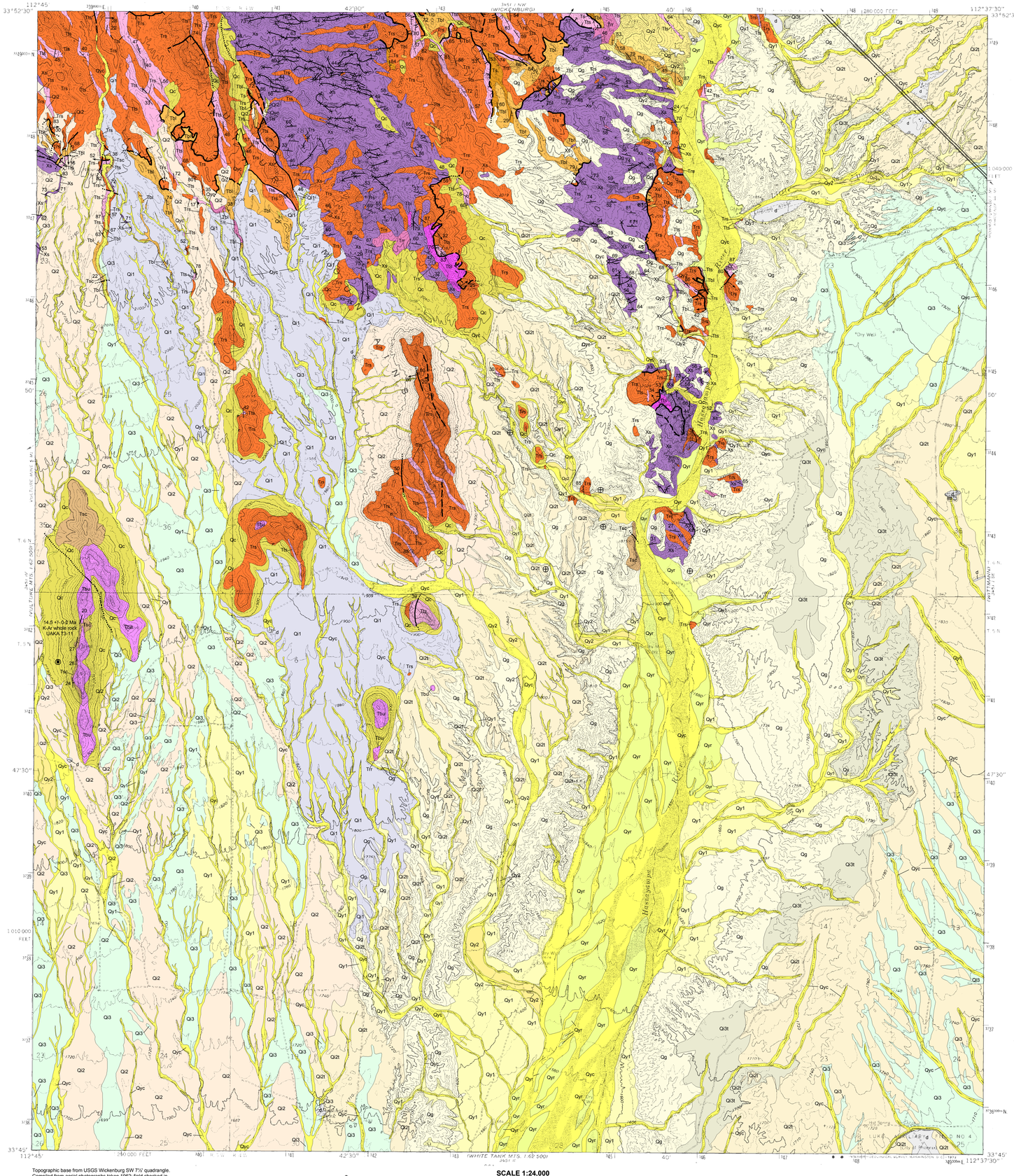

Topographic base from USGS Wickenburg SW 7½' quadrangle.
Compiled from aerial photographs taken 1962; field checked in 1965. Polyconic projection, NAD 27, UTM zone 12.
Reprojected to NAD 83, state-plane feet.
Magnetic declination 14° east of true north.
Contour interval 20 feet.

