GL03113-242

GEOLOGIC MAP AND SECTIONS OF THE FURNACE CREEK BORATE AREA, DEATH VALLEY, CALIFORNIA

By
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1970

Second Printing 1977

FURNACE CREEK BORATE AREA
MAP SHEET 14
CALIFORNIA DIVISION OF MINES AND GEOLOGY
Sacramento, California
Wesley G. Bader, State Geologist
1970
State of California
The Resources Agency
Department of Conservation

PREPARED IN COOPERATION WITH THE U.S. GEOLOGICAL SURVEY

EXPLANATION

QUATERNARY (Pleistocene and Holocene)

Surficial deposits
Qal, *younger alluvium; includes some talus rubble*
Qoa, *older alluvium; includes some talus rubble*
Ql, *salines and fine-grained clastic sediments, mostly on floor of Death Valley*
QTr, *travertine of former springs*
Qls, *landslide constituents, undifferentiated*

UNCONFORMITY

TERTIARY AND QUATERNARY(?) (Pliocene and Pleistocene(?))

Funeral Formation
QTf, *conglomerate; pebbles to boulders in mud and sand matrix, incipiently lithified*
QTfm, *lower member; gravelly mudstone and sandstone; local travertine and well-lithified conglomerate. Near Travertine Point the member includes well-lithified breccia (QTfb) and large blocks derived from the following Paleozoic formations: Hidden Valley (QTfb), Ely Springs (? QTfm), Eureka (QTfe), Pogonip (QTfu), Nopah (QTfn), Bonanza King (? QTfb)*
QTfb, *olivine-phenocryst basalt*
QTfb, *basaltic agglomerate at volcanic vents*

UNCONFORMITY

TERTIARY (Pliocene)

Furnace Creek Formation
Tf, *main part of formation; predominantly lacustrine mudstone and sandstone, abundantly tuffaceous; minor limestone and marlstone; some conglomeratic or gypsiferous beds and differentiated as members; only dispersed salines; contains major borate deposits*
Tfu, *upper member; light-colored mudstone marked at base by pumiceous tuff; grades into some sandstone and conglomerate*
Tfcu, *upper conglomerate members interlonging through much of the formation*
Tfg, *gypiferous member; granular gypsum and minor analcitic interlayered with little or much mudstone; fibrous gypsum veins abundant; limestone irregular in upper part; contains minor borate deposits*
Tfc, *conglomerate member at base of formation; some muddy and sandy matrix and interbeds; locally thick lenses of limestone flat-pebble conglomerate; contains some major borate deposits*
Volcanic rocks, interlayered and intrusive:
Tfv, *altered basalt fragmental to commonly sand to pebble size, unsorted, or poorly sorted where obscurely stratified; borate veins locally*
Tfb, *basaltic flows and intrusions; borate veins locally*
Tfl, *pale volcanic rocks; tuff-breccia, luminescent, felsitic, and vitrophyre fragments, greenish-gray or pale-orange; minor vitrophyre and vitrophyre breccia, partly altered*

MAJOR UNCONFORMITY (Funeral Mountains) — UNCONFORMITY (Eastern part)

TERTIARY (Oligocene(?) to Pliocene)

Artist Drive Formation
Tau, *upper sedimentary member*
Tapu, *upper pyroclastic member*
Tam, *middle sedimentary member*
Tapl, *lower pyroclastic member*
Tal, *lower sedimentary member*
Taf, *felsite, intrusive*
Tab, *basaltic rocks, intrusive and extrusive*

MAJOR UNCONFORMITY

SILURIAN AND DEVONIAN

Silurian and Devonian(?)
DSh — Hidden Valley Dolomite

ORDOVICIAN

Middle and Upper Ordovician
Oes — Ely Springs Dolomite

Middle Ordovician
Oe — Eureka Quartzite

Lower and Middle Ordovician
Op — Pogonip Group

CAMBRIAN

Upper Cambrian
Cn — Nopah Formation

Middle and Upper Cambrian
Cbb / Cbp — Bonanza King Formation
Cbb, *Banded Mountain Member*
Cbp, *Papoose Lake Member*

Lower and Middle Cambrian
Cc — Carrara Formation

Lower Cambrian
Cz — Zabriskie Quartzite

PRECAMBRIAN

Cwu / Cwm / pCw — Wood Canyon Formation
Cwu, *upper member*
Cwm, *middle member*
pCw, *lower member*

Borate deposits
B, *borate minerals, undifferentiated in Furnace Creek Formation (surficial accumulations on Death Valley floor and terraces are not shown)*

Contact
Dashed where approximately located

Fault, showing dip
Dashed where approximately located; dotted where concealed. U, upthrown side; D, downthrown side

Anticline
Showing trace of axial plane and bearing and plunge of axis. Dashed where approximately located

Syncline
Showing trace of axial plane and bearing and plunge of axis. Dashed where approximately located

Strike and dip of beds

Strike and dip of overturned beds

Strike of vertical beds

Horizontal beds

Landslide fracture

Borate mines
Major production (1915–1927) from mines 1 to 10; recent production from mines 1, 2, 3

1. East Coleman pit
2. Corkscrew
3. Kern Borate
4. Played Out
5. Upper Biddy McCarthy
6. Lower Biddy McCarthy
7. Grand View
8. Lizzie V. Oakley
9. Widow No. 7
10. Widow No. 3

NOTE:
For a description of these and other borate mines, see CDMG Special Report 121, *"Mines and Mineral Deposits in Death Valley National Monument, California"*, 1976.

INDEX MAP SHOWING LOCATION OF THE FURNACE CREEK BORATE AREA IN THE FURNACE CREEK AND RYAN QUADRANGLES, INYO COUNTY

SCALE 1:24 000
1 0 1 2 MILES
CONTOUR INTERVAL 80 FEET
DOTTED LINES REPRESENT 40 FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

APPROXIMATE MEAN DECLINATION, 1968

Base from U.S. Geological Survey
Furnace Creek and Ryan quadrangles,
1:62,500, 1952

Geology mapped 1954–1961

Cartography by Esther McDermott

AREA
CA
Inyo
Geol
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