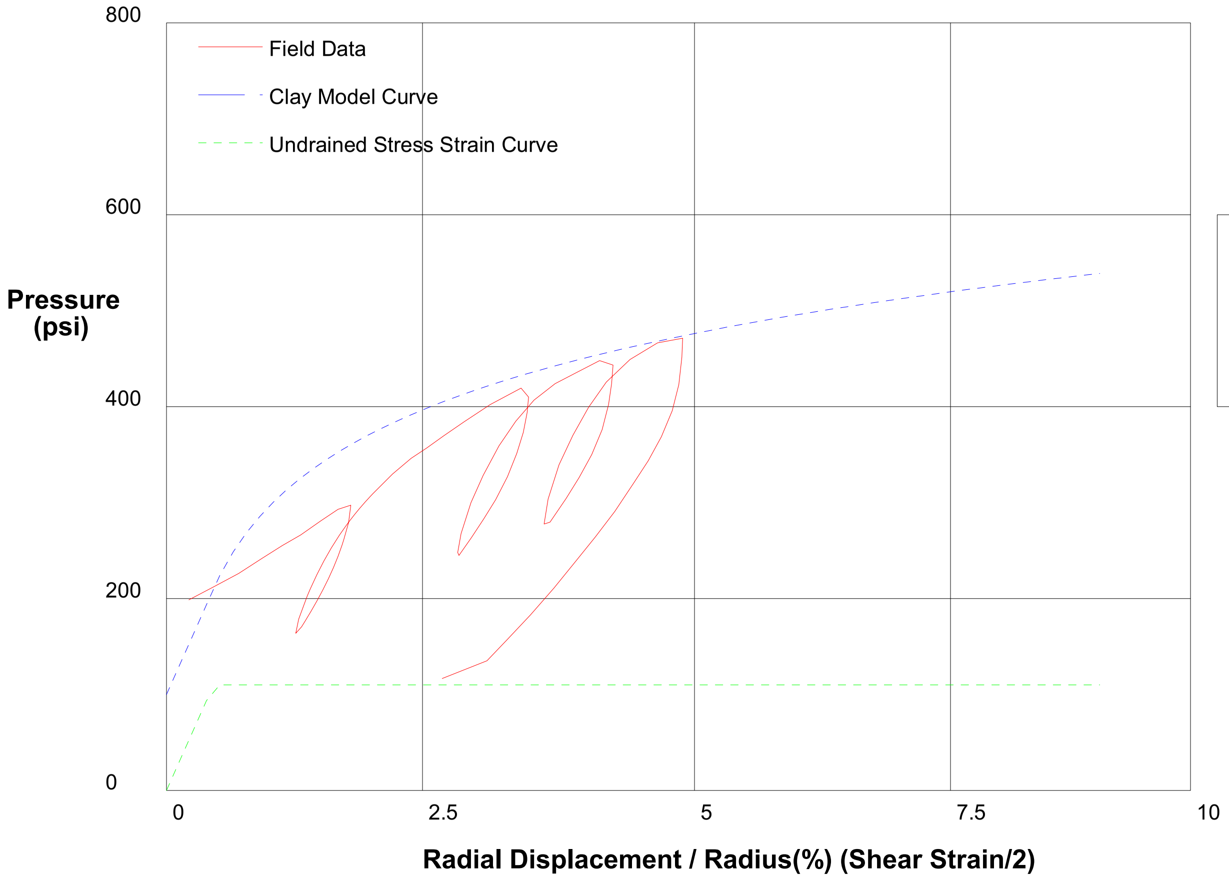
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/15/2008**

Hole No. PM301 **Depth 289.5ft** **File C:\DATA\ISE-765\CC85.P**



GIBSON'S CLAY MODEL

Shear Strength 110 psi
Insitu Stress 100 psi
Shear Modulus 12000 psi

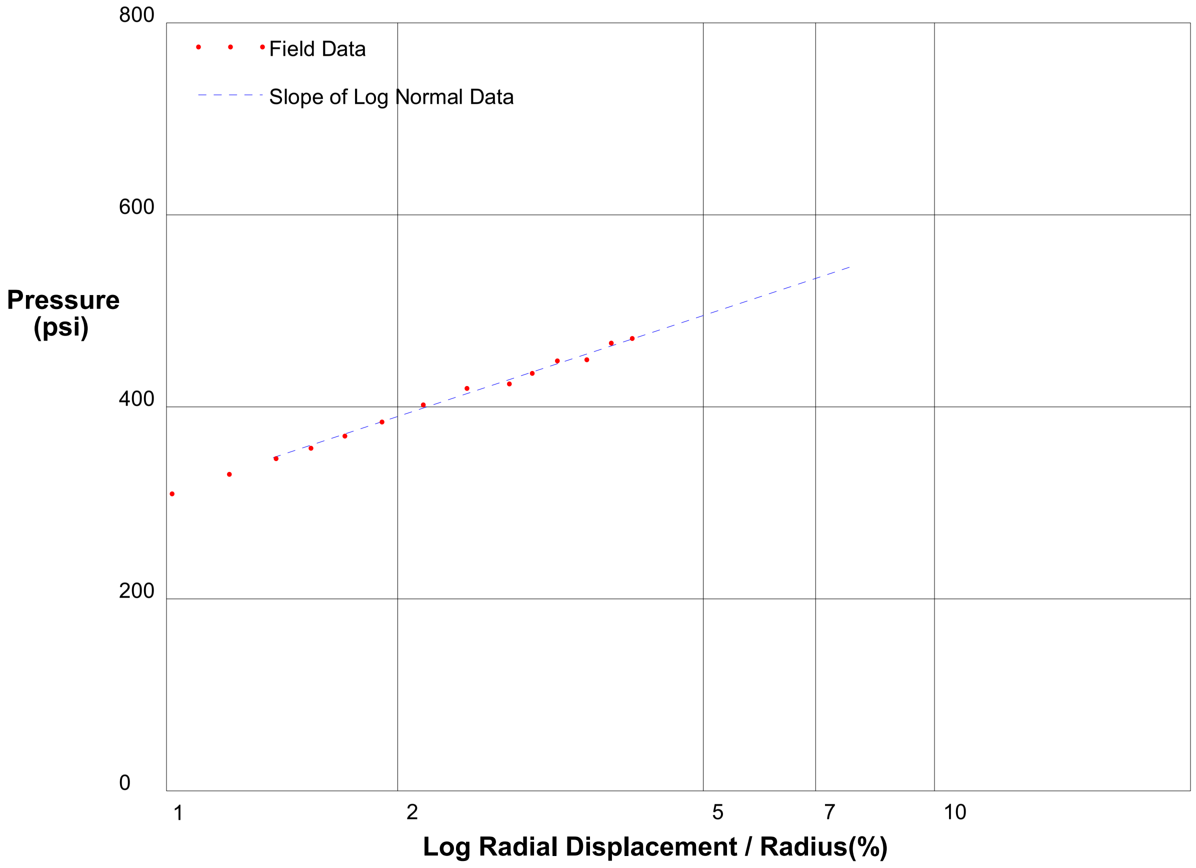
shift 9

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/15/2008**

Hole No. PM301 **Depth 289.5ft** **File C:\DATA\ISE-765\CC85.P**



Shear Strength 114.7 psi
Limit Pressure 736 psi

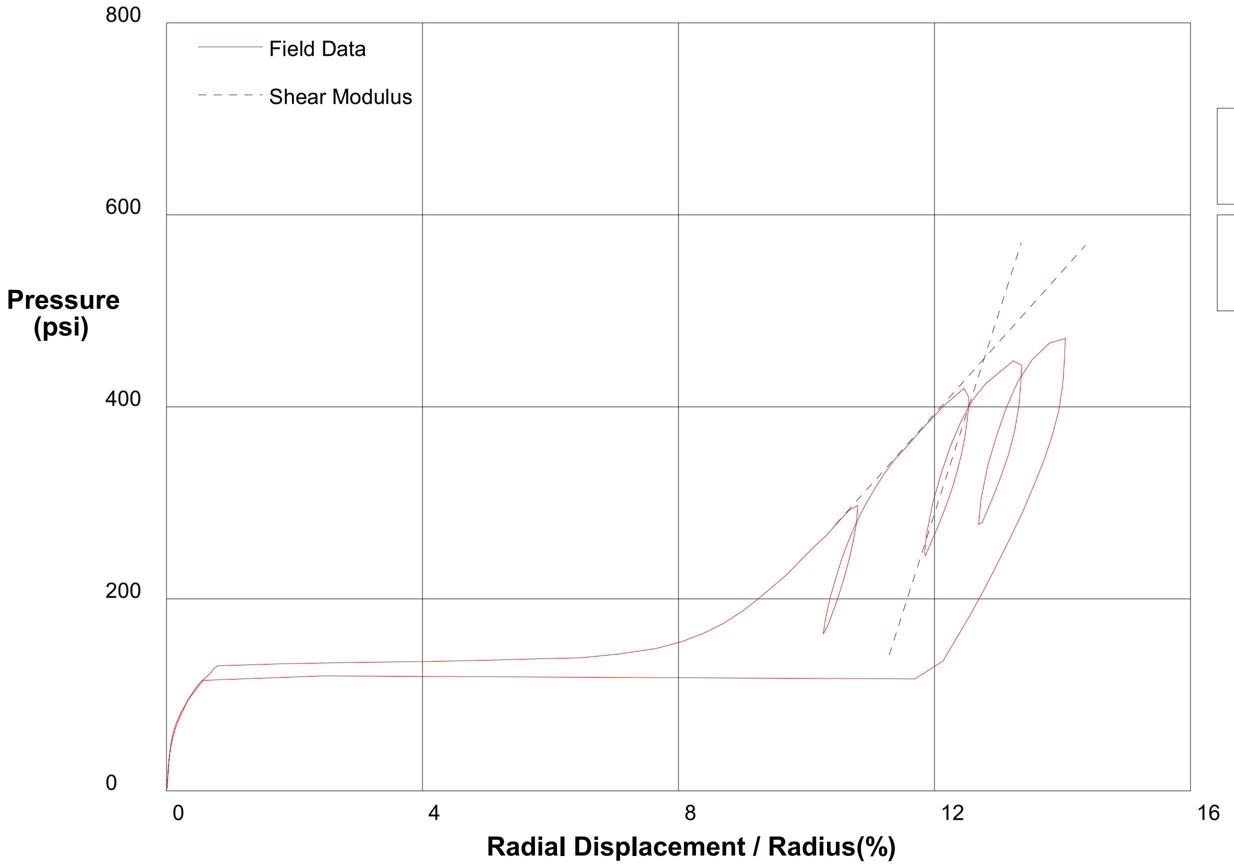
shift 10

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/15/2008**

Hole No. PM301 **Depth 289.5ft** **File C:\DATA\ISE-765\CC85.P**



Shear Modulus 3725 psi

Shear Modulus 10404 psi

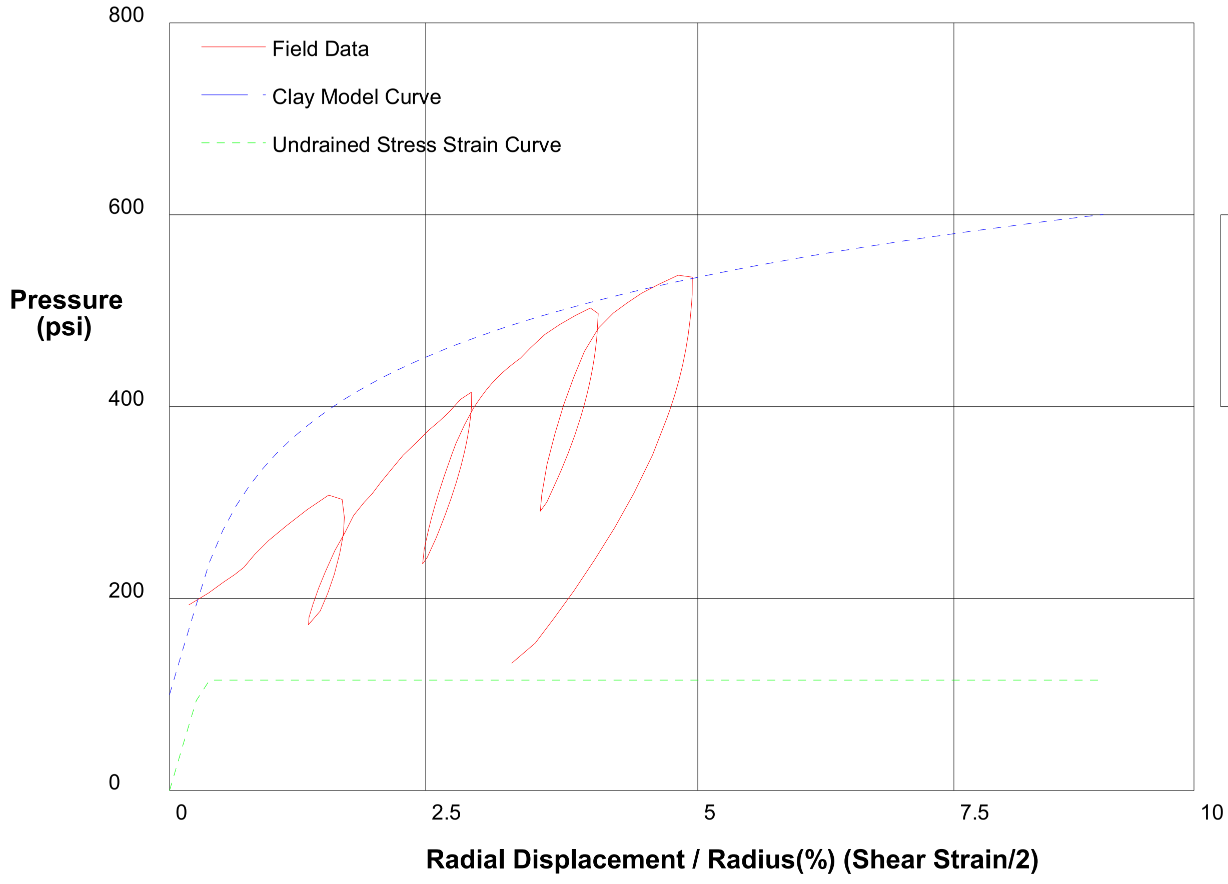
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/15/2008**

Hole No. PM301 **Depth 301ft** **File C:\DATA\ISE-765\CC86.P**



GIBSON'S CLAY MODEL

Shear Strength 115 psi
Insitu Stress 100 psi
Shear Modulus 18000 psi

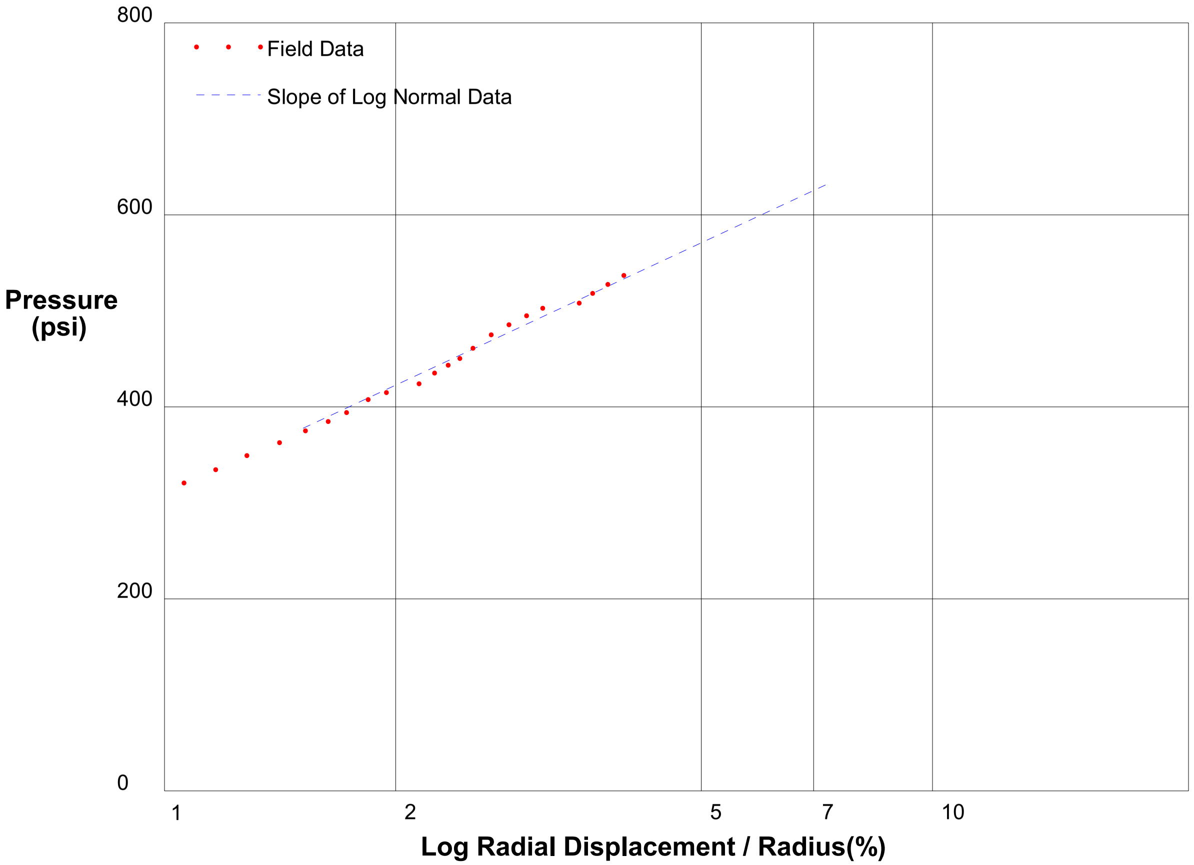
shift 9

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/15/2008**

Hole No. PM301 **Depth 301ft** **File C:\DATA\ISE-765\CC86.P**



Shear Strength 161.7 psi
Limit Pressure 911 psi

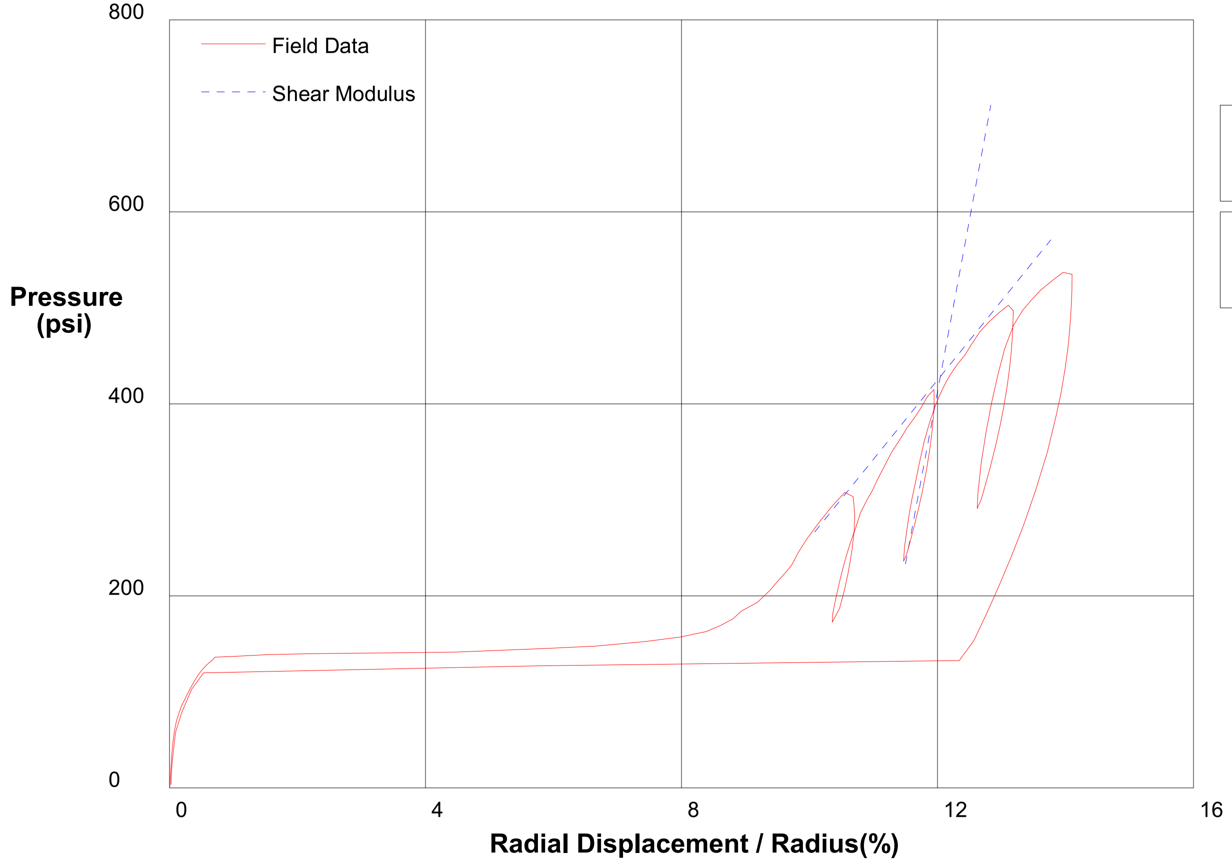
shift 10

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/15/2008**

Hole No. PM301 **Depth 301ft** **File C:\DATA\ISE-765\CC86.P**



Shear Modulus 4124 psi

Shear Modulus 17916 psi

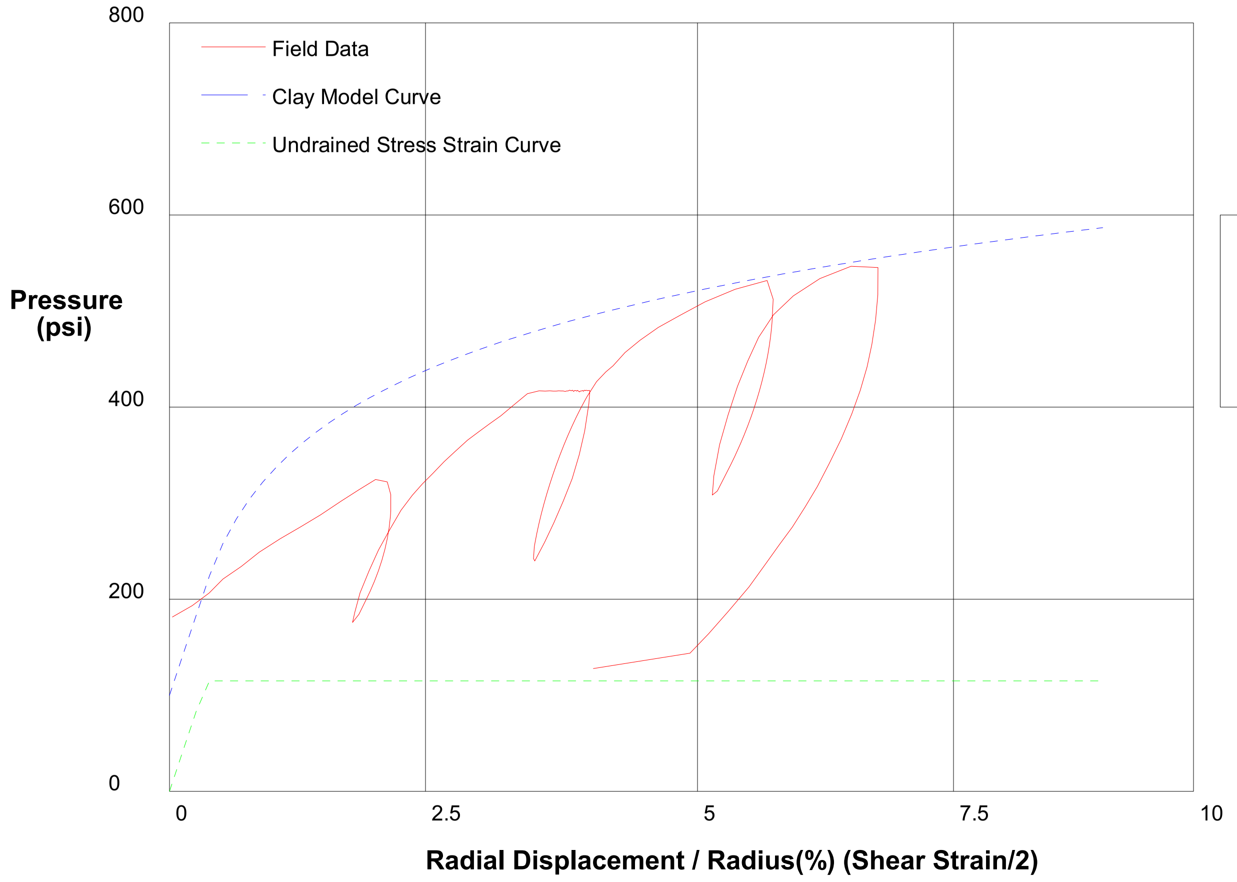
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/15/2008**

Hole No. PM301 **Depth 299.5ft** **File C:\DATA\ISE-765\CC87.P**



GIBSON'S CLAY MODEL

Shear Strength 115 psi
Insitu Stress 100 psi
Shear Modulus 16000 psi

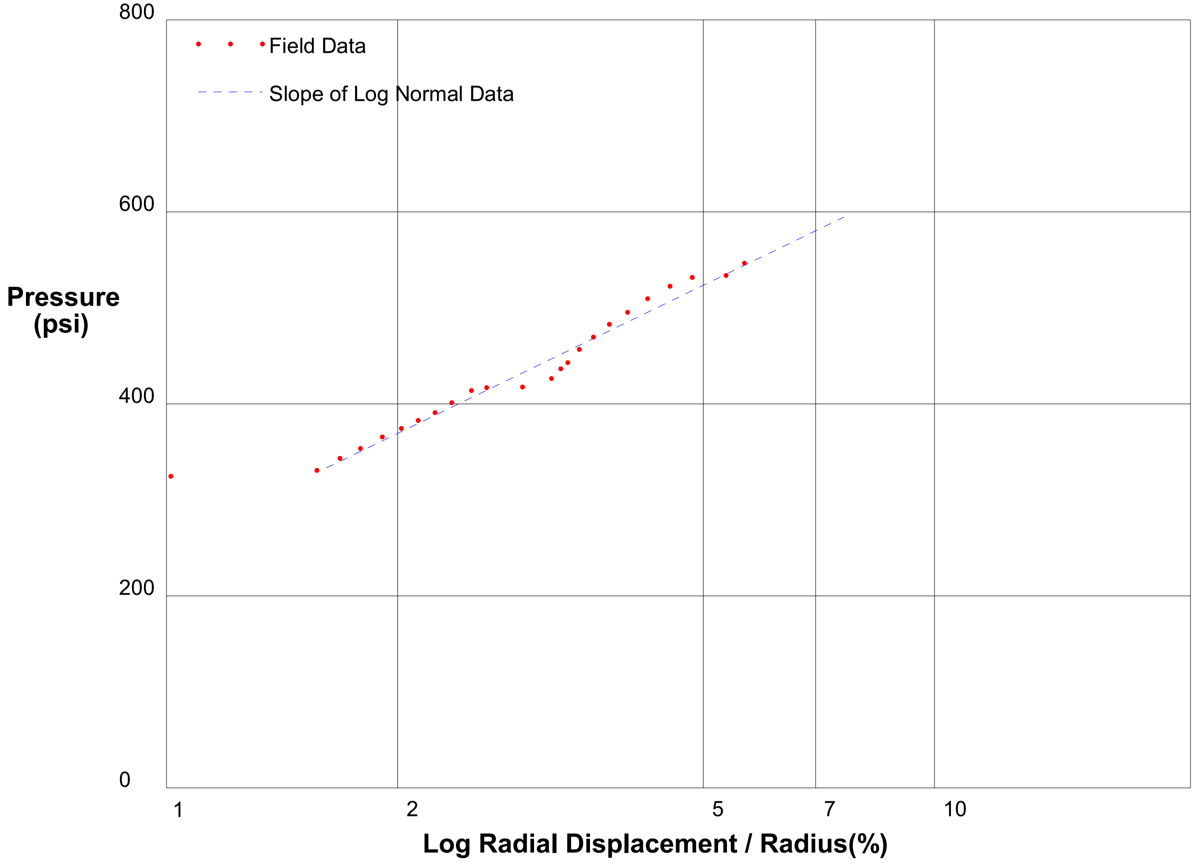
shift 7

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/15/2008**

Hole No. PM301 **Depth 299.5ft** **File C:\DATA\ISE-765\CC87.P**



Shear Strength 168.3 psi
Limit Pressure 877 psi

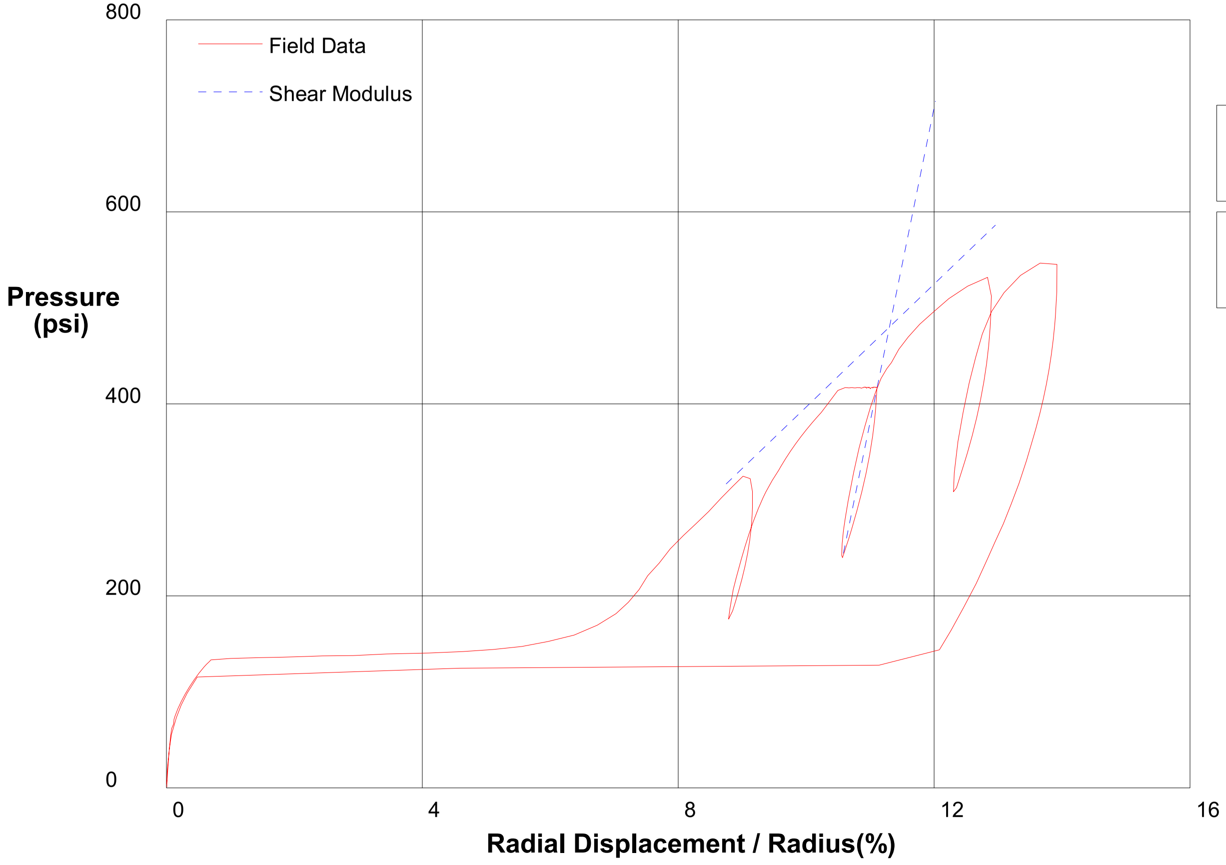
shift 8

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/15/2008**

Hole No. PM301 **Depth 299.5ft** **File C:\DATA\ISE-765\CC87.P**



Shear Modulus 3201 psi

Shear Modulus 16376 psi

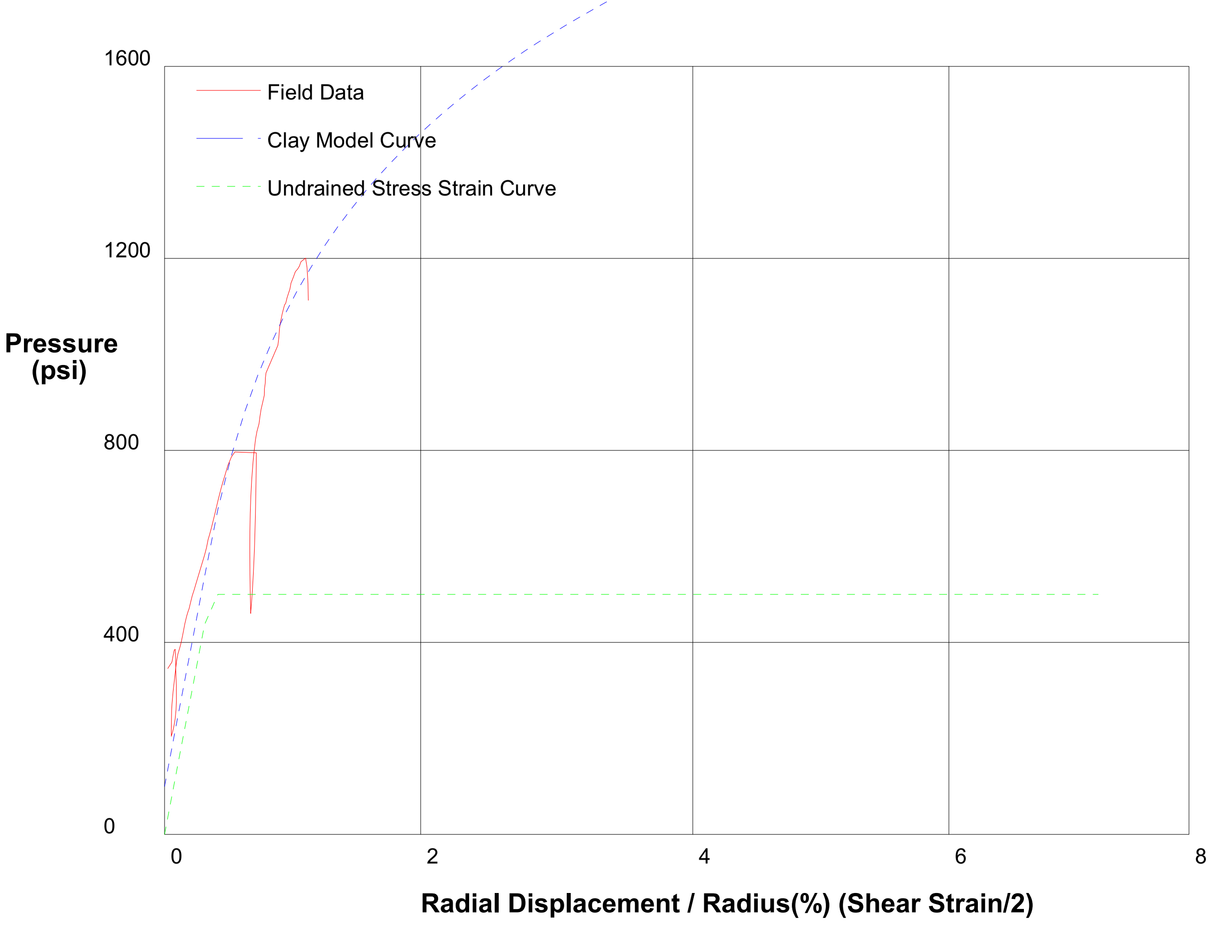
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/16/2008**

Hole No. PM301 **Depth 310.7ft** **File C:\DATA\ISE-765\CC88.P**



GIBSON'S CLAY MODEL

Shear Strength 500 psi
Insitu Stress 100 psi
Shear Modulus 70000 psi

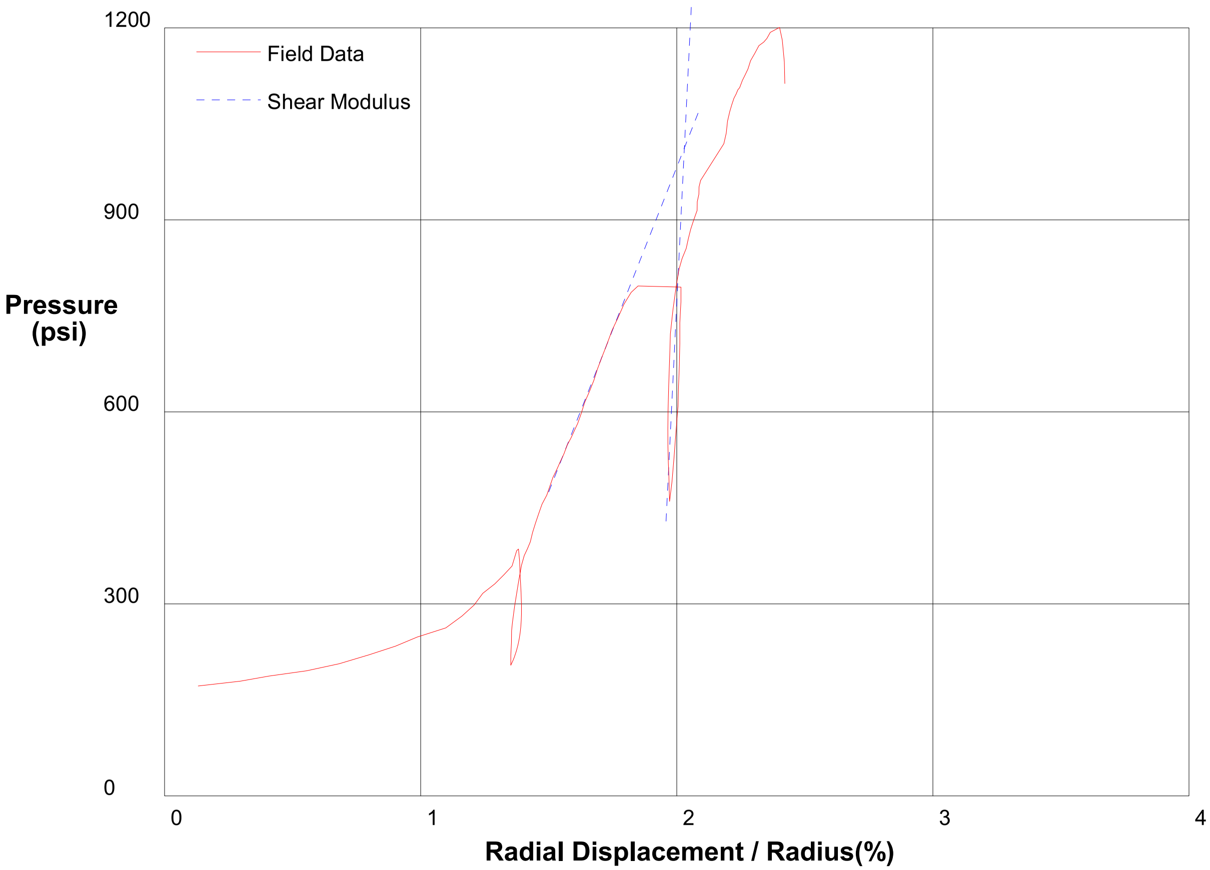
shift 5.3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/16/2008**

Hole No. PM301 **Depth 310.7ft** **File C:\DATA\ISE-765\CC88.P**



Shear Modulus 50714 psi

Shear Modulus 409473 psi

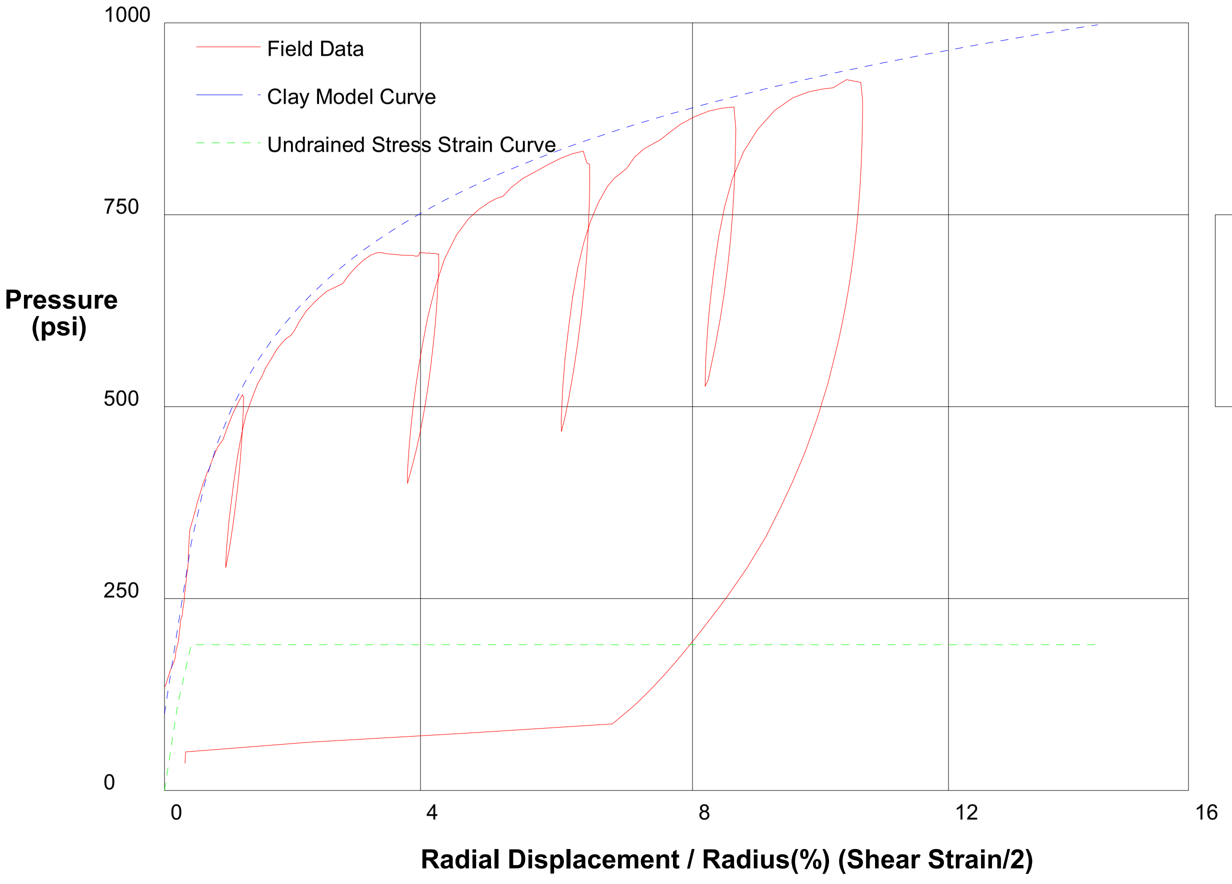
shift 4

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/16/2008**

Hole No. PM301 **Depth 321ft** **File C:\DATA\ISE-765\CC89.P**



GIBSON'S CLAY MODEL

Shear Strength 190 psi
Insitu Stress 100 psi
Shear Modulus 27000 psi

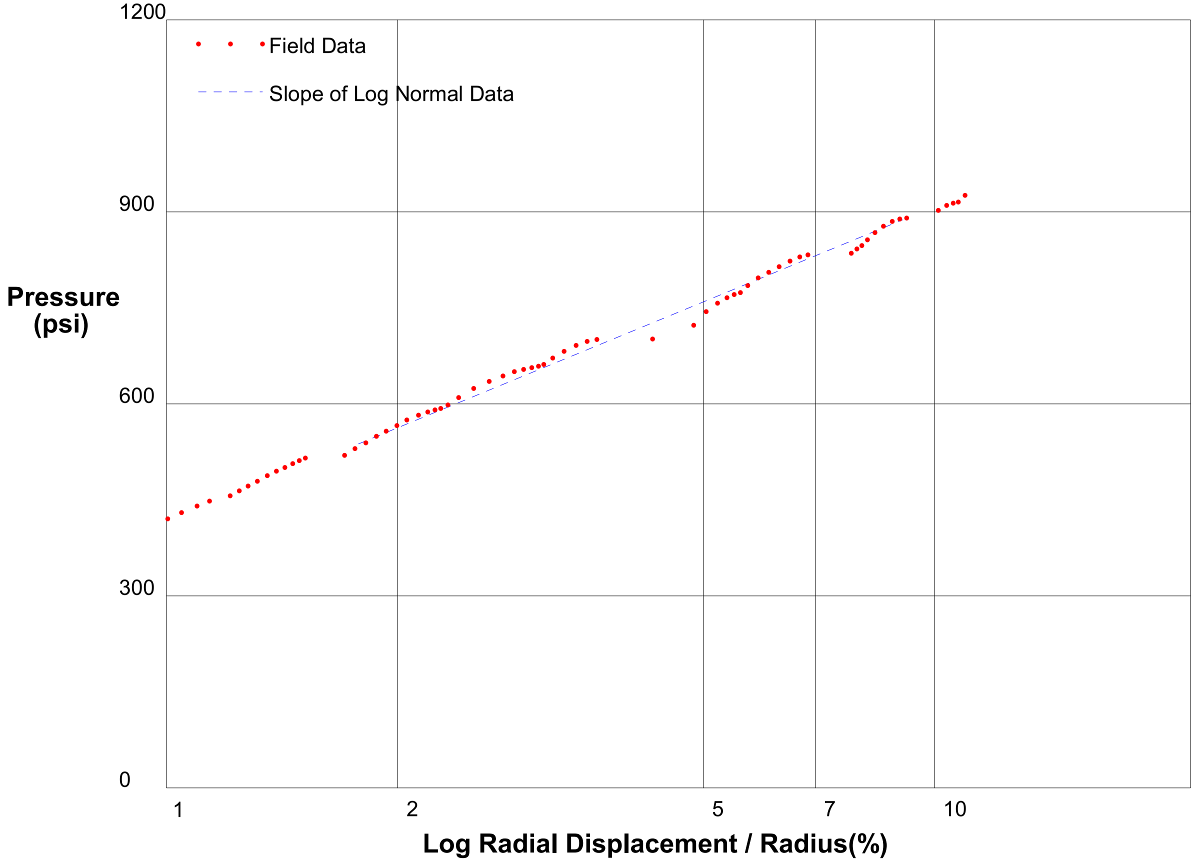
shift .3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/16/2008**

Hole No. PM301 **Depth 321ft** **File C:\DATA\ISE-765\CC89.P**



Shear Strength 214.5 psi
Limit Pressure 1210 psi

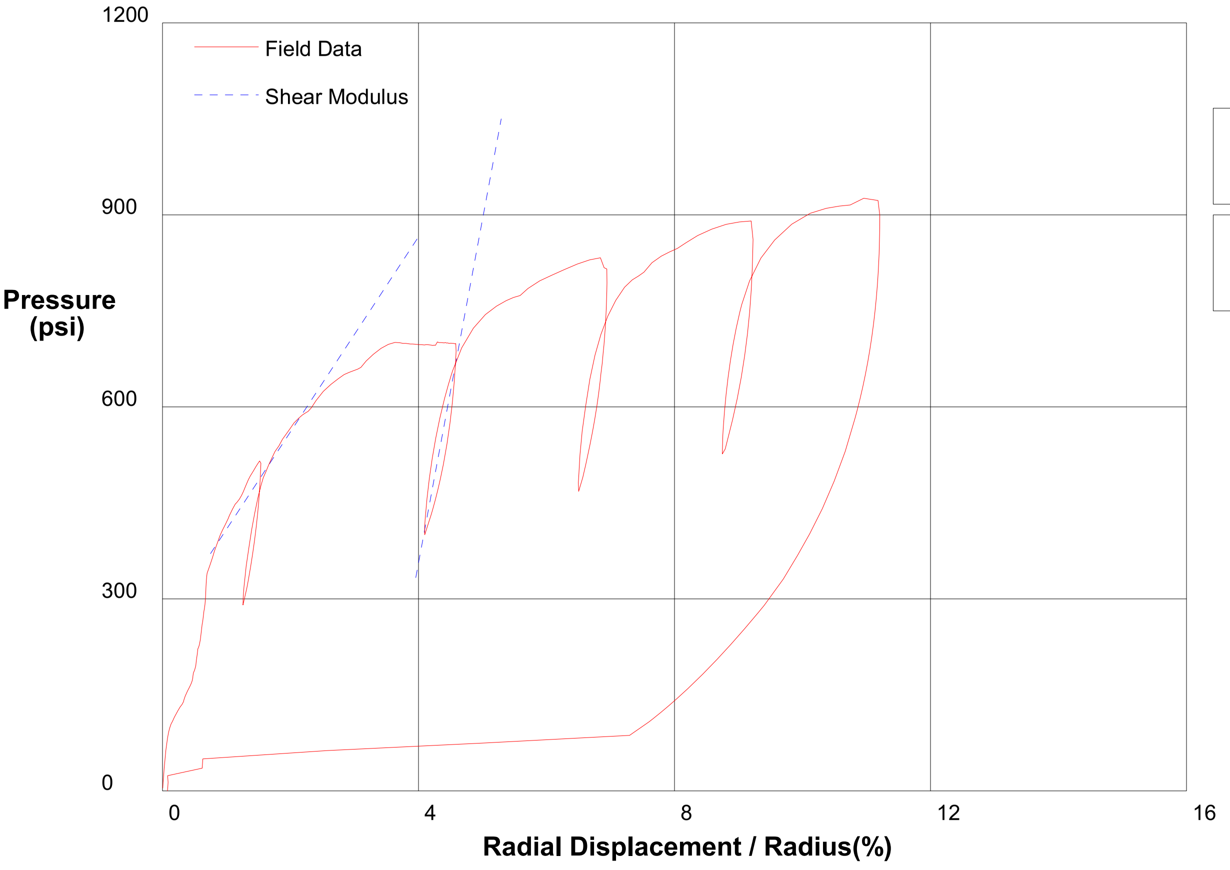
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/16/2008**

Hole No. PM301 **Depth 321ft** **File C:\DATA\ISE-765\CC89.P**



Shear Modulus 7611 psi

Shear Modulus 26875 psi

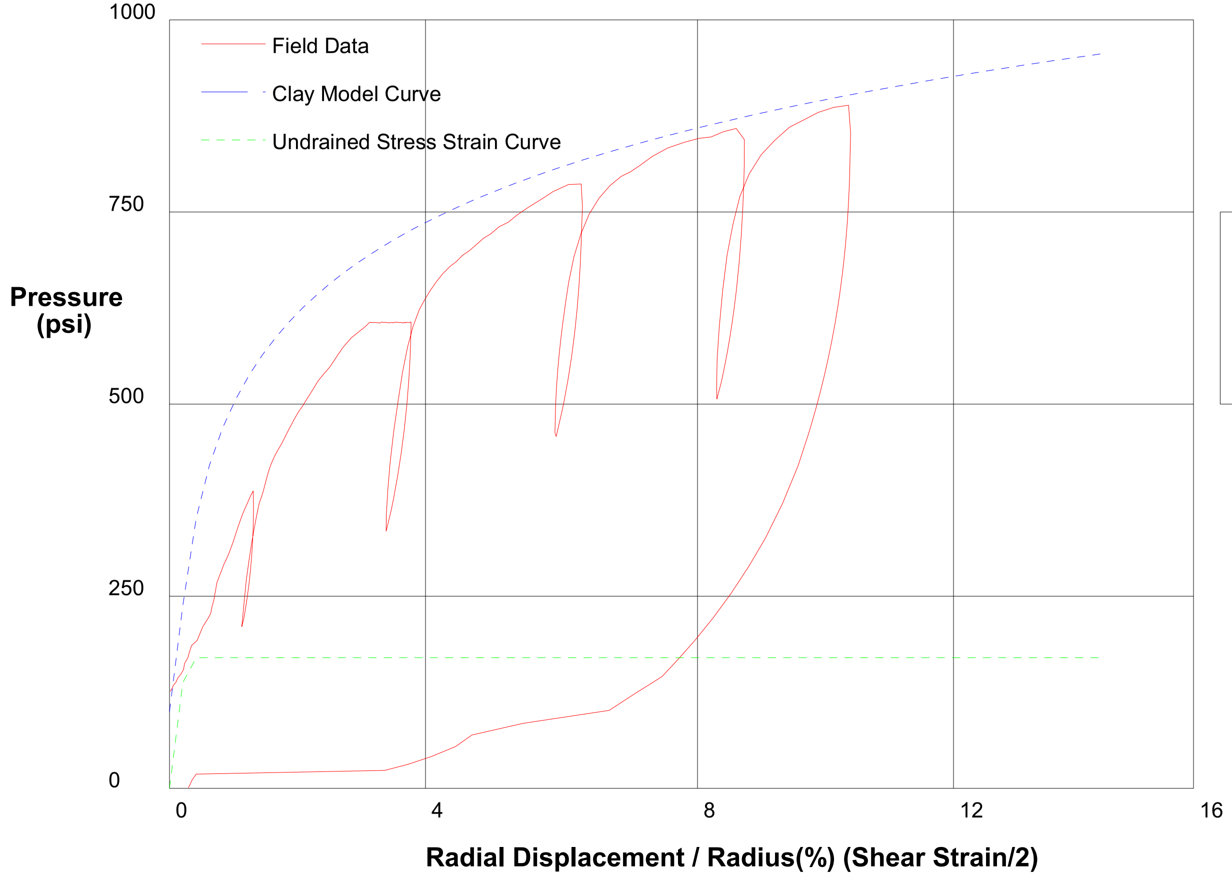
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/16/2008**

Hole No. PM301 **Depth 319.5ft** **File C:\DATA\ISE-765\CC90.P**



GIBSON'S CLAY MODEL

Shear Strength 170 psi
Insitu Stress 100 psi
Shear Modulus 33000 psi

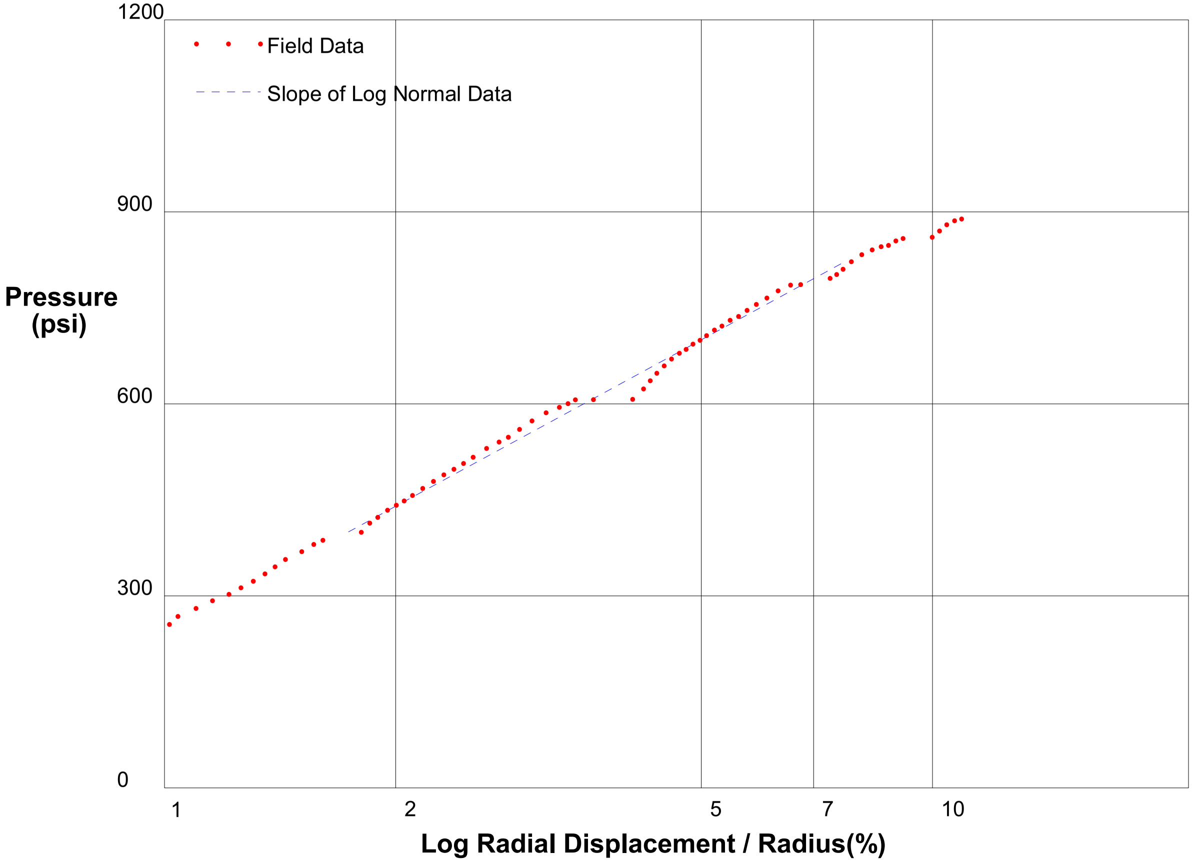
shift .3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/16/2008**

Hole No. PM301 **Depth 319.5ft** **File C:\DATA\ISE-765\CC90.P**



Shear Strength 283.6 psi
Limit Pressure 1296 psi

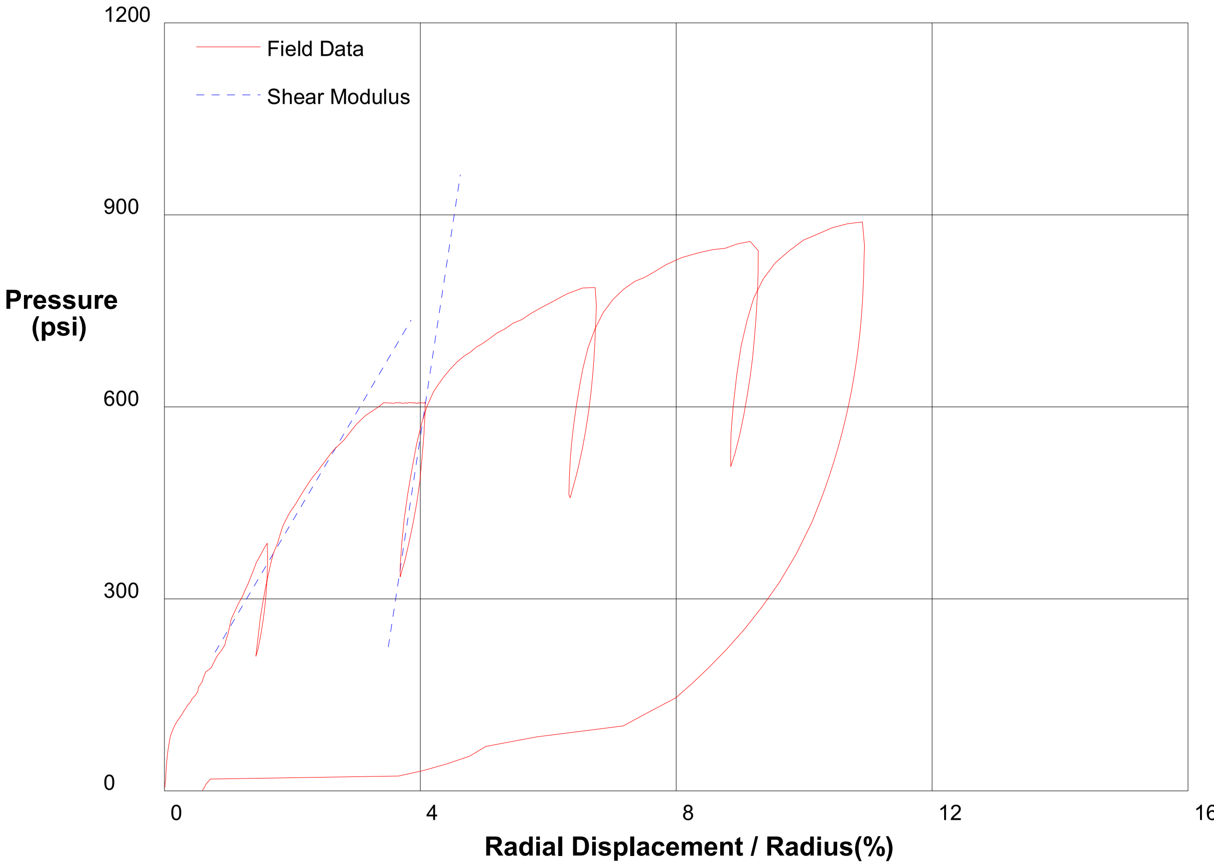
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/16/2008**

Hole No. PM301 **Depth 319.5ft** **File C:\DATA\ISE-765\CC90.P**



Shear Modulus 8469 psi

Shear Modulus 32777 psi

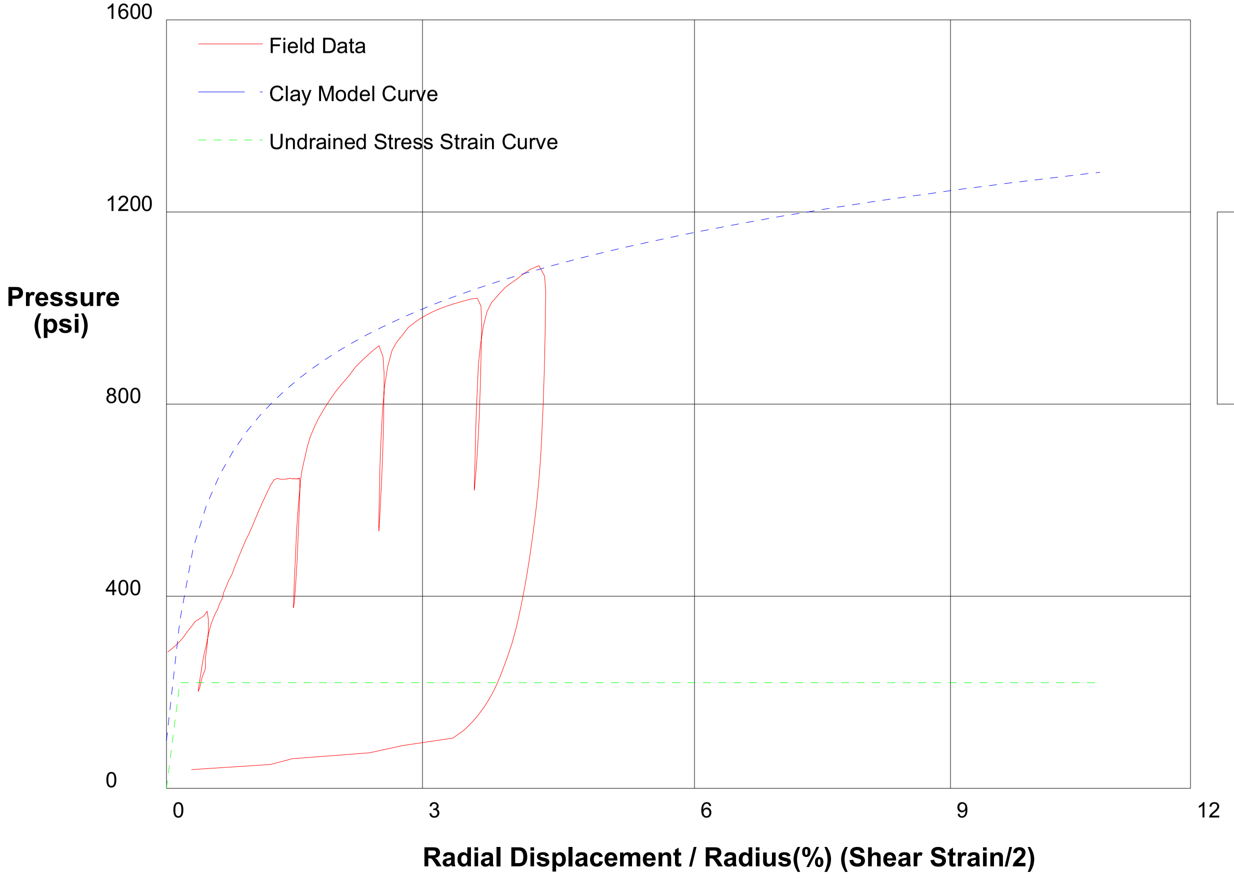
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/17/2008**

Hole No. PM301 **Depth 328.5ft** **File C:\DATA\ISE-765\CC91.P**



GIBSON'S CLAY MODEL

Shear Strength	**220**	**psi**
Insitu Stress	**100**	**psi**
Shear Modulus	**80000**	**psi**

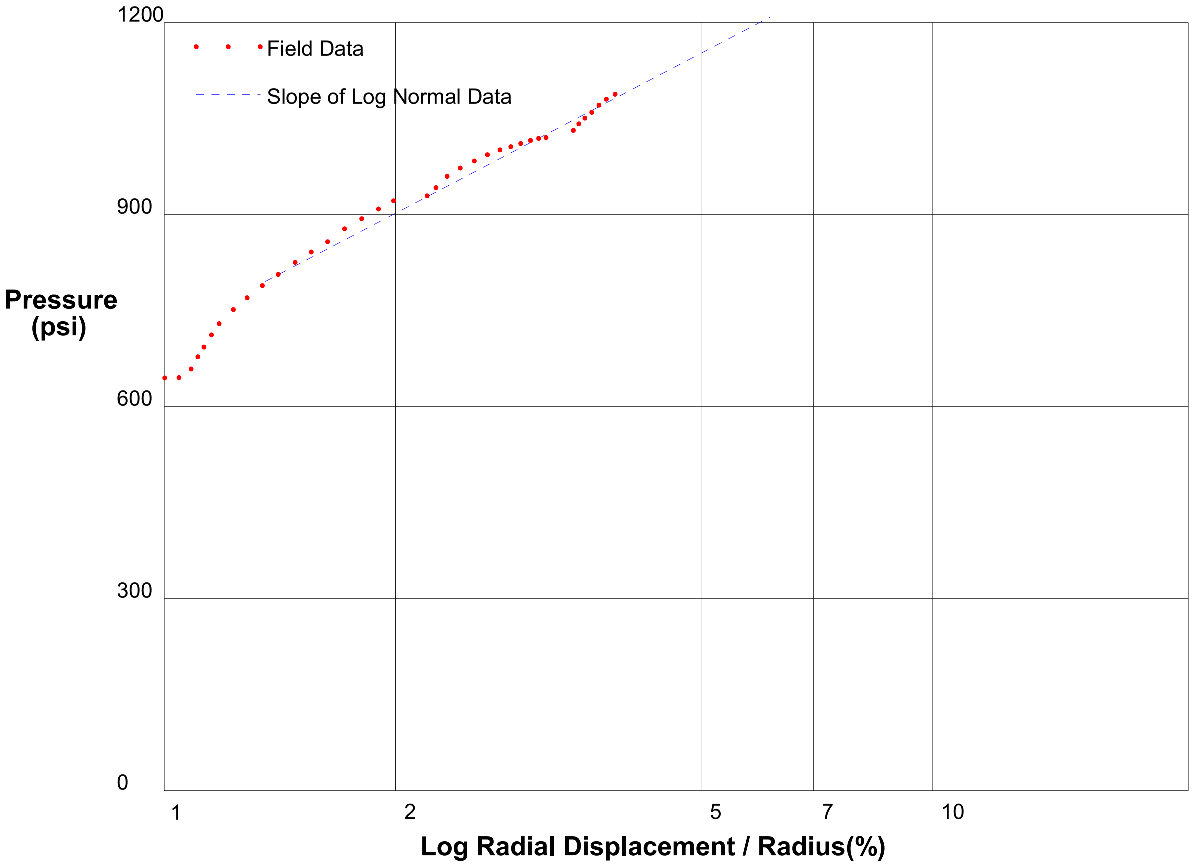
shift 4

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/17/2008**

Hole No. PM301 **Depth 328.5ft** **File C:\DATA\ISE-765\CC91.P**



Shear Strength 272.9 psi
Limit Pressure 1726 psi

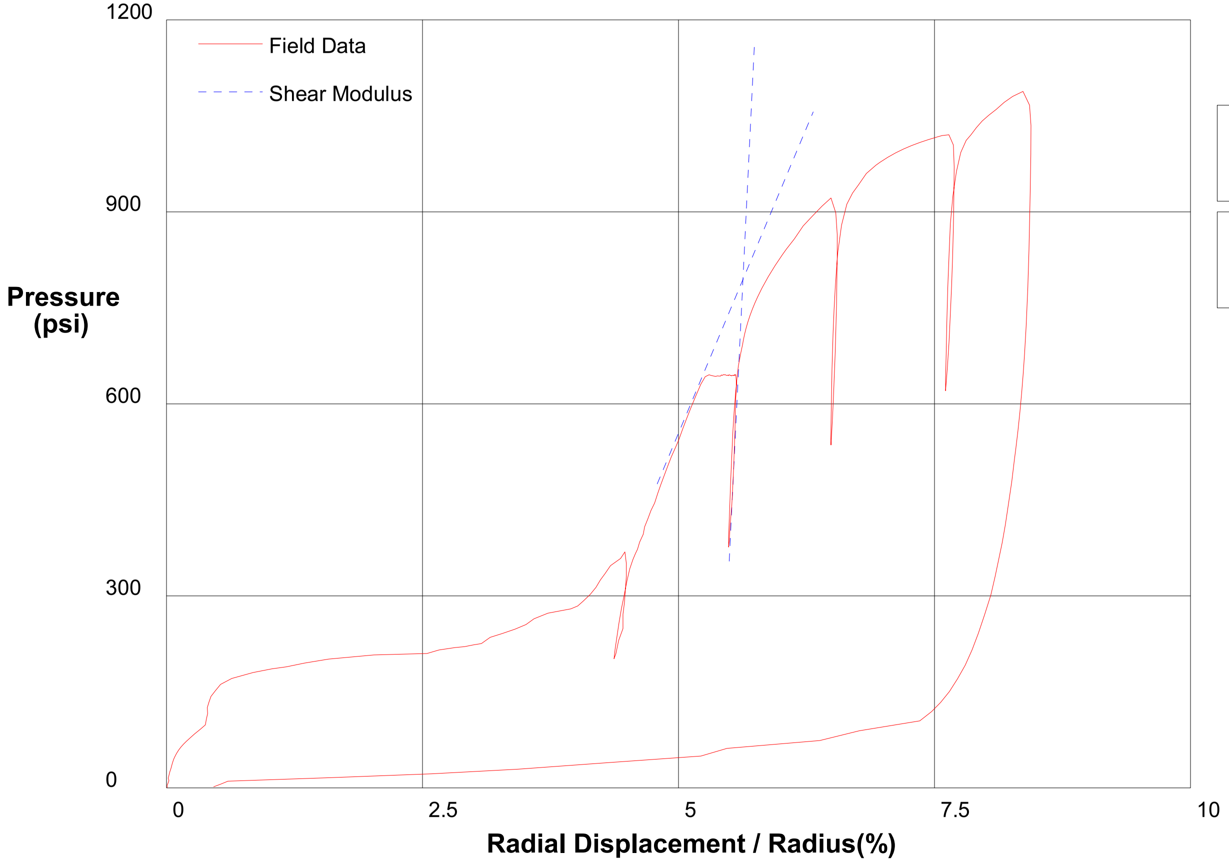
shift 4.5

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/17/2008**

Hole No. PM301 **Depth 328.5ft** **File C:\DATA\ISE-765\CC91.P**



Shear Modulus 19076 psi

Shear Modulus 163789 psi

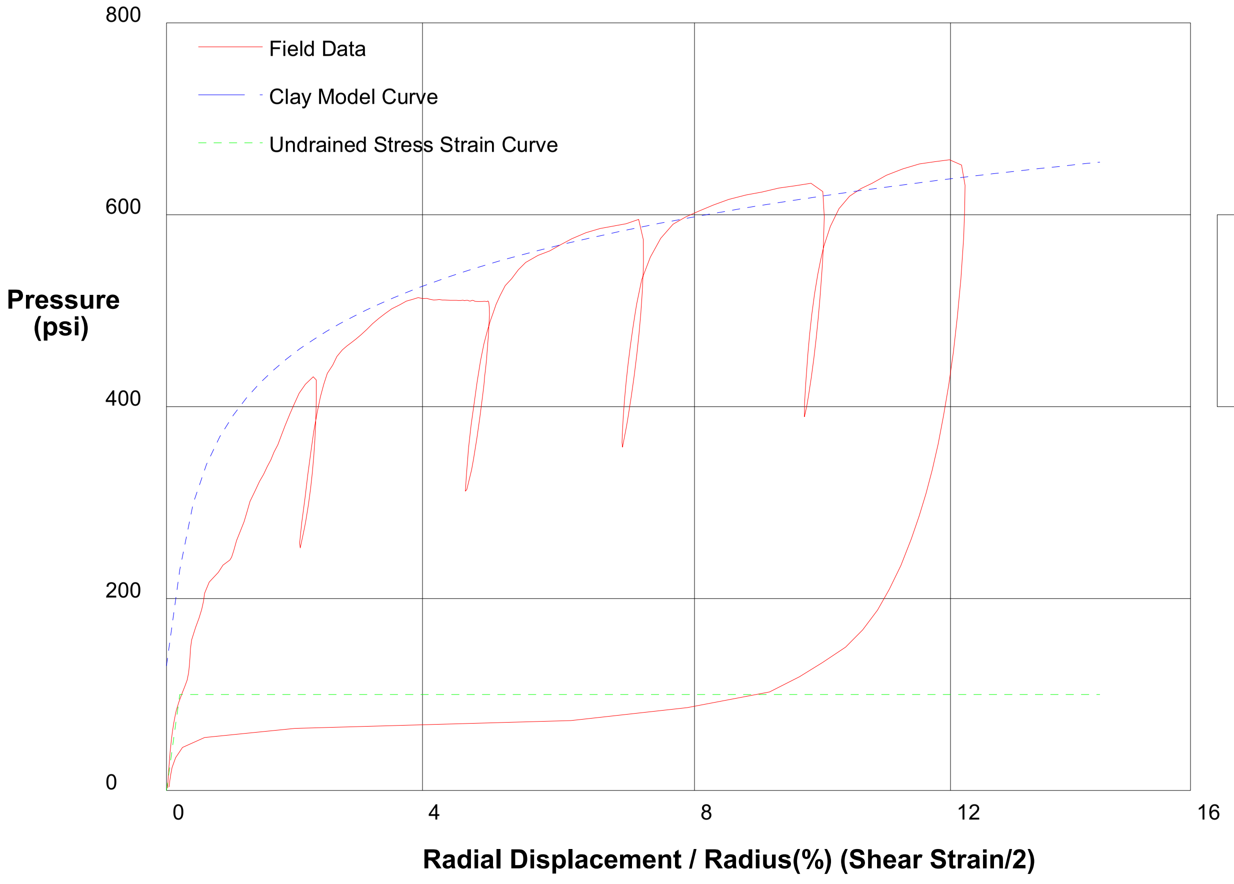
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/17/2008**

