

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Geophysical and Lithologic Logs of six
test holes drilled during 1979 in the
Como West and Elmo Quadrangles, Carbon
County, Wyoming

By

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This report is preliminary and has not been
edited or reviewed for conformity with U.S.
Geological Survey standards.

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Introduction

The U.S. Geological Survey drilled and logged six test holes during 1979 on Federal lands in the Como West and Elmo Quadrangles, T. 23 N., R. 80, 81, and 82 W., Hanna coal field, Hanna basin, Carbon County, Wyo. as part of the Coal Exploratory Program. The general purpose of the drilling was to explore for coal, facilitate correlation of coal beds, and to evaluate their thickness and lateral extent. The drilling was limited to three areas. Normal faulting in two of the areas led to closer than normally spaced drill holes in order to check the structural position of the coal beds and associated strata. In the third area drilled, the one drill hole was cored at a specified interval to check what appeared to be a higher than normal gamma-ray deflection in a prior test hole. The anomalous deflection was shown to be a combination of instrument error, hole conditions, and stratigraphic conditions in the prior test hole. The geologic objectives of the drilling were determined by field mapping and use of data from prior test holes (Hansen and Schugg, 1979).

Rotary holes were drilled by a truck-mounted rig using 5-inch tricone bits. Drilling fluids were air and air-water biodegradable foam. The holes were filled with heavy mud upon completion and a surface plug of cement placed therein. Drill sites were then reclaimed.

A general suite of logs consisting of gamma ray, gamma gamma (density), resistivity, and caliper were run. Two of the holes closed near the bottom prior to open hole logging, but gamma ray logs had been run through the drill pipe.

The geophysical logs in this report were photographically reduced to 20 percent of their original size. The reduced 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 were hand-traced prior to reproduction.

Lithologic logs are based on field examination of drill-hole cuttings collected at 5-foot intervals or in the case of the one core, field description of the cored unit. Lithologic interpretations are adjusted to geophysical logs.

Reference

Hansen, D. E., and Schugg, D. L., 1979, Geophysical and lithologic logs of 39 coal test holes drilled during 1978 in the Como West and Elmo Quadrangles, Carbon County, Wyoming: U.S. Geol. Survey Open-File Rept. 79-1701, 112 p.

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

Drill hole	Location	Quadrangle	Depth drilled (ft)	Depth logged (ft)
24-E-B	NW $\frac{1}{4}$ NE $\frac{1}{4}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 4, T. 23 N., R. 81 W.	Elmo	575.0	558.0
24-E-C	SE $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 4, T. 23 N., R. 81 W.	Elmo	636.0	629.0
34-E-C	NW $\frac{1}{4}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 14, T. 23 N., R. 82 W.	Elmo	155.7	148.0
38-CW	NW $\frac{1}{4}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 20, T. 23 N., R. 80 W.	Como West	415.0	387.0
39-CW	NE $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 20, T. 23 N., R. 80 W.	Como West	495.0	484.0
40-CW	SE $\frac{1}{4}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 18, T. 23 N., R. 80 W.	Como West	475.0	466.0

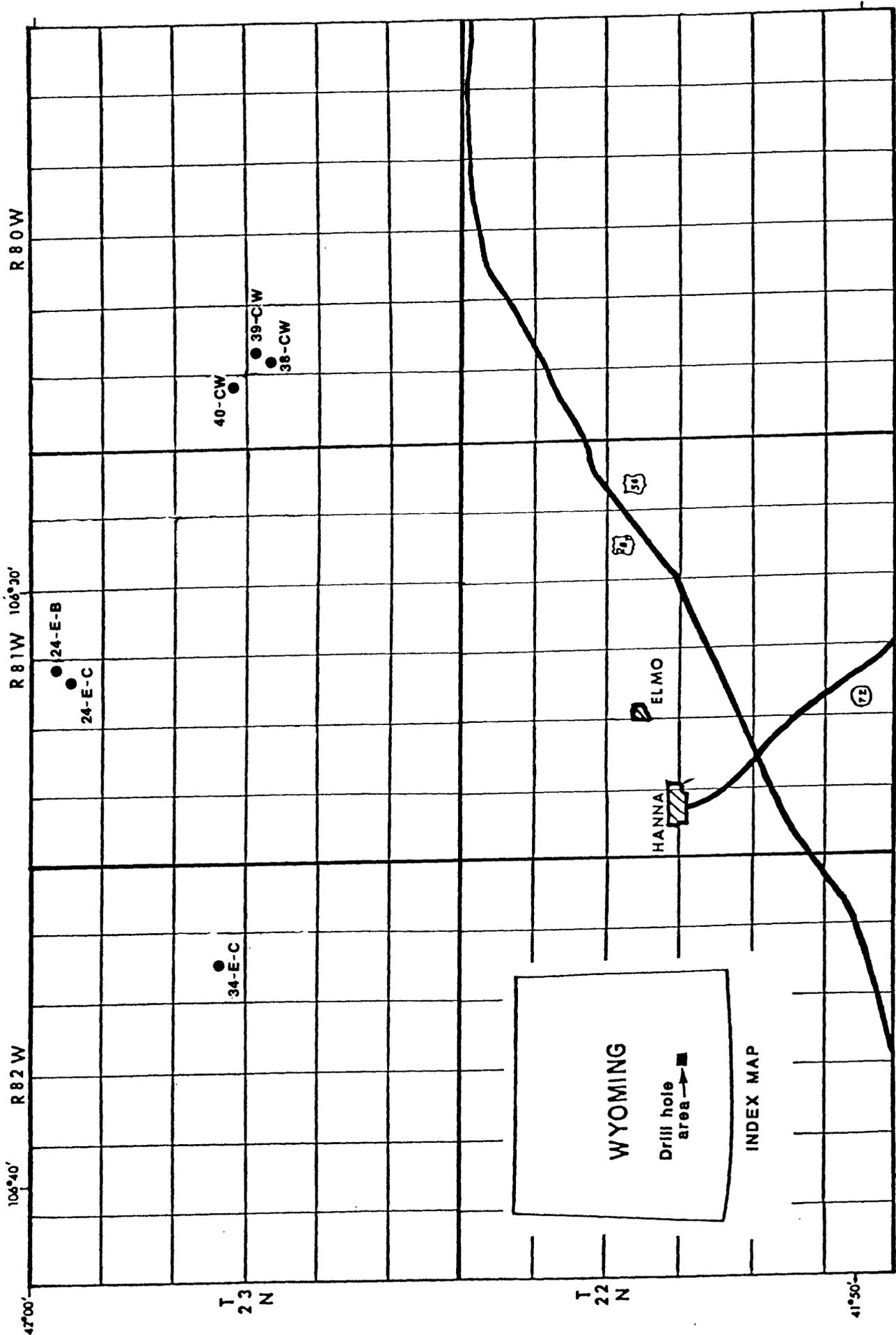


Figure 1.--Sketch map showing approximate locations of drill sites, Hanna coal field, Wyoming

COMO WEST QUADRANGLE
WYOMING-CARBON CO.

