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UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

GEOPHYSICAL AND LITHOLOGIC LOGS OF 39 TEST HOLES DRILLED
DURING 1978 IN THE COMO WEST AND ELMO QUADRANGLES, CARBON
COUNTY, WYOMING

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UNIVERSITY OF UTAH
RESEARCH INSTITUTE
EARTH SCIENCE LAB.

This report is preliminary and has not
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GEOPHYSICAL AND LITHOLOGIC LOGS OF 39 COAL TEST HOLES DRILLED DURING 1978
IN THE COMO WEST AND ELMO QUADRANGLES, CARBON COUNTY, WYOMING

by Dan E. Hansen and David L. Schug

INTRODUCTION

The U.S. Geological Survey drilled 39 test holes during 1978, on Federal lands in the Como West and Elmo Quadrangles, T. 22 and 23 N., R. 80, 81 and 82. W., Hanna coal field, Hanna basin, Carbon County, 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, lateral extent, and quality. All of the drilling was done in the coal-bearing Paleocene Hanna Formation, which is as much as 7,250 feet thick. For information on previous drilling by the U.S. Geological Survey in the Hanna coal field see Blanchard and Pike (1977), Hettinger and Brown (1978), Hettinger (1978) and Schroder and Dronyk (1978).

Drilling was done by K and K Drilling, Inc., Montrose, Colo., under the supervision of the Geological Survey. Rotary holes were drilled by truck-mounted rigs using 4 1/4 to 5 1/8 inch tricone rock bits and three-way blade bits. Core holes were drilled using a 10-foot-long core barrel with a core diameter of 2.4 inch (HQ size), diamond-bit size of 3 7/8 inch; recovery was better than 95 percent. Drilling fluids used were air, air-water biodegradable foam, and mud. Most of the holes were filled with heavy mud upon completion and a surface plug of cement placed therein. Drill sites were then reclaimed. Drill-holes 25-E-B, 26-E, 32-E, 34-E, 5-CW, 6-CW, 23-CW, 18-CW, and 19-CW were completed as water observation wells and cased with 4 1/2 inch outside diameter perforated plastic casing by the Geological Survey, Cheyenne, Wyo.

The geophysical logging of 34 drill holes was done by Nuclear Logging Service Inc., Lafayette, Colo., and five drill holes by the Geological Survey, Lakewood, Colo. A general suite of logs consisting of gamma ray, gamma gamma (density)--focused and unfocused, resistivity, and caliper were run. A few of the holes closed immediately after being drilled and the gamma ray and gamma-gamma (density) logs were run through the drill pipe in these holes. Three drift surveys were completed. The results are discussed in a separate section of this report.

Holes 25-E-A, 31-E, and 12-CW were abandoned because of drilling problems. All were offset a short distance and completed. Hole 25-E-A was abandoned because of a large water flow from the surface alluvium and a subsurface sandstone; hole 31-E was abandoned because of lost circulation caused by surface fractures; and hole 12-CW was abandoned because of a large water flow from a subsurface sandstone.

The geophysical logs in this report were photographically reduced to 20 percent of the original size. The 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 logs but three were hand traced before reduction and are not photographic reproductions of the original logs. The entire geophysical log of drill-hole 27-E was not reproduced because a malfunction caused the gamma ray log to be almost useless at a reduced scale.

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

DRILL-HOLE SECTIONS AND PRELIMINARY CORRELATIONS

Several of the drill holes were located to penetrate coals mapped by Dobbin, Bowen, and Hoots (1929) and by Glass and Roberts (1979). A few coal beds were projected into unmapped areas by means of the geophysical and lithologic logs. Most of the correlations of coal beds shown on the drill-hole sections of figures 10-18 either involve the strata between coal beds or unknown coal beds. The strata shown on these sections are in the upper part of the Hanna Formation. This information will be used with other subsurface and surface information to construct composite lithologic columns, correlate strata and coal beds, and construct large cross sections. Information shown for the Como West Quadrangle will be used to make correlations across a fault system in the central part of the quadrangle.

The lithology shown on the drill-hole sections was plotted from lithologic descriptions adjusted to geophysical logs.

DRILL-HOLE DRIFT SURVEYS; LOGS AND ANALYSIS

The results of the drift surveys, run by Nuclear Logging Service, Inc., are shown in figures 19-22. Horizontal deviations were calculated and graphed originally by Nuclear Logging Service, Inc., and are shown in figures 19-21. Vertical deviations were derived from data as furnished by Nuclear Logging Service, Inc. The graphics of the horizontal and vertical drift both show the strong clockwise rotation of the direction of the drill holes. This clockwise, downward spiraling was caused primarily by the dip of the rocks. The relative differences in hardness of the layered rocks has some effect. The sandstones, generally the hardest strata, have the effect of causing a relatively greater deviation from the vertical.

The graphics of the vertical deviation, figure 22, show that the effect of the downward spiral in these three drill holes (11-CW, 12-CW, and 26-E) was to bring the drill pipe perpendicular to the dip of the strata. The azimuth of the drill-hole deviation generally coincides with the bearing of the angle of dip, but is measured in the opposite direction. This means that at depth the drill bit is generally penetrating the true stratigraphic thickness.

In summary, during the drilling of dipping strata in the Hanna Basin the drill pipe was short of the sought-after vertical depth but had penetrated more stratigraphic section than would have been penetrated by a vertical hole.

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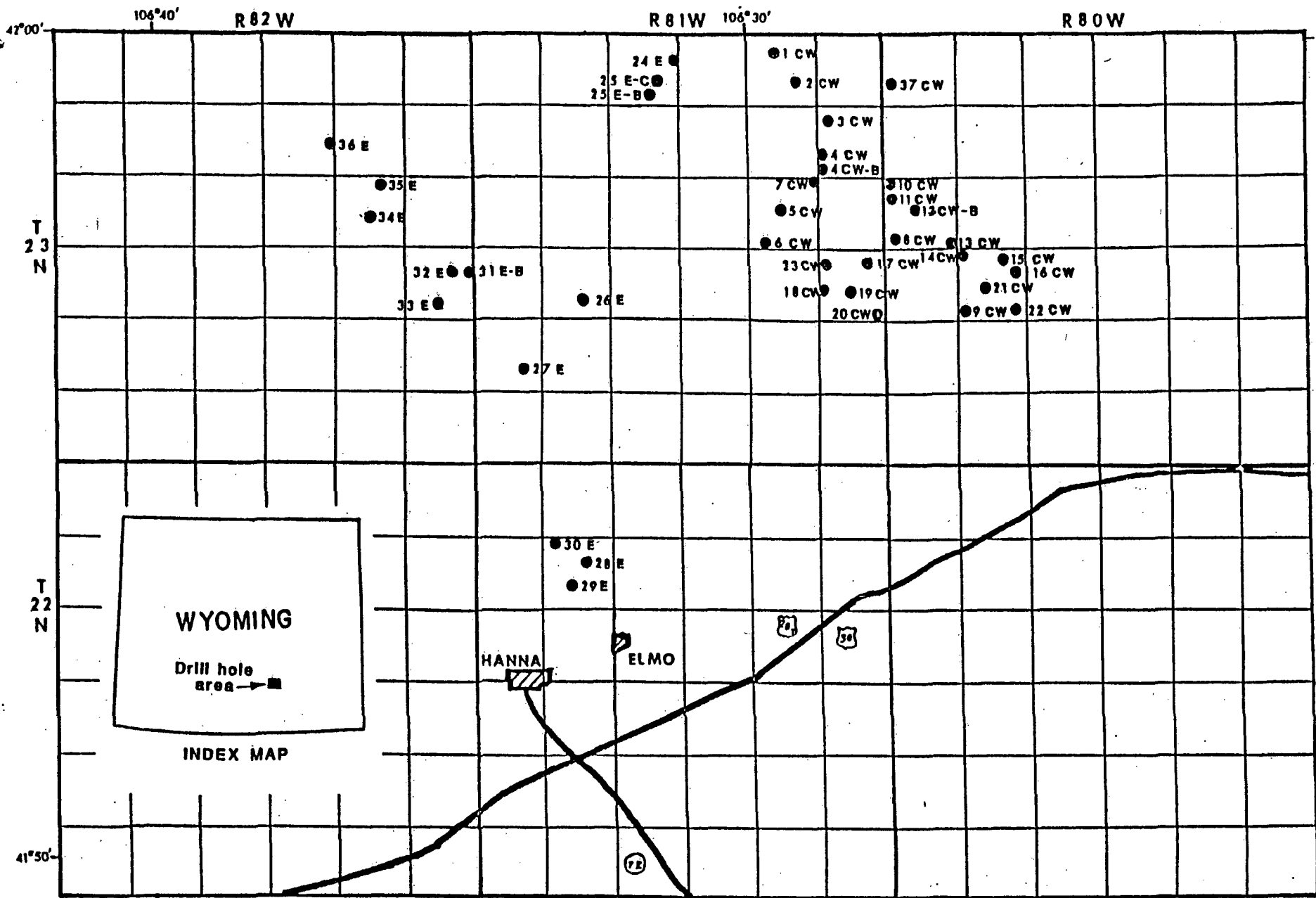


Figure 1.- Sketch map showing approximate locations of drill holes, Hanna coal field, Wyoming

COMO WEST QUADRANGLE
WYOMING-CARBON CO.

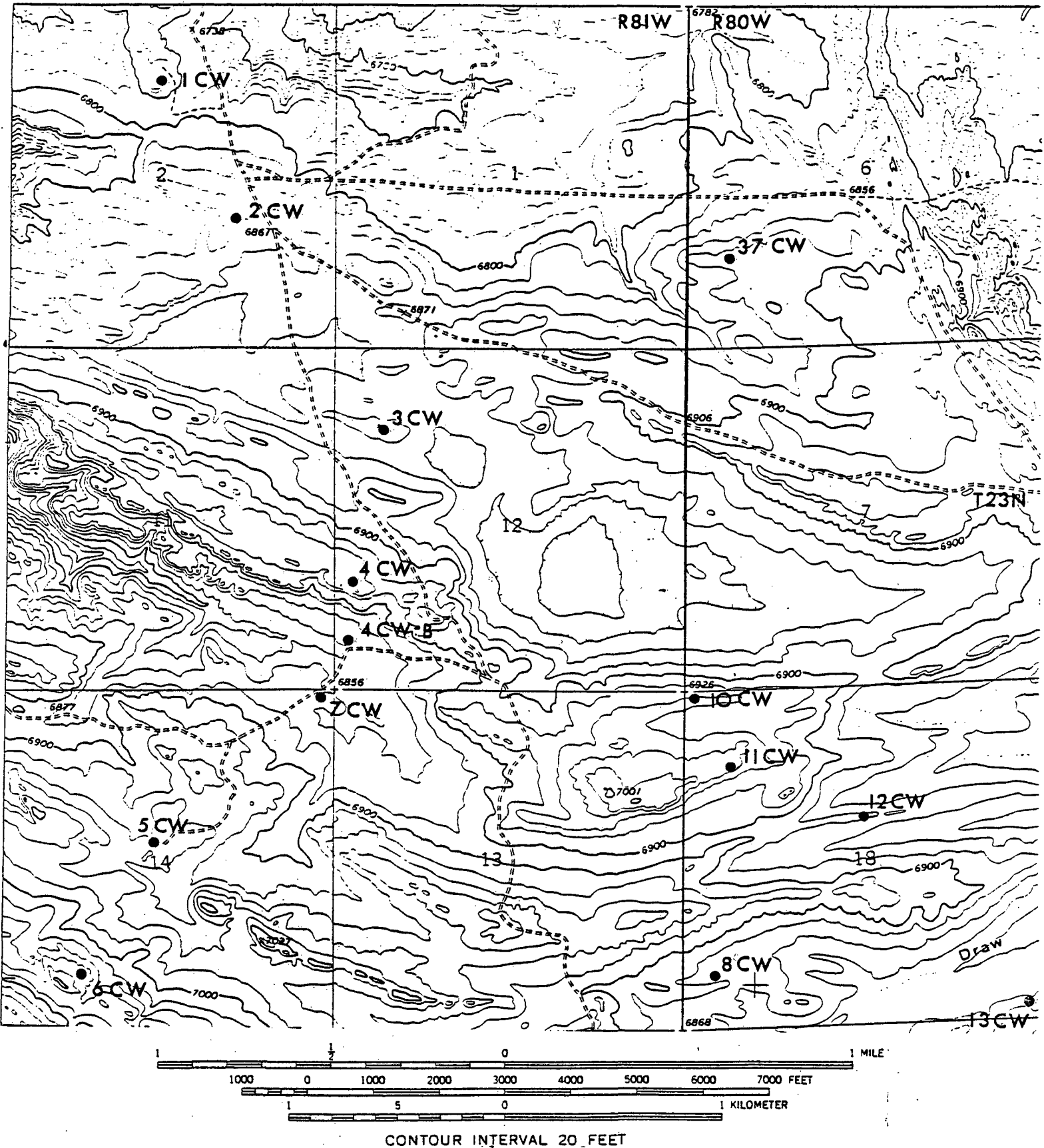


Figure 2.-Drill-hole location map, northwest part of Como West Quadrangle, Carbon County, Wyoming.

COMO WEST QUADRANGLE
 WYOMING-CARBON CO.

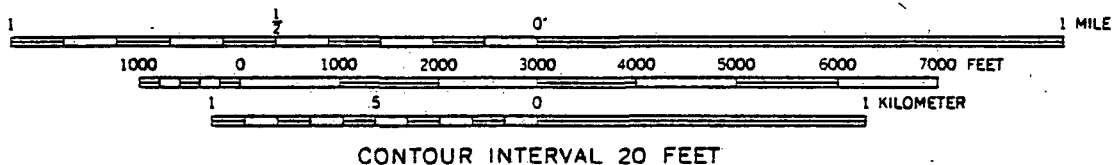
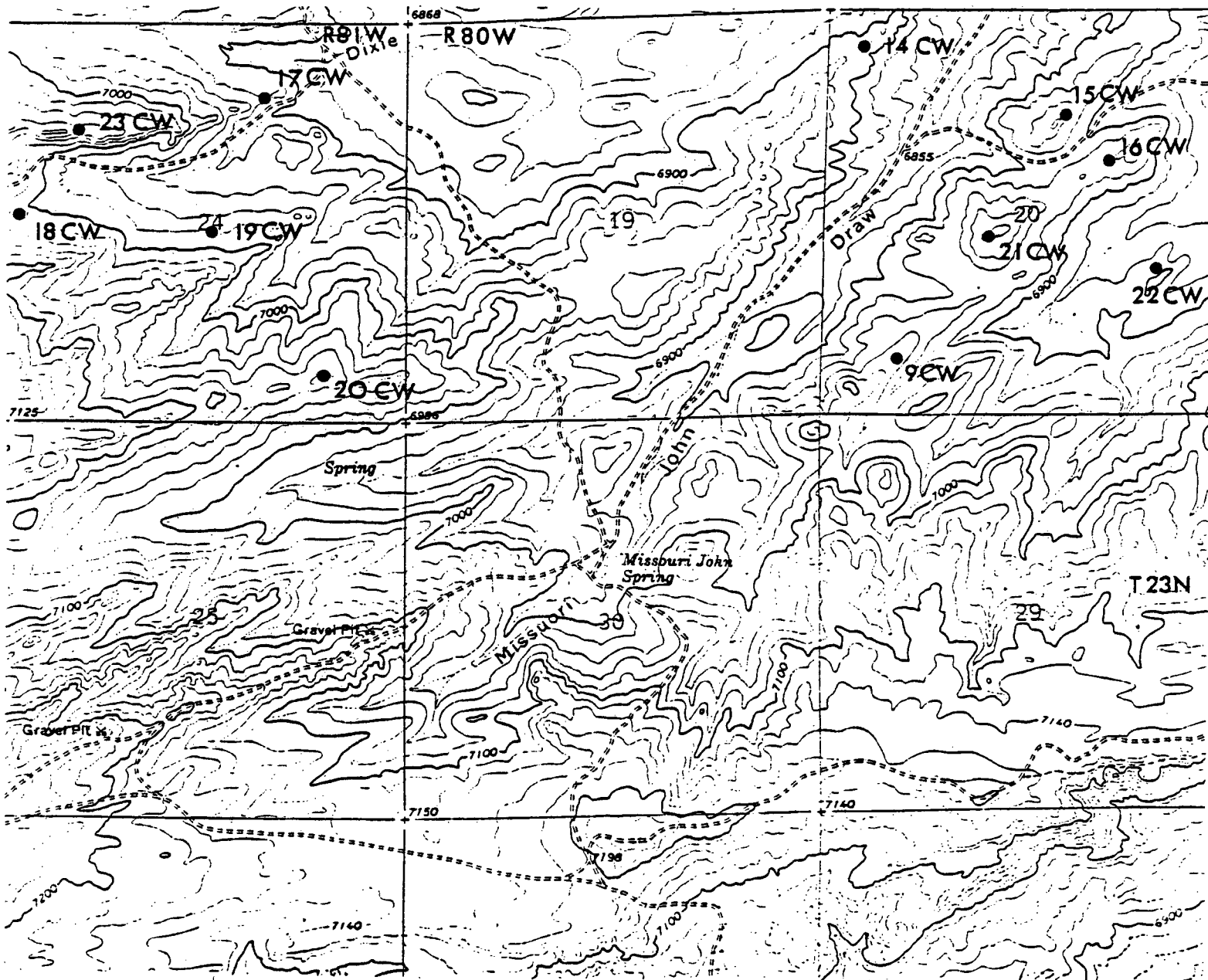
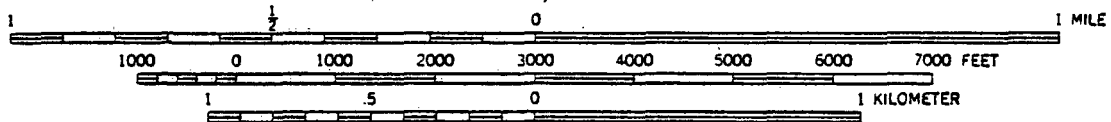
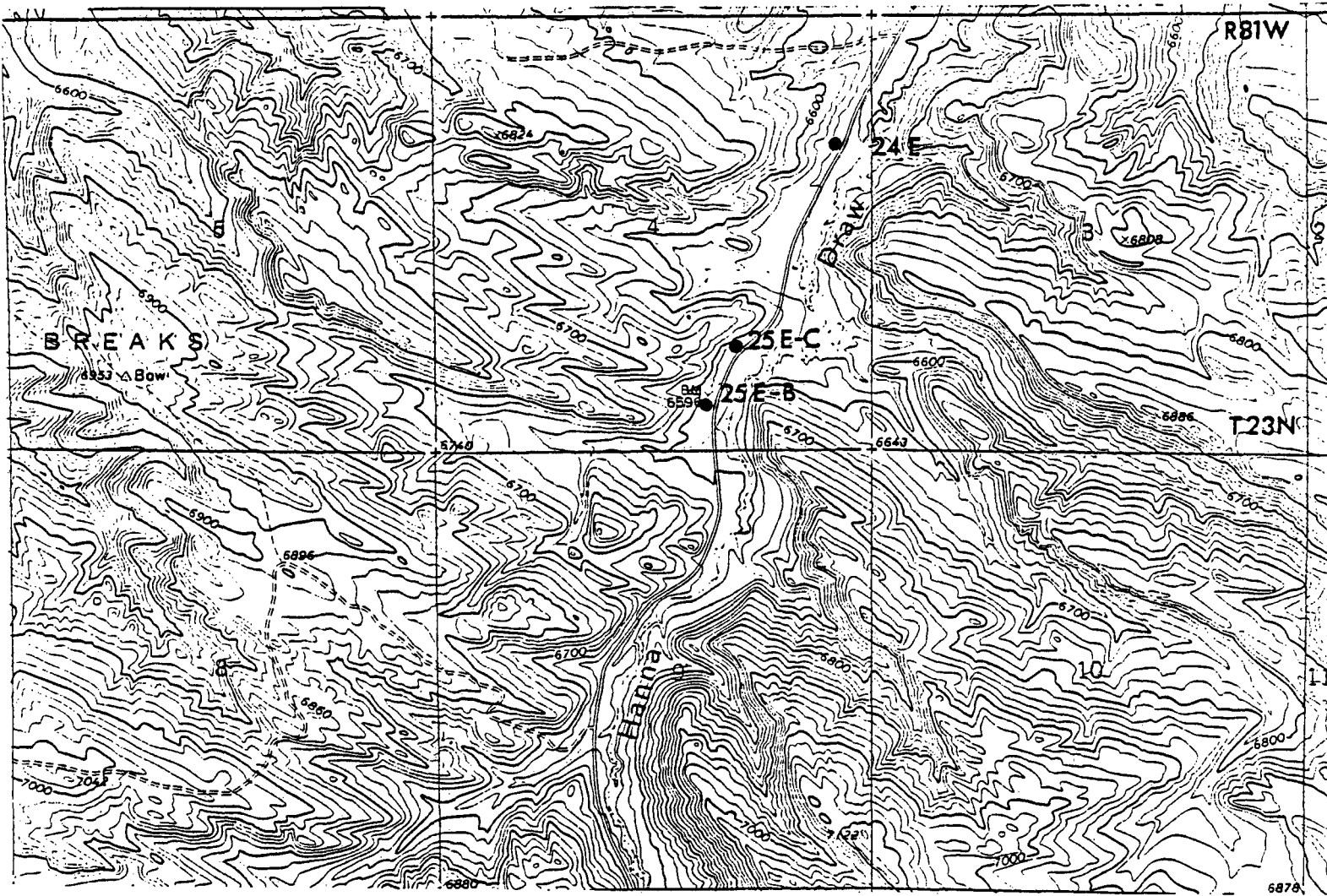


Figure 3.- Drill-hole location map, central part of Como West Quadrangle, Carbon County, Wyoming.

ELMO QUADRANGLE
WYOMING-CARBON CO.



CONTOUR INTERVAL 20 FEET

Figure 4.- Drill-hole location map, northeast part of Elmo Quadrangle, Carbon County, Wyoming.

ELMO QUADRANGLE
WYOMING-CARBON CO.

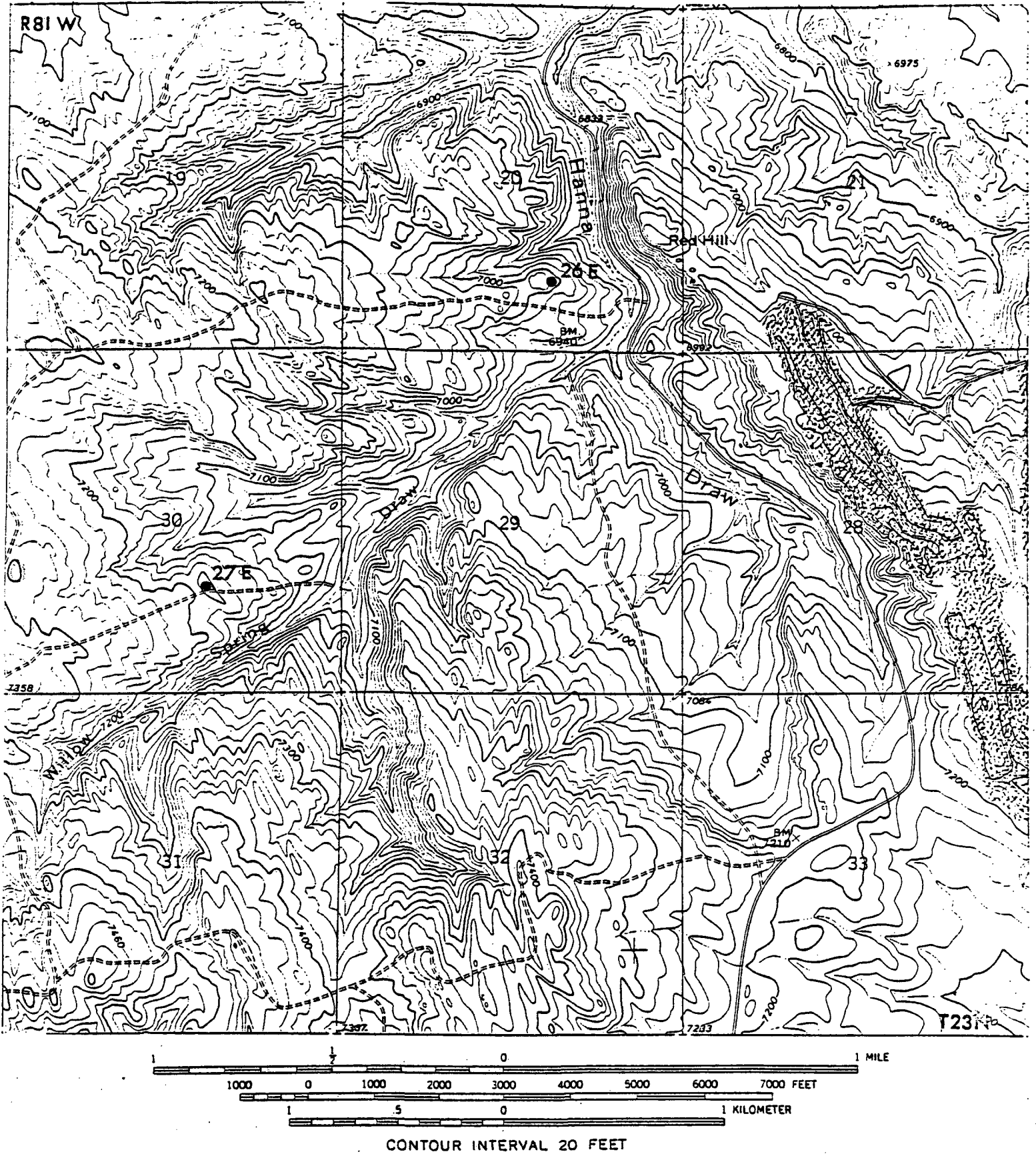
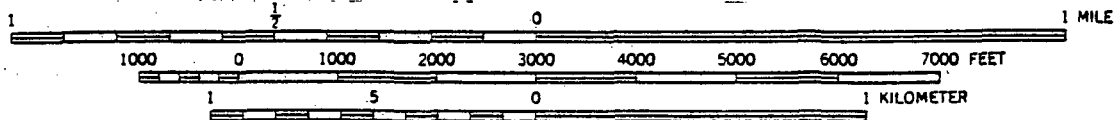
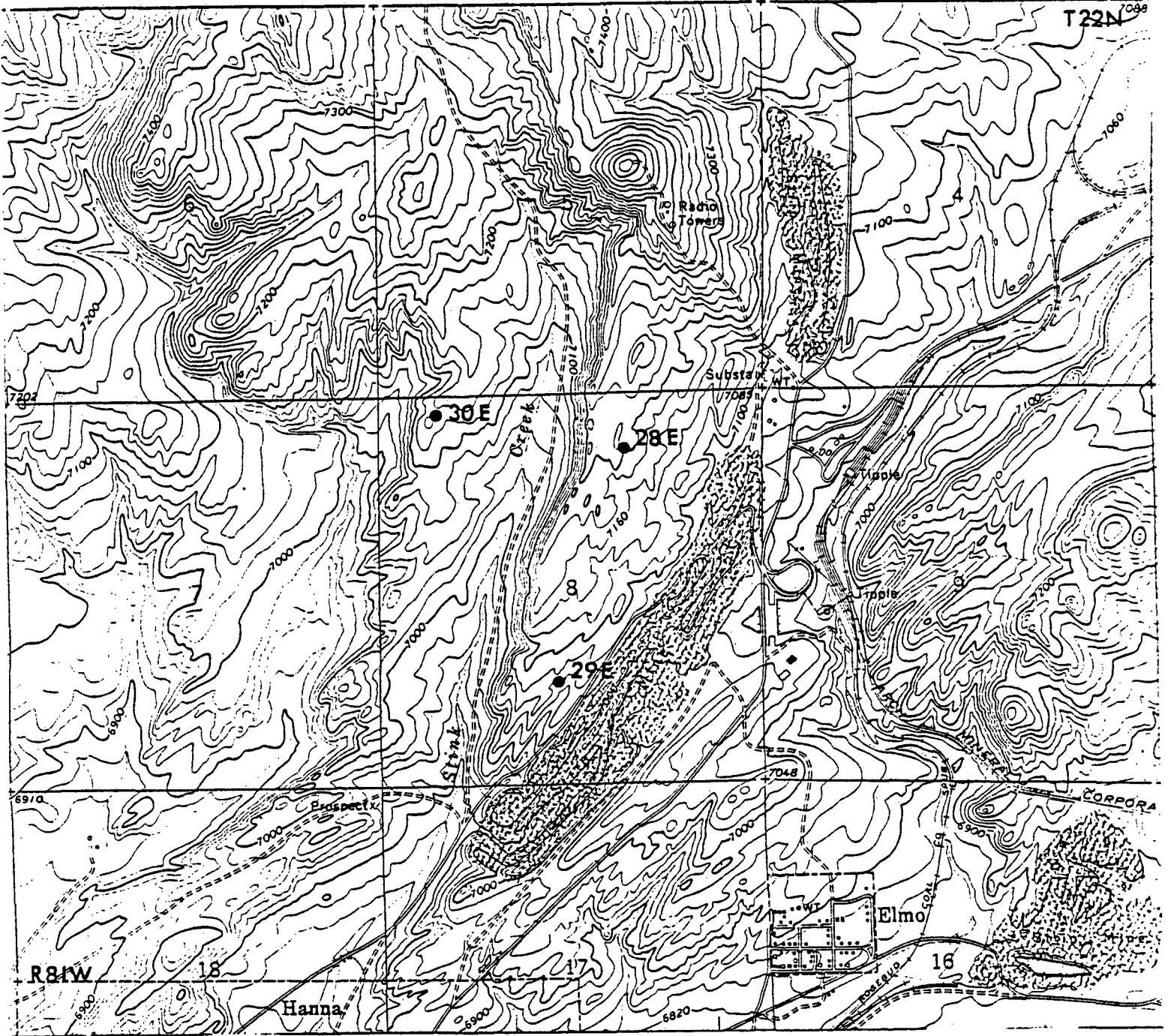


Figure 5.- Drill-hole location map, central part of Elmo Quadrangle, Carbon County, Wyoming.

