

THE GEOLOGICAL SURVEY OF WYOMING
Gary B. Glass, State Geologist

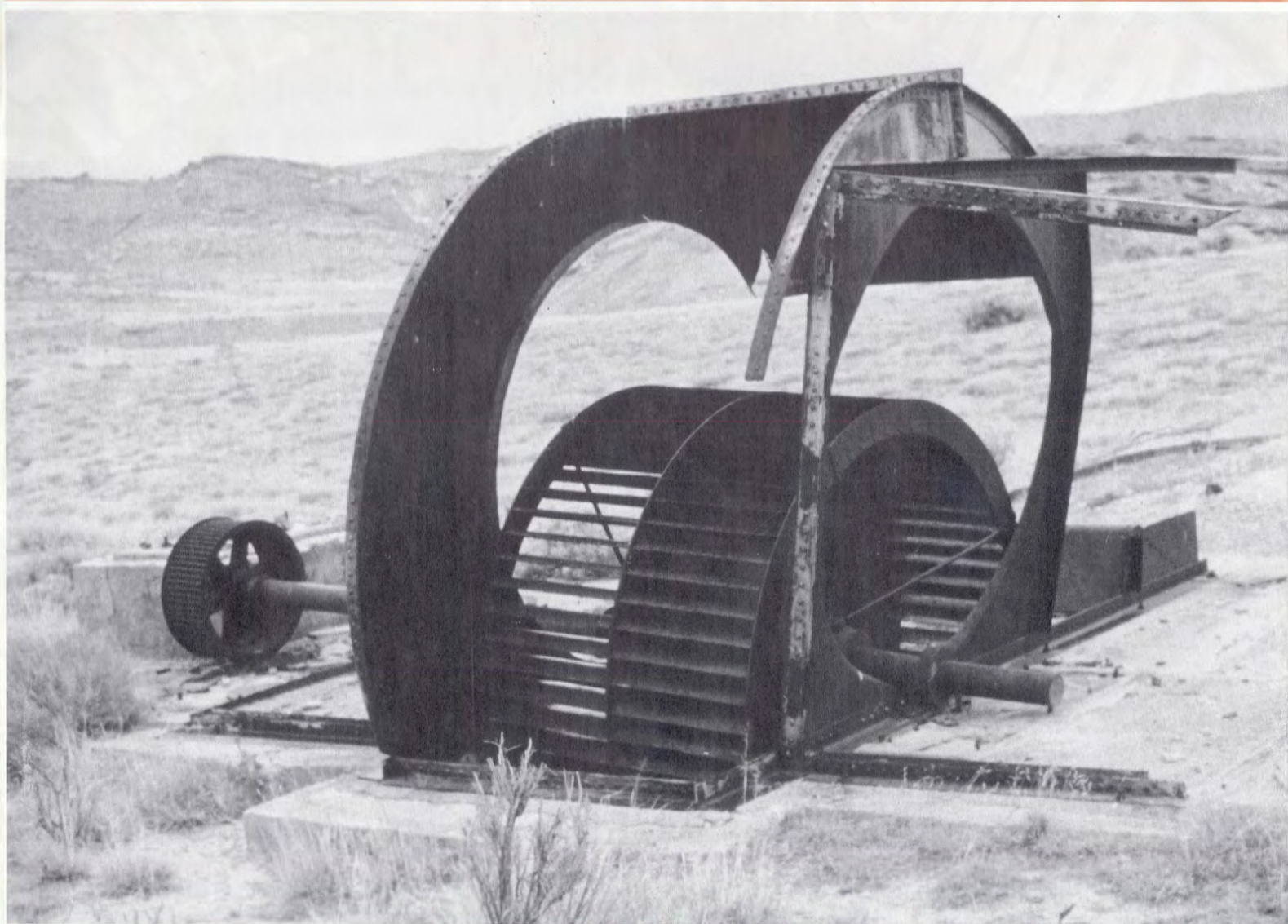


RESULTS OF COAL DRILLING PROJECTS IN THE BIGHORN BASIN, WYOMING

compiled by

Paul J. Taucher, Robert W. Gregory, and Gary B. Glass

Prepared in cooperation with the U.S. Bureau of Land Management



Report of Investigations No. 43
1990

Laramie, Wyoming

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Cover photo: This 6-foot-high structure housed a ventilation fan for a large underground coal mine at Gebo, Wyoming (section 10, T.44N, R. 95W). The Gebo No. 2 mine, which operated from 1926 through 1957, was later named Owl Creek No. 2 and was known as the Burnell No. 2 mine when it was abandoned in 1944. (Photograph by Richard W. Jones, 1984.)

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Introduction

In November, 1986, the Geological Survey of Wyoming entered into Cooperative Agreement No. WY-910-CA7-01 with the U.S. Department of the Interior, Bureau of Land Management (BLM) to "... release to the public, the geologic information collected with public funds or in response to a Federal mandate." Federal funds were made available through a grant to the Geological Survey of Wyoming to publish reports on coal exploration projects conducted in the Worland (Bighorn Basin) and the Rawlins (Wind River Basin and Hanna area) district offices of the BLM. This report presents drill hole and coal analytical data from projects located in the Bighorn Basin, Wyoming.

This report includes drill hole information from BLM-sponsored projects and from privately conducted projects on expired or relinquished Federal coal leases. Data on these coal leases is declassified and became available to the public following relinquishment or expiration. Drilling data from coal leases once held by Northwestern Resources Company, a subsidiary of Western Energy Company; Resource Exploration and

Mining, Incorporated; Western Nuclear, Incorporated; Owl Creek Coal Company, and other private interests are included in this report.

The authors of this report have not attempted to name or correlate the coals identified in any of the drill holes. In a few cases, however, the drill hole records in Appendix A include a coal bed or coal zone name designated by a company.

Because the Geological Survey of Wyoming did not generate any of the subject data, the authors cannot warrant their accuracy, particularly with regard to the analytical data, which was provided from various sources. Also, descriptions and use of trade names and commercial products in this report do not constitute their endorsement by the State of Wyoming, the Geological Survey of Wyoming, or the U.S. Department of the Interior, Bureau of Land Management. Trade names and commercial products are provided for descriptive purposes only.

Geographic and geologic setting

This report describes 102 drill holes located in the southern and eastern Bighorn Basin, Hot Springs, Washakie, and Big Horn Counties, Wyoming. All drill holes are located in the Bighorn coal basin of northwestern Wyoming (Figure 1). This coal basin is part of the larger Bighorn structural and topographic basin; boundaries of the coal basin are based on the areal limits of the stratigraphically lowest major coal-bearing formation in the area, the Mesaverde Formation. A general summary of coal occurrences and development in this coal basin is given in Glass and others (1975).

The 102 drill holes are located in 13 subareas within this coal basin (Figure 2). Most (89) of the drill

holes are located in the Gebo mining district north of Thermopolis, Wyoming (Figure 3 and Figures 13 to 15), where exploration for coals in the Upper Cretaceous Mesaverde Formation occurred. Eleven drill holes are located in a area southwest of Ten Sleep (Figures 4, 10, and 11) and in the Manderson district between the towns of Worland and Basin (Figures 5 to 9). Coal beds in the Upper Cretaceous Lance and Meeteetse Formations and the Paleocene Fort Union Formation were exploration targets in this latter area. Two drill holes are located in the Grass Creek district northwest of Thermopolis (Figure 12), where exploration for coals in the Paleocene Fort Union Formation occurred.

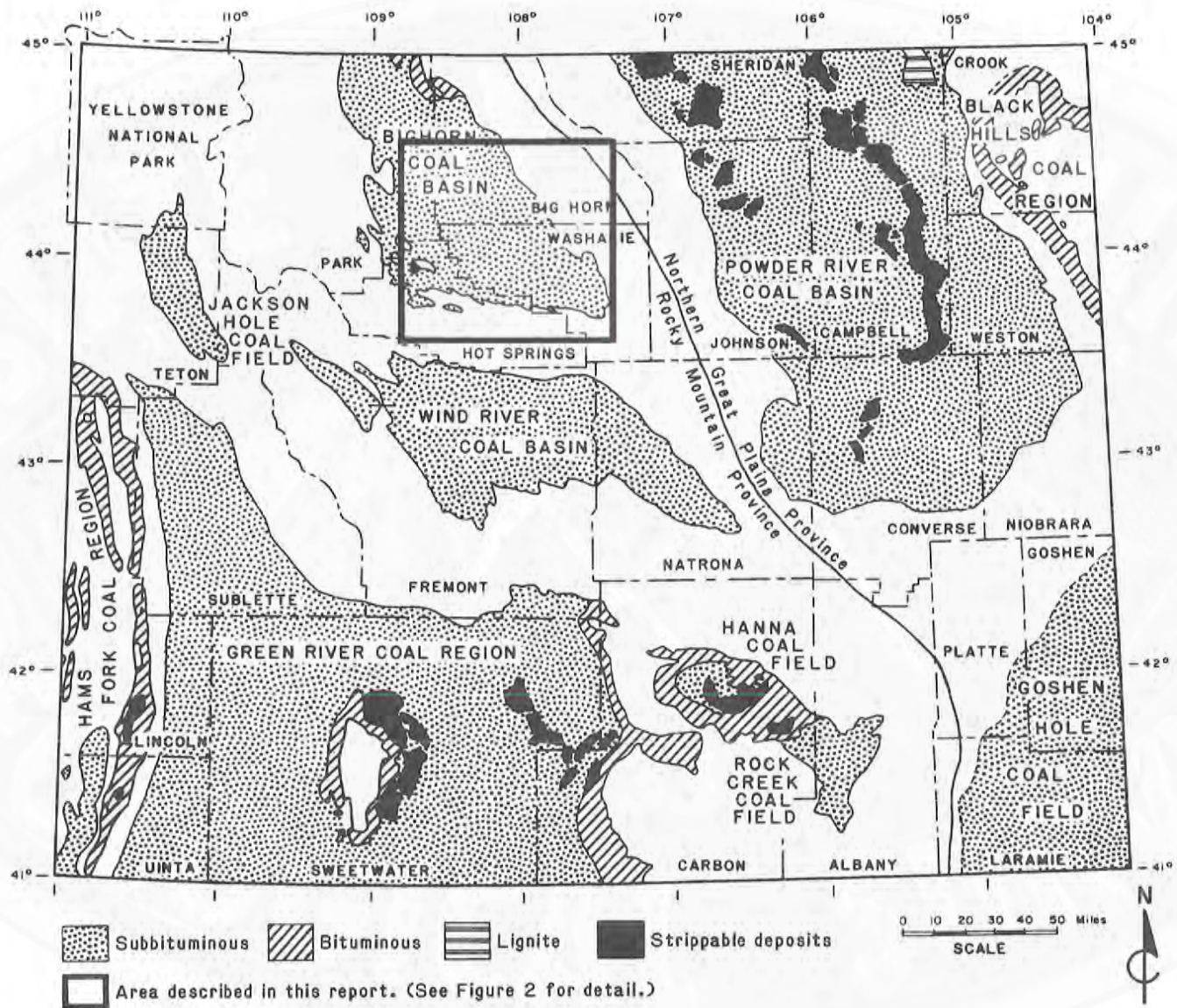


Figure 1. Index map showing the area of this report and other coal-bearing regions of Wyoming.

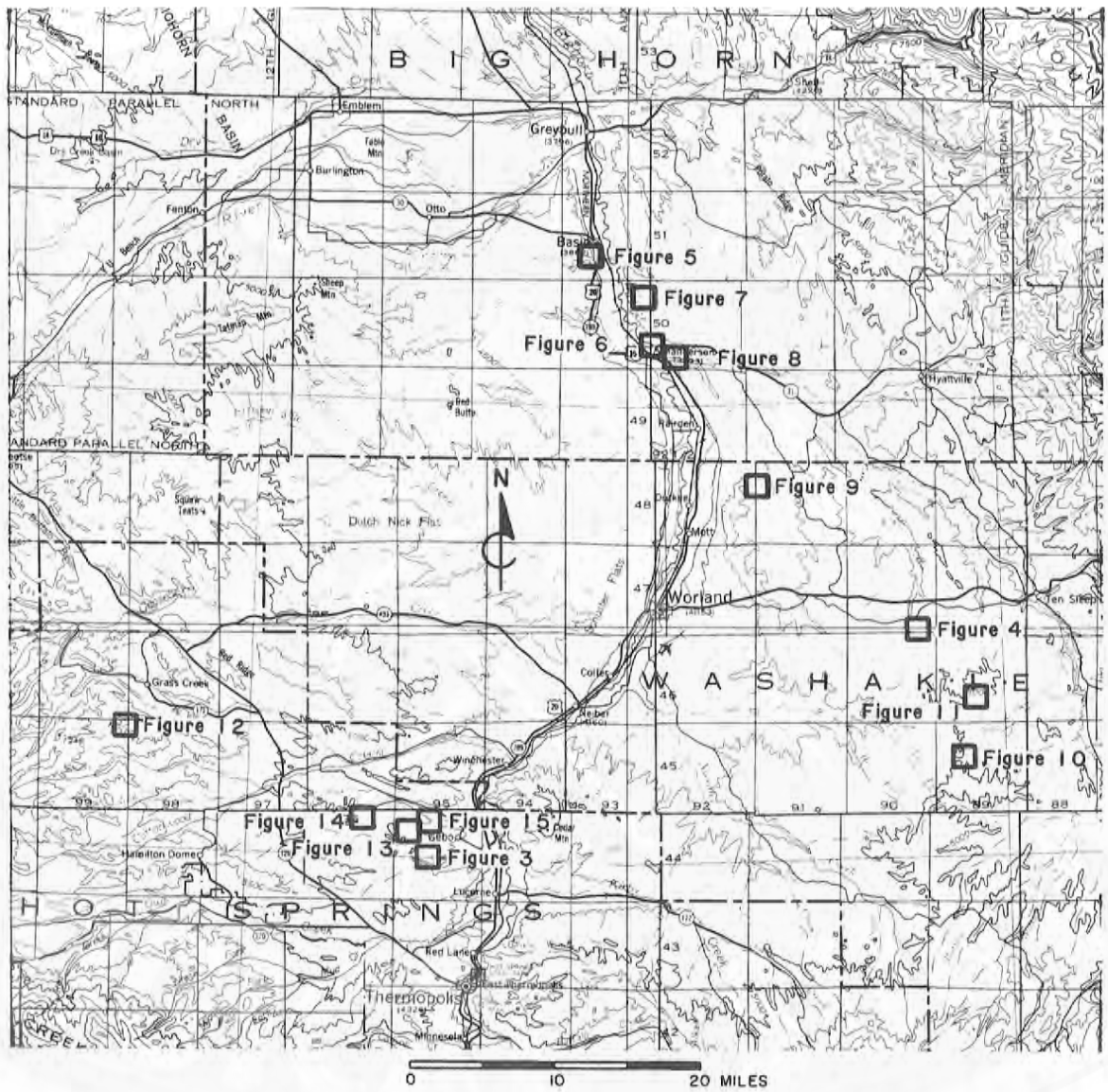


Figure 2. Index map of drilling project areas showing locations of detailed drill hole maps (see Figures 3-15).

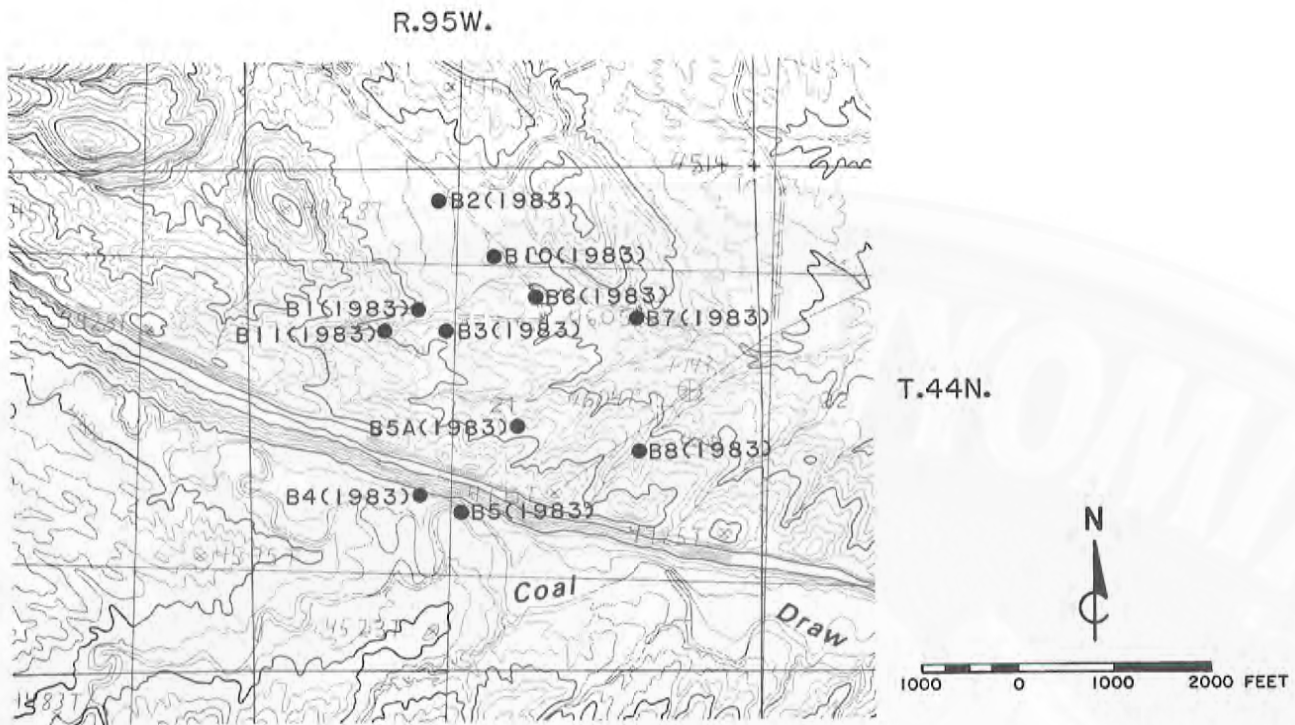


Figure 3. Locations of holes drilled by the U.S. Bureau of Land Management in 1983 in Hot Springs County (Data Base Sequence Numbers 70001-70011 in Appendix A). All these holes were drilled in the Upper Cretaceous Mesaverde Formation.

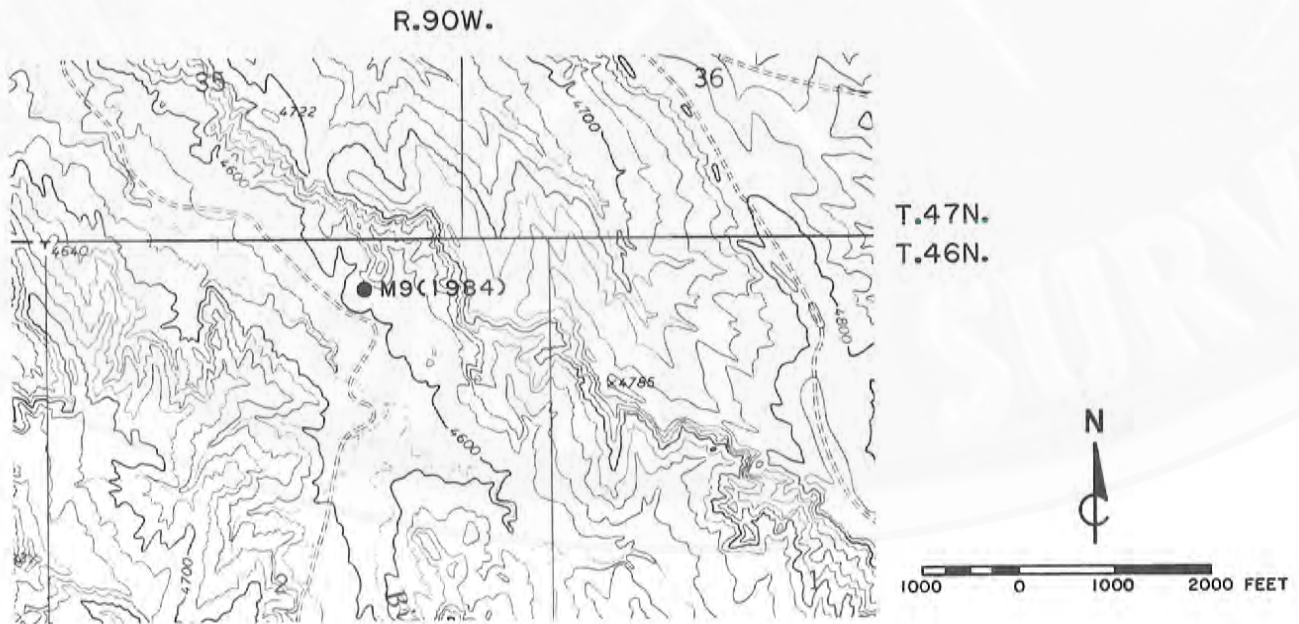


Figure 4. Location of the U.S. Bureau of Land Management's drill hole M9 (1984) in Washakie County (Data Base Sequence Number 70012 in Appendix A). This hole was drilled in the Paleocene Fort Union Formation.

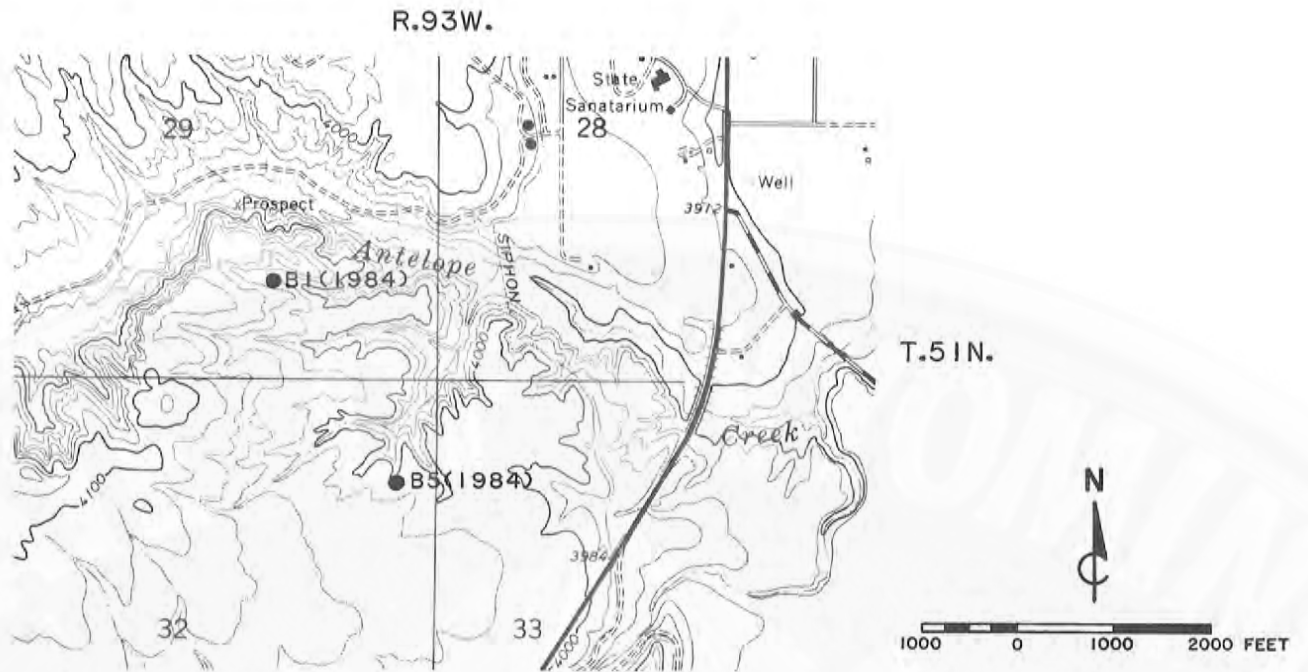


Figure 5. Locations of the U.S. Bureau of Land Management's B1 (1984) and B5 (1984) drill holes in Big Horn County (Data Base Sequence Numbers 70013 and 70014, respectively, in Appendix A). These two holes were drilled in the Paleocene Fort Union Formation.

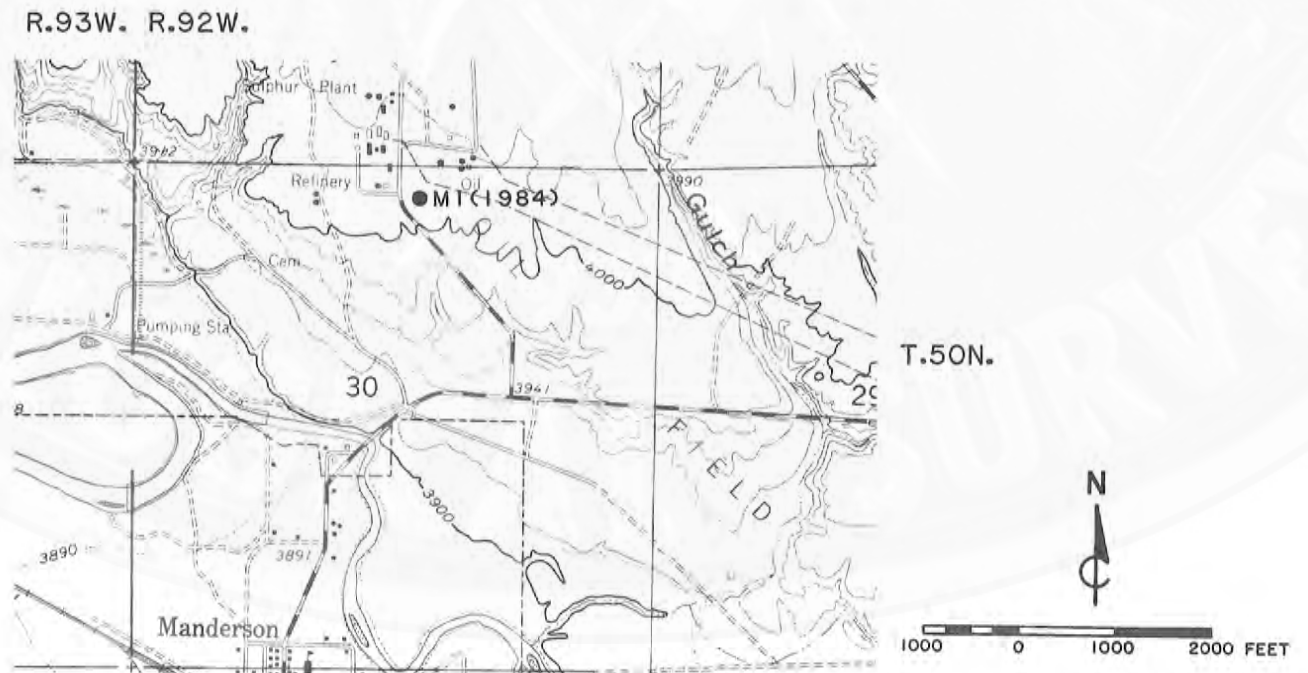


Figure 6. Location of the U.S. Bureau of Land Management's drill hole M1 (1984) in Big Horn County (Data Base Sequence Number 70015 in Appendix A). This hole was drilled in the Paleocene Fort Union Formation.

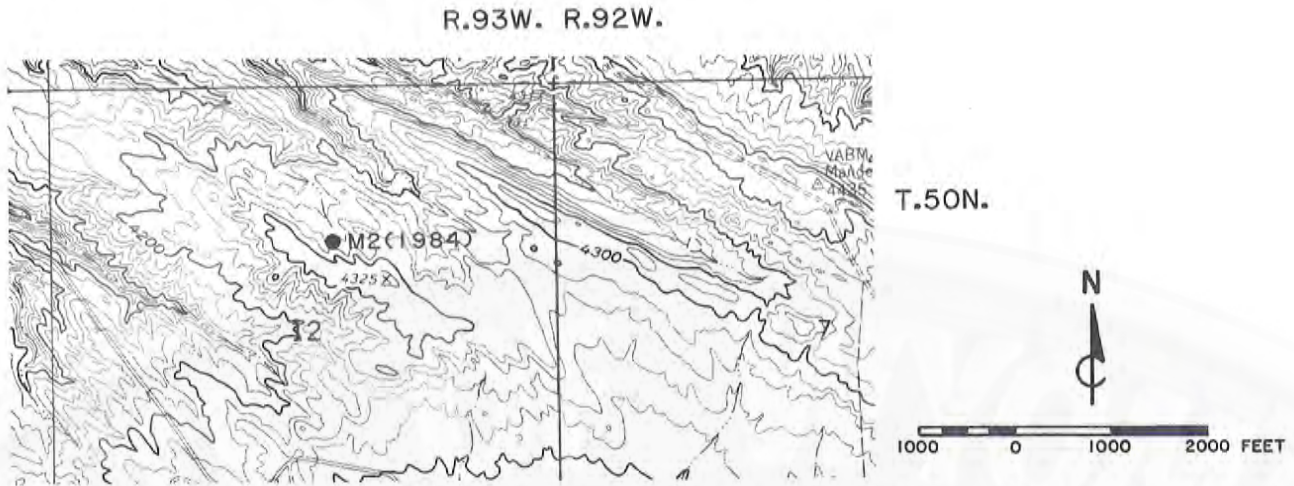


Figure 7. Location of the U.S. Bureau of Land Management's drill hole M2 (1984) in Big Horn County (Data Base Sequence Number 70016 in Appendix A). This hole was drilled in the Upper Cretaceous Lance Formation.

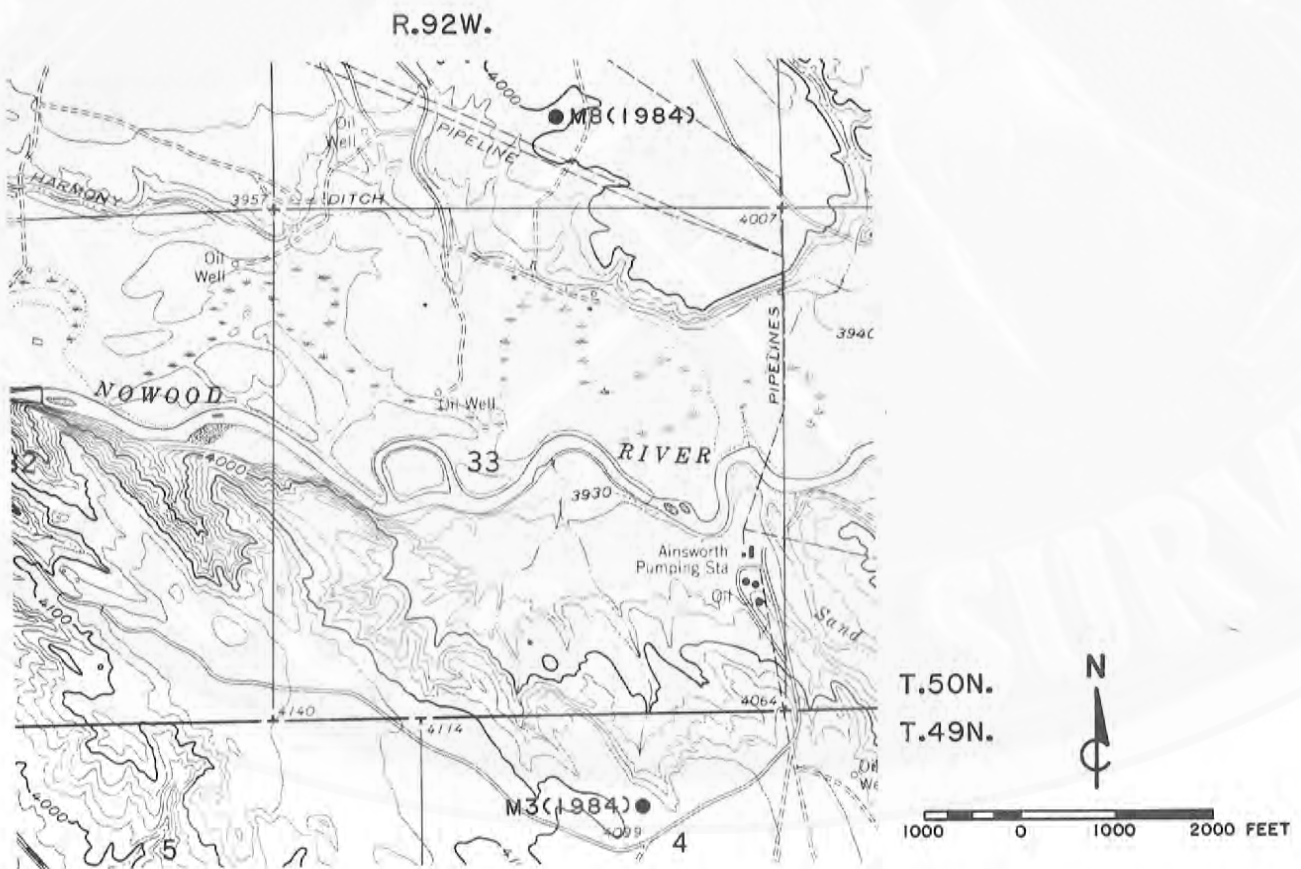


Figure 8. Locations of the U.S. Bureau of Land Management's M3 (1984) and M8 (1984) drill holes in Big Horn County (Data Base Sequence Numbers 70017 and 70022, respectively, in Appendix A). Drill hole M3 (1984) was drilled in the Upper Cretaceous Lance Formation; drill hole M8 (1984) was drilled in the Upper Cretaceous Meeteetse Formation.

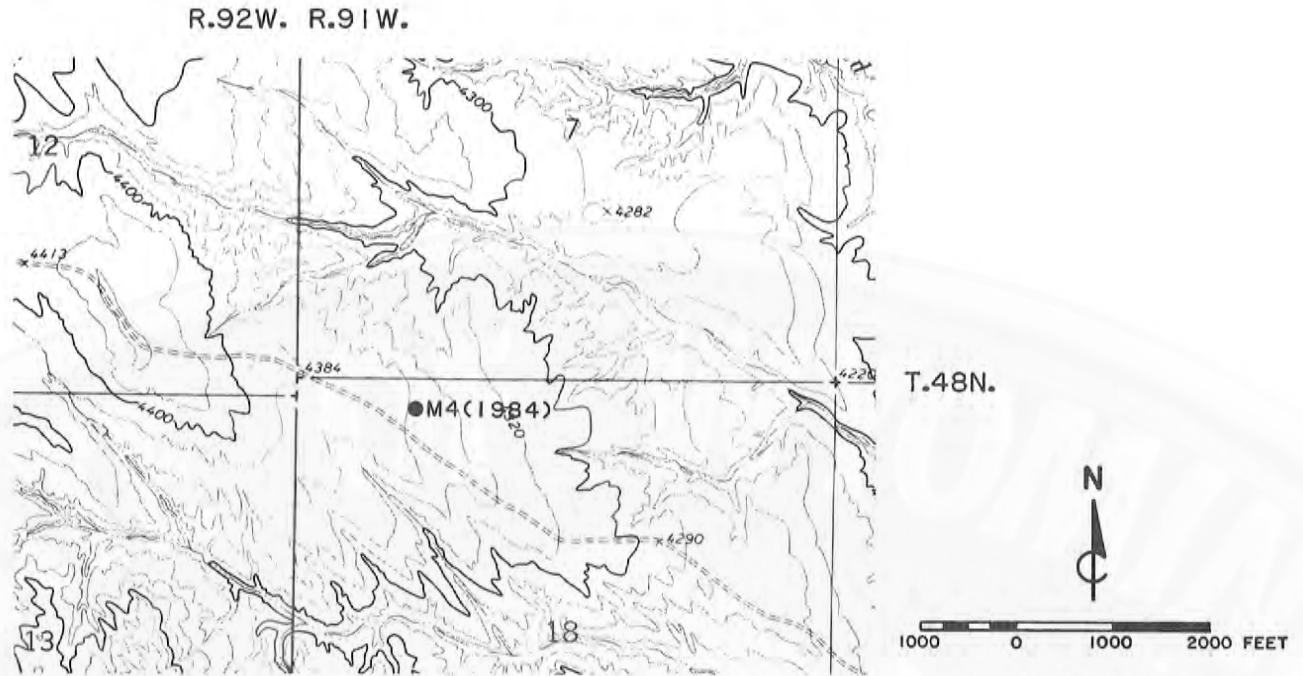


Figure 9. Location of the U.S. Bureau of Land Management's M4 (1984) drill hole in Washakie County (Data Base Sequence Number 70018 in Appendix A). This hole was drilled in the Paleocene Fort Union Formation.

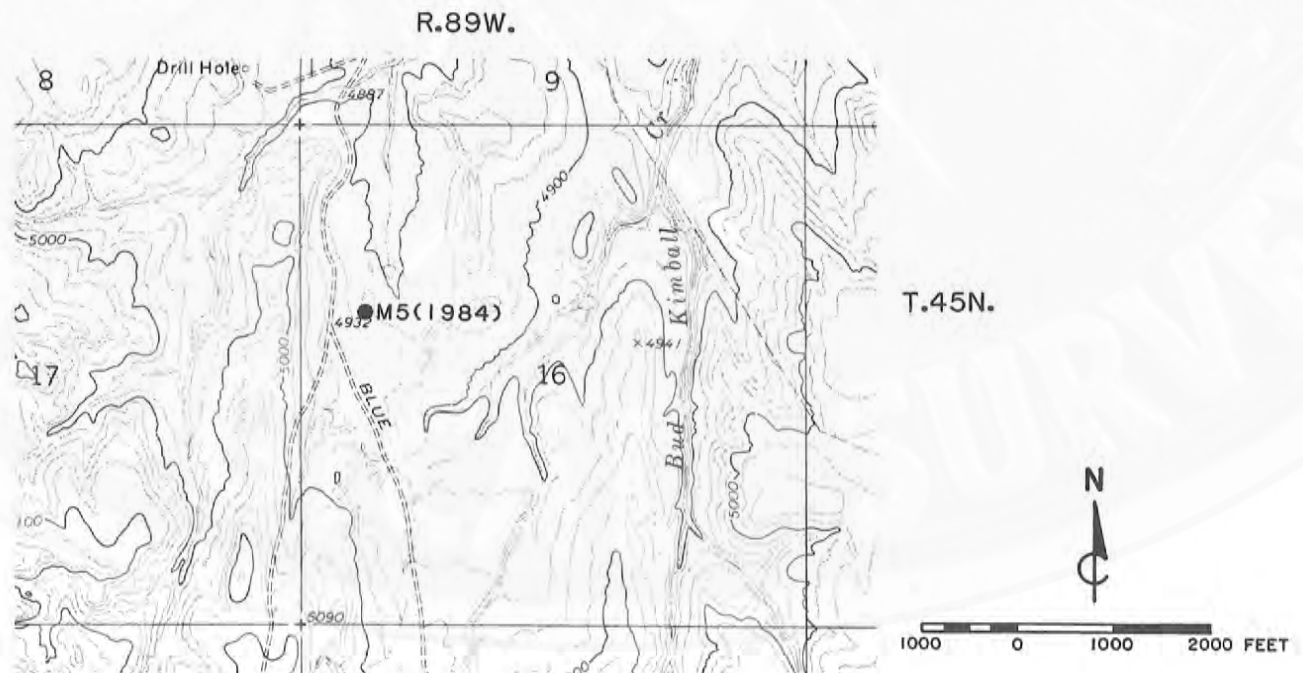


Figure 10. Location of the U.S. Bureau of Land Management's M5 (1984) drill hole in Washakie County (Data Base Sequence Number 70019 in Appendix A). This hole was drilled in the Paleocene Fort Union Formation.

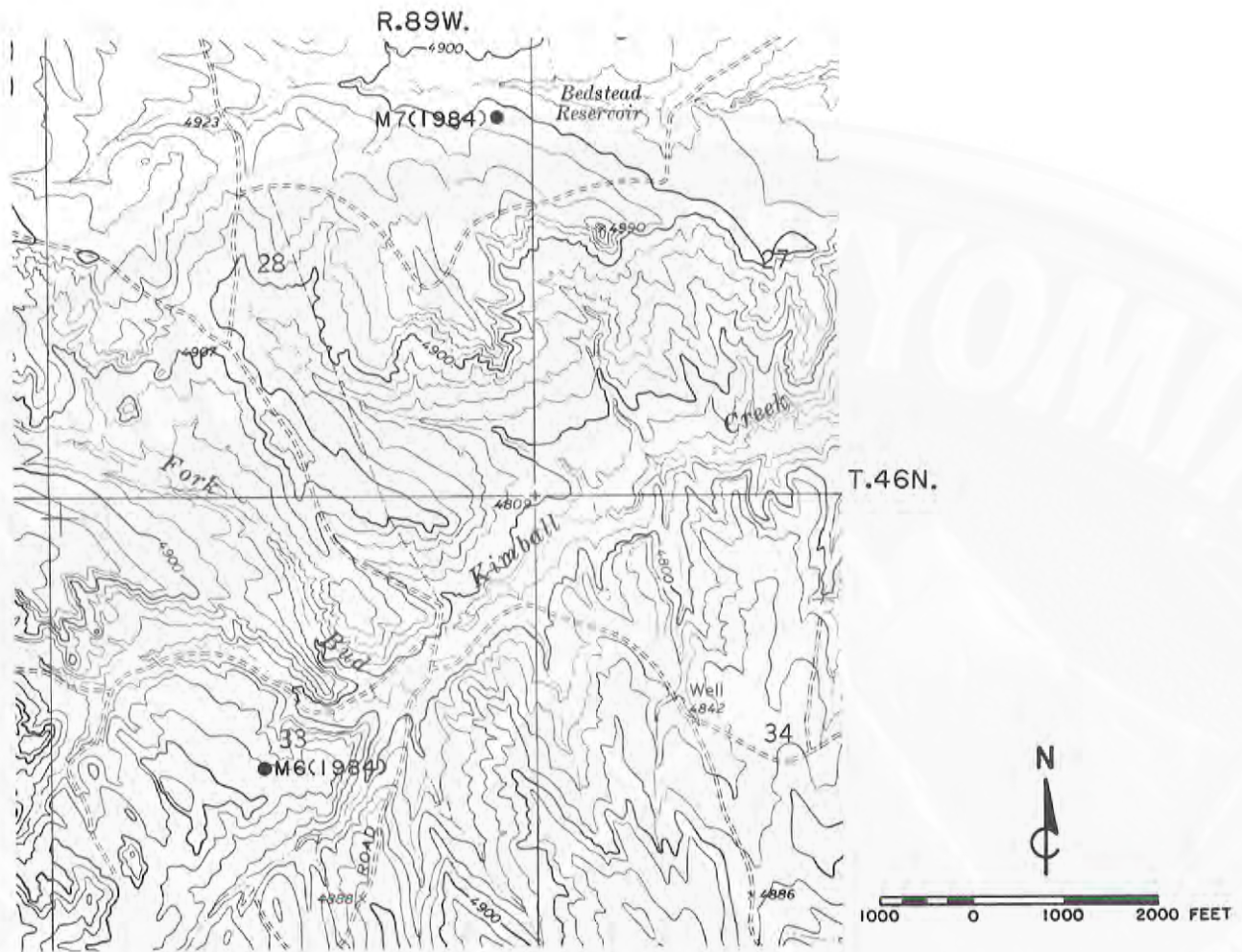


Figure 11. Locations of the U.S. Bureau of Land Management's M6 (1984) and M7 (1984) drill holes in Washakie County (Data Base Sequence Numbers 70020 and 70021, respectively, in Appendix A). These holes were both drilled in undifferentiated Upper Cretaceous Lance and Meeteetse formations.

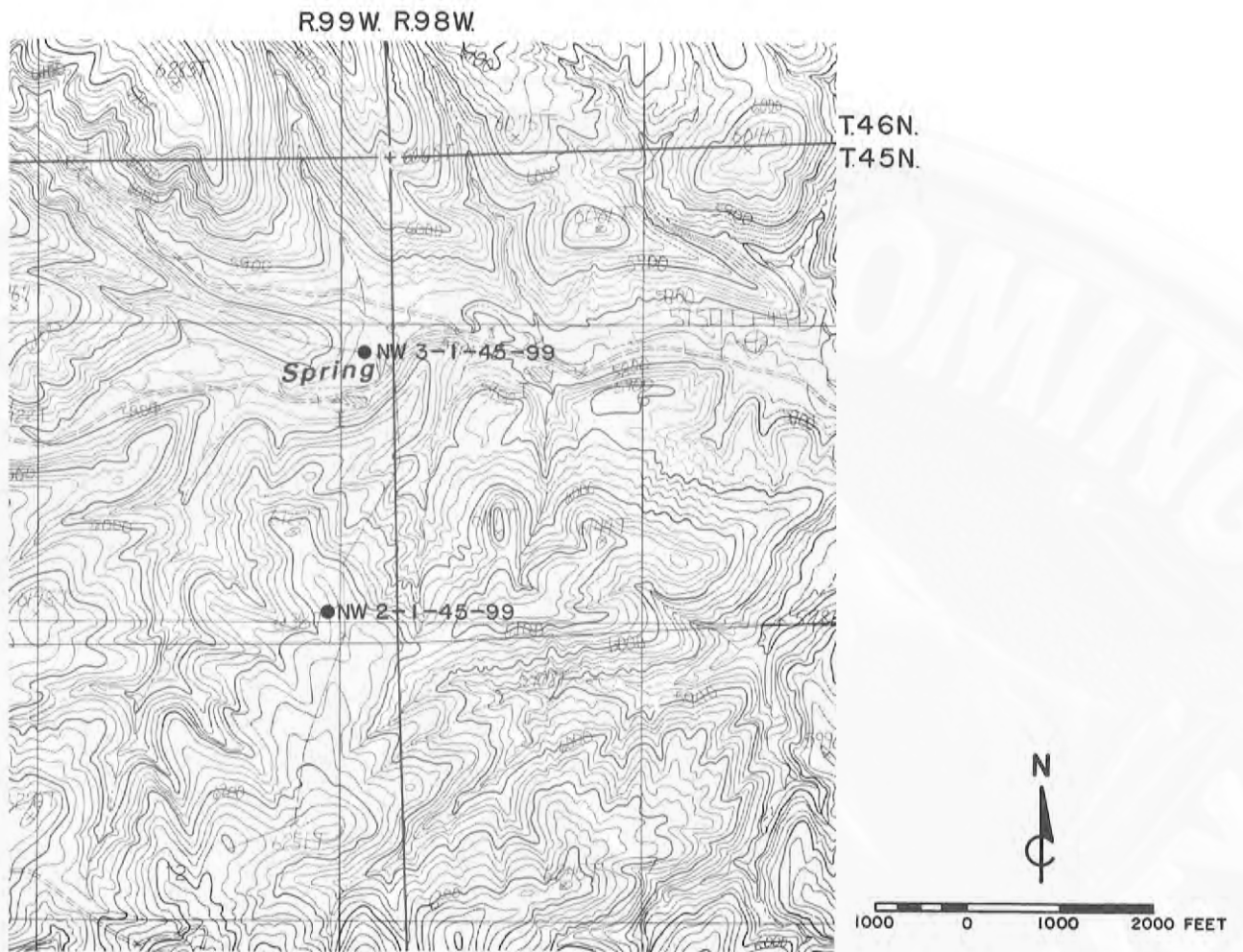


Figure 12. Locations of holes drilled by Northwestern Resources Company in the Grass Creek area of Hot Springs County (Data Base Sequence Numbers 70023 and 70024, respectively, in Appendix A). Both these holes were drilled in the Paleocene Fort Union Formation.

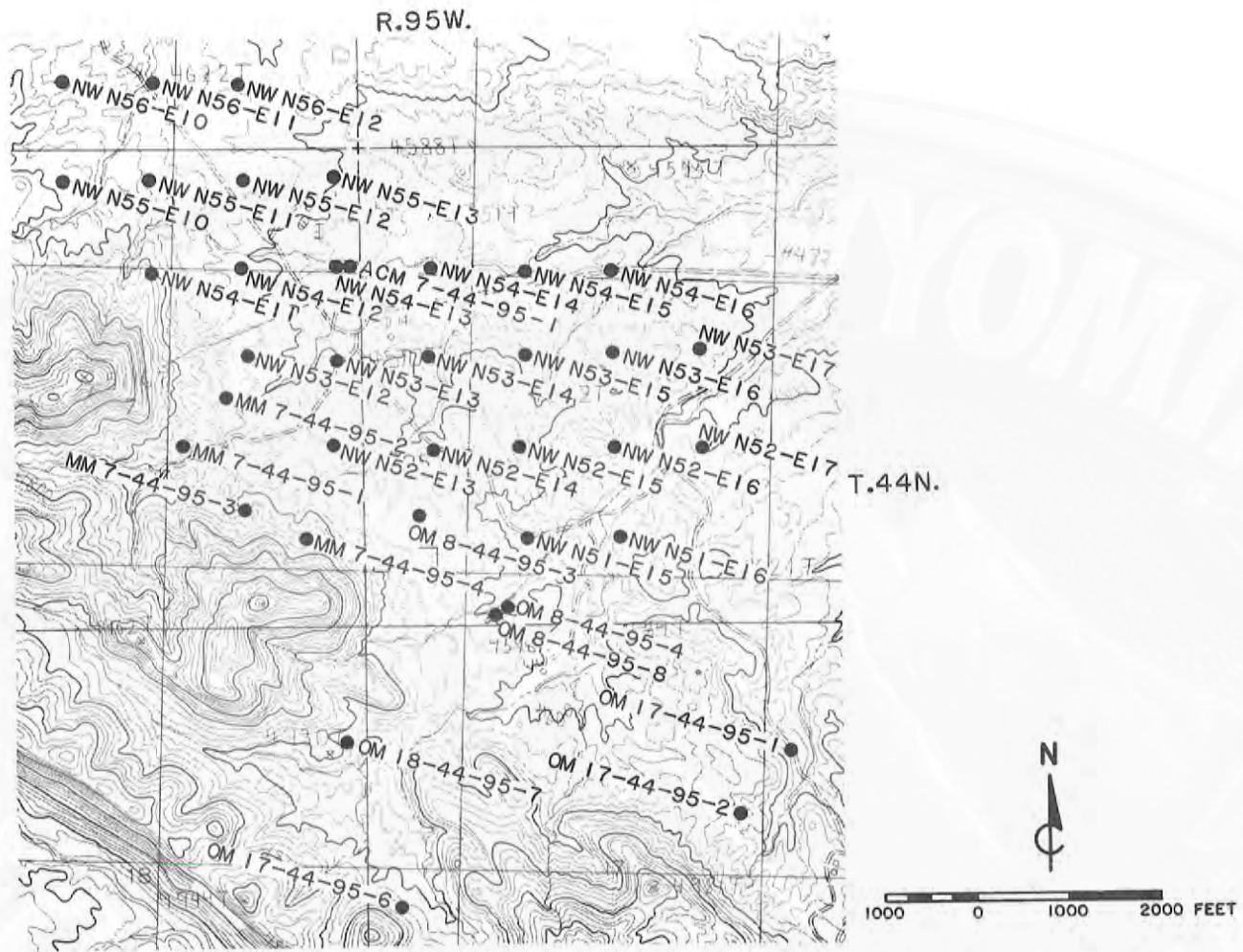


Figure 13. Locations of Northwestern Resources' drill holes (prefix NW) in 1982 and 1983 (Data Base Sequence Numbers 70025-70050 in Appendix A); A.C. Miller's drill hole ACM 7-44-95-1 (Sequence Number 70085); seven drill holes by Otto Menger (prefix OM; Sequence Numbers 70091-70094 and 70096-70098); and drill holes MM 7-44-95-1, MM 7-44-95-2, MM 7-44-95-3, and MM 7-44-95-4 from the Miller mine (Sequence Numbers 70099-70102, respectively) in Hot Springs County. All these holes were drilled in the Upper Cretaceous Mesaverde Formation.

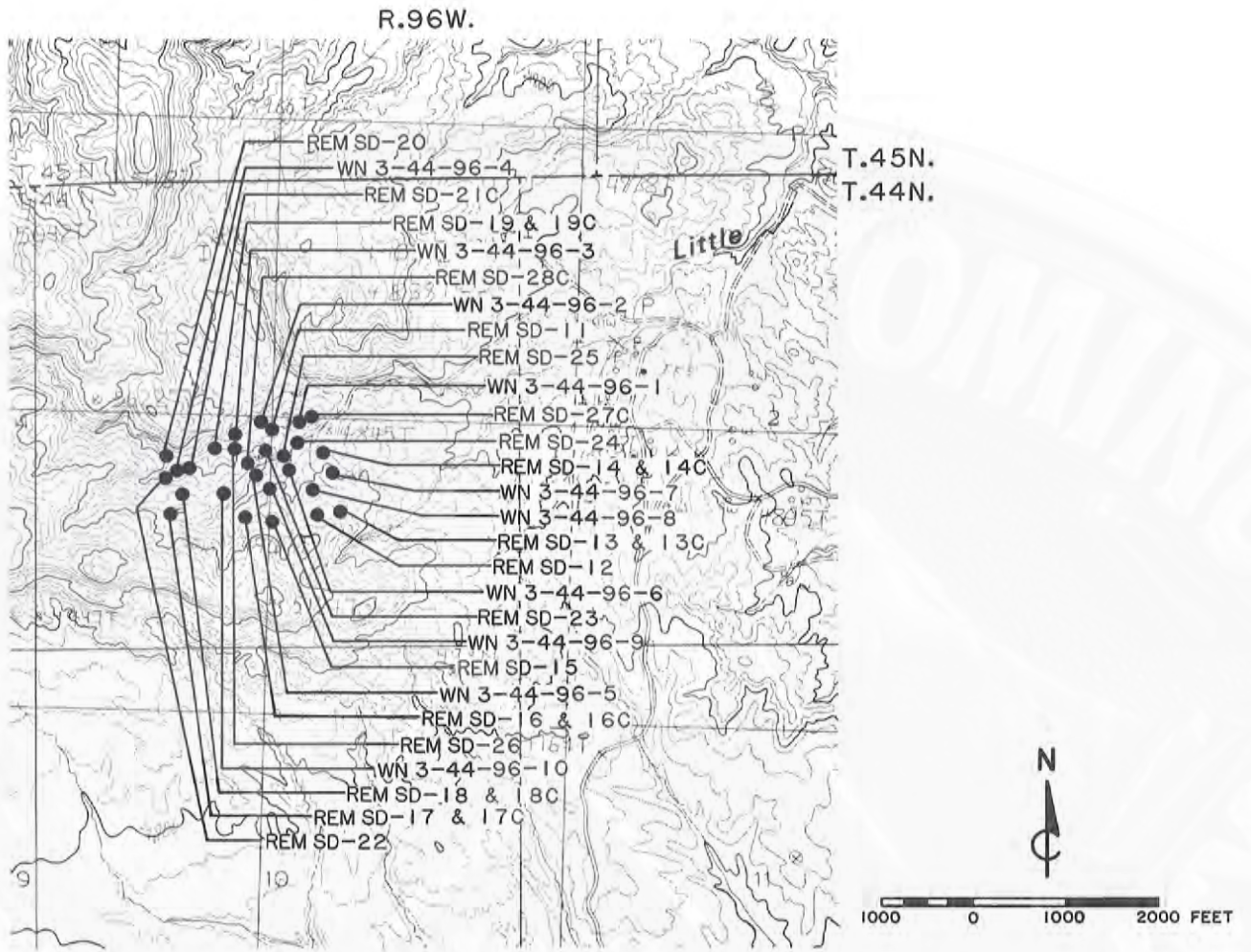


Figure 14. Locations of holes drilled by Resource Exploration and Mining, Incorporated (prefix REM; Data Base Sequence Numbers 70051-70074 in Appendix A) and Western Nuclear's drill holes (prefix WN; Data Base Sequence Numbers 70075-70084) in Hot Springs County. All these holes were drilled in the Upper Cretaceous Mesaverde Formation.

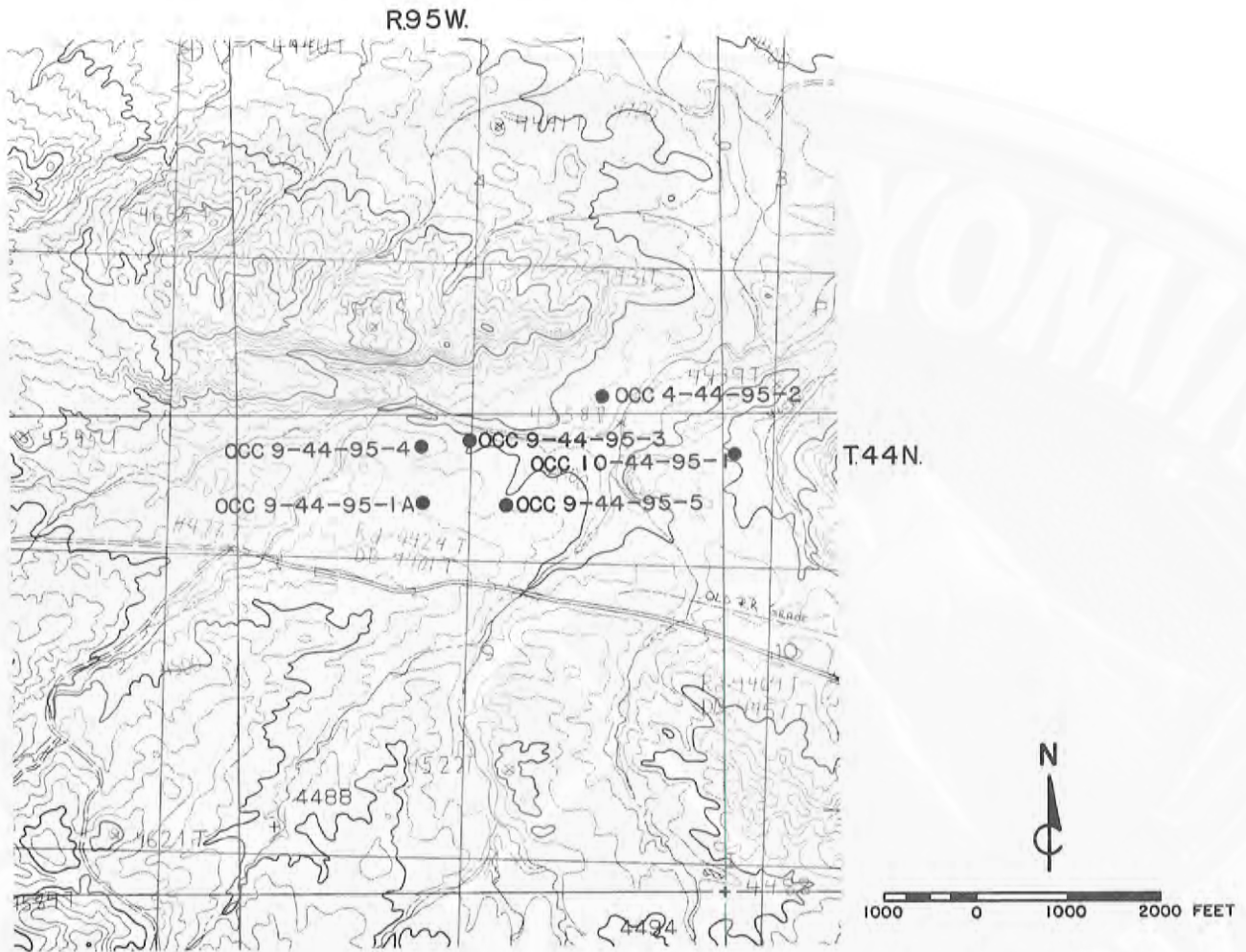


Figure 15. Locations of holes drilled by Owl Creek Coal Company between 1921 and 1930 in Hot Springs County (Data Base Sequence Numbers 70086-70090 and 70095 in Appendix A). All these holes were drilled in the Upper Cretaceous Mesaverde Formation.

Data

Acquisition

Information for the 102 drill hole locations was acquired from the BLM's Worland District Office in September, 1988. Although the type and the quality of the data varied from each source, each drill hole location generally included some or all of the following information: lithologic descriptions of drill cuttings, geophysical and mechanical logs, coal analyses, location information, and drilling information. Although data in this report appear primarily as they existed in the BLM files, formats were changed for consistency and some information was deleted or modified by the authors. Lithologic descriptions were summarized and condensed (where applicable) and correlated to available geophysical logs if necessary.

Compilation procedures

The drill hole data presented in this report were compiled using BLM's COALSYS (trademark) and Ashton-Tate's dBASEIII+ (trademark) software. BLM COALSYS Data Base Sequence Numbers 70001-70102 were assigned to the drill holes included in the report. In **Appendix A**, the drill hole descriptions are arranged by their Data Base Sequence Numbers, starting with the lowest number (70001).

Descriptions of lithologies in drill holes were summarized, condensed, and correlated to available geophysical logs prior to data entry.

Sources

Because of the wide variety of data used in this report, the following discussion may be of use in interpreting the data presented here. In addition, **Figure 2** is an index map showing the drilled areas described in this report.

U.S. Bureau of Land Management (BLM)

The BLM completed 12 drill holes in 1983 in the Gebo area (**Figure 3**), and 10 drill holes in 1984 along a 50-mile, southeast-trending belt that starts near Basin, Wyoming (**Figures 4 through 11**). Gamma-ray, density, and resistivity logs were run in most of these drill holes. Log-trace scale parameters were poorly defined in these geophysical logs and the individual log

traces were shifted relative to a common datum. Shifting the individual log traces made ground-level determination and correlation with lithologic descriptions difficult.

Two coal analyses from drill hole B5A (1983) in the Gebo area (**Figure 3**) are included in **Tables 1 and 2**. Based on these two analyses, the apparent rank of the Mesaverde Formation coals in drill hole B5A (1983) could be either subbituminous A or high volatile C bituminous (**Table 3**). Because the moist, mineral-matter-free heat value only averages 11,320 Btu per pound, the rank of these coals is only distinguishable by testing for their agglomerating properties. Because no agglomerating test results were reported, these two coals could be either rank. Other analyses of Mesaverde Formation coals in this area, including those in this report, variously indicate apparent ranks of high volatile C bituminous or subbituminous A (Glass, 1989).

Table 1 also includes a coal analysis from BLM drill hole M9 (1984), west of Worland (**Figure 4**). The apparent rank of this Paleocene Fort Union Formation coal is subbituminous C (**Table 3**).

The BLM's drill holes have been assigned Data Base Sequence Numbers 70001-70022 in **Appendix A**.

Northwestern Resources Company/ Western Energy Company

Northwestern Resources Company drilled two holes in the Grass Creek area (**Figure 12**) and 26 holes in the Gebo area (**Figure 13**) in 1982 and 1983. Gamma-ray, density, resistivity, and caliper logs were run in nearly all the drill holes. These geophysical logs were digitally recorded and are of relatively high quality. Correlation of these logs with the lithologic descriptions and drill hole depths was therefore enhanced (Data Base Sequence Numbers 70023-70050 in **Appendix A**).

While there were no analyses performed on any of the Paleocene Fort Union Formation coals drilled in the Grass Creek area, 8 of the Upper Cretaceous Mesaverde Formation coals drilled in the Gebo area were analyzed and tested. **Tables 1, 2, and 4 through 7** include analyses of Northwestern's drilled coals. The apparent rank of the Mesaverde coals in the drilled Gebo area is high volatile C bituminous. The 8 coals analyzed by Northwestern Resources as well as 6 coals from the same area analyzed by Otto Menger had an

Table 1. Proximate analyses and heat values of 91 bench and (or) full bed analyses of coals from the Ten Sleep (1 analysis) and Gebo areas (90 analyses).

Drill hole number and sample interval In feet	Sample thickness (feet)	Sample type ¹	Basis ²	Proximate analysis (percent)				Total sulfur (percent)	Btu per pound
				Moisture	Volatile matter	Fixed carbon	Ash		
Ten Sleep area (Fort Union Formation coal)									
M9 - (1984)									
23.0 - 27.3	4.3	1	1	22.76	37.77	23.78	15.69	0.43	7,380
			2		48.90	30.79	20.31	0.56	9,555
			3		61.36	38.64		0.70	11,990
Gebo area (Mesaverde Formation coals)									
B5A (1983)									
45.0 - 50.0	5.0	1	1	14.74	27.73	26.14	31.39	0.66	7,668
			2		32.53	30.66	36.81	0.78	8,993
			3		51.48	48.52		1.23	14,232
114.0 - 119.0	5.0	1	1	15.92	31.07	39.12	13.89	1.17	9,365
			2		36.95	46.53	16.52	1.39	11,139
			3		44.26	55.74		1.67	13,343
NW N51-E15									
137.0 - 142.0	5.0	1	1	15.63	32.92	41.66	9.79	0.51	9,822
			2		39.02	49.38	11.60	0.61	11,641
			3		44.14	55.86		0.69	13,169
223.0 - 227.2	4.2	1	1	14.65	35.96	44.06	5.33	0.50	10,944
			2		42.13	51.62	6.25	0.59	12,822
			3		44.94	55.06		0.63	13,677
NW N53-E14									
158.7 - 168.3	9.6	1	1	14.12	33.46	43.69	8.73	0.60	10,590
			2		38.96	50.88	10.16	0.70	12,331
			3		43.37	56.63		0.78	13,726
NW N53-E16									
106.0 - 113.2	7.2	1	1	14.77	33.50	44.95	6.78	0.50	10,695
			2		39.30	52.74	7.96	0.59	12,548
			3		42.70	57.30		0.64	13,633
NW N54-E15									
259.0 - 267.4	8.4	1	1	14.27	32.46	41.29	11.98	0.83	10,061
			2		37.86	48.17	13.97	0.97	11,736
			3		44.01	55.99		1.13	13,642
NW N55-E12									
502.0 - 513.1	11.1	1	1	13.34	34.61	46.79	5.26	0.48	11,198
			2		39.94	53.99	6.07	0.55	12,922
			3		42.52	57.48		0.59	13,757
NW N56-E10									
541.0 - 544.7	3.7	1	1	12.08	33.66	43.08	11.18	1.35	10,547
			2		38.28	49.00	12.72	1.54	11,996
			3		43.86	56.14		1.76	13,744
640.0 - 648.3	8.3	1	1	13.41	33.67	45.87	7.05	0.49	10,942
			2		38.88	52.98	8.14	0.57	12,637
			3		42.33	57.67		0.62	13,757

Table 1, continued.

