ARIZONA GEOLOGICAL SURVEY *Contributed Map Series CM 96-D*

GEOLOGY I

RIO SALADO DEVELOPMENT DISTRICT - EASTERN PART, MARICOPA COUNTY, ARIZONA

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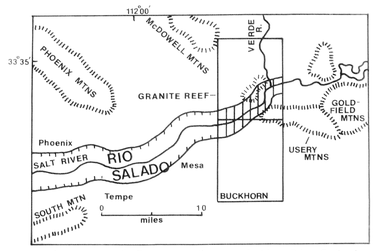
PREPARED IN COOPERATION WITH
DEPARTMENT OF GEOLOGY, ARIZONA STATE UNIVERSITY
RIO SALADO DEVELOPMENT DISTRICT
AND ARIZONA STATE LAND DEPARTMENT



Index map of Eastern Part of the Rio Salado Development District.

Geology by:
T.L.Péwé,1966-1984
J.K.Drosendahl,1982-1984

Base Map From USGS Topographical Maps,1:24,000 Series;Buckhorn(1956), Granite Reef(1964) Quadrangles.

UTM GRID AND 1964 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

Map Symbols

Contact,dashed where gradational or inferred.

Fault,dashed where inferred; U,upthrown side; D,downthrown side.

30 — Dip and strike of beds,in degrees.

A — A' Geologic cross-section of Plate 2A.

Rio Salado Development District boundary.

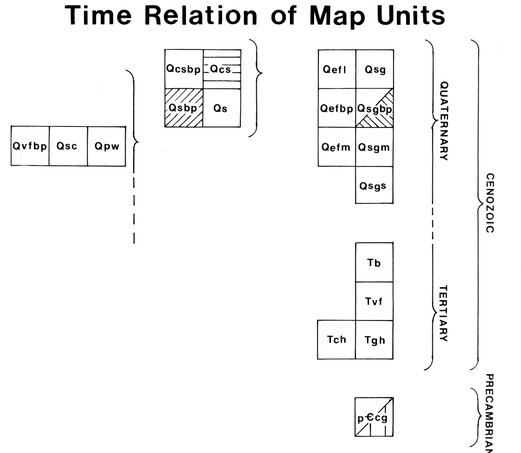
● 17.7-18.7 Age of basalt sills and dikes intruded in Camelshead Formation,in millions of years.

■ 16.3-22.6 Age of Geronimo Head Tuff,in millions of years.

▲ 1.4 Age of Camelback Granite,in billions of years.

Area covered on Plate 2B.

Time Relation of Map Units



Explanation

UNCONSOLIDATED ROCKS

Qsgs Qsgm Qsgbp Qsg — SALT RIVER SAND AND GRAVEL--Moderately to well sorted,well stratified sand and gravel;locally interbedded with silt. Well rounded clasts,2 to 12 inches(5 to 30cm) of Tertiary volcanic rocks(36.3%),Precambrian metamorphic rocks(48.4%), and precambrian granitic rocks(15.3%). Qsgs--strongly calichified sand and gravel of Sawik Terrace. Qsgm--strongly calichified sand and gravel of Mesa Terrace. Qsgbp--weakly calichified sand and gravel of Blue Point Terrace; pattern area covered by thin cover of grus. Qsg--noncalichified sand and gravel of the modern channel.

Qefm Qefbp Qefl — EXTREMELY FINE ALLUVIUM--Gray to tan,moderately to well sorted,well stratified,sandy silt and clay;few to no clasts, averaging 25% sand,75% silt and clay. Qefm--moderately calichified silt over Mesa Terrace gravel. Qefbp--weakly to moderately calichified silt over Blue Point Terrace gravel. Qefl--weakly to noncalichified silt over Lehi Terrace gravel.

Qvfbp — VERY FINE ALLUVIUM--Tan to brown,moderately sorted,moderately well stratified,weakly to moderately calichified,gravely sandy silt and clay,averaging 10% gravel,with subangular to subrounded clasts generally not exceeding 0.5 inch (1.3 cm),35% sand 55% silt and clay. Qvfbp--very fine alluvium over Blue Point Terrace gravel.

Qs Qsbp — SCOUT FORMATION--Moderately to poorly stratified,moderately sorted,unconsolidated sand and gravel,composed of 50% gravel,30% sand and 2% silt and clay; of well rounded clasts,2 to 12 inches(5 to 30cm), and sand of terrace deposits;and angular grains of grus derived from the pediment;noncalichified. Qs--occurs within deeply incised gullies between remnants of the Mesa and Sawik terraces. Qsbp--occurs as a wedge of material overlying the Blue Point Terrace,thickness of the deposit and particle size decreases towards the Salt River.

