

# Mine Safety and Environmental Protection Strictly Enforced

*There continues to be ongoing development of enhanced environmental management practices to meet the need for long-term environmental and health protection .*

Higher grade deposits, such as the breccia pipes, produce more uranium with less environmental footprint. The environmental footprint duration for each mine is short as the life for each mine in the past was only 5-7 years. The water table is deep, well below the level of mining. There is no circulation of major northern Arizona aquifers within any of the mining levels so there is essentially little chance of any contamination to the ground water. Waste rock and tailings can always be, and have been, back-filled into the abandoned mine shafts and tunnels. Even the concrete from the former mining structures was broken up and backfilled into the old mine workings. There is no greater testimony to the mining and environmental success of these breccia pipe operations than a view of the previous operations in comparison to the current environment of the terrain. *For a copy of the full paper on uranium in Arizona contact Dr. Karen Wenrich at [CrystalsUL@aol.com](mailto:CrystalsUL@aol.com)*



Upper figure is the Pigeon Mine during production, November 1989. The mine was located on the north side of Snake Gulch. Lower figure is the Pigeon Mine after reclamation, October 5, 1993.



The mission of the Mining Foundation of the Southwest is to promote public understanding and education related to the mining industry, both in the U.S. and abroad. [mfsw@dakotacom.net](mailto:mfsw@dakotacom.net)



The Department of Mining and Geological Engineering is a founding department of the University of Arizona, the only mining engineering program in the PAC-10, and one of only 13 such programs in the US. [www.mge.arizona.edu](http://www.mge.arizona.edu)

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# Natural Resources

# impact

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**GOOD INFORMATION = GOOD DECISIONS**

*factual information from credible sources for public and private decision makers and for all people who care deeply about our state and national economy and our environment*

## Uranium Mining in Arizona: High Grade and Safe



The Bat Cave Breccia Pipe is eroded and well-exposed along the canyon walls. It is about 200 feet in diameter and extends over 600 feet in elevation before its top was truncated by erosion. Photo by Karen Wenrich

The uranium industry has made a dramatic turn-around in the past two years that even the most optimistic economist was not willing to predict during the uranium downswing of the 1990s. Uranium reached a 30-year low in February 2001 of \$6.50/lb. By the end of February 2006 it had soared to \$38.50/pound. The initial slow rise from \$6.50 in February 2001 to \$10.75 in April 2003 was primarily driven by the decrease in the value of the dollar. Since then several factors have contributed to the soaring price: (1) The awakening to the simple fact that uranium supply has not met demand for several years and that the world's stockpiles are being drawn down, (2) How sharply this fragile supply can be impacted by interruptions at the world's major uranium production facilities, and (3) the announcement by the Chinese of their intent to build 30 new nuclear reactors.

The race for military nuclear supremacy during and following World War II resulted in the rapid development of a worldwide uranium production industry. The frantic pursuit of these early

military programs created environmental hazards and health risks throughout the world that left a multi-billion dollar Cold War uranium production legacy. Lessons learned from this legacy have had a profound influence on modern uranium production, thereby minimizing long-term environmental impact and health risks during uranium exploration, mining and milling.

The mining industry has since learned to embrace the philosophy that it is more effective to prevent pollution than to clean it up.

Uranium economics have a significant impact on the state of Arizona. The highest-grade uranium deposits in the United States (average grade close to 1%) occur in a breccia pipe environment in northwestern Arizona. In fact, these deposits are higher grade than most uranium deposits elsewhere in the world, with the exception of the Canadian deposits (that grade up to 20% uranium). However, the word uranium brings fear to many who live in Arizona because of the uranium legacy that was left behind on the Colorado Plateau over 50 years ago. Yet,

these breccia pipe mines are different—the uranium is deep beneath the plateau surface, the mines are underground, and nothing extraneous is left on the surface after mine closure. The breccia pipe deposits were so successfully mined and reclaimed in the 1980s and early 1990s that few people even realize that there were eight producing mines in the Arizona Strip near the end of the 20<sup>th</sup> century. Today even uranium geologists can no longer find the location of the three former producing uranium mines that are located in Hack Canyon. *Continued on back page.*

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## Looking at the General Mining Law – Part I

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Last year, Rep. Jim Gibbons from Wyoming and Sen. Larry Craig from Idaho, both Republicans, sponsored legislation to amend the federal mining law. This effort was not successful and became the latest of a series of proposals that go back to almost to the inception of the law. This article is the first of two parts to briefly look at the background of the Mining Law and address some of the main areas where changes have been proposed.

When gold was discovered in California in 1848, the war with Mexico was not yet over and when the vast “public domain” of the western frontier was added to the United States there was no law governing the acquisition of mineral rights. For the next 18 years the miners applied their own laws that were a combination of the mining laws of Europe and Latin America combined with “community protection” practices that had developed during the western migration in the United States that began with the opening of the Oregon Trail in 1834. The federal mining law was finally enacted in 1866 under the impetus provided by English financiers to provide a more secure title as hard-rock mining began to flourish after the Civil War. Not surprisingly, this law mirrored the existing practices of the miners. The law emphasized a philosophy that a right of possession would be accorded to the first person who discovered mineralization and pro-

ected this right of possession so long as the locator was actually working a “claim.” The major change brought about in 1866 was that the locator could now actually purchase (that is, “patent”) the ground within the claim from the United States at a price that was then four times the price established for agricultural lands.

