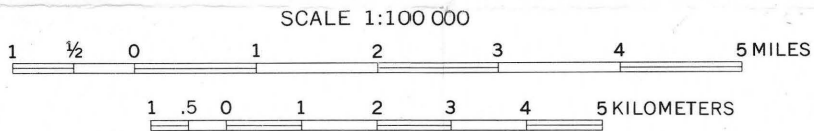


Base from U.S. Geological Survey, 1:24,000, Antelope Valley, Idaho, 1972; Big Table Mountain, Mont.-Idaho, 1968; Corral Creek, Mont.-Idaho, 1968; Icehouse Creek, Idaho, 1965; Island Park Dam, Idaho, 1964; Sheridan Reservoir, Idaho, 1965; 1:62,500 Henrys Lake, Idaho-Mont., 1964; Lower Red Rock Lake, Mont.-Idaho, 1950; Upper Red Rock Lake, Mont.-Idaho, 1950.



MAP A--AEROMAGNETIC MAP

**EXPLANATION**

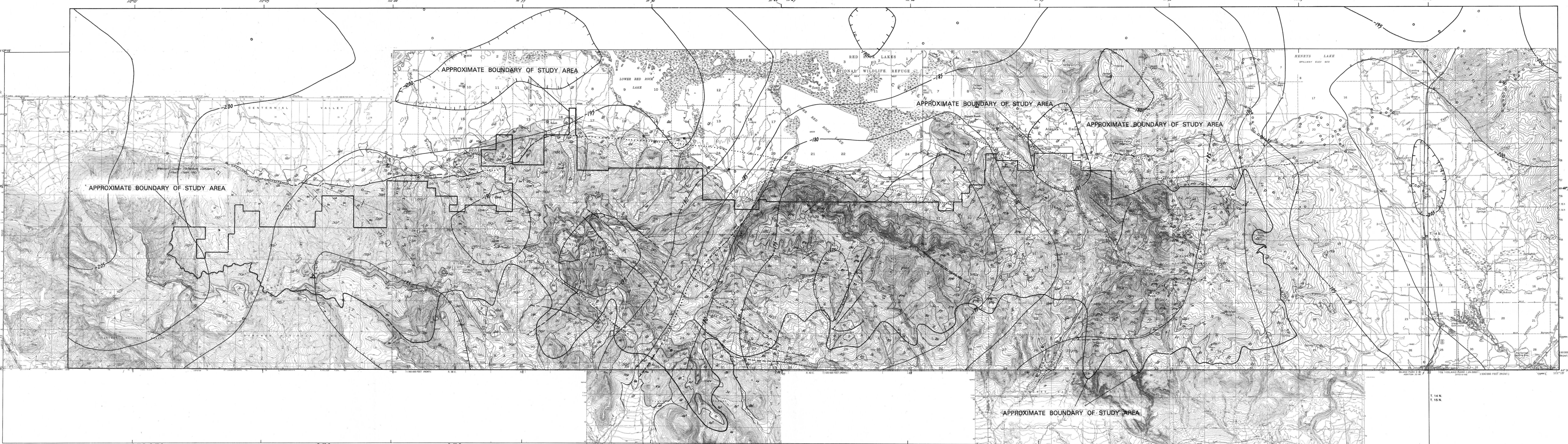
MAGNETIC CONTOURS--Represent total intensity magnetic field values of earth, in gammas. Hachured to indicate areas of low magnetic intensity

A ANOMALIES

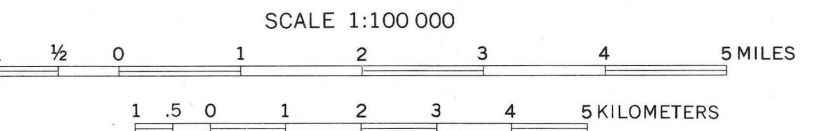
--- FLIGHT PATH

Data west of 111° 30' W. long. flown and compiled in 1978-1979 by L.K.B. Resources, Inc. Regional field removed. IGF 1975 updated to month flown. Contour interval 20 gammas. Datum base 58,000 gammas. Flight path spacing 3/4 mi (1.2 km). Flight level 11,000 ft (3.4 km) above sea level.

Data east of 111° 30' W. long. by U.S. Geological Survey (1972), scale 1:500,000. Datum base arbitrary. Contour interval 20 gammas. Flight path spacing 5 mi (8 km). Flight level 12,500 ft (3.8 km) above sea level.