Hole No. PM301 **Depth 338.5ft** **File C:\DATA\ISE-765\CC92.P**



GIBSON'S CLAY MODEL

Shear Strength 100 psi
Insitu Stress 130 psi
Shear Modulus 24000 psi

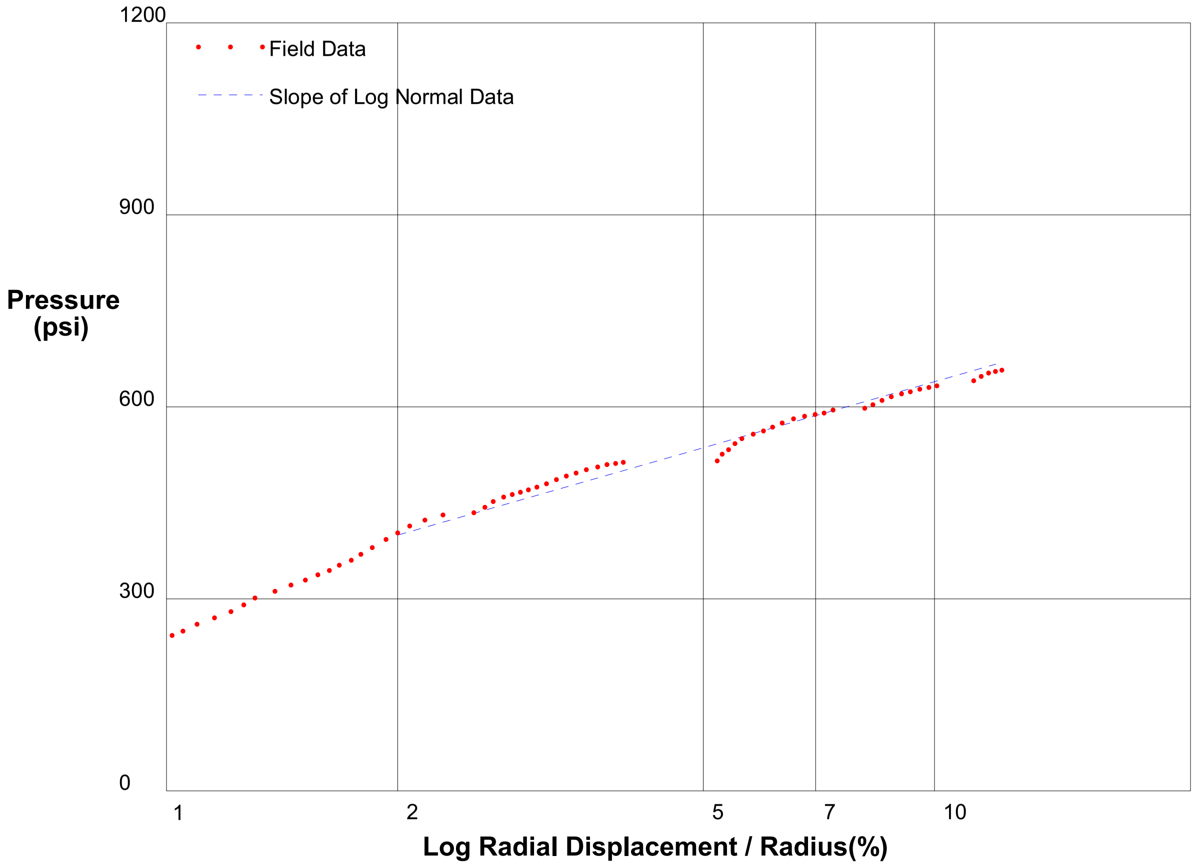
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/17/2008**

Hole No. PM301 **Depth 338.5ft** **File C:\DATA\ISE-765\CC92.P**



Shear Strength 148.9 psi
Limit Pressure 849 psi

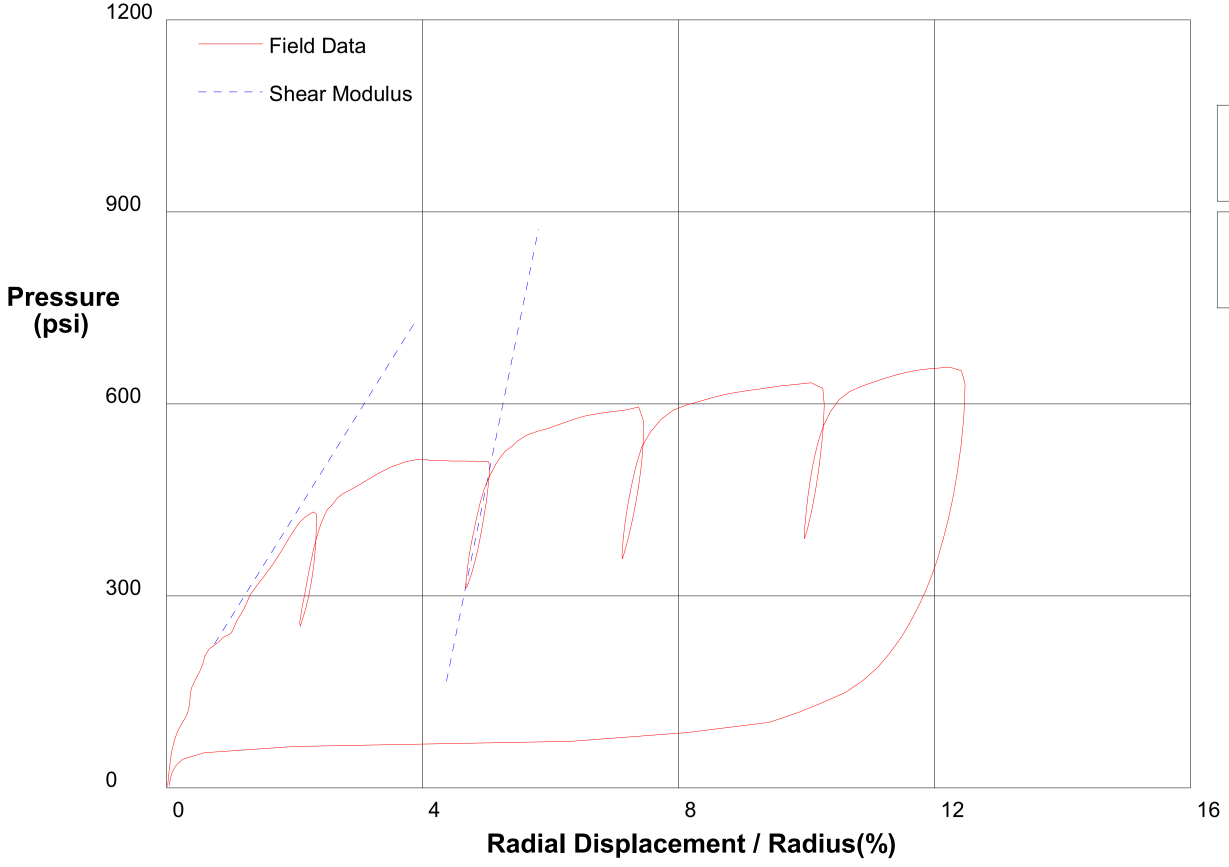
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/17/2008**

Hole No. PM301 **Depth 338.5ft** **File C:\DATA\ISE-765\CC92.P**



Shear Modulus 8026 psi

Shear Modulus 24565 psi

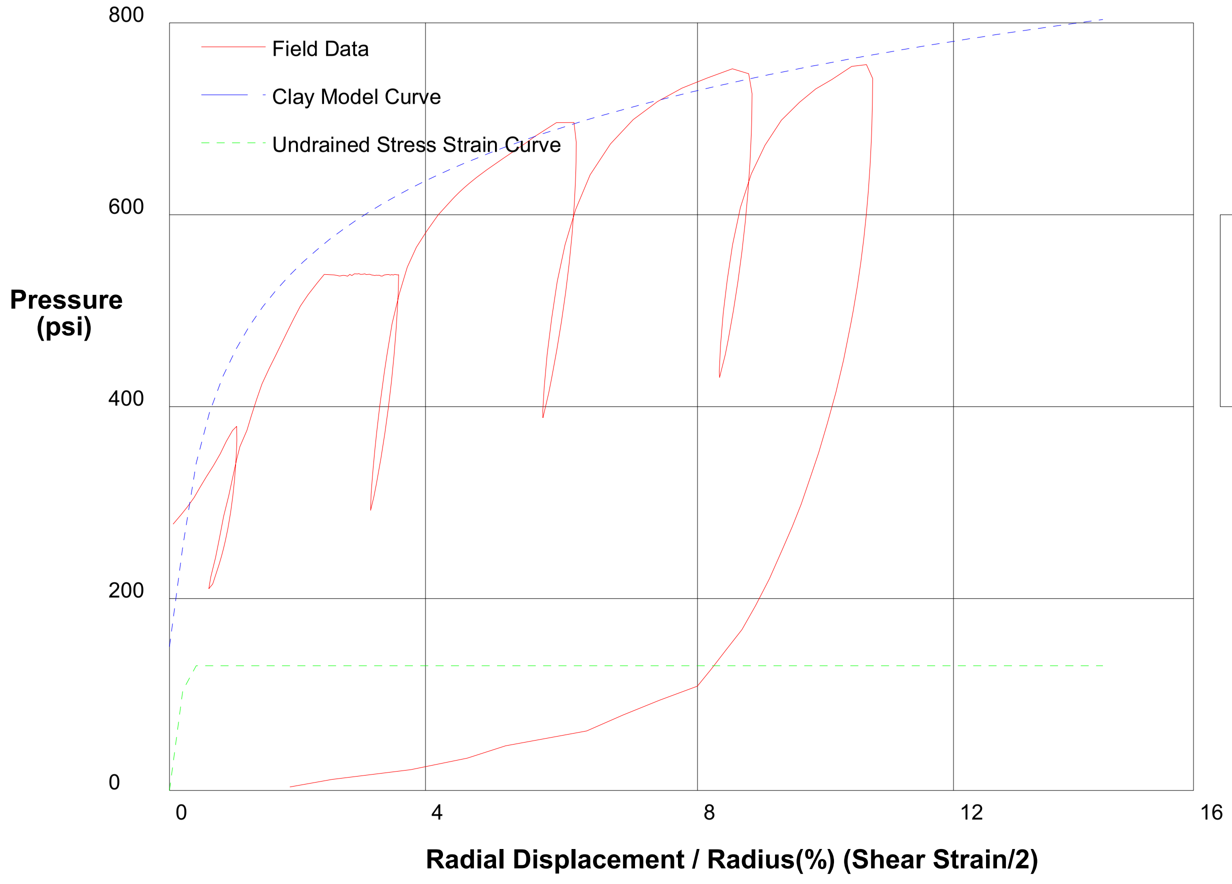
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/18/2008**

Hole No. PM301 **Depth 350ft** **File C:\DATA\ISE-765\CC93.P**



shift 2

GIBSON'S CLAY MODEL

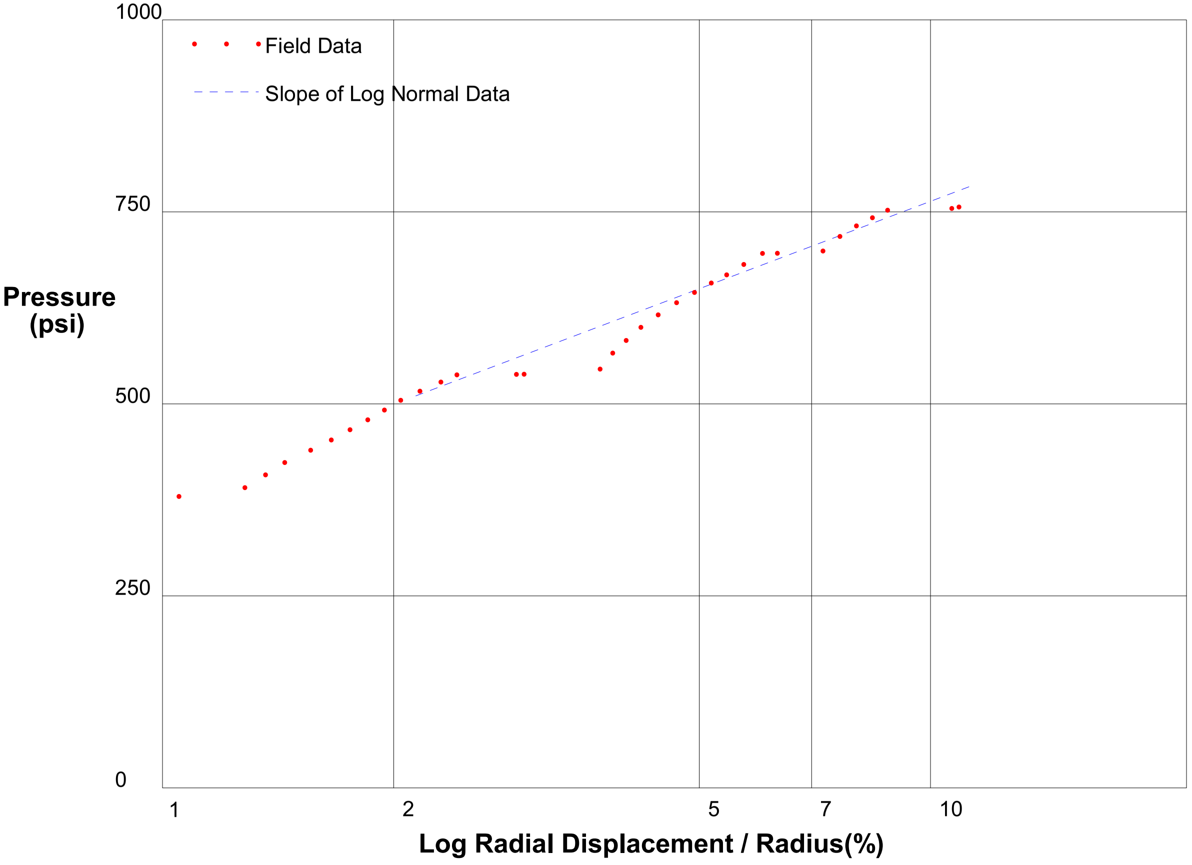
Shear Strength	**130**	**psi**
Insitu Stress	**150**	**psi**
Shear Modulus	**25000**	**psi**

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/18/2008**

Hole No. PM301 **Depth 350ft** **File C:\DATA\ISE-765\CC93.P**



Shear Strength 164.1 psi
Limit Pressure 995 psi

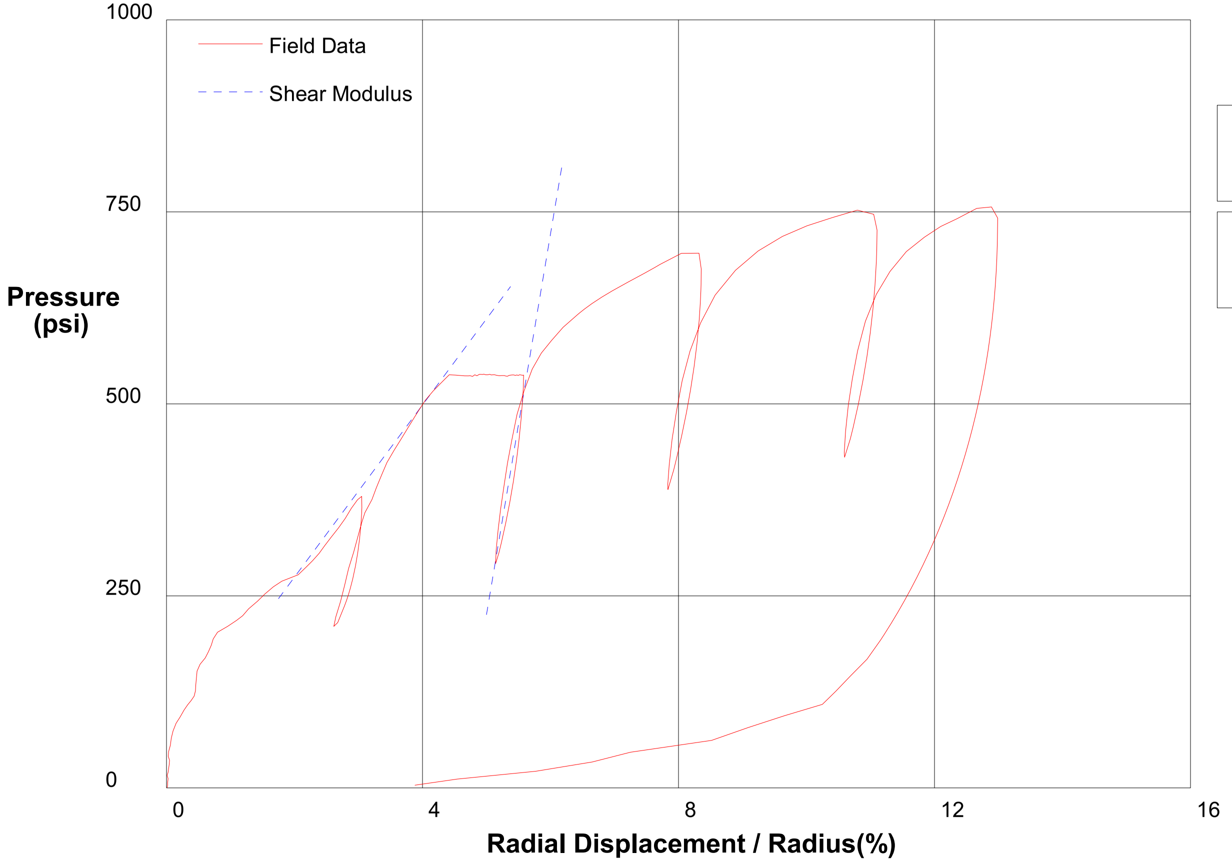
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/18/2008**

Hole No. PM301 **Depth 350ft** **File C:\DATA\ISE-765\CC93.P**



Shear Modulus 24780 psi

Shear Modulus 5603 psi

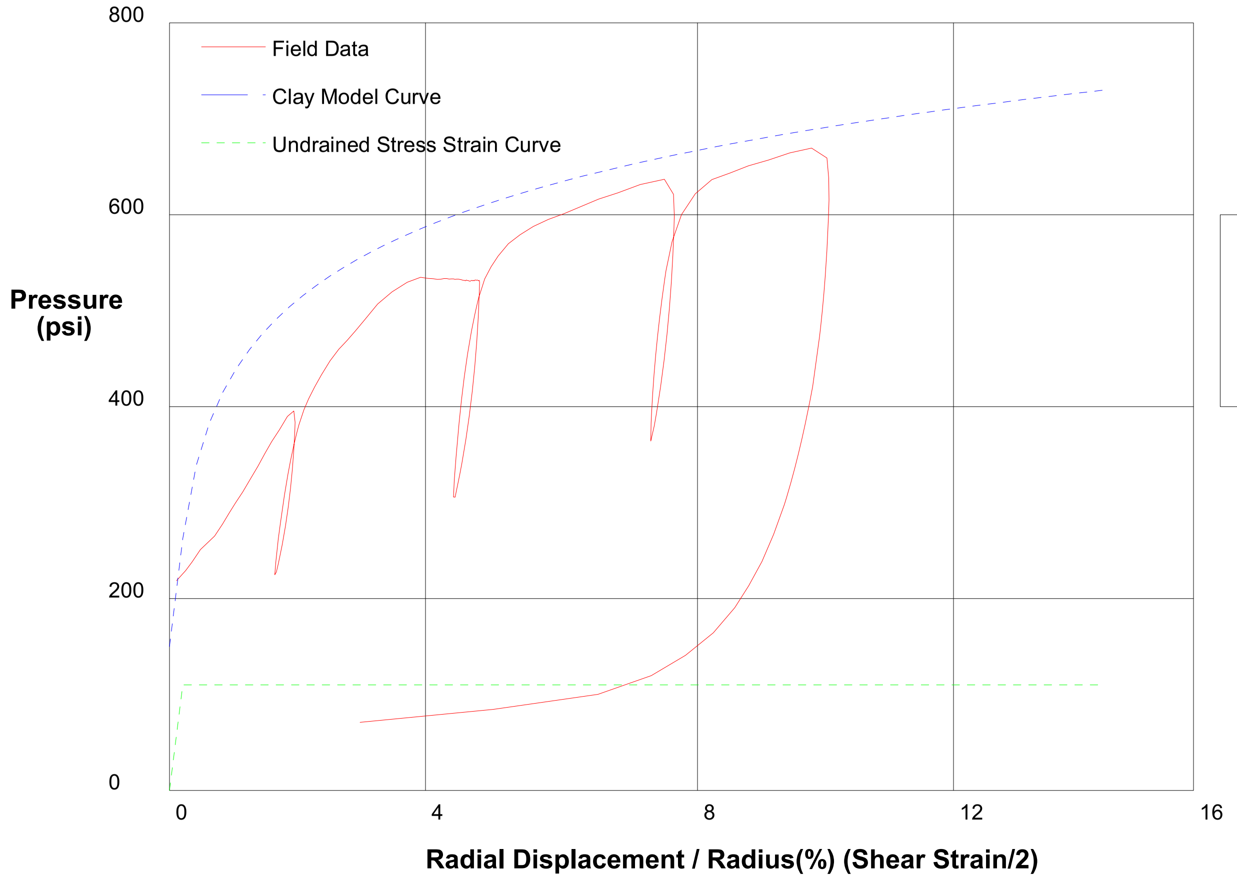
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/18/2008**

Hole No. PM301 **Depth 348.5ft** **File C:\DATA\ISE-765\CC94.P**



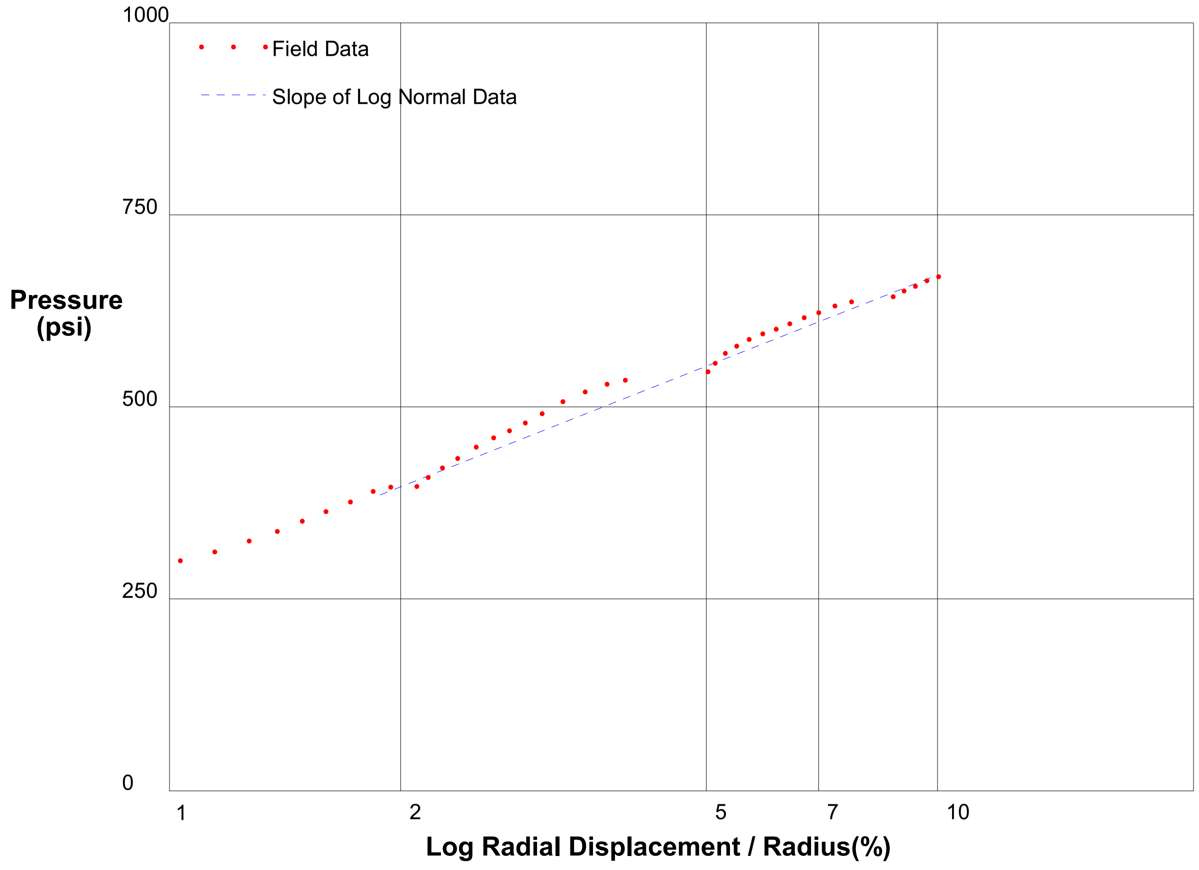
shift 3

GIBSON'S CLAY MODEL

Shear Strength	**110**	**psi**
Insitu Stress	**150**	**psi**
Shear Modulus	**27000**	**psi**

In Situ Engineering

PRESSUREMETER DATA	**Schnabel Engineering LLC.**
Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation	**9/18/2008**
Hole No. PM301 **Depth 348.5ft**	**File C:\DATA\ISE-765\CC94.P**



Shear Strength 171.4 psi
Limit Pressure 913 psi

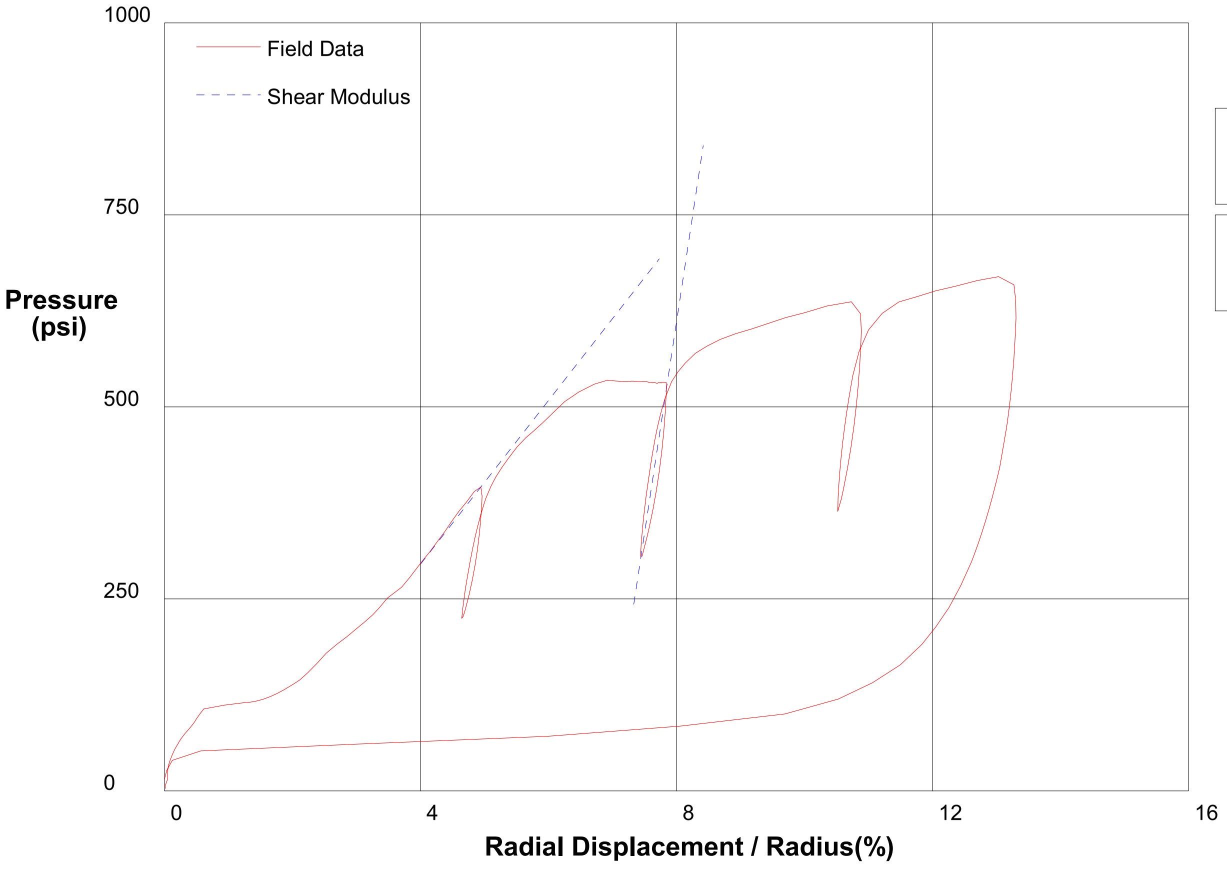
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/18/2008**

Hole No. PM301 **Depth 348.5ft** **File C:\DATA\ISE-765\CC94.P**



Shear Modulus 27564 psi

Shear Modulus 5330 psi

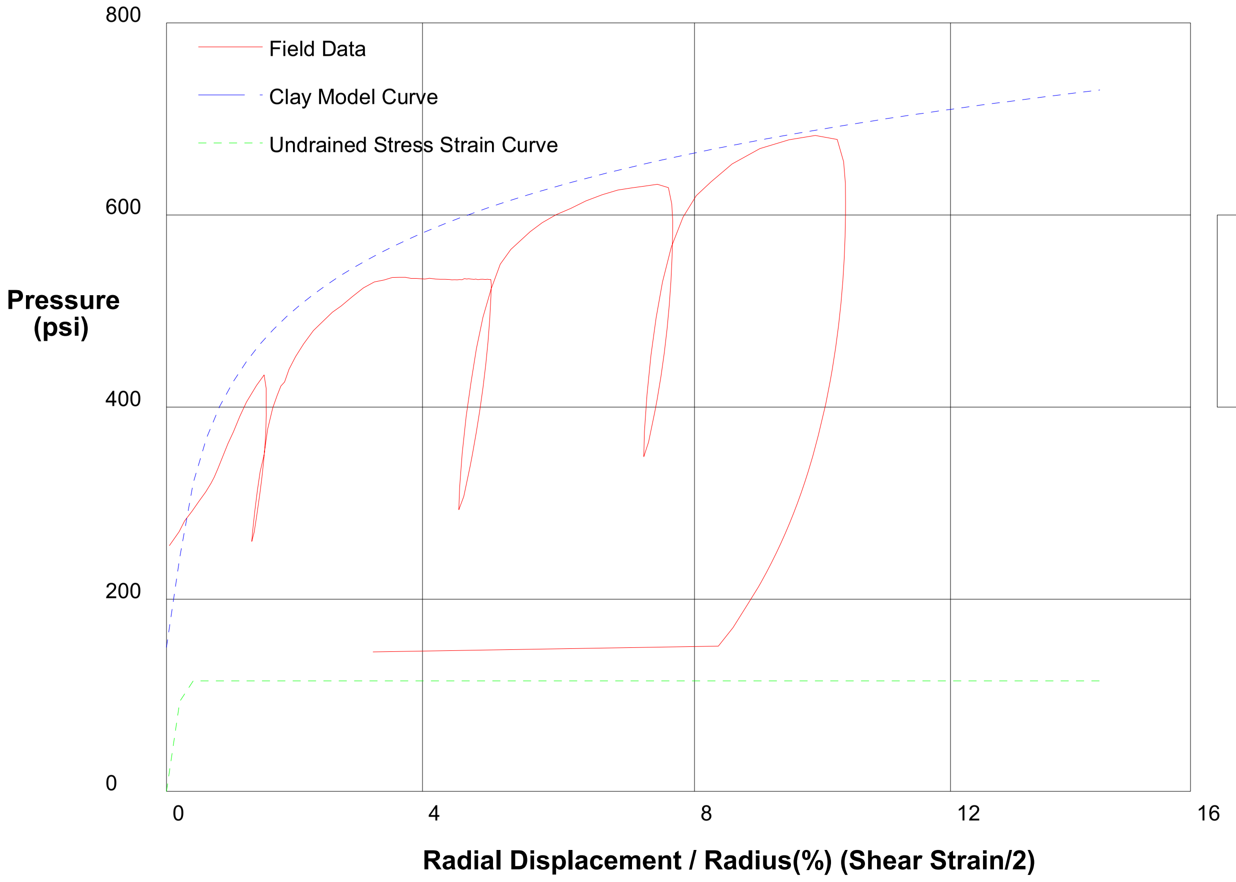
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/18/2008**

Hole No. PM301 **Depth 360.7ft** **File C:\DATA\ISE-765\CC95.P**



GIBSON'S CLAY MODEL

Shear Strength **115 psi**
Insitu Stress **150 psi**
Shear Modulus **22500 psi**

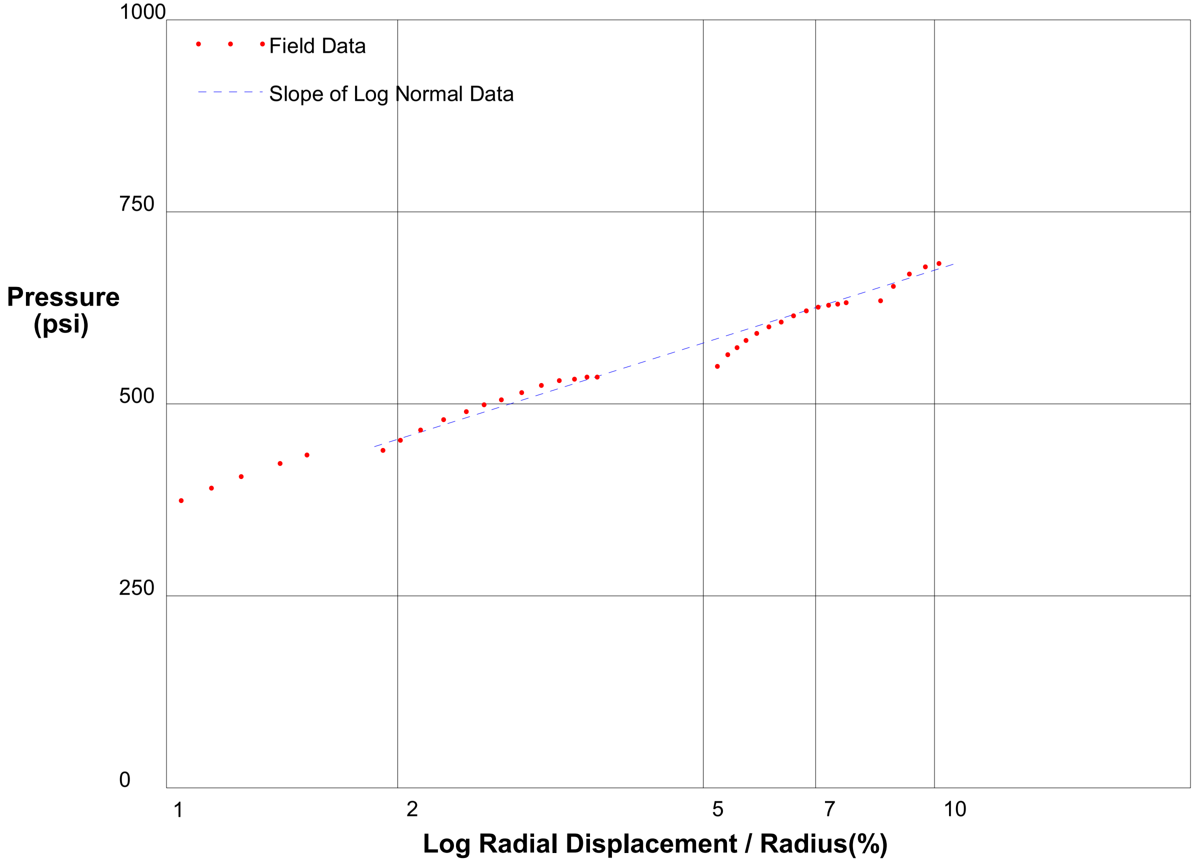
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/18/2008**

Hole No. PM301 **Depth 360.7ft** **File C:\DATA\ISE-765\CC95.P**



Shear Strength 136.8 psi
Limit Pressure 867 psi

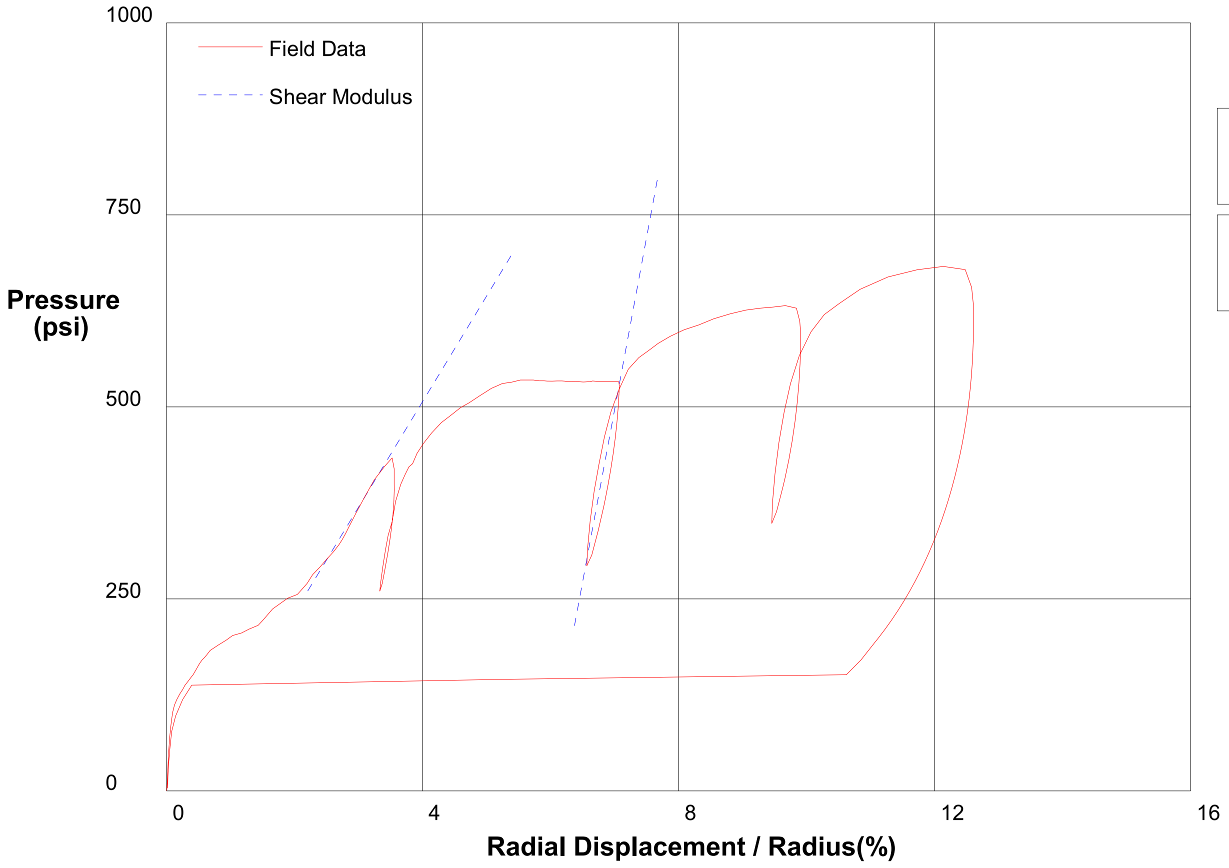
shift 2

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/18/2008**

Hole No. PM301 **Depth 360.7ft** **File C:\DATA\ISE-765\CC95.P**



Shear Modulus 22446 psi

Shear Modulus 6872 psi

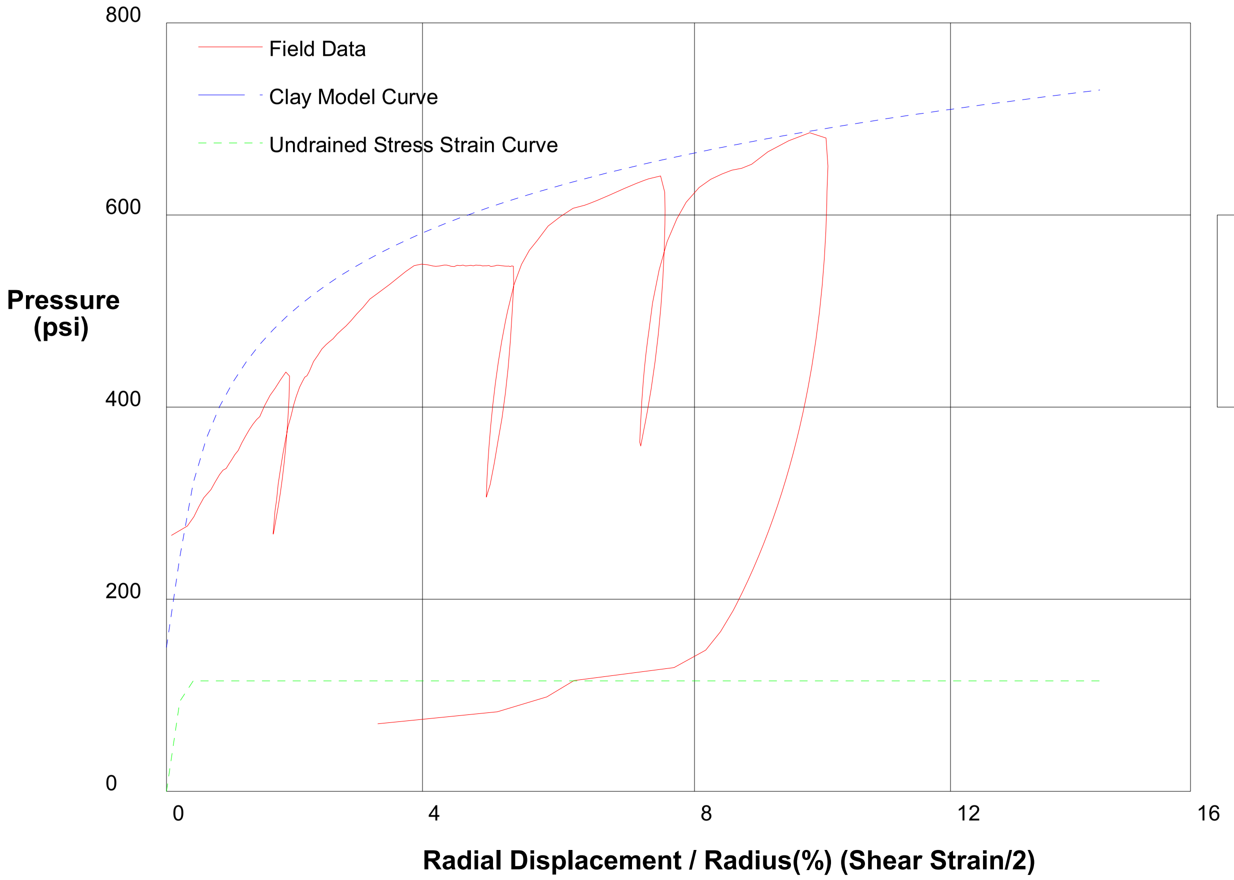
shift 0

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering, LLC.**

Calvert Cliffs Nucelar Power Plant, 2008 subsurface investigation **9/18/2008**

Hole No. PM301 **Depth 359.2ft** **File C:\DATA\ISE-765\CC96.P**



GIBSON'S CLAY MODEL

Shear Strength	**115**	**psi**
Insitu Stress	**150**	**psi**
Shear Modulus	**22500**	**psi**

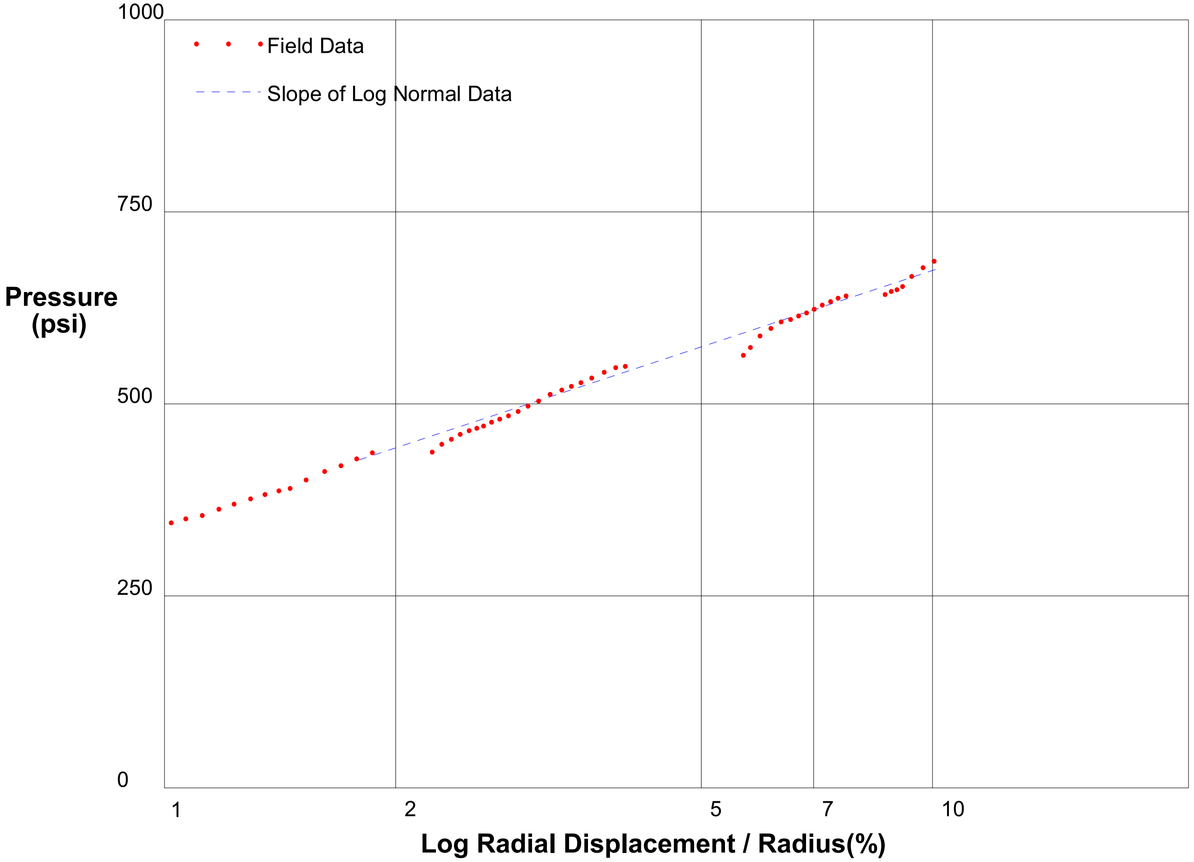
shift 3

In Situ Engineering

PRESSUREMETER DATA **Schnabel Engineering LLC.**

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/18/2008**

Hole No. PM301 **Depth 359.2ft** **File C:\DATA\ISE-765\CC96.P**



Shear Strength 143.4 psi
Limit Pressure 876 psi

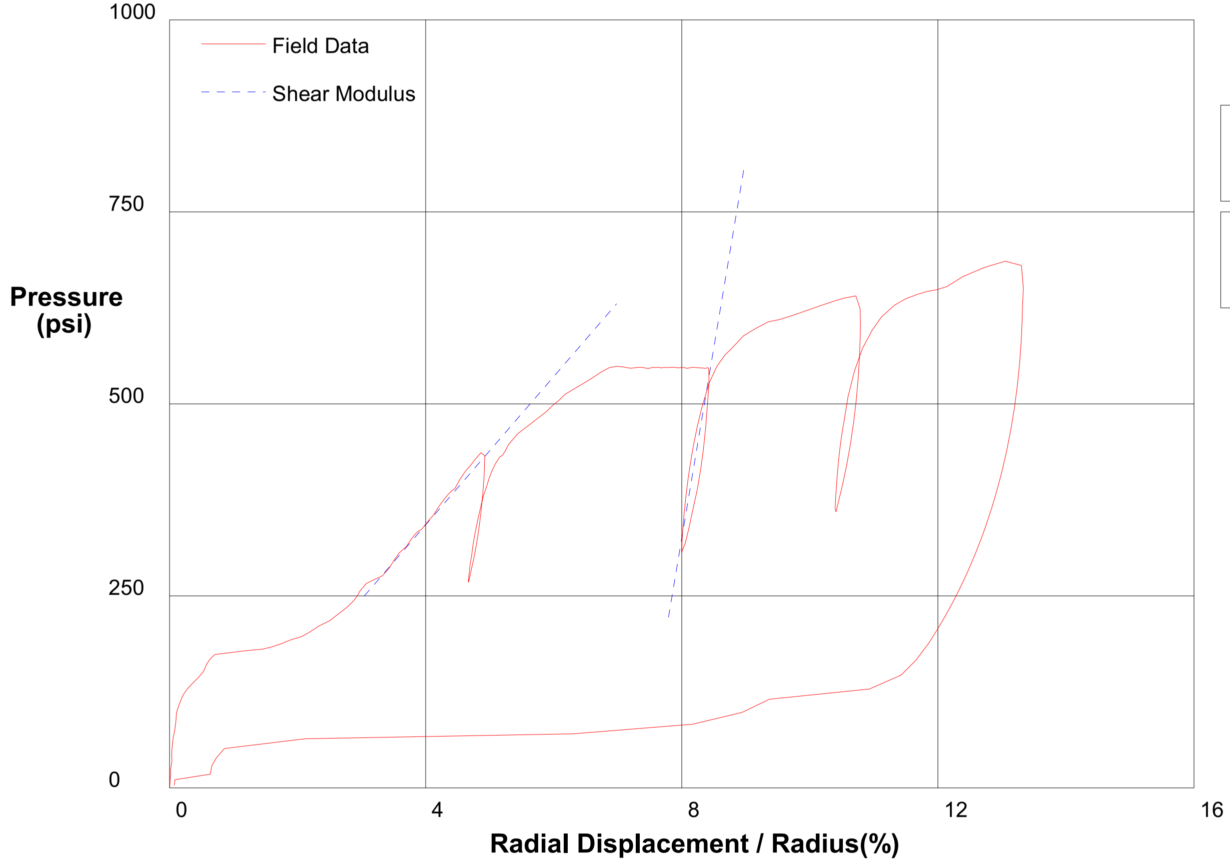
shift 3

In Situ Engineering

PRESSUREMETER DATA Schnabel Engineering LLC.

Calvert Cliffs Nuclear Power Plant, 2008 Subsurface Investigation **9/18/2008**

Hole No. PM301 **Depth 359.2ft** **File C:\DATA\ISE-765\CC96.P**



Shear Modulus 24780 psi

Shear Modulus 4828 psi

shift 0

In Situ Engineering

APPENDIX G

DILATOMETER TESTING (DMT)

Dilatometer Testing Data

DILATOMETER TESTING DATA

Provided by In-Situ Soil Testing

Variables

In order to maintain consistency between versions, variables used in WinDMT are similar to those used in the DOS version of DMT data reduction program. Input Data File Format are very similar also except Line 13 from previous DOS version is replaced with two new variables, plotting options are no longer required due to Windows environment. Line 14 and Line 15 are cards for additional calibration change for Blade and control unit. Line 14 (Test Reading Card) from previous version become Line 16 and Options Cards are no longer support (replaced by Line 13 to Line 15 cards).

Table 1 - Variables and Units Summary

Parameter	**Units**	**Description**
Z	meters	Test reading depth
ELEV	meters	Test reading elevation
THRUST	kgf	Total thrust force needed to advance the blade
A	bars	Dilatometer control unit "A" reading
B	bars	Dilatometer control unit "B" reading
C	bars	Dilatometer control unit "C" reading
DA	bars	Dilatometer A-calibration
DB	bars	Dilatometer B-calibration
ZMRNG	bars	Maximum control unit reading on low range gage
ZMLO	bars	Gage zero for low range gage
ZMHI	bars	Gage zero for high range gage
ZMCAL	bars	Gage zero for calibration gage
P0	bars	Corrected A-reading, p0
P1	bars	Corrected B-reading, p1
P2	bars	Corrected C-reading, p2
U0	bars	Porewater pressure
GAMMA	t/m3	Total unit weight of soil (1 t/m3 = 1000 kgf/m3) (equivalent to specific gravity)
SVP	bars	Effective vertical stress
KD	-	Dilatometer horizontal stress index
ID	-	Dilatometer material index
UD	-	Proposed pore pressure index
ED	bars	Dilatometer modulus
K0	-	Insitu coefficient of lateral earth pressure
SU	bars	Undrained shear strength for ID < 0.6
QD	bars	DMT bearing capacity from PHI calculation
PHI	degrees	The soil's drained plane strain friction angle for ID > 1.2
SIGFF	bars	Failure plane stress used to calculate PHIO
PHI0	degrees	PHI normalized to 2.72 bars, Baligh's theory
PC	bars	Preconsolidation pressure
OCR	-	Overconsolidation ratio
M	bars	Tangent drained constrained modulus
SOIL TYPE	-	Type of soil (clay, sand, etc.)

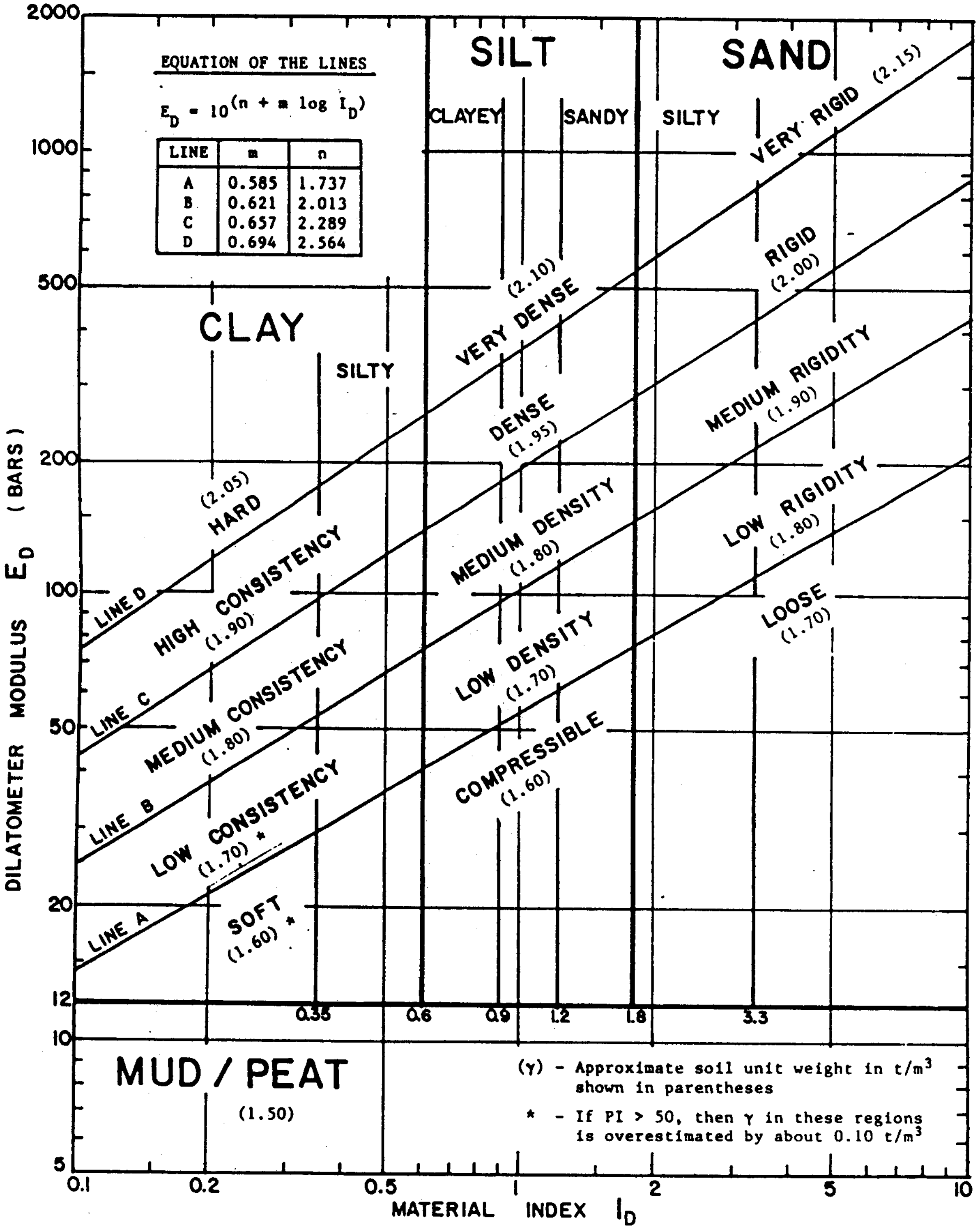


FIGURE 4.13 CHART FOR DETERMINATION OF SOIL DESCRIPTION AND UNIT WEIGHT.

(Marchetti & Crapps, 1981)

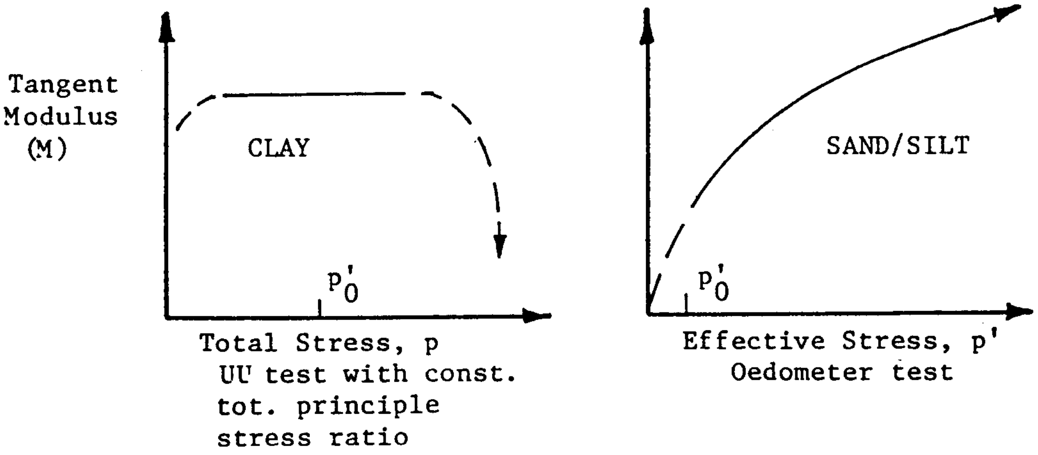


FIGURE 4.14 COMPARISON OF MODULUS BEHAVIOR IN UNDRAINED CLAYS AND DRAINED SANDS OR SILTS (Janbu, 1967)

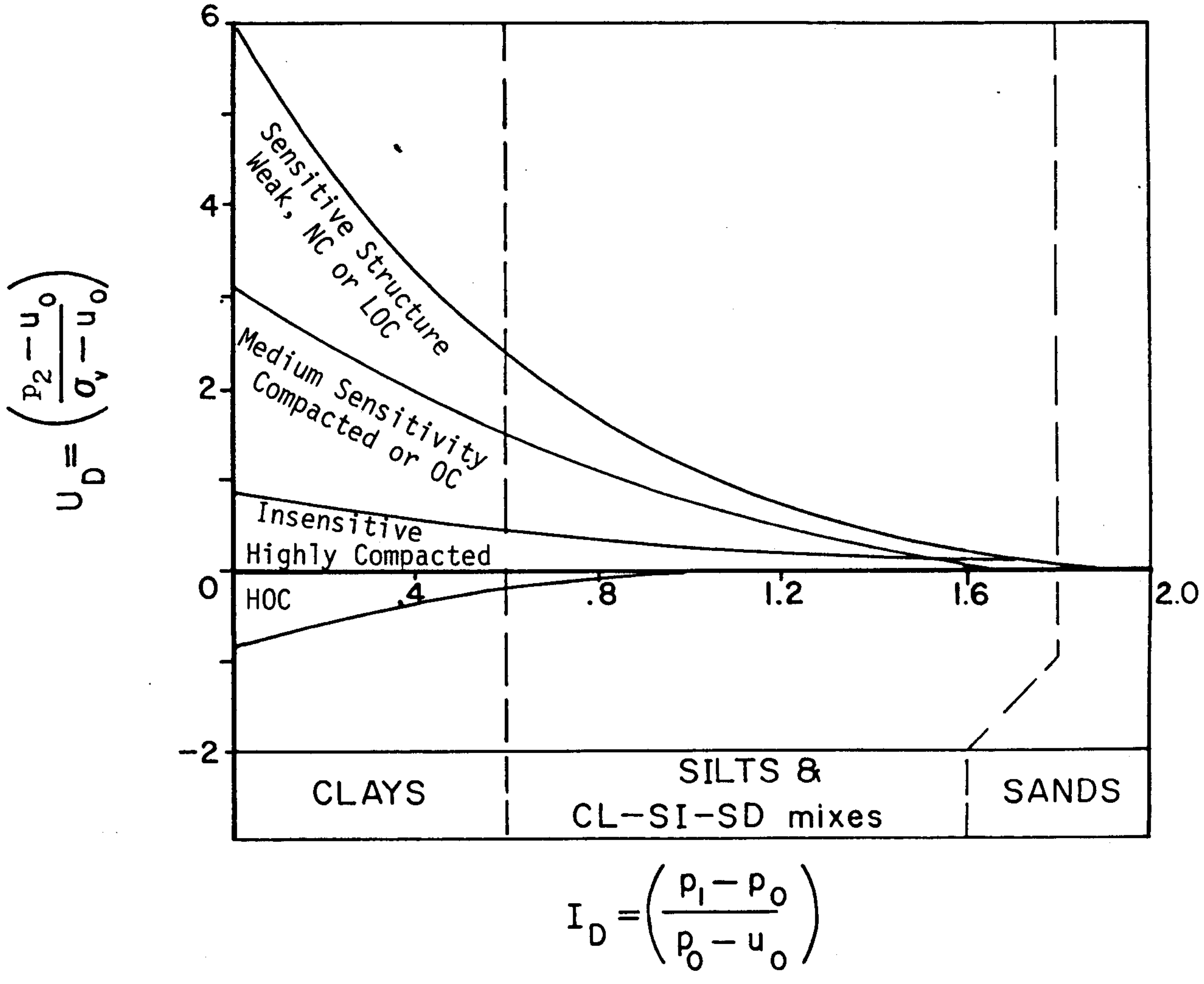


FIGURE 4.15 PROPOSED FORM OF I_D vs. U_D SOIL TYPE CORRELATION

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)       SNDG. NO. :DMT-701
In-Situ Soil Testing, L.C.                                                             Page 1a
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                       FILE NO. : 2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                SNDG. DATE: 8/18/08
ANAL.BY : Roger Failmezger, P.E.                                                       ANAL. DATE: 8/22/08

