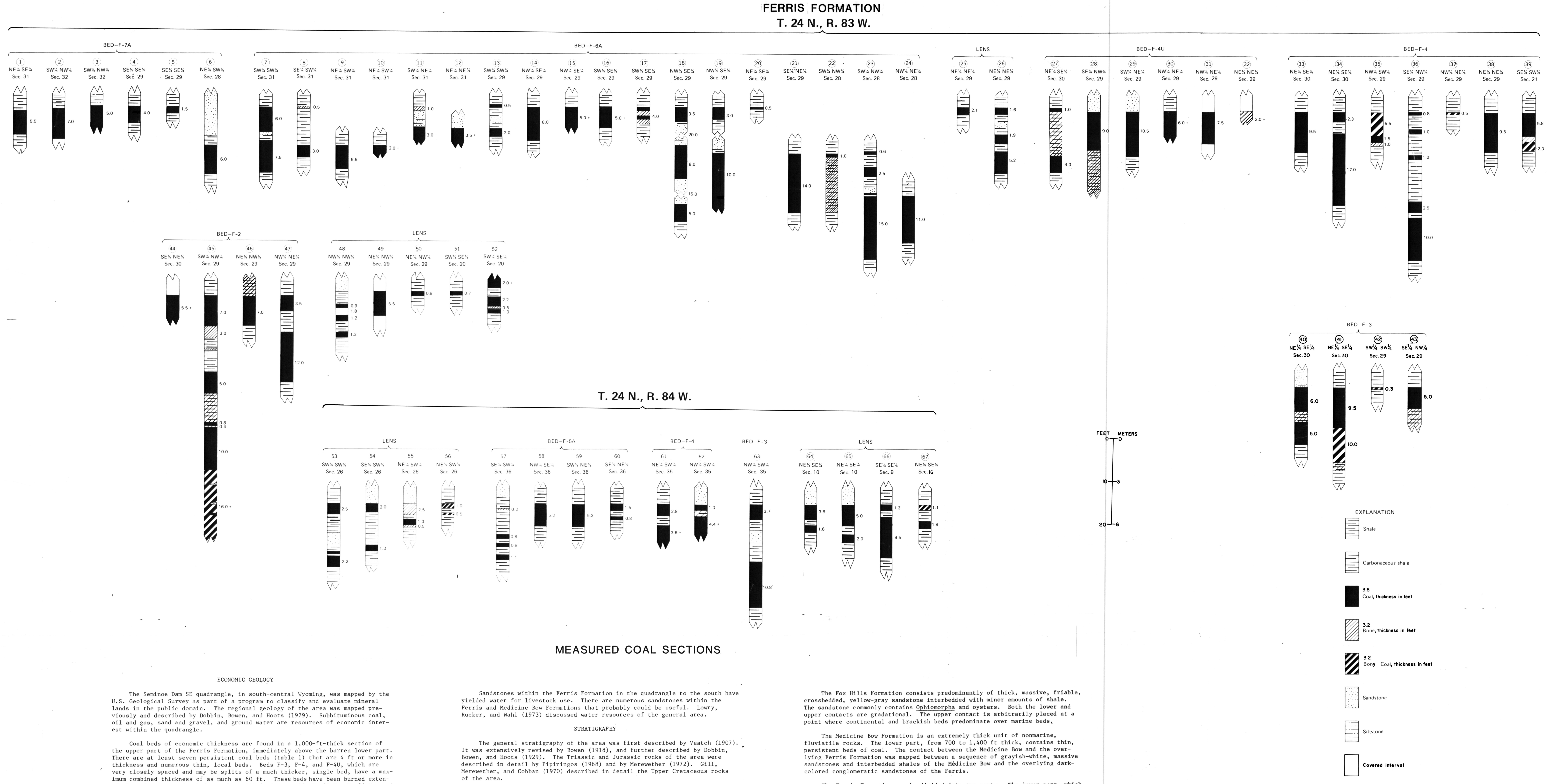

MEASURED COAL SECTIONS

ECONOMIC GEOLOGY

The Seminoe Dam SE quadrangle, in south-central Wyoming, was mapped by the U.S. Geological Survey as part of a program to classify and evaluate mineral lands in the public domain. The regional geology of the area was mapped previously and described by Dobbin, Bowen, and Hoots (1929). Subbituminous coal, oil and gas, sand and gravel, and ground water are resources of economic interest within the quadrangle.

