

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Preliminary results of 1978 coal assessment drilling in
Northern and Western Recluse Geologic Analysis Area,
Northern Campbell County and Eastern Sheridan County,
Wyoming

by

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Open-File Report 80-80
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This report has not been edited or reviewed
for conformity with U.S. Geological Survey
standards and nomenclature.

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Introduction

Coal assessment drilling in northern Campbell County and eastern Sheridan County, Wyoming (fig. 1) was conducted by the U.S. Geological Survey between July and December of 1978. The objectives of this drilling program were to obtain resource and stratigraphic information and coal core samples for quality analysis.

Twenty eight holes were drilled, with selected coal intervals cored at six locations, for a total footage drilled of 18,795 feet (fig. 2 and table 1). All drilling was done under contract with a local, private company. A contract was also issued for the geophysical logging of all holes.

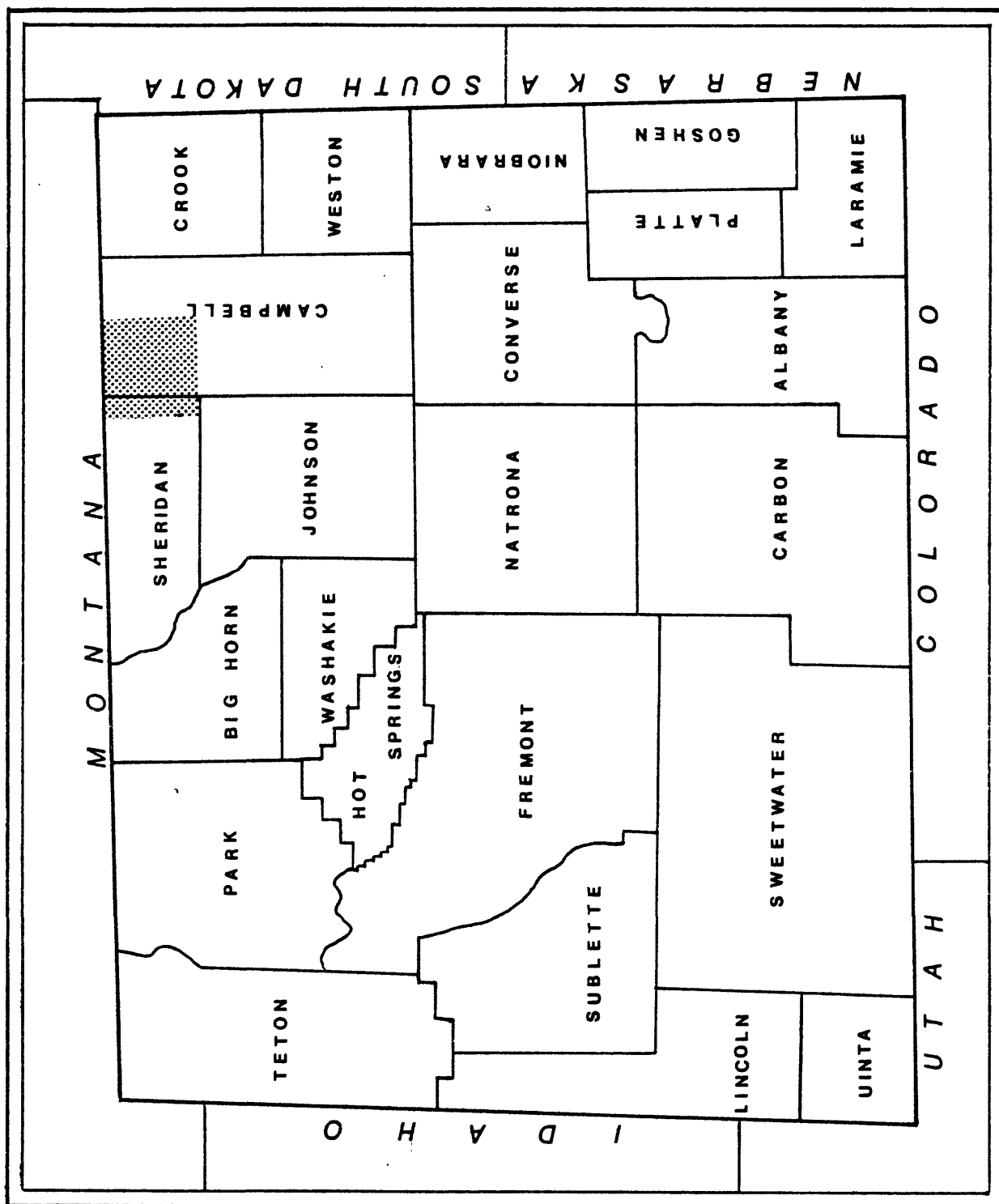


Figure 1. Location of project area (stippled) in the State of Wyoming

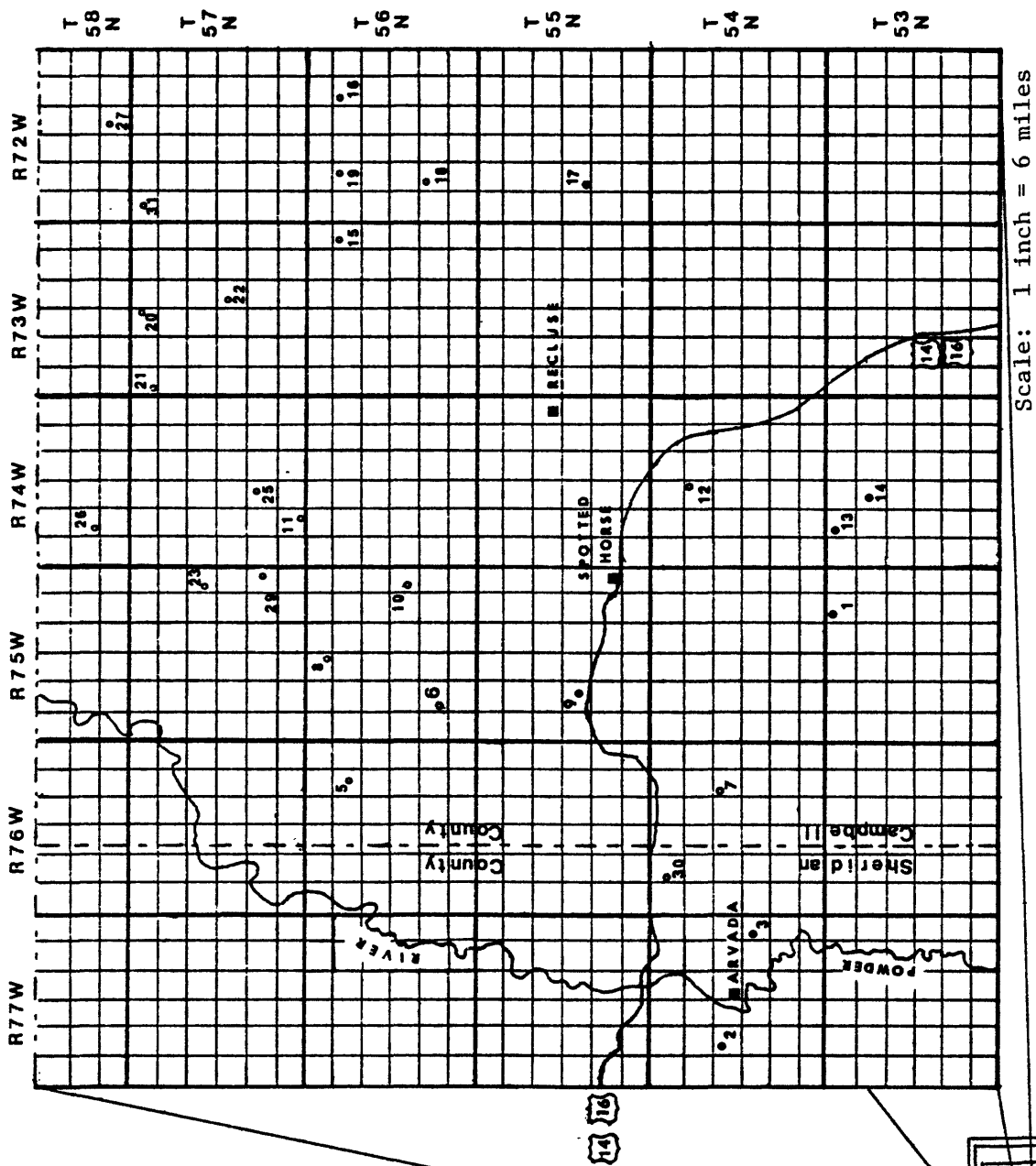


Figure 2. Location of 1978 drill holes

Table 1.--1978 Coal assessment drill-hole data.

[Symbols used in this table are: leaders (- - -), indicating no information available, and N/A, indicating no information applicable. The metric conversion formula is ft. x 0.3046]

Hole no.	Location	Quadrangle	Elevation (feet)	Total depth (feet)	Cored intervals (feet)	Remarks
1	SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 2, T. 53 N., R. 75 W.	Truman Draw	4022	800	N/A	- - -
2	SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 17, T. 54 N., R. 77 W.	Arvada	3790	800	120-144 305-317	Bottomed in coal. Water observation well.
3	SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 24, T. 54 N., R. 77 W.	Arvada NE	3797	717	90-100 105-125 702-712	Water observation well.
4	- - -	- - -	- - -	- - -	- - -	Not drilled.
5	NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 11, T. 56 N., R. 76 W.	Kline Draw	4140	660	N/A	- - -
6	SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 29, T. 56 N., R. 75 W.	Kline Draw	4120	400	N/A	- - -
7	NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 14, T. 54 N., R. 76 W.	Larey Draw	4185	700	N/A	- - -
8	NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 4, T. 56 N., R. 75 W.	Kline Draw	4120	630	N/A	- - -
9	SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 20 T. 55 N., R. 75 W.	Larey Draw	4105	796	N/A	- - -
10	SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 24, T. 56 N., R. 75 W.	Reservoir Creek	4115	635	N/A	- - -
11	SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 32, T. 57 N., R. 74 W.	Reservoir Creek	4180	597	95-112.7	- - -
12	NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 9 T. 54 N., R. 74 W.	Spotted Horse	4455	800	N/A	- - -
13	NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 5, T. 53 N., R. 74 W.	Truman Draw	4415	800	N/A	- - -
14	NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 9 T. 53 N., R. 74 W.	Truman Draw	4555	800	N/A	- - -
15	NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 12 T. 56 N., R. 73 W.	White Tail Butte	4220	500	N/A	Lithologic log prepared.
16	NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 10, T. 56 N., R. 72 W.	Rocky Butte SW	4060	380	N/A	Lithologic log prepared.
17	SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 21, T. 55 N., R. 72 W.	Pitch Draw	4040	152	N/A	Hole abandoned after 152 feet of burned rock.

Table 1.--Drill hole locations and other data--continued

Hole no.	Location	Quadrangle	Elevation (feet)	Total depth (feet)	Cored intervals (feet)	Remarks
18	NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 29, T. 56 N., R. 72 W.	White Tail Butte	3965	426	N/A	Lithologic log prepared.
19	NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 8, T. 56 N., R. 72 W.	White Tail Butte	4020	460	N/A	Lithologic log prepared.
20	NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 4, T. 57 N., R. 73 W.	Corral Creek	4200	560	71-79 8-100 329-368 440-469	Lithologic log prepared.
21	SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 6, T. 57 N., R. 73 W.	Corral Creek	4200	560	N/A	Lithologic log prepared.
22	SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 22, T. 57 N., R. 73 W.	Corral Creek	4050	380	N/A	Lithologic log prepared.
23	NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 13, T. 57 N., R. 75 W.	Dead Horse Lake	4143	500	213.6-262.7	Lithologic log prepared.
24	SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 34, T. 58 N., R. 75 W.	Dead Horse Lake	3900	- - -	- - -	Not drilled.
25	SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 28, T. 57 N., R. 74 W.	Dead Horse Lake	3985	450	N/A	- - -
26	NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 29, T. 58 N., R. 74 W.	Dead Horse Lake	3980	500	130.0-157.3 244.0-254.6 395.3-415.3	Lithologic log prepared.
27	SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 34, T. 58 N., R. 72 W.	Homestead Draw	3940	460	N/A	- - -
28	- - -	- - -	- - -	- - -	- - -	Not drilled.
29	NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 25, T. 57 N., R. 75 W.	Dead Horse Lake	4050	353	N/A	- - -
30	NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 5, T. 54 N., R. 76 W.	Arvada NE	3825	660	N/A	- - -
31	NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 6, T. 57 N., R. 72 W.	Homestead Draw	3965	383	N/A	Lithologic log prepared.

Coal Resource Evaluation

Coal-bearing rocks within the project area are in the Wasatch Formation of Eocene age and the Tongue River member of the Fort Union Formation of Paleocene age. The coal is interbedded with sandstones, siltstones, mudstones, and carbonaceous shales of, generally, very poor consolidation.

Geomorphology of this area is primarily the result of 1st, 2nd, and 3rd order stream drainage into the Powder River and Little Powder River which flow northward into the Yellowstone River in southern Montana. Small buttes and steep-walled ridges are prominent throughout the drainages due to weather-resistant baked shales, resulting from burned coal beds, that acts as caprock.

Geophysical logs including caliper, natural gamma, gamma gamma density, and resistivity were obtained on all drill holes. Lithologic logs of selected holes (see table 1) were prepared from samples of drill cuttings. All of these logs are presented in appendix 1.

U.S. Geological Survey personnel continuously monitored all drilling for methane gas emission, and a U.S. Bureau of Mines representative was present during portions of the coring program to obtain coal core for methane desorbition tests. Drill holes 78-2 and 78-3 were completed as water observation wells by the U.S. Geological Survey. Selected rock core samples were taken for paleomagnetic studies at the U.S. Geological Survey laboratories in Flagstaff, Arizona.

Acknowledgements

The author wishes to gratefully acknowledge the invaluable assistance and cooperation of the ranchers and residents of Campbell County and Sheridan County, Wyoming, without which this project would not have been possible. Also, a special acknowledgement and thank you to U.S. Geological Survey personnel: Project Geologist Robert Hobbs, Technical Field Coordinator Richard Babcock, Geologist Bion Kent, Geologist John Hardie, Geologist Laura Robinson, Dorsey Blake, and Ricke Smith who contributed so much of their valuable time and talents toward the successful planning, execution, and completion of the 1978 drilling program.

Appendix I
Lithologic and geophysical logs

Note: holes 4, 24, and 28 not drilled, hole 17 not included (see table 1)

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-1 DATE 12/11/71 SURFACE ELEVATION(ft) 4022

LOCATION SW $\frac{1}{2}$ NW $\frac{1}{4}$ Sec. 2 T. 53 N. R. 75 W. Quad. Truman Draw

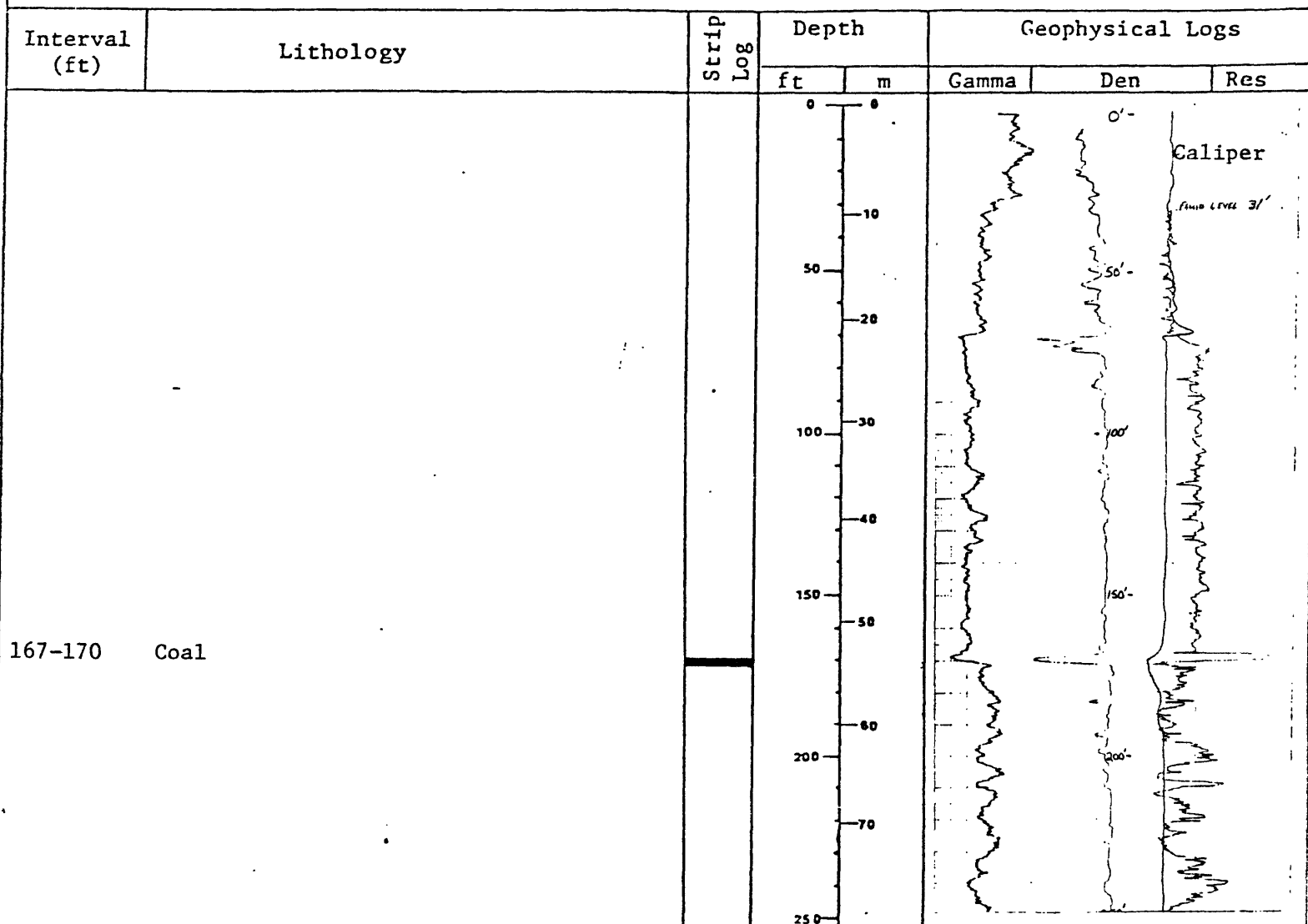
COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 800

