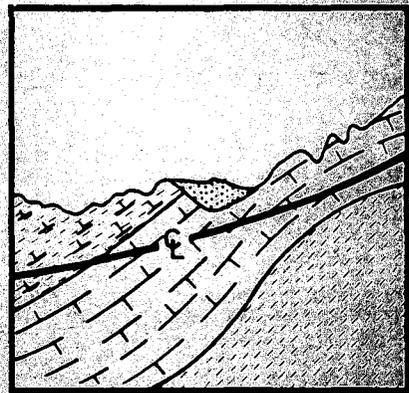
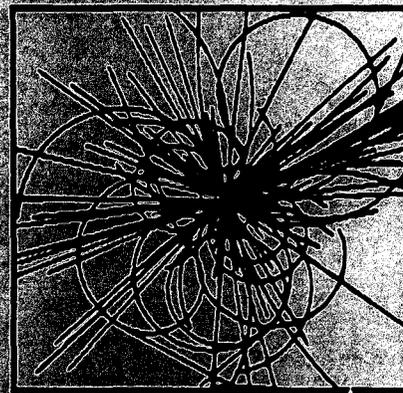


GR-21

# Data Report for Corehole BE1 and Monitoring Well BE1A



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Prepared for:  **RTK** a joint venture  
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## FOREWORD

The goal of the geotechnical studies at the Texas Superconducting Super Collider (SSC) site is to allow the geologist and engineer to build their level of knowledge and confidence about the geologic structures and geotechnical properties of the site materials to the point at which there remains only a realistically small risk of encountering geotechnical conditions during construction that would significantly increase construction costs or delay construction schedules. To do this, a characterization program has been designed to meet the following objectives:

- To confirm the site's suitability and optimize the ring location (the "footprint") and hall positions on the ring
- To provide data for a preliminary structural design
- To provide a rational framework within which construction contracts and schedules can be formulated
- To maximize the use of the site-specific data already gathered by the proposer.

The geotechnical program to meet these objectives has been divided into the following three phases of study:

- Footprint location data (the present phase)
- Global data (planned)
- Structure-specific data (planned).

The primary purpose of the present footprint location phase is to quickly assess whether individual components of the collider footprint, or the entire footprint, need to be relocated because of geotechnical constraints. Accordingly, the following areas have been assessed:

- Areas on the western side of the footprint where the geologic structure brings the Eagle Ford Shale close to the depth of the tunnel and experimental halls, thus presenting potential constraints due to weak, deformable rock.
- Areas where the tunnel placement is shallow and/or there are nearby sources of vibration such as major highways and railroads that may represent a problem due to unacceptable vibrations at tunnel depth.
- Zones of potentially poor rock quality and high water inflow in the rock that should be avoided for the experimental hall excavations.

This is one in a series of data reports prepared for the footprint phase of geotechnical characterization at the SSC site. Each data report includes the results of both field and laboratory tests for a specific drilling and sampling site. Interpretations of these data will be covered in topical reports, including three planned reports, as follows:

- Train-, traffic-, and quarry-caused vibrations
- Geomechanical properties of the Eagle Ford Shale
- Structure and stratigraphy of the near-cluster.

Future planned program phases – global and structure-specific data collection – will concentrate on (1) evaluating ring areas where few geotechnical data are currently available and (2) conducting more detailed studies at the sites of the injector and experimental halls.

# DATA REPORT

**Site Designator: BE1**

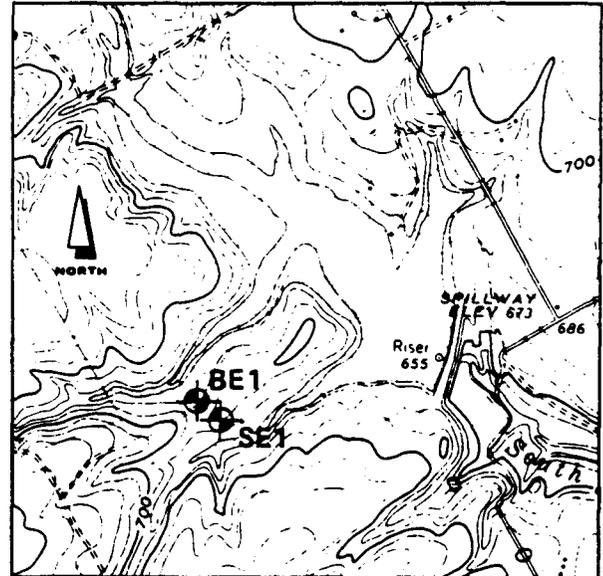
**Objective:** To delimit the top of the Eagle Ford Shale. To obtain core samples of Austin Chalk and Eagle Ford Shale for geomechanics laboratory testing. To do hydrologic straddle packer tests in the Austin Chalk and Eagle Ford Shale. To construct a piezometer for monitoring water levels in the Eagle Ford Shale.

**Hole No. BE1**

**Location:** North 261,640.3 feet  
East 2,172,255.6 feet  
Surface Elevation 679.0 feet

**Hole No. BE1A**

**Location:** North 261,647 feet  
East 2,172,256.7 feet  
Surface Elevation 679.0 feet  
Borings BE1 and BE1A are located on the western side of the ring, about 2 miles north of Farm Road 1446, near a reservoir on South Prong Creek.



SCALE 1:24,000

1000 0 1000 2000 3000 FEET

CONTOUR INTERVAL 10 FEET

<b>Scope and Schedule BE1:</b>	<b>Borehole Coring</b>	May 25, 1989 to May 26, 1989
	<b>Wire-line Logging</b>	May 26, 1989
	<b>Hydrologic Logging</b>	May 27, 1989 to May 30, 1989
	<b>Laboratory Geomechanical Testing</b>	May 26, 1989 to June 8, 1989
	<b>Plugging and Abandonment</b>	May 31, 1989
	<b>BE1A: Air Rotary Wash Boring</b>	May 31, 1989
	<b>Casing Installed</b>	May 31, 1989
	<b>Plugging and Abandonment</b>	Left open as a permanent monitoring well

**Hole No. BE1**

**Conditions Encountered:**

**Total Hole Depth:** 212.0 feet  
**Soil:** 0.0 to 4.2 feet  
**Austin Chalk:** 4.2 to 106.1 feet  
**Eagle Ford Shale:** 106.1 to 212.0 feet  
(see lithologic log, Appendix A)

**Geophysical Logging:** (See wire-line logs, Appendix B)

Spontaneous Potential  
Normal Resistivity (short)  
Guarded Resistivity (long)  
Natural Gamma  
Compensated Density (caliper)  
Sonic Velocity (full wave)

**Hydrological Test:** (see Table 3)

#1 Double Packer  
20.0 to 42.35 feet  
#2 Double Packer  
101.0 to 123.35 feet  
Slug Test  
4.0 to 212.0 feet

**Hole Status:** Cemented in and abandoned May 31, 1989  
(See as-built drawing/cementing report, Appendix C)

**Hole No. BE1A**

**Conditions Encountered:**

**Total Hole Depth:** 140.0 feet  
**Soil:** 0 to 4 feet  
**Austin Chalk:** 4 to 106 feet  
**Eagle Ford Shale:** 106 to 140.0 feet  
(see Lithologic Log, Appendix A)

**Hole Status:** Constructed as permanent monitoring well  
(See as-built drawing/cementing report, Appendix C)

**Hole No. BE1A** was drilled and constructed as a piezometer after a packer became stuck in Hole No. BE1. BE1 was planned to be constructed as a piezometer. BE1A is 4 feet from BE1.

