CM 91-K

# GEOLOGIC MAP

OF THE

# PEACOCK MOUNTAINS

AND

# SOUTHERN GRAND WASH CLIFFS

INCLUDING
PEACOCK PEAK, ANTARES, HACKBERRY, VALENTINE,
AND THE SOUTHERN HALF OF THE
MUSIC MOUNTAIN SE, AND MILKWEED CANYON SW
7 1/2 MINUTE QUADRANGLES
**NORTHWESTERN ARIZONA**

by
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## EXPLANATION

- CONTACT, dashed where approximate, dotted where concealed
- CONTACT, located by aerial photo
- 50 DIP OF CONTACT
- FAULT, dashed where approximate, dotted where concealed
- 66 DIP OF FAULT, bar and ball on down thrown side
- LINEAMENT, located by aerial photo
- STRIKE AND DIP
- MAGMATIC FLOW FOLIATION
- $S_1$ FOLIATION, trend and plunge of lineation, m = mineral, s = stretching
- $S_2$ FOLIATION, arrows indicating relative movement
- $S_3$ FOLIATION
- $L_1$ LINEATION, trend and plunge
- $L_2$ LINEATION, trend and plunge
- $F_2$ FOLD AXIS, trend and plunge
- $F_3$ FOLD AXIS, trend and plunge
- AP $F_2$ AXIAL PLANE
- AP $F_3$ AXIAL PLANE
- AHU-1 SAMPLE LOCATION AND NUMBER

QUATERNARY

**Q** — Quaternary units include locally derived alluvial deposits, channel deposits, colluvium, unconsolidated pediment and fan deposits.

TERTIARY

**q** — Quartz veins, primarily Tertiary although some may be older

**h** — Silicified zones and hydrothermally altered zones, both occuring in association with Tertiary faults.

**i** — Silicic intrusives including several small dikes and a plug at Hackberry. The plug contains approximately 10% phenocrysts including amphibole up to 5 mm long, biotite and quartz in a microcrystalline, dull purplish tan and gray flow banded matrix. There are a number of dikes lithologically similar to to the plug. Another lithologic group are dikes that have been completely silicified and contain relict sanadine phenocrysts in a microcrystalline matrix.

**Tps** — Peach Springs Tuff, a tan, moderately welded rhyolite ash-flow tuff. It contains large, up to 4 mm, blue sanadine, quartz and plagioclase phenocrysts in a welded shard rich groundmass. The Peach Springs Tuff has radiometric ages ranging from 16.9 ±0.4 to 18.3 ±0.6 Ma (Damon and others, 1964 and 1966) and 19.2 ±0.4 Ma (Nielson and others, 1988).

**Tb** — Basalic flows and related rocks exposed along the Grand Wash Cliffs, also found locally along the flanks of the Peacock Mountains. The sequence consists of basalt to basaltic andesite, tuffs, agglomerate, coarse-grained pyroclastics and fluvial volcanic-bearing sediments (Young and Hartman, 1984).

**Ts** — Sedimentary rocks exposed in the Grand Wash Cliffs. The sequence includes a thin, 1 to a few m, basal conglomerate consisting of large well rounded cobbles and small boulders of various Precambrian lithologies and a locally thick, 100 m, section of fine grained fluvial sediments. Also included in this group is a unit of younger gravels that crop out along U.S. 66 east of Hackberry. The gravels appear to have been deposited contemporaneous with Tertiary faulting.

PALEOZOIC

**Pz** — Paleozoic undivided, unconformably overlying the Proterozoic basement. Included are the basal Cambrian Tapeats sandstone, Bright Angel shale and Muav limestone.

MIDDLE PROTEROZOIC

**d** — Diabase dikes range from a few cm to 30m thick (most are 1 to 10m thick). The diabase is black to greenish black, contains plagioclase laths and augite, and commonly has an ophitic texture. Sphene, apatite and rare orthopyroxene are also present. The interiors of larger dikes commonly contain knobby zones that crumble easily to gravel. The zones are presumably due to deuteric alteration. Relatively infrequent zones of coarse-grained felsic segregations occur usually in the central portions of the larger dikes. All of the diabase contains at least some greenschist facies minerals, chlorite, actinolite, clinozoisite and epidote, presumably due to deuteric alteration. A diabase sample from the Central Peacock Mountains (AHU-70) has a U-Pb sphene age of ca. 1.08 Ga (Shastri and others 1991).

