

# The New York Times

December 30, 2005

The Cost of Gold | Water Worries

## Drier, Tainted Nevada May Be Legacy of Gold Rush

By Kirk Johnson



*Ashley Gilbertson for The New York Times*

The Barrick Goldstrike mine is one of the largest open pits in America and produces about \$3 million worth of gold each day of operation.

ELKO, Nev. - Just outside the chasm of North America's biggest open-pit gold mine there is an immense oasis in the middle of the Nevada desert. It is an idyllic and isolated spot where migratory birds often alight for a stopover. But hardly anything is natural about it.

This is water pumped from the ground by Barrick Gold of Toronto to keep its vast Goldstrike mine from flooding, as the gold company, the world's third largest, carves a canyon 1,600 feet below the level of northern Nevada's aquifer.

Nearly 10 million gallons a day draining away in the driest state in the nation - and the fastest growing one, propelled by the demographic rocket of Las Vegas - is just one of the many strange byproducts of Nevada's tangled love affair with gold.

An extensive review of government documents and court records, and scores of interviews with scientists and present and former mine industry workers and regulators, show that an absence of federal guidelines, of the sort that are commonplace for coal or oil, allowed gold wide latitude to operate here in the rural fastness of the desert, perhaps more than any other American industry.

The costs - to Nevada, its neighbors and even to the rest of the country - are only now coming into focus as diminishing ores foreshadow gold mining's eventual demise and a more urbanized West begins to express concerns over water shortages and mining's other legacies.

Barrick says the effects of its pumping will last at most a few decades. But government scientists estimate it could take 200 years or more to replenish the groundwater that it and neighboring mine companies have removed, with little public attention or debate, as they meet soaring consumer demand for jewelry and gold's price tops \$500 an ounce.

Goldstrike, meantime, may have only 10 years left, Barrick says, and most of the state's 20 or so other major mines are not expected to last much longer. When they are gone, the vast pits they leave behind will create a deficit in the aquifer equivalent to 20 to 25 years of the total flow of Nevada's longest river, the Humboldt, according to state figures tallied by independent scientists. That is three times as much water as New York City stores in its entire upstate reservoir system. "When they stop pumping, what you're going to hear is a huge sucking sound," said Robert Glennon, a law professor at the University of Arizona who has written on water issues in the West. "The impact on the Humboldt River will be catastrophic."

That is not all. Nevada's gold mines will bequeath more toxic mercury waste in their mountainous rock piles than any other industry, about 86 percent of the nation's total in 2003, according to the most recent figures from the Environmental Protection Agency. They already generate more than 3 percent of the airborne mercury pollution, the agency says, equivalent to 25 or more average coal-fired power plants.