Coal beds of economic thickness are found in a 1,000-ft-thick section of the upper part of the Ferris Formation, immediately above the barren lower part. There are at least seven persistent coal beds (table 1) that are 4 ft or more in thickness and numerous thin, local beds. Beds F-3, F-4, and F-4U, which are very closely spaced and may be splits of a much thicker, single bed, have a maximum combined thickness of as much as 60 ft. These beds have been burned extensively and to great depth (as much as 180 ft in sec. 36, T. 24 N., R. 84 W., and sec. 31, T. 24 N., R. 83 W.).

Analyses of two drill-cutting samples from USGS holes SD-1-36 and SD-1-32, are shown in table 2. An average of 10 analyses taken from core-hole samples from the Pats Bottom quadrangle to the south shows the following as-received values: moisture, 11.3 percent; ash, 8.8 percent; volatile matter, 35.35 percent; fixed carbon, 44.56 percent; sulfur, 0.57 percent; and a heating value of 10,511 Btu/lb (Blanchard and Comstock, 1980).

Coals from the Almond Formation are very steeply dipping (as much as 80°) and are therefore inaccessible to strip- or subsurface-mining methods. The thickest measurement of a single bed in outcrop is 8 ft; the thickest measurement in a drill hole is 3.5 ft. According to Veatch (1907, p. 253-258), the coals are subbituminous to bituminous in rank and have an as-received average of 6 percent moisture, 3.5 percent ash, and slightly more than 12,000 Btu/lb heating value. A sample from a drill hole in sec. 1, T. 24 N., R. 84 W., showed 7.8 percent moisture, 7.1 percent ash, 36.43 percent volatile matter, 48.67 percent fixed carbon, 0.53 percent sulfur, and a heating value of 11,643 Btu/lb (Texas Instruments, 1978, p. 27).

Coal beds in the Medicine Bow Formation are also steeply dipping (as much as 64°) and are also inaccessible to strip- or subsurface-mining methods. The thickest bed encountered in a drill hole is 4 ft. An analysis from a drill-hole sample in sec. 7, T. 24 N., R. 83 W., showed 10.59 percent moisture, 4.04 percent ash, 36.35 percent volatile matter, 49.02 percent fixed carbon, 0.82 percent sulfur, and a heating value of 11,372 Btu/lb (Texas Instruments, 1978, p. 27).

There are no active or abandoned mines in this quadrangle; however, in the Pats Bottom quadrangle to the south two large stripping operations are mining coal from the Ferris Formation. Several major problems will limit coal mining in the area: (1) Even at relatively shallow dips (15°-20°), little of the coal is exposed at the present overburden limits of the dragline; (2) faults, particularly small-displacement faults (5-10 ft) that may not be recognized in the drill hole, are difficult to compensate for while stripping; (3) the thickest coal bed is burned to a depth requiring stripping of massive quantities of clinkered rock before reaching the coal; (4) esthetic considerations because of proximity to Seminoe Reservoir; and (5) environmental considerations because of the shallow depth of the water table.

The U.S. Geological Survey drilled five exploratory drill holes in May and June 1976 and the Bureau of Land Management drilled three core holes in September and October 1974 for their Energy Minerals Rehabilitation Inventory and Analysis program (EMRIA Report no. 2, 1975). These 8 holes (Blanchard and Pike, 1977) and 30 holes drilled by Union Pacific Coal Company (now Rocky Mountain Energy Company) are shown on sheet 3. The 30 drill holes were originally correlated and shown in a report by Texas Instruments (1978); they have been recorrelated for this report.

