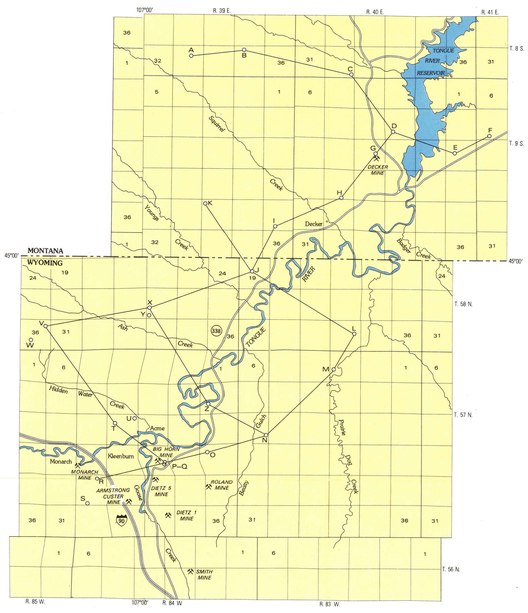
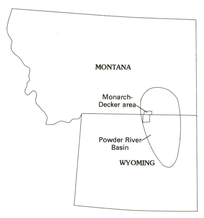
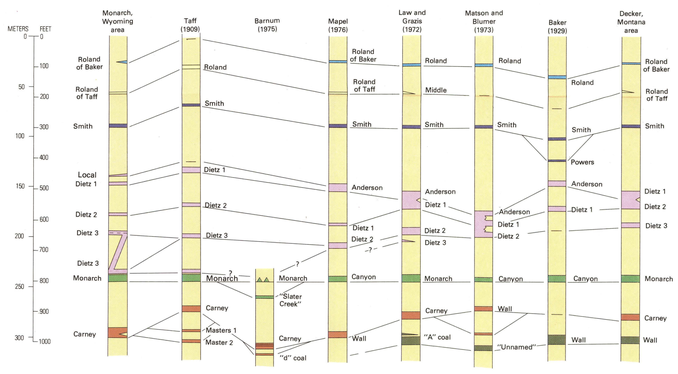


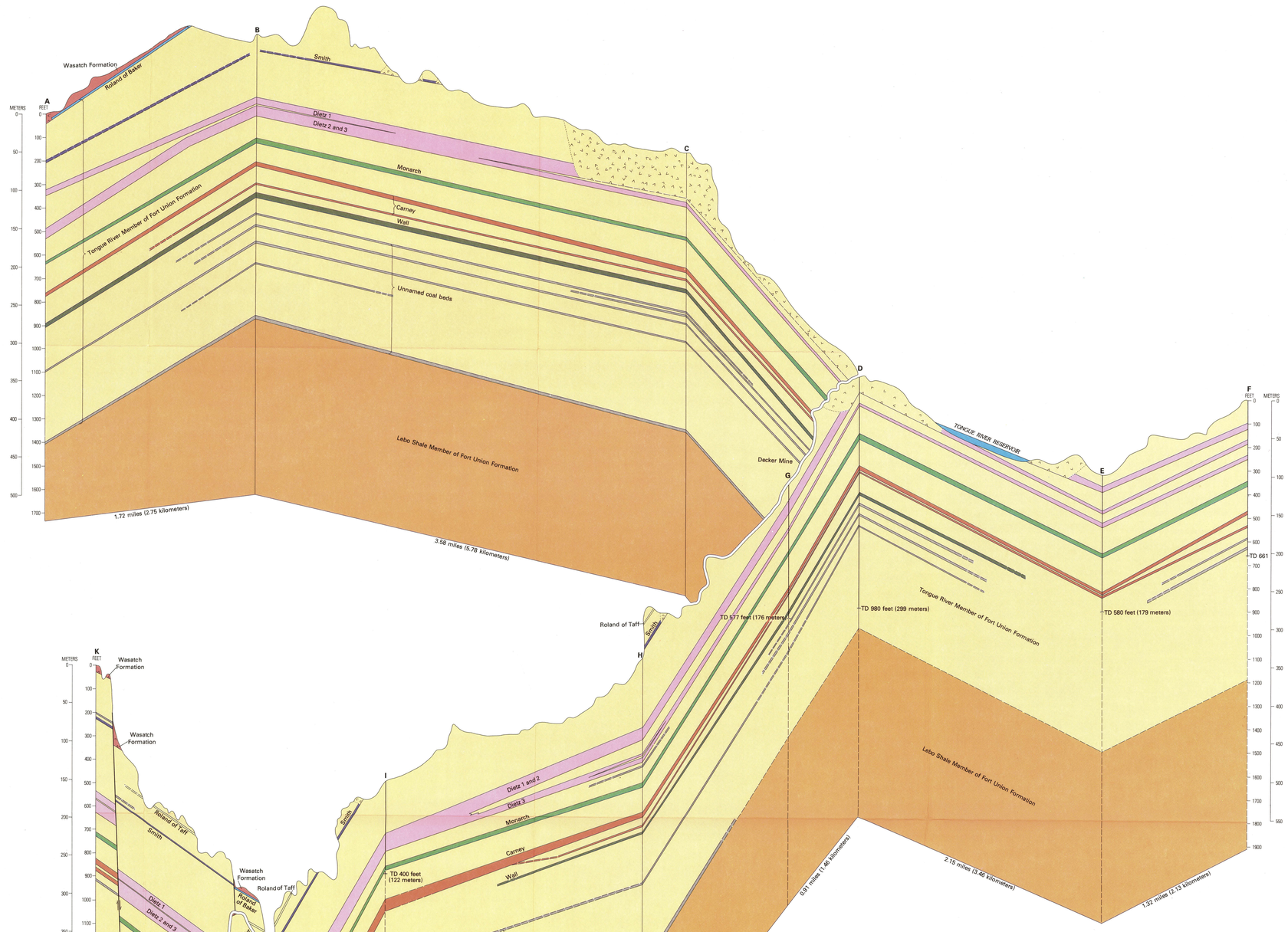
INDEX MAP SHOWING LOCATION OF REFERENCE POINTS USED IN FENCE DIAGRAM AND MAJOR COAL MINES IN THE REPORT AREA

