GEOHYDROLOGIC SUPPLEMENT
Secondary Ore Bodies

ANACONDA COPPER COMPANY
RHODE RANCH PROJECT

February 12, 1981

ED L. REED AND ASSOCIATES, INC.
CONSULTING HYDROLOGISTS
MIDLAND • CORPUS CHRISTI, TEXAS

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TEXAS

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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 geol c 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

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

V. Steve Reed

VSR:vjr

Enclosures

THICKNESS AND DEPTH OF GEOLOGIC UNITS

	WEST		CENTRAL		NORTHEAST	
	Depth	Thickness	Depth	Thickness	Depth	Thickness
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

BB-BB'

CROSS SECTION BB-BB'

17-24-44

Magnolia	Vf-f g 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.

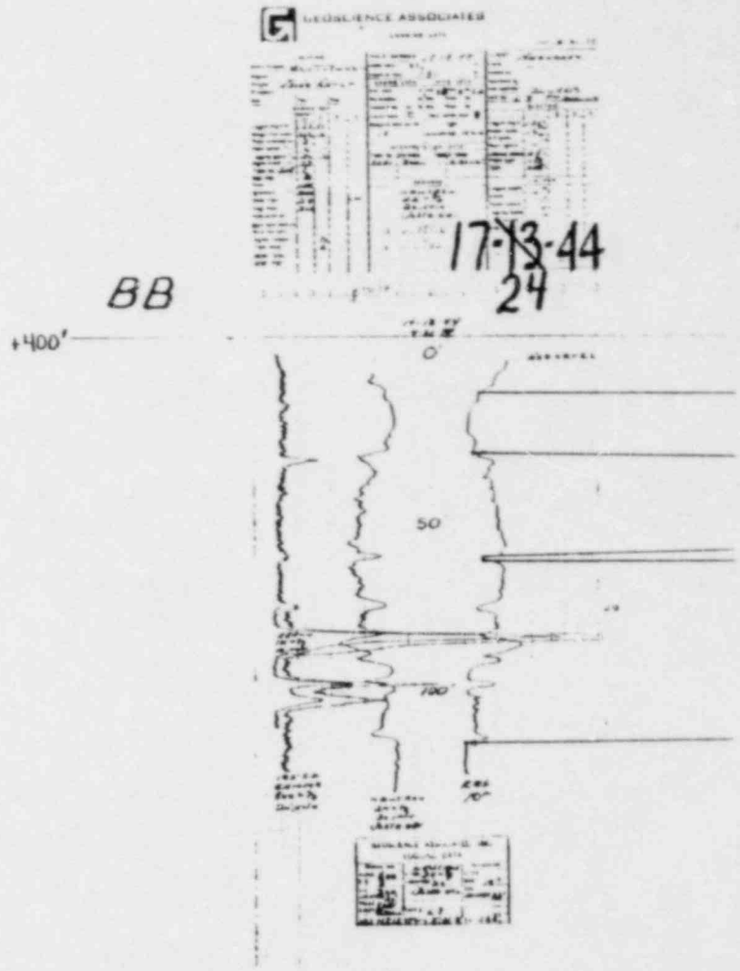
17-10-44

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.

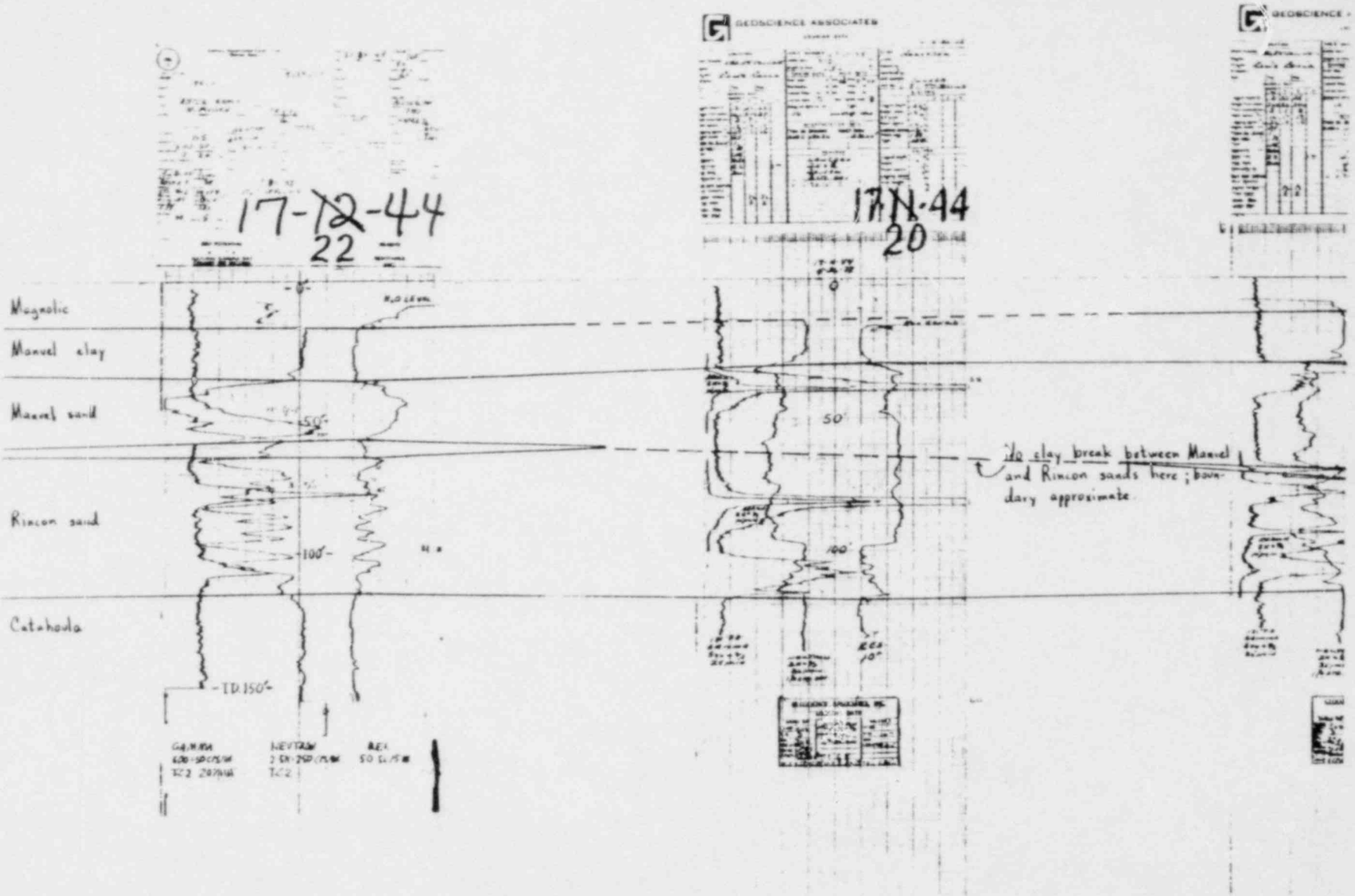
CROSS SECTION BB-BB'

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.



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



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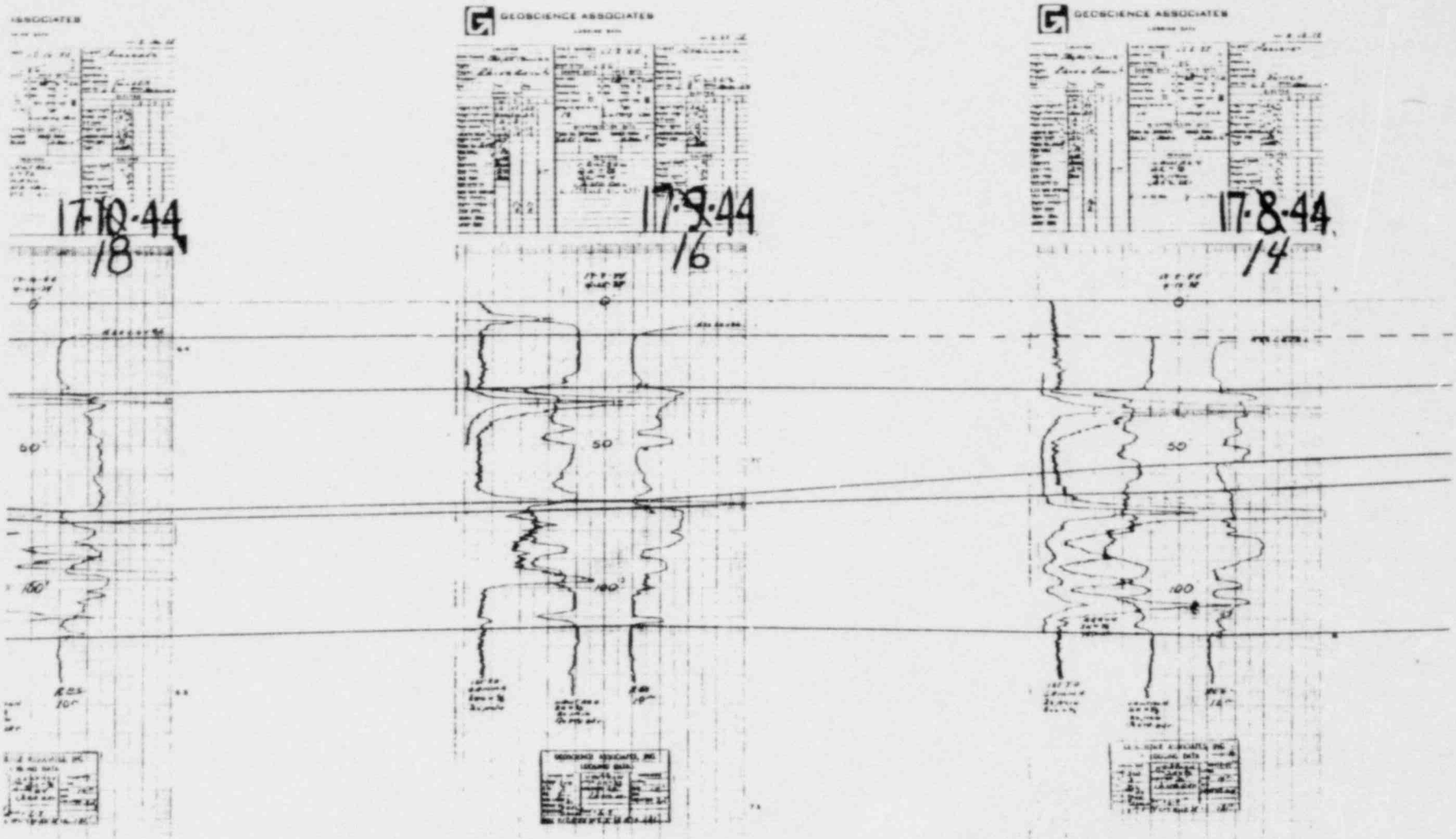
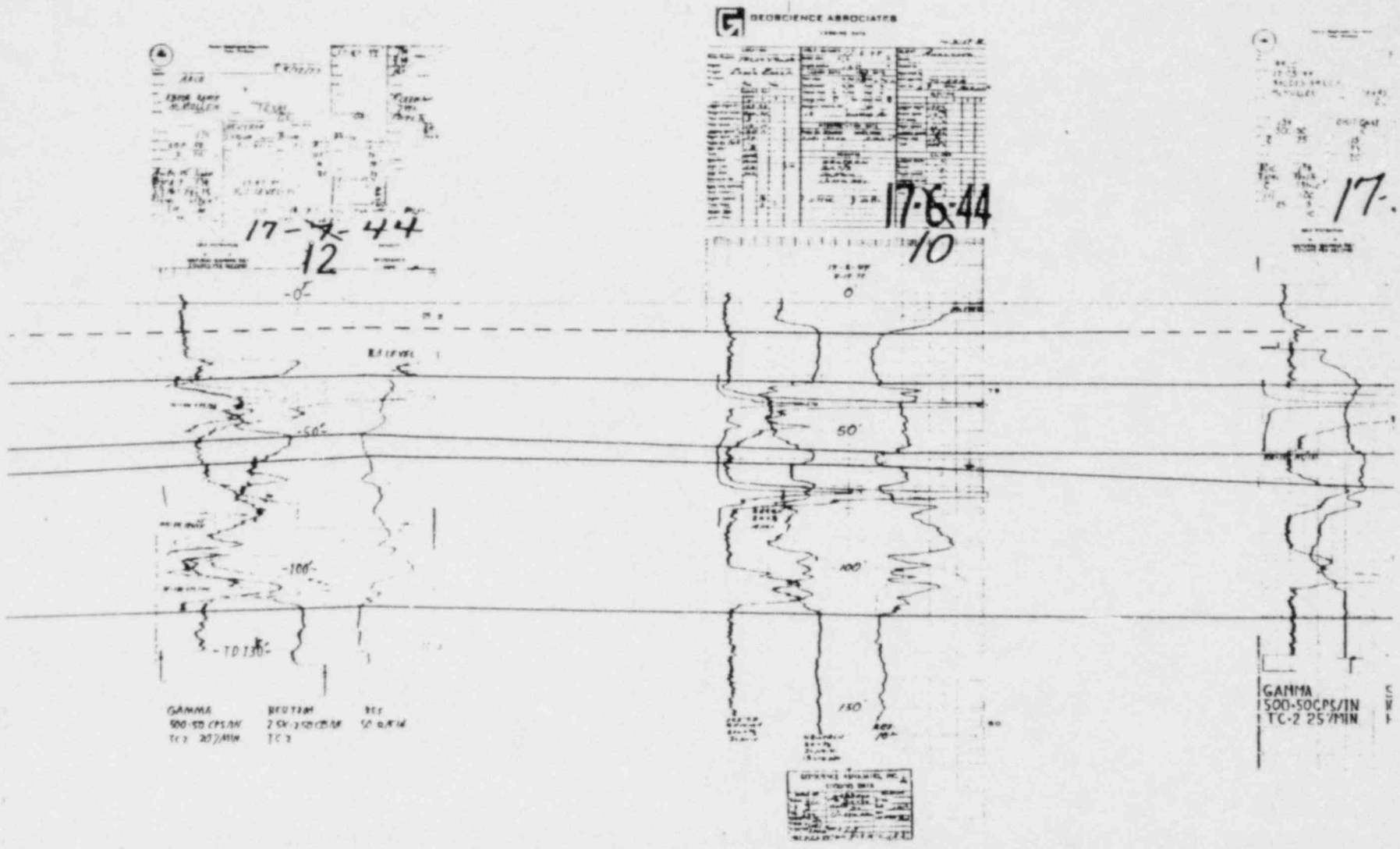
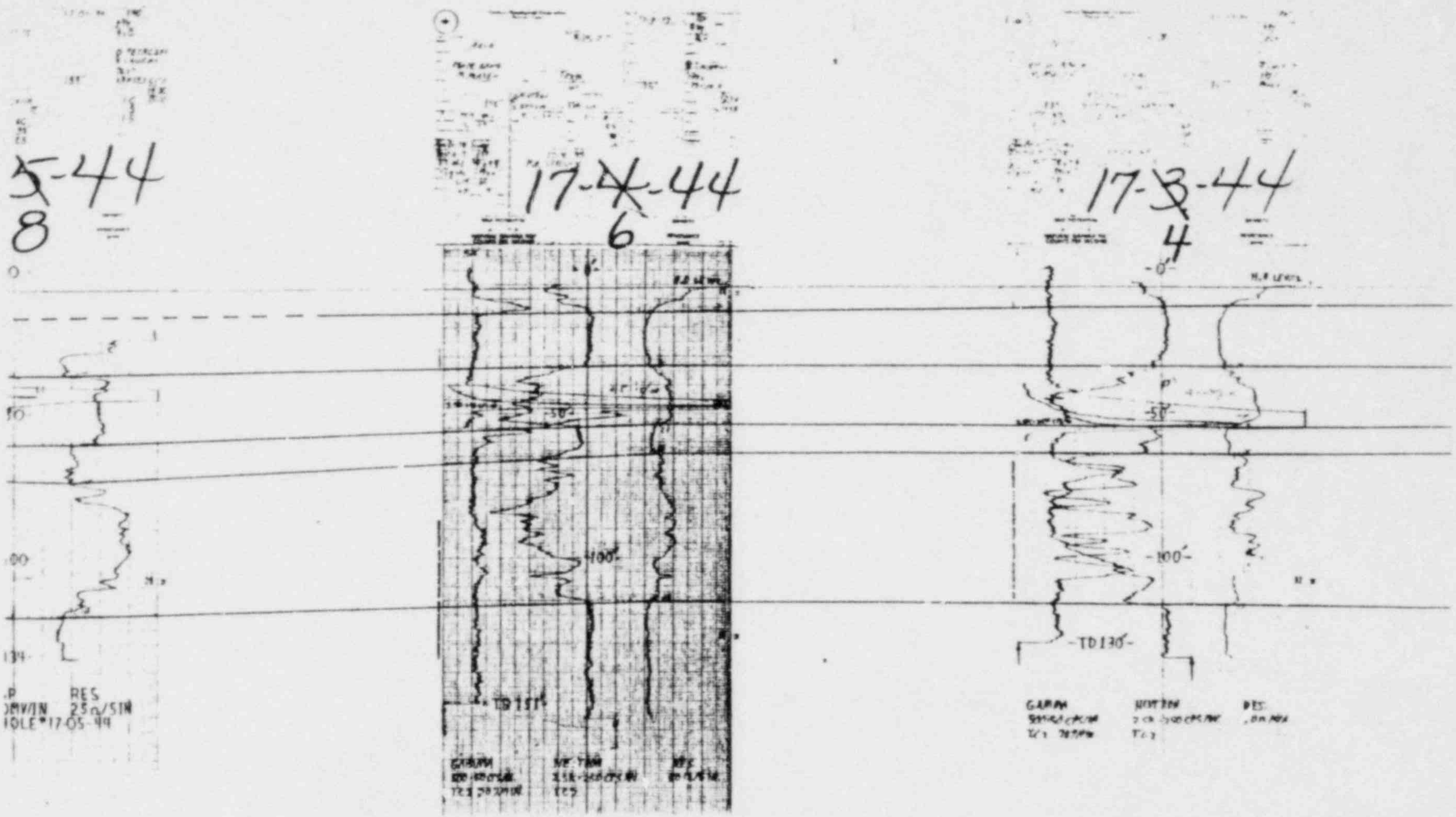

GEOSCIENCE ASSOCIATES
17-10-44
18
GEOSCIENCE ASSOCIATES
17-9-44
16
GEOSCIENCE ASSOCIATES
17-8-44
14
50'
150'
50
100
50
100


GEOSCIENCE ASSOCIATES
17-6-44
12
17-6-44
10
17-
0
50'
100'
150'
-TD 150-
GAMMA
500-50 CPS/IN
TC-2 25/MIN



5-44
8
17-4-44
6
17-3-44
4
-50'-
-100'-
TD 131'
-TD130'-
RES
GAMMA

Magnolia +400'

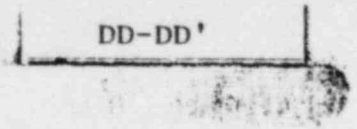
Manvel clay

Manvel 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

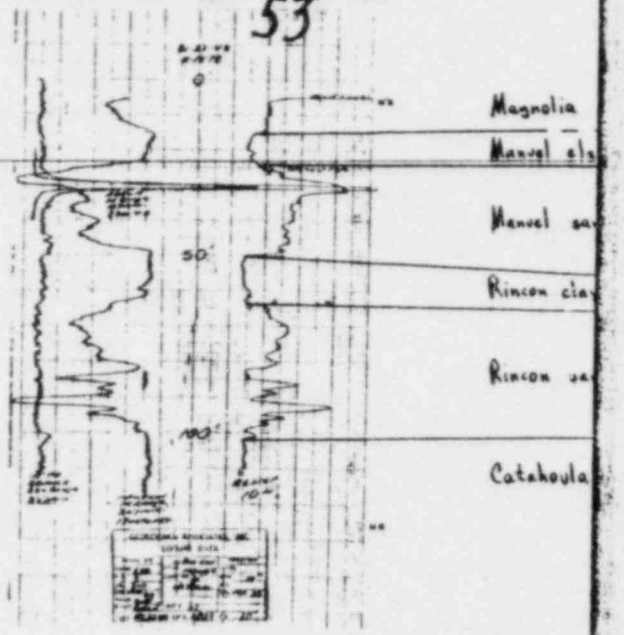
Magnolia	Clay, sandy clay, f-md g sand; oxidized, reoxidized yellow-brown to light green. Sand percentage increases near base.
Manuel clay	Clay; oxidized/reoxidized yellow-green, yellow-brown to orange-brown.
Manuel sand	Sandy clay & f-md g sand; reoxidized/reduced blue-grey to yellow-brown to black.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

DD

81-87-40

53

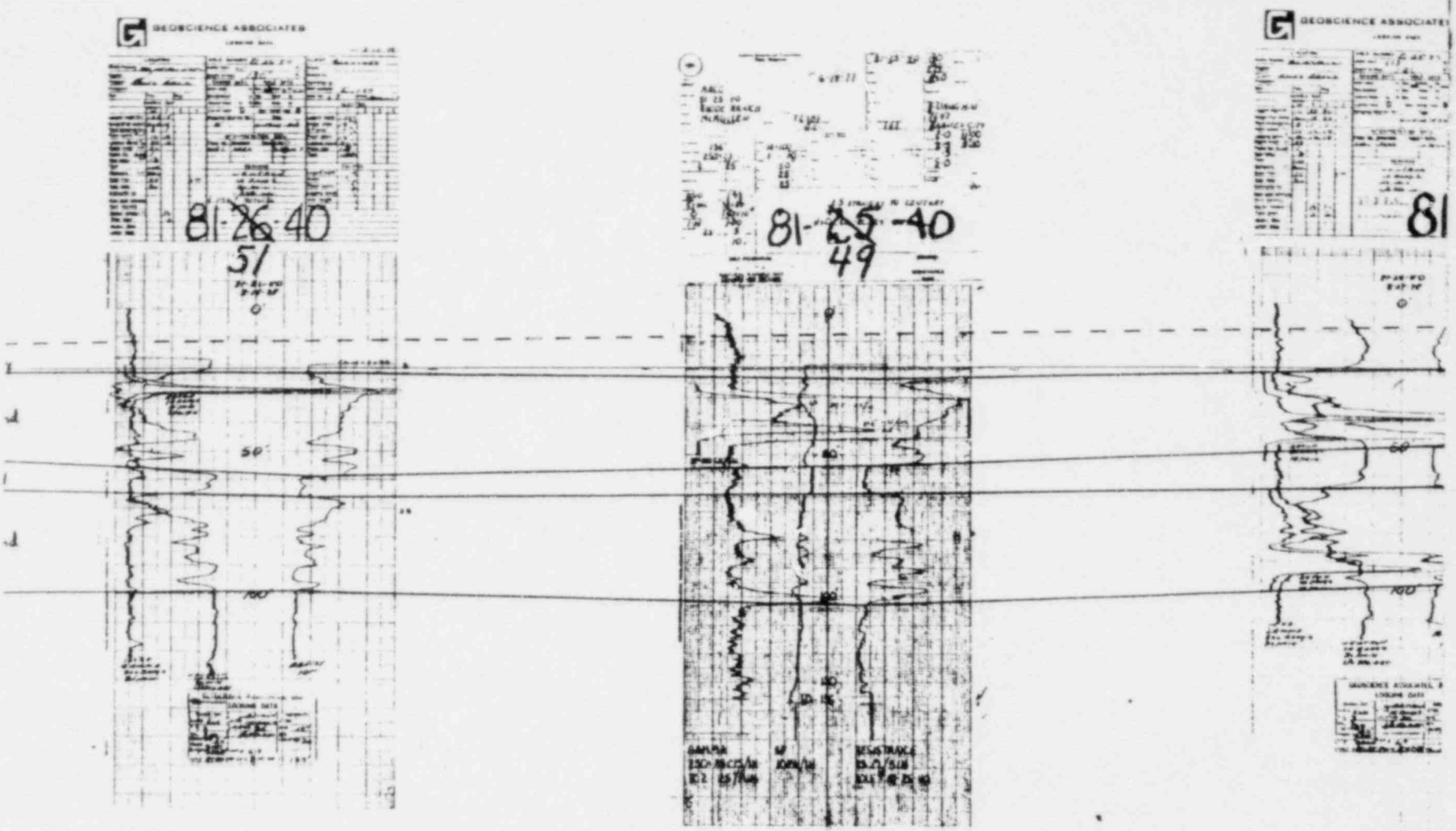


Cross-section DD - DD'

8-2-78

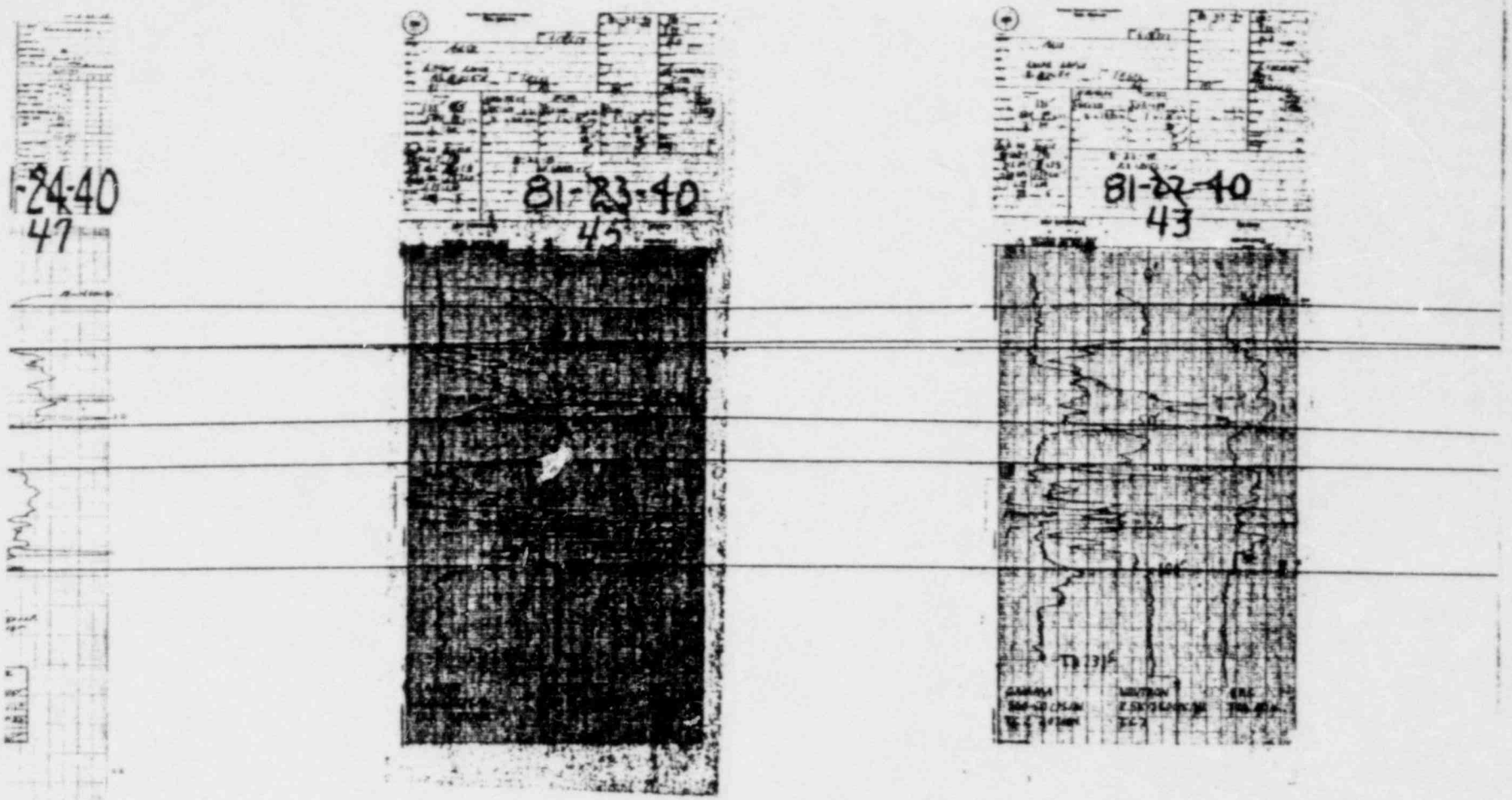
Datum

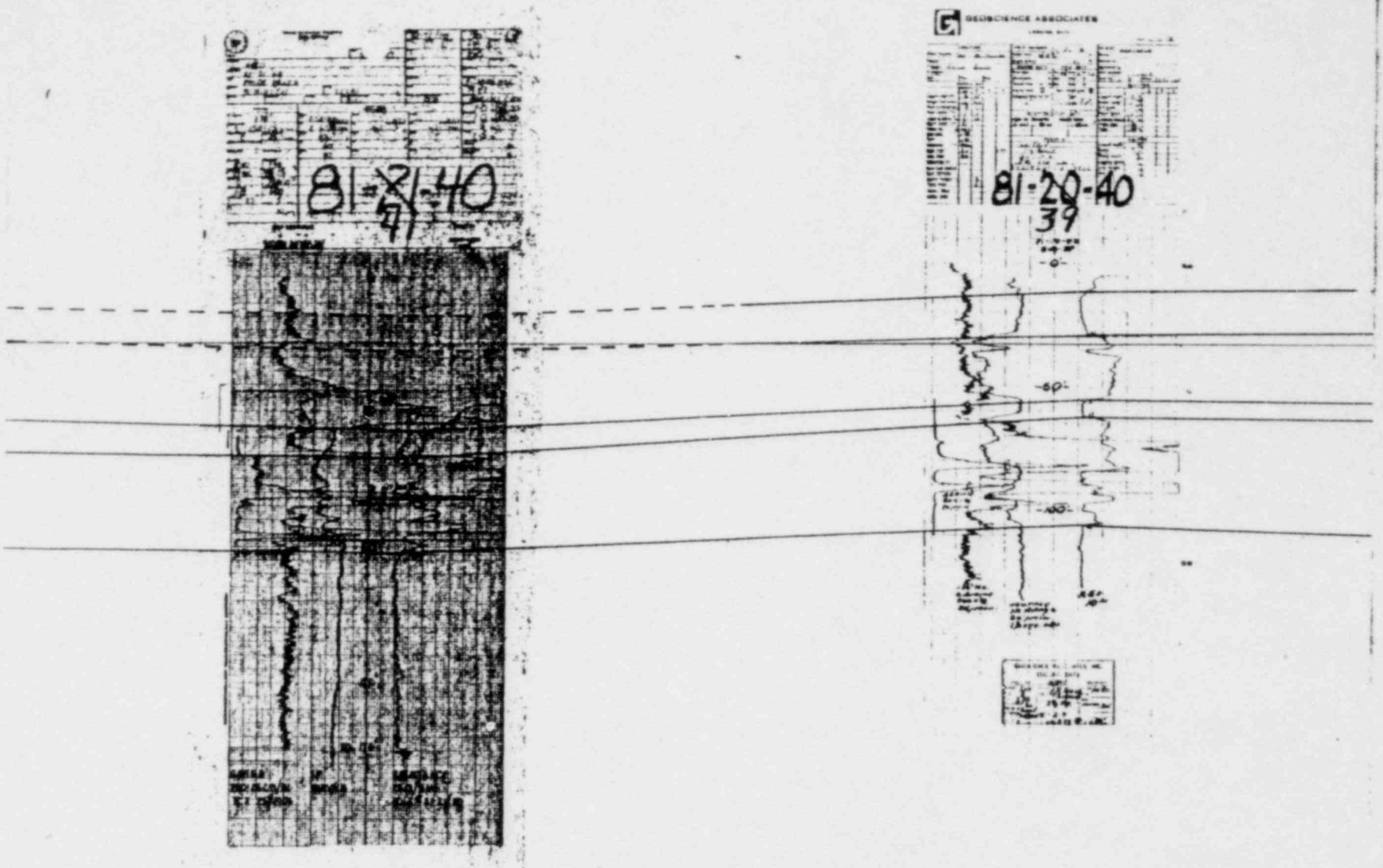
Scale



+400'

