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UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

university of Utah Research Institute Earth Science Lab.

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

> > Ву

Dan E. Hansen, Frank D. Spencer, and Margaret E. Stamm

> Open-File Report 80-899 1980

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

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Geophysical and Lithologic Logs of six test holes drilled during 1979 in the

Como West and Elmo Quadrangles, Carbon County, Wyoming

by Dan E. Hansen, Frank D. Spencer, and Margaret E. Stamm

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 $^{1}/_{4}$ NE $^{1}/_{4}$ SE $^{1}/_{4}$ NE $^{1}/_{4}$ 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 $^{1}/_{4}$ SW $^{1}/_{4}$ NW $^{1}/_{4}$ SE $^{1}/_{4}$ sec. 14, T. 23 N., R. 82 W.	Elmo	155.7	148.0
38-CW	NW $^{1}/_{4}$ NE $^{1}/_{4}$ SW $^{1}/_{4}$ NW $^{1}/_{4}$ 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

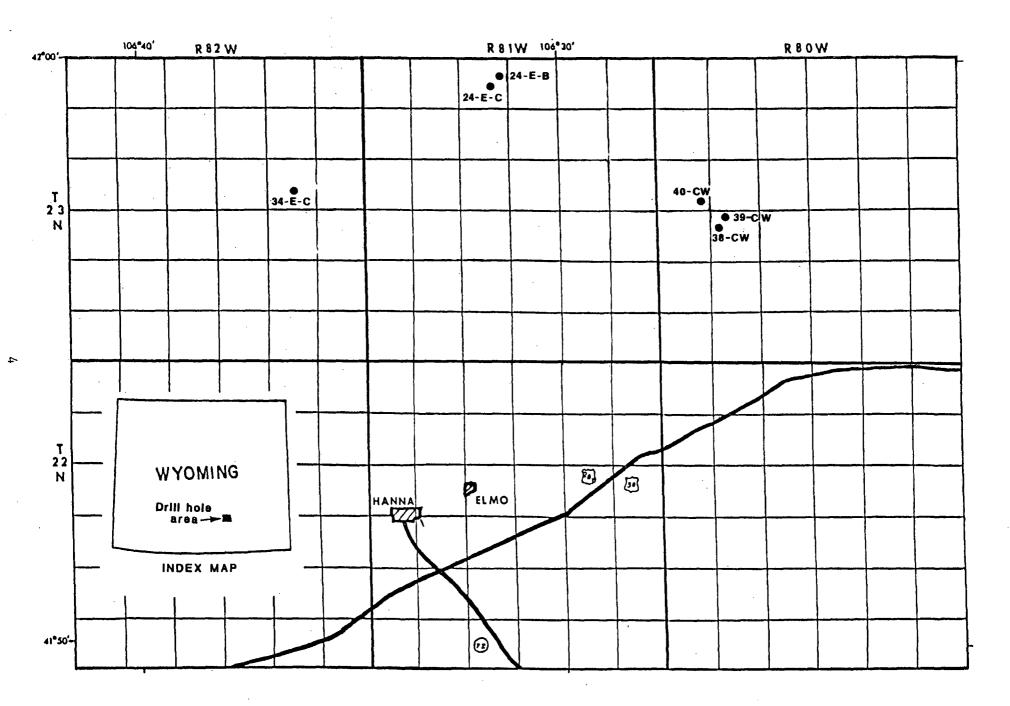


Figure 1.--Sketch map showing approximate locations of drill sites,
Hanna coal field, Wyoming

COMO WEST QUADRANGLE WYOMING-CARBON CO.

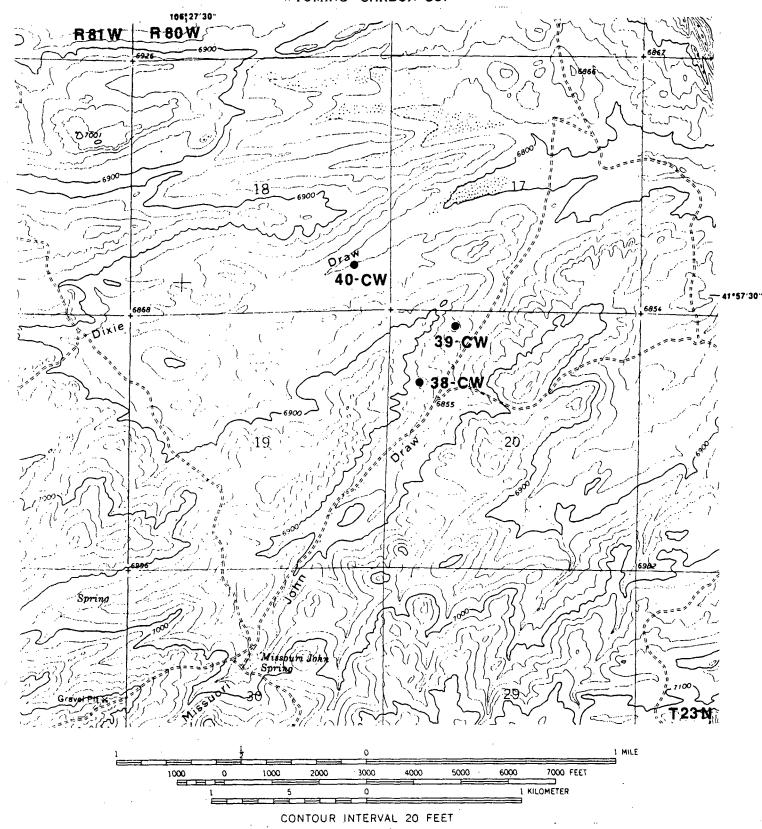


Figure 2.--Drill hole location map, central part of Como West Quadrangle, Carbon County, Wyoming

ELMO QUADRANGLE WYOMING—CARBON CO.