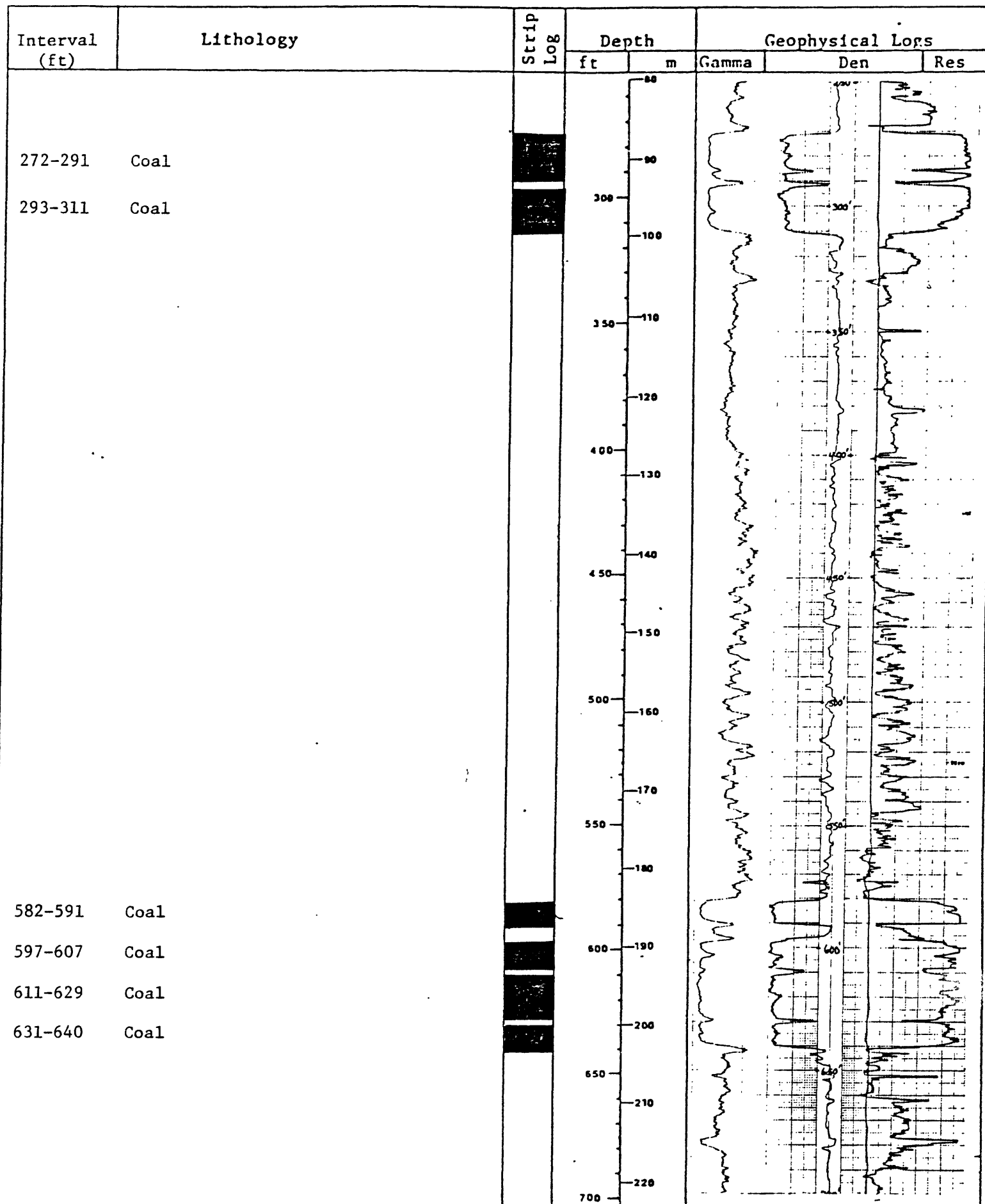
CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>50 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	:	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	:	Scale	<u>100 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale	<u>5 in/in</u>	Logging Speed	<u>15</u>	fpm





Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
782-799	Coal (bottomed in coal)		730				
			750				
			240				
			250				
			800				
			260				
			850				
			270				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-2 DATE 11/25/78 SURFACE ELEVATION(ft) 3790

LOCATION SW $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 17 T. 54 N. R. 77 W. Quad. Arvada


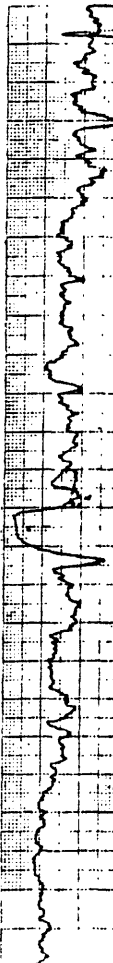
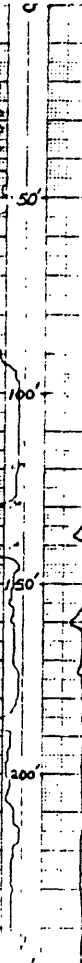
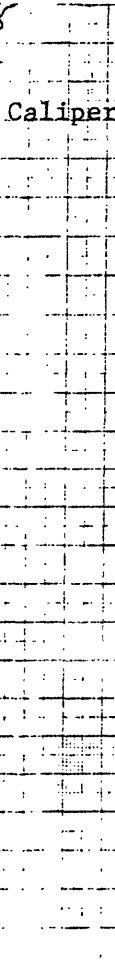
COUNTY Sheridan STATE Wyoming TOTAL DEPTH(ft) 800

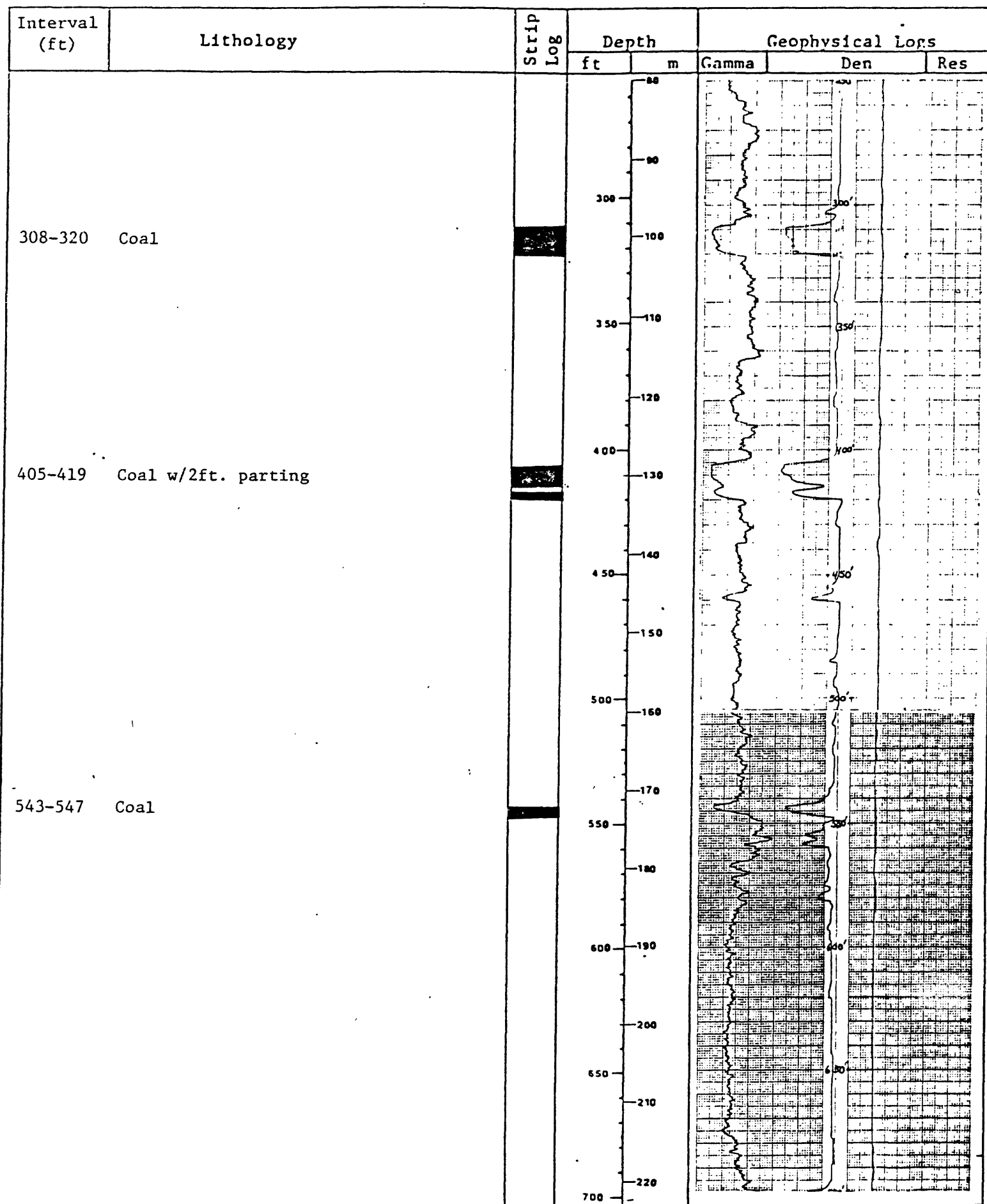
CORED YES ☒ NO ☐ INTERVAL(s) 120-144 305-317
(ft)







DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☒ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>50 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	;	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale	<u> </u>	Logging Speed	<u> </u>	fpm
Caliper	;	Scale	<u>5 in/in</u>	Logging Speed	<u>15</u>	fpm

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
131-142	Coal		0	0			
			10				
			20				
			30				
			40				
			50				
			60				
			70				
			80				
			90				
			100				
			110				



Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
701-712	Coal						
718-728	Coal		230				
			750				
			240				
			250				
782-797	Coal		800				
			260				
			850				
			270				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-3 DATE _____ SURFACE ELEVATION(ft) 3797

LOCATION SE 1/4 NE 1/4 Sec. 24 T. 54 N. R. 77 W. Quad. Arvada NE

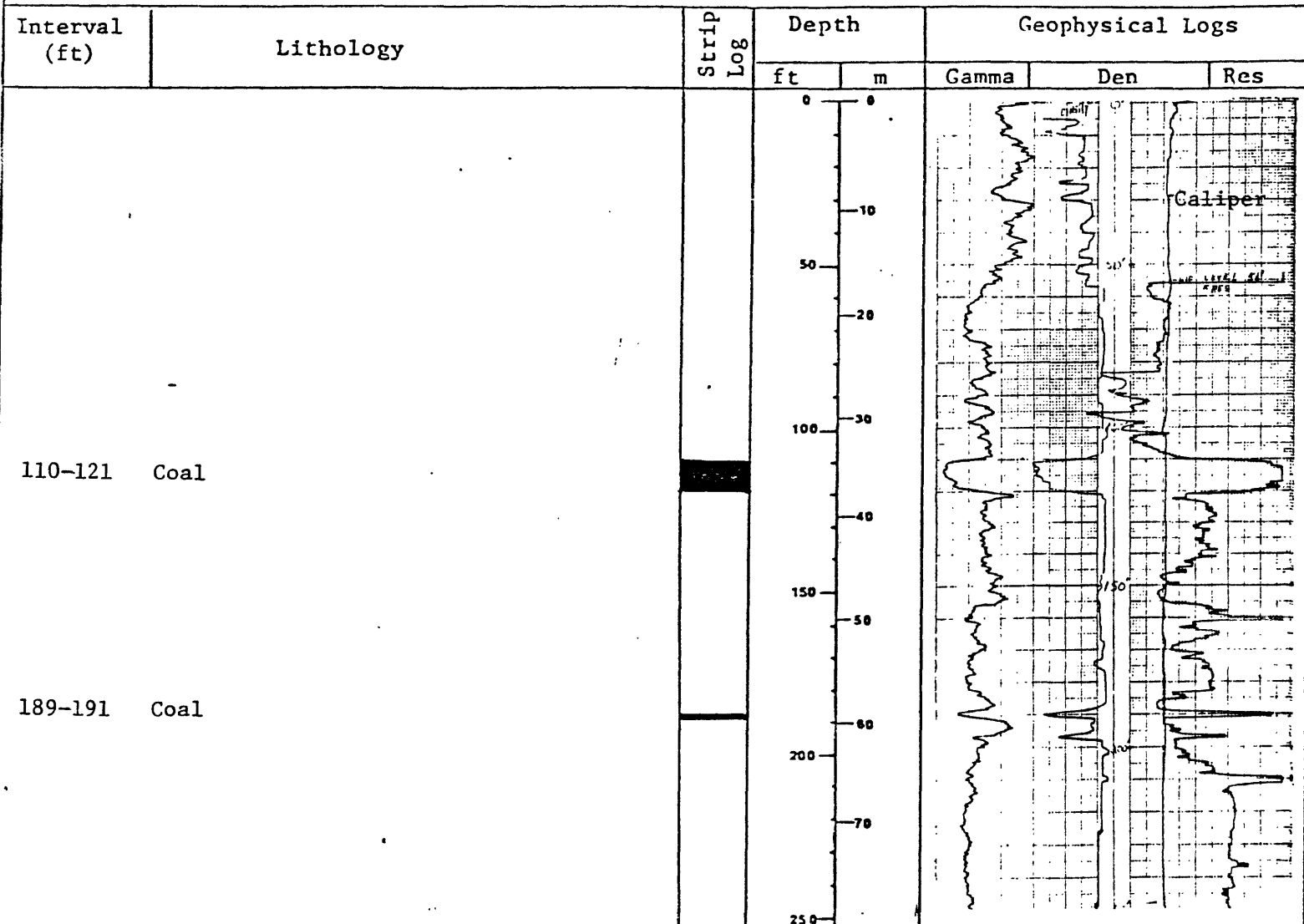
COUNTY Sheridan STATE Wyoming TOTAL DEPTH(ft) 717

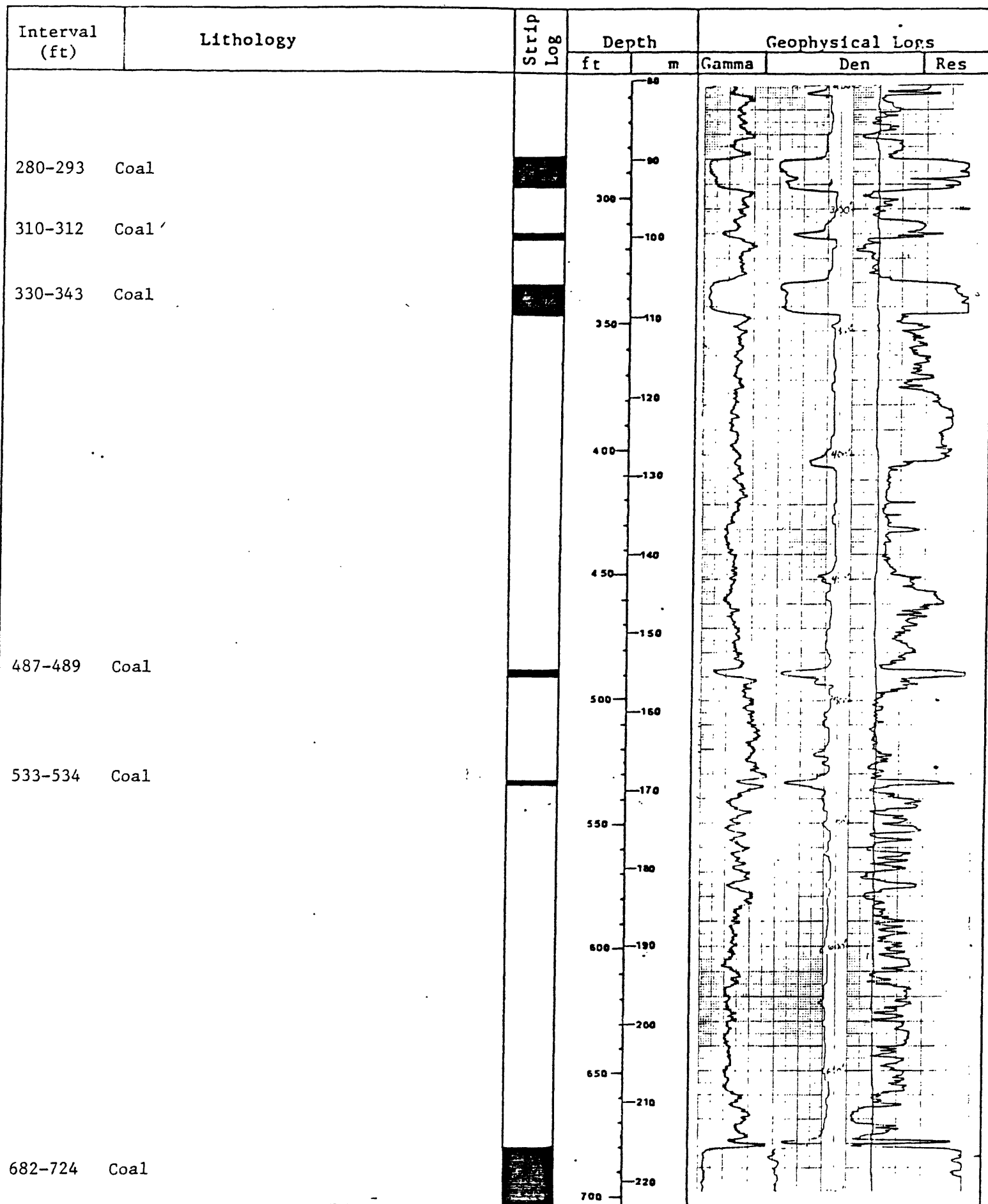
CORED YES ☒ NO ☐ INTERVAL(s) 90-100, 105-125, 702-712
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☒ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>50 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	;	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale	<u>100 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>5 in/in</u>	Logging Speed	<u>15</u>	fpm





Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
682-724	Coal		230				
			750				
			240				
			250				
			800				
			260				
			850				
			270				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-5 DATE 11/19/78 SURFACE ELEVATION(ft) 4140

LOCATION NW 1/4 SE 1/4 Sec. 11 T. 56 N. R. 76 W. Quad. Kline Draw

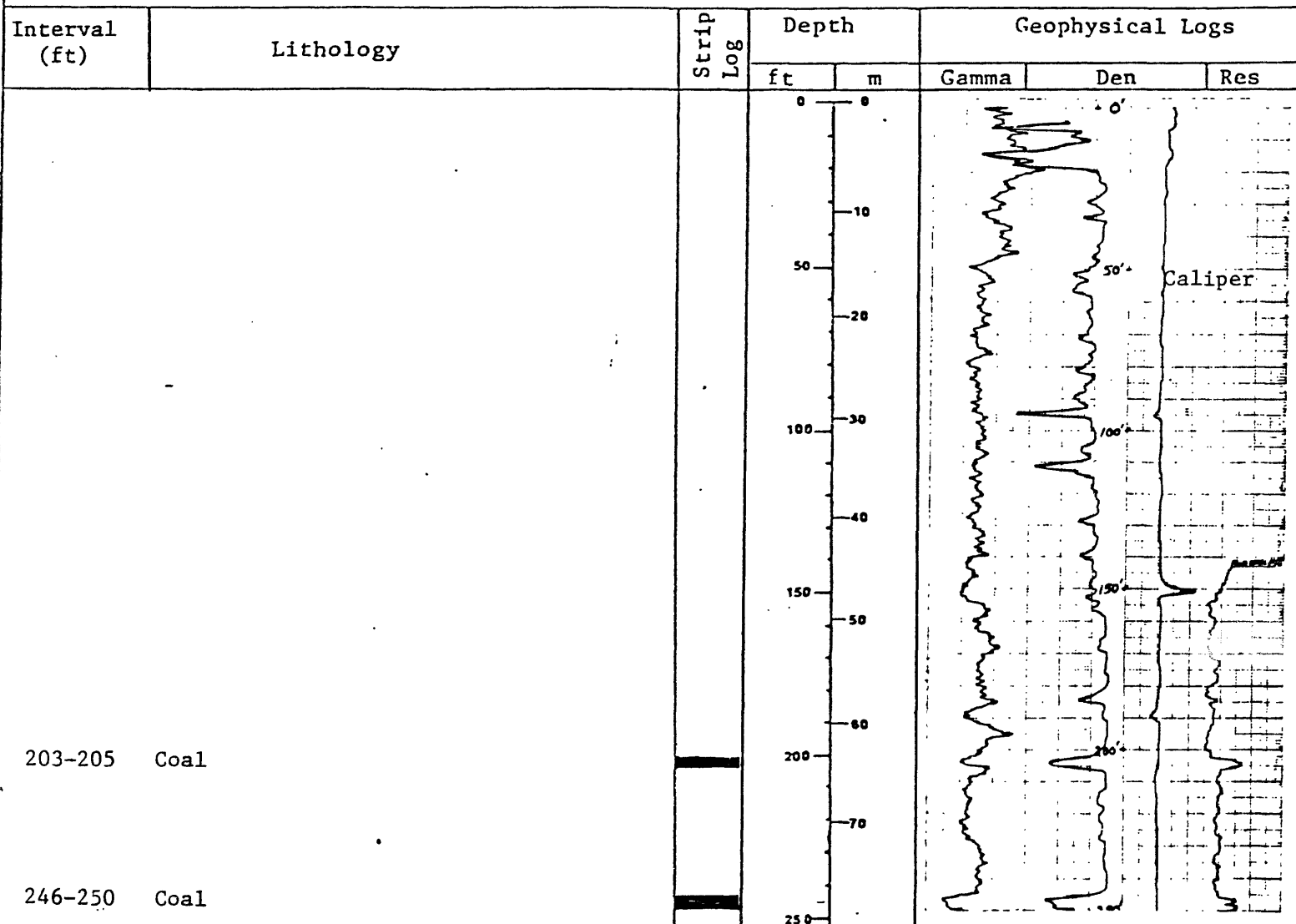
COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 660

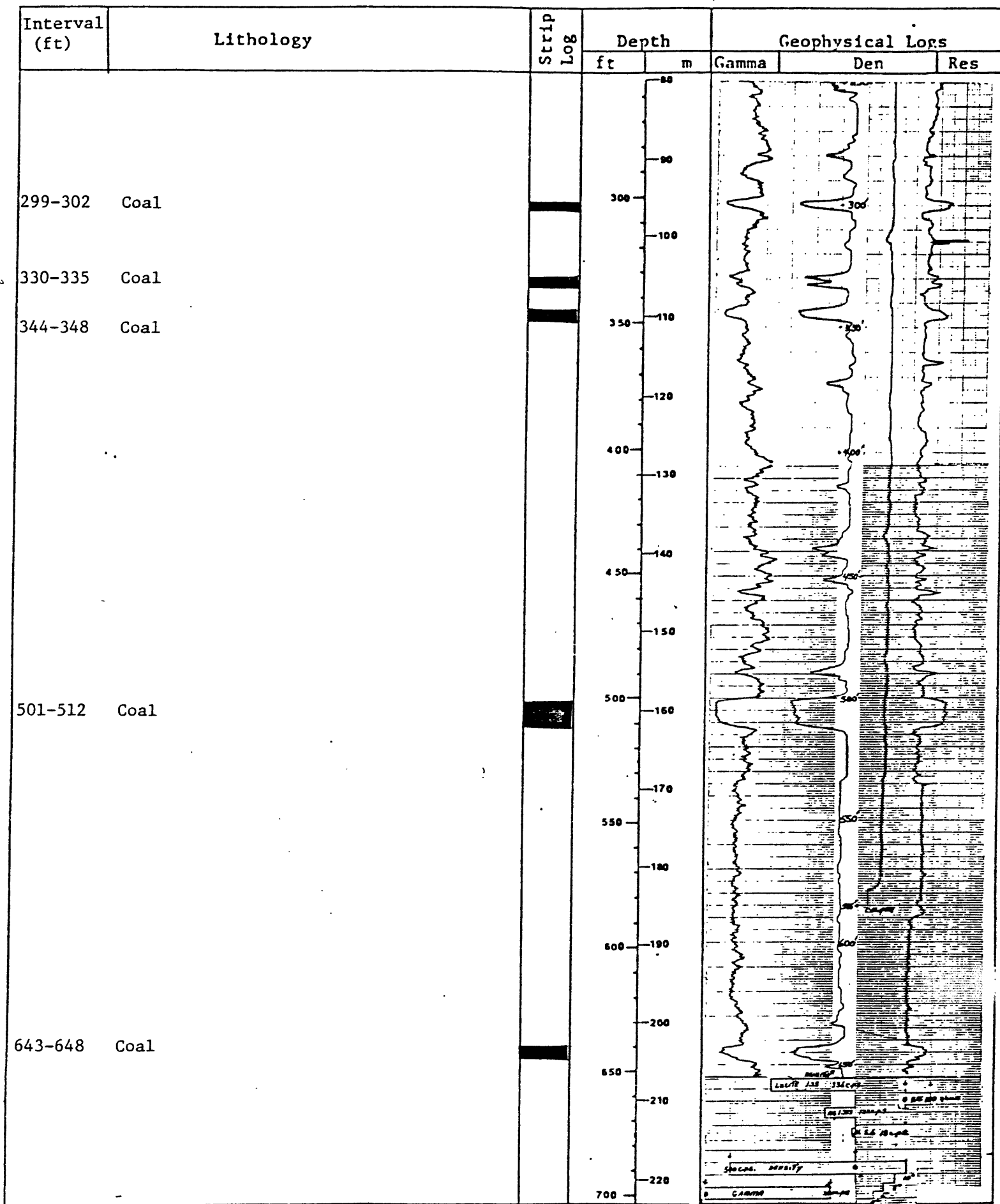
CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>50 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	;	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale	<u>100 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>5 in/in</u>	Logging Speed	<u>15</u>	fpm





LITHOLOGIC AND GEOPHYSICAL LOGS -

LOCATION NUMBER 78-6 DATE 11/20/78 SURFACE ELEVATION(ft) 4120

LOCATION SW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 29 T. 56 N. R. 75 W. Quad. Kline Draw

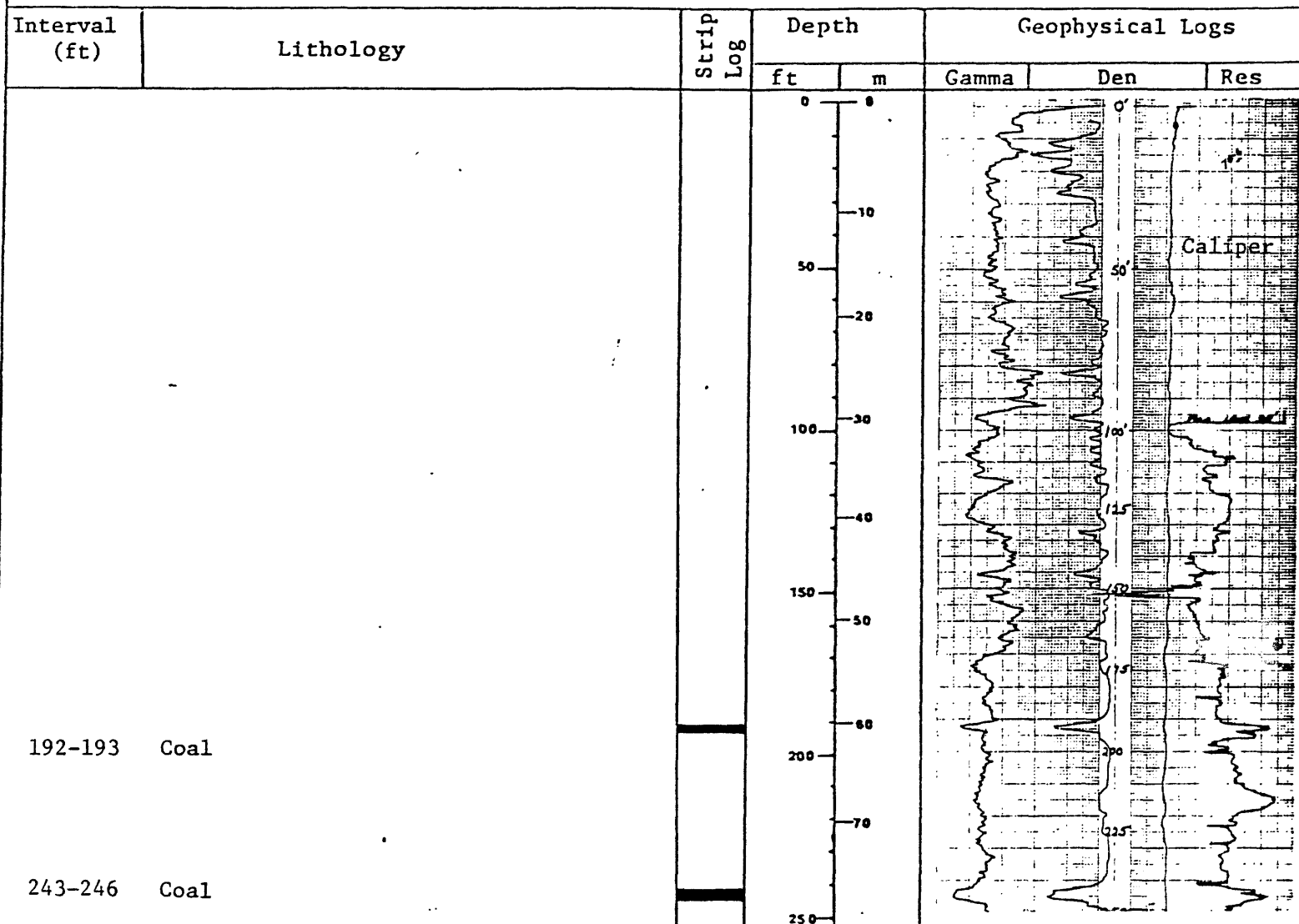
COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 400

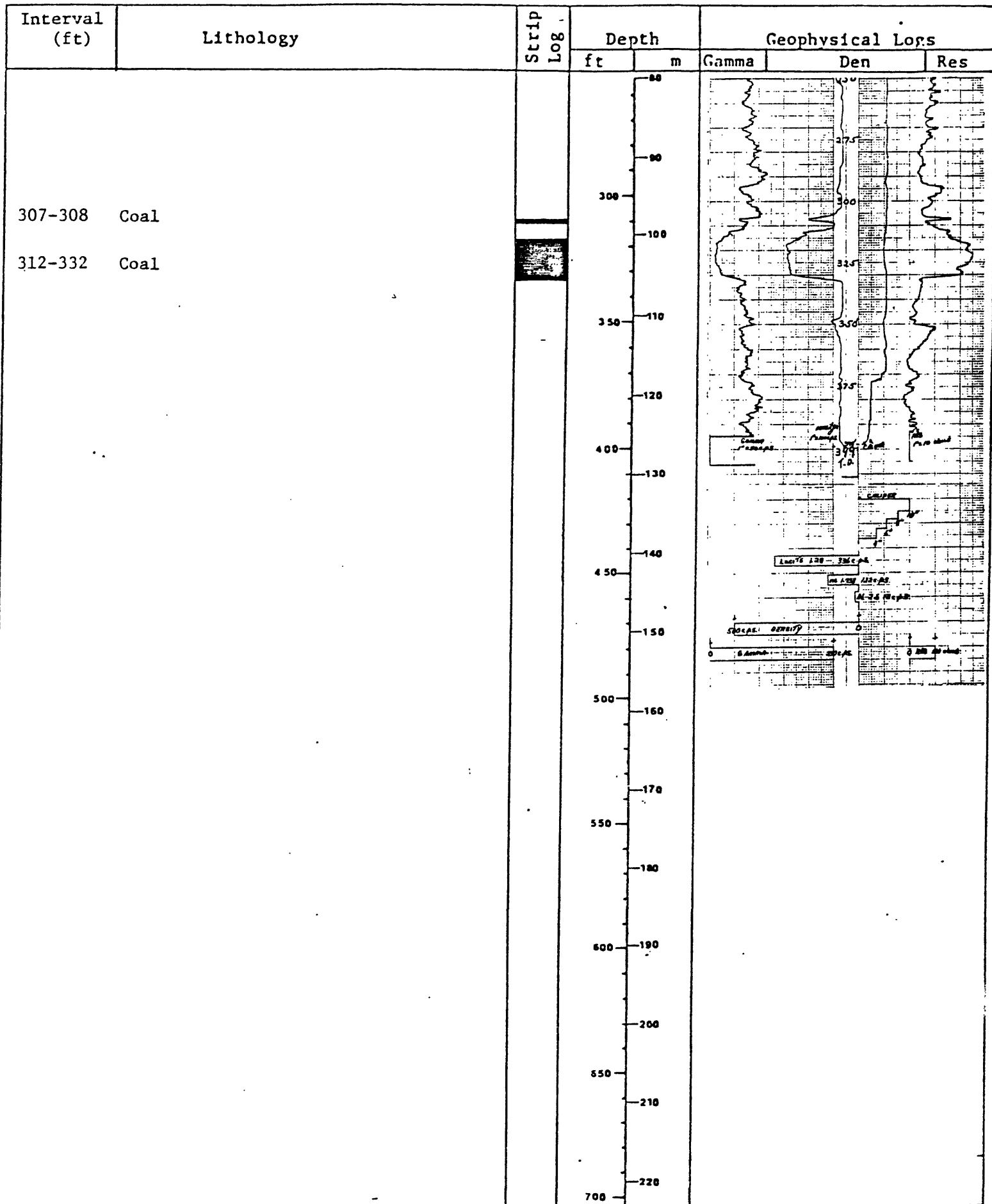
CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>50 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	;	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale	<u>50 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>5 in/in</u>	Logging Speed	<u>15</u>	fpm





LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-7 DATE 11/21/78 SURFACE ELEVATION(ft) 4185

LOCATION NE $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 14 T. 54 N. R. 76 W. Quad. Larey Draw