GN MN 14°

SCALE 1:24,000

1 0.5 0 1 Miles
1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 Feet
1 0 1 Kilometers

Arizona Geological Survey
416 W. Congress Street, Suite 100
Tucson, AZ 85701
(520) 770-3500
www.azgs.az.gov

Unit descriptions

Hassyampa River Deposits

Qyr — **Holocene alluvium, younger member (<100 yrs) –** Qyr deposits are composed of unconsolidated sand, pebbles, and cobbles. These deposits are located within the active drainage of the Hassayampa River and are often inundated when flooding occurs. Locally exhibits bar and swale topography, the bars being typically more vegetated. These surfaces are dominated by grasses and small shrubs or young mesquite trees. On this surface the main channel commonly diverges into braided channels. Qyr surfaces typically have little to no soil development.

Alluvial deposits

d — **Disturbed areas (<100 years) –** Areas where human activity has obscured the underlying geology, excavation of earthen water tanks for cattle ranching and development.

Qyc — **Late Holocene active channel deposits (present) –** This unit includes only active, open channels of tributary washes on the piedmonts that could be delineated at a scale of 1:24,000. Qyc is composed of moderately-sorted sand, gravel, and pebbles with some cobbles in the lower piedmont areas to poorly-sorted sand, gravel, pebbles, and cobbles in the upper piedmont areas. Channels are generally incised less than 0.5 to 1 meter below adjacent Holocene terraces. Channel morphologies generally consist of a single thread, deep, high-flow channel or multi-threaded, shallow, low-flow channels with adjacent gravel bars. The channels are flood prone and are subject to high velocity flow during moderate to large flood events. Channels are subject to scouring and bar deposition; banks are subject to lateral erosion. There is no soil development in this fluvially active unit, and little or no vegetation within the channels.

Qy2 — **Holocene alluvium, younger member (<100 yrs) –** Qy2 deposits are similar to Qy1 deposits, but are slightly lower in the landscape and, thus, younger. Locally exhibits bar and swale topography, the bars being typically more vegetated. On this surface, the main channel commonly diverges into braided channels. Qy2 surfaces typically have little to no soil development, however they may have some disseminated carbonate near the surface consolidating the upper portions of the profile.

Qy1 — **Holocene alluvium older member (<10 ka) –** Unit Qy1 is composed of Holocene alluvium deposited within incised valleys and on top of the Qi3. The Holocene alluvium is less than 1 meter thick and composed of poorly-sorted sandy silt, with lenses of large pebbles to cobbles. Cobbles are composed of dacite tuff, granite, and small amounts of metasedimentary clasts. Qy1 surfaces are planar with 0.5 to 1 meter of incision and no beveling. Soil development is immature loamy sand, with no apparent structure, minimal desert pavement, and no secondary carbonate. Soil color is typically light brown (7.5 YR 6/4) and white to light grey on the air photos. The dominate vegetation on this surface are small palo verde, saguaro, iron woods, and cholla. Much of the Qy1 deposits found above the incised valleys were deposited by sheet flooding and are indicators for future sheet flooding. Qy1 deposits located within the incised valleys are perched and abandoned by the incision of the local drainage.

Qi3 — **Late Pleistocene alluvium (~10 to 130 ka) –** Unit Qi3 is composed of late Pleistocene alluvium deposited within incised valleys and on top of the Qi2 unit. The late Pleistocene alluvium is less than 5 meters thick and composed of poorly-sorted cobble and pebble conglomerate with granite, dacite, rhyolite, and metasedimentary clasts. Qi3 surfaces are planar with some dissection and beveling near the edges; incision is less than 3-4 meter. Qi3 surfaces may be subject to inundation in especially large floods in the valley bottom where topographic relief is minimal. Qi3 deposits located outside the valley can experience sheet flooding when the soils become saturated during wet winters or after a period of sudden and heavy rainfall during the summer. Soil development is immature to moderate with some desert pavement, stage II to III carbonate development, composed of silty clay. Soil color is typically reddish yellow (7.5 YR 6/6) and whitish tan on the air photos. Dominate vegetation includes creosote, saguaro, palo verde, and ocotillo.