ELMO QUADRANGLE
WYOMING-CARBON CO.



CONTOUR INTERVAL 20 FEET

Figure 6.- Drill-hole location map, southeast part of Elmo Quadrangle, Carbon County, Wyoming.

ELMO QUADRANGLE
WYOMING-CARBON CO.

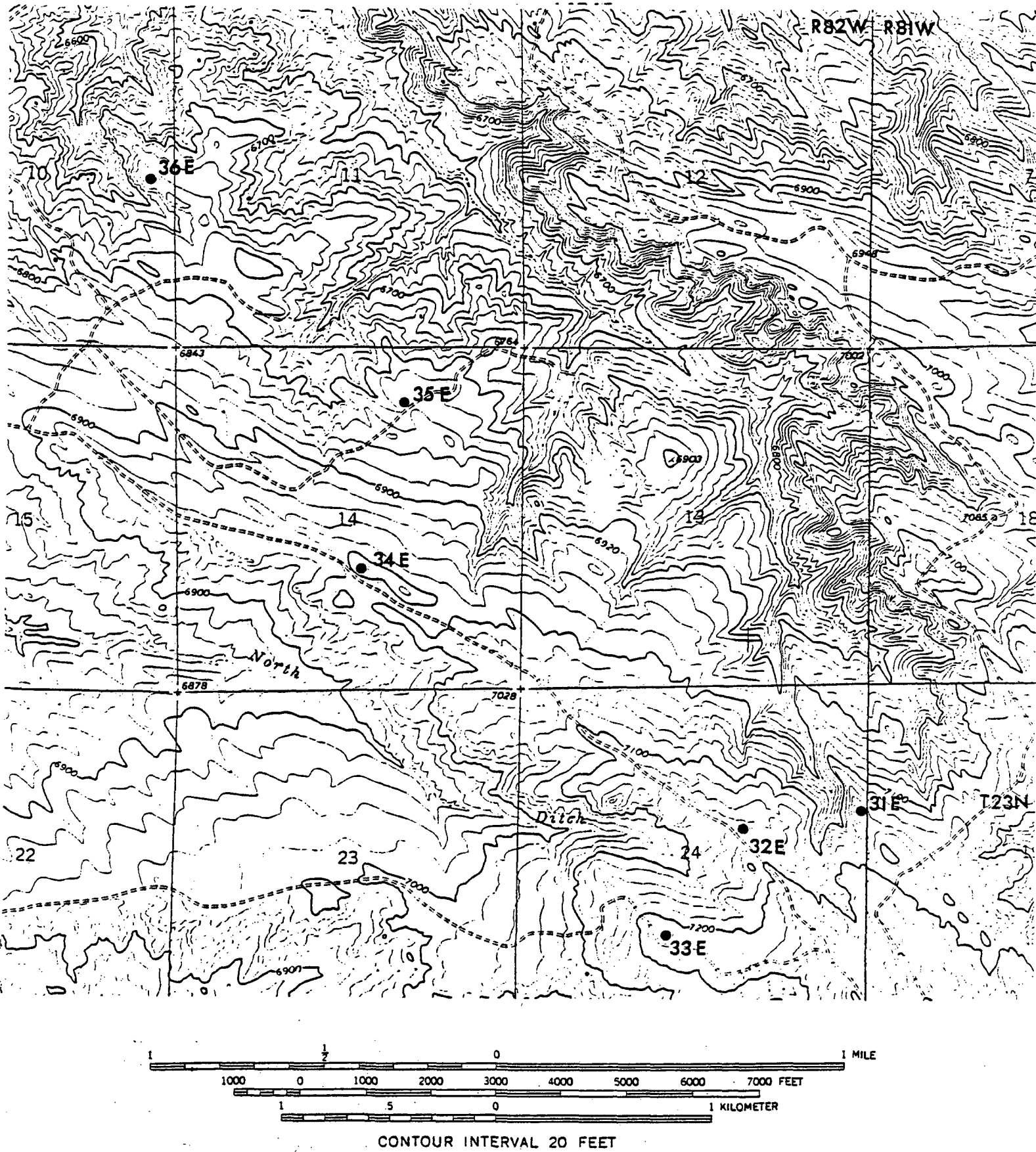


Figure 7.- Drill-hole location map, northwest part of Elmo Quadrangle, Carbon County, Wyoming.

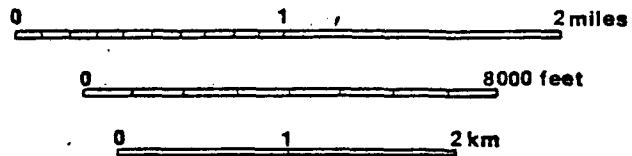
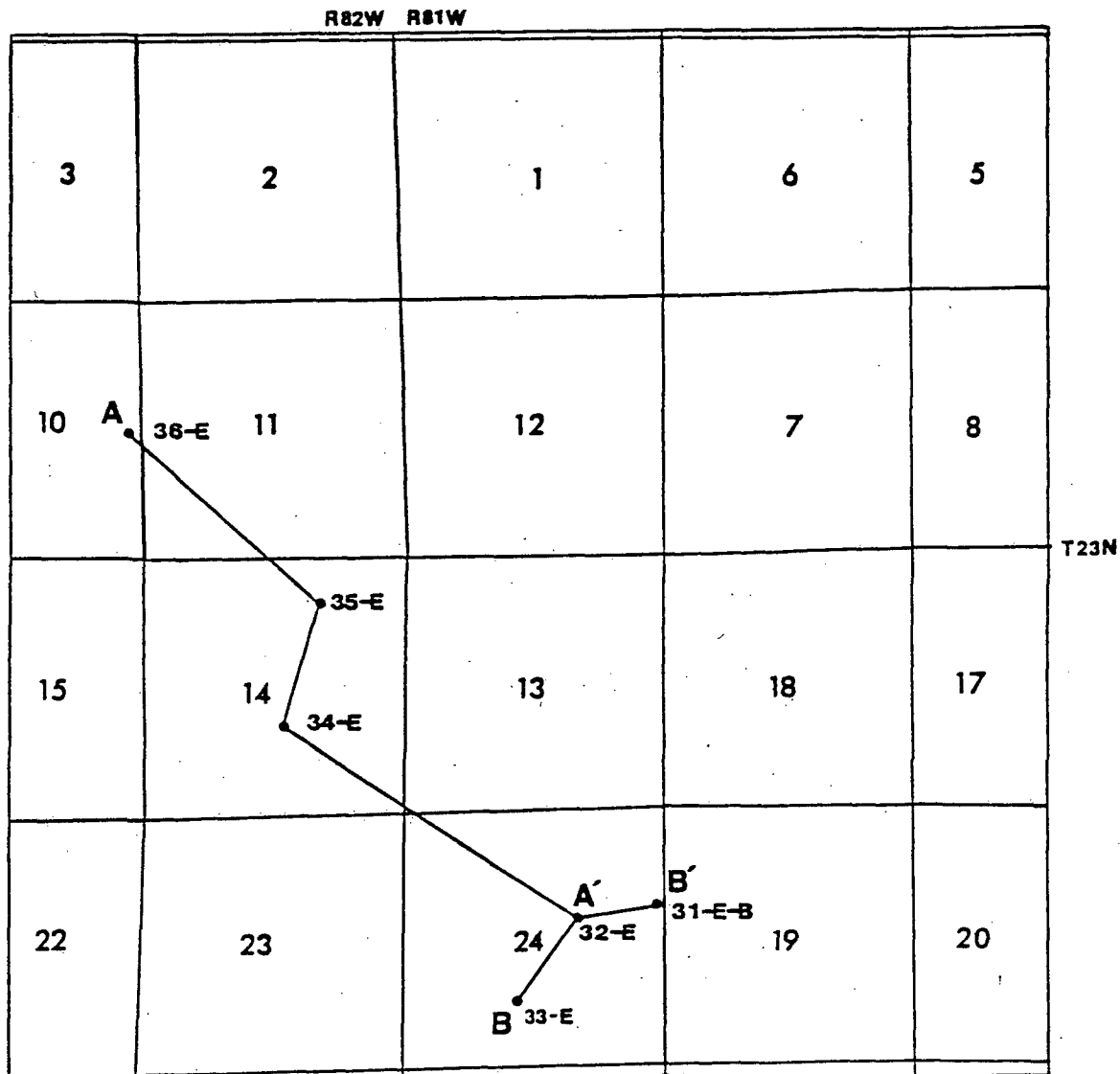


Figure 8.- Location map of correlated drill holes, northwest part of Elmo Quadrangle. Letters refer to correlated drill hole sections.

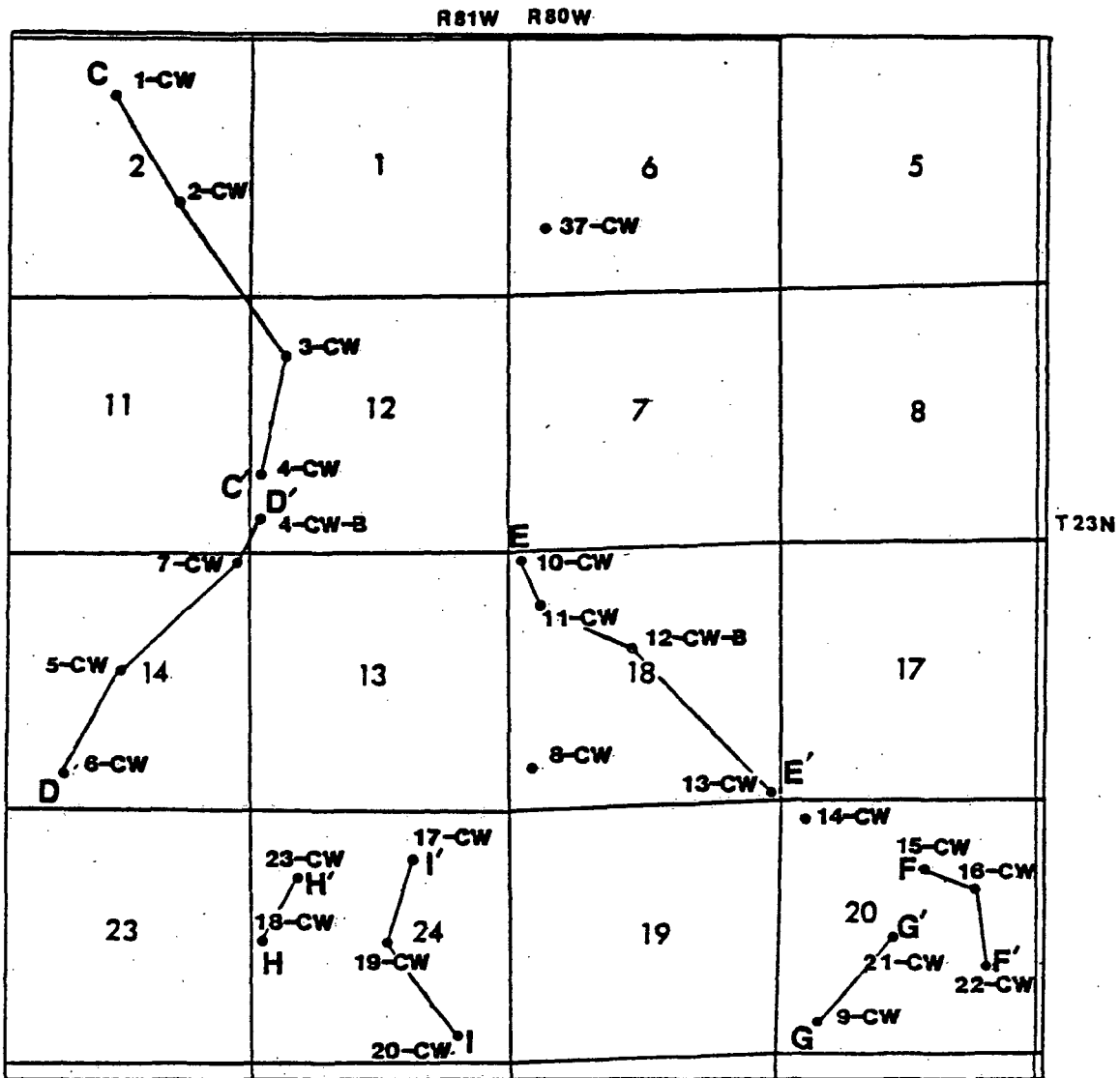


Figure 9.- Location map of correlated drill holes, northwest part of Como West Quadrangle. Letters refer to correlated drill hole sections.

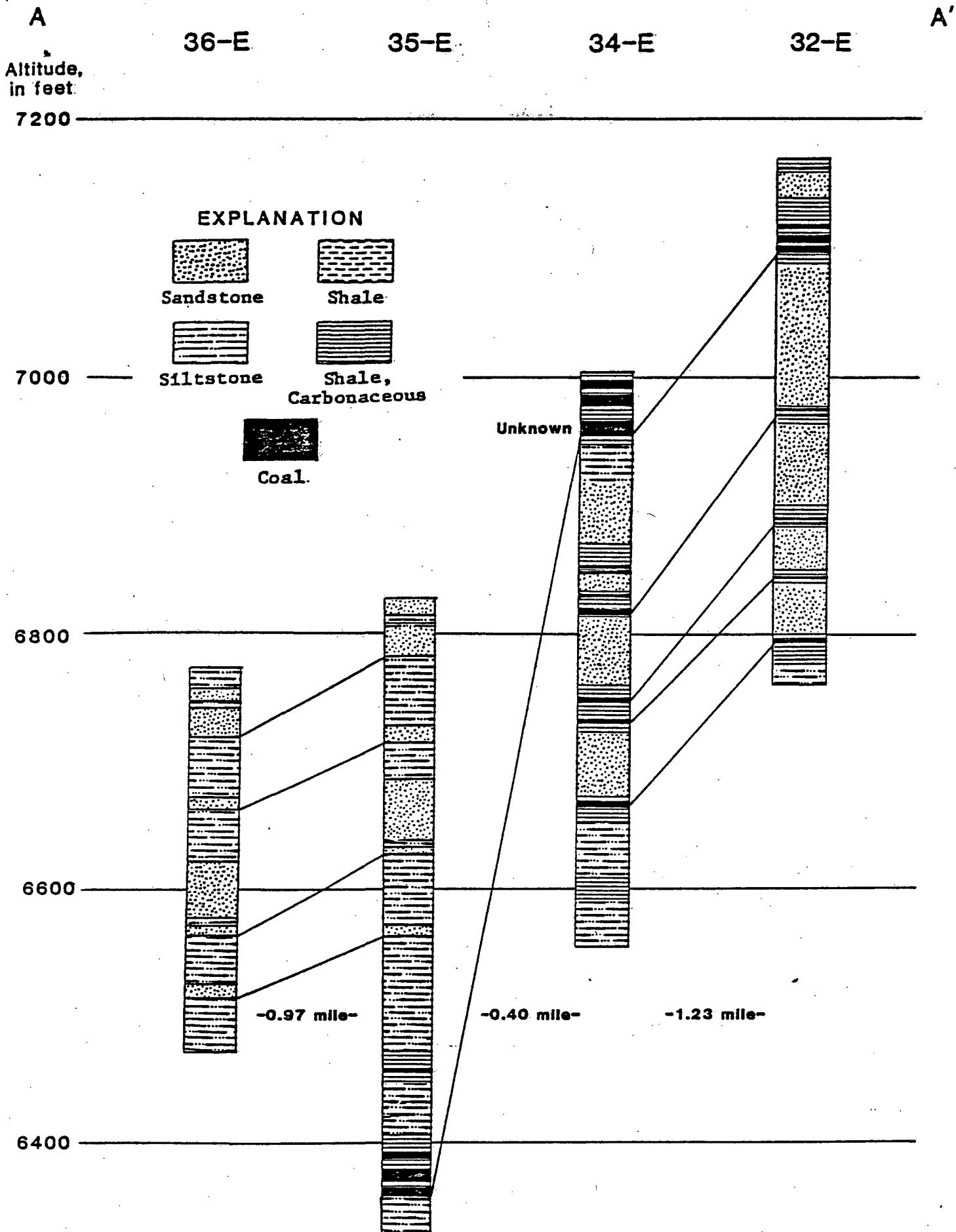


Figure 10.- Preliminary Correlation of Drill Holes in the Hanna Basin, section A-A' (fig. 8).

B

B'

33-E

32-E

31-E-B

Altitude,
in feet

7200

Hanna No. 5

Unknown

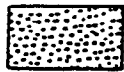
7000

6800

-0.49 mile-

-0.45 mile-

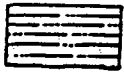
EXPLANATION



Sandstone



Shale



Siltstone



Shale,
Carbonaceous



Coal

Figure 11.- Preliminary Correlation of Drill Holes in the Hanna Basin, section B-B' (fig. 8).

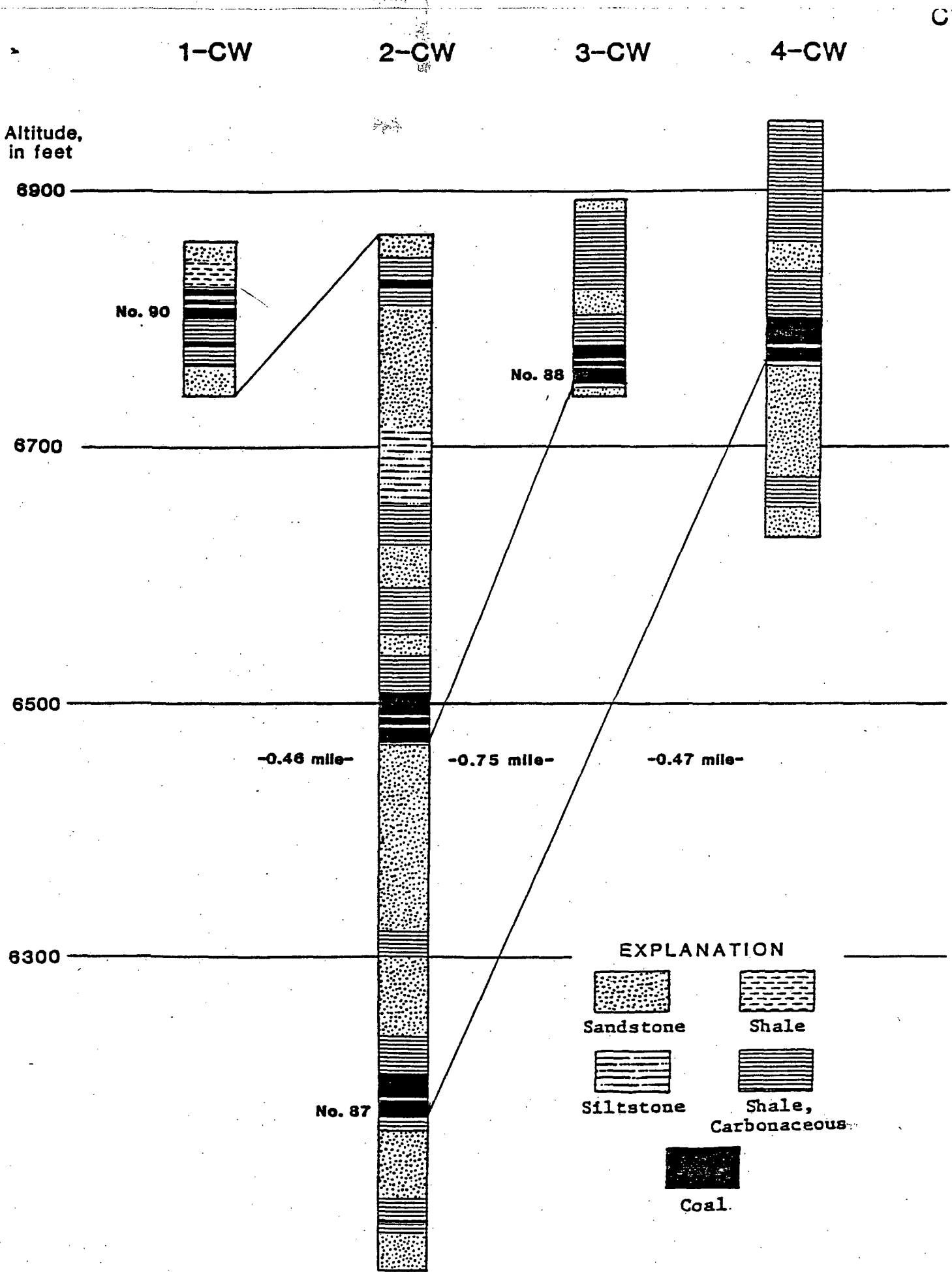


Figure 12.- Preliminary Correlation of Drill Holes in the Hanna Basin, section C-C' (fig. 9).

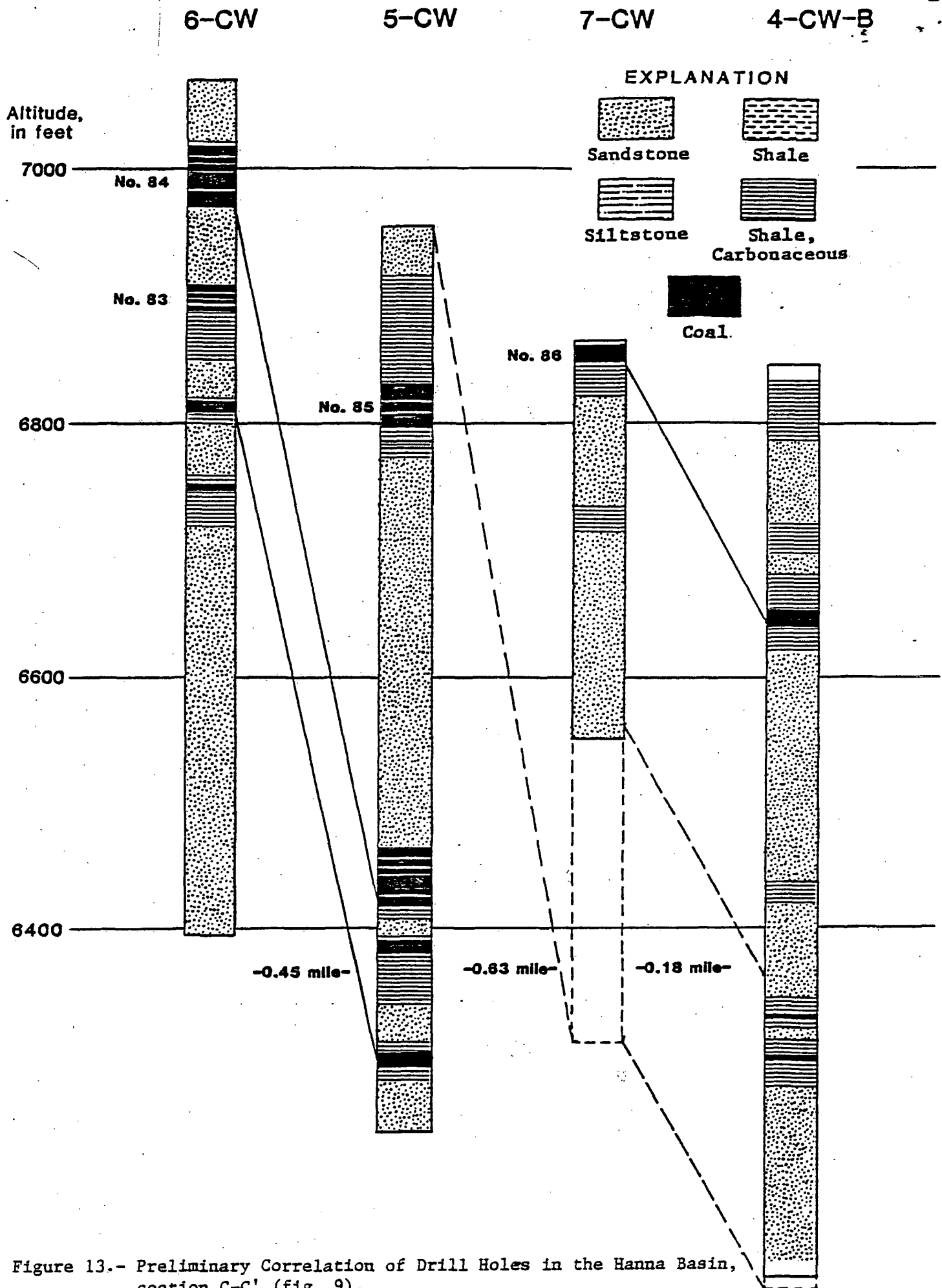


Figure 13.- Preliminary Correlation of Drill Holes in the Hanna Basin, section C-C' (fig. 9).

