

UNITED STATES DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

EXPLORATORY DRILLING IN THE COALMONT COAL FIELD,  
JACKSON COUNTY, COLORADO,  
JUNE-NOVEMBER 1977

By  
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Open-File Report 77-887

1977

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

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## CONTENTS

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	Page
Introduction-----	1
Geophysical logs-----	2
Lithologic logs-----	2
Drill-hole depths, diameters, and locations-----	2
Core holes-----	2
Coal geology-----	3
Coal correlations and coal bed thickness-----	3
Drill-hole logs-----	16

---

## ILLUSTRATIONS

---

Figure 1. Map showing drill-hole locations in the Coalmont coal field-----	4
2-10. Locations of drill holes in Jackson County, Colorado:	
2. NW $\frac{1}{4}$ of the Buffalo Peak quadrangle-----	5
3. NE $\frac{1}{4}$ of the Coalmont quadrangle-----	6
4. NW $\frac{1}{4}$ of the Coalmont quadrangle-----	7
5. SW $\frac{1}{4}$ of the Coalmont quadrangle-----	8
6. SE $\frac{1}{4}$ of the Coalmont quadrangle-----	9
7. NW $\frac{1}{4}$ of the MacFarlane Reservoir quadrangle-----	10
8. SW $\frac{1}{4}$ of the MacFarlane Reservoir quadrangle-----	11
9. NE $\frac{1}{4}$ of the Spicer Peak quadrangle-----	12
10. SE $\frac{1}{4}$ of the Teal Lake quadrangle-----	13

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## TABLE

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Table 1. Locations of drill holes in the Coalmont coal field, Jackson County, Colorado-----	14
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EXPLORATORY DRILLING IN THE COALMONT COAL FIELD, JACKSON COUNTY,  
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INTRODUCTION

The Himes Drilling Company, Inc., Grand Junction, Colorado, and Jim Feighny and Son, Loveland, Colorado, rotary drilled 52 holes and cored the coal in 3 holes in the Coalmont coal field, Jackson County, north-central Colorado (figs. 1-10, table 1). The drilling was done under Contract Nos. 14-08-0001-15769 and 14-08-0001-15798 awarded by the U.S. Geological Survey. Geophysical logging of the holes was done by Minerals Service Company, Grand Junction, Colorado. The purpose of the drilling was to obtain information about the depth, thickness, extent, and quality of coal in the Coalmont Formation, as part of the Survey's program to evaluate and classify federally owned coal resources. Most of the holes are located within areas nominated for coal leasing by industry.

U.S. Geological Survey personnel provided general supervision of the drilling, which included selecting the drill sites, determining depths to be drilled, and obtaining permission for access from the County and from private surface owners. Survey personnel also described the rocks in the cuttings at each site and compiled and analyzed the drill-hole data. Some of the holes (M-5, M-6, C-7, C-8, C-17, C-19, C-30, C-32, M-35, C-41, C-47, M-62, S-72, S-73, B-74, M-101, M-102, M-109, and M-110) were completed as observation wells. These wells will be used to monitor water level and quality over a period of at least 3 years. Water level will be measured quarterly with a steel tape, and samples will be pumped yearly to be tested for major cations

and anions and selected trace metals. Data obtained will be used to define the ground-water system and to aid in studies of the hydrologic impact of coal development. These data will be made available upon request from the U.S. Geological Survey, Water Resources Division, Colorado District Office, Lakewood, Colorado.

#### GEOPHYSICAL LOGS

Geophysical logs for each hole consist of natural gamma (G), spontaneous potential (SP), and resistivity (RES), which were measured with one probe, and density (DEN), which was measured with a separate probe. Where fluid level within the drill hole changed during logging, two fluid levels were recorded on the log. Only one fluid level, that measured by the natural-gamma spontaneous-potential resistivity probe, is listed in the log headings in this report. Geophysical logs were reduced to 20 percent of the original size for this report, and the logging scales listed in the log headings were changed accordingly. The geophysical logs are oriented so that higher gamma and resistivity and lower rock density readings are recorded to the right. The aquifer depth intervals and the quantity of waterflow (gal/min (GPM)) from drillers' logs are shown on the log headings.

#### LITHOLOGIC LOGS

Lithologic logs were made by adjusting descriptions of 5-foot cuttings intervals to correspond with the geophysical logs.

#### DRILL-HOLE DEPTHS, DIAMETERS, AND LOCATIONS

Depths of the drill holes range from 98 feet to 860 feet and the diameter of each hole is 4-3/4 inches. Locations and elevations are approximate.

#### CORE HOLES

Three of the drill holes (M-5, C-7, and C-9) were later twin drilled for the purpose of coring the Riach coal bed. Core samples have been submitted

to the U.S. Bureau of Mines for proximate and ultimate analyses, Btu/lb heating values, forms of sulfur present, and percent ash. The U.S. Geological Survey Analytical Laboratories in Denver will do the analyses for major, minor, and trace elements. Results of the analyses will be included in a future report.

#### COAL GEOLOGY

The major coal-bearing deposits are in the Coalmont Formation of Paleocene and Eocene age, which includes the Riach coal bed and several thinner coal beds in the Coalmont area. The coal occurs in the lower part of Hail's upper member of the Coalmont Formation, at least 2,400 feet above the base of the formation (Hail, W. J., Jr., 1968, Geology of southwestern North Park and vicinity, Colorado, U.S. Geol. Survey Bull. 1257, 110 p.).

The coal-bearing strata dip eastward to northward at angles generally less than  $20^{\circ}$ . Normal faults, trending north-northwestward, break the strata into numerous fault blocks, some less than 1/4-mile wide.

#### COAL CORRELATIONS AND COAL BED THICKNESS

At least 10 drill holes (M-5, C-7, C-9, M-11, M-12, M-41, C-96, C-98, M-100, and M-104) intersected what is tentatively correlated as the Riach coal bed in T. 7 N., R. 80 W. The coal is thickest (over 20 feet) in sec. 18, and it thins to the south and east. The coal bed is more than 15 feet thick in secs. 18, 22, and 28, and is at least 10 feet thick in secs. 15, 18, 19, 21, 22, 27, and 28.

The other coal beds in the area are thinner and are probably of much less economic value than the Riach coal bed. These have not yet been correlated between drill holes.

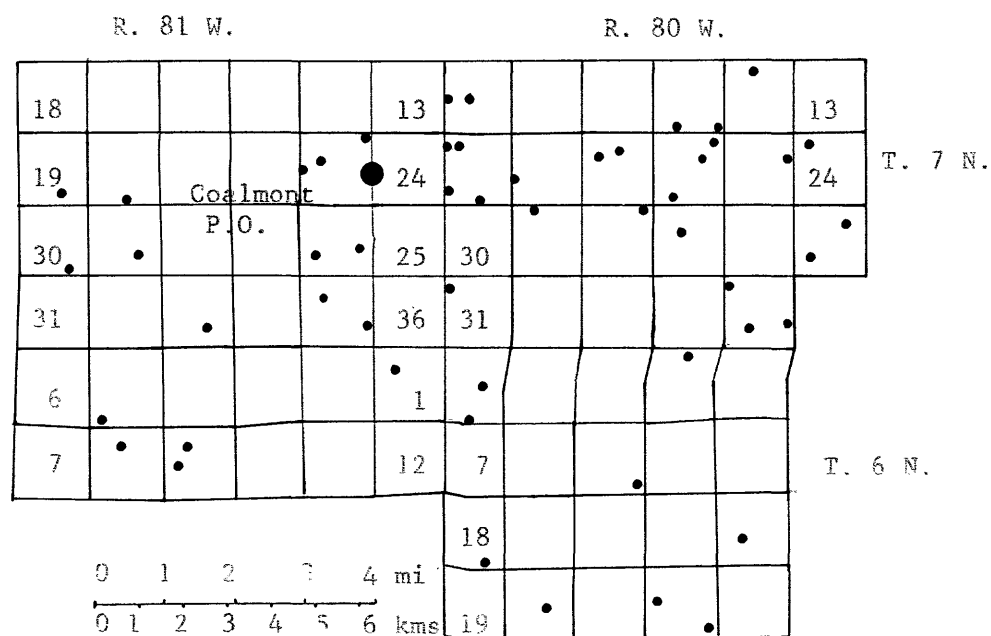
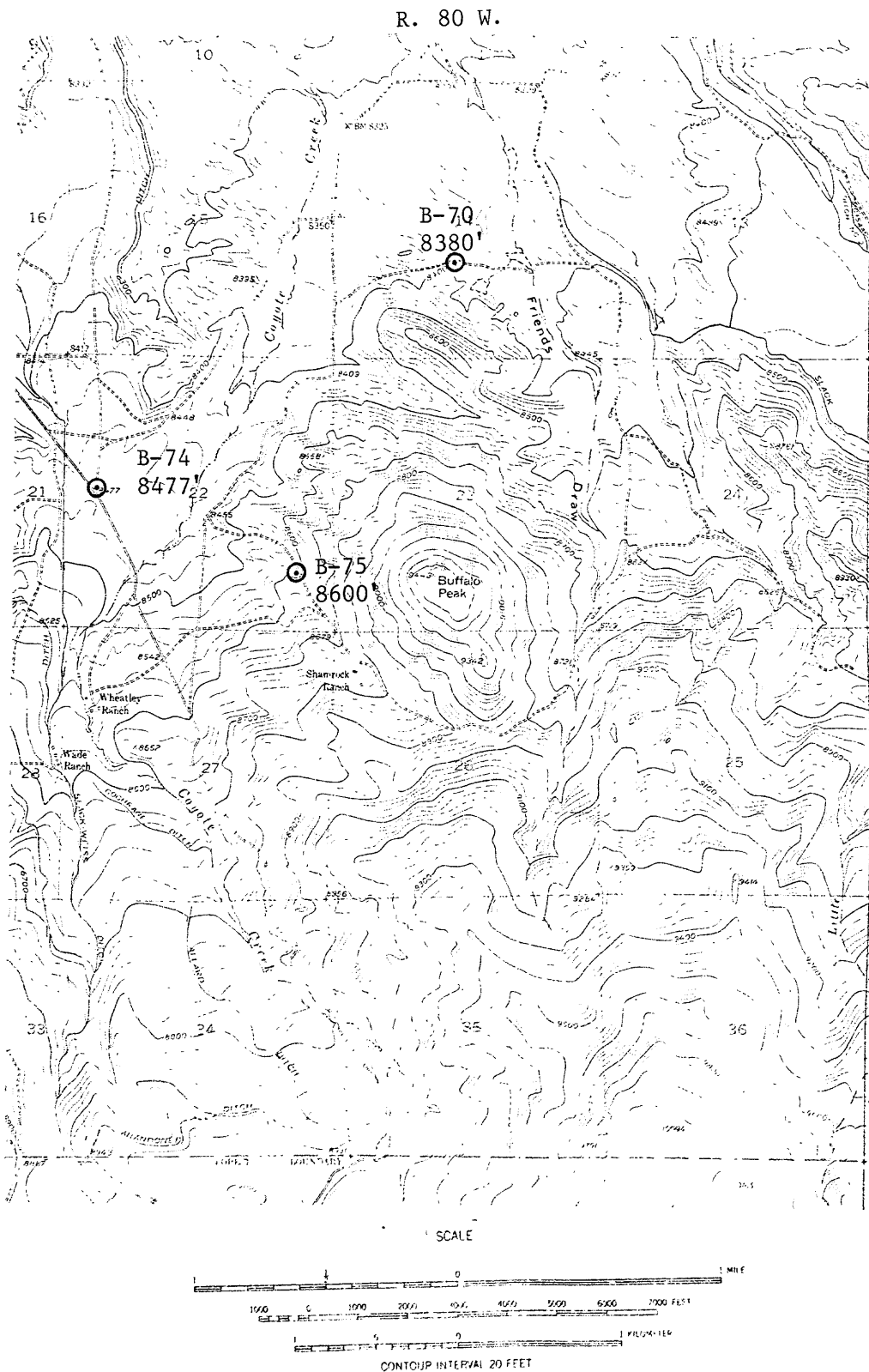


Figure 1.--Map showing drill-hole locations in the Coalmont coal field, Jackson County, Colorado.



T. 6 N.

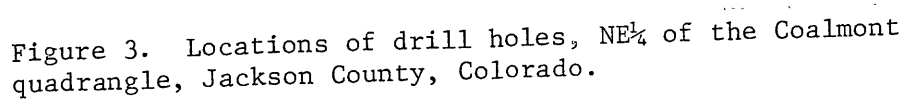
T. 5 N.

Figure 2. Locations of drill holes, NW $\frac{1}{4}$  of the Buffalo Peak quadrangle, Jackson County, Colorado.

36

31

T. 7 N.



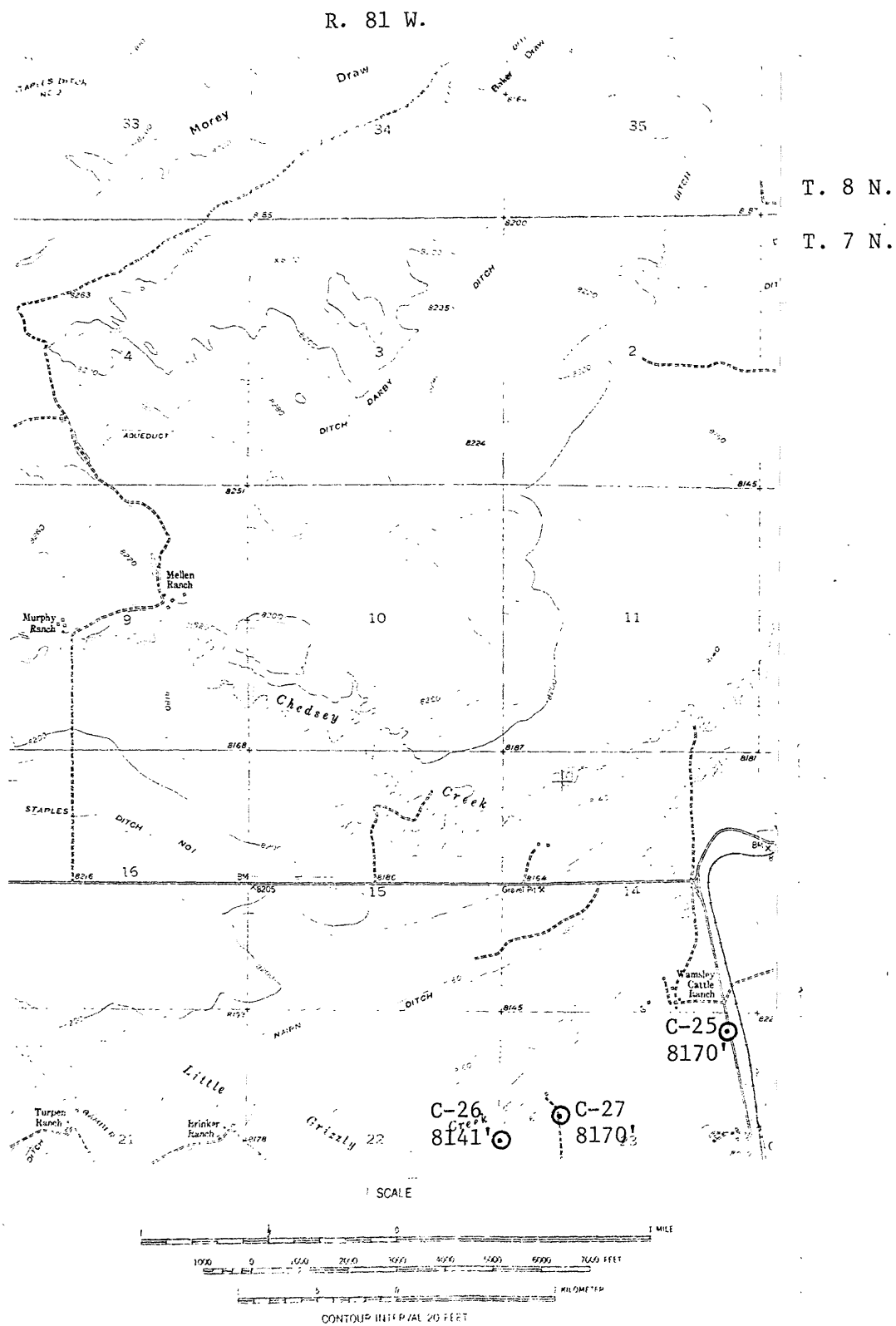


Figure 4. Locations of drill holes, NW $\frac{1}{4}$  of the Coalmont quadrangle, Jackson County, Colorado.

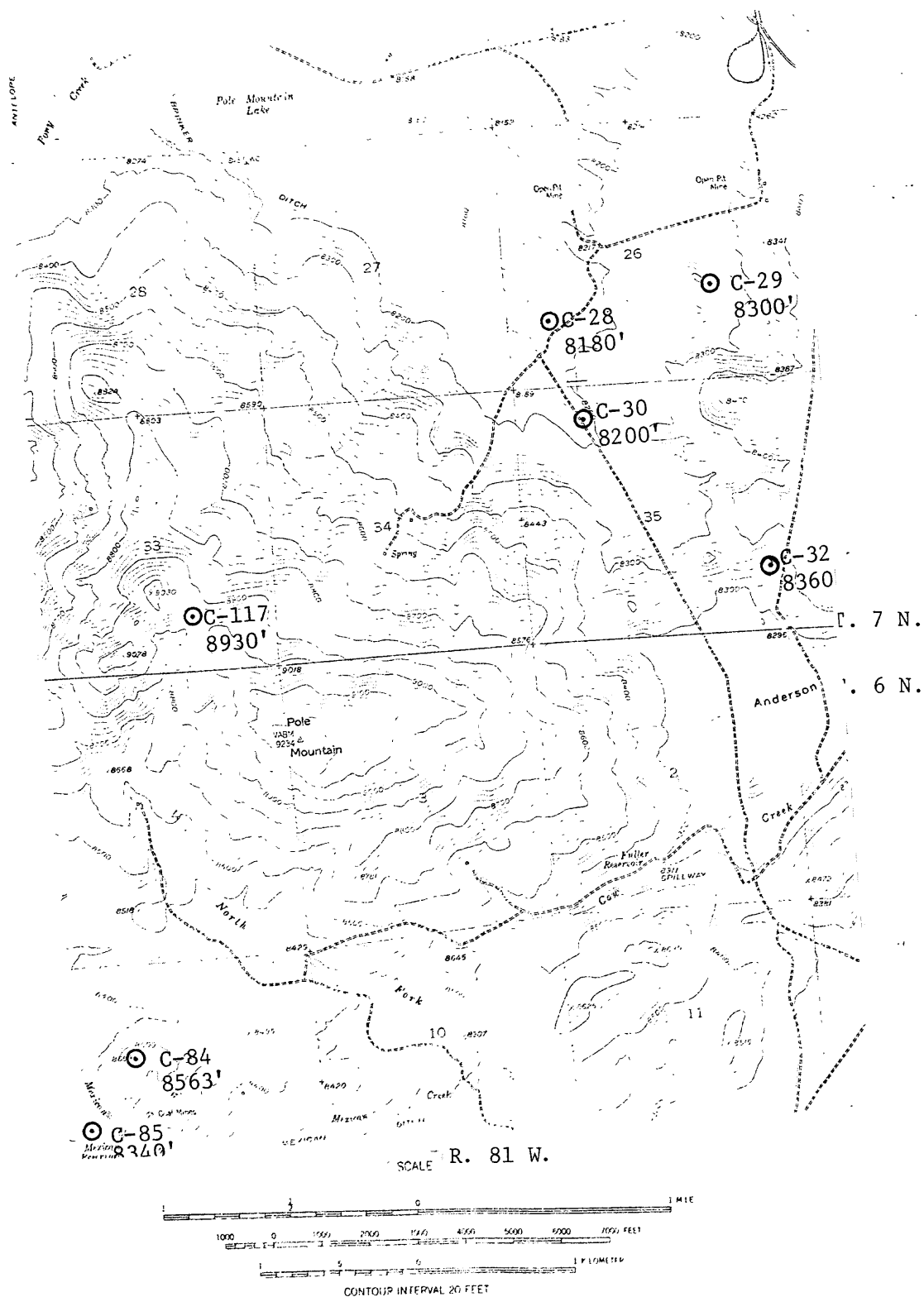


Figure 5. Locations of drill holes, SW $\frac{1}{4}$  of the Coalmont quadrangle, Jackson County, Colorado.



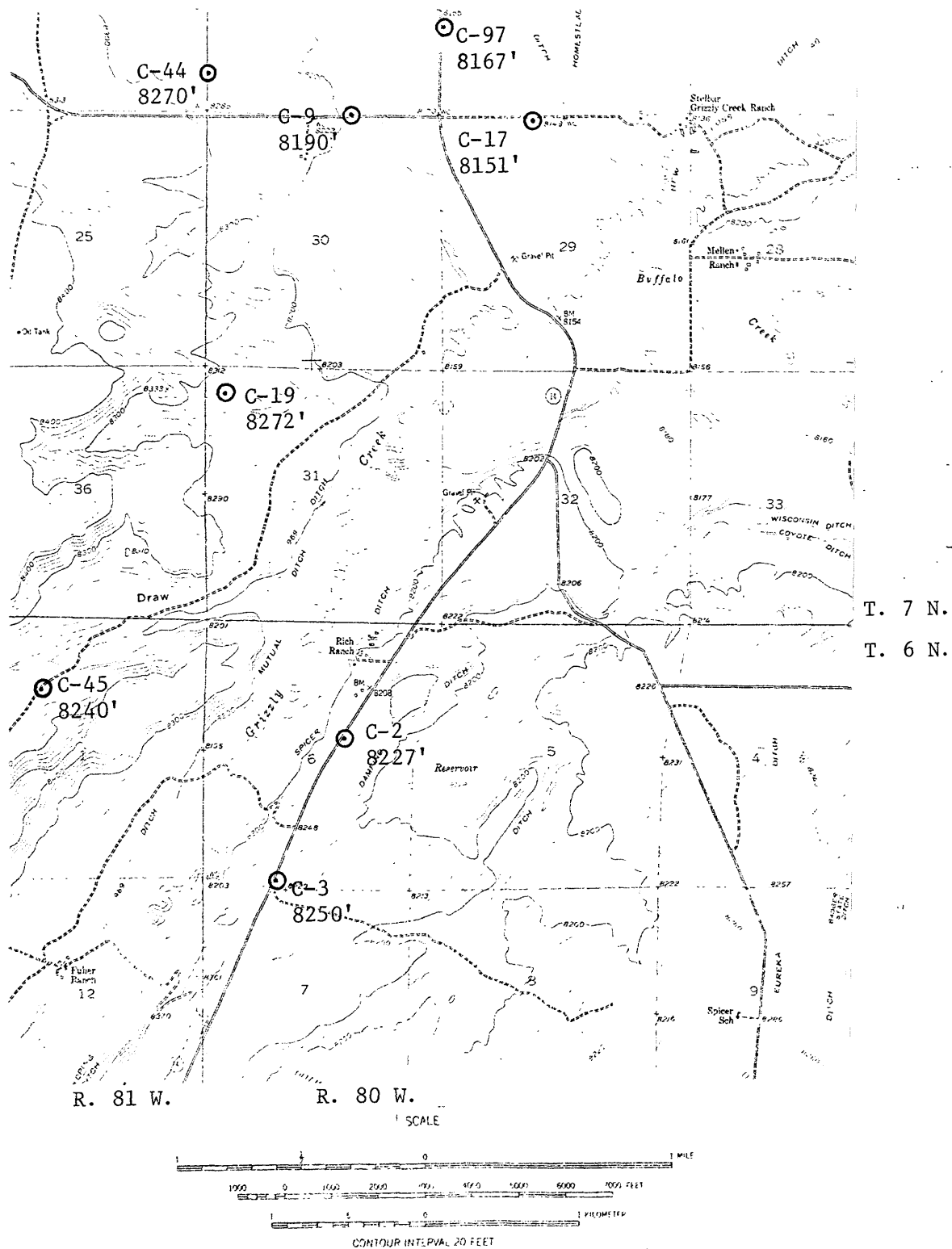


Figure 6. Locations of drill holes, SE $\frac{1}{4}$  of the Coalmont quadrangle, Jackson County, Colorado.

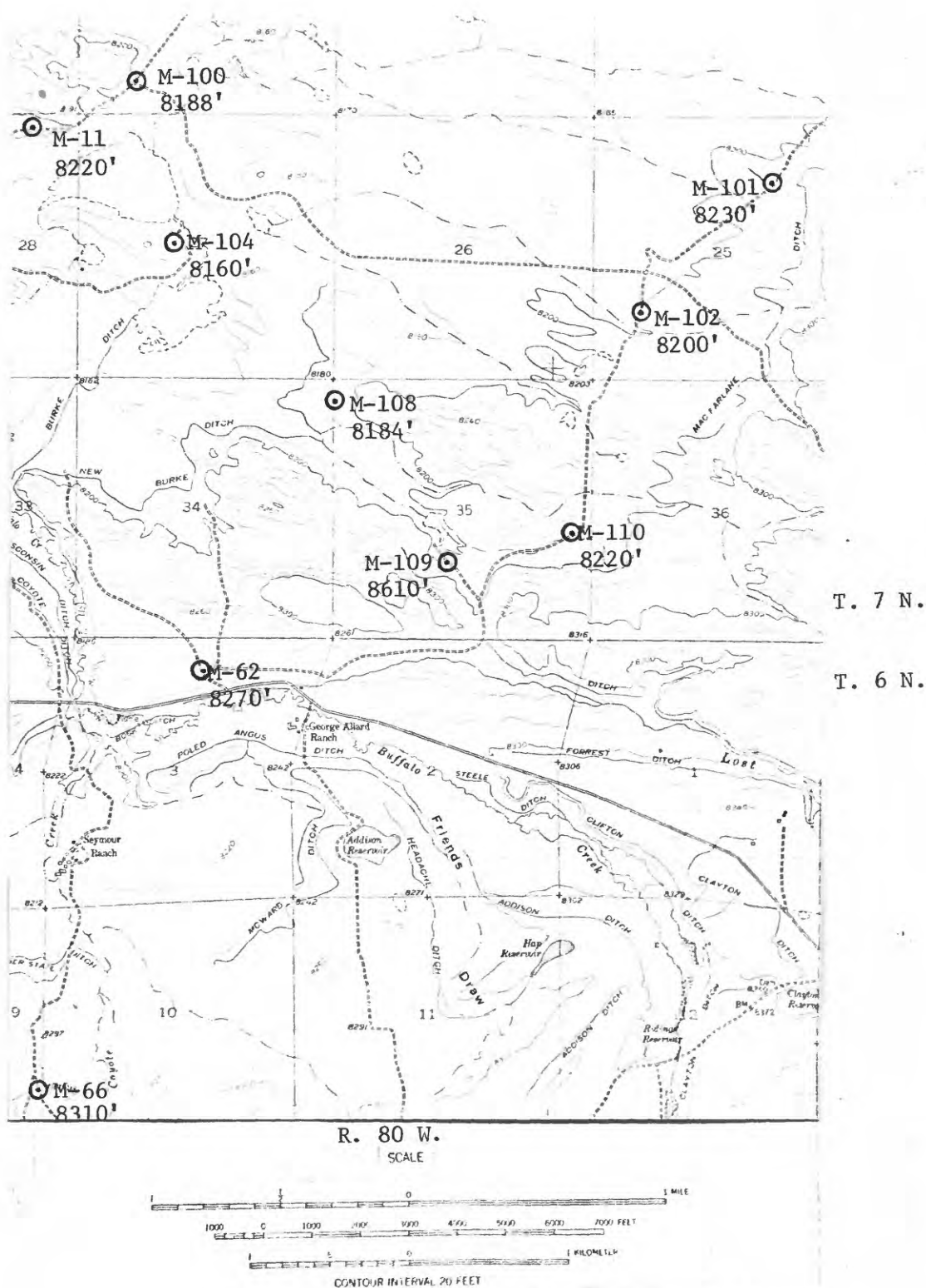


Figure 8. Locations of drill holes, SW $\frac{1}{4}$  of the MacFarlane Reservoir quadrangle, Jackson County, Colorado.

R. 80 W.

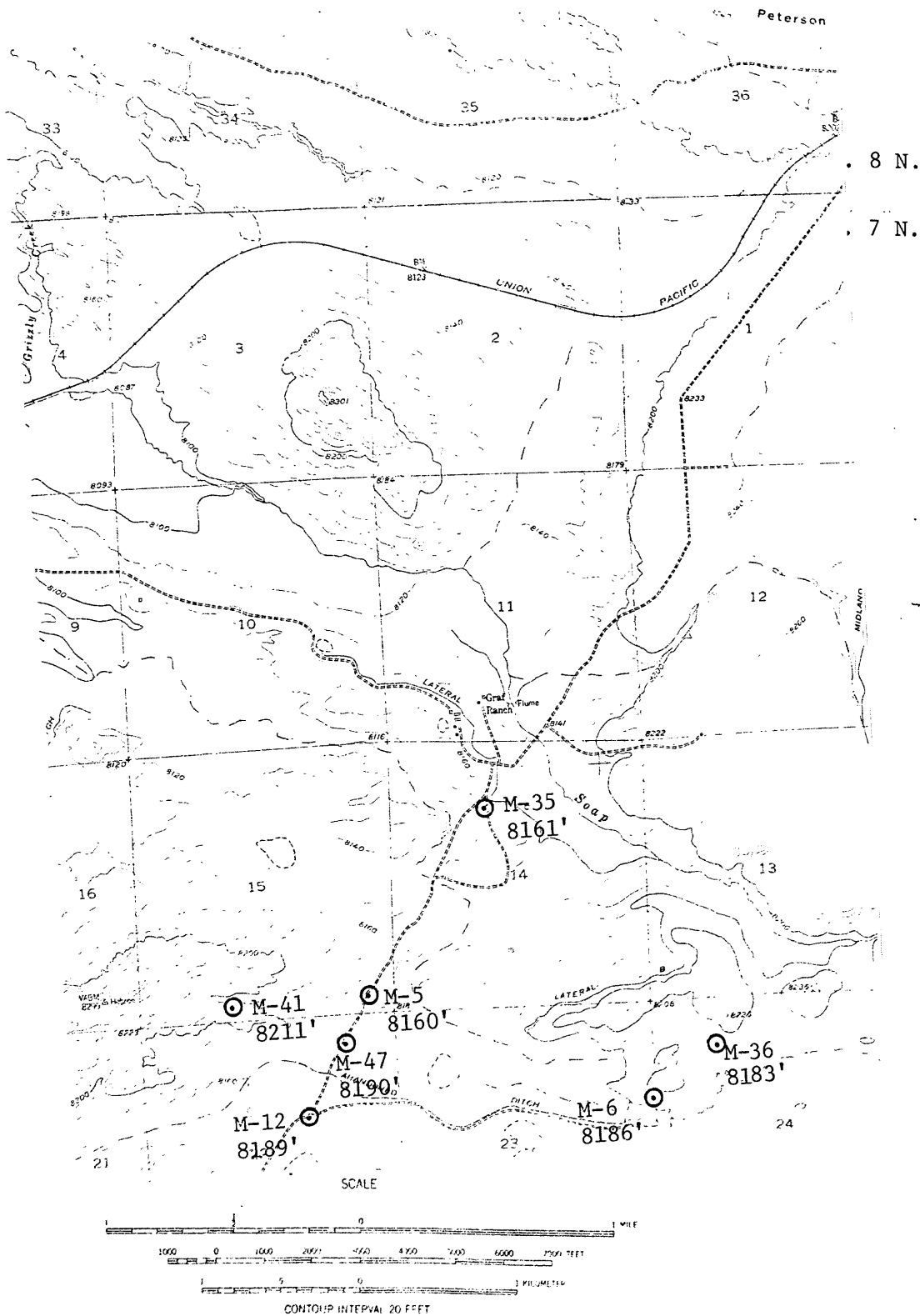


Figure 7. Locations of drill holes, NW¼ of the MacFarlane Reservoir quadrangle, Jackson County, Colorado.

