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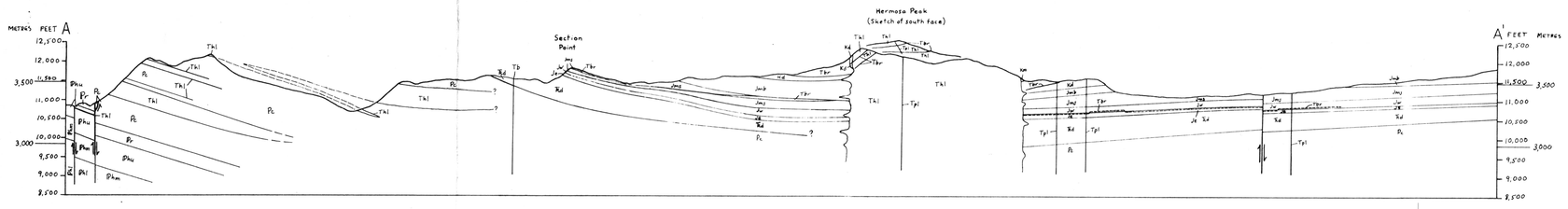

PRELIMINARY GEOLOGIC MAP OF THE HERMOSA PEAK QUADRANGLE DOLORES, SAN JUAN, LA PLATA, AND MONTEZUMA COUNTIES, COLORADO

By

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CORRELATION OF MAP UNITS

Qf, Qal, Qt, Qw, Qr, Ql	Holocene to Pleistocene	QUATERNARY
UNCONFORMITY		
Tpl, Tl, Tbr	Pliocene or Miocene	TERTIARY
Tcp, Tap, Tb	Pliocene to Paleocene	TERTIARY
Thl	Paleocene	TERTIARY
Km, Kd	Upper Cretaceous	CRETACEOUS
UNCONFORMITY		
Jmb, Jms, Jw, Jwp, Je	Upper Jurassic	JURASSIC
UNCONFORMITY		
Rd	Upper Triassic	TRIASSIC
UNCONFORMITY		
Pc	Lower Permian	PERMIAN
RICO AREA: Pr, Phu	Middle Pennsylvanian	PENNSYLVANIAN
HERMOSA PARK AREA: Phu, Phm, Phl	Middle Pennsylvanian	PENNSYLVANIAN

DESCRIPTION OF MAP UNITS

Qf TORRENTIAL FANS (HOLOCENE)

Qal ALLUVIUM (HOLOCENE)--Stream deposits, mostly sand and silt

Qt TALUS (HOLOCENE)

Qw SLOPE WASH (HOLOCENE)--Includes some soils on very gentle slopes northeast of Corral Creek and on the upland between Dolores River, Barlow Creek, and Hermosa Creek

Qr ROCK GLACIERS (HOLOCENE)--Accumulations of unsorted angular blocks marked by transverse ridges

Ql LANDSLIDE DEPOSITS (HOLOCENE)

Qd GLACIAL DRIFT (PLEISTOCENE)--Poorly sorted gravels, containing angular to subangular boulders of biotite rhyodacite, hornblende latite, biotite-pyroxene diorite (in Hermosa Park area only), and sedimentary rocks

Tpl PYROXENE LAMPROPHYRE (PLIOCENE OR MIOCENE)--Phenocrysts of pyroxene, with or without plagioclase, in dark-green aphanitic groundmass of pyroxene, chlorite, and magnetite. Forms dikes cutting biotite rhyodacite, hornblende latite porphyry, and older formations; most dikes trend northwesterly and are in northern and eastern part of quadrangle. Corresponds to lamprophyre of Mount Wilson quadrangle to north (Bromfield, 1967, p. 51-52)

Tl PYROXENE-HORNBLENDE LAMPROPHYRE (PLIOCENE OR MIOCENE)--Phenocrysts of hornblende, plagioclase, and minor quartz in dark-green aphanitic groundmass of pyroxene prisms, magnetite, chlorite, and some plagioclase; deeply altered and locally brecciated. Forms irregular dike in Cutler Formation near southeast corner of quadrangle. Age relative to other intrusives unknown, but similarity to pyroxene lamprophyre (Tpl) suggests similar age

