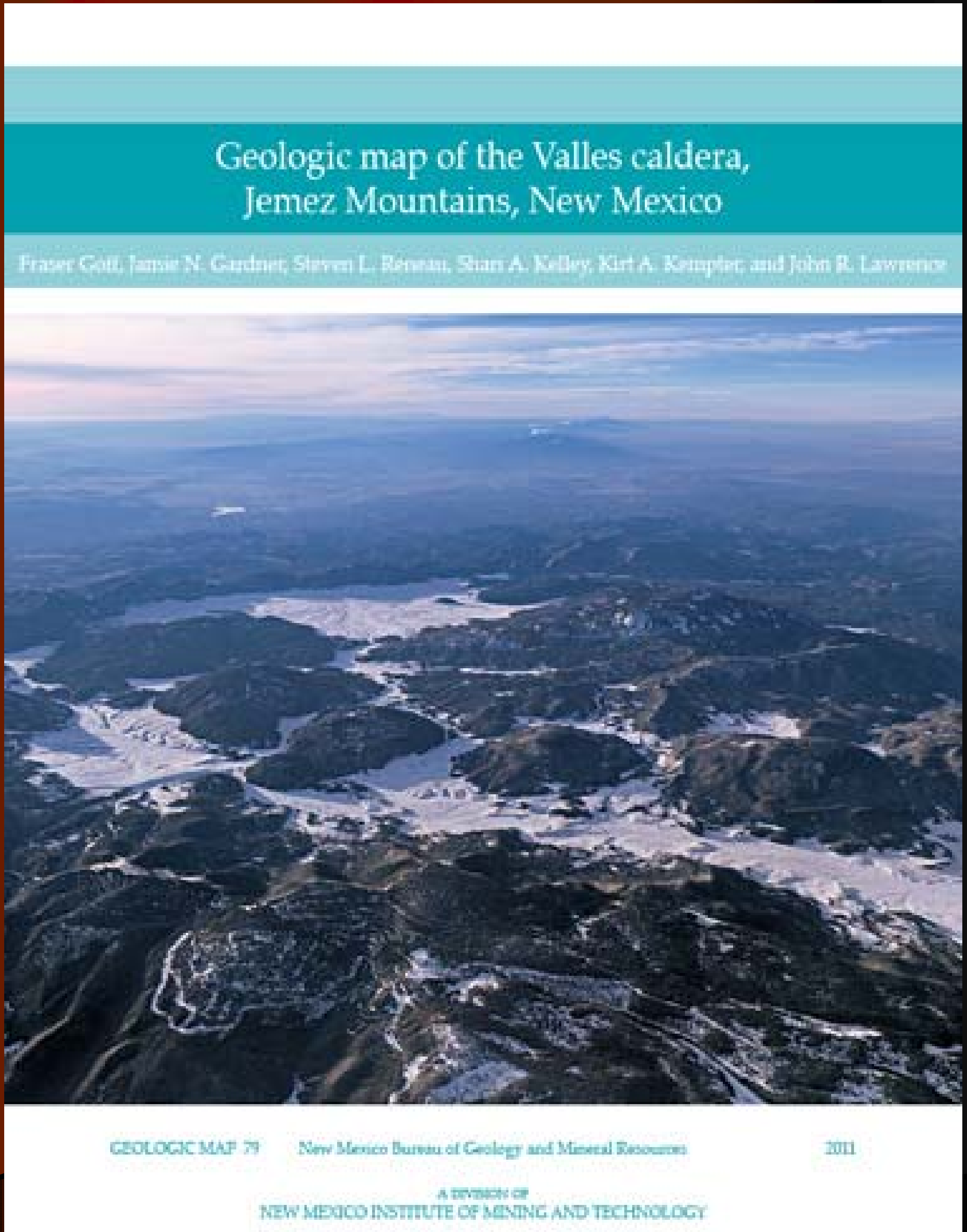
Update on New Mexico Bureau of Geology and Mineral Resources 2011

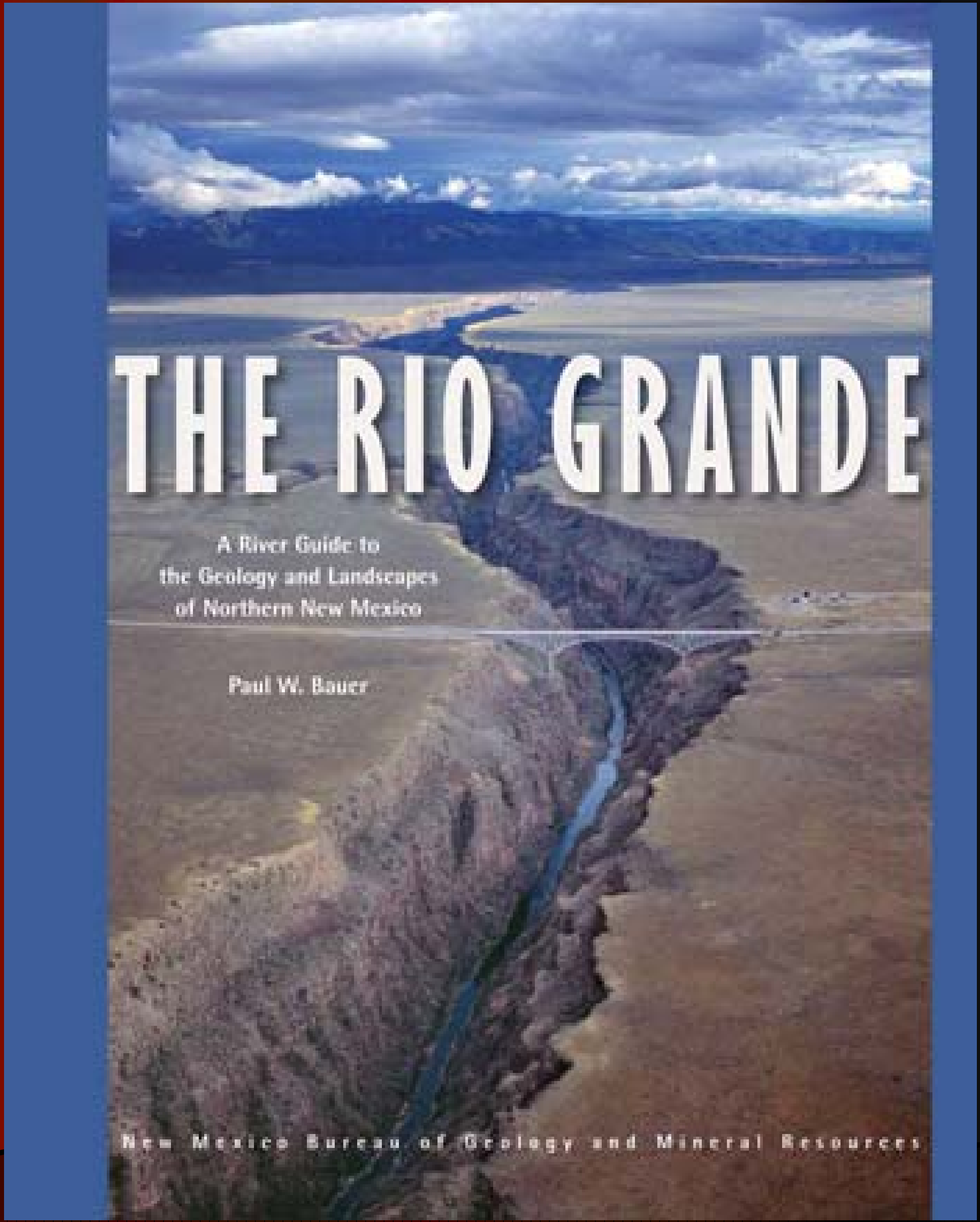
Virginia T. McLemore

- Dr. Peter Scholle retired in June 2011
- Search committee selected 4 candidates for interviews on campus, which were held in July and August
- We should have a new director and state geologist in 2012
- L. Greer Price is the interim director

