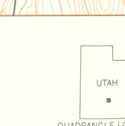
Base from U.S. Geological Survey Woods Lake, 1965; Flagstaff Peak 1966; Heliotrope Mountain, 1966; Ferron, 1978

APPROXIMATE MEAN DECLINATION, 1983

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929



QUADRANGLE LOCATION

Geology from Sanchez and Hayes (1979) and Spieker (1931)

INTERIOR—GEOLOGICAL SURVEY, RESTON, VA.—1983—G82129

DISCUSSION

INTERTONGUING

Intertonguing between the Upper Cretaceous Star Point Sandstone and the Blackhawk Formation of the Mesaverde Group has been previously mapped and described in the Muddy Canyon and Emery areas by Sanchez and Hayes (1979), Hayes and Sanchez (1979), Marley and Flores (1977), Flores and others (1979), and Sanchez and others (1983).

The sandstone tongue of the Star Point Sandstone in the study area will herewith be referred to as the No. 4 tongue of the Star Point Sandstone. The No. 4 tongue stratigraphically offsets the coal beds in the study area (fig. 1) by about 60 ft (20 m). The accompanying sections show the intertonguing in detail.

COAL ZONES

The Hiawatha (Spieker, 1931) coal bed west of the No. 4 tongue of the Star Point Sandstone contains several coal beds and will herewith be referred to as the Hiawatha coal zone in this report. The coal zone sits directly above the Star Point Sandstone and is fairly persistant laterally. The coal beds in the zone range in thickness from 21 ft 2 in. (6.4 m 5.1 cm) in drill hole UGMS-14 in the Cowboy Creek area to as little as 16 in. (41 cm) in measured section S478 on the south side of Muddy Creek. The Hiawatha coal zone thins and pinches out near the zone of intertonguing (fig. 1). Because the coal beds are thick and laterally persistant in the Cowboy Creek area and the North Fork of Muddy Creek area (figs. 2 and 3), the coal zone merits further exploration and possible development in the future.

The Acord Lakes coal zone of Sanchez and others (1983), is stratigraphically equivalent to the Muddy No. 1 and Muddy No. 2 coal beds (Spieker, 1931) west of the No. 4 tongue and Hiawatha coal bed (Spieker, 1931) east of the No. 4 tongue in the study area (fig. 1). The zone will herewith be referred to as the Acord Lakes coal zone to correspond with the studies of Sanchez and others (1983).

The coal beds in the Acord Lakes coal zone range in thickness from 11 ft (3.4 m) in section HU33 in the Box Canyon area to as little as 12 in. (31 cm) in section S476 on the south side of Muddy Creek. The Cowboy Creek area is the most favorable for further exploration and development of coal beds in the Acord Lakes coal zone, because the coal beds are thick and laterally persistant.

COAL RESOURCES

The total Identified coal resources in the Muddy Creek and Nelson Mountain areas of the Wasatch Plateau coal field is 251 million short tons (228 million metric tons, see table 1). The coal-bearing sequence, which is approximately 1000 ft (305 m) thick, is included in the lower part of the Upper Cretaceous (Campanian) Blackhawk Formation. The entire resource area is within the Manti-La Sal National Forest.

All coal beds are identified by zones because of lateral discontinuities (pinch outs) and bifurcations. Some coal beds occur as localized lenses that cannot be correlated, and are placed in the "other coal beds" category in the resource analysis table 1. Although the resources were tabulated as zones, the coal resources were calculated by individual coal bed, according to the coal classification system of the U.S. Bureau of Mines and U.S. Geological Survey (1976). All resources are classed as Identified and are in the Demonstrated class of geologic assurance. Demonstrated coal resources for coal beds were estimated to extend not more than 0.75 mi (1.2 km) from the points of measurement on the outcrop or from a drill hole. As further exploratory drilling is done in the area, more coal will undoubtedly be found and the figures will need to be revised upward.

COAL ANALYSIS

The results of analytical tests on coal core from drill hole BCR-1 (Sanchez, 1980) in sec. 32, T. 20 S., R. 6 E. in the study area are shown in table 2.

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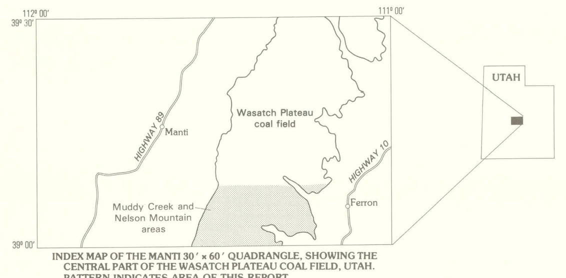
MAP EXPLANATION

CONTACT—Between Star Point Sandstone and overlying Blackhawk Formation. Chevrons enclose zone of intertonguing

U/D NORMAL FAULT—Dashed where approximately located, dotted where concealed. U, upthrown side; D, downthrown side

