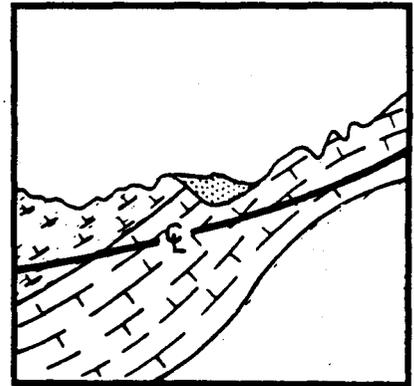
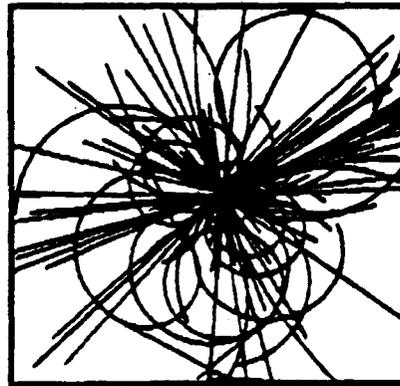


Data Report for Structure Study Zone SE 1.5, Trench SE 1.5, and Rotary Wash Borings SE 1.5A and SE 1.5B



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 (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: SE1.5

Objective: To constrain existence and location of a fault based on geologic mapping, trenching, and stratigraphic correlations between borings (determined from wire-line logs).

Hole No. SE1.5A

Location: North 268,606.3 feet

East 2,172,645.1 feet

Surface Elevation 733.0 feet

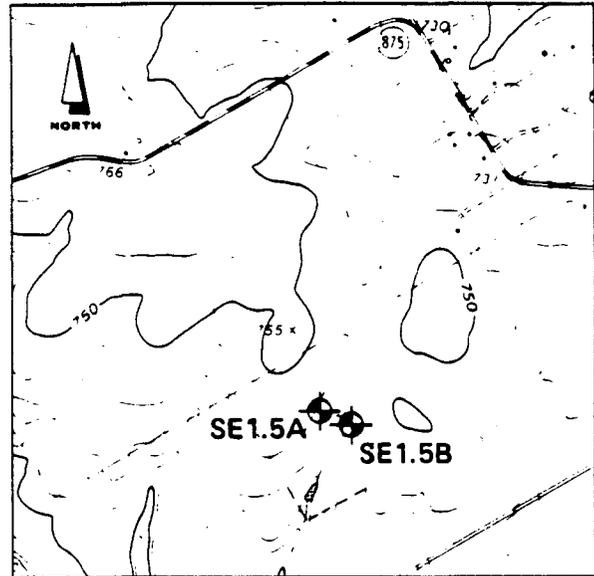
Hole No. SE1.5B

Location: North 268,541.4 feet

East 2,172,842.1 feet

Surface Elevation 732.9 feet

SE1.5A and SE1.5B are located on the western side of the ring, about 0.7 mile south of where the proposed tunnel location crosses State Route 875 and 1.5 miles west of Lone Elm.



SCALE 1:24,000

1000 0 1000 2000 3000 FEET

CONTOUR INTERVAL 10 FEET

Scope and Schedule: Geologic Mapping	May 26 to June 16, 1989
Trenching	June 16, 1989
SE1.5A: Rotary Wash Boring	June 21, 1989
Wire-line Logging	June 21, 1989
Plugging and Abandonment	June 21, 1989
SE1.5B: Rotary Wash Boring	June 21, 1989
Wire-line Logging	June 21, 1989
Plugging and Abandonment	June 21, 1989

Geologic Mapping: A north 10° east-trending aerial photograph lineament was ground-checked by mapping outcropping bedrock over a 0.7 mile length of the lineament. No evidence of faulting was observed in the sparse bedrock exposures (see Appendix A).

Trenching: A trench about 4 feet deep and 75 feet long was excavated across the photographic lineament south of a small stock pond. The potential for a fault was indicated by tilted bedrock exposed in the side of the trench (see Appendix B).

Hole No. SE1.5A

Conditions Encountered:

Total Hole Depth 75.0 feet

Soil 0.0 to 1.0 feet

Austin Chalk 1.0 to 75.0 feet
(see lithologic log, Appendix C)

Evaluation of the wire-line logs indicates 4 feet of vertical offset between the two borings, with the strata in SE1.5B (east of the fault) dropped down relative to strata in SE1.5A (west of the fault).