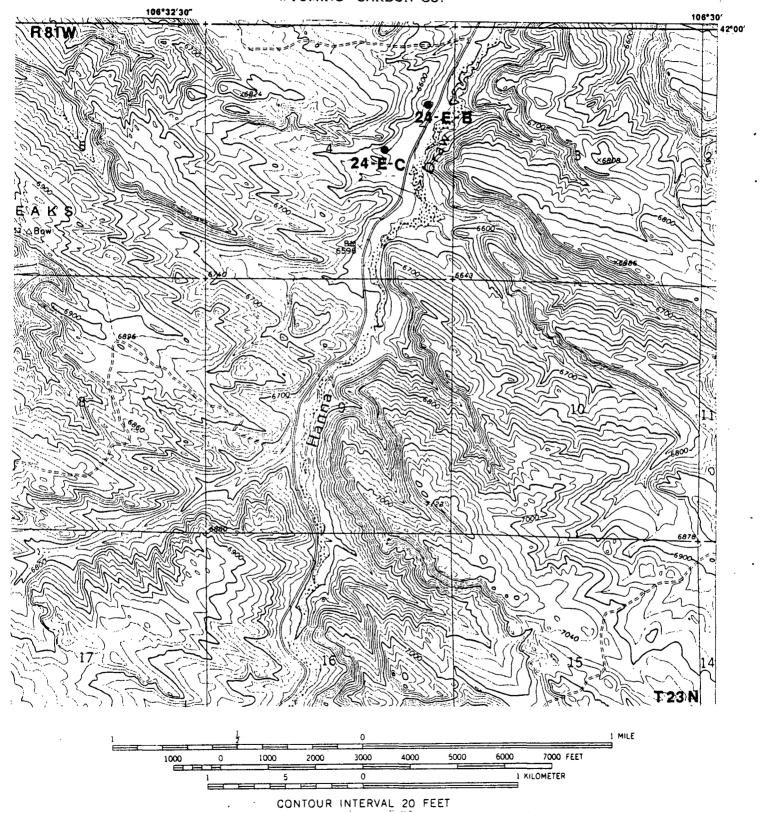


Figure 3.--Drill hole location map, northeast part of Elmo Quadrangle, Carbon County, Wyoming

ELMO QUADRANGLE WYOMING-CARBON CO.

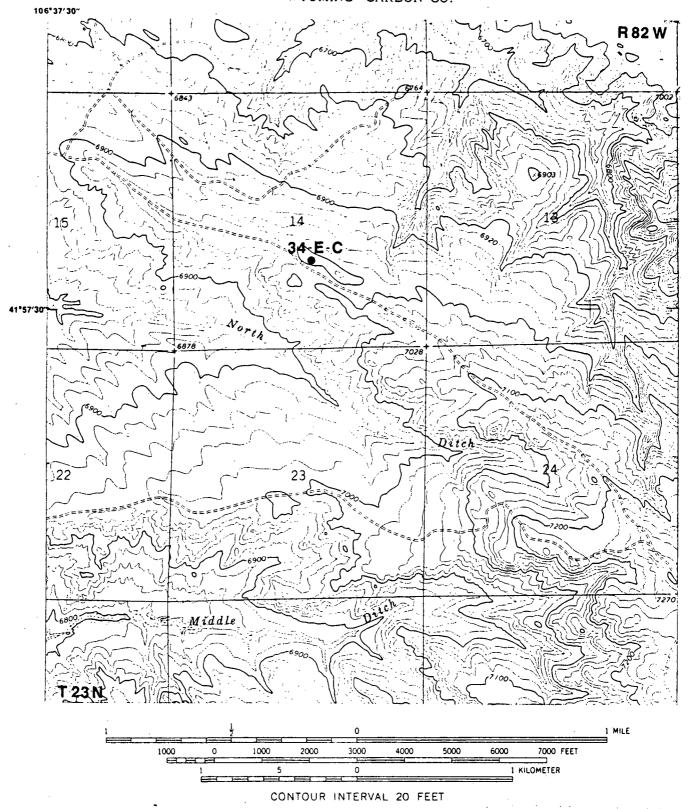


Figure 4.--Drill hole location map, northwest part of Elmo Quadrangle, Carbon County, Wyoming

,

		L	ITHOLOGIC AN	D GEOPHYSICA	L LOGS		
LOCATION	NUMBER	24-E-B	DATE	July 10, 1979	SURFACE ELEVAT	ION(ft)	6540
LOCATION	NW\zne\zs	EZNEZ	Sec. <u>4</u>	T. 23 N.	R. <u>81 W.</u> Quad.	Elmo	
	COUNTY	Carbon	STATE W	yoming	TOTAL DEPTH(ft) _575	
CORED	YES	NO X	INTERVA	L(s)			
DRILLING	MEDIUM:	X AIR	FOAM	MUD	WATER OBSER	VATION WEL	L
GEOPHYSI	CAL LOGS:						
	ural Gamma na Gamma	;	Scale 13 Scale 1.3		Logging Speed	15 15	fpm