Drill hole number and sample interval in feet	Sample thickness (feet)	Sample type ¹	Basis ²	Proximate analysis (percent)				Total sulfur (percent)	Btu per pound
				Moisture	Volatile matter	Fixed carbon	Ash		
OM 17-44-95-6									
225.7 - 227.5	1.8	1	1	14.50	34.50	48.60	2.40	0.60	11,360
227.5 - 229.2	1.7	1	1	15.10	34.50	48.20	2.20	0.60	11,260
229.2 - 230.8	1.6	1	1	14.20	34.70	48.20	2.90	0.60	11,330
230.8 - 232.5	1.7	1	1	14.00	35.40	45.50	5.10	0.60	11,110
225.7 - 232.5	6.8	3	1	14.50	34.80	47.60	3.10	0.60	11,270
			2		40.60	55.70	3.70	0.70	13,170
			3		42.20	57.80		0.70	13,670
289.5 - 291.8	2.3	1	1	15.70	35.00	47.40	1.90	0.60	11,300
291.8 - 294.2	2.4	1	1	15.50	34.00	45.90	4.60	0.80	11,150
294.2 - 296.5	2.3	1	1	14.40	35.10	46.80	3.70	0.60	11,210
289.5 - 296.5	7.0	3	1	15.20	34.70	46.70	3.40	0.70	11,220
			2		40.90	55.10	4.00	0.80	13,230
			3		42.60	57.40		0.80	13,790
OM 18-44-95-7									
238.0 - 240.5	2.5	1	1	10.60	35.60	51.00	2.80	0.80	11,760
240.5 - 243.0	2.5	1	1	11.30	35.70	50.30	2.70	0.80	11,710
238.0 - 243.0	5.0	3	1	11.00	35.60	50.60	2.80	0.80	11,740
			2		40.00	56.90	3.10	0.90	13,180
			3		41.30	58.70		0.90	13,600
295.5 - 298.5	3.0	1	1	9.70	35.90	50.10	4.30	0.60	11,660
298.5 - 301.8	3.3	1	1	11.10	36.00	49.60	3.30	0.60	11,630
295.5 - 301.8	6.3	3	1	10.40	36.00	49.80	3.80	0.60	11,640
			2		40.20	55.60	4.20	0.70	12,990
			3		41.90	58.10		0.70	13,570
60.8 - 63.5	2.7	1	1	14.00	35.00	48.40	2.60	0.70	11,120
63.5 - 66.2	2.7	1	1	13.80	34.30	48.60	3.30	0.70	11,380
60.8 - 66.2	5.4	3	1	13.90	34.60	48.50	3.00	0.70	11,250
			2		40.20	56.30	3.50	0.80	13,070
			3		41.70	58.30		0.80	13,540
202.3 - 204.7	2.4	1	1	10.40	36.20	48.90	4.50	0.60	11,720
204.7 - 207.0	2.3	1	1	10.30	34.90	46.30	8.50	0.60	11,150
207.0 - 209.4	2.4	1	1	10.20	35.30	50.00	4.50	0.60	11,690
202.3 - 209.4	7.1	3	1	10.30	35.50	48.40	5.80	0.60	11,530
			2		39.60	54.00	6.40	0.70	12,850
			3		42.30	57.70		0.70	13,740
REM SD-13C									
46.0 - 55.9	9.9	1	1	15.37	33.40	41.17	10.06	0.53	10,041
			2		39.47	48.64	11.89	0.63	11,864
			3		44.80	55.20		0.72	13,465
85.0 - 92.7	7.7	1	1	14.75	33.43	43.47	8.35	0.54	10,516
			2		39.21	50.99	9.80	0.63	12,335
			3		43.47	56.53		0.70	13,675
REM SD-14C									
59.8 - 67.5	7.7	1	1	14.12	32.60	43.16	10.12	0.46	10,047
			2		37.96	50.26	11.78	0.53	11,699
			3		43.03	56.97		0.60	13,261
REM SD-16C									
18.4 - 26.8	8.4	1	1	16.03	33.21	42.97	7.79	0.55	10,285
			2		39.55	51.17	9.28	0.65	12,249
			3		43.60	56.40		0.72	13,502

Table 1, continued.

Drill hole number and sample interval In feet	Sample thickness (feet)	Sample type ¹	Basis ²	Proximate analysis (percent)				Total sulfur (percent)	Btu per pound		
				Moisture	Volatile matter	Fixed carbon	Ash				
REM SD-17C											
59.3 - 65.1	5.8	1	1	16.13	32.13	40.25	11.49	0.68	9,747		
			2		38.31	47.99	13.70	0.81	11,622		
			3		44.39	55.61		0.94	13,466		
REM SD-18C											
46.5 - 54.9	8.4	1	1	15.04	34.32	44.46	6.18	0.48	10,683		
			2		40.39	52.34	7.27	0.50	12,574		
			3		43.56	56.44		0.54	13,560		
97.0 - 103.6	6.6	1	1	16.38	33.01	42.01	8.60	0.58	10,131		
			2		39.48	50.23	10.29	0.69	12,116		
			3		44.01	55.99		0.77	13,506		
REM SD-19C											
118.8 - 127.9	6.8 ³	1	1	16.87	33.19	43.55	6.39	0.56	10,423		
			2		39.92	52.39	7.69	0.67	12,538		
			3		43.25	56.75		0.73	13,582		
192.5 - 198.3	5.8	1	1	15.95	32.33	43.92	7.80	0.50	10,395		
			2		38.47	52.25	9.28	0.59	12,368		
			3		42.41	57.59		0.65	13,633		
REM SD-21C											
72.0 - 74.3	2.3	1	1	11.96	25.84	26.89	35.31	1.48	6,716		
			2		17.19	35.05	43.14	4.62	0.52	10,633	
						42.33	52.09	5.58	0.63	12,840	
74.3 - 82.8	8.5	1	2	17.19	44.83	55.17		0.67	13,599		
			3		33.09	39.68	11.15	0.72	9,799		
			2		39.43	47.28	13.29	0.86	11,677		
72.0 - 82.8	10.8	3	3	16.08	45.47	54.53		0.99	13,468		
			1		16.91	31.80	40.62	10.67	0.49	9,751	
			1		15.97	35.10	42.97	5.96	0.46	10,721	
126.2 - 132.4	6.2	1	1	16.78	32.32	41.04	9.86	0.49	9,921		
			2		134.0 - 135.0	1	38.84	49.31	11.85	0.59	11,921
							3	44.06	55.94		0.67
126.2 - 135.0	7.2 ⁴	2	1	16.78	32.32	41.04	9.86	0.49	9,921		
			2		38.84	49.31	11.85	0.59	11,921		
			3		44.06	55.94		0.67	13,523		
REM SD-28C											
147.3 - 158.4	10.3 ⁵	1	1	15.76	30.99	38.65	14.60	0.54	9,376		
			2		36.79	45.88	17.33	0.64	11,130		
			3		44.50	55.50		0.77	13,463		
208.1 - 214.5	6.4	1	1	16.78	32.66	41.40	9.16	0.47	10,059		
			2		39.25	49.74	11.01	0.57	12,087		
			3		44.11	55.89		0.64	13,582		
WN 3-44-96-1											
93.0 - 98.0	5.0	1	1	14.85			8.34	0.40	10,363		
			1		14.06			10.68	0.40	10,201	
			2		14.50			9.38	0.40	10,291	
98.0 - 102.0	4.0	1	2	14.50			10.97	0.46	12,037		
			2					0.52	13,520		
			3								
93.0 - 102.0	9.0	2	1	14.50			10.97	0.46	12,037		
			2					0.52	13,520		
			3								
WN 3-44-96-2											
154.0 - 160.0	6.0	1	1	13.61			17.97	0.70	8,955		
			1		14.95			9.97	0.39	10,064	
			2		14.22			14.33	0.56	9,459	
160.0 - 165.0	5.0	1	1	14.22			14.33	0.56	9,459		
			1		14.95			9.97	0.39	10,064	
			2		14.22			14.33	0.56	9,459	
154.0 - 165.0	11.0	2	1	14.22			14.33	0.56	9,459		
			1		14.95			9.97	0.39	10,064	
			2		14.22			14.33	0.56	9,459	

Table 1, continued.

Drill hole number and sample interval in feet	Sample thickness (feet)	Sample type ¹	Basis ²	Proximate analysis (percent)				Total sulfur (percent)	Btu per pound		
				Moisture	Volatile matter	Fixed carbon	Ash				
WN 3-44-96-3											
186.0 - 197.0	10.0 ⁶	1	1	14.21				22.36	0.64	8,383	
			2								
			3								26.06
WN 3-44-96-4											
63.0 - 72.0	7.0 ⁷	1	1	15.09				14.19	0.54	9,415	
			1								
			3								11.09
72.0 - 78.0	6.0	1	1	14.94				11.09	0.49	9,885	
			1								
			3								12.76
63.0 - 78.0	13.0 ⁷	3	1	15.02				12.76	0.52	9,631	
			2								
			3								13.05
118.0 - 124.0	6.0	1	1	16.37				10.13	0.48	9,802	
			1								
			2								9.10
124.0 - 129.5	4.5 ^a	1	1	17.14				9.10	0.43	9,920	
			1								
			2								9.69
118.0 - 129.5	10.5 ^a	2	1	16.70				9.69	0.46	9,853	
			2								
			3								11.63
WN 3-44-96-5											
96.0 - 103.0	7.0	1	1	13.68				17.93	0.64	9,082	
			1								
			2								6.71
103.0 - 109.0	6.0	1	1	15.76				6.71	0.39	10,394	
			1								
			2								12.75
96.0 - 109.0	13.0	2	1	14.64				12.75	0.52	9,688	
			2								
			3								14.94
161.0 - 165.0	4.0	1	1	14.82				8.89	0.51	10,288	
			1								
			2								9.09
165.0 - 169.0	4.0	1	1	15.21				9.09	0.49	10,193	
			1								
			2								8.99
161.0 - 169.0	8.0	2	1	15.02				8.99	0.50	10,211	
			2								
			3								10.58
WN 3-44-96-6											
105.0 - 110.0	5.0	1	1	16.32				5.25	0.54	10,575	
			1								
			2								9.68
110.0 - 113.5	3.5	1	1	14.88				9.68	0.51	10,098	
			1								
			2								7.07
105.0 - 113.5	8.5	2	1	15.73				7.07	0.53	10,379	
			2								
			3								8.39
161.0 - 166.0	5.0	1	1	15.62				13.00	0.45	9,642	
			1								
			2								9.99
166.0 - 170.0	4.0	1	1	18.18				9.99	0.44	9,636	
			1								
			2								11.66
161.0 - 170.0	9.0	2	1	16.76				11.66	0.45	9,639	
			2								
			3								14.01
WN 3-44-96-8											
86.0 - 91.0	5.0	1	1	15.41				7.79	0.49	10,255	
			1								
			3								8.01
91.0 - 96.0	5.0	1	1	16.05				8.01	0.45	10,133	
			1								
			2								7.90
86.0 - 96.0	10.0	3	1	15.73				7.90	0.47	10,194	
			2								
			3								9.37
139.0 - 143.0	4.0	1	1	14.39				11.08	0.46	9,970	
			1								
			2								6.35
143.0 - 147.0	4.0	1	1	15.15				6.35	0.49	10,533	
			1								
			2								8.72
139.0 - 147.0	8.0	2	1	14.77				8.72	0.48	10,252	
			2								
			3								10.23

Table 1, continued.

Drill hole number and sample interval in feet	Sample thickness (feet)	Sample type ¹	Basis ²	Proximate analysis (percent)				Total sulfur (percent)	Btu per pound
				Moisture	Volatile matter	Fixed carbon	Ash		
WN 3-44-96-9									
47.0 - 53.0	6.0	1	1	11.83			24.10	1.39	8,383
53.0 - 59.0	6.0	1	1	13.99			12.78	0.48	9,749
47.0 - 59.0	12.0	2	1	12.91			18.44	0.94	9,066
			2			21.17	1.08	10,410	
			3				1.37	13,206	
105.0 - 110.0	5.0	1	1	14.12			10.57	0.64	10,057
110.0 - 115.0	5.0	1	1	13.94			12.74	0.51	9,845
105.0 - 115.0	10.0	2	1	14.03			11.66	0.58	9,951
			2			13.56	0.67	11,575	
			3				0.78	13,391	
WN 3-44-96-10									
76.0 - 82.0	6.0	1	1	16.35			8.44	0.59	10,070
82.0 - 88.0	6.0	1	1	16.29			6.65	0.45	10,298
76.0 - 88.0	12.0	2	1	16.32			7.55	0.52	10,184
			2			18.03	0.62	12,170	
			3				0.76	14,846	
123.0 - 129.0	6.0	1	1	15.94			7.24	0.53	10,336
			2			8.62	0.64	12,296	
			3				0.70	13,456	

¹ Three types of core samples are included: (1) single interval; (2) more than one interval combined and analyzed; and (3) calculated weighted average of more than one interval.

² Analyses reported on an: (1) as-received basis, (2) dry basis, and (3) dry, ash-free basis.

³ Does not include 2.3 feet of coal between 121.7 and 124.0 feet depth.

⁴ Does not include 1.6 feet of coal between 132.4 and 134.0 feet depth.

⁵ Does not include 0.8 foot of coal between 153.3 and 154.1 feet depth.

⁶ Does not include 1.0 foot of siltstone between 192.0 and 193.0 feet depth.

⁷ Does not include 2.0 feet of siltstone between 65.0 and 67.0 feet depth.

⁸ Does not include 1.0 foot of siltstone between 126.5 and 127.5 feet depth.

Table 2. Proximate and ultimate analyses, sulfur forms, and heat values of 14 full bed analyses of coals from the Gebo area (Mesaverde Formation coals).

Drill hole number and sample interval in feet ¹	Proximate analysis (percent)				Ultimate analysis (percent)							Sulfur forms (percent)			Heat value Btu/lb
	Basis ²	Moisture	Volatile matter	Fixed carbon	Ash	C	H	N	O	S	Cl	Sulfate	Pyritic	Organic	
B5A (1983) 45.0 - 50.0	1	14.74	27.73	26.14	31.39	41.09	3.18	0.09	8.82	0.66	0.03				7,668
	2		32.53	30.66	36.81	48.20	3.73	0.11	10.33	0.78	0.04				8,993
	3		51.48	48.52		76.28	5.90	0.17	16.36	1.23	0.06				14,232
114.0 - 119.0	1	15.92	31.07	39.12	13.89	53.46	3.59	1.11	10.83	1.17	0.03				9,365
	2		36.95	46.53	16.52	63.58	4.27	1.32	12.89	1.39	0.03				11,139
	3		44.26	55.74		76.16	5.11	1.58	15.44	1.67	0.04				13,343
NW N51-E15 137.0 - 142.0	1	15.63	32.92	41.66	9.79	56.66	4.02	1.18	12.18	0.51	0.03	0.01	0.03	0.47	9,822
	2		39.02	49.38	11.60	67.16	4.77	1.40	14.43	0.61	0.03	0.01	0.03	0.57	11,641
	3		44.14	55.86		75.97	5.40	1.58	16.33	0.69	0.03	0.01	0.03	0.65	13,169
223.0 - 227.2	1	14.65	35.96	44.06	5.33	62.68	4.40	1.25	11.17	0.50	0.02	0.00	0.02	0.48	10,944
	2		42.13	51.62	6.25	73.44	5.16	1.46	13.08	0.59	0.02	0.00	0.02	0.57	12,822
	3		44.94	55.06		78.34	5.50	1.56	13.95	0.63	0.02	0.00	0.02	0.61	13,677
NW N53-E14 158.7 - 168.3	1	14.12	33.46	43.69	8.73	60.20	4.28	1.27	10.75	0.60	0.05	0.00	0.12	0.48	10,590
	2		38.96	50.88	10.16	70.10	4.98	1.48	12.52	0.70	0.06	0.00	0.14	0.56	12,331
	3		43.37	56.63		78.03	5.54	1.65	13.93	0.78	0.07	0.00	0.16	0.62	13,726
NW N53-E16 106.0 - 113.2	1	14.77	33.50	44.95	6.78	61.16	4.27	1.27	11.22	0.50	0.03	0.00	0.04	0.46	10,695
	2		39.30	52.74	7.96	71.76	5.01	1.49	13.16	0.59	0.03	0.00	0.05	0.54	12,548
	3		42.70	57.30		77.97	5.44	1.62	14.30	0.64	0.03	0.00	0.05	0.59	13,633
NW N54-E15 259.0 - 267.4	1	14.27	32.46	41.29	11.98	57.33	4.11	1.26	10.19	0.83	0.03	0.00	0.29	0.54	10,061
	2		37.86	48.17	13.97	66.87	4.79	1.47	11.90	0.97	0.03	0.00	0.34	0.63	11,736
	3		44.01	55.99		77.73	5.57	1.71	13.83	1.13	0.03	0.00	0.40	0.73	13,642

Table 2, continued.

Drill hole number and sample interval in feet ¹	Proximate analysis (percent)					Ultimate analysis (percent)								Sulfur forms (percent)		Heat value Btu/lb
	Basis ²	Moisture	Volatile matter	Fixed carbon	Ash	C	H	N	O	S	Cl	Sulfate	Pyritic	Organic		
NW N55-E12 502.0 - 513.1	1	13.34	34.61	46.79	5.26	64.08	4.41	1.40	10.99	0.48	0.04	0.00	0.03	0.45	11,198	
	2		39.94	53.99	6.07	73.94	5.09	1.61	12.69	0.55	0.05	0.00	0.04	0.51	12,922	
	3		42.52	57.48		78.72	5.42	1.71	13.52	0.58	0.05	0.00	0.04	0.54	13,757	
NW N56-E10 541.0 - 544.7	1	12.08	33.66	43.08	11.18	59.42	4.27	1.13	10.55	1.35	0.02	0.00	0.52	0.83	10,547	
	2		38.28	49.00	12.72	67.58	4.86	1.29	11.99	1.54	0.02	0.00	0.59	0.95	11,996	
	3		43.86	56.14		77.43	5.57	1.48	13.74	1.76	0.02	0.00	0.67	1.09	13,744	
640.0 - 648.3	1	13.41	33.67	45.87	7.05	61.95	4.32	1.35	11.40	0.49	0.03	0.00	0.02	0.47	10,942	
	2		38.88	52.98	8.14	71.54	4.99	1.56	13.17	0.57	0.03	0.00	0.02	0.55	12,637	
	3		42.33	57.67		77.88	5.43	1.70	14.34	0.62	0.03	0.00	0.02	0.60	13,757	
REM SD-13C 46.0 - 55.9	1	15.37	33.40	41.17	10.06	57.35	4.12	1.13	11.42	0.53	0.02	0.01	0.07	0.45	10,041	
	2		39.47	48.64	11.89	67.77	4.87	1.34	13.48	0.63	0.02	0.01	0.08	0.54	11,864	
	3		44.80	55.20		76.92	5.53	1.52	15.30	0.71	0.02	0.01	0.09	0.61	13,465	
85.0 - 92.7	1	14.75	33.43	43.47	8.35	60.25	4.28	1.17	10.65	0.54	0.01	0.01	0.03	0.50	10,516	
	2		39.21	50.99	9.80	70.67	5.02	1.37	12.50	0.63	0.01	0.01	0.04	0.58	12,335	
	3		43.47	56.53		78.35	5.56	1.52	13.86	0.70	0.01	0.01	0.05	0.64	13,675	
REM SD-18C 46.5 - 54.9	1	15.04	34.32	44.46	6.18	60.98	4.35	1.27	11.70	0.48	0.00	0.00	0.05	0.43	10,683	
	2		40.39	52.34	7.27	71.78	5.12	1.50	13.77	0.56	0.00	0.00	0.06	0.50	12,574	
	3		43.56	56.44		77.41	5.52	1.62	14.85	0.60	0.00	0.00	0.06	0.54	13,560	
97.0 - 103.6	1	16.38	33.01	42.01	8.60	57.58	4.10	1.20	11.56	0.58	0.00	0.01	0.07	0.50	10,131	
	2		39.48	50.23	10.29	68.86	4.90	1.43	13.83	0.69	0.00	0.01	0.08	0.60	12,116	
	3		44.01	55.99		76.76	5.46	1.59	15.42	0.77	0.00	0.01	0.09	0.67	13,506	

¹All samples were cores.²Analyses reported on an (1) as-received basis, (2) dry basis, and (3) dry, ash-free basis.

Table 3. Geologic formations, ages, apparent ranks, and moist, mineral-matter-free heat values of 45 representative coals from the Ten Sleep (1 sample) and Gebo areas (44 samples).

Drill hole number	Top of sample interval in feet	Bottom of sample interval in feet	Sample thickness (feet)	Sample type ¹	Geologic formation	Age ²	Apparent rank ³	Moist, mineral-matter-free Btu/lb
Ten Sleep area								
M9 (1984)	23.0	- 27.3	4.3	1	Fort Union	P	subC	8,900
Gebo area								
B5A (1983)	45.0	- 50.0	5.0	1	Mesaverde	UK	subA/hvCb	11,600
	114.0	- 119.0	5.0	1	Mesaverde	UK	subA/hvCb	11,000
NW N51-E15	137.0	- 142.0	5.0	1	Mesaverde	UK	hvCb	11,000
	223.0	- 227.2	4.2	1	Mesaverde	UK	hvCb	11,600
NW N53-E14	158.7	- 168.3	9.6	1	Mesaverde	UK	hvCb	11,700
NW N53-E16	106.0	- 113.2	7.2	1	Mesaverde	UK	hvCb	11,500
NW N54-E15	259.0	- 267.4	8.4	1	Mesaverde	UK	hvCb	11,600
NW N55-E12	502.0	- 513.1	11.1	1	Mesaverde	UK	hvCb	11,900
NW N56-E10	541.0	- 544.7	3.7	1	Mesaverde	UK	hvCb	12,000
	640.0	- 648.3	8.3	1	Mesaverde	UK	hvCb	11,900
OM 17-44-95-6	225.7	- 232.5	6.8	3	Mesaverde	UK	hvCb	11,700
	289.5	- 296.5	7.0	3	Mesaverde	UK	hvCb	11,700
OM 18-44-95-7	238.0	- 243.0	5.0	3	Mesaverde	UK	hvCb	12,100
	295.5	- 301.8	6.3	3	Mesaverde	UK	hvCb	12,100
OM 18-44-95-8	60.8	- 66.2	5.4	3	Mesaverde	UK	hvCb	11,600
	202.3	- 209.4	7.1	3	Mesaverde	UK	hvCb	12,300
REM SD-13C	46.0	- 55.9	9.9	1	Mesaverde	UK	subA	11,300
	85.0	- 92.7	7.7	1	Mesaverde	UK	subA	11,600
REM SD-14C	59.8	- 67.5	7.7	1	Mesaverde	UK	subA	11,300
REM SD-16C	18.4	- 26.8	8.4	1	Mesaverde	UK	subA	11,200
REM SD-17C	59.3	- 65.1	5.8	1	Mesaverde	UK	subA	11,100
REM SD-18C	46.5	- 54.9	8.4	1	Mesaverde	UK	subA	11,500
	97.0	- 103.6	6.6	1	Mesaverde	UK	subA	11,200
REM SD-19C	118.8	- 127.9	6.8 ⁴	1	Mesaverde	UK	subA	11,200
	192.5	- 198.3	5.8	1	Mesaverde	UK	subA	11,400

Table 3, continued.

Drill hole number	Top of sample interval in feet	Bottom of sample interval in feet	Sample thickness (feet)	Sample type ¹	Geologic formation	Age ²	Apparent rank ³	Moist, mineral-matter-free Btu/lb
REM SD-21C	72.0	- 82.8	10.8	3	Mesaverde	UK	subA	11,200
	126.2	- 135.0	7.2 ⁵	1	Mesaverde	UK	subA	11,100
REM SD-28C	147.3	- 158.4	10.3 ⁶	1	Mesaverde	UK	subA	11,100
	208.1	- 214.5	6.4	1	Mesaverde	UK	subA	11,200
WN 3-44-96-1	93.0	- 102.0	9.0	2	Mesaverde	UK	subA	11,500
WN 3-44-96-2	154.0	- 165.0	11.0	2	Mesaverde	UK	subA	11,200
WN 3-44-96-3	186.0	- 197.0	10.0 ⁷	1	Mesaverde	UK	subA	11,100
WN 3-44-96-4	63.0	- 78.0	13.0 ⁸	3	Mesaverde	UK	subA	11,200
	118.0	- 129.5	10.5 ⁹	2	Mesaverde	UK	subA	11,000
WN 3-44-96-5	96.0	- 109.0	13.0	2	Mesaverde	UK	subA	11,200
	161.0	- 169.0	8.0	2	Mesaverde	UK	subA	11,300
WN 3-44-96-6	105.0	- 113.5	8.5	2	Mesaverde	UK	subA	11,200
	161.0	- 170.0	9.0	2	Mesaverde	UK	subA	11,000
WN 3-44-96-8	86.0	- 96.0	10.0	2	Mesaverde	UK	subA	11,200
	139.0	- 147.0	8.0	2	Mesaverde	UK	subA	11,300
WN 3-44-96-9	47.0	- 59.0	12.0	2	Mesaverde	UK	subA	11,300
	105.0	- 115.0	10.0	2	Mesaverde	UK	subA	11,400
WN 3-44-96-10	76.0	- 88.0	12.0	2	Mesaverde	UK	subA	11,100
	123.0	- 129.0	6.0	1	Mesaverde	UK	subA	11,200

¹ Three types of core samples are included: (1) single interval; (2) more than one interval combined and analyzed; and (3) calculated weighted average of more than one interval.

² Age of formation: UK = Upper Cretaceous, P = Paleocene.

³ Abbreviations for rank of coal: subC = subbituminous C, subA = subbituminous A, and hvCb = high volatile C bituminous. Where there was more than one coal analysis in a drilled area, the rank was based on the average of all the moist, mineral-matter-free heat values calculated for coal analyses in that area. SubA/hvCb indicates that the apparent rank may be either subbituminous A or high volatile C bituminous because the agglomerating character of the coals is unknown. The classification of apparent rank follows ASTM Designation D388-84, Standard classification of coals by rank (American Society of Testing and Materials, 1987).

⁴ Does not include 2.3 feet of coal between 121.7 and 124.0 feet depth.

⁵ Does not include 1.6 feet of coal between 132.4 and 134.0 feet depth.

⁶ Does not include 0.8 foot of coal between 153.3 and 154.1 feet depth.

⁷ Does not include 1.0 foot of siltstone between 192.0 and 193.0 feet depth.

⁸ Does not include 2.0 feet of siltstone between 65.0 and 67.0 feet depth.

⁹ Does not include 1.0 foot of siltstone between 126.5 and 127.5 feet depth.

Table 4. Fusibilities of ashes and Hardgrove Grindability Indices for 12 coals from the Gebo area (Mesaverde Formation coals).

Drill hole number and interval in feet	Fusibility of ash								Hardgrove Grindability Index	
	Initial deformation		Softening (° F)				Fluid temperature			
	(° F)		H = W		H = .5W		(°F)			
	oxidizing	reducing	oxidizing	reducing	oxidizing	reducing	oxidizing	reducing		
NW N51 E15										
137.0 - 142.0	2700+	2700+	2700+	2700+	2700+	2700+	2700+	2700+	2700+	46.2 (9.32% moisture)
223.0 - 227.2	2520	2450	2590	2530	2680	2590	2700+	2660	2700+	52.5 (9.46% moisture)
NW N53 E14										
158.7 - 168.3	2570	2540	2650	2590	2700+	2640	2700+	2700+	2700+	49.2 (9.57% moisture)
NW N53 E16										
106.0 - 113.2	2550	2500	2600	2550	2690	2600	2700+	2670	2700+	53.4 (9.86% moisture)
NW N54 E15										
259.0 - 267.4	2570	2470	2650	2570	2700+	2640	2700+	2690	2700+	52.5 (9.24% moisture)
NW N55 E12										
502.0 - 513.1	2320	2280	2350	2300	2380	2340	2480	2420	2700+	52.3 (10.44% moisture)
NW N56 E10										
541.0 - 544.7	2500	2435	2560	2500	2610	2540	2700+	2620	2700+	49.9 (6.39% moisture)
640.0 - 648.3	2500	2440	2560	2500	2610	2540	2700+	2620	2700+	56.1 (7.94% moisture)
REM SD-13C										
46.0 - 55.9	2700+	2700+	2700+	2700+	2700+	2700+	2700+	2700+	2700+	48.0 (9.13% moisture)
85.0 - 92.7	2700+	2700+	2700+	2700+	2700+	2700+	2700+	2700+	2700+	49.2 (9.31% moisture)
REM SD-18C										
46.5 - 54.9	2660	2575	2700+	2620	2700+	2680	2700+	2700+	2700+	
97.0 - 103.6	2700+	2700+	2700+	2700+	2700+	2700+	2700+	2700+	2700+	49.2 (8.48% moisture)

H = height of ash cone. W = width of ash cone.

Table 5. Major and minor oxide composition of ashes, silica values, and base:acid ratios for 6 coals from the Gebo area (Mesaverde Formation coals).

Drill hole no. and interval In feet	Total ash ¹	Ash analysis (percent) ²													Silica value	Base:acid ratio	
		SiO ₂	Al ₂ O ₃	CaO	MgO	Na ₂ O	K ₂ O	Fe ₂ O ₃	MnO	TiO ₂	P ₂ O ₅	SO ₃	SrO	BaO			Undetermined
NW N53 E14 158.7 - 168.3	8.73	59.46	24.15	3.32	2.35	0.36	1.28	3.93	0.00	1.15	0.70	2.36	0.21	0.29	0.44	86.04	0.13
NW N55 E12 502.0 - 513.1	5.26	47.43	22.83	9.31	2.97	0.92	0.92	5.24	0.05	1.13	1.07	6.61	0.46	0.43	0.63	73.03	0.27
REM SD-13C 46.0 - 55.9	10.06	55.46	31.42	2.81	1.85	0.07	0.62	3.03		0.86	0.36	2.16			1.36	87.82	0.10
85.0 - 92.7	8.35	53.00	30.77	4.49	1.65	0.17	0.20	2.13		1.72	1.33	2.72			1.82	86.50	0.10
REM SD-18C 46.5 - 54.9	6.18	53.19	28.40	5.37	1.84	0.15	0.32	4.63		1.26	1.39	3.48			0.00	80.79	0.15
97.0 - 103.6	8.60	50.43	31.30	4.59	1.37	0.06	0.29	2.60	0.03	1.53	1.80	3.85	0.49	0.38	1.28	85.49	0.11

¹ As-received ash content (percentage) as determined by proximate analysis.

² All values expressed as percentage of the ash.

Table 6. Equilibrium moistures, water soluble alkalis, and apparent specific gravities for 10 coals from the Gebo area (Mesaverde Formation coals).

Drill hole number and interval in feet ¹	Equilibrium moisture	Water soluble alkalis		Apparent specific gravity ³
		% Na ₂ O ²	% K ₂ O ²	
NW N51 E15				
137.0-142.0	13.58			1.32
223.0-227.2	13.51			1.28
NW N53 E16				
106.0-113.2	14.53			1.35
NW N54 E15				
259.0-267.4	13.50			1.30
NW N56 E10				
541.0-544.7	11.89			1.30
640.0-648.3	12.94			1.34
REM SD-13C				
46.0-55.9	15.05	0.004	0.003	1.37
85.0-92.7	14.46	0.005	0.003	1.35
REM SD-18C				
46.5-54.9	14.33	0.004	0.003	1.33
97.0-103.6	16.04	0.004	0.003	1.35

¹ Single intervals only; no analyses on composite core samples.

² Percentage expressed as whole coal, as-received basis.

³ As-received basis.

Table 7. Estimated viscosities of ashes, fouling indices, slagging indices, and free-swelling indices for 6 coals from the Gebo area (Mesaverde Formation coals).

Drill hole number and interval in feet	Estimated viscosity of ash		Fouling index	Slagging index	Free-swelling index
	Viscosity (poises)	T ₂₅₀ Temp (° F)			
NW N53 E14					
158.7 - 168.3	305 at 2840 ° F	>2900	<0.2	<0.6	
NW N55 E12					
502.0 - 513.1	405 at 2540 ° F	2592	0.2	<0.6	
REM SD-13C					
46.0 - 55.9	>290 at >2900 ° F	>2900	<0.2	<0.6	1/2
85.0 - 92.7	>250 at >2900 ° F	>2900	<0.2	<0.6	1/2
REM SD-18C					
46.5 - 54.9	140 at 2880 ° F	2870	<0.2	<0.6	0
97.0 - 103.6	>210 at >2900 ° F	>2900	<0.2	<0.6	0

from the same area analyzed by Otto Menger had an average moist, mineral-matter-free heat value of 11,760 Btu per pound which confirms that their apparent rank is bituminous (Table 3).

A.C. Miller

A.C. Miller drilled at least one hole in the Upper Cretaceous Mesaverde Formation coals in the Gebo area (Section 7, T. 44N., R. 95W). Although the coals in this hole (drill hole ACM 7-44-95-1 on Figure 13) were apparently not analyzed, the drill hole is described in Appendix A (Data Base Sequence Number 70085).

Otto Menger

Otto Menger drilled at least seven holes in the Upper Cretaceous Mesaverde Formation coals in the Gebo area. His seven holes are prefixed with "OM" in Figure 13. Between Otto Menger, Northwestern Resources, A.C. Miller, and Miller mine, there are 38 fairly close-spaced drill holes centered on sections 7 and 8, T. 44N., R. 95W.

Menger provided analyses of six coals from his seven holes (Table 1). The average moist, mineral-matter-free heat value for the 14 analyzed coals from this property was 11,760 Btu per pound, which indicates an apparent rank of high volatile C bituminous for the Mesaverde Formation coals that were analyzed (Table 3).

Otto Menger's drill holes are designated as Data Base Sequence Numbers 70091-70094 and 70096-70098 in Appendix A.

Miller Mine

Four of the drill holes in the area drilled by Northwestern Resources are identified as coming from the Miller mine (Figure 13). At this time, it is not clear if A.C. Miller and Miller mine are the same party, consequently these holes are discussed separately. The Miller mine drill holes, which are all in section 7, T.44N., R.95W., are prefixed with "MM" on Figure 13 and are designated as Data Base Sequence Numbers 70099-70102 in Appendix A.

No coal analyses are available for these holes drilled in the Upper Cretaceous Mesaverde Formation.

Resource Exploration and Mining

Resource Exploration and Mining drilled twenty-four drill holes in the Gebo area (Section 3, T.44N., R.96W.) in 1980 (Figure 14). Gamma-ray and density logs with adequate log-trace quality were available for all of these drill holes; however, recording parameters (scale) listed in the log-trace headings were confusing.

Analyses and tests of Upper Cretaceous Mesaverde Formation coals from drill holes REM SD-13C and REM SD-18C are found in Tables 1, 2, and 4 through 7. In addition, Table 1 includes proximate analyses for Mesaverde Formation coals from six other holes drilled by Resource Exploration and Mining. Between Resource Exploration and Western Nuclear, 34 closely spaced holes were drilled on this property.

The average moist, mineral-matter-free heat value for the analyzed coals on this property was 11,200 Btu per pound, which means the coals could be either high volatile C bituminous or subbituminous A in rank. However, because four tests for agglomeration showed the coals did not agglomerate enough to qualify as bituminous coals, the coals in this area are assigned an apparent rank of subbituminous A (Table 3).

The Data Base Sequence Numbers for Resource Exploration and Mining's drill hole descriptions are 70051-70074 in Appendix A.

Western Nuclear, Incorporated

Western Nuclear drilled ten holes in the Gebo area (section 3, T.44N., R.96W.) in and around the holes drilled by Resource Exploration and Mining. Western Nuclear's drill hole numbers are prefixed with "WN" on Figure 14. These holes were drilled in the Upper Cretaceous Mesaverde Formation.

The apparent rank of the coals drilled by Western Nuclear are considered subbituminous A because other coals on the same property did not agglomerate enough to qualify as bituminous coals (see discussion of Resource Exploration and Mining). The moist, mineral-matter-free heat values of coals on this property are included in Table 3.

Table 1 includes proximate analyses and heat values for 15 coals from Western Nuclear's drilling as well as separate analyses for portions of the same coals. The Data Base Sequence Numbers for Western Nuclear's drill hole descriptions are 70075-70084 in Appendix A.

Owl Creek Coal Company

Between 1921 and 1930, Owl Creek Coal Company drilled the six holes located on **Figure 15** (Sections 4, 9, and 10, T.44N., R. 95W.). This area is also near Gebo and the holes were drilled in the Upper Cretaceous Mesaverde Formation.

No analytical data was provided for any of the coals penetrated by Owl Creek's drill holes. The drill hole descriptions are designated as Data Base Sequence Numbers 70086-70090 and 70095 in **Appendix A**.

Drill hole data presentation

Each drill hole is represented by a single data page (drill hole data summary), which summarizes location and acquisition information, and one or more pages of geophysical and/or lithologic logs (**Appendix A**). An explanation of various entries and codes used on the drill hole data summary page is provided at the begin-

ning of **Appendix A**. Zero values on the data summary page indicate data which was unavailable for the drill hole when the computer data base was developed. Zero values occur where any numeric data field was left blank. Coded entries for some of the location and acquisition data are required by COALSYS; these codes are explained at the beginning of **Appendix A**.

Each geophysical log page includes a heading that identifies the drill hole number, the sequence number, and geophysical data acquisition parameters. Because of the reduced scale of the geophysical logs, the geophysical log traces are not individually labeled; instead, log traces occur in the same order on the heading as on the geophysical log, with the appropriate recording parameters listed beneath each log-trace heading. Parameters such as logging speed, which apply equally to all traces, are designated within square brackets []. "Deflection" (right or left) indicates the direction in which values are increasing. Parameters given as "___/in (deflection)" were based on the original geophysical log scale, not the current reduced log scale.

References cited

- American Society for Testing and Materials (ASTM), 1987, Annual book of ASTM standards, Section 5-Petroleum products, lubricants, and fossil fuels, volume 5.05 - Gaseous fuels; coal and coke: ASTM, Philadelphia, 561 p.
- Glass, G.B., 1989, Wyoming [coal]: Keystone Coal Industry Manual: McGraw-Hill, Inc., New York, p. 611-636.
- Glass, G.B., Westervelt, Katherine, and Oviatt, C.G., 1975, Coal mining in the Bighorn coal basin of Wyoming, in Exum, F.A., and George, G.R., editors, Geology and mineral resources of the Bighorn Basin: Wyoming Geological Association 27th Annual Field Conference Guidebook, p. 221-228.

Appendix A - Drill hole log data

EXPLANATION

LEASE NO.:

Lease number for relinquished Federal leases, if available.

SEQ. NO.:

The Data Base Sequence Number is the Bureau of Land Management's COALSYS designation for Wyoming. The SEQ. NO. designations for drill holes in this report are as follows:

DRILL HOLE:

The abbreviations before the drill hole numbers are:

- ACM - A.C. Miller
- B or M - Bureau of Land Mangement (suffixed by the date of drilling)
- MM - Miller mine
- NW - Northwestern Resources Company/
Western Energy Company
- OCC - Owl Creek Coal Company
- OM - Otto Menger
- REM - Resource Exploration and Mining,
Incorporated
- WN - Western Nuclear, Incorporated

- BLM - (70001-70022)
- NW - (70023-70050)
- REM - (70051-70074)
- WN - (70075-70084)
- OCC, ACM, OM, MM - (70085-70102)

SOURCE:

Original generator of the drill hole data.

COALSYS BY:

Designates the individual who prepared the original data for entry in the computer data base.

CODE

COUNTY:

- 003 - Bighorn
- 017 - Hot Springs
- 043 - Washakie

DRILL HOLE TYPE:

- 01 core (continuous)
- 02 rotary (open hole)
- 03 rotary/core (coal core)
- 04 oil and gas well
- 05 water well
- 06 power line hole (grounding wire)
- 07 uranium test hole
- 08 other

QUAD. LOC. CODE:

U.S. Geological Survey, Wyoming Index to Topographic and Other Map Coverage

LOG TYPES:

LAT. - LONG. SOURCE:

- 01 survey tie to geodetic control
- 02 from USGS topographic map
- 03 from other map
- 04 from company survey (Metes and bounds)
- 05 calculated from BLM survey plat
- 06 calculated from state plane coordinates
- 07 calculated from company coordinates
- 08 source unknown

- 1 combination of gamma-ray, density, resistivity, and caliper logs
- 2 gamma (natural)
- 3 gamma density
- 4 resistivity
- 5 caliper
- 6 neutron density
- 7 spontaneous potential
- 8 sonic
- 9 lateral log
- 10 lithological log only

THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: B1 (1983)

SEQ. NO.: 70001

SOURCE: BLM

COMPLETED: 60383

*COUNTY: 17

STATE: WY

AREA: Becor/Gebo

QUADRANGLE: Blue Mesa East (7.5)

*QUAD. LOC. CODE: 43108H3

SECTION: 21

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4670.0

DEPTH TO WATER:

COMPANY COORDINATES:

1426.0N. ,

3404.0E.

DRILLER: BLM, H. Cureton

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 60.0

PROBE DEPTH: NL

HOLE DIAMETER: 4.75

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 10

LOGGED BY: BLM, R. Howell

LITHOLOGY LOG BY: BLM, A. S.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: Co. Coords. from SW cor. sec. 21, (1426 fn1, 1876 fw1), map elev.

* = SEE CODE EXPLANATIONS

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
4660			(0.0-15.0) SANDSTONE: tan - gray, shaly
	20		(15.0-20.0) SHALE: gray - tan
			(20.0-35.0) SANDSTONE: gray, medium - coarse
4640			(35.0-38.0) COAL:
	40		(38.0-45.0) SANDSTONE: gray - tan, shaly
4620			(45.0-50.0) SHALE: gray with carbonaceous shale
	60		(50.0-60.0) SANDSTONE: gray, medium

THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: B2 (1983)

SEQ. NO.: 70002

SOURCE: BLM

COMPLETED: 60383

*COUNTY: 17

STATE: WY

AREA: Becor/Gebo

QUADRANGLE: Blue Mesa East (7.5)

*QUAD. LOC. CODE: 43108H3

SECTION: 21

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4640.0

DEPTH TO WATER: GL

COMPANY COORDINATES:

338.0N. ,

3262.0E.

DRILLER: BLM, H. Cureton

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 161.0

PROBE DEPTH: 161

HOLE DIAMETER: 4.75

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 2,3,4,10

LOGGED BY: BLM, R. Howell

LITHOLOGY LOG BY: BLM, A. S.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: Co. Coords. fr. SW cor. sec. 21, (338 fn1, 3262 fe1) elev. fr. log

* = SEE CODE EXPLANATIONS

Drill Hole: B2 (1983)

Page 1 of 1

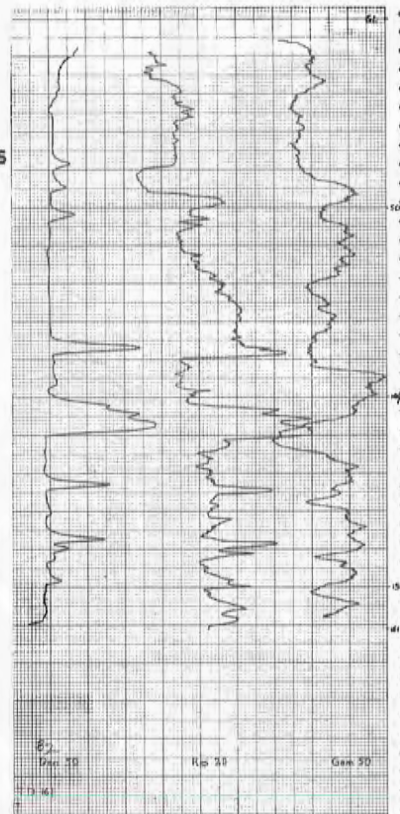
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Seq. No.: 70002

Scale:----->	DENSITY	RESISTANCE	GAMMA
Time Constant:-->	50 cps/in	20 ohm/in	50 cps/in
Deflection:---->	2 sec	-----	4 sec
Source Strength->	left	right	right
	125 mCi	[Logging Speed 15.0 ft/min]	

GEOPHYSICAL LOG

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
4620	20	[Symbol]	(0.0-7.0) ALLUVIUM: sandy (7.0-38.0) SANDSTONE: gray - tan, medium - fine grained
4600	40	[Symbol]	(38.0-43.0) SHALE: carbonaceous (43.0-47.0) COAL: shaly with sandy partings
4580	60	[Symbol]	(47.0-61.0) SANDSTONE: gray
4560	80	[Symbol]	(61.0-65.0) SHALE: dark brown, shaly - sandy (65.0-86.0) SANDSTONE: gray, medium - fine grained (86.0-88.0) COAL: shaly (88.0-103.0) SHALE: carbonaceous with gray claystone
4540	100	[Symbol]	(103.0-109.0) COAL AND SHALE: vitreous
4520	120	[Symbol]	(109.0-131.0) SHALE: gray - tan, silty, carbonaceous (131.0-138.0) SANDSTONE: fine - medium grained
4500	140	[Symbol]	(138.0-151.0) SHALE: carbonaceous with gray - tan sandstone (151.0-161.0) SANDSTONE: gray, medium - fine grained
4480	160	[Symbol]	



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: B3 (1983)

SEQ. NO.: 70003

SOURCE: BLM

COMPLETED: 60283

*COUNTY: 17

STATE: WY

AREA: Becor/Gebo

QUADRANGLE: Blue Mesa East (7.5)

*QUAD. LOC. CODE: 43108H3

SECTION: 21

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4680.0

DEPTH TO WATER: GL

COMPANY COORDINATES:

3554.0N.

, 2112.0E.

DRILLER: BLM, H. Cureton

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 123.0

PROBE DEPTH: 123

HOLE DIAMETER: 4.75

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 2,3,4,10

LOGGED BY: BLM, R. Howell

LITHOLOGY LOG BY: BLM, A. S.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: Co. Coords. fr. SW cor. sec. 21 (1726 fnl, 2112 fw1) elev. fr. log

* = SEE CODE EXPLANATIONS

Drill Hole: B3 (1983)








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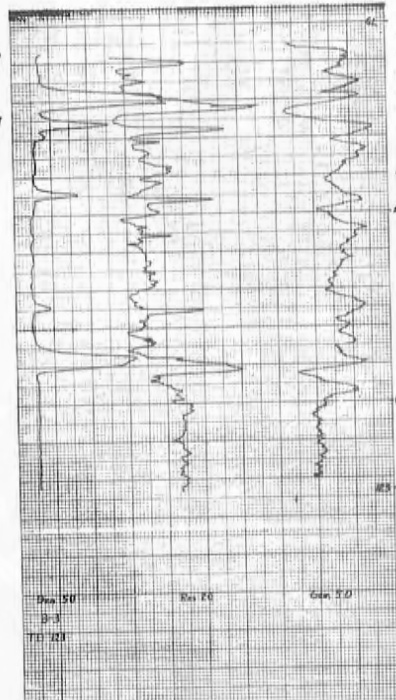
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Seq. No.: 70003

Scale:----->	50	cps/in	20	ohm/in	50	cps/in
Time Constant:-->	2	sec	-----		4	sec
Deflection:----->	left		right		right	
Source Strength->	125	mCi	[Logging Speed 15.0 ft/min]			

G E O P H Y S I C A L L O G

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
			(0.0-5.0) ALLUVIUM: sandy
			(5.0-18.0) SANDSTONE: gray - buff, silty
4660	20		(18.0-28.0) COAL: black, with silty clay partings
4640	40		(28.0-39.0) SILTSTONE: gray, with clay partings
4620	60		(39.0-87.0) SHALE: carbonaceous with clay partings and minor coal
4600	80		(87.0-90.0) COAL: with gray shale
4580	100		(90.0-120.0) SANDSTONE: gray, fine - medium grained
4560	120		



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: B4 (1983)

SEQ. NO.: 70004

SOURCE: BLM

COMPLETED: 52683

*COUNTY: 17

STATE: WY

AREA: Becor/Gebo

QUADRANGLE: Blue Mesa East (7.5)

*QUAD. LOC. CODE: 43108H3

SECTION: 21

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4740.0

DEPTH TO WATER: GL

COMPANY COORDINATES:

1962.0N. ,

1876.0E.

DRILLER: BLM, H. Cureton

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 161.0

PROBE DEPTH: 161

HOLE DIAMETER: 4.75

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 2,3,4,10

LOGGED BY: BLM, R. Howell

LITHOLOGY LOG BY: BLM, A. R. S.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: Co. Coords. fr. SW cor. sec. 21 (1962 fsl, 1876 fwl) elev. fr. log.

* = SEE CODE EXPLANATIONS

Drill Hole: B4 (1983)












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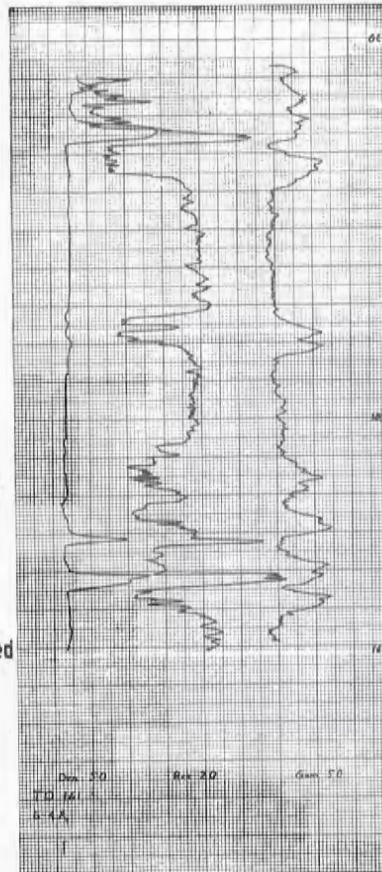
GEOPHYSICAL LOG TRACES

Seq. No.: 70004

Scale:----->	DENSITY	RESISTANCE	GAMMA
Time Constant:-->	50 cps/in	20 ohm/in	50 cps/in
Deflection:---->	2 sec	-----	4 sec
Source Strength->	left	right	right
	125 mCi	[Logging Speed 15.0 ft/min]	

GEOPHYSICAL LOG

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
			(0.0-5.0) ALLUVIUM: gray, sandy
			(5.0-23.0) SANDSTONE: red, brown, yellow, coaly
4720	20		(23.0-27.0) COAL: black, fissile
			(27.0-35.0) SHALE: gray, sandy
4700	40		(35.0-72.0) SANDSTONE: gray, buff, tan, fine - medium grained
4680	60		(72.0-79.0) SHALE: gray, sandy
4660	80		(79.0-110.0) SANDSTONE: brown - buff, fine grained
4640	100		(110.0-140.0) SHALE: gray, with clay, coal
4620	120		(140.0-144.0) COAL: black
4600	140		(144.0-151.0) SHALE: gray, carbonaceous, sandy with clay
4580	160		(151.0-161.0) SANDSTONE: buff, fine grained



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: B5 (1983)

SEQ. NO.: 70005

SOURCE: BLM

COMPLETED: 52683

*COUNTY: 17

STATE: WY

AREA: Becor/Gebo

QUADRANGLE: Blue Mesa East (7.5)

*QUAD. LOC. CODE: 4310BH3

SECTION: 21

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4705.0

DEPTH TO WATER: GL

COMPANY COORDINATES: 1738.0N. , 2226.0E.

DRILLER: BLM, H. Cureton

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 121.0

PROBE DEPTH: 117

HOLE DIAMETER: 4.75

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 2,3,4,10

LOGGED BY: BLM, R. Howell

LITHOLOGY LOG BY: BLM, A. Smith

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: Co. Coords. fr. SW cor. sec. 21 (1738 fsl, 2226 fw1) elev. fr. log.

* = SEE CODE EXPLANATIONS

Drill Hole: B5 (1983)

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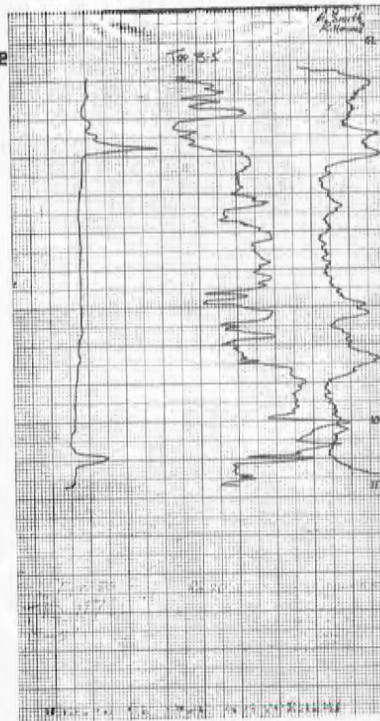
GEOPHYSICAL LOG TRACES

Seq. No.: 70005

	DENSITY	RESISTANCE	GAMMA
Scale:----->	50 cps/in	20 ohm/in	50 cps/in
Time Constant:-->	2 sec	-----	4 sec
Deflection:----->	left	right	right
Source Strength->	125 mCi	[Logging Speed 15.0 ft/min]	

GEOPHYSICAL LOG

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
4700			(0.0-5.0) COAL: with red clay and siltstone
	20		(5.0-10.0) CLAY: gray with coal partings
4680			(10.0-20.0) SANDSTONE: gray with clay interbeds
	40		(20.0-29.0) SHALE: red - brown, carbonaceous with claystone
4660			(29.0-40.0) SANDSTONE: gray, arkose
	60		(40.0-65.0) SANDSTONE: red - gray, arkose
4640			(65.0-78.0) CLAY: gray with gray - brown sandstone
4620			(78.0-109.0) SANDSTONE: gray, arkose, with minor shale and clay partings
4600	100		(109.0-111.0) COAL: black, vitreous, with clay
120			(111.0-121.0) SHALE: gray with claystone, and minor coal partings



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: B5A (1983)

SEQ. NO.: 70006

SOURCE: BLM

COMPLETED: 52683

*COUNTY: 17

STATE: WY

AREA: Becor/Gebo

QUADRANGLE: Blue Mesa East (7.5)

*QUAD. LOC. CODE: 4310BH3

SECTION: 21

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.ON.

0.OE.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4628.0

DEPTH TO WATER: GL

COMPANY COORDINATES:

2542.ON. ,

2754.OE.

DRILLER: BLM, H. Cureton

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 260.0

PROBE DEPTH: 247

HOLE DIAMETER: 4.75

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 2,3,4,10

LOGGED BY: BLM, R. Howell

LITHOLOGY LOG BY: BLM, ?

COALSYS BY: P. Taucher

CORE INTERVALS: 45.0 - 50.0 ft.; 114.0 - 119.0 ft.

COMMENTS: Co. Coords. from SW cor. sec. 21, (2738 fn1, 2526 fel), map elev.

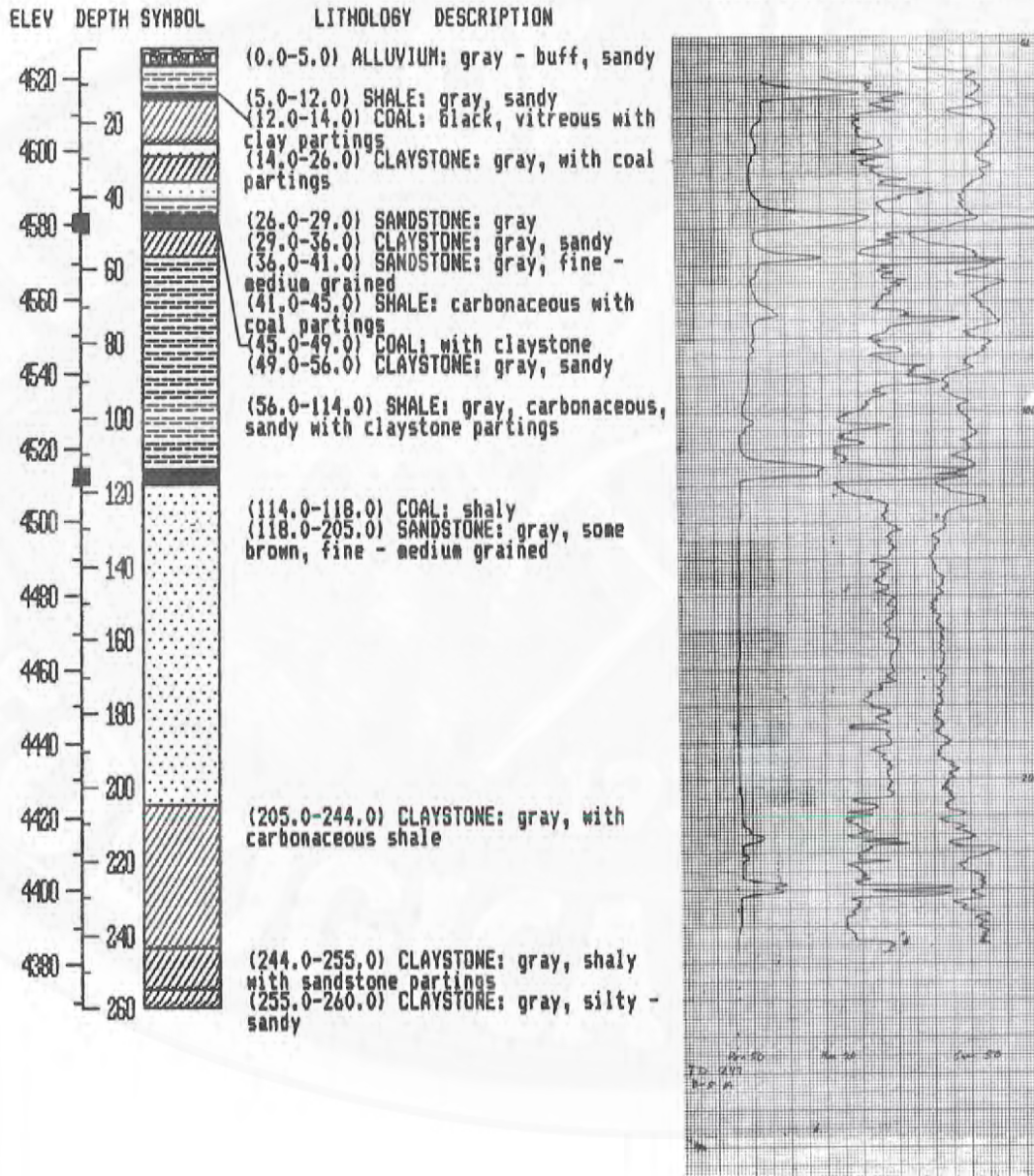
* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70006

	DENSITY	RESISTANCE	GAMMA
Scale:----->	50 cps/in	20 ohm/in	50 cps/in
Time Constant:-->	2 sec	-----	4 sec
Deflection:----->	left	right	right
Source Strength->	125 mCi	[Logging Speed 15.0 ft/min]	

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: B6 (1983)

SEQ. NO.: 70007

SOURCE: BLM

COMPLETED: 60183

*COUNTY: 17

STATE: WY

AREA: Becor/Gebo

QUADRANGLE: Blue Mesa East (7.5)

*QUAD. LOC. CODE: 43108H3

SECTION: 21

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4598.0

DEPTH TO WATER: 13

COMPANY COORDINATES:

3920.0N. ,

2980.0E.

DRILLER: BLM, H. Cureton

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 220.0

PROBE DEPTH: 223

HOLE DIAMETER: 4.75

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 2,3,4,10

LOGGED BY: BLM, R. Howell

LITHOLOGY LOG BY: BLM, A. S.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: Co. Coords. fr. SW cor. sec. 21 (1360 fn1, 2300 fel) elev. fr. log.

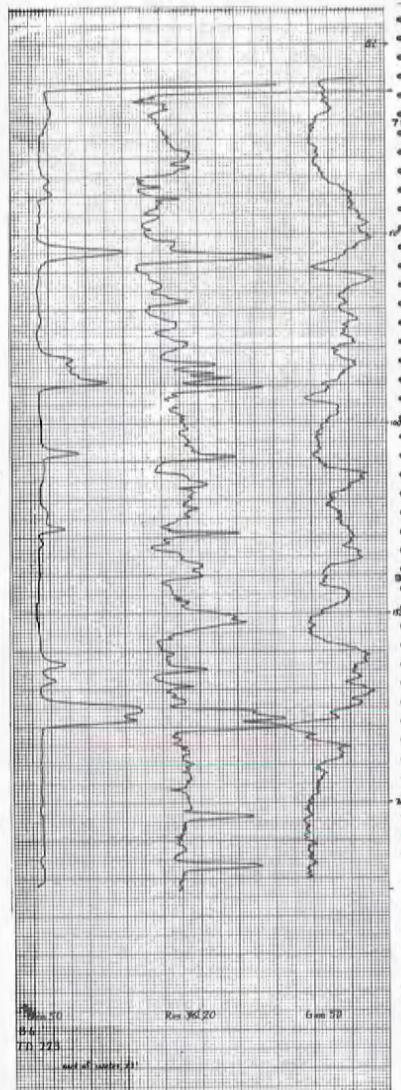
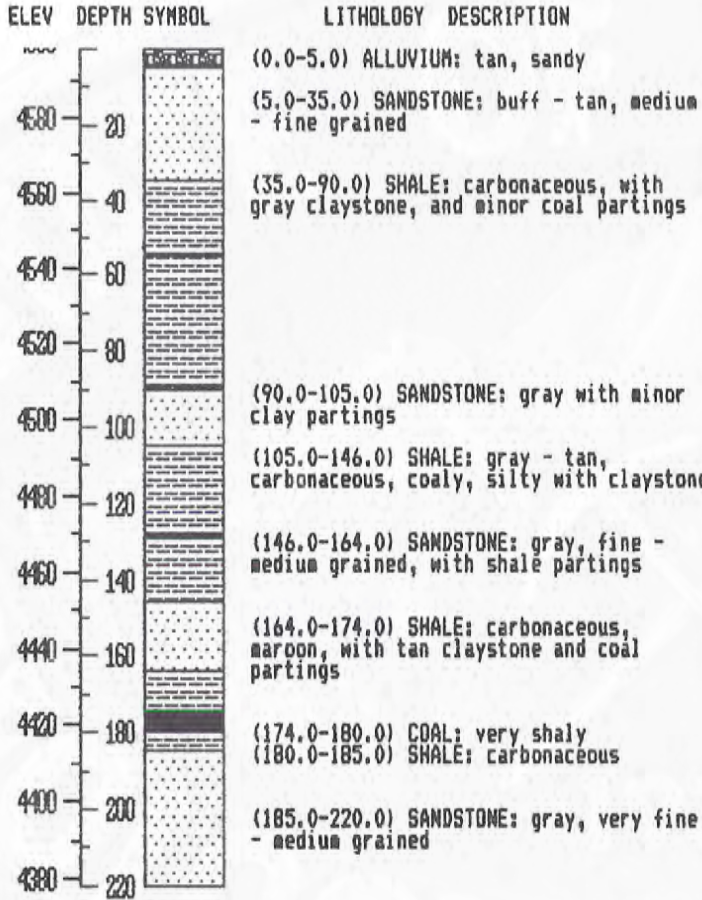
* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70007

	DENSITY	RESISTANCE	GAMMA
Scale:----->	50 cps/in	20 ohm/in	50 cps/in
Time Constant:-->	2 sec	-----	4 sec
Deflection:----->	left	right	right
Source Strength->	125 mCi	[Logging Speed 15.0 ft/min]	

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: B7 (1983)

SEQ. NO.: 70008

SOURCE: BLM

COMPLETED: 60183

*COUNTY: 17

STATE: WY

AREA: Becor/Gebo

QUADRANGLE: Blue Mesa East (7.5)

*QUAD. LOC. CODE: 43108H3

SECTION: 21

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4585.0

DEPTH TO WATER: GL

COMPANY COORDINATES:

3680.0N. ,

3504.0E.

DRILLER: BLM, H. Cureton

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 200.0

PROBE DEPTH: 197

HOLE DIAMETER: 4.75

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 2, 3, 4, 10

LOGGED BY: BLM, R. Howell

LITHOLOGY LOG BY: BLM, A. S.

COALSYS BY: P. Taucher

CORE INTERVALS:

COMMENTS: Co. Coords. fr. SW cor. sec. 21 (1600 fnl, 1776 fel) elev. fr. log.

* = SEE CODE EXPLANATIONS

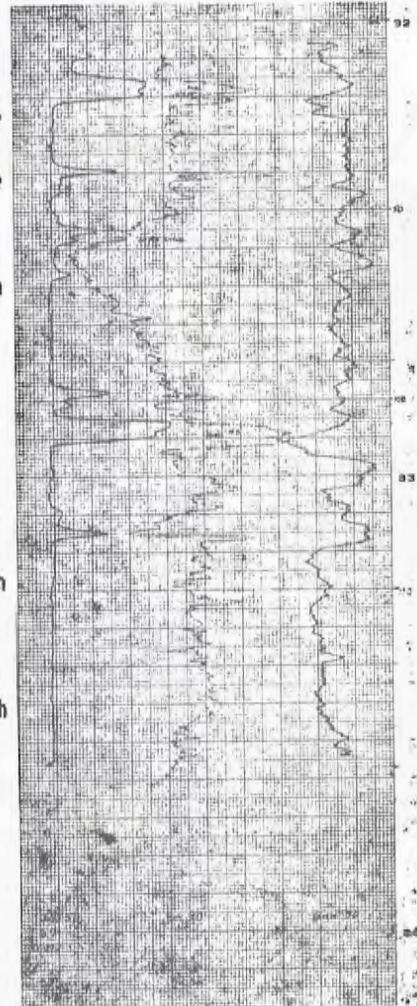
GEOPHYSICAL LOG TRACES

Seq. No.: 70008

	DENSITY	RESISTANCE	GAMMA
Scale:----->	50 cps/in	20 ohm/in	50 cps/in
Time Constant:-->	2 sec	-----	4 sec
Deflection:----->	left	right	right
Source Strength->	125 mCi	[Logging Speed 15.0 ft/min]	

GEOPHYSICAL LOG

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
4580			(0.0-15.0) SANDSTONE: gray, yellow, buff, fine grained
	20		(15.0-20.0) COAL: black, vitreous
4560			(20.0-30.0) SANDSTONE: gray, silty, fine grained with gray claystone
	40		(30.0-35.0) SILTSTONE: yellow, tan, fine grained with clay
4540			(35.0-45.0) SHALE: carbonaceous, with clay partings
	60		(45.0-60.0) CLAYSTONE: gray, silty, with carbonaceous shale
4520			(60.0-70.0) SANDSTONE: gray, fine grained with gray claystone
	80		(70.0-80.0) SHALE: gray, with tan fine grained sandstone
4500			(80.0-95.0) CLAYSTONE: gray, silty
	100		(95.0-100.0) CLAYSTONE: as above with minor coal
4480			(100.0-105.0) SANDSTONE: gray, fine grained, silty, with carbonaceous shale
	120		(105.0-110.0) COAL: black, vitreous
4460			(110.0-120.0) CLAYSTONE: dark gray, with fine grained sandstone
	140		(120.0-130.0) SANDSTONE: light gray, fine grained, silty
4440			(130.0-140.0) SHALE: carbonaceous, tan, with coal partings
	160		(140.0-195.0) SANDSTONE: gray - tan with gray claystone
4420			(195.0-200.0) CLAYSTONE: gray with carbonaceous shale
4400			
	180		
	200		



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: BB (1983)

SEQ. NO.: 70009

SOURCE: BLM

COMPLETED: 52783

*COUNTY: 17

STATE: WY

AREA: Becor/Gebo

QUADRANGLE: Blue Mesa East (7.5)

*QUAD. LOC. CODE: 43108H3

SECTION: 21

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4555.0

DEPTH TO WATER: GL

COMPANY COORDINATES:

1976.0N. ,

4104.0E.

