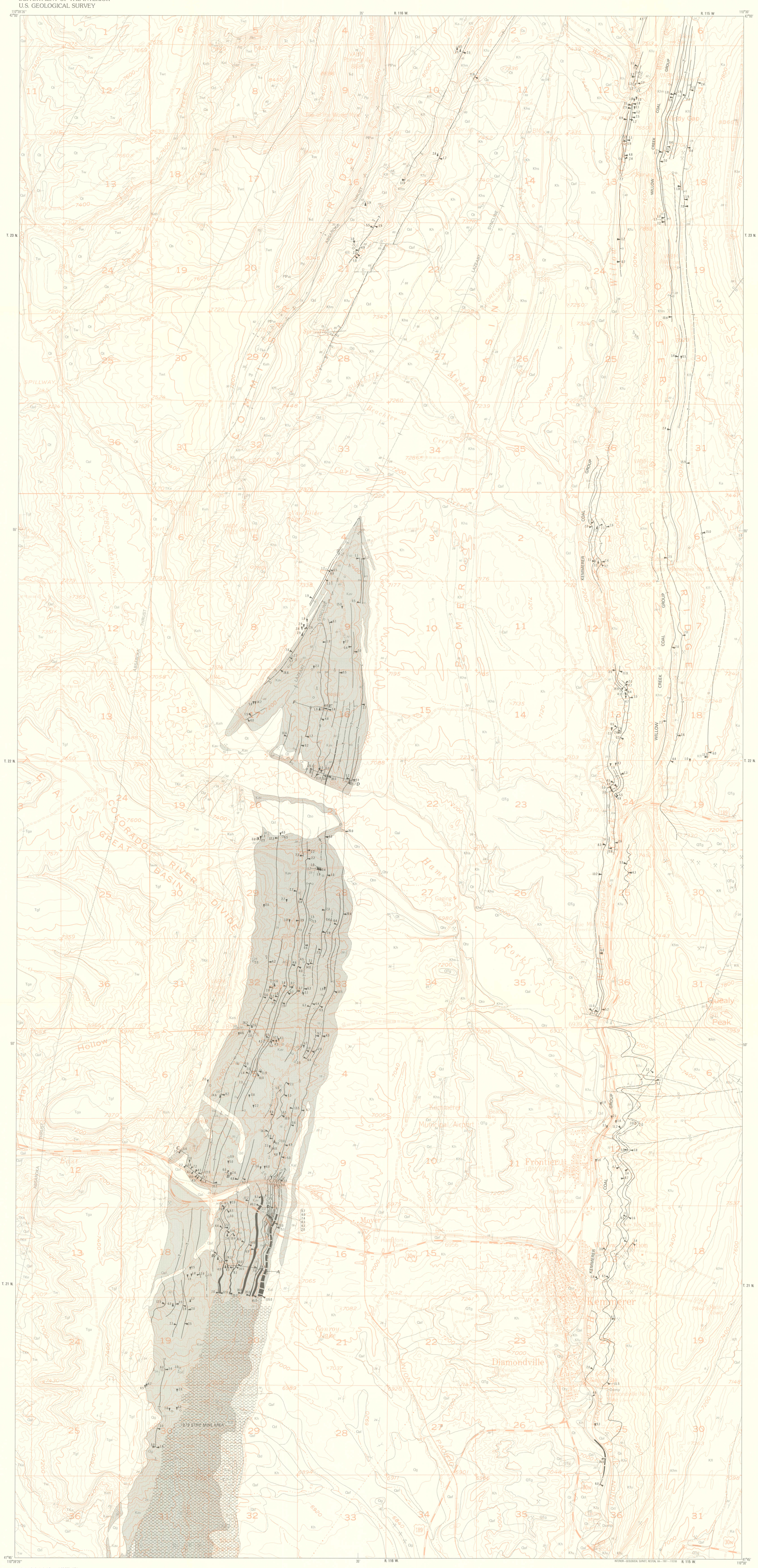

CORRELATION OF MAP UNITS

Units	Epoch	Period
Qal, Qaf, Qs, Qd, Qt, Qty, Qto, Qg	Holocene and Pleistocene	QUATERNARY
QTg	Pleistocene or Pliocene	QUATERNARY OR TERTIARY
Twt, Twm, Tw, Tga, Tgf	Eocene	TERTIARY
TKe, Keh, Kel	Paleocene	TERTIARY
Kal, Kav, Kh, Khs, Kfu, Kfm, Kfl, Ka, Kbr	Upper Cretaceous	CRETACEOUS
Kbr, Ka, Kfl, Kfm, Kfu, Khs, Kh	Lower Cretaceous	CRETACEOUS
Jt, Jtg	Upper and Middle Jurassic	JURASSIC
JTRn		JURASSIC(?) AND TRIASSIC(?)
TRa, TRt	Upper Triassic	TRIASSIC
TRw, TRd	Lower Triassic	TRIASSIC
Pp		PERMIAN
PIPw		PENNSYLVANIAN

Coal bed—Dashed where approximately located; dotted where concealed; queried where uncertain

Carbonaceous shale bed—Dotted where concealed; queried where uncertain

Contact—Dashed where approximately located; dotted where concealed

High-angle fault—Dashed where approximately located; dotted where concealed. U, upthrown side; D, downthrown side

Thrust fault—Dashed where approximately located; dotted where concealed. T on upper plate

Folds—Showing crestline or troughline. Dashed where approximately located; dotted where concealed

Anticline

Overturned anticline

Syncline

Strike and dip of beds

Inclined

Overturned

Vertical

Map station—Location of coal or carbonaceous shale unit examined for this study

Coal—Total thickness of coal, in feet, measured at solid triangle

Coal trace—No thickness measured

Carbonaceous shale—Thickness, in feet, shown where measured

Abandoned coal or phosphate mine

Phosphate trench

Prospect pit

Dry hole—Drilled for oil or gas

Line of measured section—Offset of section line shown as dotted line

DESCRIPTION OF MAP UNITS

[Modified from Rubey and others, 1975]

Stream deposits (Holocene and Pleistocene)—Gravel, sand, silt, and clay, poorly sorted, unconsolidated

Qal — **Channel and flood-plain deposits along streams**

Qaf — **Alluvium in tributary valleys and alluvial fans**

