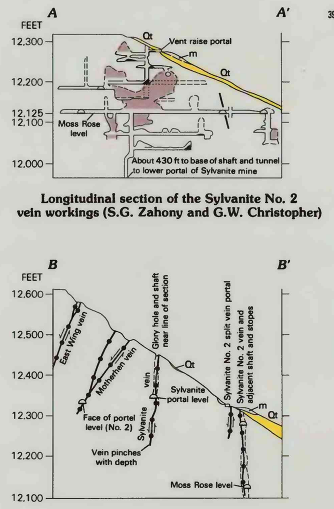
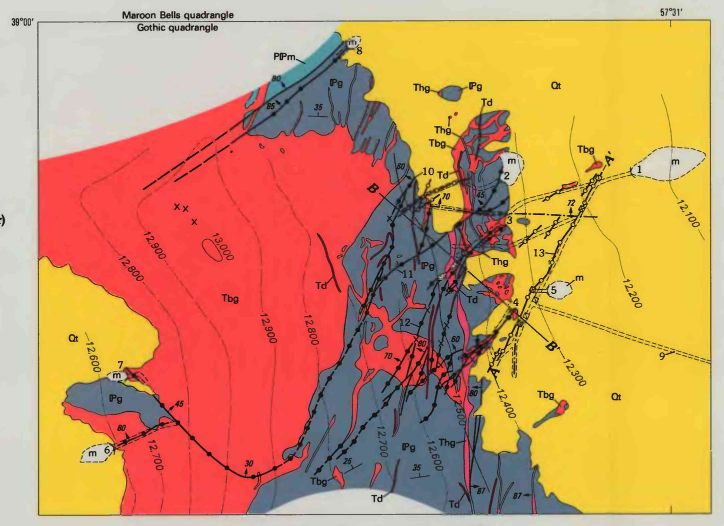
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

GEOLOGIC QUADRANGLE MAP
GOTHIC QUADRANGLE, COLORADO
GQ–1689
*Pamphlet accompanies map*




## EXPLANATION

Qt — Quaternary talus

Td — Tertiary rhyodacite porphyry dikes and sills—Gray with ...

Thg — Tertiary hornblende granodiorite porphyry dikes—Gray ...

Tbg — Tertiary biotite granodiorite—Forms apophyse of White Rock pluton ... includes unmapped ... inclusions of ...

PIPm — Permian and Pennsylvanian Maroon Formation

IPg — Pennsylvanian Gothic Formation

... Dashed where inferred

... tunnel and shaft—Dashed and dotted lines indicate workings from Engineering and Mining Journal (1888) and other records

Shaft near line of cross section B–B'

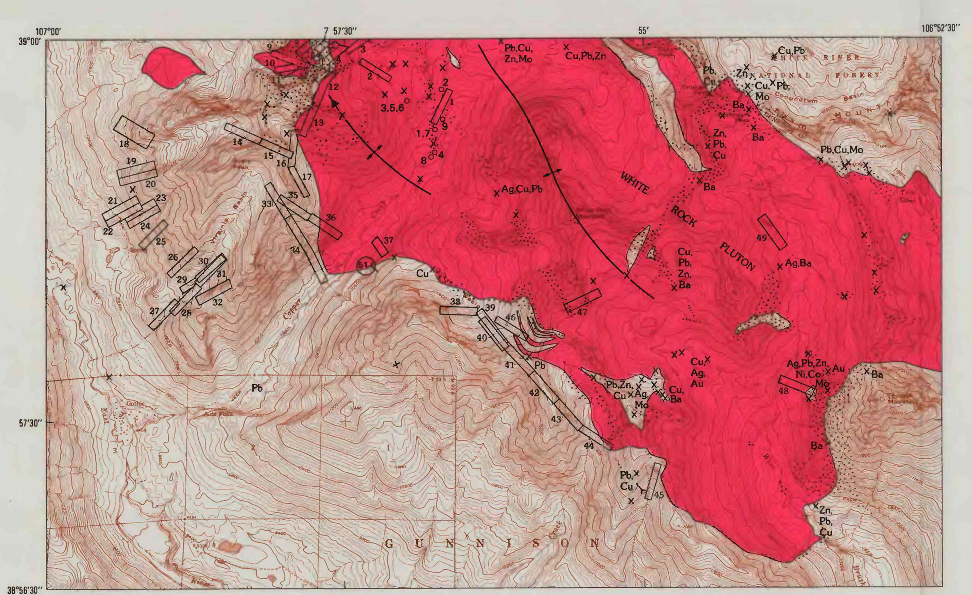
5 Vent raise portal ... lower tunnel
6 Native Silver(?) ...
7 Spirit of the Times ...
8 Buck vein portal
9 Tunnel (1,700 ft) ... portal with ...
10 East Wing vein
11 Motherhen vein
12 Sylvanite vein
13 Sylvanite No. 2 ...

