Arizona Geological Survey
DGM-30 (Samaniego Peak)

GEOLOGIC MAP OF THE SAMANIEGO PEAK 7½' QUADRANGLE, PIMA COUNTY, ARIZONA

by:

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Arizona Geological Survey Digital Geologic Map 30

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INTRODUCTION

The Sierrita Mountains are a deeply eroded Basin and Range uplift located 60km south of Tucson, Arizona. The mountains consist of a rugged inselberg core range 300 m high flanked by a bajada surface 35 km in diameter. Bedrock geology of the core range consists of Mesozoic volcanic and sedimentary successions, a subvolcanic Mesozoic intrusive suite, and early Tertiary plutons. Porphyry copper-molybdenum mineralization of the Pima mining district has been exploited at three open-pit mines in the eastern Sierrita Mountains for nearly 50 years. This district has yielded over 18 billion pounds of copper, 290 million pounds of molybdenum, and considerable lead, zinc, and silver (Keith et al., 1983; Arizona Department of Mines and Mineral Resources file data). Most previous geological studies in the Sierrita Mountains focused on the porphyry copper deposits (e.g., Kinnison, 1966; Aiken and West, 1978; West and Aiken, 1982; Barter and Kelley, 1982; Jansen, 1982; Preece and Beane, 1982; Jensen, 1998; Herrmann, 2001). The only currently active deposit, the Sierrita-Esperanza Mine, occupies the southeast corner of the map area. Mineralization at the Sierrita-Esperanza deposit is localized along the intrusive contact between the Paleocene Ruby Star Granodiorite and a Mesozoic volcanic-plutonic complex.

The Samaniego Peak quadrangle encompasses the northern half of the core range and a large area of the northern piedmont. Much of the piedmont is underlain by pediment formed on deeply weathered Ruby Star Granodiorite. The most important new conclusions based on our mapping concern the structural geometry of the Jurassic Red Boy Peak cauldron and age relationships between certain volcanic and plutonic suites. These relationships are summarized as follows: (1) the Red Boy Peak cauldron is a northwest-facing structure tilted to the southwest, (2) the Jurassic Harris Ranch Monzonite intrudes the Red Boy Rhyolite, and (3) the Sierrita Granite intrudes the Ruby Star Granodiorite and is therefore Paleocene rather than Mesozoic.

ABBREVIATED GEOLOGIC UNIT DESCRIPTIONS

See text for complete descriptions and discussion

QUATERNARY

dl — **Mine dump (<50 years)** – Very poorly-sorted, angular rock debris ranging in size from sand to boulders (some up to 3m), but generally in the cobble-boulder size range (0-200m thick).

Qyc — **Modern channel deposits (<100 years)** – Braided and meandering active channel deposits composed of sandy pebble-cobble-boulder alluvium.

Qy — **Holocene alluvium (<~10 ka)**

Ql — **Late Pleistocene alluvium (~10-130 ka)** – Weakly to moderately dissected alluvial valley fill deposits.

Qm — **Middle Pleistocene alluvium (~130-750 ka)** – Moderately dissected alluvial fan deposits.

Qmo — **Middle to early Pleistocene alluvium (~500 ka – 1 Ma)** – Deeply dissected relict alluvial fan deposits.

Qc — **Hillslope colluvium (Holocene and Pleistocene)** – Poorly-sorted colluvial and talus deposits on moderately steep hillslopes.

TERTIARY

Tdxi — **Dacite dikes (Tertiary)**

Tm — **Mafic dikes (Tertiary)**

Th* — **Helmet Conglomerate (Tertiary)** – Avalanche breccia, conglomerate and sandstone (>2km thick).

Tap* — **Porphyritic andesite (Tertiary)** – Coarse-grained, plagioclase-porphyritic andesite lava (50-100m thick).

* shown on cross-section only

Tph — **Hornblende porphyry dikes (Tertiary)** – Fine- to medium-grained monzonite dikes.