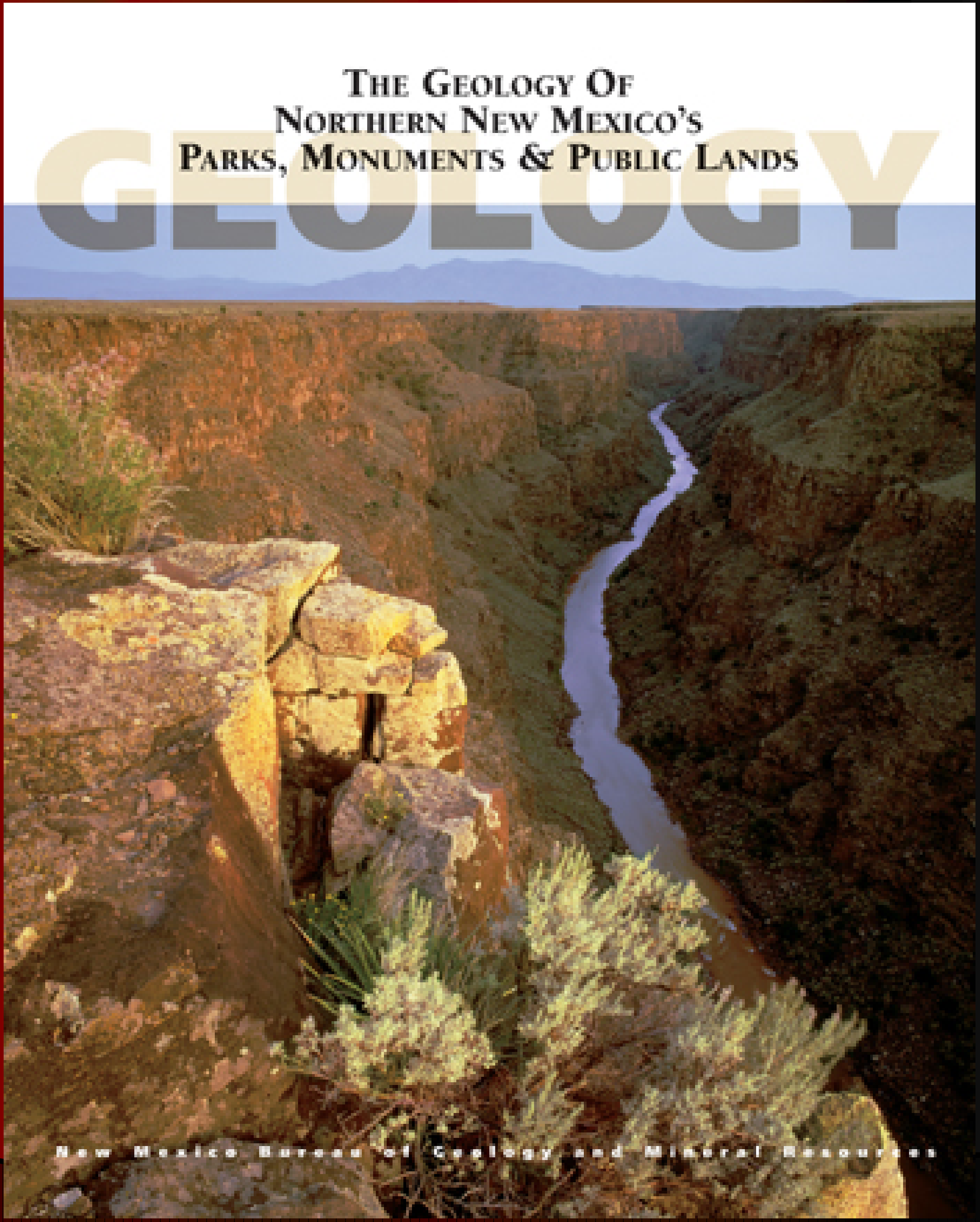
Geologic map of the Valles caldera, Jemez Mountains, New Mexico



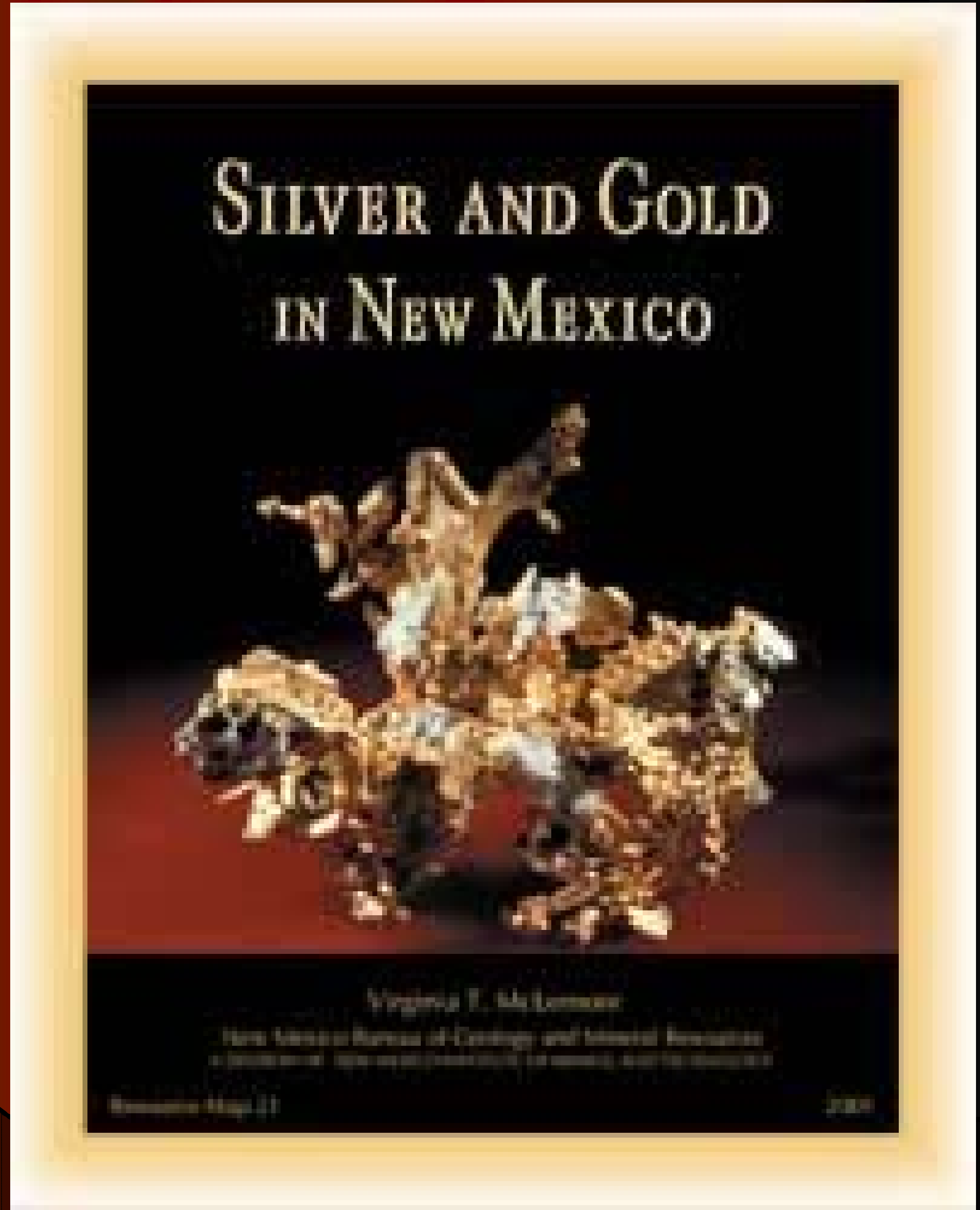
The Rio Grande: *A River Guide to the Geology and Landscapes of Northern New Mexico*



