GEOLOGIC MAP OF THE CHINO VALLEY NORTH 7 ½' QUADRANGLE, YAVAPAI COUNTY, ARIZONA

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Arizona Geological Survey Digital Geologic Map 80 (DGM-80), version 1.0

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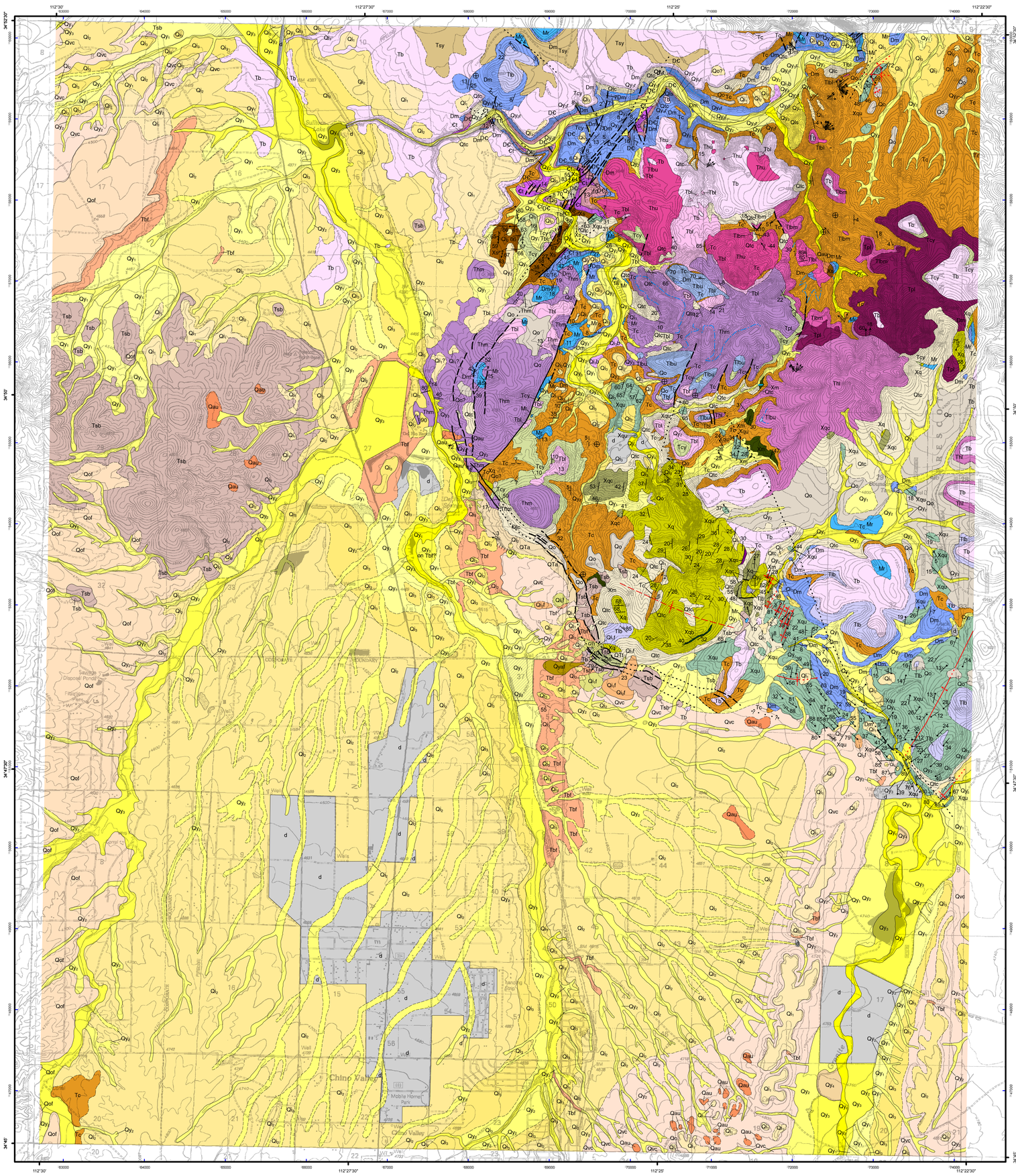


Topographic base from USGS 1:24,000 Quadrangle Series.
Seamless basemap generated using iGage All Topo Pro software.
Hillshade generated from NED 10m Digital Elevation Model.