Base from U.S. Geological Survey, 1:24,000, Antelope Valley, Idaho, 1972; Big Table Mountain, Mont.-Idaho, 1968; Corral Creek, Mont.-Idaho, 1968; Icehouse Creek, Idaho, 1965; Island Park Dam, Idaho, 1964; Sheridan Reservoir, Idaho, 1965; 1:62,500 Henrys Lake, Idaho-Mont., 1964; Lower Red Rock Lake, Mont.-Idaho, 1950; Upper Red Rock Lake, Mont.-Idaho, 1950.



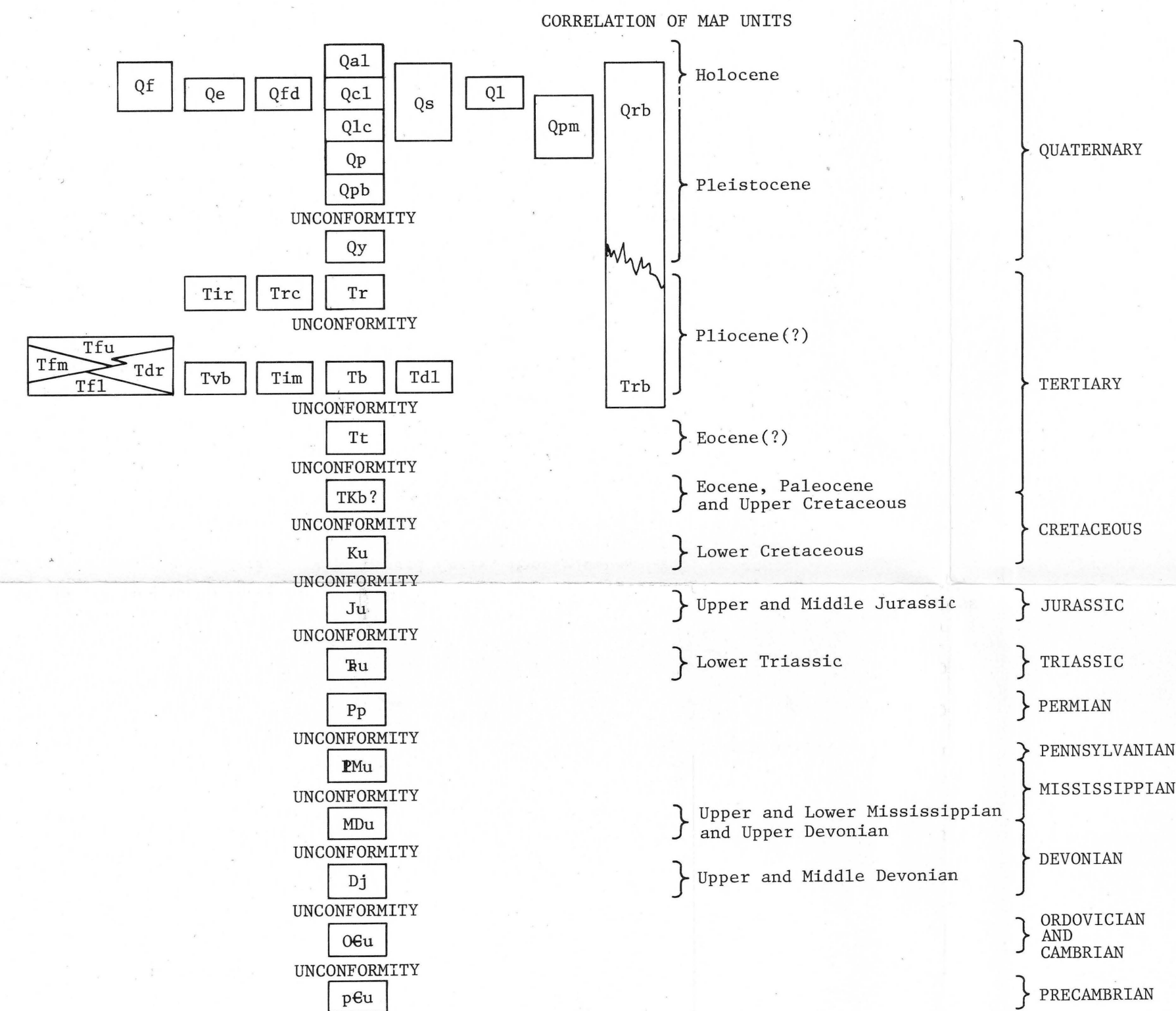
MAP B--BOUGUER GRAVITY MAP

Geology compiled in 1979 and 1980 by I. J. Witkind. Taken in part from Witkind, 1972; 1976; and Witkind and Probst, 1980.

