

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

GEOPHYSICAL LOGS FOR 18 HOLES DRILLED DURING 1977 IN THE
ROUND BOTTOM AREA, YAMPA COAL FIELD, MOFFAT COUNTY, COLORADO

By

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This report has not been edited for conformity
with Geological Survey editorial standards or
stratigraphic nomenclature.

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GEOPHYSICAL LOGS FOR 18 HOLES DRILLED DURING 1977 IN THE ROUND
BOTTOM AREA, YAMPA COAL FIELD, MOFFAT COUNTY, COLORADO

By Edward A. Johnson

INTRODUCTION

Between July 24, and October 2, 1977, 18 holes, with diameters of approximately 5 inches and with a cumulative depth of 18,098 feet, were drilled in the Round Bottom area located southwest of Craig in Moffat County, Colorado (fig. 1). The holes were drilled with truck-mounted rotary drill rigs under U.S. Geological Survey Contract No. 14-08-0001-15788, awarded to McCabe Brothers Drilling, Inc. and Hugh Harris Drilling Company, Inc.

The purpose of the drilling was to obtain information on the depth, thickness, and continuity of the Federal coal known to exist in the Williams Fork Formation of Late Cretaceous age in this area of the Yampa coal field (Hancock, 1925). Drill-hole sites were positioned within areas known to be of interest to industry for future leasing and, although drilling operations were limited to areas adjacent to existing roads, an attempt was made to space the wells within $1\frac{1}{2}$ miles of each other to facilitate indicated resource evaluation (U.S. Bureau of Mines and U.S. Geological Survey, 1976). For stratigraphic control, wells were drilled to reach either the Twentymile Sandstone Member of the Williams Fork Formation or the Trout Creek Sandstone Member of the Upper Cretaceous Iles Formation. However, in several instances the target unit was not reached or could not be identified with certainty.

Permission for access and to drill on private surface was obtained by the author, who also coordinated the drilling and geophysical logging

operations and participated in the Bureau of Land Management's pre- and post-drilling site inspections. Lawrence Rudd, U.S. Geological Survey, assisted in all phases of the drilling program and was especially helpful in sample describing during the drilling.

Under contract to McCabe and Harris, 17,843 feet of hole were logged by geophysical methods by one of the following three logging companies:

Rocky Mountain Logging Service, Casper, Wyoming

Digilog, Inc., Broomfield, Colorado

Savage Scientific, Inc., Craig, Colorado

Four geophysical logs were recorded from one sonde during a single trip up the hole. Spontaneous potential (SP) and single-point resistance (R) logs are used primarily to distinguish between noncoal rock types (e.g., sandstone from shale). Density (gamma-gamma (D)) and natural-gamma (G) logs are used to identify coal from noncoal. Coal is represented on the natural-gamma log by a sharp reduction in the radioactivity (deflection to the left) and on the density log by a sharp reduction in the density (deflection to the right). Using the density log, coal thickness can be estimated as the vertical distance between the halfway point on the upper deflection and the halfway point on the lower deflection.

Owing to various lost circulation problems, liquid (drilling mud or water) could not always be maintained in the upper parts of some drill holes during logging. Because the electric logs (SP and R) require a liquid in the hole, the logging operation was halted and an attempt was made to fill the holes to the top. This procedure was not always successful, and some of these logs are absent.

The logs were originally run at a vertical scale of 1 inch to 10 feet, but for convenience of reproducing this report, the logs were reduced in scale to 1 inch to 50 feet. To convert feet to meters, multiply by 0.3048.

REFERENCES CITED

- Hancock, E. T., 1925, Geology and coal resources of the Axial and Monument Butte quadrangles, Moffat County, Colorado: U.S. Geol. Survey Bull. 757, 134 p.
- U.S. Bureau of Mines and U.S. Geological Survey, 1976, Coal resource classification system of the U.S. Bureau of Mines and U.S. Geological Survey: U.S. Geol. Survey Bull. 1450-B, 7 p.

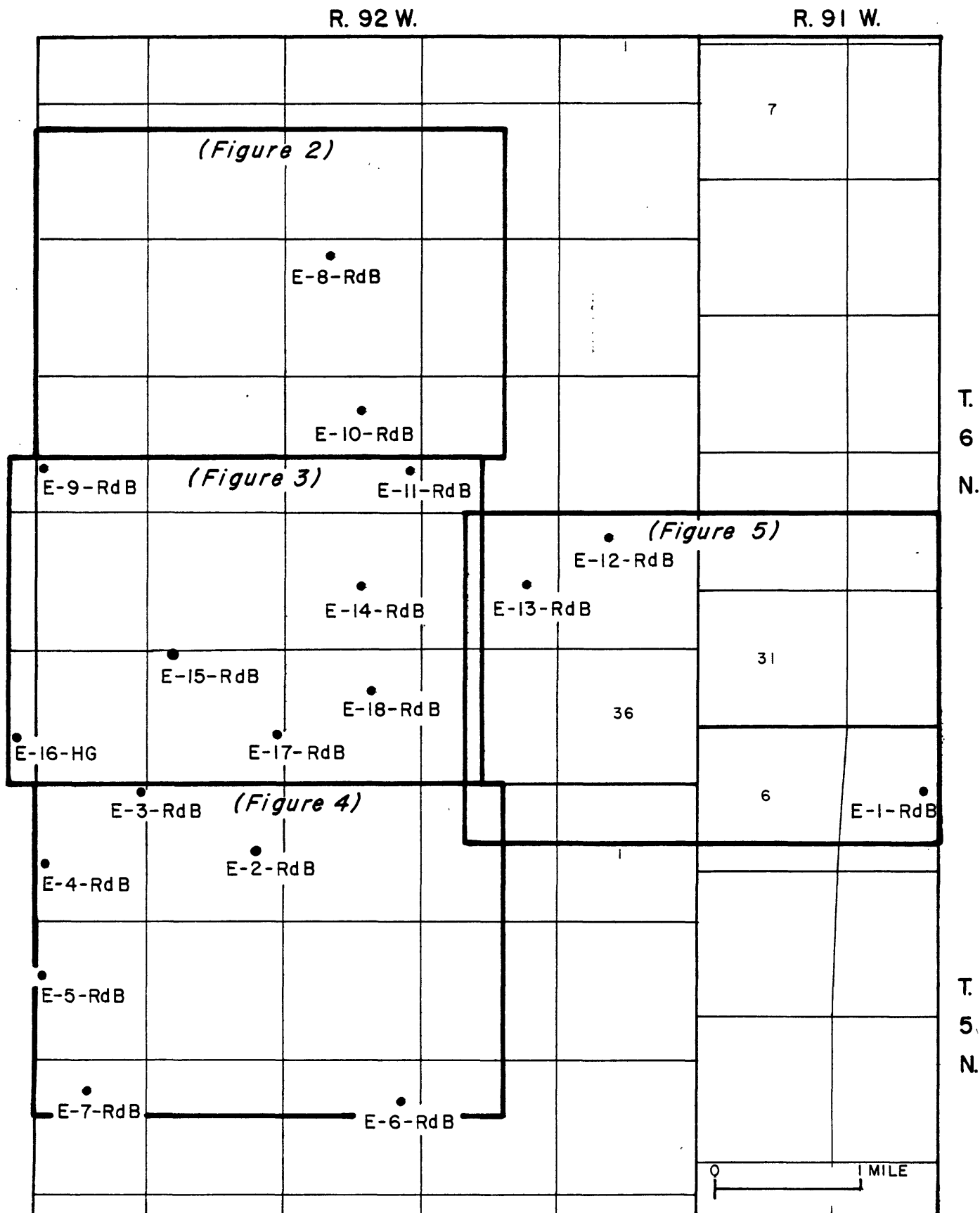


Figure 1.-General location map of the Round Bottom 7½-minute quadrangle showing approximate positions of drill holes reported in this paper. Heavy lines show boundaries for figures 2, 3, 4, and 5.

R. 92 W.

T. 6 N.

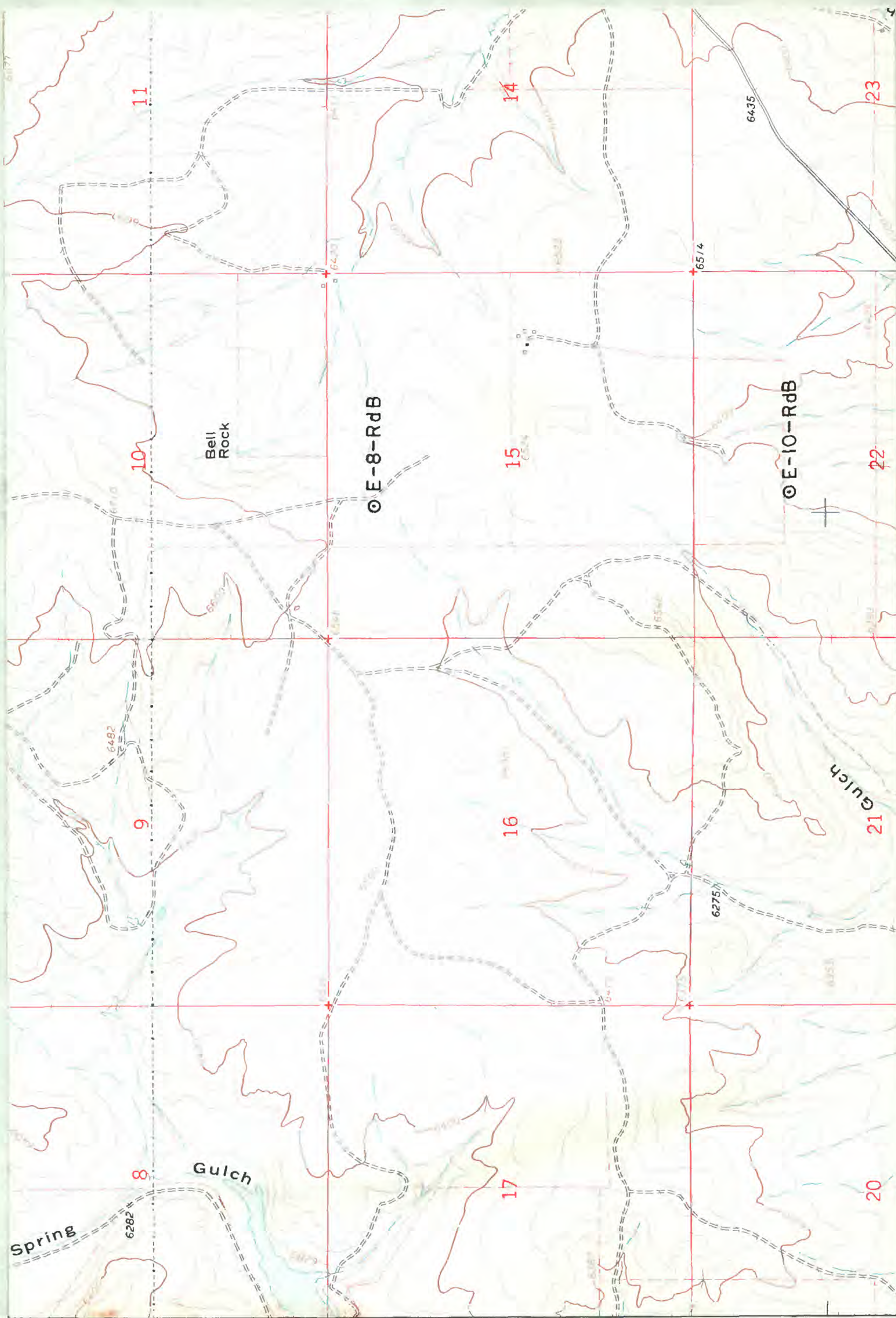


Figure 2.-Detailed location map of drill holes E-8-RdB and E-10-RdB.

R. 92 W.

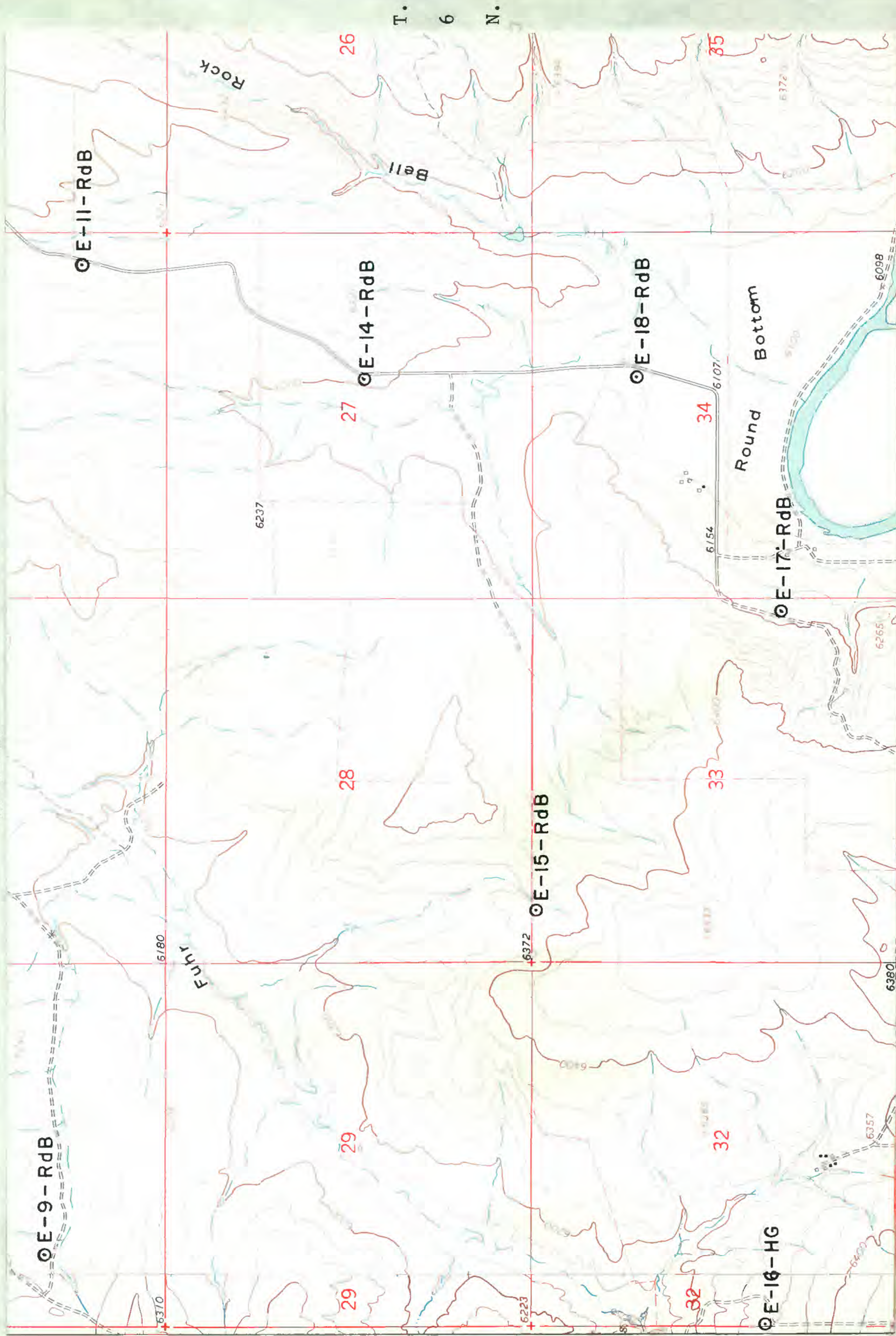


Figure 3.-Detailed location map of drill holes E-9-RdB, E-11-RdB, E-14-RdB, E-15-RdB, E-16-HG, E-17-RdB, and E-18-RdB.

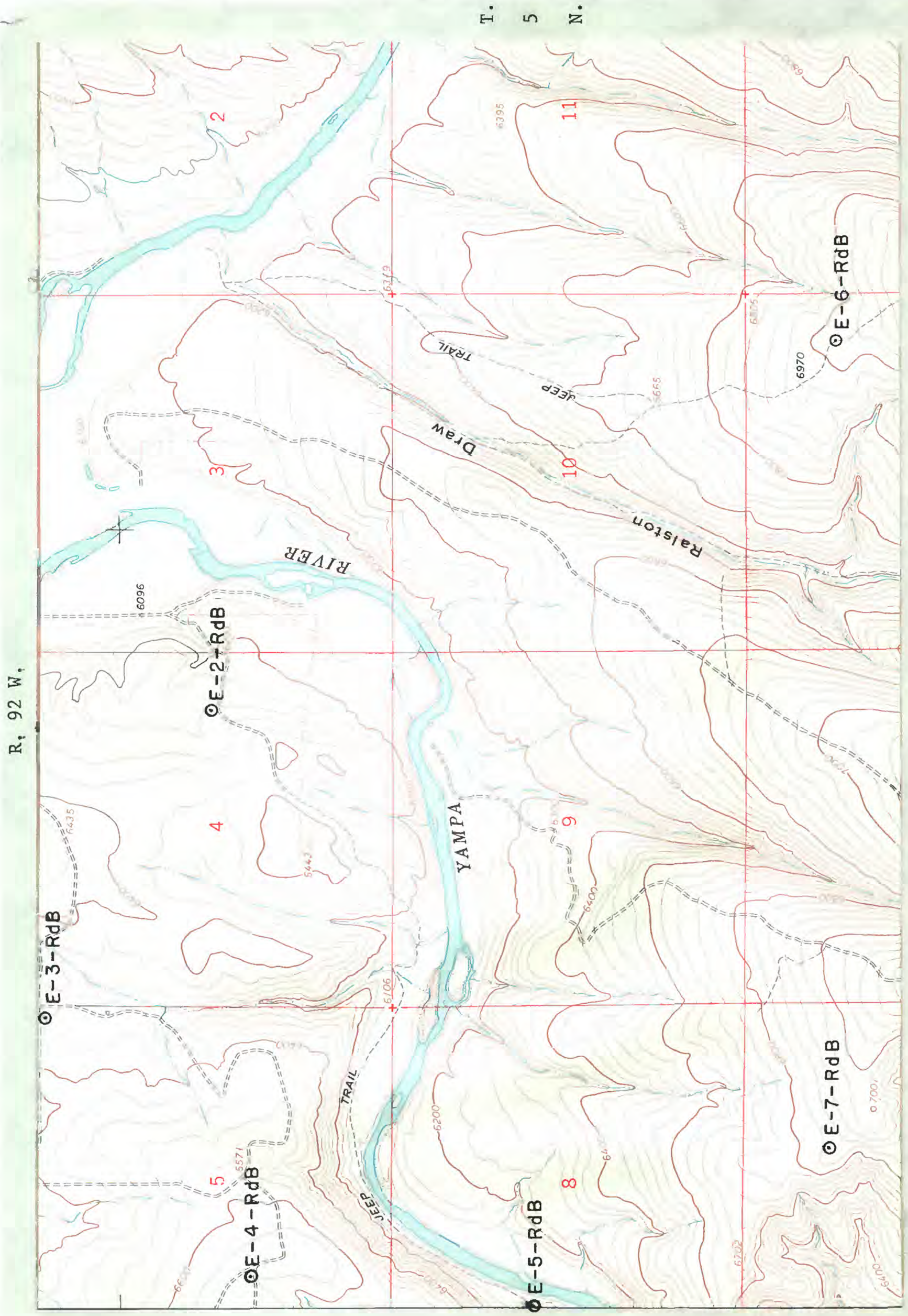


Figure 4.-Detailed location map of drill holes E-2-RdB, E-3-RdB, E-4-RdB, E-5-RdB, E-6-RdB, and E-7-RdB.

