EXPLANATION FOR

Geologic Map of New Mexico

1:500,000

New Mexico Bureau of Geology and Mineral Resources

Celebrating 75 Years of Service

A DIVISION OF NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY

Peter A. Scholle, State Geologist

2003

PUBLISHED IN COOPERATION WITH THE U.S. GEOLOGICAL SURVEY

This map represents the first substantial revision of the geologic map of New Mexico at this scale since the appearance of the State Geologic Map of New Mexico by Carle H. Dane and George O. Bachman, published in two sheets by the U.S. Geological Survey (in cooperation with the New Mexico Bureau of Mines and Mineral Resources) in 1965. The present compilation was started in 1985 by G. Robert Osburn, under the directorship of Frank Kottlowski. The bulk of the compilation was accomplished between 1987 and 1998 by Orin J. Anderson and Glen E. Jones. Since 1998 the map has been reviewed and revised by many other workers (listed below). The present map reflects substantial revisions to the Anderson and Jones compilation. Earlier versions of that compilation appeared in 1994 as Open-file Report # 408 of the New Mexico Bureau of Mines and Mineral Resources, and in 1997 as Open-file Report 97-52 of the U.S. Geological Survey. Work on this project has spanned the administrations of three directors at the New Mexico Bureau of Geology and Mineral Resources: Frank Kottlowski, Charles Chapin, and Peter Scholle. This map was created in Macromedia Freehand from ArcInfo files created by Greg Green, U.S. Geological Survey.

Unless otherwise noted, all persons listed are present or former members of the staff of the New Mexico Bureau of Geology and Mineral Resources

Digital Processing: Greg Green, U.S. Geological Survey

Digitizing: Glen E. Jones

Digital Cartography & Layout: Rebecca J.T. Taylor, Prisma Light Studio

Cartographic/GIS Support: Kathryn E. Glesener

Geologic Review:

Paul W. Bauer
Steven M. Cather
Richard M. Chamberlin
Sean D. Connell
John Hawley
Thomas W. Judkins, U.S. Geological Survey; geologic names review
Karl E. Karlstrom, University of New Mexico
Timothy Lawton, New Mexico State University
Peter W. Lipman, U.S. Geological Survey
David W. Love
Spencer G. Lucas, New Mexico Museum of Natural History and Science
William C. McIntosh
Charles Maxwell, U.S. Geological Survey
Virginia T. McLemore
Chuck Pillmore, U.S. Geological Survey
Jim Ratté, U.S. Geological Survey
Adam S. Read
William R. Seager, New Mexico State University
Lee A. Woodward, University of New Mexico

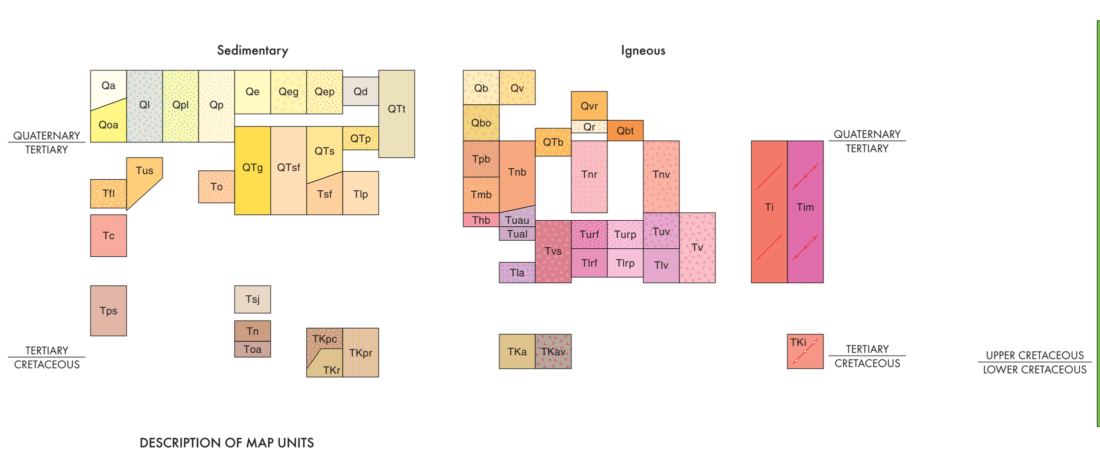
Editorial: Jane C. Love and L. Greer Price