The law was amended in 1870 and a combination of the 1866 and 1870 laws were refined and re-enacted in 1872 to become the General Mining Law. This nomenclature has stuck. Despite this name, the Mining Law has never applied to all minerals as a separate law had been applied to coal in 1864. Proposals for change began almost immediately. At first, Congress struggled with what types of minerals would be subject to the Mining Law, then refined it in 1920 to establish a new system to lease minerals used for fuels and fertilizers whose presence was more easily identified. The Mining Law was refined again in 1955 to limit the surface rights of claimants and to make “common” mineral materials subject to a system of sale.

The modern efforts to update the Mining Law began with the publication of a report by the U.S. Public Land Law Review Commission in 1970. The Commission, probably this nation’s greatest investment of time and effort to evaluate the public land laws of the United States, devoted a chapter to mineral re-

sources and recognized that “[o]ur standard of living and our national defense are heavily dependent upon the availability of fuel and nonfuel minerals” and “[w]hile it is apparent that mineral development is important to regional growth and other factors, we have given primary weight to the overriding national requirements.” An internal debate within the Commission was whether the Mining Law should be amended or replaced with a leasing system. Ultimately, the Commission recommended amendment of the General Mining Law based on its conclusion that the traditional right of self-initiation of a claim was required to encourage, in contrast to merely permitting, mineral exploration of the public lands. A minority report, on the other hand, suggested a leasing system in a footnote to the report.

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## MINING LAW: QUICK FACTS

The US mining law is derived from European mining laws

Energy minerals and fuels such as coal, oil shale, oil, and gas must be leased from the government.

Sand, gravel, dimension stone for countertops and buildings, flagstone, and landscape rocks and stone are purchased from the government.

Before land for metal mining is sold by the government, you must prove the metal can be extracted and processed at a profit. This is called the “marketability test”.



The US Mining Law was enacted to help economic development in the western US after the Civil War. The law has been amended many times since 1872 and covers all metallic and uncommon mineral resources. Separate laws govern environmental protection, reclamation, and safety.

Since the publication of the Commission’s report the Mining Law’s proponents and detractors have waged loud, and frequently inaccurate, arguments over the scope of the Mining Law and the effect of proposed changes. The opposing views on the Commission have been reflected in more than a dozen legislative proposals since the publication of the report. These crux of the arguments boil down to what nature of proof should be required to allow the purchase of mineral ground (if indeed it should be allowed to be purchased) and what financial return should flow to the government from mining. The inability of the Congress to enact any of these proposals eventually led to a congressional moratorium on the issuance of new mineral patents in 1993.

### Pre-discovery rights

Within the mining industry, criticism of the Mining Law has focused on the need to protect rights to explore and to secure rights in the minerals that might be discovered. The Mining Law has always been premised upon a “discovery” of “valuable” mineral as a part of the process of initiating a mining claim. As a practical matter, going back to the gold rush, some form of possession almost always preceded the staking of a mining claim and protection was needed until minerals could be found. The problem was an issue of fairness: to how much land could an individual assert an exclusive right? This need eventually resulted in the recognition of a legal concept of *pedis possessio* that protected the miner to the extent of an area that was being actively worked for a reasonable length of time from any forcible, clandestine or fraudulent effort to exclude the first

occupant. As remote sensing technology has been added to the prospector’s exploration techniques, the on-the-ground presence of each individual claim has become less necessary for initial prospecting, and proposals to expand the 20-acre size of individual claims (a claimant is not limited to any number of claims except under unusual circumstances) to 40 acres in 1920 and to 160 acres in 1970. In the most recent proposal in 2005, the language of the law that required the initial discovery of mineral as a prerequisite for the staking of claims was eliminated altogether and the determination of the existence of a “discovery” was left to a final determination as a part of the mineral patent process while at the same time progressively increasing holding costs of individual claims.

### What constitutes a “discovery” of “valuable” mineral?

Anyone with even a passing familiarity with the Mining Law can recite the language from instructions of the Secretary of the Interior in 1894 that “where minerals have been found and the evidence is of such a character that a person of ordinary prudence would be justified in the further expenditure of his labor and means, with a reasonable prospect of success, in developing a valuable mine, the requirements of the statute have been met.” This “prudent man” rule became the test for determining whether a patent could be issued under the Mining Law and raised few problems in its application to the metallic minerals. The same was not true for the “other valuable deposits” included in the 1872 Mining Law and the courts and the Department of Interior struggled with the issue until 1955 when the Mining Law was

amended to provide that deposits of “common varieties of sand, stone, gravel, pumice, pumicite or cinders and . . . petrified wood” would no longer be “deemed a valuable mineral deposit” under the Mining Law and would be thereafter subject only to disposition under the 1947 Materials Act. This action would make such substances available only under a system of public sale. The 1955 Surface Resources Act, however, continued the application of the Mining Law to those materials “which are valuable because the deposit has some property giving it distinct and special value.”

During the last 50 years, the parallel pressures to recognize recreational uses and non-mineral development have tested the concept of what standard should be applied to define “valuable minerals” and thus entitle a claimant to patent a mining claim. In the beginning, the concept was easy to apply; anyone willing to pay the higher price for mineral ground was not questioned. During the recent times, the administrative response began with a “marketability” test and other tests to gauge the reasonableness of a determination of value and thus test the “good faith” of the claimant. The current application of the test seems clearly to require a showing that minerals can be developed with a reasonable expectation of realizing a profit, but the pressures have continued as political arguments over the inadequacy of the purchase price and disagreements over the application of a royalty payable to the federal government.

The next edition of “*Natural Resources Impact*” will examine the questions of payment of royalty to the federal government and whether mineral lands should be leased or sold.