NEW MEXICO BUREAU OF GEOLOGY AND MINERAL RESOURCES A DIVISION OF NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY

NMBGMR Open-file Map Series
OFGM 94
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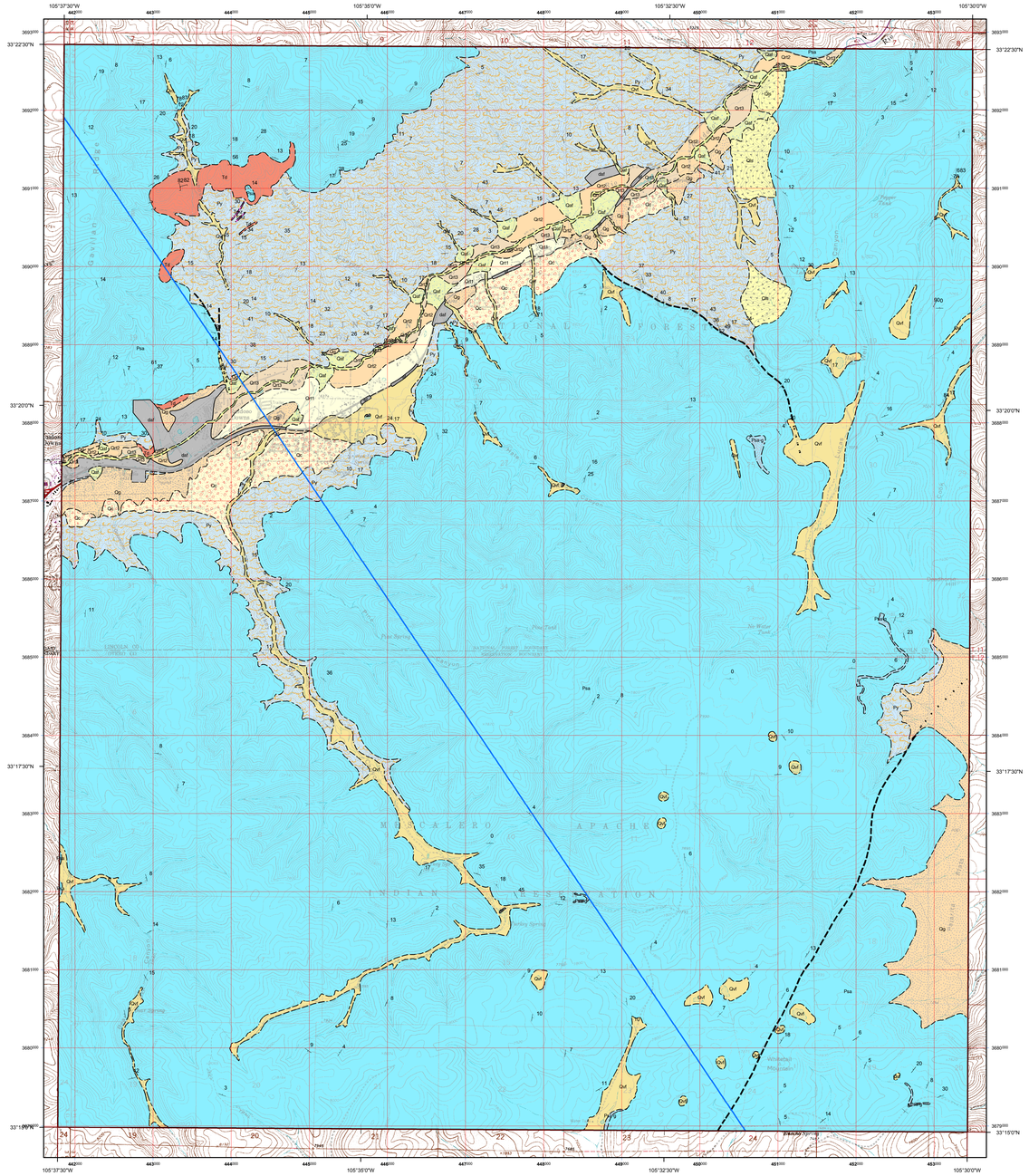

Base from U.S.Geological Survey 1983.
1927 North American datum, UTM projection -- zone 13N
1000- meter Universal Transverse Mercator grid, zone 13, shown in red

QUADRANGLE LOCATION

1:24,000

1 0.5 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0.5 0 1 KILOMETER

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

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Mapping of this quadrangle was funded by a matching-funds grant from the STATEMAP program of the National Cooperative Geologic Mapping Act, administered by the U. S. Geological Survey, and by the New Mexico Bureau of Geology and Mineral Resources. (Dr. Peter A. Scholle, *Director and State Geologist*, Dr. J. Michael Timmons, *Geologic Mapping Program Manager*).

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This and other STATEMAP quadrangles are (or soon will be) available for free download in both PDF and ArcGIS formats at:

http://geoinfo.nmt.edu/publications/maps/geologic/ofgm/home.html

This draft geologic map is preliminary and will undergo revision. It was produced from either scans of hand-drafted originals or from digitally drafted original maps and figures using a wide variety of software, and is currently in cartographic production. It is being distributed in this draft form as part of the bureau's Open-file map series (OFGM), due to high demand for current geologic map data in these areas where STATEMAP quadrangles are located, and it is the bureau's policy to disseminate geologic data to the public as soon as possible.

After this map has undergone scientific peer review, editing, and final cartographic production adhering to bureau map standards, it will be released in our Geologic Map (GM) series. This final version will receive a new GM number and will supercede this preliminary open-file geologic map.

DRAFT

New Mexico Bureau of Geology and Mineral Resources — New Mexico Tech — Earth Science for the 21st Century

NEW MEXICO STATEMAP

Geologic map of the Ruidoso Downs quadrangle, Lincoln and Otero Counties, New Mexico.

May 2004

by
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COMMENTS TO MAP USERS

A geologic map displays information on the distribution, nature, orientation, and age relationships of rock and deposits and the occurrence of structural features. Geologic and fault contacts are irregular surfaces that form boundaries between different types or ages of units. Data depicted on this geologic quadrangle map may be based on any of the following: reconnaissance field geologic mapping, compilation of published and unpublished work, and photogeologic interpretation. Locations of contacts are not surveyed, but are plotted by interpretation of the position of a given contact onto a topographic base map; therefore, the accuracy of contact locations depends on the scale of mapping and the interpretation of the geologist(s). Any enlargement of this map could cause misunderstanding in the detail of mapping and may result in erroneous interpretations. Site-specific conditions should be verified by detailed surface mapping or subsurface exploration. Topographic and cultural changes associated with recent development may not be shown.

Cross sections are constructed based upon the interpretations of the author made from geologic mapping, and available geophysical, and subsurface (drillhole) data. Cross-sections should be used as an aid to understanding the general geologic framework of the map area, and not be the sole source of information for use in locating or designing wells, buildings, roads, or other man-made structures.

The map has not been reviewed according to New Mexico Bureau of Geology and Mineral Resources standards. The contents of the report and map should not be considered final and complete until reviewed and published by the New Mexico Bureau of Geology and Mineral Resources. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the State of New Mexico, or the U.S. Government.

Preliminary Geologic Map of the Ruidoso Downs Quadrangle
OF-GM-94
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 back-rotated 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.

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: 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.

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

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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MAP AND CROSS SECTION SYMBOLS

A — A 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.

20-295 Dip and dip direction of bedding, dashed where compiled from Moore et al (1988) and Craddock (1964)

Horizontal bedding

20-295 Dip and dip direction of joints

Outcrop and local trace of dike