# Technology drives Nevada's latest gold rush

BILL O'DRISCOLL - Reno Gazette-Journal - Associated Press

They're moving mountains in Nevada in the quest for gold.

Mines are running at full-bore in a modern-day gold rush fueled by never-before-seen prices that make Nevada, if it were its own country, No. 5 in the world for gold production.

The operations along the rich Carlin Trend some 300 miles northeast of Reno are both scraping the surface on pits a mile across and tunneling down a third of a mile or more.

Typically, it can take five to seven tons of ore — enough to fill a dump truck — to get one ounce of gold through a lengthy process of crushing, grinding and chemical processing.

It's a lot of work for a little return, and the payout is hard to see — the gold produced in Nevada isn't visible until the final stages when it's separated from gray sludge and poured into 900-ounce, 90 percent-pure bars.

But at $1,600 or more per ounce on world markets, that works out to $1.3 million per bar. And in 2010, Nevada mines produced 5.34 million ounces of gold — the equivalent of 5,933 bars.

That's big business, for sure, for several mining enterprises led by global corporate giants Newmont Mining Corp. and Barrick Gold Corp., which operate side by side on the Carlin Trend, considered the most prolific mining district in the Western Hemisphere.

"We're not your great-grandpa panning for gold. We're a complex, highly capitalized industry," said Andy Cole, general manager at Barrick's 25-year-old Goldstrike mine, a maze of 30 miles of tunnels two miles wide and 1,800 feet deep in the mountains north of Carlin.

Unlike placer gold, which marked the California gold rush of 1849, Nevada's gold is classified as "disseminated." It's there, not in nuggets along streambeds, but dispersed microscopically under vast stretches of desert.

Gold particles sit in just about every rock on earth, said Jon Price, Nevada state geologist, but usually in such minuscule amounts it's not worth the effort to mine.

Then there's Northern Nevada, where beneath the sagebrush and mountains lies a relative bounty like few other places on the planet.

"Nevada has the right kind of geology," Price said. "Nevada is very well-endowed in

terms of gold."

Where it's concentrated enough, such as in the Carlin Trend and other locales in Elko, Eureka, Lander, Nye and Humboldt counties, as many as two dozen gold-mining operations employ thousands of people who operate machinery to dig out the ore and processing plants to extract the gold.

Essential processes haven't changed much over the years, mine operators say, but these days, costs are steep. Average annual pay for mine jobs is $83,000, almost double the average for all industries in Nevada, according to the Nevada Mining Association. And just one 13-foot tire on a 400-ton hauling truck can cost upwards of $80,000.

So it behooves them, they say, to focus like never before on efficiency and safety.

'CULTURE OF SAFETY'

When Jose Gonzalez arrives for a 12-hour shift in the Goldstrike mine, he'll have a three-minute elevator ride from the headframe down more than 1,000 feet to the batch plant level, where concrete is mixed for tunnel wall support and he works as a driver.

There, in humid, 75- to 80-degree temperatures, he's nearly as deep underground as the Empire State Building is tall. He wears, as all workers do, knee-high steel-toed boots to protect against the rocky, often muddy, floor, and he carries identification and safety equipment on his belt.

On his hip is a "self-rescuer," ready for fast opening should fire occur and linked to a mouth-covering apparatus that turns poisonous carbon monoxide into carbon dioxide, allowing time to escape from fire.

Next to that is a dual battery system that contains a wireless tracking device, with text-messaging capability, linked to monitors in a central control room.

Gonzalez also wears a reflective vest, a new development in recent years, officials say, and carries a "brass," an identification tag that he must match up at the end of the day with one, including his photo, left hanging on a board up on the surface.

When he's driving a hauler, Gonzalez knows the rules of the road in the 15-by-25-foot tunnels marked every so often by blinking lights on the ceiling. As he approaches miners, he looks for signals from their helmet lights. Horizontal back-and-forth motions mean stop. Up and down, back away. A circular motion, proceed.

"I love it. We have our own little language down here," he said. "We have to get along real good. We can't have it any other way. That would endanger the lives of people."

All of which is a constant reminder to miners of the potential perils they face with so much earth above them. For operators, it comes down to common sense in

managing staff.

"We call it a 'culture of safety,'" said Tim Crowley, president of the Nevada Mining Association representing the state's operators. "There's no hierarchy when it comes to safety. If your general manager doesn't tie off and somebody sees it, it's their responsibility to call them out and not get punished for it."

Such cultural and technological advancements have helped hold down the number of all mining-related fatalities in Nevada in recent decades while the industry has grown, according to state data.