Trd — **Rhyodacite porphyry (Tertiary)** – Porphyritic dikes and small stocks in the Sierrita-Esperanza mine area.

Tns — **North Sierrita Porphyry (Tertiary)** – Fine- to medium-grained biotite monzogranite.

Tqv — **Quartz veins (Tertiary)** – Massive, podiform quartz veins.

Tsb — **Sierrita Breccia (Tertiary)** – Strongly copper and molybdenum-mineralized intrusive breccia mapped in the Sierrita-Esperanza pit.

Sierrita Granite

Tg — **Sierrita Granite (Tertiary)** – Leucocratic, medium- to coarse-grained, equigranular granite to syenogranite.

Tgf — **Sierrita Granite, aplite phase (Tertiary)** – Fine-grained to aplitic leucogranite.

Ruby Star Granodiorite

Tgp — **Ruby Star Granodiorite intruded by pegmatite and aplite (Tertiary)** – Monzogranite to granodiorite intruded by 5-15% pegmatite and aplitic dikes.

Tws — **Ruby Star West Sierrita Porphyry (Tertiary)** – Light gray to pinkish gray porphyritic monzogranite.

Tgx — **Ruby Star Granodiorite, megacrystic phase (Tertiary)** – Megacrystic, medium- to coarse-grained monzogranite to granodiorite.

Tgd — **Ruby Star Granodiorite (Tertiary)** – Medium-grained, equigranular granodiorite.

TERTIARY AND OLDER ROCKS

TKq — **Hydrothermal quartz veins (Tertiary – Cretaceous)** – Zones of intense quartz vein intrusion, alteration, and pervasive silicification.

TKd — **Diorite (Teritary - Cretaceous)** – Fine-grained diorite.

Gunsight Granitoid suite

TXgr — **Heterogeneous granitoid rocks and schist intruded by pegmatite and aplite (Tertiary – Proterozoic?)**

JURASSIC

Harris Ranch Monzonite

Jh — **Harris Ranch Monzonite (Jurassic)** – Medium-grained, equigranular quartz monzonite with mafic minerals.

Jha — **Harris Ranch Monzonite, Ash Creek phase (Jurassic)** – Medium-grained, equigranular quartz monzonite and fine-grained, porphyritic quartz monzonite to monzogranite.

Jhm — **Harris Ranch Monzonite, mafic phase (Jurassic)** – Light gray, fine-grained, porphyritic quartz monzonite.

Jht — **Harris Ranch Monzonite, Tascuela phase (Jurassic)** – Monzonite to quartz monzonite porphyry.

Jap — **Andesite porphyry (Jurassic)** – Porphyritic andesite containing plagioclase phenocrysts (1-3 mm).

Red Boy Rhyolite

Jb — **Rhyolite ash-flow tuff, Red Boy Rhyolite (Jurassic)** – Rhyolite ash-flow tuff containing 15-30% phenocrysts of plagioclase, quartz, and K-feldspar (up to 2,000m thick).

Jbz — **Mesobreccia, Red Boy Rhyolite (Jurassic)**

Jbx — **Megabreccia, Red Boy Rhyolite (Jurassic)**

Jbrx — **Rhyolite lava megabreccia, Red Boy Rhyolite (Jurassic)**

Jbdx — **Rhyolite porphyry megabreccia, Red Boy Rhyolite (Jurassic)**

Jt-Jb — **Megaclasts of phenocryst-rich dacite tuff, Red Boy Rhyolite (Jurassic)**

Jr-Jb — **Megaclasts of rhyolite lava, Red Boy Rhyolite (Jurassic)**

Ja-Jb — **Megaclasts of andesite lava, Red Boy Rhyolite (Jurassic)**

Jrp — **Rhyolite porphyry (Jurassic)** – Moderately phenocryst-rich, flow-foliated rhyolite porphyry.

Ox Frame Volcanics

Jr — **Rhyolite, undifferentiated (Jurassic)** – Phenocryst-poor to aphyric rhyolite.