Qs — **Landslide deposits (Quaternary)**

Qd — **Talus deposits (Quaternary)**

Qt — **Terrace deposits (Quaternary)**

Qty — **Younger terrace deposits**—Topographically lower than unit Qto

Qto — **Older terrace deposits**—Topographically higher than unit Qty

Qg — **Gravel deposits (Quaternary)**—Some may be older than Quaternary

QTg — **High terrace deposits (Quaternary or Tertiary)**—Gravel, sand, and clay on straths 250–350 ft (76–107 m) above Hams Fork

Green River Formation (Eocene)

Tga — **Angelo Member**—Bluish-white-weathering calcareous shale, siltstone, and some limestone. As much as 200 ft (61 m) thick

Tgf — **Fossil Butte Member**—Buff laminated limestone and marlstone, some brown oil shale, and gray siltstone and claystone. Fossil fish quarries near top of this unit. About 200–280 ft (61–85 m) thick

Wasatch Formation (Eocene)

Twt — **Tunp Member**—Diamictite; boulders and blocks in red mudstone matrix; intertongues with other members of Wasatch Formation. Several hundred feet (100+ m) thick

l — **limestone bed**

Twm — **Mudstone tongue**—Red and green mudstone, brown sandstone, and thin beds of limestone. As much as 60 ft (18 m) thick

Tw — **Main body**—Red, maroon, yellow, and gray mudstone; brown, yellow, and gray sandstone; conglomerate. As much as 1,700 ft (518 m) thick in nearby areas to the west

Evanston Formation (Paleocene and Upper Cretaceous)

TKe — **Main body (Paleocene and Upper Cretaceous)**—Gray siltstone and sparse coal beds. Locally contains some lignite. As much as 1,000 ft (305 m) thick

Keh — **Hams Fork Conglomerate Member (Upper Cretaceous)**—Conglomerate beds containing pebbles, cobbles, and boulders; some gray to brown cross-bedded sandstone and gray mudstone. As much as 1,000 ft (305 m) thick

b — **Mapped trace of boulder-conglomerate bed**

Kel — **Lower member (Upper Cretaceous)**—Gray to dark-gray mudstone, siltstone, and carbonaceous sandstone. About 400 ft (122 m) thick

