U.S. DEPARTMENT OF THE INTERIOR, GEOLOGICAL SURVEY, PREPARED FOR

MINISTRY OF PETROLEUM AND MINERAL RESOURCES
DEPUTY MINISTRY FOR MINERAL RESOURCES

KINGDOM OF SAUDI ARABIA

OPEN-FILE REPORT 85-721
PLATE 1

42°30' 26°00' JABAL AS SILSILAH (26/42 D) 43°00' 26°00'

UQLAT AS SUQUR (25/42 A)

AN NABHANIYAH (25/43 A)

25°30' 42°30' AL JURDHA WIYAH (25/42 D) 43°00' 25°30'

Aerial photography 1956; controlled mosaic 1959; Aero Service Corp., Philadelphia, Penn., U. S. A.

Geographic names are based on information released by the Aerial Survey Department (Saudi Arabian Ministry of Petroleum and Mineral Resources) in 1984 and conform to the official transliteration for the Kingdom of Saudi Arabia.

This report has not been edited or reviewed for conformity with U.S. Geological Survey standards and nomenclature.

TRUE NORTH

SCALE 1 : 100 000

2 0 2 4 6 8 10 KILOMETERS

2 0 2 4 6 8 10 MILES

DATUM IS MEAN SEA LEVEL

QUADRANGLE LOCATION

Geology mapped in December 1980 and December 1983

SYMBOLS

[Planar and (or) linear symbols may be combined at point of observation]

- CONTACT--Showing dip where known
- FAULT--Showing dip and sense of vertical or lateral offset; dashed where inferred from geology
- HIGH-ANGLE REVERSE FAULT--Showing dip and sense of vertical offset; teeth on upper plate
- FAULT (with discontinuous lenses of listwanite)
- FAULT (inferred from magnetic data)
- SYNCLINE--Showing trace of trough line and plunge direction
- FOLD OF UNKNOWN VERGENCE--Showing trace of hinge surface; direction of closure indicated by trace of bedding

STRIKE AND DIP OF BEDS
- Inclined--showing dip
- Inclined--showing dip direction
- Vertical
- Overturned
- Tops known from sedimentary/volcanic features
- Average attitude of folded beds
- Trend lines--showing trace of bedding

PRIMARY IGNEOUS FABRIC--Showing average orientation of intrusive sheets in the Intrusion breccia unit (Jabal umm Burayqi area)

MINERAL SCHISTOSITY
- Inclined--showing dip
- Inclined--showing dip direction
- Vertical
- Schistosity depicted in cross-section

FRACTURE CLEAVAGE
- Inclined--showing dip
- Inclined--showing dip direction
- Vertical

CATACLASTIC FLUXION STRUCTURE
- Inclined--showing dip

LINEATION
- Axis of minor anticline or antiform
- Cataclastic streaking lineation or slickensides

QUARTZ VEIN--Chiefly consists of quartz-calcite-epidote; quartz-pyrite-chalcopyrite-(hematite-gold) typical at Al Khaymah, Al Jurayyir, and Shaib al Jurayyir mineral occurrences

Al Khaymah MODS 3941 — MINERAL OCCURRENCE (showing MODS record number)
- Ancient working--largest of a related group of workings
- Area of extensive ancient excavation
- Minor ancient working

GEOGRAPHIC AND CULTURAL FEATURES
- Town
- Village or settlement
- Paved highway
- High-voltage power line
- P.S. Power system sub-station
- Communication tower

KGN-41 — KINGDOM GRAVITY NET CONTROL POINT (Flanigan and Akhras, 1972)

SAMPLE LOCALITY FOR RADIOMETRIC AGE DETERMINATION (Whitney, 1983; Stuckless and others, 1984; Cole and Hedge, 1985)

1293 + SPOT ALTITUDE--In meters; datum is mean sea level, Jiddah, 1969

METERS 2000 1000 SEA LEVEL 1000

A Jabal Idah LUGHFIYAH FAULT BEND IN SECTION QUNAYNAH FAULT Wadi ar Rumah ATA FAULT Shaib Mibari A'