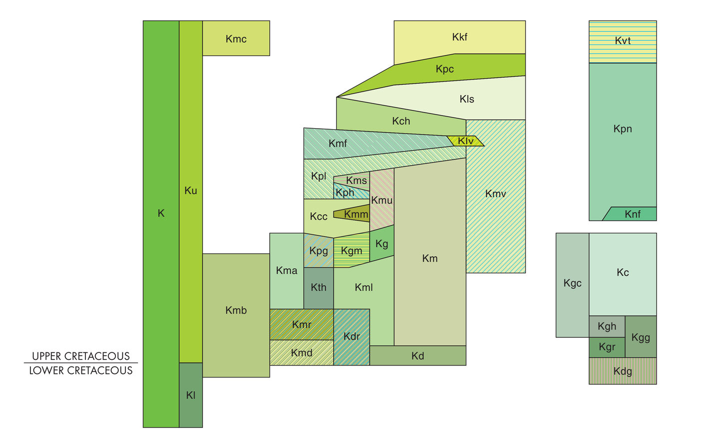
Production: L. Greer Price

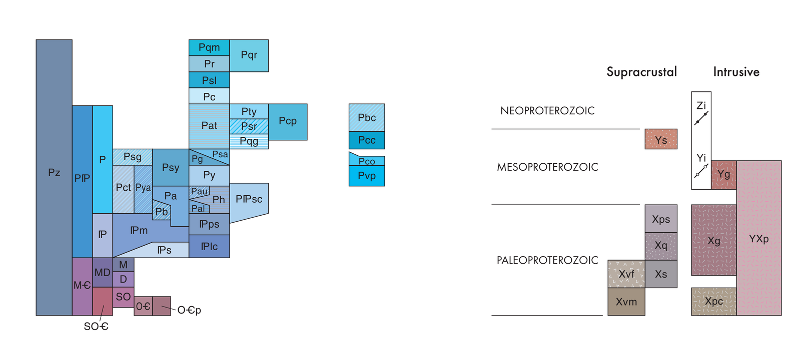
For sale from:
New Mexico Bureau of Geology and Mineral Resources
New Mexico Institute Of Mining And Technology
801 Leroy Place Socorro, New Mexico 87801 (505) 835-5410
geoinfo.nmt.edu
ISBN 1–883905–16–8

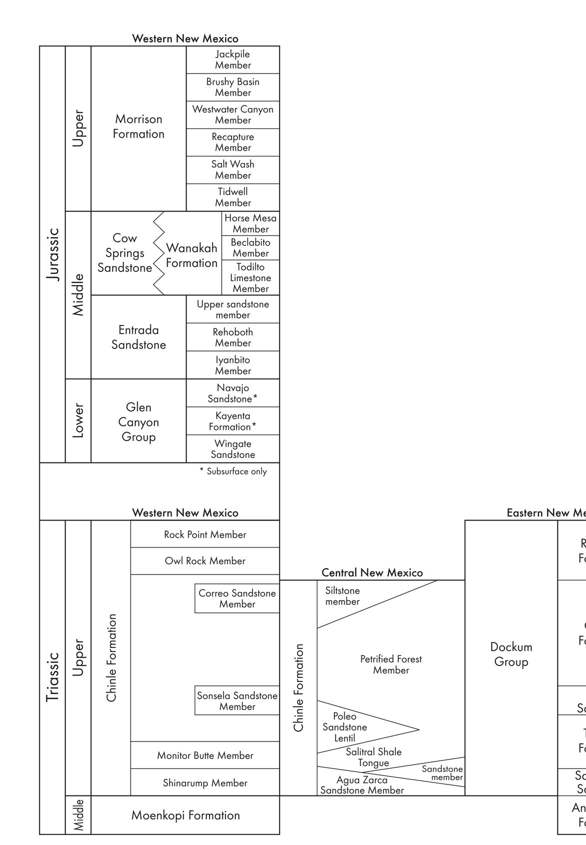
CITATION – Please cite this work as follows:
New Mexico Bureau of Geology and Mineral Resources, 2003,
Geologic Map of New Mexico, 1:500,000:
New Mexico Bureau of Geology and Mineral Resources

