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Fritz Blake was a senior project manager for the Albuquerque District of the U.S. Army Corps of Engineers. He has spent his entire 30-year career working on water issues in the Southwest. Starting in 1978 as an economist determining benefits for flood control projects, he has continued to work on flood control, watershed planning, and environmental restoration projects throughout the Rio Grande Valley. Mr. Blake retired in February 2009.

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Dominique Cartron earned a J.D. degree from the University of New Mexico and previously served as a law clerk to the general counsel of the New Mexico Office of the State Engineer. During the past 12 years, she has focused on municipal and regional water planning and water management and has participated in strategic decision-making workshops using state-of-the-art decision analysis techniques for public water management entities. Ms. Cartron has worked with several municipal and county clients to develop 40-year water plans, water system regionalization plans, and other water planning reports, including a conservation plan for the city of Hobbs. She recently completed the Eddy County 40-year water plan, which includes a regionalization component, and recently was the project manager for the city of Artesia's 40-year water plan, which included a conservation and drought management plan. Ms. Cartron has participated in all phases of seven New Mexico regional water plans, including identification and evaluation of alternatives for meeting future demand in regions where demand is expected to exceed supply over a 40-year time frame. She was the project manager for the alternatives feasibility analysis in the Middle Rio Grande Regional Water Planning area, supervising the evaluation of 25 strategies for meeting future water demand. In addition, Ms. Cartron has evaluated water rights and legal issues for several other regional water plans.

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Amy Haas is the Middle Rio Grande Bureau attorney for the New Mexico Interstate Stream Commission. Since becoming a member of the New Mexico bar in 2001, Amy has practiced primarily in the areas of water and real estate law. In private practice, she represented individual and institutional applicants in the state engineer water rights transfer process, private water rights litigation, and stream system adjudications. She also represented both buyers and sellers in water rights and land transactions in the Middle Rio Grande. Since joining the Interstate Stream Commission in 2005, Amy's responsibilities have included the implementation of the agency's Strategic Water Reserve initiative; acquiring water rights and land for the agency, most recently for the Interstate Stream Commission's Los Lunas Rio Grande Silvery Minnow Refugium; advising the agency on endangered species issues, and working with the Office of the Attorney General in its representation of the Interstate Stream Commission in related litigation; and representing the Middle Rio Grande Bureau on all aspects of Rio Grande Compact compliance. Ms. Haas has a B.A. from the University of California, Davis, and a J.D. and certificate in natural resources law from the University of New Mexico School of Law.

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Joanne Hilton is a senior hydrologist at Daniel B. Stephens & Associates. She has B.S. and M.S. degrees in hydrology and more than 17 years of experience conducting hydrological and water resource investigations. Her experience includes long-range water supply planning, groundwater/surface water interactions, regional water planning, preparation of 40-year water plans, surface water analyses, analysis of water policy and water rights, water quality investigations, groundwater supply investigations, and design and implementation of surface and groundwater monitoring programs. Ms. Hilton has successfully managed many projects involving water resources planning and analysis. She has been the project manager for development of regional water plans for seven New Mexico regions (Jemez y Sangre, Colfax, Socorro-Sierra, Mora-San Miguel-Guadalupe, Southwest New Mexico, Taos, and Northeast New Mexico). Through the development of these plans, Ms. Hilton has gained much familiarity with surface and groundwater supply issues, water rights, institutional and policy issues, and alternatives for meeting future water demands. She is familiar with the issues facing small and medium water systems, such as water quality compliance and water system losses, and can help to identify collaborative approaches for better regional water system management. All of the planning efforts that Ms. Hilton has managed included extensive public and stakeholder involvement, and she has provided presentations at numerous public and local government forums.

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After graduating from New Mexico State University in 1983, Mr. Kelly's career has concentrated on flood control, starting with operations and maintenance work on the city of Albuquerque flood control system, moving through a design and construction role while a staff engineer at the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA), and now in a senior management role in the state of New Mexico's first and largest flood control district. AMAFCA is the leading flood control agency in the state with regard to implementation of storm water best management practices, aesthetic infrastructure designs, and providing multiple uses of its flood control facilities. AMAFCA is the highest bond-rated agency in New Mexico, holding triple-A ratings from Moody's and Standard & Poor's, the two leading bond rating agencies. He is a registered professional engineer with the state of New Mexico and is the vice chair of the New Mexico Watershed and Dam Owners Coalition.