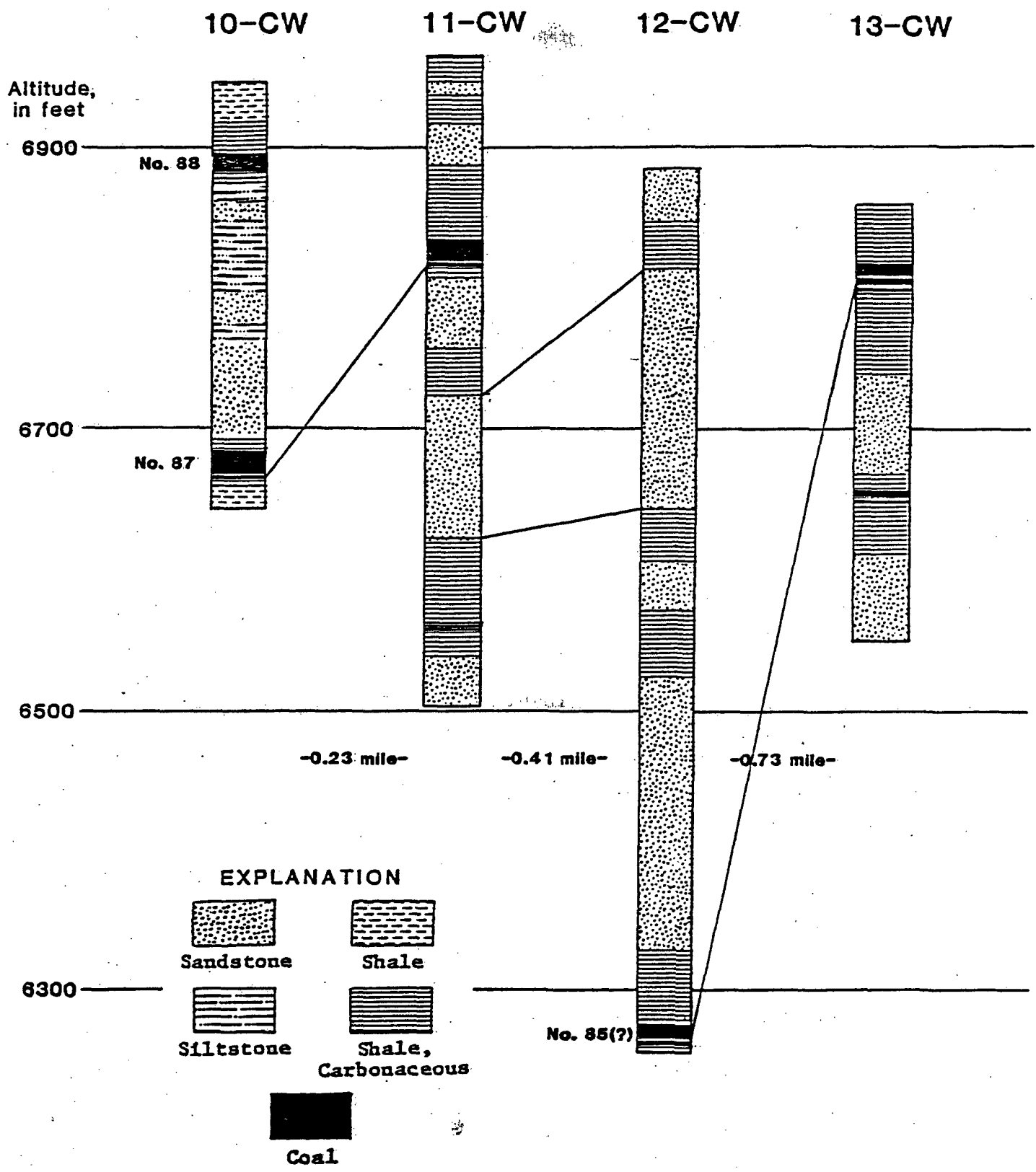


Figure 14.- Preliminary Correlation of Drill Holes in the Hanna Basin, section E-E' (fig. 9).

F

F'

15-CW

16-CW

22-CW

Altitude,
in feet

6900

6700

6500

-0.19 mile-

-0.30 mile-

No. 81(?)

No. 80(?)

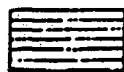
EXPLANATION



Sandstone



Shale



Siltstone



Shale,
Carbonaceous



Coal.

Figure 15.- Preliminary Correlation of Drill Holes in the Hanna Basin, section F-F', (fig. 9).

G

G'

9-CW

21-CW

Altitude,
in feet

6900

6700

6500

-0.38 mile-

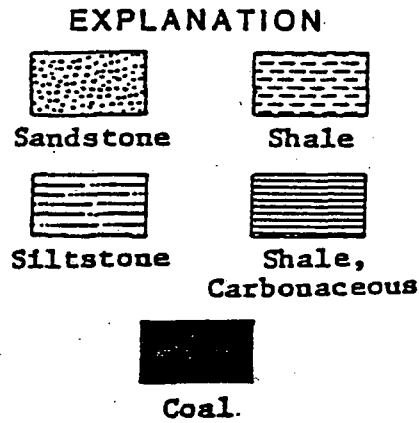


Figure 16.- Preliminary Correlation of Drill Holes in the Hanna Basin, section G-G', (fig. 9).

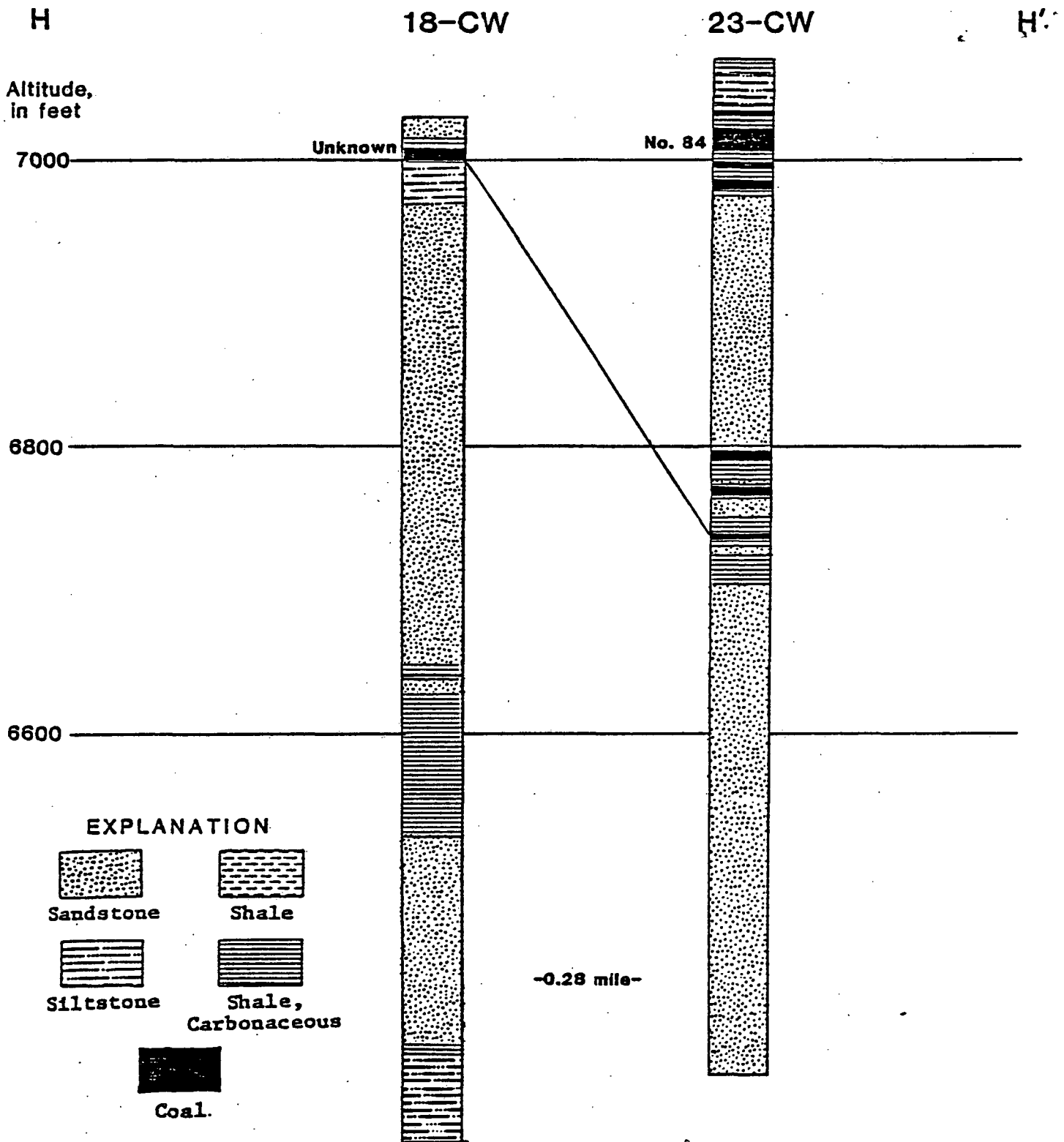


Figure 17.- Preliminary Correlation of Drill Holes in the Hanna Basin, section H-H', (fig. 9).

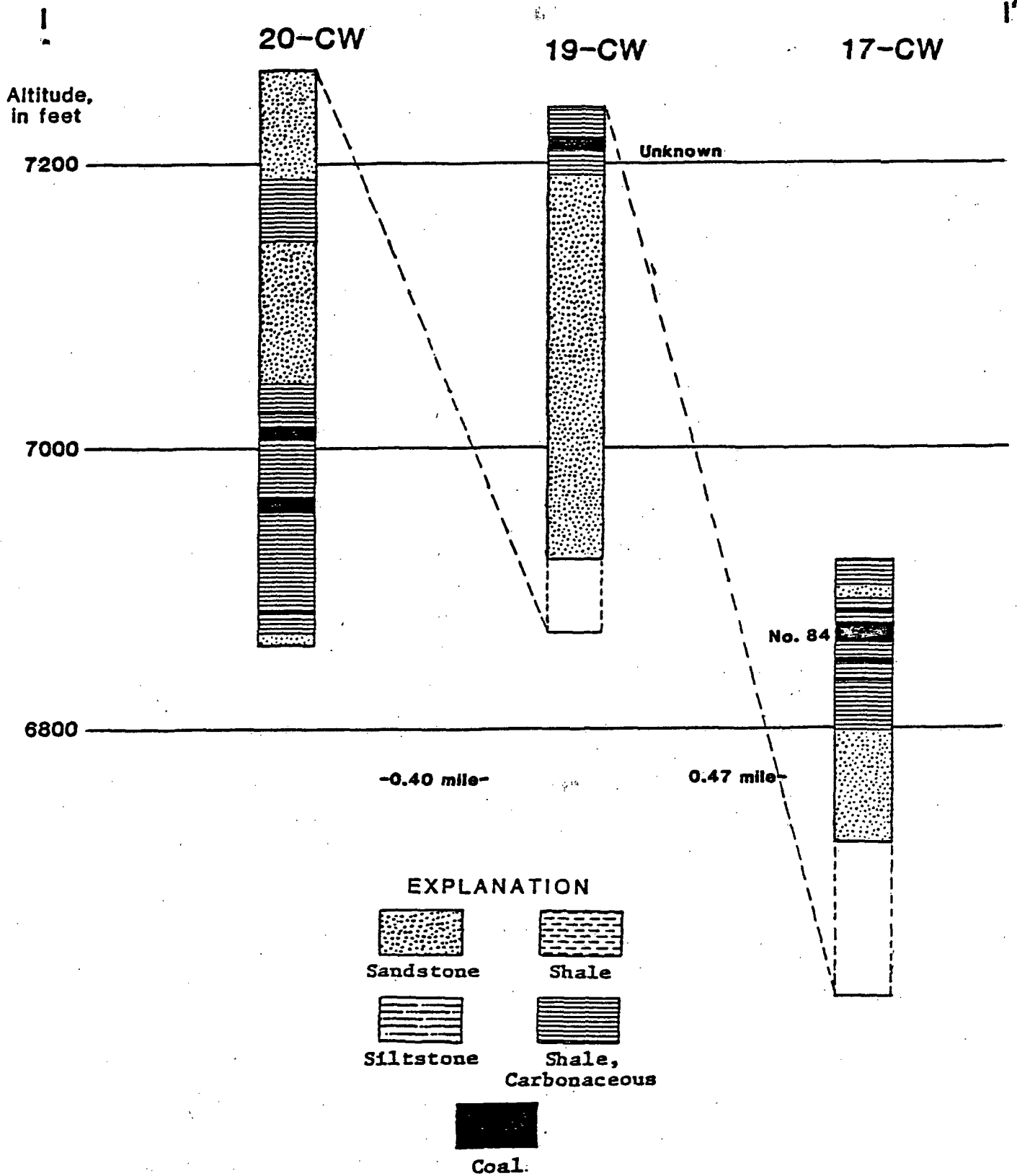


Figure 18.- Preliminary Correlation of Drill Holes in the Hanna Basin, section I-I', (fig. 9).

Strike/Dip of Surface Outcrop

3200 120

26E

Drill Hole Plot-Surface Elevation

TRUE NORTH

Bottom of Hole

Horizontal Drift: 85.1 ft

Horizontal Deviation Plot

Scale: 1 inch = 10 ft

Resultant Drift: 85.1 ft

True Bearing. 200.3°

Plan View of Directional Drift Survey

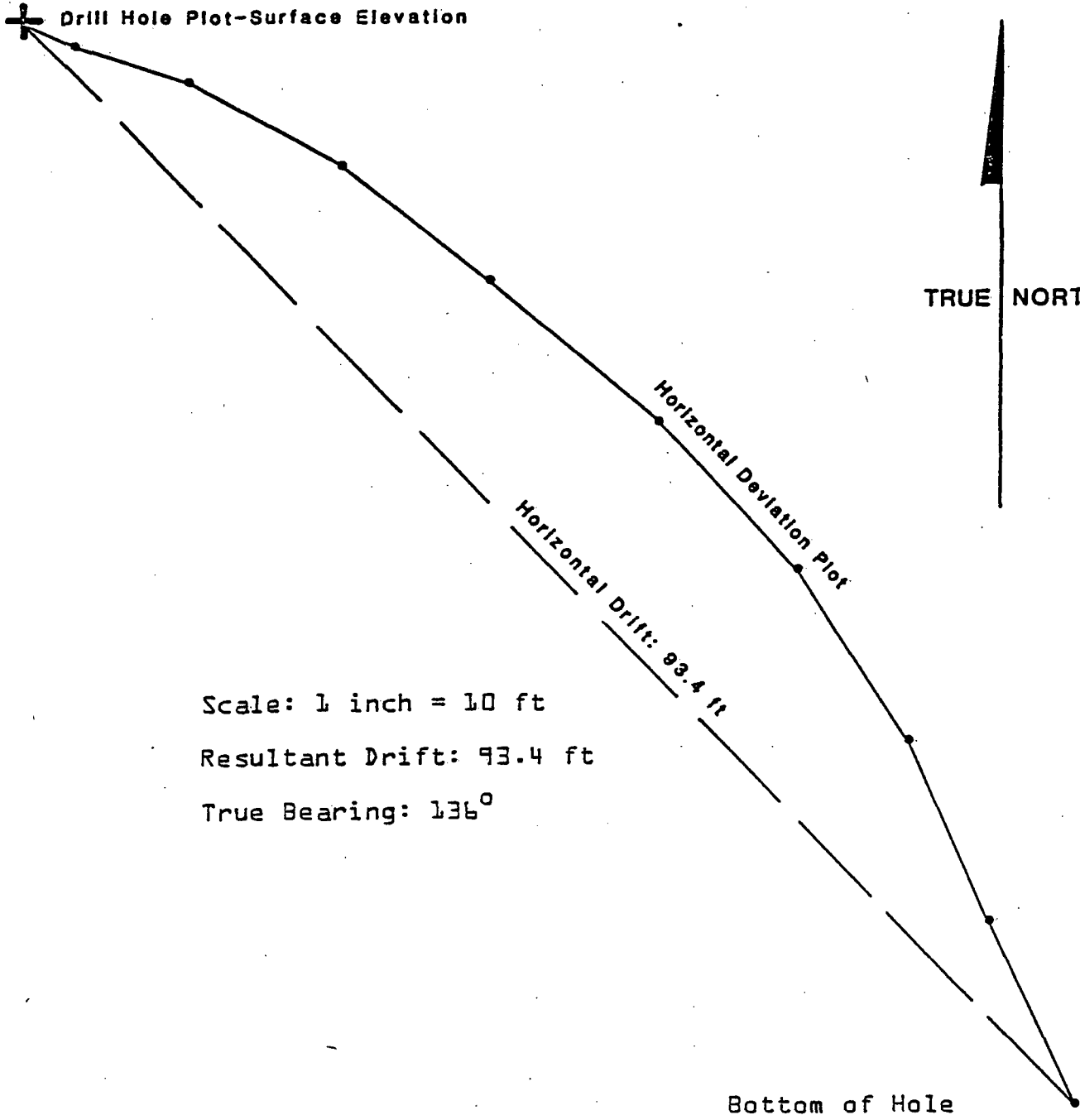
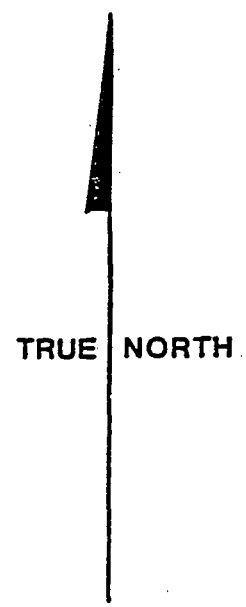
Figure 19.- Drift survey: horizontal deviation of drill-hole 26-E.

09° 68°

Strike/Dip of Surface Outcrop

11CW

Drill Hole Plot-Surface Elevation



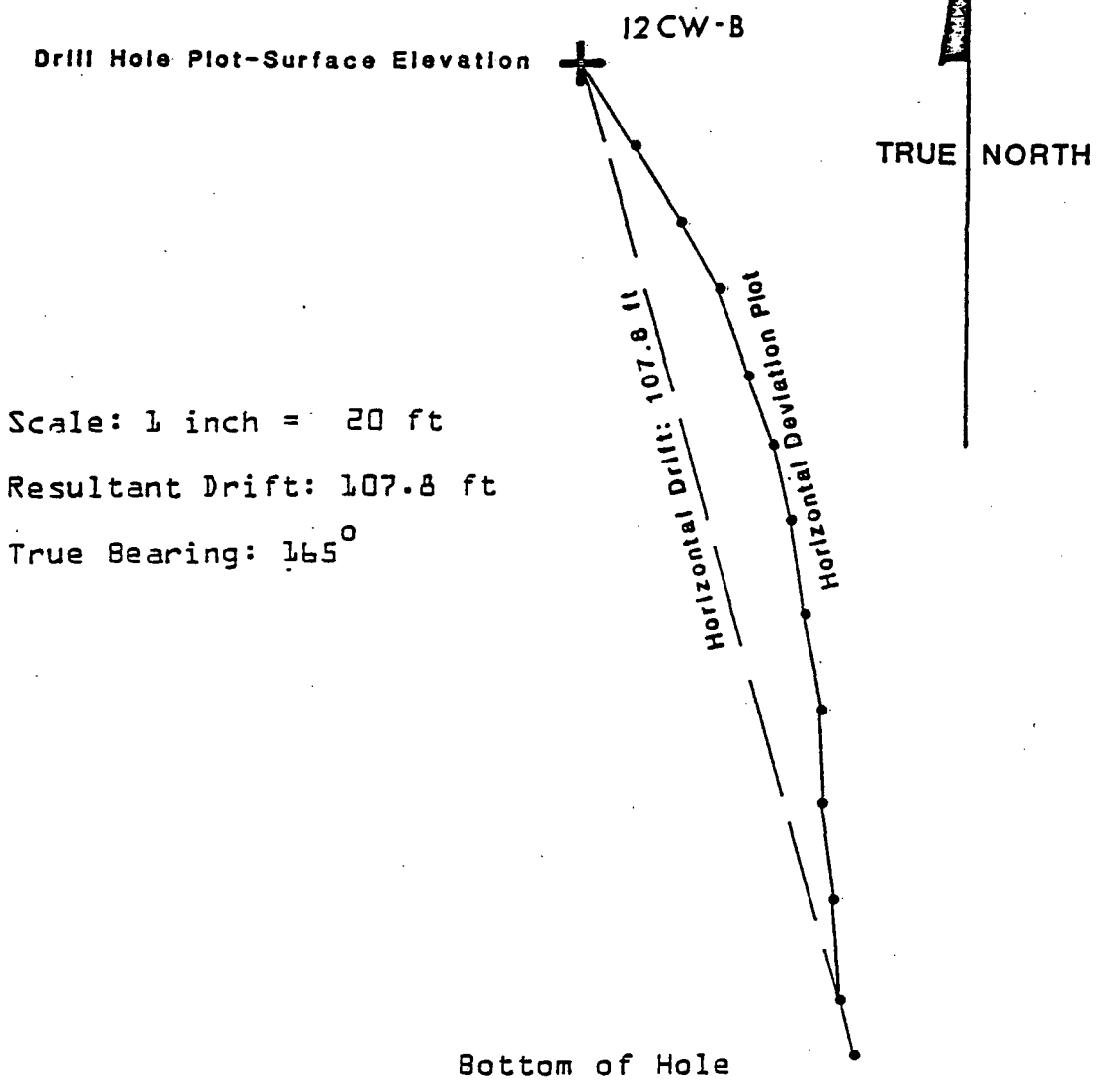
Scale: 1 inch = 10 ft
Resultant Drift: 93.4 ft
True Bearing: 136°

Plan View of Directional Drift Survey

Figure 20.- Drift Survey: horizontal deviation of drill hole 11-CW.

Strike/Dip of Surface Outcrop

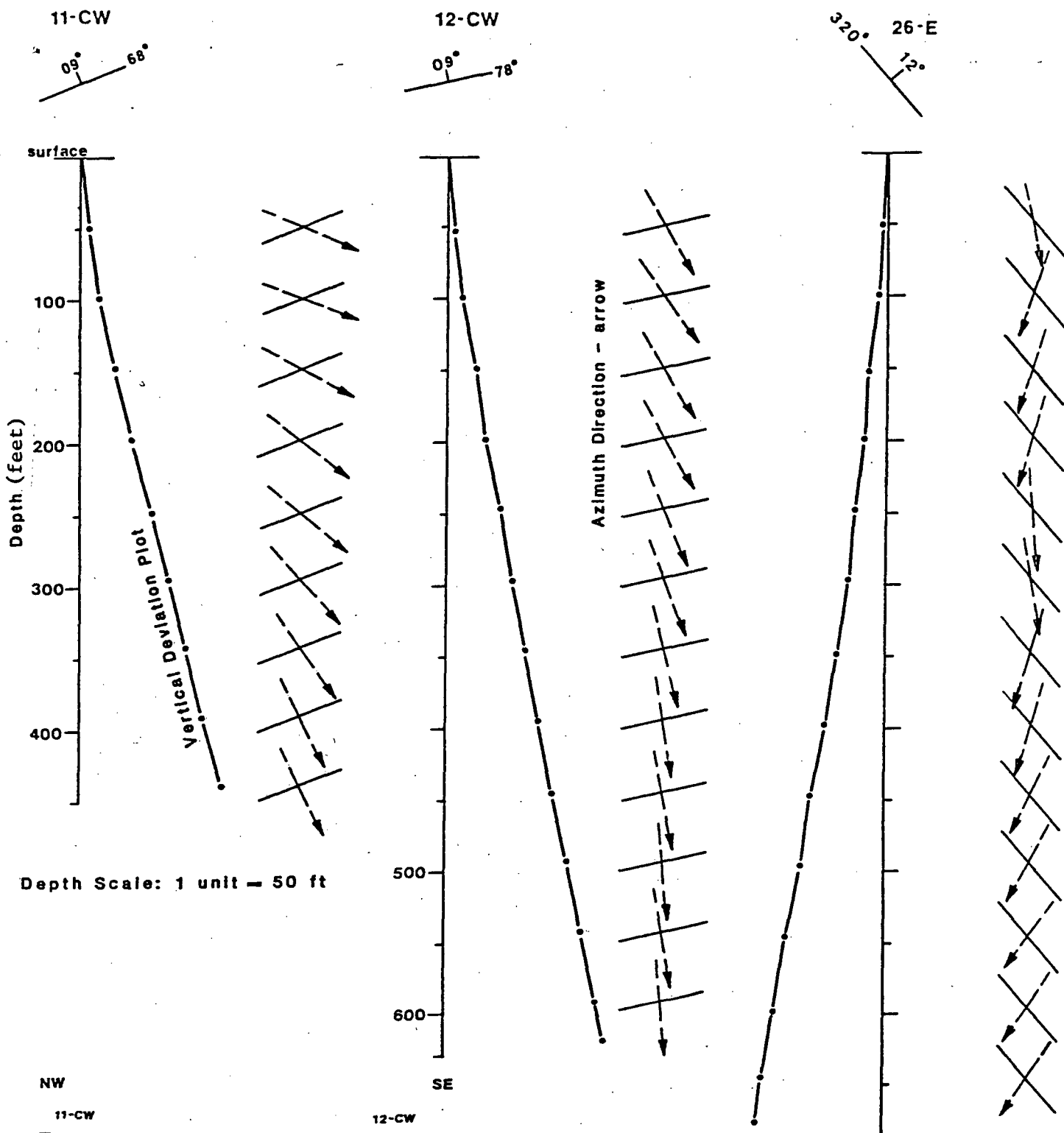
09° 78°



Scale: 1 inch = 20 ft
Resultant Drift: 107.8 ft
True Bearing: 165°

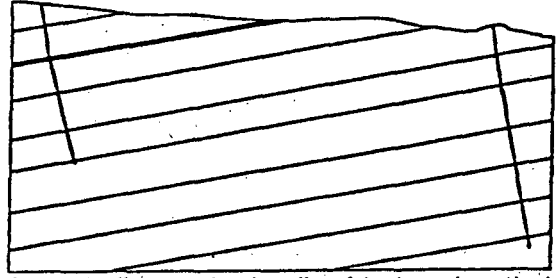
Plan View of Directional Drift Survey

Figure 21.- Drift survey: horizontal deviation of drill-hole 12-CW-B.



Depth Scale: 1 unit = 50 ft

NW 11-CW 12-CW SE



Schematic diagram showing dip of beds and vertical drill hole deviation. No scale.

Vertical View of Directional Drift Survey



Figure 22.--Drift surveys; vertical deviation for drill holes 11-CW, 12-CW, and 26-E.

Table 1.--Summary of information for 39 drill holes in the Como West and Elmo
Quadrangles, Carbon County, Wyo.