R. 92 W.

R. 91 W.

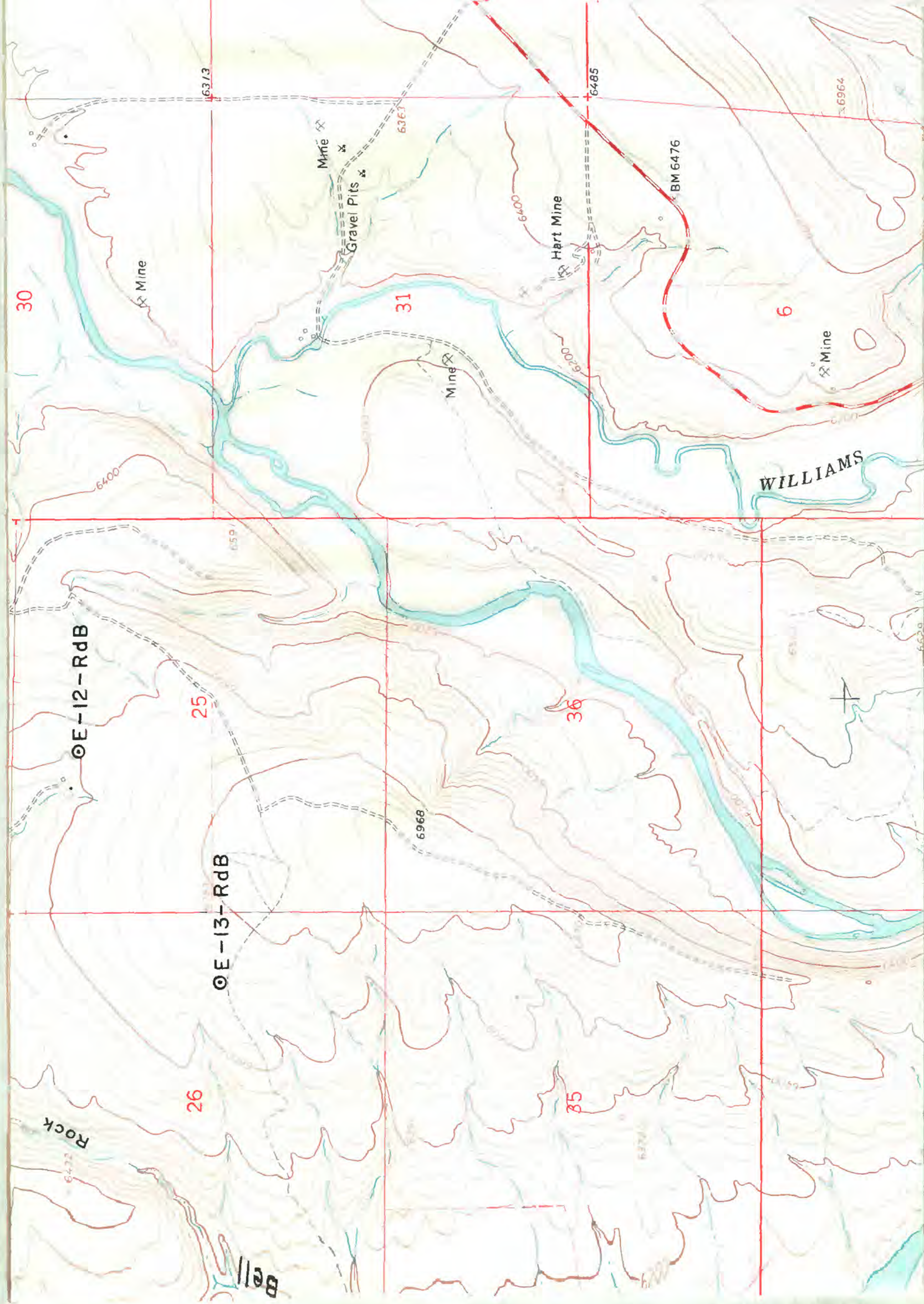


Figure 5.--Detailed location map of drill holes E-1-RdB, E-12-RdB, and E-13-RdB.

U. S. GEOLOGICAL SURVEY
GEOPHYSICAL LOG, MOFFAT COUNTY, COLORADO,
ROUND BOTTOM AREA

Hole no. E-1-RdB Date logged 10-2-77 Ground elevation 7,090'

T. 5 N., R. 91 W., Sec. 5 : 2,470' f n 1,2,000' f e 1

Drilling medium foam Drilled depth 1,106' Fluid level 221'

Logging company Rocky Mtn. Logging speed 10'/min Logged depth 1,106'

Natural gamma (G) Scale 10 cps/in. T.C. 1

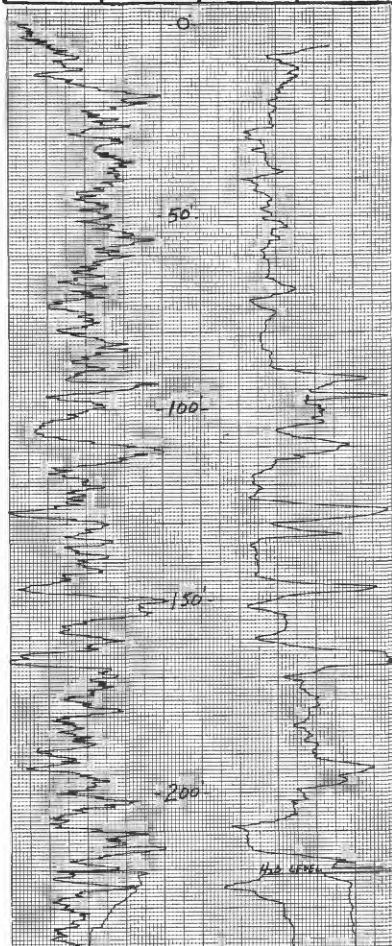
Spontaneous potential (SP) Scale 10 mv/in.

Single point resistance (R) Scale 10 ohms/in.

Density (gamma-gamma) (D) Scale 10K cps/in. T.C. 1

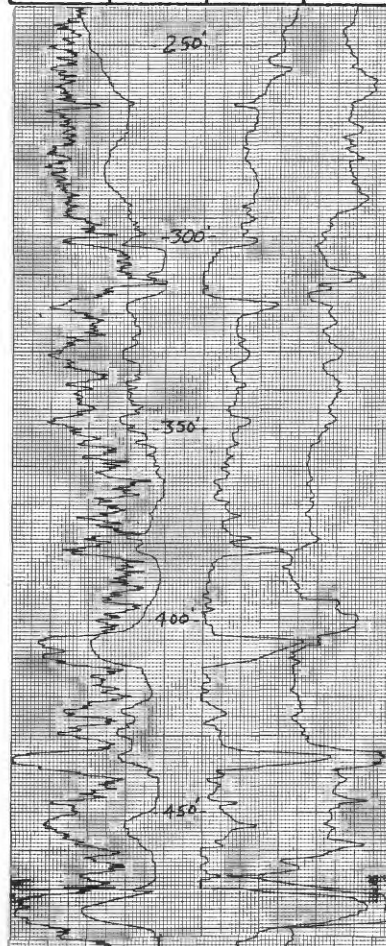
Remarks: Conditioned hole with mud. Logged from TD to 470' (1st fluid level). Pulled
tool, pumped mud, relogged from 470' to 221' (2nd fluid level). Some burn in the hole

G	SP	R	D
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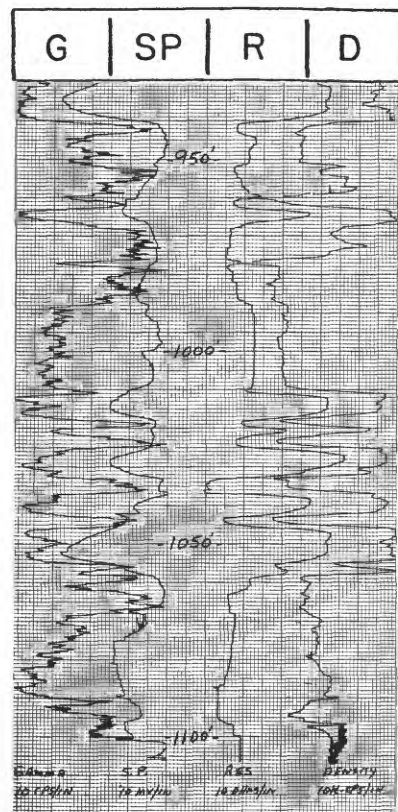
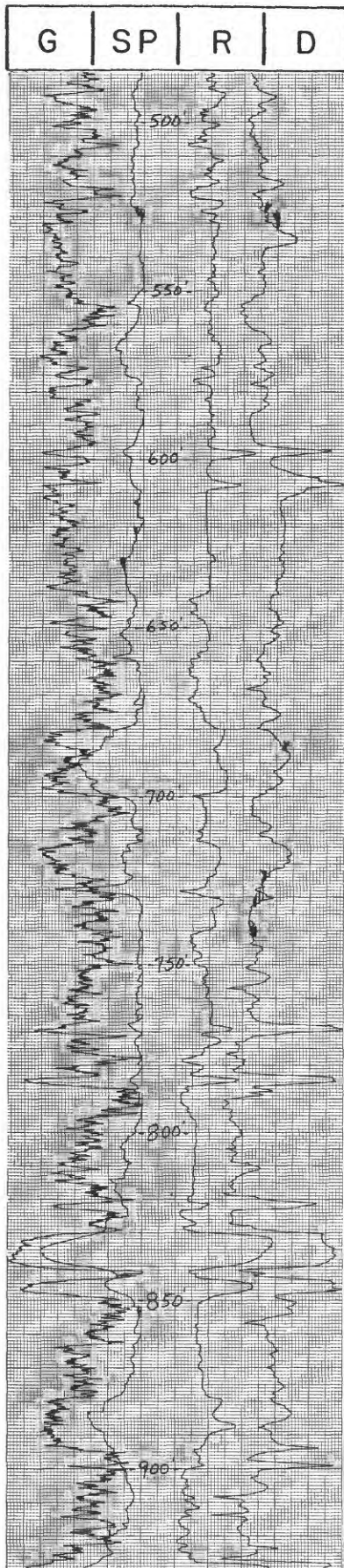


$10' \sqrt{\frac{1''}{10'}}$

G	SP	R	D
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Hole no. E-1-RdB (continued)



U. S. GEOLOGICAL SURVEY
GEOPHYSICAL LOG, MOFFAT COUNTY, COLORADO,
ROUND BOTTOM AREA

Hole no. E-2-RdB Date logged 9-18-77 Ground elevation 6,290'

T. 5 N., R. 92 W., Sec. 4 : 2,575' f n 1, 860' f e 1

Drilling medium foam Drilled depth 1,406' Fluid level 6'

Logging company Rocky Mtn. Logging speed 10'/min Logged depth 1,405'

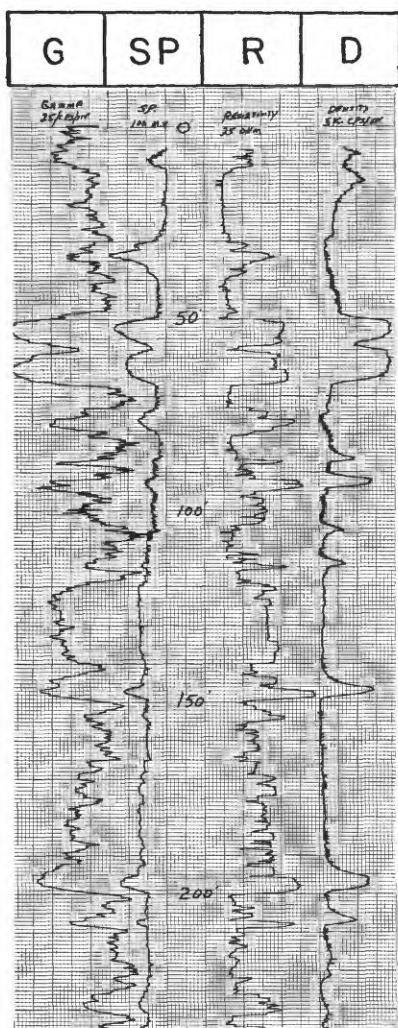
Natural gamma (G) Scale 25 cps/in. T.C. 1

Spontaneous potential (SP) Scale 100 mv/in.

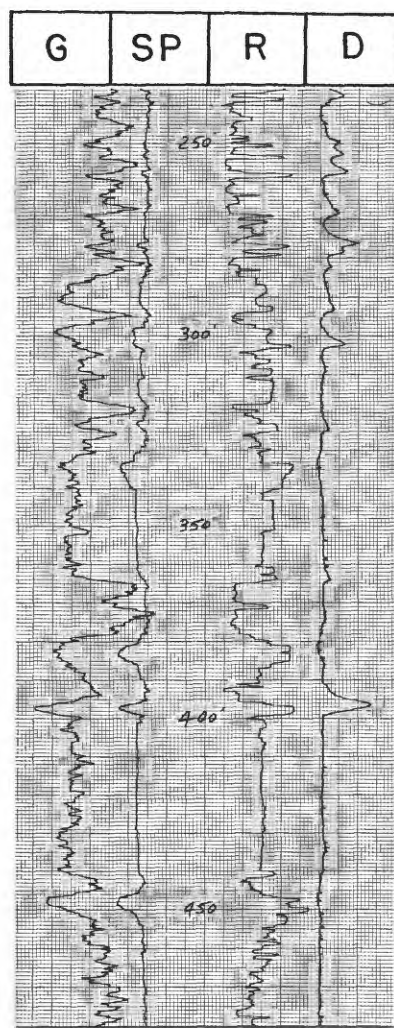
Single point resistance (R) Scale 25 ohms/in.

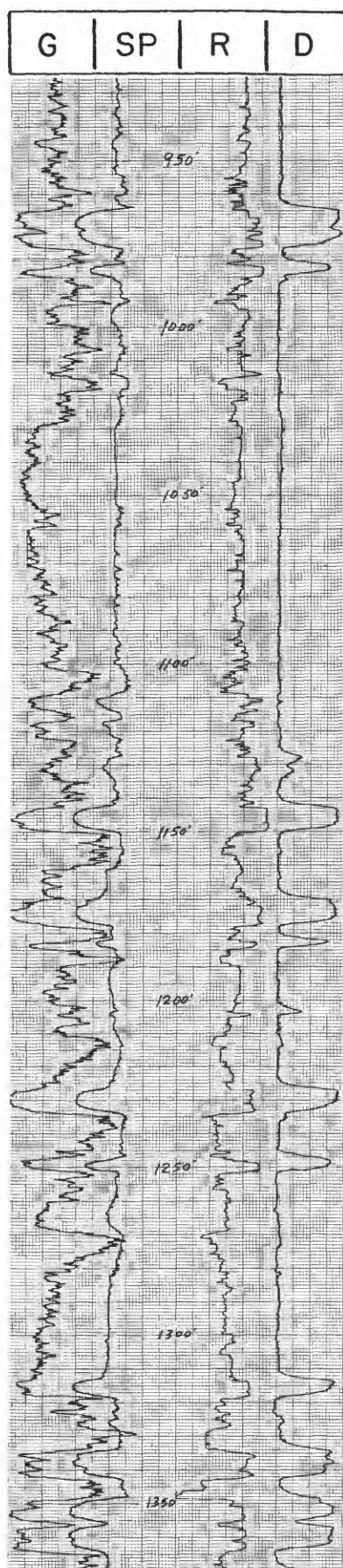
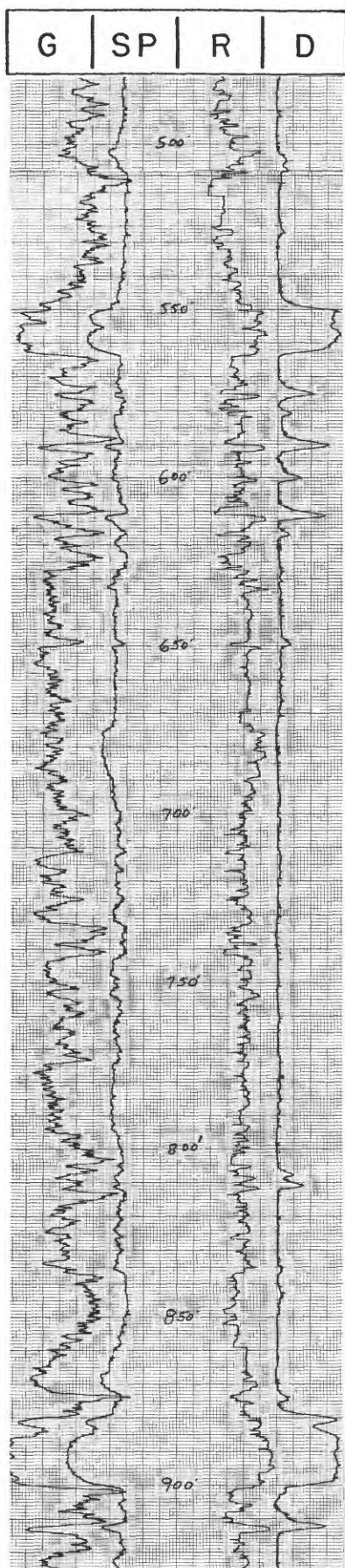
Density (gamma-gamma) (D) Scale 5K cps/in. T.C. 1

Remarks: Hit water table at 80'. Condition hole with mud.