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Susan Kelly is the associate director of the Utton Transboundary Resources Center and an adjunct faculty member at the School of Law, University of New Mexico. The Utton Center is a policy center created to help parties sharing a water resource manage the resource within a legal framework instead of litigating over it. The center promotes the equitable and sustainable management and use of transboundary resources by providing impartial expertise and scholarship. The center approaches projects from a multi-disciplinary standpoint and also provides educational programs on legal issues concerning natural resources. Ms. Kelly is active in a variety of projects, including helping to organize basin-wide planning for three regional planning areas in the Middle Rio Grande, participating in Middle Rio Grande Endangered Species Act issues, and work toward integration of land and water planning policy. She represents Governor Richardson on the New Mexico–Chihuahua Commission water table and developed the Joe Stell Adjudication Ombudsman Program. She is an attorney licensed in the state of New Mexico and also a member of the American Institute of Certified Planners (AICP). Her law degree is from the University of New Mexico and her undergraduate degree is from Arizona State University. She was formerly the water rights manager for the city of Albuquerque and is a long-time resident of New Mexico.

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Greer Price is deputy director at the bureau, where he also directs the publications program. His experience includes seven years as a geologist working in the oil patch, ten years with the National Park Service, and four years as managing editor at Grand Canyon Association. He has served on the boards of the Publishers Association of the West and the New Mexico Geological Society Foundation. His focus for many years has been on the interpretation of geology for the general public. He is an associate member of the Association of American State Geologists (AASG), and an adjunct faculty in the Humanities Department (Technical Communications Program), where he occasionally teaches. He has a B.A. and an M.A. in geology from Washington University in St. Louis.

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Jean Witherspoon worked for the City of Albuquerque's Public Works Department/Utility Department (now the Albuquerque Bernalillo County Water Utility Authority) from 1984 through 2006. In the early 1970s she worked as a land use planner for the cities of Phoenix and Albuquerque. In the Public Works Department, Jean worked with water resource, water quality, fiscal planning, and facility siting issues. She was appointed the City of Albuquerque's Water Conservation Officer in June 1992 and was responsible for overseeing the development and implementation of that program through late 2001. She has served as president of the New Mexico Water Conservation Alliance and American Water Resources Association. Jean earned a B.F.A. in architecture and a Master of Water Resource Administration from the University of New Mexico. She is a native New Mexican from Silver City and Gallup and has resided in Albuquerque for more than 30 years. After 25 years in municipal service, Jean retired in late 2006. She remains active as a member of the New Mexico Water Dialogue Board.

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ACRONYMS

ABCWUA	Albuquerque Bernalillo County Water Utility Authority
ADA	Americans with Disabilities Act (ADA-accessible)
AMAFCA	Albuquerque Metropolitan Arroyo Flood Control Authority
cfs	cubic feet per second
DNA	deoxyribonucleic acid (DNA ribo-typing)
DOE	U.S. Department of Energy
EDR	electrodialysis reversal
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
GE	General Electric
LEEDS	Leadership in Energy and Environmental Design
MRGCD	Middle Rio Grande Conservancy District
MS4	Municipal Separate Storm Sewer System permit
NRC	National Research Council
OSE	Office of the State Engineer
PSA	public service announcement
RO	reverse osmosis
SJC	San Juan–Chama
TCE	trichloroethylene
TDS	total dissolved solids
TMDL	total maximum daily load
Univar	Van Waters & Rogers
USGS	U.S. Geological Survey
WRAS	Watershed Restoration Action Strategy

The greater Albuquerque region preserves a remarkably diverse piece of the geologic record in New Mexico. Rocks exposed range in age from 1.8-billion-year-old Proterozoic crystalline rocks to the recent fluvial sediments of the Rio Grande. The Rio Grande follows the axis of the Rio Grande rift, a complex of down-faulted blocks of crystalline and sedimentary rocks that have been buried under thousands of feet of sedimentary basin fill. Rifting in this part of the state began approximately 25–30 million years ago. The Rio Grande first entered the area about 7 million years ago, long before the valley was cut. Sediments in the Rio Grande have been divided into younger, inner valley deposits and older fluvial and alluvial deposits. In many parts of the map area these fluvial and reworked alluvial sediments form the shallow regional aquifer from which much of the city's water has traditionally come.

