



EXPLANATION

— 50500 — MAGNETIC CONTOURS—Showing total-intensity magnetic field of the Earth in gammas relative to arbitrary datum. Hachured to indicate closed areas of lower magnetic intensity. Contour interval 20 gammas

— — — — — FLIGHT LINE

— — — — — FLOOD BASALT

— — — — — TROUT CREEK AND LARSEN CREEK VOLCANIC PLUGS

— — — — — RHYOLITE DIKES

— — — — — APPROXIMATE BOUNDARY OF STUDY AREA

SOURCES OF DATA

AEROMAGNETIC SURVEY NORTH OF DATA BREAK
Flight-path spacing 3/4 mi
Flown 13,000 ft above sea level
Flown and compiled in 1978-79 by L.K.B. Resources, Inc., under contract to U.S. Geological Survey Regional Field removed; International Geomagnetic Reference Field, 1975, updated to month Flown

AEROMAGNETIC SURVEY SOUTH OF DATA BREAK
Flight-path spacing about 1 mi
Flown and compiled in 1967-72 by U.S. Geological Survey (1972)

STUDIES RELATED TO WILDERNESS

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine their mineral resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a geophysical survey of the Powderhorn Wilderness Study Area and Cannibal Plateau Roadless Area in the Gunnison National Forest, Gunnison and Hinsdale Counties, Colorado. The Powderhorn Wilderness Study Area was established by Public Law 94-579, October 21, 1976. The Cannibal Plateau Roadless Area (02218) was classified as a further planning area during the Second Roadless Area Review and Evaluation (RARE-II) by the U.S. Forest Service, January 1979.

INTRODUCTION

The Powderhorn Wilderness Study Area (51,000 acres or 20,640 hectares) and the contiguous Cannibal Plateau Roadless Area (29,500 acres or 11,959 hectares) are on the Gunnison County-Hinsdale County boundary, approximately 50 mi (80 km) southwest of Gunnison and a few miles east of Lake City, Colo. Part of the area has been known as the Powderhorn Primitive Area. The mineral resource potential of the study area has been assessed by the U.S. Geological Survey and the U.S. Bureau of Mines; this assessment involved, besides the geologic study and economic appraisal (Sharp and others, 1983), a geophysical survey (this report) by the Geological Survey, and a geochemical survey (Sharp and Lane, 1983) by the Geological Survey and the Bureau of Mines.

The study area is on the northern flank of the San Juan volcanic field, between the Lake Fork Gunnison River on the west and Cobolia Creek on the east. Nearby Lake City is a well-known mining and resort town. The topography ranges from plateau tops at altitudes of approximately 12,500 ft (3,800 m) to valley floors at altitudes of approximately 8,500 ft (2,600 m). The study area is surrounded by well-maintained county roads, but access to the interior is mostly by trail. Only one logging road and one campground road on the north side extend into the study area. The west and east sides of the study area are marked by precipitous slopes and vertical cliffs that flank the canyons of Cobolia Creek and the Lake Fork Gunnison River.

AEROMAGNETIC SURVEY

Magnetic basalt lava flows cap the high plateaus of the Powderhorn Wilderness Study Area and Cannibal Plateau Roadless Area (Sharp and others, 1982) and cause intense, steep-gradient magnetic anomalies. The underlying volcanic rocks are somewhat less magnetic and have a much more subdued magnetic expression. Effects of the buried Precambrian rocks can be discerned only where the volcanic cover is thin near the north margin of the study area.

North of the plateaus, a gentle saddle on a magnetic ridge correlates with the Trout Creek volcanic plug. The lack of a stronger magnetic expression can be attributed to the compositional similarity between the intrusion and the enclosing rocks (Sharp and others, 1983). A magnetic low about 2 mi (2-3 km) northeast of the plug, and a magnetic high about 2 mi (2-3 km) northwest, probably originated in the Precambrian rocks beneath the volcanics. A magnetic high about 2 mi (2-3 km) southeast of the Trout Creek plug is an area in which monzonitic and rhyolitic porphyry dikes crop out. This high suggests the existence of a magnetic body at depth that may be related to the dikes. A magnetic low over basaltic and andesitic flows southeast of the dikes suggests the existence of rocks having low magnetic susceptibility beneath the basalt. This low extends to the southwest about 4 mi (6 km). The steep magnetic gradient northeast of the plateaus reflects thinning of the volcanic cover and emergence of the Precambrian basement.

An elongated magnetic low extends southeast from north of the Larsen Creek plugs to a point near Mesa Seco. The low magnetic closure north of the Larsen Creek plugs, even though positioned over surface andesitic rocks (unit Tpl, Sharp and others, 1983) that are cut by monzonitic and rhyolitic porphyry dikes, more likely originated in rocks beneath the andesites. The rocks that probably are the source of the low may also be the source of the dikes. Southeast of the magnetic closure, the low continues to show no relationship to the surface rocks or topography and probably has its source beneath the volcanic cover.

The steep magnetic gradient that borders the low on the southwest follows the mapped Uncompahgre caldera wall and probably represents a lithologic change across the wall. Magnetic highs west of the wall show no relationship to surface rocks and probably have deep-seated sources. Magnetic patterns from the deep-seated sources are obscured by the magnetic high caused by basaltic flood lavas in the area of Mesa Seco.

