SSCL-SR-1097

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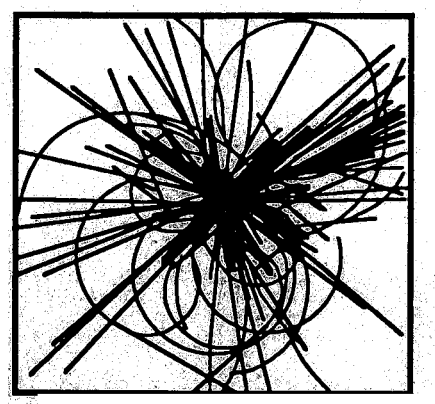
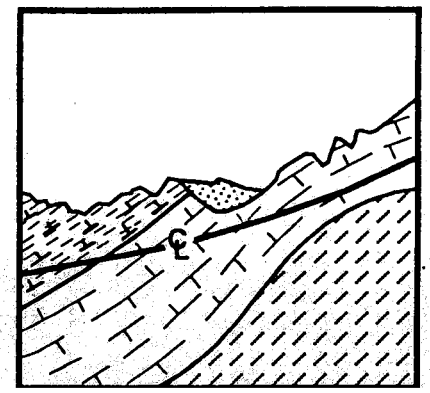
Project No. 87-888-0017
Report No. SSC-GR-38
July 1990

GR-38

Data Report for Marker Bentonite Coreholes B 1296, B 1316, B 2052, and B 2062





Prepared by: The Earth Technology Corporation
Long Beach, California

Prepared for: RTK a joint venture
Oakland, California

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
- Structure-specific data
- Global data

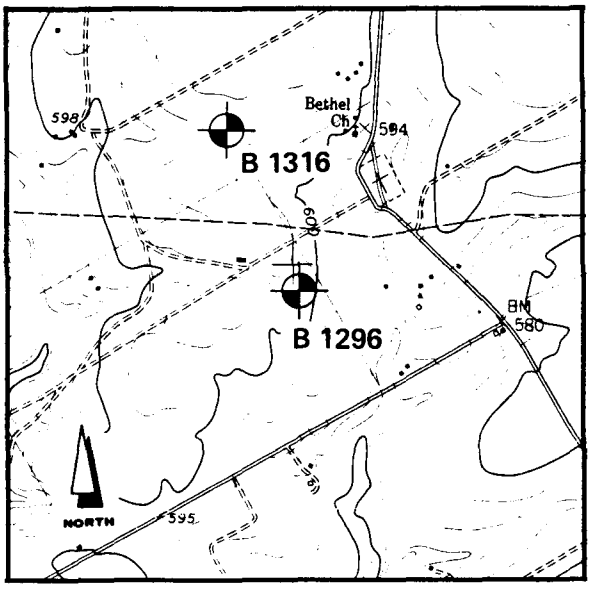
This is one in a series of data reports prepared for the global data phase of geotechnical characterization at the SSC site. Data collection for this study phase focused on drillhole-based geological, geohydrological, geophysical, and geotechnical tests in the near vicinity of the E and F access shaft sites. Additionally, several coreholes were drilled where the main tunnel is expected to penetrate geotechnically significant as well as possibly problematic stratigraphic intervals. The global data set has three key attributes: (1) uniform geographic distribution over the site footprint, (2) complete coverage of all of the strata through which the SSC tunnels and shafts will pass, and (3) consistency of the data from sampling site to sampling site throughout the SSC site. In combination with data from the other phases, these data will allow conceptual designs of construction methods. Each data report includes the results of both field and laboratory tests for specific drilling and sampling site(s).

DATA REPORT

Site Designator: Marker Bentonite Coreholes B 1296, B 1316, B 2052, and B 2062

Objective: Drill four coreholes where the main tunnel is expected to intersect the "marker" bentonite (base of A25) to determine geotechnical conditions through laboratory geomechanical testing.

Coreholes **B 1296** and **B 1316** are located on the southwestern section of the proposed tunnel alignment, approximately 1.25-1.5 miles northwest of Five Points, Texas.

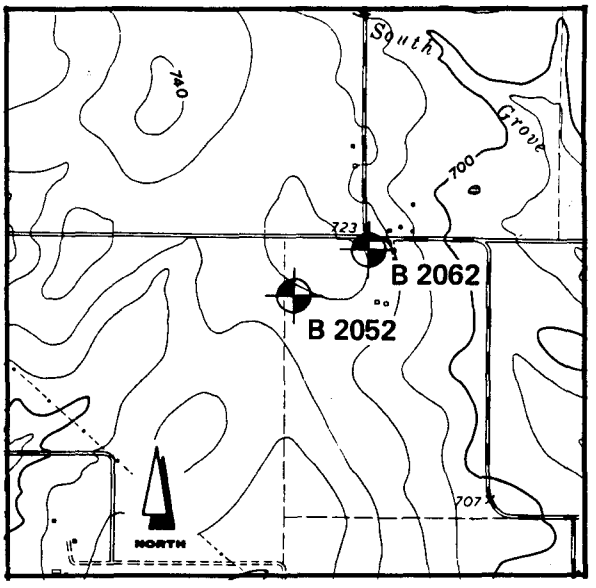


SCALE 1:24,000

0 1000 2000 3000 4000 Feet

CONTOUR INTERVAL 10 FEET

Coreholes **B 2052** and **B 2062** are located on the north-northwestern section of the proposed tunnel alignment, near the intersection of Patsy Road and FM 664.



SCALE 1:24,000

0 1000 2000 3000 4000 Feet

CONTOUR INTERVAL 10 FEET

Boring Locations:

Boring	Northing (feet)	Easting (feet)	Surface Elevation (feet)
B 1296	227,477	2,180,383	600.8
B 1316	229,310	2,179,576	623.1
B 2052	294,871	2,188,867	725.6
B 2062	295,394	2,189,735	724.7

Scope and Schedule:

Boring	Drilling	Wire-Line Logging	Laboratory Testing	Plugging
B 1296	Feb. 12 to 13, 1990	Feb. 13, 1990	Feb. 19 to 23, 1990	Feb. 13, 1990
B 1316	Feb. 14 to 16, 1990	Feb. 17, 1990	Feb. 19 to 23, 1990	Feb .17, 1990
B 2052	Feb. 19 to 20, 1990	Feb. 20, 1990	Mar. 2 to 22, 1990	Feb. 22, 1990
B 2062	Feb. 20 to 22, 1990	Feb. 22, 1990	Mar. 2 to 22, 1990	Feb. 23, 1990

Conditions Encountered: (see lithologic logs, Appendix A)

Boring	Total Depth (feet)	Soil (feet)	Weathered Austin Chalk (feet)	Fresh Austin Chalk (feet)
B 1296	140.0	0.0 to 0.5	0.5 to 14.5	14.5 to 140.0
B 1316	149.0	0.0 to 2.0	2.0 to 12.5	12.5 to 149.0
B 2052	225.0	0.0 to 4.0	4.0 to 9.5	9.5 to 225.0
B 2062	234.0	0.0 to 3.5	3.5 to 21.0	21.0 to 234.0

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

Boring	Spontaneous Potential (SP)	Normal Resistivity (Short & Long)	Guard Resistivity	Point Resistance	Natural Gamma	Short & Long Gamma	Compensated Density (caliper)	Sonic Velocity (full wave)
B 1296	X	Note	X	X	X	X	X	X
B 1316	X	X	X	X	X	X	X	X
B 2052	X	X	X	X	X	X	X	X
B 2062	X	X	X	X	X	X	X	X

Note: Tool malfunction

Bulk and Clay Mineralogy Test Results:

Formation: Austin Chalk

Boring: B 1296 Depth: 95.5 ft

Whole Rock Composition:

Mineral	Percent
total clay	32
others (not analyzed)	68
Total	100

Relative Clay Abundance:

Mineral	Percent
smectite	100
Total	100

Boring: B 1316 Depth: 113.4 ft

Whole Rock Composition:

Mineral	Percent
total clay	10
others (not analyzed)	90
Total	100

Relative Clay Abundance:

Mineral	Percent
illite	41
smectite	59
Total	100

Boring: B 1316 Depth: 114.2 ft

Whole Rock Composition:

Mineral	Percent
total clay	43
others (not analyzed)	57
Total	100

Relative Clay Abundance:

Mineral	Percent
illite	9
smectite	91
Total	100

Boring: B 2052 Depth: 190.4 ft

Whole Rock Composition:

Mineral	Percent
quartz	<1
calcite	47
pyrite	3
total clay	50
Total	100

Relative Clay Abundance:

Mineral	Percent
illite	14
smectite	86
Total	100

Boring: B 2062 Depth: 199.0

Whole Rock Composition:

Mineral	Percent
quartz	<1
calcite	<1
pyrite	4
total clay	96
Total	100

Relative Clay Abundance:

Mineral	Percent
illite	11
smectite	89
Total	100

Laboratory Geomechanical Test Results Summary: (see also Appendix C)

Vertical Depth (ft)	Formation/ Lithology	Moisture Content (%)	Dry Density (pcf)	Unconfined Compressive Strength (psi)	Tangent Young's Modulus E_{50} (psi x 10^5)	Brazil Tensile Strength (psi)
			Boring: B 1296			
95	Bentonite	40-47				
96	Austin Chalk	12	126	2488	2.70	
114	Austin Chalk	11-12	128	1070	2.60	
121	Austin Chalk	14-15	122	2608	7.90	
130	Austin Chalk	15-16	118	2576	1.30	
			Boring: B 1316			
28	Austin Chalk	15	118	2207	6.90	
107-108	Austin Chalk	13-14	118-121		2.78-4.36	
114	Bentonite	33-38	88			
133	Austin Chalk	14	123			
			Boring: B 2052			
185	Austin Chalk	16	117	2206	11.00	
191	Bentonite	32				
191	Austin Chalk	11-13	131	666	1.80	302
217-218	Austin Chalk	11-15	119-127	961-2579	0.72-5.90	
			Boring: B 2062			
155-156	Austin Chalk	13-16	114-124	939	0.83-3.96	
199	Bentonite	34	84			
210	Austin Chalk	12-13	126	2535	4.30	

Hole Status: All the borings were filled with cement grout and abandoned (see also plugging reports, Appendix D).

APPENDIX A

LITHOLOGIC LOGS

LITHOLOGIC LOG

BORING B 1296

LOG OF BORING

PROJECT: Superconducting Supercollider

CLIENT: The Earth Technology Corporation

TASK NO.: 17

BORING NO: B 1296 PG 1 OF4

LOCATION: N 227,477 ft.
E 2,180,383 ft.

GROUND EL: 600.8 ft.

DATE: 2-12/13-90 TYPE: Rotary Wash CASED TO: N/A CONTRACTOR: SwL (89-192)

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE TOP	DEPTH RANGE BOT.	PERCENT REC.	PERCENT RQD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	DESCRIPTION OF STRATUM
									CLAY, silty, dark brown, traces of roots and organic debris. 0.5
5									LIMESTONE (Austin Chalk) soft, severely weathered, tan with occasional soft brown clay layers.
10									
15									14.5 LIMESTONE (Austin Chalk) medium hard, fresh, light gray to dark gray.
20									
25									
30									
35									
40									

SAMPLE LEGEND

S= SPLIT SPOON
T= 2" THIN WALL TUBE
U= 3" THIN WALL TUBE
C= NX ROCK CORE

WATER INFORMATION

Rotary Wash 0'-80' with air on 2-12-90. Water at 73' on 2-13-90. NX Core with water at 80'-140' T.D.

DRILLING GEOLOGIST M. Granger ASSISTANT Gary White CHECKED BY Shawn Wood

LOG OF BORING

PROJECT: Superconducting Supercollider

CLIENT: The Earth Technology Corporation

TASK NO.:

BORING NO: B 1296 PG 2 OF 4

LOCATION: N 227,477 ft.
E 2,180,383 ft.

GROUND EL: 600.8 ft.

DATE: 2-12/13-90 TYPE: Rotary Wash CASED TO: N/A CONTRACTOR: SwL (89-192)

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE TOP	DEPTH RANGE BOT.	PERCENT REC.	PERCENT RQD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	SAMPLE LEGEND	WATER INFORMATION
									S= SPLIT SPOON T= 2" THIN WALL TUBE U= 3" THIN WALL TUBE G= NX ROCK CORE	See p. 1 of 4

DESCRIPTION OF STRATUM

45
50
55
60
65
70
75
80

80.0

LIMESTONE (Austin Chalk) medium hard, fresh, light gray to dark gray, occasional bentonite seams.

-bentonite seam, bluish-gray at 50.5'
-bentonite seam, bluish-gray at 54.0'

DRILLING GEOLOGIST Mike Granger ASSISTANT Gary White CHECKED BY Shawn Wood

LOG OF BORING

PROJECT: Superconducting Supercollider

CLIENT: The Earth Technology Corporation

TASK NO.:

BORING NO: B 1296 PG 3 OF 4

LOCATION: N 227,477 ft. E 2,180,383 ft.

GROUND EL: 600.8 ft.

DATE: 12/13-90 TYPE: NX Core CASED TO: N/A CONTRACTOR: SwL (89-192)

SAMPLE LEGEND: S= SPLIT SPOON; T= 2" THIN WALL TUBE; U= 3" THIN WALL TUBE; C= NX ROCK CORE

WATER INFORMATION: See p. 1 of 4

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE TOP	DEPTH RANGE BOT.	PERCENT REC.	PERCENT RQD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	DESCRIPTION OF STRATUM
85		C1	80.0	90.0	100	100			LIMESTONE (Austin Chalk), moderately to medium hard, fresh, light gray to dark gray with 0.3' to 2' thick moderately argillaceous to shaly limestone interbeds 1' to 5' apart. Also fossil partings, bentonite layer, low angle fractures, and traces of pyrite. -fossil partings 80.5', 81.0, 82.0', 82.6' and 83.5' -moderately argillaceous layer , dark gray gradational contact at 81.1' to sharp contact at 82.0' - shaly limestone layer , dark gray, sharp contacts at 82.9'-84.3' -moderately argillaceous layer , medium gray, gradational contacts at 86.5'-87.7' -moderately argillaceous layer , medium gray, gradational contact at 88.6' to sharp contact 90.1' -moderately argillaceous layer , medium gray, gradational contact at 91.4' to sharp contact at 92.1' -soft bentonitic layer , light gray with 20° fracture, smooth, open, gradational contact at 92.9' to sharp contact at 93.1' -moderately argillaceous layer , medium gray, sharp contacts at 93.8'-95.3' -soft bentonite layer , bluish-gray, sharp contacts at 95.3'-95.7' -moderately argillaceous layer , medium gray, gradational contact at 96.0' to sharp contact at 97.8' -moderately argillaceous layer , medium gray, gradational contact at 100.0' to sharp contact at 100.8' -shaly limestone layer , medium gray, gradational contacts at 101.4'-102.4' -fossil partings at 102.7 and 107.0' -shaly limestone layer , dark gray, sharp contact at 103.2' to gradational contact at 103.8' -¼" pyrite nodule at 103.5' -shaly limestone layer , dark gray, sharp contact at 109.0' to gradational contact at 109.3' -shaly limestone layer , dark gray, sharp contacts at 110.7'-111.1' -shaly limestone layer , dark gray, gradational contact at 112.4' to sharp contact at 114.0' -1" pyrite nodules at 112.8', 114.4', 115.5' and 116.2'
90			90.0	100.0	93	93			
95		C2							
100			100.0	110.0	100	100			
105		C3							
110			110.0	120.0	92	92			
115		C4							
120									

DRILLING GEOLOGIST Mike Granger ASSISTANT Gary White CHECKED BY Shawn Wood

LOG OF BORING

PROJECT: Superconducting Supercollider

CLIENT: The Earth Technology Corporation

TASK NO.: 17

BORING NO: B 1296 PG 4 OF 4

LOCATION: N 227,477 ft.
E 2,180,383 ft

GROUND EL: 600.8 ft.

DATE: 2-12/13-90 TYPE: NX Core CASED TO: N/A CONTRACTOR: SwL (89-192)

SAMPLE LEGEND

S= SPLIT SPOON
T= 2" THIN WALL TUBE
U= 3" THIN WALL TUBE
C= NX ROCK CORE

WATER INFORMATION

See p. 1 of 4

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE TOP	DEPTH RANGE BOT.	PERCENT REC.	PERCENT RQD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	DESCRIPTION OF STRATUM
			120.0						LIMESTONE (Austin Chalk), moderately to medium hard, fresh, light gray to dark gray with 0.1'to 1' thick moderately argillaceous to shaly limestone interbeds 1' to 4' apart. Also medium angle fractures.
125		C5			100	100			-shaly limestone layer, dark gray, sharp contacts at 122.7'-123.3' -shaly limestone layer, dark gray, sharp contacts at 127.8'-128.5' -60°, open, healed, calcite filled, (1/8"), fracture at 128.6'
130				130.0					-shaly limestone layer, dark gray, gradational contact at 129.1' to sharp contact at 129.3' -moderately argillaceous layer, medium gray, sharp contact at 131.4' to gradational contact at 131.7'
			130.0						
135		C6			91	91			-moderately argillaceous layer, medium gray, gradational contact at 132.6' to sharp contact at 133.5' -moderately argillaceous layer, medium gray, sharp contacts at 134.7'-134.8' -45°, open, healed, calcite filled ($\frac{1}{4}$"), fracture at 131.5'
140				140.0					-moderately argillaceous layer, medium gray, gradational contact at 137.1' to sharp contact at 137.5'
145									
150									Bottom of Exploration at 140.0 feet.
155									
160									

DRILLING GEOLOGIST Mike Granger ASSISTANT Gary White CHECKED BY Shawn Wood

LITHOLOGIC LOG

BORING B 1316

LOG OF BORING

PROJECT: Superconducting Supercollider

CLIENT: The Earth Technology Corporation

TASK NO.: 17

BORING NO: B 1316 PG 1 OF 4

LOCATION: N 229,310 ft. E 2,179,576 ft.

GROUND EL: 623.1 ft.

DATE: 2-14/16-90 TYPE: Rotary Wash/NX Core CASED TO: N/A CONTRACTOR: SwL (89-192)

SAMPLE LEGEND

S= SPLIT SPOON
T= 2" THIN WALL TUBE
U= 3" THIN WALL TUBE
C= NX ROCK CORE

WATER INFORMATION

Air Rotary Wash 0'-25', seepage at 18'. NX Core, water rotary 25' to T.D.

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE TOP	DEPTH RANGE BOT.	PERCENT REC.	PERCENT RQD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	DESCRIPTION OF STRATUM
									CLAY, silty, dark brown, traces of roots and organic debris.
									2.0
5									LIMESTONE (Austin Chalk) soft, severely weathered, tan with occasional brown clay layers.
10									12.5
15									LIMESTONE (Austin Chalk), moderately to medium hard, fresh, light gray to dark gray with 0.2' to 1' thick slightly, moderately, extremely argillaceous to shaly limestone interbeds 1' to 3' apart. Also fossil partings, bentonite layer, and medium angle fractures.
20									
25			25.0						-shaly limestone layer, dark gray, gradational contact at 25.0' to sharp contact at 25.2'
									-slightly argillaceous and moderately fossiliferous layer, medium gray, gradational contacts at 26.6'-27.4'
30		C1			100	100			-shaly limestone layer, dark gray, gradational contacts at 28.8'-29.6'
									-shaly limestone layer, dark gray, sharp contact at 31.4' to gradational contact at 32.7'
									-fossil parting at 33.1'
									-shaly limestone layer, dark gray, sharp contact at 35.8' to gradational contact at 36.2'
35				35.0					
			35.0						-moderately argillaceous layer, medium gray, gradational contacts at 38.9'-39.8'
									-shaly limestone layer, dark gray, gradational contact at 39.8' to sharp contact at 40.3' with 40°, smooth, open, slickensided fracture at 40.1' and interbedded bentonite, bluish-gray at 40.2'
40		C2			100	99			
									-fossil parting at 42.0'
									-shaly limestone layer, dark gray, sharp contacts at 43.0'-44.2'

DRILLING GEOLOGIST M. Granger ASSISTANT Gary White CHECKED BY Shawn Wood

LOG OF BORING

PROJECT: Superconducting Supercollider

CLIENT: The Earth Technology Corporation

TASK NO.: 17

BORING NO: B 1316 PG 2 OF 4

LOCATION: N 229,310 ft. E 2,179,576 ft.

GROUND EL: 623.1 ft.

DATE: 2-14/16-90 TYPE: NX Core CASED TO: N/A CONTRACTOR: SwL (89-192)

SAMPLE LEGEND: S= SPLIT SPOON; T= 2" THIN WALL TUBE; U= 3" THIN WALL TUBE; C= NX ROCK CORE

WATER INFORMATION: See p. 1 of 4

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE TOP	DEPTH RANGE BOT.	PERCENT REC.	PERCENT RQD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	DESCRIPTION OF STRATUM
45									LIMESTONE (Austin Chalk), moderately to medium hard, frsh, light gray to dark gray with 0.4' to 2' thick moderately argillaceous to shaly limestone interbeds 1' to 6' apart. Also shale layers 0.3' thick, fossil partings.
		C3	45.0	55.0	98	98			-fossil partings at 46.3 and 47.9' -shaly limestone layer , dark gray, gradational contacts at 48.2'-49.8' -shaly limestone layer , dark gray, gradational contacts at 51.5'-52.8' -moderately argillaceous layer , medium gray, gradational contact at 54.2' to sharp contact at 55.2' -fossil partings at 55.2' and 56.6' -shaly limestone layer , dark gray, sharp contacts at 58.4'-59.3' -fossil parting at 59.3'
50									
55									
		C4	55.0	65.0	97	97			-soft shale layer , medium gray, gradational contacts at 59.9'-60.3' -fossil parting at 61.6' -shaly limestone layer , dark gray, sharp contacts at 63.0'-63.4' -moderately argillaceous layer , medium gray, sharp contacts at 65.4'-66.0' -soft shale layer , dark gray, sharp contacts at 68.1'-68.4' -fossil parting at 70.2' -shaly limestone layer , dark gray, sharp contacts at 70.5'-70.9'
60									
65									
		C5	65.0	75.0	100	100			-fossil partings at 73.7', 74.8' and 76.0' -shaly limestone layer , dark gray, gradational contacts at 76.9'-77.6' -fossil partings at 78.6' and 80.2' -shaly limestone layer , dark gray, gradational 79.9'-81.2' -fossil parting at 82.6'
70									
75									
		C6	75.0		100	100			
80									

DRILLING GEOLOGIST M. Granger ASSISTANT Gary White CHECKED BY Shawn Wood

LOG OF BORING

PROJECT: Superconducting Supercollider

CLIENT: The Earth TEchnology Corporation

TASK NO.: 17

BORING NO: B 1316 PG 3 OF 4

LOCATION: N 229,310 ft.
E 2,179,576 ft.

