GEOLOGIC MAP OF THE LINCOLN RANCH BASIN, EASTERN BUCKSKIN MOUNTAINS, WESTERN ARIZONA v. 2.0

by

Jon E. Spencer and Stephen J. Reynolds

Digital Geologic Map (176)
Formerly AZGS Open-File Report (86-02)

November 17 2022

Arizona Geological Survey
University of Arizona
1955 E 6st Tucson Arizona, 85721

Includes 8 pages of text and a 1:24,000 scale geologic map

This report is part of a digital republication of a 1986 geologic map originally created by the Arizona Geological Survey. Preparation for republication was conducted by students from the University of Arizona with financial support from the U.S. Geological Survey, National Geological and Geophysical Data Preservation Program (G21AP10428) and included the production of a new GIS geodatabase and a revised map layout. The following text report has not been altered and remains identical to the 1986 original, but there may be situations where unit names, ages, symbology, or other geologic information contained within this report do not match the information presented in the new map layout or GIS geodatabase.

GEOLOGIC MAP OF THE LINCOLN RANCH BASIN, EASTERN BUCKSKIN MOUNTAINS, WESTERN ARIZONA

by

Jon E. Spencer and Stephen J. Reynolds

Arizona Geological Survey
Open-File Report 86-2

Arizona Geological Survey
416 W. Congress, Suite #100, Tucson, Arizona 85701

GEOLOGIC MAP OF THE LINCOLN RANCH BASIN, EASTERN BUCKSKIN MOUNTAINS, WESTERN ARIZONA

Jon E. Spencer and Stephen J. Reynolds
Arizona Bureau of Geology and Mineral Technology

OPEN-FILE REPORT 86-2

DESCRIPTION OF MAP UNITS

Qa ALLUVIAL DEPOSITS (QUATERNARY) -- Unconsolidated gravel, sand, and silt in washes and along the Bill Williams River, and soil deposits in Reid Valley.

Qt TALUS DEPOSITS (QUATERNARY) -- Unconsolidated angular clasts forming steep talus slopes.

Qo OLD ALLUVIAL DEPOSITS (QUATERNARY) -- Light-gray to light-tan, unconsolidated to very poorly consolidated, poorly sorted conglomeratic sandstone and conglomerate. Typically forms perched terraces and flats above modern washes.

Qvo VERY OLD ALLUVIAL DEPOSITS (QUATERNARY) -- Very light gray, unconsolidated to poorly consolidated, poorly sorted conglomeratic sandstone and conglomerate. Forms perched ridges and hills topographically higher than nearby map unit Qo and typically rests on pre-Quaternary rock units. Clearly distinguishable on aerial photographs from map unit Qo by its lighter color, more rounded landforms, and higher relative elevation.

Qovo OLD AND VERY OLD ALLUVIAL DEPOSITS, UNDIVIDED (QUATERNARY) -- Includes map units Qo and Qvo. In southwestern part of map area, within about 1-2 km of exposed crystalline lower-plate rocks, this unit contains sparse cobbles and boulders of intermediate to silicic volcanic flow breccia presumably derived from upper-plate rocks that were exposed to the south of this area but have since been eroded away.

Tbf BASIN-FILL DEPOSITS (UPPER TERTIARY) -- Stratified, poorly to moderately consolidated, poorly sorted, tan to light-brown, locally reddish brown, pebbly sandstone and cobble conglomerate. Clasts locally as large as 50 cm. Consists of clasts representative of both upper- and lower-plate lithologies, but ratio of upper- to lower-plate lithologies is much higher in clasts of this unit than in younger alluvial deposits in the same area, suggesting that upper-plate rocks were more widespread during deposition of this unit. Small outcrop on west flank of hill of lower

sandstone and conglomerate unit (map unit Tlsc) in southern half of section 36 unconformably overlies, and contains large, angular clasts derived from, the underlying, tilted sandstone.

Upper-plate Rock Units

Tue UPPER CONGLOMERATE (TERTIARY) -- Light-brown to tan, locally reddish-brown, massive to moderately bedded cobble conglomerate with local interbeds of light-brown to tan conglomeratic sandstone. Forms resistant, rounded outcrops. Conglomerate contains clasts of upper-plate granite, Tertiary sandstone, conglomerate, limestone, and volcanic rocks, and as much as 30 percent lower-plate mylonitic crystalline rocks, quartzitic and calcareous metasedimentary tectonites, and chloritic breccia. Base is marked by upward transition from dominantly sandstone beds to dominantly or entirely beds of conglomerate, locally graded. Thickness approximately 500 m.

