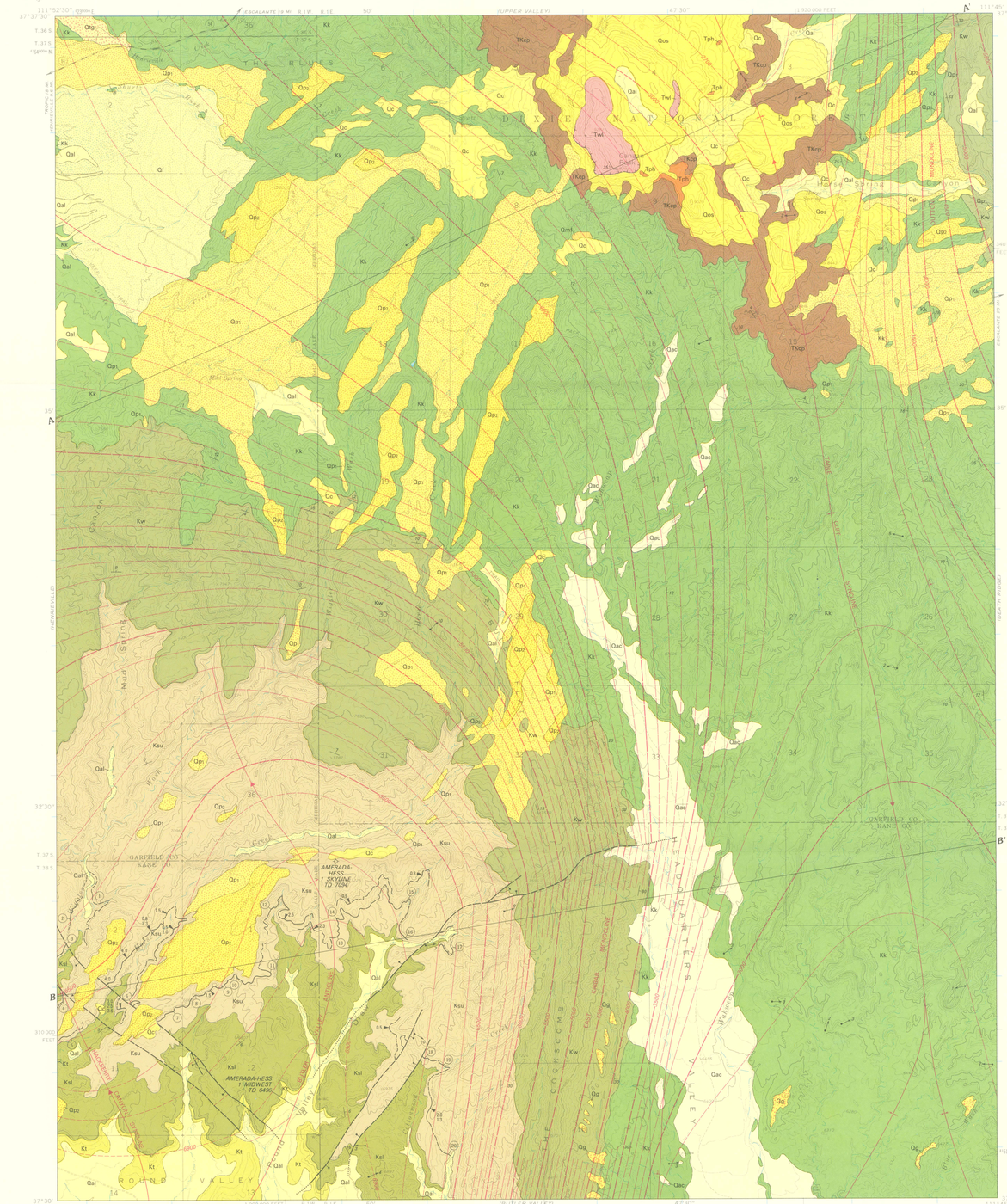
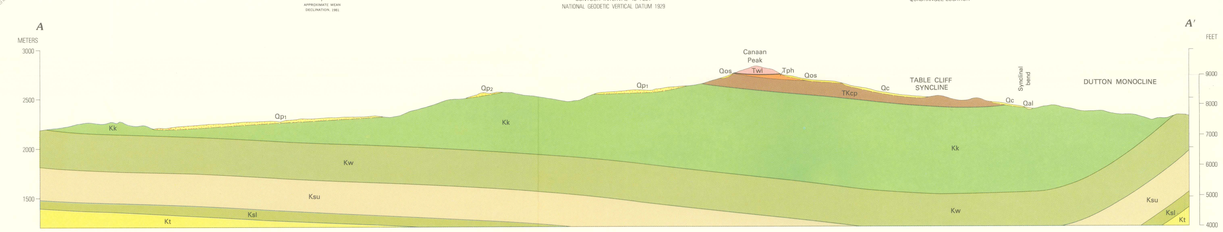
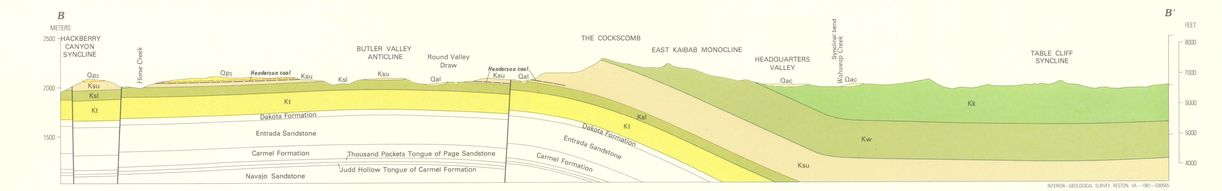
GENERALIZED COLUMNAR SECTION