20 ohms/in 1"/in

15

fpm

fpm

Scale __ Scale __

Resistivity

Caliper

		Lithology	Strip Log	Dep	th	C	eophys	ical Lo	gs
			St	ft	m	Gamma	Cal	Den	Res
5•0	10.5	Alluvium, light to medium- yellow brown, clayey sand		0 —	Γ.	-7-			. 12 • £
10.5	15.0	Alluvium, medium yellow-brown, clayey sand and silt					5	- F	<u> </u>
15.0	18.0	Alluvium, brown clayey sand	1 1		10	}	\	••• &	
18.0	25.0	Sandstone, light-yellow-brown, clayey		50 —		}	\ \{\bar{\chi}{2}\}	5.	
25.0	27.0	silty and clayey	-2.5		_20	3	{ -	} } {	
27.0	44.2	Sandstone and siltstone, gray, shaley			1	\ \\ \{\bar{\chi}}	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	$\left\{\begin{array}{c} \cdot \\ \cdot \end{array}\right\}$	
44.2	57.9	Shale, dark-brown to black, carbonaceous, lenses and very thin coal beds		100-	-30	\{	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		100
57.9	69.5		V Log		1	->	{	Ş) ·
69.5	71.0	Shale, black, carbonaceous			—40		<u>حب غ</u>	<u>کي</u> ∷ ک	· · ·
71.0	76.0	Coal, dull; carbonaceous shale	1 1			1 5	{ }	>	>
		partings	1 1		1	3		7	
76.0	79.5	Shale, black, carbonaceous	1 1	150 —	1		*		
79.5	85.5	Coal, bone and shale			- 50	\\{\cdot\}\			
85.5	91.0	Shale, black, carbonaceous, coaly				}		}	· · · · · · · · · · · · · · · · · · ·
91.0	95.5	Coal					ے لی کے	₹	! .
95.5	97.0	Shale, gray			-60	3	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	>	·
97.0	106.2	Sandstone, light- to medium- gray, very fine-grained, silty	region, to s	200 —			} {	3	>
06.2	112.3	Shale, medium-gray to black, carbonaceous, coaly			 70	2	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	\$	> -
12.3	115.5	Coal				2	-{	<u></u>	>

			Τ.			
		Lithology	Strip	De	pth	Geophysical Logs
 	· · · · · · · · · · · · · · · · · · ·		1 S 1	ft		Gamma Cal Den Res
115.	5 117.0	Shale, black, carbonaceous, coaly				
117.	0 124.0	Coal			1	
124.		Shale, black, carbonaceous	The		Ĺ	3 - 5 - 5
126.		Coal		3	√"	
130.		Sandstone, light- to medium-		300 -]	
	2 1300	gray, very fine-grained,	· Jerstander			
1 1/5	0 152 0	silty		1	100	2 2 2
145.		Siltstone, medium- to dark-gray]	
153.	0 186.5	Sandstone, light- to medium-	}	1	1	7 3 3
		gray, fine- to medium-			1 '	
		grained. Some thin interbeds		3 50-	110	3 3 4 6 6 6 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
1		of medium- to dark-gray	I		ļ	
		siltstone and shale		1]	
186.		Shale, light- to medium-gray		1 .]	\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\
189.	0 194.5	Coal and shale; shale is black,			120	
		carbonaceous and coaly		1	┧	
194.	5 196.5	Shale, black, carbonaceous	1	400-	ļ	
196.	5 200.8	Coal, shaly				-{
200.	8 204.3	Shale, black, carbonaceous,			130	
		partly coaly			1 .	
204.	3 206.0	Coal	1	ł	1	
206.	0 210.5	Coal and shale; shale is black			مُن ا	
ļ		and carbonaceous	}	4 50-	140	
210.	5 214.0	Shale, black, carbonaceous	}	1.50]	} } }
214.0		Coal			1	
222.	0 230.0	Shale, black, carbonaceous, and			—150	
		thin coal heds			1	-3
230.	0 234.5	Coal	1]	
234.	5 240.0	Shale, black, carbonaceous, and			j	1
		thin coal beds		500-	-160	
240.	0 245.0	Coal	ĺ.		f · ·	[] [] [] [] [] [] [] [] [] []
245.	0 246.5	Shale, black, carbonaceous				\ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
	5 249.5	Coal			1	
249.	5 269.0	Sandstone, light- to medium-	j		170	
İ		gray, very-fine-grained.	l			
Ì		Grades downward into		550		
· ·	•	siltstone, dark-gray with	1		•	Pulsa (75 18097) (75 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
		coal fragments			•	24-8-8
269.0		Shale, black, carbonaceous	j			JOHAN COM. FELD.
272.5	5 284.0	Coal, thin interbeds of black	[]			
		carbonaceous shale				
284.0	0 288.0	Shale, black, carbonaceous,				;
288.0	291.5	coaly Coal	.			·
291.5	•					· ·
6710.	> £30∙U	Shale, black, carbonaceous, coaly				
296.0	298.0		.			
298.0		Shale, black, carbonaceous, coaly				
300.	5 304.0	Coal and shale, interbedded.				
] 500.	7 - 704.0					
	-	Shale is black, carbonaceous and coaly			į	1
304.0	307.0	Shale, black, carbonaceous				
33440		onare, orack, carbonaceous		. -		

	Lithology	Strip	D.	epth		Geoph	ysical L	.005
		St S	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	fine-grained, silty							
325.0 335 335.0 346	.0 Sandstone, light-gray, very-							
346.0 352	fine-grained							
352.2 358								
358.2 371	•5 Siltstone, light- to medium- gray, sandy							
371.5 373	gray, silty							
373.0 378. 378.0 391.	gray, sandy							
378.0 391. 391.0 440.	fine-grained, silty							
440.0 470.	to coarse-grained					٠		
	gray, very fine-grained, silty							-
470.0 488.	O Sandstone, light-gray, very- fine-grained							
488.0 530.	gray, sandy							
530.0 542.	at base					·		
34210 3301	0 Sandstone, light- to medium- gray, very fine- to fine- grained						: :	
						,		
	·							
								1
					<u> </u>			

