UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

GEOPHYSICAL LOGS FOR SIX HOLES DRILLED DURING 1978 IN THE ROUND BOTTOM AREA, YAMPA COAL FIELD, MOFFAT COUNTY, COLORADO

By

Edward A. Johnson

and

Robert Brown

Open-File Report 79-328

1979

CONTENTS

ILLUSTRATIONS

TABLE

GEOPHYSICAL LOGS FOR SIX HOLES DRILLED DURING 1978 IN THE ROUND BOTTOM AREA, YAMPA COAL FIELD, MOFFAT COUNTY, COLORADO

By Edward A. Johnson

and

Robert Brown

INTRODUCTION

Between September 16 and September 27, 1978, six holes, with diameters of approximately 5 inches and with a cumulative depth of 5,015 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. 14-08-0001-17329, awarded to McCabe Brothers Drilling, 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). 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 authors, who also coordinated the drilling and geophysical logging operations and participated in the Bureau of Land Management's pre- and post-drilling site inspections. Charles Lee and Rodney Noah, U.S. Geological Survey, assisted in the drilling program and were especially helpful in sample describing.

Under contract to McCabe, 5,000 feet of hole were logged by geophysical methods by Digilog, Inc., Broomfield, 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. In addition to the above-mentioned logs, another trip up the hole was made to obtain a caliper (C) log accompanied in some cases by either a single-point resistance log or a high-resolution density (HRD) log to aid in correlation.

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.

REFERENCE CITED

Hancock, E. T., 1925, Geology and coal resources of the Axial and Monument Butte quadrangles, Moffat County, Colorado: U.S. Geological Survey Bulletin 757, 134 p.

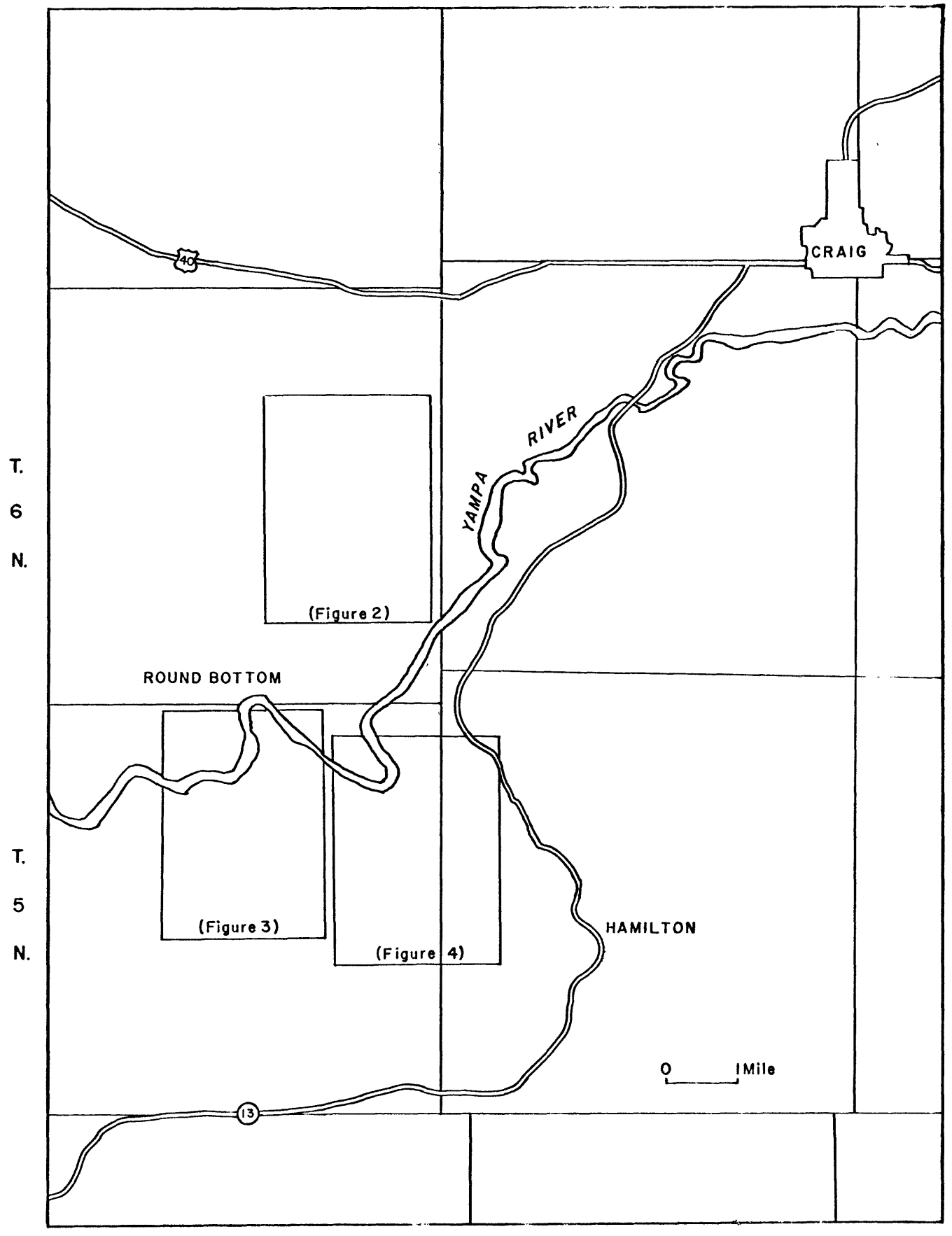


Figure 1.--General location map of the Round Bottom area showing boundaries for figures 2, 3, and 4.

R. 92 W.

T. 6 N.

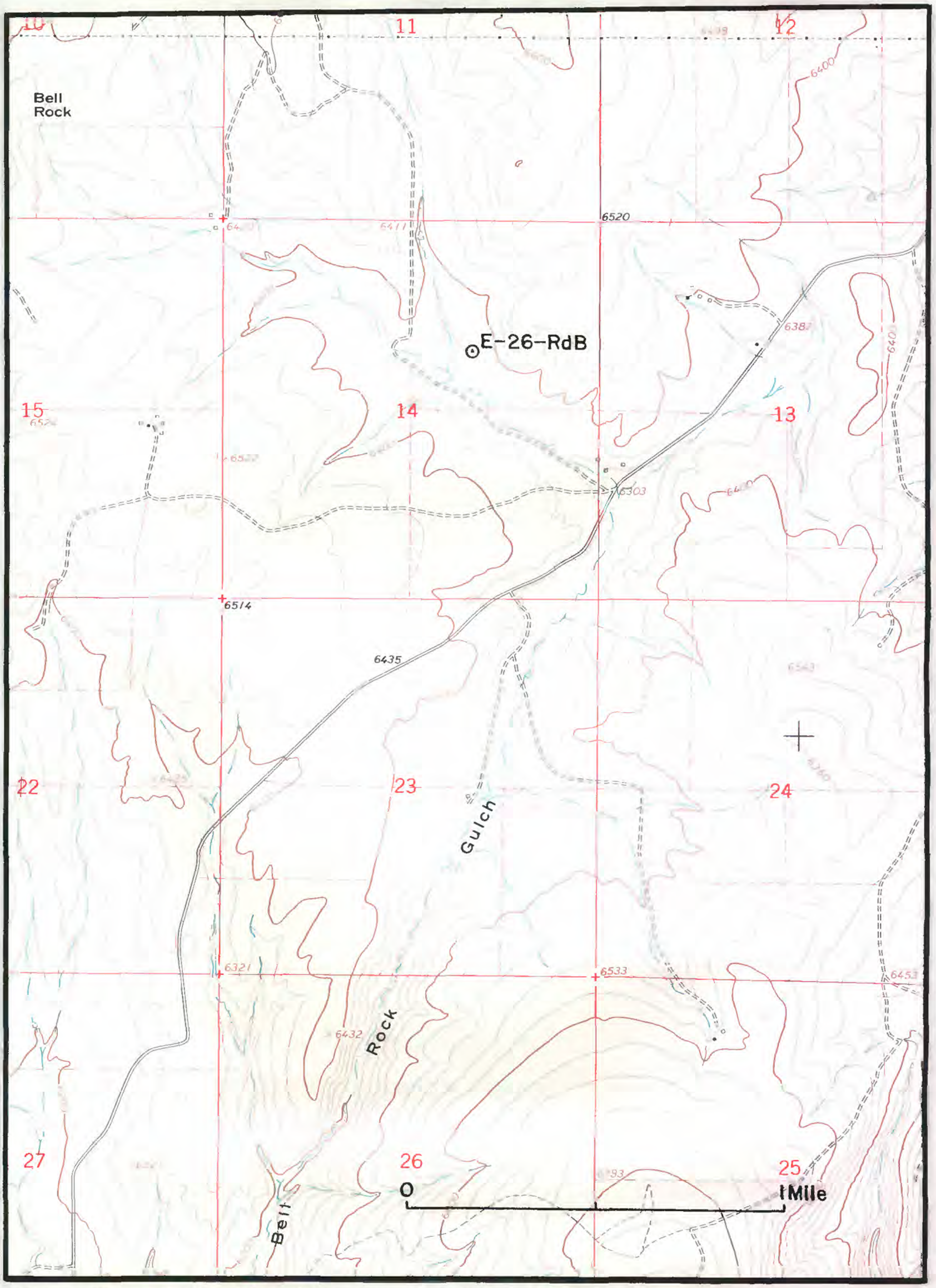


Figure 2.--Detailed location map of drill-hole E-26-RdB.