## GEOLOGY OF THE SYLVANITE MINE AREA

By S.G. Zahony

The Sylvanite mine area lies along the axis of an early formed anticlinal fold (Holmes, 1876; Thomas, 1980). Sedimentary rocks are domed, intruded, and metamorphosed by granodiorite of the White Rock pluton. The metasedimentary rocks are altered to hornfels or skarn, lime-silicate, and quartz-feldspar granulites, and migmatites rich in iron oxide and sulfide minerals, epidote, pyroxene, garnet, scapolite, magnetite, and hematite. Locally, pyrite makes up 50 percent of the rock. The metasedimentary rocks are complexly intruded by dikes and sills representing several varieties of igneous rock. Mineralized fissure veins and later faults cut dikes, sills, and earlier faults. Veins are more persistent in the granodiorite pluton than in the metasedimentary rocks, yet the best grades of mineralization (quartz-barite-pyrite-sulfosalts-native silver veins) tend to be in the metasedimentary rocks directly above their contact with the White Rock pluton. Quartz-carbonate-arsenopyrite-pyrite veins in argillized wall rock dominate above the most productive zones, whereas quartz-barite-pyrite veins in chloritized wallrock dominate below the productive zones (see Sylvanite mine, table 1). Mineralization appears to be related to a deep-seated rhyolitic heat source, much younger than the White Rock pluton, as veins of comparable age locally cut 18.3±.07 Ma rhyolite porphyry dikes (Thomas, 1972b) east of the Sylvanite mine area.

**Figure 1.—Map of Sylvanite mine area showing major veins and underground workings. Contour interval 100 ft; dashed where approximately located. Modified from unpublished mapping by S.G. Zahony (1985, 1986a, b).**

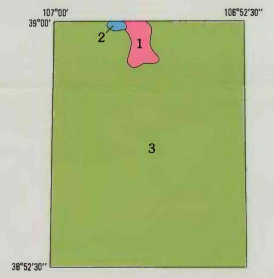



## EXPLANATION

White Rock pluton

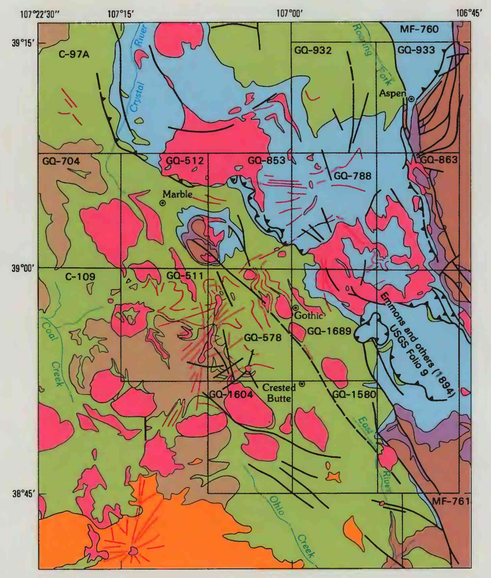
Patented mining claim—Approximately located. Numbers keyed to table 1

**Figure 2.—Mining claims, prospects, and areas of altered or mineralized rock in and near the White Rock pluton.**




## INDEX TO GEOLOGIC MAPPING

1. J.A. Thomas, by permission of AMAX Exploration, Inc., 1972–80
2. S.G. Zahony, Consulting geologist, Denver, Colo., 1985–86
3. D.L. Gaskill, 1982–88; F.E. Mutschler, Eastern Washington State Univ., 1982, 1986; J.H. Kramer, Consulting geologist, Angels Camp, Calif., 1986