GROUND EL: 623.1 ft.

DATE: 2-14/16-90 TYPE: NX Core CASED TO: NX Core CONTRACTOR: SwL (89-192)

SAMPLE LEGEND:
S= SPLIT SPOON
T= 2" THIN WALL TUBE
U= 3" THIN WALL TUBE
C= NX ROCK CORE

WATER INFORMATION: See p. 1 of 4

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE TOP	DEPTH RANGE BOT.	PERCENT REC.	PERCENT RQD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	DESCRIPTION OF STRATUM
85									LIMESTONE (Austin Chalk), moderately to medium hard, fresh, light gray to dark gray with 0.2' to 2' thick moderately argillaceous to shaly limestone interbeds 1' to 4' apart. Also bentonitic shale layers 0.4' thick, fossil partings, benonite layer, high angle fractures and traces of pyrite.
		C7	85.0	95.0	100	100			-1" bentonite layer, bluish-gray at 86.3' -shaly limestone layer, dark gray, sharp contacts at 88.1'-88.3' -fossil parting at 90.2' -¼" pyrite nodule at 92.1' -shaly limestone layer, dark gray, sharp contact at 92.8' to gradational contact at 93.9' -fossil parting at 94.6' -shaly limestone layer, dark gray, gradational contacts at 95.4'-96.1' -shaly limestone layer, dark gray, gradational contacts at 97.1'-97.9'
90									
95									
		C8	95.0	105.0	99	99			-moderately argillaceous layer, medium gray, gradational contacts at 99.4'-100.1' -shaly limestone layer, dark gray, gradational contacts at 101.2'-102.6' -vertical, open, healed, calcite filled, hairline fracture at 102.1'-106.1' -shaly limestone layer, dark gray, gradational contacts at 104.7'-106.2' -shaly limestone layer, dark gray, sharp contacts at 107.0'-108.6'
100									
105									
		C9	105.0	115.0	100	100			-shaly limestone layer, dark gray, sharp contacts at 109.9'-110.7' -soft bentonitic shale layer, medium gray, sharp contacts at 111.4'-111.6' -moderately argillaceous layer, medium gray, gradational contacts at 112.2'-112.7' -soft bentonitic shale layer, medium gray, gradational contacts at 113.4'-113.8' -bentonite layer, bluish-gray, gradational contacts at 113.8'-114.5' -fossil partings at 115.0' and 117.3' -moderately argillaceous layer, medium gray, sharp contact at 115.0' to gradational contact at 116.3'
110									
115									
		C10	115.0		100	100			-moderately argillaceous layer, medium gray, gradational contacts at 118.2'-119.1' -moderately argillaceous layer, medium gray, sharp contacts at 121.5'-122.1' -moderately argillaceous layer, medium gray, gradational contacts at 123.3'-124.7'
120									

DRILLING GEOLOGIST Mike Granger ASSISTANT Gary White CHECKED BY Shawn Wood

LOG OF BORING

PROJECT: Superconducting Supercollider

CLIENT: The Earth Technology Corporation

TASK NO.: 17

BORING NO: B 1316 PG 4 OF 4

LOCATION: N 229,310, ft.
E 2,179,576 ft.

GROUND EL: 623.1 ft.

DATE: 2-14/16-90 TYPE: NX Core CASED TO: N/A CONTRACTOR: SwL (89-192)

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE TOP	DEPTH RANGE BOT.	PERCENT REC.	PERCENT RQD.	STANDARD PENETRATION TEST PER 6 INCHES		HAND PEN. TSF.	DESCRIPTION OF STRATUM
										LIMESTONE (Austin Chalk), moderately to medium hard, fresh, light gray to dark gray with 0.3' to 2' thick moderately argillaceous to shaly limestone interbeds 3' to 9' apart. Also shale layers 0.2' thick, low to high angle fractures, and traces of pyrite.
125										-¼" pyrite nodule at 127.2'
			125.0							-moderately argillaceous layer, medium gray, gradational contacts at 127.1'-127.4'
										-1" soft shale seam, dark gray with ½" pyrite nodule at 129.3'
130		C11			100	100				-moderately argillaceous layer, medium gray, gradational contacts at 130.3'-131.7'
										-¼" pyrite nodule at 130.5'
										-1" to 2" pyrite nodules at 132.2' and 133.2'
										-soft shale layer, dark gray, sharp contacts at 136.9'-137.1'
135				135.0						-20°, open, smooth, slickensided fracture at 136.9'
			135.0							-multiple open, vertical fractures, zone at 138.8'-140.0'
										- shaly limestone layer, dark gray, sharp contacts at 140.6'-141.1'
140		C12			100	100				-zone of multiple vertical fractures, all closed, tight, hairline, some calcite filling at 141.1'-144.2'
										-¼" pyrite nodule at 144.2'
										-moderately argillaceous layer, medium gray, sharp contact at 146.8' to gradational contact at 148.3'
145				145.0						
			145.0							
		C13			100	100				
				149.0						
150										
155										Bottom of Exploration at 149.0 feet
160										

SAMPLE LEGEND

S= SPLIT SPOON
T= 2" THIN WALL TUBE
U= 3" THIN WALL TUBE
C= NX ROCK CORE

WATER INFORMATION

See p. 1 of 4

DRILLING GEOLOGIST Mike Granger ASSISTANT Gary White CHECKED BY Shawn Wood

LITHOLOGIC LOG

BORING B 2052

LOG OF BORING

PROJECT: Superconducting Supercollider

CLIENT: The Earth Technology Corporation

TASK NO.: 17

BORING NO: B 2052 PG 1 OF 6

LOCATION: N 294,871 ft. E 2,188,867 ft.

GROUND EL: 725.6 ft.

DATE: 2-19/20-90 TYPE: Rotary Wash CASED TO: N/A CONTRACTOR: SwL (89-192)

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE TOP	DEPTH RANGE BOT.	PERCENT REC.	PERCENT RQD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	DESCRIPTION OF STRATUM
									CLAY, silty, dark brown with traces of roots and organic debris.
									2.0
5									CLAY, silty, tan and brown with embedded weathered limestone fragments.
10									4.0
									LIMESTONE (Austin Chalk) severely weathered, moderately fractured, tan.
15									
20									9.5
									LIMESTONE (Austin Chalk) medium hard, fresh, light gray
25									
30									
35									
40									

SAMPLE LEGEND

S= SPLIT SPOON
T= 2" THIN WALL TUBE
U= 3" THIN WALL TUBE
C= NX ROCK CORE

WATER INFORMATION

Rotary Wash with air 0-20'. Seepage at 20.'. Rotary wash with water 20'-155'. NX Core with water 155'-T.D.

DRILLING GEOLOGIST M. Granger ASSISTANT G. White CHECKED BY Shawn Wood

LOG OF BORING

PROJECT: Superconducting Supercollider

CLIENT: The Earth Technology Corporation

TASK NO.:

BORING NO: B 2052PG 2 OF 6

LOCATION: N 294,871 ft. E 2,188,867 ft.

GROUND EL: 725.6 ft.

DATE: 2-19/20-90 TYPE: Rotary Wash CASED TO: N/A CONTRACTOR: SwL (89-192)

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE TOP	DEPTH RANGE BOT.	PERCENT REC.	PERCENT RQD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	SAMPLE LEGEND	WATER INFORMATION
									S= SPLIT SPOON T= 2" THIN WALL TUBE U= 3" THIN WALL TUBE C= NX ROCK CORE	See p. 1 of 6

DESCRIPTION OF STRATUM

LIMESTONE (Austin Chalk) medium hard, fresh, light gray

DRILLING GEOLOGIST Mike Granger ASSISTANT G. White CHECKED BY Shawn Wood

LOG OF BORING

PROJECT: Superconducting Supercollider

CLIENT: The Earth Technology Corporation

TASK NO.: 17

BORING NO: B 2052 PG 3 OF 6

LOCATION: N 294,871 ft. E 2,188,867 ft.

GROUND EL: 725.6 ft.

DATE: 2-19/20-90 TYPE: Rotary Wash CASED TO: N/A CONTRACTOR: SwL (89-192)

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE TOP	DEPTH RANGE BOT.	PERCENT REC.	PERCENT RQD.	STANDARD PENETRATION TEST PER 6 INCHES		HAND PEN. TSF.	SAMPLE LEGEND	WATER INFORMATION
										S= SPLIT SPOON T= 2" THIN WALL TUBE U= 3" THIN WALL TUBE C= NX ROCK CORE	See p. 1 of 6
										DESCRIPTION OF STRATUM	
85										LIMESTONE (Austin Chalk) medium hard, fresh, light gray	
90											
95											
100											
105											
110											
115											
120											

DRILLING GEOLOGIST Mike Granger ASSISTANT G. White CHECKED BY Shawn Wood

LOG OF BORING

PROJECT: Superconducting Supercollider

CLIENT: The Earth Technology Corporation

TASK NO.: 17

BORING NO: B 2052PG

LOCATION: N 294,871 ft. E 2,188,867 ft.

GROUND EL: 725.6 ft.

DATE: 2-19/20-90 TYPE: Rotary Wash/NX Core CASED TO: N/A CONTRACTOR: SwL (89-192)

SAMPLE LEGEND: S= SPLIT SPOON; T= 2" THIN WALL TUBE; U= 3" THIN WALL TUBE; C= NX ROCK CORE

WATER INFORMATION: See p. 1 of 6

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE TOP	DEPTH RANGE BOT.	PERCENT REC.	PERCENT RQD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	DESCRIPTION OF STRATUM
									LIMESTONE (Austin Chalk), moderately to medium hard, fresh, light gray to dark gray with 1' limestone interbeds. Also fossil partings, and bentonite layer.
125									
130									
135									
140									
145									-bentonite seam 146.0'
150									
155			155.0						-fossil partings at 156.5', 157.9' and 159.7' -moderately argillaceous layer, medium gray, gradational contacts at 157.3'-158.2'
160		C1			99	99			-fossil partings at 161.9' and 164.5'

DRILLING GEOLOGIST M. Granger ASSISTANT G. White CHECKED BY Shawn Wood

LOG OF BORING

PROJECT: Superconducting Supercollider

CLIENT: The Earth Technology Corporation

TASK NO.: 17

BORING NO: B 2052PG 5 OF 6

LOCATION: N 294,871 ft. E 2,188,867 ft.

GROUND EL: 725.6 ft.

DATE 2-19/20-90 TYPE: NX Core CASED TO: N/A CONTRACTOR: SWL (89-192)

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE TOP	DEPTH RANGE BOT.	PERCENT REC.	PERCENT RQD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	DESCRIPTION OF STRATUM
									LIMESTONE (Austin Chalk), moderately to medium hard, fresh, light gray to dark gray with 1' to 2' thick moderately argillaceous to shaly limestone interbeds 1' to 12' apart. Also shale layers 0.1' thick, fossil partings, bentonite layer, and pyrite nodules.
165									
		C2	165.0	175.0	100	100			-fossil partings at 165.9', 168.2', and 169.3' -moderately argillaceous layer, medium gray, sharp contacts at 165.3'-167.2' -moderately argillaceous layer, medium gray, sharp contacts at 169.9'-170.9' -moderately argillaceous layer, medium gray, gradational contacts at 171.8'-172.5' -fossil partings at 172.8' and 174.8' -moderately argillaceous layer, medium gray, gradational contacts at 173.6'-174.4' with ¼" soft shale seam, dark gray at 174.3'
170									
175									
		C3	175.0	185.0	48	48			-shaly limestone layer, dark gray, gradational contacts at 186.0'-187.0' -½" bentonitic shale seam, light gray, gradational contact at 187.9' -shaly limestone layer, dark gray, gradational contacts at 188.6'-189.6' -bentonite layer, bluish-gray, gradational contact at 189.6' to sharp contact at 190.8'
180									
185									
		C4	185.0	195.0	100	100			-moderately argillaceous layer, medium gray, gradational contacts at 191.3'-192.8' -fossil partings at 192.9' and 193.9' -moderately argillaceous layer, medium gray, sharp contacts at 194.7'-195.6' -moderately argillaceous layer, medium gray, sharp contacts at 196.3'-197.4' -1½" pyrite nodule at 197.3' -fossil parting at 197.4'
190									
195									
		C5	195.0		100	100			-moderately argillaceous layer, medium gray, sharp contacts at 198.1'-198.8' -fossil parting 202.0' -moderately argillaceous layer, medium gray, gradational contacts at 203.8'-204.2'
200									

SAMPLE LEGEND:
S= SPLIT SPOON
T= 2" THIN WALL TUBE
U= 3" THIN WALL TUBE
C= NX ROCK CORE

WATER INFORMATION: See p. 1 of 6

DRILLING GEOLOGIST M. Granger ASSISTANT G. White CHECKED BY Shawn Wood

LOG OF BORING

PROJECT: Superconducting Supercollider

CLIENT: The Earth Technology Corporation

TASK NO.: 17

BORING NO: B 2052PG 6 OF 6

LOCATION: N 294,871 ft. E 2,188,867 ft.

GROUND EL: 725.6 ft.

DATE: 19/20-90 TYPE: NX Core CASED TO: N/A CONTRACTOR: SwL (89-192)

SAMPLE LEGEND: S= SPLIT SPOON; T= 2" THIN WALL TUBE; U= 3" THIN WALL TUBE; C= NX ROCK CORE

WATER INFORMATION: See p. 1 of 6

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE TOP	DEPTH RANGE BOT.	PERCENT REC.	PERCENT RQD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	DESCRIPTION OF STRATUM
									LIMESTONE (Austin Chalk), moderately to medium hard, fresh, light gray to dark gray with 0.2 to 1' thick slightly to moderately argillaceous to shaly limestone interbeds 1' to 4' apart. Also fossil partings, and pyrite nodules.
205				205.0					
		C6	205.0		100	100			-shaly limestone layer, dark gray, sharp contacts at 205.4'-205.9' -fossil parting at 206.4' -moderately argillaceous layer, medium gray, gradational contact at 207.2' to sharp contact at 208.8' -¼" pyrite nodules at 207.5', 207.6', and 207.9' -½" pyrite nodules at 209.2', 212.6' and 214.4' -slightly argillaceous layer, medium gray, sharp contacts at 212.9'-213.7' -shaly limestone layer, dark gray, sharp contacts at 214.4'-214.6'
210									
215				215.0					
		C7	215.0		100	100			-shaly limestone layer, dark gray, sharp contacts at 218.2'-218.9' -1" pyrite nodule at 218.8' -slightly argillaceous layer, medium gray, gradational contacts at 221.4'-222.1' -slightly argillaceous layer, medium gray, sharp contacts at 224.0'-224.8'
220									
225				225.0					
									Bottom of Exploration at 225.0 feet Boring grouted upon completion
230									
235									
240									

DRILLING GEOLOGIST Mike Granger ASSISTANT G. White CHECKED BY Shawn Wood

LITHOLOGIC LOG

BORING B 2062

LOG OF BORING

BORING NO: B 2062 PG 1 OF 6

PROJECT: The Superconducting Supercollider

CLIENT: The Earth Technology Corporation

TASK NO.: 17

LOCATION: N 295,394 ft.
E 2,189,735 ft.

GROUND EL: Elev. 724.7 ft.

DATE: 2-20/22-90 TYPE: Air Rotary CASED TO: 1.0' CONTRACTOR: SwL (89-192)

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE TOP	DEPTH RANGE BOT.	PERCENT REC.	PERCENT RQD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	SAMPLE LEGEND	WATER INFORMATION
									S= SPLIT SPOON T= 2" THIN WALL TUBE U= 3" THIN WALL TUBE C= NX ROCK CORE	Seepage encountered at 19.0'

DESCRIPTION OF STRATUM

CLAY soft, silty, dark brown with traces of roots.

2.5

CLAY medium, silty, tan with embedded limestone fragments.

3.5

LIMESTONE (Austin Chalk) soft, extremely weathered, tan with occasional clay layers.

21.0

LIMESTONE (Austin Chalk) medium hard, fresh, light gray to dark gray with bentonite layer 0.5' thick.

-bentonite layer, soft, light gray at 41.0'-41.5'

DRILLING GEOLOGIST Shawn Wood ASSISTANT Joe Teets CHECKED BY Shawn Wood

LOG OF BORING

PROJECT: Superconducting Supercollider

CLIENT: The Earth Technology Corporation

TASK NO.: 17

BORING NO: B 2062 PG 2 OF 6

LOCATION: N 295,394 ft.
E 2,189,735 ft.

GROUND EL: Elev. 724.7 ft.

DATE: 2-20/22-90 TYPE: Air Rotary CASED TO: 1.0 CONTRACTOR: SwL (89-192)

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE TOP	DEPTH RANGE BOT.	PERCENT REC.	PERCENT RQD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	DESCRIPTION OF STRATUM
									LIMESTONE (Austin Chalk) medium hard, fresh, light gray to dark gray with bentonitic shale layer 0.4' thick.
45									
50									
55									
60									
65									
70									
75									
80									-shaly limestone layer, bentonitic, soft, dark gray at 82.0'-82.4'

SAMPLE LEGEND

S= SPLIT SPOON
T= 2" THIN WALL TUBE
U= 3" THIN WALL TUBE
C= NX ROCK CORE

WATER INFORMATION

See p. 1 of 6

DRILLING GEOLOGIST Shawn Wood ASSISTANT Joe Teets CHECKED BY Shawn Wood

LOG OF BORING

PROJECT: Superconducting Supercollider

CLIENT: The Earth Technology Corporation

TASK NO.: 17

BORING NO: B 2062 PG 3 OF 6

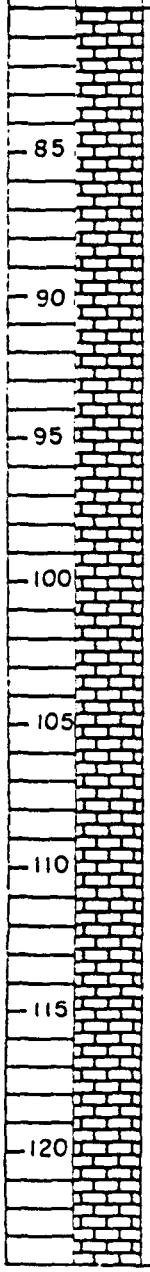
LOCATION: N 295,394 ft.
E 2,189,735 ft.

GROUND EL: Elev. 724.7 ft.

DATE: 2-20/22-90 TYPE: Air Rotary CASED TO: 1.0 CONTRACTOR: SwL (89-192)

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE TOP	DEPTH RANGE BOT.	PERCENT REC.	PERCENT RQD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	SAMPLE LEGEND	WATER INFORMATION
									S= SPLIT SPOON T= 2" THIN WALL TUBE U= 3" THIN WALL TUBE C= NX ROCK CORE	See p. 1 of 6

DESCRIPTION OF STRATUM



LIMESTONE (Austin Chalk) medium hard, fresh, light gray to dark gray

DRILLING GEOLOGIST Shawn Wood ASSISTANT Joe Teets CHECKED BY Shawn Wood

LOG OF BORING

BORING NO: B 2062 PG 4 OF 6

PROJECT: Superconducting Supercollider

CLIENT: The Earth Technology Corporation

TASK NO.: 17

LOCATION: N 295,394 ft.
E 2,189,735 ft.

GROUND EL: Elev. 724.7 ft.

DATE: 2-20/22-90 TYPE: Air Rotary/NX Core CASED TO: 1.0 CONTRACTOR: SwL (89-192)

SAMPLE LEGEND:
S= SPLIT SPOON
T= 2" THIN WALL TUBE
U= 3" THIN WALL TUBE
C= NX ROCK CORE

WATER INFORMATION: See p. 1 of 6

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE TOP	DEPTH RANGE BOT.	PERCENT REC.	PERCENT RQD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	DESCRIPTION OF STRATUM
									LIMESTONE (Austin Chalk), moderately to medium hard, fresh, light gray to dark gray with 0.3' to 1' thick moderately argillaceous to shaly limestone interbeds 1' to 5' apart. Also shale layers 0.5' thick, fossil partings.
125									
130									
135									
140		C1	140.0	144.0	88	88			-shaly limestone layer, dark gray, gradational contacts at 140.0'-140.6' -fossil partings at 141.7 and 145.5'
145		C2	144.0	148.3	98	98			-shaly limestone layer, dark gray, sharp contacts at 145.4'-146.1' -moderately argillaceous layer, medium gray, sharp contacts 148.3'-148.6' -moderately argillaceous layer, medium gray, sharp contacts at 149.0'-149.7'
150		C3	148.3	154.0	100	99			-fossil partings 149.0', 149.1', 149.6', 150.1', and 151.1' -shale layer, soft, dark gray with 1" bentonite layer, sharp contacts at 152.4'-152.7' -shale layer, soft, dark gray, sharp contacts at 155.4'-155.9'
155		C4	154.0	164.0	100	100			-fossil partings at 159.6' and 163.8'
160									-shaly limestone layer, medium gray, sharp contacts at 160.6'-161.8' -moderately argillaceous layer, medium gray, gradational contacts at 163.1'-164.0'

DRILLING GEOLOGIST Shawn Wood ASSISTANT Joe Teets CHECKED BY Shawn Wood

LOG OF BORING

BORING NO: B 2062 PG 5 OF 6

PROJECT: Superconducting Supercollider

CLIENT: The Earth Technology Corporation

TASK NO.: 17

LOCATION: N 295,394 ft.
E 2,189,735 ft.

GROUND EL: Elev. 724.7 ft.

