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REPORT ON FIELD TRIP TO WADI BIDAH AND ABLAH AREAS, SAUDI ARABIA

by

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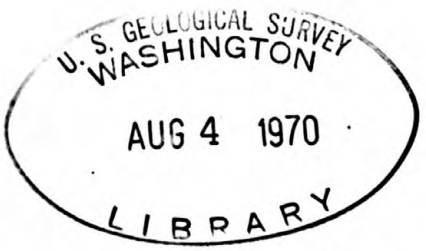
U.S. Geological Survey



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10. Geology and mineral resources of the Alegria district, Minas Gerais, Brazil, by Charles H. Maxwell. 249 p., 8 pl., 47 figs., 21 tables.

* * *

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 Also on open file in that office is a large amount of material, in the form of unpublished manuscripts, maps, field notes, drill logs, annotated aerial photographs, etc., that has resulted from other previous geologic work by Saudi Arabian government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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ABSTRACT

The Mulgatah ancient workings were briefly examined and two samples of alluvium were taken from the wadi that drains these workings. In Wadi Bidah, near gossan outcrops at the Rabathan prospects, another wadi sample was taken. In the Abla Formation area, seven wadi samples were taken and these samples as well as the ones described above were treated in the sluice. Accompanying this report is a drainage map of the Ablah area which shows where the samples were taken. Two tables give a brief description of the samples and show their tenor in detrital gold and silver.

INTRODUCTION

Objectives

The trip had the following objectives: (1) to start the program of testing alluvial deposits, (2) to become familiar with the operation of the sluice for concentrating alluvium, and (3) to determine the best field party organization for this type of work. The Wadi Bidah and Ablah mine areas in the southeast corner of the Southern Hijaz Quadrangle (Brown and others, 1962) were selected to meet these objectives: (1) in Wadi Bidah, to test wadi sediments near gold prospects for placer deposits of that metal and (2) near the Ablah mine, in the Abla Formation, to test alluvium for concentration of heavy minerals that may indicate the presence nearby of commercial ore deposits. Of special interest in the Abla Formation are the conglomerate beds that might be possible loci for mineralization.

Itinerary

The field trip lasted 18 days from October 22 to November 8, 1966. Nearly 1500 kilometers were traveled and the itinerary was as follows:

October 22, 1966:	Departed Jiddah, arrived At Ta'if
23	Departed At Ta'if
24	Arrived Bi'r Swasiah in Wadi Bidah and set camp
25 and 26	Trips to Mulgatah mine area

October	27	Trip to Rabathan mine area
	28	Departed for Al Aqiq
	29	Met airplane in Al Aqiq and departed for Ablah
	30 through to	
November	6	Work in the Abla Formation
	7	Departed Ablah
	8	Arrived Jiddah

The following staff went on the field trip: Mechanic Awad Keith; Drivers: Chail Kleef, Sinhat Betal, and Abbit Abdullah; Laborers: Maawad Naahat, Mohamad Hamud and Ibrahim Samran. All are employees of the Ministry of Petroleum and Mineral Resources, and Mr. Ibrahim Samran is also permanently attached to U.S.G.S. for work as a sample panner. The vehicles provided by the Ministry of Petroleum and Mineral Resources for the trip were: a Landrover station wagon, a Dodge Power Wagon, a G.M.C. lorry, and a Merceded Benz water tanker.

PROCEDURES

Description and operation of the sluice

A team of three men was trained to operate the sluice and one of them, Ibrahim Samran who showed the most interest, was put in charge. The sluice consists of three aluminum U-shaped pans that are bolted together to form a trough 12 feet long, 8 inches wide and 4 inches high. The bottom of the trough is covered with a tight-fitting strip of long-pile carpet and on top of the carpet a heavy-gauge wire screen of 1/2 inch mesh is laid. Both the carpet and the wire screen are secured to the bottom of the trough with bolts. The trough for operation is set at a slight inclination, usually about 5 degrees, and the alluvium to be treated, together with the water, is fed at the top of the sluice. The water is pumped at a rate of about 10 gallons per minute through a devise called a "water head box" that sends an even flow of water over the bottom of the trough. The pump used is of the centrifugal type driven by a two-horsepower gasoline engine; the pump capacity can be changed with the throttle. The alluvium is fed slowly with a shovel at a rate of about one cubic meter per hour.

