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 USGS- 84-497
PLATE 1

# RECONNAISSANCE GEOLOGIC MAP OF THE AL 'AWSHAZIYAH QUADRANGLE, SHEET 26/41 B, KINGDOM OF SAUDI ARABIA

by
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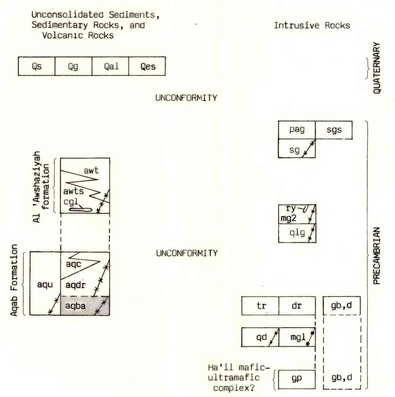
## EXPLANATION

### CORRELATION OF MAP UNITS




### DESCRIPTION OF MAP UNITS

#### SEDIMENTS

**Qs** SALINE DEPOSITS (QUATERNARY)--White to tan, salt-encrusted silt and fine sand in shallow, closed basins. Thickness unknown, but probably only a few meters

**Qg** GRAVEL (QUATERNARY)--Subangular to angular blocks generally less than 50 cm in diameter, typically with heavy desert varnish; forms broad, gently sloping dissected fans adjacent to upland areas. Thickness variable, may exceed 30 m near source

**Qal** ALLUVIUM AND COLLUVIUM (QUATERNARY)--Unofferentiated alluvial material comprising silt, sand, and pebbles, dominantly along wadi channels. Not everywhere distinguisnable from Qes. Thickness unknown but probably less than 10 m

**Qes** EOLIAN SAND AND SILT (QUATERNARY)--Sand, silt, and local pebbles distributed as flat-lying deposits on pediment surfaces deep enough to conceal bedrock. Cut by active wadi channels; mostly sparsely vegetated. Thickness unknown but probably mostly less than 15 m

#### VOLCANIC AND SEDIMENTARY ROCKS

AL' AWSHAZIYAH FORMATION (PRECAMBRIAN)

**awt** Welded-tuff member--Dominantly reddish-brown to violet welded ash-flow tuff with well-developed eutaxitic texture; typically porphyritic, containing 10-20 percent plagioclase, quartz, and 0-5 percent sanidine; locally sparsely porphyritic or non-porphyritic. Composition is rhyolite to quartz latite, possibly quartz keratophyre. Subordinate felsic flows of similar composition, and fragmental rocks including well-sorted silt- to sand-size tuffs containing fragments of felsic volcanics, and coarser sedimentary breccias with angular clasts as much as 1 m across. Conglomerate layers (not shown on pl. 1) 1-5 m thick, consisting mostly of cobbles and boulders of felsic volcanics typically 10-20 cm in diameter occur in lower part of section. Granite clasts are sparse or absent. Thickness of welded-tuff unit is highly variable, with an estimated maximum in excess of 5 km

**awts / cgl** Welded-tuff and sediments member--Same general lithology as the welded-tuff member, but fragmental rocks constitute 1/3 to 2/3 of the section while welded tuffs and flows make up the remainder. Tuffs are well bedded and locally show grading and crossbedding. Concordant conglomerate horizons (cgl) 1-10 m thick in lower part of section. The contact between awt and awts is gradational, and somewhat arbitrarily located

AQAB FORMATION (PRECAMBRIAN)

**aqdr** Dacite-rhyolite member--Dacitic ash-flow tuff, dominantly purple to brown, showing eutaxitic texture and having small white to pink phenocrysts; and lithic tuff, greenish-gray, poorly sorted containing angular clasts less than 1 cm. Red to maroon, rhyolitic ash-flow tuffs are locally interlayered. Basalt and (or) andesite constitute up to about 20 percent of the member. Some of the mafic rocks have large and abundant plagioclase phenocrysts ("fish-scale texture"). Rocks of the unit are mostly moderately altered, with development of saussurite, chlorite and (or) sericite, but retain primary textures. The thickness is unknown but may be 3-5 km

**aqc** Conglomerate member--Conglomerate consisting mostly of felsic to intermediate volcanics and granitic rocks in a matrix of medium- to coarse-grained graywacke. Conglomerate clasts range from pebbles to boulders, are mostly well rounded, moderately to well sorted, and commonly define graded bedding. The character of volcanic and granite clasts is variable and only locally reflects possible nearby source areas. Conglomerate is generally conformable with enclosing volcanics but forms lenses and channel fillings as much as 3 km thick and 10 km long

**aqba** Basalt-andesite member--Dark-gray to black volcanic rock, typically aphanitic, locally amygdaloidal in places with abundant, tabular but rounded plagioclase phenocrysts ("fish-scale texture"); associated green-gray fragmental tuff. Volcanic flow rocks consist of intergranular groundmass of plagioclase and primary augite more or less altered to chlorite, epidote and (or) actinolitic amphibole. Plagioclase phenocrysts typically saussuritized. Amygdules filled with quartz and (or) epidote

**aqu** Aqab formation, undivided--Designation used where mafic and felsic rocks are known to be interlayered, or where information is insufficient to designate formation more specifically

#### INTRUSIVE ROCKS

**pag** AR RUMMAN PERALKALINE GRANITE (PRECAMBRIAN)--Grayish-white to gray-brown, medium- to coarse-grained peralkaline granite consisting of perthite, myrmekite, quartz, less than 5 percent sodic plagioclase, and 5-8 percent mafic minerals including aegirine and (or) barkevikite, deep-green, possibly primary epidote, and an unidentified deep-orange-red mineral (enigmatite?)