Drill hole	Location	Quadrangle	Depth drilled (ft)	Depth logged (ft)
1-CW*	SE 1/4 SE 1/4 NE 1/4 NW 1/4 sec. 2, T. 23 N., R. 81 W.	Como West	122.6	120
2-CW	NE 1/4 SE 1/4 NW 1/4 SE 1/4 sec. 2, T. 23 N., R. 81 W.	Como West	810	808
3-CW*	SW 1/4 SE 1/4 NW 1/4 NW 1/4 sec. 12, T. 23 N., R. 81 W.	Como West	152.4	152
4-CW*	SW 1/4 NW 1/4 NW 1/4 SW 1/4 sec. 12, T. 23 N., R. 81 W.	Como West	325	315
4-CW-B	SW 1/4 NW 1/4 SW 1/4 SW 1/4 sec. 12, T. 23 N., R. 81 W.	Como West	717.5	714
5-CW**	SE 1/4 SE 1/4 SE 1/4 NW 1/4 sec. 14, T. 23 N., R. 81 W.	Como West	717.5	713
6-CW**	SW 1/4 NW 1/4 SE 1/4 SW 1/4 sec. 14, T. 23 N., R. 81 W.	Como West	675.0	675
7-CW	NE 1/4 NE 1/4 NE 1/4 NE 1/4 sec. 14, T. 23 N., R. 81 W.	Como West	307.5	306
8-CW	SW 1/4 NW 1/4 SW 1/4 SW 1/4 sec. 18, T. 23 N., R. 80 W.	Como West	320	316
9-CW	SW 1/4 NE 1/4 SW 1/4 SW 1/4 sec. 20, T. 23 N., R. 80 W.	Como West	520	518
10-CW*	NW 1/4 NW 1/4 NW 1/4 NW 1/4 sec. 18, T. 23 N., R. 80 W.	Como West	297.6	295
11-CW	SE 1/4 SW 1/4 NW 1/4 NW 1/4 sec. 18, T. 23 N., R. 80 W.	Como West	460	460
12-CW	NE 1/4 SE 1/4 SE 1/4 NW 1/4 sec. 18, T. 23 N., R. 80 W.	Como West	630	630
13-CW	SE 1/4 SE 1/4 SE 1/4 SE 1/4 sec. 18, T. 23 N., R. 80 W.	Como West	310	306
14-CW	SE 1/4 NW 1/4 NW 1/4 NW 1/4 sec. 20, T. 23 N., R. 80 W.	Como West	270	265
15-CW	NW 1/4 NW 1/4 SW 1/4 NE 1/4 sec. 20, T. 23 N., R. 80 W.	Como West	310	300
16-CW	SE 1/4 NE 1/4 SW 1/4 NE 1/4 sec. 20, T. 23 N., R. 80 W.	Como West	390	386
17-CW	E 1/2 SW 1/4 NW 1/4 NE 1/4 sec. 24, T. 23 N., R. 81 W.	Como West	200	194
18-CW**	SW 1/4 SW 1/4 SW 1/4 NW 1/4 sec. 24, T. 23 N., R. 81 W.	Como West	717.5	715
19-CW**	Center sec. 24, T. 23 N., R. 81 W.	Como West	317	309
20-CW	NW 1/4 SW 1/4 SE 1/4 SE 1/4 sec. 24, T. 23 N., R. 81 W.	Como West	405	405
21-CW	NW 1/4 NE 1/4 NE 1/4 SW 1/4 sec. 20, T. 23 N., R. 80 W.	Como West	310	290
22-CW	NW 1/4 SW 1/4 NE 1/4 SE 1/4 sec. 20, T. 23 N., R. 80 W.	Como West	400	398
23-CW**	NW 1/4 NE 1/4 SW 1/4 NW 1/4 sec. 24, T. 23 N., R. 80 W.	Como West	717.5	715
24-E*	NW 1/4 NE 1/4 SE 1/4 NE 1/4 sec. 4, T. 23 N., R. 81 W.	Elmo	318.2	314
25-E-C*	NW 1/4 NE 1/4 SW 1/4 SE 1/4 sec. 4, T. 23 N., R. 81 W.	Elmo	232.4	225
25-E-B**	NE 1/4 SW 1/4 SW 1/4 SE 1/4 sec. 4, T. 23 N., R. 81 W.	Elmo	710	696
26-E**	NE 1/4 NW 1/4 SW 1/4 SE 1/4 sec. 20, T. 23 N., R. 81 W.	Elmo	717.5	690
27-E	NE 1/4 SW 1/4 NW 1/4 SE 1/4 sec. 30, T. 23 N., R. 81 W.	Elmo	758.5	595
28-E*	NW 1/4 SE 1/4 NW 1/4 NE 1/4 sec. 8, T. 22 N., R. 81 W.	Elmo	102.3	98
29-E*	SE 1/4 SE 1/4 NE 1/4 SW 1/4 sec. 8, T. 22 N., R. 81 W.	Elmo	200	200
30-E	NW 1/4 NE 1/4 NW 1/4 NW 1/4 sec. 8, T. 22 N., R. 81 W.	Elmo	722	684
31-E	SE 1/4 NE 1/4 SE 1/4 NE 1/4 sec. 24, T. 23 N., R. 82 W.	Elmo	340	337
32-E**	NW 1/4 SE 1/4 SW 1/4 NE 1/4 sec. 24, T. 23 N., R. 82 W.	Elmo	410	405
33-E	SW 1/4 SE 1/4 NE 1/4 SW 1/4 sec. 24, T. 23 N., R. 82 W.	Elmo	500	477
34-E**	NW 1/4 SW 1/4 NW 1/4 SE 1/4 sec. 14, T. 23 N., R. 82 W.	Elmo	450	445
35-E	N 1/2 NE 1/4 NW 1/4 NE 1/4 sec. 14, T. 23 N., R. 82 W.	Elmo	500	500
36-E	N 1/2 NE 1/4 NE 1/4 SE 1/4 sec. 10, T. 23 N., R. 82 W.	Elmo	300	298
37-CW	SE 1/4 SW 1/4 NW 1/4 SW 1/4 sec. 6, T. 23 N., R. 80 W.	Como West	307	306

*Core holes.

**Water observation well.

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 1-CW DATE 10/13/78 SURFACE ELEVATION(ft) 6860

LOCATION NE $\frac{1}{2}$ NW $\frac{1}{2}$ Sec. 2 T. 23 N. R. 81 W. Quad. Como West 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 122.6

CORED YES NO INTERVAL(s) 12-122.6'

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 13.0 Sandstone, light-brown, fine-grained		0	0			
13.0- 16.0 Siltstone, light-gray to brown, sandy						
16.0- 19.0 Shale and sandstone, interbedded. Shale is medium gray and sandstone is light gray to light brown, very fine grained		10				
19.0- 23.0 Shale, medium-gray and olive-gray		20				
23.0- 34.0 Shale, dark-gray to black, carbonaceous						
34.0- 38.8 Shale and siltstone, interbedded, medium-gray to brown		30				
38.8- 42.2 Coal, shaly						
42.2- 44.0 Shale, black, carbonaceous, coaly		40				
44.0- 46.0 Coal, shaly						
46.0- 51.0 Shale, black, carbonaceous, coaly						
51.0- 58.5 Coal, partly shaly		50				
58.5- 61.8 Shale, black, carbonaceous, coaly						
61.8- 66.0 Coal and shale, interbedded. Shale is black carbonaceous, coaly		60				
66.0- 72.0 Coal, shaly						
72.0- 81.0 Shale and coal, interbedded. Shale is black, carbonaceous		70				
81.0- 85.2 Coal, partly shaly						
85.2- 90.0 Shale and coal, interbedded. Shale is black, carbonaceous		80				
90.0- 93.0 Coal, very shaly						
93.0-100.3 Shale, black, carbonaceous, partly coaly		90				
		100				
		150				
		200				
		250				

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
<p>100.3-106.0 Sandstone, light-gray, very fine-grained, shaly and silty, irregular bedding, convolutions</p> <p>106.0-122.6 Siltstone and sandstone, interbedded, light- to medium-gray. Some interlamination of gray mudstone and shale. Partly fractured.</p>						

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 2-CW DATE 10/27/78 SURFACE ELEVATION(ft) 6865

LOCATION NW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 2 T. 23 N. R. 81 W. Quad. Como West 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 810

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip LOG	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 15.0 Sandstone, grayish-orange, fine-grained. A few thin beds of grayish-brown, fine-grained sandstone		0	0			
15.0- 23.0 Shale, moderate- to grayish-brown, partly carbonaceous		10				
23.0- 36.8 Shale, dark-gray to black, interbedded carbonaceous and coaly shales		50				
36.8- 41.0 Coal, shaly with coaly shale top and bottom		28				
41.0- 48.0 Shale, medium-dark-gray to olive-gray		100	30			
48.0- 63.1 Sandstone, light-gray and grayish-orange, fine-grained			40			
63.1- 76.0 Shale, medium-dark-gray to dark-gray, partly carbonaceous			150			
76.0- 80.0 Siltstone, light-gray, partly shaly			50			
80.0- 86.6 Claystone, light-gray, silty						
86.6-101.6 Sandstone, grayish-orange, fine-grained, well cemented			200			
101.6-106.0 Claystone, light-gray, silty						
106.0-115.0 Sandstone, light-gray, fine-grained			60			
115.0-116.0 Shale, medium-gray, silty						
116.6-120.4 Siltstone, light- to medium-gray			70			
120.4-124.8 Shale, medium-gray						
124.8-126.0 Siltstone, light- to medium-gray						
126.0-131.5 Shale, dark-gray, carbonaceous, silty			250			

Lithology		Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
131.5-143.7	Sandstone and siltstone, light-gray, hard			80			
143.7-156.1	Siltstone and shale, light- to medium-gray, sandy			90			
156.1-190.3	Siltstone, light- to medium-gray, shaly and sandy			300			
190.3-193.2	Shale, medium-gray			100			
193.2-203.0	Siltstone, medium-gray, sandy						
203.0-210.0	Sandstone, light-gray, very fine-grained						
210.0-238.0	Siltstone and shale, light- to medium-gray			350			
238.0-259.0	Sandstone, light-gray, fine-grained			110			
259.0-272.1	Siltstone, medium-dark-gray, shaly						
272.1-311.4	Shale, dark-gray to black, carbonaceous			120			
311.4-320.0	Siltstone, medium-gray						
320.0-325.1	Sandstone, light- to medium-gray, silty			400			
325.1-339.8	Shale, dark-gray to black, carbonaceous			130			
339.8-354.7	Shale, black, carbonaceous, with streaks of coal						
354.7-372.1	Coal			140			
372.1-375.0	Shale, black, carbonaceous			450			
375.0-379.2	Coal						
379.2-382.8	Shale, black, carbonaceous and coaly			150			
382.8-391.2	Coal, upper part is moderately shaly						
391.2-392.8	Shale, dark-gray, carbonaceous						
392.8-406.8	Siltstone, medium-gray, sandy. Interbedded with light-gray, very fine- to fine-grained sandstone and medium-gray shale			500			
406.8-420.0	Sandstone, light-gray, fine-grained, silty			160			
420.0-437.0	Siltstone, medium-gray, sandy			170			
437.0-438.8	Shale, medium-gray, silty			550			
438.8-445.0	Sandstone and siltstone, sandstone, medium-gray, very-fine-grained, silty			180			
445.0-452.8	Shale, medium-gray, silty, very fine- to fine-grained, hard						
452.8-490.0	Sandstone, light-gray, very silty, very fine- to fine-grained, hard			600			
490.0-499.2	Sandstone, light-gray, very fine-grained			190			
499.2-514.8	Siltstone, medium-gray, sandy. Grades upward into sandstone			200			
514.8-525.2	Shale, dark-gray, carbonaceous			650			
525.2-544.0	Siltstone, medium-gray, sandy			210			
544.0-572.2	Shale, dark-gray to black, carbonaceous						
572.2-587.0	Sandstone, light-gray, fine- to medium-grained			700			

Lithology	Strip LOG	Depth		Geophysical Logs					
		ft	m	Gamma	Den	Res			
587.0-595.0 Sandstone and siltstone, light- to medium-gray. Sandstone is very fine grained									
595.0-601.2 Siltstone, medium-gray, shaly									
601.2-609.4 Sandstone, light-gray, fine- to medium-grained			750				240		
609.4-625.8 Siltstone and sandstone, light- to medium-gray. Sandstone is very fine grained									
625.8-654.0 Shale, black, carbonaceous; thin coal partings and streaks							250		
654.0-673.2 Coal. Middle of bed is partly shaly			800						
673.2-677.0 Shale, black, carbonaceous; thin bed of shaly coal							260		
677.0-686.0 Coal, thin coaly shale partings in upper part									
686.0-691.0 Coal and shale, black, carbonaceous; interbedded			850				270		
691.0-702.4 Shale, dark gray to black, carbonaceous; few thin shaly coal beds									
702.4-740.0 Sandstone, light-gray, fine- to medium-grained									
740.0-751.2 Siltstone, medium-gray, sandy									
751.2-768.0 Shale, dark-gray to black, carbonaceous									
769.0-771.0 Coal, very shaly									
771.0-780.2 Siltstone and shale, medium-gray									
780.2-797.0 Sandstone, light-gray, very fine-grained									
797.0-805.0 Shale, dark-gray, carbonaceous									
805.0-810.0 Sandstone, light-gray, very fine-grained									

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 3-CW DATE 10/19/78 SURFACE ELEVATION(ft) 6845

LOCATION NW $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 12 T. 23 N. R. 81 W. Quad. Como West 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 152.4

CORED YES NO INTERVAL(s) 14.5-136.3'

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma ; Scale 10 f/in Logging Speed 15 fpm
 Gamma Gamma ; Scale 10 f/in Logging Speed 3 fpm
 Resistivity ; Scale 10 f/in Logging Speed 15 fpm
 Caliper ; Scale 10 f/in Logging Speed 15 fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 5.0 Surface material		0	0			
5.0- 11.0 Shale, brown to olive-gray						
11.0- 15.0 Shale, dark-brown						
15.0- 17.0 Claystone, dark-brown						
17.0- 49.0 Shale, brown to brown-gray, fractured		10				
49.0- 73.0 Shale, light-olive-gray to dark-gray, gastropods at 59.8 ft		50				
73.0- 75.5 Siltstone, light-gray, sandy		20				
75.5- 77.0 Sandstone, light-gray, very fine-grained, with interbeds of siltstone						
77.0- 82.5 Siltstone, medium- to light-gray with very thin interbeds of very fine-grained sandstone		100	30			
82.5- 84.4 Interbedded siltstone and medium-gray shale		40				
84.4- 92.0 Shale, medium- to dark-gray, partly carbonaceous, slightly silty		150	50			
92.0- 97.6 Shale, dark-gray, carbonaceous		50				
97.6-103.9 Shale, dark-gray with medium-gray shale interbeds						
103.9-106.3 Siltstone, medium-gray, shaly		80				
106.3-114.8 Interbedded dark-gray carbonaceous shale and medium-gray siltstone		200				
114.8-115.8 Coal, bright						
115.8-116.2 Siltstone, light-gray, shaly		70				
116.2-122.4 Coal, bright, fractured, partly boney						
		250				

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
122.4-123.2 Shale, carbonaceous with coal stringers			0			
123.2-127.9 Coal, bright, broken, partly boney			10			
127.9-129.0 Shale, dark-gray to black, carbonaceous, with traces of coal			20			
129.0-134.5 Coal with interbedded bone coal and carbonaceous shale			300			
134.5-138.4 Coal, shaly			100			
138.4-142.0 Coal with thin interbeds of carbonaceous shale						
142.0-144.0 Shale, carbonaceous			110			
144.0-144.8 Mudstone, greenish-gray			350			
144.8-148.1 Siltstone, medium-gray, sandy, gradational contact with basal sandstone			120			
148.1-152.0 Sandstone, light-gray, fine-grained, fractured			400			
			130			
			140			
			450			
			150			
			500			
			160			
			170			
			550			
			180			
			600			
			190			
			200			
			650			
			210			
			220			
			700			

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 4-CW DATE 11/6/78 SURFACE ELEVATION(ft) 6955

LOCATION NW $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 12 T. 23 N. R. 81 W. Quad. Como West 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 325

CORED YES NO INTERVAL(s) 160-210'

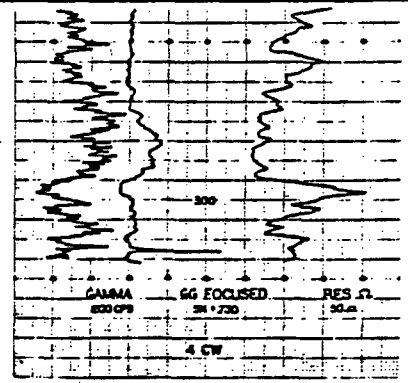
DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 8.0 Surface material		0	0			
8.0- 12.0 Shale, brown to brownish-gray, silty						
12.0- 15.7 Sandstone, brown, very fine-grained						
15.7- 29.4 Shale, medium- to dark-gray, carbonaceous		10				
29.4- 31.2 Sandstone, brown, very fine-grained			50			
31.2- 32.3 Shale, dark-gray, carbonaceous						
32.3- 34.5 Sandstone, medium-gray, very fine-grained		20				
34.5- 51.2 Shale, medium- to dark-gray, slightly carbonaceous						
51.2- 72.0 Shale, medium-gray, silty			100			
72.0- 94.4 Shale, dark-gray, carbonaceous						
94.4-107.0 Sandstone, brownish-gray, very fine grained		40				
107.0-114.0 Siltstone, medium-gray, partly sandy						
114.0-123.0 Shale, medium-gray, silty						
123.0-133.0 Shale, medium-gray, slightly carbonaceous		150				
133.0-157.0 Shale, medium-dark-gray to black, carbonaceous		50				
157.0-173.0 Coal, dull black with vitrinite-banding, minor pyrite						
173.0-176.5 Shale, dark-gray, carbonaceous			60			
176.5-183.0 Coal, dull with vitrinite banding and minor pyrite		200				
183.0-190.0 Shale, carbonaceous, dark dull brown with few vitrinite bands		70				
		250				

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
190.0-190.2 Sandstone, light-gray, very fine-grained with carbonaceous laminations			80			
190.2-190.6 Shale, carbonaceous, medium-gray			90			
190.6-192.5 Mudstone, dark gray with carbonaceous clasts			300			
192.5-192.8 Sandstone, light-gray, very fine-grained with carbonaceous clasts			100			
192.8-198.0 Siltstone, light- to medium-gray with medium-grained sandstone clasts			110			
198.0-251.0 Sandstone, light-gray, fine- to medium-grained. Carbonaceous shale, clasts throughout			350			
251.0-273.4 Sandstone is interbedded with siltstone and siltstone is interbedded with shale in ascending order			120			
273.4-295.5 Shale, medium- to dark-gray			400			
295.5-304.2 Sandstone, light-gray, fine- to very coarse-grained			130			
304.2-310.0 Shale, medium- to dark-gray			140			
310.0-325.0 Sandstone, medium-gray, fine-grained, partly silty			450			
			150			
			500			
			160			
			170			
			550			
			180			
			600			
			190			
			200			
			650			
			210			
			220			
			700			



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 4-CW-B DATE 11/8/78 SURFACE ELEVATION(ft) 6845

LOCATION SW $\frac{1}{2}$ SW $\frac{1}{2}$ Sec. 12 T. 23 N. R. 81 N. Quad. Como West 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 717.5

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 10.0 Colluvium, loam, yellow-brown, sandy		0	0			
10.0- 19.0 Colluvium, clay and silt, brown-gray						
19.0- 30.0 Siltstone and shale, interbedded, medium-gray. Brown weathering			10			
30.0- 36.5 Shale, brown-gray, silty						
36.5- 42.0 Siltstone, medium-gray, very sandy, hard			50			
42.0- 45.0 Shale, medium-gray, silty						
45.0- 48.3 Siltstone, medium-gray, shaly			20			
48.3- 65.0 Shale, medium-dark-gray to dark-gray; middle part carbonaceous with coal streaks						
65.0- 90.8 Siltstone and sandstone, interbedded, light- to medium-gray. Sandstone is very fine grained, silty			100			
90.8- 95.0 Siltstone, medium-gray						
95.0-100.0 Shale, medium-gray, silty						
100.0-112.0 Sandstone, light-gray, fine grained, friable			150			
112.0-120.0 Siltstone and sandstone, interbedded, medium-gray						
120.0-145.4 Shale, medium-gray to black, partly carbonaceous			50			
145.4-161.0 Sandstone, light-gray, fine grained, friable						
161.0-165.0 Siltstone, light-gray, sandy			200			
165.0-190.6 Shale, dark-gray to black, mostly carbonaceous						
193.6-195.1 Coal, shaly			60			
			70			
			250			

Lithology		Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
195.1-196.0	Shale, dark-gray, carbonaceous			88			
196.0-198.0	Coal						
198.0-198.8	Shale, black, coaly						
198.8-201.8	Coal						
201.8-202.5	Shale, black, coaly						
202.5-204.0	Coal, shaly			300			
204.0-210.0	Shale, dark-gray to black, carbonaceous, coal traces			100			
210.0-214.0	Coal, very shaly						
214.0-225.3	Shale, dark-gray to black, carbonaceous						
225.3-230.0	Siltstone, medium-dark-gray, shaly			350			
230.0-302.0	Sandstone, light-gray, fine-grained, carbonaceous laminations; thin interbeds of medium-gray siltstone			110			
302.0-321.0	Shale and claystone, dark-gray, carbonaceous coal fragments			120			
321.0-324.0	Claystone, dark-gray, silty						
324.0-349.0	Siltstone, medium-gray; some medium-dark-gray silty shale interbedding			400			
349.0-365.4	Sandstone, light-gray, very fine- to fine-grained			130			
365.4-378.0	Siltstone, light- to medium-gray, sandy			140			
378.0-384.0	Shale, dark-gray, carbonaceous			450			
384.0-402.0	Sandstone, light-gray, fine grained						
402.0-417.0	Shale, medium-dark-gray, silty			150			
417.0-443.0	Siltstone, medium-gray to olive-gray, sandy						
443.0-450.0	Sandstone, fine-grained, silty			500			
450.0-455.0	Siltstone and shale, interbedded, olive-gray and medium-dark-gray			160			
455.0-476.0	Sandstone, light-gray, fine-grained						
476.0-484.0	Siltstone, olive-gray, sandy						
484.0-489.0	Claystone, dark-gray, waxy			170			
489.0-505.0	Siltstone, medium-gray, sandy						
505.0-512.7	Shale, medium-dark-gray			550			
512.7-518.0	Shale, dark-gray to black, carbonaceous			180			
518.0-521.0	Coal						
521.0-523.0	Shale, dark-gray						
523.0-535.0	Sandstone, light-gray, fine-grained			600			
535.0-543.0	Shale, dark-gray to black, carbonaceous			190			
543.0-547.5	Coal, very shaly						
547.5-571.0	Shale, dark-gray, carbonaceous			200			
571.0-714.0	Sandstone, light-gray, fine- to medium-grained; some coarse sand and granules; a few shale pebbles			650			
				210			
				220			
				700			

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 5-CW DATE 11/4/78 SURFACE ELEVATION(ft) 6955

LOCATION SE 1/4 NW 1/4 Sec. 14 T. 23 N. R. 81 W Quad. Como West 7 1/2'

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 717.5

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale <u>10 f/in</u>		Logging Speed <u>15</u>	fpm
Gamma Gamma	;	Scale <u>10 f/in</u>		Logging Speed <u>10</u>	fpm
Resistivity	;	Scale <u>10 f/in</u>		Logging Speed <u>15</u>	fpm
Caliper	;	Scale <u>10 f/in</u>		Logging Speed <u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 5.0 Sandstone, light-brown-yellow, fine- to very coarse-grained to granular		0	0			
5.0- 9.0 Sandstone, light-yellowish-gray, medium- to coarse-grained						
9.0- 28.5 Sandstone, light-yellowish-gray, fine- to medium-grained		10				
28.5- 38.0 Siltstone, medium-gray and light-olive-gray, very sandy		50				
38.0- 53.0 Siltstone, medium-gray, shaly		20				
53.0-112.3 Shale, medium-gray, silty						
112.3-118.0 Sandstone, light-gray, fine-grained, silty		30				
118.0-122.0 Shale, medium-gray and dark-gray, carbonaceous		100				
122.0-131.0 Coal						
131.0-132.3 Shale, medium-gray		40				
132.3-138.0 Coal						
138.0-140.0 Shale, black, coaly						
140.0-142.0 Coal, shaly		150				
142.0-143.0 Shale, dark-gray to black, carbonaceous		50				
143.0-155.5 Coal, shaly						
155.5-166.0 Shale, dark-gray to black, coaly						
166.0-168.3 Coal		60				
168.3-172.0 Shale dark-gray, carbonaceous		200				
172.0-173.0 Coal, shaly						
173.0-182.3 Shale, dark-gray to black, carbonaceous		70				
182.3-187.0 Shale, medium-gray, silty						
187.0-300.0 Sandstone, light-gray, fine- to medium-grained, friable		250				

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
300.0-315.3 Sandstone, light-gray, coarse-grained, granular			80			
315.3-336.3 Shale, light-gray, very silty						
336.3-350.4 Siltstone, light-gray			90			
350.4-361.5 Shale, light-gray, silty						
361.5-375.0 Sandstone, light-gray, very fine grained, very silty			300			
375.0-415.0 Siltstone, light-gray						
415.0-421.2 Sandstone, light-gray, very fine grained			100			
421.2-430.0 Siltstone, medium-gray, shaly						
430.0-456.0 Siltstone, medium-gray, sandy			350			
456.0-484.5 Sandstone, light- to medium-gray, very fine-grained, silty			110			
484.5-488.3 Shale, medium-gray, silty						
488.3-494.0 Coal			120			
494.0-497.0 Shale, black, coaly						
497.0-500.0 Coal			400			
500.0-502.0 Shale, dark-gray to black, carbonaceous			130			
502.0-506.4 Coal						
506.4-508.0 Shale, black, very coaly						
508.0-515.0 Coal			140			
515.0-516.0 Shale, black, coaly						
516.0-520.4 Coal			450			
520.4-525.3 Coal, shaly and shale, black, coaly						
525.3-528.3 Shale, medium-dark-gray			150			
528.3-537.5 Coal, shaly						
537.5-542.5 Shale, medium-dark-gray						
542.5-560.5 Sandstone, light-gray, fine-grained			500			
560.5-562.0 Shale, dark-gray, carbonaceous			160			
562.0-573.0 Coal, shaly						
573.0-577.3 Shale, dark-gray to black, carbonaceous, coal stringers			170			
577.3-582.3 Shale, dark-gray to black, coaly						
582.3-587.0 Shale, dark-gray, carbonaceous			550			
587.0-591.0 Shale, medium-gray, silty			180			
591.0-601.0 Shale, medium-dark-gray, carbonaceous						
601.0-617.0 Shale, medium-dark-gray, silty						
617.0-626.0 Sandstone, light-gray, fine-grained			600			
626.0-631.0 Siltstone, medium-gray, sandy			190			
631.0-643.0 Sandstone, light-gray, fine-grained						
643.0-652.0 Shale, medium-dark-gray			200			
652.0-662.6 Coal, shaly						
662.6-671.0 Shale, medium-dark-gray, silty			650			
671.0-690.0 Sandstone, light-gray, fine- to medium-grained; upper part is shaly and silty.			210			
690.0-701.0 Shale, dark-gray to black, carbonaceous						
701.0-704.3 Coal, shaly			220			
704.3-708.0 Shale, dark-gray, carbonaceous						
708.0-712.0 Siltstone, medium-gray, shaly			700			
712.0-715.0 Sandstone, light-gray, fine-grained						

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 6-CW DATE 11/5/78 SURFACE ELEVATION(ft) 7070

LOCATION SE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 14 T. 23 N. R. 81 N. Quad. Como West 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 675

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale <u>10 f/in</u>	Logging Speed <u>15</u>	fpm
Gamma Gamma	;	Scale <u>10 f/in</u>	Logging Speed <u>10</u>	fpm
Resistivity	;	Scale <u>10 f/in</u>	Logging Speed <u>15</u>	fpm
Caliper	;	Scale <u>10 f/in</u>	Logging Speed <u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 12.5 Sandstone, yellow- to red-brown, fine-grained		0	0			
12.5- 17.8 Siltstone, medium-gray						
17.8- 24.3 Sandstone, light-yellow, fine-grained						
24.3- 26.9 Siltstone, medium-gray, shaly						
26.9- 29.5 Sandstone, light-gray, fine-grained		50				
29.5- 31.0 Siltstone, medium-gray						
31.0- 47.0 Sandstone, light-gray, fine-grained						
47.0- 53.0 Shale, medium-gray, silty						
53.0- 58.5 Coal						
58.5- 61.5 Interbedded coal and shale, dark-gray		100	30			
61.5- 62.6 Coal						
62.6- 64.0 Shale, black, carbonaceous						
64.0- 67.8 Coal						
67.8- 68.8 Shale, black, carbonaceous						
68.8- 74.6 Coal						
74.6- 76.7 Coal with interbedded carbonaceous shale		150	50			
76.7- 80.3 Coal						
80.3- 86.0 Coal and shale, carbonaceous						
86.0- 88.0 Shale, black, carbonaceous						
88.0- 89.7 Coal						
89.7- 96.0 Coal and shale, carbonaceous		200				
96.0- 97.2 Claystone, dark-gray						
97.2-155.0 Sandstone, light- to medium-gray, fine-grained, friable, argillaceous						
155.0-159.0 Siltstone, medium-gray						
159.0-162.0 Shale, black		250				