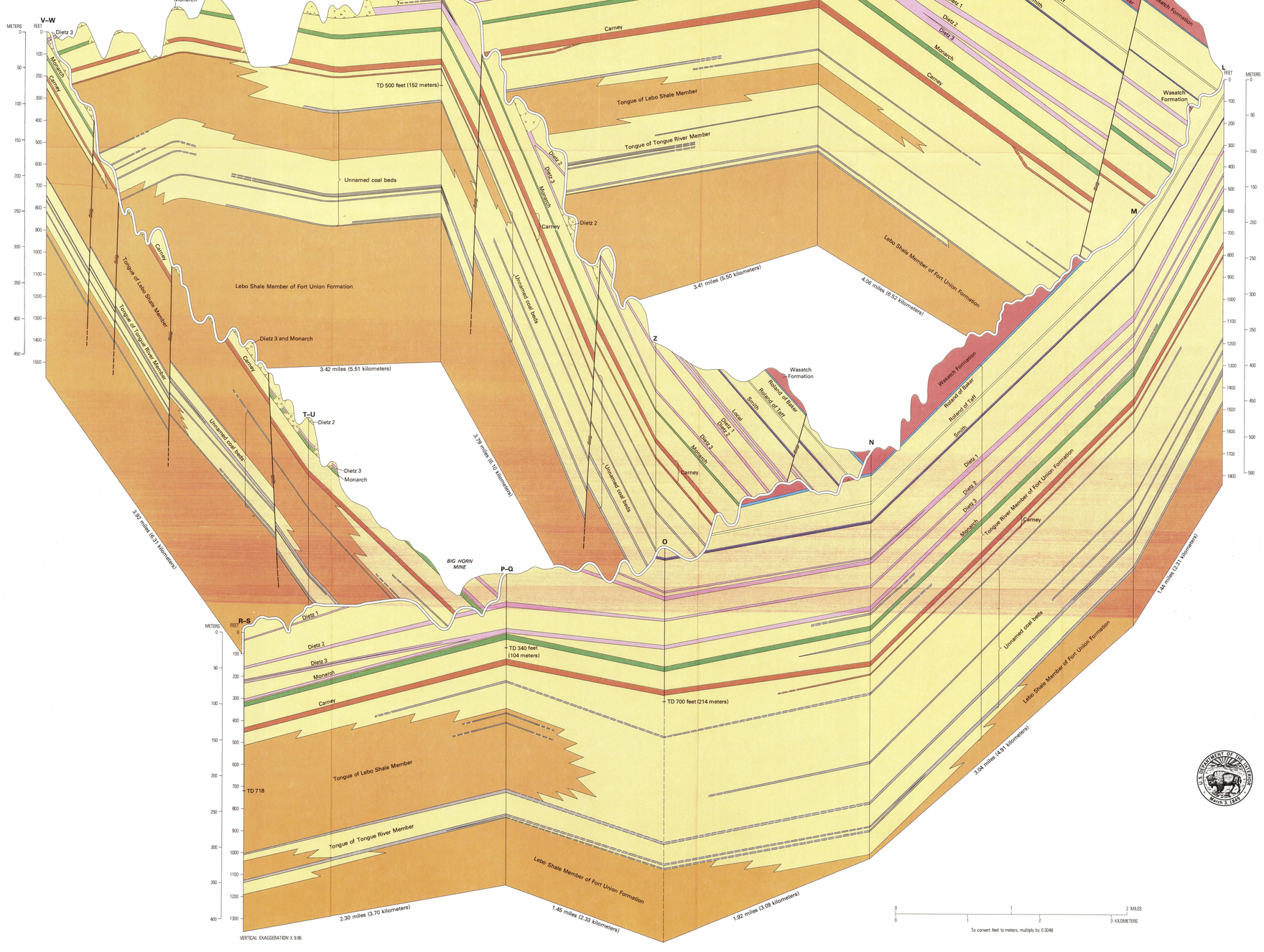


INDEX MAP SHOWING LOCATION OF MONARCH, WYOMING–DECKER, MONTANA AREA



GENERALIZED CORRELATION CHART OF COAL BED NOMENCLATURE





E X P L A N A T I O N

The fence diagram is a graphic perspective of three or more data points showing the lateral variation, extent, and correlation of geologic units. The diagram shown here was constructed using all available surface and subsurface information in the area. The reference sections, A thru Z, (see list below) used in the diagram are from measured surface sections and subsurface geophysical logs from oil and gas test holes or coal test holes. Drill-holes Q, S, U, W, and Y have been projected into the diagram to complete the stratigraphic section through the Tongue River Member of the Fort Union Formation. The top of the reference sections are located from U.S. Geological Survey 1:24,000 scale topographic maps. Surface profiles between the reference sections show vertical exaggeration (X 9.96) and are generalized. With the exception of the Ash Creek Anticline between reference sections V–W and X–Y, folds are not shown. Coal bed correlation lines are dashed where uncertain and question marks indicate areas where lack of information precludes an interpretation. Baked and burned areas caused by burning of coal beds are shown by v's enclosed by dotted lines. Burned coal beds are indicated by inverted v's attached to the base of the bed. Faults are shown by a solid line with relative movement indicated by arrows. Total drilling depth (TD) for shallow drill holes is indicated at the bottom of the reference sections. Extension below drilling depth is shown by dashed lines.

