GEOLOGIC MAP OF THE BATAMOTE HILLS 7½' QUADRANGLE, PIMA COUNTY, ARIZONA

by:
Charles A. Ferguson, Brad J. Johnson and Todd C. Shipman

Arizona Geological Survey Digital Geologic Map 32

November, 2003

Citiation for this map: Ferguson, C.A., et al., 2003, Geologic Map of the Batamote Hills 7½' Quadrangle, Pima County, Arizona: Arizona Geological Survey Digital Geologic Map 32 (DGM-32), 31 p., 1 sheet, scale 1;24,000.

Not to be reproduced for commercial purposes

Research supported by the U.S. Geological Survey, National Cooperative Geologic Mapping Program, under USGS award #02HQAG0016. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. government.

ABBREVIATED GEOLOGIC UNIT DESCRIPTIONS
See text for complete descriptions and discussion

QUATERNARY – LATE TERTIARY

- 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).
- d — **Disturbed areas (<100 years)** – Mostly water tanks and road fill.
- Qyc — **Late Holocene active channel deposits (<100 years)** – Braided and meandering active channel deposits composed of sandy pebble-cobble-boulder alluvium.
- Qy2 — **Late Holocene alluvium (<2 ka)** – Recent alluvium on floodplains and low terraces that shows evidence of intermittent inundation during large flood events.
- Qy1 — **Middle to older Holocene alluvium (~2 to 10 ka)** – Low terraces and mid-channel island deposits composed of sand, silt, and clay, with a dominance of cobbles.
- Qy — **Undifferentiated Holocene alluvium (~100 years to 10 ka)**
- Ql — **Late Pleistocene alluvium (~10 to 130 ka)** – Weakly to moderately dissected alluvial valley fill deposits.
- Qm — **Middle Pleistocene alluvium (~130-750 ka)** – Moderately dissected alluvial fan deposits.
- Qc — **Colluvium and talus (<2 Ma)** – Unconsolidated to moderately consolidated colluvium and talus hillslope deposits.
- QTs — **Surficial deposits, undivided (Quaternary to late Tertiary)** – Deeply dissected and highly eroded alluvial fan deposits.

MID-TERTIARY

- Tcv-Ql — **Pedimented volcaniclastic conglomerate and sandstone (Late Pleistocene ~10 to 130 Ka)**
- Tcv — **Volcaniclastic conglomerate and sandstone (Tertiary)** – A heterogeneous volcaniclastic unit consisting of clast-supported, boulder-cobble-pebble conglomerate and pebbly sandstone (>500m thick).
- Tdh — **Dacite of Tinaja Peak (Tertiary)** – Moderately phenocryst-rich dacite lava (≥150m thick).
- Tdx — **Lower dacite of Tinaja Peak (Tertiary)** – Moderately phenocryst-rich dacite lava (0-100m thick).
- Tcx — **Conglomerate and breccia (Tertiary)** – Coarse-grained, angular-clast, oligomict conglomerate and breccia (0-25m thick).
- Tdf — **Dacite of Escondido Wash (Tertiary)** – Fine-grained phenocryst-rich dacite lava (0-100m thick).
- Ta — **Andesite of Tinaja Hills (Tertiary)** – Phenocryst-poor andesitic lava (200m thick).
- Tbu — **Upper basaltic trachyandesite lava (Tertiary)** – Vesicular basalt lava (≥10m thick).
- Tds — **Volcaniclastic sandstone and conglomerate (Tertiary)** – Reddish volcaniclastic sandstone and pebble conglomerate (0-10m thick).
- Tdb — **Dacite of Batamote Hills (Tertiary)** – Phenocryst-rich dacite lava (0-200m thick).
- Tdt — **Tuff of Batamote Hills (Tertiary)** – Massive, nonwelded dacitic ash-flow tuff (0-65m thick).
- Ttb — **Bedded tuff (Tertiary)** – Thin- to medium-bedded, nonwelded ash-fall tuff (0-50m thick).
- Tb — **Basaltic trachyandesite lava (Tertiary)** – Vesicular basaltic lava (5-25m thick).
- Tbb — **Biotite-phyric basaltic andesite lava (Tertiary)** – Basaltic andesite lava (0-30m thick).
- Ts — **Sandstone and conglomerate (Tertiary)** – Pebbly sandstone and pebble-cobble conglomerate (up to 30m thick).
- 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