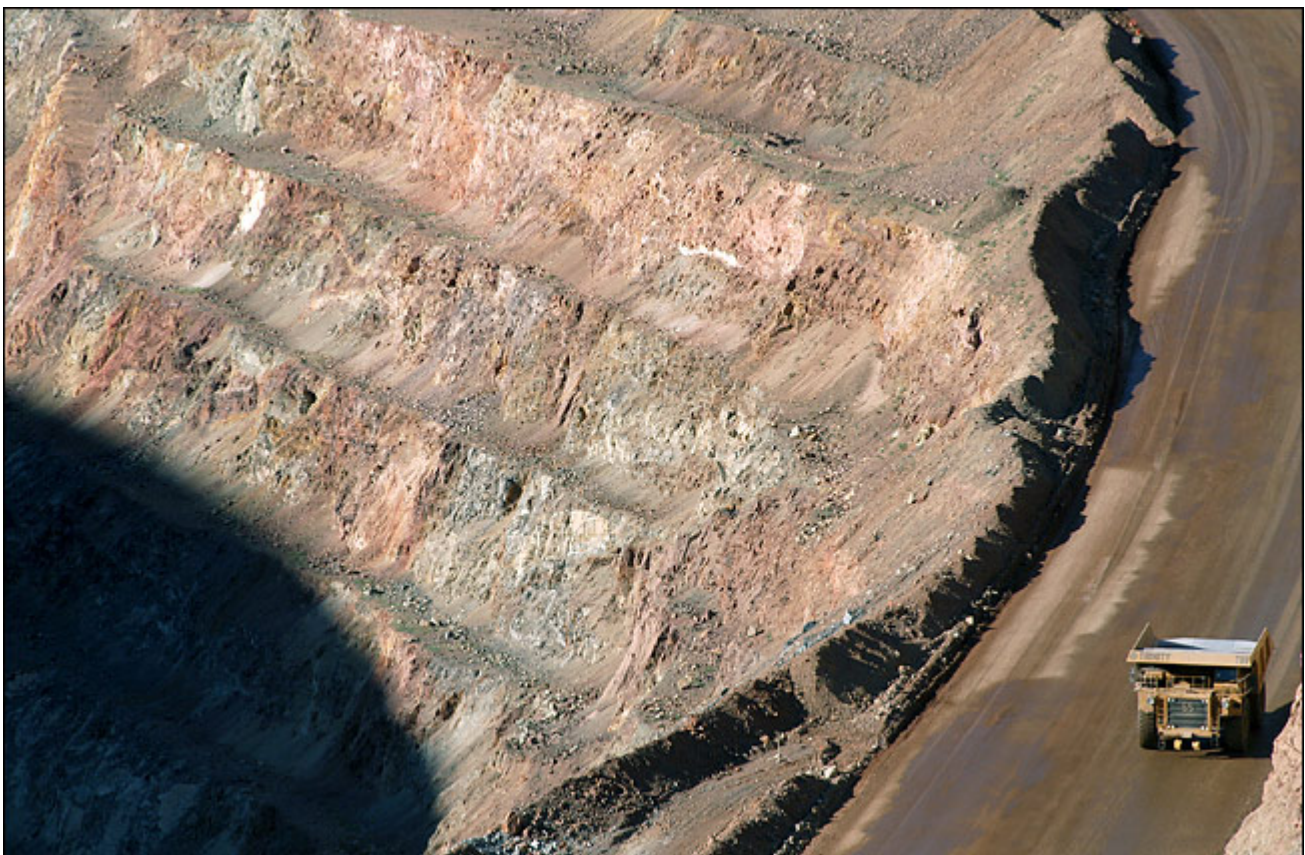
At the same time, as of May, according to state figures, about \$200 million in cleanup costs were simple promises to pay from the corporate miners of a notoriously boom-and-bust industry. Along with the modern superscale mining methods that were largely devised here beginning in the 1980's, such trade-offs have helped make Nevada the third-largest gold producer in the world, behind South Africa and Australia.

But mining experts, legal scholars and historians say that prosperity was also built on the basis of a law drafted in the age of the horse and buggy - the General Mining Law of 1872 - which declares mining the best use of public land, gives miners access to that land for bargain-basement prices, and makes no mention of a cleanup.

Mining industry officials vigorously defend the statute and say that the absence of federal guidelines - far from making things less strict - gave rise to an even tighter regulatory framework because other laws filled the breach, from endangered species protection to air and water rules.

"We just can't see a way to write a mining law that would appropriately regulate all of these different things and work any better," said Carol Raulston, a spokeswoman for the National Mining Association, the industry's trade group.

But here in Nevada, where four-fifths of the nation's gold is produced, the vacuum of antiquated law has been gold's defining feature and the handmaiden to its rise, current and former regulators say, allowing for special treatment of a favorite-son industry on a landscape of bleak extremes that few big environmental groups have risen to defend.



*Ashley Gilbertson for The New York Times*

The 'Lone Tree' mine, operated by Newmont Mining Corporation, is 800 feet deep and 1.5 miles long.