The Geology of Northern New Mexico's Parks, Monuments, and Public Lands



RM-21—Silver and Gold in New Mexico, reprinted in 2010



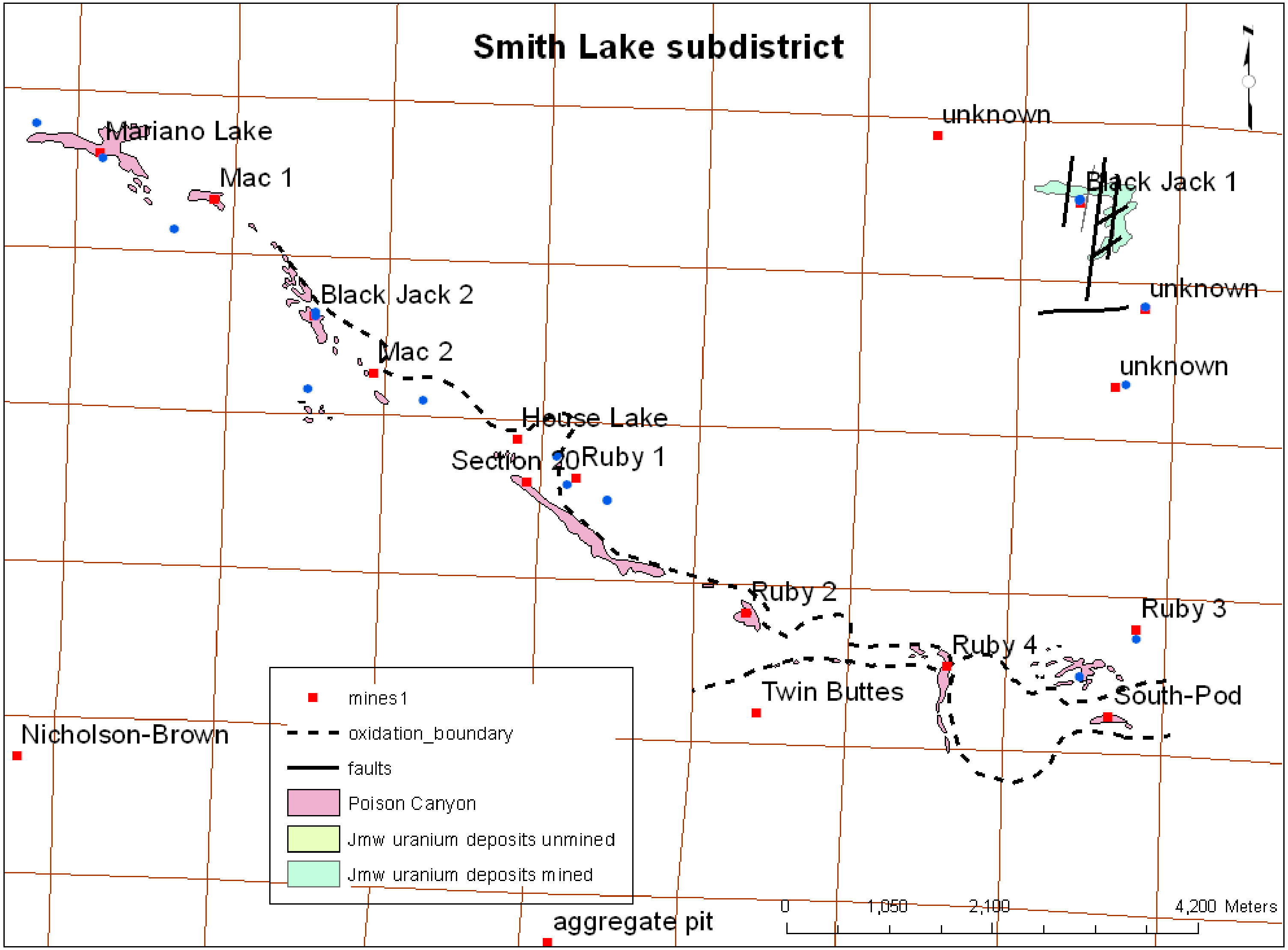
Uranium studies

- Cataloging our archival data
- Cataloging uranium geophysical logs
- Updating uranium deposits maps in ArcMap
- Papers at Espanola Basin Conference, Special Issue of The Mountain Geologist, 2011
- Paper at the U2011 conference in Casper

http://geoinfo.nmt.edu/staff/mclemore/documents/sme07_unm_mclemore.DOC

- Uranium Fuels Cycle, Hobbs, New Mexico, April 26, 2011
- Conference held to disseminate information on nuclear industry from exploration through power plants
- Presentations are at http://nmcep.nmt.edu/index.php/Past-Conferences/uranium-fuel-cycle-conference-presentations.html

Continue to update GIS database



Coal Databases

- Gretchen Hoffman
  - Resource- drill hole data, measured sections with coal depth and thickness
  - Quality- Proximate, Ultimate, Btu analyses, trace element ashed oxides
  - Historic mines- production, location, ownership
  - Historic production by county
  - Coal bibliography- reference material specific to coal geology of New Mexico
  - Catalogue of geophysical logs in coal areas
  - Uses of coal combustion by products (fly ash)

Continuing scanning and georeferencing coal mine maps

Rockin' Around New Mexico 2011: Jemez Mountains

- Annual Summer Workshop for K-12 teachers
- 35 Teachers attended from around the State
- Some were Master of Science Teaching (MST) Students at NM Tech
- Activities were rescheduled because of the Las Conchas fire
- 3-day Training Session
  - Class With Hands-On activities

NEXT YEAR WILL BE BACK TO THE JEMEZ MOUNTAINS

In Class

- Hands-on lessons
  - Seismology and Earthquake Safety
  - Volcanoes in New Mexico
  - Minerals identification

THANKS NMMA FOR YOUR SUPPORT!!!

Presentation to Leadership New Mexico Academy on Mining and Mineral Resources in New Mexico

presentation is on my web site

Thanks NMMA for funding travel expenses!!

Decision Makers Field Guides

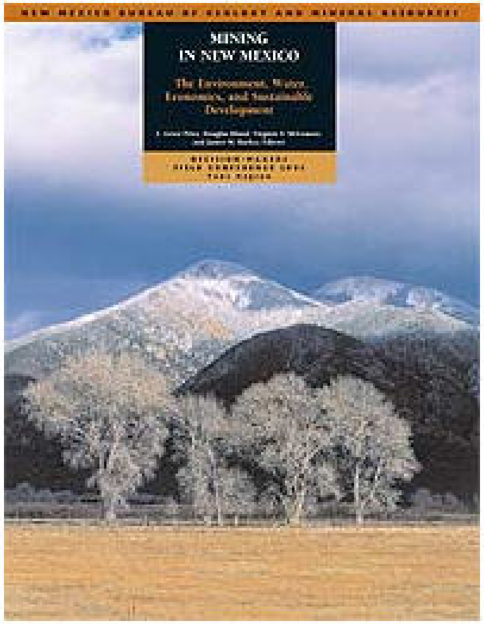
The New Mexico Bureau of Geology and Mineral Resources is joining with several state and local governmental agencies and organizations in conducting a series of field conferences for influential New Mexico decision makers. The purpose of these conferences is to present decision makers with the opportunity to learn first-hand about geological problems, opportunities, and potential solutions from some of the state's top experts, and to hear impartial (or at least balanced) opinions regarding current scientific knowledge about these matters.

Mining in New Mexico—The Environment, Water, Economics, and Sustainable Development

Decision-Makers Field Guide 2005

Edited by L. Greer Price, Douglas Bland, Virginia T. McLemore, and James M. Barker

Mining has played a significant role in the history and develop- ment of New Mexico and continues to play an important role in the state's economic prosperity. The future of this industry will depend upon achieving a balance between our needs and desires, the changing economy, and our growing concern over environmental and social issues. This anthology of 30 articles is a timely look at some of those science and policy issues. 176 pages with tables, diagrams, maps, and color photographs throughout.