PALEOCENE

- Tmi — **Mafic dikes (Tertiary)** – Fine-grained diorite to monzodiorite dikes.
- Tph — **Hornblende porphyry dikes (Tertiary)** – Fine- to medium-grained monzonite dikes.
- Tpb — **Biotite porphyry dike (Tertiary)** – Fine- to medium-grained biotite monzonite dike.
- Tsb — **Sierrita Breccia (Tertiary)** – Strongly copper and molybdenum-mineralized intrusive breccia mapped in the Sierrita-Esperanza pit.
- Tmz — **Quartz monzonite dikes (Tertiary)** – Fine- to medium-grained leucocratic dikes.
- Trd — **Rhyodacite porphyry (Tertiary)** – Porphyritic dikes and small stocks in the Sierrita-Esperanza mine area.
- Tgf — **Sierrita Granite, aplite phase (Tertiary)** – Fine-grained to aplitic leucogranite.
- Tgfs — **Sierrita Granite, aplite phase in the Sierrita pit (Tertiary)** – Fine-grained to aplitic leucogranite.
- Tg — **Sierrita Granite (Tertiary)** – Leucocratic, medium- to coarse-grained, equigranular granite to syenogranite.
- Tns — **North Sierrita Porphyry (Tertiary)** – Fine- to medium-grained biotite monzogranite.
- Tws — **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.
- TKd — **Fine-grained, biotite diorite (Tertiary)** – Fine-grained diorite.
- TKq — **Quartz vein and hydrothermal breccia (Tertiary – Cretaceous)** – Zones of intense quartz vein intrusion, alteration, and pervasive silicification.

CRETACEOUS

Demetrie Andesite, eastern units

- Ki — **Demetrie volcanics, intermediate porphyry (Cretaceous)** – Aphanitic matrix, 15% plagioclase-porphyritic porphyry.
- Kdi — **Demetrie volcanics, intrusive andesite (Cretaceous)** – Fine-grained crystalline to aphanitic matrix, plagioclase-porphyritic andesite.
- Kd — **Demetrie volcanics, andesitic lava (Cretaceous)** – Porphyritic andesitic to intermediate lava flows and possible hypabyssal equivalents (up to 1,000m thick).
- Kdr — **Demetrie volcanics, upper rhyolite tuff (Cretaceous)** – Light gray, welded rhyolite ash-flow tuff (0-50m thick).
- Kdw — **Demetrie volcanics, pyroclastic unit (Cretaceous)** – Light colored, thin- to medium-bedded nonwelded pyroclastic rocks (0-6m thick).
- Kss — **Sandstone (Cretaceous)** – Green-gray argillaceous, medium-grained feldspathic quartz sandstone.

JURASSIC

- Jh — **Harris Ranch Monzonite (Jurassic)** – Medium-grained, equigranular quartz monzonite.
- Jhm — **Harris Ranch Monzonite, mafic phase (Jurassic)** – Light gray, fine-grained, porphyritic monzonite to monzodiorite.
- Jht — **Harris Ranch Monzonite, Tascuela Canyon phase (Jurassic)** – Monzonite porphyry.

Red Boy Rhyolite

- Jbc — **Andesite-clast conglomerate, Red Boy Rhyolite (Jurassic)** – Medium- to thick-bedded andesite-clast conglomerate (0-15m thick).
- Jbd — **Dacitic ash-flow tuff, Red Boy Rhyolite (Jurassic)** – Pink weathering moderately welded dacitic ash-flow tuff (5-15m thick).
- Jbb — **Biotite-rich ash-flow tuff, Red Boy Rhyolite (Jurassic)** – Welded rhyolite ash-flow tuff (30m thick).
- 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)**
- Jbdx — **Rhyolite porphyry megabreccia, Red Boy Rhyolite (Jurassic)**
- Jbrx — **Rhyolite lava megabreccia, Red Boy Rhyolite (Jurassic)**
- Jrp-Jb — **Megaclasts of rhyolite porphyry, 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)**
- Jrpw — **Western rhyolite porphyry (Jurassic)** – Dikes and small stocks of ~10-15% phenocryst rhyolite porphyry.
- Jriu — **Rhyolite dike (Jurassic)**
- Jrp — **Rhyolite porphyry (Jurassic)** – Moderately phenocryst-rich, flow-foliated rhyolite porphyry.
- Jqu — **Quartz sandstone (Jurassic)** – Cross-stratified, gray quartz sandstone (0-15m thick).
- Jru — **Rhyolite lava (Jurassic)** – Rhyolite lava and rhyolite lava breccia.
- Jt — **Dacitic tuff (Jurassic)** – Dark gray to purple phenocryst-rich dacitic ash-flow tuff (up to 200m thick).
- Jtt — **Rhyodacite tuff (Jurassic)** – Moderately phenocryst-rich rhyodacite ash-flow tuff (~50m thick).
- Jc — **Andesitic conglomerate (Jurassic)** – Mafic volcaniclastic conglomerate interbedded with andesitic lava flows (up to 200m thick).
- Jau — **Andesitic lava and conglomerate (Jurassic)** – Plagioclase-porphyritic andesite interbedded with andesitic conglomerate (probably >300m thick).