TABLE 1. GEOMECHANICAL TEST RESULTS - BORING BK1'

Geologic Formation and General Lithology	Depth feet	Moisture Content percent	Dry Density pcf	Sample Dimension Ratio L/D	Uniaxial Compressive Strength psi	Triaxial Compression		Tangent Young's Modulus		Poisson's Ratio	Direct Shear		Brazil Tensile Strength psi	2nd Cycle Stake-Durability Index percent	Modified Tabor Abrasion/Hardness Index	Swell Pressure Index psi	Comments
						$\sigma_c$ psi	$\sigma_1, \sigma_3$ psi	$E_{50}$ psi x 10 <sup>5</sup>	$\sigma_3$ psi		$\sigma_n$ psi	$\tau$ psi					
Austin Chalk Limestone	12.9												344				
Austin Chalk Limestone	13.0										50	172					
Austin Chalk Limestone	13.2	13.7	119.6								150	416					
Austin Chalk Limestone	13.5										300	597					
Austin Chalk Limestone	40.3												225				
Austin Chalk Limestone	40.7	14.8	122.4								50	192					
Austin Chalk Limestone	41.0										150	339					
Austin Chalk Limestone	41.2										450	402					Sample damaged during preparation
Austin Chalk Limestone	41.5										450	611					
Austin Chalk Limestone	107.3			2.2	1550												
Austin Chalk Limestone	108.1	16.0	116.8	2.5	1416												
Austin Chalk Limestone	109.0			2.1		120	1939										
Austin Chalk Limestone	109.4			2.0		1000	3069										
Austin Chalk Limestone	109.8												186				
Austin Chalk Limestone	148.2													96.2			
Austin Chalk Limestone	148.8	13.8	121.1														
Austin Chalk Limestone	149.0														0.393		
Austin Chalk Limestone	180.0	15.2	115.7	2.7	2266												
Austin Chalk Limestone	220.2	14.1	115.2	2.5	2152												
Austin Chalk Limestone	220.7			2.0	2110												
Austin Chalk Limestone	221.0												321				
Eagle Ford Shale	229.0	17.3	115.7	2.5	127												
Eagle Ford Shale	229.7			2.0	171			0.94	0	0.31							
Eagle Ford Shale	239.5	16.5	118.3	2.4	190												
Eagle Ford Shale	240.0			2.2	348												
Eagle Ford Shale	259.9	16.5	117.4	2.5	434												
Eagle Ford Shale	260.5																38
Eagle Ford Shale	260.6																38
Eagle Ford Shale	260.7																38
Eagle Ford Shale	280.9	15.2	112.6	2.3	432												
Eagle Ford Shale	281.6																26
Eagle Ford Shale	281.7																26
Eagle Ford Shale	281.8																30
Eagle Ford Shale	282.0			1.9		300	701										
Eagle Ford Shale	282.4			2.3		900	811										
Eagle Ford Shale	290.6	13.8	121.1														
Eagle Ford Shale	290.9																
Eagle Ford Shale	291.4													0.690			
Eagle Ford Shale	305.0	15.0	121.9	2.1		300	781						7.3				
Eagle Ford Shale	305.8			2.2		600	680										
Eagle Ford Shale	306.4			2.2		1200	775										
Eagle Ford Shale	320.9														0.425		
Eagle Ford Shale	321.5	14.2	122.7														
Eagle Ford Shale	321.7													20.0			
Procedure	ASTM-D2216				ASTM-D2938	ASTM-D2654		ASTM-D2938	ASTM-D2938	ISRM	ISRM	ISRM	ISRM	ISRM	ISRM		

Note: Mineralogical data available in Table 2.

WP-64/BK1

**TABLE 2. BULK AND CLAY MINERALOGY TEST RESULTS**

**Depth 11.0 feet Argillaceous bed within Austin Chalk**

**Whole Rock Composition:**

<u>Mineral</u>	<u>Percent</u>
calcite	5
clay minerals	<u>95</u>
	100

**Relative Clay Abundance:**

<u>Mineral</u>	<u>Percent</u>
montmorillonite	83
illite	12
kaolinite	<u>5</u>
	100

**Depth 11.3 feet Austin Chalk**

**Whole Rock Composition:**

<u>Mineral</u>	<u>Percent</u>
calcite	95
clay minerals	<u>5</u>
	100

**Relative Clay Abundance:**

<u>Mineral</u>	<u>Percent</u>
Test not performed	

**Depth 132.5 feet Eagle Ford Shale**

**Whole Rock Composition:**

<u>Mineral</u>	<u>Percent</u>
quartz	10
clay minerals	<u>90</u>
	100

**Relative Clay Abundance:**

<u>Mineral</u>	<u>Percent</u>
illite	56
kaolinite	<u>44</u>
	100

**Depth 132.9 feet Eagle Ford Shale**

**Whole Rock Composition:**

<u>Mineral</u>	<u>Percent</u>
quartz	5
clay minerals	<u>95</u>
	100

**Relative Clay Abundance:**

<u>Mineral</u>	<u>Percent</u>
illite	63
kaolinite	<u>37</u>
	100

**TABLE 2. BULK AND CLAY MINERALOGY TEST RESULTS**

**Depth 148.7 feet Eagle Ford Shale**

**Whole Rock Composition:**

<u>Mineral</u>	<u>Percent</u>
quartz	10
clay minerals	<u>90</u>
	100

**Relative Clay Abundance:**

<u>Mineral</u>	<u>Percent</u>
illite	72
kaolinite	<u>28</u>
	100

**Depth 149.5 feet Eagle Ford Shale**

**Whole Rock Composition:**

<u>Mineral</u>	<u>Percent</u>
quartz	5
clay minerals	<u>95</u>
	100

**Relative Clay Abundance:**

<u>Mineral</u>	<u>Percent</u>
illite	63
kaolinite	<u>37</u>
	100

**Depth 174.9 feet Eagle Ford Shale**

**Whole Rock Composition:**

<u>Mineral</u>	<u>Percent</u>
quartz	5
clay minerals	<u>95</u>
	100

**Relative Clay Abundance:**

<u>Mineral</u>	<u>Percent</u>
illite	58
kaolinite	<u>42</u>
	100

**Depth 175.2 feet Eagle Ford Shale**

**Whole Rock Composition:**

<u>Mineral</u>	<u>Percent</u>
quartz	5
calcite	5
clay minerals	<u>90</u>
	100

**Relative Clay Abundance:**

<u>Mineral</u>	<u>Percent</u>
illite	50
kaolinite	<u>50</u>
	100

**TABLE 2. BULK AND CLAY MINERALOGY TEST RESULTS**

---

**Depth 193.0 feet Eagle Ford Shale**

**Whole Rock Composition:**

<u>Mineral</u>	<u>Percent</u>
quartz	5
clay minerals	<u>95</u>
	100

**Relative Clay Abundance:**

<u>Mineral</u>	<u>Percent</u>
illite	63
kaolinite	<u>37</u>
	100

**Depth 193.3 feet Eagle Ford Shale**

**Whole Rock Composition:**

<u>Mineral</u>	<u>Percent</u>
quartz	10
clay minerals	<u>90</u>
	100

**Relative Clay Abundance:**

<u>Mineral</u>	<u>Percent</u>
illite	61
kaolinite	<u>39</u>
	100

---

**TABLE 3. HYDROLOGIC TEST RESULTS**

Hole No. BE1

<b>Test Depth</b>	<b>Formation and Lithology</b>	<b>Hydraulic Conductivity (cm/sec)</b>	<b>Comments</b>
4.0-212.0 feet	Austin Chalk/ Eagle Ford Shale	$8.8 \times 10^{-5}$	Likely reflects conductivity in weathered Austin Chalk
20.0-42.3 feet	Austin Chalk	$5.5 \times 10^{-7}$	test centered on probable bentonite zone straddled contact and fractured zone at top of Eagle Ford Shale
101.0-123.3 feet	Austin Chalk/Eagle Ford Shale	$2.1 \times 10^{-8}$	

**Objective:** The objective of these tests is to provide estimates of the hydraulic conductivity at tunnel depth and of distinct zones within the host bedrock formations (Austin Chalk, Eagle Ford Shale) characterized by increased frequency of fractures, faults, or bedding plane partings, which may transmit water at increased rates.

