

## North to Alaska Fifty miles from anywhere, Fluke tools are golden

### Application Note

Gold fever was running high in 1902 and out in the Alaskan wilderness, good tools were hard to find. Trader E. T. Barnette saw opportunity in selling tools and other supplies to miners, and opened a trading post on the banks of the Chena River. A year later the little settlement was incorporated as Fairbanks.

Fast forward 105 years: the Fairbanks area has grown to more than 80,000 people. But some things never change. The world's demand for gold is strong as ever. And out in the hinterlands, mine workers like Chris Kennedy, maintenance superintendent for the Pogo Mine, still count on the quality of their tools.

Head east two hours on the Richardson Highway out of Fairbanks and turn left off the road. Stop at the guard station to pick up a two-way radio—you'll need that to report progress on your 49 mile drive over gravel roads to the site of the Pogo Mine. Here in a valley surrounded by black spruce and aspen, 85 miles east of Fairbanks and 38 miles north-east of Delta Junction, miners are delving into one of Alaska's newest gold strikes. There's no commuting to work at the Pogo Mine—the 255 mine employees work a rotating schedule, living on site two or four weeks straight, then taking a week or two weeks off.

The mine operates under strict environmental guidelines. The use of underground techniques instead of open pit operation limits surface disruption. Rocks and tailings left over after extracting the gold are backfilled into the mine. When the mine closes the site will be reclaimed

and 26 miles of access road will be closed and removed, with the remainder left open for public use.

The mine's remoteness presented challenges for the mine's majority owner, Sumitomo Metal Mining Co. Ltd., and partner Teck Cominco, a diversified mining and metals company headquartered in Vancouver, Canada. Owners had to invest some \$357 million just to get the operation going. It took 500 people to build employee housing, an airstrip, ore processing facilities, a water treatment plant, a 50-mile, 138 kV power line and the access road.

### Striking gold

But the bonanza here is worth it. Gold was found here in 1994 and based on test drilling, gold resources in the ore body are estimated at 5.6 million ounces. In its ten-year life the mine will produce between 350,000 and 500,000 ounces per year. Each block of processed gold measures four by five by eleven inches, weighs 80 pounds, and has a value of about a half million dollars.

It's a lot of money, but it's not just there for the taking. A lot of heavy lifting is required to turn tons of gold-laced quartz hidden hundreds of feet below ground

into a fortune you can cradle in two hands. Each ton of ore yields just over a half ounce of gold. So every day, workers at Pogo blast, haul, crush, extract and process 2,500 tons of raw materials. Far from anywhere, they are running a massive industrial operation.



Ken Bartlett, E&I technician, standing in front of a molten gold pour at Pogo Mine, Alaska. Each gold brick weighs approximately 80 pounds.



Ken Bartlett troubleshooting a flow control valve for the water addition to the Sag Mill.

Down in the mine, workers bore precisely-spaced 14-foot blast holes in 17-foot-wide, 14 foot-tall faces or 'drifts' in the ore body, fill the holes with an explosive emulsion, then blast the rock loose. Low-slung diesel loaders scoop or 'muck out' the material into low riding 50-ton haul trucks that carry it to a 'grizzly table' where rocks are sorted for size and larger pieces are crushed. The material then drops into an ore pass some 100 feet tall and 20 feet wide, carved out of the stone. At the bottom a steel pan feeder meters the ore onto a conveyor that takes it to an ore bin on the surface. From there it goes to the processing plant, where the ore is crushed smaller and smaller in a series of mills, then processed further with water and cyanide. The goal: recover 92 percent of the gold. Employee safety is the top concern. The facility requires not just steel toe boots but metatarsal guards to prevent foot injuries.

Rigorous rules govern lockout/tagout procedures. Permits are required for confined entry situations and hot work. Safety is always on Maintenance Supervisor Kennedy's mind.

### Keep it simple

Ensuring that the mine's complex infrastructure runs smoothly falls to Kennedy, a 32-year mining industry veteran, and his crew of 11 electricians and instrumentation specialists. Together they manage and maintain 14 motor control centers and electrical rooms. Those facilities contain breakers and the transformers that step 15 kV supplies down to 480 volts to power motors. The powerful blowers that clear diesel exhaust and blast gases from the mine, the equipment that lifts, moves and pulverizes the ore and 200 pumps with up to 200 horsepower are all on Kennedy's maintenance list. It's a complex job, but he finds that Fluke digital multimeters help keep it simple.



Looking north at the Mill and Filter building facilities. In the blue tube is the conveyor belt that brings the ore from underground to the mill.

"The Fluke meter's so versatile that one meter can do a lot of different things when you're troubleshooting," he said. "When you're looking at ohm capacity, when you're looking at grounding, you're looking at how much current is going through - just the whole gamut of electrical troubleshooting. It's our main troubleshooting tool."

Many of those 200 pumps use variable speed drives, Kennedy said, and the Fluke 87V enables technicians to filter out high-frequency noise and read the synthetic wave forms generated by the drives. The Fluke 179 and Fluke 117 are also on the job at Pogo Mine.

Kennedy uses Fluke meters to verify correct signals from the computerized controls of rock drilling machines, and to calibrate the density gauges used to measure the thickness of the slurry of ground rock and water produced in the gold extraction process.

"Gold bearing ore that's ground up has a specific gravity," he said. "That specific gravity correlates into density. When it's mixed with water, that gauge reads it. It tells you whether you need to add more water to make it a lighter density so it pumps easier, or decrease the water because it's too light. The Fluke meter reads the impedance at four to 20 milliamps to verify that the gauge is working correctly."

**Only at fifty below**

Alaska is known for its beautiful environment and its unforgiving climate. In September the aspens turn gold and the ridges around Pogo Mine flare with color. In winter, temperatures turn so cold spit will freeze before it hits the ground.

"That only happens when it's 50 below," Kennedy said. "We see temperatures on the average of anywhere from minus 30 to minus 50 at times. Minus 50 does happen once or twice during a winter.

"The cold causes issues with the variable speed drives," he added. "If the VSDs aren't warm, anything in the freezing temperatures, they just don't seem to want to work. The electronic boards in there just freeze up." To prevent such problems, the drives are housed in temperature-controlled electrical rooms.

Mining processes bring other challenges. Water used in refining the ore is 100 percent recycled, with zero discharge into the environment. "If you have an upset in the system sometimes your water could be an issue," Kennedy said, "whether it's too hot and you

can't cool it off fast enough, or it's dirty, which causes issues throughout all your other systems that require clean water."

Distance itself can be a hurdle, and that puts a premium on both correct maintenance and product reliability. Things that break can't be replaced at the store next door. There is no next door.

"In Alaska it's kind of funny," Kennedy said, "we're here, we're part of the United States but if we have to get something fairly good sized it takes two weeks just to get it here. It has to come from Seattle by barge to Anchorage, and then get driven up from Anchorage by truck." With such logistical challenges to overcome, Kennedy has a special appreciation for the dependability of his Fluke tools.

"When we were moving that density gauge the other day I had an electrician helping me," he said. "I'm out there working and pretty quick I stepped on something. I looked down—it's my electrician's Fluke meter, and I'm stepping on it. I'm going 'oh, man.' So we looked at it and tested it, and it worked fine. Fluke meters are pretty tough."



Checking incoming bus voltage and troubleshooting one of the mill's primary breakers.

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