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GEOLOGIC INVESTIGATION OF THE NORTHWEST SCOBEY LIGNITE AREA, DANIELS AND VALLEY COUNTIES, MONTANA

By

James R. Gruber, Jr.

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To convert English units	Multiply by	To obtain metric units
Inches	2.54	Centimeters
Feet	.3048	Meters
Miles	1.609	Kilometers

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ABSTRACT

There are three major coal beds in the northwest Scobey area, Daniels and Valley Counties, Montana. These beds are the C, D, and E coal beds and occur in the Tullock and Lebo Members of the Paleocene Fort Union Formation. Correlation of these beds throughout the area shows that the D bed is the thickest and most extensive, is characterized by numerous partings, and has an average thickness of 8 feet. Analyses of samples taken from three locations show the D bed to have an as-received heating value of 5,630-7,329 Btu/lb and a sulfur content of 0.20-1.54 percent. Coal from the D bed is classified as lignite in rank.

INTRODUCTION

This report describes the three major coal beds of the northwest Scobey area which is located within T. 36 N., Rs. 43-46 E., and T. 37 N., Rs. 42-48 E., Daniels and Valley Counties, Mont. (fig. 1). These coal beds are, in ascending order, the C, D, and E beds (fig. 2), and are all in the Paleocene Fort Union Formation. The C bed is located at the base of the Tullock Member of the Fort Union and the D and E beds are in the Lebo Member of the Fort Union (fig. 2).

Data for describing the thickness, quality, and extent of the coal in the area were obtained from the following sources: U.S. Geological Survey and Montana Bureau of Mines and Geology (1980); geophysical and lithologic logs from Silverspoon Research and Consulting, Ltd.; Feltis (1979); Collier (1924); Survey coal-lease files; and the author's fieldwork.

Collier (1924) mapped the coal in the area using data gathered from strip pits, domestic water wells, and outcrops. Drill-hole data support Collier's correlations and thickness of the D bed, the thickest and most extensive bed in the area. Coal-cropline projections by the author differ slightly from those of Collier--the most notable difference being a shift of the D-bed subcropline farther to the east in T. 37 N., R. 47 E.

