

Regulating the Unknown

Pit Lake Policies State by State

Alison Bolen – Southwest Hydrology Feature Editor

Regulating the water quality of pit lakes poses a major challenge for state environmental agencies. With geochemistries that vary considerably from place to place and acid levels that fluctuate as time progresses, pit lakes offer a virtual mountain of unknowns. Throughout the Southwest, the long-term environmental impacts of pit lakes and their waters are still hard to determine, yet regulators are

moving forward to manage the impending hazards and potential benefits of these massive, man-made lakes.

In most states, the regulatory aspects of pit lakes are shared between two different state agencies – often a mining reclamation unit and a water quality unit. In New Mexico, for example, the Energy, Minerals and Natural Resources

Department regulates mine reclamation and the New Mexico Environment Department deals with water quality issues at active mine sites. Likewise, the Utah Abandoned Mine Reclamation Program shares regulatory responsibility for pit lakes with the Utah Department of Environmental Quality's Division of Water Quality.

Pit Lakes Fall in Gray Area

Typically, agencies work closely to regulate pit lakes, yet sometimes the division of responsibilities can cause fractures in policy enforcement. This is the case in California, where gold mine permits issued by the state in the 1980s did not address pit lake reclamation. As a result, many of California's existing pit lakes fall into a gray area today, says Rick Humphreys, Abandoned Mines Coordinator at California's State Water Resources Control Board.

"If you went back and looked at the way our regulatory program was handled, nobody was really addressing the pits directly. We don't really have many pits in California but the ones with bad water are causing some problems now, and we're not dealing with them well. We don't have a specific body of regulations that address pits to that point."

One example, the Jamestown Pit Lake, located in California's Sierra Foothills, has very high levels of arsenic. Unfortunately, the high levels were detected only after the Sonora County Water Board had released Jamestown's bond and the mining company had dissolved. While the county proceeds with tests to determine whether Jamestown's poor water quality will affect neighboring drinking water wells, they are also scrambling to find funds for any necessary treatments.



The Berkeley Pit Lake. Scientific studies have determined that the Berkeley Pit's water will not pose a threat to human health or to the environment as long as the level stays below the 5,410-foot level. A new \$20 million wastewater treatment plant is expected to be operational by late 2003. For more on the Berkeley Pit, visit www.pitwatch.org. Photograph by Glenn C. Miller.

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Isotope Analysis

^2H ^{13}C ^{14}C ^{15}N ^{18}O ^{34}S ^{37}Cl

^{15}N of NO_3^- , Inorganic ^{37}Cl , ^2H + ^{18}O in Groundwater
 ^2H , ^{13}C , ^{14}C , ^{34}S of crude, Petroleum Fuels & Gases

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Pit Lakes State by State

	Number of existing pit lakes	Number of projected pit lakes	Pit Lake Water Quality Standards	Bond required
Arizona	21	2 to 5	Must meet aquifer water quality standards	Yes, in millions
California	5	0	No exact pit lake standards	Yes, but some were prematurely released
Montana	1	6	Must be suitable for drinking, culinary and food processing purposes, after conventional treatment	Presently state bonds expected cost for the next five-year period. Bonding methods to address long-term treatment issues are currently being developed
Nevada	20	20	Regulated on case-by-case, risk analysis basis	No
New Mexico	10	5	Must meet groundwater or surface water standards, depending on location	Yes, amounts vary
Utah	0	1	Lake water quality regulated according to type of environment its water supports	Yes
Wyoming	21	1	Must meet livestock, agriculture or domestic water quality standards, depending on location	Reclamation bonds posted with the Land Quality Division are reevaluated annually.

The data above are provided by state regulatory agencies and are estimates only.

“Today, the Jamestown Lake is an orphan,” says Humphreys. “On the surface, it looks good, but there are lingering issues of the pit water quality that we’re not very happy about.” For regulating pit lakes, Humphreys says, California relies primarily on a general provision in the state water code that says his department can issue a cleanup and abatement order if there has been a nuisance or pollution created.

Assorted Pit Lake Regulations

Melissa Bautz, Senior Environmental Analyst at the Land Quality Division of Wyoming’s Department of Environmental Quality says it’s hard for states like California to enforce safe water quality without standard pit lake regulations. Wyoming’s policies, enforced at more than 20 uranium mines throughout the state, regulate pit lakes at livestock, agriculture or domestic water quality standards, depending on the location. The state’s detailed standards list acceptable levels for all constituents, including selenium, uranium and chloride.

Likewise, Arizona holds pit lakes to aquifer water quality standards, essentially the same standards defined for drinking water. “We look at any source of water in Arizona as a potential drinking water source,” says Eric Wilson, Manager of the Mining Unit water permits section at the state’s Department of Environmental Quality. “Water is a precious natural resource here in the desert, so we do our utmost to protect it.”

Nevada, however, has made the lack of strict regulatory standards work for their

state’s management efforts, enforcing water quality at more than 20 existing pit lakes across the state. Their risk-assessment methods consider pit lake water quality standards on a case-by-case basis, enforcing a state regulation that loosely states pit lake water cannot degrade surrounding groundwater quality or adversely affect the health of human or native terrestrial life.

Taking long-term factors into consideration, Nevada’s Division of Environmental Protection works individually with each mine operator to determine the best possible solution. “It’s a very long-term process that’s continually updated with actual sampling information,” says David Gaskin, Chief of Nevada’s Bureau of Mining, Regulation and Reclamation.

New Mexico has a similar policy for working with mine operators to accept or reject their individual reclamation plans for pit lakes. In general, however, Mary Anne Menetrey, Program Manager for the mining environmental compliance section in the New Mexico Environment Department says pit lakes are considered waters of the state and must meet surface water quality standards. Flow-through pit lakes that recharge the groundwater must also meet groundwater standards.

While pit lake challenges are handled differently from state to state, the overall goal for most states is summed up succinctly by Menetrey, who says “Our goals are to ensure waters associated with these lakes meet water quality standards and are a resource to the state of New Mexico.”

Regulations Now and in the Future

Amidst the passel of laws applied to mining, pit lake issues can generally be distilled to three simple concepts.

1) Disclose impacts.

The National Environmental Policy Act requires environmental impact statements to address both “direct effects” on water quality and “indirect effects” that are “reasonably foreseeable.”

2) Protect natural resources. *Nevada’s administrative code, for example, requires that mine lakes not have “the potential to degrade the groundwaters of the state.”*

3) Don’t harm living organisms. *Again from Nevada, lakes must not have “the potential to affect adversely the health of human, terrestrial or avian life.”*

Pit lake permitting is perpetually nagged by the selection of a time to terminate the predictions of future pit-lake water quality. The Nevada Bureau of Land Management typically requires modeling out to the pit’s hydraulic steady state, which generally occurs between 100 and 300 years for large open-pit mines. Attainment of hydraulic steady state is essentially unrelated to water quality, however, which will continue evolving for thousands of years. In most cases, no matter what the criteria for terminating water-quality forecasts, trace metal concentrations are generally predicted to increase beyond the modeling period.

–Houston Kempton