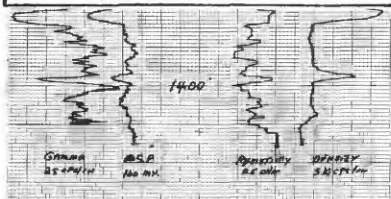
$10' \sqrt{1''}$





Hole no. E-2-RdB (continued)

G	SP	R	D
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G	SP	R	D
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U. S. GEOLOGICAL SURVEY
GEOPHYSICAL LOG, MOFFAT COUNTY, COLORADO,
ROUND BOTTOM AREA

Hole no. E-3-RdB Date logged 7-26-77 Ground elevation 6,370'

T. 5 N., R. 92 W., Sec. 5 : 175' f e 1, 75' f n 1

Drilling medium mud Drilled depth 425' Fluid level 25'

Logging company Rocky Mtn. Logging speed 20'/min Logged depth 425'

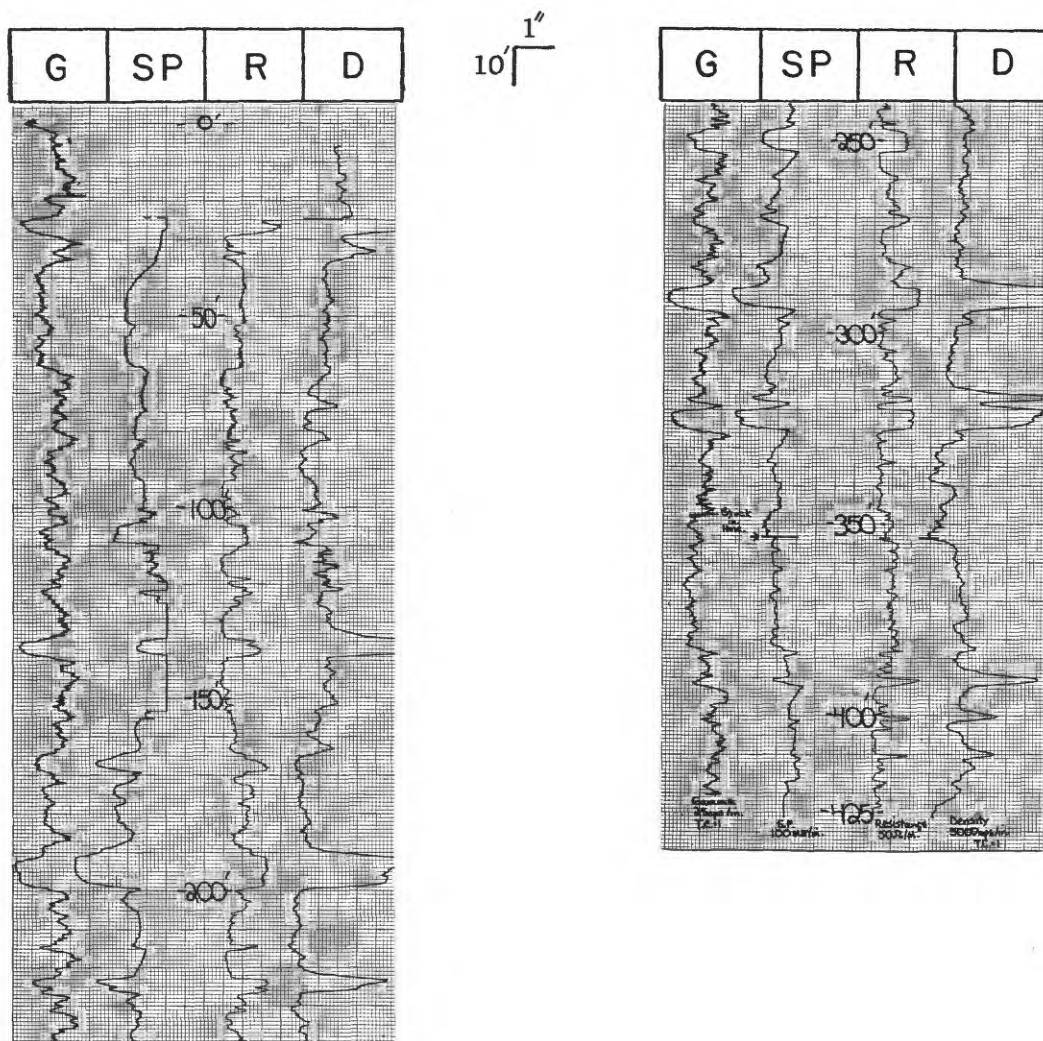
Natural gamma (G) Scale 25 cps/in. T.C. 1

Spontaneous potential (SP) Scale 100 mv/in.

Single point resistance (R) Scale 50 ohms/in.

Density (gamma-gamma) (D) Scale 5K cps/in. T.C. 1

Remarks: Density scale changed at 25' to 2.5K cps/in. T.C. = 1.



U. S. GEOLOGICAL SURVEY
GEOPHYSICAL LOG, MOFFAT COUNTY, COLORADO,
ROUND BOTTOM AREA

Hole no. E-4-RdB Date logged 9-21-77 Ground elevation 6,660'

T. 5 N., R. 92 W., Sec. 5 : 2,100' f s 1, 1,175' f w 1

Drilling medium foam Drilled depth 1,406' Fluid level 322'

Logging company Rocky Mtn. Logging speed 10'/min Logged depth 1,406'

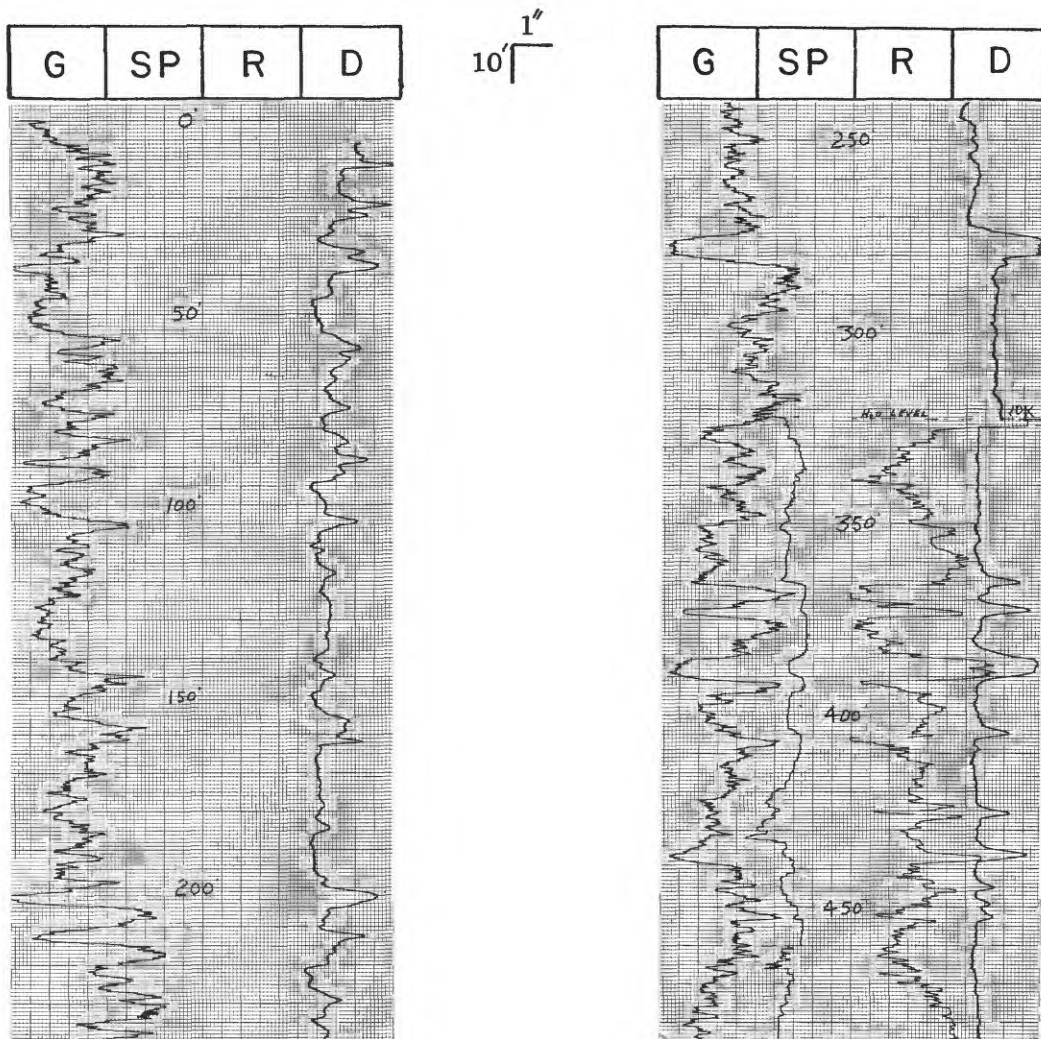
Natural gamma (G) Scale 25 cps/in. T.C. 1

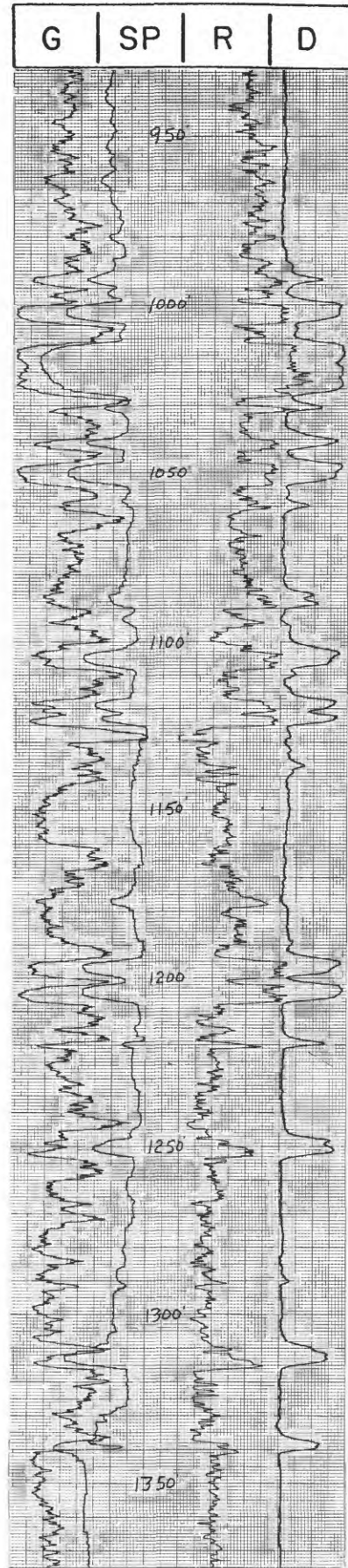
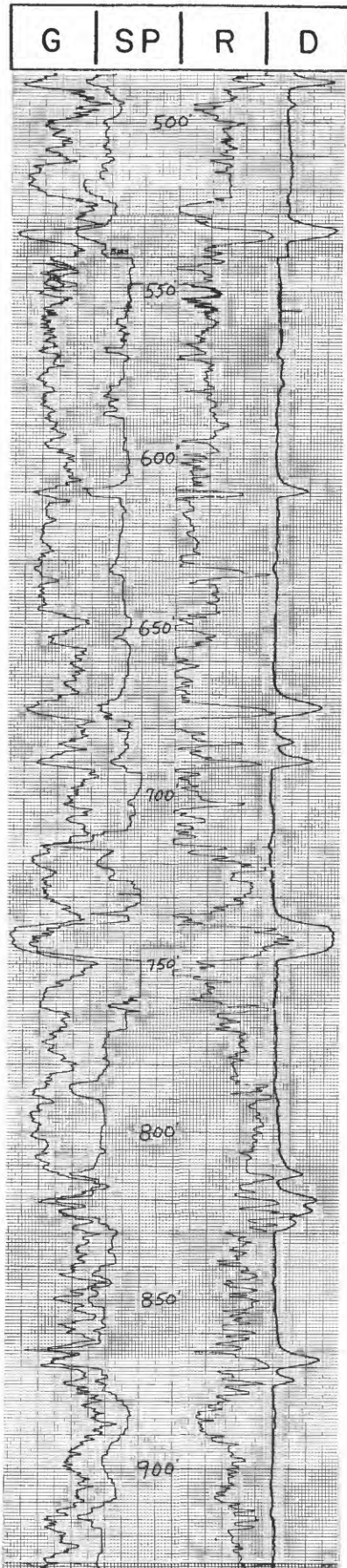
Spontaneous potential (SP) Scale 100 mv/in.

Single point resistance (R) Scale 10 ohms/in.

Density (gamma-gamma) (D) Scale 5K cps/in. T.C. 1

Remarks: Water table at 1,140'. Conditioned hole with mud. Logged TD to 521'
(1st fluid level). Pulled tool, pumped mud, relogged from 521' to 322' (2nd
fluid level).

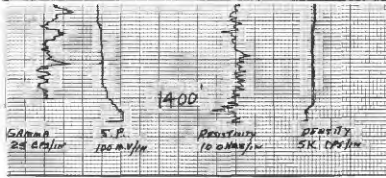




Hole no. E-4-RdB (continued)

G	SP	R	D
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G	SP	R	D
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U. S. GEOLOGICAL SURVEY
GEOPHYSICAL LOG, MOFFAT COUNTY, COLORADO,
ROUND BOTTOM AREA

Hole no. E-5-RdB Date logged 7-27-77 Ground elevation 6,100'

T. 5 N., R. 92 W., Sec. 8 : 2,150' f n 1, 750' f w 1

Drilling medium mud Drilled depth 440' Fluid level 5'

Logging company Rocky Mtn. Logging speed 20'/min Logged depth 438'

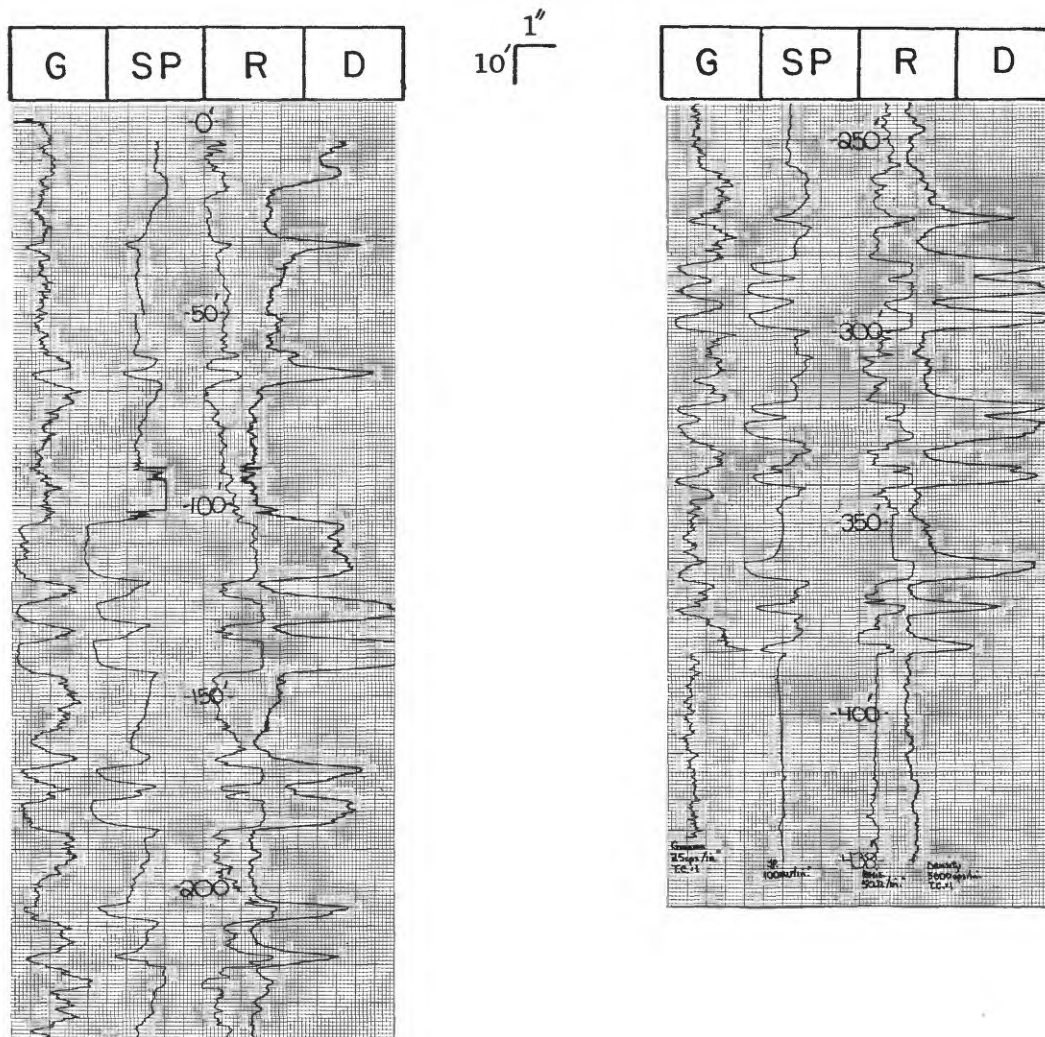
Natural gamma (G) Scale 25 cps/in. T.C. 1

Spontaneous potential (SP) Scale 100 mv/in.

Single point resistance (R) Scale 50 ohms/in.

Density (gamma-gamma) (D) Scale 5K cps/in. T.C. 1

Remarks: Water table at 415'.