1":40' vertical 1":40' horizontal


-24-40
47
81-23-10
45
81-22-10
43


81-21-40
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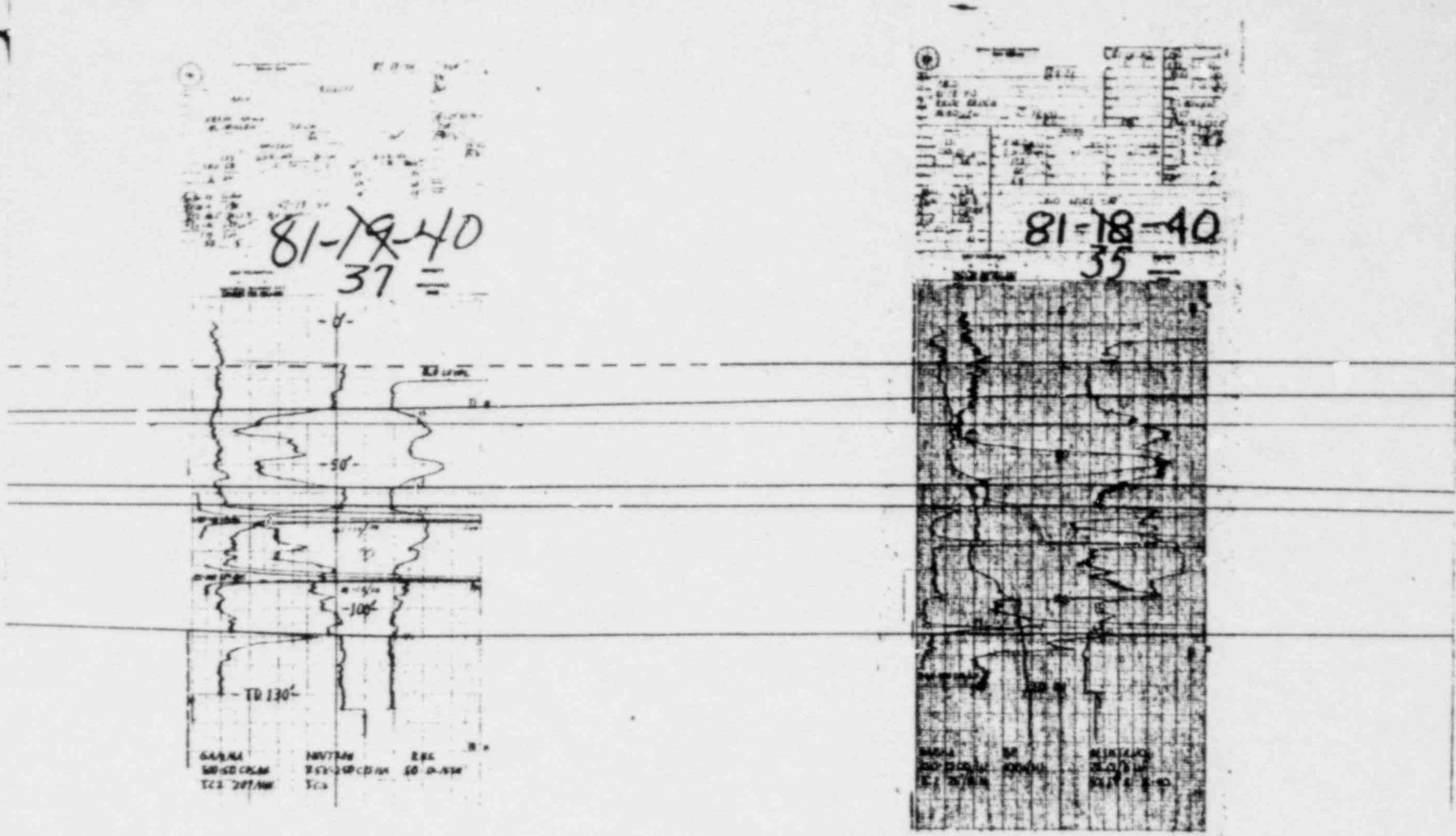
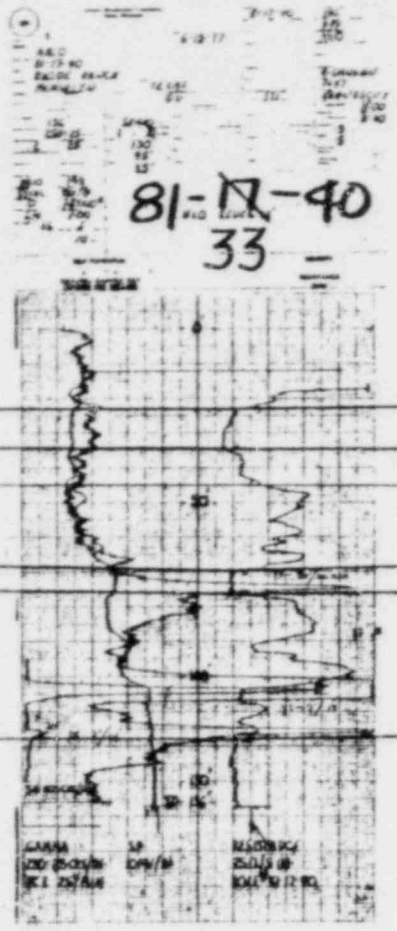
GEOSCIENCE ASSOCIATES
81-20-40
39


81-19-40
37
-0-
-50-
-100-
TD 130'
81-18-40
35


81-M-40
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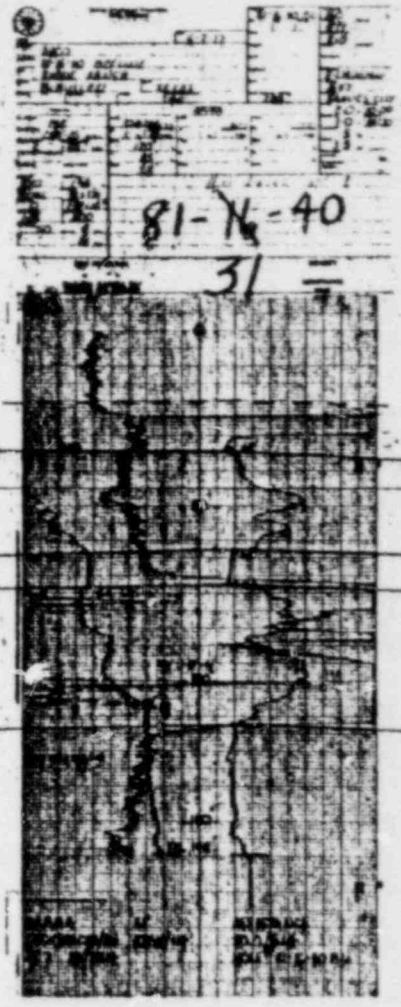
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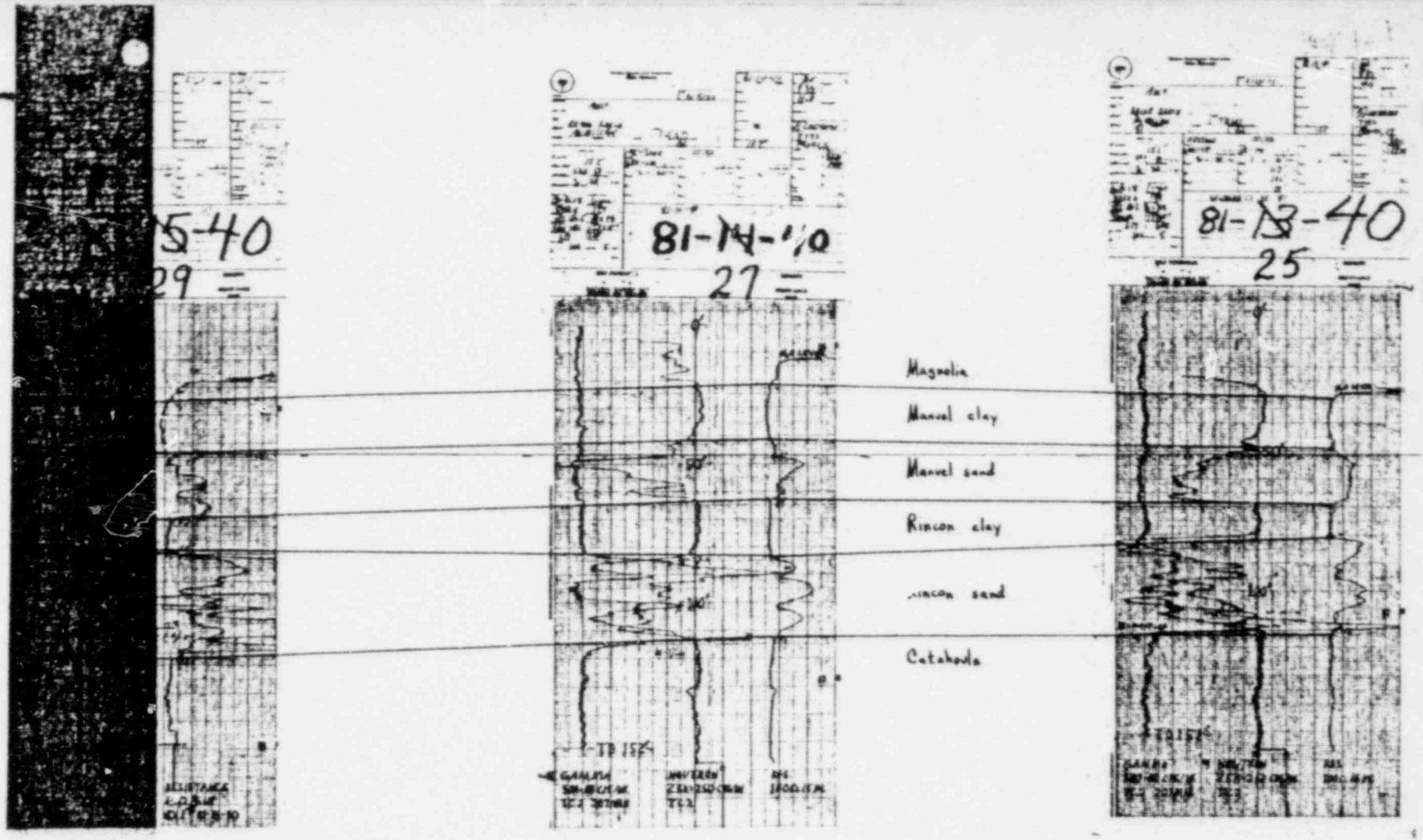
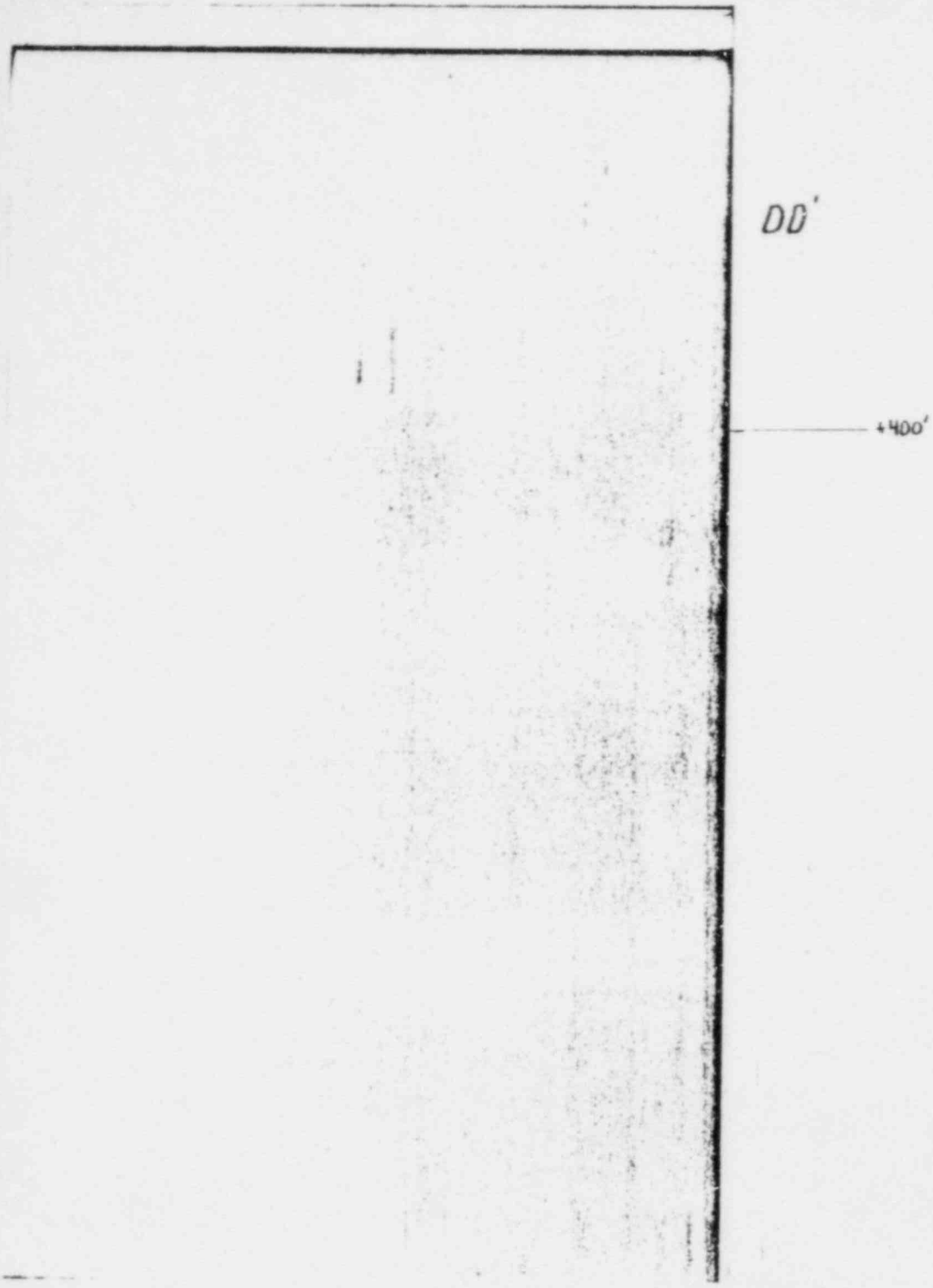
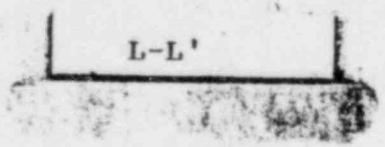

5-40
29
81-14-10
27
81-13-40
25
Magnolia
Manvel clay
Manvel sand
Rincon clay
Rincon sand
Catahoula


DD'
+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.

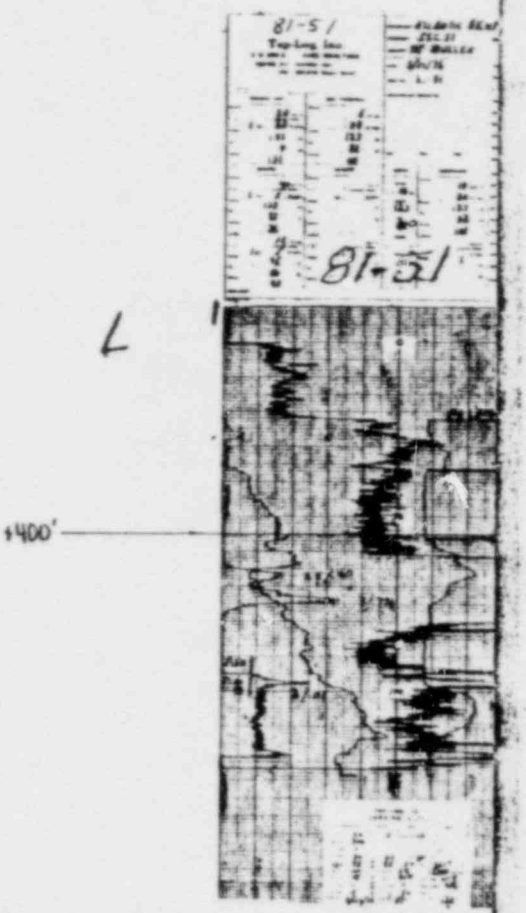
CROSS SECTION L-L'

81-51-47
Exploration hole near 81-51-48

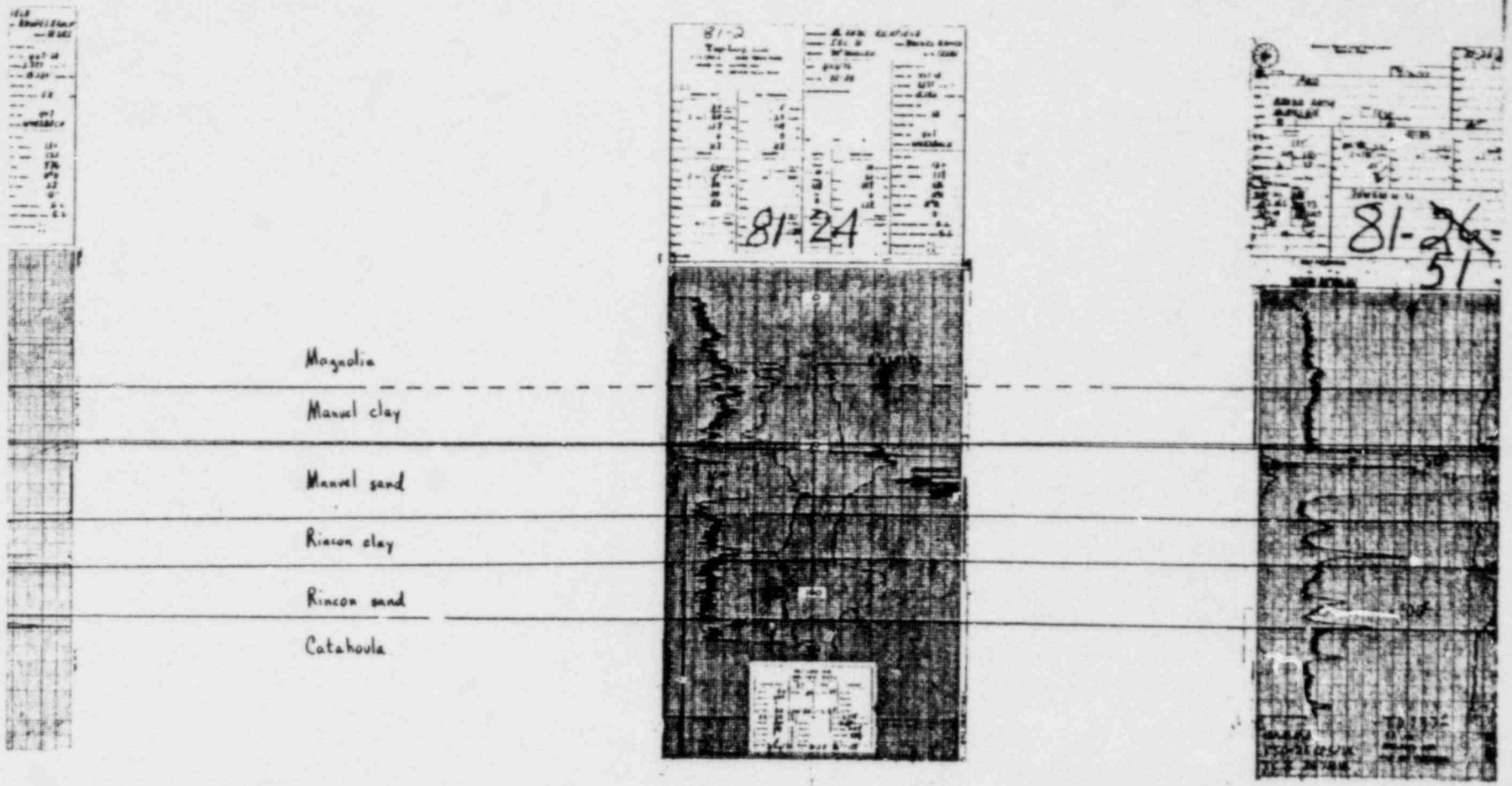
Magnolia	Md g silty sand; oxidized or reoxidized light brown.
Manuel clay	Clay & md g sand; oxidized or reduced olive to brown.
Manuel sand	Md g sand, silt & clay; reoxidized/reduced orange-brown to grey-brown. Clay balls near top.
Rincon clay	Clay; reduced blue.
Rincon sand	Interbedded md g sand, clay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



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



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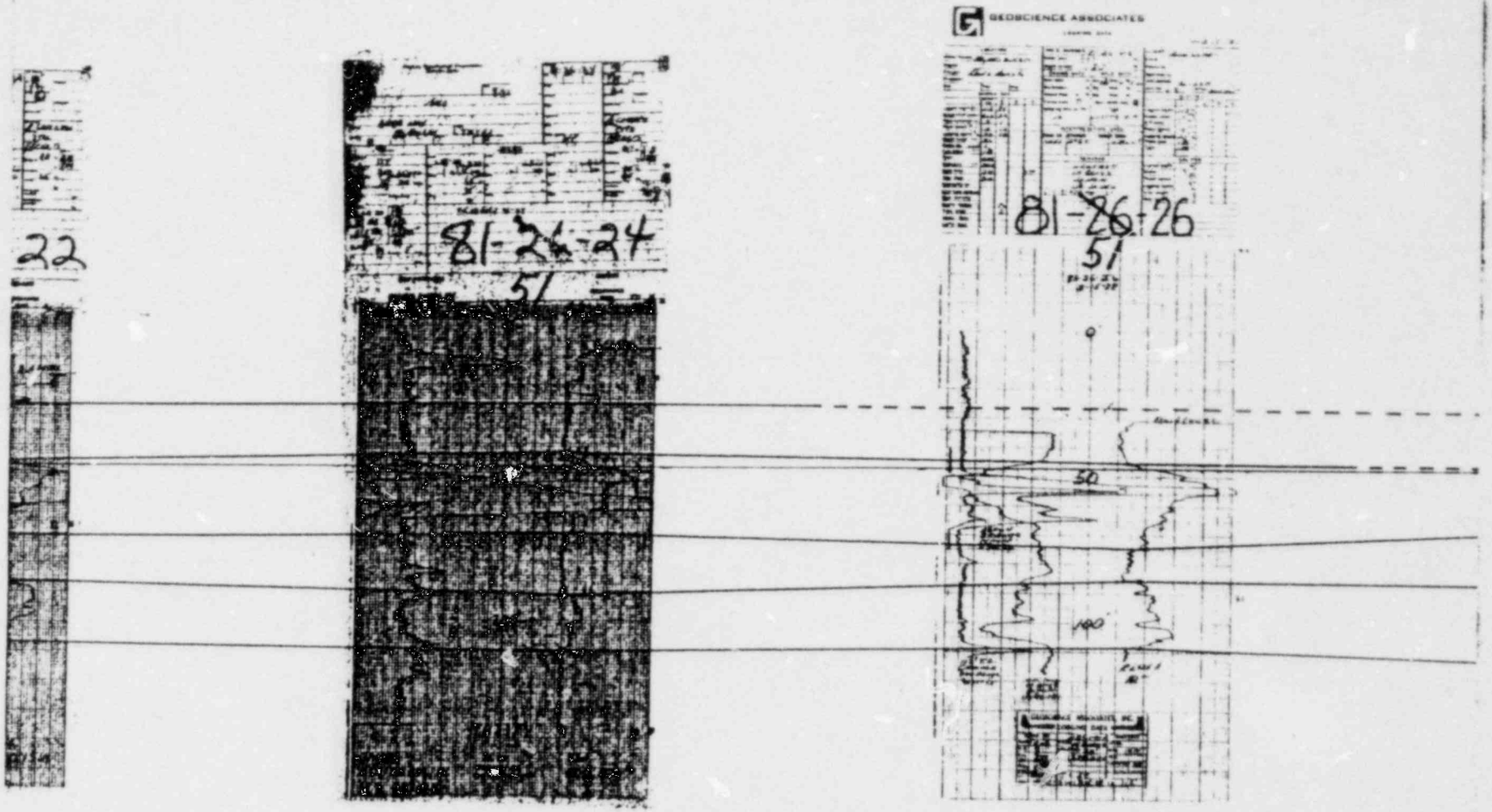
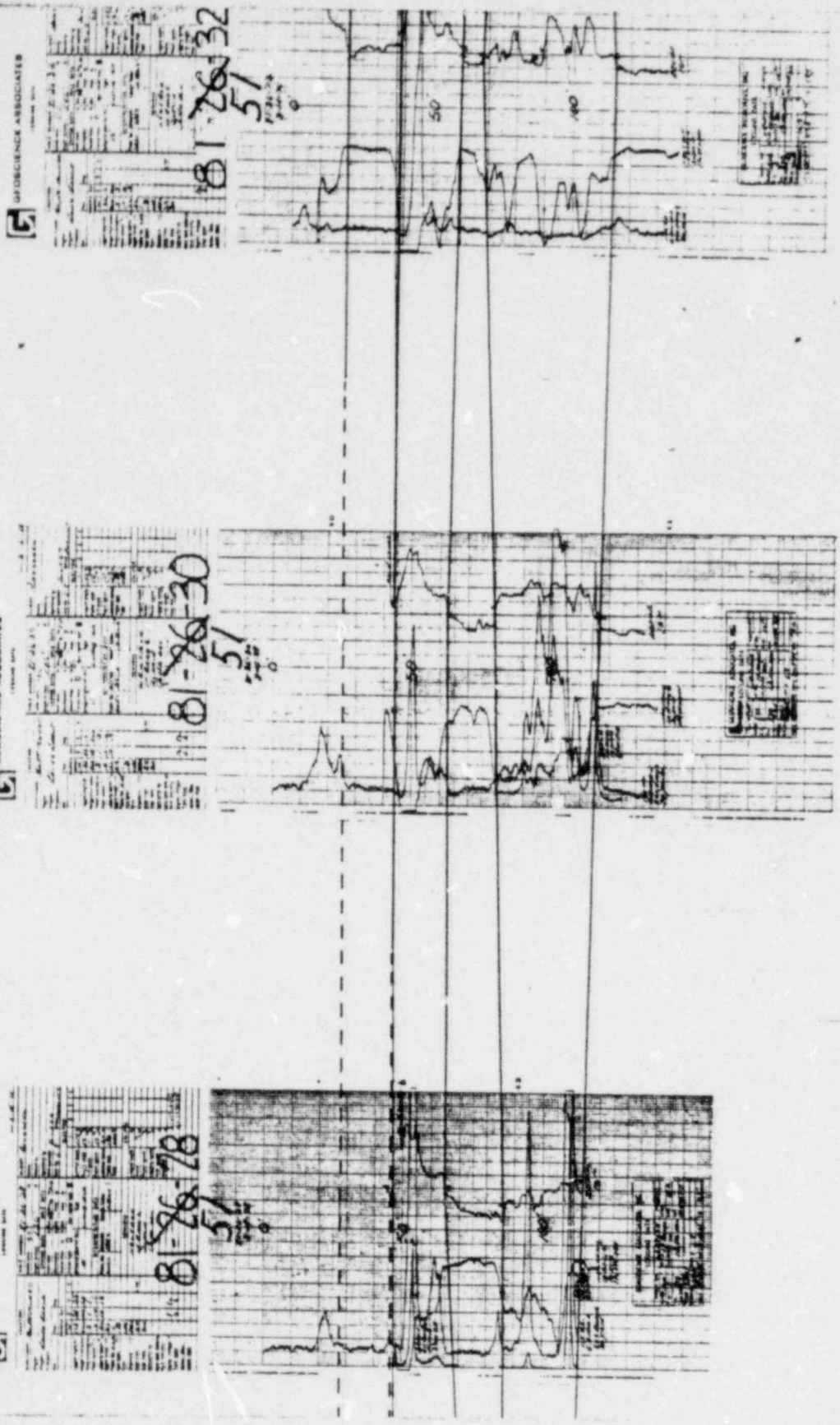