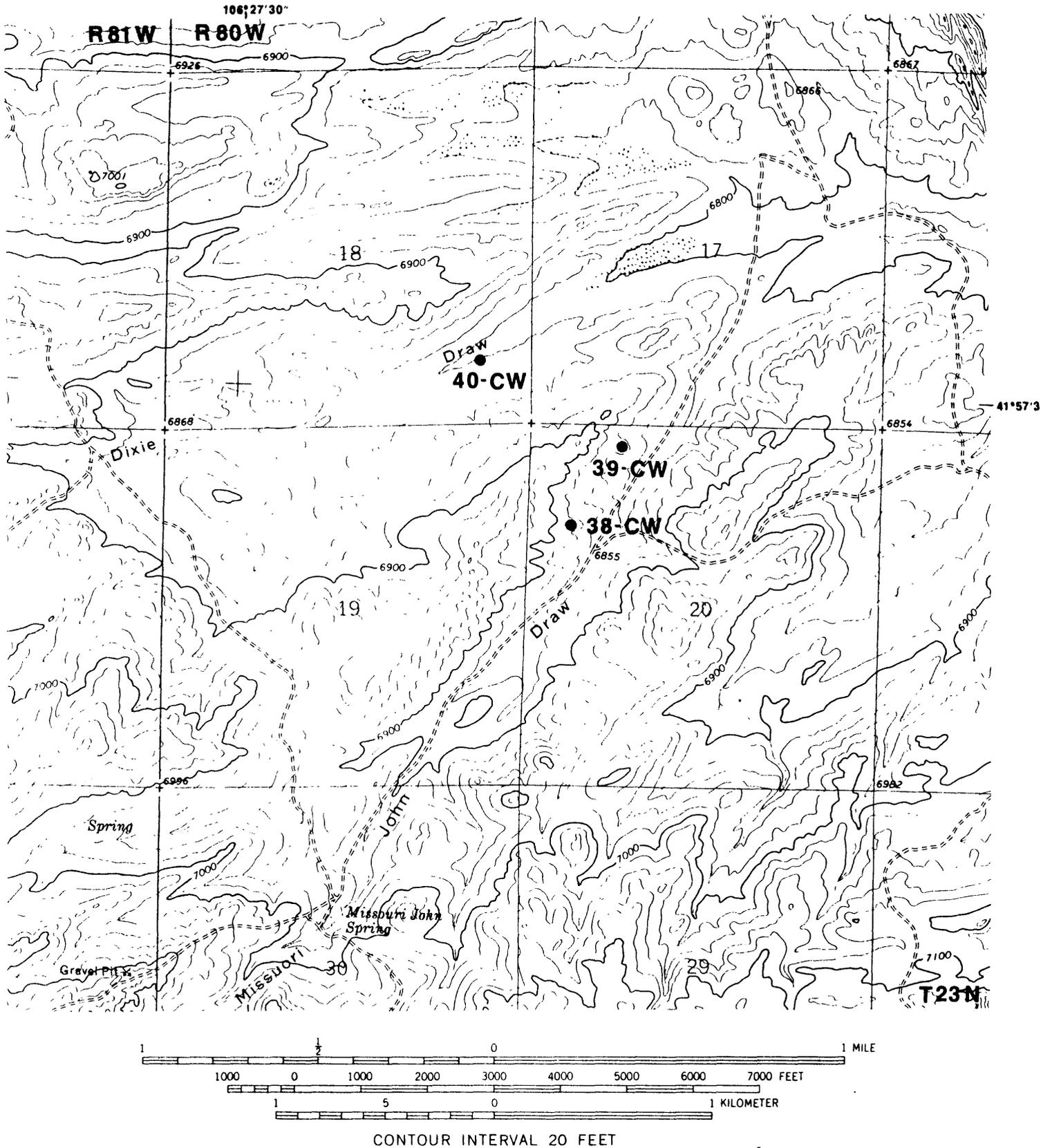
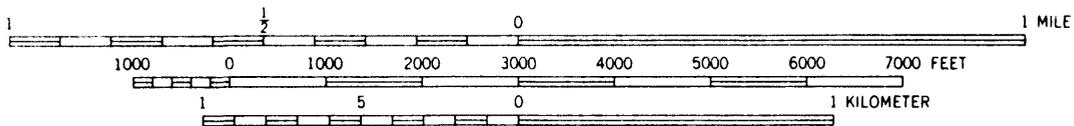
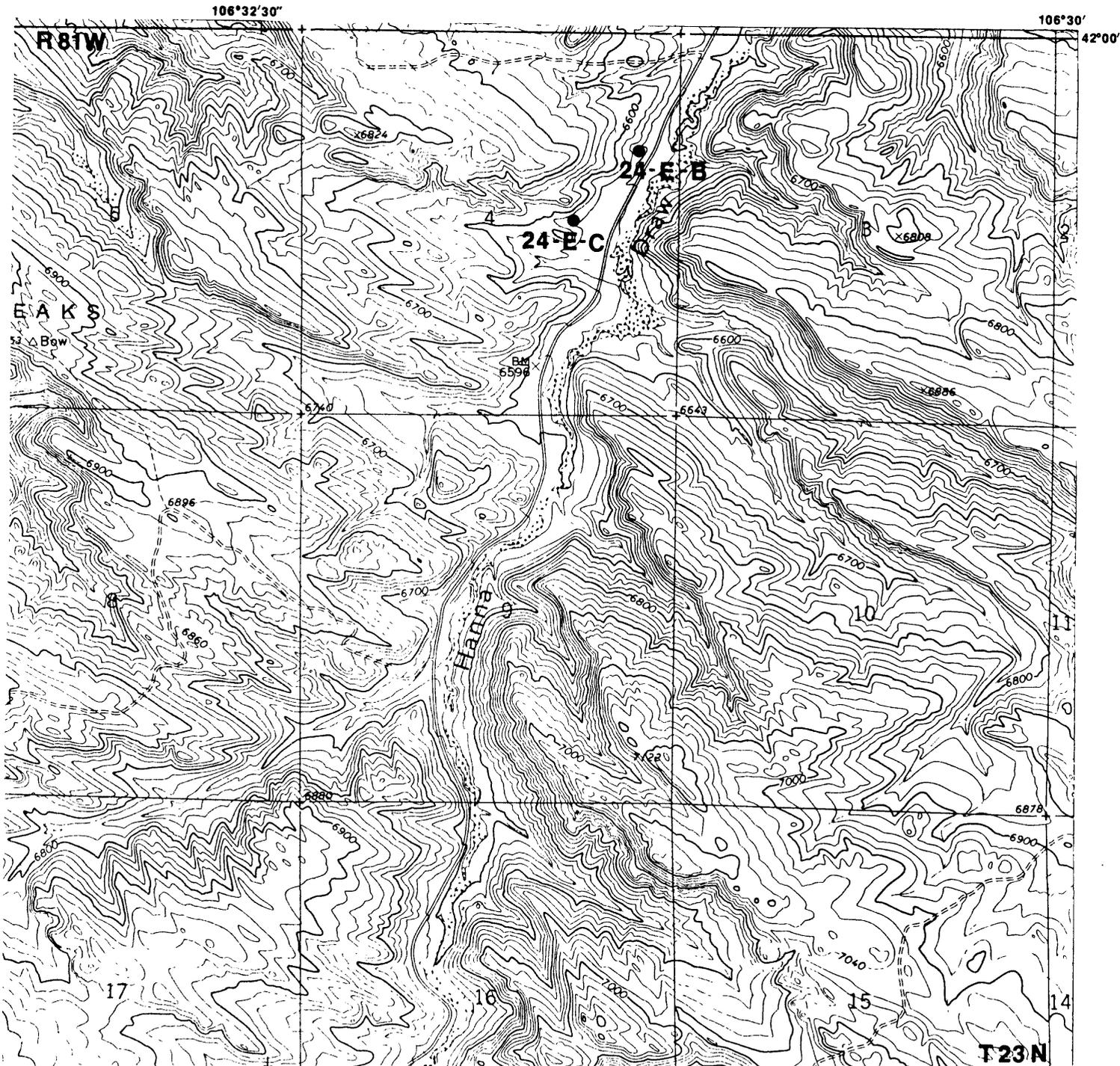