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GEOPHYSICAL LOG, MOFFAT COUNTY, COLORADO,
ROUND BOTTOM AREA

Hole no. E-6-RdB Date logged 9-30-77 Ground elevation 7,020'

T. 5 N., R. 92 W., Sec. 15 : 1,340' f n 1,700' f e 1

Drilling medium foam Drilled depth 1,046' Fluid level 19'

Logging company Rocky Mtn. Logging speed 10'/min Logged depth 1,041'

Natural gamma (G) Scale 25 cps/in. T.C. 1

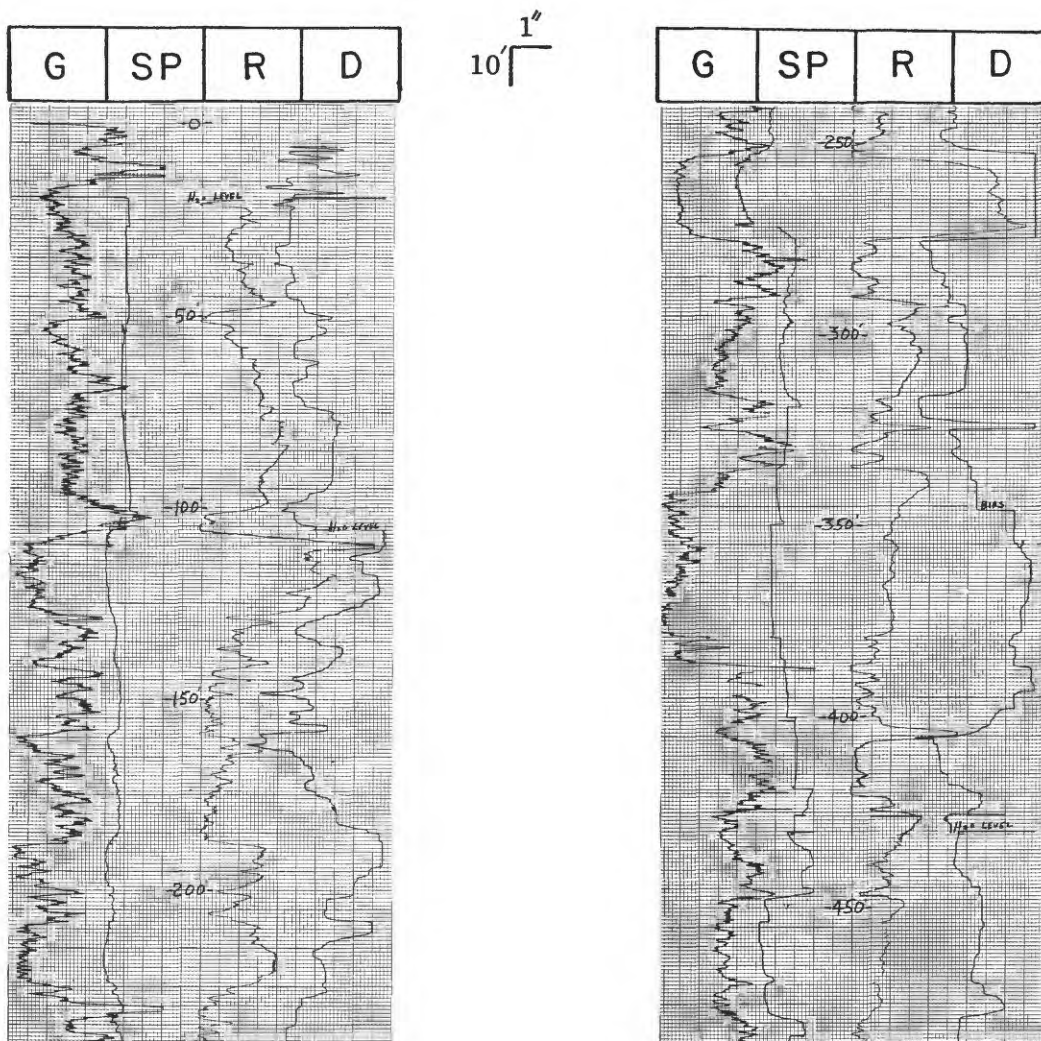
Spontaneous potential (SP) Scale 100 mv/in.

Single point resistance (R) Scale 25 ohms/in.

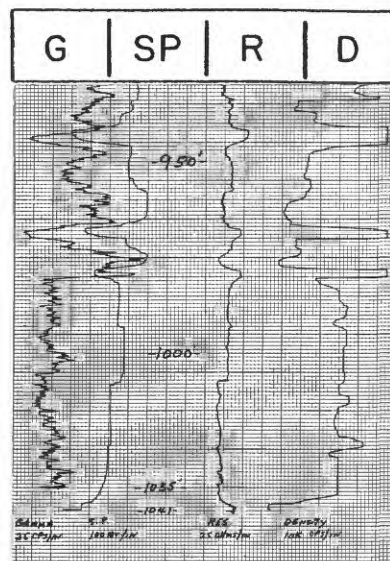
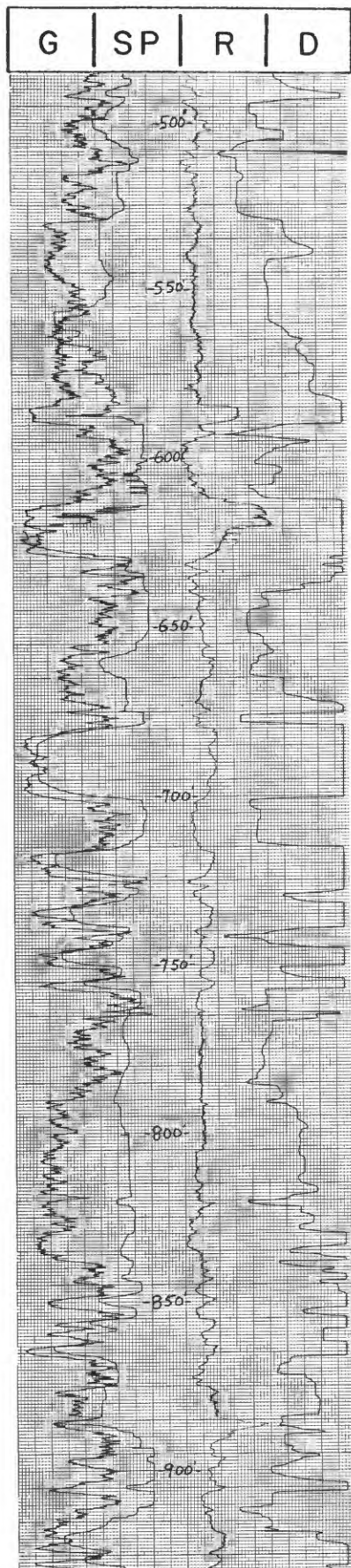
Density (gamma-gamma) (D) Scale 10K cps/in. T.C. 1

Remarks: Conditioned with mud. Logged from TD to 430' (1st fluid level).

Pulled tool, pumped mud, relogged to 106' (2nd fluid level). Process repeated
and logged to 19' (3rd fluid level).



Hole no. E-6-RdB (continued)



U. S. GEOLOGICAL SURVEY
GEOPHYSICAL LOG, MOFFAT COUNTY, COLORADO,
ROUND BOTTOM AREA

Hole no. E-7-RdB Date logged 9-24-77 Ground elevation 6,850'

T. 5 N., R. 92 W., Sec. 17 : 2,150' f e 1, 1,275' f n 1

Drilling medium foam Drilled depth 806' Fluid level dry hole

Logging company Rocky Mtn. Logging speed 10'/min Logged depth 606'

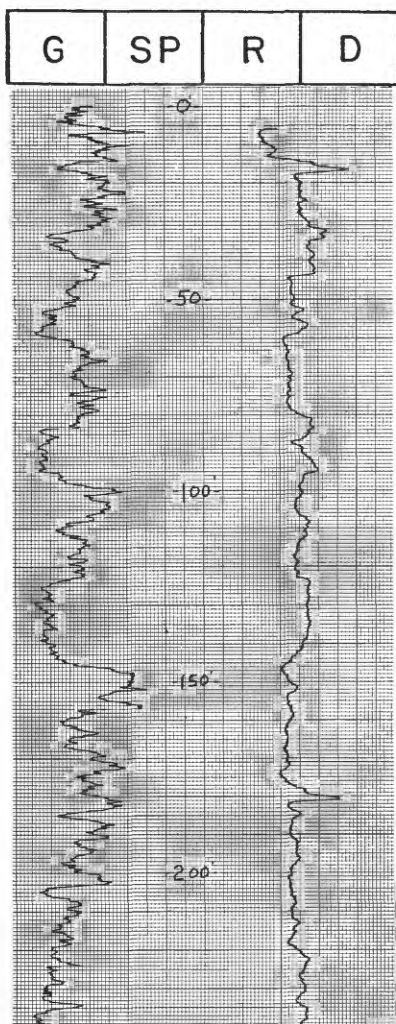
Natural gamma (G) Scale 25 cps/in. T.C. 1

Spontaneous potential (SP) Scale _____

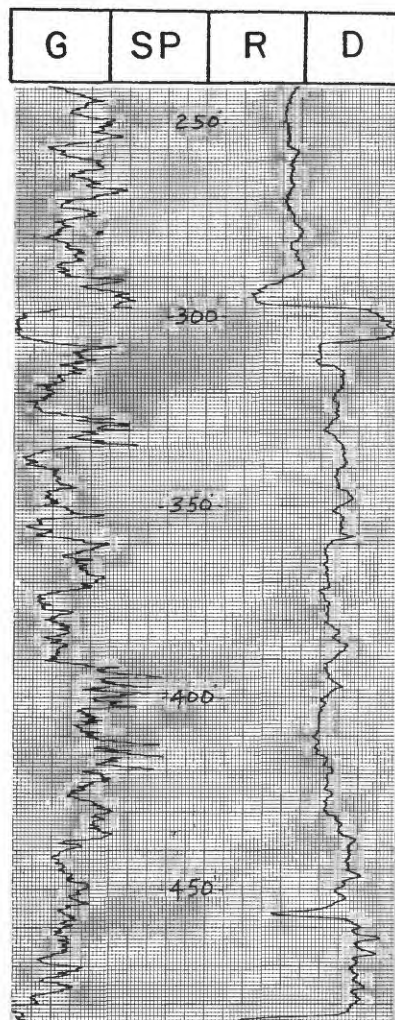
Single point resistance (R) Scale _____

Density (gamma-gamma) (D) Scale 5K cps/in. T.C. 1

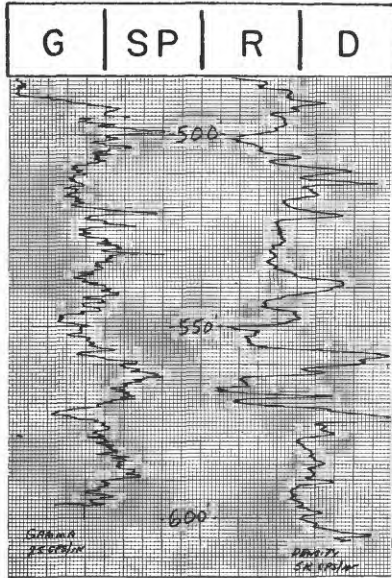
Remarks: Drilled in a coal burn. Lost all circulation at 475'.



$10' \sqrt{1''}$



Hole no. E-7-RdB (continued)



G	SP	R	D
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U. S. GEOLOGICAL SURVEY
GEOPHYSICAL LOG, MOFFAT COUNTY, COLORADO,
ROUND BOTTOM AREA

Hole no. E-8-RdB Date logged 8-11-77 Ground elevation 6,560'

T. 6 N., R. 92 W., Sec. 15 : 1,910' f w 1, 675' f n 1

Drilling medium mud Drilled depth 1,000' Fluid level at surface

Logging company Rocky Mtn. Logging speed 25'/min Logged depth 986'

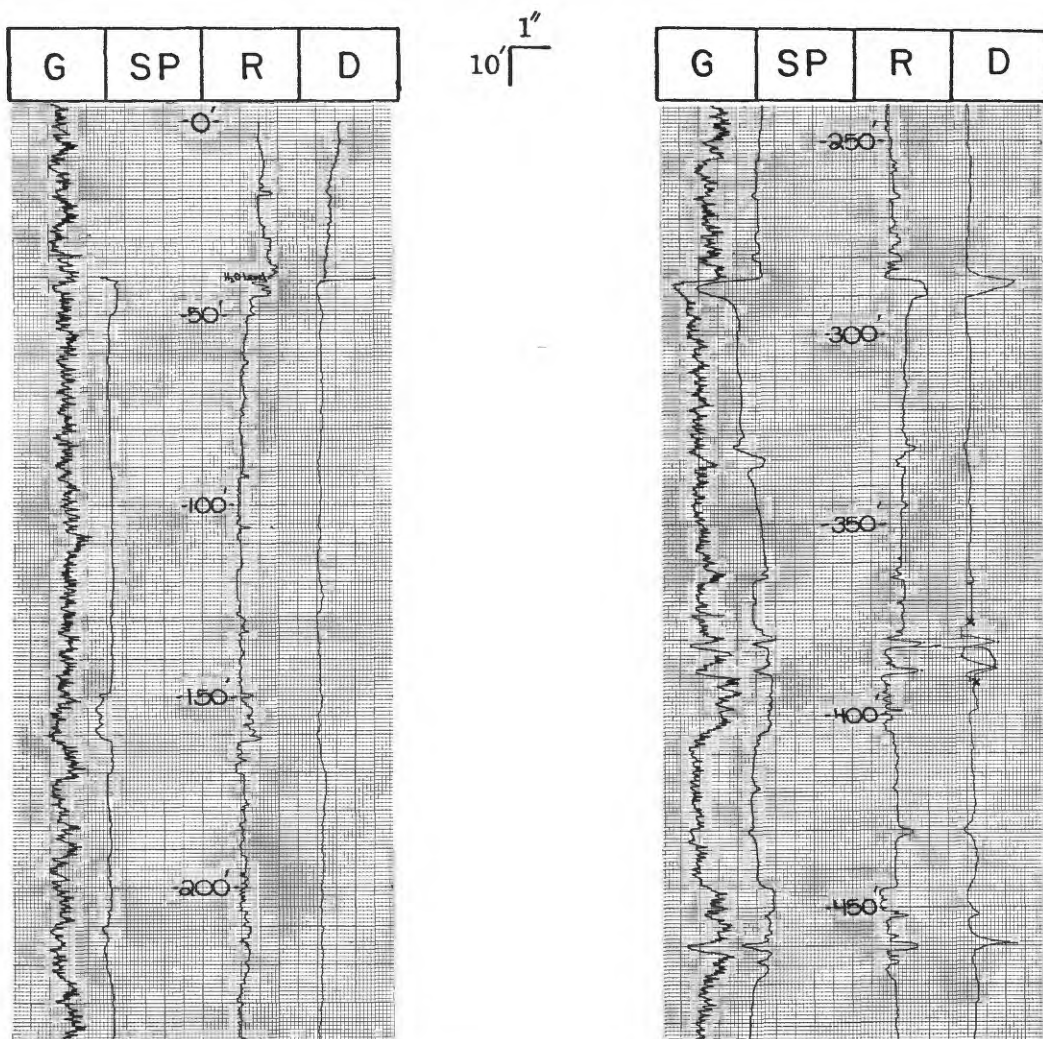
Natural gamma (G) Scale 25 cps/in. T.C. 1

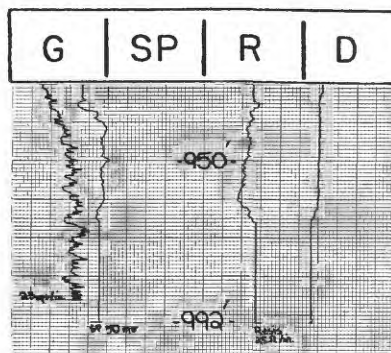
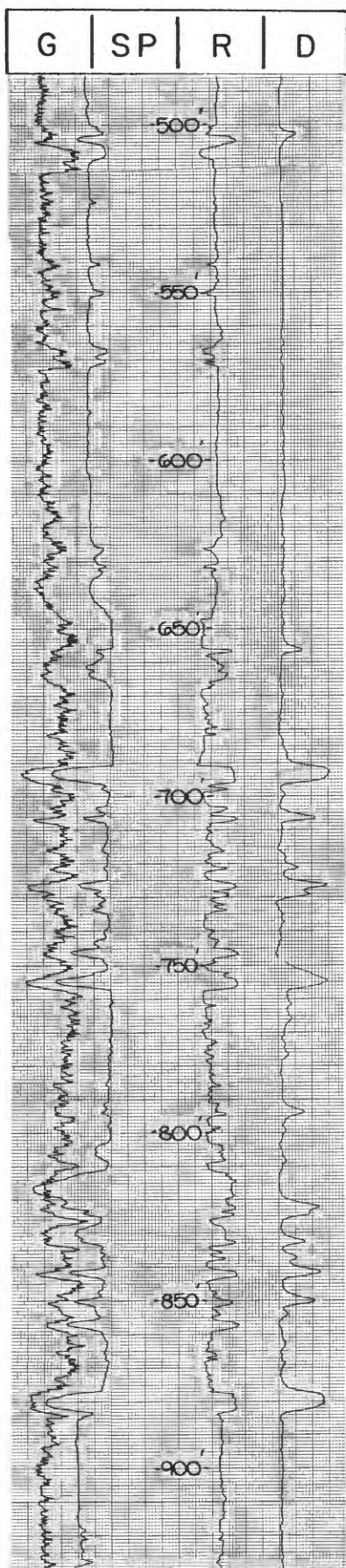
Spontaneous potential (SP) Scale 50 mv/in.