Projection Information:
North American Datum of 1983.
1000-meter Universal Transverse Mercator grid tics, zone 12, shown in blue.

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET

MN
11° 21'
2010 MAGNETIC NORTH DECLINATION

Map Unit Descriptions

Miscellaneous Units

d — **Disturbed ground** - Areas substantially modified by development and other human activity. Original geologic features are obscured.

Plowed areas - Historically or actively plowed fields, irrigated pasture, and other lightly disturbed ground.

Qvc — **Regolith and colluvium formed on basin-fill deposits** - In situ deposits mantling gentle to moderate slopes on fine-grained basin-fill deposits. Deposits commonly are sand, silt and clay, with minor clasts of reworked carbonate and fine gravel. Soil development is generally weak.

Qtc — **Quaternary talus and colluvium** - Very poorly sorted, angular, weakly bedded to massive, hillslope deposits associated with bedrock.

Qls — **Landslide deposits (Quaternary)** - Coherent and semi-coherent blocks and masses in landslides along Verde River

QTt — **Quaternary/Tertiary talus deposits** - Semi-consolidated to moderately consolidated, very angular, very poorly sorted colluvium derived from local bedrock sources at the base of steep slopes along the Little Chino fault zone.

Verde River Alluvium

Qyvf — **Active river channel deposits** - Unconsolidated, very poorly sorted sandy to cobbly beds in active river channels.

Qyvf — **Flood channel and low terrace deposits** - Unconsolidated sand, gravel and silt deposits on bars, low terraces and flood channels.

Qyvf — **Historical river terrace deposits** - Unconsolidated sand, gravel and silt deposits on low terraces inset below the abandoned early historical floodplain.

Qyvf — **Latest Holocene to historical river terrace deposits** - Silt, clay, sand and minor gravel deposits underlying the early historical floodplain.

Qyvf — **Late to early Holocene river terrace deposits** -silt, clay, sand and minor gravel terrace deposits slightly above the early historical floodplain

Piedmont Alluvium

Qyt — **Active tributary channel alluvium** - Unconsolidated, very poorly sorted sandy to bouldery ephemeral piedmont-tributary channel deposits.

Qyn — **Latest Holocene to modern alluvium** - Unconsolidated sand, gravel and cobble deposits on low terraces active in historic times.

Qyn — **Latest Holocene alluvium** - Ephemeral tributary-channel deposits and low-lying channel terraces flanking active drainages.

Qyp — **Late Holocene alluvium** - Planar terrace deposits located along incised drainages, broad low-relief distal fan deposits, and infrequently active tributary-drainage deposits.

Qyaf — **Early to late Holocene rock avalanche deposit** - Gravel-rich, very angular clasts derived from localized units and steep slopes adjacent to Little Chino fault zone.

Qyl — **Early to late Holocene alluvium** - Broad, low-relief, undulating fan and sheet-flood deposits exhibiting widespread, shallow braided-drainage patterns.

Qlb — **Latest Pleistocene alluvium** - Sub-angular to rounded local and exotic gravel to boulder-size clasts and lightly to absent reddened soil development.

Qls — **Late Pleistocene alluvium** - Gravelly and sandy late Pleistocene terrace deposits with light to moderately developed orange-colored soils.

Qlaf — **Middle to late (?) Pleistocene rock avalanche deposit** - Cobble-rich, very angular localized clasts derived from steep slopes adjacent to the Little Chino fault zone.

Qlc — **Middle to late Pleistocene alluvium** - Unconsolidated to semi-consolidated sand, gravel, cobbles and boulders forming elevated strath terrace deposits.

Qlif — **Early to middle Pleistocene (?) rock avalanche deposit** - Very angular, cobble-rich clasts derived from localized bedrock units adjacent to Little Chino Fault zone.