Two unsuccessful oil-and-gas test holes were drilled in this quadrangle. The Shell-PRBU 23X-10 Government well bottomed in the Almond Formation and is located in sec. 10, T. 24 N., R. 84 W. The Mississippi River Fuel Corp. No. 1 Seminoe Unit, in sec. 25, T. 25 N., R. 84 W., bottomed in the Tensleep Sandstone. Both of these holes are shown in cross-section B-B' (sheet 1).

Abundant terrace gravels are found along the North Platte River and would be an ideal source of material for road building and mine construction.

Sandstones within the Ferris Formation in the quadrangle to the south have yielded water for livestock use. There are numerous sandstones within the Ferris and Medicine Bow Formations that probably could be useful. Lowry, Rucker, and Wahl (1973) discussed water resources of the general area.

STRATIGRAPHY

The general stratigraphy of the area was first described by Veatch (1907). It was extensively revised by Bowen (1918), and further described by Dobbin, Bowen, and Hoots (1929). The Triassic and Jurassic rocks of the area were described in detail by Pipiringos (1968) and by Merewether (1972). Gill, Merewether, and Cobban (1970) described in detail the Upper Cretaceous rocks of the area.

Rocks exposed in the quadrangle range in age from Pennsylvanian (Tensleep Sandstone), exposed in the northeast corner of the quadrangle, to Paleocene (upper part of Ferris Formation), exposed along the south boundary of the quadrangle. Extensive surficial deposits mantle underlying units, especially in the northern part.

Except for the Tensleep Sandstone, the Paleozoic and lower part of the Mesozoic rocks are generally very poorly exposed and are covered by Quaternary pediment deposits and alluvium. The upper part of the Cretaceous, including the Mesaverde Group, Lewis Shale, Fox Hills, and Medicine Bow Formations, is particularly well exposed along Horseshoe Ridge, Big Draw, and the ridge south of Big Draw, in the north-central part of the quadrangle.

Gill, Merewether, and Cobban (1970) described rocks of Late Cretaceous age in this area. The reference section for the Haystack Mountains Formation, as described by them, is in the SE¼ sec. 36, T. 25 N., R. 84 W. The Haystack Mountains Formation consists of marine sandstone deposited in nearshore and offshore environments interbedded with marine shale deposited in deeper water. The contact with the underlying Steele Shale, of marine origin, is gradational. Marine shale units of the Haystack Mountains intertongue with the Steele Shale. The contact with the overlying Allen Ridge Formation is sharp and conformable, representing a change from marine to nonmarine and marginal marine deposition. The contact is located by a change from marine sandstone to carbonaceous shale or coal.

The Allen Ridge Formation is a thick sequence of fluviatile sandstone, shale, carbonaceous shale, and very minor coal. The contact with the overlying Pine Ridge Sandstone is sharp and probably unconformable.

The Pine Ridge Sandstone is a thin, fluviatile unit consisting of sandstone, carbonaceous siltstone, carbonaceous shale, and thin beds of impure coal. This unit is, according to Gill, Merewether, and Cobban (1970), a major regressive tongue of the Mesaverde Group, formed as the strandline retreated toward the east. The Pine Ridge Sandstone conformably underlies and grades into the overlying Almond Formation.

The Almond Formation consists of sandstone, shale, and minor coal. Some of the sandstone beds are of marginal marine origin. According to Gill, Merewether, and Cobban (1970), there are two types of shale units in the Almond. The more common is brownish gray to brownish black, carbonaceous to coaly, with abundant ironstone concretions and brackish-water fossils. The second type is typically dark gray to olive gray and probably represents tongues of the overlying Lewis Shale. The contact with the Lewis Shale is conformable and is usually placed at the top of a shallow marine sandstone underlain by brackish water and fluviatile beds and overlain by marine shale.

The Lewis Shale consists of a thick sequence of marine shale, siltstone, and sandstone, and is gradational in contact with the underlying Almond Formation and the overlying Fox Hills Formation. In the middle and upper parts of the Lewis Shale there is an interbedded sandstone and shale unit known as the Dad Sandstone Member, which is a tongue of the overlying Fox Hills. Above the Dad Member, the Lewis Shale grades into the sandstones of the Fox Hills Formation.