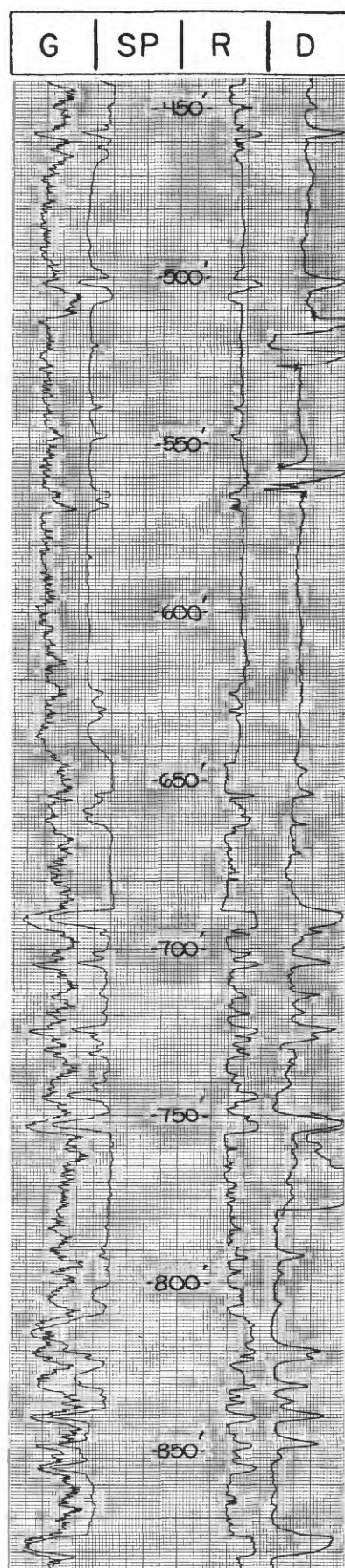
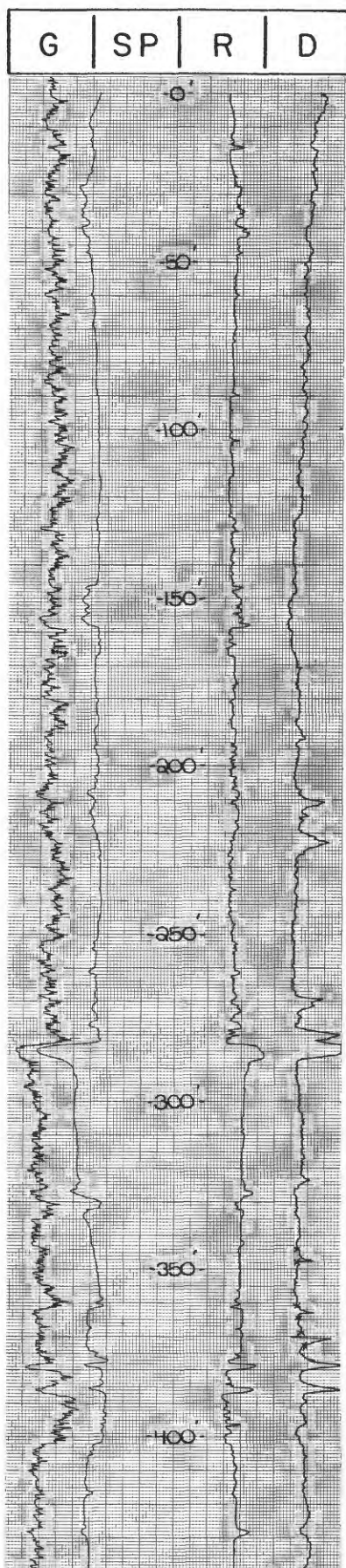
Single point resistance (R) Scale 25 ohms/in.

Density (gamma-gamma) (D) Scale 5K cps/in. T.C. 1

Remarks: Tool stuck in the hole. Afterwards poor signals received. Two trips
were made and both logs are shown here.

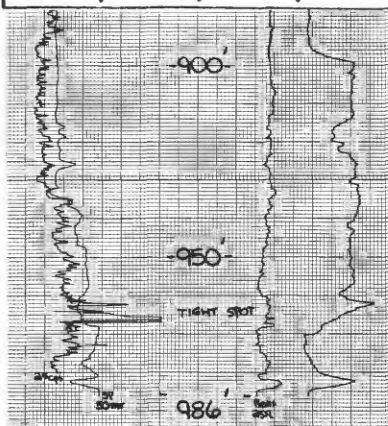






Hole no. E-8-RdB (continued)

G	SP	R	D
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G	SP	R	D
---	----	---	---

U. S. GEOLOGICAL SURVEY
GEOPHYSICAL LOG, MOFFAT COUNTY, COLORADO,
ROUND BOTTOM AREA

Hole no. E-9-RdB Date logged 9-5-77 Ground elevation 6,270'

T. 6 N., R. 92 W., Sec. 20: 1,750' f s 1,1,050' f w 1

Drilling medium foam/mud Drilled depth 1,227' Fluid level at surface

Logging company Rocky Mtn. Logging speed 20'/min Logged depth 1,216'

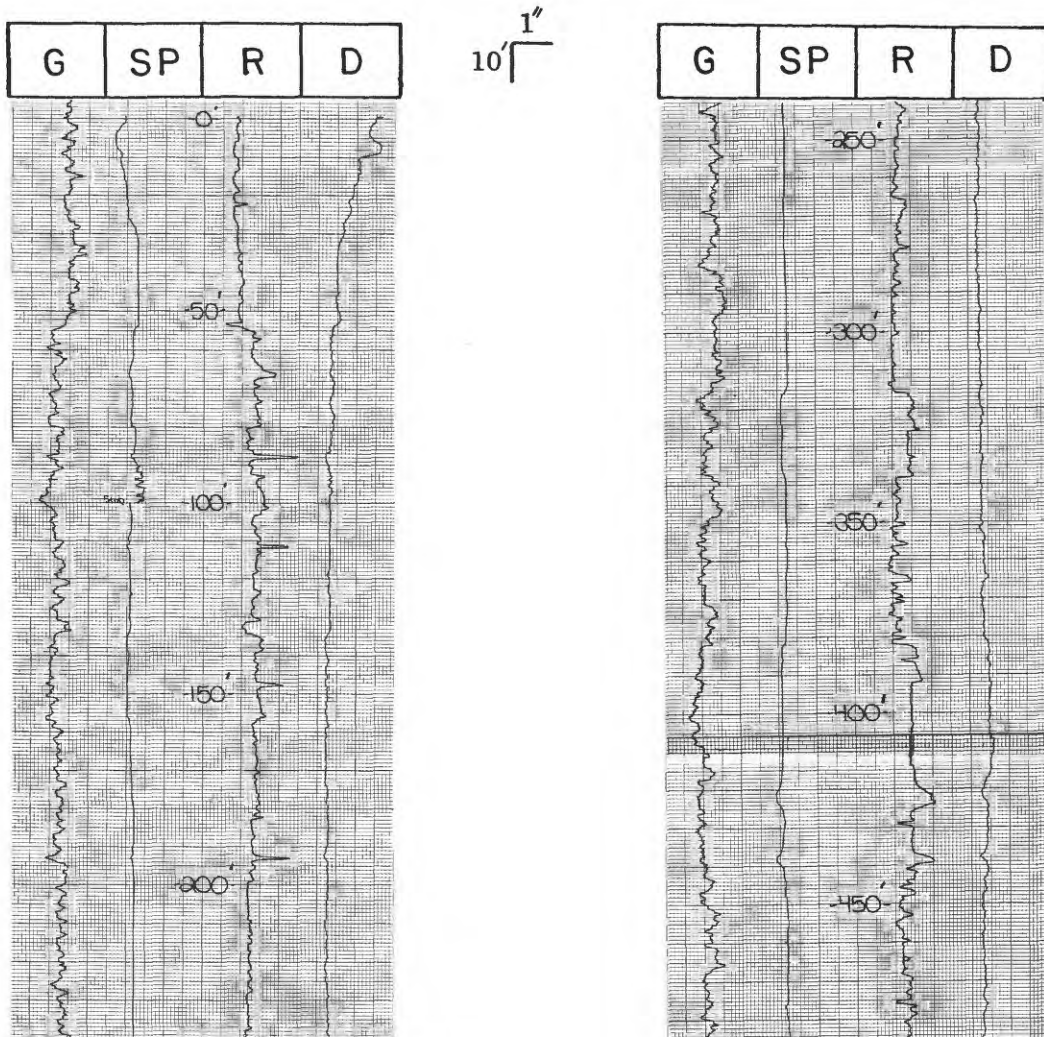
Natural gamma (G) Scale 25 cps/in. T.C. 1

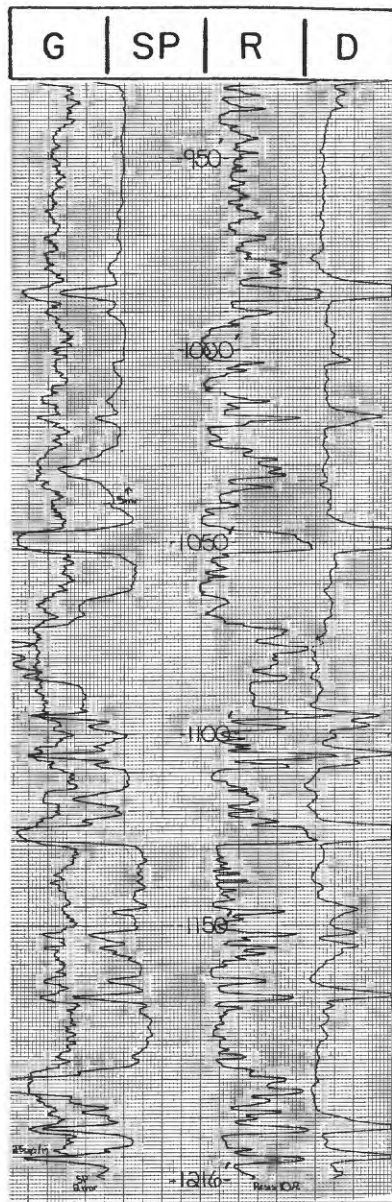
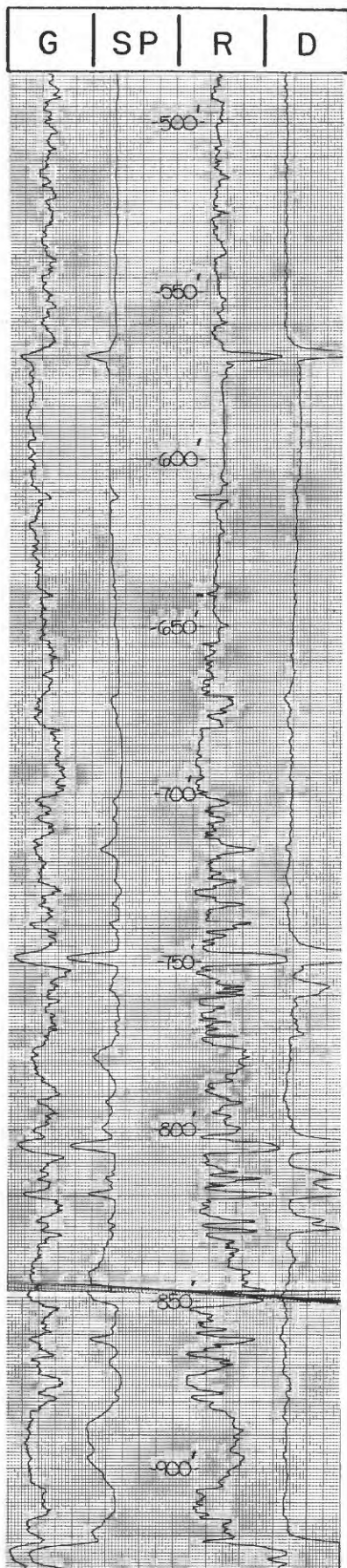
Spontaneous potential (SP) Scale 5 mv/in.

Single point resistance (R) Scale 10 ohms/in.

Density (gamma-gamma) (D) Scale 5K cps/in. T.C. 1

Remarks: Switched to mud at 1,030'.





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GEOPHYSICAL LOG, MOFFAT COUNTY, COLORADO,
ROUND BOTTOM AREA

Hole no. E-10-RdB Date logged 8-27-77 Ground elevation 6,380'

T. 6 N., R. 92 W., Sec. 22: 2,100' f w 1,1,380' f n 1

Drilling medium mud Drilled depth 1,200' Fluid level about 20'

Logging company Digilog Logging speed 20'/min Logged depth 1,196'

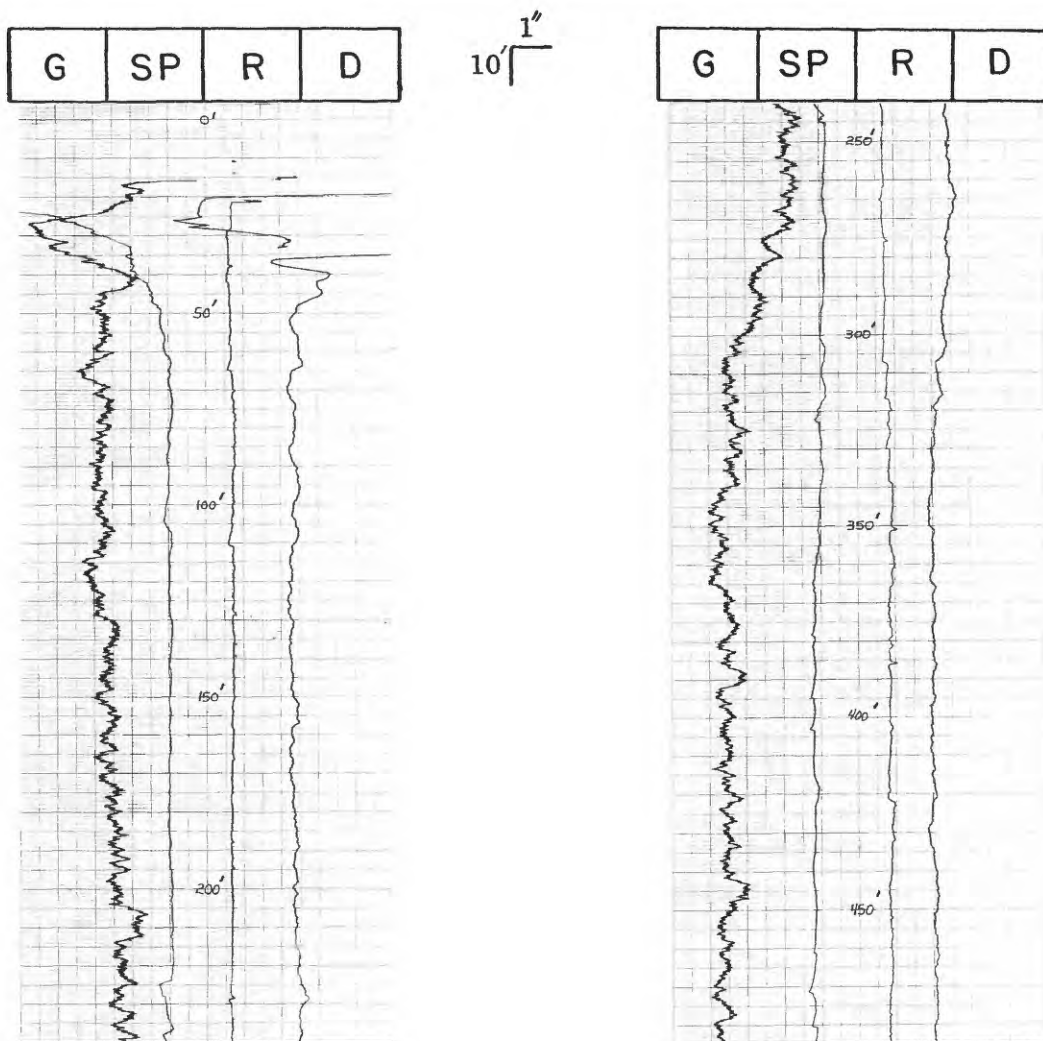
Natural gamma (G) Scale 50 cps/in. T.C. 2

Spontaneous potential (SP) Scale 40 mv/in.

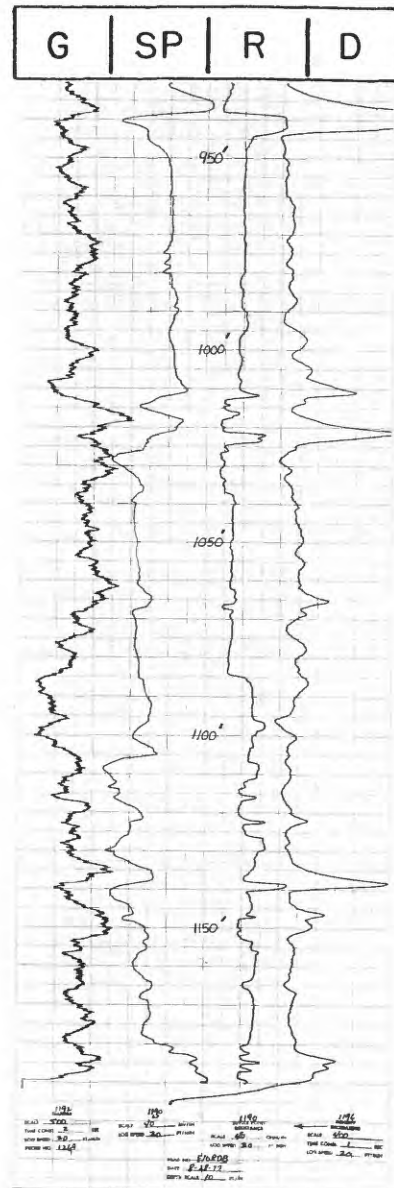
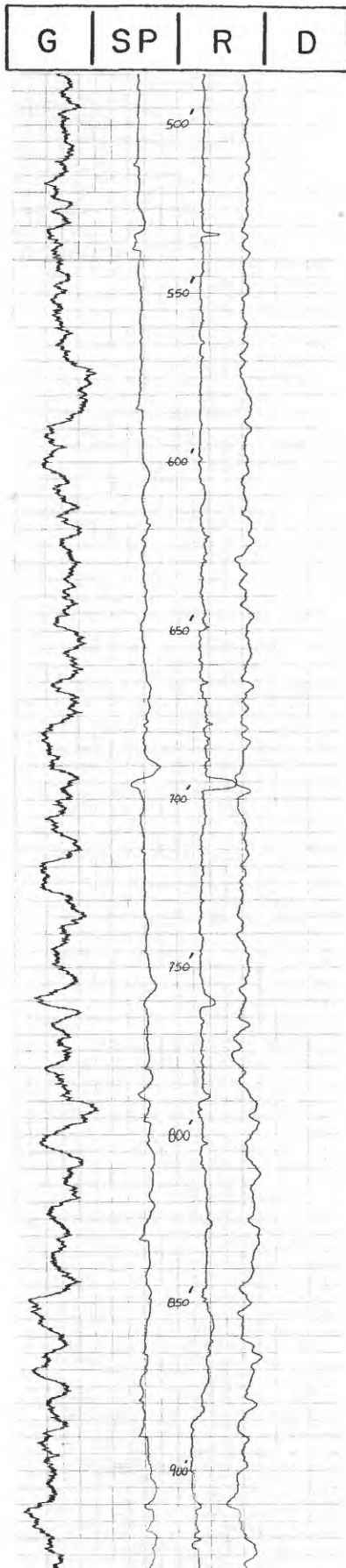
Single point resistance (R) Scale 40 ohms/in.

