Geophysical and Lithologic Logs of Coal Test Holes Drilled During 1980 In the Pierce Reservoir and Bengough Hill Quadrangles, Albany County, Wyoming

by

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GEOPHYSICAL AND LITHOLOGIC LOGS OF COAL TEST HOLES DRILLED DURING 1980 IN THE PIERCE RESERVOIR AND BENGOUGH HILL QUADRANGLES, ALBANY COUNTY, WYOMING

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Introduction

The U. S. Geological Survey drilled and logged 19 test holes in the Rock Creek coal field, Albany County, Wyoming as part of the Coal Exploratory Program. The holes were drilled on Federal lands in the Pierce Reservoir and Bengough Hill quadrangles, T. 19 N., R. 77 (see fig. 1). Information for these holes is summarized in table 1 and more precise drill hole locations are shown by individual area maps (figures 2-3). The holes were drilled chiefly to facilitate correlation of coal beds and associated strata and to evaluate the quality, thickness, and lateral extent of the coal beds. This report on 1980 drilling supplements a report on 1978 and 1979 drilling in these quadrangles (see Hansen, 1980).

Rotary holes were drilled by a U. S. Geological Survey truck-mounted drill using 5-1/8 inch tricone bits. Rotary pilot holes were drilled for all the designated core holes. The core was recovered using a 15-foot-long core barrel with a core diameter of 2.8 inch and a diamond bit size of 5-1/8 inch. Recovery of core was greater than 90 percent. 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.

Three of the holes had to be abandoned because of drilling problems, but

all were offset a short distance and completed. These three holes, PR 9, PR 10, and PR 16, were first drilled with air, but heavy water flows caused drilling problems and the offsets were drilled using heavy mud.

A general suite of logs consisting of natural gamma ray, gamma gamma (density), and resistivity were run. A caliper log was run in five of the holes. The density log was not run in holes BH-21 because of instrument malfunctions and a subsequent hole collapse. Geophysical logging was done by Geoscience Associates, Denver, Colorado.

Geophysical logs in this report were photographically reduced to 20 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, but depth in meters and feet are shown with the logs.

Lithologic logs are based on field examination of drill-hole cuttings collected at 5-foot intervals and field examination of the cores. Lithologic interpretations are adjusted to the geophysical logs.

Geologic Setting

The coal beds that were drilled occur chiefly in the basal part of the Upper Cretaceous Medicine Bow Formation, which outcrops on the northwest side of the Laramie basin. The formation, 0-300 feet thick, consists of fine-grained sandstones, shales, siltstones, and coals that were deposited in fresh to brackish water environments marginal to a marine shoreline. This means the coal beds and sedimentary strata were probably deposited as associated infill and swamp-marsh deposits of the relatively small bays and lagoons that had formed on the landward side of the ocean beach and other shore deposits. As a consequence, the coal beds are generally very lenticular.

Overlying the Medicine Bow Formation at a disconformity, the Hanna Formation, 0-400 feet thick, of Paleocene age consists chiefly of coarse-

grained and conglomeratic sandstones, silty shales, and a few thin, local coal beds and associated carbonaceous shales. The Hanna Formation was deposited in a fluvial environment as channel-fill deposits, overbank strata, and a few thin backswamp deposits (coal beds).

Where the coal beds lie, the regional dip is about seven degrees southeast into the Laramie basin. However, the basin is rimmed on this northwest side by structures in which the dips become locally steep and the strike of the rock outcrops varies widely.

Summary

The coal beds that were penetrated by the drill holes and that lie at the base of the Upper Cretaceous Medicine Bow Formation in the Rock Creek coal field, northwestern Laramie basin, occur chiefly as three coal zones. The coal beds vary locally in thickness and some appear to have a very limited areal extent. The basal coal bed, however, occurs throughout most of the area drilled. This coal bed is as thick as 22 feet Coal quality data is lacking, the coals probably range from subbituminous to bituminous in rank. Coal cores from this drilling program have been submitted for analysis.

Table 1.--Summary of information for 19 drill holes in the Bengough and Pierce Reservoir quadrangles, Albany County, Wyoming

Drill hole	Location	Quadrangle	Depth drilled (ft)	Depth logged (ft)
PR-8	SW SW SW Sec. 2, T. 19N., R. 77W.	Pierce Reservoir	455	450
PR-9-B **	SW SW NW Sec.2, T. 19N., R. 77W.	Pierce Reservoir	335	330
PR-10-B **	NW NW NW Sec. 2, T 19N., R. 77W.	Pierce Reservoir	195	191
PR-11	NE NE NE Sec 2, T. 19N., R. 77W.	Pierce Reservoir	515	501
PR-12	NE NE SE Sec. 2, T. 19N., R. 77W.	Pierce Reservoir	455	452
PR-13	SE NE NE Sec. 4, T. 19N., R. 77W.	Pierce Reservoir	135	97
PR-14	NE NE SE Sec. 4, T. 19N., R. 77W.	Pierce Reservoir	55	50
PR-14-C *	NE NE SE, Sec. 4, T. 19N., R. 77W.	Pierce Reservoir	55	40
PR-15	SW SE SE Sec. 4, T. 19N., R. 77W.	Pierce Reservoir	115	112
PR-15-C *	SW SE SE Sec. 4, T. 19N., R. 77W.	Pierce Reservoir	51	48
PR-16-B **	NW NW SW Sec. 10, T. 19N., R. 77W.	Pierce Reservoir	475	471
PR-17	SW SW SW Sec. 10, T. 19N., R. 77W.	Pierce Reservoir	555	530
PR-18	SE SE SE Sec. 10, T. 19N., R. 77W.	Pierce Reservoir	605	598
PR-19	NE NE SE Sec. 8 T. 19N., R. 77W.	Pierce Reservoir	130	130
PR-19-C *	NE NE SE Sec. 8 T. 19N., R. 77W.	Pierce Reservoir	165	130

Table 1.--Summary of information for 19 drill holes in the Bengough and Pierce Reservoir quadrangles, Albany County, Wyoming--Continued

Drill hole	Location	Quadrangle	Depth drilled (ft)	Depth logged (ft)
PR-20	SW SW SE Sec. 8, T. 19N., R77W.	Pierce Reservoir	240	240
PR-20-C*	SW SW SE Sec. 8, T. 19N., R. 77w.	Pierce Reservoir	185	182
BH-21	NE NW NE Sec. 20, T. 19N., R. 77W.	Bengough Hill	415	408
PR-22	NW NW SE Sec. 8, T. 19N., R. 77W.	Pierce Reservoir	155	120

* core holes
** offset holes

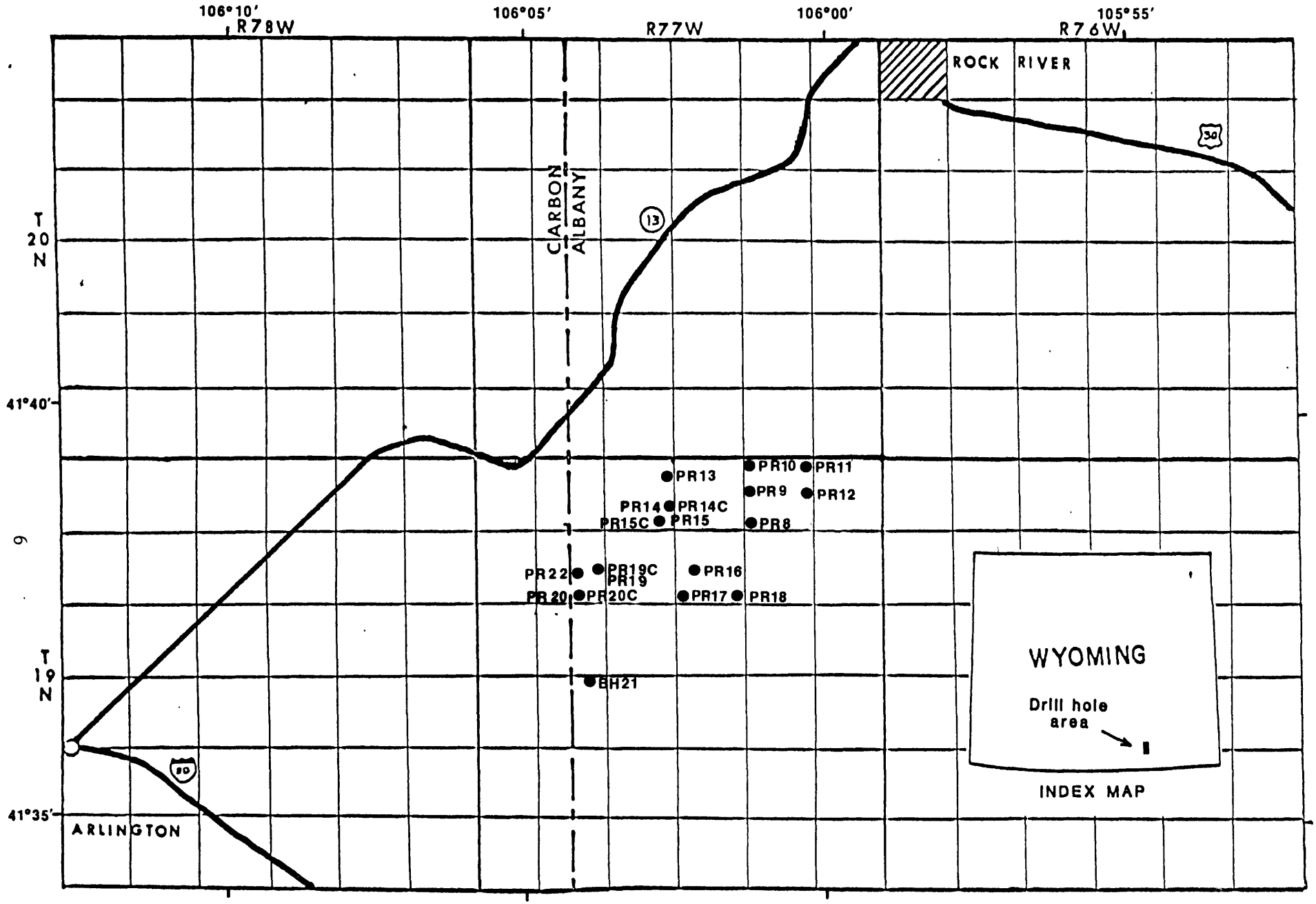


Fig. 1 Sketch map showing appoximate locations of drill holes , Rock Creek coal field, Wyoming

Pierce Reservoir and Bengough Hill Quads.

Carbon and Albany Co. Wyoming

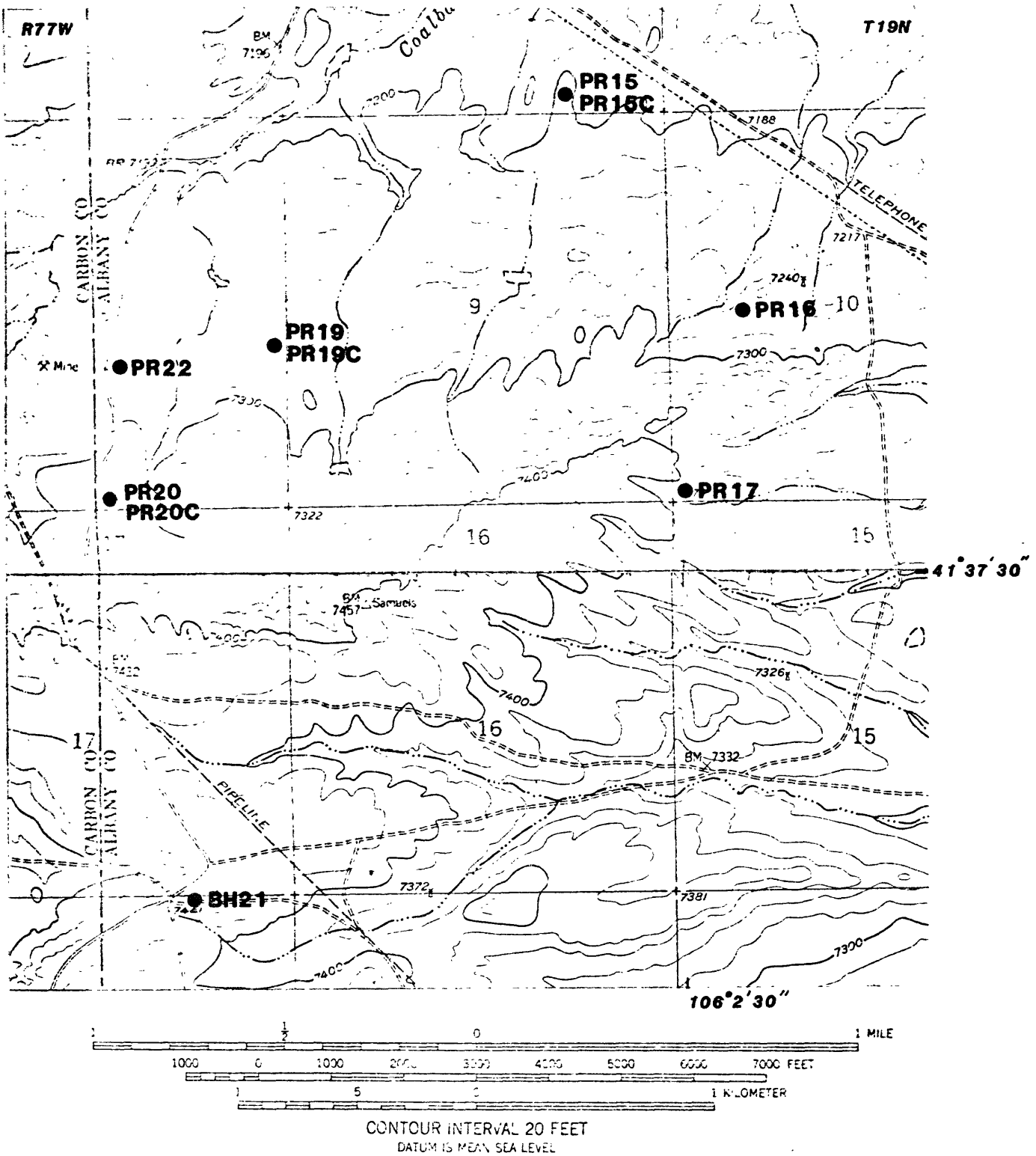


Fig.2 Drillhole location map, central part of Pierce Reservoir-Bengough Hill Quadrangle, Albany County, Wyoming

