DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
OPEN FILE REPORT 1968

EXPLANATION

NORTH MAMM PEAK QUADRANGLE, COLORADO

ALLUVIAL FACIES

TIME OF DEVELOPMENT OF LATE RECENT SOIL

Recent

Qal

Low terrace and floodplain deposits

Pinkish-gray to grayish-brown boulder, cobble, and pebble gravel in a fine sand matrix; well sorted, well rounded; igneous and metamorphic cobbles are prevalent. Reddish-brown lenses of sandy silt are common. Locally merges with terraces and fan gravels of Grand Mesa

Qass

Alluvial and eolian sand and silt

Yellowish-brown gravelly silt and sand, reddish-brown silt; generally well sorted. Contains mostly quartz derived from nearby sedimentary rocks; commonly fills depressions and young valleys; arroyos 10-12 feet deep are incised in the deposits. Mapped only where moderately extensive and thick enough to cover the underlying deposits. 1-30 feet thick

TIME OF DEVELOPMENT OF POST-GRAND MESA SOIL

Pinedale(?) Glaciation

Qga / Qgay

Terrace and fan gravels of Grand Mesa

Pebble, cobble, and boulder gravel in a sandy matrix; moderately to well sorted; subrounded to well rounded; imbricate structure; stones are mostly basalt but also include variable amounts of sedimentary rocks; near Colorado River are abundant cobbles of igneous and metamorphic rocks derived from east of the mapped area. Gradients are 50-100 feet per mile. 5-200 feet thick

Qgay, younger gravels; merges with Recent floodplain deposits (Qal); less than 80 feet above streams

TIME OF DEVELOPMENT OF LANDS END-GRAND MESA INTERGLACIAL SOIL

Bull Lake(?) Glaciation

Qla

Terrace and fan gravels of Lands End

Grayish-brown sandy gravel; moderately to poorly sorted; poorly stratified, rock fragments angular to well rounded; basalt and locally derived slabby siltstone, marlstone, and sandstone. Fan gravels are deposited on pre-Wisconsin pediments and alluvial fans. Gradients of fans 400 feet per mile, 20-200 feet thick

Pleistocene

TIME OF DEVELOPMENT OF PRE-LANDS END INTERGLACIAL SOIL

Qay / Qa

Terrace and fan gravels

Pebble, cobble, and boulder gravel; stones subrounded to well rounded; sorting poor to good; stones equally divided between basalt and locally derived sandstone, claystone, siltstone, and marlstone; matrix is greenish-gray silty sand; some terraces buried by younger fan gravel and mudflows. Reddish-brown windblown sand and silt locally mantles terrace surfaces. Gradients vary between 150 and 400 feet per mile; generally less than 60 feet thick

Qay, younger terrace and fan gravel

Qp / Qpo

Pediment gravel

Subangular to subrounded pebble, cobble, and boulder gravel; basalt boulders as much as 8 feet in diameter; cobbles, pebbles, and matrix are approximately 50 percent locally derived grayish-green sandstone, siltstone, and claystone; poorly sorted except near Colorado River. Gravel surface is commonly mantled with a thin veneer of reddish-brown windblown sand and silt. Gradients commonly 300-400 feet per mile. Generally less than 50 feet thick

Qp, pediment gravel undifferentiated; 440-600 feet above Colorado River

Qpo, older pediment gravel; 1,800 feet above Colorado River

COLLUVIAL FACIES

TIME OF DEVELOPMENT OF LATE RECENT SOIL

Recent

Qes

Earthflow and solifluction deposits

Unsorted boulder, cobble, and pebble gravel in a light-greenish-gray sandy silt matrix; contains some basalt boulders derived from older till and landslide deposits; predominantly angular fragments of sandstone, siltstone, and claystone derived from the Wasatch Formation; deformed bedding common within claystones of the Wasatch Formation. Surfaces are irregular, often crudely terraced with lobes and swales and undrained depressions; local pond deposits. Almost exclusively restricted to areas underlain by the claystone-rich members of the Wasatch Formation. 1-30 feet thick

Qft

Frost rubble, talus, and rock glaciers(?)