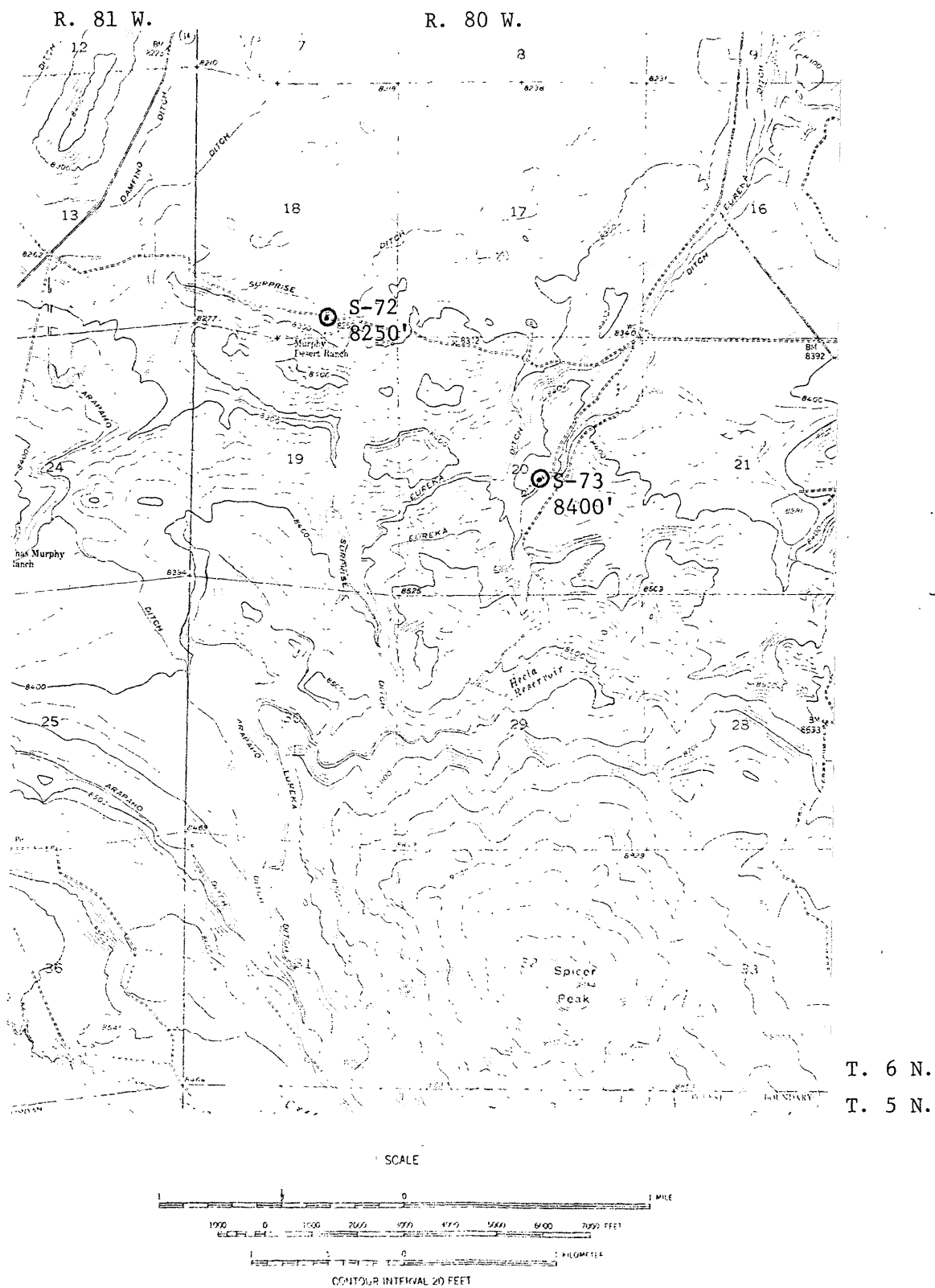


Figure 9. Locations of drill holes, NE $\frac{1}{4}$  of the Spicer Peak quadrangle, Jackson County, Colorado.

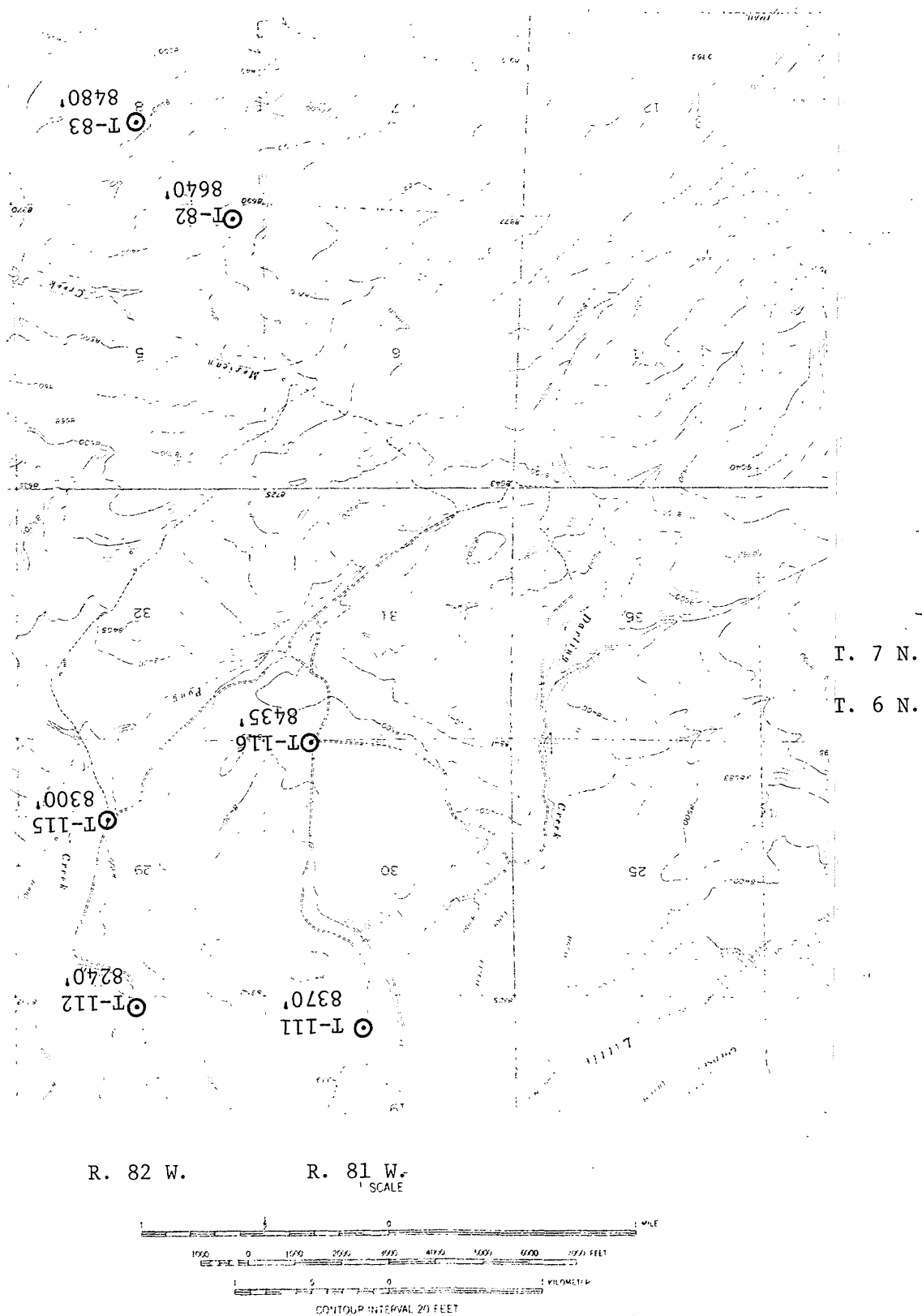


Figure 10. Locations of drill holes, SE $\frac{1}{4}$  of the Teal Lake quadrangle, Jackson County, Colorado.

Table 1.--Locations of drill holes in the Coalmont coal field, Jackson County, Colorado (listed by township and range)

[Measurements are in feet; to convert to meters, multiply by 0.3048]

<u>Hole no.</u>	<u>Location</u>	<u>Elevation (approx.)</u>	<u>Total depth drilled</u>	<u>Total depth logged</u>
T. 6 N., R. 80 W.,				
M62	sec. 3, NW $\frac{1}{4}$ NE $\frac{1}{4}$	8,270	640	640
C2	sec. 6, SW $\frac{1}{4}$ NE $\frac{1}{4}$	8,227	800	---
C3	sec. 6, SE $\frac{1}{4}$ SW $\frac{1}{4}$	8,250	800	800
M66	sec. 9, NE $\frac{1}{4}$ SE $\frac{1}{4}$	8,310	800	800
B70	sec. 14, NE $\frac{1}{4}$ SW $\frac{1}{4}$	8,380	593	591
S72	sec. 18, SW $\frac{1}{4}$ SE $\frac{1}{4}$	8,250	800	800
S73	sec. 20, NW $\frac{1}{4}$ SE $\frac{1}{4}$	8,400	800	800
B74	sec. 22, SW $\frac{1}{4}$ NW $\frac{1}{4}$	8,477	800	800
B75	sec. 22, SE $\frac{1}{4}$ SE $\frac{1}{4}$	8,600	784	782
T. 6 N., R. 81 W.,				
C45	sec. 1, SE $\frac{1}{4}$ NW $\frac{1}{4}$	8,240	300	298
T82	sec. 5, SW $\frac{1}{4}$ SW $\frac{1}{4}$	8,640	220	203
T83	sec. 8, SW $\frac{1}{4}$ NE $\frac{1}{4}$	8,480	400	400
C84	sec. 9, SE $\frac{1}{4}$ NW $\frac{1}{4}$	8,563	400	400
C85	sec. 9, NW $\frac{1}{4}$ SW $\frac{1}{4}$	8,340	500	500
T. 7 N., R. 80 W.,				
M35	sec. 14, CE $\frac{1}{2}$ NW $\frac{1}{4}$	8,161	600	600
M41	sec. 15, SE $\frac{1}{4}$ SW $\frac{1}{4}$	8,211	840	840
M5	sec. 15, SE $\frac{1}{4}$ SE $\frac{1}{4}$	8,160	860	860
C7	sec. 18, NW $\frac{1}{4}$ SW $\frac{1}{4}$	8,170	600	600
C96	sec. 18, NE $\frac{1}{4}$ SW $\frac{1}{4}$	8,160	380	380
C8	sec. 19, NW $\frac{1}{4}$ NW $\frac{1}{4}$	8,230	500	498
C43	sec. 19, NW $\frac{1}{4}$ NW $\frac{1}{4}$	8,207	300	300
C44	sec. 19, SW $\frac{1}{4}$ SW $\frac{1}{4}$	8,270	300	300
C9	sec. 19, SW $\frac{1}{4}$ SE $\frac{1}{4}$	8,190	480	480
C97	sec. 20, NW $\frac{1}{4}$ SW $\frac{1}{4}$	8,167	560	560

Table 1.--Locations of drill holes in the Coalmont coal field, Jackson County, Colorado (listed by township and range) - continued

<u>Hole no.</u>	<u>Location</u>	<u>Elevation (approx.)</u>	<u>Total depth drilled</u>	<u>Total depth logged</u>
T. 7 N., R. 80 W., continued,				
C98	sec. 21, NW $\frac{1}{4}$ NE $\frac{1}{4}$	8,218	700	700
C99	sec. 21, SE $\frac{1}{4}$ NW $\frac{1}{4}$	8,140	840	840
M47	sec. 22, NE $\frac{1}{4}$ NE $\frac{1}{4}$	8,190	800	800
M12	sec. 22, SW $\frac{1}{4}$ NE $\frac{1}{4}$	8,189	800	800
M100	sec. 22, SW $\frac{1}{4}$ SW $\frac{1}{4}$	8,188	400	400
M6	sec. 23, SE $\frac{1}{4}$ NE $\frac{1}{4}$	8,186	800	800
M36	sec. 24, NE $\frac{1}{4}$ NW $\frac{1}{4}$	8,183	800	800
M101	sec. 25, SW $\frac{1}{4}$ NE $\frac{1}{4}$	8,230	830	830
M102	sec. 25, SW $\frac{1}{4}$ SW $\frac{1}{4}$	8,200	800	802
M104	sec. 27, SE $\frac{1}{4}$ NW $\frac{1}{4}$	8,160	240	240
M11	sec. 28, NE $\frac{1}{4}$ NE $\frac{1}{4}$	8,220	800	800
C17	sec. 29, NE $\frac{1}{4}$ NW $\frac{1}{4}$	8,151	800	800
C19	sec. 31, NW $\frac{1}{4}$ NW $\frac{1}{4}$	8,272	300	298
M108	sec. 35, NW $\frac{1}{4}$ NW $\frac{1}{4}$	8,184	100	98
M109	sec. 35, NE $\frac{1}{4}$ SW $\frac{1}{4}$	8,210	800	651
M110	sec. 35, NE $\frac{1}{4}$ SE $\frac{1}{4}$	8,220	770	768
T. 7 N., R. 81 W.,				
T111	sec. 19, SW $\frac{1}{4}$ SE $\frac{1}{4}$	8,370	600	600
T112	sec. 20, SW $\frac{1}{4}$ SE $\frac{1}{4}$	8,240	500	500
C25	sec. 23, NE $\frac{1}{4}$ NE $\frac{1}{4}$	8,170	200	200
C26	sec. 23, SW $\frac{1}{4}$ NW $\frac{1}{4}$	8,141	220	220
C27	sec. 23, SW $\frac{1}{4}$ NW $\frac{1}{4}$	8,170	600	586
C28	sec. 26, NW $\frac{1}{4}$ SW $\frac{1}{4}$	8,180	400	400
C29	sec. 26, NE $\frac{1}{4}$ SE $\frac{1}{4}$	8,300	500	500
T115	sec. 29, NW $\frac{1}{4}$ SE $\frac{1}{4}$	8,300	500	500
T116	sec. 30, SE $\frac{1}{4}$ SE $\frac{1}{4}$	8,435	500	500
C117	sec. 33, SW $\frac{1}{4}$ SE $\frac{1}{4}$	8,930	500	500
C30	sec. 35, NE $\frac{1}{4}$ NW $\frac{1}{4}$	8,200	300	298
C32	sec. 35, NE $\frac{1}{4}$ SE $\frac{1}{4}$	8,360	500	500

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. C2 Map Coalmont Date logged see remarks Elevation (ft) 8,227  
Location: T. 6 N., R. 80 W., sec. 6 : 2400 FN L 1550 FEL Cored: ☐ Yes ☒ No  
Drilled depth 800 Logged depth --- Drilling medium water Fluid level ---

Geophysical logs:

Spontaneous potential (SP): Scale \_\_\_\_\_ Logging speed \_\_\_\_\_ fpm  
Resistivity (RES): Scale \_\_\_\_\_ Logging speed \_\_\_\_\_ fpm  
Gamma (G): T.C. \_\_\_\_\_ Scale \_\_\_\_\_ Logging speed \_\_\_\_\_ fpm  
Density (DEN): T.C. \_\_\_\_\_ Scale \_\_\_\_\_ Logging speed \_\_\_\_\_ fpm  
Remarks: No geophysical logs, lithology described 7/23/77

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-28	Sandstone, yellowish-gray, medium-grained, well-sorted, subrounded, with white mica						0	0
28-33	Mudstone, moderate-brown and medium-dark-gray						10	
33-50	Sandstone, medium-dark-gray to light-gray, medium-grained, subangular to subrounded, well-sorted, with white mica						50	20
50-85	Shale, medium-light-gray, and shaly mudstone, medium-light-gray, and mudstone, medium-dark-gray; interbedded sandstone, very light gray, fine-grained, well-consolidated, with two micas						100	30
85-105	Sandstone, very light gray, medium-grained, subrounded, well-sorted, with white mica						150	40
105-120	Mudstone, medium-light-gray; interbedded sandstone, very light gray, fine-grained, subrounded, well-consolidated, with two micas						200	50
120-125	Sandstone, very light gray, medium-grained, subangular, well-sorted, with white mica						250	60
125-130	Sandstone, very light gray, fine-grained to very fine grained, very well sorted, well-consolidated, with two micas; interbedded shaly mudstone, medium-light-gray						300	70
130-155	Shale, olive-black and medium-gray							80
155-160	Shale, olive-black; medium-gray mudstone							90



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. C2 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
160-175 Shale, olive-black							
175-180 Mudstone, olive-black							
						100	
180-210 Mudstone, olive-black; inter-						350	
bedded sandstone, white, fine-						110	
grained, well-sorted, well-							
consolidated with muscovite							
and biotite.							
210-220 Mudstone, olive-black; mudstone,						120	
medium-gray; minor interbedded						400	
sandstone, white, fine-							
grained, well-sorted, well-							
consolidated, with two micas							
220-275 Mudstone, olive-black and medium						130	
gray; minor interbedded sand-						450	
stone, white, fine-grained,						140	
well-sorted, well-consolidated							
with two micas; minor carbon-							
aceous shale							
275-310 Mudstone, medium-gray to light-						150	
gray; interbedded sandstone,						500	
white, fine-grained, well-							
sorted, well-consolidated,							
with two micas							
310-365 Mudstone, medium-gray to light-						160	
gray; interbedded sandstone,						550	
medium-light-gray, medium-						170	
grained, subangular, well-							
sorted, with white mica; inter-							
bedded sandstone, white, fine-							
grained, well-sorted, well-							
consolidated, with two micas;						180	
minor carbonaceous shale							
365-380 Shale, brownish-black						600	
380-420 Shale, brownish-black, mudstone,						190	
medium-dark-gray; shaly mud-							
stone, medium-light-gray							
420-480 Mudstone, olive-black; mudstone,						650	
medium-dark-gray; shaly mud-						200	
stone, medium-light-gray							
480-540 Mudstone, olive-black and							
medium-dark-gray; shaly mud-							
stone, medium-light-gray;							
interbedded sandstone, white,						210	
very fine grained, well-sorted,							
well-consolidated, with two							
micras						700	

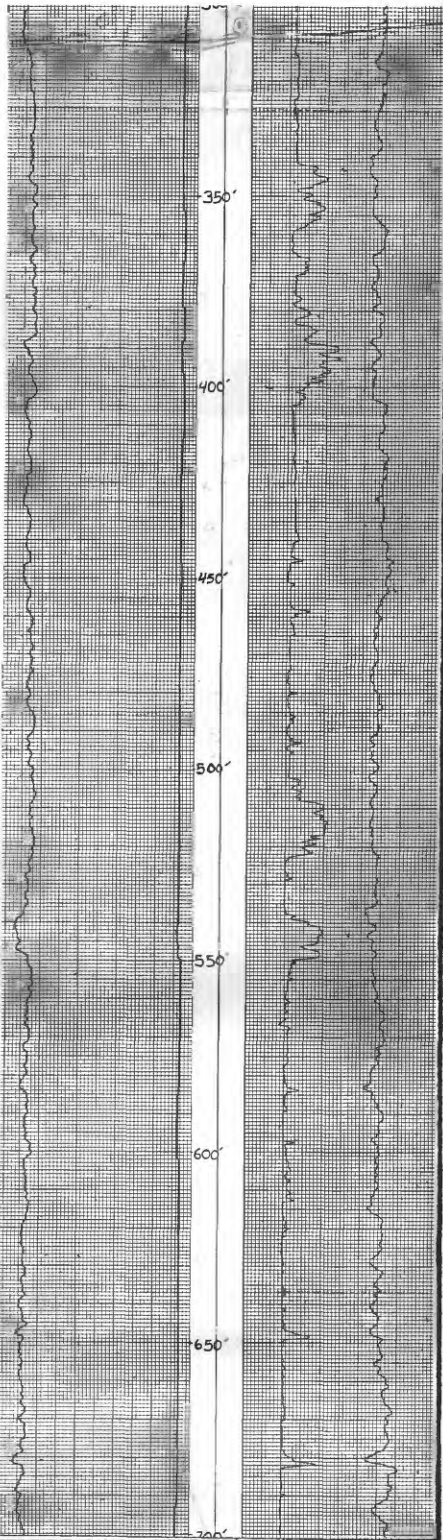
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No.   C2   (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
540-550 Shaly mudstone, medium-light-gray and brownish-black; shale, medium-dark-gray							220
550-800 Shaly mudstone, brownish-black						750	230
							240
						800	250
							260
						850	270
							900

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. C3 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-502 - Same as above						100	
						350	
						110	
						120	
						400	
502-550 - Shale and medium-light-gray, fine-grained, subrounded, poorly consolidated sandstone						130	
						450	
						140	
						500	
						150	
550-700 - Shale and light-gray, medium-grained, subrounded, poorly consolidated sandstone, with white mica, at 681'-682'						160	
						550	
						170	
						180	
						600	
						190	
						650	
						200	
						210	
						700	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. C3 Map Coalmont Date logged 8/7/77 Elevation (ft) 8,250  
Location: T. 6 N., R. 80 W., sec. 6 : 1500 FWL 150 FSL Cored: ☐ Yes ☒ No  
Drilled depth 800' Logged depth 800' Drilling medium mud Fluid level 52'

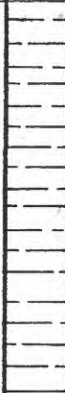
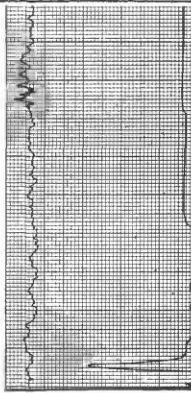
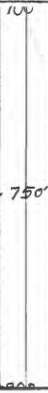
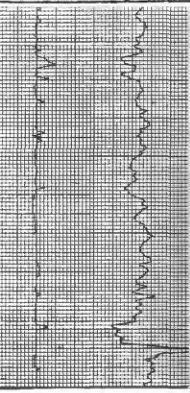

Geophysical logs:

Spontaneous potential (SP): Scale 250 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 250 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 2 Scale 400 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 2 Scale 16 Kcps/in Logging speed 20 fpm  
Remarks: \_\_\_\_\_

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
0- 96 - Sandstone, gray, coarse- and fine-grained, subrounded and subangular, poorly consolidated, with white mica						0	0
						10	
						50	
						20	
96-116 - Mudstone, shaly, and sandstone, medium-light-gray, very fine grained, well-consolidated, with black and white micas abundant						100	30
						40	
116-180 - Sandstone, light-gray, very coarse- to medium-grained, subangular, poorly consolidated; interbedded medium-light-gray mudstone and a bed of light-gray, fine-grained, well-sorted, well-consolidated sandstone at 160'-165'						150	50
						60	
180-300 - Shale, brownish-gray, and light-gray mudstone (down to 240'); sparse fine-grained sandstone						200	70
						250	80
						300	90

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No.   C3   (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
700-800 - Same as above						220	
						750	230
							240
						800	
							250
						850	260
							270
						900	

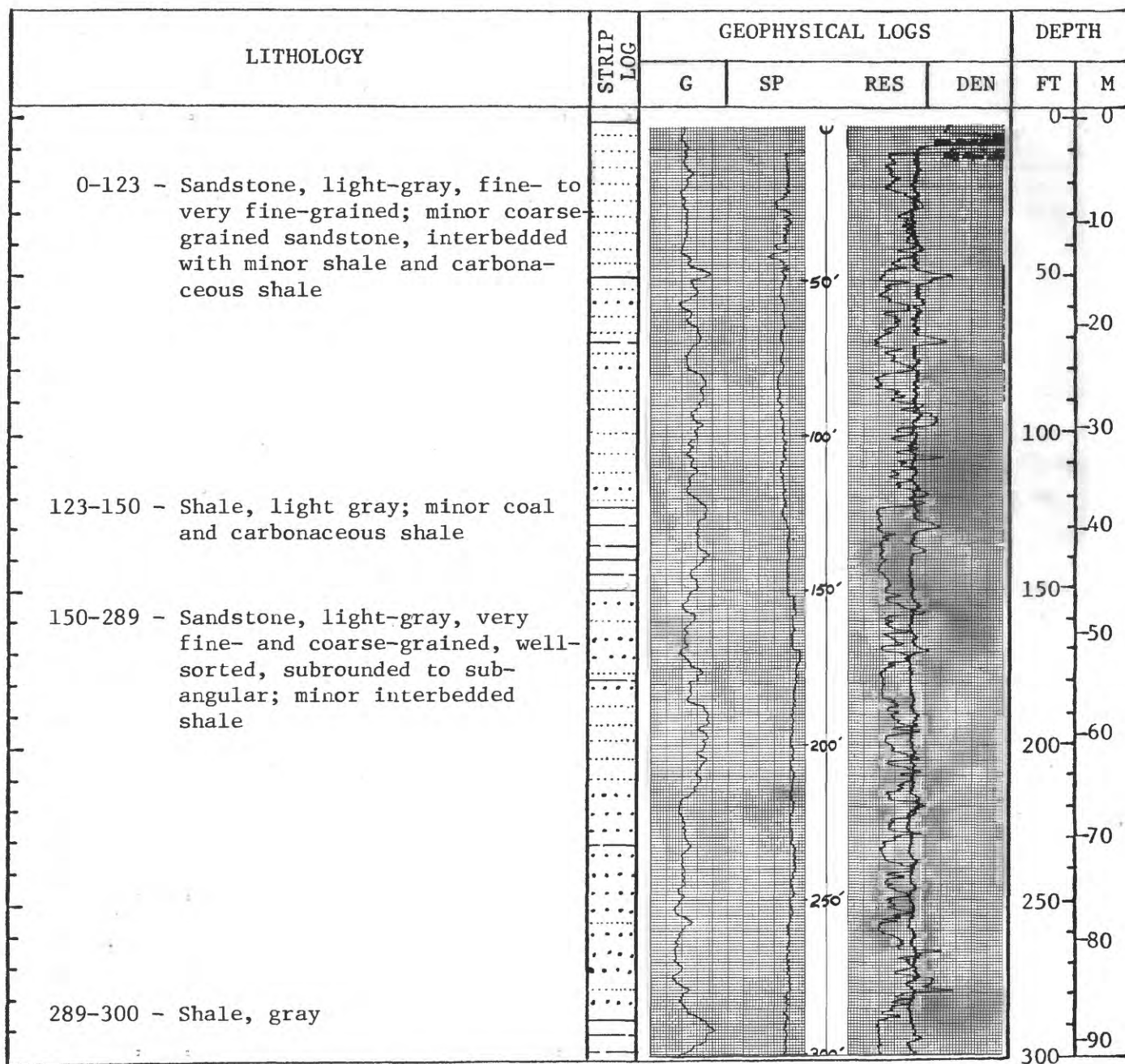
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. M5 Map MacFarlane Reservoir Date logged 7/7/77 Elevation (ft) 8,160'  
Location: T. 7 N., R. 80 W., sec. 15 : 350' FSL 550' FEL Cored: ☐ Yes ☒ No  
Drilled depth 860' Logged depth 860' Drilling medium air & water Fluid level 9'

Geophysical logs:

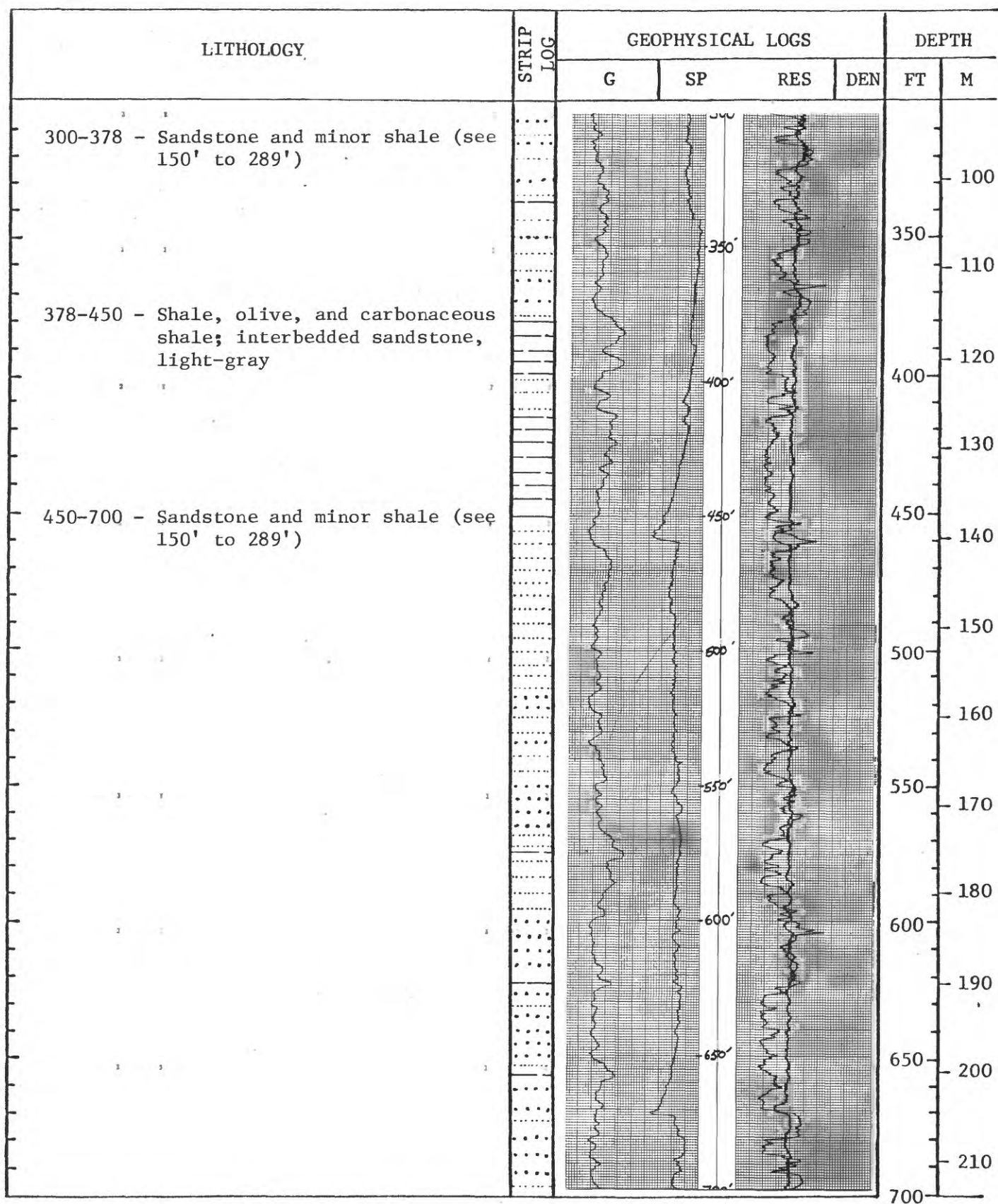
Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 400 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 2 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 2 Scale 64 Kcps/in Logging speed 20 fpm  
Remarks: Twin drilled, coal cored in second hole.