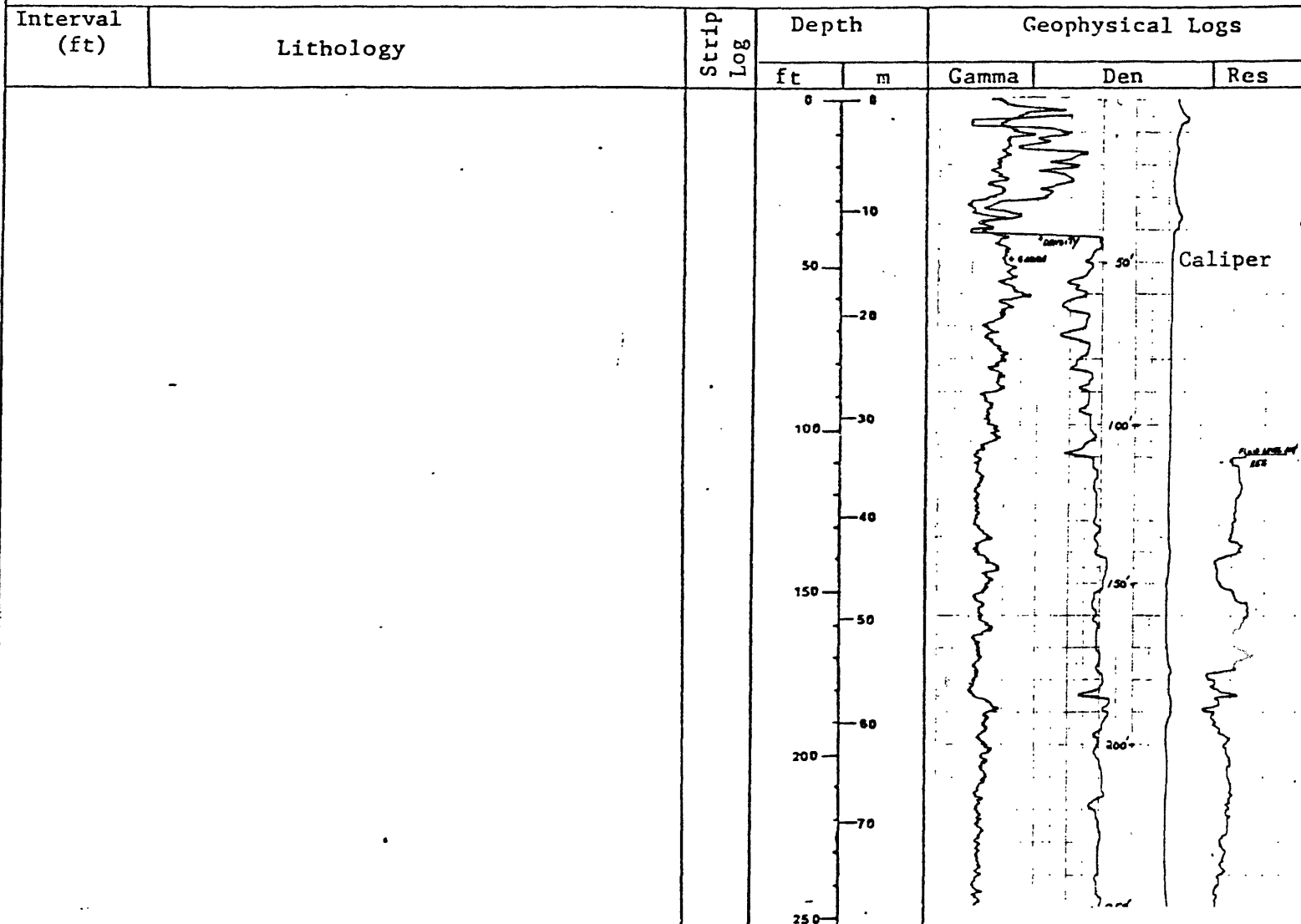
COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 700

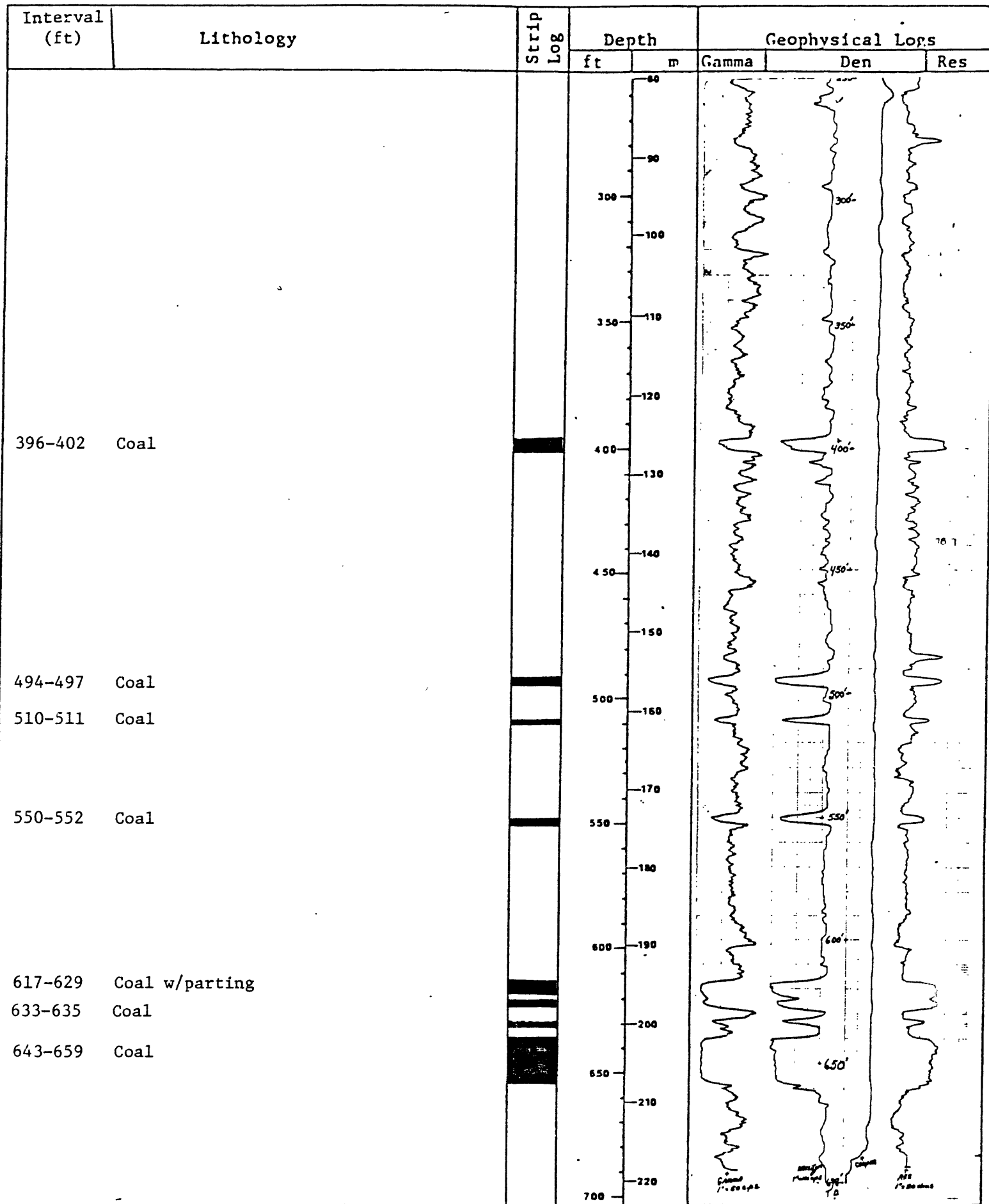
CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>50 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	:	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	:	Scale	<u>100 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale	<u>5 in/in</u>	Logging Speed	<u>15</u>	fpm





Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
			230				
			750				
			240				
			250				
			800				
			260				
			850				
			270				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-8 DATE _____ SURFACE ELEVATION(ft) 4120

LOCATION NW 1/4 NW 1/4 Sec. 4 T. 56 N R. 75 W Quad. Kline Draw

COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 630

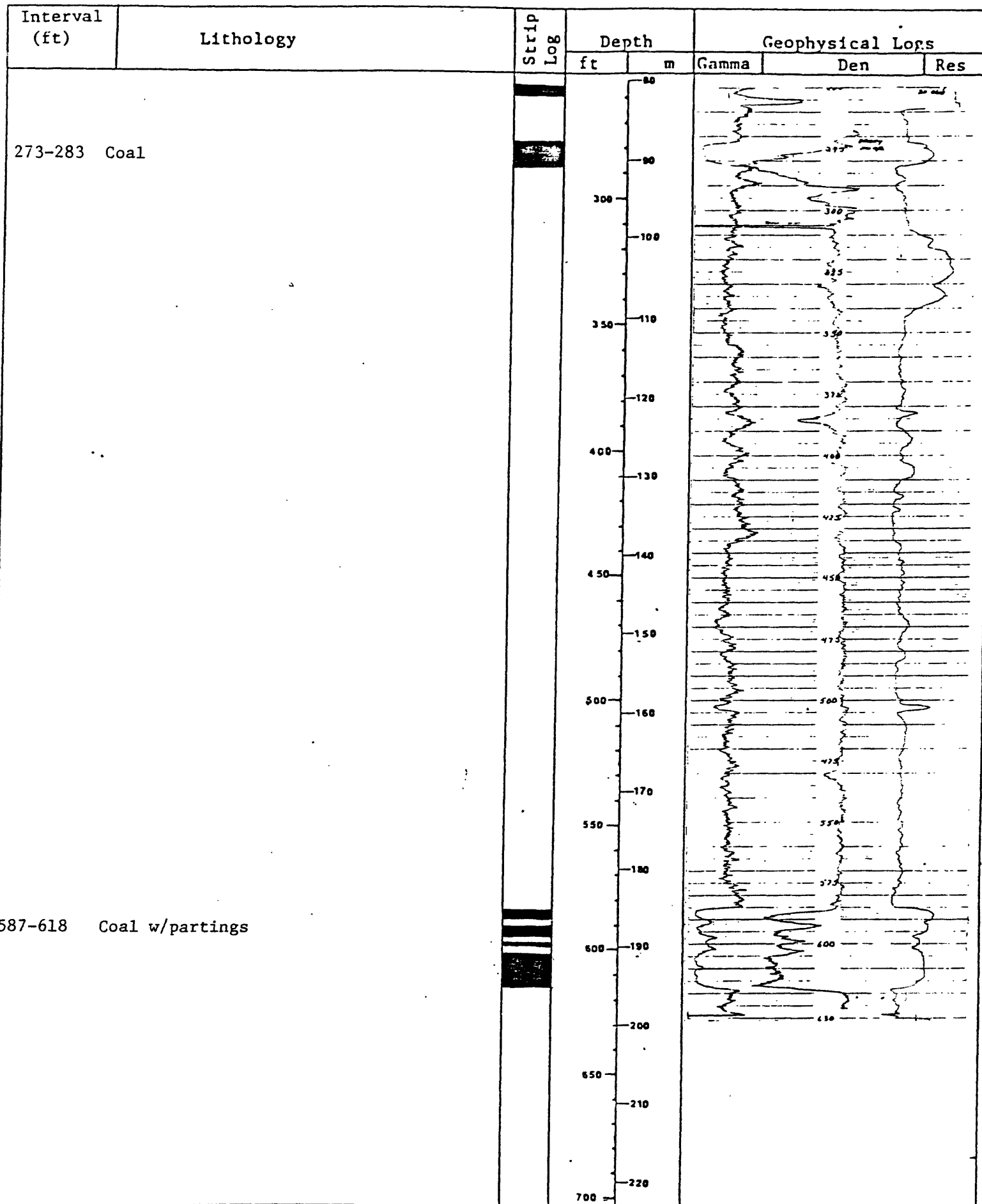
CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>20 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	;	Scale	<u>200 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale	<u>20 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>NA</u>	Logging Speed	<u>NA</u>	fpm

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
38-42	Coal		0	0			
			10				
			50				
			20				
91-93	Coal		100	30			
117-118	Coal		40				
126-132	Coal		150	50			
			50				
			200	60			
			70				
			250				



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-9 DATE 12/7/78 SURFACE ELEVATION(ft) 4105

LOCATION SW¹/₄NE¹/₄ Sec. 20 T. 55 N. R. 75 W. Quad. Larey Draw

COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 796

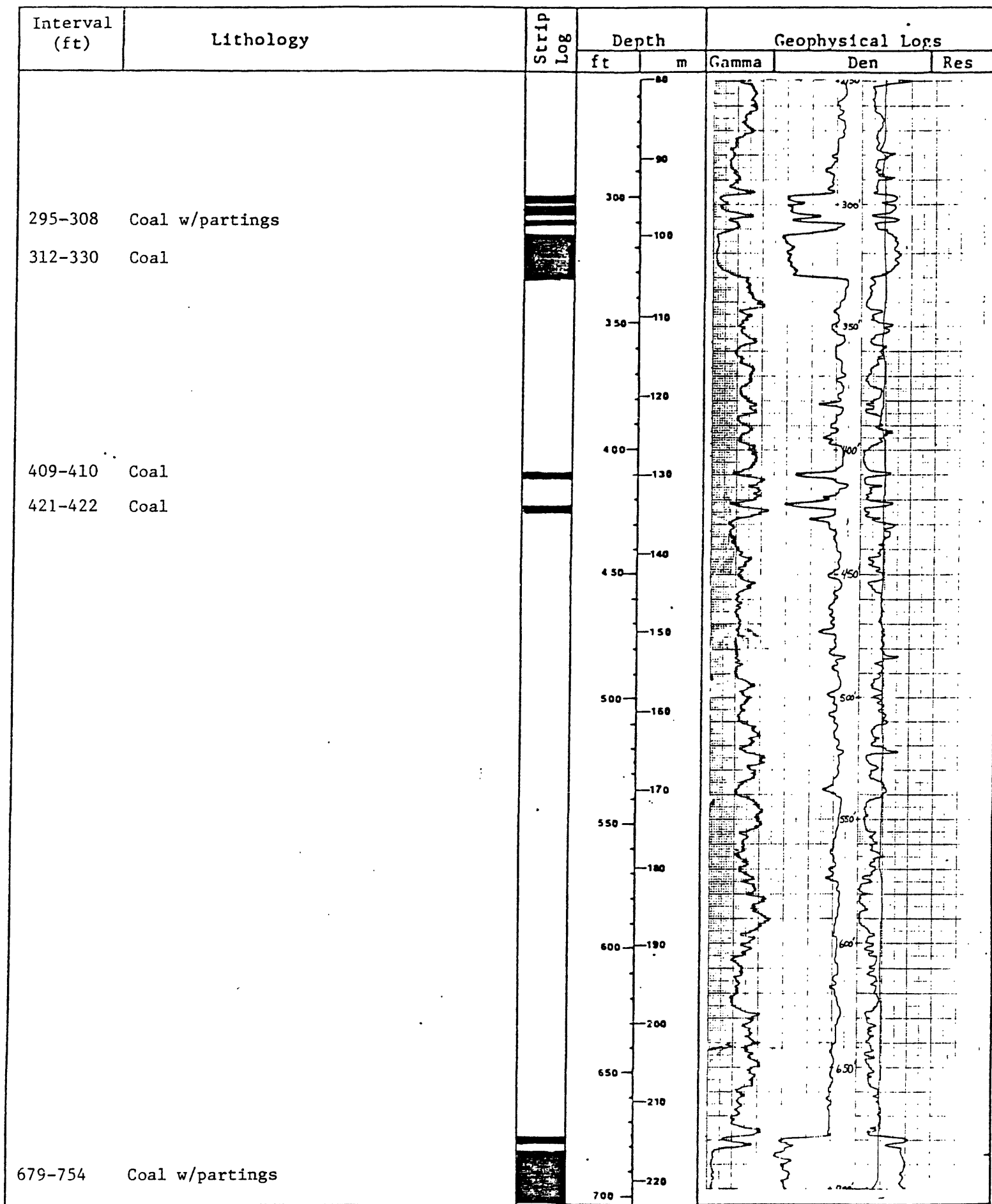
CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>50 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	;	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale	<u>100 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>5 in/in</u>	Logging Speed	<u>15</u>	fpm

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
			0	0			
			10				
			50				
			20				
			30				
			40				
157-162	Coal		150				
			50				
			60				
			200				
			70				
231-234	Coal						
			250				



Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
679-754	Coal w/partings		230				
			750				
			240				
			250				
			800				
			260				
			850				
			270				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-10 DATE 11/17/78 SURFACE ELEVATION(ft) 4115

LOCATION SW $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 24 T. 56 N. R. 75 W. Quad. Reservoir Creek

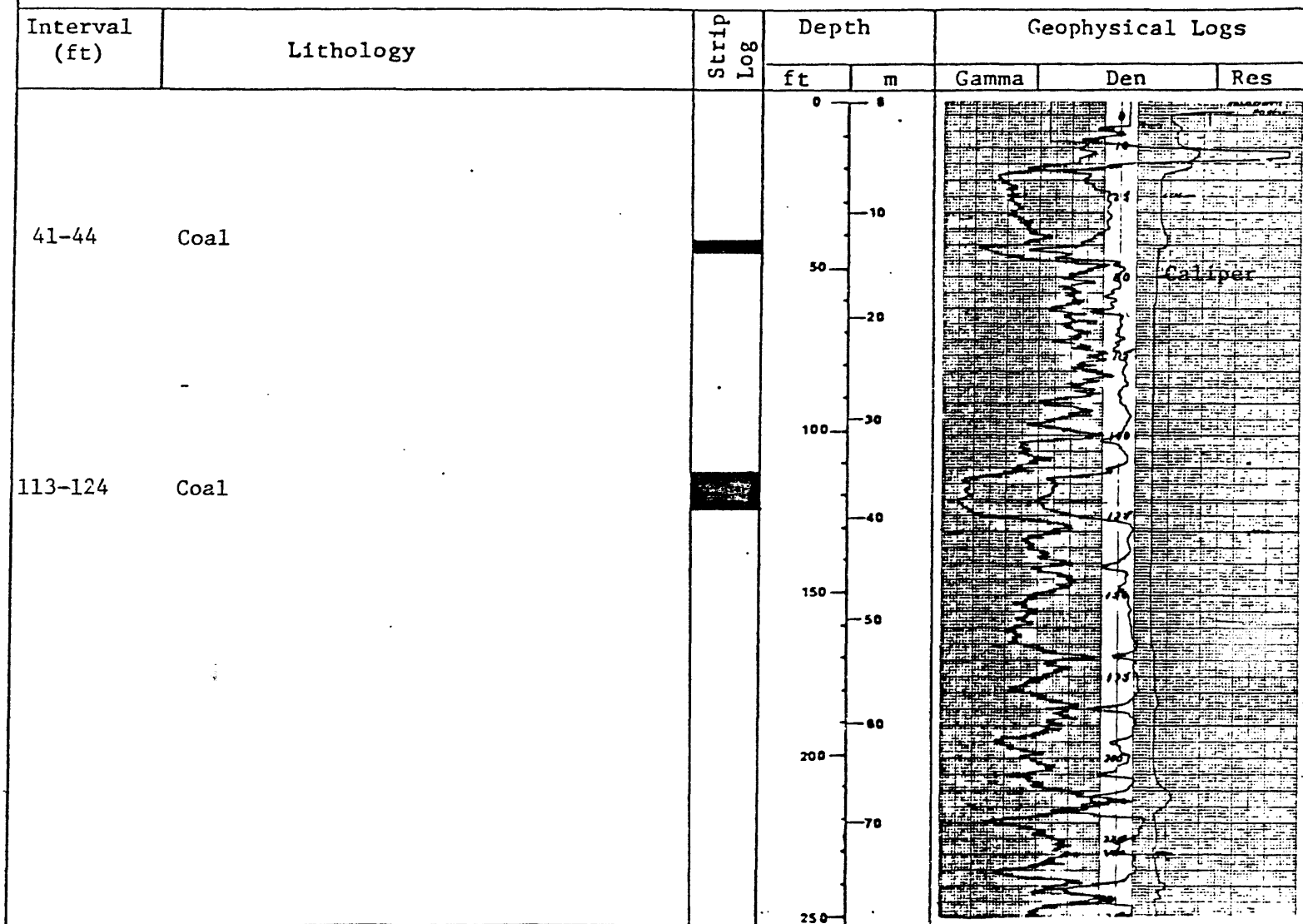
COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 635

CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>20 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	:	Scale	<u>200 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	:	Scale	<u>20 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale		Logging Speed	<u>15</u>	fpm



Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
251-260	Coal			80			
				90			
			300	100			
				110			
336-341	Coal		350	120			
				130			
			400	140			
			450	150			
				160			
			500	170			
				180			
			550	190			
				200			
			600	210			
				220			
			650				
			700				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-11 DATE 10/31/78 SURFACE ELEVATION(ft) 4180

LOCATION SW $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 32 T. 57 N. R. 74 W. Quad. Reservoir Creek

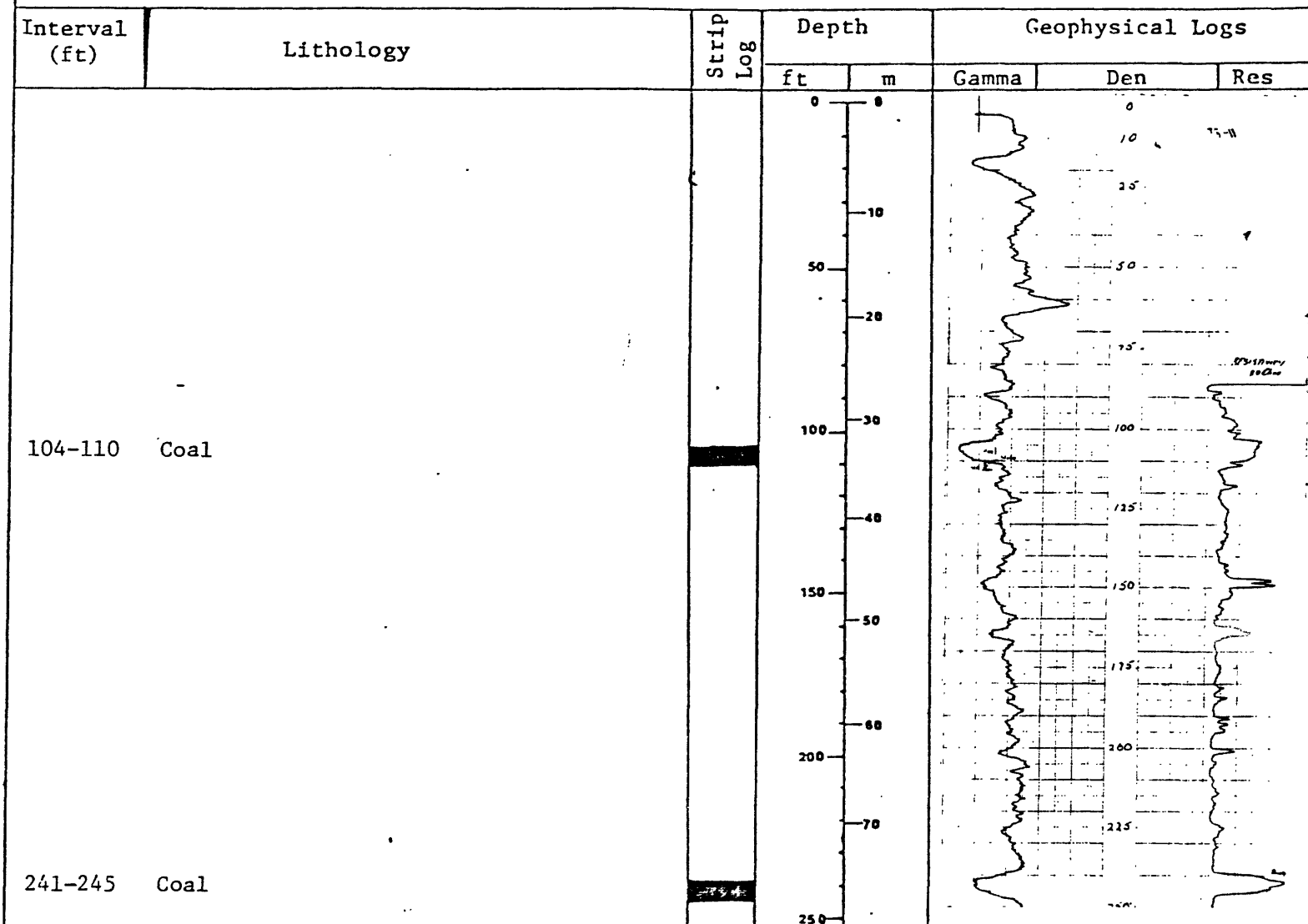
COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 597

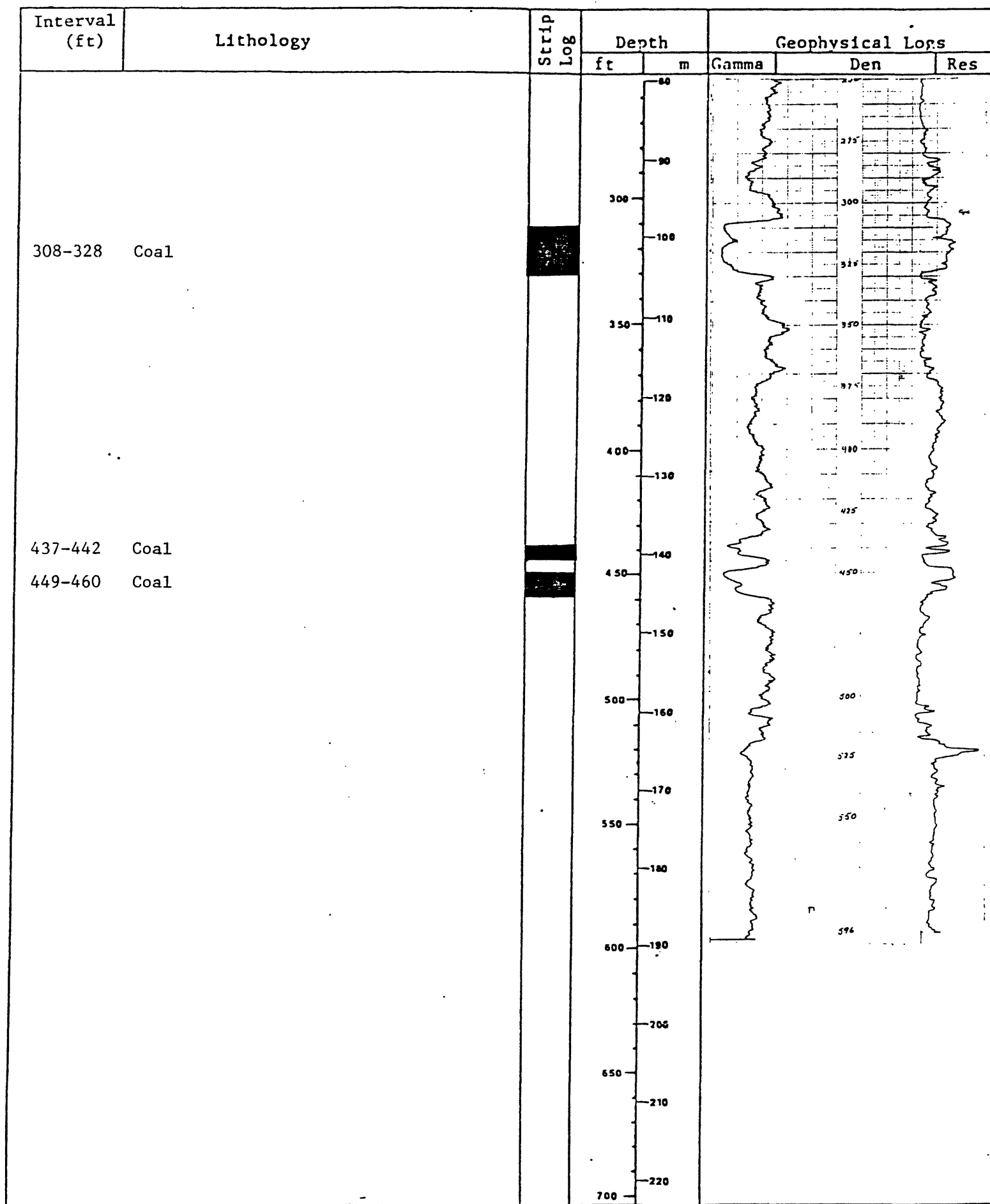
CORED YES ☒ NO ☐ INTERVAL(s) 95-112.7
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>.5 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	;	Scale	<u>NA</u>	Logging Speed	<u>NA</u>	fpm
Resistivity	;	Scale	<u>20 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>NA</u>	Logging Speed	<u>NA</u>	fpm





LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-12 DATE 12/8/78 SURFACE ELEVATION(ft) 4455

LOCATION NE $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 9 T. 54 N. R. 74 W. Quad. Spotted Horse

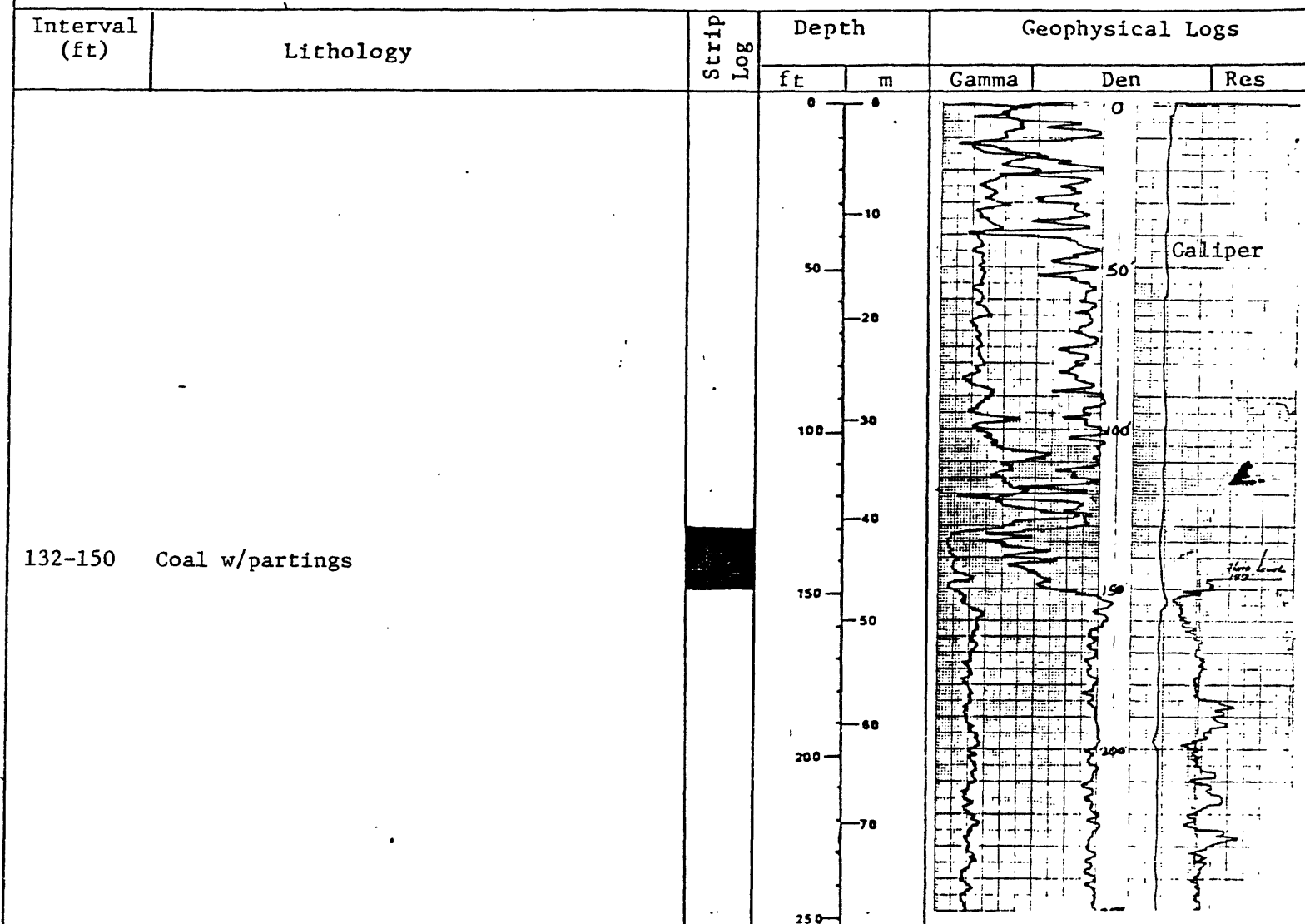
COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 800

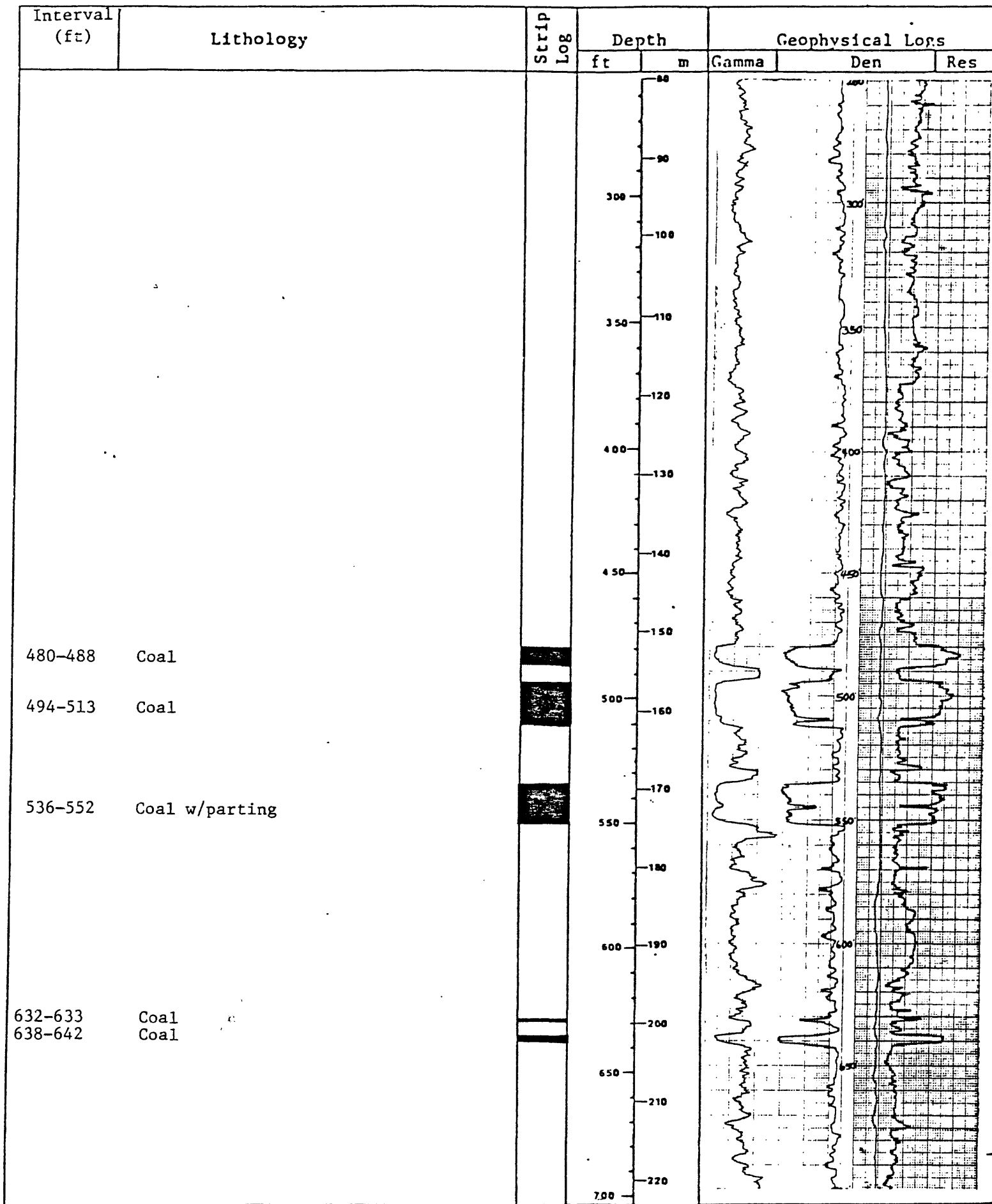
CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>50 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	;	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale	<u>100 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>5 in/in</u>	Logging Speed	<u>15</u>	fpm





Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
744-764	Coal		730				
			750				
			240				
783-785	Coal		250				
			800				
			260				
			850				
			270				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-13 DATE 12/10/78 SURFACE ELEVATION(ft) 4415

LOCATION NE $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 5 T. 53 N. R. 74 W. Quad. Truman Draw

