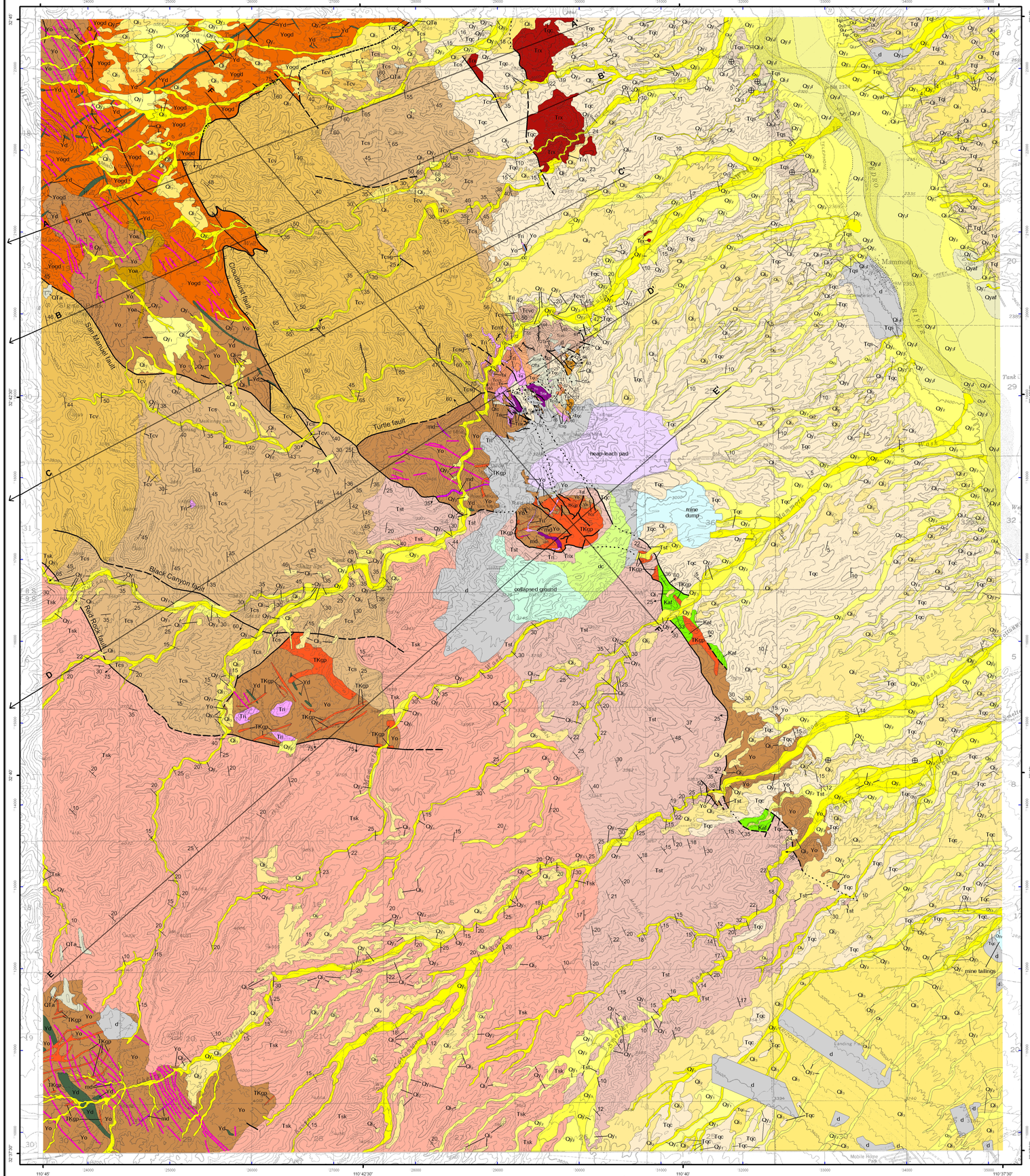

GEOLOGIC MAP OF THE MAMMOTH 7 ½' QUADRANGLE, PINAL COUNTY, ARIZONA

by
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Arizona Geological Survey Digital Geologic Map 67
(DGM-67), version 1.0
Sheet 1 of 2

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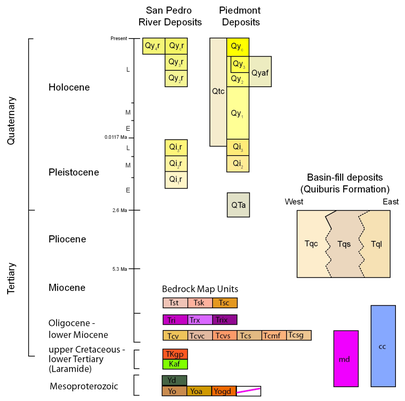
Mammoth 7.5' Quadrangle Time-Stratigraphic Correlation of Units