U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M5 (continued)



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No.     M5     (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH			
		G	SP	RES	DEN	FT	M		
700-716 - Sandstone and minor shale (see 150' to 289')									
716-741 - Coal, with partings									
741-823 - Sandstone, gray, coarse-grained; and minor shale								750	230
									240
								800	
									250
823-860 - Shale, gray to dark-gray; some sandy shale; thin coal at 848'								850	260
									270
									900



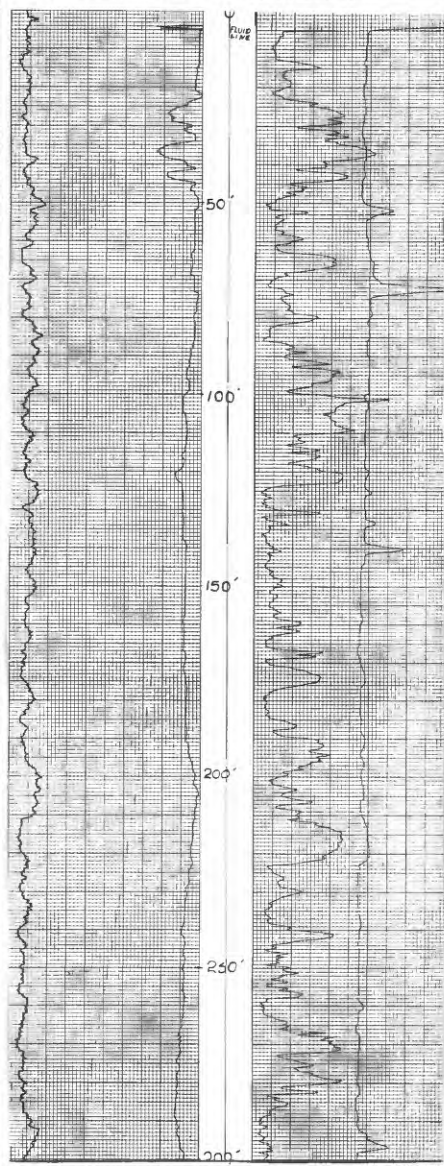
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. M5 Map MacFarlane Reservoir Date logged 8/6/77 Elevation (ft) 8,160'  
Location: T. 7 N., R. 80 W., sec. 15 : 350' FSL 550' FEL Cored: ☒ Yes ☐ No  
Drilled depth 747' Logged depth 747' Drilling medium water Fluid level 5'

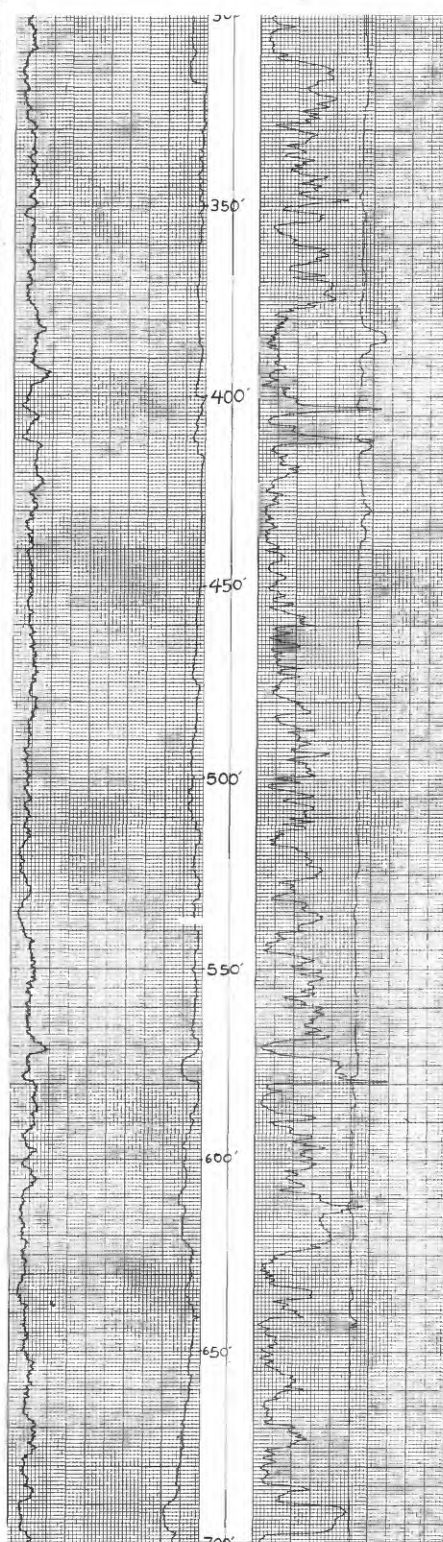
Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 2 Scale 100 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 2 Scale 500 cps/in Logging speed 20 fpm  
Remarks: Cored interval: 710'-741'

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
0-123 - Sandstone, light-gray, fine- to very fine-grained; minor coarse-grained sandstone, interbedded with minor shale and carbonaceous shale						0	0
						10	
						50	
						20	
						100	30
						40	
						150	
						50	
						200	60
						70	
123-150 - Shale, light gray; minor coal and carbonaceous shale						250	80
150-289 - Sandstone, light-gray, very fine- and coarse-grained, well-sorted, subrounded to sub-angular; minor interbedded shale						280	
						90	
289-300 - Shale, gray						300	

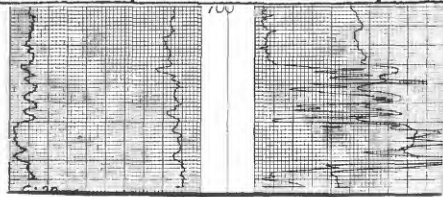
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M5 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-378 - Sandstone and minor shale (see 150' to 289')						100	
						350	
						110	
378-450 - Shale, olive, and carbonaceous shale; interbedded sandstone, light-gray						400	
						120	
						130	
						450	
450-700 - Sandstone and minor shale (see 150' to 289')						140	
						150	
						500	
						160	
						550	
						170	
						180	
						600	
						190	
						650	
						200	
						210	
						700	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M5 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
700-716 - Sandstone and minor shale (see 150' to 289')						220	
716-741 - Coal, with partings							
741-747 - Sandstone, gray, coarse-grained, and minor shale						750	
						230	
						240	
						800	
						250	
						850	
						260	
						270	
						900	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

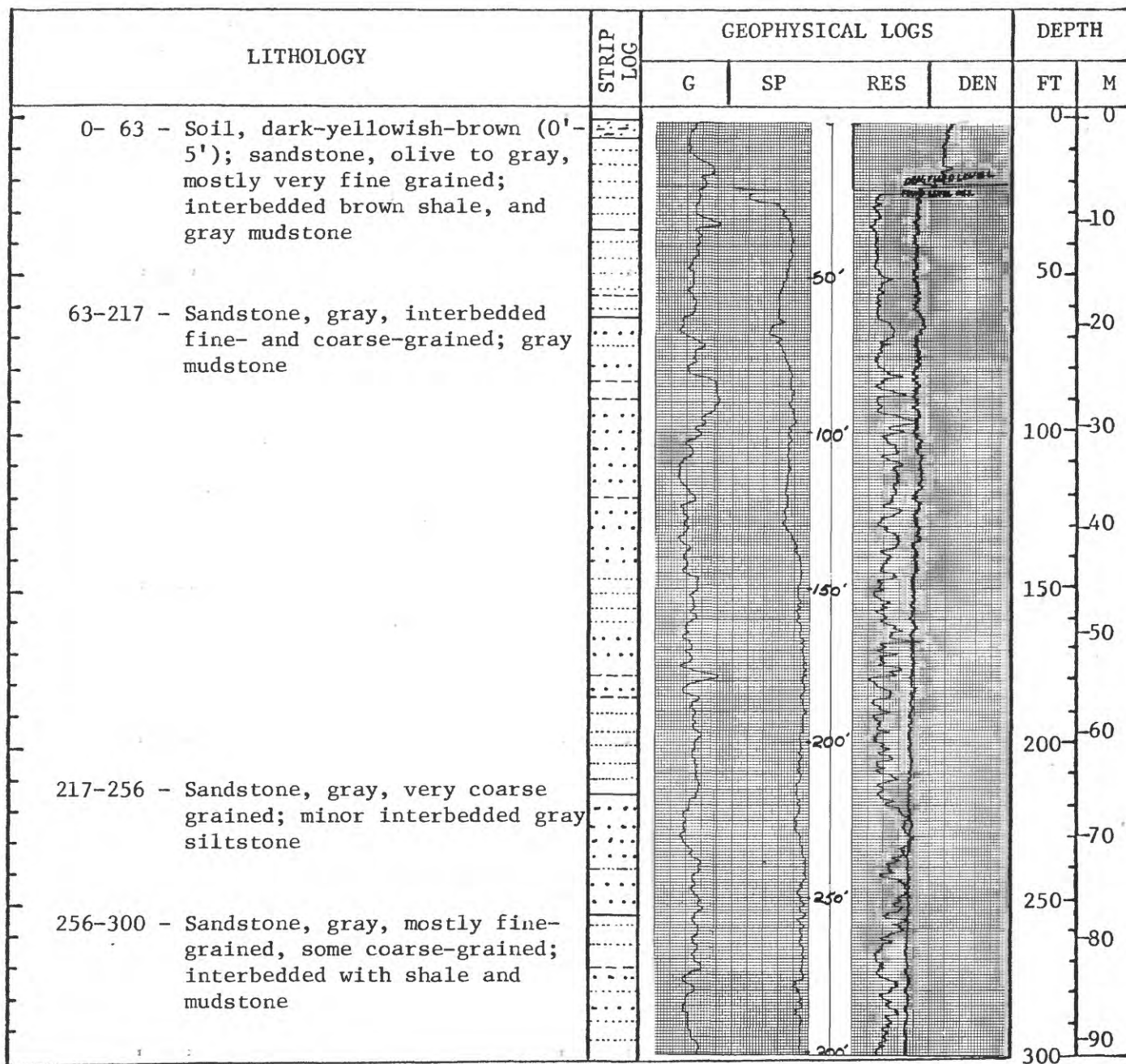
COALMONT AREA

Hole No. M6 Map MacFarlane Reservoir Date logged 7/10/77 Elevation (ft) 8,186'  
Location: T. 7 N., R. 80 W., sec. 23 : 2,000' FNL 0' FEL Cored: ☐ Yes ☒ No  
Drilled depth 800' Logged depth 800' Drilling medium water Fluid level 23'

Geophysical logs:

Spontaneous potential (SP): Scale 25 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 400 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 2 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 2 Scale 64 Kcps/in Logging speed 20 fpm

Remarks: \_\_\_\_\_





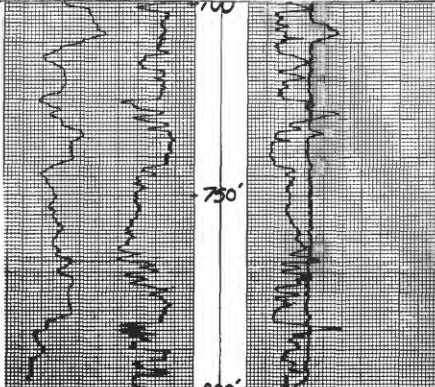
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M6 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-345 - Sandstone, gray, mostly fine grained, some coarse-grained, interbedded with shale and mudstone							100
345-363 - Sandstone, light-gray, very fine- to coarse-grained, well sorted, subangular						350	110
363-431 - Sandstone, mostly light-gray, some dark-olive-gray, very coarse- to very fine grained; some interbedded shale						400	120
431-502 - Sandstone, light-gray, coarse- to very coarse-grained, moderately sorted, subangular						450	140
502-554 - Sandstone, gray, fine-grained; interbedded olive-gray shale, and minor coal						500	160
554-575 - Sandstone, gray, very fine- to coarse-grained, interbedded with carbonaceous shale						550	170
575-593 - Thin COAL beds at 577', 581'-584', and 590', and sandstone, gray, fine- to coarse-grained						600	180
593-650 - Sandstone, gray, fine- to coarse-grained, and minor sandstone, gray, very coarse grained, poorly sorted, angular						650	190
650-700 - Sandstone, gray, fine- to coarse-grained (moderately to well-sorted and angular 670'-720')						700	200
							210
							700

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No.     M6     (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
700-800 - As above							
						220	
						750	
						230	
							240
						800	
							250
							260
							270
						900	

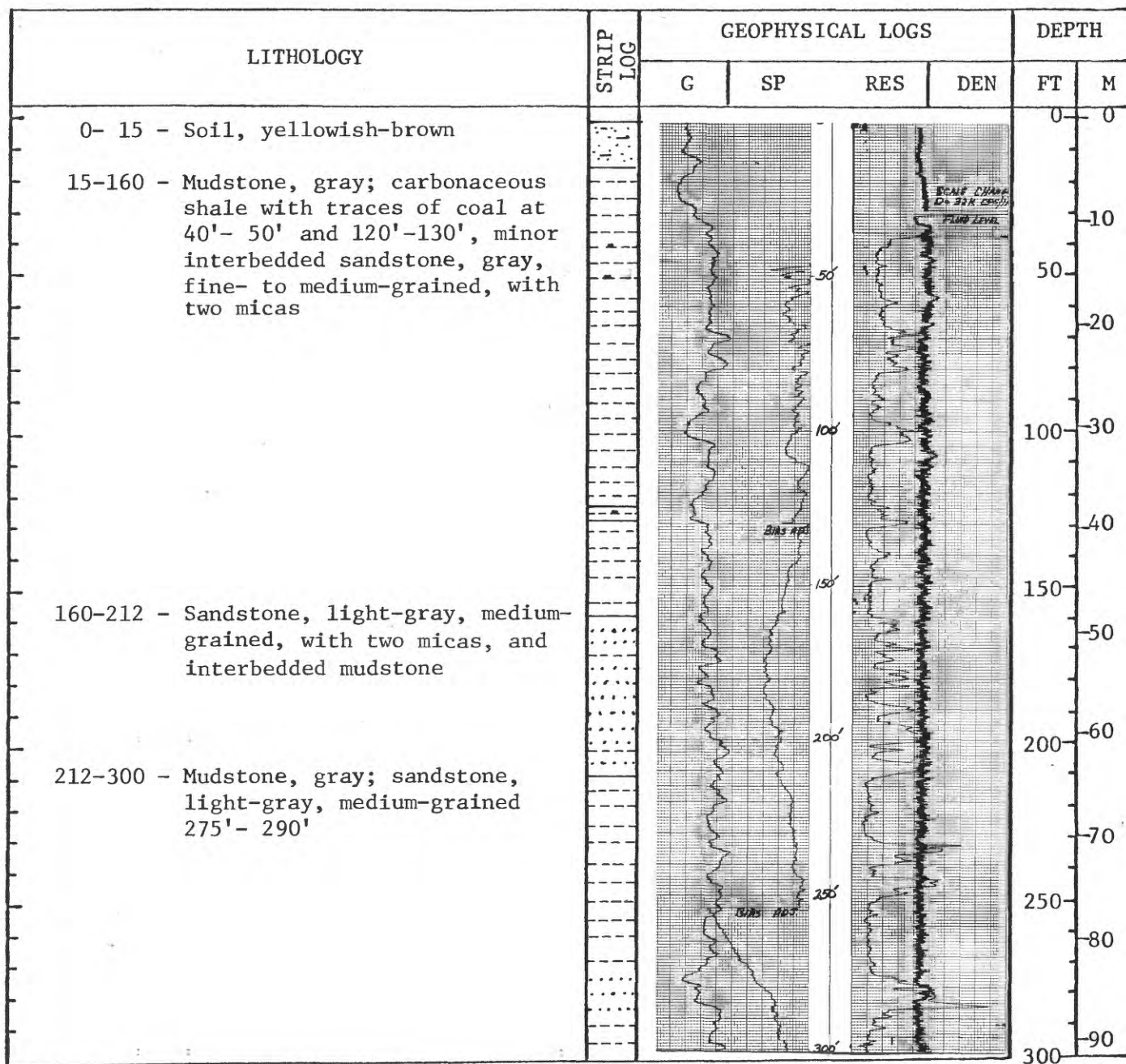
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. C7 Map Coalmont Date logged 6/19/77 Elevation (ft) 8,170'  
Location: T. 7 N., R. 80 W., sec. 18 : 2,350' F S L 0' F W L Cored: ☐ Yes ☒ No  
Drilled depth 600' Logged depth 600' Drilling medium water Fluid level 38'

Geophysical logs:

Spontaneous potential (SP): Scale 100 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 200 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 2 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 2 Scale 64 Kcps/in Logging speed 20 fpm  
Remarks: Twin drilled, coal cored in second hole.



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. C7 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-309 - Mudstone, gray							
309-340 - COAL; partings of dark-gray mudstone and carbonaceous shale							100
340-381 - Mudstone, gray						350	
							110
381-404 - Silty mudstone, medium-light-gray; traces of coal							120
404-496 - Mudstone, gray and olive-black						400	
							130
						450	
							140
							150
496-600 - Sandstone, very light gray, coarse-grained above 530' and fine-grained below 530'						500	
							160
						550	
							170
							180
						600	
							190
						650	
							200
							210
						700	



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. C7 Map Coalmont Date logged 8/10/77 Elevation (ft) 8,170  
Location: T. 7 N., R. 80 W., sec. 18 : 2350 FSL 0 FWL Cored: ☒ Yes ☐ No  
Drilled depth 340' Logged depth 340' Drilling medium water Fluid level 0'

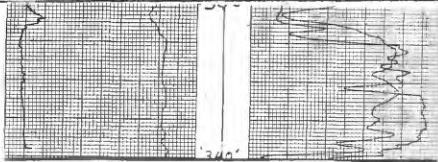
Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 100 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 2 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 2 Scale 3.2 Kcps/in Logging speed 20 fpm  
Remarks: Cored interval: 300'-339'

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
0-123 - Sandstone, light-gray, fine- to very fine-grained; minor coarse-grained sandstone, interbedded with minor shale and carbonaceous shale						0	0
						10	
						50	
						20	
						100	30
123-150 - Shale, light gray; minor coal and carbonaceous shale						40	
						150	
150-289 - Sandstone, light-gray, very fine- and coarse-grained, well-sorted, subrounded to sub-angular; minor interbedded shale						50	
						200	60
						70	
						250	
						80	
289-300 - Shale, gray						90	
						300	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No.   C7   (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-340 - Sandstone and minor shale (see 150' to 289')							
							100
							350
							110
							120
							400
							130
							450
							140
							500
							160
							550
							170
							180
							600
							190
							650
							200
							210
							700

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

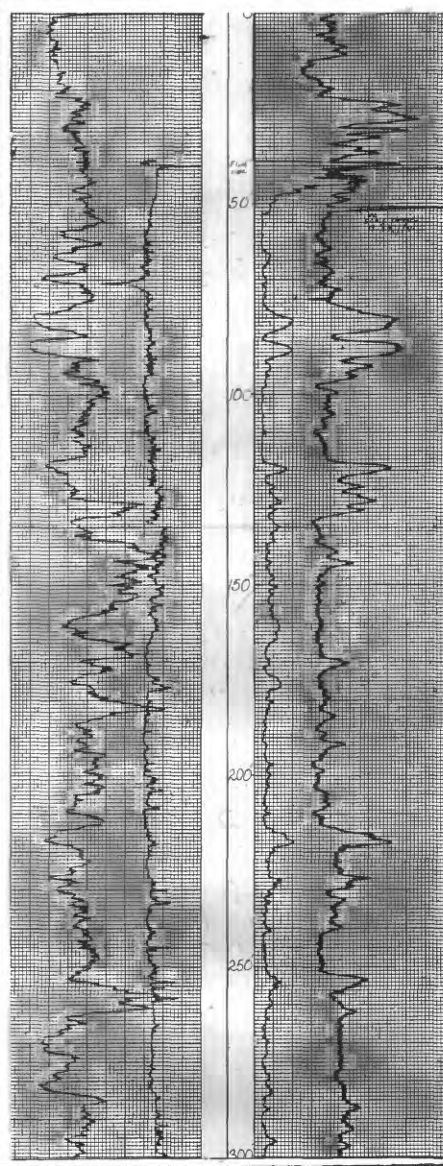
COALMONT AREA

Hole No. C8 Map Coalmont Date logged 6/17/77 Elevation (ft) 8,230'  
Location: T. 7 N., R. 80 W., sec. 19 : 1,125' FNL 0' FWL Cored: ☐ Yes ☒ No  
Drilled depth 500' Logged depth 498' Drilling medium air Fluid level 49'

Geophysical logs:

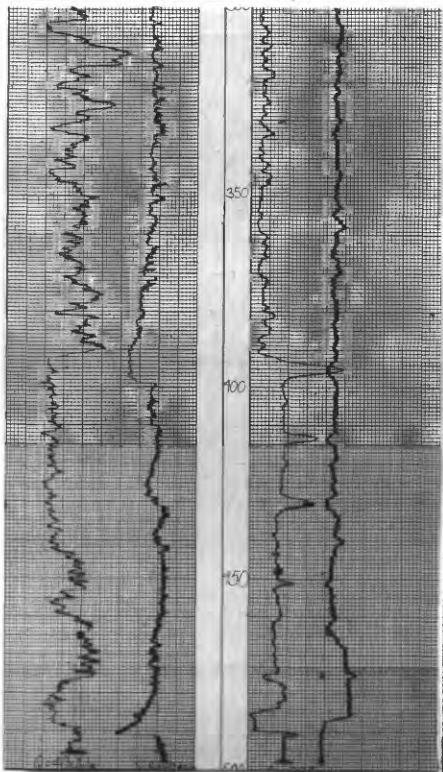
Spontaneous potential (SP): Scale 100 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 1,000 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 32 Kcps/in Logging speed 20 fpm

Remarks: \_\_\_\_\_

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
0- 30 - Soil, yellowish-brown						0	0
30- 76 - Mudstone, brown and gray; carbonaceous shale and trace of coal 60'-70'						10	
76- 91 - COAL, carbonaceous shale, and gray mudstone at 85'						20	
91-118 - Mudstone, gray						30	
118-132 - Carbonaceous shale and COAL						40	
132-214 - Mudstone, gray and interbedded siltstone, gray, with white mica						50	
214-219 - Carbonaceous shale and COAL						60	
219-250 - Mudstone, gray						70	
250-257 - Carbonaceous shale and COAL						80	
257-300 - Mudstone, gray and interbedded sandstone, gray, coarse- and fine-grained, with white mica						90	
						300	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. C8 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-391 - As above						100	
						350	
						110	
						120	
391-500 - Sandstone, light-gray, coarse-grained (medium-grained 391'-400')						400	
						130	
						140	
						150	
						500	
						160	
						170	
						180	
						190	
						200	
						210	
						700	



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. C9 Map Coalmont Date logged 6/28/77 Elevation (ft) 8,190'  
Location: T. 7 N., R. 80 W., sec. 19 : 0' F S L 1,900' F E L Cored: ☐ Yes ☒ No\*  
Drilled depth 480' Logged depth 480' Drilling medium air & gel Fluid level 11'  
Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 400 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 2 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 2 Scale 64 Kcps/in Logging speed 20 fpm

Remarks: \*C9 was "twin-drilled." The first hole was logged (log shown here), and the second hole was cored through the coal from 410' to 431' but not logged.

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
0- 10 - Soil, moderate yellowish-brown						0	0
10-137 - Sandstone, light-gray, fine-grained, with two micas; interbedded with gray and light-gray green mudstone and black shale near 80'						10	
						50	
						100	30
						150	
137-175 - Sandstone, gray, coarse to very coarse-grained, interbedded green mudstone, and fine-grained sandstone						200	
						250	
175-250 - Mudstone, greenish-gray, interbedded with light-gray, fine-grained sandstone, with white mica; minor black shale						300	
						350	
250-294 - Mudstone, dark-gray, and brownish-black shale; interbedded, light-gray, coarse grained sandstone						400	
294-300 - Sandstone, gray and white, medium-grained, with white mica						450	
						500	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. C9 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-340 - As above							
340-413 - Sandstone, light-gray, very fine- to coarse-grained; minor black shale and coal						100	
						350	
						110	
						120	
						400	
413-430 - COAL, with parting							
430-457 - Sandstone, light-gray to white, very fine- and medium-grained						130	
						140	
						450	
						150	
						500	
457-480 - Shale, medium-gray and black							
						160	
						550	
						170	
						180	
						600	
						190	
						650	
						200	
						210	
						700	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. M11 Map MacFarlane Reservoir Date logged 8/3/77 Elevation (ft) 8,220'  
 Location: T. 7 N., R. 80 W., sec. 28 : 250' FNL 950' FEL Cored: ☐ Yes ☒ No  
 Drilled depth 800' Logged depth 800' Drilling medium mud Fluid level 75'  
 Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
 Resistivity (RES): Scale 100 ohms/in Logging speed 20 fpm  
 Gamma (G): T.C. 2 Scale 500 cps/in Logging speed 20 fpm  
 Density (DEN): T.C. 2 Scale 64 Kcps/in Logging speed 20 fpm  
 Remarks: \_\_\_\_\_

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
0- 20 - Sandstone, gray, medium to coarse-grained, poorly consolidated, with two micas	.....					0	0
20-162 - Siltstone, gray, with two micas; gray mudstone; sandstone	.....					10	
	.....					50	
	.....					20	
	.....					100	30
	.....					40	
162-183 - Sandstone, light-gray, medium- to very coarse-grained, sub-angular, poorly consolidated, with muscovite	.....					150	
	.....					50	
183-252 - Sandstone, as above, and gray siltstone, with two micas	.....					200	60
	.....					70	
252-300 - Sandstone (see 162'-183') and a bed of fine pebble gravel near 260'	.....					250	
	.....					80	
	.....					90	
	.....					300	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

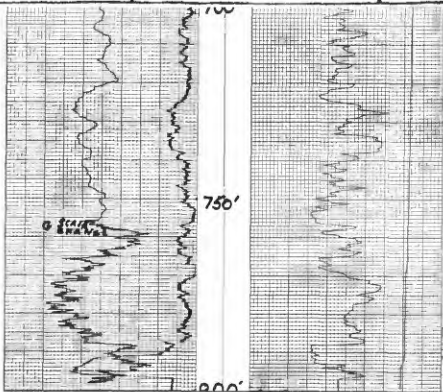
Hole No. M11 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-301 - As above							
301-392 - Sandstone (see 162'-183') interbedded with light-gray siltstone, two micas, and light-gray mudstone						100	
						350	
						110	
392-411 - COAL; partings of black shale and mudstone						120	
						400	
411-558 - Mudstone interbedded with sandstone (white mica, some biotite and shale; traces of coal 520'-530')						130	
						450	
						140	
						150	
						500	
						160	
558-590 - Sandstone, white, fine- and very coarse-grained, subangular to angular, poorly consolidated, with white mica						170	
						550	
590-617 - Mudstone, light-gray						180	
						600	
617-700 - Sandstone with white mica, and mudstone						190	
						650	
						200	
						210	
						700	



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M11 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
700-800 - As above						220	
						750	230
						240	
						800	
						250	
						850	260
						270	
						900	

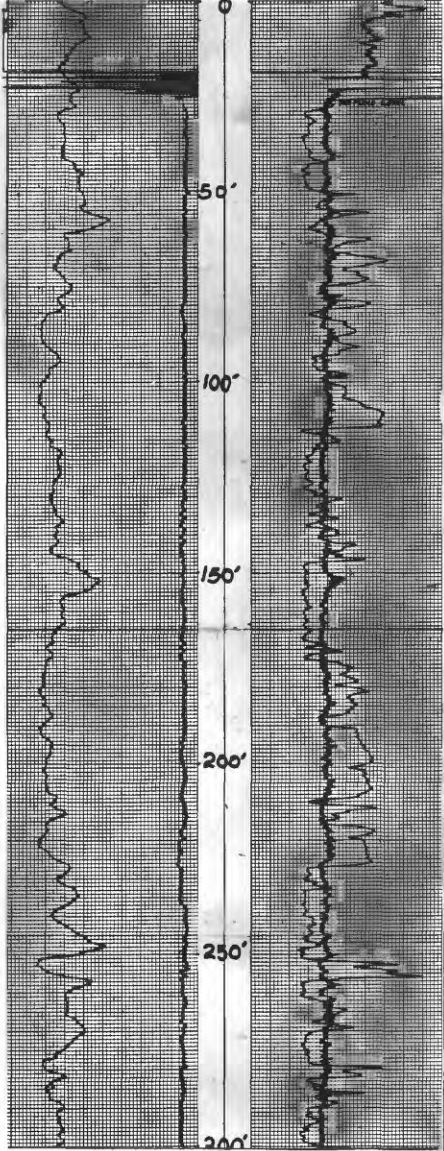
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. M12 Map MacFarlane Reservoir Date logged 7/20/77 Elevation (ft) 8,189'  
Location: T. 7 N., R. 80 W., sec. 22 : 2,050' FN 1,900' FE L Cored: ☐ Yes ☒ No  
Drilled depth 800' Logged depth 800' Drilling medium water Fluid level 26'

Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 400 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 2 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 2 Scale 64 Kcps/in Logging speed 20 fpm  
Remarks: \_\_\_\_\_

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
0- 5 - Soil, yellowish-brown						0	0
5-147 - Sandstone, gray, mostly fine-grained, interbedded siltstone and shale, gray; sandstone, light-gray, very coarse-grained poorly sorted 101'-112'						10	
						50	
						20	
						100	30
						40	
147-172 - Shale, dark-olive, and carbonaceous shale, black; coal traces						150	
						50	
172-227 - Sandstone, pinkish-gray, coarse-grained, moderately to well-sorted, subangular; minor interbedded sandstone, gray, very fine grained						200	60
						70	
227-300 - Sandstone, gray, fine- to coarse-grained, interbedded with dark-gray shale, carbonaceous shale (traces of coal), and siltstone						250	
						80	
						300	90

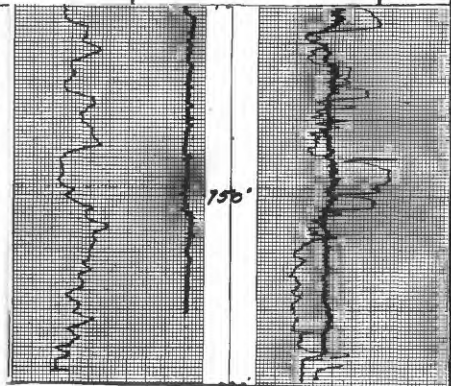
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M12 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-413 - As above						100	
						350	110
						400	120
413-456 - Sandstone, pinkish-gray, coarse-grained, well-sorted, subangular						450	130
						470	140
456-526 - Sandstone, siltstone, gray mudstone, and gray and brown shale; coal traces 470'-480'						500	150
						550	160
526-539 - Sandstone, gray, fine- to very fine-grained, well-sorted, subangular, and gray shale; some carbonaceous shale						550	170
539-564 - COAL; partings of dark-olive to black shale and gray, very fine-grained, sandstone						600	180
564-700 - Sandstone, shale, and minor carbonaceous shale						650	200
						700	210
							700

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M12 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
700-761 - As above						220	
						750	230
761-800 - Shale, brown to olive							240
						800	
							250
						850	260
							270
						900	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. C17 Map Coalmont Date logged 6/29/77 Elevation (ft) 8,151'  
Location: T. 7 N., R. 80 W., sec. 29 : 0 F S L 2,000' F W L Cored: ☐ Yes ☒ No  
Drilled depth 800' Logged depth 800' Drilling medium mud Fluid level 9'

Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 400 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 2 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 2 Scale 64 Kcps/in Logging speed 20 fpm

Remarks: \_\_\_\_\_

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
0- 10 - Gravel						0	0
10- 63 - Siltstone, gray, with white mica; yellowish-gray, fine-grained sandstone, with white mica, and greenish-gray mudstone						10	
63- 98 - Sandstone, light-gray, coarse-grained; interbedded sandstone, light-gray, fine-grained, with two micaceous						20	
98-122 - Sandstone, light-gray, fine-grained, with two micaceous, and gray mudstone						30	
122-135 - Mudstone and coaly shale						40	
135-212 - Sandstone, light-gray, medium- and coarse-grained, with two micaceous; and gray mudstone						50	
						60	
212-300 - Sandstone, gray and white, medium-grained, some coarse-grained, with two micaceous; minor black shale						70	
						80	
						90	
						300	



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. C17 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-320 - As above							
320-333 - Siltstone, greenish-gray							
333-405 - Sandstone, light-gray, coarse- to fine-grained; light-gray siltstone, and medium-light- gray mudstone						100	
						350	
						110	
						120	
405-420 - Shale, brownish-black; silt- stone, light-gray, and white, fine-grained sandstone						400	
						130	
420-515 - Sandstone, light-gray, very fine to coarse-grained						450	
						140	
						150	
						500	
515-549 - Mudstone, olive-gray						160	
						170	
549-700 - Sandstone, light-gray, fine to coarse-grained; minor inter- bedded gray mudstone						550	
						180	
						190	
						200	
						210	
						700	

U.S. GEOLOGICAL SURVEY  
 DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. C17 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
700-800 - As above							
						220	
						750	230
							240
						800	
							250
							260
						850	
							270
						900	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. C19 Map Coalmont Date logged 6/20/77 Elevation (ft) 8,272'  
Location: T. 7 N., R. 80 W., sec. 31 : 550' F<sup>N</sup> L 400' F<sup>W</sup> L Cored: ☐ Yes ☒ No  
Drilled depth 300' Logged depth 298' Drilling medium water Fluid level 79'

Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 400 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 2 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 2 Scale 64 Kcps/in Logging speed 20 fpm

Remarks: \_\_\_\_\_

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
0- 13 - Soil, orange and brown						0	0
13-170 - Sandstone, white and light-gray fine- to coarse-grained, with white mica						10	
						50	
						20	
						100	30
						40	
						150	
170-190 - Siltstone, light-gray, with white mica						50	
190-229 - Mudstone, light-gray; sandstone white, fine-grained, with white mica, 205'-216'						200	60
229-300 - Sandstone, light-gray and white fine- to coarse-grained, with white and black micas						70	
						250	
						80	
						90	
						300	



## COALMONT AREA

Geophysical logs:

Remarks:

49

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. C26 Map Coalmont Date logged 6/16/77 Elevation (ft) 8,141'  
 Location: T. 7 N., R. 81 W., sec. 23 : 2,600' FNL 0' FWL Cored: ☐ Yes ☒ No  
 Drilled depth 220' Logged depth 220' Drilling medium air & water Fluid level 18'  
 Geophysical logs:

Spontaneous potential (SP): Scale 100 mv/in Logging speed 20 fpm  
 Resistivity (RES): Scale 1,000 ohms/in Logging speed 20 fpm  
 Gamma (G): T.C. 4 Scale 200 cps/in Logging speed 20 fpm  
 Density (DEN): T.C. 4 Scale 6.4 Kcps/in Logging speed 20 fpm  
 Remarks: \_\_\_\_\_

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
0- 10 - Soil, pale-yellowish-brown						0	0
10- 20 - Shale, brown							
20- 44 - Mudstone, gray						10	
44- 55 - Carbonaceous shale and coal						50	
55-106 - Shale, gray; carbonaceous shale coal traces 90'-100'						20	
106-110 - COAL and carbonaceous shale						100	30
110-139 - Shale, gray							
139-143 - COAL and carbonaceous shale						40	
143-174 - Carbonaceous shale, coal, and gray mudstone						150	
174-180 - COAL, carbonaceous shale, and gray mudstone						50	
180-208 - Mudstone, gray						200	60
208-220 - Carbonaceous shale, brown shale, and mudstone						70	
						250	
						80	
						90	
						300	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. C27 Map Coalmont Date logged 8/11/77 Elevation (ft) 8,170'  
Location: T. 7 N., R. 81 W., sec. 23 : 2,100' FN 1,250' F WL Cored: ☐ Yes ☒ No  
Drilled depth 600' Logged depth 586' Drilling medium water Fluid level 43'

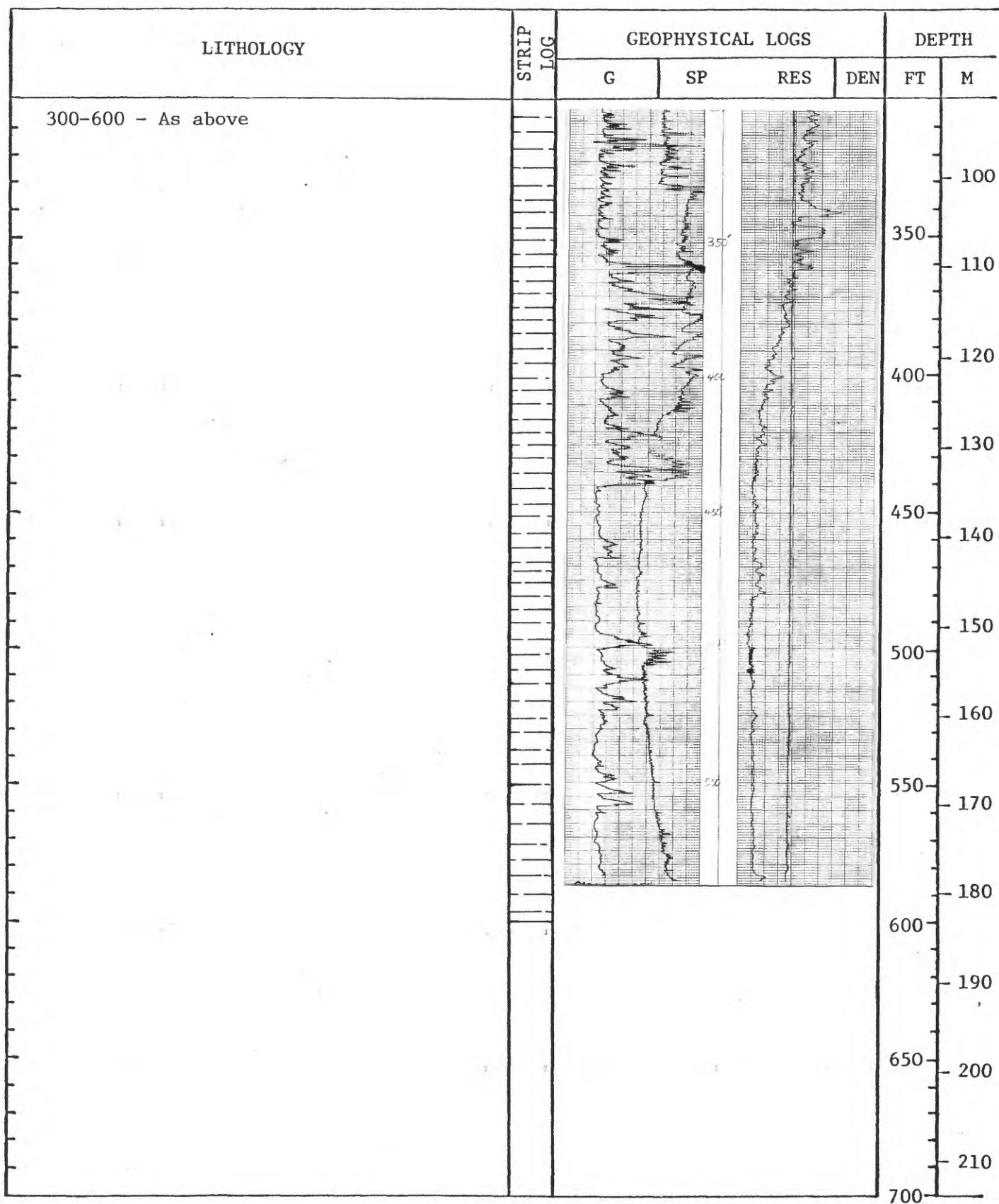
Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 50 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 2 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 2 Scale 64 Kcps/in Logging speed 20 fpm  
Remarks: \_\_\_\_\_

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
0- 5 - Soil						0	0
5- 33 - Shale, brown, some carbonaceous shale, coal traces 24'-27'						10	
33- 40 - COAL and carbonaceous shale						50	
40-123 - Mudstone, gray						20	
						100	30
123-205 - Sandstone, gray, coarse-grained above 170', medium-grained below 170', subangular; interbedded mudstone; coal traces 190'-200'						40	
						150	50
						200	60
205-300 - Shale, olive-gray						70	
						250	80
						300	90

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. C27 (continued)





## COALMONT AREA

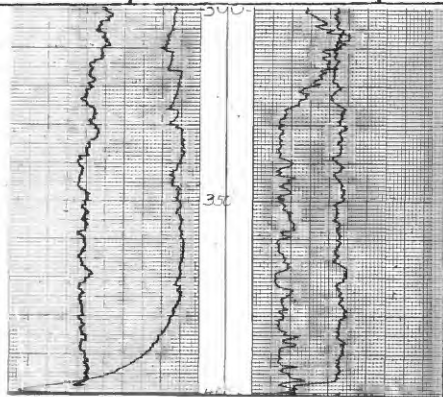
Geophysical logs:

Spontaneous potential (SP):	Scale	<u>50 mv/in</u>	Logging speed	<u>20</u> fpm
Resistivity (RES):	Scale	<u>100 ohms/in</u>	Logging speed	<u>20</u> fpm
Gamma (G): T.C. <u>2</u>	Scale	<u>200 cps/in</u>	Logging speed	<u>20</u> fpm
Density (DEN): T.C. <u>2</u>	Scale	<u>3.2 Kcps/in</u>	Logging speed	<u>20</u> fpm
Remarks: No lithology log.				

