

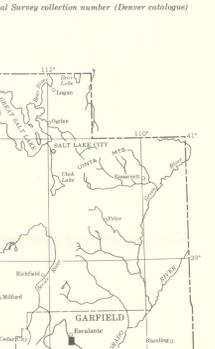
GEOLOGIC MAP AND COAL RESOURCES OF THE DAVE CANYON QUADRANGLE, GARFIELD COUNTY, UTAH

By
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EXPLANATION

- Qal Alluvium
- Qae Alluvium and colluvium
- Qac Alluvium and colluvium
- Qad Alluvium and colluvium
- Qae Alluvium and colluvium
- Kw Wahweap Formation
- Ksd Straight Cliffs Formation
- Kst Straight Cliffs Formation
- Kt Tropic Shale
- Kd Dakota Formation
- Jm Morrison Formation
- Je Summerville(?) Formation
- Jc Estrada Sandstone
- Jnt Carnel Formation
- JcJ Thousand Pockets Tongue of Navajo Sandstone
- JEn Judd Hollow Tongue of Carnel Formation
- JcJ Navajo Sandstone

- Coal bed
- Thickness of coal, in feet, measured on outcrop. Number in circle refers to measured coal section, sheet 2
- Clinker and ash of burned coal bed; approximately located
- Contact
- Dashed where approximately located
- Anticline, approximately located
- Showing crestline and direction of plunge
- Dotted where concealed
- Syncline, approximately located
- Showing troughline. Dotted where concealed
- Strike and dip of beds
- Component of dip
- Dot marks point of observation
- Structure contours
- Drawn on top of Kst (Smoky Hollow and Tibbet Canyon Members of the Straight Cliffs Formation). Dashed where contour less accurate; short dashed where projected over land surface
- Dry hole
- Number refers to table 2
- Abandoned oil mine
- Fossil locality
- U.S. Geological Survey collection number (Denver catalogue)



ECONOMIC GEOLOGY

The quadrangle was mapped as part of the U.S. Geological Survey program of classifying and evaluating mineral lands in the public domain. Resources of economic interest are coal, oil and gas, and titaniferous sandstone.

COAL

A summary of data pertaining to the coal deposits of the entire Kaiparowits coal field is given by Doelling (1970). Coal beds in the Dave Canyon quadrangle occur in the Dakota and Straight Cliffs Formations of Cretaceous age, which crop out along the Straight Cliffs escarpment in the western part of the map area. Coal exposures in the quadrangle are poor because bedrock is generally concealed by slope wash and blocks of sandstone and talus. The main coal zones in this quadrangle and in adjacent areas are in the John Henry Member of the Straight Cliffs. The coal in the Straight Cliffs Formation is of better quality, occurs in thicker beds, and contains less carbonaceous shale than that in the Dakota.

The uppermost coal zone in the Straight Cliffs Formation, the Alvey, is about 1,200-1,300 feet above the base of the formation, and the lowermost coal zone, the Christensen, is about 760-860 feet above the base. Individual coal beds are in general lenticular, grade laterally into carbonaceous shale, and in a few places interfinger with sandstone that was deposited along a beach. Marine oyster beds occur below and above coal beds, indicating fluctuations of the shoreline. The strand line during deposition of the Alvey coal zone trended about N 20° W, and field observations indicate that both the Alvey and the Christensen coal zones are more persistent in a northwesterly direction. The coal was deposited in a lagoonal-type environment, and coal beds are less continuous perpendicular to the strand line.

Coal beds 1 or more feet thick are indicated on the geologic map and are shown in the coal sections (sheet 2) where observed; however, because the coal is lenticular, only the thicker coal beds were extended any distance from an outcrop. In general, the symbol or line showing a coal bed on the geologic map represents a single bed; however, on steep cliff faces it may represent an interval of as many as four coal beds, as shown in coal sections 27 and 28.

In the Dakota Formation the better coal occurs in coal sections 5-8, where the beds, although poor in quality, attain a thickness of 5 feet. In the Straight Cliffs Formation, the Christensen coal zone has much coal in thick beds along the Straight Cliffs escarpment; the thickest individual bed is 15 feet thick (coal section 25). In the Alvey coal zone the thickest coal, in coal sections 22-25, is in beds 6-10 feet thick.

Quality.—The Dakota coal beds are highly weathered and poorly exposed along the outcrop, and in the absence of any open mines or prospects, no samples were obtained for analysis. In general, the Dakota coals are thin and lenticular, generally 2 or 3 feet thick, and only at coal sections 5-8 do they attain a thickness of 5 feet.

Five miles north of the quadrangle, Robison (1963, p. 17) collected an outcrop sample of Dakota coal that has a heating value of 11,081 British thermal units; however, this coal has a high content of ash (16.8 percent) and sulfur (3.1 percent) and a low fixed carbon content (32.4 percent).

Coal in the Straight Cliffs Formation is of much better quality. An analysis of the coal in the Christensen zone at the Don Shurts mine 1½ miles west of the quadrangle (Gregory and Moore, 1931, p. 153) on an air-dried basis shows 12.20 percent moisture, 39.35 percent volatile matter, 44.20 percent fixed carbon, 4.25 percent ash, and 0.82 percent sulfur and a heat value of 11,108 British thermal units.