22
81-26-24
51
GEOSCIENCE ASSOCIATES
81-26-26
51
50
100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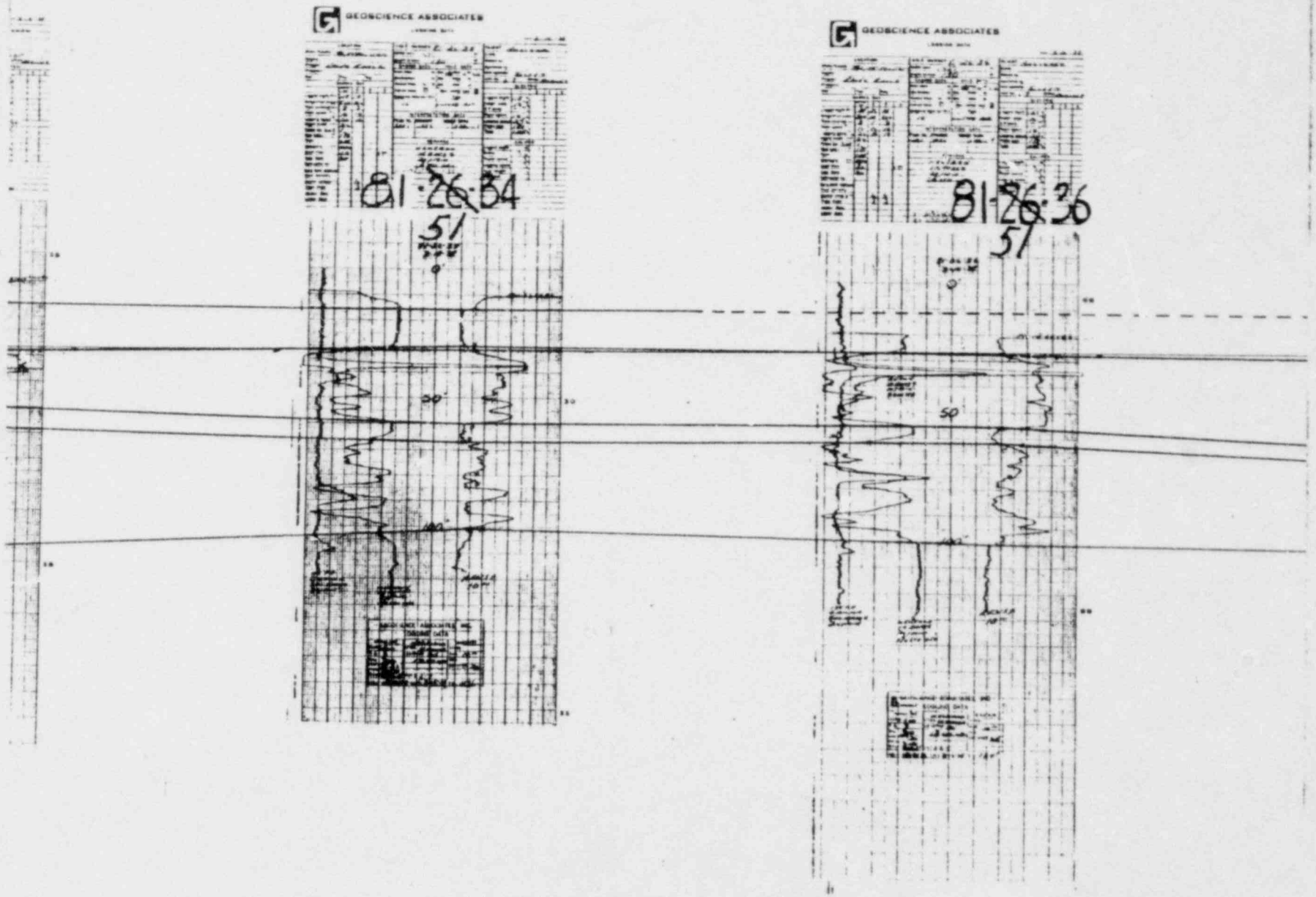
81-26-32
GEOSCIENCE ASSOCIATES
81-26-30
GEOSCIENCE ASSOCIATES
81-26-28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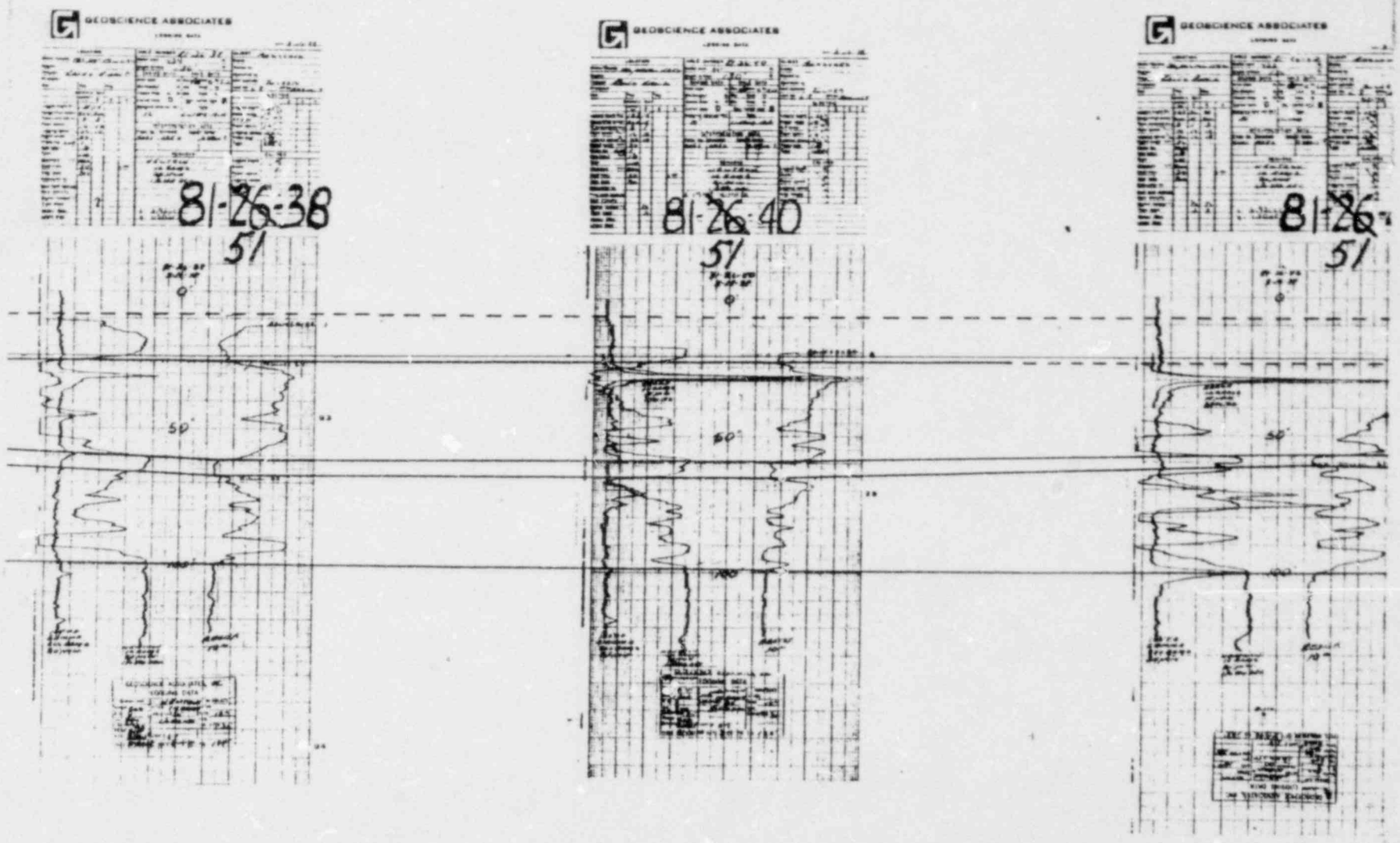
81-26-34
51
GEOSCIENCE ASSOCIATES
81-26-36
51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81-26-38
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GEOSCIENCE ASSOCIATES
81-26-40
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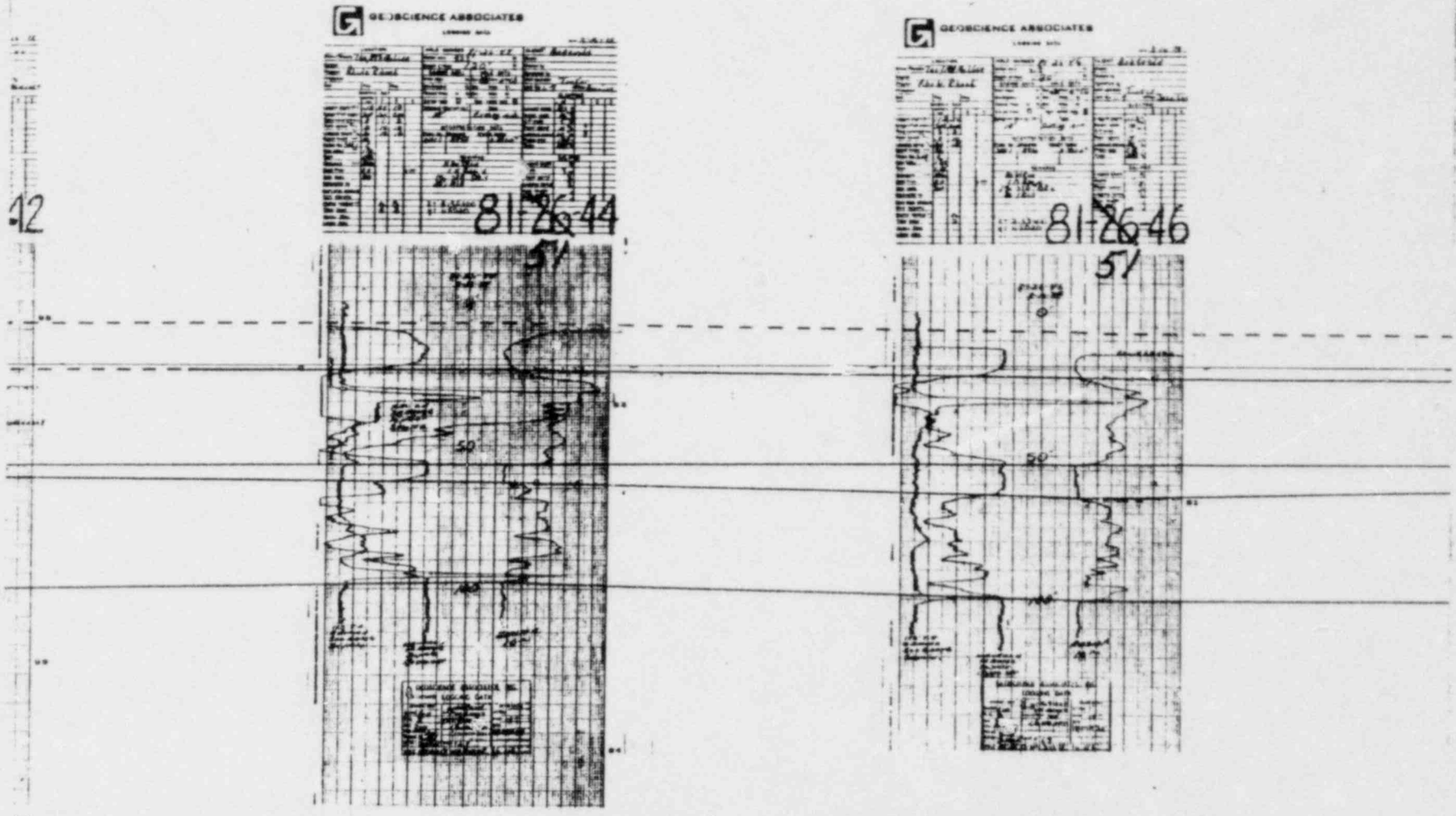
GEOSCIENCE ASSOCIATES
81-26-
51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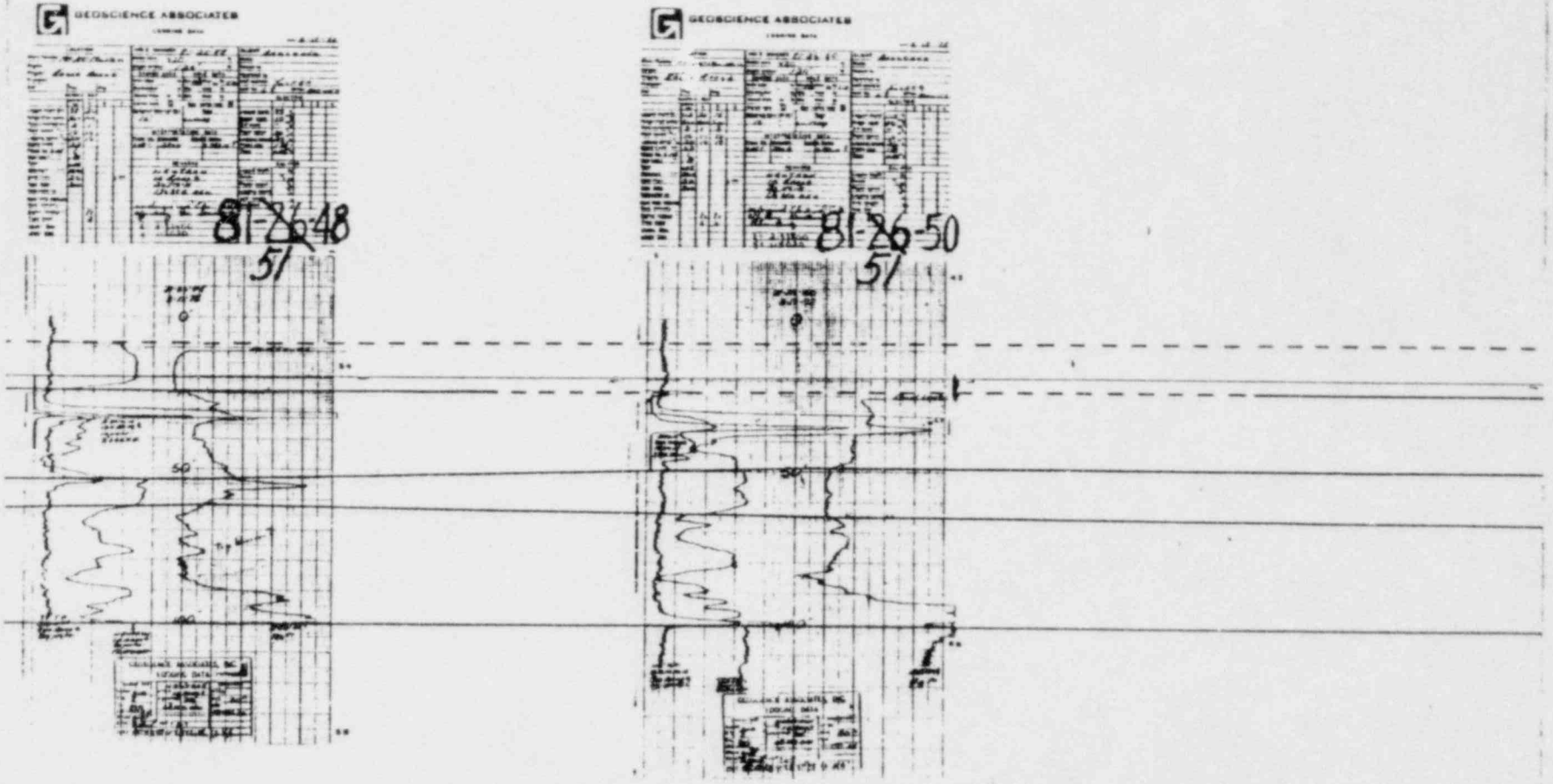
81-26-44
51
GEOSCIENCE ASSOCIATES
81-26-46
51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81-26-48
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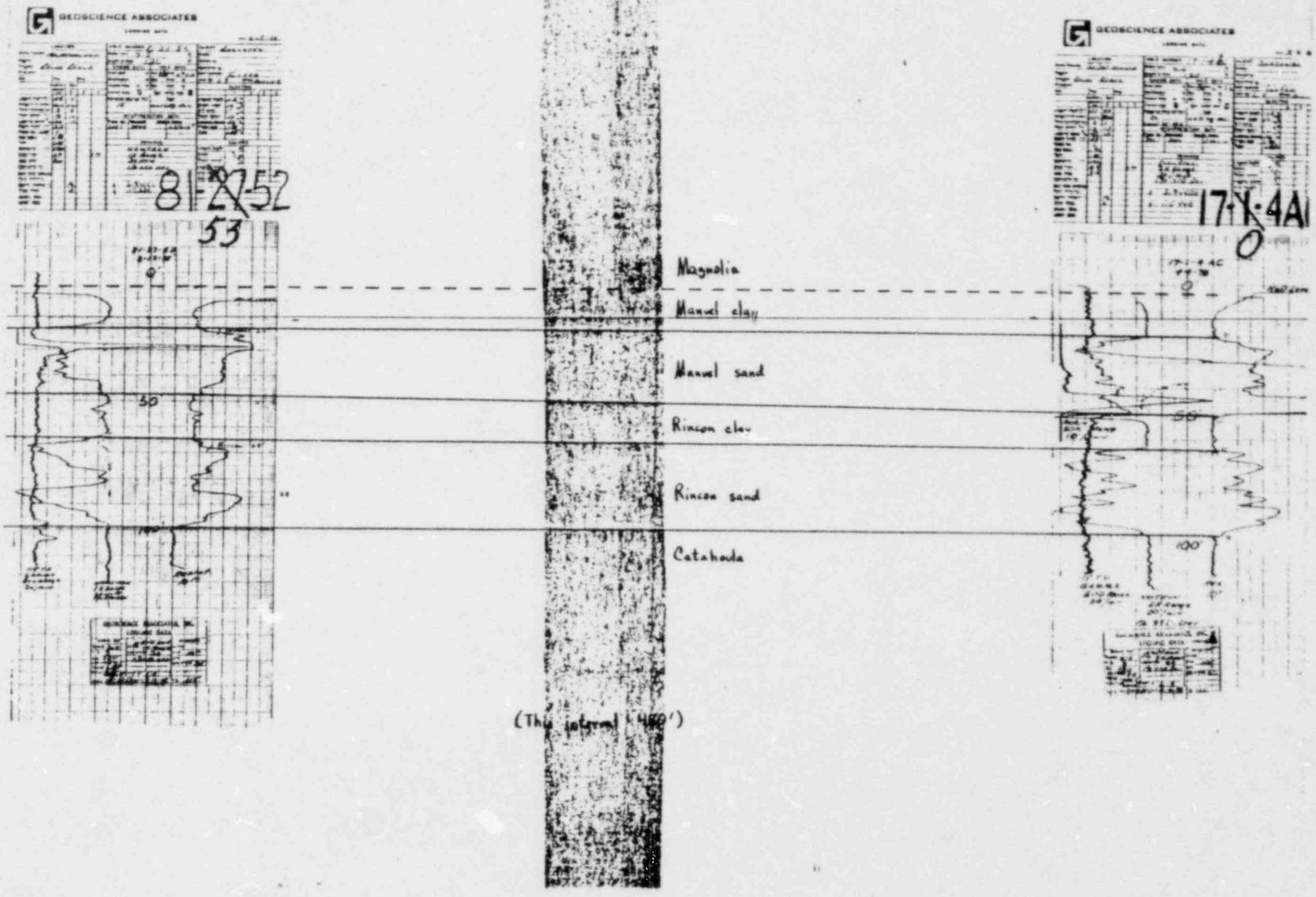
GEOSCIENCE ASSOCIATES
81-26-50
51


GEOSCIENCE ASSOCIATES
8127-52
53
50
100
GEOSCIENCE ASSOCIATES
17-K-4A
0
50
100
Magnolia
Manvel clay
Manvel sand
Rincon clay
Rincon sand
Catahoula
(This interval 480')

400'
7'

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

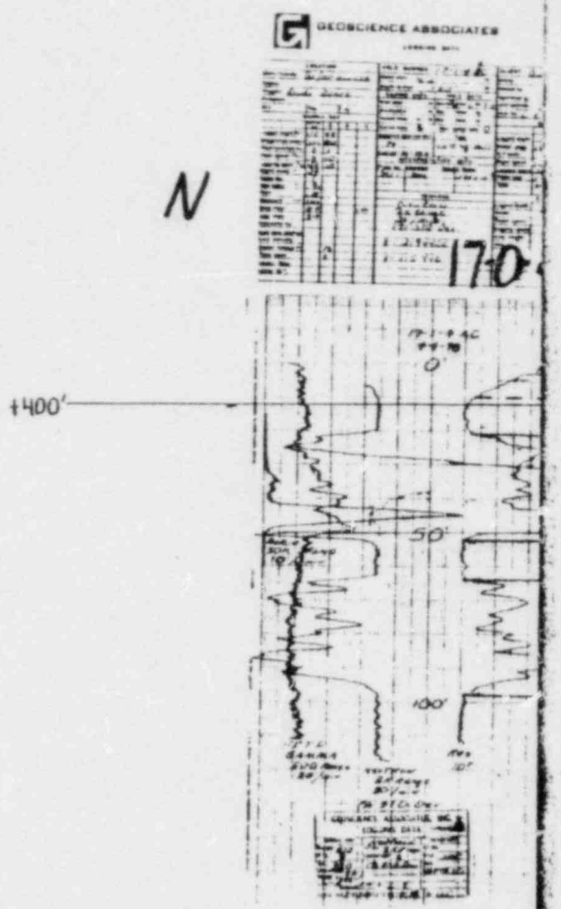
Magnolia	F g sand; oxidized/reoxidized brown.
Manuel clay	Clay, silty clay; reoxidized green-grey to brown.
Manuel sand	F-md g sand; reoxidized/reduced; light grey-brown, brown to dark grey.
Rincon clay	Clay & silty clay; reduced blue-grey.
Rincon sand	Interbedded f-md g sand & clay; reduced grey to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

CROSS SECTION N-N'

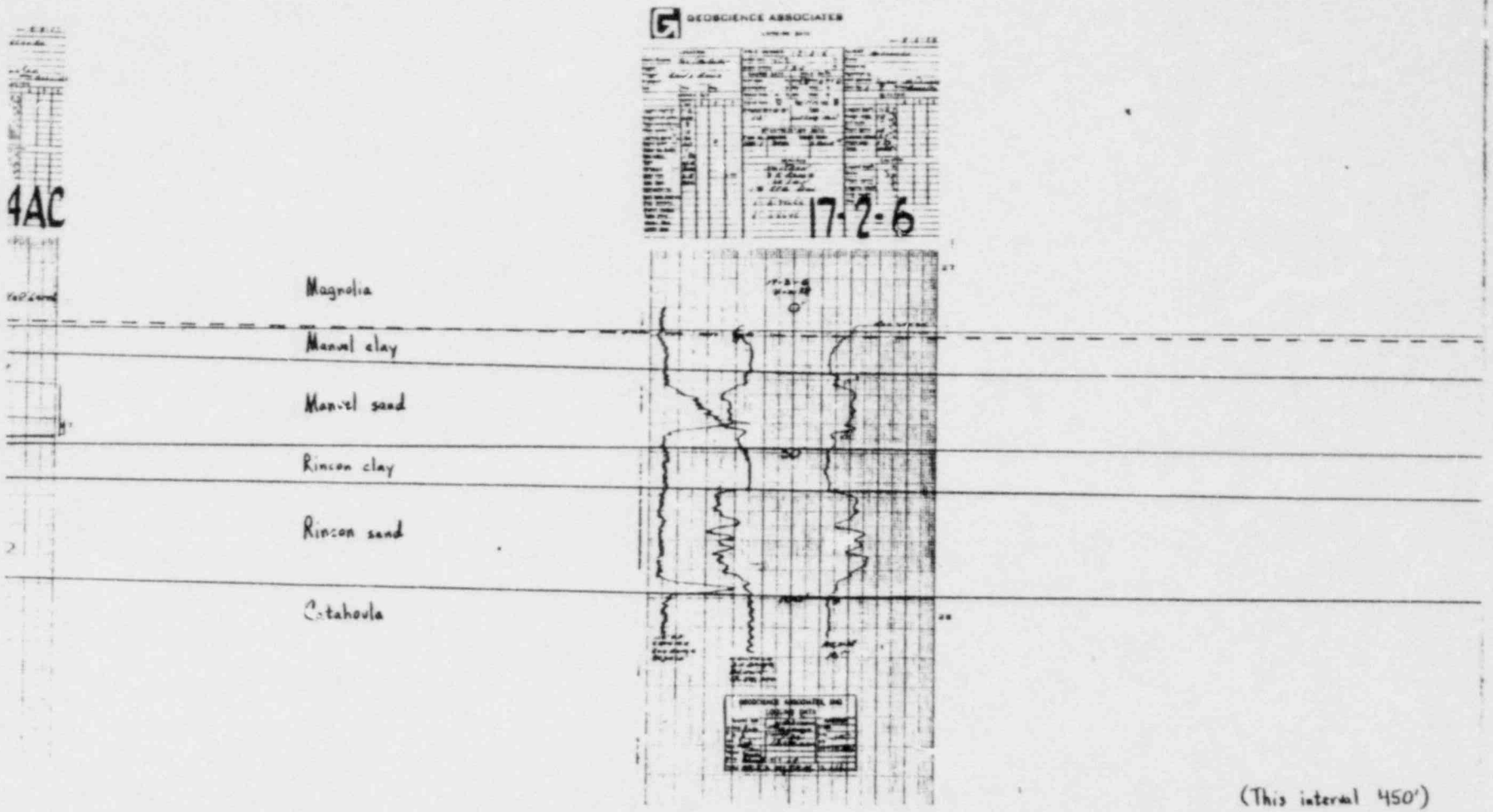
17-8-50

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



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



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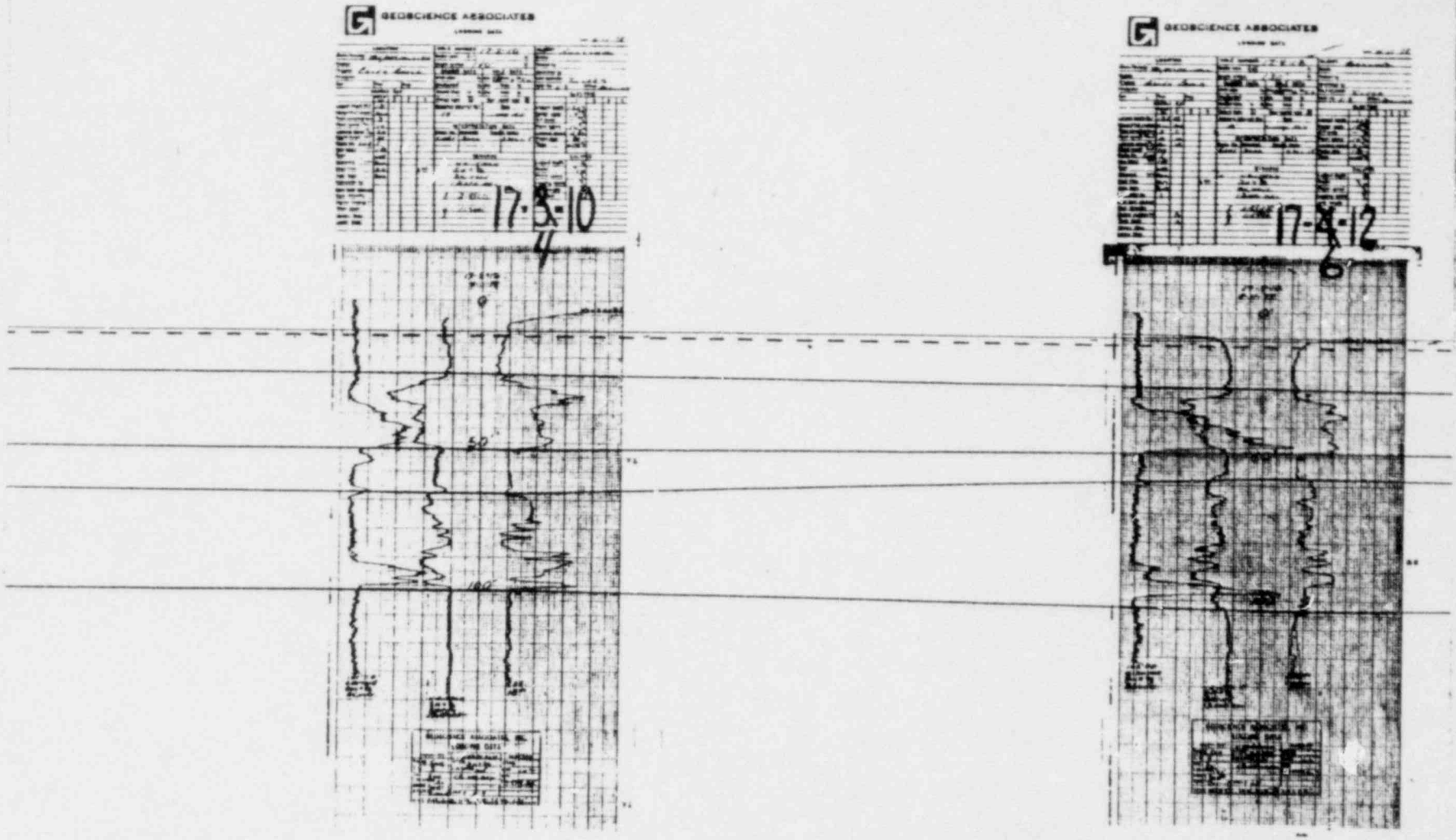
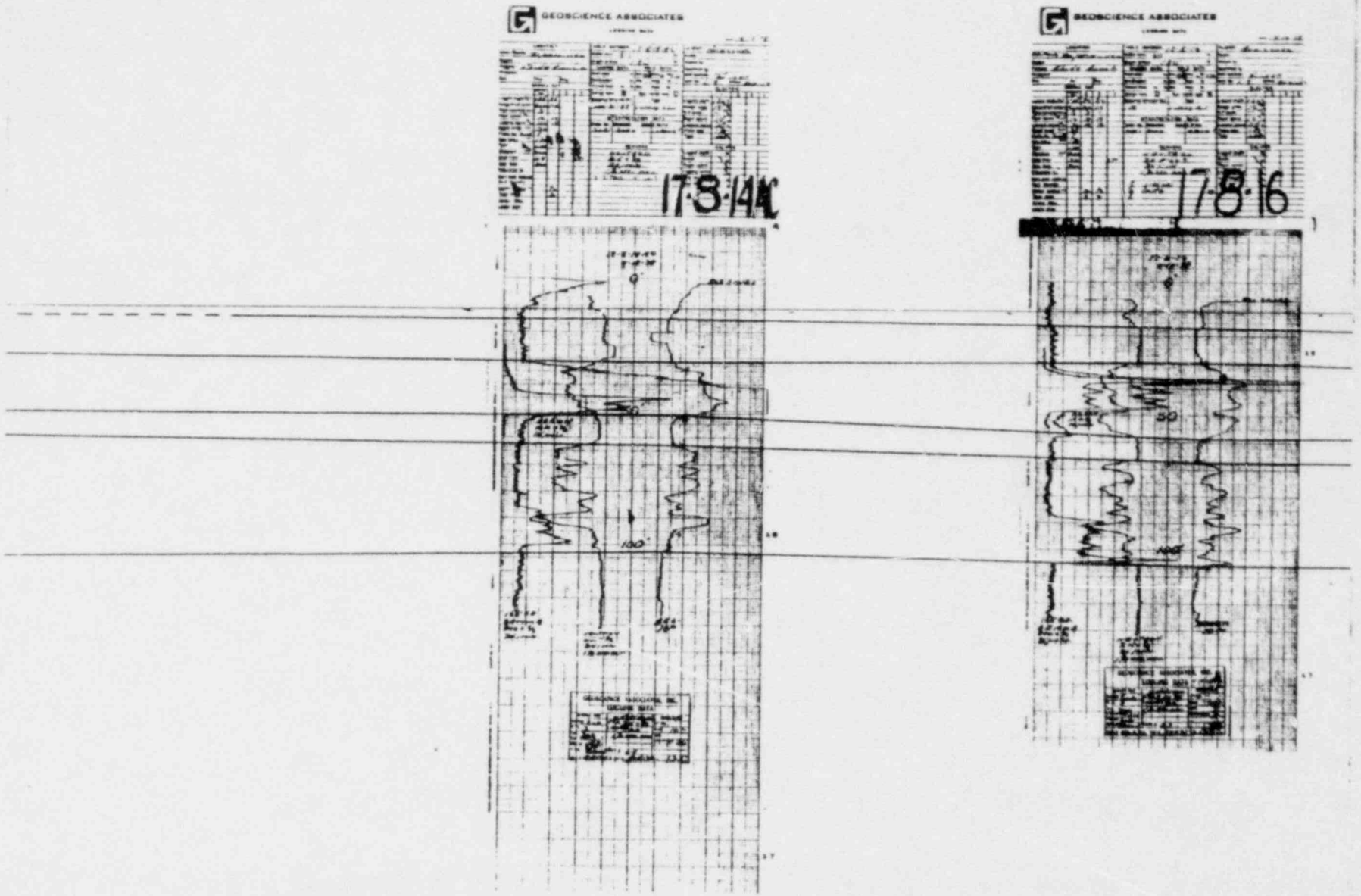
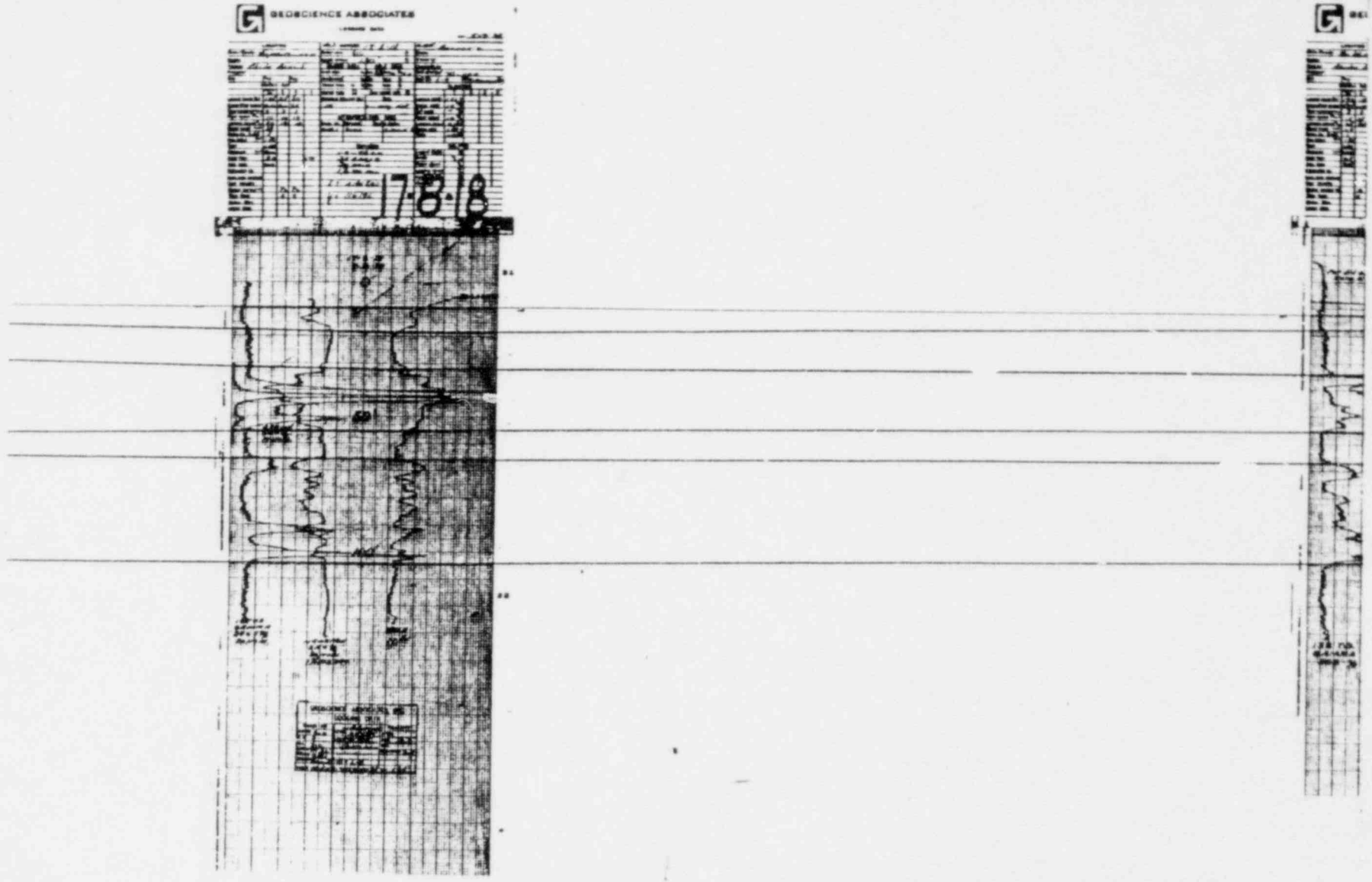
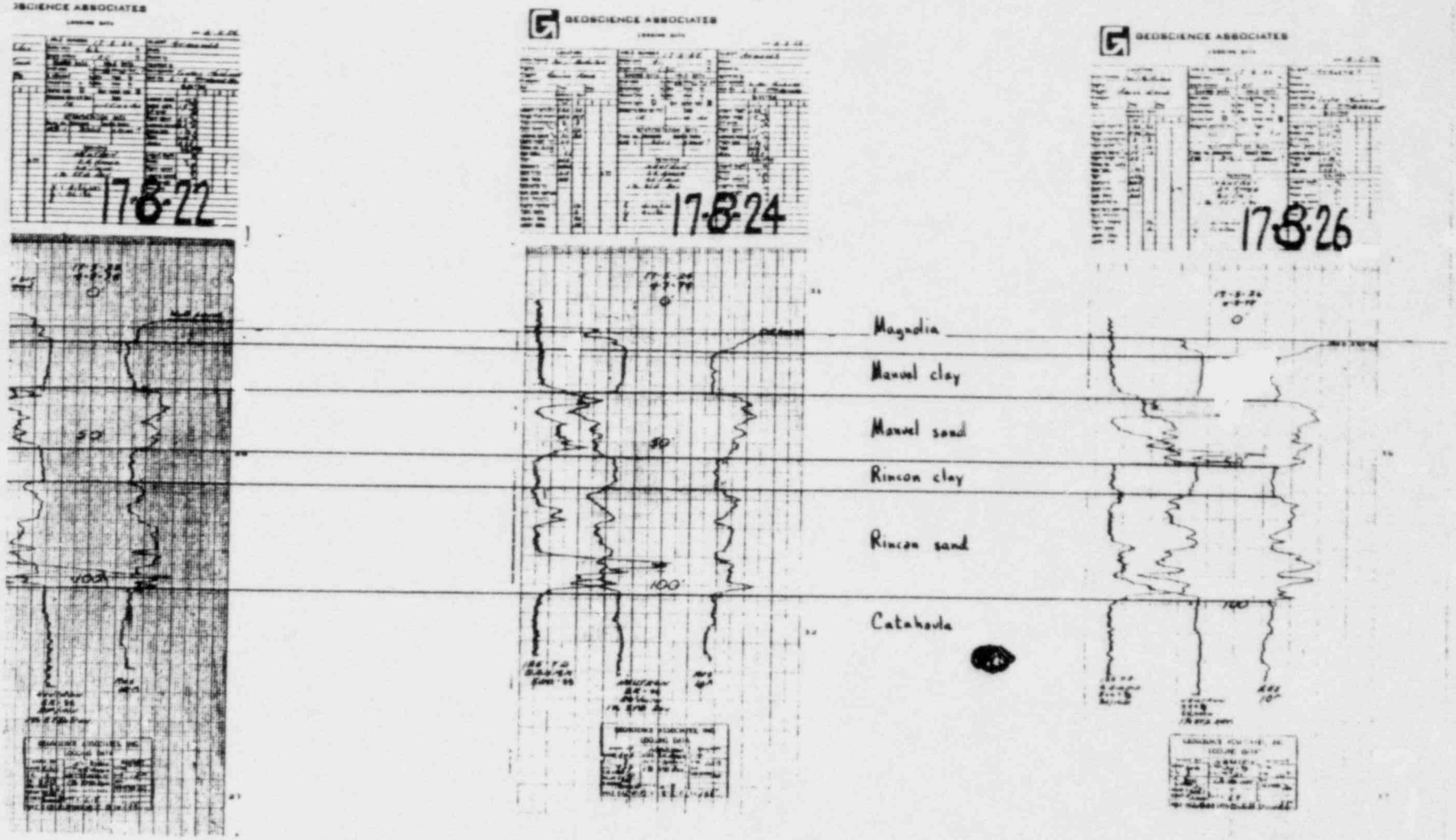
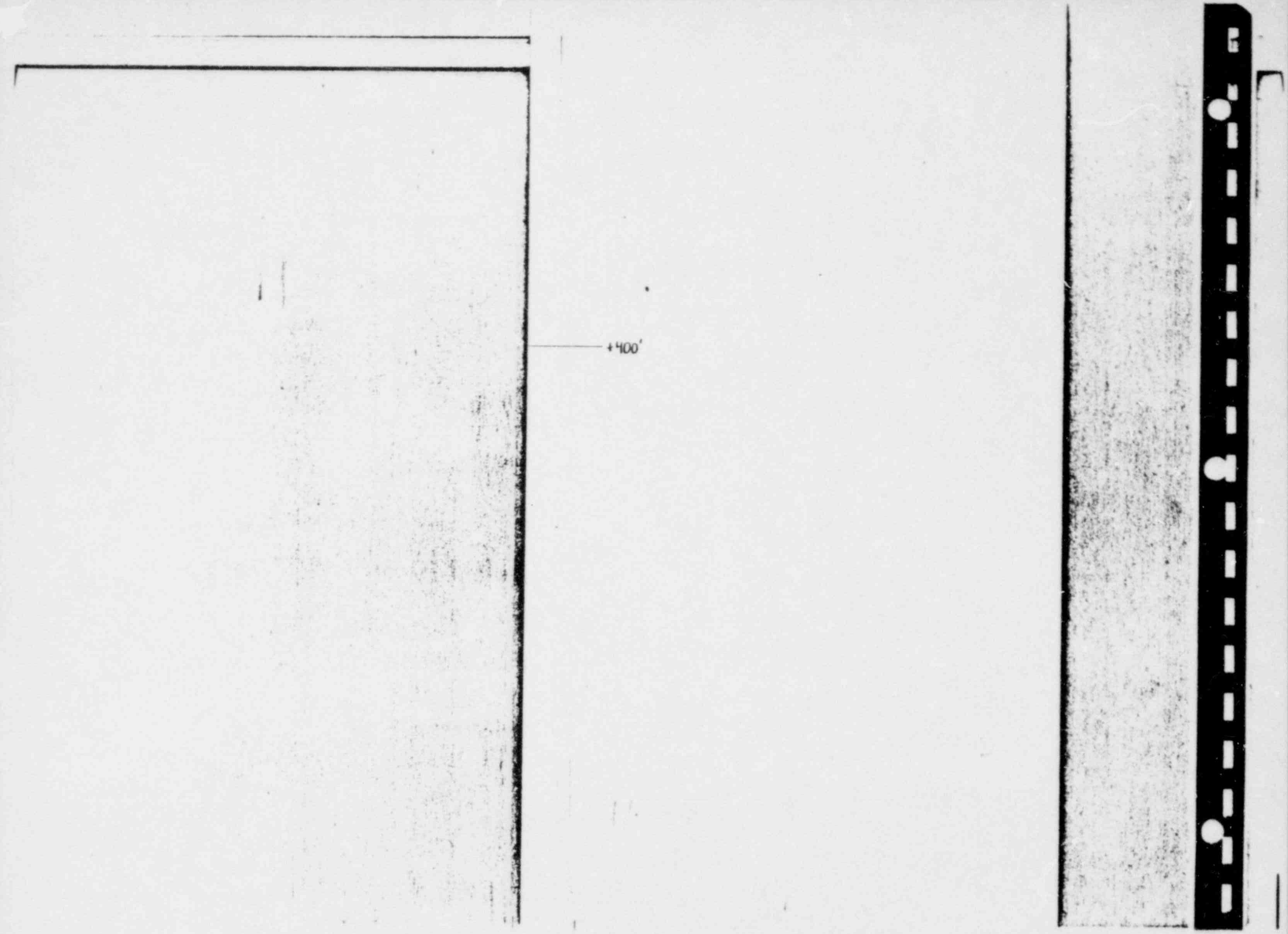