R. 92 W.

T. 5 N.

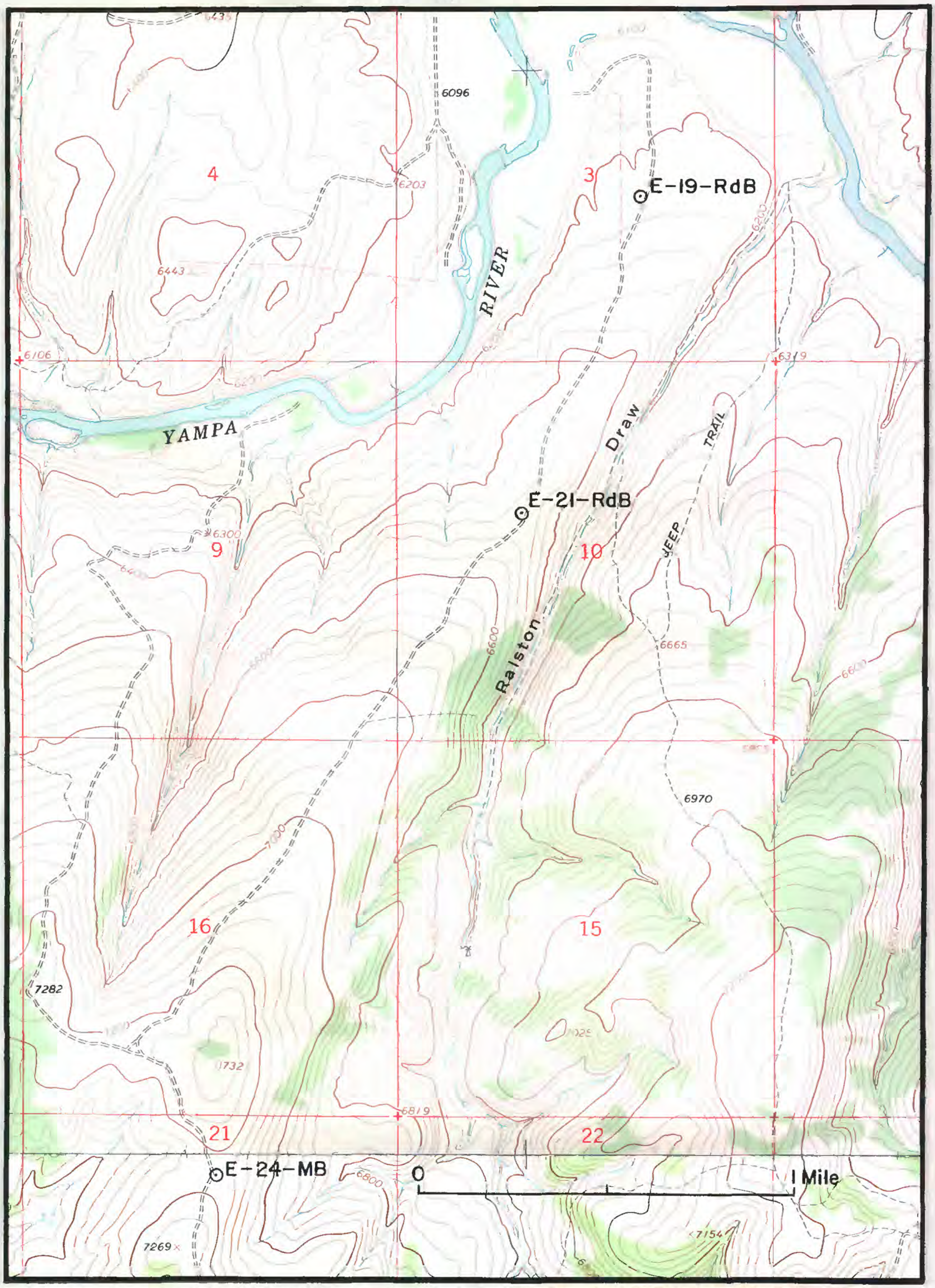


Figure 3.--Detailed location map of drill-holes E-19-RdB, E-21-RdB, and E-24-MB.

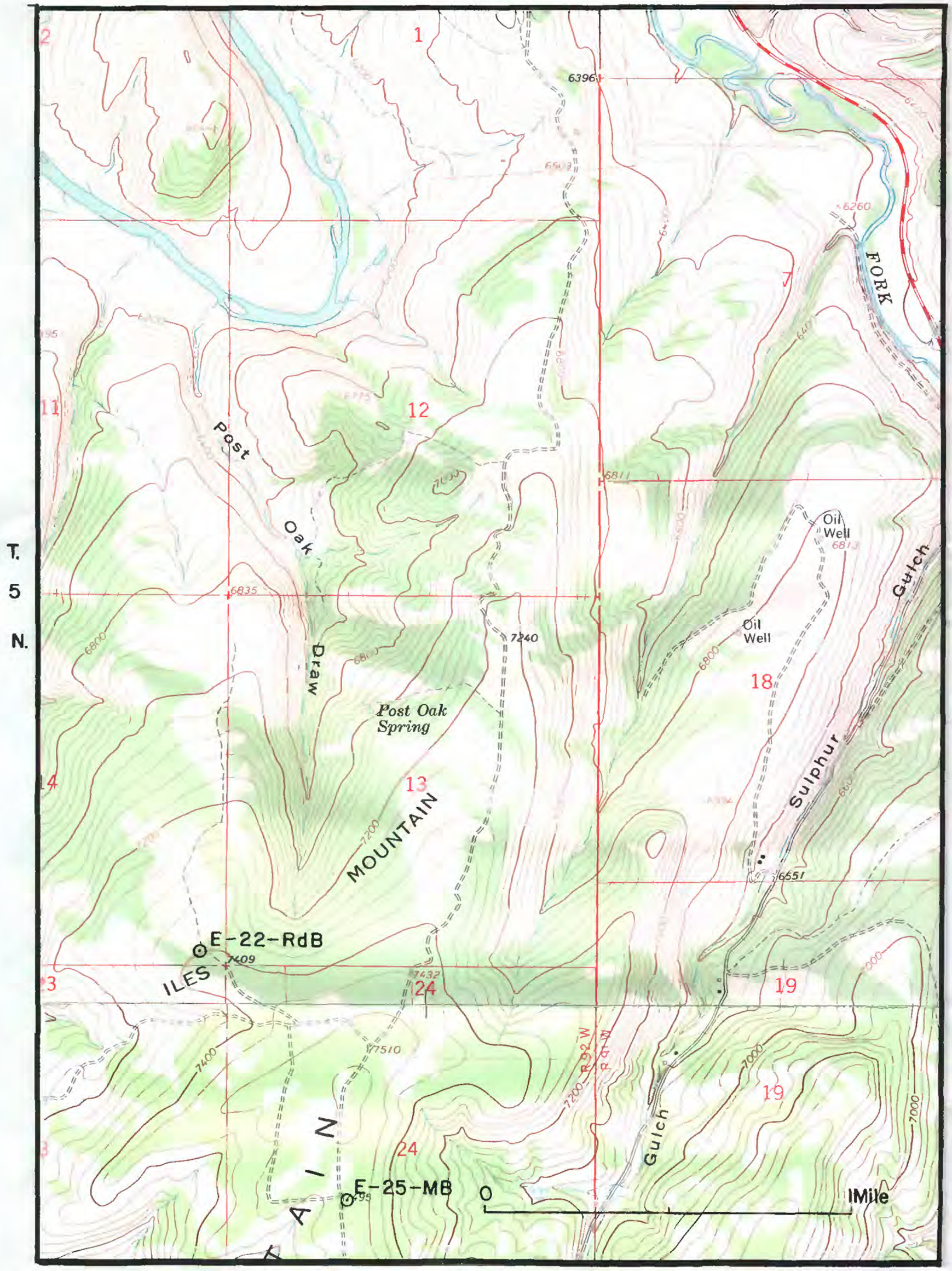


Figure 4.--Detailed location map of drill-holes E-22-RdB and E-25MB.

Table 1.--Drill-hole locations, elevations, and drilled and logged depths

[All depths stated herein are in feet; to convert to meters, multiply by 0.3048]

Hole No.	Location	Ground elevation	Total depth drilled	Depth logged
E-19-Rdb	NW¼SE¼ sec. 3 T. 5 N., R. 92 W.	6,220	360	358
E-21-RdB	SE¼NW¼ sec. 10 T. 5 N., R. 92 W.	6,500	1,311+	1,310
E-22-RdB	SE¼SE¼ sec. 14 T. 5 N., R. 92 W.	7,395	1,101+	1,101
E-24-MB	NW¼NE¼ sec. 21 T. 5 N., R. 92 W.	7,180	582+	582
E-25-MB	NE¼SW¼ sec. 24 T. 5 N., R. 92 W.	7,495	720	705
E-26-RdB	SW¼NE¼ sec. 14 T. 6 N., R. 92 W.	6,360	941+	941

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

Hole no. E-19-RdB Date logged 9-26-78 Ground elevation 6,220'