**Procedure Used:** Straddle packer test intervals were selected based on inspection of rock cores and geophysical logs. A straddle packer was lowered to the desired depth and water was pumped through the system. The packers were inflated to a calculated pressure and water was pumped into the test zone at a predetermined pressure. The flow rate and pressure fluctuations were recorded over time. The data were analyzed in accordance with U.S. Bureau of Reclamation procedures (1974, Earth Manual).

For slug tests, an electronic data logger and pressure transducer was lowered into the borehole. The boring was filled to the top with water and the data logger was activated and allowed to record the water level drop. The data were analyzed in accordance with the method outlined by Bouwer and Rice (1976).

**Note:** In the above tests, the take of water was observed to decline with time, suggesting the fractures have a finite capacity and are only poorly interconnected.

**APPENDIX A**  
**LITHOLOGIC LOG**

LOG OF BORING										BORING NO: BEL PG 1 OF 6	
PROJECT: SSC										LOCATION: N 261,640.3 feet	
CLIENT: TETC										E 2,172,255.6 feet	
TASK NO.: 17										GROUND EL: 679.0 feet	
DATE: 5/25/89 TYPE: Nx Core										CASED TO: 4.0	
										CONTRACTOR: MJA	
DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE		PERCENT REC.	PERCENT ROD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	SAMPLE LEGEND	WATER INFORMATION	
			TOP	BOT.					DESCRIPTION OF STRATUM		
			0.0								
				4.5					0.0-4.0 Surface Casing 0.0-4.2 Topsoil CLAY, silty, tan/gray		
5			4.5		64	28			4.2 LIMESTONE (Austin Chalk), mod. hard, badly weathered, broken, lt. gray-tan		
				9.5					9.5-9.8 Broken Zone		
10		Box 1 C1 11.0 to 12.1	9.5		98	80			10.6-11.0 Broken Zone		
			14.5						11.0 Base of Weathering LIMESTONE (Austin Chalk), mod. fresh hard, slightly fossiliferous, w/argillaceous bands, lt. gray		
15		Box 2			100	96			11.0-12.1 Dark gray argillaceous zone 11.9 fracture, 60°, rough surface 12.7-13.4 fracture, vertical, rough surface 13.4-14.4 Dark gray argillaceous zone 15.4 Zone of oxidation 0.2' 16.3 fracture, 20°, rough surface		
20				22.0					17.2-18.0 Dark gray argillaceous zone 19.0-19.7 Dark gray argillaceous, fossiliferous zone		
			22.0						23.4-24.1 Dark gray argillaceous zone		
25		Box 3			100	95			28.8-29.3 Dark gray argillaceous zone		
			31.2						31.3-31.9 Bentonitic clay seam, soft to v. soft, waxy, lt. gray		
30				32.0					32.5-32.7 Dark gray argillaceous zone		
			32.0						34.4-35.7 Dark gray argillaceous zone		
35		Box 4			100	96					
			40.7								
40				42.0							
			42.0								

DRILLING GEOLOGIST J. Murchison ASSISTANT G. James

## LOG OF BORING

BORING NO: BEL PG 2 OF 6

PROJECT: SSC

LOCATION: N 261,640.3 feet

CLIENT: TETC

E 2,172,255.6 feet

TASK NO.: 17

GROUND EL: 679.0 feet

DATE: 5/25/89 TYPE: Nx Core

CASED TO: 4.0

CONTRACTOR: MJA

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE		PERCENT REC.	PERCENT ROD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	SAMPLE LEGEND	WATER INFORMATION
			TOP	BOT.					S = SPLIT SPOON T = 2" THIN WALL TUBE U = 3" THIN WALL TUBE C = NX ROCK CORE	
									DESCRIPTION OF STRATUM	
				42.0					LIMESTONE (Austin Chalk), mod. fresh hard, slightly fossiliferous, w/argillaceous bands, lt. gray	
			42.0							
45		Box 5			100	99.5				
		C 2								
		45.0								
		46.5							49.6-49.9 Dark gray argillaceous zone - broken	
50		49.8								
			52.0						51.4-52.0 Dark gray argillaceous zone	
			52.0							
55		Box 6			95	95				
		59.5							60.1-60.4 Dark gray argillaceous zone	
60			62.0						62.0-62.4 Broken zone	
			62.0						62.7-63.3 Dark gray argillaceous zone	
65		Box 7			105	95				
		67.9								
70			70.5						71.8-72.9 Dark gray argillaceous, shaly inclusions, fossil fragments	
			70.5							
		Box 8			100	98			74.1-74.4 Slightly shaly zone	
75									76.5 Shaly	
		77.3							78.0-78.6 Dark gray argillaceous	
80			80.8						81.0-82.2 Dark gray argillaceous zone	
			80.8							

 DRILLING GEOLOGIST J. Murchison ASSISTANT G. James

## LOG OF BORING

BORING NO: BE1 PG 3 OF 6

PROJECT: SSC

LOCATION: N 261,640.3 feet

CLIENT: TETC

E 2,172,255.6 feet

TASK NO.: 17

GROUND EL: 679.0 feet

DATE: 5/25/89 TYPE: Nx Core

CASED TO: 4.0

CONTRACTOR: MJA

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE		PERCENT REC.	PERCENT ROD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	SAMPLE LEGEND	WATER INFORMATION
			TOP	BOT.					S = SPLIT SPOON T = 2" THIN WALL TUBE U = 3" THIN WALL TUBE C = NX ROCK CORE	
									DESCRIPTION OF STRATUM	
		Box 9 C 3 84.6-87.2								LIMESTONE (Austin Chalk), mod. fresh hard, slightly fossiliferous, w/argillaceous bands, lt. gray
-85		86.5			100	99				
				90.1						
-90			90.1							91.8-92.2 Dark gray argillaceous zone 92.2-100.4 Shaly w/calcite stringers (Fossils)
		Box 10 95.2			100	99				
-95										
		Box 11								98.0-100.4 Dark gray argillaceous zone
-100			100.4							102.7 Pyritized Fossil
		Box 12			97	82				103.3 Transition Zone, argillaceous, arenaceous, fossiliferous, mod. hard, med. to dk. gray
-105										106.1
		C 4 112.7 to 113.9								SHALE, (Eagle Ford), soft to med. hard, fresh, dark gray-black
-110			110.4							108.4 fracture, 20°, rough, clean surface 108.8 fracture, 20°, rough, clean surface 109.1 fracture, 20°, rough, clean surface 109.6 fracture, 20°, rough, clean surface 109.9 fracture, 20°, rough, clean surface 110.2 fracture, 20°, rough, clean surface 110.5 fracture, 20°, rough, clean surface 111.4 fracture, 20°, rough, clean surface
-115		Box 13			84	66				
-120			119.7							120.5 fracture, 25°, rough, clean surface 121.0 fracture, 20°, rough, clean surface
			119.7							123.0 fracture, 20°, mod. rough, clean surface 123.8 fracture, 50°, rough, clean surface