Ox Frame volcanics (Jurassic?)

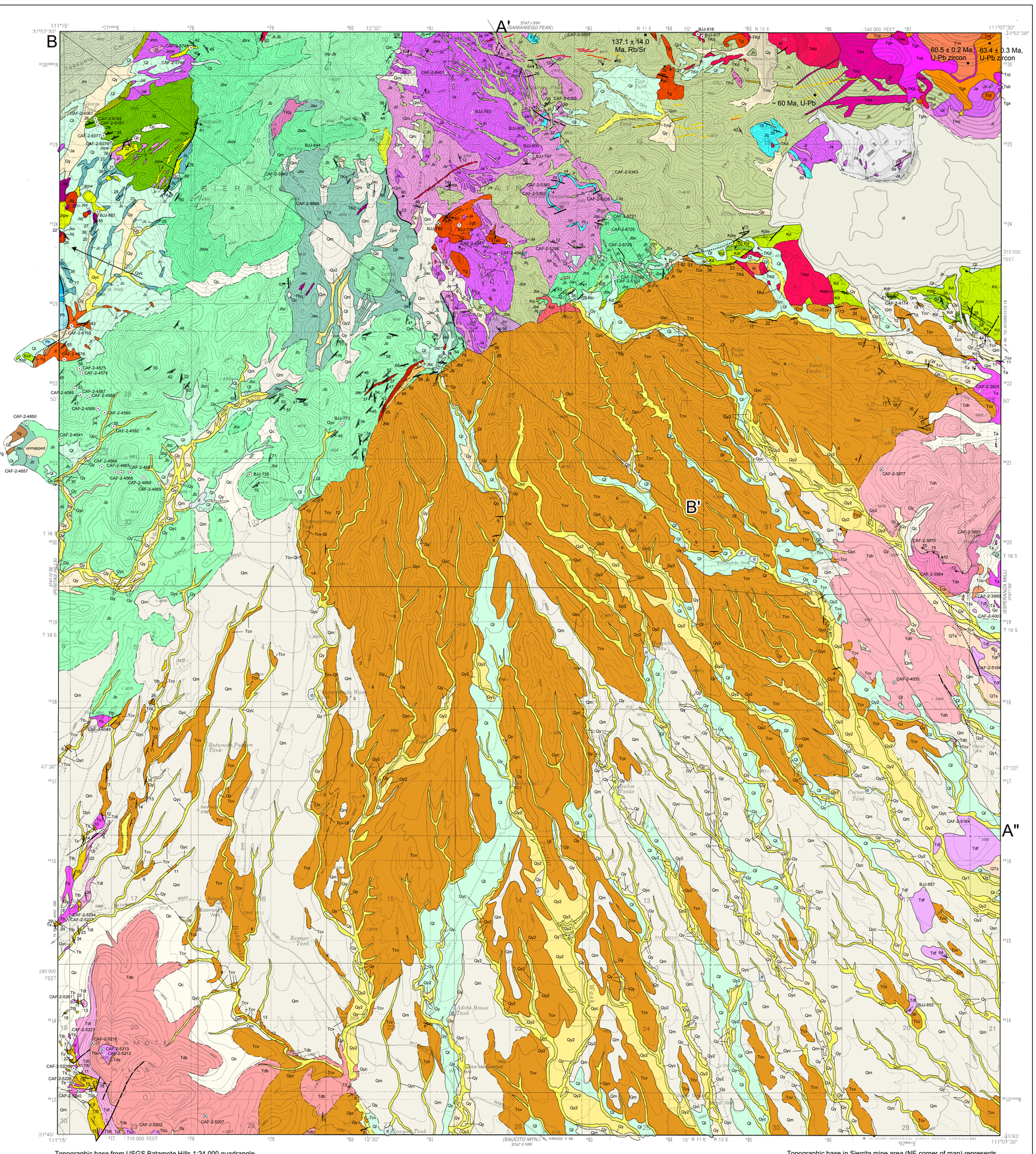
- Jg — **Tuff of George Tank (Jurassic)** – Rhyolite ash-flow tuff megabreccia (>300m thick).
- Jr — **Rhyolite, undifferentiated (Jurassic)** – Phenocryst-poor to aphyric rhyolite.
- Jrl — **Rhyolite lava (Jurassic)** – Phenocryst-poor to aphyric rhyolite lava.
- Jrb — **Rhyolite lava breccia (Jurassic)** – Phenocryst-poor to aphyric rhyolite lava breccia.
- Jrt — **Rhyolite tuff (Jurassic)** – Phenocryst-poor, thin- to medium-bedded nonwelded tuff (0-2m thick).
- 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).
- Jai — **Intrusive andesite (Jurassic)** – Plagioclase-porphyritic andesitic rocks.
- Ja — **Andesite, undifferentiated (Jurassic)** – Plagioclase-porphyritic andesitic rocks.
- Jal — **Andesite lava (Jurassic)** – Plagioclase-porphyritic andesitic lava.
- Jsj — **Tuff of San Juan Wash (Jurassic)** – Phenocryst-poor to aphyric rhyolite ash-flow tuff.
- Jsx — **Tuff of San Juan Wash megabreccia (Jurassic)** – Monolithic megabreccia within the tuff of San Juan Wash.

