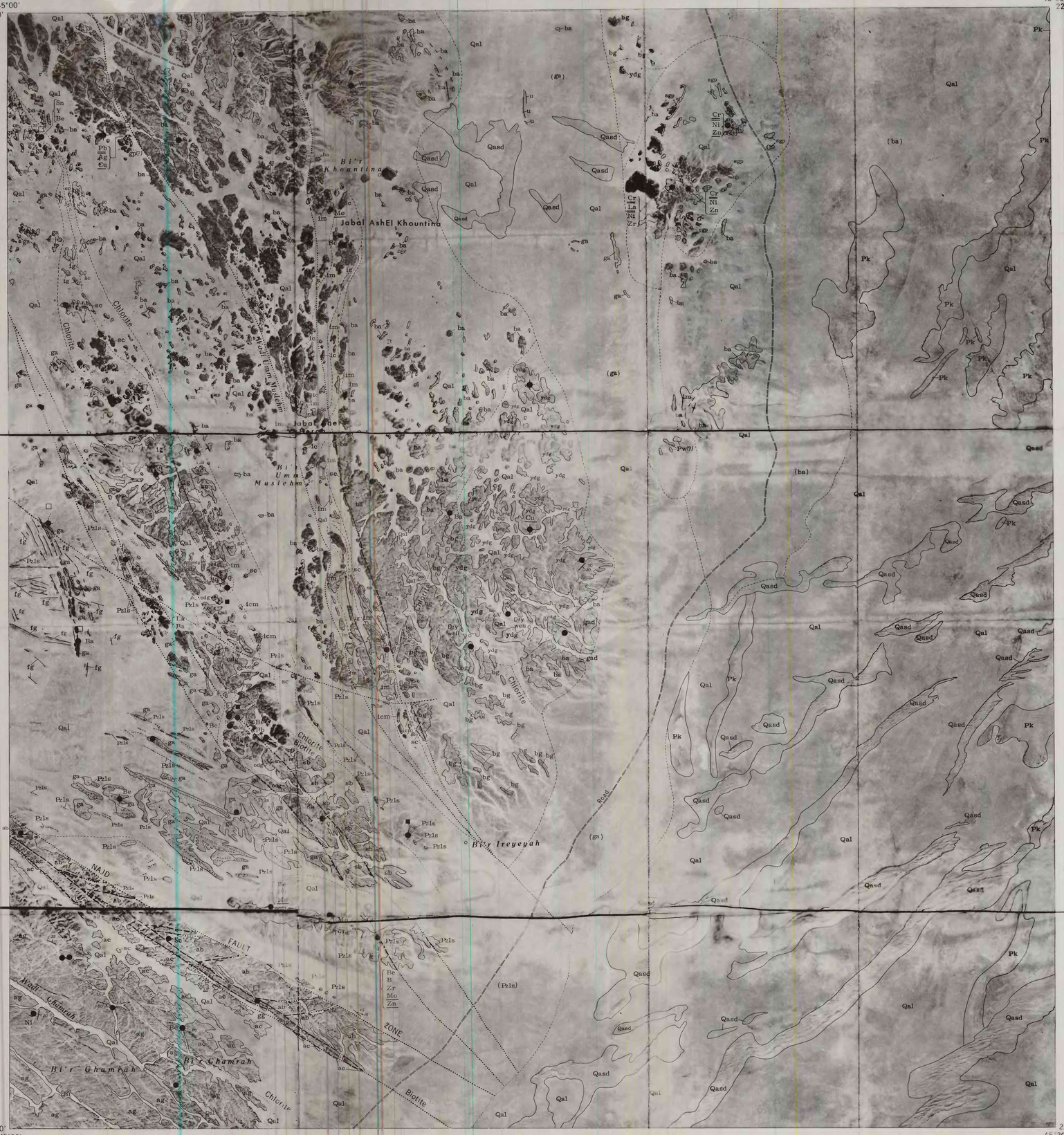


Aerial photography 1956 and controlled mosaic 1958
Aero Service Corporation, Philadelphia, Penn., USA

QUADRANGLE LOCATION

SCALE 1:100 000

KILOMETERS 2 0 2 4 6 8

MILES 2 0 2 4 6 8 10 MILES

Geology of the Precambrian area mapped by W. C. Overstreet and J. W. Whitlow, U. S. Geological Survey, May 1964. Geology east of the Precambrian area adapted from: Brankamp and others (1956).

