

GEOHYDROLOGIC SUPPLEMENT

Secondary Ore Bodies

ANACONDA COPPER COMPANY

RHODE RANCH PROJECT

February 12, 1981

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PDR PROJ

WM-38

PDR

ED L. REED AND ASSOCIATES, INC.

CONSULTING HYDROLOGISTS

MIDLAND • CORPUS CHRISTI, TEXAS

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Ed L. Reed and Associates, Inc.

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MIDLAND - CORPUS CHRISTI
TEXAS

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SUITE 315

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CORPUS CHRISTI, TEXAS 78403
512-883-1353

February 12, 1981

Mr. Glen R. Davis
Anaconda Copper Company
1400 Bank & Trust Tower
Corpus Christi, Texas 78477

Dear Mr. Davis:

In response to the Nuclear Regulatory Commission's February 5, 1981 request for additional geohydrologic data in the areas of the secondary ore bodies at the Rhode Ranch Project, I have re-examined data pertinent to this matter.

Detailed geologic information was presented in April 1980 on the main ore body of Anaconda Copper Company's Rhode Ranch Project. The main ore body as shown in Figures 2, 5, and 6 of the April report extends from the northwestern portion of Section 78 to the northwestern portion of Section 81. Several other ore bodies shown in the April report have been refined by exploration drilling since the report. Regional hydrologic data were presented in the April report covering both the main and secondary ore bodies. Included herein is detailed geologic information on the secondary ore bodies and an analysis of the hydrologic conditions affecting these ore bodies.

The secondary ore bodies as now defined are delineated on updated Figures 2 and 6. Nine geologic cross-sections are also presented which are constructed across the secondary ore bodies.

Geology. As in the main ore body, the mineralized zones in the secondary ore bodies are within sands of the Oakville Formation. The Oakville is subdivided in the April report into the Rincon, Manuel and Magnolia members in ascending order. The Magnolia member is mostly a fine to medium-grained, cross-bedded sand which is usually yellow to light brown. In the western part of the area, the upper part of the Magnolia consists predominantly of clay. The Magnolia which is at the surface, ranges in thickness from 30 to 90 feet in the west to less than 20 feet in the northeast (See enclosed table).

The Manuel member which underlies the Magnolia contains clay in the upper part and predominantly sand in the lower part. The Manuel clay is yellow to gray and usually silt free. The Manuel clay lies from 30 to 90 feet below the surface in the west to less than 20 feet from the surface in the northeast. The Manuel sand consists of fine to medium-grained sand which is usually grey in color and calcareous. The sand is occasionally silty and clayey.

Similar to the Manuel, the Rincon member consists of an upper clay zone and a lower predominantly sand zone. The Rincon clay consists of grey clay which is occasionally sandy. The Rincon sand is a fine to medium-grained, grey sand and sandy clay. In the western and southwestern areas, both the Rincon sand and Rincon clay are absent. The Rincon in the central portion lies at a depth of 40 to 125 feet and in the northeast at a depth of 50 to 70 feet.

The sands which contain uranium mineralization are usually in the Manuel member. In the western part of the area, there is some mineralization in the Magnolia at depths ranging from 40 to 70 feet. Manuel mineralization in the west lies at depths between 80 and 130 feet. In the central portion of the area, Manuel mineralization lies between 40 and 90 feet from the surface. In the northeast, both the Manuel and Rincon members have some mineralization. Manuel mineralization ranges from 30 to 60 feet from the surface and the Rincon mineralization ranges from 80 to 140 feet from the surface.

Hydrology. The April report shows the regional hydrology in the area of the main ore body and secondary ore bodies. All of the ore bodies lie on the upthrown side of a major northeast-trending fault. This fault at the Catahoula level lies in the southeast part of Section 78 and trends through the southeast part of Section 81 and the northeast corner of Section 15. Consistent with conclusions in the April report, there is no Oakville saturation on the upthrown side of the fault. Indeed, all of the exploration holes drilled in both the main and secondary ore bodies were dry. Minor amounts of water are produced from the Catahoula. The quality of the Catahoula water is usually poor but the quality improves westward.

In the vicinity of the secondary ore body #5, a water well labeled "Magnolia" is drilled to a sea level elevation of +217 feet. The water level in this well is at an elevation of +300 feet. The elevation of the Catahoula in the vicinity of ore body #5 ranges from an elevation of +355 feet to +400 feet. Thus it is readily apparent that the water produced from this well is within the Catahoula. Exploration holes drilled into this ore body show good clays in the top of the Catahoula (See cross section U-U').

In the vicinity of the secondary ore body #2, the elevation of the Catahoula ranges from +360 to +370 feet. The nearby "Rincon" water well is completed at an elevation of +270 feet or about 100 feet into the Catahoula. The water level in this well is near the top of the Catahoula. In the northwest part of this ore body (See cross-section Y-Y') one exploration hole has been drilled 100 feet into the

Mr Glen R. Davis
Anaconda Copper Company

3

February 12, 1981

Catahoula. The log of this hole shows that the upper 100 feet of the Catahoula consists of clay. Other exploration holes in this ore body also show good clays at the top of the Catahoula.

In the northwest corner of Section 15 the elevation at the top of the Catahoula ranges from +305 to +315 feet. The "Dugout" well drilled to an elevation of -230 feet has a water level of +269 feet, well within the Catahoula. The "Dugout #2" well which is an abandoned, converted gas well, has a water level elevation near the top of the Catahoula.

In summary, it is evident that no ground water is contained within the Oakville formation on the upthrown side of the fault. It is also evident that the underlying Catahoula in its upper part consists of impervious clays (See Appendix A, April report) sufficient to restrict migration of fluids out of the Oakville. In the western part of the area, the fluid levels in the Catahoula lie at an elevation near the Oakville/Catahoula contact. However, the upper part of the Catahoula as seen in cross-section Y-Y' contains a significant thickness of impervious clays which isolate the Oakville from deeper productive Catahoula sands. Extensive exploration hole drilling and an examination of the area hydrology indicates that the area within the permit boundary north of the fault has the same geohydrologic characteristics as described for the main ore body in the April report.

Very truly yours,

ED L. REED & ASSOCIATES, INC.



V. Steve Reed

VSR:vjr

Enclosures

THICKNESS AND DEPTH OF GEOLOGIC UNITS

	WEST		CENTRAL		NORTHEAST	
	<u>Depth</u>	<u>Thickness</u>	<u>Depth</u>	<u>Thickness</u>	<u>Depth</u>	<u>Thickness</u>
Magnolia	-	30-90	-	10-90	-	10-15
Manuel clay	30-90	5-30	10-90	9-20	10-15	18-20
Manuel sand	35-100	25-55	20-100	20-30	30-40	15-30
Rincon clay	- Absent -	-	45-125	5-20	50-70	0-10
Rincon sand	- Absent -	-	60-150	15-40	60-75	40-60
Catahoula	100-160	-	100-200	-	115-135	-

CROSS SECTIONS
SEE FIGURE 2 FOR LOCATIONS

CROSS SECTION BB-BB'

17-24-44

Magnolia	Vf-f ; sand & silt; oxidized tan. Minor caliche.
Manuel clay	Sandy clay; oxidized light brown to yellow.
Manuel sand	F-md-cs g silty sand; oxidized yellow-brown.
Rincon clay	Sandy clay; oxidized yellow-brown.
Rincon sand	Interbedded md-cs g sand & clay; oxidized/reduced yellow-brown to grey to blue. Orange clay balls.
Catahoula	Clay; reduced blue.

17-18-44

Magnolia	Md g silty sand & caliche; oxidized light brown.
Manuel clay	Clay & md g well cemented silty sand; oxidized/reduced orange-brown, grey-green to blue-grey. Abundant gypsum.
Manuel sand	Md-cs g sand, volcanic materials & chert pebbles; oxidized/reduced orange-brown to blue-grey. Minor silt & pyrite.
Rincon clay	Clay; reduced blue-grey. Minor pyrite.
Rincon sand	Interbedded f-md g silty sand; reduced blue-grey. Kaolinite in upper & lower sections.
Catahoula	Clay; reduced blue-grey. Abundant pyrite.

17-10-44

Magnolia	Vf-f g silty sand; oxidized light tan.
Manuel clay	Clay, sandy clay, f g silty sand; oxidized yellow, yellow-tan to yellow grey.
Manuel sand	F g sand, f-md g sand; reduced grey to blue-grey.
Rincon clay	F-md g sand; reduced grey, blue clay balls.
Rincon sand	Interbedded f-md g sand, silty sand & clay; reduced grey to blue-grey. Blue clay balls & kaolinite balls near base.
Catahoula	Clay; reduced blue.

CROSS SECTION BB-BB'

17-0-44

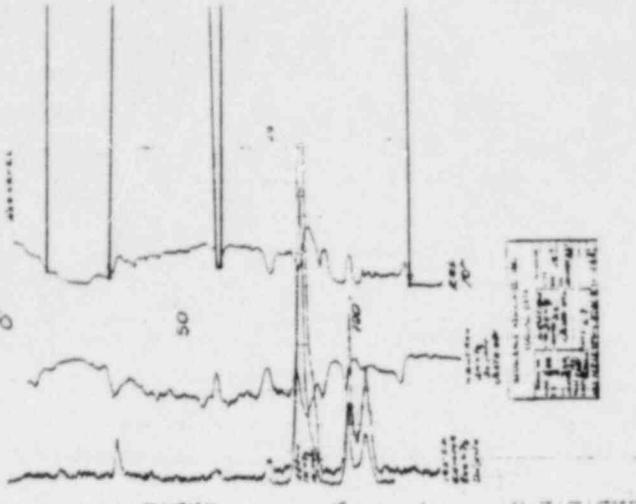
Magnolia	Silt & f g sand; oxidized brown.
Manuel clay	Clay & silt; reoxidized green-grey to brown.
Manuel sand	F g sand; reoxidized brown.
Rincon clay	Clay, silty clay; reduced blue-grey.
Rincon sand	Interbedded f-md g sand & clay; reduced grey to blue-grey. Minor pyrite.
Catahoula	Clay; reduced blue-grey.

LAURENCE ASSOCIATES

DATE	TIME	DEPTH	TEMPERATURE	WIND	WAVE	SEA	WEATHER	REMARKS
17-13-44	24							

BB

+400'



Cross-section BB-BB'
8-1-78

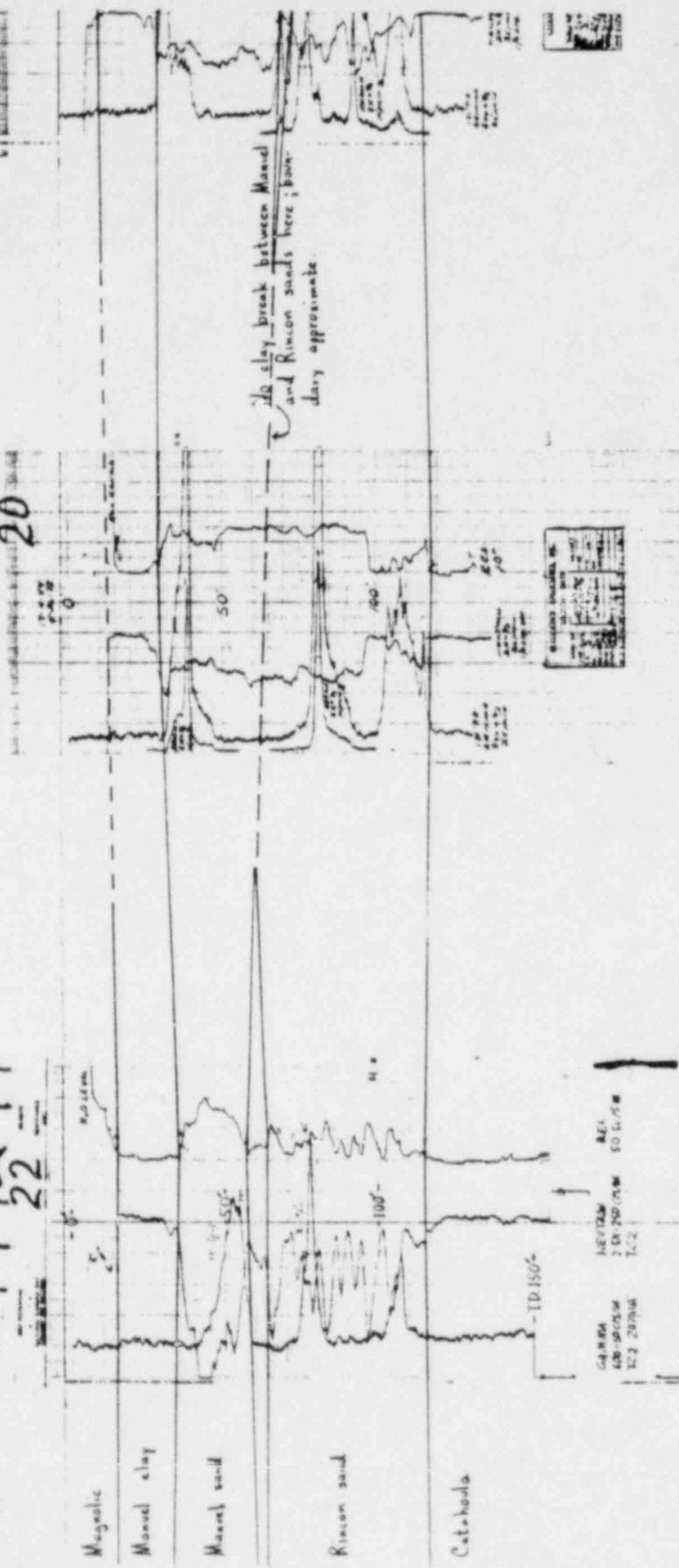
GEOSCIENCE ASSOCIATES

GEOSCIENCE ASSOCIATES

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Date	10/20/44
Operator	
Location	
Depth	
Time	
Remarks	

Well No.	17N-44
Date	10/20/44
Operator	
Location	
Depth	
Time	
Remarks	

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Date	10/22/44
Operator	
Location	
Depth	
Time	
Remarks	

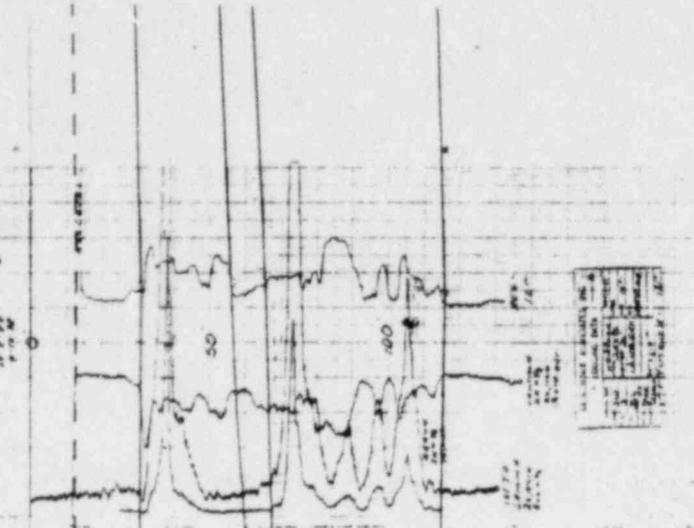


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G GEOSCIENCE ASSOCIATES
LABORATORY 2011

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Project	
Location	
Operator	
Instrument	
Scale	
Remarks	

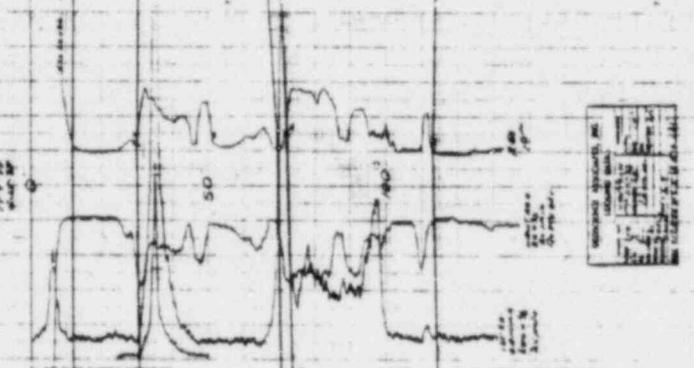
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G GEOSCIENCE ASSOCIATES
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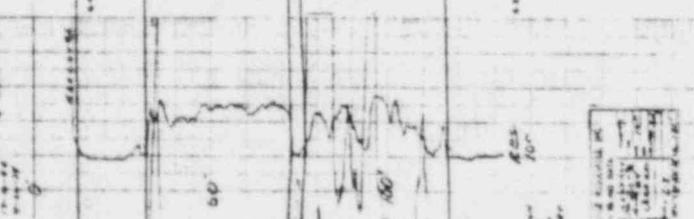
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G GEOSCIENCE ASSOCIATES
LABORATORY 2011

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Instrument	
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Remarks	

17-10-44
/8



17-3-44
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 5-44
 8

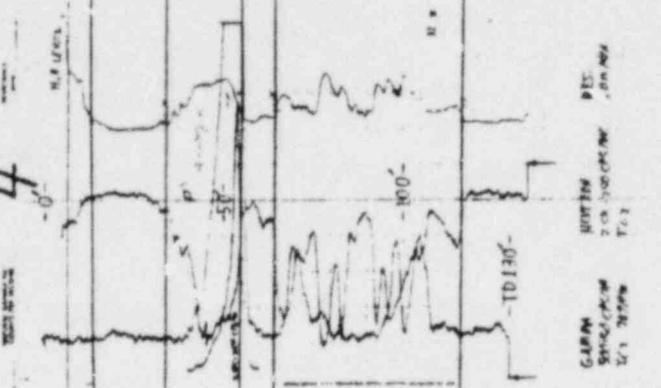
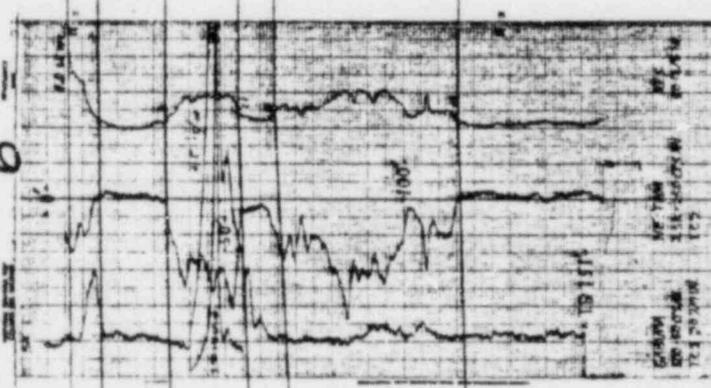
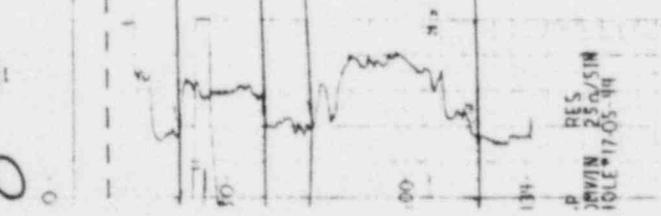
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17-3-44
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17-3-44
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 5-44
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17-3-44
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 5-44
 8

17-3-44
 4
 5-44
 8



CALMAN
 5/14/44
 17-3-44

CALMAN
 5/14/44
 17-3-44

CALMAN
 5/14/44
 17-3-44



BB'

+100'

Magnolia

Manuel clay

Manuel sand

Rincon clay

Rincon sand

Catahoula

DD-DD'

CROSS SECTION DD-DD'

81-53-40

Magnolia	Not described.
Manuel clay	Not described.
Manuel sand	Not described.
Rincon clay	Sandy clay; reduced blue-grey.
Rincon sand	Interbedded f g sand & sandy clay; reduced grey to greenish grey.
Catahoula	Clay; oxidized reddish-brown.

81-43-40

Magnolia	Md-cs g silty sand; oxidized brown-grey.
Manuel clay	Sandy silt; oxidized grey. Limonite stain.
Manuel sand	Interbedded md-cs g sand & sandy clay; oxidized brown-grey.
Rincon clay	Silt, sandy silt; reduced blue-grey. Oxidized cemented zones.
Rincon sand	Interbedded f-md g sand & clay; reduced blue-grey. White limestone nodules.
Catahoula	Clayey silt; reduced blue-grey.

81-33-40

Magnolia	Md g sand & sandy clay; oxidized orange-brown. Some tuffaceous material.
Manuel clay	Clay; oxidized orange-brown. Gypsum and tuffaceous material.
Manuel sand	Silty clay & md-cs g sand; oxidized/reduced orange to grey. Gypsum & tuffaceous material near top.
Rincon clay	Clay; reduced blue-grey. Tuffaceous material
Rincon sand	Interbedded f-md g sand & clay; reduced blue-grey. Pyrite.
Catahoula	Clay; reduced blue-grey.

CROSS SECTION DD-DD'

81-25-40

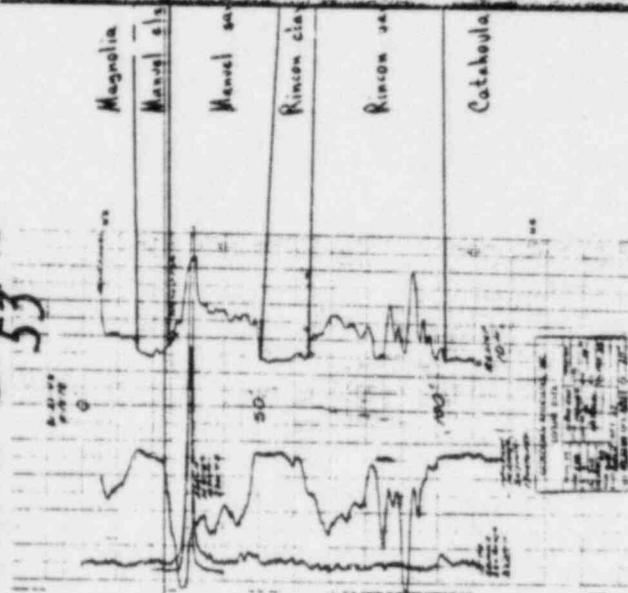
Magnolia	Clay, sandy clay, f-md g sand; oxidized, reoxidized yellow-brown to light green. Sand percentage increases near base.
Manuel clay	Clay; oxidized/reoxidized yellow-green, yellow-brown to orange-brown.
Manuel sand	Sandy clay & f-md g sand; reoxidized/reduced blue-grey to yellow-brown to black. Minor black pebbles at base.
Rincon clay	Clay; reduced blue-grey.
Rincon sand	Interbedded f-md g sand, sandy clay & silty clay; reduced blue-grey. Reoxidized yellow-brown near base.
Catahoula	Clay; reduced blue-grey.