Qi3t — **Late Pleistocene alluvium (~10 to 130 ka) –** Unit Qi3t is a late Pleistocene river terrace which is associated with the Hassayampa River. The late Pleistocene terrace is approximately 1 meter thick and rests above unit Qg. Qi3t is approximately 1 meter lower than Qi2t. Qi3t deposits are composed of poorly-sorted, subrounded to subangular, clast-supported conglomerate, with abundant channelized lenses of framework conglomerates. Clasts are pebble to cobble in size and composed of rhyolite, dacite, with some metasedimentary clasts. The matrix is composed of coarse sandstone, cemented by calcite. Qi3t is flat yet beveled near the edges and incised to the regional drainage. Flooding on the Qi3t surface is confined within the incised channels with some sheet flow contributing to the general drainage. Soil development is immature to mature and composed of sandy clay loam with platy peds. Soil color is reddish yellow (7.5 YR 6/6) and light tan in air photos. Dominate vegetation includes cholla and creosote.

Qi2 — **Middle Pleistocene alluvium (~130 to 750 ka) –** Unit Qi2 is composed of middle Pleistocene alluvium comprising most the interfluves of the regional drainage within the mapped area. The middle Pleistocene alluvium is at least 8 meters thick and composed of poorly-sorted cobble and pebble conglomerate with granite, rhyolite, and metasedimentary clasts. Qi2 surfaces have advanced beveling and incision that is more than 4 meters. Flooding on the Qi2 surface is confined within the incised channels. Soil development is mature and composed of silty clay loam with columnar peds, stage III to IV secondary carbonate; some zones have a well developed desert pavement. Soil color is typically yellowish red (5 YR 5/6) and reddish yellow on the air photos. Dominate vegetation includes creosote, palo verde, and cholla.

Qi2t — **Middle Pleistocene alluvium (~130 to 750 ka) –** Unit Qi2t is a middle Pleistocene river terrace associated with the Hassayampa River. The middle Pleistocene terrace, interpreted as the remains of a floodplain, is approximately 5 meters thick and rests above Qg deposits. Qi2t are composed of poorly-sorted, subrounded to subangular, clast-supported conglomerate, with abundant channelized lenses of framework conglomerates. Clasts are pebble to cobble in size and composed of rhyolite, dacite, with some metasedimentary clasts. The matrix is composed of coarse sandstone cemented by calcite. Large hollow calcite traces start at the pedogenic profile. Qi2t is flat yet beveled near the edges and incised to the regional drainage. Flooding on the Qi2t surface is confined within the incised channels, with some sheet flow contributing to the general drainage. Soil development is mature and composed of clay loam, columnar peds and stage III to IV secondary carbonate. Soil color is typically reddish yellow (5 YR 6/6) and reddish brown in air photos. The dominate vegetation includes cholla and saguaros.

Qi1 — **Middle to early Pleistocene alluvium (~130 ka to 1 Ma) –** Unit Qi1 is a middle to early Pleistocene alluvium deposit located near the mountain front at the highest surfaces in the mapped areas. These deposits are composed of poorly-sorted, cobble to pebble matrix-supported conglomerate. Clasts are composed of rhyolite, dacite, and metasedimentary rocks. Qi1 surfaces are planer with moderate beveling near the edges and incised at least 5 meters. Flooding on the Qi1 surface is confined within the incised channels. Soil development is mature to very mature and composed of clay loam with well developed stage IV to V laminar secondary carbonate, indurate, granular peds. Soil color is typically strong brown (7.5 YR 5/6) and light brown in the air photo. The dominate vegetation includes cholla, saguaro, creosote, and ocotillo.

Qc — **Colluvium and Talus (<2 Ma) –** Unconsolidated to moderately consolidated colluvium and talus hillslope deposits.

Qg — **Gravels (Miocene) –** Light-gray, poorly consolidated fluvial deposits of channelized conglomerate and interbedded, cross-laminated lith-arkosic sandstones in the southeastern Vulture Mountains adjacent to Hassayampa River. Clast lithology is heterogeneous, but locally dominated by unfoliated granitoid. Terraced and incised sandstone with mudstone, rounded pebbles to cobbles.