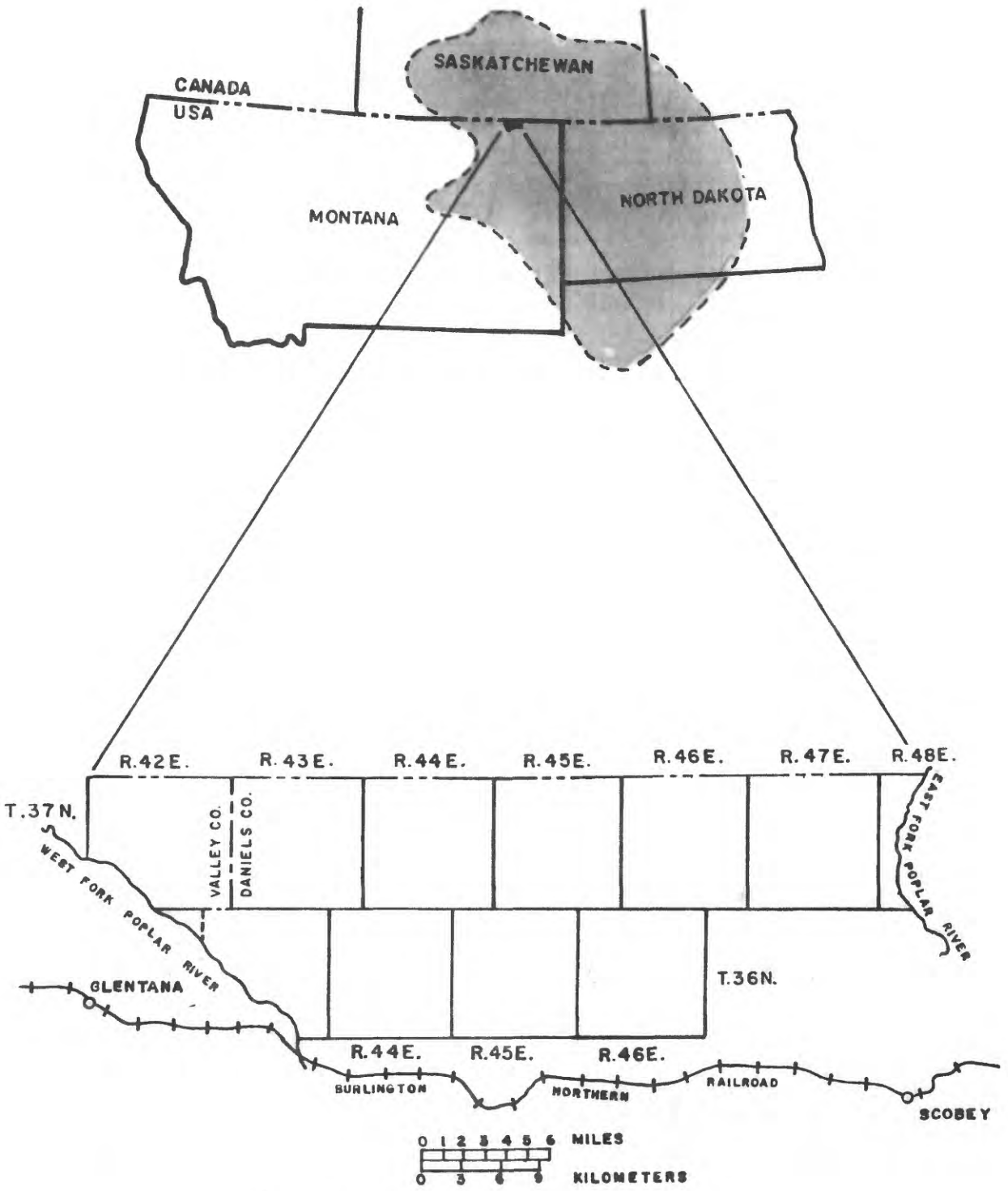

Figure 1.--Index map of northwest Scobey lignite area, Daniels and Valley Counties, Montana, showing approximate location within the Williston basin[1] (shaded).

[1]Carlson and Anderson (1965).