Figure 2.--Drill hole location map, central part of Como West Quadrangle, Carbon County, Wyoming

ELMO QUADRANGLE
WYOMING-CARBON CO.



CONTOUR INTERVAL 20 FEET

Figure 3.--Drill hole location map, northeast part of Elmo Quadrangle, Carbon County, Wyoming

ELMO QUADRANGLE
WYOMING-CARBON CO.

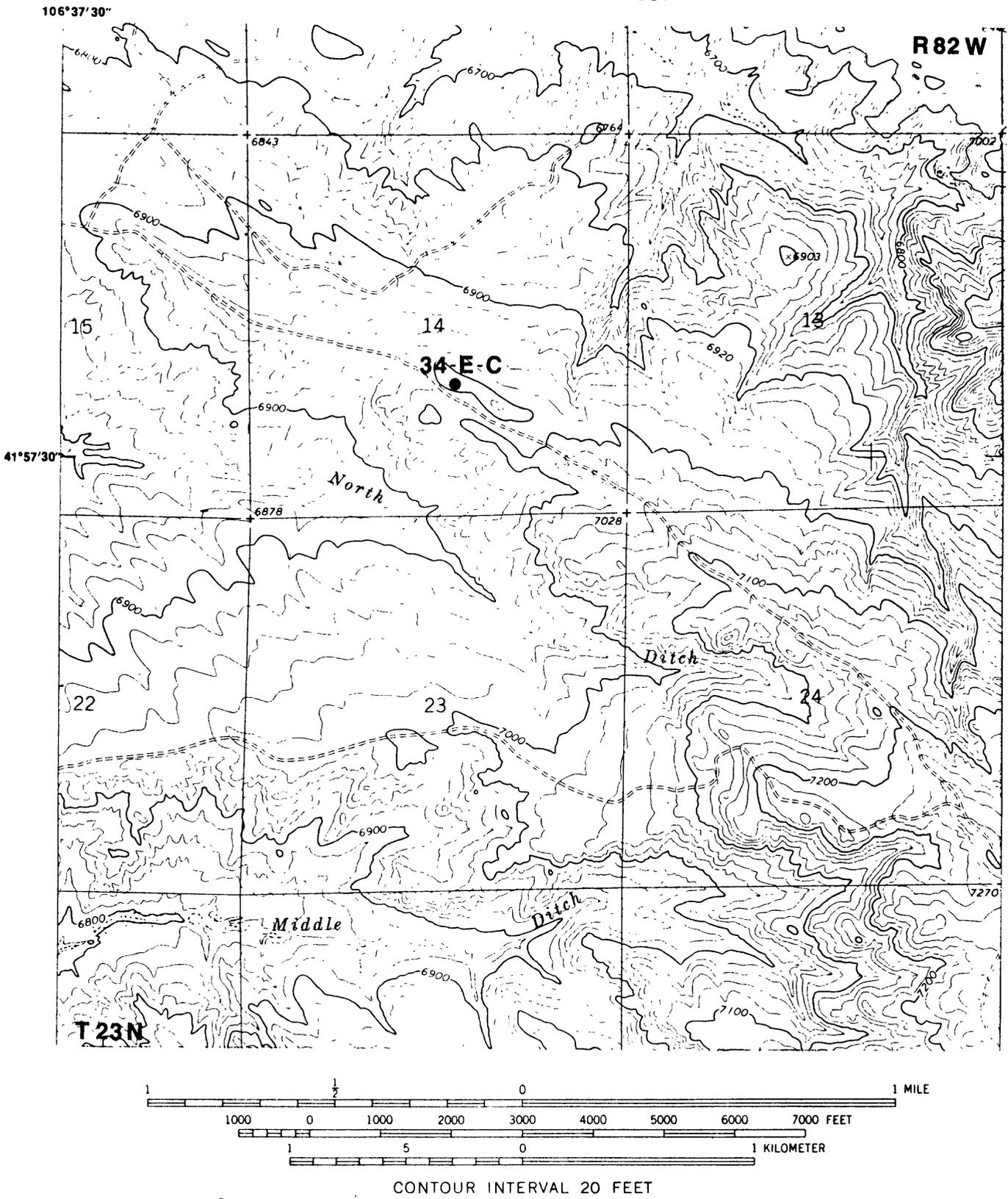


Figure 4.--Drill hole location map, northwest part of Elmo Quadrangle, Carbon County, Wyoming

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 24-E-B DATE July 10, 1979 SURFACE ELEVATION(ft) 6540

LOCATION NW $\frac{1}{4}$ NE $\frac{1}{4}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 4 T. 23 N. R. 81 W. Quad. Elmo

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 575

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale <u>13 cps/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale <u>1.33K cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale <u>20 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale <u>1"/in</u>	Logging Speed	<u>15</u>	fpm