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
		<p>The geophysical log strip displays four curves: Gamma Ray (G), Spontaneous Potential (SP), Resistivity (RES), and Density (DEN). The curves are plotted against depth from 0 to 300 feet. The SP curve shows significant deflections, particularly around 100-150 feet. The RES curve shows a general downward trend with some fluctuations. The DEN curve remains relatively stable around 2.6 g/cm³.</p>				0	0
						-10	
						50	
						-20	
						100	-30
						-40	
						150	-50
						-60	
						200	-70
						-80	
						250	-90
						-90	
						300	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. C28 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
						100	
						350	
						110	
						120	
						400	
						130	
						450	
						140	
						150	
						500	
						160	
						170	
						180	
						600	
						190	
						650	
						200	
						210	
						700	

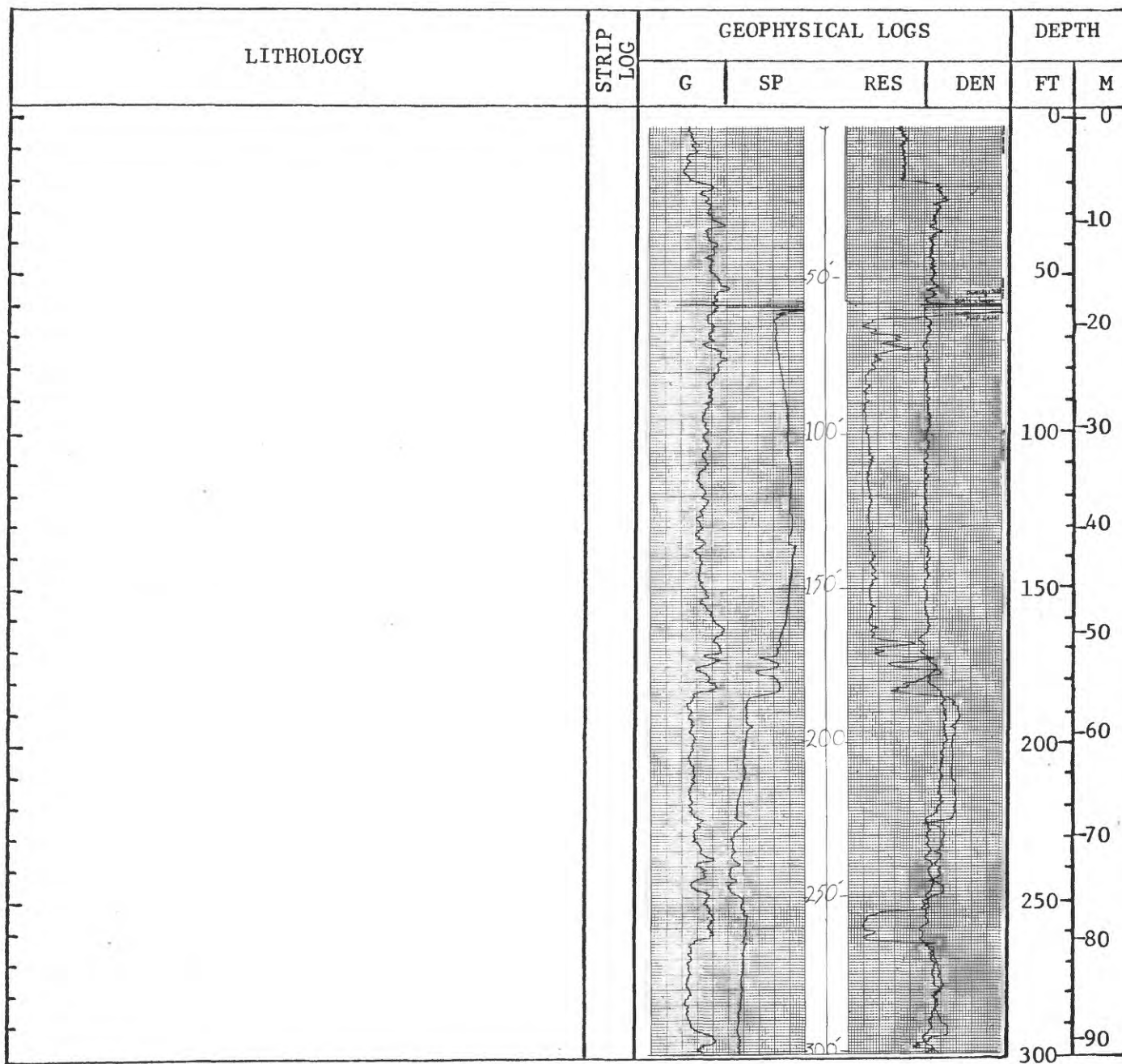
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. C29 Map Coalmont Date logged 8/17/77 Elevation (ft) 8,300'  
Location: T. 7 N., R. 81 W., sec. 26 : 1,950' F S L 1,150' F E L Cored: ☐ Yes ☒ No  
Drilled depth 500' Logged depth 500' Drilling medium water Fluid level 61'

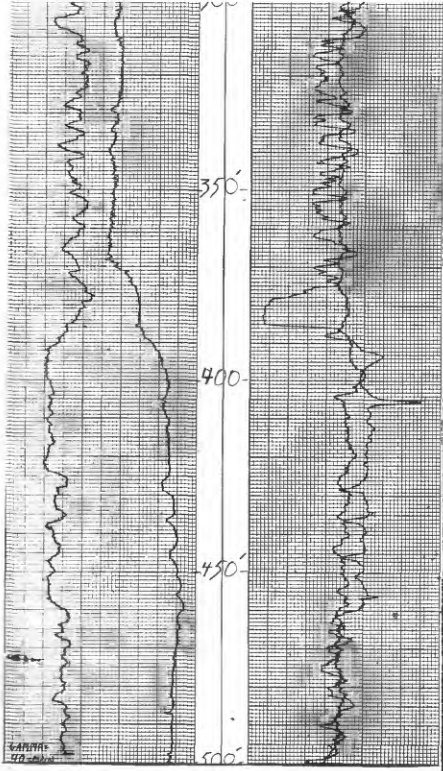
Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 100 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 2 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 2 Scale 3.2 Kcps/in Logging speed 20 fpm  
Remarks: No lithology log.



U.S. GEOLOGICAL SURVEY  
 DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. C29 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
						100	
						350	
						110	
						120	
						400	
						130	
						450	
						140	
						150	
						500	
						160	
						550	
						170	
						180	
						600	
						190	
						650	
						200	
						210	
						700	



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. C30 Map Coalmont Date logged 6/22/77 Elevation (ft) 8,200'  
Location: T. 7 N., R. 81 W., sec. 35 . 700 FNL 1400 FWL Cored: ☐ Yes ☒ No  
Drilled depth 300' Logged depth 298' Drilling medium air & water Fluid level 8'

Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 200 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 2 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 2 Scale 64 Kcps/in Logging speed 20 fpm  
Remarks: \_\_\_\_\_

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
0- 8 - Soil, yellowish-brown						0	0
8- 35 - Sandstone, light-gray, fine-grained						10	
35- 49 - Mudstone, medium-dark-gray						50	
49-148 - Sandstone, light-gray, mostly fine-grained, some medium-grained, with white mica; mudstone at 81'						100	30
						150	50
148-156 - Mudstone, medium-gray						200	60
156-183 - Sandstone, light-gray, fine- and medium-grained, with two micas and minor interbedded gray mudstone						250	80
183-300 - Mudstone, medium-gray, shaly; and gray, fine- and medium-grained sandstone						300	90

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

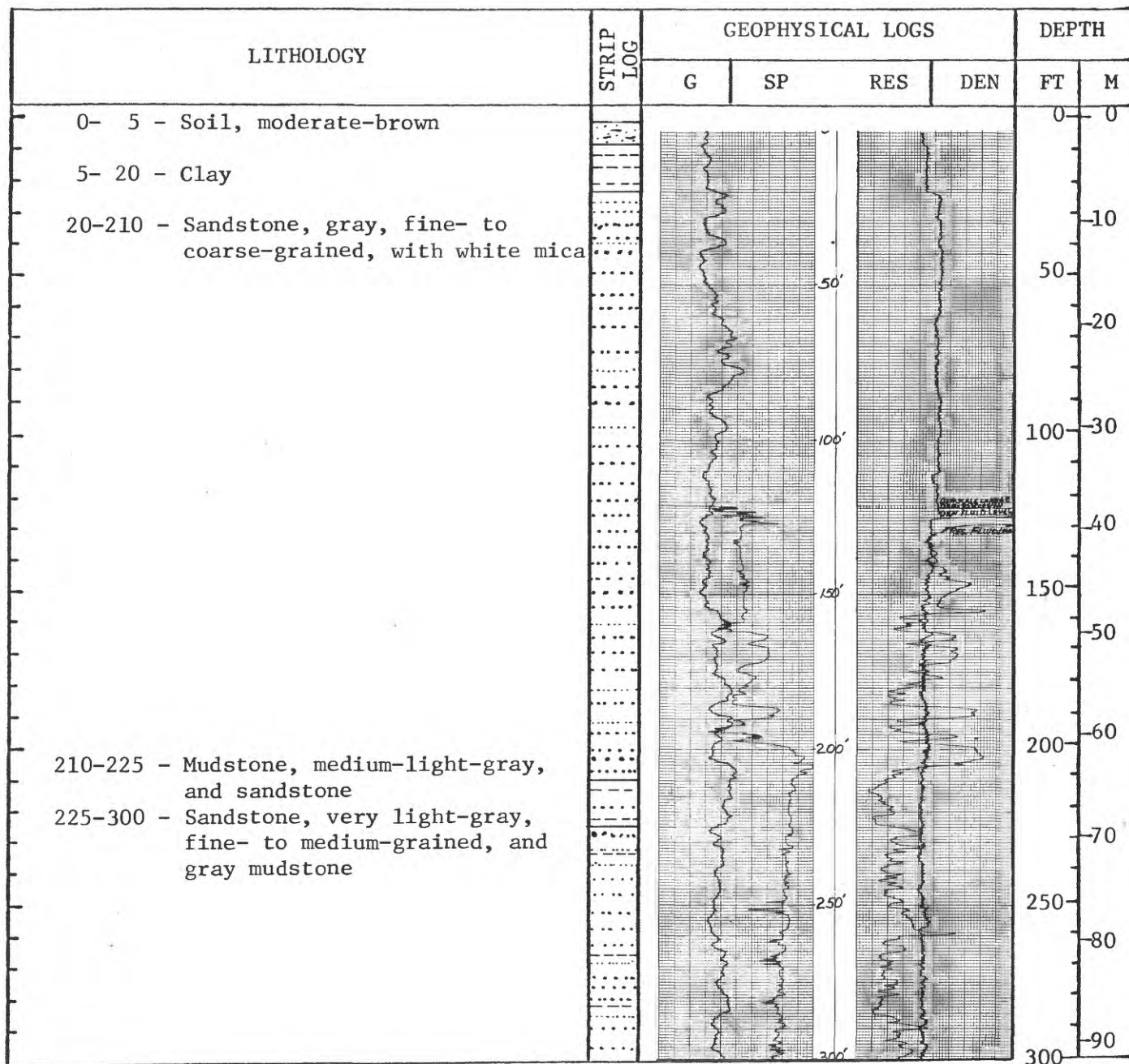
COALMONT AREA

Hole No. C32 Map Coalmont Date logged 6/21/77 Elevation (ft) 8,360'  
Location: T. 7 N., R. 81 W., sec. 35 : 1,350' F S L 300' F E L Cored: ☐ Yes ☒ No  
Drilled depth 500' Logged depth 500' Drilling medium air & Fluid level 127'  
water

Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 200 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 2 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 2 Scale 64 Kcps/in Logging speed 20 fpm

Remarks: \_\_\_\_\_



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. C32 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-339 - As above							
339-500 - Sandstone, white, coarse- to fine-grained, with white mica						100	
						350	
						110	
						120	
						400	
						130	
						450	
						140	
						150	
						500	
						160	
						550	
						170	
						180	
						600	
						190	
						650	
						200	
						210	
						700	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

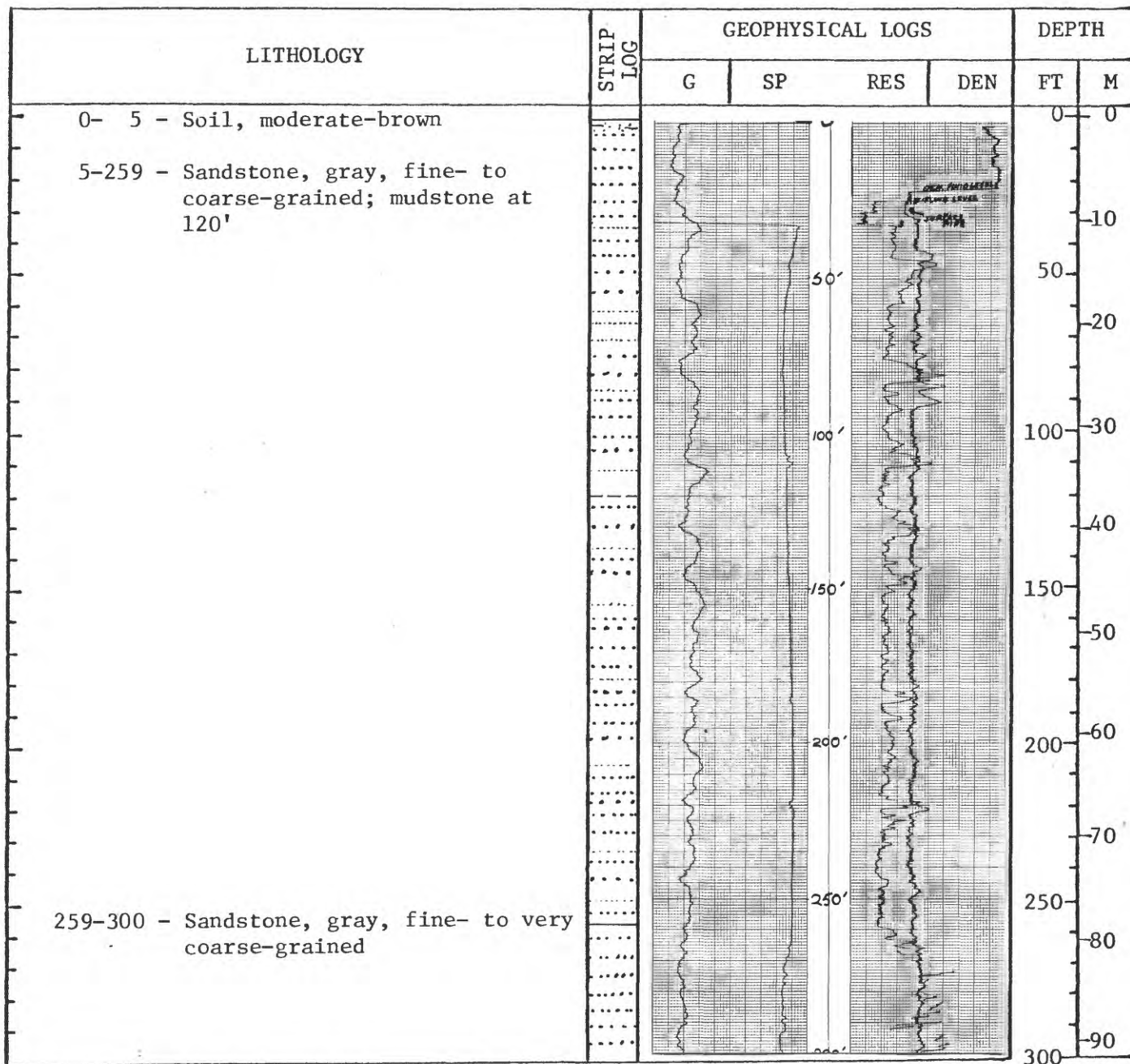
COALMONT AREA

Hole No. M35 Map MacFarlane Reservoir Date logged 7/1/77 Elevation (ft) 8,161'  
Location: T. 7 N., R. 80 W., sec. 14 : 1,350'FNL 2,000'FWL Cored: ☐ Yes ☒ No  
Drilled depth 600' Logged depth 600' Drilling medium water- Fluid level 23'  
soap

Geophysical logs:

Spontaneous potential (SP): Scale 100 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 200 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 2 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 2 Scale 64 Kcps/in Logging speed 20 fpm

Remarks: \_\_\_\_\_





U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. M36 Map MacFarlane Reservoir Date logged 7/8/77 Elevation (ft) 8,183'  
Location: T. 7 N., R. 80 W., sec. 24 : 1,000' FNL 1,300' FWL Cored: ☐ Yes ☒ No  
Drilled depth 800' Logged depth 800' Drilling medium water Fluid level 0'

Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 400 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 2 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 2 Scale 64 Kcps/in Logging speed 20 fpm

Remarks: \_\_\_\_\_

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
0- 31 - Sandstone, yellowish- to greenish-gray, fine- to coarse-grained, well-sorted, sub-angular						0	0
31- 42 - Sandstone, light-gray, very coarse-grained, moderately sorted, subangular						10	
42-143 - Sandstone, gray, fine- to coarse-grained; interbedded dark-gray shale (130'-143')						50	
						20	
						100	30
						40	
143-197 - Sandstone, gray, coarse-grained, well-sorted						150	
						50	
197-267 - Sandstone, gray, fine- to coarse-grained; interbedded dark-gray shale						200	60
						70	
						250	
267-300 - Sandstone, gray, fine- to coarse-grained; interbedded dark-gray shale						80	
						90	
						300	

## Hole No. M35 (continued)



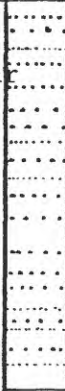
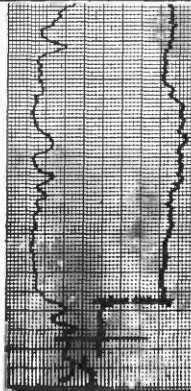
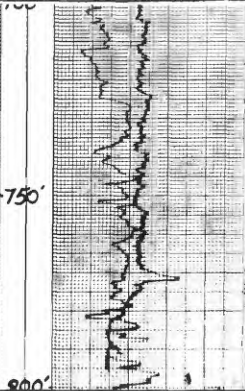
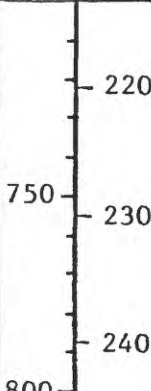

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M36 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-356 - As above							
						100	
356-378 - Sandstone, light-gray, very coarse-grained, subangular, poorly consolidated below 366'						350	
378-457 - Sandstone, light-gray, fine- to coarse-grained, poorly sorted, subrounded to subangular, poorly consolidated, interbedded with shaly sandstone, dark-gray, fine-grained sandstone, and carbonaceous shale; coal traces						110	
						120	
						130	
457-511 - Sandstone, gray, fine- to coarse-grained, moderately sorted, interbedded with carbonaceous shale and coal traces						450	
						140	
						150	
511-525 - COAL, carbonaceous shale, and light-gray, fine-grained sandstone						500	
525-591 - Sandstone, light gray, fine-grained; dark-olive shale, and carbonaceous shale						160	
						170	
						180	
591-626 - Sandstone, light-gray, very coarse-grained, well-sorted, subangular						600	
626-700 - Sandstone, light-gray, fine- to very coarse-grained, ranging from poorly to well-sorted; interbedded gray shale, and carbonaceous shale						190	
						200	
						210	
						700	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M36 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
700-800 - Sandstone, fine- to coarse-grained, well-sorted, subangular to subrounded						220	
						750	230
							240
						800	
							250
						850	260
							270
						900	



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

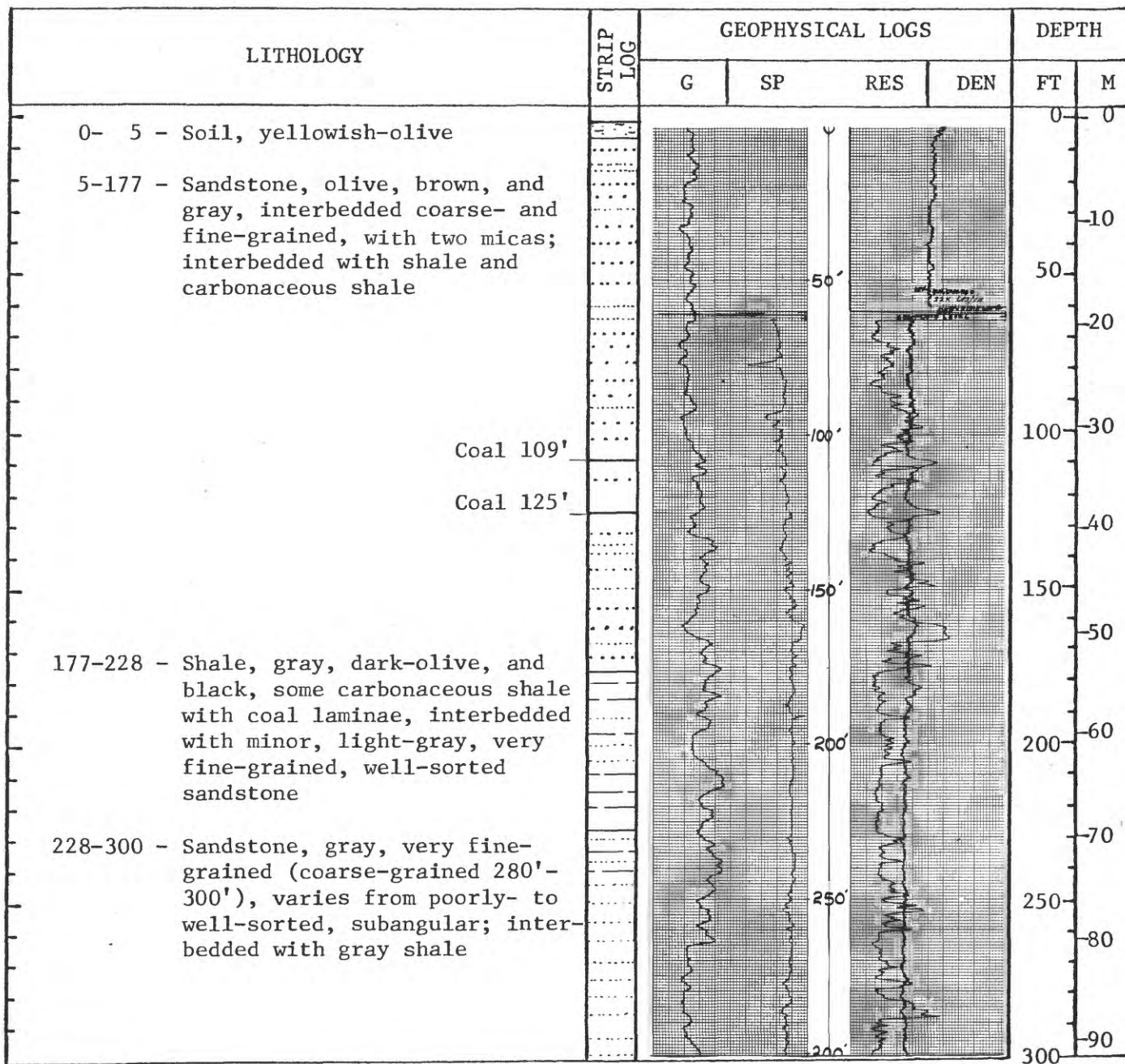
COALMONT AREA

Hole No. M41 Map MacFarlane Reservoir Date logged 7/13/77 Elevation (ft) 8,211'  
Location: T. 7 N., R. 80 W., sec. 15 : 250' F S L 1,950' F W L Cored: ☐ Yes ☒ No  
Drilled depth 840' Logged depth 840' Drilling medium water Fluid level 63'

Geophysical logs:

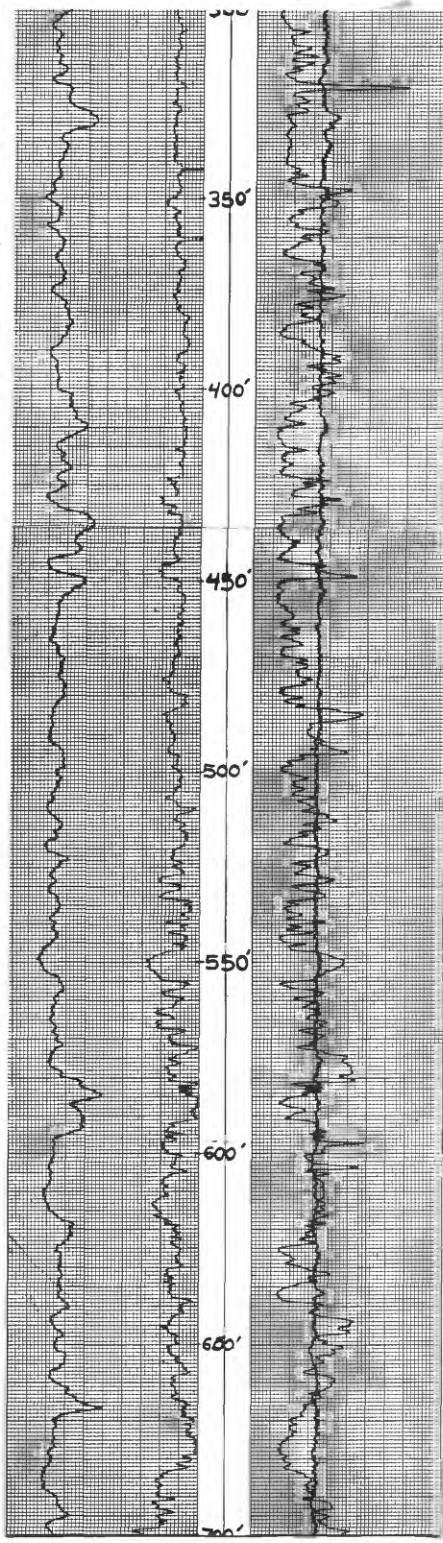
Spontaneous potential (SP): Scale 25 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 400 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 2 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 2 Scale 64 Kcps/in Logging speed 20 fpm

Remarks: \_\_\_\_\_



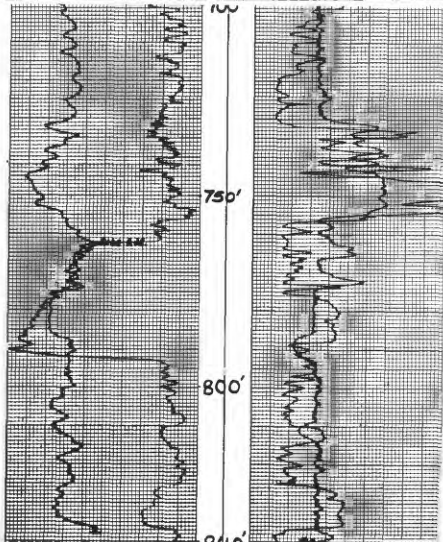
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M41 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-328 - As above							
328-341 - Shale, dark-olive-gray, and carbonaceous shale						100	
341-518 - Sandstone, gray, interbedded fine- and coarse-grained; gray shale						350	
						110	
						120	
						400	
						130	
						450	
						140	
						150	
518-700 - Sandstone, gray, fine-grained, moderately well-sorted, sub-angular						500	
						160	
						550	
						170	
						180	
						600	
						190	
						650	
						200	
						210	
						700	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M41 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
700-730 - As above						220	
730-756 - COAL; partings of gray, fine-grained, well-sorted, sub-angular sandstone						750	230
756-840 - Sandstone, gray, fine-grained, well-sorted, subangular						240	
						800	250
						260	
						850	270
						280	
						900	


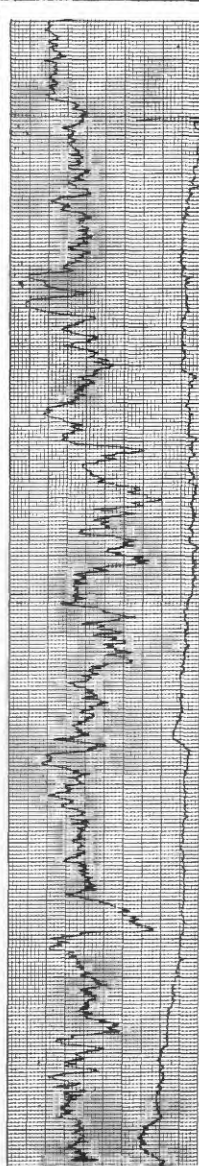
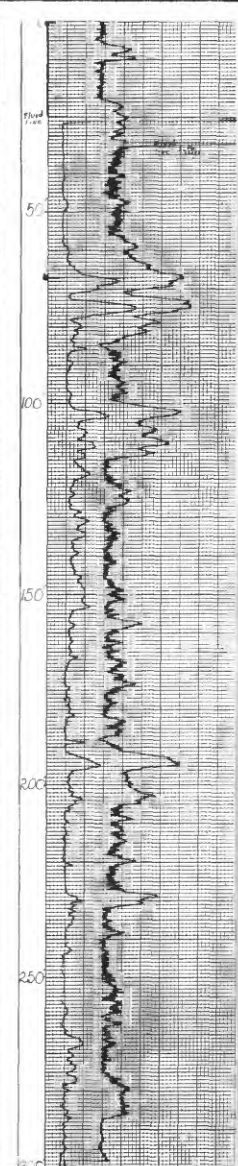
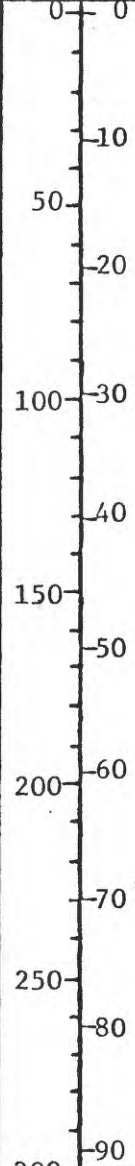





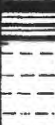







U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. C43 Map Coalmont Date logged 6/18/77 Elevation (ft) 8,207'  
Location: T. 7 N., R. 80 W., sec. 19 : 1,150' FN L 850' FW L Cored: ☐ Yes ☒ No  
Drilled depth 300' Logged depth 300' Drilling medium water Fluid level 26'

Geophysical logs:

Spontaneous potential (SP): Scale 100 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 1,000 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 64 Kcps/in Logging speed 20 fpm  
Remarks: \_\_\_\_\_