DATE: 2-20/22-90 TYPE: NX Core CASED TO: 1.0' CONTRACTOR: SwL (89-192)

SAMPLE LEGEND: S= SPLIT SPOON; T= 2" THIN WALL TUBE; U= 3" THIN WALL TUBE; C= NX ROCK CORE

WATER INFORMATION: See p. 1 of 6

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE TOP	DEPTH RANGE BOT.	PERCENT REC.	PERCENT RQD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	DESCRIPTION OF STRATUM
									LIMESTONE (Austin Chalk), moderately to medium hard, fresh, light gray to dark gray with 0.2' to 2' thick moderately argillaceous to shaly limestone interbeds 1' to 4' apart. Also shale layers 0.2' thick, fossil partings, bentonite layer, medium angle fractures.
165		C5	164.0	174.0	91	91			-fossil parting at 164.0' -shaly limestone layer, dark gray, gradational contacts at 166.2'-167.4' -shale layer, soft, dark gray, gradational contacts at 167.4'-167.6' -moderately argillaceous layer, medium gray, gradational contacts at 170.0'-172.4' -fossil partings at 174.5' and 178.0' -moderately argillaceous layer, medium gray, gradational contacts at 174.5'-175.5' -½" shale layer, soft, dark gray, sharp contact at 175.7'
170									
175		C6	174.0	184.0	98	98			-shaly limestone layer, dark gray, sharp contacts at 178.2'-179.3' -shaly limestone layer, dark gray, sharp contacts at 180.2'-181.2' -shaly limestone layer, dark gray, sharp contacts at 182.1'- 183.0' -moderately argillaceous layer, medium gray, gradational contact at 184.7' to sharp contact at 185.3' -fossil partings at 185.1 and 186.0'
180									
185		C7	184.0	194.0	97	97			-shaly limestone layer, dark gray, gradational contacts 186.0'-187.6' -moderately argillaceous layer, medium gray, sharp contacts at 189.7'-191.0' -shaly limestone layer, dark gray, gradational contact at 192.0' to sharp contactat 193.4' -shaly limestone layer, dark gray, gradational contacts 194.9'-195.7' -shaly limestone layer, dark gray, gradational contacts at 196.5'-196.7' -shaly limestone layer, dark gray, gradational contacts at 197.6'-198.9'
190									
195		C8	194.0	204.0	100	100			-bentonite layer, bluish-gray, gradational contact at 198.9' to sharp contact at 199.6' -45°, smooth, open, slickensided fracture at 200.3' -fossil parting at 201.4' -moderately argillaceous layer, medium gray, gradational contacts at 203.3'-204.0'
200									

DRILLING GEOLOGIST Mike Granger ASSISTANT J. Teets CHECKED BY Shawn Wood

LOG OF BORING

PROJECT: Superconducting Supercollider

CLIENT: The Earth Technology Corporation

TASK NO.: 17

BORING NO: B 2062 PG 6 OF 6

LOCATION: N 295,394 ft. E 2,189,735 ft.

GROUND EL: Elev. 724.7 ft.

DATE: 2-20/22-90 TYPE: NX Core CASED TO: 1.0' CONTRACTOR: SwL (89-192)

SAMPLE LEGEND: S= SPLIT SPOON; T= 2" THIN WALL TUBE; U= 3" THIN WALL TUBE; C= NX ROCK CORE

WATER INFORMATION: See p. 1 of 6

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE TOP	DEPTH RANGE BOT.	PERCENT REC.	PERCENT RQD.	STANDARD PENETRATION TEST PER 6 INCHES	HAND PEN. TSF.	DESCRIPTION OF STRATUM
									LIMESTONE (Austin Chalk), moderately to medium hard, fresh, light gray to dark gray with 0.3' to 2' thick moderately argillaceous to shaly limestone interbeds 1' to 5' apart. Also shale layers 0.2' thick, fossil partings and traces of pyrite.
205			204.0						-fossil parting at 205.1' -shaly limestone layer, dark gray, gradational contacts at 204.8'-205.3' -shaly limestone layer, dark gray, sharp contacts at 206.7'-207.3'
210		C9		214.0	100	100			-shaly limestone layer, dark gray, gradational contacts at 208.3'-209.1' -moderately argillaceous layer, medium gray, gradational contacts at 210.9'-211.6' -moderately argillaceous layer, medium gray, gradational contacts at 212.2'-213.0'
215			214.0						-shale layer, soft, dark gray, sharp contacts at 214.1'-214.6'
220		C10		224.0	99	99			-shaly limestone layer, dark gray, sharp contacts at 215.7'-217.2' -shaly limestone layer, dark gray, sharp contacts at 221.6'-222.1'
225			224.0						-shale layer, soft, dark gray, sharp contacts at 223.6'-223.8' -shaly limestone layer, dark gray, sharp contacts at 226.7'-227.5' -1" pyrite nodule 227.0
230		C11		234.0	95	95			-shaly limestone layer, dark gray, gradational contacts at 232.1'-232.7' -shaly limestone layer, dark gray, gradational contacts at 233.3'-233.6'
235									Bottom of Exploration 234.0' Boring grouted upon completion.
240									

DRILLING GEOLOGIST M. Granger ASSISTANT J. Teets CHECKED BY Shawn Wood

APPENDIX B

WIRE-LINE LOGS

WIRE-LINE LOGGING PARAMETERS

Hole No. B 1296 **Log Measured From:** Ground Level

Drilling Parameters

Depth 140.0 feet

Bit Diameter 4.75 inches and 5.0 inches

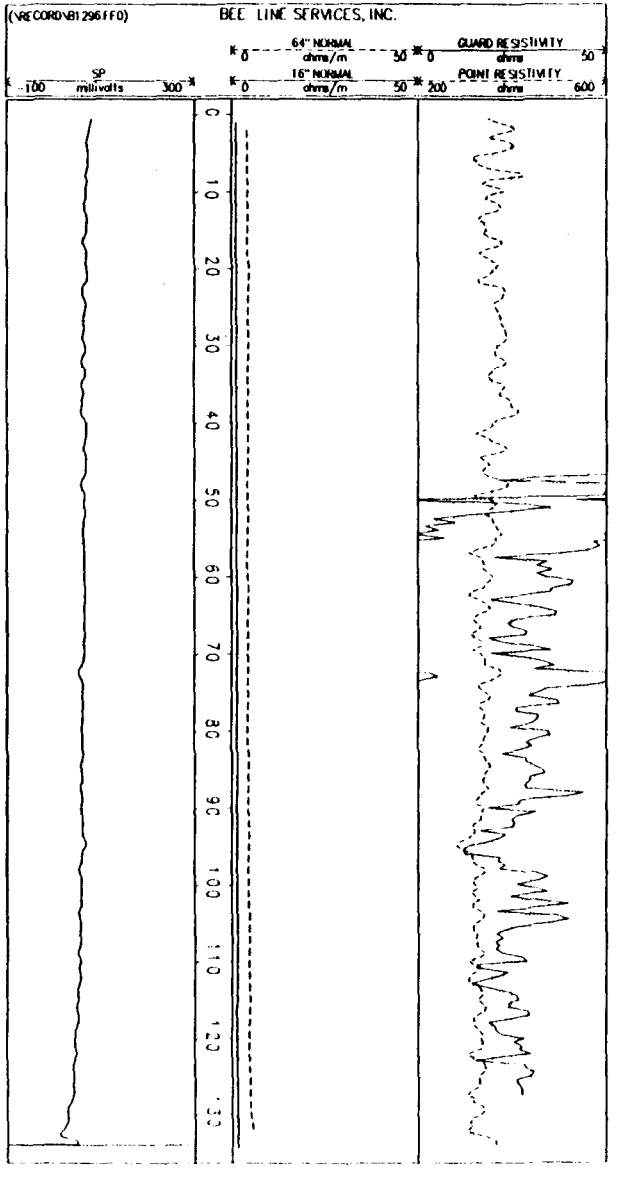
Logging Parameters	Electrical Log*	Gamma Log	Sonic Log
Date	February 13, 1990	February 13, 1990	February 13, 1990
Bottom Log Interval	134.5 feet	133.0 feet	128.4 feet
Top Log Interval	surface	surface	surface
Type of Fluid in Hole	drilling mud	drilling mud	drilling mud
Time Since Circulation Stop	45 minutes	45 minutes	45 minutes
Probe Type/S.N.	ALP-4979	XAP-4383	CLP-4877A
Module Type/S.N.	ALM-4979	XAM-4383	CLM-4877A
Logging Speed	40 feet/min.	20 feet/min.	20 feet/min.
Sample Interval	0.5 foot	0.5 foot	0.5 foot

*** Note:** Due to tool malfunction, 16" normal resistivity data is missing, and 64" normal resistivity data is erroneous.

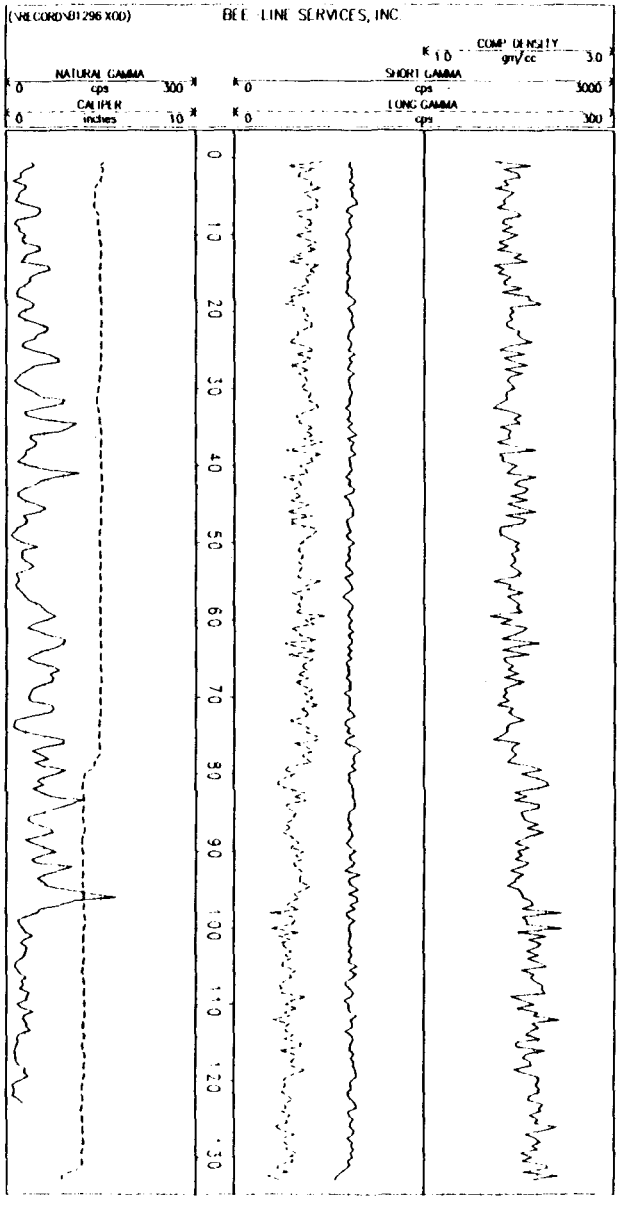
Logged by: BEE-LINE SERVICES, INC.
P.O. Box 2096
Corsicana, TX 75151

B 1296 Wire-line logs run February 13, 1990. Surface elevation 600.8 feet.

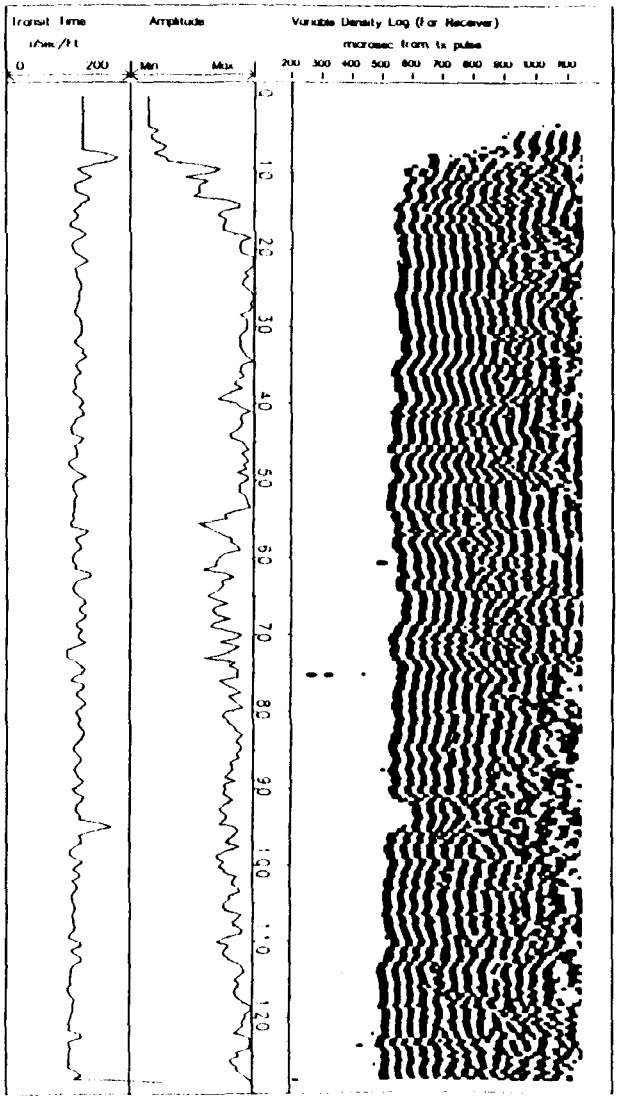
ELECTRICAL LOG



GAMMA LOG



SONIC LOG



WIRE-LINE LOGGING PARAMETERS

Hole No. B 1316 **Log Measured From:** Ground Level

Drilling Parameters

Depth 149.0 feet

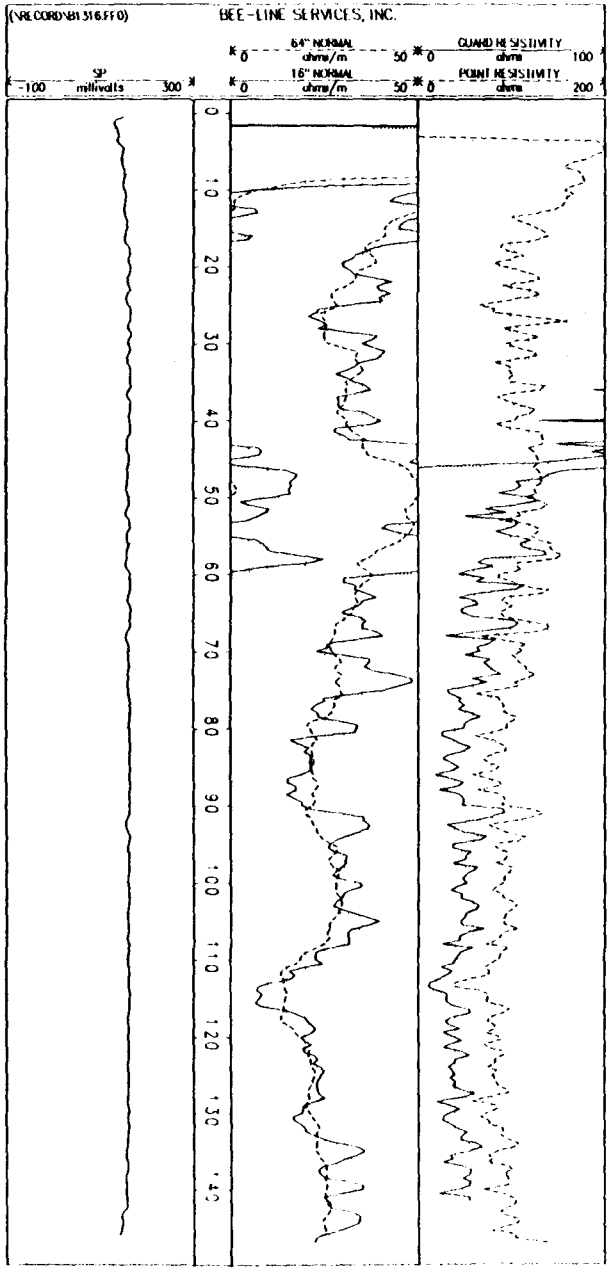
Bit Diameter 4.75 inches

Logging Parameters	Electrical Log	Gamma Log	Sonic Log
Date	February 17, 1990	February 17, 1990	February 17, 1990
Bottom Log Interval	147.0 feet	147.0 feet	141.2 feet
Top Log Interval	surface	surface	surface
Type of Fluid in Hole	fresh water	fresh water	fresh water
Time Since Circulation Stop	15.5 hours	15.5 hours	15.5 hours
Probe Type/S.N.	ALP-4979	XAP-4383	CLP-4877A
Module Type/S.N.	ALM-4979	XAM-4383	CLM-4877A
Logging Speed	40 feet/min.	20 feet/min.	20 feet/min.
Sample Interval	0.5 foot	0.5 foot	0.5 foot

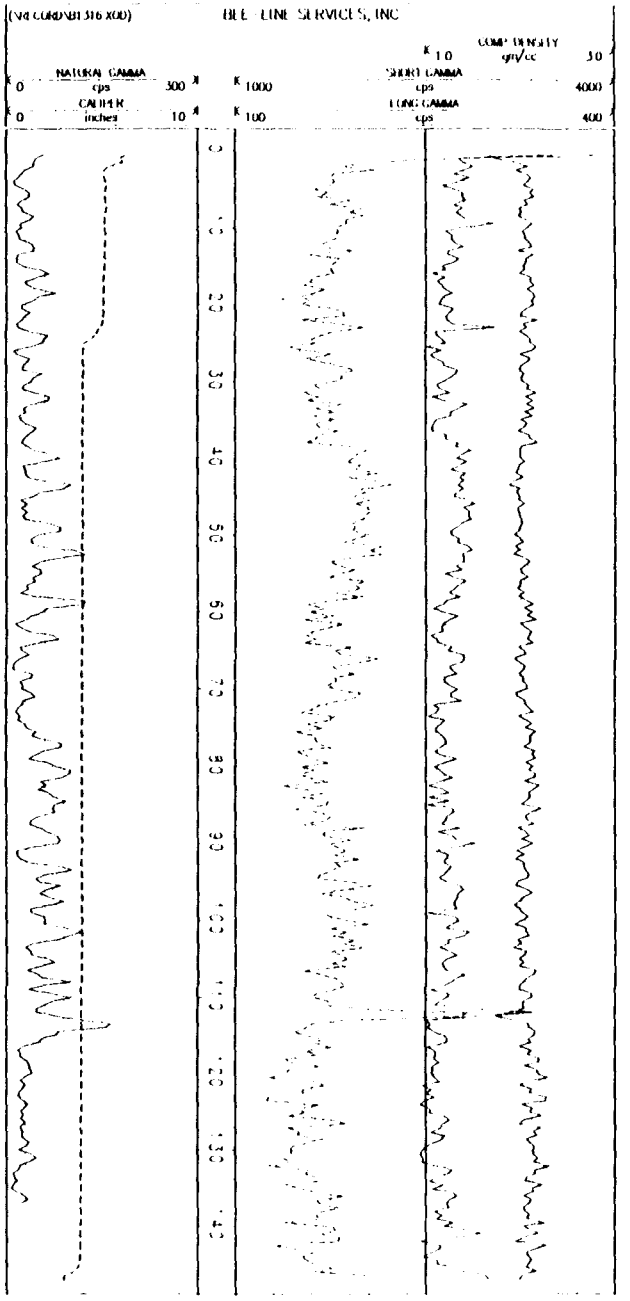
Logged by: BEE-LINE SERVICES, INC.
P.O. Box 2096
Corsicana, TX 75151

B 1316 Wire-line logs run February 17, 1990. Surface elevation 623.1 feet.

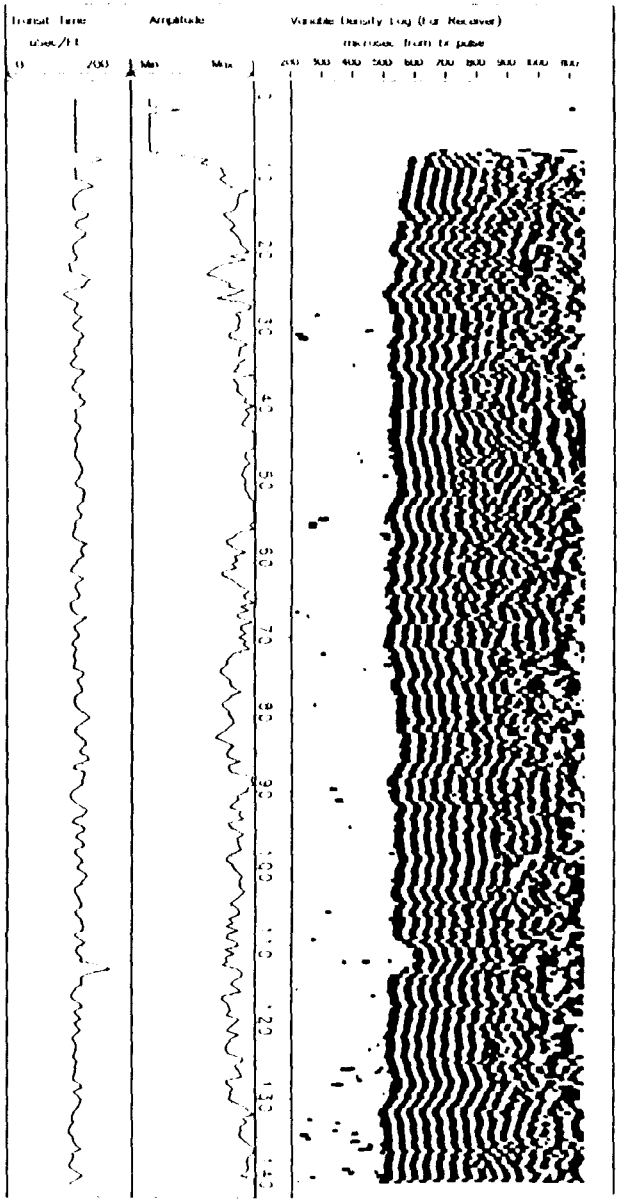
ELECTRICAL LOG



GAMMA LOG



SONIC LOG



WIRE-LINE LOGGING PARAMETERS

Hole No. B 2052 **Log Measured From:** Ground Level

Drilling Parameters

Depth 225.0 feet

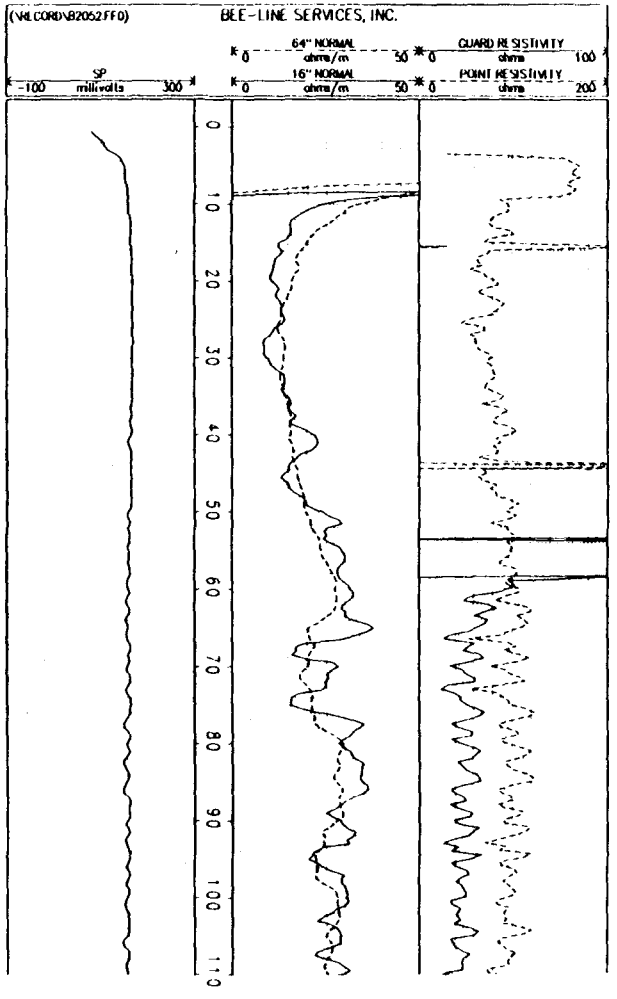
Bit Diameter 4.75 inches

Logging Parameters	Electrical Log	Gamma Log	Sonic Log
Date	February 20, 1990	February 20, 1990	February 20, 1990
Bottom Log Interval	222.5 feet	222.0 feet	218.7 feet
Top Log Interval	surface	surface	surface
Type of Fluid in Hole	drilling mud	drilling mud	drilling mud
Time Since Circulation Stop	45 minutes	45 minutes	45 minutes
Probe Type/S.N.	ALP-4979	XAP-4383	CLP-4877A
Module Type/S.N.	ALM-4979	XAM-4383	CLM-4877A
Logging Speed	40 feet/min.	20 feet/min.	20 feet/min.
Sample Interval	0.5 foot	0.5 foot	0.5 foot

