

STRATIGRAPHIC SEQUENCE OF EXPOSED ROCKS

NOT TO SCALE

SYSTEM	SERIES	FORMATION	DESCRIPTION
QUATERNARY	Holocene and Pleistocene	Surficial deposits	ALLUVIUM (Qal)—Mostly moderately sorted and stratified subrounded to subangular clay, silt, sand, and gravel; includes some colluvium and alluvial fan deposits, particularly in broad valleys
			PEDIMENT DEPOSITS (Qpd)—Poorly sorted and stratified deposits composed of subangular to subrounded pebbles to boulder-sized clasts of reworked local sediments with interstitial clay, silt, and sand; locally partially cemented by calcium carbonate
			LANDSLIDE DEPOSITS (Qls)—Poorly sorted deposits of older surficial deposits and bedrock blocks derived mainly from Flagstaff Limestone and North Horn Formation
TERTIARY	Eocene	Flagstaff Limestone	FLAGSTAFF LIMESTONE (Tf)—Limestone, dark-bluish- to yellowish-gray; contains subordinate light-bluish- to yellowish-gray fine- to medium-grained medium even-bedded sandstone interbeds, medium-grained shale interbeds, and very light to yellowish-gray volcanic ash interbeds; cliff-forming. Sandstone interbeds of moderate- to dark-reddish-brown fine- to medium-grained thin to medium even-bedded sandstone occur in some localities in the upper 50 m of the part exposed in quadrangle. Fresh-water gastropods occur locally. Base conformable with North Horn Formation in map area. Only lower 120-170 m present in quadrangle. Formation 150-300 m thick elsewhere on Wasatch Plateau
		North Horn Formation	NORTH HORN FORMATION (Tkh)—Shale, gray, grayish-purple, moderate-red, or variegated; contains interbeds of light-brown fine- to coarse-grained medium even-bedded and massive lenticular sandstone, and thin- to medium-bedded gray limestone and lenticular conglomerate; slope-forming. Contains vertebrate fossils, particularly reptilian and mammalian. Base conformable and gradational with Price River Formation. 300-360 m thick
CRETACEOUS	Upper Cretaceous	Price River Formation	PRICE RIVER FORMATION (Kpr)—Sandstone, grayish- to dark-yellowish-orange fine- to coarse-grained medium-crossbedded to massive; massive beds usually white to pinkish-gray; subordinate pinkish-gray to dark-yellowish-orange pebbles to cobble conglomerate; clasts predominantly light-gray quartzite, light-gray quartzitic sandstone, and grayish-black chert; medium-dark- to olive-gray shale. Great white sandstone unit mostly very pale orange to pinkish-gray medium- to coarse-grained massive; locally conglomeratic; stepped-topography-forming. Base conformable and gradational with Castlegate Sandstone. 100-135 m thick
		Castlegate Sandstone	CASTLEGATE SANDSTONE (Kc)—Sandstone, very pale orange to pinkish-gray medium- to coarse-grained massive; locally conglomeratic; local medium-dark-gray siltstone lenses; cliff-forming. Base locally unconformable with Blackhawk Formation; probably low-relief erosional surface. 60-75 m thick
		Blackhawk Formation	BLACKHAWK FORMATION (Kb)—Sandstone, grayish-orange to light-brown fine- to medium-grained medium- to large-crossbedded; moderate-yellowish-brown to medium-dark-gray shale; light-gray to medium-dark-gray siltstone; coal; stepped-topography-forming. Base conformable with Star Point Sandstone; paleochannels into upper Star Point Sandstone locally present. 225-265 m thick
		Star Point Sandstone	STAR POINT SANDSTONE (Ksp)—Sandstone, light-gray very fine grained to fine-grained massive to planar laminated; white to very light gray "cap" locally present; light-gray siltstone; light-gray shale; cliff-forming. Only upper 25 m present in quadrangle. Formation 150 m thick elsewhere on Wasatch Plateau
		Unconformity (local)	



CORRELATION OF MAP UNITS

Qal	Holocene and Pleistocene	QUATERNARY
Qpd		
Qls		
Tf	Eocene	TERTIARY
Tkh		
Kpr	Upper Cretaceous	CRETACEOUS
Kc		
Kb		
Ksp		