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
0- 20 - Soil, olive-gray and yellowish-brown; gravel (5'-10')						0	0
20- 65 - Mudstone, gray; minor, light-gray, medium-grained sandstone, with white mica						10	
65- 77 - COAL; carbonaceous shale						50	
77-100 - Mudstone, gray						20	
100-111 - COAL; carbonaceous shale						100	30
111-191 - Mudstone, gray; light-gray siltstone at 130'; traces of carbonaceous shale and coal						40	
191-204 - Carbonaceous shale and coal						150	
204-265 - Mudstone, gray, dark-gray, and olive-black; interbedded carbonaceous shale; fine-grained sandstone at 230'; coal traces						50	
265-280 - Sandstone, light-gray, coarse-grained						200	60
280-300 - Mudstone, gray, and silty mudstone						70	
						250	80
						90	
						300	90



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. C44 Map Coalmont Date logged 6/20/77 Elevation (ft) 8,270'  
Location: T. 7 N., R. 80 W., sec. 19 : 850' F<sup>S</sup> L 0' F<sup>W</sup> L Cored: ☐ Yes ☒ No  
Drilled depth 300' Logged depth 300' Drilling medium water Fluid level 93'

Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 200 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 2 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 2 Scale 64 Kcps/in Logging speed 20 fpm

Remarks: \_\_\_\_\_

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
0- 15 - Soil, moderate-brown, 0'-3' clay, gray, and fine sand						0	0
15- 29 - Mudstone, light-olive-gray, and coarse-grained sandstone						10	
29- 34 - COAL; carbonaceous shale						50	
34- 42 - Carbonaceous shale							
42-140 - Sandstone, light-gray, fine- to medium-grained, with white mica						20	
						100	30
						40	
140-153 - COAL, carbonaceous shale, and gray, shaly mudstone						150	
153-300 - Sandstone, light-gray, fine-grained to very coarse grained, with white mica						50	
						200	60
						70	
						250	
						80	
						90	
						300	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. C45 Map Coalmont Date logged 6/22/77 Elevation (ft) 8,240'  
Location: T. 6 N., R. 81 W., sec. 1 . 1475 F<sup>N</sup>L 1775 F<sup>W</sup>L Cored: ☐ Yes ☒ No  
Drilled depth 300' Logged depth 298' Drilling medium air & water Fluid level 22'

Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 200 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 2 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 2 Scale 64 Kcps/in Logging speed 20 fpm

Remarks: \_\_\_\_\_

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
0- 5 - Soil, moderate-yellowish-brown						0	0
5- 80 - Mudstone, gray; siltstone, light-gray, and light-gray, medium-grained sandstone, with white mica						10	
						50	
						20	
80-120 - Shale, medium-dark-gray, and interbedded siltstone and light-gray, fine-grained sandstone, with white mica						100	30
						40	
120-224 - Sandstone, light-gray, fine- to medium-grained						150	
						50	
						200	60
						70	
224-238 - Mudstone, light-gray						250	
238-289 - Sandstone, light-gray, coarse- to medium-grained, with white mica						80	
						90	
289-300 - Mudstone, gray						300	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

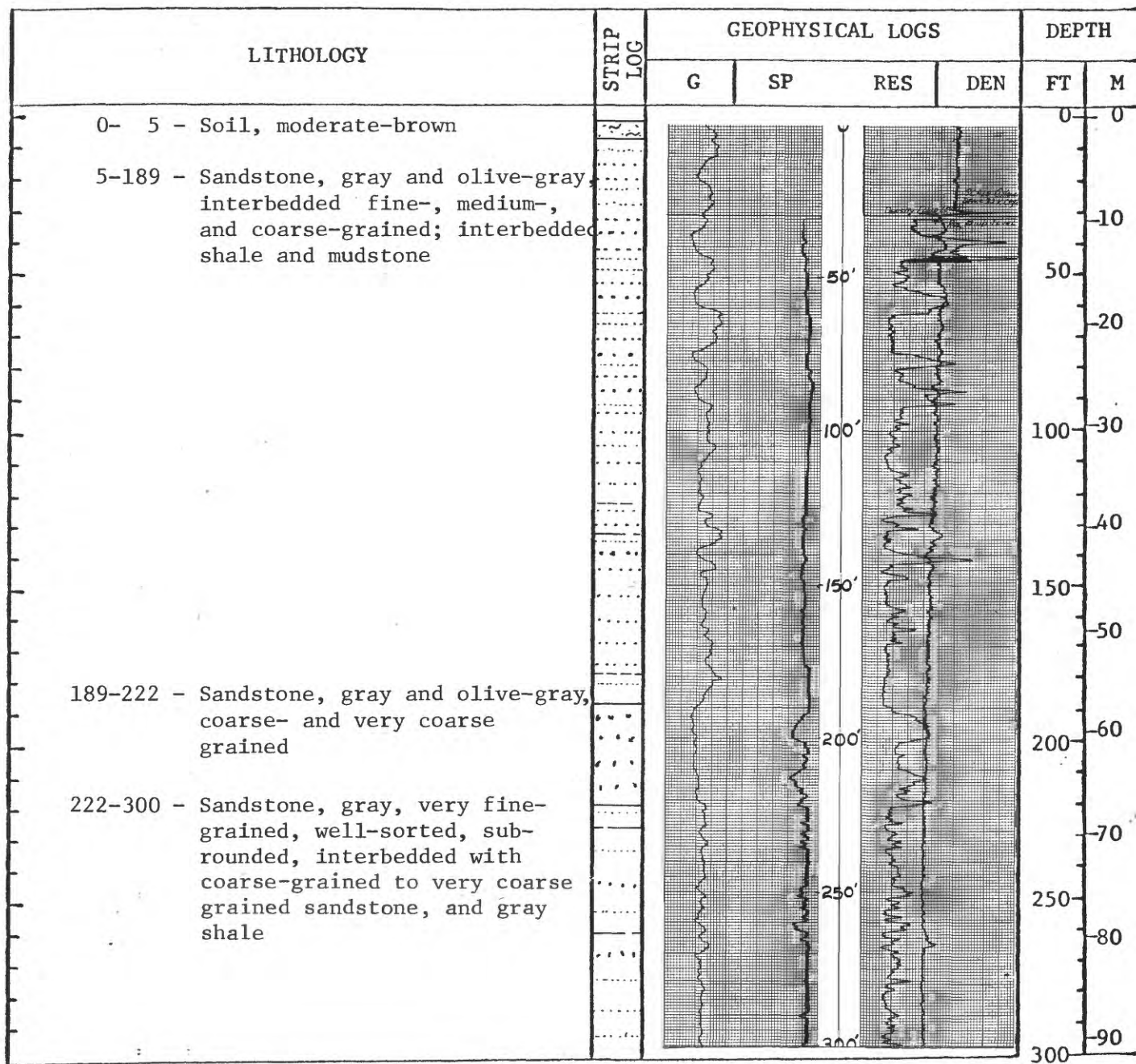
COALMONT AREA

Hole No. M47 Map MacFarlane Reservoir Date logged 7/12/77 Elevation (ft) 8,190'  
Location: T. 7 N., R. 80 W., sec. 22 : 600' FN L1,050' FE L Cored: ☐ Yes ☒ No  
Drilled depth 800' Logged depth 800' Drilling medium water Fluid level 31'

Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 400 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 2 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 2 Scale 64 Kcps/in Logging speed 20 fpm

Remarks: \_\_\_\_\_







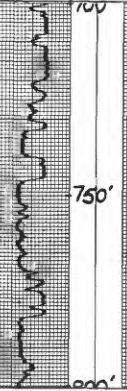
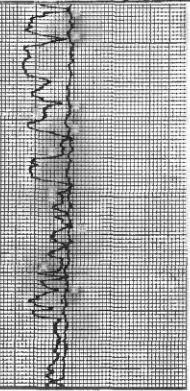
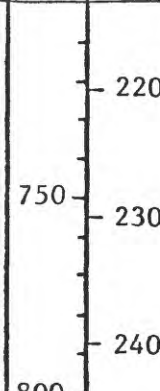



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No.     M47     (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-317 - As above							
317-398 - Sandstone, light-gray to gray, very fine-grained						100	
						350	
						110	
398-435 - Sandstone, gray, fine- to coarse-grained, well-sorted, subrounded; interbedded gray shale, and carbonaceous shale						400	
						120	
						130	
435-478 - Sandstone, light-gray to gray, coarse- and very fine grained; minor carbonaceous shale and gray shale						450	
						140	
478-609 - Sandstone, gray, interbedded fine- and coarse-grained, and gray shale						500	
						150	
						160	
						170	
						180	
						190	
609-700 - Sandstone, gray, fine- to very coarse grained; shale less abundant than above						600	
						200	
						210	
						700	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M47 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
700-745 - As above						220	
745-800 - Sandstone, gray, very fine- and very coarse-grained, sub- angular to subrounded						750	230
						800	240
						850	250
						900	260
							270
							900

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

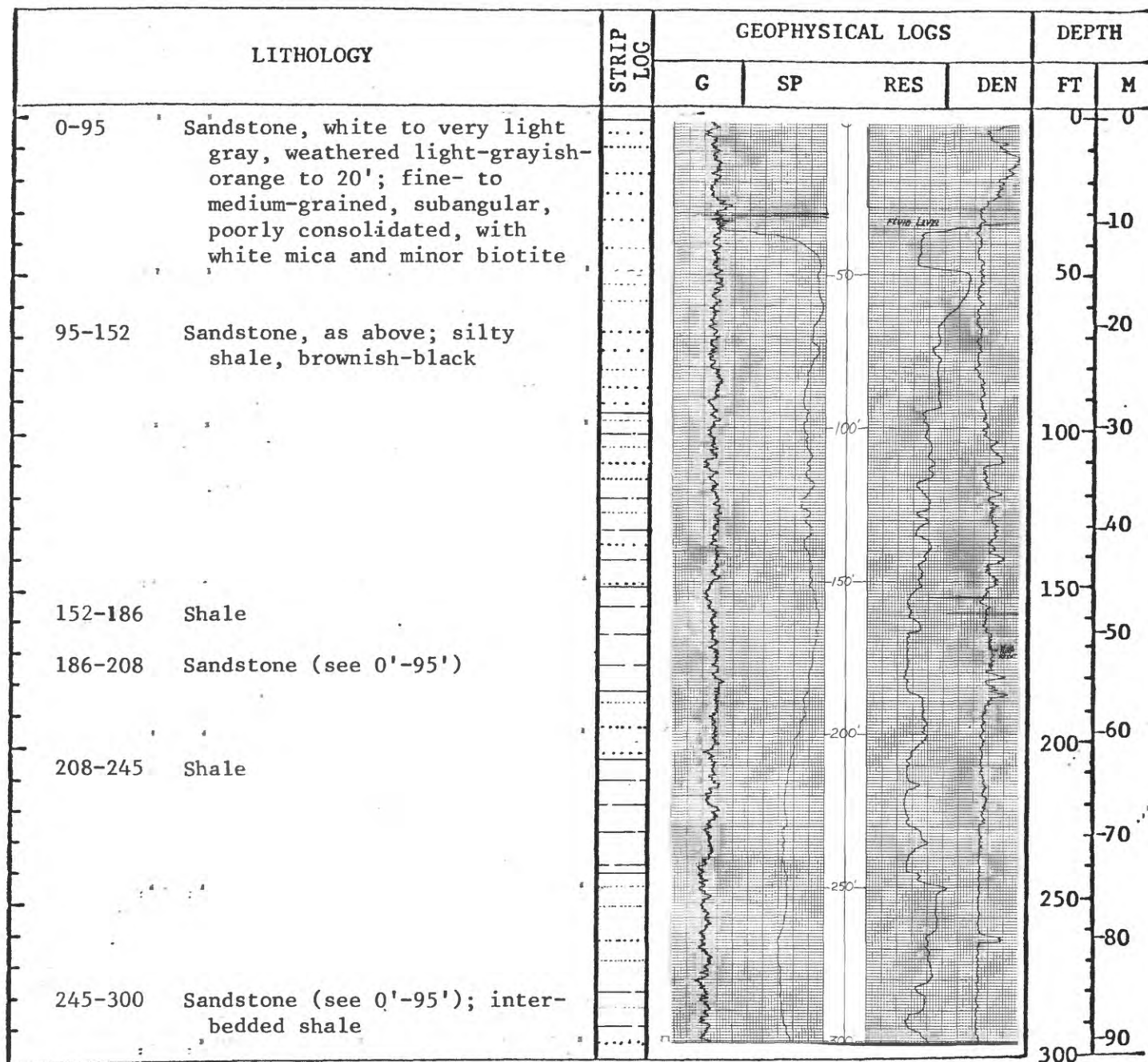
COALMONT AREA

Hole No. M62 Map MacFarlane Reservoir Date logged 10-30-77 Elevation (ft) 8,270'  
Location: T. 6 N., R. 80 W., sec. 3 : 675 FNL 2450 FEL Cored: ☐ Yes ☒ No  
Drilled depth 640 Logged depth 640 Drilling medium air-mud Fluid level 35

Geophysical logs:

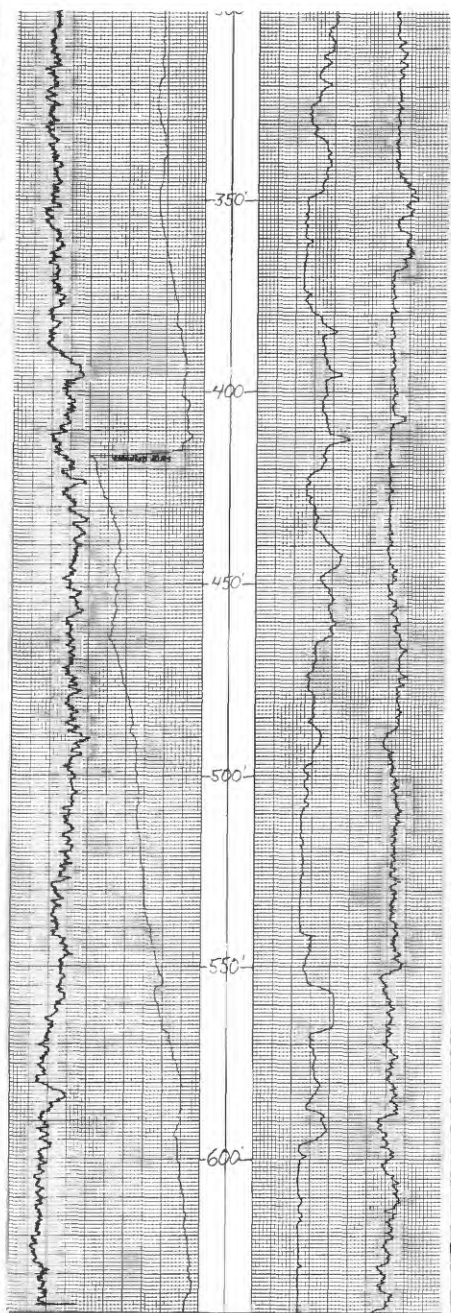
Spontaneous potential (SP): Scale 100 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 25 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 1.6 cps/in Logging speed 20 fpm

Remarks: \_\_\_\_\_



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M62 (continued)

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
300-325	Sandstone and shale							
325-349	Siltstone, light-gray						100	
349-373	Shale						350	
							110	
							120	
							400	
373-465	Sandstone, white, fine-grained, well consolidated, with white mica; siltstone, light-brownish-gray						130	
465-509	Siltstone, light-brownish-gray						450	
							140	
							150	
509-541	Shale, brownish-black						500	
							160	
541-554	Siltstone						550	
554-591	Sandstone (see 373'-465')						170	
							180	
591-640	Shale, brownish-black; siltstone, light-brownish-gray						600	
							190	
							650	
							200	
							210	
							700	



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. M66 Map MacFarlane Reservoir Date logged 10-18-77 Elevation (ft) 8,310  
Location: T. 6 N., R. 80 W., sec. 9 : 3650 FNL 100 FE L Cored: ☐ Yes ☒ No  
Drilled depth 800 Logged depth 800 Drilling medium mud Fluid level 16

Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 3.2 Kcps/in Logging speed 20 fpm  
Remarks: Water (5 GPM) between 120' and 660'.

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
0-5 Soil, sandy, moderate-yellowish-brown, medium-grained; gravel						0	0
5-72 Sandstone, pale-yellowish-orange and brown, fine- to medium-grained, poorly consolidated; gravel within upper 20'						10	
						50	
						20	
72-95 Sandstone, pale-yellowish-gray, coarse- to fine-grained, poorly consolidated, with muscovite						100	30
95-118 Siltstone, light-greenish-gray						40	
						150	
						50	
						200	60
						70	
118-300 Sandstone, very light gray, very fine grained, poorly consolidated						250	
						80	
						90	
						300	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M66 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-306 Sandstone, as above							
306-316 Siltstone, greenish-gray to white							
						100	
						350	
						110	
316-418 Sandstone, white to light-gray, fine-grained, well-consolidated						120	
418-421 Mudstone, brownish-gray						400	
						130	
421-479 Sandstone, white, coarse- to medium-grained, subangular, poorly consolidated						450	
						140	
479-491 Sandstone, light-gray, fine- grained						150	
						500	
491-570 Sandstone, very light gray to white, coarse- to medium- grained, subangular, poorly consolidated						160	
						550	
570-634 Sandstone, very light gray to white, medium- to fine-grained, subangular, poorly consolidated						170	
						180	
634-690 Mudstone, silty, light-gray and white siltstone						600	
						190	
690-700 Sandstone, white to light-gray, medium- to fine-grained, with muscovite						200	
						210	
						700	



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M66 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
700-747 Sandstone, as above						220	
747-778 Mudstone, light-gray						750	230
778-796 Sandstone, white, medium- to coarse-grained							240
796-800 Mudstone, light-gray						800	
							250
						850	260
							270
						900	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA


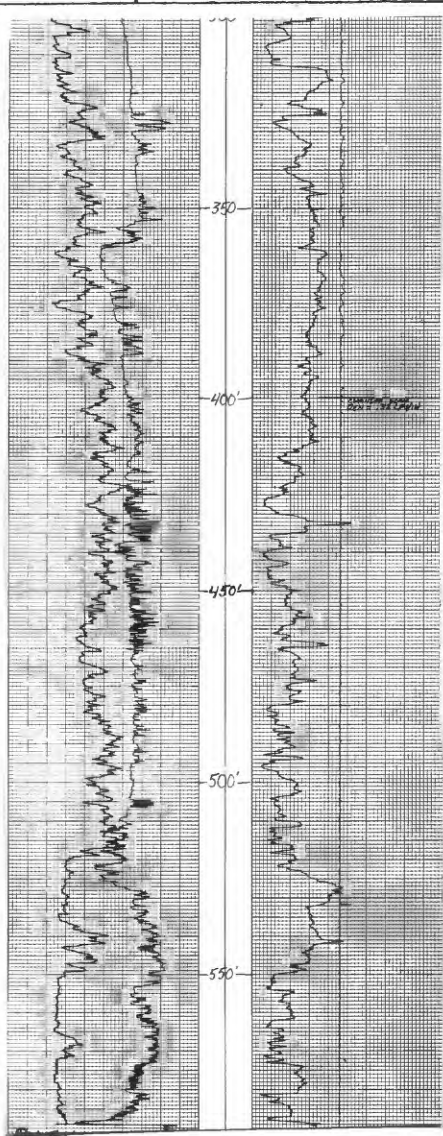

Hole No. B70 Map Buffalo Peak Date logged 10-21-77 Elevation (ft) 8380  
Location: T. 6 N., R. 80 W., sec. 14 : 1850 F S L 2550 F W L Cored: ☐ Yes ☒ No  
Drilled depth 593 Logged depth 591 Drilling medium air-mud Fluid level 90  
Geophysical logs:

Spontaneous potential (SP): Scale 100 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 2000 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 25 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 6.4 Kcps/in Logging speed 20 fpm  
Remarks: Water (10 GPM) between 185' and 600'.

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH		
			G	SP	RES	DEN	FT	M	
0-18	Mudstone, silty, light-olive-gray						0	0	
18-41	Sandstone, light-olive-gray, fine grained						-10		
41-49	Sandstone, light-brown, fine- to medium-grained						50		
49-75	Sandstone, dark-yellowish-orange, very coarse grained to medium-grained, subangular, poorly consolidated						-20		
75-104	Sandstone, medium-gray, very fine grained to fine-grained, poorly consolidated						100		
104-139	Sandstone, light-gray, medium- to fine-grained, poorly consolidated						-40		
139-179	Sandstone, medium-light-gray, fine-grained, poorly consolidated						150		
179-197	Sandstone, white, coarse-grained to very coarse grained, poorly consolidated						-50		
197-208	Mudstone, silty, medium-gray						200		
208-300	Sandstone, white, coarse-grained to very coarse grained, poorly consolidated						-70		
							250	-80	
								300	-90

U.S. GEOLOGICAL SURVEY  
 DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. B70 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-600 Sandstone, as above						100	
						350	
						110	
						120	
						400	
						130	
						450	
						140	
						150	
						500	
						160	
						550	
						170	
						180	
						600	
						190	
						200	
						210	
						700	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. S72 Map Spicer Peak Date logged 10-13-77 Elevation (ft) 8,250  
Location: T. 6 N., R. 80 W., sec. 18 : 400 FSL 1500 FE L Cored: ☐ Yes ☒ No  
Drilled depth 800 Logged depth 800 Drilling medium mud Fluid level 0

Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 100 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 3.2 Kcps/in Logging speed 20 fpm  
Remarks: Water (5 GPM) between 180' and 360' and between 420' and 500'.

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-17	Sand, grayish-orange, fine-grained						0	0
17-98	Sandstone, very light gray, fine- to medium-grained, sub-rounded, poorly consolidated, with white mica; interbedded brownish-gray silty mudstone, and medium-gray mudstone						10	
							50	
							20	
98-166	Sandstone, light-gray, fine-grained, poorly consolidated						100	30
							40	
166-188	Mudstone, silty, brownish-gray, with white mica						150	
188-208	Sandstone, very light brownish gray, fine-grained, with white mica						50	
							200	60
							70	
208-300	Sandstone, white, medium-grained, subrounded, well-sorted, poorly consolidated						250	
							80	
							90	
							300	



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. S72 (continued)

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
300-337	Sandstone, as above						100	
							350	
337-403	Mudstone, silty, brownish-gray						110	
							400	
							120	
							130	
403-538	Sandstone, white, medium-grained, subrounded, well-sorted, some is poorly consolidated; interbedded brownish-gray silty mudstone						450	
							140	
							150	
							500	
							160	
							550	
							170	
538-700	Mudstone, brownish-gray; interbedded white, medium-grained, subrounded, well-sorted, poorly consolidated sandstone						600	
							180	
							190	
							650	
							200	
							210	
							700	

Hole No. S72 (continued)83



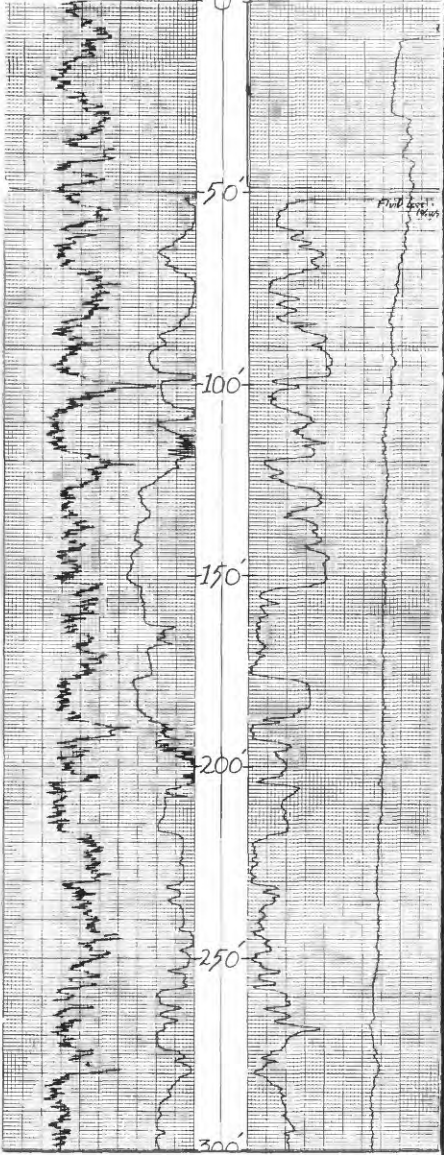
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. S73 Map Spicer Peak Date logged 10-14-77 Elevation (ft) 8400  
Location: T. 6 N., R. 80 W., sec. 20 : 2400 F SL 2200 F EL Cored: ☐ Yes ☒ No  
Drilled depth 800 Logged depth 800 Drilling medium mud Fluid level 52  
Geophysical logs:

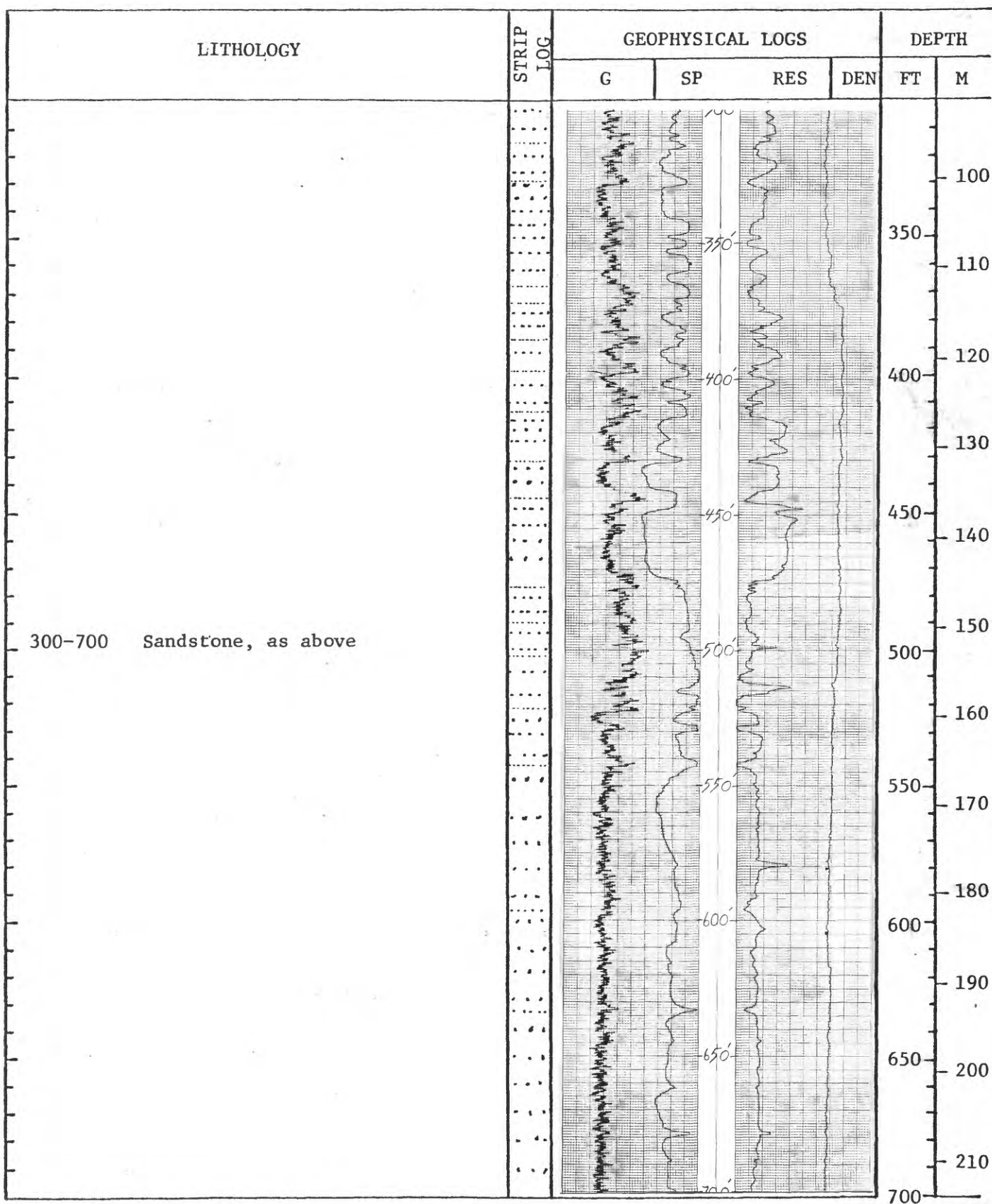
Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 3.2 cps/in Logging speed 20 fpm

Remarks: \_\_\_\_\_

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-98	Sandstone, pale-yellowish-gray, fine-grained, sub-rounded, poorly consolidated, with white mica; interbedded light-gray silty mudstone						0	0
							10	
							50	
							20	
98-108	Mudstone, silty, light-gray						100	30
108-153	Sandstone, very light gray, very coarse grained to medium-grained, subangular, poorly consolidated, with white mica; interbedded, white, medium-grained, well-consolidated sandstone with white mica						40	
							150	
							50	
153-176	Mudstone, silty, light-gray						200	60
							70	
176-300	Sandstone, white, fine-grained to very coarse grained, subangular to sub-rounded, poorly consolidated, with muscovite						250	80
							80	
							90	
							300	90

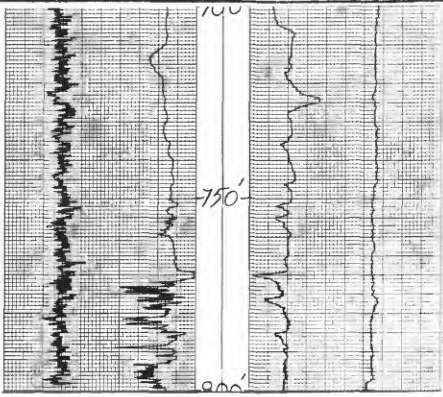
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. S73 (continued)



U.S. GEOLOGICAL SURVEY  
 DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. S73 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
700-800 Sandstone, as above	.					220	
	.					750	230
	.						240
	.					800	
	.						250
						850	260
							270
						900	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. B74 Map Buffalo Peak Date logged 10-19-77 Elevation (ft) 8,477  
Location: T. 6 N., R. 80 W., sec. 22 : 2700 FS L 625 FWL Cored: ☐ Yes ☒ No  
Drilled depth 800 Logged depth 800 Drilling medium air-mud Fluid level 23  
Geophysical logs:

Spontaneous potential (SP): Scale 250 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 2000 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 25 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 1.6 cps/in Logging speed 20 fpm

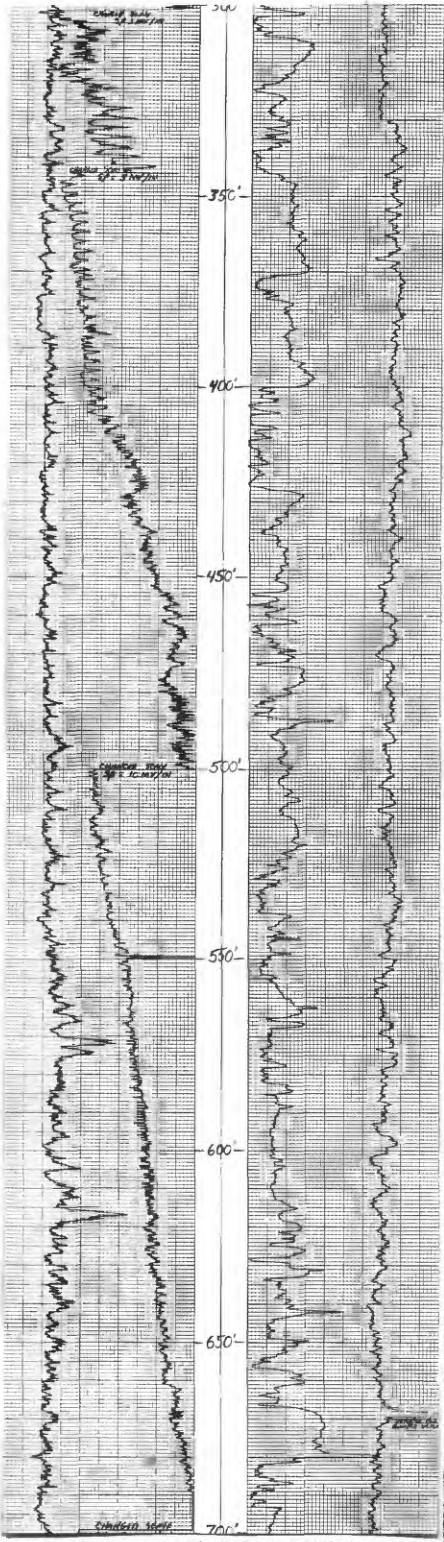
Remarks: \_\_\_\_\_

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-22	Gravel, and light-brown clay soil						0	0
22-61	Sandstone, white to yellowish-gray, very coarse grained to coarse-grained, subangular to angular, poorly consolidated						10	
							50	
							20	
							100	
61-206	Sandstone, white to light-gray, very coarse grained to coarse-grained, subangular to angular, poorly consolidated; interbedded light-gray silty mudstone						30	
							40	
							150	
							50	
206-225	Sandstone, light-gray, very fine grained						60	
225-250	Sandstone, white, coarse- to medium-grained, subangular, poorly consolidated						200	
250-260	Sandstone, medium-gray, fine-grained						70	
260-282	Sandstone, white, coarse- to medium-grained, subangular, poorly consolidated						250	
282-300	Sandstone, medium-gray, fine-grained; interbedded white, coarse- to medium-grained, subangular, poorly consolidated sandstone						80	
							90	
							300	