"If you look at the gold industry today, most of it is Nevada, and Nevada is mostly not prized by environmentalists," said John D. Leshy, who was the top lawyer for the Department of the Interior in the Clinton administration. "Nevada is being written off as a sacrifice area for gold."

In an ever-more urban West, the day of reckoning is fast approaching, people like Mr. Leshy say. The new West, embodied by postindustrial Las Vegas, will inherit the landscape that gold leaves behind.

The glittering, energy-guzzling city is already probing north to satisfy its water needs, with a \$2 billion pipeline that will be the biggest groundwater project in American history if approved and built over the next 15 years.

Water experts say the scientific studies for the plan are only now likely to reveal just how Nevada's aquifer system really works, and how it was affected by the mines.

But, they warn, the 383 billion gallons of water pumped so far from the Goldstrike mine alone - enough to fill one of the midsize Finger Lakes of upstate New York - may have already imposed its stamp on the region's future.

### **Mercury's Taint Tied to Mines**

Michael DuBois, an analyst with the Idaho State Department of Environmental Quality, was assigned this year to figure out why the Salmon Falls Creek Reservoir, on the Nevada border, had mercury levels 10 times higher than any body of water ever tested in the state.

The more Mr. DuBois and other scientists looked, the more they became convinced that airborne mercury, which has been linked to impaired neurological development in fetuses, infants and children, was coming north from Nevada's gold mines. "There are things crossing state lines here that don't know anything about political boundaries," he said this summer on a visit to the reservoir, where prominent warning signs had been posted about consumption of fish.

In November, under pressure from Idaho, Nevada said it would begin regulating mercury from the mines, which had been operating under a voluntary system since 2001. "We were moving in this direction anyway, but we ramped it up," said Colleen Cripps, a deputy administrator at the Nevada Division of Environmental Protection.

But how the huge mercury output from the mines was missed or barely regulated for so long is just as big an issue for neighboring states that may have to live with the consequences for many years to come.

Mercury persists in the environment, as it accumulates in the tissues of fish and birds that pick it up from water sources. Nobody knows just how much has come from the mines over time because the Environmental Protection Agency did not even require it to be reported until 1998.

Before then, simple reassurances were regulation enough. In a 1997 agency report on mercury, gold was left off the list as a source because, the report's authors said, an "industry representative" had told them mercury was not a problem.



*Ashley Gilbertson for The New York Times*

Joel Letz, the director of the Lone Tree and Phoenix mines, looks over the closed Love Pit at the McCoy Cove mine near Battle Mountain, Nev.

State officials insist that the voluntary efforts worked, and that the four companies taking part in the plan, including Barrick, cut emissions by 82 percent. But gaps in Nevada's patchwork regulation persisted.

In 2001, Barrick built a \$330 million "roaster," which heats ore for gold extraction and in the process also frees other metals, like mercury. But because it built the machine on private land, no state or federal law required an analysis of the environmental impact.

The roaster was subsequently identified by the E.P.A. as a main mercury source. The mine, the agency says, now accounts for about 1 percent of the nation's total airborne mercury output.

Barrick's vice president for the environment, Richie D. Haddock, said that the location of the roaster was driven by proximity to the pit, and by the fact that the land beneath contained no valuable ore. The roaster, he added, was also built with the most modern technology. There was no effort to avoid scrutiny, he said.

But no scrutiny was the effect, and such regulatory gaps have become part of doing business, numerous legal scholars and present and former regulators say.

"The fact that the 1872 mining law had no environmental provisions was significant, because it means that those rules had to emerge from other places," said James McElfish, a senior lawyer at

the Environmental Law Institute, a nonpartisan research group in Washington that advocates sustainable development and environmental protection. "The upshot of this is that it's a process of experimentation and diffuse authority and no one is really leading the way."

Industry officials, while acknowledging that gold mines have emitted significant levels of mercury, say that where the mercury actually came to earth is a much harder question. What has been found in places like Salmon Falls Creek, they say, could just as easily have come from a coal-burning plant in China, or a natural source.