Qli — **Early to middle Pleistocene alluvium** - Alluvial deposits of gravel, cobbles and boulders from local and exotic source terrains forming terraces along the Granite Creek, Verde and Williamson watersheds.

Qof — **Early Pleistocene alluvial fan deposits** - Moderately consolidated sand, gravel, cobble and boulder fanglomerate deposits. Clasts angular to subangular to subrounded, very poorly sorted, derived from local bedrock sources in the Sullivan Buttes area west and northwest of Chino Valley.

Qo — **Early Pleistocene alluvium** - Weakly to moderately-consolidated sand, gravel, cobble and boulder deposits forming elevated strath terraces and saddles overlying bedrock approximately 35 to 50 meters above the main channel.

Qau — **Quaternary alluvium undifferentiated** - Quaternary alluvium of unknown relative or absolute age forming elevated strath terraces and saddles overlying bedrock.

QTa — **Quaternary/Tertiary alluvium** - Moderately consolidated sand, gravel and silt deposits formed near steep hillslopes adjacent to bedrock along the Little Chino Fault zone.

Basin Fill Unit

Tbf — **Tertiary basin fill** - Semi-consolidated sand, silt and clay deposits.

Bedrock Units

Tsy — **Younger siliciclastic conglomerate (Tertiary)** - Semi-consolidated sand and gravel deposits derived from the Black Mesa Hills area. Southern extent of deposits likely reworked into Quaternary lag gravel deposits.

Tb — **Younger mafic lava, undifferentiated (Tertiary)** - Mafic lavas at the top of the sequence. The lavas vary in phenocryst composition from place to place. In the north, some of the lavas contain 5-7% olivine up to 2mm, 10% plagioclase up to 1mm in a plagioclase microlite-rich matrix. One of the flows in the south contains 12-15% <1mm clinopyroxene, 5-7% <1mm orthopyroxene in a plagioclase microlite-rich matrix.

Tcy — **Volcaniclastic conglomerate and breccia (Tertiary)** - Conglomerate, breccia, minor sandstone, and pyroclastic rocks. Sequences of conglomerate, sandstone, and epiclastic breccia that may contain minor pyroclastic units. Clasts are typically of mixed volcanic units mixed with 0-50% pre-volcanic clasts typical of the older conglomerate (Tc).

Tpl — **Pyroxene-porphyritic latite (Tertiary)** - Pyroxene-porphyritic latite lava, lava breccia, and related pyroclastic rocks. This lava is similar to the biotite latites in that it contains abundant matrix biotite, but it also contains 2-10%, 2-6mm and rarely up to 10mm equant green clinopyroxene phenocrysts, 20% 0.2-0.7mm orthopyroxene(?), and sparse 1mm plagioclase.

Tsb — **Sullivan Buttes latitic rocks (Tertiary)** - Undifferentiated latitic lava, lava breccia and associated pyroclastic rocks in the Sullivan Buttes area (west of US highway 89). Most of these rocks are pyroxene-porphyritic with varying amounts of matrix biotite, hornblende, pyroxene, olivine, and magnetite.

Tlb — **Biotite latite, undifferentiated (Tertiary)** - Biotite-porphyritic latite, mostly massive and locally flow-foliated. The latite contains abundant matrix biotite and plagioclase <<1mm, 5-10% biotite phenocrysts up to 2mm, up to 10% <1mm euhedral clinopyroxene, 1-3% <1mm euhedral orthopyroxene, and 1-3% <2.5mm hornblende rimmed with opaque mineral. This map unit is applied to isolated bodies of the latite that are probably eroded plugs and/or basal portions dome complexes.

Tlbu — **Upper biotite latite (Tertiary)** - Biotite-porphyritic latite lava, lava breccia and related pyroclastic rocks. Biotite latite with abundant matrix biotite and 1-10% phenocrysts up to 4mm. It consits of a central plug or dome in the north and several outliers of lava and pyroclastic rocks farther south.

Thu — **Upper hornblende latite (upper)** - Upper hornblende latite

Tlbm — **Middle biotite latite (Tertiary** - Biotite-porphyritic latite lava, lava breccia and related pyroclastic rocks. Biotite latite with abundant matrix biotite, 5-20% biotite phenocrysts up to 4mm, and 5-20% <1.5mm clinopyroxene>orthopyroxene phenocrysts.

