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UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

Technical Letter  
Saudi Arabian Mineral  
Exploration - 34  
December 2, 1965

Dr. Fadil K. Kabbani  
Deputy Minister for Mineral Resources  
Directorate General for Mineral Resources  
Ministry of Petroleum and Mineral Resources  
Jiddah, Saudi Arabia

Dear Dr. Kabbani:

Transmitted herewith are 10 copies of:

TECHNICAL LETTER NUMBER 34  
MAGNETOMETER SURVEY  
OF THE  
METHGAL IRON DEPOSIT,  
SAUDI ARABIA

by

W. E. Davis\* and R. V. Allen\*

Sincerely,

*Glen F. Brown*

Glen F. Brown, Chief  
Saudi Arabian Mineral Exploration Project

\* U. S. Geological Survey, Jiddah, Saudi Arabia

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MAGNETOMETER SURVEY  
OF THE  
METHGAL IRON DEPOSIT,  
SAUDI ARABIA

by  
W. E. Davis\* and R. V. Allen\*

A magnetometer survey was made of the Methgal iron deposit (Fig.1) in the Wadi Sitarra district as a part of the exploration program conducted by the Ministry of Petroleum and Mineral Resources. The survey was requested by Mr. C. W. Smith, who visited the area in early March 1965 and found the deposit to consist of several magnetite exposures that are of sufficient size to warrant geophysical study. Owing to the fact that the area is not accesible by car, the investigation was delayed until helicopter support became available. Field measurements were made by the authors during November 1965 while geologic mapping was conducted from a camp near Jabal Farason about 48 kilometers to the west. Magnetometer data were obtained primarily to delineate the deposit and to determine if it is large enough to justify test-drilling.

The area is near latitude 22°42'N. longitude 39°51'E. in a small branch of Wadi Sitarra about 65 kilometers northeast of Kulayyah. It occupies a low ridge and bordering lowland in the central part of the wadi branch. The ridge rises to a height of 25 meters above the wadi floor, which lies about 720 meters above sea level and is broad and fairly flat with considerable brush and small trees.

Pods and lenses of magnetite with moderate amounts of hematite intermixed crop out over a distance of 400 meters along the crest of the ridge. The exposures range from 10 to 20 meters in width and are connected by small veins or feeders along a contact of diorite with sediments, which strikes about N.20°E. and dips to the west. These outcrops seem to be parts of a vein system that terminates abruptly to the south but may extend northward beneath wadi sediments beyond the ridge.

\* U. S. Geological Survey, Jiddah, Saudi Arabia

Torsion and fluxgate vertical-force magnetometers with scale constants of 12 and 50 gammas per dial division, respectively, were used in making the survey. Instrument readings were made 12-1/2 meters apart along traverses spaced 50 to 70 meters perpendicular to a base line trending N.22°E. through the middle of the area. Horizontal control was established by means of Brunton compass and tape. The readings were referenced to a base station, which was occupied at intervals of three hours or less. Data were not corrected for diurnal variation, which was found to be very small and insignificant compared to the magnitudes of anomalies observed in the area.

Vertical intensity magnetic profiles (Fig.2) over the outcrop zone show a narrow anomaly that coincides with the magnetite exposures. The most prominent part of the anomaly is associated with the larger outcrops in the northern part of the zone. Southward the anomaly is comparatively weak over the central part, but becomes strong again over the main southern exposure. Profiles and additional reconnaissance measurements north and south of the zone show only minor magnetic relief that is attributed to the country rock.

The variation in magnitude of the anomaly indicates that the outcrops are not parts of a concealed large magnetite mass. Apparently most of the exposures dip steeply and are connected by small veins and stringers as observed by Smith. The magnetite-bearing zone is inferred from the magnetic data to terminate abruptly near the northern and southern exposed bodies; and to be about as wide as the outcrop belt.

Results of the survey suggest that the deposit contains pods and lenses of magnetite and hematite, which are not much larger than the outcrops; and which probably do not represent a sufficient quantity to be of commercial interest. In our opinion the deposit is not large enough to warrant test-drilling.