SYSTEM	SERIES	FORMATION AND MEMBER	DESCRIPTION
QUATERNARY	Holocene and Pleistocene	Surficial deposits	ALLUVIUM (Qal)—Clay, silt, sand, and gravel; includes some colluvium and slopewash
		Gravity slides or Toreva blocks	MUDFLOW DEPOSIT (Qmf)—Poorly consolidated mixture of sand and clay derived from Kaiparowits Formation. Toe of flow forms small earth dam and pond on side gully
			COLLUVIUM (Qc)—Mass-wasting debris, slopewash, slump, and landslide material derived from adjacent bedrock or older surficial deposits; predominantly pebbles and cobbles of quartzite and chert below outcrops of Canaan Peak Formation. Mostly forest covered in northeast
			ALLUVIUM AND COLLUVIUM (Qac)—Gravel, sand, silt, and clay in Headquarters Valley and Wahweap Creek drainage. Deeply incised by present drainage channels
			GRAVEL (Qg)—Isolated patches of gravel and sand; includes remnants of terrace gravel about 200 feet above Wahweap Creek
			TERRACE GRAVEL (Qtg)—Sand and gravel on terraces above Henrieville Creek
			ALLUVIAL FAN DEPOSIT (Qf)—Coarse fan or fan-topped pediment deposit of pebbles and cobbles of quartzite and chert, and subrounded limestone fragments from canyon of upper Shurtz Bush Creek. As much as 100 feet thick
			YOUNGER PEDIMENT DEPOSITS (Qp$_1$)—Moderately well sorted deposits of sand and gravel composed mostly of well-rounded pebbles and cobbles of quartzite and chert and lesser amounts of subrounded limestone fragments in a calcareous sand and mud matrix; includes some terrace remnants along Horse Creek and Wiggler Wash. About 10–50 feet thick
			OLDER PEDIMENT DEPOSITS (Qp$_2$)—Poorly sorted deposits consisting mostly of subangular to subrounded limestone fragments in a calcareous sand or mud matrix. Derived mostly from Wasatch Formation (Paleocene and Eocene); includes lesser amount of gravel and sand derived from Canaan Peak Formation or older rocks. As much as 100 feet thick
			OLDER SURFICIAL DEPOSITS (Qos)—Mostly coarse poorly sorted to unsorted debris consisting of angular fragments and blocks of limestone from Wasatch Formation in a calcareous sand and mud matrix; includes older talus, slump, landslide, and slopewash materials. Conceals older slump and landslide blocks of limestone derived from Wasatch Formation (Paleocene and Eocene). Mostly forest covered. As much as 200 feet thick
			GRAVITY SLIDE DEPOSITS OR TOREVA BLOCKS (Twl)—Steeply tilted and fractured massive blocks of limestone derived from the Wasatch Formation; fractures commonly cemented with calcite. Well exposed only on south face of Canaan Peak. Probably derived from outcrops to west or northwest now removed by erosion; nearest present outcrops of Wasatch Formation are 7 miles north-northwest of Canaan Peak
			PINE HOLLOW FORMATION (Tph)—Siltstone, mudstone, and claystone, calcareous, gray to red; includes thin interbeds of earthy white limestone; slope former, poorly exposed; basal part exposed southeast of Canaan Peak; about 150 feet thick
			CANAAN PEAK FORMATION (TKcp)—Conglomerate, sandstone, and lenticular mudstone, light-brown, tan or gray; contains well-rounded pebbles, cobbles, and small boulders of quartzite, chert, and dense to fine-grained porphyritic igneous rocks; clasts may be more than 10 inches in diameter. Usually forms steep gravel-covered slopes. Type section for Canaan Peak Formation on south face of Canaan Peak. Interbedded mudstones contain Late Cretaceous palynomorphs (Bowers, 1972). 390–500 feet thick; thickens north of quadrangle to as much as 900 feet
CRETACEOUS	Upper	Kaiparowits Formation	KAIPAROWITS FORMATION (Kk)—Sandstone, greenish- to brownish-gray, very fine grained to fine-grained, friable, salt-and-pepper coloration; contains subordinate thin light-gray mudstone interbeds and buff to brown moderately resistant lenticular fine- to medium-grained sandstone interbeds. Dinosaur bones and freshwater mollusks occur locally. Base conformable and gradational with Wahweap Formation. About 2,600–3,000 feet thick