DRILLER: BLM, H Cureton

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 130.0

PROBE DEPTH: 130

HOLE DIAMETER: 4.75

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 2,3,4,10

LOGGED BY: BLM, R. Howell

LITHOLOGY LOG BY: BLM, A. R. S.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: Co. Coords. fr. SW cor. sec. 21 (1976 fsl, 1176 fel) elev. fr. log.

* = SEE CODE EXPLANATIONS

Drill Hole: B8 (1983)

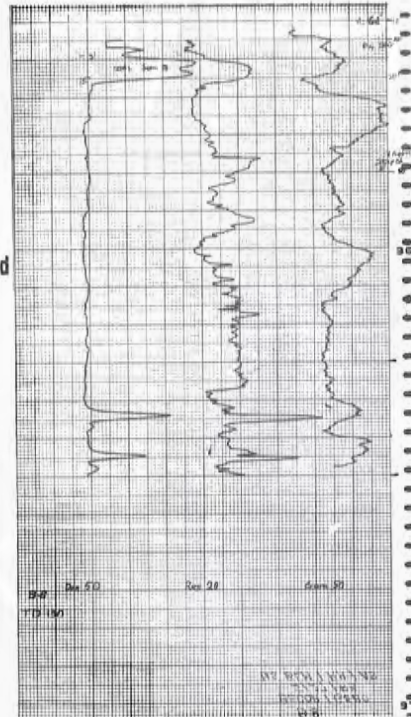
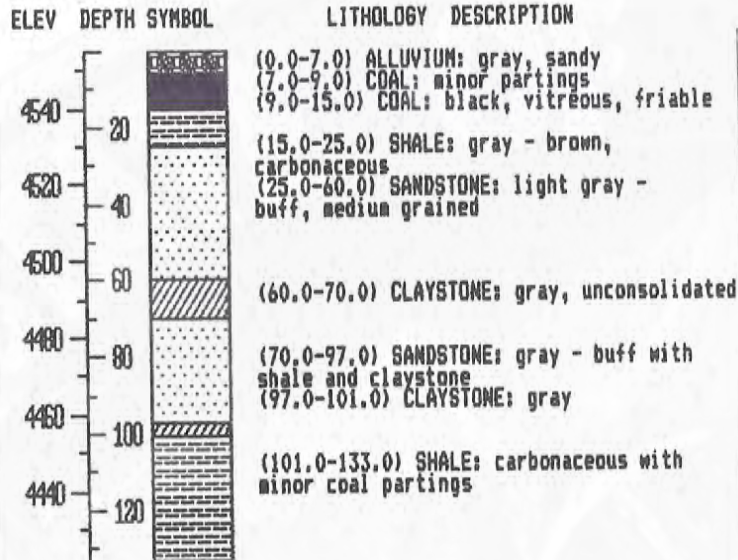
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GEOPHYSICAL LOG TRACES

Seq. No.: 70009

Scale:----->	DENSITY	RESISTANCE	GAMMA
Time Constant:-->	50 cps/in	20 ohm/in	50 cps/in
Deflection:----->	2 sec	-----	4 sec
Source Strength->	left	right	right
	125 mCi	[Logging Speed 15.0 ft/min]	

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: B10 (1983)

SEQ. NO.: 70010

SOURCE: BLM

COMPLETED: 60283

*COUNTY: 17

STATE: WY

AREA: Becor / Gebo

QUADRANGLE: Blue Mesa East (7.5)

*QUAD. LOC. CODE: 43108H3

SECTION: 21

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4620.0

DEPTH TO WATER: GL

COMPANY COORDINATES:

4354.0N. , 2604.0E.

DRILLER: BLM, H. Cureton

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 180.0

PROBE DEPTH: 182

HOLE DIAMETER: 4.75

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 2, 3, 4, 10

LOGGED BY: BLM, R. Howell

LITHOLOGY LOG BY: BLM, A. S. / E. D.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: Co. Coords. fr. SW cor. sec. 21 (926 fnl, 2676 fel), elev. fr. log

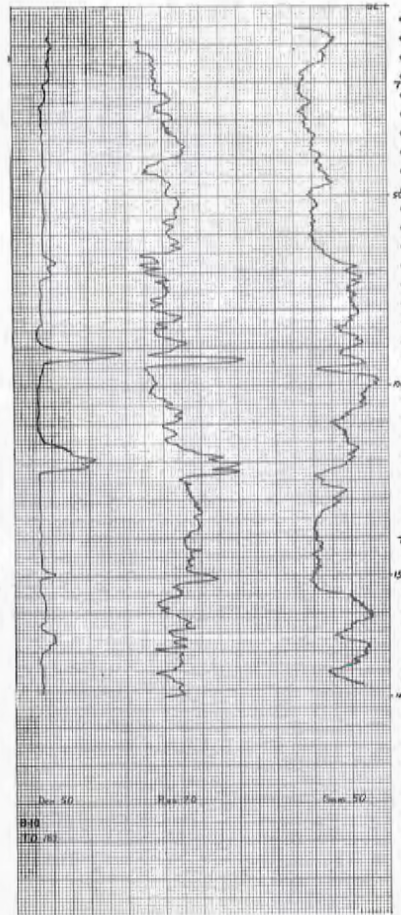
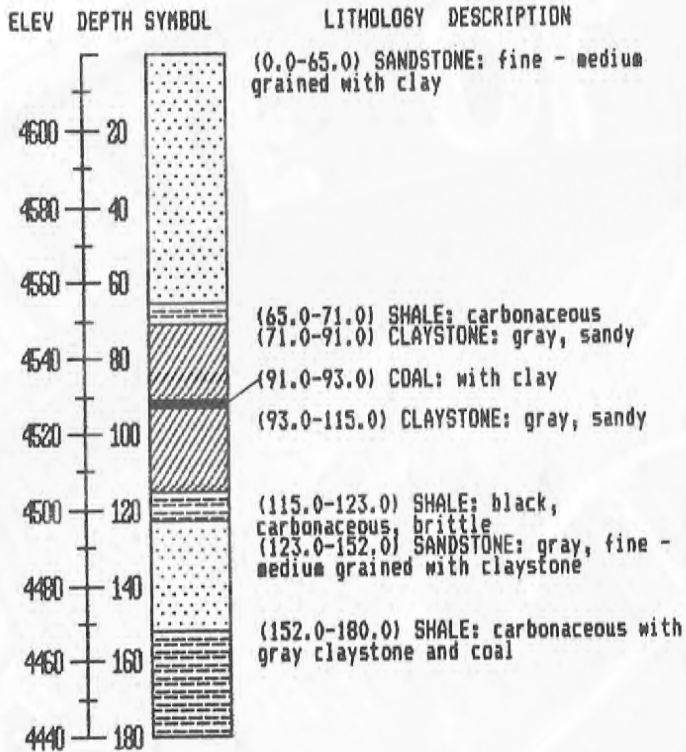
* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70010

	DENSITY	RESISTANCE	GAMMA
Scale:----->	50 cps/in	20 ohm/in	50 cps/in
Time Constant:-->	2 sec	-----	4 sec
Deflection:----->	left	right	right
Source Strength->	125 mCi	[Logging Speed 15.0 ft/min]	

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: B11 (1983)

SEQ. NO.: 70011

SOURCE: BLM

COMPLETED: 52583

*COUNTY: 17

STATE: WY

AREA: Becor / Gebo

QUADRANGLE: Blue Mesa East (7.5)

*QUAD. LOC. CODE: 43108H3

SECTION: 21

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4715.0

DEPTH TO WATER: GL

COMPANY COORDINATES:

3568.0N. , 1476.0E.

DRILLER: BLM, H. Cureton

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 180.0

PROBE DEPTH: 180

HOLE DIAMETER: 4.75

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 2,3,10

LOGGED BY: BLM, R. Howell

LITHOLOGY LOG BY: BLM, A. Smith

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: Co. Coords. fr. SW cor. sec. 21 (1712 fnl, 1476 fw1) elev. fr. log.

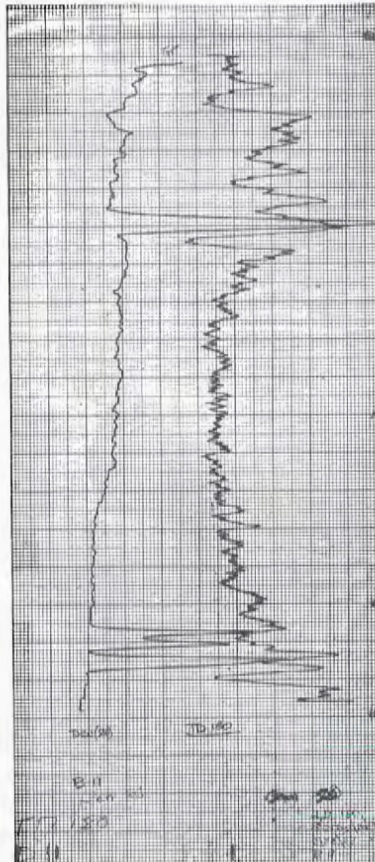
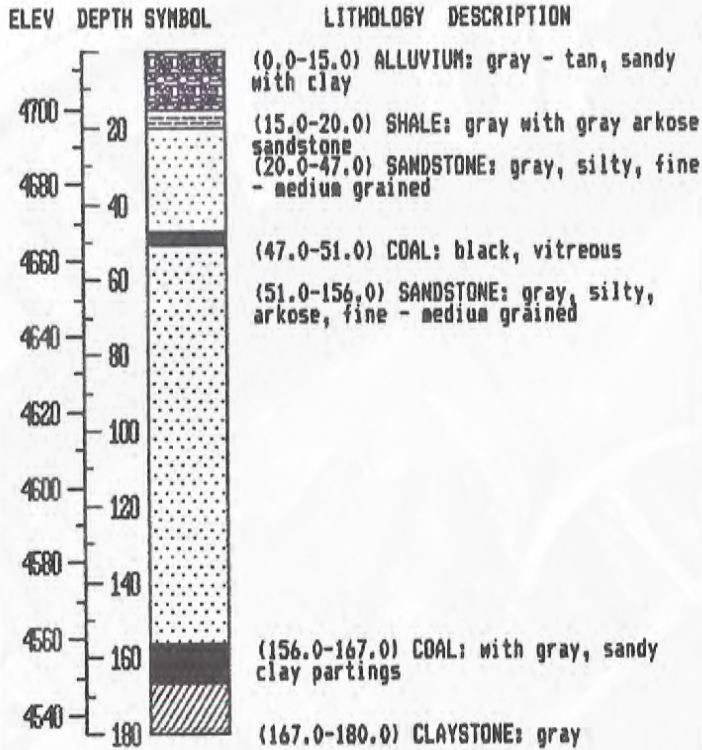
* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70011

	DENSITY	RESISTANCE	GAMMA
Scale:----->	20 cps/in	-----ohm/in	20 cps/in
Time Constant:-->	2 sec	-----	4 sec
Deflection:----->	left	-----	right
Source Strength->	125 mCi	[Logging Speed 15.0 ft/min]	

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: M 9 (1984)

SEQ. NO.: 70012

SOURCE: BLM

COMPLETED: 71684

*COUNTY: 43

STATE: WY

AREA: Moses Coal Expl.

QUADRANGLE: Castle Gardens (7.5)

*QUAD. LOC. CODE: 43107H5

SECTION: 2

TOWNSHIP: 46.00N

RANGE: 90.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4610.0

DEPTH TO WATER: GL

COMPANY COORDINATES:

0.0N. ,

0.0E.

DRILLER: BLM

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 200.0

PROBE DEPTH: 200

HOLE DIAMETER: ?

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 2,3,4,10

LOGGED BY: BLM

LITHOLOGY LOG BY: BLM

COALSYS BY: P. Taucher

CORE INTERVALS: 23 ft. - 27ft. 4in.

COMMENTS: SW¼ NE¼ NW¼ NE¼ , elev. from lithology log.

* = SEE CODE EXPLANATIONS

Drill Hole: M-9 (1984)

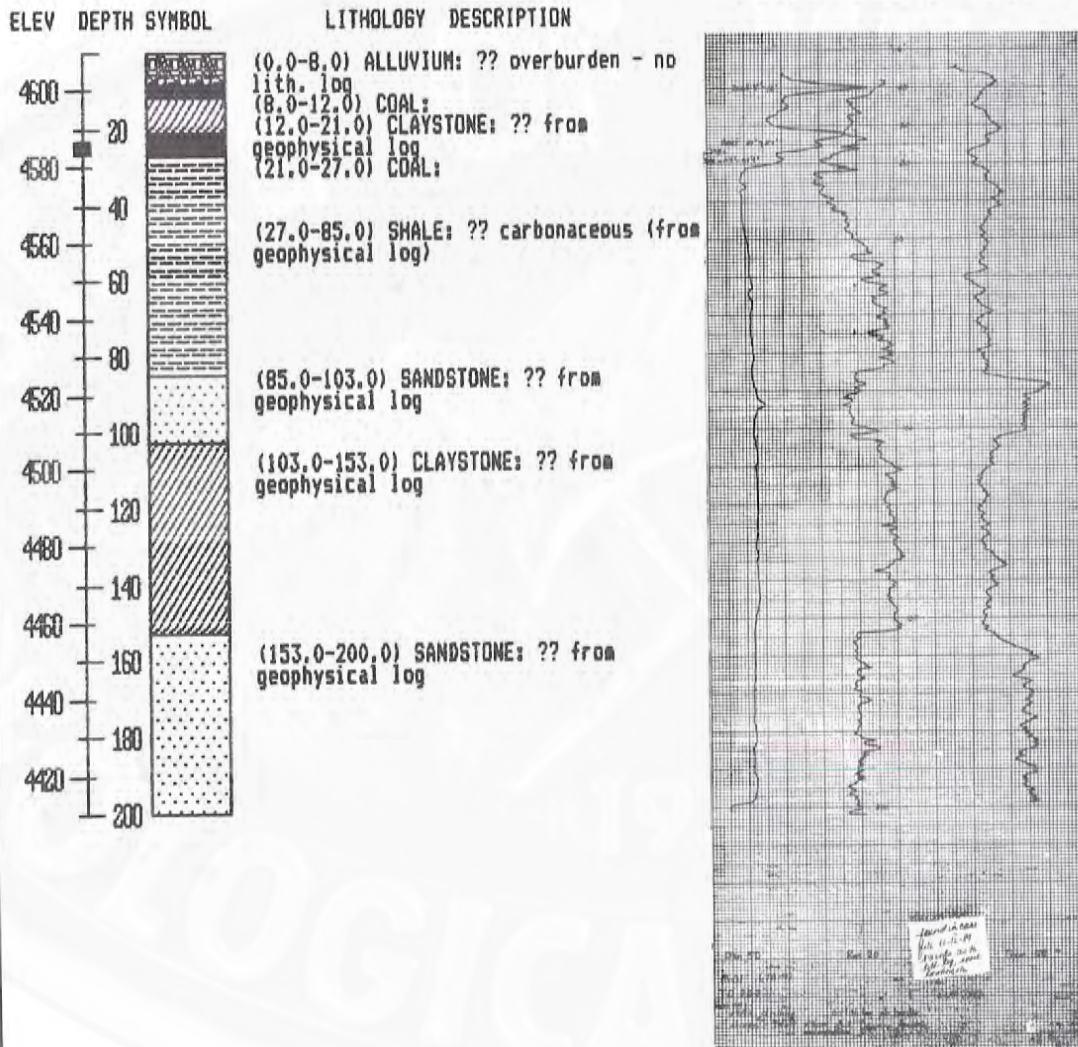
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GEOPHYSICAL LOG TRACES

Seq. No.: 70012

Scale:----->	DENSITY	RESISTANCE	GAMMA
Time Constant:-->	50 cps/in	20 ohm/in	50 cps/in
Deflection:---->	2 sec	-----	4 sec
Source Strength->	left	right	right
	125 mCi	[Logging Speed 15.0 ft/min]	

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: B1 (1984)

SEQ. NO.: 70013

SOURCE: BLM

COMPLETED: 71184

*COUNTY: 3

STATE: WY

AREA: Basin

QUADRANGLE: Manderson (7.5)

*QUAD. LOC. CODE: 44107C8

SECTION: 29

TOWNSHIP: 51.00N

RANGE: 93.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4020.0

DEPTH TO WATER:

COMPANY COORDINATES:

0.0N. ,

0.0E.

DRILLER: BLM, H. Cureton

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 200.0

PROBE DEPTH: 200

HOLE DIAMETER: 6.75

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 2,3,4,10

LOGGED BY: BLM, H. Cureton & J. Simms

LITHOLOGY LOG BY: BLM, J. Simms

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$, elev. from lithology log.

* = SEE CODE EXPLANATIONS

Drill Hole: B1 (1984)

Page 1 of 1

GEOPHYSICAL LOG TRACES

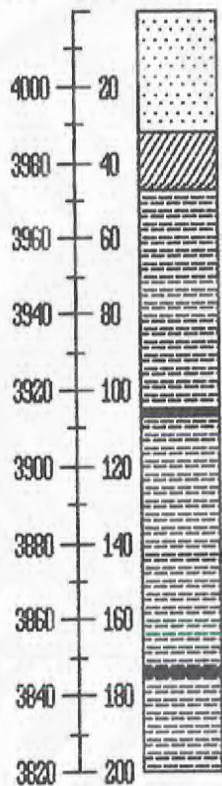
Seq. No.: 70013

	GAMMA	DENSITY	RESISTANCE
Scale:----->	50 cps/in	50 cps/in	50 ohm/in
Time Constant:-->	2 sec	1 sec	-----
Deflection:---->	right	left	right
Source Strength->		125 mCi	
Logging Speed:-->	15-20ft/min		

GEOPHYSICAL LOG

ELEV DEPTH SYMBOL

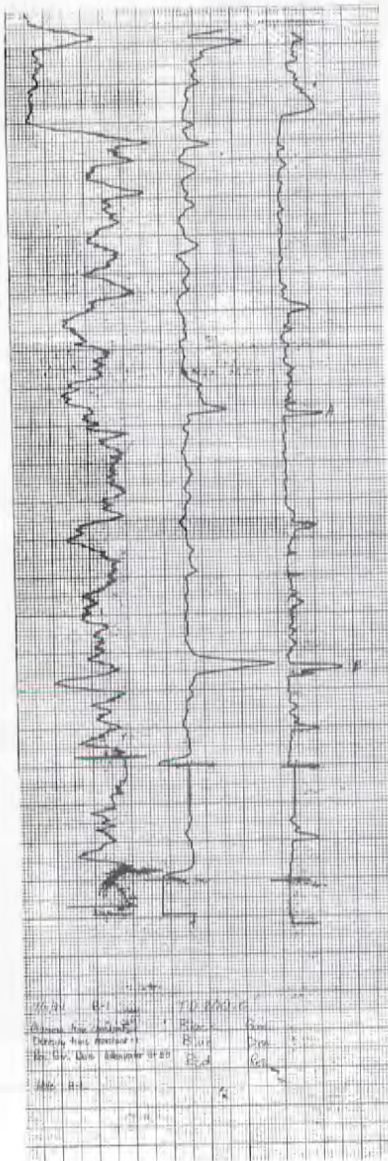
LITHOLOGY DESCRIPTION



(0,0-32.0) SANDSTONE: tan, fine grained with clay

(32.0-47.0) CLAY: red - yellow, with carbonaceous shale

(47.0-200.0) SHALE: gray - dark gray, carbonaceous with some coal, sandy in part



7/2/84 B-1 70013
 Gamma Ray Source: 125 mCi
 Density Log Model: 1
 Res. Log Model: 1
 Log. Sp. 15-20 ft/min
 Date: 7/2/84

THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: B5 (1984)

SEQ. NO.: 70014

SOURCE: BLM

COMPLETED: 71184

*COUNTY: 3

STATE: WY

AREA: Basin ?

QUADRANGLE: Manderson (7.5)

*QUAD. LOC. CODE: 44107CB

SECTION: 32

TOWNSHIP: 51.00N

RANGE: 93.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4020.0

DEPTH TO WATER: GL

COMPANY COORDINATES: 0.0N. , 0.0E.

DRILLER: BLM, H. Cureton

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 340.0

PROBE DEPTH: 342

HOLE DIAMETER: 6.75

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 2, 3, 4, 10

LOGGED BY: BLM, H. Cureton & J. Simms

LITHOLOGY LOG BY: BLM, J. Simms

COALSYS BY: P. Taucher

CORE INTERVALS: none

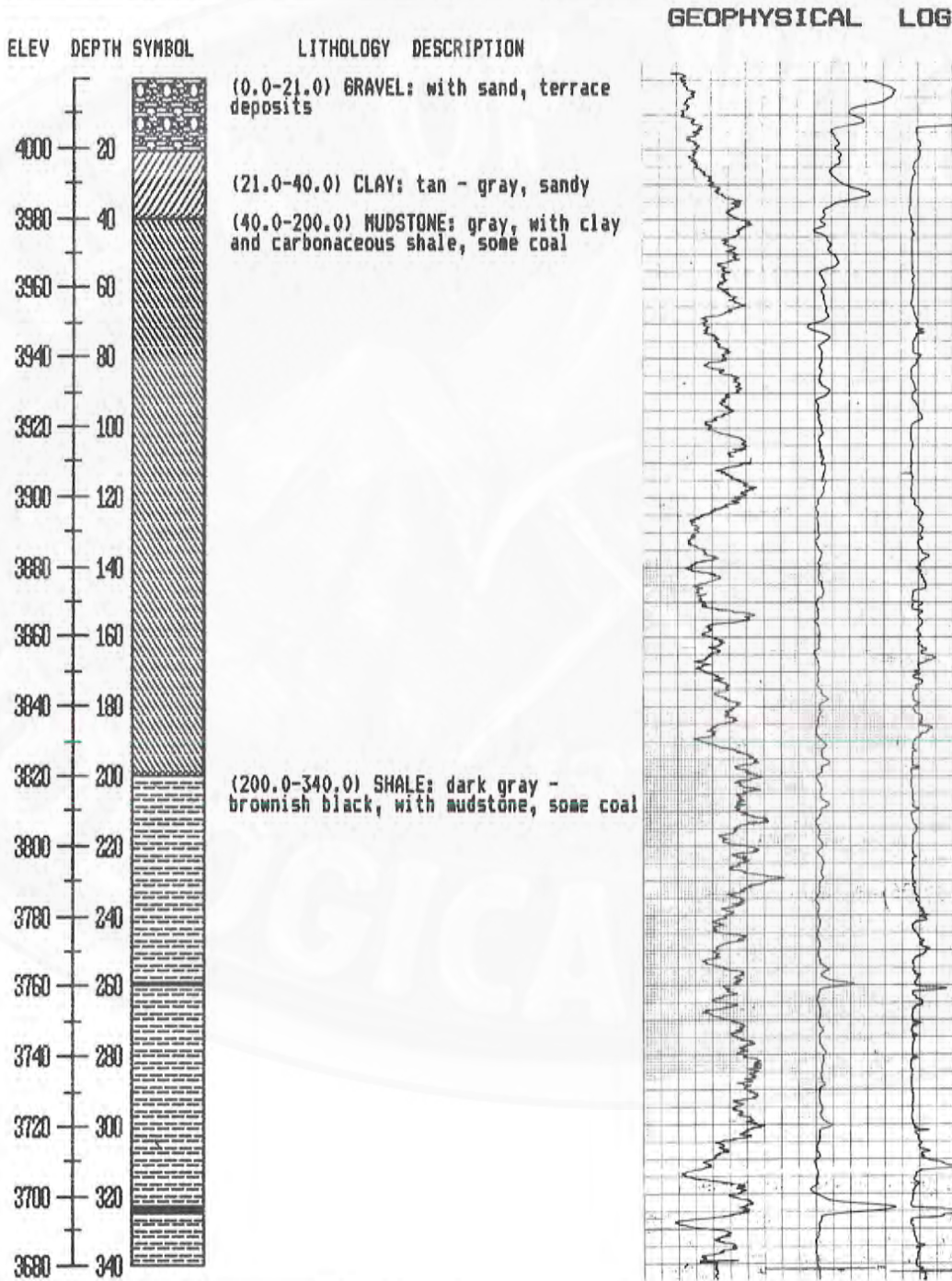
COMMENTS: SE¼ NE¼ NE¼ , elev. from lithology log.

* = SEE CODE EXPLANATIONS

G E O P H Y S I C A L L O G T R A C E S

Seq. No.: 70014

Scale:----->	GAMMA	DENSITY	RESISTANCE
Time Constant:-->	50 cps/in	50 cps/in	50 ohm/in
Deflection:----->	2 sec	1 sec	-----
Source Strength->	right	left	right
Logging Speed:-->	15-20ft/min	125 mCi	



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: M1 (1984)

SEQ. NO.: 70015

SOURCE: BLM

COMPLETED: 71384

*COUNTY: 3

STATE: WY

AREA: Cowboy Treating Plant

QUADRANGLE: Manderson (7.5)

*QUAD. LOC. CODE: 44107C8

SECTION: 30

TOWNSHIP: 50.00N

RANGE: 92.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4005.0

DEPTH TO WATER:

COMPANY COORDINATES:

0.0N. ,

0.0E.

DRILLER: BLM, H. Cureton

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 202.0

PROBE DEPTH: 202

HOLE DIAMETER: 6.75

CASING DEPTH: 0 - 21 ft.

DRILL FLUID: mud

*LOG TYPES: 2,3,4,10

LOGGED BY: BLM, V. Niermeier & H.C.

LITHOLOGY LOG BY: BLM, V. Niermeier

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NW¼ NW¼ NE¼ , elev. from lithology log.

* = SEE CODE EXPLANATIONS

Drill Hole: M1 (1984)

Page 1 of 1

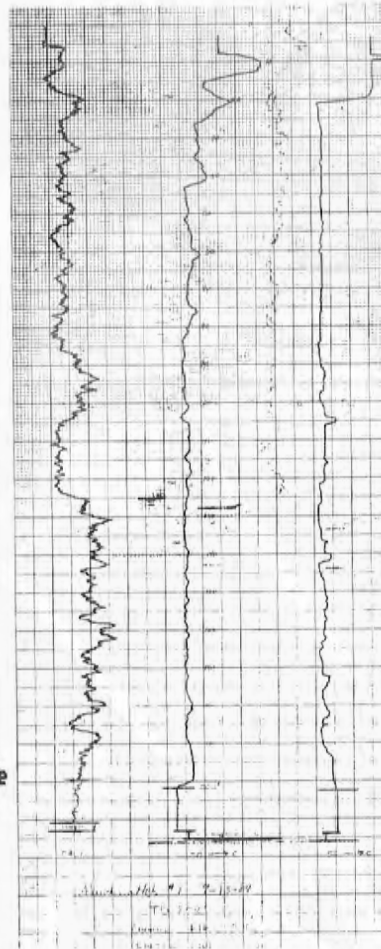
GEOPHYSICAL LOG TRACES

Seq. No.: 70015

	GAMMA	DENSITY	RESISTANCE
Scale:----->	50 cps/in	50 cps/in	50 ohm/in
Time Constant:-->	2 sec	1 sec	-----
Deflection:----->	right	left	left
Source Strength->		125 mCi	
Logging Speed:-->	15-20ft/min		

GEOPHYSICAL LOG

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
4000			(0.0-20.0) GRAVEL: with dark gray sandy clay
3980	20		(20.0-55.0) SILTSTONE: light gray
3960	40		
3940	60		(55.0-130.0) SHALE: light gray, sandy
3920	80		
3900	100		
3880	120		(130.0-159.0) SHALE: light gray
3860	140		
3840	160		(159.0-193.0) SHALE: light gray, sandy
3820	180		
200	202.0		(193.0-202.0) SANDSTONE: gray, very fine grained



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: M2 (1984)

SEQ. NO.: 70016

SOURCE: BLM

COMPLETED: 71384

*COUNTY: 3

STATE: WY

AREA: Old Mine

QUADRANGLE: Manderson (7.5)

*QUAD. LOC. CODE: 44107CB

SECTION: 12

TOWNSHIP: 50.00N

RANGE: 93.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4260.0

DEPTH TO WATER: GL

COMPANY COORDINATES:

0.0N. ,

0.0E.

DRILLER: BLM, H. Cureton

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 202.0

PROBE DEPTH: 202

HOLE DIAMETER: 5.0

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 2, 3, 4, 10

LOGGED BY: BLM, H. Cureton & V.N.

LITHOLOGY LOG BY: BLM, V. Niermeier

COALSYS BY: P. Taucher

CORE INTERVALS:

COMMENTS: NW¼ SE¼ NE¼ , elev. from lithology log.

* = SEE CODE EXPLANATIONS

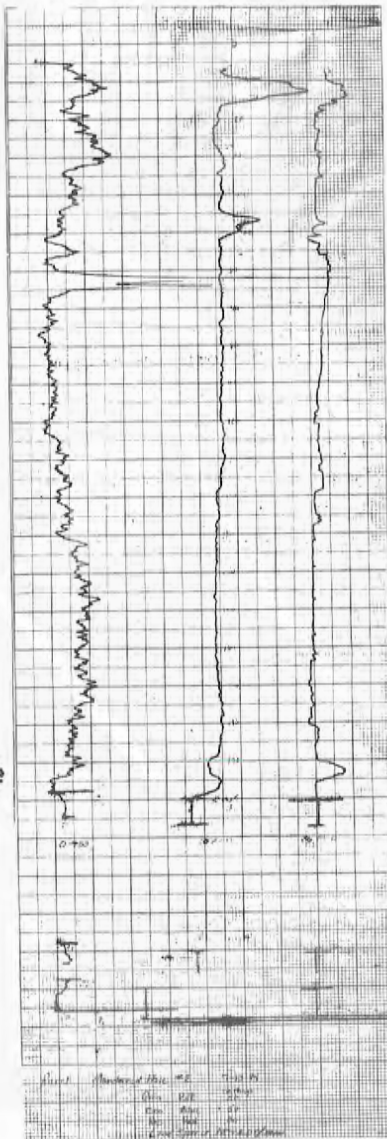
GEOPHYSICAL LOG TRACES

Seq. No.: 70016

	GAMMA	DENSITY	RESISTANCE
Scale:----->	50 cps/in	50 cps/in	50 ohm/in
Time Constant:-->	2 sec	1 sec	-----
Deflection:----->	right	left	right
Source Strength->		125 mCi	
Logging Speed:-->	15-20ft/min		

GEOPHYSICAL LOG

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
4240	20	[Symbol]	(0.0-8.0) ALLUVIUM: sandy
		[Symbol]	(8.0-14.0) COAL: dark red - brown, weathered, sandy
		[Symbol]	(14.0-33.0) SHALE: dark yellow brown - gray, sandy
4220	40	[Symbol]	(33.0-46.0) SILTSTONE: light gray
		[Symbol]	(46.0-48.0) COAL:
4200	60	[Symbol]	(48.0-132.0) SANDSTONE: light gray - light brown, fine grained with some shale
4180	80	[Symbol]	
4160	100	[Symbol]	
4140	120	[Symbol]	
4120	140	[Symbol]	(132.0-189.0) SHALE: light gray
4100	160	[Symbol]	
4080	180	[Symbol]	
4060	200	[Symbol]	(189.0-202.0) SANDSTONE: gray, very fine grained, calcareous



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: M3 (1984)

SEQ. NO.: 70017

SOURCE: BLM

COMPLETED: 71584

*COUNTY: 3

STATE: WY

AREA: So. of no. 8 (M8-1984)

QUADRANGLE: Manderson (7.5)

*QUAD. LOC. CODE: 44107CB

SECTION: 4

TOWNSHIP: 49.00N

RANGE: 92.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.ON.

0.OE.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4085.0

DEPTH TO WATER: GL

COMPANY COORDINATES:

0.ON. ,

0.OE.

DRILLER: BLM, H. Cureton

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 200.0

PROBE DEPTH: 200

HOLE DIAMETER: 6.75

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 2,3,4,10

LOGGED BY: BLM, V. Niermeier & H.C.

LITHOLOGY LOG BY: BLM, V. Niermeier

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: SE¼ NE¼ NW¼ , elev. from lithology log.

* = SEE CODE EXPLANATIONS

Drill Hole: M3 (1984)

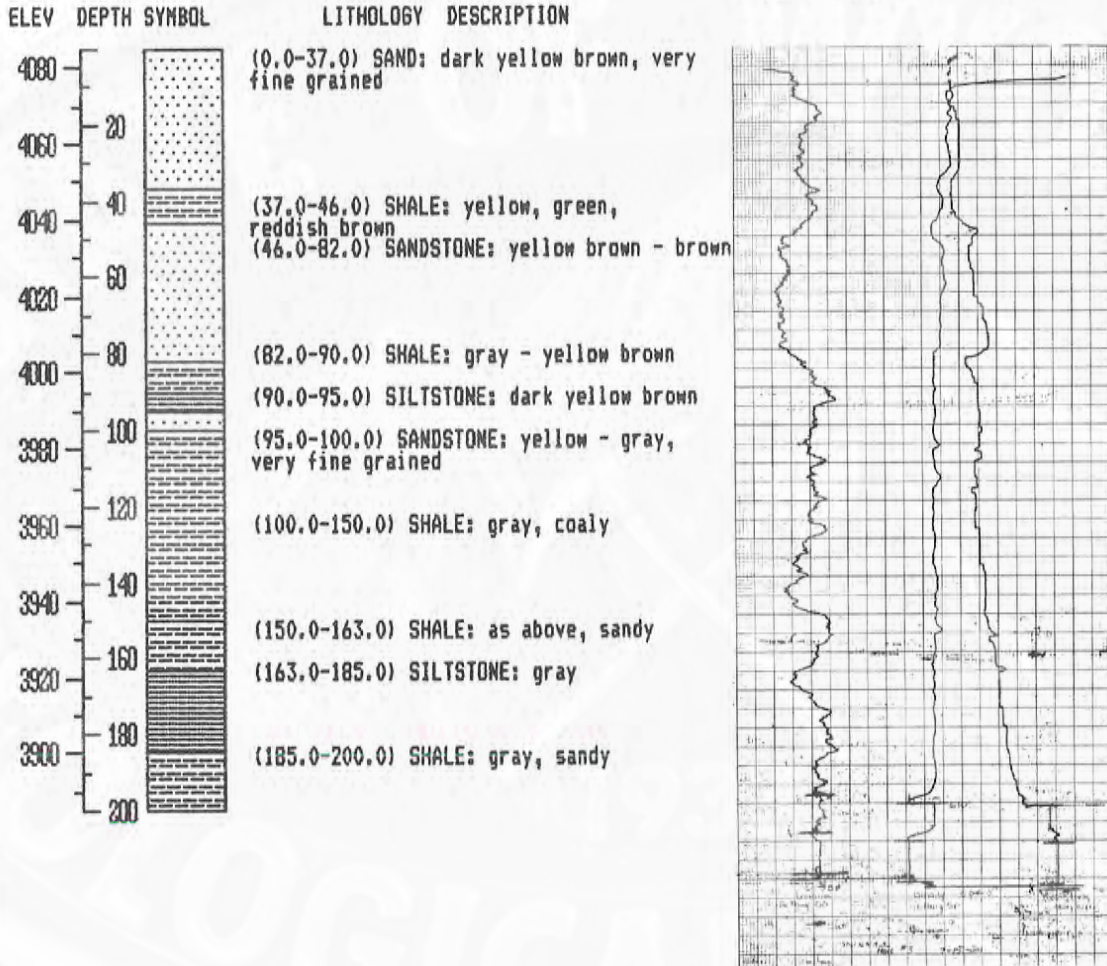
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GEOPHYSICAL LOG TRACES

Seq. No.: 70017

	GAMMA	DENSITY	RESISTANCE
Scale:----->	50 cps/in	50 cps/in	50 ohm/in
Time Constant:-->	4 sec	2 sec	-----
Deflection:----->	right	left	left
Source Strength->		125 mCi	
Logging Speed:-->	15-20ft/min		

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: M4 (1984)

SEQ. NO.: 70018

SOURCE: BLM

COMPLETED: 71584

*COUNTY: 43

STATE: WY

AREA: West of Sand Draw

QUADRANGLE: McDermotts Butte (7.5)

*QUAD. LOC. CODE: 44107B7

SECTION: 18

TOWNSHIP: 48.00N

RANGE: 91.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N. 0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4363.0

DEPTH TO WATER: GL

COMPANY COORDINATES: 0.0N. , 0.0E.

DRILLER: BLM, H. Cureton

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 200.0

PROBE DEPTH: 200

HOLE DIAMETER: 5.0

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 2,3,4,10

LOGGED BY: BLM, V. Niermeier

LITHOLOGY LOG BY: BLM, V. Niermeier

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE¼ NW¼ NW¼ , elev. from lithology log.

* = SEE CODE EXPLANATIONS

Drill Hole: M4 (1984)

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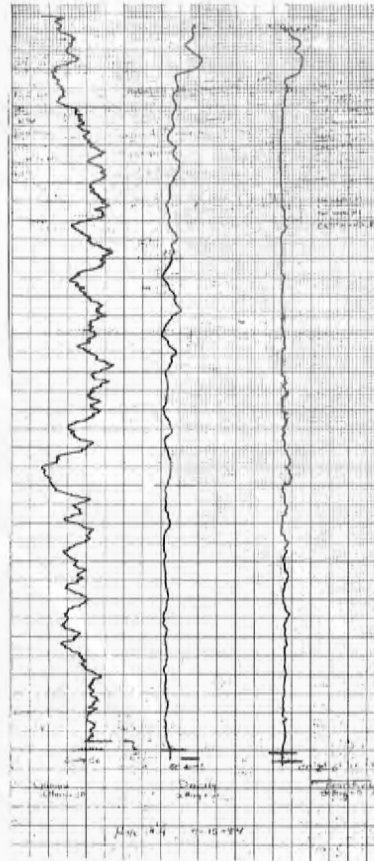
GEOPHYSICAL LOG TRACES

Seq. No.: 70018

	GAMMA	DENSITY	RESISTANCE
Scale:----->	50 cps/in	50 cps/in	50 ohm/in
Time Constant:-->	4 sec	2 sec	-----
Deflection:----->	right	left	left
Source Strength->		125 mCi	
Logging Speed:-->	15.0 ft/min		

GEOPHYSICAL LOG

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
4360		[Symbol: Dotted pattern]	(0.0-20.0) SAND: dark yellow brown
4340	20	[Symbol: Horizontal lines]	(20.0-110.0) SHALE: yellow brown - gray
4320	40	[Symbol: Horizontal lines]	
4300	60	[Symbol: Horizontal lines]	
4280	80	[Symbol: Horizontal lines]	
4260	100	[Symbol: Horizontal lines]	
4240	120	[Symbol: Horizontal lines]	(110.0-118.0) SILTSTONE: gray (118.0-200.0) SHALE: dark gray
4220	140	[Symbol: Horizontal lines]	
4200	160	[Symbol: Horizontal lines]	
4180	180	[Symbol: Horizontal lines]	
	200	[Symbol: Horizontal lines]	



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: M5 (1984)

SEQ. NO.: 70019

SOURCE: BLM

COMPLETED: 71884

*COUNTY: 43

STATE: WY

AREA: North of Big Cedar Ridge

QUADRANGLE: Deadline Draw (7.5)

*QUAD. LOC. CODE: 4310765

SECTION: 16

TOWNSHIP: 45.00N

RANGE: 89.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N. 0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4920.0

DEPTH TO WATER: GL

COMPANY COORDINATES: 0.0N. , 0.0E.

DRILLER: BLM, H. Cureton

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 200.0

PROBE DEPTH: 200

HOLE DIAMETER: 5.00

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 2,3,4,10

LOGGED BY: BLM, R. Watts

LITHOLOGY LOG BY: BLM, V. Niermeier

COALSYS BY: P. Taucher

CORE INTERVALS:

COMMENTS: C SW¼ NW¼ , elev. from lithology log.

* = SEE CODE EXPLANATIONS

Drill Hole: M5 (1984)

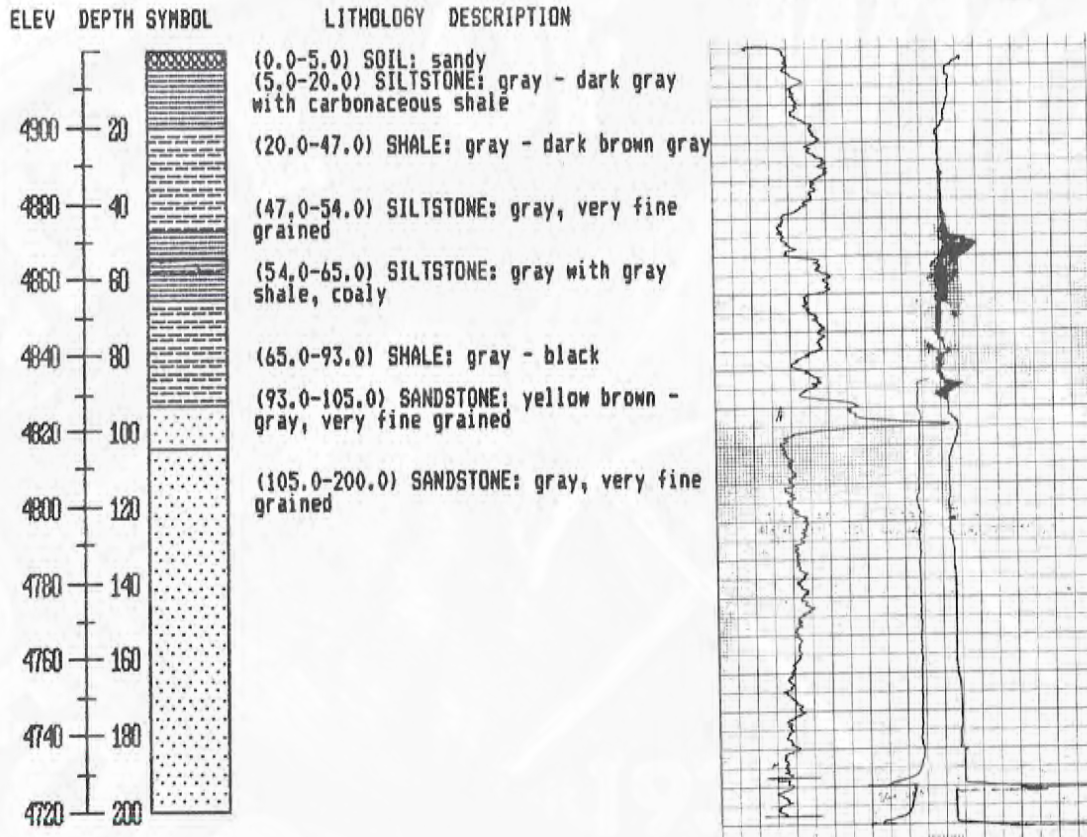
Page 1 of 1

GEOPHYSICAL LOG TRACES

Seq. No.: 70019

	GAMMA	DENSITY	RESISTANCE
Scale:----->	50 cps/in	50 cps/in	50 ohm/in
Time Constant:-->	4 sec	2 sec	-----
Deflection:----->	right	left	right
Source Strength->		125 mCi	
Logging Speed:-->	15.0 ft/min		

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: M6 (1984)

SEQ. NO.: 70020

SOURCE: BLM

COMPLETED: 71684

*COUNTY: 43

STATE: WY

AREA: E. of Bud Kimball Draw

QUADRANGLE: Castle Gardens (7.5)

*QUAD. LOC. CODE: 43107H5

SECTION: 33

TOWNSHIP: 46.00N

RANGE: 89.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4820.0

DEPTH TO WATER: 6L

COMPANY COORDINATES:

0.0N. ,

0.0E.

DRILLER: BLM, H. Cureton

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 220.0

PROBE DEPTH: 220

HOLE DIAMETER: 5.0

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 2,3,4,10

LOGGED BY: BLM, ?

LITHOLOGY LOG BY: BLM, V. Niermeier

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: SE¼ NE¼ NE¼ , elev. from lithology log.

* = SEE CODE EXPLANATIONS

Drill Hole: M6 (1984)

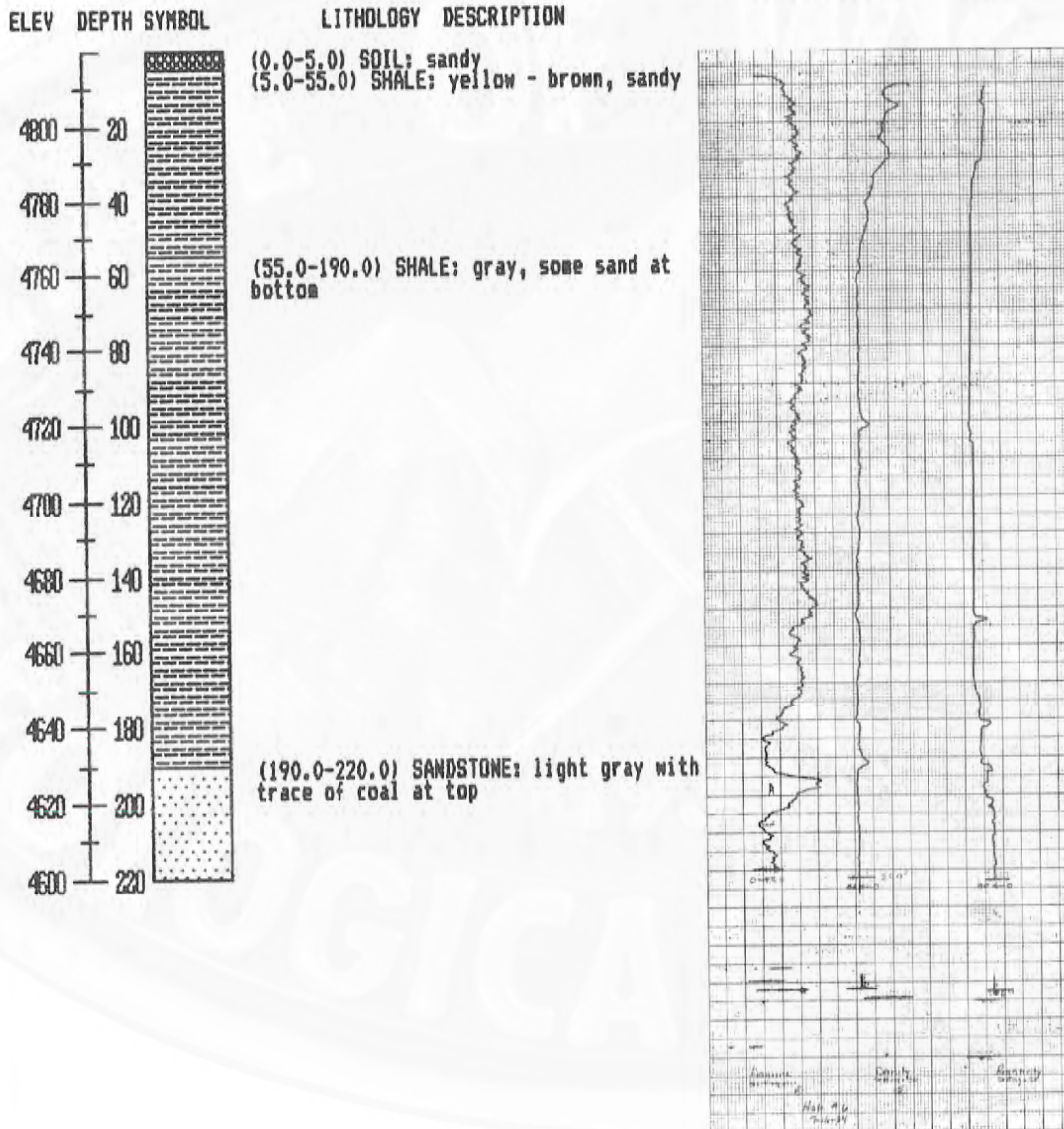
Page 1 of 1

GEOPHYSICAL LOG TRACES

Seq. No.: 70020

	GAMMA	DENSITY	RESISTANCE
Scale:----->	50 cps/in	50 cps/in	50 ohm/in
Time Constant:-->	4 sec	2 sec	-----
Deflections:----->	right	left	left
Source Strength->		125 mCi	
Logging Speed:-->	15.0 ft/min		

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: M7 (1984)

SEQ. NO.: 70021

SOURCE: BLM

COMPLETED: 71884

*COUNTY: 43

STATE: WY

AREA: Blue Bank Road

QUADRANGLE: Castle Gardens (7.5)

*QUAD. LOC. CODE: 43107H5

SECTION: 28

TOWNSHIP: 46.00N

RANGE: 89.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.ON.

0.OE.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4895.0

DEPTH TO WATER: GL

COMPANY COORDINATES:

0.ON. ,

0.OE.

DRILLER: BLM, H. Cureton

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 200.0

PROBE DEPTH: 200

HOLE DIAMETER: 5.0

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 2,3,4,10

LOGGED BY: BLM, Rob Watts

LITHOLOGY LOG BY: BLM, V Niermeier

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE¼ NE¼ SW¼ , elev. from lithology log.

* = SEE CODE EXPLANATIONS

Drill Hole: M7 (1984)

Page 1 of 1

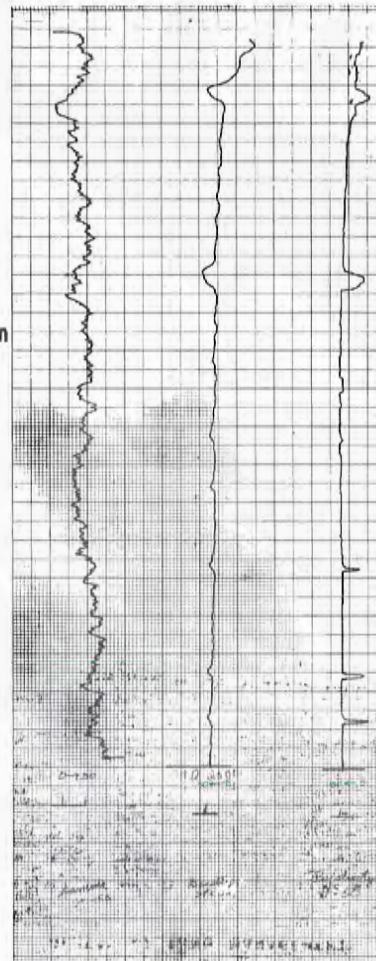
GEOPHYSICAL LOG TRACES

Seq. No.: 70021

	GAMMA	DENSITY	RESISTANCE
Scale:----->	50 cps/in	50 cps/in	50 ohm/in
Time Constant:-->	4 sec	2 sec	-----
Deflection:----->	right	left	left
Source Strength->		125 mCi	
Logging Speed:-->	15.0 ft/min		

GEOPHYSICAL LOG

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
4880	20		(0.0-5.0) SOIL: sandy
4860	40		(5.0-68.0) SILTSTONE: yellow - brown
4840	60		
4820	80		(68.0-74.0) SANDSTONE: light gray, very hard
4800	100		(74.0-85.0) SILTSTONE: yellow - brown with gray shale
4780	120		(85.0-105.0) SILTSTONE: gray - yellow brown
4760	140		
4740	160		
4720	180		
4700	200		(105.0-200.0) SILTSTONE: gray



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: NA

DRILLHOLE: MB (1984)

SEQ. NO.: 70022

SOURCE: BLM

COMPLETED: 71484

*COUNTY: 3

STATE: WY

AREA: Near River

QUADRANGLE: Manderson (7.5)

*QUAD. LOC. CODE: 44107C8

SECTION: 28

TOWNSHIP: 50.00N

RANGE: 92.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4002.0

DEPTH TO WATER: GL

COMPANY COORDINATES: 0.0N. , 0.0E.

DRILLER: BLM, H. Cureton

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 200.0

PROBE DEPTH: 200

HOLE DIAMETER: 5.0

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 2,3,4,10

LOGGED BY: BLM, V. Niermeier & H.C.

LITHOLOGY LOG BY: BLM, V. Niermeier

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NW¼ SW¼ SE¼ , elev. from lithology log.

* = SEE CODE EXPLANATIONS

Drill Hole: MB (1984)

Page 1 of 1

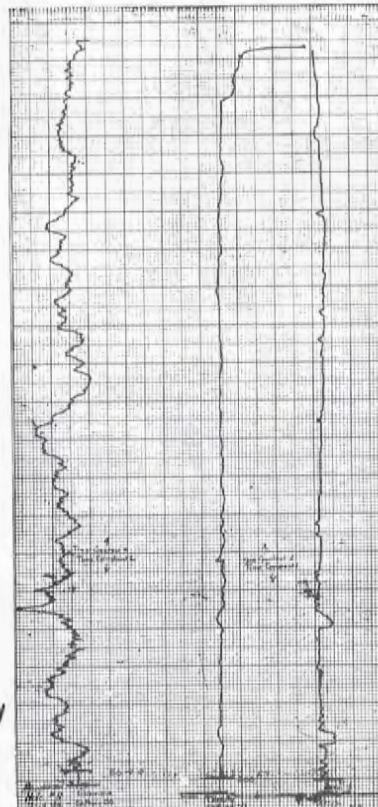
GEOPHYSICAL LOG TRACES

Seq. No.: 70022

	GAMMA	DENSITY	RESISTANCE
Scale:----->	50 cps/in	50 cps/in	50 ohm/in
Time Constant:-->	4-2 sec	2-1 sec	-----
Deflection:----->	right	left	left
Source Strength->		125 mCi	
Logging Speed:-->	15.0 ft/min		

GEOPHYSICAL LOG

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
4000			(0.0-5.0) GRAVEL;
			(5.0-70.0) SILTSTONE; yellow brown
3960	20		
3960	40		
3940	60		
3920	80		(70.0-110.0) SILTSTONE; light gray
3900	100		
3880	120		(110.0-185.0) SHALE; gray - dark gray
3860	140		
3840	160		
3820	180		(185.0-190.0) SILTSTONE; gray - dark gray
			(190.0-200.0) SHALE; gray - dark gray
	200		



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: ?

DRILLHOLE: NW 2-1-45-99

SEQ. NO.: 70023

SOURCE: Northwestern Res.

COMPLETED: 90182

*COUNTY: 17

STATE: WY

AREA: Grass Creek

QUADRANGLE: Grass Creek

*QUAD. LOC. CODE: 43108H6

SECTION: 1

TOWNSHIP: 45.00N

RANGE: 99.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 6140.0

DEPTH TO WATER: 35'

COMPANY COORDINATES: 0.0N. , 0.0E.

DRILLER: Teton, H.E.

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 300.0

PROBE DEPTH: 304'

HOLE DIAMETER: 4.5"

CASING DEPTH: 0 - 20 ft.

DRILL FLUID: mud

*LOG TYPES: 1,10

LOGGED BY: Century G., S. Carter

LITHOLOGY LOG BY: Western Energy Co.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: SE¼ SE¼ Sec. 1, elev. from lithology log

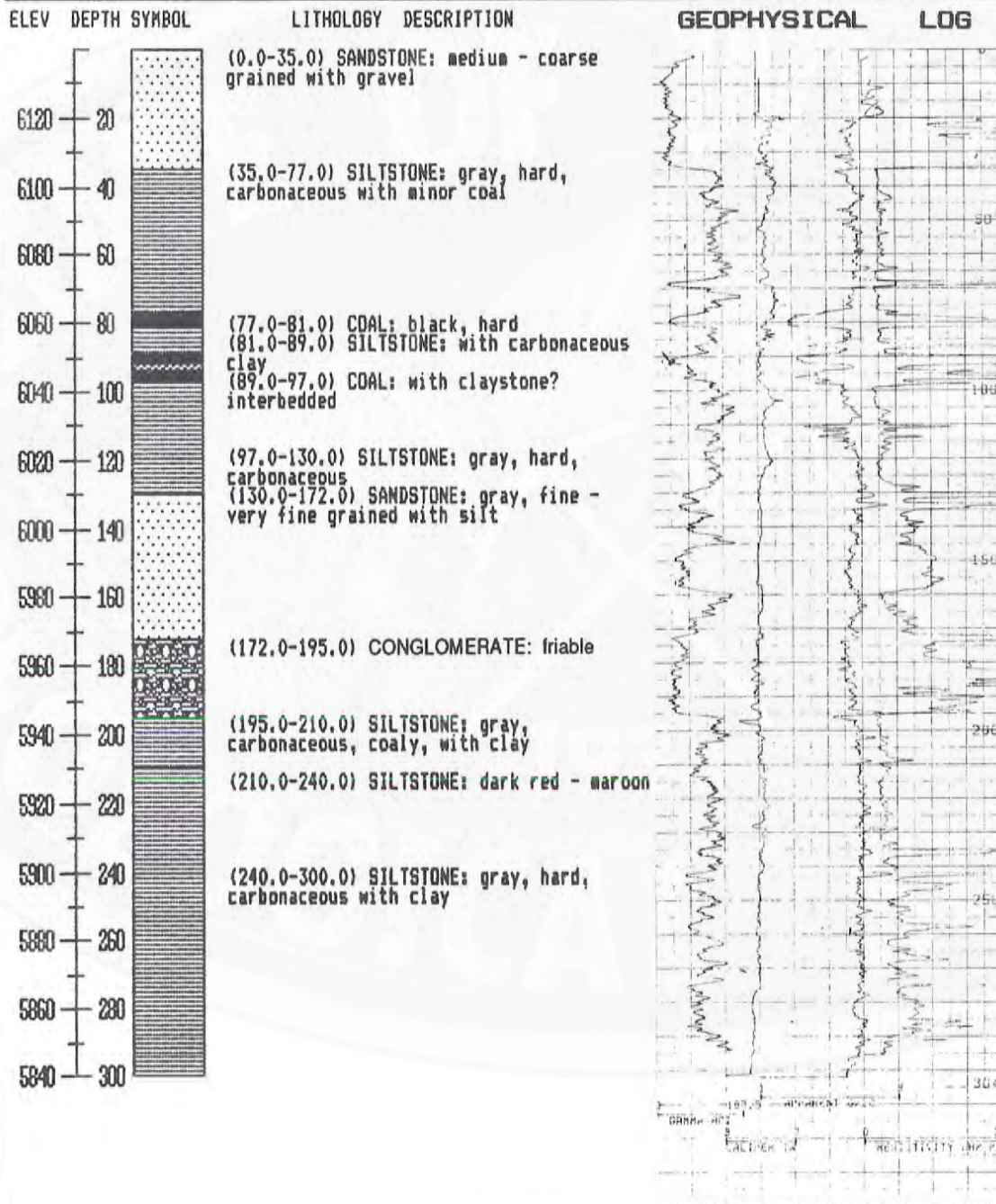
* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70023

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 75.0 cps/in; 2.0 in/in; 0.5 g/cc/in; 50.0 ohm/in
 Deflection:--> right ;right ;right ;right
 Bias:-----> ;-3.0 ;-1.0 ;0.0
 Source Strength:-----> ;125 mCi

[Logging Speed: 30.0 ft/min]



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: ?

DRILLHOLE: NW 3-1-45-99

SEQ. NO.: 70024

SOURCE: Northwestern Res.

COMPLETED: 83182

*COUNTY: 17

STATE: WY

AREA: Grass Creek

QUADRANGLE: Grass Creek

*QUAD. LOC. CODE: 43108H6

SECTION: 1

TOWNSHIP: 45.00N

RANGE: 99.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.ON.

0.OE.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 5926.0

DEPTH TO WATER: 6'

COMPANY COORDINATES:

0.ON. ,

0.OE.

DRILLER: Teton, H.E.

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 500.0

PROBE DEPTH: 495'

HOLE DIAMETER: 5.2"

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 1,10

LOGGED BY: Century G., S. Carter

LITHOLOGY LOG BY: Western Energy Co.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: Center W $\frac{1}{2}$ W $\frac{1}{2}$ sec. 1, elev. from lithology log

* = SEE CODE EXPLANATIONS

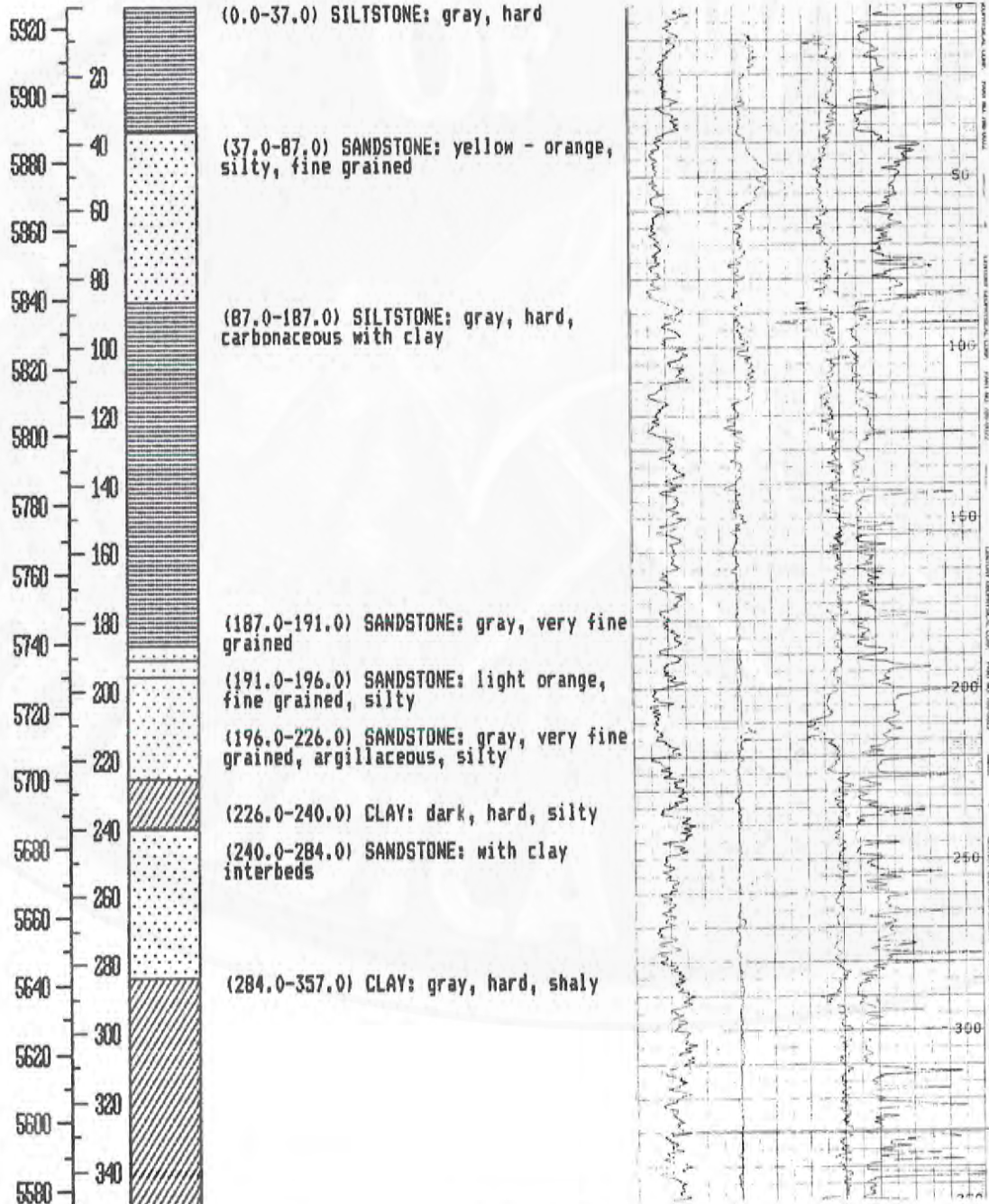
GEOPHYSICAL LOG TRACES

Seq. No.: 70024

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 100.0cps/in | 2.0 in/in | 0.5 g/cc/in | 55.0 ohm/in
 Deflection:--> right | right | right | right
 Bias:-----> | -3.0 | -1.0 | 0.0
 Source Strength:-----> | 125 mCi

[Logging Speed: 30.0 ft/min]

ELEV DEPTH SYMBOL LITHOLOGY DESCRIPTION GEOPHYSICAL LOG

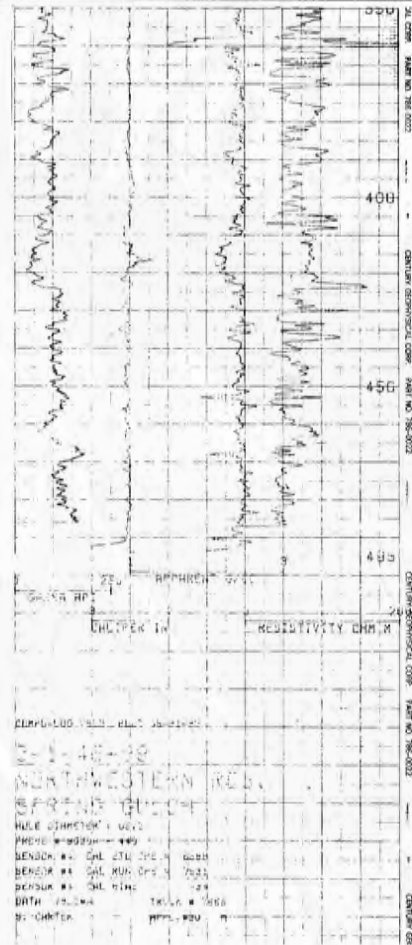
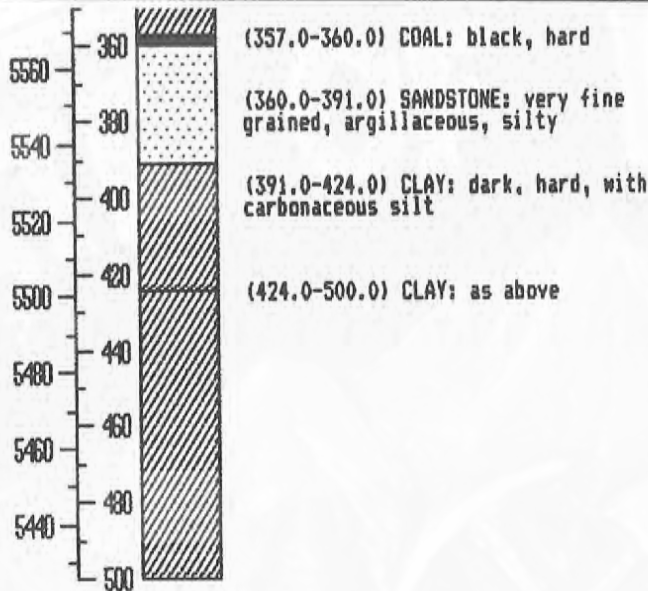


GEOPHYSICAL LOG TRACES

Seq. No.: 70024

	GAMMA (API)	CALIPER	DENSITY	RESISTIVITY
Scale:----->	100.0cps/in	2.0 in/in	0.5 g/cc/in	50.0 ohm/in
Deflection:-->	right	right	right	right
Bias:----->		-3.0	-1.0	0.0
Source Strength:----->			125 mCi	

[Logging Speed: 30.0 ft/min]



NW 3-1-45-99
 NORTHWESTERN CO. OF
 SERRANA OIL FIELD
 WELL IDENTIFICATION NO. 70024
 DATE 10/15/55
 BY J. H. HARRIS

THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W84562 fed

DRILLHOLE: NW N51-E15

SEQ. NO.: 70025

SOURCE: Northwestern Res.