Tus UPPER SANDSTONE (TERTIARY) -- Red to reddish-brown bedded sandstone. Locally includes silty sandstone and graded sandstone beds with silty tops and well-preserved mud cracks. Some beds have basal gravel layers or pebbly channel fill. Beds typically 5-50 cm thick. Very local cobble to boulder conglomerate beds, especially near base of overlying conglomerate. Cream-colored tuff layers up to 2-m thick are locally present. Asymmetric ripples 2-4 cm high, 20 cm apart, mark top of some sandstone beds. In SE1/4, SW1/4, SW1/4, Sec. 19, near Lincoln Ranch fault, sandstone is interbedded with brown, calcareous sandstone and siltstone, and locally siliceous limestone. Base of unit is gradational, with underlying siltstone unit grading upward through interbedded sandstone and siltstone to dominantly sandstone. Transition zone varies from perhaps 5 to 50 m is thickness. Total thickness varies from approximately 150 to 300 m.

Tslt SILTSTONE (TERTIARY) — Slope-forming, reddish-brown, tan, and gray siltstone and mudstone with interbedded reddish-brown, brown, tan, gray, and orange-brown, thin-bedded, fine-grained, poorly sorted sandstone. Locally contains several ledge-forming, cream-colored to light-gray, tan-weathering tuffs and a distinctive bed of ledge-forming, gray, micaceous sandstone. Total thickness varies from O to approximately 300 m.

Tl LACUSTRINE ROCKS (TERTIARY) -- Medium- to thin-bedded, dark- to light-gray or brown limestone, yellowish-gray silty limestone and calcareous shale, reddish to greenish gray mudstone and cherty claystone, and rare

gypsiferous mudstone and siltstone. Limestone commonly contains dark-weathering, light-gray to pink chert lenses and nodules and local silicified, reedlike plant stalks that are 1 to 3 mm in diameter and as long as 15 cm, with length-parallel striations. The plant fossils generally lie within the plane of bedding and are locally associated with siliceous, botryoidal spheres that are 3 to 7 mm in diameter and are solitary or occur in clusters of 3 to 5. Total thickness varies from approximately 100 to 200 m.

Tll LACUSTRINE LIMESTONE (TERTIARY) -- Medium- to dark-gray to dark-brown limestone, locally silty, with silicic stringers and laminations. Bedding defined by variations in resistance to weathering and by variations in color. Thickness difficult to determine due to deformation, but ranges from zero to approximately 100 m.

Tls LOWER SANDSTONE (TERTIARY) -- Dark-red to dark-red-brown sandstone with very sparse, 5-50-cm-thick silty limestone beds and local conglomeratic sandstone and conglomerate. Thickness approximately 100 m.

Tlc LOWER CONGLOMERATE (TERTIARY) -- Dark-red to reddish-brown, moderately bedded conglomerate composed of well-rounded pebbles and cobbles of porphyritic biotite granite, K-feldspar-rich granite, gneiss, and Mesozoic sandstone, with more angular clasts of Tertiary volcanic rocks and sparse lower-plate mylonitic and metasedimentary rocks and chloritic breccia. Commonly contains thin beds of reddish-brown conglomeratic sandstone. Thickness varies from approximately 50 to 100 m.

Tlsc LOWER SANDSTONE AND CONGLOMERATE, UNDIVIDED (TERTIARY) -- Brown to reddish-brown sandstone and conglomerate composed of clasts of medium- to coarse-grained granite, mafic to intermediate Tertiary volcanic rocks, and less abundant clasts of lower-plate rocks. Unit is thin to thick bedded, depending on the proportion of sandstone to conglomerate. Conglomeratic units grade into reddish sandstone and conglomeratic sandstone with thin partings of red siltstone. Exposures that overlie the intermediate volcanic rocks in the southern half of section 36 include dark brown, very poorly sorted and bedded, matrix-supported conglomerate and sedimentary breccia composed of angular clasts of the underlying volcanic rocks, well-rounded granite, and local pumaceous fragments. Northwesternmost exposure along north edge of section 26 consists of ledge-forming, light-brown to yellowish- or orangish-tan sandstone with thin conglomerate lenses.

Tv INTERMEDIATE VOLCANICS (TERTIARY) -- Flow breccias, flows, and volcanic agglomerates of dark- to light-gray, brown, and reddish-brown intermediate volcanics containing plagioclase and quartz+ biotite ± hornblende phenocrysts. Locally vesicular. Clasts in flow breccias are 1-10 cm diameter.