GEOSCIENCE ASSOCIATES
10000 Wilshire Blvd.
Beverly Hills, California 90210

Project No.	81-27-40
Well No.	53
Date	
Location	
Geologist	
Scale	
Notes	

DD

+400'



Magnolia

Manvel sh

Manvel ss

Rincon cla

Rincon ss

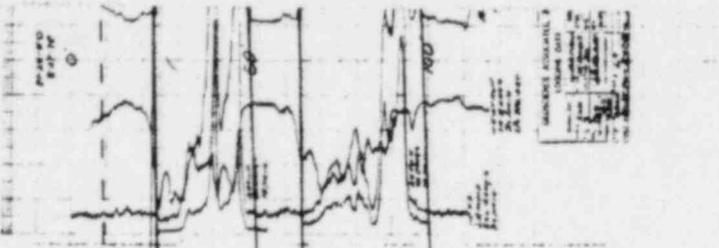
Cotaboula

Date
Scale

Cross-section DD-DD'
8-2-78

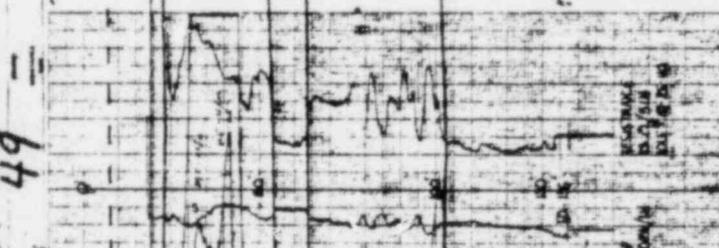
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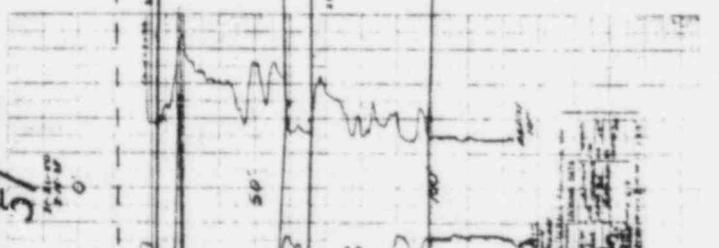
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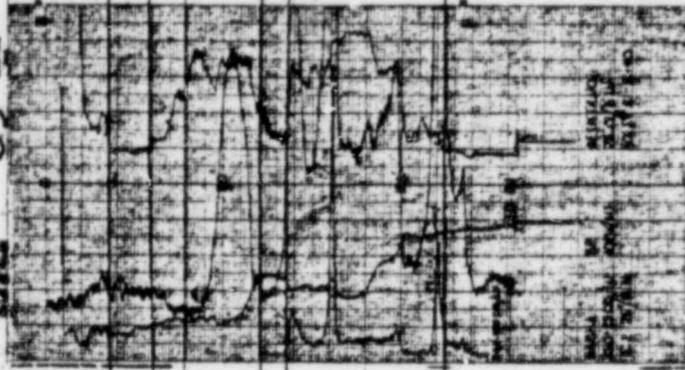
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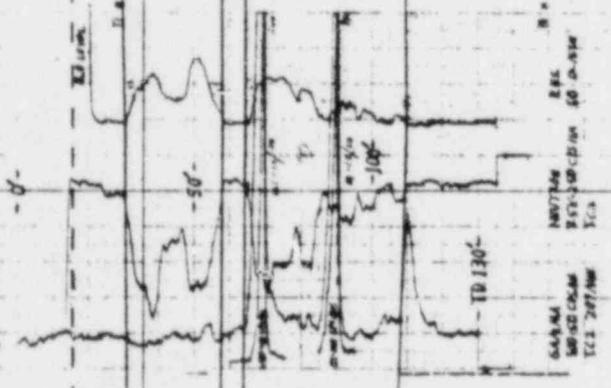


+400'
 1" = 40' vertical 1" = 40' horizontal

81-18-40
 35
 81-18-40
 35



81-18-40
 37
 81-18-40
 37



TD 130
 TD 130
 TD 130
 TD 130

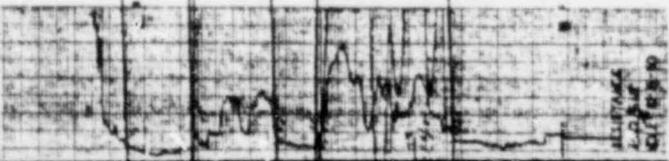
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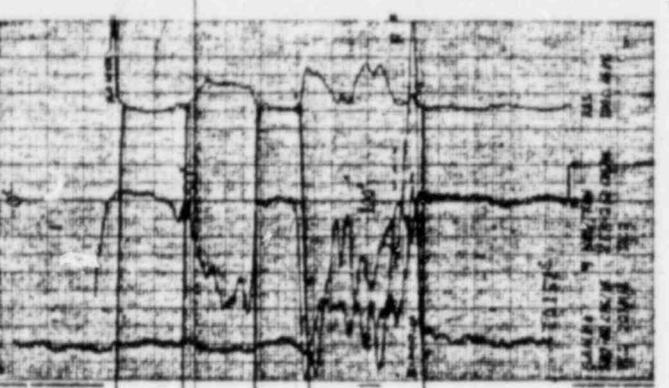
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81-14-10
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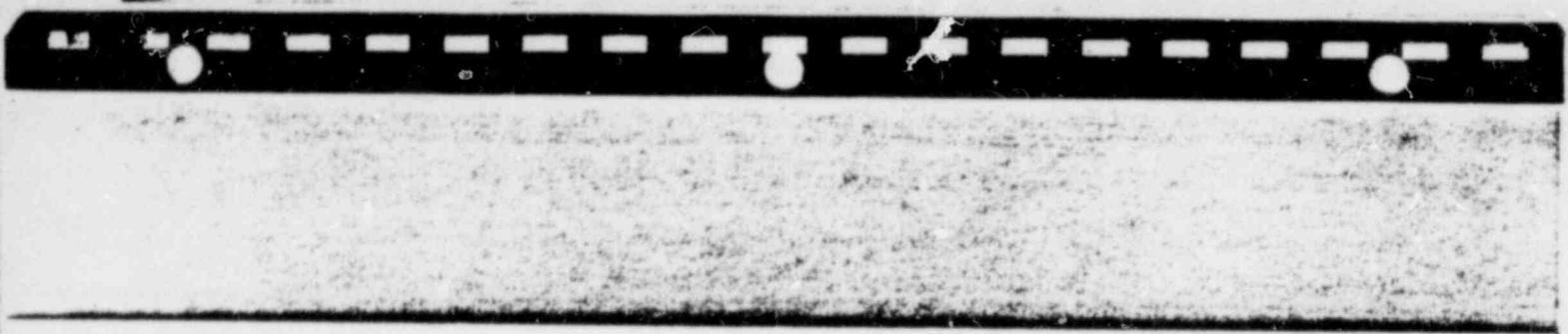
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Magnetite
Manual clay
Manual sand
Rincon clay
Rincon sand
Catabeds

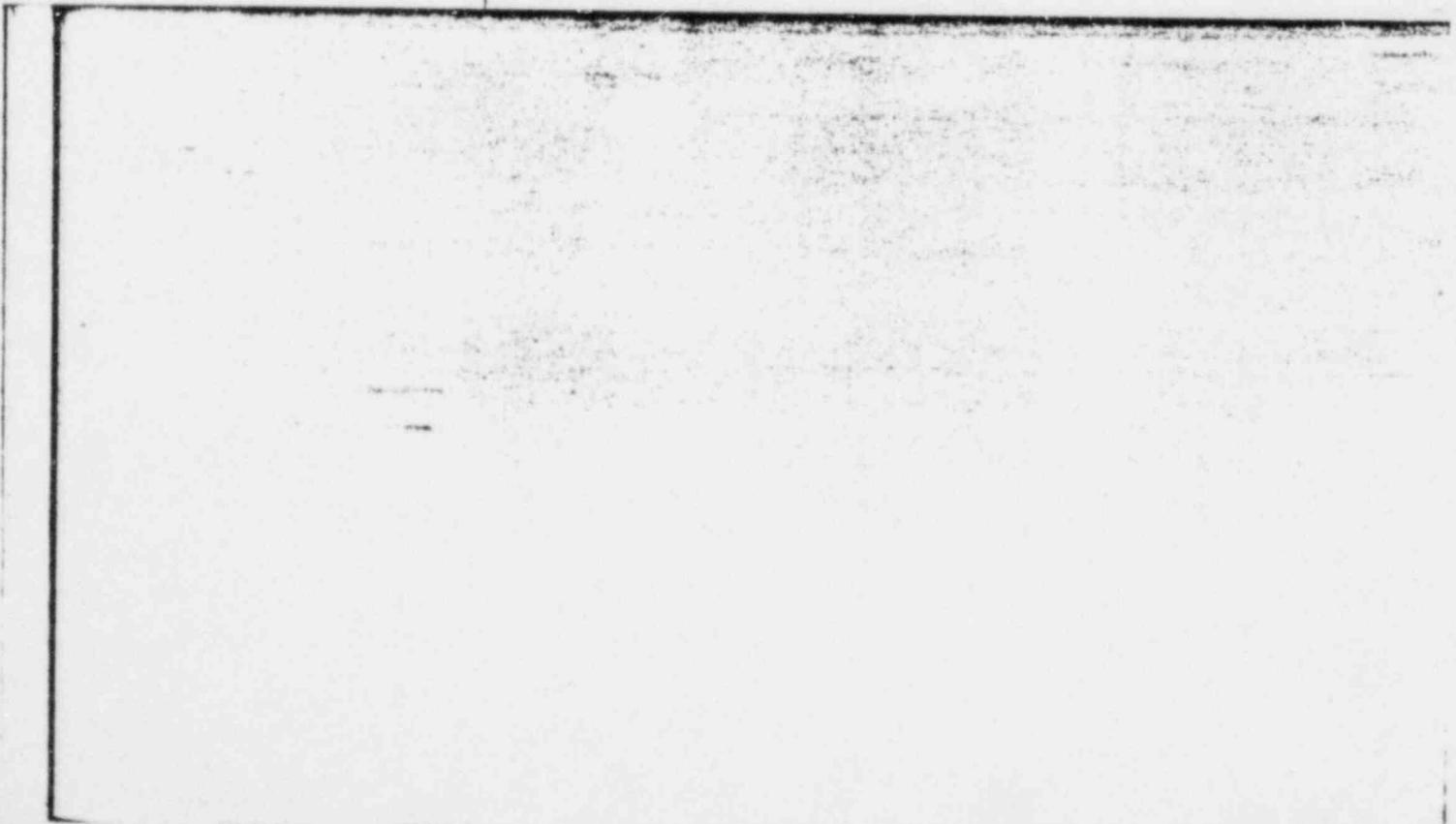
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GALVANOMETER
SERIAL NO. 221-230-0000
T.C. 371000
T.C. 371000
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75 157
GALVANOMETER
SERIAL NO. 221-230-0000
T.C. 371000
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00'

+400'



L-L'

CROSS SECTION L-L'

81-51

Magnolia	Clay & f-md g sand; reoxidized yellow-brown.
Manuel clay	Clay; reoxidized/reduced yellow-brown to blue-grey.
Manuel sand	F-md g sand & clay; reduced dark grey to black to blue-grey. Clays percentage increases towards base.
Rincon clay	Clay; reduced/reoxidized blue-grey to yellow-brown.
Rincon sand	F-md g sand; reduced blue-grey.
Catahoula	Clay; reduced blue-grey.

81-51-24

Magnolia	Clay, sandy clay, silt, clayey sand; reoxidized dark brown, yellow-brown to orange brown.
Manuel clay	Clay; reoxidized brownish-grey.
Manuel sand	F-md g sand, clayey sand & clay; reoxidized/reduced dark-grey to light-grey.
Rincon clay	Clay; reduced/reoxidized blue to light-brown to light blue-grey.
Rincon sand	F g clayey sand; partial reoxidized light grey.
Catahoula	Clay; partial reoxidized; light blue to pink.

81-51-33

Exploration hole near 81-51-34

Magnolia	Vf-f sand; oxidized orange. Minor limonite.
Manuel clay	Clay; oxidized orange-brown. Minor limonite & gypsum.
Manuel sand	Vf-f sand; oxidized orange-tan. Minor limonite & pebbles.
Rincon clay	Clay; reduced blue.
Rincon sand	Interbedded vf-f g sand & clay; reduced grey to blue-grey.
Catahoula	Clay; reduced/oxidized blue-grey to reddish-brown.

CROSS SECTION L-L'

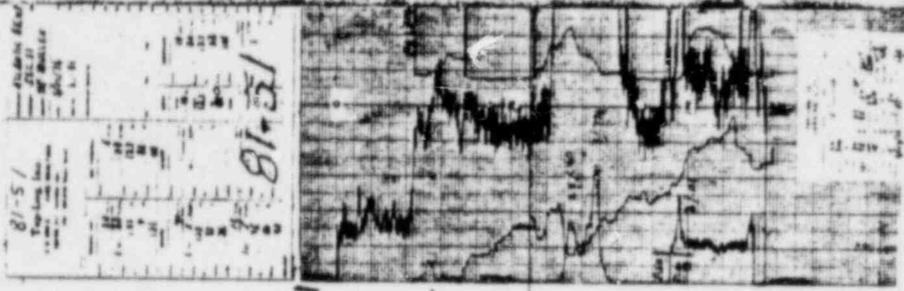
81-51-47

Exploration hole near 81-51-48

Magnolia	Md g silty sand; oxidized or reoxidized light brown.
Manuel clay	Clay & md g sand; oxidized or reduced olive to brown.
Manuel sand	Md g sand, silt & clay; reoxidized/reduced orange-brown to grey-brown. Clay balls near top.
Rincon clay	Clay; reduced blue.
Rincon sand	Interbedded md g sand, clay & silt; reduced, blue-grey to blue.
Catahoula	Clay; reduced blue.

81-53-52

Magnolia	Not described.
Manuel clay	Not described.
Manuel sand	Not described.
Rincon clay	Clay, f g sand; reduced blue-grey.
Rincon sand	Interbedded f-md g sand & silty clay; reduced grey to greenish grey. Top sand well stratified, base poorly stratified. Black chert in sands.
Catahoula	Clay; reduced/oxidized greenish-grey to reddish-brown.



7

4400'

Cross-section L-L'
4-13-78

412	Barrel	100
413	Barrel	100
414	Barrel	100
415	Barrel	100
416	Barrel	100
417	Barrel	100
418	Barrel	100
419	Barrel	100
420	Barrel	100
421	Barrel	100
422	Barrel	100
423	Barrel	100
424	Barrel	100
425	Barrel	100
426	Barrel	100
427	Barrel	100
428	Barrel	100
429	Barrel	100
430	Barrel	100

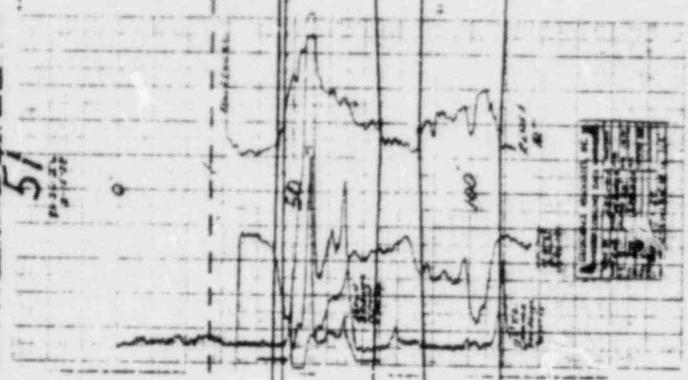


Mogodia
 Manvel clay
 Manvel sand
 Rincon clay
 Rincon sand
 Cataboula

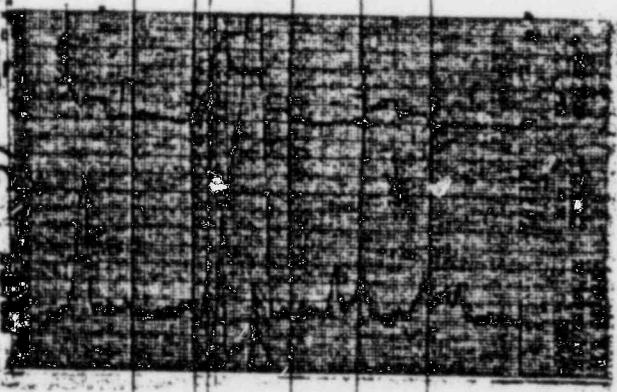
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G MEDICINE ASSOCIATES

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TIME	5/
BY	
TEST	
RESULT	
REMARKS	



DATE	8-26-24
TIME	5/
BY	
TEST	
RESULT	
REMARKS	

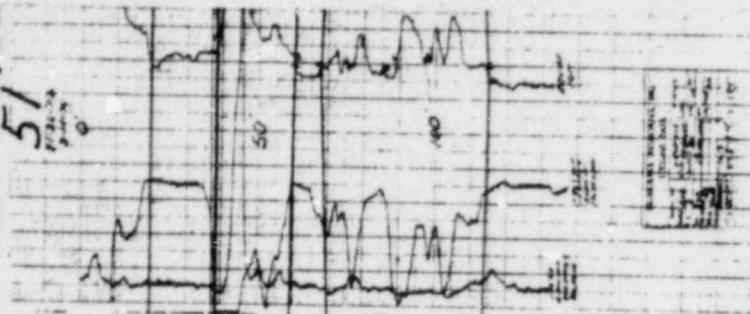


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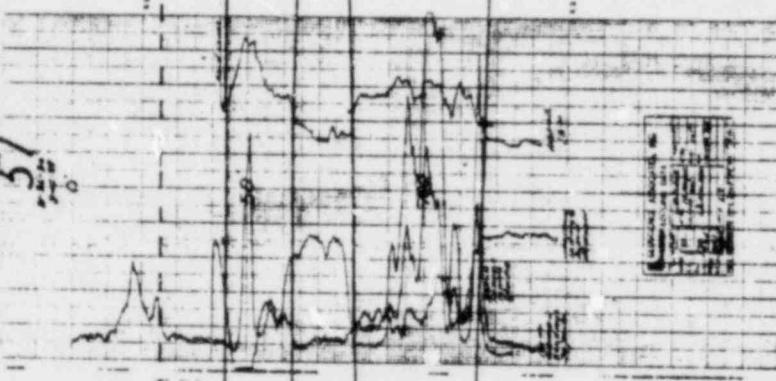
GEOSCIENCE ASSOCIATES
FIRM NO. 100

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LOG SPEED	100



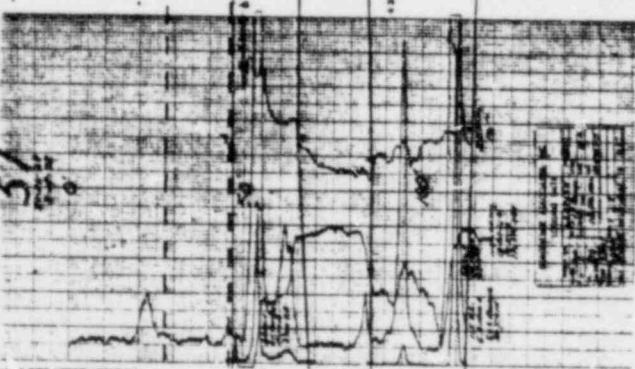
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LOG SPEED	100
LOG TYPE	SP
LOG SCALE	100
LOG SPEED	100



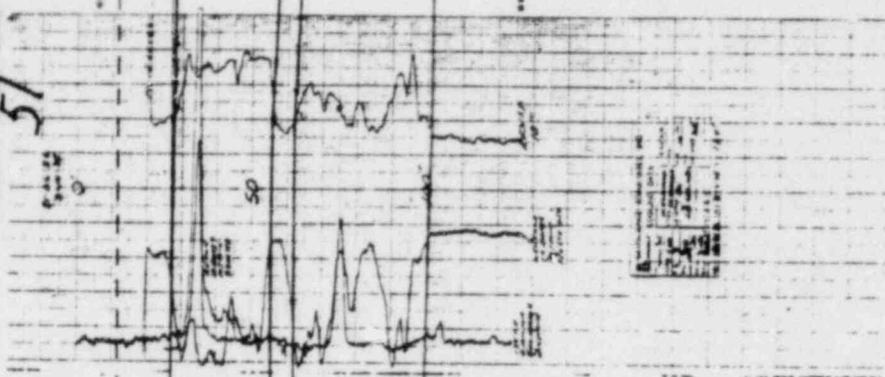
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LOG SPEED	100
LOG TYPE	SP
LOG SCALE	100
LOG SPEED	100



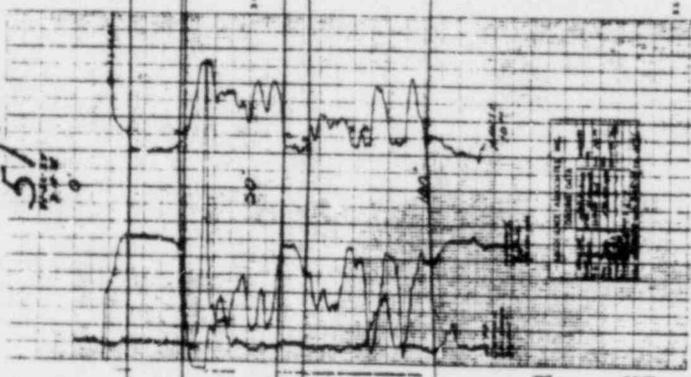
G GEOSCIENCE ASSOCIATES
MEMPHIS, TENN.

WELL NO.	81-26-36
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LOG NO.	
LOG DEPTH	
LOG TYPE	
LOG SCALE	
LOG SPEED	
LOG TIME	
LOG TOTAL	
LOG REMARKS	



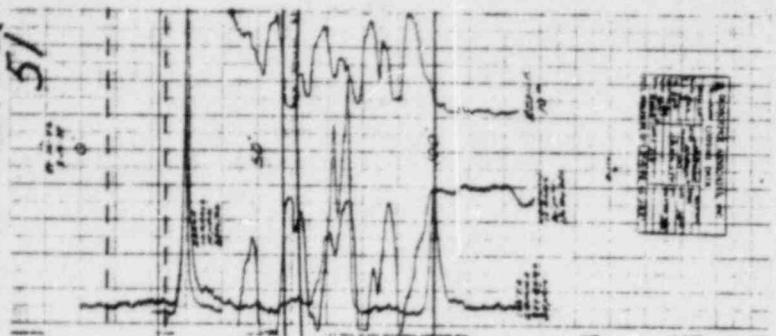
G GEOSCIENCE ASSOCIATES
MEMPHIS, TENN.