Lithology		Strip Log	Depth		Geophysical Logs			
			ft	m	Gamma	Cal	Den	Res
5.0	10.5		0	0				
10.5	15.0		10	3				
15.0	18.0		20	6				
18.0	25.0		50	15				
25.0	27.0		100	30				
27.0	44.2		150	45				
44.2	57.9		200	60				
57.9	69.5		250	75				
69.5	71.0		300	90				
71.0	76.0		350	105				
76.0	79.5		400	120				
79.5	85.5		450	135				
85.5	91.0		500	150				
91.0	95.5		550	165				
95.5	97.0		600	180				
97.0	106.2		650	195				
106.2	112.3	700	210					
112.3	115.5	750	225					

Lithology		Strip Log	Depth		Geophysical Logs			
			ft	m	Gamma	Cal	Den	Res
115.5	117.0	Shale, black, carbonaceous, coaly		80				
117.0	124.0	Coal		90				
124.0	126.5	Shale, black, carbonaceous						
126.5	130.0	Coal						
130.0	145.0	Sandstone, light- to medium-gray, very fine-grained, silty		300				300
145.0	153.0	Siltstone, medium- to dark-gray		100				
153.0	186.5	Sandstone, light- to medium-gray, fine- to medium-grained. Some thin interbeds of medium- to dark-gray siltstone and shale		350	110			350
186.5	189.0	Shale, light- to medium-gray		120				
189.0	194.5	Coal and shale; shale is black, carbonaceous and coaly						
194.5	196.5	Shale, black, carbonaceous		400				400
196.5	200.8	Coal, shaly						
200.8	204.3	Shale, black, carbonaceous, partly coaly		130				
204.3	206.0	Coal						
206.0	210.5	Coal and shale; shale is black and carbonaceous		140				450
210.5	214.0	Shale, black, carbonaceous		450				450
214.0	222.0	Coal						
222.0	230.0	Shale, black, carbonaceous, and thin coal beds		150				
230.0	234.5	Coal						
234.5	240.0	Shale, black, carbonaceous, and thin coal beds		500				500
240.0	245.0	Coal		160				
245.0	246.5	Shale, black, carbonaceous						
246.5	249.5	Coal						
249.5	269.0	Sandstone, light- to medium-gray, very-fine-grained. Grades downward into siltstone, dark-gray with coal fragments		170				
				550				550
269.0	272.5	Shale, black, carbonaceous						
272.5	284.0	Coal, thin interbeds of black carbonaceous shale						
284.0	288.0	Shale, black, carbonaceous, coaly						
288.0	291.5	Coal						
291.5	296.0	Shale, black, carbonaceous, coaly						
296.0	298.0	Coal						
298.0	300.5	Shale, black, carbonaceous, coaly						
300.5	304.0	Coal and shale, interbedded. Shale is black, carbonaceous and coaly						
304.0	307.0	Shale, black, carbonaceous						

24-E-B
 INHMA COAL FIELD

Lithology		Strip Log	Depth		Geophysical Logs			
			ft	m	Gamma	Cal	Den	Res
307.0	315.0	Coal and shale interbedded. Shale is black, carbonaceous and coaly						
315.0	320.0	Siltstone, medium-gray; dark- gray carbonaceous shale streaks						
320.0	325.0	Sandstone, medium-gray, very- fine-grained, silty						
325.0	335.0	Siltstone, medium-gray, sandy						
335.0	346.0	Sandstone, light-gray, very- fine-grained						
346.0	352.2	Siltstone, medium-gray, sandy						
352.2	358.2	Sandstone, light- to medium- gray, silty						
358.2	371.5	Siltstone, light- to medium- gray, sandy						
371.5	373.0	Sandstone, light- to medium- gray, silty						
373.0	378.0	Siltstone, light- to medium- gray, sandy						
378.0	391.0	Sandstone, light-gray, very fine-grained, silty						
391.0	440.0	Sandstone, light-gray, medium- to coarse-grained						
440.0	470.0	Sandstone, light- to medium- gray, very fine-grained , silty						
470.0	488.0	Sandstone, light-gray, very- fine-grained						
488.0	530.0	Siltstone, light- to medium- gray, sandy						
530.0	542.0	Siltstone, medium-gray, sandy at base						
542.0	558.0	Sandstone, light- to medium- gray, very fine- to fine- grained						

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 24-E-C DATE July 19, 1979 SURFACE ELEVATION(ft) 6575

LOCATION SE $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 4 T. 23 N. R. 81 W. Quad. Elmo

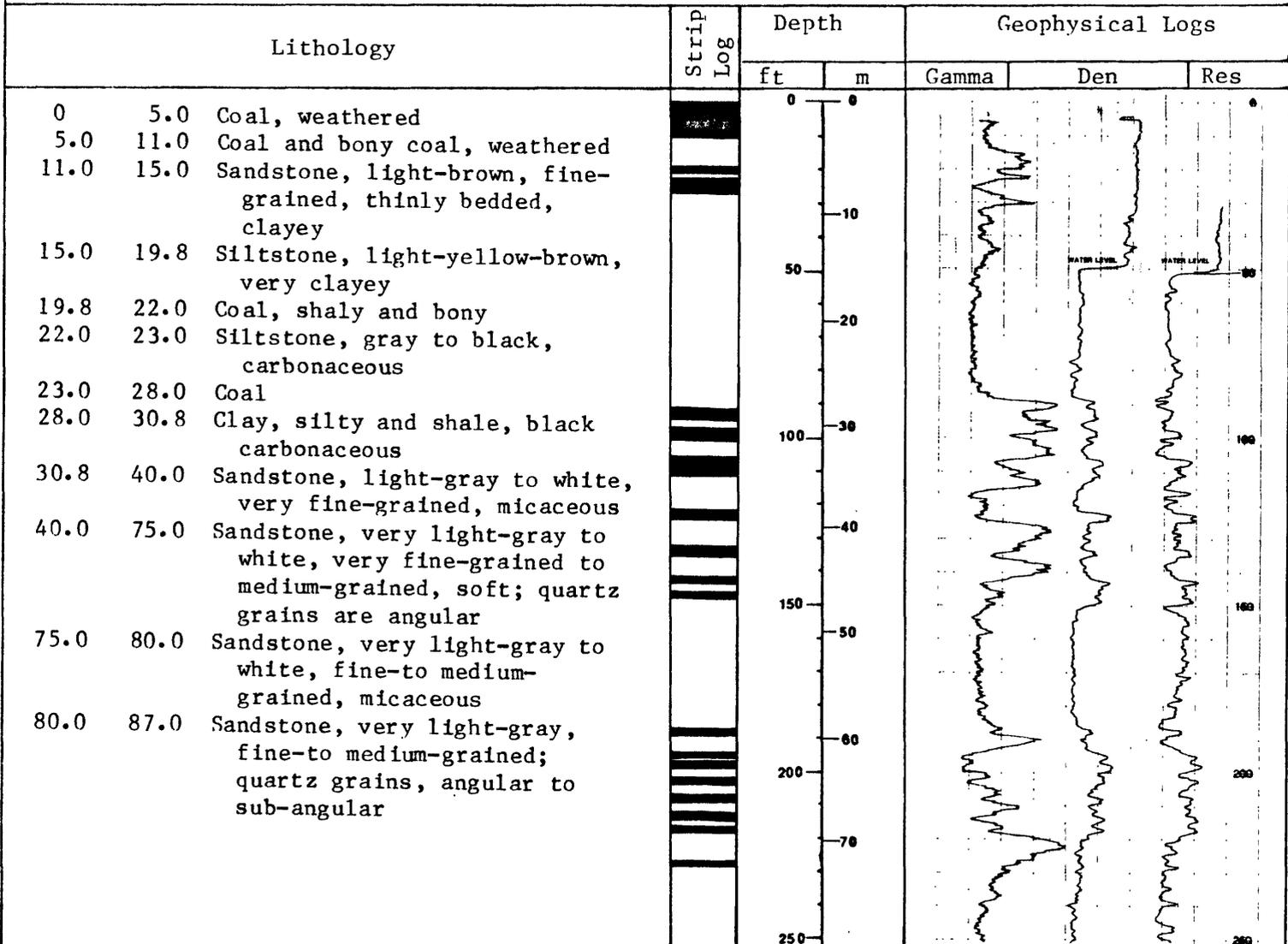
COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 636