REFERENCE SECTIONS

A, Winoma Oil–J. O. Cook 1
B, Tom Vessels–Fed. Cook 1
C, Tom Vessels–Fed. Shall 16
D, Peter Kiewit Sons' Co.—w3
E, Peter Kiewit Sons' Co.–E–1638–76
F, Peter Kiewit Sons' Co.–E–1634–76
G, Peter Kiewit Sons' Co.–1666–77
H, Forrest Oil–Simpson 20–1
I, Montana Bureau of Mines and Geology 728
J, Raymond, Midwest, Cabot–Barbula Turley 1
K, Falcon and Seaboard–Geer 1
L, Consolidated–Fed.–34–58–83–8
M, Cities Service–A–1 Dutch Creek
N, Consolidated–1 Cherni
O, U.S.–76–126
P, Peter Kiewit Sons' Col–115–74
Q, United Western–Sheridan, Wyoming Coal 22–1
R, U.S.–76–128
S, Luff–1–29–Jorgenson
T, Measured surface section
U, United Western–State 16–1
V, Composite measured surface section from section 36
W, Gulf–Hawkins State 1
X, Public Service of Oklahoma No. 5
Y, Miami–1–c Vail
Z, Petroleum Inc.–Schreibeis 1

DISCUSSION

In recent years interest in Powder River Basin coal has increased dramatically. One of the focal areas within the basin is the Tongue River Valley, from Monarch, Wyoming, to Decker, Montana. The Monarch-Decker area has long been an important coal mining region and the Decker mine, opened in 1972, is now one of the largest surface coal mines in North America. The Big Horn mine, located near Acme, Wyoming, had been enlarged and there are proposals for new mines north and east of the Decker mine in Montana.