Lithology		Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
162.0-168.0	Coal			80			
168.0-170.2	Shale, black, carbonaceous						
170.2-171.0	Coal						
171.0-172.5	Shale, black, carbonaceous						
172.5-174.0	Coal						
174.0-176.0	Shale, black, carbonaceous			300			
176.0-176.8	Coal						
176.8-178.2	Shale, black, carbonaceous						
178.2-180.0	Coal			1000			
180.0-182.5	Shale, black, very coaly						
182.5-194.5	Shale, black, carbonaceous						
194.5-197.0	Shale, medium-dark-gray			350			
197.0-203.2	Siltstone, medium-gray						
203.2-218.7	Shale, dark-gray, silty						
218.7-228.2	Siltstone, medium-gray, sandy						
228.2-248.8	Sandstone, light-gray, fine-grained			120			
248.8-250.5	Shale, black, carbonaceous						
250.5-261.0	Coal			400			
261.0-268.4	Shale, black, carbonaceous						
268.4-279.0	Sandstone, medium-gray, fine-grained, argillaceous			130			
279.0-286.0	Shale, black, carbonaceous						
286.0-289.0	Coal						
289.0-291.3	Shale, black			450			
291.3-307.5	Interbedded fine-grained sandstone						
307.5-315.5	Shale, dark-gray						
315.5-320.7	Coal						
320.7-325.0	Shale, dark-gray, silty			150			
325.0-327.2	Sandstone, light-gray, fine-grained						
327.2-328.9	Siltstone						
328.9-337.5	Shale, black			500			
337.5-339.0	Siltstone, medium-gray, silty						
339.0-350.5	Interbedded shale and siltstone						
350.5-364.0	Siltstone, medium-gray, sandy						
364.0-642.0	Sandstone, light-gray, fine-grained, friable, partly-coarse-grained to granular			170			
642.0-675.0	Sandstone, light-gray, fine- to medium-grained, argillaceous			550			
				180			
				600			
				190			
				200			
				650			
				210			
				220			
				700			

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 7-CW DATE 11/5/78 SURFACE ELEVATION(ft) 6865

LOCATION NE $\frac{1}{2}$ NE $\frac{1}{2}$ Sec. 14 T. 23 N. R. 81 W. Quad. Como West 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 307.5

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 4.0 Loam, brown		0	0			
4.0- 6.0 Coal, shaly, weathered						
6.0- 8.0 Shale, dark-brown, coaly						
8.0- 17.0 Coal, very shaly						
17.0- 20.0 Shale, black, carbonaceous			10			
20.0- 29.8 Shale and sandstone; shale is brown to medium gray; sandstone is pale brown, very fine grained		50				
29.8- 31.0 Shale, black, carbonaceous			20			
31.0- 33.0 Coal, very shaly						
33.0- 36.0 Shale, black, carbonaceous						
36.0- 40.0 Shale, medium-gray, silty						
40.0- 46.5 Siltstone, medium-gray, shaly		100	30			
46.5- 79.0 Sandstone and siltstone; interbedded sandstone is light gray, very fine grained, silty; siltstone is light to medium gray			40			
79.0-109.0 Sandstone, yellow-gray and light- to medium-gray, fine-grained		150				
109.0-132.0 Sandstone, light-gray, fine-grained			50			
132.0-154.0 Shale, medium- to dark-gray						
154.0-162.7 Siltstone, medium-gray						
162.7-171.0 Sandstone, medium-gray, fine-grained, silty			60			
171.0-194.0 Siltstone, medium-dark-gray and olive-gray, sandy		200				
194.0-199.0 Shale, medium-gray			70			
199.0-204.0 Siltstone, medium-dark-gray, sandy						
204.0-216.0 Sandstone, light-gray, silty						
216.0-246.0 Siltstone, medium-gray, shaly						
246.0-252.0 Sandstone, medium-gray, silty		250				

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
252.0-264.0 Siltstone, medium- to dark-gray, shaly			80			
264.0-271.0 Siltstone and shale, interbedded, medium- to dark-gray			90			
271.0-284.0 Siltstone and sandstone, interbedded, medium- to dark-gray		300	100			
284.0-291.0 Siltstone, medium- to dark-gray			110			
291.0-304.0 Shale, medium-dark-gray and dark-gray			120			
304.0-307.0 Siltstone, medium-gray			130			
			140			
		150				
		160				
		170				
		180				
		190				
		200				
		210				
		220				
		700				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 8-CW DATE 9/12/78 SURFACE ELEVATION(ft) 6875

LOCATION SW $\frac{1}{2}$ SW $\frac{1}{4}$ Sec. 18 T. 23 N. R. 80 W. Quad. Como West 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 320

CORED YES NO INTERVAL(s) _____

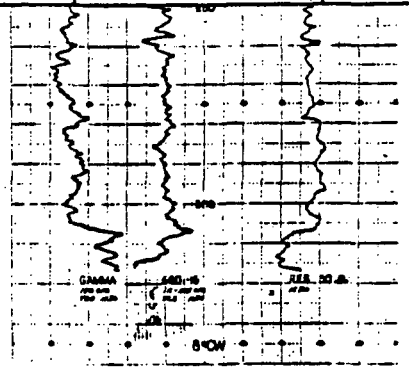
DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 5.0 Clay, loam, sandy		0	0			
5.0- 23.0 Sandstone, light-brown, medium-grained						
23.0- 46.0 Sandstone, light-brown, medium- to coarse-grained, argillaceous			10			
46.0- 53.8 Shale, medium-dark-gray, muddy						
53.8- 60.0 Siltstone, dark-olive-gray, shaly			50			
60.0- 66.3 Shale, medium-gray, muddy						
66.3- 73.0 Siltstone, dark-olive-gray, very sandy			20			
73.0- 76.0 Shale, medium-gray						
76.0- 79.0 Siltstone, dark-olive-gray, shaly						
79.0- 90.0 Shale, dark-gray to black, carbonaceous, coal stringers			100			
90.0-115.0 Shale-clay; medium-dark-gray, few coal stringers						
115.0-117.5 Siltstone, dark-gray, shaly			40			
117.5-124.3 Coal						
124.3-127.3 Shale, dark-gray to black carbonaceous			150			
127.3-133.0 Coal; laminations and thin lenses of carbonaceous shale			50			
133.0-136.5 Shale, dark-gray to black carbonaceous						
136.5-140.0 Coal, laminations of carbonaceous shale			200			
140.0-146.0 Shale and shaly coal, interbedded. Shale is dark gray to black, carbonaceous						
146.0-153.0 Shale, dark-gray to black carbonaceous, coal stringers			70			
			250			

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
153.0-165.0 Claystone, dark-gray, partly shaly			0			
165.0-171.0 Claystone, medium-gray, slightly silty			90			
171.0-191.0 Siltstone, medium-gray			300			
191.0-233.0 Sandstone, gray, very fine-grained, partly silty			100			
233.0-260.0 Sandstone, light-gray, fine- to coarse-grained			110			
260.0-298.0 Sandstone, light-gray, coarse-grained and granular			120			
298.0-307.0 Sandstone, light-gray, fine-grained			130			
307.0-320.0 Claystone, light- to medium-gray, silty			140			
			150			
			160			
		170				
		180				
		190				
		200				
		210				
		220				
		700				



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 9-CW DATE 9/10/78 SURFACE ELEVATION(ft) 6970

LOCATION SW $\frac{1}{2}$ SW $\frac{1}{2}$ Sec. 20 T. 23 N. R. 80 W. Quad. Como West 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 520

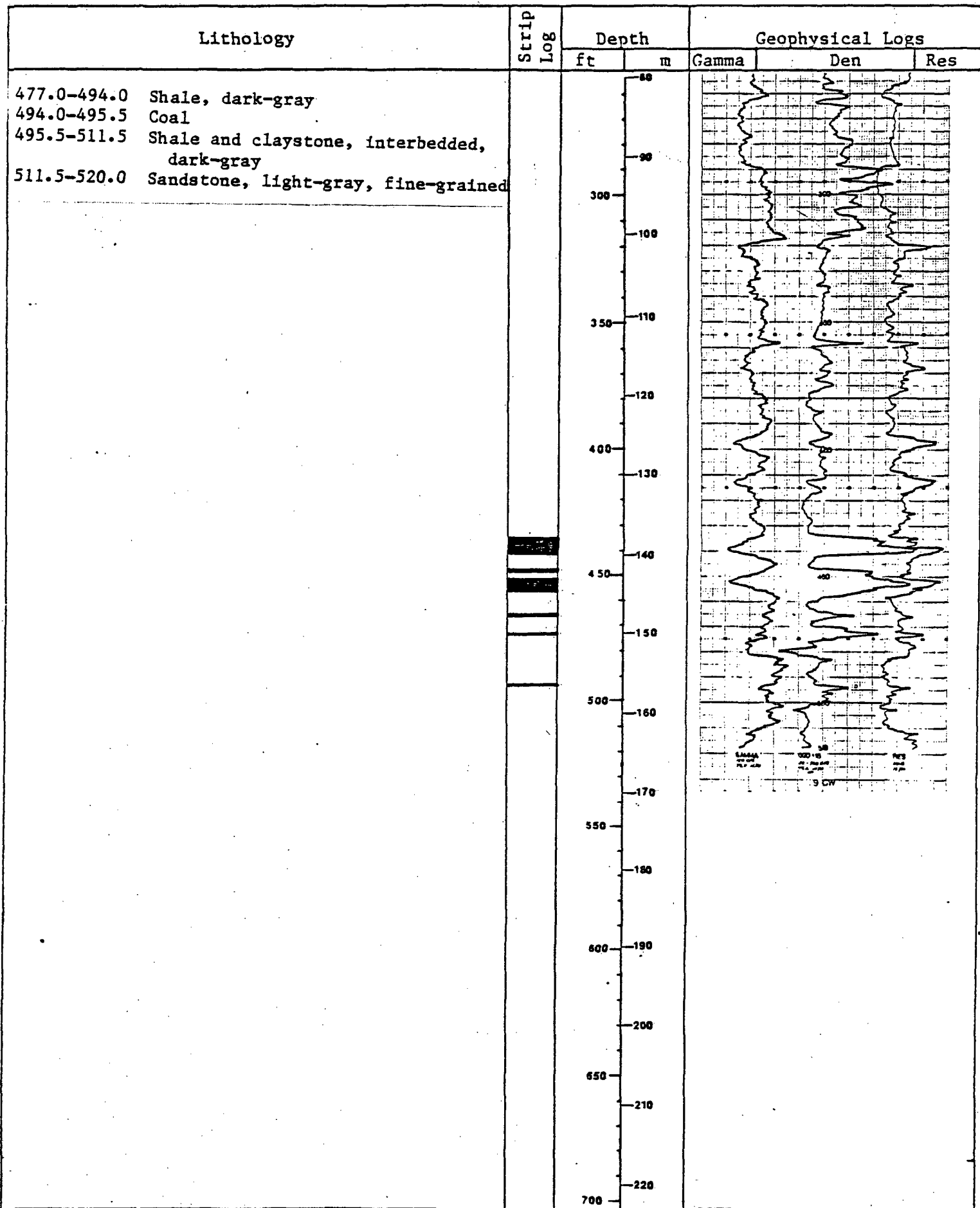
CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 5.0 Surface material		0	0			
5.0- 97.5 Sandstone, yellowish-brown to light-gray, fine- to coarse-grained, some granules						
97.5-142.0 Mudstone, light- to medium-gray, with interbedded dark-gray shale			10			
142.0-201.0 Interbedded shale and mudstone, gray			50			
201.0-259.5 Sandstone, light-gray, medium- to coarse-grained			20			
259.5-264.0 Siltstone, medium-gray						
264.0-290.0 Sandstone, light-gray, medium- to coarse-grained						
290.0-319.0 Interbedded dark-gray shale and dark-gray mudstone			100			
319.0-326.0 Sandstone, light-gray medium-grained						
326.0-335.0 Shale, dark-gray			40			
335.0-340.0 Siltstone, medium-gray						
340.0-431.5 Shale, medium- to dark-gray, partly silty			150			
431.5-434.5 Shale, black, carbonaceous			50			
434.5-441.0 Coal						
441.0-447.0 Shale, black, carbonaceous						
447.0-448.5 Coal						
448.5-451.0 Shale, black, carbonaceous			60			
451.0-456.5 Coal			200			
456.5-459.0 Shale, black, carbonaceous						
459.0-466.0 Shale, medium-gray						
466.0-467.0 Coal			70			
467.0-473.0 Shale, black, carbonaceous						
473.0-474.0 Coal						
474.0-477.0 Mudstone, brownish-gray			250			



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 10-CW DATE 10/11/78 SURFACE ELEVATION(ft) 6945

LOCATION NW $\frac{1}{2}$ NW $\frac{1}{2}$ Sec. 18 T. 23 N. R. 80 W. Quad. Como West 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 297.6

CORED YES NO INTERVAL(s) 40-70.5; 252.4-297.6'

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip LOG	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 5.0 Surface material		0	0			
5.0- 10.0 Sandstone, light-brown, fine-grained						
10.0- 12.5 Siltstone, buff, calcareous						
12.5- 25.0 Claystone, medium-gray to brown, slightly calcareous and silty			10			
25.0- 48.0 Shale and mudstone, interbedded with scattered coal stringers. Mudstone is dark gray to brown gray and is partly silty. Shale is dark gray and commonly carbonaceous			50			
48.0- 50.0 Shale, black, carbonaceous			20			
50.0- 60.0 Coal, mostly bright, partly dull, cleated, with very thin carbonaceous shale partings			100			
60.0- 70.0 Coal, carbonaceous shale, and interbedded mudstone			40			
70.0- 84.0 Mudstone, light- to dark-gray						
84.0-100.0 Siltstone, and very fine grained sandstone, interbedded light-gray, pyritic			150			
100.0-104.0 Mudstone, dark-gray with carbonized plant remains			50			
104.0-117.0 Siltstone and claystone, interbedded carbonized plant imprints common			60			
117.0-118.0 Coquina, light-brown, composed of snail and clam fragments			200			
118.0-148.0 Siltstone, claystone and very thin beds of fine-grained sandstone, interbedded, all light- to dark-gray			70			
			250			

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
148.0-169.0 Sandstone, light-gray, very fine-grained, partly silty		80				
169.0-174.3 Siltstone, medium-gray		90				
174.3-184.5 Shale, dark-gray to black, fossiliferous, (gastropod fragments)		300				
184.5-219.0 Sandstone, light-gray, thin bedded, cross-laminated, carbonaceous clasts, with very thin interbeds of gray claystone and siltstone		100				
219.0-235.0 Shale, dark- to light-gray, partly carbonaceous, commonly fossiliferous (clam and gastropod fragments)		350	110			
235.0-242.0 Siltstone, medium-gray		120				
242.0-265.0 Shale, medium- to dark-gray, carbonaceous		400				
265.0-280.0 Coal, mostly bright, pyritic		130				
280.0-291.0 Coal and carbonaceous shale, interbedded		140				
291.0-294.5 Mudstone, dark-gray		450				
294.5-298.0 Shale, greenish-gray, pyritic	500	160				
	550	170				
	600	180				
	650	190				
	700	200				
		210				
		220				
		700				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 11-CW DATE 10/6/78 SURFACE ELEVATION(ft) 6965

LOCATION NW¹/₄NW²/₄ Sec. 18 T. 23 N. R. 80 W. Quad. Como West 7¹/₂'

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 460

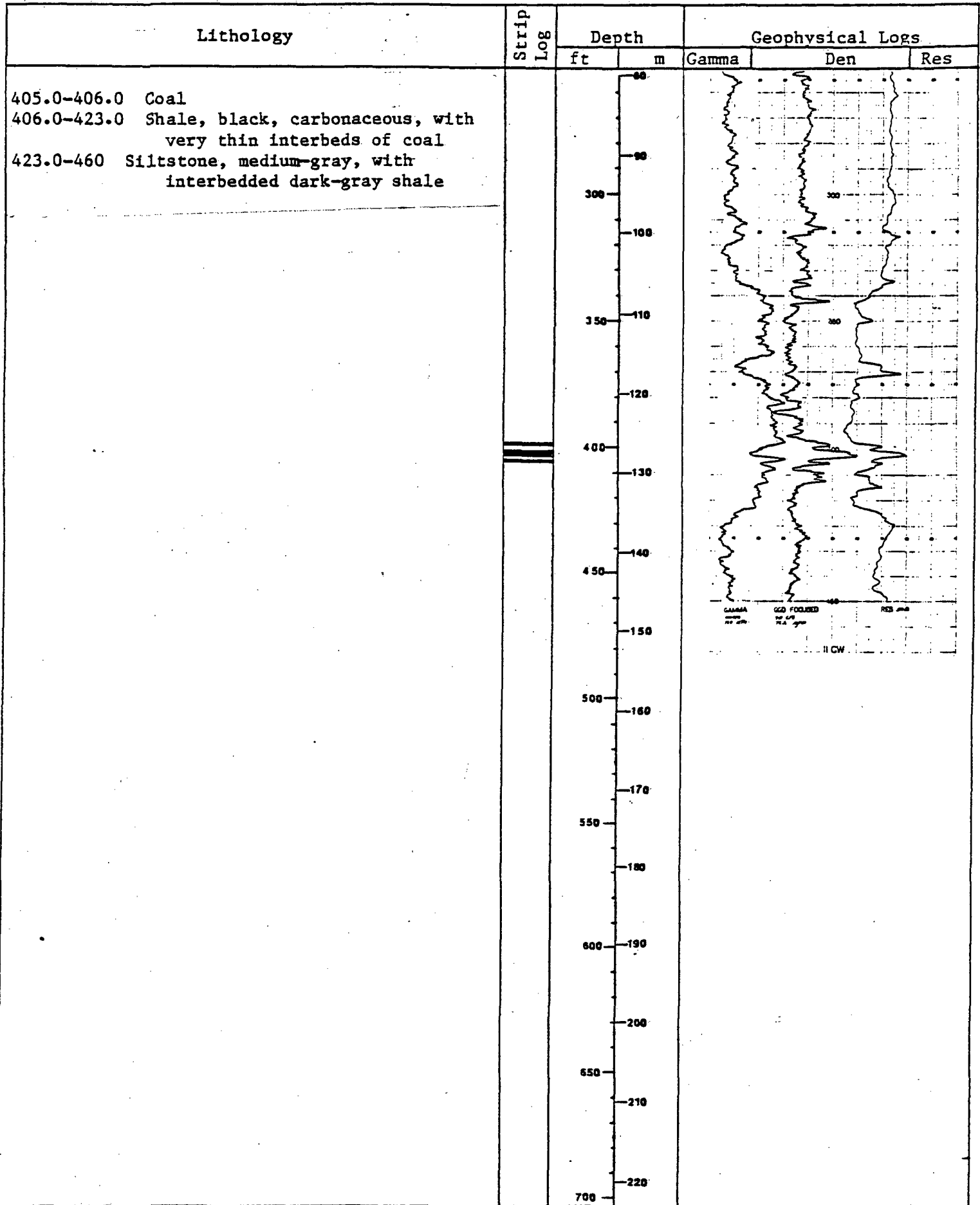
CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0- 18.0 Shale, brown-gray; slightly silty, with a few intervals of light brownish-gray siltstone		0	0			
18.0- 25.0 Sandstone, light-brownish-gray, slightly silty		10				
25.0- 39.0 Shale, yellow-brownish, silty		50				
39.0- 45.0 Shale, medium-gray, partly carbonaceous		20				
45.0- 49.0 Shale, medium-gray						
49.0- 57.5 Sandstone, light-gray, fine-grained						
57.5- 63.0 Shale, medium-gray						
63.0- 75.0 Siltstone, light-medium-gray		100	30			
75.0-132.0 Shale, dark-gray to black, carbonaceous						
132.0-144.0 Coal						
144.0-147.5 Shale, black, carbonaceous		40				
147.5-150.5 Coal						
150.5-161.0 Shale, black, carbonaceous						
161.0-167.3 Mudstone, dark-gray		150				
167.3-205.3 Siltstone, medium-gray, grading to fine-grained sandstone		50				
205.3-210.5 Shale, dark-gray, carbonaceous						
210.5-220.0 Mudstone, bluish-gray, silty						
220.0-338.7 Sandstone, light-gray, fine- to medium-grained		200	60			
338.7-398.0 Shale, medium-gray, partly carbonaceous						
398.0-399.0 Coal		70				
400.0-401.3 Shale, black, carbonaceous						
401.3-403.7 Coal						
403.7-405.0 Shale, black, carbonaceous		250				



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 12-CW DATE 10/5/78 SURFACE ELEVATION(ft) 6885

LOCATION SE 1/4 NW 1/4 Sec. 18 T. 23 N. R. 80 W. Quad. Como West 7 1/2'

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 630

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 26.0 Siltstone, light-yellow-gray, sandy		0	0			
26.0- 37.0 Sandstone, light-yellow, very fine- to fine-grained, silty		10				
37.0- 42.0 Shale-clay, medium- to dark-brown, carboniferous, gypsiferous		20				
42.0- 48.0 Shale, dark-gray, carbonaceous		30				
48.0- 60.0 Shale, dark-gray to black, carbonaceous coal stringers		40				
60.0- 74.0 Shale-clay, medium-gray, silty		50				
74.0-108.0 Sandstone, light-gray, fine- to medium-grained		60				
108.0-111.0 Shale, medium- to brown-gray, silty		70				
111.0-148.0 Sandstone, light-gray, fine- to coarse-grained; very thin, gray, shaly interbeds		80				
148.0-155.0 Siltstone and shale, light- to medium-gray		90				
155.0-186.0 Sandstone, light- to medium-gray, very fine- to coarse-grained. Coal clasts from 175-185 ft.		100				
186.0-190.0 Shale, medium-gray, silty		110				
190.0-232.0 Sandstone, light- to medium-gray, medium- to coarse-grained		120				
232.0-249.5 Shale, medium- to dark-gray		130				
249.5-251.6 Sandstone, light-gray, fine-grained		140				
251.6-276.0 Shale, medium- to dark-gray, carbonaceous, few coal stringers		150				
276.0-318.0 Sandstone, light-gray, fine- to medium-grained	160					
318.0-326.0 Shale, medium-gray, silty	170					
326.0-332.0 Siltstone, medium-gray, shaly	180					

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
332.0-360.0 Shale, dark-gray to black, carbonaceous, thin interbeds of coal			88			
360.0-362.0 Siltstone, medium-gray, shaly			90			
362.0-365.5 Shale, medium-gray			300			
365.5-368.0 Siltstone, medium-gray, shaly			100			
368.0-383.0 Claystone, light- to medium-gray; few thin interbeds of dark-gray, carbonaceous shale						
383.0-398.0 Claystone, light- to medium-gray, silty and sandy			350			
398.0-415.0 Siltstone, medium-gray, sandy			110			
415.0-514.0 Sandstone, light- to medium-gray, fine- to coarse-grained						
514.0-516.0 Shale, light- to medium-grained, sandy			120			
516.0-561.0 Sandstone, light- to medium-gray, fine- to medium-grained			400			
561.0-607.0 Shale-clay, medium-gray, interbedded with dark-gray, carbonaceous shale. Coal streaks from 582-588 ft			130			
607.0-618.0 Coal, laminations or thin lenses of carbonaceous shale			140			
618.0-621.0 Shale, dark-gray to black, carbonaceous			450			
621.0-627.0 Coal, laminations or thin lenses of carbonaceous shale			150			
627.0-630.0 Shale, dark-gray, carbonaceous			500			
			160			
			170			
			550			
			180			
			600			
			190			
			200			
			650			
			210			
			220			
			700			

GAMMA: 60 FOULDED RES: 12: CW-8

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 13-CW DATE 8/29/78 SURFACE ELEVATION(ft) 6860

LOCATION SE $\frac{1}{2}$ SE $\frac{1}{2}$ Sec. 18 T. 23 N. R. 80 W. Quad. Como West 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 310

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	_____ fpm
Gamma Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u> fpm
Resistivity	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u> fpm
Caliper	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u> fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0- 5.0 Surface material		0	0			
5.0- 43.0 Shale, olive-gray, with some interbedded carbonaceous shale						
43.0- 49.0 Coal, contains some carbonaceous shale laminations						
49.0- 52.0 Shale, Black, carbonaceous						
52.0- 55.0 Coal		50				
55.0- 57.5 Shale, black, carbonaceous						
57.5- 59.2 Coal, laminations and thin lenses of carbonaceous shale		20				
59.2- 62.0 Shale, black, carbonaceous						
62.0- 63.0 Coal						
63.0-120.0 Interbedded dark-gray shale and carbonaceous shale, with coal stringers		100	30			
120.0-179.2 Sandstone, light-gray, medium- to coarse-grained			40			
179.2-189.0 Mudstone, dark-gray with carbonaceous clasts		150				
189.0-202.0 Mudstone and interbedded carbonaceous shale, dark-gray			50			
202.0-206.0 Coal, laminations of carbonaceous shale						
206.0-210.0 Shale, black, carbonaceous			60			
210.0-212.0 Coal, laminations or thin lenses of carbonaceous shale		200				
212.0-250.0 Shale, carbonaceous with coal stringers			70			
250.0-309.0 Sandstone, light-gray, medium- to very coarse-grained			250			

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
		88				
		90				
		300				
		100				
		350				
		110				
		120				
		400				
		130				
		140				
		450				
		150				
		500				
		160				
		170				
		550				
		180				
		600				
		190				
		200				
		650				
		210				
		220				
		700				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 14-CW DATE 9/7/78 SURFACE ELEVATION(ft) 6920

LOCATION NW¹/₄NW¹/₄ Sec. 20 T. 23 N. R. 80 W. Quad. Como West 7¹/₂'

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 270

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity *	;	Scale	_____	Logging Speed	_____	fpm
Caliper	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

*Logged through drill rod

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 11.5 Surface material		0	0			
11.5- 18.0 Shale, olive-gray		10	3			
18.0-100.4 Sandstone, light-gray, fine-grained		50	15			
100.4-134.0 Shale, dark-gray		100	30			
134.0-135.0 Coal		150	45			
135.0-143.0 Shale, dark-gray to black, carbonaceous		200	60			
143.0-151.0 Interbedded coal and carbonaceous shale (coal thickness less than 1 ft)		250	75			
151.0-171.3 Shale, black, carbonaceous						
171.3-195.0 Sandstone, medium-gray, coarse-grained						
195.0-265.0 Sandstone, medium- to coarse-grained with interbedded shale and siltstone, gray						

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

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 15-CW DATE 8/31/78 SURFACE ELEVATION(ft) 6965

LOCATION NW $\frac{1}{2}$ NE $\frac{1}{2}$ Sec. 20 T. 23 N. R. 80 W. Quad. Como West 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 310

