

CORRELATION OF MAP UNITS

Qa	Qt	} Holocene	} QUATERNARY
Qm			
UNCONFORMITY		} Pleistocene	} TERTIARY
Ta			
Tt			
Tlf			
Tvb			
Tv		} Oligocene(?)	
Tg			
UNCONFORMITY		} PENNSYLVANIAN	
Fbu			
Fhm			
Fbl		} MISSISSIPPIAN	
MI			
UNCONFORMITY		} Upper Devonian	
Dd			
UNCONFORMITY		} Middle and Upper Ordovician	
Of			
Ofh			
UNCONFORMITY		} Lower Ordovician	
Om			
UNCONFORMITY		} Upper Cambrian	
Ca			
UNCONFORMITY		} PRECAMBRIAN X	
Cs			
p			
g			
ga			
gnb			
d			
h			

DESCRIPTION OF MAP UNITS

Qa	ALLUVIUM (HOLOCENE)--Poorly sorted gravel, sand, and silt deposits containing boulder and cobbles of Precambrian, Paleozoic, and Cenozoic rocks. Thickness commonly several meters.
Qt	TALUS OR LANDSLIDE DEPOSITS (HOLOCENE)--Poorly sorted, incoherent, locally derived rock fragments and soil deposited chiefly by gravity on or at the foot of a slope. Thickness commonly several meters.
Qm	GLACIAL DEPOSITS (PLEISTOCENE)--Till composed of unsorted sand, gravel, clay, and boulders deposited as ground, lateral, and terminal moraines. Thickness several meters.
Ta	ANDESITE FLOWS (OLIGOCENE?)--Dark grayish-brown andesite, mostly porphyritic with phenocrysts of plagioclase, quartz, biotite, and sparse magnetite, olivine, and hornblende in a pillow-tuffitic aphanitic or glassy groundmass; thickness of groups of flows exceeds 220 m. May be correlative with Rawley Andesite of Bonanza district to southwest of the quadrangle.
Tt	WATERLAIN TUFF (OLIGOCENE?)--White to light-brown fine-grained thin-bedded waterlaid tuff; commonly soft and easily eroded but in places brittle and platy. Thickness 20-150 m.
Tu	VOLCANIC ROCKS, UNDEVELOPED (OLIGOCENE?)--Mixture of flows, waterlaid tuff, volcanic breccia, and gravel in area where poor exposures make separation difficult.
Tlf	QUARTZ LATEX FLOWS (OLIGOCENE?)--Light-colored quartz latex flows, in places autobrecciated; phenocrysts of biotite, plagioclase, and quartz abundant in a felsitic matrix; may include some ash-flow tuff. Thickness 0-80 m.
Tvb	VOLCANIC BRECCIA (OLIGOCENE?)--Reddish to purplish-brown flow breccia, tuff breccia, and volcanic conglomerate; commonly contains quartz latite clasts in which plagioclase, sanidine, and biotite phenocrysts are in a reddish felsitic or glassy matrix; other clasts are commonly of Precambrian rocks, andesite, or pumice; crudely layered. Thickness 0-80 m.
Tv	WELDED ASH-FLOW TUFF (OLIGOCENE?)--Quartz latite, densely welded, ash-flow tuff composed of flattened pumice lapilli, fragments of Precambrian rocks and andesite, and small phenocrysts of plagioclase, quartz, and biotite in a black vitric or devitrified matrix. Represents two or more ash flows, separated by thin gravel deposits. Combined thickness about 60 m.
Tgp	QUARTZ PORPHYRY DIKES (OLIGOCENE?)--White to purplish-gray felsitic matrix containing sparse small phenocrysts of quartz and feldspar. Near Porphyry Creek in northwest corner of quadrangle; about 1 to a few meters thick. A thicker body of similar porphyry about 2.4 km west of quadrangle boundary has been dated 34.4±3.3 m.y. by Naaser and Cunningham (1976).
Tg	GRAVEL (OLIGOCENE?)--Unconsolidated gravel deposits containing rounded boulders largely of Precambrian and Paleozoic rocks; some boulders transported from sources several kilometers distant. Thickness 0-60 m.
Fbu	REDDEN SHALE (PENNSYLVANIAN)--Composed chiefly of drab colored, medium- to coarse-grained sandstone and interbedded gray shale; top removed by erosion. Thickness 200 m or more.
Fhm	MIDDLE LIMESTONE AND SHALE UNIT--Contains layers of blue-gray limestone as much as 30 m thick, and interbedded gray to purplish-red shale and fine sandstone. Thickness 30-60 m.
Fbl	LOWER SANDSTONE, CARBONACEOUS SHALE, AND LIMESTONE UNIT--Red or brown fine-grained sandstone and shale interbedded with black shale or mudstone containing oolitic carbonaceous material; white to gray, to reddish-brown arkosic, micaceous coarse-grained sandstone and conglomeratic sandstone in lower part, containing pebbles and cobbles of Precambrian rocks. Few thin limestone beds near top. Thickness 40-90 m.

