

**EXPLANATION**

**CORRELATION OF MAP UNITS**

**SEDIMENTS, AND SEDIMENTARY AND METAMORPHIC ROCKS**

Qal	Qes	Qed	QUATERNARY	CENOZOIC
TI			TERTIARY	
OGW			ORDOVICIAN AND CAMBRIAN	PALEOZOIC
				PRECAMBRIAN

**INTRUSIVE ROCKS**

a	AN	HN
u	U	
ap		
ig		
bg		
dgd		
to		

**SYMBOLS**

CONTACT—Dashed where contact delineates surficial deposits, dotted where concealed by surficial deposits

FAULT—Arrows indicate sense of displacement

SHEAR ZONE

SILICIFIED FRACTURE

STRIKE AND DIP OF BEDS

Inclined

Vertical

STRIKE AND DIP OF FOLIATION

WELL (BIR)

**DATA STORAGE**

Data from geologic samples (plate 2) are recorded in the Rock Analysis Storage System (RASS) data bank and each sample is identified with a unique six-digit number (Rass 139819 to 139929).

No entries or updates have been made to the Mineral Occurrence Documentation System (MODS) data bank. Documents relating to this project are in data file USGS-OF-03-2.

The work on which this report is based was performed in accordance with a work agreement between the U.S. Geological Survey and the Saudi Arabian Ministry of Petroleum and Mineral Resources.

**REFERENCES CITED**

Brock, M. R., 1983, Reconnaissance map of the Jabal Zain quadrangle sheet 20/44 A, Kingdom of Saudi Arabia: Saudi Arabian Deputy Ministry for Mineral Resources Open-File Report USGS-OF-03-106, no text, scale 1:100,000.

**ABSTRACT**

The Janban quadrangle, 20/44 B, lies along the eastern margin of the Arabian Shield. The oldest rocks comprise the Precambrian Namah Formation of the Halaban(?) group, and consist of basalt, dacite, siltstone, and calcareous graywacke metamorphosed in the lower amphibolite facies. Metamorphic rocks of uncertain Precambrian age in the northern part of the quadrangle are amphibolite, gneissic quartz diorite and metarhyolite that occur as roof pendants in plutonic rocks. Precambrian intrusive rocks, in order of decreasing age, are: biotite-hornblende tonalite; the locally gneissic Dawasir granodiorite and granite; the as Sabahah granite, coarse-grained alkaline granite; biotite-muscovite granite forming a small circular stock; the Janban granite, a coarse-grained non-foliated alkali-feldspar rapakivi granite; aplite granite; and fine-grained alkali granite that forms a stock, plugs, and dikes. Andesite dikes cut most of the plutonic rock units. Precambrian rocks are unconformably overlain by the Wajid Sandstone of Cambrian and Ordovician age, which covers the southeastern half of the quadrangle and consists of reddish-brown, medium-grained arkosic sandstone. Tertiary lake beds of gray marl, siltstone, and sandstone crop out locally, and lie unconformably on the Wajid. Most of the Wajid sandstone is mantled by an extensive blanket of Quaternary eolian sand and silt.

**DESCRIPTION OF MAP UNITS**

**LAYERED ROCKS**

Qal ALLUVIUM—Unconsolidated and slightly consolidated sand and gravel forms wadi floors and banks; essentially all gravel, contains locally derived material; near-surface material mixed with eolian sand, subsurface material includes consolidated sand and gravel

Qed DUNE SAND—Pale-tan, fine- to medium-grained, unconsolidated eolian sand; mostly quartz with few percent feldspar; forms west-trending self dunes that extend through flat terrain in southern half of quadrangle

Qes SHEET SAND—Pale-tan, fine- to very fine grained, slightly consolidated and unconsolidated, sheet-form deposits of sand and silt; sheet deposits consist of thin, interlayers of sand and silt generally less than a meter thick; blankets bedrock throughout southeastern half of quadrangle, forms very flat terrane; maximum thickness of deposit is believed to be no more than a few tens of meters

