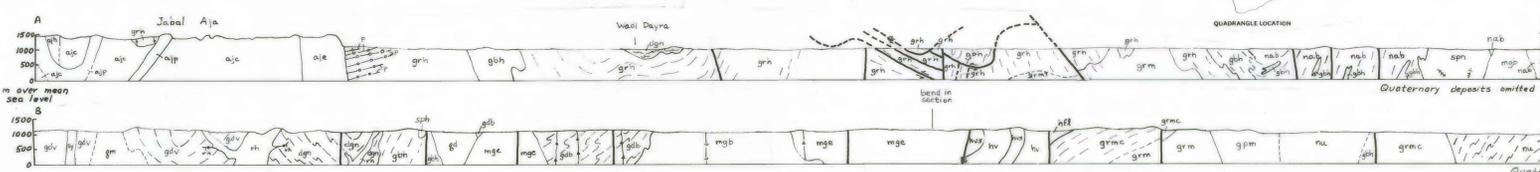




Aerial photography 1966 and controlled mosaic 1969  
Aero Service Corporation, Philadelphia, Penn., U.S.A.  
This report has not been edited or reviewed for conformity  
with U.S. Geological Survey standards and nomenclature.



**EXPLANATION**

**CORRELATION OF MAP UNITS**

<b>INTRUSIVE ROCKS</b>	<b>UNCONFORMITY</b>	<b>SEDIMENTARY, VOLCANIC, AND METAMORPHIC ROCKS</b>	<b>QUATERNARY</b>
Tba		Qa1 Qp	
		Tb	<b>MIOCENE</b>
	<b>UNCONFORMITY</b>		
	high-angle faulting		
		OGs	<b>CAMBRIAN AND ORDOVICIAN</b>
	<b>UNCONFORMITY</b>		
ajp ajc ajh asc asp			
aje ajc			
rh			
	<b>high-angle faulting</b>		
gbp gbn			
sy			
qm grs mgb			
grm gpm grmc			
	<b>UNCONFORMITY?</b>		
	shearing, metamorphism, thrusting	rrm gmm	
gdv			
	<b>HADN FORMATION</b>	hvs hv	<b>PRECAMBRIAN</b>
sgf		hfi hc	
mge ap			
	<b>UNCONFORMITY</b>		
qd			
gdb			
	<b>metamorphism</b>		
gdn			
gbb			
	<b>NUF FORMATION</b>	nu nad	
sph spn		nab mtm	

**DESCRIPTION OF MAP UNITS**

**INTRUSIVE ROCKS**

- Tba OLIVINE BASALT PLUG
- SALMA COMPLEX**
  - asp Granophyre member
  - asc Hornblende alkali-feldspar granite member
- AJA COMPLEX**
  - pr Thorium and rare-earth-bearing pegmatites
  - p Pegmatite
  - ajp Granophyre member
  - ajh Hornblende syenogranite member
  - ajc Leucocratic syenogranite member
  - aje Peralkaline granite member
  - rh RED SYENOGANITE AND RHYOLITE PORPHYRY DIKES
- MAFIC INTRUSIVE ROCKS**
  - n Late diabase dikes
  - gb Gabbro dikes
  - gbp Pyroxene-olivine melagabbro
- MASSIVE GRANITE SUITE**
  - q Melanogranite porphyry dikes
  - qz Quartz plugs and veins
  - u Undifferentiated dikes
  - gr Monzogranite dikes
  - u Undifferentiated felsic dikes
  - fo Red andesite porphyry dikes
  - sy Biotite syenogranite and quartz syenite
  - mgb Biotite monzogranite
  - grs Shatib monzogranite
  - qm Biotite-quartz monzonite
- MALAYHAH GRANITE COMPLEX**
  - grmc Cataclastic granite member
  - gpm Granophyre member
  - grm Malayhah monzogranite member
- GRANDIORITE MEGABRECCIA**
- PRE-HADN SUITE**
  - d Diabase dikes
  - rp Leucogranophyre dikes
  - b Biotite syenite dikes
  - sgf Syenogranite
  - p Pegmatite
  - grh Ha'il granite
  - ap Aplite dikes; \*dike-on-dike swarms, sparse quartz diorite country rock
  - mge 'Ishsh monzogranite
  - gdb Biotite-hornblende grandiorite orthogneiss
  - qd Quartz diorite

**SEDIMENTARY, VOLCANIC, AND METAMORPHIC ROCKS**

**QUATERNARY DEPOSITS**

- Qp Lake deposits
- Qa1 Alluvial deposits; undifferentiated, includes minor eolian deposits
- Tb MIOCENE OLIVINE BASALT
- OGs SAQ SANDSTONE

**MIXED METAPLUTONIC AND METAVOLCANIC TERRAINS**

- gmm Granite and mafic-rock melange
- rrm Rhyodacite and mafic-rock melange

**HADN FORMATION**

- hvs Sandstone and volcanic member; interbedded rhyolite and subgraywacke; hv is larger rhyolite unit
- hfi Silicic volcanic member; rhyolitic ignimbrites and flow breccias
- hc Conglomerate member

**NUF FORMATION**

- nu Mafic paragneiss
- nad Andesite and dacite member
- m Marble (m); tremolite-bearing marble (mtm)
- nab Meta-andesite and metabasalt member

**SYMBOLS**

- CONTACT, dashed where approximately located, dotted where concealed; dip indicated
- FAULT, dashed where approximately located, dotted where concealed; arrows show direction of apparent relative motion; dip indicated
- THRUST FAULT; sawteeth on upper plate, dashed where approximately located; dip indicated
- ANTICLINE; showing trace of axial plan and direction of plunge; dashed where inferred
- SYNCLINE; showing trace of axial plane and direction of plunge; dashed where inferred
- SMALL FOLD, showing direction and plunge of fold axis
- TREND LINE, interpreted from aerial photographs, represents strike of cataclastic or metamorphic foliation, cleavage, bedding, fault, or combination of these structures
- STRIKE AND DIP OF BEDS
  - Inclined, showing dip
  - Vertical
  - Inclined, tops of beds known from sedimentary structures
  - Vertical, ball indicates tops of beds
  - Overtured, showing dip
- STRIKE AND DIP OF FOLIATION
  - Inclined, showing dip
  - Vertical
  - Inclined, parallel to bedding
  - Inclined, parallel to fracture cleavage
  - Vertical, parallel to fracture cleavage
  - Inclined, showing plunge of lineation; m = mineral lineation, s = shear lineation (trains of sheared and recrystallized minerals), r = rodded schist
- MINERAL LINEATION
  - STRIKE AND DIP OF FRACTURE CLEAVAGE
    - Inclined
    - Vertical
- SAMPLE LOCALITY REFERRED TO IN TEXT
- POTASSIUM-ARGON WHOLE-ROCK AGE

RECONNAISSANCE GEOLOGY OF THE QUFAR QUADRANGLE, SHEET 27/41 D, KINGDOM OF SAUDI ARABIA

by  
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1984