		LI	THOLOGIC AND GE	OPHYSIC	AL LOG	Ś			
LOCA	TION NU	MBER <u>24-E-C</u>	DATE July 19	1979	S	URFACI	E ELEVATIO	ON(ft) <u>6</u>	575
LOCA	TION_	SE4SE4SW4NE4	Sec. <u>4</u> T	- 23 N	R	81 W.	Quad. Elm	10	
	CC	OUNTY Carbon	STATE Wyomi	.ng	T	OTAL I	DEPTH(ft)	636	•
CORE	D YE	ES NO X	INTERVAL(s)		·		 		,
DRIL	LING ME	EDIUM: X AIR	FOAM [_ MUD		WATE	ER OBSERVA	TION WEL	L
GEOP	HYSICAL	LOGS:							
	Gamma Resist	Gamma ;	Scale 10 cps/in Scale 1.33K cps/ Scale 20 ohms/i Scale 1"/in	in	Log: Log:	ging S ging S ging S	Speed	15 15 15 15	fpm fpm fpm fpm
		· · · · · · · · · · · · · · · · · · ·		Ę.	Dept	n l	Geo	physical	Logs
		Lithology		Strip	ft	m	Gamma	Den	Res
0 5.0 11.0 15.0 19.8 22.0 23.0 28.0 30.8 40.0	11.0 15.0	very clayey Coal, shaly and b Siltstone, gray t carbonaceous Coal Clay, silty and s carbonaceous	-brown, fine- y bedded, -yellow-brown, ony to black, thale, black gray to white, ed, micaceous ight-gray to e-grained to soft; quartz lar ight-gray to		50	- 0 -10 -20 -30	month of the second of the sec	M.A. A. M.	E E E E E E E E E E E E E E E E E E E
80•0	87.0	grained, micace Sandstone, very 1 fine-to medium- quartz grains, sub-angular	ight-gray, grained;		200-	-80	My way	J. Maryana	Milway Win

		Lithology	Str1p Log	Der	oth		Geophysical Logs
			St	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	1 3	
92.0	95.0	Coal, shaly		•	1	 	· · · · · · · · · · · · · · · · · · ·
95.0	98.0	Shale, black, carbonaceous		300	1	}	·
98.0	102.0	Coal and shale. Shale is black and carbonaceous			-100	: : { : : ! : : : !	; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;
102.0	106.0	Shale, black, carbonaceous, very thin coal interbeds				}	
106.0	112.0	Coal, includes a few partings of black, carbonaceous, shale		3 50	-110	\ \{	360
112.0	115.0	Shale, black, carbonaceous		•	1	[
115.0	122.0	Sandstone and siltstone, medium— to dark-gray; sandstone is very fine— to fine-grained; unit is thinly		1	-120	}	200
		bedded		400-	1	- - - - -	400.
122.0	125.0	Coal		-	130		
125.0	133.0	Shale, dark-gray and black, with thin coal partings		•			{
133.0	136.0	Coal and very thin shale beds, black and carbonaceous			140		
136.0	142.0	Shale, medium- to dark- brownish-gray, carbonaceous		4 50			
	144.0	Coal	1 ' 1		-150		<u> </u>
144.0	147.0	Shale, medium- to dark- brownish-gray, carbonaceous		-	-150		
	149.0	Coal		500-			
149.0	153.0	Siltstone, medium- to dark- gray, and thinly bedded, medium-gray shale		500	—160	1	
153.0	156.0	Sandstone, medium-gray, very					3
		fine-grained, interhedded with medium-gray, thinly		550	—170 ·		840
156.0	159.0	bedded siltstone Siltstone, medium-gray, interbedded with light-gray,		550 —		Ę	*
		fine-grained sandstone			180	\$	
159.0	178.0	Sandstone, medium-gray, very				\ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	
		fine-grained, interbedded	1 1				3
ė		with medium-gray, thinly		600 —	—190 ·		<u></u>
		bedded siltstone		Ì	-	 	5 - - - - - - - - - -
178.0	181.0	Siltstone, medium-gray, with interbedded sandy shale					\
181.0	184.0	Sandstone, medium-gray, very fine-grained, interbedded with medium-gray, thinly bedded siltstone		1	200	24 - E	
134.0	186.0	Siltstone, medium-gray, interbedded with sandy shale					
186.0	187.2	Siltstone, as above and thin interbeds of coal		-			
187.2	189.0	Coal				[