DRILLING GEOLOGIST J. Murchison ASSISTANT G. James

LOG OF BORING										BORING NO: BE1 PG 4 OF 6	
PROJECT: SSC										LOCATION: N 261,640.3 feet	
CLIENT: TETC										E 2,172,255.6 feet	
TASK NO.: 17										GROUND EL: 679.0 feet	
DATE: 5/25/89 TYPE: Nx Core										CASED TO: 4.0	
										CONTRACTOR: MJA	
DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE		PERCENT REC.	PERCENT ROD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	SAMPLE LEGEND	WATER INFORMATION	
			TOP	BOT.					DESCRIPTION OF STRATUM		
-125		Box 14		127.2		75			SHALE, (Eagle Ford), soft to med. hard, fresh, dark gray-black 124.2 Calcareous nodule 125.7 fracture, 20°, mod. rough, clean surface 126.0 fracture, 20°, rough, clean surface 126.2 fracture, 20°, smooth, clean surface 126.9 fracture, 40°, rough, clean surface 128.5 Calcareous nodule 128.7 Calcareous nodule		
-130		Box 15	127.2	132.0	66	56			Stop Drilling (5/25/)		
-135		C 5 132.5 to 135.4	132.0						Resume Drilling (5/26)		
-140		Box 16	137.2	142.0		89			136.2 fracture, 20°, rough, clean surface 136.5 fracture, 20°, rough, clean surface 137.2 fracture, 30°, rough, clean surface 137.4 fracture, 30°, rough, clean surface 137.7 fracture, 10°, smooth, clean surface 138.1 fracture, 30°, rough, clean surface 138.6 fracture, 20°, rough, clean surface 138.8 fracture, 50°, rough, clean surface 139.5 fracture, 30°, rough, clean surface 140.0 fracture, 30°, closed, clean surface 141.1 fracture, 20°, rough, clean surface 142.1 30° dip fault, rough, clean surface 142.3 Disturbed 142.9 Calcareous band 145.6 Irregular break, could be low angle frac. 145.9 Calcareous band 147.3-147.8 Limestone band 148.7-151.1 Soft zone (Sample 148.3-149.8) (20 min. run - core stuck in bbl) 154.2 fracture, 40°, rough, clean surface 153.6-154.2 Calcareous zone 154.2-154.6 Soft zone 156.2-156.4 Calcareous bands & nodules 156.7 fracture, 30°, rough, clean surface 156.7 Limestone bands		
-145		Box 17	142.0	152.0	100	98					
-150		C 6 148.3 to 149.8									
-155		Box 18	152.0	155.5		50	45				
-160		Box 18	162.0	162.0							

DRILLING GEOLOGIST J. Murchison ASSISTANT G. James

LOG OF BORING										BORING NO: BE1 PG 5 OF 6	
PROJECT: SSC										LOCATION: N 261,640.3 feet	
CLIENT: TETC										E 2,172,255.6 feet	
TASK NO.: 17										GROUND EL: 679.0 feet	
DATE: 5/26/89 TYPE: Nx Core										CASED TO: 4.0	
										CONTRACTOR: MJA	
DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE		PERCENT REC.	PERCENT ROD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	SAMPLE LEGEND	WATER INFORMATION	
			TOP	BOT.					S = SPLIT SPOON T = 2" THIN WALL TUBE U = 3" THIN WALL TUBE C = NX ROCK CORE		
										DESCRIPTION OF STRATUM	
				162.0						SHALE, (Eagle Ford), soft to med. hard, fresh, dark gray-black	
-165		Box 18			77	77				164.9 fracture, 30°, rough, clean surface 164.9 Pyrite nodule 165.7 Pyrite nodule 166.3 Limestone band 166.9 Limestone stringer 167.4 Limestone seam 167.6-168.9 Calcareous zone 169.6 Calcareous seam 171.8-172.4 Soft zone (End Run) 172.7-173.6 Calcareous zone 174.1-174.3 Calcareous zone	
-170		C 7	169.7								
		174.1 to 175.8	172.0								
-175		Box 19			60	60					
		178.6								178.3-178.6 30° dipping fracture, rough, clean surface 180.2 Calcareous nodule 180.8 Calcareous nodule * Recovered all core from hole	
-180		Box 20	179.5			89					
		183.5									
-185			183.5							186.0-186.1 Limestone band	
		187.8			100	100				No Breaks	
-190		Box 21									
		C 8	192.0							(Sample 192.0-193.65)	
		192.0 to 193.65	192.0								
-195					100	100					
		197.7									
-200		Box 22								201.6 Limestone nodule	
		202.0									

DRILLING GEOLOGIST J. Murchison ASSISTANT G. James



**APPENDIX B**

**WIRE-LINE LOGS**

# WIRE-LINE LOGGING PARAMETERS

Hole No. BE1

Log Measured From: Ground Level

## Drilling Parameters

Depth 310+ feet

Bit Diameter 3.125 inches

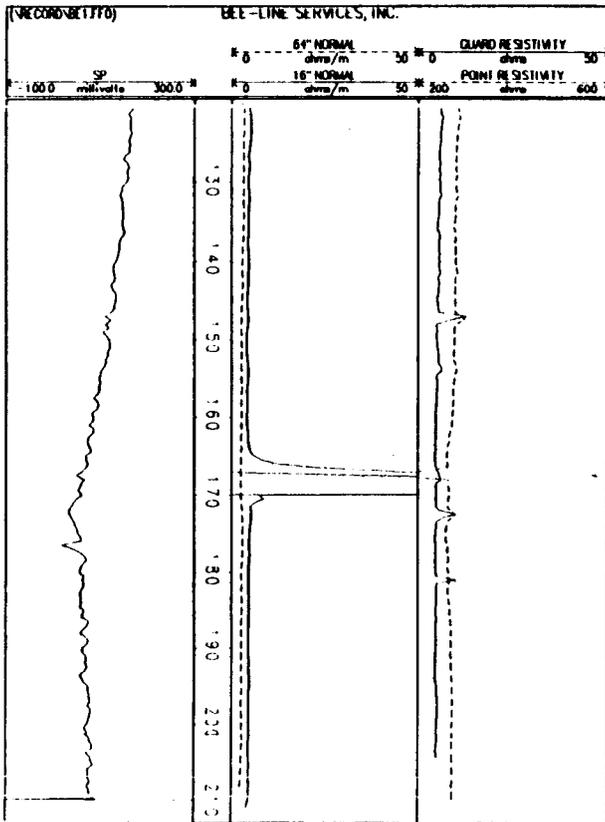
<u>Logging Parameters</u>	<u>Electrical Log</u>	<u>Gamma Log</u>	<u>Sonic Log</u>
Date	May 26, 1989	May 26, 1989	May 26, 1989
Bottom Log Interval	210.5 feet	210 feet	206.1 feet
Top Log Interval	surface	surface	surface
Type of Fluid in Hole	boring fluid	boring fluid	boring fluid
Time Since Circulation Stop	1 hour	1 hour	1 hour
Probe Type/S.N.	ALP-4979	XAP-4383	CLP-4877A
Module Type/S.N.	ALM-4979	XAM-4383	CLM-4877A
Logging Speed	20 feet/min.	19 feet/min.	7 feet/min.
Sample Interval	0.5 feet	0.5 feet	0.5 feet

Logged by: BEE-LINE SERVICES, INC.  
P.O. Box 2096  
Corsicana, TX 75151

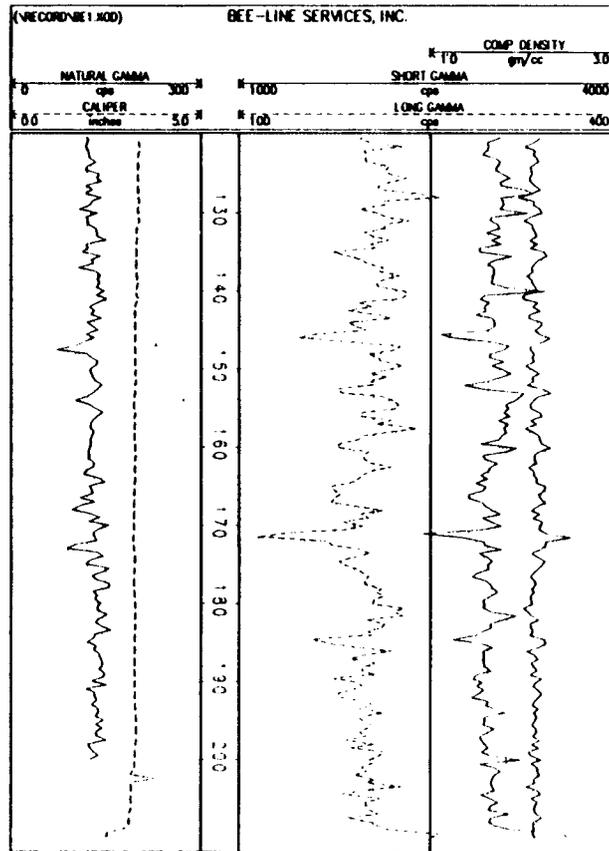


BE1 Wire-line logs run May 26, 1989. Surface elevation 679.0 feet.