GRAVITY SURVEY

A large negative Bouguer gravity anomaly underlies the southwest corner of the study area. The anomaly is part of the 60-by-90 mi (100-by-150 km) negative anomaly having steep marginal gradients that is believed to reflect a major, relatively shallow batholith beneath the San Juan Mountains (Plouff and Pakiser, 1972). The closed magnetic low north of the Larsen Creek plugs, the Trout Creek plug, the intrusive monzonitic and rhyolitic porphyry dikes, and the elongated southwest-trending magnetic low over basaltic and andesitic flows discussed previously are along the steep gradient marking the margin of the major gravity low. The gravity ridge extending southeast from the steep gravity-gradient zone across the postulated shallow batholith (Plouff and Pakiser, 1972, p. 183) passes through the Larsen Creek plugs and generally marks the Uncompahgre caldera rim.

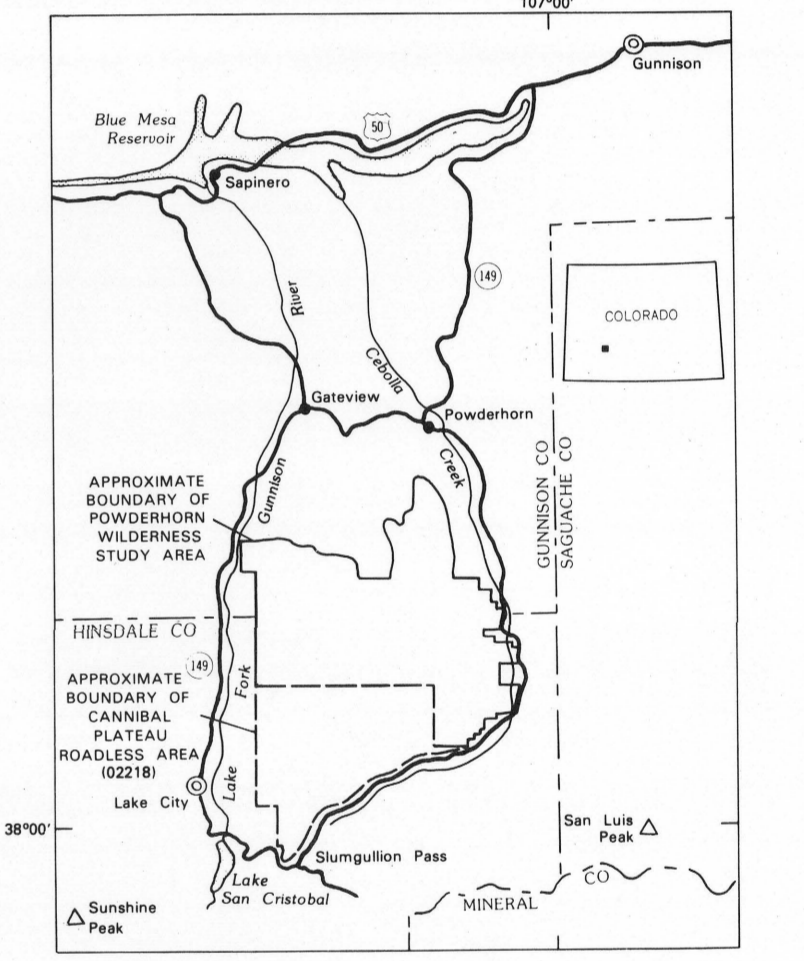
REFERENCES CITED

Plouff, Donald, and Pakiser, L. C., 1972, Gravity study of the San Juan Mountains, Colorado, in Geological Survey Research 1972, Chapter B: U.S. Geological Survey Professional Paper 800-B, p. B183-B190.

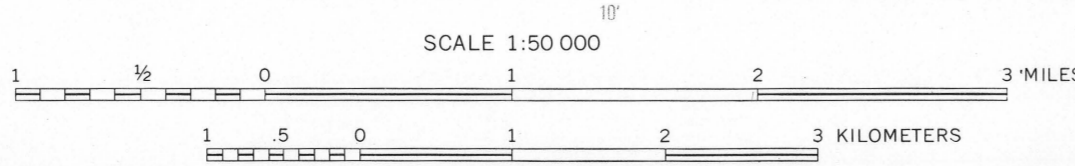
Sharp, W. M., and Lane, M. E., 1983, Geochemical map of the Powderhorn Wilderness Study Area and Cannibal Plateau Roadless Area, Gunnison and Hinsdale Counties, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF-1483-C, scale 1:50,000.

Sharp, W. N., Martin, R. A., and Lane, M. E., 1983, Mineral resource potential and geologic map of the Powderhorn Wilderness Study Area and Cannibal Plateau Roadless Area, Gunnison and Hinsdale Counties, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF-1483-A, scale 1:50,000.

U.S. Geological Survey, 1972 [1973], Aeromagnetic map of the Ridgway-Pagosa Springs area, southwestern Colorado: U.S. Geological Survey Geophysical Investigations Map G-8-840, scale 1:250,000.



INDEX MAP SHOWING THE LOCATION OF THE POWDERHORN WILDERNESS STUDY AREA AND CANNIBAL PLATEAU ROADLESS AREA (02218), COLORADO



Aeromagnetic data interpreted by R.A. Martin, 1981

AEROMAGNETIC MAP OF THE POWDERHORN WILDERNESS STUDY AREA AND CANNIBAL PLATEAU ROADLESS AREA, GUNNISON AND HINSDALE COUNTIES, COLORADO

By
R.A. Martin and William N. Sharp
1983