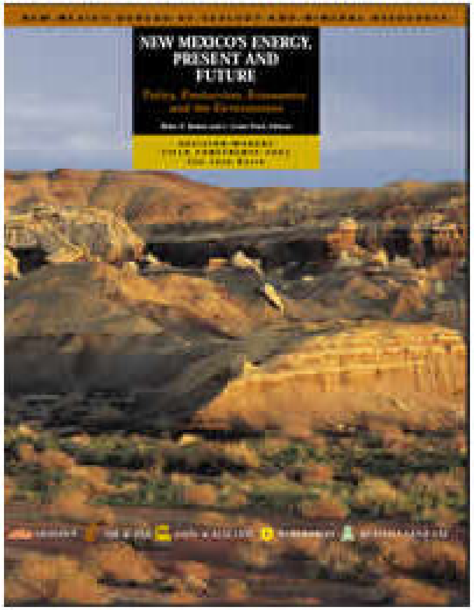


2005 guidebook cover

New Mexico's Energy, Present and Future—Policy, Production, Economics, and the Environment

Decision-Makers Field Guide 2002, San Juan Basin

Edited by Brian S. Brister and L. Greer Price



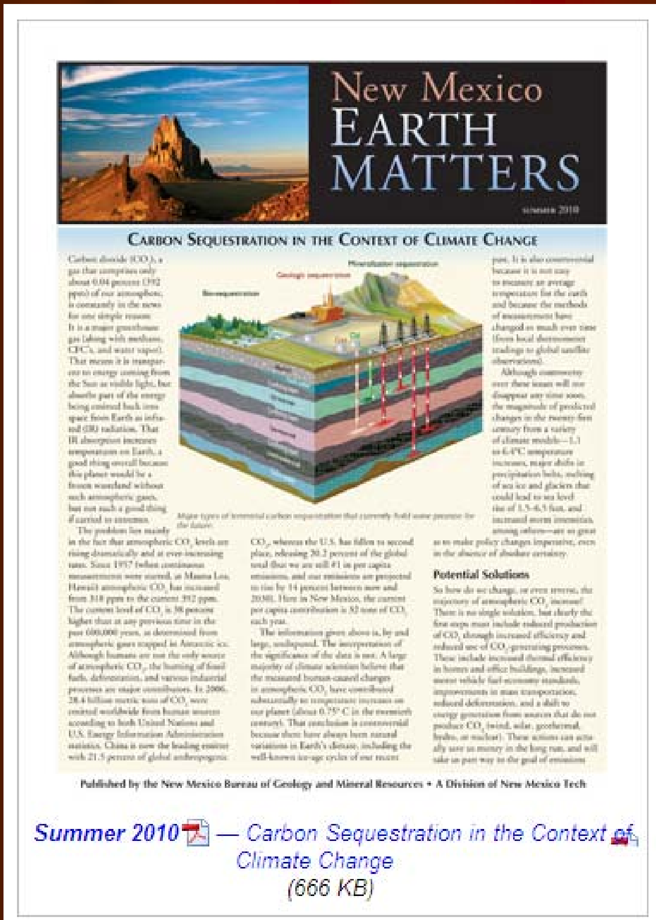
2002 guidebook cover

New Mexico, with some of the most significant energy reserves in the lower 48 states, is a major player in this country's conventional energy production. The state also has enormous potential for developing significant renewable/alternative energy resources, including solar and wind. This anthology of 30 articles is a timely look at how energy works in New Mixico today, with an eye toward the promises and challenges that lie ahead. Produced in conjunction with the second annual Decision-Makers Field Conference in may 2002, this volume is an important contribution to the literature on energy in New Mexico. 152 pages, 47 tables, graphs, and illustrations, 32 color photographs, and 23 page-size maps.

Purchase: $15.00 or Download the free PDF (5.7 Mb)

REGULAR FEATURES

- New Mexico Geology
- Earth Matters



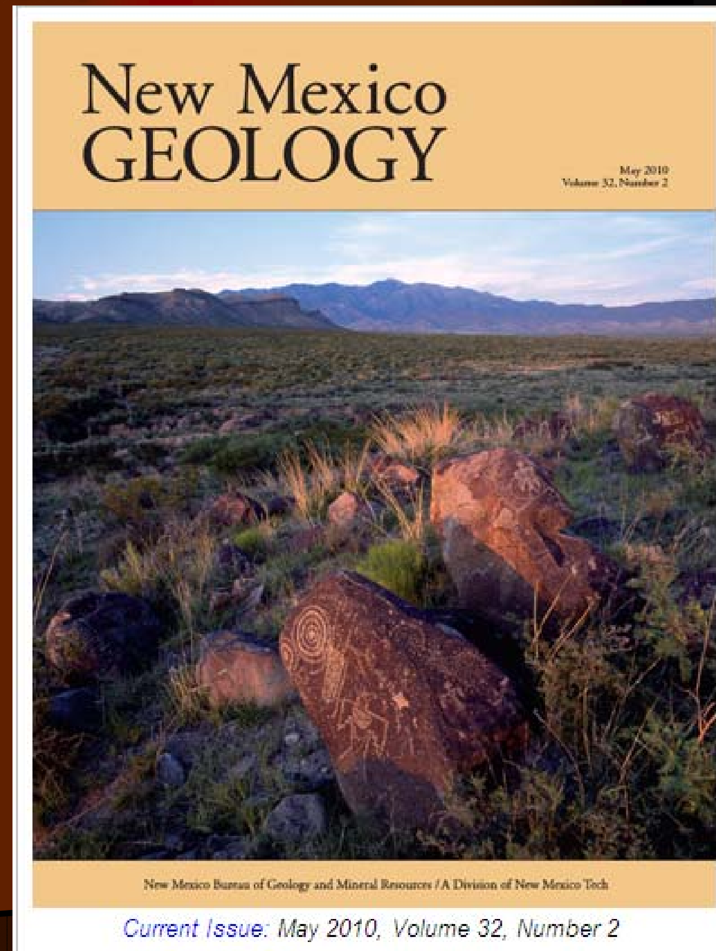
New Mexico Earth Matters

Summer 2010

Carbon Sequestration in the Context of Climate Change

Published by the New Mexico Bureau of Geology and Mineral Resources • A Division of New Mexico Tech

Summer 2010 — Carbon Sequestration in the Context of Climate Change (666 KB)



http://geoinfo.nmt.edu/publications/periodicals/earthmatters/home.html

New Mexico EARTH MATTERS

SUMMER 2011

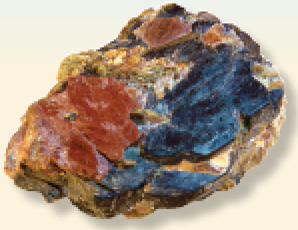
Rare Earth Elements for Emerging Technologies

Before 2010 most Americans had never heard of rare earth elements, except maybe in high school chemistry class when studying the periodic table of elements. However, in April 2010 China announced that it would impose export quotas on rare earth elements immediately, in order to address internal environmental issues at their mines, regulate illegal mining operations, and provide for a sustainable rare earth element production and supply for China. This announcement triggered an increase in price and some panic buying. In late September 2010 China halted exports of rare earth elements to Japan, following an international dispute over territorial fishing rights. Japan uses rare earth elements in their highly profitable electric/hybrid automobiles and many electronic consumer products. Although China reinstated exports to Japan in early November 2010, this incident placed rare earth elements in headlines and on the lips of resource planners, politicians, investors, and journalists throughout the world.

What Are Rare Earth Elements and How Are They Used?

Rare earth elements are some of the more important commodities required to manufacture products associated with emerging green technologies, including wind turbines and hybrid/electric cars. They are essential in most of our electronic devices, including cell phones, laptops, iPods, computer chips, etc. Other technologies are being developed that require rare earth elements in their manufacture, technologies used in water purification, desalination, magnetic refrigeration, and more energy-efficient light bulbs. The so-called rare earth elements include the 15 lanthanide elements (atomic numbers 57–71), yttrium, and scandium. They are commonly divided into two chemical groups: the more abundant light rare earth elements (lanthanum through europium) and the lesser abundant heavy rare earth elements (gadolinium through lutetium, and yttrium and scandium). They are important because of their uniquely efficient electronic properties, including the ability to readily give up or accept electrons, a property useful for magnets, optics, electronics, and other applications.