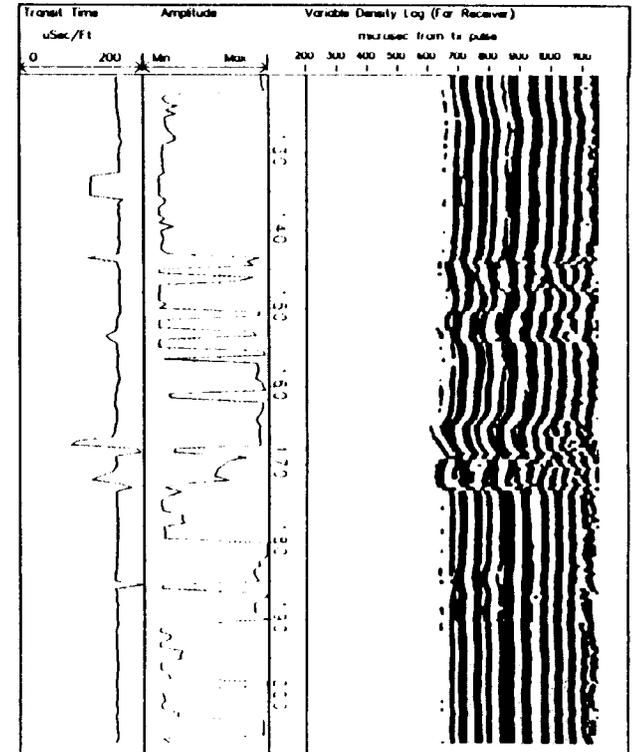
**ELECTRICAL LOG CONTINUED**



**GAMMA LOG CONTINUED**

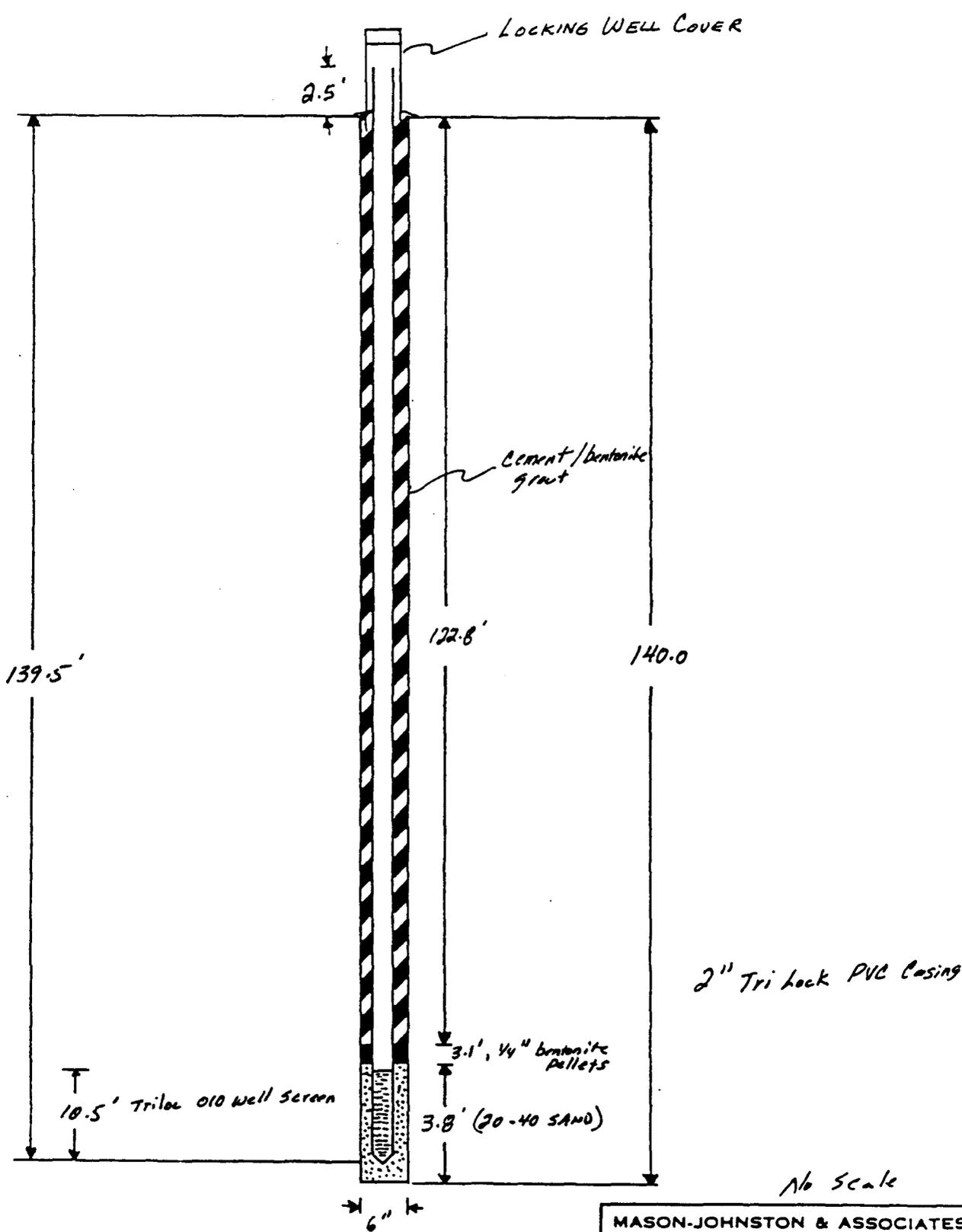


**SONIC LOG CONTINUED**



**APPENDIX C**

**AS-BUILT DRAWING AND BOREHOLE PLUGGING REPORT**



Well set in offset boring

MASON-JOHNSTON & ASSOCIATES, INC. GEOLOGISTS - ENGINEERS DALLAS, TEXAS	
SSC TASK 17, BE-1A As Built Monitor Well	
DATE 6/1/89	SHEET 1

GEOLOGISTS

### SSC BOREHOLE PLUGGING REPORT

TETC Project No. 87-888-0017

Task No. 17

Boring No. BE-1

Texas Coordinate Location:

N 261,640.3 feet

E 2,172,255.6 feet

Surface Elevation: 679.0 feet

Total Boring Depth: 212

Plugging Remarks: Boring Grouted with packer  
in the hole. Packer pushed down to ~175'  
(top of straddle packer). Cement/with  
Bentonite grout placed with PVC Tremie  
pipe. Approximate water cement ratio was  
6 gallons per sack. Total Cement used  
was ~ 12 sacks

Grout to surface  
in open hole  
(No casing)

Austin  
chalk

Eagle Ford  
shale

175'

Straddle  
packer  
assembly

212'

Date Plugged: 5/31/89

Time Completed: 5:25 PM

Drilling Geologist: John Marchison  
MJA Coordinator: Bill Flenigan  
MJA No.: 5530.17