Attendant with increased mining activity is a growing concern with coal bed nomenclature and correlations. Through the years there has been a proliferation of coal bed names throughout the Powder River Basin. Because many of the names originated in the Monarch-Decker area, the objectives of this study are to synthesize the coal bed data of previous workers with recently available surface and subsurface information. A better understanding of the coal bed correlations should facilitate more accurate resource estimates and provide a foundation for detailed stratigraphic analysis.

Previous work relevant to the objectives of this study include: the original mapping of the Sheridan coal field, Wyoming, by Taff (1909) and the northward extension of the Sheridan coal field, Montana, by Baker (1929); recent geologic maps of the Decker (Law and Grazis, 1972), Ranchester (Barnum, 1975), and Bar N Draw (Mapel, 1976) 7½-minute quadrangles; a report of the quality and reserves of strippable coal in southeastern Montana (Matson and Blumer, 1973); and unpublished mapping of the Monarch, Pearl School, and Acme 7½-minute quadrangles by Barnum, Murray and Galyardt, and Law and Barnum, respectively.

Within the Monarch-Decker area the most economically important coal beds are in the Paleocene Tongue River Member of the Fort Union Formation. As the fence diagram shows, the Tongue River Member intertongues with the underlying Lebo Shale Member causing an overall northeastward thickening of the Tongue River Member. The intertonguing relationship was also noted by Law, Barnum, and Galyardt (1975). The top of the Tongue River Member is placed at the top of the Roland coal of Baker (1929).

The correlation chart shows the coal bed nomenclature used in previous reports and in this study. The nomenclature on the fence diagram follows, where possible, the coal bed names used by Taff (1909), and to a lesser extent those used by Baker (1929). Although the main purpose of this study is to clarify the coal bed correlations in this area, there is no proposal to change coal bed names. The origin and previous usage of the coal bed names used in this study are summarized below.

Roland coal of Baker.—The Roland coal mapped by Baker (1929) was originally thought to be the same coal as the Roland described by Taff (1909). However, physical tracing of the coal bed into Wyoming by E. E. Richardson in 1957 (written commun., 1957) and Law and Grazis in 1972 determined that the coal undergoes a rapid facies change about one-half mile (0.8 km) north of the Roland mine, in the Sheridan coal field, Wyoming, and is equivalent to a carbonaceous shale about 120 ft (36.6 m) stratigraphically higher than Taff's Roland coal at the Roland mine.

Roland coal of Taff.—The Roland coal was named by Taff (1909, p. 130, 142) for exposures at the Roland mine, located in the SW¼NW¼ sec. 25, T. 57 N., R. 84 W. The coal thins northward from this locality and in the northern half of the Decker quadrangle, Montana, it is not identifiable. The Roland coal of Taff is equivalent to the "middle coal" of Law and Grazis (1972).

Smith Coal.—The Smith coal was named by Taff (1909, p. 130, 141) for exposures in the Smith mine, located in the NE¼ sec. 10, T. 56 N., R. 84 W. The Smith coal is exposed over a large part of the area and is equivalent to the Smith coal as mapped by Baker (1929) and subsequent workers.

Dietz 1 coal.—The Dietz 1 coal was named by Taff (1909, p. 129, 140) for exposures at the abandoned No. 1 mine at the old mining town of Dietz, Wyoming, located in the NE¼ sec. 34, T. 57 N., R. 84 W. The Dietz 1 coal was extensively mined in this area and is presently mined at the Decker mine where it has merged with the underlying Dietz 2 coal. The Dietz 1 coal was also mined at the abandoned Armstrong Custer mine, located in the SW¼SE¼ sec. 28, T. 57 N., R. 84 W. In the vicinity of Dietz, Wyoming, an unnamed coal bed 1 to 4 ft (.3 to 1.2 m) thick outcrops about 20 to 50 ft (6.1 to 15 m) above the Dietz 1 coal. This coal bed can be traced northward about 5 mi (8.0 km), near the Wyoming–Montana State line, where it merges with the Dietz 1 coal. The Dietz 1 coal is equivalent to the Anderson coal as mapped by Baker (1929) and subsequent workers.