Rare earth elements are *lithophile* elements (or elements enriched in the crust) that have similar physical and chemical properties, and, therefore, occur together in nature. The name is misleading; their content in the earth's crust ranges from 60 ppm (parts per million) for cerium to approximately 0.5 ppm for terbium and lutetium, which is greater than the crustal abundance of silver. Four of them (yttrium, lanthanum, cerium, and neodymium) have larger crustal abundances than lead. However, they are not always concentrated in easily mined economic deposits, and only a few deposits in the world account for current production.



Monazite (in red), a rare earth mineral. From a pegmatite in the Petaca mining district in northern New Mexico. Photo by Leo Gabaldon.

Where Are Rare Earth Elements Found?

Commercial deposits of valuable rare earth elements are not evenly distributed around the world. They tend to be concentrated in specific localities based on favorable geologic conditions. Currently more than 95 percent of the rare earth elements required for emerging technologies is obtained from mines in China. Rare earth elements are not found naturally as pure metallic elements. Instead, they are incorporated in hundreds of minerals, but only a few minerals are economically important. Bastnaite, a carbonate mineral, and monazite, a phosphate mineral, are the most economically important rare earth minerals in the world at this time. Most of the world's largest concentrations of bastnaite are in carbonatites, igneous rocks that contain more than 50 percent carbonate minerals. Carbonatites are found as dikes, sills, plugs, lava flows, and large stocks. Rare earth elements also may be concentrated in pegmatites and granitic intrusions or as placer deposits. Each ore deposit is different, and a detailed understanding of the mineralogy and chemistry, as well as an understanding of the lithology, structure, and alteration of the deposit are required to determine economic potential.

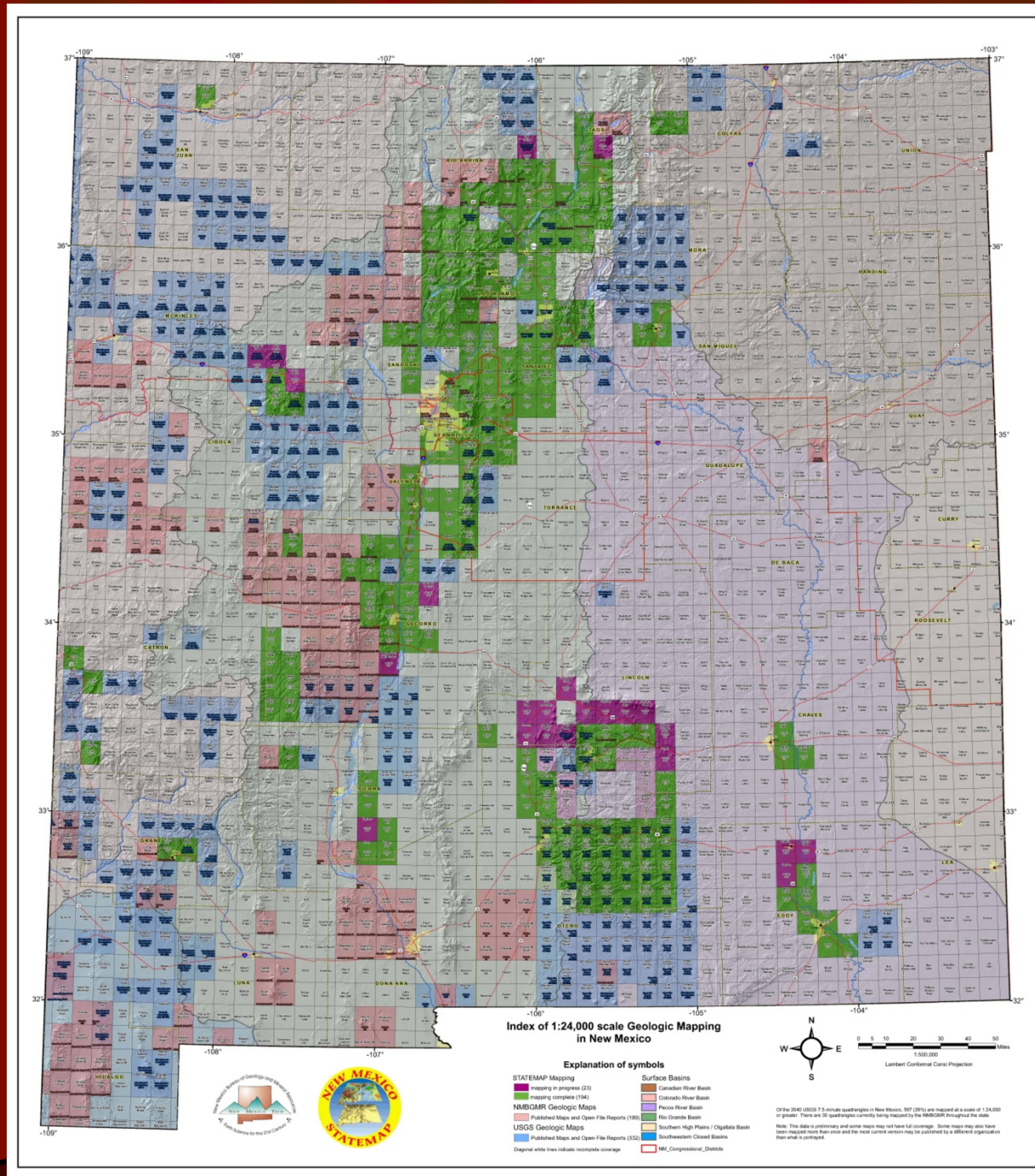
Between 1950 and 1964 monazite placer deposits in South Africa and elsewhere supplied the small amounts of rare earth elements needed. From 1965 to 1998, most of the rare earth elements were produced from the large Mountain Pass mine in California, from carbonatites similar to those now being mined in China. Rare earth elements also are produced from igneous rocks on the Kola Peninsula in Russia, clay deposits in China, heavy mineral sands (placer deposits) in India and Brazil, and as a byproduct of tin production from mines

Published by the New Mexico Bureau of Geology and Mineral Resources • A Division of New Mexico Tech

http://geoinfo.nmt.edu/publications/periodicals/earthmatters/11/EM11n2.pdf

>110 quadrangles completed

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



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

Searching for publications and geologic references on New Mexico is much easier now