Density (gamma-gamma) (D) Scale 40 cps/in. T.C. 1

Remarks: None



Hole no. E-10-RdB (continued)



U.S. GEOLOGICAL SURVEY
GEOPHYSICAL LOG, MOFFAT COUNTY, COLORADO,
ROUND BOTTOM AREA

Hole no. E-11-RdB Date logged 8-6-77 Ground elevation 6,380'

T. 6 N., R. 92 W., Sec. 22: 1,225' f s 1, 465' f e 1

Drilling medium mud Drilled depth 860' Fluid level 1'

Logging company Savage Logging speed 40'/min Logged depth 857'

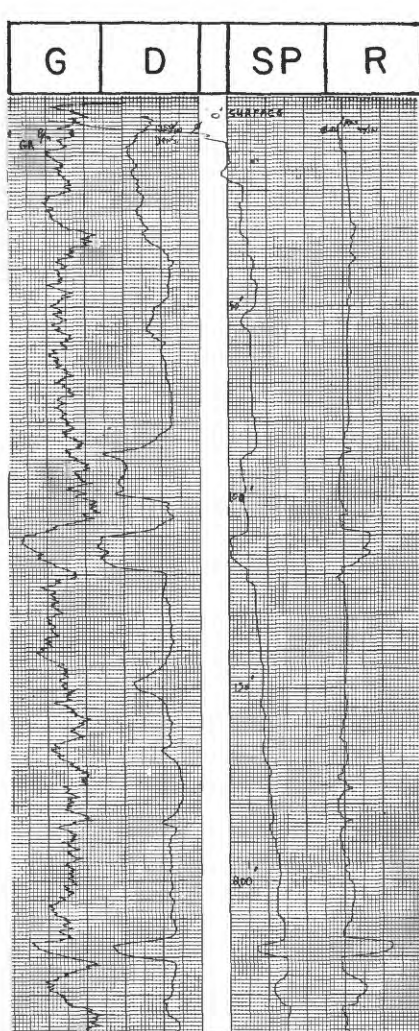
Natural gamma (G) Scale 8 cps/in. T.C. 1

Density (gamma-gamma) (D) Scale 1.25K cps/in. T.C. 1

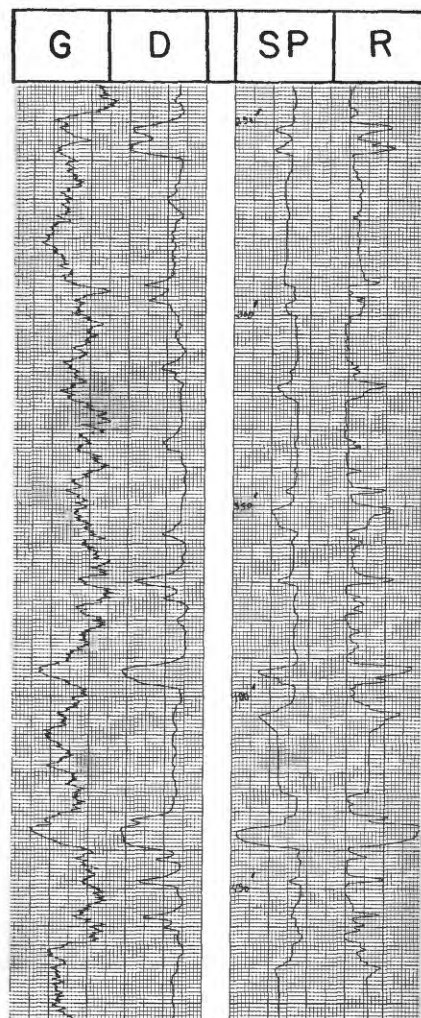
Spontaneous potential (SP) Scale 50 mv/in.

Single point resistance (R) Scale 40 ohms/in.

Remarks: None



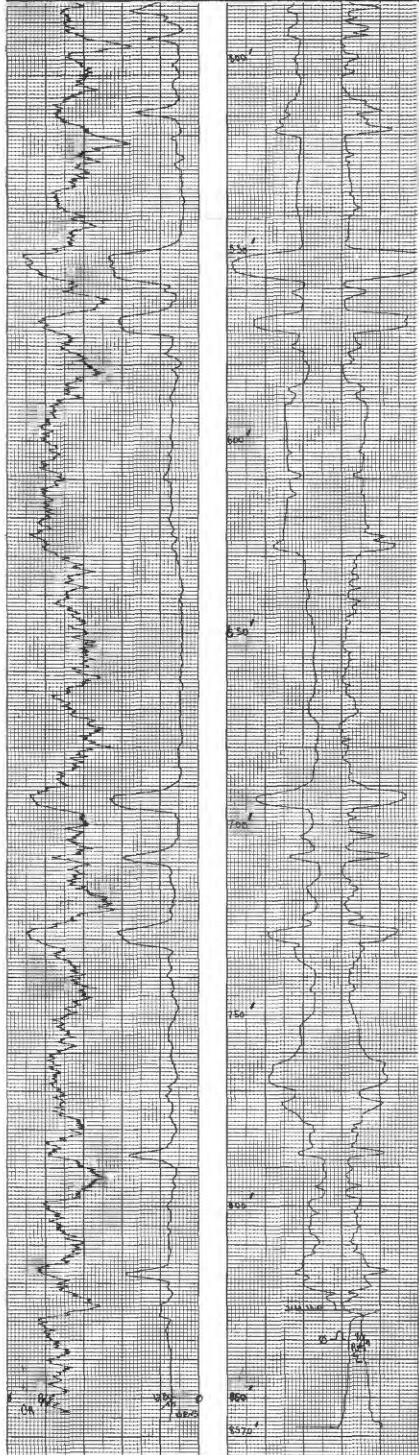
10' $\frac{1''}{1'}$



Hole no. E-11-RdB (continued)

G	D	SP	R
---	---	----	---

G	D	SP	R
---	---	----	---



U. S. GEOLOGICAL SURVEY
GEOPHYSICAL LOG, MOFFAT COUNTY, COLORADO,
ROUND BOTTOM AREA

Hole no. E-12-RdB Date logged 8-25-77 Ground elevation 6,610'

T. 6 N., R. 92 W., Sec. 25: 2,150' f w 1, 935' f n 1

Drilling medium foam/mud Drilled depth 1,400' Fluid level at surface

Logging company Digilog Logging speed 20'/min Logged depth 1,396'

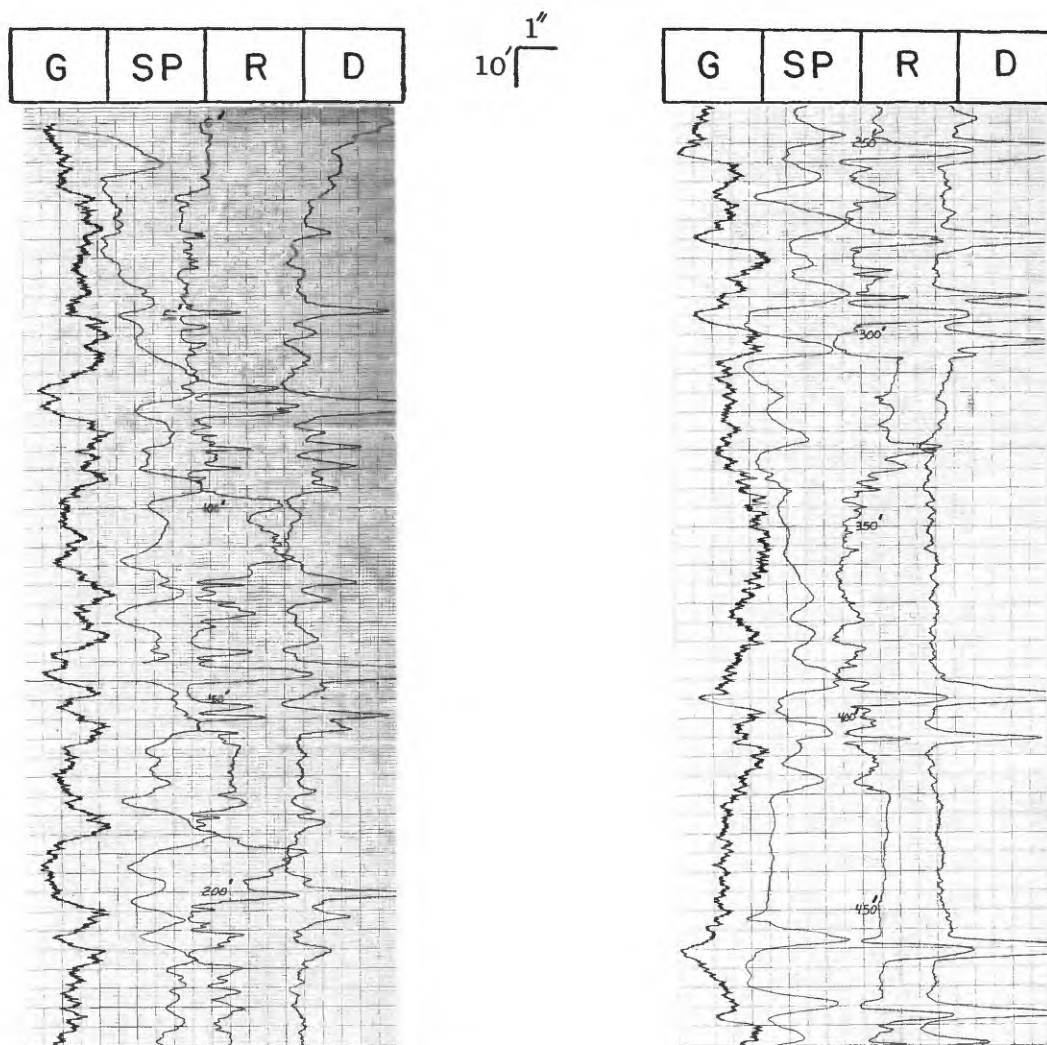
Natural gamma (G) Scale 50 cps/in. T.C. 2

Spontaneous potential (SP) Scale 30 mv/in.

Single point resistance (R) Scale 30 ohms/in.

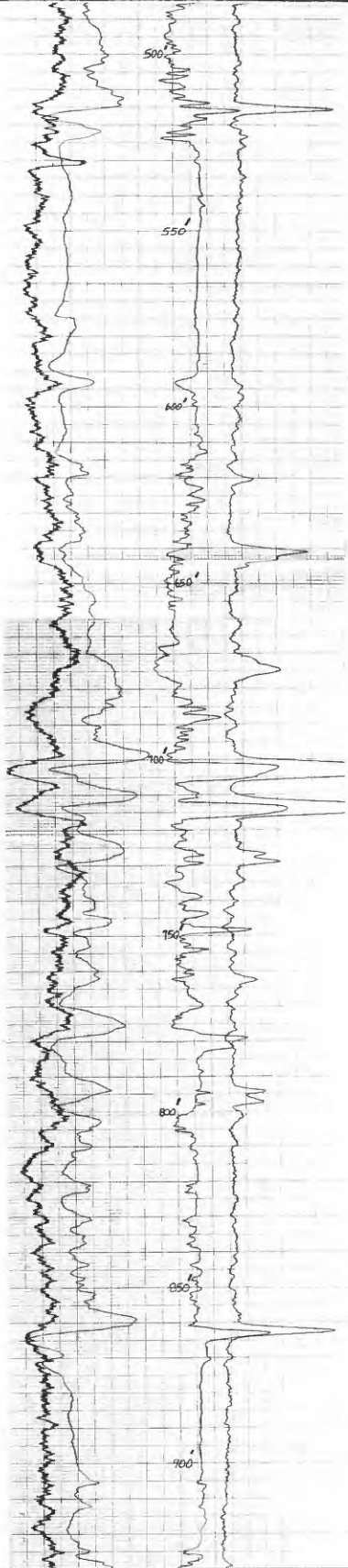
Density (gamma-gamma) (D) Scale 50 cps/in. T.C. 1

Remarks: Water table probably between 120' and 160'. Lost circulation
problems during drilling. Switched to mud at 920'.

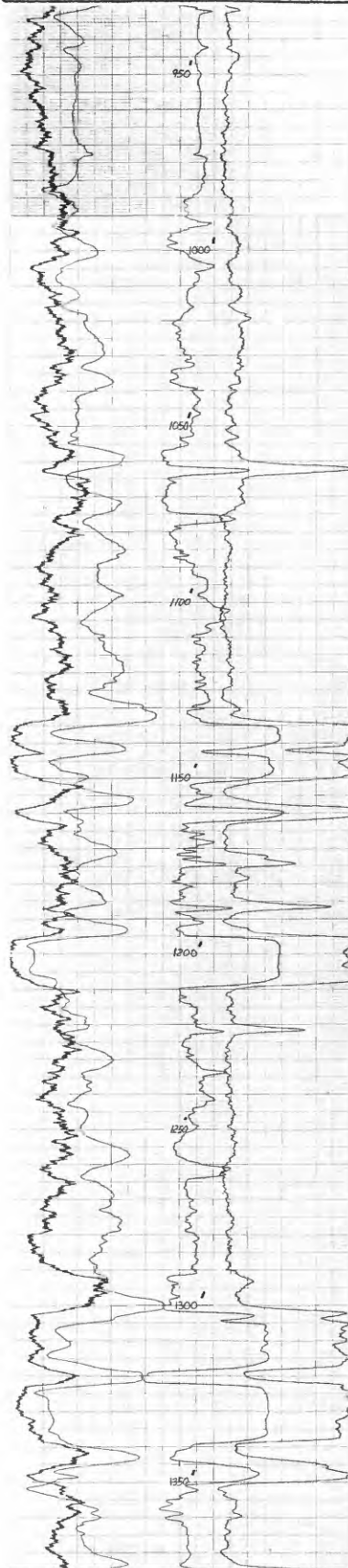


Hole no. E-12-RdB (continued)

G	SP	R	D
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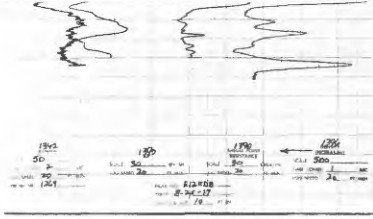


G	SP	R	D
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Hole no. E-12-RdB (continued)

G	SP	R	D
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G	SP	R	D
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U. S. GEOLOGICAL SURVEY
GEOPHYSICAL LOG, MOFFAT COUNTY, COLORADO,
ROUND BOTTOM AREA

Hole no. E-13-RdB Date logged 8-13-77 Ground elevation 6,720

T. 6 N., R. 92 W., Sec. 26 : 2,340' f s 1, 960' f e 1

Drilling medium mud Drilled depth 961' Fluid level dry hole

Logging company Rocky Mtn. Logging speed 20'/min Logged depth 961'

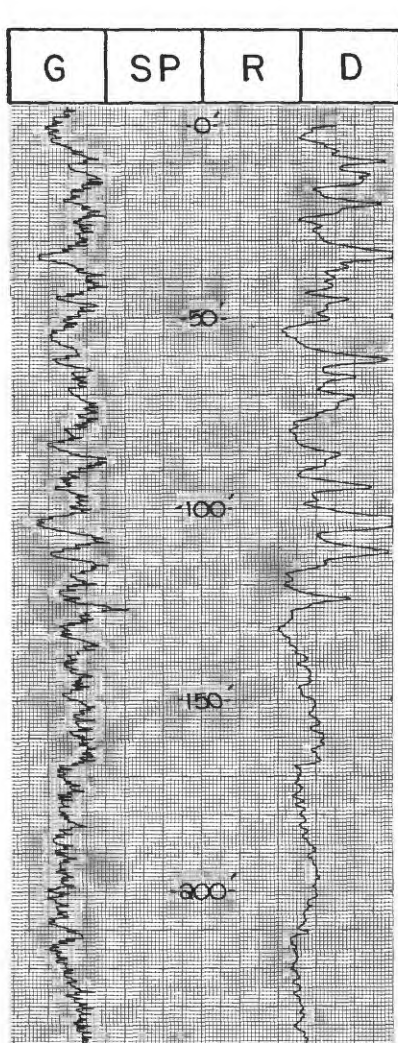
Natural gamma (G) Scale 25 cps/in. T.C. 1

Spontaneous potential (SP) Scale _____

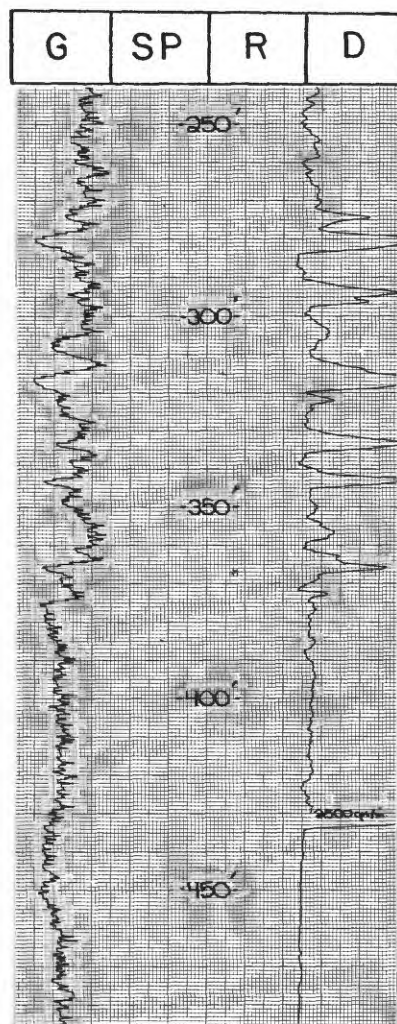
Single point resistance (R) Scale _____

Density (gamma-gamma) (D) Scale 5K cps/in. T.C. 1

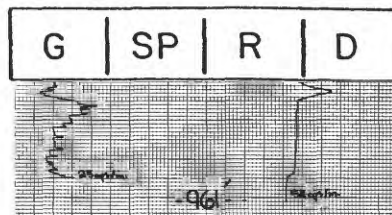
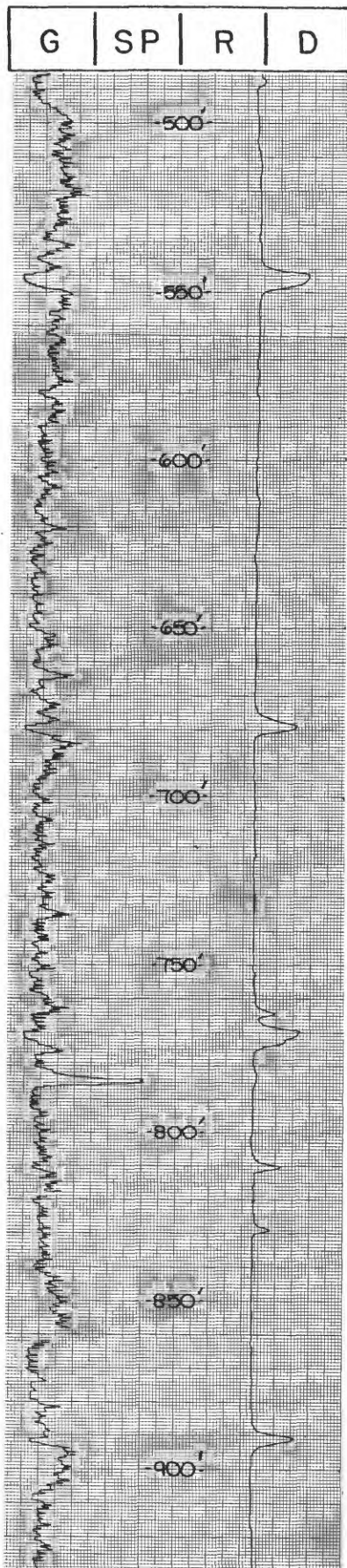
Remarks: Lost circulation problems during drilling. Density scale changed
at 430' to 2.5K cps/in. T.C. = 1.