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma ; Scale 10 cps/in Logging Speed 15 fpm
 Gamma Gamma ; Scale 1.33K cps/in Logging Speed 15 fpm
 Resistivity ; Scale 20 ohms/in Logging Speed 15 fpm
 Caliper ; Scale 1"/in Logging Speed 15 fpm



Lithology		Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
87.0	89.0	Sandstone, light- to medium-gray, very fine-grained, thinly bedded and slightly silty	80				
89.0	92.0	Shale, medium-gray, silty	90				
92.0	95.0	Coal, shaly					
95.0	98.0	Shale, black, carbonaceous	300				
98.0	102.0	Coal and shale. Shale is black and carbonaceous	100				300
102.0	106.0	Shale, black, carbonaceous, very thin coal interbeds					
106.0	112.0	Coal, includes a few partings of black, carbonaceous, shale	350	110			360
112.0	115.0	Shale, black, carbonaceous					
115.0	122.0	Sandstone and siltstone, medium- to dark-gray; sandstone is very fine- to fine-grained; unit is thinly bedded	400	120			400
122.0	125.0	Coal					
125.0	133.0	Shale, dark-gray and black, with thin coal partings	130				
133.0	136.0	Coal and very thin shale beds, black and carbonaceous					
136.0	142.0	Shale, medium- to dark-brownish-gray, carbonaceous	450	140			450
142.0	144.0	Coal					
144.0	147.0	Shale, medium- to dark-brownish-gray, carbonaceous	150				
147.0	149.0	Coal					
149.0	153.0	Siltstone, medium- to dark-gray, and thinly bedded, medium-gray shale	500	160			500
153.0	156.0	Sandstone, medium-gray, very fine-grained, interbedded with medium-gray, thinly bedded siltstone					
156.0	159.0	Siltstone, medium-gray, interbedded with light-gray, fine-grained sandstone	550	170			550
159.0	178.0	Sandstone, medium-gray, very fine-grained, interbedded with medium-gray, thinly bedded siltstone					
178.0	181.0	Siltstone, medium-gray, with interbedded sandy shale	600	190			600
181.0	184.0	Sandstone, medium-gray, very fine-grained, interbedded with medium-gray, thinly bedded siltstone					
184.0	186.0	Siltstone, medium-gray, interbedded with sandy shale					
186.0	187.2	Siltstone, as above and thin interbeds of coal	200				
187.2	189.0	Coal					

Lithology		Strip Log	Depth		Geophysical Logs		
			ft	m	Gamma	Den	Res
189.0	194.0	Shale, dark-gray to black, carbonaceous, silty					
194.0	196.0	Coal					
196.0	197.6	Shale, dark-gray to black carbonaceous and siltstone, medium-gray					
197.6	199.8	Coal					
199.8	202.0	Shale, dark-gray to black, carbonaceous and siltstone, medium-gray					
202.0	204.0	Coal					
204.0	207.0	Shale, dark-gray to black, carbonaceous, silty					
207.0	209.7	Coal					
209.7	212.8	Shale, dark-gray to black, carbonaceous					
212.8	215.2	Coal					
215.2	217.0	Shale, black, carbonaceous, and thin coal beds					
217.0	218.5	Coal					
218.5	228.0	Shale, black, carbonaceous interbeds of bony coal					
228.0	229.0	Coal, bony					
229.0	230.0	Shale, medium- to dark-gray, carbonaceous					
230.0	238.7	Siltstone, medium- to dark-gray					
238.7	254.5	Sandstone, medium- to dark-gray, very-fine-grained, silty					
254.5	266.5	Siltstone, medium- to dark-gray					
266.5	271.8	Sandstone, medium- to dark-gray, very-fine-grained, silty					
271.8	284.0	Siltstone, medium- to dark-gray and thin interbeds of dark-gray shale					
284.0	351.0	Sandstone, light- to medium-gray, fine- to medium-grained, micaceous, quartz grains, sub-angular					
351.0	363.2	Siltstone, gray, and sandstone, light-gray, fine- to medium-grained					
363.2	366.6	Sandstone, light-gray, fine- to medium-grained, crossbedded and very-thin beds of gray siltstone					
366.6	370.0	Siltstone and sandstone, light- to medium-gray, fine- to medium-grained, crossbedded					
370.0	375.0	Sandstone, light- to medium-gray, fine- to coarse-grained, with medium-gray siltstone					

Lithology			Strip Log	Depth		Geophysical Logs		
				ft	m	Gamma	Den	Res
375.0	388.8	Siltstone, light- to medium-gray, with light-gray, fine- to medium-grained sandstone						
388.8	395.0	Sandstone, medium-gray, medium- to coarse-grained with thinly bedded siltstone						
395.0	402.2	Siltstone, medium-gray, with sandstone						
402.2	411.0	Siltstone, medium-gray						
411.0	421.0	Siltstone, with thin beds of carbonaceous shale						
421.0	443.9	Siltstone, medium- to dark-gray						
443.9	446.5	Shale, medium- to dark-gray, very-silty						
446.5	452.0	Siltstone, medium-gray, very-sandy						
452.0	459.0	Shale, medium- to dark-brown, very-silty						
459.0	467.0	Siltstone with shaly interbeds, medium- gray						
467.0	472.0	Siltstone, medium-gray						
472.0	475.0	Shale, medium- to dark-brown and siltstone						
475.0	491.0	Siltstone, medium-gray						
491.0	497.0	Siltstone, medium-gray, shaly						
497.0	503.0	Sandstone, light-gray, very-fine-grained						
503.0	513.0	Siltstone, medium-gray, sandy						
513.0	538.5	Siltstone, medium-gray						
538.5	541.5	Siltstone, medium-gray, shaly						
541.5	549.0	Siltstone, medium-gray						
549.0	557.5	Siltstone, and shale interbedded, medium-gray						
557.5	565.2	Sandstone, medium-gray, fine- to medium-grained, thinly bedded						
565.2	570.2	Siltstone, medium-gray, sandy						
570.2	587.5	Sandstone, medium-gray, fine- to medium-grained, thinly bedded						
587.5	598.3	Siltstone, medium-gray						
598.3	601.4	Shale, dark-gray						
601.4	604.2	Siltstone, medium-gray						
604.2	606.8	Shale, dark-brown to black, carbonaceous						
606.8	610.0	Siltstone, medium-dark-gray						
610.0	614.5	Shale, carbonaceous, silty, dark-gray						
614.5	619.0	Siltstone, medium-dark-gray, shaly						
619.0	636.0	Shale, carbonaceous, dark-gray to black						

