Geophysical and Lithologic Logs of Seven Test Holes Drilled During 1978 and 1979 In the Pierce Reservoir and Bengough Hill Quadrangles, Albany and Carbon Counties, Wyoming

by Dan E. Hansen

Open File Report 80-381

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Introduction

The U.S. Geological Survey drilled seven test holes during 1978 and 1979, on Federal lands in the Pierce Reservoir and Bengough Hill Quadrangles, T. 19 N., R. 77 W., Rock Creek coal field, Laramie basin, Albany and Carbon Counties, Wyo. as part of the Coal Exploratory Program. The purpose of the drilling was to explore for coal, facilitate correlation of coal beds, and evaluate their thickness and lateral extent. All of the drilling was done in the coal-bearing Upper Cretaceous Medicine Bow Formation, which may be as much as 350 feet thick in this area. The geologic objectives of the drilling were determined by using the geologic mapping by Hyden (1966), a and b.

Drilling was done by K and K Drilling, Inc., Montrose Colo. under the supervision of the U.S Geological Survey. Rotary holes were drilled by truck-mounted rigs using 5 inch tricone bits and three-way blade bits. Drilling fluids used were air, air-water biodegradable foam, and mud. The holes were filled with heavy mud upon completion and a surface plug of cement placed therein. Drill sites were then reclaimed.

Two of the holes had to be abandoned because of drilling problems, but they were offset a short distance and completed. Hole BH-7A was abandoned because of an extremely large water flow from thick surface gravel. Hole BH-2-A was abandoned because of unrecoverable drill pipe in the hole.

The geophysical logging of one drill hole was done by Nuclear Logging Service Inc., Lafayette, Colo.; three drill holes were logged by the Geological Survey, Lakewood, Colo.; one drill hole was logged by Strata Surveys, Steamboat Springs, Colo.; and two drill holes were logged by Century Geophysical Corp., Casper, Wyo. A general suite of logs consisting of gamma ray, gamma gamma (density) - focused and unfocused, resistivity, and caliper were run. Two of the holes closed immediately after being drilled. Gamma ray and density logs were run through drill pipe in one of the closed holes, but only the gamma ray log was run in the other hole. In this other hole the density probe malfunctioned, and because of delay due to inclement weather, the hole collapsed before the log could be run.

The geophysical logs in this report were photographically reduced to either 20 or 40 percent of the original size. The reduced vertical scale is about 1 inch to 50 feet. All measurements on the geophysical logs are in feet; to convert to meters multiply by 0.3048. All but two logs were hand traced before reduction and are not photographic reproductions of the original logs. The two logs not hand traced were reproduced by computer print out to the desired scale.

Lithologic logs are based on field examinations of drill-hole cuttings collected at 5-foot intervals, and lithologic interpretations are adjusted to geophysical logs.

References

Hyden, H. J., 1966a, Geologic map of the Pierce Reservoir Quadrangle, Albany and Carbon Counties, Wyoming: U.S. Geol. Survey Geol. Quad. Map GQ-510.

Hyden, H. J., 1966b, Geologic map of the Bengough Hill Quadrangle, Albany and Carbon Counties, Wyoming: U.S. Geol. Survey Geol. Quad. Map GQ-579.

Table 1.--Summary of lnformation for seven holes in the Pierce Reservoir and Bengough Hill Quadrangles, Albany and Carbon Counties, Wyo.

Drill hole	Location	Quadrangle	Depth Drilled (ft)	Depth logged (ft)
PR-1	NE 1/4 NE 1/4 NE 1/4 Sec. 18, T. 19 N., R. 77 W.	Pierce Reservoir	207	203
BH-2-B	SE 1/4 SE 1/4 NE 1/4 Sec. 20, T. 19 N., R. 77 W.	Bengough Hill	665	662
PR-3	SE 1/4 SE 1/4 SE 1/4 Sec. 8, T. 19 N., R. 77 W.	Pierce Reservoir	604	600
PR-4	SE 1/4 SE 1/4 SE 1/4 Sec. 4, T. 19 N., R. 77 W.	Pierce Reservoir	400	390
PR-5	NE 1/4 NE 1/4 SW 1/4 Sec. 10, T. 19 N., R. 77 W.	Pierce Reservoir	817.5	816
PR-6	SE 1/4 SE 1/4 SE 1/4 Sec. 2, T. 19 N., R. 77 W.	Pierce Reservoir	800	798
BH-7-B	SE 1/4 NW 1/4 NW 1/4 Sec. 14, T. 19 N., R. 77 W.	Bengough Hill	963	962

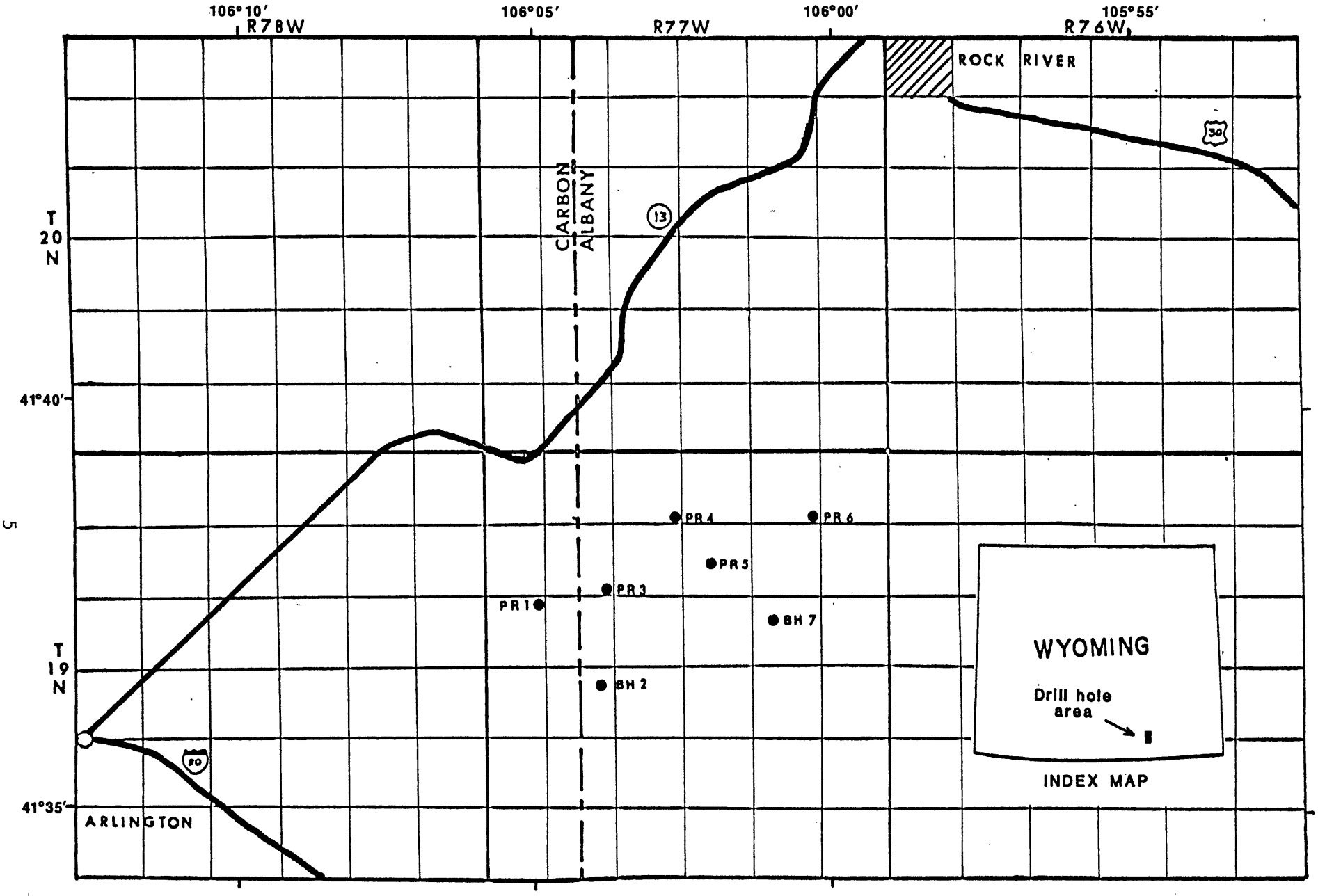


Figure 1.--Sketch map showing approximate locations of drill holes, Rock Creek coal field, Wyoming