But local regulators like Mr. DuBois and Michael L. Abbott, an advisory scientist at the Idaho National Laboratory, part of the Department of Energy, are not convinced. After studying the wind patterns and deposition rates this summer and fall near Salmon Falls Creek, Mr. Abbott said he believed that mercury from Nevada's gold mines was still coming north.

"Where do they think it's going to go," Mr. Abbott said, "outer space?"

### **Uncertain Prospects for Water**

Large-scale open-pit mining takes a lot of water, millions of gallons, mostly to dilute the cyanide that miners use to soak their ore and separate its microscopic bits of gold. Even so, mines like Goldstrike pump out so much water that company officials say they can use only a relatively small amount - less than 10 percent of what is displaced.

About half the rest goes into settling ponds where it is expected to sink back into the aquifer, company records show. About one quarter is used for irrigation. About 6 percent is sent to "sand dune drainage/evaporation."

The rest has engorged the Humboldt River since the 1980's. Though Barrick has not discharged any of its water to the river since 1999, other mines remain in full pump and drain mode.

That pumping could change both the quantity and quality of the groundwater, and even the shape of the aquifer, said Glenn Miller, a professor of environmental science at the University of Nevada, Reno. "I think it may never be quite the same hydrologic system," he said. "There is simply no data to suggest that these changes aren't going to be permanent."

Officials at Barrick strongly disagree. Mr. Haddock, the environmental vice president, said in a written response that geological faults would confine the effects of de-watering near the mine.

Barrick, he said, has tried to make Goldstrike a model for its mines around the world. "A great deal of Barrick's culture developed at Goldstrike," he wrote, "and we try to export that culture throughout the company," which is set to take over Placer Dome and become the No. 1 gold miner.

Permanent impacts are not supposed to happen under a strict interpretation of the state water law, said Professor Glennon at the University of Arizona.

An exception was made for gold. In the 1980's as mine pumping surged, the state decided that modern mining, however different in its scale and scope, was still just a "temporary" use of water, as it had been in the days of the prospector and his mule.

"The policy, if there was a policy, is that Nevada has always been a mining state, and as long as we could keep the impact within reason, it should be allowed," said Peter G. Morros, who made many of those decisions as the state engineer - Nevada's top water resource officer - from 1981 to 1990.

But the real story of gold's impact on Nevada's waters will emerge only in coming decades when the pumps are turned off, scientists say. That is when the 40-odd pits - from monsters like Goldstrike's Betze-Post to smaller mines like Newmont's Lone Tree - will start to fill with water that the mine companies no longer displace.

The lakes will store an estimated 500 billion gallons or more, according to estimates by Dr. Miller at the University of Nevada and other scientists. The Betze-Post, the center of Barrick's operations, is expected to become the largest artificial lake located wholly in the state, holding about 114 billion gallons - or more than 100 times the size of the Central Park reservoir in New York.

The result will be, if not the biggest water storage project in the West, then certainly the strangest. Some of the lakes are expected to be poisonous, laced with arsenic and selenium. Others may have metal and acid concentrations toxic to fish but safe for humans. Some will be relatively benign.

Mining companies say the water quality in the aquifer will dictate the outcome, not mining.

One thing is certain: in the hot desert sun, the water will constantly evaporate. And for every gallon of evaporation, the lakes will draw another gallon from the aquifer beneath them. Most will take decades, if not centuries, to fill. They will be like huge desert sponges, sucking from the aquifer eternally.

The Betze-Post pit, which Barrick expects to lose 74,000 gallons of water every hour to evaporation, will have good water quality, said Mr. Haddock, the environmental vice president, because of the aquifer's purity and the high volume of limestone that will act as a buffering agent.

Other scientists say it is not that simple.

The mine pits will fill with water that filters through surrounding rock, much of it disturbed by mining and thus potentially prone to acid generation. Rock with sulfide in it, once it contacts air and water, produces sulfuric acid.