http://geoinfo.nmt.edu/publications/search/home.cfml

Current Projects

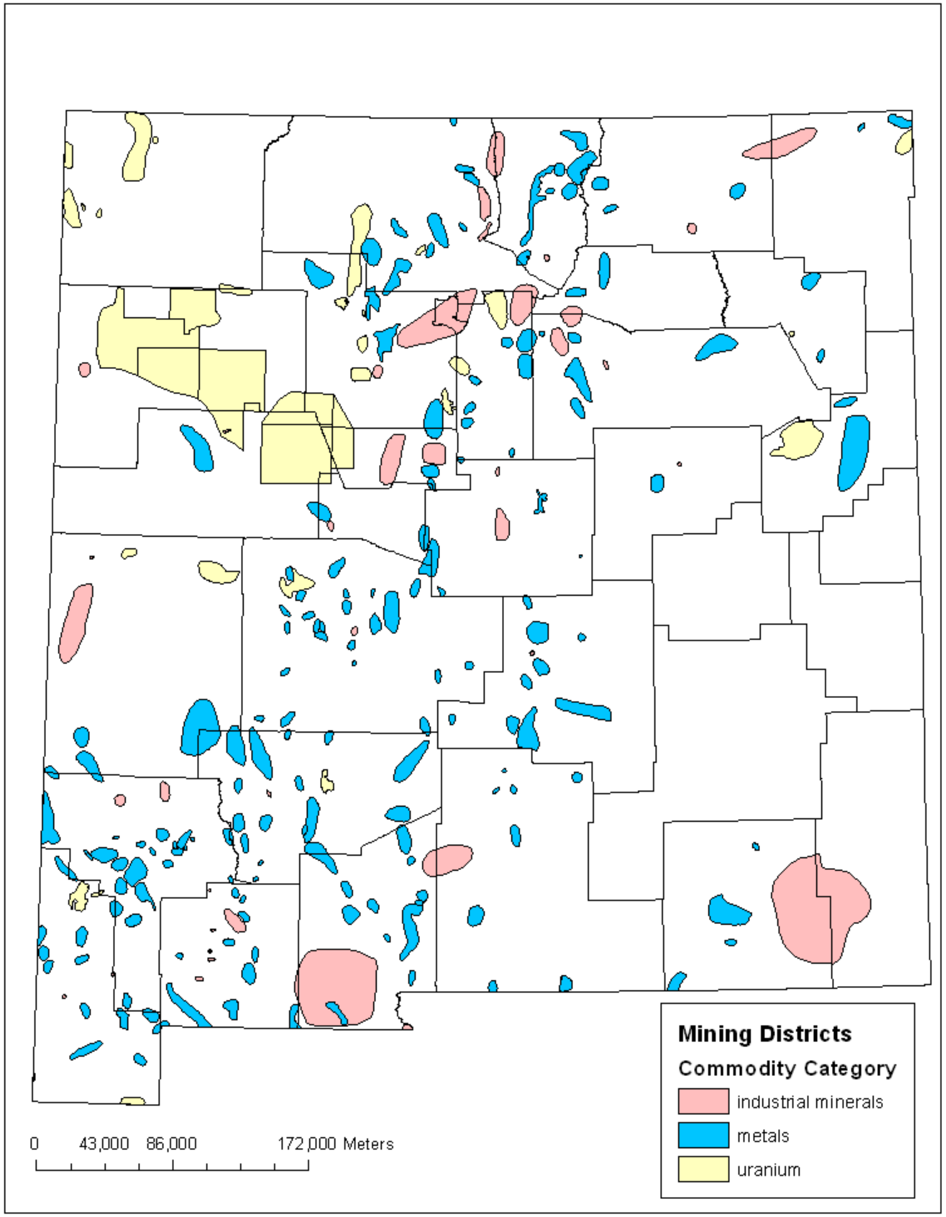
- Mineral resources of Sierra and Otero Counties (open file report, NMGS fall field conference)
- Geology and Mineral Resources of Montoya Butte quadrangle (Ojo Caliente No. 2 district)
- Minerals for emerging green technologies in New Mexico, including rare earth elements
- USGS summary on mineral resources in NM

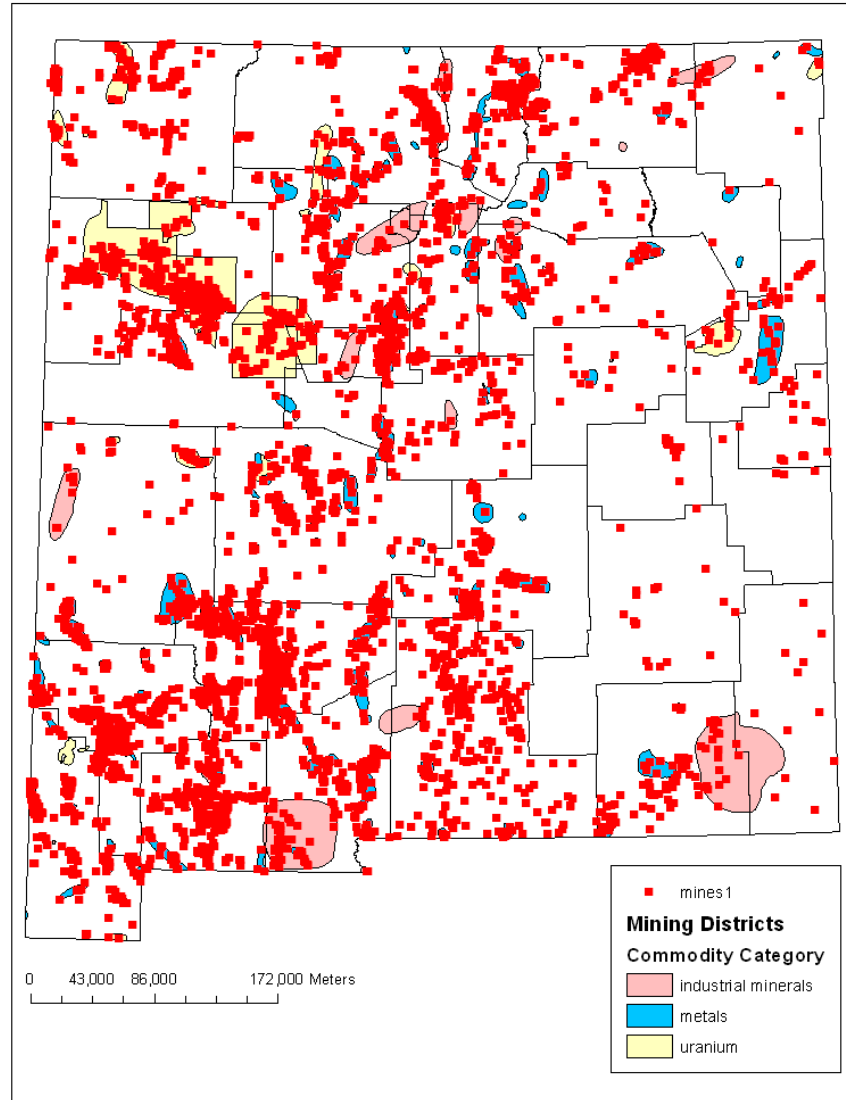
NMGS Special Mineral Resources volume

- Metallic ores
- Industrial minerals
- Petroleum resources
- Uranium resources
- Coal resources
- Geothermal resources

Plan to have it completed in 2012

Continuing updating the New Mexico Mines Database, production statistics, and commodity occurrence maps


Mining Districts
Commodity Category
industrial minerals
metals
uranium
0 43,000 86,000 172,000 Meters