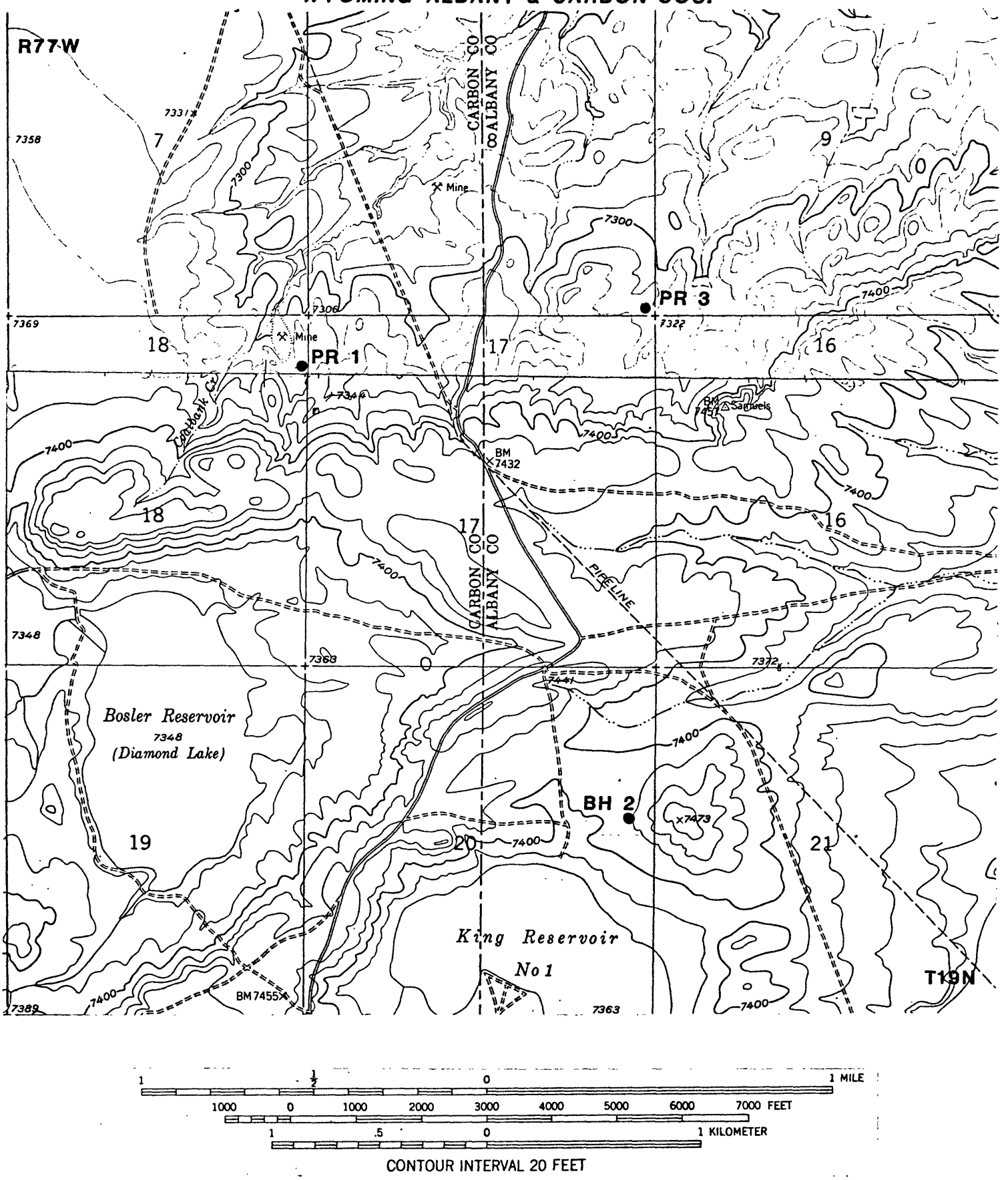


Figure 2.--Drill hole location map, central part of Pierce Reservoir-Bengough Hill Quadrangles, Albany and Carbon Counties, Wyoming.

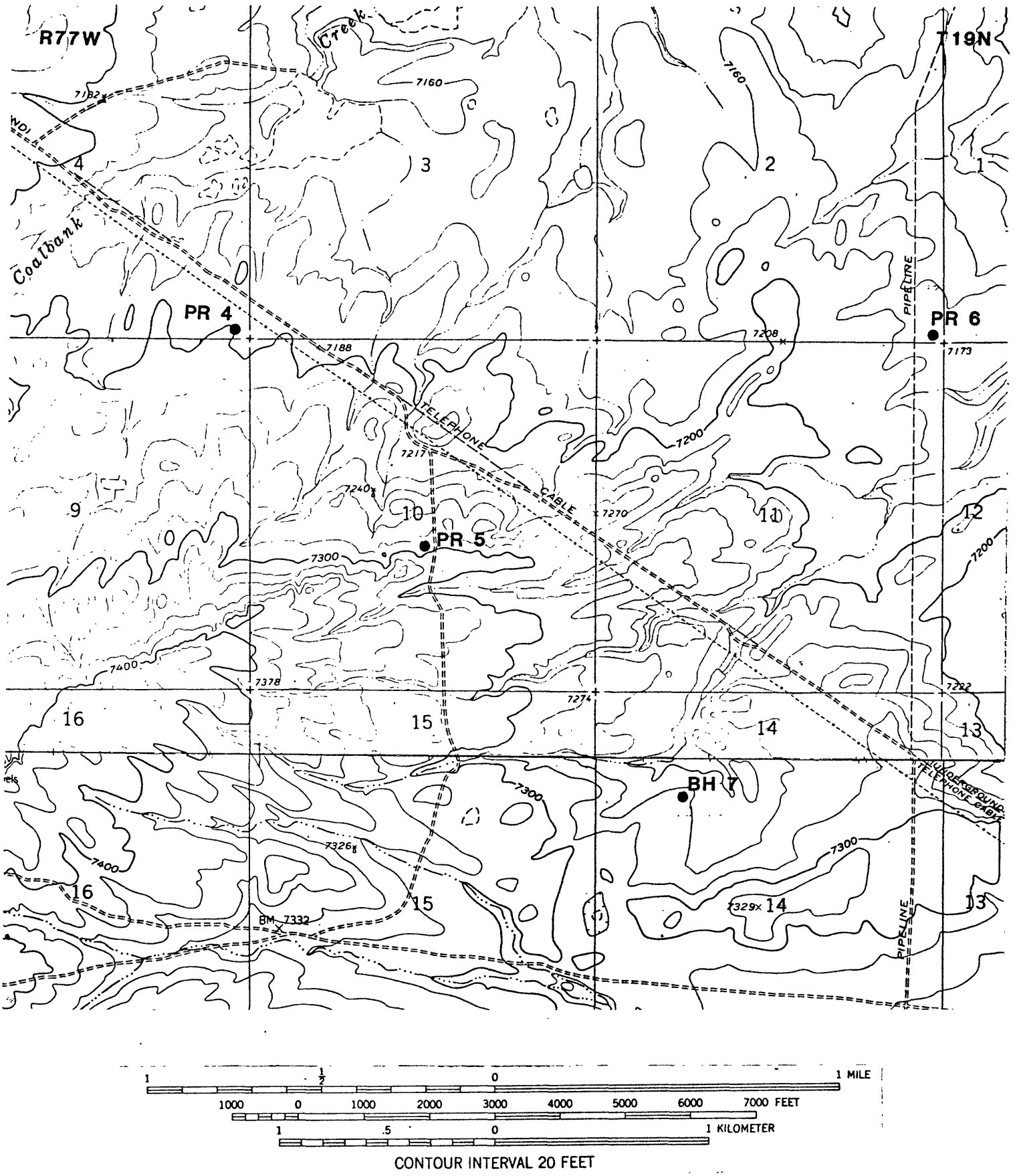


Figure 3.--Drill hole location map, east central part of Pierce Reservoir-Bengough Hill Quadrangles, Albany and Carbon Counties, Wyoming.

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-1 DATE Nov. 26, 1978 SURFACE ELEVATION(ft) 7335

LOCATION NE¼NE¼ Sec. 18 T. 19 N. R. 77 W. Quad. Pierce Reservoir

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 207

CORED YES [ ] NO [X] INTERVAL(s)

DRILLING MEDIUM: [X] AIR [ ] FOAM [ ] MUD [ ] WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	; Scale	11 CPS/in	Logging Speed	15	fpm
Gamma Gamma	; Scale	1.1K CPS/in	Logging Speed	10	fpm
Resistivity	; Scale	20 OHM/in	Logging Speed	15	fpm
Caliper	; Scale	1"/ in	Logging Speed	15	fpm

