Utah Geological Survey Open-File Report 710DR

Geologic Map of the Mt. Ellen-Blue Hills Wilderness Study Area
and Bull Mountain Study Area, Garfield and Wayne Counties, Utah
(GIS Reproduction of USGS MF-1756-B [1985])
by
C.G. Patterson, C.S. Bromfield, R.F. Dubiel, J.E. Faulds, M.J. Larson, P.G Milde,
and Fred Peterson
2019

SCALE 1:50,000

1 0.5 0 1 2 3 4 MILES

3000 0 3000 6000 9000 12000 15000 18000 21000 FEET

1 0.5 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 50 METERS

111°06'04" 111°00' 110°52'30" 110°45' 110°37'30" 110°35'
38°22'21" 38°15' 38°07'30" 38°02'37" 38°02'30"

DEPARTEMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE U.S. BUREAU OF LAND MANAGEMENT

MISCELLANEOUS FIELD STUDIES
MAP MF-1756-B

GEOLOGIC MAP OF THE MT. ELLEN-BLUE HILLS WILDERNESS STUDY AREA AND BULL MOUNTAIN STUDY AREA, GARFIELD AND WAYNE COUNTIES. UTAH

By

C.G. Patterson, C.S. Bromfield, R.F. Dubiel, J.E. Faulds, M.J. Larson, P.G. Milde, and Fred Peterson

1985

SCALE 1:50 000

CONTOUR INTERVAL 100 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

INDEX MAP SHOWING LOCATIONS OF THE MT. ELLEN-BLUE HILLS WILDERNESS STUDY AREAS AND THE BULL MOUNTAIN STUDY AREA

MT. ELLEN-BLUE HILLS WILDERNESS STUDY AREA

BULL MOUNTAIN STUDY AREA

EXPLANATION

Faulds, 1981 (unpub. data)

Milde and Larson, 1983 (unpub. data)

Hunt, and others (1953); Doelling (1972). Revisions by M. J. Larson, 1982-84 (unpub. data)

Hunt (1953); Doelling (1972). Revisions by M. J. Larson and C. G. Patterson, 1982-84 (unpub. data)

INDEX TO GEOLOGIC MAPPING

CORRELATION OF MAP UNITS

Qal, Qcl	Qg	Holocene, Pleistocene — QUATERNARY
Unconformity		
Tps, Tpl, Tpsh		Eocene — TERTIARY
Unconformity		
Kmv		Upper Cretaceous — CRETACEOUS
Kmm		
Kme		
Kmbg		
Unconformity		
Kmf		
Kmt		
Kd		
Unconformity		
Kcm		Lower Cretaceous
Unconformity		
Jmb		Upper Jurassic
Jms		
Unconformity		
Js		JURASSIC
Jcu		
Unconformity		Middle Jurassic
Je		
Jc		
Unconformity		
JTrn		JURASSIC AND TRIASSIC(?)

DESCRIPTION OF MAP UNITS

Qal — ALLUVIUM (HOLOCENE)--Poorly sorted deposits of gravel, sand, silt, and clay deposited in stream courses

Qcl — COLLUVIUM (HOLOCENE)--Talus, landslide debris, torova blocks, and unsorted boulders, gravel, sand, and mud; thickness 0-100 ft or more

Qg — GRAVEL DEPOSITS (HOLOCENE AND PLEISTOCENE)--Poorly sorted gravel, sand, and mud on pediment and terrace surfaces; thickness 0-50 ft

Tps — PORPHYRITIC INTRUSIVE ROCKS OF THE MT. ELLEN STOCK (EOCENE)--Light-gray diorite porphyry

Tpl — DIORITE PORPHYRY (EOCENE)--Laccoliths, bysmaliths, and minor intrusive masses; radiometric dates of 64 and 45 m.y. (Armstrong, 1969)

Tpsh — DIORITE PORPHYRY (EOCENE)--Irregularly intruded into shattered sedimentary rock in a zone surrounding the stock

Kmv — MESAVERDE FORMATION (UPPER CRETACEOUS)--Yellowish-tan to light-brown, fine-grained sandstone, locally conglomeratic with small pebbles of chert and quartzite; fluvial deposits; conspicuously crossbedded; forms cliffs; corresponds to Tarantula Mesa Sandstone of Smith (1964); approximate thickness 295-395 ft

Kmm — MANCOS SHALE (UPPER CRETACEOUS)--Vertically alternating marine and nonmarine units aggregating 3,200-3,600 ft in thickness
Masuk Member--Yellowish-green to yellowish-gray, slightly bentonitic mudstone and local black, carbonaceous mudstone, interbedded with yellowish-gray, very fine grained to fine-grained, crossbedded sandstone; forms slope; alluvial plain deposits, may include some brackish-water estuarine deposits (Peterson and others, 1980); approximate thickness 600-685 ft