GEOSCIENCE ASSOCIATES
17-S-10
4
GEOSCIENCE ASSOCIATES
17-S-12
6


GEOSCIENCE ASSOCIATES
17-8-14
GEOSCIENCE ASSOCIATES
17-8-16

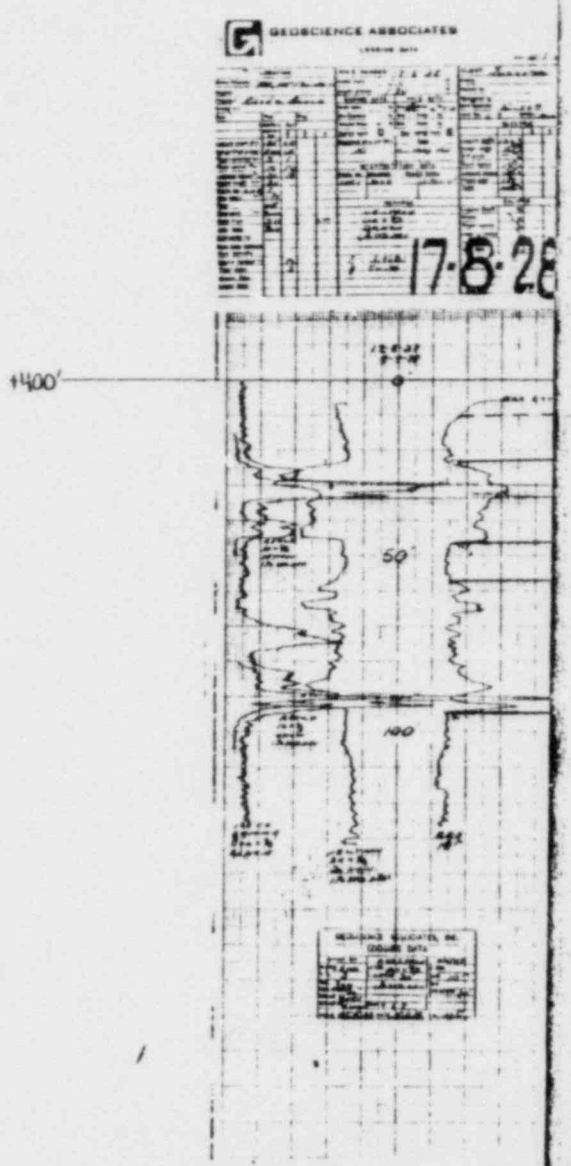

GEOSCIENCE ASSOCIATES
17-8-18

(continued on SHEET 2)




+400'

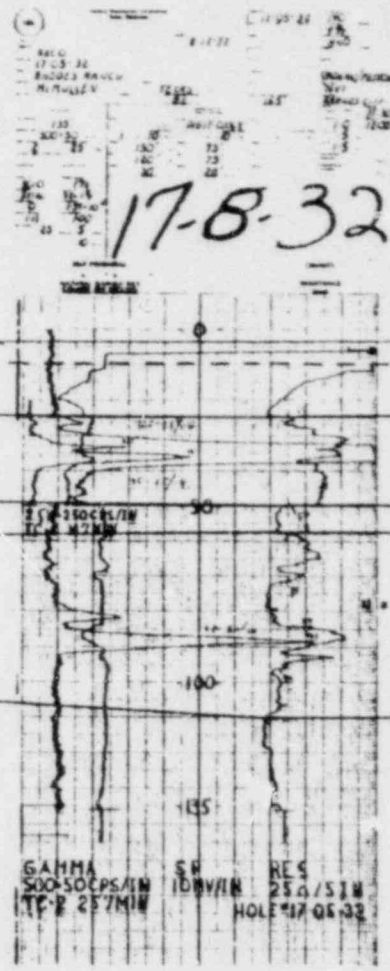
(continued from SHEET 1)



Cross-section N-N' (continued)

6-7-78

SHEET 2 of 2



Magnolia

Manvel clay

Manvel sand

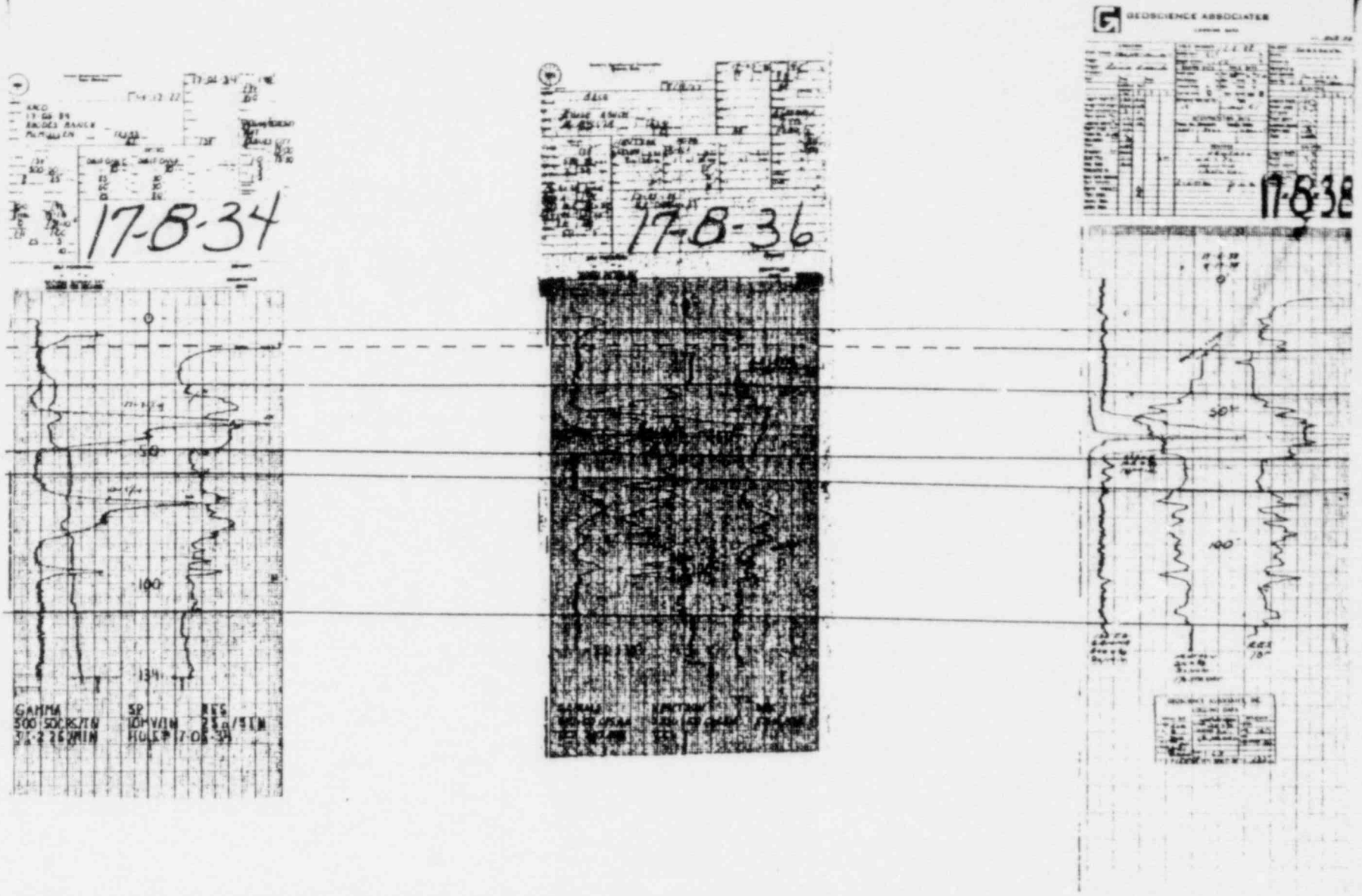
Rincon clay

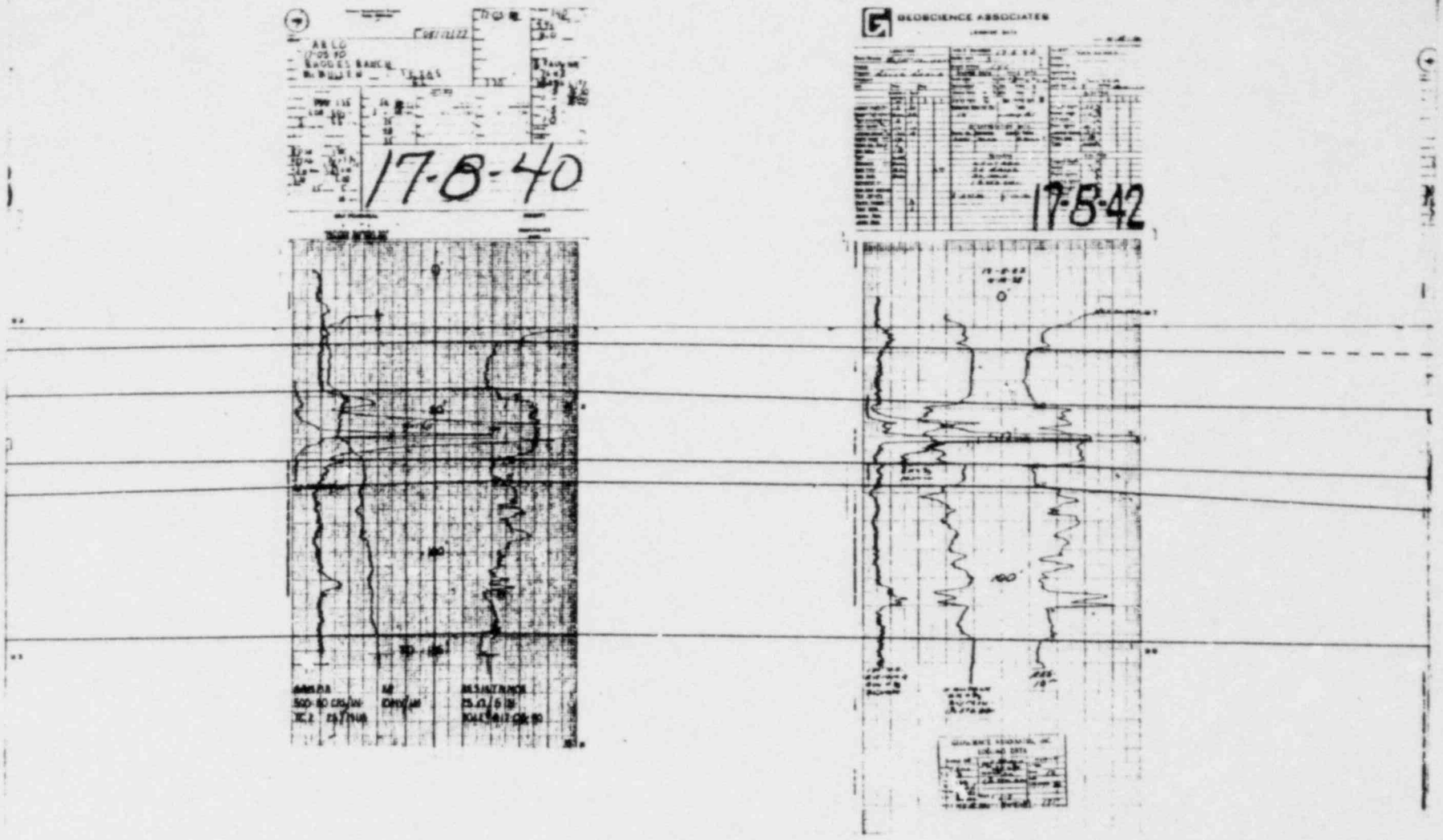
Rincon sand

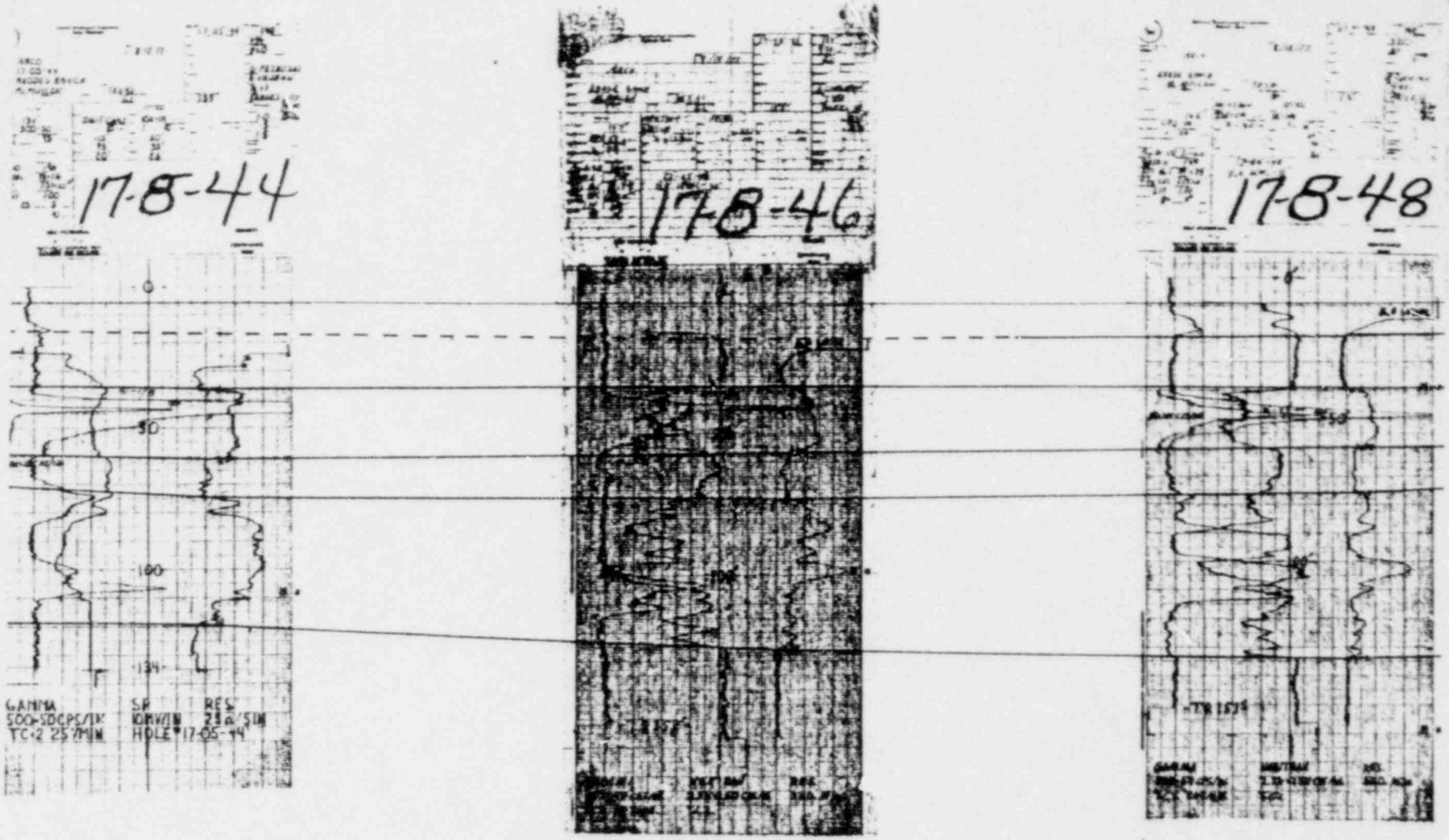
Catahoula

Datum : ±400'

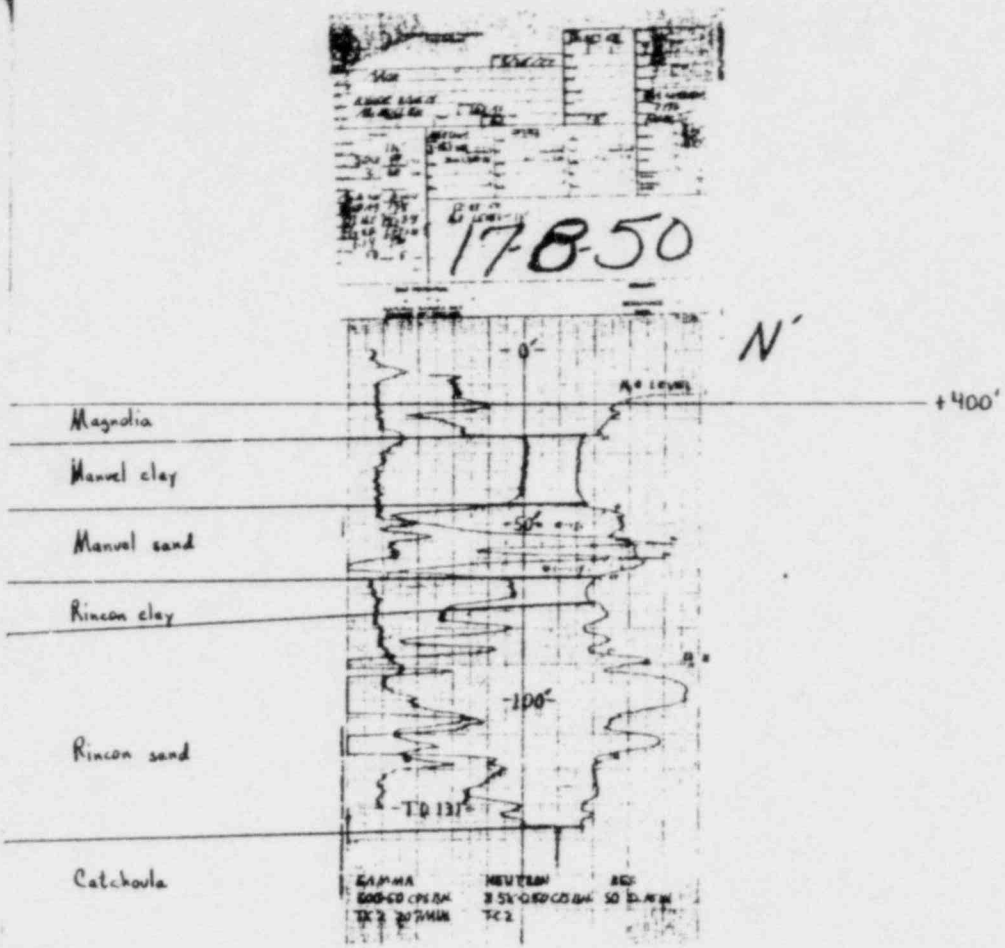
Scale : 1":40' vertical 1":40' horizontal

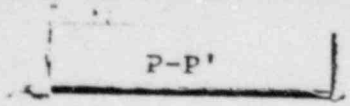

17-8-34
17-8-36
GEOSCIENCE ASSOCIATES


17-8-40
GEOSCIENCE ASSOCIATES
17-8-42



17-8-44
17-8-46
17-8-48
0
50
100
134
GAMMA
500-50CPS/IN
TC-2 25'/MIN
SP
10MV/IN
HOLE 17-05-44
RES
25Ω/5IN


17-8-50
N'
0'
+400'
Magnolia
Manvel clay
Manvel sand
Rincon clay
-100'
Rincon sand
TD 137'
Catchoula
GAMMA
NEUTRON
SP


P-P'

CROSS SECTION P-P'

82-50-44

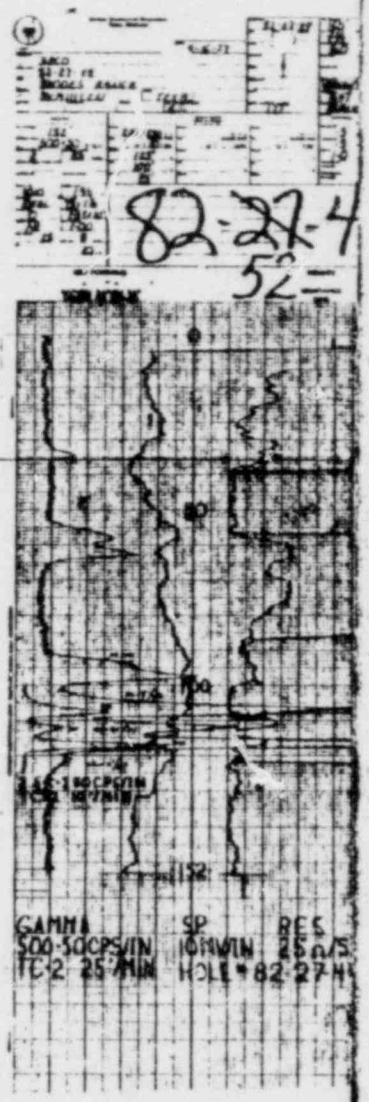
Magnolia	Vf-f-md g sand, silt & caliche; oxidized greyish-tan to tan. Minor clay balls.
Manuel clay	Clay; oxidized/reduced yellow-orange to blue.
Manuel sand	F-md g silty sand; reduced blue-grey to grey.
Rincon clay	Slightly sandy clay; reduced light blue-grey.
Rincon sand	Interbedded f-md g silty sand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

82-40-44

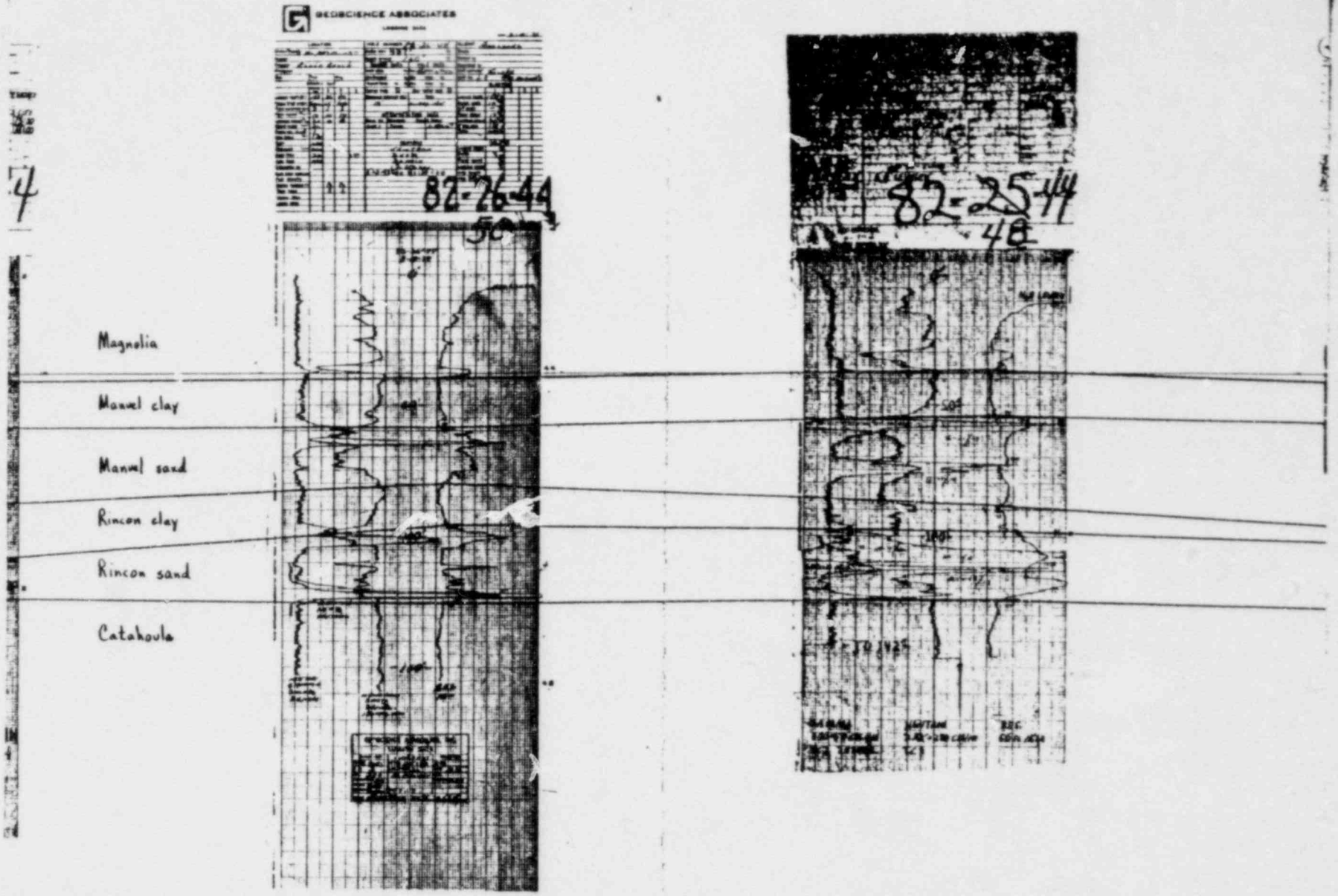
Magnolia	Interbedded md g silty sand, caliche & clay 'dized dark brown, yellow-brown, orange-brown to olive.
Manuel clay	Clay, f to md g silty sand & some caliche; oxidized/reduced orange-brown, olive to blue-grey to green-grey. Abundant gypsum.
Manuel sand	Md-cs g sand with some silt; reduced blue-grey; 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-gray 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.