PALEOZOIC

- Ph — **Horquilla Limestone (Pennsylvanian)** – Cherty limestone, epidote skarn, and marble (>100m thick).
- Me — **Escabrosa Limestone (Mississippian)** – Massive cherty limestone (~150m thick).

PROTEROZOIC

- Yg — **Granite (Mesoproterozoic)** – Medium- to coarse-grained leucogranite.
- Y-Pz-Mz — **Pre-Tertiary rocks (Mesoproterozoic-Paleozoic-Mesozoic)** – Undifferentiated granitic, volcanic and sedimentary rocks.



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.

MN 12.5°

SCALE 1:24,000

1 0.5 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

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

GEOLOGIC MAP SYMBOLS

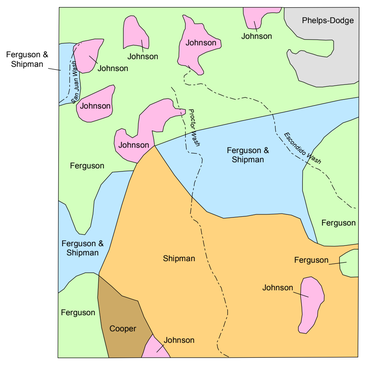
Bedding and structure symbols

- Bedding
- Indistinct bedding
- Bedding with stratigraphic top known
- Eutaxitic foliation
- Flow foliation
- Foliation with lineation
- CAF-2-2512 — Sample number
- Thin-section sample location
- Chemistry sample location
- Thin-section, chemistry location

Contact and fault symbols

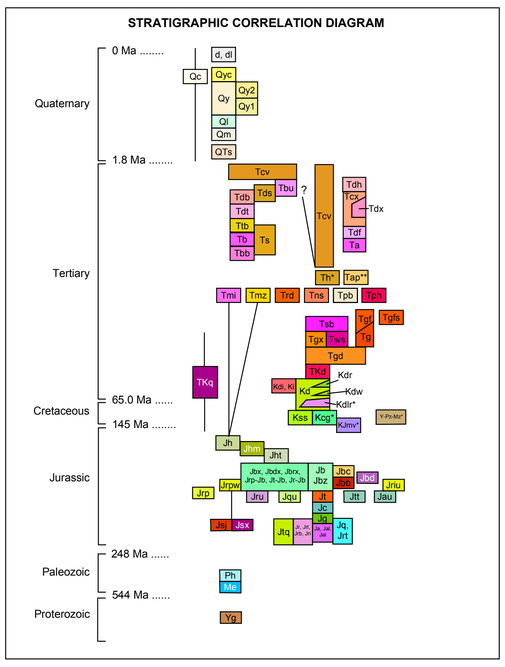
- **Depositional or intrusive contact** — Dashed where approximately located, dotted where concealed, queried where location uncertain
- Mapping boundary
- **Fault, showing dip** — Dashed where approximately located, dotted where concealed, queried where location uncertain
- Minor fault showing dip
- Plunging anticline axis
- Unconformity (on cross-sections)
- Vein, approximate
- Dike