"After the pits fill, after complete recovery, there is a possibility that water could be affected by acid drainage," said Russell W. Plume, a hydrologist at the United States Geological Survey, a federal government research agency.

In the meantime, Nevada law is already trying to come to grips with the postmine landscape. One pit mine, called Sleeper, which was operated until 1996 by a company called Amax Gold and is now closed, is already filling with water and losing about 257 million gallons a year to evaporation.

That lost water has to be accounted for somewhere in the state's water ledgers, said Hugh Ricci, the state engineer. The same will hold true for every other pit lake.

In Sleeper's case, because Nevada rules require water allocations for beneficial uses only, Mr. Ricci's predecessor came up with a novel legal interpretation. He declared that the pit lake would be used for recreation, and that its evaporation would therefore be a "recreational use."

### **Millions of People, Inches of Rain**

By 2020, Las Vegas, the go-go city of the sands, is expected to have three million people living in an area that gets perhaps four inches of rain a year.

Some ecologists and water experts have argued for years that big desert cities, whether Phoenix or Las Vegas, will one day face their comeuppance as water becomes too costly or scarce, and that all the region's cities will one day need to tap the West's rural water. But the stakes for Nevada, planners and legal scholars say, could be even higher because of what happened under gold's regime. Then the consequences of the water no one wanted may come back.

"There will a redivision of water from rural to urban use," said Hal Rothman, a professor of history at the University of Nevada, Las Vegas. "The question is not whether that's going to happen - it's the terms under which it's going to happen."

By then, the mines around Elko are likely to be played out. The Las Vegas pipeline, assuming it is built, will be drawing the first of up to 58 billion gallons a year - enough for 20 percent of the city's projected population.

Those two pincer trends - urbanization from one side, mine closure from the other - raise the greatest uncertainties for tiny Elko, a town of just 16,000, that may be the nation's last gold boomtown.

"If the basin is drained, then this becomes like the Owens Valley in California," said Warren Russell, an Elko County Commissioner. The Owens Valley, near Death Valley National Park, was drained in the 1930's - the incident made famous by the movie "Chinatown" - as Los Angeles locked in water resources.

For now, Las Vegas water officials say they have no designs on any water farther north than their pipeline, which will end 100 miles or so south of Elko. But everyone cautions that a return of the drought that gripped the region in recent years - or a victory in court by the Western Shoshone Indians, who claim vast tracts of Nevada that they say were stolen in the 1800's - could change every calculation.



*Ashley Gilbertson for the New York Times*

A pond in the Nevada desert holds water contaminated by mining operations. Major mine companies have pumped out billions of gallons from an aquifer.

The general manager of the Las Vegas-based Southern Nevada Water Authority, Patricia Mulroy, said in an interview that her motto was never to say never - to rule out tapping the waters of northern Nevada would be folly.

The state and the region should be looking at mine country now, she said, and thinking about storage and prevention of evaporation. "We need a viable place to store that water," she said. "Having said that, we're not talking to any mining company."

Mr. Ricci, the state engineer, said water transfers from mine country would require a new application, like the one Las Vegas is going through now, but none have been filed.

Many mine companies, meanwhile, have followed Barrick's lead in buying ranch lands across the state - most of which have water rights that could one day be sold, though a spokesman for Barrick said the company had no intention of going into the water business from the 110,000 acres it currently owns.

But Dean A. Rhoads, a rancher and state senator who lives near the Goldstrike mine, has been watching closely. He counts at least 20 ranches - some of them tens of thousands of acres - that have gone into mining company hands.

Water pipelines, legal experts say, can be laid across private land in Nevada without the fuss of an environmental impact statement, just like Barrick's ore-roaster.

"Water, and what happens next in these rural areas, is the most crucial issue that I've faced in 25 years in the legislature," said Mr. Rhoads, a Republican. "A lot of my neighbors are shaking in their boots."