

**DESCRIPTION OF MAP UNITS**

[Note: Descriptions of the surficial deposits of the Hawxhurst Creek quadrangle are included in a detailed report on the Quaternary geology of the Grand and Battlement Mesas, Colorado, by Yeend (1969).]

**Qal Alluvium (Holocene)**—Mud, silt, sand, and gravel forming valley floor of Plateau, Buzzard, and Kiaball Creeks. Clasts are basalt and local sedimentary rocks. Lenses of reddish-brown sandy silt are common.

**Qga Alluvial sand and silt (Holocene)**—Yellowish-brown silt and sand, reddish-brown silt, generally well sorted, and gray clay. Derived mostly from nearby sedimentary rocks. Locally occupies depressions and young valleys. Mapped only where moderately extensive. Maximum thickness about 40 ft (12 m).

**Qca Talus deposits (Holocene)**—Boulders and cobbles of basalt, commonly 1-4 ft (0.3-1.2 m) in diameter, some as much as 20 ft (6 m) across, angular, lichen covered; boulders have accumulated at base of basalt cliffs.

**Qs Slump, earthflow, and landslide deposits (Holocene)**—Two small slumps in southern part of quadrangle developed in Tertiary claystone. May be presently active.

**Qsl Slump blocks and colluvium deposits (Holocene and Pleistocene)**—Basalt blocks and boulders, and unconsolidated material moved downslope by gravity. Slump blocks form ridges of basalt rubble mantling much of the high surface of Battlement Mesa. Unbroken blocks are as much as 1 mi (1.6 km) long and locally as much as 500 ft (152 m) thick. Most deposits are of Pleistocene age but some movement continues to the present time.

**Qst Grand Mesa Formation (Pleistocene—Probably time of Pineale(?) glaciation)**

**Qqa Alluvial gravel—Outwash, terrace, valley fill, and fan gravels.** Glacial outwash present between Buzzard and Plateau Creeks where gravel interfingers with glacial till (Qgt). Mostly glacial in drainage of Kiaball Creek and elsewhere. Consists of rounded pebbles, cobbles, and boulders of basalt and variable amounts of sedimentary rocks in a sandy matrix.

**Qgs Till—Abundant angular to subangular pebbles, cobbles, and boulders in a matrix of grayish-brown sand, silt, and clay. Pebbles, cobbles, and boulders are 90 percent or more basalt. A few basalt boulders and cobbles are striated but many are soiled and faceted. Large basalt fragments in the till show little weathering. Mostly form till plain along Buzzard and Plateau Creeks, but also includes several isolated patches of lateral moraine. Maximum thickness about 150 ft (46 m).**

**Qgt** **Fediment gravel—Pebbles, cobbles, and boulders of locally derived angular sandstone, siltstone, claystone, and marlstone, in a matrix of poorly stratified to unstratified light-greenish-gray silty sand. Basal detritus scarce. Probably includes some colluvial material. Commonly mantled with reddish-brown silt. Thickness 5-40 ft (1.5-12 m).**

**Tb Basalt (Miocene)—Erosional remnant of basalt flow that covers Grand and Battlement Mesas. Occurs only on Haystack Mountain and another nearby high area near the northern edge of the quadrangle.**

**Tu** **Utah Formation (Eocene)—Light-brown and gray very fine to medium-grained sandstone and medium-grained light-gray marlstone and siltstone; contains pelecypods, gastropods, ostracodes, and fragments of fossil vertebrates. Upper part eroded. Only isolated outcrops of lower part of formation exposed in quadrangle because most of formation covered by colluvium deposits (Qsl). Maximum thickness of exposed rocks about 900 ft (274 m).**

**Tgp** **Green River Formation (Eocene)**

**Parachute Creek Member—Gray-weathering black, brown, and gray marlstone, including oil shale, that locally forms cliffs; contains minor amounts of light-gray siltstone, light-gray and brown fine- to medium-grained sandstone, and numerous very thin persistent anhydrite and tuff beds. Maximum thickness about 600 ft (183 m).**

**Mahogany oil-shale bed—Outcrop of richest oil-shale bed 80-120 ft (24-37 m) above base of Parachute Creek Member (Tgp) in the Mahogany zone. In USGS corehole C-279, Mahogany bed yields as much as 70 gallons of oil/ton (392 L/t). Entire Mahogany zone (ledge) in this hole is 63 ft (19 m) thick and averages 22.1 gallons of oil/ton (92.2 L/t). Thickness 2-3 ft (0.6-1.5 m).**