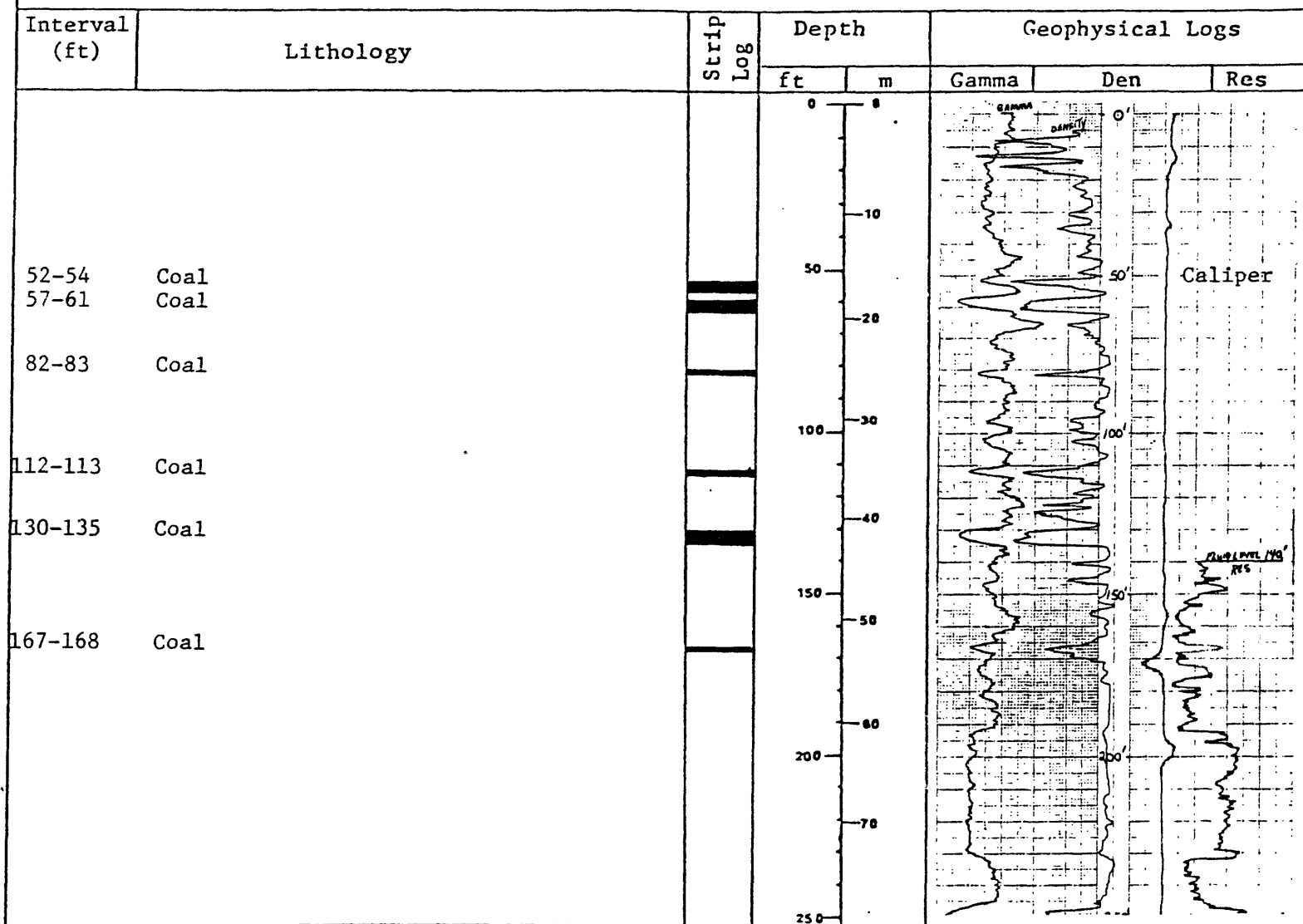
COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 800

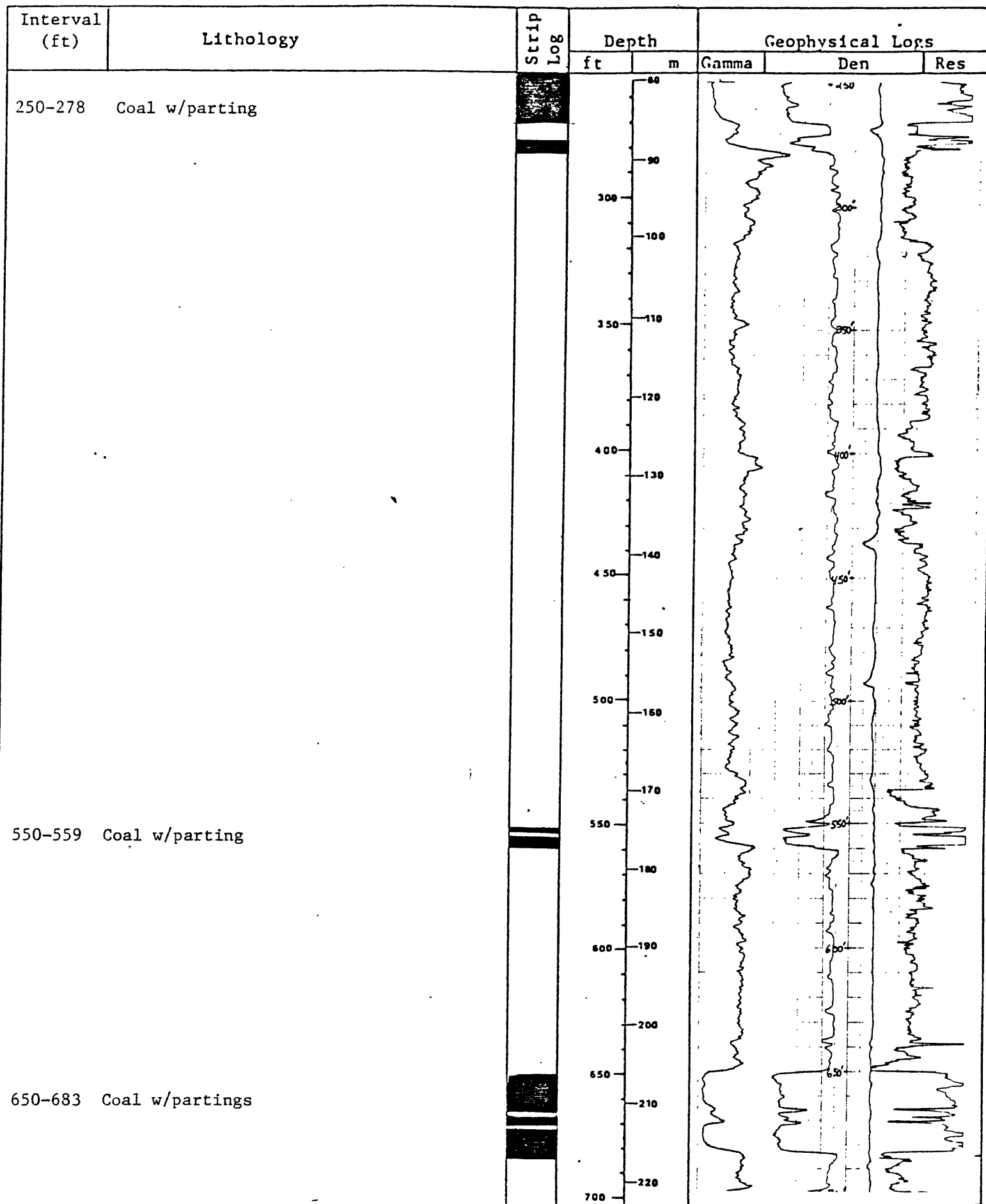
CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

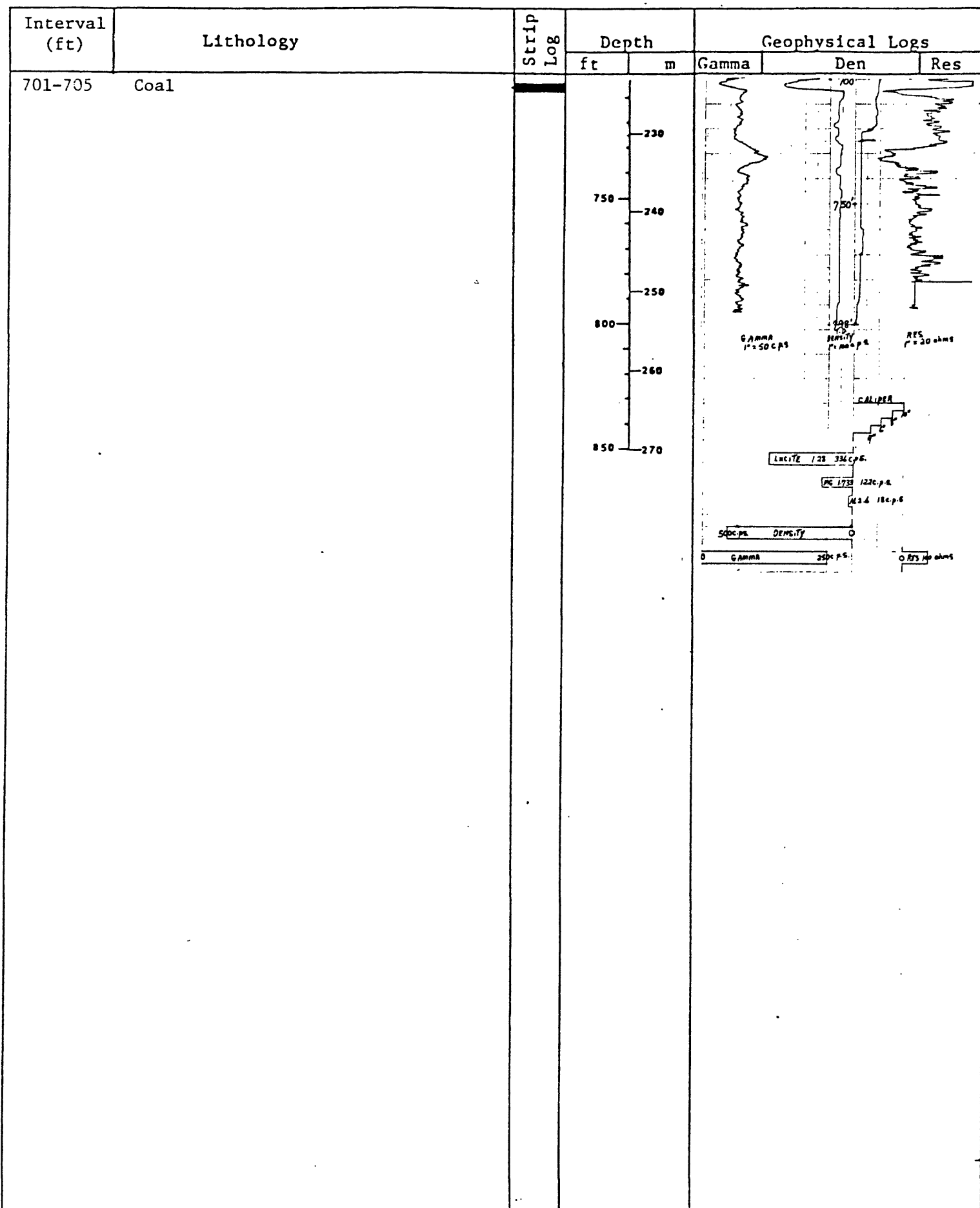
DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>50 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	:	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	:	Scale	<u>100 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale	<u>5 in/in</u>	Logging Speed	<u>15</u>	fpm







LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-14 DATE 12/9/78 SURFACE ELEVATION(ft) 4555

LOCATION NE $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 9 T. 53 N. R. 74 W. Quad. Truman Draw

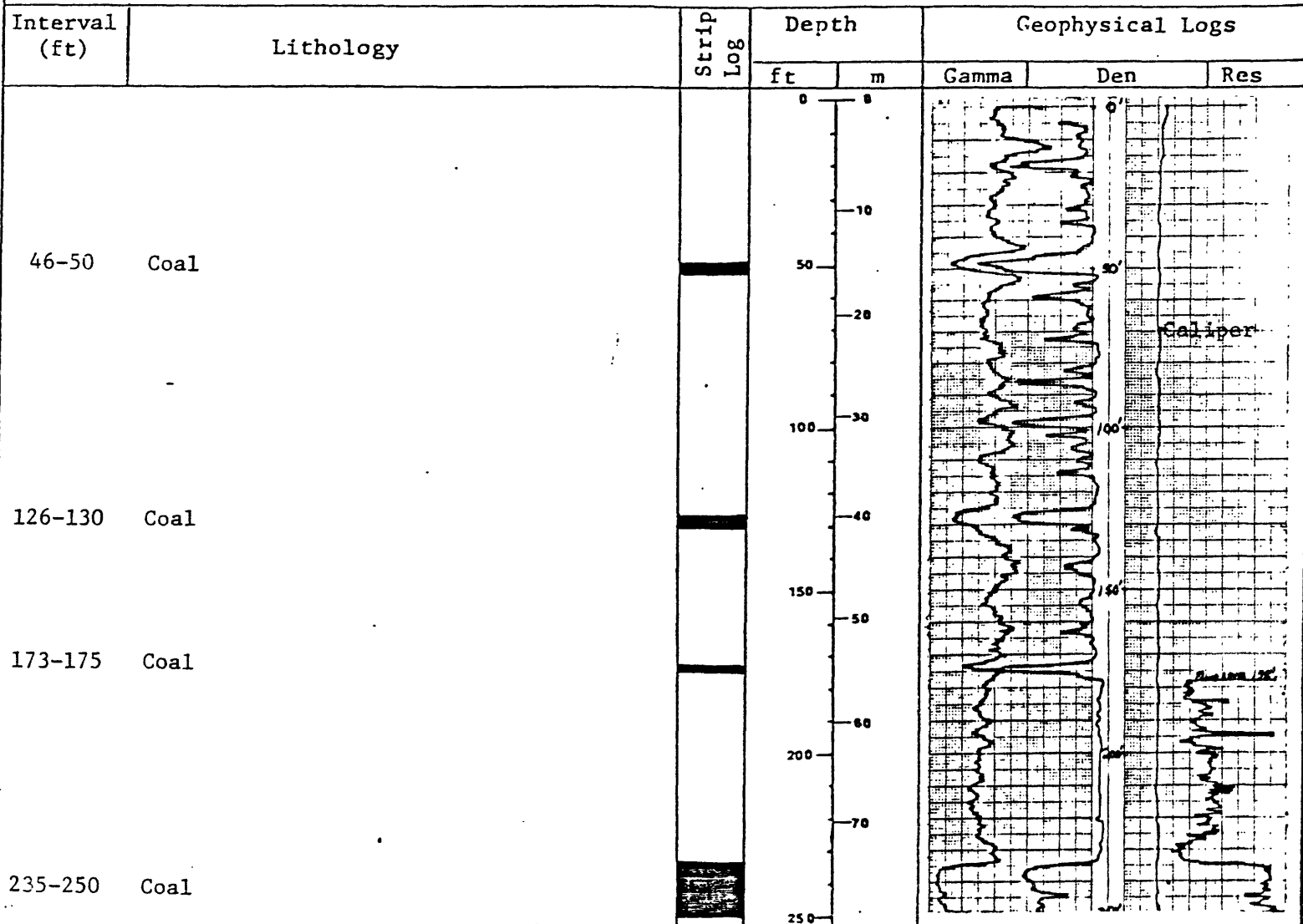
COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 800

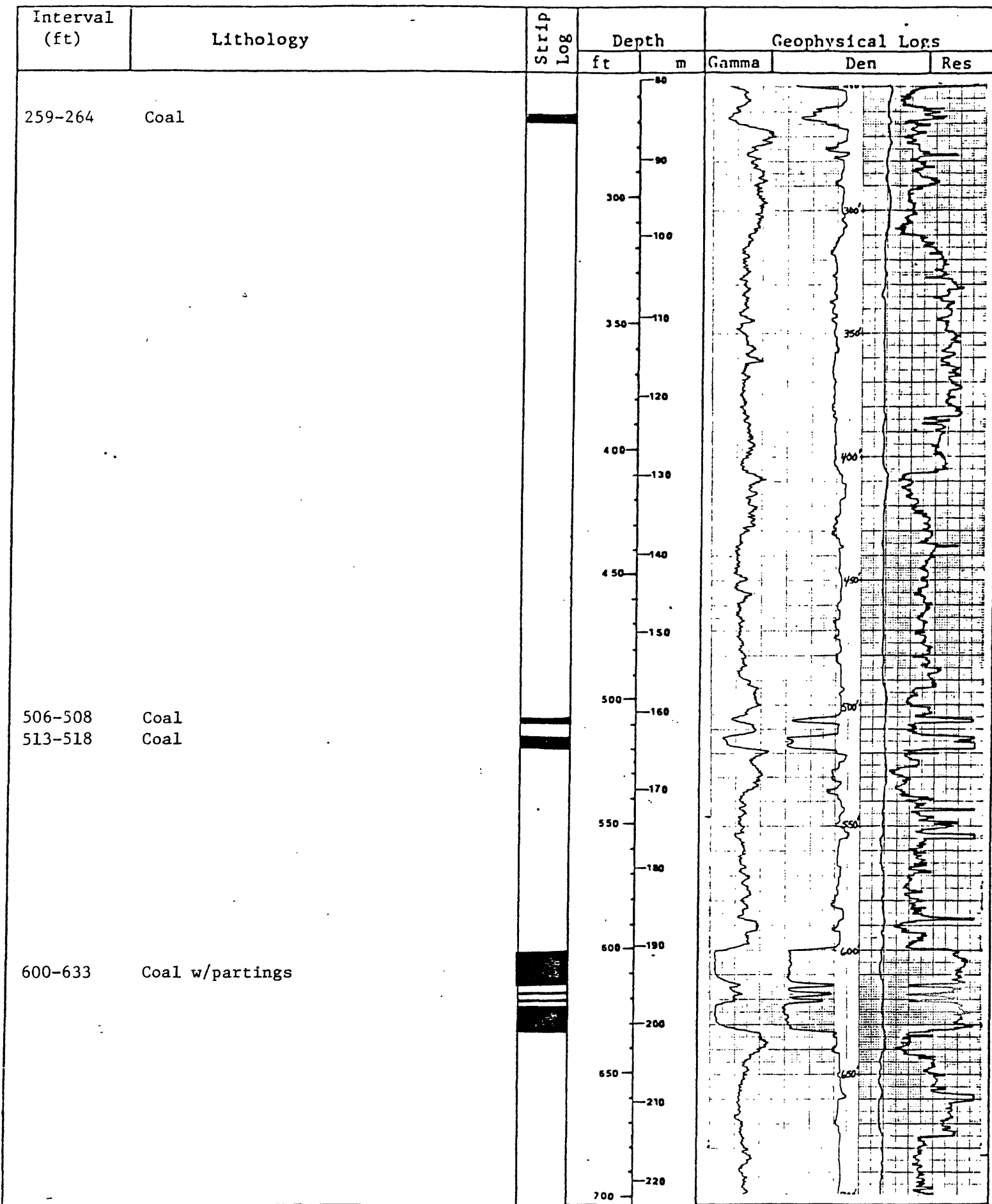
CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