## EXPLANATION

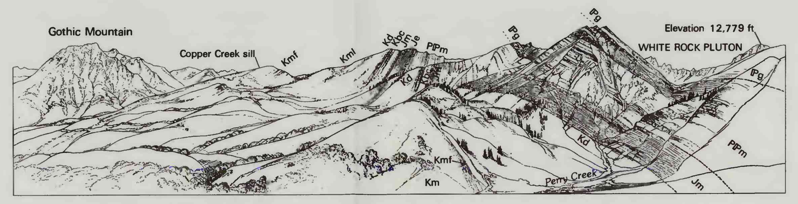
Tertiary extrusive rocks

Tertiary intrusive rocks

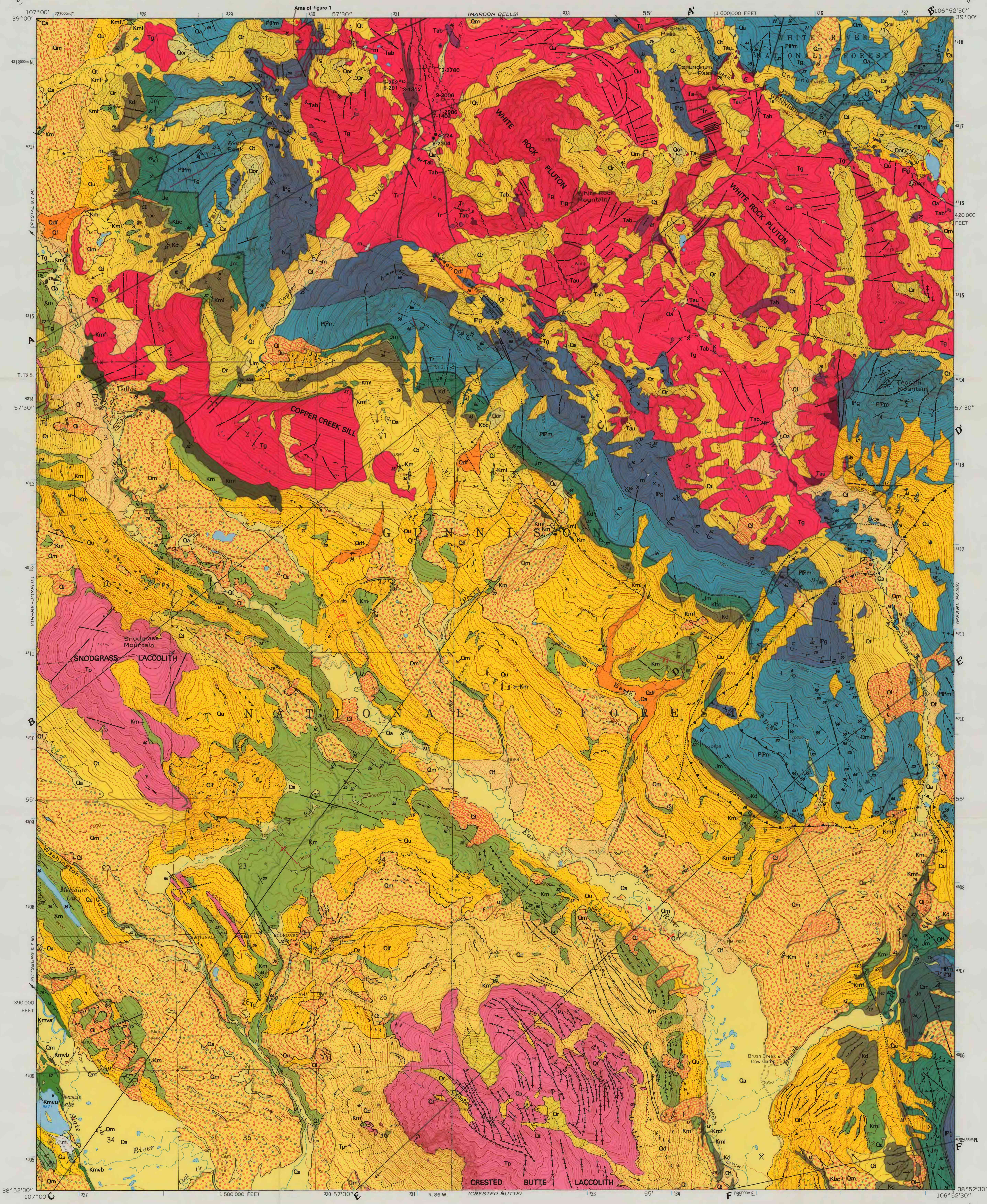
Tertiary sedimentary rocks

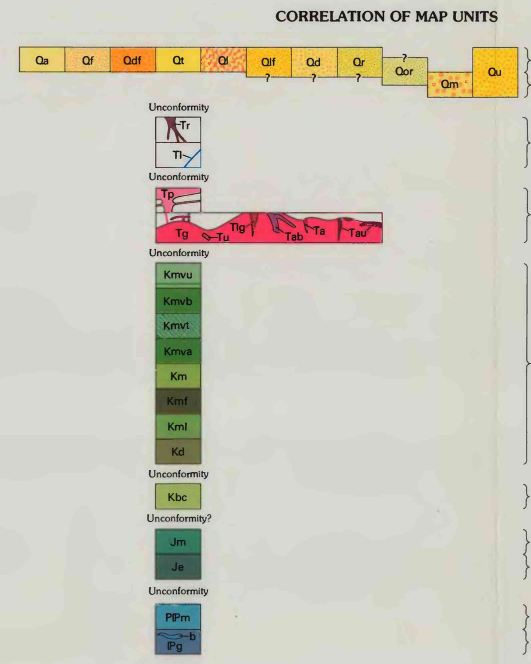
Mesozoic sedimentary rocks

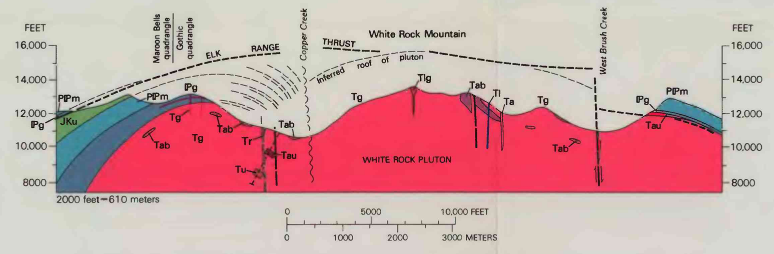
**Geologic setting of the Gothic quadrangle and location of published geologic maps (U.S. Geological Survey GQ, MF, and C maps). Modified from "Geologic map of Colorado" (Tweto, 1979).**




**View northwest from east ridge of Perry Creek valley at about elevation 10,800 ft. Sketch by W.H. Holmes, 1873, *in* Hayden (1874).**




**Diagrammatic sketch along northwest-southeast axis of White Rock pluton indicating approximate levels of mapped units within and overlying pluton, and inferred positions of Elk Range thrust and roof of pluton. JKu, undivided Jurassic and Cretaceous strata.**

## DESCRIPTION OF MAP UNITS

### SURFICIAL DEPOSITS

Qa — **Alluvial deposits (Holocene)**—Unconsolidated stream deposits of silt, sand, and gravel. Includes organic debris, soil, and hydrous iron oxides in pond, swamp, and poorly drained fluvial environments, and glaciofluvial and lake deposits in major river valleys