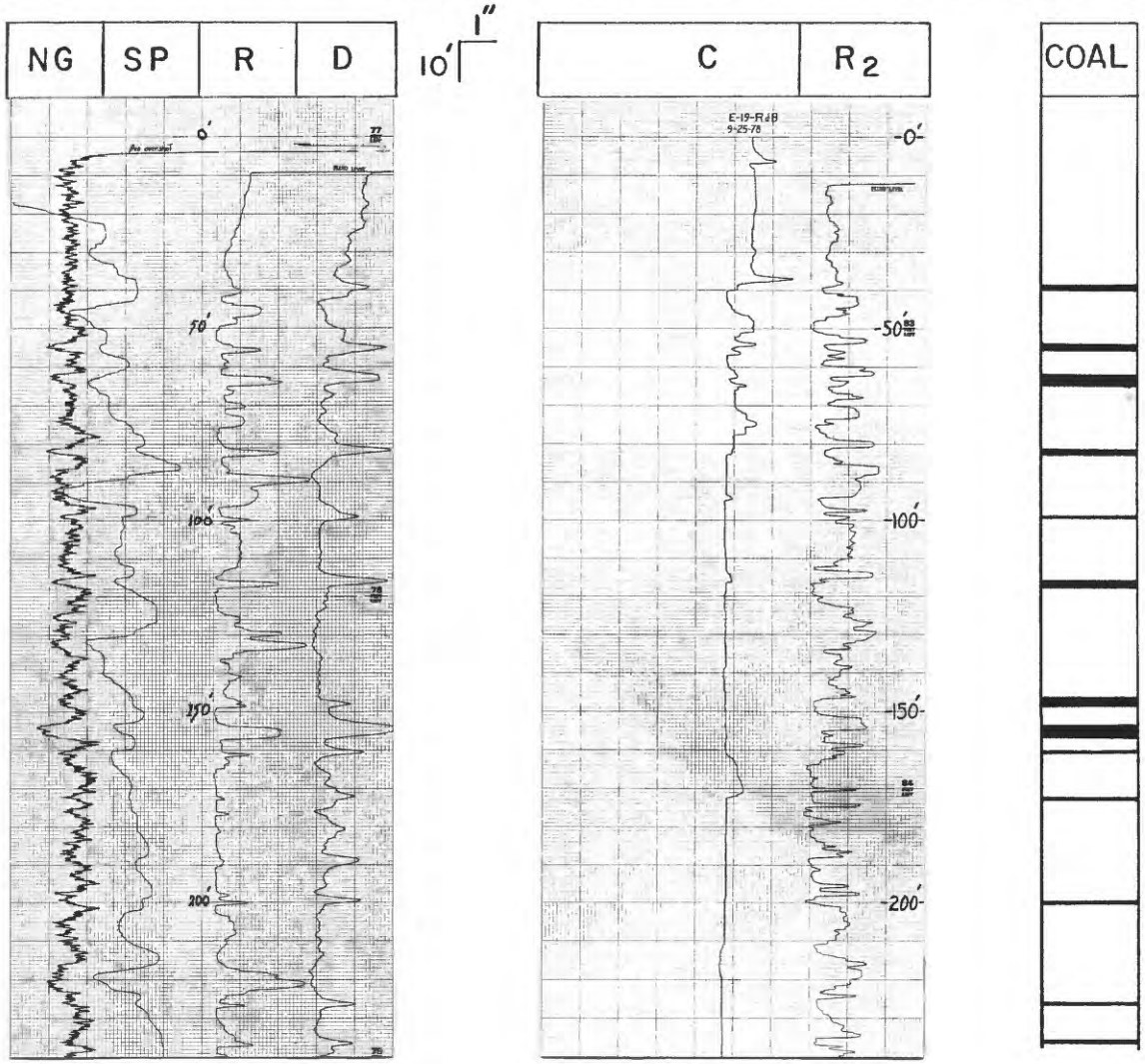
T. 5 N., R. 92 W., Sec. 3 : 2,315 f s l, 1,890 f e l

Drilling medium air/mud Drilled depth 360' Fluid level 9½'

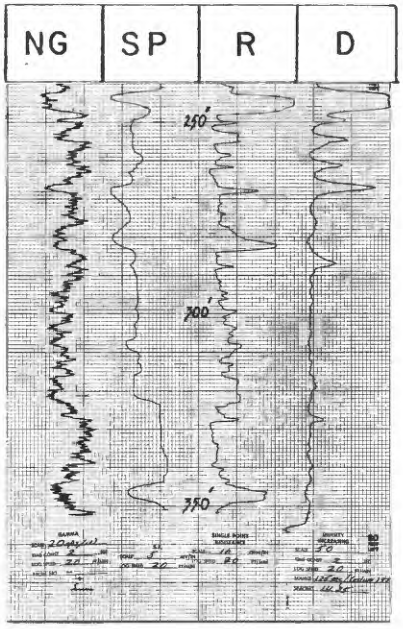
Logging speed: (1st) 20'/min (2nd) 20'/min Logged depth 358'

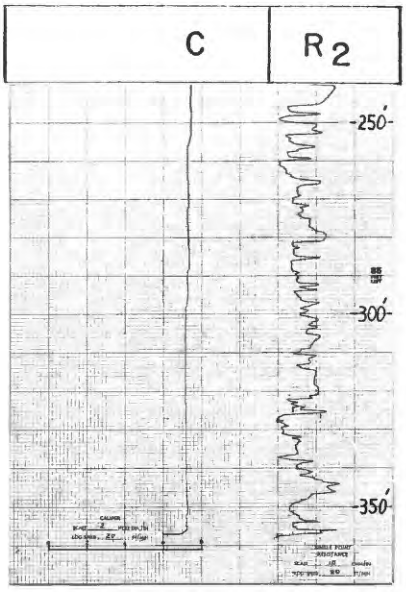
Natural gamma (NG)	Scale 20 cps/in.	T.C. 2
Spontaneous potential (SP)	Scale 5 mv/in.	
Single point resistance (R)	Scale 10 ohms/in.	
Density (gamma-gamma) (D)	Scale 50 cps/in.	T.C. 2
Caliper (C)	Scale 2 in./in.	
2nd Single point resistance (R_2)	Scale 10 ohms/in.	

Remarks: Drilled with air to 60' then switched to mud. Twentymile Sandstone expected at 233', but never reached. Suspected landslide area.



Hole no. E-19-RdB (continued)





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

Hole no. E-21-RdB Date logged 9-25-78 Ground elevation 6,500'

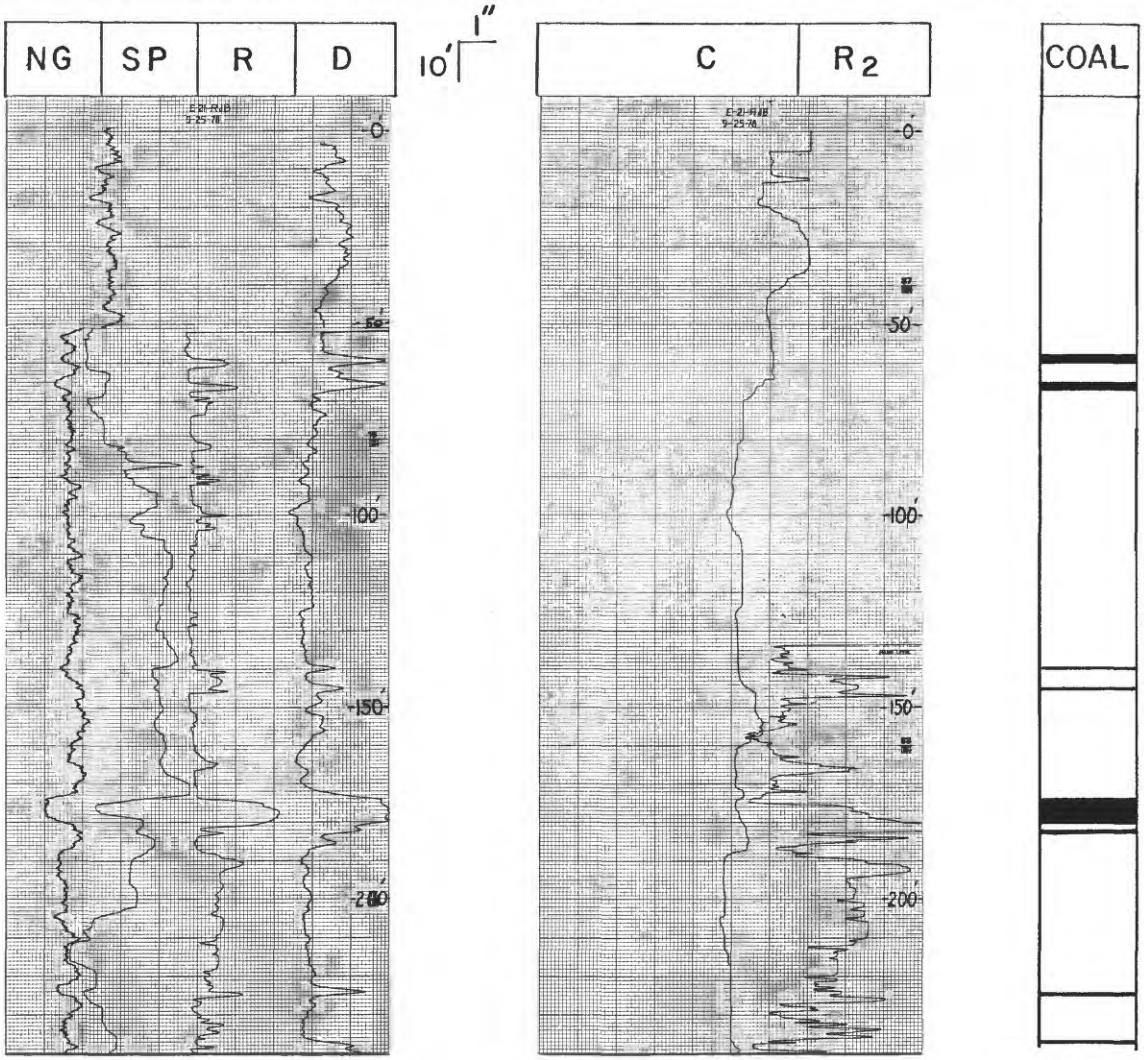
T. 5 N., R. 92 W., Sec. 10 : 2,100 f n l, 1,750 f w l

Drilling medium air/foam/mud Drilled depth 1,311'+ Fluid level 52'