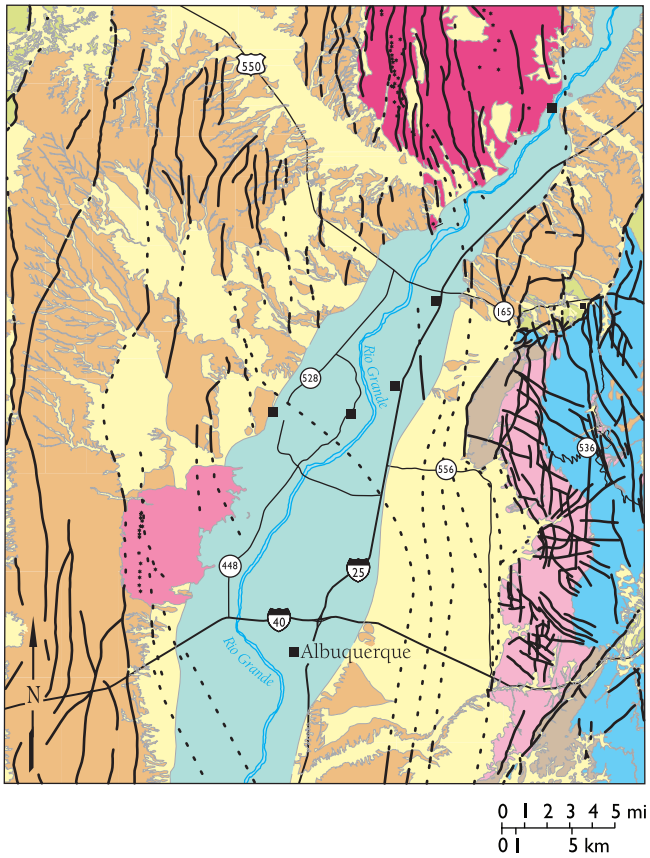
Outside the floodplain the region is dominated by exposures of the older Santa Fe Group, which is as much as 15,500 feet thick here, and by overlying Quaternary alluvium. The Santa Fe Group forms the principal source of potable ground water for the region.

Evidence of two broad episodes of volcanic activity are seen: Tertiary basalts associated with the San Felipe volcanic field, active 1.9–2.6 million years ago, and much younger Quaternary basalts (156,000 years old) associated with the Albuquerque volcanoes.