COMPLETED: 91583

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 8

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4661.0

DEPTH TO WATER: 6'

COMPANY COORDINATES: 50980.0N. , 14830.0E.

DRILLER: Materi, A. Hoxie

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 300.0

PROBE DEPTH: 301'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: foam

*LOG TYPES: 1,10

LOGGED BY: Century G., P. Schutt

LITHOLOGY LOG BY: W.E.&N.R.Cos., R. Wells

COALSYS BY: P. Taucher

CORE INTERVALS: 136 - 146 ft. & 222 - 229 ft.

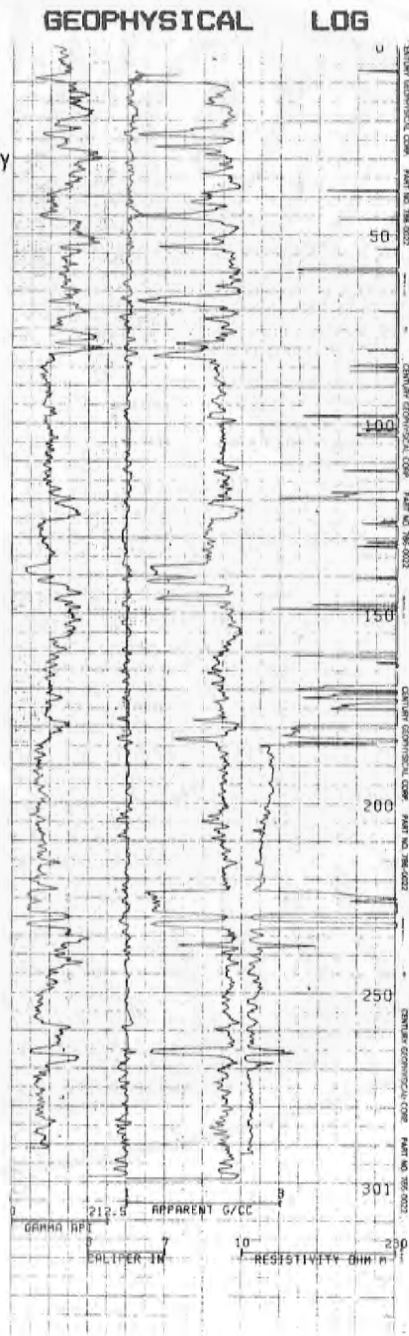
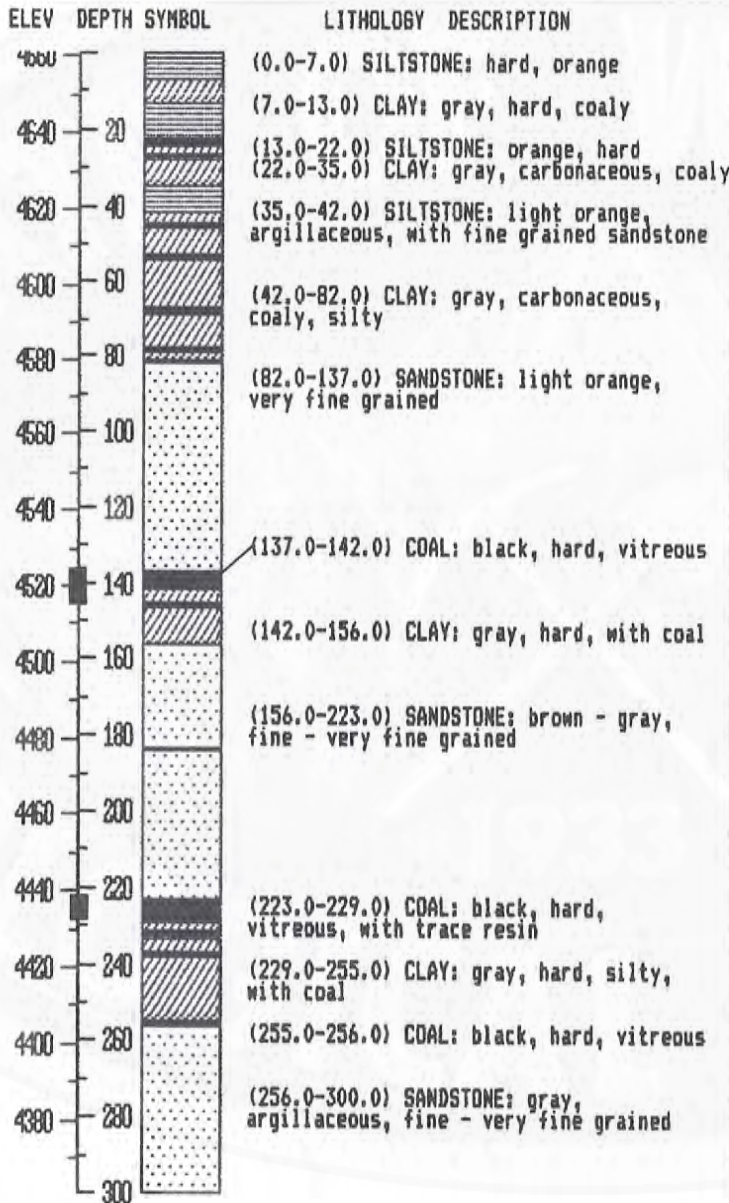
COMMENTS: SE¼ SE¼ sec. 8, 900'fsl 1800'fwl, elev. from lithology log

* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70025

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 80.0 cps/in; 2.0 in/in; 0.5 g/cc/in; 55.0 ohm/in
 Deflection:--> right |right |right |right
 Bias:-----> |-3.0 |-1.0 |-10.0
 Source Strength:-----> |125 mCi
 [Logging Speed: 30.0 ft/min]



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W84562 fed

DRILLHOLE: NW N51-E16

SEQ. NO.: 70026

SOURCE: Northwestern Res.

COMPLETED: 91383

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 8

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4619.0

DEPTH TO WATER: 144'

COMPANY COORDINATES: 50900.0N. , 15700.0E.

DRILLER: Materi, A. Hoxie

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 200.0

PROBE DEPTH: 199'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: air

*LOG TYPES: 1,10

LOGGED BY: Century G., P. Schutt

LITHOLOGY LOG BY: R. Wells

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 8, 950' fsl 2500' fel, elev. from lithology log

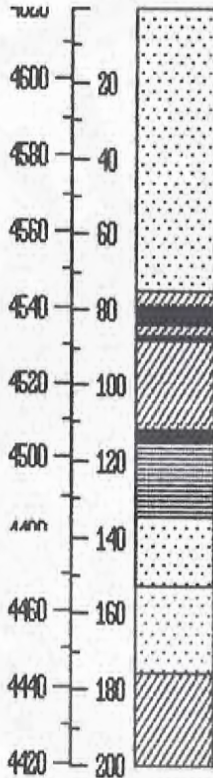
* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70026

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 80.0 cps/in!2.0 in/in!0.5 g/cc/in!55.0 ohm/in
 Deflection:--> right |right |right |right
 Bias:-----> |-3.0 |-1.0 |-10.0
 Source Strength:-----> |125 mCi
 [Logging Speed: 30.0 ft/min]

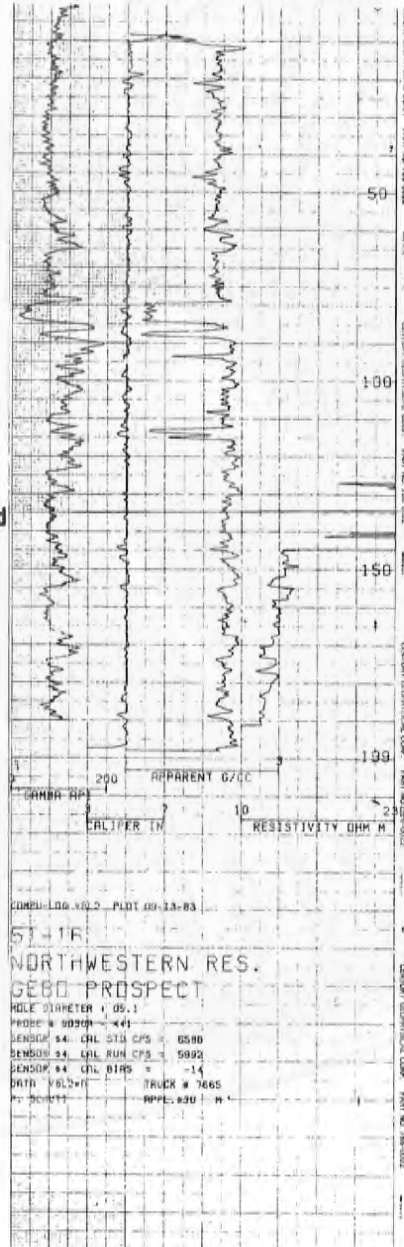
ELEV DEPTH SYMBOL



LITHOLOGY DESCRIPTION

(0.0-75.0) SANDSTONE: light orange, fine grained, argillaceous
 (75.0-79.0) CLAY: gray, hard
 (79.0-88.0) COAL: black, hard with clay interbedded
 (88.0-112.0) CLAY: gray, hard, carbonaceous, silty
 (112.0-115.0) COAL:
 (115.0-135.0) SILTSTONE: gray, hard
 (135.0-153.0) SANDSTONE: gray, fine grained
 (153.0-176.0) SANDSTONE: SILTY: gray, hard, with clay
 (176.0-200.0) CLAY: gray, hard, silty

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: WB4562 fed

DRILLHOLE: NW N52-E13

SEQ. NO.: 70027

SOURCE: Northwestern Res.

COMPLETED: 91783

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 7

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4669.0

DEPTH TO WATER: none

COMPANY COORDINATES: 51920.0N. , 12920.0E.

DRILLER: Materi, A. Hoxie

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 215.0

PROBE DEPTH: 212'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: air

*LOG TYPES: 1,10

LOGGED BY: Century G., P. Schutt

LITHOLOGY LOG BY: R. Wells

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NW¼ SW¼ sec. 7, 1900' fsl 250' fel, elev. from lithology log

* = SEE CODE EXPLANATIONS

Drill Hole: NW N52-E13

Page 1 of 1

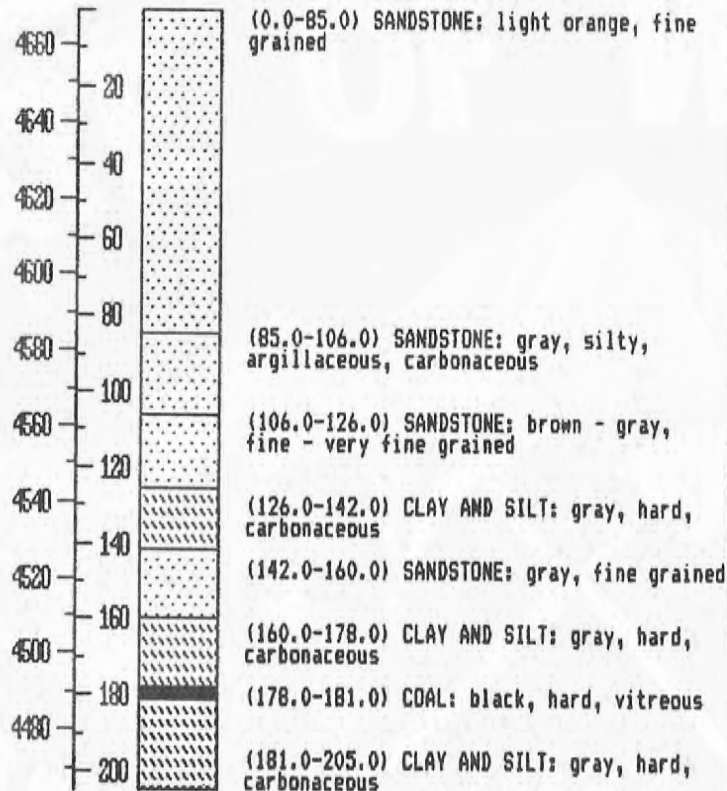
GEOPHYSICAL LOG TRACES

Seq. No.: 70027

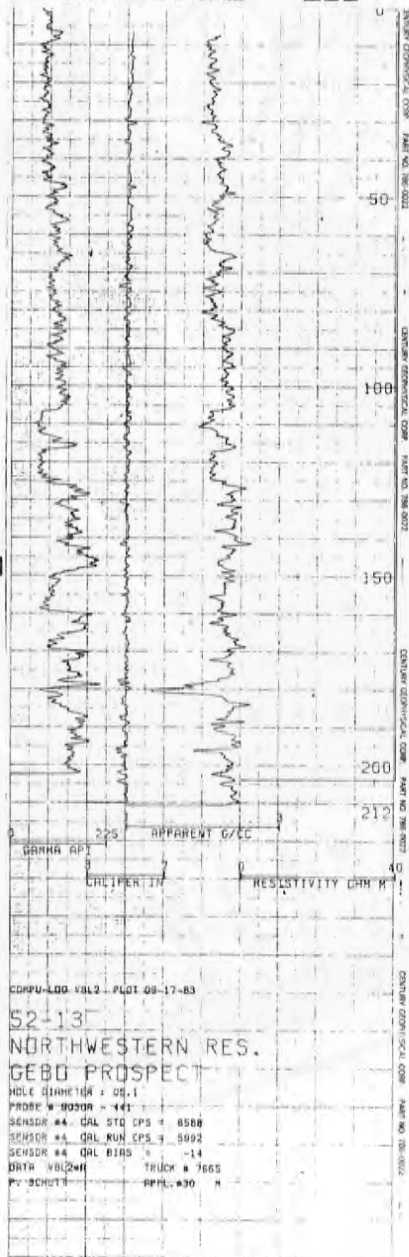
GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 90.0 cps/in; 2.0 in/in; 0.5 g/cc/in; none ohm/in
 Deflection:--> right |right |right |NA
 Bias:-----> |-3.0 |-1.0 |NA
 Source Strength:-----> |125 mCi
 [Logging Speed: 30.0 ft/min]

ELEV DEPTH SYMBOL

LITHOLOGY DESCRIPTION



GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W84562 fed

DRILLHOLE: NW N52-E14

SEQ. NO.: 70028

SOURCE: Northwestern Res.

COMPLETED: 91783

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 8

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4624.0

DEPTH TO WATER: 120

COMPANY COORDINATES: 51930.0N. , 13900.0E.

DRILLER: Materi, A. Hoxie

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 260.0

PROBE DEPTH: 258'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 1,10

LOGGED BY: Century G., P. Schutt

LITHOLOGY LOG BY: R. Wells

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NW¼ SW¼ sec. 8, 1950' fsl 750' fwl, elev. from lithology log

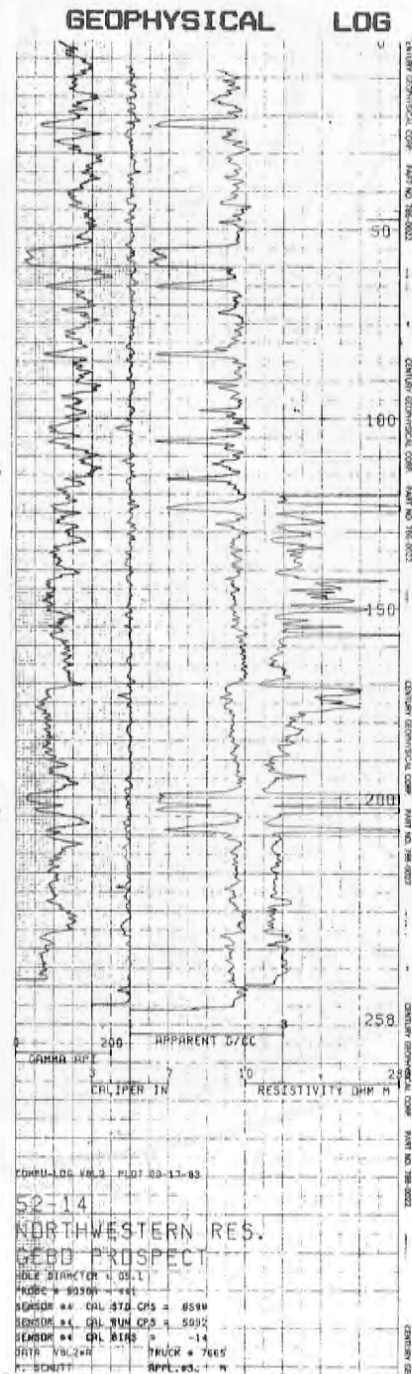
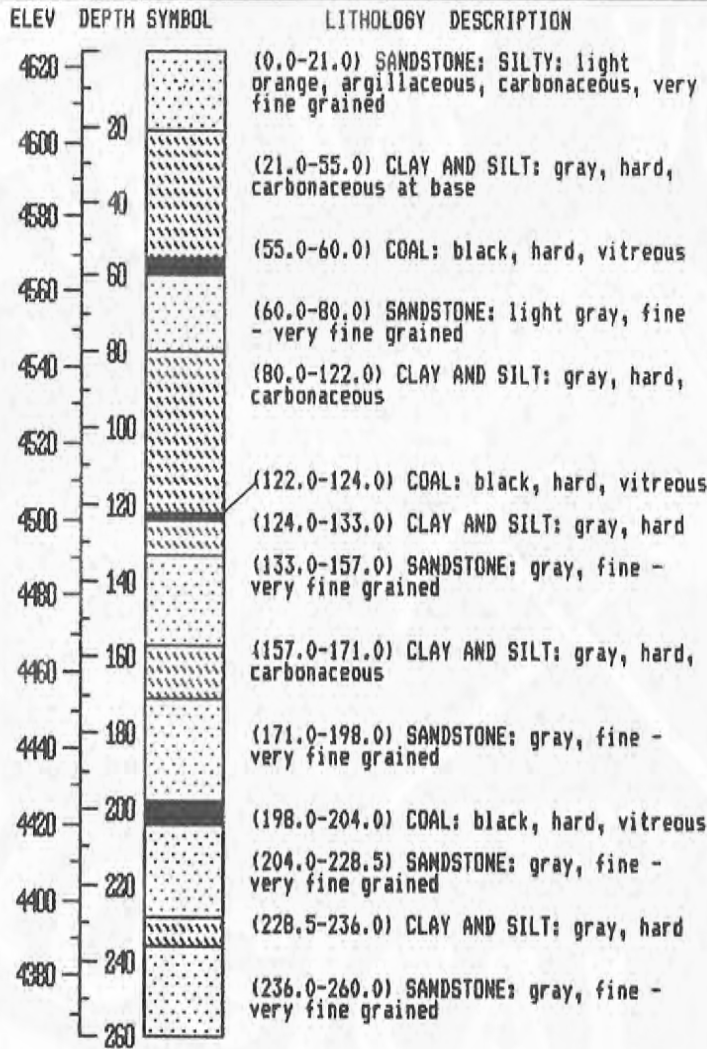
* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70028

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 80.0 cps/in!2.0 in/in!0.5 g/cc/in!55.0 ohm/in
 Deflection:--> right !right !right !right
 Bias:-----> !-3.0 !-1.0 !-10.0
 Source Strength:-----> !125 mCi

[Logging Speed: 30.0 ft/min]



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W84562 fed

DRILLHOLE: NW N52-E15

SEQ. NO.: 70029

SOURCE: Northwestern Res.

COMPLETED: 91583

*COUNTY: 17

STATE: WY

AREA: Geba

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 8

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4637.0

DEPTH TO WATER: none

COMPANY COORDINATES: 51920.0N. , 14830.0E.

DRILLER: Materi, A. Hoxie

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 280.0

PROBE DEPTH: 197'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: air

*LOG TYPES: 1,10

LOGGED BY: Century G., P. Schutt

LITHOLOGY LOG BY: R. Wells

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE¼ SW¼ sec. 8, 1950' fsl 1750' fwl, elev. from lithology log

* = SEE CODE EXPLANATIONS

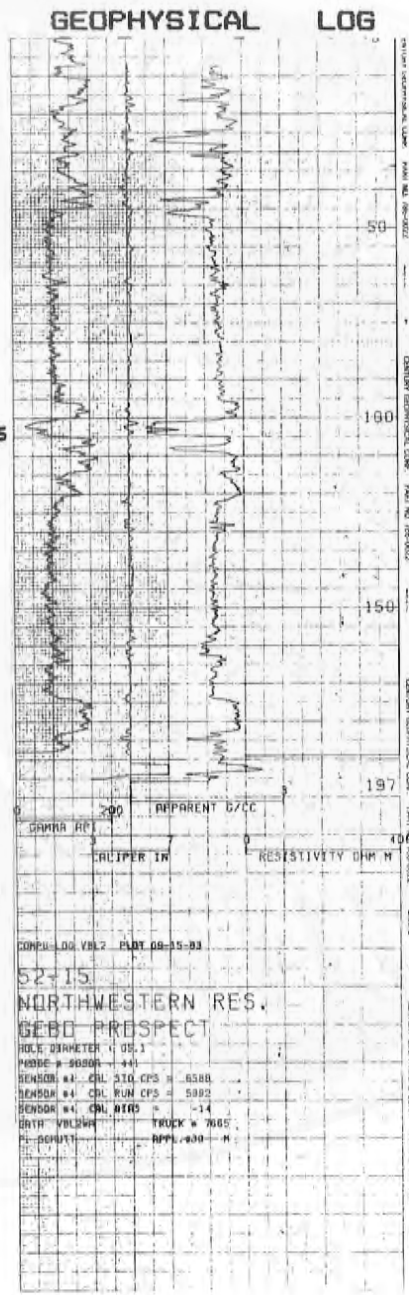
GEOPHYSICAL LOG TRACES

Seq. No.: 70029

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 80.0 cps/in!2.0 in/in!0.5 g/cc/in!none ohm/in
 Deflection:--> right !right !right !NA
 Bias:-----> !-3.0 !-1.0 !NA
 Source Strength:-----> !125 mCi

[Logging Speed: 30.0 ft/min]

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
			(0.0-7.0) SILTSTONE: gray, carbonaceous
4520	20		(7.0-36.0) SANDSTONE: light orange, fine grained argillaceous
4500	40		(36.0-45.0) CLAY AND SILT: gray - black, carbonaceous - coaly
4580	60		(45.0-60.0) SANDSTONE: light gray, fine - very fine grained
4560	80		(60.0-91.0) SANDSTONE: light orange, fine - very fine grained
4540	100		(91.0-101.0) CLAY AND SILT: gray, carbonaceous
			(101.0-105.0) COAL: black, hard, vitreous
4520	120		(105.0-110.0) CLAY: gray, hard
4500	140		(110.0-122.0) SANDSTONE: gray, fine - very fine grained
4480	160		(122.0-174.0) SANDSTONE: light orange, fine - very fine grained
4460	180		(174.0-183.0) CLAY AND SILT: dark gray, hard, carbonaceous
4440	200		(183.0-190.0) SANDSTONE: gray, fine - very fine grained
4420	220		(190.0-280.0) NO SAMPLES: mined out area
4400	240		
4380	260		
4360	280		



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W84562 fed

DRILLHOLE: NW N52-E16

SEQ. NO.: 70030

SOURCE: Northwestern Res.

COMPLETED: 91383

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 8

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4528.0

DEPTH TO WATER: 18'

COMPANY COORDINATES: 51900.0N. , 15830.0E.

DRILLER: Materi, A. Hoxie

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 200.0

PROBE DEPTH: 203'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 1, 10

LOGGED BY: Century G., P. Schutt

LITHOLOGY LOG BY: R. Wells

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NW¼ SE¼ sec. 8, 1950'fs1 2500'fel, elev. from lithology log

* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

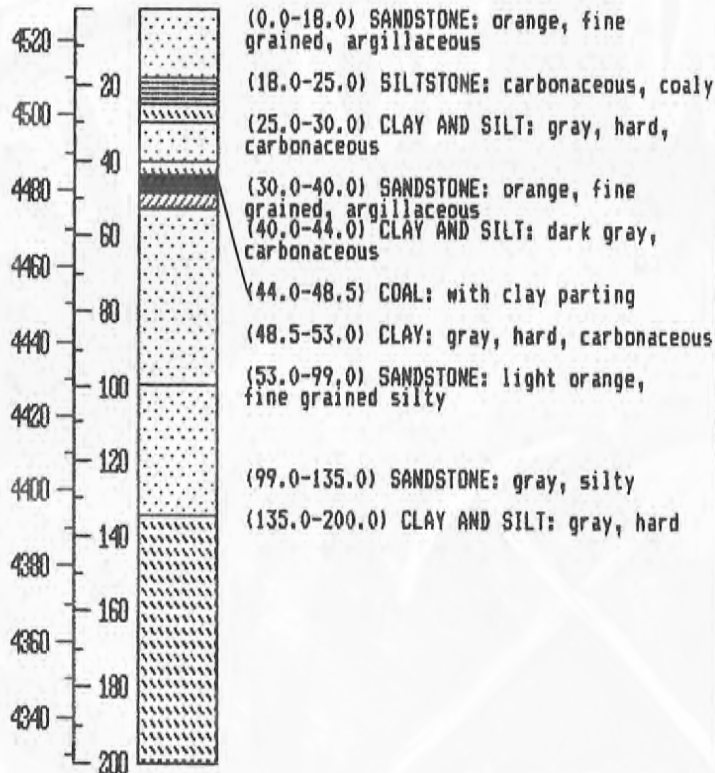
Seq. No.: 70030

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 80.0 cps/in | 2.0 in/in | 0.5 g/cc/in | 55.0 ohm/in
 Deflection:--> right | right | right | right
 Bias:-----> | -3.0 | -1.0 | -10.0
 Source Strength:-----> | 125 mCi

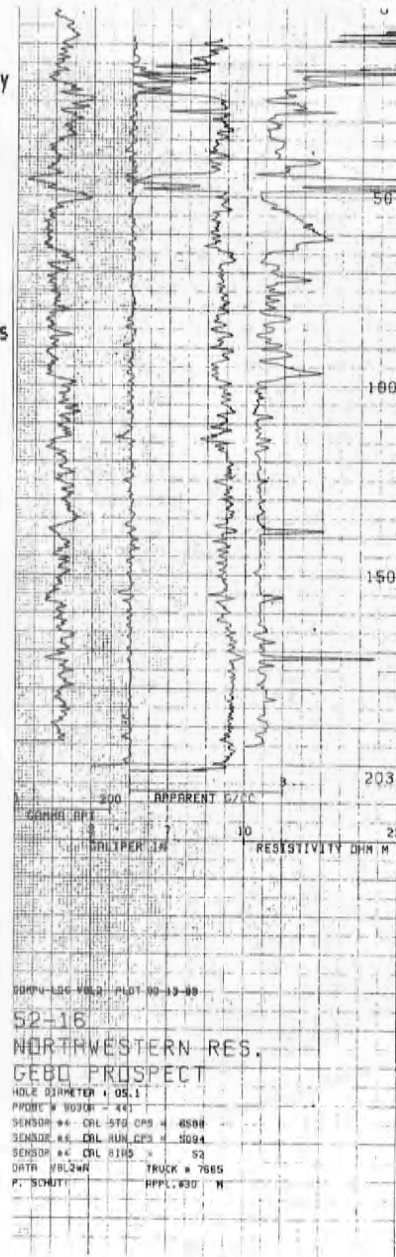
[Logging Speed: 30.0 ft/min]

ELEV DEPTH SYMBOL

LITHOLOGY DESCRIPTION



GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W84562 fed

DRILLHOLE: NW N52-E17

SEQ. NO.: 70031

SOURCE: Northwestern Res.

COMPLETED: 91383

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 8

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4521.0

DEPTH TO WATER: 28'

COMPANY COORDINATES: 51900.0N. , 16820.0E.

DRILLER: Materi, A. Hoxie

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 141.0

PROBE DEPTH: 141'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 3,4,10

LOGGED BY: Century G., P. Schutt

LITHOLOGY LOG BY: R. Wells

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE¼ SE¼ sec. 8, 1950'fsl 1500'fel, elev. from lithology log

* = SEE CODE EXPLANATIONS

Drill Hole: NW N52-E17

Page 1 of 1

GEOPHYSICAL LOG TRACES

Seq. No.: 70031

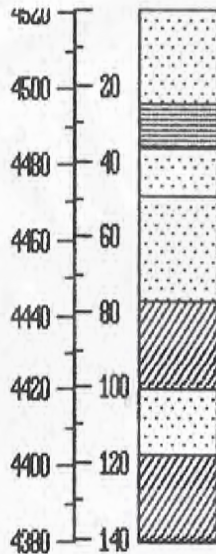
GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 80.0 cps/in; 2.0 in/in; 0.5 g/cc/in; 55.0 ohm/in
 Deflection:--> right |right |right |right
 Bias:-----> | -3.0 | -1.0 | -10.0
 Source Strength:-----> | 125 mCi

[Logging Speed: 30.0 ft/min]

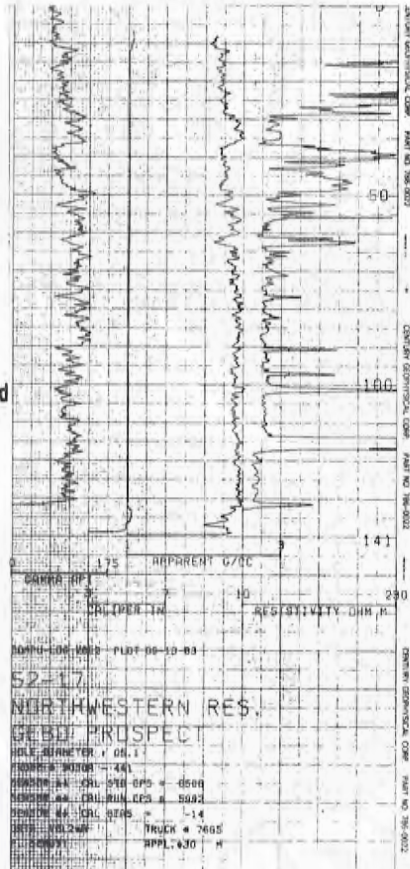
ELEV DEPTH SYMBOL

LITHOLOGY DESCRIPTION

GEOPHYSICAL LOG



(0.0-25.0) SANDSTONE: light orange, fine grained
 (25.0-37.0) SILTSTONE: gray
 (37.0-49.0) SANDSTONE: light orange, fine grained
 (49.0-77.0) SANDSTONE: gray, silty
 (77.0-101.0) CLAYSTONE: gray, silty
 (101.0-118.0) SANDSTONE: gray, fine grained
 (118.0-141.0) CLAY: gray, hard



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: WB0234 fed

DRILLHOLE: NW N53-E12

SEQ. NO.: 70032

SOURCE: Northwestern Res.

COMPLETED: 82982

*COUNTY: 17

STATE: WY

AREA: Geba

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 7

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4625.0

DEPTH TO WATER: 46'

COMPANY COORDINATES: 53000.0N. , 12000.0E.

DRILLER: Teton, H.E.

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 500.0

PROBE DEPTH: 500'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 1,10

LOGGED BY: Century G., S. Carter

LITHOLOGY LOG BY: Western Energy Co.

COALSYS BY: P. Taucher

CORE INTERVALS: none

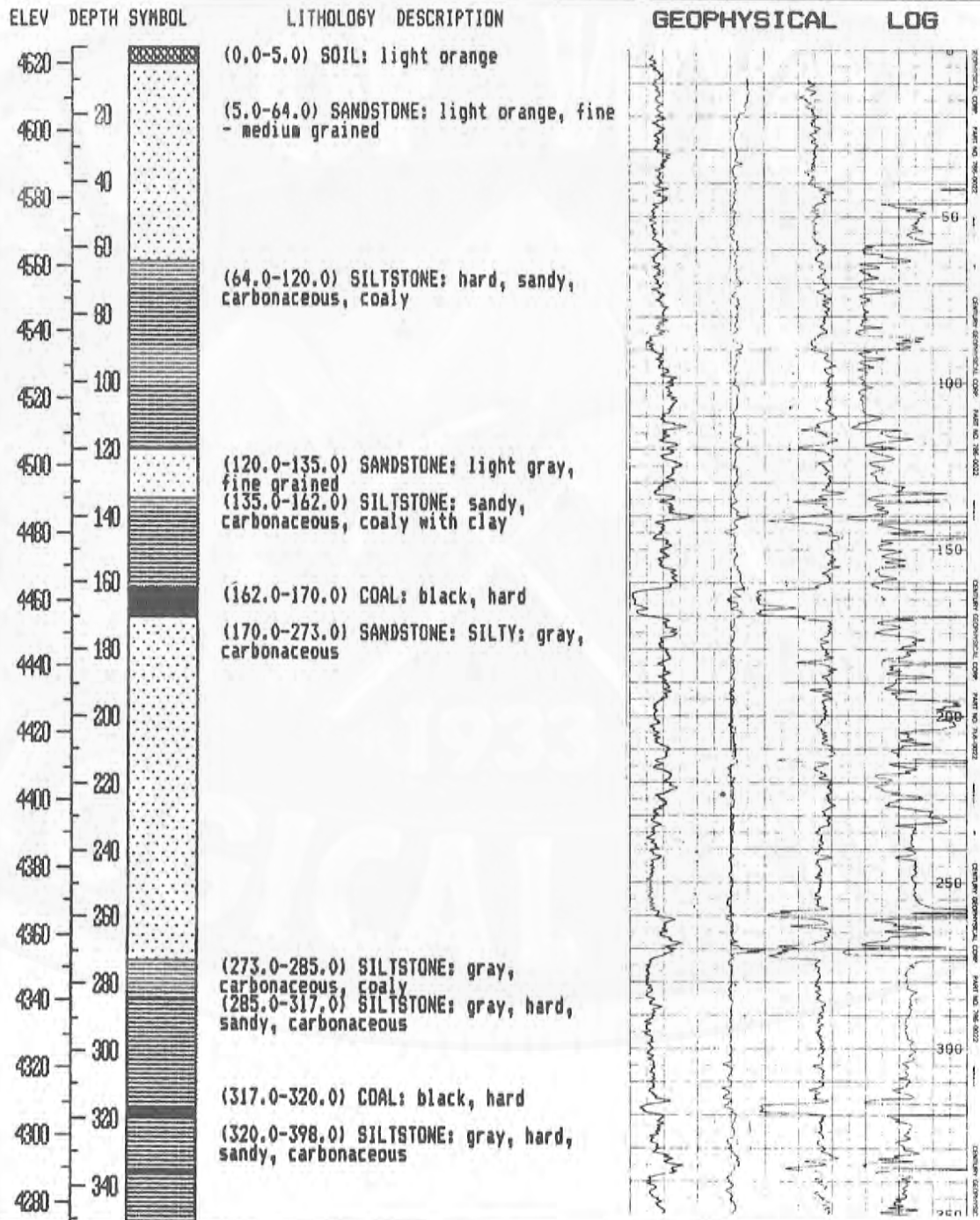
COMMENTS: SW¼ NE¼ sec. 7, elev. from lithology log

* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70032

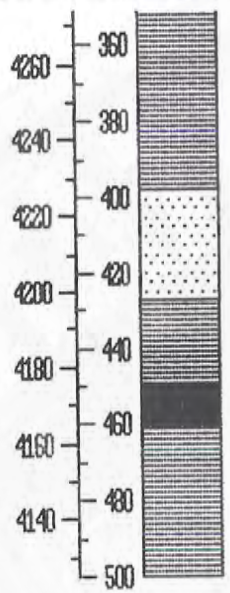
GAMMA (API) CALIPER DENSITY RESISTIVITY
 Scale: -----> 100.0cps/in | 2.0 in/in | 0.5 g/cc/in | 25.0 ohm/in
 Deflection: --> right | right | right | right
 Bias: -----> | -3.0 | -1.0 | 0.0
 Source Strength: -----> | 125 mCi
 [Logging Speed: 30.0 ft/min]



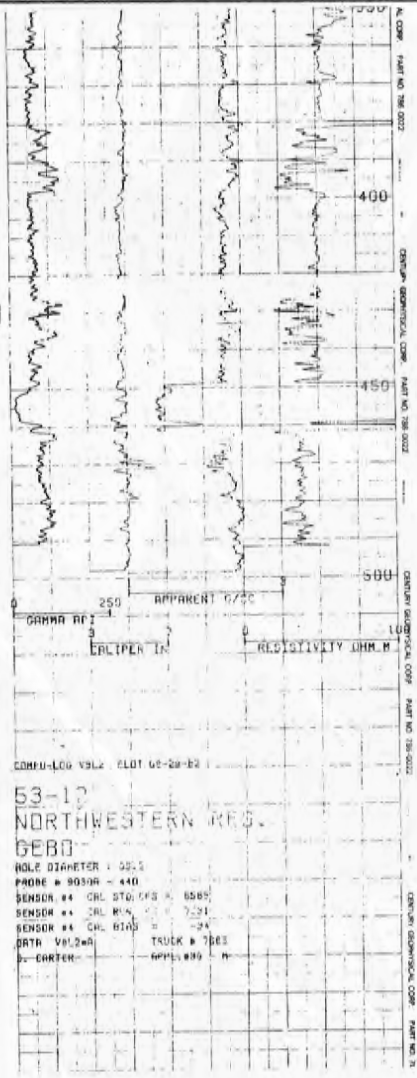
GEOPHYSICAL LOG TRACES

Seq. No.: 70032

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 100.0cps/in|2.0 in/in|0.5 g/cc/in|25.0 ohm/in
 Deflection:--> right |right |right |right
 Bias:-----> |-3.0 |-1.0 |0.0
 Source Strength:-----> |125 mCi
 [Logging Speed: 30.0 ft/min]



(398.0-427.0) SANDSTONE: fine grained, argillaceous
 (427.0-449.0) SILTSTONE: light gray, hard
 (449.0-461.0) COAL: black, hard
 (461.0-500.0) SILTSTONE: gray, hard



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W80234 fed

DRILLHOLE: NW N53-E13

SEQ. NO.: 70033

SOURCE: Northwestern Res.

COMPLETED: 82982

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 7

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4597.0

DEPTH TO WATER: 199'

COMPANY COORDINATES: 53000.0N. , 13000.0E.

DRILLER: Teton, H.E.

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 400.0

PROBE DEPTH: 401'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 1,10

LOGGED BY: Century G., S. Carter

LITHOLOGY LOG BY: Western Energy Co.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: SE¼ NE¼ sec. 7, elev. from lithology log

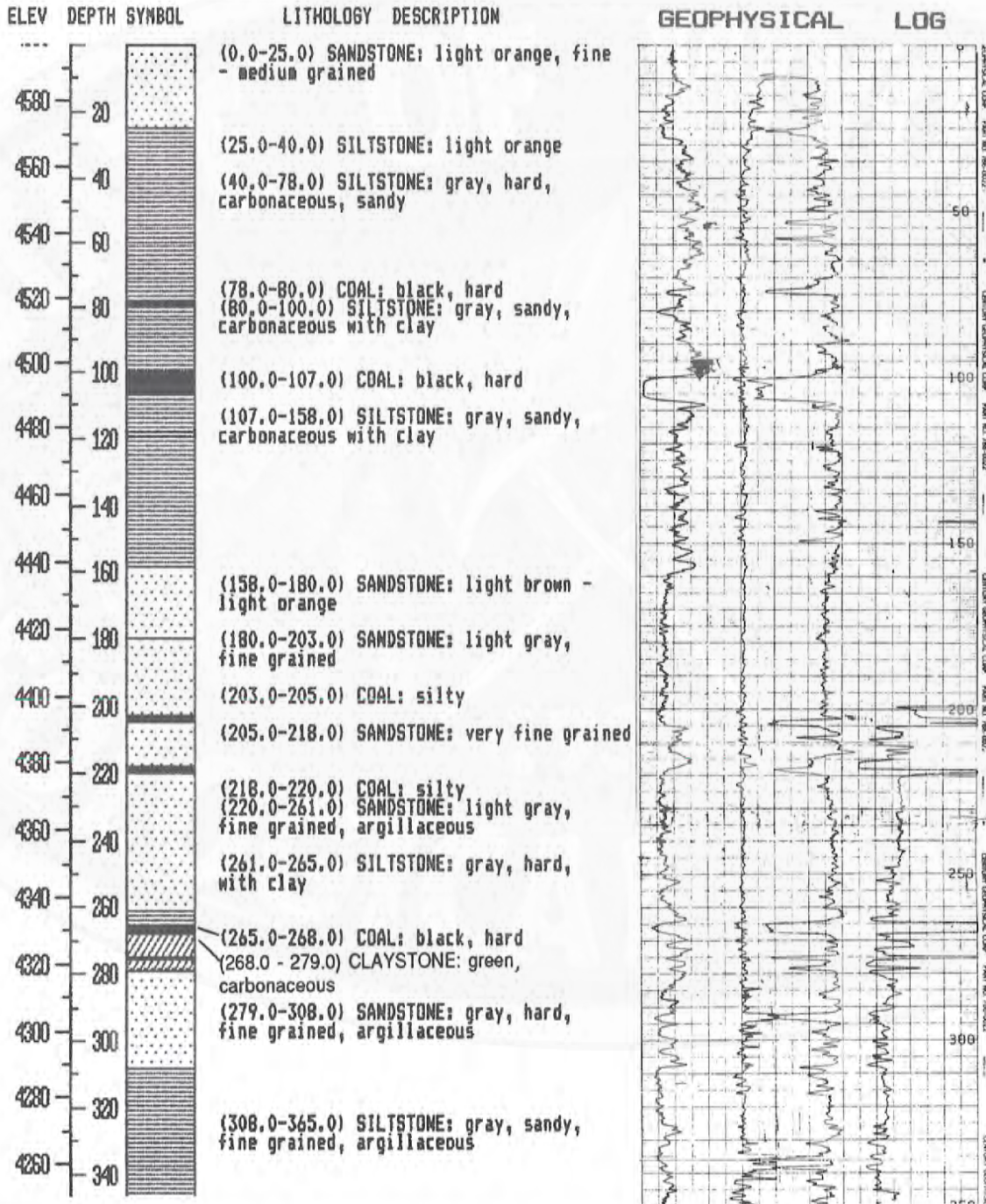
* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70033

Scale: -----> 100.0cps/in | 2.0 in/in | 0.5 g/cc/in | 25.0 ohm/in
 Deflection: --> right | right | right | right
 Bias: -----> | -3.0 | -1.0 | 10.0
 Source Strength: -----> | 125 mCi

[Logging Speed: 30.0 ft/min]

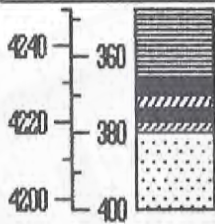


GEOPHYSICAL LOG TRACES

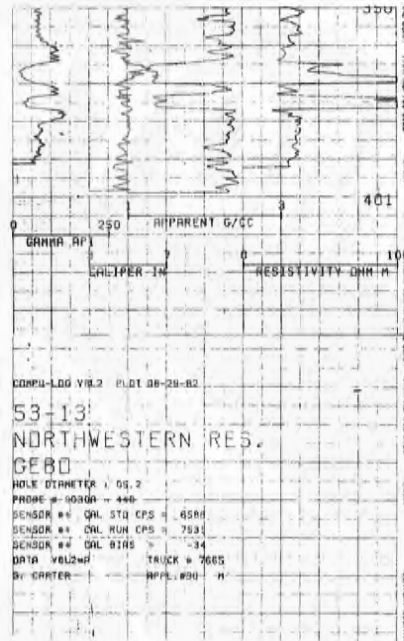
Seq. No.: 70033

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 100.0cps/in|2.0 in/in|0.5 g/cc/in|25.0 ohm/in
 Deflection:--> right |right |right |right
 Bias:-----> |-3.0 |-1.0 |0.0
 Source Strength:-----> |125 mCi

[Logging Speed: 30.0 ft/min]



(365.0-377.0) COAL: black, hard, with clay interbedded
 (377.0-380.0) CLAY: gray, hard
 (380.0-400.0) SANDSTONE: gray, very argillaceous



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W80234 fed

DRILLHOLE: NW N53-E14

SEQ. NO.: 70034

SOURCE: Northwestern Res.

COMPLETED: 83082

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 8

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4574.0

DEPTH TO WATER: 11'

COMPANY COORDINATES: 53000.0N. , 14000.0E.

DRILLER: Teton, H. E.

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 360.0

PROBE DEPTH: 362'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 1,10

LOGGED BY: Century Geo., S. Carter

LITHOLOGY LOG BY: Western Energy Co.

COALSYS BY: P. Taucher

CORE INTERVALS: 158.7 - 168.3 ft.

COMMENTS: SW¼ NW¼ sec. 8, elev. from lithology log

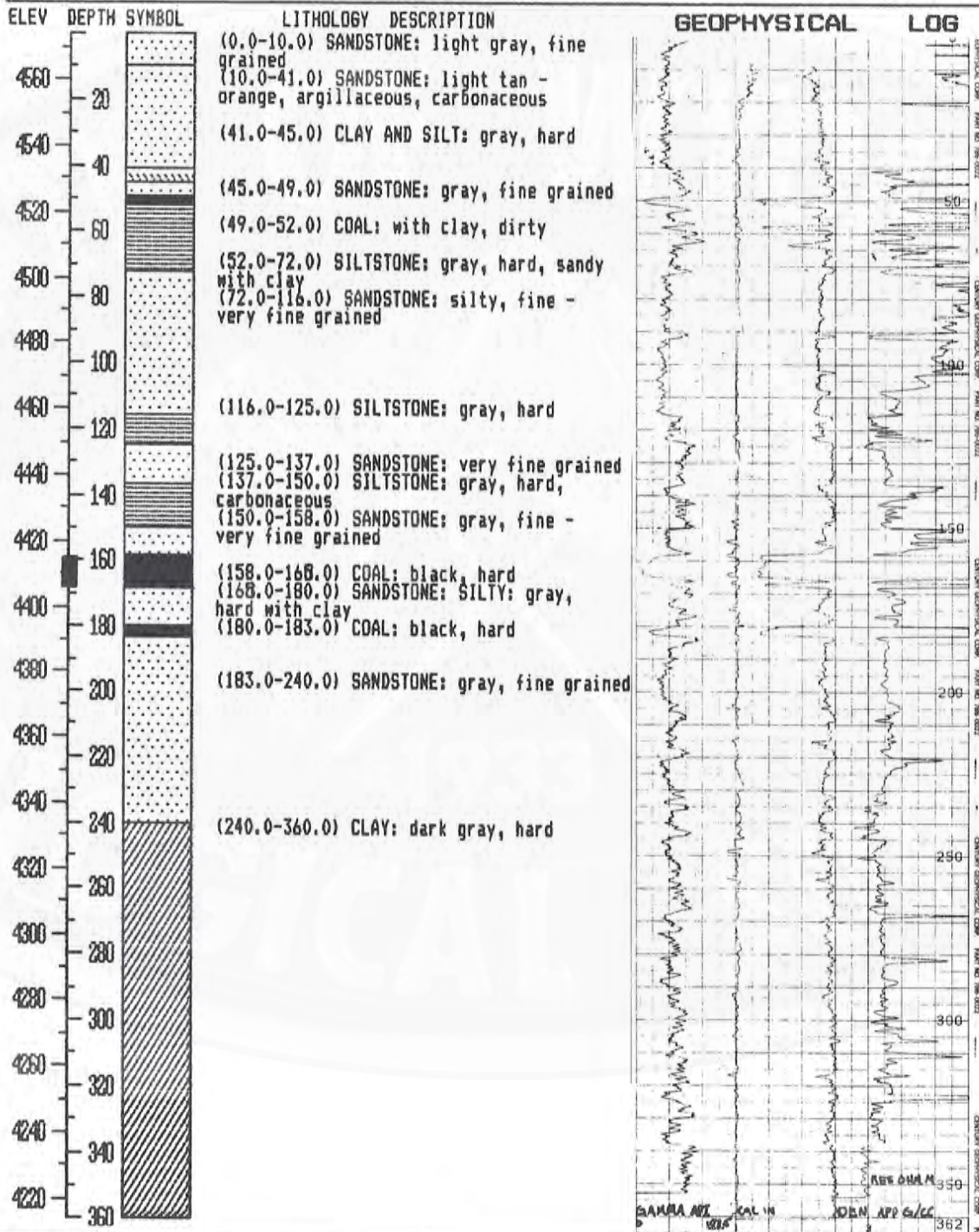
* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70034

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 100.0cps/in!2.0 in/in!0.5 g/cc/in!25.0 ohm/in
 Deflection:--> right !right !right !right
 Bias:-----> !-3.0 !-1.0 !0.0
 Source Strength:-----> !125 mCi

[Logging Speed: 30.0 ft/min]



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W84562 fed

DRILLHOLE: NW N53-E15

SEQ. NO.: 70035

SOURCE: Northwestern Res.

COMPLETED: 91583

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 8

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4640.0

DEPTH TO WATER: 39'

COMPANY COORDINATES: 52920.0N. , 14830.0E.

DRILLER: Materi, A. Hoxie

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 302.0

PROBE DEPTH: 302'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: foam

*LOG TYPES: 1,10

LOGGED BY: Century Geo., P. Schutt

LITHOLOGY LOG BY: R. Wells

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: SE¼ NW¼ sec. 8, 2300 fnl, 1750 fwl, elev. from lithology log

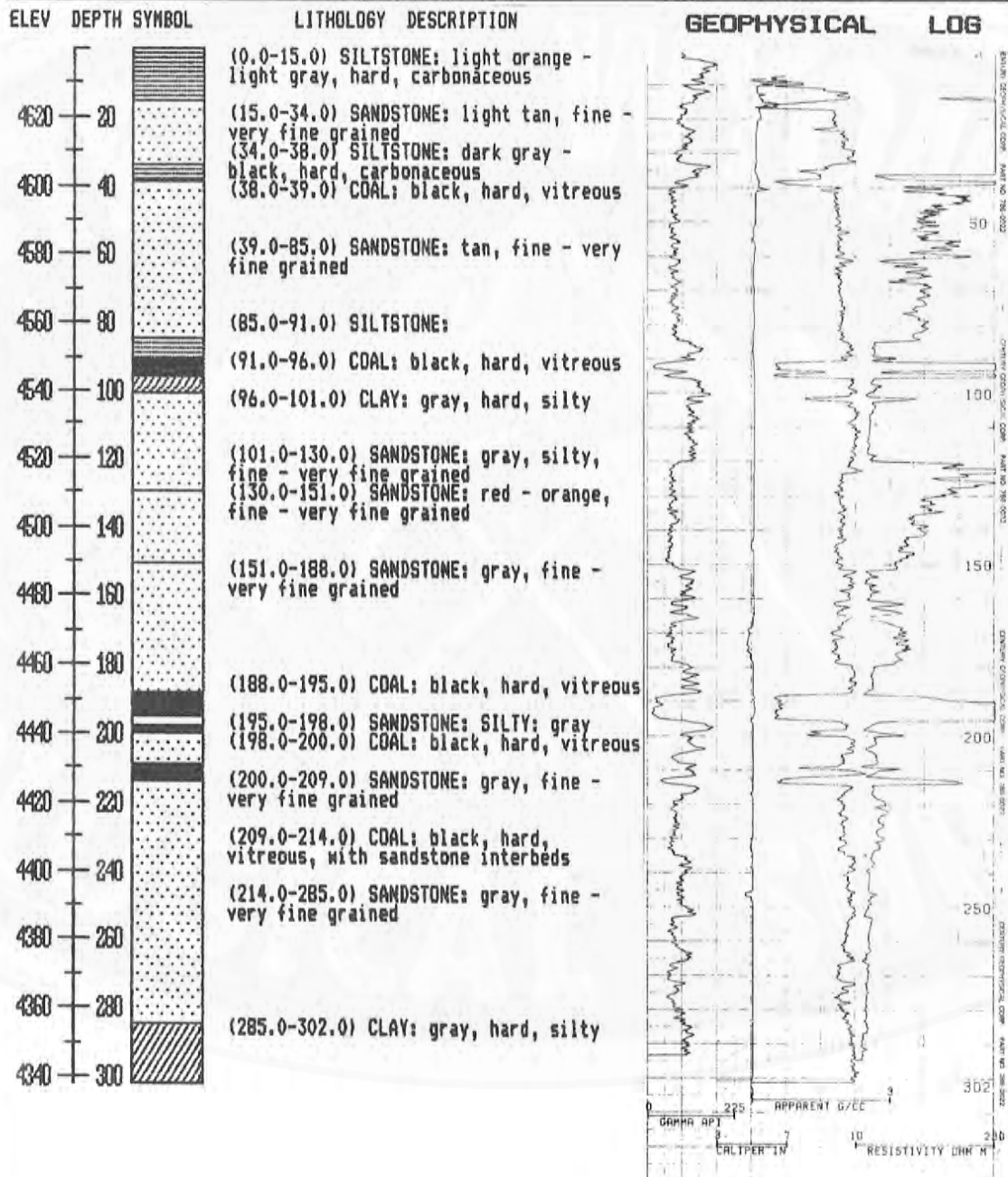
* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70035

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 90.0 cps/in | 2.0 in/in | 0.5 g/cc/in | 55.0 ohm/in
 Deflection:--> right | right | right | right
 Bias:-----> | -3.0 | -1.0 | -10.0
 Source Strength:-----> | 125 mCi

[Logging Speed: 30.0 ft/min]



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W84562 fed

DRILLHOLE: NW N53-E16

SEQ. NO.: 70036

SOURCE: Northwestern Res.

COMPLETED: 91483

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 8

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4568.0

DEPTH TO WATER: 53'

COMPANY COORDINATES: 52900.0N. , 15825.0E.

DRILLER: Materi, A. Hoxie

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 222.0

PROBE DEPTH: 222'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 1, 10

LOGGED BY: Century Geo., P. Schutt

LITHOLOGY LOG BY: R. Wells

COALSYS BY: P. Taucher

CORE INTERVALS: 106.0-113.2 ft.

COMMENTS: SW¼ NE¼ sec. 8, 2300 fnl, 2500 fel, elev. from lithology log

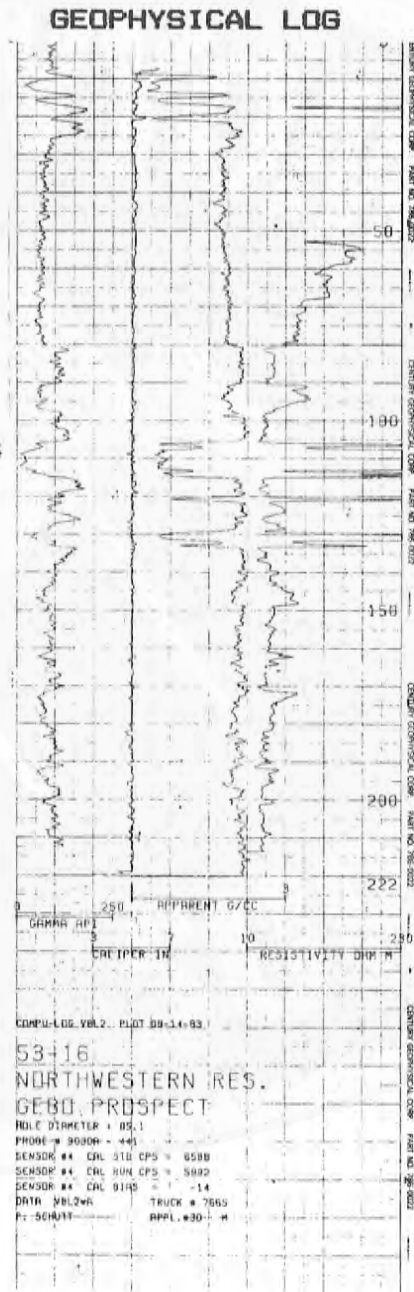
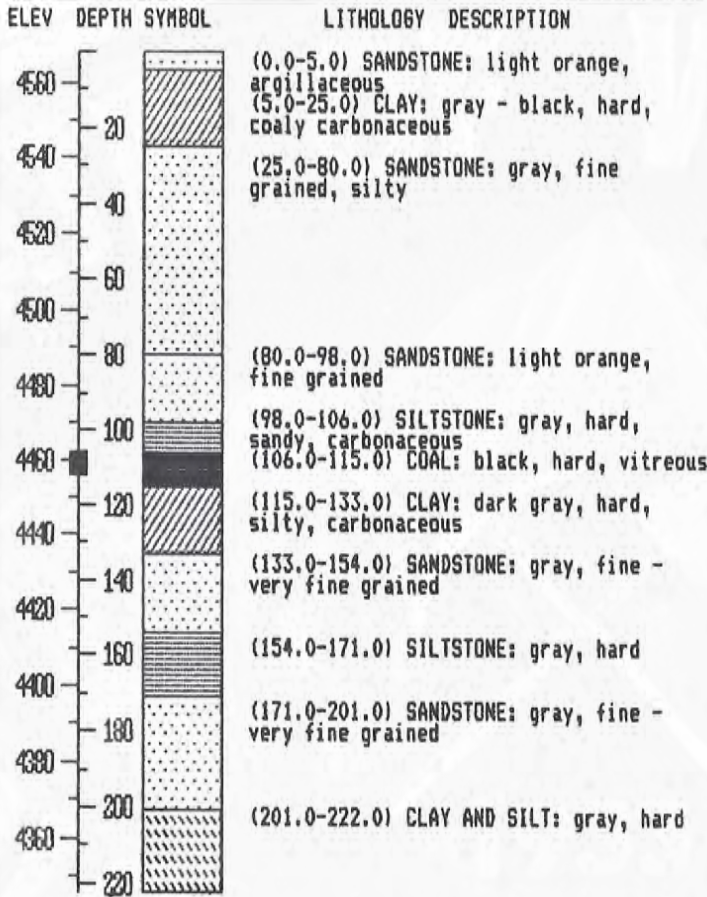
* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70036

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 80.0 cps/in!2.0 in/in!0.5 g/cc/in!55.0 ohm/in
 Deflection:--> right !right !right !right
 Bias:-----> !-3.0 !-1.0 !-10.0
 Source Strength:-----> !125 mCi

[Logging Speed: 30.0 ft/min]



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W84562 fed

DRILLHOLE: NW N53-E17

SEQ. NO.: 70037

SOURCE: Northwestern Res.

COMPLETED: 91483

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 8

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4555.0

DEPTH TO WATER: 39'

COMPANY COORDINATES: 52900.0N. , 16820.0E.

DRILLER: Materi, A. Hoxie

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 220.0

PROBE DEPTH: 221'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 1,10

LOGGED BY: Century Geo., P. Schutt

LITHOLOGY LOG BY: R. Wells

COALSYS BY: P. Taucher

CORE INTERVALS: none

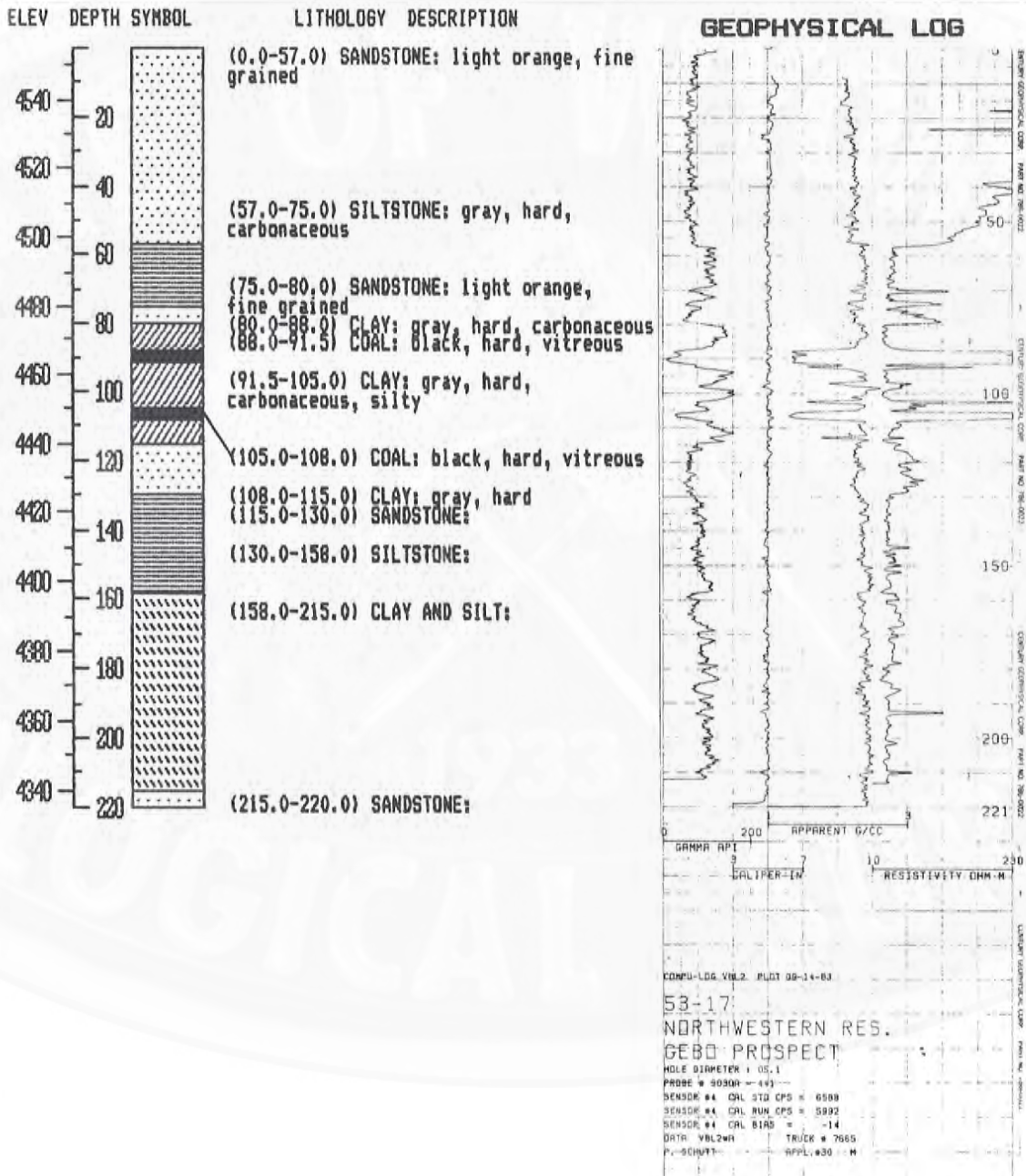
COMMENTS: SE¼ NE¼ sec. 8, 2300 fnl, 1500 fel, elev. from lithology log

* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70037

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 80.0 cps/in; 2.0 in/in; 0.5 g/cc/in; 55.0 ohm/in
 Deflection:--> right |right |right |right
 Bias:-----> |-3.0 |-1.0 |-10.0
 Source Strength:-----> |125 mCi
 [Logging Speed: 30.0 ft/min]



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W84562 fed

DRILLHOLE: NW N54-E11

SEQ. NO.: 70038

SOURCE: Northwestern Res.

COMPLETED: 92183

*COUNTY: 17

STATE: WY

AREA: Geba

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 7

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.ON.

0.OE.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4686.0

DEPTH TO WATER: 169'

COMPANY COORDINATES: 54185.ON. , 11290.OE.