EXPLANATION

PLUTONIC AND HYPABYSSAL INTRUSIVE ROCKS

p

Peridotite and serpentinite

Nearly black, very fine-grained massive peridotite variably altered to serpentinite; intrusive along Najd fault zone

pq | rgp

Granite dikes, pegmatite, quartz, and red granite porphyry

Dikes of fine-grained gray biotite granite (fg) intrude across dark-gray rhyolite dikes (Pzls); contains phenocrysts of quartz, orthoclase, and biotite; are holocrystalline equivalent of rhyolite dikes (Pzls); possibly grade into pegmatite and massive veins of milky quartz (pq) and into red granite porphyry (rgp)

gp?

Peralkalic granite (?)

Fine-grained, quartz-poor, gray to red biotite granite; intrusive into andesite of the Badriyah Formation (ba)

ga | gad

Alkalic granite

Dominantly gray, locally pink, biotite granite (ga), fine- to medium-grained, equigranular to porphyritic; strong cataclastic foliation with quartz and feldspar porphyroclasts defining gently plunging lineation adjacent to west-northwest-trending fault; intruded by many rhyolite and rhyolite porphyry dikes (Pzls) and dikes of fine-grained gray to pink granite and felsite (gad), the granitic phase of which forms small stocks

ydg

Younger diorite and gabbro

Dark-gray, dark-green, nearly black, fine- to medium-grained diorite and gabbro; forms a composite pluton intrusive into the base of the Badriyah Formation in the central part of the quadrangle; chloritized where intruded by alkalic granite

sgp

Pyroxenite, peridotite, and serpentinite

Nearly black to black pyroxenite and peridotite, dark-green to dark-brown serpentinite, yellow-green dunite, and white magnesite; undifferentiated [illegible] to [illegible] schist

odg

Older diorite and gabbro

Dark-gray to black, massive to sheared but unmetamorphosed diorite and gabbro; unconformably overlain by greenstone and conglomerate of Idsas Formation; intruded by pyroxenite dikes and alkalic granite; possibly a plutonic equivalent of older greenstones of the Bi'r Khountina Group of this quadrangle or of older greenstone west of this quadrangle

gg

Mylonitized biotite granite

Tectonic slices of mylonitized medium- to coarse-grained biotite granite representing the biotitic phase of the gray hornblende-biotite granite unit in the Najd fault

LAYERED SEDIMENTARY, PYROCLASTIC, AND METAMORPHIC ROCKS

QUATERNARY

Qasd

Aeolian sand

Mobile in dunes; adapted from Brankamp and others, 1956

Qal

Alluvial sand

Alluvial, sheet wash, and aeolian sand

PERMIAN

Pk

Khaff Formation

Light-colored limestone, argillaceous limestone, dolomite, marl, gypsiferous clay, shale; exposures poor, probably mainly marl; adapted from Brankamp and others, 1956

DISCONFORMITY (?)

PERMIAN (?)

Pw(?)

Sandstone and conglomerate

Sandstone, calcareous sandstone, and quartz-pebble conglomerate; possibly part of the Wajid Sandstone

UNCONFORMITY

SHAMMAR RHYOLITE (?) — PRECAMBRIAN OR PALEOZOIC

Pzls | Pzls

Rhyolite, rhyolite porphyry, and rhyolite lithic tuff

Red, locally gray, rhyolite and rhyolite porphyry dikes and black rhyolite lithic tuff; generally massive, locally has strong cataclastic foliation but not recrystallized; quartz porphyroclasts define lineation in mylonitized parts of rhyolite; dikes locally contain accessory pyrite

UNCONFORMITY

PRECAMBRIAN-LOWER PALEOZOIC (?)