In the sluice a gravity concentration is effected; the heavy minerals are caught in between the wire screen or work themselves into the rug pile and the light mineral particles, large and small, are washed by the water current over the wire screen and out of the end of the sluice. After sluicing, the gold and heavy minerals are further concentrated by hand panning. The sluice concentrate contains all mineral particles of density equal and greater than that of the pyroxene and amphibole group (sp. g. 2. 8-3.7), and with hand panning it is further concentrated to discard minerals lighter than the garnet group (sp. g. 3.15-4. 3). The samples treated measured exactly 0.25 cubic meter; the weight being about 900 pounds and the concentrates obtained usually weigh around 5 pounds. The samples are passed three times over the sluice to insure good recovery, and the percent of recovery can be calculated from the weights of the head and concentrate and from the assays of a heavy element in the head, concentrate and tail.

Sluicing of a sample in the manner described above takes about three hours and the water consumption is about 150 gallons. Water is recirculated to keep consumption to a minimum.

Samples prepared in this manner are listed in table 1, and the locations of the samples from the Abla Formation are shown on figures 1 and 2.

Table 1. Description of wadi samples treated in the sluice.

Sample number	Description
31041	Mulgatah mine (Goldsmith, in press); taken in wadi near ancient mine workings; poorly sorted alluvial mixture of angular fragments of chlorite schist, quartzite, gossan, quartz, epidote, and magnetite; sample size 0.25 cu m.
31042	Mulgatah mine; taken in wadi 1.5 km from mine workings; alluvium of same characteristics as in above sample; sample size 0.25 cu m.
31045	Wadi Bidah near Rabathan mine (Goldsmith, in press); alluvium is a mixture of subangular and subrounded fragments up to 15 cm in size of schist, basalt, andesite porphyry, quartz, and granite; wadi is about 100 m wide; size of sample 0.25 cu m.
31046	Abla Formation; alluvium is a mixture of angular fragments up to 10 cm long of andesite, rhyolite, wacke, feldspar grains, and quartz; wadi drains area where conglomerate crops out for 2 km; size of sample 0.25 cu m.
31048	Abla Formation; alluvium formed by conglomerate boulders, andesite, rhyolite, quartz, and feldspar grains; size of sample 0.25 cu m.
31050	Abla Formation, Wadi Halset; alluvium formed by mixture of subangular and subrounded fragments of andesite, rhyolite, quartz, and feldspar grains; wadi drains narrow valley where a strongly developed conglomerate is exposed near the base of the formation; size of sample 0.25 cu m.
31051	Abla Formation; alluvium formed by mixture of angular and subangular fragments up to 10 cm long of andesite, rhyolite, wacke, feldspar grains, and quartz; wadi drains area where 2 km of coarse conglomerate at the top of the formation crops out; size of sample 0.25 cu m.
31052	Abla Formation; alluvium is like that of sample 31051; wadi drains area where the coarse conglomerate bed at the top of the formation occurs; sample size 0.25 cu m.
31053	Abla Formation; alluvium is a mixture of angular feldspar grains and rhyolite; wadi drains east slopes of Jabal El Guern where horizontal beds of coarse conglomerate are resting on thick rhyolite flows; sample size 0.25 cu m.
31054	Abla Formation; alluvium formed by mixture of angular fragments of wacke, rhyolite, and feldspar; wadi drains area where basal conglomerate occurs; sample size 0.25 cu m.

Sample preparation

In the laboratory one-half of the sluice concentrate is used for gold and silver assays, and the other half will be separated into magnetic and non-magnetic fractions and each of these fractions will be again separated into fractions of different specific gravity. These fractions will be used for spectrographic determination of a wide range of elements and to make slides and polished sections for mineralographic identifications. Results of samples taken on this trip are listed in table 2.

Table 2. Detrital gold and silver in concentrates from alluvium in the Wadi Bidah and Ablah mine areas, Saudi Arabia. (Assays made by Sayyad Matoug Bahijri, Directorate General of Mineral Resources, December 1, 1966).