WELL NO.	81-26-34
DATE	5/1
LOG NO.	
LOG DEPTH	
LOG TYPE	
LOG SCALE	
LOG SPEED	
LOG TIME	
LOG TOTAL	
LOG REMARKS	



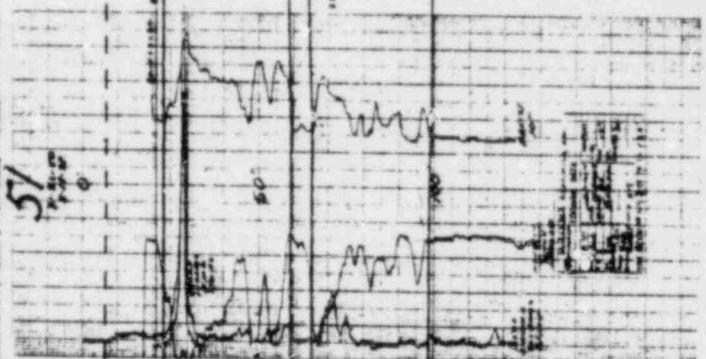
GEOSCIENCE ASSOCIATES
10000
8/26/51

DATE	8/26/51
TIME	
LOCATION	
WELL NO.	
DEPTH	
LOG NO.	
LOG SHEET NO.	
LOG SHEETS	
LOG TYPE	
LOG SCALE	
LOG SPEED	
LOG GAIN	
LOG SENSITIVITY	
LOG RESOLUTION	
LOG BANDWIDTH	
LOG FILTER	
LOG ATTENUATION	
LOG REFERENCE	
LOG COMMENTS	



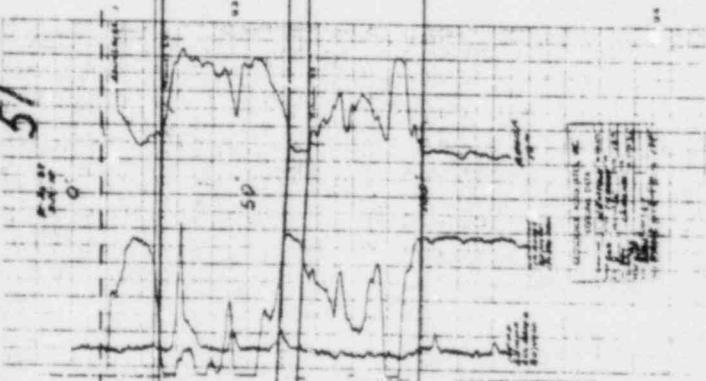
GEOSCIENCE ASSOCIATES
10000
8/26/51

DATE	8/26/51
TIME	
LOCATION	
WELL NO.	
DEPTH	
LOG NO.	
LOG SHEET NO.	
LOG SHEETS	
LOG TYPE	
LOG SCALE	
LOG SPEED	
LOG GAIN	
LOG SENSITIVITY	
LOG RESOLUTION	
LOG BANDWIDTH	
LOG FILTER	
LOG ATTENUATION	
LOG REFERENCE	
LOG COMMENTS	



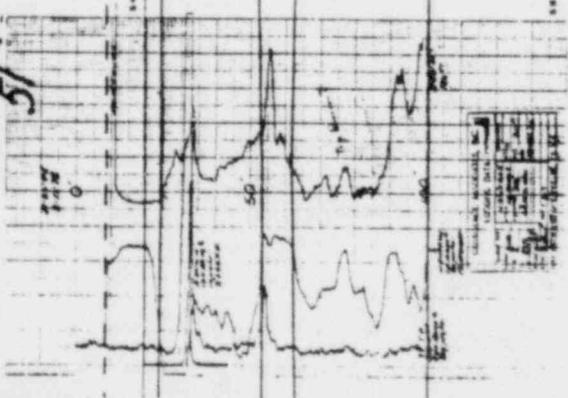
GEOSCIENCE ASSOCIATES
10000
8/26/51

DATE	8/26/51
TIME	
LOCATION	
WELL NO.	
DEPTH	
LOG NO.	
LOG SHEET NO.	
LOG SHEETS	
LOG TYPE	
LOG SCALE	
LOG SPEED	
LOG GAIN	
LOG SENSITIVITY	
LOG RESOLUTION	
LOG BANDWIDTH	
LOG FILTER	
LOG ATTENUATION	
LOG REFERENCE	
LOG COMMENTS	



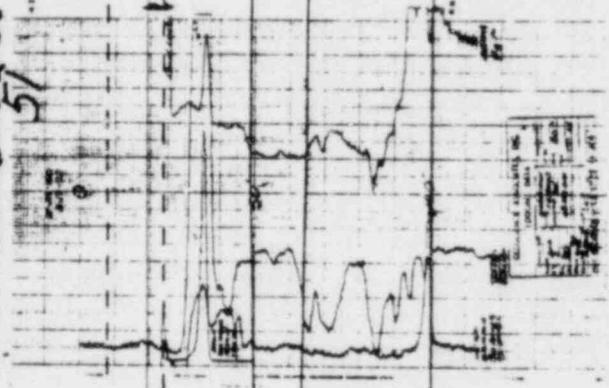
GEOSCIENCE ASSOCIATES
12000 N. 10th St.
DENVER, CO 80231

WELL NO.	81-26-48
DATE	11/11/81
TIME	10:00
DEPTH	100
LOG	...
...	...



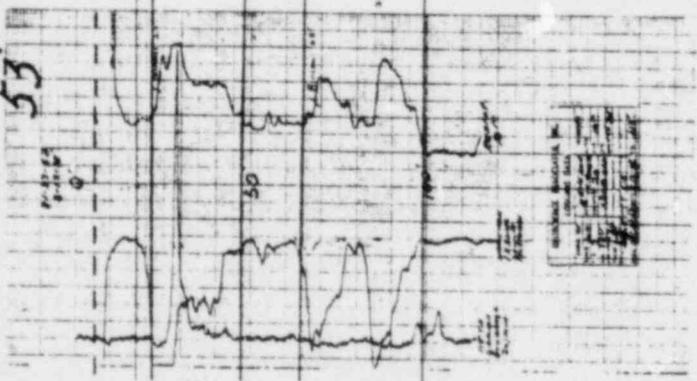
GEOSCIENCE ASSOCIATES
12000 N. 10th St.
DENVER, CO 80231

WELL NO.	81-26-50
DATE	11/11/81
TIME	10:00
DEPTH	100
LOG	...
...	...



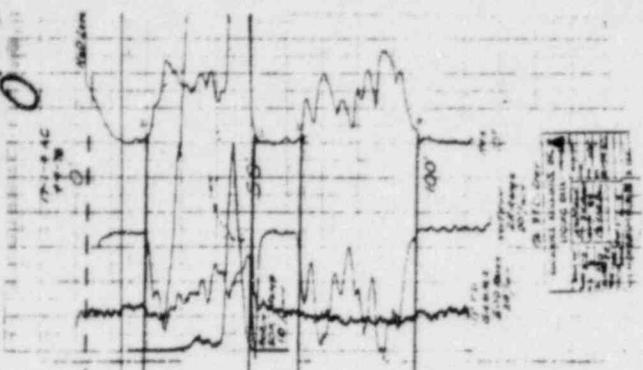
GEOSCIENCE ASSOCIATES
MEMPHIS, TENN.

WELL NO.	17X-4A
DATE	8/27/52
DEPTH	100'
LOG NO.	53
LOGGERS	
DESCRIPTION	
REMARKS	



GEOSCIENCE ASSOCIATES
MEMPHIS, TENN.

WELL NO.	17X-4A
DATE	8/27/52
DEPTH	100'
LOG NO.	53
LOGGERS	
DESCRIPTION	
REMARKS	



Magnolia

Marvel clay

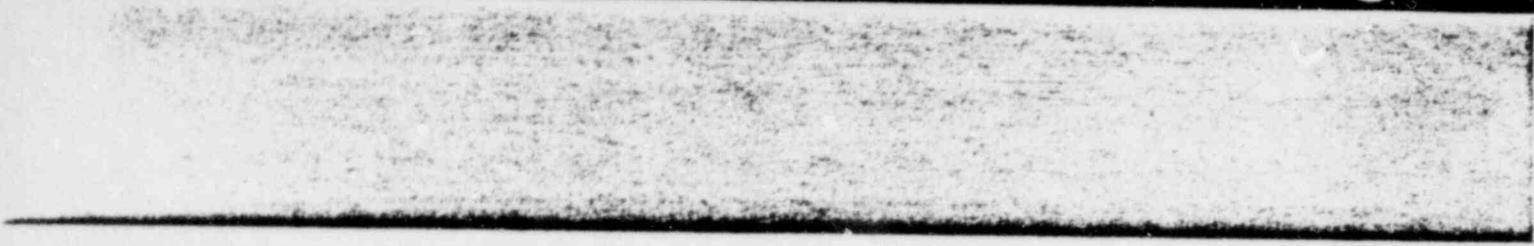
Marvel sand

Rincon clay

Rincon sand

Catohola

(This interval 1450')



7
+400'



CROSS SECTION N-N'

17-0-04AC

Magnolia	Silty clay; oxidized yellow-brown.
Manuel clay	Silt, vf-f g sand; oxidized yellow-brown.
Manuel sand	Vf-f g sand, silt & silty sand; oxidized tan to yellow-brown.
Rincon clay	Silty clay; reduced blue-grey.
Rincon sand	Interbedded f-md-cs g sand, silty & clayey sands, sandy clay & clay; reduced grey to blue-grey.
Catahoula	Clay; reduced/oxidized blue-grey to brown.

17-6-12

Magnolia	Sandy clay & silt; oxidized dark brown to olive-grey to orange-brown near base.
Manuel clay	Clay; oxidized orange-brown to greenish-grey. Abundant gypsum, some limy clay.
Manuel sand	Md-cs g sand & some silt; oxidized/reduced, brown, blue-grey to orange-brown. Cemented sand & orange clay balls in middle section.
Rincon clay	Clay; reduced blue-grey. Pyrite & white chalky clay.
Rincon sand	Interbedded f-md g silty sand & clay; reduced grey to blue-grey to black. Clay balls at top. Pyrite in clay beds.
Catahoula	Clay; reduced/oxidized grey, blue-grey to reddish-brown.

17-8-18

Magnolia	Silt, silty clay; oxidized brown to tan. Some gypsum.
Manuel clay	Silt, vf g sand & silty clay; oxidized tan to yellow.
Manuel sand	F-md g silty sand & md g sand; oxidized/reduced yellow-grey. Grey clay balls near base.
Rincon clay	Sandy clay; reduced grey.
Rincon sand	F-md g silty sand & sandy clay; reduced dark grey to grey. Some clay balls.
Catahoula	Clay; reduced/oxidized blue-grey to brown.

CROSS SECTION N-N'

17-8-26

Magnolia	F-md g sand, silt & caliche; oxidized brown.
Manuel clay	Sandy clay; oxidized orange-brown to grey-green.
Manuel sand	Interbedded f-md g silty sand & md g sand; oxidized, tan, grey-brown to orange-brown. Middle sands well cemented.
Rincon clay	Clay; reduced blue-grey.
Rincon sand	Interbedded f-md g sand & silt; reduced blue-grey. Minor clay balls.
Catahoula	Clay; reduced blue-grey.

17-8-32

Magnolia	F g sand; oxidized dark brown
Manuel clay	Silty clay; reoxidized brown to orange-brown.
Manuel sand	F g sand; reoxidized light grey to brown. Interbedded cemented zones.
Rincon clay	Silty clay; reduced blue-grey.
Rincon sand	Interbedded f-md g sand & clay; reduced grey to blue-grey.
Catahoula	Clay; reduced blue-grey.

17-8-40

Magnolia	F g sand; oxidized/reoxidized brown.
Manuel clay	Clay, silty clay; reoxidized green-grey to brown.
Manuel sand	F-md g sand; reoxidized/reduced; light grey-brown, brown to dark grey.
Rincon clay	Clay & silty clay; reduced blue-grey.
Rincon sand	Interbedded f-md g sand & clay; reduced grey to blue-grey.
Catahoula	Clay; reduced blue-grey.

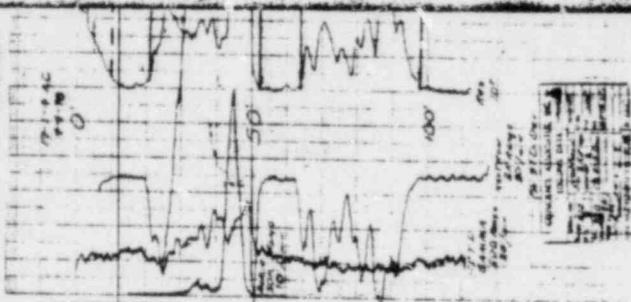
CROSS SECTION N-N'

17-8-50

Magnolia	F g sand; oxidized brown.
Manuel clay	Clay & silty clay; reoxidized light grey to brown.
Manuel sand	F-md g sand; reoxidized light grey, grey to brown. Minor clay.
Rincon clay	Clay, silty clay; reduced grey.
Rincon sand	Interbedded md g sand, clayey sand, clay and silty clay; reduced grey.
Catahoula	Clay & silty clay; reduced grey.

GEOSCIENCE ASSOCIATES
170

Project No.	170
Date	6-7-78
Location	
Scale	
Drawn by	
Checked by	
Approved by	
Geologist	
Geophysicist	
Other	



N

+1400'

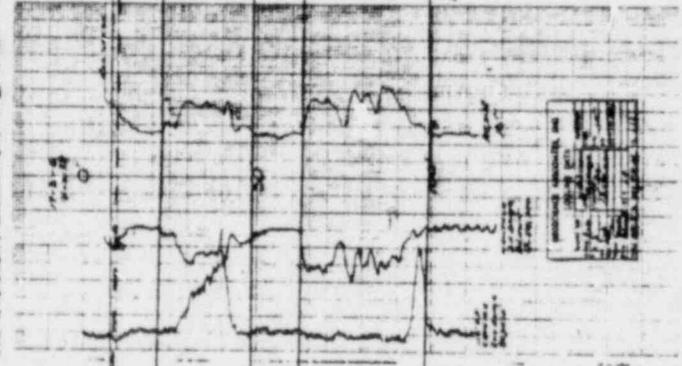
Cross-section N-N'
6-7-78
SHEET 1 of 2

GEOSCIENCE ASSOCIATES

Project No.	17-2-6
Date	10/20/50
Location	...
Scale	1" = 40'
Datum	+400'
Geologist	...
Checked by	...
Approved by	...

17-2-6

4AC



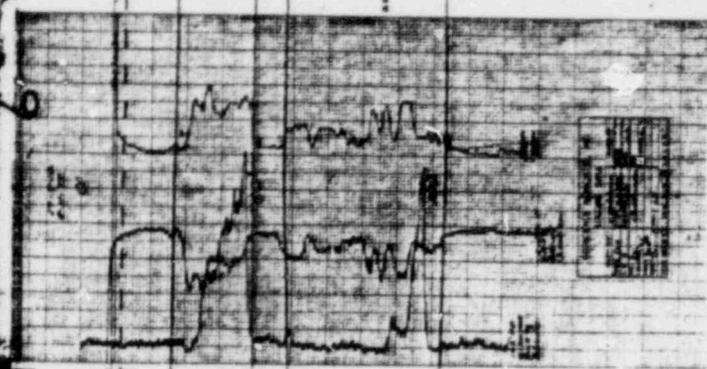
Magnolia
 Manal clay
 Manal sand
 Rincon clay
 Rincon sand
 Catahoula

(This interval 450')

Datum: +400'
 Scale: 1" = 40' vert cal 1" = 40 horizontal (unless otherwise indicated)

GEOSCIENCE ASSOCIATES
14300 E. 14th Ave.
DENVER, CO 80231

DATE	17-8-12
TIME	1:25 PM
WELL NO.	17-8-12
DEPTH	17-8-12
LOG NO.	17-8-12
LOG SHEET NO.	17-8-12
LOG TYPE	17-8-12
LOG SCALE	17-8-12
LOG UNIT	17-8-12
LOG INTERVAL	17-8-12
LOG DESCRIPTION	17-8-12
LOG COMMENTS	17-8-12

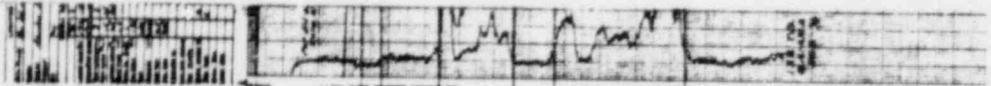


GEOSCIENCE ASSOCIATES
14300 E. 14th Ave.
DENVER, CO 80231

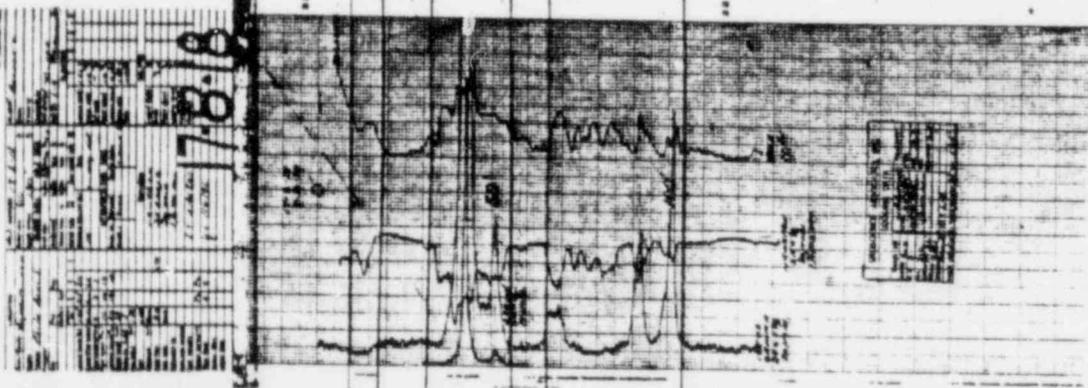
DATE	17-8-10
TIME	1:25 PM
WELL NO.	17-8-10
DEPTH	17-8-10
LOG NO.	17-8-10
LOG SHEET NO.	17-8-10
LOG TYPE	17-8-10
LOG SCALE	17-8-10
LOG UNIT	17-8-10
LOG INTERVAL	17-8-10
LOG DESCRIPTION	17-8-10
LOG COMMENTS	17-8-10



881
G



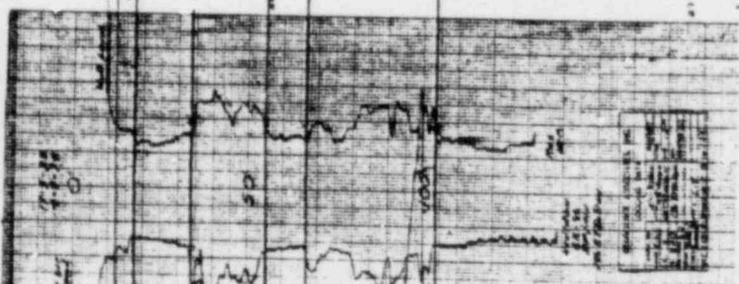
SEDICIENCE ASSOCIATES
178-18
G



GEOSCIENCE ASSOCIATES
MEMPHIS, TENN.

NO.	DATE	TIME	DEPTH	TEMP.	RESIST.	LOG
1	17-8-77	10:00	0	20.0	100	
2	17-8-77	10:05	10	20.5	100	
3	17-8-77	10:10	20	21.0	100	
4	17-8-77	10:15	30	21.5	100	
5	17-8-77	10:20	40	22.0	100	
6	17-8-77	10:25	50	22.5	100	
7	17-8-77	10:30	60	23.0	100	
8	17-8-77	10:35	70	23.5	100	
9	17-8-77	10:40	80	24.0	100	
10	17-8-77	10:45	90	24.5	100	
11	17-8-77	10:50	100	25.0	100	

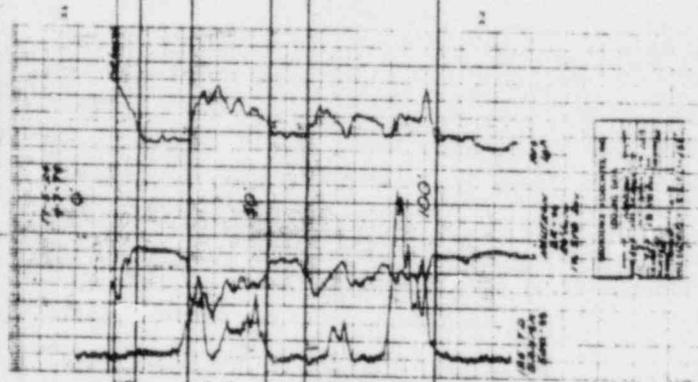
17-8-77



GEOSCIENCE ASSOCIATES
MEMPHIS, TENN.

NO.	DATE	TIME	DEPTH	TEMP.	RESIST.	LOG
1	17-8-74	10:00	0	20.0	100	
2	17-8-74	10:05	10	20.5	100	
3	17-8-74	10:10	20	21.0	100	
4	17-8-74	10:15	30	21.5	100	
5	17-8-74	10:20	40	22.0	100	
6	17-8-74	10:25	50	22.5	100	
7	17-8-74	10:30	60	23.0	100	
8	17-8-74	10:35	70	23.5	100	
9	17-8-74	10:40	80	24.0	100	
10	17-8-74	10:45	90	24.5	100	
11	17-8-74	10:50	100	25.0	100	

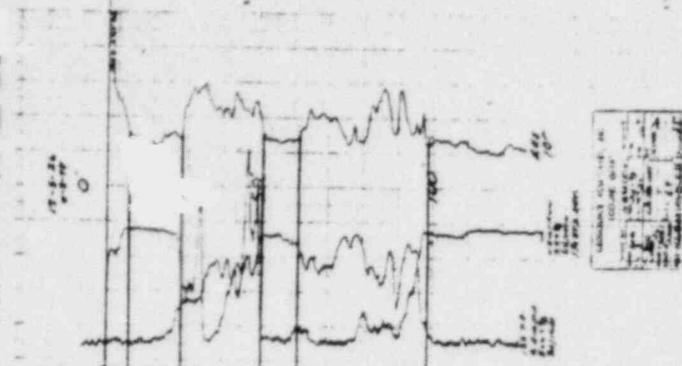
17-8-74



GEOSCIENCE ASSOCIATES
MEMPHIS, TENN.