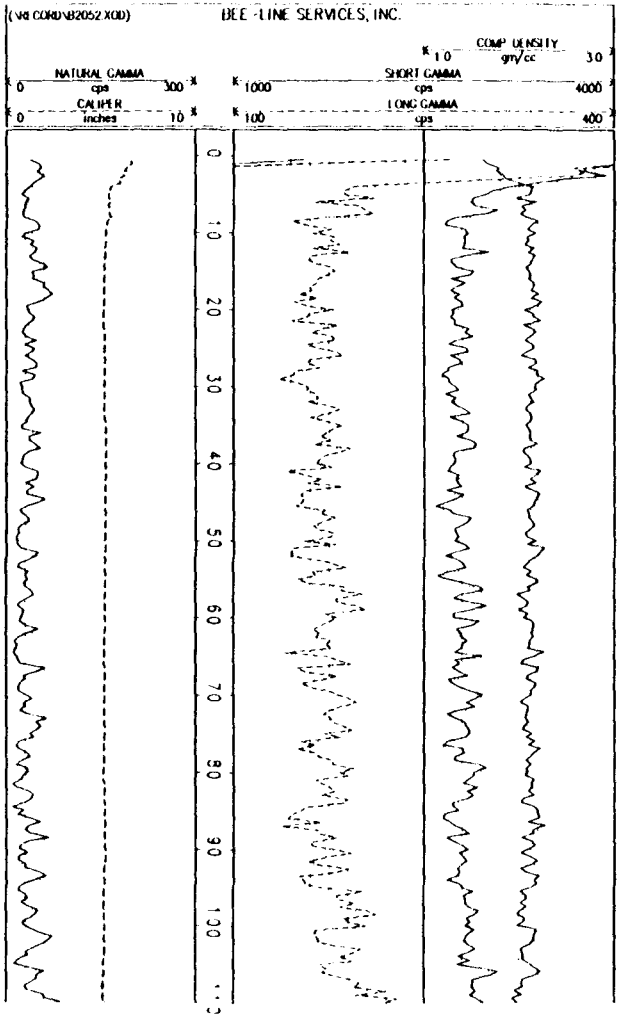
Logged by: BEE-LINE SERVICES, INC.
P.O. Box 2096
Corsicana, TX 75151

B 2052 Wire-line logs run February 20, 1990. Surface elevation 725.6 feet.

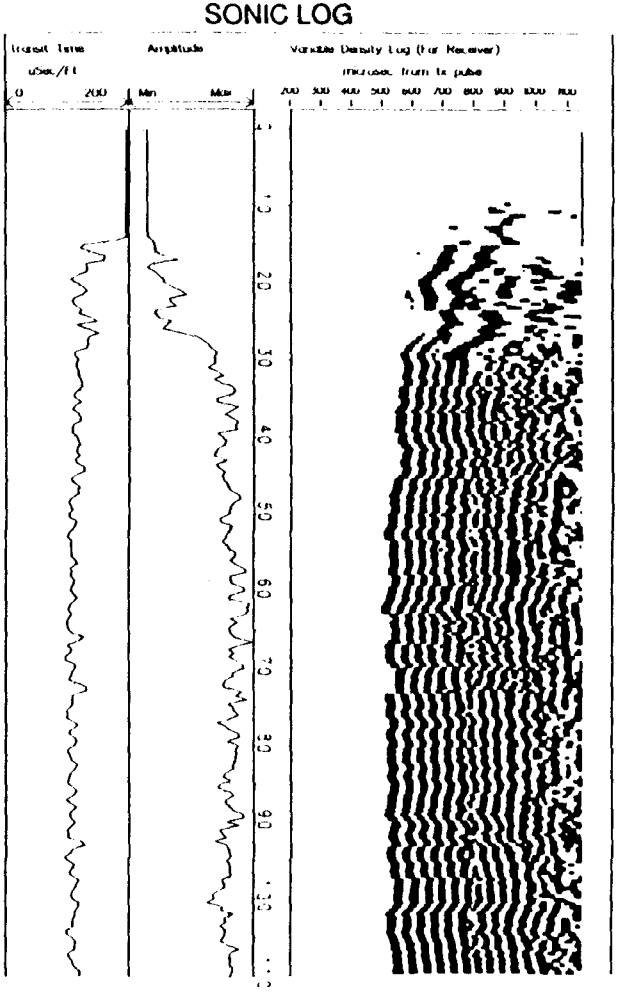
ELECTRICAL LOG



GAMMA LOG

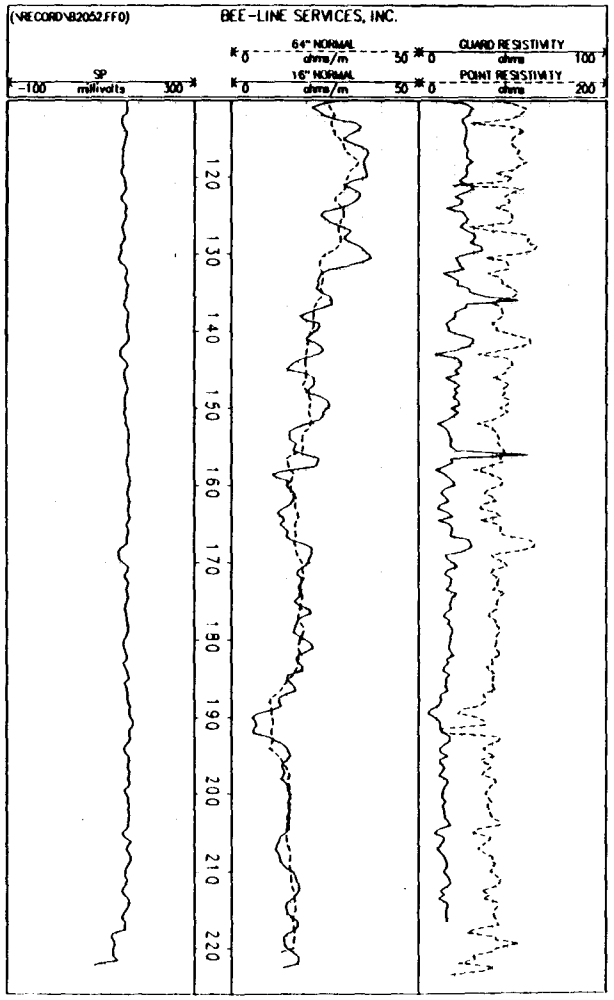


SONIC LOG

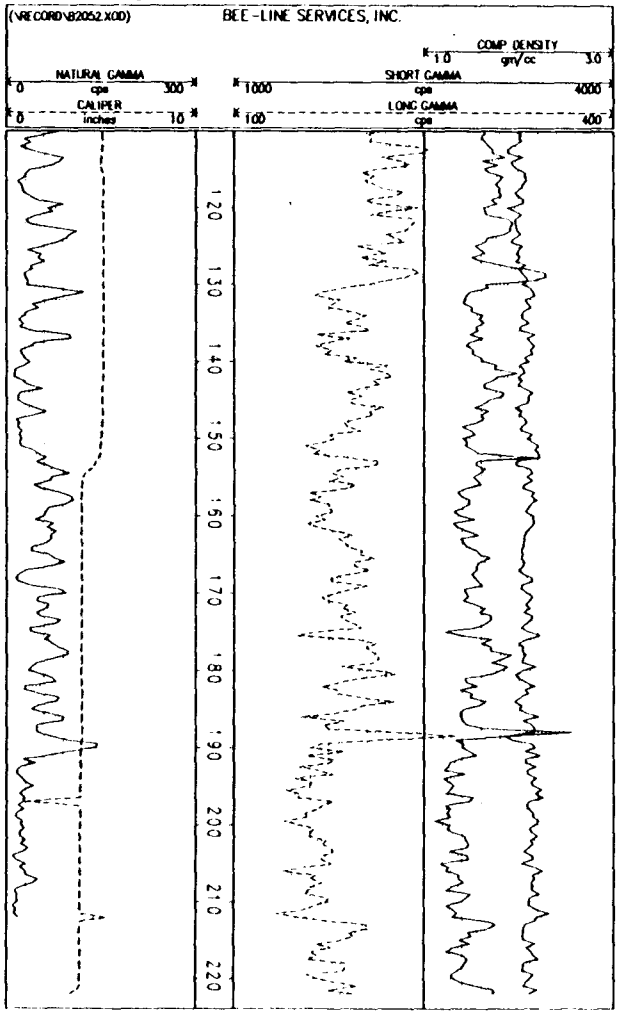


B 2052 Wire-line logs run February 20, 1990 (Continued). Surface elevation 725.6 feet.

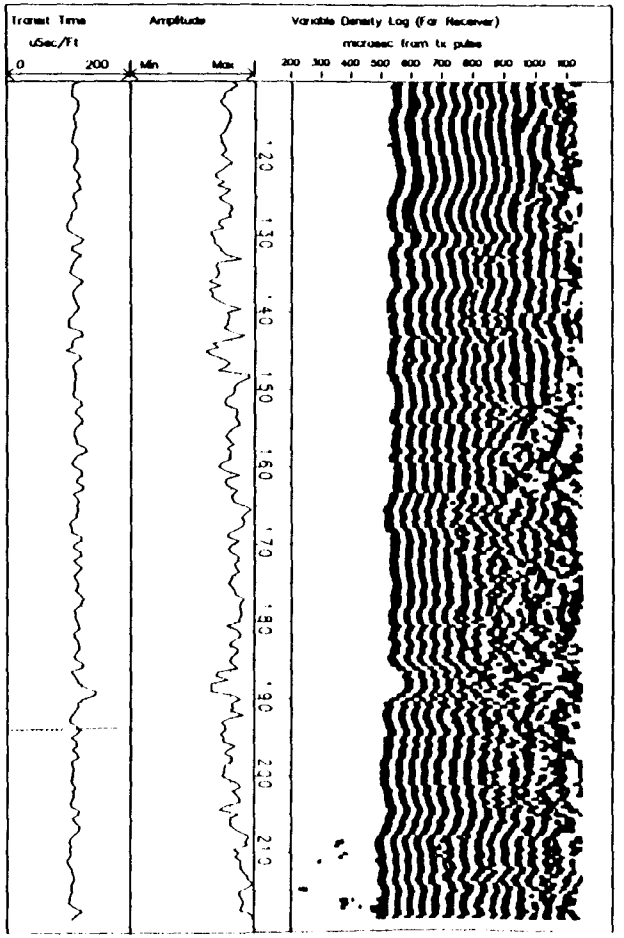
ELECTRICAL LOG CONTINUED



GAMMA LOG CONTINUED



SONIC LOG CONTINUED



WIRE-LINE LOGGING PARAMETERS

Hole No. B 2062 **Log Measured From:** Ground Level

Drilling Parameters

Depth 234.0 feet

Bit Diameter 4.75 inches and 3.875 inches

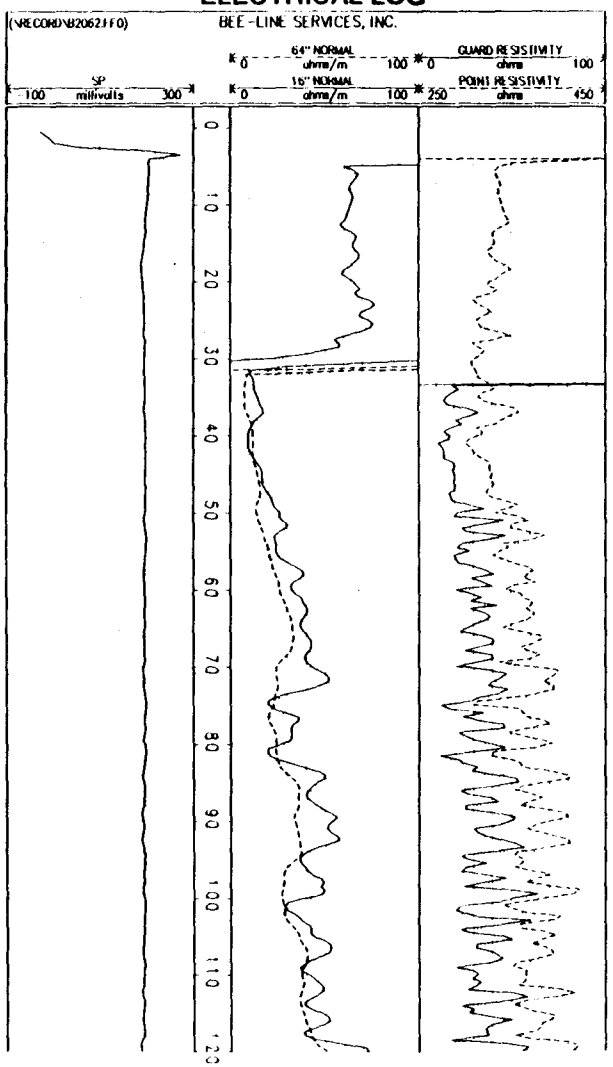
Logging Parameters	**Electrical Log**	**Gamma Log**	**Sonic Log**
Date	February 22, 1990	February 22, 1990	February 22, 1990
Bottom Log Interval	231.5 feet	231.5 feet	227.1 feet
Top Log Interval	surface	surface	surface
Type of Fluid in Hole	drilling mud	drilling mud	drilling mud
Time Since Circulation Stop	30 minutes	30 minutes	30 minutes
Probe Type/S.N.	ALP-4979	XAP-4383	CLP-4877A
Module Type/S.N.	ALM-4979	XAM-4383	CLM-4877A
Logging Speed	40 feet/min.	20 feet/min.	20 feet/min.
Sample Interval	0.5 foot	0.5 foot	0.5 foot

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

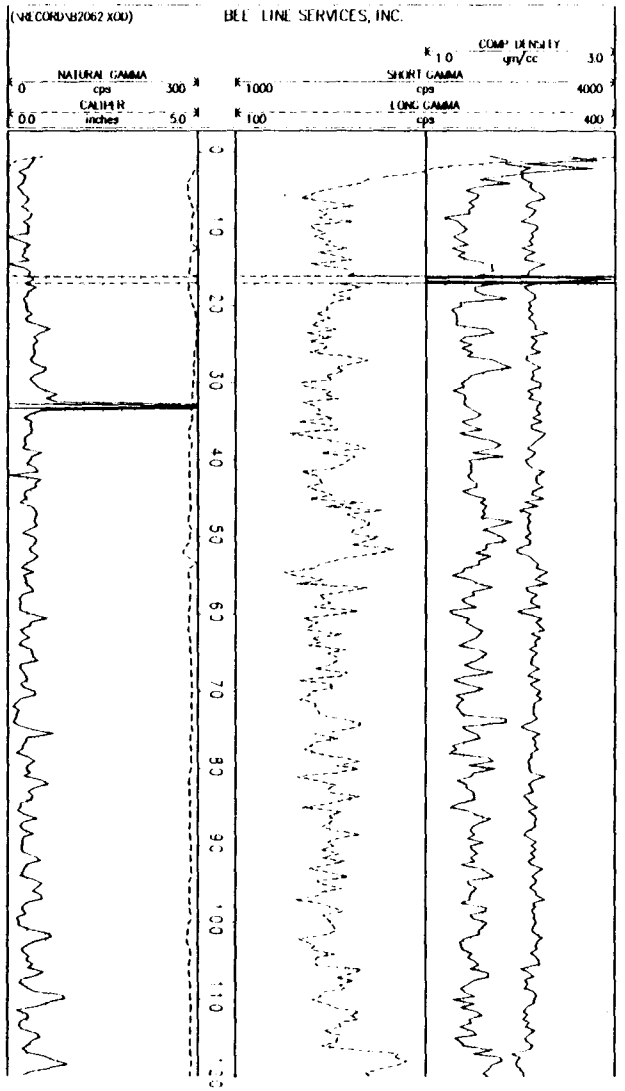
wp.V96M/MAR-BEN

B 2062 Wire-line logs run February 22, 1990. Surface elevation 724.7 feet.

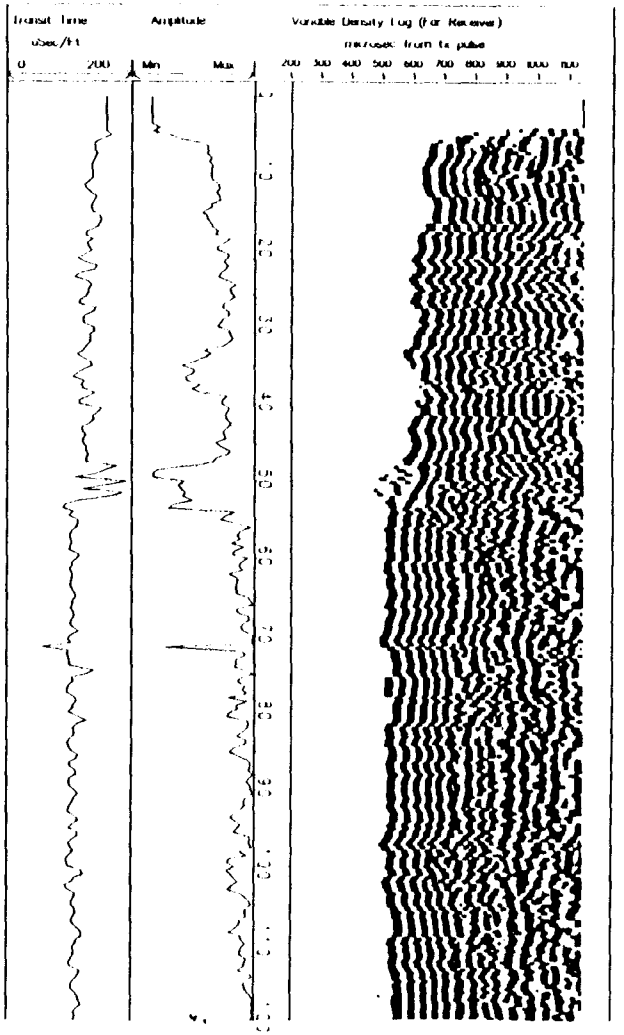
ELECTRICAL LOG



GAMMA LOG

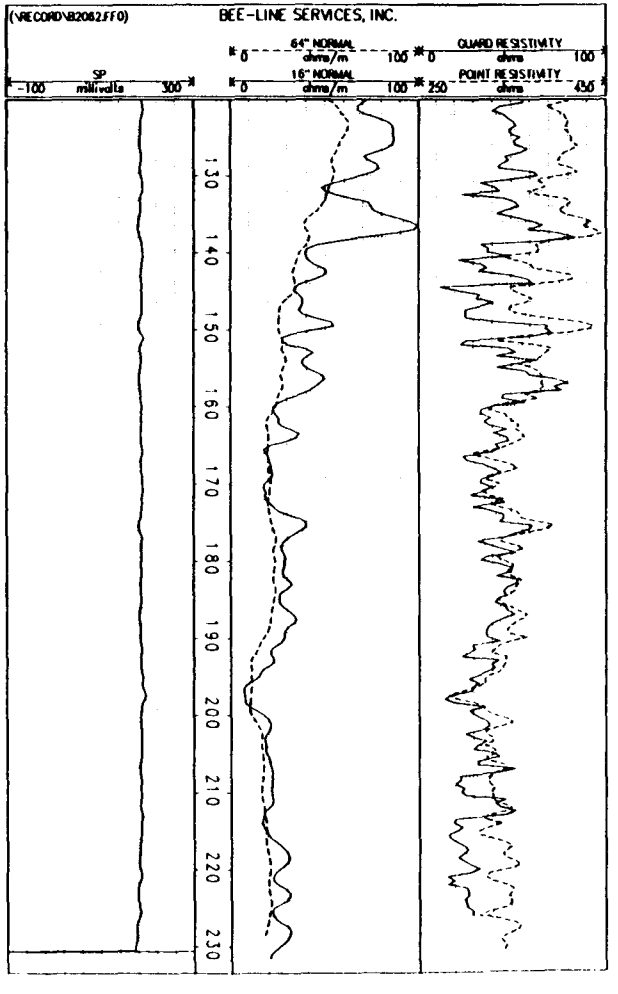


SONIC LOG

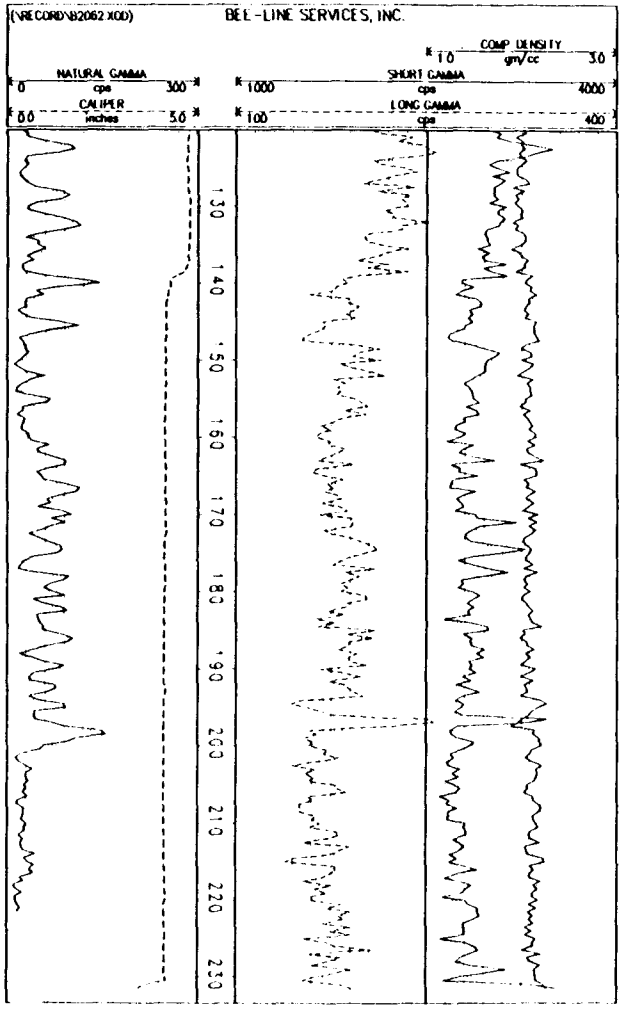


B 2062 Wire-line logs run February 22, 1990 (Continued). Surface elevation 724.7 feet.