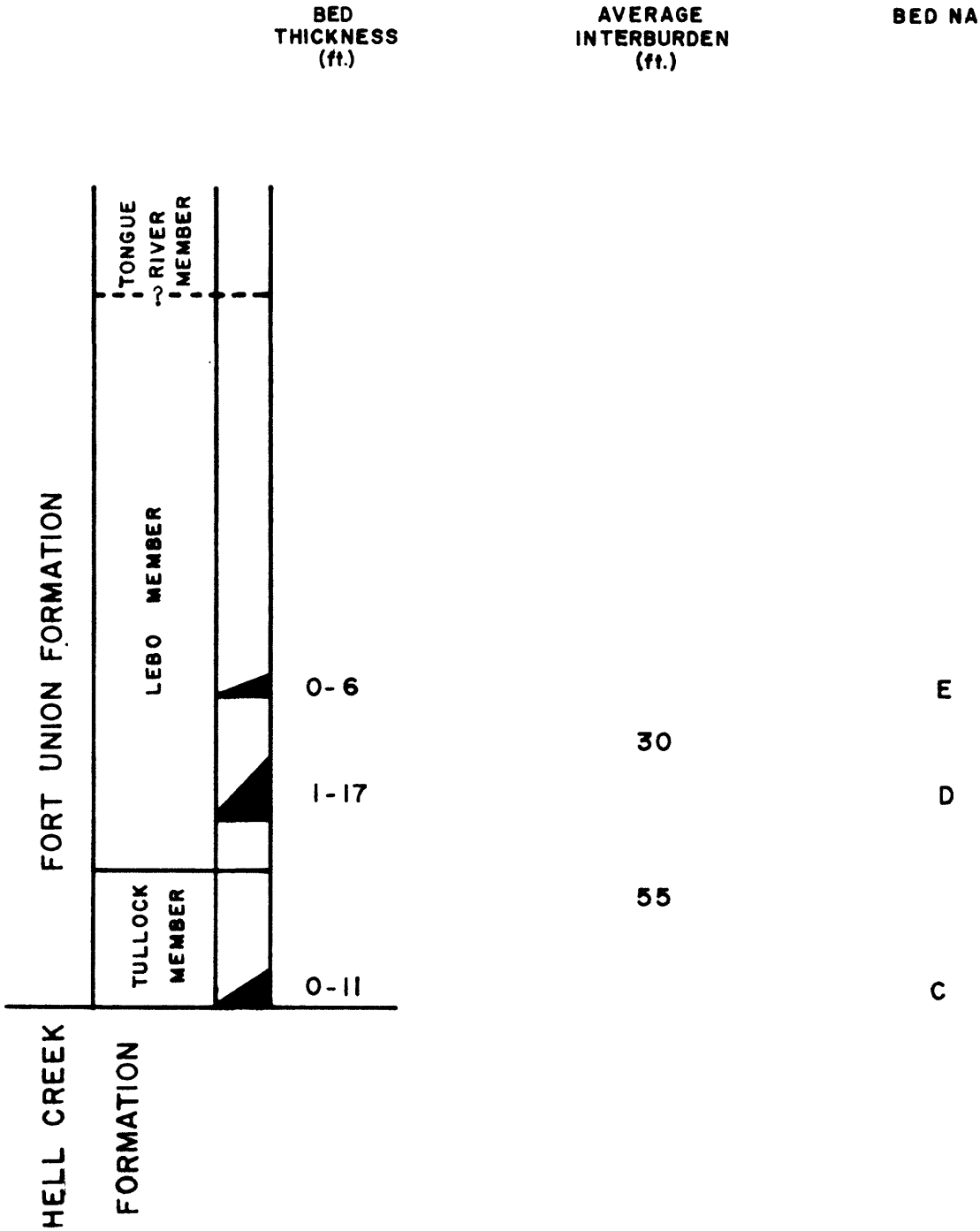

Figure 2.--Composite section showing the major coal beds and nomenclature used in this report.

Coal thicknesses and elevations shown at mine sites and outcrops in this report are from Collier (1924) and were either compared with USGS coal-lease file data or verified in the field.

PHYSIOGRAPHY

The northwest Scobey lignite area is located between the East and West Forks of the Poplar River and borders Canada to the north (fig. 1).

Local topography consists of a sequence of sedimentary plateaus, benches, and flood plains, all of which are erosional features altered to various degrees by glaciation. Typically, these features exhibit broad slopes and gentle plains that enhance farming in this region.

Annual mean precipitation in the area is 12 in. Surface runoff drains into the southeast-trending tributaries of the Poplar River, which flows into the Missouri River approximately 62 mi south of Scobey.

STRATIGRAPHY

The oldest formation exposed in the study area is the Fort Union, which conformably overlies the Cretaceous Hell Creek Formation. In Montana, the Fort Union is divided into the Tullock, Lebo, and Tongue River Members. The Tullock and Lebo Members contain the three major caol beds discussed in this report.

The Tullock Member consists of yellow fine-grained sandstone and light to dark shale, with coal in the dark shale. The Tullock is approximately 40 ft thick and the C bed is located at its base (Collier, 1924).

The Lebo Member consists of dark siltstone, light fine-grained sandstone, dark shale, and coal. The Lebo is approximately 200 ft thick and the D and E coal beds are located near its base.

The contact between the Lebo and Tongue River Members is not defined in this report (fig. 2). The lower part of the Tongue River Member may be present in this area but only as isolated erosional remnants.

Locally, the Fort Union is unconformably overlain by the Tertiary Flaxville Formation (0-100 ft thick), Pleistocene gravel (0-6 ft thick), Pleistocene glacial remnants (0-45 ft thick), or Holocene alluvium (0-15 ft thick)(Colton and others, 1978).

STRUCTURE

The Williston basin is the principal structural feature in this region (fig. 1). The coal-bearing Fort Union and Hell Creek Formations, which underlie the study area, show a gentle regional dip toward the southeast (Collier, 1924). Surface topography in the area slopes to the east.

Although numerous minor anticlines and synclines are typical, the structure-contour map (pl. 3) indicates the average dip of the D coal bed (less than 0.5°) follows the general trend of the surface.

No evidence of faulting was observed by the author in the study area, although two small faults with less than 15-ft displacement were noted by Collier (1924) on the north side of Coal Creek in T. 37 N., R. 45 E.

COAL

Coal occurs in the study area in both the Hell Creek and Fort Union Formations, but the three major coal beds--the D, C, and E--are in the Fort Union (fig. 2).