**sgs** SALMA SYENOGRANITE (PRECAMBRIAN)--Pink, medium-grained granite consisting of quartz, perthite, and oligoclase ($An_{12}$), approximately 5 percent red-brown biotite and locally less than 1 percent green hornblende. Cut by fine-grained dikes of similar composition (dikes not shown on pl. 1)

**ry** FELSIC AND SUBORDINATE MAFIC DIKES (PRECAMBRIAN)--Pink to pinkish-gray, aphanitic to slightly porphyritic quartz-albite-potassium-feldspar dikes mostly cutting U'waygat monzogranite (mg2), quartz diorite (qd), and Al Qusayr leucogranite (qlg); subordinate mafic dikes ranging from diabase to andesite; brick-red dikes of granophyric rhyolitic to trachytic composition cutting syenogranite (sg). A single large rhyolite dike is labeled ry

**sg** SYENOGRANITE (PRECAMBRIAN)--Brownish-pink to brick-red, fine- to medium-grained granite consisting dominantly of quartz and alkali feldspar, typically with extensive development of myrmekite, graphic quartz and potassium feldspar, and (or) perthite; rare albite; accessories include less than 2 percent magnetite ± hornblende

**mg2** U'WAYGAT MONZOGRANITE (PRECAMBRIAN)--Pink to beige, medium-grained, vuggy-weathering monzogranite consisting of quartz, perthite, and zoned plagioclase ($An_{8-27}$) in approximately equal proportions. Contains 7-10 percent gray-green hornblende and red-brown biotite; principal accessories are sphene and magnetite

**qlg** AL QUSAYR LEUCOGRANITE (PRECAMBRIAN)--Pink to grayish-pink, mostly fine-grained leucogranite ranging from even-grained and allotrimorphic to porphyritic with small (less than 1 mm) tabular phenocrysts. Consists of quartz, non-perthitic microcline, and oligoclase ($An_{10-15}$); relative proportions of feldspars vary significantly over short distances. Contains less than 5 percent chloritized biotite and 2-3 percent granular to patchy magnetite. Contacts established in part by conspicuous aeromagnetic anomalies

**tr** TRONDHJEMITE (PRECAMBRIAN)--Light-gray, medium-grained rock consisting of plagioclase and quartz in a ratio of about 3:1 with striking development of myrmekite; also contains 10 percent chloritized hornblende ± biotite ± clinopyroxene + magnetite. Locally grades to quartz diorite

**dr** DIORITE (PRECAMBRIAN)--Dark-gray, fine-grained rock consisting of plagioclase ($An_{20-30}$), diopside amphibole partly replaced by tremolite-actinolite, and about 5 percent quartz. Locally grades to gabbro

**gb,d** GABBRO AND DIABASE (PRECAMBRIAN)--Gabbro (gb): commonly medium- to coarse-grained, greenish-black rock with hypidiomorphic texture consisting of normally zoned plagioclase ($An_{50}$) and pyroxene (diopside?) partly replaced by tremolite-actinolite; locally contains the assemblage plagioclase ($An_{50}$) + olivine + clinopyroxene + kaersutite + red biotite + 2 percent apatite. Texturally transitional to coarse diabase containing zoned plagioclase ($An_{34-75}$) and green to red-brown hornblende. Some exposures are entirely diabase (d)

DIABASE DIKES (PRECAMBRIAN)--Dark-gray, aphanitic, moderately altered diabase consisting of saussuritized plagioclase, epidote, and about 7 percent magnetite. NE-trending swarms cut biotite-hornblende monzogranite (mgl) and WNW-trending swarms cut quartz diorite (qd)

**mgl** BIOTITE-HORNBLENDE MONZOGRANITE (PRECAMBRIAN)--Pink to gray, medium-grained monzogranite consisting of quartz, perthitic potassium feldspar, and plagioclase ($An_{30}$) in about equal proportions; contains about 5 percent chloritized biotite, hornblende, and (or) disseminated epidote. May be gradational to granodiorite and to quartz diorite

**qd** QUARTZ DIORITE (PRECAMBRIAN)--Gray to grayish-pink, medium-grained quartz diorite consisting of plagioclase ($An_{10-40}$), quartz, and 5-25 percent hornblende + biotite ± clinopyroxene (diopside?). Locally grades to leuco-quartz diorite with less than 5 percent mafic minerals

**gp** GABBRO-PYROXENITE COMPLEX (PRECAMBRIAN)--Fine- to medium-grained, gray-green to black rock forming at least two layered intrusions. Consists of pale clinopyroxene more or less replaced by amphibole (tremolite?); plagioclase ranges from 50 percent (gabbro) to nil (pyroxenite). Plagioclase-free rocks locally contain 10-20 percent olivine (wehrlite). The compositional types are probably gradational but their relative distribution and abundance in layered complexes are unknown

### SYMBOLS

CONTACT--Dashed where approximately located, dotted where concealed

FAULT--Dashed where approximately located, dotted where concealed; U, upthrown side, D, downthrown side

ROAD--Major dirt road, approximately located

SHEAR ZONE

ANTICLINE--Showing axial surface and direction of plunge; dashed where approximately located

SYNCLINE--Showing axial surface and direction of plunge; dashed where approximately located

STRIKE AND DIP OF BEDDING

Inclined

Inclined, showing dip

Inclined, tops of beds known from sedimentary features

Vertical

Overturned, tops of beds known

STRIKE AND DIP OF JOINTING

Inclined, showing dip

DIKE--Showing dip

QUARRY