



Geology mapped by R.J. Grubensky, G.B. Haxel, R.W. Koch, D.K. Sherrod, and R.W. Toedall, 1986-1988; and F.K. Miller, 1963-1966.

Base from U.S. Geological Survey Red Bluff Mountain and Roll, 1955; Kofa Butte, Livingston Hills, Quartzsite, and Vicksburg, 1962; Castle Dome Mountains and Engesser Pass, 1965.

DESCRIPTION OF MAP UNITS

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| <p>Qa Alluvium (Quaternary and Tertiary)—Unconsolidated to poorly consolidated, poorly to moderately sorted conglomerate, sandstone, and breccia. Includes alluvial fan deposits that fringe the mountains and active alluvium in arroyos. This is chiefly Holocene and Pleistocene, but includes some low-standing gravel pediments that may be Pliocene in age.</p> <p>Tc Conglomerate (Pliocene(?) and Miocene)—Poorly to well-sorted, micaceous conglomerate, sandstone, and breccia that forms moderately dissected hills, mostly in the Piomaa, New Water, and Kofa Mountains. Unit interfingers with alluvial flows and domes (unit Td) at Black Mesa and Kofa Butte. The oldest strata of the conglomerate unit are as old as early Miocene where they interfinger with dated volcanic rocks in the Piomaa and New Water Mountains.</p> <p>Tb Basalt and andesite (Miocene)—Lava flows and flow breccias of slightly porphyritic olivine basalt and andesite lava flows and breccias. The oldest lava sequences in this unit have been (flat-lying) faulted and tilted up to 30° but the youngest flows are flat-lying. K-Ar ages range from about 18 to 22 m.y. (Shafiqullah and others, 1980; table 2, this report).</p> <p>Tp Intrusive porphyry (Miocene)—Porphyritic to locally aphanitic rhyolite and subordinate dacite stocks, irregular intrusions, and dikes (dikes are not mapped). This is in part equivalent to intrusive rocks of the alluvial flows and dome unit (Tb).</p> <p>Ts Silicic flows and domes (Miocene)—Thick dacite to rhyolite lava flows, domes, subvolcanic intrusions, and minor ash-flow tuff, tuffaceous sandstone, and basalt. Unit typically caps the volcanic sequence in the Kofa and Castle Dome Mountains, where basalt (unit Tc) is generally absent, but interfingers with basalt in the Piomaa and New Water Mountains. K-Ar ages range from about 14 to 20 m.y.; part of the unit may be as old as 22 to 23 m.y., based on K-Ar dates obtained from the top portion of underlying tuff and tuffaceous rocks (unit Tc).</p> <p>Tt Tuff and tuffaceous rocks (Miocene and Oligocene)—Non-welded to heavily welded rhyolitic ash-flow tuff; moderately to well-sorted rhyolitic sandstone, tuff breccia, and conglomerate; and minor dacite lava flows, domes, and subvolcanic intrusions. Thick accumulations of sandstone to dacite lava flows occur near the base of the unit in the Castle Dome Mountains. Unit includes several widespread proclastic flow sheets; most occur on these widespread ash-flow tuffs range from about 22 to 24 m.y. The oldest K-Ar age is about 25 m.y., near the base of the Tertiary volcanic section in the Castle Dome Mountains (Outman, 1988).</p> | <p>Tm Sedimentary and tectonic breccia (Tertiary)—Quartzofeldspathic breccia, including both tectonic breccia and sedimentary breccia with sparse interbedded conglomerate and sandstone. Interbedded with welded ash-flow tuff in the southern Castle Dome Mountains.</p> <p>Tj Granite and schist porphyry (Miocene)—Medium-grained hornblende-biotite and biotite granite, and related rhyolite porphyry and, locally, intrusive rhyolite. Abundant associated dikes are not mapped.</p> <p>Tg Alaskitic granite (Cretaceous(?))—Coarse-grained to pegmatitic alaskitic granite.</p> <p>Td Granite and granodiorite (Cretaceous or Jurassic)—Comprises two distinct but consistently associated rock types: medium-grained biotite granite and granodiorite, and coarse-grained highly leucocratic biotite granite.</p> <p>Tn New Water Mountains Permian and stellar strata (Cretaceous and Jurassic(?))—Variably metamorphosed sandstone, conglomerate, siltstone, and siltstone (Sherrod and Cooper, 1983). This unit locally includes metamorphic rocks similar to those of unit Tc.</p> <p>Tz Orocopia schist (Late Mesozoic protolith, late Cretaceous metamorphism)—Fraggy weathering, two-mica quartzofeldspathic schist with rare hornblende schist, quartzite (cataclytic), and siltstone marble, overlain by Chocolate Mountains thrust (Haxel and Miller, 1970).</p> <p>Tq Granodiorite, granite, diorite (Jurassic and Jurassic(?))—Older medium- to coarse-grained hornblende-biotite granodiorite; younger medium- to coarse-grained to locally pegmatitic leucocratic biotite granite; and several varieties of dioritic rocks, none older than the granodiorite, where younger than the granite. Rocks of the unit are widely proportionally altered; and are foliated to granitic in an area within several kilometers of King of Arizona mine.</p> <p>Tl Rhyolite and schist (Jurassic(?))—Quartzofeldspathic to amphibolite rhyolite and schist, predominantly derived from the siltstone, sandstone, and argillite of unit Tc. Hornblende and (or) tourmaline are common in quartzofeldspathic schist.</p> | <p>Ta Siltstone, sandstone, argillite (Jurassic(?))—Siltstone, and subordinate sandstone and mudstone, all locally somewhat calcareous, and rocks interstratified between these types. Texturally, rocks of unit range from megacrystically metamorphosed to argillite to locally phyllite.</p> <p>Tb Sedimentary and volcanic rocks of Shungitina (Jurassic(?))—Rhyolitic volcanic, volcanoclastic, and hypabyssal or subvolcanic rocks; interstratified sandstone and volcanic wackes; conglomerate to sedimentary breccia; sandstone, including argillite; siltstone and argillite; and low-grade metamorphic derivatives of these rock types (Haxel and others, 1983).</p> <p>Tc Metavolcanic rocks; porphyry (Jurassic and Jurassic(?))—In northeastern part of map area: massive to schistose, rhyolitic to dacitic volcanic, volcanoclastic, and hypabyssal rocks (Miller, 1970). In southern Castle Dome Mountains: slightly metamorphosed schistose (locally porphyry).</p> <p>Td Gneiss (Mesozoic and (or) Proterozoic)—Coarsely layered staurolite quartzofeldspathic gneiss, with subordinate amphibolite gneiss and leucocratic quartzofeldspathic gneiss.</p> <p>Te Limestone of marble, sandstone or quartzite (Paleozoic)—Limestone and dolomite, in part cherty; argillite; sandy shale; and their metamorphic derivatives: marble, calc-silicate schist and granulite, quartzite, quartzofeldspathic schist.</p> <p>Tf Granite (Proterozoic and Proterozoic(?))—Medium- to coarse-grained biotite and hornblende-biotite granite; may include some Jurassic granitoid rocks similar to those of unit Tc.</p> |
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GEOLOGIC BASE MAP FOR MINERAL RESOURCE ASSESSMENT,
Kofa NATIONAL WILDLIFE REFUGE, SOUTHWESTERN ARIZONA

Compiled by

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This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.