	 .	I delicate and	Strip Log					·
}		Lithology	Str	Depth ft	m	Gamma	Geophysical 1	Res
189.0	194.0	Shale, dark-gray to black,		1 1	111	Gamma	1 ben	_ Kes
194.0	196.0	carbonaceous, silty]				
1	197.6							
1,000	137.0	carbonaceous and siltstone,						
197.6	199.8	medium-gray Coal			l			
199.8		Shale, dark-gray to black, carbonaceous and siltstone, medium-gray						
202.0	204.0							
204.0		Shale, dark-gray to black, carbonaceous, silty	i					
207.0	209.7	Coal						
209.7					Į			
		carbonaceous						
212.8		Coal						
215.2	,	thin coal beds						
217.0		Coal	ļ		ľ			
218.5		Shale, black, carbonaceous interbeds of bony coal						
1	229.0				}	1		•
229.0	230.0	Shale, medium- to dark-gray, carbonaceous						
230.0		Siltstone, medium- to dark-gray	ļ					
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		٠				
271.8	284.0	Siltstone, medium- to dark-gray	1		ľ		•	
		and thin interbeds of dark- gray shale					•	
284.0	351.0	Sandstone, light- to medium-			- 1		•	
		gray, fine- to medium-		!	1		:	
		grained, micaceous, quartz	}					
		grains, sub-angular	1				:	
351.0	363.2	Siltstone, gray, and sandstone, light-gray, fine- to medium-						
262.2	200	grained			.			
363.2	366.6	Sandstone, light-gray, fine- to medium-grained, crossbedded						
		and very-thin beds of gray siltstone			l			
366.6	370.0	Siltstone and sandstone, light- to medium-gray, fine- to						
		medium-grained, crossbedded			}			
370.0	375.0	Sandstone, light- to medium-			ļ			
-	•	gray, fine- to coarse-						
		grained, with medium-gray			.			1
		siltstone			į			
L								

		Lithology	Strip Log	,מ	epth		Geophysical Logs			
			St	ft	m	Gamma	Den	Res		
375.0	388.8	Siltstone, light- to medium-								
3,343	300.0	gray, with light-gray, fine-				}				
		to medium-grained sandstone	1							
388.8	395.0	Sandstone, medium-gray, medium-	1							
		to coarse-grained with thinly	1]						
		bedded siltstone	1	İ						
395.0	402.2	Siltstone, medium-gray, with	1	ł						
		sandstone	1	l						
402.2	411.0	Siltstone, medium-gray	1)		[
	421.0	Siltstone, with thin beds of								
		carbonaceous shale	1							
421.0	443.9	Siltstone, medium- to dark-gray					•			
	446.5	Shale, medium- to dark-gray,								
		very-silty	,	Į.						
446.5	452.0	Siltstone, medium-gray, very-		ļ						
		sandy								
452.0	459.0	Shale, medium- to dark-brown,		İ						
		very-silty				1				
459.0	467.0	Siltstone with shaly interbeds,	[
	,	medium- gray								
467.0	472.0	Siltstone, medium-gray	1	Ì						
472.0	475.0	Shale, medium- to dark-brown								
,,		and siltstone								
475.0	491.0	Siltstone, medium-gray								
	497.0	Siltstone, medium-gray, shaly			ı					
497.0	503.0	Sandstone, light-gray, very-								
		fine-grained								
503.0	513.0	Siltstone, medium-gray, sandy	1							
	538.5	Siltstone, medium-gray								
538.5		Siltstone, medium-gray, shaly								
541.5	549.0	Siltstone, medium-gray								
549.0	557.5	Siltstone, and shale inter-		·						
		bedded, medium-gray								
557.5	565.2	Sandstone, medium-gray, fine-	ļ.							
		to medium-grained, thinly]							
		bedded								
565.2	570.2	Siltstone, medium-gray, sandy			:	1				
570.2	587.5	Sandstone, medium-gray, fine-			•					
		to medium-grained, thinly								
		bedded	1							
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,	1							
		shaly								
619.0	636.0	Shale, carbonaceous, dark-gray								
		to black								
							•			
			1	l		i				

LITHOLOGIC AND GEOPHYSICAL LOGS

	, ,	
LOCATION NUMBER 34-E-C	DATE July 9, 1979	SURFACE ELEVATION(ft) 7005
LOCATION NWISWINWISEI	Sec. 14 T. 23 N.	R. 82 W.Quad. Elmo
COUNTY Carbon	STATE Wyoming	TOTAL DEPTH(ft) 155.7
CORED YES X NO	INTERVAL(s) 137-15	0
DRILLING MEDIUM: X AIR	X FOAM MUD	WATER OBSERVATION WELL
GEOPHYSICAL LOGS:		
Gamma Gamma ; So Resistivity ; So	cale 10 cps/in cale 1K cps/in cale 20 ohms/in cale 1"/in	Logging Speed15fpmLogging Speed15fpmLogging Speed15fpmLogging Speed15fpm

	•	Lithology	Strip Log	Depth		Geophysical Logs			
			St	ft	m	Gamma	Cal	Den	Res
0	5.0	Colluvium, sand, clay and sandstone fragments		0)		•
5.0	17.0	Shale, dark-brown, carbonaceous)		1.		٠ کي	٠ الحجر :	
17.0	20.0	Shale, black, carbonaceous, coaly			—10	{	- 100 M	> 5	
20.0	33.0	Shale, light-gray, gypsiferous, clayey, silty		50 —		}			69
33.0	36.0	Siltstone, light-gray, clayey	1.		_20	}	- * {	· · · >	
36.0	37.0	Claystone, gray, silty			-20	# _. }	.₹`\$	حي: .	
37.0	38.6	Coal, bony		,			{ کے }	. : `\	
38.6	42.0	Shale, black, carbonaceous, coaly			-30			,	3
42.0	49.2	Shale, medium-gray, silty		100-	-	l	} {	:	:
49.2	56.0	Sandstone, light-gray, silty		•	ł		;{	· i	· ,
56.0	78.0	Siltstone, medium- to dark- gray, clayey and shaly; some interbedding of thin shale			—40			E	
78.0	90.0	Sandstone, light-gray, fine- to coarse-grained, crossbedded		150			·}	<u></u>	
90.0	105.0	Sandstone, light-gray, fine- to medium-grained, crossbedded gypsiferous, feldspathic, quartz rounded to sub-rounded				34 - E - C	CALPER III	75 SO 100	150 SSS
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							