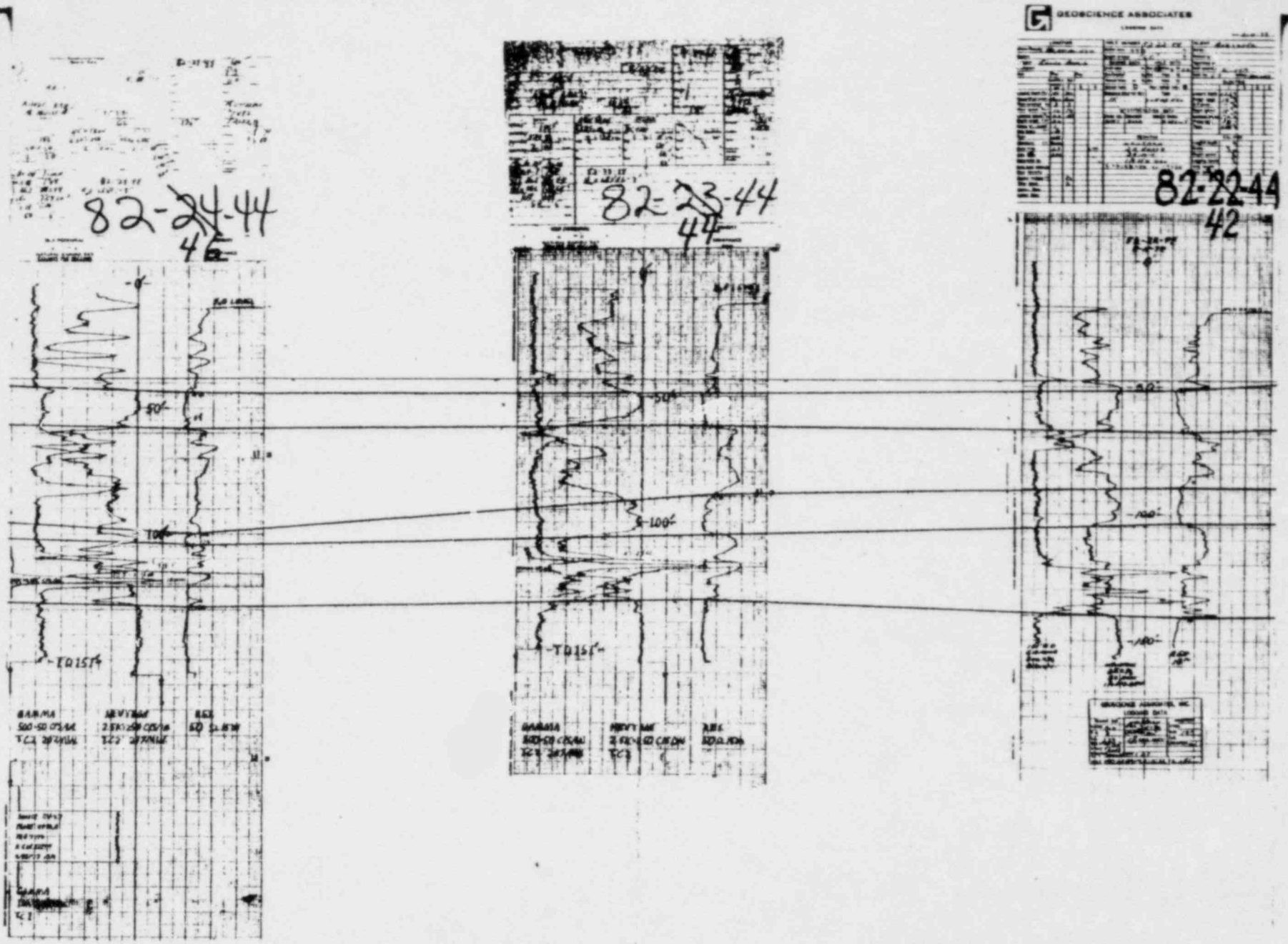


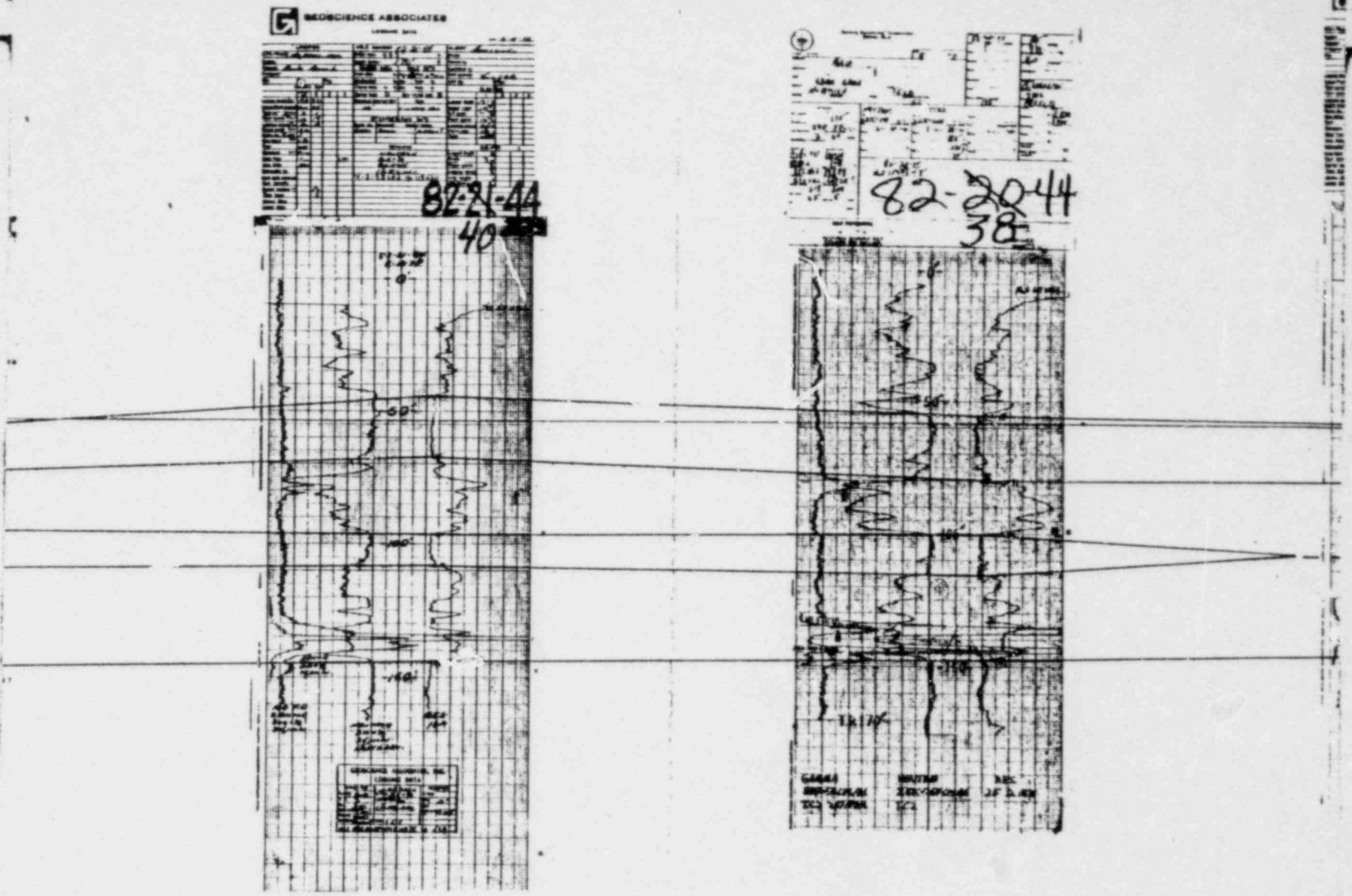
Cross-section P-P'
5-23-78

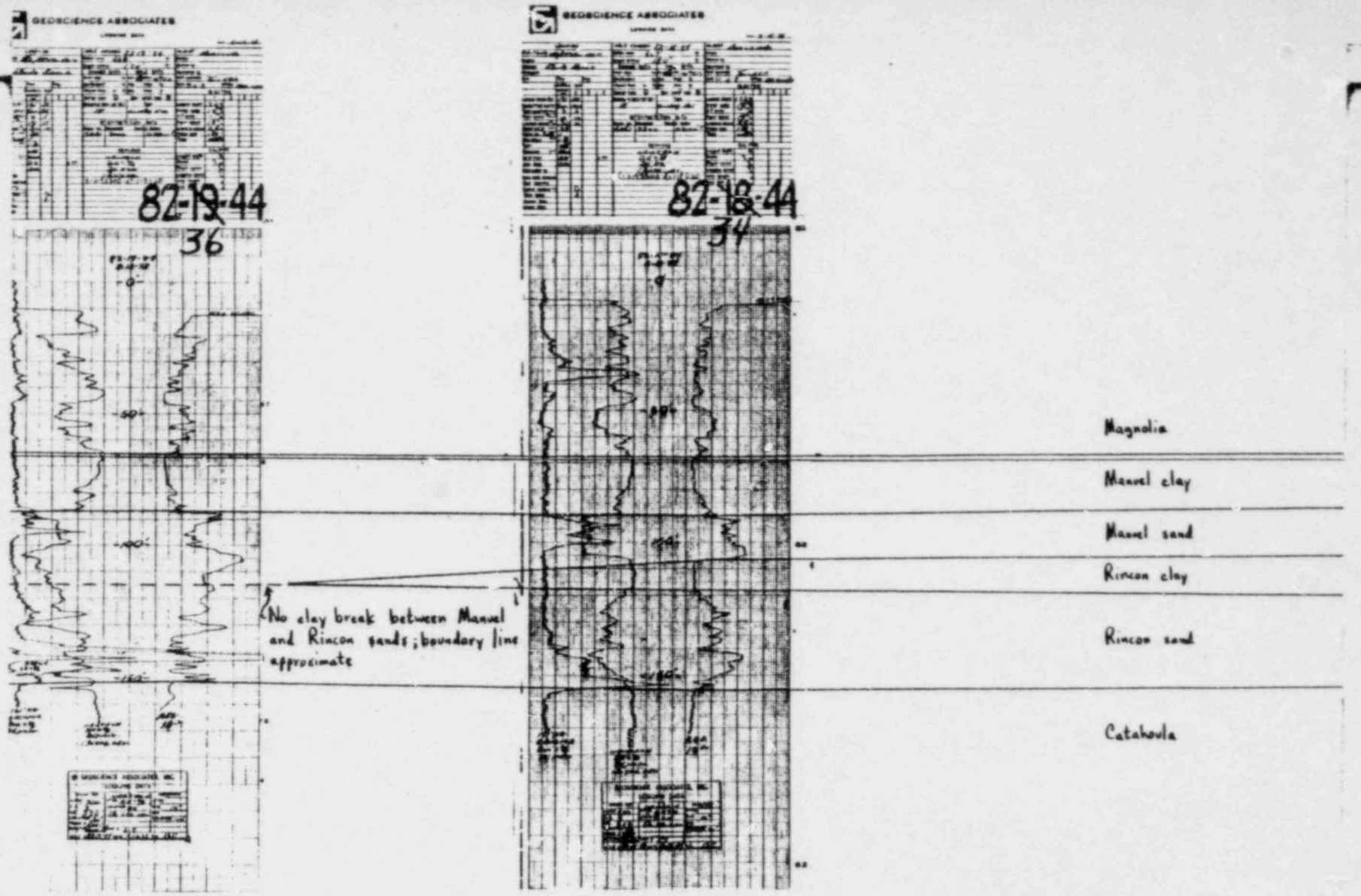


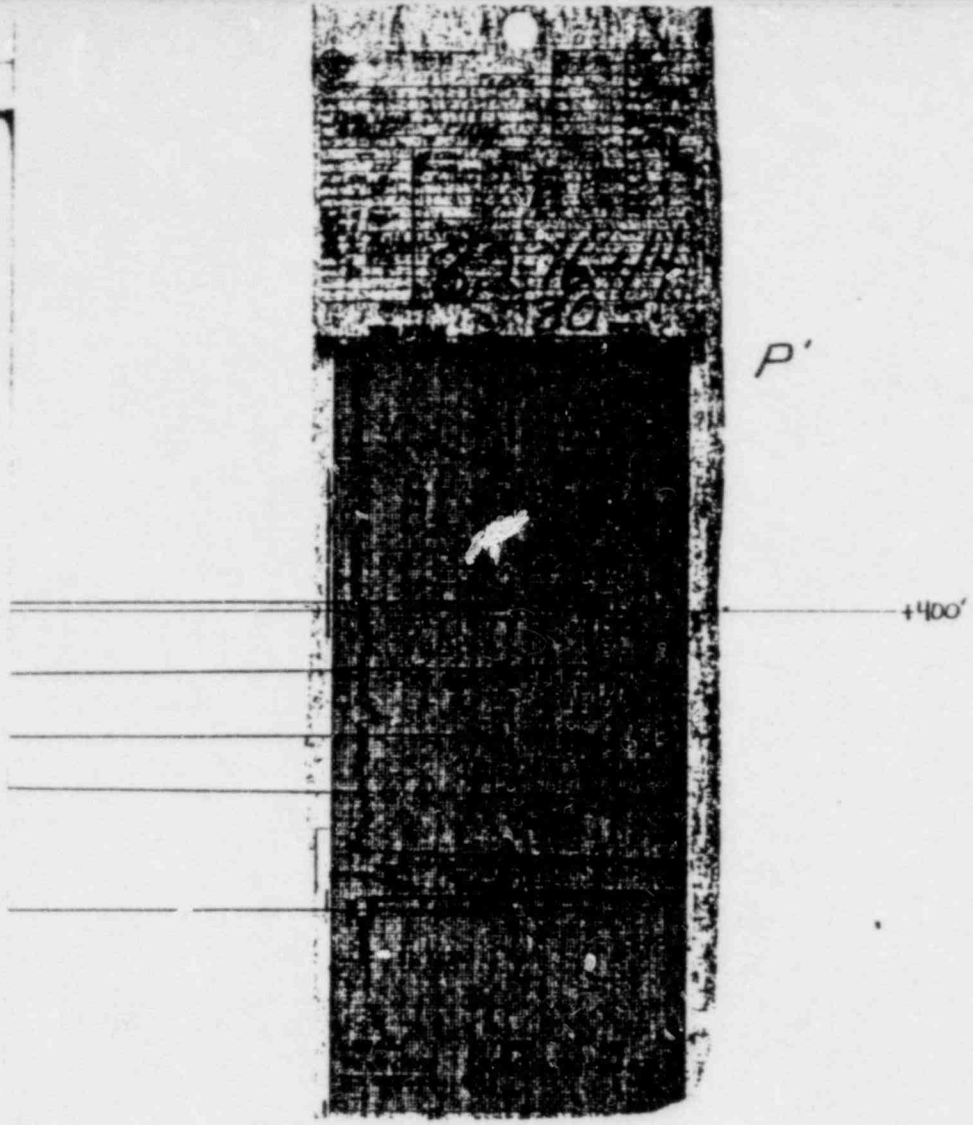
Datum: +400'

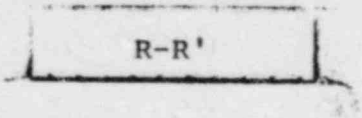
Scale: 1":40' vertical 1":40' horizontal


GEOSCIENCE ASSOCIATES
82-24-44
42
82-23-44
44
82-22-44
42
50'
100'
TD 151'
TD 151'


GEOSCIENCE ASSOCIATES
82-21-44
40
82-2044
38


GEOSCIENCE ASSOCIATES
82-18-44
36
GEOSCIENCE ASSOCIATES
82-18-44
34
No clay break between Manvel and Rincon sands; boundary line approximate
Magnolia
Manvel clay
Manvel sand
Rincon clay
Rincon sand
Catahoula


P'
+400'


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.

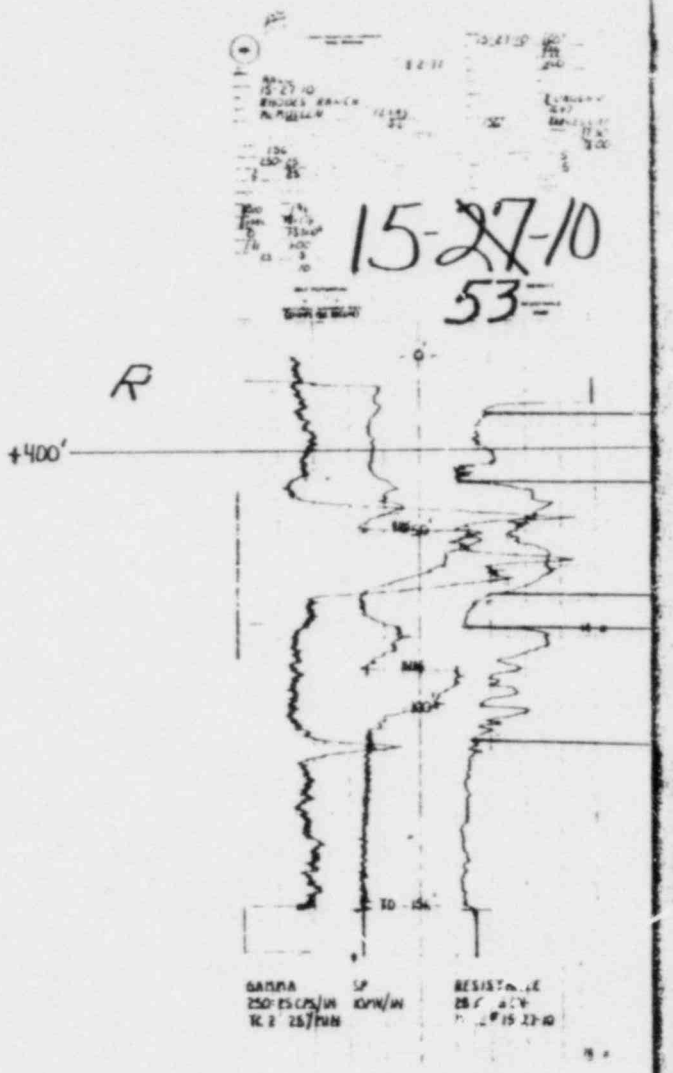
15-21-10

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.

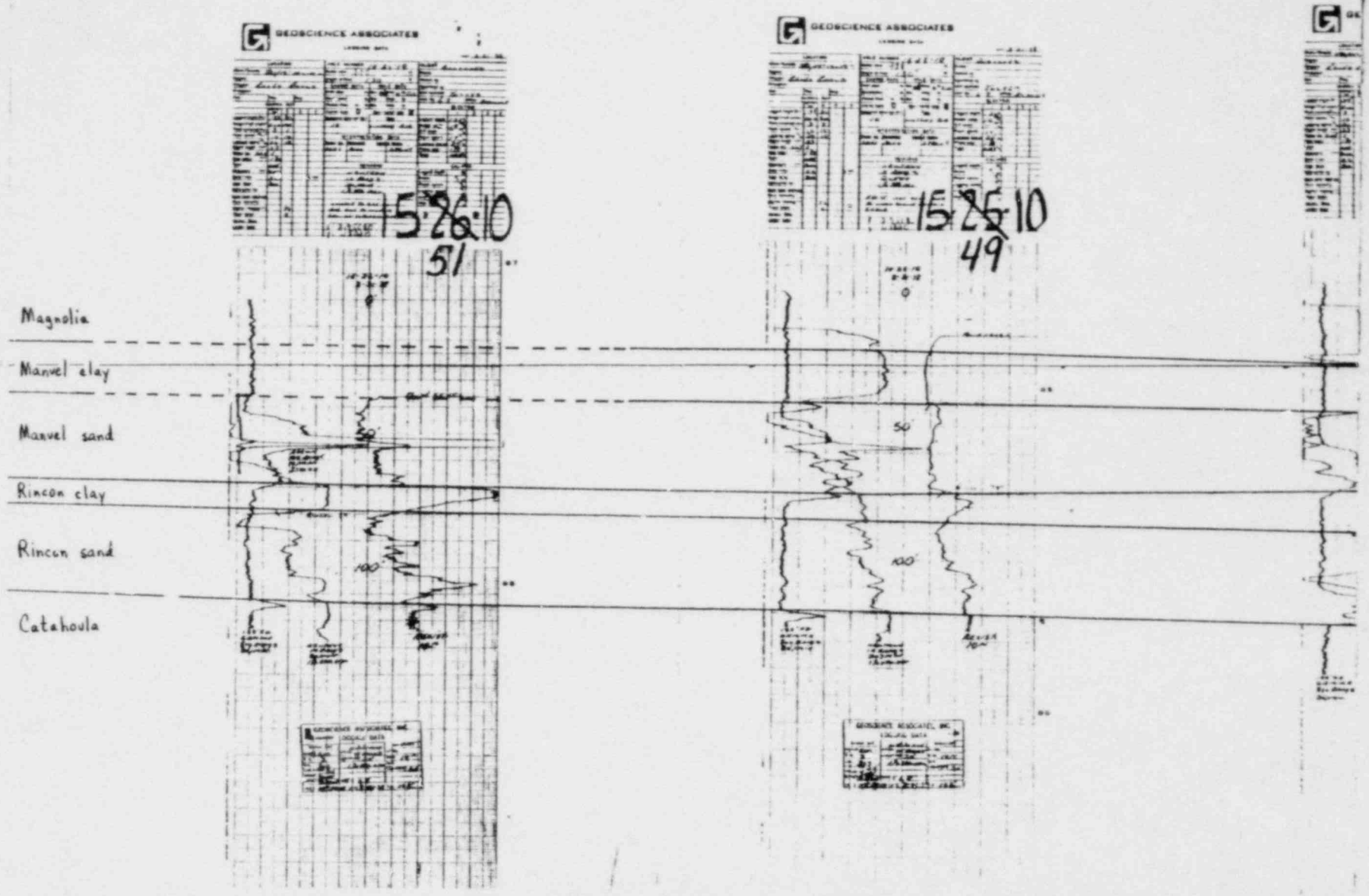


Cross-section R-R'

7-13-78

Datum

Scale



:: +400'

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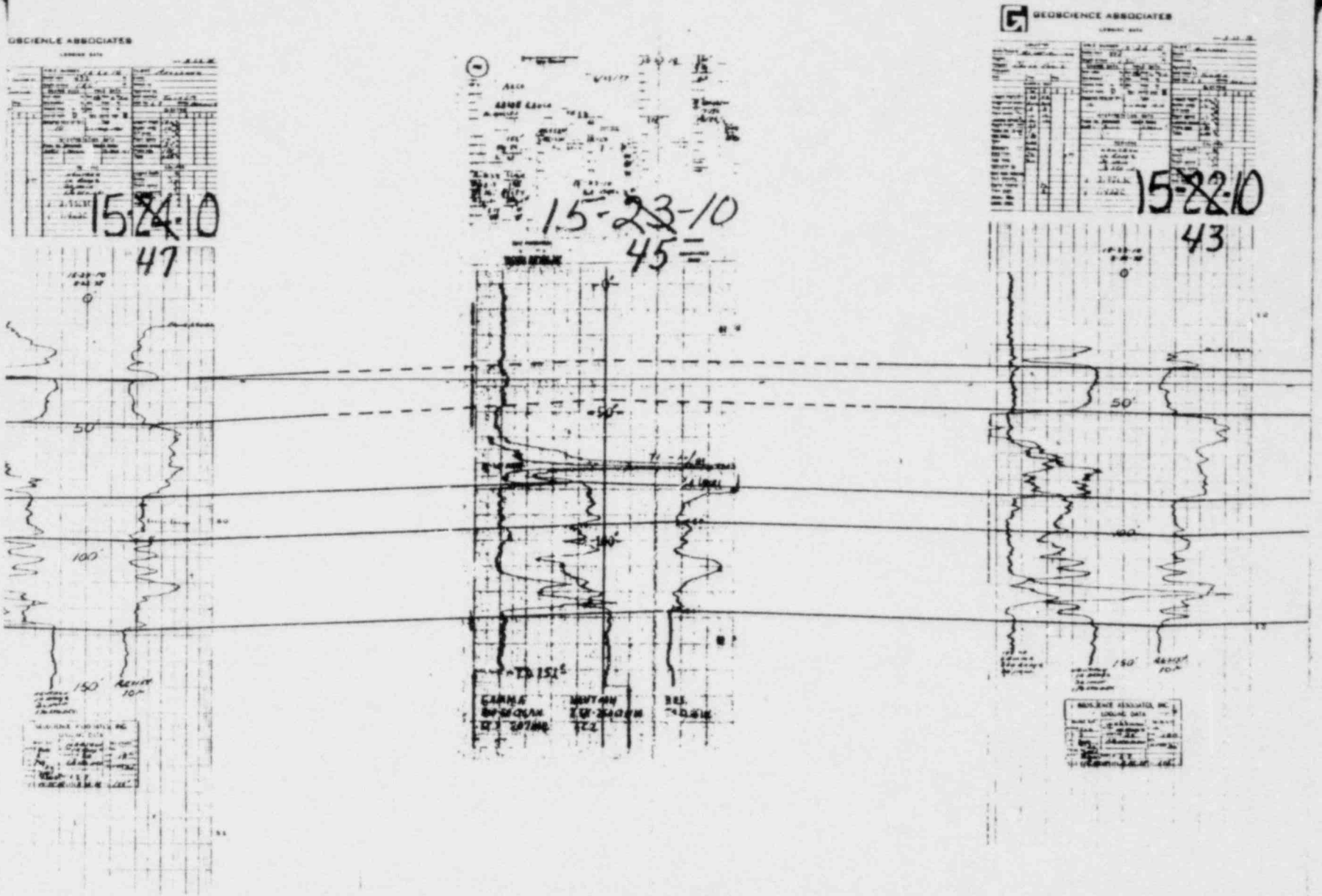
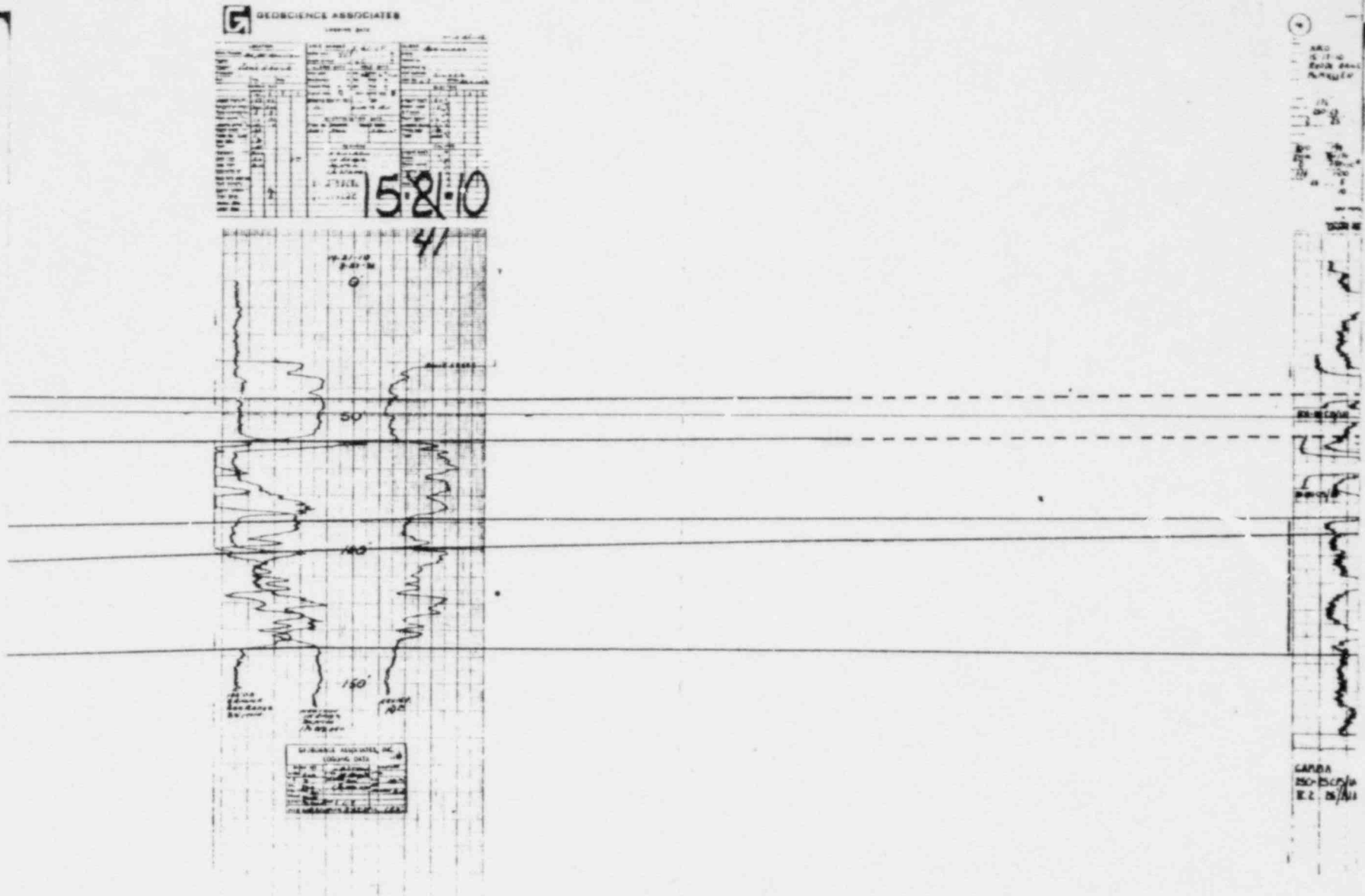
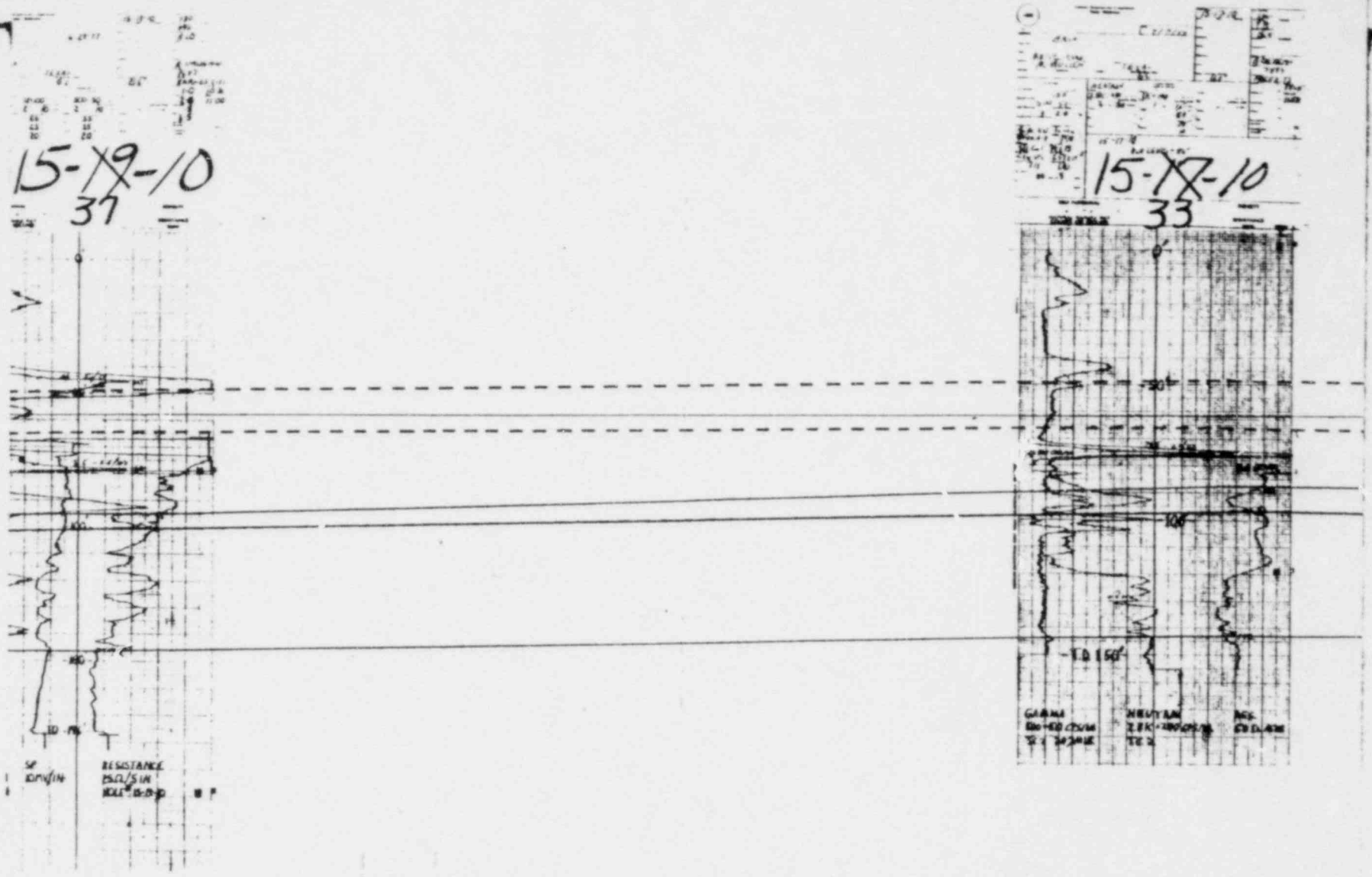
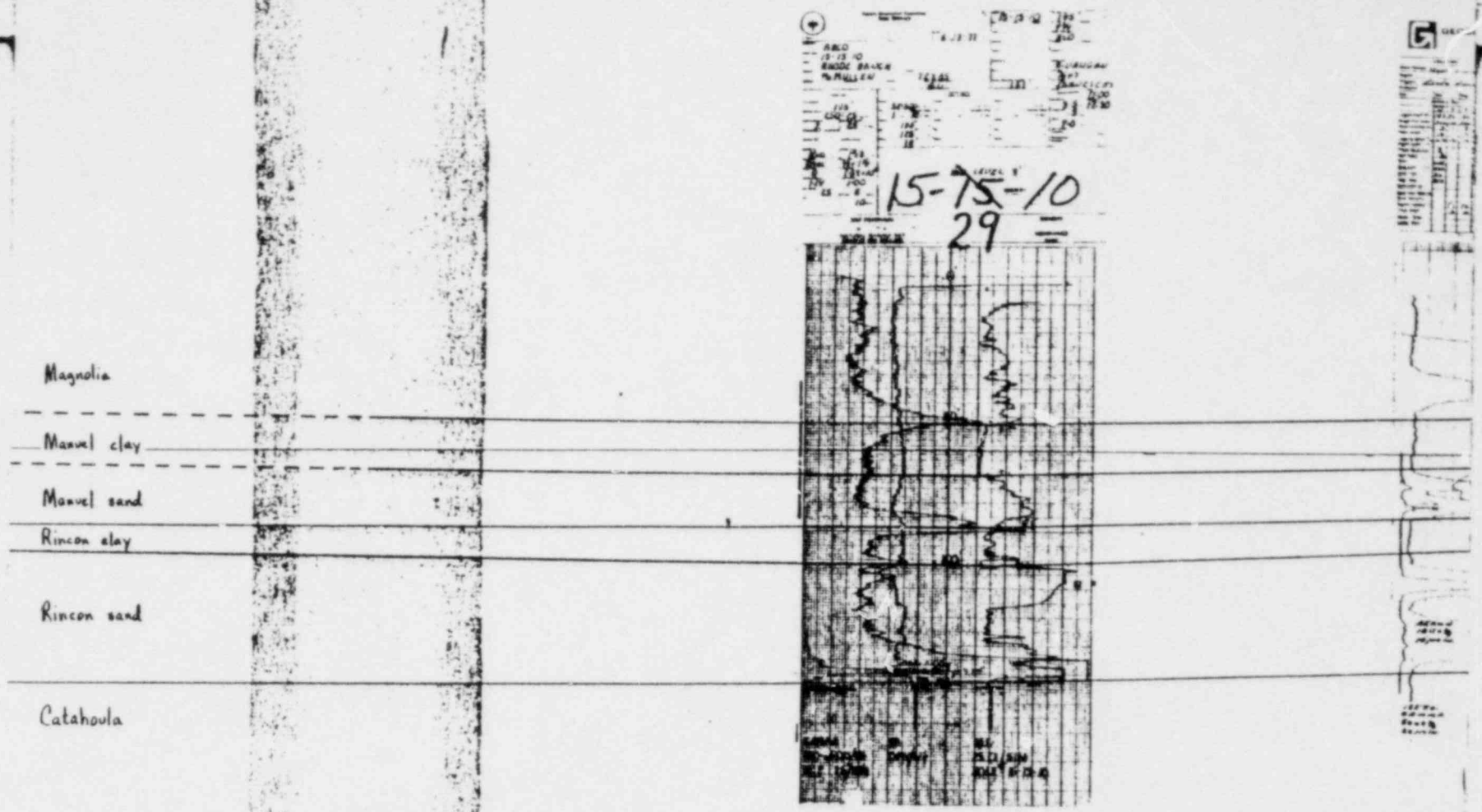
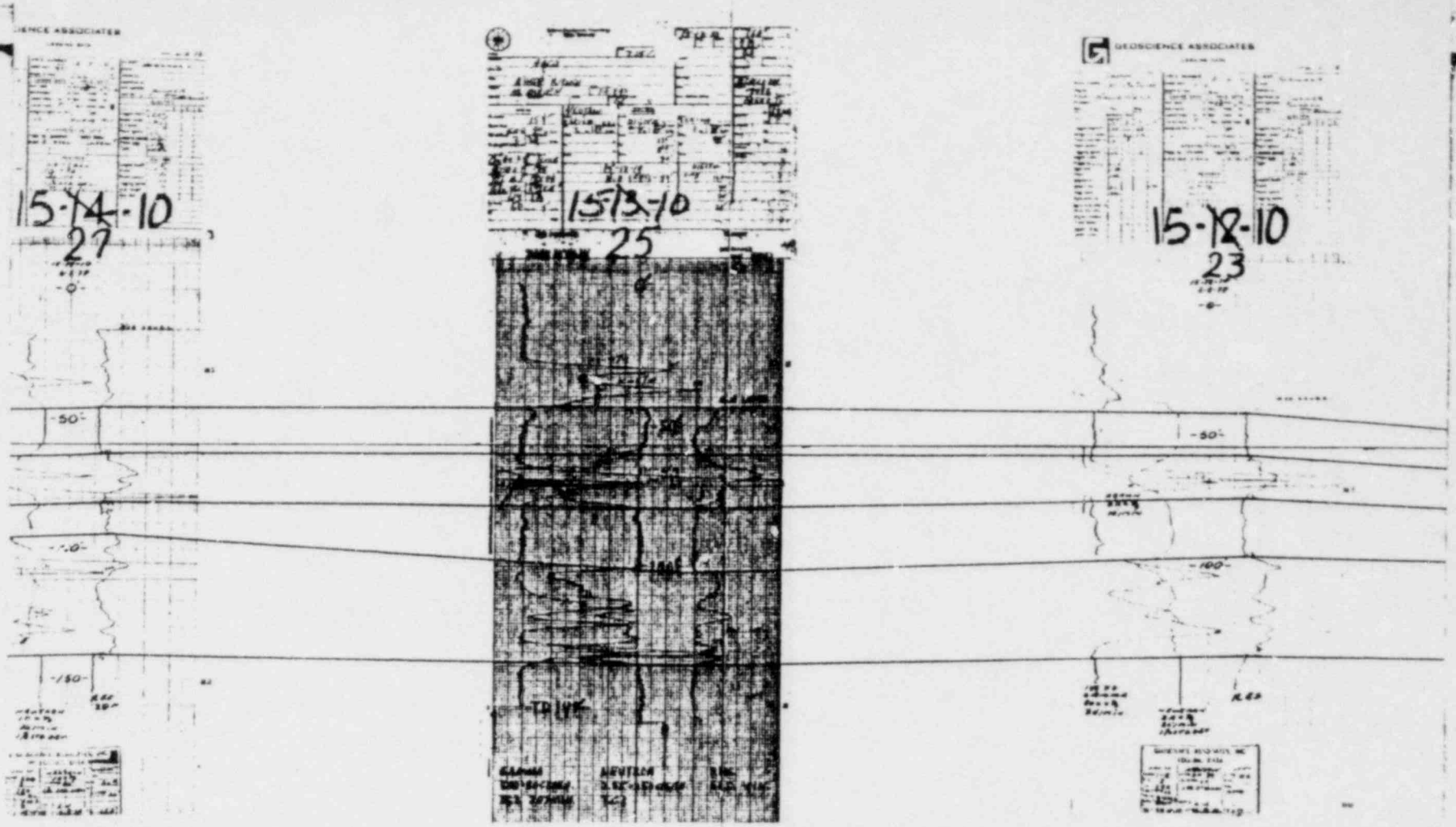
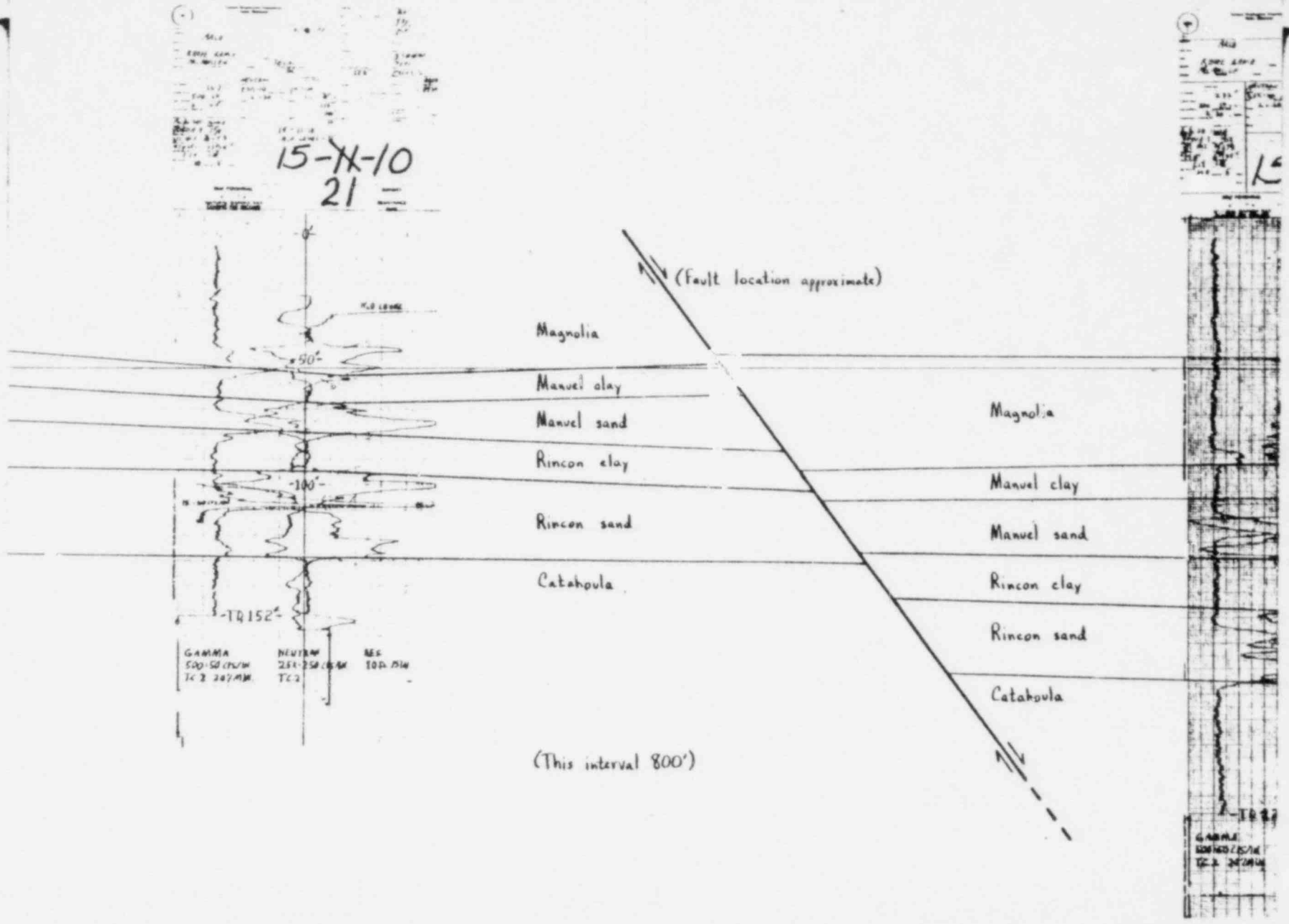