Gold mining accounts for about 90 percent of all mining in Nevada, and figures show two recorded fatalities among 8,170 workers industrywide in 1980, considered the start of the current gold boom. In 2011, with nearly three times the number of workers, two mining deaths were recorded. The deadliest year since 1980 was 1999 with nine fatalities.

In 2009, there were 3.2 non-fatal mining-related injuries in the U.S. per 100 full-time workers compared with retail trade, 4.2 injuries, and manufacturing, 4.3 injuries, according to the National Mining Association, using federal Bureau of Labor statistics.

The tech 'gift'

DeWayne Clelland is a fifth-generation miner from West Virginia, where he worked with his father in the coal mines before coming to Nevada.

Clelland can be found in the 30-foot-wide maintenance area in Goldstrike's mechanical shops some 200 feet below where Gonzalez works.

There, crews repair trucks that haul 4,300 tons of ore daily to shafts for hoisting to the surface, as well as machines that drill holes for blasting new tunnels and inserting support pipes into existing walls.

In Nevada, Clelland said, hard-rock mines' walls are more stable than a typical coal mine and conditions, notably the air, are cleaner and workspace is comparatively spacious.

"You've got room to move around," Clelland said as he spray-washed a vehicle in a nook across the main tunnel from the maintenance shops. "With coal, you've got tight areas, methane gas, explosions. ... I'll take this any day."

Technology has made surface mining safer and more economical, too, including sensors that continuously track vehicle location and monitor speeds.

At Newmont's Gold Quarry open pit mine south of Goldstrike, where digging began in 1983 and 650,000 ounces of gold were mined last year, radar devices sit at the edges of the mile-wide pit that gradually descends to a depth of 3,600 feet.

The devices constantly fire hundreds of prisms across the pit to each other, measuring movement as tiny as 1/100th of an inch per hour to detect signs of impending wall failure and alert computers in the control room.

"With the radar, you can see it coming and get your equipment out of the way," Price said. "If it weren't for computers, (mines) couldn't operate nearly as safely and efficiently."

The tunnel ahead

When workers leave the Goldstrike complex at shift's end, they're reminded by a prominent sign, "Every person home safe & healthy every day!"

"We have a low tolerance — no tolerance — for unsafe behavior," said Louis Schack, director of communications at Barrick, where all new employees undergo three weeks of training.

With the stress of staying on their game, underground workers are allowed some home-like comforts, too. Drivers have stereo systems installed for drowning out the background din, and the maintenance area has a lunch room and lounge area.

At Goldstrike's batch plant 1,225 feet down, Dave Boyd, who tests the strength of concrete samples, has a small, albeit dust-covered, microwave oven and coffee maker near his desk.

High gold prices are making lesser-quality ore, once discarded, more viable for mining, officials said. That in turn helps boost employment in Elko County, where the jobless rate fell to 6.7 percent in March compared with 12 percent statewide. Barrick officials say they plan to hire 1,000 new workers this year to their 4,000-strong Nevada workforce.

Additionally, mining's growth, in the face of recession which has stifled so much of Nevada's economy, has prompted greater scrutiny from the state.

In 2011, lawmakers created a Mining Oversight and Accountability Commission under the governor and approved SJR15, which would repeal the constitutional net proceeds of mines and minerals tax and make it statutory, thereby easier to change. But that measure needs legislative approval again in 2013 and approval from voters in 2014 before it can be enacted.

Meantime, advancements in technology and efficiency will continue, officials say.

That means innovations in robotics, already being tested, which will operate machinery at one of the most dangerous points: where explosives rip out rock and human-driven machines remove the debris before the walls and ceiling can be stabilized.

"They can be operated by remote control, from a control room," Crowley said. "That's on the horizon."

And already mines are getting better at shaping the vast amounts of rock waste into more natural-looking terrain that, with a coat of topsoil, are seeded with native vegetation.

"It's getting so that if you drove by it, you wouldn't even notice it was from a mine," said Crowley.

One thing won't change.

Few mine employees actually see the final fruits of their labor: the gleaming bars of gold. Before they're shipped off for further refining, usually to Salt Lake City but as far away as Switzerland, they're poured amid tight security inside nondescript buildings that in the case of Newmont's Gold Quarry mine are draped with razor wire.

Nor, officials said, will the attention to safety let up in getting from ore to the pour.

"We're more sophisticated now, with equipment, environmental controls, especially over the last 25 years," Cole said. "With what we do, it's come to this: no accidents are acceptable."

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