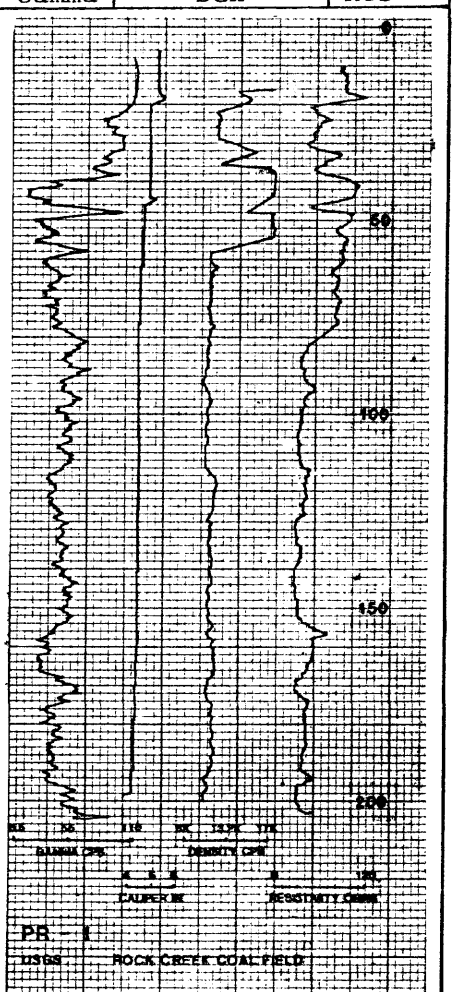
		Lithology
0.0	5.0	Loam surface, sandstone and shale, brown
5.0	10.0	Shale, light-brown-gray
10.0	16.0	Shale and sandstone, interbedded; shale is light gray; sandstone is brown, fine-grained
16.0	20.0	Shale, brown, carbonaceous
20.0	23.0	Shale, light-gray, silty
23.0	28.0	Shale, brown and black, carbonaceous
28.0	33.0	Shale, light-gray, silty
33.0	38.0	Shale, black, very coaly
38.0	47.0	Coal
47.0	48.0	Shale, light-gray
48.0	63.0	Coal, partly shaly; thin, gray shale partings
63.0	79.0	Sandstone, light-gray fine-grained, silty and shaly
79.0	109.0	Shale, siltstone, and sandstone, interbedded. Shale and siltstone are light-gray; sandstone is light-gray and light-greenish-gray, fine-grained; sandstone is minor constituent in very thin beds
109.0	114.0	Claystone, red-brown
114.0	124.0	Siltstone, light-gray, sandy

Strip Log

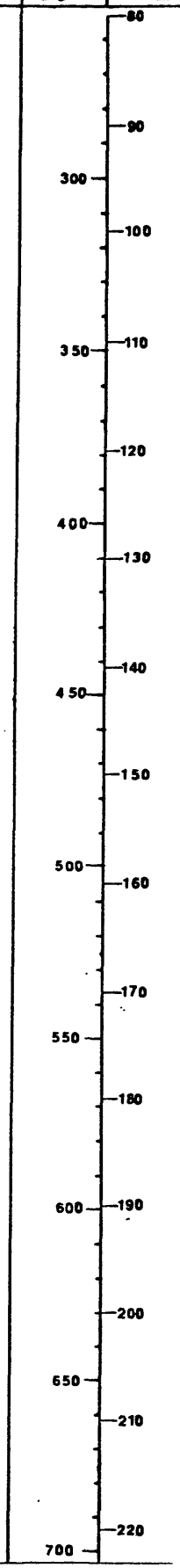
Depth

ft	m
0	0
	10
50	20
100	30
	40
150	50
	60
200	70
250	

Geophysical Logs



Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma	Geophysical Logs: Den	Geophysical Logs: Res
124.0	141.0	Shale, medium-gray, very silty						
141.0	154.6	Shale, medium-gray						
154.6	167.4	Sandstone, light-gray and light-greenish-gray, fine-grained						
167.4	174.0	Shale, medium-gray						
174.0	196.0	Siltstone and sandstone, interbedded, light-gray						
196.0	203.0	Shale, medium-dark-gray, silty						



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER BH-2-B DATE May 5, 1979 SURFACE ELEVATION(ft) 7418

LOCATION SE¼SE¼NE¼ Sec. 20 T. 19 N. R. 77 W. Quad. Bengough Hill

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 662

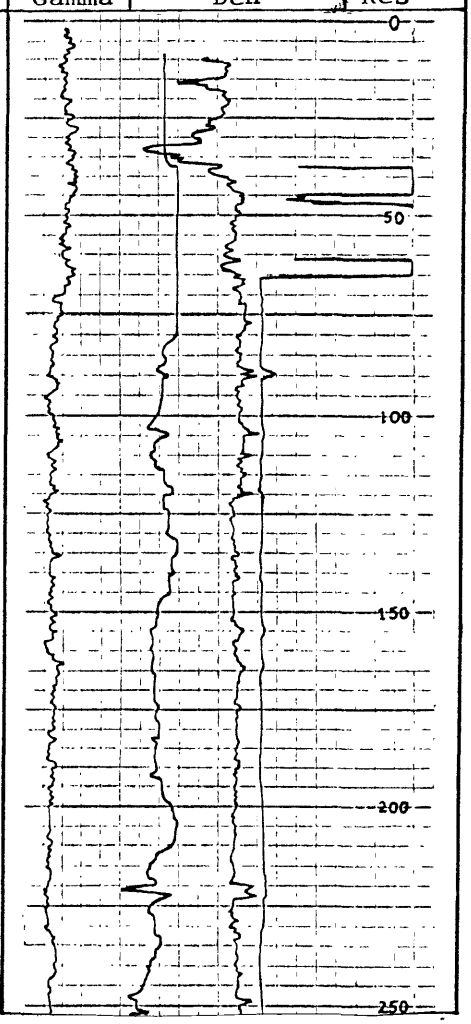
CORED YES [ ] NO [X] INTERVAL(s)

DRILLING MEDIUM: [ ] AIR [ ] FOAM [X] MUD [ ] WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	; Scale	120 APG/in	Logging Speed	20	fpm
Gamma Gamma	; Scale	Density G/cc	Logging Speed	20	fpm
Resistivity	; Scale	230 OHM M/in	Logging Speed	20	fpm
Caliper	; Scale	1"/in	Logging Speed	20	fpm

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma / Den / Res
0.0	28.0	Sandstone, conglomeritic, orange-brown, medium- to coarse-grained with granules and small quartzite pebbles		0	0	
28.0	30.9	Sandstone and siltstone, light-brown. Sandstone is chiefly coarse-grained		50	10	
30.9	35.8	Siltstone, light brown			20	
35.8	43.1	Sandstone, orange-brown, coarse-grained, silty		100	30	
43.1	55.6	Siltstone, light-yellow-brown			40	
55.6	61.0	Sandstone, orange-brown, medium-grained		150	50	
61.0	70.1	Siltstone, gray			60	
70.1	140.0	Sandstone, conglomeritic, light-gray. Sandstone is fine-to coarse-grained. Granules and small pebbles of white quartzite and pink feldspar		200	70	
140.0	158.1	Sandstone, light-gray, fine- to coarse-grained		250		
158.1	173.2	Sandstone and conglomerate, light-gray. Sandstone is chiefly coarse-grained. Conglomerate is chiefly of white and pink feldspar and white quartzite; granules and small pebbles				

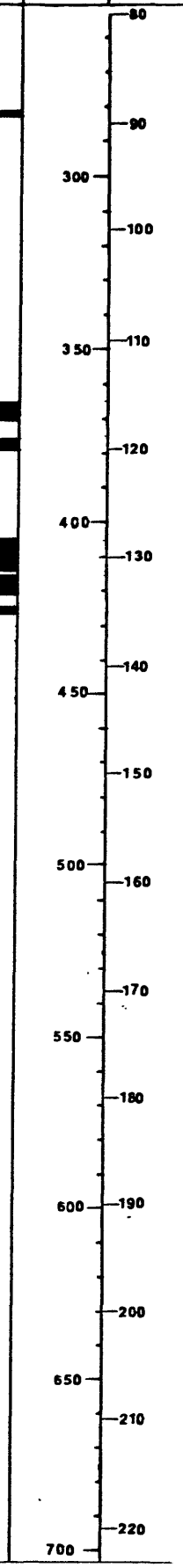


		Lithology
173.2	198.0	Sandstone, light gray, chiefly coarse-grained, partly conglomeritic. A few pebbles of white quartzite, feldspar, and gray shale
198.0	234.0	Sandstone, gray-white, coarse-grained, feldspathic
234.0	242.8	Sandstone, as above with dark-gray shale and coal fragments
242.8	261.0	Sandstone, gray, fine-grained
261.1	272.9	Shale, gray, silty, contains coaly fragments
272.9	281.0	Sandstone, gray, fine- to coarse-grained
281.0	282.0	Shale, black, carbonaceous
282.0	283.2	Coal, shaly
283.2	285.0	Shale, black, carbonaceous
285.0	299.0	Sandstone, light-gray, fine- to coarse-grained
299.0	303.3	Shale, medium-gray
303.3	315.3	Shale, black, carbonaceous, coaly and coal in thin beds
315.3	319.0	Shale, dark-gray, carbonaceous
319.0	330.6	Sandstone, light-gray, fine- to medium-grained
330.6	332.8	Shale, medium-gray
332.8	333.3	Sandstone, gray, fine-grained
333.3	336.3	Shale, medium-gray
336.3	352.8	Sandstone, light-gray, fine- to medium-grained, with a few pebbles of gray shale
352.8	356.8	Shale, dark-gray, carbonaceous
356.8	359.2	Shale, black, coaly
359.2	365.0	Shale, black, carbonaceous
365.0	370.0	Coal, shaly
370.0	376.0	Shale, black, carbonaceous
376.0	379.2	Coal
379.2	383.0	Shale, dark gray, carbonaceous
383.0	401.0	Sandstone, light-gray, fine-grained
401.0	405.0	Shale, dark-gray, carbonaceous
405.0	409.0	Coal, shaly
409.0	413.5	Coal; thin shale breaks
413.5	414.5	Shale
414.5	422.1	Coal
422.1	424.1	Shale, dark gray
424.1	426.0	Coal
426.0	432.0	Siltstone, medium-gray, sandy
432.0	435.6	Shale, medium-gray, silty
435.6	453.0	Sandstone, light- to medium-gray, fine-grained, silty
453.0	465.0	Siltstone, medium-gray
465.0	534.0	Sandstone and siltstone,