Kme — Emery Sandstone Member--Light to dark-brown, fine- to medium-grained sandstone, upper part interbedded with greenish-gray, laminated to thinly bedded mudstone, black carbonaceous mudstone and coal seams; sandstone often thinly bedded or cross-stratified, generally forms alternating slopes and cliffs; marginal marine, lagoonal-paludal, and alluvial plain deposits; corresponds to Muley Canyon Sandstone Member of Smith (1964); approximate thickness 300-445 ft

Kmbg — Blue Gate Member--Gray to dark-gray bentonitic marine shale, horizontally laminated and(or) ripple cross-laminated, locally interbedded with very fine grained sandstone; forms broad slope; offshore marine deposits; approximate thickness 1100-1500 ft

Kmf — Ferron Sandstone Member--Yellowish-gray to light-brown, fine- to medium-grained, laminated, crossbedded sandstone; upper part interbedded with black carbonaceous mudstone and coal beds; forms alternating slopes and cliffs; marginal marine, lagoonal-paludal, and alluvial plain deposits;approximate thickness 200-385 ft

Kmt — Tununk Member--Gray to bluish-gray bentonitic mudstone and silty shale, locally interbedded with yellowish-gray, very fine grained to fine-grained, laminated to thin-bedded, calcareous sandstone; forms a broad bench; offshore marine deposits; approximate thickness 530-720 ft

Kd — DAKOTA SANDSTONE (UPPER CRETACEOUS)--Light-gray to light-brown, fine- to medium-grained sandstone, and locally conglomeratic sandstone; sandstone moderately to well cemented, horizontally laminated and(or) crossbedded, and interbedded in lower part with black, carbonaceous mudstone and thin, subeconomic coal seams; forms cliffs and slopes; fluvial, lagoonal-paludal, and marginal marine deposits; thickness ranges from 0-90 ft or more

Kcm — CEDAR MOUNTAIN FORMATION (LOWER CRETACEOUS)--Light-gray to gray, medium- to coarse-grained pebbly sandstone, interbedded with yellowish-gray to light-green slightly bentonitic, mudstone; may contain a basal conglomerate bed; alluvial plain deposits; thickness ranges from 0-170 ft

Jmb — MORRISON FORMATION (UPPER JURASSIC)--Continental deposits 265-655 ft thick
Brushy Basin Member--Light-gray to gray-green, reddish-brown to purple bentonitic mudstone containing several lenses of chert pebble conglomerate; slope former; alluvial plain, mudflat, and probable lacustrine deposits; approximate thickness 100-250 ft

Jms — Salt Wash Member--Yellowish-gray to light-brown, fine- to medium-grained, crossbedded or laminated sandstone, conglomeratic sandstone and conglomerate; interstratified with grayish-green to reddish-brown siltstone and mudstone; locally a major uranium-bearing unit; forms cliffs; alluvial plain, mudflat, and lacustrine deposits; approximate thickness 100-500 ft

Js — SUMMERVILLE FORMATION (MIDDLE JURASSIC)--Moderate-reddish-brown, laminated to very-thin bedded, mudstone and siltstone; locally containing light-gray to grayish-green gypsum lenses 0-3 ft thick; forms broad slopes with prominent cliff at top; shallow-water, restricted-marine and, locally, evaporite deposits; approximate thickness 130-250 ft

Jcu — CURTIS FORMATION (MIDDLE JURASSIC)--Light-gray to grayish-green, fine- to medium-grained, glauconitic sandstone and silty shale; limestone, chert, or shale pebble conglomerate locally present at base; shallow-water marine deposits; thickness ranges from 0-175 ft

Je — ENTRADA SANDSTONE (MIDDLE JURASSIC)--Reddish-orange to reddish-brown, very fine grained to fine-grained sandstone and silty sandstone, very thin to thick-bedded; generally forms slope; eolian and sabkha deposits; approximate thickness 300-700 ft

Jc — CARMEL FORMATION (MIDDLE JURASSIC)--Yellowish-orange to moderate-reddish-brown, very fine grained to fine-grained sandstone and dark-reddish-brown mudstone; locally contains gray to green-gray limestone and coarsely crystalline white gypsum; marine, tidal flat, and sabkha deposits; approximate thickness 100-625 ft

JTrn — NAVAJO SANDSTONE (JURASSIC AND TRIASSIC?)--Light-gray to light-orange, fine- to medium-grained, well-sorted sandstone, thickly crossbedded; local contains minor lenses of mudstone, and cherty limestone, or dolomite; cliff former; eolian and minor playa deposits; approximate thickness 500-820 ft