The Fox Hills Formation consists predominantly of thick, massive, friable, crossbedded, yellow-gray sandstone interbedded with minor amounts of shale. The sandstone commonly contains Ophiomorpha and oysters. Both the lower and upper contacts are gradational. The upper contact is arbitrarily placed at a point where continental and brackish beds predominate over marine beds.

The Medicine Bow Formation is an extremely thick unit of nonmarine, fluviatile rocks. The lower part, from 700 to 1,400 ft thick, contains thin, persistent beds of coal. The contact between the Medicine Bow and the overlying Ferris Formation was mapped between a sequence of grayish-white, massive sandstones and interbedded shales of the Medicine Bow and the overlying dark-colored conglomeratic sandstones of the Ferris.

The Ferris Formation can be divided into two parts. The lower part, which ranges in thickness from 1,000 ft to 2,600 ft, and thins toward the northeast, is of Late Cretaceous age, as determined from plant microfossils collected by Gill, Merewether, and Cobban (1970). The lower part is almost devoid of coal and consists of entirely nonmarine conglomeratic sandstone, sandstone, shale, and carbonaceous shale. The upper part, about 3,600 ft thick, also continental in origin, consists of mudstone, shale, carbonaceous shale, siltstone, sandstone, conglomeratic sandstone, and numerous thick coal beds. Plant microfossils, collected by Gill, Merewether, and Cobban (1970), yielded an early Paleocene age.

The numbering sequence for persistent coal beds, as used by Dobbin, Bowen, and Hoots (1929), was revised to eliminate confusion in the correlation of beds in this quadrangle with coal beds in Pats Bottom quadrangle, to the south. Table 1 correlates the coal beds in this report with those of Dobbin, Bowen, and Hoots (1929).

Extensive Quaternary stream terrace deposits are present along the drainage of the North Platte River. These deposits are as much as 150 ft above the present reservoir level in at least two terrace levels. The pebbles and cobbles are predominantly composed of quartzite, similar to Precambrian quartzite exposed in the Medicine Bow Mountains south of the Hanna Basin. The pebbles and cobbles are very well rounded. The cobbles usually have a weathering rind that is as thick as 0.5 in. Many of the cobbles have been modified into ventifacts by the action of prevailing winds.

Quaternary pediment deposits cover large areas in the northern part of the quadrangle. These deposits contain cobbles and boulders composed of igneous and metamorphic rocks derived from Precambrian rocks exposed in the mountains north and northwest of this quadrangle. In general, the cobbles and boulders are very angular. One of the most striking lithologies is a banded quartz-magnetite-grunerite (Bayley, 1968). The source of this iron ore is probably from the Bradley Peak area about 10 mi to the northwest. This iron ore is also found, in lesser quantities, in the stream terrace deposits and is usually well rounded. Another lithology, although a very minor component, is nephrite jade which is also found as well-rounded pebbles in the stream terraces.

STRUCTURE

A prominent set of normal faults and grabens cut the Ferris Formation along the quadrangle's southern border. The displacement along these faults ranges in thickness from 5 or 10 ft to several hundred feet. Little or no drag was observed along these faults and it is presumed that little strike-slip movement was involved.

The O'Brien Springs anticline and Camp Creek syncline, which can be traced westward for about 50 mi, enter the quadrangle along the western border and die out or are terminated by a fault in the west-central part of the quadrangle.

Rocks in the northeast and east-central parts of the quadrangle are very sharply folded and faulted, probably resulting from the uplifting of Precambrian rocks to the north and plastic deformation of younger rocks in that area. A very tightly folded anticline and syncline within the Lewis Shale was mapped by R. W. Jones (oral commun., 1981) in the adjoining quadrangle to the east and enters Seminoe Dam SE quadrangle along the east-central border.

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GEOLOGIC MAP AND COAL DEPOSITS OF THE SEMINOE DAM SE QUADRANGLE, CARBON COUNTY, WYOMING

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