DRILLER: Materi, A. Hoxie

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 576.0

PROBE DEPTH: 576'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 1,10

LOGGED BY: Century Geo., P. Schutt

LITHOLOGY LOG BY: R. Wells

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NW¼ NE¼ sec. 7, 1300 fnl, 2300 fel, elev. from lithology log

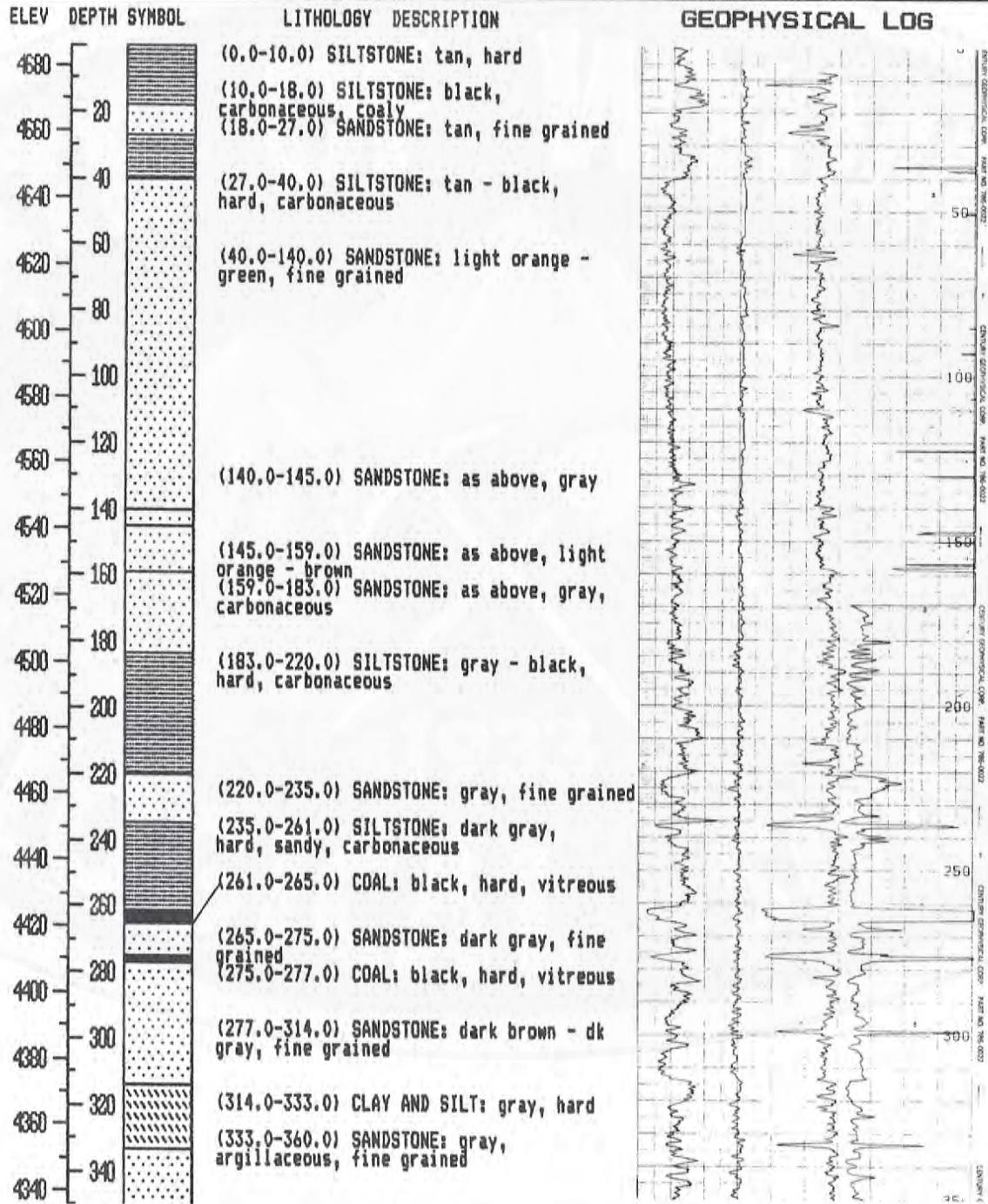
* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70038

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 90.0 cps/in; 2.0 in/in; 0.5 g/cc/in; 55.0 ohm/in
 Deflection:--> right |right |right |right
 Bias:-----> |-3.0 |-1.0 |-10.0
 Source Strength:-----> |125 mCi

[Logging Speed: 30.0 ft/min]

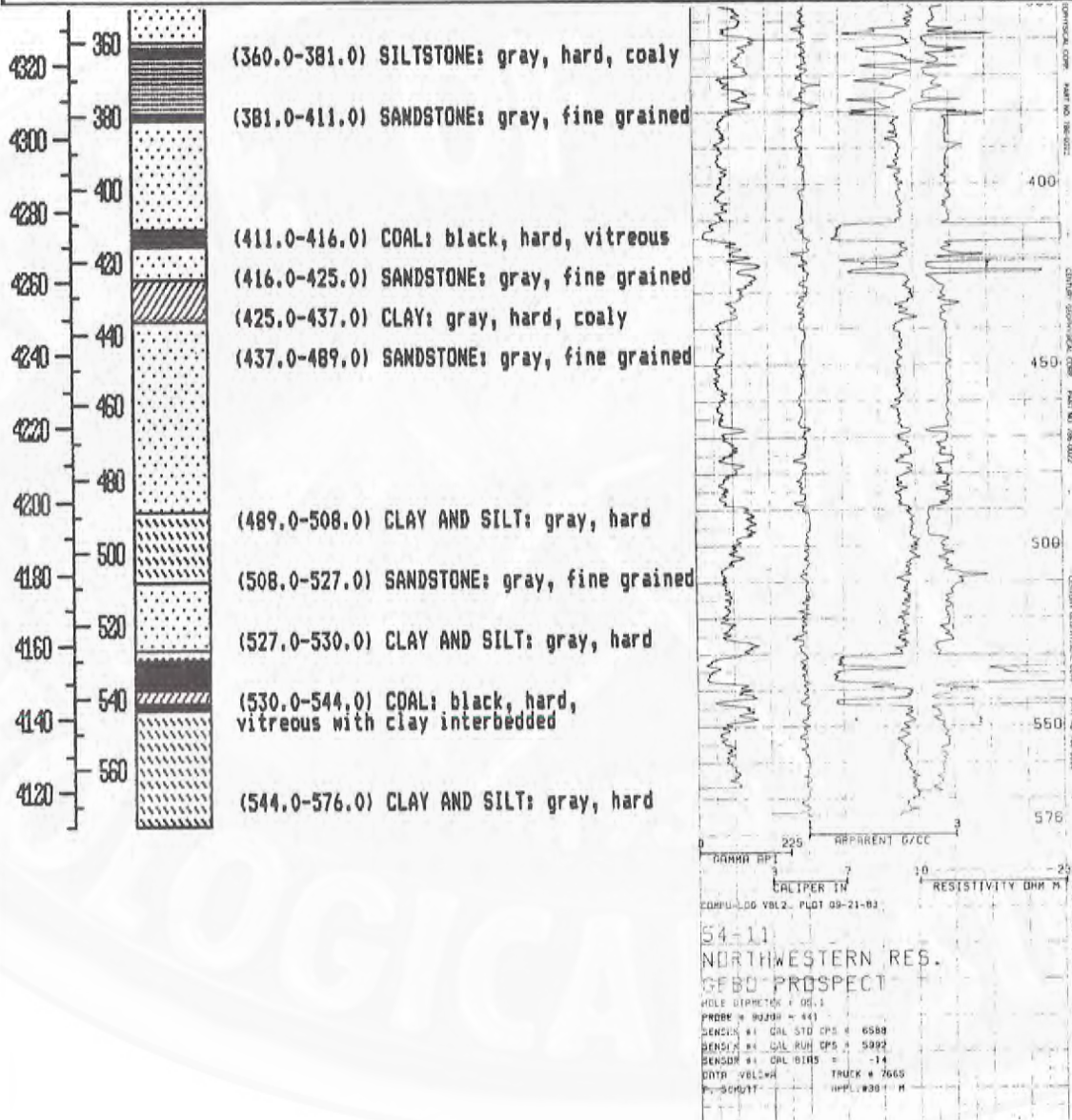


GEOPHYSICAL LOG TRACES

Seq. No.: 70038

	GAMMA(API)	CALIPER	DENSITY	RESISTIVITY
Scale:----->	90.0 cps/in	2.0 in/in	0.5 g/cc/in	55.0 ohm/in
Deflection:-->	right	right	right	right
Bias:----->		-3.0	-1.0	-10.0
Source Strength:----->			125 mCi	

[Logging Speed: 30.0 ft/min]



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W80234 fed

DRILLHOLE: NW N54-E12

SEQ. NO.: 70039

SOURCE: Northwestern Res.

COMPLETED: 83082

*COUNTY: 17

STATE: WY

AREA: Geba

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 7

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4613.0

DEPTH TO WATER: 64'

COMPANY COORDINATES: 54000.0N. , 12000.0E.

DRILLER: Teton, H. E.

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 501.0

PROBE DEPTH: 501'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 1,10

LOGGED BY: Century Geo., S. Carter

LITHOLOGY LOG BY: Western Energy Co.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE¼ NE¼ sec. 7, elev. from lithology log

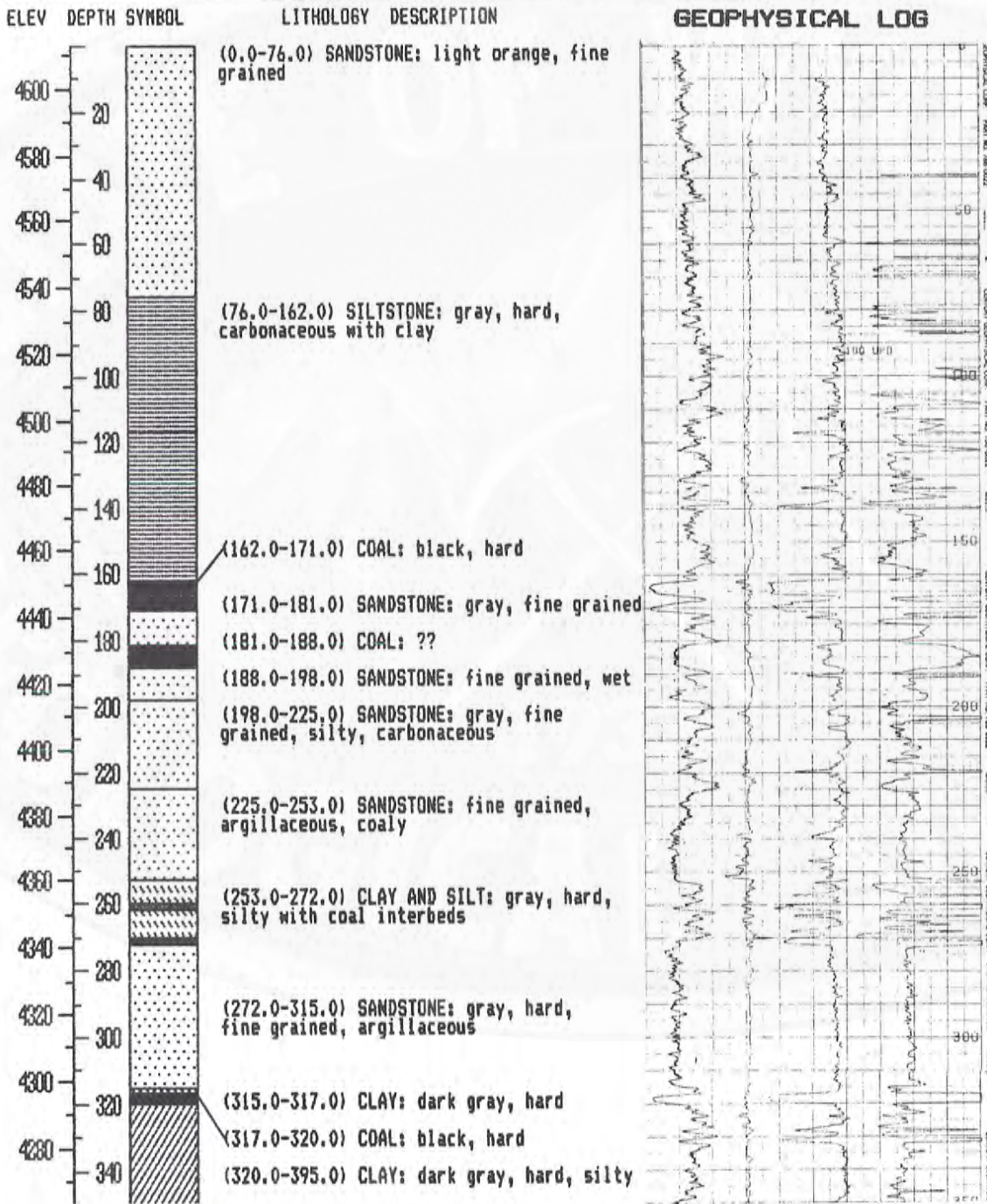
* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70039

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 75.0 cps/in; 2.0 in/in; 0.5 g/cc/in; 25.0 ohm/in
 Deflection:--> right |right |right |right
 Bias:-----> |-3.0 |-1.0 |0.0
 Source Strength:-----> |125 mCi

[Logging Speed: 30.0 ft/min]

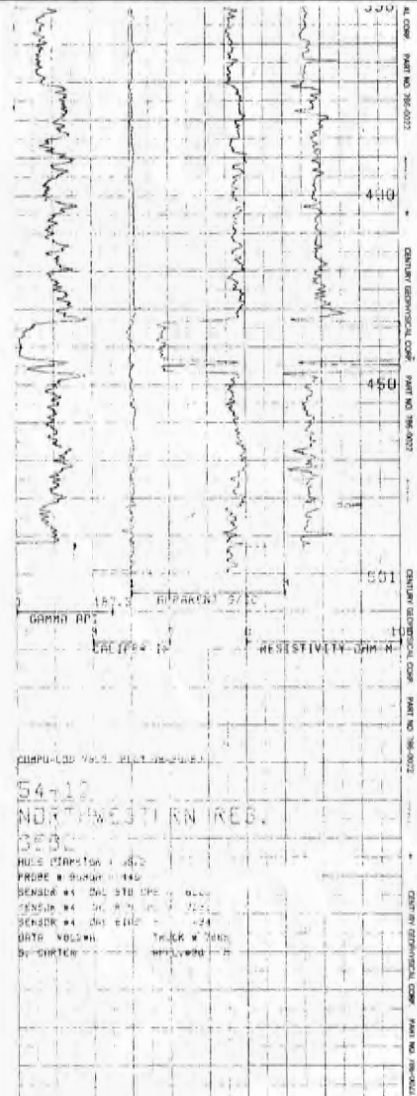
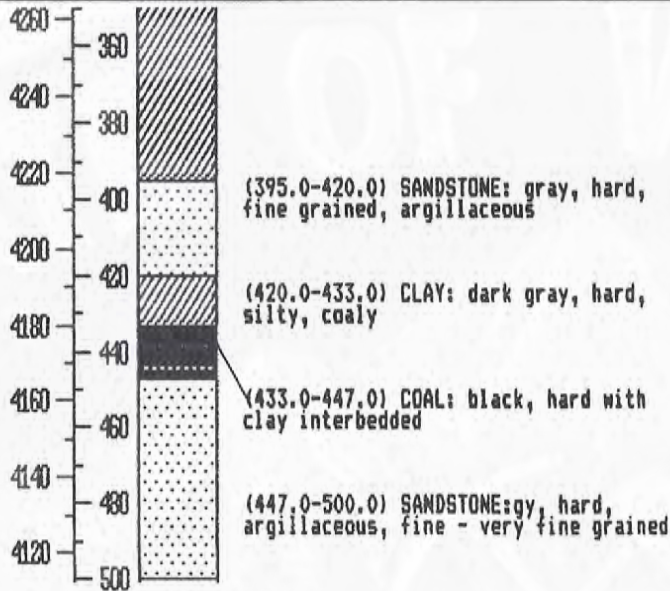


GEOPHYSICAL LOG TRACES

Seq. No.: 70039

	GAMMA(API)	CALIPER	DENSITY	RESISTIVITY
Scale:----->	75.0 cps/in	2.0 in/in	0.5 g/cc/in	25.0 ohm/in
Deflection:-->	right	right	right	right
Bias:----->		-3.0	-1.0	0.0
Source Strength:----->			125 mCi	

[Logging Speed: 30.0 ft/min]



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: WB0234 fed

DRILLHOLE: NW N54-E13

SEQ. NO.: 70040

SOURCE: Northwestern Res.

COMPLETED: 82882

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 7

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4580.0

DEPTH TO WATER: 38'

COMPANY COORDINATES: 54000.0N. , 13000.0E.

DRILLER: Teton, H. E.

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 400.0

PROBE DEPTH: 398'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 1,10

LOGGED BY: Century Geo., S. Carter

LITHOLOGY LOG BY: Western Energy Co.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE¼ NE¼ sec. 7, elev. from lithology log

* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

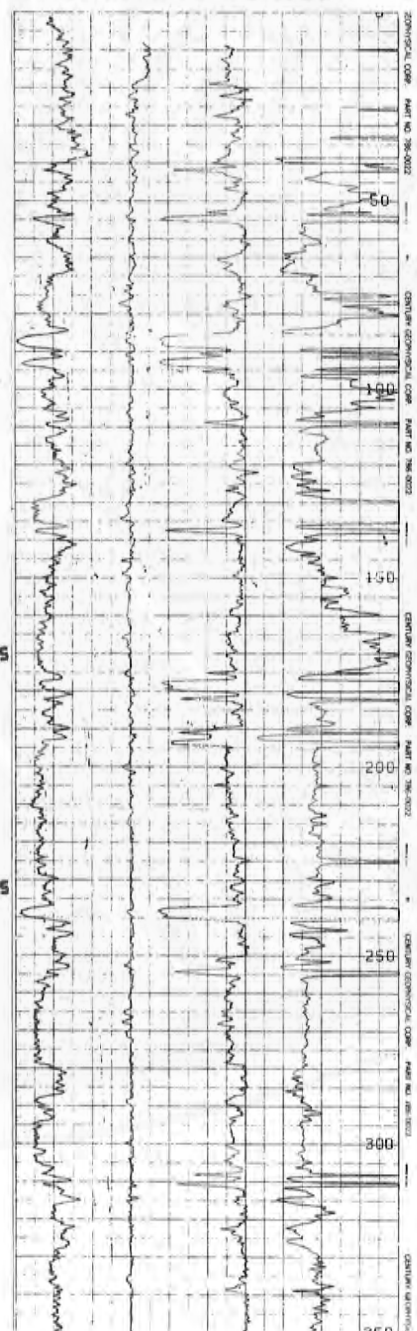
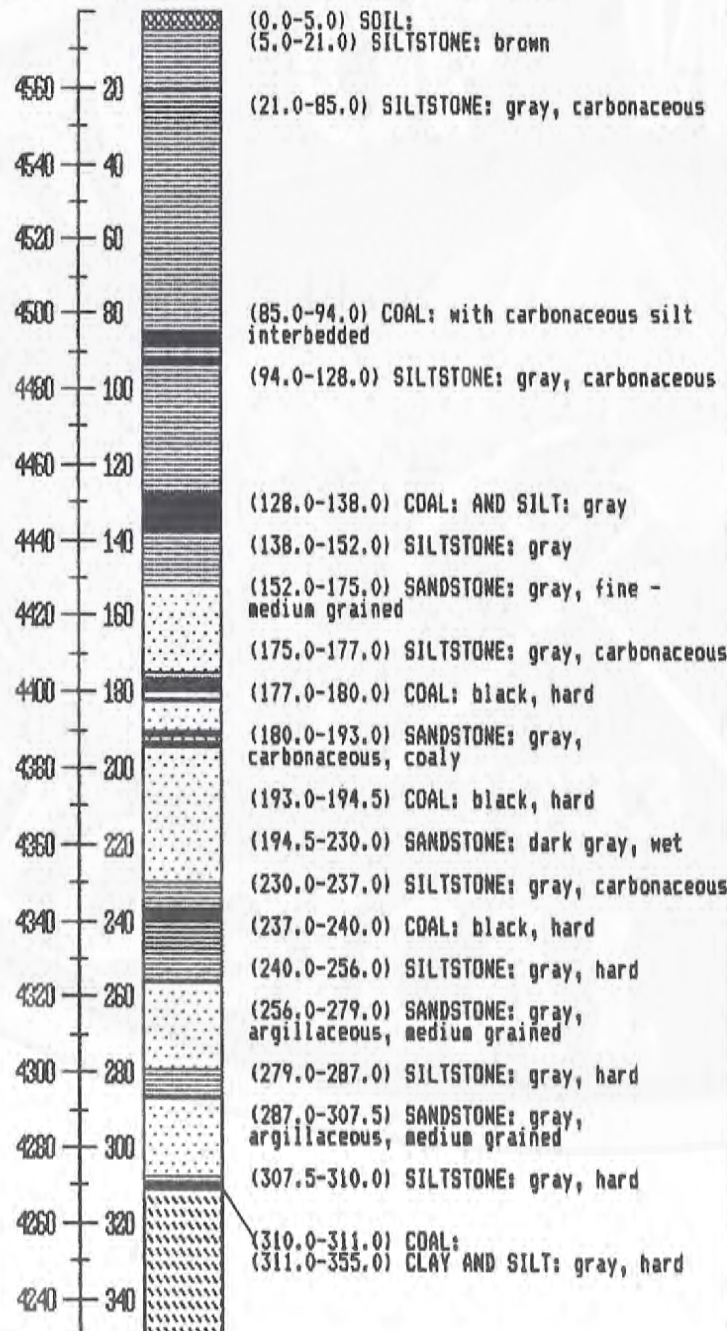
Seq. No.: 70040

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 100.0cps/in; 2.0 in/in; 0.5 g/cc/in; 25.0 ohm/in
 Deflection:--> right |right |right |right
 Bias:-----> |-3.0 |-1.0 |0.0
 Source Strength:-----> |125 mCi
 [Logging Speed: 30.0 ft/min]

ELEV DEPTH SYMBOL

LITHOLOGY DESCRIPTION

GEOPHYSICAL LOG

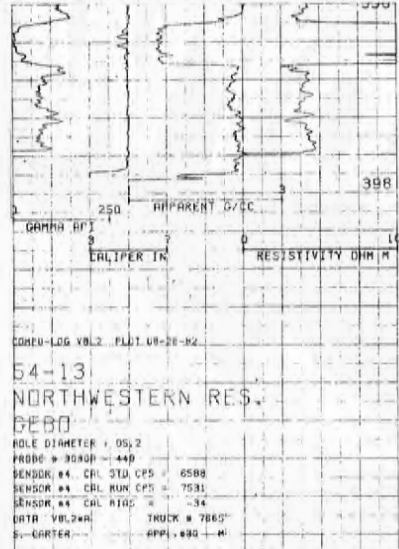
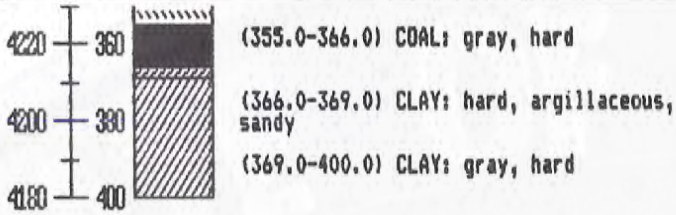


GEOPHYSICAL LOG TRACES

Seq. No.: 70040

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 100.0cps/in|2.0 in/in|0.5 g/cc/in|25.0 ohm/in
 Deflection:--> right |right |right |right
 Bias:-----> |-3.0 |-1.0 |0.0
 Source Strength:-----> |125 mCi

[Logging Speed: 30.0 ft/min]



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W84562 fed

DRILLHOLE: NW N54-E14

SEQ. NO.: 70041

SOURCE: Northwestern Res.

COMPLETED: 91783

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 8

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4578.0

DEPTH TO WATER: 172'

COMPANY COORDINATES: 53920.0N. , 13820.0E.

DRILLER: Materi, A. Hoxie

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 380.0

PROBE DEPTH: 381'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 1,10

LOGGED BY: Century Geo., P. Schutt

LITHOLOGY LOG BY: R. Wells

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NW¼ NW¼ sec. 8, 1300 fnl, 700 fwl, elev. from lithology log

* = SEE CODE EXPLANATIONS

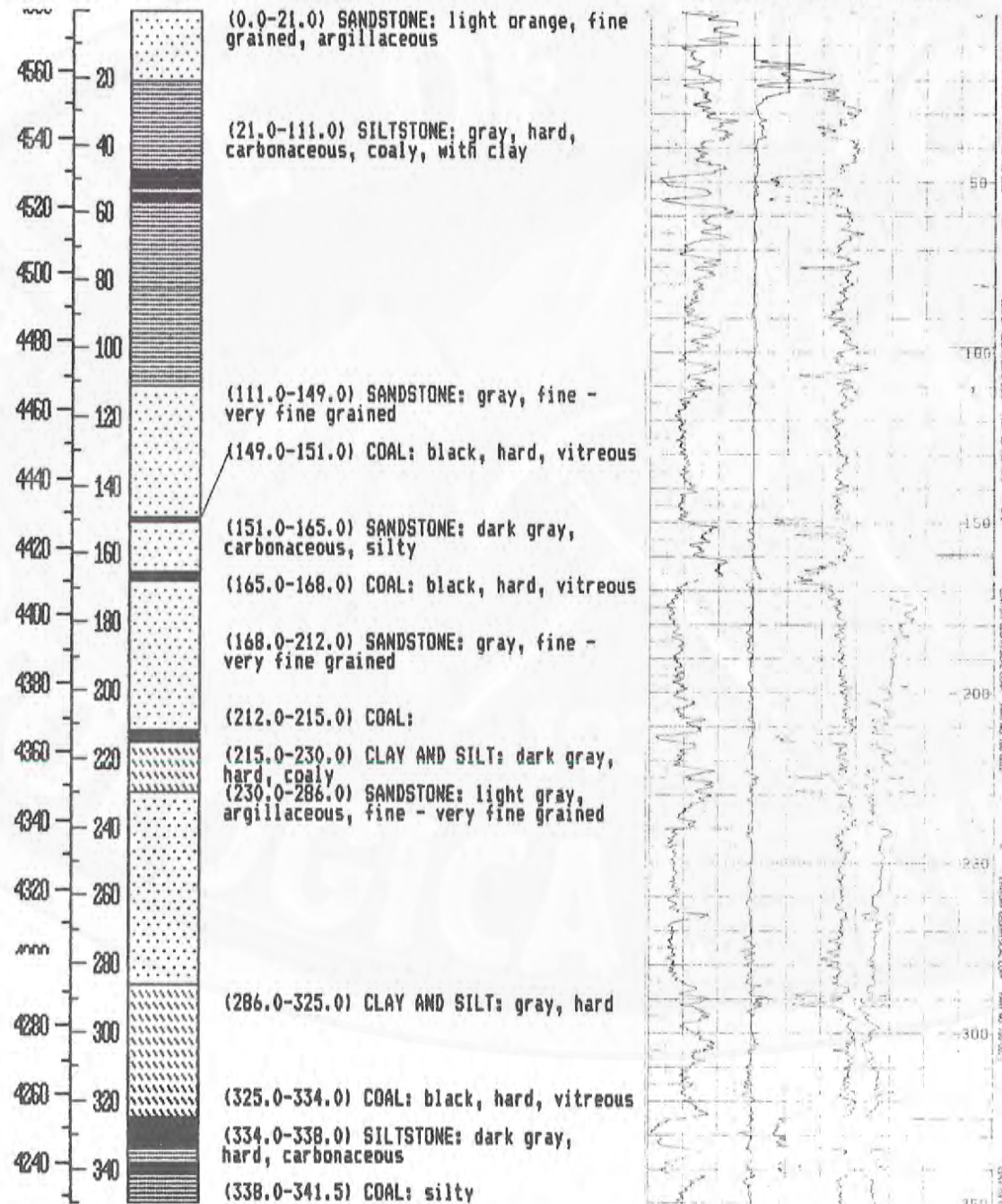
GEOPHYSICAL LOG TRACES

Seq. No.: 70041

GAMMA (API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 80.0 cps/in:2.0 in/in:0.5 g/cc/in:55.0 ohm/in
 Deflection:--> right :right :right :right
 Bias:-----> : -3.0 : -1.0 : -10.0
 Source Strength:-----> :125 mCi

[Logging Speed: 30.0 ft/min]

ELEV DEPTH SYMBOL LITHOLOGY DESCRIPTION GEOPHYSICAL LOG

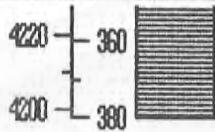


GEOPHYSICAL LOG TRACES

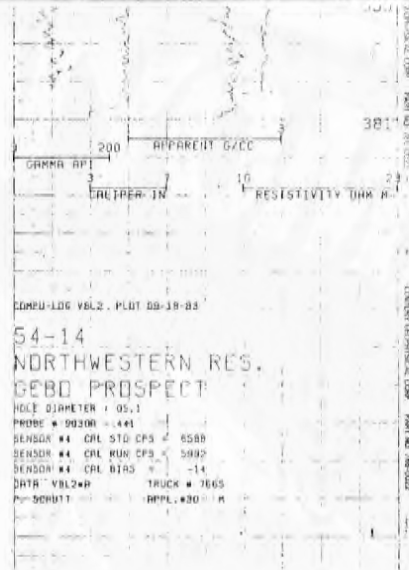
Seq. No.: 70041

	GAMMA(API)	CALIPER	DENSITY	RESISTIVITY
Scale:----->	80.0 cps/in	2.0 in/in	0.5 g/cc/in	55.0 ohm/in
Deflection:-->	right	right	right	right
Bias:----->	-3.0	-1.0	-10.0	
Source Strength:----->	125 mCi			

[Logging Speed: 30.0 ft/min]



(341.5-380.0) SILTSTONE; dark gray, hard, carbonaceous, coaly



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W84562 fed

DRILLHOLE: NW N54-E15

SEQ. NO.: 70042

SOURCE: Northwestern Res.

COMPLETED: 92283

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 8

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4526.0

DEPTH TO WATER: 16'

COMPANY COORDINATES: 53925.0N. , 14820.0E.

DRILLER: Materi, A. Hoxie

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 280.0

PROBE DEPTH: 279'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 1,10

LOGGED BY: Century Geo., P. Schutt

LITHOLOGY LOG BY: R. Wells

COALSYS BY: P. Taucher

CORE INTERVALS: 255 - 267.4 ft.

COMMENTS: NE¼ NW¼ sec. 8, 1300 fnl, 1700 fwl, elev. from lithology log

* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70042

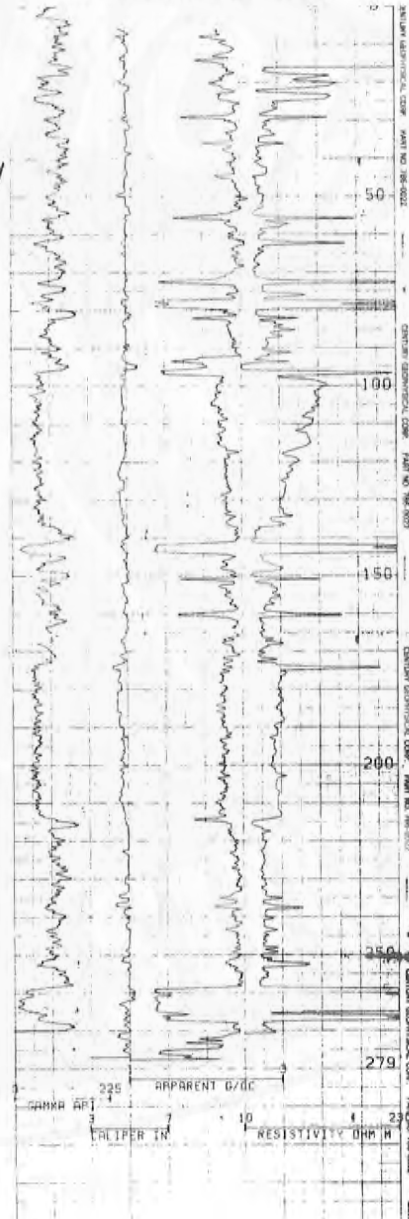
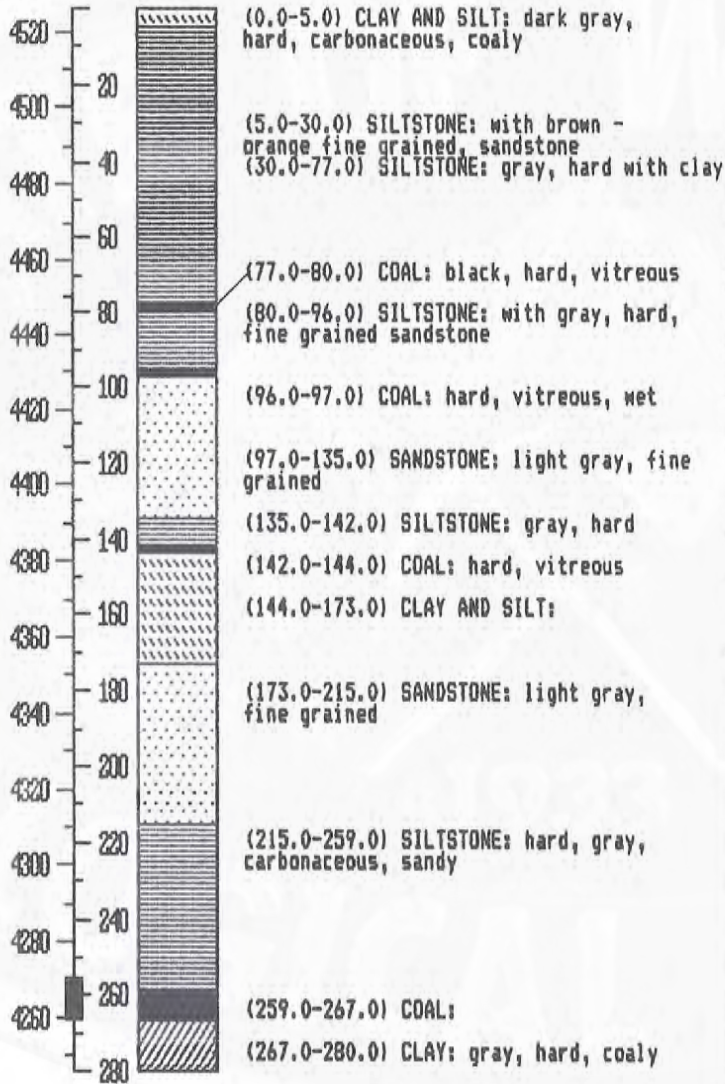
GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 90.0 cps/in; 2.0 in/in; 0.5 g/cc/in; 55.0 ohm/in
 Deflection:--> right |right |right |right
 Bias:-----> |-3.0 |-1.0 |-10.0
 Source Strength:-----> |125 mCi

[Logging Speed: 30.0 ft/min]

ELEV DEPTH SYMBOL

LITHOLOGY DESCRIPTION

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: WB4562 fed

DRILLHOLE: NW N54-E16

SEQ. NO.: 70043

SOURCE: Northwestern Res.

COMPLETED: 92783

*COUNTY: 17

STATE: WY

AREA: Geba

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 8

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4525.0

DEPTH TO WATER: 47'

COMPANY COORDINATES: 53915.0N. , 15825.0E.

DRILLER: Materi, A. Hoxie

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 300.0

PROBE DEPTH: 300'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 1,10

LOGGED BY: Century Geo., J. G.

LITHOLOGY LOG BY: R. Wells

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NW¼ NE¼ sec. 8, 1350 fnl, 2500 fwl, elev. from lithology log

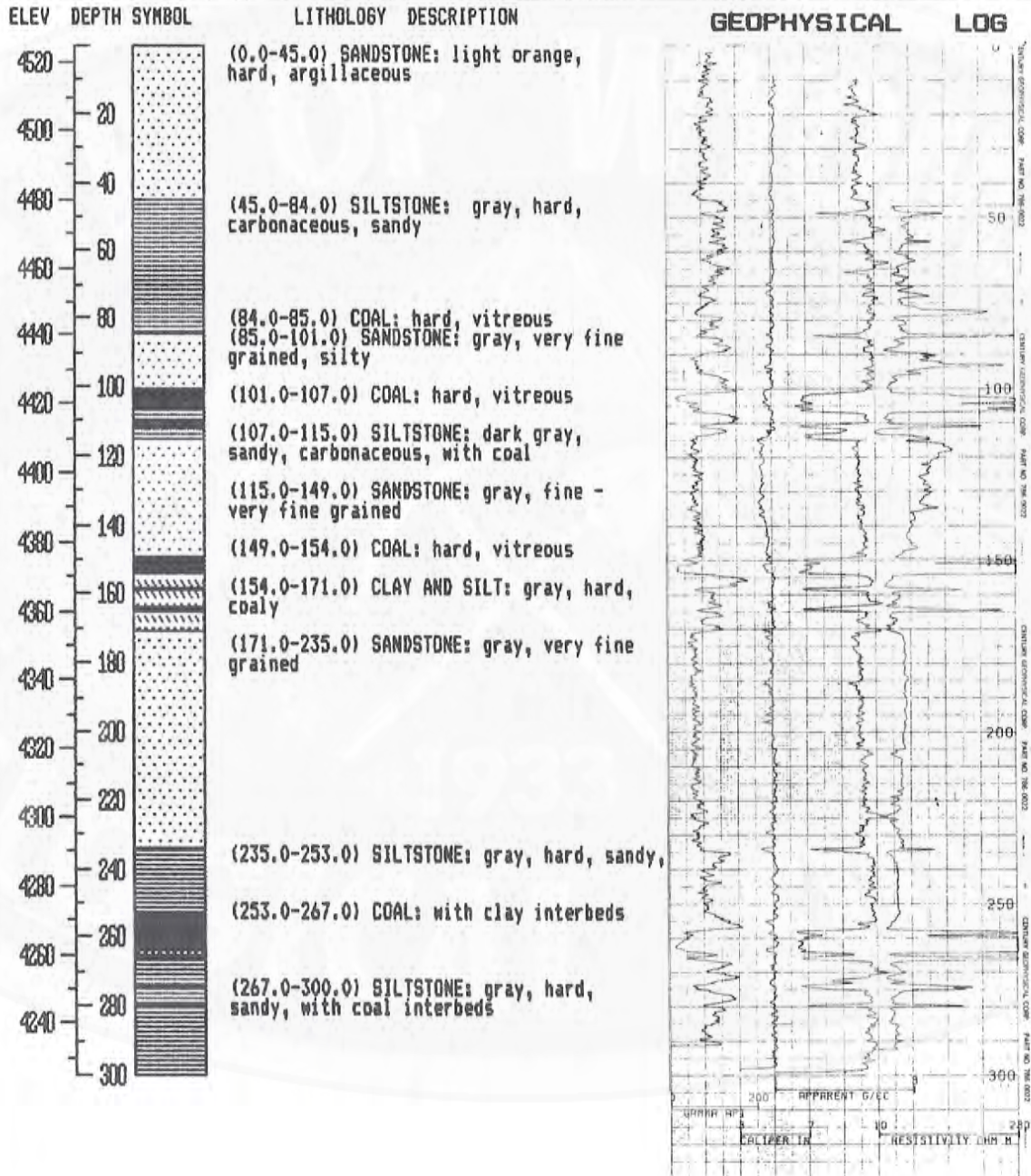
* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70043

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 80.0 cps/in; 2.0 in/in; 0.5 g/cc/in; 55.0 ohm/in
 Deflection:--> right ;right ;right ;right
 Bias:-----> ;-3.0 ;-1.0 ;-10.0
 Source Strength:-----> ;125 mCi

[Logging Speed: 30.0 ft/min]



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W84562 fed

DRILLHOLE: NW N55-E10

SEQ. NO.: 70044

SOURCE: Northwestern Res.

COMPLETED: 92983

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 7

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4710.0

DEPTH TO WATER: 46'

COMPANY COORDINATES: 54990.0N. , 10050.0E.

DRILLER: Materi, A. Hoxie

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 580.0

PROBE DEPTH: 582'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 1,10

LOGGED BY: Century Geo., J. G.

LITHOLOGY LOG BY: R. Wells

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 7, 300 fml, 1900 fwl, elev. from lithology log

* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70044

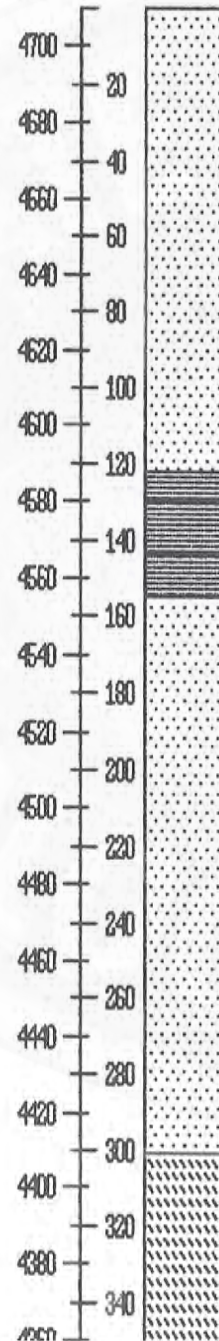
GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 100.0cps/in; 2.0 in/in; 0.5 g/cc/in; 55.0 ohm/in
 Deflection:--> right |right |right |right
 Bias:-----> |-3.0 |-1.0 |-10.0
 Source Strength:-----> |125 mCi

[Logging Speed: 30.0 ft/min]

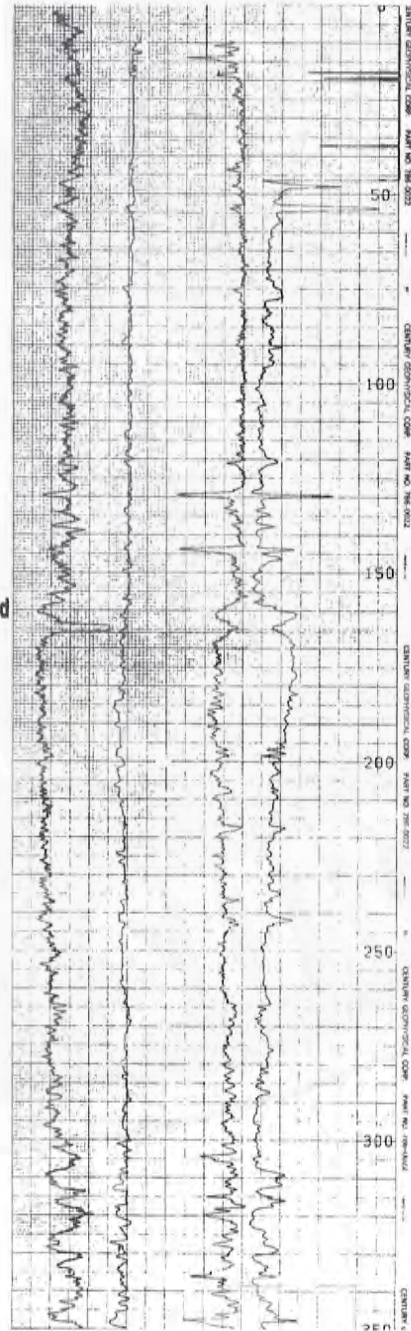
ELEV DEPTH SYMBOL

LITHOLOGY DESCRIPTION

GEOPHYSICAL LOG



(0.0-122.0) SANDSTONE: gray - brown, fine - very fine grained, silty
 (122.0-155.0) SILTSTONE: dark gray, hard, carbonaceous - coaly
 (155.0-301.0) SANDSTONE: gray, fine grained
 (301.0-376.0) CLAY AND SILT: gray, hard, with coal interbedded

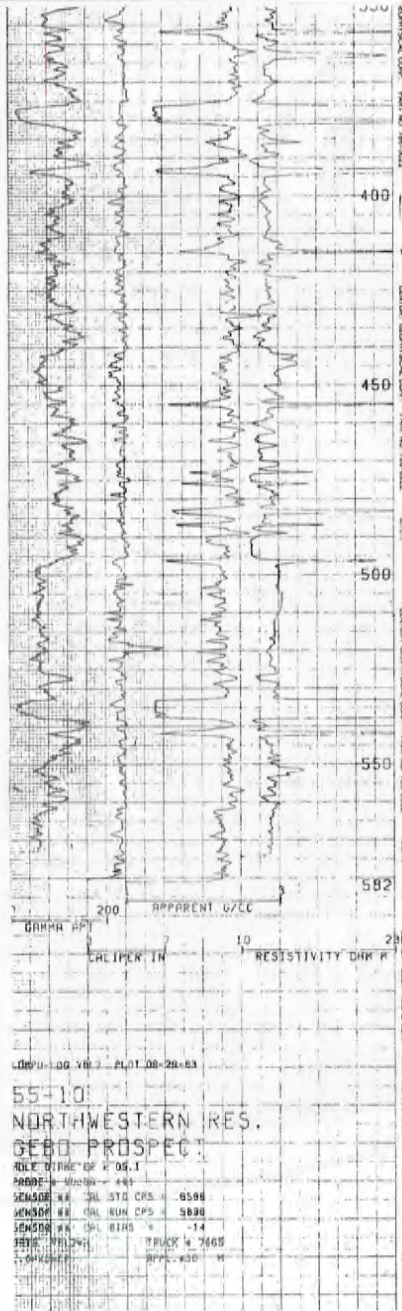
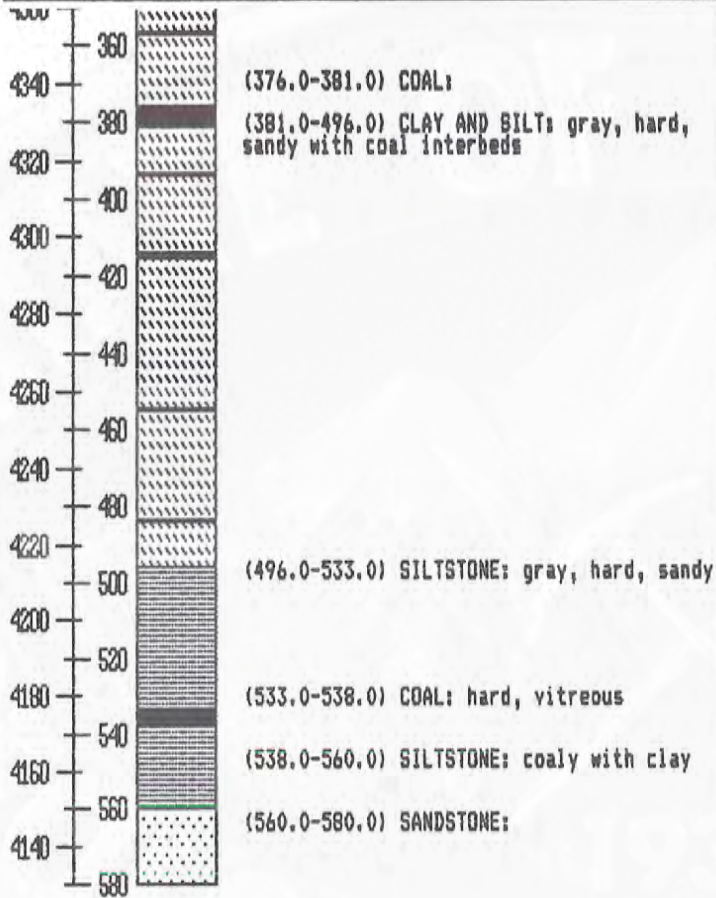


GEOPHYSICAL LOG TRACES

Seq. No.: 70044

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 100.0cps/in; 2.0 in/in; 0.5 g/cc/in; 55.0 ohm/in
 Deflection:--> right |right |right |right
 Bias:-----> |-3.0 |-1.0 |-10.0
 Source Strength:-----> |125 mCi

[Logging Speed: 30.0 ft/min]



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W84562 fed

DRILLHOLE: NW N55-E11

SEQ. NO.: 70045

SOURCE: Northwestern Res.

COMPLETED: 91883

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 7

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4694.0

DEPTH TO WATER: 84'

COMPANY COORDINATES: 54990.0N. , 11050.0E.

DRILLER: Materi, A. Hoxie

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 603.0

PROBE DEPTH: 603'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: foam

*LOG TYPES: 1,10

LOGGED BY: Century Geo., P. Schutt

LITHOLOGY LOG BY: R. Wells

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NW¼ NE¼ sec. 7, 300 fnl, 2300 fel, elev. from lithology log

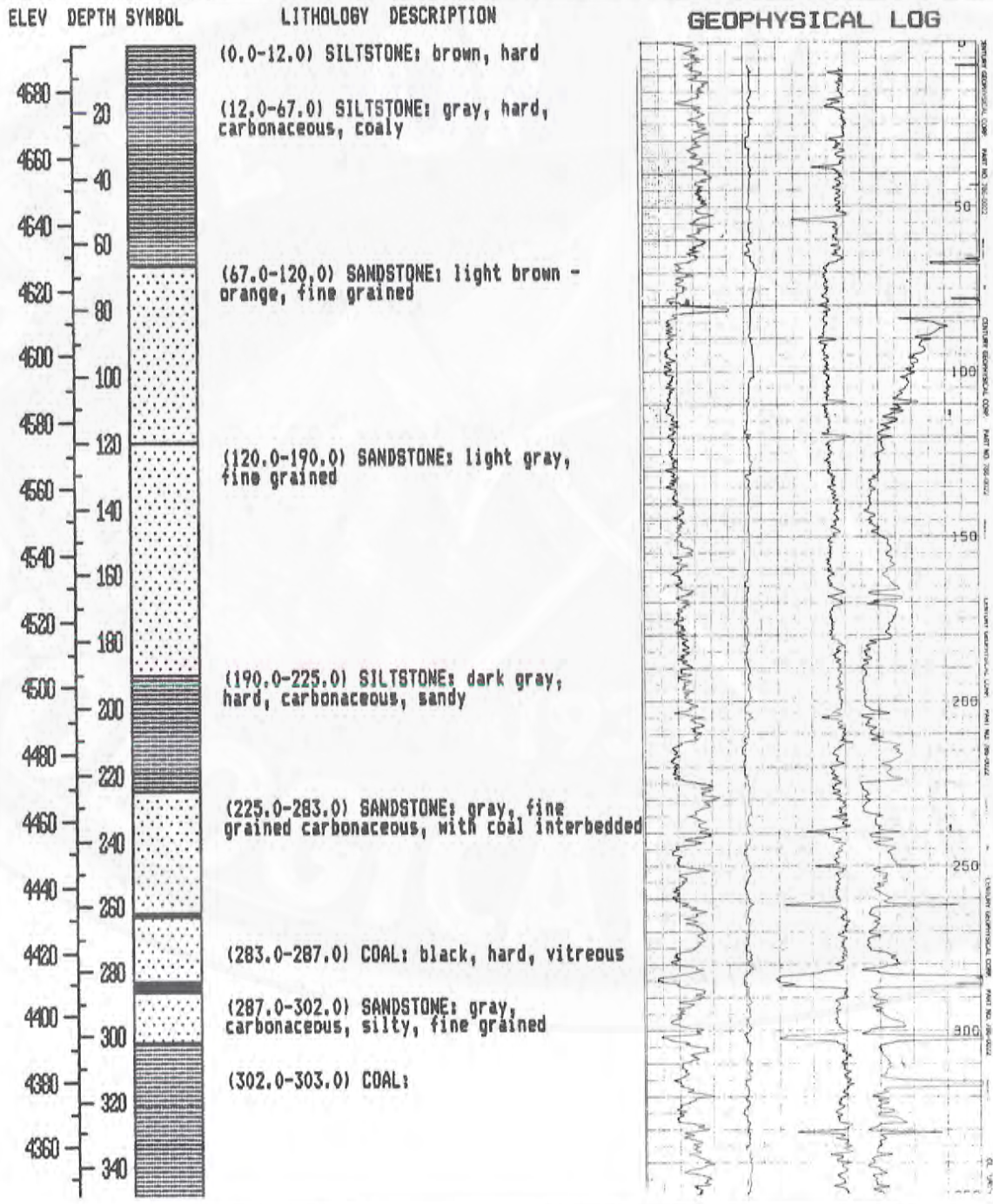
* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70045

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 80.0 cps/in; 2.0 in/in; 0.5 g/cc/in; 55.0 ohm/in
 Deflection:--> right |right |right |right
 Bias:-----> |-3.0 |-1.0 |-10.0
 Source Strength:-----> |125 mCi

[Logging Speed: 30.0 ft/min]

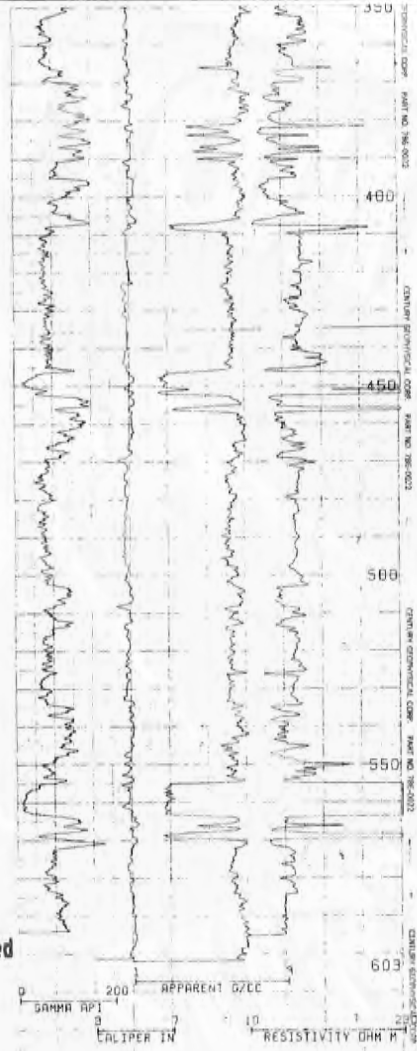
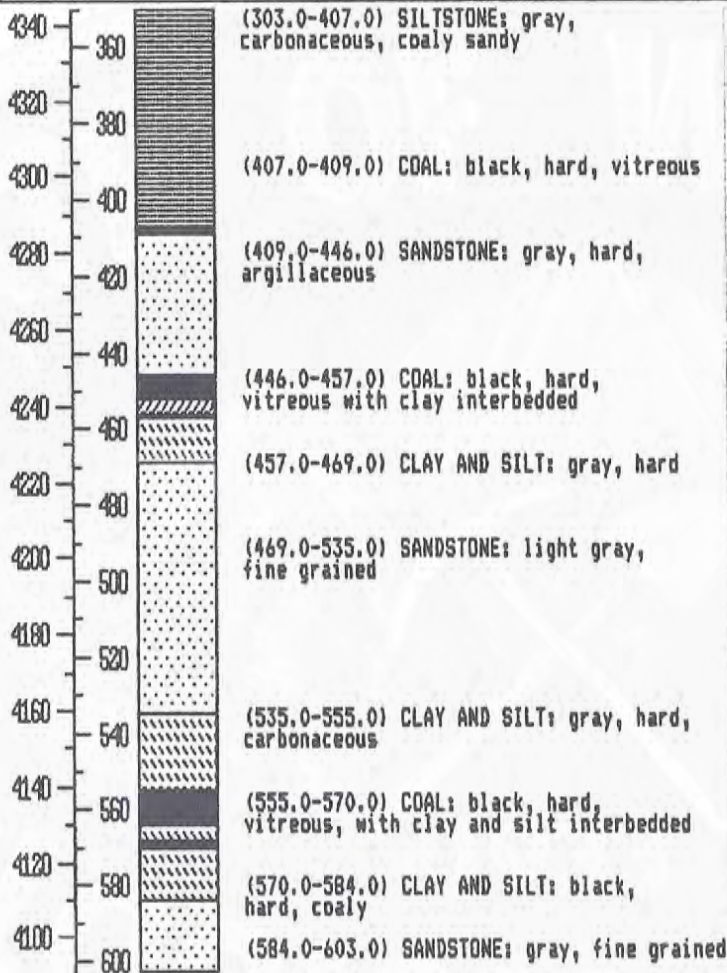


GEOPHYSICAL LOG TRACES

Seq. No.: 70045

GAMMA (API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 80.0 cps/in; 2.0 in/in; 0.5 g/cc/in; 55.0 ohm/in
 Deflection:--> right ;right ;right ;right
 Bias:-----> ;-3.0 ;-1.0 ;-10.0
 Source Strength:-----> ;125 mCi

[Logging Speed: 30.0 ft/min]



CORPUS-LOG VOL 2 PLOT 09-18-83
 55-11
 NORTHWESTERN RES.
 GEBB PROSPECT
 HOLE DIAMETER = 05.1
 PROBE # 9031A = 445
 SENSOR #4 GRL 510 CPS = 6508
 SENSOR #4 GRL RUN CPS = 5992
 SENSOR #4 GRL BIAS = -14
 DATA VOL 2A TRUCK # 7565
 P. SCHULTZ APRIL #1030 H

THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W80234 fed

DRILLHOLE: NW N55-E12 SEQ. NO.: 70046 SOURCE: Northwestern Res.

COMPLETED: 90382 *COUNTY: 17 STATE: WY AREA: Gebo

QUADRANGLE: Little Sand Draw *QUAD. LOC. CODE: 4310863

SECTION: 7 TOWNSHIP: 44.00N RANGE: 95.00W PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00 LONGITUDE: 0.00 *LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N. 0.0E. ZONE: 5851

ADJ. ABS. ELEV.: 0.0 COMPANY ELEV.: 4631.0 DEPTH TO WATER: 99'

COMPANY COORDINATES: 55000.0N. , 12000.0E. DRILLER: Teton, H. E.

*DRILLHOLE TYPE: 3 DRILLHOLE DEPTH: 535.0 PROBE DEPTH: 535'

HOLE DIAMETER: 5.1" CASING DEPTH: none DRILL FLUID: water

*LOG TYPES: 1,10 LOGGED BY: Century Geo., S. Carter

LITHOLOGY LOG BY: Western Energy Co. COALSYS BY: P. Taucher

CORE INTERVALS: 502.0-515.0 ft.

COMMENTS: NE¼ NE¼ sec. 7, elev. from lithology log

* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70046

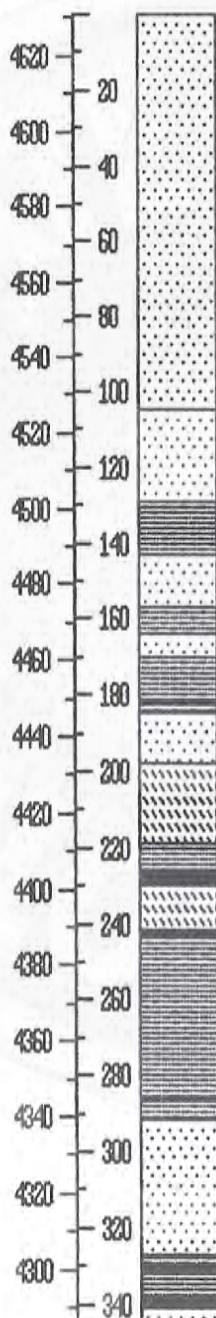
GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 75.0 cps/in; 2.0 in/in; 0.5 g/cc/in; 25.0 ohm/in
 Deflection:--> right ;right ;right ;right
 Bias:-----> ;-3.0 ;-1.0 ;0.0
 Source Strength:-----> ;125 mCi

[Logging Speed: 30.0 ft/min]

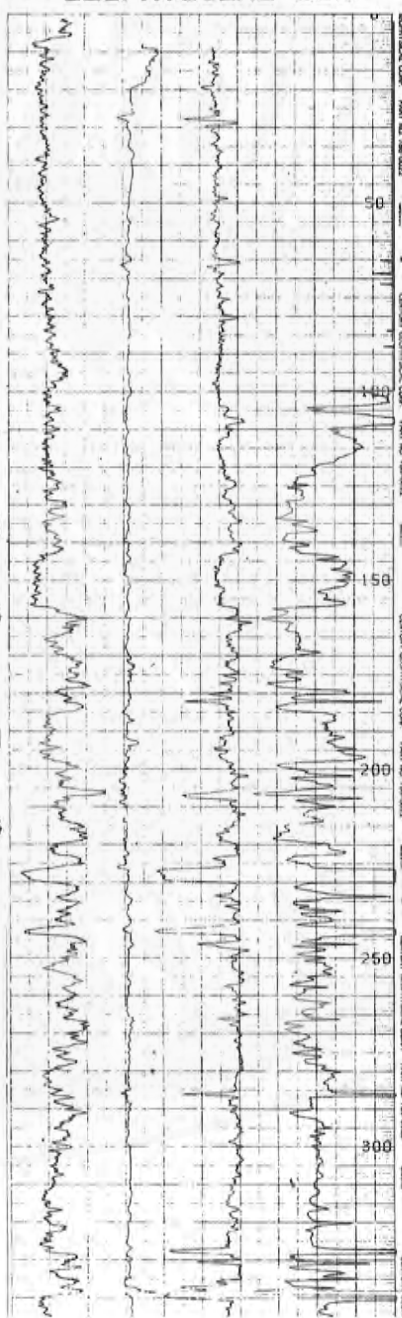
ELEV DEPTH SYMBOL

LITHOLOGY DESCRIPTION

GEOPHYSICAL LOG



(0.0-105.0) SANDSTONE: light orange, fine grained
 (105.0-129.0) SANDSTONE: gray, fine grained
 (129.0-143.0) SILTSTONE: gray, hard
 (143.0-157.0) SANDSTONE: gray, fine grained
 (157.0-164.0) SILTSTONE: gray, carbonaceous
 (164.0-170.0) SANDSTONE: dark gray, fine grained, carbonaceous
 (170.0-185.0) SILTSTONE: gray, hard, carbonaceous, coaly
 (185.0-198.0) SANDSTONE: gray, fine grained
 (198.0-219.0) CLAY AND SILT: gray, hard, carbonaceous
 (219.0-226.0) SILTSTONE: hard, carbonaceous
 (226.0-230.0) COAL: dirty
 (230.0-242.0) CLAY AND SILT: hard, carbonaceous
 (242.0-244.0) COAL: black, hard
 (244.0-280.0) SILTSTONE: gray, hard, carbonaceous, sandy
 (280.0-292.0) SILTSTONE: gray, carbonaceous, sandy, coaly
 (292.0-327.0) SANDSTONE: gray, hard, fine grained, silty
 (327.0-341.0) COAL: with gray, hard, carbonaceous, silt interbeds

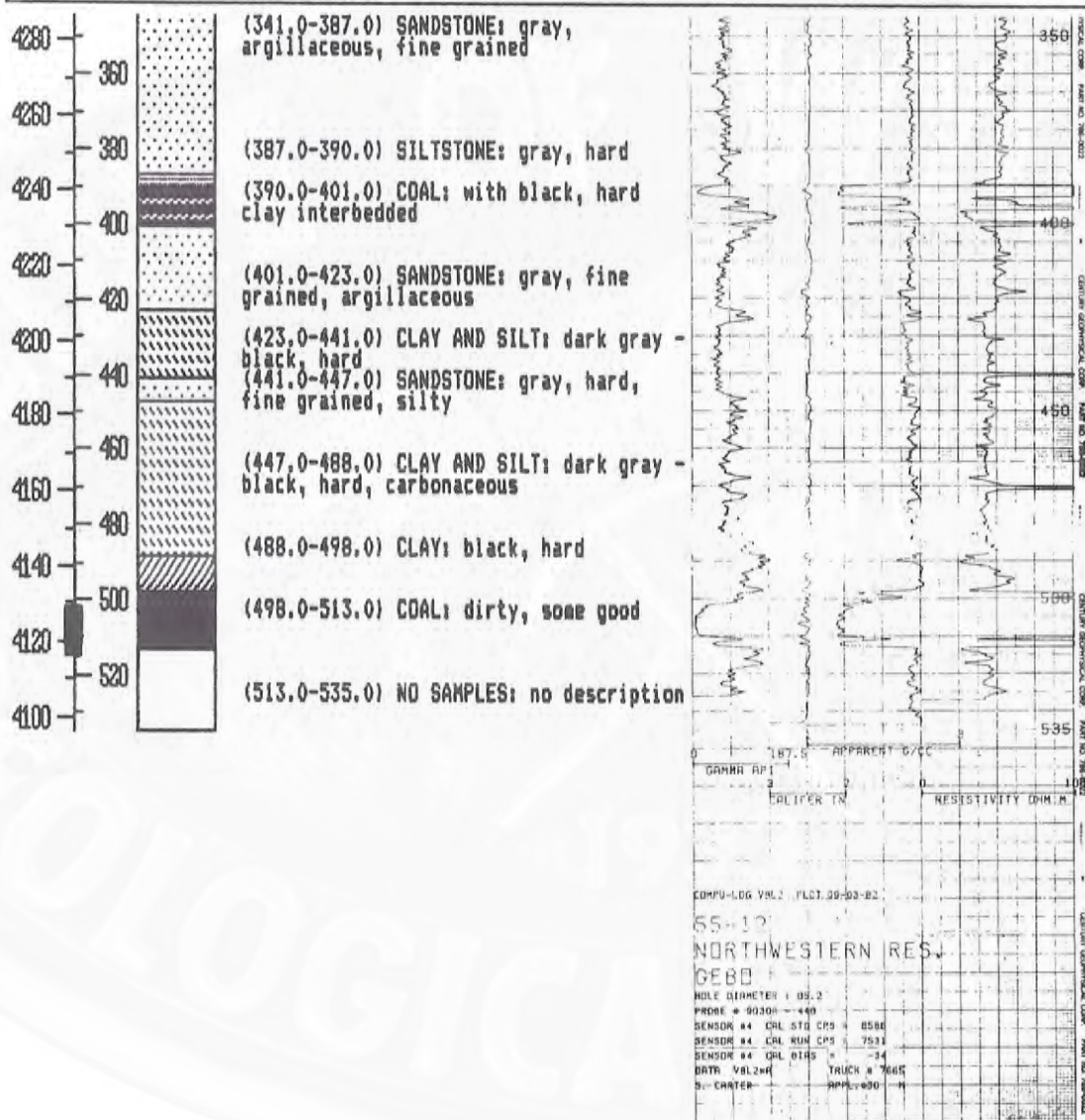


GEOPHYSICAL LOG TRACES

Seq. No.: 70046

GAMMA (API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 75.0 cps/in; 2.0 in/in; 0.5 g/cc/in; 25.0 ohm/in
 Deflection:--> right |right |right |right
 Bias:-----> |-3.0 |-1.0 |0.0
 Source Strength:-----> |125 mCi

[Logging Speed: 30.0 ft/min]



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W80234 fed

DRILLHOLE: NW N55-E13

SEQ. NO.: 70047

SOURCE: Northwestern Res.

COMPLETED: 82782

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 7

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4609.0

DEPTH TO WATER: 207'

COMPANY COORDINATES: 55000.0N. , 13000.0E.

