Courtesy of PureGold

The team at PureGold is making the most of existing infrastructure at the Madsen project to fast-track the mine to production at a time when the price of gold has reached new heights. The mine will use the hoist to move ore and waste and a ramp to move equipment and personnel.

Renaissance in Red Lake

A rich database with over a million metres of drill results, and a new geological model gave PureGold confidence to build its mine in Red Lake, Ontario

By Carolyn Gruske

PureGold is not wasting any time. Last August, the Vancouver-based company announced it was starting construction at a brownfield site in Ontario's Red Lake area and the company expects to achieve its first gold pour in Q4 2020.

That rapid timeline is thanks to a wealth of existing infrastructure at the project. PureGold also has the benefit of leadership with deep experience working in the area, as well as a new geological model supported by multi-element geochemistry analysis conducted on the deposit's mineralization and over 300,000 metres of new drilling completed on the deposit.

The historic site

The PureGold Mine Property includes the past producing Madsen mine, which produced continuously from 1938 to 1976 and became the fifth gold-producing mine in Red Lake, as well as the Starratt-Olsen mine.

A host of companies had their names attached to the Red Lake mining district throughout the years, including Hollinger Consolidated Gold Mines, Val D'Or Minerals, Hasaga Gold Mines, Uchi Gold Mines, Dickenson Mines and Buffalo Red Lake Resources. The Madsen mine itself last operated in 1976.

As PureGold president, CEO and director, Darin Labrenz, likes to point out, the Red Lake area is the home of Placer Dome's (then Goldcorp's) Campbell mine (where Labrenz worked as chief geologist) and is the birthplace of Goldcorp as a company. "It's a pretty special place in terms of the production that has come out of there: 29 million ounces have been produced in the Red Lake area to date," he said.

"As one of the highest-grade mining camps in North America, the Red Lake camp has everything you want in terms of building a company: respect for the rich history of high-grade gold mining, a strong community with a very skilled workforce, provincial highways running through and power. Infrastructure is widely available."

The geology

Because the site had been worked for over three decades with 800,000 metres already drilled, Labrenz called it a "data-rich deposit" for the wealth of information already available when PureGold (which was then known as Laurentian Goldfields) bought the project in 2014. To further the depth of data, the company conducted an additional 300,000 metres of drilling, which began shortly after the initial purchase and continued into 2019.

"We were able to use that information to really build up a geological understanding of why that deposit was there and what was controlling the mineralization," he said. Labrenz added that the PureGold team came to understand that geologically, the deposit is identical to other current and high-producing mines in the area, specifically Evolution Mining's Red Lake mine. He said that the original miners looked at the deposit and classified it incorrectly in a way that undervalued its potential.

"They went on visual cues and so what they saw underground was the mineralization was always hosted in a rock that had a certain look to it, and they called it a 'tuff' – which is a type of rock that, quite frankly, doesn't exist in the deposit," he explained.

"That thinking limited them because what they were looking for was a particular position in the rock sequence. They were looking for the tuff. They called it a strata-bound disseminated gold deposit. It meant that mineralization could only be from that particular rock unit. What we found is that it's really an alteration product. It's not a rock unit, per se, but it's primarily in basalts. It's part of the same package of rocks that hosts all of the 29 million ounces that have come out of the camp."

He went on to explain that the mineralization (which is controlled by the structures that run across the rock sequence in the northern part of the deposit) transects the hanging wall and the Balmer assemblage and moves through to the footwall in the south. Coming to that realization led the company to find parallel gold-bearing structures. The experience of the team – which includes Labrenz, geologist Mark O'Dea, who was founder of Fronteer Gold, which had its origins in Red Lake and was ultimately acquired by Newmont Mining Corp., and chief geoscientist Chris Lee, who offered specialist structural geology guidance at SRK – certainly helped, but so did the full-sweep multi-element geochemistry analysis on samples from the site.

According to Labrenz, multi-element geochemistry is not often used in mines in the area. Though there is a cost to it, he said, inductively coupled plasma mass spectrometry (ICP-MS) looks for tiny traces of over 40 metals (including iron, magnesium arsenic and antimony) in each sample and compares the ratios of those elements and shows deposit patterns, which allows one to unravel the sequence in the underlying rock. Samples are taken from the deposit at short intervals (one or two metres apart). At PureGold's mine, the samples show patterns in the Archean deformation that occurred in the volcanic basalts 2.7 million years ago – patterns that run along a seven-kilometre-long structural corridor.

In February 2019, the company released a feasibility study focused on the PureGold project, which outlined a Probable Mineral Reserve of one million ounces of gold from 3.5 million tonnes with a grade of nine grams per tonne. The study, led by JDS Energy and Mining, detailed an 800 tonne-per-day operation with a mine life of 12.2 years with an annual average output around 100,000 ounces for a capital cost of $95 million. The reserves are a portion of the broader mineral resource of 7.2 million tonnes at 8.9 grams per tonne for 2,063,000 ounces of gold in the Indicated category and 1.88 million tonnes at 7.7 grams per tonne for 467,000 ounces Inferred.