Qcs Qcsbp — CUBSCOUT FORMATION--Moderately to poorly stratified,moderately sorted,unconsolidated sand and gravel,composed of 30% gravel,40% sand and 30% silt and clay, with well rounded clasts,1 to 5 inches(2.5 to 12.7cm),and sand of terrace deposits;and angular grains of grus derived from the pediment;noncalichified. Qcs--occurs within dissected gullies of the Scout Formation,between remnants of the Mesa and Sawik terraces. Qcsbp--occurs within dissected gullies of the Scout Formation overlying the Blue Point Terrace.

Qsc — SLOPE COLLUVIUM--Gray to buff,poorly sorted,nonstratified, angular,unconsolidated talus on lower bedrock slopes; composed of 30% gravel,15% sand and 55% silt and clay; composed primarily of grus on the south side of the Salt River;on the east slope of Mount McDowell the deposit contains large,1 inch to 5 ft.(2.5 to 152.4cm), clasts of Geronimo Head and Camelshead formations along with grus. Moderately to strongly calichified.

Qpw — PEDIMENT WASH--Pink to grayish orange-pink,poorly sorted arkosic fine-grained gravel;composed of 50% gravel,48% sand and 2% silt and clay;composed of predominately medium to fine-grained,angular fragments of quartz,feldspar and minor mafic minerals. Isolated lag gravel deposits,consisting of fine-grained rock types(aplite, vein quartz and fine-grained metamorphic rocks)occur. Slightly to moderately calichified. Overlies pediment surface and is approximately 2 to 20 ft.(0.6 to 6.1m) thick.

Tvf — VALLEY FILL--Poorly bedded,2 to 20 inches(5 to 50cm),mostly fine silty sand and sandy to clayey silt;with lenses of silty,mostly fine to medium gravel;slightly to strongly indurated by caliche. Clast lithologies include mainly granitic rocks along with metamorphic and volcanic detritus.

CONSOLIDATED ROCKS

Tb — BASALT--Medium gray to brownish gray,fine-grained basalt, mainly consisting of pyroxene(augite) and olivine;in a groundmass of plagioclase feldspars and mafic opaque minerals;highly altered. Secondary calcite has filled vesicles throughout the basalt. Occurs as dikes and sills,and has fault and depositional controlled contacts with the Camelshead and Geronimo Head formations. Coon Bluff deposits approach a basaltic andesite in composition.

Tgh — GERONIMO HEAD FORMATION--White to pale yellow to pinkish white,partially welded to nonwelded,rhyolitic ash flows and epiclastic breccias;lithic inclusions of dacite, granite and basalt. The majority of the deposit has been zeolitized.

Tch — CAMELSHEAD FORMATION--Dusky red to dark red,poorly to moderately sorted and stratified,consolidated arkosic sandstones and boulder conglomerates,composed of granite, schist and quartzite clasts 0.5in. to 10 ft.(1.25cm to 3.0m). The sand stones are composed of .068 to .34 in. (2 to 10mm),angular grains of mainly quartz,orthoclase and plagioclase feldspars.

p€cg — CAMELBACK GRANITE--Pink,coarse-grained to porphyritic granite, contains large pink orthoclase feldspar crystals,0.25 to 0.75 inches(0.5 to 2.0cm). Locally highly sheared and fractured;cut by veins of quartz and dikes of aplite and greenstone;xenoliths of metarhyolite and a mafic fine-grained rock. Pattern are represents area where the granite has been eroded to a gently sloping(10%), slightly undulating pediment surface covered by a thin veneer, 2 ft.(61cm),of grus.

INTRODUCTORY STATEMENT

The eastern part of the Rio Salado Development District (RSDD) encompasses parts of the Granite Reef and Buckhorn topographic quadrangles of the U.S. Geological Survey. This part extends 1 to 2 miles(1.6 to 3.2km.) north and south of the Salt River floodplain and covers an area of about 25 square miles(60sq.km.). The western boundary of the study area is Val Vista Road and the eastern boundary is longitude 111°37'30", approximately 0.5 miles(0.8km.) east of Coon Bluff. Elevations range from 2830 ft. atop Mount McDowell, to about 1270 ft. in the Salt River channel. The geologic formations that occur within the study area range from unconsolidated alluvial clay,silt,sand and gravel;to bedrock of granite,basalt,volcanic tuff and conglomerates. The Verde River joins the Salt River in the eastern part of the area, and the Granite Reef Diversion Dam is located on the Salt River in the central part of the study area.

CLIMATE

The study area is in an arid region where the precipitation and humidity are low and daily temperatures range from 30° to 40°F(16.7° to 22.2°C). Daytime temperatures range from 65°F(18°C) in the winter, to 105°F(40.5°C) during the summer months; night time temperatures range from 38°F(3.3°C) in winter to 75°F(23.9°C) in summer. The average annual precipitation received by the study area is 9.22 inches (23.4cm) and the driest months are May and June. Most of the rain falls during one of two rainy seasons: late summer and late winter. Thunderstorms accompanied by severe dust storms are common from June through September; while moist Pacific air masses bring the gentler, steady rains of the period December to March.