		Wahweap Formation	WAHWEAP FORMATION (Kw)—Upper 250–500 feet sandstone, light-gray to white, fine- to coarse-grained, massive crossbedded, cliff-forming; contains thin gray shale interbeds in upper 100 feet and pebble-conglomerate lenses as much as 3 feet thick 100–150 feet below top; unit grades into Kaiparowits Formation. Lower 750–800 feet, light- to dark-brown fine- to medium-grained crossbedded lenticular sandstone and gray to tan mudstone. Base conformable on Straight Cliffs Formation. 1,250–1,400 feet thick
		Straight Cliffs Formation, Upper part	STRAIGHT CLIFFS FORMATION Upper unit (Ksu)—Upper 300–400 feet, sandstone, light-gray to white, medium- to coarse-grained, locally conglomeratic, massive, crossbedded, cliff-forming. Lower 700–900 feet, interbedded sandstone, mudstone, carbonaceous mudstone, and some coal. Sandstone is mostly tan to light brown, fine to coarse grained, crossbedded; mudstone is gray to tan; carbonaceous mudstone is light brown, dark gray, or black. A persistent coal-bearing interval, the Henderson coal zone, occurs 60–120 feet above base throughout region. Upper massive sandstone is equivalent to Drip Tank Member, and lower part of unit is approximately equivalent to John Henry Member of Straight Cliffs Formation (Peterson, 1969) in southern and eastern Kaiparowits Plateau. 1,000–1,200 feet thick Lower unit (Ksl)—Upper 50–80 feet, sandstone, white, medium to very coarse grained, conglomeratic, massive, crossbedded, cliff-forming. Middle part, interbedded sandstone, mudstone, carbonaceous mudstone, and a few very thin impure coal beds. At base, tan to light-brown fine-grained partly crossbedded cliff-forming marine sandstone. Upper and middle parts are probably equivalent to Smoky Hollow Member in eastern part of Kaiparowits region; basal marine sandstone is equivalent to Tibbet Canyon Member of Straight Cliffs Formation (Peterson, 1969) in southern and eastern Kaiparowits Plateau. 200–300 feet thick
		Straight Cliffs Formation, Lower part	
		Tropic shale	TROPIC SHALE (Kt)—Shale, medium- to olive-gray, marine. In upper part thin tan, yellowish-gray, or light-brown very fine grained to fine-grained sandstone interbeds, and in lower part thin bentonite beds and limestone concretions that contain marine fossils. 640–700 feet thick
		Dakota Formation	DAKOTA FORMATION—Sandstone, mudstone, carbonaceous mudstone, and coal; interbedded. Sandstone is generally light brown, fine to medium grained, moderately resistant; near base it is medium to coarse grained, conglomeratic, and locally contains pebble-cobble conglomerate. Mudstone is gray to greenish gray; carbonaceous mudstone is dark brown to black. Coal beds are generally thin, lenticular, and impure, grading laterally to carbonaceous mudstone. Basal part may include about 50 feet of unnamed pre-Dakota conglomerate exposed in Butler Valley 2.5 miles south of Amerada-Hess 1 Midwest well. 150–250 feet thick
JURASSIC	Middle	Entrada Sandstone	ENTRADA SANDSTONE—Upper 80–200 feet, sandstone, white to yellowish-brown, fine- to coarse-grained, massive, high-angle crossbedded. Middle 200–300 feet, white to light-gray fine-grained low-angle cross-stratified sandstone that is locally silty and contains red sandy or silty bands. Lower 200–300 feet, reddish-brown fine-grained low-angle cross-stratified to high-angle cross-stratified sandstone. 725–800 feet thick
		Carmel Formation	CARMEL FORMATION—Upper 50–60 feet, siltstone and mudstone, gray-green to red, and gypsum. Middle part, mostly white, pink, or red, fine-grained sandstone containing mudstone or shale interbeds. Lower 150 feet, red, pink, pale-orange, or white, fine-grained sandstone, generally greenish-gray, tan, or light-brown limestone, reddish-brown, red, or greenish-gray mudstone, and anhydrite. About 450–550 feet thick
		Thousand Pockets Tongue of Page Sandstone	THOUSAND POCKETS TONGUE OF PAGE SANDSTONE—Sandstone, white to light-gray, fine- to medium-grained, high-angle crossbedded. About 120 feet thick
		Judd Hollow Tongue of Carmel Formation	JUDD HOLLOW TONGUE OF CARMEL FORMATION—Mudstone, gray-green or reddish-brown, and gray limestone. 110 feet thick
JURASSIC AND TRIASSIC(?)		Navajo Sandstone	NAVAJO SANDSTONE—Sandstone, white to pale-orange-gray, massive, large-scale high-angle crossbedded. 1,550–1,700 feet thick