---- CONTACT-- Dashed where approximately located; dotted where concealed

D / U — NORMAL FAULT--Dashed where approximately located; U, upthrown side; D, downthrown side

ANTICLINE-- Showing approximate location of crestline

SYNCLINE-- Showing approximate location of troughline

STRIKE AND DIP OF BEDS
Apparent
Inclined
Vertical

STUDIES RELATED TO WILDERNESS
BUREAU OF LAND MANAGEMENT WILDERNESS STUDY AREAS

The Federal Land Policy and Management Act (Public Law 94-579, October 21, 1976) requires the U. S. Geological Survey and the U. S. Bureau of Mines to conduct mineral surveys on certain areas to determine the mineral values, if any, that may be present. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a geologic survey of the Mt. Ellen-Blue Hills (UT-050-238) Wilderness Study Area, Garfield and Wayne Counties, Utah. This report also presents the results of a geologic survey of the Bull Mountain study area, Garfield and Wayne Counties, Utah, which was formerly designated as the Bull Mountain (UT-050-242) Wilderness Study Area.

INTRODUCTION

The Mt. Ellen-Blue Hills Wilderness Study Area (WSA) and adjacent Bull Mountain study area together cover 70,280 acres of the northern Henry Mountains, in Garfield and Wayne Counties, Utah. The study areas are located about 20 mi southwest of Hanksville, Utah, and about 25 mi northwest of Lake Powell. The Mt. Ellen-Blue Hills WSA covers 56,480 acres in the northern Henry Mountains and adjoining plateaus extending northwest to the Fremont River. The Bull Mountain study area covers 11,800 acres surrounding Bull Mountain. The area is readily accessible from Hanksville by the Sawmill Basin road, which divides the area into two parts--the Bull Mountain area on the east, and the Blue Hills-Mount Ellen area on the west. The east, south, and west boundaries of the study area also are readily accessible by improved dirt roads extending westward from paved State Highway 95, which extends south from Hanksville and is a few miles east of the wilderness study areas.

The high, rugged, laccolithic mountains, surrounded by pediment gravel surfaces, rise from intricately dissected, sparsely vegetated plateaus. Elevations range from about 4,800 ft along the Fremont River to 11,522 ft on North Summit Ridge of Mt. Ellen.

PREVIOUS INVESTIGATIONS

G. K. Gilbert (1877) was the first geologist to examine the region and elucidate the nature of laccoliths and their importance in the Henry Mountains. From 1935 to 1939, C. B. Hunt and his assistants mapped the area topographically and geologically and later published the maps as part of a detailed geologic study of the Henry Mountains (Hunt and others, 1953). Doelling and Graham (1972) mapped several quadrangles as part of a study of the Henry Basin coal field; in addition, they modified and adapted Hunt's maps to available modern topographic maps.

GEOLOGIC SETTING

The Henry Mountains are on the eastern flank of the Henry Basin, a structure about 100 mi long in a north-south dimension and about 50 mi wide. The western flank of the asymmetric basin is steep and merges with the adjacent Circle Cliffs uplift to the west. The gently dipping, eastern flank of the basin is interrupted by the intrusive centers of the Henry Mountains and adjoins the western limb of the Monument upwarp, a monocline structure. The axis of the Henry Basin trends nearly north-south along the west edge of the map area.

The Henry Mountains consist of five distinct mountain groups, extending north-northwest for about 35 miles. The core of each is a separate diorite or monzonite porphyry stock that is bordered by an irregular zone of shattered sedimentary rock, which is intruded in various ways by the porphyry. The Mount Ellen center is surrounded by a cluster of satellitic laccoliths, bysmaliths, and sills; Bull Mountain is one of the largest of these floored intrusive bodies.

Surrounding the intrusive centers, several thousand feet of exposed sedimentary rocks, ranging in age from Triassic to Late Cretaceous, are arched into large domes. Mt. Ellen is 12-15 mi in diameter and has a structural relief of nearly 5,000 ft. Superposed on this large dome are smaller anticlinal crenulations that reflect individual laccoliths, which tend to be intruded radially from the stock. The Mt. Ellen stock is located south of the study area boundary.

The age of the intrusion is not known with certainty. The youngest sedimentary rock intruded is Late Cretaceous in age. Potassium-argon dates of 44 and 48 m.y. on hornblende from diorite porphyry of the Bull Mountain bysmalith (Armstrong, 1969) indicate an Eocene age. However, on the basis of similarity to other intrusive complexes on the Colorado Plateaus, Hunt (1980) believed that mid-Tertiary dates for the laccoliths are more likely.

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Base from U.S. Geological Survey, 1:62,500
Bull Mountain and Fruita, 1954; Hanksville, 1963; Mt. Ellen, 1962

Geologic credits--see index to geologic mapping