Boulders and cobbles of basalt, commonly 1-4 feet in diameter, some 20 feet across; angular; lichen covered; boulders have accumulated at base of basalt cliffs; slopes 30°-40° common, occasionally 50°. Arcuate ridges of rubble resembling rock glaciers and several protalus ramparts are included

TIME OF DEVELOPMENT OF POST-GRAND MESA SOIL

Pinedale(?) Glaciation

Qgmf

Mudflows and fan gravel of Grand Mesa

Pebble, cobble, and boulder gravel in a gray matrix of coarse sand; poorly sorted with stones seldom in contact; stones angular to subangular; primarily unweathered basalt. Derived largely from landslide deposits (Qsl). Forms both smooth and irregular slopes, some natural levees. Several generations of flows cut out and override terrace and fan gravels of Lands End (Qla) and older mudflow deposits

TIME OF DEVELOPMENT OF LANDS END-GRAND MESA INTERGLACIAL SOIL

Bull Lake(?) Glaciation

Qsl

Slump blocks, talus, and solifluction deposits

Slump blocks forming ridges of basalt and basalt rubble mantling much of the high surface on Battlement Mesa. Unbroken blocks are as much as 1 mile long and locally have relief of 500 feet; as much as 50° rotation observed. Block rubble deposits composed of large angular blocks of basalt are included

Pleistocene

QUATERNARY

BEDROCK

TERTIARY

Pliocene

Ti

Intrusive rocks

Basaltic or andesitic dikes and sills of basic composition. Presumably fill vents that fed overlying igneous flows

Tv

Basalt flows

UNCONFORMITY

Tgc

Gravel and variegated claystone

Eocene

Tge / Tgp / Tgl

Green River Formation

*Tge, Evacuation Creek Member: light-brown and gray very fine to medium grained sandstone and light-gray marlstone and siltstone; contains pelecypods, gastropods, ostracods, and fragments of fossil vertebrates

Tgp, Parachute Creek Member: black, brown, and gray oil shale of varying quality that locally forms cliffs; contains minor amount of light-gray siltstone and light-gray and brown fine- to medium-grained sandstone; also contains numerous thin, persistent light-gray to brown analcite and tuff beds. Outcrop of richest oil-shale bed (Mahogany bed) shown by dashed-and-dotted line

Tgl, lower member: fine- to coarse-grained gray and brown sandstone containing minor amounts of light-gray siltstone and marlstone and a few tan low-grade oil-shale beds

Tw

Wasatch Formation

Variegated red, gray, purple, and lavender shale and clay; some lenticular fine- to coarse-grained sandstone and conglomerate and thin limestone beds

Contact
Dashed where approximately located

● Core drill hole
In NW 1/4 sec. 36, T. 7 S., R. 94 W.

☼ Gas well

☼ Well with show of gas

*Although these strata are here assigned to the Evacuation Creek Member of the Green River Formation, as they commonly have been here and elsewhere in the Piceance Creek Basin, they are lithologically more similar to and probably equivalent to the Uinta Formation as used in the Uinta Basin (see H. D. Curry, 1964, Oil-content correlation of Green River oil shales, Uinta and Piceance Creek Basins: Intermountain Assoc. Petroleum Geologists Guidebook, 13th Ann. Field Conf., p. 169-171).

This report is preliminary and has not been edited or reviewed for conformity with U.S. Geological Survey standards

SOIL DESCRIPTIONS

Only those soils displaying a completely developed diagnostic profile are described. These soils may occupy as little as 10 percent of the mapped area of a unit.

LATE RECENT SOIL:
- A horizon: reddish-gray to brownish-black silt, brownish-black fine sandy silt loam, and black silty clay; humic; 0.5-1.5 ft.
- Cca horizon (generally absent): contains fracture fillings and thin stringers of grayish-white calcium carbonate; some thin carbonate films on stones; 0.4-2.0 ft.

POST-GRAND MESA SOIL:
- A horizon: brown and dark-brown to dark-reddish-gray gravelly silt loam to brownish-black silt; humic at high elevations; friable; 0.9-1.8 ft.
- B horizon: moderate-yellowish-brown (10YR 4/4) gravelly silt loam to reddish-brown (5Y 5/3) sandy silt loam to dark-reddish-gray gravelly silt loam; loose, weak granular structure; very weakly oxidized; pH 6.0 at high elevations, 8.0 at low elevations; 0.8-1.7 ft.
- Cca horizon (not developed at high elevations): white to gray-white gravelly silt; calcium-carbonate impregnation ranges from very strong with well-developed platy structure to thin coatings on stones; 1.0-1.5 ft.

