DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
OPEN FILE REPORT 1968
HAWXHURST CREEK QUADRANGLE, COLORADO

EXPLANATION

GLACIAL FACIES

TIME OF DEVELOPMENT OF POST-GRAND MESA SOIL

Qgt — Till of Grand Mesa
Light-grayish-brown and moderate-brown to olive-gray gravelly sandy silt loam to grayish-brown gravelly sandy silt; unsorted; angular to subangular boulders, cobbles, and pebbles; more than 90 percent of stones are basalt; few basalt boulders and cobbles are striated but many are soled and faceted. Smooth till plains common. Coarse basalt fragments within the till show little weathering

Pinedale(?) Glaciation — Pleistocene

Qga — Terrace and fan gravels of Grand Mesa
Pebble, cobble, and boulder gravel in a sandy matrix; glacial and nonglacial; moderately to well sorted; subrounded to well rounded; imbricate structure; stones are mostly basalt but also include variable amounts of sedimentary rocks. 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
Qgao, older terrace gravels; intertongue with till in the till plains on the lower slopes of Grand Mesa; 50-200 feet above streams

Qgp — Pediment gravel of Grand Mesa
Pebble, cobble, and boulder gravel in a light-greenish-gray silty sand matrix; poorly sorted; commonly unstratified; stones angular to subangular, slabs predominantly locally derived sandstone, siltstone, claystone, and marlstone; basalt boulders scarce. Deposits especially common at the base of steep slopes in the arid regions. Probably includes some colluvial material. Merges with and overlies terrace gravels (Qgao) in Plateau Creek. Gradients 150-200 feet per mile. Commonly mantled with thin reddish-brown eolian silt. 5-40 feet thick

ALLUVIAL FACIES

TIME OF DEVELOPMENT OF LATE RECENT SOIL

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; stones are predominantly basalt with subsidiary amounts of local sedimentary rocks. Reddish-brown lenses of sandy silt are common. Locally merges with terraces and fan gravel 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

COLLUVIAL FACIES

Qs — Earthflow, slump, and landslide deposits
Small, very recent isolated earth movements; mainly small slumps developed in Tertiary claystone beds; grade downslope into hummocky earthflow with flow ridges

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

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

Recent — QUATERNARY

BEDROCK

Pliocene — **Tv** — Basalt flows

UNCONFORMITY

Eocene — **Tge / Tgp / Tgg / 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; numerous thin, persistent light-gray to brown analcite and tuff beds. Outcrop of richest oil-shale bed (Mahogany bed) indicated by dashed-and-dotted line
Tgg, Garden Gulch Member: light-gray barren marlstone, dark-brown to black paper shale (oil shale of varying quality), light-gray oolitic limestone and sandstone, light-gray algal limestone, and some massive fine- to medium-grained sandstone
Tgl, lower member: fine- to coarse-grained gray and brown sandstone containing minor amounts of light-gray siltstone and marlstone and a few thin tan low-grade oil-shale beds

Twu — Upper member of Wasatch Formation
Variegated red, gray, purple, and lavender shale and clay, red predominant; some lenticular fine- to coarse-grained channel sandstones

TERTIARY

Contact
Dashed where approximately located

• Core drill hole
In SW 1/4 sec. 10, T. 8 S., R. 95 W.

☼ Gas well

☼ Well with show of gas

☼ Dry hole

*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

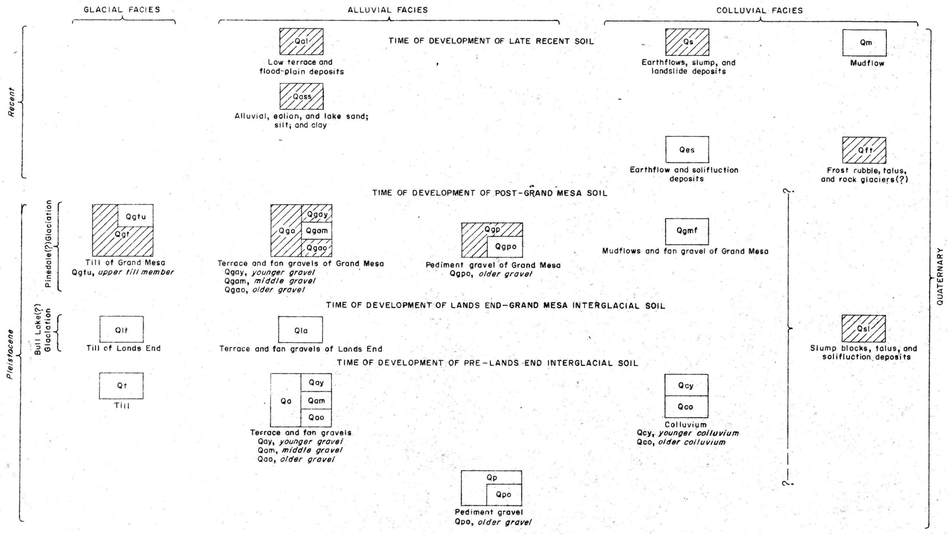

DIAGRAM SHOWING RELATIVE AGES OF SURFICIAL UNITS IN THE GRAND MESA—BATTLEMENT MESA AREA
Patterned boxes indicate units present in this quadrangle

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.