ANALYSIS PARAMETERS:   LO RANGE   =  5.74 TSF  ROD DIAM.    =  1.73 IN    BL.THICK.  =  0.59 IN     SU  FACTOR = 1
SURF.ELEV.  =    7.9 FT LO  GAGE 0 =  0.05 TSF  FR.RED.DIA. =  2.01 IN    BL.WIDTH   =  3.78 IN     PHI FACTOR = 1
WATER DEPTH =    5.9 FT HI  GAGE 0 =  0.00 TSF  LIN.ROD WT. =   5.4 LBF/FTDELTA-A    =  0.21 TSF    OCR FACTOR = 1
SP.GR.WATER = 1.000     CAL GAGE 0 =  0.00 TSF  DELTA/PHI    =   0.5       DELTA-B    =  0.34 TSF    M  FACTOR  = 1
MAX SU ID   =   0.6     SU OPTION  =     0      MIN PHI ID  =   1.8       OCR OPTION =     0        K0 FACTOR  = 1
UNIT CONVERSIONS:       1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z    ELEV   THRUST    A     B     C      DA    DB    ZMRNG ZMLO  ZMHI  ZMCAL   P0    P1    P2     U0    GAMMA   SVP
 (FT)   (FT)   (LBF)  (TSF) (TSF) (TSF)  (TSF) (TSF)  (TSF) (TSF) (TSF) (TSF)  (TSF) (TSF) (TSF)  (TSF)  (PCF)  (TSF)
***** ******  ****** ***** ***** *****  ***** *****  ***** ***** ***** *****  ***** ***** *****  ****** ****** ******
  3.9    3.9    4917  2.32 12.32         0.21  0.34   5.74  0.05  0.00  0.00   2.00 11.97         0.000  118.6  0.219
  4.6    3.3    2955  1.55  8.98         0.21  0.34   5.74  0.05  0.00  0.00   1.36  8.63         0.000  112.3  0.257
  5.2    2.6    1698  1.31  4.92         0.21  0.34   5.74  0.05  0.00  0.00   1.31  4.52         0.000  112.3  0.294
  5.9    2.0    1764  0.61  2.47         0.21  0.34   5.74  0.05  0.00  0.00   0.70  2.08         0.000  106.1  0.330
  6.6    1.3    1654  0.65  2.92         0.21  0.34   5.74  0.05  0.00  0.00   0.72  2.53         0.021  106.1  0.345
  7.2    0.7    1455  0.45  1.88         0.21  0.34   5.74  0.05  0.00  0.00   0.56  1.48         0.041   99.8  0.357
  7.9    0.0    1080  0.41  1.74         0.21  0.34   5.74  0.05  0.00  0.00   0.52  1.35         0.062   99.8  0.370
  8.5   -0.7     882  0.50  1.98         0.21  0.34   5.74  0.05  0.00  0.00   0.62  1.59         0.082  106.1  0.383
  9.2   -1.3     551  0.37  1.42         0.21  0.34   5.74  0.05  0.00  0.00   0.50  1.02         0.102   99.8  0.397
  9.8   -2.0     485  0.41  1.15         0.21  0.34   5.74  0.05  0.00  0.00   0.55  0.75         0.123   93.6  0.408
 10.5   -2.6     485  0.73  1.57         0.21  0.34   5.74  0.05  0.00  0.00   0.88  1.17         0.143   93.6  0.418
 11.2   -3.3     507  0.80  1.68         0.21  0.34   5.74  0.05  0.00  0.00   0.94  1.28         0.164   93.6  0.428
 17.1   -9.2    6659  2.08 12.53         0.19  0.37   5.74  0.05  0.00  0.00   1.71 12.16         0.349  112.3  0.548
 17.7   -9.8   14024  8.35 37.48         0.19  0.37   5.74  0.05  0.00  0.00   7.11 37.11         0.369  124.8  0.567
 18.4  -10.5   12436 11.28 36.44         0.19  0.37   5.74  0.05  0.00  0.00  10.23 36.07         0.389  134.2  0.589
 19.0  -11.2    8996  9.08 26.73         0.19  0.37   5.74  0.05  0.00  0.00   8.41 26.36         0.410  124.8  0.611
 19.7  -11.8   10805 10.02 31.01         0.19  0.37   5.74  0.05  0.00  0.00   9.19 30.64         0.430  134.2  0.633
 20.3  -12.5   14046 10.65 32.36         0.19  0.37   5.74  0.05  0.00  0.00   9.78 32.00         0.451  134.2  0.657
 23.6  -15.7    6174 11.59 29.23         0.22  0.30   5.74  0.05  0.00  0.00  10.95 28.93         0.553  131.0  0.772
 24.3  -16.4    7607 12.63 39.67         0.22  0.30   5.74  0.05  0.00  0.00  11.53 39.37         0.574  134.2  0.794
 24.9  -17.1    8092 14.20 28.50         0.22  0.30   5.74  0.05  0.00  0.00  13.73 28.20         0.594  131.0  0.817
 25.6  -17.7    8864 12.01 29.86         0.22  0.30   5.74  0.05  0.00  0.00  11.36 29.56         0.615  131.0  0.840
 26.2  -18.4    8203 14.82 27.35  0.24   0.22  0.30   5.74  0.05  0.00  0.00  14.45 27.05  0.41   0.635  131.0  0.862
 26.9  -19.0    7387 17.54 28.19  0.63   0.22  0.30   5.74  0.05  0.00  0.00  17.26 27.89  0.79   0.656  131.0  0.885
 27.2  -19.4   14046 16.60 30.07  1.15   0.22  0.30   5.74  0.05  0.00  0.00  16.17 29.76  1.32   0.666  131.0  0.897
 30.2  -22.3    3396  6.37 20.15         0.26  0.26   5.74  0.05  0.00  0.00   5.97 19.89         0.758  124.8  0.993
 30.8  -23.0    7607 13.47 30.59  0.60   0.26  0.26   5.74  0.05  0.00  0.00  12.90 30.33  0.80   0.779  131.0  1.015
 31.5  -23.6    8600 11.69 36.96  0.58   0.26  0.26   5.74  0.05  0.00  0.00  10.72 36.70  0.79   0.799  134.2  1.038
 32.2  -24.3    7321 12.01 26.41  0.28   0.26  0.26   5.74  0.05  0.00  0.00  11.58 26.15  0.49   0.820  131.0  1.061
 32.8  -24.9    7210 15.87 33.62  0.73   0.26  0.26   5.74  0.05  0.00  0.00  15.27 33.36  0.94   0.840  131.0  1.084
 33.5  -25.6    8644 13.89 27.46  0.18   0.26  0.26   5.74  0.05  0.00  0.00  13.50 27.20  0.39   0.860  131.0  1.106
 34.1  -26.2    7740 15.14 27.98  0.49   0.26  0.26   5.74  0.05  0.00  0.00  14.78 27.72  0.70   0.881  131.0  1.129
 34.8  -26.9    8136 14.62 29.44  0.97   0.26  0.26   5.74  0.05  0.00  0.00  14.17 29.18  1.18   0.902  131.0  1.152
 35.4  -27.6   10121 17.23 33.41  0.37   0.26  0.26   5.74  0.05  0.00  0.00  16.70 33.15  0.57   0.922  131.0  1.173
 36.1  -28.2    9592 24.74 41.03  1.27   0.26  0.26   5.74  0.05  0.00  0.00  24.22 40.77  1.48   0.943  131.0  1.196
 36.7  -28.9    8533 34.45 56.38  2.21   0.26  0.26   5.74  0.05  0.00  0.00  33.65 56.12  2.42   0.963  131.0  1.218
 37.4  -29.5    8864 38.84 55.85  5.44   0.26  0.26   5.74  0.05  0.00  0.00  38.27 55.59  5.65   0.983  127.9  1.240
 38.1  -30.2   10871 33.51 53.56  5.40   0.26  0.26   5.74  0.05  0.00  0.00  32.80 53.30  5.61   1.004  131.0  1.263
 38.7  -30.8    8467 35.08 54.18  9.92   0.26  0.26   5.74  0.05  0.00  0.00  34.41 53.92 10.18   1.024  127.9  1.285
 39.4  -31.5    9812 30.48 46.14  8.87   0.26  0.26   5.74  0.05  0.00  0.00  29.99 45.88  9.14   1.045  127.9  1.306
 40.0  -32.2    9746 27.98 42.07  4.62   0.26  0.26   5.74  0.05  0.00  0.00  27.56 41.81  4.83   1.066  127.9  1.328
 40.7  -32.8   10562 23.91 36.54  2.94   0.26  0.26   5.74  0.05  0.00  0.00  23.56 36.28  3.15   1.086  127.9  1.349
 41.3  -33.5   11576 20.57 34.56  3.36   0.26  0.26   5.74  0.05  0.00  0.00  20.16 34.30  3.57   1.107  131.0  1.372
 42.0  -34.1   13186 21.30 36.54  2.63   0.26  0.26   5.74  0.05  0.00  0.00  20.83 36.28  2.84   1.126  131.0  1.394
 42.7  -34.8   13208 23.18 36.75  3.08   0.26  0.26   5.74  0.05  0.00  0.00  22.79 36.49  3.29   1.147  131.0  1.417
 43.3  -35.4   13186 25.26 41.97  3.54   0.26  0.26   5.74  0.05  0.00  0.00  24.72 41.71  3.75   1.168  131.0  1.439
 44.0  -36.1   13230 25.47 45.31  3.99   0.26  0.26   5.74  0.05  0.00  0.00  24.77 45.05  4.20   1.188  131.0  1.462
 44.6  -36.7   13230 29.75 43.53  4.46   0.26  0.26   5.74  0.05  0.00  0.00  29.36 43.27  4.67   1.209  127.9  1.484
 45.9  -38.1    4101 12.95 26.10  1.28   0.28  0.22   5.74  0.05  0.00  0.00  12.59 25.88  1.51   1.250  131.0  1.527
 46.6  -38.7    5909 12.63 26.41  1.39   0.28  0.22   5.74  0.05  0.00  0.00  12.25 26.19  1.62   1.271  131.0  1.550
 47.2  -39.4    6681 12.42 26.41  1.12   0.28  0.22   5.74  0.05  0.00  0.00  12.03 26.19  1.35   1.291  131.0  1.572
 47.9  -40.0   10275 17.54 46.77  0.30   0.28  0.22   5.74  0.05  0.00  0.00  16.38 46.55  0.53   1.311  134.2  1.595
 48.6  -40.7   12480 17.43 38.73  0.31   0.28  0.22   5.74  0.05  0.00  0.00  16.67 38.51  0.54   1.332  131.0  1.619
 49.2  -41.3   14046 14.41 43.64  0.57   0.28  0.22   5.74  0.05  0.00  0.00  13.25 43.42  0.80   1.352  134.2  1.642
 51.8  -44.0    4454 23.59 38.94  0.96   0.29  0.21   5.74  0.05  0.00  0.00  23.15 38.73  1.20   1.434  131.0  1.734
 52.5  -44.6    5027 26.41 38.00  3.48   0.29  0.21   5.74  0.05  0.00  0.00  26.15 37.79  3.72   1.455  127.9  1.756
 53.1  -45.3    4212 25.58 35.91  4.77   0.29  0.21   5.74  0.05  0.00  0.00  25.38 35.70  5.01   1.475  127.9  1.778
 53.8  -45.9    5711 27.25 39.05  5.70   0.29  0.21   5.74  0.05  0.00  0.00  26.98 38.84  5.94   1.496  127.9  1.799
 54.5  -46.6    7519 30.07 42.28  9.50   0.29  0.21   5.74  0.05  0.00  0.00  29.77 42.07  9.79   1.516  127.9  1.821
 55.1  -47.2    7122 30.69 43.53 10.65   0.29  0.21   5.74  0.05  0.00  0.00  30.37 43.33 10.94   1.537  127.9  1.842
 55.8  -47.9    8114 32.99 47.29  8.87   0.29  0.21   5.74  0.05  0.00  0.00  32.59 47.08  9.17   1.558  127.9  1.864
 56.4  -48.6   10033 35.18 48.13 14.72   0.29  0.21   5.74  0.05  0.00  0.00  34.85 47.92 15.01   1.577  127.9  1.885
 57.1  -49.2    9724 38.42 52.20 14.93   0.29  0.21   5.74  0.05  0.00  0.00  38.04 51.99 15.22   1.598  127.9  1.906
 57.7  -49.9    8754 38.21 52.41 15.45   0.29  0.21   5.74  0.05  0.00  0.00  37.81 52.20 15.74   1.619  127.9  1.928
 58.4  -50.5    9305 35.29 50.32 13.89   0.29  0.21   5.74  0.05  0.00  0.00  34.85 50.11 14.18   1.639  127.9  1.950
 59.7  -51.8    4653 40.51 58.88 16.70   0.15  0.37   5.74  0.05  0.00  0.00  39.76 58.52 16.85   1.680  127.9  1.993
 60.4  -52.5    5292 39.88 56.27 18.58   0.15  0.37   5.74  0.05  0.00  0.00  39.23 55.91 18.73   1.701  127.9  2.014
 61.0  -53.1    5689 34.24 47.19 13.26   0.15  0.37   5.74  0.05  0.00  0.00  33.76 46.82 13.40   1.722  127.9  2.036
 61.7  -53.8    6417 24.95 35.29  4.83   0.15  0.37   5.74  0.05  0.00  0.00  24.61 34.92  4.93   1.741  127.9  2.058
 62.3  -54.5    6902 21.72 32.57  4.09   0.15  0.37   5.74  0.05  0.00  0.00  21.34 32.21  4.19   1.762  127.9  2.079
 63.0  -55.1    7916 20.57 32.05  4.62   0.15  0.37   5.74  0.05  0.00  0.00  20.16 31.69  4.72   1.783  131.0  2.101
 63.6  -55.8    9107 20.04 30.90  3.48   0.15  0.37   5.74  0.05  0.00  0.00  19.67 30.54  3.57   1.803  131.0  2.123
```

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)        SNDG. NO. : DMT-701
In-Situ Soil Testing, L.C.                                                              Page 2
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                        FILE NO. :2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                 SNDG. DATE: 8/18/08
ANAL.BY : Roger Failmezger, P.E.                                                        ANAL. DATE: 8/22/08

ANALYSIS PARAMETERS:   LO RANGE   =  5.74 TSF  ROD DIAM.   =  1.73 IN    BL.THICK.  =  0.59 IN    SU  FACTOR = 1
SURF.ELEV.  =    7.9 FT LO  GAGE 0 =  0.05 TSF  FR.RED.DIA. =  2.01 IN    BL.WIDTH   =  3.78 IN    PHI FACTOR = 1
WATER DEPTH =    5.9 FT HI  GAGE 0 =  0.00 TSF  LIN.ROD WT. =    5.4 LBF/FTDELTA-A    =  0.21 TSF    OCR FACTOR = 1
SP.GR.WATER = 1.000      CAL GAGE 0 =  0.00 TSF;
                                                 DELTA / PHI =   0.5       DELTA - B =  0.34 TSF    M FACTOR = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.8      OCR OPTION =     0       K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z    ELEV    KD    ID    UD     ED      K0     SU     QD     PHI   SIGFF   PHIO    PC     OCR      M      SOIL TYPE
(FT)   (FT)                      (TSF)          (TSF)  (TSF)  (DEG)  (TSF)   (DEG)  (TSF)          (TSF)
***** ******  ***** ***** ***** ******  *****  *****  *****  *****  ******  *****  *****  *****  ******  ************
  3.9    3.9    9.12  4.99           347   0.89           73.8   46.4    0.38    43.8   1.38    6.3      837  SAND
  4.6    3.3    5.27  5.37           253   0.62           44.5   43.5    0.44    40.8   0.73    2.8      491  SAND
  5.2    2.6    4.45  2.45           112   0.70           24.1   38.9    0.48    35.9   0.92    3.1      197  SILTY SAND
  5.9    2.0    2.11  1.98            48   0.38           28.0   40.0    0.54    37.3   0.30    0.9       50  SILTY SAND
  6.6    1.3    2.03  2.59            63   0.39           26.2   39.3    0.56    36.6   0.33    1.0       67  SILTY SAND
  7.2    0.7    1.46  1.77            32   0.39                                         0.22    0.6       27  SANDY SILT
  7.9    0.0    1.25  1.78            28   0.32                                         0.18    0.5       24  SANDY SILT
  8.5   -0.7    1.38  1.84            33   0.44           14.3   34.3    0.60    31.4   0.38    1.0       29  SILTY SAND
  9.2   -1.3    0.99  1.33            18   0.22                                         0.14    0.3       16  SANDY SILT
  9.8   -2.0    1.06  0.46             7   0.25   0.04                                  0.15    0.4        6  MUD
 10.5   -2.6    1.75  0.41            10   0.47   0.07                                  0.33    0.8        8  MUD
 11.2   -3.3    1.82  0.44            11   0.50   0.08                                  0.37    0.9       10  MUD
 17.1   -9.2    2.49  7.64           362   0.14          108.3   45.8    0.94    44.3   0.10    0.2      469  SAND
 17.7   -9.8   11.90  4.45          1041   1.31          205.0   45.3    0.97    43.8   7.26   12.8     2774  SAND
 18.4  -10.5   16.72  2.62           897   2.03          164.3   42.7    0.99    41.2  17.27   29.3     2678  SILTY SAND
 19.0  -11.2   13.11  2.24           622   1.65          116.4   41.4    1.01    39.9  11.81   19.3     1716  SILTY SAND
 19.7  -11.8   13.84  2.45           744   1.71          142.8   42.2    1.05    40.7  13.14   20.8     2090  SILTY SAND
 20.3  -12.5   14.21  2.38           772   1.69          193.7   43.6    1.11    42.2  13.45   20.5     2184  SILTY SAND
 23.6  -15.7   13.48  1.73           624   2.21                                        15.14   19.6     1736  SANDY SILT
 24.3  -16.4   13.78  2.54           966   1.85           83.5   37.8    1.28    36.5  19.29   24.3     2709  SILTY SAND
 24.9  -17.1   16.07  1.10           502   2.45                                        21.09   25.8     1480  SILT
 25.6  -17.7   12.79  1.69           632   2.14                                        15.18   18.1     1726  SANDY SILT
 26.2  -18.4   16.01  0.91 -0.02     437   2.44                                        22.13   25.7     1288  SILT
 26.9  -19.0   18.75  0.64  0.01     369   2.68                                        29.05   32.8     1142  CLAYEY SILT
 27.2  -19.4   17.30  0.88  0.04     472   2.56                                        25.95   28.9     1424  CLAYEY SILT
 30.2  -22.3    5.24  2.67           483   0.92           40.4   33.7    1.55    32.6   5.00    5.0      930  SILTY SAND
 30.8  -23.0   11.94  1.44  0.00     604   2.05                                        16.48   16.2     1614  SANDY SILT
 31.5  -23.6    9.56  2.62  0.00     902   1.32          104.8   38.5    1.68    37.7  12.37   11.9     2217  SILTY SAND
 32.2  -24.3   10.14  1.36 -0.03     506   1.85                                        13.34   12.6     1272  SANDY SILT
 32.8  -24.9   13.32  1.25  0.01     627   2.19                                        20.86   19.3     1739  SANDY SILT
 33.5  -25.6   11.42  1.08 -0.04     475   2.00                                        16.76   15.2     1249  SILT
 34.1  -26.2   12.32  0.93 -0.01     449   2.09                                        19.24   17.0     1211  SILT
 34.8  -26.9   11.52  1.13  0.02     521   2.01                                        17.67   15.4     1373  SILT
 35.4  -27.6   13.45  1.04 -0.02     571   2.20                                        22.94   19.5     1587  SILT
 36.1  -28.2   19.46  0.71  0.02     574   2.74                                        41.60   34.8     1798  CLAYEY SILT
 36.7  -28.9   26.82  0.69  0.04     780   3.28                                        69.92   57.4     2678  CLAYEY SILT
 37.4  -29.5   30.06  0.46  0.13     601   3.49   8.08                                 85.03   68.5     2129  SILTY CLAY
 38.1  -30.2   25.18  0.64  0.14     711   3.16                                        65.66   52.0     2400  CLAYEY SILT
 38.7  -30.8   25.99  0.58  0.27     678   3.22   6.97                                 70.18   54.6     2305  SILTY CLAY
 39.4  -31.5   22.16  0.55  0.28     551   2.95   5.80                                 55.65   42.6     1795  SILTY CLAY
 40.0  -32.2   19.96  0.54  0.14     495   2.77   5.18                                 48.04   36.2     1560  SILTY CLAY
 40.7  -32.8   16.66  0.57  0.09     442   2.50   4.20                                 36.83   27.3     1316  SILTY CLAY
 41.3  -33.5   13.89  0.74  0.13     491   2.25                                        28.20   20.6     1379  CLAYEY SILT
 42.0  -34.1   14.13  0.78  0.09     537   2.27                                        29.43   21.1     1516  CLAYEY SILT
 42.7  -34.8   15.28  0.63  0.10     475   2.38                                        33.78   23.8     1379  CLAYEY SILT
 43.3  -35.4   16.37  0.72  0.11     590   2.47                                        38.21   26.6     1749  CLAYEY SILT
 44.0  -36.1   16.13  0.86  0.13     704   2.45                                        37.96   26.0     2078  CLAYEY SILT
 44.6  -36.7   18.97  0.49  0.12     483   2.70   5.43                                 49.60   33.4     1500  SILTY CLAY
 45.9  -38.1    7.43  1.17  0.02     461   1.52                                        11.83    7.7     1017  SILT
 46.6  -38.7    7.08  1.27  0.03     483   1.47                                        11.15    7.2     1046  SANDY SILT
 47.2  -39.4    6.83  1.32  0.01     492   1.44                                        10.68    6.8     1045  SANDY SILT
 47.9  -40.0    9.45  2.00 -0.05    1047   1.36          115.0   36.5    2.55    36.3  20.01   12.5     2561  SILTY SAND
 48.6  -40.7    9.48  1.42 -0.05     758   1.78                                        18.34   11.3     1855  SANDY SILT
 49.2  -41.3    7.25  2.54 -0.05    1047   1.00          188.0   39.9    2.69    39.8  11.17    6.8     2315  SILTY SAND
 51.8  -44.0   12.52  0.72 -0.01     541   2.11                                        30.32   17.5     1468  CLAYEY SILT
 52.5  -44.6   14.06  0.47  0.09     404   2.26   4.43                                 36.81   21.0     1140  SILTY CLAY
 53.1  -45.3   13.45  0.43  0.15     358   2.20   4.24                                 34.74   19.5      996  SILTY CLAY
 53.8  -45.9   14.16  0.47  0.17     411   2.27   4.57                                 38.13   21.2     1164  SILTY CLAY
 54.5  -46.6   15.52  0.44  0.29     427   2.40   5.19                                 44.51   24.4     1244  SILTY CLAY
 55.1  -47.2   15.65  0.45  0.33     450   2.41   5.30                                 45.62   24.8     1314  SILTY CLAY
 55.8  -47.9   16.65  0.47  0.25     503   2.50   5.79                                 50.85   27.3     1500  SILTY CLAY
 56.4  -48.6   17.65  0.39  0.40     453   2.59   6.31                                 56.32   29.9     1377  SILTY CLAY
 57.1  -49.2   19.12  0.38  0.37     483   2.71   7.05                                 64.52   33.8     1506  SILTY CLAY
 57.7  -49.9   18.77  0.40  0.39     499   2.68   6.97                                 63.42   32.9     1545  SILTY CLAY
 58.4  -50.5   17.04  0.46  0.38     529   2.53   6.24                                 55.11   28.3     1591  SILTY CLAY
 59.7  -51.8   19.11  0.49  0.40     650   2.71   7.36                                 67.39   33.8     2026  SILTY CLAY
 60.4  -52.5   18.63  0.44  0.45     578   2.67   7.21                                 65.49   32.5     1787  SILTY CLAY
 61.0  -53.1   15.74  0.41  0.36     453   2.42   5.91                                 50.87   25.0     1327  SILTY CLAY
 61.7  -53.8   11.11  0.45  0.14     358   1.96   3.86                                 29.87   14.5      930  SILTY CLAY
 62.3  -54.5    9.42  0.55  0.12     377   1.77   3.17                                 23.32   11.2      920  SILTY CLAY
 63.0  -55.1    8.75  0.63  0.16     400   1.69                                        21.01   10.0      945  CLAYEY SILT
 63.6  -55.8    8.42  0.61  0.10     377   1.65                                        19.98    9.4      876  CLAYEY SILT
```

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)       SNDG. NO. :DMT-701
In-Situ Soil Testing, L.C.                                                             Page 2a
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                       FILE NO. : 2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                SNDG. DATE: 8/18/08
ANAL.BY : Roger Failmezger, P.E.                                                       ANAL. DATE: 8/22/08

ANALYSIS PARAMETERS:   LO RANGE   =  5.99 TSF  ROD DIAM.    =  0.68 IN    BL.THICK.  =  0.02 IN     SU  FACTOR = 1
SURF.ELEV.  =   7.9 FT LO  GAGE 0 =  0.05 TSF  FR.RED.DIA. =  0.79 IN     BL.WIDTH   =  0.15 IN     PHI FACTOR = 1
WATER DEPTH =   5.9 FT HI  GAGE 0 =  0.00 TSF  LIN.ROD WT. =   3.6 LBF/FTDELTA-A    =  0.22 TSF    OCR FACTOR = 1
SP.GR.WATER = 1.000    CAL GAGE 0 =  0.00 TSF  DELTA/PHI   =   0.5        DELTA-B    =  0.35 TSF    M  FACTOR  = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.8        OCR OPTION =     0        K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z    ELEV   THRUST    A     B     C      DA    DB     ZMRNG ZMLO  ZMHI  ZMCAL   P0    P1    P2     U0    GAMMA   SVP
(FT)   (FT)   (LBF)   (TSF) (TSF) (TSF)  (TSF) (TSF)   (TSF) (TSF) (TSF) (TSF)  (TSF) (TSF) (TSF)  (TSF)  (PCF)  (TSF)
***** ******  ******  ***** ***** *****  ***** *****   ***** ***** ***** *****  ***** ***** *****  ****** ****** ******
 64.3  -56.4    8004  19.42 30.59  2.98   0.15  0.37    5.74  0.05  0.00  0.00  19.03 30.22  3.07   1.824  131.0  2.145
 65.0  -57.1   10275  20.98 30.07  5.80   0.15  0.37    5.74  0.05  0.00  0.00  20.70 29.70  5.95   1.844  127.9  2.168
 65.6  -57.7   10584  26.62 36.85 10.54   0.15  0.37    5.74  0.05  0.00  0.00  26.28 36.49 10.69   1.865  127.9  2.189
 66.3  -58.4   10871  27.87 37.48 13.78   0.15  0.37    5.74  0.05  0.00  0.00  27.56 37.11 13.93   1.885  127.9  2.211
 66.9  -59.1   13120  28.29 39.25 12.01   0.15  0.37    5.74  0.05  0.00  0.00  27.92 38.89 12.15   1.905  127.9  2.232
 67.6  -59.7   10716  28.50 38.84 14.09   0.15  0.37    5.74  0.05  0.00  0.00  28.16 38.47 14.24   1.926  127.9  2.254
 68.2  -60.4   13054  31.63 42.07 16.39   0.15  0.37    5.74  0.05  0.00  0.00  31.28 41.71 16.54   1.947  127.9  2.276
 68.9  -61.0   12965  34.35 45.73 16.39   0.15  0.37    5.74  0.05  0.00  0.00  33.95 45.36 16.54   1.967  127.9  2.297
 69.6  -61.7   12965  32.99 44.16 16.50   0.15  0.37    5.74  0.05  0.00  0.00  32.60 43.80 16.64   1.988  127.9  2.319
 70.2  -62.3   13010  31.22 42.18 14.30   0.15  0.37    5.74  0.05  0.00  0.00  30.84 41.81 14.45   2.008  127.9  2.340
 70.9  -63.0   13781  27.04 38.42  8.56   0.15  0.37    5.74  0.05  0.00  0.00  26.64 38.05  8.71   2.028  127.9  2.362
 71.5  -63.6   14002  24.85 36.44  7.62   0.15  0.37    5.74  0.05  0.00  0.00  24.44 36.07  7.77   2.049  127.9  2.383
 72.2  -64.3    4123  23.91 35.91  4.91   0.17  0.37    5.74  0.05  0.00  0.00  23.50 35.55  5.02   2.069  127.9  2.404
 72.8  -65.0    4873  24.74 35.18 10.13   0.17  0.37    5.74  0.05  0.00  0.00  24.42 34.82 10.29   2.090  127.9  2.426
 73.5  -65.6    4697  27.25 37.79 11.38   0.17  0.37    5.74  0.05  0.00  0.00  26.91 37.43 11.55   2.111  127.9  2.447
 74.1  -66.3    5138  34.24 45.94 16.29   0.17  0.37    5.74  0.05  0.00  0.00  33.86 45.57 16.45   2.131  127.9  2.469
 74.8  -66.9    5843  36.23 48.34 18.90   0.17  0.37    5.74  0.05  0.00  0.00  35.82 47.97 19.06   2.152  127.9  2.491
 75.5  -67.6    6174  34.97 47.61 17.54   0.17  0.37    5.74  0.05  0.00  0.00  34.54 47.24 17.71   2.172  127.9  2.512
 76.1  -68.2    7784  37.38 50.53 19.11   0.17  0.37    5.74  0.05  0.00  0.00  36.92 50.16 19.27   2.192  127.9  2.534
 76.8  -68.9    9548  36.85 50.84 17.02   0.17  0.37    5.74  0.05  0.00  0.00  36.35 50.48 17.18   2.213  127.9  2.555
 77.4  -69.6    8644  38.42 51.89 19.21   0.17  0.37    5.74  0.05  0.00  0.00  37.94 51.52 19.38   2.233  127.9  2.577
 78.1  -70.2    9173  37.90 51.78 18.48   0.17  0.37    5.74  0.05  0.00  0.00  37.40 51.42 18.65   2.254  127.9  2.599
 78.7  -70.9   10187  39.05 52.83 17.85   0.17  0.37    5.74  0.05  0.00  0.00  38.55 52.46 18.02   2.275  127.9  2.619
 79.4  -71.5   12304  40.40 54.18 17.64   0.17  0.37    5.74  0.05  0.00  0.00  39.91 53.82 17.81   2.295  127.9  2.641
 80.1  -72.2   12965  39.88 54.91 16.50   0.17  0.37    5.74  0.05  0.00  0.00  39.33 54.55 16.66   2.316  127.9  2.663
 80.7  -72.8   13781  41.03 54.60 19.73   0.17  0.37    5.74  0.05  0.00  0.00  40.55 54.24 19.90   2.335  127.9  2.684
 81.4  -73.5   13759  44.79 60.34 20.46   0.17  0.37    5.74  0.05  0.00  0.00  44.20 59.98 20.63   2.356  127.9  2.706
 82.0  -74.1   13847  41.34 61.60 13.15   0.17  0.37    5.74  0.05  0.00  0.00  40.53 61.23 13.32   2.377  127.9  2.727
 82.7  -74.8   13737  44.68 62.22 15.56   0.17  0.37    5.74  0.05  0.00  0.00  44.00 61.86 15.72   2.397  127.9  2.749
 83.3  -75.5   13737  44.79 63.79 15.97   0.17  0.37    5.74  0.05  0.00  0.00  44.04 63.42 16.14   2.418  127.9  2.771
 84.0  -76.1   13737  44.79 61.49 18.06   0.17  0.37    5.74  0.05  0.00  0.00  44.15 61.13 18.23   2.439  127.9  2.792
 84.6  -76.8    4785  40.72 56.38 18.69   0.18  0.37    5.74  0.05  0.00  0.00  40.14 56.01 18.87   2.459  127.9  2.814
 85.3  -77.4    5535  39.88 55.54 19.73   0.18  0.37    5.74  0.05  0.00  0.00  39.31 55.18 19.91   2.480  127.9  2.834
 86.0  -78.1    3925  37.90 51.99 17.75   0.18  0.37    5.74  0.05  0.00  0.00  37.40 51.63 17.93   2.500  127.9  2.856
 86.6  -78.7    5623  39.46 52.51 21.51   0.18  0.37    5.74  0.05  0.00  0.00  39.01 52.15 21.68   2.520  127.9  2.878
 87.3  -79.4    6791  38.42 52.30 22.34   0.18  0.37    5.74  0.05  0.00  0.00  37.93 51.94 22.52   2.541  127.9  2.899
 87.9  -80.1    7343  41.24 55.33 22.34   0.18  0.37    5.74  0.05  0.00  0.00  40.74 54.97 22.52   2.561  127.9  2.921
 88.6  -80.7    7475  36.44 49.38 19.21   0.18  0.37    5.74  0.05  0.00  0.00  36.00 49.02 19.39   2.582  127.9  2.942
 89.2  -81.4    9283  34.87 49.28 13.68   0.18  0.37    5.74  0.05  0.00  0.00  34.36 48.91 13.85   2.603  127.9  2.964
 89.9  -82.0    9614  41.13 55.96 17.43   0.18  0.37    5.74  0.05  0.00  0.00  40.60 55.59 17.61   2.623  127.9  2.986
 90.6  -82.7   10782  43.64 62.33 17.43   0.18  0.37    5.74  0.05  0.00  0.00  42.91 61.96 17.61   2.643  127.9  3.007
 91.2  -83.3   13010  46.77 64.31 19.94   0.18  0.37    5.74  0.05  0.00  0.00  46.10 63.95 20.12   2.664  127.9  3.029
 91.9  -84.0   12899  49.49 66.09 20.15   0.18  0.37    5.74  0.05  0.00  0.00  48.86 65.72 20.33   2.684  127.9  3.050
 92.5  -84.6   12943  46.77 65.56 19.63   0.18  0.37    5.74  0.05  0.00  0.00  46.04 65.20 19.80   2.705  127.9  3.071
 93.2  -85.3   13693  50.11 66.50 21.09   0.18  0.37    5.74  0.05  0.00  0.00  49.50 66.14 21.27   2.725  127.9  3.093
 93.8  -86.0   13605  49.49 65.46 22.86   0.18  0.37    5.74  0.05  0.00  0.00  48.89 65.09 23.04   2.746  127.9  3.114
 94.5  -86.6   13671  47.82 63.48 23.07   0.18  0.37    5.74  0.05  0.00  0.00  47.24 63.11 23.25   2.767  127.9  3.136
 95.1  -87.3   13671  47.92 65.25 22.45   0.18  0.37    5.74  0.05  0.00  0.00  47.26 64.88 22.62   2.786  127.9  3.158
 95.8  -87.9   13671  46.98 64.41 21.82   0.18  0.37    5.74  0.05  0.00  0.00  46.31 64.05 22.00   2.807  127.9  3.179
 96.5  -88.6   14046  43.22 58.57 19.42   0.18  0.37    5.74  0.05  0.00  0.00  42.66 58.20 19.60   2.828  127.9  3.201
 97.1  -89.2   14046  40.72 55.96 17.54   0.18  0.37    5.74  0.05  0.00  0.00  40.16 55.59 17.72   2.848  127.9  3.222
 97.8  -89.9    5535  48.86 64.10 26.31   0.18  0.37    5.74  0.05  0.00  0.00  48.31 63.74 26.49   2.869  127.9  3.244
 98.4  -90.6    5909  52.10 66.40 29.86   0.18  0.37    5.74  0.05  0.00  0.00  51.58 66.03 30.04   2.889  127.9  3.266
 99.1  -91.2    5336  47.19 62.12 28.81   0.18  0.37    5.74  0.05  0.00  0.00  46.65 61.75 28.99   2.910  127.9  3.287
 99.7  -91.9    6637  41.55 55.33 24.74   0.18  0.37    5.74  0.05  0.00  0.00  41.07 54.97 24.92   2.931  127.9  3.308
100.4  -92.5    8467  41.86 56.69 22.34   0.18  0.37    5.74  0.05  0.00  0.00  41.33 56.32 22.52   2.950  127.9  3.329
101.0  -93.2    8644  41.45 54.81 23.80   0.18  0.37    5.74  0.05  0.00  0.00  40.99 54.44 23.98   2.971  127.9  3.351
101.7  -93.8    9459  45.73 60.24 21.19   0.18  0.37    5.74  0.05  0.00  0.00  45.21 59.87 21.37   2.992  127.9  3.373
102.4  -94.5   10474  47.29 64.00 22.76   0.18  0.37    5.74  0.05  0.00  0.00  46.67 63.63 22.94   3.012  127.9  3.394
103.0  -95.1   12569  48.96 67.55 23.91   0.18  0.37    5.74  0.05  0.00  0.00  48.24 67.18 24.09   3.033  127.9  3.416
103.7  -95.8   12150  51.05 65.77 23.80   0.18  0.37    5.74  0.05  0.00  0.00  50.52 65.41 23.98   3.053  127.9  3.437
104.3  -96.5   12436  45.10 60.34 23.18   0.18  0.37    5.74  0.05  0.00  0.00  44.55 59.98 23.35   3.074  127.9  3.459
105.0  -97.1   13252  45.21 60.87 24.53   0.18  0.37    5.74  0.05  0.00  0.00  44.63 60.50 24.71   3.094  127.9  3.481
105.6  -97.8   12833  47.19 62.43 24.64   0.18  0.37    5.74  0.05  0.00  0.00  46.64 62.07 24.82   3.114  127.9  3.502
106.3  -98.4   13671  43.12 57.94 23.28   0.18  0.37    5.74  0.05  0.00  0.00  42.58 57.58 23.46   3.135  127.9  3.524
107.0  -99.1   13671  40.72 55.12 24.01   0.18  0.37    5.74  0.05  0.00  0.00  40.20 54.76 24.19   3.156  127.9  3.544
107.6  -99.7   13671  41.34 55.65 22.13   0.18  0.37    5.74  0.05  0.00  0.00  40.83 55.28 22.31   3.176  127.9  3.566
108.3  -100.4  13671  40.40 55.02 22.45   0.18  0.37    5.74  0.05  0.00  0.00  39.88 54.65 22.62   3.197  127.9  3.588
108.9  -101.0  13892  44.68 60.97 21.30   0.18  0.37    5.74  0.05  0.00  0.00  44.08 60.60 21.48   3.217  127.9  3.609
109.6  -101.7  14046  43.85 62.95 18.06   0.18  0.37    5.74  0.05  0.00  0.00  43.10 62.59 18.24   3.237  127.9  3.631
110.2  -102.4   4895  46.77 63.79 21.40   0.18  0.35    5.74  0.05  0.00  0.00  46.12 63.43 21.58   3.258  127.9  3.653
110.9  -103.0   5799  49.69 66.61 23.39   0.18  0.35    5.74  0.05  0.00  0.00  49.06 66.25 23.56   3.278  127.9  3.674
```

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)       SNDG. NO. : DMT-701
In-Situ Soil Testing, L.C.                                                             Page 2
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                       FILE NO. :2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                SNDG. DATE: 8/18/08
ANAL.BY : Roger Failmezger, P.E.                                                       ANAL. DATE: 8/22/08

ANALYSIS PARAMETERS:   LO RANGE   =  5.99 TSF  ROD DIAM.    =  0.68 IN    BL.THICK.  =  0.02 IN    SU  FACTOR = 1
SURF.ELEV.  =   7.9 FT LO  GAGE 0 =  0.05 TSF  FR.RED.DIA. =  0.79 IN      BL.WIDTH   =  0.15 IN    PHI FACTOR = 1
WATER DEPTH =   5.9 FT HI  GAGE 0 =  0.00 TSF  LIN.ROD WT. =   3.6 LBF/FTDELTA-A    =  0.22 TSF    OCR FACTOR = 1
SP.GR.WATER = 1.000      CAL GAGE 0 =  0.00 TSF;
                                                DELTA / PHI =   0.5       DELTA - B =  0.35 TSF    M FACTOR = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.8      OCR OPTION =     0      K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z    ELEV    KD    ID    UD    ED      K0      SU    QD     PHI   SIGFF   PHIO    PC     OCR      M      SOIL TYPE
(FT)   (FT)                     (TSF)          (TSF)  (TSF)  (DEG)  (TSF)   (DEG)  (TSF)          (TSF)
***** ****** ***** ***** ***** ******  *****  *****  *****  *****  ******  *****  *****  *****  ******  ************
 64.3  -56.4  8.02  0.65  0.07    388   1.60                                      18.73    8.7     883  CLAYEY SILT
 65.0  -57.1  8.70  0.48  0.22    312   1.68   3.00                               21.48    9.9     736  SILTY CLAY
 65.6  -57.7 11.15  0.42  0.36    354   1.97   4.12                               31.96   14.6     922  SILTY CLAY
 66.3  -58.4 11.62  0.37  0.47    331   2.02   4.38                               34.39   15.6     875  SILTY CLAY
 66.9  -59.1 11.65  0.42  0.39    381   2.02   4.45                               34.89   15.6    1007  SILTY CLAY
 67.6  -59.7 11.64  0.39  0.47    358   2.02   4.48                               35.16   15.6     946  SILTY CLAY
 68.2  -60.4 12.89  0.36  0.50    361   2.15   5.15                               41.65   18.3     992  SILTY CLAY
 68.9  -61.0 13.92  0.36  0.46    396   2.25   5.71                               47.41   20.6    1114  SILTY CLAY
 69.6  -61.7 13.21  0.37  0.48    388   2.18   5.40                               44.05   19.0    1073  SILTY CLAY
 70.2  -62.3 12.32  0.38  0.43    381   2.09   5.00                               39.90   17.1    1027  SILTY CLAY
 70.9  -63.0 10.42  0.46  0.27    396   1.89   4.09                               31.02   13.1    1005  SILTY CLAY
 71.5  -63.6  9.40  0.52  0.26    404   1.77   3.62                               26.62   11.2     983  SILTY CLAY
 72.2  -64.3  8.91  0.56  0.14    418   1.71   3.42                               24.74   10.3     996  SILTY CLAY
 72.8  -65.0  9.20  0.47  0.37    361   1.75   3.59                               26.24   10.8     872  SILTY CLAY
 73.5  -65.6 10.13  0.42  0.38    364   1.85   4.09                               30.78   12.6     917  SILTY CLAY
 74.1  -66.3 12.85  0.37  0.45    406   2.14   5.55                               44.94   18.2    1113  SILTY CLAY
 74.8  -66.9 13.52  0.36  0.50    422   2.21   5.97                               49.07   19.7    1175  SILTY CLAY
 75.5  -67.6 12.88  0.39  0.48    441   2.15   5.67                               45.93   18.3    1208  SILTY CLAY
 76.1  -68.2 13.70  0.38  0.49    459   2.23   6.18                               51.00   20.1    1287  SILTY CLAY
 76.8  -68.9 13.36  0.41  0.44    491   2.19   6.03                               49.43   19.3    1360  SILTY CLAY
 77.4  -69.6 13.86  0.38  0.48    471   2.24   6.37                               52.78   20.5    1324  SILTY CLAY
 78.1  -70.2 13.53  0.40  0.47    487   2.21   6.23                               51.25   19.7    1355  SILTY CLAY
 78.7  -70.9 13.85  0.38  0.43    482   2.24   6.47                               53.60   20.5    1355  SILTY CLAY
 79.4  -71.5 14.24  0.37  0.41    482   2.28   6.75                               56.46   21.4    1369  SILTY CLAY
 80.1  -72.2 13.90  0.41  0.39    528   2.25   6.61                               54.80   20.6    1486  SILTY CLAY
 80.7  -72.8 14.23  0.36  0.46    475   2.28   6.87                               57.34   21.4    1347  SILTY CLAY
 81.4  -73.5 15.47  0.38  0.44    547   2.39   7.67                               65.78   24.3    1594  SILTY CLAY
 82.0  -74.1 13.99  0.54  0.29    718   2.26   6.83                               56.68   20.8    2024  SILTY CLAY
 82.7  -74.8 15.13  0.43  0.32    620   2.36   7.59                               64.61   23.5    1793  SILTY CLAY
 83.3  -75.5 15.02  0.47  0.33    673   2.35   7.58                               64.35   23.2    1942  SILTY CLAY
 84.0  -76.1 14.94  0.41  0.38    589   2.35   7.58                               64.30   23.0    1697  SILTY CLAY
 84.6  -76.8 13.39  0.42  0.44    551   2.20   6.67                               54.64   19.4    1529  SILTY CLAY
 85.3  -77.4 12.99  0.43  0.47    551   2.16   6.46                               52.49   18.5    1514  SILTY CLAY
 86.0  -78.1 12.22  0.41  0.44    494   2.08   6.03                               48.08   16.8    1328  SILTY CLAY
 86.6  -78.7 12.68  0.36  0.53    455   2.13   6.37                               51.33   17.8    1241  SILTY CLAY
 87.3  -79.4 12.21  0.40  0.56    487   2.08   6.12                               48.72   16.8    1307  SILTY CLAY
 87.9  -80.1 13.07  0.37  0.52    494   2.17   6.71                               54.61   18.7    1359  SILTY CLAY
 88.6  -80.7 11.35  0.39  0.50    452   1.99   5.67                               44.17   15.0    1184  SILTY CLAY
 89.2  -81.4 10.71  0.46  0.35    505   1.92   5.31                               40.63   13.7    1296  SILTY CLAY
 89.9  -82.0 12.72  0.39  0.39    520   2.13   6.63                               53.51   17.9    1420  SILTY CLAY
 90.6  -82.7 13.39  0.47  0.37    661   2.20   7.12                               58.39   19.4    1835  SILTY CLAY
 91.2  -83.3 14.34  0.41  0.40    619   2.29   7.82                               65.46   21.6    1759  SILTY CLAY
 91.9  -84.0 15.14  0.37  0.38    585   2.36   8.43                               71.72   23.5    1692  SILTY CLAY
 92.5  -84.6 14.11  0.44  0.39    665   2.27   7.77                               64.70   21.1    1879  SILTY CLAY
 93.2  -85.3 15.12  0.36  0.40    577   2.36   8.53                               72.60   23.5    1669  SILTY CLAY
 93.8  -86.0 14.82  0.35  0.44    563   2.33   8.37                               70.81   22.7    1615  SILTY CLAY
 94.5  -86.6 14.18  0.36  0.46    551   2.27   7.99                               66.59   21.2    1559  SILTY CLAY
 95.1  -87.3 14.08  0.40  0.45    612   2.27   7.97                               66.34   21.0    1728  SILTY CLAY
 95.8  -87.9 13.68  0.41  0.44    616   2.23   7.74                               63.86   20.1    1722  SILTY CLAY
 96.5  -88.6 12.44  0.39  0.42    540   2.10   6.92                               55.44   17.3    1461  SILTY CLAY
 97.1  -89.2 11.58  0.41  0.40    536   2.01   6.37                               49.87   15.5    1414  SILTY CLAY
 97.8  -89.9 14.01  0.34  0.52    536   2.26   8.13                               67.57   20.8    1510  CLAY
 98.4  -90.6 14.91  0.30  0.56    501   2.34   8.85                               75.00   23.0    1443  CLAY
 99.1  -91.2 13.31  0.35  0.60    524   2.19   7.73                               63.20   19.2    1452  CLAY
 99.7  -91.9 11.53  0.36  0.58    482   2.01   6.50                               50.85   15.4    1271  SILTY CLAY
100.4  -92.5 11.53  0.39  0.51    520   2.01   6.55                               51.17   15.4    1371  SILTY CLAY
101.0  -93.2 11.34  0.35  0.55    467   1.99   6.45                               50.23   15.0    1224  SILTY CLAY
101.7  -93.8 12.52  0.35  0.44    509   2.11   7.35                               58.94   17.5    1380  CLAY
102.4  -94.5 12.86  0.39  0.46    589   2.15   7.64                               61.88   18.2    1612  SILTY CLAY
103.0  -95.1 13.23  0.42  0.47    658   2.18   7.98                               65.12   19.1    1818  SILTY CLAY
103.7  -95.8 13.81  0.31  0.44    517   2.24   8.47                               70.03   20.4    1449  CLAY
104.3  -96.5 11.99  0.37  0.49    536   2.06   7.14                               56.52   16.3    1431  SILTY CLAY
105.0  -97.1 11.93  0.38  0.52    551   2.05   7.14                               56.46   16.2    1469  SILTY CLAY
105.6  -97.8 12.43  0.35  0.50    536   2.10   7.56                               60.52   17.3    1449  SILTY CLAY
106.3  -98.4 11.20  0.38  0.52    520   1.97   6.67                               51.74   14.7    1356  SILTY CLAY
107.0  -99.1 10.45  0.39  0.57    505   1.89   6.16                               46.75   13.2    1284  SILTY CLAY
107.6  -99.7 10.56  0.38  0.51    501   1.90   6.27                               47.80   13.4    1279  SILTY CLAY
108.3 -100.4 10.22  0.40  0.53    513   1.86   6.07                               45.73   12.7    1292  SILTY CLAY
108.9 -101.0 11.32  0.40  0.45    573   1.99   6.93                               53.92   14.9    1501  SILTY CLAY
109.6 -101.7 10.98  0.49  0.38    677   1.95   6.71                               51.72   14.2    1751  SILTY CLAY
110.2 -102.4 11.74  0.40  0.43    600   2.03   7.34                               57.73   15.8    1592  SILTY CLAY
110.9 -103.0 12.46  0.38  0.44    597   2.10   7.96                               63.75   17.4    1616  SILTY CLAY
```

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)      SNDG. NO. :DMT-701
In-Situ Soil Testing, L.C.                                                             Page 3a
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                       FILE NO. : 2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                SNDG. DATE: 8/18/08
ANAL.BY : Roger Failmezger, P.E.                                                       ANAL. DATE: 8/22/08

ANALYSIS PARAMETERS:   LO RANGE   =  6.25 TSF  ROD DIAM.   =  0.27 IN     BL.THICK.  =  0.00 IN      SU  FACTOR = 1
SURF.ELEV.  =   7.9 FT LO  GAGE 0 =  0.05 TSF  FR.RED.DIA. =  0.31 IN  BL.WIDTH   =  0.01 IN        PHI FACTOR = 1
WATER DEPTH =   5.9 FT HI  GAGE 0 =  0.00 TSF  LIN.ROD WT. =   2.4 LBF/FTDELTA-A    =  0.23 TSF    OCR FACTOR = 1
SP.GR.WATER = 1.000    CAL GAGE 0 =  0.00 TSF  DELTA/PHI   =   0.5       DELTA-B    =  0.37 TSF    M  FACTOR  = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.8       OCR OPTION =     0        K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z    ELEV   THRUST    A     B     C      DA    DB    ZMRNG ZMLO  ZMHI  ZMCAL   P0    P1    P2     U0    GAMMA   SVP
 (FT)   (FT)   (LBF)  (TSF) (TSF) (TSF)  (TSF) (TSF)  (TSF) (TSF) (TSF) (TSF)  (TSF) (TSF) (TSF)  (TSF)  (PCF)  (TSF)
***** ******  ****** ***** ***** *****  ***** *****  ***** ***** ***** *****  ***** ***** *****  ****** ****** ******
111.5  -103.7   5535  43.64 59.61 21.30   0.18  0.35   5.74  0.05  0.00  0.00  43.04 59.26 21.48   3.299   127.9   3.696
112.2  -104.3   5049  27.77 37.79 12.53   0.18  0.35   5.74  0.05  0.00  0.00  27.48 37.44 12.71   3.320   127.9   3.717
112.9  -105.0   5777  22.97 31.11  3.67   0.18  0.35   5.74  0.05  0.00  0.00  22.77 30.76  3.80   3.340   127.9   3.739
113.5  -105.6   7409  14.93 24.53  2.75   0.18  0.35   5.74  0.05  0.00  0.00  14.66 24.18  2.87   3.361   121.7   3.759
114.2  -106.3   8820  17.64 29.55  2.80   0.18  0.35   5.74  0.05  0.00  0.00  17.26 29.19  2.92   3.380   131.0   3.780
114.8  -107.0   9790  21.92 35.91  2.96   0.18  0.35   5.74  0.05  0.00  0.00  21.43 35.56  3.09   3.401   131.0   3.802
115.5  -107.6  10297  21.30 35.70  2.79   0.18  0.35   5.74  0.05  0.00  0.00  20.79 35.35  2.91   3.422   131.0   3.825
116.1  -108.3  12789  16.60 40.51  2.84   0.18  0.35   5.74  0.05  0.00  0.00  15.61 40.15  2.96   3.442   134.2   3.848
116.8  -108.9  12833  17.02 39.36  2.81   0.18  0.35   5.74  0.05  0.00  0.00  16.11 39.00  2.93   3.463   134.2   3.872
117.5  -109.6  12855  15.97 38.84  2.91   0.18  0.35   5.74  0.05  0.00  0.00  15.03 38.48  3.04   3.484   134.2   3.895
118.1  -110.2  12855  15.87 40.30  2.95   0.18  0.35   5.74  0.05  0.00  0.00  14.86 39.94  3.08   3.504   134.2   3.919
118.8  -110.9  13649  15.35 34.35  2.95   0.18  0.35   5.74  0.05  0.00  0.00  14.61 33.99  3.08   3.525   131.0   3.942
119.4  -111.5  12833  15.03 32.47  2.96   0.18  0.35   5.74  0.05  0.00  0.00  14.37 32.11  3.09   3.544   131.0   3.964
120.1  -112.2  12833  16.29 31.63  2.98   0.18  0.35   5.74  0.05  0.00  0.00  15.72 31.28  3.10   3.565   131.0   3.987
120.7  -112.9  12877  15.97 24.74  2.69   0.18  0.35   5.74  0.05  0.00  0.00  15.74 24.39  2.82   3.586   121.7   4.008
121.4  -113.5  12833  13.99 23.18  2.86   0.18  0.35   5.74  0.05  0.00  0.00  13.74 22.82  2.99   3.606   121.7   4.028
122.0  -114.2  13649  15.56 32.68  3.06   0.18  0.35   5.74  0.05  0.00  0.00  14.91 32.32  3.18   3.627   131.0   4.049
122.7  -114.8   3506  17.43 36.23  2.94   0.19  0.34   5.74  0.05  0.00  0.00  16.71 35.88  3.08   3.648   131.0   4.071
123.4  -115.5   6350  17.64 29.23  2.85   0.19  0.34   5.74  0.05  0.00  0.00  17.28 28.89  2.99   3.668   131.0   4.094
124.0  -116.1   6858  18.06 31.01  3.08   0.19  0.34   5.74  0.05  0.00  0.00  17.63 30.66  3.22   3.688   131.0   4.116
124.7  -116.8   7122  18.69 29.34  2.96   0.19  0.34   5.74  0.05  0.00  0.00  18.37 28.99  3.10   3.709   131.0   4.138
125.3  -117.5   9592  18.48 29.44  3.01   0.19  0.34   5.74  0.05  0.00  0.00  18.14 29.10  3.14   3.729   131.0   4.161
126.0  -118.1   7651  19.94 31.32  3.11   0.19  0.34   5.74  0.05  0.00  0.00  19.59 30.98  3.25   3.750   131.0   4.183
126.6  -118.8   7850  20.88 32.99  3.74   0.19  0.34   5.74  0.05  0.00  0.00  20.49 32.65  3.87   3.770   131.0   4.206
127.3  -119.4   8092  20.46 32.26  3.52   0.19  0.34   5.74  0.05  0.00  0.00  20.09 31.92  3.65   3.791   131.0   4.229
128.0  -120.1   8181  22.55 32.99  4.67   0.19  0.34   5.74  0.05  0.00  0.00  22.25 32.65  4.80   3.812   127.9   4.251
128.6  -120.7   8533  23.80 33.93  4.88   0.19  0.34   5.74  0.05  0.00  0.00  23.51 33.59  5.01   3.831   127.9   4.272
129.3  -121.4   8710  24.01 33.83  6.79   0.19  0.34   5.74  0.05  0.00  0.00  23.74 33.48  6.97   3.852   127.9   4.294
129.9  -122.0  10341  23.80 35.91  7.73   0.19  0.34   5.74  0.05  0.00  0.00  23.42 35.57  7.91   3.873   131.0   4.316
130.6  -122.7  12833  23.80 35.81  6.68   0.19  0.34   5.74  0.05  0.00  0.00  23.42 35.46  6.87   3.893   131.0   4.339
131.2  -123.4  12017  25.26 36.02  7.10   0.19  0.34   5.74  0.05  0.00  0.00  24.94 35.67  7.29   3.914   127.9   4.361
131.9  -124.0  11091  26.52 36.85  6.79   0.19  0.34   5.74  0.05  0.00  0.00  26.21 36.51  6.97   3.934   127.9   4.382
135.2  -127.3   1455  23.70 38.84  3.92   0.15  0.49   5.74  0.05  0.00  0.00  23.12 38.35  4.01   4.037   131.0   4.492
135.8  -128.0   5601  27.35 40.72  4.01   0.15  0.49   5.74  0.05  0.00  0.00  26.86 40.23  4.10   4.057   127.9   4.514
136.5  -128.6   8754  22.97 36.33  3.99   0.15  0.49   5.74  0.05  0.00  0.00  22.48 35.84  4.08   4.078   131.0   4.536
137.1  -129.3   9173  23.39 36.02  4.29   0.15  0.49   5.74  0.05  0.00  0.00  22.94 35.53  4.38   4.098   131.0   4.559
137.8  -129.9   9217  25.79 37.17  4.72   0.15  0.49   5.74  0.05  0.00  0.00  25.40 36.68  4.81   4.119   127.9   4.581
138.4  -130.6   9923  26.94 39.99  4.56   0.15  0.49   5.74  0.05  0.00  0.00  26.47 39.49  4.66   4.139   127.9   4.602
139.1  -131.2  10297  26.52 38.73  5.62   0.15  0.49   5.74  0.05  0.00  0.00  26.09 38.24  5.71   4.159   127.9   4.624
139.8  -131.9  10584  27.56 43.12  4.26   0.15  0.49   5.74  0.05  0.00  0.00  26.97 42.63  4.35   4.180   131.0   4.646
140.4  -132.5   4741  27.67 42.80  3.58   0.15  0.49   5.74  0.05  0.00  0.00  27.09 42.31  3.67   4.201   131.0   4.669
141.1  -133.2   4851  31.11 45.41  4.77   0.15  0.49   5.74  0.05  0.00  0.00  30.58 44.92  4.87   4.221   127.9   4.691
141.7  -133.9   5402  41.97 55.85 10.96   0.15  0.49   5.74  0.05  0.00  0.00  41.46 55.36 11.11   4.242   127.9   4.712
142.4  -134.5   6284  37.69 52.72  7.73   0.15  0.49   5.74  0.05  0.00  0.00  37.11 52.23  7.87   4.262   127.9   4.733
143.0  -135.2   7232  38.94 52.83 12.11   0.15  0.49   5.74  0.05  0.00  0.00  38.43 52.34 12.26   4.282   127.9   4.754
143.7  -135.8   8181  40.51 53.56 12.95   0.15  0.49   5.74  0.05  0.00  0.00  40.04 53.07 13.09   4.303   127.9   4.776
144.4  -136.5   9415  37.17 51.78 10.75   0.15  0.49   5.74  0.05  0.00  0.00  36.61 51.29 10.90   4.323   127.9   4.798
145.0  -137.1  10341  36.85 50.95 11.59   0.15  0.49   5.74  0.05  0.00  0.00  36.33 50.46 11.73   4.344   127.9   4.819
145.7  -137.8  11047  41.76 53.97 13.89   0.15  0.49   5.74  0.05  0.00  0.00  41.33 53.48 14.03   4.365   127.9   4.841
146.3  -138.4  12591  40.82 53.04 14.20   0.15  0.49   5.74  0.05  0.00  0.00  40.39 52.54 14.34   4.385   127.9   4.862
147.0  -139.1  12745  40.40 53.66 13.36   0.15  0.49   5.74  0.05  0.00  0.00  39.92 53.17 13.51   4.406   127.9   4.884
147.6  -139.8  13561  34.97 47.19 10.96   0.15  0.49   5.74  0.05  0.00  0.00  34.55 46.70 11.11   4.426   127.9   4.906
148.3  -140.4  13561  36.64 49.17  9.71   0.15  0.49   5.74  0.05  0.00  0.00  36.20 48.68  9.86   4.446   127.9   4.927
148.9  -141.1  13561  34.66 50.11  4.46   0.15  0.49   5.74  0.05  0.00  0.00  34.07 49.62  4.55   4.467   127.9   4.949
```

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)       SNDG. NO. : DMT-701
In-Situ Soil Testing, L.C.                                                             Page 2
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                       FILE NO. :2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                SNDG. DATE: 8/18/08
ANAL.BY : Roger Failmezger, P.E.                                                       ANAL. DATE: 8/22/08

ANALYSIS PARAMETERS:   LO RANGE   =  6.25 TSF  ROD DIAM.   =  0.27 IN    BL.THICK.  =  0.00 IN    SU  FACTOR = 1
SURF.ELEV.  =   7.9 FT LO  GAGE 0 =  0.05 TSF  FR.RED.DIA. =  0.31 IN  BL.WIDTH   =  0.01 IN      PHI FACTOR = 1
WATER DEPTH =   5.9 FT HI  GAGE 0 =  0.00 TSF  LIN.ROD WT. =   2.4 LBF/FTDELTA-A    =  0.23 TSF    OCR FACTOR = 1
SP.GR.WATER = 1.000     CAL GAGE 0 =  0.00 TSF;
                                                DELTA / PHI =   0.5       DELTA - B =  0.37 TSF    M FACTOR = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.8      OCR OPTION =     0      K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z    ELEV    KD    ID    UD    ED      K0     SU     QD     PHI   SIGFF   PHIO    PC     OCR     M      SOIL TYPE
(FT)   (FT)                     (TSF)          (TSF)  (TSF)  (DEG)  (TSF)   (DEG)  (TSF)         (TSF)
***** ******  ***** ***** ***** ******  *****  *****  *****  *****  ******  *****  *****  *****  ******  ************
111.5 -103.7  10.76  0.41  0.46    563   1.92   6.66                               50.98   13.8    1445  SILTY CLAY
112.2 -104.3   6.50  0.41  0.39    346   1.39   3.57                               23.36    6.3     712  SILTY CLAY
112.9 -105.0   5.20  0.41  0.02    278   1.19   2.71                               16.58    4.4     507  SILTY CLAY
113.5 -105.6   3.00  0.84 -0.04    331   0.79                                       7.09    1.9     425  CLAYEY SILT
114.2 -106.3   3.67  0.86 -0.03    414   0.92                                       9.74    2.6     617  CLAYEY SILT
114.8 -107.0   4.74  0.78 -0.02    491   1.12                                      14.62    3.8     855  CLAYEY SILT
115.5 -107.6   4.54  0.84 -0.03    505   1.08                                      13.73    3.6     860  CLAYEY SILT
116.1 -108.3   3.16  2.02 -0.04    852   0.64         177.6   35.2    6.07   36.5   8.79    2.3    1214  SILTY SAND
116.8 -108.9   3.27  1.81 -0.04    794   0.65         176.6   35.1    6.10   36.4   9.28    2.4    1145  SILTY SAND
117.5 -109.6   2.97  2.03 -0.04    813   0.61         181.1   35.3    6.15   36.6   8.13    2.1    1113  SILTY SAND
118.1 -110.2   2.90  2.21 -0.04    871   0.60         182.1   35.3    6.18   36.7   7.92    2.0    1184  SILTY SAND
118.8 -110.9   2.81  1.75 -0.04    673   0.74                                       6.70    1.7     871  SANDY SILT
119.4 -111.5   2.73  1.64 -0.04    616   0.72                                       6.44    1.6     775  SANDY SILT
120.1 -112.2   3.05  1.28 -0.04    540   0.80                                       7.69    1.9     720  SANDY SILT
120.7 -112.9   3.03  0.71 -0.06    300   0.79                                       7.67    1.9     386  CLAYEY SILT
121.4 -113.5   2.51  0.90 -0.06    315   0.67                                       5.75    1.4     351  CLAYEY SILT
122.0 -114.2   2.79  1.54 -0.04    604   0.74                                       6.79    1.7     766  SANDY SILT
122.7 -114.8   3.21  1.47 -0.04    665   0.83                                       8.51    2.1     931  SANDY SILT
123.4 -115.5   3.32  0.85 -0.05    403   0.85                                       9.05    2.2     560  CLAYEY SILT
124.0 -116.1   3.39  0.93 -0.03    452   0.87                                       9.36    2.3     640  SILT
124.7 -116.8   3.54  0.72 -0.04    369   0.90                                      10.10    2.4     532  CLAYEY SILT
125.3 -117.5   3.46  0.76 -0.04    380   0.88                                       9.80    2.4     542  CLAYEY SILT
126.0 -118.1   3.79  0.72 -0.03    396   0.95                                      11.32    2.7     597  CLAYEY SILT
126.6 -118.8   3.97  0.73  0.01    422   0.98                                      12.28    2.9     659  CLAYEY SILT
127.3 -119.4   3.85  0.73 -0.01    410   0.96                                      11.77    2.8     628  CLAYEY SILT
128.0 -120.1   4.34  0.56  0.05    361   1.05   2.46                               14.22    3.3     593  SILTY CLAY
128.6 -120.7   4.61  0.51  0.06    350   1.09   2.66                               15.70    3.7     596  SILTY CLAY
129.3 -121.4   4.63  0.49  0.16    338   1.10   2.69                               15.91    3.7     578  SILTY CLAY
129.9 -122.0   4.53  0.62  0.21    422   1.08                                      15.44    3.6     712  CLAYEY SILT
130.6 -122.7   4.50  0.62  0.15    418   1.08                                      15.38    3.5     704  CLAYEY SILT
131.2 -123.4   4.82  0.51  0.16    373   1.13   2.88                               17.22    3.9     653  SILTY CLAY
131.9 -124.0   5.08  0.46  0.14    357   1.17   3.09                               18.78    4.3     645  SILTY CLAY
135.2 -127.3   4.25  0.80  0.00    528   1.03                                      14.55    3.2     863  CLAYEY SILT
135.8 -128.0   5.05  0.59  0.00    464   1.17   3.16                               19.16    4.2     835  SILTY CLAY
136.5 -128.6   4.06  0.73  0.00    464   1.00                                      13.67    3.0     734  CLAYEY SILT
137.1 -129.3   4.13  0.67  0.02    437   1.01                                      14.14    3.1     698  CLAYEY SILT
137.8 -129.9   4.64  0.53  0.03    392   1.10   2.89                               17.05    3.7     671  SILTY CLAY
138.4 -130.6   4.85  0.58  0.02    452   1.14   3.06                               18.33    4.0     796  SILTY CLAY
139.1 -131.2   4.74  0.55  0.07    422   1.12   3.00                               17.78    3.8     732  SILTY CLAY
139.8 -131.9   4.90  0.69  0.01    544   1.14                                      18.82    4.1     964  CLAYEY SILT
140.4 -132.5   4.90  0.67 -0.02    528   1.14                                      18.91    4.0     936  CLAYEY SILT
141.1 -133.2   5.62  0.54  0.02    498   1.26   3.75                               23.50    5.0     951  SILTY CLAY
141.7 -133.9   7.90  0.37  0.18    482   1.58   5.77                               40.15    8.5    1090  SILTY CLAY
142.4 -134.5   6.94  0.46  0.11    524   1.45   4.93                               32.97    7.0    1115  SILTY CLAY
143.0 -135.2   7.18  0.41  0.23    482   1.49   5.17                               34.92    7.3    1043  SILTY CLAY
143.7 -135.8   7.48  0.36  0.25    452   1.53   5.47                               37.40    7.8     996  SILTY CLAY
144.4 -136.5   6.73  0.45  0.20    509   1.42   4.81                               31.85    6.6    1067  SILTY CLAY
145.0 -137.1   6.64  0.44  0.23    491   1.41   4.75                               31.30    6.5    1020  SILTY CLAY
145.7 -137.8   7.64  0.33  0.26    422   1.55   5.68                               39.13    8.1     938  CLAY
146.3 -138.4   7.40  0.34  0.28    422   1.52   5.49                               37.47    7.7     925  CLAY
147.0 -139.1   7.27  0.37  0.26    459   1.50   5.40                               36.58    7.5     999  SILTY CLAY
147.6 -139.8   6.14  0.40  0.22    422   1.34   4.38                               28.22    5.8     844  SILTY CLAY
148.3 -140.4   6.44  0.39  0.17    433   1.38   4.68                               30.57    6.2     888  SILTY CLAY
148.9 -141.1   5.98  0.53  0.00    540   1.32   4.28                               27.33    5.5    1065  SILTY CLAY
```

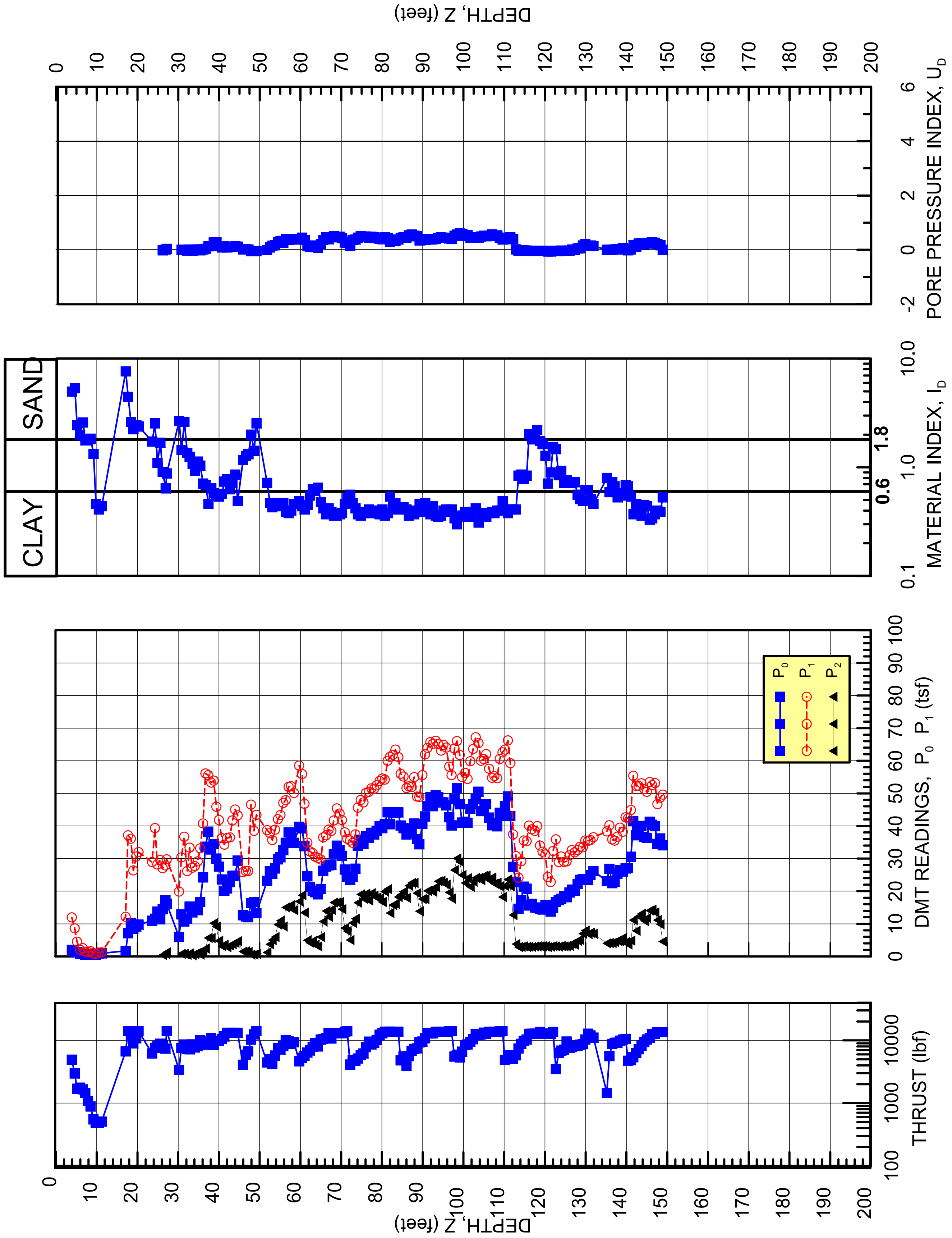
PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8/18/08

SOUNDING
DMT-701

DILATOMETER RESULTS

Ground Surface Elev.: ~ 8.0 Ft
Water Depth: ~ 6.0 Ft



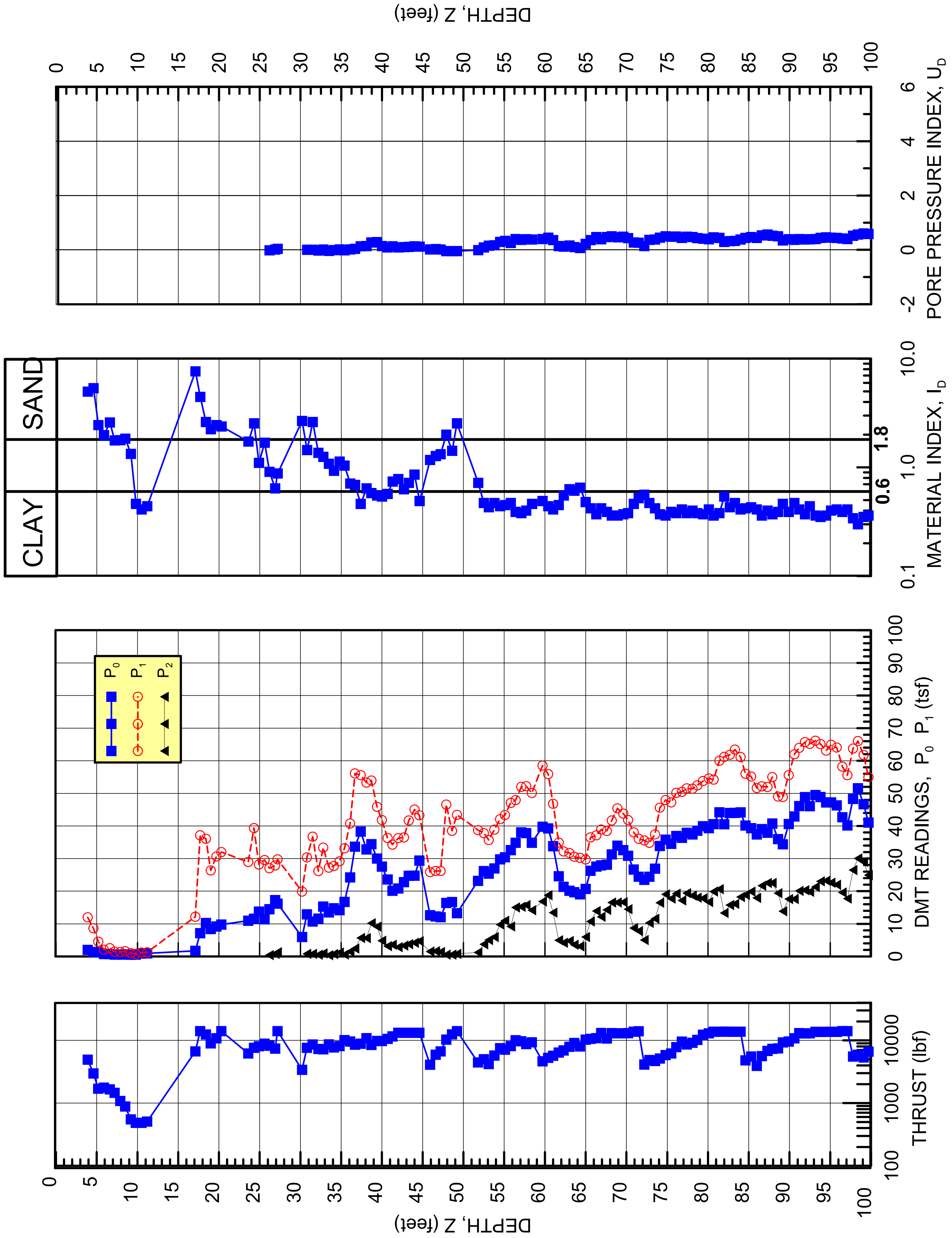
PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8/18/08

SOUNDING
DMT-701

DILATOMETER RESULTS

Ground Surface Elev.: ~ 8.0 Ft
Water Depth: ~ 6.0 Ft



PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

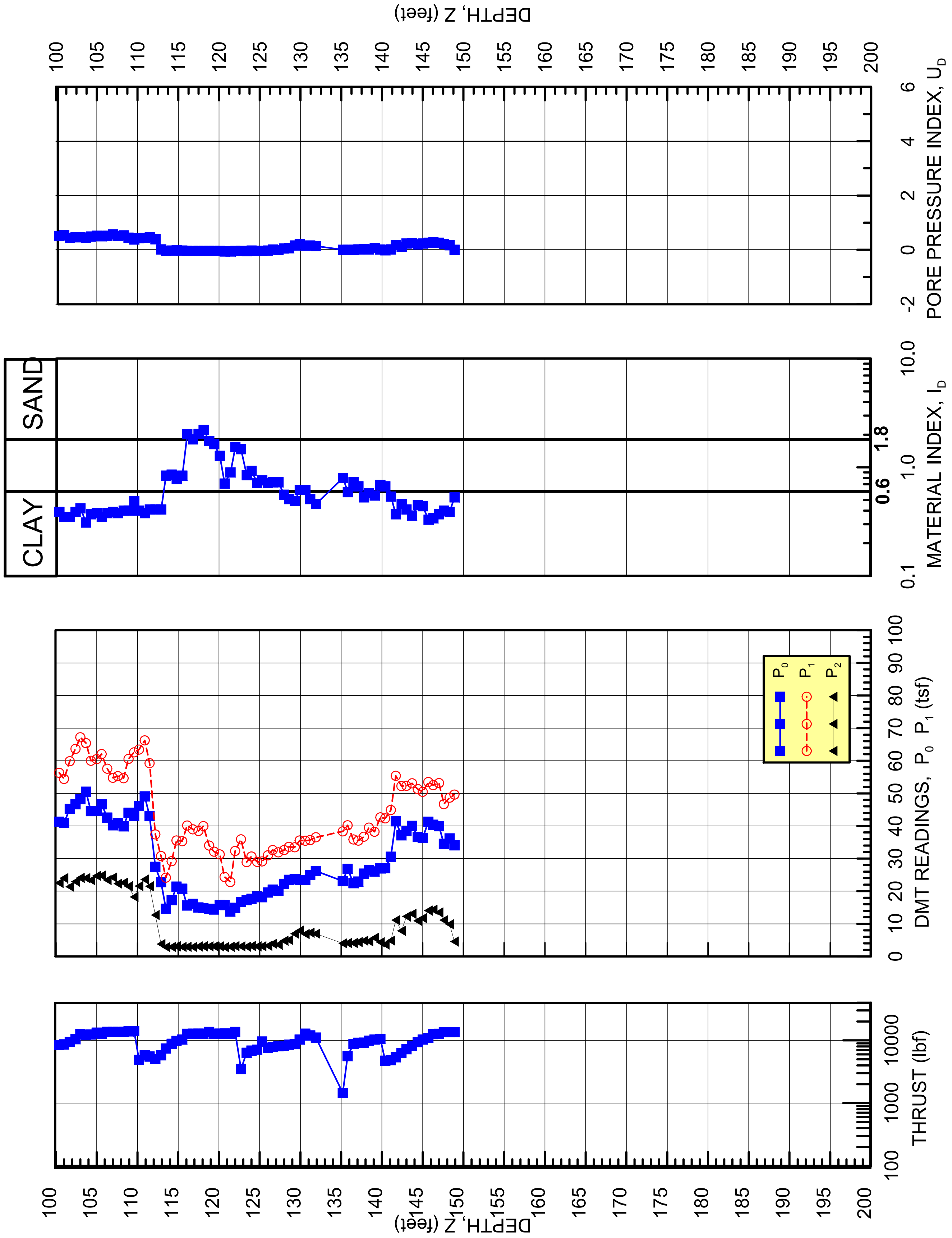
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8/18/08

SOUNDING

DMT-701

DILATOMETER RESULTS

Ground Surface Elev.: ~ 8.0 Ft
Water Depth: ~ 6.0 Ft



PROJECT: **Calvert Cliffs NPP -- 2008 Subsurface Investigations**
LOCATION: **Calvert County, Maryland**

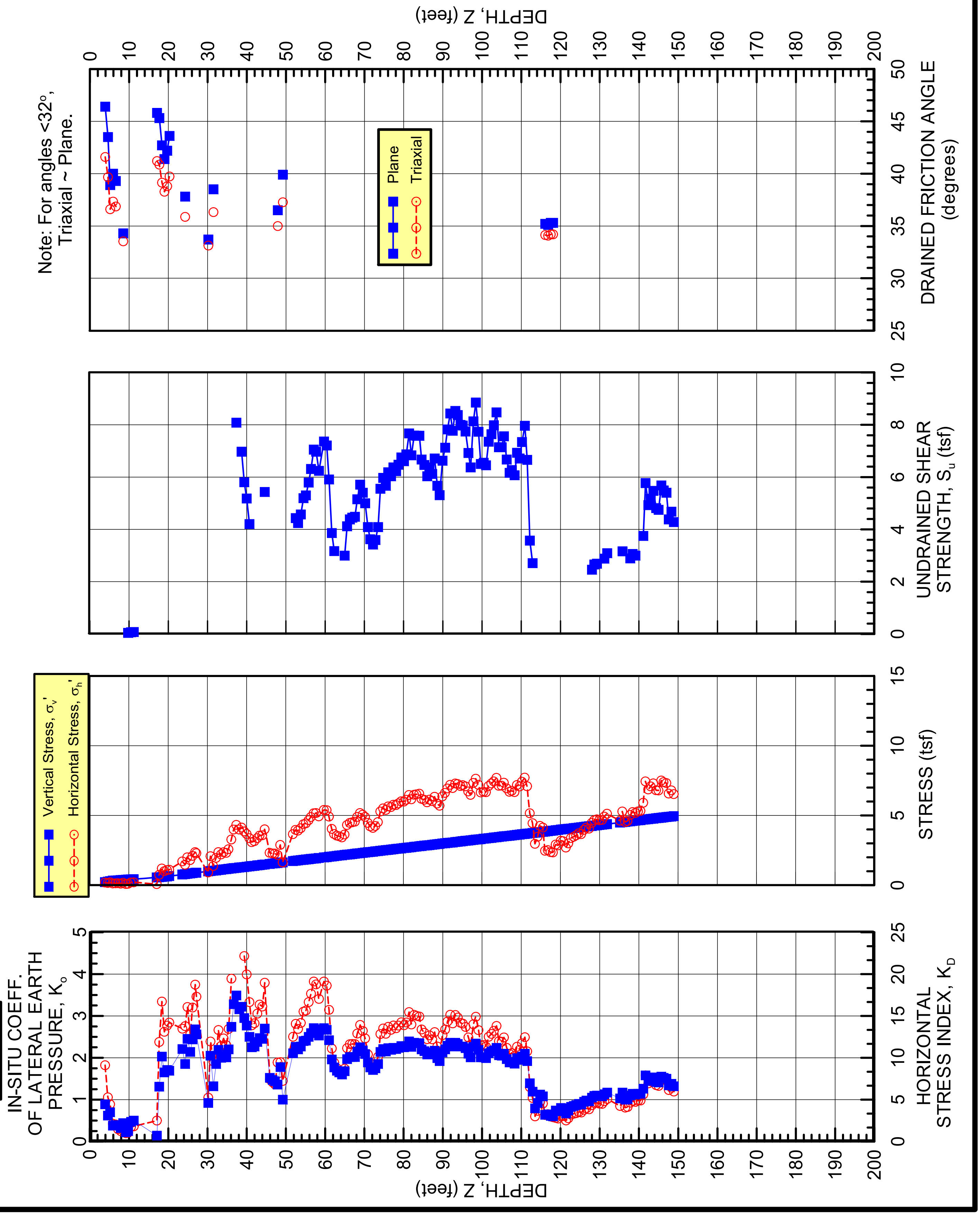
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8/18/08