MAPPING RESPONSIBILITY DIAGRAM

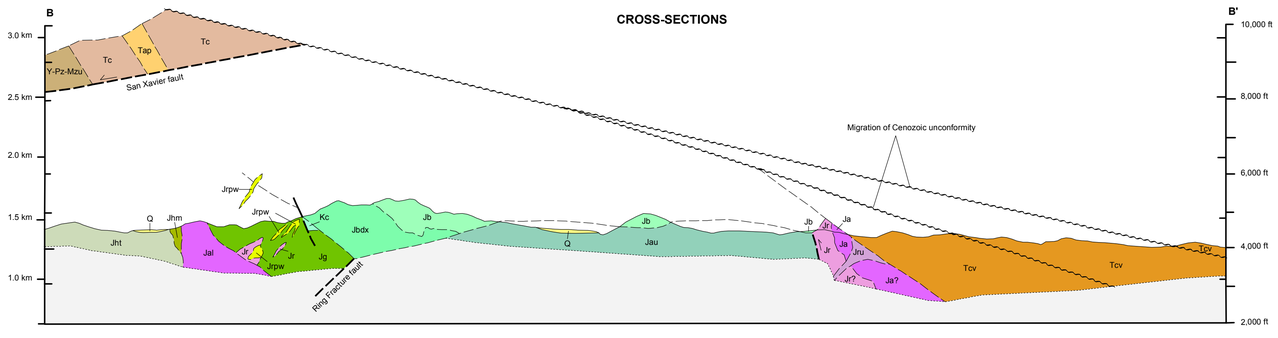


Mapping Responsibility Key
- Cooper
- Ferguson
- Ferguson & Shipman
- Johnson
- Phelps-Dodge
- Shipman

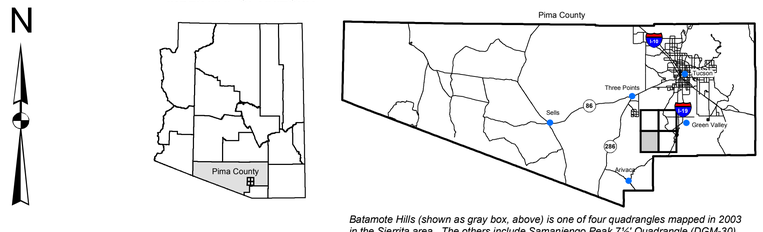
STRATIGRAPHIC CORRELATION DIAGRAM



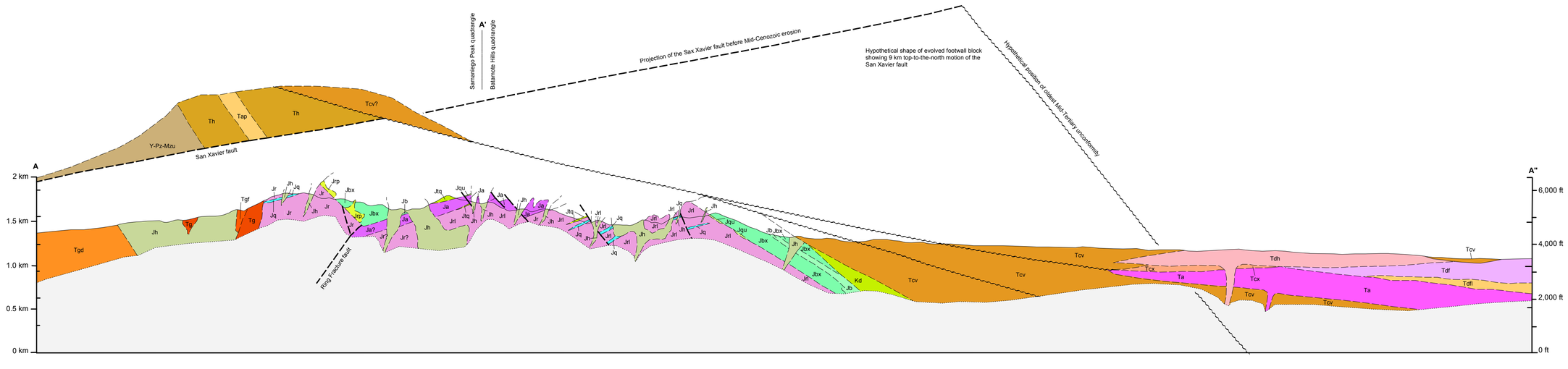
CROSS-SECTIONS



INDEX MAP OF ARIZONA



Batamote Hills (shown as gray box, above) is one of four quadrangles mapped in 2003 in the Sierrita area. The others include Samaniego Peak 7½' Quadrangle (DGM-30), Twin Buttes 7½' Quadrangle (DGM-31) and Esperanza Mill 7½' Quadrangle (DGM-33).

Digital cartography by Erin M. Moore

Arizona Geological Survey
416 W. Congress, Suite 100
Tucson, Arizona 85701