LANDS END-GRAND MESA INTERGLACIAL SOIL:
- A horizon: brown to brownish-black silt and fine silty sand; loose, friable; 0.5-1.9 ft.
- B horizon: dark-reddish-brown (5YR 3/3) clay to dark-reddish-brown (5YR 4/4) sandy silt to reddish-brown (2.5YR 4/4) silty clay loam and silt; clay skins, medium platy to blocky structure; moderately sticky; pH 8.5; secondary carbonate; 2.0-4.0 ft.
- Cca horizon: pink (7.5YR 7/4) silt loam to white gravelly silt; strongly impregnated with calcium carbonate; locally indurated platy structure; 1.5-5.0 ft.

PRE-LANDS END INTERGLACIAL SOIL:
- A horizon: dark-brown to brown sandy silt; friable, calcium-carbonate aggregates scattered throughout; probably of modern origin; no structure; pH 8.0; 0.5-1.5 ft.
- B horizon (commonly partially or completely stripped): reddish-brown (5YR 5/3-5YR 4/3) fine sandy silt; a few partially weathered basalt pebbles; weak blocky structure; very slightly sticky; 2.0-3.0 ft.
- Cca horizon: white gravelly silty sand; very strongly impregnated with calcium carbonate, stones often thickly coated; prominent platy structure, moderately well cemented, firm; 3.0-5.0 ft.

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pt. 2 of 2

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GEOLOGIC MAP OF [SIX] QUADRANGLES,
GARFIELD AND MESA COUNTIES, COLORADO
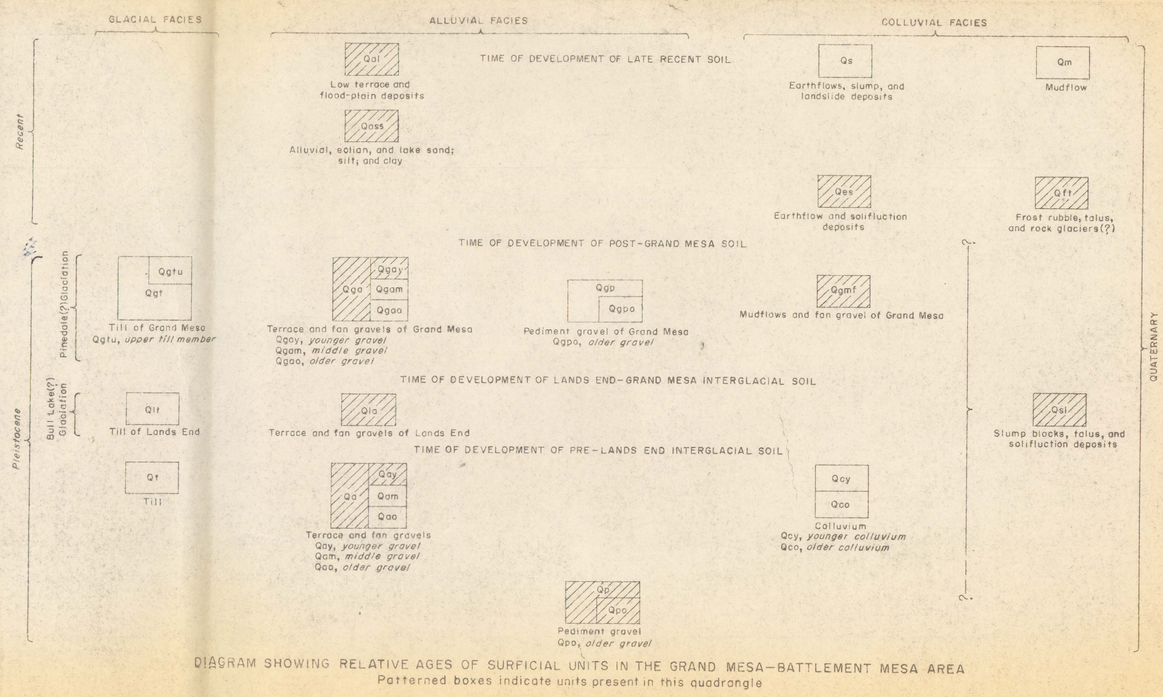
DIAGRAM SHOWING RELATIVE AGES OF SURFICIAL UNITS IN THE GRAND MESA–BATTLEMENT MESA AREA
Patterned boxes indicate units present in this quadrangle