

SYMBOL	DESCRIPTION OF MAP UNITS	UNIT	DESCRIPTION OF MAP UNITS	UNIT	
Qw	<b>Alluvium of modern washes (Quaternary)</b> --Unconsolidated, locally derived gravel and sand	Kmi	<b>Member I (Cretaceous)</b> --Light-gray, medium- to coarse-grained arkosic and micaceous sandstone, conglomeratic sandstone, and dacitic composition. In Big Maria Mountains, includes dacite that has a hornblende K-Ar age of 21.7±2.8 Ma (Martin and others, 1982)	Jai	<b>Sedimentary rocks of Apache Wash (Cretaceous or Jurassic)</b> --Finning-upward sequence of conglomerate, sandstone, and siltstone, structurally interleaved on low-angle faults with the lower part of the McCoy Mountains Formation (unit Kmlu) in the southern Piomosa Mountains. Age relation to the McCoy Mountains Formation uncertain (Harding and Coney, 1985). Thickness in the vicinity of Apache Wash approximately 1,900 m (Harding, 1980). Divided into:
Qr	<b>Alluvium of the modern Colorado River floodplain (Quaternary)</b> --Unconsolidated sand, silt, and mud, largely converted to farmland	Kmh	<b>Member H (Cretaceous)</b> --Light-gray, fine-grained arkosic sandstone, conglomeratic sandstone, and shale, all micaceous and phyllitic. Thickness approximately 50 to 250 m	Jk	<b>Siltstone</b> --Light- to medium-gray, thin-bedded siltstone and minor fine-grained sandstone. Graded beds common. Thickness approximately 900 m (Harding, 1980)
Qp	<b>Playa lake deposits (Quaternary)</b> --Unconsolidated silt, mud, and evaporitic sediment	Kmg	<b>Member G (Cretaceous)</b> --Lower part consists of light-gray to tan phyllitic and calcareous shale; tan calcareous sandstone; and conglomerate containing clasts of quartzite and carbonate	Jkac	<b>Conglomerate and sandstone</b> --Brownish-yellow to reddish-brown, massive conglomerate composed primarily of poorly sorted, angular clasts of quartzite, carbonate rocks, and volcanic rocks; and sandstone to dark-gray arkosic sandstone. Conglomerate decreases in abundance upsection and from south to north. In southern part of outcrop area, conglomerate locally contains large, angular blocks and slabs of quartzite and carbonate rocks as much as several hundred meters long, interbedded with siltstone. Graded beds locally present in sandstone. Thickness in vicinity of Apache Wash approximately 1,000 m (Harding, 1980)
Qs	<b>Windblown sand (Quaternary)</b> --Unconsolidated sand dunes and sheets	Kmi	<b>Member I (Cretaceous)</b> --Light- to medium-gray, fine- to coarse-grained arkosic sandstone and conglomerate interbedded with less abundant light-gray phyllitic shale. Dark-gray to dark-greenish-gray, very fine grained to fine-grained volcanic-lithic sandstone and siltstone present in upper part. Conglomerate clasts are granitic rocks, quartzite, volcanic rocks, and minor carbonate rocks. Fines upward from conglomerate and sandstone in lower part to very fine grained sandstone and siltstone in upper part. Basal contact with lower part of McCoy Mountains Formation part. Basal contact is locally unconformable. In Dome Rock Mountain (unit Kmlu) is locally unconformable. In Dome Rock Mountain includes a lenticular, 5-m-thick turf bed that has a U-Pb zircon age of 78±2 Ma (Tosdal, 1988). On this basis, members F through L (units Kmf through Kml) are considered to be of Late Cretaceous age. Thickness in McCoy Mountains approximately 2,600 m	Jkbc	<b>Lower part, undivided (Cretaceous or Jurassic)</b> --In Dome Rock Mountain, Piomosa Mountains, and Livingston Hills. Lower part of unit consists of tan quartzose sandstone and maroon mudstone and siltstone correlative with member A (unit Kma). Upper part consists of greenish-gray, impure quartzose sandstone, siltstone, mudstone, and minor conglomerate that may be correlative with members C and E (units Kmc and Kme). Conglomerate clasts are quartzite and volcanic rocks. Strata equivalent to members B and D (units Kmb and Kmd) are not recognized. Maximum thickness approximately 2,350 m (Harding, 1982; Harding and Coney, 1985)