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 10.0 Sandstone, reddish-brown to light-brown, very coarse-grained; granules and small pebbles; silty	Strip Log	0	0			
10.0- 19.0 Siltstone and clay-shale, light-gray to light-yellowish-brown		10				
19.0- 31.0 Clay-shale, medium-dark-gray, partly carboniferous		50				
31.0- 34.4 Siltstone and shale, medium-gray		20				
34.4- 60.0 Shale, medium-gray, partly silty						
60.0- 71.0 Shale, medium-gray						
71.0-100.0 Shale, medium-gray, silty						
100.0-109.0 Siltstone, medium-gray, shaly		100	30			
109.0-119.0 Sandstone, light-gray, coarse- to very coarse-grained						
119.0-121.5 Siltstone, light-gray, sandy						
121.5-127.0 Sandstone, light-gray, medium- to coarse-grained		40				
127.0-130.5 Sandstone, light-gray, very fine-grained		150				
130.5-147.0 Siltstone, light-gray, sandy		50				
147.0-150.3 Sandstone, light-gray, coarse-grained						
150.3-156.0 Siltstone, light-gray, sandy		60				
156.0-166.5 Sandstone, light-gray, coarse-grained		200				
166.5-172.0 Sandstone, light-gray, very fine- to coarse-grained						
172.0-183.0 Sandstone, light-gray, very fine-grained	70					
	250					

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
183.0-189.0 Claystone, light-gray to light-bluish-gray, particles of pyrite			0			
189.0-201.0 Claystone, medium-gray			30			
201.0-211.0 Claystone, dark-gray, partly carbonaceous			60			
211.0-235.0 Claystone, medium-gray			90			
235.0-266.0 Siltstone, medium-light-gray, sandy			100			
266.0-269.0 Claystone, medium-gray			110			
269.0-277.0 Claystone, medium-gray, very silty, traces carbonaceous material			120			
277.0-283.5 Claystone, medium-gray			130			
283.5-298.0 Siltstone, medium-gray, sandy			140			
298.0-309.0 Sandstone, medium-light-gray, fine-grained			150			
			160			
			170			
			180			
			190			
			200			
			210			
			220			
			230			
			240			
			250			
			260			
			270			
			280			
			290			
			300			
			310			
			320			
			330			
			340			
			350			
			360			
			370			
			380			
			390			
			400			
			410			
			420			
			430			
			440			
			450			
			460			
			470			
			480			
			490			
			500			
			510			
			520			
			530			
			540			
			550			
			560			
			570			
			580			
			590			
			600			
			610			
			620			
			630			
			640			
			650			
			660			
			670			
			680			
			690			
			700			

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 16-CW DATE 9/7/78 SURFACE ELEVATION(ft) 6945

LOCATION SW $\frac{1}{2}$ NE $\frac{1}{2}$ Sec. 20 T. 23 N. R. 80 W. Quad. Como West 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 390

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma ; Scale 10 f/in Logging Speed 15 fpm
 Gamma Gamma ; Scale 10 f/in Logging Speed 10 fpm
 Resistivity ; Scale 10 f/in Logging Speed _____ fpm
 Caliper ; Scale 10 f/in Logging Speed 15 fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 48.0 Sandstone, light-brown to reddish-brown		0	0			
48.0- 70.0 Shale, medium- to dark-gray, silty						
70.0- 84.0 Mudstone, dark-gray, silty			10			
84.0- 86.0 Sandstone, light-gray, very fine-grained			50			
86.0- 90.5 Mudstone, dark-gray silty						
90.5- 92.7 Sandstone, light-gray, very fine-grained			20			
92.7- 99.3 Interbedded dark-gray shale and mudstone						
99.3-105.3 Coal with very thin carbonaceous shale partings			100			
105.3-114.0 Shale, dark-gray, partly carbonaceous						
114.0-120.0 Siltstone, dark-gray with coaly material			40			
120.0-123.4 Shale, medium- to dark-gray						
123.4-125.0 Coal			150			
125.0-137.5 Mudstone and shale, interbedded, gray; with thin black coaly stringers			50			
137.5-145.6 Sandstone, light-gray, very fine-grained						
145.6-152.0 Shale, medium- to dark-gray			200			
152.0-257.5 Sandstone, medium-gray, fine-grained, partly silty						
257.5-266.9 Mudstone, dark-gray, silty			70			
266.9-285.9 Sandstone, medium-gray, fine-grained, partly silty						
			250			

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
285.9-323.5 Interbedded dark-gray shale and black, carbonaceous shale with thin coaly stringers			88			
232.5-326.0 Sandstone, light-gray, very fine-grained			90			
326.0-338.0 Mudstone, light-blue-gray			300			
338.0-340.3 Coal, laminations or thin lenses of carbonaceous shale			100			
340.3-382.0 Shale, medium- to dark-gray			110			
382.0-390.0 Mudstone, dark-gray			350			
			120			
			400			
			130			
			140			
			450			
			150			
			500			
			160			
			170			
			550			
			180			
			600			
			190			
			200			
			650			
			210			
			220			
			700			

GAMMA 0-100
 DEN 1.5-2.5
 RES 0-100
 16-CW

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 17-CW DATE 9/14/78 SURFACE ELEVATION(ft) 6930

LOCATION NW¹/₄NE¹/₄ Sec. 24 T. 23 N. R. 81 W. Quad. Como West 7¹/₂'

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 200

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 17.0 Shale, medium-olive-gray		0	0			
17.0- 26.0 Sandstone, light-gray, fine-grained						
26.0- 32.5 Mudstone, medium-gray						
32.5- 37.0 Coal, laminations of carbonaceous shale		10				
37.0- 46.0 Shale, black, coaly						
46.0- 60.7 Coal, shaly with thin carbonaceous shale partings (less than 1 ft thick)		50				
60.7- 84.3 Shale, black, carbonaceous with interbedded coal (less than 1 ft thick)		20				
84.3-121.0 Shale, dark-gray to black		100	30			
121.0-200.0 Sandstone, light-gray, very fine- to coarse-grained		40				
		150	50			
		200	60			
		70				
		250				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 18-CW DATE 9/27/78 SURFACE ELEVATION(ft) 7030

LOCATION SW¹/₄NW¹/₄ Sec. 24 T. 23 N. R. 81 W. Quad. Como West 7¹/₂'

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 717.5

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

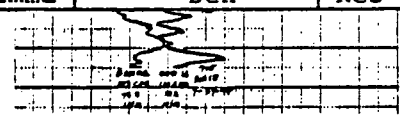
Natural Gamma ; Scale 10 f/in Logging Speed 15 fpm
 Gamma Gamma ; Scale 10 f/in Logging Speed 10 fpm
 Resistivity * ; Scale _____ Logging Speed _____ fpm
 Caliper * ; Scale _____ Logging Speed _____ fpm

*Logged through drill rod

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 17.0 Sandstone, light-yellowish-gray, fine- to coarse-grained		0	0			
17.0- 24.0 Shale, dark-gray		10				
24.0- 31.0 Coal, with black carbonaceous shale partings		50				
31.0- 35.0 Siltstone, medium-gray		20				
35.0- 57.0 Mudstone, medium- to dark-gray, silty		100	30			
57.0- 63.5 Siltstone, medium-gray		40				
63.5- 95.5 Sandstone, light-gray, fine- to coarse-grained		150	50			
95.5-100.7 Mudstone, dark-gray, silty		60				
100.7-115.9 Sandstone, light-gray, fine- to coarse-grained with carbonaceous clasts		200	70			
115.9-122.5 Mudstone, dark-gray, silty		70				
122.5-185.0 Sandstone, light- to medium-gray, fine- to medium-grained, with some chert pebbles		250	75			
185.0-189.0 Mudstone						
189.0-381.0 Sandstone, light- to medium-gray, medium- to coarse-grained, with some chert pebbles						
381.0-388.8 Shale, brown, coaly						
388.8-391.0 Coal, shaly						
391.0-401.0 Sandstone, light-gray, very fine-grained						
401.0-458.0 Shale, dark-gray to dark-brown, silty						

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
458.0-479.0 Interbedded shale and siltstone, gray			80			
479.0-504.0 Siltstone, light- to medium-gray, shaly			90			
504.0-511.0 Sandstone, light-gray, fine- to medium-grained			300			
511.0-516.0 Shale, dark-gray			100			
516.0-619.0 Sandstone, light-gray, fine- to medium-grained, with some interbedded siltstone, and minor pyrite			350			
619.0-645.0 Siltstone, light-gray			110			
645.0-654.0 Shale, medium-gray			120			
654.0-717.0 Interbedded shale and siltstone. Shale is medium-brown and partly carbonaceous. Siltstone is light-greenish-gray and partly sandy			400			
			130			
			140			
			450			
			150			
			500			
			160			
			170			
			550			
			180			
			600			
			190			
			200			
			650			
			210			
			220			
			700			

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



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 19-CW DATE 9/23/78 SURFACE ELEVATION(ft) 6980

LOCATION Center Sec. 24 T. 23 N. R. 81 W. Quad. Como West 7½'

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 304

CORED YES NO INTERVAL(s) _____

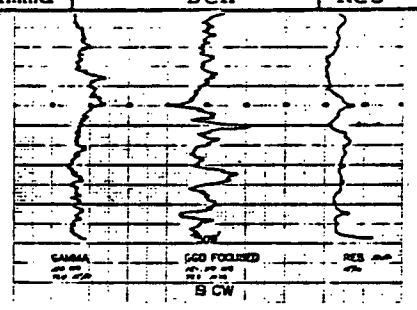
DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 3.7 Surface material		0	0			
3.7- 7.3 Claystone, light-yellow-gray						
7.3- 14.0 Sandstone, light-yellow, very fine-grained						
14.0- 18.0 Claystone, yellow-brown		10				
18.0- 21.0 Shale, black, carbonaceous						
21.0- 26.7 Coal, dull black		50				
26.7- 29.5 Coal, laminations and thin lenses of carbonaceous shale						
29.5- 35.9 Shale, thin lenses or lamnations of coal		20				
35.9- 41.0 Claystone, medium gray						
41.0- 53.0 Shale, medium- to dark-gray		100	30			
53.0- 55.5 Claystone, light- to medium-gray, silty						
55.5-309.0 Sandstone, light- to dark-gray, very fine- to coarse-grained, micaceous, subrounded, partly interbedded with siltstone		40				
		150				
		50				
		60				
		200				
		70				
		250				

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



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 20-CW DATE 10/5/78 SURFACE ELEVATION(ft) 7085

LOCATION SE $\frac{1}{2}$ SE $\frac{1}{2}$ Sec. 24 T. 23 N. R. 81 W. Quad. Como West 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 405

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma* ; Scale 10 f/in Logging Speed 15 fpm
 Gamma Gamma * ; Scale _____ Logging Speed 10 fpm
 Resistivity ; Scale _____ Logging Speed _____ fpm
 Caliper** ; Scale 10 f/in Logging Speed 15 fpm

*Logged through drill rod. **Caliper from 0-281.

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 4.0 Sandstone, yellowish-brown to brownish-gray, fine- to coarse-grained		0	0			
74.0- 78.8 Shale, medium- to dark-gray, partly carbonaceous		10				
78.8- 91.0 Shale, olive-gray		50				
91.0- 92.5 Shale, black, carbonaceous						
92.5-105.0 Shale, medium- to olive-gray		20				
105.0-110.0 Shale, black, carbonaceous						
110.0-118.0 Shale, medium- to olive-gray						
118.0-123.0 Shale, black, carbonaceous						
123.0-219.0 Sandstone, light-gray, very fine- to fine-grained, partly silty		100	30			
219.0-225.0 Interbedded sandstone and siltstone						
225.0-230.0 Shale, dark-gray		40				
230.0-233.0 Shale, black, carbonaceous						
233.0-240.0 Shale, dark-gray, partly carbonaceous		150				
240.0-243.0 Coal, laminations and lenses of carbonaceous shale		50				
243.0-249.0 Shale, medium- to dark-gray						
249.0-257.0 Coal						
257.0-261.0 Coal, laminations and lenses of carbonaceous shale		60				
261.0-297.5 Shale, dark-gray		200				
297.5-311.0 Coal and carbonaceous shale, interbedded		70				
311.0-329.0 Shale, dark-gray						
329.0-333.0 Shale, black, carbonaceous		250				

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
333.0-337.0 Shale, dark-gray		88				
337.0-343.0 Shale, black, carbonaceous		90				
343.0-345.5 Shale, dark-gray						
345.5-349.0 Shale, black, carbonaceous		90				
349.0-376.5 Shale, dark-gray, partly carbonaceous		300				
376.5-380.5 Coal		100				
380.0-391.0 Shale, dark-gray, partly carbonaceous						
391.0-405.0 Sandstone, light-gray, fine-grained		110				
		350				
		120				
		400				
		130				
		140				
		450				
		150				
		500				
		160				
		170				
		550				
		180				
		600				
		190				
		200				
		650				
		210				
		220				
		700				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 21-CW DATE 9/1/78 SURFACE ELEVATION(ft) 6990

LOCATION NE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 20 T. 23 N. R. 80 W. Quad. Como West 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 310

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 5.0 Sandstone, grayish-orange, medium- to coarse-grained		0	0			
5.0- 9.0 Siltstone, grayish-orange, very sandy						
9.0- 14.0 Claystone, gray- to dark-brown						
14.0- 21.0 Siltstone, gray, very sandy						
21.0- 35.0 Claystone, medium-gray		50				
35.0- 43.5 Claystone, dark-gray to brown, carbonaceous						
43.5- 61.0 Claystone, medium-gray						
61.0- 66.5 Claystone, dark-gray, silty						
66.5- 72.0 Sandstone, light-gray, very fine-grained, sandy		100	30			
72.0- 76.0 Siltstone, medium-gray, sandy						
76.0- 86.0 Siltstone and claystone, dark-gray, traces carbonaceous material						
86.0- 92.5 Siltstone, dark-gray, shaly						
92.5-112.0 Sandstone, light-gray, coarse-grained; silty		150				
112.0-116.0 Siltstone and claystone, dark-gray						
116.0-128.0 Sandstone, light-gray, very fine-grained, shaly						
128.0-136.0 Siltstone, medium-gray, very sandy						
136.0-163.0 Sandstone, light-gray, fine-grained						
163.0-172.0 Sandstone, light-gray, fine- to medium-grained		200				
172.0-255.5 Claystone, medium-gray, partly silty						
255.5-263.0 Siltstone, medium-gray, very sandy						
		250				

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
263.0-273.0 Claystone, brown to black, some carbonaceous material 273.0-279.0 Claystone, dark-gray, silty 279.0-285.0 Siltstone, medium-gray 285.0-310.0 Sandstone, light-gray, medium- to coarse-grained, very silty		80		<p>The geophysical logs for well 21-CW are plotted against depth from 80 to 700 feet. The logs include Gamma-ray, Density (Den), and Resistivity (Res) curves. The Gamma-ray curve shows a peak around 270-280 feet, corresponding to the sandstone interval. The Den and Res curves show corresponding variations in these properties. A scale bar at the bottom of the logs is labeled '21-CW'.</p>		
		90				
		300				
		100				
		350	110			
		120				
		400				
		130				
		140				
		450				
		150				
		500	160			
		170				
		550	180			
		190				
		600	190			
		200				
		650				
		210				
		220				
		700				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 22-CW DATE 9/9/78 SURFACE ELEVATION(ft) 6895

LOCATION NE $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 20 T. 23 N. R. 80 W. Quad. Como West 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 400

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 13.0 Sandstone, light-brown, medium- to very coarse-grained		0	0			
13.0- 21.0 Sandstone, light-brown, fine- to coarse-grained						
21.0- 31.0 Sandstone, brownish-gray to red-brown, fine- to medium-grained			10			
31.0- 43.0 Sandstone, yellowish-brown, fine grained			50			
43.0- 51.5 Sandstone, brownish-gray to red-brown, fine- to coarse-grained			20			
51.5- 62.0 Shale, dark-gray, trace coal						
62.0- 65.0 Shale-clay, medium-gray						
65.0- 76.0 Siltstone, medium-gray, sandy			100			
76.0- 94.0 Siltstone, medium-gray, shaly						
94.0- 98.5 Shale, medium-gray, partly silty						
98.5-101.0 Sandstone, light-gray, fine grained			40			
101.0-111.0 Siltstone, medium-gray, sandy						
111.0-115.0 Shale, medium-gray						
115.0-117.0 Coal, black, carbonaceous shale lenses and laminations			150			
117.0-125.0 Sandstone, light-gray, fine-grained			50			
125.0-131.0 Siltstone, light-gray, sandy						
131.0-146.0 Shale, medium- to dark-gray, partly silty			60			
146.0-155.0 Siltstone, medium- to dark-gray			200			
155.0-158.0 Sandstone, medium-gray, fine-grained, silty						
158.0-162.0 Shale, medium-gray			70			
162.0-166.0 Siltstone, medium-gray						
166.0-173.0 Sandstone, light-gray, fine-grained						
173.0-184.0 Shale, medium- to dark-gray			250			

Lithology		Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
184.0-187.0	Shale, dark-gray			80			
187.0-189.0	Shale, black, thin lenses or laminations of coal						
189.0-192.0	Coal			90			
192.0-197.0	Shale and claystone. Shale is medium-gray and claystone is brownish-gray			300			
197.0-202.0	Shale, black, carbonaceous			100			
202.0-208.5	Coal, some thin lenses and laminations of shale						
208.5-211.0	Shale, dark-gray						
211.0-227.0	Siltstone, medium-gray, sandy			350			
227.0-231.0	Shale, black, thin lenses or laminations of coal						
231.0-234.0	Coal, laminations of black carbonaceous shale			120			
234.0-239.0	Shale, black, carbonaceous, coal laminations			400			
239.0-244.4	Coal, laminations or lenses of carbonaceous shale			130			
244.4-248.0	Shale, black, carbonaceous						
248.0-251.0	Shale, medium-gray, silty						
251.0-260.5	Shale, dark-gray, carbonaceous						
260.5-278.0	Sandstone, light-gray, fine-grained			450			
278.0-288.0	Siltstone, medium-gray						
288.0-300.0	Shale, medium-gray, silty						
300.0-306.0	Claystone, dark-gray to black			150			
306.0-312.7	Shale, black, carbonaceous						
312.7-319.7	Coal						
319.7-321.5	Shale, dark-gray to black, carbonaceous			500			
321.5-327.7	Coal			160			
327.7-333.8	Coal, some lenses and laminations of carbonaceous shale						
333.8-344.0	Shale, medium-gray, silty			170			
344.0-348.0	Siltstone, medium-gray, sandy						
348.0-356.5	Shale, medium-gray, silty			550			
356.5-360.0	Siltstone, medium-gray, sandy						
360.0-365.0	Sandstone, light-gray, fine-grained, silty			180			
365.0-372.0	Shale, medium-gray, silty						
372.0-378.0	Shale, medium-gray						
378.0-383.0	Shale, medium-gray, silty			800			
383.0-390.0	Shale, medium-gray			190			
390.0-396.0	Siltstone						
396.0-400.0	Sandstone, light-gray, fine-grained			200			
				650			
				210			
				220			
				700			

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 23-CW DATE 11/7/78 SURFACE ELEVATION(ft) 7060
 LOCATION SW 1/4 NW 1/4 Sec. 24 T. 23 N R. 81 W Quad. Como West 7 1/2'
 COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 717.5

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 3.0 Sandstone and siltstone, interbedded, light-brownish-gray. Sandstone is fine-grained		0	0			
3.0- 8.0 Siltstone, grayish-brown		10				
8.0- 13.0 Shale, grayish-brown						
13.0- 15.0 Siltstone, grayish-brown		50				
15.0- 20.0 Shale, medium-gray, silty						
20.0- 23.5 Siltstone, light- to medium-gray		20				
23.5- 25.5 Sandstone, light-gray						
25.5- 32.0 Siltstone, light- to medium-gray, sandy						
32.0- 36.0 Shale, black, carbonaceous		100	30			
36.0- 42.0 Coal						
42.0- 46.0 Shale, black, carbonaceous, thin coal lenses						
46.0- 51.0 Coal			40			
51.0- 53.0 Shale, black, carbonaceous						
53.0- 58.0 Coal						
58.0- 61.0 Shale, thin coal lenses or laminations		150	50			
61.0- 64.5 Coal						
64.5- 66.0 Shale, black, carbonaceous						
66.0- 69.0 Coal, laminations and lenses of black shale and claystone						
69.0- 72.0 Shale, black, carbonaceous		200				
72.0- 74.0 Coal						
74.0- 78.0 Coal and shale, interbedded. Shale is black, coal lenses and laminations			70			
78.0- 82.0 Shale, black, carbonaceous		250				

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
82.0- 88.0	Shale, black, coal lenses and laminations		80			
88.0- 96.0	Shale, medium-dark-gray and black, carbonaceous		90			
96.0-101.0	Shale, medium-gray, silty					
101.0-118.0	Siltstone and shale, interbedded, medium-gray		300			
118.0-136.5	Siltstone, medium-gray, sandy					
136.5-161.0	Sandstone, light- to medium-gray, fine-grained, silty		100			
161.0-213.0	Sandstone, light-gray, fine- to very coarse-grained; few granules and pebbles		350			
213.0-266.0	Sandstone, light-gray, fine-grained, friable					
266.0-278.0	Coal, thin carbonaceous shale lenses or laminations		120			
278.0-287.0	Shale, dark-brown to black, carbonaceous		400			
287.0-293.0	Sandstone and siltstone, light-gray. Sandstone is very fine grained.		130			
293.0-295.0	Shale, medium-gray					
295.0-302.5	Coal and carbonaceous shale, interbedded. Shale is black, coal lenses and laminations		450			
302.5-318.0	Siltstone and shale, interbedded, medium-gray, sandy		150			
318.0-322.0	Sandstone, light-gray, fine-grained					
322.0-330.0	Shale, dark-gray to black, carbonaceous		500			
330.0-336.0	Coal, shaly					
336.0-339.0	Shale, medium-gray, silty					
339.0-346.0	Sandstone, light-gray, fine-grained					
346.0-352.0	Shale, dark-gray to black, carbonaceous		170			
352.0-366.0	Shale, medium-gray silty		550			
366.0-369.0	Siltstone, medium-gray					
369.0-379.0	Siltstone, medium-gray, sandy		180			
379.0-405.0	Sandstone, light-gray, fine- to very coarse-grained, granules					
405.0-407.0	Shale, medium-gray		600			
407.0-424.0	Sandstone, light-gray, fine to very coarse-grained, granules, shaly and silty					
424.0-425.0	Shale, medium-gray		200			
425.0-525.0	Sandstone, light-gray, fine- to very coarse-grained, and granules					
525.0-550.0	Sandstone, light- to medium-gray, fine-grained silty and shaly		650			
550.0-715.0	Sandstone, light-gray, fine- to medium-grained; some very coarse grained		210			
			220			
			700			

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

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 24-E DATE 8/1/78 SURFACE ELEVATION(ft) 6535

LOCATION SE 1/4 NE 1/4 Sec. 4 T. 23 N. R. 81 W. Quad. Elmo 7 1/2'

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 318.2

CORED YES NO INTERVAL(s) 37.5-318.2

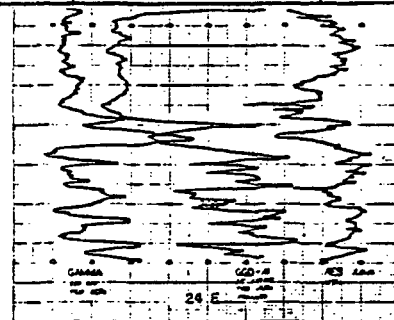
DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 17.5 Surface material: yellowish-gray sand and silt		0	0			
17.5- 26.5 Silty shale, brownish-gray						
26.5- 30.0 Sandstone, brownish-gray, fine-grained						
30.0- 32.5 Mudstone, silty with coal traces						
32.5- 37.0 Sandstone, brownish-gray, fine- to medium-grained		50				
37.0- 40.2 Mudstone, medium- to dark-gray, with interbedded carbonaceous shale, leaf and stem imprints, minor pyrite			20			
40.2- 40.7 Sandstone, light-gray, very fine-grained, carbonaceous banding		100	30			
40.7- 42.8 Sandstone, medium-gray, claystone stringers, stem and leaf imprints, carbonaceous mottling			40			
42.8- 44.0 Sandstone, light-gray, very fine-grained, silty, carbonaceous banding		150	50			
44.0- 59.0 Sandstone, light- to dark-gray, very fine- to fine-grained, carbonaceous banding, stem and leaf impressions			60			
59.0- 64.0 Mudstone, dark-gray, stem imprints		200				
64.0- 64.9 Coal, stem imprints						
64.9- 65.2 Carbonaceous shale						
65.2- 66.0 Coal			70			
66.0- 68.0 Carbonaceous shale with coal stringers						
68.0- 69.0 Carbonaceous shale		250				

Lithology		Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
69.0- 70.0	Carbonaceous shale and interbedded coal			80			
70.0- 71.8	Coal						
71.8- 74.5	Carbonaceous shale with coal stringers			90			
74.5- 78.3	Coal with thin carbonaceous shale partings			300			
78.3- 80.0	Carbonaceous shale with thin interbedded mudstone			100			
80.0- 82.5	Coal						
82.5- 83.5	Carbonaceous shale						
83.5- 87.0	Coal						
87.0- 88.5	Carbonaceous shale			350			
88.5- 91.0	Coal						
91.0- 92.0	Carbonaceous shale						
92.0- 93.0	Coal			120			
93.0- 94.3	Carbonaceous shale						
94.3- 97.0	Coal						
97.0- 99.0	Carbonaceous shale with very thin interbeds of coal			400			
99.0-103.0	Coal, boney			130			
103.0-105.0	Mudstone, dark-gray, carbonaceous banding						
105.0-112.3	Siltstone, medium-gray, very muddy, with carbonaceous clasts			450			
112.3-113.3	Carbonaceous shale						
113.3-114.5	Coal, shaly						
114.5-118.0	Carbonaceous shale			150			
118.0-120.0	Coal with thin carbonaceous shale partings						
120.7-122.0	Carbonaceous shale			500			
122.0-126.0	Coal			160			
126.5-127.0	Carbonaceous shale						
127.5-129.0	Coal						
129.0-130.5	Carbonaceous shale			170			
130.5-135.5	Coal, with minor carbonaceous shale partings			550			
135.5-137.5	Mudstone, light- and medium-gray banded, carbonaceous clasts			180			
137.5-143.0	Sandstone, light-gray, very fine-grained, mineralization along fracture						
143.0-144.0	Shale, dark-gray			600			
144.0-150.5	Sandstone, light-gray, very fine-grained, laminated with carbonaceous material						
150.5-157.0	Mudstone, very silty, minor carbonaceous shale bands			200			
157.0-159.0	Mudstone, dark-gray			650			
159.0-169.0	Sandstone, light- to medium-gray, very fine-grained			210			
169.0-170.1	Mudstone and siltstone, medium-gray, carbonaceous						
170.1-183.0	Sandstone, light- to medium-gray, very fine- to fine-grained			220			
				700			



Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
183.0-184.5	Siltstone, medium-gray					
184.5-189.2	Sandstone, light- to medium-gray, very fine- to fine-grained					
189.2-192.3	Siltstone, medium-gray					
192.3-200.0	Carbonaceous shale with coal stringers					
200.0-202.0	Coal, with minor carbonaceous shale partings					
202.0-204.0	Carbonaceous shale					
204.0-205.0	Interbedded coal and carbonaceous shale					
205.0-208.0	Carbonaceous shale with coal stringers					
208.0-211.0	Coal					
211.0-212.5	Carbonaceous shale, coaly					
212.5-214.0	Coal, shaly					
214.0-221.0	Shale with coal stringers					
211.0-226.0	Coal, transitional to shaly coal at base					
226.0-233.0	Carbonaceous shale with interbedded coal lenses and stringers					
233.0-234.0	Shaly coal					
234.0-237.0	Carbonaceous shale and coal					
237.0-242.5	Carbonaceous shale					
242.5-246.8	Coal, shaly					
246.8-247.6	Carbonaceous shale, coaly					
247.6-251.5	Coal, partly shaly					
251.5-268.0	Interbedded fine-grained sandstone and siltstone with carbonaceous banding					
268.0-272.0	Mudstone, dark-gray with carbonaceous banding					
272.0-273.5	Interbedded coal and carbonaceous shale					
273.5-278.0	Sandstone, light-gray, very fine- grained					
278.0-279.3	Coal, shaly					
279.3-281.5	Shale, dark-gray					
281.5-286.0	Shale, black, carbonaceous and thin coal lenses					
286.0-290.6	Coal, carbonaceous shale laminations					
290.6-295.0	Carbonaceous shale and shaly coal					
295.0-296.0	Coal					
296.0-301.0	Shale, with thin coal interbeds					
301.0-304.0	Coal					
304.0-305.3	Shale, coaly					
305.3-310.0	Coal, partly shaly					
310.0-312.0	Carbonaceous shale					
312.0-315.0	Coal shaly					
315.0-318.2	Carbonaceous shale and coal interbeds					

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 25-E-C DATE 8/18/78 SURFACE ELEVATION(ft) 6580

LOCATION SW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 4 T. 23 N. R. 81 W. Quad. Elmo 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 232.4

CORED YES NO INTERVAL(s) 46.4-232.4

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 49.0 Alluvium and weathered material		0	0			
49.0-101.0 Shale, dark-gray, and carbonaceous shale, dull dark-gray to black, with thin interbeds of mudstone and siltstone		10				
101.0-101.5 Carbonaceous shale with vitrinite banding		50				
101.5-102.5 Shale, dark-gray		20				
102.5-105.0 Coal and bone coal		30				
105.0-106.0 Carbonaceous shale with vitrinite bands		40				
106.0-108.5 Coal and bone coal		100				
108.5-110.0 Carbonaceous shale		150				
110.0-115.0 Coal, thin interbeds of bone coal		50				
115.0-119.0 Mudstone, light gray		60				
119.0-142.0 Sandstone, light-gray, fine- to medium-grained, very porous, fractured in places, many carbonaceous clasts basal		70				
142.0-150.0 Coal, very bright black, conchoidal fracture, moist, with thin bone coal partings, less than 0.5 ft thick		80				
150.0-154.0 Carbonaceous shale and bone coal with vitrinite banding		200				
154.0-160.0 Coal, bright to dull black with thin carbonaceous shale interbeds		250				
160.0-165.0 Coal, bright to dull black, very hard, pyritic						

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
165.0-176.0 Sandstone, light-gray, very fine-grained, laminated, carbonaceous clasts common; with some thin mudstone interbeds						
176.0-181.0 Alternating carbonaceous shale, mudstone, and core lenses and stringers						
181.0-189.5 Coal, bright to dull black, moist, concoidal fracture, pyritic						
189.5-217.0 Alternating carbonaceous shale, shale, mudstone, and then lenses and stringers of coal						
217.0-232.0 Interbedded sandstone, very fine- to fine- grained, and siltstone. Convolute laminations and carbonaceous material common.						