Jrb — **Rhyolite lava breccia (Jurassic)** – Phenocryst-poor to aphyric rhyolite lava breccia.

Jri — **Intrusive rhyolite (Jurassic)** – Flow-foliated to massive, phenocryst-poor to aphyric rhyolite.

Jtq — **Rhyolite ash-flow tuff (Jurassic)** – Moderately phenocryst-rich rhyolite ash-flow tuff (2-20m thick).

Jq — **Quartz sandstone (Jurassic)** – Medium- to coarse-grained gray quartz sandstone that contains between 0-30% rhyolitic detrital clasts (0-200m thick).

Jas — **Volcanic-lithic sandstone (Jurassic)** – Thin- to medium-bedded, fine-grained sandstone.

Jax — **Porphyritic andesite (Jurassic)** – Green andesite with plagioclase phenocrysts (1-5 mm).

Ja — **Andesite, undifferentiated (Jurassic)** – Plagioclase-porphyritic andesitic rocks.

Jai — **Intrusive andesite (Jurassic)** – Plagioclase-porphyritic andesitic rocks.

Js — **Sandstone of upper Ash Creek (Jurassic)** – Quartzose sandstone and siltstone exposed north of Ash Creek.

OTHER MESOZOIC ROCKS

Soto Assemblage

Mzs-Tp — **Sandstone intruded by aplite and pegmatite (Tertiary – Mesozoic?)** – Subarkosic to arkosic arenite of unit Ms intruded by aplite and pegmatite dikes.

Mzs — **Sandstone (Mesozoic?)** – Subarkosic to arkosic arenite, fine-grained, sub-rounded, moderately well-sorted.

Mzc — **Limestone (Mesozoic?)** – Limestone, marble, and epidote calcsilicate skarn.

PALEOZOIC AND OLDER ROCKS

Ps — **Sandstone (Permian)** – Fine- to medium-grained, thin- to medium-bedded quartz sandstone.

Pl — **Limestone (Permian)** – Medium- to thick-bedded skeletal packstone and grainstone.

Y-Pz-Mz — **Pre-Tertiary rocks (Mesoproterozoic – Paleozoic – Mesozoic)** – Undifferentiated granitic, volcanic, and sedimentary rocks.

GEOLOGIC MAP SYMBOLS

Bedding and structure symbols

- 25 Bedding
- 34 Indistinct bedding
- 50 Bedding with stratigraphic top known
- Apparent dip of bedding
- Vertical bedding
- Horizontal bedding
- 47 Eutaxitic foliation
- 8 Flow foliation
- 45/10 Foliation with lineation
- 14/50 Mylonitic foliation with stretching lineation
- Geochronology sample location
- BJJ-785 Sample number
- Thin-section sample location
- Chemistry sample location
- Thin-section, chemistry location

Contact and fault symbols

- 63 **Depositional or intrusive contact** Dashed where approximately located, dotted where concealed, queried where location uncertain
- 45 **Fault, showing dip** Dashed where approximately located, dotted where concealed, queried where location uncertain
- 20 Minor fault showing dip
- Vein
- Dike

Topographic base from USGS Batamote Hills 1:24,000 quadrangle. Compiled by photogrammetric methods from aerial photographs taken in 1975, field checked in 1976, map edited in 1981. UTM grid, zone 12; 1927 North American Datum; Clarke 1866 spheroid.

Topographic base in Sierrita mine area (SE corner of map) represents 2001 mine surface (Phelps Dodge, 1999; 2001).