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 34-E-C DATE July 9, 1979 SURFACE ELEVATION(ft) 7005

LOCATION NW $\frac{1}{4}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 14 T. 23 N. R. 82 W. Quad. Elmo

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 155.7

CORED YES NO INTERVAL(s) 137-150

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

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

Lithology		Strip Log	Depth		Geophysical Logs				
			ft	m	Gamma	Cal	Den	Res	
0	5.0	Colluvium, sand, clay and sandstone fragments		0					
5.0	17.0	Shale, dark-brown, carbonaceous							
17.0	20.0	Shale, black, carbonaceous, coaly		10					
20.0	33.0	Shale, light-gray, gypsiferous, clayey, silty		50					
33.0	36.0	Siltstone, light-gray, clayey		20					
36.0	37.0	Claystone, gray, silty							
37.0	38.6	Coal, bony							
38.6	42.0	Shale, black, carbonaceous, coaly		100					
42.0	49.2	Shale, medium-gray, silty		30					
49.2	56.0	Sandstone, light-gray, silty							
56.0	78.0	Siltstone, medium- to dark-gray, clayey and shaly; some interbedding of thin shale		40					
78.0	90.0	Sandstone, light-gray, fine- to coarse-grained, crossbedded		150					
90.0	105.0	Sandstone, light-gray, fine- to medium-grained, crossbedded gypsiferous, feldspathic, quartz rounded to sub-rounded							
105.0	110.0	Sandstone, light- to medium-gray, fine- to medium-coarse-grained, crossbedded, thin shale and siltstone streaks							
110.0	113.0	Sandstone, medium-gray, fine- to medium-grained							

34-E-C
USGG
WYOMING COAL FIELD

Lithology		Strip Log	Depth		Geophysical Logs			
			ft	m	Gamma	Cal	Den	Res
113.0	115.0	Shale, dark-brown, carbonaceous, coaly with some light-gray sandstone						
115.0	125.0	Shale, dark-brown to black, carbonaceous						
125.0	135.0	Sandstone, light- to medium-gray, medium- to coarse-grained, feldspathic and gypsiferous with thin, coaly, carboniferous shale cross-beds						
135.0	137.0	Sandstone, light- to medium-gray; interbedded with thin, dark-brown beds of carbonaceous shale						
137.0	142.0	Sandstone, light- to medium-gray, medium- to coarse-grained; with black chert						
142.0	143.3	Sandstone, light- to medium-gray, medium- to coarse-grained with black chert, bony coal, carbonaceous shale						
143.3	143.4	Coal						
143.4	143.8	Shale, carbonaceous						
143.8	143.9	Coal, bony						
143.9	144.5	Shale carbonaceous						
144.5	144.6	Sandstone, light-gray, fine-grained, crossbedded with carbonaceous shale						
144.6	145.8	Coal, bony, and black, carbonaceous shale						
145.8	146.3	Shale, black, carbonaceous						
146.3	146.8	Clay, medium- to dark-gray						
146.8	150.0	Claystone, dark-gray, carbonaceous						
150.0	150.6	Shale, black, carbonaceous						
150.6	151.6	Clay, medium-dark-gray, slightly carbonaceous						
151.6	151.8	Shale, black, carbonaceous						
151.8	151.9	Coal						
151.9	152.1	Shale, black, carbonaceous						
152.1	152.4	Claystone, dark-gray						
152.4	155.7	Sandstone, light- to medium-gray, medium- to coarse-grained; with feldspar and black chert grains						

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 38-CW DATE July 20, 1979 SURFACE ELEVATION(ft) 6885

LOCATION NW¹/₄NE¹/₄SW¹/₄NW¹/₄ Sec. 20 T. 23 N. R. 80 W. Quad. Como West

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 415

CORED YES NO INTERVAL(s) _____

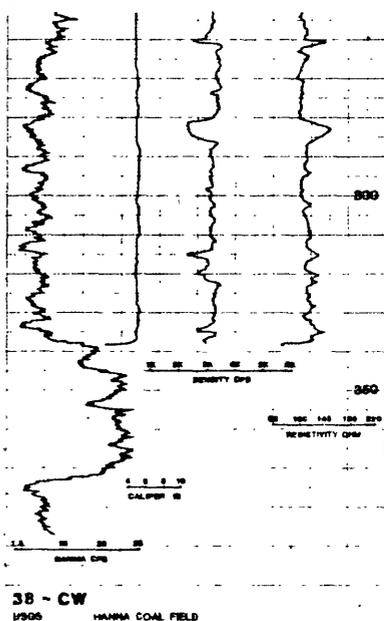
DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma ; Scale 5 cps/in Logging Speed 15 fpm
 Gamma Gamma ; Scale 1.33K cps/in Logging Speed 15 fpm
 Resistivity ; Scale 20 ohms/in Logging Speed 15 fpm
 Caliper ; Scale 1"/in Logging Speed 15 fpm

Lithology		Strip Log	Depth		Geophysical Logs			
			ft	m	Gamma	Cal	Den	Res
0	15.0	Colluvium, yellow sand, coarse-grained; a few pebbles	0	0				
15.0	22.0	Sandstone, light-yellow, to light-gray, medium- to coarse-grained	10					
22.0	27.0	Siltstone, medium-gray, sandy	50					
27.0	34.0	Sandstone, light-yellow, to light-gray, medium- to coarse-grained	20					
34.0	38.3	Siltstone, medium-gray, sandy	100	30				
38.3	40.0	Sandstone, yellowish-brown to dark-brown, medium- to coarse-grained, silty and clayey	40					
40.0	45.0	Sandstone, yellowish-brown silty and clayey, poorly indurated	150	50				
45.0	54.0	Sandstone, yellowish-brown, fine- to coarse-grained, poorly indurated	60					
54.0	63.0	Siltstone, medium-gray, sandy	200	80				
63.0	80.0	Sandstone, light-gray, medium- to coarse-grained, conglomeratic; pebbles, 1/8" to 3/8", of black chert, quartz; some pyrite, rounded to sub-rounded	70					
80.0	95.0	Sandstone, light- to medium-gray, medium- to coarse-grained; with black chert grains	250					