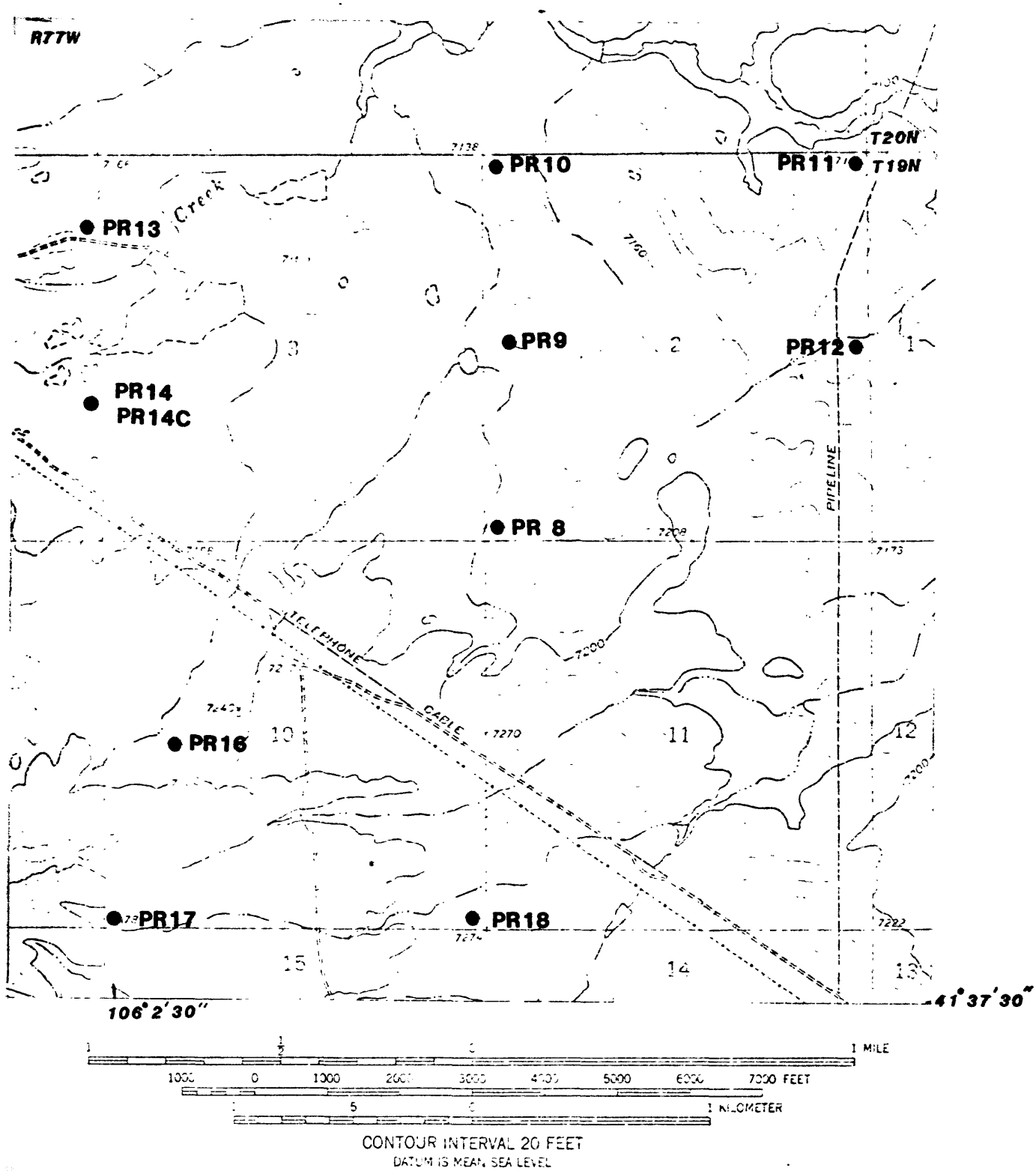


Fig.3 Drill hole location map, southeast part of Pierce Reservoir Quadrangle, Albany County, Wyoming

Reference

Hansen, D. E., 1980, 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: U.S. Geol. Survey, Open-file Report 80-381.

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-8 DATE 7/4/80 SURFACE ELEVATION(ft) 7165

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

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 455

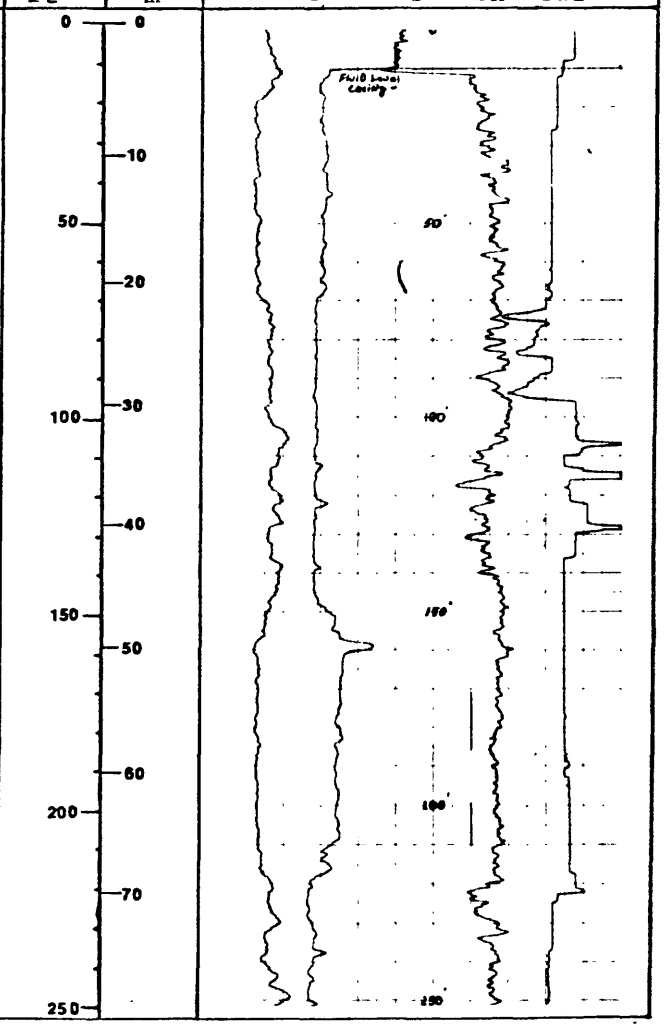
CORED YES [ ] NO [X] INTERVAL(s) _____

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

GEOPHYSICAL LOGS:

Natural Gamma	; Scale	100 CPS/In	Logging Speed	15	fpm
Gamma Gamma	; Scale	10K CPS/IN	Logging Speed	15	fpm
Resistivity	; Scale	20 Ohms/IN	Logging Speed	15	fpm
Caliper	; Scale	2 ft/IN	Logging Speed	20	fpm

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma Res Den Cal
0.0	7.0	Soil and gravel, yellowish-brown				
7.0	10.0	Sandstone, yellowish brown, very coarse grained				
10.0	12.0	Claystone, yellowish-brown, sandy				
12.0	18.0	Siltstone and shale, gray				
18.0	24.0	Sandstone, gray, very coarse grained				
24.0	33.0	Sandstone, gray, very fine to very coarse grained				
33.0	37.0	Sandstone, gray and brown, coarse-grained				
37.0	45.0	Sandstone, gray, very coarse grained, conglomeratic (small pebbles)				
45.0	70.0	Sandstone, gray, very fine to very coarse grained, conglomeratic				
70.0	74.0	Siltstone, medium-gray, clayey				
74.0	75.0	Shale, black, carbonaceous				
75.0	77.0	Siltstone, medium-gray				
77.0	80.0	Shale and claystone, black, carbonaceous				
80.0	81.5	Siltstone, medium-gray, clayey				
81.5	83.0	Shale and claystone, dark-gray, carbonaceous				
83.0	88.0	Siltstone, medium-gray, clayey				
88.0	91.0	Shale, black carbonaceous				
91.0	95.5	Claystone, medium to dark-gray, silty				



Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs
95.5	103.0	Siltstone, medium to dark-gray				Gamma Res Den Cal
103.0	108.0	Siltstone, light to medium-gray				
108.0	113.0	Shale, dark-brown, carbonaceous				
113.0	119.0	Siltstone, greenish-gray				
119.0	122.0	Claystone, dark-brown				
122.0	124.5	Shale, black, carbonaceous, coaly				
124.5	127.5	Claystone, dark-brown				
127.5	140.5	Shale and claystone, black, carbonaceous				
140.5	146.0	Claystone, medium-gray, silty				
146.0	157.0	Siltstone, medium-gray, sandy				
157.0	218.0	Sandstone, gray, fine to very coarse grained, conglomeratic from 211 to 218 feet				
218.0	229.0	Shale, dark greenish-gray, silty, traces of coal				
229.0	231.0	Shale, dark-gray and black, carbonaceous				
231.0	243.0	Siltstone, dark-gray				
243.0	252.0	Shale, dark-gray and black, carbonaceous				
252.0	256.0	Sandstone, gray, fine-grained, silty				
256.0	260.0	Shale, dark-gray, silty				
260.0	274.0	Siltstone, gray, sandy				
274.0	278.0	Shale and claystone, dark-gray				
278.0	282.0	Sandstone, gray, fine-grained				
282.0	283.0	Shale, dark-gray				
283.0	285.0	Coal				
285.0	291.0	Shale, black, carbonaceous				
291.0	302.0	Shale, dark-gray				
302.0	305.0	Shale, black, carbonaceous				
305.0	307.0	Coal				
307.0	308.0	Shale, black, carbonaceous				
308.0	343.0	Sandstone, gray, fine-grained				
343.0	350.0	Shale, dark-gray, carbonaceous				
350.0	357.5	Coal				
357.5	360.0	Shale, black, carbonaceous				
360.0	361.0	Coal				
361.0	376.0	Shale, dark-gray, carbonaceous, silty				
376.0	380.0	Coal, shaly				
380.0	391.0	Sandstone, light-gray, fine-grained				
391.0	441.0	Sandstone and siltstone, gray. Sandstone is very fine grained; some dark-gray shale				
441.0	455.1	Siltstone, medium to dark-gray, sandy and shaly				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-9-B DATE 7/3/80 SURFACE ELEVATION(ft) 7160

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

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 335

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

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

GEOPHYSICAL LOGS:

Natural Gamma	; Scale	100 CPS/In	Logging Speed	15	fpm
Gamma Gamma	; Scale	4K CPS/In	Logging Speed	"	fpm
Resistivity	; Scale	20 Ohms/In	Logging Speed	"	fpm
Caliper	; Scale	2 ft/In	Logging Speed	"	fpm

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma Res Den Cal
0.0	6.0	Gravel and clay, yellowish brown		0	0	
6.0	8.0	Siltstone, yellowish brown, sandy and clayey				
8.0	13.0	Siltstone, red-brown, clayey		50	10	
13.0	23.0	Siltstone, yellowish-brown, sandy and clayey			20	
23.0	27.0	Sandstone, yellowish-brown, fine to coarse-grained		100	30	
27.0	31.0	Siltstone, yellowish-brown; sandy				
31.0	35.0	Sandstone, light-brown, coarse-grained				
35.0	41.0	Siltstone, gray, clayey.				
41.0	46.0	Siltstone, gray and shale, black, carbonaceous		150	40 50	
46.0	50.0	Siltstone, gray, sandy				
50.0	54.0	Siltstone, gray, clayey				
54.0	63.0	Siltstone and sandstone, gray, interbedded. Sandstone is fine-grained				
63.0	67.0	Sandstone, gray, fine-grained, silty		200	60	
67.0	74.0	Siltstone, gray, and shale, black, carbonaceous				
74.0	84.0	Shale, black, carboanceous, coaly; gray interbedded siltstone			70	
84.0	92.0	Shale, black, carbonaceous, silty		250		

		Lithology	Strip Log	Depth ft	Depth m	Geophysical Logs
92.0	103.0	Shale, black, carbonaceous; some coal				Gamma Res Den Cal
103.0	112.0	Sandstone, gray, fine-grained, silty				
112.0	114.0	Siltstone, gray				
114.0	116.0	Shale, black, carbonaceous				
116.0	117.0	Coal				
117.0	121.0	Shale, black, carbonaceous				
121.0	133.0	Siltstone, gray, sandy				
133.0	156.0	Sandstone, gray, very coarse grained				
156.0	183.5	Sandstone, gray, fine-grained				
183.5	185.5	Siltstone, gray				
185.5	189.0	Shale, black, carbonaceous				
189.0	190.0	Coal, shaly				
190.0	195.5	Shale, black, carbonaceous, silty, coaly; some brownish-gray claystone				
195.5	201.0	Claystone, gray, partly silty				
201.0	212.0	Sandstone, gray, coarse-grained				
212.0	216.5	Claystone, gray, silty				
216.5	219.0	Shale, brown and black, carbonaceous				
219.0	220.0	Coal, shaly				
220.0	224.5	Sandstone, gray, fine-grained, silty				
224.5	229.0	Siltstone, gray, clayey				
229.0	241.0	Sandstone, gray, fine-grained, silty, clayey				
241.0	242.0	Shale, dark-gray				
242.0	243.0	Siltstone, gray				
243.0	245.5	Shale, black, carbonaceous				
245.5	247.0	Sandstone, brownish-gray, very fine grained				
247.0	248.0	Shale, black, carbonaceous				
248.0	250.0	Coal				
250.0	266.0	Siltstone, gray and brownish-gray				
266.0	269.0	Sandstone, gray, fine-grained,				
269.0	273.0	Claystone, brownish-gray, silty				
273.0	281.0	Sandstone, gray, fine-grained, silty				
281.0	285.0	Shale, black, carbonaceous				
285.0	288.0	Coal				
288.0	291.0	Shale, black, carbonaceous				
291.0	300.0	Siltstone, gray, sandy				
300.0	303.0	Shale, black, carbonaceous				
303.0	310.0	Coal				
310.0	312.0	Shale, black, carbonaceous				
312.0	313.0	Coal, sha[illegible]				
313.0	322.0	Sandstone, gray, very fine grained, silty				
322.0	328.0	Coal				

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
328.0 335.0 Sandstone, gray, very fine grained						

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-10-B DATE 7/1/80 SURFACE ELEVATION(ft) 7138

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

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 195

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

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

GEOPHYSICAL LOGS:

Natural Gamma	; Scale	100 CPS/IN	Logging Speed	20	fpm
Gamma Gamma	; Scale	8K CPS/In	Logging Speed	20	fpm
Resistivity	; Scale	200hms /In	Logging Speed	15	fpm
Caliper	; Scale	2 Ft /In	Logging Speed	15	fpm

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs
0.0	6.0	Gravel and soil, yellowish-brown with white calcium carbonate		0	0	Gamma Res Den Cal
6.0	9.5	Claystone, yellowish-brown				
9.5	14.5	Shale, black, carbonaceous			10	
14.5	22.0	Siltstone, gray and yellowish-brown, sandy at base		50		
22.0	30.0	Sandstone, brownish-gray, fine- to coarse-grained			20	
30.0	60.0	Sandstone, gray, fine to coarse-grained				
60.0	70.5	Sandstone, gray, fine to coarse-grained, conglomeratic		100	30	
70.5	75.0	Shale, dark-brown and dark-gray				
75.0	77.0	Shale, dark-brown and black, carbonaceous			40	
77.0	78.0	Coal		150		
78.0	85.0	Shale, dark-brown and black, carbonaceous			50	
85.0	94.5	Sandstone; gray, fine-grained				
94.5	99.0	Shale, black, carbonaceous			60	
99.0	100.0	Coal, shaly		200		
100.0	113.5	Sandstone, gray, fine-grained				
113.5	115.5	Shale, dark-gray, sandy			70	
115.5	117.5	Sandstone, gray, fine-grained, hard, calcareous				
117.5	123.0	Shale, dark-gray, silty		250		
123.0	128.0	Sandstone, gray, very fine grained				

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs Gamma	Res	Den	Cal
128.0	129.5	Coal							
129.5	142.5	Shale, black to brown, carbonaceous, partly coaly							
142.5	144.0	Coal							
144.0	146.0	Shale and claystone, dark-gray to black							
146.0	163.0	Sandstone, gray, fine-grained, silty, hard; calcareous from 146 to 148 feet							
163.0	169.0	Shale, grayish brown and black; carbonaceous							
169.0	173.0	Coal							
173.0	175.5	Shale, grayish brown and black, carbonaceous							
175.5	186.0	Siltstone, light-brown, sandy							
186.0	195.0	Siltstone, light-gray, sandy							

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-11 DATE 7/5/80 SURFACE ELEVATION(ft) 7134

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

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 515

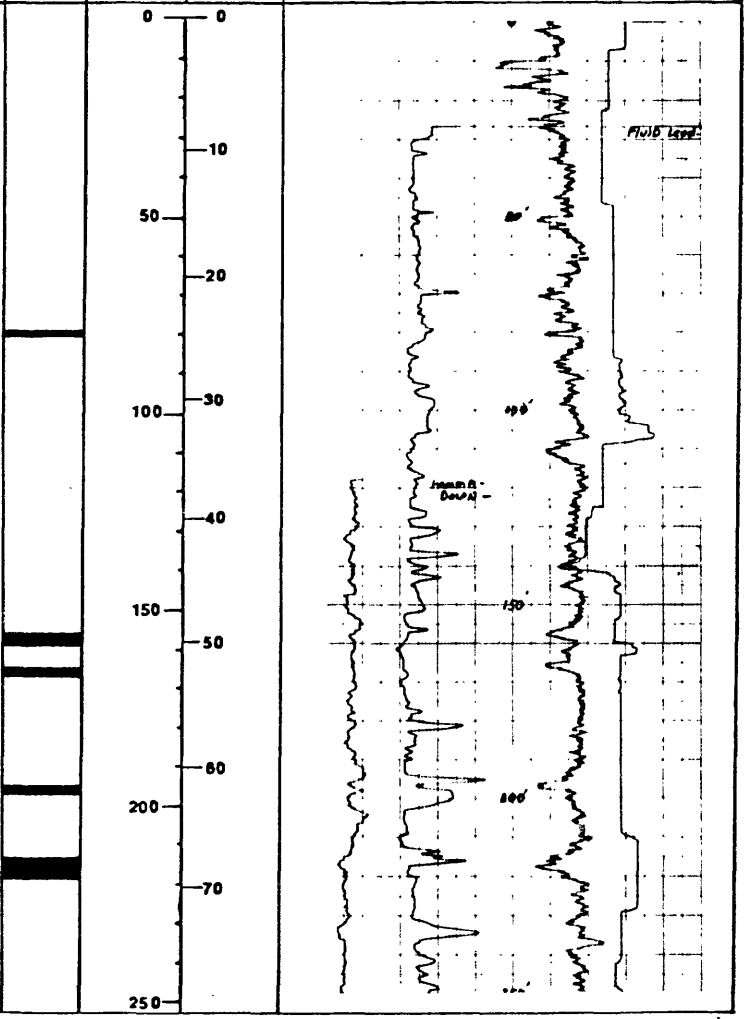
CORED YES ☐ NO ☒ INTERVAL(s) _____

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

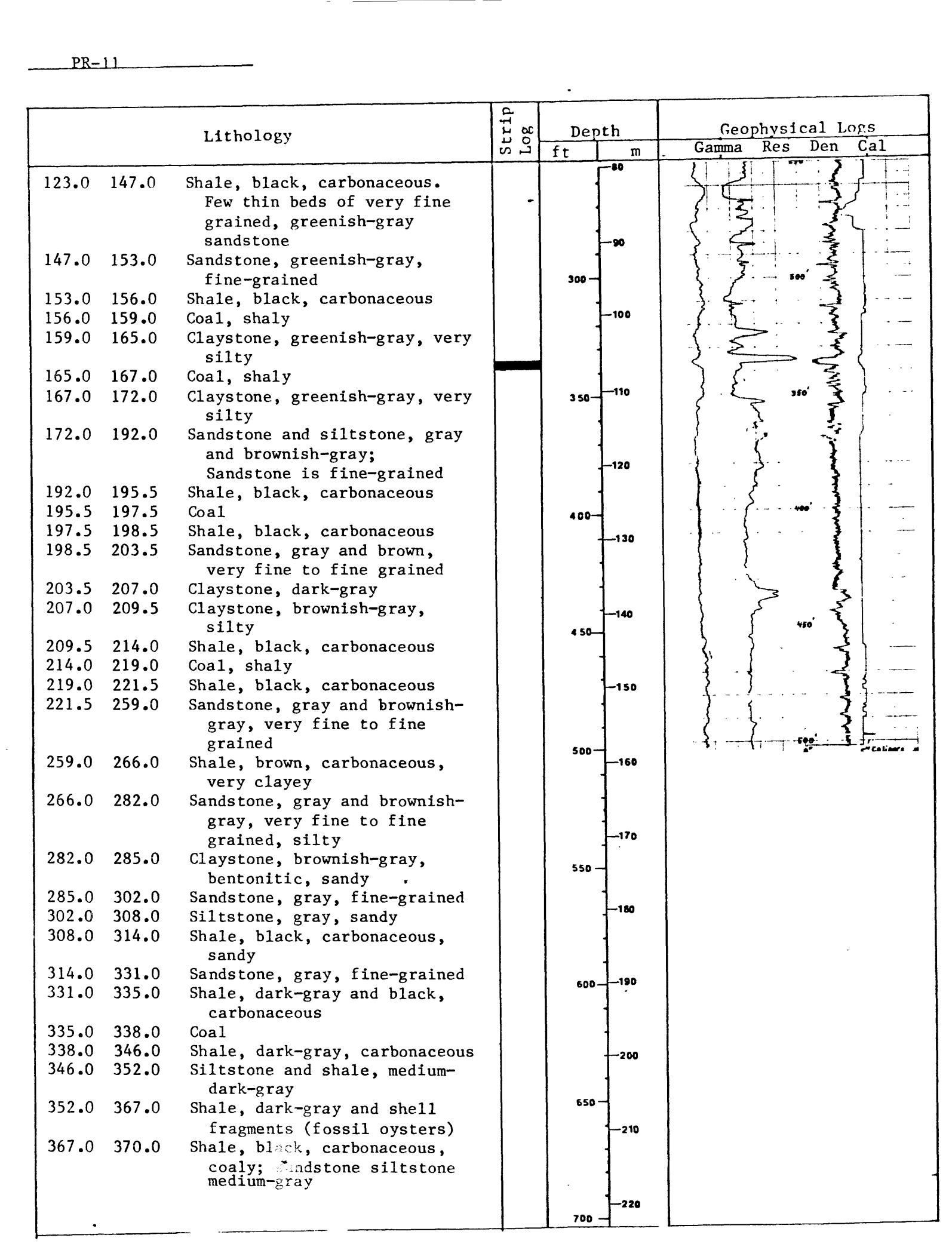
GEOPHYSICAL LOGS:

Natural Gamma	; Scale	100 CPS/IN	Logging Speed	15	fpm
Gamma Gamma	; Scale	20K CPS/IN	Logging Speed	15	fpm
Resistivity	; Scale	20 Ohms/IN	Logging Speed	15	fpm
Caliper	; Scale	2 Ft/IN	Logging Speed	20	fpm

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs
0.0	8.0	Gravel, light-brown and soil				
8.0	20.0	Sandstone and siltstone, yellowish-brown, clayey; sandstone is very coarse grained				
20.0	26.0	Sandstone, yellowish-brown, very coarse grained				
26.0	28.5	Shale, black, carbonaceous				
28.5	42.0	Siltstone, gray, clayey, sandy				
42.0	48.0	Shale, black and dark-brown, carbonaceous				
48.0	67.0	Sandstone and siltstone, gray; sandstone is fine-grained				
67.0	80.0	Claystone, dark-gray and grayish-brown; some black, carbonaceous shale				
80.0	81.0	Coal, shaly				
81.0	90.0	Shale, black, carbonaceous				
90.0	96.0	Claystone, greenish-gray, silty; coal at 93 to 94 feet				
96.0	106.0	Sandstone, gray, very fine grained				
106.0	114.0	Shale, black, carbonaceous, coaly				
114.0	118.0	Sandstone, gray, very fine grained				
118.0	121.0	Shale, black, carbonaceous				
121.0	123.0	Sandstone, gray, very fine grained				



Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma Res Den Cal
123.0	147.0	Shale, black, carbonaceous. Few thin beds of very fine grained, greenish-gray sandstone				
147.0	153.0	Sandstone, greenish-gray, fine-grained				
153.0	156.0	Shale, black, carbonaceous				
156.0	159.0	Coal, shaly				
159.0	165.0	Claystone, greenish-gray, very silty				
165.0	167.0	Coal, shaly				
167.0	172.0	Claystone, greenish-gray, very silty				
172.0	192.0	Sandstone and siltstone, gray and brownish-gray; Sandstone is fine-grained				
192.0	195.5	Shale, black, carbonaceous				
195.5	197.5	Coal				
197.5	198.5	Shale, black, carbonaceous				
198.5	203.5	Sandstone, gray and brown, very fine to fine grained				
203.5	207.0	Claystone, dark-gray				
207.0	209.5	Claystone, brownish-gray, silty				
209.5	214.0	Shale, black, carbonaceous				
214.0	219.0	Coal, shaly				
219.0	221.5	Shale, black, carbonaceous				
221.5	259.0	Sandstone, gray and brownish-gray, very fine to fine grained				
259.0	266.0	Shale, brown, carbonaceous, very clayey				
266.0	282.0	Sandstone, gray and brownish-gray, very fine to fine grained, silty				
282.0	285.0	Claystone, brownish-gray, bentonitic, sandy				
285.0	302.0	Sandstone, gray, fine-grained				
302.0	308.0	Siltstone, gray, sandy				
308.0	314.0	Shale, black, carbonaceous, sandy				
314.0	331.0	Sandstone, gray, fine-grained				
331.0	335.0	Shale, dark-gray and black, carbonaceous				
335.0	338.0	Coal				
338.0	346.0	Shale, dark-gray, carbonaceous				
346.0	352.0	Siltstone and shale, medium-dark-gray				
352.0	367.0	Shale, dark-gray and shell fragments (fossil oysters)				
367.0	370.0	Shale, black, carbonaceous, coaly; Sandstone siltstone medium-gray				



Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs Gamma Res Den Cal
370.0	398.0	Sandstone, light-gray, very fine grained				
398.0	435.0	Sandstone, light-gray, very fine grained, silty				
435.0	440.0	Sandstone, light-gray, fine-grained; firm to hard drilling				
440.0	455.0	Sandstone, light-gray, very fine grained				
455.0	462.0	Sandstone, medium-gray, very fine grained, silty and shaly				
462.0	492.0	Siltstone, medium to medium-dark-gray, sandy				
492.0	515.0	Sandstone, medium-gray, fine-grained, silty				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-12 DATE 7/8/80 SURFACE ELEVATION(ft) 7130

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

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft)455

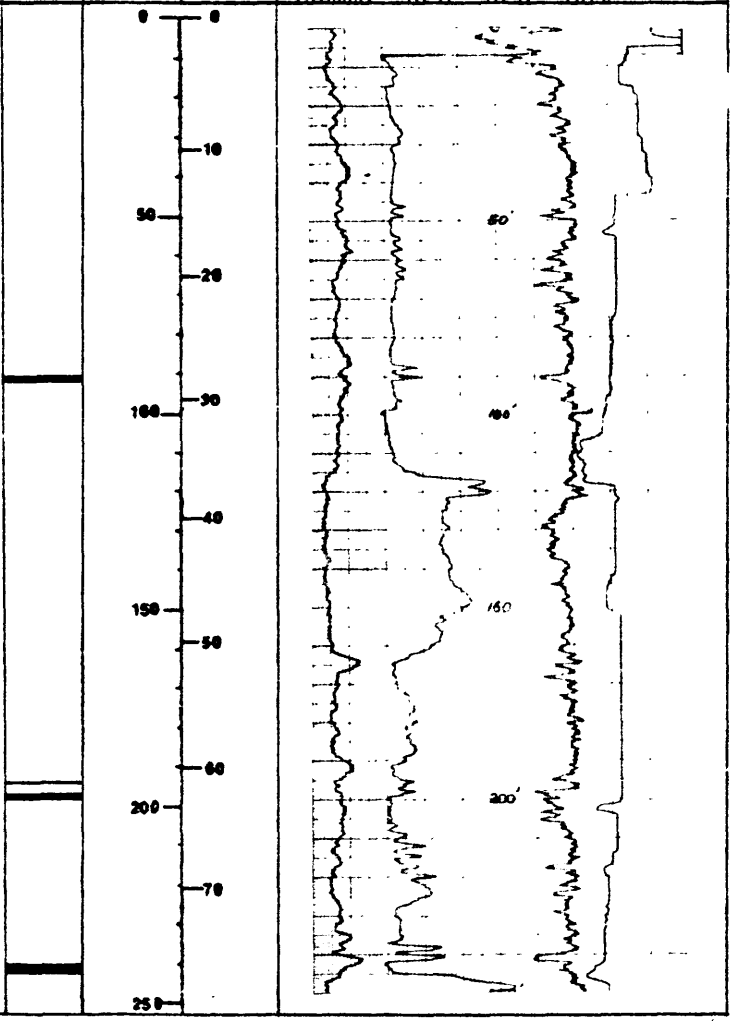
CORED YES [ ] NO [X] INTERVAL(s) _____

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

GEOPHYSICAL LOGS:

Natural Gamma	; Scale	100 CPS/IN	Logging Speed	15	fpm
Gamma Gamma	; Scale	20K CPS/IN	Logging Speed	15	fpm
Resistivity	; Scale	20 Ohms/IN	Logging Speed	20	fpm
Caliper	; Scale	2 Ft /IN	Logging Speed	20	fpm

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs
0.0	6.0	Silt and clay, brownish-gray				Gamma Res Den Cal
6.0	17.0	Sandstone, brown, very coarse grained, argillaceous conglomeratic; with granules and small pebbles				
17.0	22.0	Shale, light-olive-gray, clayey				
22.0	26.0	Siltstone, light to medium-greenish-gray, sandy				
26.0	29.0	Sandstone, light to medium-greenish-gray, fine-grained, silty				
29.0	35.0	Siltstone, medium-greenish-gray, sandy				
35.0	40.0	Claystone, medium-dark-gray, silty				
40.0	46.0	Siltstone, medium-dark-gray, clayey				
46.0	48.0	Siltstone, light-gray, coaly				
48.0	49.0	Coal, clayey				
49.0	55.0	Claystone and siltstone, medium-gray				
55.0	62.0	Shale and siltstone, brownish-gray; interbedded				
62.0	63.0	Shale, dark-brownish-gray, carbonaceous				
63.0	65.0	Shale and siltstone, brownish-gray, interbedded				
65.0	66.0	Shale, dark-brownish-gray, carbonaceous				



		Lithology
66.0	73.0	Shale and siltstone, brownish-gray, interbedded
73.0	84.3	Siltstone and claystone, medium to medium-dark-gray
84.3	87.0	Shale, medium-dark-gray
87.0	88.0	Siltstone, medium-gray
88.0	90.0	Shale, medium-dark-gray
90.0	91.0	Coal, shaly
91.0	92.5	Shale, medium-dark-gray
92.5	99.0	Siltstone, medium-gray, argillaceous
99.0	105.0	Claystone, medium-gray, silty
105.0	115.0	Siltstone and shale, olive-gray, interlaminated
115.0	121.0	Sandstone, light-gray, medium-grained
121.0	152.0	Sandstone, light-gray, coarse- to very coarse grained
152.0	162.0	Conglomerate, light-gray; granule
162.0	167.0	Shale, brownish-gray
167.0	180.0	Sandstone, greenish-gray, silty
180.0	190.0	Sandstone, light to medium-gray, fine-grained, silty
190.0	195.0	Shale, black, carbonaceous
195.0	195.5	Coal
195.5	197.5	Shale, black, carbonaceous
197.5	198.5	Coal
198.5	206.0	Shale, black, carbonaceous
206.0	209.0	Siltstone, medium-gray
209.0	214.0	Sandstone, light-gray, fine-grained, silty
214.0	217.0	Siltstone, medium-gray, sandy
217.0	226.0	Sandstone, light-gray, fine-grained
226.0	234.0	Siltstone, medium-gray, sandy
234.0	237.0	Shale, medium-gray, sandy, silty
237.0	238.0	Sandstone, light-gray, fine-grained, hard, silty
238.0	240.0	Shale, medium-gray
240.0	242.0	Coal, shaly
242.0	243.0	Shale, medium-gray
243.0	246.0	Siltstone, medium-gray, shaly
246.0	253.0	Sandstone, light-gray, medium to coarse-grained
253.0	256.8	Shale, medium-gray
256.8	259.0	Shale, black, carbonaceous
259.0	265.0	Coal, shaly
265.0	271.0	Shale, black, carbonaceous
271.0	283.0	Siltstone and shale, dark-brownish-gray
283.0	291.5	Sandstone, light-gray, fine-grained, silty

Strip Log

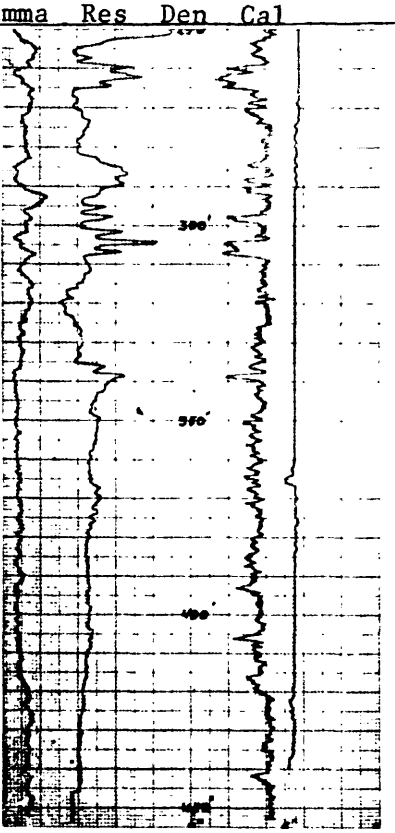
Depth

ft: 300, 350, 400, 450, 500, 550, 600, 650, 700

m: 80, 90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210, 220

Geophysical Logs

Gamma Res Den Cal



Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs Gamma	Res	Den	Cal
291.5	296.0	Shale, black, carbonaceous							
296.0	297.0	Sandstone, brownish-gray, fine-grained							
297.0	299.0	Coal, shaly							
299.0	304.0	Shale, black, carbonaceous, sandy							
304.0	308.0	Coal, shaly							
308.0	314.0	Sandstone, light-gray, fine-grained, silty							
314.0	325.0	Shale, dark-gray and dark-brownish-gray, silty and sandy							
325.0	335.5	Sandstone, light-gray , light-greenish-gray, fine-grained							
335.5	336.5	Shale, black, coaly							
336.5	338.0	Shale, black; shell fragments							
338.0	339.0	Coal							
339.0	345.0	Claystone, dark-gray, sandy; including shell fragments (gastropods?)							
345.0	348.0	Sandstone, dark-brown, very fine-grained							
348.0	416.0	Sandstone, light-gray, very fine grained							
416.0		Siltstone, medium-dark-gray, sandy and clayey							

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-13 DATE 6/17/80 SURFACE ELEVATION(ft) 7178

LOCATION SE NE NE Sec. 4 T. 19N R. 77W Quad. Pierce Reservoir

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 135

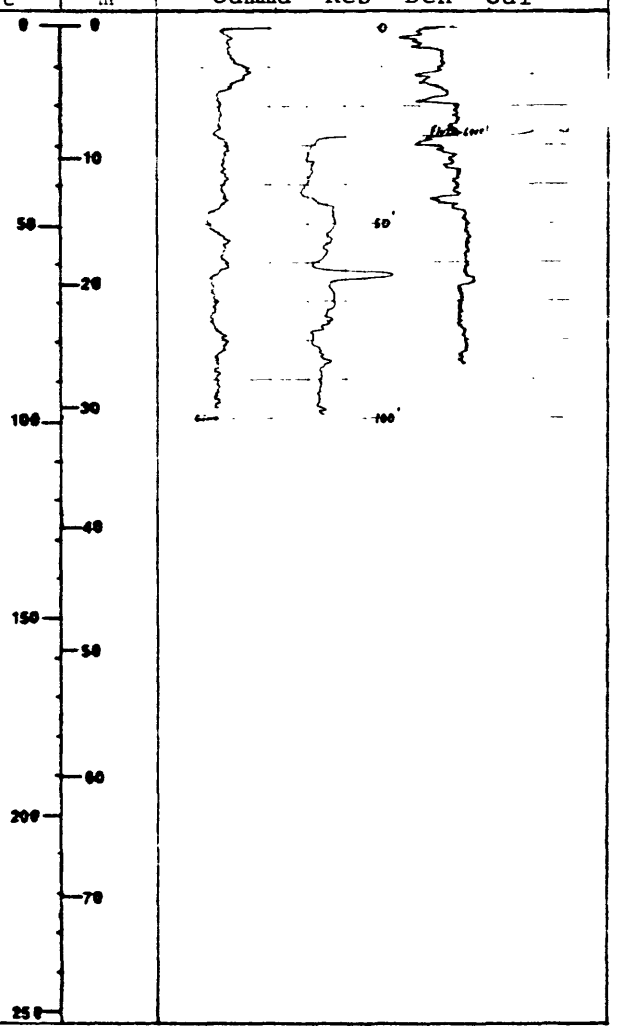
CORED YES [ ] NO [X] INTERVAL(s) _____

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

GEOPHYSICAL LOGS:

Natural Gamma	; Scale	100 CPS/IN	Logging Speed	15	fpm
Gamma Gamma	; Scale	8K CPS/IN	Logging Speed	"	fpm
Resistivity	; Scale	20 Ohms/IN	Logging Speed	15	fpm
Caliper	; Scale		Logging Speed		fpm

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs
0.0	2.0	Gravel, brown				Gamma Res Den Cal
2.0	5.0	Gravel, light-brown, caliche				
5.0	9.2	Siltstone, gray, shaly, weathers olive-gray				
9.2	14.0	Shale, dark-brown, weathered				
14.0	19.0	Sandstone, gray, fine-grained				
19.0	28.0	Sandstone, light-gray, fine-grained, weathers brownish-gray, silty				
28.0	34.0	Siltstone, yellowish-brown, clayey				
34.0	39.5	Siltstone, light-gray, sandy				
39.5	46.0	Siltstone, gray				
46.0	53.0	Sandstone, gray, fine-grained				
53.0	61.5	Siltstone, gray				
61.5	78.0	Sandstone, gray, fine-grained; calcareous near top of interval				
78.0	82.8	Siltstone, gray				
82.8	135.0	Sandstone and siltstone, gray; with interbedded thick laminations of shale				



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-14 DATE 7/20/80 SURFACE ELEVATION(ft) 7175

LOCATION NE NE SE Sec. 4 T. 19N R. 77W Quad. Pierce Reservoir

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 55

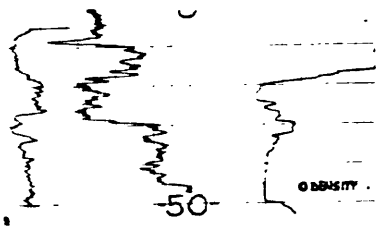
CORED YES [ ] NO [X] INTERVAL(s) _____

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

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	80 CPS/IN	Logging Speed	20 fpm
Gamma Gamma	;	Scale	8K CPS/IN	Logging Speed	" fpm
Resistivity	;	Scale	40 Ohms/IN	Logging Speed	" fpm
Caliper	;	Scale		Logging Speed	fpm

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs
0.0	3.0	Claystone, brownish-gray		0	0	Gamma Res Den Cal
3.0	16.5	Sandstone, light-brown, fine-grained				
16.5	18.0	Siltstone, medium-gray				
18.0	19.0	Shale, dark-gray				
19.0	21.0	Coal, shaly				
21.0	26.8	Shale, dark-gray and black, carbonaceous		50	10	
26.8	29.0	Coal, bright				
29.0	32.0	Sandstone, gray, fine-grained				
32.0	34.0	Siltstone, gray				
34.0	38.0	Sandstone, gray, fine-grained, silty		100	30	
38.0	48.0	Claystone and siltstone, brownish-red (oxidized zone)				
48.0	55.0	Sandstone, light-gray, fine-grained, silty and clayey		150	50	
				200	60	
				250	70	



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-14-C DATE 7/21/80 SURFACE ELEVATION(ft) 7175

LOCATION NE NE SE Sec. 4 T. 19N R. 77 W Quad. Pierce Reservoir

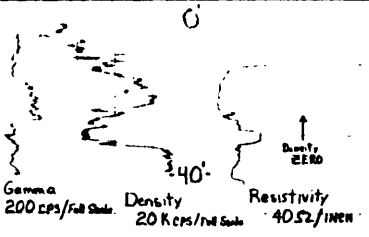
COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 55

CORED YES [X] NO [ ] INTERVAL(s) 20.0-42.8'

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

GEOPHYSICAL LOGS:

Natural Gamma	; Scale	80 CPS/IN	Logging Speed	20	fpm
Gamma Gamma	; Scale	8K CPS/IN	Logging Speed	20	fpm
Resistivity	; Scale	40 Ohms/IN	Logging Speed	20	fpm
Caliper	; Scale		Logging Speed		fpm

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma Res Den Cal
0.0	20.0	No samples. Pilot hole.		0	0	
20.0	21.3	Missing				
21.3	22.4	Shale, medium dark-gray with a medium-gray silt streak from 21.2 to 21.3 feet			10	
22.4	22.8	Shale, dark-gray, clayey		50		
22.8	23.0	Shale, black, carbonaceous			20	
23.0	23.4	Claystone, black, carbonaceous				
23.4	23.6	Claystone, brownish-gray				
23.6	24.9	Coal, bright				
24.9	26.1	Claystone, light brownish-gray				
26.1	26.9	Coal, bright and dull, banded				
26.9	33.7	Coal, bright, pyritic, fractured		100	30	
33.7	34.0	Shale, black, carbonaceous, sandy			40	
34.0	42.4	Sandstone, brownish-gray, fine-grained; irregular bedding; disturbed		150	50	
42.4	42.8	Missing (core loss)			60	
				200		
					70	
				250		

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-15 DATE 7/17/80 SURFACE ELEVATION(ft) 7205

LOCATION SW SE SE Sec. 4 T. 19N R. 77W Quad. Pierce Reservoir

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 115

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

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

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale 80 CPS/IN	Logging Speed	20	fpm
Gamma Gamma	;	Scale 20K CPS/IN	Logging Speed	15	fpm
Resistivity	;	Scale 40 Ohms/IN	Logging Speed	20	fpm
Caliper	:	Scale _____	Logging Speed	_____	fpm