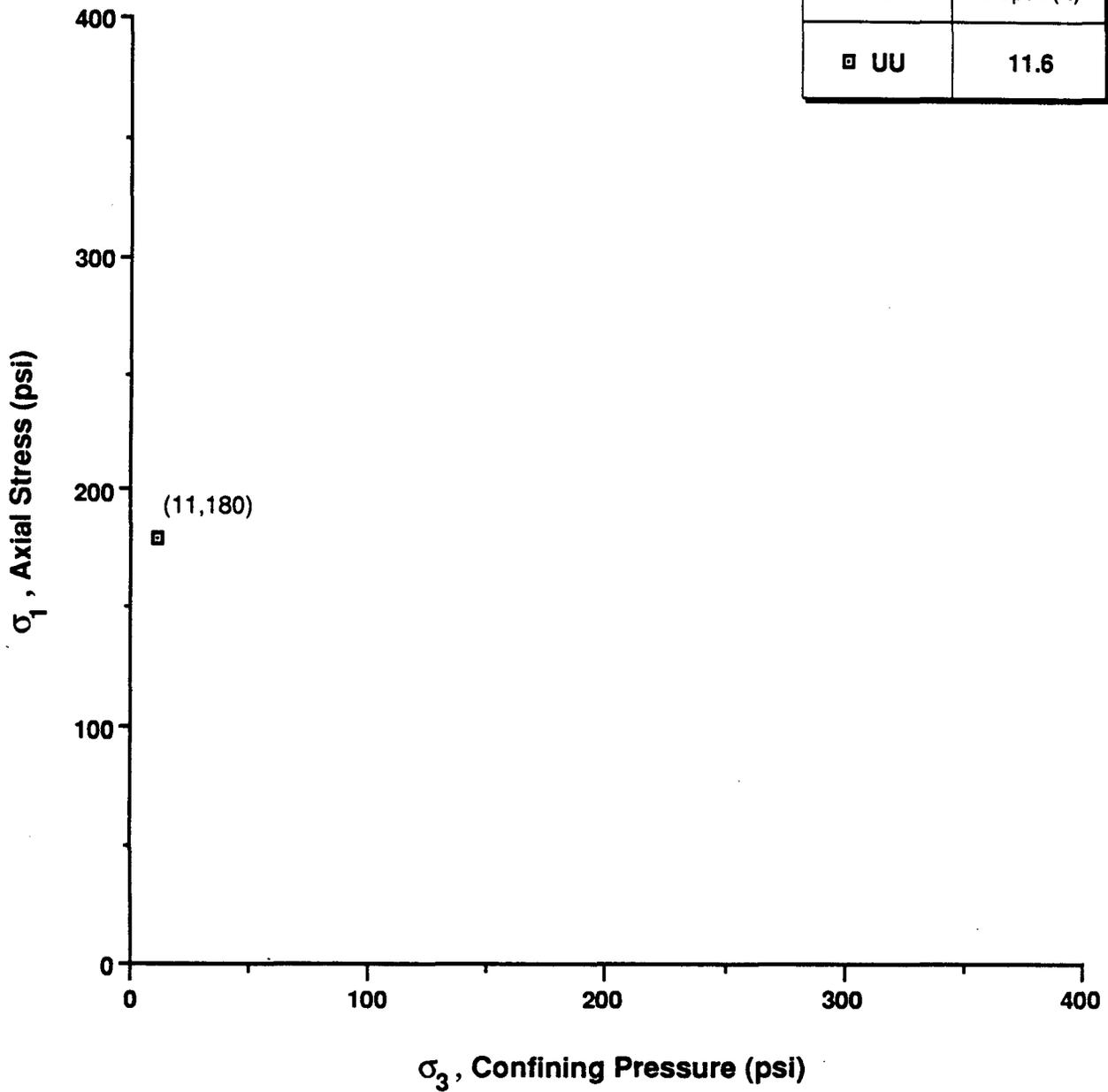
ENGINEERS



**APPENDIX D**

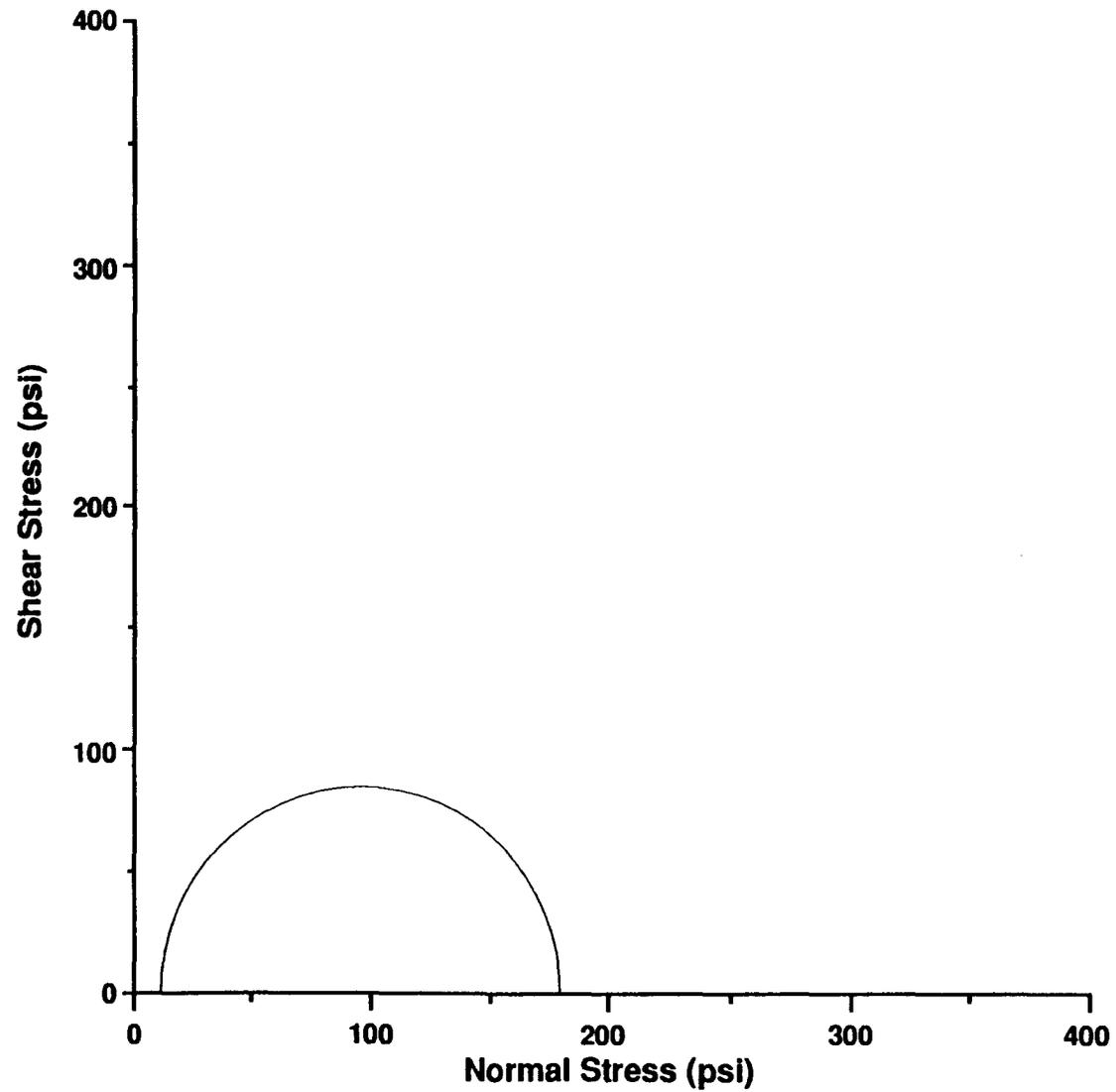
**DIAGRAMS OF LABORATORY RESULTS**

BORING BE1 Austin Chalk	
Test	Depth (ft)
□ UU	11.6



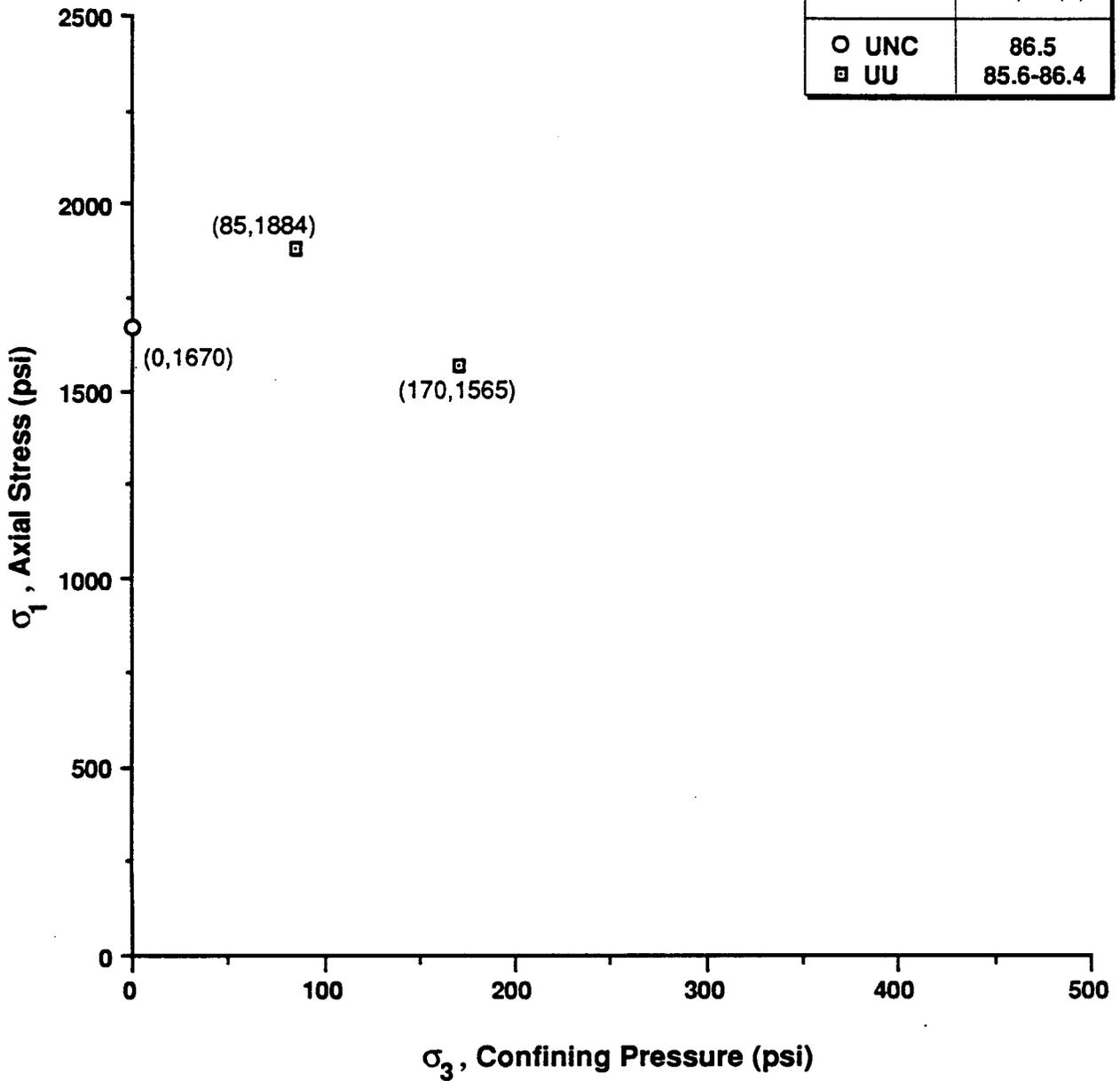
UU- ASTM D2664

BORING BE1 Austin Chalk	
Test	Depth (ft)
UU	11.6



