OPEN FILE REPORT

# Significance of an Aeromagnetic Anomaly in the Southwestern Part of the Blue Range Primitive Area, Arizona-New Mexico

by

Gordon P. Eaton and James C. Ratté

U.S. Geological Survey

In the Autumn of 1968 the U.S. Geological Survey flew a detailed aerial magnetic survey of the southwesternmost part of the Blue Range primitive area between Lat 33°21'00" and 33°29'00" N. and Long 109°15'00" and 109°22'30" W. The survey was intended to define more precisely a positive magnetic anomaly that had been found from an earlier survey (Ratte and others, 1969, Pl. 1 and p. E30-31) by reducing the original flight elevation from 10,500 feet to 8,000 feet and the flight line spacing from 1 mile to 1/2 mile. The results of the more detailed survey are shown in the accompanying figure (fig. 1). The anomaly in question lies in the center of the map and has a peak value of 915 gammas and a closure of approximately 460 gammas. On the earlier map (Ratte and others, op. cit.) the closure is approximately 80 gammas.



U. S. GOVERNMENT PRINTING OFFICE: 1969 O - 341171

Three interpretations of the anomaly are possible: 1) it reflects a blind intrusive stock or vertical volcanic pipe approximately 1.0 to 2.0 miles in diameter beneath the surface flows of pyroxene-hornblende andesite, 2) it reflects geographic variations in the magnetic susceptibility of the pyroxene-hornblende andesite, that part of the andesite in the area of the anomaly having relatively high susceptibility, or 3) it is due to remanent magnetization, of normal polarity, of either the andesite, or of a blind body hidden beneath the andesite.

The second interpretation is ruled out on the basis of the configuration and amplitude of the anomaly as well as by the fact that preliminary measurements of the susceptibilities of a suite of samples from the pyroxene-hornblende andesite do not indicate locally higher susceptibilities in the area of the anomaly.

The third interpretation was tested by measuring the remanent magnetization of a suite of 22 oriented samples both from the pyroxene-hornblende andesite and from the latite and andesitic dikes that cut it. A majority of the samples of the andesite flows and flow-breccias show reversed polarity indicating that the positive anomaly is not caused by remanent magnetization of these flow rocks. The dikes, on the other hand, are predominantly normally polarized and if they reflect the polarization of a deeper intrusive stock, it is possible that the stock contributes to the anomaly both through induced and remanent magnetization.

U. S. GOVERNMENT PRINTING OFFICE : 1959 O - 511171

U. S. GEOLOGICAL SURVEY
WASHINGTON, D. C.
20242

For release DECEMBER 9, 1969

The U. S. Geological Survey is releasing in open files the following report. Copies are available for inspection in the Geological Survey Libraries, 1033 GSA Bldg., Washington, D.C. 20242; Bldg. 25, Federal Center, Denver, Colo. 80225; and 345 Middlefield Rd., Menlo Park, Calif. 94025. Copy is also available for inspection in the office of the Forest Supervisor, Apache National Forest, Springerville, Ariz. 85938; and the Arizona Bureau of Mines, University of Arizona, Tucson, Ariz. 85721:

1. Significance of an aeromagnetic anomaly in the southwestern part of the Blue Range primitive area, Arizona-New Mexico, by Gordon P. Eaton and James C. Ratté. 5 p., 1 map (scale 1:62,500).

* * * * *

Thus, the first interpretation, that of a blind stock or plug, is favored by all of the available data. Magnetic depth estimates based on the new aeromagnetic data indicate that the maximum depth to the top of the body producing the anomaly, if it is a vertical stock, is less than 400 feet below the surface.

Geologic evidence that favors the hypothesis of a stock or plug includes: 1) quaquaversal dips in the andesite in the vicinity of the anomaly, suggesting doming by an intrusive. 2) the presence of a swarm of dikes of latitic and andesitic composition within the area of the anomaly. 3) the presence of fumarolic-type rock alteration within and adjacent to the anomaly.

If a buried stock or plug causes the anomaly it seems reasonable that its composition is latitic or rhyolitic, for similarly altered rocks nearby are closely associated with latitic and rhyolitic rocks of an intrusive-extrusive complex (figure 1), which is younger than the pyroxene-hornblende andesite unit (Ratte and others, 1969, p. E18-E19). Furthermore, a relatively large dike of latite (several hundred feet long and at least several tens of feet wide) crops out near the center of the anomaly and near the highest topographic point within it. This dike could well be an apophysis from a shallow stock or plug.

U. S. GOVERNMENT PRINTING OFFICE: 1959 O - 511171
867-100

Although the magnetic data, the fumarolic-type of alteration, and the weak geochemical anomalies of copper, molybdenum, and mercury associated with the altered rocks all indicate an underlying source of hydrothermal fluids, they do not insure the presence of significant mineralization. They do, however, point to a possible exploration target.

U. S. GOVERNMENT PRINTING OFFICE : 1959 O - 511171
867-100

Reference cited

Ratte, J. C., and others, 1969, Mineral Resources of the Blue Range Primitive Area, Greenlee County, Arizona, and Catron County, New Mexico; Geol. Survey Bulletin 1261-E.

U. S. GOVERNMENT PRINTING OFFICE : 1959 O - 511171
867-100

POCKET CONTAINS
1 ITEM