Thm — **Middle hornblende latite (Tertiary)** - Hornblende-porphyritic latite lava, lava breccia, and related pyroclastic rocks. The latite contains 5-15%, 1-10mm hornblende phenocrysts.

Tlbl — **Lower biotite latite (Tertiary)** - Biotite-porphyritic latite, mostly massive and locally flow-foliated. This unit is a single exposure of biotite latite with abundant matrix biotite and several % phenocrysts up to 4mm located in the northeast corner of the map area that appears to be erosionally overlain by the upper part of the conglomerate unit Tc

Tbl — **Lower mafic lava and pyroclastic complex (Tertiary)** - Mafic lava and scoria. Mafc lava and scoria containing up to 10% total phenocrysts of olivine, pyroxene, and plagioclase. These rocks occur as a flow or series of flows and a related cinder cone(s) at the base of the Tertiary volcanic succession southeast of the confluence of Granite Creek and Verde River. The lava is virtually indistinguishable in the field from the younger basaltic lavas (Tb) and therefore can only be confidently assigned to the older unit where stratigraphic context is available. The lava has been analyzed and classified geochemically as a shoshonite (Riggs et al., 1997).

Thl — **Lower hornblende latite (Tertiary)** - Hornblende-porphyritic latite lava, lava breccia, and related pyroclastic rocks. The latite typically contains two populations of hornblende phenocrysts; 10-20% <2mm, and 1-5% 2-15mm. The latite also contains sparse hornblende gabbro xenoliths up to 30cm, minor plagioclase up to 0.5mm, and a trace of sphene.

Tc — **Conglomerate (Tertiary)** - Conglomerate, pebbly sandstone, and sandstone. Massive, commonly poorly preserved outcrops of conglomerate, pebbly sandstone, and lesser arkosic, lithic-rich sandstone are weakly medium- to thick-bedded as defined by pebble trains and diffuse channelized conglomeratic zones within pebbly sandstone. Clasts consist of varying amounts of quartzite, quartz sandstone, limestone, schist, argillite/siltstone, mafic granitoid, and felsic granitoid. Clasts range in size from pebbles to boulders up to several meters, and in shape from rounded to angular. Most clasts are sub-rounded to sub-angular pebbles and cobbles. Schist, limestone, and argillite clasts are commonly strongly nonequant and help define well-developed imbrications. Tertiary volcanic clasts are absent and distinguish this unit from younger, typically strongly volcaniclastic conglomerate and sandstone units interbedded with the overlying Tertiary volcanics. In some areas, non-volcaniclastic conglomerate of this unit occurs above some of the basal Mid-Tertiary volcanic units (Tbl and Tlbl), and if possible, this relationship is depicted as an intraformational contact extending into the main body of the map unit.

Paleozoic Rock Units

Mr — **Redwall Limestone (Mississippian)** - Limestone, and minor dolostone. Medium- to thick-bedded, in mostly tabular, amalgamated sets, carbonate of this unit is typically strongly recrystallized skeletal packstone and grainstone with abundant crinoid columnals. Chert in this unit is typically rounded, in large bread-loaf shaped masses.

Dm — **Martin Limestone (Devonian)** - Dolostone, limestone, quartzite-pebble conglomerate, and minor green shale in an unconformity bounded sequence in the northern part of the map area. The main part consists of tabular, medium-bedded, very fine-grained, creamy white micritic dolostone with thin (<5cm) light green shale interbeds. These rocks grade downwards into tan to light brown, variably quartzose dolostone, locally with quartzite pebbles. The base of the unit is a conglomeratic zone 1-8m thick, and the top is defined by a similar quartzose conglomeratic carbonate at the base of the Martin that typically overlies a reddish altered (paleosol?) zone at the top of this unit. No fossils have been recognized, and the unit's age remains unclear. The main part of the unit is recessive, forming slopes in some areas, and overhung cliffs along steep canyon walls of lower Granite Creek and the Verde River. See the text for a description of this unit's nomenclatural history. 0-20m thick.