Strip Log

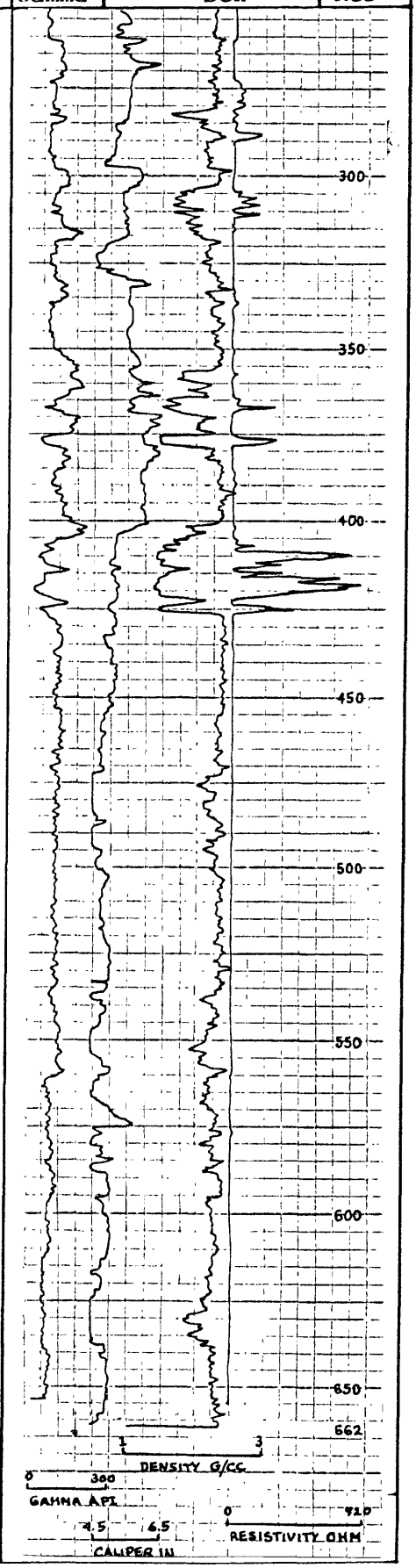
Depth

ft m

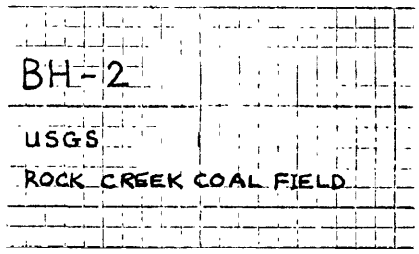


Geophysical Logs

Gamma Den Res



Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma	Den	Res
		interbedded. Siltstone is medium gray. Sandstone is light gray, very fine grained, rarely glauconitic.						
534.0	540.0	Sandstone, light-gray, fine-grained						
540.0	560.0	Siltstone, medium- to medium-dark-gray, shaly						
560.0	662.0	Sandstone, light-gray, fine-grained, silty. A few hard, thin beds of calcareous cemented sandstone						



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-3 DATE Nov. 22, 1978 SURFACE ELEVATION(ft) 7330

LOCATION SE¼SE¼SE¼ Sec. 8 T. 19 N. R. 77 W. Quad. Pierce Reservoir

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 604

CORED YES [ ] NO [X] INTERVAL(s) _____

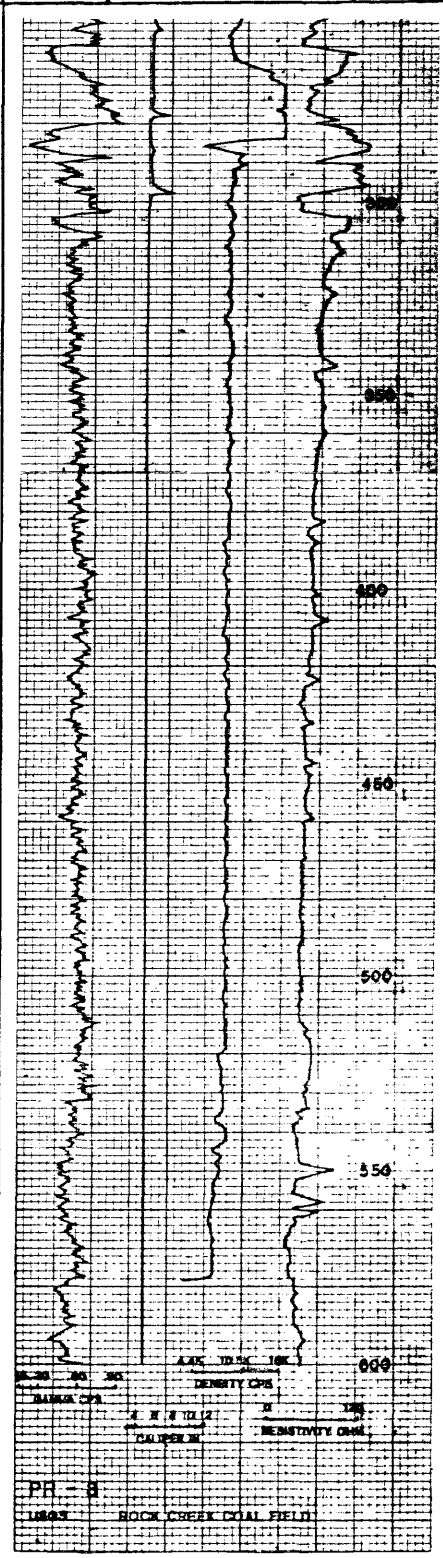
DRILLING MEDIUM: [X] AIR [ ] FOAM [ ] MUD [ ] WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	; Scale	12 CPS/in	Logging Speed	15	fpm
Gamma Gamma	; Scale	1.27K CPS/in	Logging Speed	10	fpm
Resistivity	; Scale	20 OHM/in	Logging Speed	15	fpm
Caliper	; Scale	1"/in	Logging Speed	15	fpm

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma / Den / Res
0.0	22.0	Sandstone, yellowish-brown, fine- to very- coarse-grained and conglomeritic; pebbles and granules of feldspar		0	0	
22.0	28.0	Siltstone, yellowish-brown			10	
28.0	41.0	Sandstone, yellowish-brown, fine- to very-coarse-grained; calcite cemented		50		
41.0	49.0	Sandstone, medium-brown, fine-grained			20	
49.0	55.0	Shale, medium-gray		100		
55.0	69.0	Siltstone, medium-gray, sandy			30	
69.0	74.0	Sandstone, light-gray, fine-grained			40	
74.0	80.0	Siltstone, medium-gray, sandy		150		
80.0	85.0	Sandstone, light-gray, fine-grained			50	
85.0	98.0	Siltstone, medium-gray, sandy			60	
98.0	164.0	Sandstone, light-gray, fine- to very-coarse-grained, conglomeritic; granules and small pebbles of feldspar; gray shale pebbles from 160.0 to 164.0		200		
164.0	168.0	Sandstone, light-gray, fine- to very-coarse-grained			70	
168.0	172.0	Shale, medium-gray		250		

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma / Den / Res
172.0	180.0	Sandstone, light-gray, fine- to coarse-grained, loose				
180.0	200.0	Shale, medium-dark-gray				
200.0	212.0	Coal, very shaly				
212.0	218.0	Shale, black, carbonaceous				
218.0	228.0	Coal				
228.0	233.0	Shale, black, carbonaceous				
233.0	236.0	Coal				
236.0	240.0	Shale, black, carbonaceous				
240.0	250.0	Coal, shaly				
250.0	257.0	Shale, black, carbonaceous, partly coaly				
257.0	260.0	Shale, medium-gray, hard				
260.0	267.0	Sandstone, light-gray, fine-grained				
267.0	276.0	Shale, medium-gray, silty				
276.0	280.0	Shale, black, carbonaceous				
280.0	288.0	Coal				
288.0	297.0	Coal, shaly				
297.0	303.0	Shale, black, carbonaceous				
303.0	308.0	Sandstone, light-gray; fine-grained, hard				
308.0	310.0	Shale, medium-dark-gray				
310.0	345.0	Sandstone, light-gray, fine-grained				
345.0	460.0	Siltstone, medium-dark-gray; contains thin beds of light-gray, well cemented, fine-grained sandstone				
460.0	533.0	Siltstone, medium-dark-gray, shaly				
533.0	564.0	Sandstone, light-gray, fine-grained				
564.0	578.0	Siltstone, medium-dark-gray, shaly				
578.0	604.0	Sandstone, light-gray, fine-grained				



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-4 DATE Nov. 15, 1978 SURFACE ELEVATION(ft) 7202

LOCATION SE¼SE¼ Sec. 4 T. 19 N. R. ____ Quad. 77 W.