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

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

Hole Status: Cemented and abandoned.
(See plugging report, Appendix E)

Hole No. SF1.5B

Conditions Encountered:

Total Hole Depth 75.0 feet

Soil 0.0 to 2.5 feet

Austin Chalk 2.5 to 75.0 feet
(see lithologic log, Appendix C)

Evaluation of the wire-line logs indicates 4 feet of vertical offset between the two borings, with the strata in SE1.5B (east of the fault) dropped down relative to strata in SE1.5A (west of the fault).

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

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

Hole Status: Cemented and abandoned.
(See plugging report, Appendix E)

APPENDIX A

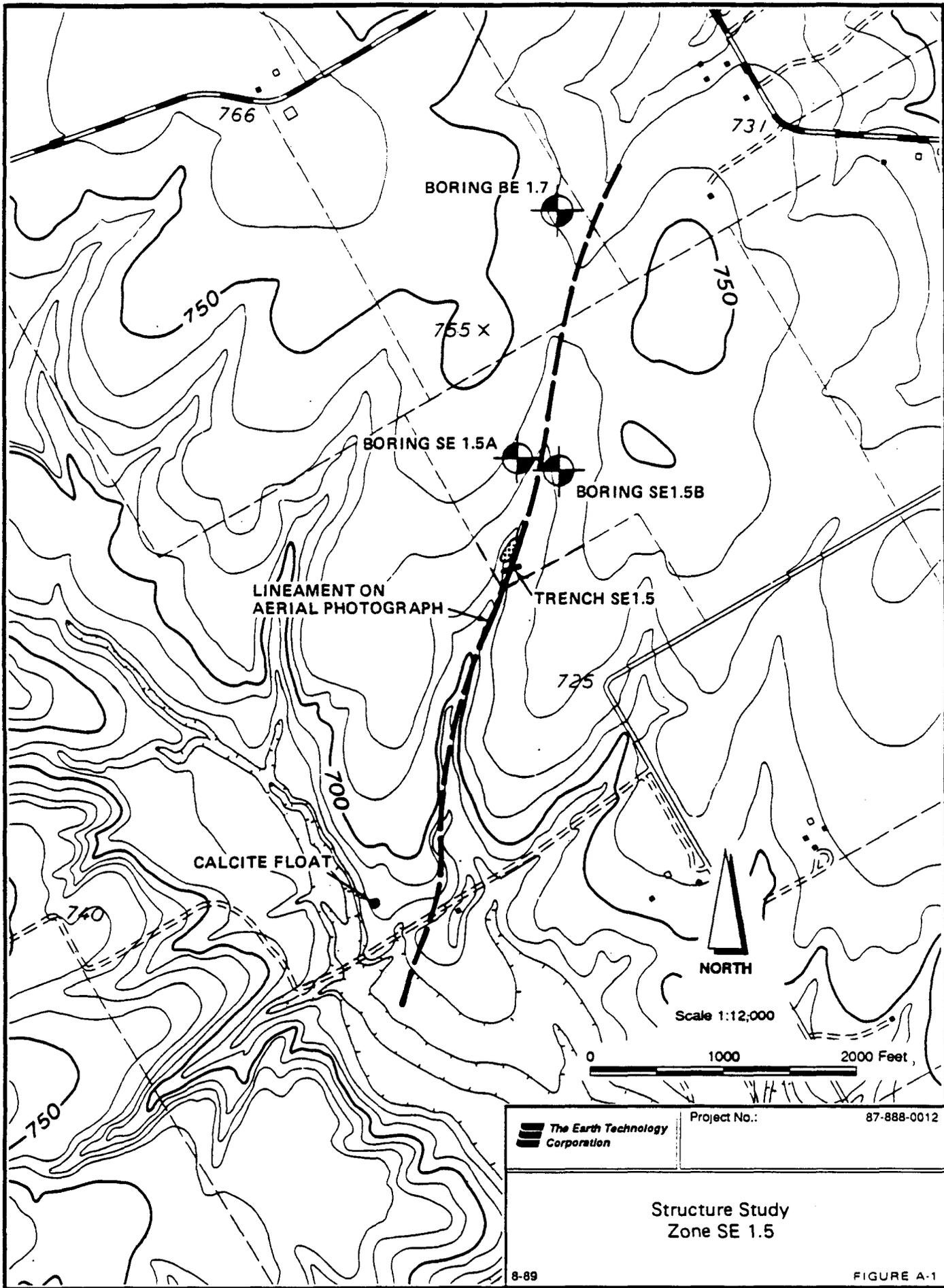
STRUCTURE ZONE MAP

STRUCTURE STUDY ZONE SE1.5

Field mapping of the structure study zones consisted primarily of locating and measuring the bearing of calcite-filled veins and noting areas of abundant, loose calcite fragments (float). Crystalline and fibrous calcite formed in fractures are primary indicators of faulting in the SSC study area. The bearing of significant bedrock fractures was also mapped.

The only exposed bedrock in Structure Study Zone SE1.5 occurred between the small stock pond, on the north side of Trench SE1.5, and the small unimproved road about 0.6 mile to the south. Austin Chalk was exposed in the drainage over about 40 percent of the drainage length. No faults were observed during the surficial mapping; however, some tilting of rock fragments in the zone of weathered bedrock was identified in the trench (see Appendix B).