SOUNDING

DMT-701

INTERPRETED DMT STRENGTH PARAMETERS

Ground Surface Elev: ~ 8.0 Ft
Water Depth: ~ 6.0 Ft



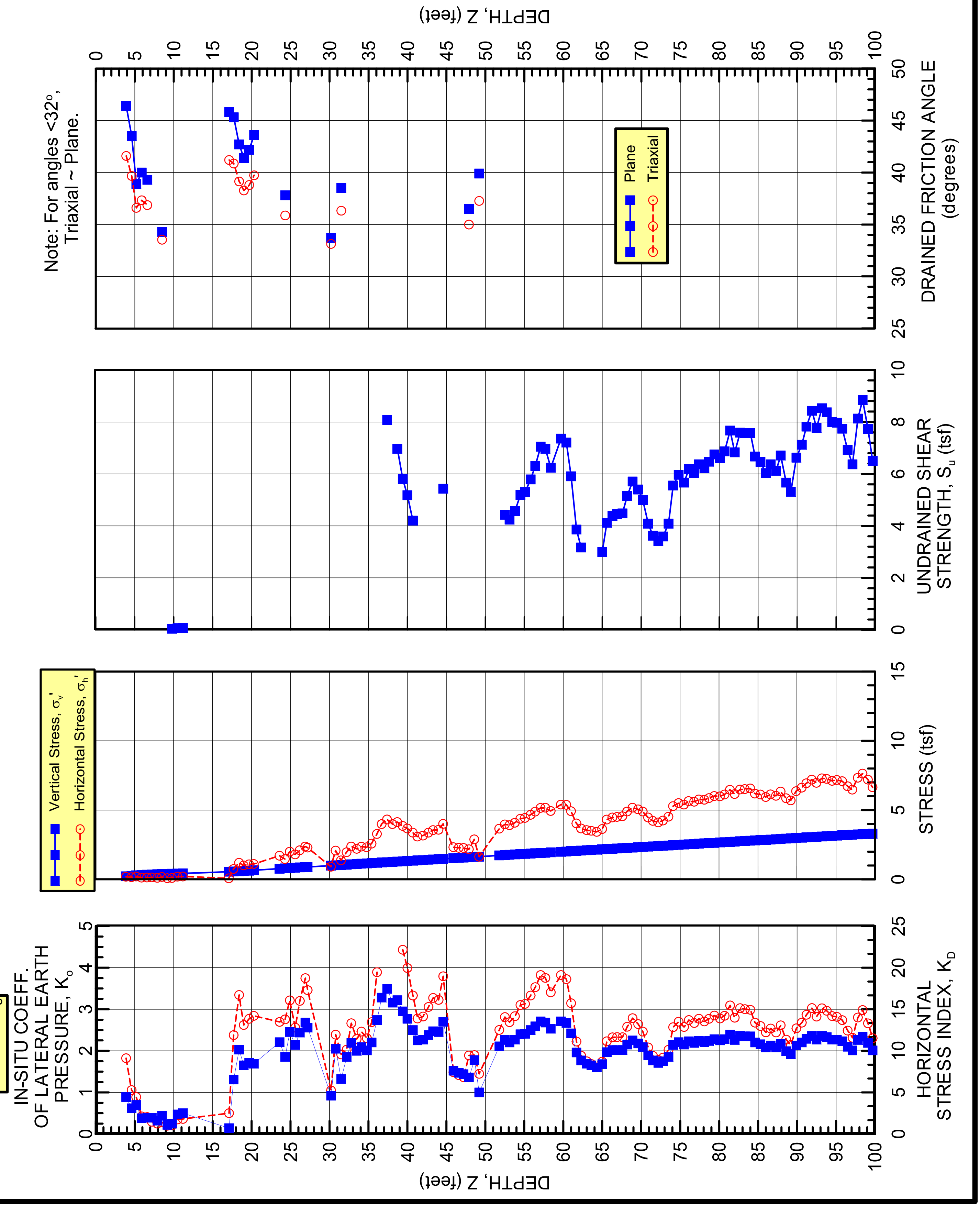
PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8/18/08

SOUNDING
DMT-701

INTERPRETED DMT STRENGTH PARAMETERS

Ground Surface Elev: ~ 8.0 Ft
Water Depth: ~ 6.0 Ft



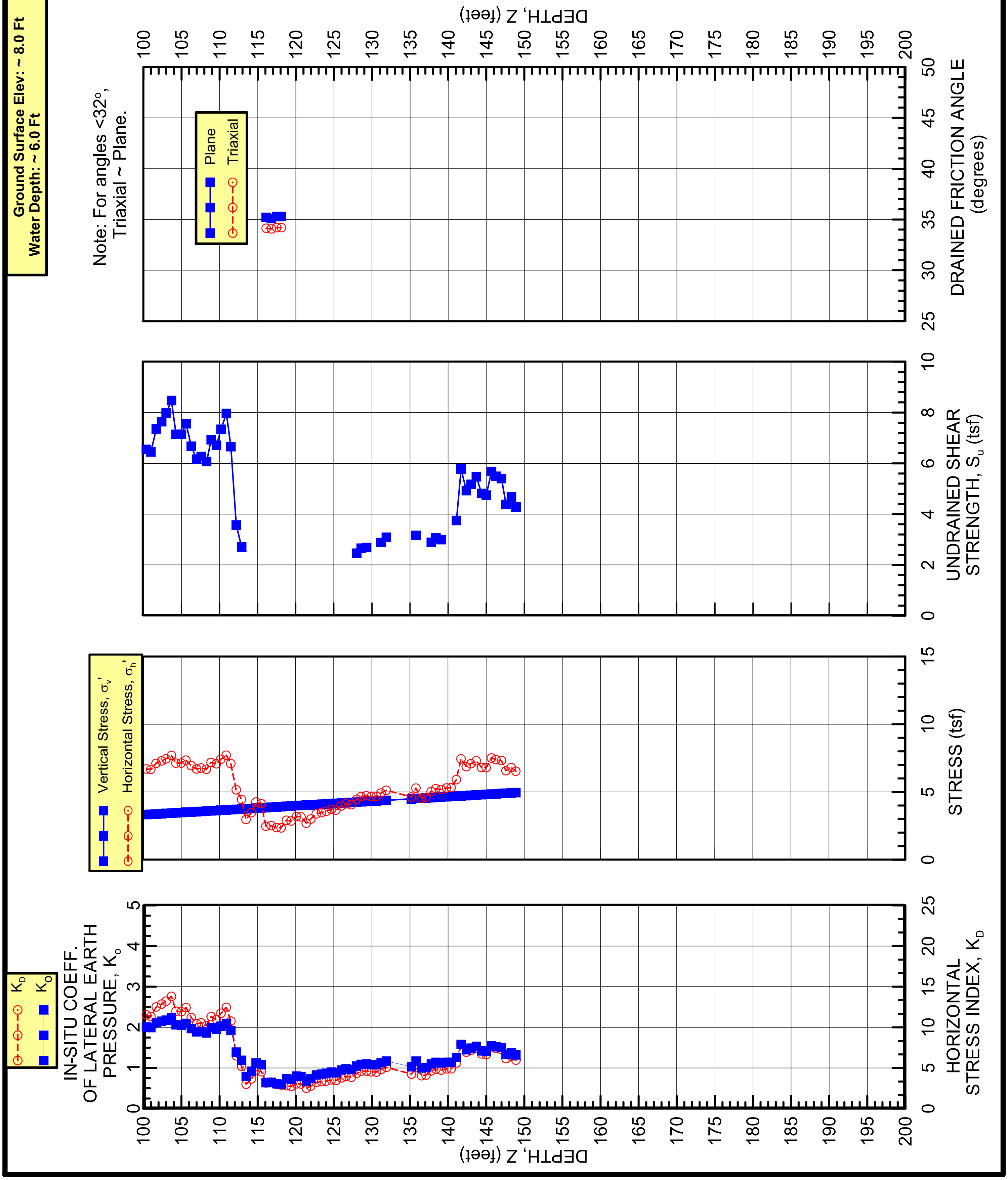
PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8/18/08

SOUNDING
DMT-701

INTERPRETED DMT STRENGTH PARAMETERS

Ground Surface Elev: ~ 8.0 Ft
Water Depth: ~ 6.0 Ft



PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

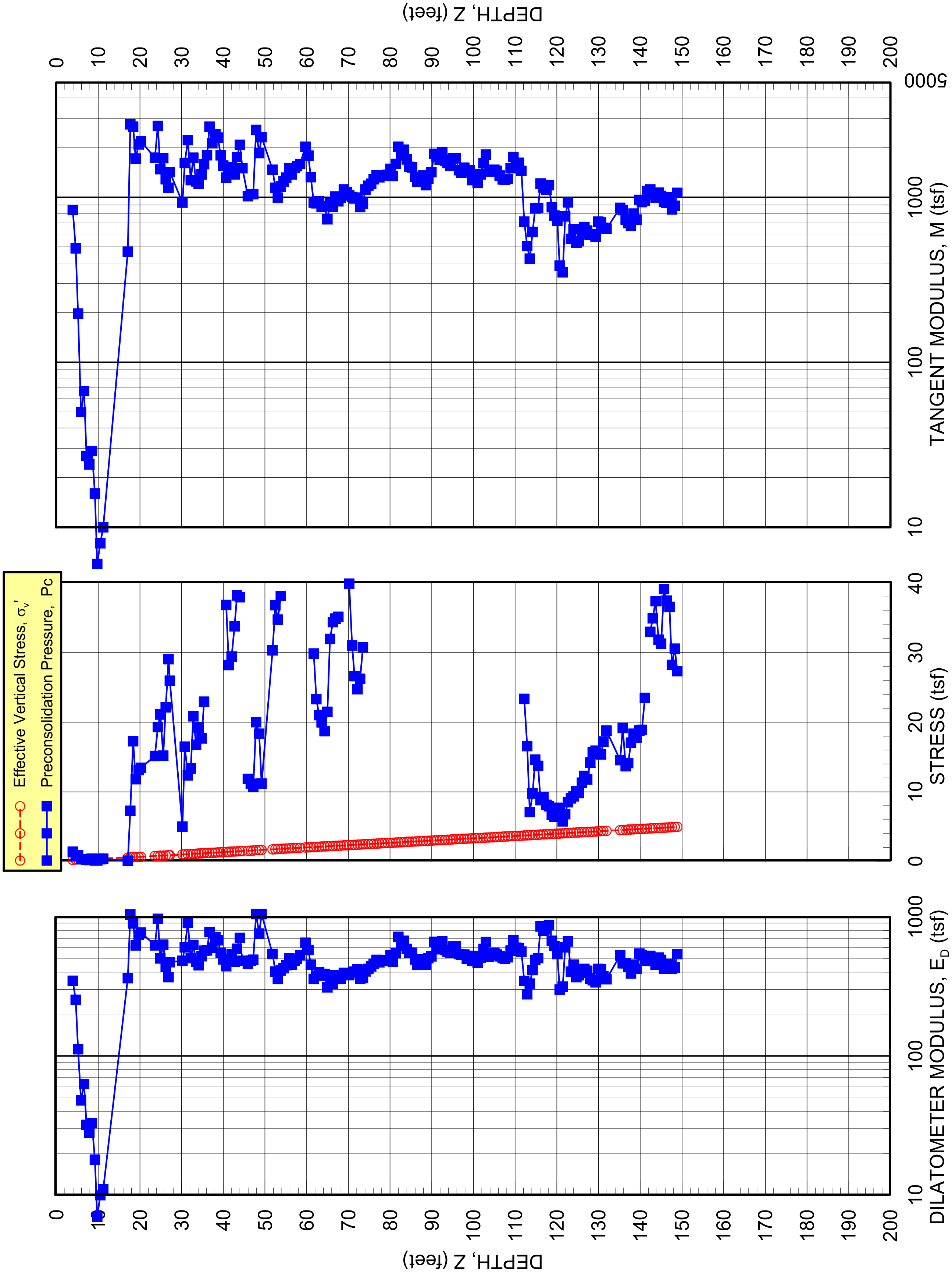
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8/18/08

SOUNDING

DMT-701

INTERPRETED DMT DEFORMATION PARAMETERS

Ground Surface Elev.: ~ 8.0 Ft
Water Depth: ~ 6.0 Ft



PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

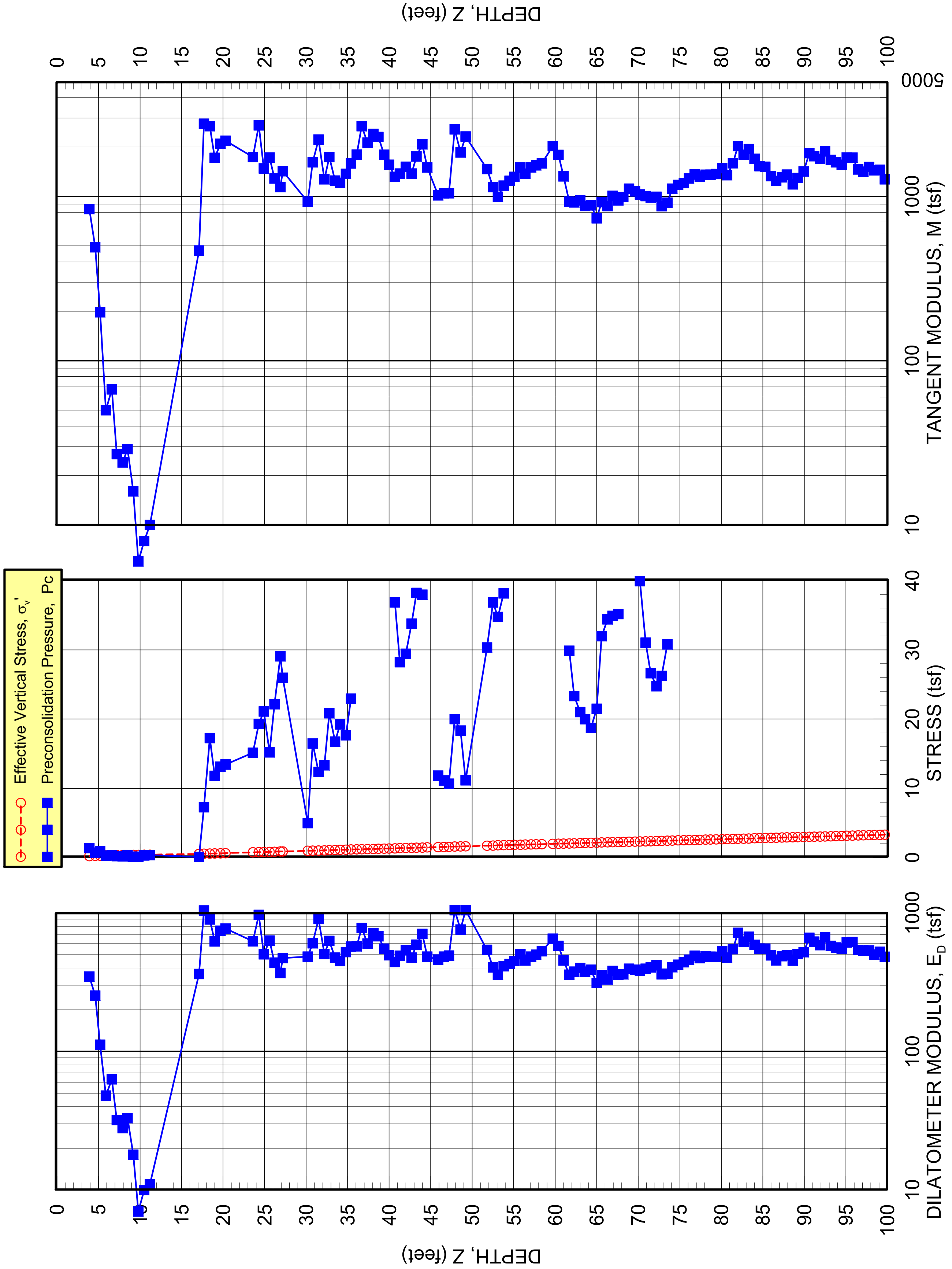
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8/18/08

SOUNDING

DMT-701

INTERPRETED DMT DEFORMATION PARAMETERS

Ground Surface Elev.: ~ 8.0 Ft
Water Depth: ~ 6.0 Ft



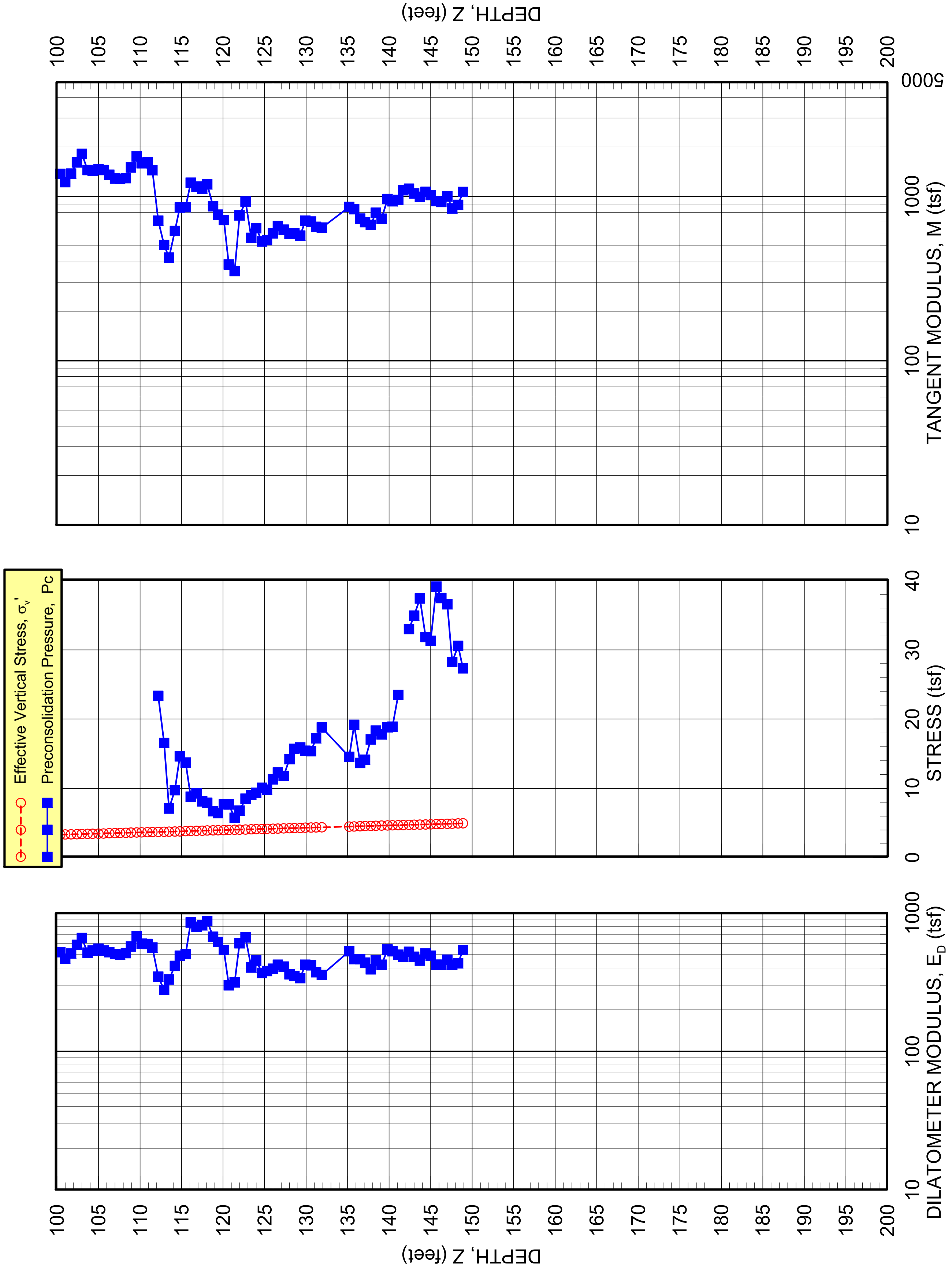
PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8/18/08

SOUNDING
DMT-701

INTERPRETED DMT DEFORMATION PARAMETERS

Ground Surface Elev.: ~ 8.0 Ft
Water Depth: ~ 6.0 Ft



DMT-701 - Tabular data: Vs, Go, Ed, Vs Repeatability

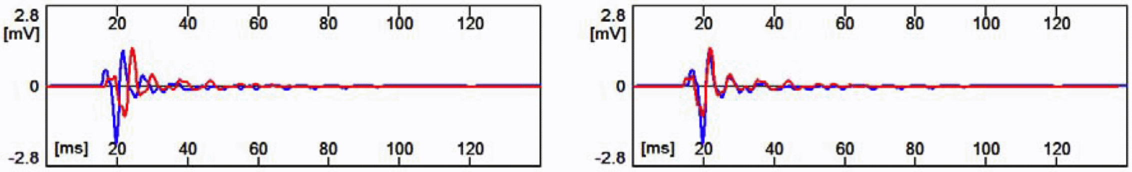
Each Vs value in the 'VS Repeatability' column corresponds to a distinct energization.

Z [m]	Vs [m/s]	Go [MPa]	Rho [kg/m^3]	Ed [MPa]	Go/Ed	Id	Kd	Vs Repeatability [m/s]	Var Coeff. [%]
1.80	182	53.0	1600	4.63	11.45	1.76	2.4	179,180,186	1.71
3.00	51	3.9	1500	0.69	5.64	0.32	1.2	51,51	0.00
10.20	299	192	2150	0.00	0.00	0.00	0.0	298,296,302	0.84
11.20	404	351	2150	0.00	0.00	0.00	0.0	398,402,411	1.35
12.20	385	319	2150	0.00	0.00	0.00	0.0	375,390,390	1.84
13.10	316	215	2150	0.00	0.00	0.00	0.0	320,315,312	1.05
16.60	386	320	2150	0.00	0.00	0.00	0.0	387,389,383	0.65
17.40	404	351	2150	0.00	0.00	0.00	0.0	405,403,405	0.25
18.80	335	241	2150	0.00	0.00	0.00	0.0	336,334,334	0.30
19.80	337	244	2150	0.00	0.00	0.00	0.0	342,334,336	1.01
21.00	366	288	2150	0.00	0.00	0.00	0.0	370,367,362	0.91
22.80	398	341	2150	0.00	0.00	0.00	0.0	381,405,409	3.11
23.80	349	262	2150	0.00	0.00	0.00	0.0	346,351,351	0.68
24.80	412	365	2150	0.00	0.00	0.00	0.0	409,413,415	0.61
26.60	363	283	2150	0.00	0.00	0.00	0.0	359,362,367	0.91
27.60	420	379	2150	0.00	0.00	0.00	0.0	423,422,415	0.85
28.60	444	424	2150	0.00	0.00	0.00	0.0	449,444,440	0.83
30.80	412	365	2150	0.00	0.00	0.00	0.0	405,402,429	2.93
31.80	398	341	2150	0.00	0.00	0.00	0.0	402,393,398	0.93
32.80	365	286	2150	0.00	0.00	0.00	0.0	367,366,361	0.72
34.60	316	215	2150	0.00	0.00	0.00	0.0	307,324,316	2.20
35.60	381	312	2150	0.00	0.00	0.00	0.0	377,379,387	1.13
36.80	334	240	2150	0.00	0.00	0.00	0.0	334,332,336	0.49
38.20	374	301	2150	0.00	0.00	0.00	0.0	364,374,384	2.18
39.20	370	294	2150	0.00	0.00	0.00	0.0	371,374,364	1.14

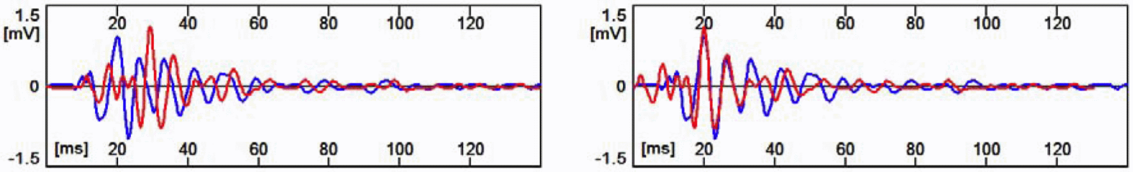
DMT-701

RECORDED RE-PHASED

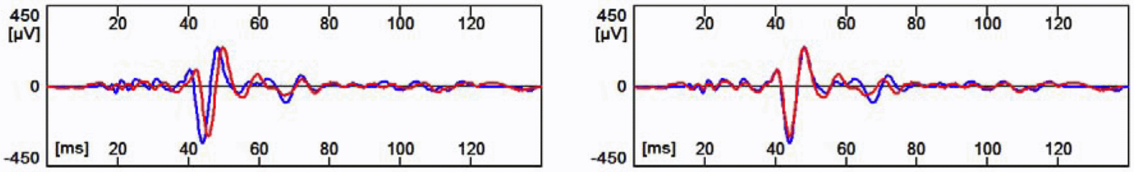
Z = 1.80 m
Ds = 0.44 m
Dt = 2.44 ms
Vs = 179 m/s



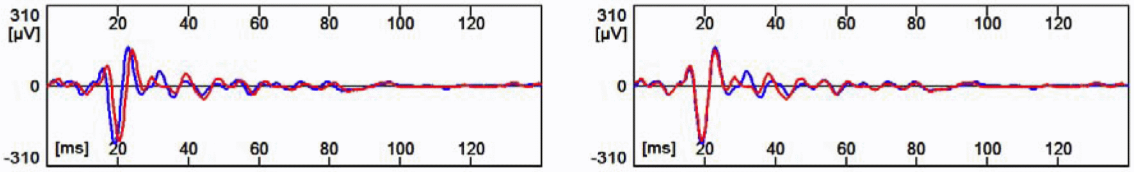
Z = 3.00 m
Ds = 0.47 m
Dt = 9.31 ms
Vs = 51 m/s



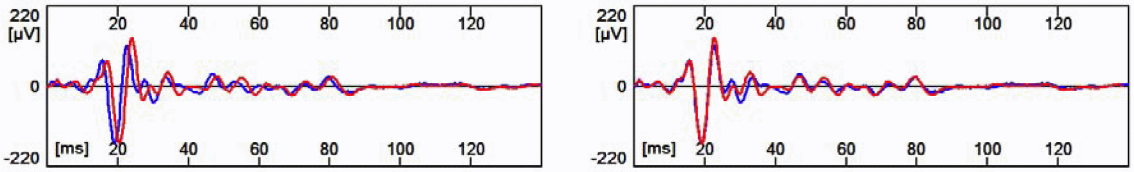
Z = 10.20 m
Ds = 0.50 m
Dt = 1.67 ms
Vs = 298 m/s



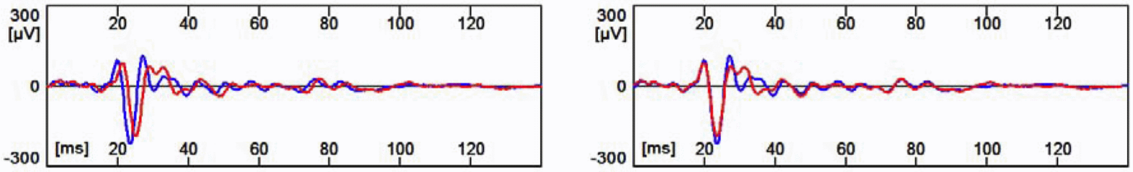
Z = 11.20 m
Ds = 0.50 m
Dt = 1.25 ms
Vs = 398 m/s



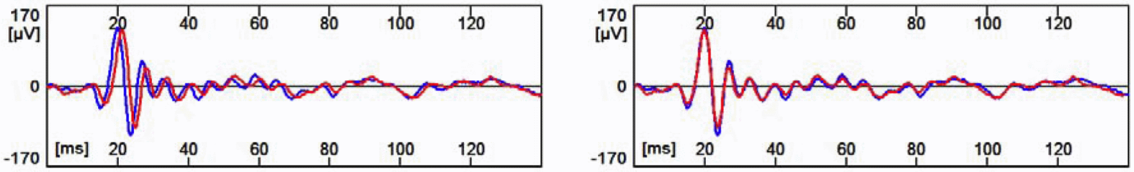
Z = 12.20 m
Ds = 0.50 m
Dt = 1.33 ms
Vs = 375 m/s



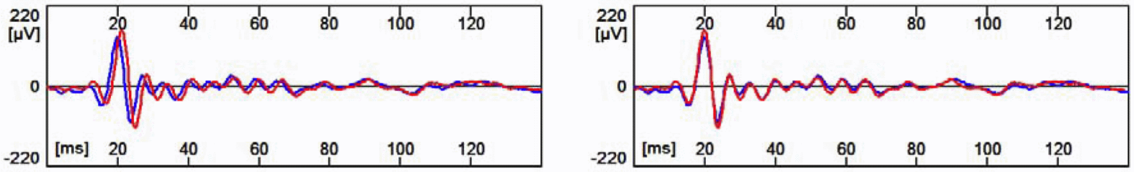
Z = 13.10 m
Ds = 0.50 m
Dt = 1.56 ms
Vs = 320 m/s



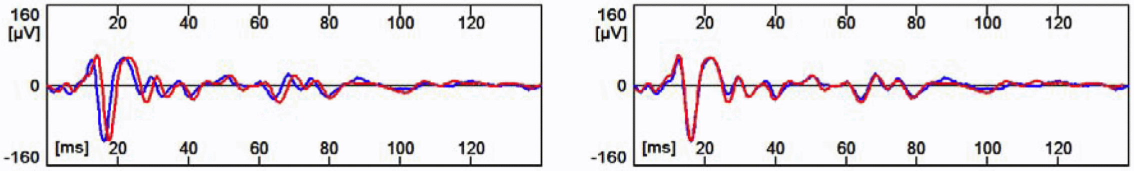
Z = 16.60 m
Ds = 0.50 m
Dt = 1.29 ms
Vs = 387 m/s



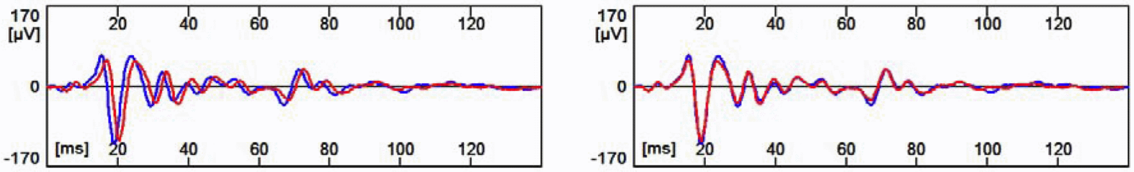
Z = 17.40 m
Ds = 0.50 m
Dt = 1.23 ms
Vs = 405 m/s



Z = 18.80 m
Ds = 0.50 m
Dt = 1.49 ms
Vs = 336 m/s



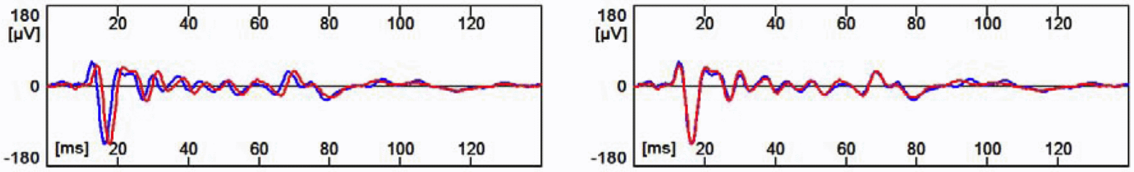
Z = 19.80 m
Ds = 0.50 m
Dt = 1.46 ms
Vs = 342 m/s



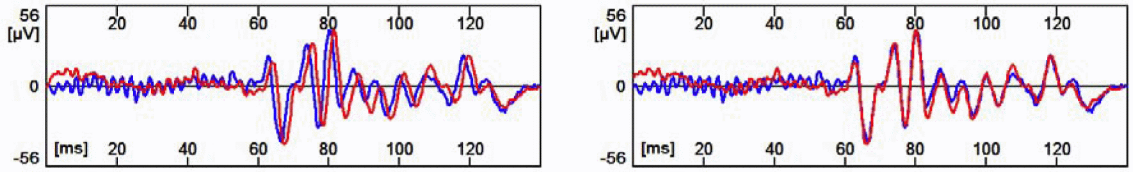
RECORDED

RE-PHASED

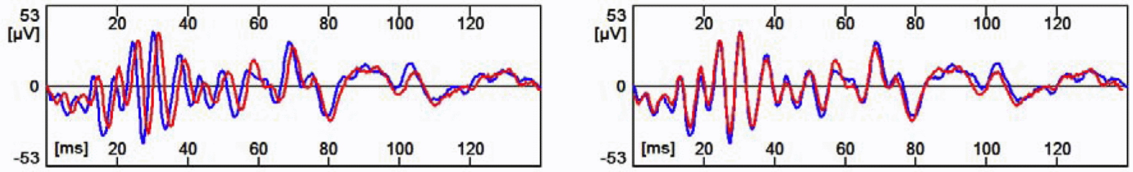
Z = 21.00 m
Ds = 0.50 m
Dt = 1.35 ms
Vs = 370 m/s



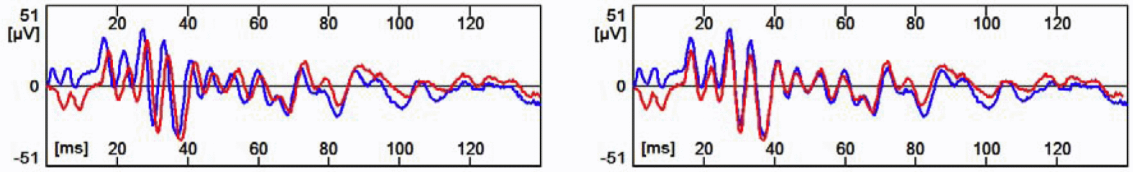
Z = 22.80 m
Ds = 0.50 m
Dt = 1.31 ms
Vs = 381 m/s



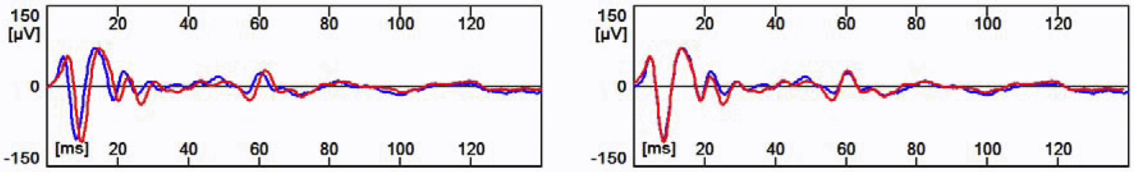
Z = 23.80 m
Ds = 0.50 m
Dt = 1.44 ms
Vs = 346 m/s



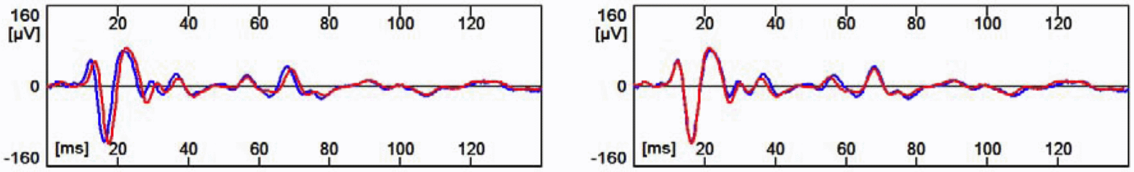
Z = 24.80 m
Ds = 0.50 m
Dt = 1.22 ms
Vs = 409 m/s



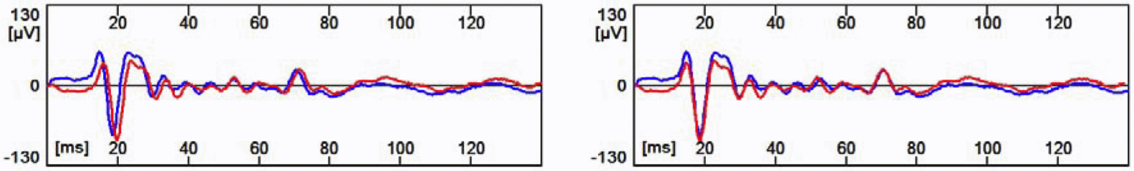
Z = 26.60 m
Ds = 0.50 m
Dt = 1.39 ms
Vs = 359 m/s



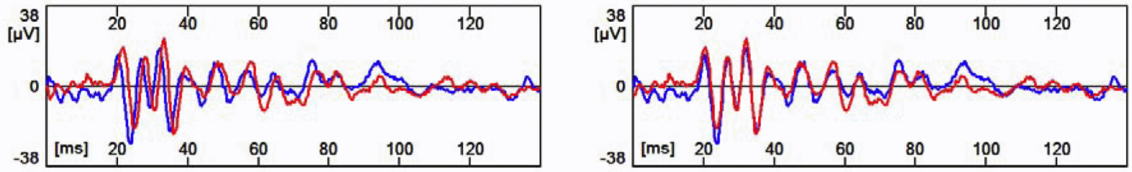
Z = 27.60 m
Ds = 0.50 m
Dt = 1.18 ms
Vs = 423 m/s



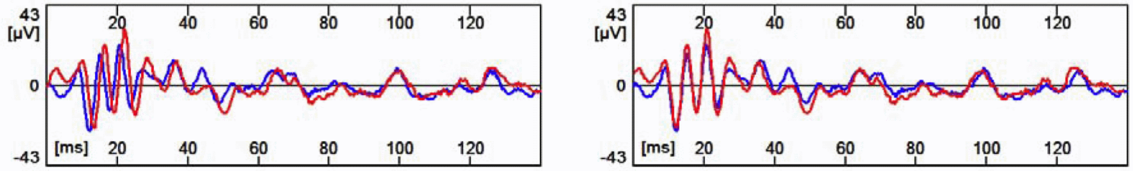
Z = 28.60 m
Ds = 0.50 m
Dt = 1.11 ms
Vs = 449 m/s



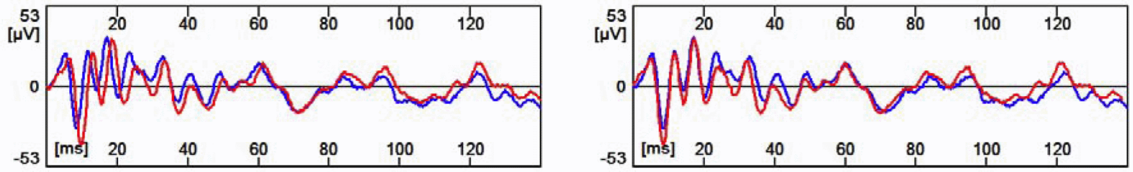
Z = 30.80 m
Ds = 0.50 m
Dt = 1.23 ms
Vs = 405 m/s



Z = 31.80 m
Ds = 0.50 m
Dt = 1.24 ms
Vs = 402 m/s



Z = 32.80 m
Ds = 0.50 m
Dt = 1.36 ms
Vs = 367 m/s

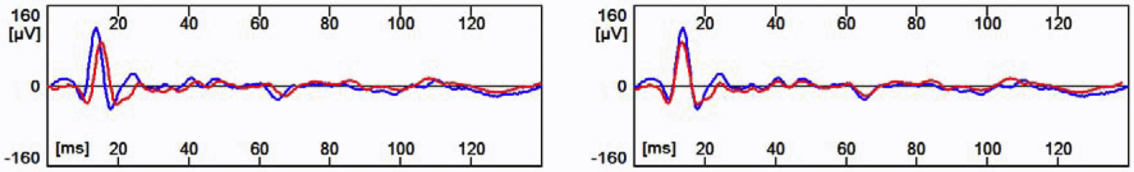


DMT-701

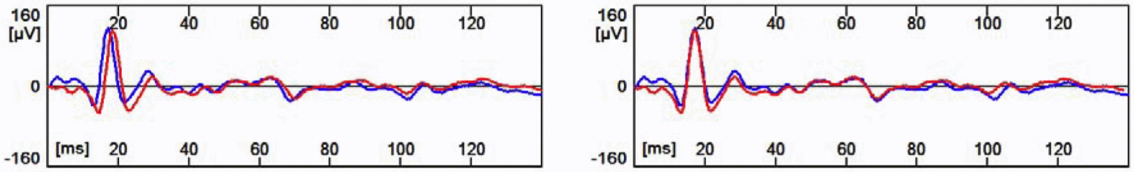
RECORDED

RE-PHASED

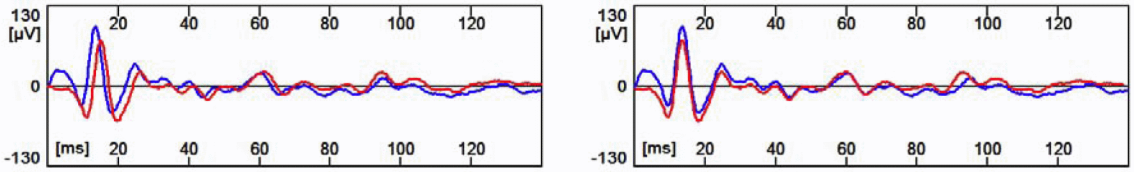
Z = 34.60 m
Ds = 0.50 m
Dt = 1.63 ms
Vs = 307 m/s



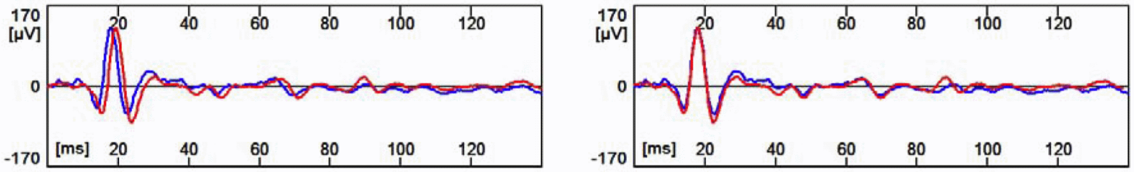
Z = 35.60 m
Ds = 0.50 m
Dt = 1.33 ms
Vs = 377 m/s



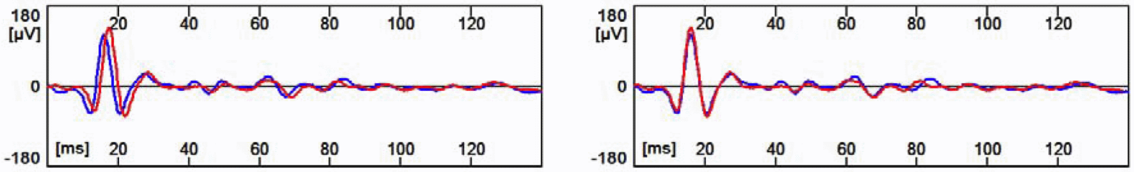
Z = 36.80 m
Ds = 0.50 m
Dt = 1.50 ms
Vs = 334 m/s



Z = 38.20 m
Ds = 0.50 m
Dt = 1.37 ms
Vs = 364 m/s



Z = 39.20 m
Ds = 0.50 m
Dt = 1.35 ms
Vs = 371 m/s



PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

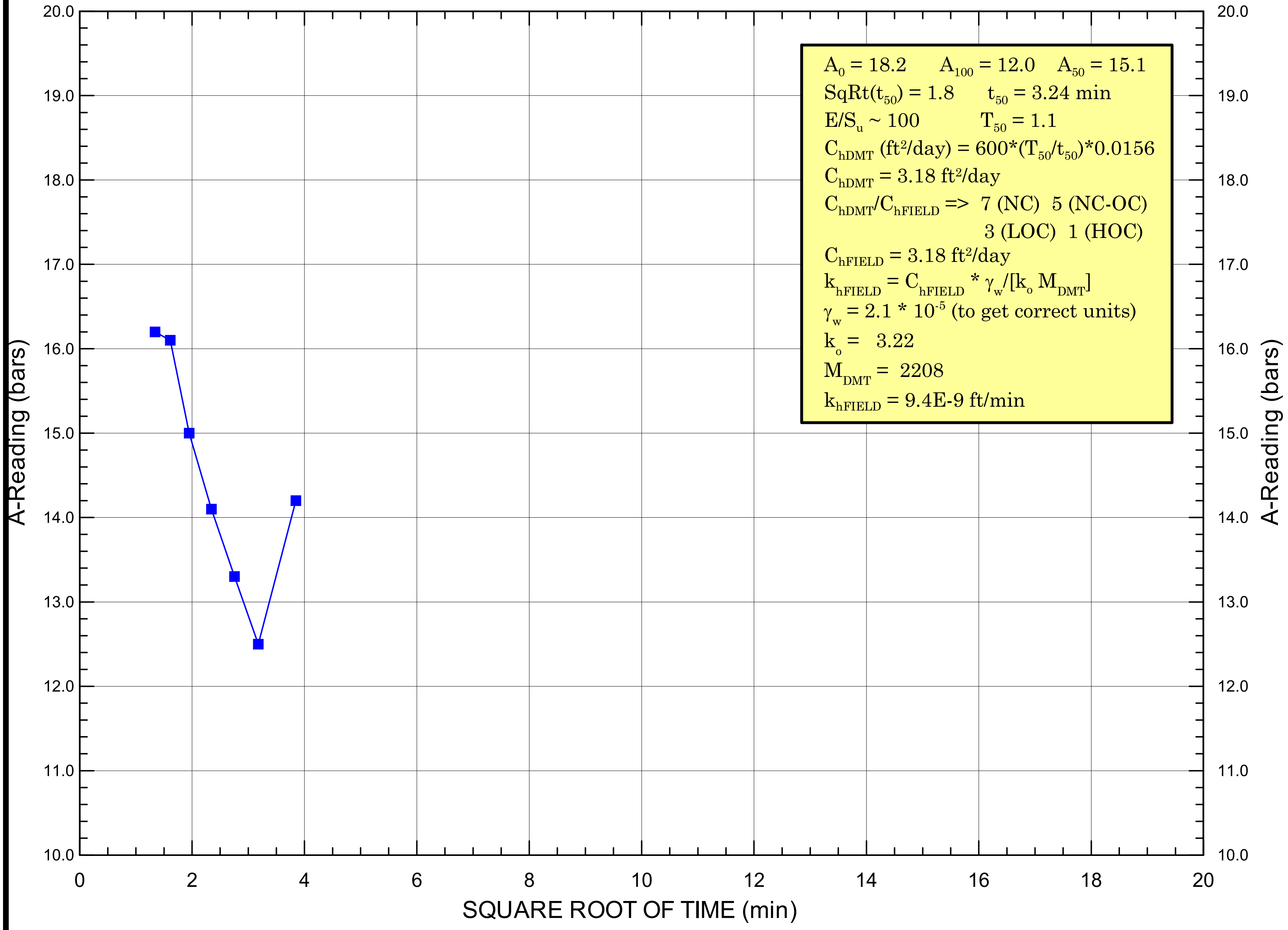
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8-19-08

SOUNDING

DMT-701

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 11.8 m



$A_0 = 18.2$ $A_{100} = 12.0$ $A_{50} = 15.1$
$SqRt(t_{50}) = 1.8$ $t_{50} = 3.24$ min
$E/S_u \sim 100$ $T_{50} = 1.1$
C_{hDMT} (ft²/day) = $600*(T_{50}/t_{50})*0.0156$
$C_{hDMT} = 3.18$ ft²/day
C_{hDMT}/C_{hFIELD} => 7 (NC) 5 (NC-OC)
3 (LOC) 1 (HOC)
$C_{hFIELD} = 3.18$ ft²/day
$k_{hFIELD} = C_{hFIELD} * \gamma_w/[k_o\ M_{DMT}]$
$\gamma_w = 2.1 * 10^{-5}$ (to get correct units)
$k_o = 3.22$
$M_{DMT} = 2208$
$k_{hFIELD} = 9.4E\text{-}9$ ft/min

PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

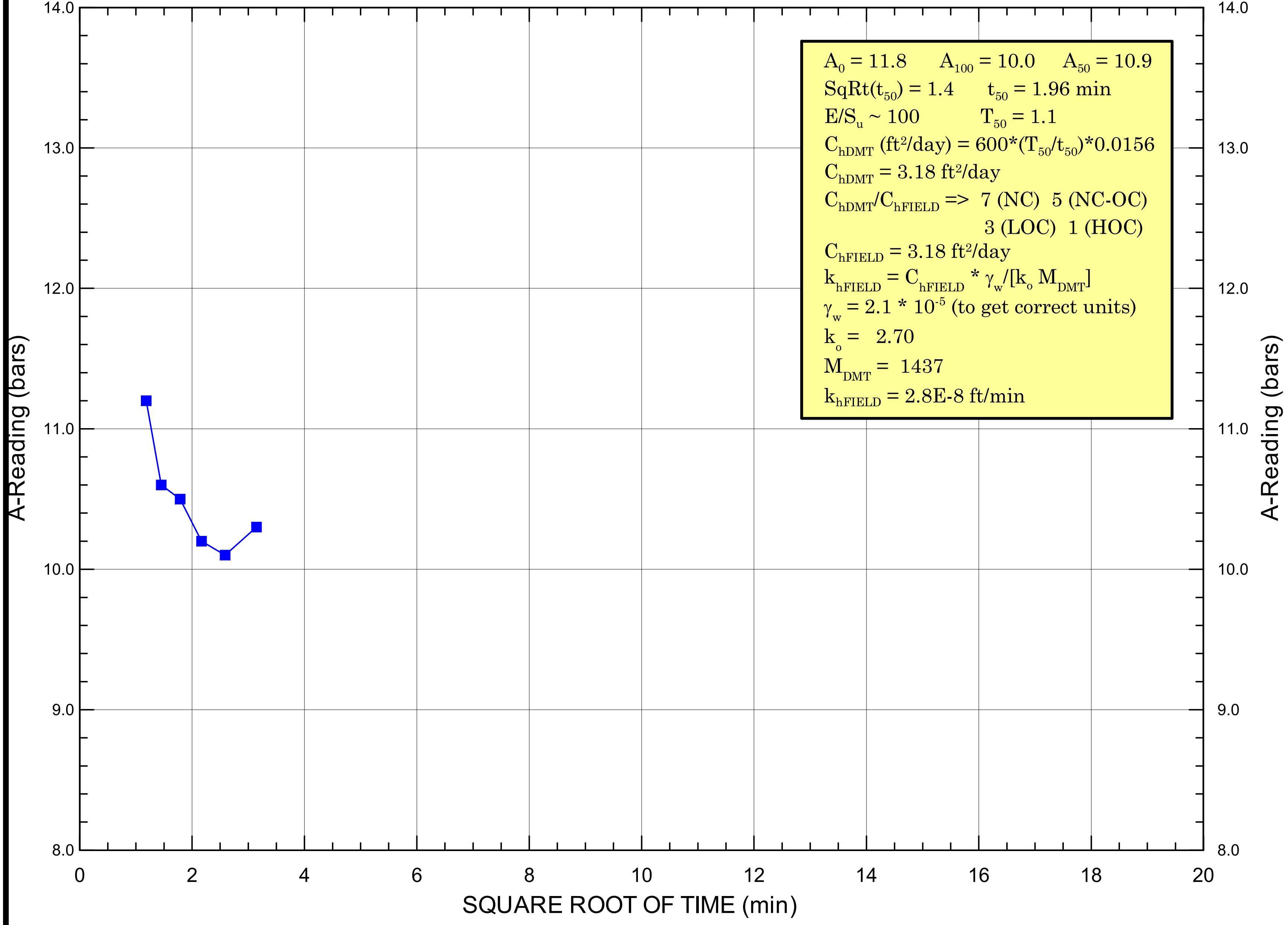
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8-19-08

SOUNDING

DMT-701

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 13.6 m



A_0 = 11.8 A_{100} = 10.0 A_{50} = 10.9
SqRt(t_{50}) = 1.4 t_{50} = 1.96 min
E/S_u ~ 100 T_{50} = 1.1
C_{hDMT} (ft²/day) = 600*(T_{50}/t_{50})*0.0156
C_{hDMT} = 3.18 ft²/day
C_{hDMT}/C_{hFIELD} => 7 (NC) 5 (NC-OC)
3 (LOC) 1 (HOC)
C_{hFIELD} = 3.18 ft²/day
k_{hFIELD} = C_{hFIELD} * γ_w/[k_o M_{DMT}]
γ_w = 2.1 * 10^{-5} (to get correct units)
k_o = 2.70
M_{DMT} = 1437
k_{hFIELD} = 2.8E-8 ft/min

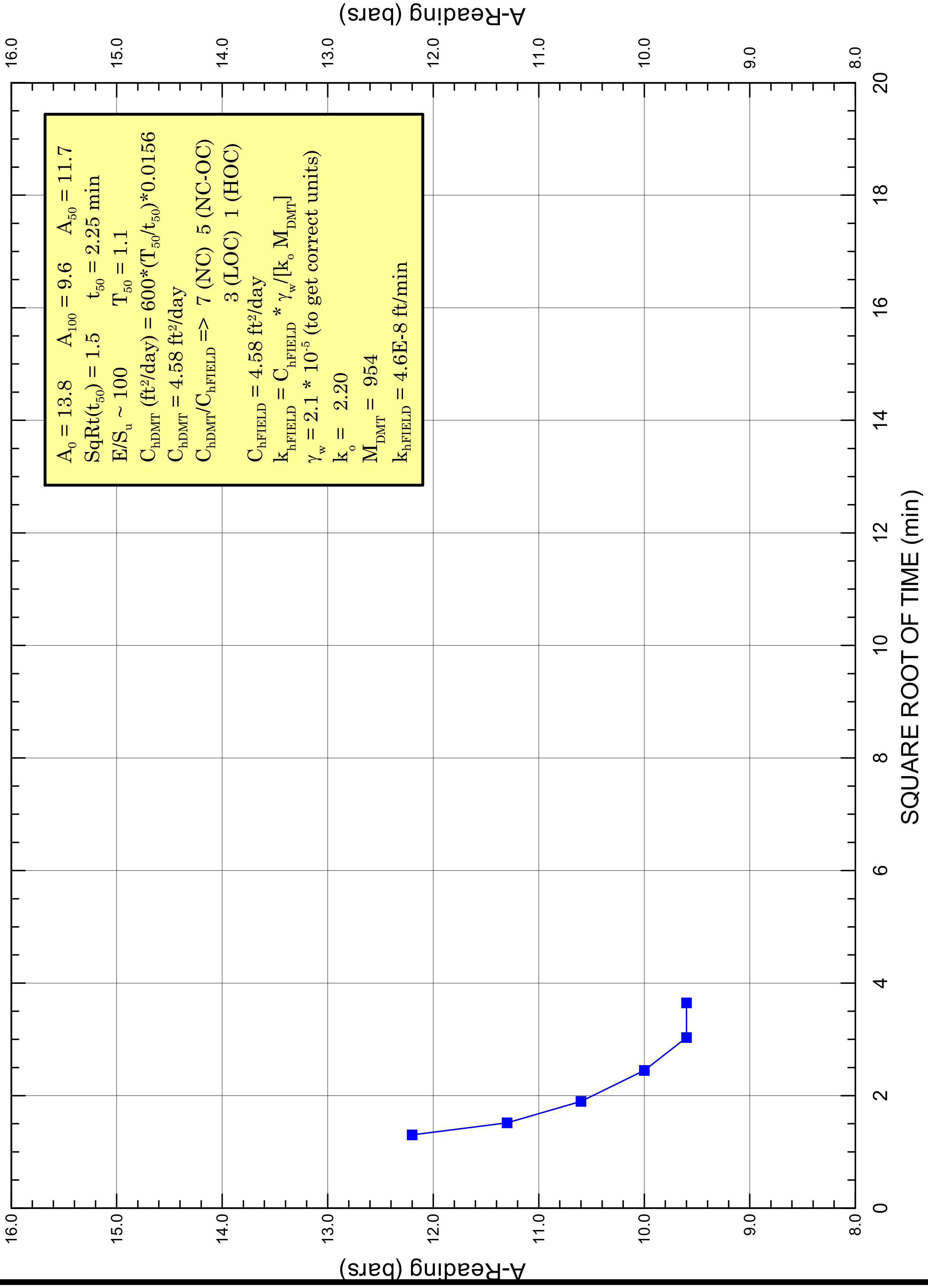
PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8-19-08

SOUNDING
DMT-701

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 16.2 m



$A_0 = 13.8$ $A_{100} = 9.6$ $A_{50} = 11.7$
$SqRt(t_{50}) = 1.5$ $t_{50} = 2.25$ min
$E/S_u \sim 100$ $T_{50} = 1.1$
C_{hDMT} (ft²/day) = $600*(T_{50}/t_{50})*0.0156$
$C_{hDMT} = 4.58$ ft²/day
C_{hDMT}/C_{hFIELD} => 7 (NC) 5 (NC-OC)
3 (LOC) 1 (HOC)
$C_{hFIELD} = 4.58$ ft²/day
$k_{hFIELD} = C_{hFIELD} * \gamma_w/[k_o M_{DMT}]$
$\gamma_w = 2.1 * 10^{-5}$ (to get correct units)
$k_o =$ 2.20
$M_{DMT} =$ 954
$k_{hFIELD} =$ 4.6E-8 ft/min

PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

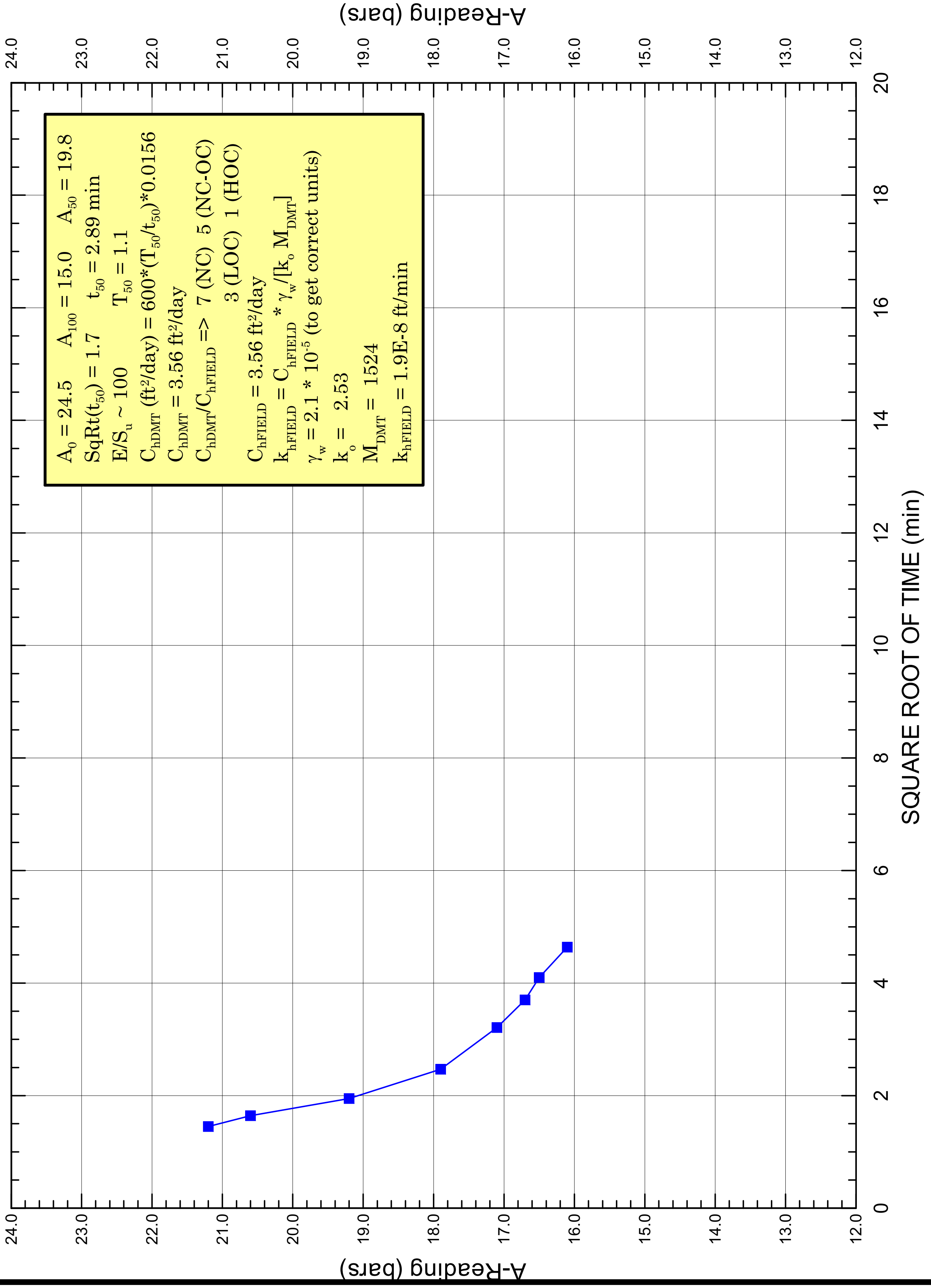
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8-19-08

SOUNDING

DMT-701

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 17.8 m



$A_0 = 24.5$ $A_{100} = 15.0$ $A_{50} = 19.8$

$SqRt(t_{50}) = 1.7$ $t_{50} = 2.89$ min

$E/S_u \sim 100$ $T_{50} = 1.1$

C_{hDMT} (ft²/day) = $600*(T_{50}/t_{50})*0.0156$

$C_{hDMT} = 3.56$ ft²/day

C_{hDMT}/C_{hFIELD} => 7 (NC) 5 (NC-OC)
3 (LOC) 1 (HOC)

$C_{hFIELD} = 3.56$ ft²/day

$k_{hFIELD} = C_{hFIELD} * \gamma_w /[k_o M_{DMT}]$

$\gamma_w = 2.1 * 10^{-5}$ (to get correct units)

$k_o =$ 2.53

$M_{DMT} = 1524$

$k_{hFIELD} = 1.9E\text{-}8$ ft/min

PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

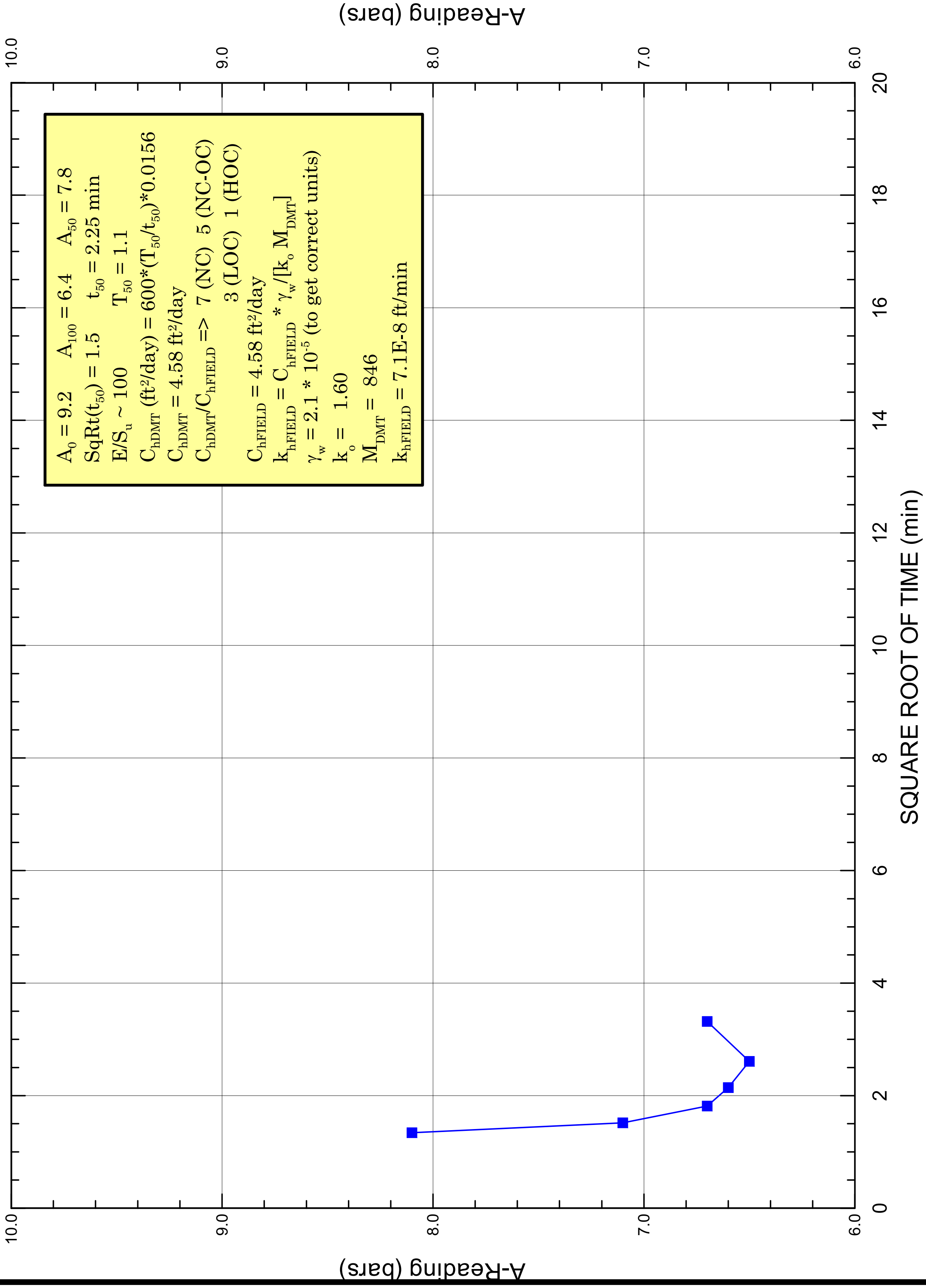
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8-20-08

SOUNDING

DMT-701

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 19.6 m



$A_0 = 9.2$ $A_{100} = 6.4$ $A_{50} = 7.8$
$\mathrm{SqRt}(t_{50}) = 1.5$ $t_{50} = 2.25$ min
$E/S_u \sim 100$ $T_{50} = 1.1$
C_{hDMT} (ft^2/day) $= 600*(T_{50}/t_{50})*0.0156$
$C_{hDMT} = 4.58$ ft^2/day
$C_{hDMT}/C_{hFIELD} \Rightarrow 7$ (NC) 5 (NC-OC)
3 (LOC) 1 (HOC)
$C_{hFIELD} = 4.58$ ft^2/day
$k_{hFIELD} = C_{hFIELD} * \gamma_w/[k_o\, M_{DMT}]$
$\gamma_w = 2.1 * 10^{-5}$ (to get correct units)
$k_o = 1.60$
$M_{DMT} = 846$
$k_{hFIELD} = 7.1E\text{-}8$ ft/min

PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

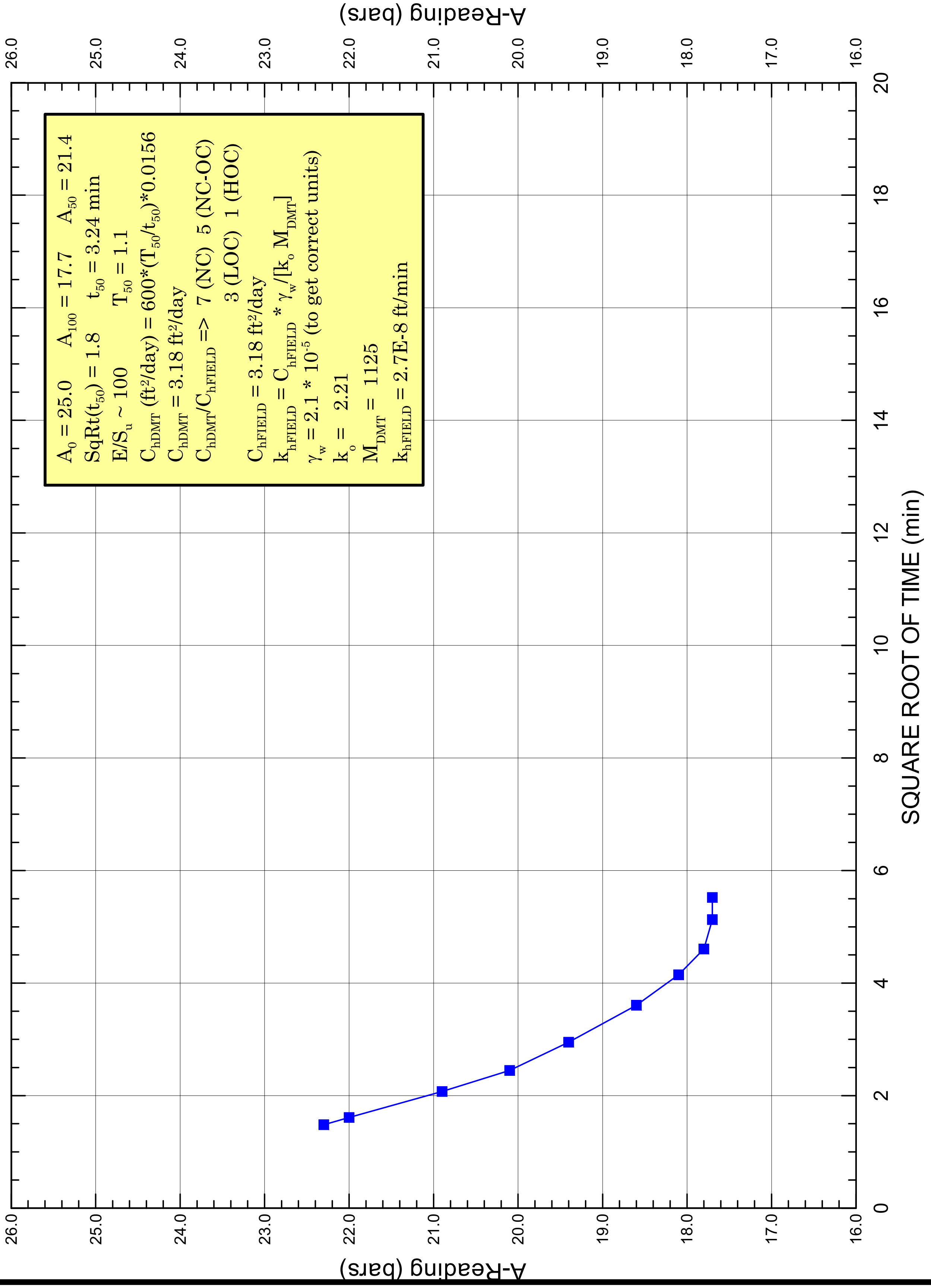
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8-20-08

SOUNDING

DMT-701

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 22.8 m



$A_0 = 25.0$ $A_{100} = 17.7$ $A_{50} = 21.4$
$SqRt(t_{50}) = 1.8$ $t_{50} = 3.24$ min
$E/S_u \sim 100$ $T_{50} = 1.1$
C_{hDMT} (ft²/day) = $600*(T_{50}/t_{50})*0.0156$
$C_{hDMT} = 3.18$ ft²/day
C_{hDMT}/C_{hFIELD} => 7 (NC) 5 (NC-OC)
3 (LOC) 1 (HOC)
$C_{hFIELD} = 3.18$ ft²/day
$k_{hFIELD} = C_{hFIELD} * \gamma_w/[k_o\ M_{DMT}]$
$\gamma_w = 2.1 * 10^{-5}$ (to get correct units)
$k_o = 2.21$
$M_{DMT} = 1125$
$k_{hFIELD} = 2.7E\text{-}8$ ft/min

PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

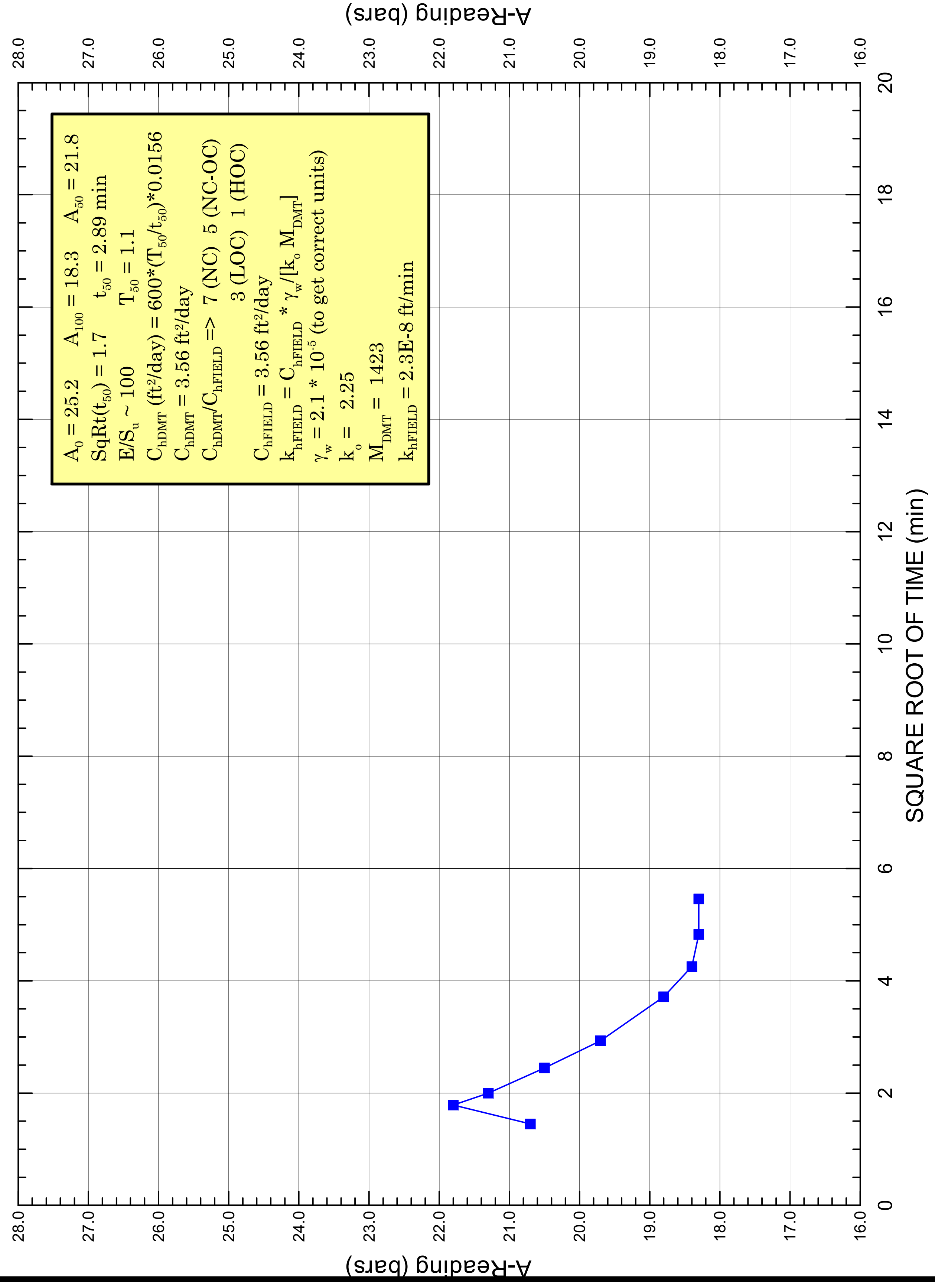
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8-20-08

SOUNDING

DMT-701

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 24.4 m



$A_0 = 25.2$ $A_{100} = 18.3$ $A_{50} = 21.8$
$SqRt(t_{50}) = 1.7$ $t_{50} = 2.89$ min
$E/S_u \sim 100$ $T_{50} = 1.1$
C_{hDMT} (ft²/day) = $600*(T_{50}/t_{50})*0.0156$
$C_{hDMT} = 3.56$ ft²/day
C_{hDMT}/C_{hFIELD} => 7 (NC) 5 (NC-OC)
3 (LOC) 1 (HOC)
$C_{hFIELD} = 3.56$ ft²/day
$k_{hFIELD} = C_{hFIELD} * \gamma_w /[k_o M_{DMT}]$
$\gamma_w = 2.1 * 10^{-5}$ (to get correct units)
$k_o = 2.25$
$M_{DMT} = 1423$
$k_{hFIELD} = 2.3E\text{-}8$ ft/min

PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

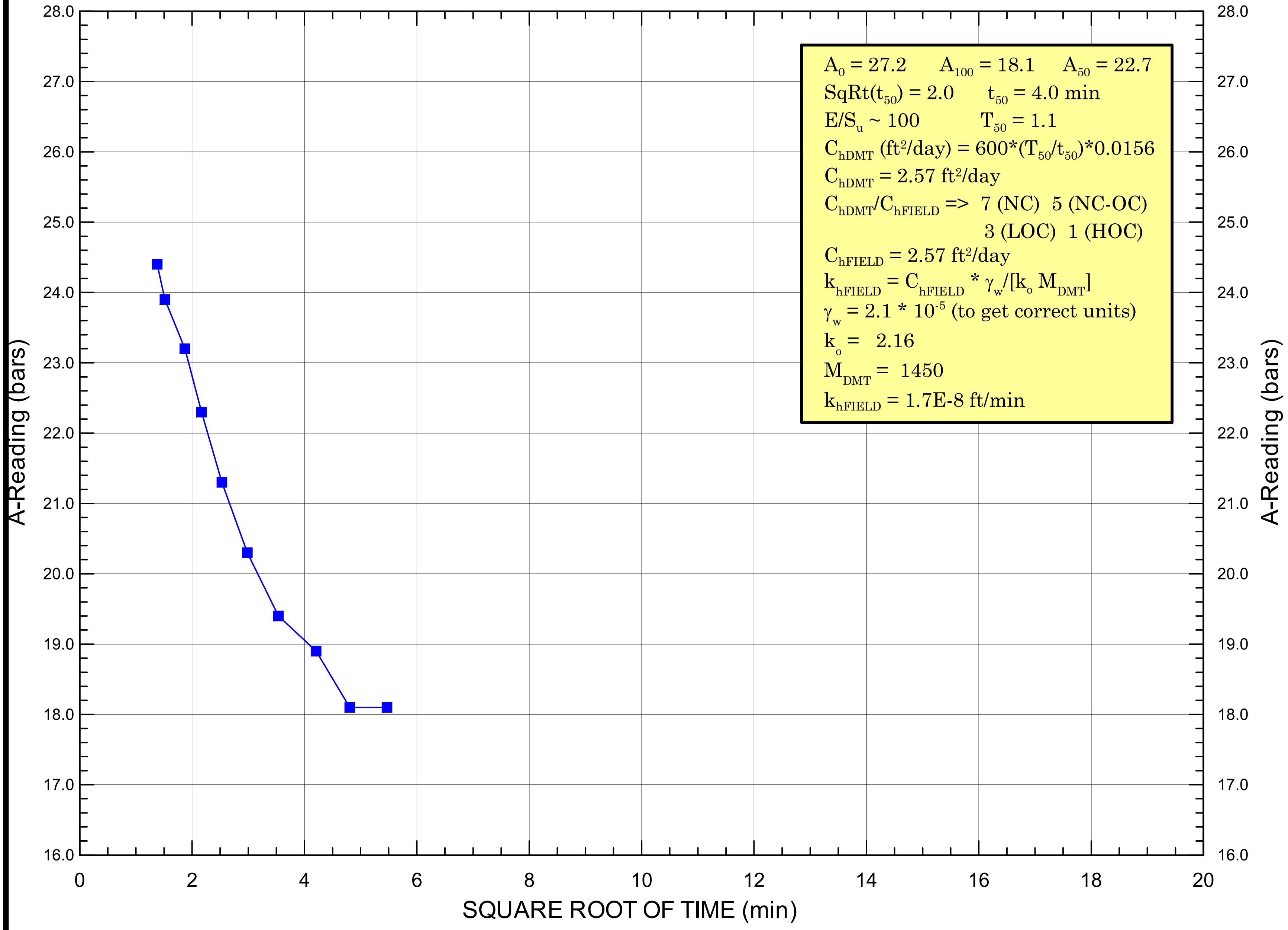
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8-20-08

SOUNDING

DMT-701

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 26.0 m



$A_0 = 27.2$ $A_{100} = 18.1$ $A_{50} = 22.7$

$SqRt(t_{50}) = 2.0$ $t_{50} = 4.0$ min

$E/S_u \sim 100$ $T_{50} = 1.1$

C_{hDMT} (ft²/day) = $600*(T_{50}/t_{50})*0.0156$

$C_{hDMT} = 2.57$ ft²/day

C_{hDMT}/C_{hFIELD} => 7 (NC) 5 (NC-OC)
3 (LOC) 1 (HOC)

$C_{hFIELD} = 2.57$ ft²/day

$k_{hFIELD} = C_{hFIELD} * \gamma_w/[k_o\ M_{DMT}]$

$\gamma_w = 2.1 * 10^{-5}$ (to get correct units)

$k_o = 2.16$

$M_{DMT} = 1450$

$k_{hFIELD} = 1.7E\text{-}8$ ft/min

PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

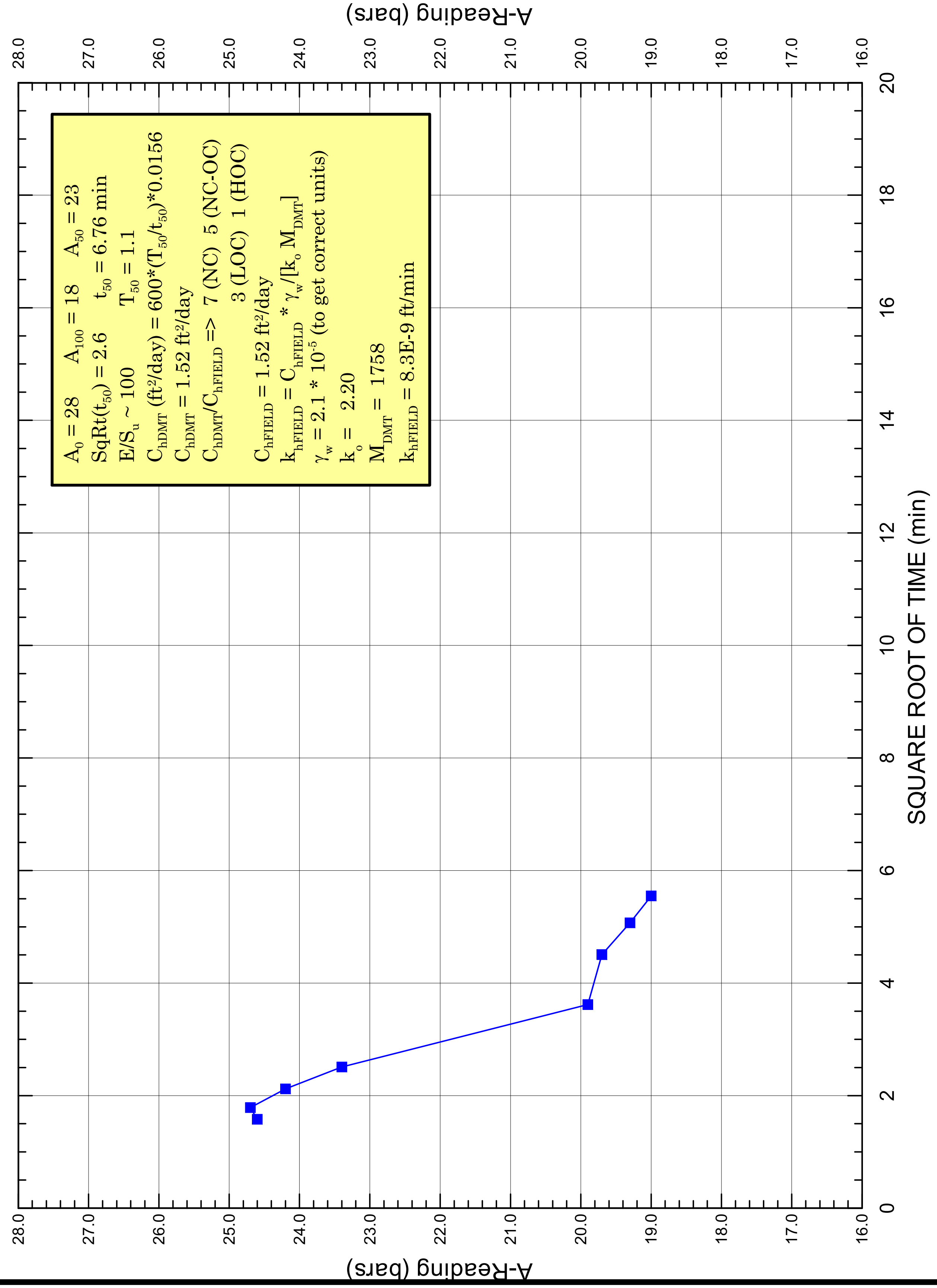
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8-20-08

SOUNDING

DMT-701

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 27.6 m



$A_0 = 28$ $A_{100} = 18$ $A_{50} = 23$
SqRt(t_{50}) = 2.6 $t_{50} = 6.76$ min
E/S_u ~ 100 $T_{50} = 1.1$
C_{hDMT} (ft²/day) = 600*(T_{50}/t_{50})*0.0156
C_{hDMT} = 1.52 ft²/day
C_{hDMT}/C_{hFIELD} => 7 (NC) 5 (NC-OC)
3 (LOC) 1 (HOC)
C_{hFIELD} = 1.52 ft²/day
$k_{hFIELD} = C_{hFIELD} * \gamma_w /[k_o M_{DMT}]$
$\gamma_w = 2.1 * 10^{-5}$ (to get correct units)
k_o = 2.20
M_{DMT} = 1758
k_{hFIELD} = 8.3E-9 ft/min

PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

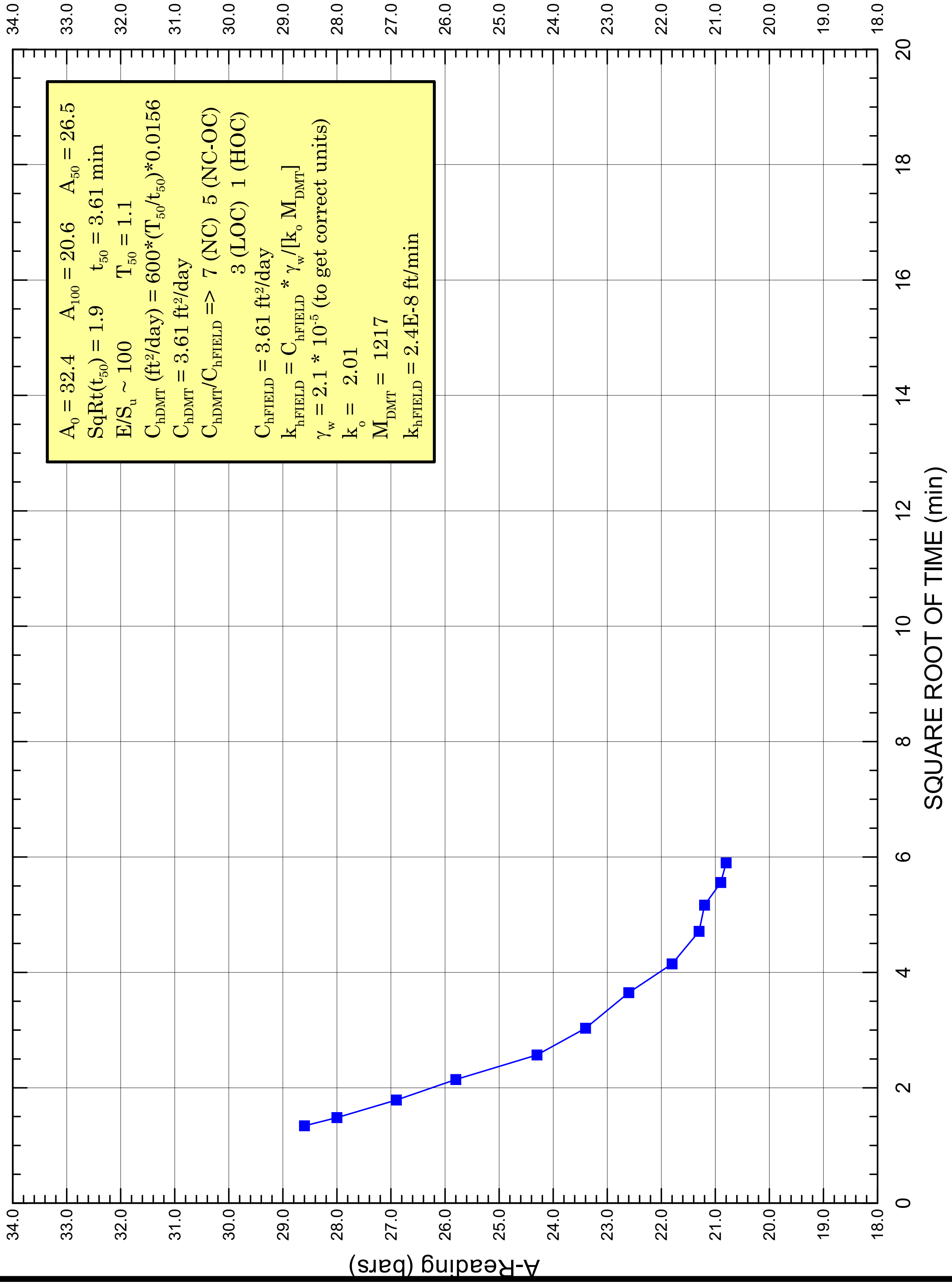
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8-21-08

SOUNDING

DMT-701

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 30.4 m



A_0 = 32.4 A_{100} = 20.6 A_{50} = 26.5

SqRt(t_{50}) = 1.9 t_{50} = 3.61 min

E/S_u ~ 100 T_{50} = 1.1

C_{hDMT} (ft²/day) = 600*(T_{50}/t_{50})*0.0156

C_{hDMT} = 3.61 ft²/day

C_{hDMT}/C_{hFIELD} => 7 (NC) 5 (NC-OC)
3 (LOC) 1 (HOC)

C_{hFIELD} = 3.61 ft²/day

k_{hFIELD} = C_{hFIELD} * γ_w /[k_o M_{DMT}]

γ_w = 2.1 * 10^{-5} (to get correct units)

k_o = 2.01

M_{DMT} = 1217

k_{hFIELD} = 2.4E-8 ft/min

PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

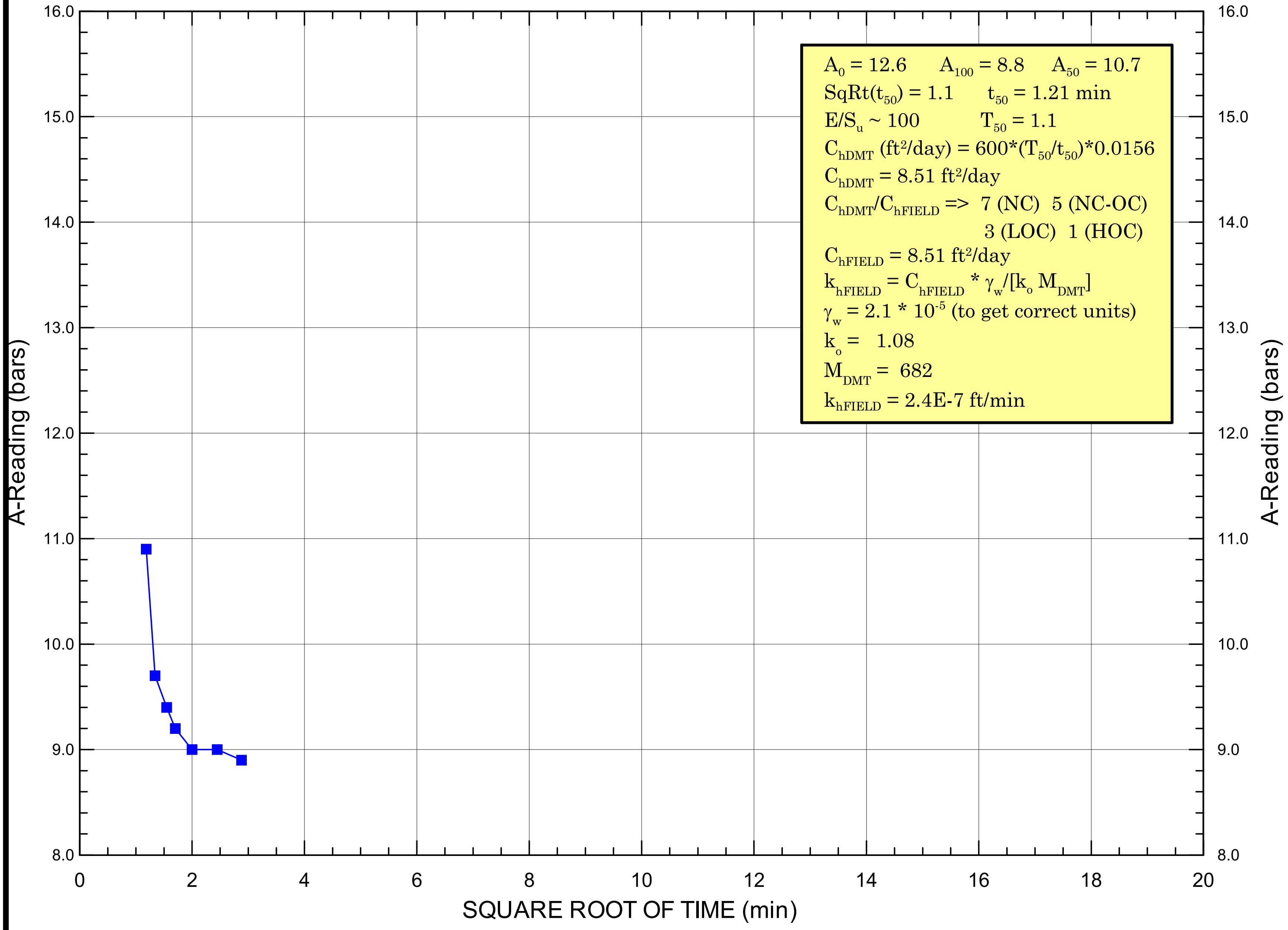
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8-21-08

SOUNDING

DMT-701

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 39.6 m



$A_0 = 12.6$ $A_{100} = 8.8$ $A_{50} = 10.7$

$SqRt(t_{50}) = 1.1$ $t_{50} = 1.21$ min

$E/S_u \sim 100$ $T_{50} = 1.1$

C_{hDMT} (ft²/day) = $600*(T_{50}/t_{50})*0.0156$

$C_{hDMT} = 8.51$ ft²/day

C_{hDMT}/C_{hFIELD} => 7 (NC) 5 (NC-OC)
3 (LOC) 1 (HOC)

$C_{hFIELD} = 8.51$ ft²/day

$k_{hFIELD} = C_{hFIELD} * \gamma_w/[k_o\ M_{DMT}]$

$\gamma_w = 2.1 * 10^{-5}$ (to get correct units)

$k_o = 1.08$

$M_{DMT} = 682$

$k_{hFIELD} = 2.4E-7$ ft/min

PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

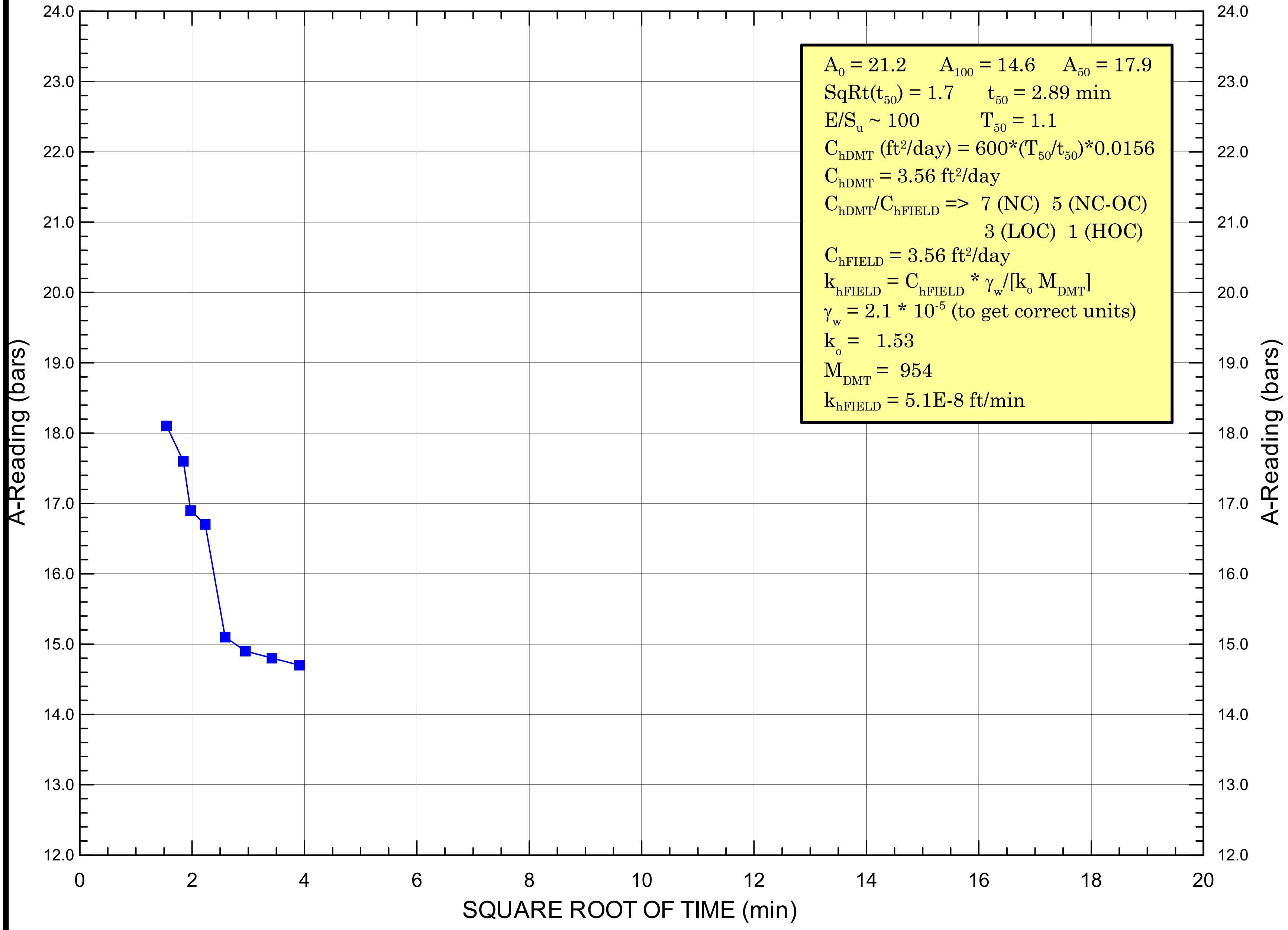
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 8-25-08

SOUNDING

DMT-701

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 43.8 m



$A_0 = 21.2$ $A_{100} = 14.6$ $A_{50} = 17.9$
$SqRt(t_{50}) = 1.7$ $t_{50} = 2.89$ min
$E/S_u \sim 100$ $T_{50} = 1.1$
C_{hDMT} (ft²/day) = $600*(T_{50}/t_{50})*0.0156$
$C_{hDMT} = 3.56$ ft²/day
C_{hDMT}/C_{hFIELD} => 7 (NC) 5 (NC-OC)
3 (LOC) 1 (HOC)
$C_{hFIELD} = 3.56$ ft²/day
$k_{hFIELD} = C_{hFIELD} * \gamma_w/[k_o M_{DMT}]$
$\gamma_w = 2.1 * 10^{-5}$ (to get correct units)
$k_o = 1.53$
$M_{DMT} = 954$
$k_{hFIELD} = 5.1E-8$ ft/min

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)       SNDG. NO. :DMT-301
In-Situ Soil Testing, L.C.                                                              Page 1a
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                        FILE NO. : 2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                 SNDG. DATE: 11/20/08
ANAL.BY : Roger Failmezger, P.E.                                                        ANAL. DATE: 12/15/08

ANALYSIS PARAMETERS:   LO RANGE   = 11.65 TSF  ROD DIAM.   =  0.02 IN    BL.THICK.  =  0.00 IN     SU  FACTOR = 1
SURF.ELEV.  = 97.0 FT
                       LO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  0.02 IN    BL.WIDTH   =  0.00 IN     PHI FACTOR = 1
WATER DEPTH = 63.0 FT HI  GAGE 0 =  0.26 TSF  LIN.ROD WT. =   0.7 LBF/FTDELTA-A    =  0.20 TSF   OCR FACTOR = 1
SP.GR.WATER = 1.000    CAL GAGE 0 =  0.00 TSF  DELTA/PHI   =   0.5       DELTA-B    =  0.29 TSF    M  FACTOR  = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.8       OCR OPTION =     0        K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z    ELEV   THRUST    A     B     C      DA    DB     ZMRNG ZMLO  ZMHI  ZMCAL   P0    P1    P2     U0    GAMMA   SVP
 (FT)  (FT)   (LBF)   (TSF) (TSF) (TSF)  (TSF) (TSF)   (TSF) (TSF) (TSF) (TSF)  (TSF) (TSF) (TSF)  (TSF)  (PCF)  (TSF)
***** ******  ******  ***** ***** *****  ***** *****   ***** ***** ***** *****  ***** ***** *****  ****** ****** ******
  1.0   95.8    1918   1.86  5.32        0.15  0.24    9.40  0.00  0.21  0.00   1.85  5.08         0.000  106.1  0.052
  1.3   95.5    1985   2.09  6.89        0.15  0.24    9.40  0.00  0.21  0.00   2.01  6.65         0.000  112.3  0.070
  2.0   94.8    1654   2.71  8.46        0.15  0.24    9.40  0.00  0.21  0.00   2.59  8.22         0.000  118.6  0.108
  2.6   94.2    3308   5.45  8.98        0.15  0.24    9.40  0.00  0.21  0.00   5.44  8.74         0.000  112.3  0.146
  3.3   93.5    6505  10.75 25.06        0.15  0.24    9.40  0.00  0.21  0.00   9.99 24.61         0.000  131.0  0.186
  3.9   92.8    9702  13.57 32.16        0.15  0.24    9.40  0.00  0.21  0.00  12.60 31.71         0.000  131.0  0.229
  4.6   92.2   10077  17.02 33.72        0.15  0.24    9.40  0.00  0.21  0.00  16.14 33.27         0.000  131.0  0.272
  5.2   91.5   13715  12.21 38.21        0.15  0.24    9.40  0.00  0.21  0.00  10.87 37.76         0.000  134.2  0.315
  6.2   90.6   15281  12.42 32.99        0.15  0.24    9.40  0.00  0.21  0.00  11.35 32.54         0.000  134.2  0.382
  6.6   90.2   13098  11.90 29.34        0.15  0.24    9.40  0.00  0.21  0.00  10.98 28.89         0.000  131.0  0.403
  7.2   89.6   11223   8.56 21.82        0.15  0.24    9.40  0.00  0.21  0.00   8.07 21.37         0.000  121.7  0.445
  7.9   88.9   11334  12.95 30.90        0.15  0.24    9.40  0.00  0.21  0.00  12.01 30.45         0.000  131.0  0.487
  8.5   88.3   10562  12.21 28.92        0.15  0.24    9.40  0.00  0.21  0.00  11.34 28.47         0.000  131.0  0.529
  9.2   87.6   10915  11.38 28.08        0.15  0.24    9.40  0.00  0.21  0.00  10.50 27.63         0.000  131.0  0.572
  9.8   86.9   10959  11.38 28.92        0.15  0.24    9.40  0.00  0.21  0.00  10.46 28.47         0.000  131.0  0.615
 10.5   86.3   11157  12.42 29.96        0.15  0.24    9.40  0.00  0.21  0.00  11.50 29.51         0.000  131.0  0.659
 11.2   85.6   11246  11.69 29.65        0.15  0.24    9.40  0.00  0.21  0.00  10.75 29.20         0.000  131.0  0.702
 11.8   85.0   11201  12.11 31.42        0.15  0.24    9.40  0.00  0.21  0.00  11.10 30.98         0.000  131.0  0.744
 12.5   84.3   12436  12.42 33.09        0.15  0.24    9.40  0.00  0.21  0.00  11.35 32.65         0.000  134.2  0.788
 13.1   83.7   13010  11.90 32.99        0.15  0.24    9.40  0.00  0.21  0.00  10.81 32.54         0.000  134.2  0.832
 13.8   83.0   13010  14.30 35.29        0.15  0.24    9.40  0.00  0.21  0.00  13.21 34.84         0.000  131.0  0.876
 14.4   82.3   11047  11.80 29.13        0.15  0.24    9.40  0.00  0.21  0.00  10.89 28.68         0.000  131.0  0.919
 15.1   81.7    8136   9.29 23.07        0.15  0.24    9.40  0.00  0.21  0.00   8.78 22.62         0.000  121.7  0.960
 15.7   81.0   11598   7.52 37.58        0.15  0.24    9.40  0.00  0.21  0.00   6.19 37.14         0.000  124.8  1.000
 16.4   80.4    9724   8.25 23.18        0.15  0.24    9.40  0.00  0.21  0.00   7.67 22.73         0.000  124.8  1.042
 17.4   79.4   11201  10.65 36.33        0.09  0.57    9.40  0.00  0.21  0.00   9.28 35.55         0.000  134.2  1.106
 17.7   79.1    9217  10.54 36.54        0.09  0.57    9.40  0.00  0.21  0.00   9.17 35.76         0.000  134.2  1.128
 18.4   78.4    5777   7.31 15.76        0.09  0.57    9.40  0.00  0.21  0.00   7.03 14.98         0.000  121.7  1.169
 19.0   77.8    3749   7.52 14.41        0.09  0.57    9.40  0.00  0.21  0.00   7.31 13.62         0.000  121.7  1.209
 19.7   77.1    2161   6.99 12.32        0.09  0.57    9.40  0.00  0.21  0.00   6.87 11.54         0.000  121.7  1.250
 20.3   76.4    2536   3.57 12.84        0.09  0.57    9.40  0.00  0.21  0.00   3.25 12.06         0.000  118.6  1.288
 21.0   75.8    3021   3.74 10.44        0.09  0.57    9.40  0.00  0.21  0.00   3.54  9.66         0.000  112.3  1.327
 21.7   75.1    2756   3.37 10.13        0.09  0.57    9.40  0.00  0.21  0.00   3.17  9.34         0.000  118.6  1.365
 22.3   74.5    2646   3.88  8.46        0.09  0.57    9.40  0.00  0.21  0.00   3.78  7.88         0.000  112.3  1.402
 23.0   73.8    2271   4.51  9.50        0.09  0.57    9.40  0.00  0.21  0.00   4.40  8.72         0.000  112.3  1.440
 23.6   73.2    2205   5.41 10.23        0.09  0.57    9.40  0.00  0.21  0.00   5.30  9.45         0.000  112.3  1.476
 24.3   72.5    2161   6.99 10.13        0.09  0.57    9.40  0.00  0.21  0.00   6.97  9.34         0.000  112.3  1.513
 24.9   71.8    1786   7.41 10.75  2.70  0.09  0.57    9.40  0.00  0.21  0.00   7.38  9.97  2.80  0.000  112.3  1.550
 25.6   71.2    1896   8.98 12.21  3.89  0.09  0.57    9.40  0.00  0.21  0.00   8.96 11.43  3.99  0.000  112.3  1.587
 26.2   70.5    1896   9.50 13.15  4.69  0.09  0.57    9.40  0.00  0.21  0.00   9.24 12.37  4.78  0.000  118.6  1.624
 26.9   69.9    1962  10.13 13.78  5.11  0.09  0.57    9.40  0.00  0.21  0.00   9.87 13.00  5.20  0.000  118.6  1.664
 27.6   69.2    1940  10.34 13.89  5.09  0.09  0.57    9.40  0.00  0.21  0.00  10.07 13.10  5.19  0.000  118.6  1.703
 28.2   68.6    1874  11.28 15.97  6.06  0.09  0.57    9.40  0.00  0.21  0.00  10.96 15.19  6.15  0.000  118.6  1.741
 28.9   67.9    2337  10.13 16.50  2.84  0.09  0.57    9.40  0.00  0.21  0.00   9.73 15.71  2.93  0.000  121.7  1.781
 29.5   67.3    3021  10.65 15.56  4.41  0.09  0.57    9.40  0.00  0.21  0.00  10.33 14.77  4.50  0.000  118.6  1.821
 30.2   66.6    3021  10.34 14.30  4.60  0.09  0.57    9.40  0.00  0.21  0.00  10.05 13.52  4.70  0.000  118.6  1.859
 30.8   65.9    2977  12.63 17.85  6.89  0.09  0.57    9.40  0.00  0.21  0.00  12.29 17.07  6.98  0.000  118.6  1.898
 31.5   65.3    2800  12.74 17.85  7.41  0.09  0.57    9.40  0.00  0.21  0.00  12.40 17.07  7.51  0.000  118.6  1.938
 32.2   64.6    3219  14.72 20.46  9.29  0.09  0.57    9.40  0.00  0.21  0.00  14.36 19.68  9.39  0.000  118.6  1.976
 32.8   64.0    3263  14.41 20.15  8.35  0.09  0.57    9.40  0.00  0.21  0.00  14.04 19.37  8.45  0.000  118.6  2.015
 33.5   63.3    7100   8.25 26.52  0.06  0.09  0.57    9.40  0.00  0.21  0.00   7.48 25.73  0.16  0.000  124.8  2.056
 34.1   62.7    7784  13.89 21.72  5.95  0.09  0.57    9.40  0.00  0.21  0.00  13.42 20.93  6.04  0.000  127.9  2.096
 34.8   62.0    4939  16.39 25.47  7.73  0.09  0.57    9.40  0.00  0.21  0.00  15.86 24.69  7.82  0.000  127.9  2.139
 35.4   61.4    4675  17.96 26.10 10.02  0.09  0.57    9.40  0.00  0.21  0.00  17.47 25.32  9.91  0.000  127.9  2.181
 36.1   60.7    4697  18.06 26.31 10.34  0.09  0.57    9.40  0.00  0.21  0.00  17.57 25.53 10.22  0.000  127.9  2.223
 36.7   60.0    4807  17.12 25.26  6.89  0.09  0.57    9.40  0.00  0.21  0.00  16.63 24.48  6.98  0.000  127.9  2.264
 37.4   59.4    5402  20.15 28.29  9.71  0.09  0.57    9.40  0.00  0.21  0.00  19.66 27.51  9.59  0.000  127.9  2.306
 38.1   58.7    5667  22.76 31.11 13.26  0.09  0.57    9.40  0.00  0.21  0.00  22.26 30.33 13.14  0.000  127.9  2.349
 38.7   58.1    6152  24.85 33.30 14.41  0.09  0.57    9.40  0.00  0.21  0.00  24.35 32.52 14.29  0.000  127.9  2.391
 39.4   57.4    6328  23.39 32.47 12.42  0.09  0.57    9.40  0.00  0.21  0.00  22.85 31.69 12.31  0.000  127.9  2.433
 40.0   56.8    8247  22.97 31.95 12.11  0.09  0.57    9.40  0.00  0.21  0.00  22.44 31.16 12.00  0.000  127.9  2.474
 40.7   56.1    7806  20.57 29.23  7.73  0.09  0.57    9.40  0.00  0.21  0.00  20.06 28.45  7.82  0.000  127.9  2.517
 41.3   55.4   10077  13.47 23.80  0.73  0.09  0.57    9.40  0.00  0.21  0.00  12.87 23.02  0.82  0.000  131.0  2.559
 42.0   54.8   18390  11.90 38.63        0.09  0.57    9.40  0.00  0.21  0.00  10.48 37.85         0.000  134.2  2.603
 42.7   54.1   20727  12.21 34.24  0.28  0.09  0.57    9.40  0.00  0.21  0.00  11.04 33.46  0.38  0.000  134.2  2.647
 43.3   53.5   11069  25.06 34.87 10.44  0.09  0.57    9.40  0.00  0.21  0.00  24.48 34.09 10.33  0.000  127.9  2.689
 44.0   52.8    9570  31.84 43.85 14.93  0.09  0.57    9.40  0.00  0.21  0.00  31.16 43.07 14.81  0.000  127.9  2.732
 44.6   52.2    9548  34.35 47.61 16.91  0.09  0.57    9.40  0.00  0.21  0.00  33.61 46.82 16.80  0.000  127.9  2.774
 45.3   51.5   10033  37.27 49.38 19.63  0.09  0.57    9.40  0.00  0.21  0.00  36.58 48.60 19.51  0.000  127.9  2.816
 45.9   50.9   11400  41.55 55.02 18.58  0.09  0.57    9.40  0.00  0.21  0.00  40.80 54.24 18.47  0.000  127.9  2.857
 46.6   50.2   10893  45.00 56.90 21.82  0.09  0.57    9.40  0.00  0.21  0.00  44.32 56.12 21.70  0.000  127.9  2.900
 47.2   49.5   11201  44.58 58.05 19.21  0.09  0.57    9.40  0.00  0.21  0.00  43.83 57.26 19.09  0.000  127.9  2.942
```

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)         SNDG. NO. : DMT-301
In-Situ Soil Testing, L.C.                                                               Page 2
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                         FILE NO. :2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                  SNDG. DATE: 11/20/08
ANAL.BY : Roger Failmezger, P.E.                                                         ANAL. DATE: 12/15/08

ANALYSIS PARAMETERS:    LO RANGE   = 11.65 TSF  ROD DIAM.   =  0.02 IN    BL.THICK.  =  0.00 IN    SU  FACTOR = 1
SURF.ELEV.  = 97.0 FT
                        LO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  0.02 IN    BL.WIDTH   =  0.00 IN    PHI FACTOR = 1
WATER DEPTH = 63.0 FT HI  GAGE 0 =  0.26 TSF  LIN.ROD WT. =   0.7 LBF/FTDELTA-A    =  0.20 TSF      OCR FACTOR = 1
SP.GR.WATER = 1.000     CAL GAGE 0 =  0.00 TSF;
                                                 DELTA / PHI =   0.5       DELTA - B =  0.29 TSF    M FACTOR = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.8      OCR OPTION =     0       K0 FACTOR  = 1
UNIT CONVERSIONS:       1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z    ELEV    KD    ID    UD     ED      K0     SU     QD      PHI    SIGFF   PHIO   PC      OCR     M      SOIL TYPE
(FT)   (FT)                       (TSF)          (TSF)  (TSF)   (DEG)  (TSF)  (DEG)  (TSF)           (TSF)
***** ******   ***** ***** *****  ******  *****  *****  *****   *****  ******  *****   *****  *****  ******  ************
  1.0   95.8   35.45  1.75           112   3.82                                         4.62   88.7     414  SANDY SILT
  1.3   95.5   28.71  2.30           161   3.39          23.9    44.3    0.11   39.8    5.56   79.4     563  SILTY SAND
  2.0   94.8   24.00  2.17           195   3.04          17.0    39.2    0.18   34.5    7.39   68.4     649  SILTY SAND
  2.6   94.2   37.27  0.61           115   3.93                                        13.99   95.9     429  CLAYEY SILT
  3.3   93.5   53.76  1.46           507   4.78                                        31.57  169.8    2075  SANDY SILT
  3.9   92.8   55.04  1.52           663   4.84                                        40.32  176.1    2728  SANDY SILT
  4.6   92.2   59.34  1.06           594   5.03                                        53.87  198.1    2489  SILT
  5.2   91.5   34.46  2.47           933   4.10         178.1    44.1    0.53   41.7   36.29  115.0    3425  SILTY SAND
  6.2   90.6   29.75  1.87           735   3.53         202.2    44.2    0.65   42.2   32.65   85.5    2597  SILTY SAND
  6.6   90.2   27.24  1.63           621   3.31                                        23.71   58.8    2142  SANDY SILT
  7.2   89.6   18.15  1.65           461   2.63                                        13.89   31.2    1414  SANDY SILT
  7.9   88.9   24.68  1.54           640   3.13                                        24.51   50.4    2149  SANDY SILT
  8.5   88.3   21.41  1.51           594   2.89                                        21.38   40.4    1915  SANDY SILT
  9.2   87.6   18.35  1.63           594   2.64                                        18.17   31.7    1828  SANDY SILT
  9.8   86.9   16.99  1.72           625   2.53                                        17.33   28.2    1876  SANDY SILT
 10.5   86.3   17.47  1.57           625   2.57                                        19.36   29.4    1893  SANDY SILT
 11.2   85.6   15.33  1.72           640   2.38                                        16.82   24.0    1859  SANDY SILT
 11.8   85.0   14.91  1.79           690   2.34                                        17.10   23.0    1985  SANDY SILT
 12.5   84.3   14.40  1.88           739   1.80         158.3    41.5    1.31   40.3   18.21   23.1    2103  SILTY SAND
 13.1   83.7   12.98  2.01           755   1.62         170.2    41.9    1.39   40.8   15.47   18.6    2072  SILTY SAND
 13.8   83.0   15.09  1.64           751   2.36                                        20.48   23.4    2168  SANDY SILT
 14.4   82.3   11.85  1.63           617   2.04                                        14.74   16.0    1642  SANDY SILT
 15.1   81.7    9.14  1.58           480   1.74                                        10.28   10.7    1160  SANDY SILT
 15.7   81.0    6.19  5.00          1074   0.76         168.7    42.7    1.68   42.0    4.24    4.2    2236  SAND
 16.4   80.4    7.37  1.96           522   0.99         131.3    40.5    1.72   39.8    7.09    6.8    1157  SILTY SAND
 17.4   79.4    8.40  2.83           911   1.11         148.9    40.6    1.83   39.9    9.52    8.6    2138  SILTY SAND
 17.7   79.1    8.13  2.90           923   1.13         117.2    39.1    1.84   38.4    9.78    8.7    2139  SILTY SAND
 18.4   78.4    6.01  1.13           277   1.32                                         6.50    5.6     551  SILT
 19.0   77.8    6.04  0.86           219   1.33                                         6.79    5.6     436  CLAYEY SILT
 19.7   77.1    5.50  0.68           162   1.24                                         6.04    4.8     306  CLAYEY SILT
 20.3   76.4    2.52  2.72           306   0.65          33.9    31.2    1.95   30.5    2.64    2.1     390  SILTY SAND
 21.0   75.8    2.67  1.73           212   0.71                                         2.08    1.6     264  SANDY SILT
 21.7   75.1    2.32  1.95           214   0.61          38.0    31.7    2.08   31.1    2.50    1.8     242  SILTY SAND
 22.3   74.5    2.70  1.08           142   0.72                                         2.23    1.6     170  SILT
 23.0   73.8    3.06  0.98           150   0.80                                         2.79    1.9     197  SILT
 23.6   73.2    3.59  0.78           144   0.91                                         3.69    2.5     210  CLAYEY SILT
 24.3   72.5    4.61  0.34            82   1.10   0.95                                  5.56    3.7     140  CLAY
 24.9   71.8    4.76  0.35  0.38      90   1.12   1.01                                  6.00    3.9     157  SILTY CLAY
 25.6   71.2    5.64  0.28  0.45      86   1.26   1.27                                  8.01    5.0     165  CLAY
 26.2   70.5    5.68  0.34  0.52     109   1.27   1.32                                  8.29    5.1     209  CLAY
 26.9   69.9    5.93  0.32  0.53     109   1.31   1.42                                  9.06    5.4     214  CLAY
 27.6   69.2    5.92  0.30  0.51     105   1.31   1.45                                  9.25    5.4     206  CLAY
 28.2   68.6    6.29  0.39  0.56     147   1.36   1.61                                 10.41    6.0     298  SILTY CLAY
 28.9   67.9    5.46  0.62  0.30     208   1.24                                         8.54    4.8     390  CLAYEY SILT
 29.5   67.3    5.67  0.43  0.44     155   1.27   1.47                                  9.25    5.1     296  SILTY CLAY
 30.2   66.6    5.41  0.34  0.47     120   1.23   1.42                                  8.78    4.7     224  CLAY
 30.8   65.9    6.47  0.39  0.57     166   1.39   1.82                                 11.86    6.2     340  SILTY CLAY
 31.5   65.3    6.40  0.38  0.61     162   1.38   1.83                                 11.89    6.1     331  SILTY CLAY
 32.2   64.6    7.26  0.37  0.65     185   1.50   2.18                                 14.77    7.5     402  SILTY CLAY
 32.8   64.0    6.97  0.38  0.60     185   1.46   2.11                                 14.11    7.0     394  SILTY CLAY
 33.5   63.3    3.64  2.44  0.02     634   0.70          94.3    35.0    3.24   35.2    5.73    2.8    1004  SILTY SAND
 34.1   62.7    6.40  0.56  0.45     261   1.38   1.97                                 12.86    6.1     532  SILTY CLAY
 34.8   62.0    7.41  0.56  0.49     307   1.52   2.42                                 16.52    7.7     672  SILTY CLAY
 35.4   61.4    8.01  0.45  0.57     272   1.60   2.71                                 19.00    8.7     619  SILTY CLAY
 36.1   60.7    7.90  0.45  0.58     277   1.58   2.72                                 18.96    8.5     624  SILTY CLAY
 36.7   60.0    7.34  0.47  0.42     272   1.51   2.54                                 17.23    7.6     595  SILTY CLAY
 37.4   59.4    8.52  0.40  0.49     272   1.66   3.11                                 22.13    9.6     636  SILTY CLAY
 38.1   58.7    9.48  0.36  0.59     280   1.78   3.61                                 26.60   11.3     685  SILTY CLAY
 38.7   58.1   10.18  0.34  0.59     284   1.86   4.02                                 30.28   12.7     714  CLAY
 39.4   57.4    9.39  0.39  0.54     307   1.77   3.70                                 27.16   11.2     746  SILTY CLAY
 40.0   56.8    9.07  0.39  0.53     303   1.73   3.60                                 26.15   10.6     727  SILTY CLAY
 40.7   56.1    7.97  0.42  0.39     291   1.59   3.11                                 21.75    8.6     661  SILTY CLAY
 41.3   55.4    5.03  0.79  0.06     352   1.17                                        10.78    4.2     636  CLAYEY SILT
 42.0   54.8    4.03  2.61           949   0.60         268.5    40.4    4.29   41.0    6.21    2.4    1601  SILTY SAND
 42.7   54.1    4.17  2.03  0.03     778   0.59         305.0    41.0    4.38   41.7    6.32    2.4    1311  SILTY SAND
 43.3   53.5    9.10  0.39  0.42     333   1.73   3.94                                 28.61   10.6     801  SILTY CLAY
 44.0   52.8   11.41  0.38  0.48     413   1.99   5.29                                 41.30   15.1    1084  SILTY CLAY
 44.6   52.2   12.11  0.39  0.50     458   2.07   5.79                                 46.07   16.6    1230  SILTY CLAY
 45.3   51.5   12.99  0.33  0.53     417   2.16   6.42                                 52.16   18.5    1145  CLAY
 45.9   50.9   14.28  0.33  0.45     467   2.28   7.34                                 61.31   21.5    1323  CLAY
 46.6   50.2   15.28  0.27  0.49     409   2.38   8.10                                 69.21   23.9    1188  CLAY
 47.2   49.5   14.90  0.31  0.44     467   2.34   7.97                                 67.45   22.9    1342  CLAY
```

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)       SNDG. NO. :DMT-301
In-Situ Soil Testing, L.C.                                                              Page 2a
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                        FILE NO. : 2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                 SNDG. DATE: 11/20/08
ANAL.BY : Roger Failmezger, P.E.                                                        ANAL. DATE: 12/15/08

ANALYSIS PARAMETERS:    LO RANGE   = 12.16 TSF  ROD DIAM.   =  0.01 IN    BL.THICK.  =  0.00 IN     SU  FACTOR = 1
SURF.ELEV.  = 97.0 FT
                        LO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  0.01 IN    BL.WIDTH   =  0.00 IN     PHI FACTOR = 1
WATER DEPTH = 63.0 FT HI  GAGE 0 =  0.27 TSF  LIN.ROD WT. =   0.5 LBF/FTDELTA-A    =  0.21 TSF         OCR FACTOR = 1
SP.GR.WATER = 1.000     CAL GAGE 0 =  0.00 TSF  DELTA/PHI   =   0.5       DELTA-B    =  0.30 TSF    M  FACTOR  = 1
MAX SU ID   =   0.6     SU OPTION  =     0      MIN PHI ID  =   1.8       OCR OPTION =     0        K0 FACTOR  = 1
UNIT CONVERSIONS:       1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z    ELEV   THRUST    A     B     C      DA    DB     ZMRNG ZMLO  ZMHI  ZMCAL   P0    P1    P2     U0    GAMMA   SVP
 (FT)   (FT)   (LBF)  (TSF) (TSF) (TSF)  (TSF) (TSF)   (TSF) (TSF) (TSF) (TSF)  (TSF) (TSF) (TSF)  (TSF)  (PCF)  (TSF)
***** ****** ****** ***** ***** *****  ***** *****   ***** ***** ***** *****  ***** ***** *****  ****** ****** ******
 47.9   48.9   11554 45.00 62.12 22.24   0.09  0.57    9.40  0.00  0.21  0.00  44.06 61.34 22.12   0.000  127.9  2.984
 48.6   48.2   12260 50.95 66.82 22.86   0.09  0.57    9.40  0.00  0.21  0.00  50.07 66.03 22.75   0.000  127.9  3.026
 49.2   47.6   12348 39.78 53.45 18.48   0.09  0.57    9.40  0.00  0.21  0.00  39.01 52.67 18.36   0.000  127.9  3.068
 49.9   46.9   12128 31.11 43.64 10.13   0.09  0.57    9.40  0.00  0.21  0.00  30.40 42.86 10.01   0.000  127.9  3.110
 50.5   46.3   12238 21.92 36.85  3.06   0.09  0.57    9.40  0.00  0.21  0.00  21.10 36.07  3.15   0.000  131.0  3.153
 51.2   45.6   12304 17.54 36.23  0.55   0.09  0.57    9.40  0.00  0.21  0.00  16.53 35.44  0.65   0.000  131.0  3.196
 51.8   44.9   13428 15.87 39.15         0.09  0.57    9.40  0.00  0.21  0.00  14.63 38.37         0.000  131.0  3.238
 52.5   44.3   15104 41.76 71.31  5.85   0.09  0.57    9.40  0.00  0.21  0.00  40.20 70.52  5.94   0.000  131.0  3.281
 53.1   43.6   17023 39.67 75.27  3.96   0.09  0.57    9.40  0.00  0.21  0.00  37.81 74.49  4.05   0.000  131.0  3.324
 53.8   43.0   18897 45.73 83.52         0.09  0.57    9.40  0.00  0.21  0.00  43.75 82.74         0.000  131.0  3.368
 54.5   42.3   25027 52.30 102.31        0.09  0.57    9.40  0.00  0.21  0.00  49.73 101.53        0.000  131.0  3.411
 55.1   41.7   41586 77.78 146.1649.07   0.09  0.57    9.40  0.00  0.21  0.00  74.28 145.3848.95   0.000  131.0  3.454
 66.3   30.5   35280 27.98 93.65  0.16   0.18  0.43    9.40  0.00  0.21  0.00  24.69 93.01  0.33   0.102  134.2  4.091
 84.6   12.1   11444 13.42 43.17  0.47   0.18  0.43    9.40  0.00  0.21  0.00  11.92 42.53  0.65   0.677  134.2  4.751
 85.3   11.5   17464 18.79 53.77  0.37   0.18  0.43    9.40  0.00  0.21  0.00  17.04 53.13  0.54   0.696  134.2  4.775
 86.0   10.8   19801 16.70 54.34  0.64   0.18  0.43    9.40  0.00  0.21  0.00  14.82 53.70  0.81   0.717  134.2  4.798
 86.6   10.2   21631 17.96 56.12  0.43   0.18  0.43    9.40  0.00  0.21  0.00  16.05 55.48  0.61   0.738  134.2  4.822
 87.3    9.5   21653 16.91 57.11  0.60   0.18  0.43    9.40  0.00  0.21  0.00  14.90 56.47  0.77   0.758  134.2  4.845
 87.9    8.9   18169 18.37 47.82  0.35   0.18  0.43    9.40  0.00  0.21  0.00  16.90 47.18  0.53   0.779  134.2  4.869
 88.6    8.2   15700 12.11 40.72  0.41   0.18  0.43    9.40  0.00  0.21  0.00  10.68 40.08  0.58   0.799  134.2  4.892
 89.2    7.5   18081 15.92 51.42  0.63   0.18  0.43    9.40  0.00  0.21  0.00  14.15 50.78  0.80   0.820  134.2  4.916
 89.9    6.9   25291 14.82 50.53  0.69   0.18  0.43    9.40  0.00  0.21  0.00  13.04 49.89  0.87   0.840  134.2  4.940
 90.6    6.2   25666 21.72 62.95  0.76   0.18  0.43    9.40  0.00  0.21  0.00  19.65 62.32  0.94   0.860  134.2  4.963
 91.2    5.6   24983 18.06 55.02  0.74   0.18  0.43    9.40  0.00  0.21  0.00  16.21 54.38  0.92   0.881  134.2  4.987
 91.9    4.9   22689 21.98 59.40  0.70   0.18  0.43    9.40  0.00  0.21  0.00  20.11 58.77  0.88   0.902  134.2  5.010
 92.5    4.3   21036 21.45 59.51  0.70   0.18  0.43    9.40  0.00  0.21  0.00  19.55 58.87  0.88   0.922  134.2  5.034
 93.2    3.6   18654 17.07 46.98  0.69   0.18  0.43    9.40  0.00  0.21  0.00  15.58 46.34  0.87   0.943  134.2  5.057
 93.8    3.0   16692 15.03 44.89  0.75   0.18  0.43    9.40  0.00  0.21  0.00  13.54 44.26  0.93   0.963  134.2  5.081
 94.5    2.3   16097 16.50 48.86  0.64   0.18  0.43    9.40  0.00  0.21  0.00  14.88 48.22  0.81   0.983  134.2  5.105
 95.1    1.6   11025 11.80 38.00  0.42   0.18  0.43    9.40  0.00  0.21  0.00  10.48 37.36  0.60   1.004  134.2  5.128
 95.8    1.0   12635 13.36 39.05  0.68   0.18  0.43    9.40  0.00  0.21  0.00  12.08 38.41  0.86   1.024  134.2  5.152
 96.5    0.3   11951 12.53 33.93  0.58   0.18  0.43    9.40  0.00  0.21  0.00  11.45 33.29  0.76   1.045  134.2  5.175
 97.1   -0.3   12061 11.43 37.01  0.67   0.18  0.43    9.40  0.00  0.21  0.00  10.15 36.37  0.85   1.066  134.2  5.199
 97.8   -1.0   10716 10.60 35.08  0.74   0.18  0.43    9.40  0.00  0.21  0.00   9.38 34.44  0.92   1.086  134.2  5.222
 98.4   -1.6    9459 13.36 37.90  0.84   0.18  0.43    9.40  0.00  0.21  0.00  12.13 37.26  1.01   1.107  134.2  5.246
 99.1   -2.3    8974 14.36 32.57  0.73   0.18  0.43    9.40  0.00  0.21  0.00  13.45 31.94  0.91   1.126  131.0  5.269
 99.7   -3.0    6924 15.19 32.89  0.85   0.18  0.43    9.40  0.00  0.21  0.00  14.30 32.25  1.02   1.147  131.0  5.292
100.4   -3.6    6924 17.07 31.69  0.96   0.18  0.43    9.40  0.00  0.21  0.00  16.34 31.05  1.14   1.168  131.0  5.314
101.0   -4.3    5557 19.16 31.53  2.11   0.18  0.43    9.40  0.00  0.21  0.00  18.54 30.89  2.29   1.188  131.0  5.337
101.7   -4.9   10165 16.65 44.27  0.80   0.18  0.43    9.40  0.00  0.21  0.00  15.27 43.63  0.98   1.209  134.2  5.360
102.4   -5.6   17420 19.11 58.67  1.00   0.18  0.43    9.40  0.00  0.21  0.00  17.12 58.04  1.18   1.230  134.2  5.383
103.0   -6.2   18853 13.47 50.11  0.93   0.18  0.43    9.40  0.00  0.21  0.00  11.63 49.48  1.11   1.250  134.2  5.407
103.7   -6.9   16912 13.00 46.35  0.46   0.18  0.43    9.40  0.00  0.21  0.00  11.33 45.72  0.64   1.271  134.2  5.431
104.3   -7.5   23902 27.14 67.86  1.36   0.18  0.43    9.40  0.00  0.21  0.00  25.11 67.22  1.53   1.291  131.0  5.454
105.0   -8.2   27122 25.21 63.37  1.32   0.18  0.43    9.40  0.00  0.21  0.00  23.30 62.73  1.49   1.311  131.0  5.476
105.6   -8.9   44100 29.02 104.40 0.95   0.18  0.43    9.40  0.00  0.21  0.00  25.25 103.76 1.13   1.332  134.2  5.499
108.6  -11.8   11775 27.56 69.43  0.91   0.18  0.43    9.40  0.00  0.21  0.00  25.46 68.79  1.09   1.424  134.2  5.605
108.9  -12.1   18897 13.36 50.84  1.14   0.18  0.43    9.40  0.00  0.21  0.00  11.48 50.21  1.32   1.434  134.2  5.617
109.6  -12.8   42138 38.63 90.51  1.50   0.18  0.43    9.40  0.00  0.21  0.00  36.03 89.88  1.68   1.455  131.0  5.640
112.2  -15.4   28400 29.44 58.05  1.51   0.18  0.43    9.40  0.00  0.21  0.00  28.01 57.41  1.69   1.537  131.0  5.731
112.9  -16.1   21631 21.04 49.28  1.70   0.18  0.43    9.40  0.00  0.21  0.00  19.63 48.64  1.88   1.558  131.0  5.752
113.5  -16.7   21631 22.50 50.11  1.63   0.18  0.43    9.40  0.00  0.21  0.00  21.12 49.48  1.81   1.577  131.0  5.775
114.2  -17.4   20705 24.74 51.99  1.11   0.18  0.43    9.40  0.00  0.21  0.00  23.38 51.35  1.28   1.598  131.0  5.797
114.8  -18.0   14156 18.17 37.85  0.84   0.18  0.43    9.40  0.00  0.21  0.00  17.18 37.21  1.01   1.619  131.0  5.820
115.5  -18.7   10077 21.09 36.49  1.47   0.18  0.43    9.40  0.00  0.21  0.00  20.32 35.85  1.65   1.639  131.0  5.843
116.1  -19.4    9526 19.94 32.36  1.79   0.18  0.43    9.40  0.00  0.21  0.00  19.31 31.73  1.96   1.660  131.0  5.865
116.8  -20.0   10143 19.89 35.76  1.38   0.18  0.43    9.40  0.00  0.21  0.00  19.09 35.12  1.56   1.680  131.0  5.888
117.5  -20.7   11819 18.48 44.37  1.42   0.18  0.43    9.40  0.00  0.21  0.00  17.18 43.73  1.60   1.701  131.0  5.910
118.1  -21.3   12855 18.32 34.30  0.31   0.18  0.43    9.40  0.00  0.21  0.00  17.52 33.66  0.49   1.722  131.0  5.933
118.8  -22.0   16317 16.44 50.74  1.27   0.18  0.43    9.40  0.00  0.21  0.00  14.73 50.10  1.45   1.741  134.2  5.956
119.4  -22.6   22734 25.26 56.95  1.81   0.18  0.43    9.40  0.00  0.21  0.00  23.68 56.31  1.98   1.762  131.0  5.979
120.1  -23.3   18037 21.87 50.53  1.82   0.18  0.43    9.40  0.00  0.21  0.00  20.44 49.89  1.99   1.783  131.0  6.002
120.7  -23.9   15016 22.55 46.67  1.42   0.18  0.43    9.40  0.00  0.21  0.00  21.34 46.03  1.60   1.803  131.0  6.024
121.4  -24.6   11113 20.15 34.24  1.48   0.18  0.43    9.40  0.00  0.21  0.00  19.44 33.61  1.66   1.824  131.0  6.047
122.0  -25.3   11003 19.21 33.41  0.17   0.18  0.43    9.40  0.00  0.21  0.00  18.50 32.77  0.34   1.844  131.0  6.069
123.0  -26.2    4785 16.29 33.09  0.52   0.18  0.43    9.40  0.00  0.21  0.00  15.44 32.46  0.70   1.875  131.0  6.103
123.4  -26.6    6747 20.46 42.18  1.86   0.18  0.43    9.40  0.00  0.21  0.00  19.38 41.54  2.04   1.885  131.0  6.115
124.0  -27.2    7872 21.25 39.31  1.77   0.18  0.43    9.40  0.00  0.21  0.00  20.34 38.67  1.95   1.905  131.0  6.137
124.7  -27.9    8026 24.43 43.48  2.72   0.18  0.43    9.40  0.00  0.21  0.00  23.48 42.85  2.90   1.926  131.0  6.160
125.3  -28.5    7938 29.65 51.57  2.71   0.18  0.43    9.40  0.00  0.21  0.00  28.55 50.94  2.89   1.947  131.0  6.182
126.0  -29.2    8688 37.79 57.99  4.46   0.18  0.43    9.40  0.00  0.21  0.00  36.78 57.36  4.64   1.967  127.9  6.204
126.6  -29.9    8864 41.08 61.70 11.85   0.18  0.43    9.40  0.00  0.21  0.00  40.05 61.06 11.82   1.988  127.9  6.225
```

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)       SNDG. NO. : DMT-301
In-Situ Soil Testing, L.C.                                                              Page 2
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                        FILE NO. :2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                 SNDG. DATE: 11/20/08
ANAL.BY : Roger Failmezger, P.E.                                                        ANAL. DATE: 12/15/08

ANALYSIS PARAMETERS:   LO RANGE   = 12.16 TSF  ROD DIAM.   =  0.01 IN    BL.THICK.  =  0.00 IN    SU  FACTOR = 1
SURF.ELEV.  = 97.0 FT
                       LO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  0.01 IN    BL.WIDTH   =  0.00 IN    PHI FACTOR = 1
WATER DEPTH = 63.0 FT HI  GAGE 0 =  0.27 TSF  LIN.ROD WT. =   0.5 LBF/FTDELTA-A    =  0.21 TSF   OCR FACTOR = 1
SP.GR.WATER = 1.000     CAL GAGE 0 =  0.00 TSF;
                                                DELTA / PHI =   0.5       DELTA - B =  0.30 TSF    M FACTOR = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.8       OCR OPTION =    0       K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z    ELEV    KD    ID    UD    ED      K0     SU     QD     PHI   SIGFF   PHIO    PC     OCR     M      SOIL TYPE
(FT)   (FT)                     (TSF)          (TSF)  (TSF)  (DEG)  (TSF)   (DEG)  (TSF)          (TSF)
***** ****** ***** ***** ***** ******  *****  *****  *****  *****  ******  *****  *****  *****  ******  ************
 47.9   48.9 14.77  0.39  0.50    599   2.33   7.99                                67.48   22.6    1719  SILTY CLAY
 48.6   48.2 16.55  0.32  0.45    553   2.49   9.34                                81.75   27.0    1648  CLAY
 49.2   47.6 12.72  0.35  0.47    474   2.13   6.82                                54.96   17.9    1292  SILTY CLAY
 49.9   46.9  9.78  0.41  0.33    432   1.81   4.97                                36.97   11.9    1070  SILTY CLAY
 50.5   46.3  6.69  0.71  0.15    520   1.42                                       20.74    6.6    1087  CLAYEY SILT
 51.2   45.6  5.17  1.15  0.04    657   1.19                                       14.06    4.4    1213  SILT
 51.8   44.9  4.52  1.62          824   1.08                                       11.54    3.6    1432  SANDY SILT
 52.5   44.3 12.25  0.75  0.15   1052   2.08                                       55.47   16.9    2832  CLAYEY SILT
 53.1   43.6 11.37  0.97  0.11   1273   1.99                                       50.04   15.1    3337  SILT
 53.8   43.0 12.99  0.89         1353   2.16                                       62.39   18.5    3717  CLAYEY SILT
 54.5   42.3 14.58  1.04         1798   2.31                                       75.62   22.2    5135  SILT
 55.1   41.7 21.51  0.96  0.66   2467   2.90                                      140.44   40.7    7956  SILT
 66.3   30.5  6.01  2.78  0.01   2371   0.83         491.1   40.6    6.75    41.9  19.19    4.7    4861  SILTY SAND
 84.6   12.1  2.37  2.72  0.00   1062   0.59         159.9   33.1    7.35    34.8   8.34    1.8    1299  SILTY SAND
 85.3   11.5  3.42  2.21 -0.01   1252   0.66         237.8   35.7    7.56    37.3  11.89    2.5    1895  SILTY SAND
 86.0   10.8  2.94  2.76  0.01   1349   0.56         284.8   37.1    7.69    38.7   9.01    1.9    1912  SILTY SAND
 86.6   10.2  3.18  2.58 -0.01   1369   0.58         310.1   37.5    7.76    39.1   9.79    2.0    2014  SILTY SAND
 87.3    9.5  2.92  2.94  0.00   1443   0.54         315.4   37.7    7.81    39.3   8.64    1.8    2057  SILTY SAND
 87.9    8.9  3.31  1.88 -0.02   1050   0.64         250.6   35.9    7.73    37.6  11.44    2.3    1533  SILTY SAND
 88.6    8.2  2.02  2.98 -0.02   1020   0.48         234.9   35.9    7.76    37.6   6.23    1.3    1131  SILTY SAND
 89.2    7.5  2.71  2.75  0.00   1272   0.55         260.4   36.3    7.83    38.0   8.67    1.8    1709  SILTY SAND
 89.9    6.9  2.47  3.02  0.00   1279   0.45         384.2   39.1    8.06    40.7   6.25    1.3    1643  SILTY SAND
 90.6    6.2  3.79  2.27  0.00   1480   0.64         362.3   38.2    8.03    39.8  12.54    2.5    2383  SILTY SAND
 91.2    5.6  3.07  2.49  0.00   1325   0.54         365.7   38.5    8.09    40.1   9.07    1.8    1902  SILTY SAND
 91.9    4.9  3.83  2.01  0.00   1342   0.67         312.4   37.1    8.03    38.8  13.70    2.7    2154  SILTY SAND
 92.5    4.3  3.70  2.11  0.00   1365   0.67         287.9   36.5    8.03    38.2  13.44    2.7    2155  SILTY SAND
 93.2    3.6  2.89  2.10 -0.01   1068   0.58         265.2   36.2    8.05    37.9   9.77    1.9    1442  SILTY SAND
 93.8    3.0  2.48  2.44  0.00   1066   0.54         241.3   35.6    8.04    37.4   8.32    1.6    1318  SILTY SAND
 94.5    2.3  2.72  2.40 -0.01   1157   0.59         226.5   35.1    8.04    36.8   9.68    1.9    1526  SILTY SAND
 95.1    1.6  1.85  2.83 -0.04    932   0.53         160.9   32.8    7.90    34.6   7.06    1.4     947  SILTY SAND
 95.8    1.0  2.15  2.38 -0.02    914   0.55         181.3   33.5    8.00    35.4   7.97    1.5    1006  SILTY SAND
 96.5    0.3  2.01  2.10 -0.03    758   0.54         172.7   33.2    8.01    35.0   7.61    1.5     767  SILTY SAND
 97.1   -0.3  1.75  2.89 -0.02    910   0.50         179.5   33.5    8.07    35.4   6.54    1.3     884  SILTY SAND
 97.8   -1.0  1.59  3.03 -0.02    870   0.50         160.5   32.7    8.04    34.6   6.26    1.2     784  SILTY SAND
 98.4   -1.6  2.10  2.28 -0.01    872   0.61         130.9   30.9    7.94    32.8   9.03    1.7     934  SILTY SAND
 99.1   -2.3  2.34  1.50 -0.02    642   0.63                                        6.72    1.3     703  SANDY SILT
 99.7   -3.0  2.49  1.36 -0.01    622   0.67                                        7.43    1.4     712  SANDY SILT
100.4   -3.6  2.85  0.97  0.00    511   0.75                                        9.26    1.7     636  SILT
101.0   -4.3  3.25  0.71  0.06    429   0.84                                       11.39    2.1     582  CLAYEY SILT
101.7   -4.9  2.62  2.02 -0.02    984   0.68         132.7   30.7    8.09    32.7  11.82    2.2    1232  SILTY SAND
102.4   -5.6  2.95  2.57  0.00   1420   0.61         241.6   35.1    8.48    36.9  11.32    2.1    1997  SILTY SAND
103.0   -6.2  1.92  3.64 -0.01   1313   0.45         286.8   36.6    8.63    38.4   6.18    1.1    1401  SAND
103.7   -6.9  1.85  3.42 -0.06   1193   0.46         256.1   35.8    8.60    37.7   6.33    1.2    1235  SAND
104.3   -7.5  4.37  1.77  0.01   1462   1.05                                       18.44    3.4    2505  SANDY SILT
105.0   -8.2  4.02  1.79  0.01   1369   0.99                                       16.24    3.0    2238  SANDY SILT
105.6   -8.9  4.35  3.28 -0.01   2724   0.61         646.5   41.1    9.11    42.8  14.08    2.6    4841  SILTY SAND
108.6  -11.8  4.29  1.80 -0.01   1503   0.90         127.9   29.6    8.37    31.7  24.40    4.4    2554  SILTY SAND
108.9  -12.1  1.79  3.85 -0.01   1344   0.44         289.6   36.5    8.96    38.4   6.02    1.1    1351  SAND
109.6  -12.8  6.13  1.56  0.01   1869   1.34                                       32.37    5.7    3791  SANDY SILT
112.2  -15.4  4.62  1.11  0.01   1020   1.10                                       21.15    3.7    1770  SILT
112.9  -16.1  3.14  1.61  0.02   1006   0.82                                       11.63    2.0    1398  SANDY SILT
113.5  -16.7  3.38  1.45  0.01    984   0.87                                       13.11    2.3    1426  SANDY SILT
114.2  -17.4  3.76  1.28 -0.01    971   0.94                                       15.50    2.7    1495  SANDY SILT
114.8  -18.0  2.67  1.29 -0.04    695   0.71                                        9.16    1.6     838  SANDY SILT
115.5  -18.7  3.20  0.83  0.00    539   0.83                                       12.14    2.1     727  CLAYEY SILT
116.1  -19.4  3.01  0.70  0.02    430   0.79                                       11.10    1.9     550  CLAYEY SILT
116.8  -20.0  2.96  0.92 -0.01    556   0.78                                       10.84    1.8     710  SILT
117.5  -20.7  2.62  1.71 -0.01    921   0.70                                        9.00    1.5    1128  SANDY SILT
118.1  -21.3  2.66  1.02 -0.08    560   0.71                                        9.27    1.6     661  SILT
118.8  -22.0  2.18  2.72 -0.02   1228   0.53         237.0   34.4    9.32    36.5   8.97    1.5    1411  SILTY SAND
119.4  -22.6  3.67  1.49  0.01   1133   0.92                                       15.39    2.6    1732  SANDY SILT
120.1  -23.3  3.11  1.58  0.01   1022   0.81                                       11.94    2.0    1407  SANDY SILT
120.7  -23.9  3.24  1.26 -0.01    857   0.84                                       12.81    2.1    1194  SANDY SILT
121.4  -24.6  2.91  0.80 -0.01    492   0.77                                       10.88    1.8     616  CLAYEY SILT
122.0  -25.3  2.74  0.86 -0.09    495   0.73                                        9.94    1.6     592  CLAYEY SILT
123.0  -26.2  2.22  1.25 -0.09    590   0.60                                        7.20    1.2     603  SANDY SILT
123.4  -26.6  2.86  1.27  0.01    769   0.75                                       10.69    1.7     978  SANDY SILT
124.0  -27.2  3.00  0.99  0.00    636   0.79                                       11.58    1.9     826  SILT
124.7  -27.9  3.50  0.90  0.05    672   0.89                                       14.74    2.4     971  CLAYEY SILT
125.3  -28.5  4.30  0.84  0.04    777   1.04                                       20.43    3.3    1281  CLAYEY SILT
126.0  -29.2  5.61  0.59  0.08    714   1.26   4.96                                31.02    5.0    1362  SILTY CLAY
126.6  -29.9  6.11  0.55  0.26    729   1.34   5.53                                35.58    5.7    1455  SILTY CLAY
```

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)       SNDG. NO. :DMT-301
In-Situ Soil Testing, L.C.                                                             Page 3a
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                       FILE NO. : 2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                SNDG. DATE: 11/20/08
ANAL.BY : Roger Failmezger, P.E.                                                       ANAL. DATE: 12/15/08