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 400

CORED YES ☐ NO ☒ INTERVAL(s) ____

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

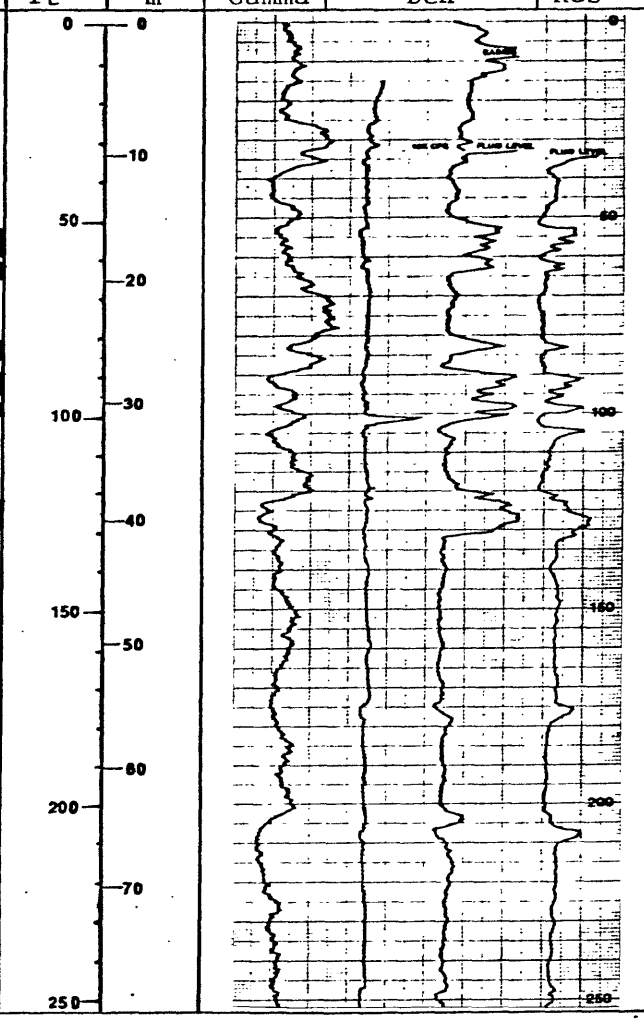
GEOPHYSICAL LOGS:

Natural Gamma	; Scale	10 CPS/in	Logging Speed	15	fpm
Gamma Gamma	; Scale	1K CPS/in	Logging Speed	10	fpm
Resistivity	; Scale	20 OHM/in	Logging Speed	15	fpm
Caliper	; Scale	1"/in	Logging Speed	15	fpm

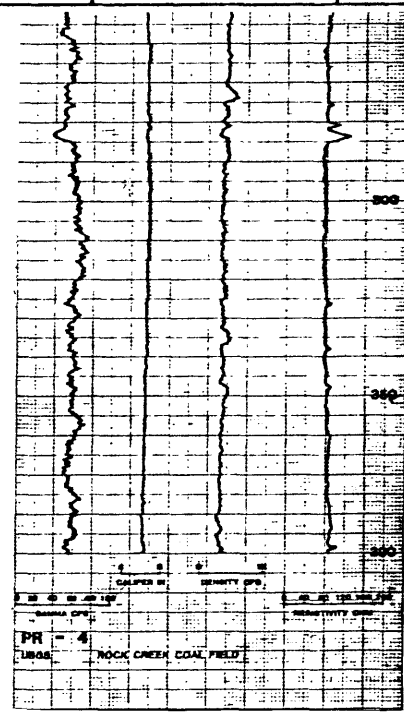
		Lithology
0.0	15.0	Sandstone, light-brown to brown fine to coarse-grained
15.0	20.0	Sandstone, light-brown, fine-grained
20.0	25.5	Sandstone, light-brownish-gray, fine-grained
25.5	30.2	Shale, medium-dark-gray
30.2	36.8	Shale, black, carbonaceous
36.8	46.5	Sandstone, light-gray, fine-grained, friable
46.5	52.0	Shale, black, carbonaceous
52.0	59.0	Coal, shaly
59.0	61.0	Shale, black, carbonaceous
61.0	64.0	Coal, shaly
64.0	69.6	Siltstone, light- to medium-gray, clayey
69.6	81.0	Shale, black, carbonaceous
81.0	84.0	Coal, shaly
84.0	89.0	Shale, black, carbonaceous
89.0	94.0	Coal
94.0	97.2	Shale, black, carbonaceous, coaly
97.2	99.5	Coal
99.5	103.0	Shale, black, carbonaceous
103.0	109.0	Sandstone, light-gray, fine-grained
109.0	114.5	Siltstone, medium-gray, sandy
114.5	122.0	Shale, black, carbonaceous

Strip Log

Depth (ft / m)



Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs
122.0	129.0	Coal				
129.0	145.5	Sandstone, light-gray, fine to medium-grained				
145.5	165.0	Siltstone, medium-gray, sandy				
165.0	181.3	Sandstone, light-gray, fine-grained				
181.3	190.0	Siltstone, medium-gray, sandy				
190.0	196.0	Sandstone, light-gray, very-fine-grained, silty				
196.0	203.0	Siltstone, medium-gray, sandy				
203.0	223.5	Sandstone, light-gray, fine-grained				
223.5	228.0	Siltstone, medium-gray, sandy				
228.0	248.0	Sandstone, light-gray, very-fine-grained, silty				
248.0	258.5	Siltstone, medium-gray, sandy				
258.5	270.0	Siltstone, medium-dark-gray				
270.0	281.8	Siltstone, medium-gray, sandy				
281.8	285.0	Sandstone, light-gray, fine-grained				
285.0	308.0	Siltstone, medium-dark-gray				
308.0	320.0	Shale, dark-gray, silty				
320.0	354.0	Siltstone, medium-gray to medium-dark-gray, sandy. Contains a few thin beds of light-gray, fine-grained, calcareous cemented sandstone				
354.0	358.0	Shale, dark-gray, silty				
358.0	373.0	Siltstone, medium-gray, very sandy				
373.0	400.0	Siltstone, medium-gray, sandy				



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-5 DATE Nov. 25, 1978 SURFACE ELEVATION(ft) 7386