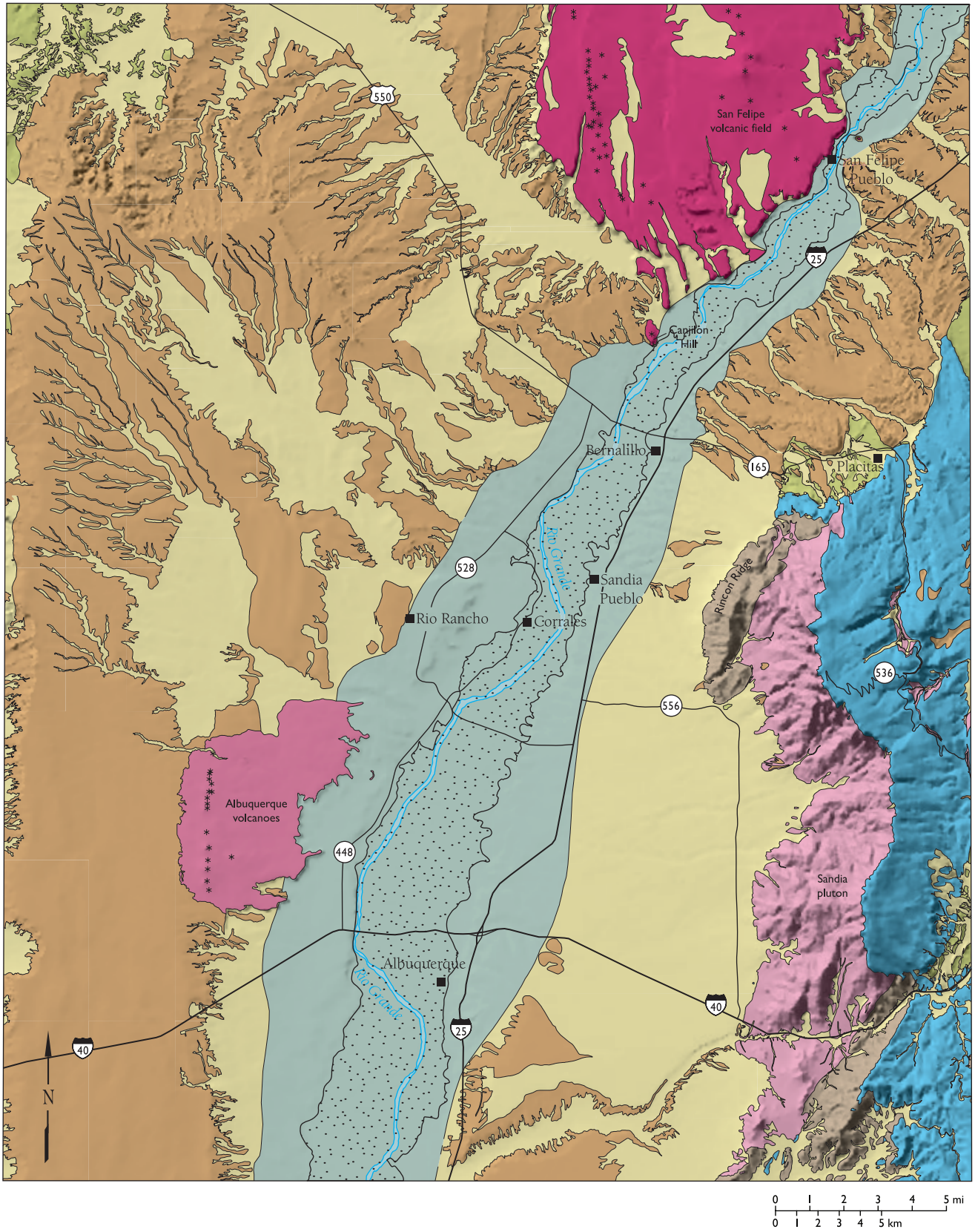
The Sandia granite exposed on the face of the Sandia Mountains is 1.4 billion years old. It is overlain by 325-million-year-old Paleozoic sedimentary rocks that dip to the east, forming the thin veneer of sediments that are visible along the crest. The enormous gap in the geologic record between these two units is known as the Great Unconformity.

The highly generalized fault map on this page shows the principal faults of the region in solid black lines (dotted where concealed). Many different types and generations of faults are shown here. Many of these faults are young; some are seismically active. Faults can profoundly influence the distribution and movement of ground water and in some instances have influenced the trend of recent volcanic eruptions. In many instances they define zones of potential seismic hazards.

This map was excerpted and generalized from the Geologic map of the *Albuquerque–Rio Rancho metropolitan area and vicinity, Bernalillo and Sandoval Counties, New Mexico*, Geologic Map 78, published in 2008 by the New Mexico Bureau of Geology and Mineral Resources. Call (575-835-5490) or visit our Web site at www.geoinfo.nmt.edu for more information.



- Rio Grande, inner valley deposits
- Rio Grande, older fluvial and undivided alluvial deposits
- Quaternary basalt
- Quaternary alluvium
- Tertiary basalt
- Santa Fe Group
- Mesozoic sedimentary rocks
- Paleozoic sedimentary rocks
- Sandia granite
- Older Proterozoic crystalline rocks
- * Volcanic vent


San Felipe volcanic field
San Felipe Pueblo
Capitan Hill
Bernalillo
Placitas
Rio Grande
Sandia Pueblo
Rio Rancho
Corrales
Rincon Ridge
Albuquerque volcanoes
Sandia pluton
Albuquerque
550
25
165
528
536
556
448
40
N
0 1 2 3 4 5 mi
0 1 2 3 4 5 km