<u></u>		Lithology	Strip Log					
		Lithology	Str	ft	epth n	n Gamma	Geophysical Cal Den	Res
112 0	115.0	01-1-1-1-1	 	7.5		Gamma	I car pen	
113.0	113.0	Shale, dark-brown,	ļ					
		carbonaceous, coaly with some light-gray sandstone						
115.0	125.0	Shale, dark-brown to black,		Ì				
11340	12300	carbonaceous	1					
125.0	135.0	Sandstone, light- to medium-	l	·		Ì	,	
		gray, medium- to coarse-				1		
		grained, feldspathic and		ļ		'		
		gypsiferous with thin, coaly,						
		carboniferouss shale cross-						
		beds	1					
135.0	137.0	Sandstone, light- to medium-						
		gray; interbedded with thin,	1					
		dark-brown beds of						
		carbonaceous shale						
137.0	142.0	Sandstone, light- to medium-		•				
		gray, medium- to coarse-						
1/2 0	1/2 2	grained; with black chert						
142.0	143.3	Sandstone, light- to medium-						
		gray, medium- to coarse-						
		grained with black chert,	1					
143.3	143.4	bony coal, carbonaceous shale						
	143.8	Shale, carbonaceous						
	143.9	Coal, bony						
	144.5	Shale carbonaceous					•	
	144.6	Sandstone, light-gray, fine-	İ					
		grained, crossbedded with						
		carbonaceous shale	1			1		
144.6	145.8	Coal, bony, and black,						
		carbonaceous shale						•
	146.3	• • • • • • • • • • • • • • • • • • • •						
146.3	146.8	Clay, medium- to dark-gray	Ì		•			
140.8	150.0	Claystone, dark-gray,						
150.0	150.6	carbonaceous						
150.6	151.6	Shale, black, carbonaceous Clay, medium-dark-gray,	}					
130.0	131.0	slightly carbonaceous	<u> </u>					
151.6	151.8	Shale, black, carbonaceous						`
151.8	151.9	Coal	}					
151.9	152.1	Shale, black, carbonaceous						
152.1	152.4							
l 52•4	155.7	Sandstone, light- to medium-						
		gray, medium- to coarse-						
		grained; with feldspar and						
		black chert grains						
						1		
٠			1	}				
	•			[
						1		•
			<u> </u>	L				

LITHOLOGIC AND GEOPHYSICAL LOGS

LOCA	ATION N	UMBER 38-CW DATE July 20	0, 197	9	SURFAC	E ELEVATION	I(ft) <u>68</u>	85
LOCA	ATION _	NW\fine\family Ne\family Sec. 20 T.	23 N	R.	80 W.	Quad. Come	West	
	. C	OUNTY Carbon STATE Wyomin	ng		TOTAL	DEPTH(ft) _	415	
CORE	ED Y	NO X INTERVAL(s)_						
DRIL	LING M	EDIUM: X AIR FOAM] MU	D [WAT	ER OBSERVAT	ION WELI	L .
GEOP	HYSICAL	LOGS:						
	Gamma	Gamma ; Scale 1.33K cps/ ivity ; Scale 20 of	ms/in	Lo Lo	gging gging gging gging	Speed	15 15 15 15	fpm fpm fpm fpm
		Lithology	Strip	Dep	th	Geop	hysical	Logs
			St St	ft	m	Gamma C	al Der	Res
0	15.0	Colluvium, yellow sand, coarse-		0 -		- 4		
		grained; a few pebbles		1	·		i	
15.0	22.0	Sandstone, light-yellow, to						<u>.</u>
		light-gray, medium- to				حے ا		
		coarse-grained	1		10		}	5
22.0	27.0	Siltstone, medium-gray, sandv]			
27.0	34.0	Sandstone, light-yellow, to		50			\[\frac{1}{2}\]	· · · · · · · · · · · · · · · · · · ·
		light-gray, medium- to	İ		20	**	=	
34.0	38.3	coarse-grained Siltstone, medium-gray, sandy	İ			-	<u> </u>	
38.3	40.0	Sandstone, yellowish-brown to			ļ	├	}	
	4000	dark-brown, medium- to coarse-grained, silty and clayey		100_	—30	}		199
40.0	45.0	Sandstone, yellowish-brown	1			5		}
		silty and clayey, poorly		'	—40		} · ₹	- {
	.	indurated			,	7	3	
45.0	54.0	Sandstone, yellowish-brown,		ļ · · · · ·		3	3	· [
		fine- to coarse-grained,		150	·		· · · · · · ·	180
54.0	63.0	poorly indurated Siltstone, medium-gray, sandy	ŀ		- 50	\$	\ `	
63.0	80.0	Sandstone, light-gray, medium-				_5	<u> </u>	
		to coarse-grained,	1		Ì		<u>} </u>	
		conglomeratic; pebbles, 1/8"	1	-	60		{	-
		to 3/8", of black chert,		200 —		3	5	}
		quartz; some pyrite, rounded					<u> </u>	<i></i>
		to sub-rounded					محجر جح	
80.0	95.0	Sandstone, light- to medium-		,		* * * * * * * * * * * * * * * * * * *		
		gray, medium- to coarse-				5	3	
		grained; with black chert				4	}	250.
		grains	ــــــــــــــــــــــــــــــــــــــ	250-				