Bedrock units

Tsc — **Sandstone and conglomerate (Miocene) –** Slope-forming deposits of sandstone and conglomerate interbedded with or deposited adjacent to upper basalt lavas (unit Tbu). Beds locally dip as much as 70° or as little as 20°, decreasing with higher stratigraphic position. Steeply-dipping beds locally intruded by rhyolite dikes (unit Trp). Clast dimensions average about 10 cm across, but locally exceed 30 to 40 cm; clast lithology consists of basalt (unit Tbu), foliated granitoid, and rhyolite lava.

Tbu — **Upper basalt (Miocene) –** Dark-gray, cliff-forming basalt and basaltic andesite lava flows, flow breccias, and scoria beds. The most common type of lava contains phenocrysts of plagioclase and olivine, large vesicles, an aphanitic groundmass, and as much as 15% euhedral olivine phenocrysts that measure 1 to 3 mm across. The subordinate lava type contains phenocrysts of clinopyroxene and plagioclase, few vesicles, a higher proportion and content of plagioclase phenocrysts (10% to 15%), and a microcrystalline groundmass.

Tbl — **Lower basalt (Miocene) –** Reddish-gray, nonresistant basaltic lava and scoria containing phenocrysts and microphenocrysts of plagioclase, clinopyroxene, and olivine. Olivine phenocrysts are replaced by iddingsite; clinopyroxene phenocrysts are altered to green clays. Locally basalt is interbedded with arkosic sedimentary rocks. Maximum exposed thickness is approximately 200 m.

Ts — **Sedimentary rocks and interbedded tuff, undivided (Miocene) –** Lapilli tuff and arkosic conglomerate.

Tbl — **Basaltic intrusions (Miocene) –** Dark-gray to dark-brown, nonresistant, aphanitic to fine-grained basalt dikes containing plagioclase microphenocrysts. Dike thicknesses are between 0.5 and 2 m.

Trp — **Crystal-poor rhyolite dikes (Miocene) –** Dark-brown, resistant, compositionally homogeneous, sparsely porphyritic rhyolite dikes containing feldspar (5-15%), trace quartz, biotite phenocrysts and basalt inclusions. Margins locally form flow-foliated zones. Dikes of this unit are mineralogically indistinguishable from dikes associated with the San Domingo rhyolite of Stimac et al. (1987) and Grubensky (1989). Associated with and grades laterally into crystal-rich rhyolite dikes (unit Trr); dikes trend generally N-S and dip between 5° and 30° west. Thickness is typically 3 to 5 m.

Trr — **Crystal-rich rhyolite dikes (Miocene) –** Purplish-brown, porphyritic dikes, largely rhyolite in composition, containing phenocrysts of feldspar, quartz, and biotite. Dikes are typically intruded along or parallel to low-angle normal faults. Dikes are texturally and compositionally zoned; margins of aphanitic basalt grade inward to fine-grained, plagioclase feldspar-phyric andesite(?), to fine- and medium-grained rhyolite, to a core of crystal-rich, medium- and coarse-grained rhyolite with about 30% to 35% phenocrysts of quartz and feldspar. Subangular inclusions of microphyric to aphanitic basalt are common in the interiors and average 2 cm across. Dikes generally strike north-south and dip between 5° and 30° west. Thickness is typically about 5 to 8 m.

Trs — **Lava flows and domes (Miocene) –** Pinkish to reddish, sparsely porphyritic, rhyolite lava flows and domes containing phenocrysts of sanidine (1 - 4 mm) and clinopyroxene or biotite. Lavas are texturally zoned from vitrophyric margins to flow-foliated and stony lava cores. Phenocrysts comprise 5% to 15% of the rock. Individual flow thicknesses average 130 m. This unit was considered by Grubensky (1989) to be part of the San Domingo rhyolite of Stimac et al. (1987).

Tts — **Pyroclastic rocks (Miocene) –** Yellow, unwelded, massive to thin-bedded and laminated, locally crossbedded tuff, lapilli tuff, and lithic lapilli tuff of pyroclastic flow-, fall-, and surge-related origin. Phenocrysts consist of sanidine and biotite. Angular lithic fragments of crystal-poor rhyolite (unit Trs) are locally 4 m across. Individual, interlava pyroclastic sequences typically have thicknesses of about 100 m.