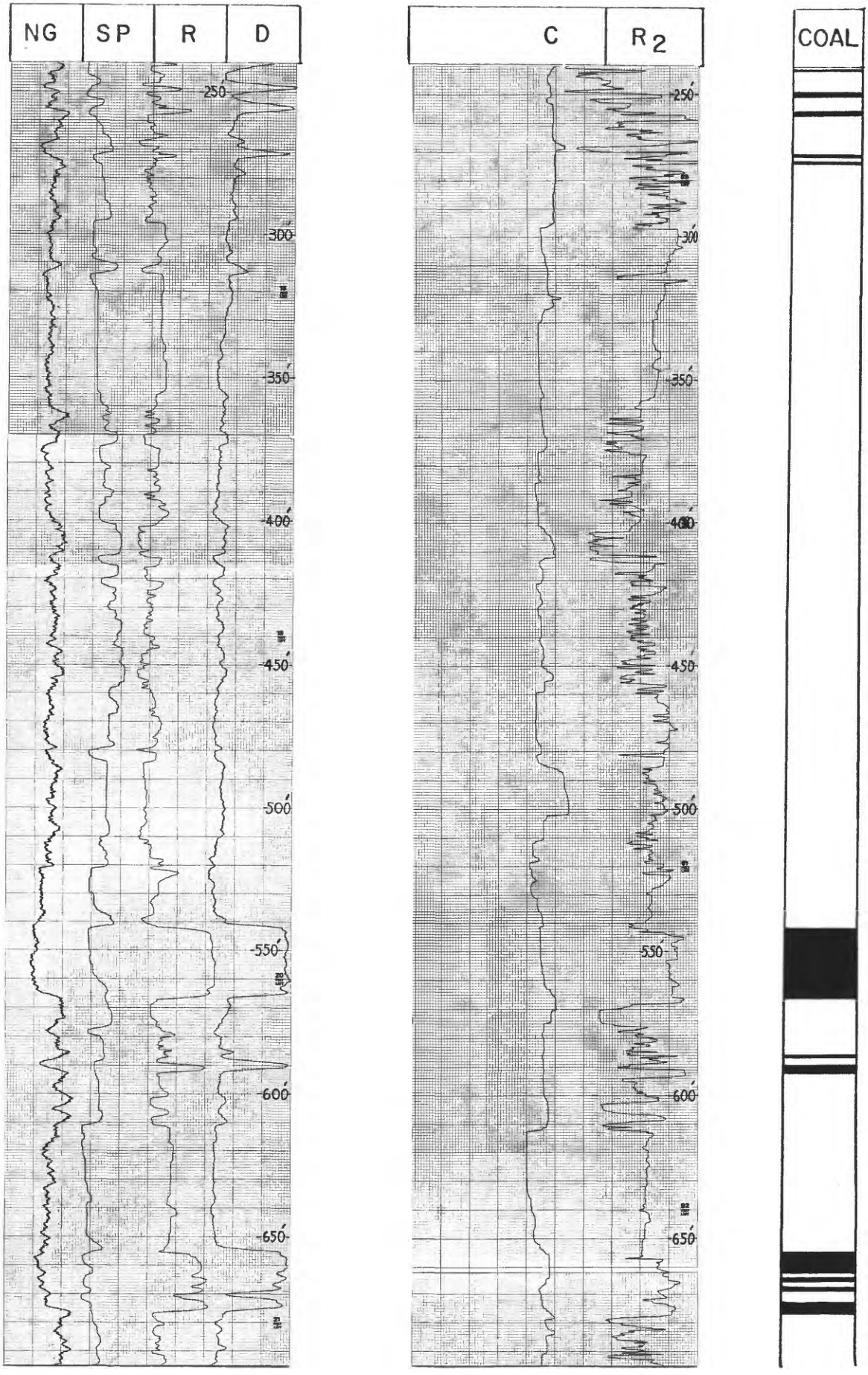
Logging speed: (1st) 20'/min (2nd) 20'/min Logged depth 1,310'

Natural gamma (NG)	Scale 20 cps/in.	T.C. 3
Spontaneous potential (SP)	Scale 20 mv/in.	
Single point resistance (R)	Scale 10 ohms/in.	
Density (gamma-gamma) (D)	Scale 50 cps/in.	T.C. 3
Caliper (C)	Scale 2 in./in.	
2nd Single point resistance (R_2)	Scale 10 ohms/in.	

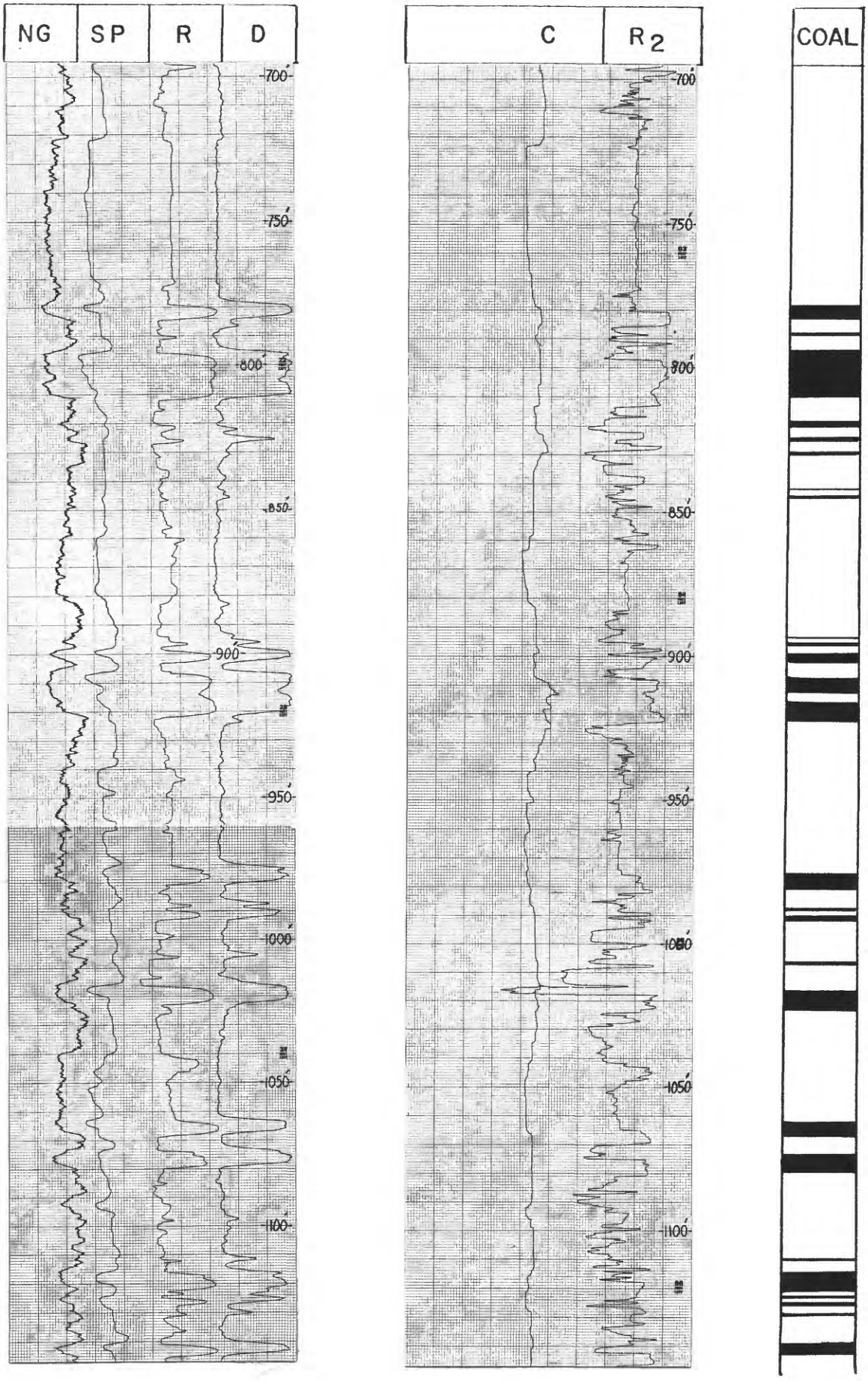
Remarks: Drilled with air to 20' then foam to 540' and then switched to mud. Top of Twentymile Sandstone 313'. Top of Trout Creek Sandstone 1,185'. NG 1' high on rerun above fluid level.



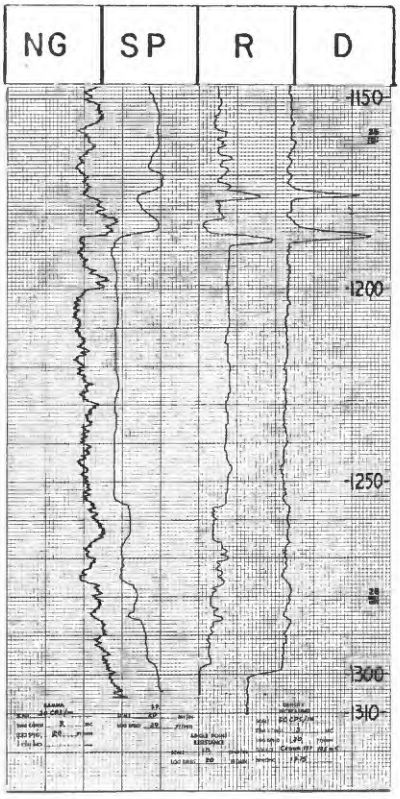
Hole no. E-21-RdB (continued)

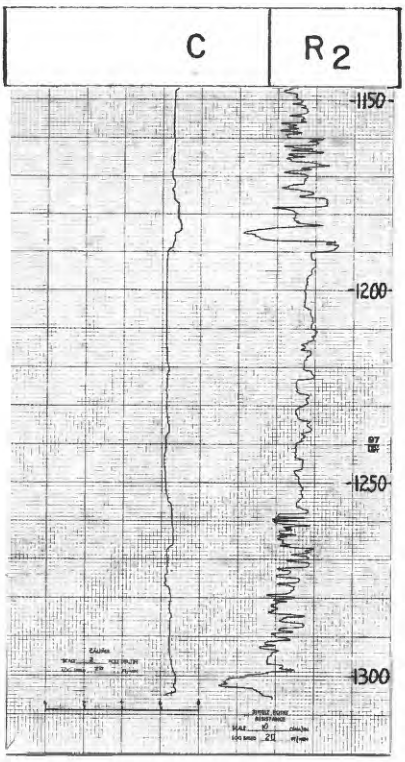


Hole no. E-21-RdB (continued)