Sample number	mg/m^3	
	Gold	Silver
31041	349.6	194.56
31042	178.4	14.72
31045	3.36	nil
31046	0.96	nil
31048	0.64	nil
31050	nil	nil
31051	nil	nil
31052	nil	nil
31053	nil	9.36
31054	nil	nil

RESULTS

All samples in the Wadi Bidah area were taken at depths of less than one meter and the wadi alluvium consisted of unsorted mixture of angular to subrounded rock fragments and minerals ranging in size from less than .5 mm to 15 cm. Rocks visible were: chlorite schist, granite, quartzite, felsite, rhyolite and gossan. Sand grains present were: quartz, feldspar, epidote, and magnetite.

In sample 31041, which is concentrate of wadi sediment near the ancient workings of Mulgatah mine, "colors" are present, and the results of the fire assay (table 2) confirm the visual identification. The concentrate of sample 31042, taken one and a half kilometers downstream from 31041, was not panned; thus, it was not known to be gold-bearing until the results of the fire assay were received (table 2).

The Abla Formation is a north-trending belt of sedimentary rocks about 40 km long and 3 km in width. It consists of beds of water-laid sediments interbedded with lava flows. The strata range in thickness from less than 1 cm to more than 20 cm, however, the bulk occurs as beds less than 10 cm thick. Thin beds of red arkose or wacke and gray, medium-grained, feldspathic arenite are the most abundant sediments. At least 5 conglomerate horizons occur in the formation. Two of them, at the top and the bottom of the formation, are strongly developed along the dip and the strike. The conglomerate at the top of the section is about 20 m thick, and consists of poorly sorted angular to subangular pebbles and boulders ranging in size from 5 mm to 30 mm and is roughly layered in a matrix of reddish, friable, wacke. The pebbles and boulders constitute about 60 percent of the bulk and are derived from parent material - apparently from the same formation - such as rhyolite, wacke, andesite, amygdaloidal basalt, and sandstone. Very few pebbles of granitic rock or quartz are present. Within this conglomerate some thin beds of wacke are interbedded. The conglomerate at the base of the formation is only about 1 m thick and pebbles constitute about 50 percent of the bulk. These pebbles are subrounded and subangular, measure from 2 mm to 2 cm, and are of assorted composition,

but red wacke pebbles are most abundant. The matrix is a red, friable wacke. Other conglomerate units occur elsewhere in the section, but these are lenses that in short distances grade laterally into wacke. The conglomerates, as noted above, are of interest because Precambrian conglomerates similar to these are the host rocks for a variety of large, low-grade, ore deposits in the United States, Africa, and Australia. Also in the formation occur thin beds of layered gray limestone that crop out conspicuously near the top of the formation.

The extrusive rocks are abundant. At the north end of the formation, thick rhyolite flows occur near the base and at the top of the formation, and to the south rhyolite also occurs in several horizons. A thick flow of porphyritic andesite is present about the middle of the section. This andesite is resistant to weathering and constitutes the crest of a line of ridges. Amygdaloidal basalt, usually in thin flows, also occurs at various horizons in the section; the amygdules are filled with calcite.

The strike of the bedding is nearly north except for local variations with strikes to the east and northeast due probably to rotational movements along fault planes. The dips are to the east around 40° except at the north end of the belt of sediments where the beds are horizontal. Original sedimentary features, cross bedding, and graded bedding show that the sediments are right side up.

The west contact of the formation is a wide shear zone with an approximate direction of N.15°E. Drag on the beds indicates that the relative movement of the east block, consisting of sediments, was downward. Along the east contact of the formation, at about the latitude of the Ablah Mine, occurs a granite pluton that seems to be condordant with the sedimentary beds. Farther to the north, along the contact, the Abla Formation rests against chlorite schist. This belt of sediments is probably a limb of a broad fold.

Except for two samples near the Ablah Mine (table 2 and fig. 1), which are sparsely auriferous, and one sample south of the road between Ablah and Bishah (table 2 and fig. 2), which has a little silver, no precious metals were detected by assay of concentrates from wadi sediment derived from the Abla Formation.