MUHAMMA GROUP

ag | ac | sh

Ala Formation

Gray-green graywacke sandstone, laminated argillite, gray to black sandy conglomerate, some interbedded andesite flows and tuff, unmetamorphosed to slightly metamorphosed (ag); metamorphosed to sericite-chlorite schist of chlorite zone (ac); metamorphosed to biotite-hornblende schist and hornblende schist of biotite zone (sh); strong cataclastic deformation in west-northwest-trending fault zone, but not recrystallized; rize in metamorphic grade toward intrusive alkalic granite interpreted to be product of contact metamorphism

UNCONFORMITY

BI'R KHOUNTINA GROUP

ba | bg

Badriyah Formation

Dark-green, green, and black andesite, andesite porphyry, trachytic andesite, andesite tuff, and conglomerate (ba); commonly massive, locally sheared, includes andesite dikes and intercalated beds of graywacke, calcareous graywacke, conglomerate, mainly near base but interlayered throughout; massive to schistose greenstone and epidotized andesite (bg) formed from unit ba at intrusive contact of alkalic granite (ga)

sg | sc | sb

Abu Sawarir Formation

Graywacke; calcareous graywacke, conglomerate, and marble (sg); intercalated andesite flows and tuff; where intruded by alkalic granite (ga) the rocks of the graywacke unit are metamorphosed to argillite and chlorite-sericite-quartz phyllite (sc) and to biotite-muscovite-quartz schist (sb)

im | ic | ag

[illegible] Formation

Greenstone and schistose greenstone (ic), locally [illegible] conglomerate and marble; conglomerate (ag) contains rounded fragments of quartz, quartzite, greenstone, red granite porphyry, and silicified marble; locally agglomeratic; blue-gray to brown marble, dolomitic marble, and silicified marble (im). Marble grades into calcareous conglomerate with scattered pebbles and small cobbles of quartz, quartzite, and greenstone; commonly intensely sheared; conglomerate and marble undifferentiated (icm)

UNCONFORMITY
(Tectonic contact in this quadrangle)

PRECAMBRIAN

Contact

Dashed where approximately located or inferred; dotted where concealed. Where contact follows a metamorphic isograd, the highest rank index mineral is shown on the high-rank side

U D

Fault

Showing relative horizontal movement where known. Dashed where approximately located or inferred; dotted where concealed. U, upthrown side; D, downthrown side

Anticline

Showing crestline and direction of plunge

Minor fold axis showing plunge

Vertical — Dipping 60

Strike of beds

Vertical — Dipping 75

Strike of cleavage

Strike of vertical foliation

60 60

Strike and dip of foliation showing plunge of lineation

Primary flow banding with horizontal lineation

m

Isolated outcrop of marble

r

Rhyolite dike; age unassigned

u

Dike or inclusion; relations not known

Abandoned ancient mine or prospect

● 30ppm Cu or less, 100ppm Zn

○ 30ppm Cu, [illegible] Zn

Location and metal content by chemical analysis of sample of wadi sediment expressed in parts per million (ppm)

■ 2ppm Mo

□ 3ppm Mo

Wadi sand containing molybdenum (located by adjacent copper symbol)

+

Scheelite and/or powellite

Present in concentrates from wadi sand (superimposed on symbol for copper)

Cr La Pb

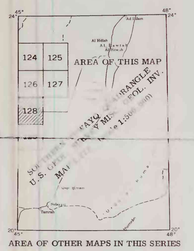
Anomalous elements in wadi sand. Chromium (Cr) 5000ppm; lanthanum (La) 300ppm; lead (Pb) 500 and 700ppm (located by adjacent copper symbol)

Ag B Ba

Threshold elements in wadi sand. Silver (Ag) 1ppm; boron (B) 50ppm or more; barium (Ba) 1000ppm; beryllium (Be) 2 and 3ppm; lead (Pb) 50ppm; zirconium (Zr) 150ppm; nickel (Ni) 70ppm or more; scandium (Sc) 30ppm; vanadium (V) 150ppm; lanthanum (La) 30ppm; tin (Sn) 10ppm (located by adjacent copper symbol)

Cu Mo W Zn

Elements in concentrate or magnetite. Copper (Cu) 100ppm in magnetite; molybdenum (Mo) 15ppm in concentrate, 20ppm in magnetite; tungsten (W) 20ppm in concentrate; zinc (Zn) 200 and 400ppm in magnetite (located by adjacent copper symbol)



AREA OF OTHER MAPS IN THIS SERIES

124 Jabal Bitran quadrangle
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126 Bi'r al Badriyah quadrangle
127 Sabkhat Muraysis quadrangle
129 Wadi Mahraghah quadrangle

RECONNAISSANCE GEOLOGIC MAP OF THE BI'R GHAMRAH QUADRANGLE, KINGDOM OF SAUDI ARABIA

By

[redacted]

1972