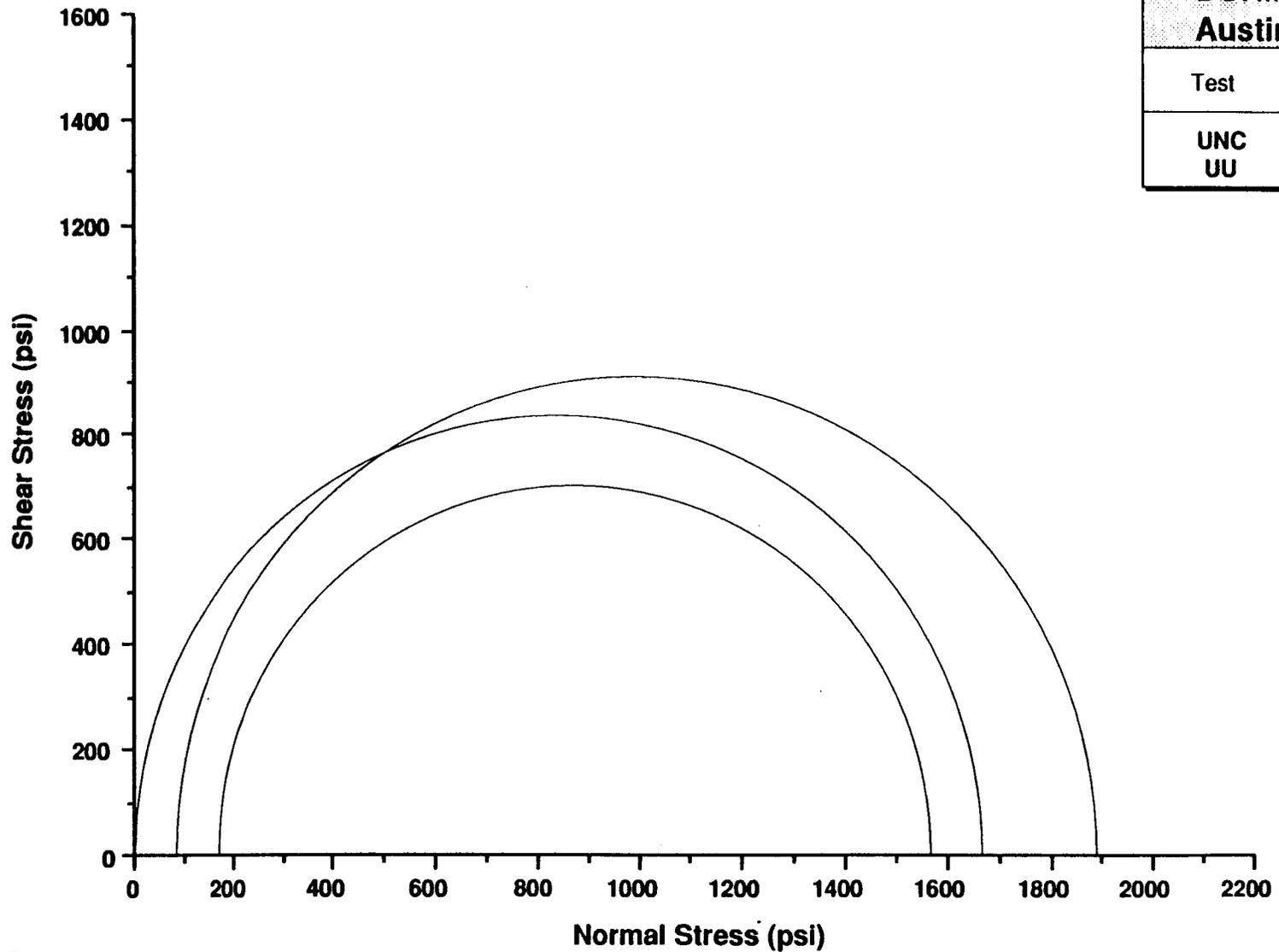
UU-ASTM 2664

BORING BE1 Austin Chalk	
Test	Depth (ft)
○ UNC	86.5
□ UU	85.6-86.4



UNC-ASTM D2938  
 UU- ASTM D2664

BORING BE1 Austin Chalk	
Test	Depth (ft)
UNC	86.5
UU	85.6-86.4



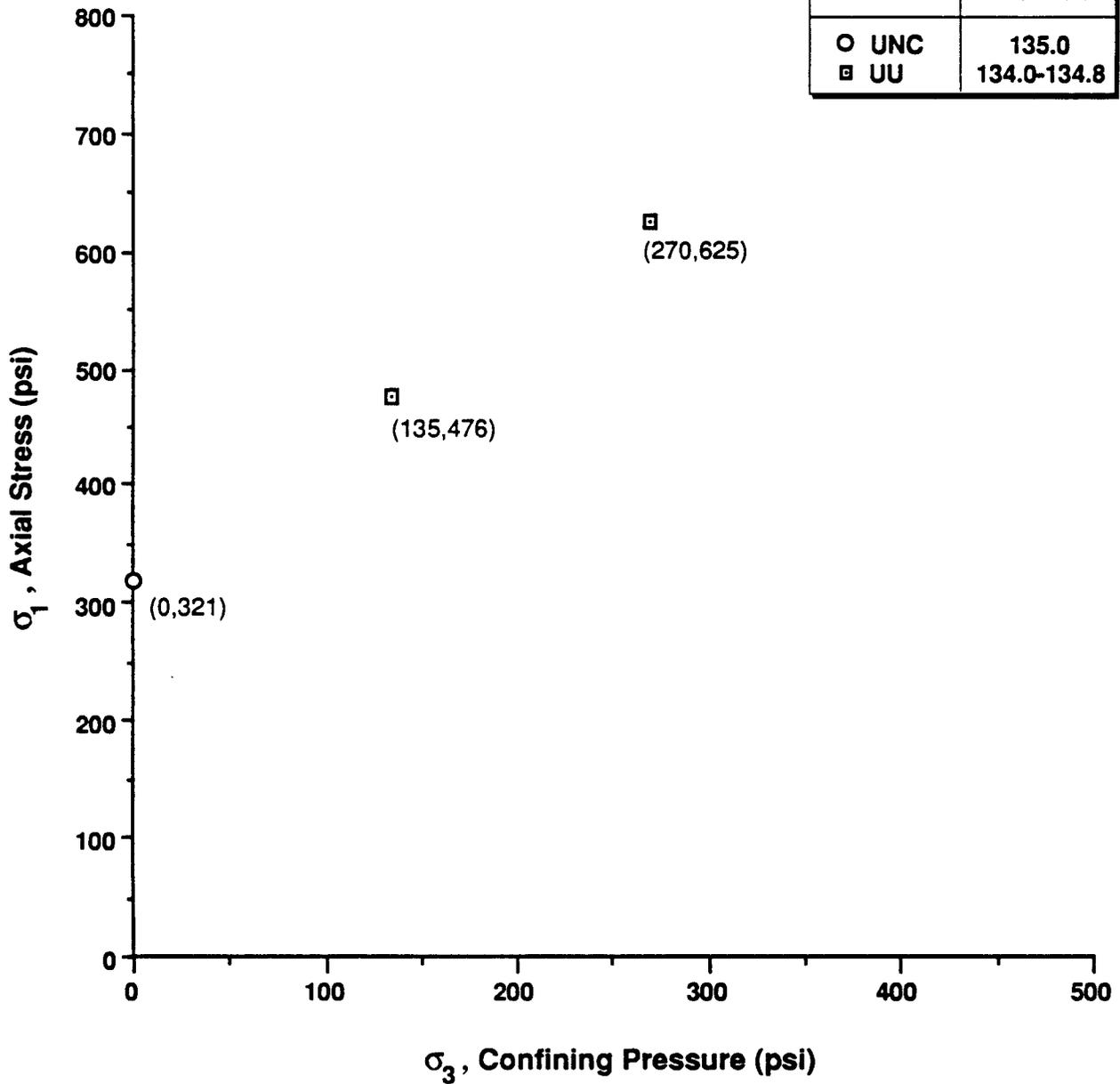
UNC-ASTM D2938  
UU-ASTM D2664



**Mohr Circle Plot  
Texas SSC Site**