But that's just phase one, said Labrenz, who explained that those numbers come from a resource that spans from surface to a depth of roughly one kilometre below the surface.

"One of the characteristics of these types of deposits is they're typically very deep. We have a drillhole that sits at 2.1 kilometres and intersects the deposit with about a half an ounce over two metres. That's still 500 metres shallower than the deepest part of the Red Lake mine to the north of us, so we think there's an enormous opportunity in front of us regarding depth."

He also envisions finding additional deposits in the structural corridor along the south part of the property, so the company is drilling there and will have three rigs operating throughout most of 2020 and into 2021. "The idea is to rapidly move those resources into an economic study and ultimately to other mine reserves and look at the expansion of the phase one mine," he said.

"As one of the highest-grade mining camps in North America, the Red Lake camp has everything you want in terms of building a company"

– D. Labrenz

Construction

PureGold gave Dumas Mine Contracting the task of underground mine engineering and distributed the work on the surface to JDS, Hatch and Knight Piesold. That latter assignment included making use of as much of the existing infrastructure as possible, which is key to the miner being able to stick to its tight timeline. Retrofitting instead of starting from scratch also helps save the company money.

"I don't have an exact number, but we're putting about $35 million into the mill upgrades. To replace it would be somewhere in the order of $100 million," said Labrenz.

Good weather conditions have also speeded the construction. Ken Donner, vice-president for operations at PureGold, is normally based in Vancouver, but since February, he has been at the mine site supervising construction. According to Donner, a fairly mild winter allowed the company to get an early start on the earth works, and the lack of frost on the ground meant the hammer attachment on the excavator was not needed and that free digging could occur. As of late June, approximately 90 per cent of the major earth works had been completed and the company was in the process of finishing concrete and foundation work and ready to start erecting steel support structures.

The company has employed a crew of approximately 60 workers and was getting ready to hire an additional crew of 60 to support the upcoming lateral development construction phase.

Ramp and hoist

Donner said that work in the mine itself was also progressing smoothly.

"Underground, we're doing very well in terms of development rates. We got a couple months' jump on what the feasibility study initially forecast in terms of starting mining. We're performing higher than the feasibility study in terms of metres per day." The operating mine will rely on a combination of conventional cut and fill, mechanized cut and fill and longhole mining to extract the ore.

Courtesy of PureGold

A multi-element geochemical analysis performed on samples on the project complemented the leadership team's experience working in the Red Lake camp.

Courtesy of PureGold

The management at PureGold has said the mine will initially run diesel equipment and consider transitioning to battery electric vehicles if the price of BEVs continues to come down.

Donner said the company both expected good ground and found it, and PureGold is working to "push the ramp down" to an eventual depth of about 1,300 metres. Donner predicts the ramp in the hybrid ramp and hoist mine will have reached a depth of 300 metres by the time the first pour occurs.

"The idea is we'll have a ramp the men, materials and equipment will go down and we'll put in a hoisting system [in] the existing shaft. That shaft will be used exclusively for skipping material, ore and waste. In a typical shaft-only operation, to get the equipment down or get your men down or the material down, you have to stop moving the ore and waste up and down the shaft to allow whatever you're taking down there to get safely down. With skipping only, we figure we'll have probably 20 hours a day availability to move ore from the mine," said Donner.

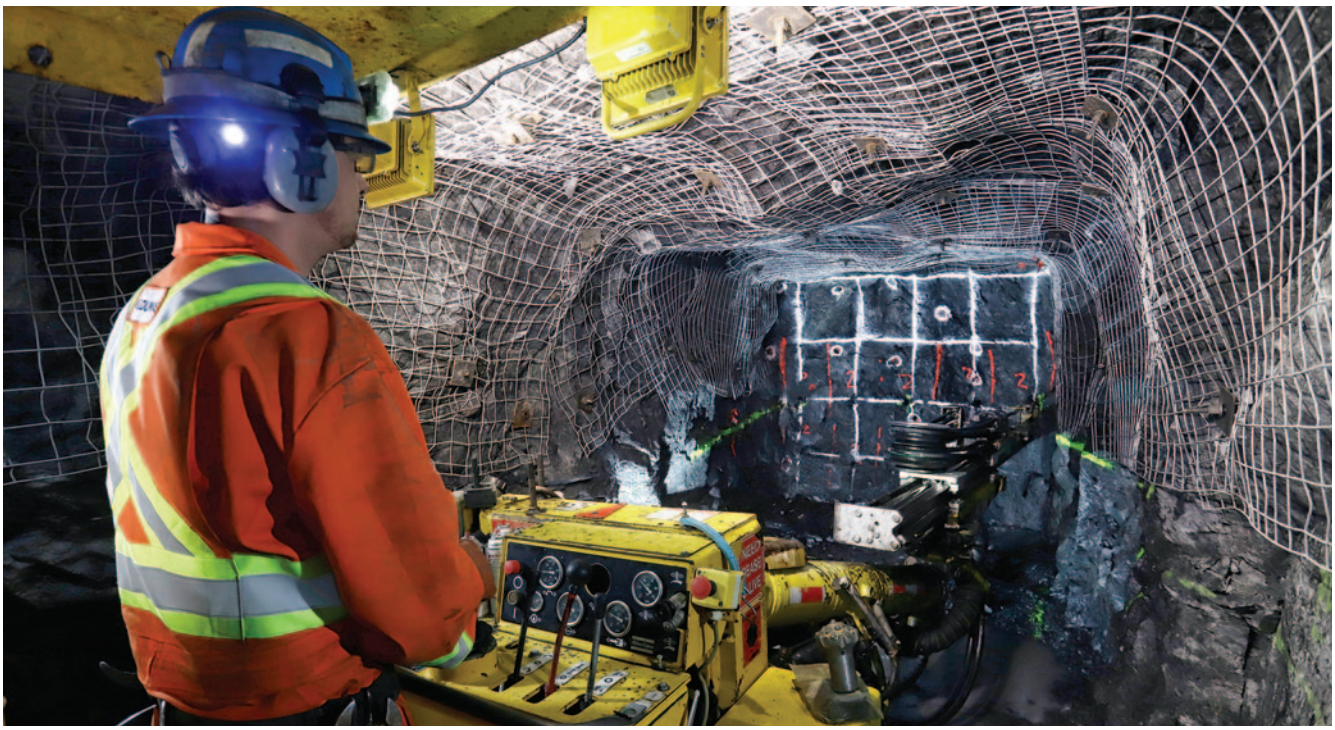
Before the mine closed, it had been relying on a Koepe hoist, but PureGold has decided to switch that out for a ground-mounted hoist with a sheave wheel. "It's easier to maintain. It's easier for the guys to get in and out without having to climb through the top of the head frame," said Donner.