Hole no. E-21-RdB (continued)





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

Hole no. E-22-RdB Date logged 9-20-78 Ground elevation 7,395'

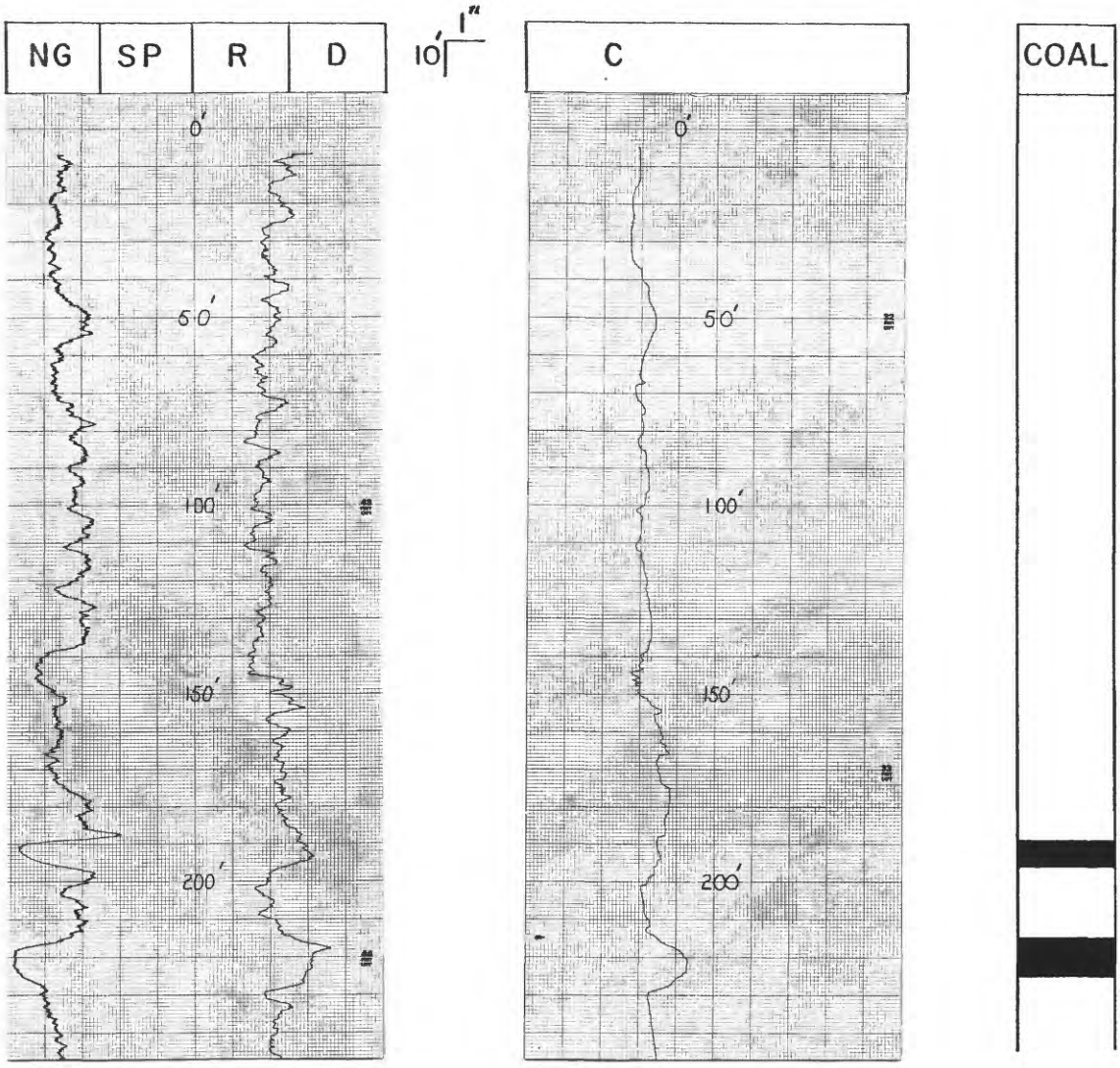
T. 5 N., R. 92 W., Sec. 14 : 375 f e l 200 f s l

Drilling medium air/foam Drilled depth 1,101'+ Fluid level 587½'

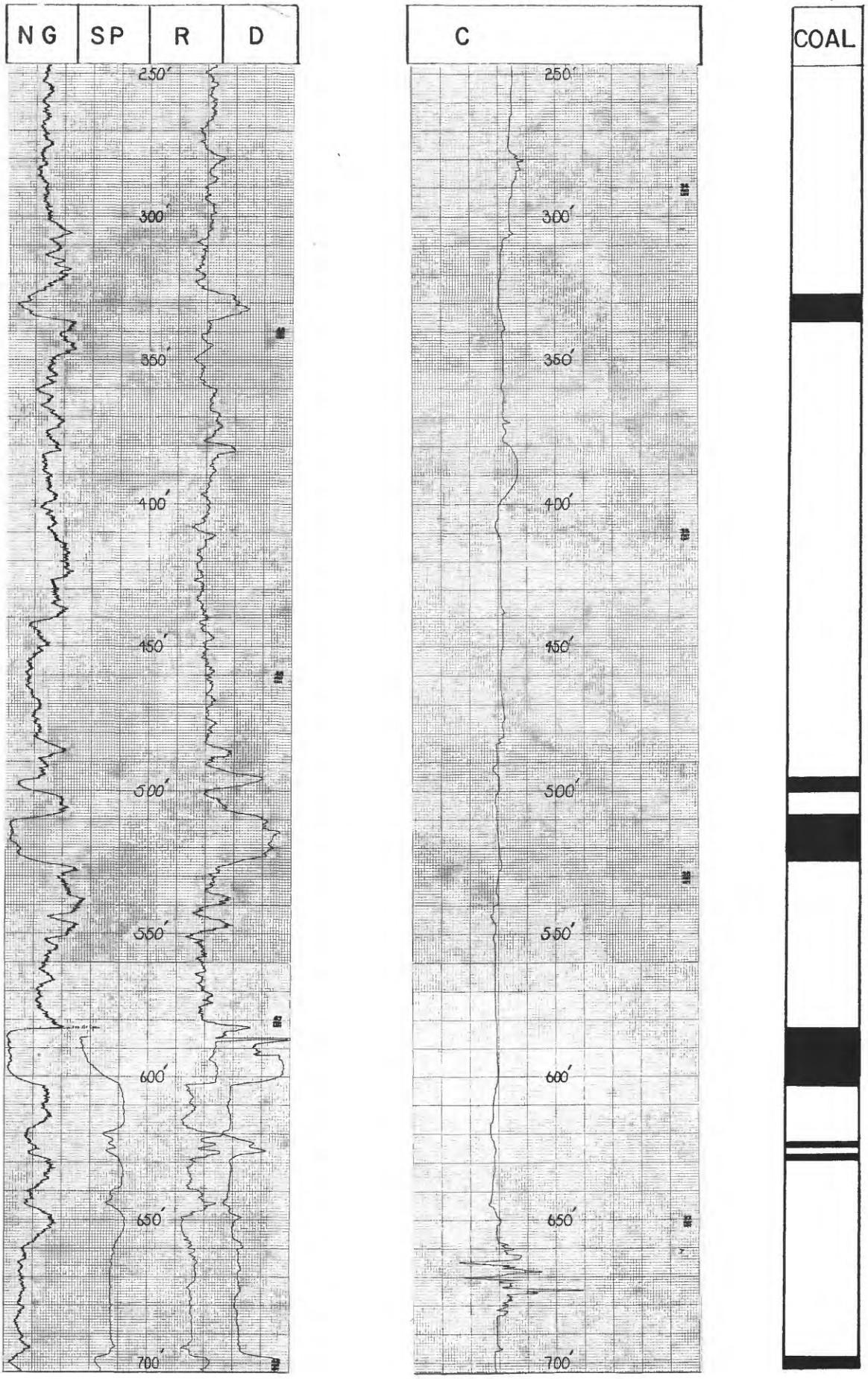
Logging speed: (1st) 20'/min (2nd) 10'/min Logged depth 1,101'

Natural gamma (NG	Scale 10 cps/in.	T.C. 2
Spontaneous potential (SP)	Scale 10 mv/in.	
Single point resistance (R)	Scale 10 ohms/in.	
Density (gamma-gamma) (D)	Scale 50 cps/in.	T.C. 2
Caliper (C)	Scale 2 in./in.	

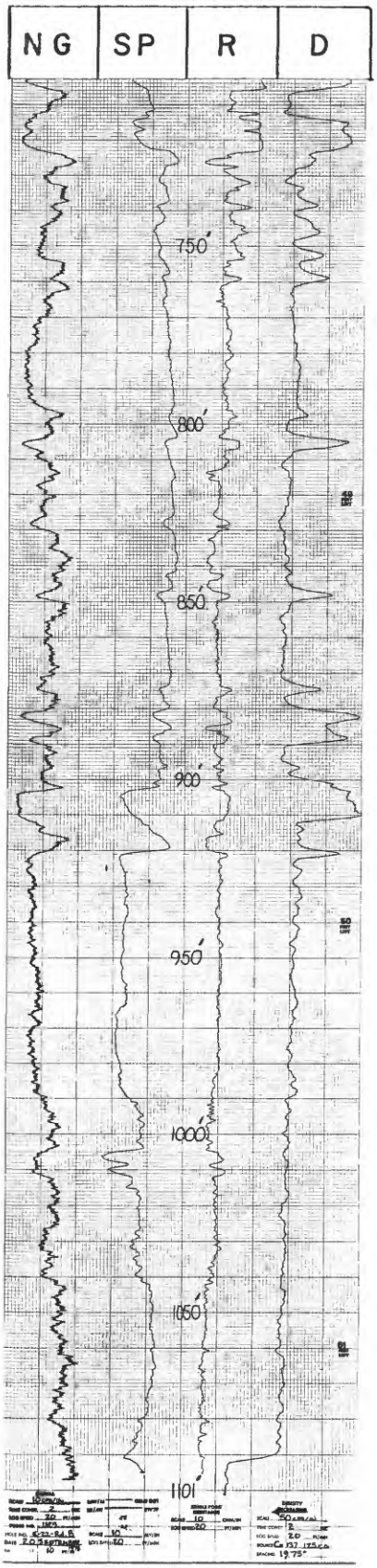
Remarks: Drilled with air to 15' then switched to foam. Lost circulation after 65' and drilled blind to total depth. Top of Trout Creek Sandstone at 920'.