Lithology		Strip Log	Depth		Geophysical Logs			
			ft	m	Gamma	Cal	Den	Res
95.0	109.0	Sandstone, light- to medium-gray, medium- to coarse-grained, with conglomeratic streaks, pebbles 1/4" to 5/8", quartz rounded to sub-rounded; pyrite and feldspar		80				
109.0	111.0	Siltstone, medium-gray, sandy		90				
111.0	175.7	Sandstone, light to medium-gray, medium- to coarse-grained, conglomeratic streaks, quartz rounded to sub-rounded, pyrite and feldspar		300				
				100				
				110				
175.7	199.0	Siltstone, light- to medium-gray, sandy and clayey		350				
199.0	200.3	Claystone, medium-gray, silty						
200.3	214.0	Siltstone, medium-gray, clayey						
214.0	218.2	Claystone, medium-gray, silty						
218.2	252.0	Siltstone and sandstone interbedded, medium-gray; sandstone is fine-grained						
252.0	260.0	Siltstone, medium-gray, interbedded with light-gray sandstone, medium-grained; pyrite						
260.0	270.0	Sandstone, medium-gray, fine- to medium-grained, traces pyrite, interbedded with medium-gray shale						
270.0	280.0	Sandstone, light- to medium-gray with pyrite, interbedded with medium- to dark-gray silty shale						
280.0	295.0	Sandstone, light-gray, medium- to coarse-grained, with thin, dark-brown shale, interbedded or cross-bedded						
295.0	300.0	Shale, dark-brown-gray with thin, light-gray, fine- to medium-grained sandstone						
300.0	315.0	Sandstone, light-gray, medium- to coarse-grained, conglomeratic; pebbles of rounded quartz with some pyrite and chert, with dark-gray, thin shale						
315.0	325.0	Sandstone, light-gray, medium-grained, interbedded with gray shale						
325.0	337.8	Sandstone, coarse-grained, conglomeratic; pebbles 1/8" to 1/2", rounded, quartz and black chert						



Lithology	Strip Log	Depth		Geophysical Logs			
		ft	m	Gamma	Cal	Den	Res
337.8 344.5 Siltstone, medium-gray; very thin interbeds of dark-gray shale							
344.5 352.8 Shale, medium- to dark-gray, silty							
352.8 354.5 Siltstone, medium- to dark-gray, silty							
354.5 372.0 Shale, medium- to dark-gray, slightly carbonaceous							
372.0 415.0 Shale, medium- to dark-gray							
Geophysical log ends at 387.0. The drill hole collapsed.							

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 39-CW DATE July 22, 1979 SURFACE ELEVATION(ft) 6865

LOCATION NE $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 20 T. 23 N. R. 80 W. Quad. Como West

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 495

CORED YES NO INTERVAL(s) _____

DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma ; Scale 5 cps/in Logging Speed 15 fpm
 Gamma Gamma ; Scale 1.33K cps/in Logging Speed 15 fpm
 Resistivity ; Scale 20 ohms/in Logging Speed 15 fpm
 Caliper ; Scale 1"/in Logging Speed 15 fpm

Lithology		Strip Log	Depth		Geophysical Logs			
			ft	m	Gamma	Cal	Den	Res
0	15.0	Colluvium, yellow-brown to red silty, sandy clay		0				
15.0	25.0	Sand, light-yellow-brown, unconsolidated, medium- to coarse-grained; clayey		10				
25.0	39.0	Sandstone, light-yellow-brown, medium- to coarse-grained with some black chert and siltstone bands		50				
39.0	44.0	Sandstone, light-gray to white medium- to coarse-grained, sub-rounded quartz and black chert		100				100
44.0	120.0	Sandstone, light- to medium-gray, medium- to coarse-grained conglomeratic; chert and quartz pebbles and some pyrite		150				150
120.0	140.0	Sandstone, medium-gray, medium- to very-coarse-grained; quartz grains, rounded to sub-rounded, some thin clay and shale beds		200				200
140.0	170.0	Sandstone, medium-gray, coarse-grained, conglomeratic		250				250
170.0	173.0	Shale, medium- to dark-gray-brown						
173.0	174.0	Siltstone, medium-gray						

Lithology		Strip Log	Depth		Geophysical Logs			
			ft	m	Gamma	Cal	Den	Res
174.0	180.3	Shale, medium- to dark-gray, clayey and silty	80					
180.3	205.0	Siltstone, medium-gray, clayey; sample includes some dark-gray shale, red dog and clinker particles	90					
205.0	209.0	Shale, medium- to dark-gray, silty, partly carbonaceous	300					
209.0	215.0	Siltstone, medium-gray; contains many thin beds of dark-gray claystone, carbonaceous	100					
215.0	222.8	Siltstone and claystone, interbedded, medium- to dark-gray, partly carbonaceous	350	110				
222.8	226.5	Siltstone, medium-gray, clayey and sandy	120					
226.5	230.0	Siltstone and claystone interbedded, medium-gray	400					
230.0	234.8	Siltstone, medium-gray	130					
234.8	241.3	Claystone, medium-gray, very silty	140					
241.3	249.0	Siltstone, medium-gray, clayey	150					
249.0	254.0	Siltstone, medium-gray, sandy	450					
254.0	262.0	Siltstone, medium-gray						
262.0	311.0	Sandstone, light-gray, medium- to coarse-grained; quartz grains sub-angular to sub-rounded; chert pebbles, hornblend and quartzite with pyrite						
311.0	336.0	Sandstone, medium-gray, coarse-grained; conglomeratic, rounded chert pebbles, quartz and quartzite; quartz grains; rounded to sub-rounded with pyrite						
336.0	344.8	Shale, dark-gray, carbonaceous, traces of coal and bony coal						
344.8	351.8	Shale, dark-brown, carbonaceous						
351.8	354.8	Shale, dark-brownish-gray, clayey, carbonaceous						
354.8	372.0	Shale, dark-brownish-gray, clayey						
372.0	374.2	Shale, dark-brownish-gray, carbonaceous						
374.2	390.3	Shale, dark-brownish -gray, clayey						
390.3	394.3	Shale, dark-brownish-gray, carbonaceous						
394.3	408.0	Shale, dark-gray to dark-brownish-black, slightly carbonaceous						
408.0	410.5	Siltstone, medium-gray, clayey						
410.5	414.8	Sandstone, medium-gray, silty						

Lithology		Strip Log	Depth		Geophysical Logs			
			ft	m	Gamma	Cal	Den	Res
414.8	417.0	Siltstone, medium-gray, sandy						
417.0	420.7	Claystone, medium-gray						
420.7	428.0	Coal, partly shaly						
428.0	443.0	Shale, dark-gray, carbonaceous, bony coal streaks						
443.0	464.2	Shale, dark-gray, carbonaceous						
464.2	473.0	Shale, medium- to dark-gray						
473.0	480.0	Siltstone, medium-gray, carbonaceous, sandy						
480.0	495.0	Shale, dark-brown, carbonaceous, clayey						
		Hole closed below 350 feet, gamma ray log run through drill rod.						