M1	LEADVILLE LIMESTONE (MISSISSIPPIAN)--Massive dark blue-gray to brownish-gray limestone and dolomite, containing calcite veins. Near top, thin quartz veins, minor black chert beds; karst features, and minor replacement of limestone by limonite and hematite are present locally. Lower part includes some gray sandy limestone and dolomite. Gray dolomite is brecciated in large fault-bounded area 2 km SSW of Pinnacle (Pitch) mine. Thickness about 130 m.
Dd	CHAPPEE FORMATION (UPPER DEVONIAN) Dyer Dolomite Member--Upper part, mostly thin-bedded sandy dolomite, locally fossiliferous; few massive cream-colored dolomite layers. Lower part, white to creamy gray or light-tan, thin-bedded, commonly sandy dolomite and limestone. Thickness 45-50 m.
Dp	Parting Quartzite Member--Red, green, and gray shale, locally conglomeratic quartzite, and shaly limestone. Thickness about 1.6 m.
Of	FRONT DOLOMITE (MIDDLE AND UPPER ORDOVICIAN)--Bluish gray, commonly mottled, massive crystalline dolomite and limestone. Most fossiliferous formation in area; petrifoliferous odor when broken; chert blebs present locally; cliff-forming. Upper part, less resistant thin-bedded shaly to sandy dolomite. Thickness about 55 m.
Oh	HARDING QUARTZITE (MIDDLE ORDOVICIAN)--Quartzite and minor black shale. Upper third, medium- to coarse-grained limonitic quartzite; uranium-mineralized limonitic zone 1-2 m thick, with carbonaceous material, carbonized vegetal debris, fish scales, and asphaltic pellets, about 2 m below top of formation. Lower two-thirds, white medium- to fine-grained silica-cemented quartzite. Total thickness 10-12 m.
Om	MANitou DOLOMITE (LOWER ORDOVICIAN)--Light-gray dolomite, commonly pinkish east on fresh surface; thin-bedded (lower part) to massive; characteristic nodules and lenses of chert along bedding planes, especially in lower half. Thickness 75-90 m.
Ca	SANITCH QUARTZITE (UPPER CAMBRIAN)--White, vitreous, medium-grained quartzite less than 1 m thick in southernmost exposures on Line Ridge to several meters thick near the head of Brier Creek in NW part of quadrangle.
Cs	PRECAMBRIAN ROCKS (PRECAMBRIAN X) Ultramafic rocks--Dark-green schistose to massive ultramafic dike rocks composed of chlorite, colorless to very pale green amphibole, pyroxene, olivine and its alteration products, serpentine, magnetite, biotite, and minor plagioclase. Dike-like bodies about 1-60 m thick.
p	Pegmatite--White to pink coarse-grained pegmatite dikes composed chiefly of plagioclase, microcline, quartz, muscovite, and biotite, minor tourmaline, and magnetite. Magnetite crystals in Harry Creek area are as large as 7 cm in diameter. One dike was mined for feldspar in sec. 13, T. 48 N., R. 6 E. Only the more conspicuous bodies have been mapped; most are less than 50 m thick but some reach 100 m.
pg	Pegmatite granite--White to pink coarse-grained to pegmatite, gneissic granite composed of plagioclase, microcline, quartz, biotite, and muscovite, minor apatite, and magnetite; inclusions of metasedimentary rocks common.
g	Medium-grained quartz monzonite--light gray to red gneissic quartz monzonite composed of oligoclase, microcline, quartz, biotite, minor green hornblende, and sphene; locally small pegmatite streaks.
ga	Porphyritic gneissic granite--light-colored porphyritic gneissic granite; numerous tabular or rectangular phenocrysts of microcline, 1-2 cm long, in subparallel orientation.
gnb	Porphyritic gneissic biotite granite--Gray coarse- to medium-grained, porphyritic gneissic granite similar in composition to unit gn but darkened by more abundant biotite. Included in and cut by the lighter-colored medium-grained quartz monzonite (g).
d	Gneissic hornblende diorite--Gneissic rock composed of green hornblende, plagioclase, and minor chlorite; more uniform than other hornblende units.
s	Mica gneiss and schist--Biotite-muscovite-quartz gneiss, schist, and migmatite in layers of variable composition and probable metasedimentary origin; contains microcline, plagioclase, sillimanite, garnet, and magnetite. Includes small interlayered units of various metasedimentary rock types such as calc-silicate rocks; biotite-epidote quartzite; several blue-gray quartzite beds as much as 20 m thick near Peel Point that resemble metachert; coarse silvery muscovite schist; and spotted schists with eye-shaped lenses of quartz gneiss and schist composed of plagioclase and blue-green amphibole, commonly plagioclase; chlorite, minor quartz, epidote, garnet, and sphene. Interlayered with various mica gneisses and probably represents hornblende units of both metasedimentary and metavolcanic origin.