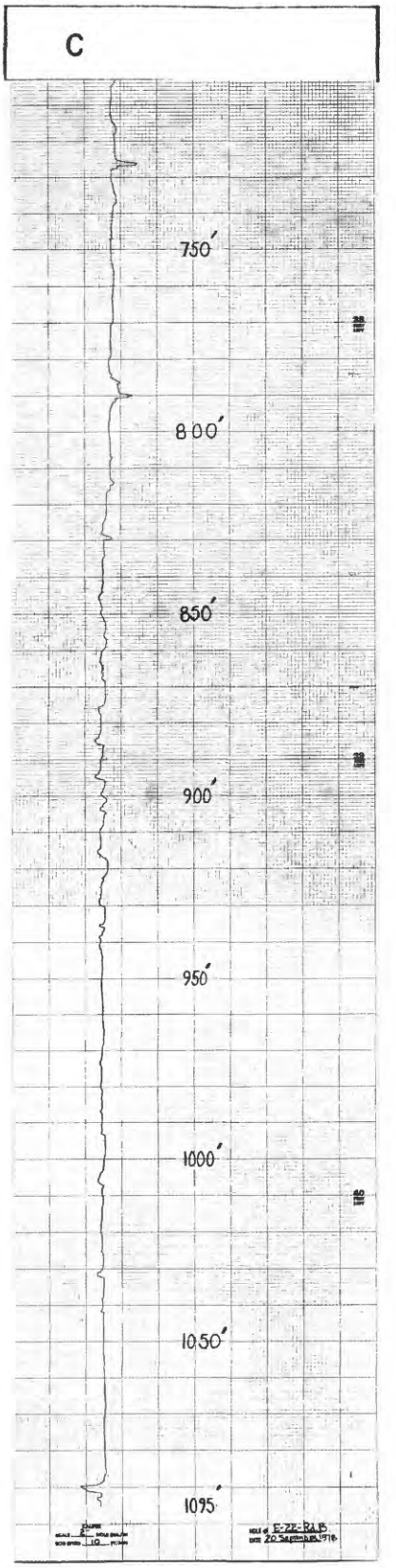


Hole no. E-22-RdB (continued)



Hole no. E-22-RdB (continued)





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

Hole no. E-24-MB Date logged 9-23-78 Ground elevation 7,180'

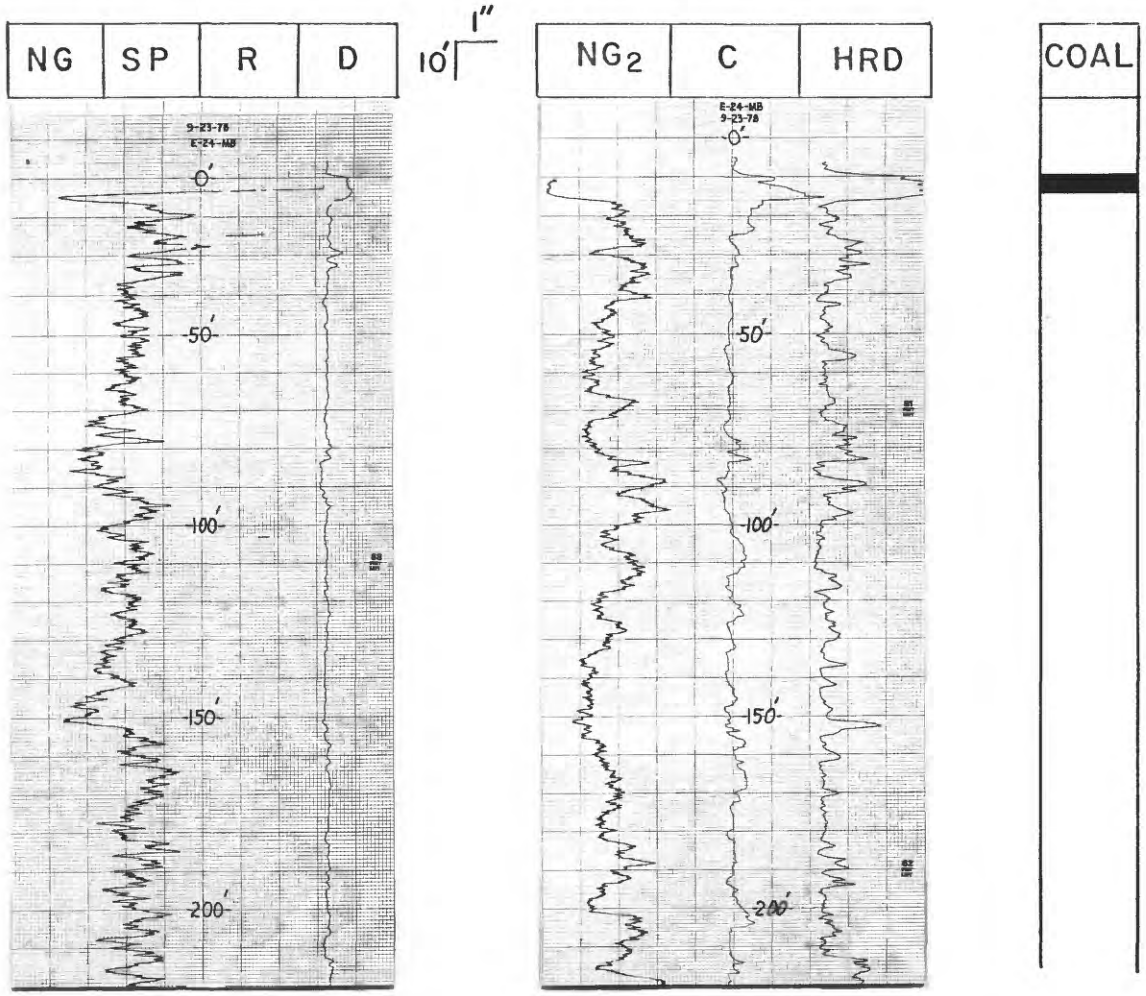
T. 5 N., R. 92 W., Sec. 21 : 2,530 f e l, 830 f n l

Drilling medium air/foam Drilled depth 582'+ Fluid level 338' (includes some foam)

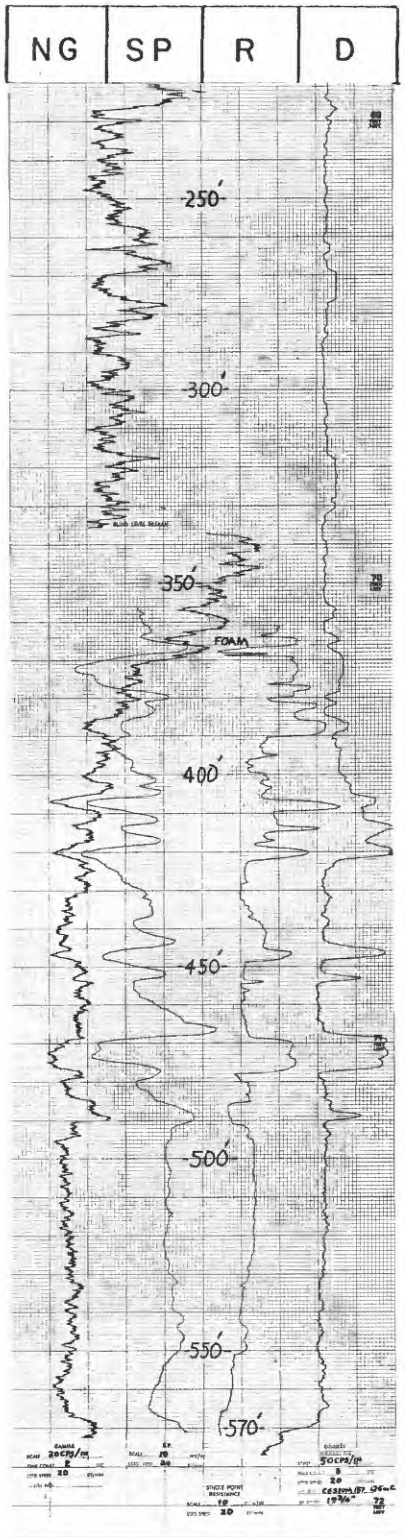
Logging speed: (1st) 20'/min (2nd) 20'/min Logged depth 582'