Tbr BIOTITE RHYODACITE (MIOCENE)--Phenocrysts of sodic plagioclase and biotite in light-gray or pinkish-gray aphanitic groundmass of stubby plagioclase crystals and anhedral quartz. Classified as rhyodacite, rather than trachyte as previously reported (Cross, 1910; Pratt, 1968), using the classification of Rittmann (1952) and chemical analysis of a specimen from sill north of Barlow Creek. Forms sills throughout northeastern half of quadrangle, and dikes cutting hornblende latite porphyry in Hermosa Peak. Thin sill that follows Entrada-Wanakah contact on slopes south of Hermosa Peak is shown for clarity as a heavy short-dashed line with separation from contact exaggerated. K-Ar age of biotite is 16.2±0.5 m.y. (H. H. Mehnert, oral commun., 1971)

Tcp CALICO PEAK PORPHYRY (PLIOCENE TO PALEOCENE)--Porphyritic latite with large phenocrysts of potassic feldspar (Cross, 1910). Forms dike south of Harts Peak. Dikes of similar rock cut hornblende latite porphyry in Rico quadrangle and basalt west of Rico quadrangle (Pratt and others, 1969); age relative to other intrusives unknown

Tb BASALT (PLIOCENE TO PALEOCENE)--Altered plagioclase or pyroxene phenocrysts in dark-green aphanitic groundmass of plagioclase laths, chlorite, calcite, and magnetite. Forms three dikes in Dolores Formation near northwest corner of quadrangle and south of Section Point. Similar rocks cut hornblende latite porphyry in Rico quadrangle; age relative to other intrusives unkown

Tap ALASKITE PORPHYRY (PLIOCENE TO PALEOCENE)--Rounded quartz phenocrysts in pale-gray or pale-drab aphanitic groundmass (McKnight, 1974, p. 39-40). Forms dike on south side of Silver Creek at extreme western edge of quadrangle, occupying fault that cuts hornblende latite porphyry; age relative to other intrusives unknown

Thl HORNBLENDE LATITE PORPHYRY (PALEOCENE)--Abundant white plagioclase phenocrysts and hornblende prisms in light- to medium-gray or greenish-gray aphanitic groundmass (Pratt and others, 1969; McKnight, 1974, p. 35-38). Forms sills and dikes throughout northern and western parts of quadrangle, and forms Flattop laccolith along northern edge of quadrangle (Bromfield, 1967, p. 31-32). Also forms Hermosa Peak mass, here interpreted as a stock because of sharply discordant vertical contacts against Dakota Sandstone and Mancos Shale at east and west ends of Hermosa Peak. Fission-track age of zircon is 57.2±6.9 m.y. (C. W. Naeser, written commun., 1971)

Km MANCOS SHALE (UPPER CRETACEOUS)--Black fissile shale with local thin beds of dark-gray limestone and local brownish-gray limestone concretions; locally sandy. Near contacts with igneous rocks, may be hardened or "baked" and contain disseminated pyrite grains

Kd DAKOTA SANDSTONE (UPPER CRETACEOUS)--Tan to light-gray sandstone, and black shale with a few sandstone beds. Section at southwest end of Hermosa Peak shows uppermost 40 ft (12 m) siltstone; lowermost 17 ft (5 m) sandstone, locally conglomeratic with abundant granules of white chert; total thickness about 220 ft (70 m). Thickness elsewhere as much as 570 ft (170 m). Carbonaceous shales in middle of formation contain coal seams on north side of Flattop Mountain (Bromfield, 1967, p. 93-94)

MORRISON FORMATION (UPPER JURASSIC)

Jmb Brushy Basin Shale Member--Light-green and brown mudstone and shale; minor siltstone (Pratt and others, 1969). Thickness ranges about 160-450 ft (50-140 m)

Jms Salt Wash Sandstone Member--Light-gray and brownish-gray sandstone with greenish clay galls (Pratt and others, 1969). Thickness ranges about 230-360 ft (70-110 m). Junction Creek Sandstone equivalent not recognized

Jw WANAKAH FORMATION (UPPER JURASSIC)--Fine-grained sandstone, siltstone, and mudstone, mostly pale reddish gray and light grayish brown; red chert grains locally present. Where measured in cliff about 0.7 mi (1.1 km) south-southeast of Hermosa Peak all three members can be recognized, but elsewhere the upper two members (marl member and Bilk Creek Sandstone Member) are not readily distinguishable. Total measured thickness of formation, including Pony Express Limestone Member, 134 ft (41 m) at Section Point, 124 ft (38 m) at cliff south-southeast of Hermosa Peak; elsewhere, total thickness as much as 240 ft (70 m)

Marl member--Reddish-brown silty mudstone, poorly exposed; 29 ft (9 m) thick where measured

Bilk Creek Sandstone Member--Mudstone and sandstone, with sparse red chert grains in a 6-ft (2 m) sandstone bed at top ("carnelian bed"); 88 ft (27 m) thick where measured

