DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

COAL INVESTIGATIONS
MAP C–73

CORRELATION OF MAP UNITS

Qac, Qs, Qp, Qg	Holocene and Pleistocene	QUATERNARY
Qpg	Pleistocene	QUATERNARY
Tw	Eocene	TERTIARY
Tfu	Paleocene	TERTIARY

DESCRIPTION OF MAP UNITS

SURFICIAL DEPOSITS (Holocene and Pleistocene)

Qac — Alluvium and colluvium undivided — Mainly unconsolidated poorly sorted argillaceous silt, but locally reflects lithologies of adjacent units

Qs — Windblown sand — Unconsolidated, well-sorted, light-brown, fine-grained. Generally associated with friable sandstone lenses in upper and middle parts of Fort Union Formation

Qp — Playa lake deposits — Light-gray-brown compact expandable clay, the surface of which is seasonally whitened by alkali salts. Quartz and ganister ventifacts 1–2 inches (2.5–5 cm) in diameter litter surface of playa but not adjacent colluvial areas

Qg — Gravel — Unsorted, mainly unconsolidated gravel composed of subangular granite and quartzite cobbles and subrounded granite, chert, and quartzite pebbles in angular quartz sand. Commonly forms terrace adjacent to and 15–210 feet (4.6–64 m) above Fillmore Creek. Locally has ferruginous cement

Qpg — PEDIMENT GRAVEL (Pleistocene) — Unconsolidated, poorly sorted, reddish-brown, tuffaceous, sandy; composed of subrounded polished pebbles of granite, quartzite, dark chert, and jasper. Caps Cherokee Hill and terrace remnants of similar altitude (6,980–7,150 ft; 2,127–2,179 m) to the north. Apparent source is hill in sec. 26, T. 20 N., R. 92 W., and other high areas (7,150–7,180 ft; 2,179–2,188 m) to the north. Volcanic ash bed exposed at base of unit in quarry in NE. cor. sec. 35, T. 20 N., R. 92 W.

Tw — WASATCH FORMATION (Eocene) — Arkose and shale. Arkose, coarse-grained to granulitic; lithologically equivalent to Battle Spring Formation; in white to yellowish-white massive beds and in brown ferruginous lenses. Shale, dark-gray, gray-green, or black; locally contains numerous plant fragments. Base of formation placed at lowest occurrence of ferruginous lenses or massive arkose beds. About 350 feet present

Tfu — FORT UNION FORMATION (Paleocene) — Siltstone, shale, sandstone, and coal. Upper 600–700 feet (183–213 m) consists of gray-brown argillaceous siltstone, brown micaceous sandstone, shale, and coal. Coal, lignitic to subbituminous *C* rank, is in persistent seams as much as 35 feet thick (10.7 m). Most out-cropping beds (sandstones) have a low sedimentary dip component to the northwest. Steeply dipping fore-set beds and current bedded tubular sandstone bodies locally obscure the regional structural trend as in the SE¼ sec. 19, T. 20 N., R. 91 W. Section below 700 feet (213 m) poorly exposed, apparently consisting of arenaceous siltstone and carbonaceous shale. Only upper half of the 3,400-foot-thick (1,036-m) formation exposed. Subsurface portion of formation consists of alternating siltstone, sandstone, shale, and thin lenticular coal beds and a 500-foot-thick (152-m) basal sandstone

2.0 / A — COAL BED — Showing informal alphabetic designation. Dashed where approximately located; short dashed where inferred or indefinite; dotted where concealed; alternating dots and dashes where inferred solely from projection of subsurface data. Outcrop thickness, in feet[1], measured at triangle; where more than one bed, thickness of youngest is at the top

BURNED COAL BED — Approximately located

CONTACT — Approximately located; dashed where inferred or indefinite

D 30 / U — INFERRED FAULT — Existence from indirect geologic evidence; could be explained by differential sedimentary compaction or monoclinal folding. Dotted where concealed. U, apparent upthrown side; D, apparent downthrown side with apparent throw in feet[1]

10 — STRIKE AND DIP OF BEDS — Dotted where based on subsurface data

2 / 1 — APPROXIMATE STRIKE AND DIP OF BEDS

5 — COMPONENT OF DIP

30 — DOMINANT COMPONENT OF DIP DUE TO CROSS-STRATIFICATION — Some shown without amount of dip

PALEOCURRENT DIRECTION

14.0 B / 20.5 C — DRILL HOLE — Showing reported thickness of coal beds, in feet[1]; coal beds are alphabetically designated

4.9 — ABANDONED AND COLLAPSED ADIT OR TRENCH — Showing thickness of coal bed, in feet[1], as recorded in U.S. Geological Survey files

GRAVEL PIT

[1] To convert feet to metres, multiply by 0.3048.