Mill workings

Given the type of production levels PureGold expects, the company decided that renovating the site's existing mill was necessary. According to Labrenz, the old mill was rated for 600 tonnes per day. With the updates, the modernized one is expected to handle 800 tonnes per day.

The company is keeping the existing SAG mill, but a new ball mill will be installed over the summer. The gold room was

Courtesy of PureGold



A combination of conventional cut and fill, mechanized cut and fill and longhole mining will be used to extract the ore.

Courtesy of PureGold

A new ball mill and gravity circuit are among the additions to the pre-existing processing circuit.

removed and a new one with modern equipment will replace it. A gravity circuit is also being added.

"When we did our metallurgical test work and looked at historical documents, we realized that a lot of the gold is what we call 'free gold,' so it doesn't need a lot of work to release it. The gravity circuit basically takes that density characteristic of gold and pulls the gold out without using any of the reagents you use in the primary milling process, so it's a fairly cost-effective way to extract gold," explained Labrenz.

The mill, like the rest of the facility, will be built with optimization in mind. Instrumentation will allow the company to gather real-time information on reagents like cyanide and on overall system conditions such as pH.

"Sometimes you get a slug of ore that may consume more cyanide because it's higher grade. [With monitoring systems,] you can increase the amount of cyanide to keep the cyanide ratio at optimum levels and optimize your recoveries, as opposed to in the old days where [operators] might test three or four times a day. It's a real-time reaction to what's going on in the process, and you can adjust your reagents," said Donner.

Labrenz added that PureGold determined the on-site leach tanks and CIP tanks are "all in great shape" and can continue to be used.

Powering the future

PureGold will not be using battery electric vehicles (BEVs) immediately, but it has a timeline in place to bring them into the operation three years after production begins.

There are a few reasons why BEVs are not being adopted immediately. First, Donner said, they are still too expensive, but he expects costs will decrease significantly in three years, to roughly the same price as diesel models. More importantly, BEVs will reduce ventilation demands as the mining extends deeper.

Regardless of how its vehicles are powered, PureGold intends to use telematics to monitor its fleet. The company is running fibre into the mine so that real-time data on vehicle performance can be conveyed and monitored and decisions can be made on the fly about vehicle maintenance.

Being good stewards and neighbours

Even as the company plans for future expansion, PureGold has the environmental reclamation of the mine top of mind. It has already removed legacy buildings, hauled away scrap material that was left when the previous owner shut down the mine and begun work on site reclamation.

"We've taken great care to improve the environment, all the way from the exploration work," said Labrenz. "This mine that we're developing right now has been designed for reclamation from day one. What I mean is that every decision we're making is to ultimately return the site to its original condition. I'm really proud of that component of the project."

He added that he is equally proud of the relationship the company has built with the Lac Seul and the Wabauskang First Nations. Labrenz said the project agreement allows for collaboration between the Indigenous communities and the company. It also stipulates that there are employment opportunities and that contractors who are members of the First Nations are given preference. PureGold has also committed to providing funding for community-based environmental projects and other initiatives for the life of the mine.

"[Miners] are an important facet of the economy. We can't be a compromise to the communities and the environment in which we work," said Labrenz. "I think that we're certainly getting better as an industry. In the 1930s, things were considerably different. I think we understand the impact much better now, and we have the right systems and policies and procedures to conduct our work in a fashion that does no harm. The more we communicate that, as stewards of the industry and in the communities that we're in, the better." CIM