Qta	<b>Alluvial-fan and fluvial deposits (Quaternary and Tertiary?)</b> --Unconsolidated to weakly consolidated gravel and sand forming alluvial fans and sediment bodies that underlie terraces of the Colorado River. Alluvial-fan deposits consist of angular, poorly sorted gravel and sand derived from local mountains. Fluvial deposits, primarily exposed adjacent to the Colorado River where they interfinger with alluvial-fan deposits, consist of rounded, moderately to well sorted gravel and sand carried into the area by the ancestral Colorado River. Fluvial deposits commonly are crossbedded. Unit may include equivalents of the dissected fan deposits (unit Qtdf), fluvial gravel deposits (unit Qtrg), and fluvial sand deposits (unit Qtsf)	Kmf	<b>Member F (Cretaceous)</b> --Light- to medium-gray, fine- to coarse-grained arkosic sandstone and conglomerate interbedded with less abundant light-gray phyllitic shale. Dark-gray to dark-greenish-gray, very fine grained to fine-grained volcanic-lithic sandstone and siltstone present in upper part. Conglomerate clasts are granitic rocks, quartzite, volcanic rocks, and minor carbonate rocks. Fines upward from conglomerate and sandstone in lower part to very fine grained sandstone and siltstone in upper part. Basal contact with lower part of McCoy Mountains Formation part. Basal contact is locally unconformable. In Dome Rock Mountain (unit Kmlu) is locally unconformable. In Dome Rock Mountain includes a lenticular, 5-m-thick turf bed that has a U-Pb zircon age of 78±2 Ma (Tosdal, 1988). On this basis, members F through L (units Kmf through Kml) are considered to be of Late Cretaceous age. Thickness in McCoy Mountains approximately 2,600 m	Jkbc	<b>Upper bedded unit</b> --Thin- to thick-bedded, fine-grained, felsic tuff and tuffaceous sedimentary rocks that form the uppermost part of the Dome Rock sequence and concordantly underlie the McCoy Mountains Formation
Tbom	<b>Basalt of Black Mesa (Miocene)</b> --Olivine basalt flows that cap Black Mesa and other mesas in the southern Piomosa Mountains. K-Ar whole-rock age of 17.2±0.43 Ma (Shafiqullah and others, 1980)	Kmg	<b>Member G (Cretaceous)</b> --Lower part consists of light-gray to tan phyllitic and calcareous shale; tan calcareous sandstone; and conglomerate containing clasts of quartzite and carbonate	Jkbc	<b>Lower bedded unit</b> --Dark, thin-bedded, strongly metamorphosed sedimentary or volcanoclastic rocks that form the lowermost exposed part of the Dome Rock sequence. Rocks are composed largely of calc-silicate minerals, quartz, and biotite
Tls	<b>Limestone and calcareous sandstone (Miocene)</b> --Fine-grained, thin-bedded calcareous rocks near base of the Tertiary section in central Piomosa Mountains	Kmh	<b>Member H (Cretaceous)</b> --Light-gray, fine-grained arkosic sandstone, conglomeratic sandstone, and shale, all micaceous and phyllitic. Thickness approximately 50 to 250 m	Jkbc	<b>Upper bedded unit</b> --Thin- to thick-bedded, fine-grained, felsic tuff and tuffaceous sedimentary rocks that form the uppermost part of the Dome Rock sequence and concordantly underlie the McCoy Mountains Formation
Tg	<b>Granite (Miocene)</b> --Fine- to coarse-grained biotite granite and hornblende-biotite granite, locally foliated and lineated. U-Pb zircon age of 20.9±3.2 Ma (Knapp, 1989)	Kmi	<b>Member I (Cretaceous)</b> --Light-gray, medium- to coarse-grained arkosic and micaceous sandstone, conglomeratic sandstone, and dacitic composition. In Big Maria Mountains, includes dacite that has a hornblende K-Ar age of 21.7±2.8 Ma (Martin and others, 1982)	Jkbc	<b>Lower bedded unit</b> --Dark, thin-bedded, strongly metamorphosed sedimentary or volcanoclastic rocks that form the lowermost exposed part of the Dome Rock sequence. Rocks are composed largely of calc-silicate minerals, quartz, and biotite
Qtdf	<b>Dissected fan deposits (Quaternary or Tertiary)</b> --Weakly consolidated, locally derived gravel and sand (fanglomerate) forming dissected, longitudinal hills and ridges near mountain fronts	Kmg	<b>Member G (Cretaceous)</b> --Lower part consists of light-gray to tan phyllitic and calcareous shale; tan calcareous sandstone; and conglomerate containing clasts of quartzite and carbonate	Jkbc	<b>Lower bedded unit</b> --Dark, thin-bedded, strongly metamorphosed sedimentary or volcanoclastic rocks that form the lowermost exposed part of the Dome Rock sequence. Rocks are composed largely of calc-silicate minerals, quartz, and biotite