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 25-E-B DATE 8/28/78 SURFACE ELEVATION(ft) 6600
 LOCATION SW $\frac{1}{2}$ SE $\frac{1}{2}$ Sec. 4 T. 23 N. R. 81 W. Quad. Elmo 7 $\frac{1}{2}$ '
 COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 710

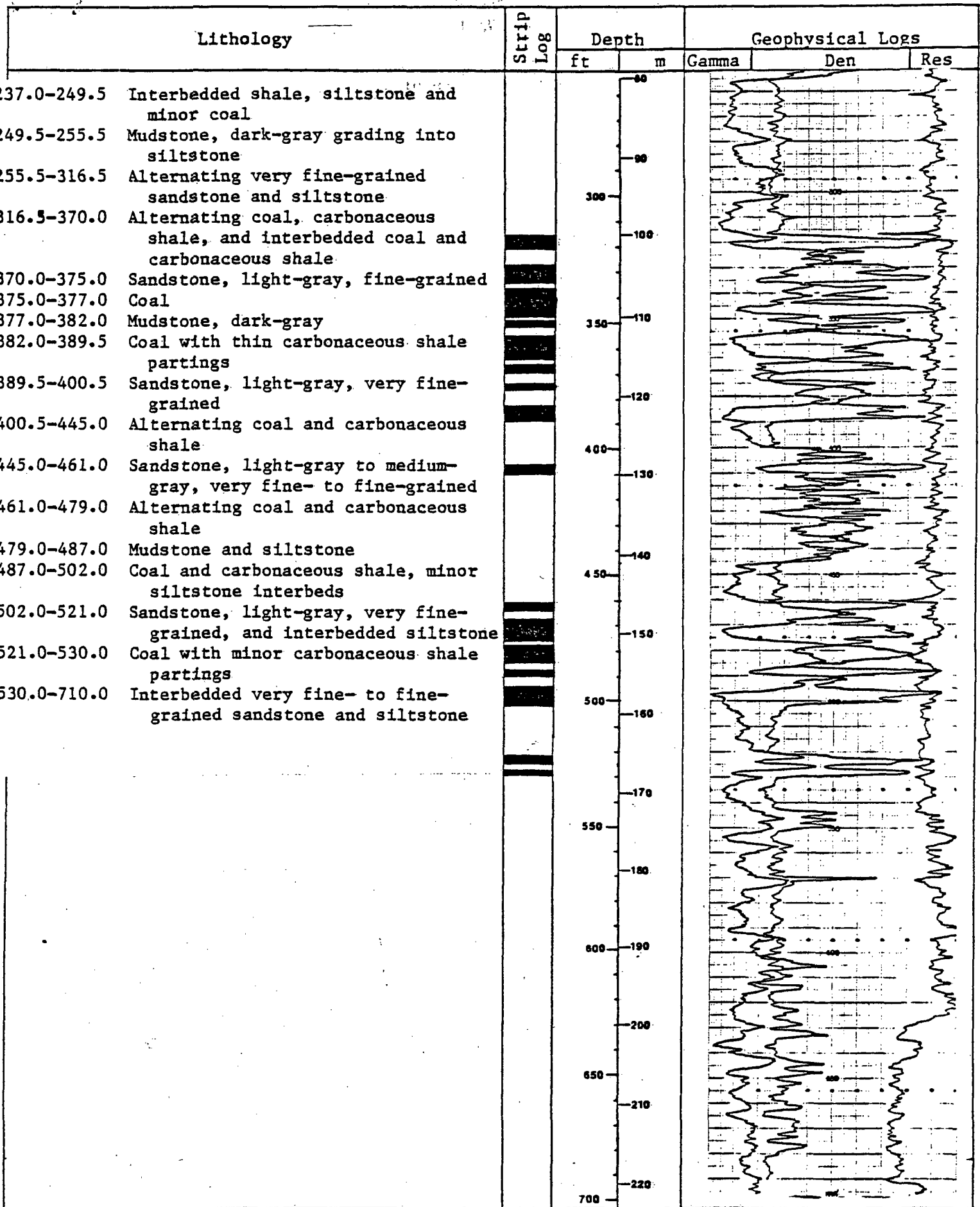
CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale <u>10 f/in</u>		Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale <u>10 f/in</u>		Logging Speed	<u>10</u>	fpm
Resistivity	;	Scale <u>10 f/in</u>		Logging Speed	<u>15</u>	fpm
Caliper	;	Scale <u>10 f/in</u>		Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 35.0 Alluvium and weathered material		0	0			
35.0- 38.0 Shale; light-gray with coal traces						
38.0- 51.0 Coal and interbedded carbonaceous shale						
51.0- 73.0 Sandstone, light-gray, very fine-grained		50				
73.0- 80.0 Siltstone grading into shale						
80.0- 89.0 Coal with minor carb-shale partings		20				
89.0- 91.5 Carbonaceous shale parting						
91.5- 92.5 Coal						
92.5- 97.5 Siltstone, light-gray						
97.5-100.5 Carbonaceous shale						
100.5-111.5 Siltstone, light-gray, grading into mudstone, dark gray		100	30			
111.5-114.5 Carbonaceous shale						
114.5-137.0 Interbedded shale and dark-gray mudstone grading into light gray siltstone		40				
137.0-148.0 Sandstone, light- to dark-gray, fine-grained, laminated		50				
148.0-183.0 Interbedded coal and carbonaceous shale, dull black						
183.0-199.0 Interbedded dark-gray mudstone, shale, and carbonaceous shale		60				
199.0-207.0 Coal, with minor carbonaceous shale partings		200				
207.0-221.5 Interbedded shale, carbonaceous shale, and coal		70				
221.5-237.0 Coal with small carbonaceous shale partings		250				



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

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 26-E DATE 9/1/78 SURFACE ELEVATION(ft) 7020

LOCATION SW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 20 T. 23 N. R. 81 W. Quad. Elmo 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 717.5

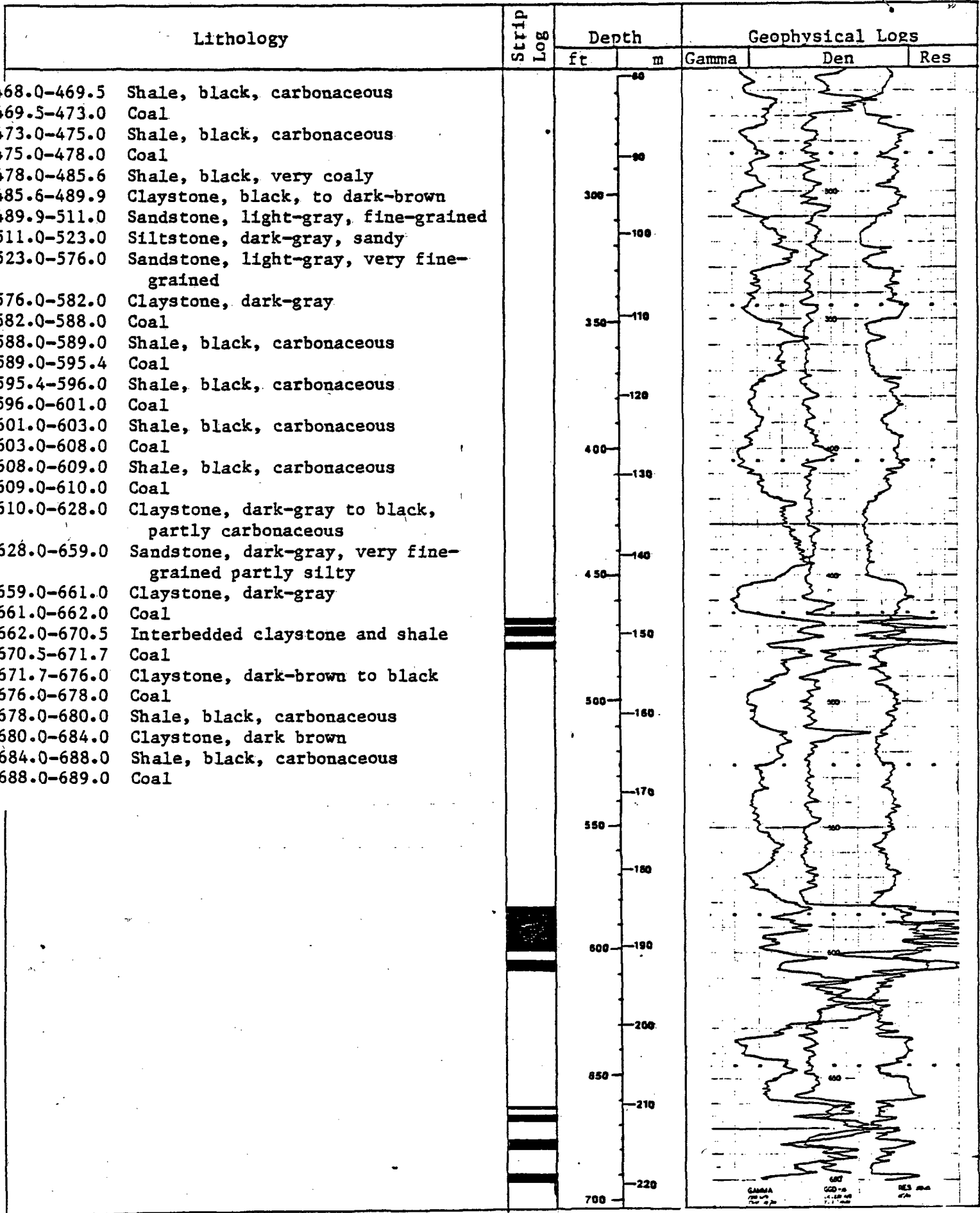
CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale <u>10 f/in</u>	Logging Speed <u>15</u>	fpm
Gamma Gamma	;	Scale <u>10 f/in</u>	Logging Speed <u>10</u>	fpm
Resistivity	;	Scale <u>10 f/in</u>	Logging Speed <u>15</u>	fpm
Caliper	;	Scale <u>10 f/in</u>	Logging Speed <u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 4.0 Surface material		0	0			
4.0- 9.0 Shale, light-brown						
9.0- 14.5 Sandstone, light-yellow, fine-grained						
14.5- 19.2 Siltstone, medium-gray			10			
19.2- 33.0 Sandstone, light-yellow-gray, fine-grained			50			
33.0- 75.0 Shale, medium- to dark-gray, partly carbonaceous with coal traces			20			
75.0- 85.0 Sandstone, light-yellow, fine-grained						
85.0- 99.0 Siltstone, olive-gray, with interbedded medium-gray shale			100			
99.0-254.0 Sandstone, light-gray to tan, fine-grained with coarse-grained lenses, partly silty			40			
254.0-310.0 Interbedded siltstone and claystone						
310.0-330.0 Claystone, dark-brown to black						
330.0-350.0 Sandstone, dark-gray, very fine-grained			150			
350.0-372.0 Claystone, dark-brown			50			
372.0-378.0 Sandstone, dark-gray, very fine-grained						
387.0-395.0 Claystone, dark-brown to black						
395.0-408.0 Sandstone, medium-gray, fine-grained			200			
408.0-453.0 Claystone, dark-brown to black, slightly silty						
453.0-459.9 Sandstone, light-gray, fine-grained			70			
459.9-465.0 Claystone, black						
465.0-467.3 Shale, black, carbonaceous						
467.3-468.0 Coal			250			



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 27-E DATE 9/10/78 SURFACE ELEVATION(ft) 7205

LOCATION NW $\frac{1}{2}$ SE $\frac{1}{2}$ Sec. 30 T. 23 N. R. 81 W. Quad. Elmo 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 758.5

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma*	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma*	;	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity**	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper**	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

*Logged through drill rod to 755 ft.

**Logged from 0-59 ft.

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 32.0 Sandstone, light-yellowish-gray to light-gray, fine- to medium-grained		0	0			
32.0- 43.0 Shale, brown-gray, carbonaceous		10	3			
43.0- 49.0 Coal		50	15			
49.0- 57.2 Shale, medium-gray, silty and sandy		20	6			
57.2- 75.0 Siltstone, medium-gray, sandy		30	9			
75.0-123.0 Sandstone, light-gray, fine-grained		40	12			
123.0-129.0 Siltstone, medium-gray		50	15			
129.0-131.0 Sandstone, light-gray, fine-grained, silty		60	18			
131.0-154.0 Siltstone, light- to medium-gray, very sandy		70	21			
154.0-158.0 Sandstone, light-gray, fine-grained, silty		80	24			
158.0-167.0 Siltstone, light- to medium-gray, sandy		90	27			
167.0-175.0 Sandstone, light-gray, very fine grained, silty		100	30			
175.0-179.0 Siltstone, medium-gray, sandy		110	33			
179.0-185.0 Sandstone, light-gray, fine-grained		120	36			
185.0-202.0 Siltstone, medium-gray, sandy		130	39			
202.0-218.0 Sandstone, light-gray, very fine grained. Grades downward into siltstone	140	42				
218.0-247.0 Siltstone, medium- to medium dark-gray, sandy and shaly	150	45				
247.0-250.0 Sandstone, light-gray, very fine-grained, silty	160	48				
	170	51				
	180	54				
	190	57				
	200	60				
	210	63				
	220	66				
	230	69				
	240	72				
	250	75				

	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
250.0-259.0	Shale, medium-dark-gray, partly silty, slightly carbonaceous			90			
259.0-274.5	Sandstone, light-gray, very fine- to fine-grained, silty			90			
274.5-283.0	Shale, medium-dark-gray, silty, carbonaceous			300			
283.0-301.0	Sandstone, light-gray, medium-grained, grades downward into fine-grained sandstone and into siltstone			100			
301.0-342.0	Siltstone, medium-dark-gray and olive-gray, shaly			350			
342.0-346.0	Shale, dark-gray, carbonaceous			110			
346.0-349.0	Coal, very shaly						
349.0-351.0	Shale, dark-gray, carbonaceous						
351.0-353.0	Coal, very shaly			120			
353.0-356.3	Shale, black, coaly						
356.3-359.3	Siltstone, medium-gray			400			
359.3-362.5	Shale, dark-gray						
362.5-365.0	Coal, shaly			130			
365.0-366.0	Shale, black, carbonaceous						
366.0-368.0	Siltstone, medium-gray						
368.0-370.0	Shale, black, carbonaceous						
370.0-372.0	Coal			450			
372.0-373.5	Shale, black, carbonaceous						
373.5-378.0	Coal						
378.0-383.0	Shale, dark-gray, carbonaceous			150			
383.0-390.5	Sandstone, light-gray, very fine-grained, silty						
390.5-403.0	Siltstone, medium-gray, sandy			500			
403.0-422.0	Sandstone and siltstone, interbedded, medium-gray			160			
422.0-432.0	Sandstone, medium-gray, very fine-grained, silty						
432.0-442.5	Shale, medium-dark-gray			170			
442.5-463.0	Sandstone, light-gray, fine-grained			550			
463.0-470.0	Shale, dark-gray, carbonaceous						
470.0-472.0	Coal, very shaly						
472.0-475.3	Shale, black, coaly			180			
475.3-478.3	Coal, shaly						
478.3-495.0	Shale, dark-gray, carbonaceous, partly coaly			600			
495.0-499.5	Coal, shaly			190			
499.5-503.0	Shale, black, carbonaceous						
503.0-510.0	Coal						
510.0-511.0	Shale, dark-gray			200			
511.0-520.0	Sandstone, light-gray, fine-grained, coal clasts			650			
520.0-537.0	Siltstone, medium-gray, shaly			210			
537.0-552.0	Sandstone, light-gray, medium- to coarse-grained, very silty and shaly						
552.0-565.0	Shale, medium-dark-gray, partly carbonaceous			220			
565.0-568.5	Siltstone, medium-gray			700			

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
568.5-571.0 Shale, medium-dark-gray						
571.0-589.0 Siltstone, medium-gray						
589.0-595.0 Siltstone, medium-gray, sandy						
595.0-599.0 Shale, black, carbonaceous						
599.0-610.0 Coal, shaly						
610.0-628.0 Siltstone, medium-gray, sandy						
628.0-692.0 Claystone and siltstone, interbedded, medium- to dark-gray						
692.0-704.0 Sandstone, light-gray, fine-grained						
704.0-711.0 Shale, dark-gray						
711.0-717.0 Sandstone, light-gray, fine-grained						
717.0-734.0 Claystone, dark-gray						
734.0-740.4 Sandstone, light-gray,, fine-grained						
740.4-750.0 Claystone, medium-gray, silty						
750.0-758.0 Sandstone, light-gray, fine-grained, silty						

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 28-E DATE 10-21-78 SURFACE ELEVATION(ft) 7205

LOCATION NW $\frac{1}{2}$ NE $\frac{1}{2}$ Sec. 8 T. 22 N. R. 81 W. Quad. Elmo 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 102.3

CORED YES NO INTERVAL(s) 11-102.3

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 9.0 Surface material		0	0			
9.0- 14.0 Sandstone, tan to brown, fine-grained						
14.0- 14.5 Mudstone, light- to medium-gray						
14.5- 16.0 Coal						
16.0- 19.0 Interbedded carbonaceous shale and dark-gray mudstone		50				
19.0- 25.5 Coal, bright black with thin interbeds of carbonaceous shale, dull black						
25.5- 33.5 Interbedded carbonaceous shale, coal, and mudstone						
33.5- 41.0 Mudstone and shale, gray		100	30			
41.0- 46.0 Sandstone, light-gray to light-greenish-gray, very fine- to fine-grained, with shale inclusions						
46.0- 73.0 Thin, alternating carbonaceous shales, gray mudstones and very thin coal beds		150	50			
73.0-102.0 Interbedded sandstone and siltstone. Sandstone is light-gray, fine- to medium-grained and convoluted.						
		200				
		70				
		250				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 29-E DATE 10/25/78 SURFACE ELEVATION(ft) 7070

LOCATION NE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 8 T. 22 N. R. 81 W. Quad. Elmo 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 200

CORED YES NO INTERVAL(s) 11-200

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 11.0 Surface material		0	0			
11.0- 14.0 Carbonaceous shale						
14.0- 16.0 Coal, bright black						
16.0- 26.0 Carbonaceous shale with thin bands of coal		10				
26.0- 30.0 Coal with thin carbonaceous shale partings		50				
30.0- 37.0 Interbedded carbonaceous shale and mudstone		20				
37.0- 53.0 Sandstone and siltstone, sandstone is light-gray, very fine-grained, siltstone is medium-gray		100	30			
53.0- 54.0 Claystone						
54.0- 55.0 Coal						
55.0- 75.0 Interbedded sandstone and siltstone. Sandstone is light-gray, fine-grained and contains carbonaceous material. Siltstone is medium-gray with thin interbeds of dark-gray shale		40				
75.0- 85.0 Coal, mostly bright black, pyritic, with thin carbonaceous shale partings (less than 0.5 ft thick)		150	50			
85.0- 89.0 Mudstone, dark-gray, and shale						
89.0- 92.0 Siltstone and sandstone, as above		60				
92.0- 94.0 Coal		200				
94.0-101.0 Shale, medium-gray, with thin siltstone interbeds		70				
		250				

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
101.0-115.0 Sandstone, light-gray, very fine-grained, with interbedded siltstone, dark-gray						
115.0-125.0 Carbonaceous shale						
125.0-140.0 Interbedded mudstone and siltstone, cross-laminated, with carbonaceous stringers						
140.0-165.0 Sandstone, light-gray, fine-grained, cross-laminated						
165.0-177.0 Interbedded sandstone and siltstone, sandstone is light- to medium-gray, very fine- to fine-grained						
177.0-181.0 Coal, dull black with vitrinite banding						
181.0-183.0 Carbonaceous shale with coal stringers						
183.0-185.0 Coal, bright black						
185.0-200.0 Alternating gray siltstone and dark gray mudstone						

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 30-E DATE 9/12/78 SURFACE ELEVATION(ft) 7135

LOCATION NW¹/₄NW¹/₄ Sec. 8 T. 22 N. R. 81 W. Quad. Elmo 7¹/₂'

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 722

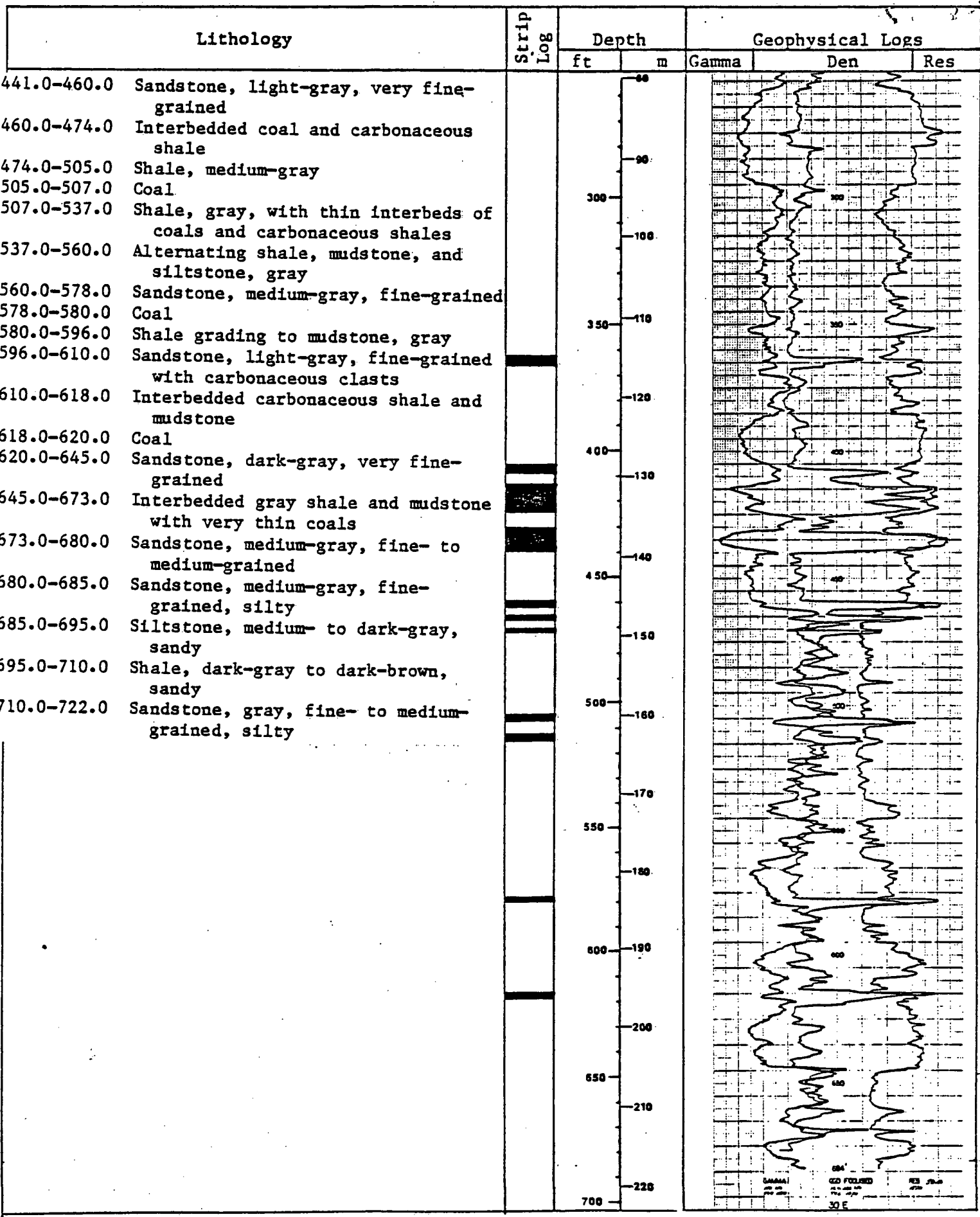
CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>10 f/in</u>	Logging Speed		fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 5.0 Surface material		0	0			
5.0- 71.0 Sandstone, light-gray to tan, fine- to medium-grained, commonly cross-bedded, with coal clasts						
71.0- 76.0 Claystone, light-gray			10			
76.0- 95.0 Siltstone, light- to medium-gray						
95.0-240.0 Alternating sandstone and siltstone. Sandstone is light- to medium-gray, very fine- to fine-grained		50				
240.0-249.0 Carbonaceous shale, dark-gray						
249.0-259.0 Carbonaceous shale and mudstone						
259.0-296.0 Sandstone, light-gray, very fine-grained		100	30			
296.0-317.0 Shale, sandy, medium- to light-gray						
317.0-363.0 Alternating sandstone and siltstone; sandstone is light-gray, very fine- to fine-grained, commonly cross-bedded			40			
363.0-365.0 Coal and carbonaceous shale		150	50			
365.0-405.0 Sandstone and interbedded siltstone, as above						
405.0-407.0 Carbonaceous shale						
407.0-410.0 Coal						
410.0-413.0 Carbonaceous shale, coaly		200				
413.0-420.0 Coal						
420.0-422.0 Carbonaceous shale						
422.0-425.0 Coal			70			
425.0-432.0 Carbonaceous shale						
432.0-440.0 Coal						
440.0-441.0 Carbonaceous shale		250				