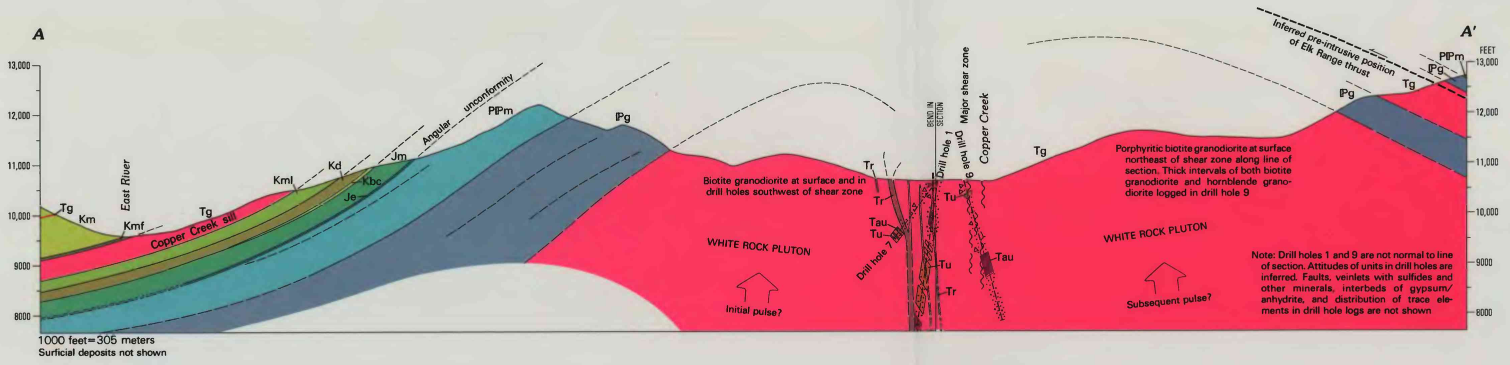
Qf — **Alluvial fan and debris-flow deposits (Holocene)**—Generally poorly sorted silt- to ...

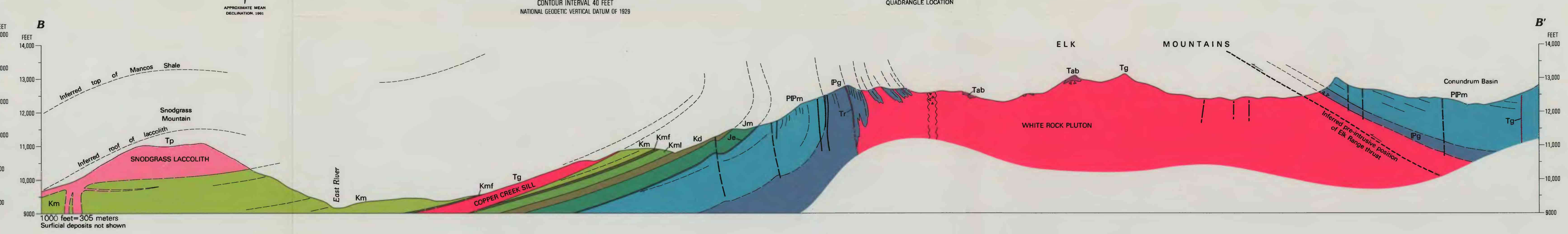
... groundmass of comminuted granodiorite. Fractures or matrix commonly ... veined, or permeated with calcite, barite, and other minerals. The granod... has an unusually high soda content (Thomas, 1972a), probably due ... similation of evaporite beds and lime-rich Paleozoic rocks. Campbell (1... inferred that the White Rock pluton is a conical body that widens at dept... protrudes from a batholith about 16,000 ft (5 km) below the surface; h... suggested that magnetically distinct areas within the pluton may repr... separate intrusions or altered mineralized areas. K-Ar date of biotite ...