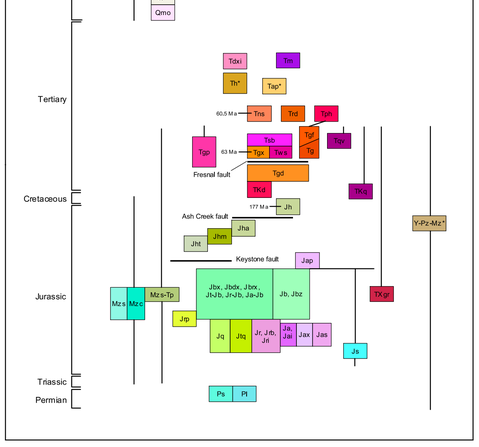
MN 12.5°

SCALE 1:24,000

1 0 1 MILES
1,000 500 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 FEET
1 0.5 0 1 KILOMETERS

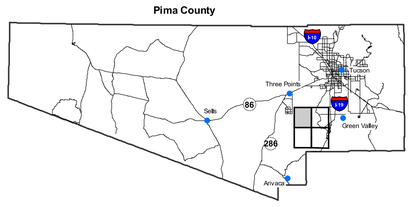
CONTOUR INTERVAL 40 feet
MINE CONTOUR INTERVAL 100 feet

STRATIGRAPHIC CORRLEATION DIAGRAM



INDEX MAP OF ARIZONA

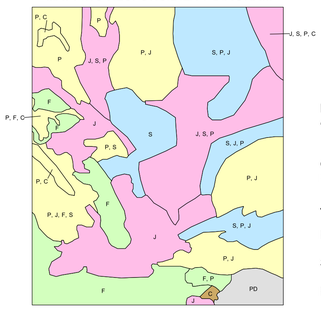
Pima County



Samaniego Peak (shown as gray box, above) is one of four quadrangles mapped in 2003 in the Sierrita area. The others include Twin Buttes 7½' Quadrangle (DGM-31), Batamote Hills 7½' Quadrangle (DGM-32) and Esperanza Mill 7½' Quadrangle (DGM-33).

N

MAPPING RESPONSIBILITY DIAGRAM



MAPPING RESPONSIBILITY KEY:
colors by lead author

C = Cooper (1973)
F = Ferguson
J = Johnson
P = Pearthree
S = Stavast
PD = Phelps Dodge

Digital cartography by Erin M. Moore

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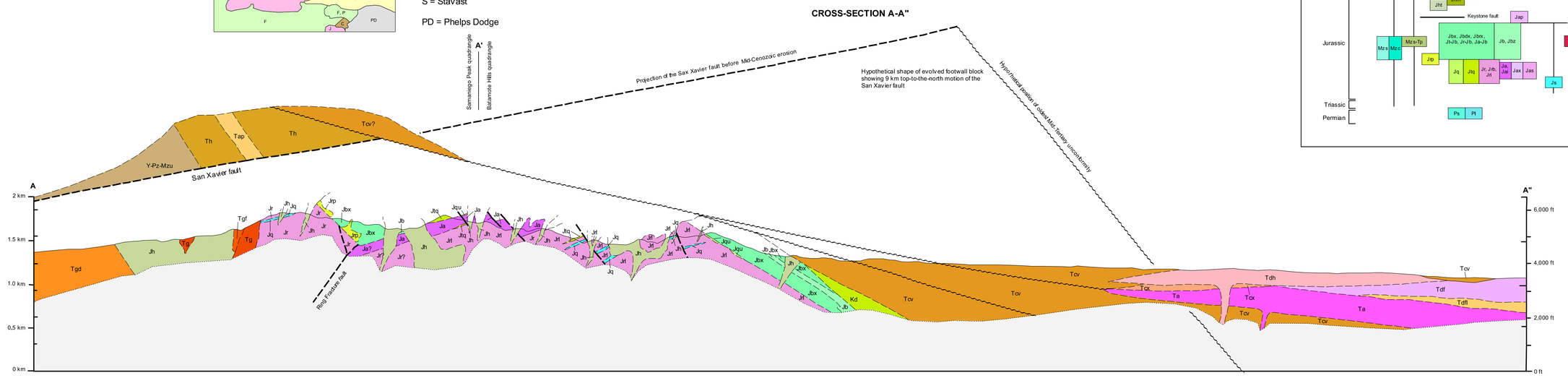
CROSS-SECTION A-A"



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