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs
0.0	3.0	Sandstone, brownish-gray, fine-grained				Gamma Res Den Cal
3.0	9.5	Shale, dark gray and brownish-gray, carbonaceous				
9.5	27.0	Sandstone, yellowish-gray, fine-grained				
27.0	31.0	Siltstone and shale, medium to dark-gray, interlaminated				
31.0	32.0	Sandstone, gray, fine-grained, silty				
32.0	34.5	Shale, black, carbonaceous				
34.5	36.0	Coal				
36.0	37.0	Shale, black, carbonaceous				
37.0	44.0	Coal				
44.0	50.0	Sandstone, light-gray, fine-grained				
50.0	57.0	Sandstone and siltstone, light to medium-gray, interbedded; sandstone is very fine-grained				
57.0	59.0	Sandstone, light-gray, very fine grained				
59.0	64.0	Sandstone and siltstone, light to medium-gray, interbedded; sandstone is very fine-grained				
64.0	70.0	Siltstone, medium-dark-gray				
70.0	88.5	Sandstone, light-brownish-gray, fine-grained				

Lithology			Strip Log	Depth		Geophysical Logs			
				ft	m	Gamma	Res	Den	Cal
88.5	115.0	Sandstone and siltstone, light-gray to dark-gray, interbedded and interlaminated; sandstone fine-grained							

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-15-C DATE 7/20/80 SURFACE ELEVATION(ft) 7205

LOCATION SW SE SE Sec. 4 T. 19N R. 77W Quad. Pierce Reservoir

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 51.0

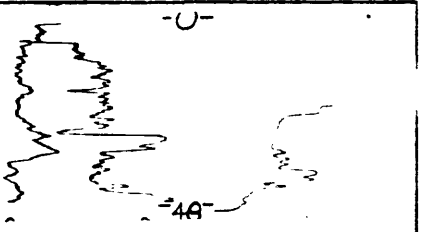
CORED YES [X] NO [ ] INTERVAL(s) 30.0-51.0'

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

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale 80 CPS/IN	Logging Speed 20	fpm
Gamma Gamma	;	Scale 8K CPS/IN	Logging Speed 20	fpm
Resistivity	;	Scale 40 Ohms/IN	Logging Speed 20	fpm
Caliper	;	Scale	Logging Speed	fpm

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma Res Den Cal
0.0	30.0	No description. Pilot hole		0	0	
30.0	30.6	Shale, medium-dark-gray				
30.6	30.9	Shale, medium-dark-gray; very thin laminations of siltstones			10	
30.9	31.4	Shale, medium-dark-gray		50		
31.4	31.5	Shale-claystone, dark-gray			20	
31.5	31.8	Shale, dark-gray and black, carbonaceous				
31.8	32.2	Shale and claystone, dark-gray				
32.2	32.4	Coal and shale, interlaminated. Shale is black, carbonaceous		100	30	
32.4	32.5	Coal, bright				
32.5	33.5	Coal, bright and dull; interlaminations of black carbonaceous shale			40	
33.5	33.6	Coal; a thin parting of black claystone		150		
33.6	34.3	Coal, bright and dull, pyritic			50	
34.3	36.3	Coal, bright and dull				
36.3	37.4	Coal and shale, interbedded. Shale is black, carbonaceous			60	
37.4	39.8	Coal, bright; flecks of pyrite		200		
39.8	40.2	Coal, dull, shaly			70	
40.2	40.3	Coal, bright				
40.3	40.6	Shale, black, carbonaceous; coal streaks				
40.6	41.8	Coal, bright and dull		250		



Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs Gamma	Res	Den	Cal
41.8	44.5	Missing (core loss)							
44.5	44.7	Shale, black, carbonaceous							
44.7	45.2	Sandstone, light-gray, fine-grained and shale, black, irregularly bedded							
45.2	49.5	Sandstone, light- to medium-gray, fine-grained; irregular bedding shows disturbance; grades downward into underlying sandstone							
49.5	50.9	Sandstone, light-greenish-gray, fine-grained; clasts of light-gray sandstone in upper part of interval							
50.9	51.0	Missing (core loss)							

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-16-B DATE 7/17/80 SURFACE ELEVATION(ft) 7265

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

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 475

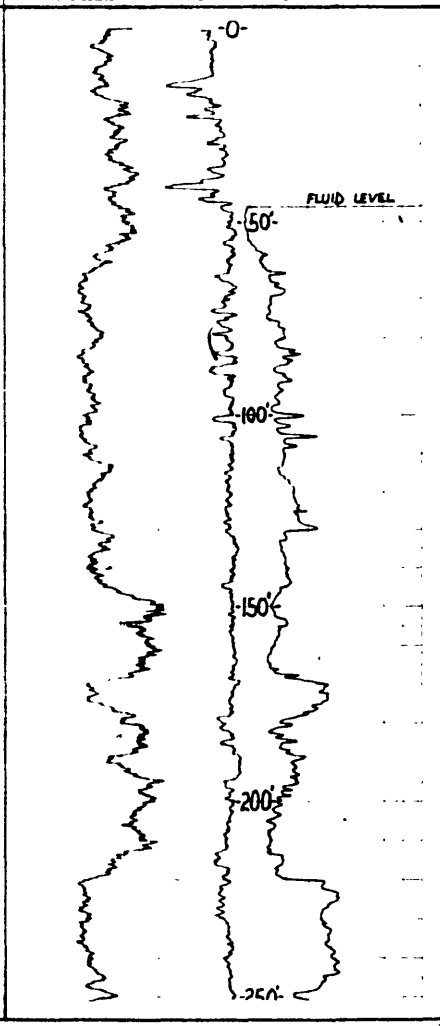
CORED YES [ ] NO [X] INTERVAL(s) _____

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

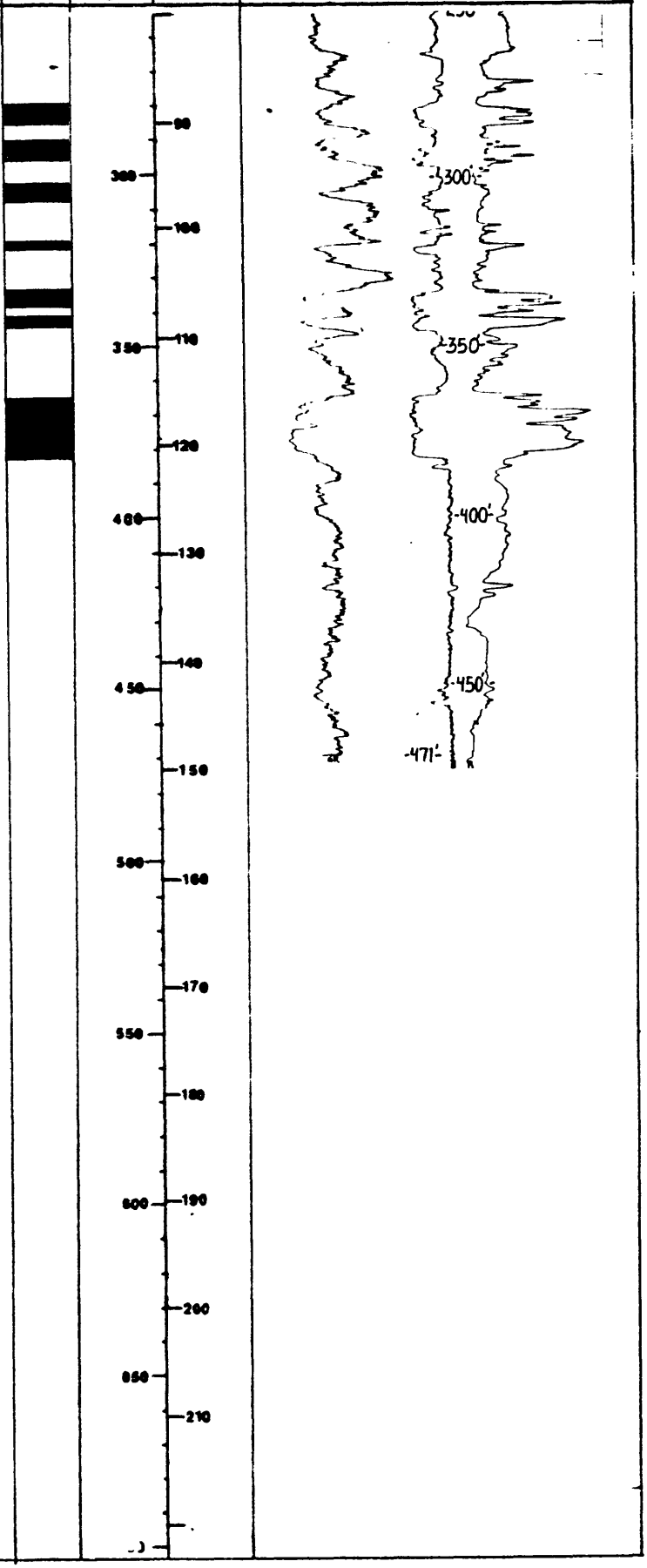
GEOPHYSICAL LOGS:

Natural Gamma	; Scale	80 CPS/IN	Logging Speed	20	fpm
Gamma Gamma	; Scale	20K CPS/IN	Logging Speed	15	fpm
Resistivity	; Scale	20 Ohms/IN	Logging Speed	20	fpm
Caliper	: Scale		Logging Speed		fpm

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs Gamma Res Den Cal
0.0	4.0	Siltstone and claystone, brown				
4.0	5.0	Sandstone, brown, fine-grained				
5.0	10.0	Claystone, brown, silty				
10.0	12.0	Sandstone, light-brown and light-olive-gray, fine-grained				
12.0	15.0	Siltstone, brown, sandy				
15.0	18.0	Sandstone, light-brown and light-olive-gray, silty				
18.0	22.0	Shale, light-brown and light-olive-gray, silty				
22.0	25.0	Siltstone, light-olive-gray				
25.0	31.0	Shale and siltstone, light-brown and light-olive-gray				
31.0	34.5	Siltstone, light-olive-gray				
34.5	40.5	Shale, light-brown				
40.5	47.0	Siltstone, gray, clayey				
47.0	55.0	Claystone, gray, silty				
55.0	58.0	Siltstone, gray, sandy				
58.0	60.0	Sandstone, gray, fine-grained, silty				
60.0	62.0	Siltstone, gray, sandy				
62.0	73.0	Sandstone, light-gray, fine-grained				
73.0	78.0	Sandstone, light-gray, very coarse grained, conglomeratic (chiefly granule size)				
78.0	83.0	Siltstone, gray, sandy				



Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma Res Den Cal
83.0	99.0	Sandstone, light-gray, very coarse grained, conglomeratic, silty and clayey				
99.0	102.5	Sandstone, light-gray, fine- to medium-grained				
102.5	112.0	Sandstone, light-gray, fine- to very coarse grained				
112.0	117.0	Siltstone, gray, clayey				
117.0	131.0	Sandstone, light-gray, fine-grained				
131.0	136.0	Siltstone, gray, sandy and clayey				
136.0	145.0	Sandstone and siltstone, medium-gray				
145.0	154.0	Shale, medium-dark-gray				
154.0	155.0	Siltstone, gray				
155.0	169.0	Shale and claystone, medium-gray, silty				
169.0	175.0	Sandstone, light-gray, fine-grained, silty				
175.0	177.0	Siltstone, light-gray, sandy				
177.0	188.0	Shale, dark-gray and black Carbonaceous, slightly coaly				
188.0	190.0	Siltstone, gray				
190.0	194.0	Siltstone and shale, gray				
194.0	212.5	Shale, dark-gray, clayey, slightly silty				
212.5	219.5	Shale, dark-gray, carbonaceous				
219.5	244.0	Sandstone, light-gray, fine to very coarse grained, conglomeratic (chiefly granules)				
244.0	248.0	Sandstone, light-gray, fine to very coarse grained, conglomeratic; granules and claystone, silty, gray				
248.0	250.5	Claystone, gray, silty				
250.5	262.5	Sandstone, gray, fine-grained, silty				
262.5	265.5	Claystone, olive-gray, silty				
270.0	274.0	Sandstone, light-gray, fine-grained, silty				
274.0	279.0	Claystone, olive-gray, shaly				
279.0	285.0	Coal, shaly				
285.0	290.5	Shale, dark-gray and black, carbonaceous; sandy at base				
290.5	296.0	Coal and shale. Shale is dark gray and black, carbonaceous				
296.0	303.0	Shale, dark-gray and black, carbonaceous				
303.0	308.5	Coal, shaly				
308.5	313.0	Shale, dark-gray, clayey				



Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs Gamma	Res	Den	Cal
313.0	317.0	Siltstone, dark-gray; with interbedded coal and black shale							
317.0	320.0	Shale, dark gray, carbonaceous							
320.0	322.5	Coal							
322.5	327.0	Siltstone, gray							
327.0	334.0	Shale, dark-gray and black, carbonaceous							
334.0	339.0	Coal							
339.0	342.0	Shale, dark-gray to black, carbonaceous							
342.0	345.0	Coal							
345.0	348.0	Shale, dark brownish-gray to black, carbonaceous							
348.0	352.0	Sandstone, olive-gray, silty, coaly							
352.0	356.0	Siltstone, olive-gray							
356.0	365.0	Shale, dark-gray							
365.0	382.0	Coal; with clay and shale partings							
382.0	385.0	Sandstone, gray, fine-grained							
385.0	390.0	Shale, dark-gray							
390.0	400.5	Sandstone, light-gray and light-brownish-gray, fine-grained, silty							
400.5	413.5	Shale and siltstone, dark-gray, interbedded							
413.5	415.5	Sandstone, light-gray, fine-grained, silty							
415.5	420.0	Shale and siltstone, dark-gray, interbedded							
420.0	422.0	Sandstone, light-brownish-gray, fine-grained, calcareous							
422.0	430.0	Shale, dark-gray; with thin interbeds of dark-gray siltstone							
430.0	433.0	Shale and siltstone, dark-gray, interbedded							
433.0	442.0	Siltstone, dark-gray, partly sandy							
442.0	446.0	Sandstone and siltstone, gray, interbedded. Sandstone is very fine grained							
446.0	448.0	Siltstone, dark-gray							
448.0	455.0	Sandstone, gray, very fine grained							
455.0	463.0	Siltstone, dark gray							
463.0	465.5	Shale, dark gray, silty							
465.5	475.0	Siltstone, dark gray, shaly							

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-17 DATE 6/22/80 SURFACE ELEVATION(ft) 7478