**EXPLANATION**

GRAVITY CONTOURS--Hachured to indicate closed areas of low gravity. Contour interval 5 milligals

GRAVITY STATION



EXPLANATION OF MAP UNITS	
Qal	ALLUVIUM (HOLOCENE)
Qf	ALLUVIAL FAN DEPOSIT (HOLOCENE)
Qe	EARTHFLOW DEPOSIT (HOLOCENE)
Qfd	FRACTURED AND DISTURBED GROUND (HOLOCENE)--A type of landslide
Qs	OTHER SURFICIAL DEPOSITS (QUATERNARY)--Includes masses of slump blocks and large boulder fields
Ql	LANDSLIDE DEPOSITS (HOLOCENE)
Qlc	COLLUVIUM (HOLOCENE)
Qpm	LACUSTRINE DEPOSITS (QUATERNARY)
Qp	PELLETIC MUDS (QUATERNARY)
Qpb	PINEDALE TILL (PLEISTOCENE)
Qrb	PRE-BULL LAKE TILL (PLEISTOCENE)
Qrb	REWORKED DIVIDE QUARTZITE CONGLOMERATE UNIT OF THE BEAVERHEAD(?) FORMATION (QUATERNARY)
Qy	YELLOWSTONE GROUP, UNDIVIDED (PLEISTOCENE)--Rhyolite ash-flow tuff
Trb	REWORKED DIVIDE QUARTZITE CONGLOMERATE UNIT OF THE BEAVERHEAD(?) FORMATION (TERTIARY)
Tir	RHYOLITE DIKE (PLEISTOCENE?)
Trc	RHYOLITE OF CHINE CREEK (PLEISTOCENE?)
Tr	RHYOLITE ASH-FLOW TUFF (PLEISTOCENE)
Tfm	VOLCANIC SEDIMENTS INTERLAYED IN LAVA FLOWS (PLEISTOCENE?)
Tfu	UPPER LAVA FLOWS (PLEISTOCENE?)
Tfl	LOWER LAVA FLOWS (PLEISTOCENE?)
Tdr	LAVA FLOWS OF DACITE AND RHYODACITE (PLEISTOCENE?)
Tin	VOLCANIC MUDFLOW BRECCIA (PLEISTOCENE?)
Tb	MARIC DIKE (PLEISTOCENE?)
Td	BASALT (PLEISTOCENE?)
Td	PIROXENE TRACHYTE PORPHYRY (EOCENE?)
Td	DIATHESE(?) (PLEISTOCENE?)
Tkb	BEAVERHEAD (?) FORMATION (EOCENE, PALEOCENE, AND UPPER CRETACEOUS)--Light-brown to light-gray siltstone and fine- to medium-grained sandstone
Ku	LOWER CRETACEOUS ROCKS, UNDIVIDED
Ju	LOWER TRIASSIC ROCKS, UNDIVIDED
Tru	PHOSPHORIA FORMATION AND RELATED ROCKS (PERMIAN)
Pp	PENNSYLVANIAN AND MISSISSIPPIAN ROCKS, UNDIVIDED
Pmu	MISSISSIPPIAN AND DEVONIAN ROCKS, UNDIVIDED
Dj	JEFFERSON FORMATION (UPPER AND MIDDLE DEVONIAN)
Ocu	ORDOVICIAN AND CAMBRIAN ROCKS, UNDIVIDED
pcu	PRECAMBRIAN CRYSTALLINE ROCKS, UNDIVIDED

**EXPLANATION**

CONTACT--Approximately located or inferred. In many places partly concealed beneath overlying surficial deposits.

FAULT--Dashed where approximately located or inferred; dotted where concealed; queried where uncertain. Bar and bell on downthrown side.

ANTICLINE--Showing approximate position of crestline, and direction of plunge of axis.

STRIKE AND DIP OF INCLINED BEDS

STRIKE AND DIP OF VERTICAL BEDS

STRIKE AND DIP OF FOLIATION

Inclined

Vertical

STRIKE AND DIP OF FLOW STRUCTURE IN EXTRUSIVE ROCKS

OPEN-PIT PHOSPHATE MINE--Abandoned

PROSPECT PIT

DRY HOLE

ABANDONED MINE OR QUARRY

**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 geophysical survey of the Centennial Mountains Wilderness Study Area and contiguous areas in the Targhee and Beaverhead National Forests, Beaverhead County, Montana, and Clark and Fremont Counties, Idaho.