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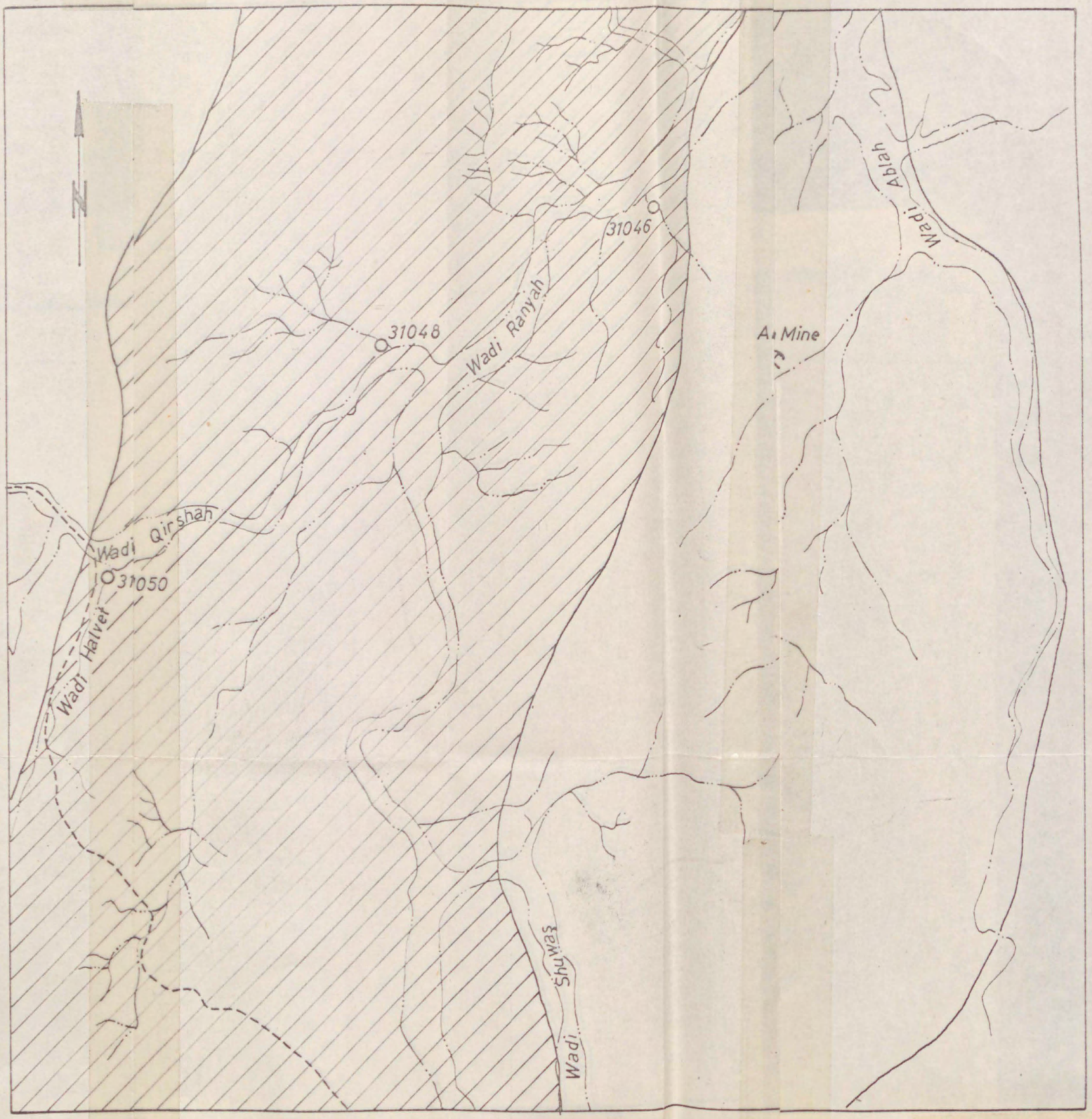

Figure 1 Map showing location of sluice samples in the Abla Formation near the Ablah Mine.