DRILLER: Teton, Harvey

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 517.0

PROBE DEPTH: 516'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 1,10

LOGGED BY: Century Geo., S. Carter

LITHOLOGY LOG BY: Western Energy Co.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE¼ NE¼ sec. 7, elev. from lithology log

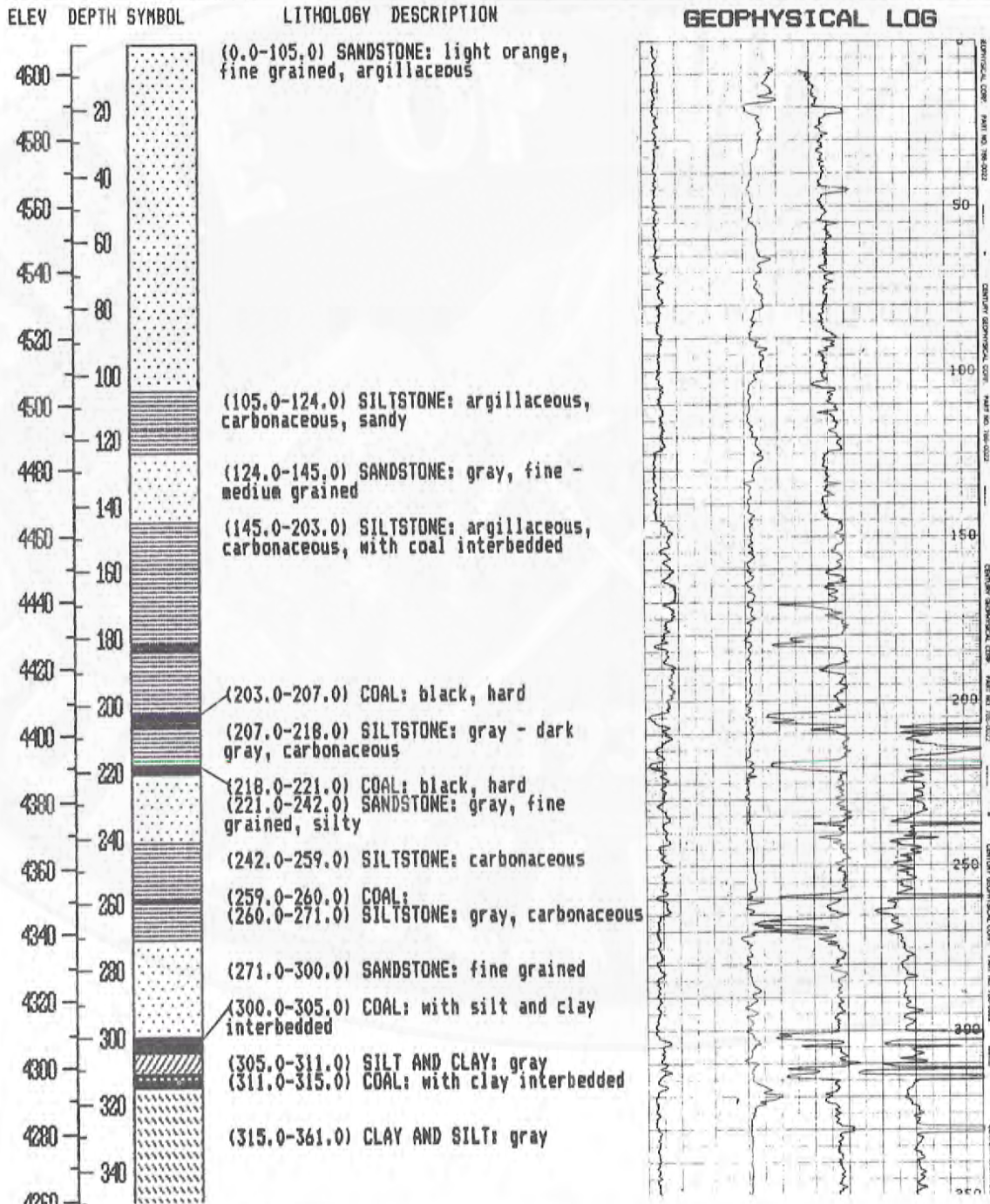
* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70047

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 200.0cps/in!2.0 in/in!0.5 g/cc/in!25.0 ohm/in
 Deflection:--> right !right !right !right
 Bias:-----> !-3.0 !-1.0 !0.0
 Source Strength:-----> !125 mCi

[Logging Speed: 30.0 ft/min]

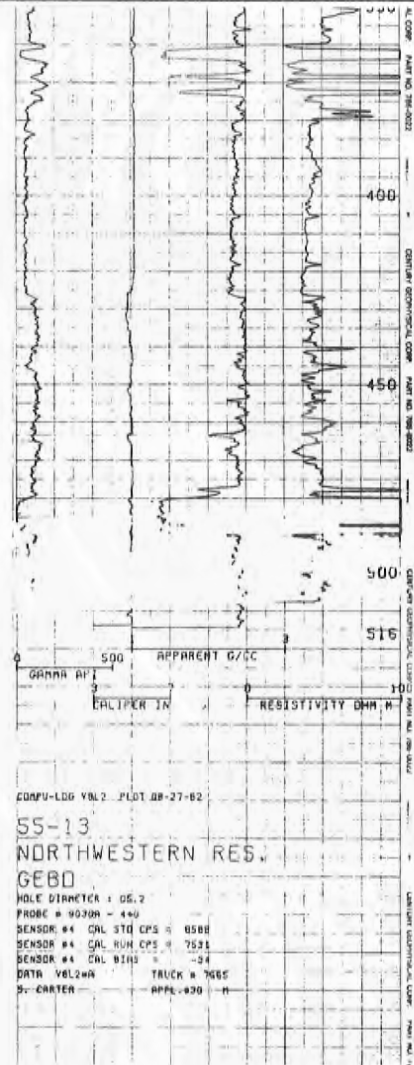
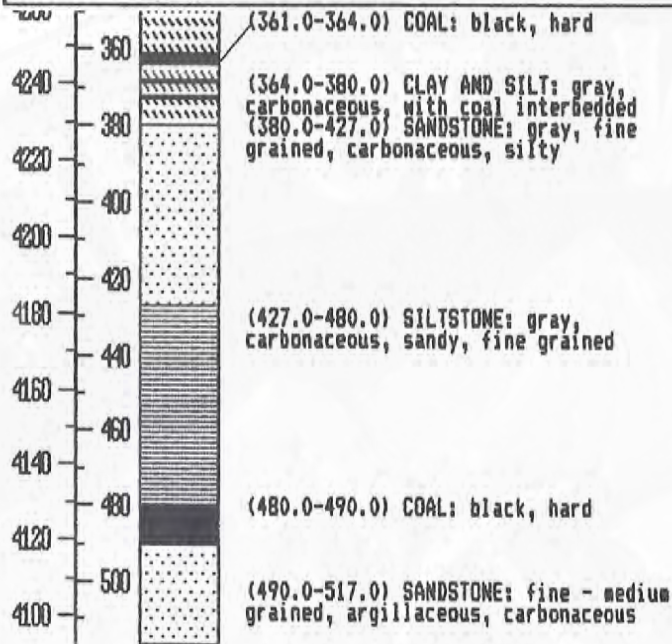


GEOPHYSICAL LOG TRACES

Seq. No.: 70047

GAMMA (API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 200.0cps/in; 2.0 in/in; 0.5 g/cc/in; 25.0 ohm/in
 Deflection:--> right |right |right |right
 Bias:-----> |-3.0 |-1.0 |0.0
 Source Strength:-----> |125 mCi

[Logging Speed: 30.0 ft/min]



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W84562 fed

DRILLHOLE: NW N56-E10

SEQ. NO.: 70048

SOURCE: Northwestern Res.

COMPLETED: 92883

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 6

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4689.0

DEPTH TO WATER: 24'

COMPANY COORDINATES: 55990.0N. , 10050.0E.

DRILLER: Materi, A.Hoxie

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 660.0

PROBE DEPTH: 661'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 1, 10

LOGGED BY: CenturyGeo., J.Gardner

LITHOLOGY LOG BY: R. Wells

COALSYS BY: P. Taucher

CORE INTERVALS: 510.0 - 544.7 ft.; 640.0 - 650.0 ft.

COMMENTS: SE¼ SW¼ sec. 6, 700 fsl, 1900 fwl, elev. from lithology log

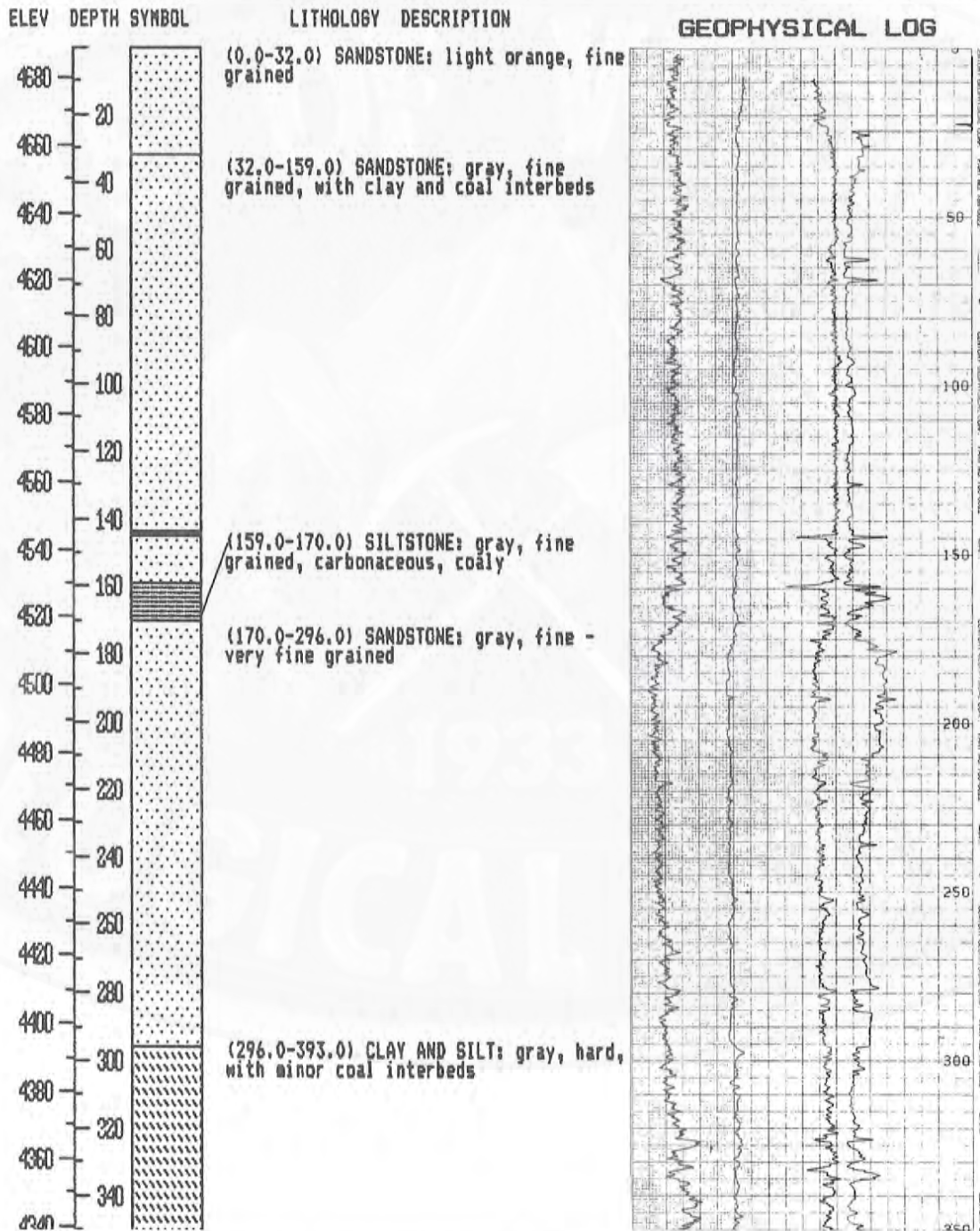
* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70048

GAMMA (API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 80.0 cps/in:2.0 in/in:0.5 g/cc/in:55.0 ohm/in
 Deflection:--> right :right :right :right
 Bias:-----> : -3.0 : -1.0 : -10.0
 Source Strength:-----> :125 mCi

[Logging Speed: 30.0 ft/min]

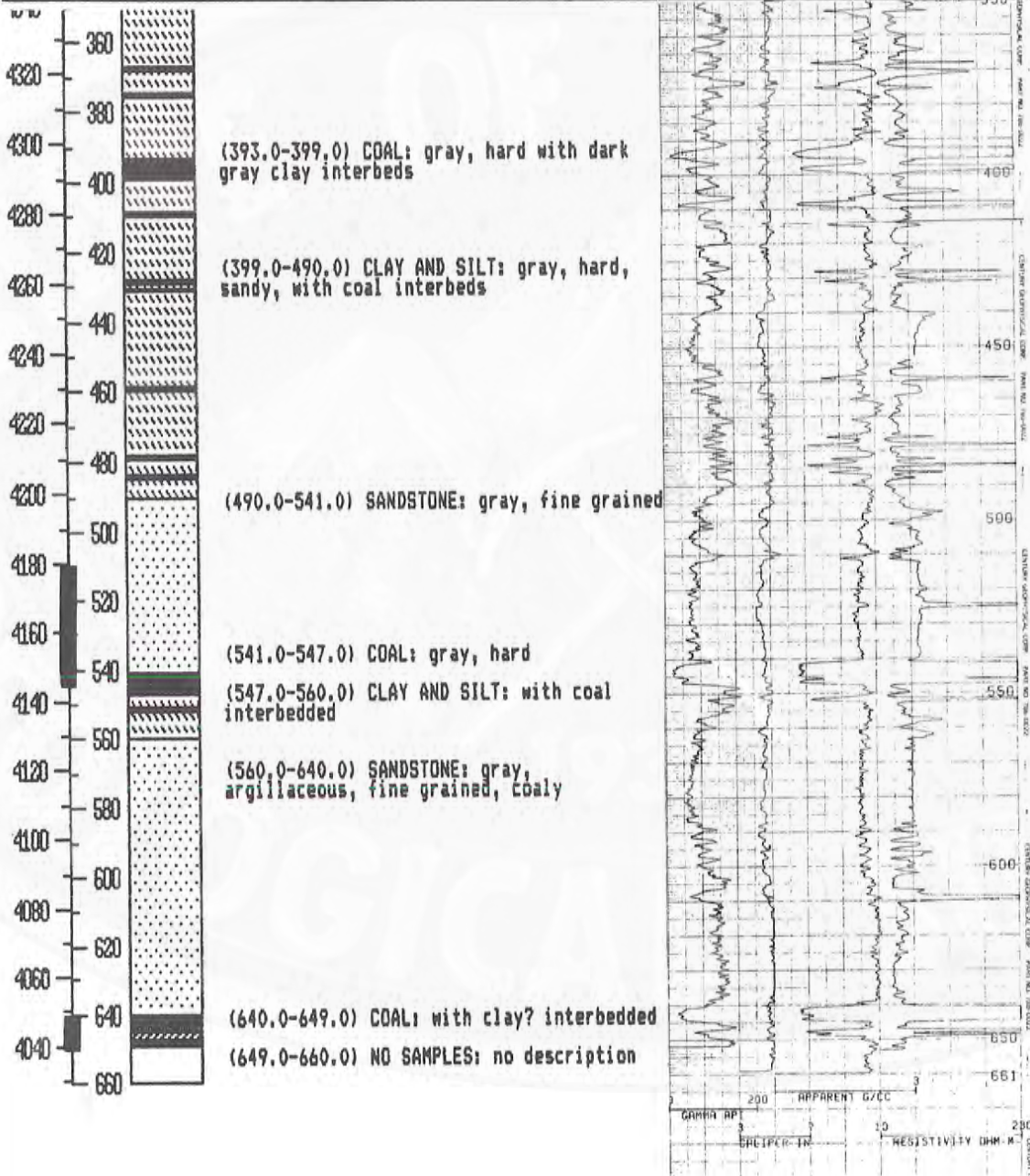


GEOPHYSICAL LOG TRACES

Seq. No.: 70048

GAMMA (API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 80.0 cps/in; 2.0 in/in; 0.5 g/cc/in; 55.0 ohm/in
 Deflection:--> right |right |right |right
 Bias:-----> |-3.0 |-1.0 |-10.0
 Source Strength:-----> |125 mCi

[Logging Speed: 30.0 ft/min]



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W84562 fed

DRILLHOLE: NW N56-E11

SEQ. NO.: 70049

SOURCE: Northwestern Res.

COMPLETED: 92083

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 6

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4669.0

DEPTH TO WATER: 1'

COMPANY COORDINATES: 55990.0N. , 11090.0E.

DRILLER: Materi, A.Hoxie

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 663.0

PROBE DEPTH: 663'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: mud

*LOG TYPES: 1,10

LOGGED BY: CenturyGeo., P.Schutt

LITHOLOGY LOG BY: R. Wells

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: SW¼ SE¼ sec. 6, 700 fsl, 2300 fel, elev. from lithology log

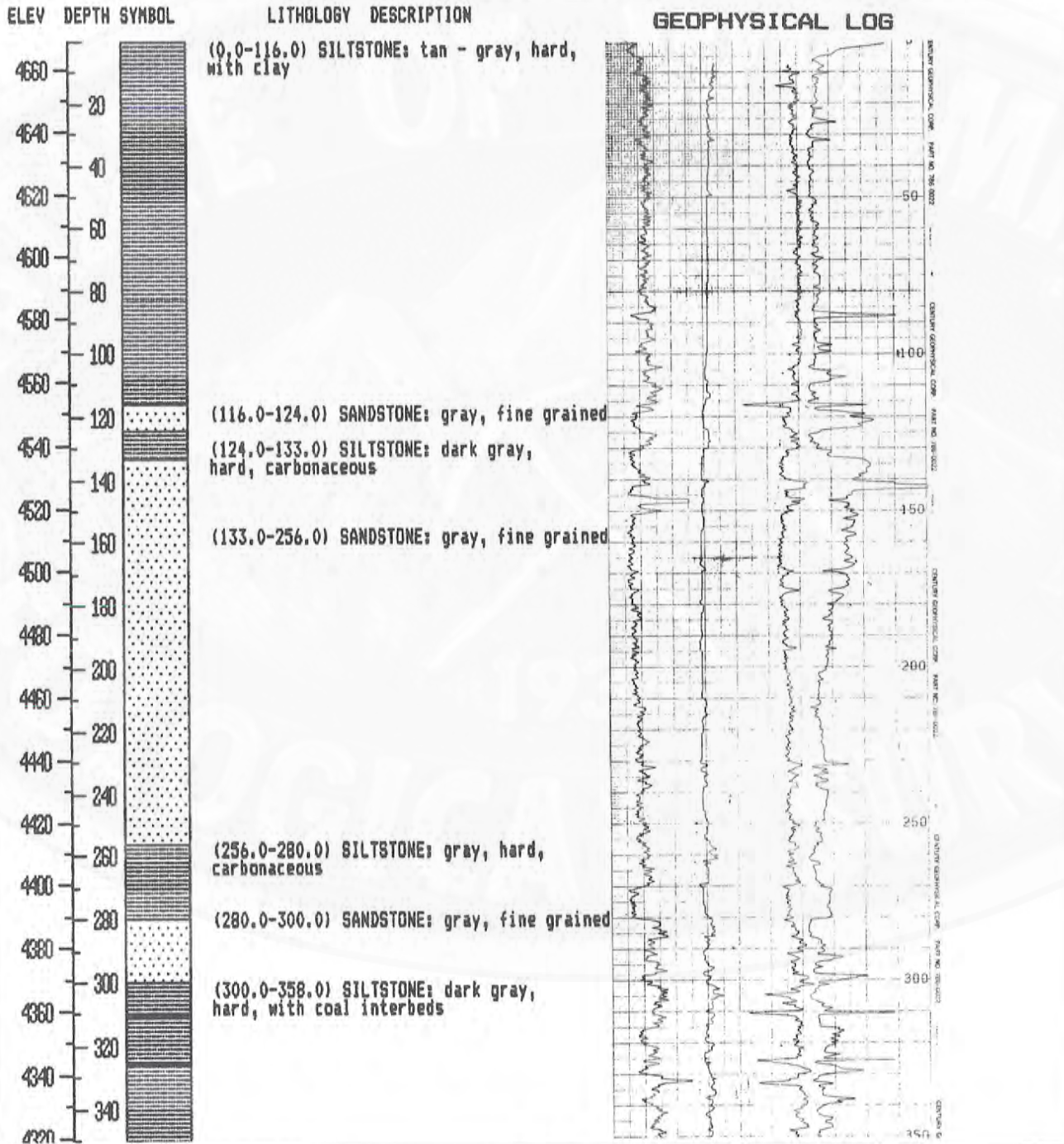
* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70049

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 90.0 cps/in; 2.0 in/in; 0.5 g/cc/in; 55.0 ohm/in
 Deflection:--> right ;right ;right ;right
 Bias:-----> ;-3.0 ;-1.0 ;-10.0
 Source Strength:-----> ;125 mCi

[Logging Speed: 30.0 ft/min]

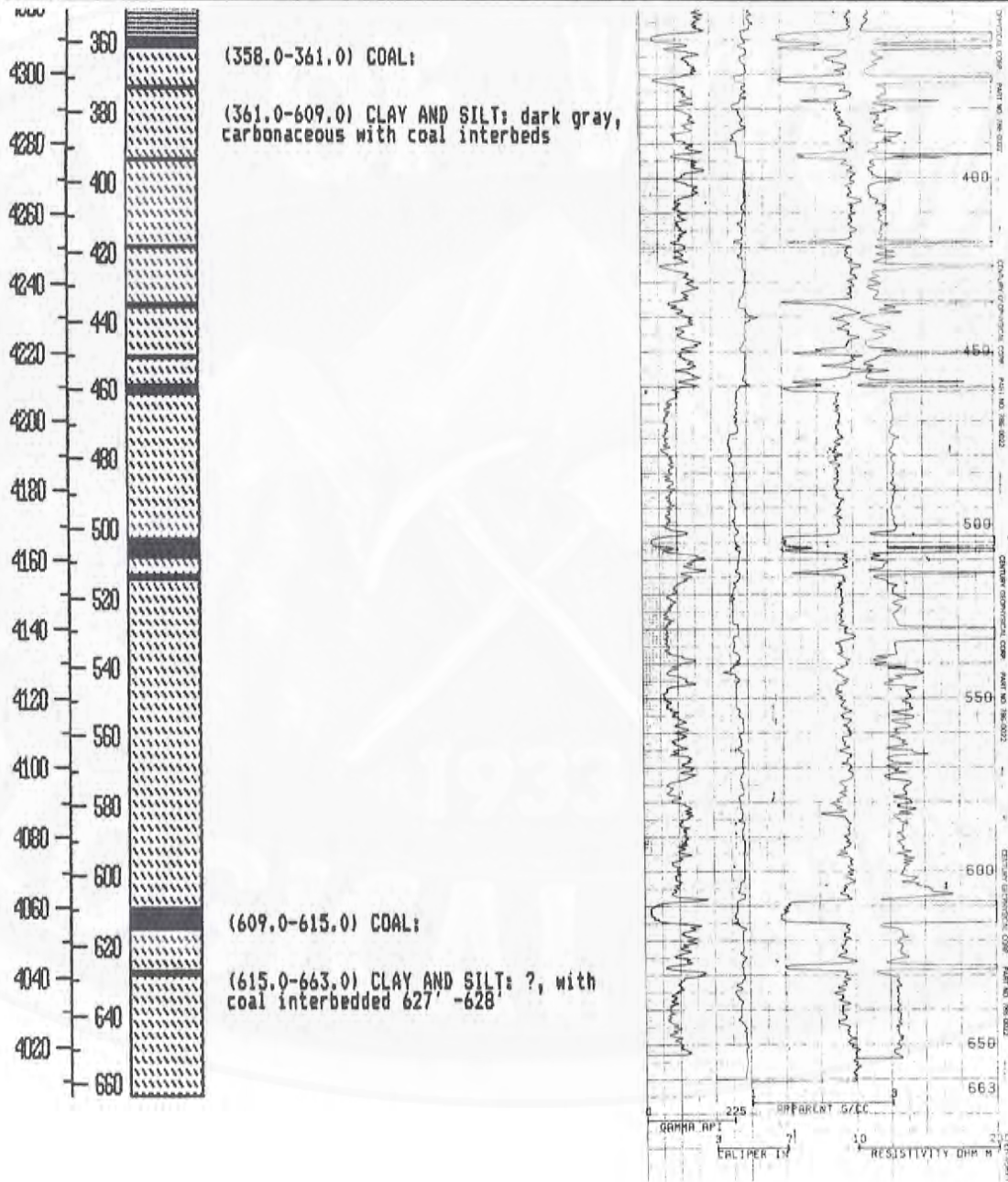


GEOPHYSICAL LOG TRACES

Seq. No.: 70049

GAMMA (API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 90.0 cps/in; 2.0 in/in; 0.5 g/cc/in; 55.0 ohm/in
 Deflection:--> right ;right ;right ;right
 Bias:-----> ;-3.0 ;-1.0 ;-10.0
 Source Strength:-----> ;125 mCi

[Logging Speed: 30.0 ft/min]



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W84562 fed

DRILLHOLE: NW N56-E12

SEQ. NO.: 70050

SOURCE: Northwestern Res.

COMPLETED: 93083

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 6

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.ON.

0.OE.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4651.0

DEPTH TO WATER: 56'

COMPANY COORDINATES: 55990.ON. , 12050.OE.

DRILLER: Materi, A.Hoxie

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 640.0

PROBE DEPTH: 643'

HOLE DIAMETER: 5.1"

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 1,10

LOGGED BY: CenturyGeo., J.Gardner

LITHOLOGY LOG BY: R. Wells

COALSYS BY: P. Taucher

CORE INTERVALS: none

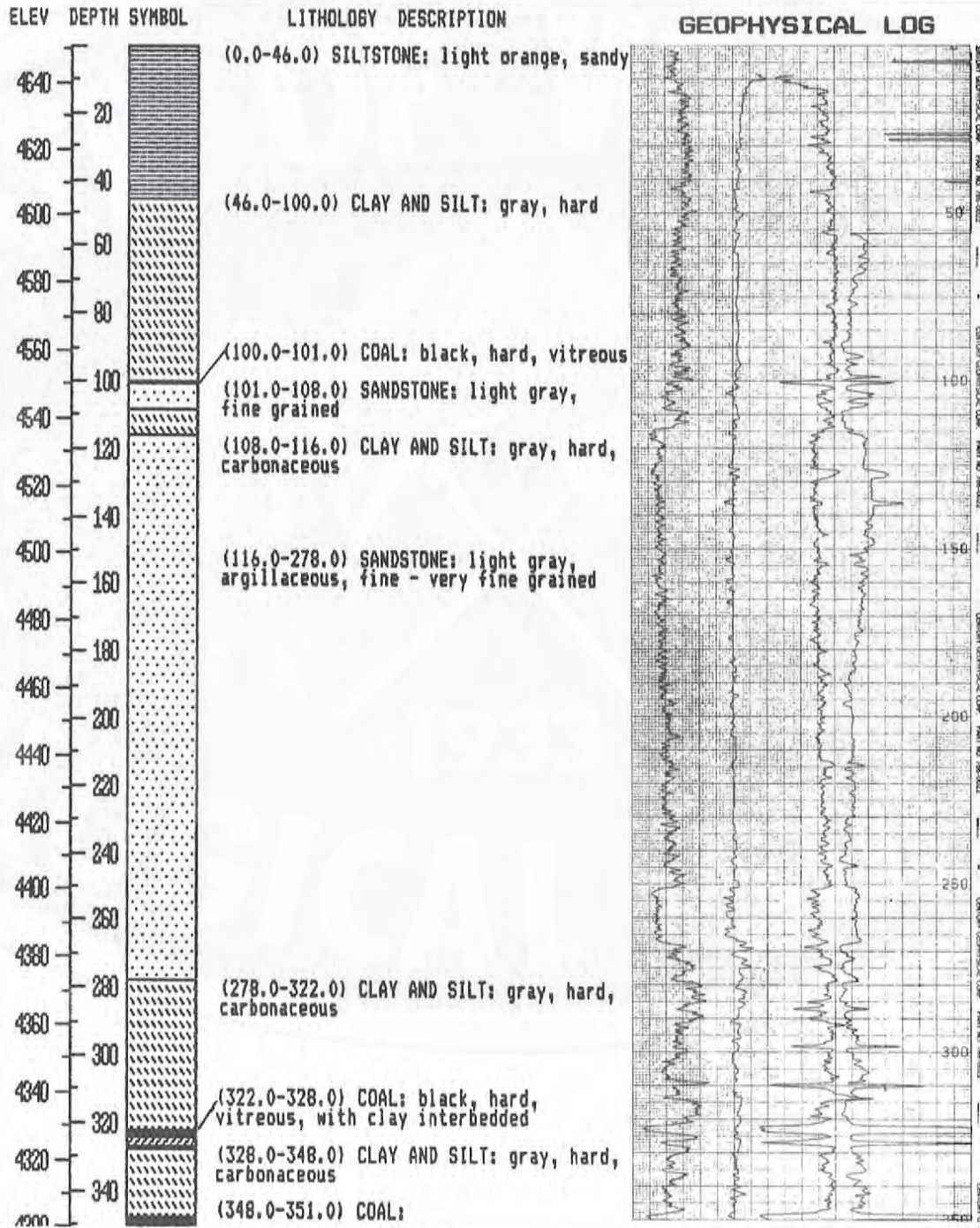
COMMENTS: SE¼ SE¼ sec. 6, 700 fsl, 1300 fel, elev. from lithology log

* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70050

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 80.0 cps/in; 2.0 in/in; 0.5 g/cc/in; 55.0 ohm/in
 Deflection:--> right ;right ;right ;right
 Bias:-----> ;-3.0 ;-1.0 ;-10.0
 Source Strength:-----> ;125 mCi
 [Logging Speed: 30.0 ft/min]

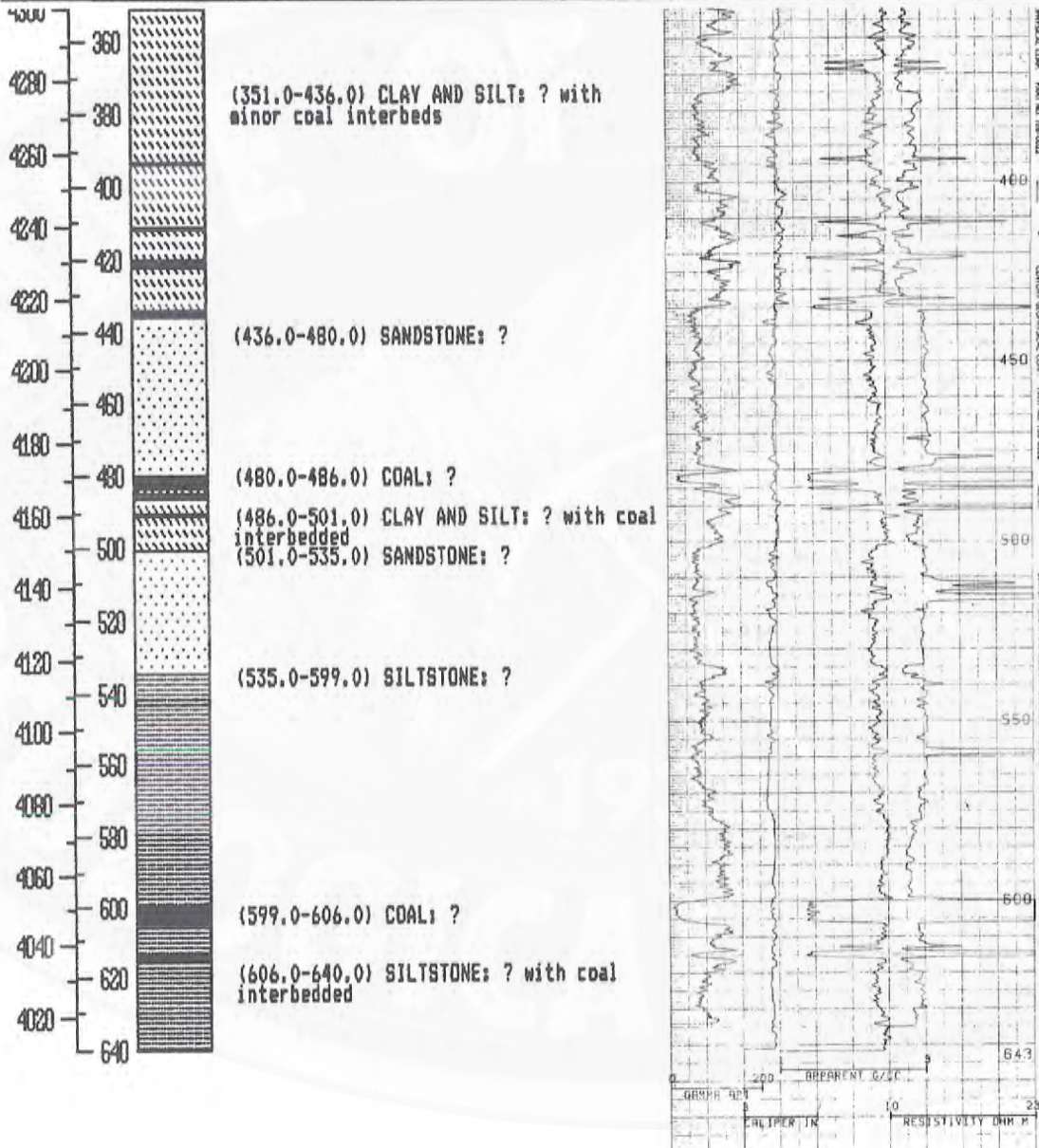


GEOPHYSICAL LOG TRACES

Seq. No.: 70050

GAMMA(API) CALIPER DENSITY RESISTIVITY
 Scale:-----> 80.0 cps/in|2.0 in/in|0.5 g/cc/in|55.0 ohm/in
 Deflection:--> right |right |right |right
 Bias:-----> |-3.0 |-1.0 |-10.0
 Source Strength:-----> |125 mCi

[Logging Speed: 30.0 ft/min]



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-11

SEQ. NO.: 70051

SOURCE: Resource Expl. & Mng.

COMPLETED: 50280

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4814.0

DEPTH TO WATER: ?

COMPANY COORDINATES: 47300.0N. , 22400.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 260.0

PROBE DEPTH: 260

HOLE DIAMETER: 4.75

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2, 3, 10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NW¼ SE¼, sec. 3, Co. Coords. scaled from map, elev. from lith log

* = SEE CODE EXPLANATIONS

Drill Hole: REM SD-11

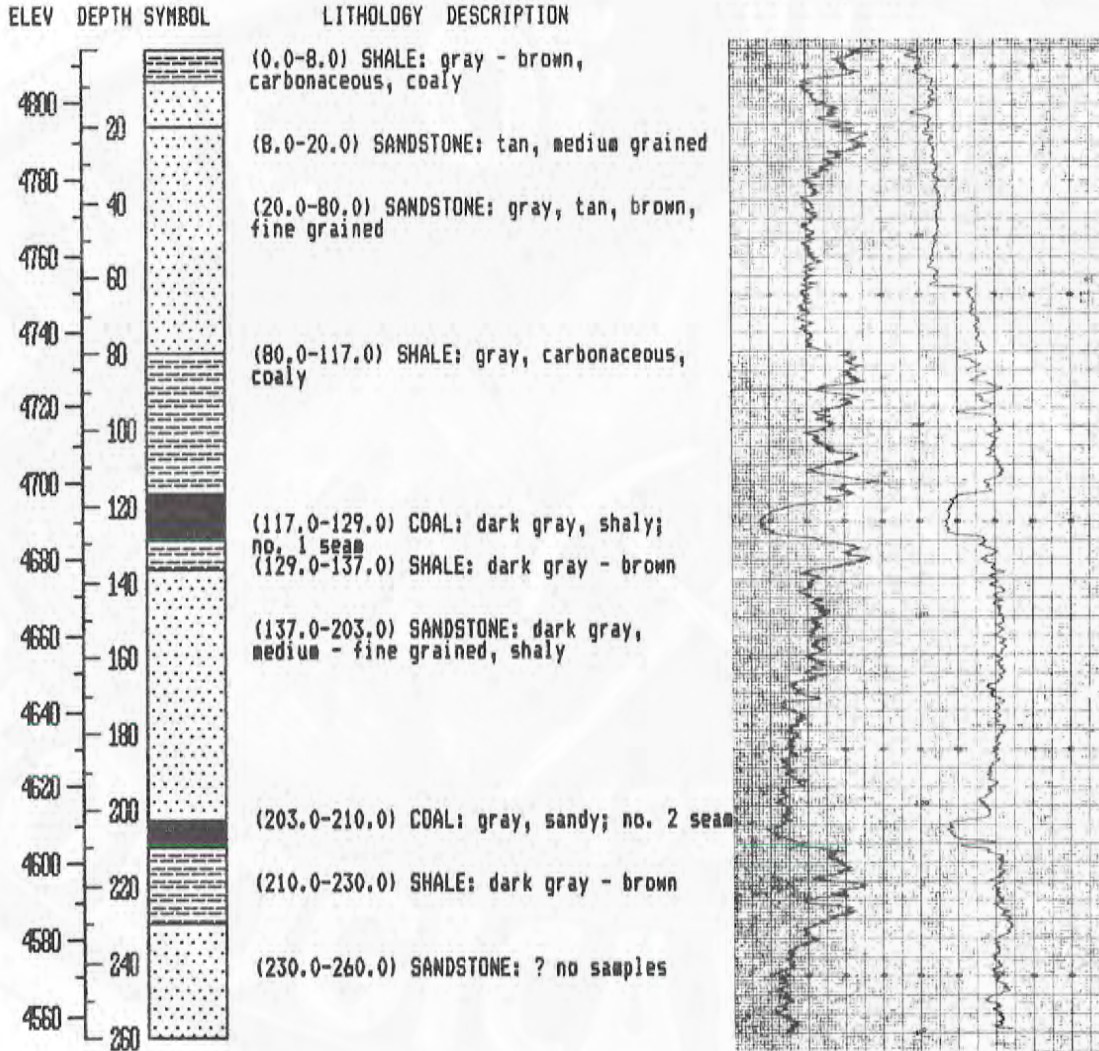
Page 1 of 1

GEOPHYSICAL LOG TRACES

Seq. No.: 70051

	GAMMA	DENSITY
Range:----->	100 cps	1.2K cps
Time Constant:----->	2 sec	1 sec
Deflection:----->	right	left
[Logging Speed: 15 ft/min]		

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-12

SEQ. NO.: 70052

SOURCE: Resource Expl. & Mng.

COMPLETED: 50280

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4918.2

DEPTH TO WATER: ?

COMPANY COORDINATES: 46340.0N. , 22900.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 180.0

PROBE DEPTH: 180'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2, 3, 10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NW¼ SE¼, sec. 3, Co. Coords. scaled from map, elev. from lith log

* = SEE CODE EXPLANATIONS

Drill Hole: REM SD-12

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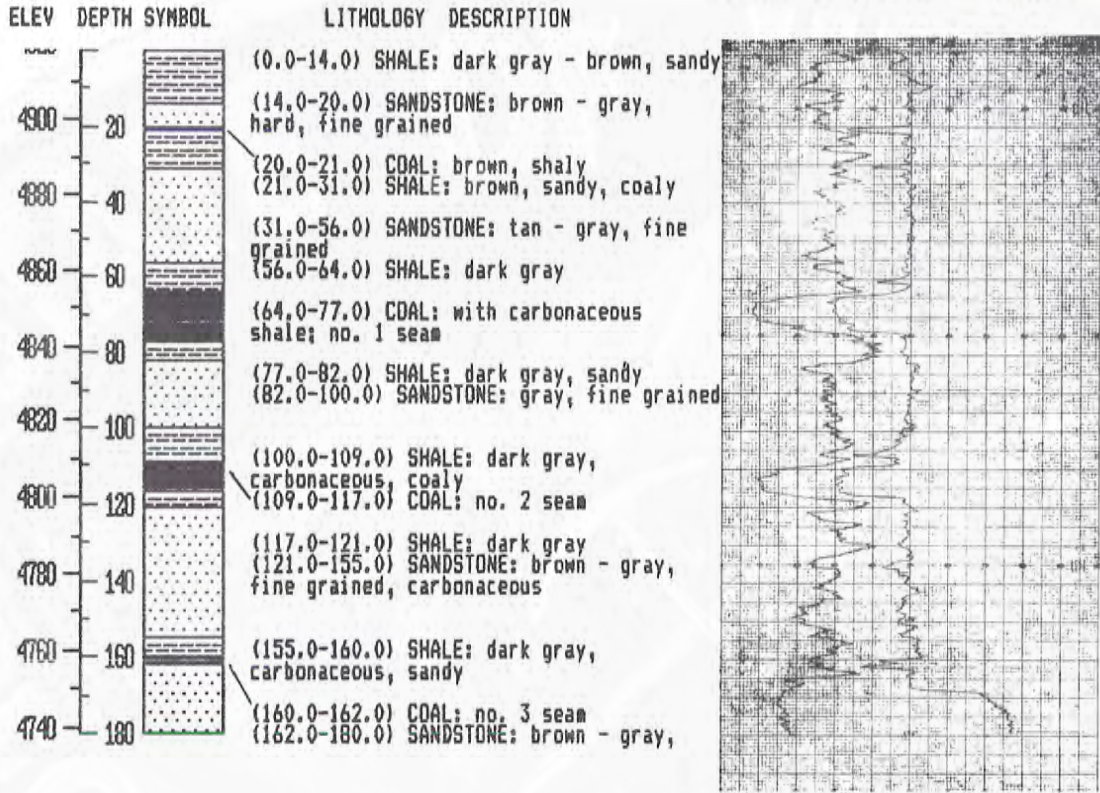
GEOPHYSICAL LOG TRACES

Seq. No.: 70052

	GAMMA	DENSITY
Range:----->	100 cps	500 cps
Time Constant:----->	2 sec	1 sec
Deflection:----->	right	left

[Logging Speed: 15 ft/min]

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-13

SEQ. NO.: 70053

SOURCE: Resource Expl. & Mng.

COMPLETED: 50380

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.ON.

0.OE.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4880.8

DEPTH TO WATER: ?

COMPANY COORDINATES: 46470.ON. , 23230.OE.

DRILLER: same ?

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 120.0

PROBE DEPTH: 120'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2, 3, 10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NW¼ SE¼, sec. 3, Co. Coords. scaled from map, elev. from lith log

* = SEE CODE EXPLANATIONS

Drill Hole: REM SD-13

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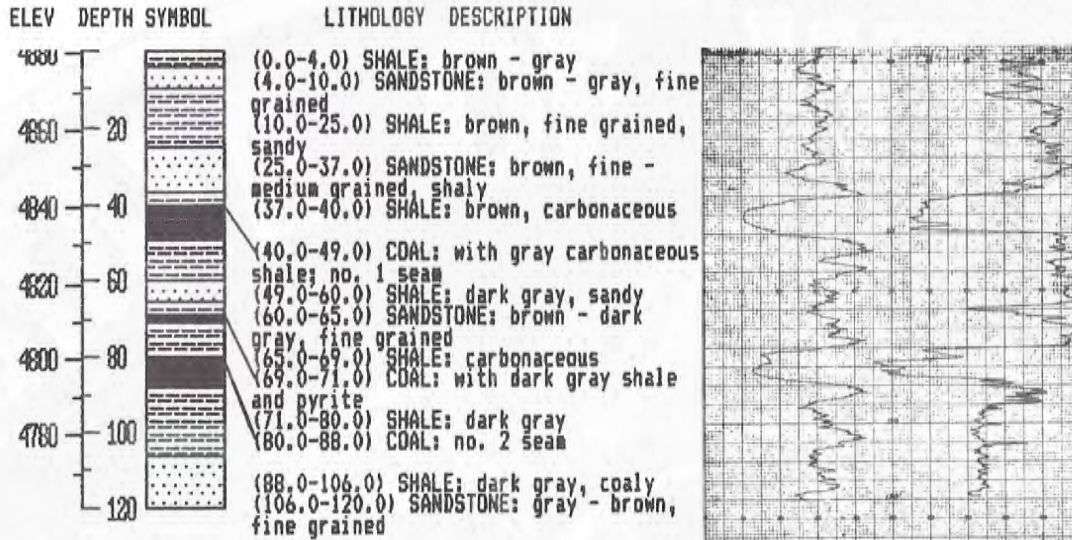
GEOPHYSICAL LOG TRACES

Seq. No.: 70053

	GAMMA	DENSITY
Range:----->	100 cps	500 cps
Time Constant:----->	2 sec	1 sec
Deflection:----->	right	left

[Logging Speed: 15 ft/min]

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-13C

SEQ. NO.: 70054

SOURCE: Resource Expl. & Mng.

COMPLETED: 50380

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4880.0

DEPTH TO WATER: ?

COMPANY COORDINATES: 46470.0N. , 23230.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 110.0

PROBE DEPTH: 110'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2,3,10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: 43 - 58 ft. and 85 - 94.3 ft.

COMMENTS: NW¼ SE¼, sec. 3, elev. from lith log, 13 ft. offset of SD-13

* = SEE CODE EXPLANATIONS

Drill Hole: REM SD-13C

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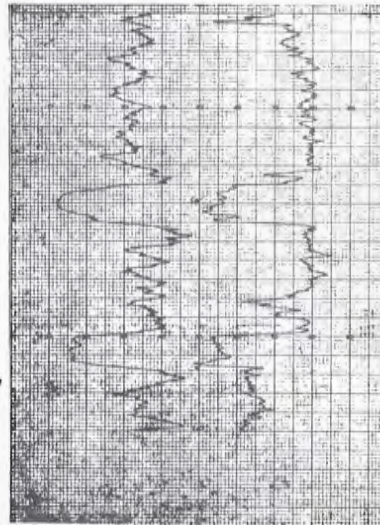
GEOPHYSICAL LOG TRACES

Seq. No.: 70054

	GAMMA	DENSITY
Range:----->	100 cps	500 cps
Time Constant:----->	2 sec	1 sec
Deflection:----->	right	left
	[Logging Speed: 15 ft/min]	

GEOPHYSICAL LOG

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
			(0.0-43.0) NO SAMPLES: see SD-13
4860	20		(43.0-46.0) SHALE: dark gray, carbonaceous, coaly
4840	40		(46.0-55.9) COAL: with calcite and pyrite and dark gray carbonaceous shale interbeds; no. 1 seam
4820	60		(55.9-58.0) SHALE: carbonaceous, dark gray, moist
4800	80		(58.0-85.0) NO SAMPLES: see SD-13
4780	100		(85.0-92.7) COAL: with pyrite, and calcite; no. 2 seam (92.7-94.3) SHALE: carbonaceous, dark gray
			(94.3-110.0) NO SAMPLES: see SD-13



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-14

SEQ. NO.: 70055

SOURCE: Resource Expl. & Mng.

COMPLETED: 50580

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4833.3

DEPTH TO WATER: 83'

COMPANY COORDINATES: 47000.0N. , 22980.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 100.0

PROBE DEPTH: 99'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2, 3, 10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NW¼ SE¼, sec. 3, Co. Coords. scaled from map, elev. from lith log

* = SEE CODE EXPLANATIONS

Drill Hole: REM SD-14

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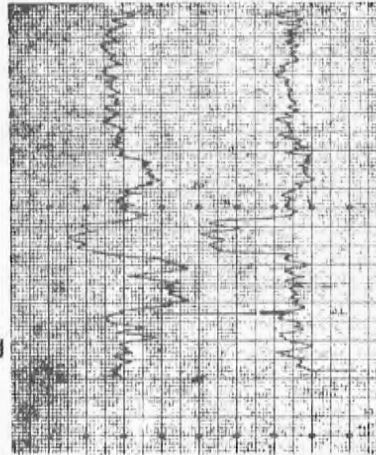
GEOPHYSICAL LOG TRACES

Seq. No.: 70055

Range:-----> GAMMA 100 cps DENSITY 500 cps
Time Constant:-----> 2 sec 1 sec
Deflection:-----> right left
[Logging Speed: 15 ft/min]

GEOPHYSICAL LOG

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
4820	20	(0.0-42.0)	SANDSTONE: gray, tan, brown, fine grained
4800	40	(42.0-50.0)	SHALE: dark gray
4780	60	(50.0-58.0)	SANDSTONE: brown, fine grained, shaly
4760	80	(58.0-67.0)	COAL: no. 2 seam
4740	100	(67.0-72.0)	SHALE: dark gray
		(72.0-81.0)	SANDSTONE: gray, fine grained, shaly
		(81.0-100.0)	SANDSTONE: gray, fine grained



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-14C

SEQ. NO.: 70056

SOURCE: Resource Expl. & Mng.

COMPLETED: 50580

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4833.3

DEPTH TO WATER: ?

COMPANY COORDINATES: 47000.0N. , 22980.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 80.0

PROBE DEPTH: 79'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2,3,10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: 56 - 71 ft.

COMMENTS: NW¼ SE¼, sec. 3, elev. from lith log, 7 ft. offset from SD-14

* = SEE CODE EXPLANATIONS

Drill Hole: REM SD-14C

Page 1 of 1

GEOPHYSICAL LOG TRACES

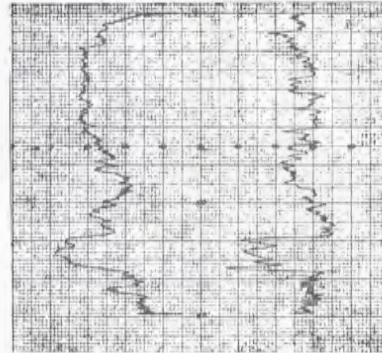
Seq. No.: 70056

	GAMMA	DENSITY
Range:----->	100 cps	500 cps
Time Constant:----->	2 sec	1 sec
Deflection:----->	right	left

[Logging Speed: 15 ft/min]

GEOPHYSICAL LOG

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
			(0.0-56.0) NO SAMPLES: see SD-14
4820	20		(56.0-59.5) SHALE: brown - gray
4800	40		(59.5-59.8) SHALE: carbonaceous
4780	60		(59.8-67.5) COAL: dull, rust, with calcite and minor shale interbedded; no. 2 seam
4760	80		(67.5-70.2) SHALE: carbonaceous, dark gray, sandy, with coal streaks
			(70.2-80.0) NO SAMPLES: see SD-14



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-15

SEQ. NO.: 70057

SOURCE: Resource Expl. & Mng.

COMPLETED: 50580

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4886.5

DEPTH TO WATER: ?

COMPANY COORDINATES: 46280.0N. , 22425.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 100.0

PROBE DEPTH: 99'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2,3,10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NW¼ SE¼, sec. 3, Co. Coords. scaled from map, elev. from lith log

* = SEE CODE EXPLANATIONS

Drill Hole: REM SD-15

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GEOPHYSICAL LOG TRACES

Seq. No.: 70057

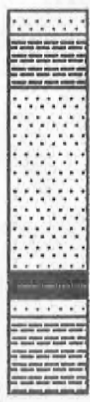
	GAMMA	DENSITY
Range:----->	100 cps	500 cps
Time Constant:----->	2 sec	1 sec
Deflection:----->	right	left

[Logging Speed: 15 ft/min]

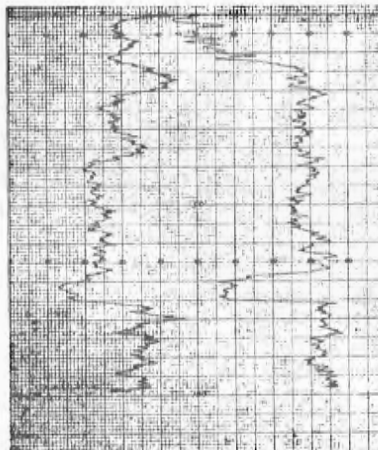
GEOPHYSICAL LOG

ELEV DEPTH SYMBOL

LITHOLOGY DESCRIPTION



(0.0-6.0) SANDSTONE: light gray with dark gray shale
 (6.0-20.0) SHALE: brown - gray
 (20.0-68.0) SANDSTONE: brown - tan, fine grained, with dark gray shale
 (68.0-75.0) COAL: with tan, fine grained sandstone; no. 2 seam
 (75.0-80.0) SANDSTONE: gray, fine grained, with dark gray shale
 (80.0-100.0) SHALE: brown - gray with gray sandstone



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-16

SEQ. NO.: 70058

SOURCE: Resource Expl. & Mng.

COMPLETED: 50680

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4848.5

DEPTH TO WATER: ?

COMPANY COORDINATES: 46320.0N. , 21970.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 60.0

PROBE DEPTH: 60'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2, 3, 10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE 1/4 SW 1/4, sec. 3, Co. Coords. scaled from map, elev. from lith log

* = SEE CODE EXPLANATIONS

Drill Hole: REM SD-16





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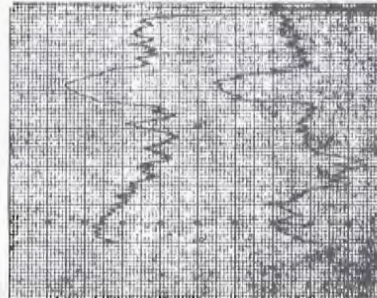
GEOPHYSICAL LOG TRACES

Seq. No.: 70058

Range:-----> GAMMA 100 cps DENSITY 500 cps
Time Constant:-----> 2 sec 1 sec
Deflection:-----> right left
[Logging Speed: 15 ft/min]

GEOPHYSICAL LOG

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
4840			(0.0-15.0) SHALE: brown with tan fine grained sandstone
	20		(15.0-23.0) COAL: no. 2 seam
4820			(23.0-39.0) SHALE: dark gray - brown with fine grained sandstone
	40		(39.0-60.0) SANDSTONE: brown, tan, gray, fine grained
4800			
	60		



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-16C

SEQ. NO.: 70059

SOURCE: Resource Expl. & Mng.

COMPLETED: 50680

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4848.0

DEPTH TO WATER: ?

COMPANY COORDINATES: 46320.0N. , 21970.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 40.0

PROBE DEPTH: 39'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2, 3, 10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: 15 - 30.3 ft.

COMMENTS: NE¼ SW¼, sec. 3, elev. from lith log, offset of SD-16

* = SEE CODE EXPLANATIONS

Drill Hole: REM SD-16C

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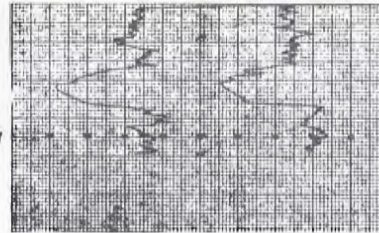
GEOPHYSICAL LOG TRACES

Seq. No.: 70059

	GAMMA	DENSITY
Range:----->	100 cps	500 cps
Time Constant:----->	2 sec	1 sec
Deflection:----->	right	left
	[Logging Speed: 15 ft/min]	

GEOPHYSICAL LOG

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
4840			(0.0-15.0) NO SAMPLES: see SD-16
			(15.0-18.4) SHALE: dark gray, rusty, carbonaceous, coaly
			(18.4-26.8) COAL: rusty, with calcite and minor carbonaceous shale interbeds
4820			(26.8-30.3) SHALE: carbonaceous, dark gray
			(30.3-40.0) NO SAMPLES: see SD-16



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-17

SEQ. NO.: 70060

SOURCE: Resource Expl. & Mng.

COMPLETED: 50680

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4942.4

DEPTH TO WATER: ?

COMPANY COORDINATES: 46370.0N. , 21340.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 140.0

PROBE DEPTH: 139'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2, 3, 10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE $\frac{1}{4}$ SW $\frac{1}{4}$, sec. 3, Co. Coords. scaled from map, elev. from lith log

* = SEE CODE EXPLANATIONS

Drill Hole: REM SD-17

Page 1 of 1

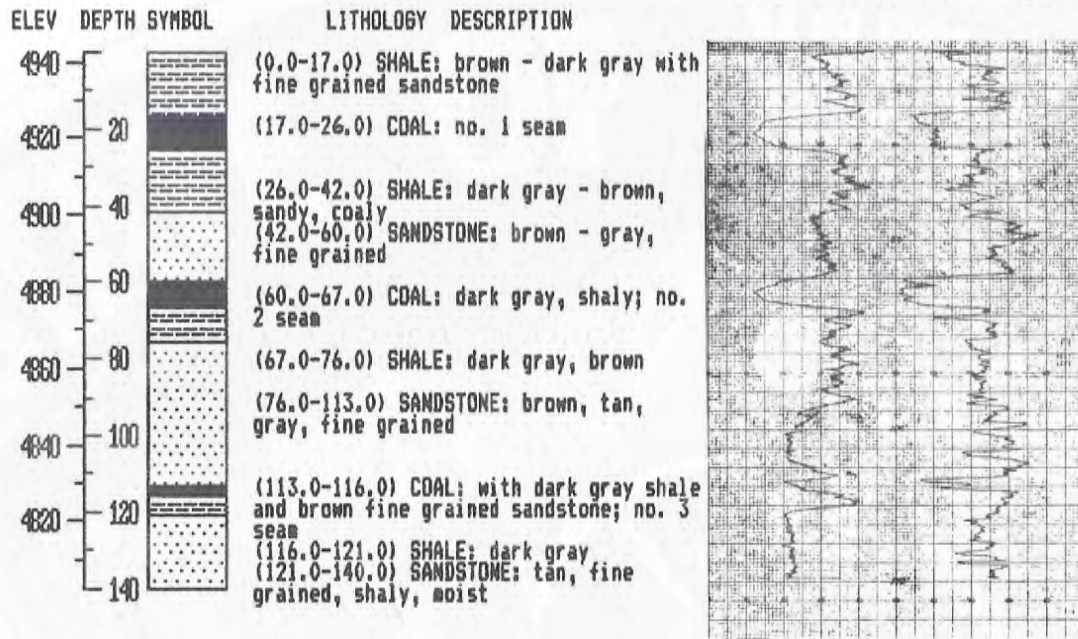
GEOPHYSICAL LOG TRACES

Seq. No.: 70060

	GAMMA	DENSITY
Range:----->	100 cps	500 cps
Time Constant:----->	2 sec	1 sec
Deflection:----->	right	left

[Logging Speed: 15 ft/min]

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-17C

SEQ. NO.: 70061

SOURCE: Resource Expl. & Mng.

COMPLETED: 50680

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.ON.

0.OE.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4942.0

DEPTH TO WATER: ?

COMPANY COORDINATES:

46370.ON. ,

21340.OE.

DRILLER: same ?

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 76.0

PROBE DEPTH: 75'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2,3,10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: 13.5 - 26.7 ft. ; 58.0-76.0 ft.

COMMENTS: NE¼ SW¼, sec. 3, elev. from lith log, offset from SD-17

* = SEE CODE EXPLANATIONS

Drill Hole: REM SD-17C

Page 1 of 1

GEOPHYSICAL LOG TRACES

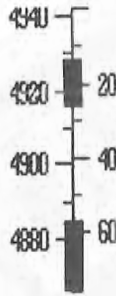
Seq. No.: 70061

	GAMMA	DENSITY
Range:----->	100 cps	500 cps
Time Constant:----->	2 sec	1 sec
Deflection:----->	right	left
[Logging Speed: 15 ft/min]		

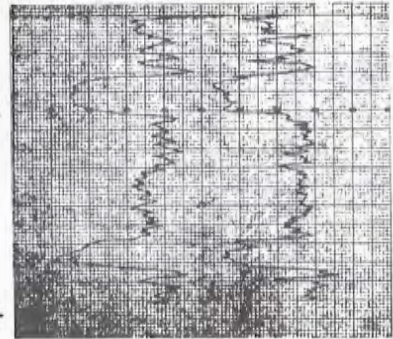
GEOPHYSICAL LOG

ELEV DEPTH SYMBOL

LITHOLOGY DESCRIPTION



(0.0-13.5) NO SAMPLES: see SD-17
 (13.5-16.2) SHALE: dark gray - brown, carbonaceous, coaly
 (16.2-25.0) COAL: rust, oxidized; no. 1 seam
 (25.0-58.0) NO SAMPLES: see SD-17
 (58.0-59.3) SHALE: dark gray, carbonaceous, coaly
 (59.3-65.1) COAL: with calcite and pyrite; no. 2 seam
 (65.1-76.0) SHALE: dark gray, carbonaceous, sandy, with coal at 69.5 -



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-18

SEQ. NO.: 70062

SOURCE: Resource Expl. & Mng.

COMPLETED: 50780

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4883.8

DEPTH TO WATER: 131'

COMPANY COORDINATES: 46600.0N. , 21460.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 160.0

PROBE DEPTH: 160'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2, 3, 10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE 1/4 SW 1/4, sec. 3, Co. Coords. scaled from map, elev. from lith log

* = SEE CODE EXPLANATIONS

Drill Hole: REM SD-18

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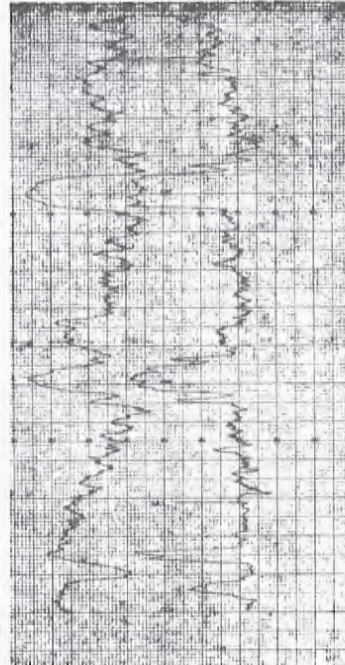
GEOPHYSICAL LOG TRACES

Seq. No.: 70062

	GAMMA	DENSITY
Range:----->	100 cps	500 cps
Time Constant:----->	2 sec	1 sec
Deflection:----->	right	left
	[Logging Speed: 15 ft/min]	

GEOPHYSICAL LOG

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
4880			(0.0-8.0) SANDSTONE: brown, fine grained, carbonaceous, shaly
	20		(8.0-35.0) SHALE: tan, dark gray, brown, sandy
4860			(35.0-40.0) SANDSTONE: gray with dark gray shale
	40		(40.0-45.0) SHALE: dark gray, with trace coal
4840			(45.0-53.0) COAL: no. 1 seam
	60		(53.0-82.0) SHALE: dark gray, carbonaceous
4820			(82.0-85.0) SHALE: dark gray with gray fine grained sandstone
	80		(85.0-90.0) SANDSTONE: gray, fine grained
4800			(90.0-105.0) COAL: no. 2 seam, with carbonaceous shale
4780	100		
	120		(105.0-118.0) SHALE: dark gray, carbonaceous
4760			(118.0-143.0) SANDSTONE: gray, fine grained, with dark gray shale
	140		(143.0-147.0) SAND: with traces of coal
4740			(147.0-152.0) SHALE: dark gray
	160		(152.0-160.0) SAND: shaly, dark gray-brown



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-18C

SEQ. NO.: 70063

SOURCE: Resource Expl. & Mng.

COMPLETED: 50780

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4883.0

DEPTH TO WATER: ?

COMPANY COORDINATES: 46600.0N. , 21460.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 110.0

PROBE DEPTH: 109'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2, 3, 10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: 43 - 57 ft. & 95 - 111.3 ft.

COMMENTS: NE¼ SW¼, sec. 3, elev. from lith log, offset of SD-18

* = SEE CODE EXPLANATIONS

Drill Hole: REM SD-18C

Page 1 of 1

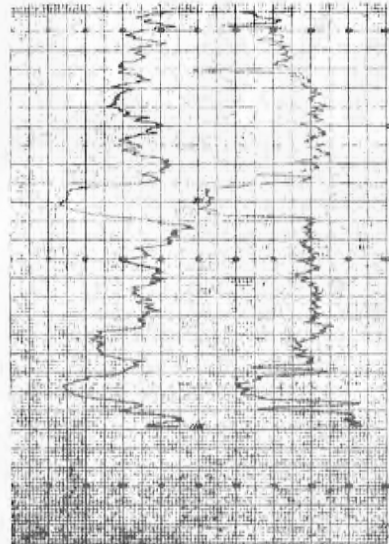
GEOPHYSICAL LOG TRACES

Seq. No.: 70063

	GAMMA	DENSITY
Range:----->	100 cps	500 cps
Time Constant:----->	2 sec	1 sec
Deflection:----->	right	left
	[Logging Speed: 15 ft/min]	

GEOPHYSICAL LOG

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
4880			(0.0-43.0) NO SAMPLES: see SD-18
4860	20		
4840	40		(43.0-46.8) SHALE: gray, carbonaceous, pyritic, coaly
4820	60		(46.8-54.9) COAL: with pyrite flakes, shaly; no. 1 seam
4800	80		(54.9-57.0) SHALE: dark gray, shaly
			(57.0-95.0) NO SAMPLES: see SD-18
4780	100		(95.0-97.0) SHALE: carbonaceous, coaly
			(97.0-106.3) COAL: with calcite and pyrite and shale interbedded; no. 2 seam
			(106.3-111.3) SHALE: carbonaceous, dark gray



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-19

SEQ. NO.: 70064

SOURCE: Resource Expl. & Mng.

COMPLETED: 50780

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4799.0

DEPTH TO WATER: 65'

COMPANY COORDINATES: 47075.0N. , 21725.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 200.0

PROBE DEPTH: 200'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2, 3, 10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE¼ SW¼, sec. 3, Co. Coords. scaled from map, elev. from lith log

* = SEE CODE EXPLANATIONS

Drill Hole: REM SD-19

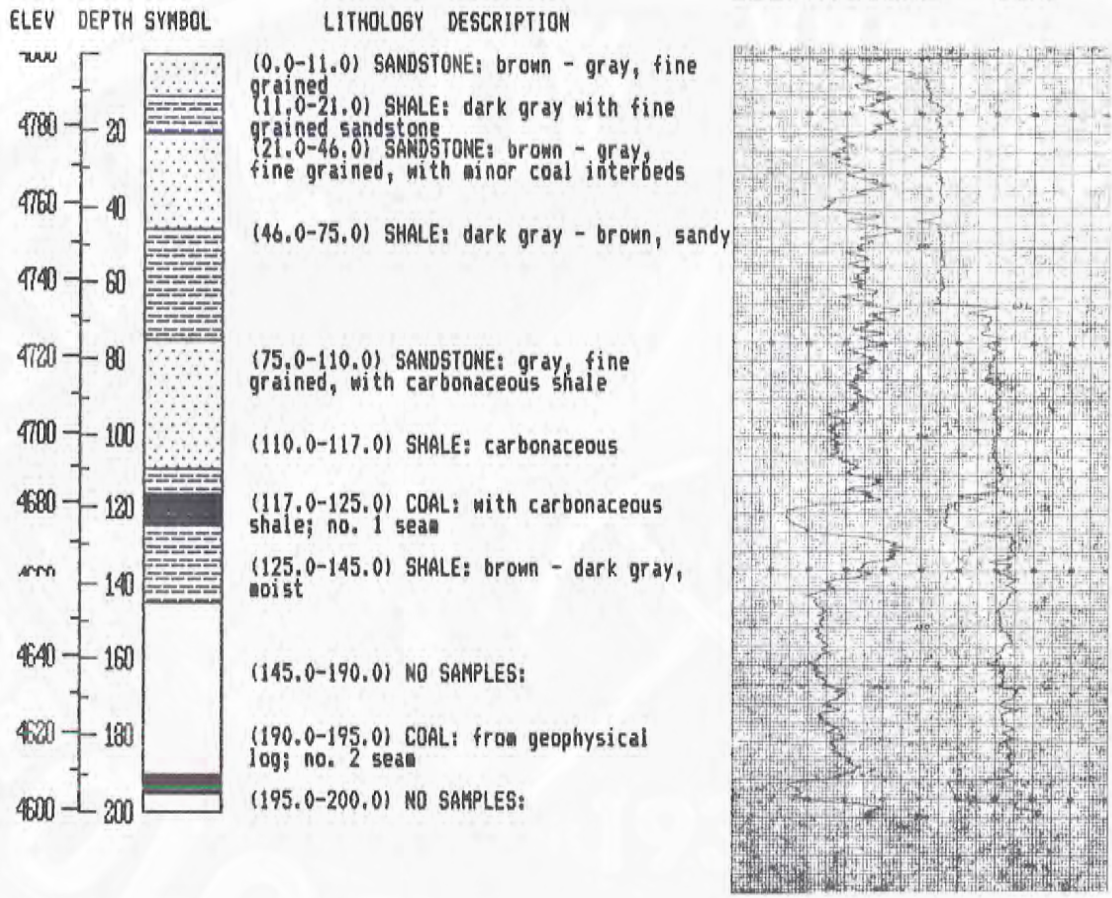
Page 1 of 1

GEOPHYSICAL LOG TRACES

Seq. No.: 70064

	GAMMA	DENSITY
Range:----->	100 cps	500 cps
Time Constant:----->	2 sec	1 sec
Deflection:----->	right	left
[Logging Speed: 15 ft/min]		

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-19C

SEQ. NO.: 70065

SOURCE: Resource Expl. & Mng.

COMPLETED: 50880

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4799.2

DEPTH TO WATER: 48'

COMPANY COORDINATES: 47075.0N. , 21725.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 216.0

PROBE DEPTH: 215'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2,3,10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: 114 - 128 ft. and 189.5 - 199.5 ft.

