

MEASURED COAL SECTIONS IN THE COLLET TOP QUADRANGLE, KANE COUNTY, UTAH

ECONOMIC GEOLOGY

Introduction

The Collet Top quadrangle was mapped as part of the U.S. Geological Survey's program of classifying and evaluating mineral lands in the public domain. Coal is the main resource of economic interest. Collet Top is about 30 mi (48.3 km) southeast of Escalante, Utah, in the east-central part of the Kaiparowits Plateau and can be reached by vehicle from either the Hole-in-the-Rock road or the Alvey Wash-Big Sage road southeast of town. The quadrangle contains 59 sq mi (153 km²) with 7 sq mi (18.1 km²) belonging to the State of Utah and the remaining 52 sq mi (135 km²) being Federal land administered by the U.S. Bureau of Land Management. Federal coal leases include 35.5 sq mi (91.9 km²) and State coal leases include 5.5 sq mi (14.2 km²). Eighty-five percent of the Collet Top quadrangle is in the Kaiparowits Plateau Known Recoverable Coal Resource Area (KRCRA).

Coal

The area of this coal study contains a central flat area and drainage divide cut by deep canyons draining northeastward into Left Hand Collet Canyon and the Escalante River, eastward and southward into Rogers and Reese Canyons, and westward into Dry Wash. All drainage goes into Lake Powell, either through the Escalante River or Last Chance Creek. Coal beds occur in three zones in the John Henry Member of the Straight Cliffs Formation and are from base upward: Christensen, Rees (spelling per Doelling and Graham, 1972), and Alvey. The Drip Tank Member, a massive cliff-forming sandstone, overlies the coal-bearing sequence.

Individual coal beds are generally lenticular, grading laterally into carbonaceous shale and, in a few places, interfingering with sandstones that were deposited along a beach or offshore bar. Marine oyster beds occur below and above coal beds, indicating eastward and westward fluctuations of the shoreline. During deposition of the Alvey coal zone, the strand line 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 environment, and coal beds are less continuous perpendicular to the strand line.

Coal beds 1 ft (0.3 m) or more thick are indicated on the geologic map and are shown in the coal sections; however, because the coal is lenticular, only the thicker coal beds were correlated for any significant distance from a measured section. In

general, the symbol or line showing a coal bed on the geologic map represents a single bed, but on steep cliff faces it may include an interval of as many as three coal beds (see coal sections 2-5, 7, 61, and 62).

In addition to the measured sections of this report, Doelling and Graham (1972, p. 140-141, fig. 26) include sections at different localities. The Christensen coal zone is best observed in Left Hand Collet Canyon (coal sections 61 and 62). It also crops out in the south-central Reese Canyon area (coal sections 52 and 53), but is almost completely buried along the entire outcrop. Generally, it contains two or three minable coal beds 6-8 ft (1.8-2.4 m) in thickness. Overburden on the Christensen coal is never greater than 1,000 ft (305 m) thick and generally only 700-800 ft (213-244 m). The Rees coal zone is buried along much of its exposure, but in the southwest corner of the area one bed, 6.2 ft (1.9 m) thick, was measured (coal section 55). It contains significant amounts of coal but is the least important of the three zones. Overburden is generally 500-600 ft (152-183 m) thick.

The Alvey coal zone is the most widely exposed. More than 20 measured coal sections contain beds over 5 ft (1.5 m) thick. The Alvey coal thins to the east to 1- or 2-foot (0.3- or 0.6-m)-thick beds and the zone is only inferred in the extreme northeast quarter of the quadrangle. Overburden on the Alvey coal zone averages 300-400 ft (91.4-122 m) in thickness, but in much of the area is less than 300 ft (91.4 m) thick.

Information on the quality of the coal is not available in the area; however, an analysis from the Christensen zone 20 mi (32.2 km) to the northwest at the Don Shurtz mine (Gregory and Moore, 1931, p. 153) on an air-dried basis, showed 12.20 percent moisture, 39.35 percent volatile matter, 40.20 percent fixed carbon, 4.25 percent ash, 0.82 percent sulfur, and a heating value of 11,108 Btu/lb. Analyses in surrounding areas are generally similar, except that sulfur is commonly lower (from 0.5 to 0.7 percent) and ash higher (from 5 to 8 percent).