		Lithology	Strip Log	De	pth		Geophysi	ical Logs
			N N	ft	m	Gamma	Ca1_	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		300 —	-90			}
	111.0	Siltstone, medium-gray, sandy Sandstone, light to medium- gray, medium- to coarse- grained, conglomeratic streaks, quartz rounded to sub-rounded, pyrite and feldspar		3 50-	—10 0 —110		2	265
175.7	199.0	Siltstone, light- to medium- gray, sandy and clayey				5	جمر المنظ	
199.0	200.3	Claystone, medium-gray, silty				, £		
200.3	214.0	Siltstone, medium-gray, clayey	j			:		
214.0	218.2	Claystone, medium-gray, silty]			38 - CY		
218.2	252.0	Siltstone and sandstone interbedded, medium-gray; sandstone is fine-grained				traca	HANNA COM, FEELD	
252.0	260.0	Siltstone, medium-gray, interbedded with light-gray sandstone, medium-grained;					: '	
260.0	270.0	pyrite 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-						
315.0	325.0	gray, thin shale 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		Lithology	Strip Log	D	epth		Geophysical Logs		
		-	St	ft		n Gamma			
	344.5	thin interbeds of dark-gray shale							
	352.8	silty							
352.8	354.5	gray, silty							
354.5	372.0	slightly carbonaceous							
372.0	415.0	Shale, medium- to dark-gray							
·		Geophysical log ends at 387.0. The drill hole collapsed.							
						,			
								•	
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								, , ;	
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LITHOLOGIC AND GEOPHYSICAL LOGS LOCATION NUMBER 39-CW DATE July 22, 1979 SURFACE ELEVATION(ft) 6865 LOCATION NELNELNWLNWL Sec. 20 T. 23 N. R. 80 W. Quad. Como West COUNTY Carbon STATE Wyoming TOTAL DEPTH(ft) 495 CORED INTERVAL(s) YES NO X DRILLING MEDIUM: FOAM MUD WATER OBSERVATION WELL AIR х GEOPHYSICAL LOGS: Natural Gamma Scale 5 cps/in Logging Speed 15 fpm Logging Speed _ Logging Speed _ Scale 1.33K cps/in Gamma Gamma 15 fpm Resistivity Scale 20 ohms/in Logging Speed 15 fpm Caliper 15 Scale l"/in Logging Speed fpm

		Lithology	Strip Log	Dep	th	G	eophys	ical L	ogs
			St		m.	Gamma	Cal	Den	Res
0	15.0	Colluvium, yellow-brown to red silty, sandy clay		0		3]_	•
15.0	25.0	Sand, light-yellow-brown, unconsolidated, medium- to coarse-grained; clayey			10	A CONTRACTOR	}		3
25.0	39.0	Sandstone, light-yellow-brown, medium- to coarse-grained with some black chert and siltstone bands		50 —	—20	MA AND THE STREET OF THE STREE			•
39.0	44.0	Sandstone, light-gray to white medium- to coarse-grained, sub-rounded quartz and black chert		100	30			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	100
44.0	120.0	Sandstone, light- to medium- gray, medium- to coarse- grained conglomeratic; chert and quartz pebbles and some pyrite		•	40	Jamas			
120.0	140.0	Sandstone, medium-gray, medium- to very-coarse-grained; quartz grains, rounded to sub-rounded, some thin clay and shale beds	,	150	50 60	happy De Maria	- Ma		150
140.0	170.0	Sandstone, medium-gray, coarse- grained, conglomeratic	·	200-		-		5 }	200
170.0	173.0	Shale, medium- to dark-gray- brown		1	-70	\$	کچ	کے کم محمر	
L 73•0	174.0	Siltstone, medium-gray				3	}	}	
				250-				}	> 260

		Lithology	trip		pth		Geophys	ical Lo	
			N N	ft	m	Gamma	Cal	Den	Res
174.0	180.3	Shale, medium- to dark-gray,		I	_==0	ļ	<u> </u>	}	·
100 0	005.0	clayey and silty						` \ `	٠
180.3	205.0	Siltstone, medium-gray, clayey;		1	1	1		} <u>.</u>	ζ:
		sample includes some dark-		1		3		\	<u></u>
•		gray shale, red dog and		1	↑ ~	}		}	
205.0	209.0	clinker particles Shale, medium- to dark-gray,		300 -	-{	}			300
203.0	203.0	silty, partly carbonaceous	1	1	1	\$. }	\ <u>-</u>
209.0	215.0	Siltstone, medium-gray;			-100	1		}	
		contains many thin beds of	1		}	\ \	+}		<u> </u>
ļ		dark-gray claystone,		1		[4		£	
	•	carbonaceous		i	110		<u> </u>	- \	+
215.0	222.8	Siltstone and claystone,		3 50~	1		<u> </u>	_ ج	950
		interbedded, medium- to dark-	1		1		£	. <u>(</u> :	
		gray, partly carbonaceous	1		1	_	25	# 6 6 Name of	100 100 100 1117 pen
222.8	226.5	Siltstone, medium-gray, clayey	1	1	120		-		. ;
226.5	220.0	and sandy			1		}		
220.3	230.0	Siltstone and claystone	1	400-]		E		409
230.0	234.8	interbedded, medium-gray Siltstone, medium-gray		100	130		\$		
234.8	241.3	Claystone, medium-gray, very			130	- 4			
234.0	27103	silty	Section 1	1	1	- \			<u> </u>
241.3	249.0	Siltstone, medium-gray, clayey	1		1	-3	• 		
249.0	254.0	Siltstone, medium-gray, sandy	j		140	3	·		
254.0	262.0	Siltstone, medium-gray		4 50	4	3	-		460
262.0	311.0	Sandstone, light-gray, medium-		1	4	£	2		
ļ		to coarse-grained; quartz		Ì]	50um 5	>		
		grains sub-angular to sub-		j	J-150	1 E		. ::	
		rounded; chert pebbles,		1	1				:
•		hornblend and quartzite with		l		25 - C	A CP8		
211 2	226.2	pyrite				_MAGA	. HANNA COAL FIEL	م	
311.0	336.0	Sandstone, medium-gray, coarse-							
		grained; conglomeratic, rounded chert pebbles, quartz	1						
		and quartzite; quartz grains;							
		rounded to sub-rounded with							
		pyrite							
336.0	344.8	Shale, dark-gray, carbonaceous,						·	
		traces of coal and bony coal	1						
	351.8	Shale, dark-brown, carbonaceous					•		
351.8	354.8	Shale, dark-brownish-gray,							
354.8	372 A	clayey, carbonaceous							
JJ4+0	.3/2•U .	Shale, dark-brownish-gray, clayey							
372.0	374.2	Shale, dark-brownish-gray,							
	·	carbonaceous	1 1						
374.2	390.3	Shale, dark-brownish -gray,	1 . 1						
		clayey	1					•	
390.3	394.3	Shale, dark-brownish-gray,	1 1						
		carbonaceous] [
394.3	408.0	Shale, dark-gray to dark-							
		brownish-black, slightly			'				
		carbonaceous							
408.0 410.5	410.5	Siltstone, medium-gray, clayey Sandstone, medium-gray, silty					,		
410+3·	414.0	bandstone, mentum-gray, Silty							