LIST OF MAP UNITS

- Qal Alluvium
- Qpd Pediment deposits
- Qls Landslide deposits
- Tf Flagstaff Limestone
- Tkh North Horn Formation
- Kpr Price River Formation
- Kc Castlegate Sandstone
- Kb Blackhawk Formation
- Ksp Star Point Sandstone

CONTACT—Dashed where approximately located; dotted where concealed

FAULT—Dashed where approximately located; dotted where concealed; quartered where conjectured. Bar and ball on downthrow side

FAULT—Located from aerial photographs

COAL SECTION—Circled number refers to measured coal section. Apex of triangle at top of coal section

STRIKE AND DIP OF BEDS

INTRODUCTION

The Ferron Canyon quadrangle, in Emery and Sanpete Counties in central Utah, was mapped in 1977-78 as part of the U.S. Geological Survey's program to evaluate lands in the public domain for potential coal leasing. Mapping was done using U.S. Forest Service color aerial photographs at a scale of 1:15,840 on U.S. Geological Survey topographic maps at a scale of 1:24,000. The eastern part of the quadrangle was mapped previously by Spiekler (1931) at a scale of 1:62,500.

GEOGRAPHY

The quadrangle is named for the steep-sided canyon in the south-central part of the area, about 16 km west-northwest of Ferron, Utah. This area is part of the Wasatch Plateau and extends about 2,000 m in the southeastern part of the quadrangle to 3,200 m in the southwestern part. Ferron Creek flows northward and drains most of the quadrangle and North Dragon Creek flows southeastward and drains only the northeastern part of the quadrangle. Ferron Canyon is a deep (about 300 m) straight canyon rimmed by a small cliff about 60 m high. Both this canyon and the broader valley of the Graben system to the east dissect the upland terrain of the Wasatch Plateau.

Resistant sandstones and limestones form cliffs throughout the area with less resistant shales forming gentler slopes that, in places, are covered by hummocky landslide deposits. McEwan and Singleton Plateaus at the head of Ferron Canyon are remnants of pediment surfaces. Throughout the quadrangle, small areas of badlands have been formed in the shales of the Upper Cretaceous and Paleocene North Horn Formation, most notably in the northeast corner on the western slopes of North Horn Mountain.

Access to much of the area is by foot or by four-wheel-drive vehicle; the only improved (light-duty dirt) roads are in the North Dragon Creek Valley and the Narrows-Dairy Point areas. The floor of Ferron Canyon is accessible only by pack trail, although the upper rim of the canyon can be reached by a four-wheel-drive road from the north. There are no permanent habitations and no active mines in the quadrangle.

Annual precipitation varies from less than 30 cm to at least 64 cm, and increases with altitude. The vegetation zones found in this area are the Upper Sonoran, Transition, Canadian, and Hudsonian (U.S. Forest Service, 1978).

STRATIGRAPHY

Sedimentary rocks total about 1,200 m in thickness and range in age from Late Cretaceous to Tertiary. Lithology and thickness of the units are shown in the generalized stratigraphic section.

North Horn Formation is a flood-plain lacustrine facies, well known for its vertebrate fossils. Fossils of reptiles and mammals, in particular, have been described by researchers from the Smithsonian Institution (Gavin, 1941; Gilmore, 1946) and from various universities (for example, Jensen, 1966).

The Upper Cretaceous Price River Formation contains a distinct marker bed about 30 m below the top of the formation. This marker bed, informally named the great white sandstone, is lithologically similar to the Upper Cretaceous Castlegate Sandstone in that it is very pale orange to pinkish gray, medium to coarse grained, massive, and locally conglomeratic. The great white sandstone forms a prominent cliff in the Ferron Canyon and adjacent quadrangles.

The Upper Cretaceous Blackhawk Formation is a deltaic facies and contains the major coal resources of the area. The Blackhawk is predominantly sandstone with lesser amounts of shale, siltstone, and coal. The sandstone is thicker and more extensive in the upper part of the formation than in the lower part, which contains the economically valuable coal beds.

STRUCTURE

The rocks generally dip northward in the western part of the quadrangle and north-northwestward in the eastern part. Major northerly trending fault zones extend through much of the area. The large fault zone in the eastern part of the area, through which Dragon Creek flows, is part of the Jose Valley fault zone and shows displacements greater than 750 m. In the Jose Valley Reservoir quadrangle to the north, faulting within this zone has displaced Quaternary alluvium.