GENERAL GEOLOGY

The Creston Junction quadrangle was mapped as part of the U.S. Geological Survey program of classifying and evaluating mineral lands in the public domain. The use of subsurface data aquired by Pacific Power and Light Company is gratefully acknowledged.

The quadrangle lies near the Continental Divide in the Red Desert, south-central Wyoming. Physiographically, the area is mostly one of broad gravel-capped terraces and gentle cuestas. All streams are intermittent and terminate locally in playas or at Separation Lake, 26 miles (42 km) northeast of the quadrangle.

Structurally, the area is on the northeast flank of the Washakie Basin. To the north is the Wamsutter arch, a low, broad indistinct structure that separates the Great Divide and Washakie Basins. To the east is a series of uplifts associated with the Rawlins uplift.

Throughout most of the area the rocks strike N. 60° E. and dip gently northwest, but in the southwestern part of the area the strata strike nearly north and dip into the Washakie Basin.

In the upper 600 feet (183 m) of the Fort Union Formation, dips measured at sandstone outcrops are 2°–5° higher than dips measured on shale and coal in prospect pits and as interpreted from drill-hole data. This anomaly, attributed to depositional attitudes, makes determination of unit thickness and bed correlations difficult. Random low-amplitude undulations of coal beds suggest that much small-scale unmapped structure in the area is nondiastrophic in origin, the result of the vagaries of deposition, differential compaction, and, locally, near-surface slump. Pseudostructures occur in the upper part of the Fort Union Formation, especially in secs. 19 and 20, T. 20 N., R. 91 W. where surface dips are 25° to 45° steeper than those of underlying strata. These steeply dipping strata are believed to represent sedimentary structures, probably fore-set beds.

Two small faults shown on the map are hypothetical structures based primarily on drill-hole data. These could be the result of monoclinal folding or differential compaction. Similar features may occur elsewhere within the quadrangle but cannot be recognized without additional subsurface data.

ECONOMIC GEOLOGY

Resources of economic interest are coal, water, and sand and gravel. The coal-bearing area of the quadrangle contains most of the locally named Cherokee coal district, which lies on the arbitrary boundary (the Union Pacific Railroad) between the Great Divide and Little Snake River coal fields. Because the coal beds extend southward whereas their northward extension is not known, the Cherokee coal district is considered part of the Little Snake River coal field.

The coal beds of the Cherokee coal district occur in the upper-most 600–700 feet (183–213 m) of the Fort Union Formation. The beds are informally designated *A* through *E*, from youngest to oldest. Beds *B*, *C*, *D*, and *E* are considered economically significant. In the southwestern part of the quadrangle, where detailed subsurface data are available, the coal beds are highly undulatory and vary in thickness. Thickness variations within the coal beds of as much as 50 percent in 1,000 feet (305 m) are recorded. Similarly, the clastic interval between the coal beds is variable, the best example being the parting between beds *B* and *C* which thickens from 4 feet to 60 feet (1–18 m), in less than 1 mile (1.6 km) (secs. 14, 11, 2, and 3, T. 19 N., R. 92 W.). These variations plus the general aberrant attitude of the few outcrops make correlation of the coal beds difficult except where abundant subsurface data are available.

Summaries of thicknesses and analytical data of coal beds are given in table 1. These data are based on drill data almost exclusively from the southern part of the area and may not validly reflect the thickness or quality of the coal to the northeast. Locally, the coal is subbituminous *C* or *B* rank, but the average rank is lignite. The few outcrop thickness measurements are generally less than 50 percent of the subsurface determinations owing to the slumping of overlying shales such as at the north face of Cherokee No. 1 mine, sec. 2, T. 19 N., R. 92 W. Resource estimates (table 2) are based, where possible, on thicknesses from subsurface data. More than 1.8 billion tons (1.6 billion metric tons) of coal, of which more than one-half is in beds exceeding 10 feet (3 m) in thickness and at depths of less than 200 feet (61 m), is inferred to be present in the Cherokee coal district in the Creston Junction quadrangle. Sufficient data for the calculation of measured and indicated resources are known only for coal bed *C* in the southern part of the area.

Coal is also present in the Lance Formation and in the lower part of the Fort Union Formation. The coal beds of the lower Fort Union coal zone are not exposed in the quadrangle and subsurface data for the coal bed are lacking. These coal beds, however, outcrop in the adjacent quadrangle to the east (Sanders, 1974) where they are generally thin and discontinuous but may range up to 5 feet (1.5 m) in thickness. The thickest coal beds of the Lance Formation are in the lower part of the formation and probably lie at a depth of at least 1 mile (1.6 km).

Ground water can be obtained at depths of less than 1,000 feet (305 m) from both the Fort Union and Wasatch Formations. On the basis of data from Welder and McGreevy (1966), water from both sources contains 1,000–3,200 parts per million of dissolved solids, mainly as bicarbonates and sulfates.