**f** — Fine-grained felsic intrusive dikes are relatively common in the southern Grand Wash Cliffs but rare elsewhere in the study area. The dikes consistantly trend north northeast and dip moderately to steepiy to the northwest. They are generally thin, rarely greater than a few meters thick. They are commonly porphyritic containing plagioclase, biotite and infrequently amphibole phenocrysts usually not larger than 3 mm long. The matrix is very fine-grained to microcrystalline. A few of the dikes have flow foliation defined by the alignment of euhedral plagioclase phenocrysts. These dikes are invariably undeformed. One such dike from the southern Grand Wash Cliffs has a U-Pb zircon age of ca. 1.39 Ga (Albin and others 1991).

**mg** — K-spar megacrystic granite plutons of the Peacock Mountains and the hills to the north. Also included are several small (± 2m wide) dikes which occur near the larger bodies. The pluton in the northern Peacock Mountains contains K-spar phenocrysts up to 8 cm in length. The phenocrysts make up 20% to 70% of the rock with varying amounts of biotite in the matrix. In the hills north of the Peacock Mountains, the K-spar phenocrysts reach a maximum length of 3 cm and make up no more than 40% of the rock. The megacrystic granite from the northern Peacock Mountains AGW-138 and APK-11, have U-Pb zircon ages of 1.37 and 1.39 Ga respectively (Albin and others, 1991).

EARLY PROTEROZOIC

**p** — Pegmatite dikes range from less than a meter to as much as 10 m thick. Pegmatites contain varying amounts of pink K-feldspar, white quartz ± muscovite. Some pegmatites are highly folded indicating emplacement during regional deformation. Most dikes however are undeformed or only slightly deformed thus are postkinematic or late synkinematic.

**g** — Biotite and biotite bearing monzogranites ranging from well foliated to undeformed. Compositions vary chiefly in biotite content and K-spar to plagioclase ratios. These granites are generally pink to dull orange in color. This group can be subdvided into three major groups; biotite monzogranite (75%), leucocratic biotite bearing monzo to syenogranite (20%), and biotite bearing ± muscovite and garnet monzogranite (5%). The large pluton in the Southern Grand Wash Cliffs and the Nothern Cottonwood Cliffs, the Valentine granite, has a U-Pb age of 1.715 Ga (Chamberlain and Bowring 1990).

**bg** — Biotite monzogranite ranging from coarse-grain, hornblende bearing gneissic granite to medium-grain, well foliated biotite granites including some leucogranite. These granites are generally colored in shades of gray with some nearly white leucogranites. Granites in this group are generally more highly deformed than the granites designated "g". There is some gradation between these two groups of granite in texture, composition and color.

**gd** — Granodiorites range in composition from coarse-grain, salt and pepper granodiorites to medium-grain gray hornblende bearing biotite granodiorite. Also included in this group are biotite-bearing hornblende tonalites. The granodiorites have a gneissic texture and often contain xenoliths of amphibite and metasedimentary rocks. A smaple (ALS-9) from the large body of granodiorite in the Grand Wash Cliffs 8 km north of Hackberry has a U-Pb age of 1.73 Ga (Albin and others 1991).

**gn** — Quartzofeldspathic gneissis including some migmatites. Most of the gneiss is similar compositionally to the granodiorites and thus is interpreted to be orthogneiss. Some gneiss is clearly paragneiss. The protoliths of the migmatites are uncertain.

**m** — Metasedimentary rocks range in composition form amphibole schists to quartzofeldspathic biotite gneiss, biotite schist and garnet-sillimanite-biotite schist. The metasedimentary rock units are characterized by compositional and textural change across layering. Identification of protoliths was difficult due to the high grade of metamorphism and degree of recrystallization. Identification is based on composition and outcrop characteristics. The metasedimentary are presumed to include metasandstones, metapelites and perhaps some metatuffs.

**a** — Amphibolites range in composition from coarse-grain hornblendite to hornblende-rich plagioclase gneisses with micaceous quartzofeldspathic amphibole schists and some garnet-bearing amphibolite. Amphibolites are interpreted to be both metavolcanic and volcanically derived metasedimentary rocks and tuffs. Interpretations are based on composition and internal structure, outcrop character and associated lithologies. An amphibolite from the central Peacock Mountains (ALS-11) has U-Pb zircon and sphene ages of 1.68 Ga (Albin and others 1991). Also included in this group is thin unit of altered ultramafic rock that crops out along the western front of the Peacock Mountains. The four meter wide unit consists of large serpentinized olivine, orthopyroxene, cummingtonite, plagioclase and orthoclase.

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Control by USGS and NOS/NOAA
Topography by photogrammetric methods from aerial photographs taken 1967. Field checked 1968
Polyconic projection. 1927 North American datum
10,000-foot grid based on Arizona coordinate system, west zone
SCALE 1:24 000
CONTOUR INTERVAL 40 FEET
ROAD CLASSIFICATION
Heavy-duty — Unimproved dirt
U.S. Route

ARIZONA GEOLOGICAL SURVEY
Contributed Map CM 91-K