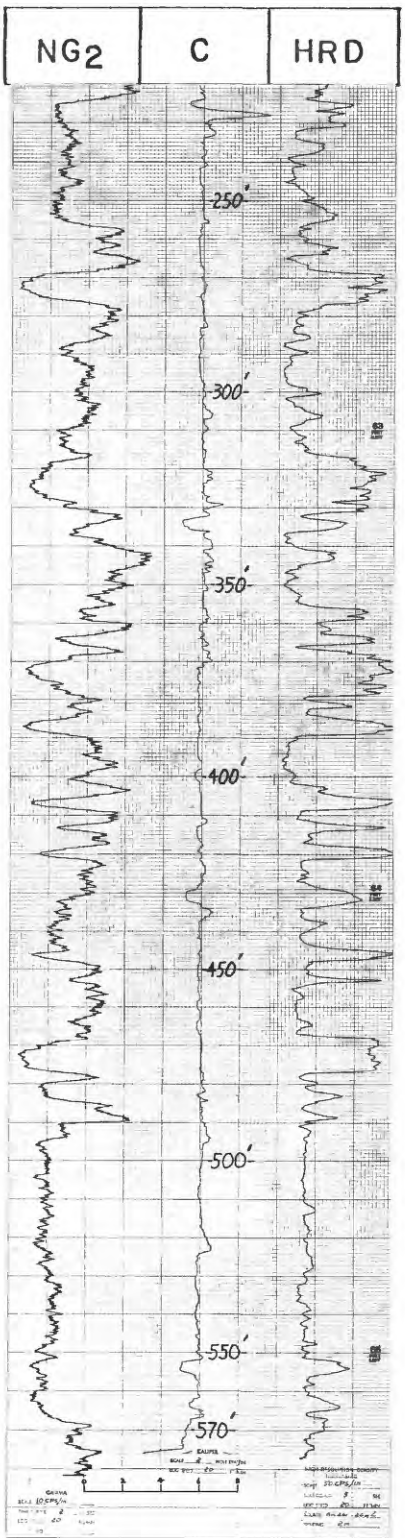
Natural gamma (NG)	Scale 20 cps/in.	T.C. 2
Spontaneous potential (SP)	Scale 10 mv/in.	
Single point resistance (R)	Scale 10 ohms/in.	
Density (gamma-gamma) (D)	Scale 50 cps/in.	T.C. 3
2nd Natural gamma (NG)	Scale 10 cps/in.	T.C. 2
Caliper (C)	Scale 2 in./in.	
High resolution density (HRD)	Scale 50 cps/in.	T.C. 3

Remarks: Drilled with air to 35' then switched to foam. Top of Trout Creek Sandstone 491'.



Hole no. E-24-MB (continued)





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

Hole no. E-25-MB Date logged 9-16-78 Ground elevation 7,495'

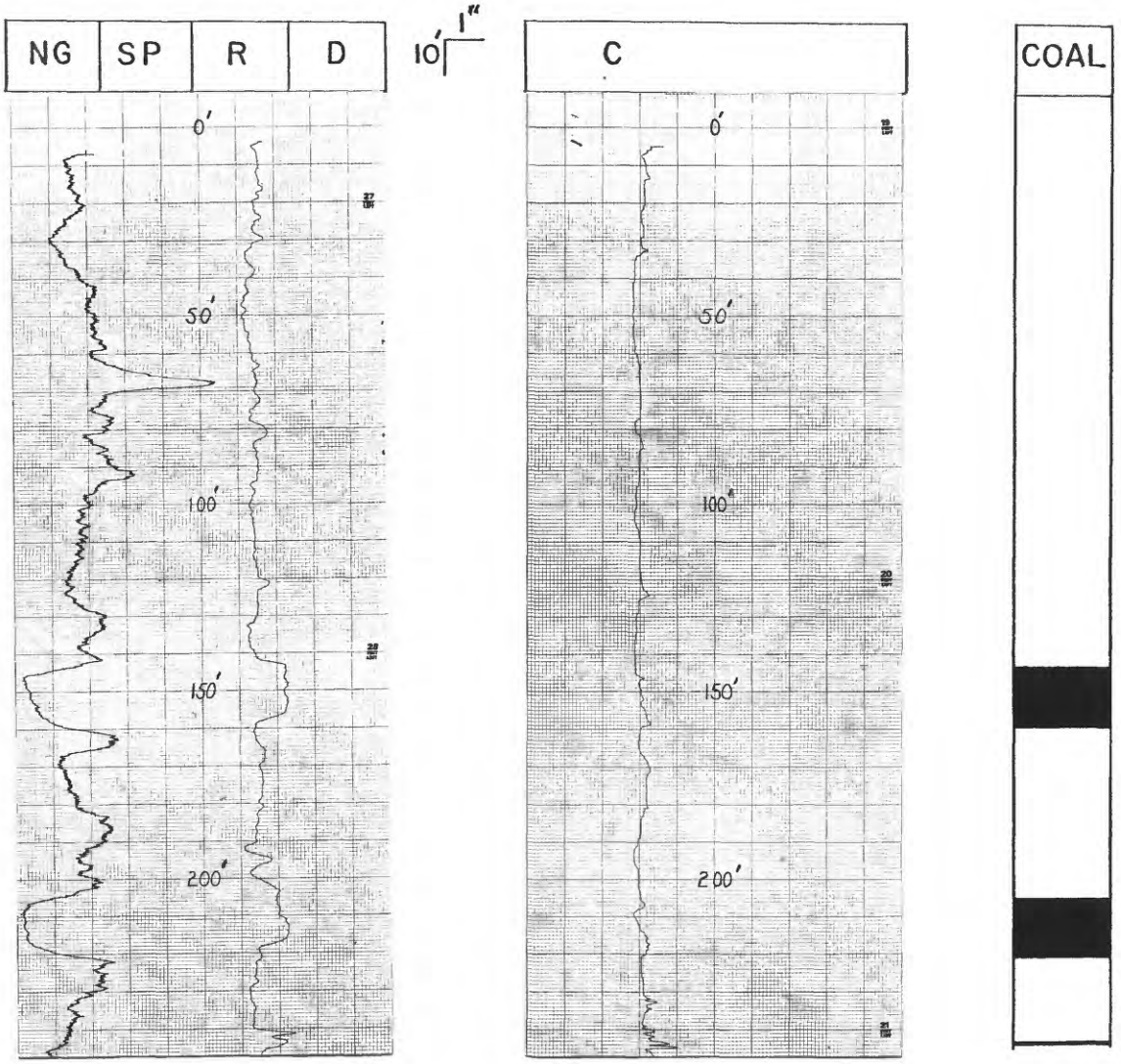
T. 5 N., R. 92 W., Sec. 24 : 1,900 f s l 1,715 f w l

Drilling medium air Drilled depth 720' Fluid level 281'

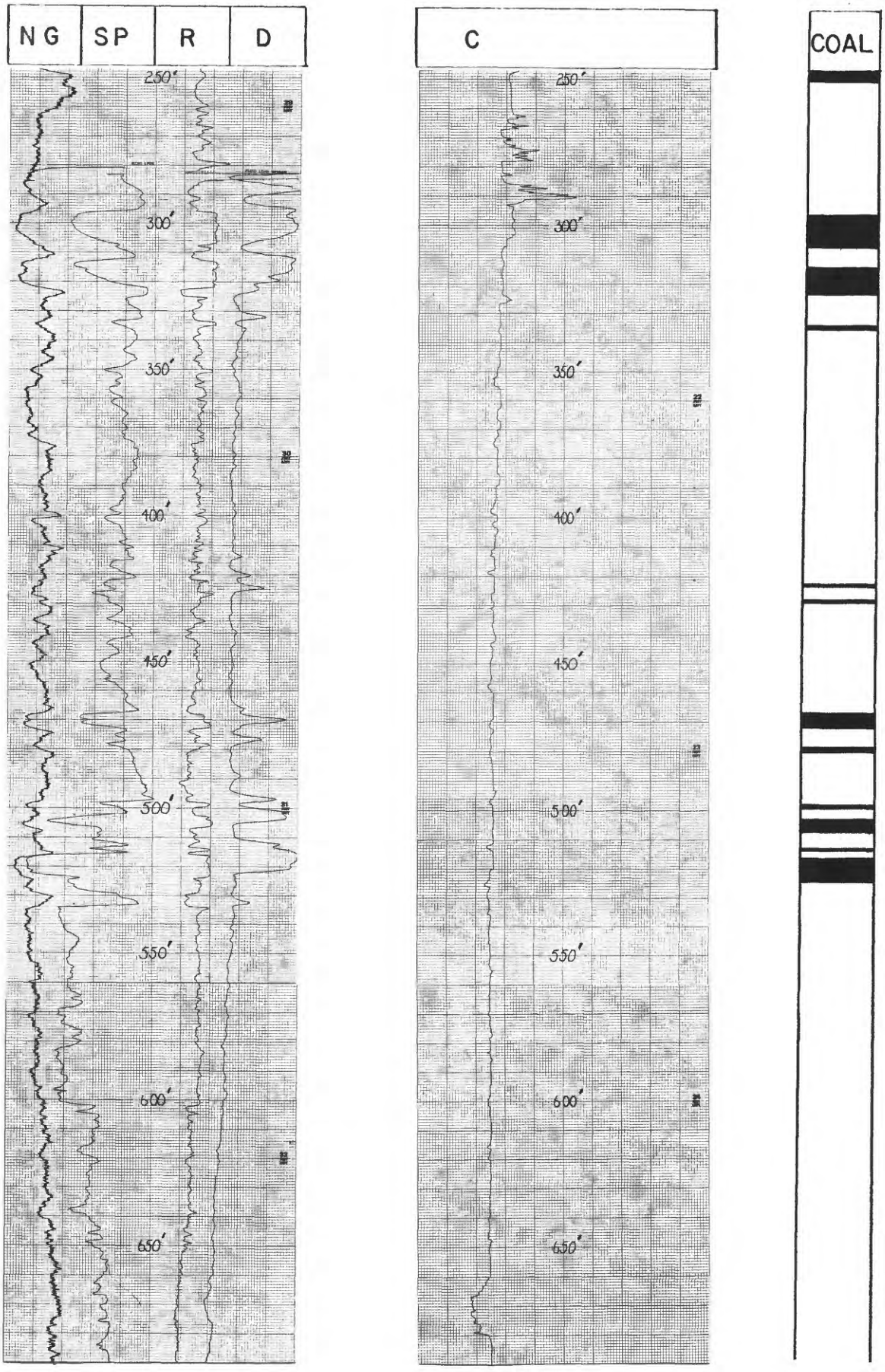
Logging speed: (1st) 20'/min (2nd) 10'/min Logged depth 705'

Natural gamma (NG	Scale 10 cps/in.	T.C. 2
Spontaneous potential (SP)	Scale 10 mv/in.	
Single point resistance (R)	Scale 10 ohms/in.	
Density (gamma-gamma) (D)	Scale 50 cps/in.	T.C. 2
Caliper (C)	Scale 2 in./in.	