TRIASSIC(?)	Upper	Kayenta Formation	KAYENTA FORMATION—Sandstone, siltstone, and shale, interbedded, reddish-brown to pale-red. About 400–450 feet thick
TRIASSIC		Wingate Sandstone	WINGATE SANDSTONE—Sandstone, pale-orange, fine- to medium-grained, well-rounded, crossbedded. About 75–100 feet thick
	Upper	Chinle Formation	CHINLE FORMATION Upper unit—Shale and claystone, red, silty, in upper part; sandstone and siltstone interbeds in middle part; thin interbeds of limestone and chert in lower part. Contains limestone nodules or very thin beds of limestone or dolomite throughout. About 450–600 feet thick Shinarump Member—Sandstone, white to light-brown, fine- to coarse-grained; conglomeratic near base. 70–110 feet thick
		Shinarump Member	
	Middle(?) and Lower	Moenkopi Formation	MOENKOPI FORMATION Upper unit—Siltstone and shale, red to reddish-brown, micaceous, gypsiferous, and calcareous; contains a few very thin interbeds of pink to cream dolomite or limestone; sandy in upper and lower parts. About 900 feet thick Timpoweap Member—Upper part, dolomite and limestone, gray, cream, or tan, oolitic and crinoidal; lower part, medium- to coarse-grained conglomeratic sandstone. Formation commonly shows brown oil stain. About 120–130 feet thick
		Timpoweap Member	
		Kaibab Limestone	Deepest rocks penetrated in Amerada-Hess 1 Skyline well KAIBAB LIMESTONE—Dolomite, tan to light-brown, cherty, oil-stained. About 150 feet thick
PERMIAN	Lower	White Rim Sandstone Member of Cutler Formation	WHITE RIM SANDSTONE MEMBER OF CUTLER FORMATION—Sandstone, white, fine- to medium-grained; contains thin interbeds of tan dolomite. 150–200 feet thick
		Toroweap Formation	TOROWEAP FORMATION—Dolomite, arhydrite, and sandstone, interbedded. Sandstone is gray to light brown and fine to medium grained; dolomite is light brown. About 450 feet thick
		Cutler Formation: Organ Rock Member	Deepest rocks penetrated in Tenneco Oil Co 1 Tropic well, 7 mi. west of quadrangle CUTLER FORMATION Organ Rock Member—Interbedded sandstone and siltstone, light-gray, brown or red. 50–200 feet Cedar Mesa Sandstone Member—Sandstone, light-gray to tan, fine- to medium-grained, calcareous; may contain thin interbeds of red siltstone. About 750 feet thick Halgaito Tongue—Dolomite and limestone, cream to tan, and interbedded white fine- to medium-grained sandstone limestone and dolomite contain algal structures. 345 feet thick
		Cutler Formation: Cedar Mesa Sandstone Member	
		Cutler Formation: Halgaito Tongue	
PENNSYLVANIAN	Upper and Middle	Hermosa Formation	HERMOSA FORMATION—Limestone, dolomite, and chert, white, cream, or tan, interbedded with gray to tan sandstone and siltstone and red and green shale. About 475–500 feet thick
	Lower	Molas Formation	Deepest rocks penetrated in California Co. 1 Johns Valley well, 10 mi. northwest of quadrangle MOLAS FORMATION—Siltstone and shale, pink to red, calcareous; red medium- to coarse-grained sandstone at base. About 65 feet thick
MISSISSIPPIAN	Upper and Lower	Redwall Limestone	REDWALL LIMESTONE—Limestone and dolomite, white, cream, or light-gray. Lowest formation penetrated by drilling in the area. About 900 feet thick
		Ouray Limestone	OURAY LIMESTONE—Dolomite and limestone, light-brown and light-gray; possibly contains thin shale beds. About 100–150 feet thick
DEVONIAN	Upper	Elbert Formation	Pre-Mississippian lithology and thickness inferred from data by Lessentine (1969) and Munger, Peay, and Peace and Linn, (1965) ELBERT FORMATION—Dolomite and limestone, gray to brown; may include thin shale and sandstone. About 300 feet thick
CAMBRIAN	Middle	Muav Limestone	MUAV LIMESTONE—Dolomite and limestone, gray to brown; may include shaly interbeds. About 900 feet thick
		Bright Angel Shale	BRIGHT ANGEL SHALE—Shale and siltstone, red, green, or gray; may include thin beds of limestone or dolomite. About 600 feet thick
	Lower	Tapeats Sandstone	TAPEATS SANDSTONE—Sandstone, medium- to coarse-grained, feldspathic, probably conglomeratic. About 300 feet thick
PRECAMBRIAN			Lithology unknown in map area