The smaller fault zone to the west, Wagon Road Ridge, shows displacements of 35-60 m. Within both zones are numerous small faults of diverse orientations that truncate the zones. The orientations of the coal clasts (sheet 1) coincide with the orientations of the joints of the enclosing formations.

ECONOMIC GEOLOGY

Coal.—The only coal beds in this area that meet current classification standards (Bass and others, 1970) are those of the Hiawatha (Lower and Upper) coal zones in the lower 12 m of the Blackhawk Formation. These coal beds are generally lenticular. The lowest coal of the Hiawatha coal zone is usually the most laterally extensive although it has been locally cut off by paleochannels as in Ferron Canyon (coal sections 3, 4, 5, 10, and 11, sheet 2).

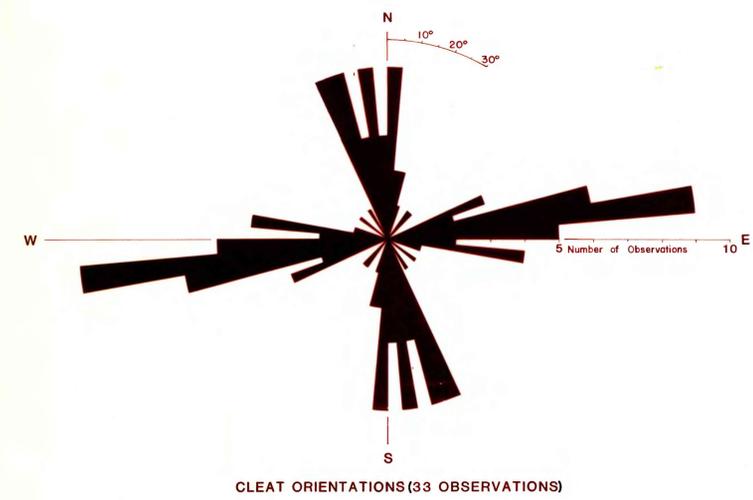
As measured section 7 in Ferron Canyon, the two main coal beds of the Hiawatha coal zone become one bed 2.43 m thick; this is the thickest coal bed measured at an outcrop within the quadrangle.

No coal analyses from this quadrangle have been published. Coal analyses from the Wasatch Plateau coal field as a whole (Doelling, 1972) show average values for high-volatile B bituminous coal to be 12,569 Btu/lb; moisture, 8.1 percent; volatile matter, 42.0 percent; fixed carbon, 45.4 percent; ash, 6.5 percent; and sulfur, 0.6 percent. Coal in the Ferron Canyon quadrangle may be of similar quality.

Doelling (1972) reported reserves of 57,664,800 tons for the Ferron Canyon quadrangle—an estimate based on limited data which did not consider all of the area.

Limestone.—Limestone of potential economic value is found in the lacustrine Flagstaff Limestone. At least some of this limestone meets the purity requirements for potential use in the sulfur dioxide scrubber systems of coal-burning power plants and as mine rock dust in coal mines. Analyses of samples have shown this limestone to be generally very pure with an average soluble carbonate percentage of 94.4 (Stamm, 1979).

Water.—Ferron Creek drainage supplies water primarily for agricultural uses. Average annual yield of this drainage is 44,799 ac/ft (U.S. Forest Service, 1978). No unappropriated water rights exist on this drainage.



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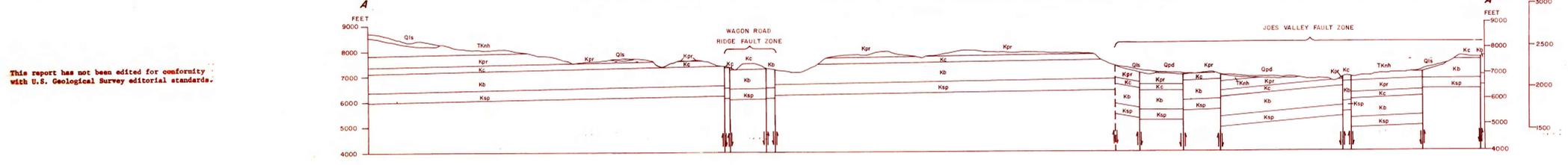
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CONVERSION FACTORS FOR ENGLISH EQUIVALENTS

To convert METRIC UNIT	Multiply by	To obtain ENGLISH UNIT
Centimeter	0.3937	Inch
Meter	3.281	Feet
Kilometer	.6214	Mile



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