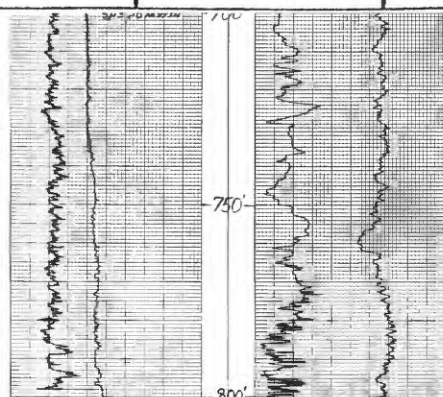
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. B74 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-667 Sandstone, as above						100	
						350	
						110	
						120	
						400	
						130	
						450	
						140	
						500	
						150	
						160	
667-682 Sandstone, white, coarse-grained, subangular, poorly consolidated						550	
						170	
						180	
682-700 Mudstone, silty, and interbedded light-gray mudstone						600	
						190	
						200	
						210	
						700	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. B-74 (continued)

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
700-753	Mudstone, silty, dark-yellowish-orange and light-brown; interbedded light-gray mudstone						220	
							230	
753-800	Sandstone, light-gray, medium-grained, subangular, poorly consolidated; interbedded medium-gray mudstone						240	
							250	
							260	
							270	
							280	
							290	
							300	
							310	
							320	
							330	
							340	
							350	
							360	
							370	
							380	
							390	
							400	
							410	
							420	
							430	
							440	
							450	
							460	
							470	
							480	
							490	
							500	
							510	
							520	
							530	
							540	
							550	
							560	
							570	
							580	
							590	
							600	
							610	
							620	
							630	
							640	
							650	
							660	
							670	
							680	
							690	
							700	
							710	
							720	
							730	
							740	
							750	
							760	
							770	
							780	
							790	
							800	
							810	
							820	
							830	
							840	
							850	
							860	
							870	
							880	
							890	
							900	



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

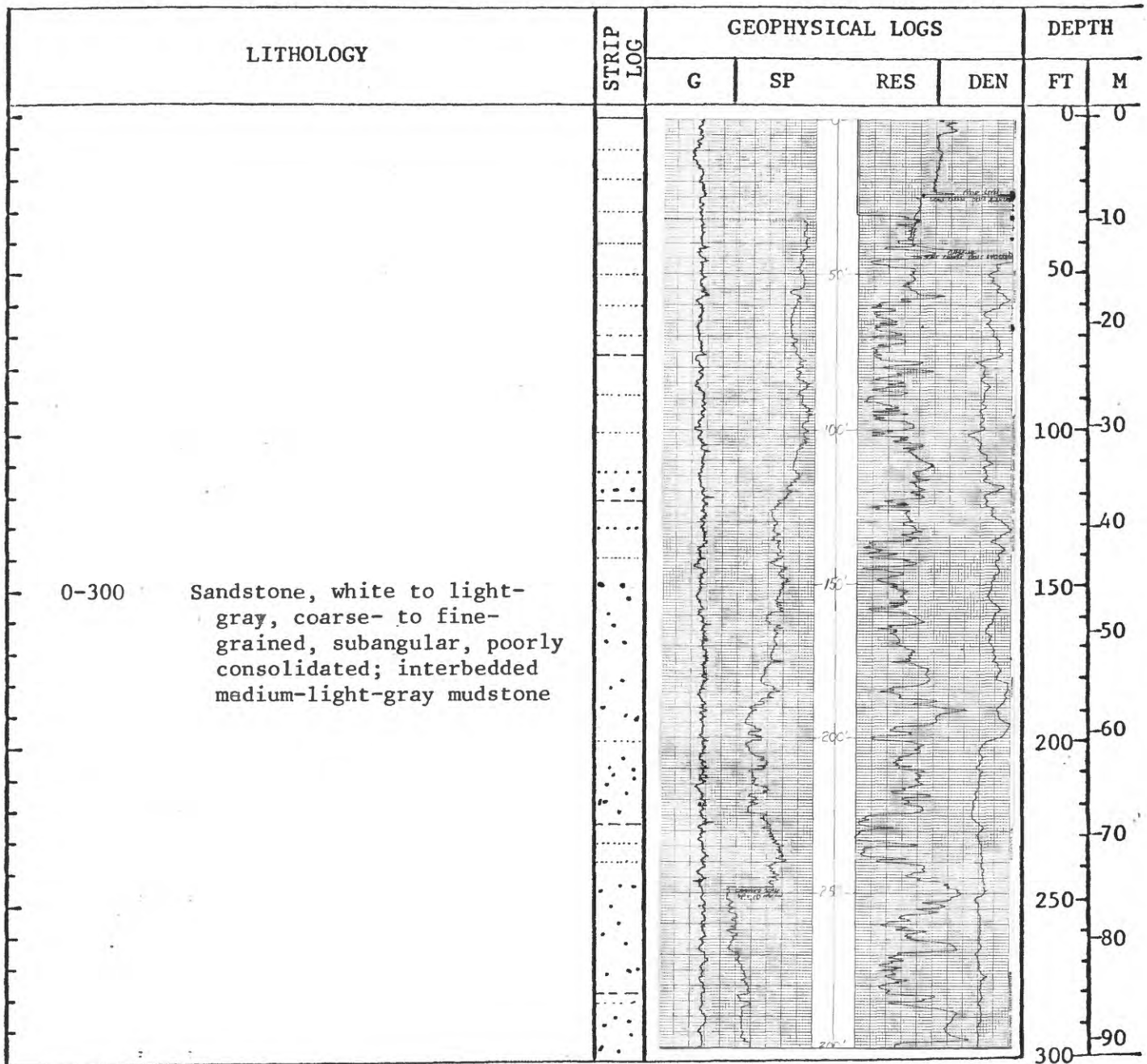
COALMONT AREA

Hole No. B75 Map Buffalo Peak Date logged 10-20-77 Elevation (ft) 8600  
Location: T. 6 N., R. 80 W., sec. 22 : 1100 F S L 700 F E L Cored: ☐ Yes ☒ No  
Drilled depth 784 Logged depth 782 Drilling medium air-mud Fluid level 31

Geophysical logs:

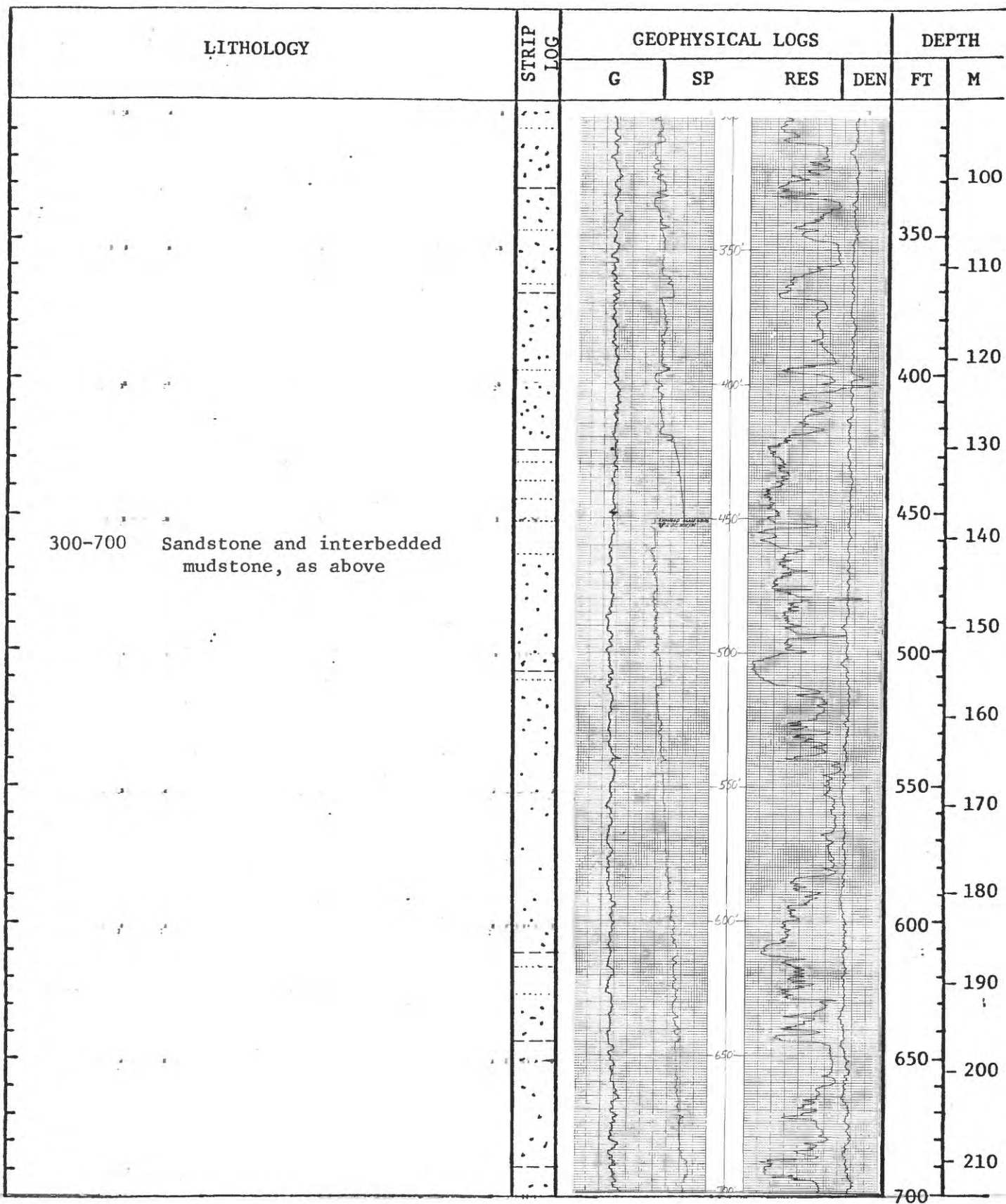
Spontaneous potential (SP): Scale 250 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 2000 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 25 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 1.6 cps/in Logging speed 20 fpm

Remarks: \_\_\_\_\_



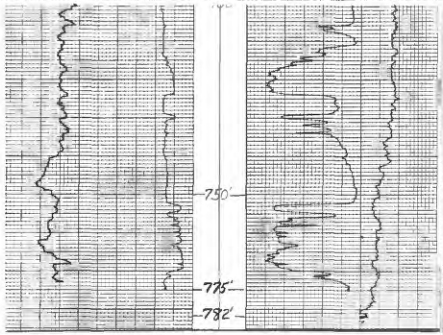
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. B75 (continued)



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. B-75 (continued)

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
700-724	Sandstone and interbedded mudstone, as above							220
							750	230
724-752	Sandstone, pale-yellowish-gray, very coarse to medium-grained angular to subangular, poorly consolidated							240
							800	
752-782	Sandstone, light-gray, fine- to coarse-grained							250
							850	260
								270
							900	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

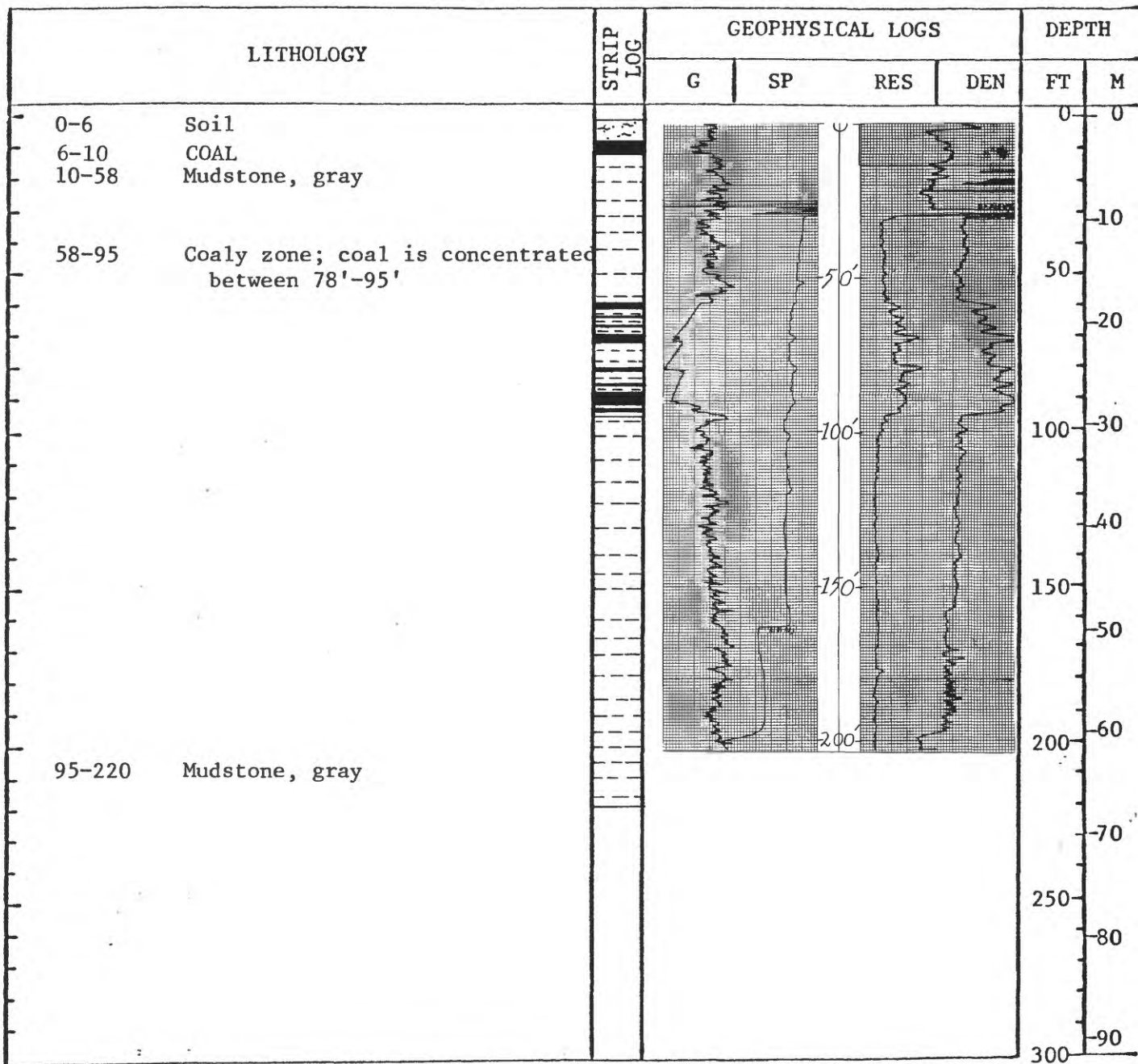
COALMONT AREA

Hole No. T82 Map Teal Lake Date logged 9-29-77 Elevation (ft) 8640  
Location: T. 6 N., R. 81 W., sec. 5 : 300 FS L 625 FWL Cored: ☐ Yes ☒ No  
Drilled depth 220 Logged depth 203 Drilling medium air Fluid level 30

Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 3.2 Kcps/in Logging speed 20 fpm

Remarks: \_\_\_\_\_



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

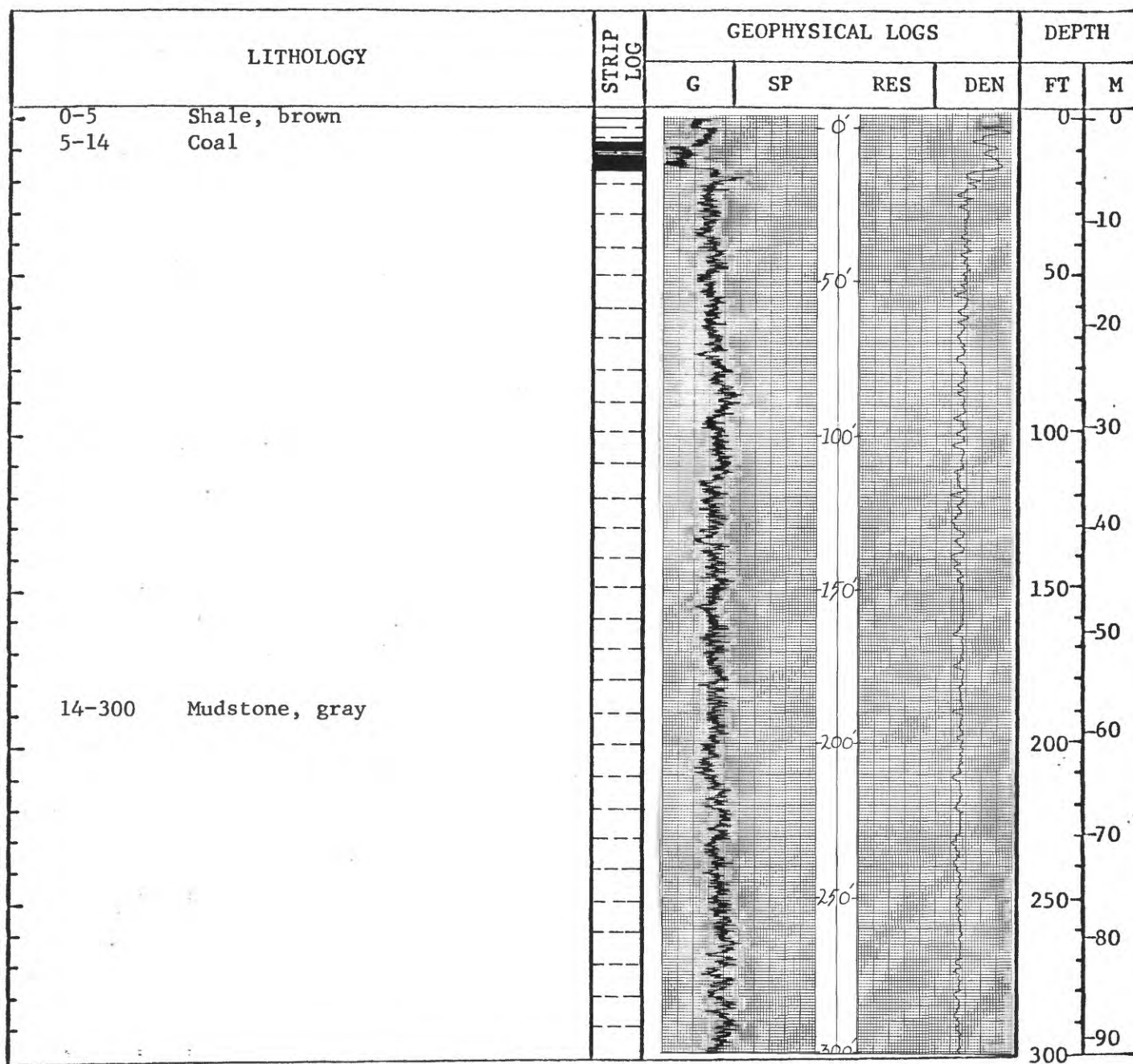
COALMONT AREA

Hole No. T83 Map Teal Lake Date logged 9-29-77 Elevation (ft) 8480  
Location: T. 6 N., R. 81 W., sec. 8 : 1725 F N L 2700 F E L Cored: ☐ Yes ☒ No  
Drilled depth 400 Logged depth 400 Drilling medium air Fluid level 353

Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 3.2 Kcps/in Logging speed 20 fpm

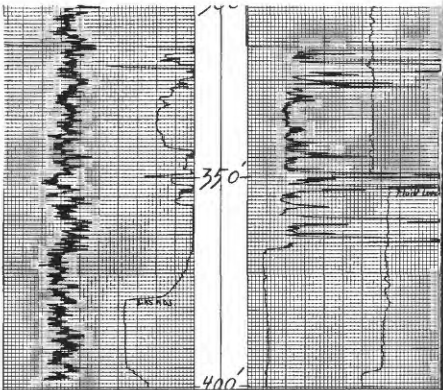
Remarks: \_\_\_\_\_





U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. T83 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-400 Mudstone, gray						350	100
						360	109
						370	118
						380	127
						390	136
						400	145
						410	154
						420	163
						430	172
						440	181
						450	190
						460	199
						470	208
						480	217
						490	226
						500	235
						510	244
						520	253
						530	262
						540	271
						550	280
						560	289
						570	298
						580	307
						590	316
						600	325
						610	334
						620	343
						630	352
						640	361
						650	370
						660	379
						670	388
						680	397
						690	406
						700	415

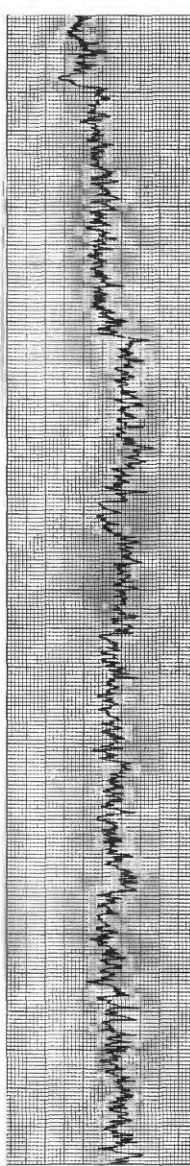
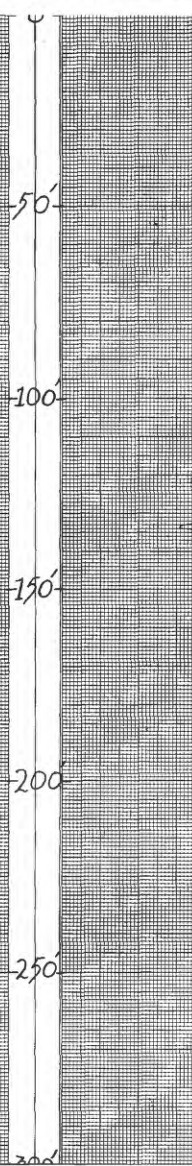
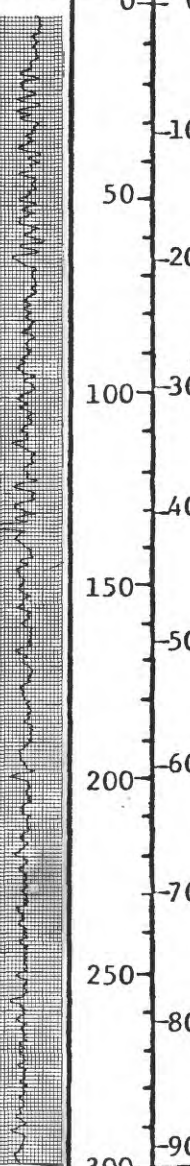

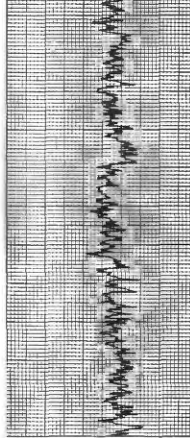
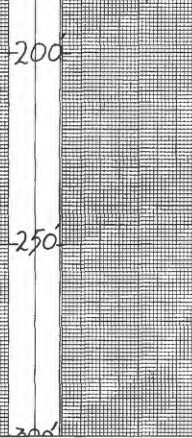
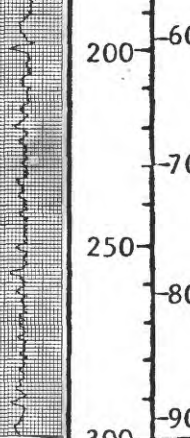



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

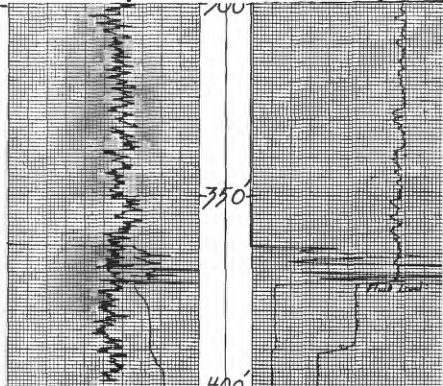
Hole No. C84 Map Coalmont Date logged 9-30-77 Elevation (ft) 8,563  
 Location: T. 6 N., R. 81 W., sec. 9 : 1900 FN L 3800 FE L Cored: ☐ Yes ☒ No  
 Drilled depth 400 Logged depth 400 Drilling medium air Fluid level 373  
Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
 Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
 Gamma (G): T.C. 4 Scale 200 cps/in Logging speed 20 fpm  
 Density (DEN): T.C. 4 Scale 16 Kcps/in Logging speed 20 fpm  
 Remarks: \_\_\_\_\_

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-10	Sandstone, light-brown, micaceous						0	0
							10	
							50	
							20	
10-85	Mudstone, brown						100	30
							40	
							150	
							50	
							200	60
							70	
85-300	Mudstone, gray						250	75
							80	
							90	
							300	90

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. C84 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-400 Mudstone, gray						100	
						350	110
						400	120
						450	130
						500	140
						550	150
						600	160
						650	170
						700	180
							190
							200
							210
							700



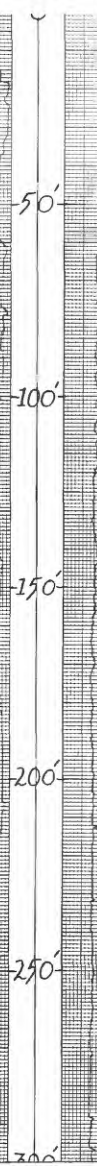
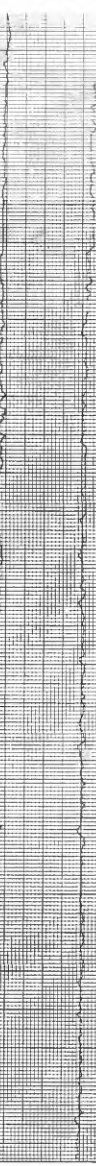
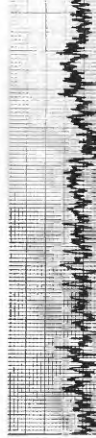
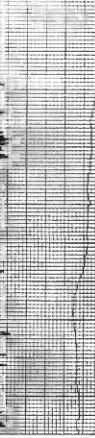

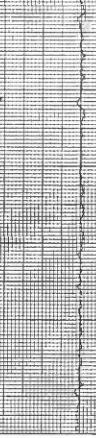
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. C85 Map Coalmont Date logged 9-29-77 Elevation (ft) 8340  
Location: T. 6 N., R. 81 W., sec. 9 : 3275 FN L 4800 FEL Cored: ☐ Yes ☒ No  
Drilled depth 500 Logged depth 500 Drilling medium air Fluid level 0

Geophysical logs:

Spontaneous potential (SP): Scale 50 mV/in Logging speed 20 fpm  
Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 3.2 Kcps/in Logging speed 20 fpm  
Remarks: Water flowing (3 GPM) from the interval between 495' and 500'.

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-18	Mudstone, brown						0	0
							10	
							50	
							20	
							100	30
							40	
							150	
							50	
							200	60
							70	
18-300	Mudstone, gray						200	60
							70	
							250	80
							80	
							300	90
							90	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. C85 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
						100	
						350	
						110	
						120	
						400	
						130	
						450	
						140	
						150	
						500	
						160	
						550	
						170	
						180	
						600	
						190	
						650	
						200	
						210	
						700	
300-481 Mudstone, gray							
481-500 Sandstone, gray, medium-grained							



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. C96 Map Coalmont Date logged 9-18-77 Elevation (ft) 8,160  
Location: T. 7 N., R. 80 W., sec. 18 : 2650 FS L 2225 FWL Cored: ☐ Yes ☒ No  
Drilled depth 380 Logged depth 380 Drilling medium air Fluid level 10

Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 8 cps/in Logging speed 20 fpm


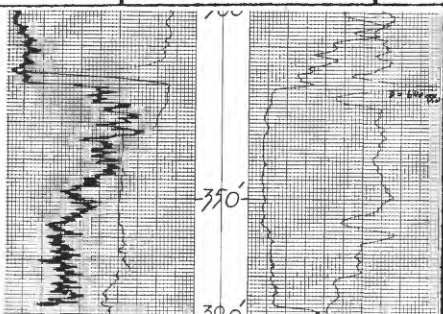



Remarks: \_\_\_\_\_

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-5	Sand, light-brown; gravel						0	0
5-26	Gravel; some sand, as above							
26-28	Mudstone, medium-dark-gray							
28-33	Shale, coaly							
33-42	Mudstone, brownish-gray and light-gray						10	
42-46	Shale, coaly						50	
46-51	Mudstone, light-gray							
51-86	Mudstone, light-gray; siltstone, very light gray, with biotite at 60'						20	
86-131	Sandstone, very light gray, fine- to medium-grained, poorly consolidated, with white mica; siltstone, very light gray, with biotite; mudstone, light-gray						100	30
131-166	Mudstone, light-gray; interbedded, very light gray siltstone, with biotite						150	50
166-271	Sandstone, very light gray, fine- to coarse-grained, subangular, poorly consolidated, with white mica; siltstone, light-gray; light-gray and medium-dark-gray mudstone						200	60
271-300	Coal; partings of black mudstone						250	70
							300	80
							300	90



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. C96 (continued)

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
300-321	Coal; partings of black mudstone							
321-356	Mudstone, light-gray							100
							350	110
356-380	Mudstone, medium-dark-gray							
							120	
							400	
							130	
							450	
							140	
							500	
							150	
							550	
							160	
							170	
							180	
							600	
							190	
							650	
							200	
							210	
							700	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. C97 Map Coalmont Date logged 9-19-77 Elevation (ft) 8,167  
Location: T. 7 N., R. 80 W., sec. 20 : 1900 F S L 0 F E L Cored: ☐ Yes ☒ No  
Drilled depth 560 Logged depth 560 Drilling medium air Fluid level 18

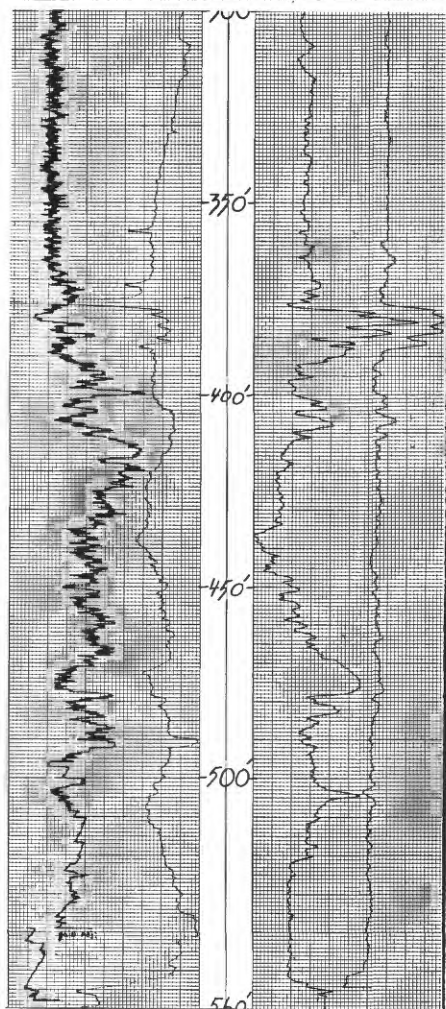
Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 3.2 Kcps/in Logging speed 20 fpm  
Remarks: Water (5 GPM) between 130' and 140'.