Resources

Coal resources were not calculated for individual beds within a coal zone because of limited exposures and lenticularity of the beds. Total resources (Reserve Base) were calculated by adding the coal-bed thicknesses in each zone for beds 48 in. (122 cm) or more thick and multiplying by the average weight of 1,770 tons per acre-foot (1.31 t/m³) for subbituminous coal. According to these calculations the Collet Top quadrangle contains about 920 million tons (835 million tonnes (t)) of total coal resources in

the three zones. The resources of these three zones (Christensen, Rees, and Alvey) are shown separately in table 1 along with the tonnage breakdown by township for both Federal and State land. All coal in the quadrangle has less than 1,000 ft (305 m) of overburden. An area of about 4 sq mi (10.4 km²) in secs. 26, 27, 34, 35, and 36, T. 39 S., R. 4 E., was omitted from resource calculation because of extensive burning of the coal. Probably 35-50 percent of the coal in the quadrangle is minable by underground methods.

The 48-in. (122-cm) coal thickness was used for the Reserve Base calculation instead of the 60-in. (152 cm) thickness advocated on Federal lands (U.S. Geol. Survey Bull. 1450-B, 1976) because the 48-in. (122 cm)-thick or thicker coal beds which occur within 300 or 400 ft (91.4 or 122 m) above other minable coal beds must be mined first in order to salvage them in underground mining operations. This is because there is a good chance that later subsidence would destroy this 48-in. (122 cm)-thick coal bed for future mining. This assumes that a 48-in. (122-cm)-thick bed of this quality is commercially minable in this area. According to paragraph 2 (Reserve Base), p. 5, U.S. Geological Survey Bulletin 1450-B, this thickness of coal can therefore be included in the Reserve Base.

The author acknowledges the careful work of D. T. Sandberg who made the coal resource calculations.

Oil and gas

A test hole for oil and gas was drilled by the Great Western Drilling Company in sec. 31, T. 39 S., R. 5 E. (see geologic map), and was completed as a dry hole. It probably bottomed in Pennsylvanian rocks at a total depth of 9,017 ft (2,748 m).

REFERENCES

Doelling, H. H., and Graham, R. L., 1972, Southwestern Utah coal fields: Alton, Kaiparowits Plateau, and Kolob-Harmony: Utah Geol. and Mineralog. Survey Mem. Ser., no. 1, 333 p.
Gregory, H. E., and Moore, R. C., 1931, The Kaiparowits region, a geographic and geologic reconnaissance of parts of Utah and Arizona: U.S. Geol. Survey Prof. Paper 164, 161 p.
U.S. Bureau of Mines and U.S. Geological Survey, 1976, Coal resource classification system of the U.S. Bureau of Mines and U.S. Geological Survey: U.S. Geol. Survey Bull. 1450-B, 7 p.

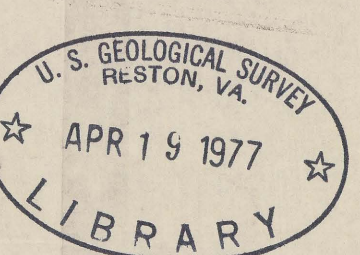
Table 1.—Coal resources of the Collet Top quadrangle, Kane County, Utah

(In thousands of short tons; to convert to metric tonnes, multiply by 0.9072; overburden and coal zone thickness are in feet; to convert to meters, multiply by 0.3048; —, no data)