**FIGURE  
D-4**

BORING BE1 Eagle Ford Shale	
Test	Depth (ft)
○ UNC	135.0
▣ UU	134.0-134.8



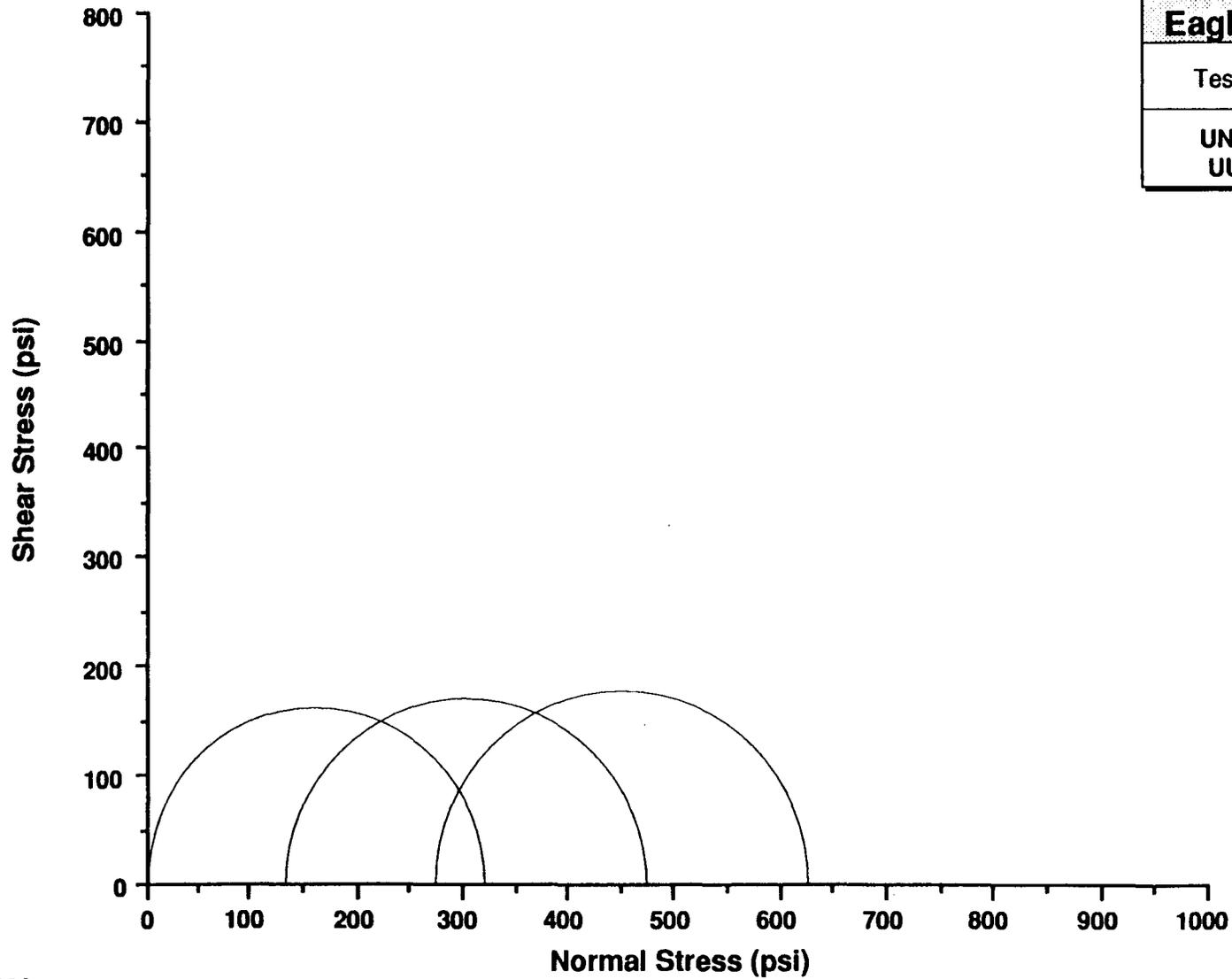
UNC-ASTM D2938  
 UU- ASTM D2664



**Compression Test  
 Texas SSC Site**

**FIGURE  
 D-5**

BORING BE1 Eagle Ford Shale	
Test	Depth (ft)
UNC	135.0
UU	134.0-134.8



UNC-ASTM D2938  
UU-ASTM D2664