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCATION NUMBER 40-CW DATE July 21, 1979 SURFACE ELEVATION(ft) 6825

LOCATION SE $\frac{1}{4}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 18 T. 23 N. R. 80 W. Quad. Como West

COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 475

CORED YES NO INTERVAL(s) _____

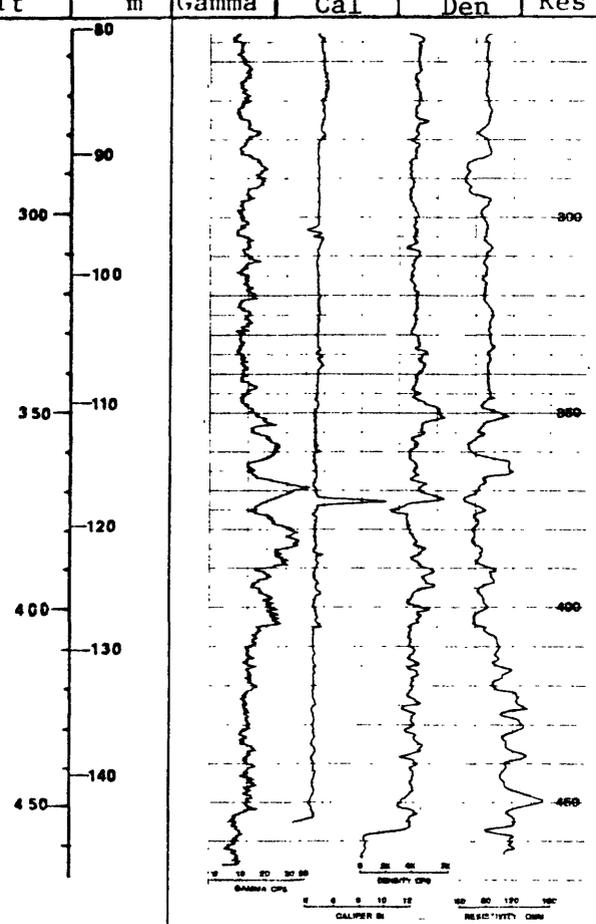
DRILLING MEDIUM: AIR FOAM MUD WATER OBSERVATION WELL

GEOPHYSICAL LOGS:

Natural Gamma	;	Scale	<u>5 cps/in</u>	Logging Speed	<u>15</u>	fpm
Gamma Gamma	;	Scale	<u>1K cps/in</u>	Logging Speed	<u>15</u>	fpm
Resistivity	;	Scale	<u>20 ohms/in</u>	Logging Speed	<u>15</u>	fpm
Caliper	;	Scale	<u>1"/in</u>	Logging Speed	<u>15</u>	fpm

Lithology		Strip Log	Depth		Geophysical Logs				
			ft	m	Gamma	Cal	Den	Res	
0	25.0	Alluvium, yellowish-gray sand and silt		0					
25.0	30.0	Sandstone, light- to medium-gray, fine- to medium-grained							
30.0	59.0	Sandstone, light- to medium-gray, fine- to coarse-grained, cherty		10					
59.0	85.0	Sandstone, light- to medium-gray interbedded with coal and thin medium-gray shale		20					
85.0	90.0	Siltstone, medium-gray, sandy							
90.0	93.0	Sandstone, light- to medium-gray, fine- to coarse-grained; with black chert		30					
93.0	96.0	Siltstone, dark-gray, sandy							
96.0	105.0	Sandstone, light- to medium-gray, fine- to coarse-grained; with black chert and quartz, sub-angular		40					
105.0	115.0	Sandstone, light- to medium-gray, medium- to coarse-grained with thin siltstone beds		50					
115.0	120.0	Sandstone, light- to medium-gray, medium- to coarse-grained with thin dark-brown shale		60					
120.0	130.0	Sandstone, light- to medium-gray, medium- to coarse-grained with thin carbonaceous shale		70					
				250					

Lithology		Strip Log	Depth		Geophysical Logs			
			ft	m	Gamma	Cal	Den	Res
130.0	147.0	Sandstone, light- to medium-gray, medium- to coarse-grained, with black chert and quartz, angular to sub-angular		80				
147.0	155.2	Sandstone, light- to medium-gray, fine-grained, silty		90				
155.2	165.0	Siltstone, medium-gray		100				
165.0	173.3	Shale, medium-gray, clayey						
173.3	176.0	Sandstone, medium-gray, fine-grained, silty						
176.0	181.0	Siltstone, medium-gray, clayey		110				
181.0	199.7	Coal						
199.7	210.8	Shale, medium-gray, silty						
210.8	215.3	Coal						
215.3	218.0	Shale, dark-brown and black, carbonaceous, includes a very thin bed of bony coal		120				
218.0	219.7	Coal						
219.7	225.0	Shale, black, carbonaceous, some bony coal						
225.0	230.0	Siltstone, light- to medium-gray, sandy						
230.0	240.0	Shale, medium- to dark-gray, carbonaceous						
240.0	275.0	Sandstone, light-gray, coarse-grained						
275.0	279.7	Siltstone, medium-gray, clayey						
279.7	284.0	Sandstone, light-gray, coarse-grained						
284.0	295.8	Siltstone, medium-gray, clayey						
295.8	348.0	Sandstone, light- to medium-gray, coarse grained; interbedded with medium-gray siltstone						
348.0	352.0	Coal, bony coal and black, carbonaceous shale						
352.0	362.0	Shale, black, carbonaceous, includes some bony coal						
362.0	366.8	Sandstone, gray, silty						
366.8	374.0	Shale, black, carbonaceous, clayey, some bony coal						
374.0	376.0	Sandstone and siltstone, gray						
376.0	389.0	Shale, medium-gray, carbonaceous						
389.0	391.0	Coal						
391.0	393.0	Shale, medium-gray, carbonaceous, coaly						
393.0	396.0	Coal						
396.0	404.6	Shale, medium-gray, carbonaceous, coaly						



40 - CW
USGS HANNA COAL FIELD

Lithology	Strip Log	Depth		Geophysical Logs		
		ft	m	Gamma	Den	Res
404.6 475.0 Sandstone, light- to medium-gray, medium- to coarse-grained, quartz and chert grains, rounded to sub-rounded						