GEOSCIENCE ASSOCIATES
15-24-10
47
15-23-10
45
GEOSCIENCE ASSOCIATES
15-22-10
43
50'
100'
150'
50'
150'

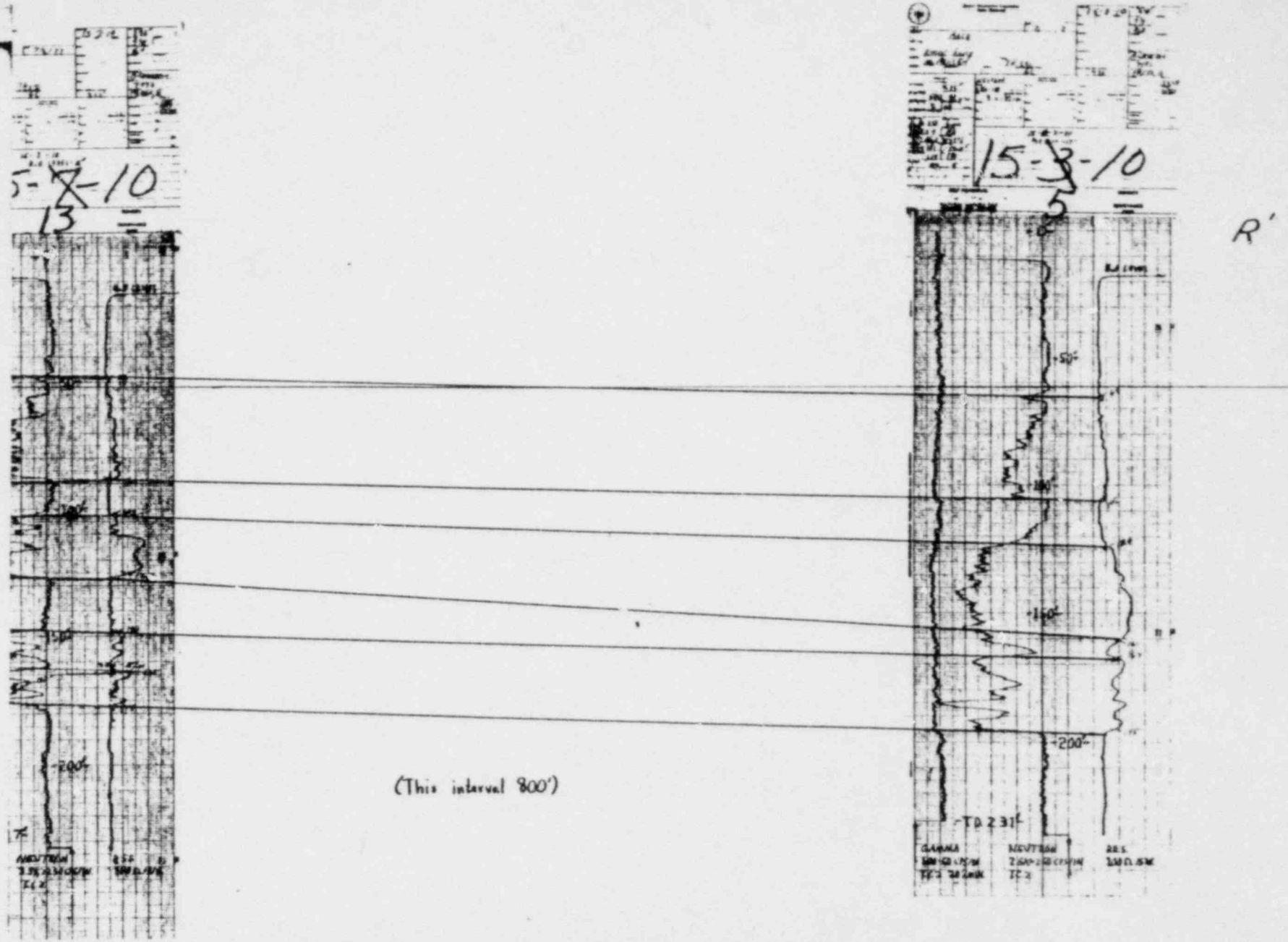

GEOSCIENCE ASSOCIATES
15-8-10
41
0
50'
100'
150'

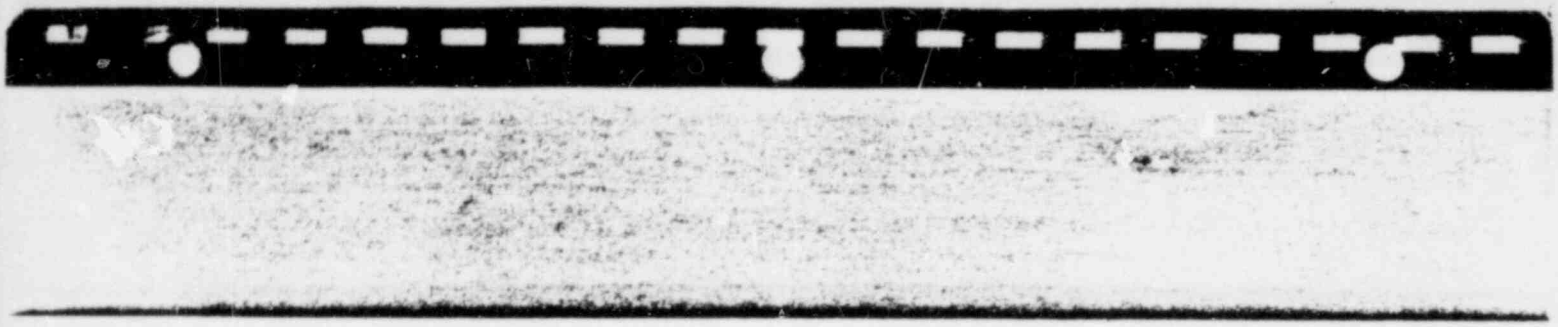

15-X9-10
37
15-X8-10
33
T.D. 150'


15-75-10
29
Magnolia
Manvel clay
Manvel sand
Rincon clay
Rincon sand
Catahoula

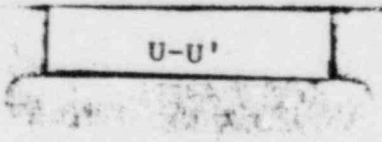

15-14-10
27
15-13-10
25
15-12-10
23
-50-
-100-
-150-


15-X-10
21
-50'-
-100'-
-TR 152'-
(Fault location approximate)
Magnolia
Manvel clay
Manvel sand
Rincon clay
Rincon sand
Catahoula
Magnolia
Manvel clay
Manvel sand
Rincon clay
Rincon sand
Catahoula
(This interval 800')


15-3-10
R'
-50'
-100'
-150'
-200'
TD 231'
(This interval 800')



+400'


U-U'

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

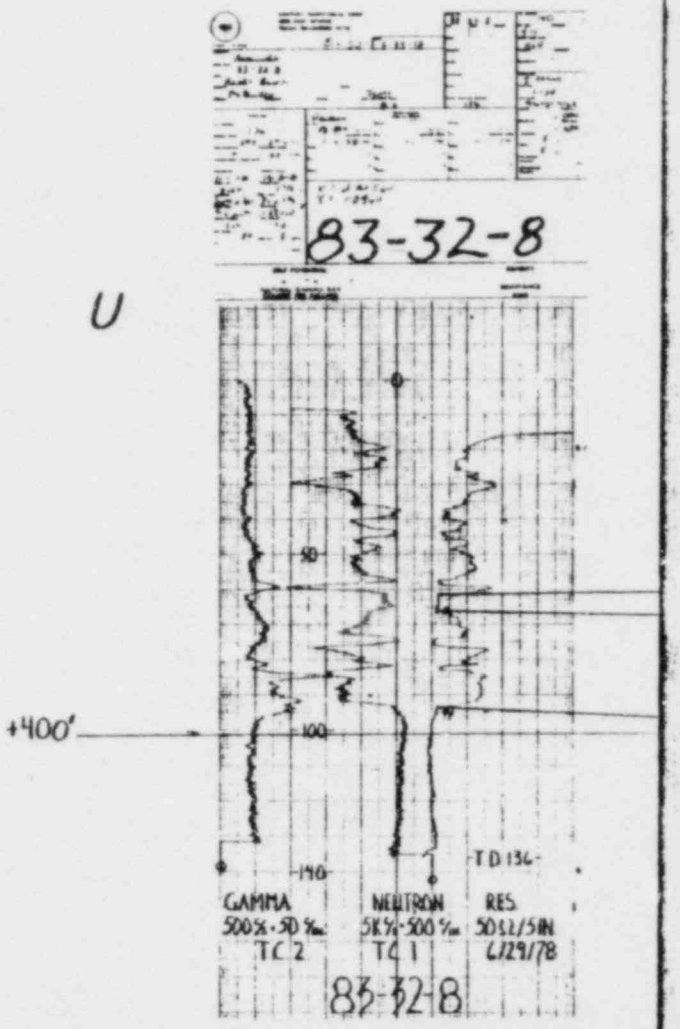
Magnolia	Interbedded f-md g sand, silt & clay; oxidized/reoxidized light grey to grey & brown. Minor gypsum.
Manuel clay	Clay & f g silty sand; reoxidized & reduced light brown to blue-grey. Minor gypsum.
Manuel sand	F-md g sand, silt & minor clay; reduced grey to blue-grey.
Catahoula	Slightly silty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

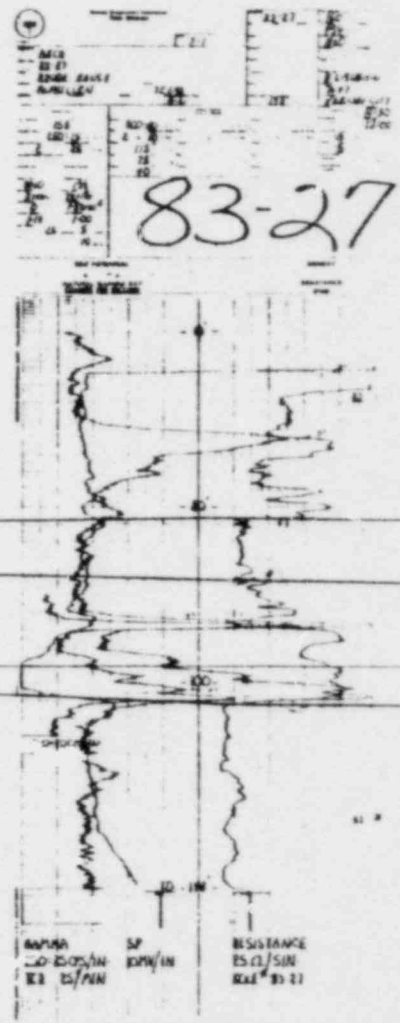


Cross-section U-U'

7-17-78

Datum

Scale:



Magnolia

Manvel clay

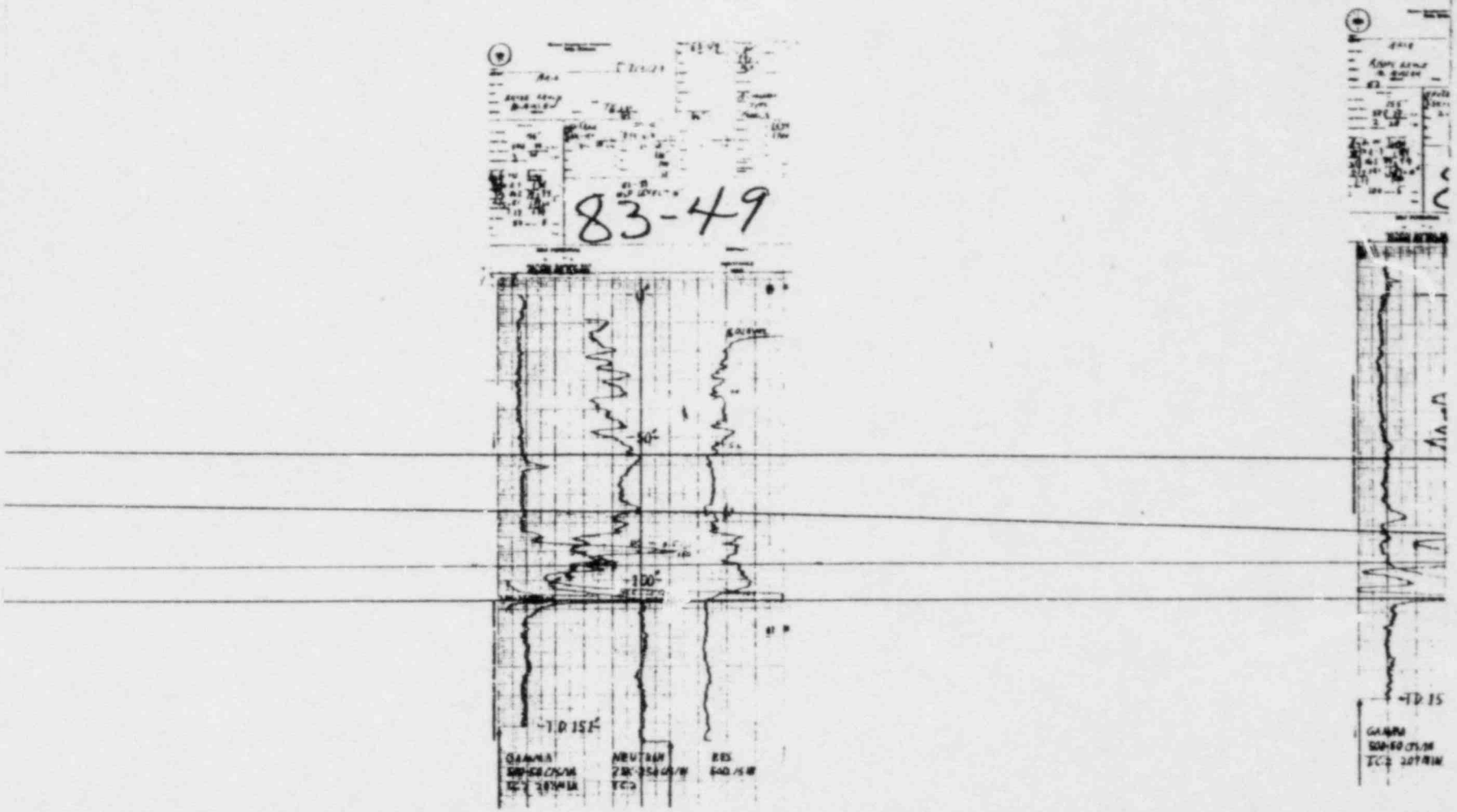
Manvel sand

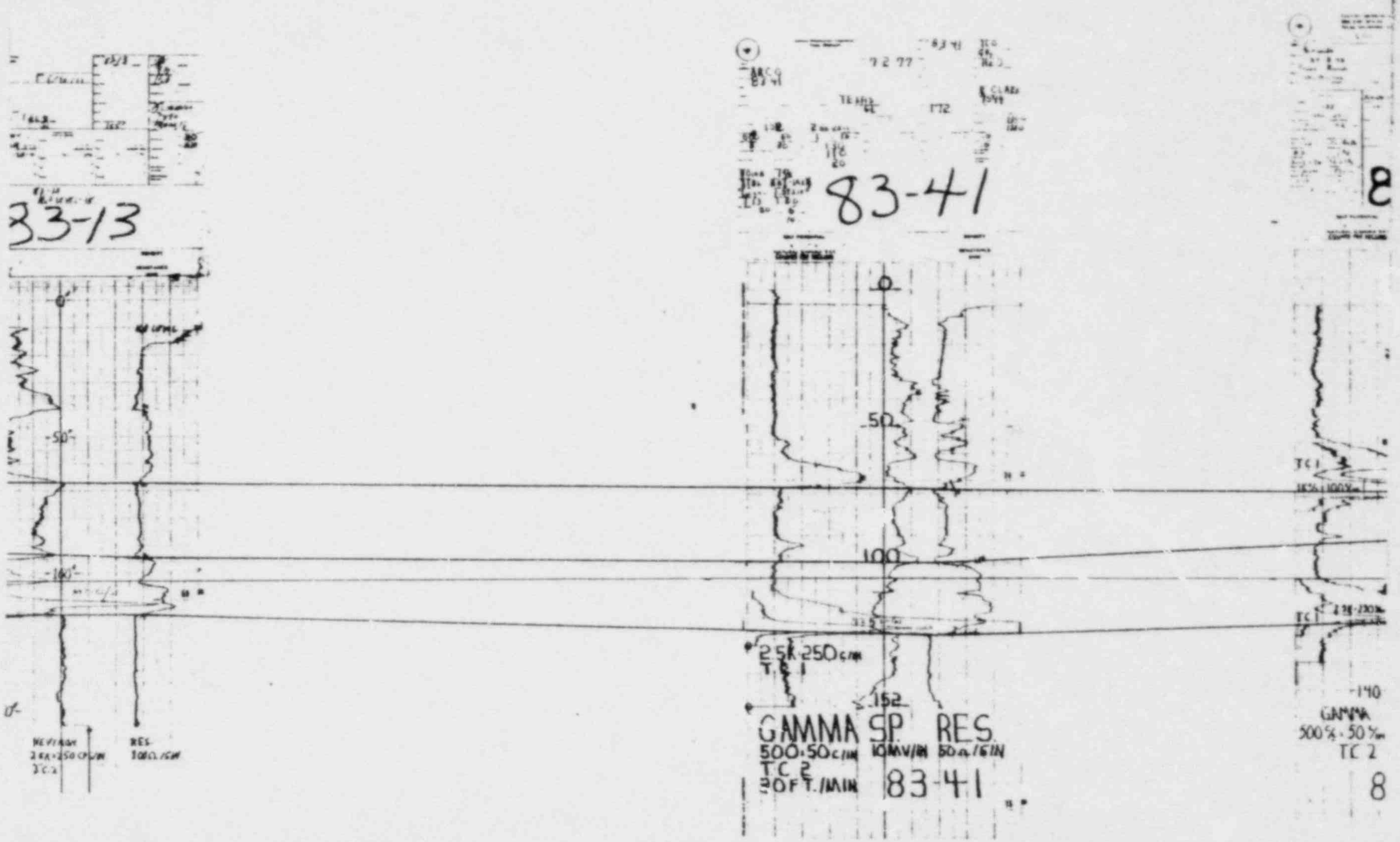
Catahoula

(This interval 750')

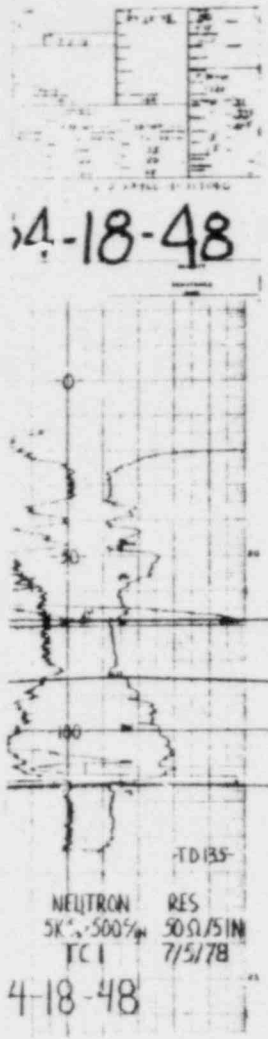
+400'

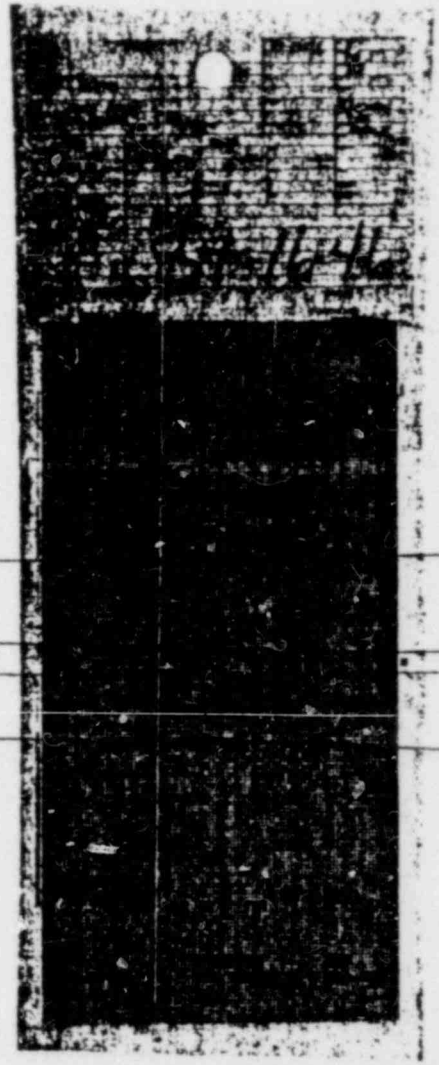
1":40' vertical 1":40' horizontal (unless otherwise indicated)


83-49
50'
100'
T.D. 151'
T.D. 15



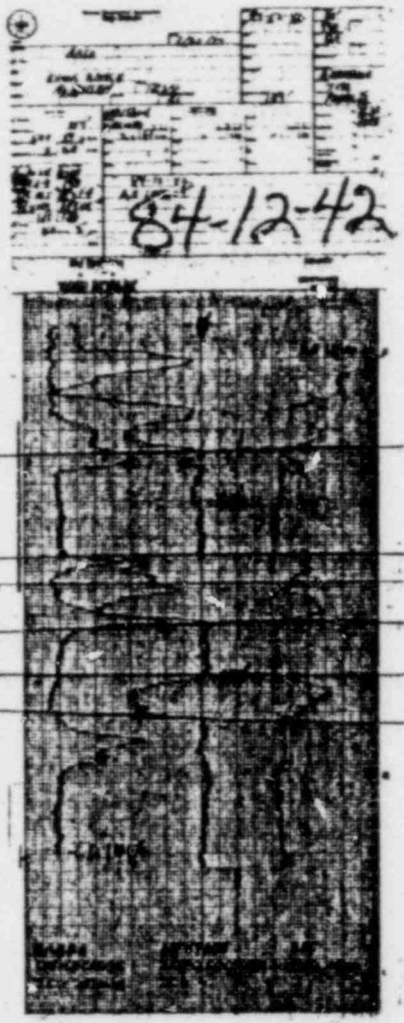
83-13
-50'
-100'
RES.
83-41
50
100
152
2.5K 250c/m
T.C. 1
GAMMA SP. RES.
500:50c/IN 10MV/IN 50Ω/6IN
T.C. 2
20FT./MIN
83-41
8
TC 1
TC 1
140
GAMMA
500%-50%
TC 2
8





Rincon sand and clay pinch out here

(This interval 550')



Magnolia

Manvel clay

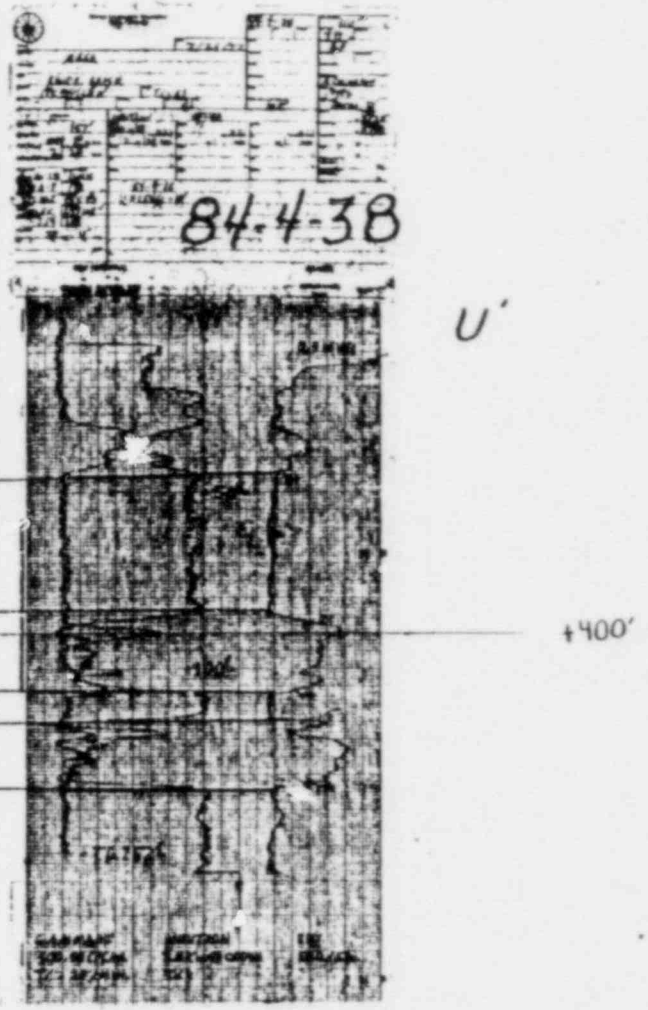
Manvel sand

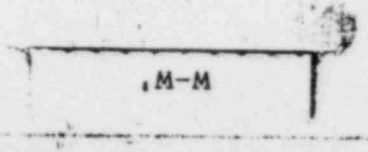
Rincon clay

Rincon sand

Catahoula

(This interval 900')


84-4-38
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

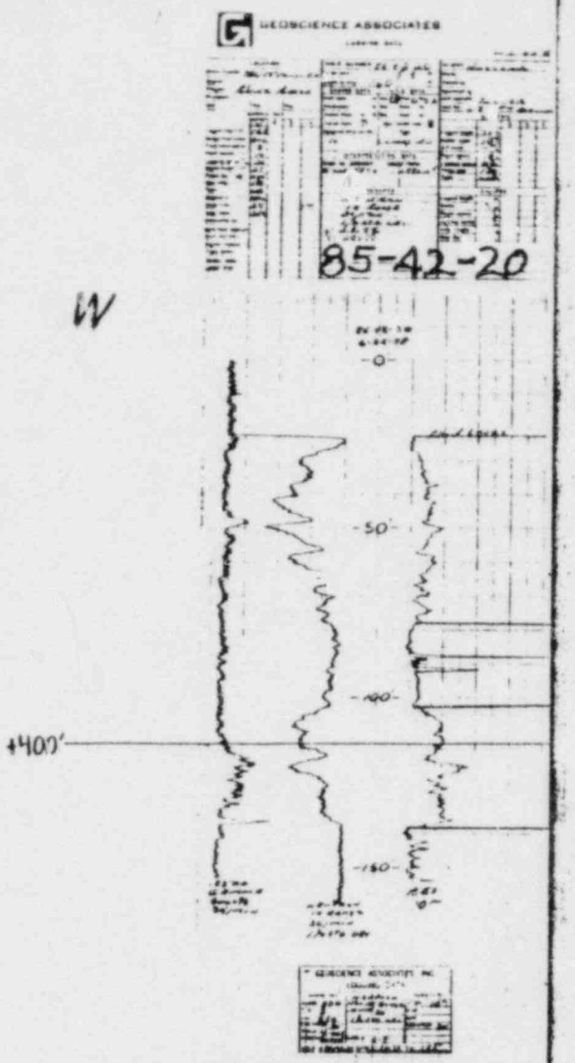
Magnolia	Interbedded f-md g silty sand & clay; oxidized orange-brown, red-brown to green-brown.
Manuel clay	Clay; reduced blue-grey.
Manuel sand	Interbedded f-md-cs sand, upper well cemented, clay; reduced/ oxidized blue-grey, grey-green to red-brown. Minor pyrite & clay balls.
Catahoula	Clay; reduced/oxidized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

85-22-20

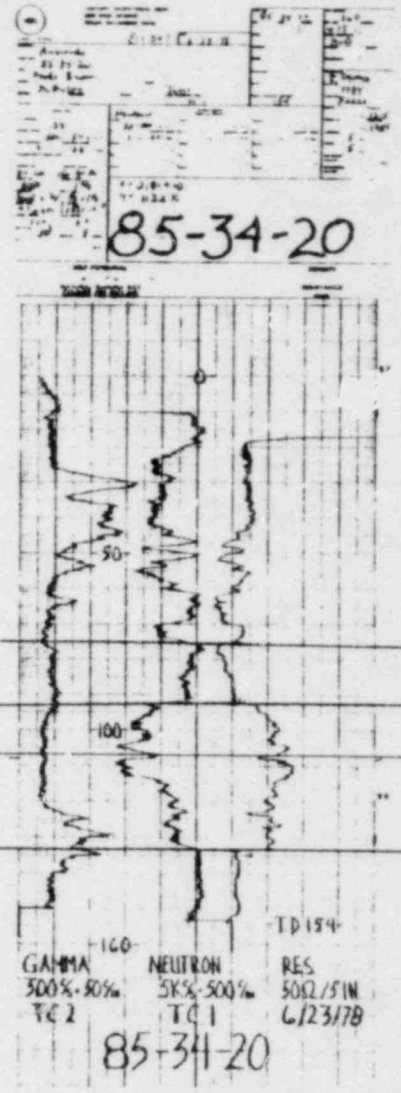
Magnolia	Caliche & interbedded f-md g sand, silty sand, & sandy clay; oxidized/reduced white, tan, yellow-tan to blue-grey. Abundant gypsum & minor clay balls
Manuel clay	Sandy clay; reduced blue-grey.
Manuel sand	Silty f-md g sand; reduced grey.
Catahoula	Clay to sandy clay; reduced/oxidized blue to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



