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MINERAL INVESTIGATIONS IN THE AL AQIQ AREA, SAUDI ARABIA

by

Virgil A. Trent
U. S. Geological Survey

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1. Mineral investigations in the Al Aqiq area, Saudi Arabia, by Virgil A. Trent. 4 p.

2. A geologic and mineral reconnaissance by helicopter in a part of the Tihamat Ash Sham quadrangle, Saudi Arabia, by Virgil A. Trent. 10 p.

3. Section of the Fatima Formation near Bahrah, Saudi Arabia, by Richard Goldsmith. 6 p., 1 fig., 1 table.

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4. Tectonic map of the central and southern Appalachians, by John C. Reed, Jr. 1 map, scale 1:2,500,000.

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MINERAL INVESTIGATIONS IN THE AL AQIQ AREA, SAUDI ARABIA

by

Virgil A. Trent
U. S. Geological Survey

PREFACE

In 1963, in response to a request from the Ministry of Petroleum and Mineral Resources, the Saudi Arabian Government and the U. S. Geological Survey, U. S. Department of the Interior, with the approval of the U. S. Department of State, undertook a joint and cooperative effort to map and evaluate the mineral potential of central and western Saudi Arabia. The results of this program are being released in USGS open files in the United States and are also available in the Library of the Ministry of Petroleum and Mineral Resources. Also on open file in that office is a large amount of material, in the form of unpublished manuscripts, maps, field notes, drill logs, annotated aerial photographs, etc., that has resulted from other previous geologic work by Saudi Arabian government agencies. The Government of Saudi Arabia makes this information available to interested persons, and has set up a liberal mining code which is included in "Mineral Resources of Saudi Arabia, a Guide for Investment and Development," published in 1965 as Bulletin 1 of the Ministry of Petroleum and Mineral Resources, Directorate General of Mineral Resources, Jiddah, Saudi Arabia.

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MINERAL INVESTIGATIONS IN THE AL AQIQ AREA, SAUDI ARABIA

by

Virgil A. Trent

Introduction

During June and July 1964 two fifteen-day field trips sponsored jointly by the Directorate General of Mineral Resources, Kingdom of Saudi Arabia, and the U. S. Geological Survey were undertaken. The ultimate objective of the trips was a geologic reconnaissance and economic mineral exploration of the plateau area of the Tihamat Ash Sham quadrangle, sheet I-216A. (Brown and Jackson, 1958). Circumstances prevented us from completing this assignment; however, several minor objectives involving mineral and geologic investigations in the Al Aqiq area were attacked. Initially the Kamdan aeromagnetic anomaly area was to be field checked to determine the source of the anomaly and then the Ain Kathamah and Ablah ancient mine areas in the Southern Hijaz quadrangle, sheet I-210A (Brown and others, 1962) were to be examined. While working in the area we would describe a section of the Ablah formation in detail and then trace those rocks south into the Tihamat Ash Sham quadrangle.

Preparations for these trips involved a study of aerial photographs at 1:60,000 and 1:12,500 scales (black and white) and color photography (approximately 1:12,500) where applicable; and review of reports by Kahr and Ronner (1963) and D. R. Mabey (1964, written communication). The first trip extended from June 6, 1964, to June 22, 1964, and the second was from July 11, 1964, to July 25, 1964.

The Kamdan anomaly area

In the Southern Hijaz quadrangle at 41°28'E., 20°10'N. there is a small body of granite shown by the symbol Gr which Don Mabey felt may have been the source of the gamma anomaly in this area. Several traverses from our camp revealed a series of

rocks from east to west that are mapped as schist (Gs), schist (Sc), and on the high ground, local highly cleaved flow rocks, small areas of dike rock with greenstone making the high peaks and domes. To the west the rocks are Sc schists. No magnetic rock units were found to account for the anomaly.

Seven concentrate samples were collected for trace element analysis and ten hand samples of the various rock types were taken, some for gossan analysis.

Inasmuch as we had only a short time to spend in the area and access was difficult the fact that we did not find the lithologic cause for the anomaly in three days field work is not discouraging.

An aerial reconnaissance on September 19, 1964, with W. E. Davis and Rex Allen over the Kamdan anomaly revealed no dark basic or ultrabasic rocks outcropping in the area. I think this indicates one of two possibilities: 1) the small outcrops of granitic dike rock (or other igneous rock masses) may have a cupola structure at depth and carry quantities of magnetite or 2) the anomaly is centered in the nearby Gs or Sc schists where a metamorphic magnetite localization has taken place. Richard Goldsmith has found lenses of magnetite, hermatite and quartz in Gs schist in the Mahawiyah area.

If possible a geologist should accompany a geophysicist into the area to run several (?) magnetometer lines to locate the anomaly on the ground. I found no accessible route to the area from the southwest or west; thus, the Wadi Aqiq entry is best until possible helicopter transport is secured. I estimate the geologist-geophysicist team trip into this area to study the geology and discover the ground location of this anomaly will take a minimum of 15-20 days from Jiddah and back.

When we left our base camp on the 15th of June we attempted to drive south up Wadi Buhur to examine the Gr granite area but soft wadi material prevented our passage beyond 7 km. We continued on to Ablah and examined the ancient mine and village. We then worked in some of the dark hills west of Ablah which are for the most part interbedded sediments - conglomeratic shales, argillaceous conglomerates, shales and wackes. We traced these rocks north to Wadi Ranya and decided to move

our camp to a central location in the Ablah formation (41°52'E., 20°06'E.) along the road. Leaving Ablah we collected a bulk sample of Gr granite (3 km. East) for age determination.

Section of the Ablah formation

A detailed section of the Ablah formation was described in vicinity of our camp where we mapped the rocks both north and south as well as along the road. We collected both hand and concentrate samples and checked areas that had been previously noted on the aerial photographs.

The Ablah formation is a relatively unmetamorphosed series of interbedded clastic sediments bounded on the east and west by major faults. It is contains cross-bedded conglomeratic sandstones, pebble conglomerates, black or red or green shales and wackes. In addition there are concordant beds of limestone and marble forming prominent buff colored ridges which are frequently cross faulted. Both granitic dikes and syenite sills (both concordant) occur within and adjacent to the Ablah formation carrying small amounts of florite, calcite, chalcopyrite and pyrite locally. Some andesitic to rhyolitic volcanic flows occur in the formation, and we found trace amounts of copper only. All the field data that we gathered indicated that the Ablah formation was considerably younger than the Gd or Gs units to the west and east respectively.

Approximately sixty (60) hand samples and twenty (20) concentrate samples were collected from this area - primarily within the Ablah formation.

After completing our road section we continued to work further south until we were within the Tihamat Ash Sham Quadrangle. We checked and sampled faults and favorable structures noted in the field and on the photographs. Our plans were to continue working south but passage up Wadi Ranya with our vehicles was not possible. We were about to drive south in Wadi Shuwas and cover that area when the trip was discontinued.

I feel strongly that a regional mineral survey of the Arabian shield should include an exploration of the Tihamat Ash Sham quadrangle. Hopefully R. F. Johnson and I could complete two trips into the area prior to the contract termination date.

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