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-32	Gravel; sand, pale-yellowish-brown, medium-grained						0	0
32-68	Sandstone, white, medium-grained to very coarse grained; subangular, with white mica; interbedded medium-dark-gray silty mudstone						10	
68-80	Silty mudstone, medium-dark-gray						50	
80-89	Sandstone, very light gray, fine- to medium-grained, with biotite						100	30
89-178	Sandstone, white, medium-grained, to very coarse grained, subangular, poorly consolidated, with white mica; interbedded, medium-gray, brownish-gray, and light-brown mudstone						150	40
178-223	Mudstone, medium-gray and brownish-gray; interbedded silty mudstone, medium-light-gray; sandstone, white, fine- to medium-grained, subrounded, black and white micas; minor carbonaceous shale						200	60
223-300	Sandstone, white, medium- to fine-grained, subangular, poorly consolidated, with white mica; coal traces						250	80
							300	90

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. C97 (continued)

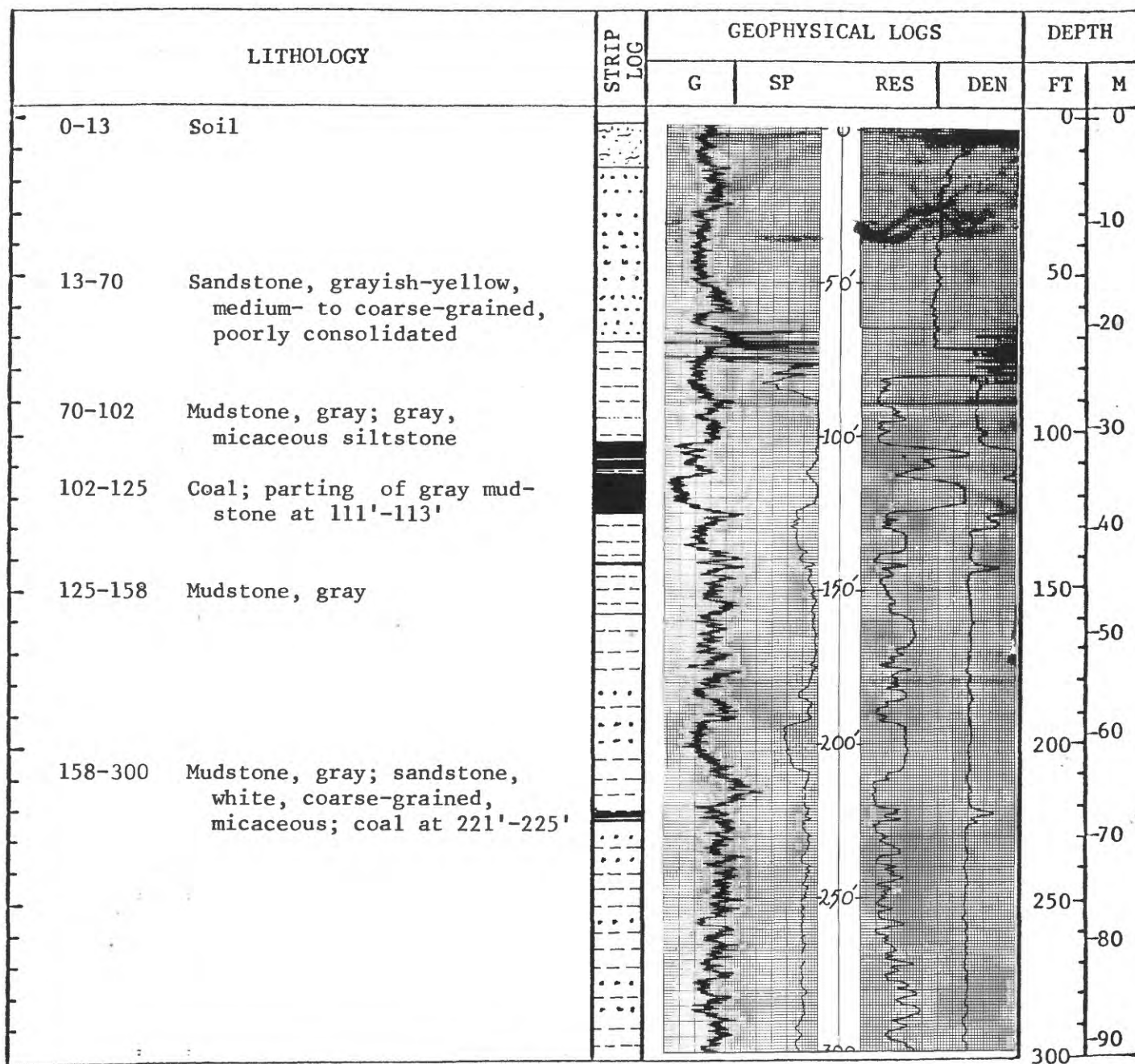
LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-377 Sandstone, as above						100	
						350	
377-388 Coal						110	
						120	
388-400 Siltstone, white						400	
400-412 Coal; mudstone, light-gray; very light-gray siltstone						130	
412-467 Silty mudstone, light-gray to very light gray; inter- bedded, brownish-gray and light-gray mudstone						450	
						140	
						150	
467-522 Sandstone, very light gray, medium- to coarse-grained, subangular, poorly consolidated						500	
						160	
522-552 Mudstone, brownish-black						550	
552-560 Sandstone, very light gray, medium- to coarse-grained, subangular, poorly consolidated						170	
						180	
						600	
						190	
						650	
						200	
						210	
						700	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. C98 Map Coalmont Date logged 9-26-77 Elevation (ft) 8,218  
 Location: T. 7 N., R. 80 W., sec. 21 : 1200 FN L 3500 FWL Cored: ☐ Yes ☒ No  
 Drilled depth 700 Logged depth 700 Drilling medium mud Fluid level 80  
 Geophysical logs:

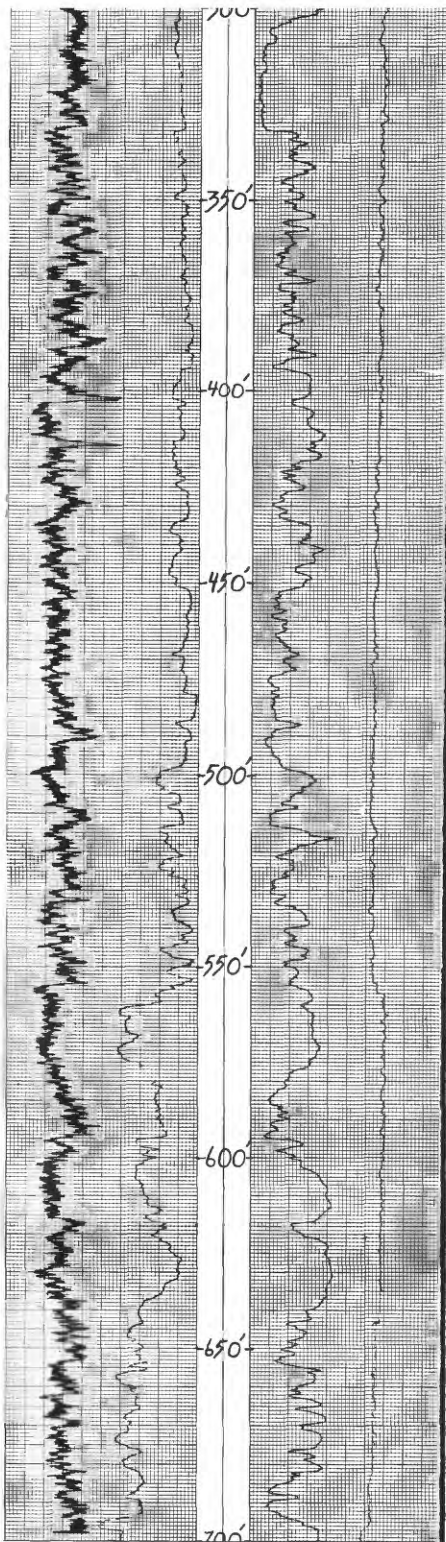
Spontaneous potential (SP): Scale 25 mv/in Logging speed 20 fpm  
 Resistivity (RES): Scale 500ohms/in Logging speed 20 fpm  
 Gamma (G): T.C. 4 Scale 200 cps/in Logging speed 20 fpm  
 Density (DEN): T.C. 4 Scale 3.2 Kcps/in Logging speed 20 fpm  
 Remarks: \_\_\_\_\_





U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. C98 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
						100	
						350	110
						400	120
						450	130
						500	140
300-555	Mudstone and sandstone, as above					550	150
						600	160
						650	170
555-700	Sandstone(?), poor cuttings samples					700	180
							190
							200
							210
							700


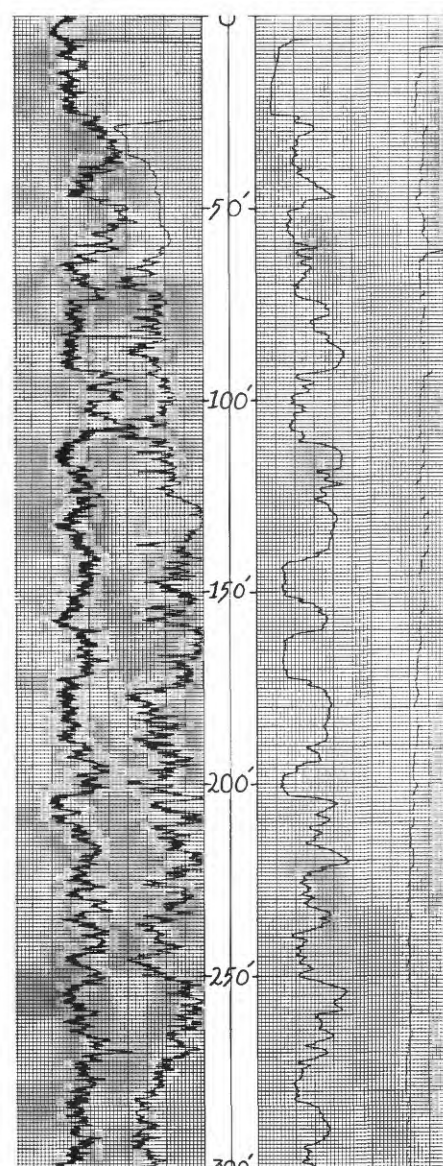
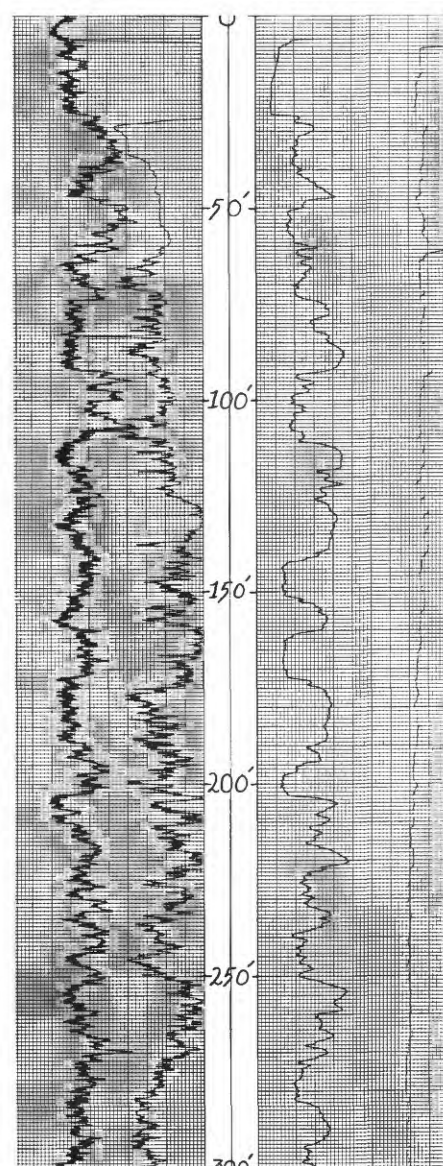
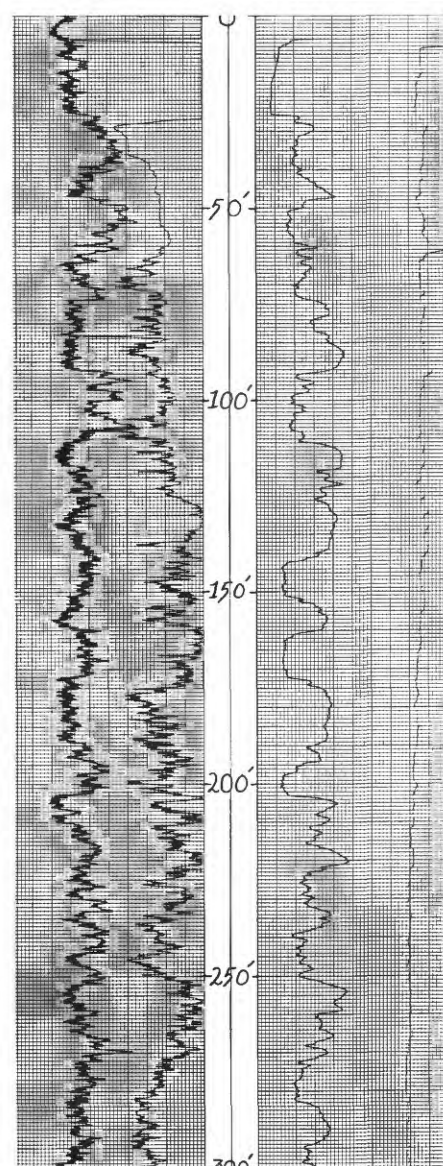
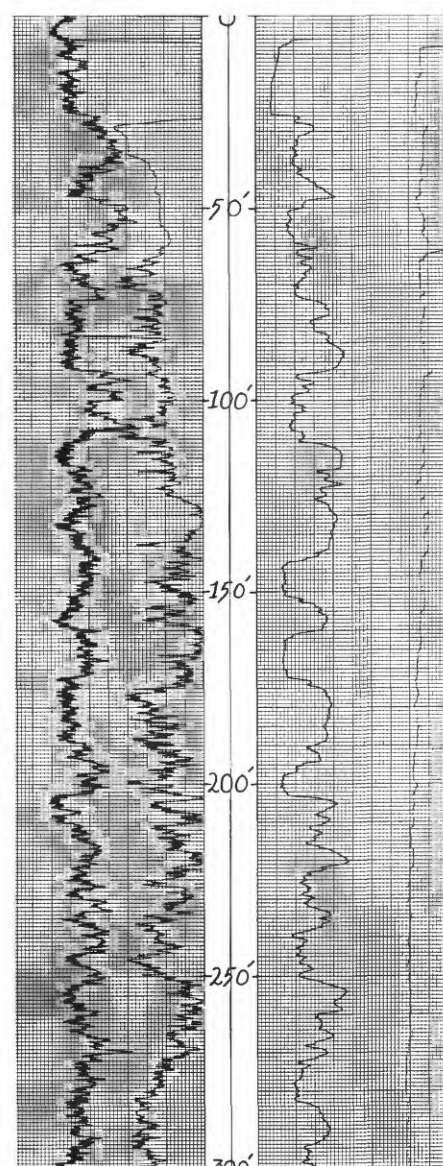



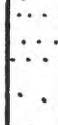













U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. C99 Map Coalmont Date logged 9-20-77 Elevation (ft) 8,140  
 Location: T. 7 N., R. 80 W., sec. 21 : 1500 FNL 1600 FWL Cored: ☐ Yes ☒ No  
 Drilled depth 840 Logged depth 840 Drilling medium mud Fluid level 6  
Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
 Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
 Gamma (G): T.C. 4 Scale 100 cps/in Logging speed 20 fpm  
 Density (DEN): T.C. 4 Scale 3.2 Kcps/in Logging speed 20 fpm  
 Remarks: Water (10 GPM) between 300' and 320' and water (5 GPM) between 600' and 680'

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-26	Gravel						0	0
26-74	Mudstone, brownish-gray and light-gray, some silty; coal at 60'						10	
							50	
							20	
74-142	Sandstone, white, coarse-grained to very coarse grained, subangular to angular, poorly consolidated; gravel						100	
							30	
							40	
142-172	Mudstone, brownish-gray and shaly, some pale-yellowish-brown and silty						150	
							50	
172-197	Sandstone, white, coarse-grained to very coarse grained, subangular, poorly consolidated; gravel						200	
							60	
197-203	Mudstone, black, shaly						200	
							70	
							250	
							80	
203-300	Mudstone, light-greenish-gray, silty						250	
							80	
							300	

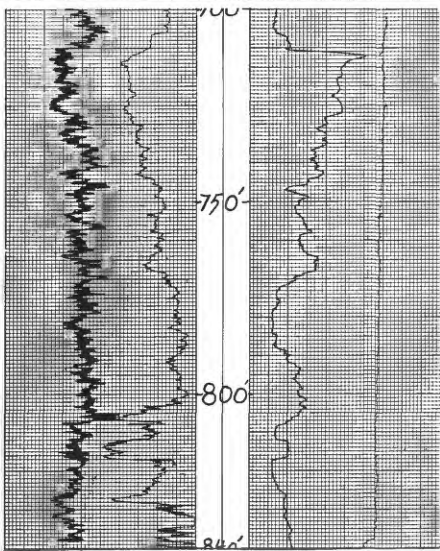
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. C99 (continued)

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
300-365	Mudstone, as above						100	
							350	
							110	
365-422	Sandstone, white, fine-grained, to very coarse grained, finer-grained upwards, sub-rounded to subangular, well-sorted, poorly consolidated; light-brownish-gray mudstone at 385'-406'						120	
							400	
							130	
422-486	Mudstone, light-brownish-gray; interbedded, white, fine- to medium-grained, subrounded, well-sorted, poorly consolidated sandstone						450	
							140	
							150	
486-571	Sandstone, white, medium-grained to very coarse grained, subangular, poorly consolidated						500	
							160	
							170	
571-620	Mudstone, light-brownish-gray; interbedded, fine-grained sandstone						550	
							180	
							190	
620-630	Mudstone, brownish-gray						600	
							200	
630-693	Sandstone, very light gray, medium- to coarse-grained, poorly consolidated						650	
							210	
693-700	Mudstone, brownish-gray, some silty						700	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. C99 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
700-840 Silty mudstone, as above						220	
						230	
						240	
						250	
						260	
						270	
						280	
						290	
						300	
						310	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. M100 Map MacFarlane Reservoir Date logged 9-21-77 Elevation (ft) 8,188  
Location: T. 7 N., R. 80 W., sec. 22 : 650 F S L 1150 F W L Cored: ☐ Yes ☒ No  
Drilled depth 400 Logged depth 400 Drilling medium air Fluid level 49

Geophysical logs:

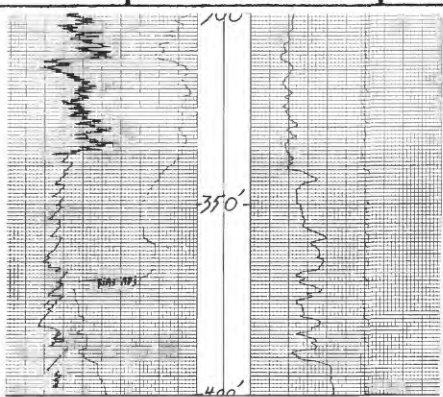
Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 100 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 3.2 Kcps/in Logging speed 20 fpm  
Remarks: Water (5 GPM) between 120' and 250'.

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-5	Soil, moderate-yellowish-brown						0	0
5-41	Sandstone, very light gray, very coarse grained; mudstone, light-gray						10	
41-50	Mudstone, light-gray						50	
50-72	Coal						20	
72-85	Siltstone, very light gray; white, fine-grained sandstone						100	30
85-91	Silty mudstone, medium-gray; coaly shale; coal at 88'-89'						40	
91-110	Sandstone, fine- to medium-grained, well-sorted, poorly to well-consolidated, with white mica						150	50
110-121	Mudstone, medium-gray; coal at 112'-113'						60	
121-175	Sandstone, white, medium-grained to very coarse grained; subangular, poorly consolidated, with white mica; light-gray silty mudstone						70	
175-203	Mudstone, brownish-gray and black; coal at 182'-183'; interbedded, greenish-gray, fine-grained, well-sorted well-consolidated sandstone						250	80
203-254	Sandstone, white, coarse-grained, subangular, poorly consolidated with white mica; interbedded sandstone, greenish-gray, fine-grained, well-sorted, well-consolidated						300	90
254-289	Sandstone, very light gray, fine-grained, well-consolidated, with white mica; shaly mudstone, medium-dark-gray; light-gray siltstone							
289-300	Sandstone							



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M100 (continued)

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
300-341	Sandstone, medium-light-gray, fine-grained, with white mica; sandstone, white, medium- to coarse-grained, subangular, poorly consolidated, with white mica; brownish-gray mudstone						100	
							350	
							110	
							120	
341-400	Sandstone, white, medium- to coarse-grained, subangular, poorly consolidated, with white mica						400	
							130	
							140	
							150	
							500	
							160	
							550	
							170	
							180	
							600	
							190	
							650	
							200	
							210	
							700	



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. M101 Map MacFarlane Reservoir Date logged 10-1-77 Elevation (ft) 8,230  
Location: T. 7 N., R. 80 W., sec. 25 : 1350 FNL 1650 FEL Cored: ☐ Yes ☒ No  
Drilled depth 830 Logged depth 830 Drilling medium mud Fluid level 45

Geophysical logs:

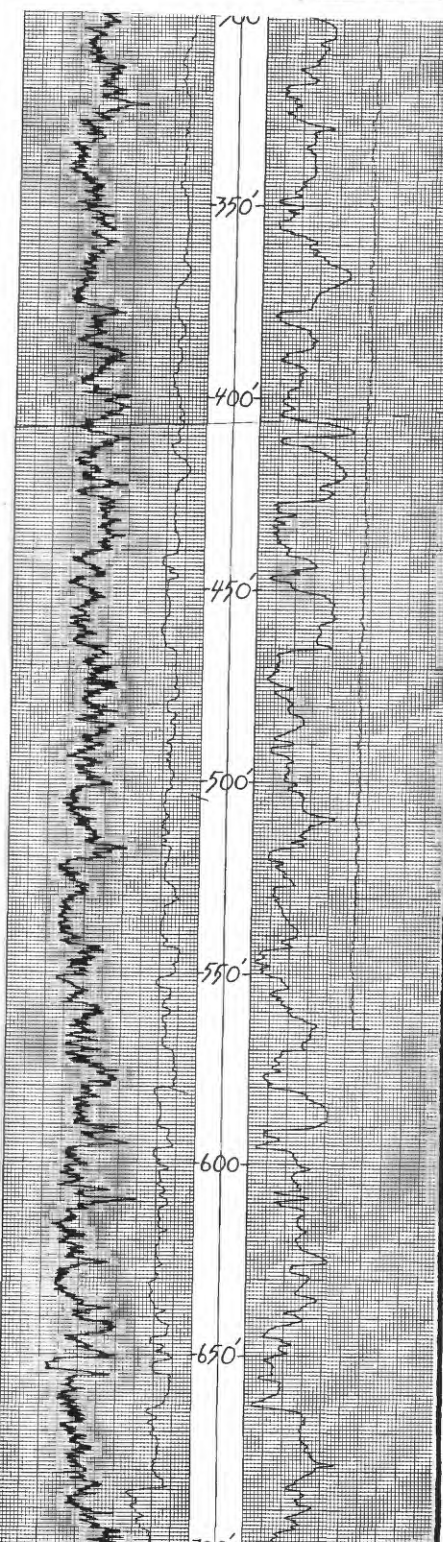
Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 1000 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 3.2 Kcps/in Logging speed 20 fpm

Remarks: Density log 550'-830' run separately on a different sheet from the  
SP, RES, G, and DEN 0'-550'. Water (5 GPM) between 120' and 140'.

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-5	Soil						0	0
							10	
							50	
5-117	Mudstone, gray; greenish-gray, micaceous siltstone						20	
							100	30
117-147	Sandstone, light-gray, coarse-grained						40	
147-154	Shale, carbonaceous						150	
154-185	Siltstone, greenish-gray, micaceous						50	
							200	60
185-300	Sandstone, light-gray, coarse-grained; interbedded, greenish-gray mudstone						70	
							250	80
							300	90
							300	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M101 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
						100	
						350	
						110	
						120	
						400	
300-615						130	
Sandstone, light-gray; interbedded, greenish-gray mudstone						140	
						450	
						150	
						500	
						160	
						550	
						170	
						180	
615-700						600	
Sandstone, light-gray; siltstone; black mudstone; cutting samples all poor						190	
						200	
						210	
						700	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M101 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
700-830 Sandstone, siltstone, and mudstone, as above; poor samples						220	
						750	230
						800	240
						850	250
						900	260
							270
							900

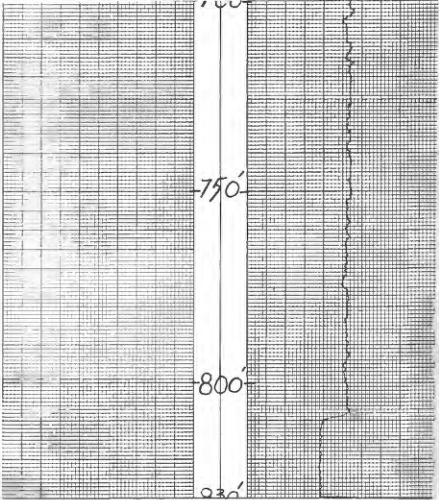
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M101 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
						100	
						350	
						110	
						120	
						400	
						130	
						450	
						140	
550-615 Sandstone, light-gray						150	
						500	
						160	
						550	
						170	
						180	
615-700 Sandstone, light-gray; siltstone; black mudstone; cuttings samples all poor						600	
						190	
						650	
						200	
						210	
						700	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M101 (continued)

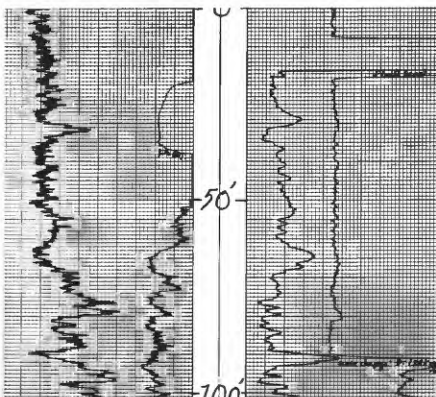
LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
<div>700-830</div> Sandstone, siltstone, and mudstone, as above; poor samples						220	
						750	230
							240
						800	250
							260
						850	270
						900	



## COALMONT AREA

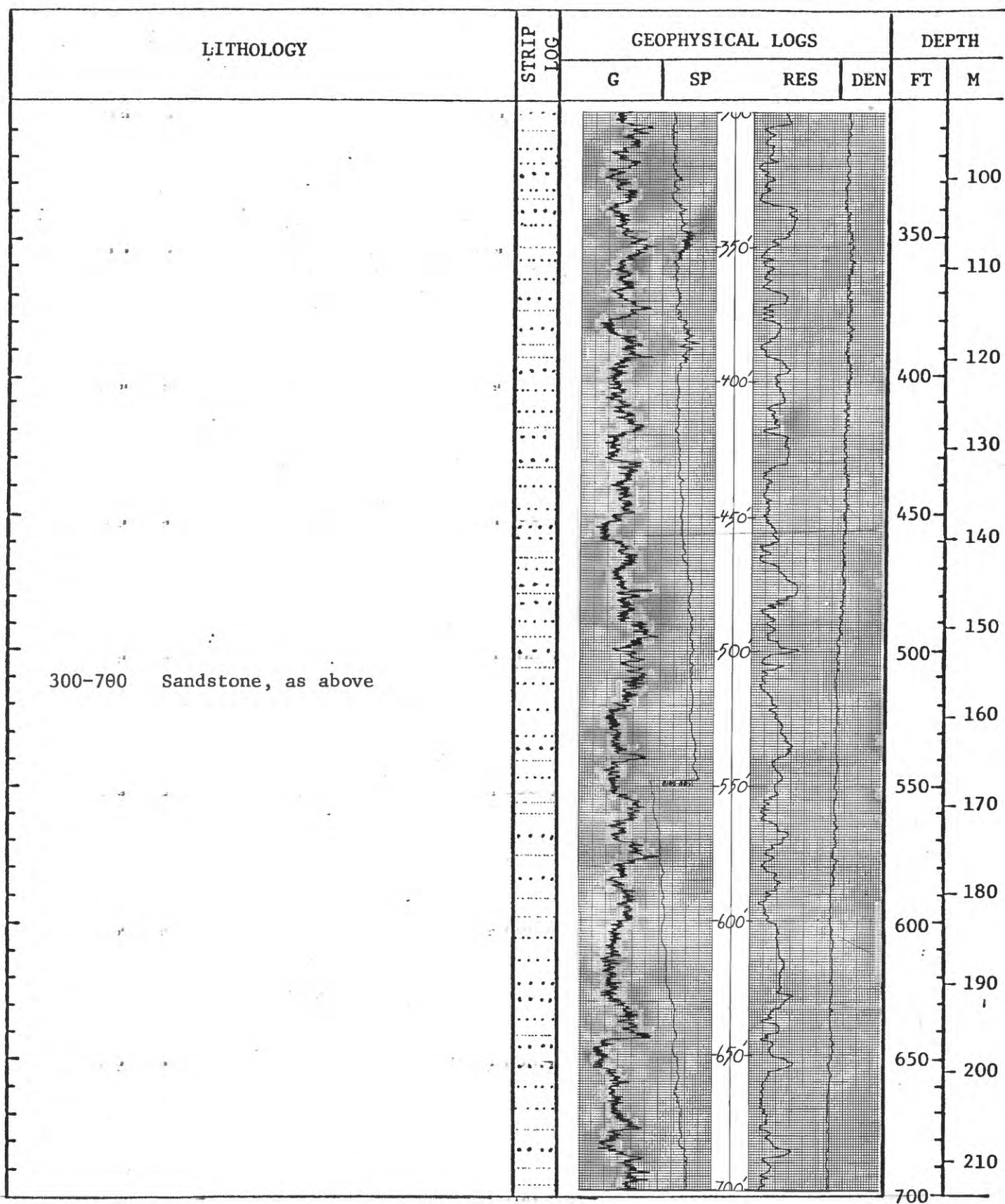
**Geophysical logs:**

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
 Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
 Gamma (G): T.C. 4 Scale 200 cps/in Logging speed 20 fpm  
 Density (DEN): T.C. 4 Scale 3.2 Kcps/in Logging speed 20 fpm  
 Remarks: Water (5 GPM) between 290' and 305'.

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-18	Sandstone, pale-olive, fine-grained, micaceous						0	0
18-25	Mudstone, dusky-yellow						10	
25-76	Sandstone, light-gray, fine-grained						50	
76-89	Sandstone, light-gray, fine-grained; gray mudstone						20	
89-93	Carbonaceous shale							
93-111	Mudstone, dark-gray						100	
111-115	Coal						30	
							40	
							150	
							50	
115-240	Siltstone and mudstone		200	60				
240-252	Carbonaceous shale		70					
252-300	Sandstone, light-gray, interbedded fine-, medium- and coarse-grained		250	80				
			300	90				
			300	90				

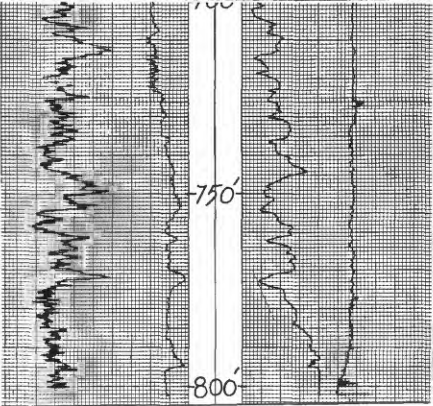
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M102 (continued)



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M102 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
700-802 Sandstone, as above						220	
						750	230
						240	
						800	
						250	
						850	260
						270	
						900	


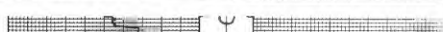





















U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. M104 Map MacFarlane Reservoir Date logged 9-27-77 Elevation (ft) 8,160  
Location: T. 7 N., R. 8 W., sec. 27 : 2600 FN L 2000 FW L Cored: ☐ Yes ☒ No  
Drilled depth 240 Logged depth 240 Drilling medium air Fluid level 109  
Geophysical logs:

Spontaneous potential (SP): Scale 25 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 100 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 3.2 Kcps/in Logging speed 20 fpm

Remarks: \_\_\_\_\_

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-9	Soil						0	0
9-20	Sandstone, fine-grained, poorly consolidated							
20-30	Mudstone, gray							
								
30-99	Sandstone, gray, coarse-grained							
								
99-153	Sandstone, gray, coarse-grained; mudstone, gray							
								
153-179	Coal; mudstone							
								
179-205	Mudstone, gray							
								
205-240	Sandstone, coarse-grained							
								
								
								
								
								
								

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. M108 Map MacFarlane Reservoir Date logged 9-27-77 Elevation (ft) 8,184  
Location: T. 7 N., R. 80 W., sec. 35 : 450 FNL 0 FWL Cored: ☐ Yes ☒ No  
Drilled depth 100 Logged depth 98 Drilling medium air Fluid level 15

Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 3.2 Kcps/in Logging speed 20 fpm  
Remarks: \_\_\_\_\_

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-8	Soil						0	0
8-21	Siltstone, brown							
21-40	Mudstone, gray						10	
40-55	Coal; mudstone at 42'-43'; bone coal at 51'-52'						50	
55-98	Siltstone, light-gray; micaceous coarser downward						100	30
							150	50
							200	60
							250	80
							300	90



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. M109 Map MacFarlane Reservoir Date logged 10-29-77 Elevation (ft) 8210  
Location: T. 7 N., R. 80 W., sec. 35 : 1500 FSL 2325 FWL Cored: ☐ Yes ☒ No  
Drilled depth 800 Logged depth 800 Drilling medium mud-air Fluid level 5

Geophysical logs:

Spontaneous potential (SP): Scale 250 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 100 cps/in Logging speed 20 fpm  
Density (DEN): T.C. \_\_\_\_\_ Scale \_\_\_\_\_ Logging speed \_\_\_\_\_ fpm  
Remarks: Density log on a separate sheet. Water (5 GPM) between 510' and 800'.  
No lithology or strip logs below 755'.