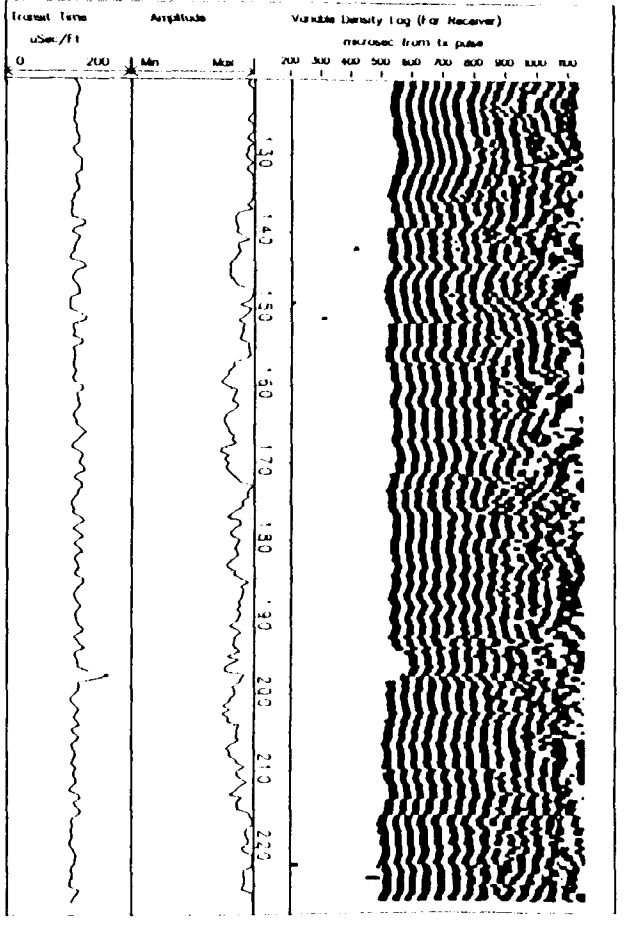
ELECTRICAL LOG CONTINUED



GAMMA LOG CONTINUED



SONIC LOG CONTINUED



APPENDIX C

GEOMECHANICAL TEST RESULTS

GEOMECHANICAL TEST RESULTS

BORING B 1296

TABLE C–1. GEOMECHANICAL TEST RESULTS–BORING B 1296

GENERAL LITHOLOGY	BORING DEPTH	MOISTURE CONTENT	DRY DENSITY	SPECIFIC GRAVITY	ATTERBERG LIMITS		FRACTION FINER THAN	CARBONATE CONTENT	SAMPLE DIMENSION RATIO	SAMPLE FAILURE MODE/	UNCONFINED COMPRESSIVE	TRIAXIAL COMPRESSION		FAILURE STRAIN	TANGENT YOUNG'S MODULUS			POISSON'S RATIO	BRAZIL TENSILE STRENGTH	2ND CYCLE SLAKE DURABILITY INDEX	MODIFIED TABOR ABRASION/ HARDNESS INDEX	SWELL PRESSURE INDEX	COMMENTS
												CONFINING PRESSURE	DEVIATOR STRESS										
					LL	PI	# 200 SIEVE		L/D	DEGREES *	STRENGTH	σ_3	$\sigma_1-\sigma_3$		E50	UNLOAD/ RELOAD	σ_3						
	feet	percent	pcf				percent	percent			psi	psi	psi	percent	(psi)x10E5	(psi)x10E5	psi		psi	percent		percent	
BENTONITE	95.3	39.7					97.0																
BENTONITE	95.35	47.1			104	67																	
AUSTIN CHALK	96.1	11.7																					
AUSTIN CHALK	96.3	11.6	126.2						2.2	D	2488			1.05	2.70		0						
AUSTIN CHALK	113.6	12.3																					
AUSTIN CHALK	113.7	10.7	127.8						2.3	B–1/20	1070			0.61	2.60		0						
AUSTIN CHALK	120.6	15.2																					
AUSTIN CHALK	120.8	14.3	122.2						2.3	B–1/30	2608			0.46	7.90		0						
AUSTIN CHALK	130.3	15.0																					
AUSTIN CHALK	130.5	15.6	117.7						2.3	D	2576			0.34	1.30		0						
PROCEDURE		ASTM-D2216		ASTM-D854	ASTM-D4318		ASTM-D422				ASTM-D2938	ASTM-D2664			ASTM-D3148			ASTM-D3148	ISRM	ISRM	ISRM	ISRM	

B1296PRT.WK1
REVISION:1.1
DATE: 4/17/90

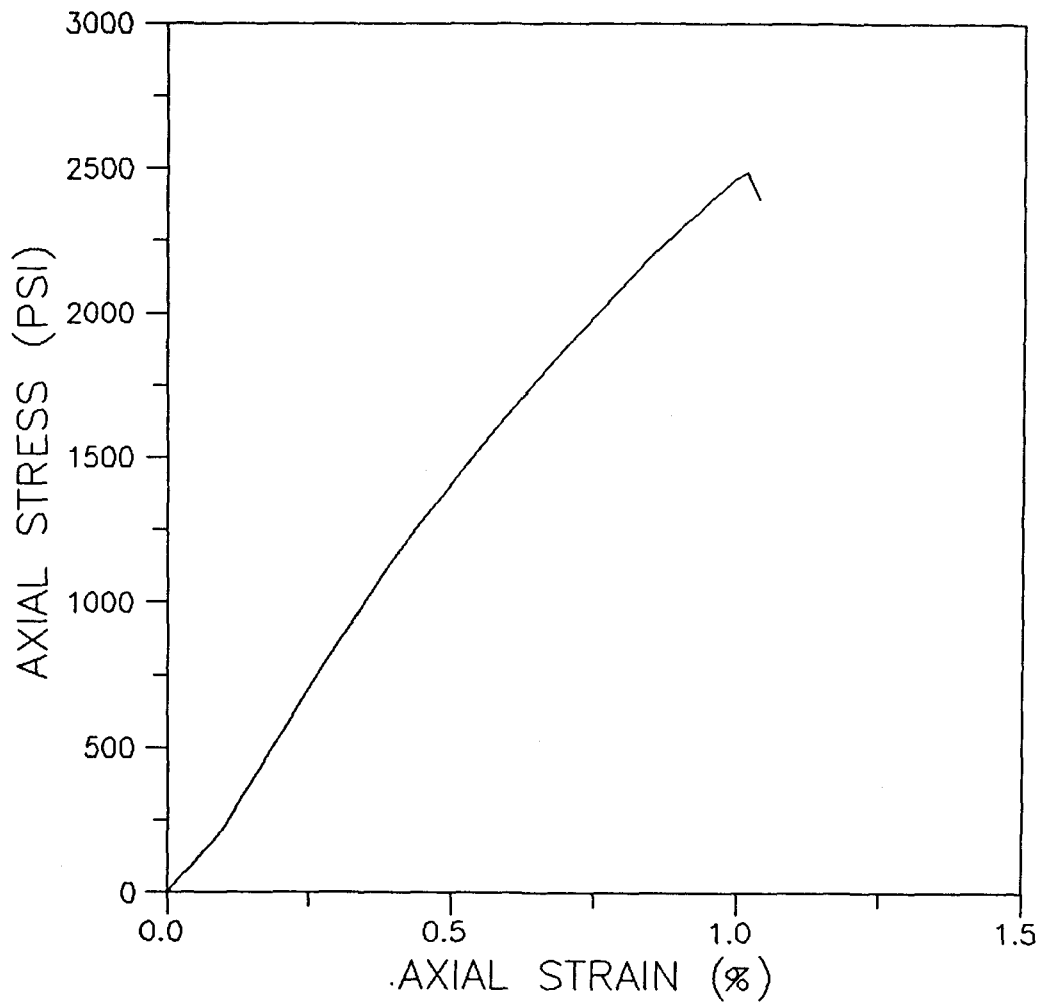
PRELIMINARY
(Subject to Revision)

* EXPLANATION OF SAMPLE FAILURE MODE AS FOLLOWS.

Symbol	Failure Type	Symbol	Failure Type
A	No discernible failure plane	B–4	Combination
(B)	Well defined shear plane @ "X" angle(deg) to vertical or to long axis of core	C	Barreling/Bulging
B–1	Shear plane	D	Longitudinal (axial) splitting
B–2	Bedding plane shear	E	Conical
B–3	Shear plane along pre-existing fracture, shear zone, etc.	F	No information

Note: Some values in this table may be revised based on reviews of test procedures and individual test results. The reader should refer to the latest revision of the gINT geotechnical data base (geotechnical report GR-70).

BORING NO: B1296
DEPTH (FT): 96.3
AUSTIN CHALK



INCLINATION (DEG): VERTICAL
MOISTURE CONTENT (%): 11.6
DRY UNIT WEIGHT (PCF): 126.2
DEG. OF SATURATION (%): 93.0
ASSUMED SPECIFIC GRAVITY: 2.7
CONFINING PRESSURE (PSI): 0
TEST TYPE:UNCONFINED COMPRESSION
(ASTM D 2938)

TANGENT MODULUS AT 50%
ULTIMATE STRESS:
2.7 x 10E5 PSI

FAILURE MODE:
LONGITUDINAL (AXIAL)
SPLITTING

TEXAS SSC SITE

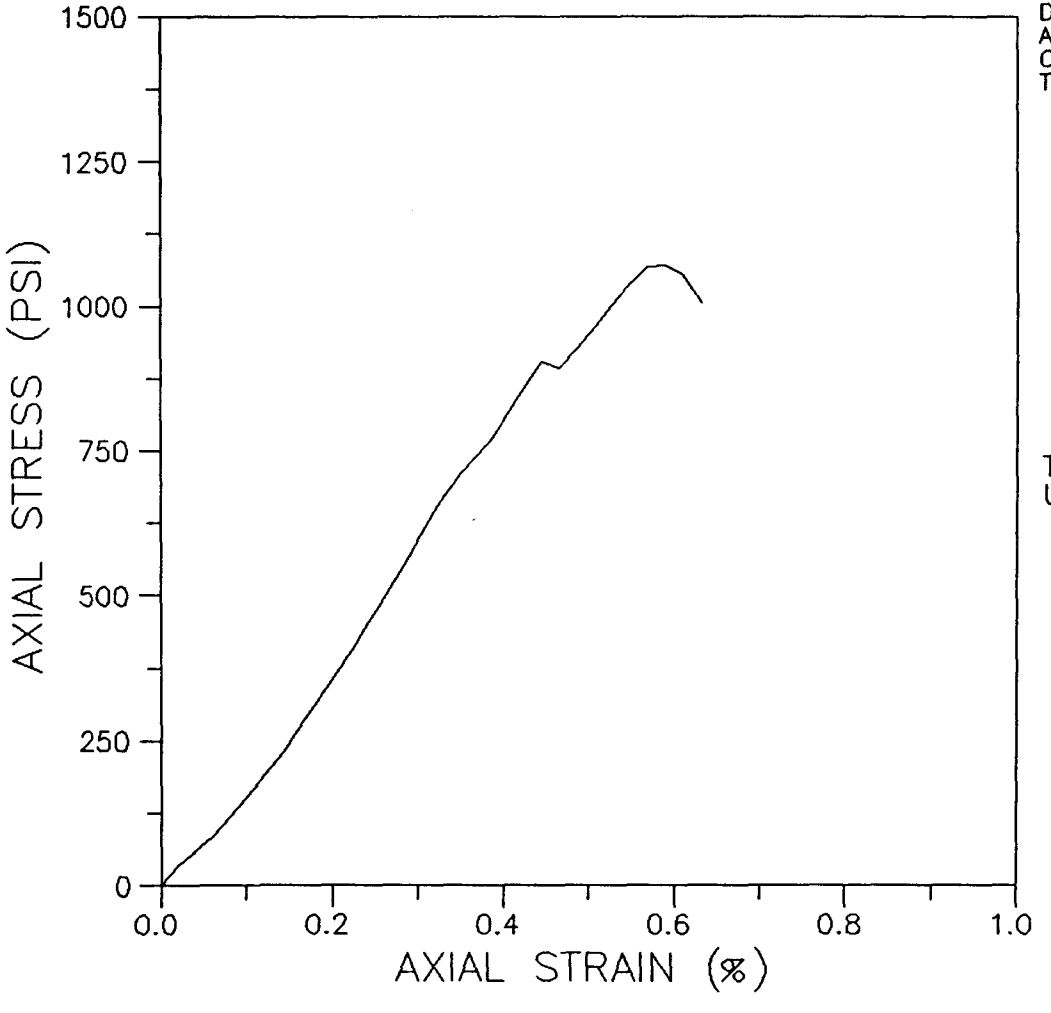
STRESS-STRAIN PLOT

SOUTHWESTERN LABORATORIES
DALLAS, TEXAS

JOB NO.: 89-192

FIGURE

BORING NO: B1296
DEPTH (FT): 113.7
AUSTIN CHALK



INCLINATION (DEG): VERTICAL
MOISTURE CONTENT (%): 10.7
DRY UNIT WEIGHT (PCF): 127.8
DEG. OF SATURATION (%): 47.7
ASSUMED SPECIFIC GRAVITY: 2.7
CONFINING PRESSURE (PSI): 0
TEST TYPE:UNCONFINED COMPRESSION
(ASTM D 2938)

TANGENT MODULUS AT 50%
ULTIMATE STRESS:
2.6 x 10E5 PSI

FAILURE MODE:
SHEAR PLANE THROUGH
ARGILLACEOUS ZONE AT
20 DEG

TEXAS SSC SITE

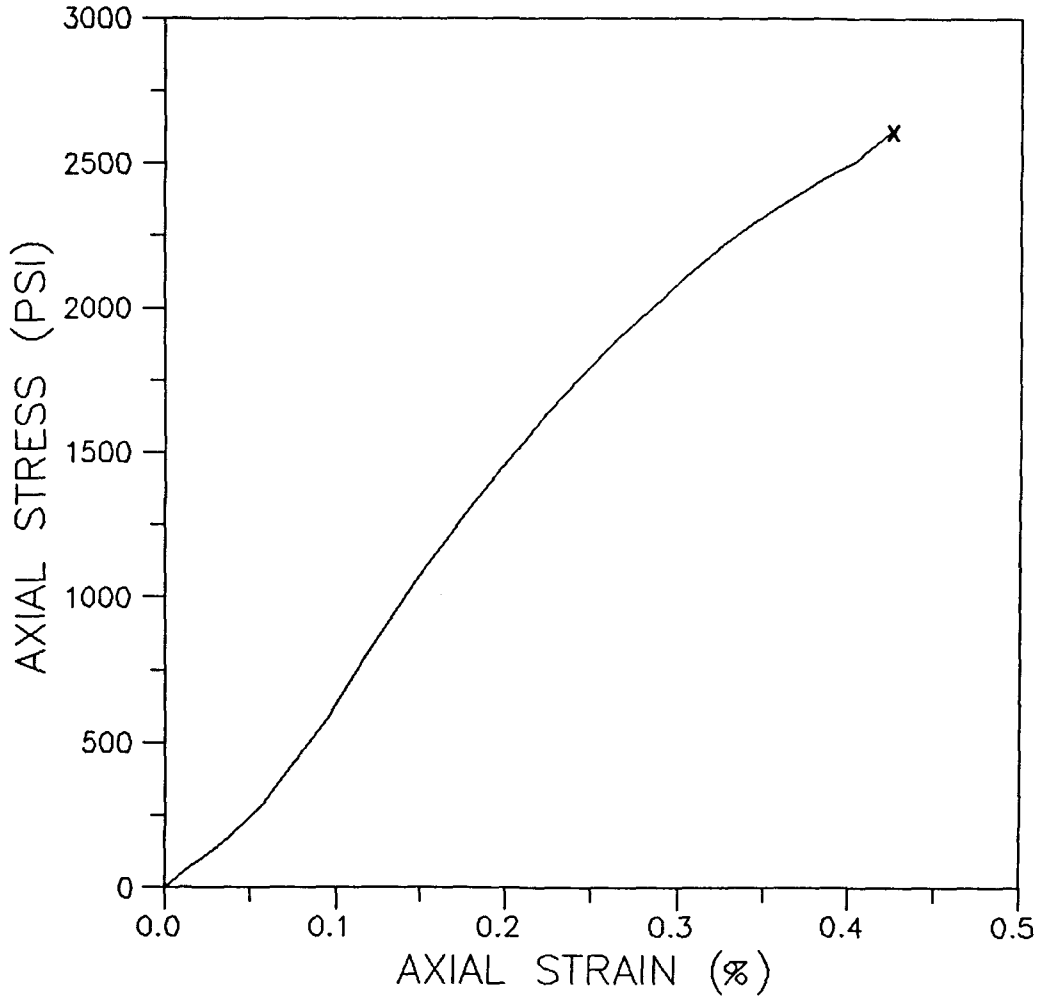
STRESS-STRAIN PLOT

SOUTHWESTERN LABORATORIES
DALLAS, TEXAS

JOB NO.: 89-192

FIGURE

BORING NO: B1296
DEPTH (FT): 120.8
AUSTIN CHALK



INCLINATION (DEG): VERTICAL
MOISTURE CONTENT (%): 14.3
DRY UNIT WEIGHT (PCF): 122.2
DEG. OF SATURATION (%): 101.6
ASSUMED SPECIFIC GRAVITY: 2.7
CONFINING PRESSURE (PSI): 0
TEST TYPE:UNCONFINED COMPRESSION
(ASTM D 2938)

TANGENT MODULUS AT 50%
ULTIMATE STRESS:
7.9 x 10E5 PSI

FAILURE MODE:
SHEAR PLANE AT 30 DEG

TEXAS SSC SITE

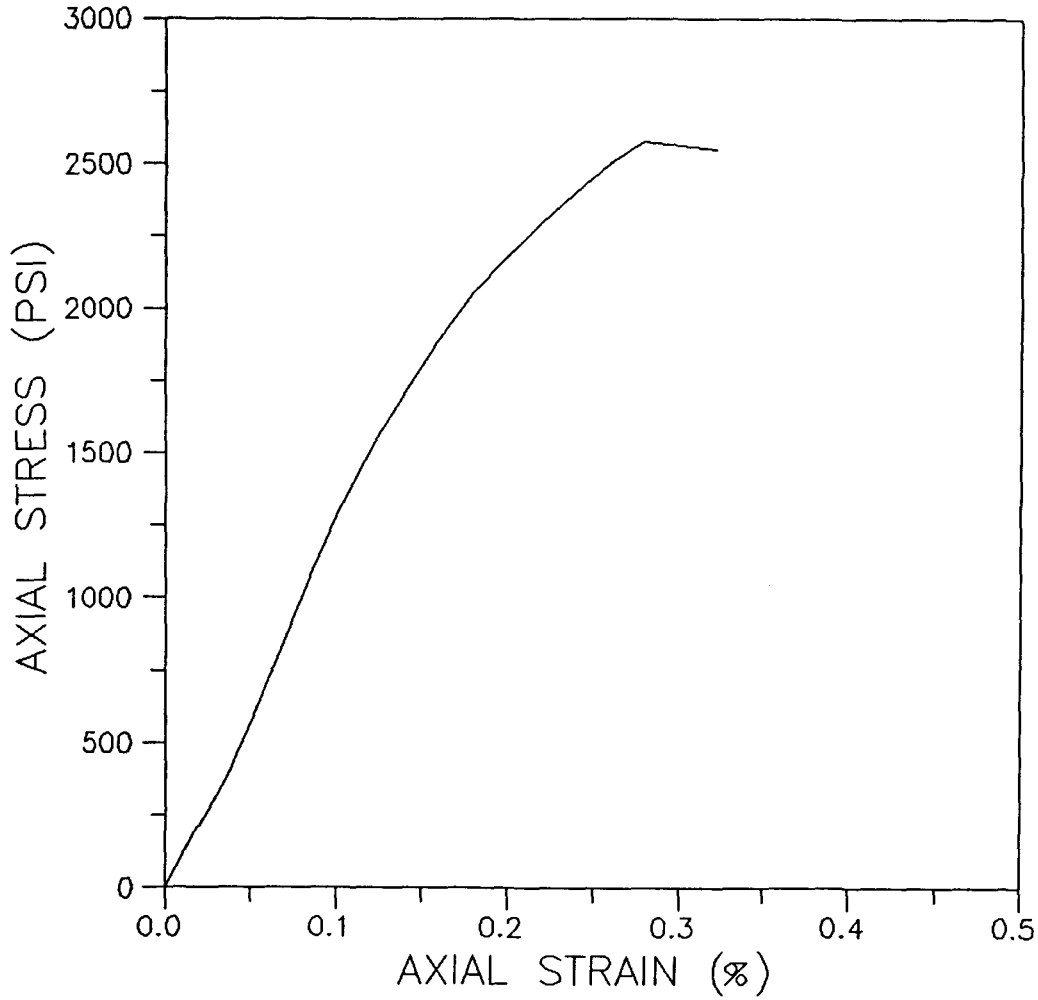
STRESS-STRAIN PLOT

SOUTHWESTERN LABORATORIES
DALLAS, TEXAS

JOB NO.: 89-192

FIGURE

BORING NO: B1296
DEPTH (FT): 130.5
AUSTIN CHALK



INCLINATION (DEG): VERTICAL
MOISTURE CONTENT (%): 15.6
DRY UNIT WEIGHT (PCF): 117.7
DEG. OF SATURATION (%): 97.4
ASSUMED SPECIFIC GRAVITY: 2.7
CONFINING PRESSURE (PSI): 0
TEST TYPE:UNCONFINED COMPRESSION
(ASTM D 2938)

TANGENT MODULUS AT 50%
ULTIMATE STRESS:
1.3 x 10E5 PSI

FAILURE MODE:
LONGITUDINAL (AXIAL)
SPLITTING

TEXAS SSC SITE

STRESS–STRAIN PLOT

SOUTHWESTERN LABORATORIES
DALLAS, TEXAS

JOB NO.: 89–192

FIGURE

GEOMECHANICAL TEST RESULTS

BORING B 1316

TABLE C–2. GEOMECHANICAL TEST RESULTS–BORING B 1316

GENERAL LITHOLOGY	BORING DEPTH	MOISTURE CONTENT	DRY DENSITY	SPECIFIC GRAVITY	ATTERBERG LIMITS		FRACTION FINER THAN # 200 SIEVE	CARBONATE CONTENT	SAMPLE DIMENSION RATIO	SAMPLE FAILURE MODE/ DEGREES *	UNCONFINED COMPRESSIVE STRENGTH	TRIAXIAL COMPRESSION		FAILURE STRAIN	TANGENT YOUNG'S MODULUS			POISSON'S RATIO	BRAZIL TENSILE STRENGTH	2ND CYCLE SLAKE DURABILITY INDEX	MODIFIED TABOR ABRASION/ HARDNESS INDEX	SWELL PRESSURE INDEX	COMMENTS
					LL	PI						CONFINING PRESSURE	DEVIATOR STRESS		E50	UNLOAD/ RELOAD							
	feet	percent	pcf				percent	percent	L/D		psi	σ_3 psi	$\sigma_1-\sigma_3$ psi	percent	(psi)x10E5	(psi)x10E5	σ_3 psi		psi	percent			
AUSTIN CHALK	27.7	15.0																					
AUSTIN CHALK	27.9	15.5	117.9						2.3	E	2207			0.46	6.90		0						
AUSTIN CHALK	107.0	14.5	120.7																				
AUSTIN CHALK	107.4	14.2	119.4	2.68					2.3	D		100	2335	0.67	3.23		100						NOTE 1
AUSTIN CHALK	107.4														4.36			0.19					NOTE 2
AUSTIN CHALK	107.8	13.4	117.8						2.2	D		200	2457	1.00	2.78		200						NOTE 1
AUSTIN CHALK	107.8														3.30			0.11					NOTE 2
BENTONITE	113.6	33.1	88.3		105	67	94.1																
BENTONITE	114.4	37.6			105	68	95.0																
AUSTIN CHALK	133.1	13.6	123.0																				
PROCEDURE		ASTM-D2216		ASTM-D854	ASTM-D4318		ASTM-D422				ASTM-D2938	ASTM-D2664			ASTM-D3148			ASTM-D3148	ISRM	ISRM	ISRM	ISRM	

B1316PRT.WK1
REVISION: 1.1
DATE: 4/12/90

PRELIMINARY
(Subject to Revision)

* EXPLANATION OF SAMPLE FAILURE MODE AS FOLLOWS.