NO.	DATE	TIME	DEPTH	TEMP.	RESIST.	LOG
1	17-8-76	10:00	0	20.0	100	
2	17-8-76	10:05	10	20.5	100	
3	17-8-76	10:10	20	21.0	100	
4	17-8-76	10:15	30	21.5	100	
5	17-8-76	10:20	40	22.0	100	
6	17-8-76	10:25	50	22.5	100	
7	17-8-76	10:30	60	23.0	100	
8	17-8-76	10:35	70	23.5	100	
9	17-8-76	10:40	80	24.0	100	
10	17-8-76	10:45	90	24.5	100	
11	17-8-76	10:50	100	25.0	100	

17-8-76

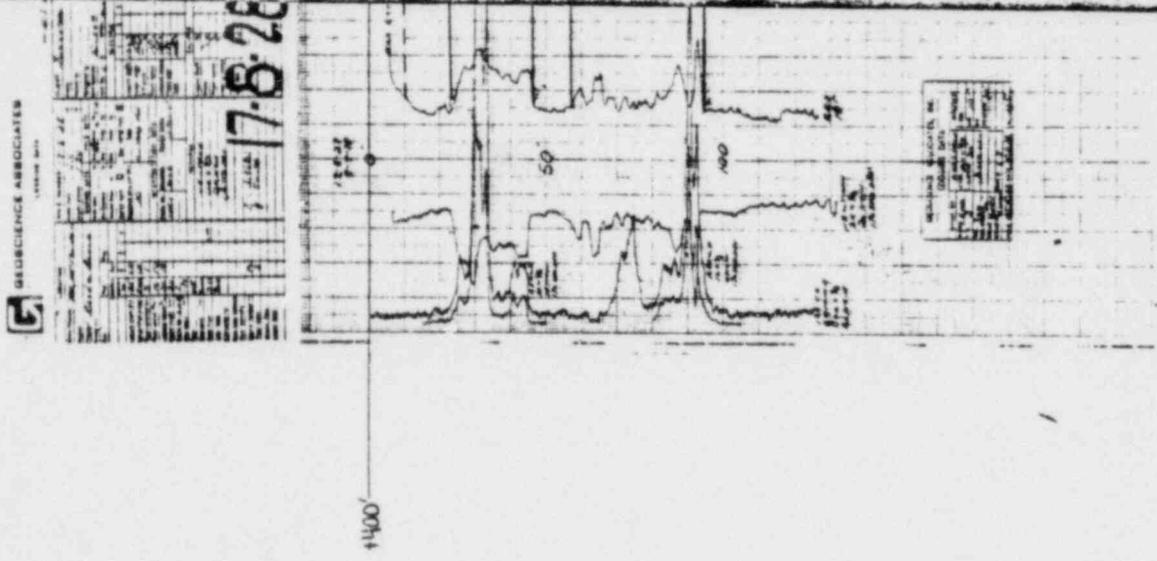




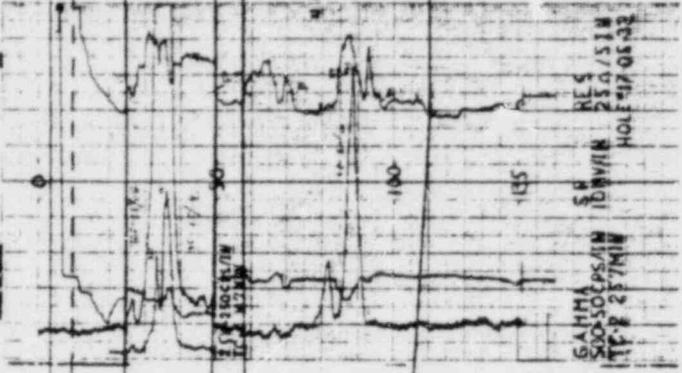
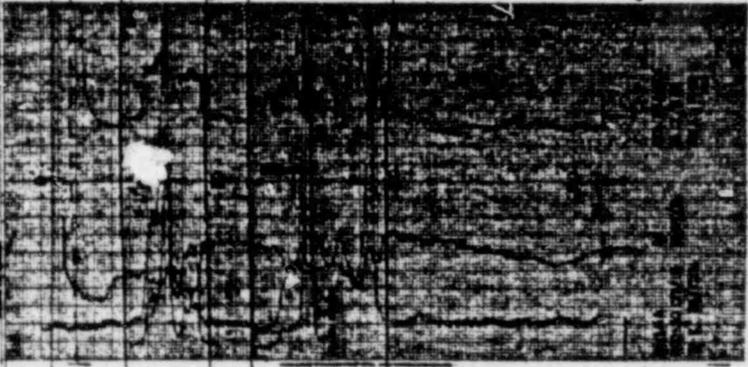
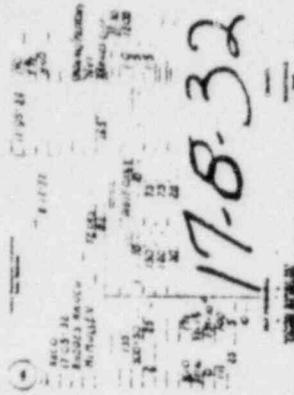
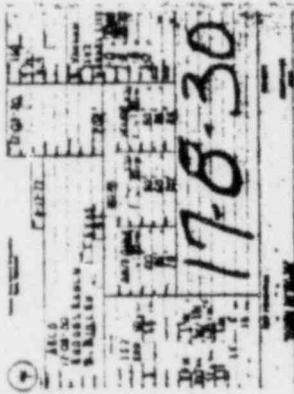
+400'



(continued from SHEET 1)



Cross-section N-N' (continued)
 6-7-78
 SHEET 2 of 2

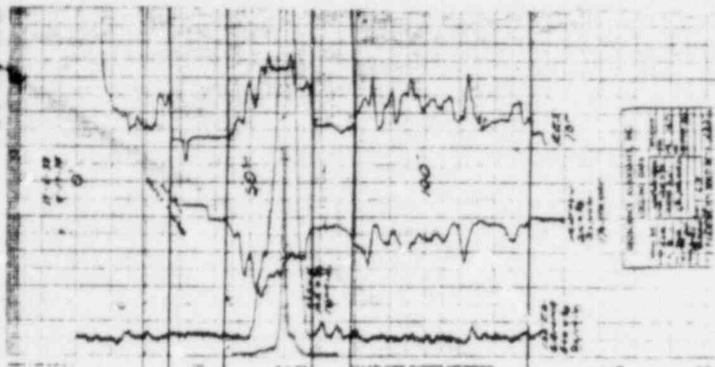


Magadia
Manual clay
Manual sand
Rincon clay
Rincon sand
Cataboula

Datum: +400'
Scale: 1"=40' vertical 1"=40' horizontal

17-8-38

DATE	7-11-58
TIME	10:00
LOCATION	...
DEPTH	...
...	...



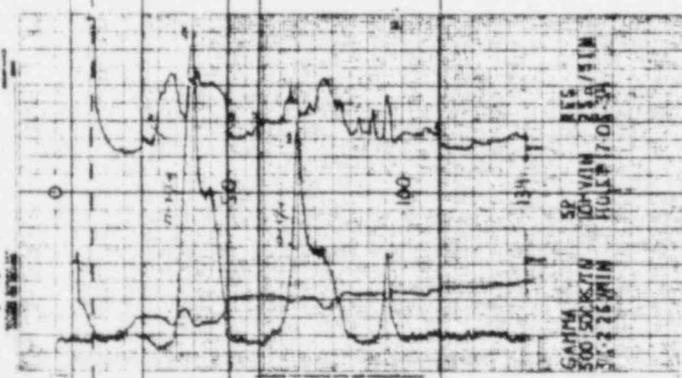
17-8-36

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TIME	10:00
LOCATION	...
DEPTH	...
...	...



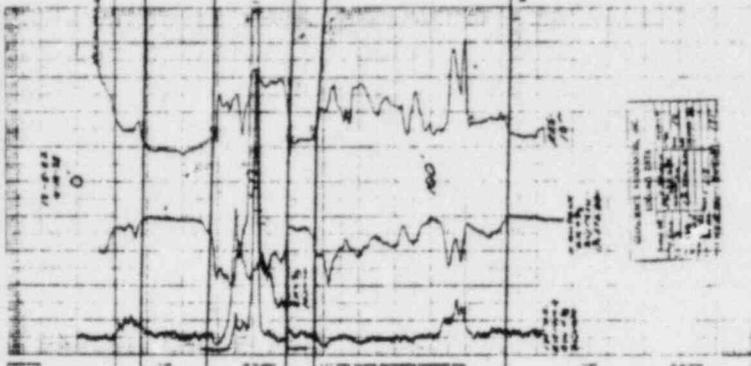
17-8-34

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TIME	10:00
LOCATION	...
DEPTH	...
...	...

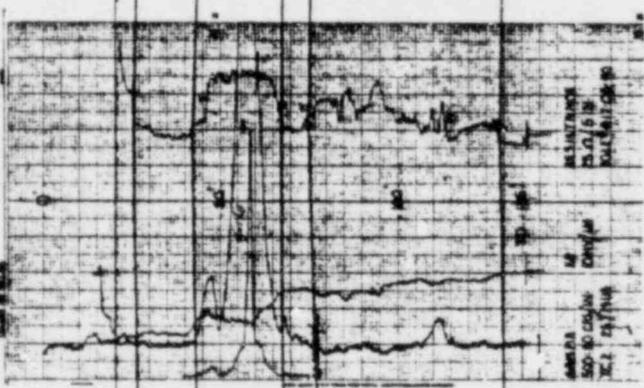


GEORGE ASSOCIATES

DATE	TIME	STATION	TYPE	REMARKS
17-8-42	17:54
...



DATE	TIME	STATION	TYPE	REMARKS
17-8-40
...



REC'D BY
DATE
TIME
17-8-44

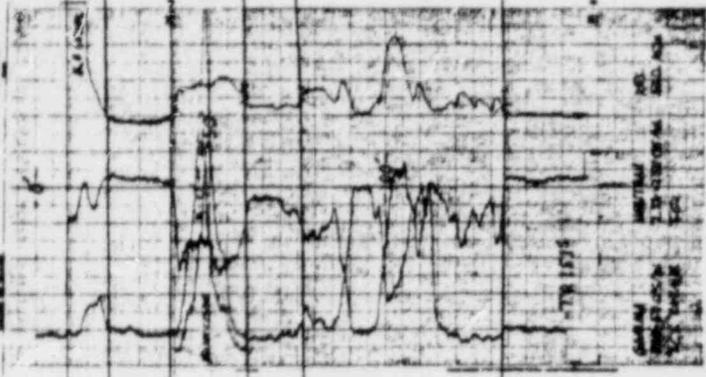


GAINMA RES
500-300PS/IV
TC-2 25-77M
SP
DRWIN 210-51M
HOLE 17-05-44

17-8-46



17-8-48



17-8-48

P-11

CROSS SECTION P-P'

82-50-44

Magnolia	Vf-f-md g sand, silt & caliche; oxidized greyish-tan to tan. Minor clay balls.
Manuel clay	Clay; oxidized/reduced yellow-orange to blue.
Manuel sand	F-md g silty sand; reduced blue-grey to grey.
Rincon clay	Slightly sandy clay; reduced light blue-grey.
Rincon sand	Interbedded f-md g silty sand & clay; reduced blue.
Catahoula	Clay, slightly sandy clay; reduced blue.

82-40-44

Magnolia	Interbedded md g silty sand, caliche & clay oxidized dark brown, yellow-brown, orange-brown to olive.
Manuel clay	Clay, f to md g silty sand & some caliche; oxidized/reduced orange-brown, olive to blue-grey to green-grey. Abundant gypsum.
Manuel sand	Md-cs g sand with some silt; reduced blue-grey; Pyrite, clay balls & chert pebbles present.
Rincon clay	Clay; reduced blue-grey and brown.
Rincon sand	Interbedded md g silty sand & clay; reduced blue-grey, grey to brown. Abundant clay balls, some pyrite.
Catahoula	Clay; reduced blue-grey.

82-30-44

Magnolia	Interbedded vf-f g sand & clay; reoxidized yellow-brown to yellow-grey. Limonite present.
Manuel clay	Clay; reoxidized/reduced blue-grey. Minor yellow-grey clay.
Manuel sand	F g sand & clay; reduced blue-grey.
Rincon clay	Clay; reduced blue-grey. Minor yellow-grey clay.
Rincon sand	Interbedded f g sand & clay; reduced blue-grey.
Catahoula	Clay; reduced blue-grey.



P

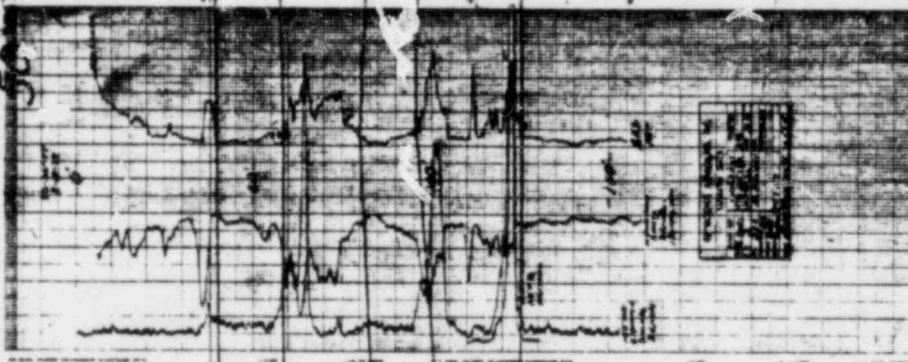
+400'

Cross-section P-P'
5-23-78

GEOSCIENCE ASSOCIATES

DATE	NOV 19 1944
PROJECT	...
WELL NO.	...
LOG NO.	...
DEPTH	...
...	...

82-26-44



Magnolia

Manuel clay

Manuel sand

Rincon clay

Rincon sand

Catahoula

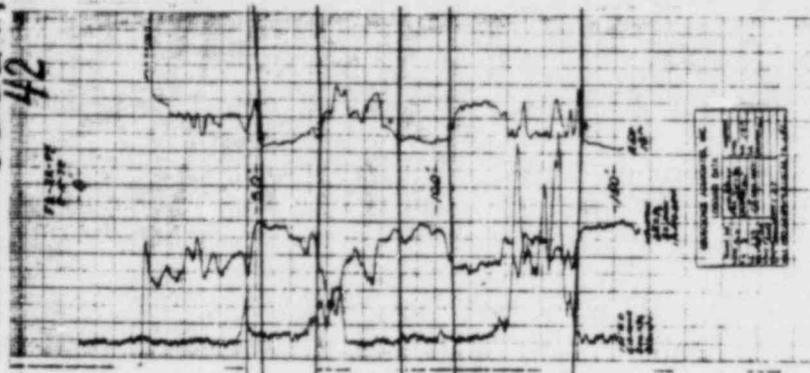


82-25-44

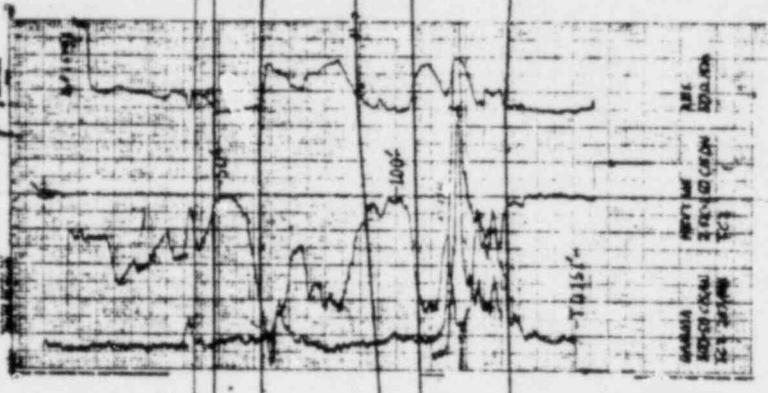


Datum: +100'
 Scale: 1" = 40' vertical 1" = 40' horizontal

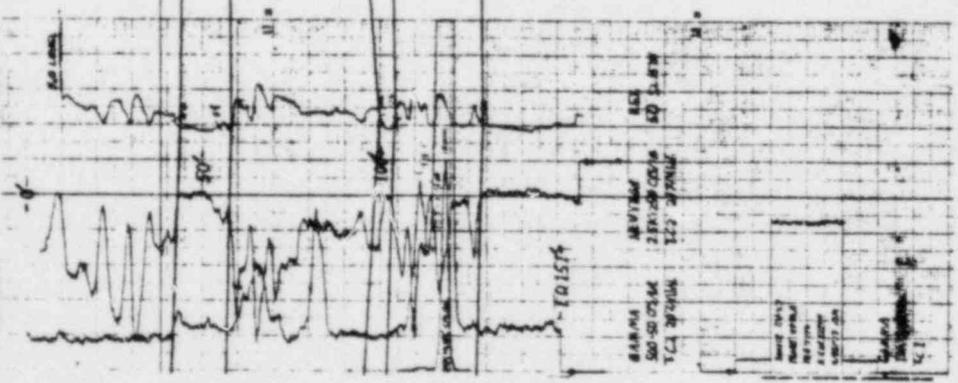
DATE	TIME	DEPTH	TEMPERATURE	RESISTIVITY	APPARENT RESISTIVITY	PHASE	DEPTH	TEMPERATURE	RESISTIVITY	APPARENT RESISTIVITY	PHASE
82-22-44	42	100	100	100	100	100	100	100	100	100	100



DATE	TIME	DEPTH	TEMPERATURE	RESISTIVITY	APPARENT RESISTIVITY	PHASE	DEPTH	TEMPERATURE	RESISTIVITY	APPARENT RESISTIVITY	PHASE
82-23-44	44	100	100	100	100	100	100	100	100	100	100



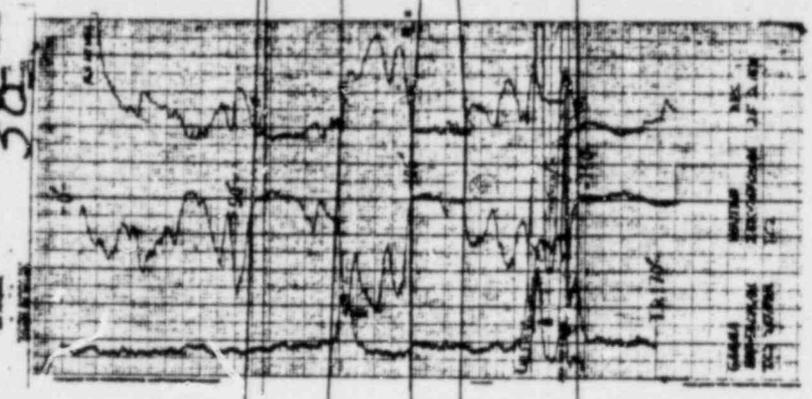
DATE	TIME	DEPTH	TEMPERATURE	RESISTIVITY	APPARENT RESISTIVITY	PHASE	DEPTH	TEMPERATURE	RESISTIVITY	APPARENT RESISTIVITY	PHASE
82-24-44	44	100	100	100	100	100	100	100	100	100	100



DATE	8/28/44
TIME	4:00
LEAD	
PATIENT	
PHYSICIAN	
HOSPITAL	
ROOM	
AGE	
SEX	
HT	
WT	
TEMP	
PULSE	
B.P.	
RESPIRATIONS	
ECG	
PHYSICIAN	
HOSPITAL	
ROOM	
AGE	
SEX	
HT	
WT	
TEMP	
PULSE	
B.P.	
RESPIRATIONS	
ECG	



DATE	8-28-44
TIME	3:38
LEAD	
PATIENT	
PHYSICIAN	
HOSPITAL	
ROOM	
AGE	
SEX	
HT	
WT	
TEMP	
PULSE	
B.P.	
RESPIRATIONS	
ECG	
PHYSICIAN	
HOSPITAL	
ROOM	
AGE	
SEX	
HT	
WT	
TEMP	
PULSE	
B.P.	
RESPIRATIONS	
ECG	



DATE	8-28-44
TIME	3:38
LEAD	
PATIENT	
PHYSICIAN	
HOSPITAL	
ROOM	
AGE	
SEX	
HT	
WT	
TEMP	
PULSE	
B.P.	
RESPIRATIONS	
ECG	
PHYSICIAN	
HOSPITAL	
ROOM	
AGE	
SEX	
HT	
WT	
TEMP	
PULSE	
B.P.	
RESPIRATIONS	
ECG	

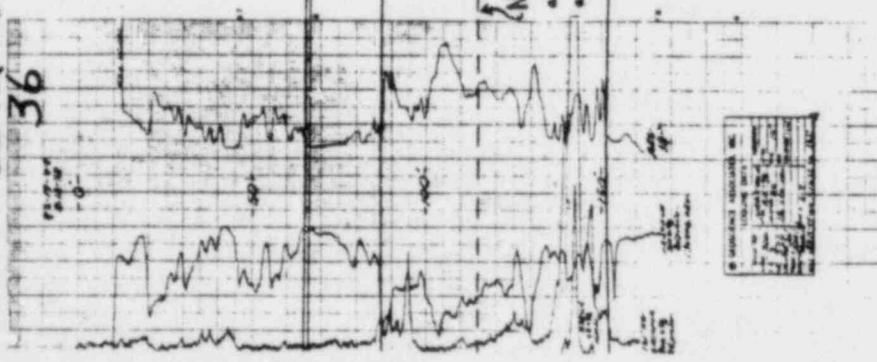
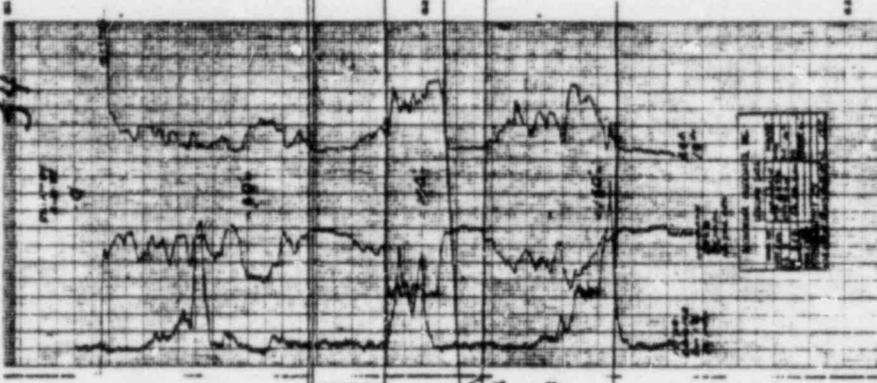


82-18-44

Well No.	82-18-44
Date	10/1/44
Operator	...
Location	...
...	...

82-18-44

Well No.	82-18-44
Date	10/1/44
Operator	...
Location	...
...	...

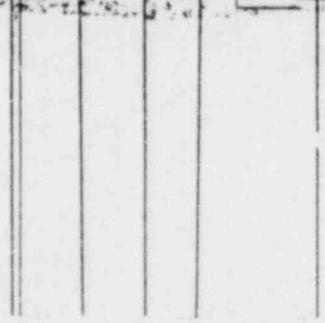


Magnolia
 Maxwell clay
 Maxwell sand
 Rincon clay
 Rincon sand
 Cataboula

No clay break between Maxwell and Rincon sands; boundary line approximate

P.

+1100'



R-R'

CROSS SECTION R-R'

15-37-10

Magnolia	F g sand & silt; oxidized yellow-grey to orange-brown. Gypsum near surface.
Manuel clay	Interbedded silt, clay & gypsum; reduced/oxidized blue-grey to yellow brown. Limonite stain.
Manuel sand	F-md g sand; reduced green-grey to blue-grey. Cemented zones.
Rincon clay	F-md g cemented sand; reduced blue-grey.
Rincon sand	Interbedded f-md g sand & clay; reduced blue-grey.
Catahoula	Silty clay; reduced blue-grey.

15-27-10

Magnolia	Interbedded, f g sand, silt & clay; oxidized yellow-brown to yellow. Minor caliche near surface. Abundant gypsum near base.
Manuel clay	Sandy clay; reduced blue.
Manuel sand	Vf-f g silty sand & silt; reduced light blue-grey to dark greenish-grey to light grey. Well cemented at surface.
Rincon clay	Sandy clay; reduced light grey, white, limy clay pieces.
Rincon sand	Incerbedded silty f g sands; reduced dark-grey to grey to light grey. Blue-grey clay balls & pyrite.
Catahoula	Clay; reduced; blue clay. Minor pyrite near top.