DC — **Undifferentiated lower Paleozoic rocks (Devonian-Cambrian)** - Dolostone, limestone, quartzite-pebble conglomerate, and minor green shale in an unconformity bounded sequence in the northern part of the map area. The main part consists of tabular, medium-bedded, very fine-grained, creamy white micritic dolostone with thin (<5cm) light green shale interbeds. These rocks grade downwards into tan to light brown, variably quartzose dolostone, locally with quartzite pebbles. The base of the unit is a conglomeratic zone 1-8m thick, and the top is defined by a similar quartzose conglomeratic carbonate at the base of the Martin that typically overlies a reddish altered (paleosol?) zone at the top of this unit. No fossils have been recognized, and the unit's age remains unclear. The main part of the unit is recessive, forming slopes in some areas, and overhung cliffs along steep canyon walls of lower Granite Creek and the Verde River. See the text for a description of this unit's nomenclatural history. 0-20m thick.

Ꞓt — **Tapeats Sandstone (Cambrian)** - Medium- to coarse-grained and locally granule and pebbly quartz sandstone, typically cross-stratified in medium-bedded, tabular and wedge-shaped sets.

Proterozoic Rock Units

Xq — **Del Rio Quartzite (Paleoproterozoic)** - This unit generally consists of fine- to coarse-grained, cross-bedded to plane-bedded, light gray, quartz-rich sandstone with abundant magnetite-rich laminations and thin beds. Sands are commonly cross-stratified in medium- to thick-bedded trough, wedge, and tabular sets, mostly with sweeping asymptotic basal cross-strata. Paleocurrent directions revealed by cross bedding average due south. Unit includes coarse, poorly sorted, red to brown sandstone, and granule (<1 cm) to pebble (<2 cm) conglomerate. Clasts consist almost exclusively of white vein quartz and red jasper or argillite. Somewhat micaceous, medium to coarse, silty sandstone that is reddish due to hematite stain was mapped by Krieger as "argillite" but is here included with the quartzite in most areas.

Xqc — **Del Rio Quartzite, conglomerate unit (Paleoproterozoic)** - Massive to plane-bedded to cross bedded (up to 25 cm thick sets) to channelized coarse sandstone and pebble to cobble conglomerate with clasts dominated by well rounded, 1-10 cm (locally to 25 cm), white vein quartz. Bedding is well defined by variations in grain size and by dark, magnetite(?)-rich sandstone layers. Channels are up to 40 cm deep. White clasts in matrix of reddish brown, magnetite-bearing sandstone are visually striking. Most clasts are subrounded to, less commonly, rounded or subangular. Minor clast component includes fine grained, red siltstone and fine grained sandstone, some perhaps is hornfelsed, and <1% of possible basalt or metabasalt. Three ribs of siliceous conglomerate separated by swaths of buried, less resistant sandstone in S ½ of section 24 suggests development of conglomerate depolobes downstream from channelized upper alluvial fan.

Xqs — **Del Rio Quartzite, silty quartzite unit** - Reddish (hematite-stained), silty, somewhat micaceous sandstone.

Xqu — **Del Rio Quartzite, undivided (Paleoproterozoic)** - Quartzite, pebbly quartzite, and pebble-cobble conglomerate. A heterogeneous sequence of complexly interbedded quartzite, pebbly quartzite, and pebble-cobble conglomerate. Quartzite and pebbly quartzite are invariably cross-stratified in medium- to thick-bedded trough, wedge, and tabular sets, mostly with sweeping asymptotic basal cross-strata. Ripple-laminated zones are also present but not common. Rare, thin, and poorly exposed reddish argillite units are present in some areas. Clasts consist almost exclusively of white vein quartz and red jasper or argillite.

Xm — **Mafic metavolcanic rocks (Paleoproterozoic)** - Lava, pillow lava, hyaloclastite breccia, and minor volcaniclastic rocks. Plagioclase phenocrysts are recognizable in some of these rocks, but the mafic phenocrysts are either altered or metamorphosed beyond recognition. Also includes some fine-grained, sparsely plagioclase-porphyritic dacitic lava and/or hypabyssal rocks.