Drill-hole data (pl. 1) indicate that there are many thin coal beds (less than 5 ft thick) in the area and one noticeably thicker bed that correlates as the D bed. Because of the greater thickness of the D bed, more emphasis is given to evaluate it than is given to beds C and E. Only a small part of the E bed is evaluated (pl. 4) owing to uncertain correlation and lesser thicknesses outside the area. The C bed is not evaluated for the same reasons and, also, because it is considerably lower stratigraphically than the D bed--the most economically minable bed in the area.

C bed.--The C coal bed has a total thickness of 0 to 11 ft, with an average total thickness of 3 ft throughout the area. The greatest single thickness found is 6 ft in secs. 8 and 11, T. 37 N., R. 43 E., (pl. 1), and the thickest parting found within this bed is 7 ft in sec. 29, T. 37 N., R. 46 E., and sec. 27, T. 36 N., R. 44 E.

D bed.--The D coal bed lies an average of 55 ft above the C bed; interburden thickness between the two beds ranges from 20 to 156 ft. Plate 2 shows areas where the overburden of the D bed is less than 150 ft thick. The D bed is characterized by numerous local partings throughout the study area (pl. 2). It has a combined thickness of 1 to 17 ft, with an average combined thickness of 8 ft. The greatest single thickness found is 17 ft in sec. 22, T. 37 N., R. 45 E., and the greatest parting found within this bed is 8 ft in sec. 2, T. 37 N., R. 44 E.

Chemical and physical analyses of the D bed are given in table 1. Data for drill-hole no. US-7898, sec. 15, T. 37 N., R. 45 E., were received from the Montana Bureau of Mines and Geology (written commun., 1979). Analyses for the upper bed refer to the combined two upper thicknesses of the D bed (pl. 2); analyses for the lower bed refer to the lower thickness of the D bed. These data indicate the rank of this coal to be lignite (Averitt, 1975).

E bed.--The E coal bed lies an average of 30 ft above the D bed; interburden thickness between the two beds ranges from 5 to 64 ft. All overburden of the E bed (pl. 4) is less than 150 ft thick. The E bed was evaluated in T. 37 N., R. 45 E., and in parts of T. 37 N., Rs. 44 and 46 E., and T. 36 N., R. 46 E. (pl. 4). Within this isolated area the total coal thickness ranges from 0 to 6 ft, with an average total thickness of 3 ft. The greatest single thickness of coal in this area is 6 ft. A parting was found in only one small part of this area (pl. 4).

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Table 1.--Chemical and physical analyses of coal in the northwest Scobey area, Daniels and Valley Counties, Mont.

[Analysis form: A, as received; B, air dried; C, moisture free; D, moisture and ash free; --- no data. Source of data: 1, Montana Bureau of Mines and Geology (written commun., 1979); 2, Collier (1924)]

Coal bed name	Location			Type of analysis	Proximate analysis (percent)				Ultimate analysis (percent)	Heating value	Source of data
	Sec.	T.N.	R.E.		Moisture	Volatile matter	Fixed carbon	Ash	Sulfur	Btu/lb	
Upper D bed, at drill-hole no. US-7898-----	15	37	45	A	17.83	31.27	30.24	20.66	1.54	7,032	1
				B	---	---	---	---	---	---	
				C	---	38.06	36.80	25.14	1.87	8,558	
				D	---	---	---	---	---	---	
Lower D bed, at drill-hole no. US-7898-----	15	37	45	A	18.87	31.42	33.70	16.01	0.20	7,329	1
				B	---	---	---	---	---	---	
				C	---	38.73	41.54	19.73	.25	9,034	
				D	---	---	---	---	---	---	
D bed, at Fisher mine--	36	37	42	A	41.3	23.3	26.7	8.7	0.29	5,630	2
				B	14.1	24.1	39.1	12.7	.42	8,240	
				C	---	39.7	45.4	14.9	.49	9,600	
				D	---	46.6	53.4	---	.58	11,270	
D bed, at Coal Creek mine----------	16	37	45	A	41.3	23.0	26.4	9.3	0.53	5,680	2
				B	13.0	34.1	39.2	13.7	.79	8,420	
				C	---	39.2	45.0	15.8	.90	9,670	
				D	---	46.6	53.4	---	1.07	11,480	