B BEND IN SECTION BEND IN SECTION Aban al Asmar BEND IN SECTION MITLA FAULT B'

DS = UNDIVIDED DHIRAN - SUWAJ TERRANE

CORRELATION OF MAP UNITS

LAYERED UNITS — INTRUSIVE UNITS

HOLOCENE: Q, Qs, Qe, Qo, Ql, Qf, Qt

PLEISTOCENE

UNCONFORMITY

Samra rhyolite: sry

UNCONFORMITY

Abanat suite: ssy, sgp, spg, shpg, sbr, srp (Asmar complex); apg, aag, arp (Ahmar complex)

UNCONFORMITY

Idah suite: Igdp

UNCONFORMITY

Jurdhawiyah group: Js, Jc, Ja — gbn, pp

UNCONFORMITY ?

Khishaybi suite: dsg, hmg

UNCONFORMITY

Murdama group: Ms, Ml, Mtc

UNCONFORMITY

Suwaj suite: Sgg, St, Sdr, Sgb, Sqd

UNCONFORMITY

Dhiran meta-andesite: dq, da, dm — gnl

PROTEROZOIC

STRUCTURAL UNITS: lw, mbr

DESCRIPTION OF MAP UNITS

[see text for discussion of stated ages]

QUATERNARY DEPOSITS

Q — ALLUVIUM (Holocene)--Sand and gravel in modern drainage channels

Qs — SABKHAH DEPOSITS (Holocene)--Saline silt and sand

Qe — EOLIAN SAND DEPOSITS (Holocene and Pleistocene)

Ql — LACUSTRINE MARL DEPOSITS (Holocene)--White, calcareous lakebed marl in interdune basins (Nufud al Urayq only)

Qo — LITHIFIED ALLUVIUM (Holocene)--Stratified, calcite cemented gravel conglomerate and arkose; only in Aban al Ahmar canyons

Qt — TERRACE GRAVEL DEPOSITS (Pleistocene)--Gravel and sand adjacent to modern drainage channels; weak to moderate, oxidized, clayey soil

Qf — ALLUVIAL FAN AND APRON DEPOSITS (Pleistocene)--Gravel, sand, and boulders adjacent to high mountains; weak, oxidized, clayey soil

PROTEROZOIC LAYERED ROCKS

sry — SAMRA RHYOLITE (585 to 570 Ma)--Dark red-brown, structureless to weakly bedded, recrystallized peraluminous rhyolite; contains 10-30 percent phenocrysts of quartz, orthoclase/sanidine, and sparse biotite and magnetite; –<–<– denotes beds of lapilli tuff and graded ash

Js, Jc, Ja — JURDHAWIYAH GROUP (640(?) to 620 Ma)--Preserved in two major basins; thickness and depositional order variable within and between basins. Lapilli tuff member (–v–v–), red and brown, andesitic to dacitic crystal-lapilli tuff (variably welded); Volcaniclastic sandstone (Js), brown-green, well bedded coarse sandstone with minor pebble conglomerate; Polymict conglomerate member (oooooo), sparse boulder and cobble conglomerate (Dhiran-Suwaj clasts distinctive); Volcaniclastic conglomerate (Jc), poorly sorted, thick-bedded, cobble and boulder conglomerate (dominantly Andesite and Plagioclase porphyry clasts) with minor volcaniclastic sandstone lenses; and Andesite (Ja), dark-green flow rock and flow breccia, locally amygdaloidal, with prominent phenocrysts of plagioclase, augite, hornblende, hypersthene, and[or] magnetite