Name of Structure:	Fault SE1.5
Surface Expression:	Relatively straight alignment of drainages over much of its length, including a saddle between borings SE1.5A and B and boring BE1.7.
Trend:	Variable, generally north 10° east.
Width:	About 4 feet as indicated by a sheared zone encountered in the trench.
Faults in Outcrop:	None located
Slickensides and Mineralization:	Calcite float was observed on an outcrop of Austin Chalk several hundred feet west of the southern extent of the lineament (Figure A-1). No mineralization was observed along the lineament.
Offset in Borings:	4 feet of down-to-the-east vertical displacement between borings.
Trenches:	4-foot-wide zone of sheared and tilted Austin Chalk marks the probable intersection of the fault with trench SE1.5.

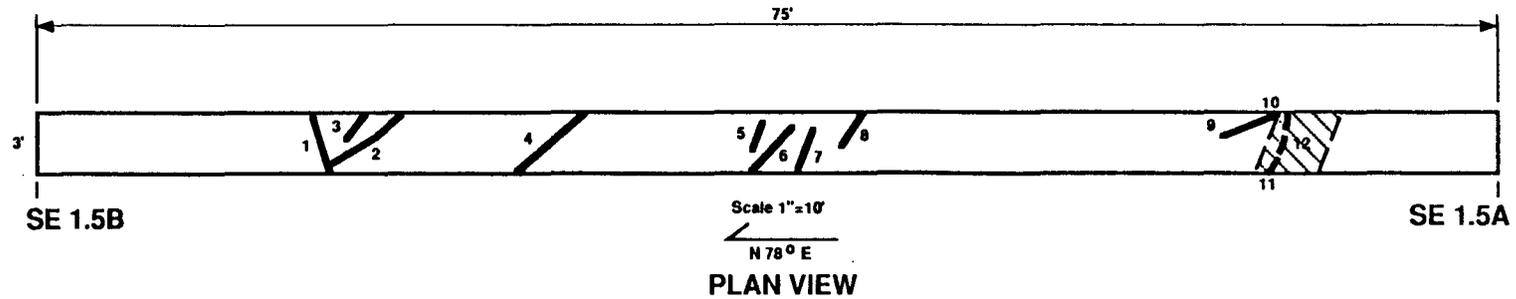


	Project No.: 87-888-0012
--	--------------------------

Structure Study
Zone SE 1.5

APPENDIX B

TRENCH LOG



Fracture	1	N24W, 86W
Attitudes	2	N57E, 73S
	3	N30E, 83S
	4	N43E, 75NW
	5	N14E, 81W
	6	N24E, 54W
	7	N32E, 45W
	8	N45E, 65SE
	9	N51E, 59SE
	10	N5E, 63W
		N6E, 64W
	11	N24E, 58W
	12	Zone of highly sheared rock about 4' wide between dashed lines

Rock on both sides of sheared zone looks identical on the sidewall of the trench: light colored chalk with occasional fossils, but is slightly more sheared and with a deeper soil profile west of shear zone (toward A).

Relatively unweathered Austin Chalk was exposed over 90% of the bottom of the trench.