$10' \sqrt{1''}$



Hole no. E-13-RdB (continued)



U. S. GEOLOGICAL SURVEY
GEOPHYSICAL LOG, MOFFAT COUNTY, COLORADO,
ROUND BOTTOM AREA

Hole no. E-14-RdB Date logged 8-9-77 Ground elevation 6,210'

T. 6 N., R. 92 W., Sec. 27 : 2,435' f s 1, 2,115' f e 1

Drilling medium mud Drilled depth 1,000' Fluid level at surface

Logging company Rocky Mtn. Logging speed 20'/min Logged depth 1,000'

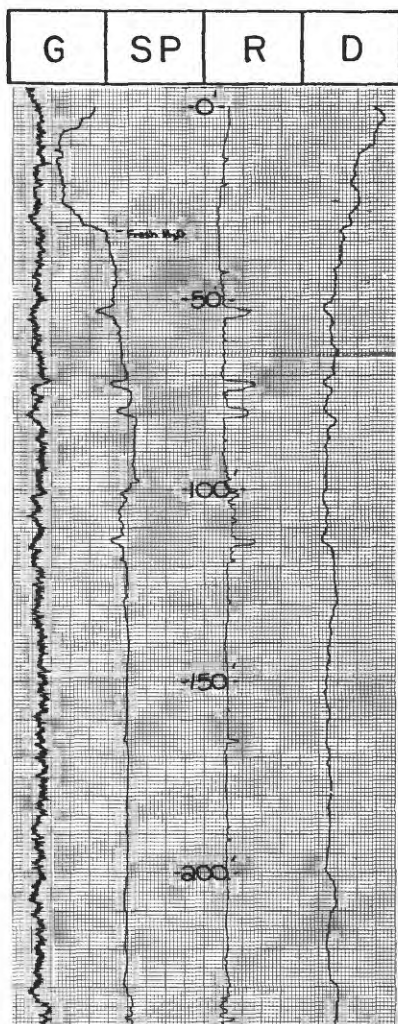
Natural gamma (G) Scale 25 cps/in. T.C. 1

Spontaneous potential (SP) Scale 25 mv/in.

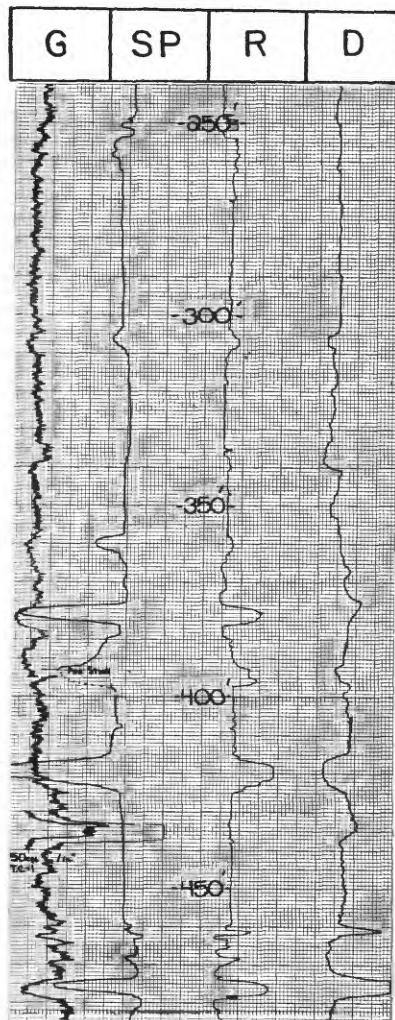
Single point resistance (R) Scale 50 ohms/in.

Density (gamma-gamma) (D) Scale 5K cps/in. T.C. 1

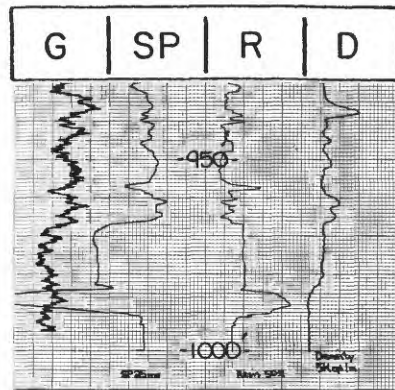
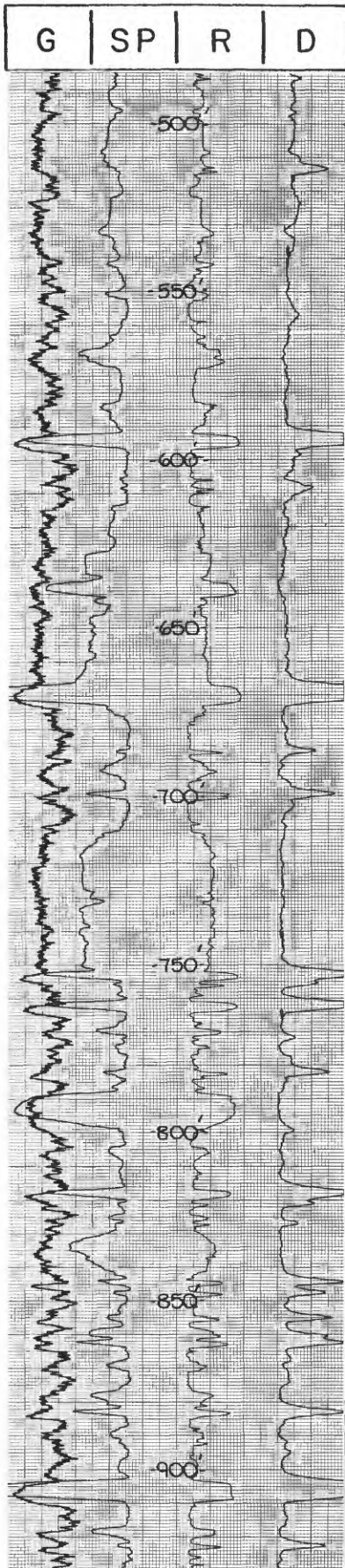
Remarks: None



$10' \sqrt{1''}$



Hole no. E-14-RdB (continued)



U. S. GEOLOGICAL SURVEY
GEOPHYSICAL LOG, MOFFAT COUNTY, COLORADO,
ROUND BOTTOM AREA

Hole no. E-15-RdB Date logged 8-26-77 Ground elevation 6,340'

T. 6 N., R. 92 W., Sec. 33 : 750' f w 1, 60' f n 1

Drilling medium mud Drilled depth 1,010' Fluid level at surface

Logging company Digilog Logging speed 20'/min Logged depth 1,006'

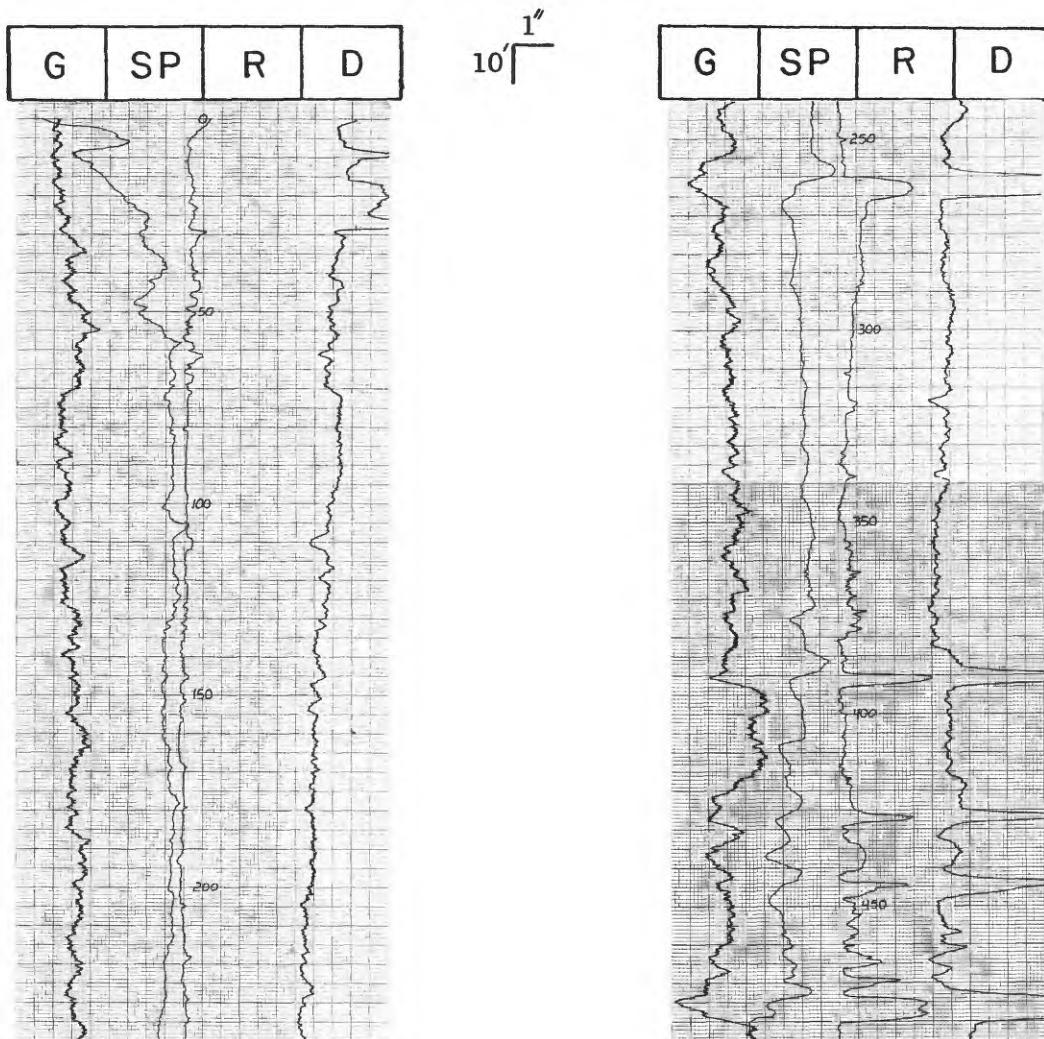
Natural gamma (G) Scale 50 cps/in. T.C. 2

Spontaneous potential (SP) Scale 40 mv/in.

Single point resistance (R) Scale 40 ohms/in.

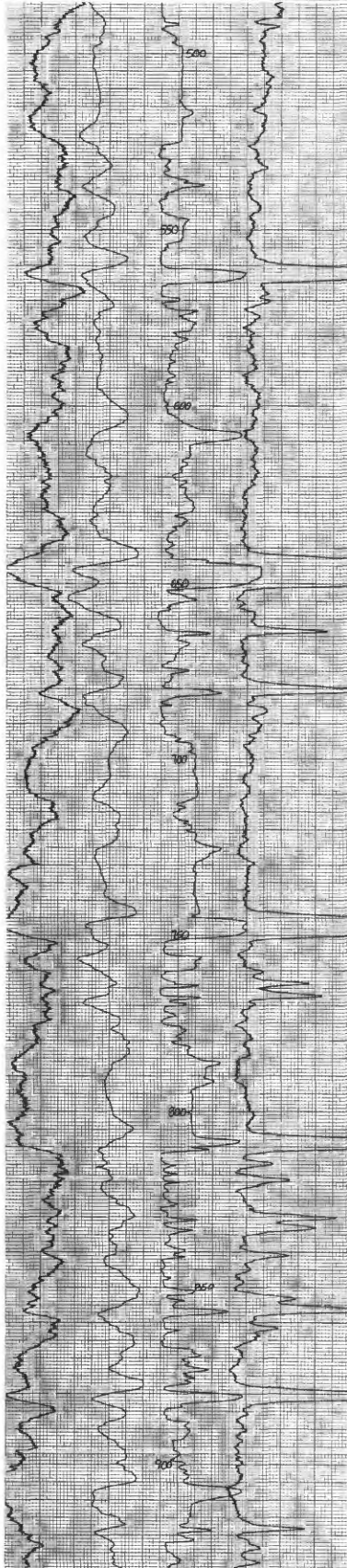
Density (gamma-gamma) (D) Scale 40 cps/in. T.C. 1

Remarks: None

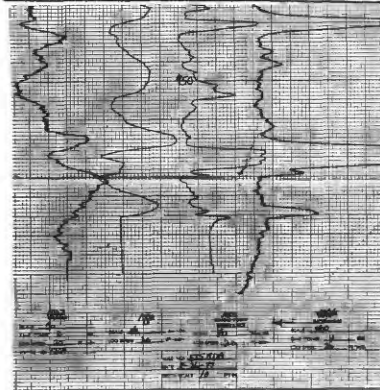


Hole no. E-15-RdB (continued)

G	SP	R	D
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G	SP	R	D
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U. S. GEOLOGICAL SURVEY
GEOPHYSICAL LOG, MOFFAT COUNTY, COLORADO,
ROUND BOTTOM AREA

Hole no. E-16-HG Date logged 9-10-77 Ground elevation 6,320'

T. 6 N., R. 92 W., Sec. 32 : 1,860' f s 1, 40' f w 1

Drilling medium foam/mud Drilled depth 1,385' Fluid level at surface

Logging company Rocky Mtn. Logging speed 20'/min Logged depth 1,380'

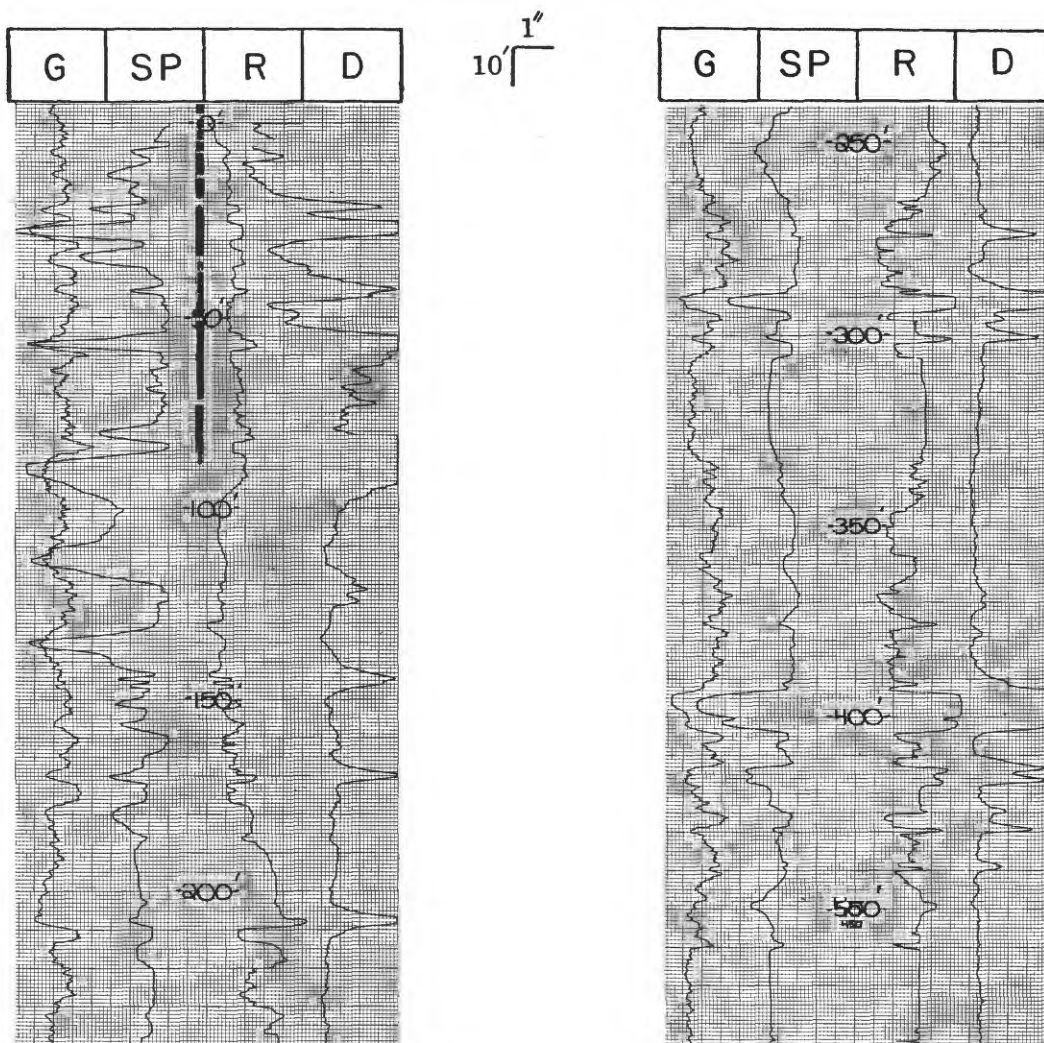
Natural gamma (G) Scale 25 cps/in. T.C. 1