ANALYSIS PARAMETERS:    LO RANGE   = 12.70 TSF  ROD DIAM.   =  0.00 IN    BL.THICK.  =  0.00 IN     SU  FACTOR = 1
SURF.ELEV.  = 97.0 FT
                        LO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  0.00 IN    BL.WIDTH   =  0.00 IN     PHI FACTOR = 1
WATER DEPTH = 63.0 FT HI  GAGE 0 =  0.28 TSF  LIN.ROD WT. =   0.3 LBF/FTDELTA-A    =  0.22 TSF   OCR FACTOR = 1
SP.GR.WATER = 1.000     CAL GAGE 0 =  0.00 TSF  DELTA/PHI   =   0.5       DELTA-B    =  0.31 TSF    M  FACTOR  = 1
MAX SU ID   =   0.6     SU OPTION  =     0      MIN PHI ID  =   1.8       OCR OPTION =     0        K0 FACTOR  = 1
UNIT CONVERSIONS:       1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z    ELEV   THRUST    A     B     C      DA    DB     ZMRNG ZMLO  ZMHI  ZMCAL   P0    P1    P2      U0    GAMMA   SVP
 (FT)   (FT)   (LBF)  (TSF) (TSF) (TSF)  (TSF) (TSF)   (TSF) (TSF) (TSF) (TSF)  (TSF) (TSF) (TSF)   (TSF)  (PCF)  (TSF)
***** ******  ****** ***** ***** *****  ***** *****   ***** ***** ***** *****  ***** ***** *****  ****** ****** ******
127.3  -30.5    8644  42.18 62.12 14.20   0.18  0.43    9.40  0.00  0.21  0.00   41.18 61.48 14.17   2.008  127.9  6.247
128.0  -31.2    8688  40.30 57.94 12.53   0.18  0.43    9.40  0.00  0.21  0.00   39.41 57.31 12.50   2.028  127.9  6.268
128.6  -31.8    8908  34.97 51.94 12.58   0.18  0.43    9.40  0.00  0.21  0.00   34.13 51.30 12.55   2.049  127.9  6.290
129.3  -32.5   10099  32.57 49.38 11.33   0.18  0.43    9.40  0.00  0.21  0.00   31.73 48.74 11.30   2.069  127.9  6.312
129.9  -33.1    9856  27.72 43.64  7.26   0.18  0.43    9.40  0.00  0.21  0.00   26.92 43.00  7.43   2.090  131.0  6.334
130.6  -33.8   11664  23.75 38.89  5.14   0.18  0.43    9.40  0.00  0.21  0.00   22.99 38.25  5.31   2.111  131.0  6.356
131.2  -34.4   12216  25.26 39.36  5.52   0.18  0.43    9.40  0.00  0.21  0.00   24.55 38.72  5.70   2.131  131.0  6.379
131.9  -35.1   12613  25.32 38.31  6.35   0.18  0.43    9.40  0.00  0.21  0.00   24.67 37.68  6.53   2.152  127.9  6.401
132.5  -35.8   12789  27.77 46.77  6.47   0.18  0.43    9.40  0.00  0.21  0.00   26.82 46.13  6.65   2.172  131.0  6.423
133.2  -36.4    6020  32.10 37.90  0.15   0.18  0.43    9.40  0.00  0.21  0.00   31.81 37.26  0.32   2.192  127.9  6.445
133.9  -37.1    6350  31.22 46.14  9.66   0.18  0.43    9.40  0.00  0.21  0.00   30.46 45.51  9.63   2.213  127.9  6.467
134.5  -37.7    7387  26.05 44.58  4.25   0.18  0.43    9.40  0.00  0.21  0.00   25.12 43.94  4.43   2.233  131.0  6.488
135.2  -38.4    8952  20.15 37.79  1.61   0.18  0.43    9.40  0.00  0.21  0.00   19.26 37.16  1.79   2.254  131.0  6.510
135.8  -39.0    7651  17.80 31.32  2.10   0.18  0.43    9.40  0.00  0.21  0.00   17.12 30.68  2.28   2.275  131.0  6.533
136.5  -39.7    7475  16.39 30.48  2.42   0.18  0.43    9.40  0.00  0.21  0.00   15.68 29.85  2.60   2.295  131.0  6.556
137.1  -40.4   10540  23.28 43.48  0.96   0.18  0.43    9.40  0.00  0.21  0.00   22.27 42.85  1.14   2.316  131.0  6.578
137.8  -41.0   14377  21.40 50.27  1.41   0.18  0.43    9.40  0.00  0.21  0.00   19.96 49.63  1.59   2.335  131.0  6.601
138.4  -41.7   17993  26.36 57.73  1.46   0.18  0.43    9.40  0.00  0.21  0.00   24.80 57.10  1.64   2.356  131.0  6.623
139.1  -42.3   22932  16.70 43.69  1.64   0.18  0.43    9.40  0.00  0.21  0.00   15.36 43.05  1.82   2.377  134.2  6.646
139.8  -43.0   22425  20.15 45.15  0.82   0.18  0.43    9.40  0.00  0.21  0.00   18.90 44.52  1.00   2.397  131.0  6.670
140.4  -43.6   15744  18.17 41.97  0.87   0.18  0.43    9.40  0.00  0.21  0.00   16.98 41.33  1.04   2.418  131.0  6.692
141.1  -44.3   11400  22.13 37.69  2.05   0.18  0.43    9.40  0.00  0.21  0.00   21.35 37.05  2.22   2.439  131.0  6.715
141.7  -44.9    9482  26.73 40.09  5.62   0.18  0.43    9.40  0.00  0.21  0.00   26.06 39.45  5.79   2.459  127.9  6.737
142.4  -45.6    8754  27.25 40.40  6.89   0.18  0.43    9.40  0.00  0.21  0.00   26.59 39.77  7.07   2.480  127.9  6.758
143.0  -46.3    8754  31.48 44.53 10.02   0.18  0.43    9.40  0.00  0.21  0.00   30.82 43.89  9.99   2.500  127.9  6.780
144.0  -47.2    4675  29.02 44.47  5.19   0.06  0.57    9.40  0.00  0.21  0.00   28.14 43.69  5.25   2.531  131.0  6.813
144.4  -47.6    6174  30.64 44.47  7.58   0.06  0.57    9.40  0.00  0.21  0.00   29.84 43.69  7.64   2.541  127.9  6.824
145.0  -48.2    5799  30.59 43.64  9.14   0.06  0.57    9.40  0.00  0.21  0.00   29.83 42.86  9.20   2.561  127.9  6.846
145.7  -48.9    6725  32.99 47.76 11.43   0.06  0.57    9.40  0.00  0.21  0.00   32.13 46.98 11.29   2.582  127.9  6.866
146.3  -49.5    7409  33.83 47.71 12.84   0.06  0.57    9.40  0.00  0.21  0.00   33.02 46.93 12.70   2.603  127.9  6.888
147.0  -50.2    8688  37.11 51.94 13.83   0.06  0.57    9.40  0.00  0.21  0.00   36.26 51.16 13.69   2.623  127.9  6.910
147.6  -50.9    9085  35.34 49.33 12.58   0.06  0.57    9.40  0.00  0.21  0.00   34.53 48.55 12.43   2.643  127.9  6.931
148.3  -51.5    9393  34.77 49.85 12.63   0.06  0.57    9.40  0.00  0.21  0.00   33.90 49.07 12.49   2.664  127.9  6.953
148.9  -52.2    9482  38.31 52.83 16.29   0.06  0.57    9.40  0.00  0.21  0.00   37.48 52.04 16.14   2.684  127.9  6.975
149.6  -52.8   10231  37.38 53.61 17.17   0.06  0.57    9.40  0.00  0.21  0.00   36.45 52.83 17.03   2.705  127.9  6.996
150.3  -53.5   10275  37.58 53.82 17.12   0.06  0.57    9.40  0.00  0.21  0.00   36.65 53.04 16.98   2.725  127.9  7.018
150.9  -54.1   10672  39.88 56.79 19.42   0.06  0.57    9.40  0.00  0.21  0.00   38.92 56.01 19.27   2.746  127.9  7.039
151.6  -54.8   11312  39.36 56.32 19.21   0.06  0.57    9.40  0.00  0.21  0.00   38.40 55.54 19.06   2.767  127.9  7.061
152.2  -55.4   12260  37.79 52.15 16.70   0.06  0.57    9.40  0.00  0.21  0.00   36.96 51.36 16.56   2.786  127.9  7.082
152.9  -56.1   12789  31.63 44.68  9.66   0.06  0.57    9.40  0.00  0.21  0.00   30.87 43.90  9.51   2.807  127.9  7.103
153.5  -56.8    4631  24.43 41.34  1.61   0.06  0.57    9.40  0.00  0.21  0.00   23.47 40.56  1.67   2.828  131.0  7.125
154.2  -57.4    5755  25.73 38.63  3.25   0.06  0.57    9.40  0.00  0.21  0.00   24.97 37.85  3.31   2.848  127.9  7.147
154.9  -58.1    6461  25.73 39.10  4.94   0.06  0.57    9.40  0.00  0.21  0.00   24.95 38.31  5.00   2.869  131.0  7.169
155.5  -58.7    7166  23.75 35.50  5.63   0.06  0.57    9.40  0.00  0.21  0.00   23.05 34.71  5.69   2.889  127.9  7.192
156.2  -59.4    7299  22.45 34.19  6.20   0.06  0.57    9.40  0.00  0.21  0.00   21.75 33.41  6.26   2.910  131.0  7.214
156.8  -60.0    7607  27.61 38.84 10.28   0.06  0.57    9.40  0.00  0.21  0.00   26.94 38.05 10.14   2.931  127.9  7.236
157.5  -60.7    7299  34.24 46.46 15.45   0.06  0.57    9.40  0.00  0.21  0.00   33.52 45.68 15.31   2.950  127.9  7.257
158.1  -61.4    7343  34.03 45.31 17.12   0.06  0.57    9.40  0.00  0.21  0.00   33.36 44.53 16.98   2.971  127.9  7.279
158.8  -62.0    7563  30.28 42.33 14.25   0.06  0.57    9.40  0.00  0.21  0.00   29.56 41.55 14.10   2.992  127.9  7.301
159.4  -62.7    8379  32.16 44.58 14.46   0.06  0.57    9.40  0.00  0.21  0.00   31.42 43.80 14.31   3.012  127.9  7.322
160.1  -63.3   10121  34.87 47.40 11.85   0.06  0.57    9.40  0.00  0.21  0.00   34.13 46.61 11.70   3.033  127.9  7.343
160.8  -64.0    9967  36.07 48.23 16.50   0.06  0.57    9.40  0.00  0.21  0.00   35.35 47.45 16.35   3.053  127.9  7.364
161.4  -64.6    9923  33.20 45.52 15.82   0.06  0.57    9.40  0.00  0.21  0.00   32.47 44.74 15.67   3.074  127.9  7.386
162.1  -65.3   10275  33.98 46.25 17.33   0.06  0.57    9.40  0.00  0.21  0.00   33.25 45.47 17.18   3.094  127.9  7.408
162.7  -65.9   10650  31.79 43.59 15.66   0.06  0.57    9.40  0.00  0.21  0.00   31.09 42.80 15.51   3.114  127.9  7.429
163.4  -66.6   11422  26.52 39.99  7.49   0.06  0.57    9.40  0.00  0.21  0.00   25.73 39.20  7.55   3.135  127.9  7.451
```

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)       SNDG. NO. : DMT-301
In-Situ Soil Testing, L.C.                                                             Page 2
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                       FILE NO. :2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                SNDG. DATE: 11/20/08
ANAL.BY : Roger Failmezger, P.E.                                                       ANAL. DATE: 12/15/08

ANALYSIS PARAMETERS:   LO RANGE   = 12.70 TSF  ROD DIAM.   =  0.00 IN    BL.THICK.  =  0.00 IN    SU  FACTOR = 1
SURF.ELEV.  = 97.0 FT
                       LO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  0.00 IN    BL.WIDTH   =  0.00 IN    PHI FACTOR = 1
WATER DEPTH = 63.0 FT HI  GAGE 0 =  0.28 TSF  LIN.ROD WT. =   0.3 LBF/FTDELTA-A    =  0.22 TSF        OCR FACTOR = 1
SP.GR.WATER = 1.000     CAL GAGE 0 =  0.00 TSF;
                                                 DELTA / PHI =   0.5       DELTA - B =  0.31 TSF    M FACTOR = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.8      OCR OPTION =     0       K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z    ELEV    KD    ID    UD    ED      K0     SU     QD     PHI   SIGFF   PHIO    PC     OCR     M      SOIL TYPE
(FT)   (FT)                    (TSF)          (TSF)  (TSF)  (DEG)  (TSF)   (DEG)  (TSF)          (TSF)
***** ******  ***** ***** ***** ******  *****  *****  *****  *****  ******  *****  *****  *****  ******  ************
127.3  -30.5   6.27  0.52  0.31    705   1.36   5.73                               37.15    5.9    1424  SILTY CLAY
128.0  -31.2   5.96  0.48  0.28    621   1.31   5.41                               34.47    5.5    1224  SILTY CLAY
128.6  -31.8   5.10  0.54  0.33    596   1.18   4.46                               27.09    4.3    1078  SILTY CLAY
129.3  -32.5   4.70  0.57  0.31    590   1.11   4.04                               23.93    3.8    1019  SILTY CLAY
129.9  -33.1   3.92  0.65  0.22    559   0.97                                      18.10    2.9     861  CLAYEY SILT
130.6  -33.8   3.29  0.73  0.15    529   0.85                                      13.79    2.2     725  CLAYEY SILT
131.2  -34.4   3.52  0.63  0.16    492   0.89                                      15.38    2.4     704  CLAYEY SILT
131.9  -35.1   3.52  0.58  0.19    451   0.89   2.85                               15.44    2.4     645  SILTY CLAY
132.5  -35.8   3.84  0.78  0.18    670   0.96                                      17.75    2.8    1025  CLAYEY SILT
133.2  -36.4   4.60  0.18 -0.06    189   1.09   4.01                               23.59    3.7     322  CLAY
133.9  -37.1   4.37  0.53  0.26    522   1.05   3.78                               21.88    3.4     862  SILTY CLAY
134.5  -37.7   3.53  0.82  0.10    654   0.89                                      15.72    2.4     945  CLAYEY SILT
135.2  -38.4   2.61  1.05 -0.03    621   0.70                                       9.88    1.5     722  SILT
135.8  -39.0   2.27  0.91  0.00    471   0.62                                       7.98    1.2     476  SILT
136.5  -39.7   2.04  1.06  0.02    492   0.56                                       6.78    1.0     452  SILT
137.1  -40.4   3.03  1.03 -0.06    714   0.79                                      12.60    1.9     935  SILT
137.8  -41.0   2.67  1.68 -0.04   1029   0.71                                      10.36    1.6    1277  SANDY SILT
138.4  -41.7   3.39  1.44 -0.03   1121   0.87                                      15.06    2.3    1626  SANDY SILT
139.1  -42.3   1.95  2.13 -0.04    962   0.46         348.1   36.5    10.61  38.7   7.80    1.2     951  SILTY SAND
139.8  -43.0   2.47  1.55 -0.08    888   0.67                                       9.29    1.4    1027  SANDY SILT
140.4  -43.6   2.18  1.67 -0.09    846   0.59                                       7.63    1.1     882  SANDY SILT
141.1  -44.3   2.82  0.83 -0.01    545   0.74                                      11.45    1.7     665  CLAYEY SILT
141.7  -44.9   3.50  0.57  0.14    465   0.89   2.99                               16.15    2.4     662  SILTY CLAY
142.4  -45.6   3.57  0.55  0.19    457   0.90   3.07                               16.67    2.5     660  SILTY CLAY
143.0  -46.3   4.18  0.46  0.26    453   1.02   3.75                               21.39    3.2     728  SILTY CLAY
144.0  -47.2   3.76  0.61  0.11    540   0.94                                      18.23    2.7     808  CLAYEY SILT
144.4  -47.6   4.00  0.51  0.19    481   0.99   3.57                               20.12    2.9     751  SILTY CLAY
145.0  -48.2   3.98  0.48  0.24    452   0.98   3.56                               20.04    2.9     704  SILTY CLAY
145.7  -48.9   4.30  0.50  0.29    515   1.04   3.94                               22.70    3.3     843  SILTY CLAY
146.3  -49.5   4.42  0.46  0.33    482   1.06   4.08                               23.70    3.4     802  SILTY CLAY
147.0  -50.2   4.87  0.44  0.33    517   1.14   4.62                               27.68    4.0     911  SILTY CLAY
147.6  -50.9   4.60  0.44  0.31    487   1.09   4.32                               25.41    3.7     829  SILTY CLAY
148.3  -51.5   4.49  0.49  0.31    526   1.07   4.21                               24.57    3.5     884  SILTY CLAY
148.9  -52.2   4.99  0.42  0.39    505   1.16   4.81                               29.02    4.2     903  SILTY CLAY
149.6  -52.8   4.82  0.49  0.42    568   1.13   4.62                               27.62    3.9     996  SILTY CLAY
150.3  -53.5   4.84  0.48  0.42    568   1.13   4.66                               27.81    4.0     997  SILTY CLAY
150.9  -54.1   5.14  0.47  0.46    593   1.18   5.04                               30.68    4.4    1078  SILTY CLAY
151.6  -54.8   5.05  0.48  0.46    595   1.17   4.94                               29.91    4.2    1070  SILTY CLAY
152.2  -55.4   4.83  0.42  0.40    500   1.13   4.69                               27.98    4.0     876  SILTY CLAY
152.9  -56.1   3.95  0.46  0.24    452   0.98   3.65                               20.54    2.9     701  SILTY CLAY
153.5  -56.8   2.90  0.83 -0.06    593   0.76                                      12.71    1.8     740  CLAYEY SILT
154.2  -57.4   3.10  0.58  0.02    447   0.81   2.71                               14.13    2.0     579  SILTY CLAY
154.9  -58.1   3.08  0.61  0.10    464   0.80                                      14.06    2.0     599  CLAYEY SILT
155.5  -58.7   2.80  0.58  0.14    405   0.74   2.41                               12.17    1.7     484  SILTY CLAY
156.2  -59.4   2.61  0.62  0.18    405   0.70                                      10.93    1.5     455  CLAYEY SILT
156.8  -60.0   3.32  0.46  0.30    385   0.85   3.00                               15.94    2.2     528  SILTY CLAY
157.5  -60.7   4.21  0.40  0.40    422   1.02   4.05                               23.20    3.2     681  SILTY CLAY
158.1  -61.4   4.17  0.37  0.46    387   1.02   4.02                               22.94    3.2     622  SILTY CLAY
158.8  -62.0   3.64  0.45  0.42    417   0.92   3.39                               18.57    2.5     610  SILTY CLAY
159.4  -62.7   3.88  0.44  0.40    429   0.96   3.69                               20.59    2.8     657  SILTY CLAY
160.1  -63.3   4.23  0.40  0.28    433   1.03   4.12                               23.67    3.2     702  SILTY CLAY
160.8  -64.0   4.38  0.37  0.41    420   1.06   4.32                               25.07    3.4     695  SILTY CLAY
161.4  -64.6   3.98  0.42  0.43    426   0.98   3.84                               21.61    2.9     662  SILTY CLAY
162.1  -65.3   4.07  0.40  0.47    424   1.00   3.97                               22.46    3.0     669  SILTY CLAY
162.7  -65.9   3.76  0.42  0.44    406   0.94   3.60                               19.93    2.7     610  SILTY CLAY
163.4  -66.6   3.03  0.60  0.20    468   0.79   2.76                               14.26    1.9     597  SILTY CLAY
```

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)       SNDG. NO. :DMT-301
In-Situ Soil Testing, L.C.                                                             Page 1a
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                       FILE NO. : 2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                SNDG. DATE: 11/20/08
ANAL.BY : Roger Failmezger, P.E.                                                       ANAL. DATE: 12/15/08

ANALYSIS PARAMETERS:   LO RANGE   =  9.39 TSF  ROD DIAM.    =  1.73 IN    BL.THICK.  =  0.59 IN     SU  FACTOR = 1
SURF.ELEV.  =  97.0 FT LO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  2.01 IN     BL.WIDTH   =  3.78 IN     PHI FACTOR = 1
WATER DEPTH =  63.0 FT HI  GAGE 0 =  0.21 TSF  LIN.ROD WT. =   5.4 LBF/FTDELTA-A    =  0.06 TSF    OCR FACTOR = 1
SP.GR.WATER = 1.000    CAL GAGE 0 =  0.00 TSF  DELTA/PHI   =   0.5        DELTA-B    =  0.57 TSF    M  FACTOR  = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.8        OCR OPTION =     0        K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z     ELEV   THRUST    A     B     C      DA    DB     ZMRNG ZMLO  ZMHI  ZMCAL   P0    P1    P2     U0    GAMMA   SVP
 (FT)   (FT)   (LBF)   (TSF) (TSF) (TSF)  (TSF) (TSF)   (TSF) (TSF) (TSF) (TSF)  (TSF) (TSF) (TSF)  (TSF)  (PCF)  (TSF)
***** ******  ******   ***** ***** *****  ***** *****   ***** ***** ***** *****  ***** ***** *****  ****** ****** ******
164.0  -66.9    5027   21.92 37.38  2.55   0.06  0.57    9.39  0.00  0.21  0.00  21.04 36.59  2.61   3.156  131.0  7.475
164.7  -67.6    6064   31.69 43.64 10.70   0.06  0.57    9.39  0.00  0.21  0.00  30.98 42.86 10.55   3.176  127.9  7.497
165.4  -68.2    6196   28.50 41.66  7.28   0.06  0.57    9.39  0.00  0.21  0.00  27.73 40.87  7.34   3.197  127.9  7.519
166.0  -68.9    6218   32.05 43.85 11.22   0.06  0.57    9.39  0.00  0.21  0.00  31.35 43.07 11.08   3.217  127.9  7.540
166.7  -69.6    6417   37.95 50.90 17.28   0.06  0.57    9.39  0.00  0.21  0.00  37.19 50.11 17.13   3.237  127.9  7.562
167.3  -70.2    6858   38.00 51.57 19.00   0.06  0.57    9.39  0.00  0.21  0.00  37.21 50.79 18.85   3.258  127.9  7.584
168.0  -70.9    7078   39.36 53.61 18.32   0.06  0.57    9.39  0.00  0.21  0.00  38.53 52.83 18.18   3.278  127.9  7.604
168.6  -71.5    7718   37.90 53.82 17.70   0.06  0.57    9.39  0.00  0.21  0.00  36.99 53.04 17.55   3.299  127.9  7.626
169.3  -72.2    7916   41.03 56.64 19.05   0.06  0.57    9.39  0.00  0.21  0.00  40.13 55.85 18.91   3.320  127.9  7.647
169.9  -72.8    8952   40.30 56.38 17.33   0.06  0.57    9.39  0.00  0.21  0.00  39.38 55.59 17.18   3.340  127.9  7.669
170.6  -73.5    9636   42.33 58.73 15.92   0.06  0.57    9.39  0.00  0.21  0.00  41.41 57.94 15.77   3.361  127.9  7.691
171.3  -74.1    9592   41.76 58.10 18.58   0.06  0.57    9.39  0.00  0.21  0.00  40.83 57.32 18.44   3.380  127.9  7.712
171.9  -74.8   10165   42.33 59.30 15.76   0.06  0.57    9.39  0.00  0.21  0.00  41.37 58.52 15.62   3.401  127.9  7.734
172.6  -75.5   10760   43.22 60.60 15.45   0.06  0.57    9.39  0.00  0.21  0.00  42.24 59.82 15.31   3.422  127.9  7.755
173.2  -76.1   11841   42.07 60.55 14.09   0.06  0.57    9.39  0.00  0.21  0.00  41.04 59.77 13.95   3.442  127.9  7.777
173.9  -76.8   12392   41.76 60.34 13.73   0.06  0.57    9.39  0.00  0.21  0.00  40.72 59.56 13.58   3.463  127.9  7.799
174.5  -77.4    3396   40.66 58.15 12.16   0.06  0.57    9.39  0.00  0.21  0.00  39.67 57.37 12.02   3.484  127.9  7.820
175.2  -78.1    4895   41.29 56.58 16.44   0.06  0.57    9.39  0.00  0.21  0.00  40.41 55.80 16.30   3.504  127.9  7.841
175.9  -78.7    5358   39.10 54.91 19.52   0.06  0.57    9.39  0.00  0.21  0.00  38.19 54.13 19.38   3.525  127.9  7.862
176.5  -79.4    5777   37.32 51.63 18.06   0.06  0.57    9.39  0.00  0.21  0.00  36.50 50.84 17.92   3.544  127.9  7.884
177.2  -80.1    5954   36.02 50.58 16.29   0.06  0.57    9.39  0.00  0.21  0.00  35.17 49.80 16.14   3.565  127.9  7.906
177.8  -80.7    6350   35.81 49.69 16.76   0.06  0.57    9.39  0.00  0.21  0.00  35.01 48.91 16.61   3.586  127.9  7.927
178.5  -81.4    6659   36.70 50.95 16.86   0.06  0.57    9.39  0.00  0.21  0.00  35.87 50.16 16.71   3.606  127.9  7.949
179.1  -82.0    7056   37.85 52.83 18.11   0.06  0.57    9.39  0.00  0.21  0.00  36.98 52.04 17.97   3.627  127.9  7.970
179.8  -82.7    7607   37.95 51.57 19.21   0.06  0.57    9.39  0.00  0.21  0.00  37.16 50.79 19.06   3.648  127.9  7.992
180.4  -83.3   10275   33.09 47.14 11.01   0.06  0.57    9.39  0.00  0.21  0.00  32.28 46.35 10.87   3.668  127.9  8.014
181.1  -84.0   10738   36.12 50.16 14.98   0.06  0.57    9.39  0.00  0.21  0.00  35.31 49.38 14.84   3.688  127.9  8.035
181.8  -84.6   11929   41.13 57.47 19.42   0.06  0.57    9.39  0.00  0.21  0.00  40.20 56.69 19.27   3.709  127.9  8.057
182.4  -85.3   12965   42.60 63.48 13.52   0.06  0.57    9.39  0.00  0.21  0.00  41.44 62.69 13.37   3.729  127.9  8.078
183.1  -86.0   13715   44.58 63.37 14.62   0.06  0.57    9.39  0.00  0.21  0.00  43.52 62.59 14.47   3.750  127.9  8.099
183.7  -86.6   14156   46.93 62.43 15.56   0.06  0.57    9.39  0.00  0.21  0.00  46.04 61.65 15.41   3.770  127.9  8.121
184.4  -87.3   14685   45.31 62.33 12.42   0.06  0.57    9.39  0.00  0.21  0.00  44.35 61.54 12.28   3.791  127.9  8.142
185.0  -87.9    5138   43.74 62.22 16.44   0.05  0.62    9.39  0.00  0.21  0.00  42.70 61.40 16.29   3.812  127.9  8.164
185.7  -88.6    6240   46.93 63.48 17.90   0.05  0.62    9.39  0.00  0.21  0.00  45.98 62.65 17.75   3.831  127.9  8.186
186.3  -89.2    6350   43.38 60.76 17.75   0.05  0.62    9.39  0.00  0.21  0.00  42.39 59.94 17.59   3.852  127.9  8.207
187.0  -89.9    7012   40.92 56.58 18.58   0.05  0.62    9.39  0.00  0.21  0.00  40.02 55.76 18.43   3.873  127.9  8.229
187.7  -90.6    7321   39.88 54.60 17.17   0.05  0.62    9.39  0.00  0.21  0.00  39.02 53.78 17.02   3.893  127.9  8.250
188.3  -91.2    7695   35.65 49.49 15.50   0.05  0.62    9.39  0.00  0.21  0.00  34.84 48.66 15.35   3.914  127.9  8.272
189.0  -91.9    8048   42.33 57.73 18.95   0.05  0.62    9.39  0.00  0.21  0.00  41.44 56.91 18.79   3.934  127.9  8.294
189.6  -92.5    8533   43.95 59.09 22.60   0.05  0.62    9.39  0.00  0.21  0.00  43.08 58.27 22.45   3.955  127.9  8.314
190.3  -93.2   10055   45.94 60.34 22.39   0.05  0.62    9.39  0.00  0.21  0.00  45.09 59.52 22.24   3.976  127.9  8.336
190.9  -93.8   10209   41.76 56.27 20.51   0.05  0.62    9.39  0.00  0.21  0.00  40.91 55.45 20.36   3.995  127.9  8.357
191.6  -94.5   10849   39.88 52.93 20.31   0.05  0.62    9.39  0.00  0.21  0.00  39.11 52.11 20.15   4.016  127.9  8.379
192.3  -95.1   11069   36.85 51.89 16.29   0.05  0.62    9.39  0.00  0.21  0.00  35.98 51.06 16.13   4.037  127.9  8.401
192.9  -95.8   11598   34.03 47.29 14.20   0.05  0.62    9.39  0.00  0.21  0.00  33.25 46.47 14.04   4.057  127.9  8.422
193.6  -96.5   12591   39.05 54.55 15.35   0.05  0.62    9.39  0.00  0.21  0.00  38.15 53.72 15.19   4.078  127.9  8.444
194.2  -97.1   13892   44.47 59.40 15.29   0.05  0.62    9.39  0.00  0.21  0.00  43.61 58.58 15.14   4.098  127.9  8.465
194.9  -97.8   15082   43.64 61.28 11.80   0.05  0.62    9.39  0.00  0.21  0.00  42.64 60.46 11.64   4.119  127.9  8.487
195.5  -98.4    3330   26.94 49.59  5.46   0.05  0.62    9.39  0.00  0.21  0.00  25.68 48.77  5.51   4.139  131.0  8.509
196.2  -99.1    5027   43.59 58.15 19.26   0.05  0.62    9.39  0.00  0.21  0.00  42.73 57.33 19.11   4.159  127.9  8.531
196.8  -99.7    5557   44.27 59.51 19.26   0.05  0.62    9.39  0.00  0.21  0.00  43.38 58.68 19.11   4.180  127.9  8.552
197.5  -100.4   6417   44.21 60.50 16.55   0.05  0.62    9.39  0.00  0.21  0.00  43.27 59.68 16.39   4.201  127.9  8.574
198.2  -101.0   6703   40.04 54.91 18.32   0.05  0.62    9.39  0.00  0.21  0.00  39.17 54.09 18.17   4.221  127.9  8.595
198.8  -101.7   6813   39.15 53.51 19.42   0.05  0.62    9.39  0.00  0.21  0.00  38.30 52.68 19.26   4.242  127.9  8.617
199.5  -102.4   7210   40.09 54.65 18.64   0.05  0.62    9.39  0.00  0.21  0.00  39.23 53.83 18.48   4.262  127.9  8.638
200.1  -103.0   7629   42.02 57.32 19.05   0.05  0.62    9.39  0.00  0.21  0.00  41.13 56.49 18.90   4.282  127.9  8.660
200.8  -103.7   8313   41.19 57.99 19.21   0.05  0.62    9.39  0.00  0.21  0.00  40.23 57.17 19.05   4.303  127.9  8.682
201.4  -104.3   9129   41.92 57.79 18.17   0.05  0.62    9.39  0.00  0.21  0.00  41.00 56.96 18.01   4.323  127.9  8.703
202.1  -105.0  11400   41.08 57.89 14.62   0.05  0.62    9.39  0.00  0.21  0.00  40.12 57.07 14.46   4.344  127.9  8.725
202.8  -105.6  12061   41.86 58.26 16.76   0.05  0.62    9.39  0.00  0.21  0.00  40.92 57.43 16.60   4.365  127.9  8.746
203.4  -106.3  12524   35.18 47.76 12.48   0.05  0.62    9.39  0.00  0.21  0.00  34.43 46.94 12.32   4.385  127.9  8.768
204.1  -107.0  12436   22.29 32.16  4.59   0.05  0.62    9.39  0.00  0.21  0.00  21.67 31.33  4.65   4.406  127.9  8.789
204.7  -107.6  13759   20.88 34.35  2.41   0.05  0.62    9.39  0.00  0.21  0.00  20.09 33.52  2.46   4.426  131.0  8.811
205.4  -108.3  21433   24.22 48.55  1.60   0.05  0.62    9.39  0.00  0.21  0.00  22.88 47.72  1.65   4.446  131.0  8.833
206.0  -108.9  17530   17.75 51.57  1.53   0.05  0.62    9.39  0.00  0.21  0.00  15.93 50.75  1.59   4.467  134.2  8.856
206.7  -109.6  23461   19.52 57.32  2.21   0.05  0.62    9.39  0.00  0.21  0.00  17.51 56.49  2.27   4.487  134.2  8.880
207.3  -110.2  22976   20.62 51.68  2.70   0.05  0.62    9.39  0.00  0.21  0.00  18.94 50.85  2.76   4.508  134.2  8.903
208.0  -110.9  22645   22.19 58.26  2.85   0.05  0.62    9.39  0.00  0.21  0.00  20.25 57.43  2.90   4.529  134.2  8.927
208.7  -111.5  24453   23.54 59.82  2.70   0.05  0.62    9.39  0.00  0.21  0.00  21.60 59.00  2.76   4.549  134.2  8.951
209.3  -112.2  23968   20.04 56.53  2.54   0.05  0.62    9.39  0.00  0.21  0.00  18.09 55.71  2.59   4.570  134.2  8.974
210.0  -112.9  24079   25.47 60.13  2.87   0.05  0.62    9.39  0.00  0.21  0.00  23.62 59.31  2.92   4.589  134.2  8.998
210.6  -113.5  22557   22.76 59.09  2.78   0.05  0.62    9.39  0.00  0.21  0.00  20.82 58.27  2.83   4.610  134.2  9.021
```

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)       SNDG. NO. : DMT-301
In-Situ Soil Testing, L.C.                                                              Page 2
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                        FILE NO. :2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                 SNDG. DATE: 11/20/08
ANAL.BY : Roger Failmezger, P.E.                                                        ANAL. DATE: 12/15/08

ANALYSIS PARAMETERS:   LO RANGE   =  9.39 TSF  ROD DIAM.   =  1.73 IN    BL.THICK.  =  0.59 IN    SU  FACTOR = 1
SURF.ELEV.  =  97.0 FT LO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  2.01 IN     BL.WIDTH   =  3.78 IN    PHI FACTOR = 1
WATER DEPTH =  63.0 FT HI  GAGE 0 =  0.21 TSF  LIN.ROD WT. =   5.4 LBF/FTDELTA-A    =  0.06 TSF    OCR FACTOR = 1
SP.GR.WATER = 1.000     CAL GAGE 0 =  0.00 TSF;
                                                DELTA / PHI =   0.5       DELTA - B =  0.57 TSF    M FACTOR = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.8       OCR OPTION =     0       K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z    ELEV    KD    ID    UD    ED      K0      SU     QD     PHI   SIGFF   PHIO    PC     OCR      M      SOIL TYPE
(FT)  (FT)                      (TSF)          (TSF)  (TSF)  (DEG)  (TSF)   (DEG)  (TSF)           (TSF)
***** ******  ***** ***** ***** ******  *****  *****  *****  *****  ******  *****  *****  *****  ******  ************
164.0  -66.9   2.39  0.87 -0.03    540   0.65                                        9.89    1.3     572  CLAYEY SILT
164.7  -67.6   3.71  0.43  0.27    412   0.93   3.57                                19.64    2.6     612  SILTY CLAY
165.4  -68.2   3.26  0.54  0.17    456   0.84   3.05                                16.13    2.1     617  SILTY CLAY
166.0  -68.9   3.73  0.42  0.28    406   0.93   3.61                                19.94    2.6     606  SILTY CLAY
166.7  -69.6   4.49  0.38  0.41    449   1.07   4.57                                26.70    3.5     753  SILTY CLAY
167.3  -70.2   4.48  0.40  0.46    471   1.07   4.57                                26.65    3.5     790  SILTY CLAY
168.0  -70.9   4.64  0.41  0.42    496   1.10   4.78                                28.22    3.7     849  SILTY CLAY
168.6  -71.5   4.42  0.48  0.42    556   1.06   4.52                                26.26    3.4     926  SILTY CLAY
169.3  -72.2   4.81  0.43  0.42    545   1.13   5.04                                30.10    3.9     955  SILTY CLAY
169.9  -72.8   4.70  0.45  0.38    563   1.11   4.91                                29.08    3.8     971  SILTY CLAY
170.6  -73.5   4.95  0.43  0.33    574   1.15   5.25                                31.58    4.1    1021  SILTY CLAY
171.3  -74.1   4.86  0.44  0.40    572   1.14   5.15                                30.77    4.0    1006  SILTY CLAY
171.9  -74.8   4.91  0.45  0.32    595   1.15   5.23                                31.39    4.1    1053  SILTY CLAY
172.6  -75.5   5.01  0.45  0.31    610   1.16   5.37                                32.44    4.2    1092  SILTY CLAY
173.2  -76.1   4.83  0.50  0.28    650   1.13   5.16                                30.81    4.0    1141  SILTY CLAY
173.9  -76.8   4.78  0.51  0.27    654   1.12   5.09                                30.33    3.9    1140  SILTY CLAY
174.5  -77.4   4.63  0.49  0.24    614   1.10   4.91                                28.95    3.7    1050  SILTY CLAY
175.2  -78.1   4.71  0.42  0.35    535   1.11   5.03                                29.80    3.8     923  SILTY CLAY
175.9  -78.7   4.41  0.46  0.46    553   1.06   4.65                                26.99    3.4     919  SILTY CLAY
176.5  -79.4   4.18  0.44  0.44    498   1.02   4.35                                24.89    3.2     800  SILTY CLAY
177.2  -80.1   4.00  0.46  0.40    507   0.99   4.13                                23.29    2.9     791  SILTY CLAY
177.8  -80.7   3.96  0.44  0.41    482   0.98   4.10                                23.04    2.9     749  SILTY CLAY
178.5  -81.4   4.06  0.44  0.41    496   1.00   4.24                                23.98    3.0     782  SILTY CLAY
179.1  -82.0   4.18  0.45  0.43    523   1.02   4.42                                25.21    3.2     840  SILTY CLAY
179.8  -82.7   4.19  0.41  0.46    473   1.02   4.44                                25.36    3.2     761  SILTY CLAY
180.4  -83.3   3.57  0.49  0.25    489   0.90   3.63                                19.79    2.5     706  SILTY CLAY
181.1  -84.0   3.94  0.45  0.35    489   0.97   4.12                                23.09    2.9     754  SILTY CLAY
181.8  -84.6   4.53  0.45  0.43    572   1.08   4.93                                28.85    3.6     966  SILTY CLAY
182.4  -85.3   4.67  0.56  0.26    737   1.11   5.13                                30.31    3.8    1268  SILTY CLAY
183.1  -86.0   4.91  0.48  0.27    662   1.15   5.48                                32.89    4.1    1171  SILTY CLAY
183.7  -86.6   5.20  0.37  0.28    542   1.19   5.91                                36.11    4.4     992  SILTY CLAY
184.4  -87.3   4.98  0.42  0.21    597   1.16   5.61                                33.79    4.2    1066  SILTY CLAY
185.0  -87.9   4.76  0.48  0.32    649   1.12   5.31                                31.61    3.9    1129  SILTY CLAY
185.7  -88.6   5.15  0.40  0.33    578   1.19   5.87                                35.79    4.4    1052  SILTY CLAY
186.3  -89.2   4.70  0.46  0.36    609   1.11   5.25                                31.07    3.8    1050  SILTY CLAY
187.0  -89.9   4.39  0.44  0.40    546   1.06   4.84                                28.08    3.4     905  SILTY CLAY
187.7  -90.6   4.26  0.42  0.37    512   1.03   4.67                                26.82    3.3     832  SILTY CLAY
188.3  -91.2   3.74  0.45  0.37    479   0.94   3.98                                21.94    2.7     715  SILTY CLAY
189.0  -91.9   4.52  0.41  0.40    537   1.08   5.06                                29.62    3.6     905  SILTY CLAY
189.6  -92.5   4.70  0.39  0.47    527   1.11   5.32                                31.58    3.8     910  SILTY CLAY
190.3  -93.2   4.93  0.35  0.44    500   1.15   5.67                                34.09    4.1     888  SILTY CLAY
190.9  -93.8   4.42  0.39  0.44    504   1.06   4.95                                28.76    3.4     838  SILTY CLAY
191.6  -94.5   4.19  0.37  0.46    451   1.02   4.65                                26.54    3.2     726  SILTY CLAY
192.3  -95.1   3.80  0.47  0.38    523   0.95   4.12                                22.88    2.7     789  SILTY CLAY
192.9  -95.8   3.47  0.45  0.34    458   0.88   3.69                                19.86    2.4     648  SILTY CLAY
193.6  -96.5   4.03  0.46  0.33    541   0.99   4.47                                25.23    3.0     849  SILTY CLAY
194.2  -97.1   4.67  0.38  0.28    520   1.10   5.37                                31.75    3.8     894  SILTY CLAY
194.9  -97.8   4.54  0.46  0.20    618   1.08   5.20                                30.47    3.6    1045  SILTY CLAY
195.5  -98.4   2.53  1.07  0.06    801   0.68                                       12.29    1.4     908  SILT
196.2  -99.1   4.52  0.38  0.39    506   1.08   5.20                                30.45    3.6     854  SILTY CLAY
196.8  -99.7   4.58  0.39  0.38    531   1.09   5.30                                31.18    3.6     903  SILTY CLAY
197.5  -100.4  4.56  0.42  0.31    569   1.09   5.28                                30.99    3.6     965  SILTY CLAY
198.2  -101.0  4.07  0.43  0.40    518   1.00   4.59                                26.00    3.0     816  SILTY CLAY
198.8  -101.7  3.95  0.42  0.44    499   0.98   4.45                                24.95    2.9     773  SILTY CLAY
199.5  -102.4  4.05  0.42  0.41    506   0.99   4.59                                25.95    3.0     797  SILTY CLAY
200.1  -103.0  4.26  0.42  0.40    532   1.03   4.90                                28.13    3.2     865  SILTY CLAY
200.8  -103.7  4.14  0.47  0.41    588   1.01   4.74                                26.99    3.1     939  SILTY CLAY
201.4  -104.3  4.21  0.44  0.37    553   1.03   4.87                                27.83    3.2     894  SILTY CLAY
202.1  -105.0  4.10  0.47  0.28    588   1.00   4.71                                26.74    3.1     933  SILTY CLAY
202.8  -105.6  4.18  0.45  0.33    573   1.02   4.83                                27.62    3.2     920  SILTY CLAY
203.4  -106.3  3.43  0.42  0.26    434   0.87   3.78                                20.31    2.3     609  SILTY CLAY
204.1  -107.0  1.96  0.56  0.01    335   0.54   1.89                                 8.55    1.0     285  SILTY CLAY
204.7  -107.6  1.78  0.86 -0.13    467   0.48                                        7.33    0.8     397  CLAYEY SILT
205.4  -108.3  2.09  1.35 -0.15    862   0.57                                        9.44    1.1     836  SANDY SILT
206.0  -108.9  1.29  3.04 -0.25   1208   0.46          272.7   32.8    13.66  35.6   8.92    1.0    1027  SILTY SAND
206.7  -109.6  1.47  2.99 -0.17   1353   0.44          364.7   34.9    13.97  37.6   8.74    1.0    1149  SILTY SAND
207.3  -110.2  1.62  2.21 -0.12   1108   0.46          351.2   34.6    13.96  37.3   9.83    1.1     942  SILTY SAND
208.0  -110.9  1.76  2.36 -0.10   1290   0.49          341.1   34.3    13.96  37.0  10.86    1.2    1187  SILTY SAND
208.7  -111.5  1.91  2.19 -0.11   1298   0.50          365.5   34.7    14.05  37.4  11.49    1.3    1262  SILTY SAND
209.3  -112.2  1.51  2.78 -0.15   1305   0.44          371.5   35.0    14.11  37.7   9.03    1.0    1110  SILTY SAND
210.0  -112.9  2.11  1.88 -0.09   1238   0.53          352.2   34.3    14.07  37.1  13.18    1.5    1284  SILTY SAND
210.6  -113.5  1.80  2.31 -0.11   1300   0.50          337.9   34.1    14.08  36.9  11.29    1.3    1211  SILTY SAND
```

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)        SNDG. NO. :DMT-301
In-Situ Soil Testing, L.C.                                                              Page 2a
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                        FILE NO. : 2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                 SNDG. DATE: 11/20/08
ANAL.BY : Roger Failmezger, P.E.                                                        ANAL. DATE: 12/15/08

ANALYSIS PARAMETERS:    LO RANGE    =  9.80 TSF  ROD DIAM.    =  0.68 IN    BL.THICK.  =  0.02 IN     SU  FACTOR = 1
SURF.ELEV.  =  97.0 FT LO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  0.79 IN  BL.WIDTH   =  0.15 IN   PHI FACTOR = 1
WATER DEPTH =  63.0 FT HI  GAGE 0 =  0.22 TSF  LIN.ROD WT. =   3.6 LBF/FTDELTA-A    =  0.06 TSF    OCR FACTOR = 1
SP.GR.WATER = 1.000    CAL GAGE 0 =  0.00 TSF  DELTA/PHI    =   0.5        DELTA-B    =  0.60 TSF    M  FACTOR  = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.8        OCR OPTION =     0        K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z    ELEV   THRUST   A     B     C      DA    DB    ZMRNG ZMLO  ZMHI  ZMCAL   P0    P1    P2     U0   GAMMA   SVP
(FT)   (FT)   (LBF)  (TSF) (TSF) (TSF)  (TSF) (TSF)  (TSF) (TSF) (TSF) (TSF)  (TSF) (TSF) (TSF)  (TSF)  (PCF)  (TSF)
***** ****** ******  ***** ***** *****  ***** *****  ***** ***** ***** *****  ***** ***** *****  ****** ****** ******
211.3  -114.2  18544  20.51 53.97  3.03   0.05  0.62   9.39  0.00  0.21  0.00  18.72 53.15  3.08   4.631  134.2  9.045
211.9  -114.8  16824  18.84 45.31  2.67   0.05  0.62   9.39  0.00  0.21  0.00  17.39 44.48  2.72   4.651  134.2  9.068
212.6  -115.5  15082  20.72 51.78  2.81   0.05  0.62   9.39  0.00  0.21  0.00  19.04 50.96  2.86   4.672  134.2  9.092
213.3  -116.1  14553  19.16 37.58  2.34   0.05  0.62   9.39  0.00  0.21  0.00  18.11 36.76  2.39   4.693  131.0  9.115
213.9  -116.8  12745  19.26 37.95  2.45   0.05  0.62   9.39  0.00  0.21  0.00  18.21 37.12  2.51   4.713  131.0  9.138
214.6  -117.5   9856  18.79 33.41  1.95   0.05  0.62   9.39  0.00  0.21  0.00  17.94 32.58  2.00   4.733  131.0  9.160
215.2  -118.1   9371  20.88 38.00  1.93   0.05  0.62   9.39  0.00  0.21  0.00  19.90 37.18  1.98   4.753  131.0  9.183
215.9  -118.8  10827  22.29 38.11  1.94   0.09  0.52   9.39  0.00  0.21  0.00  21.41 37.38  2.04   4.774  131.0  9.206
216.5  -119.4   8379  25.79 45.47  2.57   0.09  0.52   9.39  0.00  0.21  0.00  24.72 44.74  2.66   4.795  131.0  9.228
217.2  -120.1   8644  19.47 34.77  2.40   0.09  0.52   9.39  0.00  0.21  0.00  18.62 34.03  2.50   4.815  131.0  9.251
217.8  -120.7   7695  21.56 36.33  2.71   0.09  0.52   9.39  0.00  0.21  0.00  20.73 35.60  2.81   4.836  131.0  9.273
218.5  -121.4   7607  24.22 36.75  2.72   0.09  0.52   9.39  0.00  0.21  0.00  23.51 36.02  2.82   4.857  131.0  9.296
219.2  -122.0   7960  24.80 37.17  3.06   0.09  0.52   9.39  0.00  0.21  0.00  24.10 36.44  3.15   4.877  131.0  9.318
219.8  -122.7   7321  25.47 35.65  3.61   0.09  0.52   9.39  0.00  0.21  0.00  24.88 34.92  3.71   4.897  127.9  9.341
220.5  -123.4   7188  25.00 36.96  3.70   0.09  0.52   9.39  0.00  0.21  0.00  24.33 36.23  3.79   4.918  131.0  9.363
221.1  -124.0   7365  25.42 35.50  4.04   0.09  0.52   9.39  0.00  0.21  0.00  24.84 34.77  4.13   4.938  127.9  9.385
221.8  -124.7   8269  25.37 37.27  4.44   0.09  0.52   9.39  0.00  0.21  0.00  24.69 36.54  4.53   4.959  131.0  9.406
222.4  -125.3   8313  27.93 40.30  4.81   0.09  0.52   9.39  0.00  0.21  0.00  27.23 39.57  4.91   4.979  127.9  9.428
223.1  -126.0   8710  27.25 38.89  5.20   0.09  0.52   9.39  0.00  0.21  0.00  26.58 38.16  5.29   5.000  127.9  9.450
223.8  -126.6   8622  27.14 38.37  5.67   0.09  0.52   9.39  0.00  0.21  0.00  26.50 37.64  5.76   5.021  127.9  9.471
224.4  -127.3   8776  24.64 36.91  4.05   0.09  0.52   9.39  0.00  0.21  0.00  23.94 36.17  4.14   5.040  131.0  9.493
225.1  -128.0   9349  26.88 38.58  5.04   0.09  0.52   9.39  0.00  0.21  0.00  26.21 37.85  5.14   5.061  127.9  9.515
225.7  -128.6   8688  30.69 42.60  5.11   0.09  0.52   9.39  0.00  0.21  0.00  30.02 41.86  5.20   5.082  127.9  9.537
226.4  -129.3   3462  23.80 36.28  4.91   0.09  0.52   9.39  0.00  0.21  0.00  23.09 35.55  5.00   5.102  131.0  9.559
227.0  -129.9   5027  29.55 40.35  6.21   0.09  0.52   9.39  0.00  0.21  0.00  28.92 39.62  6.31   5.123  127.9  9.581
227.7  -130.6   5821  31.06 42.96  7.28   0.09  0.52   9.39  0.00  0.21  0.00  30.38 42.23  7.37   5.143  127.9  9.603
228.3  -131.2   5954  31.53 42.80  8.25   0.09  0.52   9.39  0.00  0.21  0.00  30.88 42.07  8.34   5.164  127.9  9.624
229.0  -131.9   6461  30.69 41.71  7.79   0.09  0.52   9.39  0.00  0.21  0.00  30.06 40.98  7.88   5.185  127.9  9.646
229.7  -132.5   7321  32.89 43.85  9.40   0.09  0.52   9.39  0.00  0.21  0.00  32.25 43.12  9.28   5.204  127.9  9.667
230.3  -133.2   7188  31.32 41.19 11.85   0.09  0.52   9.39  0.00  0.21  0.00  30.75 40.46 11.73   5.225  127.9  9.688
231.0  -133.9   8952  29.86 41.13 10.91   0.09  0.52   9.39  0.00  0.21  0.00  29.21 40.40 10.79   5.246  127.9  9.710
231.6  -134.5   9063  29.81 40.14 12.11   0.09  0.52   9.39  0.00  0.21  0.00  29.20 39.41 12.00   5.266  127.9  9.731
232.3  -135.2  10319  31.16 43.07 12.11   0.09  0.52   9.39  0.00  0.21  0.00  30.48 42.33 12.00   5.287  127.9  9.753
232.9  -135.8  10253  32.89 43.38 11.59   0.09  0.52   9.39  0.00  0.21  0.00  32.28 42.65 11.47   5.307  127.9  9.775
233.6  -136.5  10386  33.98 47.87 12.11   0.09  0.52   9.39  0.00  0.21  0.00  33.20 47.14 12.00   5.328  127.9  9.796
234.2  -137.1  10782  32.94 47.61 10.18   0.09  0.52   9.39  0.00  0.21  0.00  32.12 46.88 10.06   5.348  127.9  9.818
234.9  -137.8  11223  34.82 50.43 11.28   0.09  0.52   9.39  0.00  0.21  0.00  33.95 49.69 11.16   5.368  127.9  9.839
235.6  -138.4  11885  37.69 51.21 11.33   0.09  0.52   9.39  0.00  0.21  0.00  36.93 50.48 11.21   5.389  127.9  9.861
236.2  -139.1  12458  35.24 49.54 10.65   0.09  0.52   9.39  0.00  0.21  0.00  34.43 48.81 10.53   5.410  127.9  9.883
237.2  -140.1   3682  38.42 51.89 16.65   0.09  0.48   9.39  0.00  0.21  0.00  37.66 51.20 16.54   5.440  127.9  9.915
237.5  -140.4   5270  40.14 55.12 15.03   0.09  0.48   9.39  0.00  0.21  0.00  39.31 54.43 14.92   5.451  127.9  9.925
238.2  -141.1   6042  39.20 51.94 15.03   0.09  0.48   9.39  0.00  0.21  0.00  38.48 51.25 14.92   5.471  127.9  9.947
238.8  -141.7   6681  40.19 52.67 13.10   0.09  0.48   9.39  0.00  0.21  0.00  39.48 51.98 12.99   5.491  127.9  9.968
239.5  -142.4   7078  39.20 50.79 13.05   0.09  0.48   9.39  0.00  0.21  0.00  38.53 50.10 12.94   5.512  127.9  9.990
240.2  -143.0   7519  40.19 50.63 11.75   0.09  0.48   9.39  0.00  0.21  0.00  39.59 49.94 11.63   5.532  127.9  10.011
240.8  -143.7   8313  37.17 48.39 12.74   0.09  0.48   9.39  0.00  0.21  0.00  36.52 47.70 12.62   5.553  127.9  10.033
241.5  -144.4   9018  36.96 48.08 11.48   0.09  0.48   9.39  0.00  0.21  0.00  36.32 47.39 11.37   5.574  127.9  10.055
242.1  -145.0  10518  35.55 45.41  8.14   0.09  0.48   9.39  0.00  0.21  0.00  34.97 44.72  8.24   5.594  127.9  10.076
242.8  -145.7  10871  34.87 47.45 10.70   0.09  0.48   9.39  0.00  0.21  0.00  34.16 46.76 10.59   5.615  127.9  10.098
243.4  -146.3  11179  35.91 49.96 10.70   0.09  0.48   9.39  0.00  0.21  0.00  35.13 49.27 10.59   5.634  127.9  10.118
244.1  -147.0  11554  36.07 49.43 10.91   0.09  0.48   9.39  0.00  0.21  0.00  35.32 48.74 10.79   5.655  127.9  10.140
244.7  -147.6  12591  33.72 49.69  4.02   0.09  0.48   9.39  0.00  0.21  0.00  32.83 49.01  4.11   5.676  127.9  10.162
245.4  -148.3  13980  35.18 50.53  8.94   0.09  0.48   9.39  0.00  0.21  0.00  34.33 49.84  9.03   5.696  127.9  10.183
246.1  -148.9  14685  31.69 49.49  6.57   0.09  0.48   9.39  0.00  0.21  0.00  30.71 48.80  6.66   5.717  131.0  10.205
246.7  -149.6  16471  37.43 50.84  8.65   0.09  0.48   9.39  0.00  0.21  0.00  36.68 50.15  8.75   5.738  127.9  10.227
247.7  -150.6   4123  31.01 50.53  6.34   0.09  0.48   9.39  0.00  0.21  0.00  29.94 49.84  6.43   5.768  131.0  10.260
248.0  -150.9   5292  40.98 53.56 12.37   0.09  0.48   9.39  0.00  0.21  0.00  40.27 52.87 12.26   5.779  127.9  10.272
248.7  -151.6   5204  40.19 52.20 15.03   0.09  0.48   9.39  0.00  0.21  0.00  39.50 51.51 14.92   5.798  127.9  10.293
249.3  -152.2   5424  40.19 52.98 17.28   0.09  0.48   9.39  0.00  0.21  0.00  39.47 52.29 17.16   5.819  127.9  10.315
250.0  -152.9   5755  36.80 49.28 14.36   0.09  0.48   9.39  0.00  0.21  0.00  36.09 48.59 14.24   5.840  127.9  10.336
250.7  -153.5   6461  36.70 49.22 12.89   0.09  0.48   9.39  0.00  0.21  0.00  35.99 48.54 12.78   5.860  127.9  10.358
251.3  -154.2   6681  36.54 48.86 12.58   0.09  0.48   9.39  0.00  0.21  0.00  35.84 48.17 12.47   5.881  127.9  10.379
252.0  -154.9   7673  36.12 48.02 12.53   0.09  0.48   9.39  0.00  0.21  0.00  35.44 47.33 12.41   5.902  127.9  10.400
252.6  -155.5   8423  34.19 46.67 11.54   0.09  0.48   9.39  0.00  0.21  0.00  33.48 45.98 11.42   5.922  127.9  10.422
253.3  -156.2   8688  35.65 47.08 12.58   0.09  0.48   9.39  0.00  0.21  0.00  34.99 46.40 12.47   5.942  127.9  10.443
253.9  -156.8  10606  35.50 48.86 12.89   0.09  0.48   9.39  0.00  0.21  0.00  34.74 48.17 12.78   5.962  127.9  10.465
254.6  -157.5  11356  34.87 46.77 11.90   0.09  0.48   9.39  0.00  0.21  0.00  34.19 46.08 11.79   5.983  127.9  10.487
255.2  -158.1  12524  33.25 45.10  7.81   0.09  0.48   9.39  0.00  0.21  0.00  32.57 44.41  7.90   6.004  127.9  10.508
255.9  -158.8  13517  33.25 45.68  8.10   0.09  0.48   9.39  0.00  0.21  0.00  32.54 44.99  8.20   6.024  127.9  10.530
256.6  -159.4  13803  32.63 45.68  8.27   0.09  0.48   9.39  0.00  0.21  0.00  31.88 44.99  8.36   6.045  127.9  10.552
257.2  -160.1  14774  34.03 48.29  6.53   0.09  0.48   9.39  0.00  0.21  0.00  33.24 47.60  6.62   6.066  127.9  10.573
257.9  -160.8  16604  34.19 47.66  6.60   0.09  0.48   9.39  0.00  0.21  0.00  33.43 46.97  6.69   6.085  127.9  10.595
```

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)       SNDG. NO. : DMT-301
In-Situ Soil Testing, L.C.                                                              Page 2
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                        FILE NO. :2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                 SNDG. DATE: 11/20/08
ANAL.BY : Roger Failmezger, P.E.                                                        ANAL. DATE: 12/15/08

ANALYSIS PARAMETERS:   LO RANGE   =  9.80 TSF  ROD DIAM.    =  0.68 IN    BL.THICK.  =  0.02 IN    SU  FACTOR = 1
SURF.ELEV.  =  97.0 FT LO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  0.79 IN  BL.WIDTH   =  0.15 IN  PHI FACTOR = 1
WATER DEPTH =  63.0 FT HI  GAGE 0 =  0.22 TSF  LIN.ROD WT. =   3.6 LBF/FTDELTA-A    =  0.06 TSF    OCR FACTOR = 1
SP.GR.WATER = 1.000     CAL GAGE 0 =  0.00 TSF;
                                                DELTA / PHI =   0.5       DELTA - B =  0.60 TSF    M FACTOR = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.8       OCR OPTION =     0      K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z    ELEV    KD    ID    UD     ED      K0     SU      QD     PHI    SIGFF   PHIO    PC     OCR       M     SOIL TYPE
(FT)   (FT)                     (TSF)          (TSF)   (TSF)  (DEG)   (TSF)   (DEG)  (TSF)            (TSF)
***** ******  ***** ***** ***** ******  *****  *****   *****  *****  ******  *****  *****   *****   ******  ************
211.3 -114.2  1.56  2.44 -0.11   1194   0.50          280.3   32.8    13.94  35.6  10.63   1.2    1016  SILTY SAND
211.9 -114.8  1.41  2.13 -0.15    940   0.49          257.1   32.1    13.90  35.0  10.07   1.1     799  SILTY SAND
212.6 -115.5  1.58  2.22 -0.13   1108   0.54          223.4   30.9    13.77  33.9  11.99   1.3     942  SILTY SAND
213.3 -116.1  1.47  1.39 -0.17    647   0.39                                        5.65   0.6     550  SANDY SILT
213.9 -116.8  1.48  1.40 -0.16    657   0.39                                        5.69   0.6     559  SANDY SILT
214.6 -117.5  1.44  1.11 -0.21    508   0.38                                        5.49   0.6     432  SILT
215.2 -118.1  1.65  1.14 -0.18    599   0.45                                        6.80   0.7     509  SILT
215.9 -118.8  1.81  0.96 -0.16    553   0.49                                        7.86   0.9     471  SILT
216.5 -119.4  2.16  1.00 -0.11    694   0.59                                       10.40   1.1     673  SILT
217.2 -120.1  1.49  1.12 -0.17    535   0.40                                        5.86   0.6     454  SILT
217.8 -120.7  1.71  0.93 -0.13    516   0.46                                        7.30   0.8     438  SILT
218.5 -121.4  2.01  0.67 -0.11    434   0.55                                        9.34   1.0     374  CLAYEY SILT
219.2 -122.0  2.06  0.64 -0.09    428   0.56                                        9.77   1.0     380  CLAYEY SILT
219.8 -122.7  2.14  0.50 -0.06    349   0.58   2.23                                10.38   1.1     321  SILTY CLAY
220.5 -123.4  2.07  0.61 -0.06    413   0.56                                        9.90   1.1     367  CLAYEY SILT
221.1 -124.0  2.12  0.50 -0.04    345   0.58   2.22                                10.27   1.1     313  SILTY CLAY
221.8 -124.7  2.10  0.60 -0.02    411   0.57                                       10.14   1.1     370  CLAYEY SILT
222.4 -125.3  2.36  0.55  0.00    428   0.64   2.55                                12.20   1.3     436  SILTY CLAY
223.1 -126.0  2.28  0.54  0.01    402   0.62   2.45                                11.62   1.2     397  SILTY CLAY
223.8 -126.6  2.27  0.52  0.03    386   0.61   2.44                                11.53   1.2     378  SILTY CLAY
224.4 -127.3  1.99  0.65 -0.05    425   0.54                                        9.43   1.0     361  CLAYEY SILT
225.1 -128.0  2.22  0.55  0.00    404   0.60   2.39                                11.22   1.2     387  SILTY CLAY
225.7 -128.6  2.61  0.48  0.00    411   0.70   2.93                                14.48   1.5     462  SILTY CLAY
226.4 -129.3  1.88  0.69 -0.01    432   0.51                                        8.70   0.9     367  CLAYEY SILT
227.0 -129.9  2.48  0.45  0.05    372   0.67   2.77                                13.44   1.4     398  SILTY CLAY
227.7 -130.6  2.63  0.47  0.09    411   0.70   2.98                                14.70   1.5     465  SILTY CLAY
228.3 -131.2  2.67  0.44  0.12    388   0.71   3.04                                15.13   1.6     446  SILTY CLAY
229.0 -131.9  2.58  0.44  0.11    379   0.69   2.91                                14.34   1.5     421  SILTY CLAY
229.7 -132.5  2.80  0.40  0.15    377   0.74   3.24                                16.32   1.7     450  SILTY CLAY
230.3 -133.2  2.63  0.38  0.26    337   0.70   3.01                                14.89   1.5     382  SILTY CLAY
231.0 -133.9  2.47  0.47  0.23    388   0.66   2.78                                13.48   1.4     414  SILTY CLAY
231.6 -134.5  2.46  0.43  0.28    354   0.66   2.78                                13.44   1.4     376  SILTY CLAY
232.3 -135.2  2.58  0.47  0.27    411   0.69   2.95                                14.54   1.5     457  SILTY CLAY
232.9 -135.8  2.76  0.38  0.23    360   0.73   3.22                                16.15   1.7     425  SILTY CLAY
233.6 -136.5  2.85  0.50  0.24    483   0.75   3.35                                16.99   1.7     586  SILTY CLAY
234.2 -137.1  2.73  0.55  0.18    512   0.72   3.18                                15.92   1.6     598  SILTY CLAY
234.9 -137.8  2.91  0.55  0.20    546   0.76   3.46                                17.61   1.8     673  SILTY CLAY
235.6 -138.4  3.20  0.43  0.18    470   0.83   3.90                                20.51   2.1     626  SILTY CLAY
236.2 -139.1  2.94  0.50  0.18    499   0.77   3.52                                18.00   1.8     620  SILTY CLAY
237.2 -140.1  3.25  0.42  0.34    470   0.84   4.00                                21.14   2.1     634  SILTY CLAY
237.5 -140.4  3.41  0.45  0.28    525   0.87   4.26                                22.83   2.3     734  SILTY CLAY
238.2 -141.1  3.32  0.39  0.29    443   0.85   4.12                                21.91   2.2     607  SILTY CLAY
238.8 -141.7  3.41  0.37  0.22    433   0.87   4.27                                22.92   2.3     606  SILTY CLAY
239.5 -142.4  3.31  0.35  0.22    401   0.85   4.12                                21.88   2.2     548  SILTY CLAY
240.2 -143.0  3.40  0.30  0.18    359   0.87   4.28                                22.93   2.3     501  CLAY
240.8 -143.7  3.09  0.36  0.23    388   0.80   3.80                                19.74   2.0     502  SILTY CLAY
241.5 -144.4  3.06  0.36  0.19    384   0.80   3.76                                19.49   1.9     494  SILTY CLAY
242.1 -145.0  2.92  0.33  0.09    338   0.77   3.55                                18.13   1.8     419  CLAY
242.8 -145.7  2.83  0.44  0.17    437   0.75   3.42                                17.32   1.7     527  SILTY CLAY
243.4 -146.3  2.91  0.48  0.17    491   0.77   3.56                                18.21   1.8     607  SILTY CLAY
244.1 -147.0  2.92  0.45  0.17    466   0.77   3.59                                18.35   1.8     577  SILTY CLAY
244.7 -147.6  2.67  0.60 -0.06    561   0.71   3.22                                15.97   1.6     644  SILTY CLAY
245.4 -148.3  2.81  0.54  0.12    539   0.74   3.43                                17.33   1.7     645  SILTY CLAY
246.1 -148.9  2.45  0.72  0.04    627   0.66                                       14.00   1.4     671  CLAYEY SILT
246.7 -149.6  3.02  0.44  0.10    468   0.79   3.77                                19.50   1.9     596  SILTY CLAY
247.7 -150.6  2.36  0.82  0.03    690   0.64                                       13.25   1.3     717  CLAYEY SILT
248.0 -150.9  3.36  0.37  0.19    437   0.86   4.32                                23.04   2.2     604  SILTY CLAY
248.7 -151.6  3.27  0.36  0.27    417   0.84   4.20                                22.22   2.2     565  SILTY CLAY
249.3 -152.2  3.26  0.38  0.34    445   0.84   4.19                                22.13   2.1     601  SILTY CLAY
250.0 -152.9  2.93  0.41  0.28    433   0.77   3.66                                18.72   1.8     538  SILTY CLAY
250.7 -153.5  2.91  0.42  0.23    435   0.77   3.64                                18.57   1.8     538  SILTY CLAY
251.3 -154.2  2.89  0.41  0.22    428   0.76   3.61                                18.40   1.8     525  SILTY CLAY
252.0 -154.9  2.84  0.40  0.22    412   0.75   3.55                                17.98   1.7     499  SILTY CLAY
252.6 -155.5  2.64  0.45  0.20    433   0.71   3.25                                16.11   1.5     493  SILTY CLAY
253.3 -156.2  2.78  0.39  0.22    396   0.74   3.47                                17.48   1.7     470  SILTY CLAY
253.9 -156.8  2.75  0.47  0.24    466   0.73   3.42                                17.19   1.6     548  SILTY CLAY
254.6 -157.5  2.69  0.42  0.21    412   0.72   3.34                                16.65   1.6     476  SILTY CLAY
255.2 -158.1  2.53  0.45  0.07    410   0.68   3.10                                15.15   1.4     448  SILTY CLAY
255.9 -158.8  2.52  0.47  0.08    432   0.68   3.09                                15.09   1.4     469  SILTY CLAY
256.6 -159.4  2.45  0.51  0.09    454   0.66   2.99                                14.47   1.4     481  SILTY CLAY
257.2 -160.1  2.57  0.53  0.02    498   0.69   3.18                                15.63   1.5     552  SILTY CLAY
257.9 -160.8  2.58  0.50  0.02    470   0.69   3.21                                15.77   1.5     522  SILTY CLAY
```

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)       SNDG. NO. :DMT-301
In-Situ Soil Testing, L.C.                                                             Page 3a
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                       FILE NO. : 2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                SNDG. DATE: 11/20/08
ANAL.BY : Roger Failmezger, P.E.                                                       ANAL. DATE: 12/15/08