(Uppermost Holocene anthropogenic units are not shown)



Map Unit Descriptions

Miscellanous Quaternary Units

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

d — **Disturbed ground (upper Holocene)** - Areas substantially modified by mining and other human activity. Original geologic features are obscure.

collapsed ground — **Area of collapsed ground above underground ore-removal zone at San Manuel mine** - Area of collapsed ground above underground block-caving ore-removal zone at San Manuel mine

dc — **Disturbed and collapsed ground, undivided** - Disturbed and collapsed ground associated with the San Manuel Mine.

mine dump — **Waste rock produced by mining** - Rock debris derived from ore-deposit overburden (mine waste)

mine tailings — **Mine tailings** - Tailings derived from processing ore from the San Manuel mine.

heap-leach pad — **Former heap-leach pad for oxide copper ore derived from the San Manuel ore body** - Former heap-leach pad for oxide copper ore derived from the upper part of the San Manuel ore body, now landscaped to resemble a hill.

Qtc — **Quaternary talus and colluvium** - Unconsolidated to weakly consolidated, very poorly sorted, angular, weakly bedded to massive, angular rock debris deposited at the base of bedrock slopes.

San Pedro River Alluvium

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

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

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

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

Qlf r — **Late Pleistocene river terrace deposits** - Gravelly, sandy river terrace deposits up to 25 m above the active river channel.

Qlf r — **Middle to late Pleistocene river terrace deposits** - Older, higher gravelly, sandy river terrace deposits.

Qlf r — **Early to middle Pleistocene river gravel terraces** - Oldest, highest preserved gravelly, sandy river terrace deposits.

Piedmont Deposits

Qy f — **Active tributary channel alluvium** - Unconsolidated, very poorly sorted sandy to cobbly ephemeral piedmont-tributary channel deposits.

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

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

Qyaf — **Late Holocene alluvial fan** - Active portions of young fan deposits exhibiting distributary drainage patterns.

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

Ql f — **Late Pleistocene alluvium** - Gravelly and sandy late Pleistocene fan and terrace deposits with moderately developed orange-colored soils.

Ql f — **Middle to late Pleistocene alluvium** - Gravelly and sandy late Pleistocene fan and terrace deposits with moderately developed orange-colored soils.

QTa — **Quaternary-Tertiary alluvium** - Sand and gravel alluvial deposits capping Quiburis-age and older deposits in topographically elevated areas.

Basin-Fill Deposits

Tqc — **Late Miocene to Pliocene Quiburis deposits, conglomeratic facies** - Gravelly to sandy, moderately to strongly indurated alluvial fan deposits

Tqs — **Late Miocene to Pliocene Quiburis deposits, sandflat facies** - Moderately indurated distal alluvial-fan sandstone and silty sandstone (sandflat facies), lacustrine silty strata, and gypsiferous fine sandy to silty lake-margin deposits.

Tql — **Late Miocene to Pliocene Quiburis deposits, lacustrine facies** - Fine-grained, laminated playa and lacustrine deposits

Miocene San Manuel Formation

Tst — **San Manuel Formation, Tucson Wash Member** - Conglomerate and conglomeratic sandstone derived from Cloudburst and Galiuro Volcanics. Paleocurrent directions, indicated by clast imbrication, are dominant southwesterly (Dickinson, 1993).

Tsk — **San Manuel Formation, Kannally Member** - Conglomerate and conglomeratic sandstone derived largely from Oracle Granite. Paleocurrent directions, indicated by clast imbrication, are dominantly east-northeast (Dickinson, 1993).

Tsc — **Weakly to moderately indurated, volcanic-lithic conglomerate** - Volcanic-lithic conglomerate derived from Cloudburst Volcanics but less indurated that Cloudburst Formation. Possibly equivalent to Tucson Wash Member of the San Manuel Formation. Exposed in small areas near the Tiger Mine.

Oligocene to lower Miocene igneous and sedimentary units

Tri — **Intrusive rhyolite** - White to light gray, very fine-grained rhyolite, with 1-2% phenocrysts of quartz, feldspar and trace biotite.

Trix — **Intrusive rhyolitic breccia** - Rhyolite, monolithologic breccia derived from rhyolite, and heterolithologic breccia derived from rhyolite, mafic volcanic rocks (Cloudburst volcanics), and Oracle Granite.