**INTRODUCTION**

Parts of both the Targhee and Beaverhead National Forests are within the study area. Four contiguous parcels of land, totaling about 96,176 acres (38,922 ha) make up the area. The first of these encompasses about 46,126 acres (18,667 ha), is wholly in Montana, and includes an addition by the Bureau of Land Management. The second area, in the Targhee National Forest, consists of some 38,750 acres (15,682 ha) within Idaho. The third and fourth parcels include about 11,300 acres (4,573 ha) in the Beaverhead and Targhee National Forests that overlies the Mt. Jefferson and Sawtell Peak areas in the eastern part of the Centennial Mountains.

**AEROMAGNETIC SURVEY**

The west half of the study area is characterized by low-gradient magnetic features over the Upper Cretaceous-lower Tertiary strata, and high amplitude, steep-gradient anomalies over higher terrain which is capped with younger, more magnetic volcanic rocks. Anomalies A and B, (map A) correlate with the volcanic rocks that cover Little Table Mountain and Big Table Mountain, respectively. Anomaly C is produced by volcanic rocks that underlie Baldy Mountain and Slide Mountain; however, the linear shape of the anomaly implies a quasi-tabular form for the source rather than the existing terrain. Possibly northwest-trending faults (map A) have positioned a block of strongly magnetic volcanic material near, but not coincident with, the high points of the mountains. The magnetic gradient is steep across the northeast-trending Odell Creek fault between anomalies C and D. Immediately east of the fault, the broad, moderate-amplitude anomaly D correlates with a preserved southeast-plunging anticline having a core of Precambrian crystalline rocks. Anomaly D is probably due to the elevated crystalline rocks. Part of the anomaly could stem from an inferred concealed intrusive body related to a known small diatreme (?) that crops out about 0.6 miles (1 km) east of the apex of anomaly D (Witkind, 1974).

Eastward, between anomalies D and E, a residual magnetic low is developed over Paleozoic strata. Farther eastward, anomalies E and F both correlate with Tertiary volcanic rocks. The anomaly axes show no relation to topographic highs; the Willow Creek fault could be responsible for a thickened volcanic section beneath anomaly E and a similar prevolcanic trough filled with volcanic flows could be related to anomaly F although its strength and form suggest the possible contribution from a deep-seated intrusive source.

