



Arizona Geological Survey
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Map showing the orientation of layering and faults in the San Carlos-Safford-Duncan Nonpoint-Source Management area, east-central Arizona

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Map Units

- Qs** Sand, gravel, clay (Quaternary). Non-indurated to moderately indurated very poorly sorted sand and gravel, very fine-grained sand to clay in basin center areas. Includes basin fill units that post-date most or all Tertiary tectonism.
- Ts** Non-consolidated sedimentary rocks (Miocene and Pliocene). Sand, gravel, clay in older basin fill deposits; weakly to moderately indurated; locally faulted and slightly tilted as a result of late Miocene tectonism. Includes salt and gypsum deposits in subsurface of Safford Basin.
- QTb** Young volcanic rock (Pliocene and Pleistocene). Mostly basalt lava flows in southern part of map area. Overlie and interbedded with Qs or Ts at or near the present surface. Generally flat-lying and unfaulked.
- TKv** Volcanic rocks (Cretaceous, Oligocene, and Miocene). Compositionally and texturally variable rocks related to Laramide and Middle Tertiary volcanic activity. Includes associated fine-grained intrusive rocks. Rapid lateral variations in lithology, and association of faulting and hydrothermal activity with eruption of these rocks makes this unit extremely heterogeneous. Andesitic lavas and associated fragmental rocks, and siliceo-pyroclastic rocks are most abundant components. Gently tilted Oligocene to Early Miocene tuffs and lavas underlie most of the northern and eastern part of the map area. More complexly faulted and hydrothermally altered Cretaceous to Early Tertiary volcanic rocks underlie the Middle Tertiary volcanic rocks along the southwestern margin of the Gila Mountains. Strongly faulted and hydrothermally altered Cretaceous to Early Tertiary volcanic rocks are present along the Apache Pass fault zone in the southern Coconino Mountains and west of the Santa Teresa Mountains. These rocks are typically highly fractured from early in their history due to processes of deposition and cooling.
- MpCs** Bedded sedimentary rocks (Middle Proterozoic to Cretaceous). Sandstone, quartzite, limestone, dolomite, shale and conglomerate of Apache Group, Paleozoic section, and Bisbee Group. Units characterized by initially horizontal bedding, and relatively great lateral continuity of lithologic units. Glance conglomerate a base of the Bisbee Group is an exception to this, with rapid lateral variations in thickness and lithology. Fracturing in these rocks is typically parallel or perpendicular to the bedding.
- TrCi** Massive igneous rocks (Proterozoic, Mesozoic and Tertiary). Mafic to felsic intrusive igneous rocks. Characterized by general absence of penetrative fabric and irregular intrusive contacts. Some foliated Precambrian granites are included. Includes diabase intruding Apache Group. Fracturing in these rocks is controlled by external stresses and the geometry of existing fractures.
- pCm** Metamorphic rocks (Early Proterozoic). Schist and gneiss, mostly quartzo-feldspathic or pelitic in composition. Characterized by metamorphic foliation that may be quite regular and planar over 100's of meters or irregular and variable on a scale of meters. Metamorphic foliation defined by variations in mineral content or by alignment of planar mineral grains. In domains of well developed and relatively consistent foliation, fracturing develops preferentially along the foliation.

- Symbols**
- Contacts**
Intrusive or depositional
 - Faults**
— Accurate to line width; arrow shows direction of dip; number is magnitude of dip
..... Concealed
 - Orientation of layering**
⊙ Horizontal (dp = 0°)
↑ Inclined, with dp
↓ Vertical (dp = 90°)
↖ Overturned, with dp
 - Metamorphic foliation**
↑ Inclined, with dp
↓ Vertical (dp = 90°)