Xs — **Schist (Early Proterozoic) –** Dark- to medium-gray, quartzo-feldspathic biotite schist and quartzofelspathic andalusite-muscovite schist.

GEOLOGIC MAP OF THE WICKENBURG SW 7½' QUADRANGLE, MARICOPA COUNTY, ARIZONA

by Todd C. Shipman and Michael J. Grubensky

Arizona Geological Survey Digital Geologic Map 40 (DGM-40), version 1.0

October, 2004

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Introduction

This map depicts the geology of the Wickenburg SW 7½' quadrangle in Maricopa County, central Arizona. The map area is located south of Wickenburg and southwest of Highway 60. The map area covers the southeastern piedmont of the Vulture Mountains. It includes the inactive Wolf Mine and some small unnamed settlements along the piedmont. The Hassayampa River bisects the mapped area and controls most of the regional drainage. The Toyota Proving Grounds occupy part of the southwestern corner of the quadrangle, where access is restricted. The area was mapped during March through August, 2004. A 1:24,000-scale map is the primary product of this study.

The bedrock geology was mapped and described by Grubensky (1989), with all of the surficial mapping and some bedrock described by Shipman. Bedrock was digitized by Shipman and Spencer for the final digital map. Quaternary and late Tertiary sediments were mapped by direct field observation, aerial photo and Maricopa Flood Control District digital orthophoto interpretation. Descriptions of bedrock map units are from Grubensky (1989) and were written to apply to all exposures in the Vulture Mountains. Therefore, some characteristics outlined here in the unit descriptions may not be strictly applicable to outcrops in this particular quadrangle.

The physical characteristics of Quaternary depositional surfaces were used to assign ages to specific deposits. Alluvial deposits of similar age tend to have similar physical characteristics and can be correlated with a reasonable degree of certainty. Relative relief, degree of erosion and dissection of the original depositional topography, and soil development are all indicators of age. Soil color tends to change from the color of the originally deposited material. Clay enrichment also progresses with time due to addition of wind-borne materials and chemical weathering of primary sedimentary materials. Older deposits tend to be enriched with clays and carbonate tends to accumulate at depth, which was taken into consideration when interpreting age. Age are in thousands of years (ka) or millions of years (Ma).

Acknowledgements

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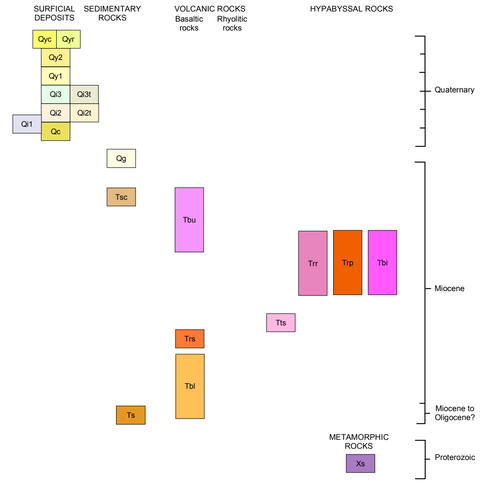
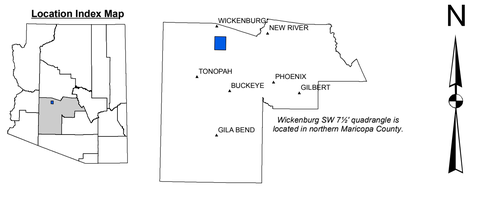
Grubensky, M.J., 1989, Geologic map of the Vulture Mountains, west-central Arizona: Arizona Geological Survey Map 27, 3 sheets, scale 1:24,000.

Stimac, J. A., Fryxell, J. E., Reynolds, S. J., Richard, S. M., Grubensky, M. J., and Scott, E. A., 1987, Geologic map of the Wickenburg, southern Buckhorn, and northwestern Hieroglyphic Mountains, central Arizona: Tucson, Arizona Bureau of Geology and Mineral Technology Open-File Report 87-9, 13 p., 2 sheets, scale 1:24,000.

Stratigraphic correlation diagram



Location Index Map



Map Legend