DESCRIPTION OF MAP UNITS

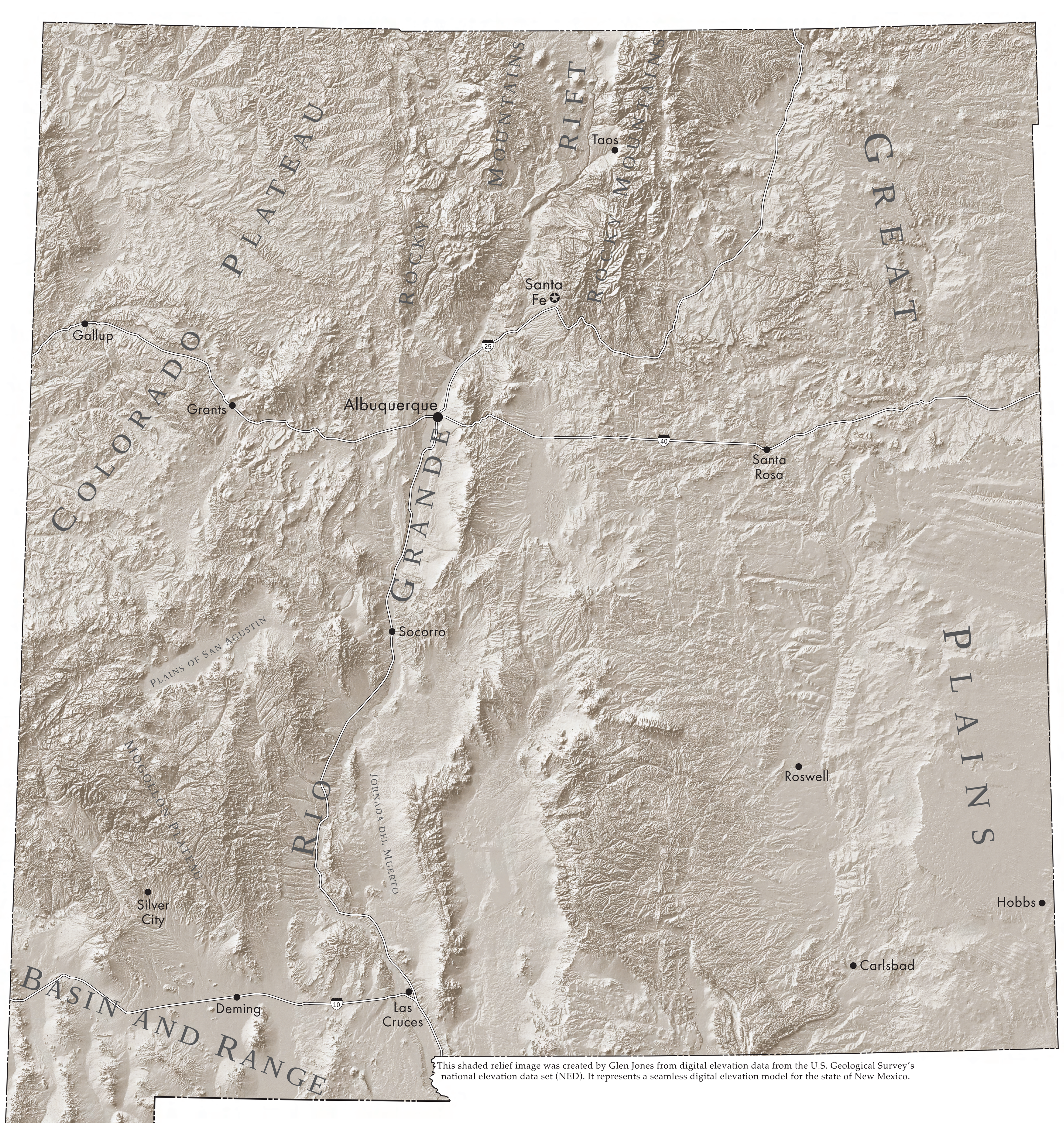








Formal stratigraphic terminology of Triassic and Jurassic rocks in New Mexico, as used in the National Geologic Map Database of the U.S. Geological Survey.



This shaded relief image was created by Glen Jones from digital elevation data from the U.S. Geological Survey's national elevation data set (NED). It represents a seamless digital elevation model for the state of New Mexico.