LOCATION NE¼NE¼SW¼ Sec. 10 T. 19 N. R. 77 W. Quad. Pierce Reservoir

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 817.5

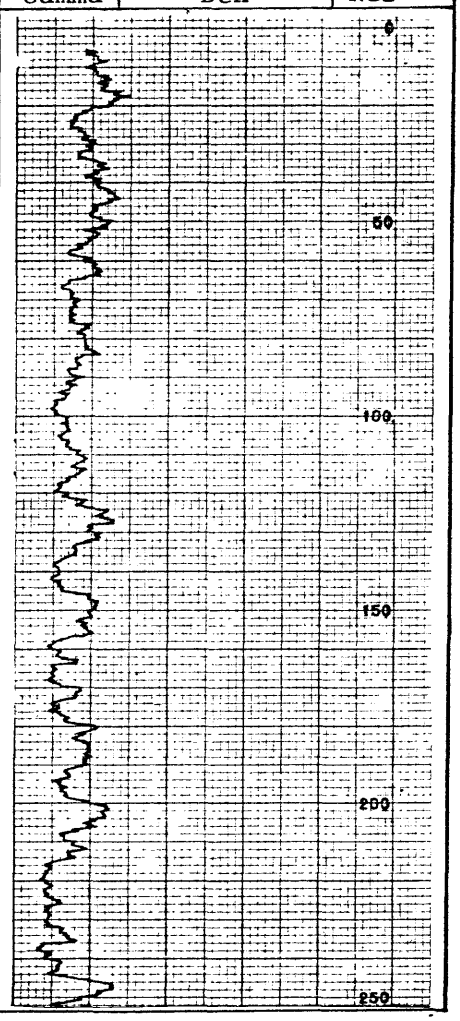
CORED YES [ ] NO [X] INTERVAL(s) _____

DRILLING MEDIUM: [X] AIR [ ] FOAM [ ] MUD [ ] WATER OBSERVATION WELL

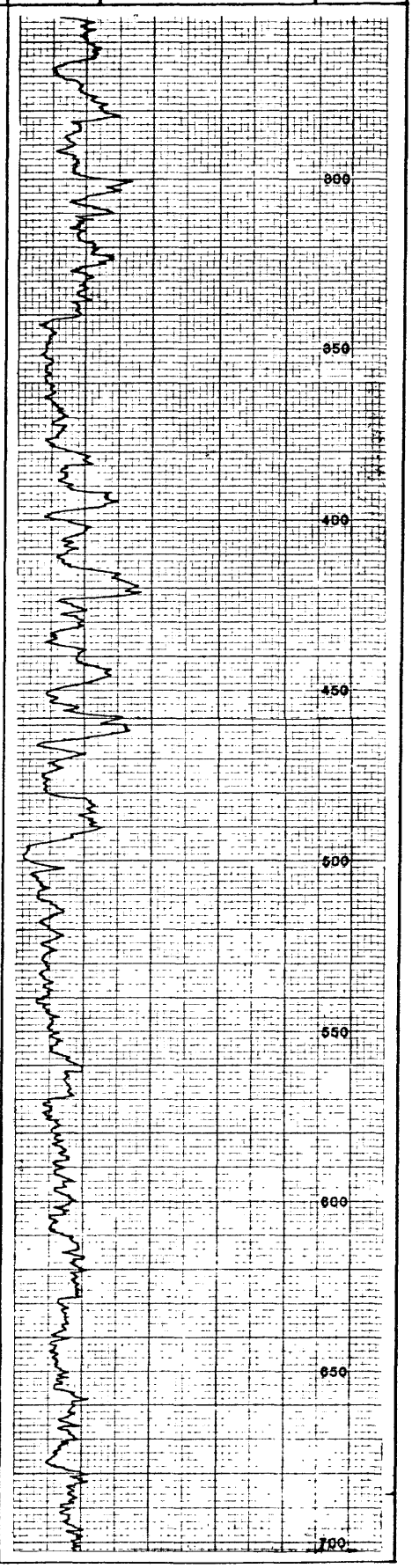
GEOPHYSICAL LOGS:

Natural Gamma	;	Scale 12 CPS/in	Logging Speed 15	fpm
Gamma Gamma	;	Scale _____	Logging Speed _____	fpm
Resistivity	;	Scale _____	Logging Speed _____	fpm
Caliper	;	Scale _____	Logging Speed _____	fpm

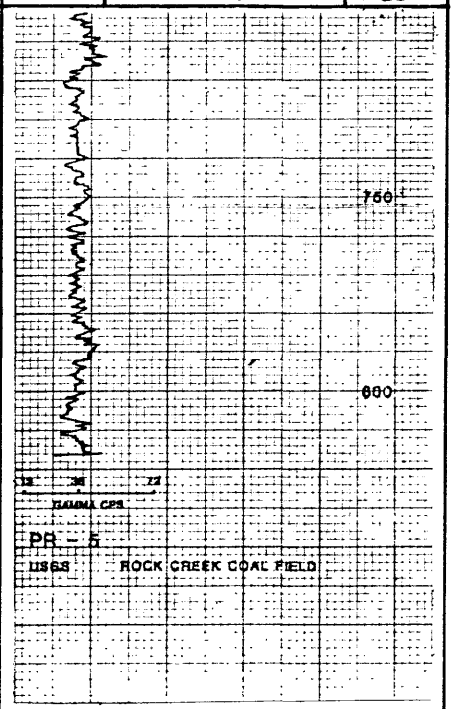
Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma / Den / Res
0-0	10.5	Gravel, light- to medium-brown; pebbles mostly of pink feldspar and sandstone. Caliche for first 5 feet		0	0	
10.5	22.0	Siltstone, light-grayish-brown			10	
22.0	26.0	Sandstone, light-brown, fine- to very-coarse-grained		50		
26.0	37.0	Sandstone, light-brown to brown, fine- to very coarse-grained, conglomeritic			20	
37.0	41.0	Conglomerate, reddish-brown		100	30	
41.0	45.0	Shale, light-gray, silty				
45.0	54.0	Siltstone, light- to medium-gray, shaly and sandy			40	
54.0	58.0	Sandstone, light-gray, very-fine- to fine- grained		150		
58.0	65.0	Siltstone, light-gray			50	
65.0	78.0	Sandstone, light-gray, fine- to medium-grained			60	
78.0	94.0	Sandstone, light- to medium-gray, fine-grained, silty		200		
94.0	100.0	Sandstone, light-gray to olive-gray, fine- to medium-grained			70	
100.0	121.0	Sandstone, light-gray, coarse-grained, conglomeritic. Granules of pink feldspar		250		
121.0	137.0	Mudstone, dark-greenish-gray, very silty				



Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma / Den / Res
137.0	146.0	Sandstone, light-gray, fine- to medium- grained				
146.0	156.0	Siltstone, light-gray, clayey				
156.0	179.7	Sandstone, light-gray, fine- to very-coarse-grained, conglomeritic; granules of feldspar				
179.7	190.5	Siltstone, olive-gray				
190.5	200.0	Sandstone, light-gray, fine- to medium-grained, silty				
200.0	206.0	Siltstone, light- to medium-gray, clayey				
206.0	240.0	Sandstone, light-gray, medium- to coarse-grained; trace of granules				
240.0	245.0	Sandstone, light-gray, coarse-grained, conglomeritic; granules of pink feldspar				
245.0	251.0	Claystone, medium-gray and greenish-gray				
251.0	254.0	Sandstone, light-gray, fine-grained				
254.0	266.0	Siltstone, medium-gray				
266.0	272.0	Sandstone, light-gray, fine-grained				
272.0	282.0	Shale, medium-gray, silty				
282.0	300.0	Sandstone, gray, fine-grained, very silty				
300.0	306.0	Shale, black, carbonaceous				
306.0	308.0	Coal, shaly				
308.0	322.0	Siltstone, medium-gray				
322.0	325.3	Shale, medium-gray, silty				
325.3	341.0	Siltstone, light- to medium-gray, sandy				
341.0	380.0	Sandstone, light-gray, medium- to coarse-grained, partly conglomeritic; a few granules of pink feldspar				
380.0	384.0	Shale, black, carbonaceous				
384.0	392.0	Coal, very shaly				
392.0	397.0	Shale, black, carbonaceous				
397.0	402.0	Coal				
402.0	404.0	Shale, black, carbonaceous				
404.0	414.6	Coal, shaly				
414.6	423.0	Shale, black, carbonaceous				
423.0	432.0	Coal, shaly				
432.0	438.0	Coal				
438.0	448.0	Shale, black, carbonaceous				
448.0	456.0	Sandstone, light-gray, fine-grained				
456.0	465.0	Shale, black, carbonaceous				
465.0	468.0	Coal				
468.0	470.0	Shale, black, carbonaceous				
470.0	481.0	Coal				



Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs
481.0	494.0	Shale, black carbonaceous				
494.0	557.0	Sandstone, light-gray, fine-grained				
557.0	570.0	Siltstone, dark gray, shaly				
570.0	580.0	Sandstone, light-gray, fine-grained				
580.0	604.0	Sandstone, light- to dark-gray, very-fine-grained, silty				
604.0	610.0	Sandstone, light-gray, very-fine-grained				
610.0	628.0	Siltstone, medium- to dark-gray, shaly				
628.0	678.0	Sandstone, light- to dark-gray, very-fine- to fine-grained, very silty				
678.0	817.5	Siltstone, dark-gray, shaly and sandy				



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-6 DATE Nov. 16, 1978 SURFACE ELEVATION(ft) 7172

LOCATION SE¼SE¼SE¼ Sec. 2 T. 19 N. R. 77 W. Quad. Pierce Reservoir

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 800

CORED YES ☐ NO ☒ INTERVAL(s) _____

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

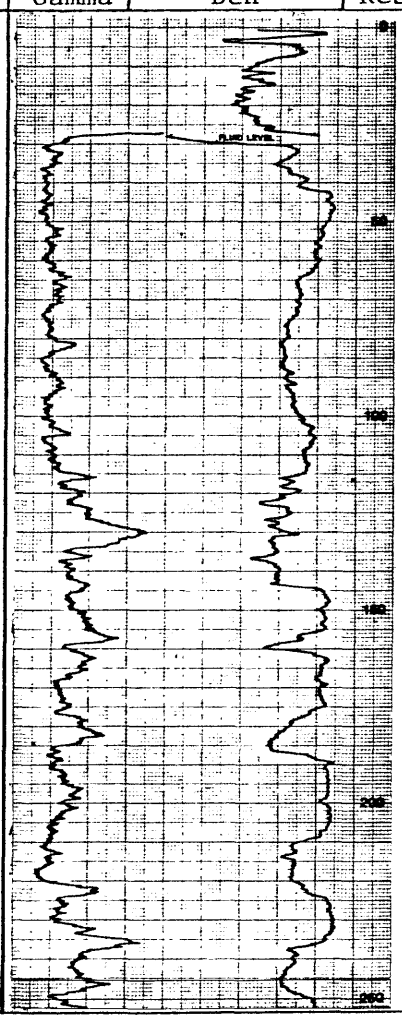
GEOPHYSICAL LOGS:

Natural Gamma	; Scale	50 CPS/in	Logging Speed	15	fpm
Gamma Gamma	; Scale	1K/3 in	Logging Speed	10	fpm
Resistivity	; Scale	20 OHM/in	Logging Speed	15	fpm
Caliper	; Scale	1"/in	Logging Speed	15	fpm