APPROX. 1 INCH TO 600 FEET

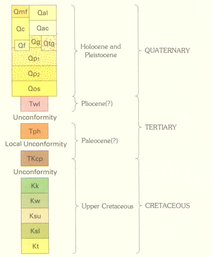






INTERIOR—GEOLOGICAL SURVEY, RESTON, VA.—1981—G6965

CORRELATION OF MAP UNITS

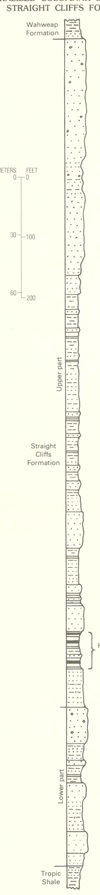


LIST OF MAP UNITS

- Qal — ALLUVIUM
- Qmf — MUDFLOW DEPOSIT
- Qc — COLLUVIUM
- Qac — ALLUVIUM AND COLLUVIUM
- Qg — GRAVEL DEPOSITS
- Qtg — TERRACE GRAVEL
- Qf — ALLUVIAL FAN DEPOSIT
- PEDIMENT DEPOSITS
  - Qp1 — Younger
  - Qp2 — Older
- Qos — OLDER SURFICIAL DEPOSITS
- Twl — GRAVITY SLIDE DEPOSITS OR TOREVA BLOCKS OF LIMESTONE OF THE WASATCH FORMATION
- Tph — PINE HOLLOW FORMATION
- TKcp — CANAAN PEAK FORMATION
- Kk — KAIPAROWITS FORMATION
- Kw — WAHWEAP FORMATION
- STRAIGHT CLIFFS FORMATION
  - Ksu — Upper part
  - Ksl — Lower part
- Kt — TROPIC SHALE