ANALYSIS PARAMETERS:   LO RANGE   = 10.23 TSF  ROD DIAM.    =  0.27 IN    BL.THICK.  =  0.00 IN     SU  FACTOR = 1
SURF.ELEV.  =  97.0 FTLO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  0.31 IN  BL.WIDTH   =  0.01 IN   PHI FACTOR = 1
WATER DEPTH =  63.0 FT HI  GAGE 0 =  0.23 TSF  LIN.ROD WT. =   2.4 LBF/FTDELTA-A    =  0.06 TSF    OCR FACTOR = 1
SP.GR.WATER = 1.000    CAL GAGE 0 =  0.00 TSF  DELTA/PHI   =   0.5       DELTA-B    =  0.63 TSF    M  FACTOR  = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.8       OCR OPTION =     0         K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z     ELEV  THRUST    A     B     C      DA    DB    ZMRNG ZMLO  ZMHI  ZMCAL   P0    P1    P2      U0   GAMMA    SVP
(FT)    (FT)  (LBF)   (TSF) (TSF) (TSF)   (TSF) (TSF)  (TSF) (TSF) (TSF) (TSF)  (TSF) (TSF) (TSF)   (TSF) (PCF) (TSF)
***** ******  ******  ***** ***** *****   ***** *****  ***** ***** ***** *****  ***** ***** *****  ****** ****** ******
258.5  -161.4   4608  30.28 48.55  2.92   0.09  0.48    9.39  0.00  0.21  0.00  29.27 47.86  3.02   6.106  131.0  10.616
259.2  -162.1   5777  39.67 51.57  8.77   0.09  0.48    9.39  0.00  0.21  0.00  38.99 50.88  8.86   6.126  127.9  10.638
259.8  -162.7   6218  37.17 50.84 11.95   0.09  0.48    9.39  0.00  0.21  0.00  36.39 50.15 11.84   6.147  127.9  10.660
260.5  -163.4   7519  38.16 52.36 10.81   0.09  0.48    9.39  0.00  0.21  0.00  37.36 51.67 10.69   6.168  127.9  10.681
261.2  -164.0   7585  36.54 49.49 12.37   0.09  0.48    9.39  0.00  0.21  0.00  35.81 48.80 12.26   6.188  127.9  10.703
261.8  -164.7   7916  35.91 51.78 10.70   0.09  0.48    9.39  0.00  0.21  0.00  35.04 51.09 10.59   6.209  127.9  10.724
262.5  -165.4   8070  39.88 54.60 10.49   0.09  0.48    9.39  0.00  0.21  0.00  39.06 53.91 10.38   6.230  127.9  10.746
263.1  -166.0   8864  33.62 46.98  7.69   0.09  0.48    9.39  0.00  0.21  0.00  32.87 46.29  7.79   6.249  127.9  10.768
263.8  -166.7   9327  34.19 48.18  7.16   0.09  0.48    9.39  0.00  0.21  0.00  33.41 47.49  7.26   6.270  127.9  10.789
264.4  -167.3   9834  32.57 46.20  6.94   0.09  0.48    9.39  0.00  0.21  0.00  31.81 45.51  7.04   6.291  127.9  10.811
265.1  -168.0  11268  33.56 47.76  9.07   0.09  0.48    9.39  0.00  0.21  0.00  32.77 47.07  9.17   6.311  127.9  10.832
265.7  -168.6  11554  36.28 51.00  8.05   0.09  0.48    9.39  0.00  0.21  0.00  35.45 50.31  8.14   6.332  127.9  10.853
266.4  -169.3  12569  35.24 50.11  8.23   0.09  0.48    9.39  0.00  0.21  0.00  34.41 49.42  8.32   6.352  127.9  10.875
267.1  -169.9  13384  36.12 50.90  6.22   0.09  0.48    9.39  0.00  0.21  0.00  35.30 50.21  6.32   6.373  127.9  10.896
267.7  -170.6  14333  32.05 47.71  6.65   0.09  0.48    9.39  0.00  0.21  0.00  31.18 47.02  6.74   6.393  131.0  10.918
268.4  -171.3  15876  38.94 52.30  8.00   0.09  0.48    9.39  0.00  0.21  0.00  38.19 51.62  8.09   6.413  127.9  10.940
269.0  -171.9   3793  32.63 48.86  5.75   0.09  0.47    9.39  0.00  0.21  0.00  31.73 48.18  5.85   6.434  131.0  10.963
269.7  -172.6   5645  38.11 50.53  5.99   0.09  0.47    9.39  0.00  0.21  0.00  37.40 49.85  6.09   6.455  127.9  10.985
270.3  -173.2   6858  39.25 50.74  7.12   0.09  0.47    9.39  0.00  0.21  0.00  38.60 50.06  7.21   6.475  127.9  11.006
271.0  -173.9   7740  36.17 47.66  7.10   0.09  0.47    9.39  0.00  0.21  0.00  35.52 46.98  7.19   6.496  127.9  11.028
271.7  -174.5   8511  34.24 49.38  4.45   0.09  0.47    9.39  0.00  0.21  0.00  33.40 48.70  4.54   6.516  127.9  11.049
272.3  -175.2   9371  36.91 51.36  5.54   0.09  0.47    9.39  0.00  0.21  0.00  36.09 50.69  5.64   6.536  127.9  11.071
273.0  -175.9  10871  35.91 50.11  6.27   0.09  0.47    9.39  0.00  0.21  0.00  35.12 49.43  6.37   6.557  127.9  11.093
273.6  -176.5  10540  32.89 48.02  5.47   0.09  0.47    9.39  0.00  0.21  0.00  32.04 47.35  5.56   6.577  131.0  11.114
274.3  -177.2  11069  35.29 50.53  6.89   0.09  0.47    9.39  0.00  0.21  0.00  34.44 49.85  6.98   6.598  127.9  11.136
274.9  -177.8  11642  33.93 47.61  7.03   0.09  0.47    9.39  0.00  0.21  0.00  33.16 46.93  7.12   6.619  127.9  11.157
275.6  -178.5  12855  35.65 49.49  6.24   0.09  0.47    9.39  0.00  0.21  0.00  34.87 48.81  6.34   6.639  127.9  11.179
276.2  -179.1  13406  34.82 49.17  6.97   0.09  0.47    9.39  0.00  0.21  0.00  34.01 48.49  7.07   6.660  127.9  11.201
276.9  -179.8  13869  32.57 46.35  6.72   0.09  0.47    9.39  0.00  0.21  0.00  31.80 45.68  6.82   6.680  127.9  11.222
277.6  -180.4  14663  35.91 49.07  7.06   0.09  0.47    9.39  0.00  0.21  0.00  35.17 48.39  7.15   6.700  127.9  11.244
278.2  -181.1  15347  34.66 47.19  7.29   0.09  0.47    9.39  0.00  0.21  0.00  33.95 46.51  7.38   6.721  127.9  11.266
278.9  -181.8  12679  35.70 49.22  7.02   0.09  0.47    9.39  0.00  0.21  0.00  34.94 48.55  7.11   6.741  127.9  11.287
279.5  -182.4   3638  24.74 43.17  4.52   0.13  0.44    9.39  0.00  0.21  0.00  23.76 42.52  4.65   6.762  131.0  11.309
280.2  -183.1   5998  34.03 46.72  5.73   0.13  0.44    9.39  0.00  0.21  0.00  33.35 46.07  5.86   6.783  127.9  11.331
280.8  -183.7   5380  34.97 47.76  5.96   0.13  0.44    9.39  0.00  0.21  0.00  34.27 47.12  6.09   6.803  127.9  11.352
281.5  -184.4   5931  34.19 48.75  6.75   0.13  0.44    9.39  0.00  0.21  0.00  33.41 48.11  6.88   6.824  127.9  11.374
282.1  -185.0   6637  31.01 42.60  7.15   0.13  0.44    9.39  0.00  0.21  0.00  30.37 41.95  7.28   6.843  127.9  11.395
282.8  -185.7   7784  30.17 43.01  6.92   0.13  0.44    9.39  0.00  0.21  0.00  29.47 42.37  7.05   6.864  127.9  11.417
283.5  -186.3   8467  31.11 42.86  7.07   0.13  0.44    9.39  0.00  0.21  0.00  30.46 42.21  7.19   6.885  127.9  11.438
284.1  -187.0   9415  30.64 43.01  7.23   0.13  0.44    9.39  0.00  0.21  0.00  29.96 42.37  7.36   6.905  127.9  11.460
284.8  -187.7  10231  30.38 43.07  7.53   0.13  0.44    9.39  0.00  0.21  0.00  29.69 42.42  7.65   6.926  127.9  11.482
285.4  -188.3  11047  30.28 42.54 10.65   0.13  0.44    9.39  0.00  0.21  0.00  29.61 41.90 10.57   6.947  127.9  11.503
286.1  -189.0  11025  31.79 43.85  7.69   0.13  0.44    9.39  0.00  0.21  0.00  31.13 43.20  7.82   6.967  127.9  11.525
286.7  -189.6  11444  30.48 45.47  7.26   0.13  0.44    9.39  0.00  0.21  0.00  29.68 44.82  7.38   6.987  131.0  11.547
287.4  -190.3  12216  34.77 48.34  6.75   0.13  0.44    9.39  0.00  0.21  0.00  34.03 47.69  6.88   7.007  127.9  11.569
288.1  -190.9  11775  34.87 48.81  7.41   0.13  0.44    9.39  0.00  0.21  0.00  34.12 48.16  7.54   7.028  127.9  11.590
288.7  -191.6  12348  36.33 50.06  8.04   0.13  0.44    9.39  0.00  0.21  0.00  35.59 49.41  8.16   7.049  127.9  11.611
289.4  -192.3  13384  37.32 50.69  7.94   0.13  0.44    9.39  0.00  0.21  0.00  36.60 50.04  8.07   7.069  127.9  11.633
290.7  -193.6   5248  35.34 52.20  7.93   0.13  0.44    9.39  0.00  0.21  0.00  34.44 51.55  8.06   7.111  131.0  11.677
291.3  -194.2   5865  36.70 52.51  7.98   0.13  0.44    9.39  0.00  0.21  0.00  35.85 51.87  8.10   7.131  127.9  11.699
292.0  -194.9   6791  36.91 51.73  8.16   0.13  0.44    9.39  0.00  0.21  0.00  36.11 51.08  8.29   7.151  127.9  11.721
292.6  -195.5   7673  36.80 52.93  7.22   0.13  0.44    9.39  0.00  0.21  0.00  35.93 52.28  7.35   7.171  127.9  11.742
293.3  -196.2   9195  38.58 53.82  7.76   0.13  0.44    9.39  0.00  0.21  0.00  37.76 53.17  7.88   7.192  127.9  11.764
294.0  -196.8  10253  35.50 55.18  7.33   0.13  0.44    9.39  0.00  0.21  0.00  34.45 54.53  7.45   7.213  131.0  11.786
294.6  -197.5  10341  39.15 53.87  6.93   0.13  0.44    9.39  0.00  0.21  0.00  38.36 53.22  7.06   7.233  127.9  11.808
295.3  -198.2  11268  39.20 54.65  7.63   0.13  0.44    9.39  0.00  0.21  0.00  38.38 54.01  7.76   7.254  127.9  11.830
```

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)      SNDG. NO. : DMT-301
In-Situ Soil Testing, L.C.                                                             Page 2
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                       FILE NO. :2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                SNDG. DATE: 11/20/08
ANAL.BY : Roger Failmezger, P.E.                                                       ANAL. DATE: 12/15/08

ANALYSIS PARAMETERS:   LO RANGE   = 10.23 TSF  ROD DIAM.   =  0.27 IN    BL.THICK.  =  0.00 IN    SU  FACTOR = 1
SURF.ELEV.  =  97.0 FTLO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  0.31 IN  BL.WIDTH   =  0.01 IN  PHI FACTOR = 1
WATER DEPTH =  63.0 FT HI  GAGE 0 =  0.23 TSF  LIN.ROD WT. =   2.4 LBF/FTDELTA-A    =  0.06 TSF    OCR FACTOR = 1
SP.GR.WATER = 1.000      CAL GAGE 0 =  0.00 TSF;
                                               DELTA / PHI =   0.5       DELTA - B =  0.63 TSF    M FACTOR = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.8       OCR OPTION =     0       K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z    ELEV    KD    ID    UD    ED      K0     SU     QD     PHI   SIGFF    PHIO    PC     OCR      M      SOIL TYPE
(FT)   (FT)                     (TSF)          (TSF)  (TSF)  (DEG)  (TSF)   (DEG)  (TSF)           (TSF)
***** ******  ***** ***** ***** ******  *****  *****  *****  *****  ******  *****  *****  *****  ******  ************
258.5  -161.4  2.18  0.80 -0.13    645   0.59                                      12.16    1.1     619  CLAYEY SILT
259.2  -162.1  3.09  0.36  0.08    412   0.80   4.03                               20.96    2.0     535  SILTY CLAY
259.8  -162.7  2.84  0.45  0.19    477   0.75   3.63                               18.40    1.7     577  SILTY CLAY
260.5  -163.4  2.92  0.46  0.14    496   0.77   3.77                               19.28    1.8     615  SILTY CLAY
261.2  -164.0  2.77  0.44  0.20    451   0.73   3.53                               17.76    1.7     533  SILTY CLAY
261.8  -164.7  2.69  0.56  0.15    557   0.72   3.41                               17.01    1.6     643  SILTY CLAY
262.5  -165.4  3.06  0.45  0.13    516   0.80   4.02                               20.81    1.9     662  SILTY CLAY
263.1  -166.0  2.47  0.50  0.06    466   0.66   3.09                               14.98    1.4     497  SILTY CLAY
263.8  -166.7  2.52  0.52  0.04    489   0.67   3.16                               15.43    1.4     530  SILTY CLAY
264.4  -167.3  2.36  0.54  0.03    475   0.64   2.92                               14.00    1.3     485  SILTY CLAY
265.1  -168.0  2.44  0.54  0.11    496   0.66   3.06                               14.79    1.4     524  SILTY CLAY
265.7  -168.6  2.68  0.51  0.06    516   0.71   3.45                               17.17    1.6     594  SILTY CLAY
266.4  -169.3  2.58  0.54  0.07    521   0.69   3.29                               16.17    1.5     579  SILTY CLAY
267.1  -169.9  2.65  0.52  0.00    518   0.71   3.41                               16.94    1.6     590  SILTY CLAY
267.7  -170.6  2.27  0.64  0.01    549   0.62                                      13.31    1.2     541  CLAYEY SILT
268.4  -171.3  2.90  0.42  0.05    466   0.76   3.83                               19.58    1.8     574  SILTY CLAY
269.0  -171.9  2.31  0.65 -0.02    571   0.62                                      13.70    1.2     572  CLAYEY SILT
269.7  -172.6  2.82  0.40 -0.01    432   0.74   3.71                               18.74    1.7     519  SILTY CLAY
270.3  -173.2  2.92  0.36  0.02    398   0.77   3.88                               19.85    1.8     493  SILTY CLAY
271.0  -173.9  2.63  0.40  0.02    398   0.70   3.41                               16.92    1.5     450  SILTY CLAY
271.7  -174.5  2.43  0.57 -0.07    531   0.66   3.10                               15.00    1.4     559  SILTY CLAY
272.3  -175.2  2.67  0.49 -0.03    506   0.71   3.50                               17.37    1.6     580  SILTY CLAY
273.0  -175.9  2.57  0.50 -0.01    497   0.69   3.35                               16.45    1.5     551  SILTY CLAY
273.6  -176.5  2.29  0.60 -0.04    531   0.62                                      13.74    1.2     525  CLAYEY SILT
274.3  -177.2  2.50  0.55  0.01    535   0.67   3.24                               15.77    1.4     577  SILTY CLAY
274.9  -177.8  2.38  0.52  0.02    478   0.64   3.05                               14.63    1.3     492  SILTY CLAY
275.6  -178.5  2.53  0.49 -0.01    483   0.68   3.29                               16.09    1.4     527  SILTY CLAY
276.2  -179.1  2.44  0.53  0.01    502   0.66   3.16                               15.29    1.4     530  SILTY CLAY
276.9  -179.8  2.24  0.55  0.01    481   0.61   2.84                               13.37    1.2     465  SILTY CLAY
277.6  -180.4  2.53  0.46  0.02    458   0.68   3.32                               16.24    1.4     501  SILTY CLAY
278.2  -181.1  2.42  0.46  0.02    436   0.65   3.14                               15.14    1.3     455  SILTY CLAY
278.9  -181.8  2.50  0.48  0.01    472   0.67   3.28                               15.97    1.4     509  SILTY CLAY
279.5  -182.4  1.50  1.10 -0.12    650   0.40                                       7.25    0.6     553  SILT
280.2  -183.1  2.34  0.48 -0.03    442   0.63   3.04                               14.51    1.3     448  SILTY CLAY
280.8  -183.7  2.42  0.47 -0.03    446   0.65   3.17                               15.28    1.3     466  SILTY CLAY
281.5  -184.4  2.34  0.55  0.00    511   0.63   3.04                               14.50    1.3     516  SILTY CLAY
282.1  -185.0  2.06  0.49  0.02    402   0.56   2.61                               11.97    1.1     355  SILTY CLAY
282.8  -185.7  1.98  0.57  0.01    447   0.54   2.48                               11.24    1.0     380  SILTY CLAY
283.5  -186.3  2.06  0.50  0.01    407   0.56   2.61                               12.00    1.0     359  SILTY CLAY
284.1  -187.0  2.01  0.54  0.02    430   0.55   2.54                               11.57    1.0     369  SILTY CLAY
284.8  -187.7  1.98  0.56  0.03    442   0.54   2.50                               11.33    1.0     376  SILTY CLAY
285.4  -188.3  1.97  0.54  0.16    426   0.54   2.48                               11.23    1.0     362  SILTY CLAY
286.1  -189.0  2.10  0.50  0.04    419   0.57   2.69                               12.40    1.1     377  SILTY CLAY
286.7  -189.6  1.97  0.67  0.02    525   0.54                                      11.23    1.0     447  CLAYEY SILT
287.4  -190.3  2.34  0.51  0.00    474   0.63   3.09                               14.74    1.3     478  SILTY CLAY
288.1  -190.9  2.34  0.52  0.02    488   0.63   3.10                               14.78    1.3     492  SILTY CLAY
288.7  -191.6  2.46  0.48  0.04    479   0.66   3.31                               16.01    1.4     509  SILTY CLAY
289.4  -192.3  2.54  0.46  0.03    467   0.68   3.45                               16.87    1.5     511  SILTY CLAY
290.7  -193.6  2.34  0.63  0.03    594   0.63                                      14.92    1.3     602  CLAYEY SILT
291.3  -194.2  2.45  0.56  0.03    555   0.66   3.33                               16.11    1.4     589  SILTY CLAY
292.0  -194.9  2.47  0.52  0.04    520   0.66   3.36                               16.30    1.4     554  SILTY CLAY
292.6  -195.5  2.45  0.57  0.01    567   0.66   3.33                               16.12    1.4     600  SILTY CLAY
293.3  -196.2  2.60  0.50  0.02    535   0.69   3.59                               17.70    1.5     598  SILTY CLAY
294.0  -196.8  2.31  0.74  0.01    696   0.63                                      14.77    1.3     705  CLAYEY SILT
294.6  -197.5  2.64  0.48 -0.01    516   0.70   3.66                               18.17    1.5     585  SILTY CLAY
295.3  -198.2  2.63  0.50  0.02    543   0.70   3.66                               18.14    1.5     614  SILTY CLAY
```

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)       SNDG. NO. :DMT-301
In-Situ Soil Testing, L.C.                                                             Page 1a
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                       FILE NO. : 2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                SNDG. DATE: 11/20/08
ANAL.BY : Roger Failmezger, P.E.                                                       ANAL. DATE: 12/15/08

ANALYSIS PARAMETERS:    LO RANGE   =  9.40 TSF  ROD DIAM.    =  1.73 IN    BL.THICK.  =  0.59 IN     SU  FACTOR = 1
SURF.ELEV.  =  97.0 FT LO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  2.01 IN       BL.WIDTH   =  3.78 IN     PHI FACTOR = 1
WATER DEPTH =  63.0 FT HI  GAGE 0 =  0.21 TSF  LIN.ROD WT. =    5.4 LBF/FTDELTA-A    =  0.13 TSF    OCR FACTOR = 1
SP.GR.WATER = 1.000     CAL GAGE 0 =  0.00 TSF  DELTA/PHI    =   0.5        DELTA-B    =  0.44 TSF    M  FACTOR  = 1
MAX SU ID   =   0.6     SU OPTION  =     0      MIN PHI ID  =   1.8        OCR OPTION =     0        K0 FACTOR  = 1
UNIT CONVERSIONS:       1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z     ELEV   THRUST    A     B      C      DA     DB     ZMRNG  ZMLO   ZMHI  ZMCAL    P0    P1     P2     U0    GAMMA   SVP
 (FT)   (FT)   (LBF)   (TSF) (TSF) (TSF)  (TSF)  (TSF)   (TSF)  (TSF)  (TSF)  (TSF)  (TSF)  (TSF)  (TSF)  (TSF)  (PCF)  (TSF)
***** ****** ******   ***** ***** *****   ***** *****    ***** *****  ***** *****    ***** ***** *****   ****** ****** ******
295.9  -199.1  11312  37.22 52.15  8.51   0.13  0.44    9.40  0.00  0.21  0.00   36.41 51.50  8.63   7.275  127.9  11.849
296.6  -199.8  11753  39.05 60.87  1.58   0.13  0.44    9.40  0.00  0.21  0.00   37.90 60.22  1.70   7.294  131.0  11.871
297.2  -200.5  12877  37.85 53.45  8.10   0.13  0.44    9.40  0.00  0.21  0.00   37.01 52.81  8.23   7.315  127.9  11.893
297.9  -201.1  13715  37.32 51.42  8.61   0.13  0.44    9.40  0.00  0.21  0.00   36.56 50.77  8.74   7.335  127.9  11.915
298.6  -201.8  14377  35.81 51.73  9.55   0.13  0.44    9.40  0.00  0.21  0.00   34.95 51.08  9.47   7.356  127.9  11.936
299.2  -202.4  15237  35.18 50.90 10.18   0.13  0.44    9.40  0.00  0.21  0.00   34.34 50.25 10.10   7.377  127.9  11.958
299.9  -203.1  15722  34.56 50.11 10.60   0.13  0.44    9.40  0.00  0.21  0.00   33.72 49.46 10.51   7.397  127.9  11.980
300.5  -203.7   2161  35.50 55.07  8.40   0.13  0.44    9.40  0.00  0.21  0.00   34.46 54.42  8.53   7.418  131.0  12.002
301.2  -204.4   4167  38.84 53.71 11.28   0.13  0.44    9.40  0.00  0.21  0.00   38.03 53.07 11.19   7.439  127.9  12.024
301.8  -205.1   4013  32.78 44.27 11.95   0.13  0.44    9.40  0.00  0.21  0.00   32.16 43.62 11.87   7.458  127.9  12.045
302.5  -205.7   6262  30.64 42.54 13.57   0.13  0.44    9.40  0.00  0.21  0.00   29.99 41.90 13.49   7.479  127.9  12.067
302.8  -206.0  40352  52.93 79.66  6.31   0.13  0.44    9.40  0.00  0.21  0.00   51.54 79.01  6.43   7.490  131.0  12.078
305.8  -209.0   8555  37.69 81.54  2.04   0.13  0.44    9.40  0.00  0.21  0.00   35.44 80.89  2.16   7.582  131.0  12.179
306.4  -209.6   8445  33.56 47.76  6.50   0.13  0.44    9.40  0.00  0.21  0.00   32.80 47.12  6.63   7.602  127.9  12.201
307.1  -210.3   8092  24.74 58.67  4.64   0.13  0.44    9.40  0.00  0.21  0.00   22.99 58.03  4.76   7.622  134.2  12.223
307.7  -211.0  14774  25.26 51.36  2.78   0.13  0.44    9.40  0.00  0.21  0.00   23.91 50.72  2.90   7.643  131.0  12.247
308.4  -211.6  12392  35.08 60.55 12.53   0.13  0.44    9.40  0.00  0.21  0.00   33.75 59.90 12.44   7.664  131.0  12.269
309.7  -212.9   5380  34.19 63.27  7.19   0.13  0.44    9.40  0.00  0.21  0.00   32.68 62.62  7.32   7.705  131.0  12.314
310.4  -213.6   9526  38.84 60.55  8.63   0.13  0.44    9.40  0.00  0.21  0.00   37.70 59.90  8.76   7.725  131.0  12.337
311.0  -214.2   8577  48.39 64.10 20.67   0.13  0.44    9.40  0.00  0.21  0.00   47.54 63.45 20.59   7.745  127.9  12.359
311.7  -214.9   6902  48.86 65.77 21.66   0.13  0.44    9.40  0.00  0.21  0.00   47.96 65.12 21.58   7.766  127.9  12.381
312.3  -215.5   7740  49.07 66.09 22.97   0.13  0.44    9.40  0.00  0.21  0.00   48.16 65.44 22.88   7.786  127.9  12.402
313.0  -216.2   8908  50.84 68.38 24.27   0.13  0.44    9.40  0.00  0.21  0.00   49.91 67.73 24.19   7.807  127.9  12.424
313.6  -216.9   9724  51.31 68.07 26.94   0.13  0.44    9.40  0.00  0.21  0.00   50.41 67.42 26.85   7.828  127.9  12.444
314.3  -217.5  11466  39.36 58.05  8.35   0.13  0.44    9.40  0.00  0.21  0.00   38.37 57.40  8.48   7.848  131.0  12.467
315.0  -218.2  12326  33.41 48.44  7.82   0.13  0.44    9.40  0.00  0.21  0.00   32.60 47.79  7.94   7.869  131.0  12.489
315.6  -218.8  19669  30.02 60.55  5.47   0.13  0.44    9.40  0.00  0.21  0.00   28.43 59.90  5.60   7.888  131.0  12.512
316.3  -219.5  25468  30.07 63.58  5.66   0.13  0.44    9.40  0.00  0.21  0.00   28.33 62.93  5.78   7.909  131.0  12.534
316.9  -220.1  22028  30.48 56.12  4.92   0.13  0.44    9.40  0.00  0.21  0.00   29.15 55.47  5.04   7.930  131.0  12.557
317.6  -220.8  17001  34.09 63.06  5.83   0.13  0.44    9.40  0.00  0.21  0.00   32.58 62.41  5.95   7.950  131.0  12.579
318.2  -221.5  18875  32.16 61.49  4.66   0.13  0.44    9.40  0.00  0.21  0.00   30.63 60.84  4.78   7.971  131.0  12.602
318.9  -222.1  19669  34.24 60.45  5.49   0.13  0.44    9.40  0.00  0.21  0.00   32.88 59.80  5.62   7.992  131.0  12.625
319.5  -222.8  20330  26.88 48.39  4.58   0.13  0.44    9.40  0.00  0.21  0.00   25.76 47.74  4.71   8.012  131.0  12.647
320.2  -223.4  28290  24.01 72.66  6.53   0.13  0.44    9.40  0.00  0.21  0.00   21.53 72.02  6.65   8.033  134.2  12.670
320.9  -224.1  12061  40.09 89.05  8.25   0.13  0.44    9.40  0.00  0.21  0.00   37.58 88.41  8.37   8.052  131.0  12.693
321.5  -224.7  23968  45.83 92.29 11.69   0.13  0.44    9.40  0.00  0.21  0.00   43.45 91.64 11.61   8.073  131.0  12.716
321.8  -225.1  39911  45.73 94.90 12.95   0.13  0.44    9.40  0.00  0.21  0.00   43.21 94.25 12.86   8.084  131.0  12.727
324.1  -227.4   4101  35.08 56.01  5.68   0.13  0.44    9.40  0.00  0.21  0.00   33.97 55.36  5.80   8.156  131.0  12.806
324.8  -228.0   5490  43.12 56.74  8.06   0.13  0.44    9.40  0.00  0.21  0.00   42.38 56.09  8.18   8.176  127.9  12.828
325.5  -228.7   6505  44.84 62.01  8.04   0.13  0.44    9.40  0.00  0.21  0.00   43.92 61.37  8.16   8.196  127.9  12.850
326.1  -229.3   8247  42.18 58.46  9.25   0.13  0.44    9.40  0.00  0.21  0.00   41.31 57.82  9.38   8.216  127.9  12.871
326.8  -230.0   9063  45.21 61.60 10.91   0.13  0.44    9.40  0.00  0.21  0.00   44.33 60.95 10.83   8.237  127.9  12.892
327.4  -230.6  10099  41.55 57.11 11.69   0.13  0.44    9.40  0.00  0.21  0.00   40.72 56.46 11.61   8.258  127.9  12.914
328.1  -231.3  13428  34.66 60.76  6.59   0.13  0.44    9.40  0.00  0.21  0.00   33.30 60.11  6.71   8.278  131.0  12.936
328.7  -232.0  14487  41.50 54.71 16.29   0.13  0.44    9.40  0.00  0.21  0.00   40.78 54.06 16.20   8.299  127.9  12.958
329.4  -232.6   9349  40.51 53.66 16.44   0.13  0.44    9.40  0.00  0.21  0.00   39.80 53.01 16.36   8.320  127.9  12.980
330.0  -233.3  10782  32.99 48.75 15.29   0.13  0.44    9.40  0.00  0.21  0.00   32.14 48.11 15.21   8.339  131.0  13.002
330.7  -233.9  13428  35.39 60.34  4.36   0.13  0.44    9.40  0.00  0.21  0.00   34.09 59.70  4.49   8.360  131.0  13.024
331.4  -234.6  16273  32.52 51.89  3.37   0.13  0.44    9.40  0.00  0.21  0.00   31.50 51.24  3.50   8.380  131.0  13.047
332.0  -235.2  18081  34.19 49.69  5.37   0.13  0.44    9.40  0.00  0.21  0.00   33.36 49.05  5.49   8.401  131.0  13.070
332.7  -235.9  19206  30.75 57.11  2.81   0.13  0.44    9.40  0.00  0.21  0.00   29.37 56.46  2.93   8.422  131.0  13.092
333.3  -236.5  20043  32.89 47.61  2.53   0.13  0.44    9.40  0.00  0.21  0.00   32.09 46.96  2.65   8.442  131.0  13.115
334.0  -237.2  24542  27.72 62.85  3.98   0.13  0.44    9.40  0.00  0.21  0.00   25.90 62.20  4.10   8.463  134.2  13.138
334.6  -237.9  27364  31.32 56.06  4.17   0.13  0.44    9.40  0.00  0.21  0.00   30.03 55.42  4.29   8.484  131.0  13.161
335.3  -238.5   7210  40.09 54.65 18.64   0.13  0.44    9.40  0.00  0.21  0.00   39.31 54.01 18.55   8.503  127.9  13.183
336.0  -239.2   7629  42.02 57.32 19.05   0.13  0.44    9.40  0.00  0.21  0.00   41.20 56.67 18.97   8.524  127.9  13.205
336.6  -239.8   8313  41.19 57.99 19.21   0.13  0.44    9.40  0.00  0.21  0.00   40.29 57.35 19.13   8.544  127.9  13.225
337.3  -240.5   9129  41.92 57.79 18.17   0.13  0.44    9.40  0.00  0.21  0.00   41.07 57.14 18.08   8.565  127.9  13.247
337.9  -241.1  11400  41.08 57.89 14.62   0.13  0.44    9.40  0.00  0.21  0.00   40.18 57.24 14.53   8.586  127.9  13.268
338.6  -241.8  12061  41.86 58.26 16.76   0.13  0.44    9.40  0.00  0.21  0.00   40.99 57.61 16.67   8.606  127.9  13.290
339.2  -242.5  12524  35.18 47.76 12.48   0.13  0.44    9.40  0.00  0.21  0.00   34.49 47.12 12.39   8.627  127.9  13.312
339.9  -243.1  12436  22.29 32.16  4.59   0.13  0.44    9.40  0.00  0.21  0.00   21.74 31.51  4.72   8.647  131.0  13.334
340.5  -243.8  13759  20.88 34.35  2.41   0.13  0.44    9.40  0.00  0.21  0.00   20.15 33.70  2.54   8.667  131.0  13.356
341.2  -244.4  21433  24.22 48.55  1.60   0.13  0.44    9.40  0.00  0.21  0.00   22.95 47.90  1.72   8.688  131.0  13.379
341.9  -245.1  17530  17.75 51.57  1.53   0.13  0.44    9.40  0.00  0.21  0.00   16.00 50.93  1.66   8.709  134.2  13.402
342.5  -245.7  23461  19.52 57.32  2.21   0.13  0.44    9.40  0.00  0.21  0.00   17.58 56.67  2.34   8.729  134.2  13.426
343.2  -246.4  22976  20.62 51.68  2.70   0.13  0.44    9.40  0.00  0.21  0.00   19.01 51.03  2.83   8.750  134.2  13.449
343.8  -247.0  22645  22.19 58.26  2.85   0.13  0.44    9.40  0.00  0.21  0.00   20.33 57.61  2.98   8.770  134.2  13.473
344.5  -247.7  24453  23.54 59.82  2.70   0.13  0.44    9.40  0.00  0.21  0.00   21.67 59.17  2.83   8.790  134.2  13.496
345.1  -248.4  23968  20.04 56.53  2.54   0.13  0.44    9.40  0.00  0.21  0.00   18.17 55.89  2.66   8.811  134.2  13.520
345.8  -249.0  24079  25.47 60.13  2.87   0.13  0.44    9.40  0.00  0.21  0.00   23.69 59.49  3.00   8.831  134.2  13.543
346.5  -249.7  22557  22.76 59.09  2.78   0.13  0.44    9.40  0.00  0.21  0.00   20.89 58.44  2.90   8.852  134.2  13.567
```

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)       SNDG. NO. : DMT-301
In-Situ Soil Testing, L.C.                                                             Page 2
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                       FILE NO. :2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                SNDG. DATE: 11/20/08
ANAL.BY : Roger Failmezger, P.E.                                                       ANAL. DATE: 12/15/08

ANALYSIS PARAMETERS:   LO RANGE   =  9.40 TSF  ROD DIAM.   =  1.73 IN    BL.THICK.  =  0.59 IN    SU  FACTOR = 1
SURF.ELEV.  =  97.0 FT LO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  2.01 IN       BL.WIDTH   =  3.78 IN    PHI FACTOR = 1
WATER DEPTH =  63.0 FT HI  GAGE 0 =  0.21 TSF  LIN.ROD WT. =   5.4 LBF/FTDELTA-A    =  0.13 TSF    OCR FACTOR = 1
SP.GR.WATER = 1.000     CAL GAGE 0 =  0.00 TSF;
                                                DELTA / PHI =   0.5       DELTA - B =  0.44 TSF    M FACTOR = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.8      OCR OPTION =     0       K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z    ELEV    KD    ID    UD    ED      K0      SU     QD      PHI   SIGFF   PHIO    PC     OCR      M      SOIL TYPE
(FT)   (FT)                    (TSF)           (TSF)  (TSF)   (DEG)  (TSF)   (DEG)  (TSF)           (TSF)
***** ******  ***** ***** ***** ******  *****  *****  *****   *****  ******  *****  *****  *****  ******  ************
295.9  -199.1  2.46  0.52  0.05    523   0.66   3.37                                16.36    1.4     556  SILTY CLAY
296.6  -199.8  2.58  0.73 -0.18    775   0.69                                       17.64    1.5     869  CLAYEY SILT
297.2  -200.5  2.50  0.53  0.03    548   0.67   3.46                                16.81    1.4     591  SILTY CLAY
297.9  -201.1  2.45  0.49  0.05    493   0.66   3.38                                16.38    1.4     522  SILTY CLAY
298.6  -201.8  2.31  0.58  0.08    560   0.63   3.15                                14.97    1.3     560  SILTY CLAY
299.2  -202.4  2.25  0.59  0.10    552   0.61   3.06                                14.42    1.2     538  SILTY CLAY
299.9  -203.1  2.20  0.60  0.12    546   0.60   2.96                                13.87    1.2     517  SILTY CLAY
300.5  -203.7  2.25  0.74  0.04    692   0.61                                       14.46    1.2     683  CLAYEY SILT
301.2  -204.4  2.54  0.49  0.12    522   0.68   3.57                                17.51    1.5     572  SILTY CLAY
301.8  -205.1  2.05  0.46  0.18    398   0.56   2.74                                12.52    1.0     349  SILTY CLAY
302.5  -205.7  1.87  0.53  0.27    413   0.51   2.43                                10.83    0.9     351  SILTY CLAY
302.8  -206.0  3.65  0.62 -0.02    953   0.92                                       30.83    2.6    1399  CLAYEY SILT
305.8  -209.0  2.29  1.63 -0.19   1577   0.62                                       15.01    1.2    1714  SANDY SILT
306.4  -209.6  2.07  0.57 -0.04    497   0.56   2.80                                12.83    1.1     438  SILTY CLAY
307.1  -210.3  1.26  2.28 -0.19   1215   0.69          121.4   23.4    17.08  27.2  18.49    1.5    1034  SILTY SAND
307.7  -211.0  1.33  1.65 -0.29    930   0.34                                        6.46    0.5     791  SANDY SILT
308.4  -211.6  2.13  1.00  0.18    907   0.58                                       13.50    1.1     865  SILT
309.7  -212.9  2.03  1.20 -0.02   1039   0.55                                       12.59    1.0     963  SILT
310.4  -213.6  2.43  0.74  0.03    770   0.65                                       16.71    1.4     820  CLAYEY SILT
311.0  -214.2  3.22  0.40  0.32    552   0.83   4.93                                25.99    2.1     739  SILTY CLAY
311.7  -214.9  3.25  0.43  0.34    596   0.84   4.99                                26.36    2.1     803  SILTY CLAY
312.3  -215.5  3.26  0.43  0.37    599   0.84   5.02                                26.52    2.1     809  SILTY CLAY
313.0  -216.2  3.39  0.42  0.39    618   0.87   5.28                                28.28    2.3     860  SILTY CLAY
313.6  -216.9  3.42  0.40  0.45    590   0.87   5.36                                28.77    2.3     827  SILTY CLAY
314.3  -217.5  2.45  0.62  0.02    661   0.66                                       17.09    1.4     699  CLAYEY SILT
315.0  -218.2  1.98  0.61  0.00    527   0.54                                       12.30    1.0     448  CLAYEY SILT
315.6  -218.8  1.64  1.53 -0.11   1092   0.44                                        9.20    0.7     928  SANDY SILT
316.3  -219.5  1.63  1.69 -0.10   1201   0.44                                        9.10    0.7    1020  SANDY SILT
316.9  -220.1  1.69  1.24 -0.14    914   0.46                                        9.66    0.8     777  SANDY SILT
317.6  -220.8  1.96  1.21 -0.08   1035   0.53                                       12.17    1.0     925  SANDY SILT
318.2  -221.5  1.80  1.33 -0.14   1048   0.49                                       10.68    0.8     892  SANDY SILT
318.9  -222.1  1.97  1.08 -0.10    934   0.54                                       12.34    1.0     828  SILT
319.5  -222.8  1.40  1.24 -0.19    763   0.37                                        7.28    0.6     648  SANDY SILT
320.2  -223.4  1.06  3.74 -0.10   1752   0.41          455.3   34.1    19.76  37.4  10.22    0.8    1489  SAND
320.9  -224.1  2.33  1.72  0.01   1763   0.63                                       16.07    1.3    1961  SANDY SILT
321.5  -224.7  2.78  1.36  0.10   1672   0.74                                       21.29    1.7    2094  SANDY SILT
321.8  -225.1  2.76  1.45  0.14   1771   0.73                                       21.04    1.7    2217  SANDY SILT
324.1  -227.4  2.02  0.83 -0.09    742   0.55                                       12.97    1.0     655  CLAYEY SILT
324.8  -228.0  2.67  0.40  0.00    476   0.71   4.04                                20.09    1.6     545  SILTY CLAY
325.5  -228.7  2.78  0.49  0.00    606   0.74   4.27                                21.49    1.7     719  SILTY CLAY
326.1  -229.3  2.57  0.50  0.04    573   0.69   3.87                                19.04    1.5     635  SILTY CLAY
326.8  -230.0  2.80  0.46  0.07    576   0.74   4.32                                21.79    1.7     689  SILTY CLAY
327.4  -230.6  2.51  0.48  0.10    546   0.67   3.78                                18.45    1.4     593  SILTY CLAY
328.1  -231.3  1.93  1.07 -0.06    930   0.53                                       12.28    0.9     806  SILT
328.7  -232.0  2.51  0.41  0.24    460   0.67   3.78                                18.44    1.4     498  SILTY CLAY
329.4  -232.6  2.42  0.42  0.26    458   0.65   3.63                                17.53    1.4     480  SILTY CLAY
330.0  -233.3  1.83  0.67  0.29    553   0.50                                       11.33    0.9     471  CLAYEY SILT
330.7  -233.9  1.98  1.00 -0.15    888   0.54                                       12.78    1.0     782  SILT
331.4  -234.6  1.77  0.85 -0.21    685   0.48                                       10.79    0.8     583  CLAYEY SILT
332.0  -235.2  1.91  0.63 -0.12    544   0.52                                       12.16    0.9     462  CLAYEY SILT
332.7  -235.9  1.60  1.29 -0.26    940   0.43                                        9.25    0.7     799  SANDY SILT
333.3  -236.5  1.80  0.63 -0.24    516   0.49                                       11.16    0.9     438  CLAYEY SILT
334.0  -237.2  1.33  2.08 -0.25   1259   0.48          380.1   32.3    20.16  35.8  13.83    1.1    1070  SILTY SAND
334.6  -237.9  1.64  1.18 -0.19    881   0.44                                        9.63    0.7     749  SILT
335.3  -238.5  2.34  0.48  0.33    511   0.63   3.52                                16.80    1.3     515  SILTY CLAY
336.0  -239.2  2.47  0.47  0.32    537   0.67   3.79                                18.41    1.4     573  SILTY CLAY
336.6  -239.8  2.40  0.54  0.33    592   0.65   3.65                                17.58    1.3     614  SILTY CLAY
337.3  -240.5  2.45  0.49  0.29    557   0.66   3.76                                18.22    1.4     591  SILTY CLAY
337.9  -241.1  2.38  0.54  0.19    592   0.64   3.63                                17.42    1.3     610  SILTY CLAY
338.6  -241.8  2.44  0.51  0.25    576   0.66   3.74                                18.08    1.4     608  SILTY CLAY
339.2  -242.5  1.94  0.49  0.15    437   0.53   2.83                                12.73    1.0     372  SILTY CLAY
339.9  -243.1  0.98  0.75 -0.30    339   0.22                                        4.40    0.3     288  CLAYEY SILT
340.5  -243.8  0.86  1.18 -0.53    470   0.17                                        3.58    0.3     400  SILT
341.2  -244.4  1.07  1.75 -0.49    865   0.25                                        5.01    0.4     736  SANDY SILT
341.9  -245.1  0.54  4.79 -0.97   1212   0.43          300.9   30.5    20.20  34.1   9.70    0.7    1030  SAND
342.5  -245.7  0.66  4.42 -0.72   1356   0.39          394.4   32.6    20.67  36.2   8.98    0.7    1153  SAND
343.2  -246.4  0.76  3.12 -0.58   1111   0.41          381.2   32.3    20.64  35.9   9.87    0.7     945  SILTY SAND
343.8  -247.0  0.86  3.23 -0.50   1294   0.43          371.1   32.1    20.63  35.6  10.70    0.8    1099  SILTY SAND
344.5  -247.7  0.95  2.91 -0.46   1301   0.43          396.3   32.5    20.75  36.1  11.13    0.8    1106  SILTY SAND
345.1  -248.4  0.69  4.03 -0.66   1309   0.39          401.3   32.7    20.83  36.2   9.22    0.7    1113  SAND
345.8  -249.0  1.10  2.41 -0.39   1242   0.45          383.1   32.2    20.77  35.8  12.45    0.9    1055  SILTY SAND
346.5  -249.7  0.89  3.12 -0.49   1303   0.43          368.1   31.9    20.74  35.5  11.08    0.8    1108  SILTY SAND
```

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)       SNDG. NO. :DMT-301
In-Situ Soil Testing, L.C.                                                             Page 2a
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                       FILE NO. : 2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                SNDG. DATE: 11/20/08
ANAL.BY : Roger Failmezger, P.E.                                                       ANAL. DATE: 12/15/08

ANALYSIS PARAMETERS:   LO RANGE   =  9.81 TSF  ROD DIAM.   =  0.68 IN    BL.THICK.  =  0.02 IN     SU  FACTOR = 1
SURF.ELEV.  =  97.0 FT LO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  0.79 IN  BL.WIDTH   =  0.15 IN   PHI FACTOR = 1
WATER DEPTH =  63.0 FT HI  GAGE 0 =  0.22 TSF  LIN.ROD WT. =   3.6 LBF/FTDELTA-A    =  0.14 TSF    OCR FACTOR = 1
SP.GR.WATER = 1.000    CAL GAGE 0 =  0.00 TSF  DELTA/PHI   =   0.5       DELTA-B    =  0.46 TSF    M  FACTOR  = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.8       OCR OPTION =     0        K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z    ELEV   THRUST    A     B     C     DA    DB    ZMRNG ZMLO  ZMHI  ZMCAL   P0    P1    P2     U0    GAMMA   SVP
(FT)  (FT)    (LBF)   (TSF) (TSF) (TSF)  (TSF) (TSF)  (TSF) (TSF) (TSF) (TSF)  (TSF) (TSF) (TSF)  (TSF)  (PCF)  (TSF)
***** ******  ******  ***** ***** *****  ***** *****  ***** ***** ***** *****  ***** ***** *****  ****** ****** ******
347.1  -250.3  18544  20.51 53.97  3.03   0.13  0.44   9.40  0.00  0.21  0.00  18.78 53.33  3.15   8.873  134.2  13.591
347.8  -251.0  16824  18.84 45.31  2.67   0.13  0.44   9.40  0.00  0.21  0.00  17.47 44.66  2.80   8.893  134.2  13.614
348.4  -251.6  15082  20.72 51.78  2.81   0.13  0.44   9.40  0.00  0.21  0.00  19.12 51.14  2.93   8.914  134.2  13.638
349.1  -252.3  14553  19.16 37.58  2.34   0.13  0.44   9.40  0.00  0.21  0.00  18.18 36.94  2.46   8.934  134.2  13.661
349.7  -252.9  12745  19.26 37.95  2.45   0.13  0.44   9.40  0.00  0.21  0.00  18.27 37.30  2.58   8.954  134.2  13.685
350.4  -253.6   9856  18.79 33.41  1.95   0.13  0.44   9.40  0.00  0.21  0.00  18.01 32.76  2.08   8.975  121.7  13.706
```

```
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)       SNDG. NO. : DMT-301
In-Situ Soil Testing, L.C.                                                             Page 2
JOB FILE: Calvert Cliffs Nuclear Power Plant 2008 Investigations                       FILE NO. :2008-48
LOCATION: Calvert County, Maryland
SNDG.BY : R. Failmezger                                                                SNDG. DATE: 11/20/08
ANAL.BY : Roger Failmezger, P.E.                                                       ANAL. DATE: 12/15/08

ANALYSIS PARAMETERS:   LO RANGE   =  9.81 TSF  ROD DIAM.   =  0.68 IN    BL.THICK.  =  0.02 IN    SU  FACTOR = 1
SURF.ELEV.  =  97.0 FT LO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  0.79 IN  BL.WIDTH   =  0.15 IN  PHI FACTOR = 1
WATER DEPTH =  63.0 FT HI  GAGE 0 =  0.22 TSF  LIN.ROD WT. =   3.6 LBF/FTDELTA-A    =  0.14 TSF    OCR FACTOR = 1
SP.GR.WATER = 1.000     CAL GAGE 0 =  0.00 TSF;
                                                DELTA / PHI =   0.5       DELTA - B =  0.46 TSF    M FACTOR = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.8       OCR OPTION =     0       K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT


  Z    ELEV    KD    ID    UD    ED      K0     SU     QD     PHI   SIGFF   PHIO    PC     OCR     M      SOIL TYPE
(FT)   (FT)                     (TSF)          (TSF)  (TSF)  (DEG)  (TSF)   (DEG)  (TSF)          (TSF)
***** ******  ***** ***** ***** ******  *****  *****  *****  *****  ******  *****  *****  *****  ******  ************
347.1  -250.3  0.73  3.48 -0.58   1199   0.45         309.2   30.6    20.50  34.2  11.09    0.8    1019  SAND
347.8  -251.0  0.63  3.17 -0.71    944   0.46         285.3   29.9    20.40  33.6  10.85    0.8     802  SILTY SAND
348.4  -251.6  0.75  3.14 -0.59   1111   0.50         251.3   28.8    20.21  32.6  12.48    0.9     945  SILTY SAND
349.1  -252.3  0.68  2.03 -0.70    650   0.50         245.7   28.6    20.20  32.4  12.07    0.9     553  SILTY SAND
349.7  -252.9  0.68  2.04 -0.68    661   0.52         215.9   27.5    20.00  31.4  12.77    0.9     562  SILTY SAND
350.4  -253.6  0.66  1.63 -0.76    512   0.08                                        2.42    0.2     435  SANDY SILT
```

PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

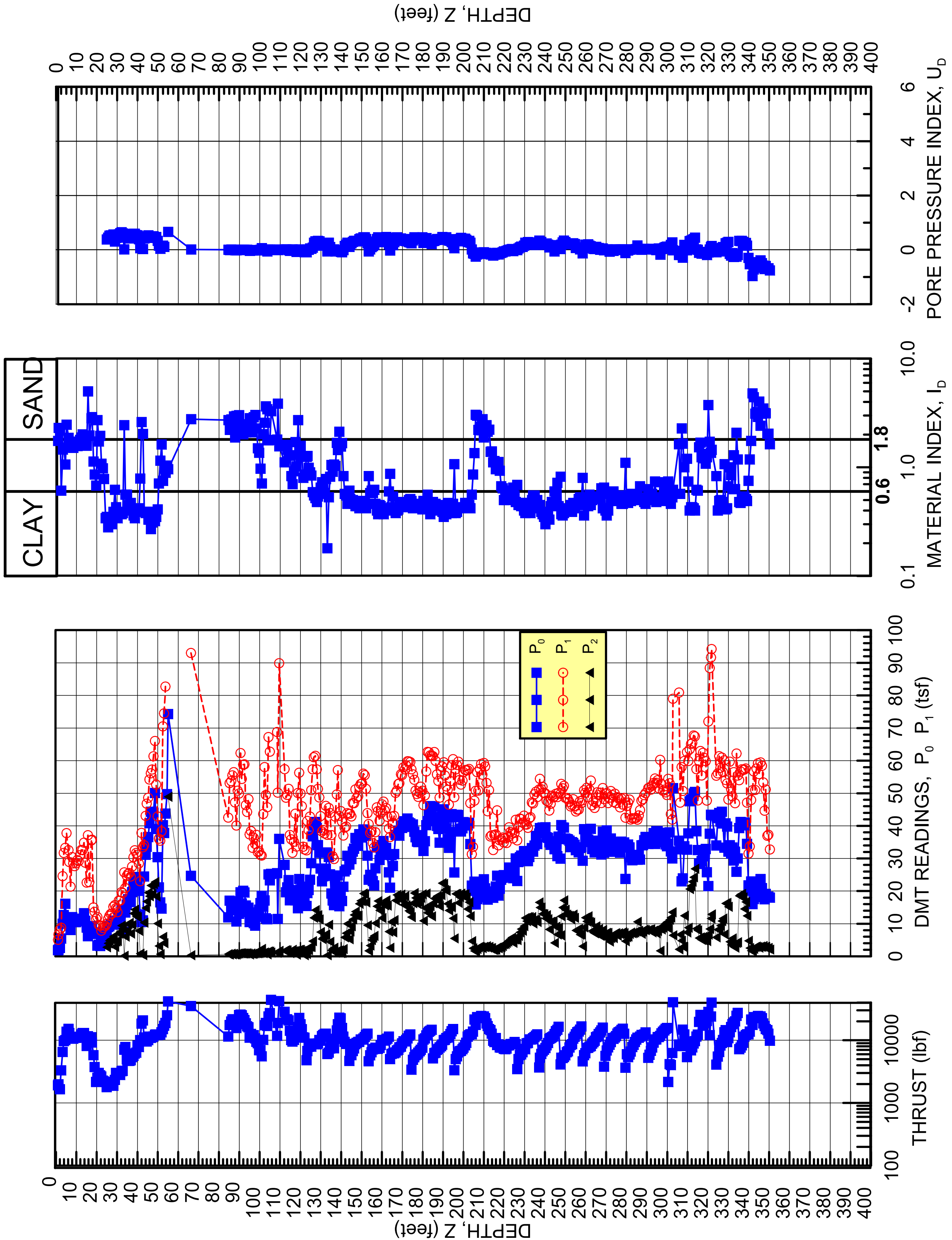
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11/20/08

SOUNDING

DMT-301

DILATOMETER RESULTS

Ground Surface Elev.: ~ 97.0 Ft
Water Depth: ~ 63.0 Ft



PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

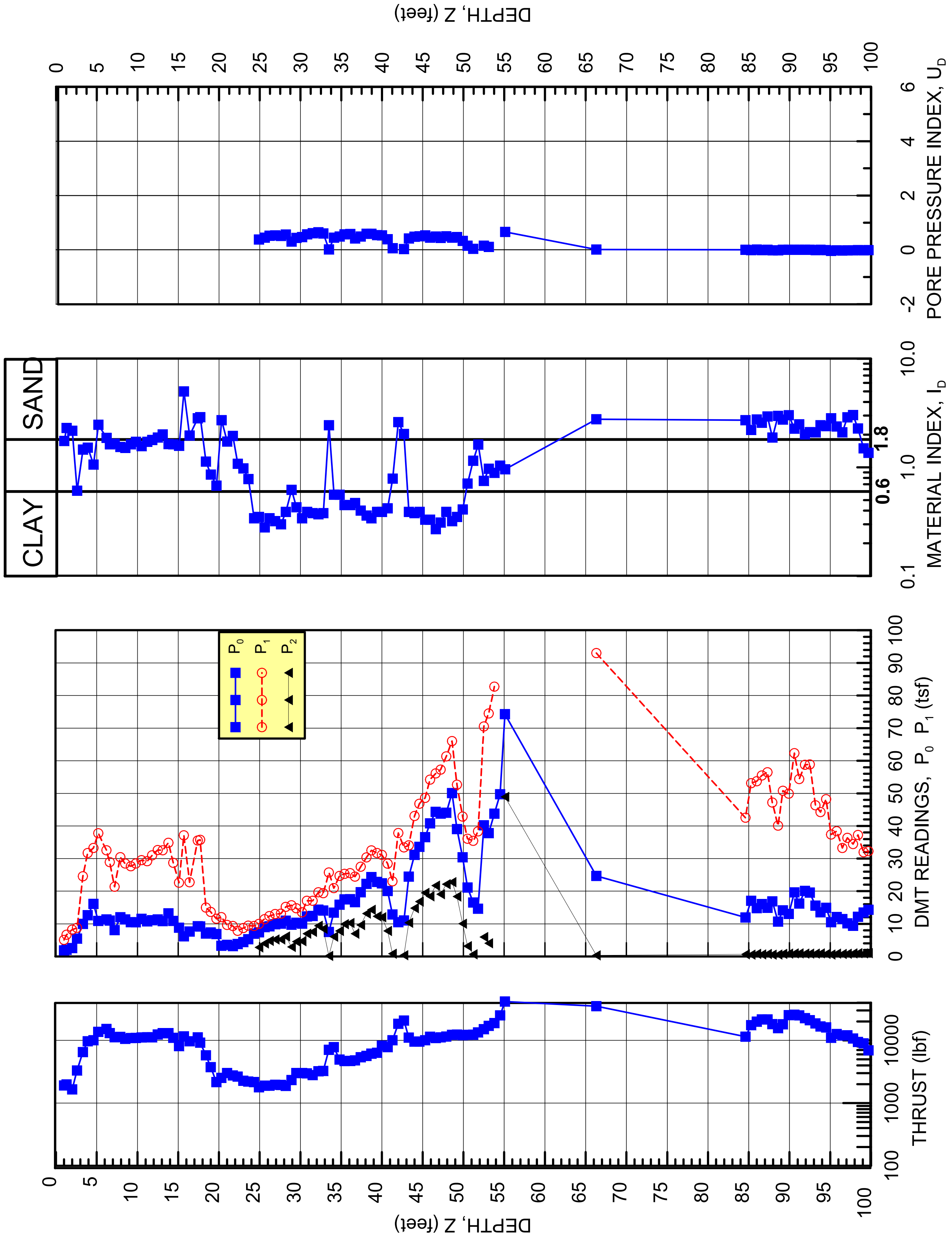
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11/20/08

SOUNDING

DMT-301

DILATOMETER RESULTS

Ground Surface Elev.: ~ 97.0 Ft
Water Depth: ~ 63.0 Ft



PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

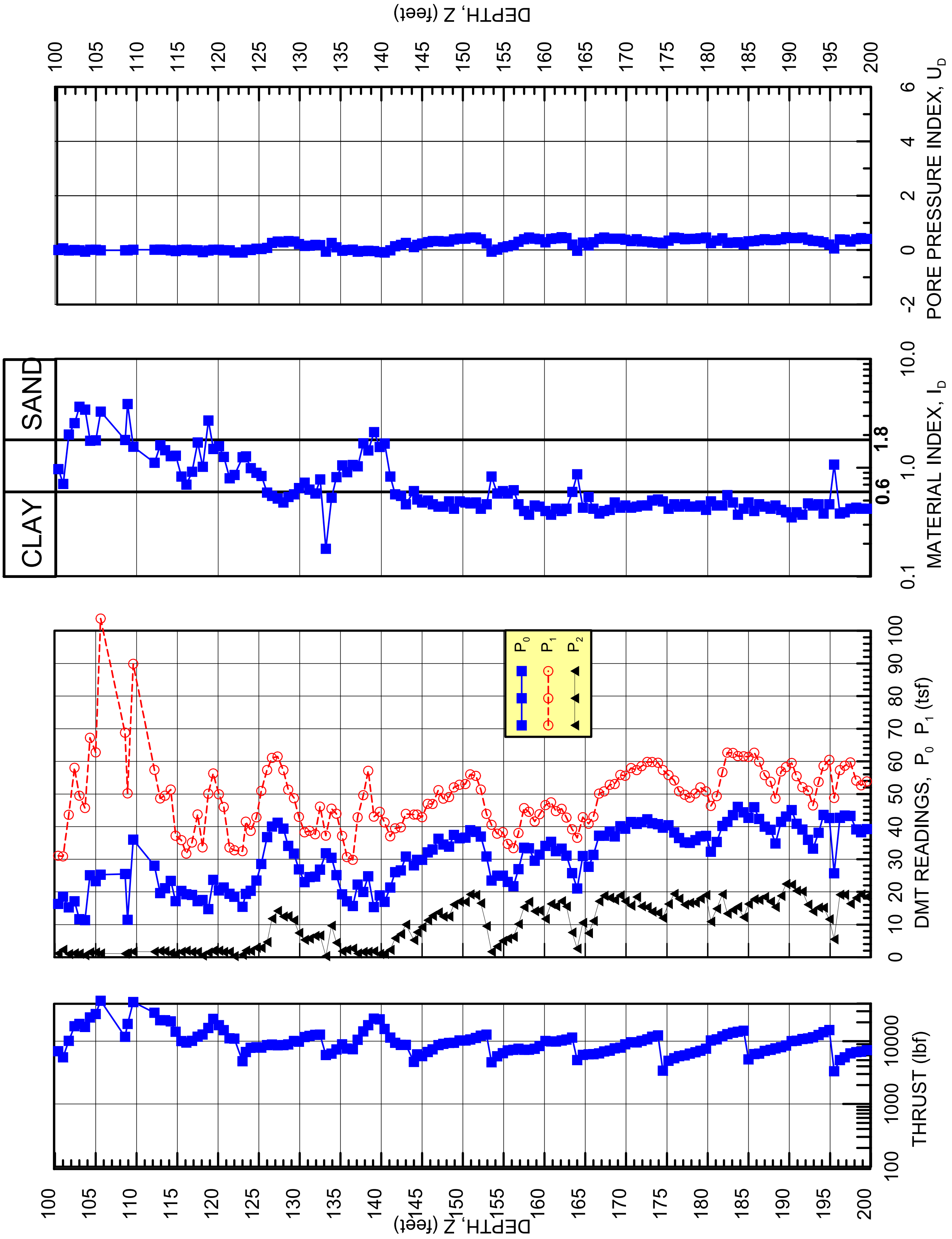
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11/20/08

SOUNDING

DMT-301

DILATOMETER RESULTS

Ground Surface Elev.: ~ 97.0 Ft
Water Depth: ~ 63.0 Ft



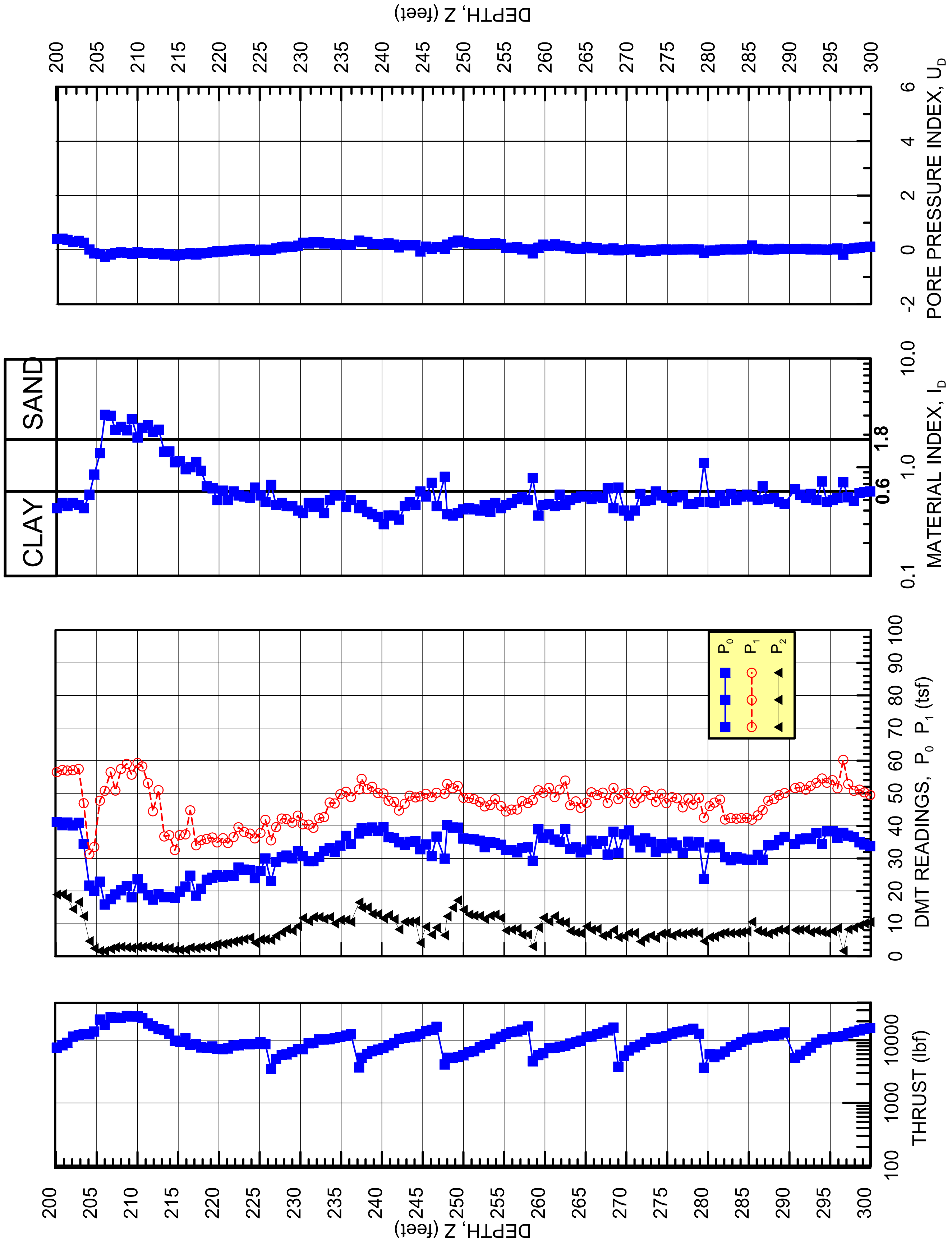
PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11/20/08

SOUNDING
DMT-301

DILATOMETER RESULTS

Ground Surface Elev.: ~ 97.0 Ft
Water Depth: ~ 63.0 Ft



PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

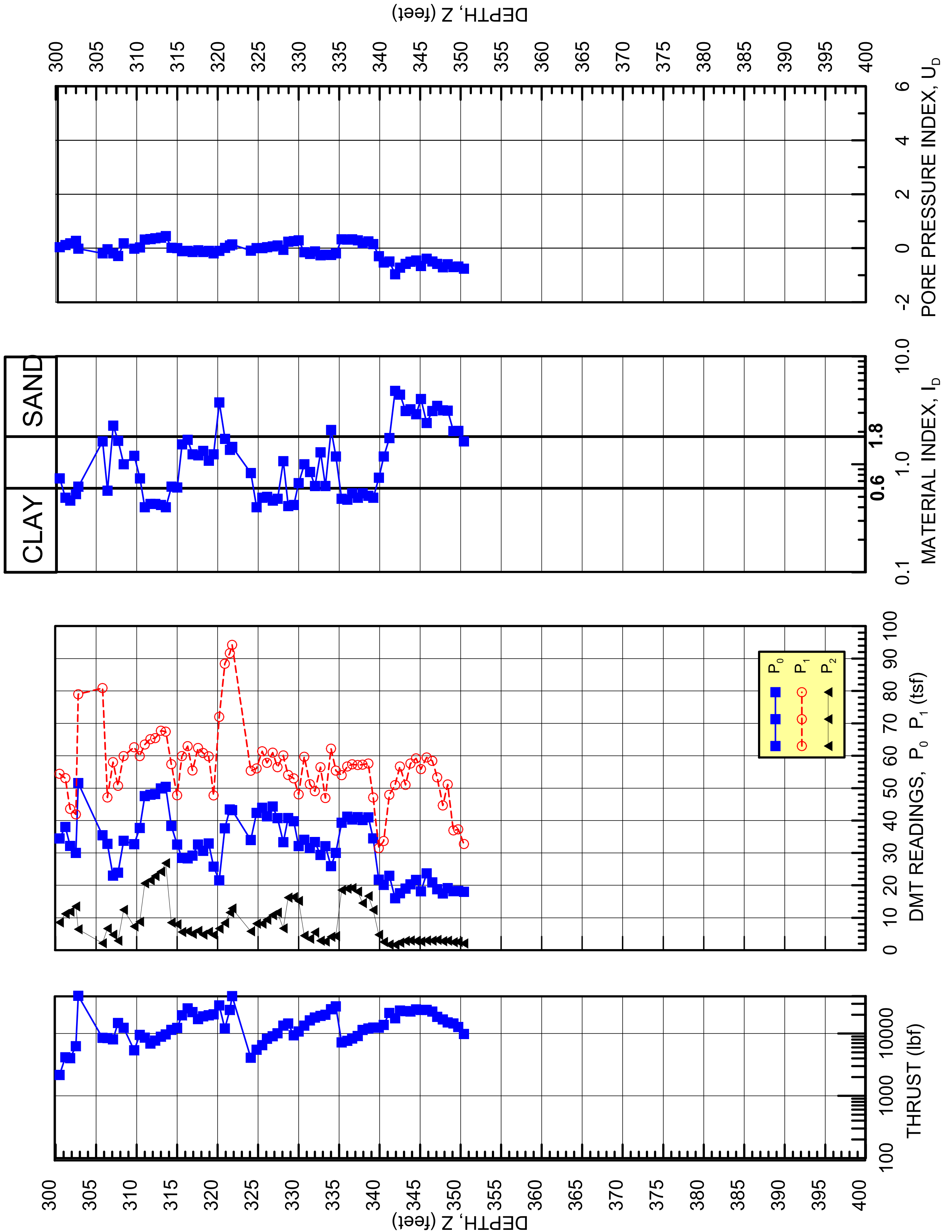
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11/20/08

SOUNDING

DMT-301

DILATOMETER RESULTS

Ground Surface Elev.: ~ 97.0 Ft
Water Depth: ~ 63.0 Ft

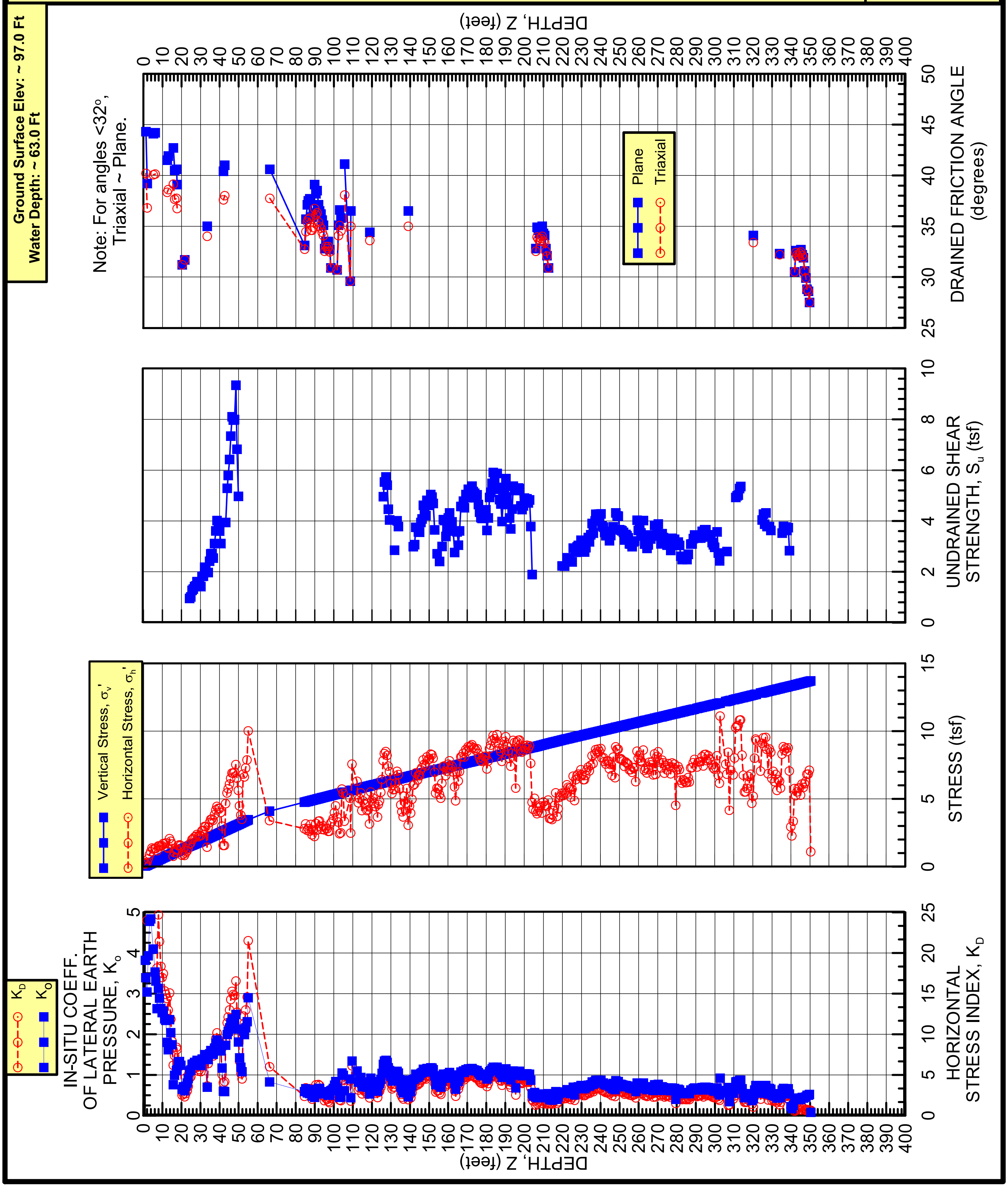


PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11/20/08

SOUNDING
DMT-301

INTERPRETED DMT STRENGTH PARAMETERS



Ground Surface Elev: ~ 97.0 Ft
Water Depth: ~ 63.0 Ft

Note: For angles <32°, Triaxial ~ Plane.

PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

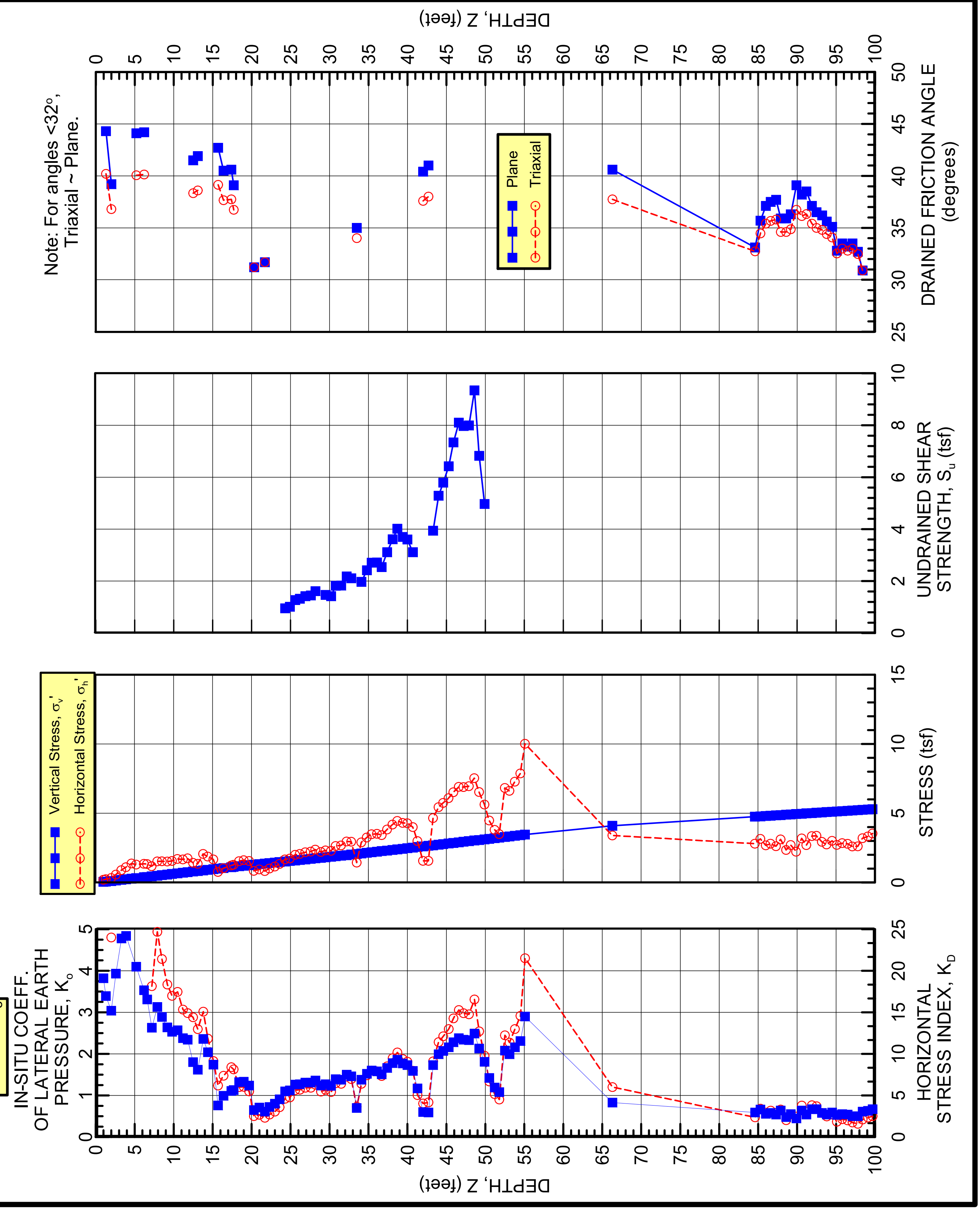
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11/20/08

SOUNDING

DMT-301

INTERPRETED DMT STRENGTH PARAMETERS

Ground Surface Elev: ~ 97.0 Ft
Water Depth: ~ 63.0 Ft

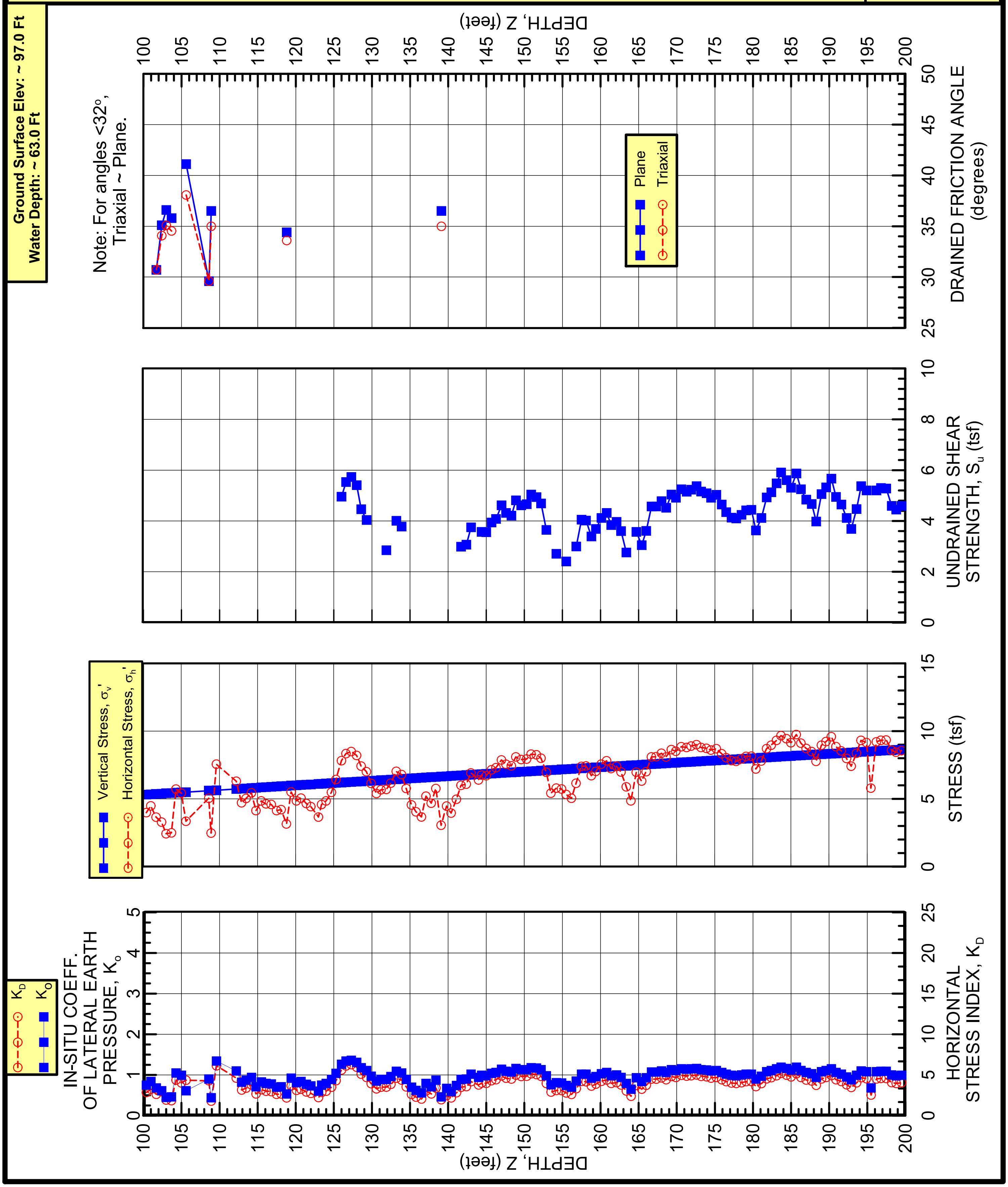


PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11/20/08

SOUNDING
DMT-301

INTERPRETED DMT STRENGTH PARAMETERS

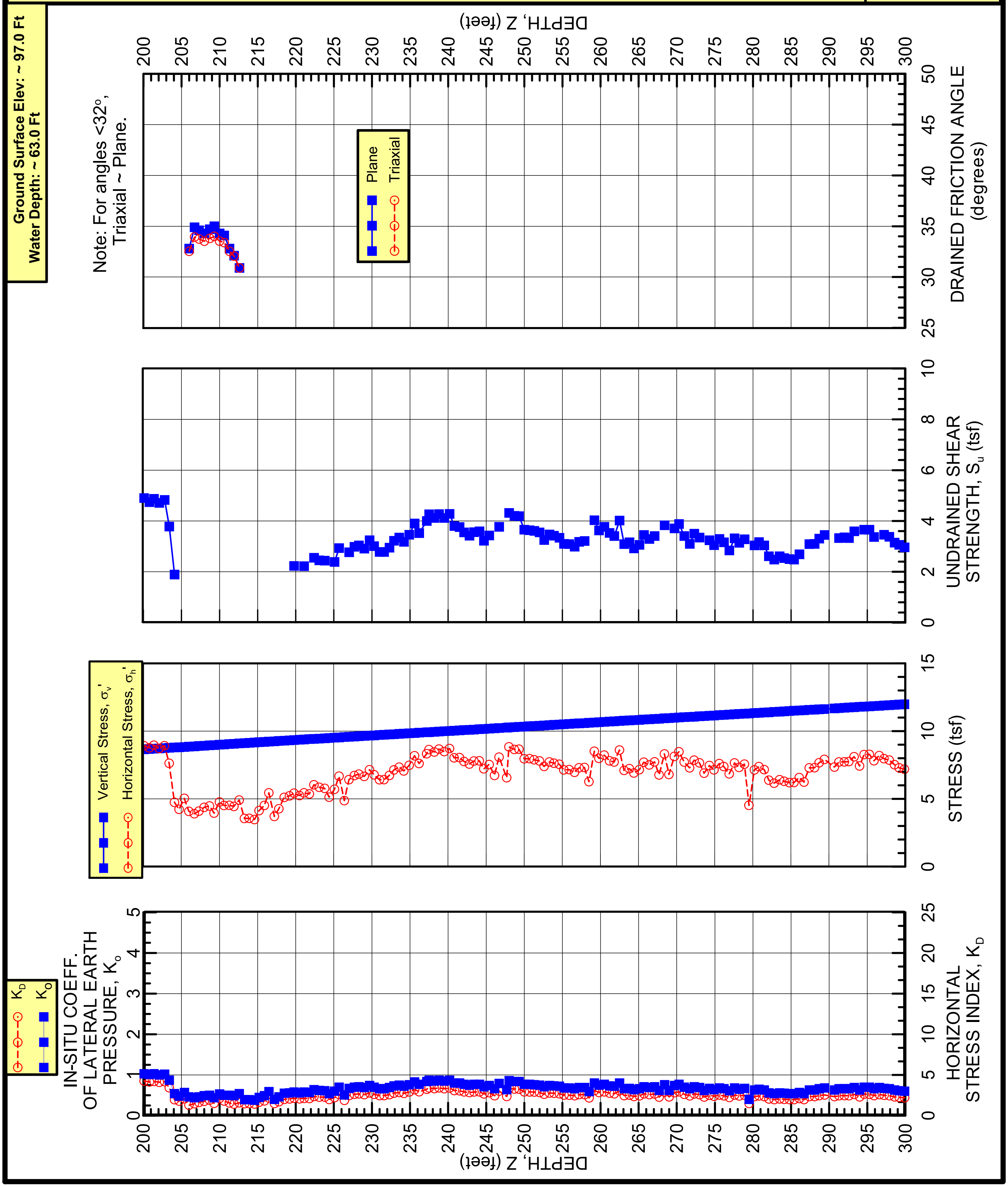


PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11/20/08

SOUNDING
DMT-301

INTERPRETED DMT STRENGTH PARAMETERS



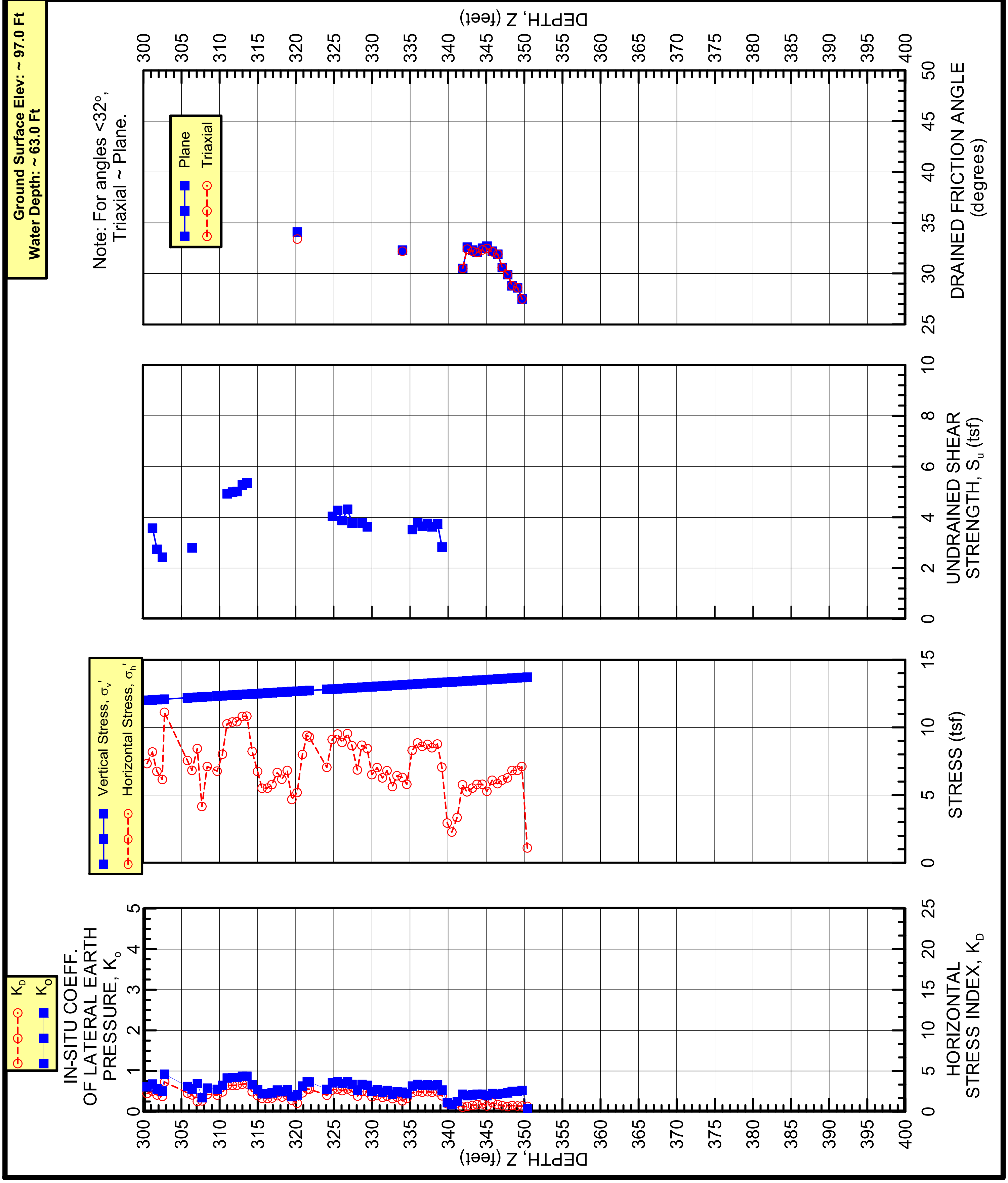
PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11/20/08

SOUNDING
DMT-301

INTERPRETED DMT STRENGTH PARAMETERS

Ground Surface Elev: ~ 97.0 Ft
Water Depth: ~ 63.0 Ft



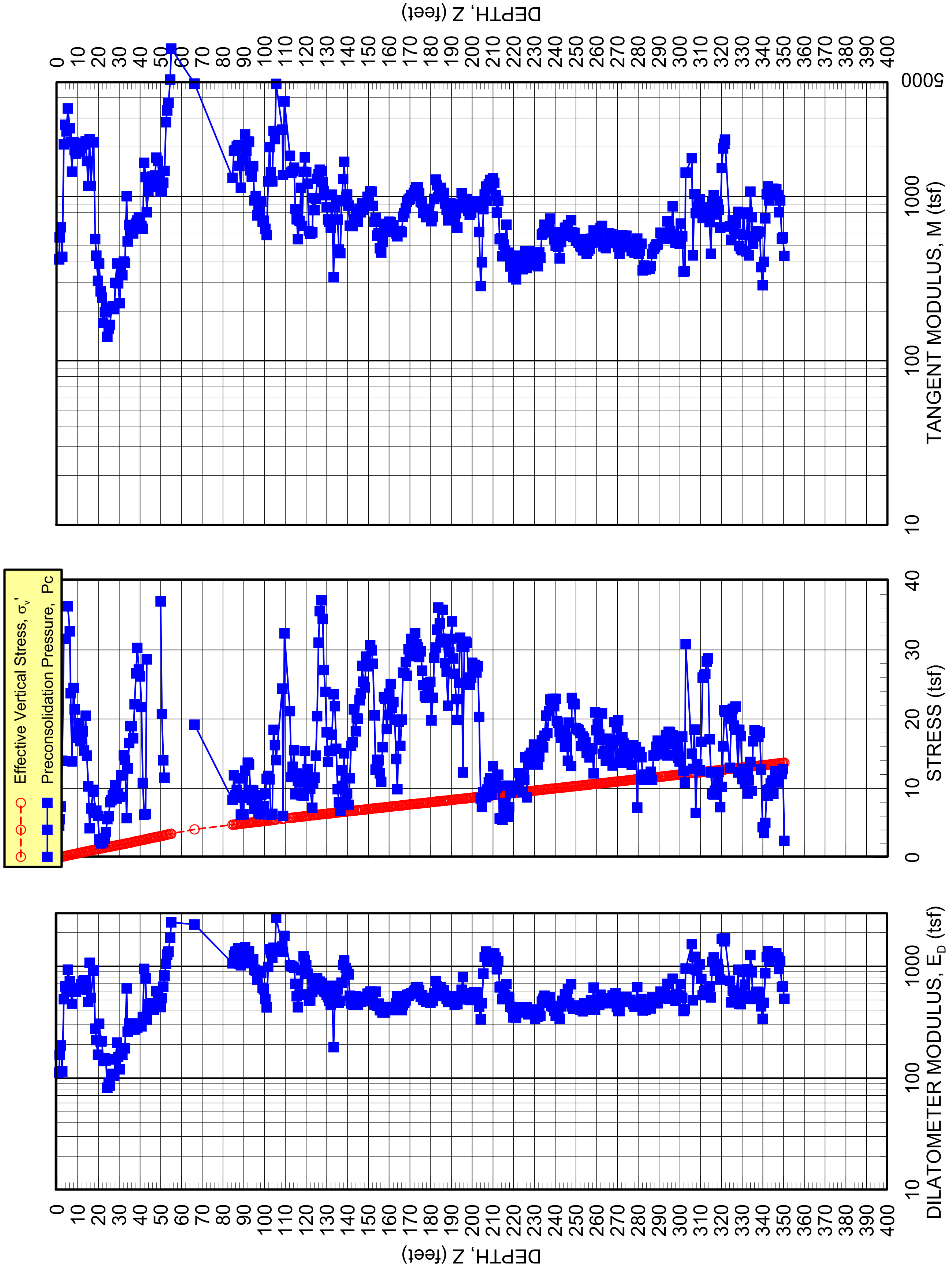
PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11/20/08

SOUNDING
DMT-301

INTERPRETED DMT DEFORMATION PARAMETERS

Ground Surface Elev.: ~ 97.0 Ft
Water Depth: ~ 63.0 Ft



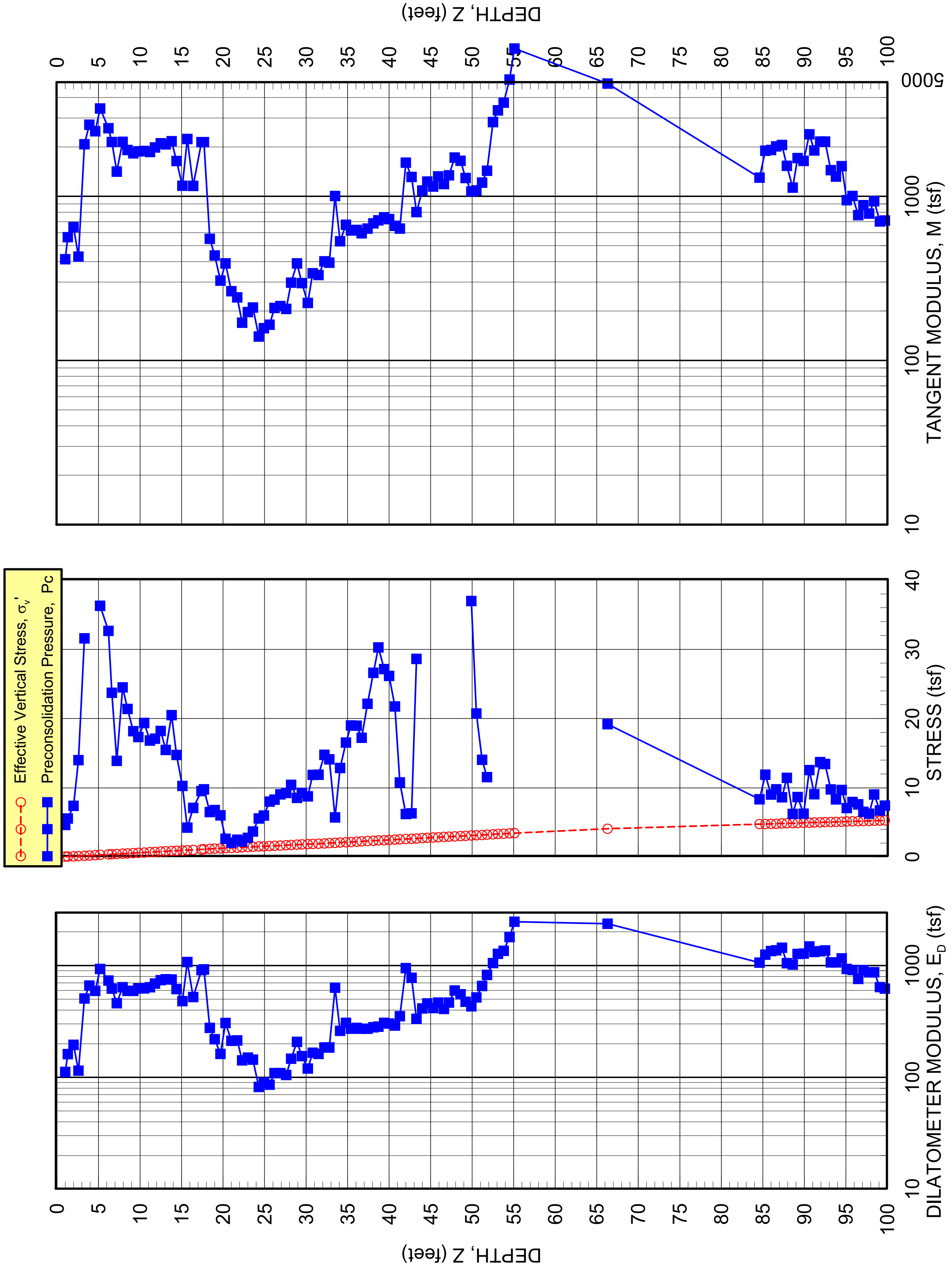
PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11/20/08

SOUNDING
DMT-301

INTERPRETED DMT DEFORMATION PARAMETERS

Ground Surface Elev.: ~ 97.0 Ft
Water Depth: ~ 63.0 Ft



PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

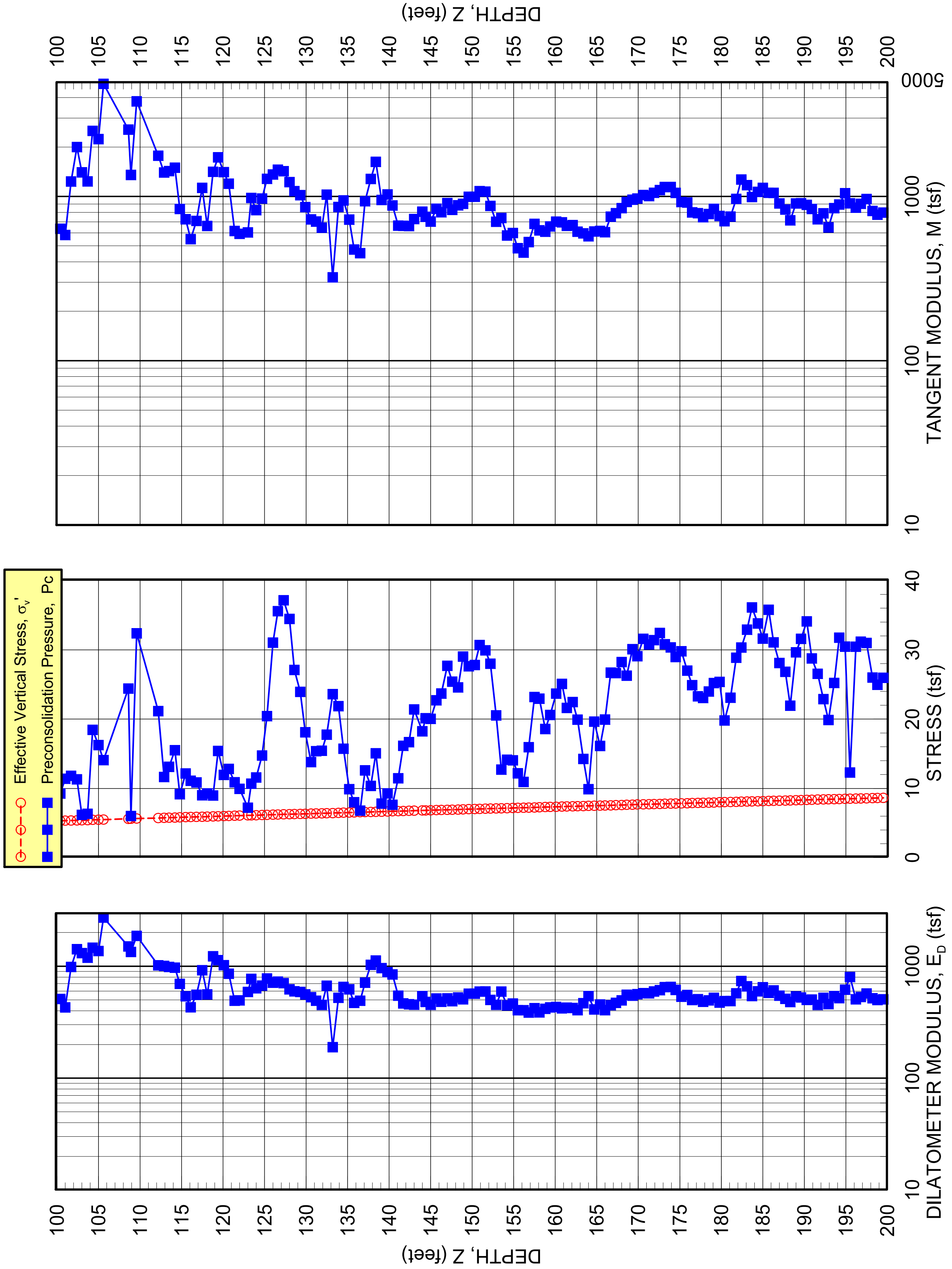
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11/20/08

SOUNDING

DMT-301

INTERPRETED DMT DEFORMATION PARAMETERS

Ground Surface Elev.: ~ 97.0 Ft
Water Depth: ~ 63.0 Ft



PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

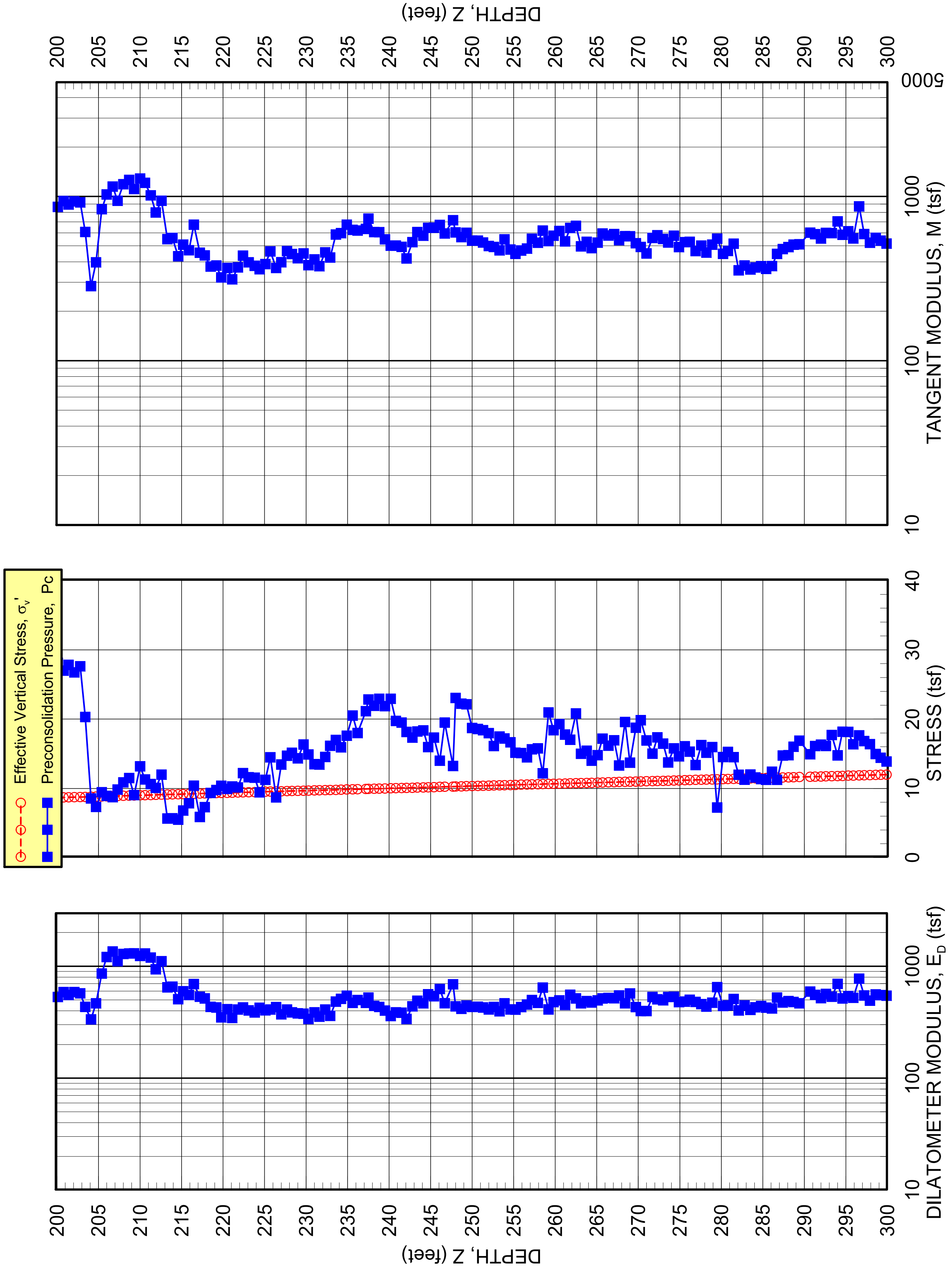
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11/20/08

SOUNDING

DMT-301

INTERPRETED DMT DEFORMATION PARAMETERS

Ground Surface Elev.: ~ 97.0 Ft
Water Depth: ~ 63.0 Ft



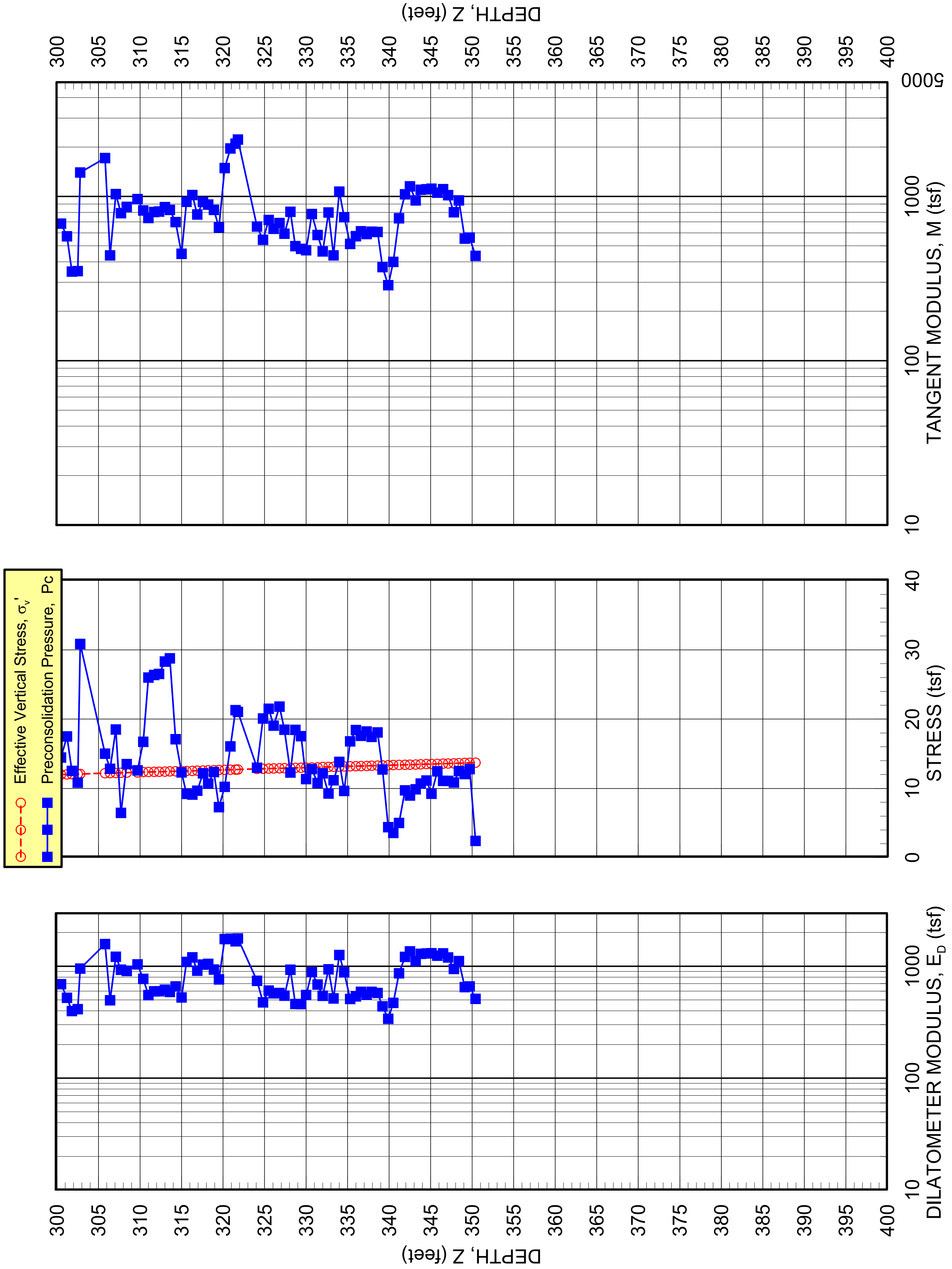
PROJECT: Calvert Cliffs NPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11/20/08

SOUNDING
DMT-301

INTERPRETED DMT DEFORMATION PARAMETERS

Ground Surface Elev.: ~ 97.0 Ft
Water Depth: ~ 63.0 Ft



PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

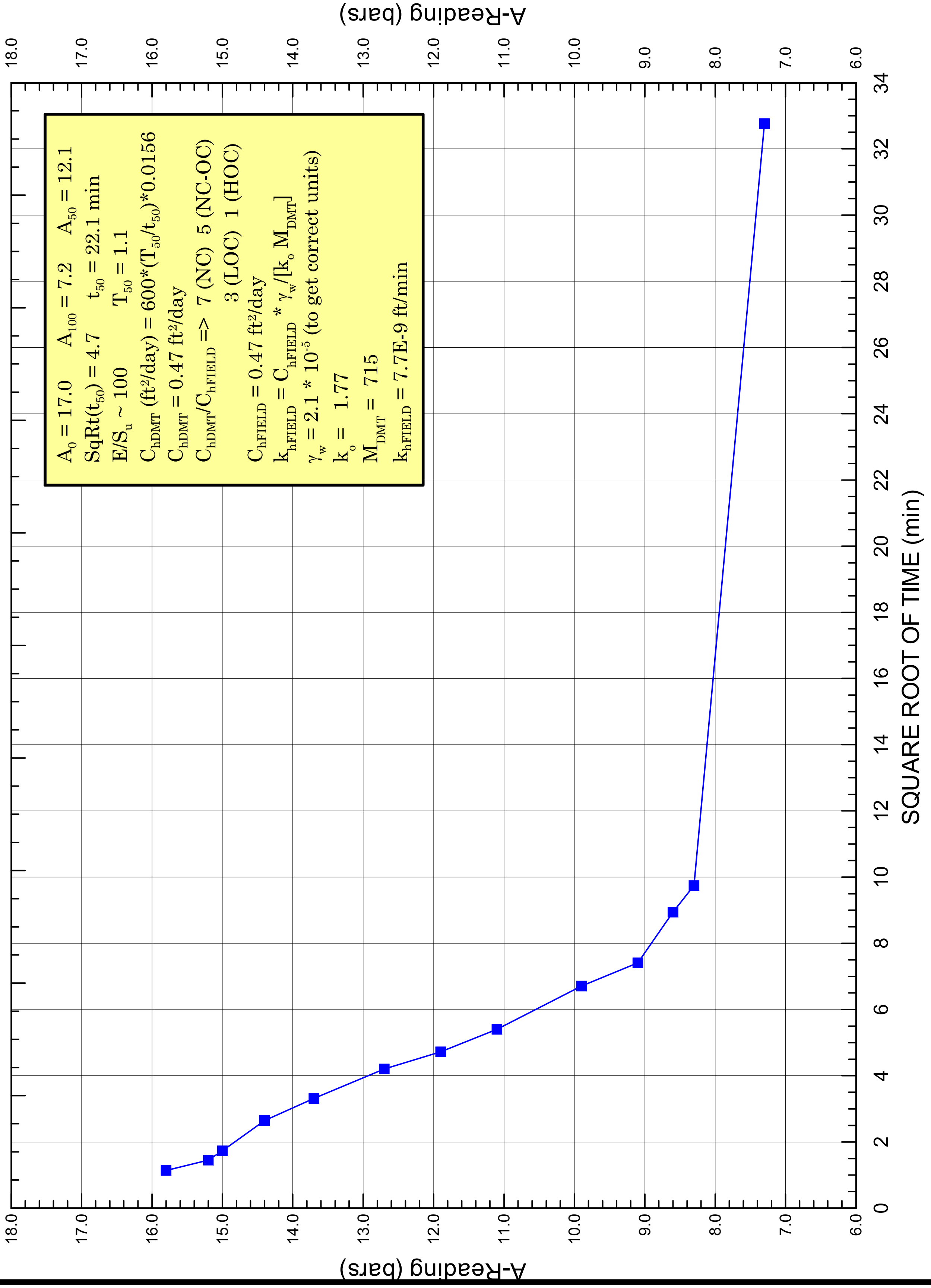
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11-20-08

SOUNDING

DMT-301

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 12.0 m



A_0 = 17.0 A_{100} = 7.2 A_{50} = 12.1
SqRt(t_{50}) = 4.7 t_{50} = 22.1 min
E/S_u ~ 100 T_{50} = 1.1
C_{hDMT} (ft²/day) = 600*(T_{50}/t_{50})*0.0156
C_{hDMT} = 0.47 ft²/day
C_{hDMT}/C_{hFIELD} => 7 (NC) 5 (NC-OC)
3 (LOC) 1 (HOC)
C_{hFIELD} = 0.47 ft²/day
k_{hFIELD} = C_{hFIELD} * γ_w /[k_o M_{DMT}]
γ_w = 2.1 * 10^{-5} (to get correct units)
k_o = 1.77
M_{DMT} = 715
k_{hFIELD} = 7.7E-9 ft/min

PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

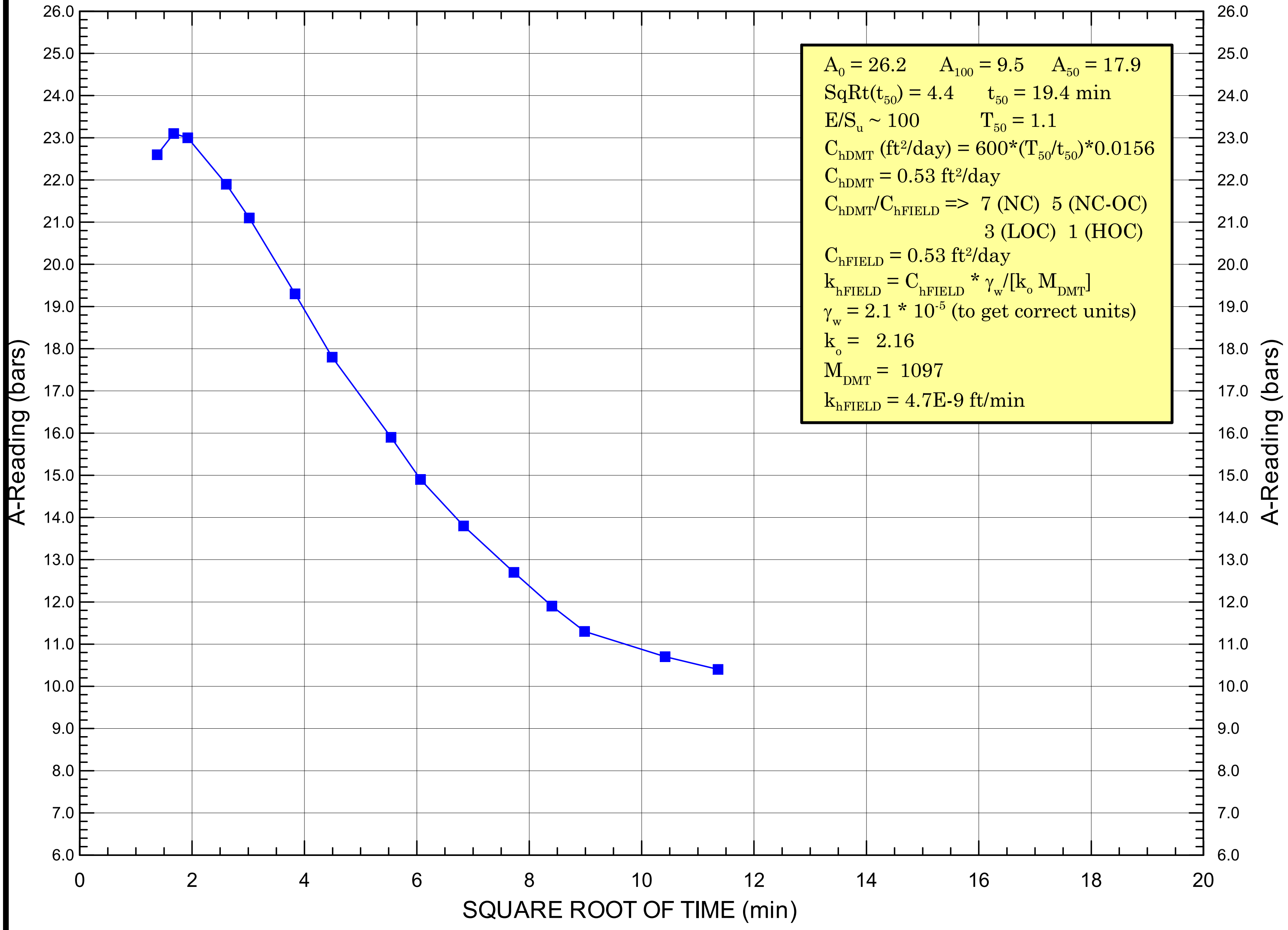
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11-21-08

SOUNDING

DMT-301

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 13.8 m



$A_0 = 26.2$ $A_{100} = 9.5$ $A_{50} = 17.9$
$SqRt(t_{50}) = 4.4$ $t_{50} = 19.4$ min
$E/S_u \sim 100$ $T_{50} = 1.1$
C_{hDMT} (ft²/day) = $600*(T_{50}/t_{50})*0.0156$
$C_{hDMT} = 0.53$ ft²/day
C_{hDMT}/C_{hFIELD} => 7 (NC) 5 (NC-OC)
3 (LOC) 1 (HOC)
$C_{hFIELD} = 0.53$ ft²/day
$k_{hFIELD} = C_{hFIELD} * \gamma_w/[k_o\ M_{DMT}]$
$\gamma_w = 2.1 * 10^{-5}$ (to get correct units)
$k_o = 2.16$
$M_{DMT} = 1097$
$k_{hFIELD} = 4.7E\text{-}9$ ft/min

PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

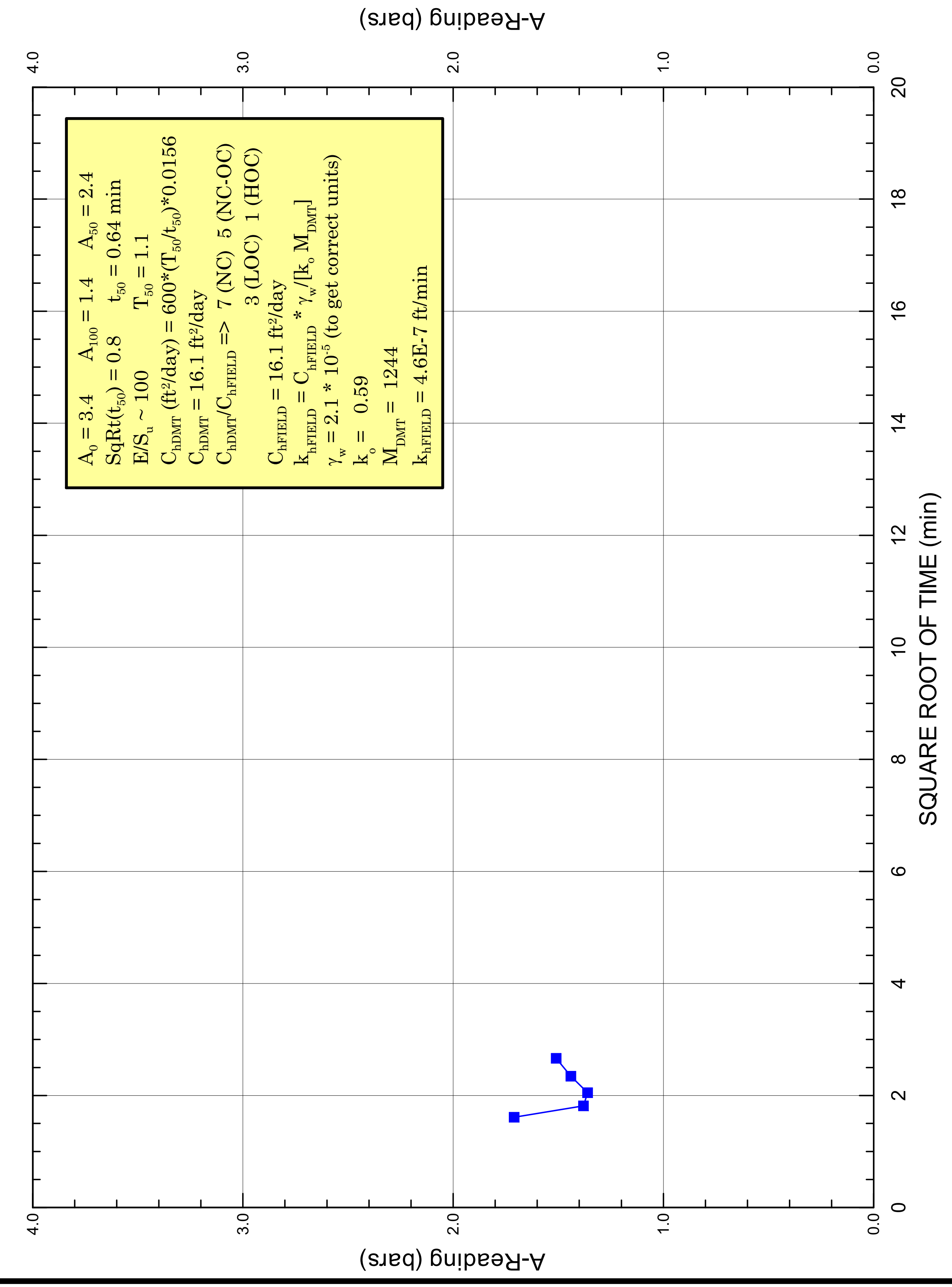
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11-24-08

SOUNDING

DMT-301

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 25.8 m



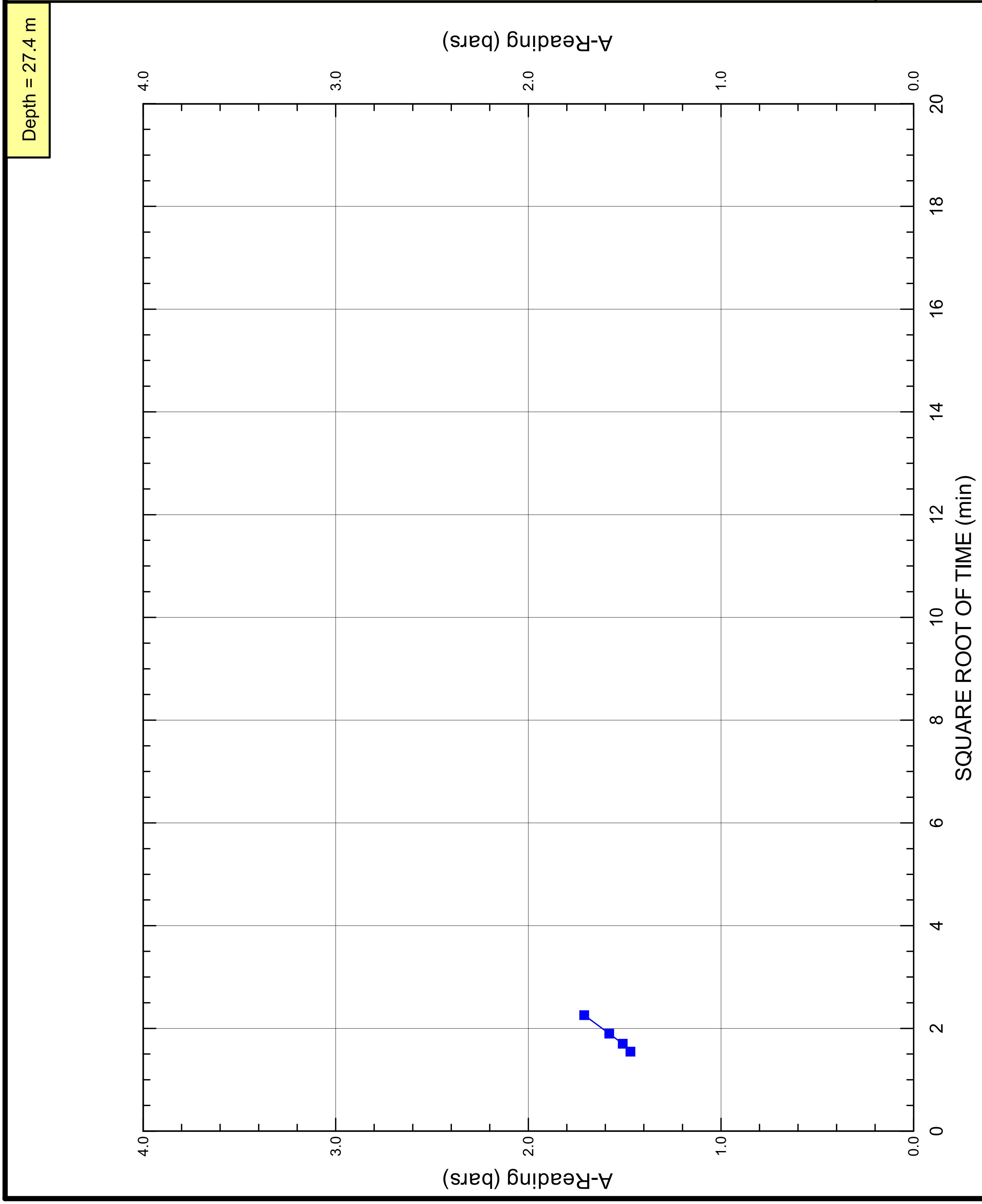
PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11-24-08

SOUNDING

DMT-301

DILATOMETER "A2" DISSIPATION RESULTS



PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

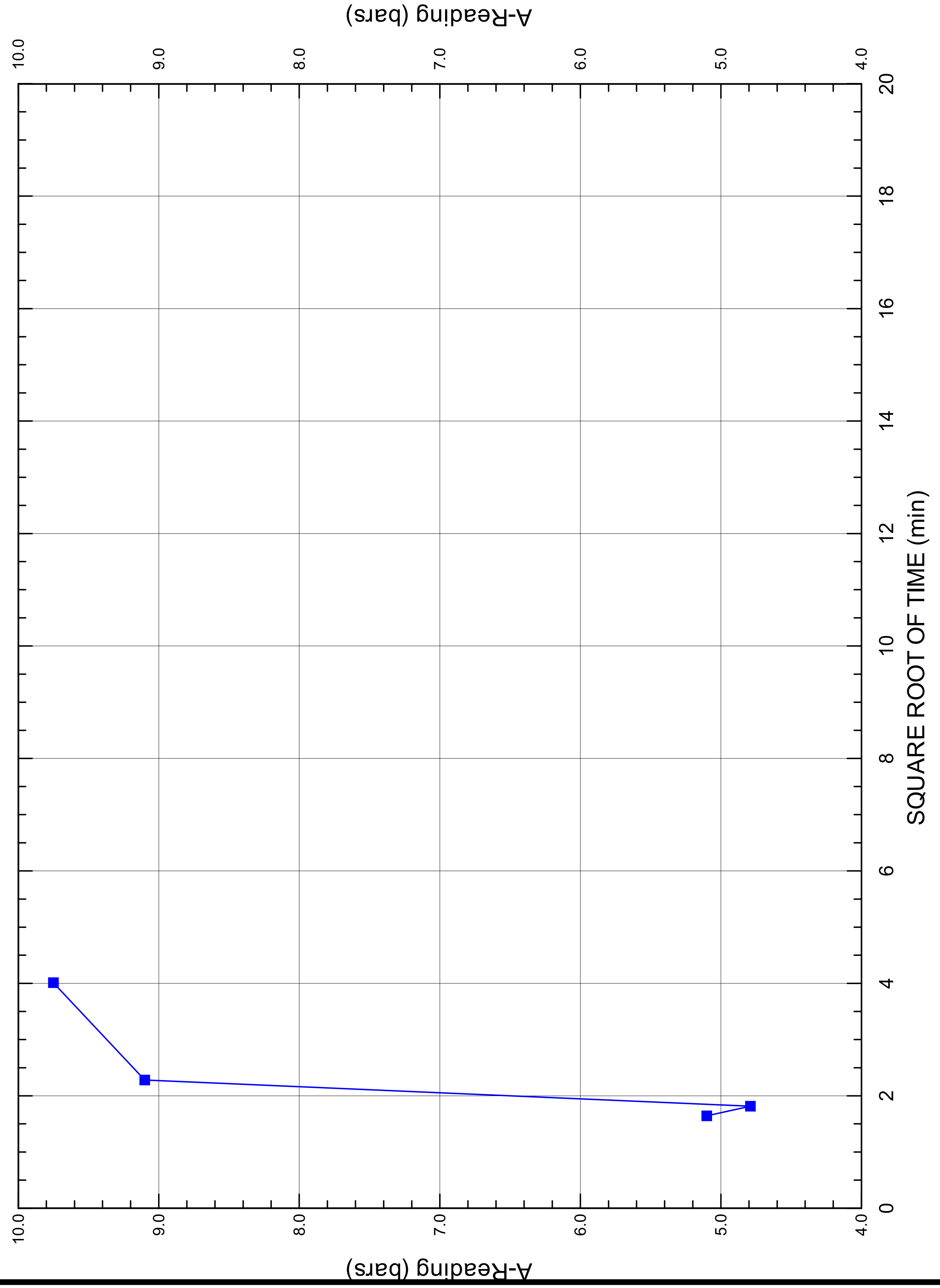
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11-26-08

SOUNDING

DMT-301

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 34.2 m



PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

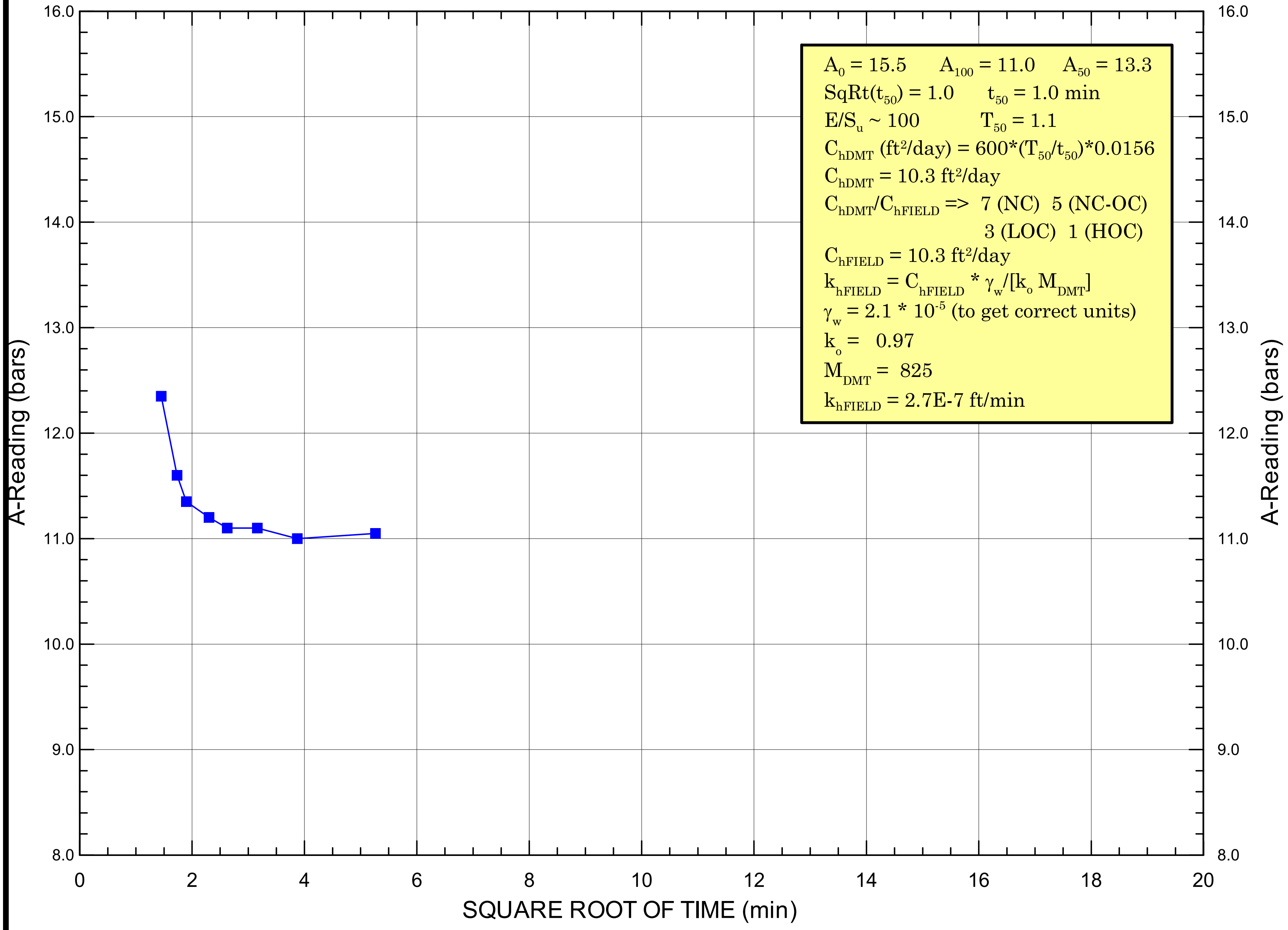
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 11-26-08

SOUNDING

DMT-301

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 39.6 m



$A_0 = 15.5$ $A_{100} = 11.0$ $A_{50} = 13.3$
$SqRt(t_{50}) = 1.0$ $t_{50} = 1.0$ min
$E/S_u \sim 100$ $T_{50} = 1.1$
C_{hDMT} (ft²/day) = 600*(T_{50}/t_{50})*0.0156
C_{hDMT} = 10.3 ft²/day
C_{hDMT}/C_{hFIELD} => 7 (NC) 5 (NC-OC)
3 (LOC) 1 (HOC)
C_{hFIELD} = 10.3 ft²/day
$k_{hFIELD} = C_{hFIELD} * \gamma_w/[k_o M_{DMT}]$
$\gamma_w = 2.1 * 10^{-5}$ (to get correct units)
k_o = 0.97
M_{DMT} = 825
k_{hFIELD} = 2.7E-7 ft/min

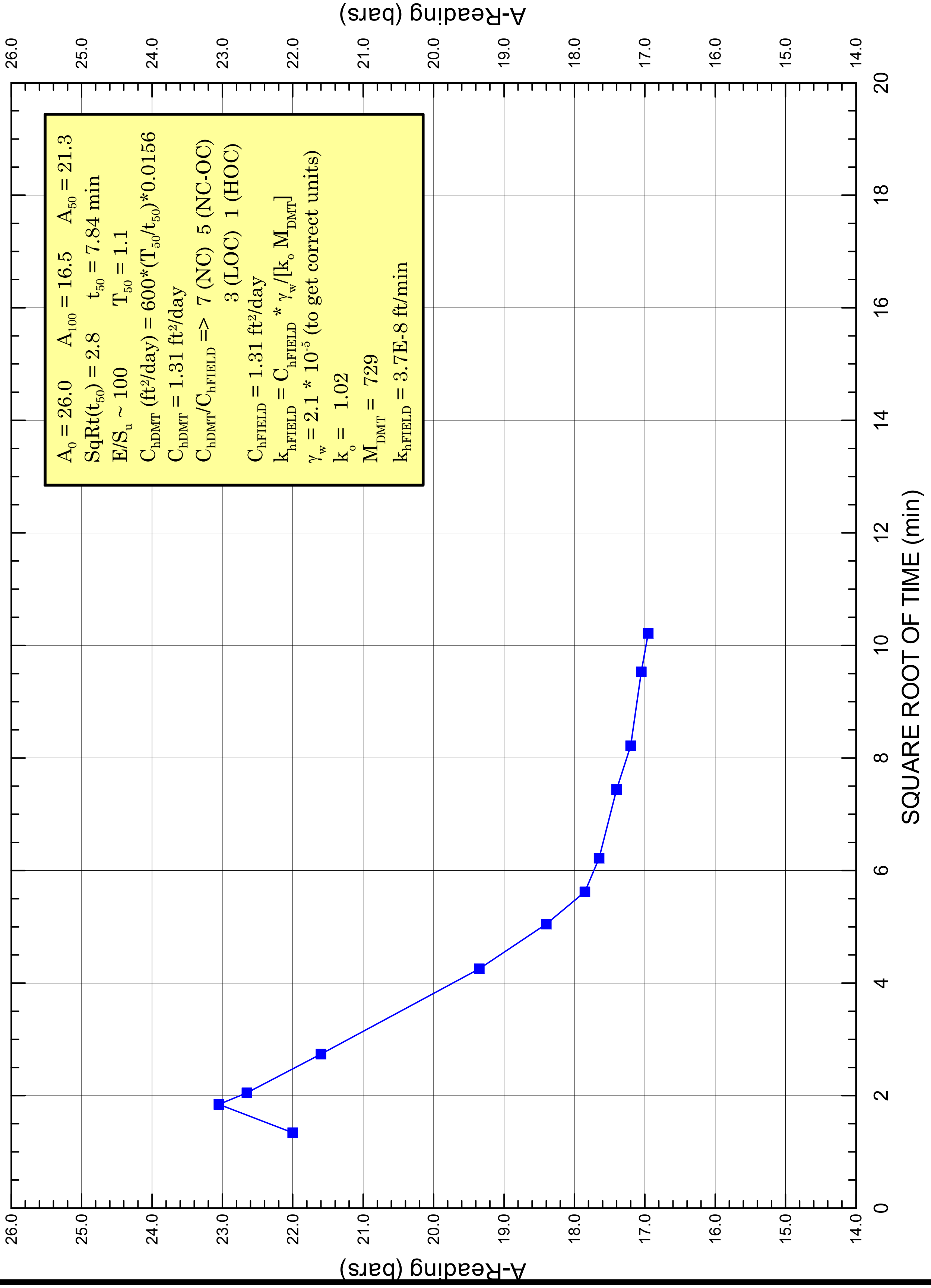
PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 12-2-08

SOUNDING
DMT-301

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 54.8 m



PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

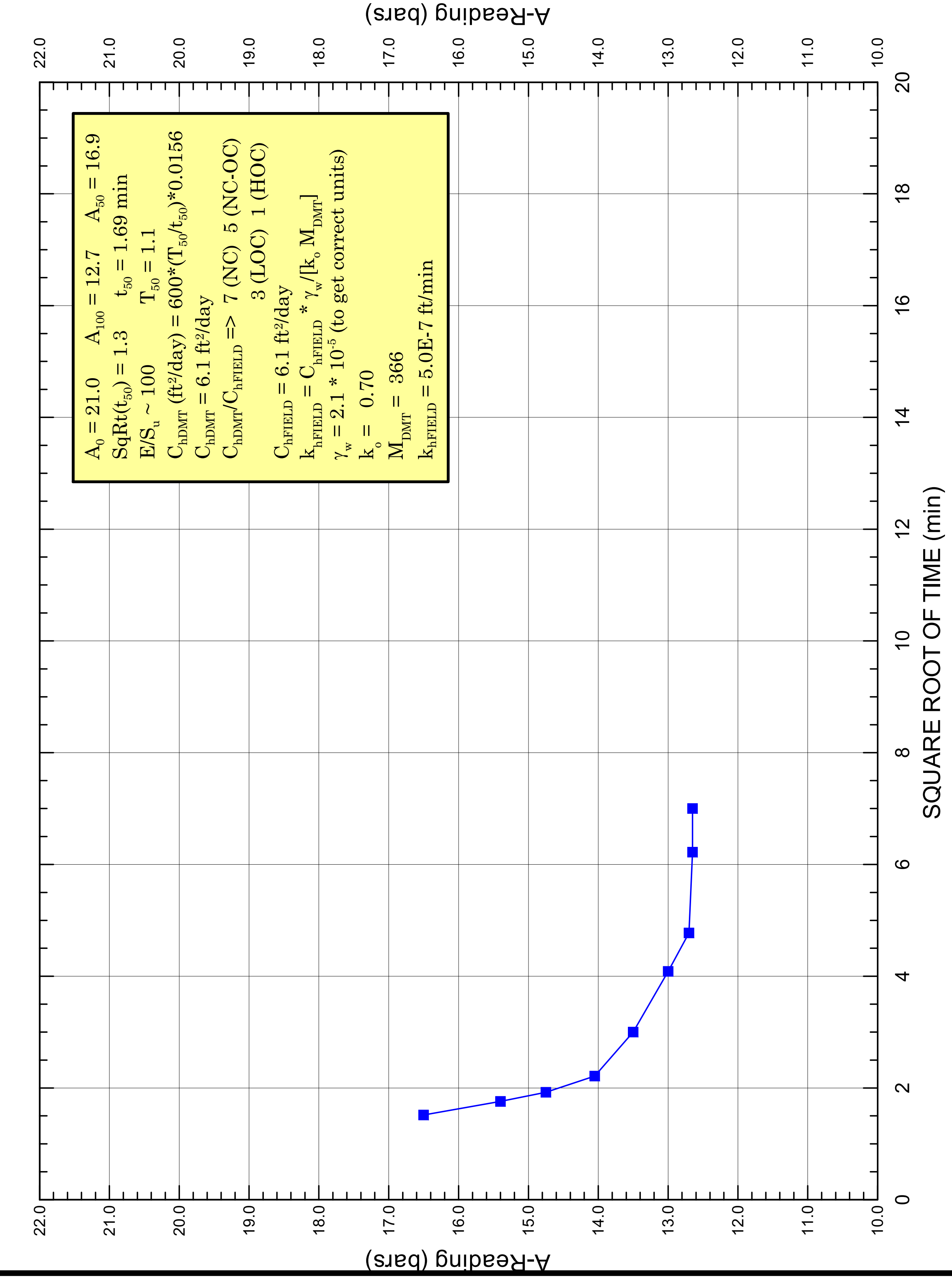
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 12-4-08

SOUNDING

DMT-301

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 70.2 m



$A_0 = 21.0$ $A_{100} = 12.7$ $A_{50} = 16.9$
$SqRt(t_{50}) = 1.3$ $t_{50} = 1.69$ min
$E/S_u \sim 100$ $T_{50} = 1.1$
C_{hDMT} (ft²/day) = $600*(T_{50}/t_{50})*0.0156$
$C_{hDMT} = 6.1$ ft²/day
C_{hDMT}/C_{hFIELD} => 7 (NC) 5 (NC-OC)
3 (LOC) 1 (HOC)
$C_{hFIELD} = 6.1$ ft²/day
$k_{hFIELD} = C_{hFIELD} * \gamma_w/[k_o M_{DMT}]$
$\gamma_w = 2.1 * 10^{-5}$ (to get correct units)
$k_o = 0.70$
$M_{DMT} = 366$
$k_{hFIELD} = 5.0E\text{-}7$ ft/min

PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

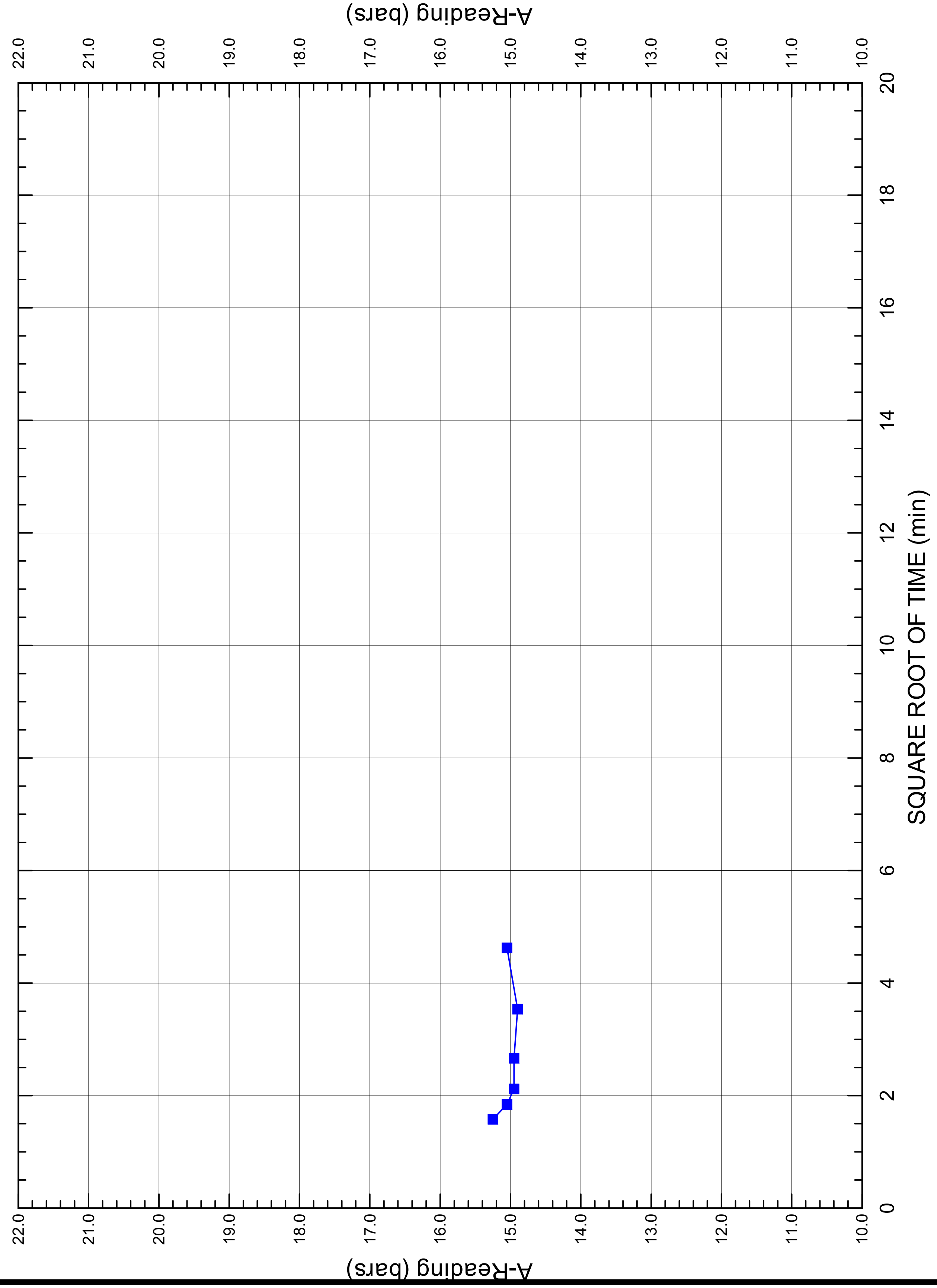
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 12-8-08

SOUNDING

DMT-301

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 85.0 m



PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

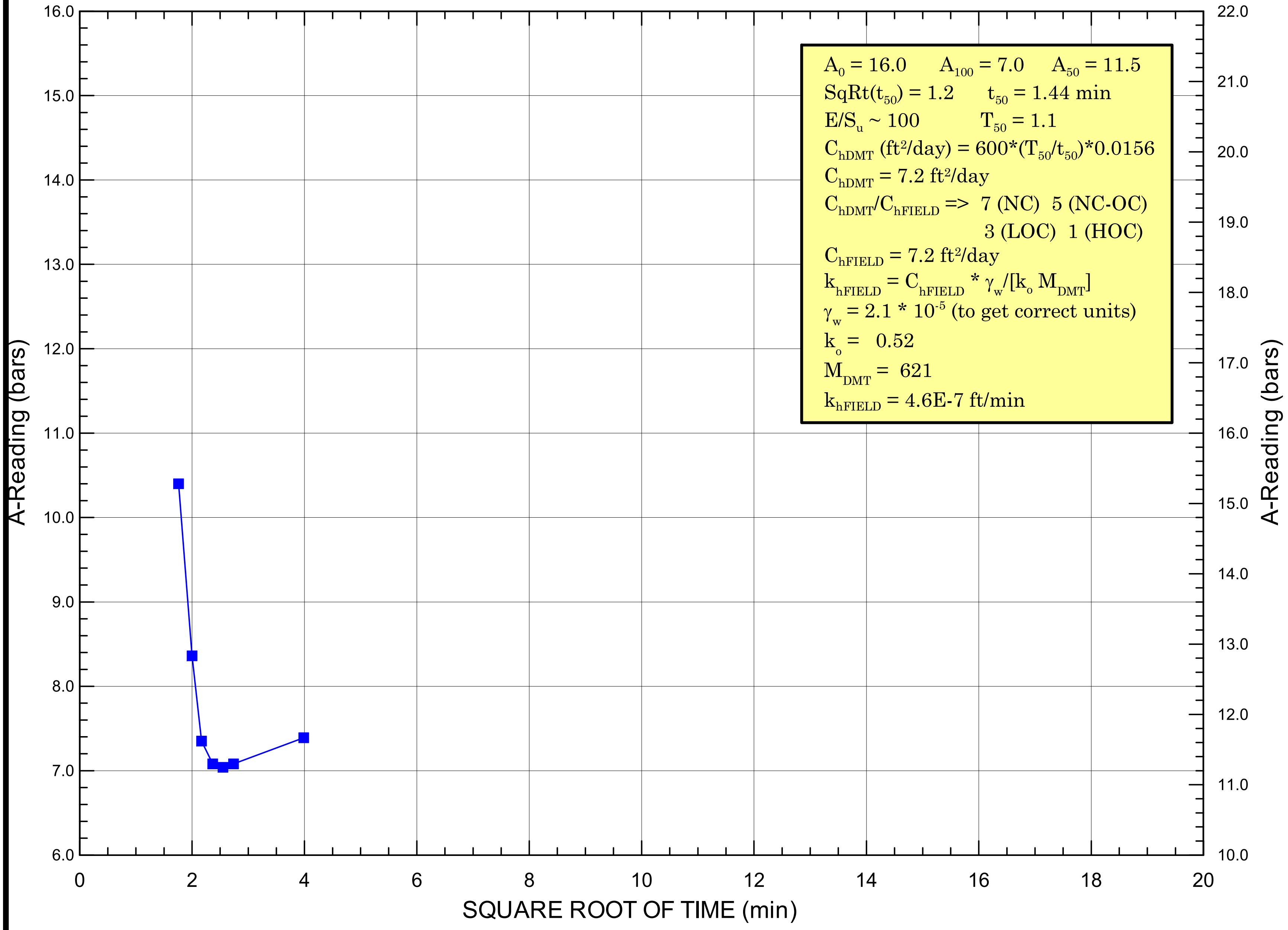
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 12-10-08

SOUNDING

DMT-301

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 97.4 m



$A_0 = 16.0$ $A_{100} = 7.0$ $A_{50} = 11.5$

$SqRt(t_{50}) = 1.2$ $t_{50} = 1.44$ min

$E/S_u \sim 100$ $T_{50} = 1.1$

C_{hDMT} (ft²/day) = $600*(T_{50}/t_{50})*0.0156$

$C_{hDMT} = 7.2$ ft²/day

C_{hDMT}/C_{hFIELD} => 7 (NC) 5 (NC-OC)
3 (LOC) 1 (HOC)

$C_{hFIELD} = 7.2$ ft²/day

$k_{hFIELD} = C_{hFIELD} * \gamma_w/[k_o\ M_{DMT}]$

$\gamma_w = 2.1 * 10^{-5}$ (to get correct units)

$k_o = 0.52$

$M_{DMT} = 621$

$k_{hFIELD} = 4.6E\text{-}7$ ft/min

PROJECT: CCNPP -- 2008 Subsurface Investigations
LOCATION: Calvert County, Maryland

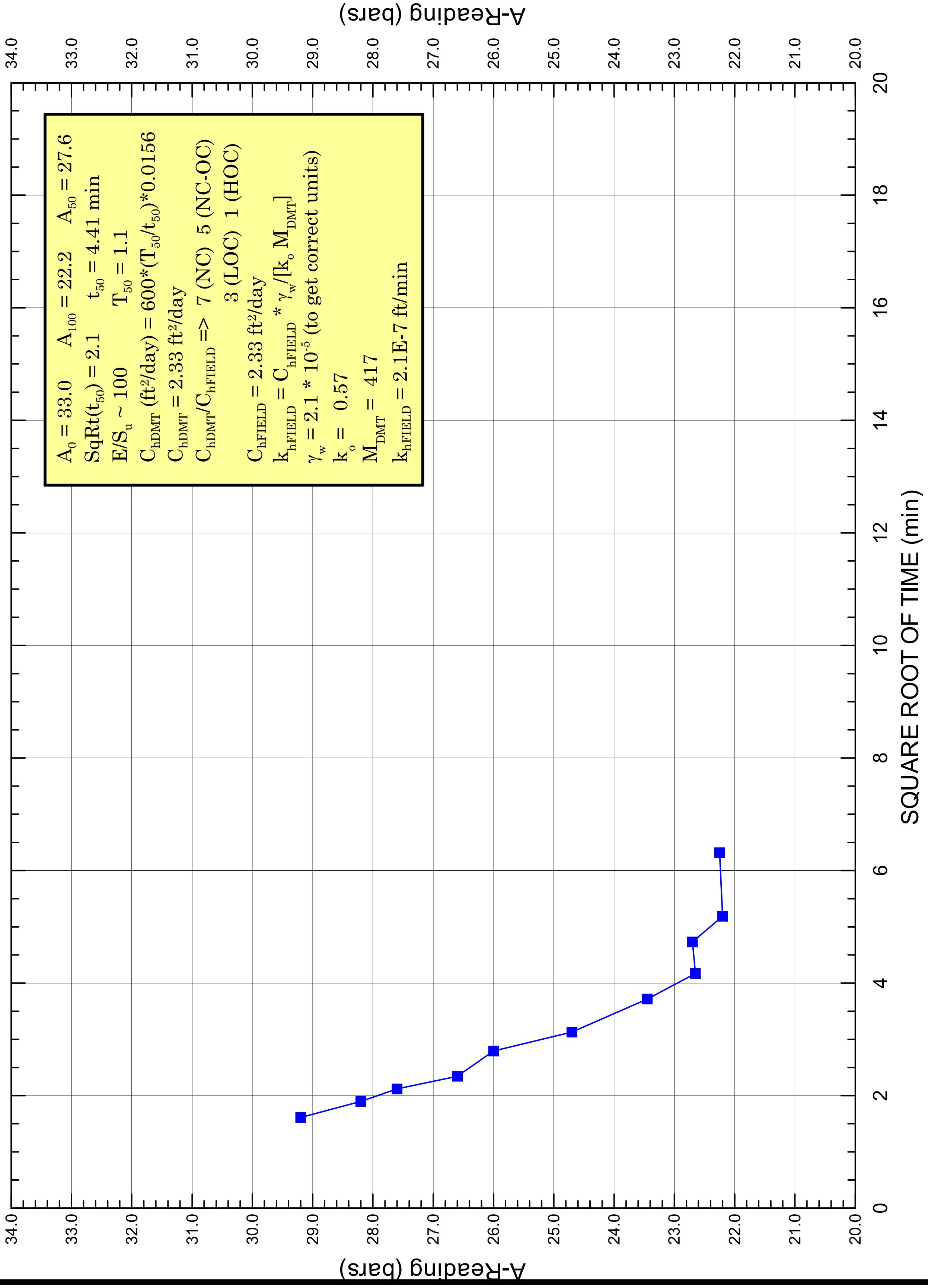
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 12-12-08

SOUNDING

DMT-301

DILATOMETER "A2" DISSIPATION RESULTS

Depth = 106.8 m



$A_0 = 33.0 \quad A_{100} = 22.2 \quad A_{50} = 27.6$

$SqRt(t_{50}) = 2.1 \quad t_{50} = 4.41$ min

$E/S_u \sim 100 \quad T_{50} = 1.1$

C_{hDMT} (ft²/day) = $600*(T_{50}/t_{50})*0.0156$

$C_{hDMT} = 2.33$ ft²/day

C_{hDMT}/C_{hFIELD} => 7 (NC) 5 (NC-OC)
3 (LOC) 1 (HOC)

$C_{hFIELD} = 2.33$ ft²/day

$k_{hFIELD} = C_{hFIELD} * \gamma_w/[k_o\ M_{DMT}]$

$\gamma_w = 2.1 * 10^{-5}$ (to get correct units)

$k_o = 0.57$

$M_{DMT} = 417$

$k_{hFIELD} = 2.1E\text{-}7$ ft/min

APPENDIX H

BOREHOLE GEOPHYSICS

Borehole Geophysics Report