Kav — **Adaville Formation (Upper Cretaceous)**—Yellow- to brown-weathering gray sandstone, siltstone, and carbonaceous clay. Numerous coal beds in middle and lower parts. About 2,900 ft (884 m) thick

Kal — **Lazeart Sandstone Member**—Light-gray to white sandstone and grit; basal part of formation. About 400 ft (122 m) thick in the south part of map area; pinches out to the north

Kh — **Hilliard Shale (Upper Cretaceous)**—Dark-gray to tan marine claystone, siltstone, and sandy shale; thin beds of light-gray sandstone, grit, and bentonite. As much as 6,450 ft (1,966 m) thick

Khs — **Shurtliff Sandstone Member**—Near middle of formation; divides formation into two parts. Sandstone ledges in upper and lower parts, shale in middle; abundant *Inoceramus* shell fragments. Thickens northward from 150 to 975 ft (46 to 297 m)

Frontier Formation (Upper Cretaceous)

Kfu — **Upper unit**—Hogbacks of tan sandstone; shale, lignitic shale, and coal. Abundant oyster shells locally. As much as 750 ft (229 m) thick

Kfm — **Middle unit**—Prominent hogbacks of white to light-gray sandstone in upper half (Oyster Ridge Sandstone Member); tan sandstone, dark shale, and coal beds. As much as 700 ft (213 m) thick

Kfl — **Lower unit**—Beds of white and brown sandstone, less resistant than those above; tan siltstone and gray shale; beds of lignite; coal; and pink, gray, and white porcelanite (silicified volcanic ash). As much as 1,100 ft (335 m) thick

Ka — **Aspen Shale (Lower Cretaceous)**—Light- to dark-gray siltstone, claystone, quartzitic sandstone, and porcelanite. Lower part forms silver-gray hogbacks. Thickens northward from 825 to 1,225 ft (251 to 373 m)

Kbr — **Bear River Formation (Lower Cretaceous)**—Black fissile claystone, resistant sandstone, and fossiliferous limestone. About 1,400 ft (427 m) thick

Jt — **Twin Creek Limestone (Upper and Middle Jurassic)**—Light- to yellowish-gray weathering argillaceous limestone and calcareous siltstone, and layers of massive oolitic limestone. About 900 ft (274 m) thick

Jtg — **Gypsum Spring Member**—Red calcareous mudstone and light-gray limestone breccia; basal member of formation

JTRn — **Nugget Sandstone (Jurassic? and Triassic?)**—Buff to pinkish-tan quartzite and slightly calcareous sandstone; massive. 700 to 900 ft (213 to 274 m) thick

TRa — **Ankareh Redbeds (Upper Triassic)**—Red sandy calcareous mudstone and red, purple, and tan fine-grained quartzite, sandstone, and siltstone. As much as 700 ft (213 m) thick

TRt — **Thaynes Limestone (Lower Triassic)**—Gray sandy and silty limestone and greenish-gray calcareous siltstone. Some silty claystone. Maximum thickness about 1,000 ft (305 m)

TRw — **Woodside Redbeds (Lower Triassic)**—Nonresistant red siltstone and claystone; some red sandstone and gray limestone. About 650 ft (198 m) thick

TRd — **Dinwoody Formation (Lower Triassic)**—Dull greenish-gray calcareous siltstone, claystone, and argillaceous sandy limestone. As much as 525 ft (160 m) thick

Pp — **Phosphoria Formation and equivalent strata (Permian)**—Dark-gray siltstone, black chert, and limestone; dark-gray, occasionally phosphatic siltstone; beds of phosphate rock; gray cherty dolomitic limestone. About 400 ft (122 m) thick

PIPw — **Wells Formation (Permian and Pennsylvanian)**—Buff to light-gray fine-grained quartzite and sandstone with some dolomite and limestone units. About 600–700 ft (183–213 m) thick

INTRODUCTION

The purpose of the study was to locate, measure, and map coal outcrops in the Cretaceous Adaville and Frontier Formations, in order to increase knowledge of the coal geology of the area through measurements of individual coal beds. In 1977, the U.S. Geological Survey initiated the Kemmerer and Evanston 1:100,000-scale coal folio project in southwestern Wyoming to map the geologic setting of coal-bearing units in the region, particularly in the Upper Cretaceous Adaville and Frontier Formations; the present work was part of that regional study. U.S. Geological Survey regional maps of southwestern Wyoming were previously published by Veatch (1907) and Rubey and others (1975).