15-21-10

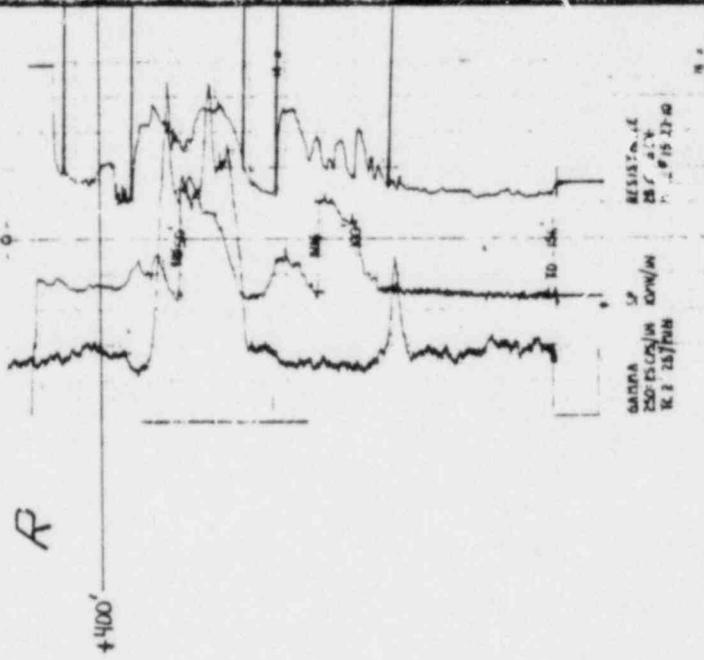
Magnolia	Interbedded silty, vf-f silty sand; oxidized/reoxidized yellow-grey to orange-grey. Soil zone organically rich, gypsum and calcic material present, limonite stain.
Manuel clay	Silt, clay, gypsum; reoxidized yellow-grey. Limonite.
Manuel sand	Vf-f g sand; reduced/reoxidized light grey to orange-grey. Cemented near base.
Rincon clay	Silty clay; reduced light grey.
Rincon sand	Interbedded vf-f g sand & silt; reduced light-grey.
Catahoula	Silty clay & silt; reduced blue-grey to light grey. Pyrite present.

CROSS SECTION R-R'

15-13-10

Magnolia	Clay, silty clay; oxidized/reoxidized; brown, pinkish-brown to green-grey. Interbedded f g sand, silty sand, silt and clay; reduced light grey to grey.
Manuel clay	Clay, silty clay; reduced blue-grey.
Manuel sand	Fg-f-md g sand; reduced light-grey to dark-grey.
Rincon clay	Clay, silty clay; reduced blue-grey.
Rincon sand	Interbedded md g sand, silt & clay; reduced blue-grey.
Catahoula	Clay, silty clay; reduced blue-grey.

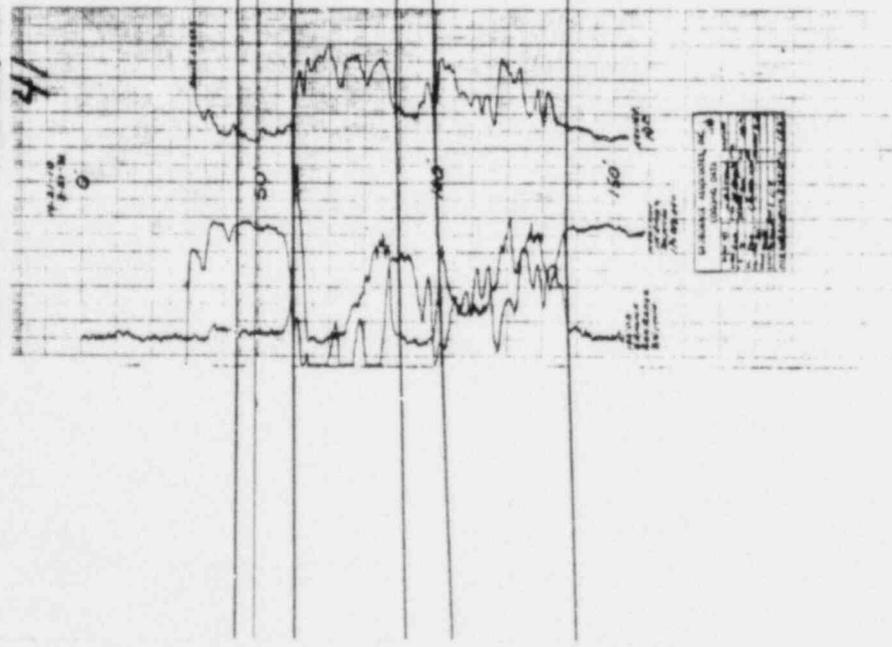
15-27-10
 53-



Cross-section R-R'
 7-13-78
 Date
 Scale

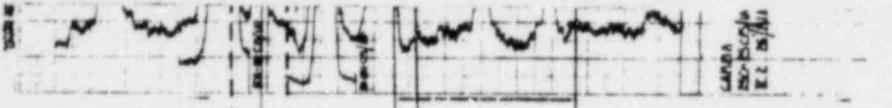
GEOSCIENCE ASSOCIATES
CORPORATION

WELL NO.	158810
DATE	10/15/81
LOG NO.	41
LOG TYPE	...
LOG SCALE	...
LOG INTERVAL	...
LOG POSITION	...
LOG DEPTH	...
LOG CORRECTIONS	...
LOG COMMENTS	...



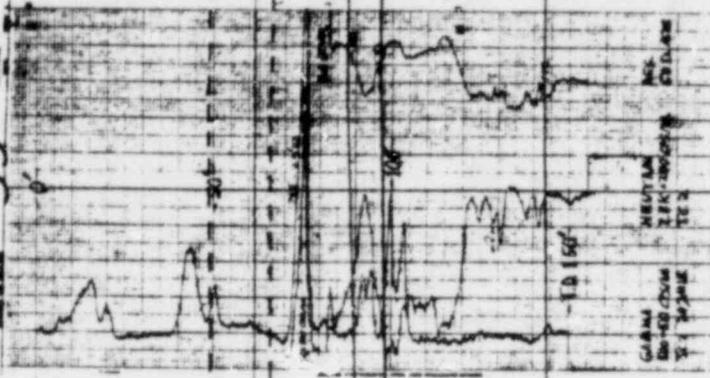
GEOSCIENCE ASSOCIATES
CORPORATION
10000 W. 10th Ave.
Denver, CO 80202
Tel: 303-751-1000

WELL NO. 158810
DATE 10/15/81
LOG NO. 41
LOG TYPE ...
LOG SCALE ...
LOG INTERVAL ...
LOG POSITION ...
LOG DEPTH ...
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LOG COMMENTS ...



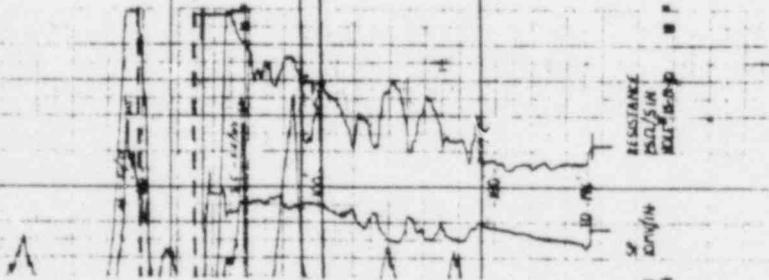
WELL NO. 158810
DATE 10/15/81
LOG NO. 41

15-18-10
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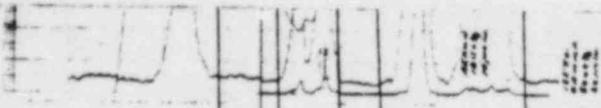
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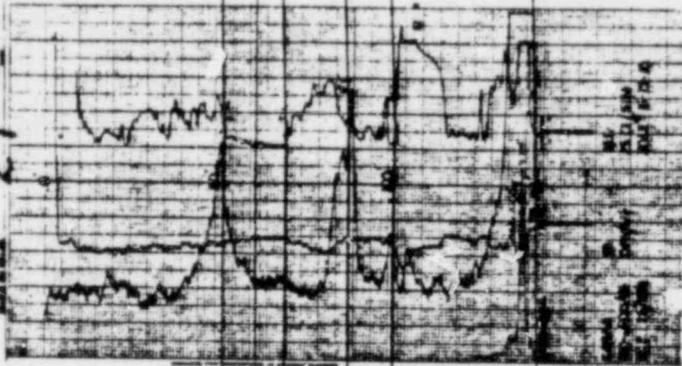
5

WATER LEVEL
TEMPERATURE
WIND DIRECTION
WIND VELOCITY
SEA STATE
CLOUDS
VISIBILITY
WEATHER
TIME
DATE



WATER LEVEL
TEMPERATURE
WIND DIRECTION
WIND VELOCITY
SEA STATE
CLOUDS
VISIBILITY
WEATHER
TIME
DATE

15-75-10
29



Magnolia

Manuel clay

Manuel sand

Rincon clay

Rincon sand

Catahoula



1400'



U-0

CROSS SECTION U-U'

83-32-8

Magnolia	Interbedded f g to silty sand, md g sand & clay; oxidized orange-brown. Clay balls & minor gypsum.
Manuel clay	Clay; oxidized/reduced orange-brown to blue-grey. Well cemented sand at base.
Manuel sand	Interbedded f g silty sand & clay; reduced blue-grey to grey-green to green. Minor pyrite & clay balls.
Catahoula	Clay; reduced/oxidized blue-grey to red-brown. Minor sand.

83-13

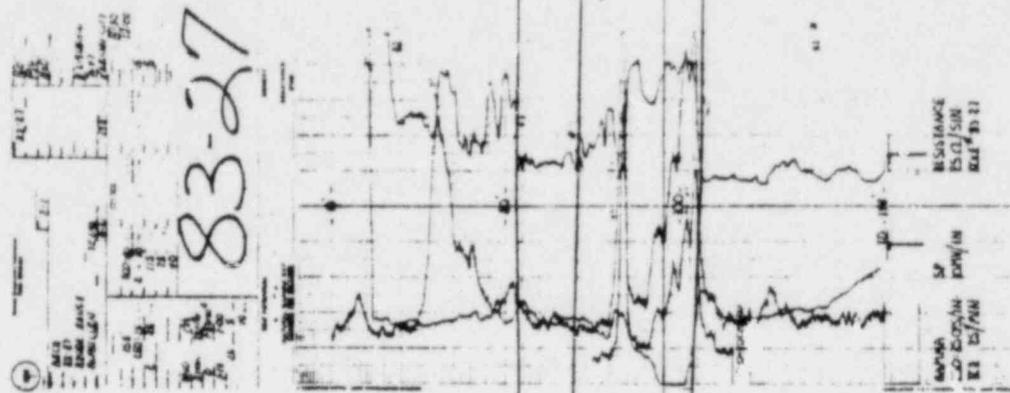
Magnolia	Interbedded f-md g sand, silt & clay; oxidized/reoxidized light grey to grey & brown. Minor gypsum.
Manuel clay	Clay & f g silty sand; reoxidized & reduced light brown to blue-grey. Minor gypsum.
Manuel sand	F-md g sand, silt & minor clay; reduced grey to blue-grey.
Catahoula	Slightly silty clay; reduced/oxidized blue-grey to grey to brown.

84-16-46

Magnolia	Silty vf-f g sand, interbedded clay; reoxidized yellow grey; limonite.
Manuel clay	Clay & silt; reoxidized & reduced, blue-grey to yellow-grey.
Manuel sand	F g sand & clay; reduced blue-grey; silty sand near base.
Catahoula	Clay with vf g silty sand; oxidized(?) reddish light grey to blue-grey.

84-4-38

Magnolia	Silty clay & silt; f g sand with minor clay; f g sand in lower half; oxidized/reoxidized black to brown to light brown.
Manuel clay	Silt & clay; reoxidized & reduced, brown to blue-grey.
Manuel sand	F-md g sand; reduced, light grey to grey.
Rincon clay	Clay; reduced blue-grey.
Rincon sand	F g sand; reduced, light grey.
Catahoula	Silt with minor clay; reduced, light grey to grey.



Magnolia

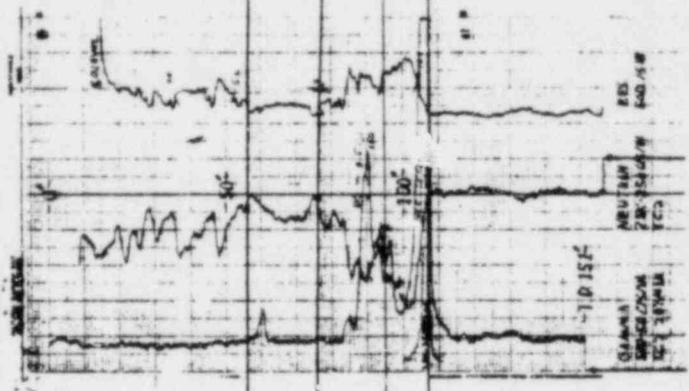
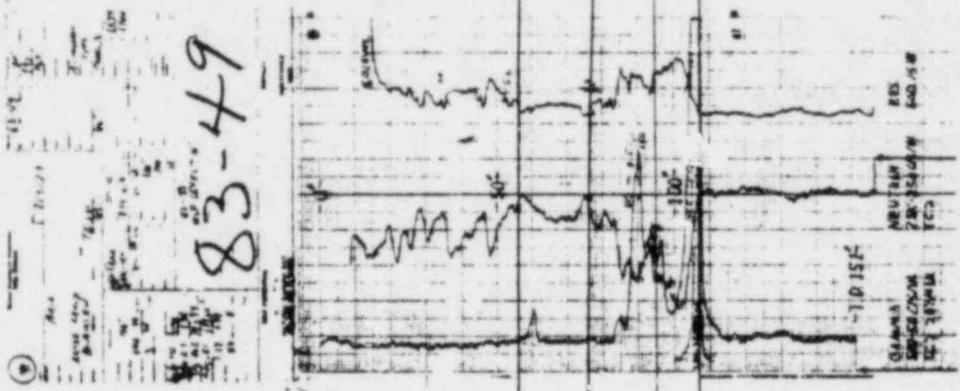
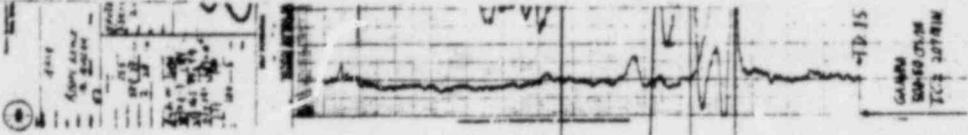
Manuel clay

Manuel sand

Catahoula

(This interval 750')

+1400'
1" = 40' vertical 1" = 40' horizontal (unless otherwise indicated)



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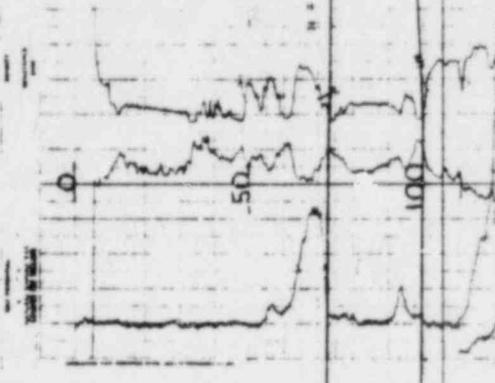
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RES.
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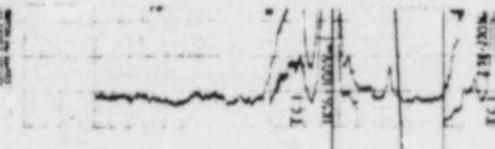
83-41



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 TC 2

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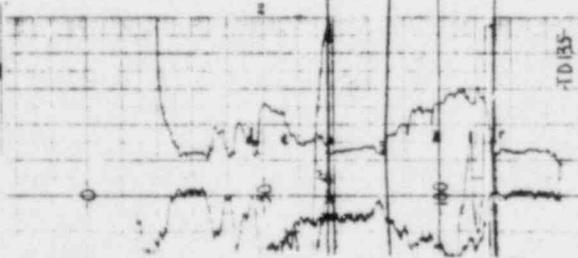
8



RES.
 1000 CM
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 TC 2

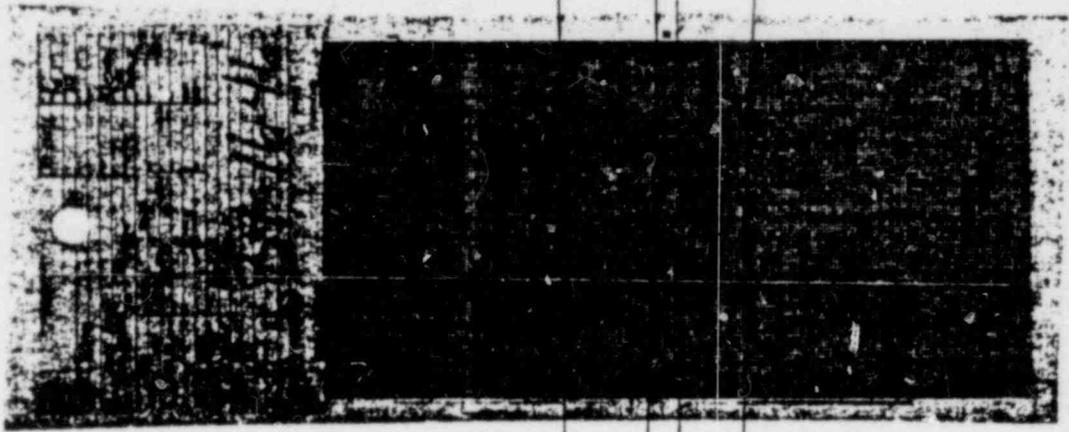
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10:10	110	110	110	110	110
10:15	115	115	115	115	115
10:20	120	120	120	120	120
10:25	125	125	125	125	125
10:30	130	130	130	130	130
10:35	135	135	135	135	135
10:40	140	140	140	140	140
10:45	145	145	145	145	145
10:50	150	150	150	150	150
10:55	155	155	155	155	155
11:00	160	160	160	160	160
11:05	165	165	165	165	165
11:10	170	170	170	170	170
11:15	175	175	175	175	175
11:20	180	180	180	180	180
11:25	185	185	185	185	185
11:30	190	190	190	190	190
11:35	195	195	195	195	195
11:40	200	200	200	200	200
11:45	205	205	205	205	205
11:50	210	210	210	210	210
11:55	215	215	215	215	215
12:00	220	220	220	220	220

4-18-48



NEUTRON RES
5K-5005/4
TC 1 7/5/78

4-18-48

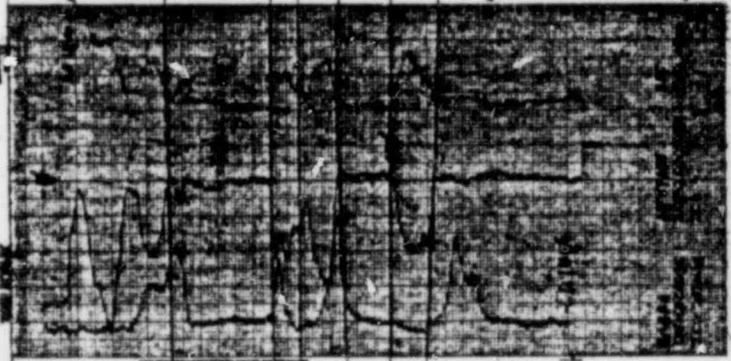


← Rincon sand and clay pinch out here

(This interval 550')

84-12-42

DATE	8-12-42
TIME	
DEPTH	
TEMPERATURE	
WIND	
SEA	
WEATHER	
REMARKS	



Magnolia

Maurel clay

Maurel sand

Rincon clay

Rincon sand

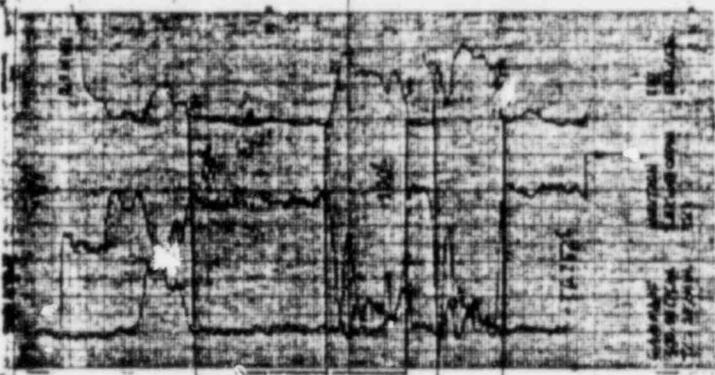
Catahoula

(This interval 900')

DATE	TIME	DEPTH	WIND	SEA	TEMP	WAVE	SWELL	STATE	REMARKS
84-4-38									
ALL DATA TO BE REPORTED IN THE FOLLOWING ORDER:									
1. DATE AND TIME 2. DEPTH 3. WIND 4. SEA 5. TEMPERATURE 6. WAVE 7. SWELL 8. STATE 9. REMARKS									

U.

+400'



M-M

CROSS SECTION W-W

85-42-20

Magnolia	Interbedded f-md-cs g silty sand & clay; oxidized green-grey, yellow-brown, orange-brown. Minor calcitic sand balls.
Manuel clay	Clay & sandy clay; reduced/oxidized blue-grey to red-brown.
Manuel sand	F-md g silty sand & silt; reduced oxidized green-grey to orange-brown. Minor pyrite & clay balls.
Catahoula	Clay; oxidized blue-grey to orange-brown and red-brown.

85-28-20

Magnolia	Interbedded f-md g silty sand & clay; oxidized orange-brown, red-brown to green-brown.
Manuel clay	Clay; reduced blue-grey.
Manuel sand	Interbedded f-md-cs sand, upper well cemented, clay; reduced/oxidized blue-grey, grey-green to red-brown. Minor pyrite & clay balls.
Catahoula	Clay; reduced/oxidized blue-grey to red-brown.

85-22-20

Magnolia	Caliche & interbedded f-md g sand, silty sand, & sandy clay; oxidized/reduced white, tan, yellow-tan to blue-grey. Abundant gypsum & minor clay balls
Manuel clay	Sandy clay; reduced blue-grey.
Manuel sand	Silty f-md g sand; reduced grey.
Catahoula	Clay to sandy clay; reduced/oxidized blue to brown. Minor pyrite.

85-14-20

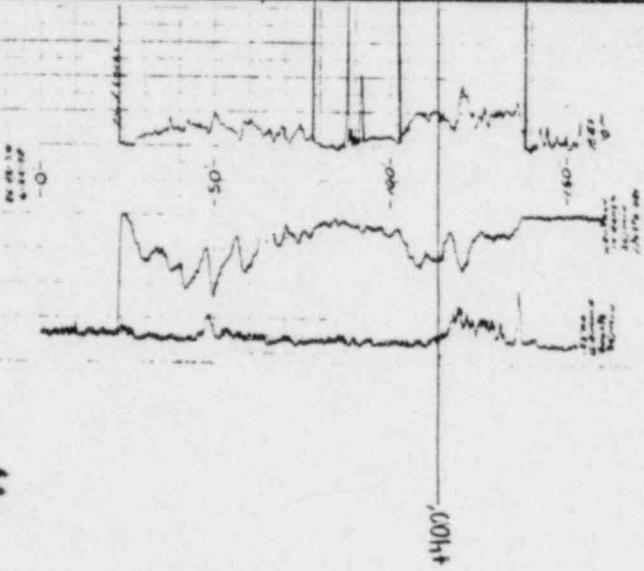
Magnolia	Interbedded f-md g silty sand & clay; oxidized/reduced orange-brown, olive, green-grey; minor gypsum & pyrite & clay balls.
Manuel clay	Clay; reduced green-grey.
Manuel sand	Interbedded f-md g sand, silty sand & sandy clay; reduced olive to blue-grey.
Catahoula	Clay, sandy clay; reduced/oxidized blue-grey to red-brown.