- COAL BED—Dashed where approximately located; short dashed where inferred. Thickness of coal, in feet, measured at triangle (multiple numbers indicate thicknesses of individual beds). Circled number refers to measured coal section
- BAKED AND FUSED ROCK NEAR BURNED COAL BED—Approximately located
- CONTACT—Dashed where approximately located or inferred (all contacts around or between surficial deposits are inferred)
- FAULT—Dashed where approximately located; dotted where concealed. Bar and ball on downthrown side
- BASE OF GRAVITY SLIDE OR TOREVA BLOCK—Approximately located
- 5000 — STRUCTURE CONTOURS—Drawn on top of the lower part of the Straight Cliffs Formation (Ksl). Dashed where control less accurate; short dashed where projected above land surface. Contour intervals 100 and 500 feet
- ANTICLINE—Showing crestline and direction of plunge. Approximately located; dotted where concealed
- SYNCLINE—Showing troughline and direction of plunge. Approximately located; dotted where concealed
- SYNCLINAL BEND OF MONOCLINE—Showing troughline
- 17 — STRIKE AND DIP OF BEDS
- 9 — COMPONENT OF DIP OF BEDS
- 16 — STRIKE AND DIP OF BEDS IN SLIDE BLOCK
- AMERADA-HESS 1 SKYLINE TD 7094 — DRY HOLE—Showing name of operator, lease name, and total depth (TD), in feet
- COAL PROSPECT

GENERALIZED COLUMNAR SECTION OF THE STRAIGHT CLIFFS FORMATION



INTRODUCTION

The Canaan Peak quadrangle, in Garfield and Kane Counties in southern Utah, was mapped in 1969–70 as part of the U.S. Geological Survey's program of classifying and evaluating Federal lands withdrawn for coal. Mapping was done on U.S. Geological Survey topographic maps at a scale of 1:24,000 with the aid of aerial photographs at about 1:49,000 scale.

The west half of the quadrangle is drained by tributaries of the southward-flowing Paria River. The central and southern part is drained by Wahweap Creek, which flows into the Colorado River near Glen Canyon Dam. The northeast part is drained by eastward-flowing tributaries of the Escalante River. Altitudes range from about 6,200 feet to nearly 9,300 feet on top of Canaan Peak.

The climate of the region is semiarid. In the central and southern parts of the quadrangle, vegetation consists mainly of pinyon, juniper, and sage. At high altitudes, particularly on the north slopes of Canaan Peak, a harvestable timber crop of pine and fir occurs in Dixie National Forest. Depending on soil type and altitude, parts of the area provide summer or winter grazing for livestock. Grass and other vegetation are sparse in the Wahweap Creek drainage, much of which is nearly badland topography, except for the flats of Headquarters Valley where a thick growth of juniper forest exists.

GENERAL GEOLOGY

Sedimentary rocks exposed in the quadrangle total about 6,200 feet in thickness and range in age from Late Cretaceous to early Tertiary. Sedimentary rocks in the subsurface total about 10,000 feet and range in age from Cambrian to Late Cretaceous. Two drill holes in the area penetrated rocks of Early Permian age. Lithology and thickness of stratigraphic units are shown in the generalized columnar section.

Two major regional folds converge in the quadrangle: the northwest-trending East Kaibab monocline, with steep easterly dips, and the northwest-trending Dutton monocline, with steep westerly dips. In the eastern part of the area, between these folds, is a narrow north-trending structural basin. The East Kaibab monocline terminates near the center of the quadrangle. Several northeast- and northwest-trending faults with as much as 200 feet displacement occur on or west of the monocline. The monoclinal folds are probably related to major faults in the basement rocks, as evident on the East Kaibab monocline in the Grand Canyon region (Huntoon, 1971).

Canaan Peak is interpreted as a large gravity slide or Toreva block made up of massive, steeply tilted blocks of limestone derived from the Wasatch Formation.

ECONOMIC GEOLOGY

COAL

Straight Cliffs coal.—The only coal beds exposed in the quadrangle occur in the Straight Cliffs Formation of Late Cretaceous age. Coal beds thick enough to meet present classification standards (Bass and others, 1970) occur in the Henderson coal zone, a fairly continuous coal-bearing interval from 60 to 120 feet above the base of the upper part of the Straight Cliffs Formation. Coal crops out only in the southwestern part of the area. The Henderson zone contains multiple coal beds ranging in thickness from a few inches to about 6.5 feet. Individual coal beds are commonly separated by shale or carbonaceous shale or mudstone, and may pinch out into carbonaceous shale. The thickest coal bed occurs near the western edge of the area and generally thins or pinches out eastward or northeastward. Zones of carbonaceous shale above the Henderson zone locally contain thin coal beds less than 1 foot thick.