mines1
Mining Districts
Commodity Category
industrial minerals
metals
uranium
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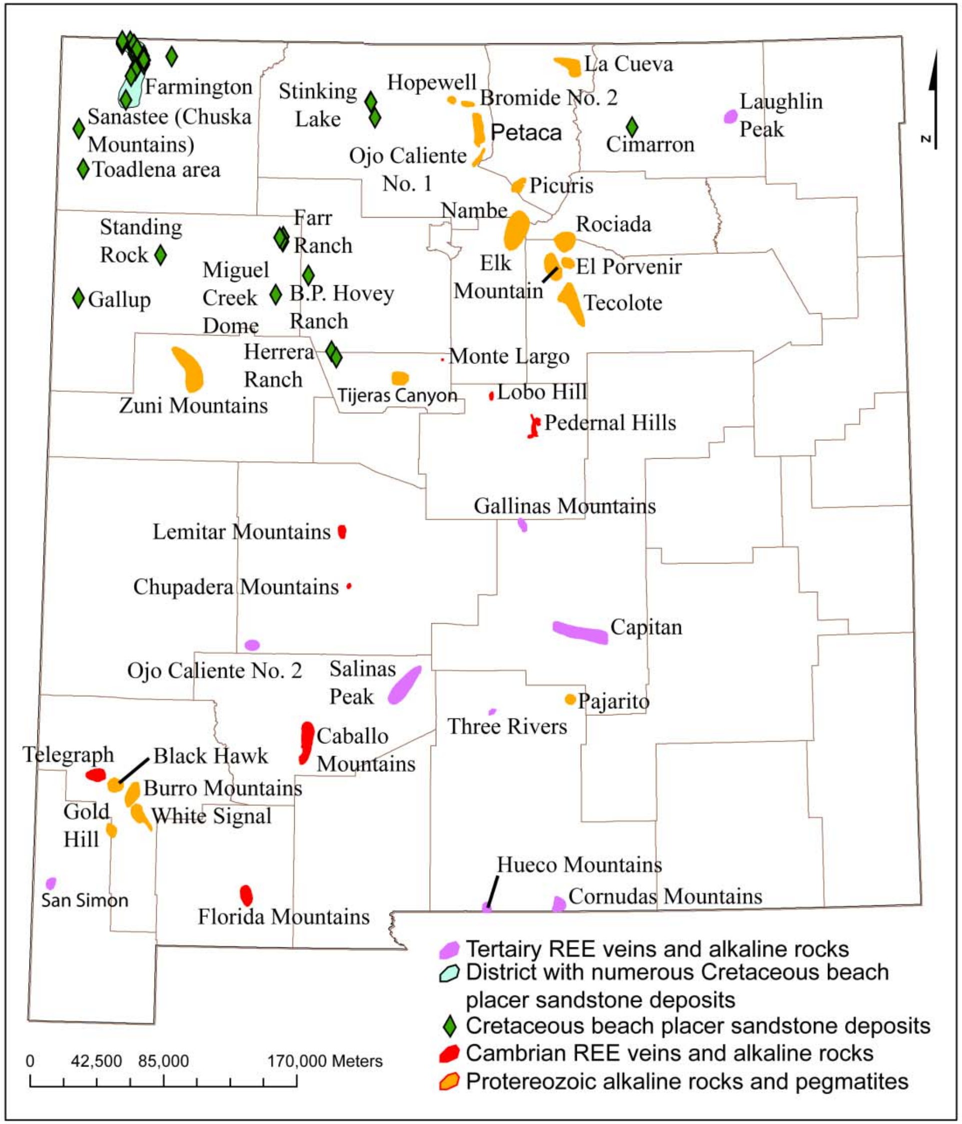
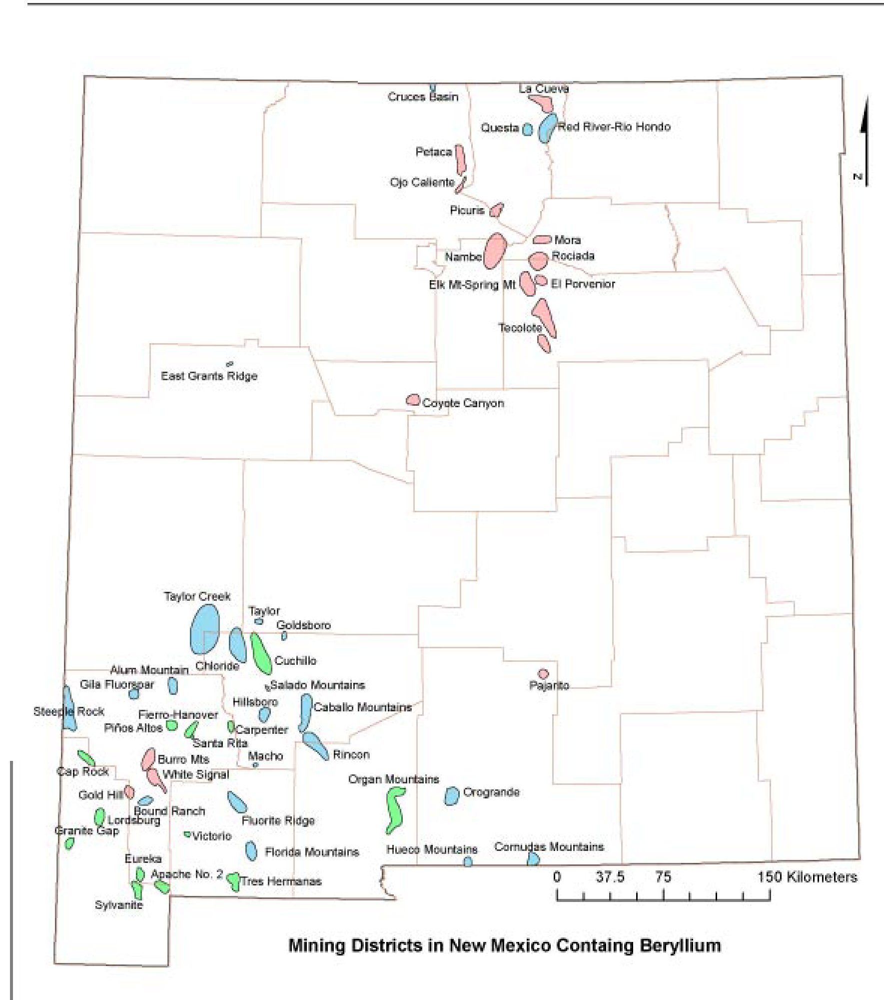
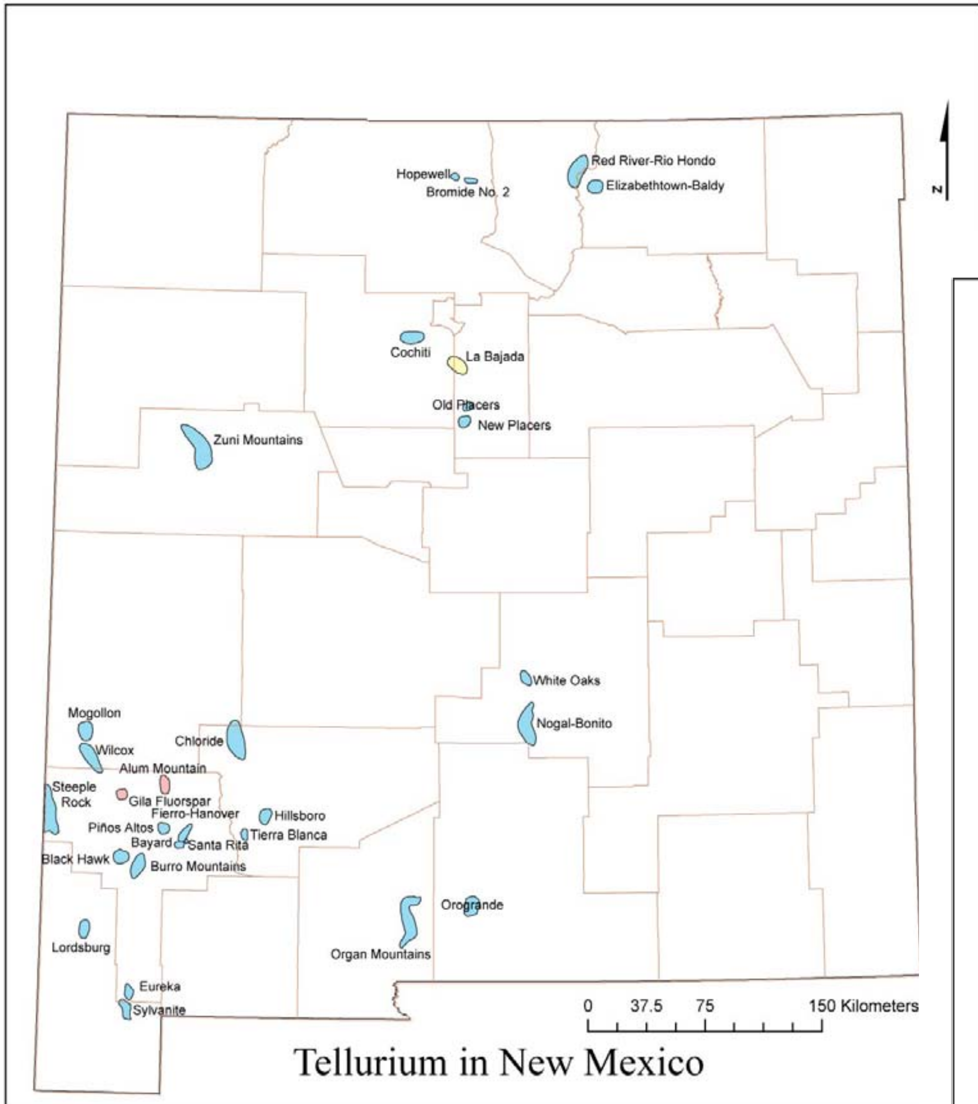
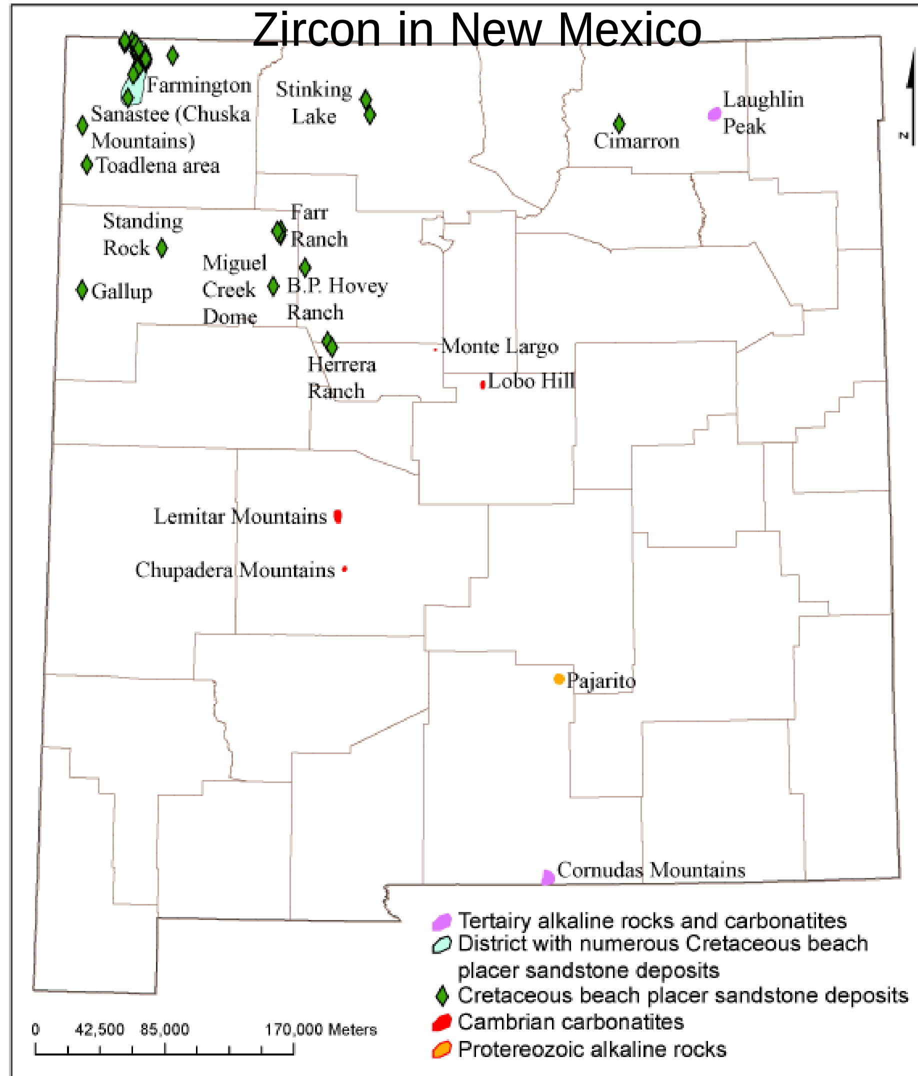
Beryllium in NM