GEOSCIENTIFIC ASSOCIATES
1980-1981

Well No.	Depth (ft)	Gamma Ray (API)	Neutron Porosity (%)	Resistivity (ohm-ft)	Formation
85-42-20	0	100	0.00	1000	Surface
	10	100	0.00	1000	Surface
	20	100	0.00	1000	Surface
	30	100	0.00	1000	Surface
	40	100	0.00	1000	Surface
	50	100	0.00	1000	Surface
	60	100	0.00	1000	Surface
	70	100	0.00	1000	Surface
	80	100	0.00	1000	Surface
	90	100	0.00	1000	Surface
	100	100	0.00	1000	Surface
	110	100	0.00	1000	Surface
	120	100	0.00	1000	Surface
	130	100	0.00	1000	Surface
	140	100	0.00	1000	Surface
	150	100	0.00	1000	Surface
	160	100	0.00	1000	Surface
	170	100	0.00	1000	Surface
	180	100	0.00	1000	Surface
	190	100	0.00	1000	Surface
	200	100	0.00	1000	Surface
	210	100	0.00	1000	Surface
	220	100	0.00	1000	Surface
	230	100	0.00	1000	Surface
	240	100	0.00	1000	Surface
	250	100	0.00	1000	Surface
	260	100	0.00	1000	Surface
	270	100	0.00	1000	Surface
	280	100	0.00	1000	Surface
	290	100	0.00	1000	Surface
	300	100	0.00	1000	Surface
	310	100	0.00	1000	Surface
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	340	100	0.00	1000	Surface
	350	100	0.00	1000	Surface
	360	100	0.00	1000	Surface
	370	100	0.00	1000	Surface
	380	100	0.00	1000	Surface
	390	100	0.00	1000	Surface
	400	100	0.00	1000	Surface

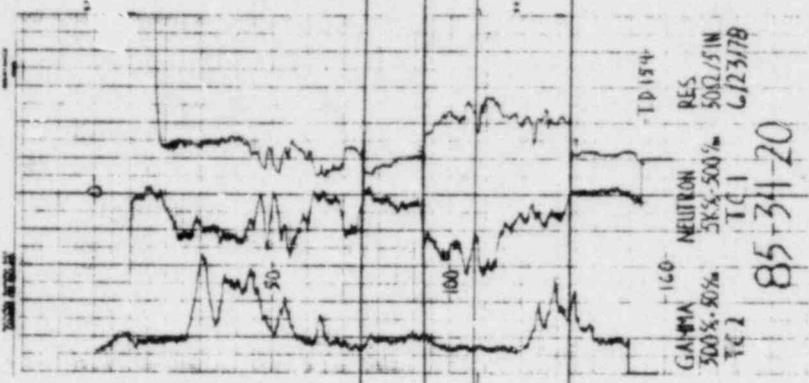
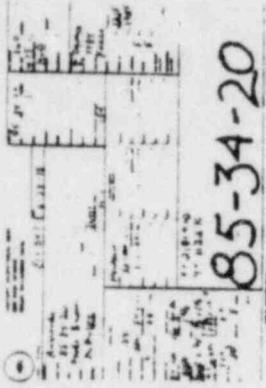
85-42-20

W



Well No.	Depth (ft)	Gamma Ray (API)	Neutron Porosity (%)	Resistivity (ohm-ft)	Formation
85-42-20	0	100	0.00	1000	Surface
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	20	100	0.00	1000	Surface
	30	100	0.00	1000	Surface
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	50	100	0.00	1000	Surface
	60	100	0.00	1000	Surface
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	80	100	0.00	1000	Surface
	90	100	0.00	1000	Surface
	100	100	0.00	1000	Surface
	110	100	0.00	1000	Surface
	120	100	0.00	1000	Surface
	130	100	0.00	1000	Surface
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	330	100	0.00	1000	Surface
	340	100	0.00	1000	Surface
	350	100	0.00	1000	Surface
	360	100	0.00	1000	Surface
	370	100	0.00	1000	Surface
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	400	100	0.00	1000	Surface

Cross-section W-W
7-18-78



Magnolia

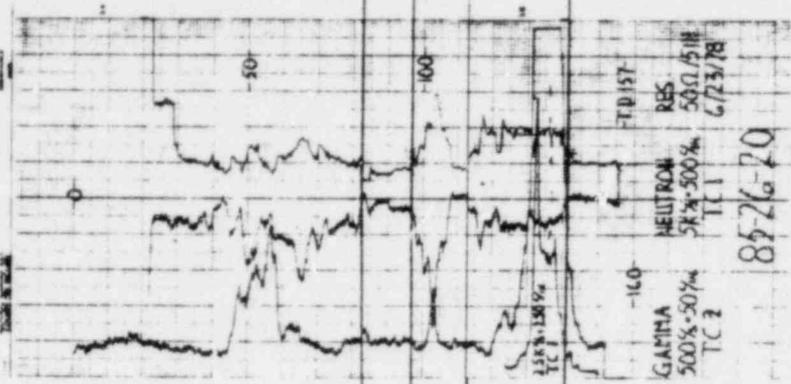
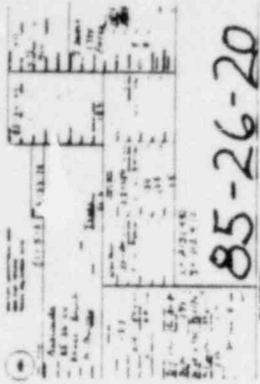
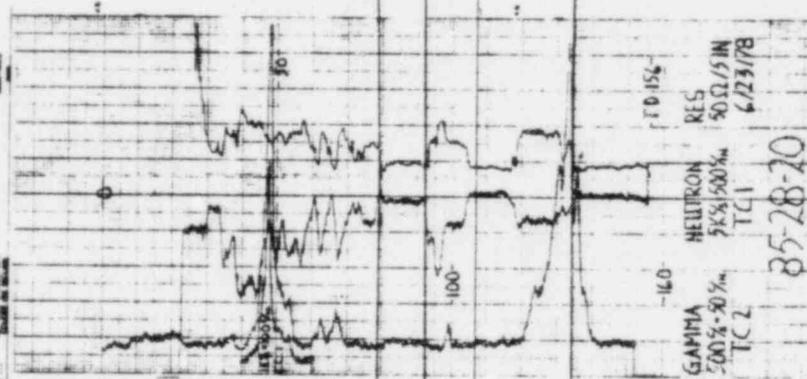
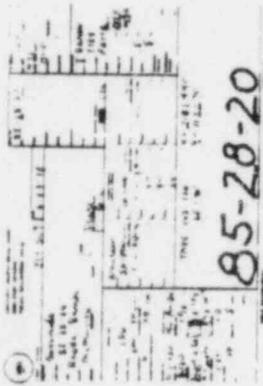
Manuel clay

Manuel sand

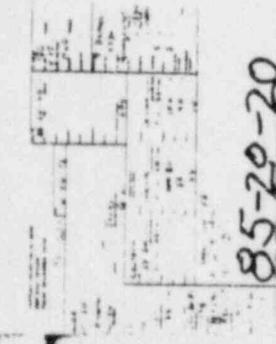
Cataboula

(This interval 800')

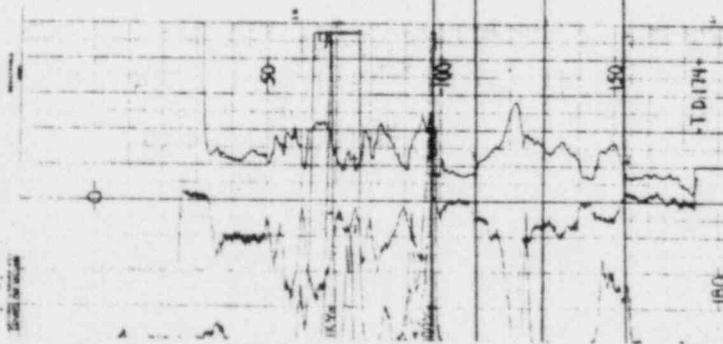
Datum: +400'
 Scale: 1" = 40' vertical 1" = 40' horizontal (unless otherwise indicated)



This interval (600')

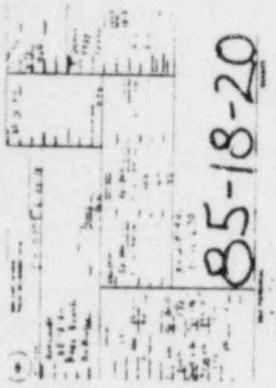


85-20-20

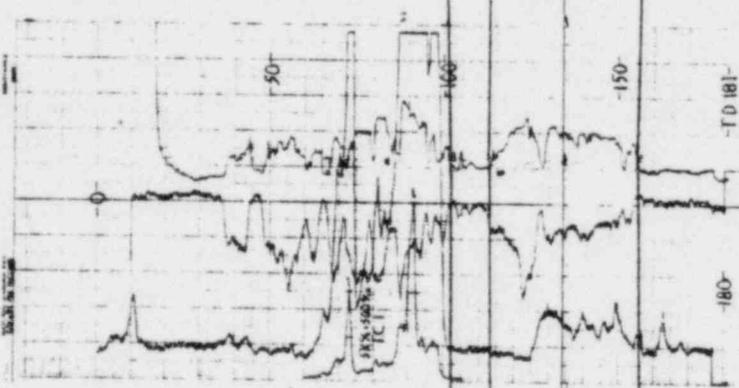


Gamma NEUTRON RES
500% 50% 500% 50%
TC 1 TC 1
6/24/78

85-20-20

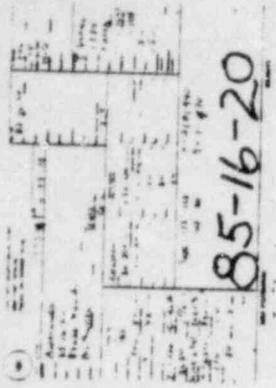


85-18-20

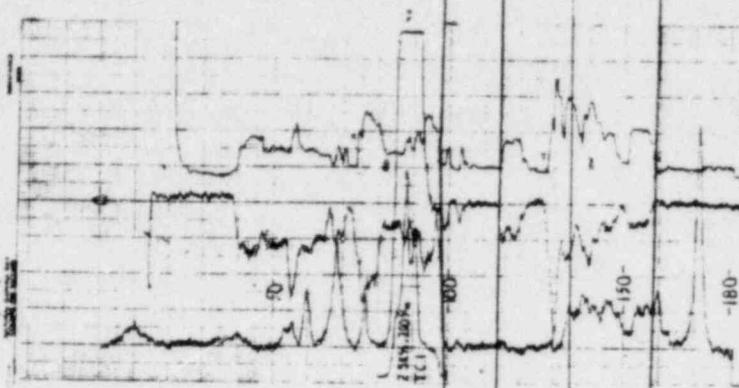


Gamma NEUTRON RES
500% 50% 500% 50%
TC 1 TC 1
6/23/78

85-18-20



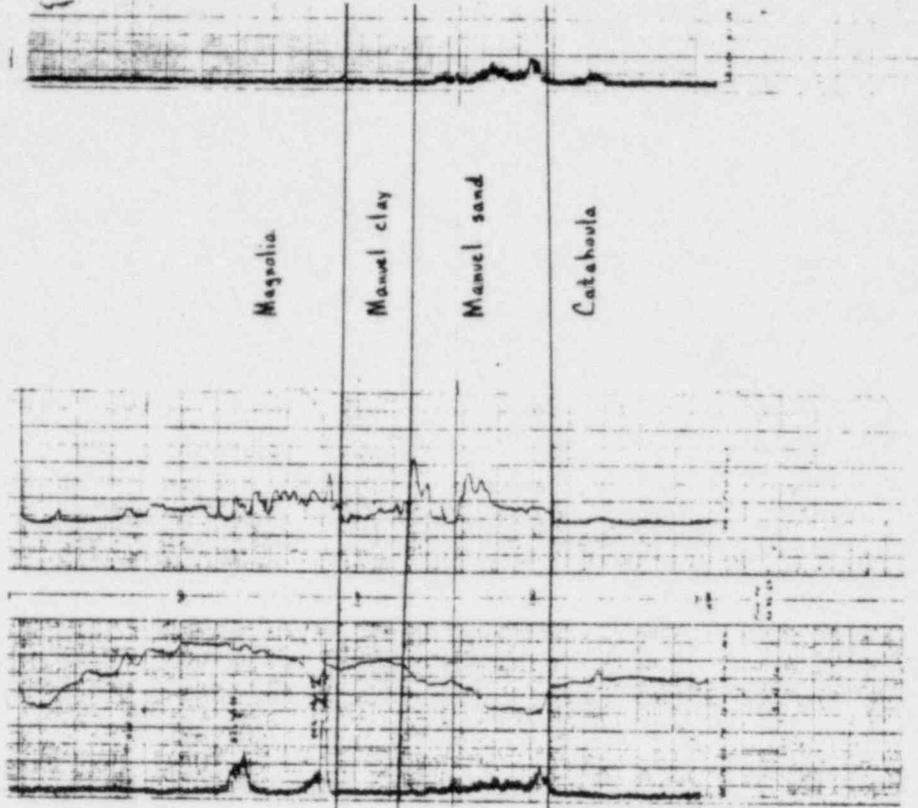
85-16-20



Gamma NEUTRON RES
500% 50% 500% 50%
TC 1 TC 1
6/23/78

85-16-20

DATE	8/14/78
WELL NO.	85-14-20
LOG NO.	
LOGGERS	
TIME	
DEPTH	
TEMP.	
RES.	
GRAB	
TEST	
REMARKS	



85-14-20

Magnolia

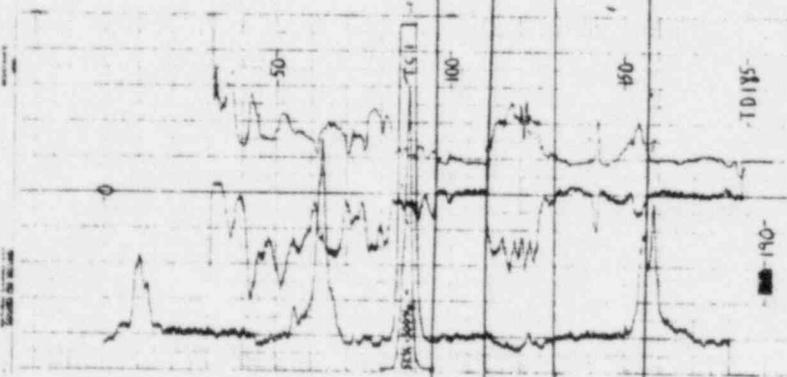
Manuel clay

Manuel sand

Catahoula

DATE	8/14/78
WELL NO.	85-14-20
LOG NO.	
LOGGERS	
TIME	
DEPTH	
TEMP.	
RES.	
GRAB	
TEST	
REMARKS	

85-14-20



GAMMA
500% - 50%
TCL

NEUTRON
30% - 40%
TCL

RES
50 ft / 5 in
6/27/78

85-14-20

TD 115

190

150

100

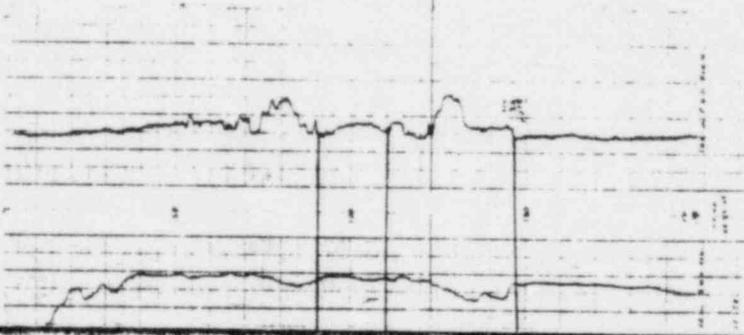
50

Time	Depth	Temperature	Salinity	Current	Wind	Wave	Pressure	Other
00:00	10	15.0	35.0	0.0	0.0	0.0	1013.0	
00:15	10	15.0	35.0	0.0	0.0	0.0	1013.0	
00:30	10	15.0	35.0	0.0	0.0	0.0	1013.0	
00:45	10	15.0	35.0	0.0	0.0	0.0	1013.0	
01:00	10	15.0	35.0	0.0	0.0	0.0	1013.0	
01:15	10	15.0	35.0	0.0	0.0	0.0	1013.0	
01:30	10	15.0	35.0	0.0	0.0	0.0	1013.0	
01:45	10	15.0	35.0	0.0	0.0	0.0	1013.0	
02:00	10	15.0	35.0	0.0	0.0	0.0	1013.0	
02:15	10	15.0	35.0	0.0	0.0	0.0	1013.0	
02:30	10	15.0	35.0	0.0	0.0	0.0	1013.0	
02:45	10	15.0	35.0	0.0	0.0	0.0	1013.0	
03:00	10	15.0	35.0	0.0	0.0	0.0	1013.0	
03:15	10	15.0	35.0	0.0	0.0	0.0	1013.0	
03:30	10	15.0	35.0	0.0	0.0	0.0	1013.0	
03:45	10	15.0	35.0	0.0	0.0	0.0	1013.0	
04:00	10	15.0	35.0	0.0	0.0	0.0	1013.0	
04:15	10	15.0	35.0	0.0	0.0	0.0	1013.0	
04:30	10	15.0	35.0	0.0	0.0	0.0	1013.0	
04:45	10	15.0	35.0	0.0	0.0	0.0	1013.0	
05:00	10	15.0	35.0	0.0	0.0	0.0	1013.0	
05:15	10	15.0	35.0	0.0	0.0	0.0	1013.0	
05:30	10	15.0	35.0	0.0	0.0	0.0	1013.0	
05:45	10	15.0	35.0	0.0	0.0	0.0	1013.0	
06:00	10	15.0	35.0	0.0	0.0	0.0	1013.0	
06:15	10	15.0	35.0	0.0	0.0	0.0	1013.0	
06:30	10	15.0	35.0	0.0	0.0	0.0	1013.0	
06:45	10	15.0	35.0	0.0	0.0	0.0	1013.0	
07:00	10	15.0	35.0	0.0	0.0	0.0	1013.0	
07:15	10	15.0	35.0	0.0	0.0	0.0	1013.0	
07:30	10	15.0	35.0	0.0	0.0	0.0	1013.0	
07:45	10	15.0	35.0	0.0	0.0	0.0	1013.0	
08:00	10	15.0	35.0	0.0	0.0	0.0	1013.0	
08:15	10	15.0	35.0	0.0	0.0	0.0	1013.0	
08:30	10	15.0	35.0	0.0	0.0	0.0	1013.0	
08:45	10	15.0	35.0	0.0	0.0	0.0	1013.0	
09:00	10	15.0	35.0	0.0	0.0	0.0	1013.0	
09:15	10	15.0	35.0	0.0	0.0	0.0	1013.0	
09:30	10	15.0	35.0	0.0	0.0	0.0	1013.0	
09:45	10	15.0	35.0	0.0	0.0	0.0	1013.0	
10:00	10	15.0	35.0	0.0	0.0	0.0	1013.0	
10:15	10	15.0	35.0	0.0	0.0	0.0	1013.0	
10:30	10	15.0	35.0	0.0	0.0	0.0	1013.0	
10:45	10	15.0	35.0	0.0	0.0	0.0	1013.0	
11:00	10	15.0	35.0	0.0	0.0	0.0	1013.0	
11:15	10	15.0	35.0	0.0	0.0	0.0	1013.0	
11:30	10	15.0	35.0	0.0	0.0	0.0	1013.0	
11:45	10	15.0	35.0	0.0	0.0	0.0	1013.0	
12:00	10	15.0	35.0	0.0	0.0	0.0	1013.0	

85-27

W

+100'



CROSS SECTION Y-Y'

77-16-36

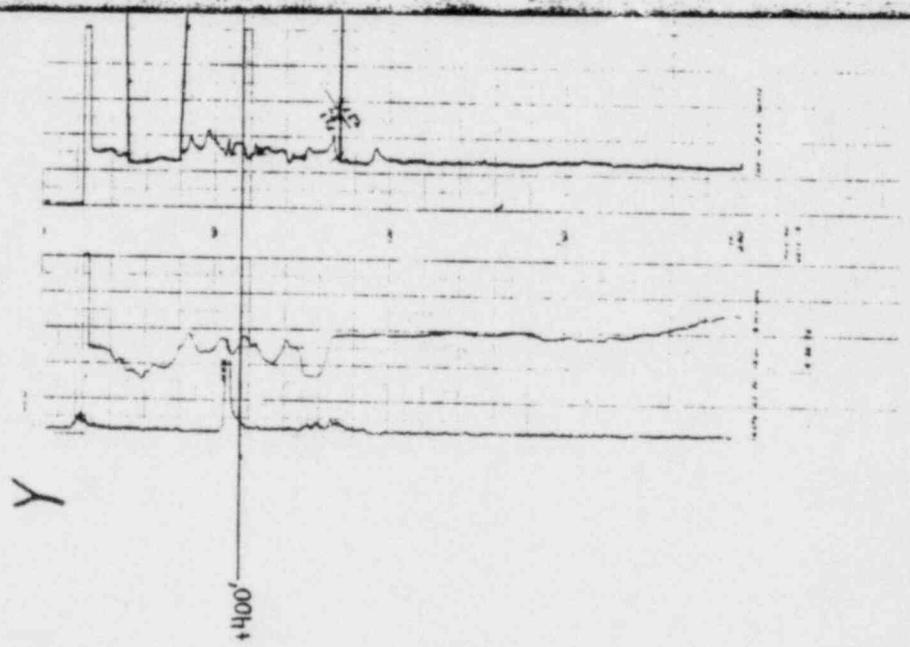
Magnolia	Silty clay & f g silty sand; oxidized light-brown to yellowish tan. Minor caliche, gypsum & clay balls.
Manuel clay	Sandy clay, silty f g sand; oxidized/reduced yellow to blue-grey. Minor gypsum & clay balls. Light blue silt near base.
Manuel sand	Interbedded silty f g cemented sand & silty clay; reduced light blue-grey to blue.
Catahoula	Clay; reduced blue. Minor pyrite.

770-20

Magnolia	Caliche, clay, f g sand; oxidized/reoxidized/reduced; buff, yellow-brown.
Manuel clay	Clay and f g sand, reduced blue-grey.
Manuel sand	Md-f g cemented sand; reduced grey to blue-grey.
Catahoula	Clay; reduced blue-grey.

Time	Depth	Temperature	Salinity	Specific Gravity	Direction	Speed	Current	Wind	Wave	Weather	State
0000	0	15.0	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0005	10	14.5	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0010	20	14.0	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0015	30	13.5	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0020	40	13.0	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0025	50	12.5	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0030	60	12.0	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0035	70	11.5	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0040	80	11.0	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0045	90	10.5	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0050	100	10.0	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0055	110	9.5	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0100	120	9.0	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0105	130	8.5	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0110	140	8.0	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0115	150	7.5	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0120	160	7.0	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0125	170	6.5	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0130	180	6.0	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0135	190	5.5	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0140	200	5.0	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0145	210	4.5	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0150	220	4.0	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0155	230	3.5	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0200	240	3.0	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0205	250	2.5	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0210	260	2.0	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0215	270	1.5	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0220	280	1.0	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0225	290	0.5	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0
0230	300	0.0	35.0	1.0230	000	0.0	0.0	0.0	0.0	0.0	0.0

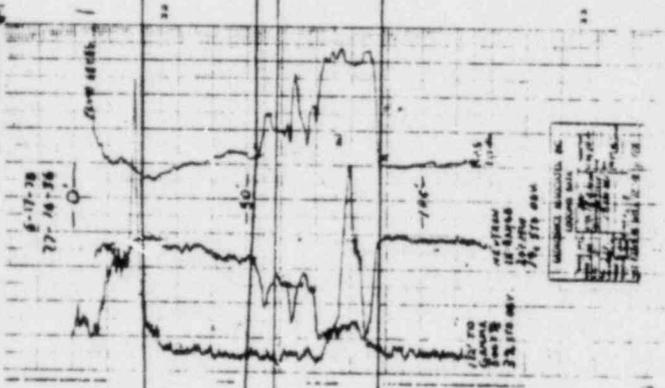
77.13



Cross-section Y-Y'
7-19-78

GEO SCIENCE ASSOCIATES
MEMPHIS, TENN.