Tbs BASAL SEDIMENTARY UNIT (TERTIARY) -- Tan, brown, reddish-brown, purple-brown, and greenish-gray arkosic sandstone and conglomeratic sandstone, brown mudstone, dark-brown siliceous limestone, purplish ash-flow tuff, and sparse white to gray tuff. Sandstone beds are commonly graded. Sandstone is composed of 2-4 mm quartz and feldspar grains and sparse detrital muscovite and tuff fragments in a purple-brown matrix. Conglomeratic units contain well-rounded clasts of crystalline rocks, including unfoliated porphyritic granite and muscovite-bearing granite. Basal contact with underlying, shattered granite is not highly sheared and could be a slightly sheared depositional contact.

Tbx SEDIMENTARY BRECCIA, GRANITIC PROTOLITH (TERTIARY) -- Shattered rocks composed of a mosaic of angular fragments of coarse- to medium-grained biotite granite, compositionally banded gneiss, and mafic dikes in a crushed matrix. Unit is massive and occurs near base of Tertiary section, adjacent to less shattered crystalline rocks.

Tbxt TECTONIC BRECCIA (TERTIARY) -- Variably shattered blocks and slivers of Tertiary volcanic rocks, Tertiary conglomerate and sandstone, mylonitic metasedimentary tectonite, and chloritic breccia derived from mylonitic tectonite. Forms fault-bounded slivers along the Lincoln Ranch fault.

Tbxtg TECTONIC BRECCIA, GRANITIC PROTOLITH (TERTIARY) -- Medium-grained biotite granite of unknown age intruded by mafic dikes of probable Tertiary age, variably fractured, faulted, and disrupted. Forms fault-bounded slivers along the Lincoln Ranch fault.

Mzv METAVOLCANIC ROCKS (MESOZOIC) -- Light-purplish-gray, quartz-sericite schist with darker, purplish-gray volcanic fragments.

Pk KAIBAB LIMESTONE (PERMIAN) -- Dark-gray and brown, cherty limestone and dolomite, locally gypsiferous. Unit is locally highly folded and is ductilely deformed.

Pc COCONINO SANDSTONE (PERMIAN) -- Tan- to pinkish-gray-weathering, white vitreous quartzite.

Pzc CARBONATE, UNDIVIDED (PALEOZOIC) -- Brown-, tan-, or gray-weathering, tectonized, variably siliceous carbonate. Layering is defined by variations in resistance to weathering, variations in color, and irregular, elongate siliceous stringers and blebs (recrystallized chert?), and is inferred to represent transposed bedding.

MzXc CRYSTALLINE ROCKS, UNDIVIDED (MESOZOIC OR PROTEROZOIC) -- Includes medium- to coarse-grained, biotite granite with K-feldspar phenocrysts as large as 3 cm, medium-grained biotite granite with 0.5- to 2-m-thick mafic dikes, and local compositionally banded gneiss, gneissic granite, and pegmatite. Unit is typically strongly shattered and locally includes massive, sedimentary breccia and megabreccia.

Lower-plate Rock Units

ms METASEDIMENTARY ROCKS (PROTEROZOIC TO CENOZOIC) -- Highly tectonized, variably mylonitic metasedimentary rocks. Composed of interlayered, banded to thinly laminated, white, pale-yellow, tan, pale-red, and gray, variably siliceous carbonate tectonite, very fine-grained quartzite, green to tan calc-silicate containing epidote and chlorite, gray phyllite, and greenish-gray sandstone. Protolith of carbonates is probably Paleozoic in age, of sandstone is probably Mesozoic in age. All rocks are tectonized and contain intrafolial folds. Boudin-like pods of pegmatite are mylonitized and contain quartz ribbons. Fractures of variable density are coated or filled with hematite, chlorite, epidote, and quartz.

me MYLONITIC CRYSTALLINE ROCKS (PROTEROZOIC TO CENOZOIC) -- Mylonitic granitic and high-grade metamorphic rocks. Includes foliated megacrystic granite with K-feldspar augen up to 3 cm diameter. Top-to-the-northeast shear during mylonitization is indicated by S-C fabrics. A variety of foliated granitic rocks have probable protolith ages of Proterozoic or Mesozoic, and possibly Tertiary. Amphibolitic gneissic rocks have probable Proterozoic protoliths. Yielded a K-Ar biotite cooling age of 15.1+0.2 Ma (sample 2-7-85-1 from sec. 29, eastern part of map area).

mes MYLONITIC CRYSTALLINE AND METASEDIMENTARY ROCKS, UNDIVIDED (PROTEROZOIC TO CENOZOIC)--Includes mylonitic plutonic rocks and high-grade metamorphic rocks, and tectonized metasedimentary rocks.