**GRAVITY SURVEY**

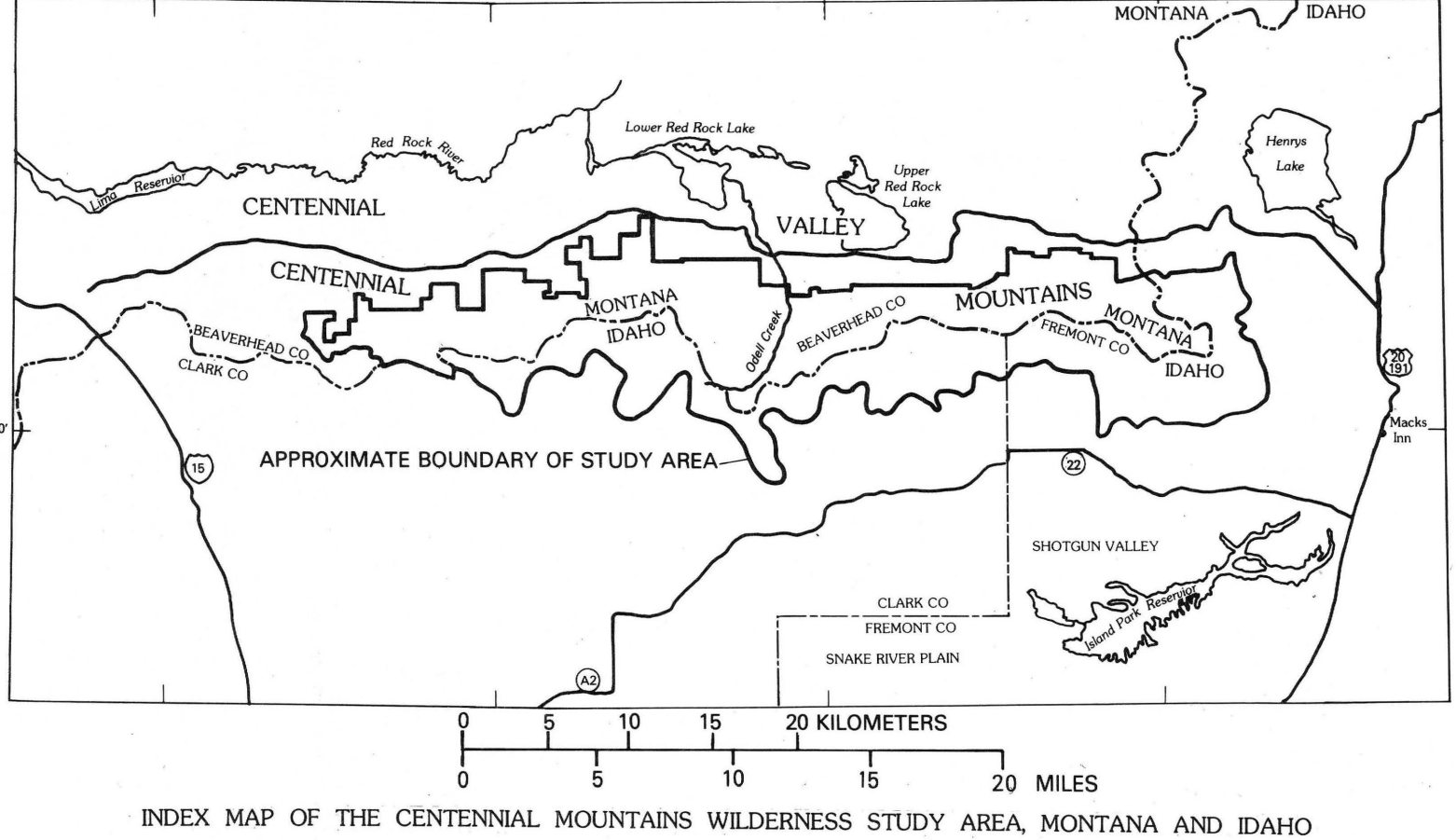
Reconnaissance gravity data, collected by the U.S. Geological Survey, are presented as a complete Bouguer gravity map contoured at 5 mgal intervals (map B). Small gravity anomalies may have been missed, and the indicated shapes of larger anomalies may be inexact because of the sparse coverage. A linear gravity low along the north margin of the west half of the study area correlates with the Centennial Valley, presumably filled with a thick section of Tertiary and Quaternary sedimentary rocks. The low extends eastward to the Odell Creek fault where it ends against a gravity high caused by more dense rock in the upthrust block east of the fault. The Western Centennials show weak gravity relief. The Odell Creek fault marks the west edge of a gravity high much as it marks the west edge of magnetic anomaly D (Map A). The magnetic and gravity patterns east of the fault, however are not strongly correlative; seemingly a magnetic susceptibility contrast exists between the crystalline and sedimentary rocks, but an overall density contrast is not evident. The broad gravity high between the Odell Creek fault and the Willow Creek fault probably correlates with a structural high and implies higher composite rock densities relative to the Western Centennials.

**CONCLUSIONS**

The anomalies (A-F Map A) can generally be correlated with the mapped geology and the topography of the area except possibly for magnetic anomaly D. The magnetic expressions are dominated by Tertiary volcanic rocks at higher altitudes in the Western Centennials and by anomaly D in the Eastern Centennials, which correlates with elevated crystalline rock. Anomaly D is probably mainly caused by magnetic rocks in the crystalline basement, but its magnetic apex is near a diatreme(?) and inference can be drawn for the existence of a concealed intrusion related to the diatreme(?). The broad gravity high east of the Odell Creek fault reflects older, more dense Precambrian and Phanerozoic rocks but gives no support for a concealed intrusion as a partial anomaly source.

**References Cited**

U.S. Geological Survey, 1972, Aeromagnetic map of southeastern Idaho and part of southwestern Montana, Open-File Report, scale 1:500,000. Witkind, I. J., 1972, Geologic map of the Henrys Lake quadrangle, Idaho and Montana: U.S. Geological Survey Miscellaneous Investigations Map I-781-A, scale 1:62,500, 2 sheets. 1974, A possible concealed pluton in Beaverhead and Madison Counties, Montana, and Clark County, Idaho: U.S. Geological Survey Open-File Report 74-312, 7p. 1976, Geologic map of the southern part of the Upper Red Rock Lake quadrangle, southwestern Montana and adjacent Idaho: U.S. Geological Survey Miscellaneous Investigations Map I-943, scale 1:62,500. 1981, Geologic map of the Centennial Mountains Wilderness Study Area and contiguous areas, Beaverhead County, Montana, and Clark and Fremont Counties, Idaho, Miscellaneous Field Studies Map



**GEOPHYSICAL SURVEY OF THE CENTENNIAL MOUNTAINS WILDERNESS STUDY AREA AND CONTIGUOUS AREAS, BEAVERHEAD COUNTY, MONTANA AND CLARK AND FREMONT COUNTIES, IDAHO**

By  
R. A. Martin  
1982