

## Mining by Remote

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In 1995, Barrick Goldstrike studied its options for the Meikle-Rodeo ore bodies. Spread out over one-and-a-half miles in Elko, Nev., the Meikle-Rodeo ore is embedded in what one company official calls “a very large block.” However, the ground is highly fractured, so safety is the primary concern. Mine workers who operate load haul dumps (LHDs) could easily be at risk in what can charitably be described as an uncertain environment.

The answer was obvious, according to Paul Smith, general supervisor, at Barrick Goldstrike. “We had to plan on portable radio remote controls (PRRCs) because there was no way we could mine down there without them,” Smith recalled. “You didn’t want to put any operators at risk in the event of a rock fall or cave-in, and with the kind of fractured ground we were dealing with, those were definite and serious possibilities. This is unsupported ground.”

Barrick knew that PRRCs capable of manipulating LHDs by an operator situated safely away from potential danger were on the market. Yet, the controls would have to stand up to a harsh environment that generally tends to take its toll on any computerized equipment.

### **The Environment**

Mining occurs at eleven different levels of Meikle-Rodeo starting at 925 feet to the lowest level of 1,950 feet below the surface. Several of those levels have to be refrigerated because temperatures can be as high as 150 degrees. As in most mining operations, water is a concern and that’s especially true for this one, since the water has an extremely high acid content. “Although those areas are refrigerated, it’s still pretty hot in there and that affects our workers and our equipment,” Smith said.

The company uses a stoping process. Once blasting is completed, the stope that is created for access is generally 60 feet high and 25 feet wide. Once an area has been stoped, it is filled in with cemented backfill and concrete. That enables workers to take the ore body next to it. An LHD can go through the newly created opening to a depth of 200 feet. What can’t go in is the worker. And that’s where portable remote controls become a necessity.

### **PRRCs and how they work**

Since 1995, Barrick Goldstrike has used Laird Controls CO 1/LHD Series PRRCs for its LHD controls. The controller keeps the operator protected in potentially dangerous situations by enabling him to stand a considerable distance from the machine. It also allows for more aggressive digging since the LHD can continue its progression into the rock much deeper than it would with the operator on the machine. More

material is removed before the walls are shored up. Once the LHD loading is completed, the operator leaves the remote stand and manually loads the truck.

PRRCs have proven to be especially reliable. Some joysticks, when operated continuously, tend to wear out in approximately six months. However, specifications for the joystick in Laird Controls LHD Joystick Controller show a working life of two years of continuous use even in the arduous environment of mining.

Controllers have been constructed with industrial-grade components, powerful microcomputers and sophisticated operating software. The exterior housing is made of aluminum to protect the circuitry inside. Controllers have total dust and water sealing—certainly important when working above or below ground. PRRCs also have to be able to withstand shocks such as accidental droppage and manufacturers have responded. Laird Controls, for example, has included urethane-coated plates at the end of the housing that are shock absorbers.

In the event an accident occurs to an operator while a PRRC is running an LHD, for example, a fall, the PRRC is equipped with a “man-down” function that automatically stops all commands. Most have tilt switches that can be programmed to automatically send this and other functions.

Diagnostics are a crucial element of remote control operations. Most PRRCs have self-test diagnostics, in which the system checks itself once it is turned on. Should any difficulties be detected, e.g. unwanted commands still in the system, the receiver sends an alert to the controller operator either in the form of LEDs or digital readbacks. Everything in the system is analyzed, particularly switch inputs, before the operator gets the go-ahead from the controller.

### **Getting more visual**

The system for using PRRCs for Meikle-Rodeo ore removal is quite basic. The operator, holding a controller, is placed on a remote stand away from the chamber opening and the LHD. At all times, the entire procedure is in his eyesight. However, portable remote control technology has taken it a major step further with television PRRC systems. One example, the PVS-800, is a joystick controller with a video monitor, which gives an operator a televised view of all activities. It's especially useful for those situations where an operator, due to safety reasons, may not be able to have the best view for loading and removal.

### **Results and reliability**

Officials at Barrick Goldstrike say they are more than satisfied with their portable remote controllers and their reliability. “It’s amazing how reliable they are considering the abuse they take and how harsh the environment is,” said Ed Gosling, underground electrical foreman at Meikle-Rodeo. “They’re easily adapted to our stoping system and we can retrieve as much as possible because of them.”

According to Paul Smith, the Meikle-Rodeo zone yields around 90 thousand tons per month—a combination of ore and waste. Not all of it is removed by remote controls, but their role is sizeable. Smith and Gosling say they cannot understate the value of their PRRCs, especially the safety and efficiency they bring to their operations.