1:1,250,000

Cenozoic Tectonic Features of New Mexico

The shortening, stretching, translation, uplift, subsidence, fusion, crystallization, eruption, and erosion of New Mexico's crust, in response to global plate motions, have produced a complex collage of enchanting landforms during the last 1.8 billion years. The modern landscape formed mostly in Cenozoic time, in the last 65 million years.

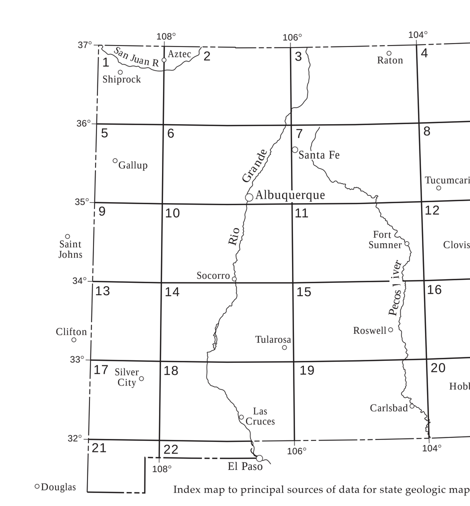
The riverine axis of New Mexico is dominated by tilted fault block ranges and extensional basins of the **Rio Grande rift.** Closely spaced faulting and domino–style block tilting along the rift axis represent brittle stretching of the upper crust in response to plastic flow of hotter rocks in the middle and lower crust. The rift is a northward narrowing arm of the strongly extended **Basin and Range** province. It separates the **Colorado Plateau** microplate from the **Great Plains** province and the rest of cratonic North America. Westward flow of the underlying mantle, initially associated with roll back (retreat) of the subducted Farallon plate and later differential motion between the Pacific and North American plates, has caused the relatively rigid Colorado Plateau to slowly drift away from the Great Plains in the last 30 million years. Westward stretching, focused along the hotter rift zone, has accommodated this differential separation of microplates at an average rate of roughly 0.5–1.0 millimeters per year. Compared to California, New Mexico is now in a plate tectonic "backwater."

Broad zones of moderate–to–slight crustal extension generally parallel the evolving (warming) margins of the Colorado Plateau and Great Plains. These transition zones are marked by shallow depressions and a few north–trending upper Cenozoic normal faults that occur south of Grants and along the east shoulder of the rift from Eagle Nest to Estancia and to the Brokeoff Mountains west of Carlsbad. Synclinal blocks of the **Mogollon Plateau** and **Jornada del Muerto,** which occur within the rifted terrane, appear to represent moderately wide rafted blocks similar to the Colorado Plateau microplate. Fusion and dehydration of the batholithic crust under the Mogollon Plateau may have given it additional strength. The Colorado Plateau initially drifted away from the Mogollon Plateau to form the **Plains of San Agustin,** an incipient transverse arm of the Rio Grande rift. Quaternary fault patterns suggest that the Mogollon Plateau is now largely coupled to the Colorado Plateau.

In late Mesozoic to early Cenozoic time, crustal welts of the southern **Rocky Mountains** were squeezed and jostled upward along the east margin of the Colorado Plateau as it was pushed northeastward against the less resistant margin of the craton. This Laramide zone of crustal shortening has apparently guided later development of the Rio Grande rift and peripheral zones of extension. For example, in northern New Mexico younger rift basins have partially inverted (collapsed) the core area of the older Laramide Rocky Mountains.

–Richard M. Chamberlin

Principal Sources of Data



Index map to principal sources of data for state geologic map

Byers, V. P., 1979, Geologic map and sections of the Crystal quadrangle, San Juan and McKinley Counties, New Mexico: U.S. Geological Survey, Open-file Report 79–599, scale 1:24,000.
Byers, V. P., 1980, Geologic map and sections of the Sonsela Butte 4 SE quadrangle, Apache County, Arizona, and San Juan and McKinley Counties, New Mexico: U.S. Geological Survey, Open-file Report 80-788, scale 1:24,000.
Campbell, F. W., 1981, Geology and coal resources of Cerro Prieto and The Dyke quadrangles, Cibola County, New Mexico: New Mexico Bureau of Mines and Mineral Resources, Open-file Report 144, 68 pp., scale 1:24,000.