		Lithology
0.0	15.0	Gravel and sand, light-yellow-brown, large pebbles of pink feldspar
15.0	32.0	Sandstone, light-yellow-gray, fine- to very-coarse-grained
32.0	38.0	Sandstone, light-brown, fine- to medium-grained
38.0	43.0	Sandstone, light-gray, fine- to very-coarse grained, conglomeritic. Pebbles of pink feldspar
43.0	119.0	Sandstone, light-gray, fine- to very-coarse-grained, conglomeritic. Granules of feldspar. Large pebbles of granite from 115 to 119 feet
119.0	123.0	Siltstone, medium-dark-gray, sandy
123.0	134.0	Shale, medium-dark-gray
134.0	150.0	Siltstone, medium-dark-gray, sandy
150.0	158.5	Shale, medium- to dark-gray
158.5	161.0	Coal, shaly
161.0	168.0	Shale, medium-dark-gray, silty
168.0	177.0	Sandstone, light-gray, fine-grained
177.0	185.0	Shale, gray, silty
185.0	191.5	Sandstone, light-gray, fine-grained
191.5	202.0	Siltstone, gray, shaly

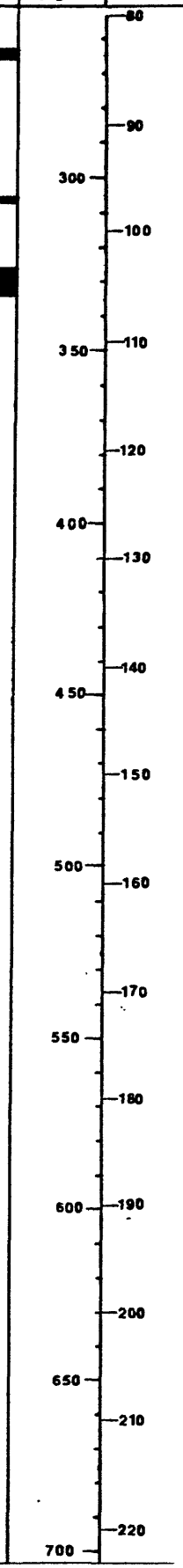
Strip Log

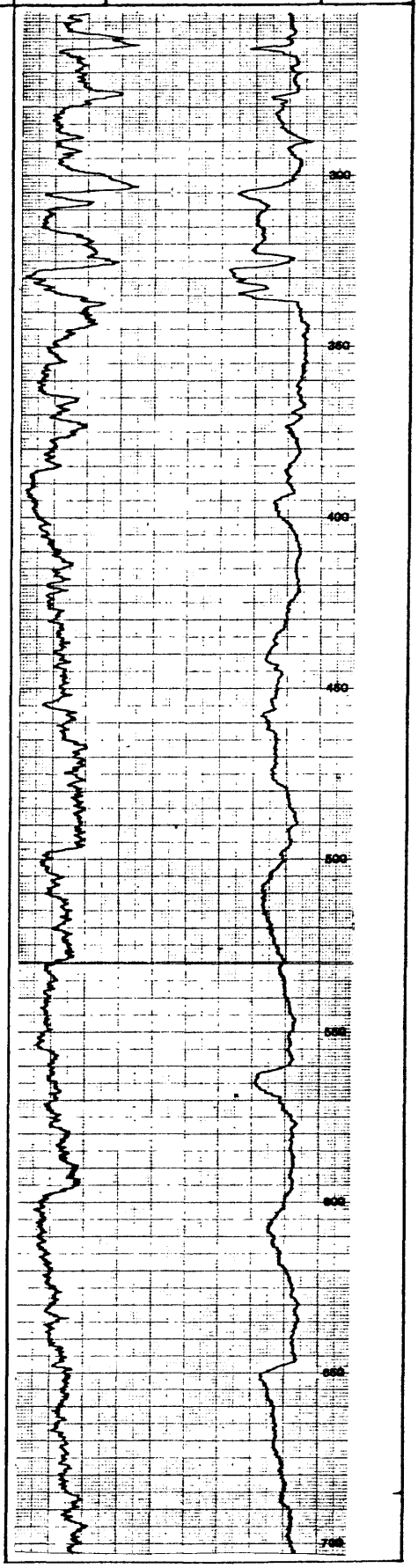
Depth: ft 0, 50, 100, 150, 200, 250; m 0, 10, 20, 30, 40, 50, 60, 70

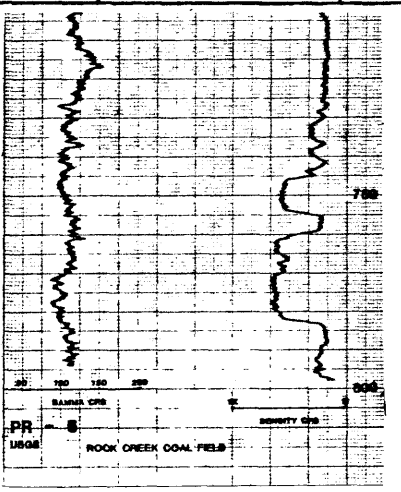


		Lithology
202.0	221.0	Sandstone, light-gray, fine- to very-coarse-grained, conglomeritic-granule size
221.0	224.0	Shale, medium-dark-gray
224.0	231.0	Siltstone, medium-gray, sandy
231.0	248.0	Shale, medium-dark-gray, partly carboniferous
248.0	259.0	Siltstone, medium-gray, sandy
259.0	263.0	Shale, dark-gray
263.0	265.5	Coal
265.5	275.5	Siltstone, gray, sandy
275.5	278.0	Shale, dark-gray
278.0	299.0	Sandstone, light-gray, fine- to very-coarse-grained
299.0	305.0	Shale, black, carbonaceous
305.0	307.0	Coal
307.0	309.5	Shale, black, carbonaceous
309.5	317.0	Sandstone, light-gray, fine-grained
317.0	327.0	Shale, dark-gray, carbonaceous
327.0	334.0	Coal
334.0	337.0	Shale, dark-gray, carbonaceous
337.0	345.0	Shale, medium-gray
345.0	364.5	Sandstone, white and light-gray, fine-grained
364.5	386.0	Siltstone, light-gray, sandy, shaly
386.0	410.0	Sandstone, light-gray, fine-grained
410.0	466.0	Siltstone, medium- to dark-gray, sandy
466.0	497.5	Shale, dark-gray, silty
497.5	511.0	Sandstone, light-gray, very-fine-grained
511.0	530.0	Siltstone, medium- to dark-gray, shaly
530.0	556.0	Sandstone, light-gray, fine-grained
556.0	578.0	Siltstone, medium-dark-gray, sandy
578.0	597.0	Shale, dark-gray, silty
597.0	648.2	Sandstone, light-gray, fine-grained
648.2	712.0	Siltstone, dark-gray, sandy
712.0	726.2	Shale, dark-gray
726.2	752.0	Siltstone, dark-gray, sandy
752.0	770.0	Siltstone, dark-gray, shaly
770.0	782.5	Sandstone, medium-gray, fine-grained, silty
782.5	799.0	Siltstone, dark-gray

Strip Log





Lithology	Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma / Den / Res
		750	230	
			240	
			250	
		800		
			260	
		850	270	

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER BH-7-B DATE May 20, 1979 SURFACE ELEVATION(ft) 7265

LOCATION NW¼NW¼SE¼ Sec. 14 T. 19 N. R. 77 W. Quad. Bengough Hill

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 963

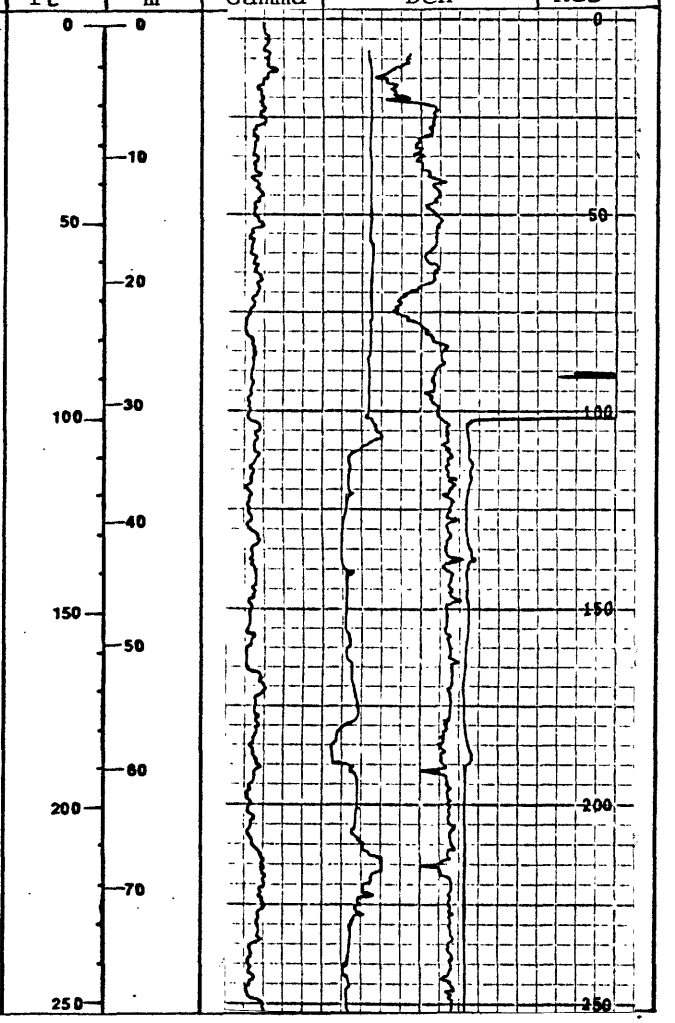
CORED YES [ ] NO [X] INTERVAL(s)