		Lithology	Strip Log	De	pth			ysical Lo	
420.7 428.0 443.0 464.2 473.0	420.7 428.0 443.0	bony coal streaks Shale, dark-gray, carbonaceous Shale, medium- to dark-gray Siltstone, medium-gray, carbonaceous, sandy		ft	m	Gamma	Cal	Den .	Res
		Hole closed below 350 feet, gamma ray log run through drill rod.							•
				·		·			
							•		
				·	· :				
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		LITHOLOGIC AND G	EOPHYSI	CAL LOGS	
LOC	ATION N	UMBER 40-CW DATE July	21, 1979	SURFAC	CE ELEVATION(ft)_6825
LOC	ATION S	SELNWLSELSEL Sec. 18	T. 23 N.	R. 80 W	Quad. Como West
	C	OUNTY Carbon STATE Wy	oming	TOTAL	DEPTH(ft) 475
COR	ED Y	ES NO X INTERVAL(s)		
DRI	LLING M	EDIUM: X AIR X FOAM	MUI	WAT	ER OBSERVATION WELL
GEO	PHYSICA	L LOGS:			
	Gamma	al Gamma ; Scale 5 cps/ Gamma ; Scale 1K cps tivity ; Scale 20 ohm er ; Scale 1"/in	/in s/in	Logging Logging	Speed 15 fpm Speed 15 fpm Speed 15 fpm Speed 15 fpm
		Lithology	Strip	Depth	Geophysical Logs
0	25.0	Alluvium, yellowish-gray sand	S	ft m	Gamma Cal Den Res
25.0		and silt Sandstone, light- to medium-			}
30.0		gray, fine- to medium-grained Sandstone, light- to medium-gray, fine- to coarse-		-10	
59.0	85.0	grained, cherty Sandstone, light- to medium- gray interbedded with coal		50 — —20	
85.0 90.0	90.0 93.0	Sandstone, light- to medium- gray, fine- to coarse-		10030	
93.0 96.0	96.0 105.0	grained; with black chert Siltstone, dark-gray, sandy Sandstone, light- to medium- gray, fine- to coarse- grained; with black chert and		-40	
105.0	115.0	quartz, sub-angular 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	4	200 —	
120.0	130.0	Sandstone, light- to medium- gray, medium- to coarse- grained with thin		70	

carbonaceous shale

				· ·	~
		Lithology	Strip	Depth	Geophysical Logs
			07 17	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		-90	
147.0	155.2	Sandstone, light- to medium- gray, fine-grained, silty		300	300
155.2	165.0	Siltstone, medium-gray		-100	\ \{\} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
165.0	173.3	Shale, medium-gray, clayey		1	
173.3	176.0	Sandstone, medium-gray, fine- grained, silty			
176.0	181.0	Siltstone, medium-gray, clayey		3 50-110	S S S S S S S S S S
181.0	199.7	Coal			5 - 2 - 2 - 2
199.7	210.8	Shale, medium-gray, silty			} > -
210.8	215.3	Coal		1	
215.3	218.0	Shale, dark-brown and black, carbonaceous, includes a very		-120	3
218.0	219.7	thin bed of bony coal Coal		40.0	1
219.7	225.0	Shale, black, carbonaceous,		130	}
	22300	some bony coal	İ	1	
225.0	230.0	Siltstone, light- to medium- gray, sandy		—140	\\
230.0	240.0	Shale, medium- to dark-gray, carbonaceous		4 50	
240.0	275.0	Sandstone, light-gray, coarse- grained		ł	- 10 10 10 10 10 10 10 10 10 10 10 10 10
275.0	279.7	Siltstone, medium-gray, clayey			40 - CW
279.7	284.0	Sandstone, light-gray, coarse- grained			USQS MANHA COAL FELD
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		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			
					L

		Lithology	Strip Log	De	pth		Geophysical 1	Logs	
	 -		S 7	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						,	
•									
			,						
		•					•		
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