8-89

The Earth Technology Corporation

Project No.:

87-888-0012

Trench SE 1.5
Plan View

Figure B-1

APPENDIX C
LITHOLOGIC LOGS

LOG OF BORING

PROJECT: TEXAS SSC SITE CLIENT: The Earth Technology Corporation TASK NO.: 12	BORING NO: SE1.5A PG 1 OF 2 LOCATION: N 268,606.3 feet E 2,172,645.1 feet GROUND EL: 733.0 feet
--	---

DATE: 6/21/89 **TYPE:** Air Rotary **CASED TO:** N/A **CONTRACTOR:** SwL (89-192)

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE		PERCENT REC.	PERCENT RQD.	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	Water encountered at 5.0'
DESCRIPTION OF STRATUM										
	1.0								CLAY, stiff, dark brownish-gray	
- 5	[Symbol]								LIMESTONE (Austin Chalk), severely weathered, occasional clay layers, tan	
- 10	[Symbol]									
- 15	[Symbol]									
- 20	[Symbol]									
- 25	[Symbol]									
- 30	[Symbol]								LIMESTONE (Austin Chalk), fresh, occasional thin shaly limestone layers, light gray to dark gray	
- 35	[Symbol]									
- 40	[Symbol]									
									-3" bentonite layer at 42.0'	

DRILLING GEOLOGIST E. C. Nicholas
 ASSISTANT N/A
 CHECKED BY B. Bailey

LOG OF BORING

PROJECT: TEXAS SSC SITE CLIENT: The Earth Technology Corporation TASK NO.: 12	BORING NO: SE1.5A PG 2 OF 2 LOCATION: N 268,606.3 feet E 2,172,645.1 feet GROUND EL: 733.0 feet
--	---

DATE: 6/21/89 **TYPE:** Air Rotary **CASED TO:** N/A **CONTRACTOR:** SwL (89-192)

DEPTH IN FEET	SYMBOL	SAMPLE TYPE & NUMBER	DEPTH RANGE		PERCENT REC.	PERCENT RQD.	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	see page 1 of 2
DESCRIPTION OF STRATUM										
-45	[Brick Pattern]									LIMESTONE (Austin Chalk), fresh, occasional thin shaly limestone layers, light gray to dark gray
-50	[Brick Pattern]									
-55	[Brick Pattern]									
-60	[Brick Pattern]									
-65	[Brick Pattern]									
-70	[Brick Pattern]									
-75	[Brick Pattern]									
-80										Bottom of Exploration at 75.0' NOTE: Borehole grouted after completion.

DRILLING GEOLOGIST E. C. Nicholas **ASSISTANT** N/A **CHECKED BY** B. Bailey

LOG OF BORING

PROJECT: TEXAS SSC SITE
 CLIENT: The Earth Technology Corporation
 TASK NO.: 12

BORING NO: SE1.5B PG 1 OF 2
 LOCATION: N 268,541.4 feet
 E 2,172,842.1 feet
 GROUND EL: 732.9 feet

DATE: 6/21/89 TYPE: Air Rotary CASED TO: N/A CONTRACTOR: SwL (89-192)

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	Water encountered at 4.5'
DESCRIPTION OF STRATUM										
	[Diagonal Hatching]									
- 5	[Cross-hatching]								2.5	CLAY, stiff, dark brown and gray
- 10	[Cross-hatching]									LIMESTONE (Austin Chalk), severely weathered, occasional clay layers, tan
- 15	[Cross-hatching]									
- 20	[Cross-hatching]								19.0	LIMESTONE (Austin Chalk), fresh, occasional thin shaly limestone layers, light gray to dark gray
- 25	[Cross-hatching]									
- 30	[Cross-hatching]									
- 35	[Cross-hatching]									
- 40	[Cross-hatching]									
										-3" bentonite layer at 43.0'

DRILLING GEOLOGIST E. C. Nicholas ASSISTANT N/A CHECKED BY B. Bailey

LOG OF BORING

PROJECT: TEXAS SSC SITE CLIENT: The Earth Technology Corporation TASK NO.: 12	BORING NO: SE1.5B PG 2 OF 2 LOCATION: N 268,541.4 feet E 2,172,842.1 feet GROUND EL: 732.9 feet
---	--