GENERAL GEOLOGY

The exposed coal-bearing units are located on the eastern edge of the Wyoming Thrust Belt that abuts the west side of the Green River Basin, where coal-bearing units are present in the subsurface. The coal-bearing Adaville and Frontier Formations, located in the eastern two-thirds of the Kemmerer 15-minute quadrangle, are exposed from T. 21 N. through most of T. 23 N., and in R. 116 W. and R. 115 W. The two formations, together with the intervening marine Hilliard Shale, are located in the nose of the southward-plunging Lazeart syncline; the stratigraphically lower Frontier Formation surrounds the Hilliard Shale on the east, north, and northwest, and the Adaville Formation occupies the axial trough of the fold. The syncline is asymmetric; the Frontier Formation beds on the eastern limb dip as much as 48° to the west, and the beds in the western limb are mostly vertical with some overturned 60° to the west. The Frontier Formation was described by Rubey and others (1975, p. 7 and pl. 1) as consisting of three informal map units: in the map area, the lowermost unit (Kfl), thickens northward from 900 to 1,000 ft; the middle unit (Kfm) thins northward from 700 to 625 ft and includes the Willow Creek group of coal beds; and the upper unit (Kfu) thickens northward from 450 to 650 ft and includes the Kemmerer group of coal beds.

The geologic map by Rubey and others (1975), does not show coal beds, and a major reason for our mapping the coal beds was to provide a tie to other detailed coal-bed mapping done in the south by M'Gonigle (1979a,b), Schroeder (1976; 1977; 1979; 1981; 1982) and Schroeder and Lunceford (1979a,b).

The area has been of long-standing interest to the mining industry. Coal beds in the Frontier Formation were mined underground during the first half of the century. The thicker and more numerous beds in the Adaville Formation are currently being mined in the southern part of the study area by the Pittsburgh and Midway Coal Mining Company. Land north of Hams Fork has been leased by the Pittsburgh and Midway Coal Mining Company for the proposed North Block Mine. The land south of Hams Fork and north of the Kemmerer open-pit mine is the proposed site for the Twin Creek Mine.

The majority of the coal measurements made for this study were taken in the Adaville Formation (approximately 2900 ft thick), where coal beds are concentrated in the middle and lower parts of the section; in the Frontier Formation (as much as 2500 ft thick), coal beds are concentrated in the middle and upper parts of the formation. The greatest thickness of coal measured in a bed in the Frontier Formation was 24 ft; in the Adaville Formation, the greatest thickness of coal measured was 115 ft, in a bed on the north side of the Kemmerer coal mine IUD pit. The rank of the coal is bituminous in the Frontier Formation and subbituminous in the Adaville Formation. Most of the coal and carbonaceous shale beds have a lenticular distribution and are not traceable for great distances. No formal names have been associated with any of the measured coal beds in the Adaville Formation; however, major coal seams have been assigned numbers by the Pittsburgh and Midway Coal Mining Company. Four sections were measured in the Adaville Formation in order to examine, in detail, the stratigraphic units associated with the coals and carbonaceous shales.

METHOD OF STUDY

Field work was conducted in the summer of 1979 by Jean N. Weaver and John W. M'Gonigle, assisted by Ellen B. Hardman and Ralph C. M'Gonigle. Field work consisted of trenching, measuring, and plotting the coal and carbonaceous shale beds. The data points were located on 1:20,000-scale black-and-white aerial photographs and transferred, using a PG-2 Photogrammetric Plotter, to a 1:24,000-scale geologic base that was enlarged from a scale of 1:62,500 (Rubey and others, 1975). The relationship of data points was determined by walking out the stratigraphic units in the field and also by tracing them on the aerial photographs.

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MEASURED STRATIGRAPHIC SECTIONS IN THE ADAVILLE FORMATION

LOCATION OF COAL AND CARBONACEOUS SHALE BEDS EXPOSED IN THE EASTERN PART OF THE KEMMERER 15-MINUTE QUADRANGLE, LINCOLN COUNTY, WYOMING

By
J. N. Weaver and J. W. M'Gonigle

1987

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