Ktg	<b>Granite (Tertiary and/or Cretaceous)</b> --Fine- to coarse-grained biotite granite that intrudes the migmatitic gneiss of Mesquite Mountain (unit Kmg). Age is inferred to be either latest Cretaceous and/or earliest Tertiary (Knapp, 1989)	Kmh	<b>Member H (Cretaceous)</b> --Light-gray, fine-grained arkosic sandstone, conglomeratic sandstone, and shale, all micaceous and phyllitic. Thickness approximately 50 to 250 m	Jkbc	<b>Lower bedded unit</b> --Dark, thin-bedded, strongly metamorphosed sedimentary or volcanoclastic rocks that form the lowermost exposed part of the Dome Rock sequence. Rocks are composed largely of calc-silicate minerals, quartz, and biotite
Kgp	<b>Gneissic porphyritic granite (Cretaceous)</b> --Distinctly to indistinctly foliated and lineated gneiss, medium- to coarse-grained biotite granite to granodiorite containing phenocrysts of potassium feldspar 1 to 5 cm long. Age in northern Dome Rock Mountains is Late Cretaceous on the basis of unpublished U-Pb analysis of zircon (R.M. Tosdal, oral commun., 1990). Rocks in Little Maria Mountains are considered part of the Late Cretaceous Cadiz Valley batholith (K.A. Howard, oral commun., 1990), parts of which intrude the McCoy Mountains Formation in the Coxcox Mountains 30 km west of the map area. A biotite K-Ar age of 55.2±7.8 Ma, indicating the minimum age of crystallization, has been reported for a sample from the Little Maria Mountains (Martin and others, 1982)	Kmi	<b>Member I (Cretaceous)</b> --Light-gray, medium- to coarse-grained arkosic and micaceous sandstone, conglomeratic sandstone, and dacitic composition. In Big Maria Mountains, includes dacite that has a hornblende K-Ar age of 21.7±2.8 Ma (Martin and others, 1982)	Jkbc	<b>Lower bedded unit</b> --Dark, thin-bedded, strongly metamorphosed sedimentary or volcanoclastic rocks that form the lowermost exposed part of the Dome Rock sequence. Rocks are composed largely of calc-silicate minerals, quartz, and biotite
Qtrg	<b>Fluvial gravel deposits</b> --Deposits composed primarily of rounded gravel	Kmg	<b>Member G (Cretaceous)</b> --Lower part consists of light-gray to tan phyllitic and calcareous shale; tan calcareous sandstone; and conglomerate containing clasts of quartzite and carbonate	Jkbc	<b>Lower bedded unit</b> --Dark, thin-bedded, strongly metamorphosed sedimentary or volcanoclastic rocks that form the lowermost exposed part of the Dome Rock sequence. Rocks are composed largely of calc-silicate minerals, quartz, and biotite
Qtsf	<b>Fluvial sand deposits</b> --Deposits composed primarily of well-sorted, light-colored sand and minor rounded gravel; commonly crossbedded	Kmh	<b>Member H (Cretaceous)</b> --Light-gray, fine-grained arkosic sandstone, conglomeratic sandstone, and shale, all micaceous and phyllitic. Thickness approximately 50 to 250 m	Jkbc	<b>Lower bedded unit</b> --Dark, thin-bedded, strongly metamorphosed sedimentary or volcanoclastic rocks that form the lowermost exposed part of the Dome Rock sequence. Rocks are composed largely of calc-silicate minerals, quartz, and biotite
House Formation (Pliocene)	--Marine to brackish-water sedimentary rocks interpreted to have been deposited in an embayment of the Gulf of California (Metzger and others, 1973). Divided into:	Kmi	<b>Member I (Cretaceous)</b> --Light-gray, medium- to coarse-grained arkosic and micaceous sandstone, conglomeratic sandstone, and dacitic composition. In Big Maria Mountains, includes dacite that has a hornblende K-Ar age of 21.7±2.8 Ma (Martin and others, 1982)	Jkbc	<b>Lower bedded unit</b> --Dark, thin-bedded, strongly metamorphosed sedimentary or volcanoclastic rocks that form the lowermost exposed part of the Dome Rock sequence. Rocks are composed largely of calc-silicate minerals, quartz, and biotite
Tbs	<b>Fine-grained sedimentary rocks</b> --Thin-bedded mudstone, siltstone, fine-grained sandstone, and limestone. Mudstone is green to red and plane bedded; siltstone and sandstone are tan and plane bedded to crossbedded. Equivalent to the basal limestone unit and the interbedded unit of Metzger and others (1973)	Kmg	<b>Member G (Cretaceous)</b> --Lower part consists of light-gray to tan phyllitic and calcareous shale; tan calcareous sandstone; and conglomerate containing clasts of quartzite and carbonate	Jkbc	<b>Lower bedded unit</b> --Dark, thin-bedded, strongly metamorphosed sedimentary or volcanoclastic rocks that form the lowermost exposed part of the Dome Rock sequence. Rocks are composed largely of calc-silicate minerals, quartz, and biotite