No oil or gas wells have been drilled in the Creston Junction quadrangle. The few wells drilled in adjacent areas, apparently targeted for sands in the Mesaverde Formation, were dry and abandoned.

Sand and gravel have been quarried at several sites on the gravel-capped terrace. The deposit apparently averages 10 feet in thickness over much of the area but may thicken toward the hill in sec. 26, T. 20 N., R. 92 W. The material is a gravelly sand that consists of rounded and polished pebbles of granite, quartzite, chert, and jasper in a poorly sorted matrix of subangular quartz sand and vitric tuff. Even after washing or sieving the material is of limited value because the abundance of chert makes it poorly suited for use as aggregate in concrete and the roundness of the pebbles detracts from its value as road fill or as aggregate for paving. It is best suited for use as bulk fill where compactional stability is not required. Approximately 300 million short tons (272 million metric tons) is present.

REFERENCES

Sanders, R. B., 1974, Geologic map of the Riner quadrangle, Carbon and Sweetwater Counties, Wyoming: U.S. Geol. Survey Coal Inv. Map C–68. (In press)

Welder, G. E., and McGreevy, L. J., 1966, Ground-water reconnaissance of the Great Divide and Washakie Basins and some adjacent areas, southwestern Wyoming: U.S. Geol. Survey Hydrol. Inv. Atlas HA–219.

TABLE 1 – *Averaged analyses of coal beds in Cherokee coal district, Creston Junction quadrangle, Wyoming*
[Based on drill-hole data mainly from the southwestern part of the quadrangle supplied by Pacific Power and Light Co.]

Coal bed	Average thickness (ft)[1]		No. of sample localities	No. of analyses	Analyses, in percent, on an as-received basis					Heat value (Btu)	Rank
	Range	Average			Moisture	Ash	Volatile matter	Fixed carbon	Sulfur		
A[2]	------	5(?)	1	1	15.87	20.36	34.76	29.01	3.33	7,782	Lignite.
B	8–17	14	12	34	22.65	14.59	31.62	30.30	1.82	7,714	Do.
C[3,4]	19–31	25	39	190	22.37	12.80	34.85	30.42	1.66	8,293	Lignite, grading north to subbituminous *C*.
D	8–9	8	9	35	17.64	21.28	35.01	25.80	3.26	7,417	Lignite.
E	7–18	15(?)	3	10	18.86	19.80	33.08	28.25	2.25	7,613	Do.

[1] To convert feet to inches, multiply by 0.3048.
[2] Based on sample taken 2 miles (3.2 km) south of the southwest corner of the quadrangle.
[3] The basal 2–6 feet (60–180 cm) of coal bed *C* is impure (ash > 30 percent) and is therefore excluded from the averaged analysis. A separate averaged analysis of this part of the bed indicated 6–8 percent less moisture, volatile matter, and fixed carbon, twice the sulfur content, three times the ash content, and 2,100 less caloric value (Btu).
[4] Distributional analyses show a slight and gradual change in composition along strike—the moisture, ash, fixed carbon, and sulfur contents increase to the south with a corresponding increase in volatile matter and caloric value to the north where the coal generally attains subbituminous *C* rank (average of 90 analyses from the northern half of the area, 8,373 Btu).

TABLE 2 – *Coal resources in the Creston Junction quadrangle*
[In millions of short tons[1]]

Coal bed	<200 feet (61 m) overburden			To maximum overburden[2]
	Measured	Indicated	Inferred	
A--------	----------	---------	2.8	2.8
B--------	----------	---------	157.0	274.0
C--------	170.0	335.0	443.0	669.0
D--------	----------	---------	164.0	292.0
E--------	----------	---------	148.0	572.0
Beds known from core-hole data only	----------	---------	31.0	61.0
Total------	170.0	335.0	945.8	1,870.8

[1] To convert short tons to metric tons, multiply by 0.9072.
[2] Maximum overburden above bed *C* is 780 feet (238 m).

Base from U.S. Geological Survey, 1966
10,000-foot grids based on Wyoming coordinate system west central and east central zones
1000-metre Universal Transverse Mercator grid ticks, zone 13, shown in blue

SCALE 1:24 000
1 MILE
1 KILOMETRE
CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

APPROXIMATE MEAN DECLINATION, 1975

WYOMING
QUADRANGLE LOCATION

Geology mapped in 1971

Interior–Geological Survey, Reston, Va.–1975

GEOLOGIC MAP AND COAL RESOURCES OF THE CRESTON JUNCTION QUADRANGLE, CARBON AND SWEETWATER COUNTIES, WYOMING

By
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1975

For sale by U.S. Geological Survey
Denver, Colo. 80225 and Reston, Va. 22092, price $1.00