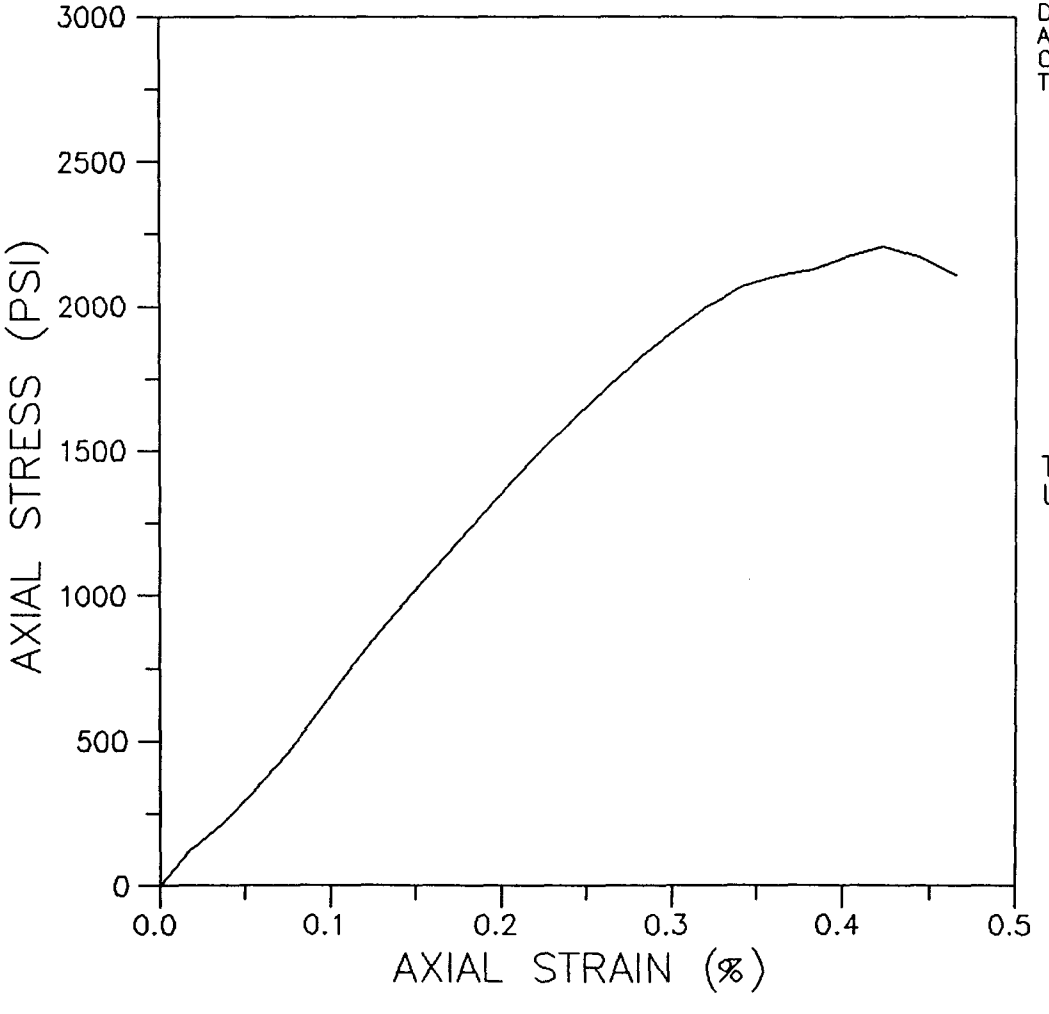
Symbol	Failure Type
A	No discernible failure plane
(B)	Well defined shear plane @ "X" angle (deg) to vertical or to long axis of core
B-1	Shear plane
B-2	Bedding plane shear
B-3	Shear plane along pre-existing fracture, shear zone, etc.
B-4	Combination
C	Barreling/Bulging
D	Longitudinal (axial) splitting
E	Conical
F	No information

NOTE:
1) MODULUS WAS CALCUTED FROM AXIAL STRAINS MEASURED USING DIAL MICROMETER. AXIAL LENGTH IS THE SAMPLE LENGTH.

2) MODULII AND POISSON'S RATIO WERE CALCULATED FROM AXIAL AND LATERAL STRAINS MEASURED USING 3 AXIAL AND 3 LATERAL LVDTS OFFSET @ 120 DEGREES APART. AXIAL LENGTH IS 2.8 INCHES.

Note: Some values in this table may be revised based on reviews of test procedures and individual test results. The reader should refer to the latest revision of the gINT geotechnical data base (geotechnical report GR-70).

BORING NO: B1316
DEPTH (FT): 27.9
AUSTIN CHALK



INCLINATION (DEG): VERTICAL
MOISTURE CONTENT (%): 15.5
DRY UNIT WEIGHT (PCF): 117.9
DEG. OF SATURATION (%): 97.4
ASSUMED SPECIFIC GRAVITY: 2.7
CONFINING PRESSURE (PSI): 0
TEST TYPE:UNCONFINED COMPRESSION
(ASTM D 2938)

TANGENT MODULUS AT 50%
ULTIMATE STRESS:
6.9 x 10E5 PSI

FAILURE MODE:
CONICAL BREAK

TEXAS SSC SITE

STRESS-STRAIN PLOT

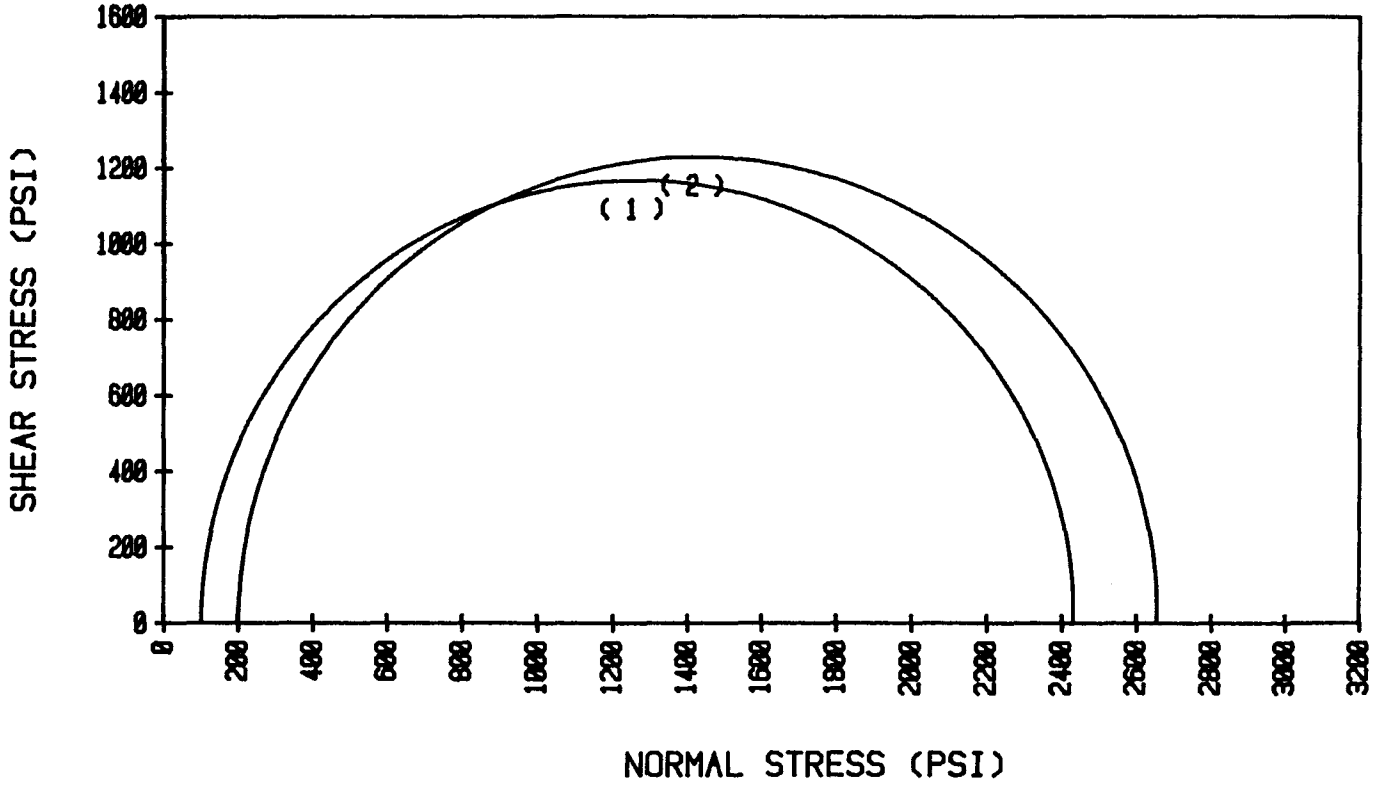
SOUTHWESTERN LABORATORIES
DALLAS, TEXAS

JOB NO.: 89-192

FIGURE

BORING NO.: B1316
DEPTH RANGE (FT): 107.4-108.2
AUSTIN CHALK LIMESTONE

BORING INCLINATION (DEG): VERTICAL
TEST TYPE: TRIAXIAL COMPRESSION (ASTM D2664)

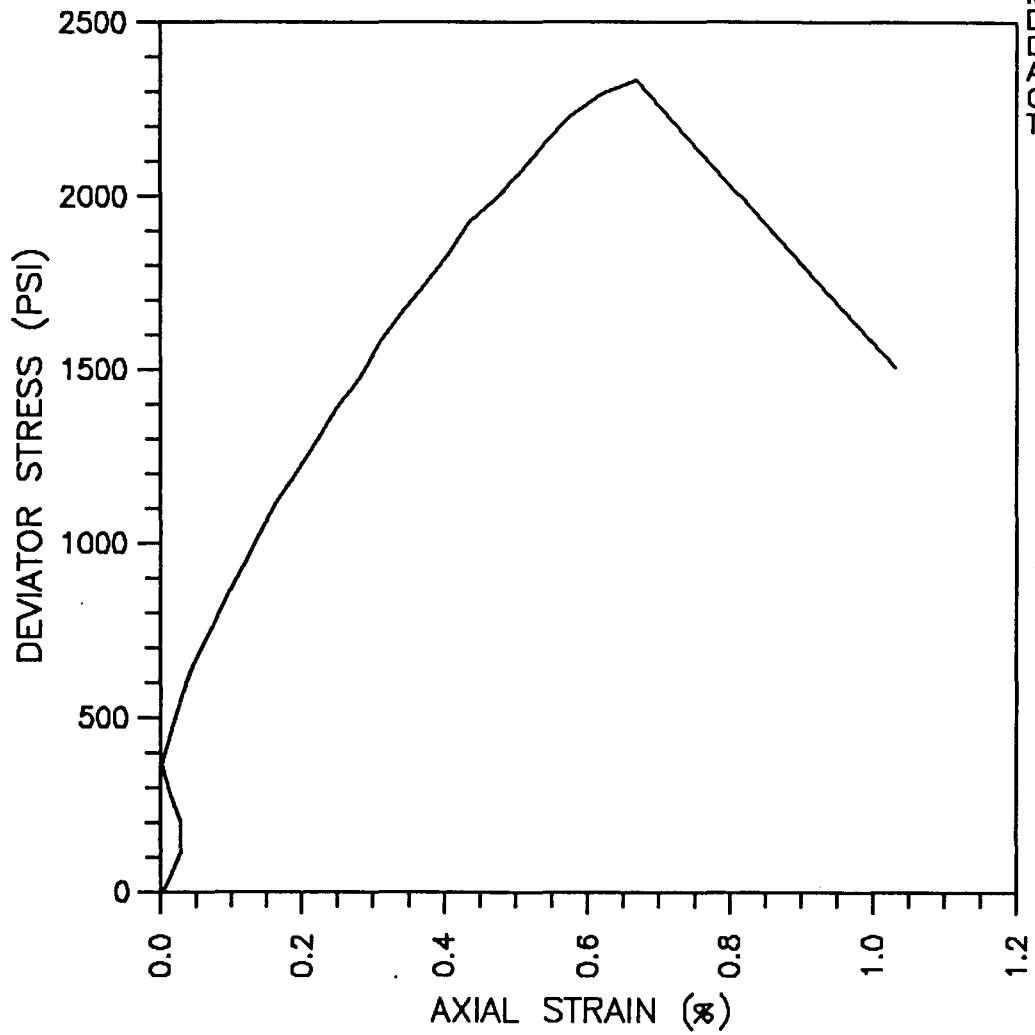


SEE STRESS - STRAIN PLOTS
FOR INDIVIDUAL SAMPLE DATA

(1) DEPTH (FT): 107.4
(2) DEPTH (FT): 107.8

TEXAS SSC SITE	
MOHR CIRCLE PLOT	
MASON-JOHNSTON & ASSOCIATES, INC. GEOLOGISTS-ENGINEERS	
JOB NO.: 5530.17	FIGURE

BORING NO.: B1316
DEPTH (FT): 107.4
AUSTIN CHALK LIMESTONE



INCLINATION (DEG): VERTICAL
MOISTURE CONTENT (%): 14.2
DRY UNIT WEIGHT (PCF): 119.4
DEG. OF SATURATION (%): 93.4
ASSUMED SPECIFIC GRAVITY: 2.7
CONFINING PRESSURE (PSI): 100
TEST TYPE: TRIAXIAL COMPRESSION
(ASTM D 2664)

TANGENT MODULUS AT 50%
ULTIMATE STRESS:
3.226 x10E5 PSI

FAILURE MODE:
AXIAL SPLITTING

TEXAS SSC SITE

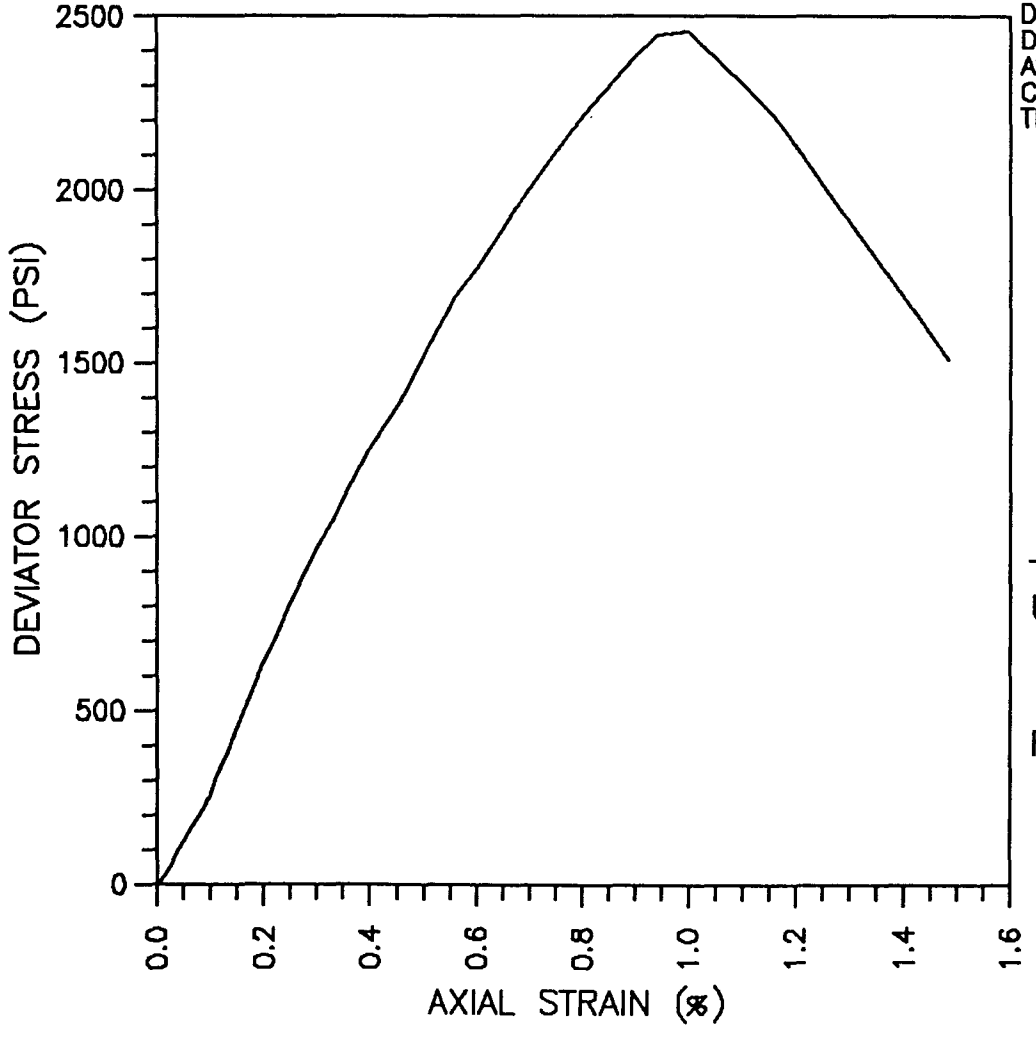
STRESS-STRAIN PLOT

MASON-JOHNSTON & ASSOCIATES, INC.
GEOLOGISTS-ENGINEERS

JOB NO.: 5530.17

FIGURE

BORING NO.: B1316
DEPTH (FT): 107.8
AUSTIN CHALK LIMESTONE



INCLINATION (DEG): VERTICAL
MOISTURE CONTENT (%): 13.4
DRY UNIT WEIGHT (PCF): 117.8
DEG. OF SATURATION (%): 83.8
ASSUMED SPECIFIC GRAVITY: 2.7
CONFINING PRESSURE (PSI): 200
TEST TYPE: TRIAXIAL COMPRESSION
(ASTM D 2664)

TANGENT MODULUS AT 50%
ULTIMATE STRESS:
2.778 x10E5 PSI

FAILURE MODE:
AXIAL SPLITTING

TEXAS SSC SITE

STRESS-STRAIN PLOT

MASON-JOHNSTON & ASSOCIATES,INC.
GEOLOGISTS-ENGINEERS

JOB NO.: 5530.17

FIGURE

GEOMECHANICAL TEST RESULTS

BORING B 2052

TABLE C–3. GEOMECHANICAL TEST RESULTS–BORING B 2052

GENERAL LITHOLOGY	BORING DEPTH feet	MOISTURE CONTENT percent	DRY DENSITY pcf	SPECIFIC GRAVITY	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	FRACTION FINER THAN # 200 SIEVE percent	CARBONATE CONTENT percent	SAMPLE DIMENSION RATIO L/D	SAMPLE FAILURE MODE/ DEGREES*	UNCONFINED COMPRESSIVE STRENGTH psi	TRIAXIAL COMPRESSION CONFINING PRESSURE σ_3 psi	TRIAXIAL COMPRESSION DEVIATOR STRESS $\sigma_1-\sigma_3$ psi	FAILURE STRAIN percent	TANGENT YOUNG'S MODULUS E50 (psi)x10E5	TANGENT YOUNG'S MODULUS UNLOAD/ RELOAD (psi)x10E5	TANGENT YOUNG'S MODULUS σ_3 psi	POISSON'S RATIO	BRAZIL TENSILE STRENGTH psi	2ND CYCLE SLAKE DURABILITY INDEX percent	MODIFIED TABOR ABRASION/ HARDNESS INDEX	SWELL PRESSURE INDEX percent	COMMENTS
AUSTIN CHALK	185.0	16.1																					
AUSTIN CHALK	185.2	16.2	116.7	2.69					2.3	B–1/30	2206			0.27	11.00		0						
BENTONITE	190.6			2.33	155	108	92.4	9.4															
BENTONITE	190.9	32.4																					
AUSTIN CHALK	191.0	12.9																					
AUSTIN CHALK	191.1	11.4							0.4										302				
AUSTIN CHALK	191.2	10.9	130.9						2.1	D	666			0.49	1.80		0						
AUSTIN CHALK	216.9	13.7																					
AUSTIN CHALK	217.1	15.2	118.6						2.2	B–1/30	2579			0.54	5.90		0						
AUSTIN CHALK	218.2	11.5																					
AUSTIN CHALK	218.4	12.0	127.3						2.2	B–1/30	961			1.34	0.72		0						
PROCEDURE		ASTM-D2216		ASTM-D854	ASTM-D4318		ASTM-D422				ASTM-D2938	ASTM-D2664			ASTM-D3148			ASTM-D3148	ISRM	ISRM	ISRM	ISRM	