Base from aerial photo 881_WSA_5

Scale 1: 60,000

○ Sample location

▨ Abla Formation

----- Road

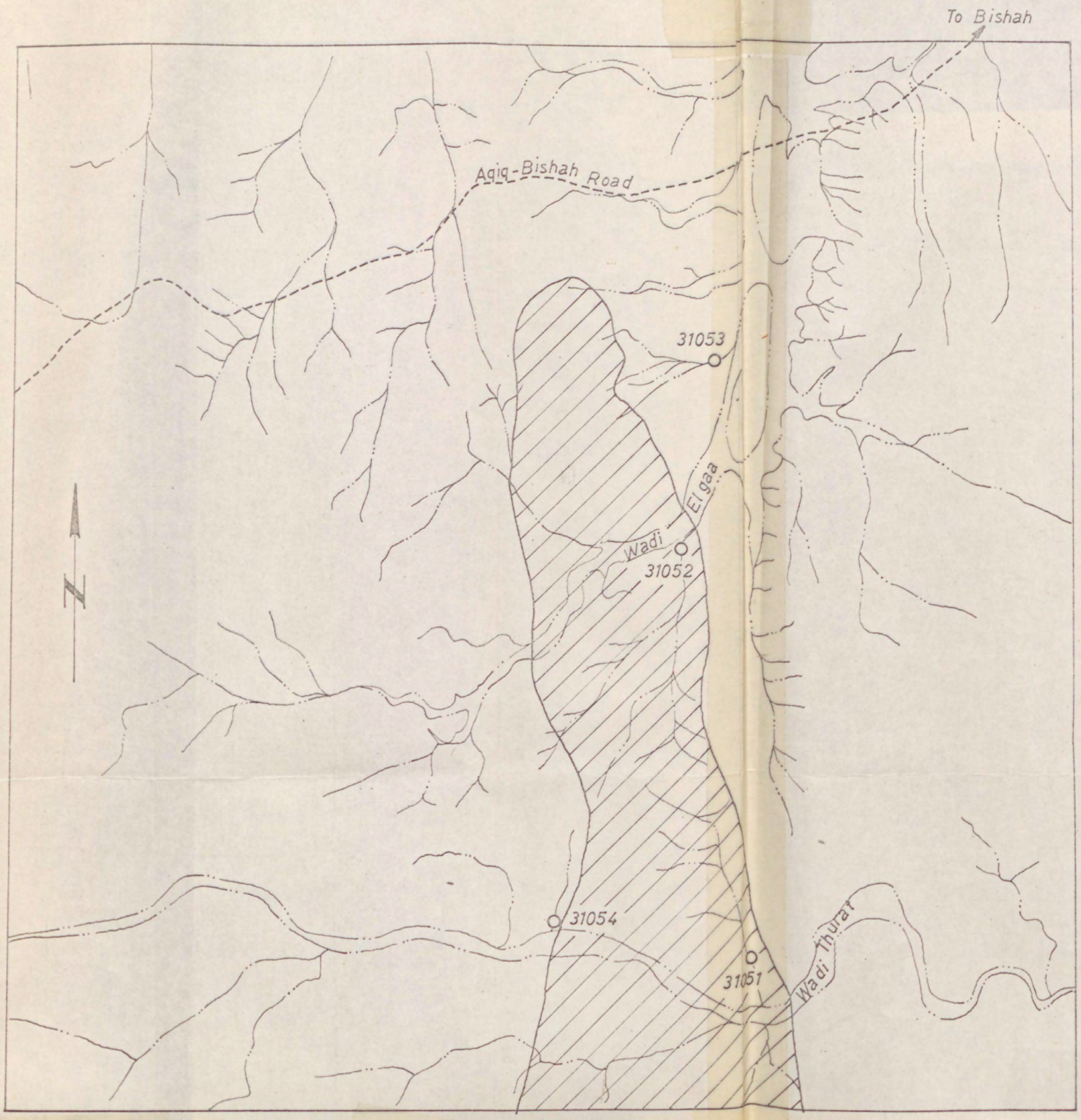

Figure 2 Map showing location of sluice samples in the Abla Formation near Wadi Thurat

Base from aerial photo 769_WSA_5

Scale 1: 60,000

○ Sample location

▨ Abla Formation

----- Road


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