COMMENTS: NE¼ SW¼, sec. 3, elev. from lith log, offset of SD-19

* = SEE CODE EXPLANATIONS

Drill Hole: REM SD-19C

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GEOPHYSICAL LOG TRACES

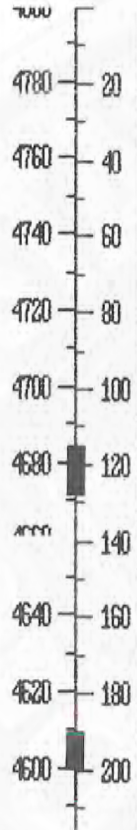
Seq. No.: 70065

	GAMMA	DENSITY
Range:----->	100 cps	? cps
Time Constant:----->	2 sec	1 sec
Deflection:----->	right	left
	[Logging Speed: 15 ft/min]	

GEOPHYSICAL LOG

ELEV DEPTH SYMBOL

LITHOLOGY DESCRIPTION



(0.0-114.0) NO SAMPLES: see SD-19

(114.0-118.8) SHALE: dark gray, carbonaceous, with coal at 117-117.3 ft.

(118.8-127.9) COAL: with calcite and pyrite; no. 1 seam

(127.9-128.0) SHALE: carbonaceous

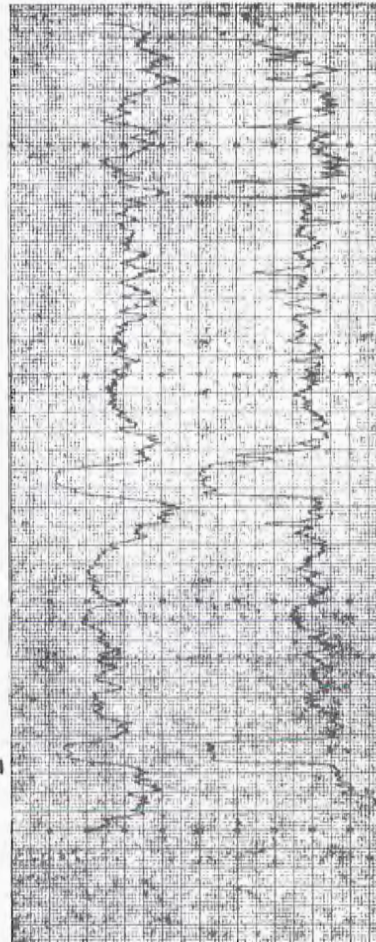
(128.0-189.5) NO SAMPLES: see SD-19

(189.5-192.5) SANDSTONE: gray, fine grained, with dark gray shale

(192.5-198.3) COAL: with pyrite; no. 2 seam

(198.3-199.5) SHALE: carbonaceous, brown

(199.5-216.0) NO SAMPLES: see SD-19



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-20

SEQ. NO.: 70066

SOURCE: Resource Expl. & Mng.

COMPLETED: 51680

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4820.7

DEPTH TO WATER: 69'

COMPANY COORDINATES: 47000.0N. , 21180.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 180.0

PROBE DEPTH: 178'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2, 3, 10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE $\frac{1}{4}$ SW $\frac{1}{4}$, sec. 3, Co. Coords. scaled from map, elev. from lith log

* = SEE CODE EXPLANATIONS

Drill Hole: REM SD-20

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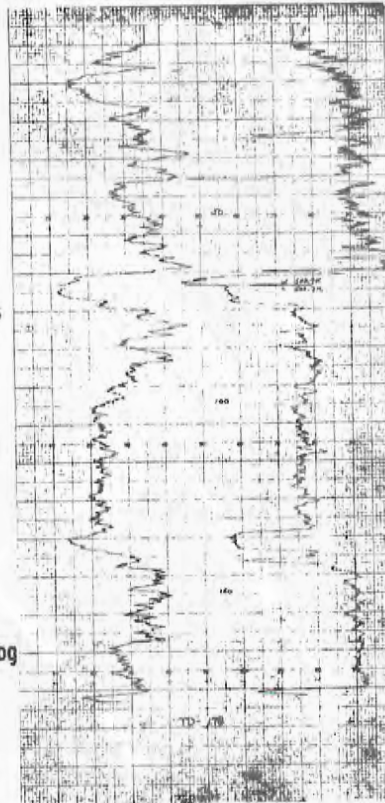
GEOPHYSICAL LOG TRACES

Seq. No.: 70066

	GAMMA	DENSITY
Range:----->	100 cps	500.3K cps
Time Constant:----->	2 sec	1 sec
Deflection:----->	right	right
[Logging Speed: 20 ft/min]		

GEOPHYSICAL LOG

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
4840			(0.0-11.0) SHALE: dark gray, tan, rust, coaly
4800	20		(11.0-21.0) SANDSTONE: tan, fine grained, with dark gray shale
			(21.0-28.0) SHALE: dark gray with brown fine grained sandstone
4780	40		(28.0-30.0) COAL: with dark gray shale
			(30.0-40.0) SHALE: dark gray
4760	60		(40.0-41.0) COAL: dark gray, shaly
			(41.0-51.0) SANDSTONE: brown - gray, fine grained
4740	80		(51.0-65.0) SHALE: dark gray, carbonaceous
			(65.0-74.0) COAL: with dark gray shale; no. 1 seam
4720	100		(74.0-95.0) SHALE: dark gray, carbonaceous, sandy
			(95.0-115.0) SANDSTONE: gray, fine grained, moist
4700	120		
			(115.0-133.0) SANDSTONE: ? no samples, picked from geophysical log
4680	140		(133.0-142.0) COAL: from geophysical log; no. 2 seam
4660	160		(142.0-176.0) SHALE: ? from geophysical log
180	180		(176.0-178.0) COAL: ? from geophysical



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-21C

SEQ. NO.: 70067

SOURCE: Resource Expl. & Mng.

COMPLETED: 51780

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4812.7

DEPTH TO WATER: 61'

COMPANY COORDINATES: 46920.0N. , 21460.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 150.0

PROBE DEPTH: 143'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2, 3, 10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: 69 - 135.5 ft.

COMMENTS: NE $\frac{1}{4}$ SW $\frac{1}{4}$, sec. 3, Co. Coords. scaled from map, elev. from lith log

* = SEE CODE EXPLANATIONS

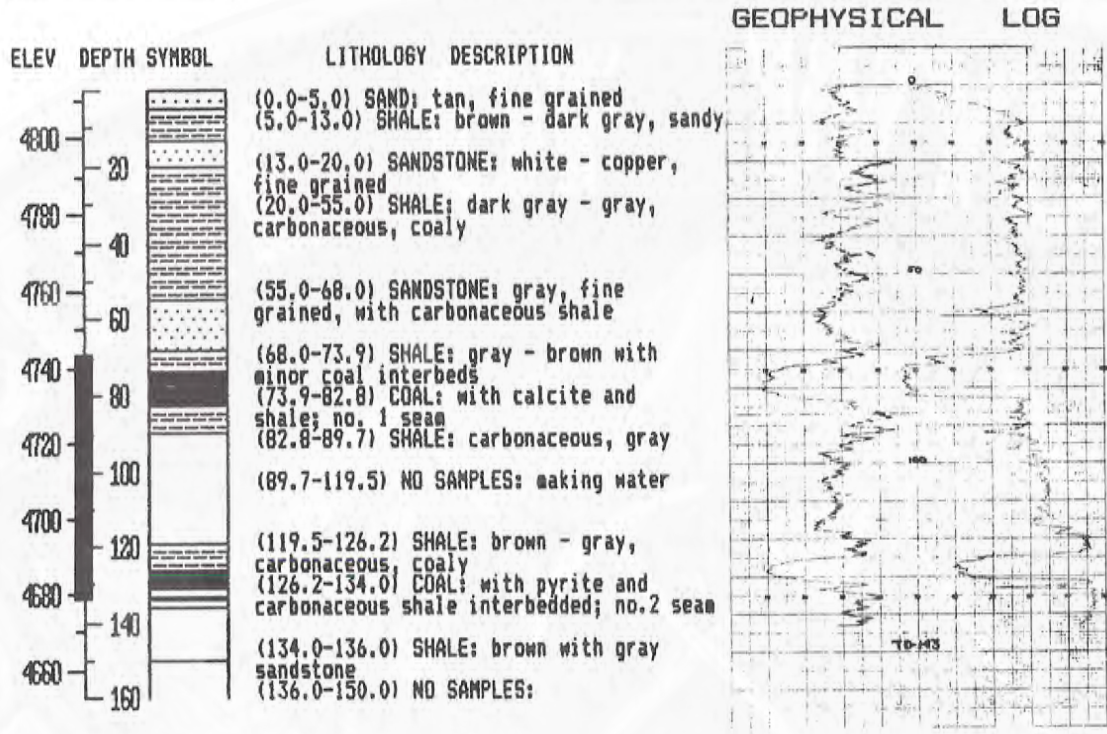
Drill Hole: REM SD-21C

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GEOPHYSICAL LOG TRACES

Seq. No.: 70067

	GAMMA	DENSITY
Range:----->	100 cps	500.3K cps
Time Constant:----->	2 sec	1 sec
Deflection:----->	right	right
[Logging Speed: 20 ft/min]		



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-22

SEQ. NO.: 70068

SOURCE: Resource Expl. & Mng.

COMPLETED: 51780

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4840.9

DEPTH TO WATER: none

COMPANY COORDINATES: 46730.0N. , 21230.0E.

DRILLER: same?

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 100.0

PROBE DEPTH: 98'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2, 3, 10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE¼ SW¼, sec. 3, Co. Coords. scaled from map, elev. from lith log

* = SEE CODE EXPLANATIONS

THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-23

SEQ. NO.: 70069

SOURCE: Resource Expl. & Mng.

COMPLETED: 51980

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4834.7

DEPTH TO WATER: 84'

COMPANY COORDINATES: 47050.0N. , 22320.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 300.0

PROBE DEPTH: 297'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2,3,10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE¼ SW¼, sec. 3, Co. Coords. scaled from map, elev. from lith log

* = SEE CODE EXPLANATIONS

THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-24

SEQ. NO.: 70070

SOURCE: Resource Expl. & Mng.

COMPLETED: 52280

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4799.2

DEPTH TO WATER: 46'

COMPANY COORDINATES: 47080.0N. , 22720.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 150.0

PROBE DEPTH: 145'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2, 3, 10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NW¼ SE¼, sec. 3, Co. Coords. scaled from map, elev. from lith log

* = SEE CODE EXPLANATIONS

Drill Hole: REM SD-24

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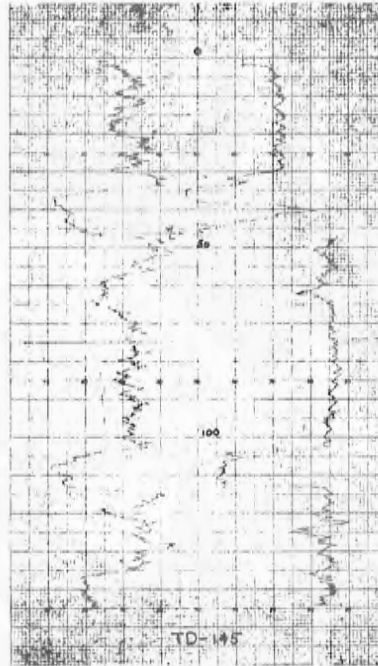
GEOPHYSICAL LOG TRACES

Seq. No.: 70070

	GAMMA	DENSITY
Range:----->	100 cps	500.3K cps
Time Constant:----->	2 sec	1 sec
Deflection:----->	right	right
[Logging Speed: 20 ft/min]		

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
7000			
4780	20		(0.0-11.0) SAND: and sandstone, brown, fine grained shaly
			(11.0-32.0) SHALE: dark gray, brown, sandy, carbonaceous
4760	40		
4740	60		(32.0-48.0) COAL: old mine workings; no. 1 seam
4720	80		(48.0-150.0) NO SAMPLES: 40 -150 ft.
4700	100		
4680	120		(104.0 - 114.0) COAL: indicated by the geophysical log
4660	140		

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-25

SEQ. NO.: 70071

SOURCE: Resource Expl. & Mng.

COMPLETED: 52880

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4804.7

DEPTH TO WATER: 49'

COMPANY COORDINATES: 47000.0N. , 22500.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 220.0

PROBE DEPTH: 216'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2,3,10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NW¼ SE¼, sec. 3, Co. Coords. scaled from map, elev. from lith log

* = SEE CODE EXPLANATIONS

Drill Hole: REM SD-25

Page 1 of 1

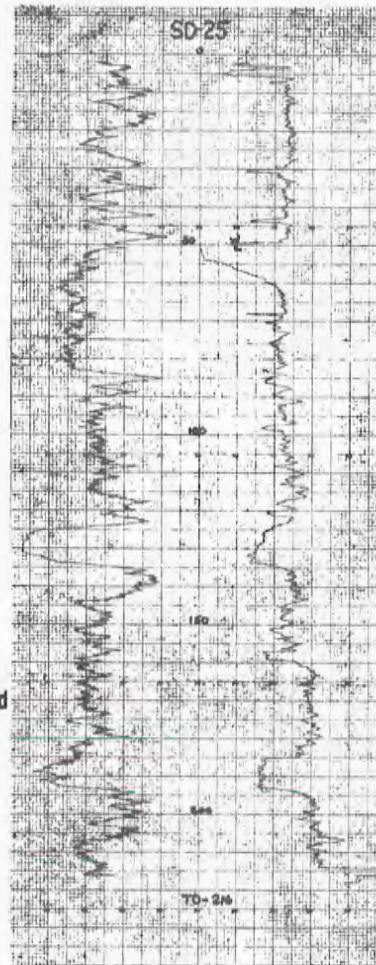
GEOPHYSICAL LOG TRACES

Seq. No.: 70071

-----> GAMMA DENSITY
 Range:-----> 100 cps 500.3K cps
 Time Constant:-----> 2 sec 1 sec
 Deflection:-----> right right
 [Logging Speed: 15 ft/min]

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
4800			(0.0-19.0) SHALE: tan, brown, gray with scoria
4780	20		(19.0-30.0) SANDSTONE: tan - brown, fine grained, shaly
4760	40		(30.0-48.0) SHALE: dark gray, carbonaceous with coal interbeds
4740	60		(48.0-85.0) SANDSTONE: gray - brown, fine grained shaly
4720	80		(85.0-108.0) SHALE: dark gray, carbonaceous, sandy, coaly
4700	100		(108.0-124.0) SANDSTONE: dark gray, fine grained
4680	120		(124.0-134.0) COAL: with dark gray carbonaceous shale; no. 1 seam
4660	140		(134.0-174.0) SHALE: dark gray, sandy, coaly
4640	160		(174.0-185.0) SANDSTONE: gray, fine grained
4620	180		(185.0-193.0) COAL: sandy, shaly; no. 2 seam
4600	200		(193.0-205.0) SHALE: dark gray
220	220		(205.0-220.0) SANDSTONE: brown, tan, gray, fine grained

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-26

SEQ. NO.: 70072

SOURCE: Resource Expl. & Mng.

COMPLETED: 52980

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4814.0

DEPTH TO WATER: 66'

COMPANY COORDINATES: 47100.0N. , 22000.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 250.0

PROBE DEPTH: 246'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2, 3, 10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE¼ SW¼, sec. 3, Co. Coords. scaled from map, elev. from lith log

* = SEE CODE EXPLANATIONS

THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-27C

SEQ. NO.: 70073

SOURCE: Resource Expl. & Mng.

COMPLETED: 53080

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4824.7

DEPTH TO WATER: 75'

COMPANY COORDINATES: 47420.0N. , 22880.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 120.0

PROBE DEPTH: 118'

HOLE DIAMETER: 4.5"

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2,3,10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: 25 - 41 ft.

COMMENTS: NW¼ SE¼, sec. 3, Co. Coords. scaled from map, elev. from lith log

* = SEE CODE EXPLANATIONS

Drill Hole: REM SD-27C

Page 1 of 1

GEOPHYSICAL LOG TRACES

Seq. No.: 70073

	GAMMA	DENSITY
Range:----->	100 cps	500.3K cps
Time Constant:----->	2 sec	1 sec
Deflection:----->	right	right
[Logging Speed: 15 ft/min]		



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W022978 fed

DRILLHOLE: REM SD-28C

SEQ. NO.: 70074

SOURCE: Resource Expl. & Mng.

COMPLETED: 60480

*COUNTY: 17

STATE: WY

AREA: Sand Draw

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4871.7

DEPTH TO WATER: 119'

COMPANY COORDINATES: 46870.0N. , 22090.0E.

DRILLER: same ?

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 260.0

PROBE DEPTH: 257'

HOLE DIAMETER: 4.75

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 2,3,10

LOGGED BY: same

LITHOLOGY LOG BY: Res. Explor. & Mng. Inc.

COALSYS BY: P. Taucher

CORE INTERVALS: 10 - 220.8 ft.

COMMENTS: NE¼ SW¼, sec. 3, Co. Coords. scaled from map, elev. from lith log

* = SEE CODE EXPLANATIONS

Drill Hole: REM SD-28C

Page 1 of 1

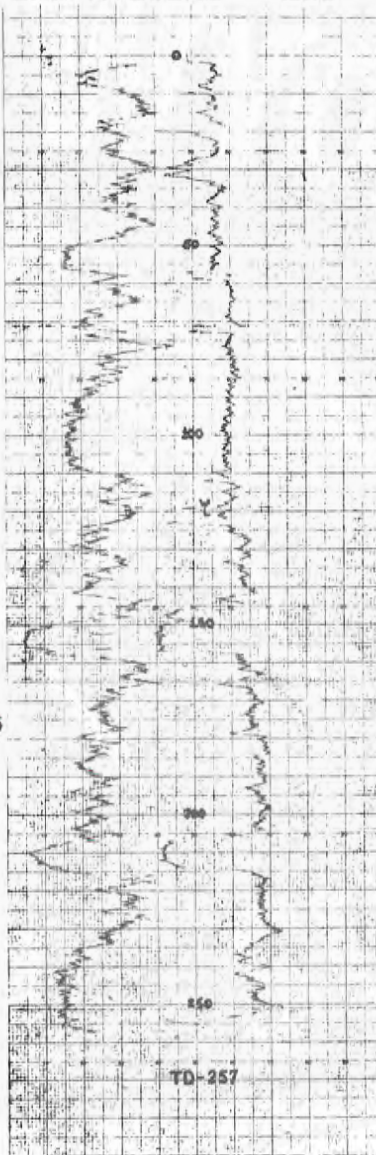
GEOPHYSICAL LOG TRACES

Seq. No.: 70074

-----> GAMMA DENSITY
 Range:-----> 100 cps 500.3K cps
 Time Constant:-----> 2 sec 1 sec
 Deflection:-----> right right
 [Logging Speed: 15 ft/min]

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
4860	20	(0.0-10.0)	SANDSTONE: tan, fine grained, with dark gray shale
		(10.0-21.4)	SHALE: gray, tan, red, with calcite and scoria
4840	40	(21.4-41.3)	SANDSTONE: red, tan, gray, fine grained, with shale interbeds
		(41.3-49.4)	SHALE: dark gray with calcite filled fractures
4820	60	(49.4-57.3)	SANDSTONE: red - tan, fine grained
4800	80	(57.3-86.8)	SHALE: dark gray with gray - tan fine grained sandstone interbeds
4780	100	(86.8-110.3)	SANDSTONE: tan, brown, gray, fine grained, coaly
4760	120	(110.3-147.3)	SHALE: gray, carbonaceous, coaly, with fine grained sandstone interbeds
4740	140		
4720	160	(147.3-158.4)	COAL: with calcite and pyrite and dark gray carbonaceous shale; no. 1 seam
4700	180	(158.4-199.2)	SHALE: dark gray, coaly with gray fine grained sandstone interbeds
4680	200	(199.2-206.5)	SANDSTONE: gray with dark gray shale interbeds
4660	220	(206.5-215.5)	COAL: with calcite pyrite and carbonaceous shale interbeds; no. 2 seam
4640	240	(215.5-220.8)	SHALE: dark gray, coaly, with gray sandstone interbeds
4620	260	(220.8-260.0)	NO SAMPLES:

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W-022978 fed

DRILLHOLE: WN 3-44-96-1

SEQ. NO.: 70075

SOURCE: Western Nuclear Inc.

COMPLETED: 72475

*COUNTY: 17

STATE: WY

AREA: Graham Coal Lease

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4825.0

DEPTH TO WATER: 74'

COMPANY COORDINATES:

0.0N. ,

0.0E.

DRILLER: Ormsbee Drilling

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 300.0

PROBE DEPTH: 200'

HOLE DIAMETER: 5.7"

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 2,4,7

LOGGED BY: Geoscience Associates

LITHOLOGY LOG BY: W.N., E. Ralston

COALSYS BY: P. Taucher

CORE INTERVALS: 28.0-38.0 ft., 93.0-102.0 ft., and 141.0-144.0 ft.

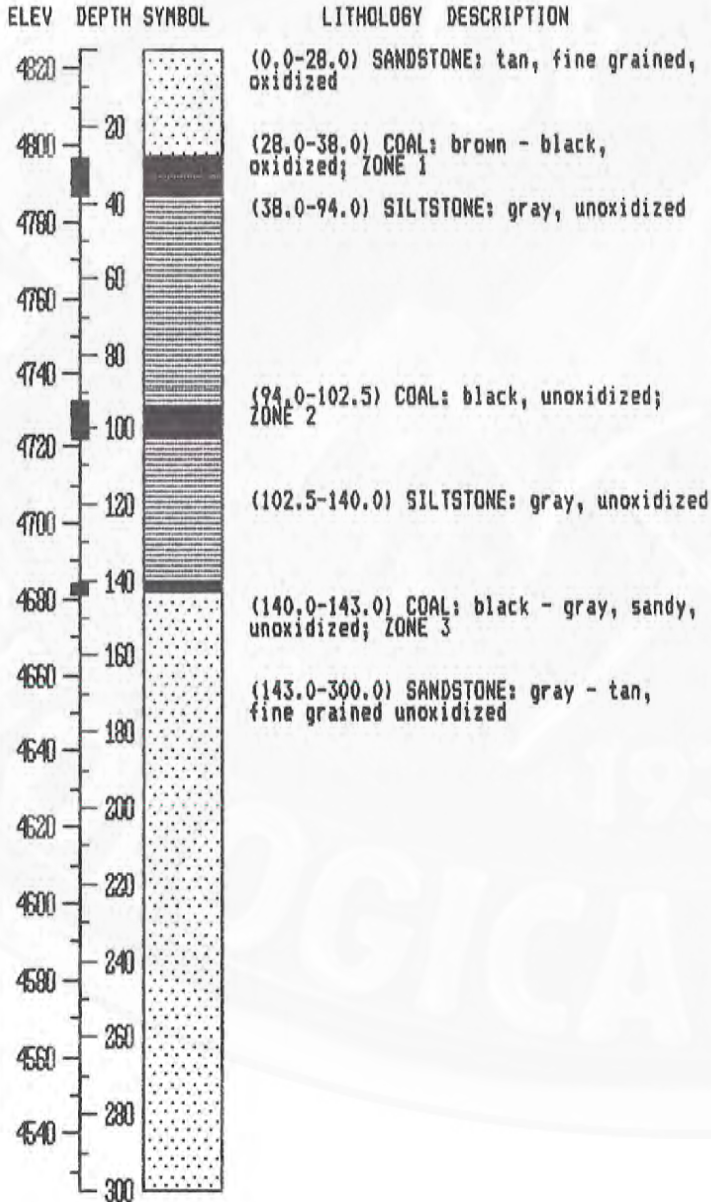
COMMENTS:

* = SEE CODE EXPLANATIONS

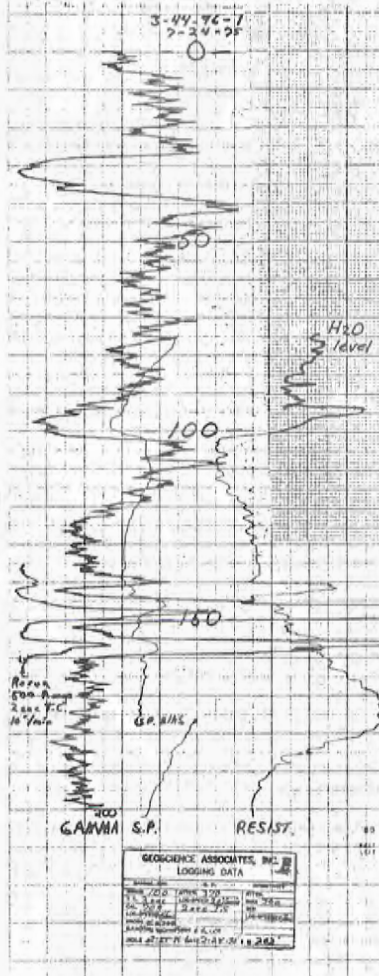
GEOPHYSICAL LOG TRACES

Seq. No.: 70075

	GAMMA	SP	RESISTANCE
Scale:----->	100 cps(full)	350 mv/div	300 ohm/div
Deflection:---->	right	right	right
Time Constant:->	2.0 sec		
Dead Time:----->	6.0 micro-sec	[Logging Speed: 20	ft/min]
K-Factor:----->	1.95 eex-5		



GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W-022978 fed

DRILLHOLE: WN 3-44-96-2

SEQ. NO.: 70076

SOURCE: Western Nuclear Inc.

COMPLETED: 72175

*COUNTY: 17

STATE: WY

AREA: Graham Coal Lease

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4803.0

DEPTH TO WATER: 58'

COMPANY COORDINATES: 0.0N. , 0.0E.

DRILLER: ABW Drilling

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 320.0

PROBE DEPTH: 298'

HOLE DIAMETER: 5.7"

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 2,4,7

LOGGED BY: Geoscience Associates

LITHOLOGY LOG BY: W.N., E. Ralston

COALSYS BY: P. Taucher

CORE INTERVALS: 154.0-165.0 ft.

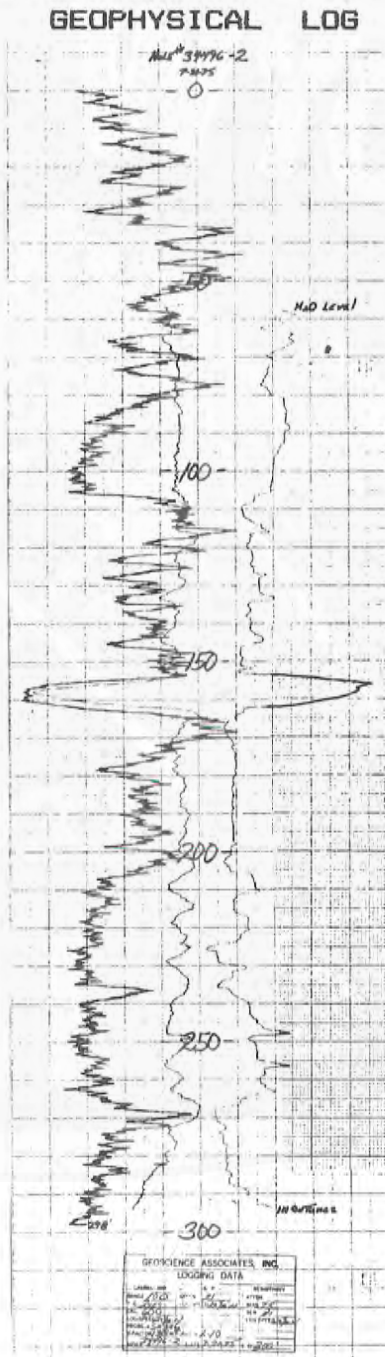
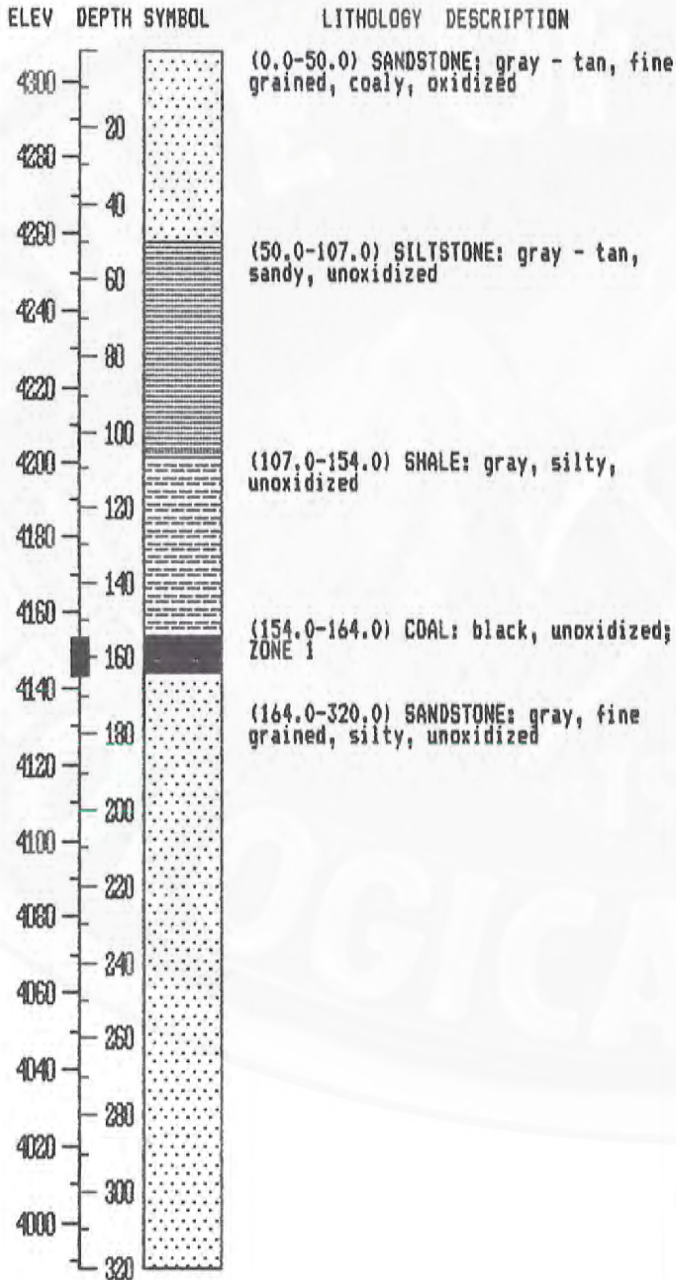
COMMENTS:

* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70076

	GAMMA	SP	RESISTANCE
Scale:----->	100 cps(full)	21 mv/div	75 ohm/div
Deflection:---->	right	right	right
Time Constant:->	2.0 sec		
Dead Time:----->	6.0 micro-sec	[Logging Speed: 20	ft/min]
K-Factor:----->	1.95 eex-5		



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W-022978 fed

DRILLHOLE: WN 3-44-96-3

SEQ. NO.: 70077

SOURCE: Western Nuclear Inc.

COMPLETED: 72575

*COUNTY: 17

STATE: WY

AREA: Graham Coal Lease

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4794.0

DEPTH TO WATER: 52'

COMPANY COORDINATES:

0.0N. ,

0.0E.

DRILLER: Ormsbee Drilling

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 240.0

PROBE DEPTH: 237'

HOLE DIAMETER: 5.7"

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 2,4,7

LOGGED BY: Geoscience Associates

LITHOLOGY LOG BY: W.N., E. Ralston

COALSYS BY: P. Taucher

CORE INTERVALS: 186.0-197.0 ft.

COMMENTS:

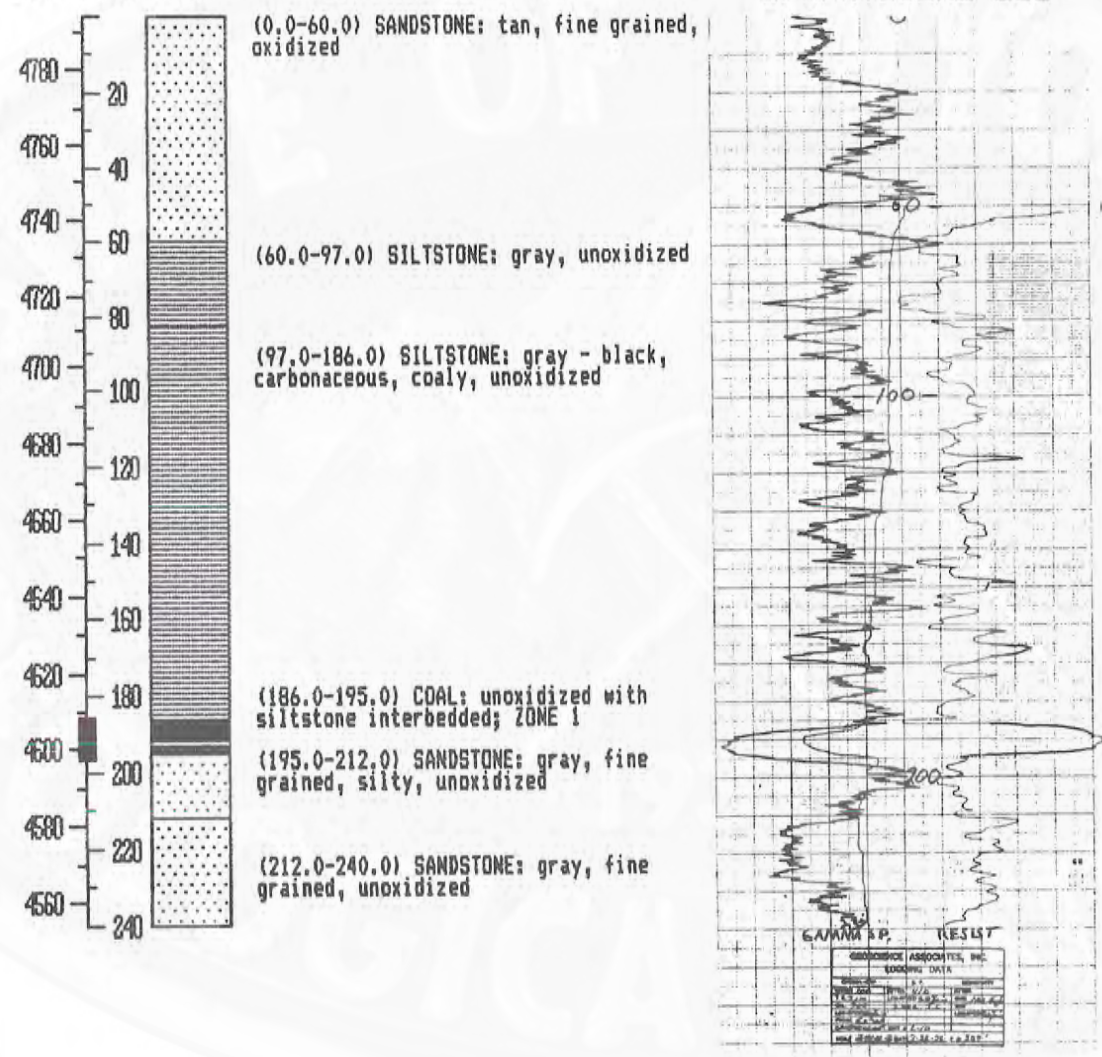
* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70077

	GAMMA	SP	RESISTANCE
Scale:----->	100 cps(full)	410 mv/div	105 ohm/div
Deflection:---->	right	right	right
Time Constant:->	2.0 sec		
Dead Time:----->	6.0 micro-sec	[Logging Speed: 20	ft/min]
K-Factor:----->	1.95 eex-5		

ELEV DEPTH SYMBOL LITHOLOGY DESCRIPTION GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W-022978 fed

DRILLHOLE: WN 3-44-96-4

SEQ. NO.: 70078

SOURCE: Western Nuclear Inc.

COMPLETED: 72475

*COUNTY: 17

STATE: WY

AREA: Graham Coal Lease

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4812.0

DEPTH TO WATER: 62'

COMPANY COORDINATES:

0.0N. ,

0.0E.

DRILLER: Ormsbee Drilling

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 242.0

PROBE DEPTH: 242'

HOLE DIAMETER: 5.7"

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 2, 4, 7

LOGGED BY: Geoscience Associates

LITHOLOGY LOG BY: W.N., E. Ralston

COALSYS BY: P. Taucher

CORE INTERVALS: 60.0-78.0 ft.; 115.0-130.0 ft.

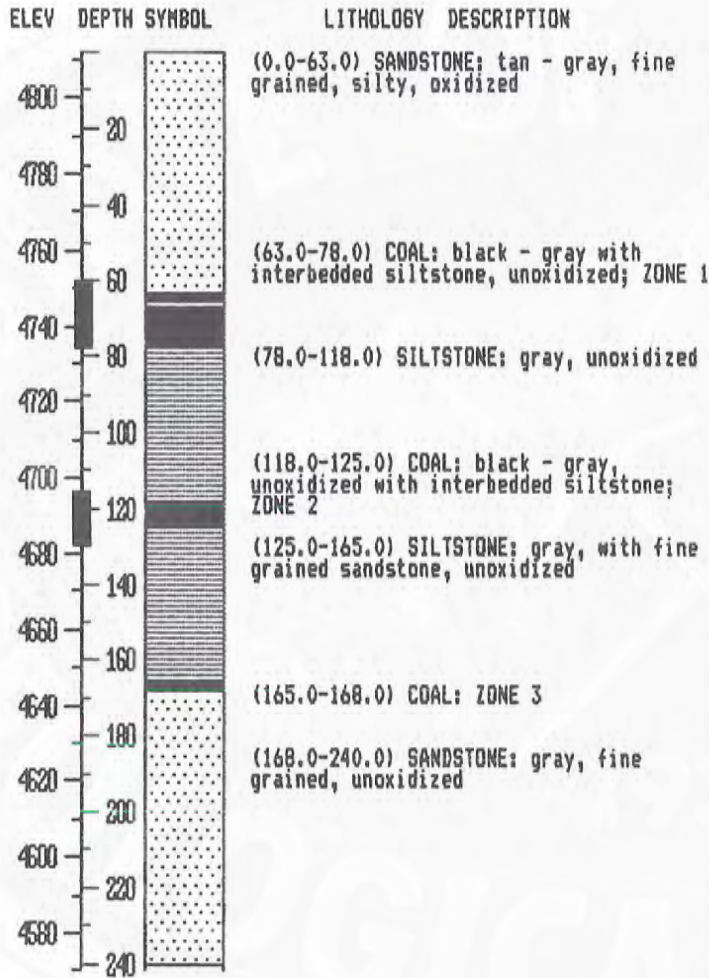
COMMENTS:

* = SEE CODE EXPLANATIONS

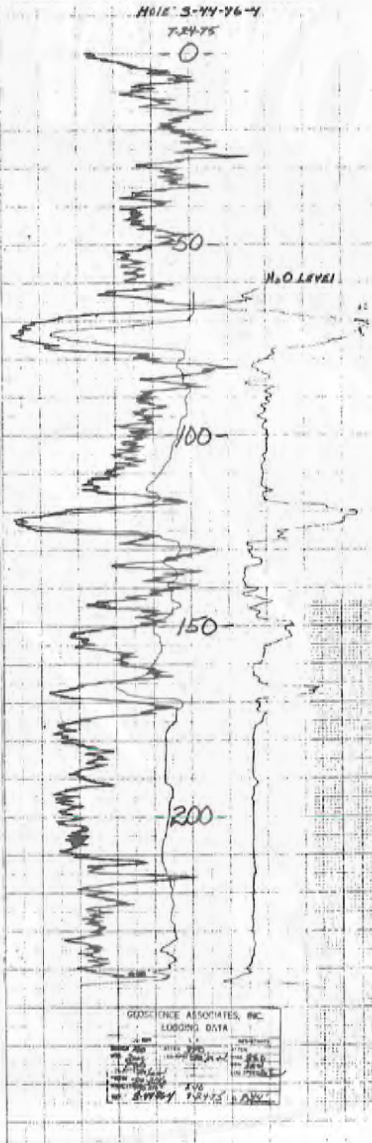
GEOPHYSICAL LOG TRACES

Seq. No.: 70078

	GAMMA	SP	RESISTANCE
Scale:----->	100 cps(full)	370 mv/div	300 ohm/div
Deflection:---->	right	right	right
Time Constant:->	2.0 sec		
Dead Time:----->	6.0 micro-sec	[Logging Speed: 20	ft/min]
K-Factor:----->	1.95 eex-5		



GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W-022978 fed

DRILLHOLE: WN 3-44-96-5

SEQ. NO.: 70079

SOURCE: Western Nuclear Inc.

COMPLETED: 73075

*COUNTY: 17

STATE: WY

AREA: Graham Coal Lease

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.ON.

0.OE.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4828.0

DEPTH TO WATER: 72'

COMPANY COORDINATES:

0.ON. ,

0.OE.

DRILLER: Ormsbee Drilling

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 260.0

PROBE DEPTH: 262'

HOLE DIAMETER: 5.7"

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 2,4,7

LOGGED BY: Geoscience Associates

LITHOLOGY LOG BY: W.N., D. Garber

COALSYS BY: P. Taucher

CORE INTERVALS: 96.0-109.0 ft.; 161.0-169.0 ft.

COMMENTS:

* = SEE CODE EXPLANATIONS

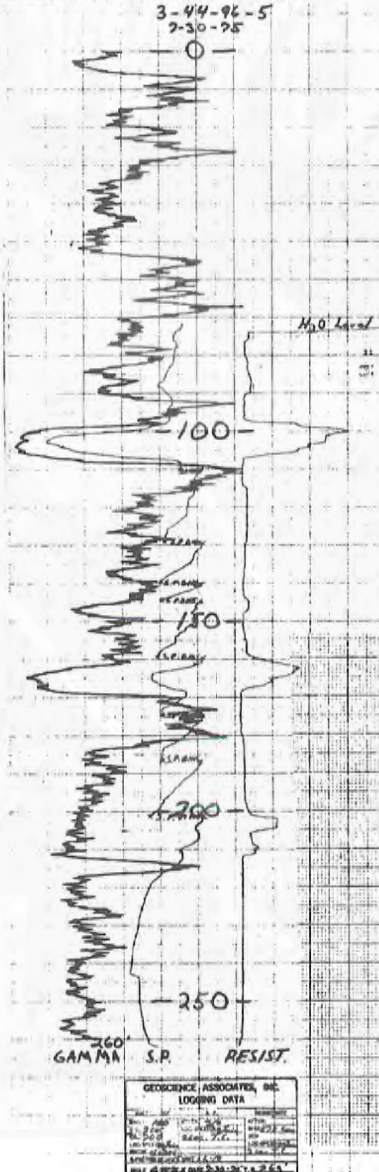
GEOPHYSICAL LOG TRACES

Seq. No.: 70079

Scale:-----> GAMMA 100 cps(full) SP 310 mv/div RESISTANCE 508 ohm/div
 Deflection:----> right right right
 Time Constant:-> 2.0 sec
 Dead Time:----> 6.0 micro-sec [Logging Speed: 20 ft/min]
 K-Factor:-----> 1.95 eex-5

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
4820	20		(0.0-27.0) SILTSTONE: gray, oxidized, coaly
4800	40		(27.0-55.0) SANDSTONE: gray - tan, coarse - fine grained oxidized
4780	60		(55.0-97.0) SILTSTONE: gray, unoxidized
4760	80		
4740	100		(97.0-108.5) COAL: black, unoxidized; ZONE 1
4720	120		(108.5-161.0) SANDSTONE: gray, unoxidized
4700	140		
4680	160		(161.0-169.0) COAL: unoxidized; ZONE 2
4660	180		(169.0-202.0) SILTSTONE: gray, unoxidized
4640	200		(202.0-205.0) COAL: ZONE 3
4620	220		
4600	240		(205.0-260.0) SILTSTONE: gray, unoxidized
4580	260		

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W-022978 fed

DRILLHOLE: WN 3-44-96-6

SEQ. NO.: 70080

SOURCE: Western Nuclear Inc.

COMPLETED: 71975

*COUNTY: 17

STATE: WY

AREA: Graham Coal Lease

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.ON.

0.OE.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4821.0

DEPTH TO WATER: 66'

COMPANY COORDINATES:

0.ON. ,

0.OE.

DRILLER: ABW Drilling

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 370.0

PROBE DEPTH: 368'

HOLE DIAMETER: 5.7"

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 2,4,7

LOGGED BY: Scintilog, Rooney

LITHOLOGY LOG BY: W.N., E. Ralston

COALSYS BY: P. Taucher

CORE INTERVALS: 105.0-113.5 ft., 161.0-170.0 ft., and 206.0-209.0 ft.

COMMENTS:

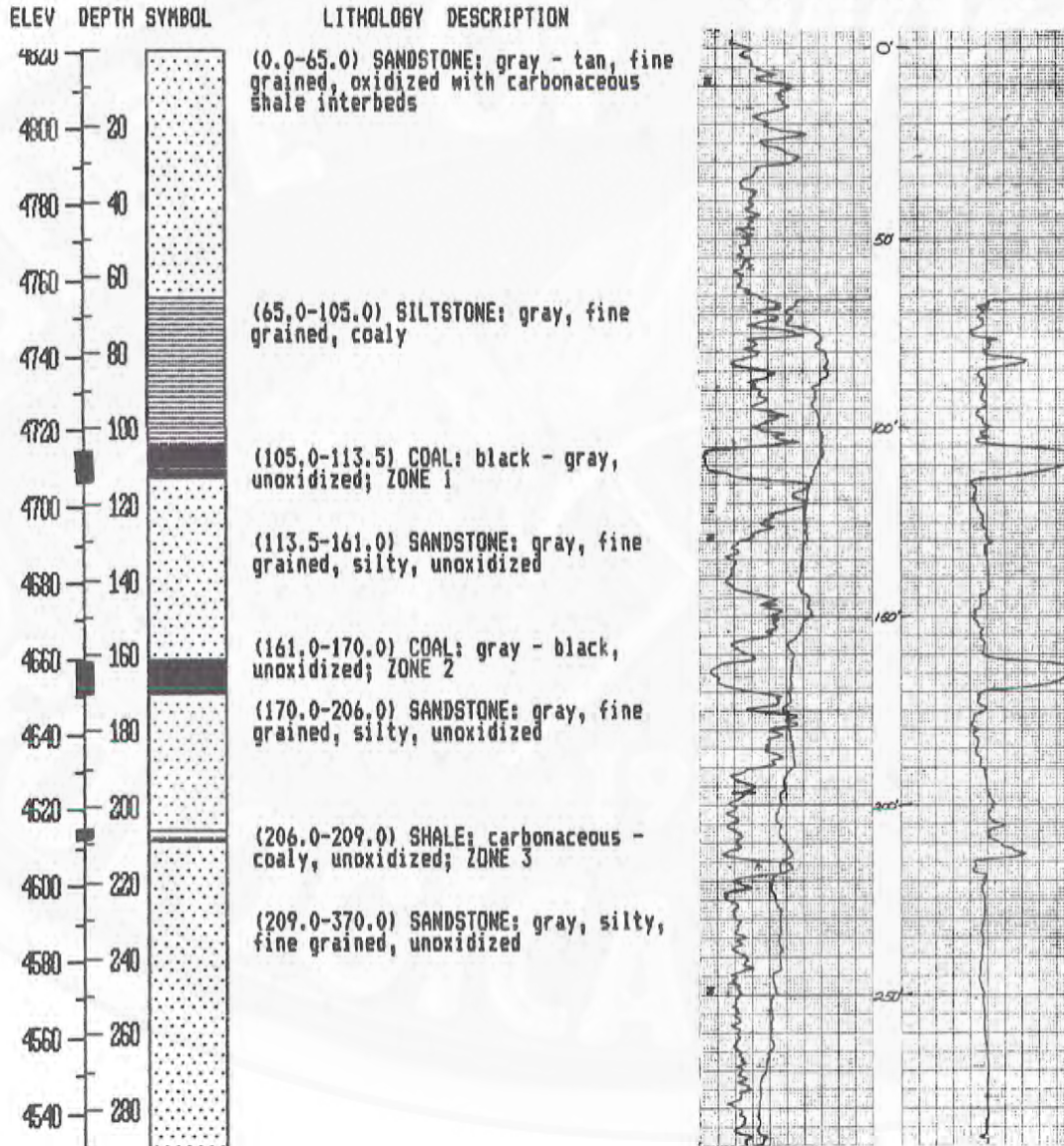
* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70080

	GAMMA	SP	RESISTANCE
Scale:----->	50 cps(full)	5 mv/div	20 ohm/div
Deflection:---->	right	right	right
Time Constant:->	1.0 sec		
Dead Time:----->	0.0 micro-sec	[Logging Speed: 15	ft/min]
K-Factor:----->	2.99 eex-5		

GEOPHYSICAL LOG



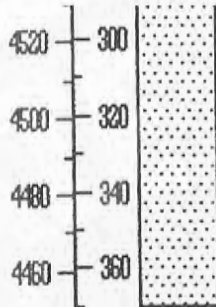
Drill Hole: WN 3-44-96-6

Page 2 of 2

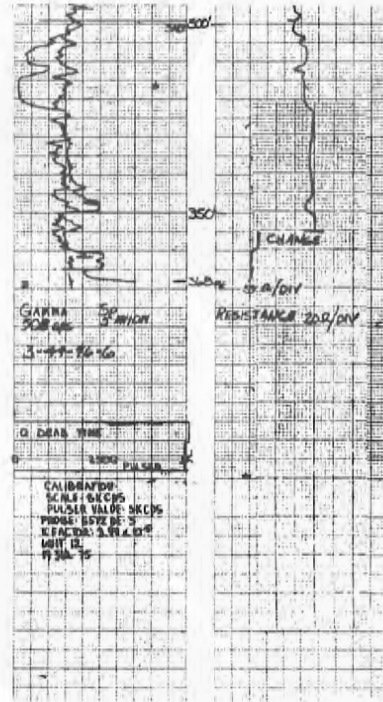
GEOPHYSICAL LOG TRACES

Seq. No.: 70080

	GAMMA	SP	RESISTANCE
Scale:----->	50 cps(full)	5 mv/div	20 ohm/div
Deflection:---->	right	right	right
Time Constant:->	1.0 sec		
Dead Time:----->	0.0 micro-sec	[Logging Speed: 15	ft/min]
K-Factor:----->	2.99 eex-5		



GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W-022978 fed

DRILLHOLE: WN 3-44-96-7

SEQ. NO.: 70081

SOURCE: Western Nuclear Inc.

COMPLETED: 73075

*COUNTY: 17

STATE: WY

AREA: Graham Coal Lease

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.ON.

0.OE.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 0.0

DEPTH TO WATER: none

COMPANY COORDINATES:

0.ON. ,

0.OE.

DRILLER: Ormsbee Drilling

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 128.0

PROBE DEPTH: 128'

HOLE DIAMETER: 5.7"

CASING DEPTH: none

DRILL FLUID: air

*LOG TYPES: 2

LOGGED BY: Geoscience Associates

LITHOLOGY LOG BY: no lith log

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NO LITHOLOGY LOG AVAILABLE

* = SEE CODE EXPLANATIONS

Drill Hole: WN 3-44-96-7

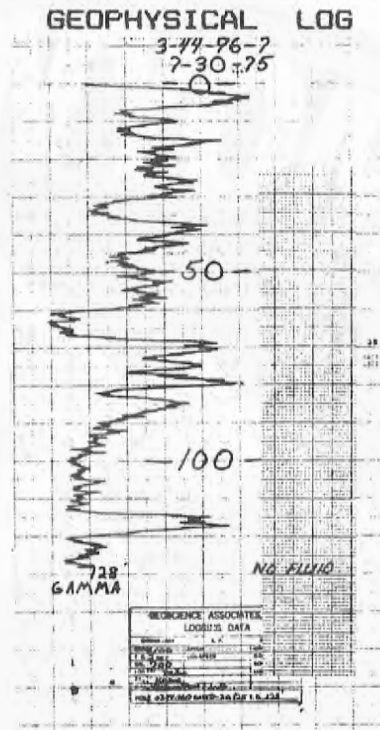
Page 1 of 1

GEOPHYSICAL LOG TRACES

Seq. No.: 70081

	GAMMA	SP	RESISTANCE
Scale:----->	100 cps(full)	none mv/div	none ohm/div
Deflection:---->	right	NA	NA
Time Constant:->	2.0 sec		
Dead Time:----->	6.0 micro-sec	[Logging Speed: 20	ft/min]
K-Factor:----->	1.95 eex-5		

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
4860			(0.0-60.0) NO SAMPLE: no lith log
4840	20		
4820	40		
4800	60	■	(60.0-68.0) COAL: ? from gamma log
4780	80		(68.0-128.0) NO SAMPLE: no lith log
4760	100		
4740	120		



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W-022978 fed

DRILLHOLE: WN 3-44-96-8

SEQ. NO.: 70082

SOURCE: Western Nuclear Inc.

COMPLETED: 73175

*COUNTY: 17

STATE: WY

AREA: Graham Coal Lease

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4866.0

DEPTH TO WATER: 117'

COMPANY COORDINATES: 0.0N. , 0.0E.

DRILLER: Ormsbee Drilling

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 260.0

PROBE DEPTH: 261'

HOLE DIAMETER: 5.7"

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 2,4,7

LOGGED BY: Geoscience Associates

LITHOLOGY LOG BY: W.N., D. Garber

COALSYS BY: P. Taucher

CORE INTERVALS: 86.0-96.0 ft.; 139.0-147.0 ft.

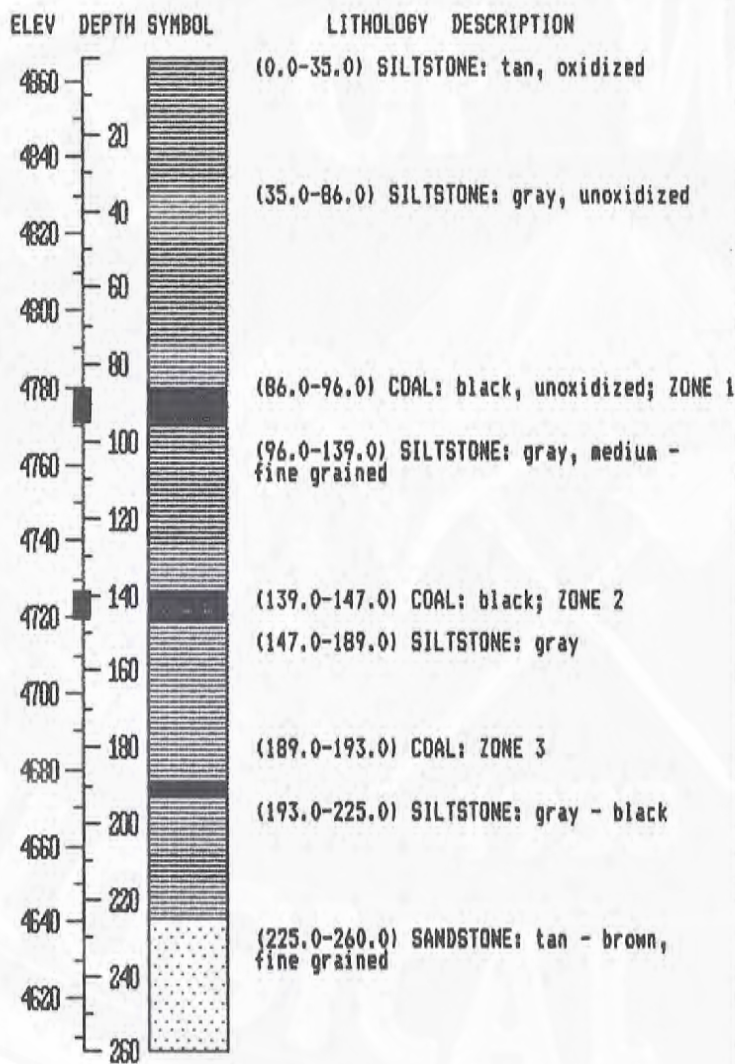
COMMENTS:

* = SEE CODE EXPLANATIONS

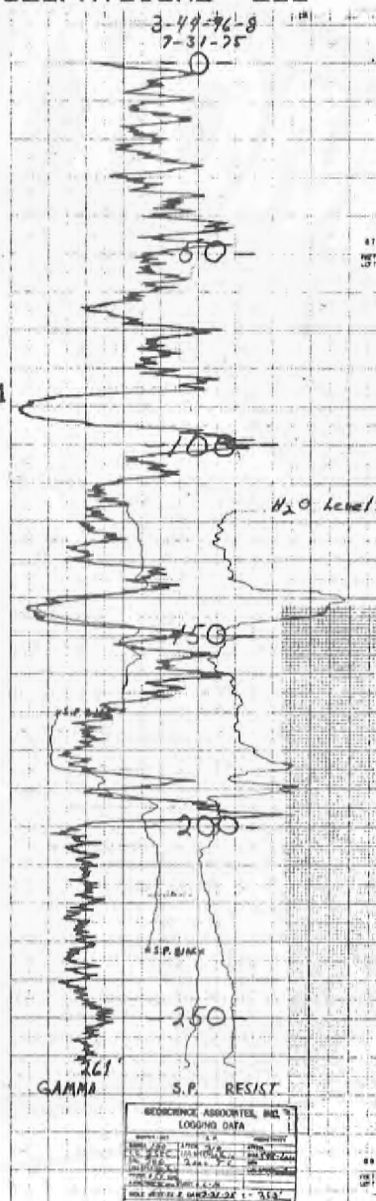
GEOPHYSICAL LOG TRACES

Seq. No.: 70082

Scale:----->	GAMMA	SP	RESISTANCE
Deflection:---->	100 cps(full)	310 mv/div	548 ohm/div
Time Constant:->	right	right	right
Dead Time:----->	2.0 sec		
K-Factor:----->	6.0 micro-sec	[Logging Speed: 20	ft/min]
	1.95 eex-5		



GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W-022978 fed

DRILLHOLE: WN 3-44-96-9

SEQ. NO.: 70083

SOURCE: Western Nuclear Inc.

COMPLETED: 72875

*COUNTY: 17

STATE: WY

AREA: Graham Coal Lease

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4858.0

DEPTH TO WATER: 103'

COMPANY COORDINATES: 0.0N. ,

0.0E.

DRILLER: Drmsbee Drilling

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 240.0

PROBE DEPTH: 232'

HOLE DIAMETER: 5.7"

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 2, 4, 7

LOGGED BY: Geoscience Associates

LITHOLOGY LOG BY: W.N., E. Ralston

COALSYS BY: P. Taucher

CORE INTERVALS: 47.0-59.0 ft.; 105.0-115.0 ft.

COMMENTS:

* = SEE CODE EXPLANATIONS

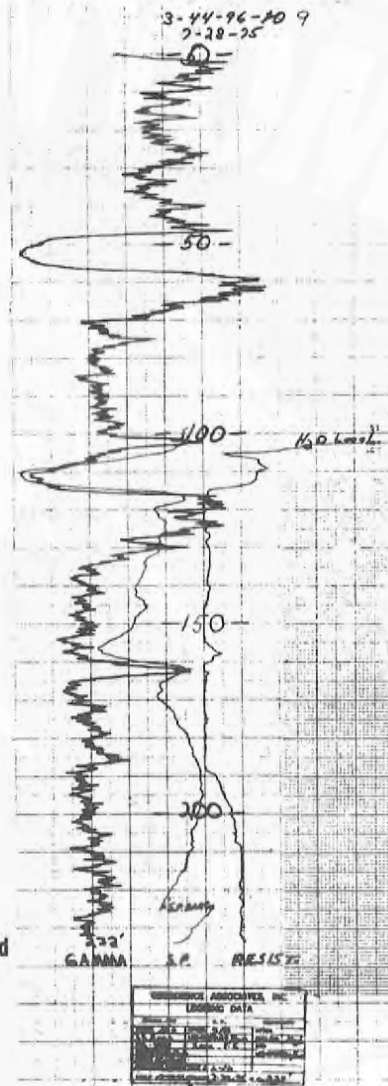
GEOPHYSICAL LOG TRACES

Seq. No.: 70083

Scale:-----> 100 cps(full) SP RESISTANCE
 Deflection:----> right 310 mv/div 83 ohm/div
 Time Constant:-> 2.0 sec right right
 Dead Time:-----> 6.0 micro-sec [Logging Speed: 20 ft/min]
 K-Factor:-----> 1.95 eex-5

ELEV	DEPTH	SYMBOL	LITHOLOGY DESCRIPTION
~			(0.0-47.0) SANDSTONE: tan - gray, fine grained, oxidized
4840	20		
4820	40		(47.0-58.0) COAL: unoxidized; ZONE 1
4800	60		(58.0-70.0) SILTSTONE: tan, sandy, fine grained, unoxidized
4780	80		(70.0-101.0) SANDSTONE: tan, fine grained, oxidized
4760	100		(101.0-106.0) SILTSTONE:
4740	120		(106.0-115.0) COAL: black, unoxidized; ZONE 2
4720	140		(115.0-156.0) SILTSTONE: gray, fine grained, sandy, unoxidized
4700	160		(156.0-160.0) COAL: ZONE 3
4680	180		(160.0-245.0) SANDSTONE: gray, fine - very fine grained, unoxidized
4660	200		
4640	220		
4620	240		(245.0-250.0) SILTSTONE: gray, unoxidized

GEOPHYSICAL LOG



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: W-022978 fed

DRILLHOLE: WN 3-44-96-10

SEQ. NO.: 70084

SOURCE: Western Nuclear Inc.

COMPLETED: 72875

*COUNTY: 17

STATE: WY

AREA: Graham Coal Lease

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 3

TOWNSHIP: 44.00N

RANGE: 96.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4891.0

DEPTH TO WATER: 8'

COMPANY COORDINATES: 0.0N. , 0.0E.

DRILLER: ABW Drilling

*DRILLHOLE TYPE: 3

DRILLHOLE DEPTH: 250.0

PROBE DEPTH: 235'

HOLE DIAMETER: 5.7"

CASING DEPTH: none

DRILL FLUID: water

*LOG TYPES: 2,4,7

LOGGED BY: Geoscience Associates

LITHOLOGY LOG BY: W.N., E. Ralston

COALSYS BY: P. Taucher

CORE INTERVALS: 76.0-88.0 ft.; 120.0-131.0 ft.

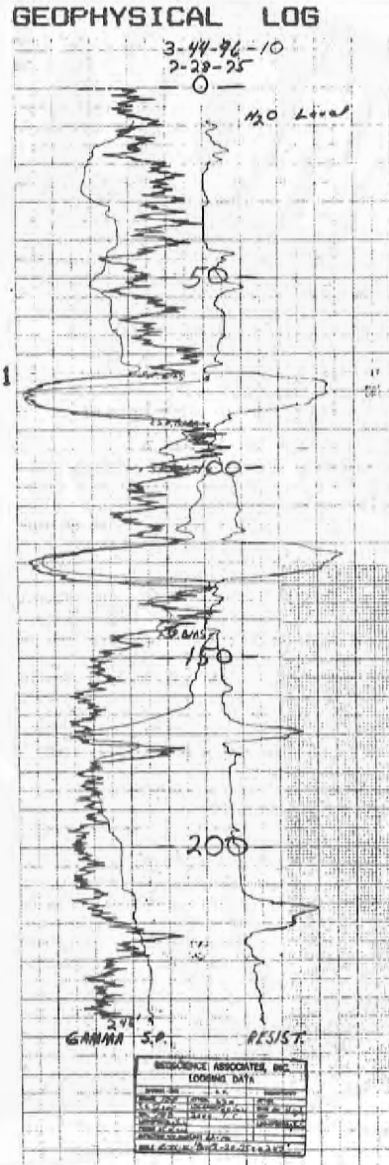
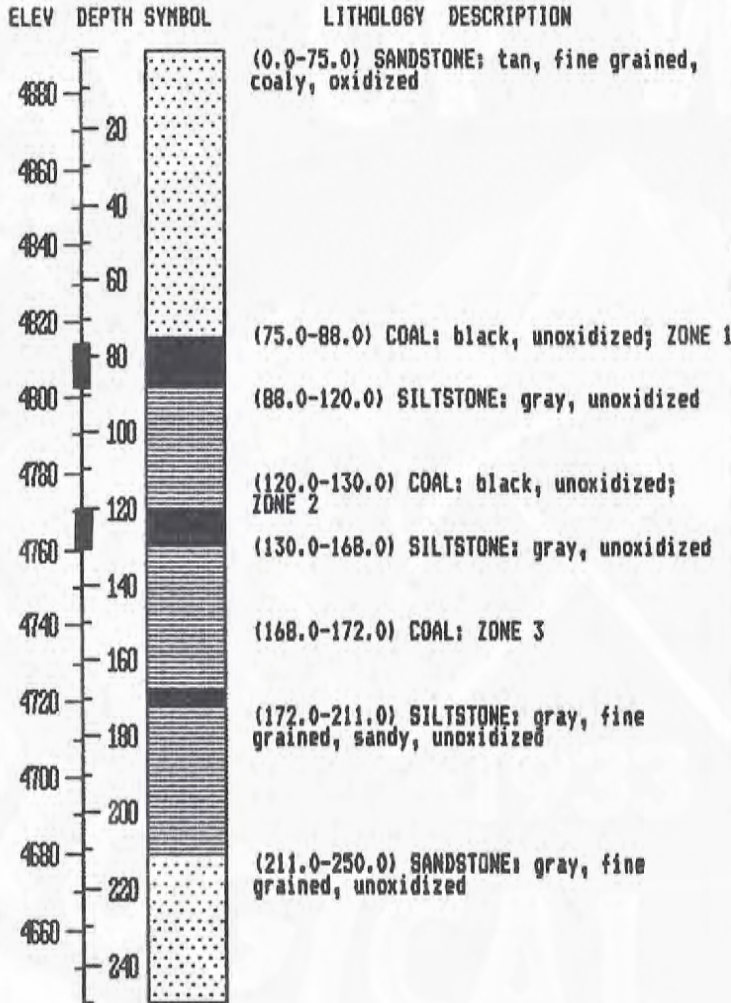
COMMENTS:

* = SEE CODE EXPLANATIONS

GEOPHYSICAL LOG TRACES

Seq. No.: 70084

Scale:----->	GAMMA	SP	RESISTANCE
Deflection:---->	100 cps(full)	330 mv/div	85 ohm/div
Time Constant:->	right	right	right
Dead Time:----->	2.0 sec		
K-Factor:----->	6.0 micro-sec	[Logging Speed: 20	ft/min]
	1.95 eex-5		



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: 049405 ST

DRILLHOLE: ACM 7-44-95-1

SEQ. NO.: 70085

SOURCE: BLM / A. C. Miller

COMPLETED: 122429

*COUNTY: 17

STATE: WY

AREA: Geba

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 7

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4550.0

DEPTH TO WATER: ?

COMPANY COORDINATES: 0.0N. , 0.0E.

DRILLER: A. C. Miller

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 127.0

PROBE DEPTH: none

HOLE DIAMETER: ?

