Geologic Map of the Ruidoso Downs Quadrangle, Lincoln, Otero Counties, New Mexico

By

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New Mexico Bureau of Geology and Mineral Resources Open-file Digital Geologic Map OF-GM 094

Scale 1:24,000

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Mapped and compiled by Geoffrey Rawling

EXPLANATION OF MAP UNITS

Anthropogenic Deposits

af Artificial fill for stock tanks and highway embankments.

daf Heavily disturbed land and/or artificial fill. Mapped where extensive, underlying deposits are obscured, and/or geomorphic surfaces are extensively altered.

Quaternary and Tertiary Surficial Deposits

- QHa Alluvium (Holocene to Historic) Unlithified gravel and poorly to moderately sorted clay, silt, sand in active stream channels and ephemeral arroyos. Generally incised into Qvf and terrace deposits. Only mapped where extensive; unit is otherwise lumped with Qvf. Thickness: 0 to 4 (?) meters.
- **Qvf Valley fill (upper Pleistocene to Holocene)** Unlithified valley fill composed of poorly sorted clay, silt, and sand, commonly with angular to subrounded cobbles of

local bedrock. Matrix material is light to dark brown, reflecting soil development processes. Grades into minor alluvial and colluvial fans on toes of hillslopes. Generally incised by active drainages, floored by sand and cobble to boulder gravel of **QHa**. Anthropogenic disturbance common in developed areas. Also fills circular depressions on San Andres limestone uplands, exemplified by Pothole Lake, that are probably sinkholes. Largely mapped from aerial photographs. Thickness: 0 to12 (?) meters.

- Qc Colluvium (lower to upper Pleistocene) Unlithified valley margin deposits composed of poorly sorted clay, silt, and sand, with abundant angular to subrounded cobbles and boulders of San Andres limestone. Cobbles and boulders are much more abundant than in unit Qvf. Mantles Yeso Formation and Quaternary stream gravels (Qg) at the toes of steep slopes on the south side of the Rio Ruidoso valley. Thickness: 0 to10 (?) meters.
- **Qrt3 Lowest terrace deposit of Rio Ruidoso (Holocene)** Poorly to moderately sorted alluvial deposits composed of interstratified fine to coarse sand and sandy cobble to boulder gravel. Clasts are rounded intrusive and volcanic igneous rocks with lesser limestone and sandstone. Deposit forms the active floodplain of the Rio Ruidoso and its surface is within a few meters of present stream grade. Largely mapped from aerial photographs. Thickness: 0 to 5 (?) meters.

- Qrt2 Middle terrace deposit of Rio Ruidoso (upper Pleistocene) Poorly to moderately sorted alluvial deposits composed of interstratified fine to coarse sand and sandy cobble to boulder gravel. Clasts are rounded intrusive and volcanic igneous rocks with lesser limestone and sandstone. Forms discontinuous remnants between units Qrt3 and Qrt1. Deposit forms a terrace whose tread is 5 - 6 meters above present stream grade, dissected, and generally affected by human disturbance. Largely mapped from aerial photographs. Thickness: 0 to 6 (?) meters.
- **Qrt1 Upper terrace deposit of Rio Ruidoso (middle Pleistocene) -** Poorly to

moderately sorted alluvial deposits composed of interstratified fine to coarse sand and sandy cobble to boulder gravel. Clasts are rounded intrusive and volcanic igneous rocks with lesser limestone and sandstone. The surface of the deposit forms a terrace tread 12-15 meters above present stream grade, which is variably eroded, and strongly affected by human disturbance. Largely mapped from aerial photographs. Thickness: 0 to 10 (?) meters.

Qaf – Alluvial fan deposits (middle to upper Pleistocene) - Alluvial fans composed of poorly sorted rounded to angular cobbles, boulders, sand, silt, and clay. Fans head in tributary canyons and interfinger with or spread out onto Qvf and terrace deposits. Stabilized by vegetation and apparently no longer active, and locally incised by drainages floored with QHa. Mapped where geomorphic expression is clear on aerial photos. Thickness: 0 to 8 (?) meters.

- Qls Landslide deposits (lower to middle (?) Pleistocene) Landslide and colluvium complex on steep slopes northeast of Palo Verde Canyon composed of poorly sorted angular to subrounded blocks of San Andres limestone some of which are backrotated towards the cliff. Debris obscures the San Andres Formation – Yeso Formation contact, and scattered Yeso outcrops are present. Headscarp is indicated by normal fault symbols.Thickness: 0 to 60 meters.
- Qg Stream gravel deposits (lower to middle (?) Pleistocene) Moderately lithified, crudely bedded pebble to boulder gravel along Rio Ruidoso valley and the margin of Pajarita Flats in the southwest corner of the quadrangle. Along Rio Ruidoso, sandy clast-supported gravel is interbedded with channel deposits of sand and silty clay. Postdates incision of modern drainages. Correlated by Moore et al (1988) to the Palomas gravel of the Tularosa basin. Thickness: 0 to 20 (?) meters.