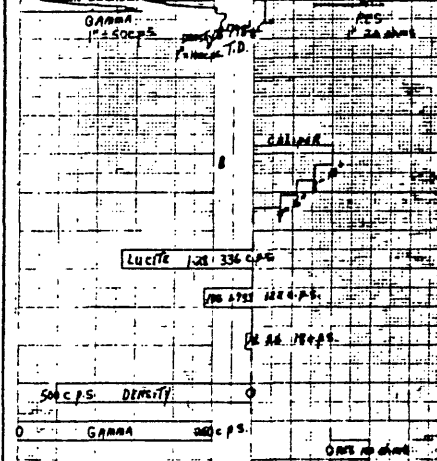
GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>50 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	;	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale	<u>100 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>5 in/in</u>	Logging Speed	<u>15</u>	fpm





Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
752-756	Coal w/parting		230				
			750	240			
781-791	Coal		250				
			800				
			260				
			850	270			



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-15 DATE 7/20/78 SURFACE ELEVATION(ft) 4220

LOCATION NE1/4NW1/4 Sec. 12 T. 56 N. R. 73 W. Quad. White Tail Butte

COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 500

CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	:	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	:	Scale	<u>20 ohm/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale	<u>4 in/in</u>	Logging Speed	<u>15</u>	fpm

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
0-31	Mudstone, medium-light-gray, sandy		0	0			
31-63	Coal, interbedded with shale, black carbonaceous		10				
63-103	Mudstone, medium-gray, silty		50				
103-158	Sandstone, medium-light-gray, fine grain, slightly muddy		100				
158-171	Coal with large sandstone parting		150				
171-192	Mudstone, brownish-black, carbonaceous, shaly		200				
192-209	Mudstone, medium-gray, sandy toward bottom		250				
209-312	Sandstone, medium-light-gray, fine grain, slightly muddy, occasional shale streaks						

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
312-332	Coal		80				
			90				
332-397	Shale, brownish-black, carbonaceous, coaly stringers with coal 394 to 397 ft. muddy		300				
			100				
			350				
			110				
			120				
397-417	Mudstone, brownish-gray, carbonaceous, shaly at top, sandy at bottom		400				
			130				
417-479	Sandstone, medium-light-gray, fine grain, slightly muddy and shaly in spots, pyrite nodules scattered through		450				
			140				
			150				
479-500	Mudstone, medium-gray, shaly at top silty		500				
			160				
			170				
			550				
			180				
			600				
			190				
			200				
			650				
			210				
			220				
			700				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-16 DATE 7/21/78 SURFACE ELEVATION(ft) 4060

LOCATION NW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 10 T. 56 N. R. 72 W. Quad. Rocky Butte S.W.

COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 380

CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	;	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale	<u>20 ohm/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>NA</u>	Logging Speed	<u>NA</u>	fpm

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
0-10	Alluvium		0	0			
10-100	Mudstone, medium-gray, slightly sandy		10				
			50				
			20				
100-108	Coal, shaly		100	30			
108-160	Shale, dusky brown, interbedded with mudstone, sandy						
			40				
160-168	Coal		150	50			
168-221	Sandstone, medium-light-gray, fine grained, muddy, hard calcareous layer 181 to 183 ft.						
			60				
			200				
221-228	Coal						
228-258	Sandstone, medium-gray, muddy, shaly streak		70				
			250				

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
258-284	Shale, dusky brown, carbonaceous to coaly			80			
284-287	Coal			90			
287-362	Sandstone, medium-light-gray, fine-grain, muddy at top, shaly in spots, strong sulfur smell at 318 ft.		300	100			
			350	110			
362-380	Shale, brownish-gray, slightly carbonaceous			120			
			400	130			
				140			
			450	150			
				160			
			500	170			
				180			
			550	190			
				200			
			600	210			
				220			
			650				
			700				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-18 DATE 7/19/78 SURFACE ELEVATION(ft) 3965

LOCATION NW¹/₄ NW¹/₄ Sec. 29 T. 56 N. R. 72 W. Quad. White Tail Butte

COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 426

CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	:	Scale	<u>1000 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	:	Scale	<u>20 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale	<u>3 in/in</u>	Logging Speed	<u>15</u>	fpm

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
0-10	Alluvium		0	0			
10-64	Burned Rock						
64-99	Siltstone, medium-light-gray, muddy, shaly in spots		50	15			
99-108	Mudstone, medium-light-gray, carbonaceous, shaly toward bottom		100	30			
108-114	Mudstone, black, carbonaceous, shaly						
114-129	Coal						
129-132	Shale, brownish-black, carbonaceous		40	12			
132-161	Mudstone, medium-gray, interbedded with shale, calcareous near bottom		150	46			
161-165	Shale, black, carbonaceous		50	15			
165-169	Coal, black, shaly						
169-205	Mudstone, dusky brown, calcareous, interbedded with shale, black, carbonaceous		60	18			
205-213	Shale, dark-gray, carbonaceous		200	61			
213-216	Coal						
216-220	Shale, medium-dark-gray, slightly silty		70	21			
220-250	Siltstone, medium-dark-gray, muddy, carbonaceous in spots						
250-259	Mudstone, medium-dark-gray, carbonaceous		250	76			

78-18

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
259-270	Coal			80			
270-288	Shale, medium-gray, silty in spots			90			
288-368	Sandstone, medium-light-gray, fine grain, muddy, shaly at top		300	100			
			350	110			
368-390	Mudstone, medium-light-gray, interbedded with sandstone, medium-light-gray, fine grain, (wash out 375-378)			120			
390-399	Coal			400			
399-420	Sandstone, medium-gray, fine grain very calcareous 407-409, wash out 402-405			130			
420-425	Limestone, medium-light-gray, very hard			140			
			450	150			
			500	160			
				170			
			550	180			
				190			
			600	200			
			650	210			
				220			
			700				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-19 DATE 7/22/78 SURFACE ELEVATION(ft) 4020

LOCATION NW 1/4 NE 1/4 Sec. 8 T. 56 N. R. 72 W. Quad. White Tail Butte

COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 460

CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale	<u>20 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>NA</u>	Logging Speed	<u>NA</u>	fpm

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
0-5	Soil		0	0			
5-21	Mudstone, dusky brown, carbonaceous						
21-52	Shale, dusky brown, carbonaceous at top with coal stringer 37-38 ft, gypsum rosettes						
52-67	Coal		50				
67-83	Shale, brownish-black, muddy at top						
83-91	Sandstone, medium-light-gray, fine grain						
91-108	Mudstone, medium-gray, carbonaceous, shaly at top		100	30			
108-114	Coal, very shaly						
114-120	Mudstone, medium-gray, silty, slightly shaly and carbonaceous						
120-122	Coal, very shaly						
122-134	Shale, medium-gray, silty at top, slightly carbonaceous		150	50			
134-152	Sandstone, medium-light-gray, fine grained, slightly muddy						
152-154	Limestone, light-gray, hard						
154-188	Shale, black, carbonaceous, silty, alternating with mudstone, medium-dark-gray, silty		200	60			
188-196	Coal						
196-239	Siltstone, medium-gray, slightly muddy and carbonaceous						
239-279	Sandstone, light-gray, fine grain, damp, interbedded with mudstone toward bottom, washouts(?) at 260-275 ft.		250	70			

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
279-285	Mudstone, medium-gray, sticky			80			
285-323	Sandstone, medium-light-gray, fine grain, muddy in spots			90			
			300				
323-347	Shale, brownish-black, carbonaceous, muddy, sandstone stringer near top			100			
347-356	Coal						
356-365	Shale, black, carbonaceous, muddy toward bottom		350	110			
365-382	Mudstone, medium-gray, shaly, sandy toward bottom, silicious bottom foot			120			
382-397	Shale, black, carbonaceous, muddy						
397-406	Coal		400				
406-442	Mudstone, medium-dark-gray, shaly			130			
442-448	Sandstone, medium-gray, fine grain			140			
448-458	Shale, dark-gray, carbonaceous at top, pyrite nodules		450				
				150			
			500	160			
				170			
			550				
				180			
			600	190			
				200			
			650				
				210			
				220			
			700				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-20 DATE 8-1-78 SURFACE ELEVATION(ft) 4200

LOCATION NE 1/4 SE 1/4 Sec. 4 T. 57 N. R. 73 W. Quad. Corral Creek

COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 560

CORED YES ☒ NO ☐ INTERVAL(s) 71-79, 8-100, 329-368, 440-469
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	;	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale	<u>20 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>5 in/in</u>	Logging Speed	<u>15</u>	fpm

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
0-19	Sandstone, brownish-gray, fine-grained, muddy		0	0			
19-20	Coal, shaly						
20-35	Shale, brownish-black, carbonaceous, muddy		10				
35-68	Mudstone, medium-gray, silty, shaly 50-56 ft.		50				
68-78	Coal, black, shale parting 70-72 ft.		20				
78-82	Mudstone, medium-light-gray, sandy						
82-96	Coal, black, shale partings						
96-101	Shale, black, coaly						
101-115	Sandstone, medium-light-gray, fine-grained, muddy		100	30			
115-120	Coal, black, shaly, washed out						
120-129	Shale, dusky brown, carbonaceous to coaly		40				
129-138	Sandstone, light-gray, fine-grained, muddy		150				
138-140	Limestone, light-gray, hard		50				
140-145	Mudstone, light-blue, slight silt						
145-168	Siltstone, very light-gray, muddy						
168-329	Sandstone, light-gray with brown pockets near bottom, fine-grained, limestone lense, muddy		200				
			70				
			250				

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
329-365	Coal, black, shaly at top		80				
			90			325	
			300			300	
			100			325	
			350	110		350	
365-368	Sandstone, light-gray, fine-grained, muddy						
368-390	Mudstone, dark-gray, silty, alternating with shaly zones		120				
390-423	Mudstone, dark-gray, alternating hard calcareous and shaly beds		400			400	
423-429	Shale, dusky brown, carbonaceous, coaly. 423-425		130				
429-450	Mudstone, brownish-gray, carbonaceous slightly shaly, calcareous at bottom					425	
450-469	Coal		140				
			450			450	
469-476	Mudstone, medium-gray, shaly						
476-482	Limestone, medium-light-gray, hard		150				
482-490	Sandstone, medium-light-gray, fine-grained						
490-495	Coal, black, shale parting		500				
495-558	Mudstone, medium-gray, alternating hard calcareous and shaly beds		160				
			170				
			550				
			180				
			600	190			
			200				
			650				
			210				
			220				
			700				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-21 DATE 7/26/78 SURFACE ELEVATION(ft) 4200

LOCATION SW $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 6 T. 57 N. R. 73 W. Quad. Corral Creek

COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 560

CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	;	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale	<u>50 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>NA</u>	Logging Speed	<u>NA</u>	fpm

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
0-5	Soil		0	0			
5-20	Mudstone, medium-light-gray and brownish-gray, shaly						
20-99	Mudstone, medium-gray, silty with brownish-gray shaly streaks		10				
			50				
			20				
99-125	Mudstone, dusky brown, slightly carbonaceous, shaly		100	30			
125-152	Coal, black, mudstone parting		40				
152-174	Mudstone, greenish-gray, sandy at top very shaly at bottom, some pyrite		150	50			
174-315	Sandstone, light-gray, fine-grained, slightly muddy, very unconsolidated 197 to 220 ft, limestone lenses at 220 to 222 ft. and 272 to 276 ft. very hard		200	60			
			70				
			250				

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
315-322	Mudstone, light-gray, sandy, shaly		80				
322-331	Coal with partings		90				
331-348	Shale, black, carbonaceous, muddy at top		100				
348-390	Sandstone, medium-gray, fine grained, muddy		110				
390-398	Coal		120				
398-411	Sandstone, brownish-gray, medium- to fine-grained, unconsolidated, calcareous lense at bottom		130				
411-455	Sandstone, medium-gray, fine-grained, muddy, calcareous lenses at bottom		140				
445-472	Mudstone, brownish-gray, sandy		150				
472-484	Shale, dusky brown, carbonaceous, muddy at top, coaly 483-484 ft.		160				
484-494	Mudstone, black, carbonaceous, shaly		170				
494-501	Mudstone, medium-gray, sandy		180				
501-506	Shale, black, carbonaceous		190				
506-510	Coal		200				
510-520	Shale, black, carbonaceous, muddy at bottom		210				
520-543	Coal, black, muddy		220				
543-550	Mudstone, medium-dark-gray, carbonaceous shaly		230				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-22 DATE 7/25/78 SURFACE ELEVATION(ft) 4050

LOCATION SW $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 22 T. 57 N. R. 73 W. Quad. Corral Creek

COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 380

CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	;	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale	<u>20 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>NA</u>	Logging Speed	<u>NA</u>	fpm

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
0-26	Mudstone, dusky brown, carbonaceous, silty, shaly		0	0			
26-35	Coal						
35-57	Mudstone, dusky brown, carbonaceous, silty		10				
57-100	Mudstone, greenish- to light-bluish-gray, slightly silty, sticky, very hard (SiO ₂ ?) lenses at 57 to 58 and 83 to 84 ft		50				
99-105	Coal, shaly		100	30			
105-120	Mudstone, brownish-black, carbonaceous,						
120-155	Mudstone, very light gray, shaly		40				
155-199	Shale, brownish-black, carbonaceous, calcareous 160 to 165 ft, muddy		150	50			
199-239	Coal, black, two partings		200	60			
239-322	Mudstone, dusky brown, carbonaceous, coal stringer 290 to 293 ft., sandy top and bottom, shaly in center		250	70			

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
322-325	Coal			88			
325-330	Shale, black, carbonaceous			90			
330-352	Coal		300	100			
				110			
352-361	Shale, black, carbonaceous, muddy toward bottom		350	110			
361-371	Coal, shaly on bottom			120			
371-380	Shale, black, carbonaceous			130			
			400	140			
				150			
			450	160			
				170			
			500	180			
				190			
			550	200			
				210			
			600	220			
				230			
			650	240			
				250			
			700	260			

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-23 DATE 10/18/78 SURFACE ELEVATION(ft) 4143

LOCATION NW $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 13 T. 57 N. R. 75 W. Quad. Dead Horse Lake

COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 500

CORED YES ☒ NO ☐ INTERVAL(s) 213.6 - 262.7
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>50 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	:	Scale	<u>200 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	:	Scale	<u>20 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale	<u>5 in/in</u>	Logging Speed	<u>15</u>	fpm

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
0-17	Alluvium		0	0			
17-21	Shale, dusky brown, carbonaceous						
21-57	Mudstone, medium-gray, interbedded with shale, coal streak 37 to 40 ft. sandy toward bottom		10				
57-68	Shale, medium-gray, silty		50				
68-79	Coal		20				
79-117	Mudstone, medium-gray, shaly		100	30			
117-163	Sandstone, medium-light-gray, fine grain, slightly muddy, highly calcareous 128-138		40				
163-217	Mudstone, brown-gray, carbonaceous, interbedded with shale, brownish-black, carbonaceous		150	50			
217-255	Coal, shaly at base		200	80			
			70				
			250				

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
255-271	Siltstone, medium-light-gray, muddy			80			
271-289	Mudstone, medium-gray, silty, very calcareous 283 to 289 ft.			90			
289-317	Shale, medium-gray, muddy			300			
317-326	Coal, shale parting at top			100			
327-339	Shale, brownish-black, carbonaceous			110			
339-341	Sandstone, pale blue-green, very fine grain			350			
341-394	Shale, greyish-brown, sandy in spots (pale blue green near bottom)			120			
394-466	Sandstone, pale blue-green, very fine grain, calcareous 418 to 420 ft. and 453 to 456 ft. (very hard)			400			
466-467	Coal			130			
467-473	Shale, brownish-black, carbonaceous			140			
473-500	Sandstone, pale blue-green, very fine grained, muddy, shaly at bottom			450			
				150			
				500			
				160			
				170			
				550			
				180			
				600			
				190			
				200			
				650			
				210			
				220			
				700			

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-25 DATE 11/2/78 SURFACE ELEVATION(ft) 3985

LOCATION SW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 28 T. 57 N. R. 74 W. Quad. Dead Horse Lake