REE IN NM


Hopewell
Bromide No. 2
Red River-Rio Hondo
Elizabethtown-Baldy
Cochiti
La Bajada
Old Placers
New Placers
Zuni Mountains
White Oaks
Nogal-Bonito
Mogollon
Wilcox
Chloride
Alum Mountain
Steeple Rock
Gila Fluorspar
Fierro-Hanover
Hillsboro
Piños Altos
Tierra Blanca
Bayard
Santa Rita
Black Hawk
Burro Mountains
Orogrande
Lordsburg
Organ Mountains
Eureka
Sylvanite
N
0 37.5 75 150 Kilometers
Tellurium in New Mexico


Zircon in New Mexico
Farmington
Sanastee (Chuska Mountains)
Toadlena area
Stinking Lake
Cimarron
Laughlin Peak
N
Standing Rock
Farr Ranch
Miguel Creek Dome
Gallup
B.P. Hovey Ranch
Herrera Ranch
Monte Largo
Lobo Hill
Lemitar Mountains
Chupadera Mountains
Pajarito
Cornudas Mountains
Tertairy alkaline rocks and carbonatites
District with numerous Cretaceous beach placer sandstone deposits
Cretaceous beach placer sandstone deposits
Cambrian carbonatites
Protereozoic alkaline rocks
0 42,500 85,000 170,000 Meters

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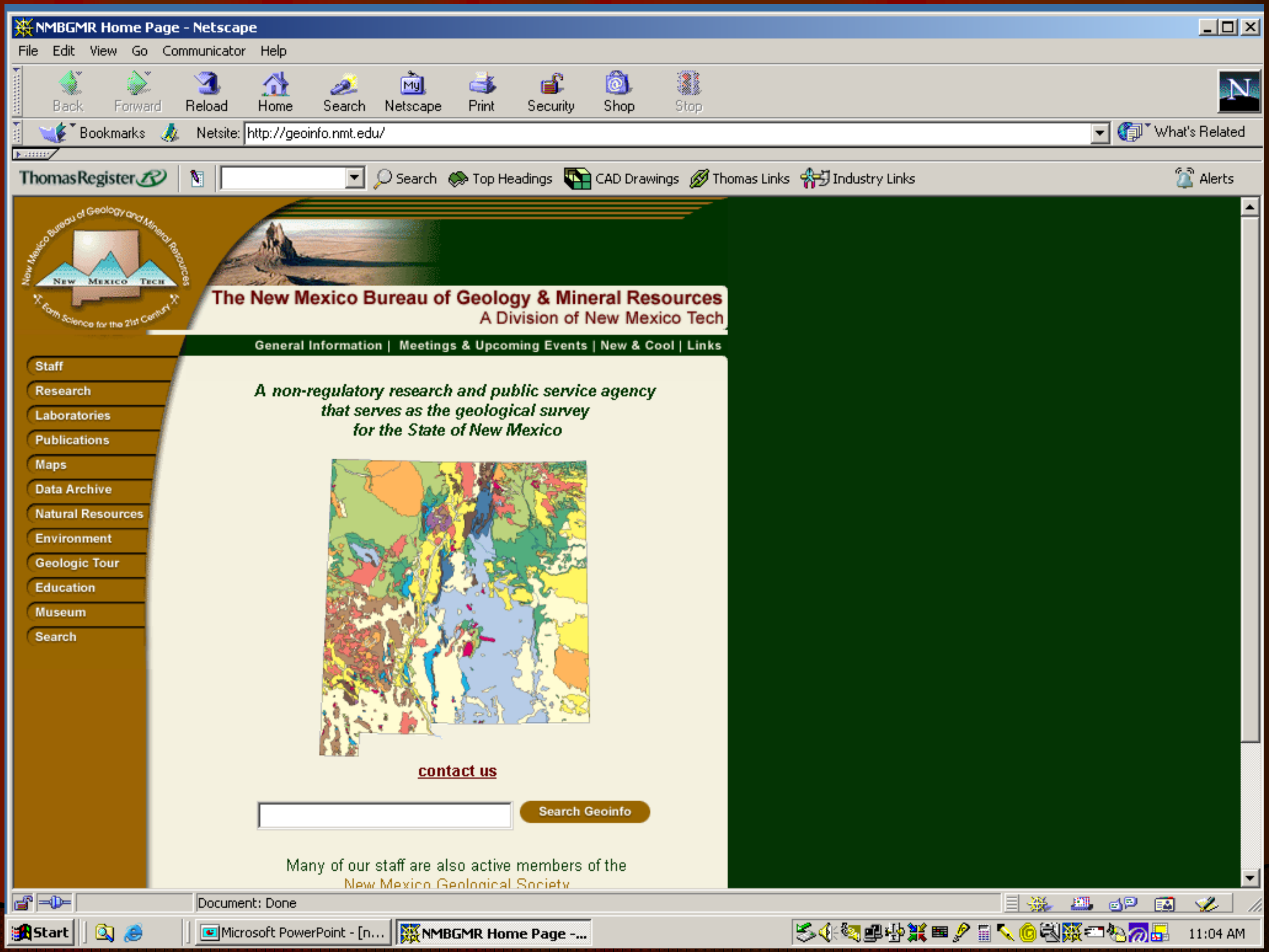

This presentation is on my web site http://geoinfo.nmt.edu/staff/mclemore/home.html