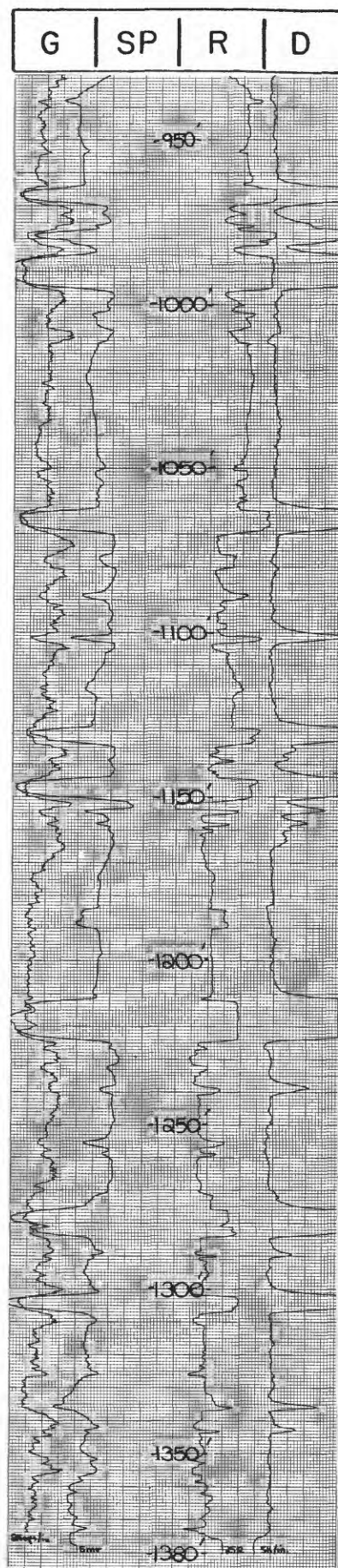
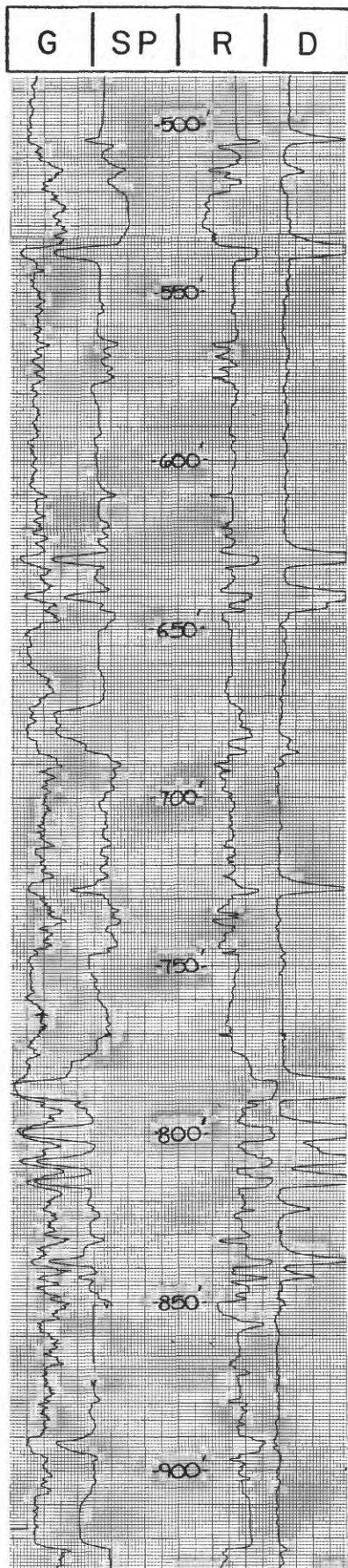
Spontaneous potential (SP) Scale 5 mv/in.

Single point resistance (R) Scale 25 ohms/in.

Density (gamma-gamma) (D) Scale 5K cps/in. T.C. 1

Remarks: Water table probably between 160' and 180'. Switched to mud at 875'.





U. S. GEOLOGICAL SURVEY
GEOPHYSICAL LOG, MOFFAT COUNTY, COLORADO,
ROUND BOTTOM AREA

Hole no. E-17-RdB Date logged 7-25-77 Ground elevation 6,185'

T. 6 N., R. 92 W., Sec. 33 : 1,700' f s 1, 175' f e 1

Drilling medium mud Drilled depth 580' Fluid level 28'

Logging company Rocky Mtn. Logging speed 20'/min Logged depth 578'

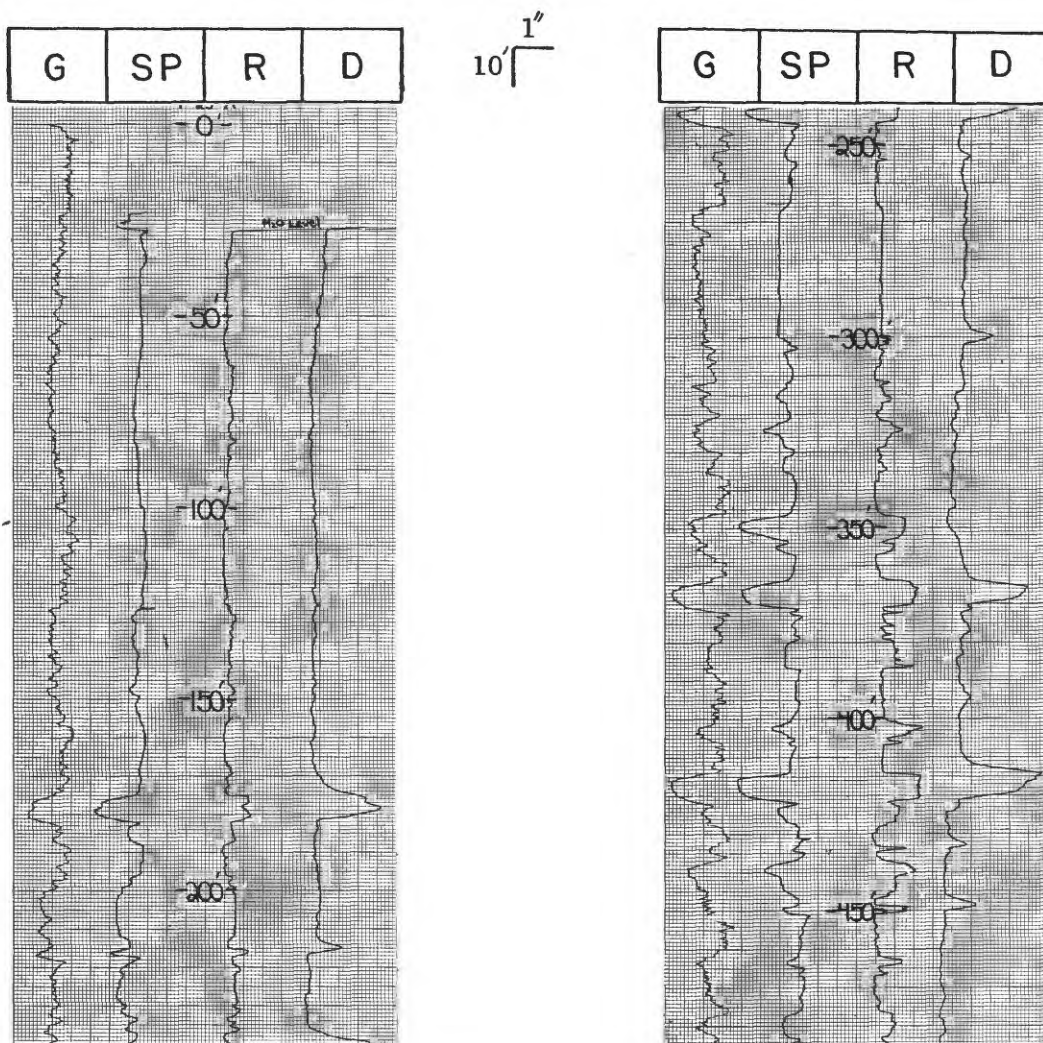
Natural gamma (G) Scale 25 cps/in. T.C. 1

Spontaneous potential (SP) Scale 100 mv/in.

Single point resistance (R) Scale 15 ohms/in.

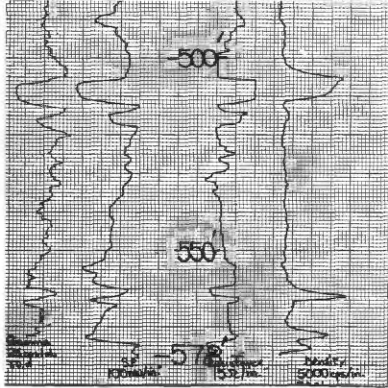
Density (gamma-gamma) (D) Scale 5K cps/in. T.C. 1

Remarks: None



Hole no. E-17-RdB (continued)

G	SP	R	D
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G	SP	R	D
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U. S. GEOLOGICAL SURVEY
GEOPHYSICAL LOG, MOFFAT COUNTY, COLORADO,
ROUND BOTTOM AREA

Hole no. E-18-RdB Date logged 7-29-77 Ground elevation 6,130'

T. 6 N., R. 92 W., Sec. 34: 2,080' f e 1, 1,520' f n 1

Drilling medium mud Drilled depth 840' Fluid level at surface

Logging company Rocky Mtn. Logging speed 20'/min Logged depth 840'

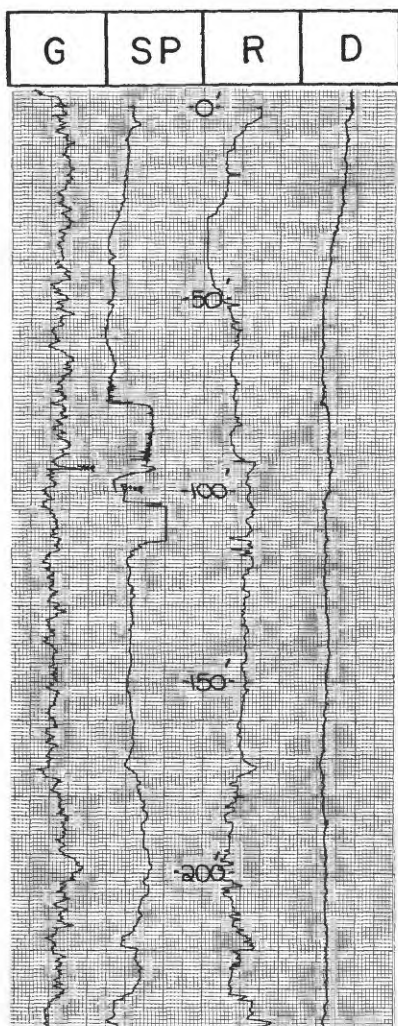
Natural gamma (G) Scale 25 cps/in. T.C. 11

Spontaneous potential (SP) Scale 50 mv/in.

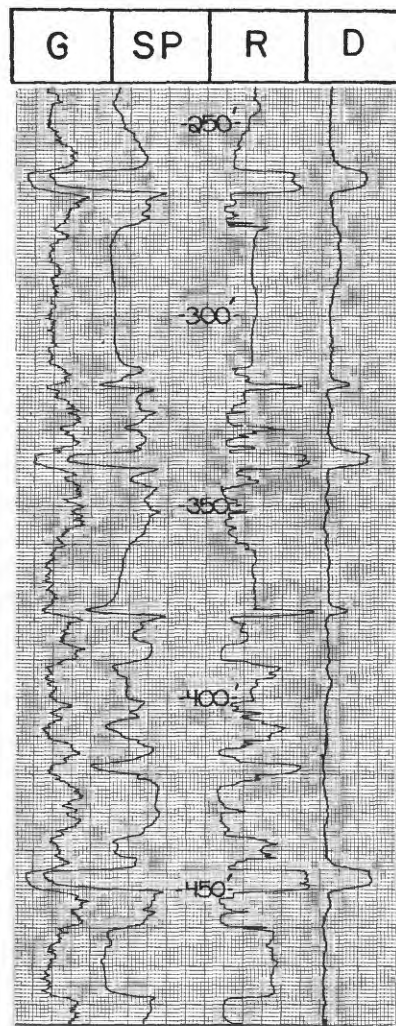
Single point resistance (R) Scale 25 ohms/in.

Density (gamma-gamma) (D) Scale 5K cps/in. T.C. 1

Remarks: Water table at about 300'.



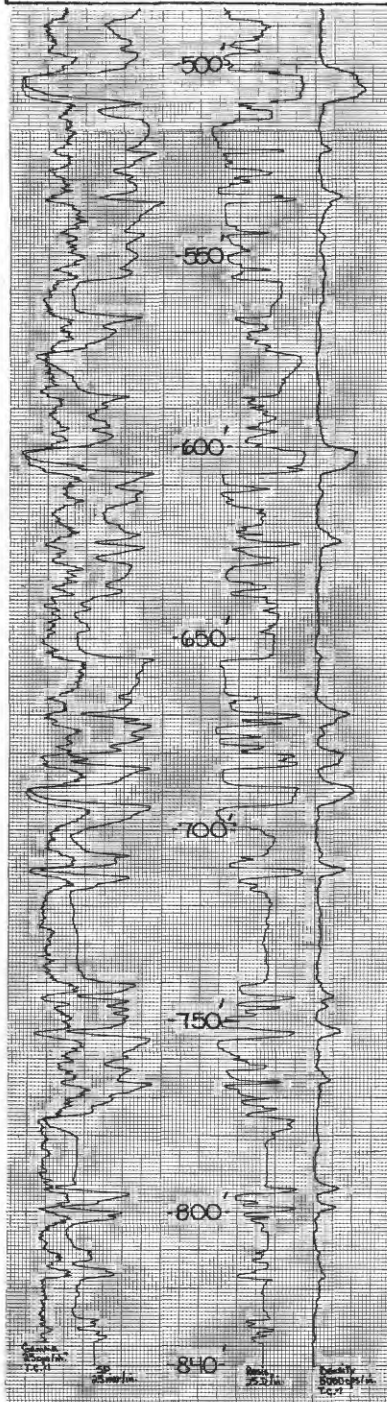
$10' \begin{array}{l} \text{1"} \\ \text{1"} \end{array}$



Hole no. E-18-RdB (continued)

G	SP	R	D
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G	SP	R	D
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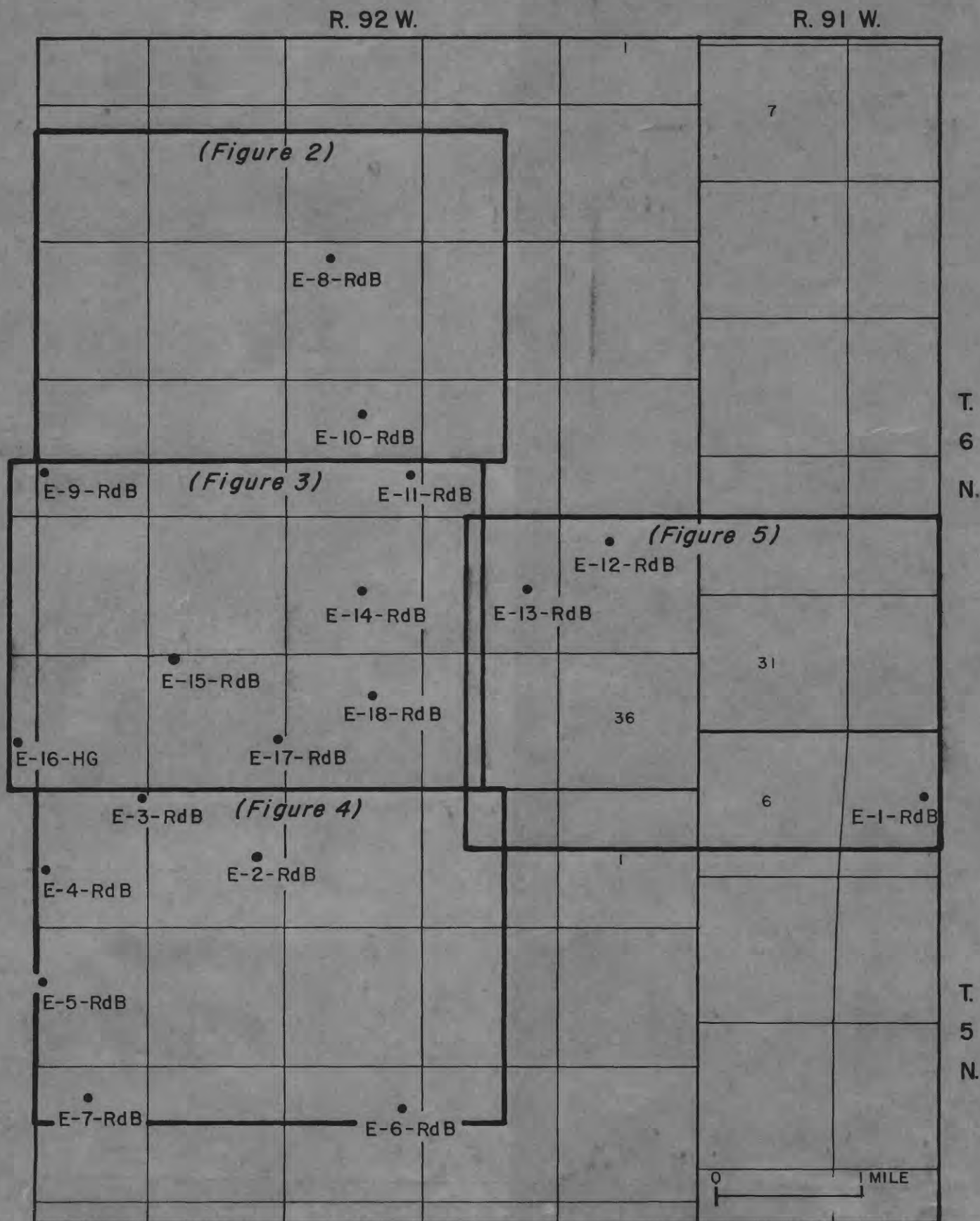


Figure 1.—General location map of the Round Bottom 7½-minute quadrangle showing approximate positions of drill holes reported in this paper. Heavy lines show boundaries for figures 2, 3, 4, and 5.