Mines.—No coal mines exist in the quadrangle. One coal prospect in a 4-foot coal bed occurs on Horse Creek in sec. 2, T. 38 S., R. 1 W.

Quality of coal.—The Straight Cliffs coal in the Kaiparowits region generally falls within the range of high-rank subbituminous to low-rank high-volatile bituminous, is low to moderate in ash content, and is low in sulfur content. No coal analyses are available from the quadrangle. A few analyses from the Henderson coal in the Tropic area northwest of the quadrangle were reported by Robison (1966, p. 38) and Doelling and Graham (1972, p. 125). Coal exposed in the Canaan Peak quadrangle is generally thinner and of poorer quality than in most of the coal field.

Resources.—The regional trend of the major coal deposition indicates that thicker coal beds are probably present at considerable depth in the northeast part of the area. Coal beds of minable thickness are exposed just east of the northeast edge of the area in the Death Ridge quadrangle (Zeller, 1973), where three major coal zones are present in the Straight Cliffs Formation. Overburden that ranges from 1,800 feet to at least 4,000 feet and dips that range from 20° to 30° reduce the potential for development of coal resources in the area. Stratigraphically higher coals present in the Straight Cliffs Formation east of the area pinch out in the subsurface, and in the southwest part of the quadrangle occur only as zones of carbonaceous shale above the Henderson coal zone.

No attempt was made to calculate coal resources for the area because of the somewhat marginal value of exposed coal beds and the absence of any subsurface information for the quadrangle. All minerals in the area are reserved to the United States except for sections owned by the State of Utah (about 4,180 acres). To date, no coal leases have been issued on lands within the quadrangle. On the basis of available data, the area is considered of low potential for coal resource development.

OIL AND GAS

Two oil and gas tests, drilled by Amerada-Hess on the Butler Valley anticline, are listed as dry and abandoned. The 1 Skyline test bottomed in the Kaibab Limestone; the 1 Midwest bottomed in the White Rim Sandstone Member of the Cutler Formation. The Upper Valley oil field, operated by the Tenneco Oil Company, about 7 miles northeast of the 1 Skyline test, has been producing since 1964.

GRAVEL

Terrace gravel deposits along Henrieville Creek have been a source of road metal for the Utah Highway Department. Large quantities of gravel of variable quality are present in the extensive fan and pediment deposits that occur in the quadrangle, particularly in the northwest.

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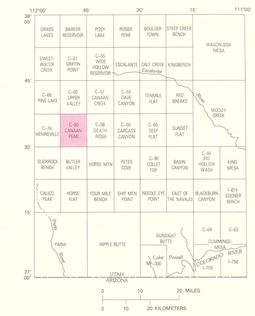
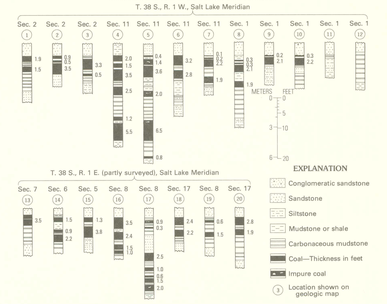
CONVERSION FACTORS FOR METRIC EQUIVALENTS

To convert ENGLISH UNIT	Multiply by	To obtain METRIC UNIT
Mile	1.609	Kilometer
Foot	.3048	Meter
Inch	2.54	Centimeter
Square mile	2.59	Square kilometer
Acre	.4047	Hectare



INDEX MAP OF SOUTH-CENTRAL UTAH—SHOWING CANAAN PEAK QUADRANGLE, QUADRANGLE NAMES, AND NUMBERS OF RECENTLY PUBLISHED U.S. GEOLOGICAL SURVEY GEOLOGIC MAPS



MEASURED COAL SECTIONS IN THE CANAAN PEAK QUADRANGLE

GEOLOGIC MAP AND COAL DEPOSITS OF THE CANAAN PEAK QUADRANGLE, GARFIELD AND KANE COUNTIES, UTAH

By
William E. Bowers

1981

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