Well No.	77-16-36
Date	6-17-78
Operator	77-16-36
Company	
Geophysicist	
Geologist	
Drill Bit	
Drill Rate	
Drill Time	
Drill Cost	
Drill Yield	
Drill Loss	
Drill Breakdown	
Drill Status	
Drill Remarks	



Magnolia

Manuel clay

Manuel sand

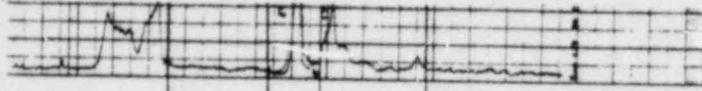
Catahoula

(This interval 550')

Datum: +400'

Scale: 1" = 40' vertical, 1" = 40' horizontal (unless otherwise indicated)

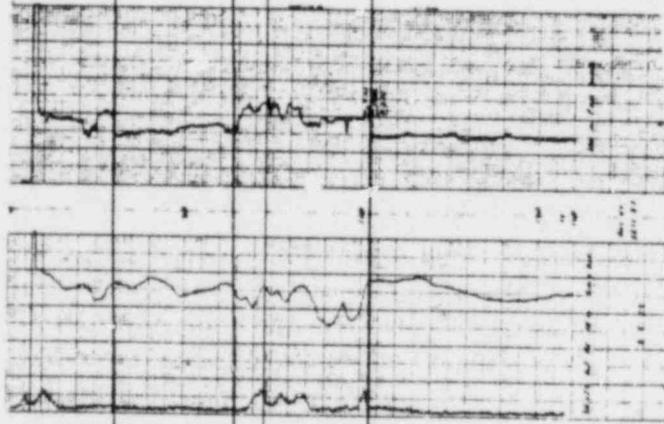
11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100



(This interval 450')

77-57

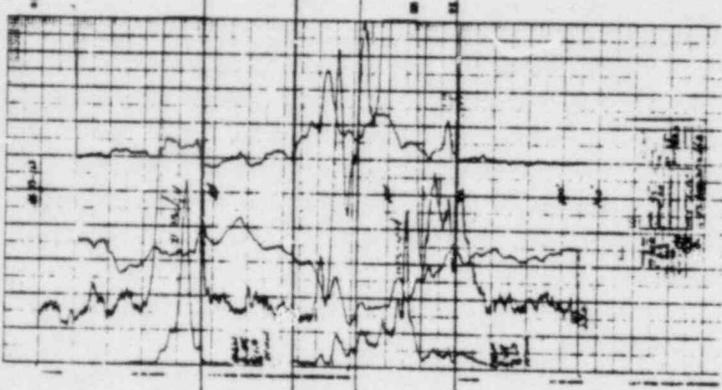
Time	Rate	PR	QT	QTc	ST-T
12	75	180	380	380	0.2
13	75	180	380	380	0.2
14	75	180	380	380	0.2
15	75	180	380	380	0.2
16	75	180	380	380	0.2
17	75	180	380	380	0.2
18	75	180	380	380	0.2
19	75	180	380	380	0.2
20	75	180	380	380	0.2
21	75	180	380	380	0.2
22	75	180	380	380	0.2
23	75	180	380	380	0.2
24	75	180	380	380	0.2
25	75	180	380	380	0.2
26	75	180	380	380	0.2
27	75	180	380	380	0.2
28	75	180	380	380	0.2
29	75	180	380	380	0.2
30	75	180	380	380	0.2
31	75	180	380	380	0.2
32	75	180	380	380	0.2
33	75	180	380	380	0.2
34	75	180	380	380	0.2
35	75	180	380	380	0.2
36	75	180	380	380	0.2
37	75	180	380	380	0.2
38	75	180	380	380	0.2
39	75	180	380	380	0.2
40	75	180	380	380	0.2
41	75	180	380	380	0.2
42	75	180	380	380	0.2
43	75	180	380	380	0.2
44	75	180	380	380	0.2
45	75	180	380	380	0.2
46	75	180	380	380	0.2
47	75	180	380	380	0.2
48	75	180	380	380	0.2
49	75	180	380	380	0.2
50	75	180	380	380	0.2
51	75	180	380	380	0.2
52	75	180	380	380	0.2
53	75	180	380	380	0.2
54	75	180	380	380	0.2
55	75	180	380	380	0.2
56	75	180	380	380	0.2
57	75	180	380	380	0.2
58	75	180	380	380	0.2
59	75	180	380	380	0.2
60	75	180	380	380	0.2
61	75	180	380	380	0.2
62	75	180	380	380	0.2
63	75	180	380	380	0.2
64	75	180	380	380	0.2
65	75	180	380	380	0.2
66	75	180	380	380	0.2
67	75	180	380	380	0.2
68	75	180	380	380	0.2
69	75	180	380	380	0.2
70	75	180	380	380	0.2
71	75	180	380	380	0.2
72	75	180	380	380	0.2
73	75	180	380	380	0.2
74	75	180	380	380	0.2
75	75	180	380	380	0.2
76	75	180	380	380	0.2
77	75	180	380	380	0.2
78	75	180	380	380	0.2
79	75	180	380	380	0.2
80	75	180	380	380	0.2
81	75	180	380	380	0.2
82	75	180	380	380	0.2
83	75	180	380	380	0.2
84	75	180	380	380	0.2
85	75	180	380	380	0.2
86	75	180	380	380	0.2
87	75	180	380	380	0.2
88	75	180	380	380	0.2
89	75	180	380	380	0.2
90	75	180	380	380	0.2
91	75	180	380	380	0.2
92	75	180	380	380	0.2
93	75	180	380	380	0.2
94	75	180	380	380	0.2
95	75	180	380	380	0.2
96	75	180	380	380	0.2
97	75	180	380	380	0.2
98	75	180	380	380	0.2
99	75	180	380	380	0.2
100	75	180	380	380	0.2



 GEOPHYSICAL ASSOCIATES

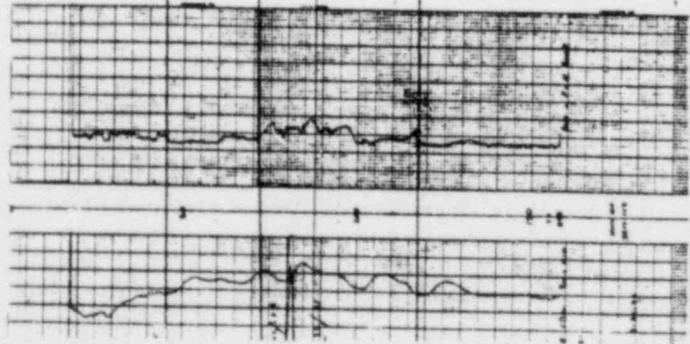
77-13

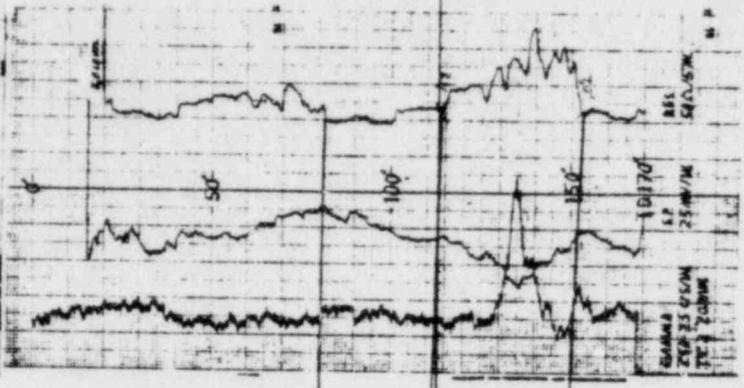
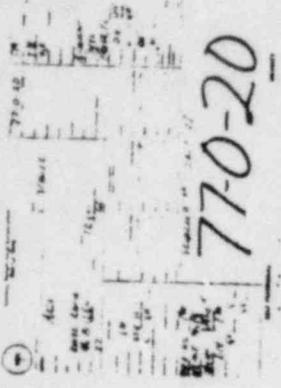
DATE	TIME	DEPTH	TEMPERATURE	RESISTIVITY	LOG
1957	10:00	100	25.0	100	
1957	10:05	110	25.5	110	
1957	10:10	120	26.0	120	
1957	10:15	130	26.5	130	
1957	10:20	140	27.0	140	
1957	10:25	150	27.5	150	
1957	10:30	160	28.0	160	
1957	10:35	170	28.5	170	
1957	10:40	180	29.0	180	
1957	10:45	190	29.5	190	
1957	10:50	200	30.0	200	
1957	10:55	210	30.5	210	
1957	11:00	220	31.0	220	
1957	11:05	230	31.5	230	
1957	11:10	240	32.0	240	
1957	11:15	250	32.5	250	
1957	11:20	260	33.0	260	
1957	11:25	270	33.5	270	
1957	11:30	280	34.0	280	
1957	11:35	290	34.5	290	
1957	11:40	300	35.0	300	
1957	11:45	310	35.5	310	
1957	11:50	320	36.0	320	
1957	11:55	330	36.5	330	
1957	12:00	340	37.0	340	
1957	12:05	350	37.5	350	
1957	12:10	360	38.0	360	
1957	12:15	370	38.5	370	
1957	12:20	380	39.0	380	
1957	12:25	390	39.5	390	
1957	12:30	400	40.0	400	
1957	12:35	410	40.5	410	
1957	12:40	420	41.0	420	
1957	12:45	430	41.5	430	
1957	12:50	440	42.0	440	
1957	12:55	450	42.5	450	
1957	13:00	460	43.0	460	
1957	13:05	470	43.5	470	
1957	13:10	480	44.0	480	
1957	13:15	490	44.5	490	
1957	13:20	500	45.0	500	
1957	13:25	510	45.5	510	
1957	13:30	520	46.0	520	
1957	13:35	530	46.5	530	
1957	13:40	540	47.0	540	
1957	13:45	550	47.5	550	
1957	13:50	560	48.0	560	
1957	13:55	570	48.5	570	
1957	14:00	580	49.0	580	
1957	14:05	590	49.5	590	
1957	14:10	600	50.0	600	
1957	14:15	610	50.5	610	
1957	14:20	620	51.0	620	
1957	14:25	630	51.5	630	
1957	14:30	640	52.0	640	
1957	14:35	650	52.5	650	
1957	14:40	660	53.0	660	
1957	14:45	670	53.5	670	
1957	14:50	680	54.0	680	
1957	14:55	690	54.5	690	
1957	15:00	700	55.0	700	
1957	15:05	710	55.5	710	
1957	15:10	720	56.0	720	
1957	15:15	730	56.5	730	
1957	15:20	740	57.0	740	
1957	15:25	750	57.5	750	
1957	15:30	760	58.0	760	
1957	15:35	770	58.5	770	
1957	15:40	780	59.0	780	
1957	15:45	790	59.5	790	
1957	15:50	800	60.0	800	
1957	15:55	810	60.5	810	
1957	16:00	820	61.0	820	
1957	16:05	830	61.5	830	
1957	16:10	840	62.0	840	
1957	16:15	850	62.5	850	
1957	16:20	860	63.0	860	
1957	16:25	870	63.5	870	
1957	16:30	880	64.0	880	
1957	16:35	890	64.5	890	
1957	16:40	900	65.0	900	
1957	16:45	910	65.5	910	
1957	16:50	920	66.0	920	
1957	16:55	930	66.5	930	
1957	17:00	940	67.0	940	
1957	17:05	950	67.5	950	
1957	17:10	960	68.0	960	
1957	17:15	970	68.5	970	
1957	17:20	980	69.0	980	
1957	17:25	990	69.5	990	
1957	17:30	1000	70.0	1000	



77-108

DATE	TIME	DEPTH	TEMPERATURE	RESISTIVITY	LOG
1957	10:00	100	25.0	100	
1957	10:05	110	25.5	110	
1957	10:10	120	26.0	120	
1957	10:15	130	26.5	130	
1957	10:20	140	27.0	140	
1957	10:25	150	27.5	150	
1957	10:30	160	28.0	160	
1957	10:35	170	28.5	170	
1957	10:40	180	29.0	180	
1957	10:45	190	29.5	190	
1957	10:50	200	30.0	200	
1957	10:55	210	30.5	210	
1957	11:00	220	31.0	220	
1957	11:05	230	31.5	230	
1957	11:10	240	32.0	240	
1957	11:15	250	32.5	250	
1957	11:20	260	33.0	260	
1957	11:25	270	33.5	270	
1957	11:30	280	34.0	280	
1957	11:35	290	34.5	290	
1957	11:40	300	35.0	300	
1957	11:45	310	35.5	310	
1957	11:50	320	36.0	320	
1957	11:55	330	36.5	330	
1957	12:00	340	37.0	340	
1957	12:05	350	37.5	350	
1957	12:10	360	38.0	360	
1957	12:15	370	38.5	370	
1957	12:20	380	39.0	380	
1957	12:25	390	39.5	390	
1957	12:30	400	40.0	400	
1957	12:35	410	40.5	410	
1957	12:40	420	41.0	420	
1957	12:45	430	41.5	430	
1957	12:50	440	42.0	440	
1957	12:55	450	42.5	450	
1957	13:00	460	43.0	460	
1957	13:05	470	43.5	470	
1957	13:10	480	44.0	480	
1957	13:15	490	44.5	490	
1957	13:20	500	45.0	500	
1957	13:25	510	45.5	510	
1957	13:30	520	46.0	520	
1957	13:35	530	46.5	530	
1957	13:40	540	47.0	540	
1957	13:45	550	47.5	550	
1957	13:50	560	48.0	560	
1957	13:55	570	48.5	570	
1957	14:00	580	49.0	580	
1957	14:05	590	49.5	590	
1957	14:10	600	50.0	600	
1957	14:15	610	50.5	610	
1957	14:20	620	51.0	620	
1957	14:25	630	51.5	630	
1957	14:30	640	52.0	640	
1957	14:35	650	52.5	650	
1957	14:40	660	53.0	660	
1957	14:45	670	53.5	670	
1957	14:50	680	54.0	680	
1957	14:55	690	54.5	690	
1957	15:00	700	55.0	700	
1957	15:05	710	55.5	710	
1957	15:10	720	56.0	720	
1957	15:15	730	56.5	730	
1957	15:20	740	57.0	740	
1957	15:25	750	57.5	750	
1957	15:30	760	58.0	760	
1957	15:35	770	58.5	770	
1957	15:40	780	59.0	780	
1957	15:45	790	59.5	790	
1957	15:50	800	60.0	800	
1957	15:55	810	60.5	810	
1957	16:00	820	61.0	820	
1957	16:05	830	61.5	830	
1957	16:10	840	62.0	840	
1957	16:15	850	62.5	850	
1957	16:20	860	63.0	860	
1957	16:25	870	63.5	870	
1957	16:30	880	64.0	880	
1957	16:35	890	64.5	890	
1957	16:40	900	65.0	900	
1957	16:45	910	65.5	910	
1957	16:50	920	66.0	920	
1957	16:55	930	66.5	930	
1957	17:00	940	67.0	940	
1957	17:05	950	67.5	950	
1957	17:10	960	68.0	960	
1957	17:15	970	68.5	970	
1957	17:20	980	69.0	980	
1957	17:25	990	69.5	990	
1957	17:30	1000	70.0	1000	



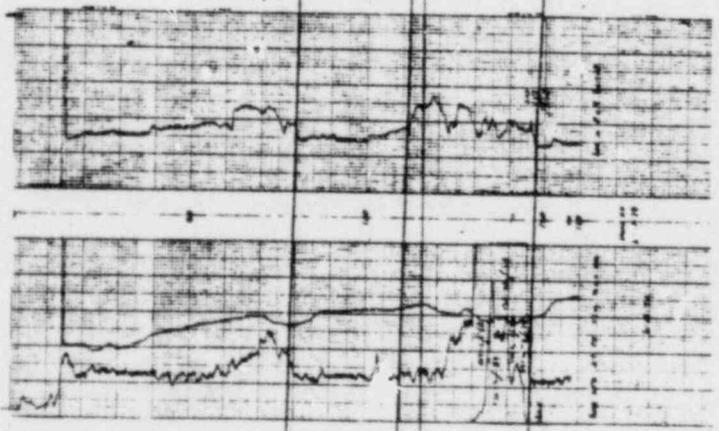
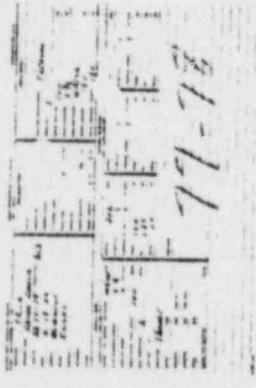