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 31-E DATE 8/25/78 SURFACE ELEVATION(ft) 7170
 LOCATION SE $\frac{1}{2}$ NE $\frac{1}{2}$ Sec. 24 T. 23 N. R. 81 W. Quad. Elmo 7 $\frac{1}{2}$ '
 COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 340

CORED YES NO INTERVAL(s) _____

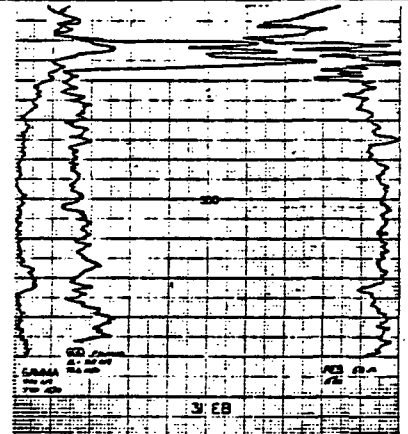
DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>10 f/in</u>	Logging Speed		fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 7.0 Surface material		0	0			
7.0- 13.0 Shale, dark-gray, carbonaceous, weathered						
13.0- 19.5 Coal, shaly						
19.5- 25.0 Shale, carbonaceous		10				
25.0- 28.5 Shale, dark-gray, silty						
28.5- 57.0 Sandstone, light-gray, fine-grained, partly silty		50				
57.0- 70.0 Shale, dark-gray to black, partly carbonaceous and partly interbedded with very thin coals		20				
70.0- 71.0 Coal						
71.0- 71.7 Shale, black, carbonaceous		100	30			
71.7- 73.0 Coal						
73.0- 74.0 Shale, black, carbonaceous						
74.0- 75.0 Coal		40				
75.0- 77.4 Shale, black, carbonaceous						
77.4- 79.5 Coal, shaly						
79.5- 89.0 Shale, black, carbonaceous		150	50			
89.0- 90.3 Coal						
90.3- 94.5 Shale, black, coaly						
94.5- 99.3 Coal, shaly						
99.3-102.0 Shale, dark-gray						
102.0-110.0 Siltstone, medium-gray, sandy		60				
110.0-118.5 Sandstone, light-gray, very fine-grained		200				
118.5-124.0 Shale, dark-gray to black						
124.0-128.0 Sandstone, light-gray, very fine-grained		70				
128.0-132.0 Shale, dark-gray		250				

Lithology		Strip Log	Depth		Geophysical Logs			
			ft	m	Gamma	Den	Res	
132.0-143.0	Sandstone, light-gray, fine-grained with very coarse-grained lenses							
143.0-153.0	Mudstone, dark-gray							
153.0-176.0	Sandstone, light-gray, very coarse-grained							
176.0-177.0	Shale, dark-gray							
177.0-179.0	Coal							
179.0-181.0	Shale, black, carbonaceous							
181.0-181.5	Coal							
181.5-184.0	Shale, black, carbonaceous							
184.0-185.5	Coal							
185.5-189.0	Shale, black, coaly							
189.0-191.0	Coal							
191.0-196.0	Shale, dark-olive-gray							
196.0-204.7	Sandstone, light-gray, very coarse-grained							
204.7-220.2	Interbedded dark-gray mudstone and medium-gray siltstone							
202.2-221.8	Shale, dark-gray							
221.8-223.0	Coal							
223.0-224.0	Shale, black, carbonaceous							
224.0-225.8	Coal, shaly							
225.8-229.0	Shale, black, carbonaceous							
229.0-231.0	Coal							
231.0-233.3	Shale, black, carbonaceous							
233.0-237.0	Coal							
237.0-239.0	Shale, black, coaly							
239.0-241.4	Coal							
241.4-246.0	Shale, black, coaly							
246.0-255.0	Sandstone, light-gray, very fine-grained							
255.0-257.0	Siltstone, medium-gray							
257.0-260.0	Sandstone, light-gray, very fine-grained							
260.0-266.0	Shale, dark-gray to black							
266.0-340.0	Sandstone, light-gray, fine- to medium-grained with thin interbeds of dark-gray mudstone							



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 32-E DATE 8-9-78 SURFACE ELEVATION(ft) 7175

LOCATION SW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 24 T. 23 N. R. 82 W. Quad. Elmo 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 410

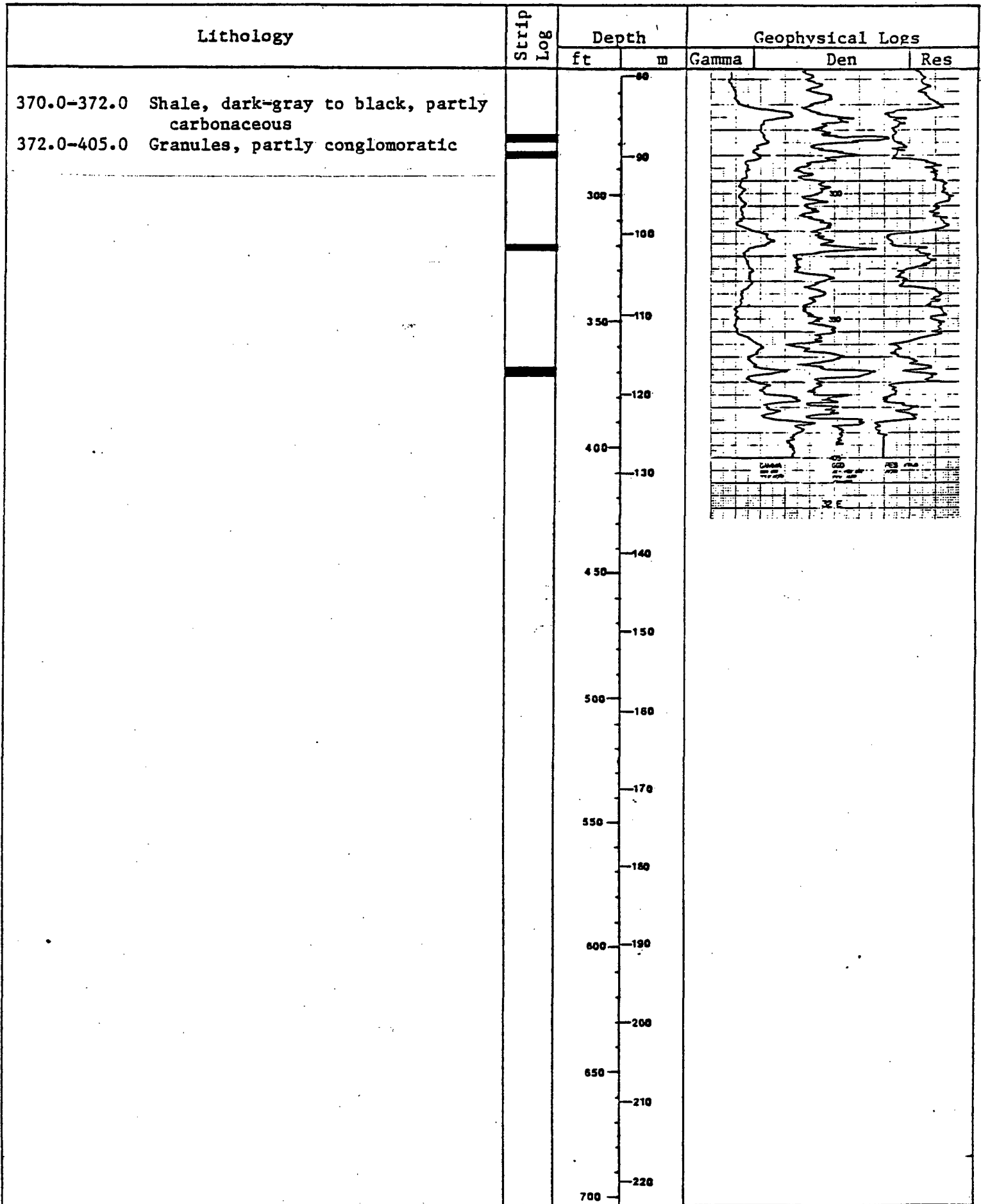
CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 5.0 Surface material		0	0			
5.0- 12.5 Shale, black, carbonaceous, with very thin, weathered, coal interbeds						
12.5- 32.0 Sandstone, tan, fine-grained						
32.0- 80.0 Shale, medium- to dark-gray with interbedded carbonaceous shale and very thin coals		50				
80.0- 88.0 Sandstone, light-gray, fine-grained						
88.0- 93.0 Siltstone, medium-gray						
93.0-189.0 Sandstone, light-gray, very fine- to coarse-grained						
189.0-205.0 Shale, dark-gray		100				
205.0-267.0 Sandstone, light-gray, fine- to medium-grained with coarse-grained to granular lenses						
267.0-278.5 Shale, medium- to dark-gray with thin interbeds of coal		40				
278.5-279.8 Coal		150				
279.8-284.5 Shale, black, carbonaceous						
284.5-285.7 Coal						
285.7-287.0 Shale, dark-gray						
287.0-315.0 Sandstone, light-gray, fine-grained partly silty						
315.0-321.0 Shale, medium- to dark-gray		200				
321.0-359.0 Sandstone, light-gray, fine-grained						
359.0-364.0 Shale, dark-gray						
364.0-370.0 Sandstone, light-gray, fine-grained, silty		70				
		250				



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 33-E DATE 8/26/78 SURFACE ELEVATION(ft) 7225

LOCATION NE 1/4 SW 1/4 Sec. 24 T. 23 N. R. 82 W. Quad. Elmo 7 1/2'

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 500

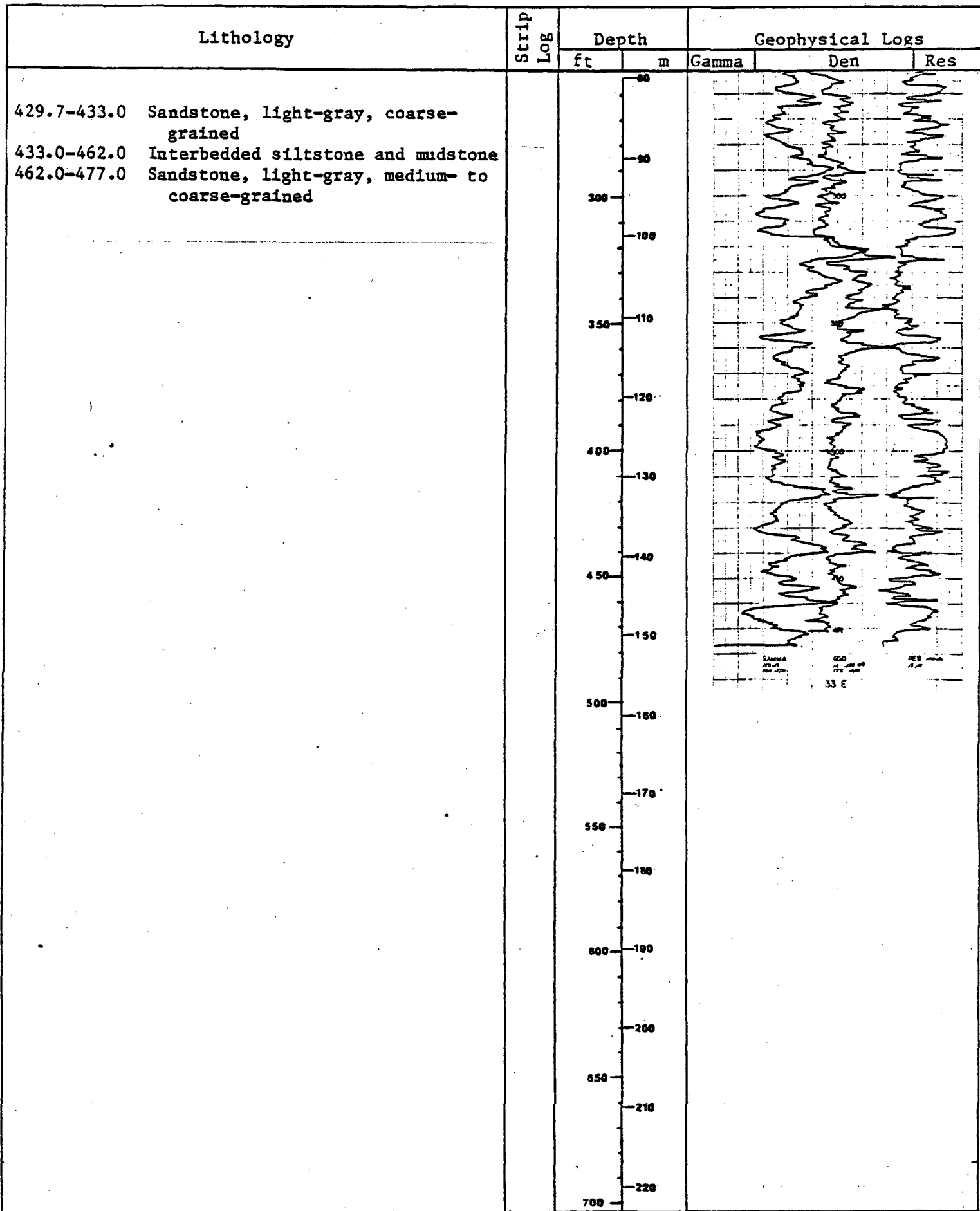
CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 8.0 Surface material		0	0			
8.0- 44.0 Sandstone, light-brown, fine- to medium-grained						
44.0- 66.0 Shale, dull-dark-brown, carbonaceous, weathered			10			
66.0- 84.0 Shale, dark-brown to black, very coaly			50			
84.0- 93.0 Sandstone, light-gray, fine-grained						
93.0- 97.5 Siltstone, medium-gray			20			
97.5-118.0 Shale, dark-gray						
118.0-152.0 Sandstone, light- to medium-gray, very fine-grained						
152.0-153.0 Coal			100			
153.0-156.2 Shale, black, coaly						
156.2-160.0 Coal, with very thin carbonaceous shale partings			40			
160.0-165.0 Shale, dark-gray to black, partly carbonaceous						
165.0-173.0 Sandstone, light-gray, very fine grained			150			
173.0-179.4 Siltstone, medium-gray			50			
179.4-310.0 Interbedded sandstone and siltstone; sandstone is light-gray, fine- to coarse-grained. Siltstone is medium-gray						
310.0-392.0 Shale, medium- to dark-gray, partly carbonaceous			200			
392.0-401.0 Sandstone, light-gray, medium- to coarse-grained			70			
401.0-418.0 Interbedded siltstone and mudstone						
418.0-429.7 Shale, medium- to dark-gray			250			



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 34-E DATE 8/12/78 SURFACE ELEVATION(ft) 7005

LOCATION NE $\frac{1}{2}$ SE $\frac{1}{2}$ Sec. 14 T. 23 N. R. 82 W. Quad. Elmo 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 450

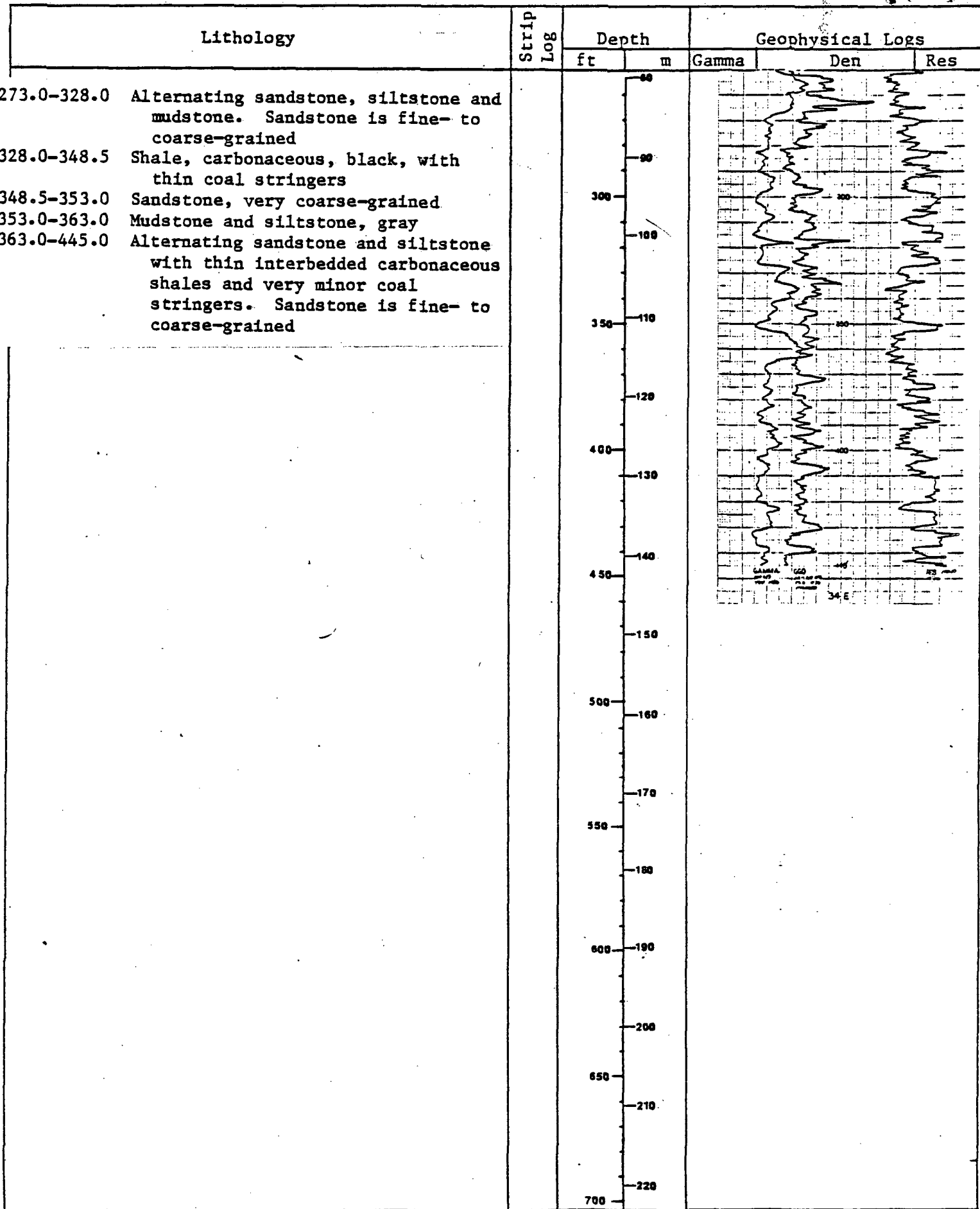
CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip LOB	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 20.0 Shale, dark-brown, carbonaceous, weathered		0	0			
20.0- 25.0 Coal, dull black, slightly bony						
25.0- 40.0 Shale, carbonaceous, black with vitrinite banding		10				
40.0- 45.0 Coal and shale, carbonaceous, black						
45.0- 60.0 Mudstone, dark-gray, grading into siltstone		50				
60.0- 67.5 Siltstone, light-gray		20				
67.5- 73.0 Carbonaceous shale, dark-gray						
73.0- 86.5 Mudstone grading into siltstone						
86.5- 97.5 Sandstone, coarse- to very coarse-grained		100	30			
97.5-103.0 Siltstone, light-gray						
103.0-134.5 Sandstone, coarse-grained to granular sub-angular		40				
134.5-138.0 Shale, dull dark-brown, carbonaceous						
138.0-143.0 Sandstone, light-gray, fine grained						
143.0-150.0 Shale, carbonaceous, black, with traces of coal		150	50			
150.0-174.0 Sandstone, light-gray, fine- to coarse-grained						
174.0-200.5 Interbedded shale and siltstone with thin beds of carbonaceous shale		60				
200.5-252.0 Alternating fine-grained sandstone and siltstone with thin interbeds of dark-gray mudstone		200				
252.0-273.0 Shale, carbonaceous, black, with thin coal beds (<0.5 ft thick) grading into dark-gray shale		70				
		250				



LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 35-E DATE 8/17/78 SURFACE ELEVATION(ft) 6830

LOCATION NW¹/₄NE¹/₄ Sec. 14 T. 23 N. R. 82 W. Quad. Elmo 7¹/₂'

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 500

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>10 f/in</u>		Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale	<u>10 f/in</u>		Logging Speed	<u>10</u>	fpm
Resistivity	;	Scale	<u>10 f/in</u>		Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>10 f/in</u>		Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 3.0 Sandstone, light-brown, coarse-grained		0	0			
3.0- 17.0 Sandstone, pale-brown to light-gray, very fine grained						
17.0- 23.0 Sandstone, yellowish-gray, fine-grained, silty		10				
23.0- 33.0 Sandstone, yellow-gray, to light-brown, very coarse-grained		50				
33.0- 37.0 Sandstone, light-brown, fine- to medium-grained		20				
37.0- 47.0 Sandstone, yellowish-brown, very coarse-grained and granular						
47.0- 52.0 Siltstone, medium-gray, sandy, some carbonaceous material		100	30			
52.0- 69.0 Sandstone, medium-gray, fine-grained, silty						
69.0- 80.0 Sandstone, light- to medium-gray, fine- to coarse-grained		40				
80.0- 93.0 Sandstone, medium-gray, fine-grained, silty		150	50			
93.0-101.0 Siltstone, medium-gray, very sandy						
101.0-112.0 Sandstone, light-medium-gray, coarse-grained		50				
112.0-126.0 Siltstone, dark-gray, shaly, and very sandy		200	60			
126.0-150.0 Sandstone, light-gray, very coarse-grained upper part silty and shaly						
150.0-179.0 Sandstone, light-gray, fine-grained, very silty		70				
		250				

	Lithology	Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
179.0-270.0	Sandstone, light-gray, very coarse-grained, silty and shaly			80			
270.0-274.0	Shale, medium-gray						
274.0-312.0	Sandstone, light-gray, very coarse-grained			90			
312.0-326.0	Shale, dark-gray, carbonaceous			300			
326.0-331.0	Sandstone, light-gray, coarse-grained			100			
331.0-340.5	Shale, dark-gray, carbonaceous						
340.5-344.0	Sandstone, light-gray, coarse-grained						
344.0-351.0	Siltstone, medium-gray, shaly			350			
351.0-353.0	Sandstone, medium-gray, fine-grained, silty						
353.0-359.5	Shale, dark-gray, carbonaceous						
359.5-371.5	Sandstone, light-gray, coarse-grained			120			
371.5-388.0	Shale, dark-gray, carbonaceous, a number of coal stringers			400			
388.0-401.0	Sandstone, medium-gray, fine-grained			130			
401.0-421.0	Sandstone, medium- to olive-gray, very fine grained, silty						
421.0-425.0	Shale, dark-gray, coaly stringers						
425.0-431.0	Sandstone, light-gray, fine-grained, silty			450			
431.0-449.0	Shaly, dark-gray, carbonaceous, very thin coal bands			150			
449.0-451.0	Coal, shaly						
451.0-452.0	Shale, black, coaly						
452.0-453.0	Coal, shaly			500			
453.0-454.2	Shale, dark-gray			160			
454.2-456.0	Coal, shaly						
456.0-464.0	Shale, dark-gray, carbonaceous						
464.0-466.0	Coal						
466.0-467.0	Shale, black, coaly			170			
467.0-469.0	Coal			550			
469.0-482.0	Shale, dark-gray, carbonaceous, silty			180			
482.0-487.0	Sandstone, medium-gray, fine-grained						
487.0-494.0	Siltstone, medium-gray to dark olive-gray, sandy and shaly						
494.0-500.0	Sandstone, medium-gray, fine-grained			600			
				200			
				650			
				210			
				220			
				700			

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 36-E DATE 8/15/78 SURFACE ELEVATION(ft) 6770

LOCATION NE $\frac{1}{2}$ SE $\frac{1}{2}$ Sec. 10 T. 23 N. R. 82 W. Quad. Elmo 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 300

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale	<u>10 f/in</u>	Logging Speed	<u>10</u>	fpm
Resistivity	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 6.0 Sandstone, light-brown, coarse grained to granular		0	0			
6.0-100.0 Interbedded siltstone and sandstone. Siltstone is medium gray. Sandstone is light gray, very fine grained with granules		10				
100.0-110.0 Sandstone, light-gray, very coarse-grained		50				
110.0-150.0 Interbedded sandstone and siltstone, as above		20				
150.0-195.0 Sandstone, light-gray, coarse-grained to granular with carbonaceous clasts		100	30			
195.0-248.0 Interbedded sandstone and siltstone, as above		40				
248.0-259.0 Sandstone, light-gray, very coarse-grained		150	50			
259.0-300.0 Siltstone, medium-gray, shaly		50				
		200	60			
	70					
	250					

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
		88				
		90				
		300				
		100				
		350				
		110				
		120				
		400				
		130				
		450				
		140				
		500				
		150				
		550				
		160				
		600				
		170				
		650				
		180				
		700				
		190				
		200				
		210				
		220				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 37-CW DATE 10/24/78 SURFACE ELEVATION(ft) 6885

LOCATION NW $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 6 T. 23 N. R. 80 W. Quad. Como West 7 $\frac{1}{2}$ '

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 307

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	:	Scale	<u>10 f/in</u>	Logging Speed	<u>15</u>	fpm

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
0.0- 13.0 Sandstone and gravel, yellow-brown and yellow-orange		0	0			
13.0- 17.2 Claystone, light-olive-gray						
17.2- 39.2 Shale, dark-brown, carbonaceous						
39.2- 53.0 Siltstone, light-brown-gray and medium-gray, sandy		10				
53.0- 70.0 Shale, medium- to medium dark-gray, silty, fossiliferous		50				
70.0- 78.0 Shale-clay, medium- to medium-dark-gray, fossiliferous		20				
78.0- 84.0 Sandstone, gray-orange to light-gray, fine-grained						
84.0-101.0 Siltstone, light-gray, sandy		100	30			
101.0-127.0 Shale, dark-brown-gray, carbonaceous						
127.0-131.0 Shale, medium-gray, slightly silty						
131.0-145.0 Sandstone, light-gray, fine-grained		40				
145.0-160.5 Siltstone, medium-gray, slightly sandy						
160.5-168.0 Shale, medium-gray, silty		150	50			
168.0-173.0 Coal, shaly						
173.0-174.3 Shale, black, carbonaceous						
174.3-177.3 Coal, shaly						
177.3-178.4 Shale, black, coaly						
178.4-185.0 Coal		60				
185.0-186.0 Shale, black, coaly		200				
186.0-194.0 Coal						
194.0-195.4 Shale, black, coaly						
195.4-198.0 Coal, shaly		70				
198.0-222.0 Shale black, carbonaceous						
222.0-230.0 Siltstone, medium-gray, sandy		250				

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
230.0-243.0 Sandstone, light-gray, fine- to medium-grained, partly silty	[Redacted]	88				
243.0-247.7 Shale, dark-gray, carbonaceous		90				
247.7-252.5 Coal, shaly						
252.5-258.0 Siltstone, medium-gray		300				
258.0-264.0 Siltstone, medium-light-gray, sandy						
264.0-270.5 Shale, dark-gray to dark-brown-gray, carbonaceous		100				
270.5-273.0 Coal, shaly						
273.0-280.0 Shale, dark-brown-gray, carbonaceous						
280.0-292.0 Siltstone and sandstone, interbedded, light-gray. Sandstone is fine-grained		350	110			
292.0-294.0 Sandstone, light-gray, fine-grained						
294.0-307.0 Sandstone and siltstone, interbedded, light-gray and light-olive-gray. Sandstone is very fine grained		120				
		400				
		130				
		140				
	450					
	150					
	500	160				
	170					
	550					
	180					
	600	190				
	200					
	650					
	210					
	700	220				