Cenozoic Igneous Rocks

Td – Diorite (Oligocene) - Light to dark brown very fine-grained phaneritic to phaneritic-porphyritic sills and small stocks. Phenocrysts include augite, hornblende and tabular intermediate (?) plagioclase. Tabular plagioclase phenocrysts are up to 4 cm in diameter and are usually aligned with the dike margins. Includes rocks ranging from diorite to theralite and gabbro in composition. Thickness: dikes are < 1 up to 5 meters wide. Large diorite sill in Johnson Canyon is ≥ 75 meters thick. Tmz – Monzonite (?) dike (Oligocene) - Tan to brown aphanitic to very fine-grained phaneritic dike rocks. Typically composed of approximately equal amounts of white feldspar and brown mafic minerals with little or no quartz. Often weathers in a granular fashion resulting in a surface texture resembling sandstone. Feldspar is largely intermediate (?) plagioclase with lesser amounts of potassium feldspar and forms a felted network of interlocking crystals. Includes rocks ranging from syenite to diorite in composition. Thickness: dikes are < 1 up to 5 meters wide.</p>

Paleozoic Sedimentary Rocks

Psa - San Andres Formation (middle to upper Permian) - Light to dark gray and bluish gray limestone and dolomite. Limestones and dolomites range from thin to very thick bedded, and are carbonate mudstones, wackestones, and grainstones. Freshly broken surfaces are darker gray than weathered surfaces and occasionally fetid. Beds are often silty or sandy. Dark brown irregular chert nodules are sparse. Fossils are sparse and are dominantly crinoid stem fragments. Intraformational solution breccias and paleokarst features such as collapsed caves are common along faults and as isolated occurrences. They are characterized by red soil and red and yellow stained breccia fragments. The base of the unit is characterized by irregular bedding dips due to gypsum dissolution in the underlying Yeso Formation. Delineation of the San Andres into the lower thick-bedded Rio Bonito Member and upper thin-bedded Bonney Canyon member (Kelley, 1971) was attempted but was not possible due to steep topography, heavy vegetation, and sparse outcrop. The lowest portions of the unit do contain abundant thick beds, but in the Ruidoso area, vertical

changes in bedding thickness and bed color are not mappable distinctions. Thickness: Thickness: ~ 335 meters.

Psa-g – **Glorieta Sandstone tongue (middle Permian)** - Discontinuous beds of gray and light to medium brown fine to medium-grained sandstone consisting of frosted and well-rounded quartz grains. Generally only observed as float and very sparse outcrop. Thickness: 0 to 6 (?) meters.

Py – **Yeso Formation** (middle Permian) - Yellow to tan siltstone and fine sandstone, red to pink muddy siltstone and fine sandstone, gray to tan silty limestone and dolomite, and white to gray gypsum. Siltstone and sandstones are thin to medium bedded and friable. Muddy siltstones and sandstones are laminated to very thin bedded and locally contain paleosol carbonate nodules in trains. Limestones are very thin to thin bedded, rarely medium to thick bedded. In general, they are thinner bedded than overlying basal San Andres beds. Meter scale interbedding of carbonate, siltstone, and sandstone is common. Bedding dips are chaotic due to dissolution of gypsum and (and carbonates?) and individual beds are generally not traceable laterally for more than a few 10s of meters. Natural exposures are poor except in stream cuts and very steep slopes and the upper contact is usually mantled by colluvium and/or landslides from the overlying San Andres Formation. Thickness: \geq Base not exposed; ~ 240 meters exposed along Rio Ruidoso Canyon. Wasiolek (1991) reported a regional thickness range of 320 to 380 meters based on wells from the north central part of the Mescalero Reservation.

Pp€u - Permian to Proterozoic rocks - Paleozoic sedimentary rocks and Proterozoic igneous and metamorphic rocks, undivided (cross section only). Thickness of Sub-Yeso Paleozoic rocks unknown.

MAP AND CROSS SECTION SYMBOLS

Location of geologic cross section

Geologic contact, solid where exposed, dashed where approximately located, dotted where concealed, queried where inferred

Normal fault, arrow shows dip and dip direction of fault plane where measured, ball and bar on downthrown side, dashed where approximately located, dotted where concealed. Fault tip is queried where the termination of fault is unknown.

Dip and dip direction of bedding, dashed where compiled from Moore et al (1998) and Craddock (1964)

Horizontal bedding

Dip and dip direction of joints

Outcrop and local trace of dike

NOTES

Geology within Mescalero Tribal lands was compiled from Moore et al (1988). Some bedding attitude measurements north of the Rio Ruidoso were compiled from Craddock (1964).

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