TI LACUSTRINE ROCKS—Mostly light- to medium-gray, inter-layered sequence of thin (10-100 cm) beds of marl, marly siltstone, gritty sandstone, conglomeratic sandstone, and petrolierous limestone; three small outcrops in sand-covered flat in eastern and southeastern part of quadrangle may represent parts of an extensively concealed lake bed, presumably underlain in large part by Wajid Sandstone. Color of hydrocarbon residue in limestone indicates lack of maturation of kerogen component which, in turn, suggests shallow burial; age of lacustrine, therefore, deposit is likely no older than Tertiary

OGW WAJID SANDSTONE—Reddish-brown, medium-grained, thin-bedded arkosic sandstone; matrix is rich in oxidized iron. Poorly exposed in northeast quarter of quadrangle and near southwestern corner; overlaps Precambrian basement rocks; contact with Precambrian rocks marks eastern margin of Arabian Shield

UVS METAMORPHOSED VOLCANIC AND SEDIMENTARY ROCKS OF UNCERTAIN AGE—Mostly fine- to medium-grained, volcanic and sedimentary rocks; includes amphibolite, gneissic hornblende and biotite quartz diorite (commonly garnetiferous), and metarhyolite with relict phenocrysts in fine-grained, recrystallized, aplitic-textured groundmass; metamorphosed to amphibolite facies and recrystallized to a degree that genesis is uncertain; crops out as large xenoliths and pendants of possibly Murdama or Halaban rocks

**INTRUSIVE ROCKS**

HN NAMAH FORMATION—Interlayered, very fine grained, dark-gray, lower amphibolite facies sedimentary and volcanic rocks; volcanic rocks include approximately equal amounts of basalt, andesite, and dacite; sedimentary rocks include siltstone and limy graywacke sandstone; all rocks approximately same color and texture and individual layers difficult to distinguish. Differences between Namah formation and greenschist-facies conglomerates of overlying Zain formation in the adjoining Jabal Zain quadrangle to the west (Brock, 1983) suggest tentative assignment of Namah formation to Halaban group

A ALKALI-FELDSPAR GRANITE—Pink to red, fine-grained alkali granite; phenocrysts of microcline and sodic oligoclase constitute 5 to 10 percent of rock at most localities, locally ranges to 25 percent; contains 2 to 5 percent biotite and at some localities hornblende; rapakivi texture locally in stock and dikes, granophyric texture fairly common at all localities. Cassiterite is most noteworthy of accessory minerals and distinguishes rock as tin-bearing granite; other accessory minerals include relative quantities of magnetite, fluorite, zircon, apatite, sphene, and allanite. Forms a large, hypabyssal stock, several very small plutons, and many dikes; large stock in northeastern part of quadrangle contains a concentric ring structure formed by a series of dikes that appear as low ridges; the dikes differ from their host only in color. Stock contains large inclusions of Janban granite, many autolith inclusions as much as tens of meters in size, and slabby inclusions of mafic rock; inclusions believed to be founder-blocks of rock roof in apical zone of stock. Thin sections reveal effects of deformation and alteration of contained minerals, suggestive of posttectonic emplacement; undeformed dikes transect Najd-age shear zones; represents a very late Precambrian magmatic event

AN ANDESITE—Fine- to very fine grained, dark-gray andesite porphyry in dikes; hornblende-pxroxene-plagioclase rock with 0.5 to 1.0 mm tabular phenocrysts of saussuritized plagioclase, groundmass hornblende, with plagioclase moderately altered to chlorite and epidote. Many additional andesite dikes not shown

U DIKE ROCK—Composition not determined

AP APLITE GRANITE—Tan to pinkish-tan, fine- to very fine grained, equigranular, nonporphyritic granite; about equal amounts of quartz, sodic oligoclase, and microcline, and trace of biotite and magnetite. Forms several low hills in northwestern quarter of quadrangle; intrudes Dawasir granodiorite and granite and Janban granite