Trx — **Intrusive rhyolite and rhyolite breccia, undivided** - Intrusive rhyolite and rhyolite breccia, undivided.

Tcs — **Cloudburst Formation, sedimentary unit** - Conglomerate and sandstone representing alluvial fan to braidplane facies (Dickinson, 1993). This unit is typically volcanic-lithic and includes breccia derived from Cloudburst volcanics and, locally, from Oracle Granite.

Tcsg — **Cloudburst Formation, granitic sediment facies** - Conglomerate and breccia derived from Oracle Granite and interbedded with Cloudburst volcanics. This unit includes conglomerate with mixed volcanic and granitic clasts.

Tcv — **Cloudburst Formation, volcanic unit** - Massive, crystal-poor to slightly porphyritic, medium to dark gray lava flows and autobreccia, and less abundant volcanic-lithic breccia and massive conglomerate.

Tcvc — **Cloudburst Formation, massive volcanic conglomerate** - Massive to crudely bedded, polymict boulder conglomerate with mafic volcanic clasts and minor Oracle granite grus and clasts.

Tcvs — **Cloudburst formation, volcanic, volcaniclastic, and brecciated rocks, undivided** - Undivided mafic lava flows, rhyolite intrusions, and massive breccia derived from highly variable proportions of rhyolite, Cloudburst volcanics, and Oracle Granite.

Tcmf — **Cloudburst formation, mafic fragmental rock** - Massive monolithologic fragmental rock derived from mafic Cloudburst volcanics.

md — **mafic dike** - Mafic dike containing fine- to medium-grained plagioclase phenocrysts, possibly with hornblende and/or biotite. Age is uncertain but dikes are suspected to be related to the Cloudburst volcanics.

cc — **Undesignated crystalline carbonate** - Bedded and brecciated cherty limestone of unknown age.

Laramide units (upper Cretaceous and lower Tertiary)

TKgp — **Granodiorite porphyry** - Granodiorite porphyry with abundant plagioclase up to 7 mm, less common biotite and hornblende, in a fine-grained gray groundmass that contains fine quartz and K-feldspar as well as plagioclase and mafic minerals (Creasey, 1965).

Kaf — **American Flag Formation** - Conglomerate with clasts of Oracle Granite and volcanic rocks overlain by intermediate volcanics and lava autobreccia (Force, 1997).

Proterozoic units

Aplite dikes - Light cream or buff colored, fine to medium grained aplite dikes.

Yd — **diabase** - Dark greenish gray to olive gray to black, fine to medium grained diabase forming dikes within Oracle Granite.

Yo — **Oracle Granite** - Porphyritic, medium- to coarse-grained biotite granite ("quartz monzonite" of Creasey [1965]).

Yoa — **Oracle Granite, alaskitic** - Equigranular, medium to coarse grained, pale gray alaskite that forms an irregular intrusion in the northwestern part of the map area.

Yogd — **Oracle Granite, granodioritic** - Medium-grained, gray granodiorite containing biotite and hornblende.

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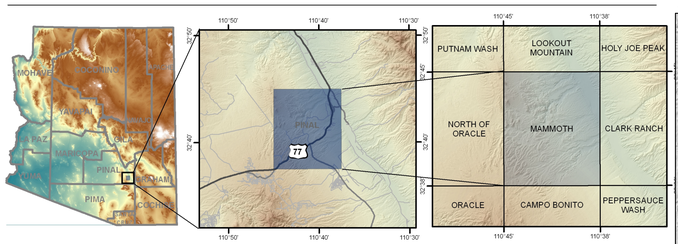
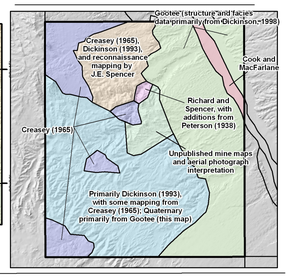
Location Map

Mapped Area Shown in Blue



Mapping Responsibility



Map Symbol Descriptions

- Horizontal bedding
- Inclined bedding showing strike and dip
- Flow foliation
- Fault attitude
- Intermediate dike
- Mafic dike
- Accurately located contact
- Approximately located contact
- Contact, concealed beneath surficial units
- Gradational contact
- Approximately located contact, inferred
- Accurately located fault
- Approximately located fault
- Fault, concealed beneath surficial units
- Approximately located fault, inferred
- Accurately located detachment fault
- Quartz vein

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

2007 MAGNETIC NORTH DECLINATION

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