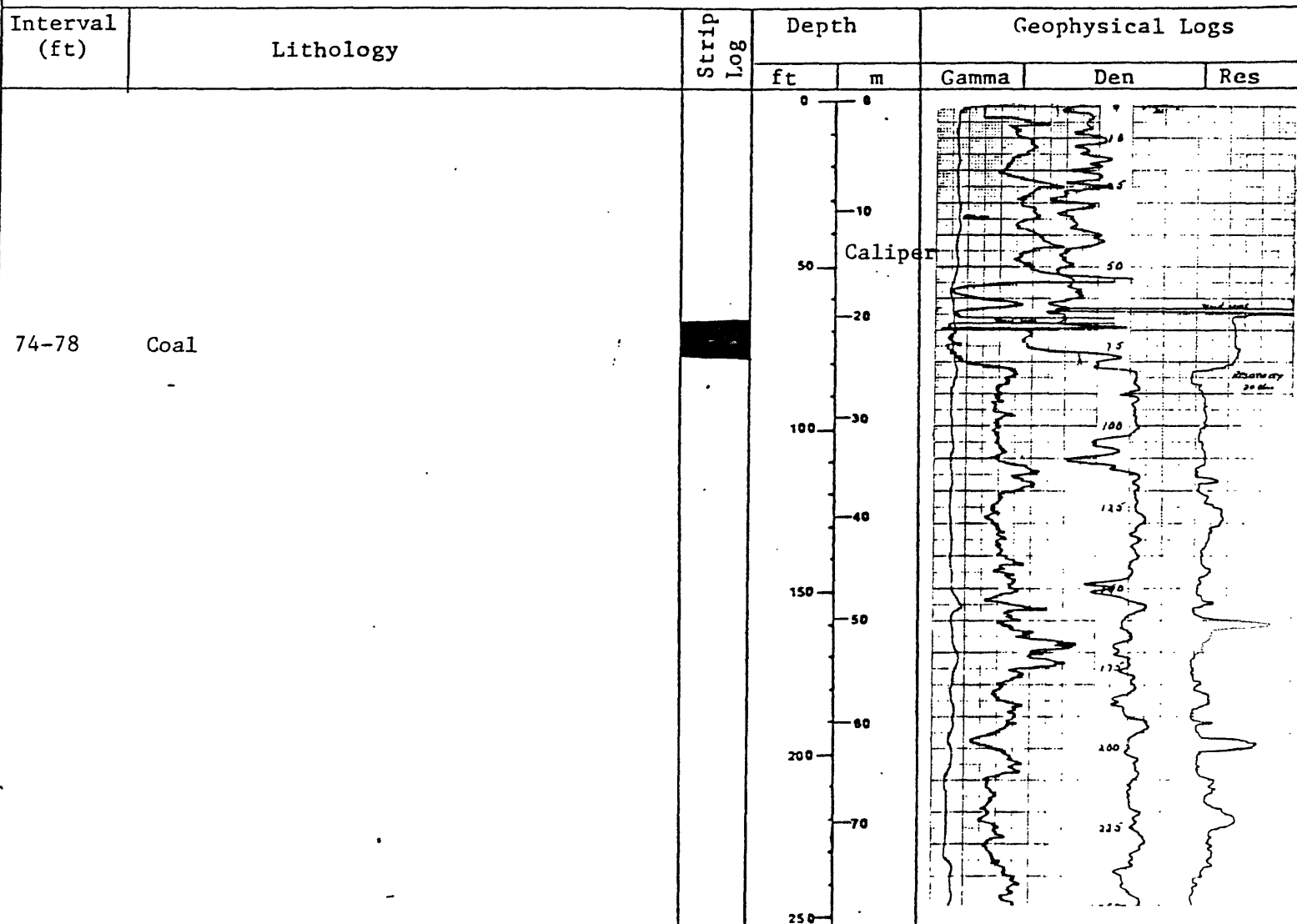
COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 450

CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>5 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	:	Scale	<u>200 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	:	Scale	<u>20 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale	<u>5 in/in</u>	Logging Speed	<u>15</u>	fpm



Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
			80			330	
			90			325	
			300			300	
			100			325	
			350			350	
			110			335	
			120			335	
			400			400	
			130			425	
			140			442	
			450				
			150				
			500				
			160				
			170				
			550				
			180				
			600				
			190				
			200				
			650				
			210				
			220				
			700				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-26 DATE 10/11/78 SURFACE ELEVATION(ft) 3980

LOCATION NW $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 29 T. 58 N. R. 74 W. Quad. Dead Horse

COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 500

130-157.3 395.3-415.3

CORED YES ☒ NO ☐ INTERVAL(s) 244-254.6
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>50 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	;	Scale	<u>200 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale	<u>20 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>5 in/in</u>	Logging Speed	<u>15</u>	fpm

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
0-2	Mudstone, dusky brown, shaly		0	0			
2-10	Mudstone, light-bluish-gray, shaly						
10-15	Coal, shale parting						
15-24	Shale, dusky brown, carbonaceous						
24-133	Mudstone, light-gray, sandy, shaly 78-95 ft. and 128 to 133 ft.		50				
			20				
			100	30			
33-157	Coal, grayish-black, shaly top and bottom		40				
			150				
57-245	Mudstone, medium-gray, interbedded with shale, medium gray, carbonaceous at bottom		50				
			80				
			200				
			70				
45-251	Coal		250				

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
251-287	Mudstone, medium-gray, carbonaceous at top		80				
287-296	Shale, medium-dark-gray		90				
296-313	Mudstone, brownish-gray, sandy, shaly in spots		300				
313-349	Shale, medium-gray, muddy, carbonaceous streaks		100				
349-351	Coal		110				
351-392	Sandstone, medium-light-gray, very fine grained, muddy at top		350				
			120				
392-397	Shale, brownish-black, carbonaceous		400				
397-412	Coal		130				
412-421	Shale, medium-light-gray, muddy		140				
421-500	No cuttings		450				
			150				
464-466	Coal		160				
469-472	Coal		170				
487-490	Coal		500				
			180				
			550				
			190				
			200				
			650				
			210				
			220				
			700				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-27 DATE 7/24/78 SURFACE ELEVATION(ft) 3940

LOCATION SW $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 34 T. 58 N. R. 72 W. Quad. Homestead Draw

COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 460

CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

DRILLING MEDIUM: ☒ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	;	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale	<u>20 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>NA</u>	Logging Speed	<u>NA</u>	fpm

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
0-12	Mudstone, medium-light-gray, shaly		0	0			
12-23	Sandstone, medium-light-gray, fine-grained						
23-27	Shale, brownish-black, carbonaceous, muddy		10				
27-35	Coal, black, with mudstone parting						
35-45	Shale, black, carbonaceous, muddy		50				
45-78	Mudstone, dusky brown to medium-gray, carbonaceous top and bottom		20				
78-112	Mudstone, medium-gray, silty						
112-123	Mudstone, brownish-black, carbonaceous		100	30			
123-125	Shale, black, carbonaceous						
125-162	Mudstone, medium-gray, silty, calcareous lense 147 to 149 ft.		40				
162-167	Coal		150	50			
167-192	Mudstone, grayish-black, very carbonaceous, shaly						
192-207	Coal, black, with mudstone parting		60				
207-218	Shale, black, carbonaceous, muddy		200				
218-244	Mudstone, medium-light-gray, shaly, pyrite nodules		70				
244-309	Sandstone, very light-gray, fine-grained pyrite nodules, shaly streaks of		250				

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
	brownish-gray and light bluish-gray, shaly at bottom		80				
309-320	Coal		90				
320-337	Mudstone, medium-gray, silty, shale streak 327 to 329 ft.		100				
337-355	Mudstone, dusky brown, carbonaceous, shaly		110				
355-361	Coal with parting		120				
361-374	Shale, black, carbonaceous, muddy at top, coaly at bottom		130				
374-385	Mudstone, dusky brown, sandy toward base, shaly		140				
385-402	Sandstone, medium gray, fine grained		150				
402-460	Mudstone, medium-gray, sandy toward base		160				
			170				
			180				
			190				
			200				
			210				
			220				
			700				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-29 DATE 10/27/78 SURFACE ELEVATION(ft) 4050

LOCATION NW 1/4 SW 1/4 Sec. 25 T. 57 N. R. 75 W. Quad. Dead Horse Lake

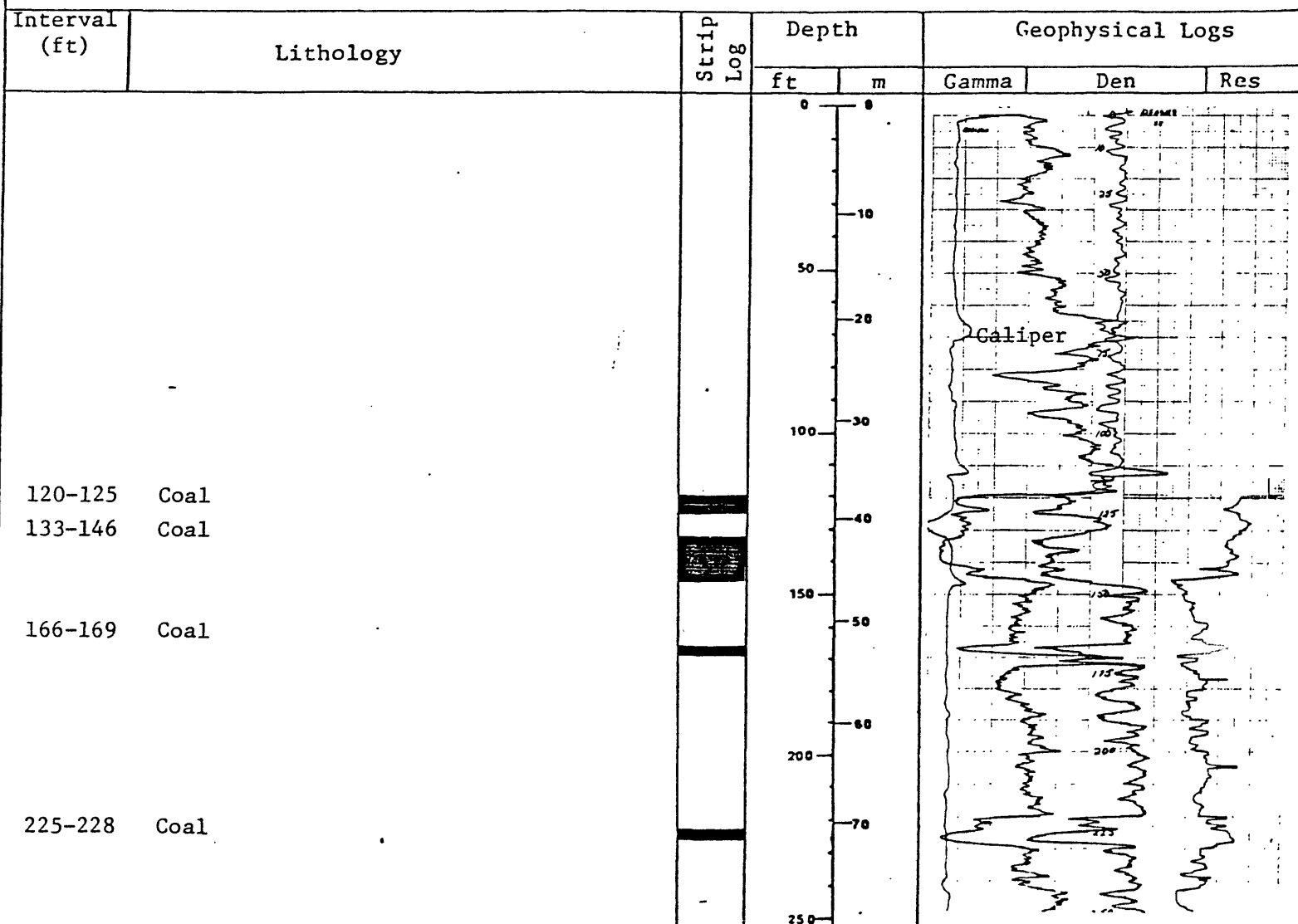
COUNTY Campbell STATE Wyoming TOTAL DEPTH(ft) 353

CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>50 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	;	Scale	<u>1000 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale	<u>20 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>5 in/in</u>	Logging Speed	<u>15</u>	fpm



Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
			80				
			90				
			300				
			100				
			350				
			110				
			120				
			400				
			130				
			140				
			450				
			150				
			500				
			160				
			170				
			550				
			180				
			600				
			190				
			200				
			650				
			210				
			220				
			700				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-30 DATE 11/27/78 SURFACE ELEVATION(ft) 3825

LOCATION NW $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 5 T. 54 N. R. 76 W. Quad. Arvada NE

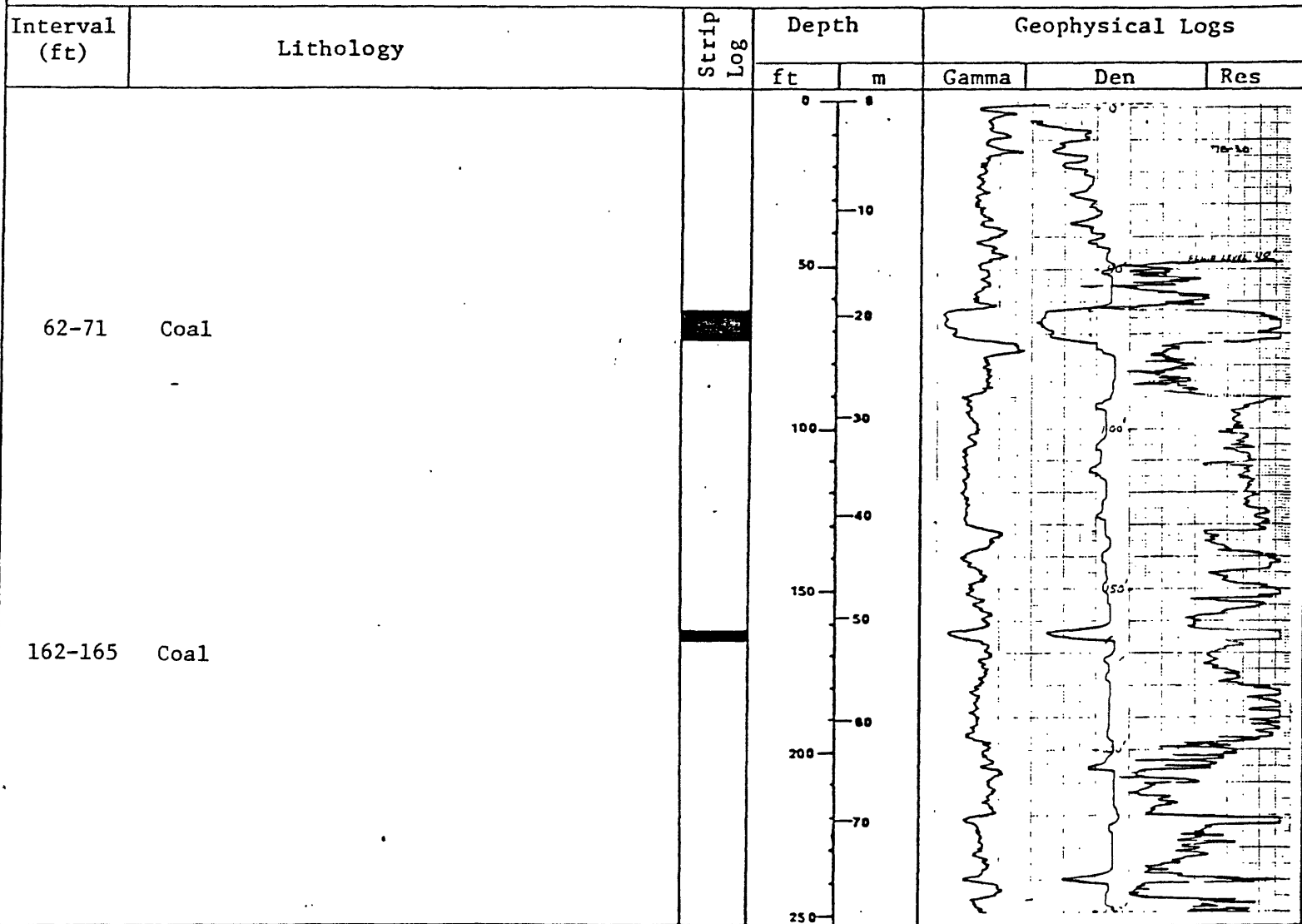
COUNTY Sheridan STATE Wyoming TOTAL DEPTH(ft) 660

CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>50 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	;	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale	<u>20 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>NA</u>	Logging Speed	<u>NA</u>	fpm



Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
261-280	Coal w/parting		80				
299-315	Coal		300				
422-424	Coal		110				
596-648	Coal		190				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 78-31 DATE 7/23/78 SURFACE ELEVATION(ft) 3965

LOCATION NW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 6 T. 57 N. R. 72 W. Quad. Homestead Draw

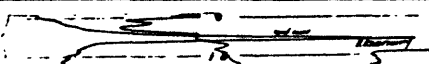
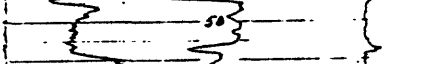

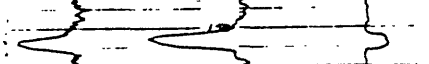
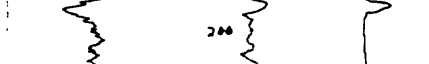
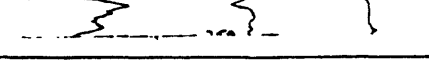
COUNTY Sheridan STATE Wyoming TOTAL DEPTH(ft) 383

CORED YES ☐ NO ☒ INTERVAL(s) NA
(ft)

DRILLING MEDIUM: ☐ AIR ☐ FOAM ☒ MUD ☐ WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Density	:	Scale	<u>100 cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	:	Scale	<u>50 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale	<u>NA</u>	Logging Speed	<u>NA</u>	fpm

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
0-60	Sandstone, medium-dark-gray, fine- to medium-grained, muddy, very loose quartz sand 35-42 feet.		0	0			
			10				
60-70	Shale, dark-gray, carbonaceous		50				
70-110	Mudstone, dark-gray, carbonaceous, shaly, several coaly streaks		20				
110-115	Coal		100	30			
115-128	Mudstone, dark-gray, carbonaceous		40				
128-132	Coal		150	50			
132-152	Mudstone, dark-gray, carbonaceous		50				
152-157	Coal		200	60			
157-193	Mudstone, medium-gray, interbedded with shale, silty, limestone lenses 172-174		70				
193-222	Mudstone, medium-gray, shaly bottom, calcareous 193-196		250	76			
222-232	Sandstone, light-gray, fine-grained						
232-240	Coal						
240-328	Sandstone, medium-gray, fine-grained, muddy, calcareous 281-283 and 323-325 ft.						

Interval (ft)	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
328-347	Mudstone, medium-gray, shaly to sandy to 336,		80				
	sandy to 347		90				
			300				
			100				
347-383	Mudstone, dusky-brown, shaly, coal stringers 352 to 355 ft. and 366 to 371 ft., bottom in limestone		110				
			350				
			120				
			400				
			130				
			140				
			450				
			150				
			500				
			160				
			170				
			550				
			180				
			600				
			190				
			200				
			650				
			210				
			220				
			700				