The Alvey coal zone is best represented by the coal in the Alvey mine, half a mile west of the quadrangle. This coal on an air-dried basis contains 12 percent moisture, 42.8 percent volatile matter, 42.8 percent fixed carbon, 7.1 percent ash, and 0.6 percent sulfur and has a heat value of 10,730 British thermal units. More detailed information on the quality of the coal in the area is given by Robison (1963, 1964) and Grosse, Hileman, and Ward (1967).

TITANIFEROUS SANDSTONE

Three oil tests were made near the northwest corner of the quadrangle (table 2). Oil shows in the Kaiparowits and the Toroweap Formation in well 1 A. J. Button and free oil swabbed from the Toroweap in well "A" 1 Button indicate that the Toroweap is a significant objective for oil exploration (Kunkel, 1965).

In sees 7 and 17, T. 36 S., R. 3 E., black sandstone deposits occur in the upper part of the John Henry Member of the Straight Cliffs Formation. A deposit in sec. 17 described by Dow and Batty (1961, p. 11) is 12 feet thick. The upper 6 feet, which is dark purplish gray and very hard, contains 1 percent TiO₂, 6.5 percent ZrO₂, 11.7 percent Fe, and 0.09 percent equivalent ThO₂. The lower 6 feet, which is dark buff and softer, contains 24.1 percent TiO₂, 18.1 percent ZrO₂, 17.8 percent Fe, and 0.15 percent equivalent ThO₂. Mineral claims have been made on these deposits, but no commercial mining has been done.

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TABLE 1.—FOSSIL COLLECTIONS

(Cephalopod and pelecypod identification and zone assignment by W. A. Cobban, gastropod identification by N. F. Söhl, and vertebrate identification by G. E. Lewis, all of the U.S. Geological Survey. Locations of fossil collections are shown on the geologic map, and the stratigraphic positions are given in the generalized columnar section of rocks.)

USGS locality No.	Collector(s)	Fossils
D596	H. D. Zeller and J. W. Mercer.	Fragmentary specimens: "One incomplete ophiuroidan vertebra, with centrum and the proximal part of the neural arch, is seemingly an anterior dorsal or posterior cervical of a small ornithischian dinosaur of the Suborder Ornithomiridae, Family Hydroauridae. I would compare it to <i>Chasmosa</i> (of the Niobrara) were it not for the inadequate published descriptions of this genus. Two fragments of teeth represent a crocodylian and a dinosaur of the Suborder Theropoda" (G. E. Lewis, written commun., Dec. 28, 1964).
D4707do.....	<i>Esagra olisiponensis</i> Sharpe
D4708	H. D. Zeller, W. A. Cobban, G. H. Horn, and E. V. Stephens.	<i>Trochospira</i> sp. (a solitary coral) <i>Gryphaea neubergeri</i> Stanton <i>Palaemeta meeki</i> (White) <i>Melosira whitei</i> Hyatt <i>Plicatula hydroeca</i> White <i>Venella</i> n. sp. <i>Corbula landanensis</i> Stanton
D4709	H. D. Zeller and J. W. Mercer.	<i>Campaniletes platensis</i> White <i>Corbula landanensis</i> Stanton <i>Alloisoceras annulatum</i> (Shumard) <i>Terratula whitei</i> Stanton <i>Mesostoma</i> sp.
D4710do.....	<i>Inoceramus pictus</i> Sowerby <i>Gryphaea neubergeri</i> Stanton <i>Campaniletes platensis</i> White <i>Palaemeta meeki</i> (White) <i>Lucina</i> sp. <i>Corbula landanensis</i> Stanton <i>Alloisoceras annulatum</i> (Shumard) <i>Melosira whitei</i> Hyatt
D4711	H. D. Zeller.....	<i>Melosira whitei</i> Hyatt
D4712do.....	<i>Collignoniceras woolgari</i> (Mantell)
D4713	W. M. Christensen and H. D. Zeller.	<i>Otres</i> sp.
D5177	H. D. Zeller.....	<i>Esagra olisiponensis</i> Sharpe
D5178	H. D. Zeller and F. J. Alvey.	<i>Dinorthis</i> sp. <i>Palaemeta meeki</i> (White) <i>Dentalium</i> sp. <i>Alloisoceras annulatum</i> (Shumard) <i>Kanaboceras septentrionale</i> (Crugni) <i>Esagra</i> sp.
D5424	W. A. Cobban and G. H. Horn.	<i>Prodorcas</i> sp. <i>Plicatula hydroeca</i> White? <i>Esagra</i> sp.
D5459	H. D. Zeller.....	<i>Plectambonites stantoni</i> Hyatt
D5460	Edson Alvey.....	<i>Calyptoceras</i> sp.

TABLE 2.—LIST OF WELLS DRILLED FOR OIL

Number on geologic map	Company and well	Location in T. 35 S., R. 3 E.	Drilling ceased or well abandoned	Elevation of hole (ft)	Total depth (ft)	Lowest formation reached	Well status and remarks
1	Teneco Oil Co., well 1 A. J. Button.	C 36°N 90°E	June 1963.....	5,779	5,483	Cedar Mesa Sandstone	Abandoned oil test. Oil shows in Kaiparowits Formation.
2	Teneco Oil Co., well 2 A. J. Button.	W 36°N 90°E	October 1963.....	5,797	7,223	Redwall Limestone.	Abandoned oil test.
3	Teneco Oil Co., well "A" 1 Button.	C 36°W 90°E	February 1965.....	5,796	5,093	Toroweap (?) Formation.	Abandoned oil test. Some noncommercial oil swabbed from Toroweap Formation at 4,907-4,983 ft.