New Mexico GEOLOGY

November 2016
Volume 38, Number 4

New Mexico Bureau of Geology and Mineral Resources/A Division of New Mexico Tech

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Cover Image

Jackpile mine, looking north, around 1980. The Jackpile-Paquate open pit mine was discovered by aerial reconnaissance in 1951 and closed in 1983. It was the largest uranium mine at that time, consisting of 4 coalescing pits. The mine complex produced more than 80 million pounds of U_3O_8 from the Jackpile Sandstone of the Morrison Formation. The Jackpile-Paquate mine is now an EPA Superfund site. W.L. Chenoweth photo.

A publication of the
New Mexico Bureau of Geology and Mineral Resources,
a division of the New Mexico Institute of Mining and Technology

Science and Service
ISSN 0196-948X

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Cover image: W.L. Chenoweth
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New Mexico Geology is an "electronic only" publication as of 2015. Each issue is available as a free PDF download from the New Mexico Bureau of Geology and Mineral Resources website. Subscribe to receive e-mail notices when each issue is available at: geoinfo.nmt.edu/publications/subscribe

Editorial Matter: Articles submitted for publication should be in the editor's hands a minimum of five (5) months before date of publication (February, May, August, or November) and should be no longer than 40 typewritten, double-spaced pages. All scientific papers will be reviewed by at least two people in the appropriate field of study. Address inquiries to Bruce Allen, Geologic Editor, New Mexico Bureau of Geology and Mineral Resources, 2808 Central Avenue SE, Albuquerque, NM 87106-2245, phone (505) 366-2531.

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Uranium in New Mexico: A Special Issue of New Mexico Geology

Virginia T. McLemore and Bonnie A. Frey

In January 2016, a team of experts from the uranium industry and researchers from two New Mexico universities assembled at the Sevilleta National Wildlife Refuge for a three-day workshop to discuss topics associated with in situ recovery of uranium. Part of the motivation for this workshop was the recognition that there has been little new research completed by the uranium industry and that much of the current uranium knowledge base consists of research, mapping and technology from the 1970s and 1980s. Researchers and industry workers today have many new technologies available to help re-evaluate exploration, mining, processing, reclamation and restoration. Furthermore, today's industry has become much more open to sharing data, in part because today's strenuous permitting process has turned previously proprietary information into public record.

During a period of nearly three decades (1951–1980), the Grants district in northwestern New Mexico yielded more uranium than any other district in the United States, thereby making New Mexico a major producer of uranium. Today, uranium is used primarily in nuclear reactors to produce electricity via nuclear fission. Although no producing operations exist in New Mexico today, numerous companies have acquired uranium properties within the Grants, Hooks Ranch-Riley, and Red Basin-Pietown districts and plan to explore and develop deposits in the future (shown on McLemore and Chenoweth, 1989; listed in **http://nmgs.nmt.edu/repository/index.cfml?rid=2013002**). New Mexico has world-class uranium deposits in the Grants district and ranks 2nd in uranium reserves in the United States, after Wyoming. The New Mexico reserves amount to 64 million short tons of ore at 0.14% U_3O_8 (179 million pounds U_3O_8) at $50/pound. The most important deposits in the state are within the sandstones of the Jurassic Morrison Formation in the Grants district (McLemore and Chenoweth, 2003). More than 340 million pounds of U_3O_8 have been produced from Morrison Formation deposits from 1948–2002, accounting for 97% of the total production in New Mexico and more than 30% of the total production in the country.

Companies face several challenges to begin producing uranium in the Grants district and elsewhere in New Mexico again. These challenges include the following:

- No conventional mills remain in New Mexico to process the ore, adding to the cost of producing uranium in the state. Currently, all conventional ore must be processed by the White Mesa Mill near Blanding, Utah, or heap-leached on site. New infrastructure will need to be built before conventional mining can resume.
- Permitting for new in situ recovery and conventional mines and mills will take years to complete.
- Closure plans, including reclamation, must be developed before mining or in situ recovery begins. Modern regulatory costs will add to the cost of producing uranium in the United States.
- Some communities, especially the Navajo Nation communities, do not view development of uranium properties as favorable. The Navajo Nation has declared that no uranium production will occur on tribal lands. Most of Mount Taylor and adjacent mesas have been designated as the Mount Taylor Traditional Cultural Property; the effect of this designation on uranium exploration and mining is uncertain.
- High-grade, low-cost uranium deposits in Canada and Australia and the large low-grade deposits in Kazakhstan are sufficient to meet current international demands; additional resources will be required to meet long-term future requirements.

With some of these limitations in mind, the group that met in January compiled a list of research activities that could support renewed activity in the New Mexico uranium industry. Topics include workforce training, resource characterization, hydrogeological and geochemical modeling, updated environmental and regulatory protections, improved understanding of depositional mineralogy, microbiology and geochemistry, and the development of new recovery and restoration technology.

The group also settled on several outreach activities that could foster discussion within the community. It was determined that a conference held in New Mexico would be the best venue for showcasing the current research and collected knowledge associated with today's uranium industry. In response, Virginia McLemore and Bonnie Frey volunteered to co-chair a key-note session on uranium for the 2017 spring meeting of the New Mexico Geological Society (NMGS). Another outcome are two special editions of *New Mexico Geology*, including this fall issue and the upcoming spring issue. We hope that these editions of *New Mexico Geology* will provide information about current uranium-mining topics. We also hope that today's mining environment can encourage collaboration among researchers, industry, government agencies, and community representatives. Finally, we hope that interested readers of these articles will join us during the April 2017 NMGS spring meeting in Socorro.

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