UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

SLIDES SHOWING AEROMAGNETIC AND GRAVITY ANOMALY MAPS AND A METALLIC MINERAL RESOURCE FAVORABILITY MAP OF THE WALLACE 1° X 2° QUADRANGLE, MONTANA AND IDAHO

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DISCUSSION

This open-file report includes three 35-mm color slides which show aeromagnetic and gravity anomaly maps and a map showing favorability of ground for hydrothermal veins in the Wallace 1° X 2° quadrangle, located in the northern Rocky Mountains at latitudes 47° to 48° north and longitudes 114° to 116° west.

The favorability work assumes that mesothermal veins are associated with known or inferred intrusions, defined by interpreting the aeromagnetic, gravity, and audio-magnetotelluric (AMT) data. The AMT data are limited to the northwestern part of the quadrangle.

The magnetic anomaly data provide the most diagnostic criteria for locating buried plutons and defining the subsurface configuration of exposed plutons. Gravity information helps define the structural setting and contributes to ranking the favorability of areas that may contain hidden intrusions. The AMT data provide clues to the presence of possible alteration zones around high resistivity granitic intrusions.

The geophysical maps on the slides are part of a folio of maps of other disciplines applied to the mineral resource assessment of the Wallace 1° X 2° quadrangle. The geophysical data can be correlated with geologic and geographic information by projecting the slides on a generalized geologic map of the quadrangle at a scale of 1:250,000 (Harrison and others, 1982).

The three slides of this open-file report are:

(1) Total intensity aeromagnetic map. These data are from four surveys flown at average line spacing of 1.6 km and altitudes 2.1, 2.3, and 2.7 km barometric and 300 m above terrain. One survey covers more than 70 percent of the quadrangle, and the International Geomagnetic Reference Field has not been removed from these data.

(2) Complete Bouguer gravity map. These data are reduced using a

density of 2.67 g/cm^3 and referenced to the International Gravity Standardization Net, IGSN-71, by ties to Department of Defense bases at Missoula, Montana and Wallace, Idaho. Control consists of nearly 2100 stations at an average spacing of 3 km.

(3) Favorability of ground for hydrothermal veins based on aeromagnetic, gravity, and audio-magnetotelluric data. Favorability scores from 3 to -1 for various subareas in the quadrangle were assigned according to the following set of criteria:

3-High-amplitude positive magnetic anomaly associated with intrusion that is mineralized. A corresponding negative Bouguer gravity anomaly is likely.

2-Medium amplitude positive anomaly, commonly expressed as a secondary feature associated with a rank 3 anomaly. May or may not have direct correlation with negative gravity anomaly.

1-Low-amplitude positive magnetic anomaly, negative gravity anomaly, or some combination showing subtle expressions of small plutons. One-station gravity anomalies are not included. Magnetic anomalies related to magnetite-rich rocks of the Ravalli Group are not included.

0-Broad zones of high magnetic intensity that encompass areas ranked 3, 2, or 1 that may indicate broad regions favorable for mineral occurrences.

1-Other areas where the regional magnetic and gravity anomaly data show no anomalies judged significant relative to the occurrence of mineral deposits.

REFERENCE CITED

Harrison, J. E., Griggs, A. B., and Wells, J. D., 1982, Generalized geologic map of the Wallace 1^{o} X 2^{o} quadrangle, Montana and Idaho: U.S. Geological Survey Miscellaneous Field Studies Map MF-1354-A, scale 1:250,000.