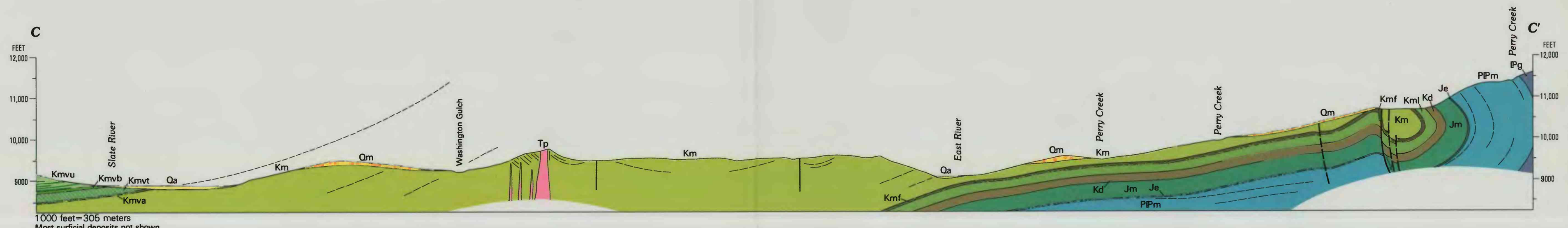
**Lower part**—Gray, microcrystalline, thick-bedded limestone and argillaceous limestone (about 50–60 percent) containing fossil clams, charophyte algae, and black chert interbedded with dark-gray shale and one, or more, thin to thick beds of light-gray, calcareous, locally cherty and friable quartz sandstone. Lower part may be partly marine in origin and equivalent to either the Curtis Formation (Langenheim, 1957; Craig and others, 1959; Wright and Dickey, 1979), the Wanakah Formation (Hansen, 1971), or the Tidwell Member of the Morrison Formation (Young, 1987; Bartleson and Jensen, 1988). About 50–80 ft (15–25 m) thick

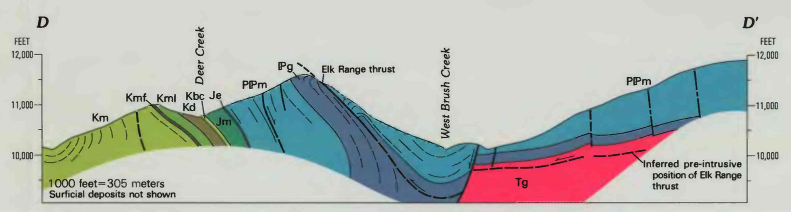
Je — **Entrada Sandstone (Middle Jurassic)**—White to yellowish- or pale-red, mainly rounded to subangular, massive- and thick-bedded, cross-laminated quartz-arenite, or quartzite. Contains sparse grains of chert and feldspar. Locally ...

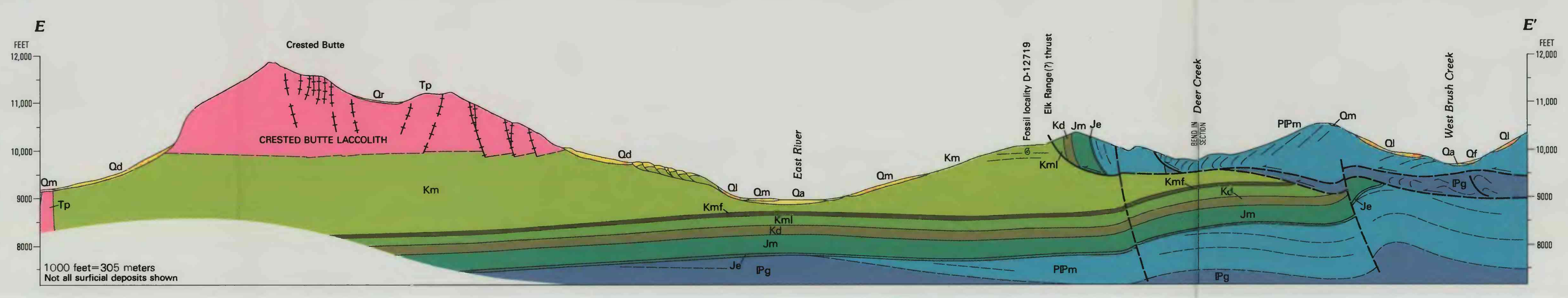
## ECONOMIC GEOLOGY AND GEOLOGIC HAZARDS

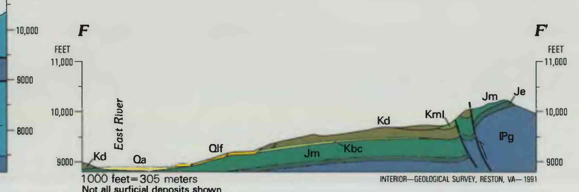



# GEOLOGIC MAP OF THE GOTHIC QUADRANGLE, GUNNISON COUNTY, COLORADO

By

David L. Gaskill, Felix E. Mutschler, John H. Kramer, John A. Thomas, and Stephen G. Zahony

1991