Cross-section W-W'
7-18-78



Magnolia

Manvel clay

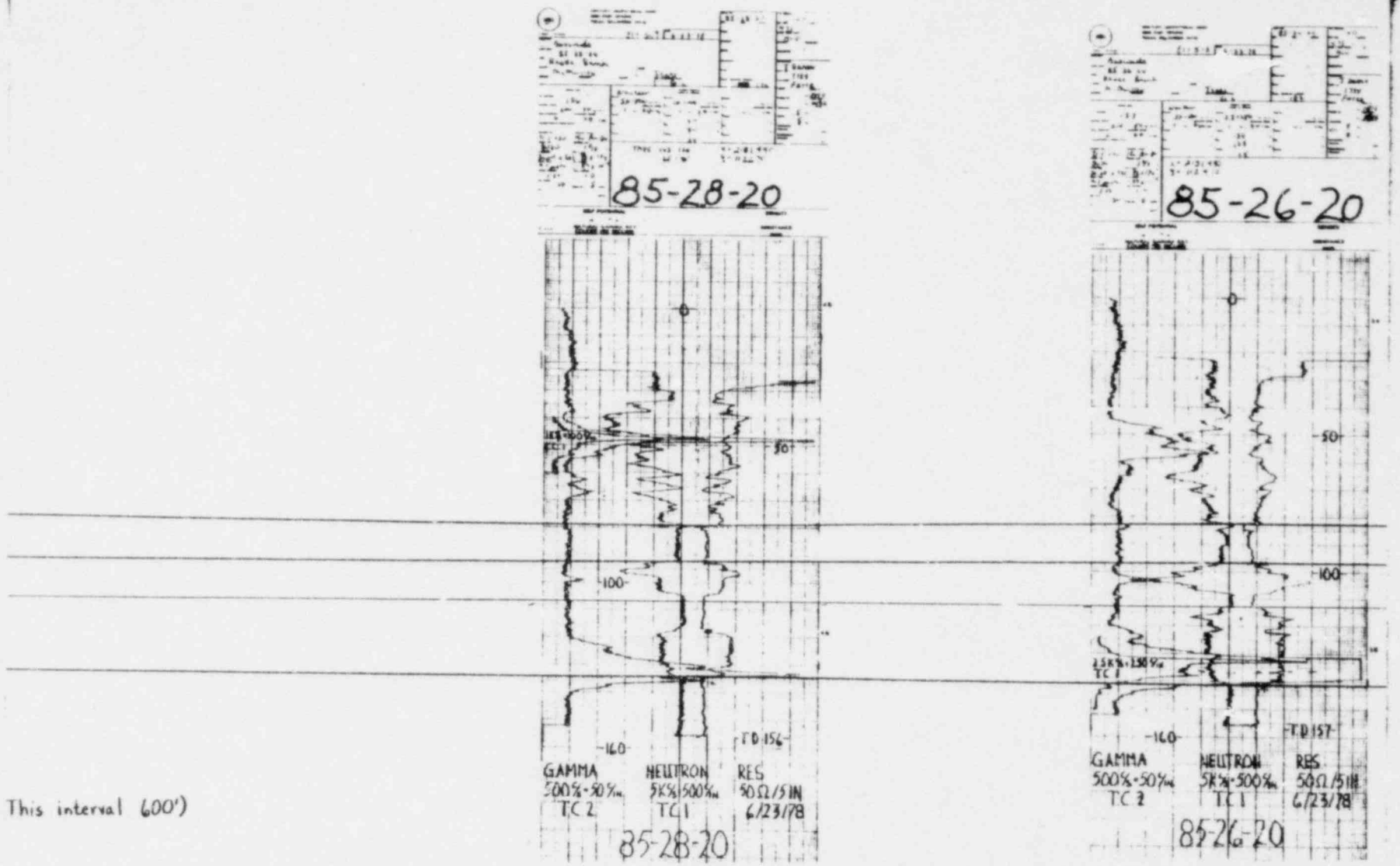
Manvel sand

Cataboula

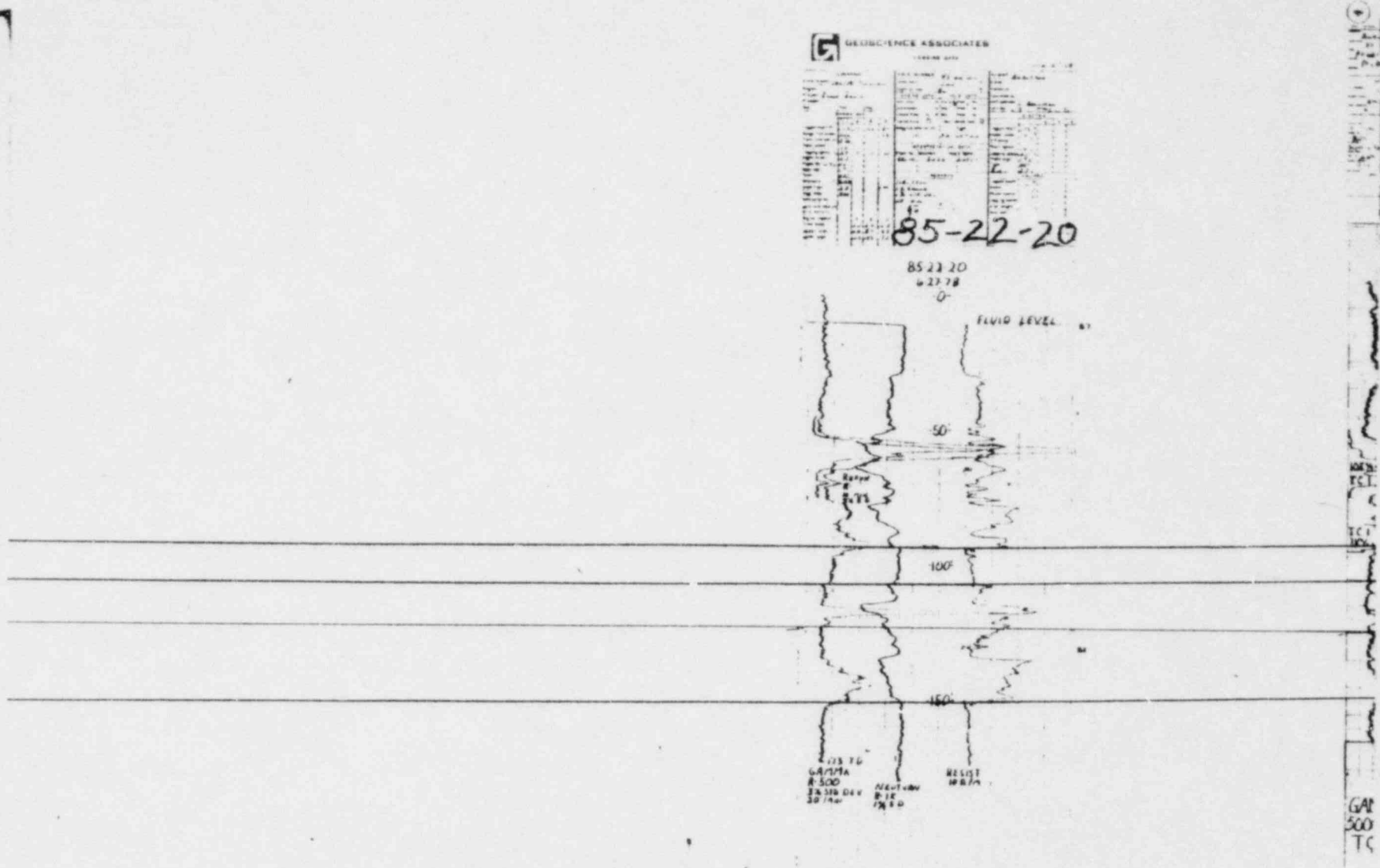
(This interval 800')

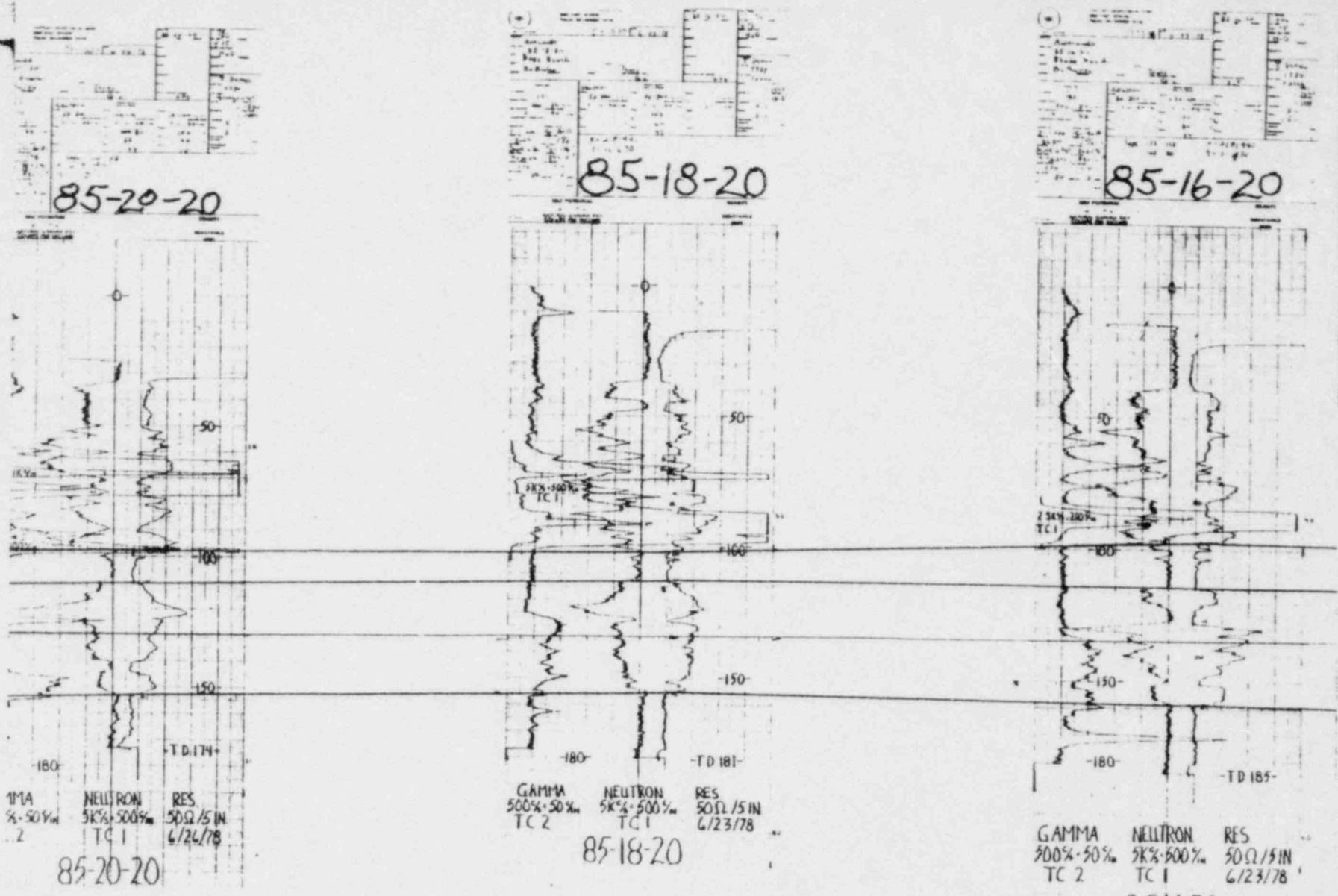
Datum: +400'

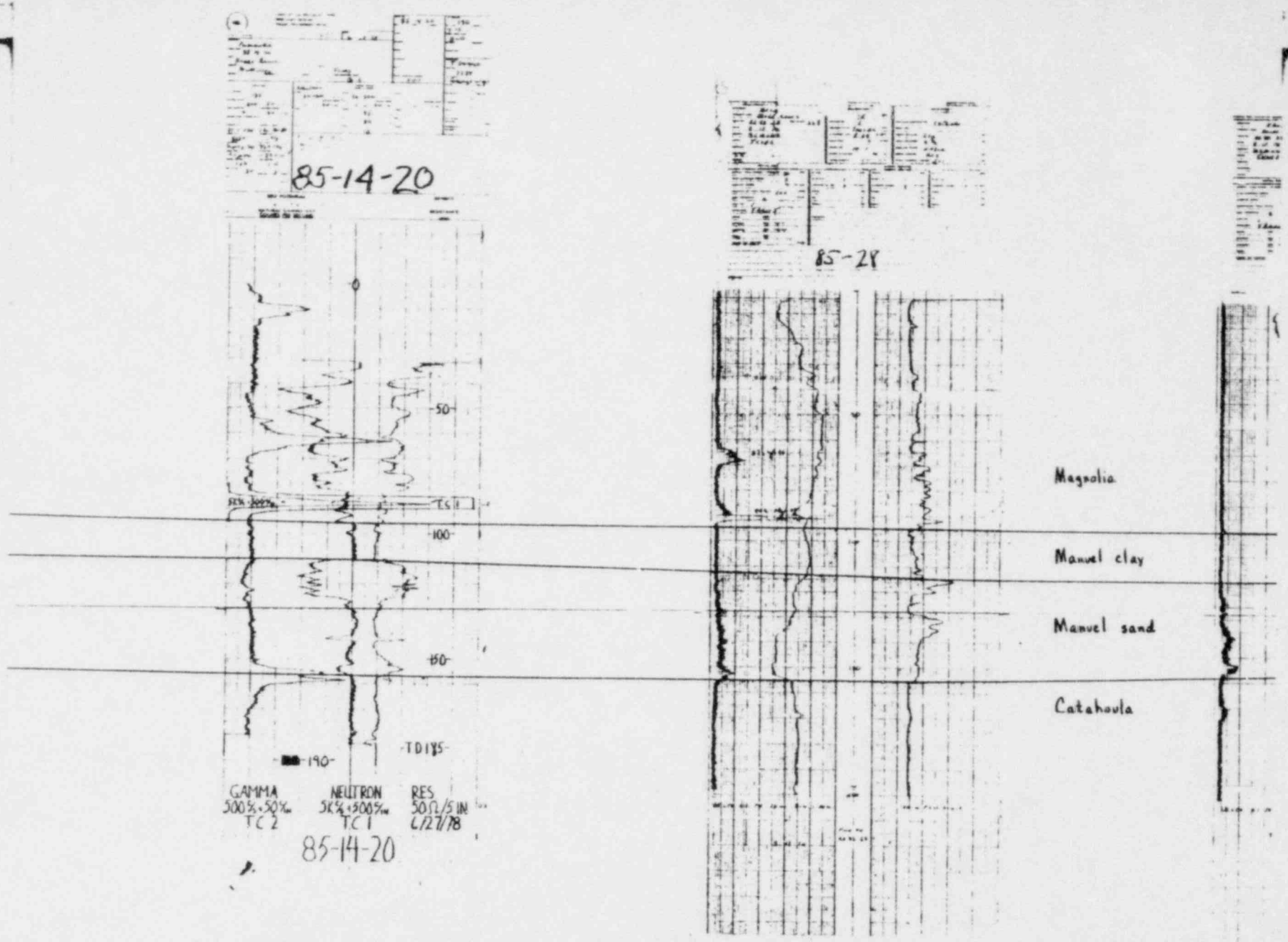
Scale: 1":40' vertical 1":40' horizontal (unless otherwise indicated)

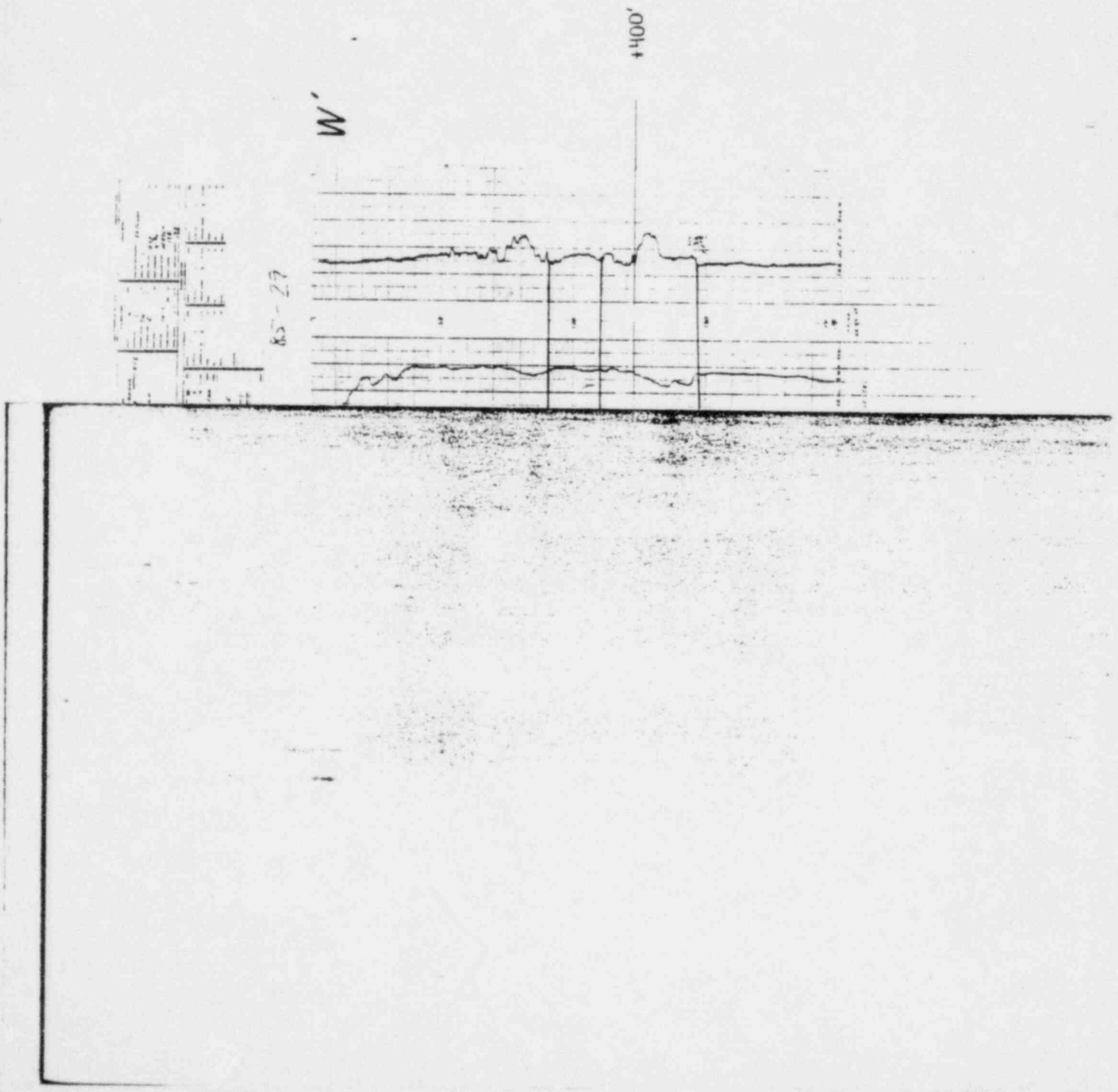


This interval 600')


GEOSCIENCE ASSOCIATES
85-22-20
85 22 20
6-23-78
0'
FLUID LEVEL
50'
100'
150'


85-20-20
50
100
150
180
TD 174
1MA
½-50½/m
.2
NEUTRON
5K%-500%/m
TC 1
RES
50Ω/5 IN
6/24/78
85-20-20
85-18-20
50
100
150
180
TD 181
GAMMA
500%-50%/m
TC 2
NEUTRON
5K%-500%/m
TC 1
RES
50Ω/5 IN
6/23/78
85-18-20
85-16-20
50
100
150
180
TD 185
GAMMA
500%-50%/m
TC 2
NEUTRON
5K%-500%/m
TC 1
RES
50Ω/5 IN
6/23/78
85-16-20


85-14-20
85-28
50
100
150
190
TD 185
Magnolia
Manuel clay
Manuel sand
Catahoula
GAMMA
300 % - 50 %
TC 2
NEUTRON
3K % - 300 %
TC 1
RES
50 Ω/5 IN
6/27/78
85-14-20


W'
+400'
KS - 27

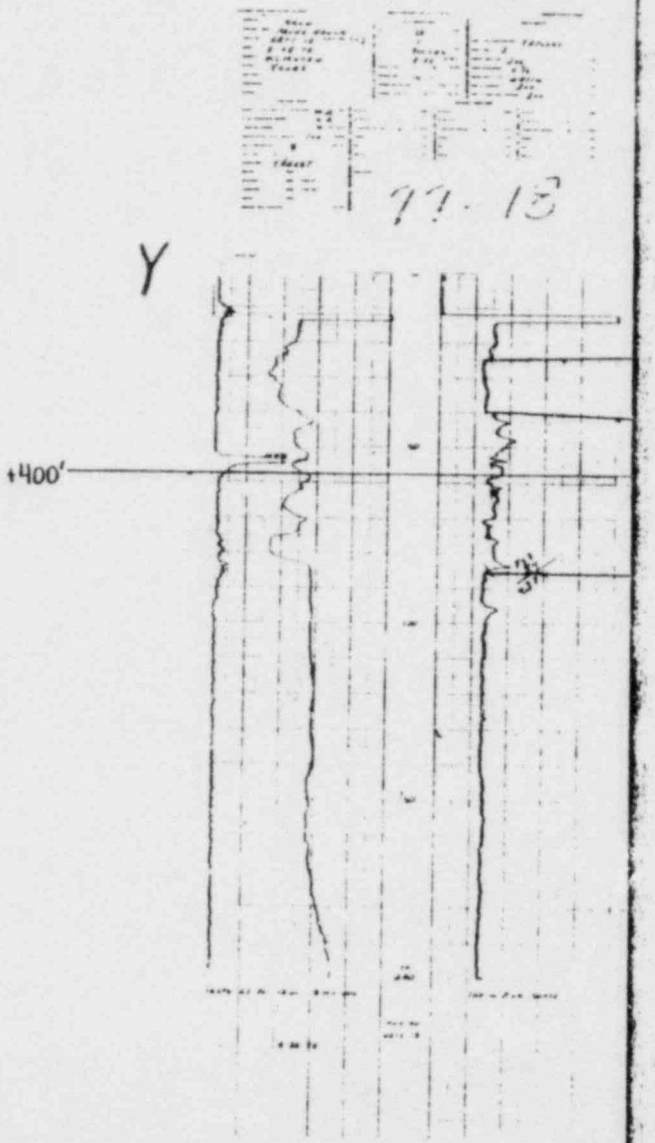
CROSS SECTION Y-Y'

77-16-36

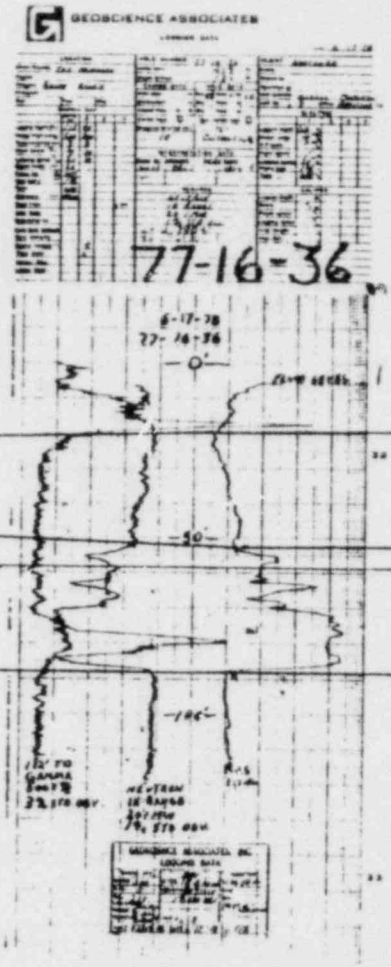
Magnolia	Silty clay & f g silty sand; oxidized light-brown to yellowish tan. Minor caliche, gypsum & clay balls.
Manuel clay	Sandy clay, silty f g sand; oxidized/reduced yellow to blue-grey. Minor gypsum & clay balls. Light blue silt near base.
Manuel sand	Interbedded silty f g cemented sand & silty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



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



Magnolia

Manvel clay

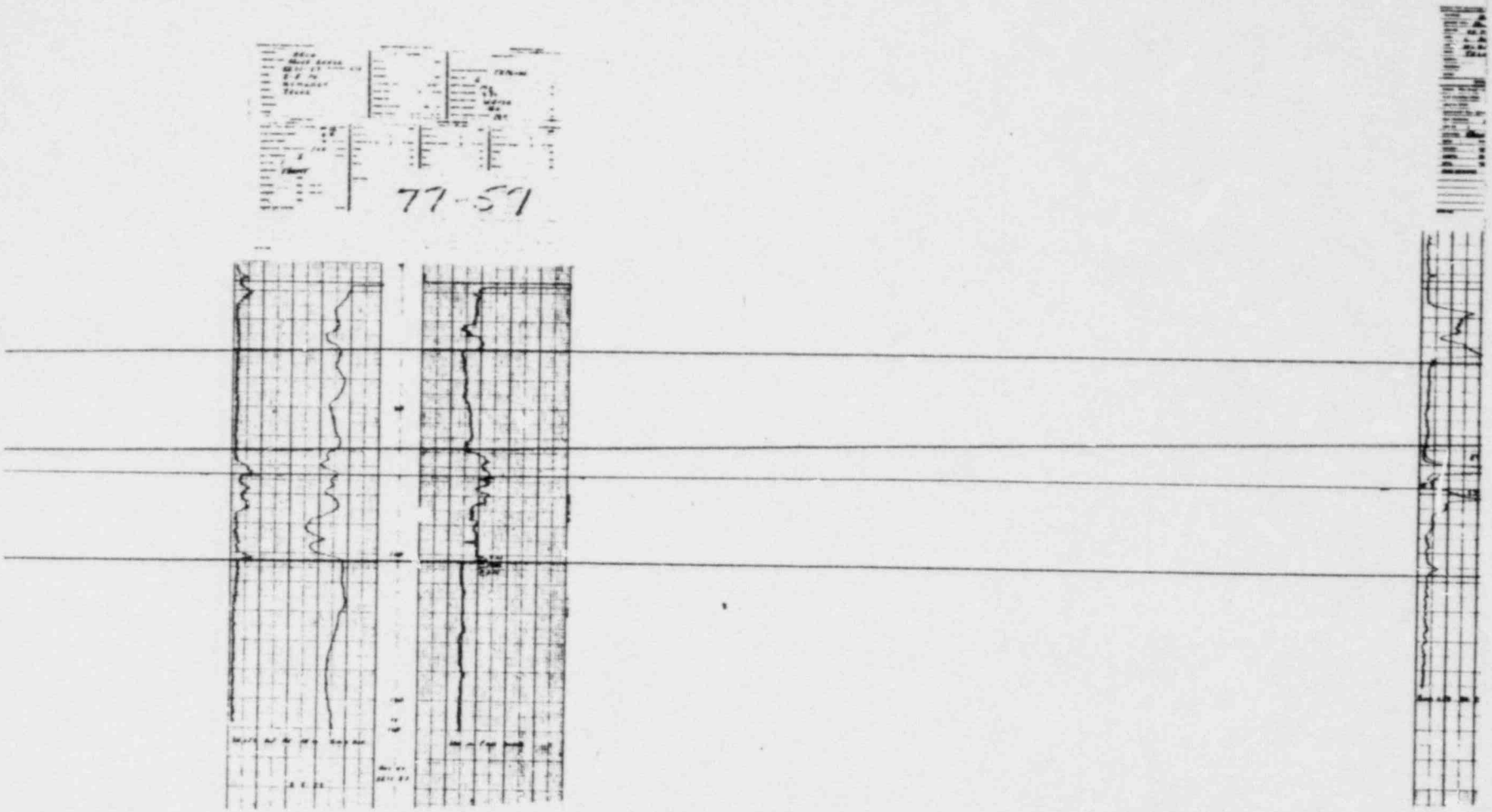
Manvel sand

Catahoula

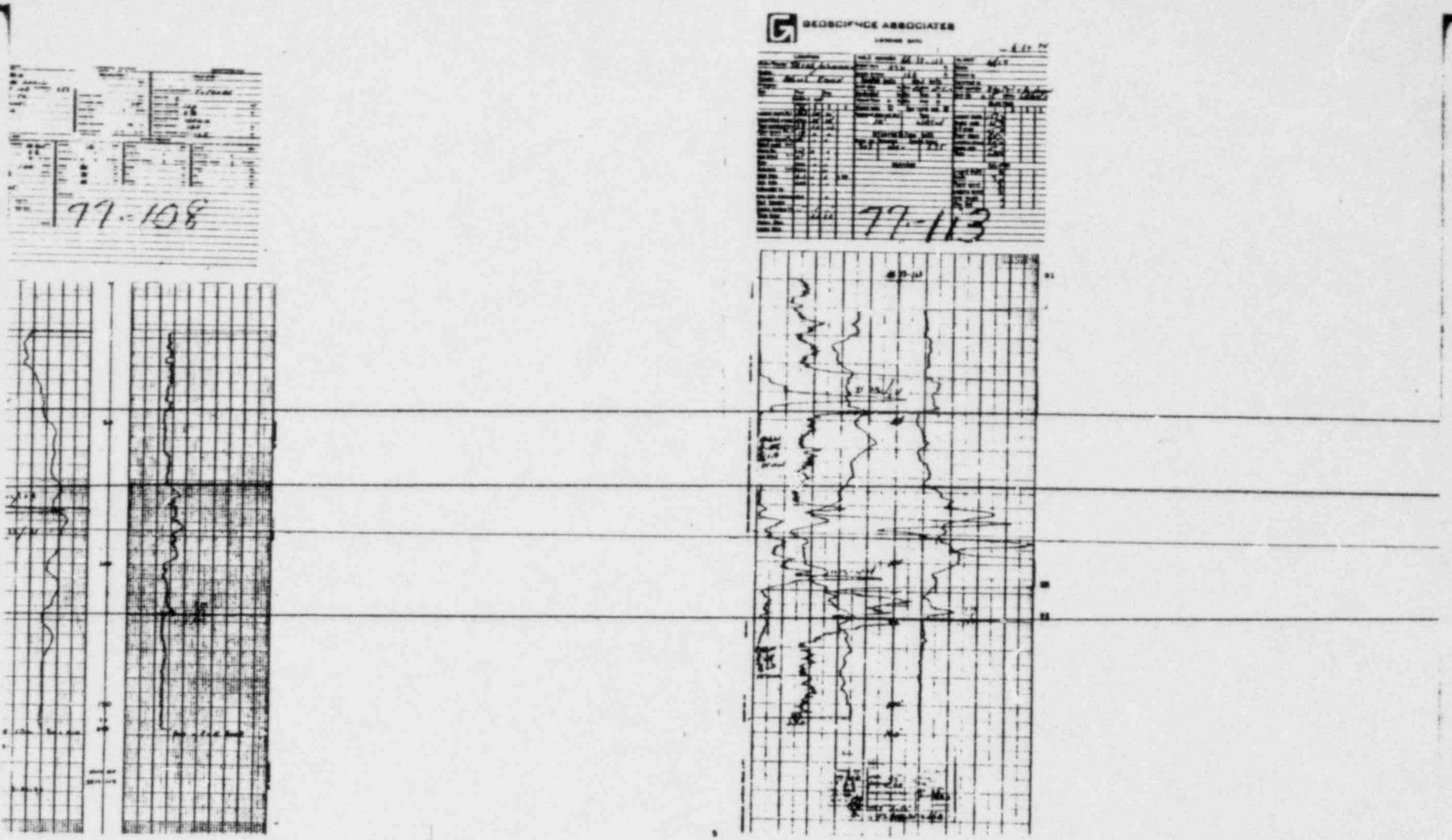
(This interval 550')

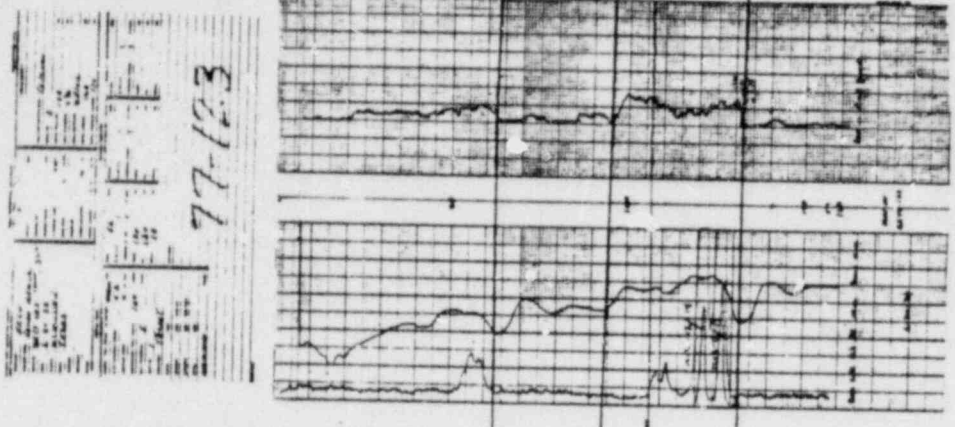
Datum: +400'

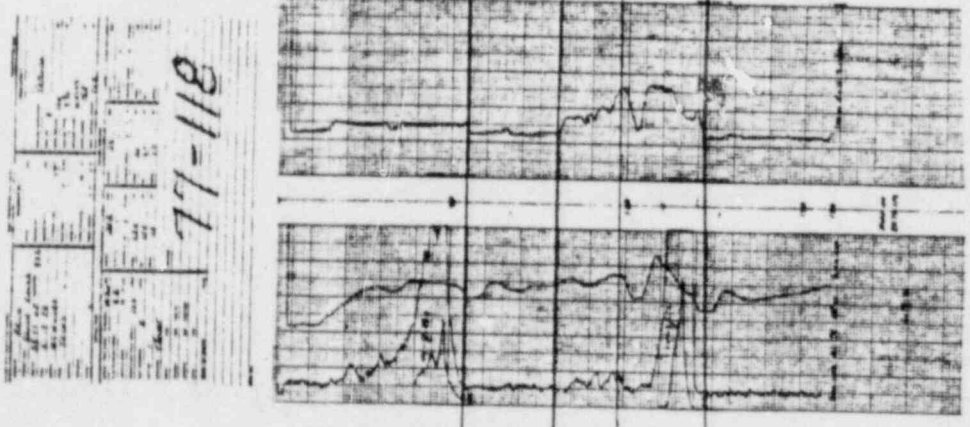
Scale: 1": 40' vertical 1": 40' horizontal (unless otherwise indicated)