CONTACT, SHOWING DIP--Approximately located

U ..... FAULT, SHOWING DIP--Dashed where inferred; dotted where concealed. U, upthrown side; D, downthrown side

Qv QUARTZ VEIN

IO STRIKE AND DIP OF BEDS

IO Inclined

— Horizontal

70 STRIKE AND DIP OF FOLIATION

IO Inclined

IO Vertical

20 BEARING AND PLUNGE OF LINEATION--May be combined with foliation symbol

50 STRIKE AND DIP OF JOINTS

IO Inclined

IO Vertical

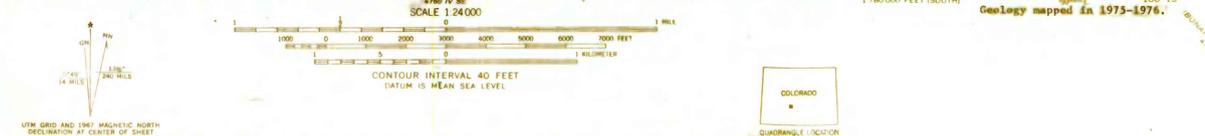
x PROSPECT PIT OR MINE

ADIT

REFERENCE

Naaser, C. W., and Cunningham, C. J., Jr., 1976. Fission-track ages of zircons from three Tertiary porphyries near Tincup, Colorado: U.S. Geological Survey Open-File Rept. 76-831, 3 p.

U.S. Geological Survey  
OPEN FILE REPORT  
This map is preliminary and has not been edited or reviewed for conformity with Geological Survey standards or nomenclature.



PRELIMINARY GEOLOGIC MAP OF PART OF THE PAHLONE PEAK QUADRANGLE,  
GUNNISON, SAGUACHE, AND CHAFFEE COUNTIES, COLORADO

By  
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