DATE: 6/21/89 TYPE: Air Rotary CASED TO: N/A CONTRACTOR: SwL (89-192)

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	see page 1 of 2	
DESCRIPTION OF STRATUM											
-45	[Brick Pattern]									LIMESTONE (Austin Chalk), fresh, occasional thin shaly limestone layers, light gray to dark gray	
-50	[Brick Pattern]										
-55	[Brick Pattern]										
-60	[Brick Pattern]										
-65	[Brick Pattern]										
-70	[Brick Pattern]										
-75	[Brick Pattern]										
-80	[Brick Pattern]										
											Bottom of Exploration at 75.0' NOTE: Borehole grouted after completion.

DRILLING GEOLOGIST E. C. Nicholas ASSISTANT N/A CHECKED BY B. Bailey

APPENDIX D

WIRE-LINE LOGS

WIRE-LINE LOGGING PARAMETERS

Hole No. SE1.5A

Log Measured From: Ground level

Drilling Parameters

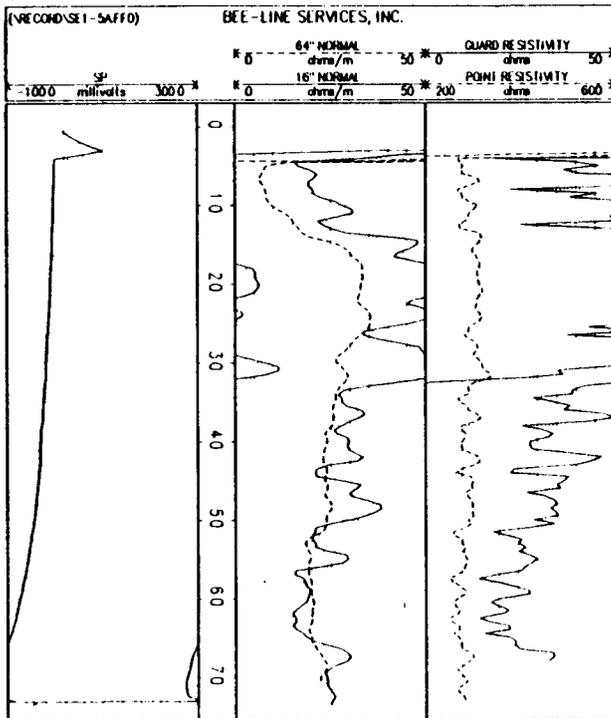
Depth 75 feet
Bit Diameter 4.75 inches

<u>Logging Parameters</u>	<u>Electrical Log</u>	<u>Gamma Log</u>	<u>Sonic Log</u>
Date	June 21, 1989	June 21, 1989	June 21, 1989
Bottom Log Interval	73.5 feet	73.5 feet	69.6 feet
Top Log Interval	surface	surface	surface
Type of Fluid in Hole	boring fluid	boring fluid	boring fluid
Time Since Circulation Stop	3 hours	3 hours	3 hours
Probe Type/S.N.	ALP-4979	XAP-4383	CLP-4877A
Module Type/S.N.	ALM-4979	XAM-4383	CLM-4877A
Logging Speed	15 feet/min.	15 feet/min.	5 feet/min.
Sample Interval	0.5 feet	0.5 feet	0.1 feet

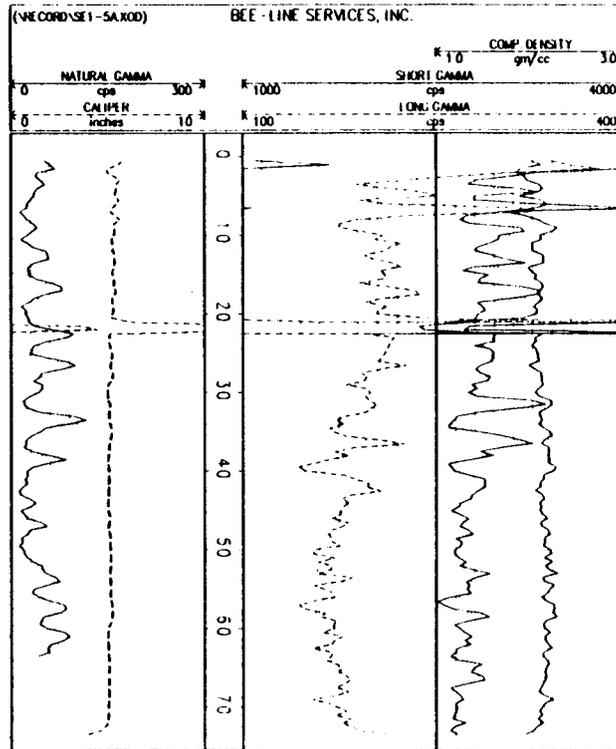
Logged by: BEE-LINE SERVICES, INC.
P.O. Box 2096
Corsicana, TX 75151