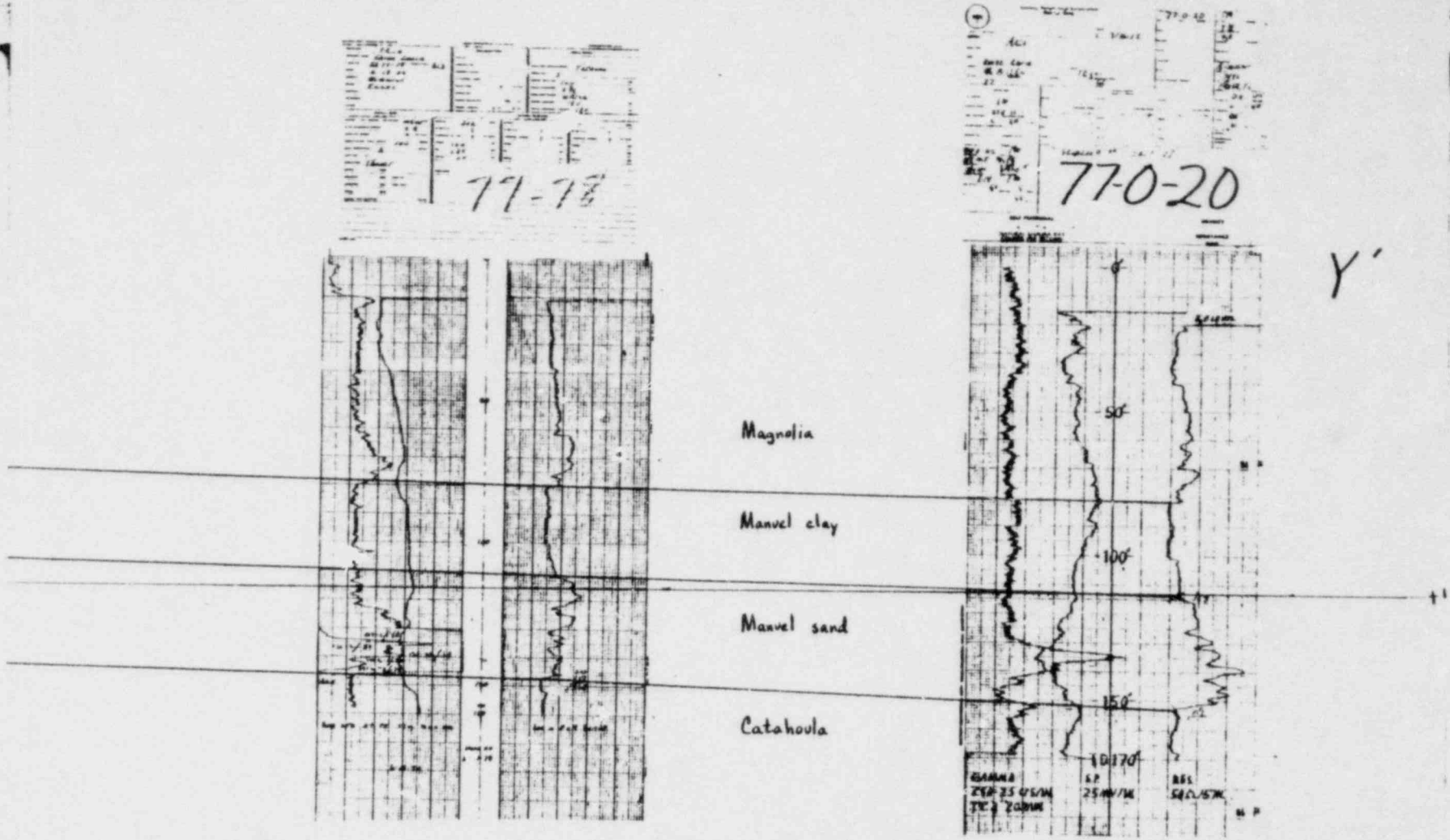


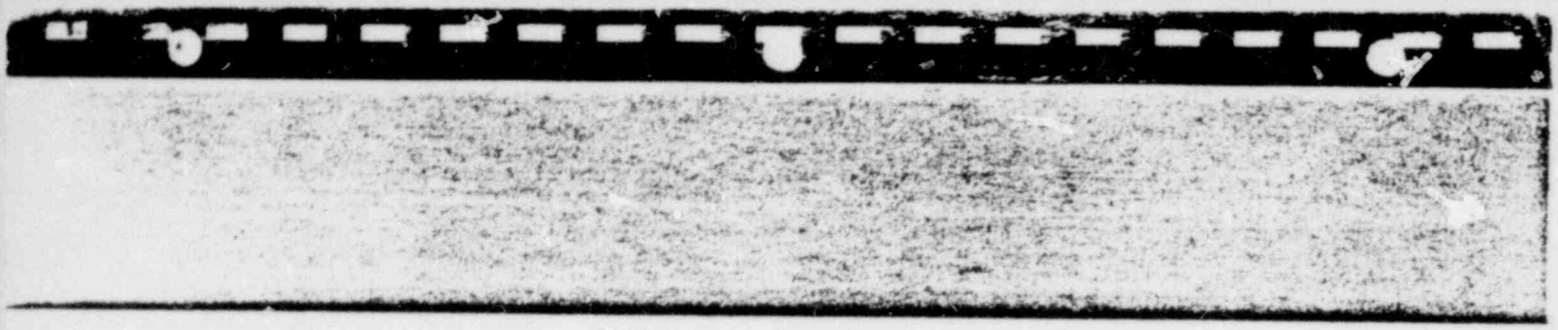
(This interval 450')


77-108
77-113


E11-12


B11-11

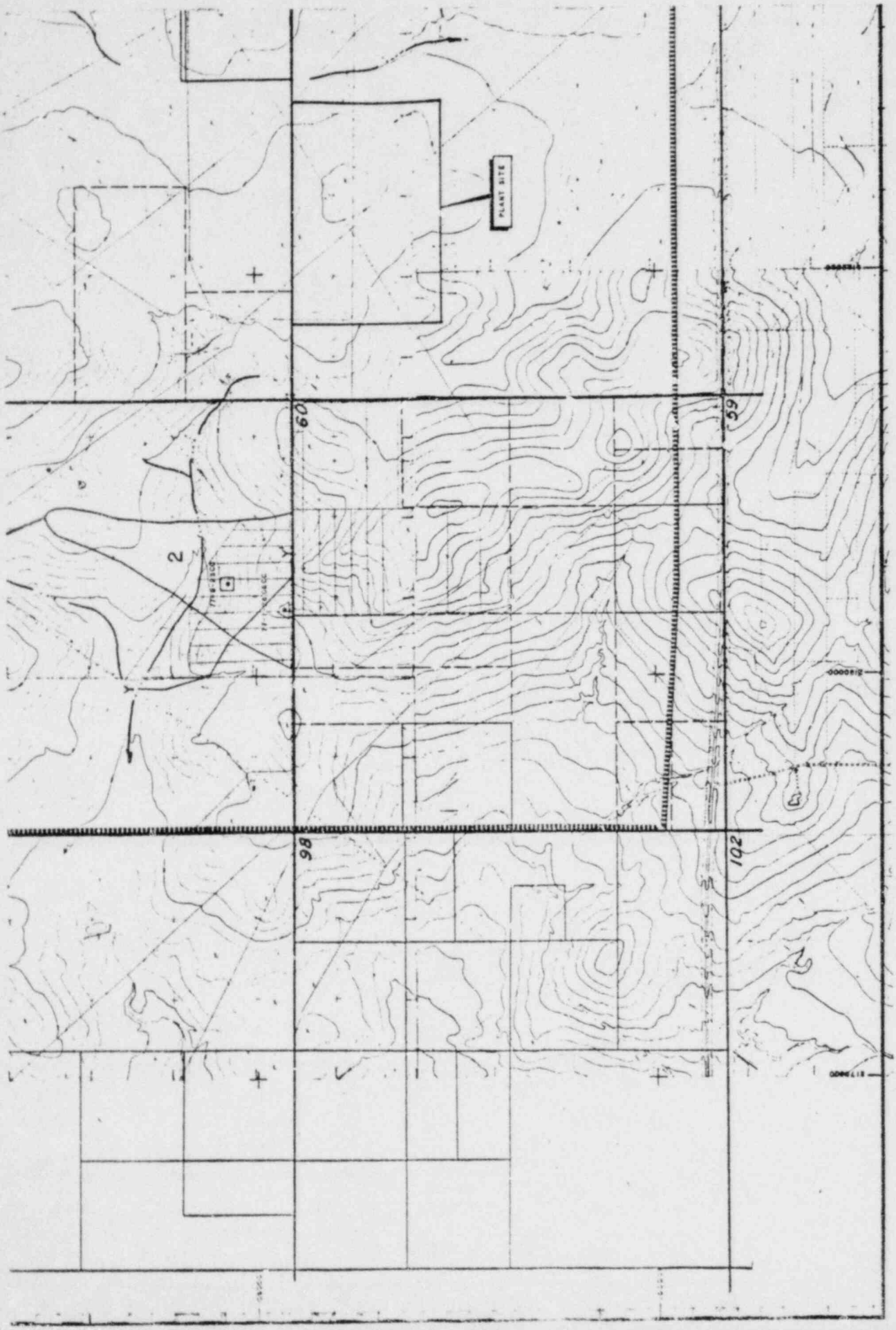

77-78
77-0-20
Y'
Magnolia
Manvel clay
Manvel sand
Catahoula
50'
100'
150'
170'

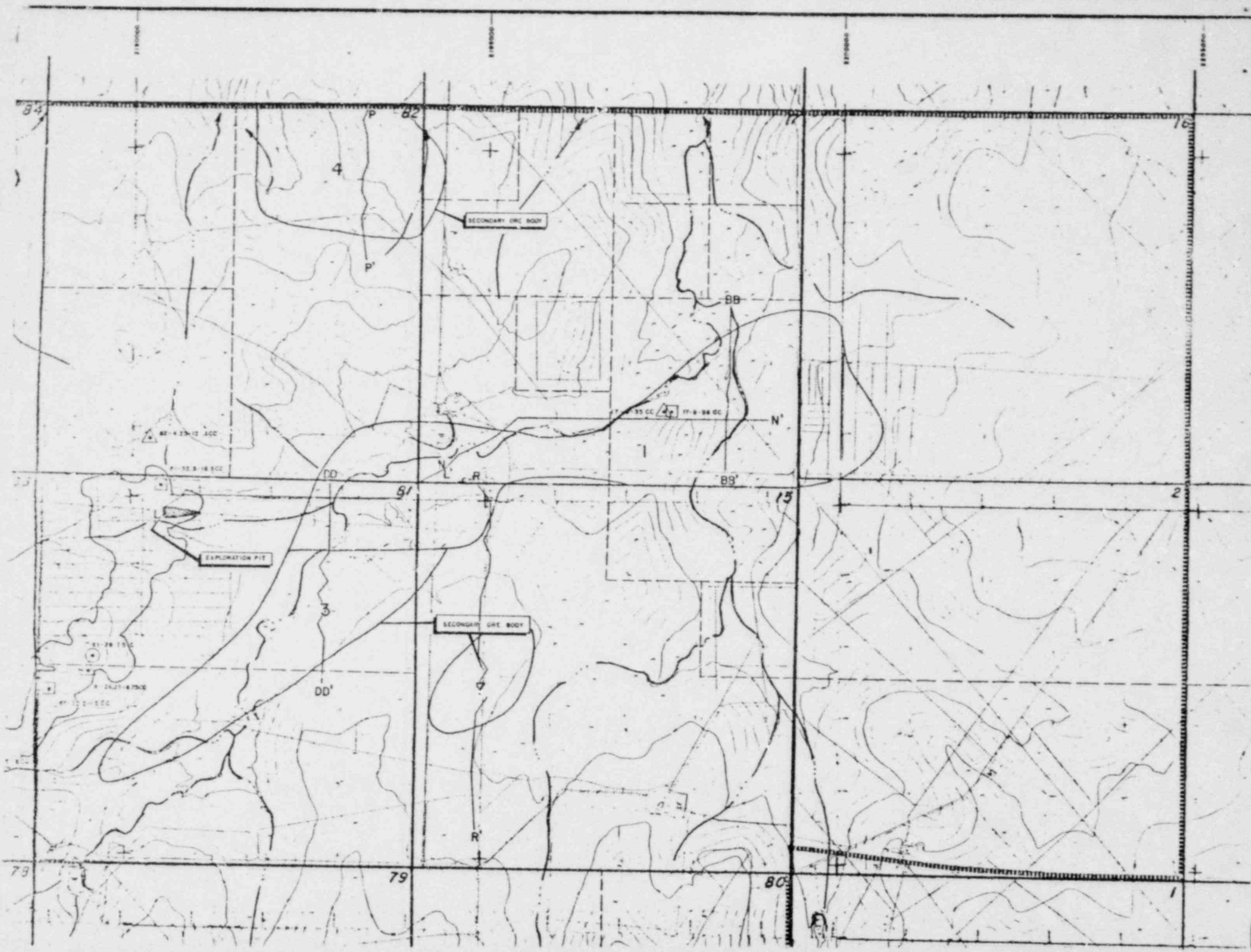



100'

FIGURE 2


87
83
88
85
97
77
SECONDARY ORE BODY
MAIN ORE BODY
SECONDARY ORE BODY
5
6
U
U
W
W


PLANT SITE
60
59
98
102
2


84
82
P
P'
4
SECONDARY ORE BODY
BB
N'
1
DD
R
BB'
81
15
2
EXPLORATION PIT
3
SECONDARY ORE BODY
DD'
R'
79
80
1

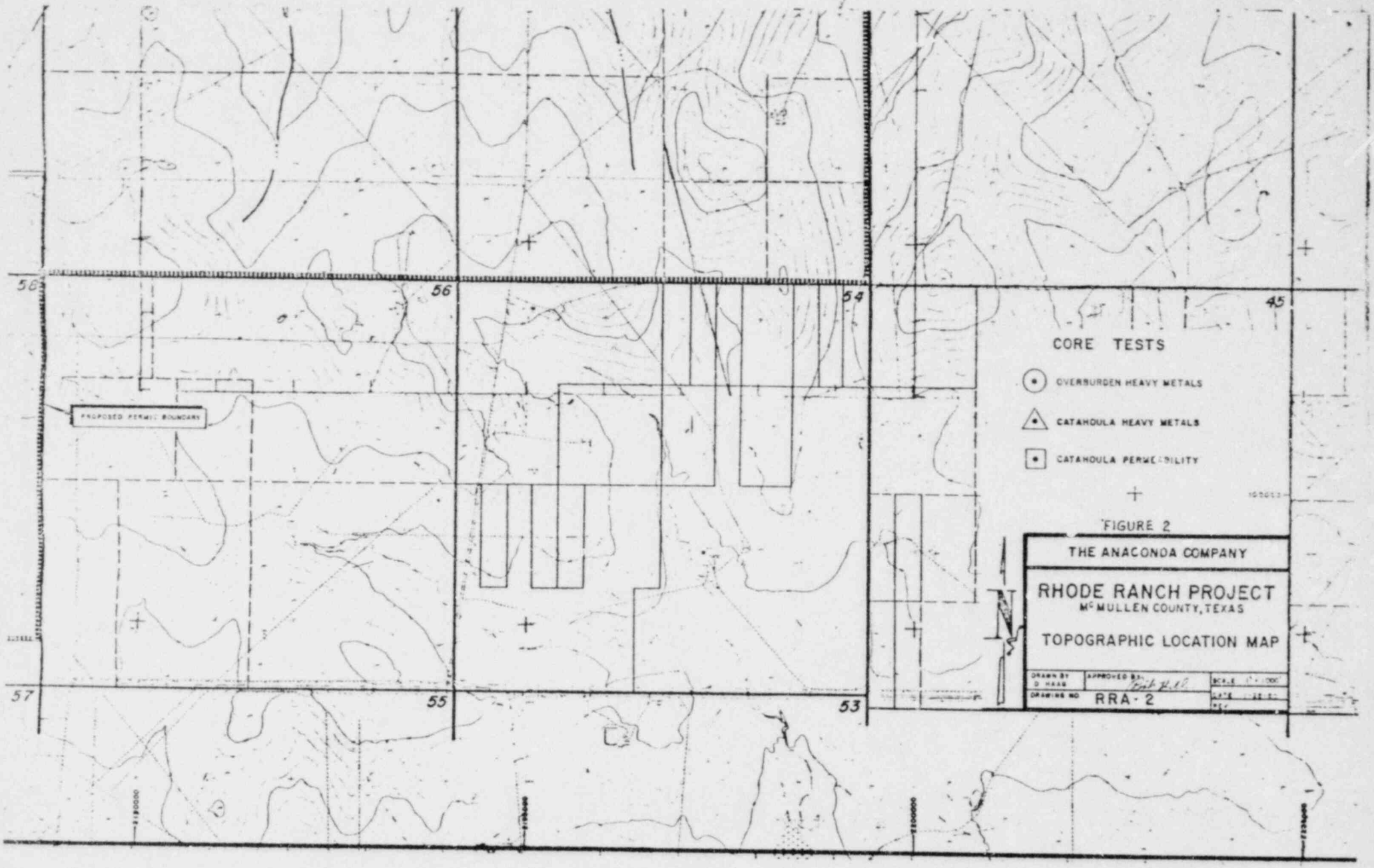
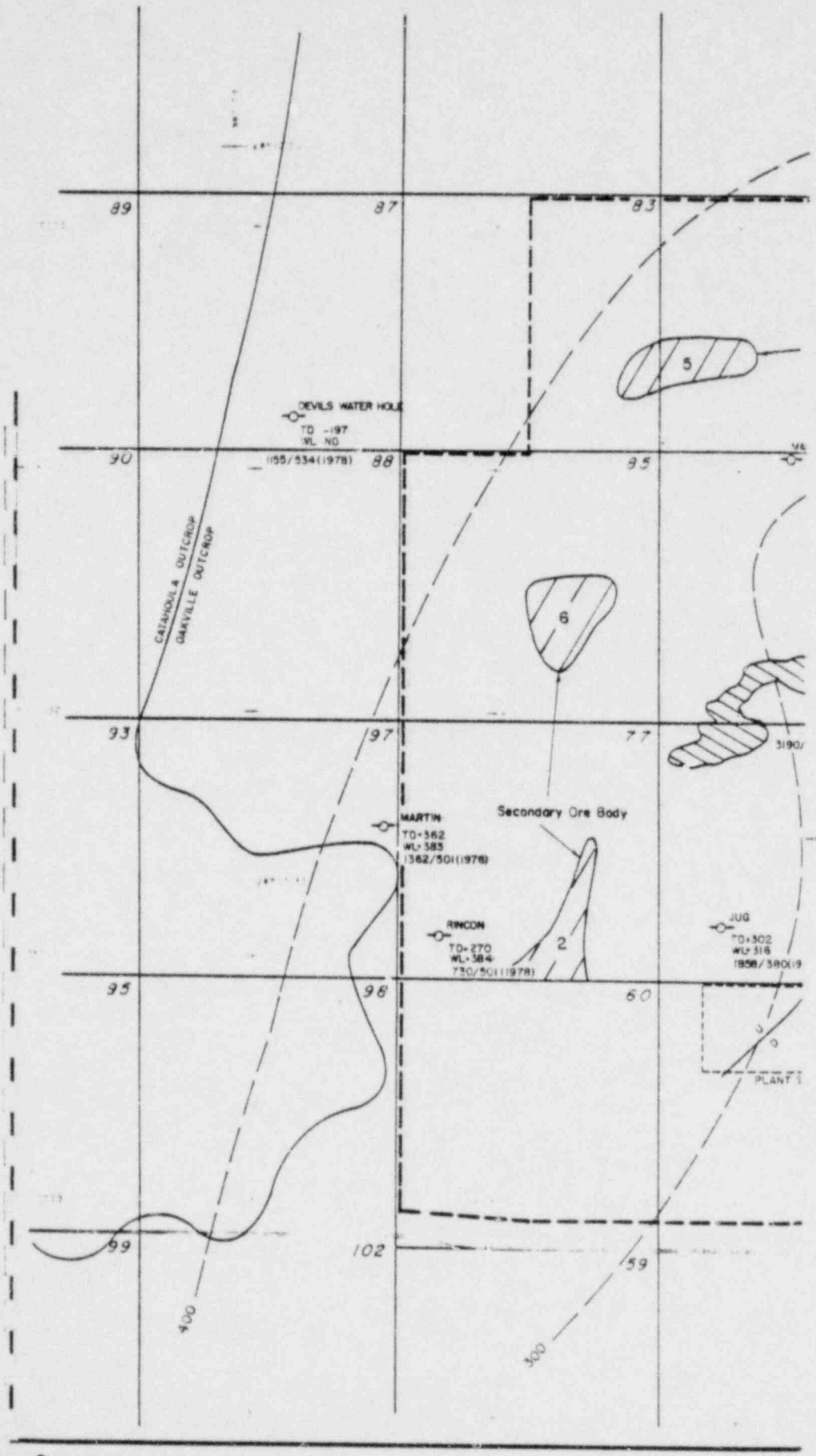
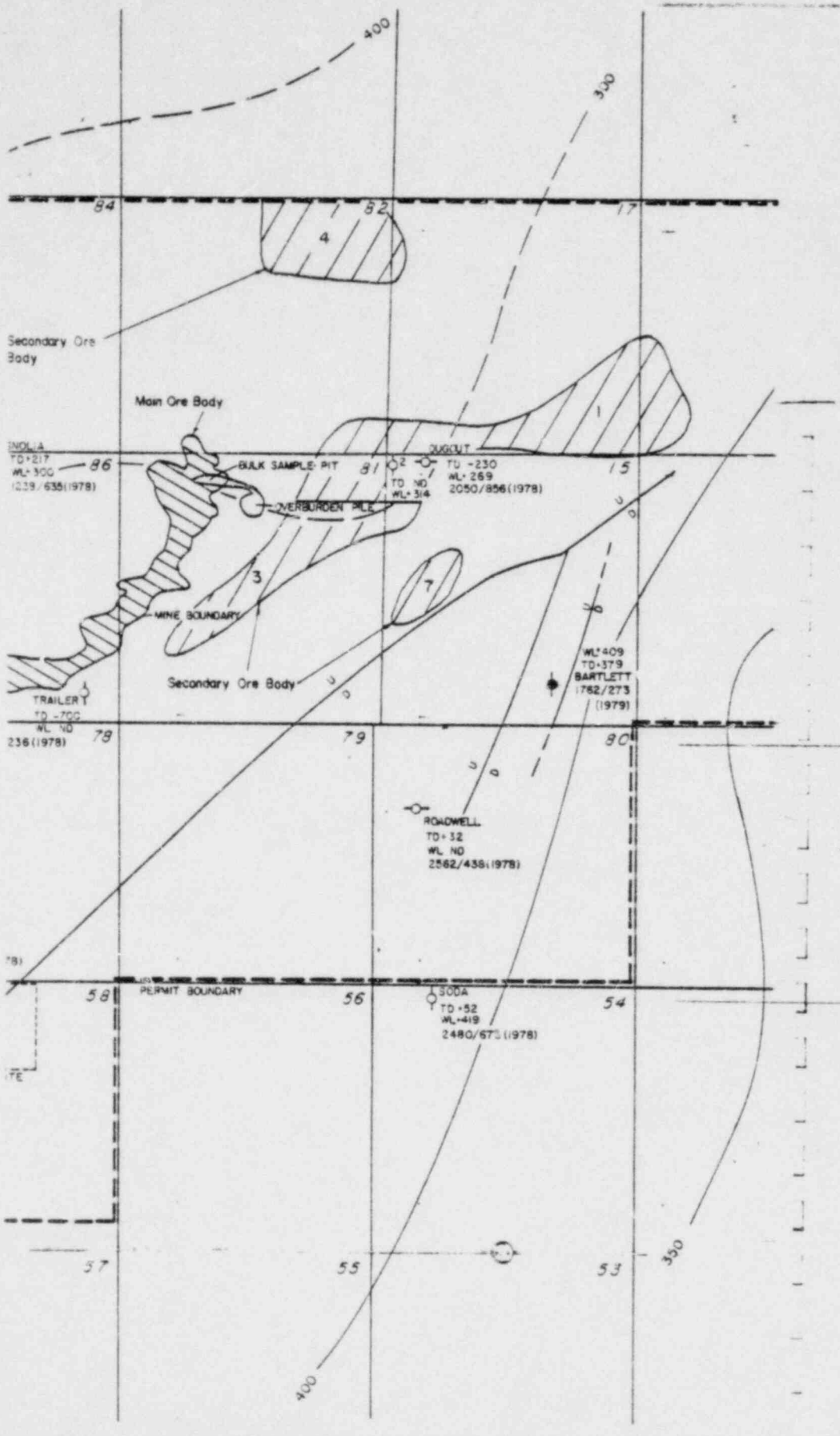
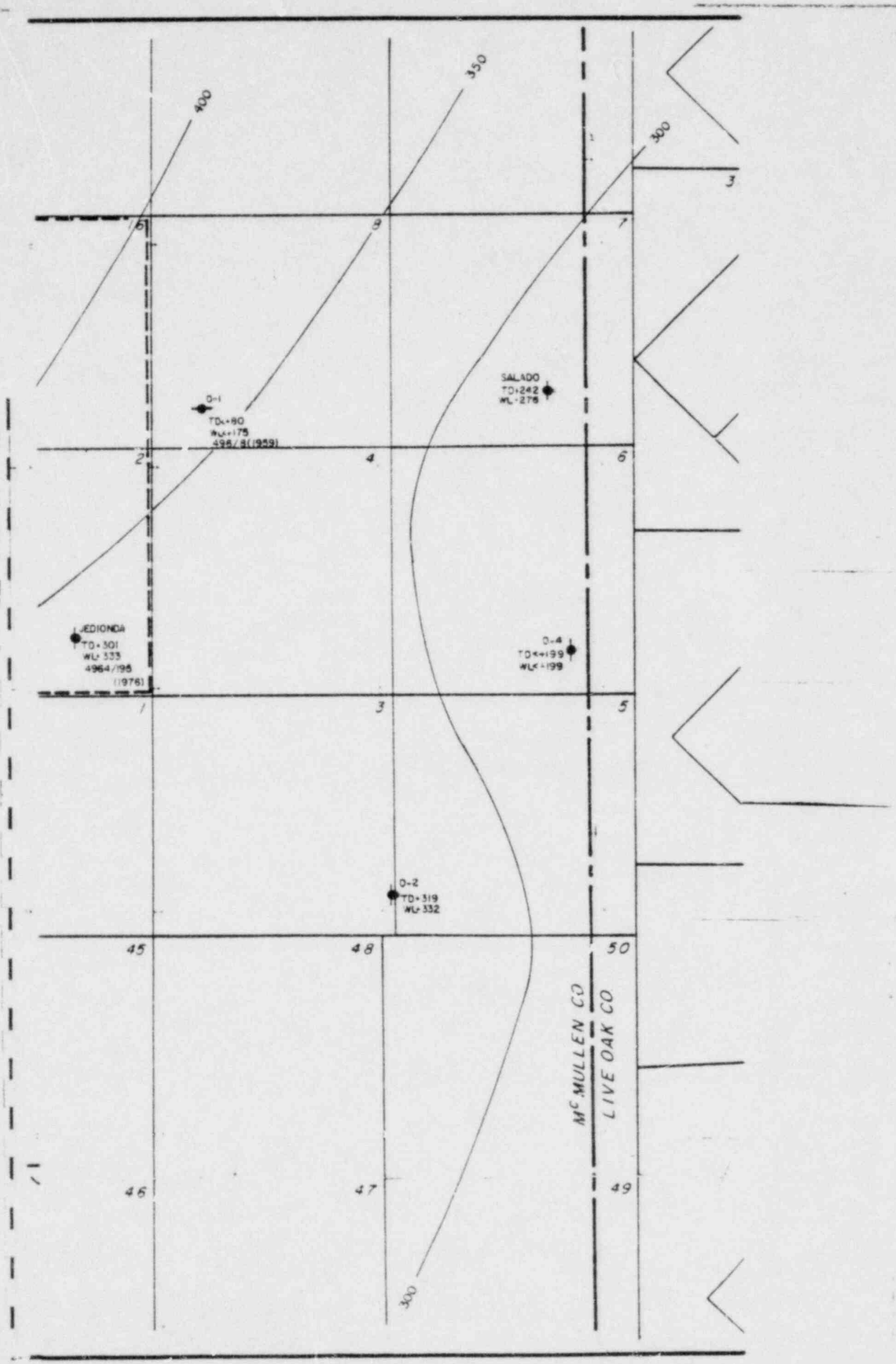

56
54
45
57
55
53
PROPOSED PERMIT BOUNDARY
CORE TESTS
OVERBURDEN HEAVY METALS
CATAHOULA HEAVY METALS
CATAHOULA PERMEABILITY
FIGURE 2
THE ANACONDA COMPANY
RHODE RANCH PROJECT
Mc MULLEN COUNTY, TEXAS
TOPOGRAPHIC LOCATION MAP
DRAWN BY D. HAAG
APPROVED BY
SCALE 1" = 1000'
DRAWING NO RRA-2
DATE 12-2-

FIGURE 6


89
87
83
5
DEVILS WATER HOLE
TD -197
WL ND
1155/534(1978)
90
88
85
CATARINA OUTCROP
OAKVILLE OUTCROP
6
93
97
77
5190'
MARTIN
TD+562
WL+385
1362/501(1976)
Secondary Ore Body
RINCON
TD+270
WL+384
730/501(1978)
2
JUG
TD+302
WL+316
1858/380(19
95
98
60
PLANT
99
102
59
400
300


400
300
84
82
17
4
Secondary Ore Body
Main Ore Body
1
INDULA
TD+217
WL+300
(239/635(1978)
86
BULK SAMPLE PIT
81
2
TD -230
WL+269
2050/856(1978)
OVERBURDEN PILE
TD NO
WL+314
15
3
7
MINE BOUNDARY
WL+409
TD+379
BARTLETT
1762/273
(1979)
Secondary Ore Body
TRAILER
TD -700
WL NO
236(1978)
78
79
80
ROADWELL
TD+32
WL NO
2562/438(1978)
PERMIT BOUNDARY
58
56
54
SODA
TD+52
WL+419
2480/673(1978)
57
55
53
350
400


400
350
300
300
O-1
TD+80
WL+175
496/8(1939)
SALADO
TD+242
WL+276
JEDIONDA
TD+301
WL+333
4964/195
(1976)
O-4
TD+199
WL+199
O-2
TD+319
WL+332
Mc MULLEN CO
LIVE OAK CO
1
2
3
4
5
6
7
8
45
46
47
48
49
50

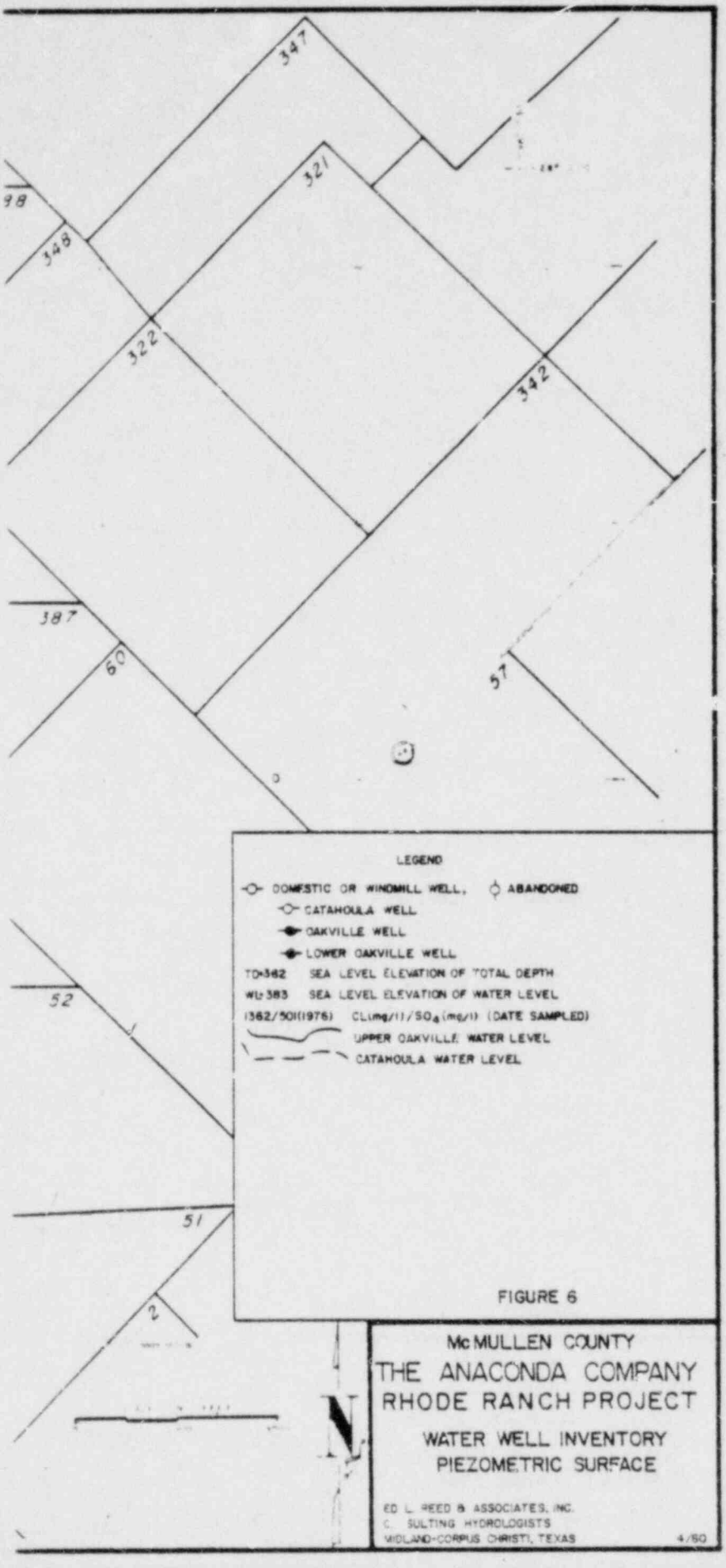


FIGURE 6

McMULLEN COUNTY

THE ANACONDA COMPANY
RHODE RANCH PROJECT

WATER WELL INVENTORY
PIEZOMETRIC SURFACE

ED L. REED & ASSOCIATES, INC.
CONSULTING HYDROLOGISTS
MIDLAND-CORPUS CHRISTI, TEXAS 4/80