**Tgs** **Garden Gulch Member—Light-gray marlstone, dark-brown to black locally fissile shale some of which is oil shale; a few beds of light-gray algal limestone, and some massive brown fine- to medium-grained sandstone. Thickness 1,000-1,200 ft (305-366 m).**

**Tgsa** **Avail Points Member—Brown and buff massive fine- to coarse-grained sandstone that forms conspicuous ledges, minor amounts of light-gray siltstone, marlstone and a few thin tan low-grade oil-shale beds. Grades westward into the Garden Gulch Member (Tgs), with a decrease in number and thickness of sandstone beds. Facies boundary between Avail Points and Garden Gulch Members is arbitrarily placed along drainage divide capped by Parachute Creek Member (Tgp) in western part of quadrangle. Maximum thickness about 1,200 ft (366 m).**

**Tws** **Shire Member of Wasatch Formation (Eocene)—Variegated purple, lavender, red, gray, and brown claystone; some locally lenticular fine- to coarse-grained sandstone. Thickness west to east. Maximum thickness of exposed beds about 1,000 ft (305 m).**

**Contact**—Approximately located where obscured by soil cover or vegetation.

**Gas well**—Number keyed to table 1.

**Dry hole**—Oil and gas test. Number keyed to table 1.

**Oil-shale corehole**—Number keyed to table 1.

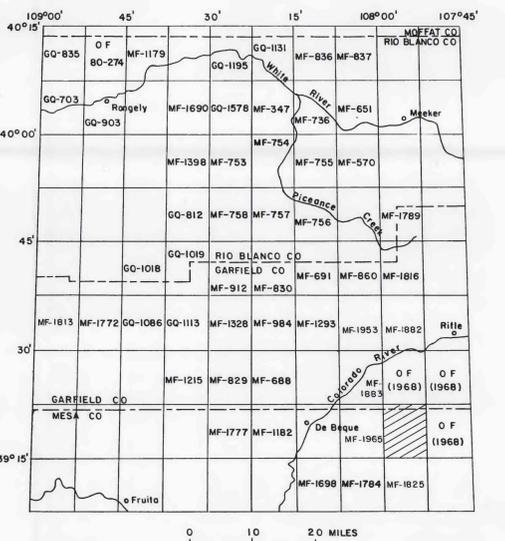
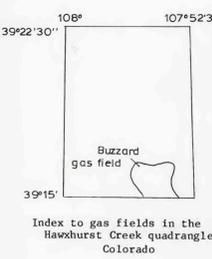
**Structure contour**—Drawn on top of the Mahogany oil-shale bed. Contour interval 100 ft (30.5 m).

**REFERENCE**

Yeend, W. E., 1969, Quaternary geology of the Grand and Battlement Mesas area, Colorado: U.S. Geological Survey Professional Paper 817, 90 p.

Table 1.—Drill-hole data, Hawxhurst Creek quadrangle, Colorado [All drill holes are gas exploration wells except for C-279, which is an oil-shale core hole]

Drill hole No. (on map)	Sec-tion	Company and Name	Total depth, feet
T. 8 S., R. 94 W.			
1	33	Fred W. Pool, Janice #1	7,715 2,352
T. 8 S., R. 95 W.			
C-279	10	Gulf Oil Corp., #1A	491 150
T. 9 S., R. 94 W.			
2	17	Pan American Petroleum, Lowher #1	6,593 2,010
3	18	Fred W. Pool, Donald #1	6,687 2,038
4	19	Fred W. Pool, Hudson #1	6,357 1,938
5	20	Fred W. Pool, Moss #1	6,619 2,017
T. 9 S., R. 95 W.			
6	11	Exxon Co., Dan Kenney Estate #1	7,400 2,256
7	13	Fred W. Pool, McCurry #1	6,757 2,060
8	24	Fred W. Pool, Donner #1	5,630 1,716



INDEX MAP SHOWING LOCATION OF THIS QUADRANGLE (PATTERNED) AND OTHER PUBLISHED U.S. GEOLOGICAL SURVEY 7 1/2-MINUTE GEOLOGIC MAPS IN THE PICEANCE CREEK BASIN AREA, NORTHWESTERN COLORADO. PUBLISHED USGS MAPS INCLUDE GEOLOGIC QUADRANGLE MAPS (Q), MISCELLANEOUS FIELD STUDIES MAPS (MF), AND OPEN-FILE REPORTS (OF).

**GEOLOGIC MAP OF THE HAWXHURST CREEK QUADRANGLE, GARFIELD AND MESA COUNTIES, COLORADO**

By  
J. R. Donnell, W. E. Yeend, and M. C. Smith  
1988

Surficial geology modified from mapping by W.E. Yeend, 1963-65; bedrock geology mapped by J.R. Donnell, 1964