SE1.5A Wire-line logs run June 21, 1989. Surface elevation 733.0 feet.

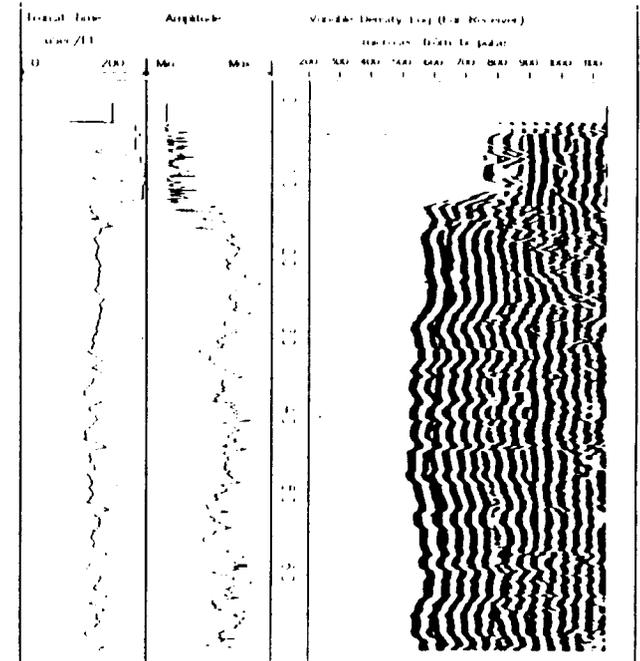
ELECTRICAL LOG



GAMMA LOG



SONIC LOG



WIRE-LINE LOGGING PARAMETERS

Hole No. SE1.5B

Log Measured From: Ground level

Drilling Parameters

Depth 75 feet
Bit Diameter 4.75 inches

Logging Parameters

Electrical Log

Gamma Log

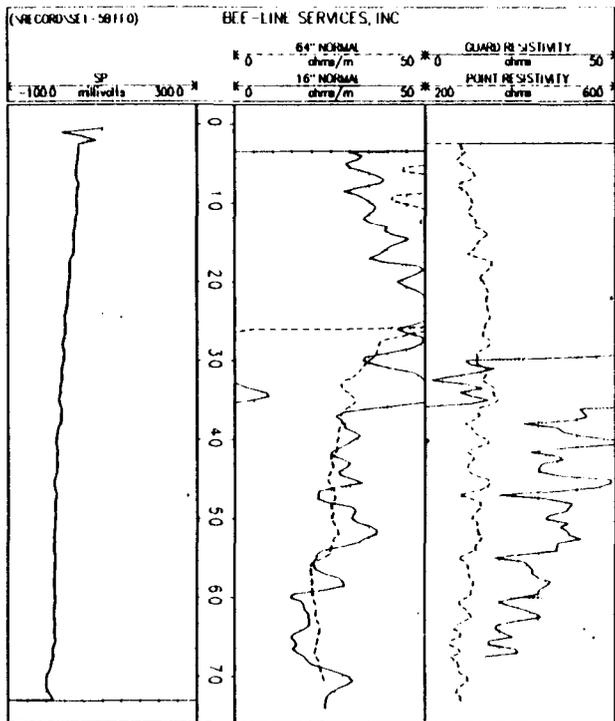
Sonic Log

Date	June 21, 1989	June 21, 1989	June 21, 1989
Bottom Log Interval	74 feet	73 feet	68.2 feet
Top Log Interval	surface	surface	surface
Type of Fluid in Hole	boring fluid	boring fluid	boring fluid
Time Since Circulation Stop	7 hours	7 hours	7 hours
Probe Type/S.N.	ALP-4979	XAP-4383	CLP-4877A
Module Type/S.N.	ALM-4979	XAM-4383	CLM-4877A
Logging Speed	15 feet/min.	15 feet/min.	5 feet/min.
Sample Interval	10.5 feet	0.5 feet	0.1 feet