Tbt	<b>Tuffa</b> --Thin (generally less than 2 m), locally extensive sheets of white to light-gray limestone coating Miocene and older bedrock units. Locally includes minor conglomerate	Kmh	<b>Member H (Cretaceous)</b> --Light-gray, fine-grained arkosic sandstone, conglomeratic sandstone, and shale, all micaceous and phyllitic. Thickness approximately 50 to 250 m	Jkbc	<b>Lower bedded unit</b> --Dark, thin-bedded, strongly metamorphosed sedimentary or volcanoclastic rocks that form the lowermost exposed part of the Dome Rock sequence. Rocks are composed largely of calc-silicate minerals, quartz, and biotite
Tbx	<b>Sedimentary breccia (Miocene and Oligocene?)</b> --Unbedded, unsorted deposits of angular gravel and slide blocks, commonly monolithologic. Interpreted as landslide deposits. Largest slide blocks are shown as a separate unit (Tsb)	Kmi	<b>Member I (Cretaceous)</b> --Light-gray, medium- to coarse-grained arkosic and micaceous sandstone, conglomeratic sandstone, and dacitic composition. In Big Maria Mountains, includes dacite that has a hornblende K-Ar age of 21.7±2.8 Ma (Martin and others, 1982)	Jkbc	<b>Lower bedded unit</b> --Dark, thin-bedded, strongly metamorphosed sedimentary or volcanoclastic rocks that form the lowermost exposed part of the Dome Rock sequence. Rocks are composed largely of calc-silicate minerals, quartz, and biotite
Tsb	<b>Slide blocks (Miocene and Oligocene?)</b> --Large, angular blocks and slabs of Mesozoic(?) and Paleozoic carbonate rocks and quartzite interpreted to have been deposited by landslides. Generally brecciated	Kmg	<b>Member G (Cretaceous)</b> --Lower part consists of light-gray to tan phyllitic and calcareous shale; tan calcareous sandstone; and conglomerate containing clasts of quartzite and carbonate	Jkbc	<b>Lower bedded unit</b> --Dark, thin-bedded, strongly metamorphosed sedimentary or volcanoclastic rocks that form the lowermost exposed part of the Dome Rock sequence. Rocks are composed largely of calc-silicate minerals, quartz, and biotite
Tvs	<b>Volcanic and sedimentary rocks, undivided (Miocene and Oligocene?)</b> --In upper plate of detachment fault in northern Piomosa Mountains. In descending order, general stratigraphic sequence is: fanglomerate; rhyolitic to andesitic volcanic rocks and carbonate slide blocks; limestone, shale, and ash-flow tuff; and arkosic sandstone and fanglomerate (Scarborough and Meader, 1983, 1989). Includes ash-flow tuff that has a biotite K-Ar age of 24.6±1.6 Ma (Eberly and Stanley, 1978; age recalculated by the method of Dalrymple, 1979)	Kmh	<b>Member H (Cretaceous)</b> --Light-gray, fine-grained arkosic sandstone, conglomeratic sandstone, and shale, all micaceous and phyllitic. Thickness approximately 50 to 250 m	Jkbc	<b>Lower bedded unit</b> --Dark, thin-bedded, strongly metamorphosed sedimentary or volcanoclastic rocks that form the lowermost exposed part of the Dome Rock sequence. Rocks are composed largely of calc-silicate minerals, quartz, and biotite
Tf	<b>Fanglomerate (Miocene and Oligocene?)</b> --Distinctly to indistinctly bedded, poorly to well sorted conglomerate and sandstone containing angular, locally derived clasts	Kmi	<b>Member I (Cretaceous)</b> --Light-gray, medium- to coarse-grained arkosic and micaceous sandstone, conglomeratic sandstone, and dacitic composition. In Big Maria Mountains, includes dacite that has a hornblende K-Ar age of 21.7±2.8 Ma (Martin and others, 1982)	Jkbc	<b>Lower bedded unit</b> --Dark, thin-bedded, strongly metamorphosed sedimentary or volcanoclastic rocks that form the lowermost exposed part of the Dome Rock sequence. Rocks are composed largely of calc-silicate minerals, quartz, and biotite
Tfbc	<b>Fanglomerate, sedimentary breccia, and slide blocks, undivided (Miocene and Oligocene?)</b> --In Riverside Mountains	Kmg	<b>Member G (Cretaceous)</b> --Lower part consists of light-gray to tan phyllitic and calcareous shale; tan calcareous sandstone; and conglomerate containing clasts of quartzite and carbonate	Jkbc	<b>Lower bedded unit</b> --Dark, thin-bedded, strongly metamorphosed sedimentary or volcanoclastic rocks that form the lowermost exposed part of the Dome Rock sequence. Rocks are composed largely of calc-silicate minerals, quartz, and biotite

## PRELIMINARY GEOLOGIC MAP OF THE BLYTHE 30' BY 60' QUADRANGLE, CALIFORNIA AND ARIZONA

By  
**Paul Stone**

1990

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