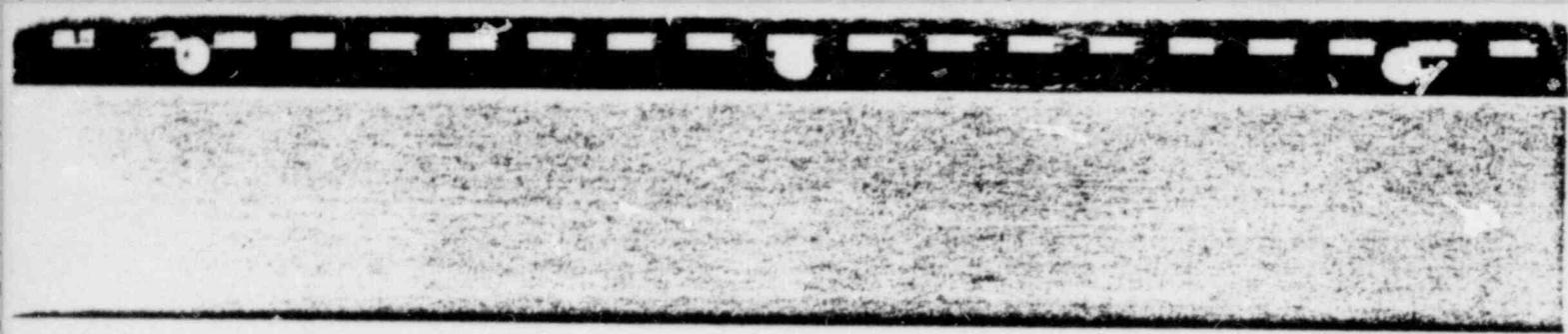
Magnolia

Manuel clay

Manuel sand

Catahoula

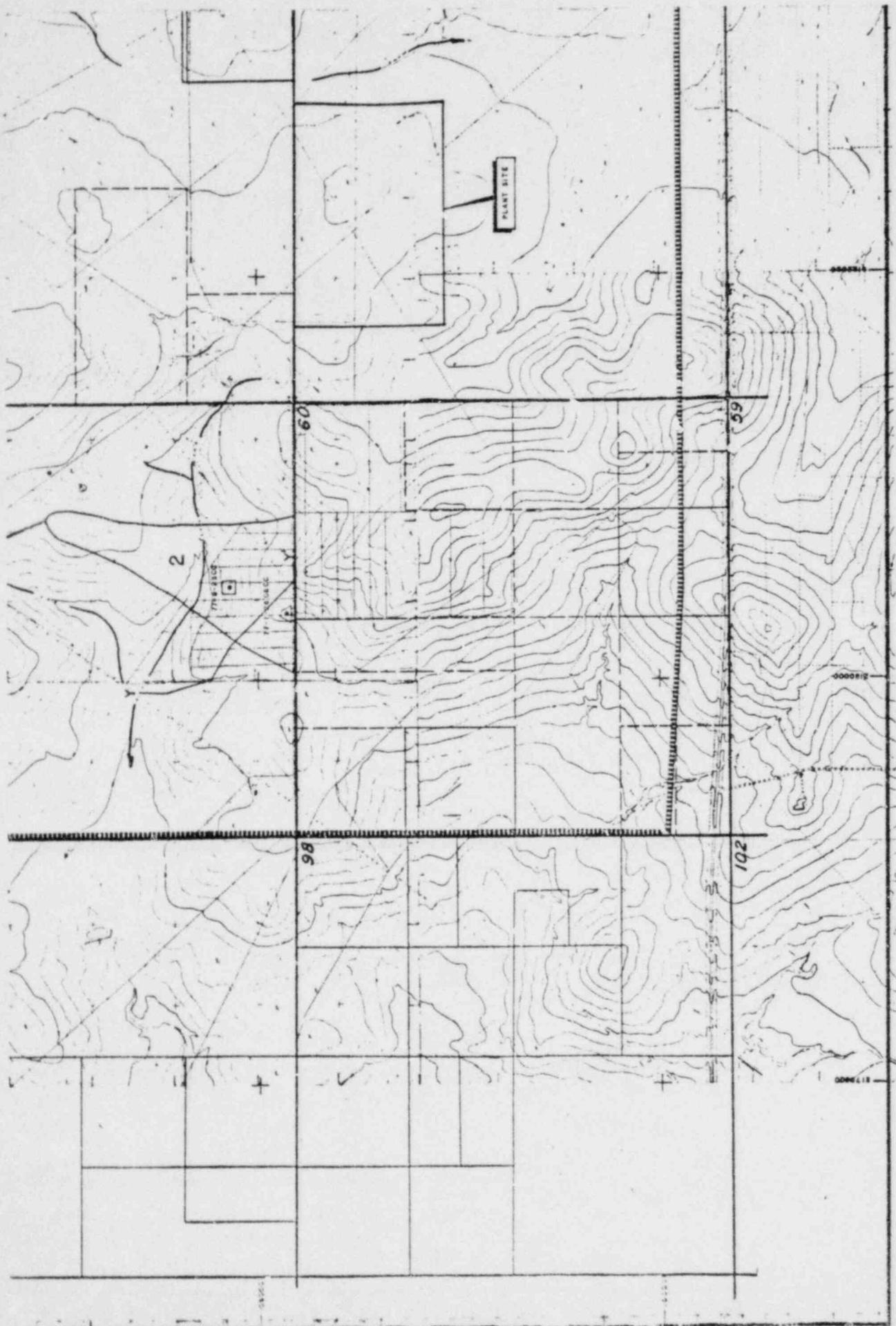


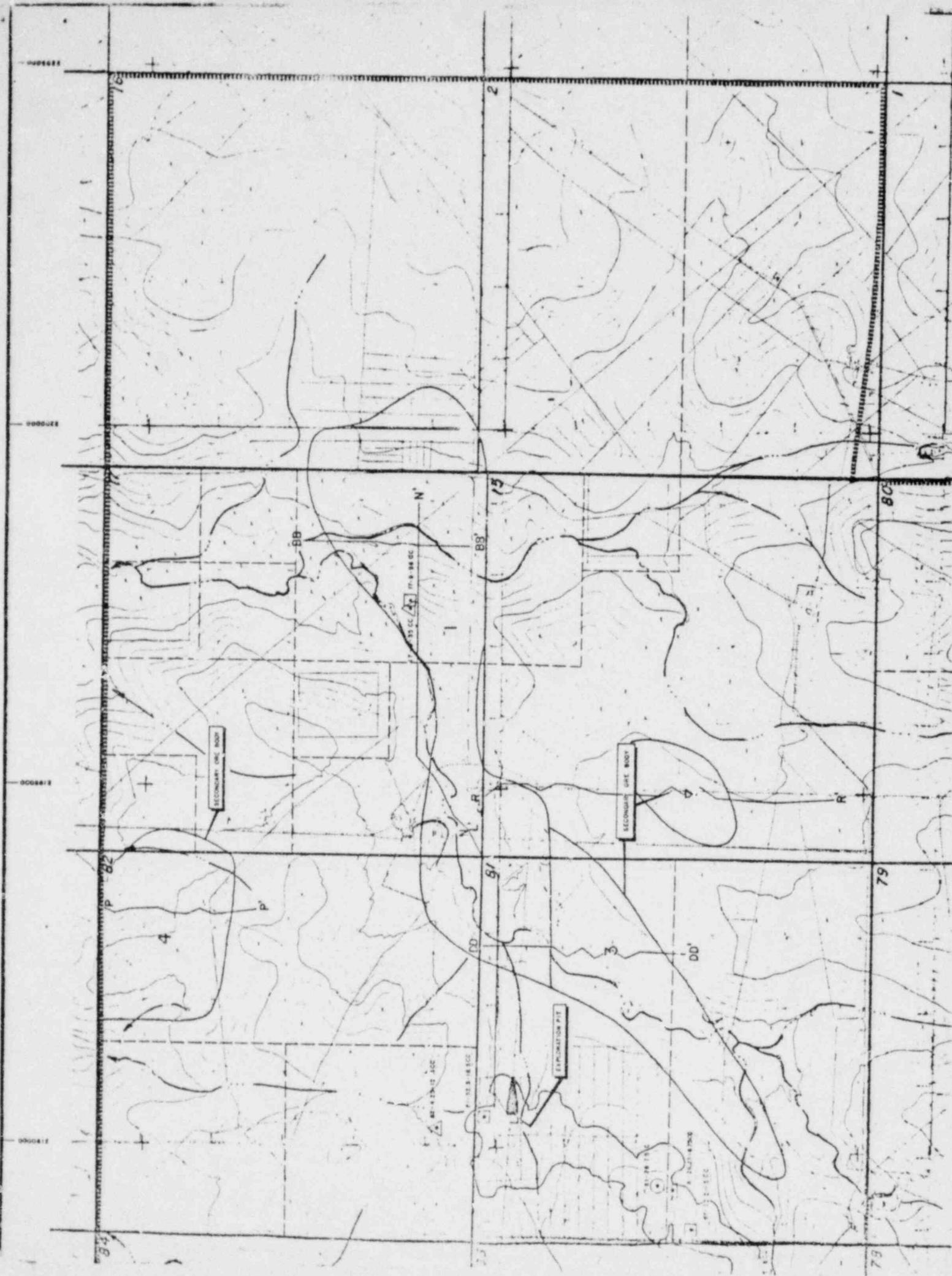


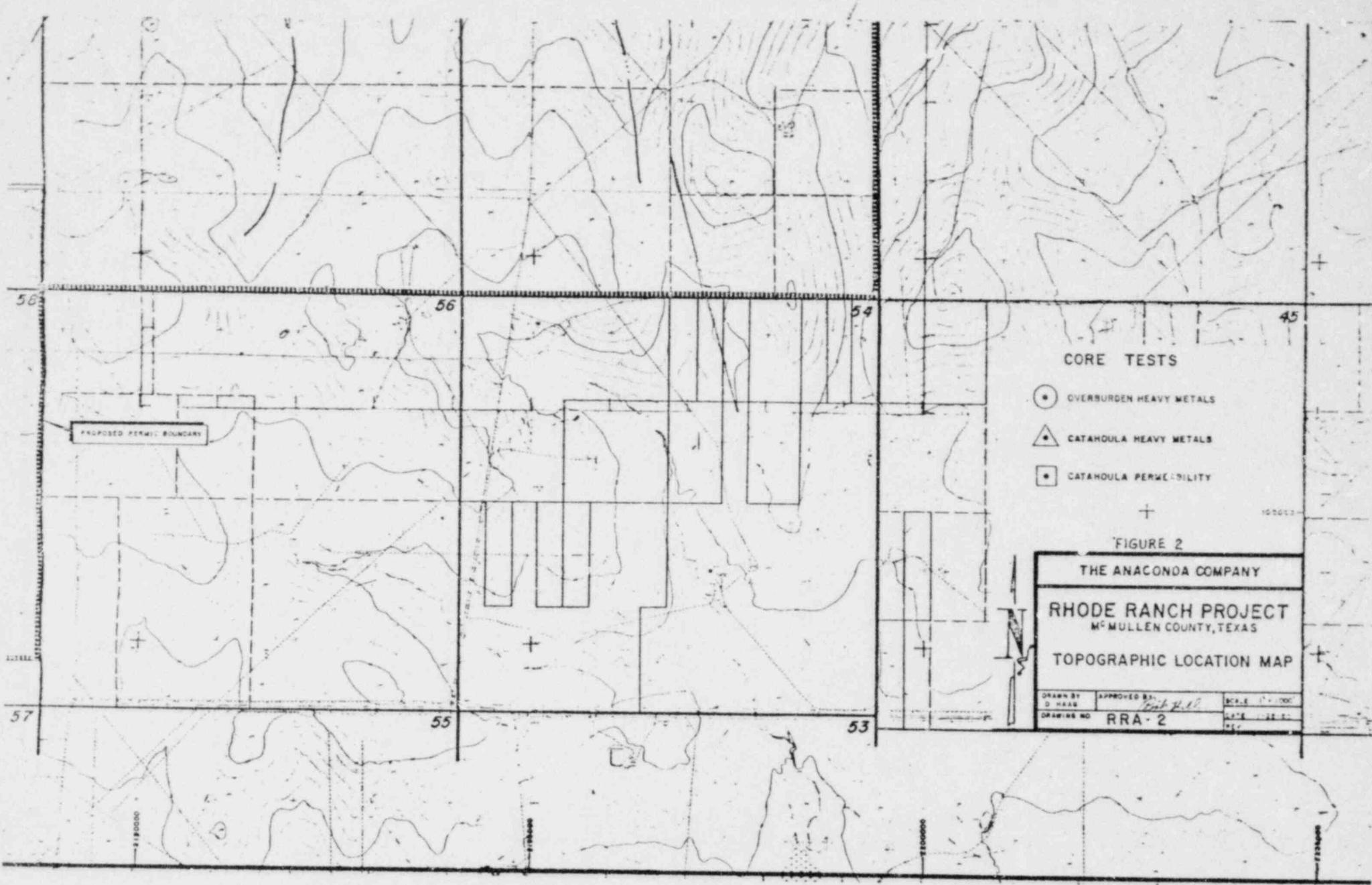
100'



FIGURE 2







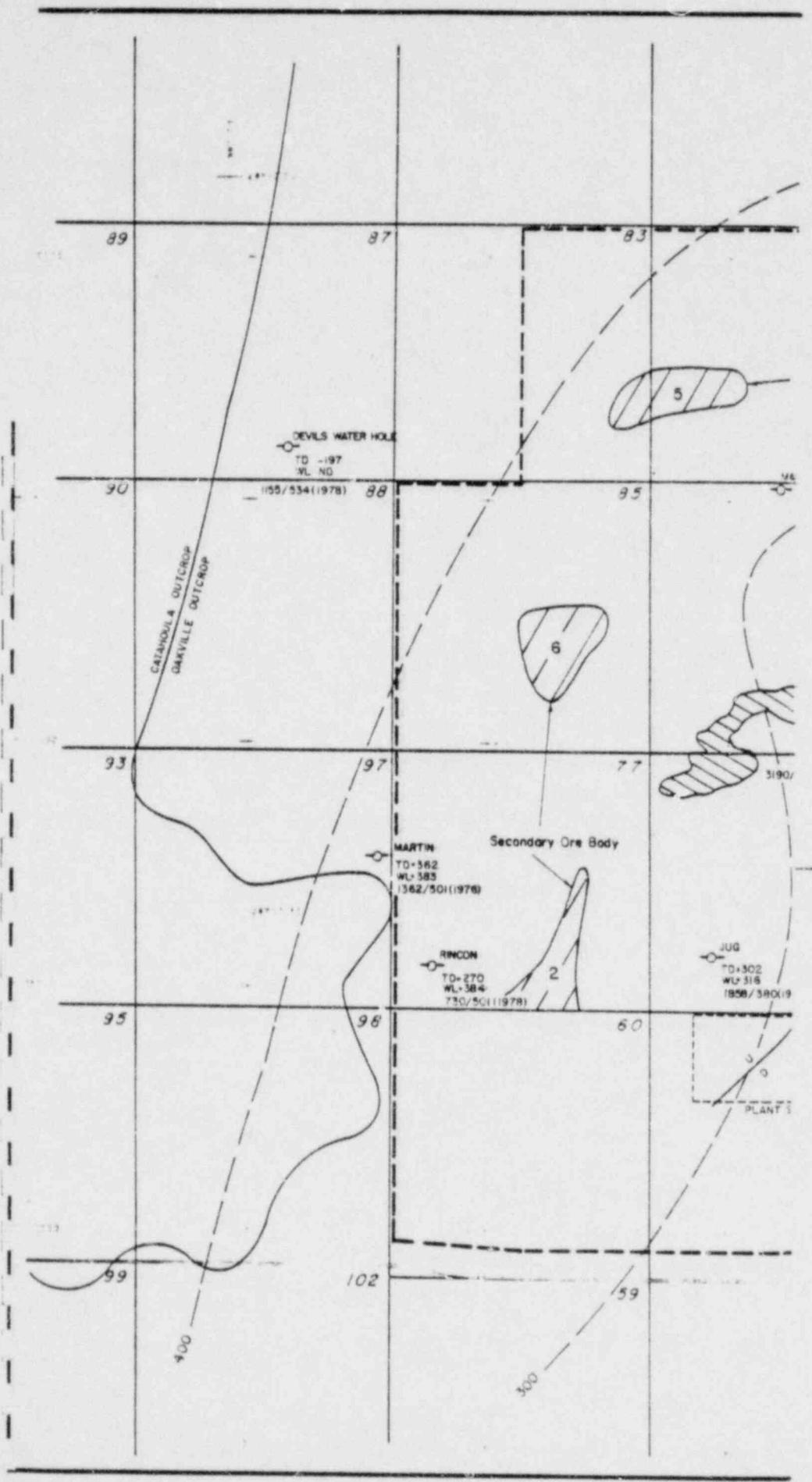
CORE TESTS

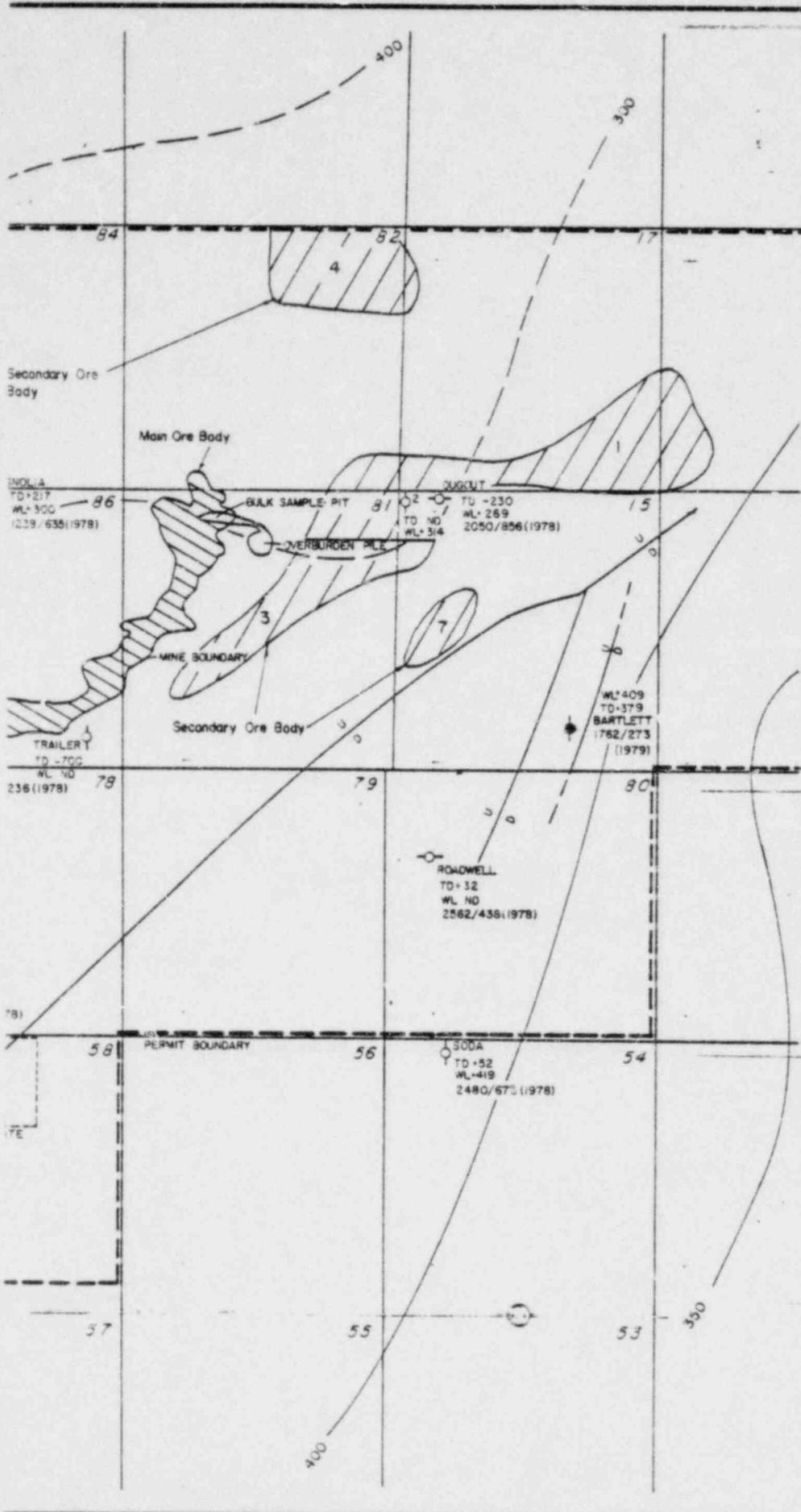
- OVERBURDEN HEAVY METALS
- △ CATAHOULA HEAVY METALS
- CATAHOULA PERMEABILITY

FIGURE 2

THE ANACONDA COMPANY			
RHODE RANCH PROJECT M ^c MULLEN COUNTY, TEXAS			
TOPOGRAPHIC LOCATION MAP			
DRAWN BY D. HARRIS	APPROVED BY <i>[Signature]</i>	SCALE 1" = 1000'	DATE 12-2-57
DRAWING NO. RRA-2		REV.	

FIGURE 6





Secondary Ore Body

Main Ore Body

INOLA
TD=217
WL# 300
(239/635) (1978)

BLK SAMPLE PIT

DUGOUT
TD=230
WL# 269
2050/856 (1978)

OVERBURDEN PILE

MINE BOUNDARY

Secondary Ore Body

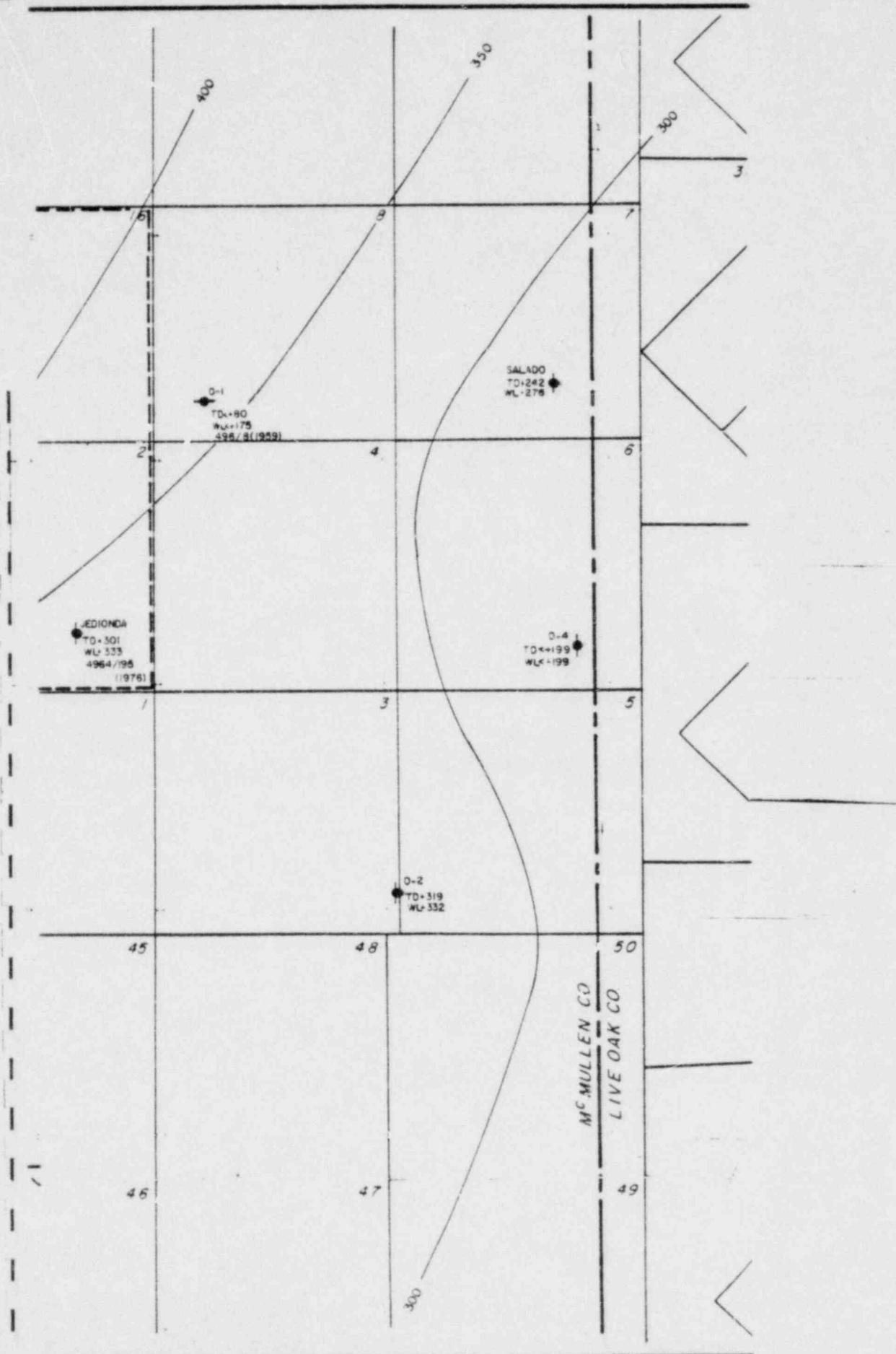
TRAILERY
TD=700
WL# 40
236 (1978)

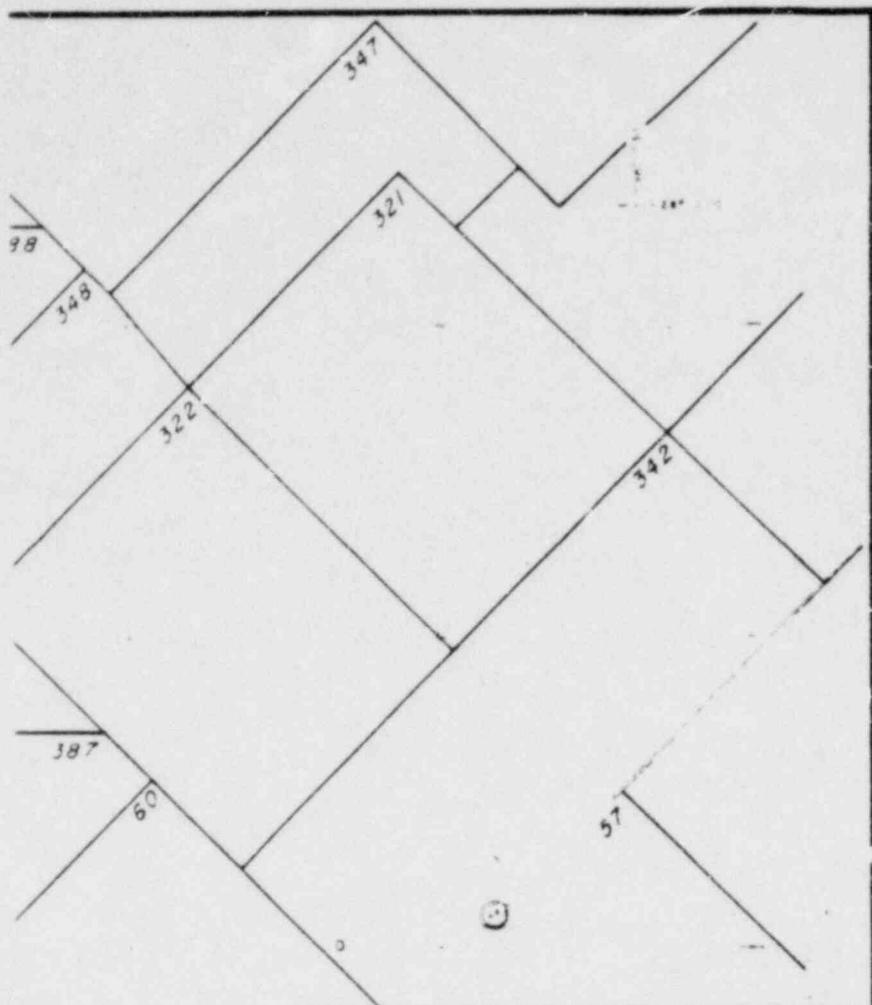
WL# 409
TD=379
WL# 409
BARTLETT
1762/273
(1979)

ROADWELL
TD=32
WL# 419
2562/438 (1978)

300A
TD=52
WL# 419
2480/673 (1978)

PERMIT BOUNDARY





LEGEND

- DOMESTIC OR WINDMILL WELL, ○ ABANDONED
- CATAHOULA WELL
- OAKVILLE WELL
- LOWER OAKVILLE WELL
- TD-342 SEA LEVEL ELEVATION OF TOTAL DEPTH
- WL-383 SEA LEVEL ELEVATION OF WATER LEVEL
- (362/50)(1976) CL(mg/l)/SO₄(mg/l) (DATE SAMPLED)
- UPPER OAKVILLE WATER LEVEL
- - - CATAHOULA WATER LEVEL

FIGURE 6

McMULLEN COUNTY
 THE ANACONDA COMPANY
 RHODE RANCH PROJECT
 WATER WELL INVENTORY
 PIEZOMETRIC SURFACE

ED L. REED & ASSOCIATES, INC.
 C. SULTING HYDROLOGISTS
 MIDLAND-CORPUS CHRISTI, TEXAS

4/60