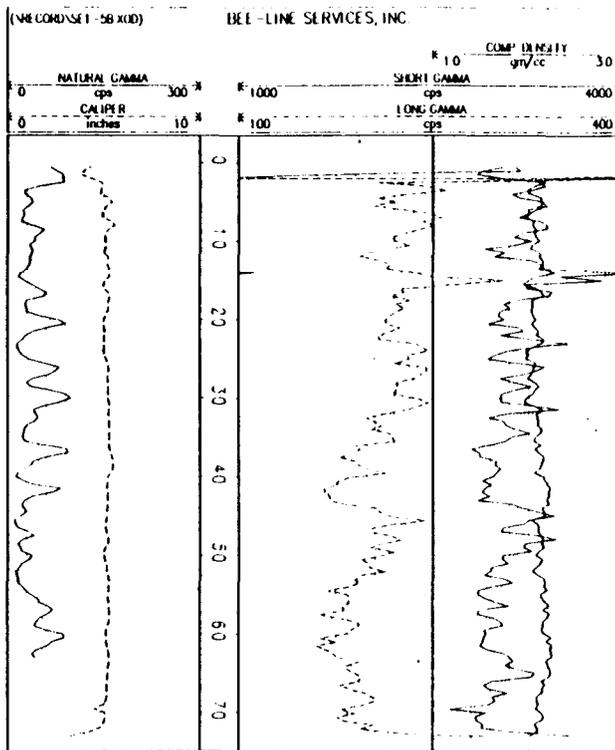
Logged by: BEE-LINE SERVICES, INC.
P.O. Box 2096
Corsicana, TX 75151

SE1.5B Wire-line logs run June 21, 1989. Surface elevation 732.9 feet.

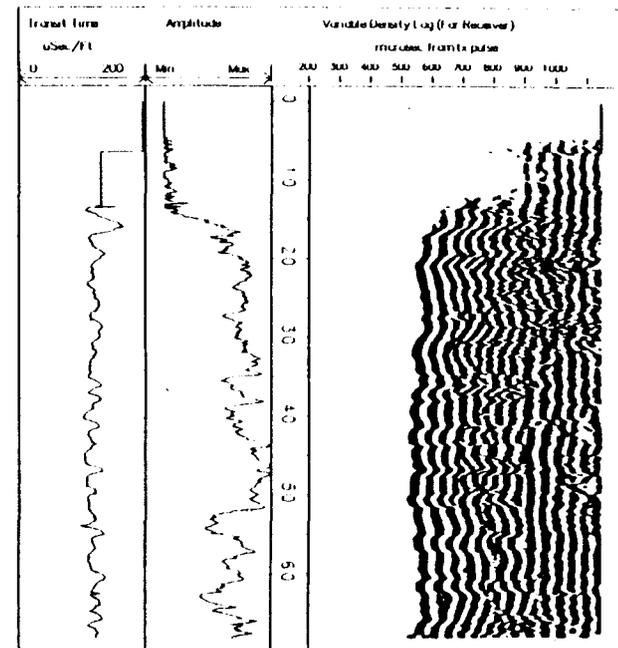
ELECTRICAL LOG



GAMMA LOG



SONIC LOG



APPENDIX E

PLUGGING REPORTS

SSC BOREHOLE PLUGGING REPORT

TETC Project No. 87-88-0012

Task No. 12

Boring No. SE 1.5B

Texas Coordination Location: N 268,541.4 feet
E 2,172,842.1 feet

Surface Elevation: 732.9 feet

Total Boring Depth: 75.0'

Date Drilled: 6-21-89

Date Plugged: 6-21-89

Time Completed: 7:25 p.m.

Remarks:

88 gallons of grout was used to completely cement boring from bottom to top. 10 sacks of Portland Cement and 1 sack of Polygel Bentonite combined with water comprised the total grout mixture. Water/cement ratio was approximately 9 gallons per sack.

Drilling Geologist: E.C. Nicholas
SwL Coordinator: Bruce Bailey
SwL Report No. 89-192