Ms, Ml, Mtc — MURDAMA GROUP (670(?) to 655(?) Ma)--Preserved in two major basins; thickness and internal stratigraphy moderately variable within and between basins. Sandstone (Ms), green, thin-bedded, medium- to fine-grained volcanic arenite and feldspathic volcanic arenite (disseminated pyrite and 10 percent detrital quartz distinctive), calcite cement; Limestone (Ml), tan to brown to blue-white, thin-bedded, locally oolitic micrite and siliceous sandy micrite; and Timirivat conglomerate (Mtc), varicolored, poorly sorted cobble and boulder polymict conglomerate (Dhiran-Suwaj clasts distinctive)

gnl — MAFIC GRANULITE (age uncertain)--Gray-green, fine- to medium-grained, layered and isoclinally folded granulite consisting of scapolite, diopside, calcite, and minor wollastonite, vesuvianite, and sphene; exposed only west of Jibal Zalma

dq, da, dm — DHIRAN META-ANDESITE (greater than 670 Ma)--Dark-green to epidote-green andesitic flow rock and flow breccia (da), locally amygdaloidal and cataclastic, actinolite-chlorite-epidote-oligoclase mineral assemblages. Marble member (dm), white to tan, indistinctly bedded calcite marble in discontinuous pods; Sodic metadacite member (dq), brown-gray, schistose, richly porphyritic metadacite with 30-40 percent phenocrysts of oligoclase and quartz (variable); contact with meta-andesite structurally transposed and approximately located by distribution of caret pattern

PROTEROZOIC INTRUSIVE ROCKS

ABANAT SUITE (585 to 570 Ma)--Leucocratic, silica-rich peralkaline and peraluminous granitic rocks, typically emplaced in ring dikes and ellipsoidal, composite plutons

sry — SANIDINE PORPHYRY (585 to 570 Ma)--Bright-orange to brick-red, richly porphyritic, weakly peralkaline rhyolite porphyry with 30 to 50 percent phenocrysts of sanidine, quartz, albite, and sparse, deep-green biotite; intruded as prominent dikes (2- to 5-m-thick) with N. 50° E. trend.

apg, aag, arp — AHMAR COMPLEX (574±5 Ma)--Zoned, elliptical composite pluton with flat roof (external contact and boundary between members dip steeply outward) and inward-dipping ring-dikes. Rhyolite porphyry member (arp and –ll–), ring-dikes of brick-red, peralkaline rhyolite with 10-20 percent phenocrysts of quartz and orthoclase; Arfvedsonite granite member (aag, rim phase), tan, coarse-grained, equigranular orthoclase-perthite granite with 7 percent arfvedsonite, aegirine, magnetite, and fluorite; and Perthite granite member (apg, core phase), red, coarse-grained, equigranular to granophyric orthoclase-perthite granite with about 6 percent brown biotite, magnetite, fluorite, and disseminated hematite.

ssy, sgp, spg, shpg, sbr, srp — ASMAR COMPLEX (585 to 570 Ma)--Composite pluton at Aban al Asmar (cogenetic with Samra rhyolite) and partial ring dike south of Wadi ar Rumah. Granite porphyry member (sgp and –o–), pale gray, subporphyritic biotite orthoclase granite to biotite syenogranite that contains 10-20 percent phenocrysts of perthite and quartz, and about 7 percent biotite; Quartz syenite member (ssy), gray, richly porphyritic biotite-hornblende quartz syenite with about 18 percent mafic and accessory minerals; Rhyolite porphyry member (srp and –ll–), brick-red, weakly flow-banded rhyolite (10-20 percent phenocrysts of quartz and orthoclase) in dikes and irregular plugs; Intrusion breccia (sbr), megalithic mixture of Hornblende perthite granite and tabular blocks of Samra rhyolite; Hornblende perthite granite member (shpg), tan to pale pink, very coarse grained, orthoclase-perthite granite with about 4 percent hornblende, biotite, magnetite, and fluorite; and Biotite perthite granite member (spg), tan to pale pink, coarse-grained, equigranular orthoclase-perthite granite with about 4 percent green biotite, magnetite, and fluorite.