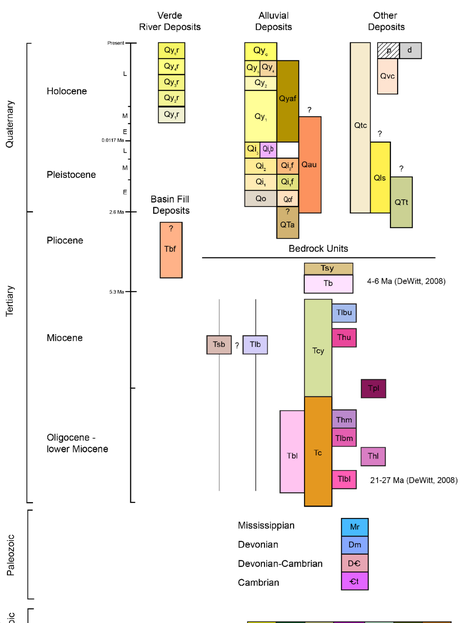
Xs — **Metasedimentary rocks (Paleoproterozoic)** - Quartzite-biotite-sericite schist and psammitic schist. Compositional layering in these rocks is strongly reminiscent of relict bedding. The layering typically ranges between a few cm to a meter. In one area, to the northwest, the layering is very well preserved in the form of graded beds (in the form of mica-rich zones with wispy laminae suggestive of ripple-lamination at the top of thicker psammitic intervals) strongly reminiscent of turbidite Bouma (1962) ac and/or abc divisions. The schist is invariably intruded by quartz veinlets locally as much as 10% of the rock. Schistosity invariably produces a strong intersection lineation which is in some places parallel to a crenulation lineation along compositionally layered "bedding" surfaces.

Map Symbol Descriptions

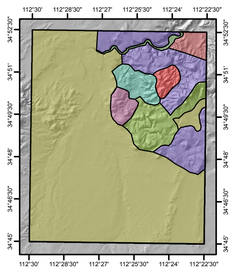
- bedding, horizontal
- bedding, inclined
- bedding, inclined, approximate
- bedding, inclined w/tops known
- bedding, overturned
- bedding, overturned w/ tops known
- generic primary igneous foliation, inclined
- inclined flow foliation
- inclined schistosity
- vetical first generation tectonic fabric
- lineation at intersection of bedding and clevage
- fault attitude
- apparent dip
- anticline, color red
- overturned anticline, color red
- syncline, color red
- overturned syncline, color red
- monocline, color red
- Paleocurrent direction determined from clast imbrication. Plunge is not shown for gently dipping strata. Plunge value indicated otherwise. Negative plunge indicates transport in up-plunge direction.
- Multiple paleocurrent directions

- Contact, accurate
- Contact, approximate
- Contact, concealed
- Gradational contact
- Intraformational contact or marker horizon
- Fault, accurate
- Fault, approximate
- Fault, concealed
- Fault, concealed, hypothetical
- Fault, approximate, hypothetical
- Anticline, accurate
- Anticline, approximate
- Anticline, buried
- Syncline, accurate
- Syncline, buried
- Mafic dike

Correlation of Map Units



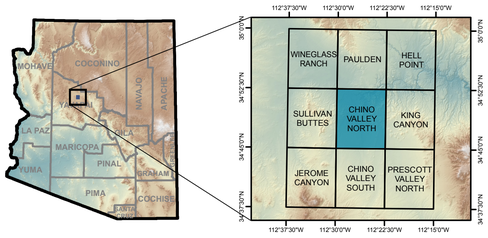
Mapping Responsibility



- Cook, J.P.
- Ferguson, C.A.
- Ferguson, C.A. and Gootee, B.F.
- Ferguson, C.A. and Spencer, J.E.
- Gootee, B.F.
- Gootee, B.F. and Ferguson, C.A.
- Spencer, J.E.
- Spencer, J.E., Ferguson, C.A., and Gootee, B.F.

Location Map

Mapped Area Shown in Blue



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