82052PRT.WK1
REVISION: 1.1
DATE: 4/17/90

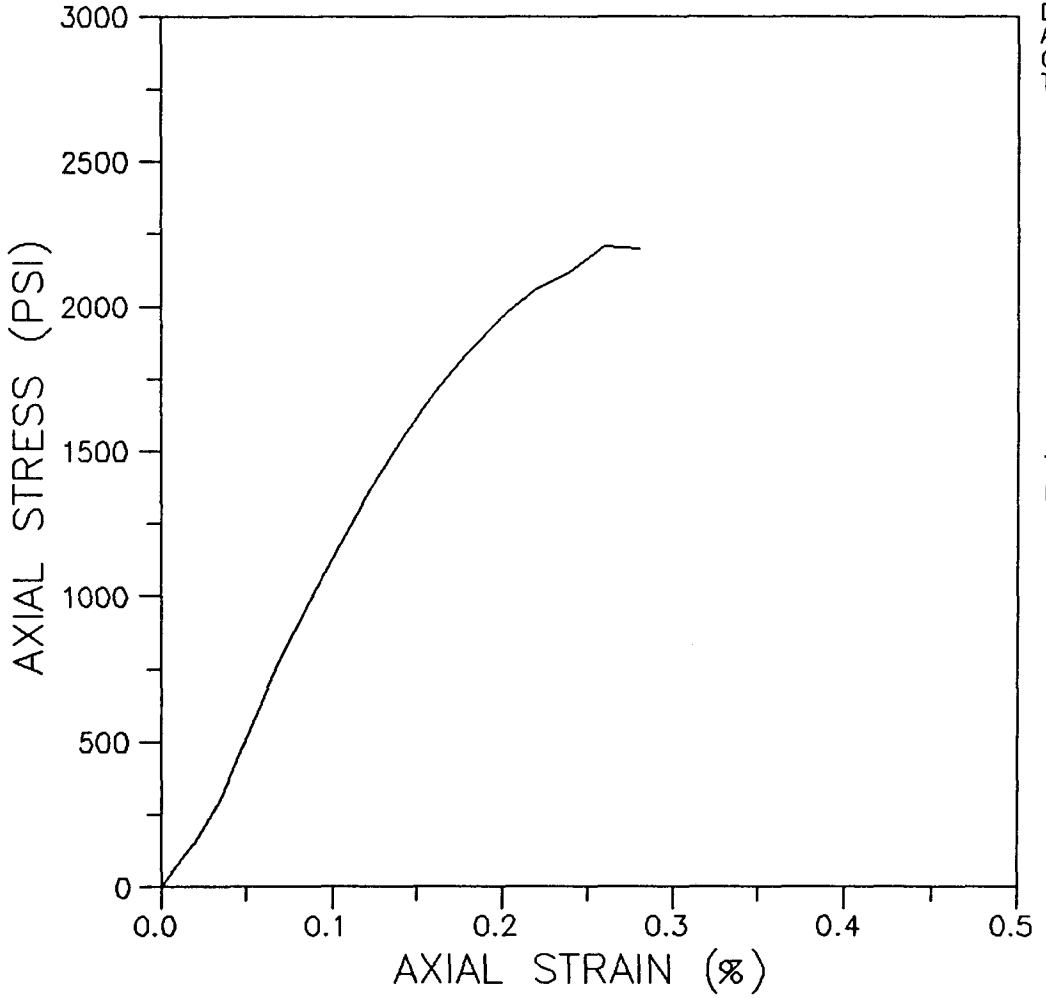
PRELIMINARY
(Subject to Revision)

Note: Some values in this table may be revised based on reviews of test procedures and individual test results. The reader should refer to the latest revision of the gINT geotechnical data base (geotechnical report GR-70).

* EXPLANATION OF SAMPLE FAILURE MODE AS FOLLOWS.

Symbol	Failure Type	Symbol	Failure Type
A	No discernible failure plane	B–4	Combination
(B)	Well defined shear plane @ "X" angle(deg) to vertical or to long axis of core	C	Barreling/Bulging
B–1	Shear plane	D	Longitudinal (axial) splitting
B–2	Bedding plane shear	E	Conical
B–3	Shear plane along pre–existing fracture, shear zone, etc.	F	No information

BORING NO: B2052
DEPTH (FT): **185.2**
AUSTIN CHALK



INCLINATION (DEG): VERTICAL
MOISTURE CONTENT (%): 16.2
DRY UNIT WEIGHT (PCF): 116.7
DEG. OF SATURATION (%): 98.2
ASSUMED SPECIFIC GRAVITY: 2.7
CONFINING PRESSURE (PSI): 0
TEST TYPE:UNCONFINED COMPRESSION
(ASTM D 2938)

TANGENT MODULUS AT 50%
ULTIMATE STRESS:
1.1 x 10E6 PSI

FAILURE MODE:
SHEAR PLANE AT 30 DEG

TEXAS SSC SITE

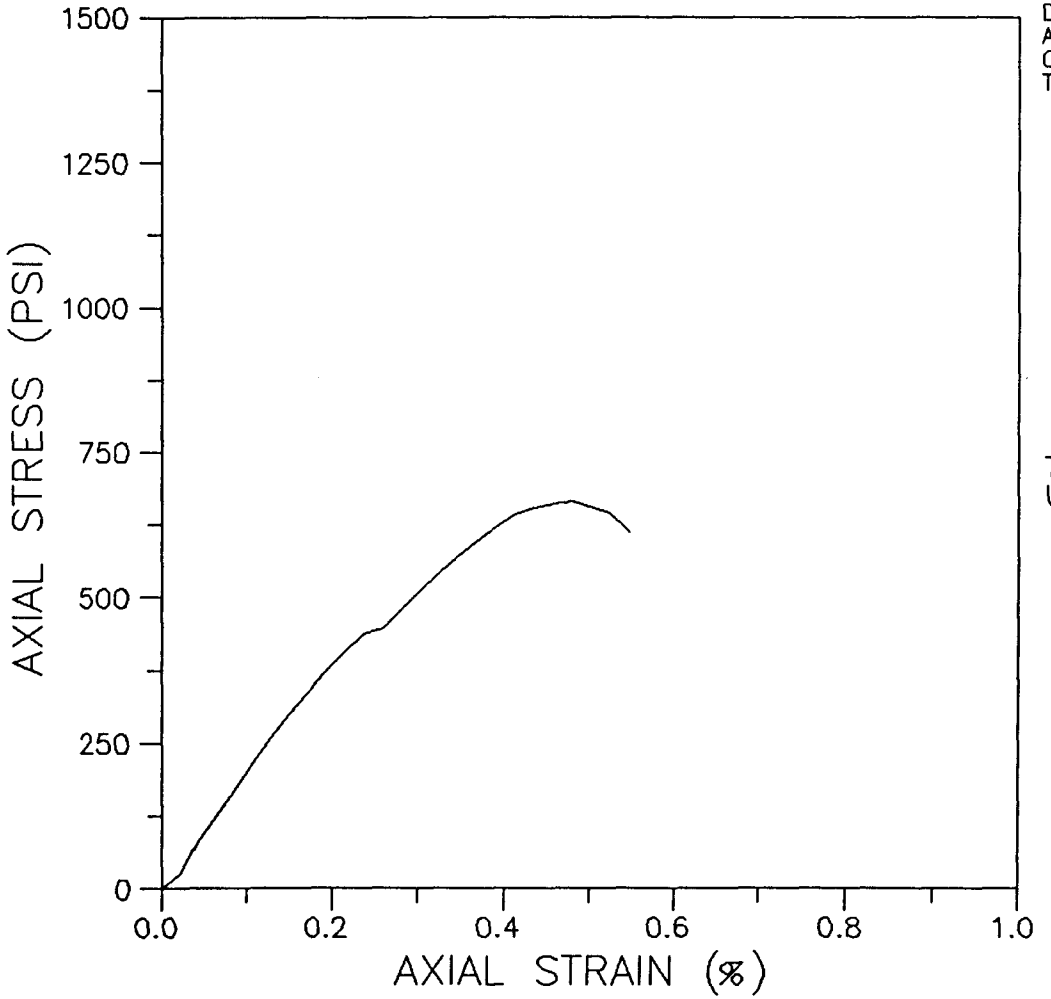
STRESS–STRAIN PLOT

SOUTHWESTERN LABORATORIES
DALLAS, TEXAS

JOB NO.: 89–192

FIGURE

BORING NO: B2052
DEPTH (FT): 191.2
AUSTIN CHALK



INCLINATION (DEG): VERTICAL
MOISTURE CONTENT (%): 10.9
DRY UNIT WEIGHT (PCF): 130.9
DEG. OF SATURATION (%): 102.5
ASSUMED SPECIFIC GRAVITY: 2.7
CONFINING PRESSURE (PSI): 0
TEST TYPE:UNCONFINED COMPRESSION
(ASTM D 2938)

TANGENT MODULUS AT 50%
ULTIMATE STRESS:
1.8 x 10E5 PSI

FAILURE MODE:
LONGITUDINAL (AXIAL)
SPLITTING

TEXAS SSC SITE

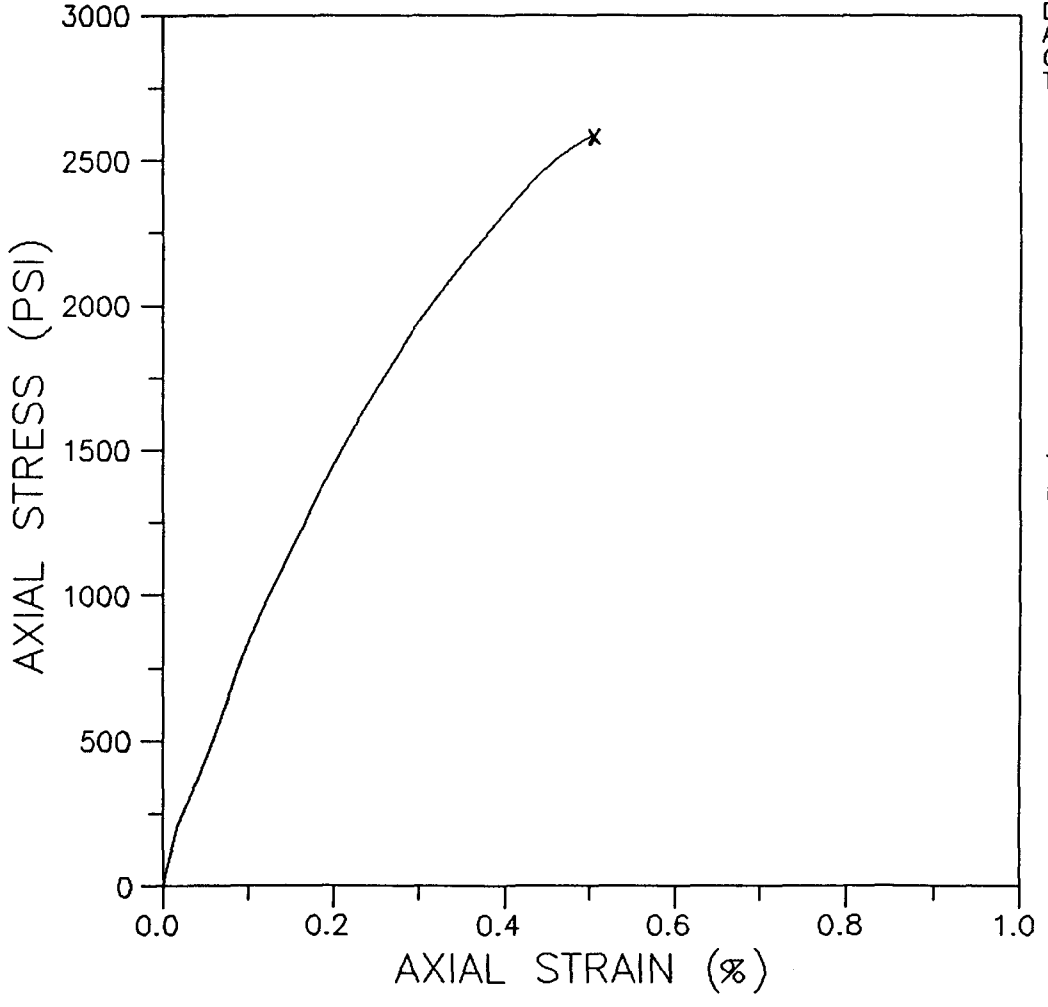
STRESS–STRAIN PLOT

SOUTHWESTERN LABORATORIES
DALLAS, TEXAS

JOB NO.: 89–192

FIGURE

BORING NO: B2052
DEPTH (FT): 217.1
AUSTIN CHALK



INCLINATION (DEG): VERTICAL
MOISTURE CONTENT (%): 15.2
DRY UNIT WEIGHT (PCF): 118.6
DEG. OF SATURATION (%): 97.5
ASSUMED SPECIFIC GRAVITY: 2.7
CONFINING PRESSURE (PSI): 0
TEST TYPE:UNCONFINED COMPRESSION
(ASTM D 2938)

TANGENT MODULUS AT 50%
ULTIMATE STRESS:
5.9 x 10E5 PSI

FAILURE MODE:
SHEAR PLANE AT 30 DEG

TEXAS SSC SITE

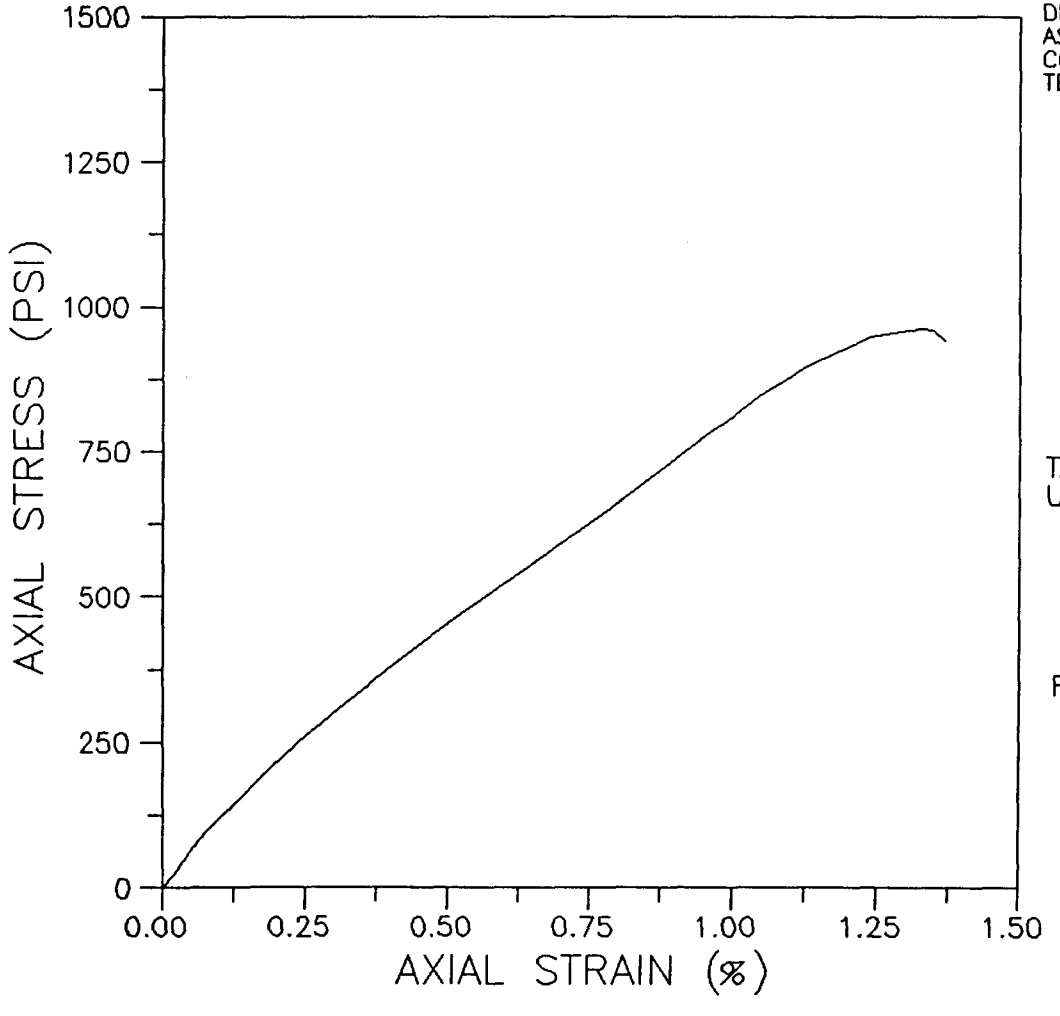
STRESS-STRAIN PLOT

SOUTHWESTERN LABORATORIES
DALLAS, TEXAS

JOB NO.: 89-192

FIGURE

BORING NO: B2052
DEPTH (FT): 218.4
AUSTIN CHALK



INCLINATION (DEG): VERTICAL
MOISTURE CONTENT (%): 12.0
DRY UNIT WEIGHT (PCF): 127.3
DEG. OF SATURATION (%): 100.3
ASSUMED SPECIFIC GRAVITY: 2.7
CONFINING PRESSURE (PSI): 0
TEST TYPE:UNCONFINED COMPRESSION
(ASTM D 2938)

TANGENT MODULUS AT 50%
ULTIMATE STRESS:
7.2 x 10E4 PSI

FAILURE MODE:
SHEAR PLANE AT 30 DEG

TEXAS SSC SITE

STRESS-STRAIN PLOT

SOUTHWESTERN LABORATORIES
DALLAS, TEXAS

JOB NO.: 89-192

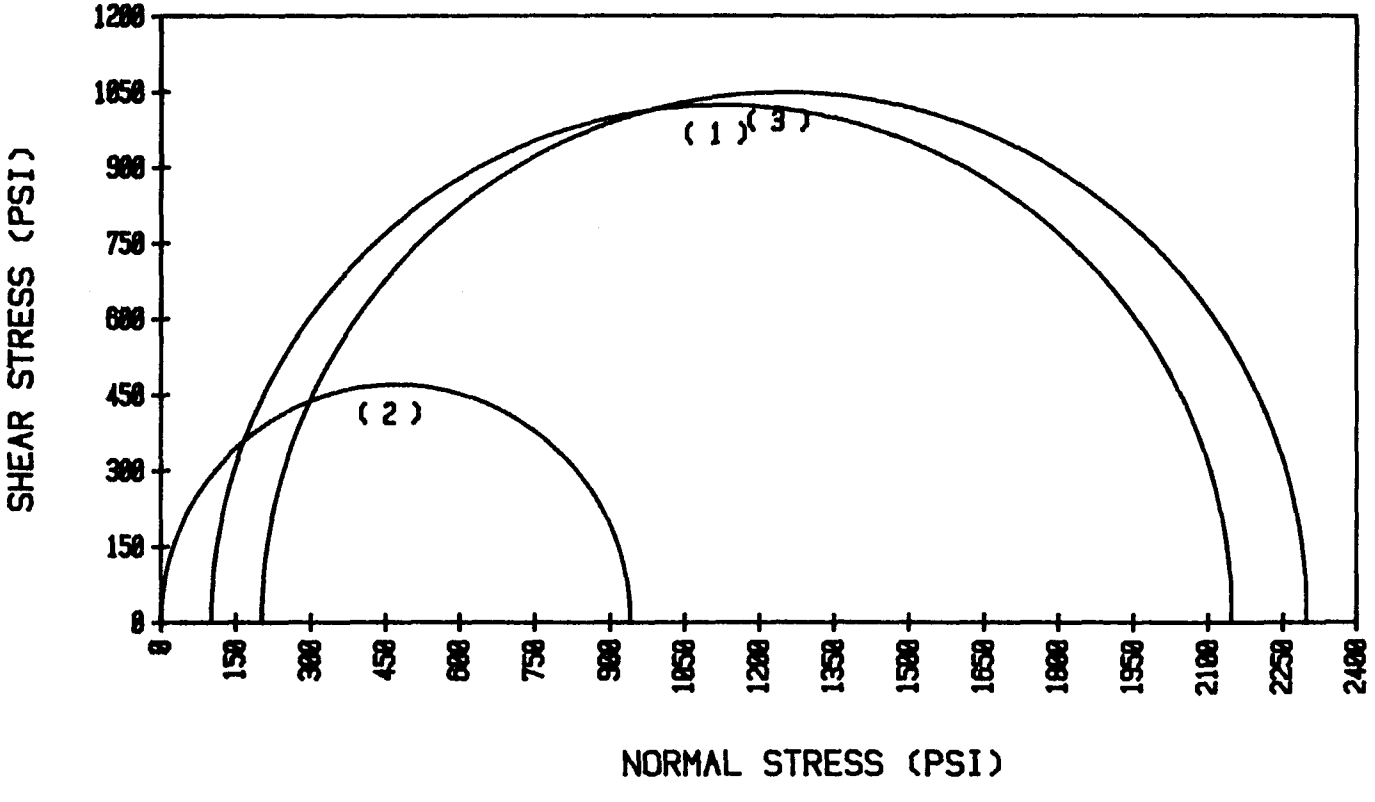
FIGURE

GEOMECHANICAL TEST RESULTS

BORING B 2062

BORING NO.: B2062
DEPTH RANGE (FT): 155.0-156.2
AUSTIN CHALK LIMESTONE

BORING INCLINATION (DEG): VERTICAL
TEST TYPE: UNCONFINED COMPRESSION (ASTM D2938)
TRIAXIAL COMPRESSION (ASTM D2664)