Js, Jc, Ja — IDAH SUITE (620 to 615 Ma)--Calc-alkaline-series intrusive rocks emplaced in elliptical plutons and plugs; characterized by marginal magnetic anomalies and discoid congate inclusions; associated with gold deposits

Dike rocks--Mafic dikes [– – – – –], chiefly diabase; felsic dikes [———], aplite and leucocratic granite porphyry

lgdp — Granodiorite porphyry--Gray, medium-grained, seriate-porphyritic biotite-hornblende granodiorite with about 20 percent phenocrysts of zoned andesine-oligoclase; mafic minerals (15 to 20 percent) consist of subequal hornblende and biotite and minor magnetite

JURDHAWIYAH-CONTEMPORARY INTRUSIVE ROCKS (640(?) to 620 Ma)--Plugs and dikes of mafic and intermediate rock that form sub-volcanic conduit intrusions; locally gradational to Jurdhawiyah group andesite

pp — Plagioclase porphyry--Red-brown to dark green, structureless, richly porphyritic andesite (abundant) to dacite (rare) that contain about 25 percent phenocrysts of zoned andesine, augite, hornblende, hypersthene, magnetite and[or] biotite (rare)

gbn — Gabbronorite--Dark gray, medium-grained, faintly layered cumulus hypersthene-augite gabbronorite and olivine gabbro

KHISHAYBI SUITE (650(?) to 640(?) Ma)--Composite batholithic mass of leucocratic monzogranite and syenogranite; all units weakly cataclastic and characterized by flat magnetic signature and by accessory allanite

dsg, hmg — Dike rocks--Mafic dikes [– – – – –], chiefly altered diabase and latite porphyry; felsic dikes [———], chiefly microgranite and leucocratic granite porphyry, many of which are crushed and cemented by quartz and hematite

dsg — Dilaymiyah syenogranite--Orange-brown to red-brown, very coarse grained, equigranular ferro-edenite syenogranite; 6 percent mafic and accessory minerals; fine-grained and granophyric in dikes that intrude Hamar monzogranite

hmg — Hamar monzogranite--Pale gray, tan, or pink, fine-grained, equigranular to sparsely porphyritic, leucocratic biotite monzogranite; 4 percent mafic and accessory minerals

SUWAJ SUITE (690 to 670(?) Ma)--Irregular bodies of thoroughly altered and locally cataclastic rock; granophyric textures common; all units characterized by low potassium content at all levels of silica content, and by short-wavelength, high-amplitude magnetic anomalies

Dike rocks--Altered, subporphyritic andesite

Sgg — Granodiorite granophyre--Pale-pink to -orange, medium-grained, porphyritic hornblende(?) granodiorite (19 percent relict mafic grains) and local syenogranite (3 percent sphene and minor magnetite); coarsely granophyric groundmass (visible with hand lens) typical

St — Tonalite--White to light tan, medium- to coarse-grained, equigranular biotite-hornblende tonalite; mafic minerals (16 percent) typically aggregated in clusters

Sdr — Diorite--Dark brown to brown-green, medium-grained, equigranular hornblende(?) diorite; 28 percent mafic minerals altered to chlorite, epidote, actinolite, and sphene

Sqd — Foliated quartz diorite--Gray-green, medium-grained, cataclastically foliated biotite-hornblende quartz diorite with 23 percent relict mafic grains

Sgb — Metagabbro--Dark green-brown, medium- to fine-grained, equigranular hornblende gabbro; crushed, altered, and recrystallized

STRUCTURAL UNITS

[exposed only along Ata fault trace]

lw — LISTWÄNITE--Pale rose-brown, banded and weakly foliated siliceous-dolomitic rock consisting of traces of serpentine and brucite, fractured relict grains of dark-brown spinel, and abundant strained quartz, iron-stained spongy dolomite, and colorless rhombic dolomite

mbr — CATACLASTIC MEGABRECCIA--Gray-green to dark-green, heterogeneous structural mixture of about 75 percent lensoid blocks (10 to 20 m in length) in locally foliated serpentine-rich matrix; lensoid blocks consist of intensely cataclastic and altered Dhiran meta-andesite, diorite, hornblende gneiss, and Murdama(?) sandstone

RECONNAISSANCE GEOLOGIC MAP OF THE AL ABANAT QUADRANGLE, SHEET 25/42 B, KINGDOM OF SAUDI ARABIA

by
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