VEGETATION

The RSDD is within the Lower Sonoran Life Zone, as described by Merriam in the late 1800's. Temperature and moisture determine the characteristic vegetation of the different life zones. The Lower Sonoran desert includes creosote,catclaw,acacia,paloverde,mesquite, sage,saltbush,tamarisk and a wide variety of cactus. Local controls on vegetation distributions include soil and rock types and availability of water. Thus, cactus predominate on rocky,well drained slopes; while catclaw,acacia,paloverde,saltbush and other water lovers occur extensively in the washes and river bottoms. Due to the use of irrigation,citrus and other agriculture can be found within this area.

REGIONAL GEOLOGY

The area lies in the Basin and Range physiographic province of southern Arizona. This region is characterized by narrow,uplifted fault block mountain ranges separated by broad elongated,downdropped basins. The most recent normal faulting that produced the Basin and Range province began about 18 million years ago, and was caused by a thinning of the continental crust which created tension in the bedrock. Crustal blocks that were uplifted resulted in the creation of the mountain ranges; while those that subsided formed the basins. Subsequent erosion of the fault block mountains filled the basins with more than 10,000 ft. (3048m) of alluvium. Some of the landforms that are common to the Basin and Range province are: fault block mountains,basins,alluvial fans, pediments,and river terraces.

GEOLOGIC HISTORY

Precambrian granites are the oldest rock formations that are present within the study area and occur within the Usery Mountains an Arizona Dam Butte. Rock formations of the Paleozoic and Mesozoic eras are missing from the stratigraphy of the area. Rapid uplift and subsequent erosion of the Precambrian rocks during Mid-Tertiary time resulted in the deposition of the Valley Fill and Camelshead(fanglomerate) formations,within the basins. These formations lie uncomfortably upon the Precambrian basement. Volcanic activity during the Mid-Tertiary within the Superstition cauldron complex,to the south of the study area,produced welded tuffs and basalt flows that are interbedded with the Camelshead Formation.

The uplift and erosion of the fault block mountains continued,and thousands of feet of silt,sand and gravel along with some evaporites were deposited within the basins. The more recent of these unconsolidated alluvia, comprise one of the major geologic formations of the Rio Salado Development District(RSDD). These formations are differentiated on the basis of the lithology of the clasts,size and distribution of the particles and the relative degree of caliche development.

Rejuvenation of the area is an ongoing process,in that four paired terraces:Lehi,Blue Point,Mesa and Sawik(youngest to oldest),have been formed with the bedrock and alluvium within the past 2 or 3 million years, as the ranges were periodically uplifted and the basins subsided (Pewe,1978). The terraces are cut both into alluvium and into bedrock (strath terrace) within the Granite Reef and Buckhorn quadrangles. The terraces converge vertically downstream relative to each other,because of the continuing uplift of the mountains and the subsidence of the basins.

ENVIRONMENTAL GEOLOGY

The geologic map is the basis for the development of additional maps which show different aspects of the environmental geology of the study area. Field reconnaissance,laboratory analysis,air photographs, excavations,well logs,published and unpublished reports and information from city,state and national agency offices,were used to compile the geologic map and the maps on groundwater conditions,flooding,and sand and gravel distributions. An interpretive map analyzing conditions for construction and development was prepared from the basic maps.

SELECTED REFERENCES

Bruck,C.R.,Jordan,M.,andPéwé,T.L.,1982,Environmental geology of the Guadalupe quadrangle,Arizona:unpublished folio of maps prepared for the cities of Tempe,Chandler and Phoenix,1:24,000.

Green,C.R. and Sellers,W.D.,1964,Arizona climate:University of Arizona Press,Tucson,Arizona,503 pages.

Kokalis,P.G.,1971,Terraces of the lower Salt River Valley,Arizona: unpublished Master's Thesis,Arizona State University,103 pages.

Montz,M.J. and Péwé,T.L.,1982,Environmental geology of the Rio Salado Development District-Central Part,Maricopa County,Arizona:unpublished folio of maps prepared for the Rio Salado Development District,1:24,000.

Lowe,C.H.,1964,The vertebrates of Arizona:University of Arizona Press, Tucson,Arizona,259 pages.

Scarborough,R.B.,1981,Reconnaissance geology:Goldfield and northern Superstition mountains:Fieldnotes:Bureau of Geology and Mineral Technology;v.11,pg.6-10.

Schulten,C.S.,Bales,J.T.,and Péwé,T.L.,1979,Environmental geology of the Tempe quadrangle,Arizona:unpublished folio of maps prepared for the city of Tempe,1:24,000.

Stuckless,J.S. and Sheridan,M.F.,1971,Tertiary volcanic stratigraphy in the Goldfield and Superstition mountains,Arizona:Geological Society of America Bullentin,v.82,pg.3235-3240.

Wilson,E.D.,Moore,R.T.,and Copper,J.R.,1969,Geologic map of Arizona: Arizona Bureau of Mines and United States Geologic Survey,1:500,000.