UGMS-7 DRILL HOLE—Drilled by Utah Geological and Mineral Survey (UGMS) and U.S. Geological Survey (BCR)-1

MEASURED SECTION—S, from Spieker (1931); BM or RF, from Muldoon and others (1981); HU, from Sanchez and Hayes (1979); M, from Marley and Flores (1977)



INDEX MAP OF THE MANTI 30′ x 60′ QUADRANGLE, SHOWING THE CENTRAL PART OF THE WASATCH PLATEAU COAL FIELD, UTAH. PATTERN INDICATES AREA OF THIS REPORT

Table 1—*IDENTIFIED COAL RESOURCES IN THE LOWER BLACKHAWK FORMATION, MUDDY CREEK AND NELSON MOUNTAIN AREAS, WASATCH PLATEAU COAL FIELD, SEVIER, SANPETE, AND EMERY COUNTIES, UTAH, AS OF JANUARY 1981*

[In millions of short tons. Totals rounded to 3 significant figures; coal assumed to weigh 1800 tons per acre foot; 1 short ton =0.9072 metric ton; 1 foot =0.3048 m; 1 inch =2.54 cm. Leaders (---) indicate no resources.]

County	Location: Township (South)	Location: Range (East)	Coal under less than 1000 ft of overburden — Demonstrated — Thickness of coal bed, in inches: 14-28	28-42	>42	Coal under less than 1000 ft — Inferred — Thickness of coal bed, in inches: 14-28	28-42	>42	Coal overlain by 1000 to 2000 ft of overburden — Demonstrated — Thickness of coal bed, in inches: 14-28	28-42	>42	Coal overlain by 1000 to 2000 ft — Inferred — Thickness of coal bed, in inches: 14-28	28-42	>42	
Hiawatha coal zone															
Sevier-------------	20	5	1.7	0.3	1.7	---	---	---	1.1	1.8	20.7	---	---	---	27.3
Sevier-------------	21	5	2.5	0.6	0.2	---	---	---	1.2	0.9	15.0	---	---	---	20.4
Sanpete------------	20	4	---	---	---	---	---	---	0.8	0.4	0.9	---	---	---	2.1
Sanpete------------	20	5	0.4	0.8	5.2	---	---	---	0.7	1.1	34.4	---	---	---	42.6
Hiawatha coal zone totals			4.6	1.7	7.1	---	---	---	3.8	4.2	71.0	---	---	---	92.4
Acord Lakes coal zone															
Sevier-------------	20	5	2.4	1.5	4.9	---	---	---	1.8	2.3	23.0	---	---	---	35.9
Sevier-------------	21	5	2.4	0.8	1.4	---	---	---	2.8	2.6	5.5	---	---	---	15.5
Sanpete------------	20	5	2.5	3.6	1.0	---	---	---	3.1	1.7	10.4	---	---	---	22.3
Emery--------------	20	6	7.0	1.3	5.8	---	---	---	0.9	1.1	2.0	---	---	---	18.1
Emery--------------	21	6	0.7	2.1	4.3	---	---	---	---	---	---	---	---	---	7.1
Acord Lakes coal zone totals			15.0	9.3	17.4	---	---	---	8.6	7.7	40.9	----	---	---	98.9
Other coal beds															
Sevier-------------	20	5	0.6	0.4	0.5	---	---	---	0.5	0.5	---	---	---	---	2.5
Sevier-------------	21	5	5.0	1.7	---	---	---	---	4.5	0.9	---	---	---	---	12.1
Sanpete------------	20	5	1.8	---	---	---	---	---	0.9	1.5	7.0	---	---	---	11.2
Emery--------------	19	6	2.3	1.8	2.5	---	---	---	---	---	---	---	---	---	6.6
Emery--------------	20	6	3.0	4.7	9.7	---	---	---	1.0	1.1	1.1	---	---	---	20.6
Emery--------------	21	6	2.5	2.8	1.6	---	---	---	---	---	---	---	---	---	6.9
Other coal bed totals			15.2	11.4	14.3	---	---	---	6.9	4.0	8.1	---	---	---	59.9
Grand totals			34.8	22.4	38.8	---	---	---	19.3	15.9	120.0	---	---	---	251.2

Table 2.—*Proximate, ultimate, B.T.U., Forms of sulphur, Free swelling index, and ash deformation from drill hole BCR-1, T. 20 S., R. 6 E., sec. 32, Emery County, Utah*

All analyses except Btu and ash deformation are in percent. Forms of analyses: 1, as received; 2, moisture free; 3, moisture and ash free. All analysis by Dept. of Energy, Forrest E. Walker, Chemist-in-Charge