DRILLING MEDIUM: [ ] AIR [ ] FOAM [X] MUD [ ] WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	; Scale	160 API/in	Logging Speed	30	fpm
Gamma Gamma	; Scale	Density G/cc	Logging Speed	30	fpm
Resistivity	; Scale	160 OHM M/in	Logging Speed	30	fpm
Caliper	; Scale	1"/in	Logging Speed	30	fpm

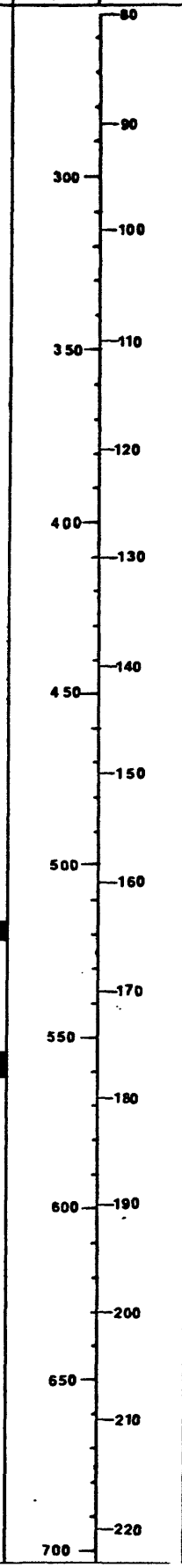
Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma / Den / Res
0.0	4.0	Gravel, light-brown				
4.0	15.0	Siltstone, light-olive-gray and brownish-red, clayey				
15.0	21.0	Sandstone, yellow-brown, fine-grained				
21.0	47.0	Sandstone, light-brown, fine- to coarse-grained, feldspathic				
47.0	65.5	Sandstone, light-gray, fine- to very-coarse-grained, conglomeritic. Many granule size fragments of dark-gray schist and light-gray feldspar				
65.5	76.2	Siltstone, medium-greenish-gray, clayey, partly sandy				
76.2	84.0	Sandstone, light-greenish-gray, chiefly fine-grained				
84.0	103.0	Sandstone, gray, fine to very-coarse-grained, conglomeritic, feldspathic				
103.0	121.0	Siltstone and sandstone, medium-greenish-gray, clayey. Sandstone is very fine grained				
121.0	141.0	Sandstone, gray, fine- to very-coarse-grained, slightly conglomeritic-granule size, feldspathic				



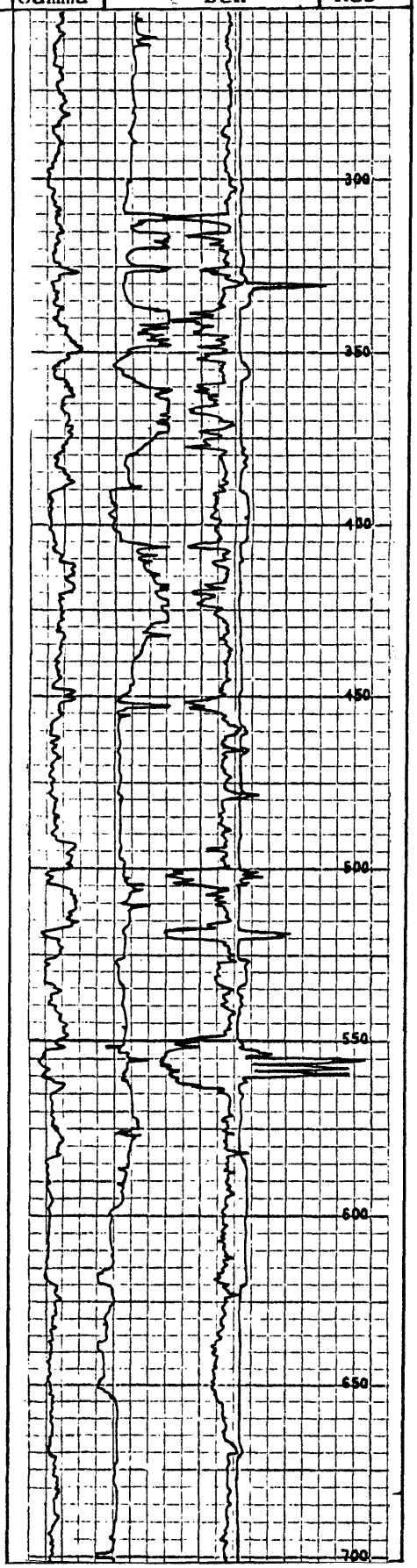
		Lithology
141.0	147.0	Siltstone, medium-greenish-gray, sandy
147.0	161.5	Sandstone, gray, fine- to very-coarse-grained
161.5	179.0	Siltstone, medium-greenish-gray, clayey and sandy
179.0	190.3	Sandstone and siltstone, gray. Sandstone is fine-grained with a few granules of feldspar
190.3	208.8	Siltstone and sandstone, medium-gray, clayey. Sandstone is chiefly fine-grained
208.8	220.0	Claystone, medium-gray, silty
220.0	228.0	Claystone, medium-gray, silty and sandy
228.0	235.0	Claystone and sandstone, medium-gray. Sandstone is fine- to medium-grained
235.0	249.0	Sandstone, gray, fine- to medium-grained, clayey
249.0	260.8	Claystone, medium-gray, silty
260.8	268.8	Siltstone, medium-greenish-gray
268.8	294.5	Siltstone and claystone, medium-gray, traces of carbonaceous material
294.5	303.0	Sandstone, medium-gray, silty
303.0	310.0	Siltstone, medium-gray, sandy
310.0	320.0	Siltstone, and claystone, light-gray, bentonitic
320.0	325.5	Sandstone, gray, fine-grained, very silty
325.5	326.9	Claystone, light-gray, bentonitic
326.9	337.5	Sandstone, gray, fine-grained
337.5	342.5	Siltstone, light-gray, bentonitic, clayey
342.5	349.0	Claystone, medium-gray, bentonitic
349.0	353.0	Claystone, medium-gray, silty
353.0	358.0	Sandstone, gray, fine-grained
358.0	363.0	Claystone, medium-gray, bentonitic
363.0	369.0	Siltstone, medium to dark-gray, clayey, traces carbonaceous material
369.0	380.0	Claystone, medium- to dark-gray, small amount carbonaceous material and light-gray, bentonitic claystone
380.0	385.0	Sandstone, gray, fine-grained, silty
385.0	390.5	Claystone, medium-gray
390.5	412.0	Sandstone, gray, fine-grained,

Strip Log

Depth



Geophysical Logs



Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs
		silty				
412.0	420.3	Claystone, medium-gray, bentonitic				
420.3	449.3	Siltstone, medium-gray, sandy				
449.3	457.4	Claystone, medium-dark-gray, silty				
457.4	493.4	Sandstone, gray, fine-grained, silty				
493.4	501.0	Shale, medium-gray				
501.0	506.0	Shale and coal, interbedded. Shale is dark-gray, carboniferous				
506.0	518.5	Shale, dark-gray				
518.5	521.5	Coal				
521.5	527.0	Shale, dark-gray				
527.0	535.0	Sandstone, light-gray, fine-grained				
535.0	537.0	Shale, dark-gray				
537.0	542.0	Sandstone and siltstone, gray. Sandstone is very fine grained				
542.0	550.0	Shale, dark-gray				
550.0	553.0	Shale, dark-gray, carboniferous, coaly				
553.0	561.5	Coal, thin shale partings				
561.5	564.0	Shale, dark-gray, carboniferous				
564.0	565.5	Shale, dark-gray				
565.5	575.2	Sandstone, gray, fine-grained, silty				
575.2	584.0	Shale, dark-gray, partly silty				
584.0	620.3	Sandstone, gray, fine-grained				
620.3	630.0	Shale, dark-gray, silty				
630.0	637.5	Siltstone, gray				
637.5	667.0	Sandstone, gray, very-fine-grained, silty				
667.0	672.0	Sandstone, gray, fine-grained				
672.0	691.6	Siltstone, dark-gray, shaly				
691.6	713.0	Sandstone, gray, very-fine-grained, silty				
713.0	747.0	Siltstone, dark-gray, interlaminated with dark-gray shale. A few thin beds of gray, fine-grained sandstone				
747.0	761.0	Shale and siltstone, dark gray, interlaminated				
761.0	774.0	Shale, dark-gray				
774.0	963.0	Siltstone, medium-gray, sandy and shaly; a few thin beds of light-gray, fine-grained, calcareous sandstone