Jwp Pony Express Limestone Member--Medium-gray aphanitic limestone; locally sandy, especially in lower part; wavy bedding 1-4 in. (2.5-10 cm) thick in eastern part of quadrangle. Thickness in outcrop increases eastward from 2 ft (0.6 m) at Section Point and 5 ft (1.5 m) at Barlow Creek mine, to 20 ft (6.1 m) about 1 mi (1.6 km) southwest of Grayail mine, to 17 ft (5.2 m) about 3/4 mi (1.2 km) southeast of Grayail mine. Pinches out to northwest: last exposure in quadrangle is 2 ft (0.6 m) in creek bed 0.65 mi (1.05 km) northwest of Barlow Creek mine; seen in float about 0.8 mi (1.3 km) farther northwest (A. L. Bush, written commun., 1976), and occurs as a limy sandstone bed less than 1 ft (0.3 m) thick near the mouth of Barlow Creek (Bromfield, 1967, p. 13). Shown separately on map only at Barlow Creek mine and in two areas southeast of Grayail mine, where it forms dip slope, but can be followed in outcrop almost continuously from Section Point to east edge of quadrangle

Je ENTRADA SANDSTONE (UPPER JURASSIC)--Light-brown or gray fine- to medium-grained massive sandstone, thin bedded to massive and crossbedded; locally contains coarse frosted quartz grains near base. Host rock for uranium-vanadium deposits mined on Barlow Creek and at Grayail mine at head of Hermosa Creek. Thickness about 80-110 ft (25-35 m)

Rd DOLORES FORMATION (UPPER TRIASSIC)--Mostly light reddish-brown fine-grained sandstone, siltstone, and minor shale; parts of section may be gray in some areas. Characterized by thin beds of gray or reddish-gray limestone pebble conglomerate; Wingate Sandstone equivalent (Pratt and others, 1969) not recognized. Contact with Cutler Formation appears transitional where exposed, and is drawn using criteria of limestone pebble conglomerate and massive, well-sorted siltstone in Dolores, and arkosic components in Cutler. Thickness varies from about 800 ft (240 m) at Section Point to about 300 ft (90 m) at eastern edge of quadrangle, probably because of pre-Entrada erosion

Pc CUTLER FORMATION (LOWER PERMIAN)--Interbedded reddish-brown poorly sorted shaly siltstone and purplish-brown coarse-grained and commonly crossbedded arkose and conglomerate (Pratt and others, 1969). At least 2,000 ft (600 m) thick at western edge of quadrangle; thickness elsewhere may vary owing to uneven deposition or pre-Dolores erosion. In south-central part of quadrangle, poorly exposed because of heavy timber cover

Pr RICO FORMATION (MIDDLE PENNSYLVANIAN)--Sandstone and arkose, and subordinate shale and shaly limestone; various shades of greenish-, reddish-, and brownish-gray. Thickness about 300 ft (90 m) where mapped at western edge of quadrangle. Included in upper member of Hermosa Formation in southeastern part of quadrangle because of lack of good criteria for locating either top or basal contacts (Pratt, 1968; Pratt and others, 1969; McKnight, 1974)

HERMOSA FORMATION (MIDDLE PENNSYLVANIAN)

Phu Upper Member--Greenish-gray to brownish-red arkose, sandstone, shale, conglomerate, and minor limestone (Pratt and others, 1969; McKnight, 1974). Exposed only along western edge and in southeastern corner of quadrangle

Phm Middle Member--Gray massive limestone beds separated by gray or brownish-red sandstone and shale (Pratt and others, 1969; McKnight, 1974). Limestone beds are the principal host rock for the major massive sulfide replacement ore deposits of the Rico mining district. Exposed in southeast corner of quadrangle and a short distance west of quadrangle

Phl Lower Member--Greenish-gray sandstone, siltstone, and arkose; minor shale and limestone. In subsurface only; exposed a short distance west of quadrangle (Pratt and others, 1969; McKnight, 1974)

——— CONTACT--Dotted where concealed on map; queried where unknown on cross section

6 4.5 FAULT--Showing dip; bar and ball on downthrown side. Long dashed where approximately located; short dashed where inferred; dotted where concealed. Arrows indicate direction of relative movement

LINEAR TREND ON COLORED AERIAL PHOTOGRAPHS--Caused by anomalously straight drainage alignments, linear features in vegetation, abrupt linear changes in pattern of outcrops or vegetation, or breaks in slope. May reflect joints or faults

15 STRIKE AND DIP OF BEDDING

50 STRIKE AND DIP OF JOINTS

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