Dietz 2 coal.—The Dietz 2 coal was named by Taff (1909, p. 129, 140) for exposures at the abandoned underground mines at and near Dietz, Wyoming. The Dietz 2 coal was mined in the No. 5 mine (NW¼ sec. 27, T. 57 N., R. 84 W.). It is the uppermost bed in the Big Horn mine and is mined at the Decker mine where it has merged with the Dietz 1 coal. The Dietz 2 coal is equivalent to the Dietz 1 coal as mapped by Baker (1929) and subsequent workers.

Dietz 3 coal.—The Dietz 3 coal was named by Taff (1909, p. 129, 140). Taff's description of this bed is ambiguous and he gives no reference localities which can be recovered with certainty. It appears that the prospects near the mouth of Goose Creek described as the Dietz 3 coal were probably in the middle coal that is presently mined at the Big Horn mine. West of the Big Horn mine the Dietz 3 coal splits into three beds and in drill-hole R the upper two beds are about 75 ft (22.9 m) above the lower bed (Monarch on fence diagram). The upper beds are in the same stratigraphic position shown by Taff (1909, pl. v 111) as intermediate between the Dietz 2 and Monarch coals. East and northeast of the Big Horn mine the Dietz 3 coal diverges from the underlying Monarch coal. In the vicinity of Squirrel Creek (drill-hole I) the Dietz 3 coal merges with the Dietz 1 and 2 coals forming a single coal 75 ft (22.9 m) thick. The Dietz 3 coal is equivalent to the Dietz 3 of Taff plus the upper bench of coal described by Taff (1909, p. 138–139) as part of the Monarch; and the Dietz 2 coal of Law and Grazis (1972), Matson and Blumer (1973), and Mapel (1976).

Monarch coal.—The Monarch coal was named by Taff (1909, p. 129, 138–139) for exposures at the Monarch mine, Monarch, Wyoming (sec. 19, T. 57 N., R. 84 W.). At Monarch the coal is described by Taff (1909, p. 129) as "divided into two benches." However, the upper bench is probably part of the Dietz 3 coal and consequently only the lower bench is referred to as the Monarch coal in this report. The coal was mined extensively in underground workings south of Monarch and is the lowest of the three beds mined at the Big Horn mine. The Monarch coal is equivalent to the Canyon coal of Baker (1929), Matson and Blumer (1973), and Mapel (1976); and the Monarch coal of Law and Grazis (1972).

Carney coal.—The Carney coal was named by Taff (1909, p. 129, 137–138, 149) for exposures at the extensive Carney Coal Company mines, which had entries on the north side of the Tongue River near Kleenburn, Wyoming (SE¼SE¼ sec. 17 and SW¼SW¼ sec. 16, T. 57 N., R. 84 W.). The Masters coals described by Taff (1909, p. 128, 136) are probably splits of the Carney coal. The Carney coal is equivalent to the Carney coal of Law and Grazis (1972), Barnum (1975), the Wall coal of Matson and Blumer (1973), and Mapel (1976).

Wall coal.—The Wall coal was named by Baker (1929) but he did not give any details regarding the derivation of the name. Baker thought that the Wall coal was equivalent to the Monarch and Carney coals of the Sheridan coal field. However, present information suggests that it is stratigraphically lower than the Carney coal and is equivalent to the A coal of Law and Grazis (1972) and an unnamed coal below the Wall in the Winoma, Vessels No. 1, and Shell No. 16 wells (A, B, and C wells of this report) of Matson and Blumer (1973). The Wall coal thins and apparently undergoes a facies change to the south and southwest and is not present in the Monarch area.

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COAL BED CORRELATIONS IN THE TONGUE RIVER MEMBER OF THE FORT UNION FORMATION, MONARCH, WYOMING, AND DECKER, MONTANA, AREAS

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