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-8	Sandy soil, moderate - yellowish-brown						0	0
8-13	Siltstone, yellowish-gray							
13-21	Sandstone, very light gray, fine-grained (13'-15'), medium-grained (15'-21'), with white mica; minor shale						10	
21-26	Sandstone, as above, except fine- to coarse-grained; sandstone, light-gray, fine- to medium-grained, with biotite						50	
26-41	Silty mudstone, medium-dark-gray, with white mica; sandstone, light-gray, fine-grained, poorly consolidated, with white mica						100	30
41-82	Sandstone, as above; sandstone, very light gray, fine- to coarse-grained, subangular, poorly consolidated, with white mica; shale, black						150	50
82-97	Silty mudstone, moderate-yellowish-brown and yellowish-gray; sandstone, fine- to medium-grained, poorly consolidated, with white mica						200	60
97-300	Sandstone, as above (41'-82'), except fine- to medium-grained (100'-126'), very coarse grained (126'-131') medium-grained (131'-205'), very coarse grained to very fine pebble gravel (205'-220'), fine- to medium-grained (220'-340')						250	70
							300	90

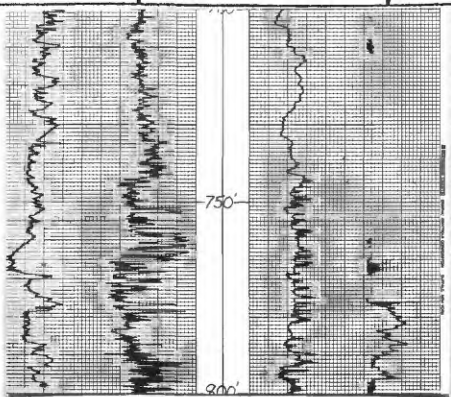
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M109 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-342 Sandstone, as above, fine- to medium-grained						100	
342-385 Shaly mudstone, dark-gray						350	
						110	
						120	
385-489 Sandstone, as above (41'-82'), fine- to medium-grained, with biotite						400	
						130	
						140	
489-495 Shaly mudstone, black						150	
495-560 Sandstone, as above (41'-82'); shaly mudstone, black						500	
						160	
						170	
560-600 Mudstone, brownish-gray						180	
						190	
600-674 Sandstone, as above (41'-82')						200	
						210	
674-700 Mudstone, brownish-gray						700	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M109 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
700-710' Mudstone, as above							
710-728 Sandstone, as above (41'-82')							220
728-742 Mudstone, brownish-gray							
742-755' Sandstone, as above (41'-82')						750	230
						800	240
							250
						850	260
							270
						900	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. M109 Map MacFarlane Reservoir Date logged 10-29-77 Elevation (ft) 8210  
Location: T. 7 N., R. 80 W., sec. 35 : 1500 FS L2325 FWL Cored: ☐ Yes ☒ No  
Drilled depth 800 Logged depth 651 Drilling medium air-mud Fluid level 5

Geophysical logs:

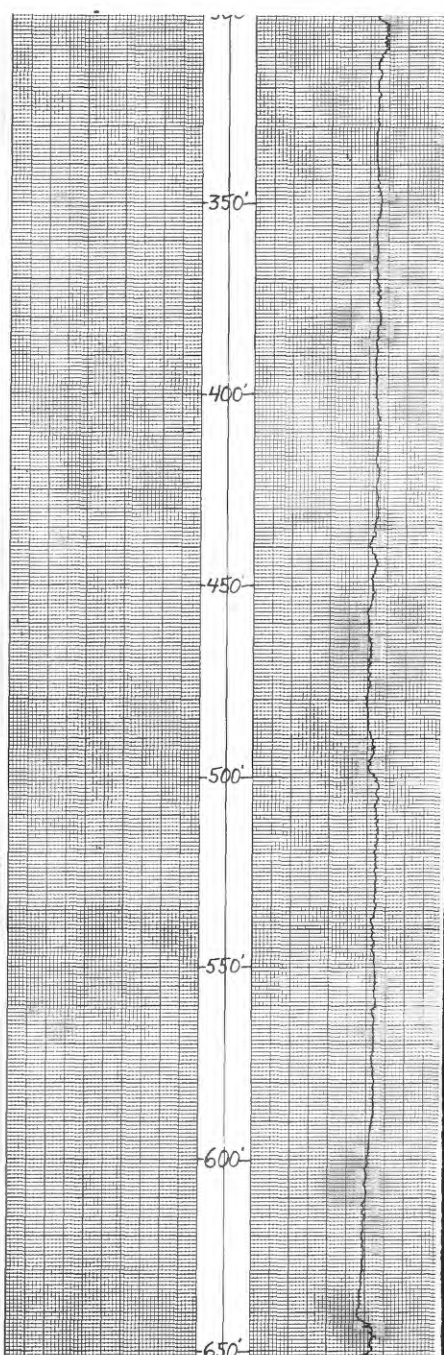
Spontaneous potential (SP): Scale \_\_\_\_\_ Logging speed \_\_\_\_\_ fpm  
Resistivity (RES): Scale \_\_\_\_\_ Logging speed \_\_\_\_\_ fpm  
Gamma (G): T.C. \_\_\_\_\_ Scale \_\_\_\_\_ Logging speed \_\_\_\_\_ fpm  
Density (DEN): T.C. 4 Scale 3.2 Kcps/in Logging speed 20 fpm  
Remarks: SP, RES, and G logs on a separate sheet with strip log.

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-8	Sandy soil, moderate-yellowish-brown						0	0
8-13	Siltstone, yellowish-gray							
13-21	Sandstone, very light gray, fine-grained (13'-15'), medium-grained (15'-21'), with white mica; minor shale						10	
21-26	Sandstone, as above, except fine- to coarse-grained; sandstone, light-gray, fine- to medium-grained, with biotite						20	
26-41	Silty mudstone, medium-dark-gray, with white mica; sandstone, light-gray, fine-grained, poorly consolidated, with white mica						30	
41-82	Sandstone, as above; sandstone, very light gray, fine- to coarse-grained, subangular, poorly consolidated, with white mica; shale, black						40	
82-97	Silty mudstone, moderate-yellowish-brown and yellowish-gray; sandstone, fine- to medium-grained, poorly consolidated, with white mica						50	
97-300	Sandstone, as above (41'-82'), except fine- to medium-grained (100'-126'), very coarse grained (126'-131') medium-grained (131'-205'), very coarse grained to very fine pebble gravel (205'-220'), fine- to medium-grained (220'-340')						60	
							70	
							80	
							90	
							300	



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M109 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-342 Sandstone, as above, fine- to medium-grained							
						100	
342-385 Shaly mudstone, dark-gray						350	
						110	
						120	
385-489 Sandstone, as above (41'-82'), fine- to medium-grained, with biotite						400	
						130	
						140	
						150	
489-495 Shaly mudstone, black						500	
495-560 Sandstone, as above (41'-82'); shaly mudstone, black						160	
						170	
560-600 Mudstone, brownish-gray						180	
						190	
600-651 Sandstone, as above (41'-82')						200	
						210	
						700	



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. M110 Map MacFarlane Reservoir Date logged 10-27-77 Elevation (ft) 8220  
Location: T. 7 N., R. 80 W., sec. 35 : 2100 FSL 375 FEL Cored: ☐ Yes ☒ No  
Drilled depth 770 Logged depth 768 Drilling medium air-mud Fluid level 0

Geophysical logs:

Spontaneous potential (SP): Scale 250 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 1000 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 1000 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 1.6 cps/in Logging speed 20 fpm  
Remarks: Water (5 GPM) between 15' and 95'. No lithology log below 755'.

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-4	Soil, moderate-yellowish-brown						0	0
4-18	Sandstone, very light gray, weathered to pale-yellowish-brown, fine-grained, well-consolidated, white mica; minor interbedded shale						10	
18-27	Sandstone, light-gray, mostly medium- to fine-grained, well-consolidated, with biotite						50	
27-32	Sandstone, very light gray, very coarse grained to medium-grained, subangular to angular, poorly consolidated, with white mica; minor shale, black						100	30
32-39	Silty mudstone, medium-dark-gray with white mica; sandstone, medium-light-gray, fine-grained, poorly consolidated, with white mica						150	40
39-55	Sandstone, as above; some silty mudstone						200	50
55-78	Sandstone, very light gray, fine to coarse-grained, subangular, poorly consolidated, with white mica; minor black shale						250	60
78-104	Sandstone, as above; minor silty mudstone, moderate-yellowish-brown; sandstone, yellowish-gray, fine- to medium-grained, poorly consolidated, with white mica						300	70
104-125	Sandstone, very light gray, fine to coarse-grained, subangular, poorly consolidated, with white mica						350	80
							400	90

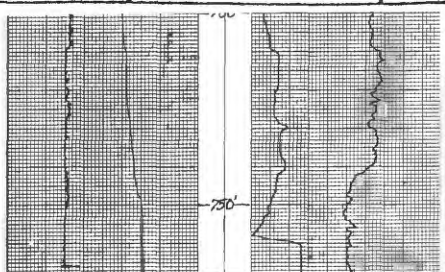
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M110 (continued)

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
125-132	Sandstone, as above, except very coarse grained	.....						
132-208	Sandstone, as above, except medium-grained	.....						100
208-220	Sandstone, as above, except very coarse grained to very fine pebble gravel	.....					350	
220-329	Sandstone, as above, except fine- to medium-grained	.....						110
329-388	Shaly mudstone, dark-gray; sandstone, as above, with biotite	.....					400	120
388-481	Sandstone, very light gray, fine- to medium-grained, sub-angular, poorly consolidated, with white mica	.....						130
481-485	Shaly mudstone, black	.....					450	
485-494	Sandstone (see 388'-481')	.....						140
494-498	Shaly mudstone, black	.....						
498-508	Sandstone (see 388'-481')	.....						
508-514	Mudstone	.....					150	
514-529	Sandstone (see 388'-481'); mudstone, brownish-gray	.....					500	160
529-593	Mudstone, brownish-gray	.....					550	170
593-662	Sandstone, very light gray, medium- to coarse-grained, subangular to subrounded, poorly consolidated, with white mica	.....					600	180
662-700	Mudstone, brownish-gray	.....					650	200
							700	210
								700

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. M110 (continued)

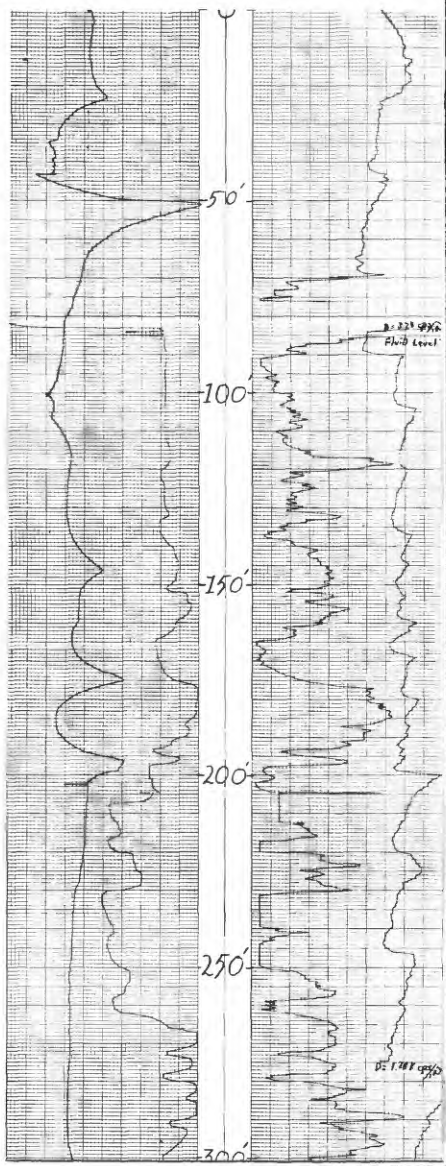
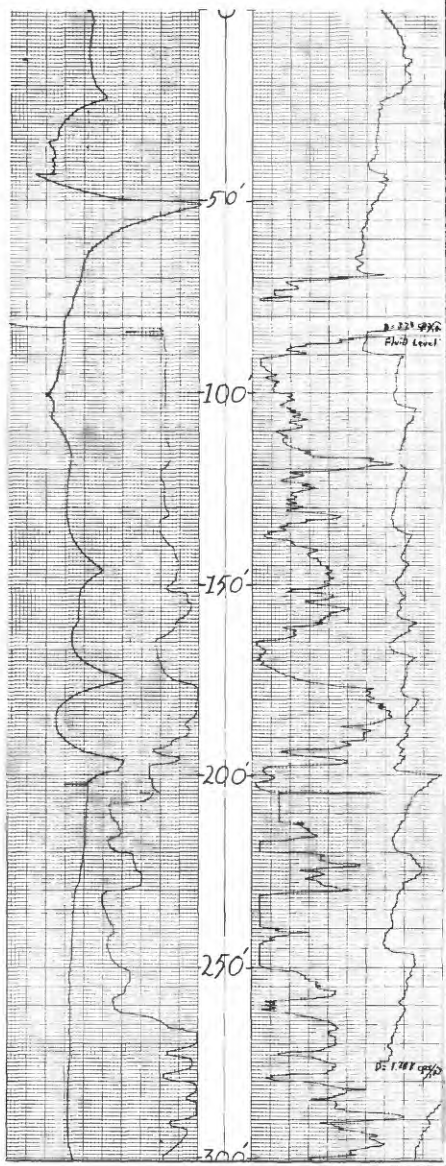
LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
700-709	Mudstone, brownish-gray						220	
709-742	Sandstone, as at 593'-662', except very coarse grained to medium-grained						750	230
742-750	Sandstone, as above; mudstone, brownish-gray							
750-755	Sandstone (see 709'-742')							
							800	240
								250
							850	260
								270
							900	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. T111 Map Teal Lake Date logged 10-11-77 Elevation (ft) 8370  
Location: T. 7 N., R. 81 W., sec. 19 : 675 FS L 2075 FE L Cored: ☐ Yes ☒ No  
Drilled depth 600 Logged depth 600 Drilling medium air Fluid level 85  
Geophysical logs:

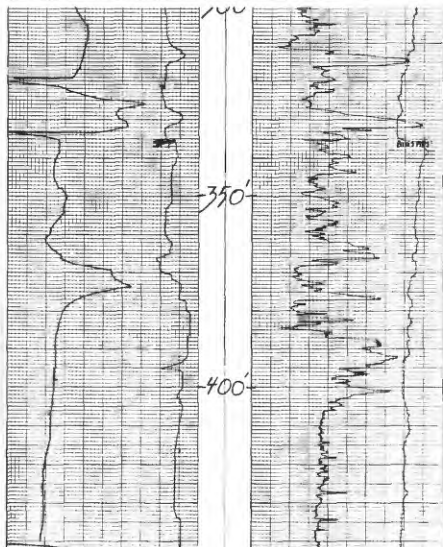
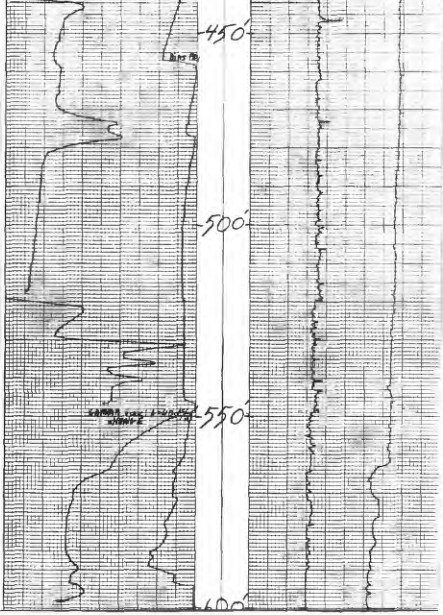
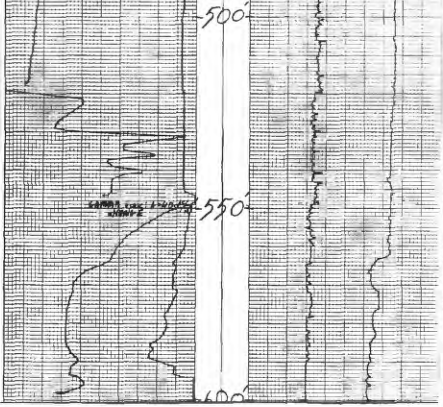
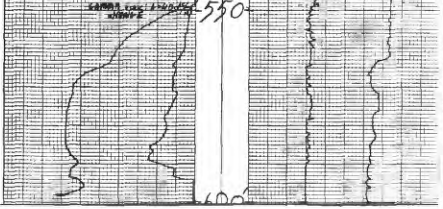
Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 100 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 3.2 Kcps/in Logging speed 20 fpm  
Remarks: Water (5 GPM) between 60' and 415'.

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-23	Shale, light-brown, moderate-brown, and medium-light-gray						0	0
							10	
23-71	Sandstone, very light gray to white, fine-grained to very coarse grained, subangular, poorly consolidated; greenish-gray siltstone						50	
							20	
71-76	Sandstone, very light greenish gray, fine-grained, poorly consolidated						100	30
76-87	Sandstone, white, very coarse grained to medium-grained, poorly consolidated						40	
87-115	Siltstone, medium-dark-greenish-gray						150	
							50	
115-300	Sandstone, white, fine-grained to very coarse grained, angular to subangular, poorly consolidated; interbedded siltstone, light-greenish-gray; light-brown shale						200	60
							70	
							250	
							80	
							300	90



U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. T111 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-406, Sandstone, siltstone, and shale, as above			350'			100	
						350	
						110	
						120	
406-600 Shaly mudstone, medium-dark- gray			400'			400	
						130	
						140	
						150	
			500'			500	
						160	
						170	
						180	
			550'			550	
						190	
						200	
						210	
						600	
						650	
						700	



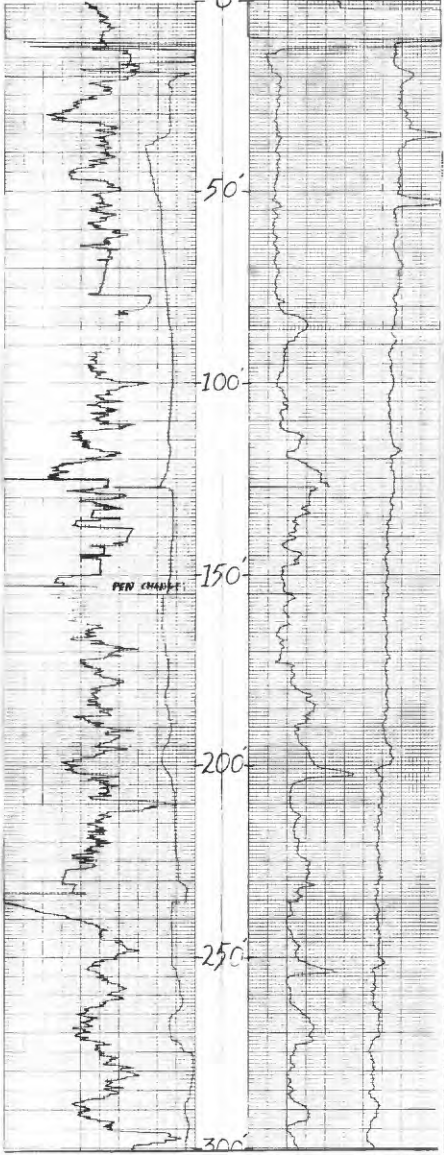
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. T112 Map Teal Lake Date logged 10-12-77 Elevation (ft) 8250  
Location: T. 7 N., R. 81 W., sec. 20 : 200 F SL 2575 FE L Cored: ☐ Yes ☒ No  
Drilled depth 500 Logged depth 500 Drilling medium air Fluid level 12

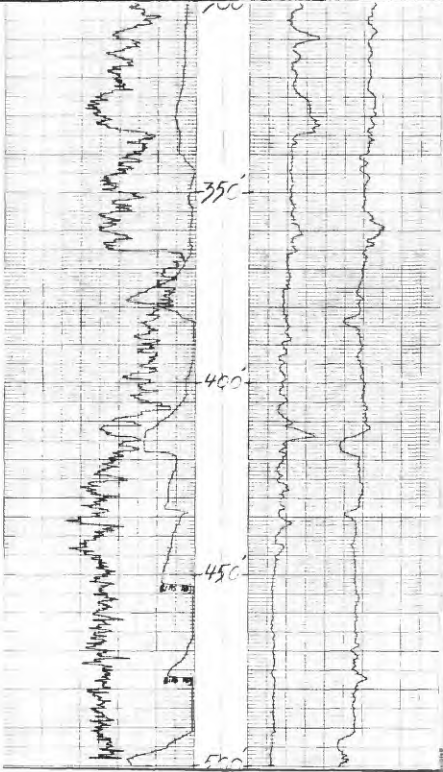
Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 3.2 Kcps/in Logging speed 20 fpm  
Remarks: Water (5 GPM) between 120' and 420'.

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-13	Sandy soil, moderate-brown						0	0
13-82	Shaly mudstone, medium-dark-gray; brownish-black mudstone						10	
82-90	Sandstone, white, fine-grained, poorly consolidated						50	
90-112	Mudstone, brownish-gray						100	30
112-154	Sandstone, white, very coarse grained to very fine pebble gravel, subangular to angular, poorly consolidated; interbedded, light-gray silty mudstone						150	
154-173	Siltstone, light-gray						200	60
173-300	Sandstone, white, coarse-grained to very fine pebble gravel, subangular to angular, poorly consolidated; brownish-gray shaly mudstone						250	
							300	90

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. T112 (continued)

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
300-335	Sandstone and shaly mudstone, as above							100
							350	110
335-444	Sandstone, white, fine-grained, poorly consolidated							120
							400	130
444-500	Shaly mudstone, brownish-gray							140
							450	150
								160
							500	170
								180
							550	190
								200
							600	210
								220
							650	230
								240
							700	250

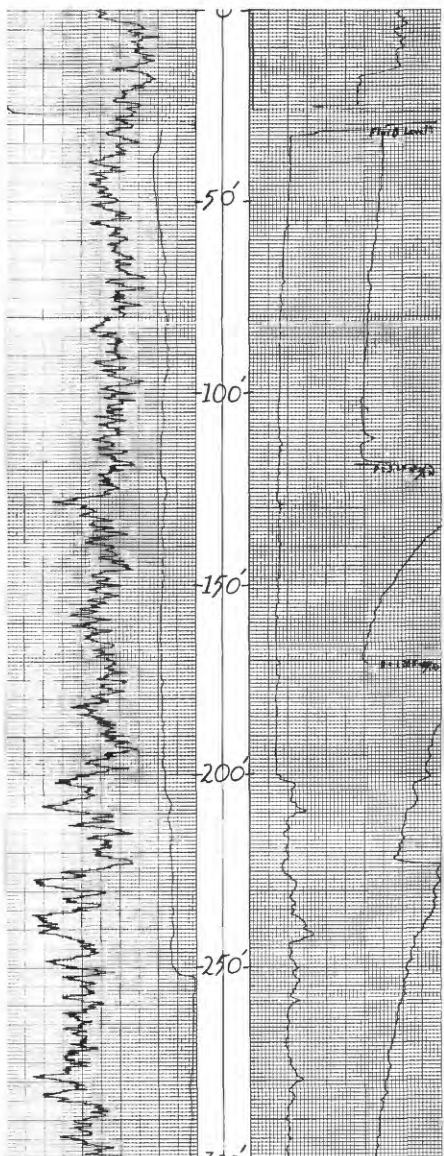
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

COALMONT AREA

Hole No. T115 Map Teal Lake Date logged 10-11-77 Elevation (ft) 8300  
Location: T. 7 N., R. 81 W., sec. 29 : 1675 FSL 1900 FE L Cored: ☐ Yes ☒ No  
Drilled depth 500 Logged depth 500 Drilling medium air Fluid level 32

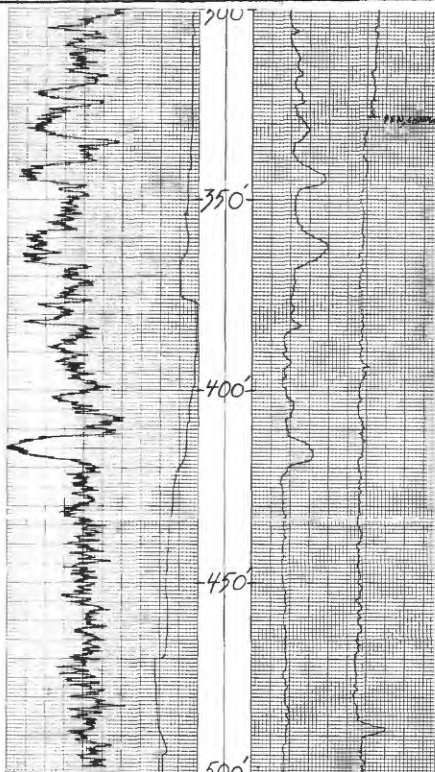
Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 3.2 Kcps/in Logging speed 20 fpm  
Remarks: Water (5 GPM) between 330' and 460'.

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-17	Sandy mudstone, grayish-orange						0	0
							10	
							50	
							20	
							100	30
17-201	Silty mudstone, brownish-gray and brownish-black						40	
							150	
201-236	Sandstone, light-gray, fine-grained, micaceous						50	
236-244	Sandstone, white, very coarse grained, poorly consolidated						200	60
							70	
244-300	Sandstone, light-gray, fine-grained, well-consolidated with mica; interbedded brownish-gray silty mudstone						250	
							80	
							90	
							300	

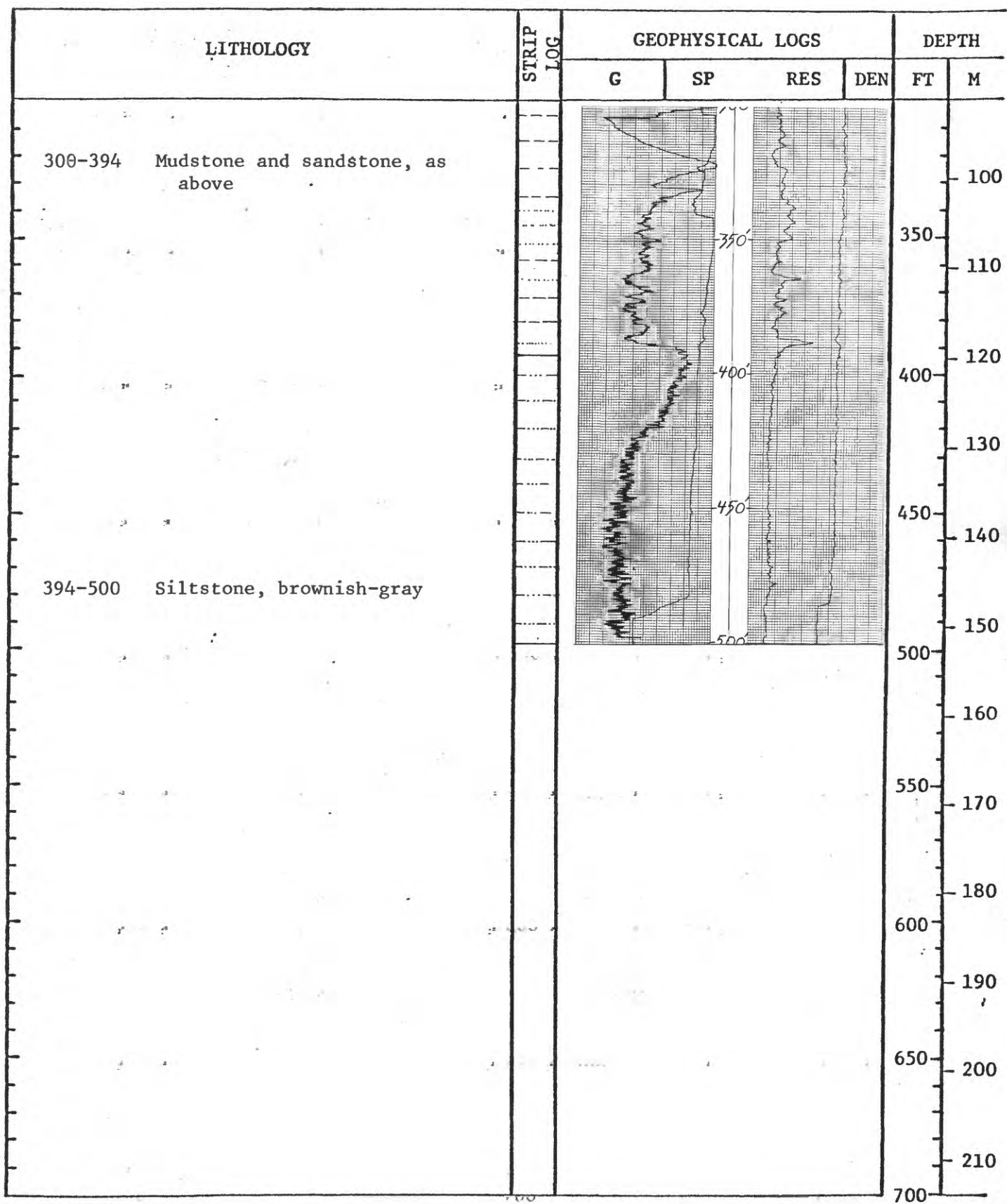
U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. T115 (continued)

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
300-328	Sandstone and silty mudstone, as above							
328-368	Sandstone, white, very coarse to fine-grained; angular to subangular, poorly consolidated						100	
							350	
368-412	Sandstone, greenish-gray, fine- grained, with mica; inter- bedded brownish-gray silty mudstone						110	
							120	
412-420	Sandstone, white, very coarse grained						400	
							130	
							450	
							140	
420-500	Silty mudstone, brownish-gray						450	
							150	
							500	
							160	
							550	
							170	
							180	
							600	
							190	
							650	
							200	
							210	
							700	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. T116 (continued)





COALMONT AREA

Geophysical logs:

Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
 Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
 Gamma (G): T.C. 4 Scale 100 cps/in Logging speed 20 fpm  
 Density (DEN): T.C. 4 Scale 3.2 Kcps/in Logging speed 20 fpm  
 Remarks: Water (5 GPM) between 40' and 360'.

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-21	Muddy siltstone, light-brown						0	0
21-34	Sandstone, grayish-orange and dark-yellowish-orange, fine-grained, subangular, poorly consolidated						-10	
34-58	Sandstone, white, very coarse grained, to medium-grained, subangular, poorly consolidated						50	
58-80	Sandstone, dark-greenish-gray, fine-grained						-20	
							100	
80-263	Sandstone, white, fine-grained to very coarse grained, subangular, poorly consolidated						-40	
							150	
							-50	
							200	
							-70	
263-300	Mudstone, medium-dark-gray; interbedded, white, fine-grained, poorly consolidated sandstone						250	
							-80	
							300	
							-90	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

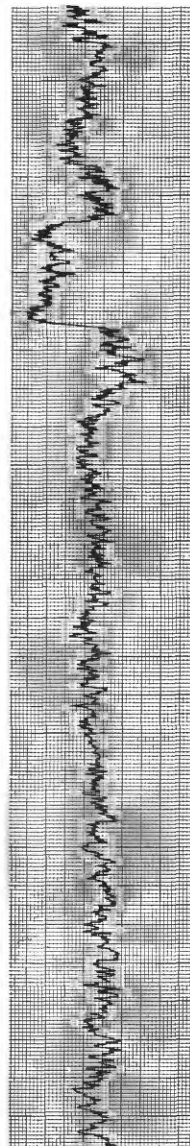
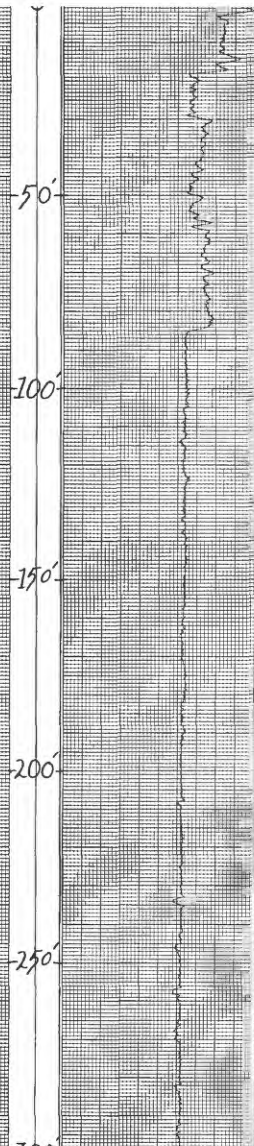
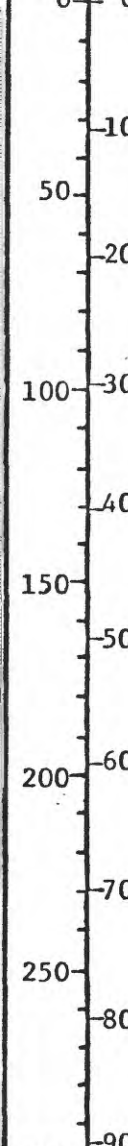

COALMONT AREA

Hole No. C117 Map Coalmont Date logged 9-30-77 Elevation (ft) 8,930  
Location: T. 7 N., R. 81 W., sec. 33 : 1100 F SL 1675 F E L Cored: ☐ Yes ☒ No  
Drilled depth 500 Logged depth 500 Drilling medium air Fluid level 384

Geophysical logs:

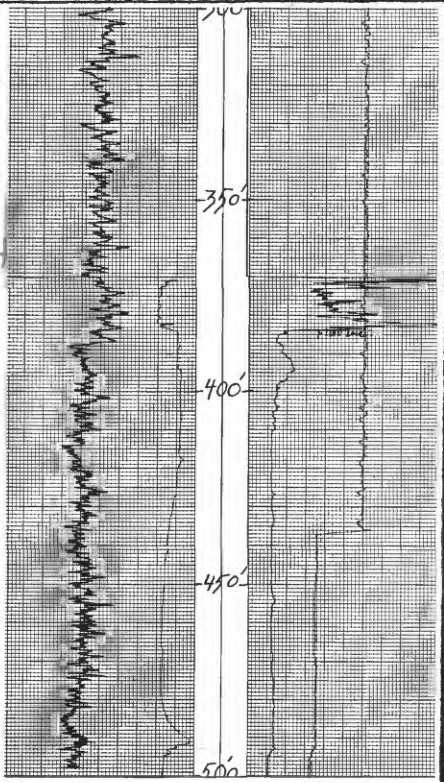
Spontaneous potential (SP): Scale 50 mv/in Logging speed 20 fpm  
Resistivity (RES): Scale 500 ohms/in Logging speed 20 fpm  
Gamma (G): T.C. 4 Scale 200 cps/in Logging speed 20 fpm  
Density (DEN): T.C. 4 Scale 16 Kcps/in Logging speed 20 fpm

Remarks: \_\_\_\_\_

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
			G	SP	RES	DEN	FT	M
0-29	Mudstone, brown						0	0
29-48	Sandstone, yellowish-brown, medium-grained						10	
48-78	Mudstone, gray						20	
78-84	Coal						30	
							40	
							50	
							60	
							70	
							80	
							90	
84-300	Mudstone, gray; coal traces at 123'-124'						100	
							110	
							120	
							130	
							140	
							150	
							160	
							170	
							180	
							190	
							200	
							210	
							220	
							230	
							240	
							250	
							260	
							270	
							280	
							290	
							300	

U.S. GEOLOGICAL SURVEY  
DRILL-HOLE LOG, JACKSON COUNTY, COLORADO

Hole No. C117 (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS				DEPTH	
		G	SP	RES	DEN	FT	M
300-500 Mudstone, gray							100
							350
							110
							120
							400
							130
							450
							140
							150
							500
							160
							550
							170
							180
							600
							190
							650
							200
							210
							700