Sample number and footage	Form of analysis	Proximate analysis: Moisture	Volatile matter	Fixed carbon	Ash	Ultimate Analysis: Hydrogen	Carbon	Nitrogen	Sulfur	Oxygen	Ash	Heating value Btu/lb	Forms of Sulfur: Sulfate	Pyrite	Organic	Free Swelling Index	ASH (degrees Fahrenheit): Initial deformation	Softening temp.	Fluid temp.
C-1	1	8.2	41.1	44.5	6.2	6.5	66.9	1.4	.6	18.5	6.2	12,061	.01	.40	.17	1.0	2,195 F.	2,345 F.	2,485 F.
865.1-	2	N/A	44.7	48.6	6.7	6.5	66.9	1.4	.6	12.2	6.7	13,132	.01	.40	.17				
872.6 ft	3	N/A	47.9	52.1	N/A	6.5	78.1	1.6	.7	13.1	N/A	14,079	.01	.46	.20				
C-2	1	6.8	42.1	39.4	11.7	6.0	63.4	1.4	.8	16.7	11.7	11,397	.01	.32	.46	1.0	2,540 F.	2,650 F.	2,750 F.
905.7-	2	N/A	45.1	42.3	12.6	5.6	68.0	1.5	.8	11.4	12.6	12,225	.01	.35	.49				
907.7 ft	3	N/A	51.6	48.4	N/A	6.4	77.9	1.7	1.0	13.1	N/A	13,988	.01	.40	.56				
C-3	1	8.4	36.8	42.2	12.6	5.7	61.8	1.2	.7	18.0	12.6	10,877	.01	.01	.01	1.0	2,430 F.	2,560 F.	2,690 F.
941.5-	2	N/A	40.1	46.2	13.7	5.2	67.5	1.3	.7	11.5	13.7	11,873	.01	.36	.35				
943.6 ft	3	N/A	46.5	53.5	N/A	6.1	78.2	1.5	.8	13.3	N/A	13,763	.01	.36	.35				
C-4	1	8.5	41.5	44.7	5.3	5.9	68.2	1.3	.7	18.7	5.3	12,143	.01	.01	.01	1.0	1,980 F.	2,070 F.	2,180 F
943.6-	2	N/A	45.3	48.9	5.8	5.8	74.5	1.5	.7	12.2	5.8	13,273	.01	.30	.42				
947.8 ft	3	N/A	48.1	51.9	N/A	5.7	79.1	1.6	.8	12.9	N/A	14,048	.01	.32	.45				
C-5	1	8.4	39.5	42.8	9.3	5.8	64.8	1.2	1.6	17.3	9.3	11,452	.01	.01	.01	1.0	2,050 F.	2,170 F.	2,260 F.
951.3-	2	N/A	43.1	46.8	10.1	5.3	70.8	1.3	1.7	10.7	10.1	12,507	.80	.87	.97				
958.2 ft	3	N/A	48.0	52.0	N/A	5.9	78.8	1.5	1.9	11.9	N/A	13,914	.79	.86	.96				

N/A = not applicable

From Sanchez (1980)

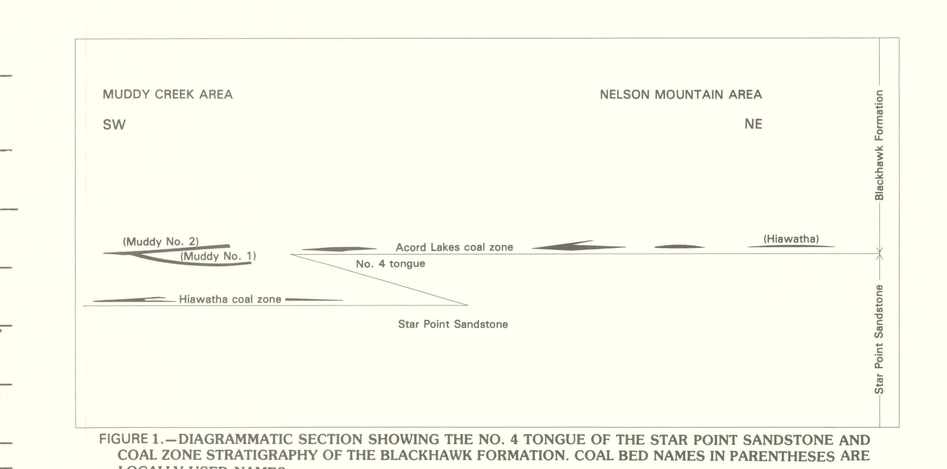


FIGURE 1.—DIAGRAMMATIC SECTION SHOWING THE NO. 4 TONGUE OF THE STAR POINT SANDSTONE AND COAL ZONE STRATIGRAPHY OF THE BLACKHAWK FORMATION. COAL BED NAMES IN PARENTHESES ARE LOCALLY USED NAMES.

STRATIGRAPHIC FRAMEWORK AND COAL RESOURCES OF THE UPPER CRETACEOUS BLACKHAWK FORMATION IN THE MUDDY CREEK AND NELSON MOUNTAIN AREAS OF THE WASATCH PLATEAU COAL FIELD, MANTI 30′ x 60′ QUADRANGLE, EMERY, SEVIER, AND SANPETE COUNTIES, UTAH

By
J. David Sanchez and Terrence L. Brown

1983

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