Remarks: Drilled with air to 255' and then lost circulation and continued blind to total depth. Top of Trout Creek Sandstone at 534'.

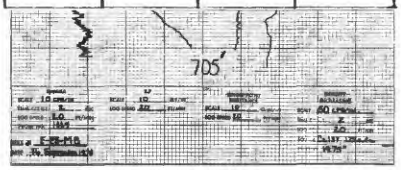


Hole no. E-25-MB (continued)

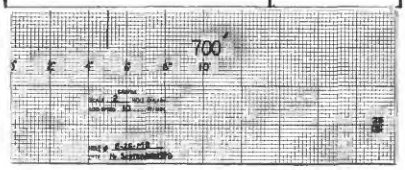


Hole no. E-25-MB (continued)

NG	SP	R	D



C	R_2



COAL

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

Hole no. E-26-RdB Date logged 9-27-78 Ground elevation 6,360'

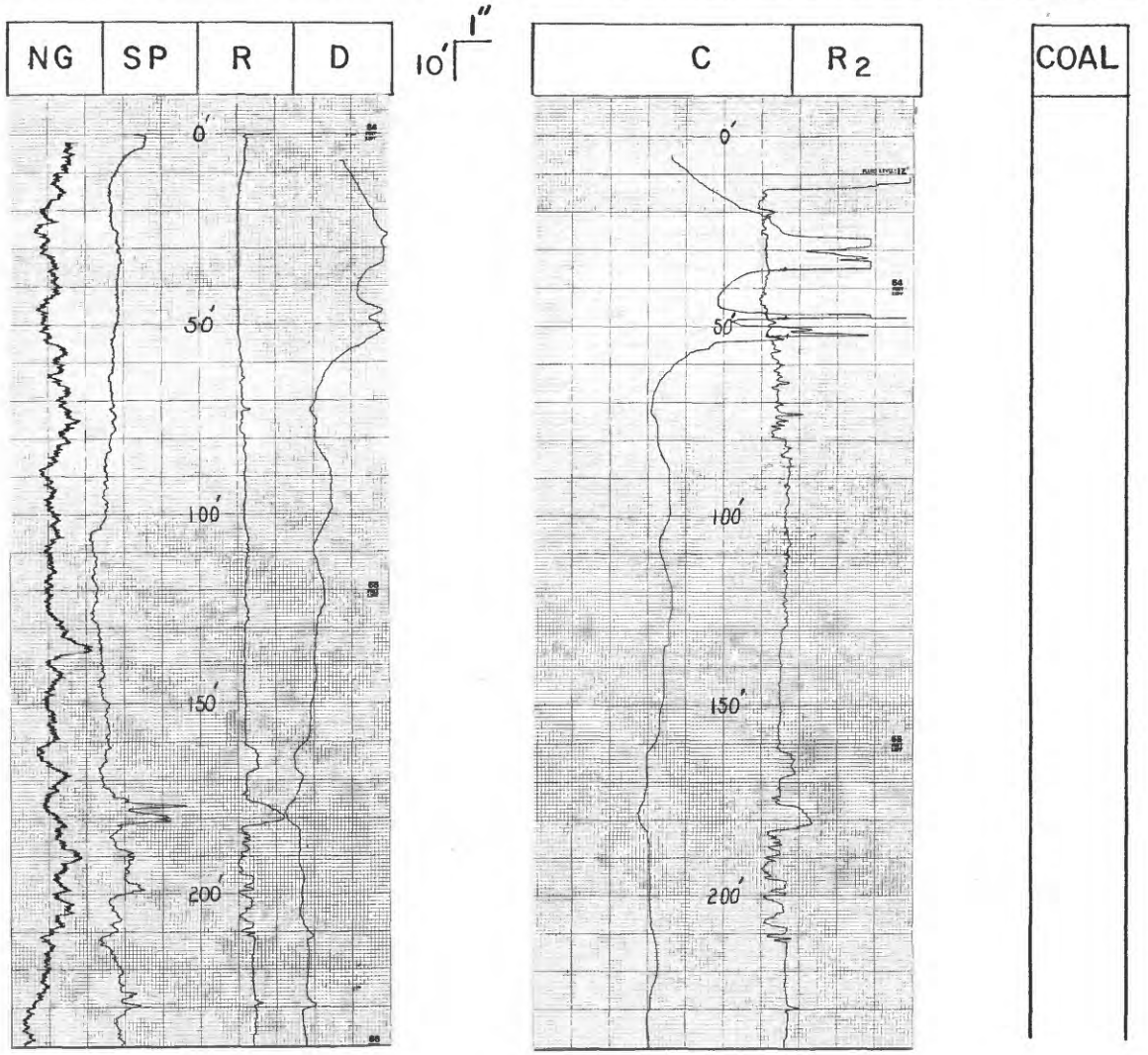
T. 6 N., R. 92 W., Sec. 14 : 1,815 f n l, 1,785 f e l

Drilling medium foam/mud Drilled depth 941'+ Fluid level at surface

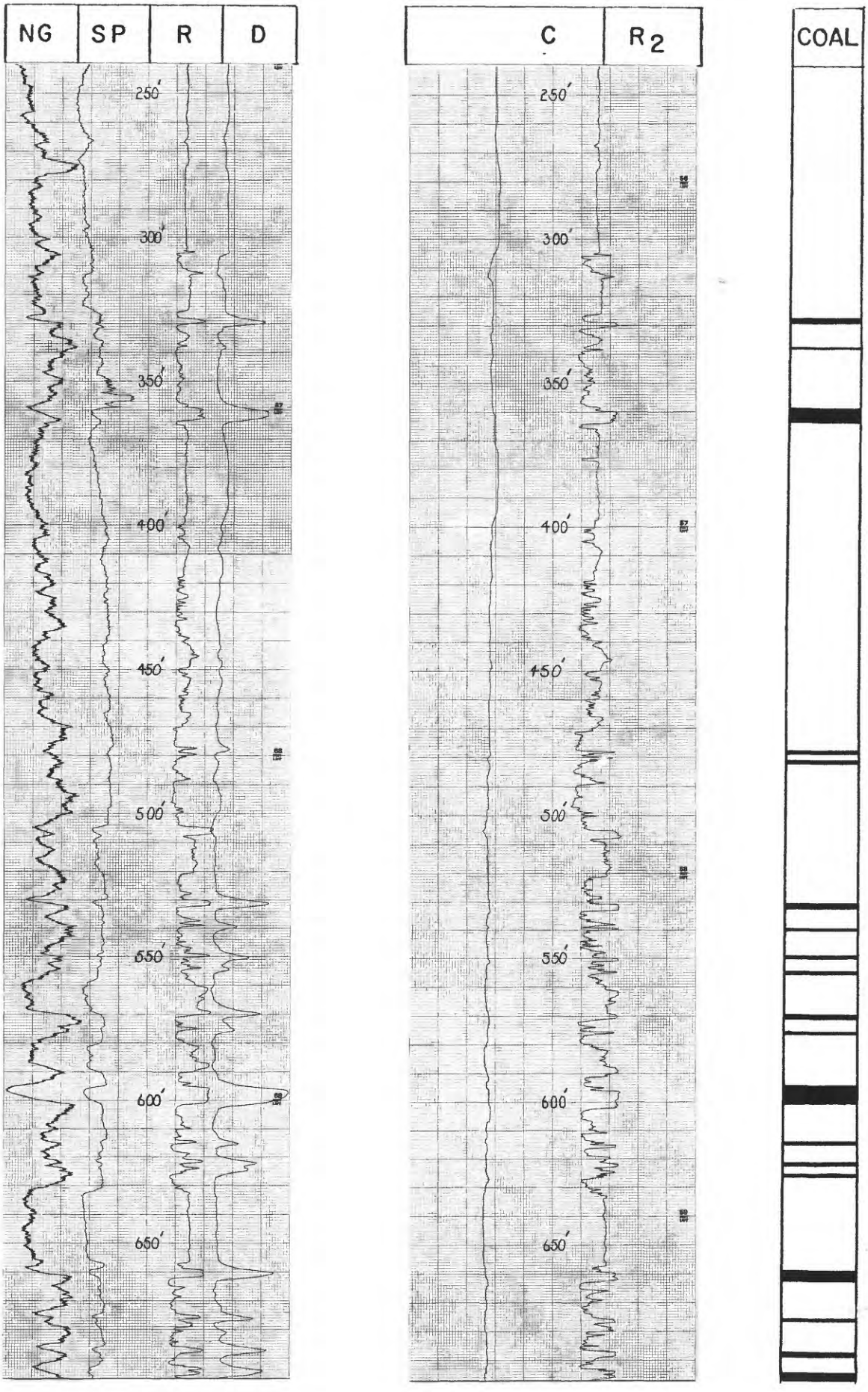
Logging speed: (1st) 20'/min (2nd) 20'/min Logged depth 941'

Natural gamma (NG)	Scale 10 cps/in.	T.C. 2
Spontaneous potential (SP)	Scale 10 mv/in.	
Single point resistance (R)	Scale 10 ohms/in.	
Density (gamma-gamma) (D)	Scale 50 cps/in.	T.C. 2
Caliper (C)	Scale 2 in./in.	
2nd Single point resistance (R_2)	Scale 10 ohms/in.	

Remarks: Drilled with foam to 180' then switched to mud. Twentymile Sandstone expected before 855', but apparently never reached.



Hole no. E-26-RdB (continued)



Hole no. E-26-RdB (continued)