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 10

LOGGED BY: none

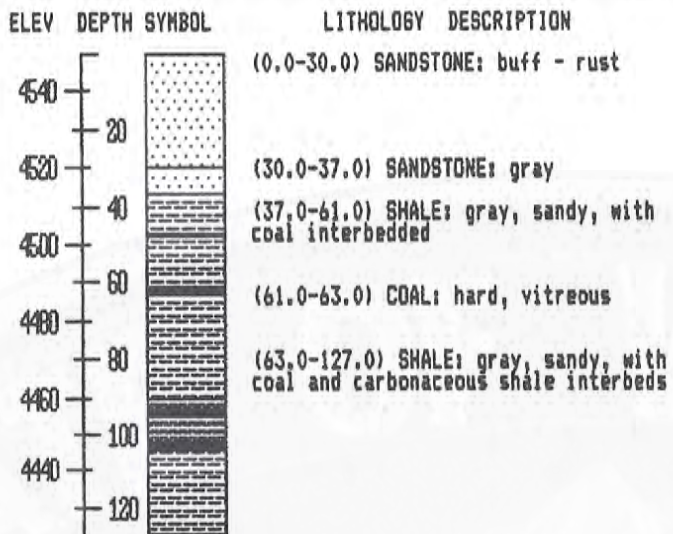
LITHOLOGY LOG BY: A. C. Miller

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE¼ NE¼ sec. 7, 1203'fn1, 144'fel

* = SEE CODE EXPLANATIONS



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.:

DRILLHOLE: OCC 9-44-95-1A

SEQ. NO.: 70086

SOURCE: BLM / Owl Creek Coal

COMPLETED: 112621

*COUNTY: 17

STATE: WY

AREA: Geba

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 9

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.ON.

0.OE.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 0.0

DEPTH TO WATER: ?

COMPANY COORDINATES:

0.ON. ,

0.OE.

DRILLER: H.R. Ameling Co.

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 573.0

PROBE DEPTH: none

HOLE DIAMETER: ?

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 10

LOGGED BY: none

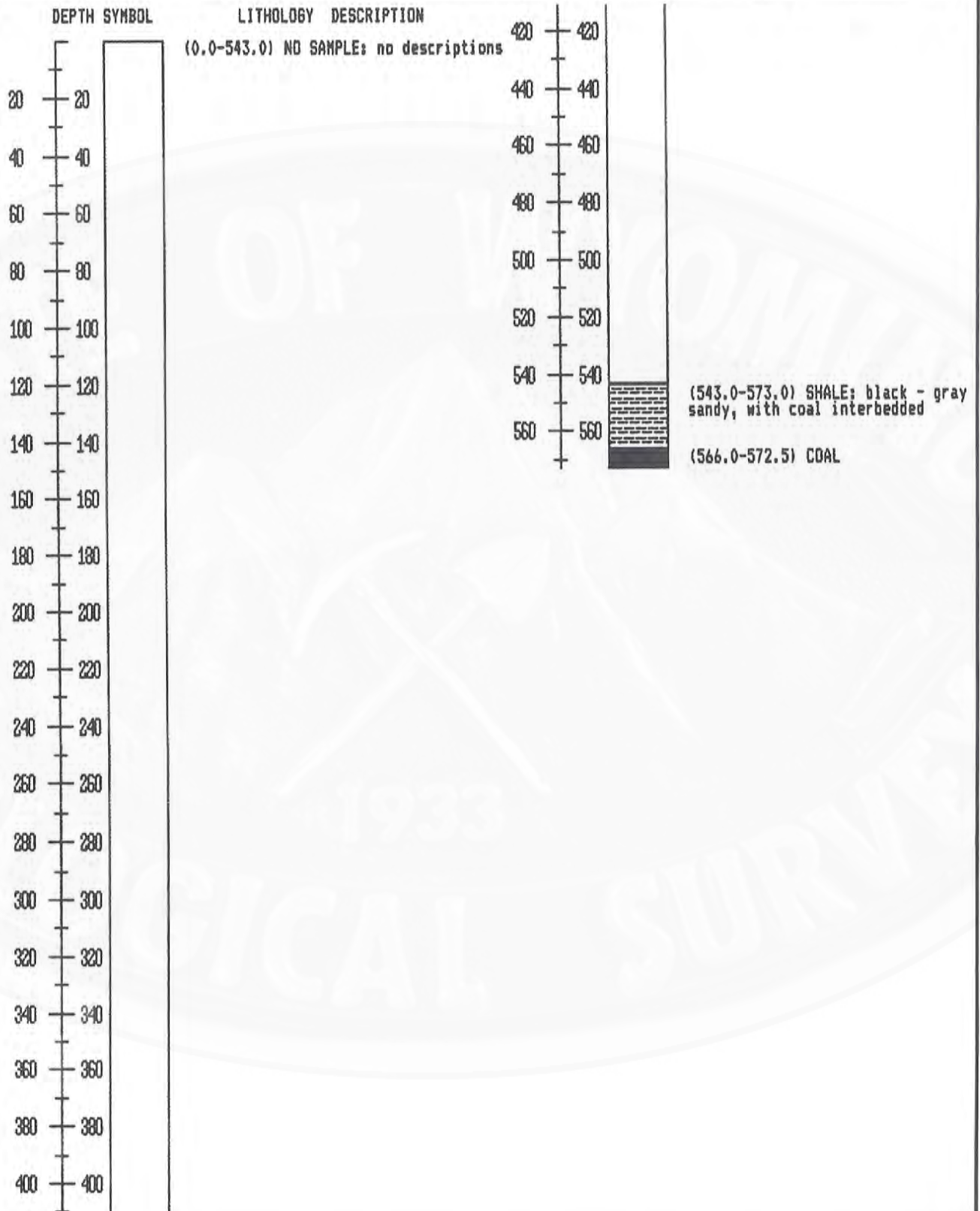
LITHOLOGY LOG BY: Owl Creek Coal Co.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE¼ NW¼ sec. 9

* = SEE CODE EXPLANATIONS



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.:

DRILLHOLE: OCC 10-44-95-1

SEQ. NO.: 70087

SOURCE: BLM / Owl Creek Coal

COMPLETED: 110521

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Kirby

*QUAD. LOC. CODE: 43108G2

SECTION: 10

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 0.0

DEPTH TO WATER: ?

COMPANY COORDINATES:

0.0N. ,

0.0E.

DRILLER: H.R. Ameling Co.

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 562.0

PROBE DEPTH: none

HOLE DIAMETER: ?

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 10

LOGGED BY: none

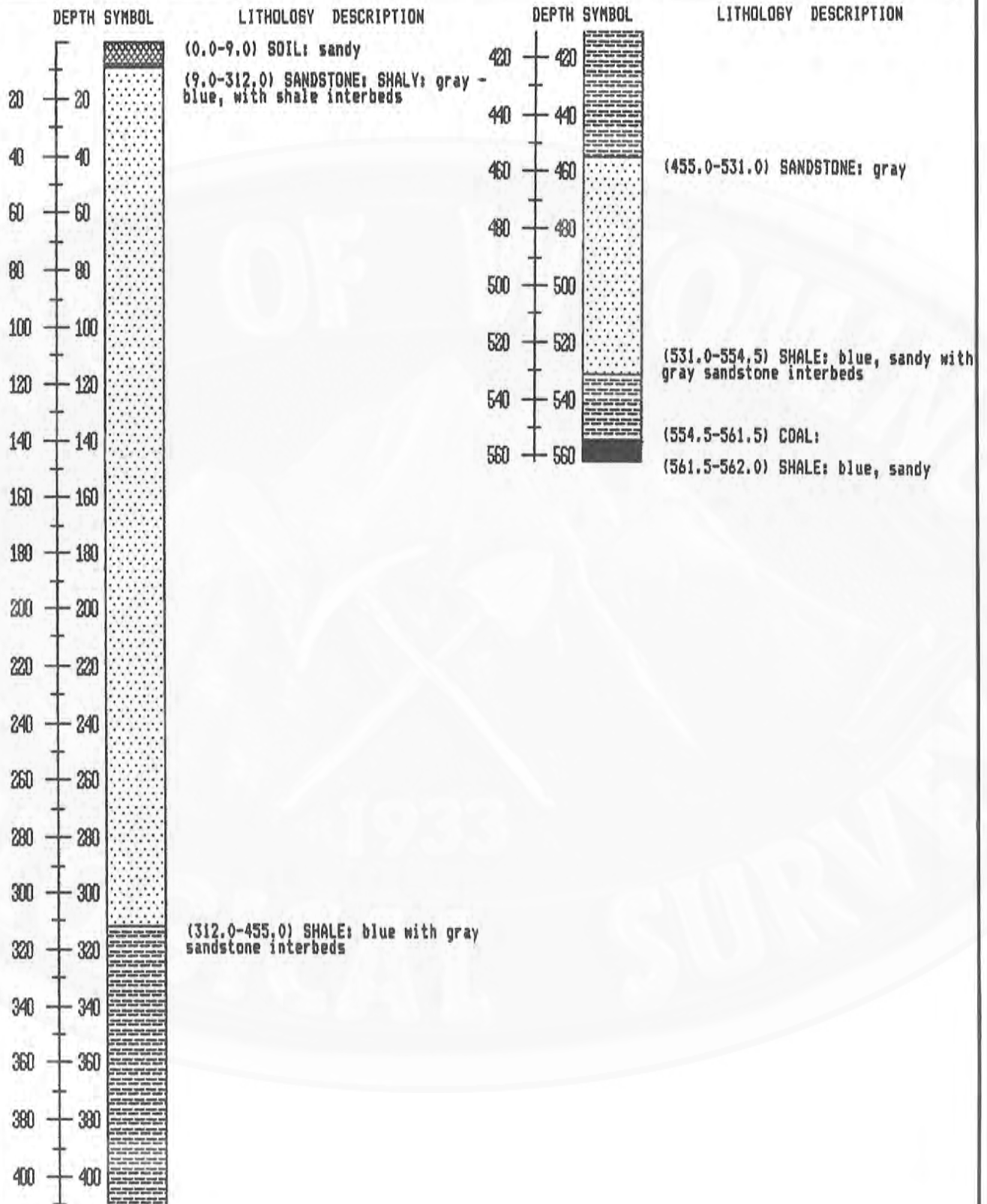
LITHOLOGY LOG BY: Owl Creek Coal Co.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NW¼ NW¼ sec. 10, 2242'N - 159'E OF W¼ cor. of sec. 10

* = SEE CODE EXPLANATIONS



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.:

DRILLHOLE: OCC 4-44-95-2

SEQ. NO.: 70088

SOURCE: BLM / Owl Creek Coal

COMPLETED: 102021

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 4

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 0.0

DEPTH TO WATER: ?

COMPANY COORDINATES:

0.0N. ,

0.0E.

DRILLER: H.R. Ameling Co.

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 610.0

PROBE DEPTH: none

HOLE DIAMETER: ?

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 10

LOGGED BY: none

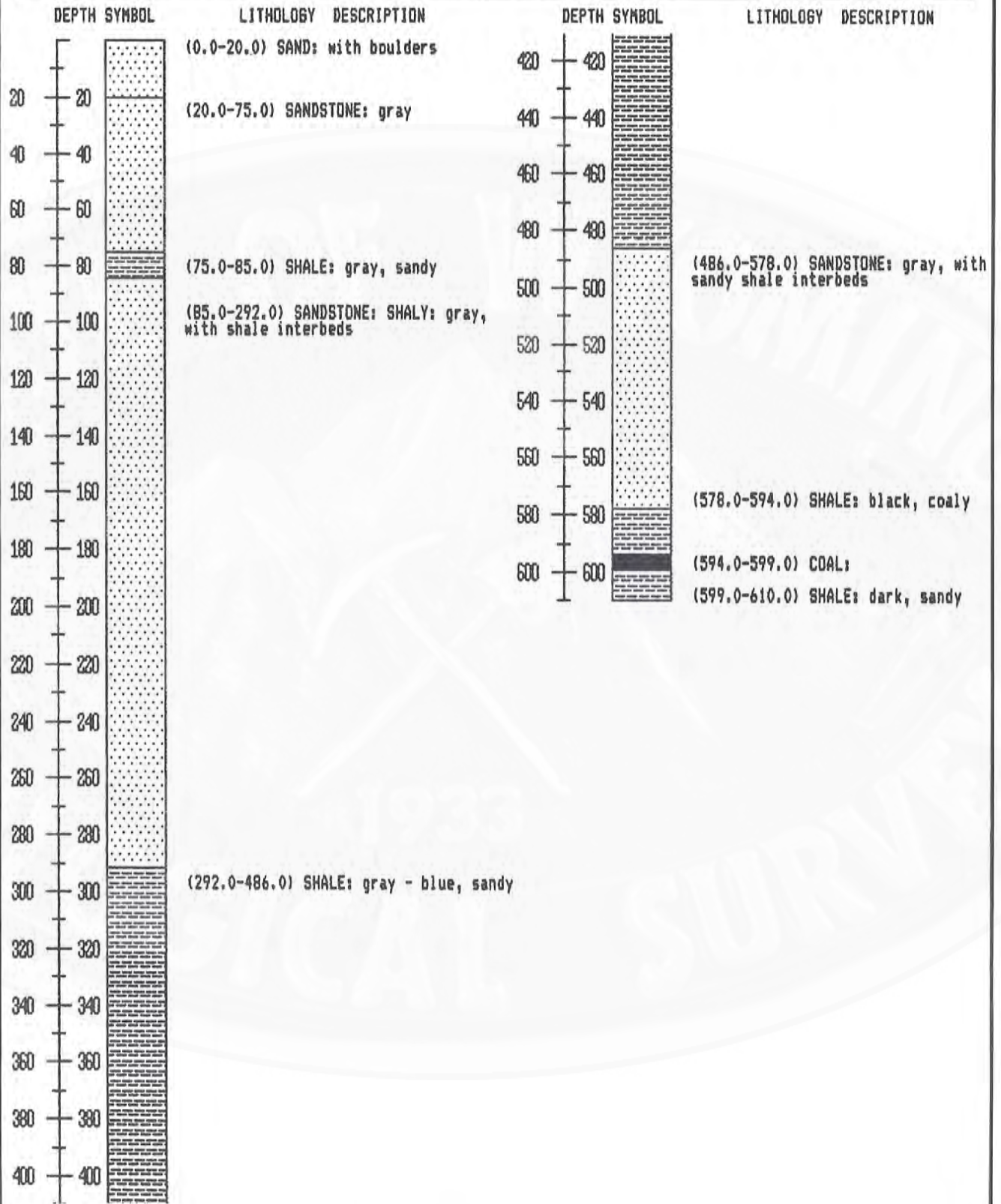
LITHOLOGY LOG BY: Owl Creek Coal Co.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: SW¼ SE¼ sec. 4, 1356'W - 191'N of SE cor. of sec. 4

* = SEE CODE EXPLANATIONS



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.:

DRILLHOLE: OCC 9-44-95-3

SEQ. NO.: 70089

SOURCE: BLM / Owl Creek Coal

COMPLETED: 93021

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 9

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 3985.0

DEPTH TO WATER: ?

COMPANY COORDINATES: 0.0N. , 0.0E.

DRILLER: H.R. Ameling Co.

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 310.0

PROBE DEPTH: none

HOLE DIAMETER: ?

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 10

LOGGED BY: none

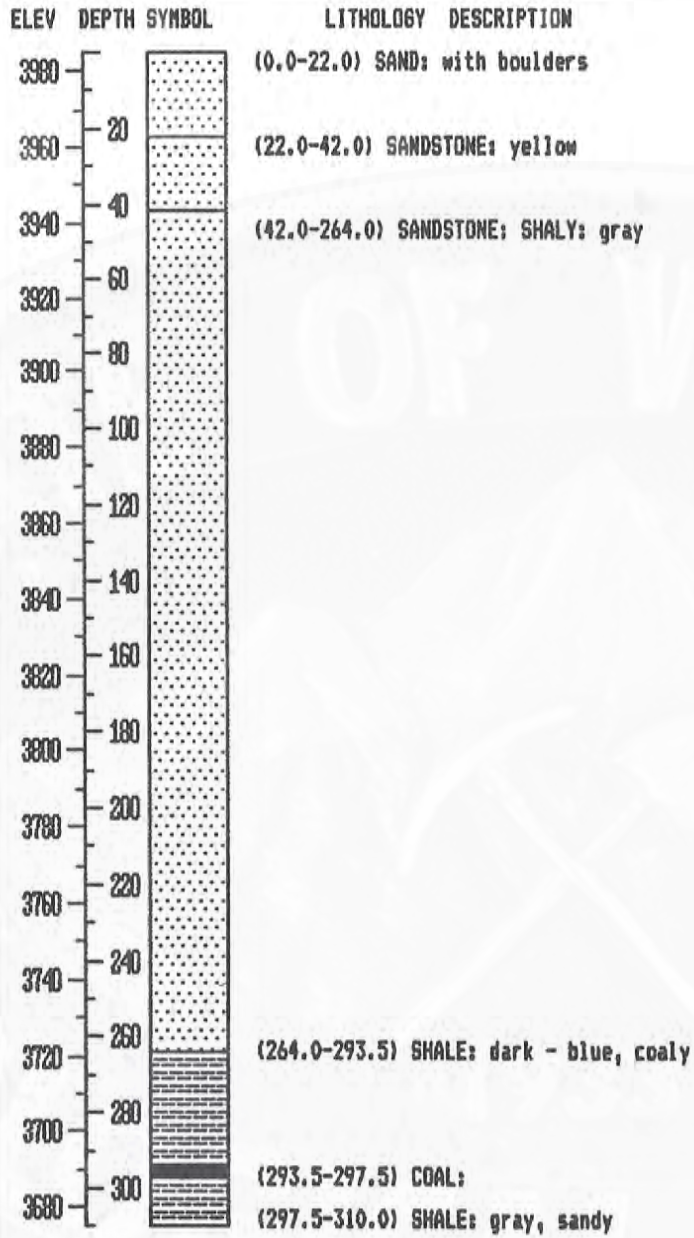
LITHOLOGY LOG BY: Owl Creek Coal Co.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE¼ NW¼ sec. 9, 268'S - 100'W OF N¼ cor. of sec. 9

* = SEE CODE EXPLANATIONS



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.:

DRILLHOLE: OCC 9-44-95-4

SEQ. NO.: 70090

SOURCE: BLM / Owl Creek Coal

COMPLETED: 92821

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 9

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 0.0

DEPTH TO WATER: ?

COMPANY COORDINATES: 0.0N. , 0.0E.

DRILLER: H.R. Ameling Co.

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 504.0

PROBE DEPTH: none

HOLE DIAMETER: ?

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 10

LOGGED BY: none

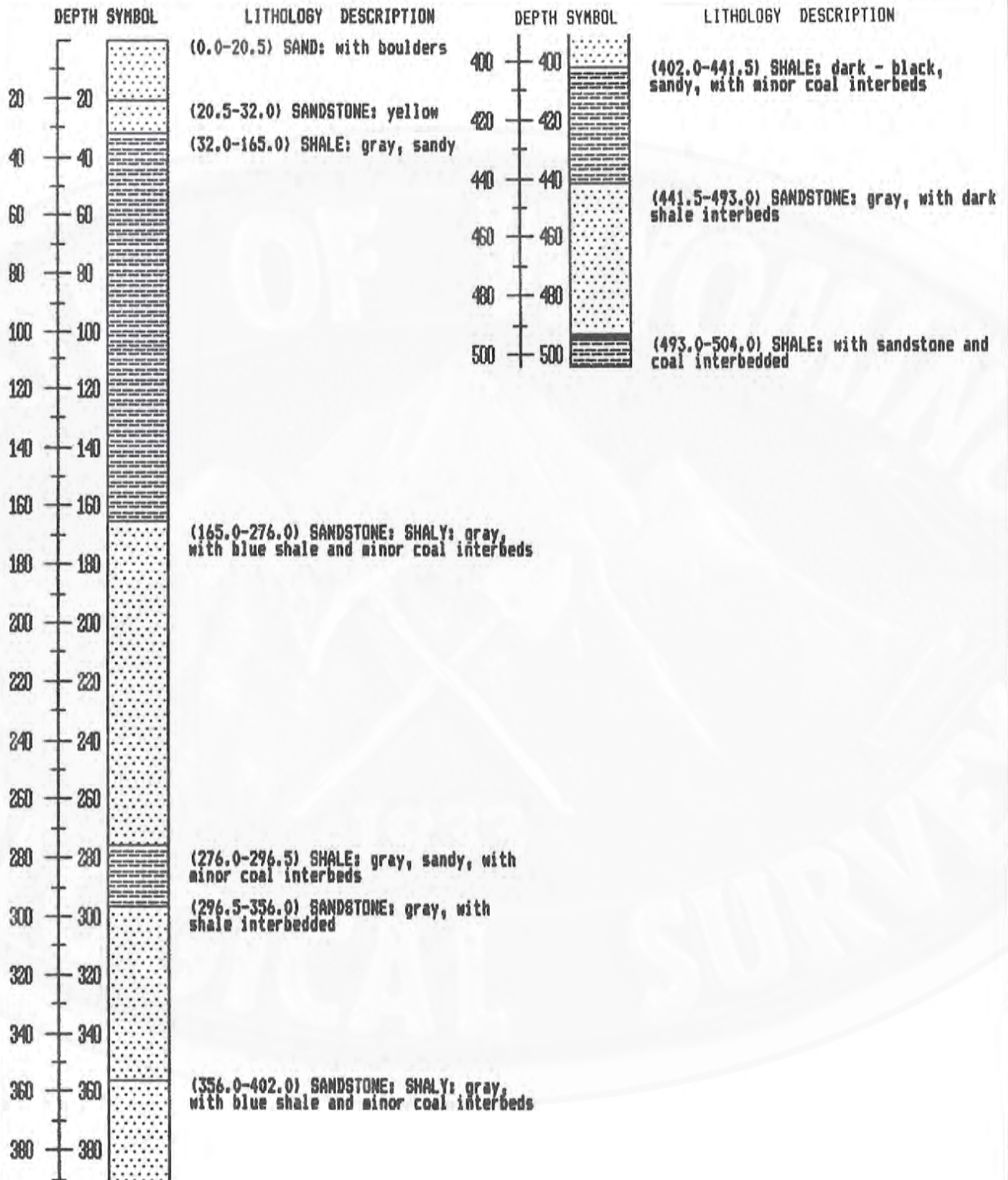
LITHOLOGY LOG BY: Owl Creek Coal Co.

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NE¼ NW¼ sec. 9

* = SEE CODE EXPLANATIONS



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: 044365 ST

DRILLHOLE: OM 17-44-95-1

SEQ. NO.: 70091

SOURCE: BLM / Otto Menger

COMPLETED: 101329

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 17

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 0.0

DEPTH TO WATER: ?

COMPANY COORDINATES: 0.0N. ,

0.0E.

DRILLER: Sullivan Mach.Co

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 754.0

PROBE DEPTH: none

HOLE DIAMETER: ?

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 10

LOGGED BY: none

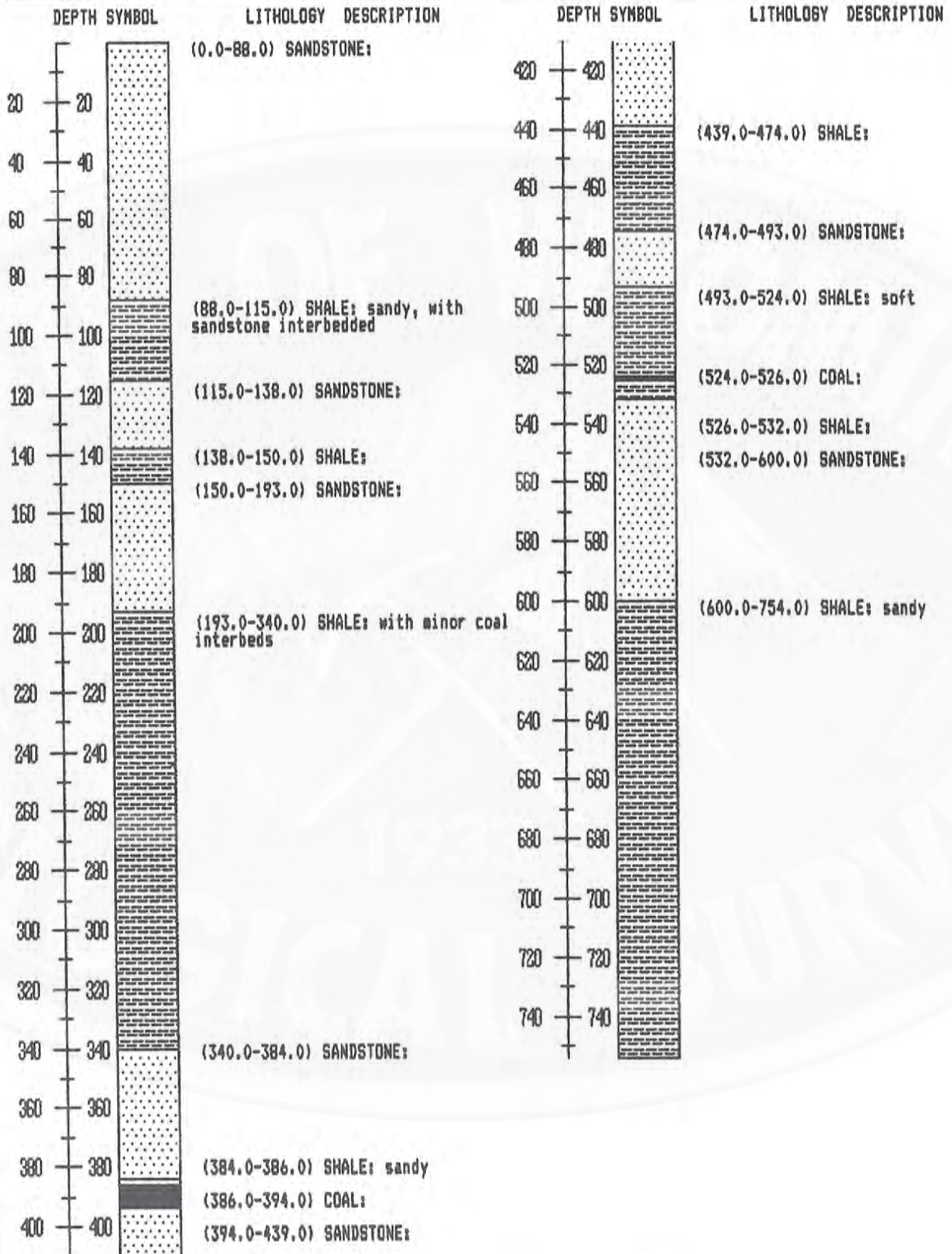
LITHOLOGY LOG BY: J.C. Rae / Otto Menger

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: SE¼ NE¼ sec. 17, 1420' fnl - 600' fel

* = SEE CODE EXPLANATIONS



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: 044365 ST

DRILLHOLE: OM 17-44-95-2

SEQ. NO.: 70092

SOURCE: BLM / Otto Menger

COMPLETED: 122029

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 17

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.ON.

0.OE.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 0.0

DEPTH TO WATER: ?

COMPANY COORDINATES: 0.ON. , 0.OE.

DRILLER: Sullivan Mach.Co

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 771.0

PROBE DEPTH: none

HOLE DIAMETER: ?

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 10

LOGGED BY: none

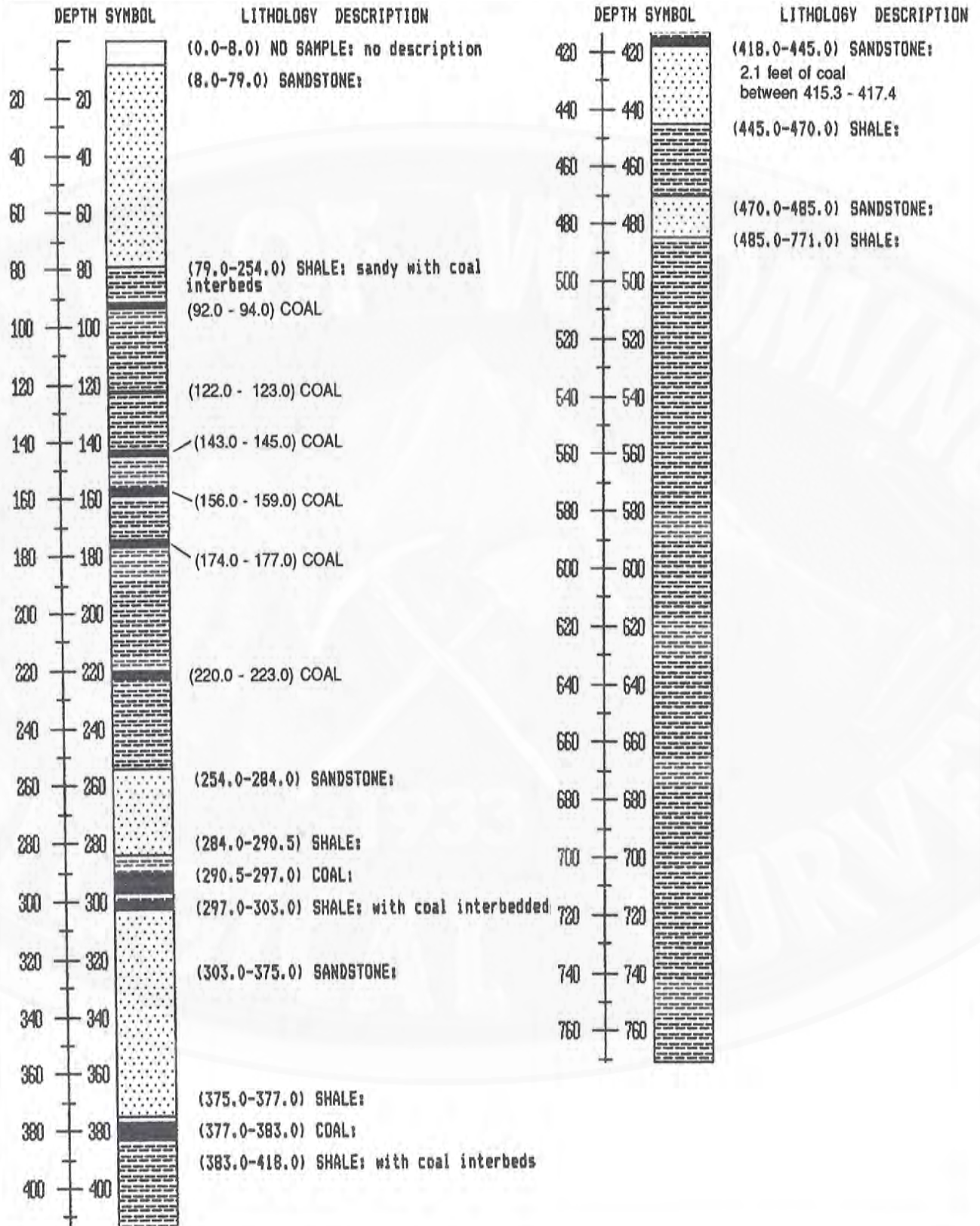
LITHOLOGY LOG BY: Otto Menger

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: SE¼ NE¼ sec. 17, 2140' fnl - 1220' fel

* = SEE CODE EXPLANATIONS



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: 044365 ? ST

DRILLHOLE: OM 8-44-95-3

SEQ. NO.: 70093

SOURCE: BLM / Otto Menger

COMPLETED: 12330

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 8

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 0.0

DEPTH TO WATER: ?

COMPANY COORDINATES: 0.0N. , 0.0E.

DRILLER: Sullivan Mach.Co

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 408.0

PROBE DEPTH: none

HOLE DIAMETER: ?

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES:10

LOGGED BY: none

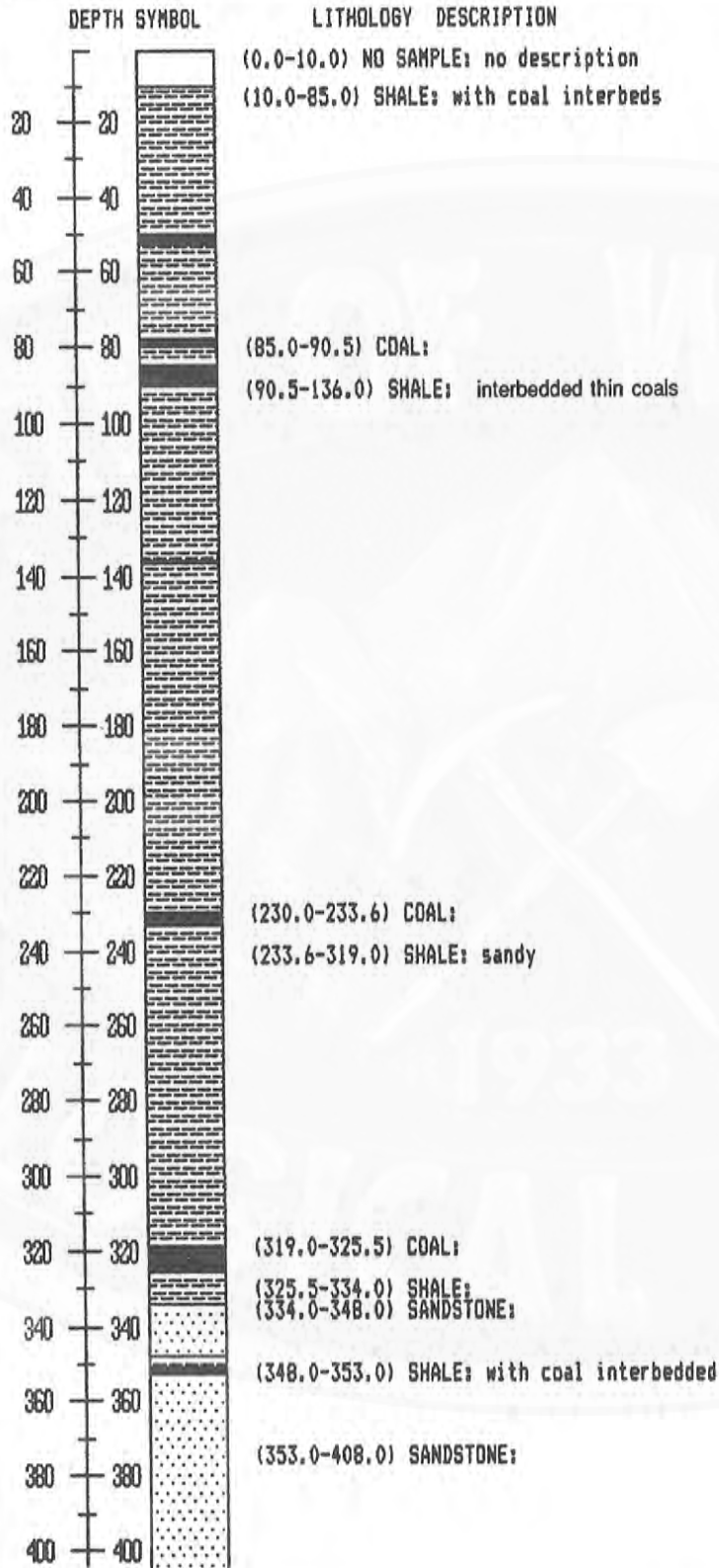
LITHOLOGY LOG BY: J. C. Rae / Otto Menger

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: SW¼ SW¼ sec. 8, 660' fwl - 1245' fsl

* = SEE CODE EXPLANATIONS



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: 044365 ? ST

DRILLHOLE: OM 8-44-95-4

SEQ. NO.: 70094

SOURCE: BLM / Otto Menger

COMPLETED: 20830

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 8

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 0.0

DEPTH TO WATER: ?

COMPANY COORDINATES: 0.0N. , 0.0E.

DRILLER: Sullivan Mach.Co

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 307.0

PROBE DEPTH: none

HOLE DIAMETER: ?

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES:10

LOGGED BY: none

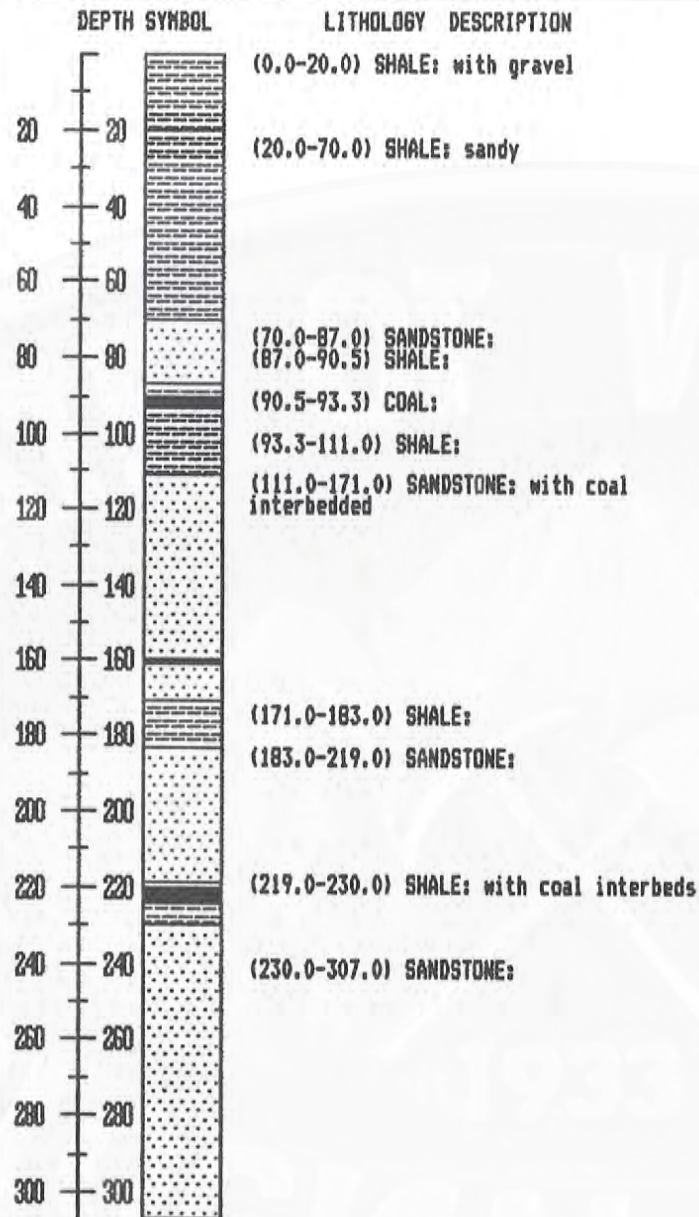
LITHOLOGY LOG BY: J. C. Rae / Otto Menger

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: SE¼ SW¼ sec. 8, 1550' fwl - 220' fsl

* = SEE CODE EXPLANATIONS



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.:

DRILLHOLE: OCC 9-44-95-5

SEQ. NO.: 70095

SOURCE: BLM / Owl Creek Coal

COMPLETED: 22130

*COUNTY: 17

STATE: WY

AREA: Geba

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 9

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.ON.

0.OE.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 0.0

DEPTH TO WATER: ?

COMPANY COORDINATES: 0.ON. ,

0.OE.

DRILLER: Sullivan Mach.Co

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 243.0

PROBE DEPTH: none

HOLE DIAMETER: ?

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 10

LOGGED BY: none

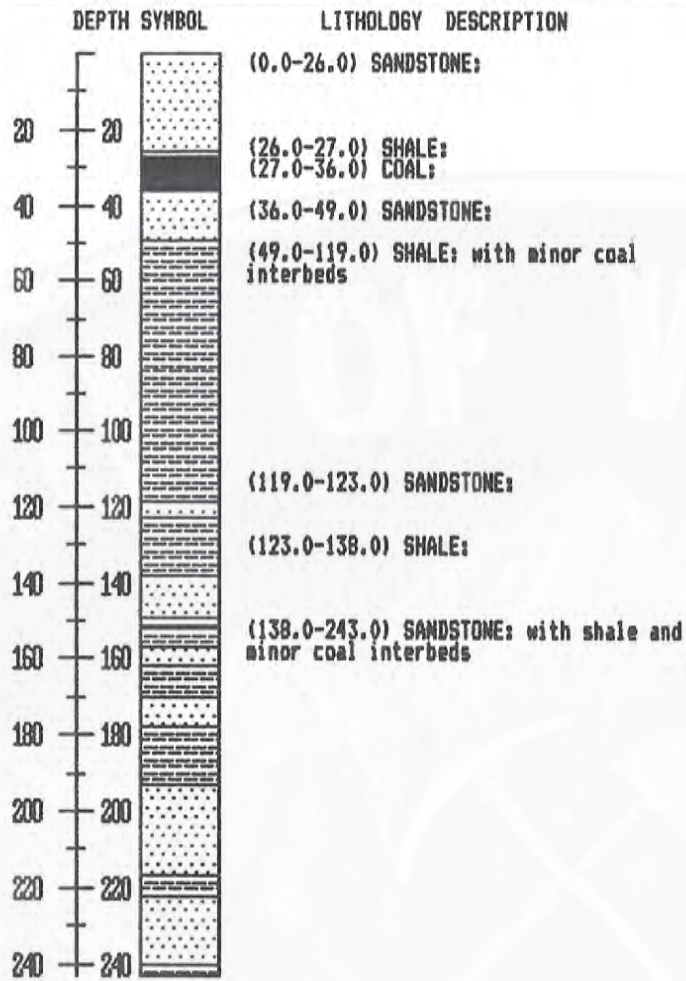
LITHOLOGY LOG BY: J.C.Rae / Owl Creek Coal

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NW¼ NE¼ sec. 9, 2350' fcl - 1050' fnl

* = SEE CODE EXPLANATIONS



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: 044365 ST

DRILLHOLE: OM 17-44-95-6

SEQ. NO.: 70096

SOURCE: BLM / Otto Menger

COMPLETED: 62430

*COUNTY: 17

STATE: WY

AREA: Geba

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 17

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 0.0

DEPTH TO WATER: ?

COMPANY COORDINATES:

0.0N. ,

0.0E.

DRILLER: Sullivan Mach.Co

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 340.0

PROBE DEPTH: none

HOLE DIAMETER: ?

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 10

LOGGED BY: none

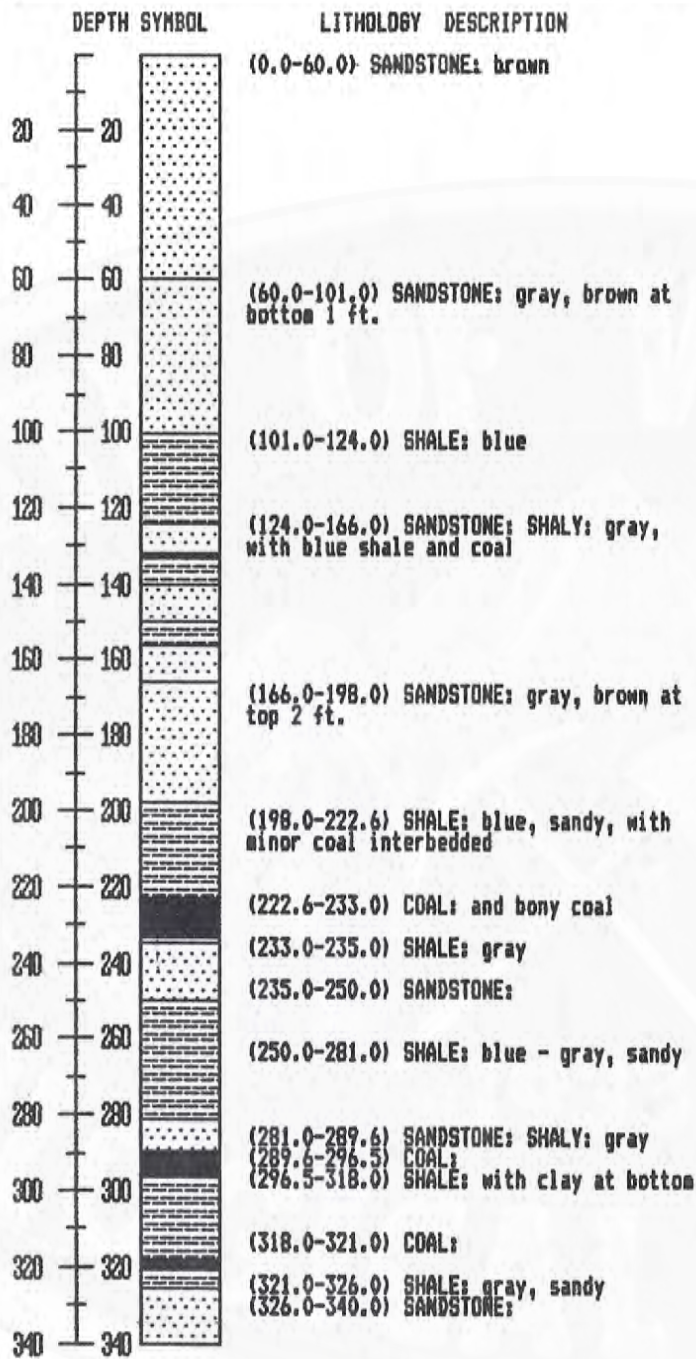
LITHOLOGY LOG BY: J.C.Rae / Otto Menger

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: SW¼ SW¼ sec. 17, 380' fwl - 2180' fsl

* = SEE CODE EXPLANATIONS



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: 044365 ST

DRILLHOLE: OM 18-44-95-7

SEQ. NO.: 70097

SOURCE: BLM / Otto Menger

COMPLETED: 70430

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 18

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.ON.

0.OE.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 0.0

DEPTH TO WATER: ?

COMPANY COORDINATES:

0.ON. ,

0.OE.

DRILLER: Sullivan Mach.Co

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 333.0

PROBE DEPTH: none

HOLE DIAMETER: ?

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 10

LOGGED BY: none

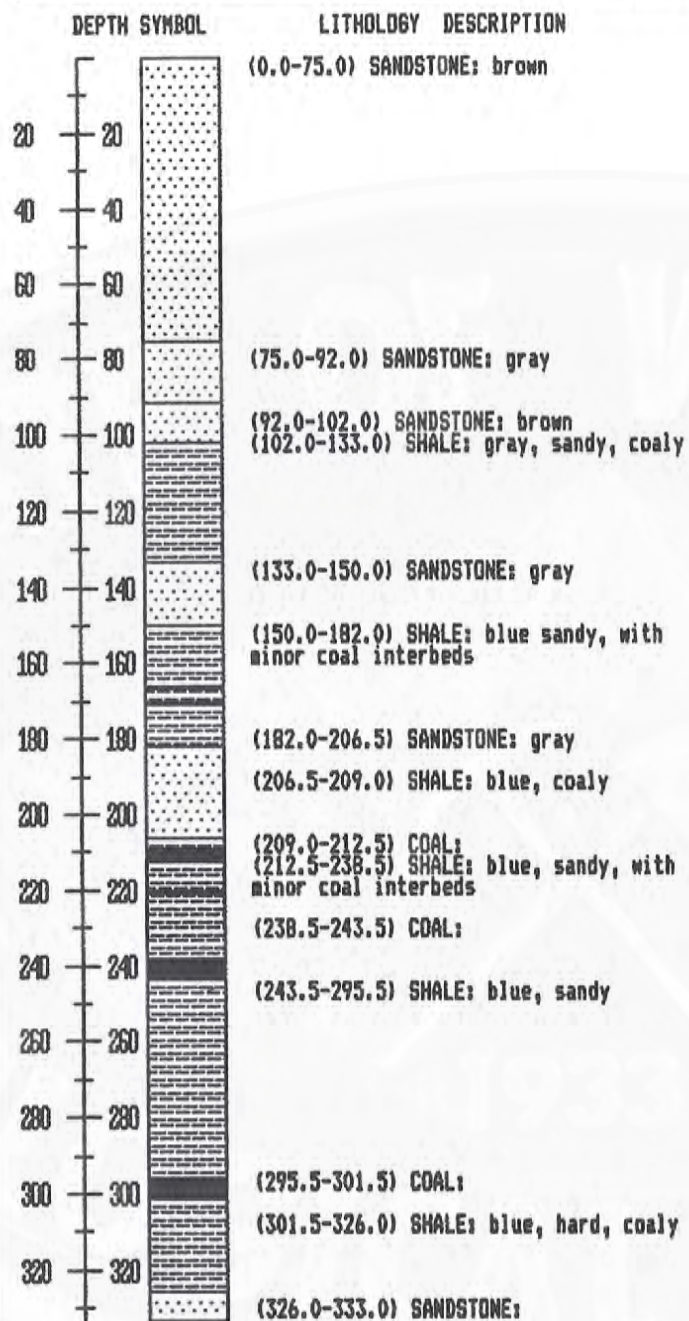
LITHOLOGY LOG BY: Otto Menger

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: SE¼ NE¼ sec. 18, 200' fe1 - 1340' fn1

* = SEE CODE EXPLANATIONS



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.: 044365 ST

DRILLHOLE: OM 8-44-95-8

SEQ. NO.: 70098

SOURCE: BLM / Otto Menger

COMPLETED: 71730

*COUNTY: 17

STATE: WY

AREA: Gebo

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 8

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES: 0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 0.0

DEPTH TO WATER: ?

COMPANY COORDINATES: 0.0N. , 0.0E.

DRILLER: Sullivan Mach.Co

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 301.0

PROBE DEPTH: none

HOLE DIAMETER: ?

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 10

LOGGED BY: none

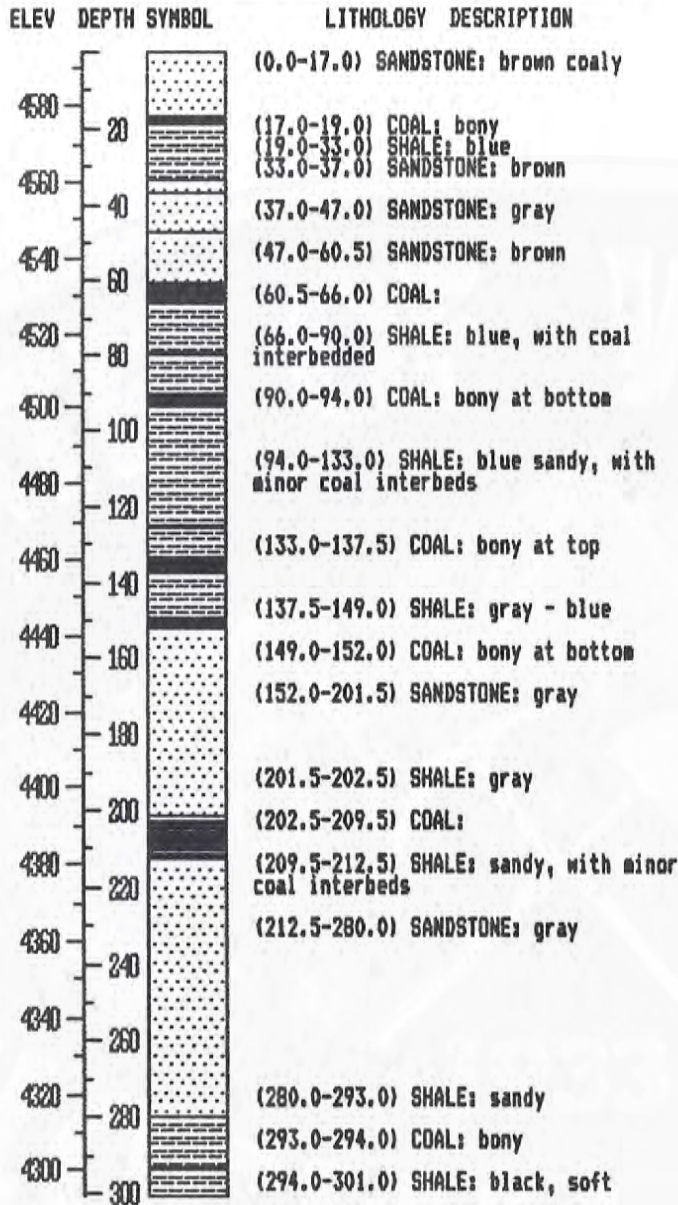
LITHOLOGY LOG BY: Otto Menger

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: SE¼ SW¼ sec. 8, 1485' fw1 - 185' fs1

* = SEE CODE EXPLANATIONS



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.:

DRILLHOLE: MM 7-44-95-1

SEQ. NO.: 70099

SOURCE: BLM / Miller Mine

COMPLETED: 0

*COUNTY: 17

STATE: WY

AREA: Miller Mine, Kirby, WY

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 43108G3

SECTION: 7

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 4550.0

DEPTH TO WATER: ?

COMPANY COORDINATES:

0.0N. ,

0.0E.

DRILLER: ?

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 483.0

PROBE DEPTH: none

HOLE DIAMETER: ?

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 10

LOGGED BY: none

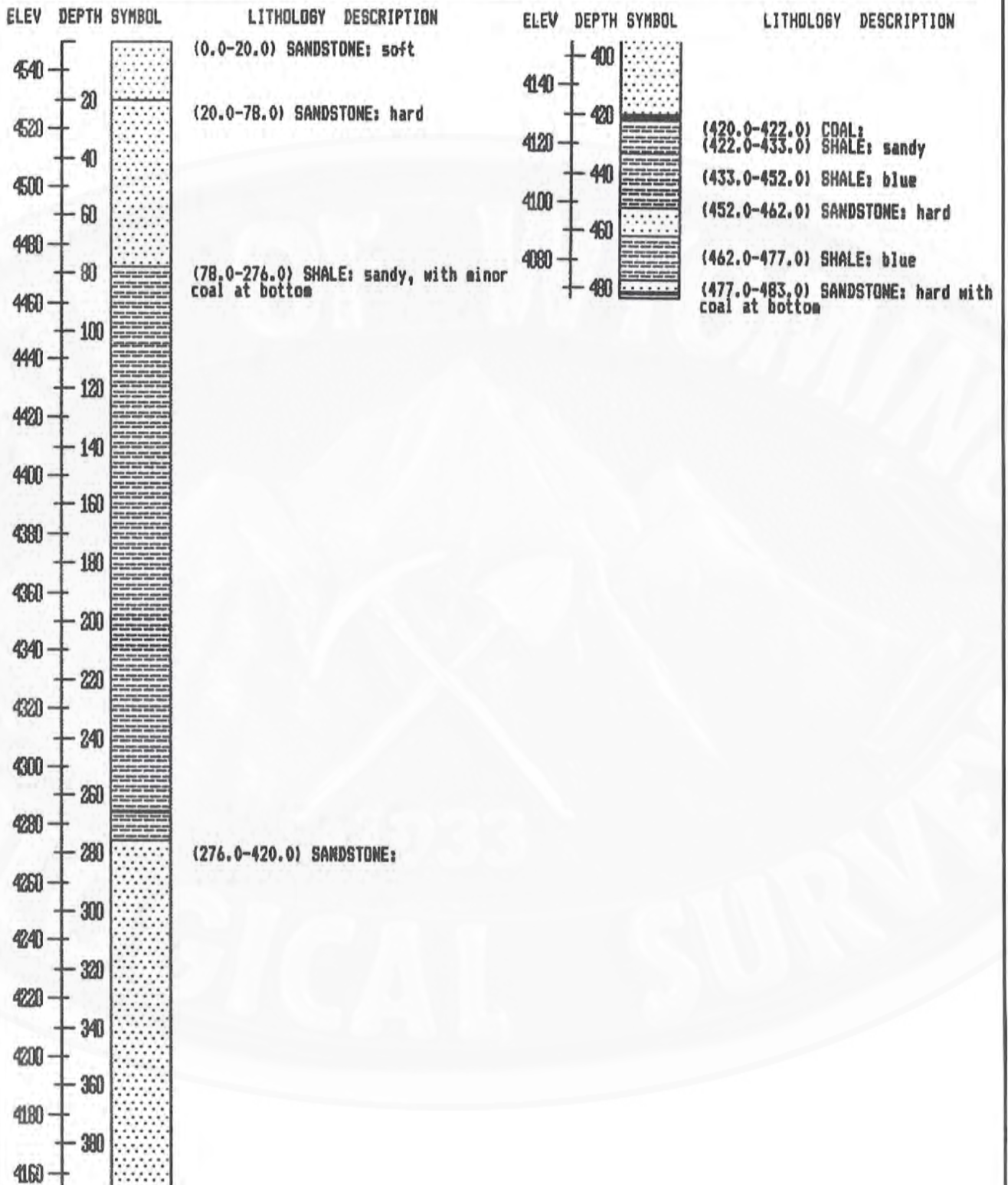
LITHOLOGY LOG BY: ?

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NW¼ SE¼ sec. 7, 1203' snl - 144' wel

* = SEE CODE EXPLANATIONS



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.:

DRILLHOLE: MM 7-44-95-2

SEQ. NO.: 70100

SOURCE: BLM / Miller Mine

COMPLETED: 0

*COUNTY: 17

STATE: WY

AREA: Miller Mine, Kirby, WY

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 7

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.ON.

0.OE.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 0.0

DEPTH TO WATER: ?

COMPANY COORDINATES:

0.ON. ,

0.OE.

DRILLER: ?

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 272.0

PROBE DEPTH: none

HOLE DIAMETER: ?

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 10

LOGGED BY: none

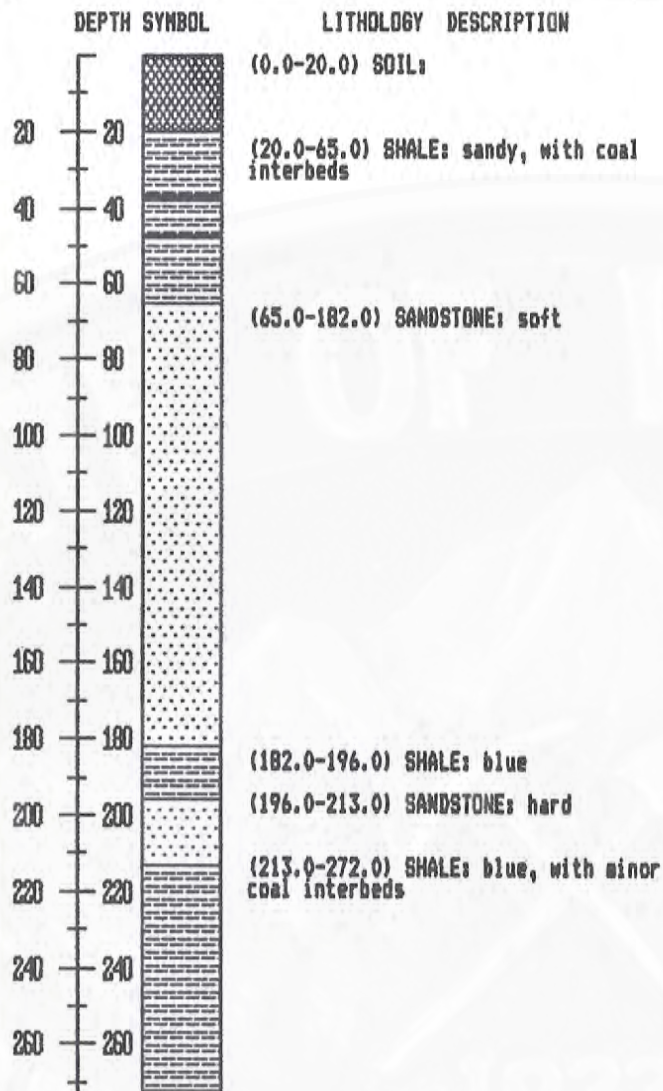
LITHOLOGY LOG BY: ?

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: NW¼ SE¼ sec. 7

* = SEE CODE EXPLANATIONS



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.:

DRILLHOLE: MM 7-44-95-3

SEQ. NO.: 70101

SOURCE: BLM / Miller Mine

COMPLETED: 0

*COUNTY: 17

STATE: WY

AREA: Miller Mine, Kirby, WY

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 7

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 0.0

DEPTH TO WATER: ?

COMPANY COORDINATES:

0.0N. , 0.0E.

DRILLER: ?

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 208.0

PROBE DEPTH: none

HOLE DIAMETER: ?

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 10

LOGGED BY: none

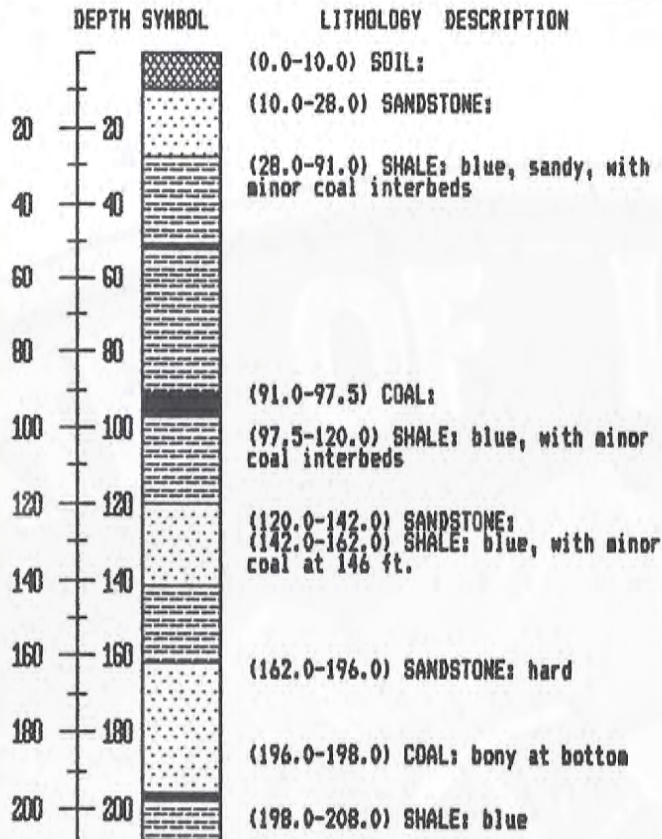
LITHOLOGY LOG BY: ?

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS:

* = SEE CODE EXPLANATIONS



THE GEOLOGICAL SURVEY OF WYOMING

DRILLHOLE DATA SUMMARY

LEASE NO.:

DRILLHOLE: MM 7-44-95-4

SEQ. NO.: 70102

SOURCE: BLM / Miller Mine

COMPLETED: 0

*COUNTY: 17

STATE: WY

AREA: Miller Mine, Kirby, WY

QUADRANGLE: Little Sand Draw

*QUAD. LOC. CODE: 4310863

SECTION: 7

TOWNSHIP: 44.00N

RANGE: 95.00W

PRINCIPAL MERIDIAN: 6

LATITUDE: 0.00

LONGITUDE: 0.00

*LAT.-LONG. SOURCE: 0

STATE PLANE COORDINATES:

0.0N.

0.0E.

ZONE: 5851

ADJ. ABS. ELEV.: 0.0

COMPANY ELEV.: 0.0

DEPTH TO WATER: ?

COMPANY COORDINATES:

0.0N. ,

0.0E.

DRILLER: ?

*DRILLHOLE TYPE: 2

DRILLHOLE DEPTH: 172.0

PROBE DEPTH: none

HOLE DIAMETER: ?

CASING DEPTH: none

DRILL FLUID: ?

*LOG TYPES: 10

LOGGED BY: none

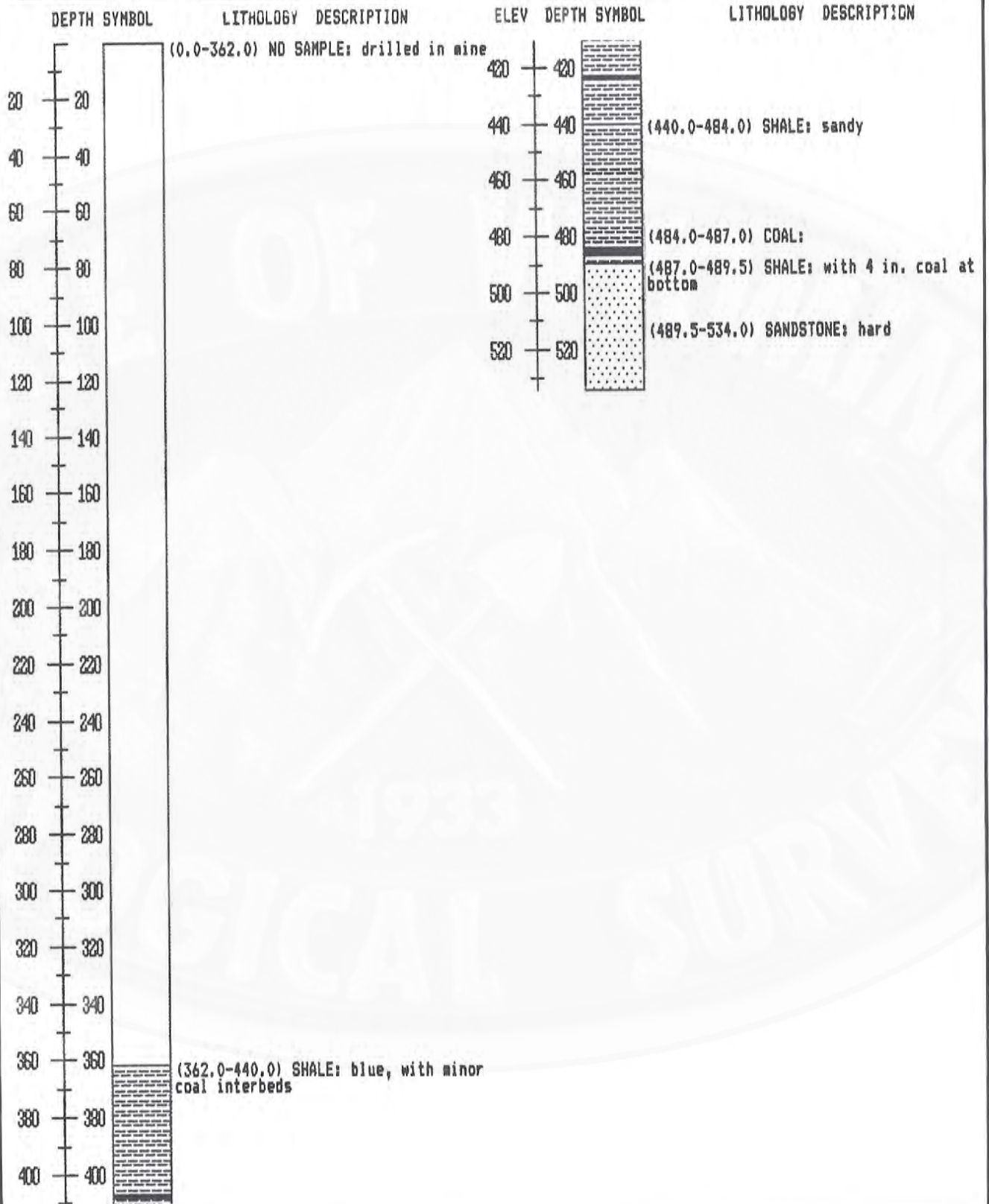
LITHOLOGY LOG BY: ?

COALSYS BY: P. Taucher

CORE INTERVALS: none

COMMENTS: Drilled in mine ~362 ft. below G.L., spud @ base of mined coal

* = SEE CODE EXPLANATIONS





Geology -- Interpreting the past to provide for the future