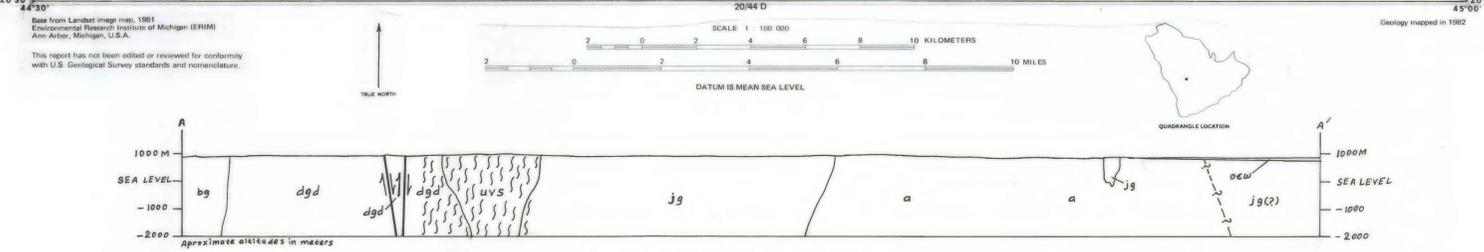
IG JANBAN GRANITE—Pink, coarse-grained, porphyritic, non-foliated biotite alkali-feldspar granite containing about equal amounts of quartz, plagioclase, and microcline; phenocrysts of sodic oligoclase and microcline plus larger feldspar grains in groundmass mantled by albite; biotite generally is few percent of rock, slightly altered to chlorite; contains much sphene, zircon, and apatite; displays conspicuous rapakivi texture; contains many small, irregular-shaped masses of gray-phase granite of same age; Janban granite intrudes Dawasir granodiorite and granite and is intruded by hypabyssal alkali-feldspar granite that forms much of its eastern margin

BMG BIOTITE-MUSCOVITE GRANITE—Pale-pink, fine- to medium-grained, locally porphyritic granite; contains about a percent each of muscovite and biotite; sparse sodic oligoclase and microcline phenocrysts (2-3 cm) in equigranular groundmass of quartz, oligoclase, and microcline in nearly equal amounts; sparse accessory minerals are magnetite, allanite, and zircon; granite is nonfoliated but moderately strained. Forms 4-km-diameter circular stock in west-central part of quadrangle, intrudes Dawasir granodiorite and granite

BG AS SABAHAH GRANITE—Pale-pink to light-gray, medium- to coarse-grained, biotite-bearing alkaline granite; hornblende less common than biotite, together they are 1 to 5 percent of rock; coarse-grained variety of granite prevails and is commonly porphyritic; characterized by abundant perthite; generally sparse accessory minerals include sphene and zircon, zircon grains commonly concentrically zoned; interstitial fluorite noted at one locality; biotite and, to less extent, hornblende partially altered to chlorite. Locally foliated, crush structure evident in thin sections from throughout pluton; intrudes Dawasir granodiorite and granite

DGD DAWASIR GRANODIORITE AND GRANITE—Pinkish-gray to light-gray, coarse- to medium-grained, locally gneissic biotite granodiorite and biotite granite; granodiorite nearly twice as abundant as granite; coarse-grained (1-2 cm), equigranular to subequigranular phases prevail over medium- to coarse-grained porphyritic phases; these textural phases include both granodiorite and granite; phenocrysts include microcline and oligoclase, many of latter rimmed with albite and microcline; granite phase completely transitional with granodiorite and the two are considered coeval; individual masses of each range in size from few tens of meters to few kilometers; granite is pinkish gray and contains nearly equal quantities of microcline and plagioclase in contrast to light-gray granodiorite in which plagioclase predominates; plagioclase in granite is sodic oligoclase with subordinate albite, plagioclase in granodiorite contains more-calcic oligoclase and appreciably less albite. Intruded by as Sabahah granite and intrudes tonalite

TO TONALITE—Medium- to dark-greenish-gray, medium-grained, generally nonfoliated; contains 15 to 20 percent hornblende and biotite, about 70 percent feldspar including mostly calcic oligoclase with few percent albite and microcline, 5 to 10 percent quartz; hornblende typically twice as abundant as biotite; moderate to intense deformation of quartz and plagioclase grains (undulatory extinction and dislocation of twin lamella); biotite largely converted to chlorite but hornblende unaltered. Exposed near southwestern corner of quadrangle; intrudes layered rocks of probable Halaban group and intruded by Dawasir granodiorite and granite



**RECONNAISSANCE GEOLOGIC MAP OF THE JANBAN QUADRANGLE, SHEET 20/44 B, KINGDOM OF SAUDI ARABIA**  
 by  
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 1984