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

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 555

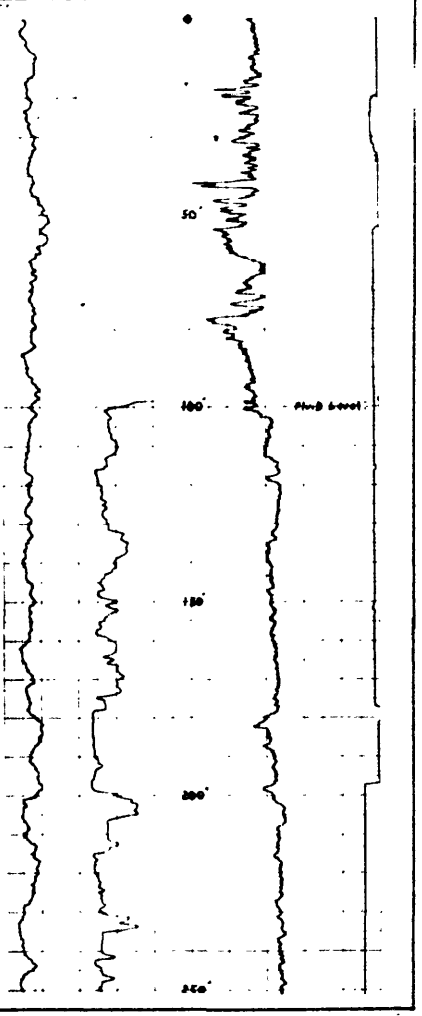
CORED YES ☐ NO ☒ INTERVAL(s) _____

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

GEOPHYSICAL LOGS:

Natural Gamma	; Scale	200 CPS/IN	Logging Speed	20	fpm
Gamma Gamma	; Scale	8K CPS/IN	Logging Speed	20	fpm
Resistivity	; Scale	20 Ohms/IN	Logging Speed	20	fpm
Caliper	; Scale	3 IN/IN	Logging Speed	20	fpm

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma Res Den Cal
0.0	9.0	Sand, yellowish-brown, fine to coarse-grained, conglomeratic				
9.0	15.0	Shale, greenish-gray; brown nodules				
15.0	21.0	Sandstone, yellow, fine-grained; white, calcareous cement; gray siltstone nodules				
21.0	23.0	Siltstone, gray, sandy				
23.0	27.0	Sandstone, light yellowish-brown, coarse-grained, conglomeratic				
27.0	45.0	Sandstone, yellowish-brown, fine to coarse-grained				
45.0	54.0	Siltstone, gray				
54.0	62.0	Siltstone, greenish-gray				
62.0	86.0	Sandstone, gray, fine-grained, silty				
86.0	92.0	Sandstone, gray, fine to medium-grained; some coarse grains near base of section				
92.0	103.0	Siltstone, greenish-gray				
103.0	116.0	Sandstone, gray, fine to coarse-grained, silty				
116.0	132.0	Sandstone, gray, fine to medium-grained, silty				
132.0	145.0	Sandstone, gray, medium to coarse-grained, conglomeratic				



Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma Res Den Cal
145.0	160.0	Sandstone, gray, fine to coarse-grained, silty and clayey, conglomeratic				
160.0	166.0	Sandstone, gray, fine to medium-grained				
166.0	171.0	Sandstone, gray, fine to coarse-grained				
171.0	180.0	Sandstone, gray, fine to coarse-grained, conglomeratic, silty				
180.0	187.0	Siltstone, greenish-gray, clayey				
187.0	192.0	Sandstone, fine to coarse-grained, silty				
192.0	200.6	Siltstone, greenish-gray, clayey				
200.6	213.0	Sandstone, gray, fine to coarse-grained, conglomeratic				
213.0	228.0	Siltstone, gray, sandy				
228.0	242.0	Sandstone, gray, fine to coarse-grained, conglomeratic				
242.0	246.0	Siltstone, gray, sandy				
246.0	277.0	Sandstone, gray, fine to coarse-grained, partly conglomeratic				
277.0	290.0	Siltstone, gray, sandy				
290.0	295.5	Siltstone, dark-gray, shaly				
295.5	299.0	Sandstone, gray, fine to coarse-grained				
299.0	304.2	Shale, dark brown, carbonaceous				
304.2	305.0	Coal, shaly				
305.0	312.8	Shale, dark brown, carbonaceous				
312.8	322.0	Siltstone, gray, sandy				
322.0	331.0	Shale, dark brown, carbonaceous				
331.0	332.0	Coal, shaly				
332.0	334.0	Shale, dark-brown				
334.0	335.0	Coal, shaly				
335.0	339.0	Shale, dark-brown, carbonaceous				
339.0	344.0	Siltstone, greenish-gray, sandy				
344.0	389.0	Sandstone, gray, medium to coarse-grained				
389.0	395.0	Siltstone, gray, clayey				
395.0	400.0	Sandstone, fine to coarse-grained				
400.0	406.0	Siltstone, gray, sandy				
406.0	411.0	Shale, gray				

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs Gamma	Res	Den	Cal
411.0	414.5	Shale, dark-brown, carbonaceous, coaly							
414.5	417.0	Siltstone, gray, sandy							
417.0	420.5	Sandstone, gray, fine-grained							
420.5	424.0	Shale, dark-gray							
424.0	430.0	Coal							
430.0	431.0	Shale, black, carbonaceous							
431.0	432.0	Coal							
432.0	434.0	Shale, dark-brown, carbonaceous							
434.0	435.0	Coal, shaly							
435.0	436.0	Shale, dark-brown, carbonaceous							
436.0	437.0	Coal, shaly							
437.0	439.5	Shale, dark-gray							
439.5	442.0	Siltstone, gray, sandy							
442.0	448.5	Shale, gray							
448.5	451.0	Coal							
451.0	462.5	Siltstone, gray, sandy							
462.5	466.5	Sandstone, gray, fine-grained							
466.5	469.0	Shale, dark-gray, carbonaceous							
469.0	474.0	Coal							
474.0	478.5	Shale, dark-brown, carbonaceous							
478.5	481.0	Coal							
481.0	485.5	Shale, dark-gray, carbonaceous							
485.5	488.0	Sandstone, gray, fine-grained, silty							
488.0	495.0	Siltstone, gray, sandy							
495.0	497.0	Shale, dark-brown, carbonaceous							
497.0	498.0	Coal, shaly							
498.0	502.0	Shale, dark-brown, carbonaceous							
502.0	515.0	Coal							
515.0	528.5	Siltstone, dark-gray, sandy							
528.5	555.0	Sandstone, light-gray, fine-grained							

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-18 DATE 7/14/80 SURFACE ELEVATION(ft) 7273

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

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 605

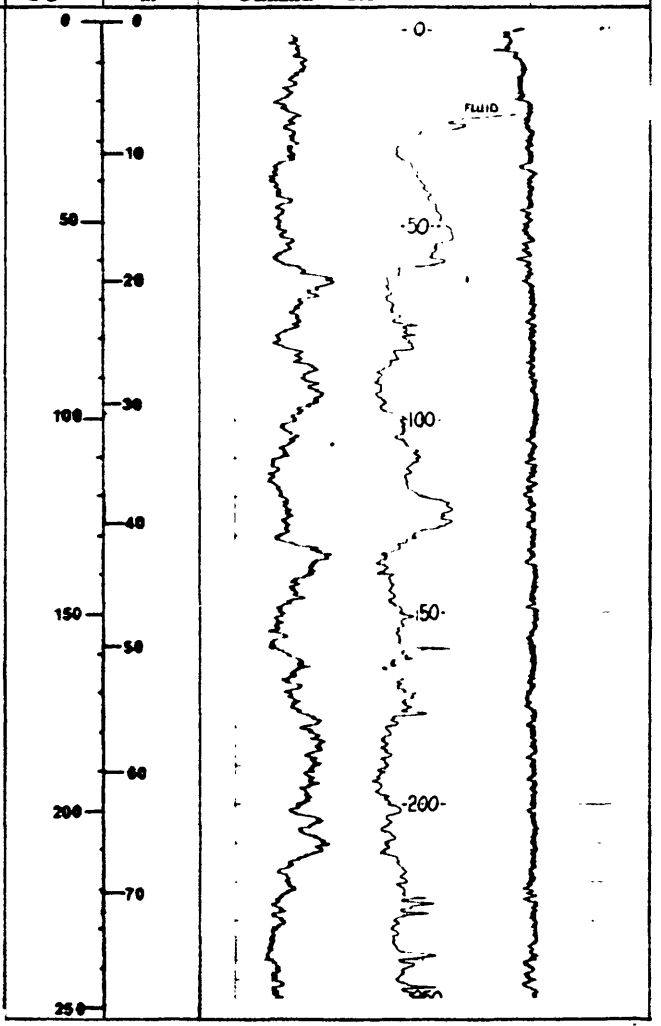
CORED YES [ ] NO [X] INTERVAL(s) _____

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

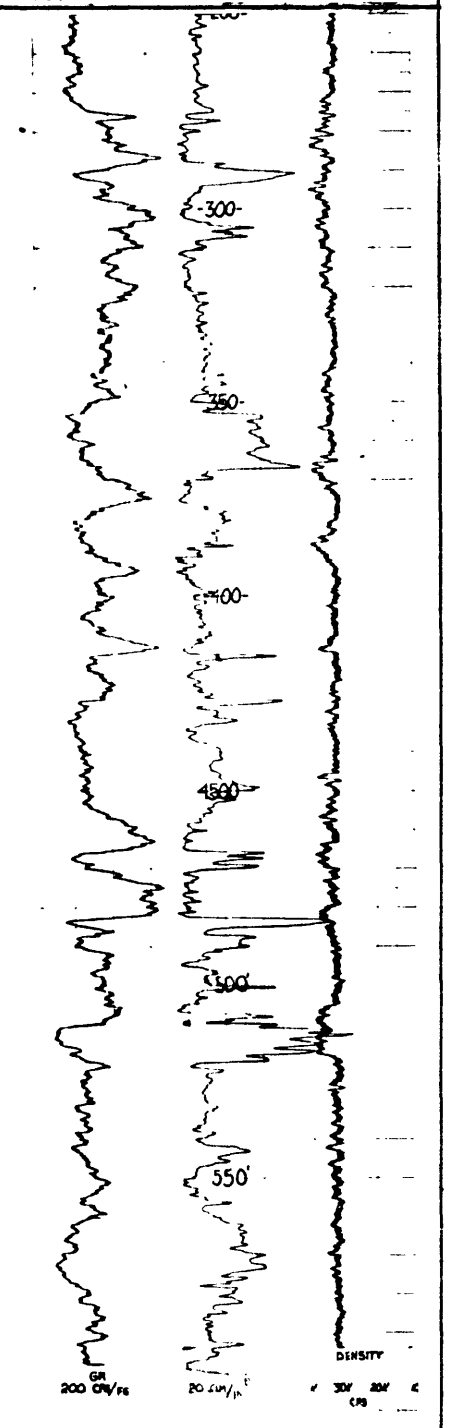
GEOPHYSICAL LOGS:

Natural Gamma	; Scale	80 CPS/IN	Logging Speed	20	fpm
Gamma Gamma	; Scale	40K CPS/IN	Logging Speed	15	fpm
Resistivity	; Scale	20 Ohms/IN	Logging Speed	20	fpm
Caliper	; Scale		Logging Speed		fpm

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma Res Den Cal
0.0	7.0	Gravel, brown				
7.0	11.0	Claystone, dark-gray, silty				
11.0	17.0	Sandstone, brown, coarse-grained, clayey				
17.0	21.0	Sandstone, brown, very coarse-grained and granules of feldspar and quartzite				
21.0	25.5	Siltstone, brown, sandy. Sandstone is coarse-grained				
25.5	33.0	Siltstone, olive-gray, clayey				
33.0	39.0	Sandstone, light-gray and greenish-gray, fine- to coarse-grained				
39.0	60.0	Sandstone, light-gray, very conglomeratic; including small pebbles and granules of chiefly angular feldspar and quartzite				
60.0	68.0	Shale, dark-gray, clayey				
68.0	76.2	Siltstone, medium-dark-gray, sandy				
76.2	82.0	Sandstone, medium-gray, fine-grained, silty				
82.0	85.2	Siltstone, greenish-gray, sandy				
85.2	96.5	Claystone, gray and brown, silty				
96.5	109.5	Siltstone and sandstone, interbedded, greenish-gray. Sandstone is fine-grained.				



Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma Res Den Cal
109.5	132.0	Sandstone, gray, very coarse-grained, conglomeratic; granules and very small pebbles				
132.0	140.0	Claystone, medium-gray, partly silty				
140.0	146.5	Siltstone, olive-gray				
146.5	161.0	Sandstone, gray, very coarse grained, clayey				
161.0	177.0	Siltstone, greenish-gray, clayey				
177.0	191.0	Claystone, greenish-gray				
191.0	195.5	Shale, medium-dark-gray				
195.5	201.0	Claystone, medium-gray, silty				
201.0	203.0	Siltstone, medium-gray				
203.0	206.0	Claystone, medium-gray				
206.0	208.0	Siltstone, medium-gray, clayey				
208.0	213.0	Claystone, medium-gray				
213.0	217.0	Siltstone, medium-gray				
217.0	218.0	Sandstone, medium-gray, fine-grained, silty				
218.0	223.0	Siltstone, medium-gray, sandy				
223.0	231.0	Sandstone, gray, fine-grained, silty and clayey				
231.0	240.0	Sandstone, gray, fine to coarse-grained; chiefly coarse-grained				
240.0	275.0	Sandstone, light-gray, fine to very coarse grained, conglomeratic; with coarsest fractions being feldspathic granules				
275.0	277.0	Claystone, greenish-gray				
277.0	281.0	Shale, dark-gray, silty				
281.0	285.0	Shale, dark-gray; traces of coal and black carbonaceous shale				
285.0	289.0	Claystone, dark-gray				
289.0	293.0	Sandstone, light-gray, fine-grained				
293.0	300.0	Shale, dark-gray to black, partly carbonaceous; some coal fragments				
300.0	303.0	Claystone, dark-gray				
303.0	310.0	Shale, dark-gray to black, carbonaceous; some coal fragments				
310.0	319.0	Shale, dark-gray, carbonaceous				
319.0	324.0	Shale, dark-gray, partly silty				
324.0	336.0	Shale and siltstone, medium-gray, thinly interbedded				
336.0	342.0	Shale, medium-dark-gray, silty				
342.0	344.0	Siltstone, medium-gray				
344.0	345.0	Shale, medium-dark-gray, silty				



Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs Gamma	Res	Den	Cal
345.0	346.5	Siltstone, medium-gray							
346.5	349.0	Shale, medium-dark-gray, silty							
349.0	353.0	Siltstone, medium-gray, sandy							
353.0	360.0	Sandstone, gray, medium to coarse-grained							
360.0	367.0	Sandstone, gray, very coarse grained, conglomeratic (granules); with trace of pyrite. Sandstone is silty and clayey							
367.0	370.0	Siltstone, gray, sandy							
370.0	376.0	Shale, dark-gray							
376.0	380.0	Siltstone, gray							
380.0	388.0	Sandstone, light-gray, fine-grained							
388.0	390.0	Siltstone, medium-gray, sandy							
390.0	395.0	Shale, black, carbonaceous							
395.0	400.0	Siltstone, medium-gray							
400.0	401.0	Shale, dark-gray							
401.0	403.8	Siltstone, medium-gray							
403.8	406.0	Sandstone, light-gray, fine-grained, silty							
406.0	410.0	Siltstone, medium-gray							
410.0	416.0	Shale, black, carbonaceous							
416.0	420.0	Siltstone, gray, sandy							
420.0	427.0	Shale, dark-gray and black, carbonaceous							
427.0	442.0	Sandstone, light-gray, fine- to medium-grained							
442.0	454.5	Sandstone and siltstone, gray, interbedded. Sandstone is fine to medium-grained							
454.5	457.0	Siltstone, olive-gray							
457.0	459.0	Shale, olive-gray							
459.0	465.0	Shale, dark-gray to black, carbonaceous							
465.0	470.0	Coal, shaly							
470.0	482.0	Shale, dark-gray to black, carbonaceous							
482.0	485.0	Coal							
485.0	487.2	Shale, dark-gray to black, carbonaceous							
487.2	491.0	Sandstone, light-gray, fine-grained							
491.0	496.0	Shale, dark-gray, silty							
496.0	502.0	Siltstone, light-gray							
502.0	505.5	Shale, dark-gray, silty							
505.5	510.0	Shale, dark-gray to black, carbonaceous, coaly							
510.0	518.0	Coal							
518.0	520.0	Sandstone, light-gray, fine-grained							
520.0	522.0	Shale, dark-gray							

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs Gamma	Res	Den	Cal
522.0	531.0	Sandstone and siltstone, light-gray, interbedded. Sandstone is fine-grained							
531.0	533.0	Sandstone, light-gray, fine-grained							
533.0	541.5	Sandstone and siltstone, light gray, interbedded. Sandstone is fine-grained							
541.5	544.0	Sandstone, light-gray, fine-grained							
544.0	550.0	Siltstone, light-gray, sandy							
550.0	553.8	Shale, dark-gray, silty							
553.8	561.5	Sandstone, light-gray, fine-grained							
561.5	579.0	Sandstone, light-gray, fine-grained							
579.0	581.0	Siltstone, light-gray							
581.0	582.5	Sandstone, light-gray, very fine-grained							
582.5	592.0	Siltstone, light-gray. Some interbedding of light-gray, silty claystone							
592.0	605.0	Sandstone, light-gray, fined-grained, silty and clayey							

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-19 DATE 6/19/80 SURFACE ELEVATION(ft) 7265

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

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 130

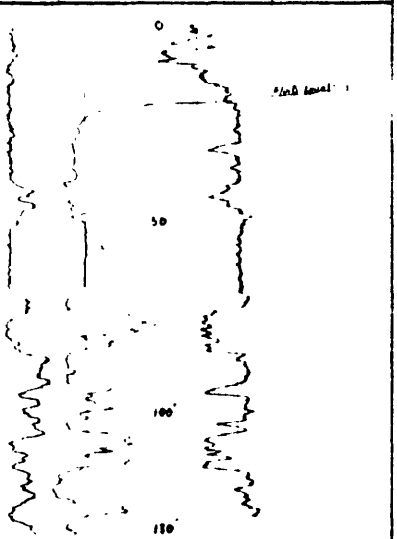
CORED YES [ ] NO [X] INTERVAL(s) _____

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

GEOPHYSICAL LOGS:

Natural Gamma	; Scale	200 CPS/IN	Logging Speed	15	fpm
Gamma Gamma	; Scale	8K CPS/IN	Logging Speed	15	fpm
Resistivity	; Scale	20 Ohms/IN	Logging Speed	15	fpm
Caliper	; Scale		Logging Speed		fpm

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma Res Den Cal
0.0	8.0	Gravel, light-brown		0	0	
8.0	12.0	Gravel, sandy				
12.0	15.0	Sandstone, yellowish-gray, clayey				
15.0	20.0	Sandstone, gray, fine-grained		50	10	
20.0	25.0	Sandstone, gray, fine-grained, pyrite				
25.0	30.5	Sandstone, gray, fine-grained				
30.5	33.0	Sandstone, gray, fine-grained and coal fragments		100	20	
33.0	41.0	Sandstone, gray, fine to coarse-grained				
41.0	47.0	Shale, dark brown, coaly				
47.0	51.0	Siltstone, gray, sandy; hard streak		150	30	
51.0	69.0	Sandstone, gray, fine to coarse-grained, silty				
69.0	74.0	Shale, gray, silty				
74.0	81.0	Coal				
81.0	82.5	Shale, dark-gray, carbonaceous				
82.5	85.0	Coal, shaly				
85.0	93.0	Shale, dark-gray, carbonaceous				
93.0	96.0	Coal, shaly				
96.0	98.5	Shale, dark-gray, carbonaceous				
98.5	101.0	Siltstone and sandstone, gray		200	40	
101.0	106.0	Shale, dark-gray, coaly				
106.0	110.0	Coal				
110.0	112.5	Shale, dark-gray				
112.5	115.0	Coal		250	50	



Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs Gamma	Res	Den	Cal
115.0	123.0	Shale, dark-gray, carbonaceous							
123.0	128.5	Sandstone, gray, fine-grained, silty							
128.5	130.0	Shale, dark-gray							

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-19-C DATE 6/20/80 SURFACE ELEVATION(ft) 7265

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

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 165

CORED YES [X] NO [ ] INTERVAL(s) 70-161 Ft

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

GEOPHYSICAL LOGS:

Natural Gamma	; Scale	200 CPS/IN	Logging Speed	20	fpm
Gamma Gamma	: Scale	8K CPS/IN	Logging Speed	20	fpm
Resistivity	; Scale	20 Ohms/IN	Logging Speed	15	fpm
Caliper	: Scale		Logging Speed		fpm

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma Res Den Cal
0.0	70.2	No samples.		0	0	
70.2	71.6	Sandstone, gray, fine-grained, fine laminations. Contains some coal and clay clasts				
71.6	72.0	Siltstone and sandstone, gray or medium dark-gray interbedded		50	20	
72.0	76.6	Shale, dark-gray; thin siltstone bands				
76.6	79.9	Coal, bright and dull banding, pyritic		100	30	
79.9	80.0	Shale, dark brownish-gray				
80.0	81.1	Coal, pyritic				
81.1	81.8	Coal; thin dark brown shale banding				
81.8	83.6	Coal, pyritic				
83.6	84.6	Shale, dark-brown, coaly				
84.6	86.0	Coal, bright and dull, pyritic; shaly at bottom		150	50	
86.0	87.5	Shale, medium dark-gray, silty, coal stringers				
87.5	89.8	Shale, dark gray, siltstone banding				
89.8	92.8	Shale, dark gray, coal streaks		200	60	
92.8	93.5	Claystone, dark-gray				
93.5	95.1	Shale, dark-gray and black, coal streaks				
95.1	97.6	Coal, black shale bands		250	70	
97.6	98.8	Shale, dark-brown, silty				
98.8	99.6	Siltstone, dark-gray				

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs Gamma	Res	Den	Cal
99.6	100.0	Sandstone, gray, fine-grained, irregular laminations							
100.0	102.5	Sandstone, light- blue-gray, fine to medium-grained, hard; calcite cement							
102.5	103.5	Sandstone, brownish-gray; slump bedding							
103.5	105.8	Sandstone and siltstone, light-gray; coal streaks							
105.8	106.2	Claystone, dark-gray							
106.2	108.8	Coal, pyritic; clay stone partings							
108.8	109.2	Shale, dark-gray, coaly							
109.2	111.0	Coal, pyritic							
111.0	111.9	Shale, dark-gray, coaly							
111.9	113.2	Coal, pyritic, with black coaly shale							
113.2	115.0	Coal, pyritic							
115.0	116.5	Shale, black, coaly, pyritic							
116.5	117.7	Siltstone, gray; sandstone laminations							
117.7	123.2	Shale, dark-gray to black, silty							
123.2	124.8	Siltstone, dark-gray, shaly							
124.8	129.2	Sandstone, gray, fine-grained; thin laminations of siltstone and shale							
129.2	135.5	Siltstone and shale, gray; thin interlaminations of silt and shale							
135.5	140.5	Coal and shale-claystone, interbedded, pyritic							
140.5	142.0	Coal; clay partings							
142.0	148.0	Coal							
148.0	149.9	Shale, dark-gray							
149.9	157.0	Coal, pyritic							
157.0	161.0	Sandstone, light-brownish-gray, fine-grained							

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-20 DATE 6/18/80 SURFACE ELEVATION(ft) 7325

LOCATION SW SW SE Sec. 8 T. [illegible]N R. 77W Quad. Pierce Reservoir

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 240

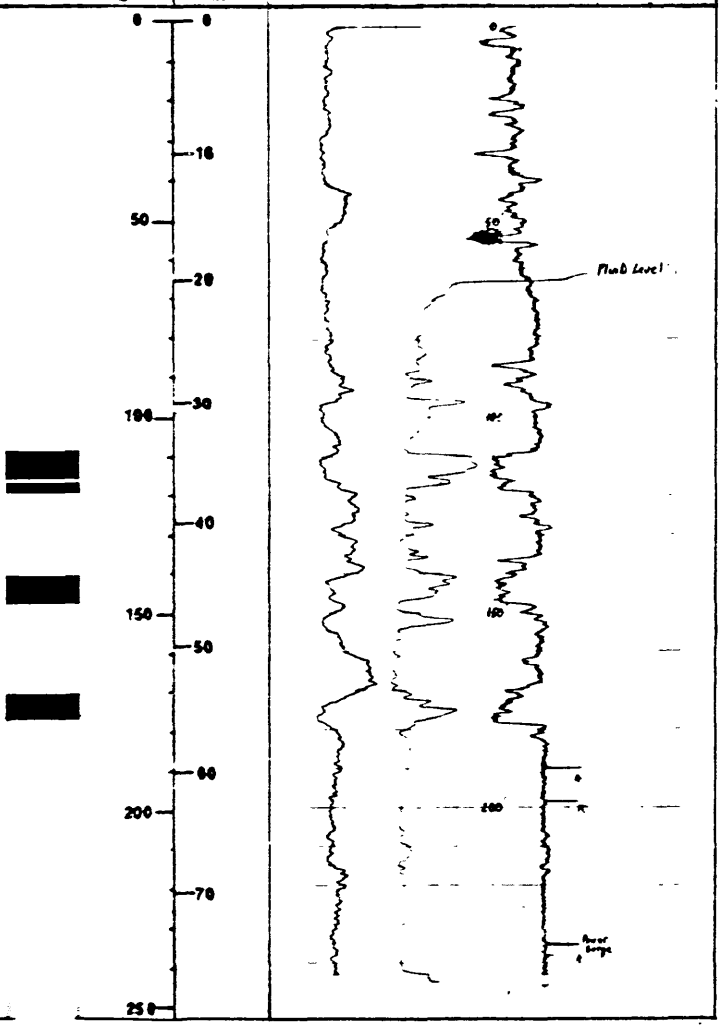
CORED YES [ ] NO [X] INTERVAL(s) _____

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

GEOPHYSICAL LOGS:

Natural Gamma	; Scale	200 CPS/IN	Logging Speed	15	fpm
Gamma Gamma	; Scale	8K CPS/IN	Logging Speed	15	fpm
Resistivity	; Scale	20 Ohms/IN	Logging Speed	15	fpm
Caliper	; Scale		Logging Speed		fpm

		Lithology	Depth ft	Depth m	Geophysical Logs: Gamma Res Den Cal
0.0	4.0	Gravel, light-brownish-gray and yellowish-brown			
4.0	28.0	Sandstone, light-brownish-gray, fine-grained			
28.0	41.0	Sandstone, light-brownish-gray, fine to coarse-grained			
41.0	51.0	Shale, olive-gray, partly carbonaceous			
51.0	55.0	Sandstone, light-gray to white, fine-grained			
55.0	81.0	Sandstone, dark-brown and yellowish-brown, fine to coarse-grained			
81.0	89.0	Sandstone, gray, fine to coarse-grained; small pebbles, conglomeratic			
89.0	96.0	Siltstone, gray, hard streaks, sandy; thin claystone at middle of unit			
96.0	103.3	Sandstone, gray, fine-grained, partly calcareous, hard			
103.3	109.5	Siltstone, gray, sandy; some interbedding of brownish-gray clay			
109.5	116.3	Coal			
116.3	116.8	Shale, gray			
116.8	118.8	Coal, shaly			
118.8	127.0	Claystone, gray, silty			



Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs Gamma	Res	Den	Cal
127.0	130.7	Sandstone, gray, fine-grained, silty, hard, calcareous							
130.7	135.0	Claystone, gray, silty							
135.0	137.5	Shale, dark-gray, coaly							
137.5	139.8	Shale, dark-gray							
139.8	141.2	Shale, dark-gray, carbonaceous							
141.2	147.0	Coal							
147.0	150.7	Shale, dark-gray							
150.7	155.0	Sandstone, gray, fine-grained							
155.0	161.5	Siltstone, gray; grades downward							
161.5	170.0	Shale, dark-gray and olive-gray							
170.0	172.5	Shale, dark-gray, coaly							
172.5	178.5	Coal							
178.5	197.0	Siltstone, gray, sandy							
197.0	216.0	Sandstone, gray, fine-grained, partly silty							
216.0	240.0	Siltstone, dark-gray, sandy							

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-20-C DATE 6/19/80 SURFACE ELEVATION(ft) 7310