SEE STRESS - STRAIN PLOTS
FOR INDIVIDUAL SAMPLE DATA

(1) DEPTH (FT): 155.0
(2) DEPTH (FT): 155.4
(3) DEPTH (FT): 155.8

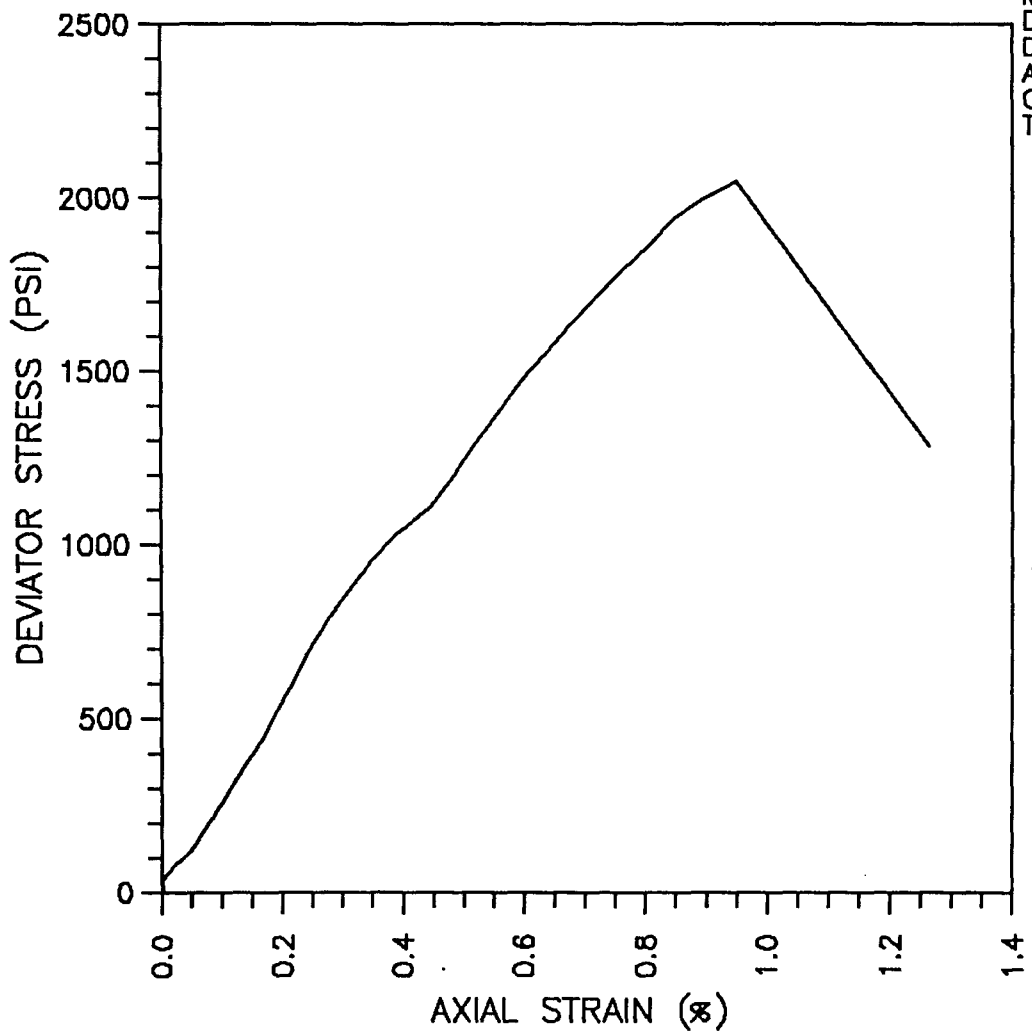
TEXAS SSC SITE

MOHR CIRCLE PLOT

MASON-JOHNSTON & ASSOCIATES, INC.
GEOLOGISTS-ENGINEERS

JOB NO.: 5530.17 | FIGURE

BORING NO.: B2062
DEPTH (FT): 155.0
AUSTIN CHALK LIMESTONE



INCLINATION (DEG): VERTICAL
MOISTURE CONTENT (%): 15.6
DRY UNIT WEIGHT (PCF): 116.7
DEG. OF SATURATION (%): 95.0
ASSUMED SPECIFIC GRAVITY: 2.7
CONFINING PRESSURE (PSI): 100
TEST TYPE: TRIAXIAL COMPRESSION
(ASTM D 2664)

TANGENT MODULUS AT 50%
ULTIMATE STRESS:
2.118 x10E5 PSI

FAILURE MODE:
AXIAL SPLITTING

TEXAS SSC SITE

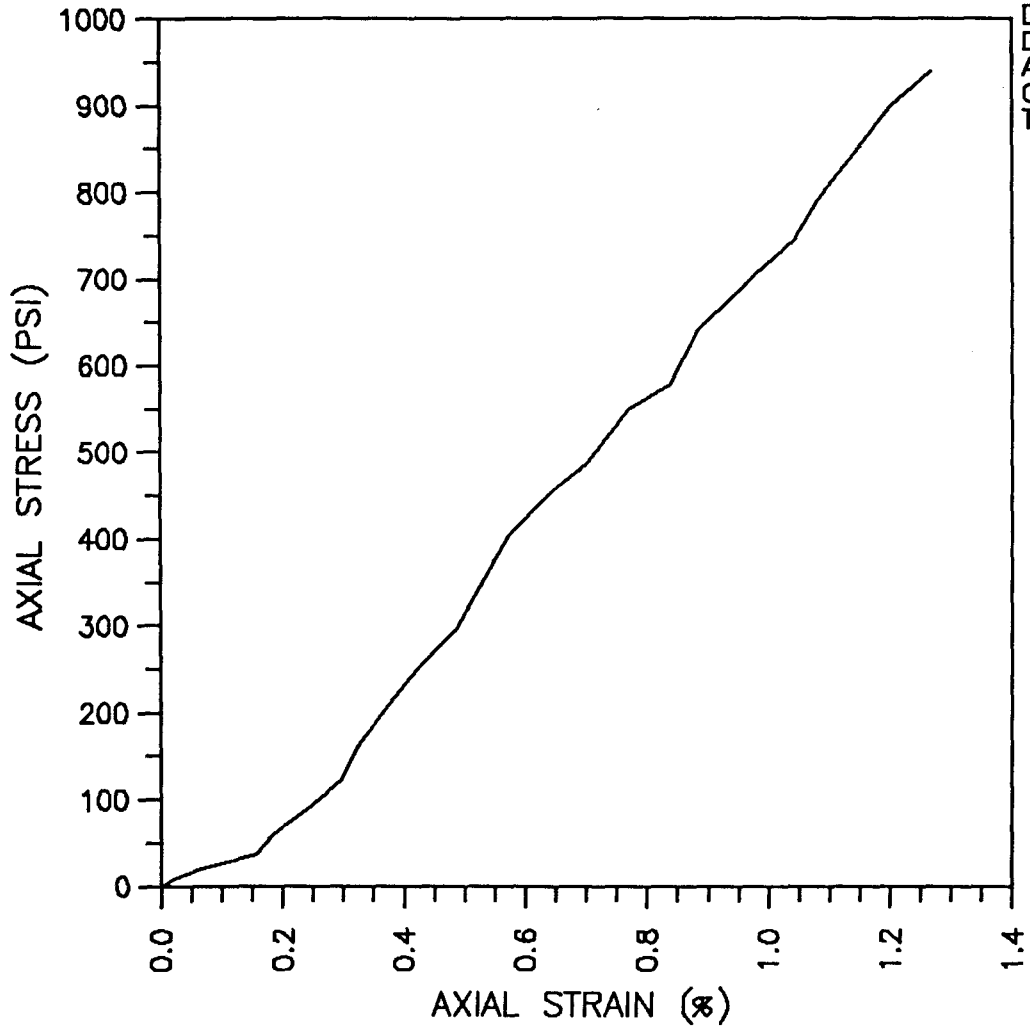
STRESS-STRAIN PLOT

MASON-JOHNSTON & ASSOCIATES, INC.
GEOLOGISTS-ENGINEERS

JOB NO.: 5530.17

FIGURE

BORING NO.: B2062
DEPTH (FT): 155.4
AUSTIN CHALK LIMESTONE



INCLINATION (DEG): VERTICAL
MOISTURE CONTENT (%): 12.8
DRY UNIT WEIGHT (PCF): 120.5
DEG. OF SATURATION (%): 87.0
ASSUMED SPECIFIC GRAVITY: 2.7
CONFINING PRESSURE (PSI): 0
TEST TYPE: UNCONFINED COMPRESSION
(ASTM D 2938)

TANGENT MODULUS AT 50%
ULTIMATE STRESS:
0.833 x10E5 PSI

FAILURE MODE:
AXIAL SPLITTING

TEXAS SSC SITE

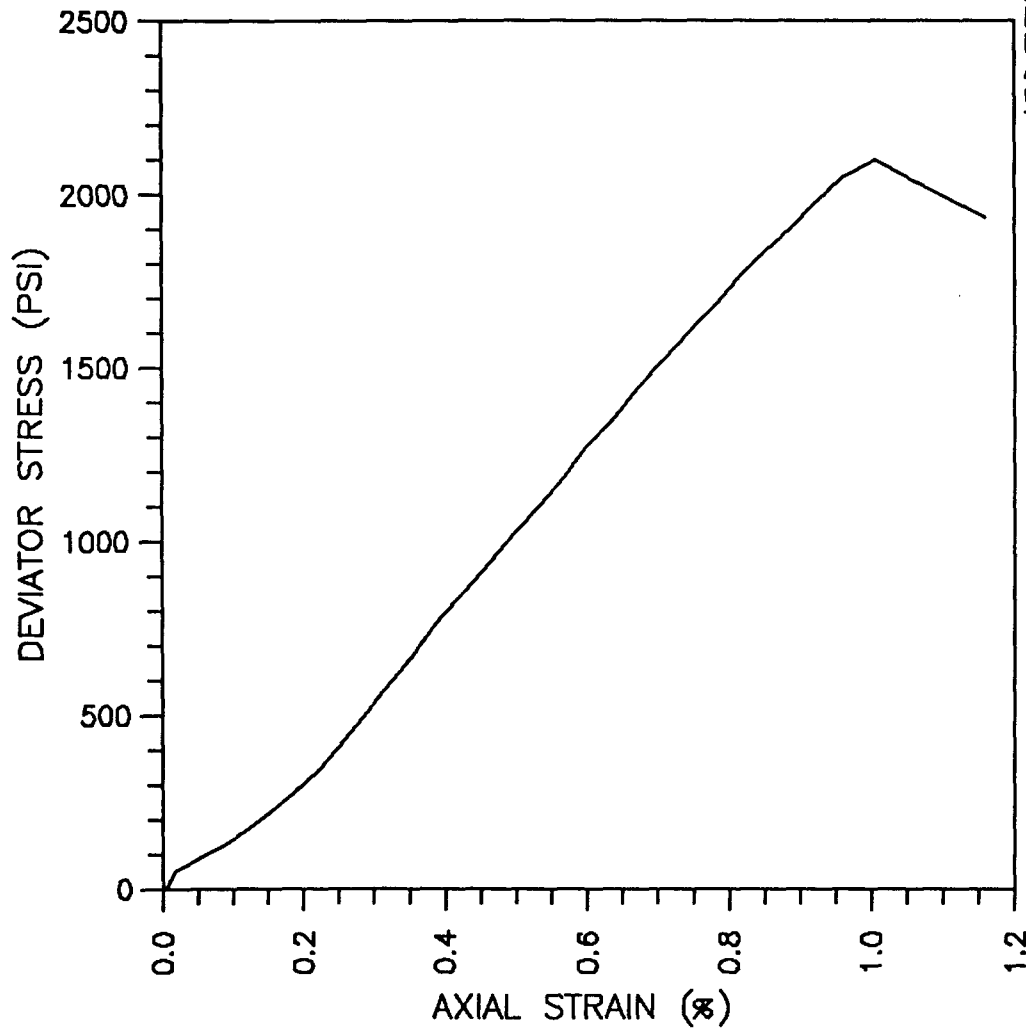
STRESS-STRAIN PLOT

MASON-JOHNSTON & ASSOCIATES, INC.
GEOLOGISTS-ENGINEERS

JOB NO.: 5530.17

FIGURE

BORING NO.: B2062
DEPTH (FT): 155.8
AUSTIN CHALK LIMESTONE



INCLINATION (DEG): VERTICAL
MOISTURE CONTENT (%): 12.7
DRY UNIT WEIGHT (PCF): 124.0
DEG. OF SATURATION (%): 95.5
ASSUMED SPECIFIC GRAVITY: 2.7
CONFINING PRESSURE (PSI): 200
TEST TYPE: TRIAXIAL COMPRESSION
(ASTM D 2664)

TANGENT MODULUS AT 50%
ULTIMATE STRESS:
2.353 x10E5 PSI

FAILURE MODE:
AXIAL SPLITTING

TEXAS SSC SITE

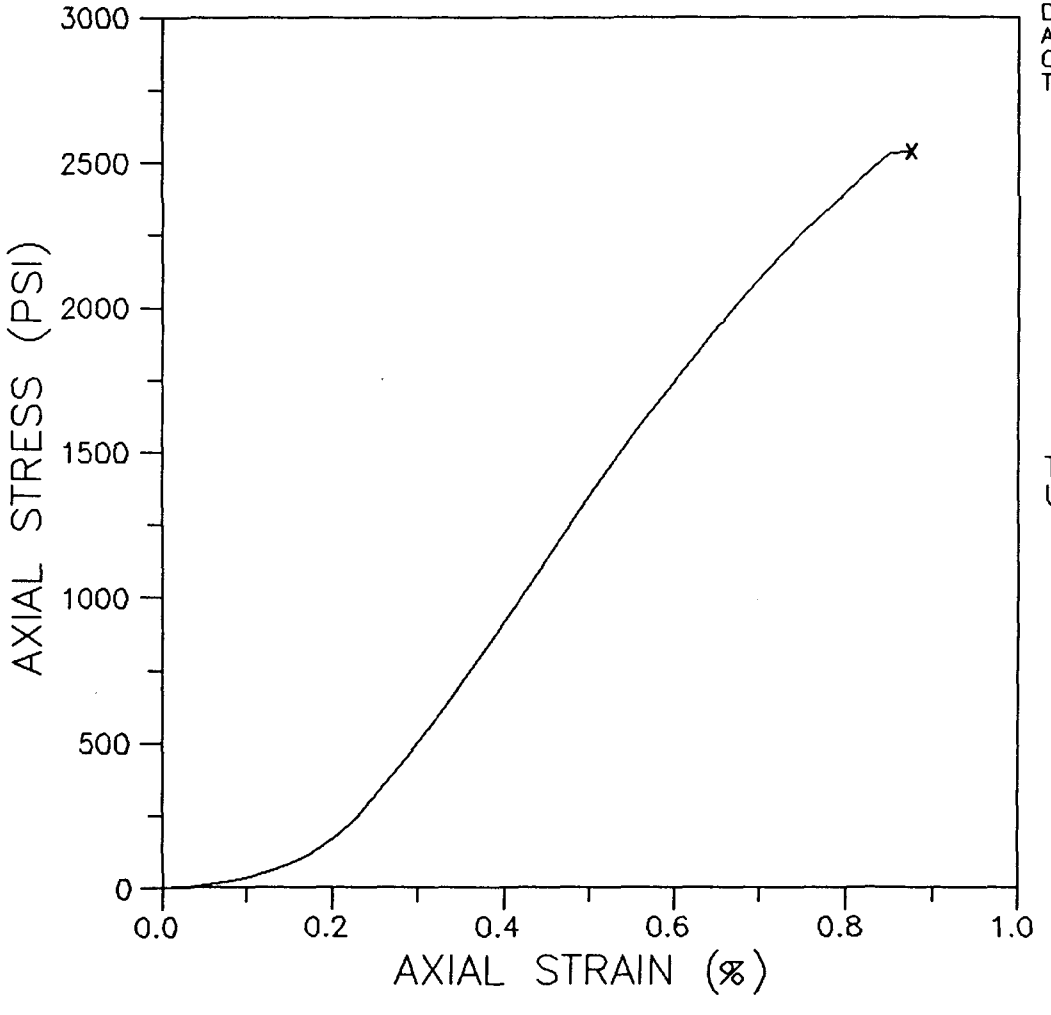
STRESS-STRAIN PLOT

MASON-JOHNSTON & ASSOCIATES,INC.
GEOLOGISTS-ENGINEERS

JOB NO.: 5530.17

FIGURE

BORING NO: B2062
DEPTH (FT): 210.2
AUSTIN CHALK



INCLINATION (DEG): VERTICAL
MOISTURE CONTENT (%): 12.3
DRY UNIT WEIGHT (PCF): 126.2
DEG. OF SATURATION (%): 99.1
ASSUMED SPECIFIC GRAVITY: 2.7
CONFINING PRESSURE (PSI): 0
TEST TYPE:UNCONFINED COMPRESSION
(ASTM D 2938)

TANGENT MODULUS AT 50%
ULTIMATE STRESS:
4.3 x 10E5 PSI

FAILURE MODE:
LONGITUDINAL (AXIAL)
SPLITTING

TEXAS SSC SITE

STRESS-STRAIN PLOT

SOUTHWESTERN LABORATORIES
DALLAS, TEXAS

JOB NO.: 89-192

FIGURE

APPENDIX D

BOREHOLE PLUGGING REPORTS

TABLE C-4. GEOMECHANICAL TEST RESULTS-BORING B 2062

GENERAL LITHOLOGY	BORING DEPTH feet	MOISTURE CONTENT percent	DRY DENSITY pcf	SPECIFIC GRAVITY	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	FRACTION FINER THAN # 200 SIEVE percent	CARBONATE CONTENT percent	SAMPLE DIMENSION RATIO L/D	SAMPLE FAILURE MODE/ DEGREES *	UNCONFINED COMPRESSIVE STRENGTH psi	TRIAXIAL COMPRESSION CONFINING PRESSURE σ_3 psi	TRIAXIAL COMPRESSION DEVIATOR STRESS $\sigma_1-\sigma_3$ psi	FAILURE STRAIN percent	TANGENT YOUNG'S MODULUS E50 (psi)x10E5	TANGENT YOUNG'S MODULUS UNLOAD/ RELOAD (psi)x10E5	TANGENT YOUNG'S MODULUS σ_3 psi	POISSON'S RATIO	BRAZIL TENSILE STRENGTH psi	2ND CYCLE SLAKE-DURABILITY INDEX percent	MODIFIED TABOR ABRASION/ HARDNESS INDEX	SWELL PRESSURE INDEX psi	COMMENTS
AUSTIN CHALK	154.9	15.1	114.1																				
AUSTIN CHALK	155.0	15.6	116.7	2.67					2.2	D		100	2047	0.95	2.12		100						NOTE 1
AUSTIN CHALK	155.0														3.96			0.05					NOTE 2
AUSTIN CHALK	155.4	12.8	120.5						1.9	D	939			1.27	0.83		0						
AUSTIN CHALK	155.8	12.7	124.0						2.3	D		200	2099	1.00	2.35		200						NOTE 1
AUSTIN CHALK	155.8														3.39			0.12					NOTE 2
BENTONITE	198.9	34.5	84.1																				
AUSTIN CHALK	199.2			2.38	149	103	96.2	8.1															
AUSTIN CHALK	210.0	12.6																					
AUSTIN CHALK	210.2	12.3	126.2						2.3	D	2535			0.91	4.30		0						
PROCEDURE		ASTM-D2216		ASTM-D854	ASTM-D4318		ASTM-D422				ASTM-D2938	ASTM-D2664			ASTM-D3148			ASTM-D3148	ISRM	ISRM	ISRM	ISRM	

B2062PRT.WK1
REVISION: 1.1
DATE 4/12/90

PRELIMINARY
(Subject to Revision)

* EXPLANATION OF SAMPLE FAILURE MODE AS FOLLOWS.

Symbol	Failure Type
A	No discernible failure plane
(B)	Well defined shear plane @ "X" angle (deg) to vertical or to long axis of core
B-1	Shear plane
B-2	Bedding plane shear
B-3	Shear plane along pre-existing fracture, shear zone, etc.
B-4	Combination
C	Barreling/Bulging
D	Longitudinal (axial) splitting
E	Conical
F	No information

NOTE:
1) MODULUS WAS CALCUTED FROM AXIAL STRAINS MEASURED USING DIAL MICROMETER. AXIAL LENGTH IS THE SAMPLE LENGTH.

2) MODULII AND POISSON'S RATIO WERE CALCULATED FROM AXIAL AND LATERAL STRAINS MEASURED USING 3 AXIAL AND 3 LATERAL LVDTS OFFSET @ 120 DEGREES APART. AXIAL LENGTH IS 2.8 INCHES.

Note: Some values in this table may be revised based on reviews of test procedures and individual test results. The reader should refer to the latest revision of the gINT geotechnical data base (geotechnical report GR-70).

SSC BOREHOLE PLUGGING REPORT

Project No. 87-888

Task No. 17

Boring No. B 1296

Texas Coordination Location: N 227,477
E 2,180,383

Surface Elevation: 600.8 feet

Total Boring Depth: 140.0 feet

Date Drilled: 2/12/90-2/13/90

Date Plugged: 2/13/90

Time Completed: 4:45 p.m.

Remarks:

162 gallons of grout (tremie placed) was used to completely cement boring from bottom to top. Water/cement ratio was approximately 7 gallons per sack.

Drilling geologist: Mike Granger
Coordinator: Shawn Wood
SwL Report No. 89-192

SSC BOREHOLE PLUGGING REPORT

Project No. 87-888

Task No. 17

Boring No. B 1316

Texas Coordination Location: N 229,310
E 2,179,576

Surface Elevation: 623.1 feet

Total Boring Depth: 149.0 feet

Date Drilled: 2/14/90-2/16/90

Date Plugged: 2/17/90

Time Completed: 11:30 a.m.

Remarks:

140 gallons of grout (tremie placed)was used to completely cement boring from bottom to top. Water/cement ratio was approximately 7 gallons per sack.

Drilling geologist: Mike Granger
Coordinator: Bruce Bailey
SwL Report No. 89-192

SSC BOREHOLE PLUGGING REPORT

Project No. 87-888

Task No. 17

Boring No. B 2052

Texas Coordination Location: N 294,871
E 2,188,867

Surface Elevation: 725.6 feet

Total Boring Depth: 225.0 feet

Date Drilled: 2/19/90-2/20/90

Date Plugged: 2/22/90

Time Completed: 12:00 p.m.

Remarks:

258 gallons of grout (tremie placed) was used to completely cement boring from bottom to top. Water/cement ratio was approximately 7 gallons per sack.

Drilling geologist: Mike Granger
Coordinator: Shawn Wood
SwL Report No. 89-192

SSC BOREHOLE PLUGGING REPORT

Project No. 87-888

Task No. 17

Boring No. B 2062

Texas Coordination Location: N 295,394
E 2,189,735

Surface Elevation: 724.7 feet

Total Boring Depth: 234.0 feet

Date Drilled: 2/20/90-2/22/90

Date Plugged: 2/23/90

Time Completed: 12:00 p.m.

Remarks:

269 gallons of grout (tremie placed) was used to completely cement boring from bottom to top. Water/cement ratio was approximately 7 gallons per sack.

Drilling geologist: Mike Granger
Coordinator: Shawn Wood
SwL Report No. 89-192