| Township and coal zone | FEDERAL LAND | | | | | | STATE LAND | | | | | |
|------------------------|---------------------------|----------|---------|-----------|----------|---------|---------------------------|----------|--------|-----------|----------|-------|
| | Demonstrated ¹ | | | Inferred | | | Demonstrated ¹ | | | Inferred | | |
| | 4-10 feet | >10 feet | Total | 4-10 feet | >10 feet | Total | 4-10 feet | >10 feet | Total | 4-10 feet | >10 feet | Total |
| T. 38 S., R. 4 E. | | | | | | | | | | | | |
| Alvey | 25,654 | 44,270 | 69,924 | 1,164 | ----- | 1,164 | 71,088 | 4,358 | ----- | 4,358 | 75,446 | |
| Rees | ----- | 27,800 | 27,800 | 6,701 | 88,806 | 95,507 | 123,307 | 4,357 | 137 | 4,494 | 4,586 | |
| Christensen | ----- | ----- | ----- | ----- | ----- | ----- | ----- | 3,980 | 3,980 | 7,960 | 127,287 | |
| Township total | 25,654 | 72,070 | 97,724 | 7,865 | 88,806 | 96,671 | 194,395 | 9,105 | 4,117 | 13,222 | 207,617 | |
| T. 38 S., R. 5 E. | | | | | | | | | | | | |
| Alvey | ----- | ----- | ----- | ----- | ----- | ----- | ----- | 122 | ----- | 122 | 122 | |
| Township total | ----- | ----- | ----- | ----- | ----- | ----- | ----- | 122 | ----- | 122 | 122 | |
| T. 39 S., R. 4 E. | | | | | | | | | | | | |
| Alvey | 55,883 | 5,750 | 61,633 | 22,210 | 70,670 | 92,880 | 134,513 | 3,129 | ----- | 3,129 | 137,642 | |
| Rees | 12,170 | ----- | 12,170 | ----- | ----- | ----- | 12,170 | 22,279 | 22,279 | 34,449 | 34,449 | |
| Christensen | 39,274 | 39,274 | 78,548 | 347,437 | 372,575 | 719,012 | 611,849 | 5,803 | 5,803 | 11,606 | 417,652 | |
| Township total | 68,053 | 45,024 | 113,077 | 271,348 | 418,107 | 689,455 | 758,532 | 3,129 | 28,082 | 31,211 | 609,743 | |
| T. 39 S., R. 5 E. | | | | | | | | | | | | |
| Alvey | 8,829 | ----- | 8,829 | 451 | ----- | 451 | 9,280 | 3,087 | 223 | 3,310 | 12,590 | |
| Christensen | ----- | ----- | ----- | 2,745 | 2,745 | 5,490 | 5,490 | 4,205 | 4,205 | 8,410 | 8,410 | |
| Township total | 8,829 | ----- | 8,829 | 2,696 | 2,696 | 5,940 | 14,770 | 7,292 | 2,428 | 9,718 | 20,999 | |
| Quadrangle total | 102,536 | 117,094 | 219,630 | 57,909 | 506,913 | 564,822 | 784,632 | 15,443 | 36,627 | 52,070 | 836,322 | |
| STATE LAND | | | | | | | | | | | | |
| T. 38 S., R. 4 E. | | | | | | | | | | | | |
| Alvey | 1,085 | 147 | 1,232 | 5,645 | ----- | 5,645 | 6,877 | 1,522 | ----- | 1,522 | 8,399 | |
| Christensen | ----- | ----- | ----- | 13,553 | 13,553 | 27,106 | 27,106 | 2,007 | 2,007 | 4,014 | 4,014 | |
| Township total | 1,085 | 147 | 1,232 | 19,198 | 19,198 | 32,751 | 33,983 | 3,529 | 3,529 | 5,536 | 12,413 | |
| T. 39 S., R. 4 E. | | | | | | | | | | | | |
| Alvey | 5,444 | 9,168 | 14,612 | 1,026 | 5,345 | 6,371 | 20,983 | ----- | ----- | ----- | 20,983 | |
| Rees | 1,758 | ----- | 1,758 | ----- | ----- | ----- | 1,758 | 2,007 | 2,007 | 4,014 | 4,014 | |
| Christensen | ----- | ----- | ----- | 4,943 | 33,415 | 38,358 | 38,358 | 700 | 700 | 1,400 | 1,400 | |
| Township total | 7,202 | 9,168 | 16,370 | 5,969 | 38,760 | 44,729 | 61,099 | 3,607 | 3,607 | 6,414 | 26,796 | |
| T. 39 S., R. 5 E. | | | | | | | | | | | | |
| Alvey | ----- | ----- | ----- | ----- | ----- | ----- | ----- | 225 | ----- | 225 | 225 | |
| Township total | ----- | ----- | ----- | ----- | ----- | ----- | ----- | 225 | ----- | 225 | 225 | |
| Quadrangle total | 8,287 | 9,315 | 17,602 | 11,614 | 52,311 | 63,925 | 81,527 | 1,747 | 3,607 | 5,354 | 86,881 | |

¹ Includes measured and indicated.

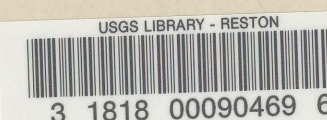
OPEN-FILE REPORT
This report has not been edited
for conformity with Geological
Survey editorial standards or
stratigraphic nomenclature.



PRELIMINARY GEOLOGIC MAP AND COAL RESOURCES OF THE COLLET TOP QUADRANGLE, KANE COUNTY, UTAH

By
H. D. ZELLER
1977

Utah (Collet Top quad). Sheet 1-24,000-777
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