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

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 185

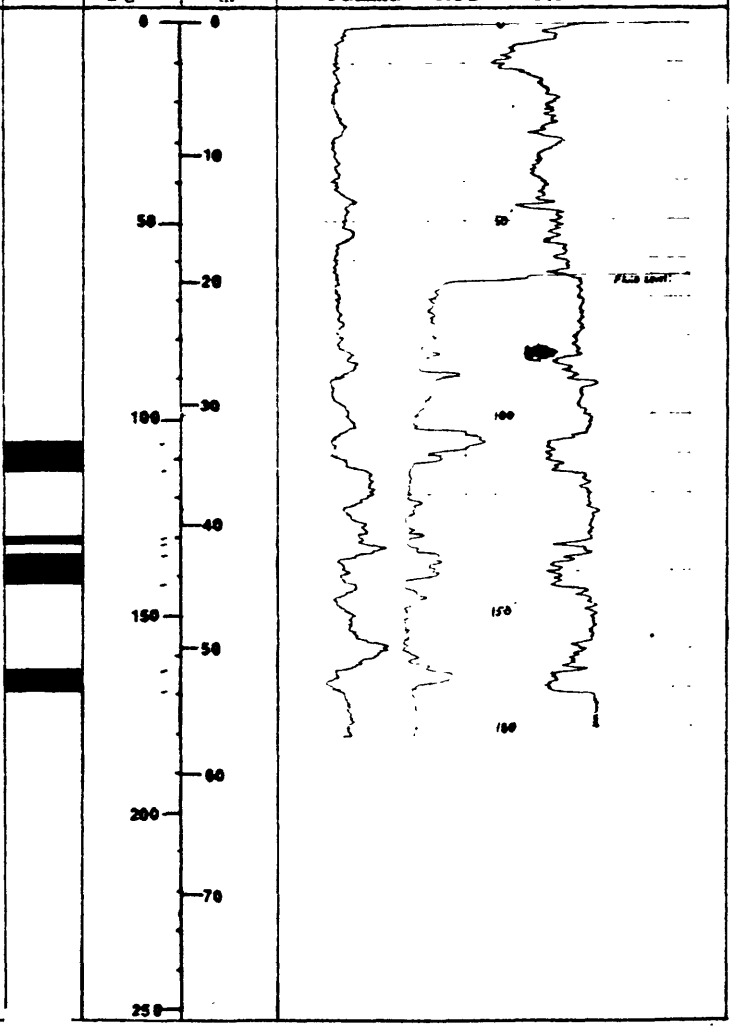
CORED YES [X] NO [ ] INTERVAL(s) 100-185.0 Ft

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

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	200 CPS/IN	Logging Speed	15 fpm
Gamma Gamma	:	Scale	8K CPS/IN	Logging Speed	15 fpm
Resistivity	;	Scale	20 Ohmes/IN	Logging Speed	15 fpm
Caliper	;	Scale		Logging Speed	fpm

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma Res Den Cal
0.0	100.0	No sample				
100.0	101.6	Siltstone, gray; irregular laminations				
101.6	102.0	Shale, medium-dark-gray, silty				
102.0	105.0	Shale and claystone, dark-gray				
105.0	106.2	Shale, black, coaly				
106.2	111.2	Coal, bright and dull; minute crystals of pyrite				
111.2	113.5	Coal; lenses of pyrite				
113.5	121.1	Shale, medium to dark-gray; thin coal lenses				
121.1	121.2	Sandstone and shale, gray, irregular bedded				
121.2	123.0	Sandstone and shale, interbedded, gray				
123.0	124.2	Sandstone, gray, very fine grained				
124.1	127.0	Sandstone and shale, interbedded. Sandstone is gray, fine to coarse-grained; shale is dark-gray				
127.0	130.0	Shale, dark-brown				
130.0	131.0	Sandstone, gray, fine to medium-grained; interlaminations of gray shale				
131.0	131.8	Shale, dark-gray				
131.8	132.5	Coal, shaly				
132.5	135.8	Shale, olive-gray to dark-gray; thin lenses of coal, plant impressions				



Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs Gamma Res Den Cal
135.8	142.8	Coal; numerous thin shale and claystone partings				
142.8	146.0	Shale, dark-gray, pyritic				
146.0	149.3	Sandstone, light-gray, medium-grained				
149.3	157.5	Siltstone, gray; few thin beds of dark-gray shale				
157.5	160.5	Shale, dark-gray; few thin beds of medium-gray siltstone				
160.5	164.5	Shale and claystone, gray to dark gray; coal bands and thin lenses				
164.5	165.0	Shale, black				
165.0	170.0	Coal, pyritic; thin shale partings				
170.0	171.0	Siltstone, gray; coal inclusions				
171.0	173.0	Sandstone, brownish-gray, fine-grained, silty				
173.0	180.0	Sandstone, gray, very finegrained, mottled, burrowed				
180.0	185.0	Sandstone, greenish-gray, very fine grained				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER BH-21 DATE 6/21/80 SURFACE ELEVATION(ft) 7441

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

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 415

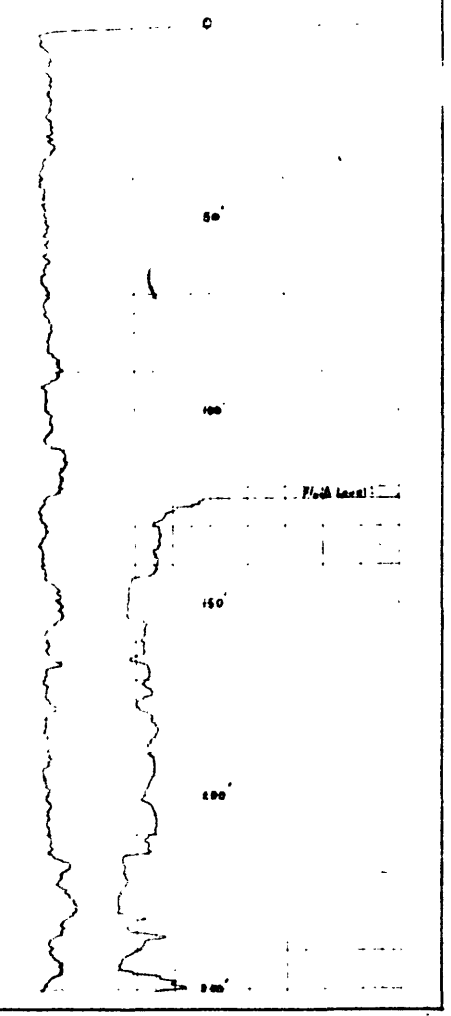
CORED YES [ ] NO [X] INTERVAL(s) _____

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

GEOPHYSICAL LOGS:

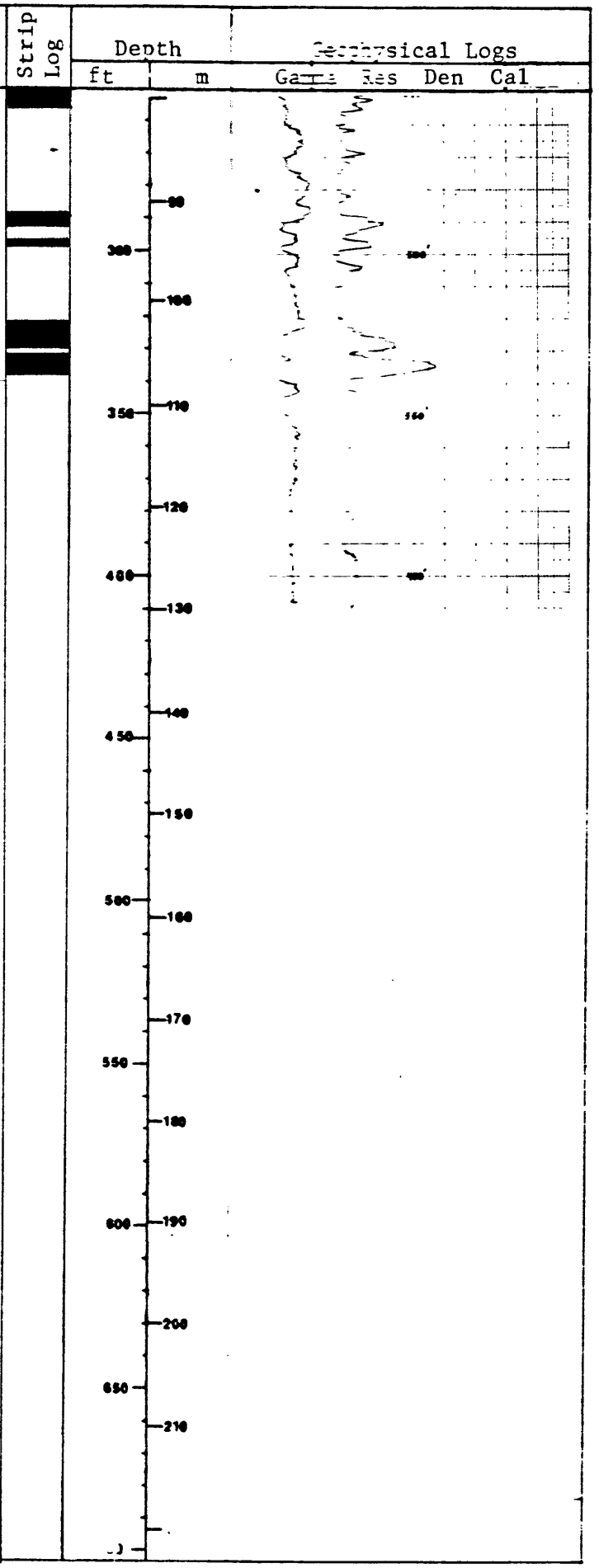
Natural Gamma	; Scale	200 CPS/IN	Logging Speed	15	fpm
Gamma Gamma	; Scale		Logging Speed		fpm
Resistivity	; Scale	20 Ohms/IN	Logging Speed	15	fpm
Caliper	; Scale		Logging Speed		fpm

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs: Gamma Res Den Cal
0.0	6.0	Gravel, brown, calcareous				
6.0	34.0	Sandstone, yellowish-brown, coarse-grained; interbedded light-brown and yellowish-brown claystone				
34.0	85.0	Sandstone, light-brown, gray, and yellowish-brown, fine to very coarse-grained, silty, clayey, conglomeratic				
85.0	92.0	Siltstone, gray, sandy				
92.0	109.5	Sandstone, yellowish-gray, fine to coarse-grained				
109.5	122.0	Shale, gray, silty				
122.0	144.5	Sandstone, gray, fine to coarse-grained				
144.5	155.0	Siltstone, gray, clayey				
155.0	216.5	Sandstone, gray, fine to coarse-grained, silty				
216.5	219.5	Shale, gray, silty				
219.5	224.0	Siltstone, gray				
224.0	231.0	Shale, gray				
231.0	236.0	Shale, gray and coal				
236.0	242.5	Sandstone, fine-grained, calcareous				
242.5	246.5	Shale, gray				
246.5	251.5	Coal				
251.5	256.0	Coal, shaly				
256.0	261.0	Sandstone, gray, fine-grained				
261.0	269.5	Shale, gray				
269.5	274.5	Sandstone, gray, fine-grained				



BH-21

Lithology		
274.5	282.5	Shale, dark-gray, silty
282.5	285.0	Siltstone, gray
285.0	289.0	Shale, dark-gray
289.0	293.5	Coal
293.5	297.0	Shale, dark-gray
297.0	299.5	Coal
299.5	304.0	Shale, gray
304.0	307.0	Sandstone, gray, fine-grained
307.0	320.0	Siltstone, gray, sandy
320.0	323.5	Shale, dark-gray
323.5	331.0	Coal
331.0	333.0	Shale, dark-gray
333.0	339.5	Coal
339.5	344.0	Shale, dark-gray
344.0	350.0	Sandstone, light-gray, fine-grained
350.0	353.5	Siltstone, gray, sandy
353.5	370.0	Siltstone, dark-gray
370.0	392.0	Siltstone, greenish-gray, thin beds of sandstone
392.0	415.0	Siltstone, gray, sandy



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER PR-22 DATE 6/21/80 SURFACE ELEVATION(ft) 7270

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

COUNTY Albany STATE Wyoming TOTAL DEPTH(ft) 155

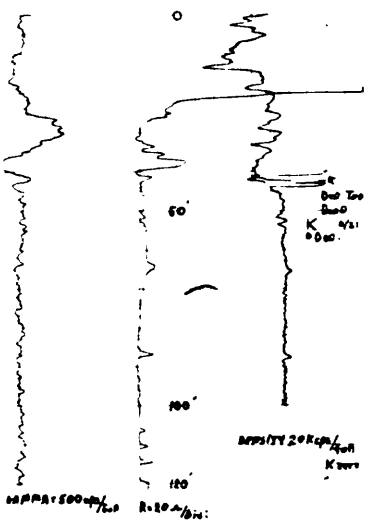
CORED YES [X] NO [ ] INTERVAL(s) _____

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

GEOPHYSICAL LOGS:

Natural Gamma	; Scale	200 CPS/IN	Logging Speed	15	fpm
Gamma Gamma	: Scale	8K CPS/IN	Logging Speed	15	fpm
Resistivity	; Scale	20 Ohms/IN	Logging Speed	15	fpm
Caliper	: Scale		Logging Speed		fpm

Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs
0.0	2.0	Soil, rock, gravel, brown				Gamma Res Den Cal
2.0	10.0	Shale-claystone, brown, sandy				
10.0	20.0	Sandstone, light-yellowish-brown, very fine grained, silty				
20.0	26.0	Siltstone, brownish-gray to dark-olive-gray				
26.0	30.0	Shale, dark-brown to black				
30.0	32.0	Shale-claystone, medium-gray				
32.0	36.0	Shale, black, carbonaceous; coal streaks				
36.0	40.5	Coal				
40.5	42.8	Shale, black, carbonaceous				
42.8	45.0	Sandstone, light-gray, fine-grained				
45.0	63.5	Siltstone and sandstone, light to medium-gray, interbedded. Sandstone is very fine-grained				
63.5	66.3	Sandstone, gray, very fine grained				
66.3	79.0	Sandstone and siltstone, medium to medium-dark-gray, interbedded. Sandstone is very fine-grained				
79.0	89.0	Siltstone and sandstone, medium-dark-gray, interbedded. Sandstone is very fine-grained				



Lithology			Strip Log	Depth ft	Depth m	Geophysical Logs Gamma Res Den Cal
89.0	155.0	Siltstone and sandstone, medium-dark-gray, interbedded. Some thin beds of hard, calcareous, very fine grained, silty sandstone; with thick interlaminations of dark-gray shale				