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Colossus Minerals digs in at Serra Pelada

JUNIOR ACTIVE AT SITE OF BRAZIL'S EPIC 1980s GOLD RUSH

SITE VISIT

CARAJAS, BRAZIL — Old photographs of the most spectacular gold rush in recent history show tens of thousands of artisanal miners called *garim-peiros* clawing away at the mud in the middle of the Brazilian jungle.



BY TRISH SAYWELL

At the height of production, the open-pit mine at Serra Pelada was worked by more than 100,000 *garim-peiros* scaling slippery ladders in sandals with 50- to 80-lb. sacks of rock on their backs.

“Not since the building of the pyramids by thousands of slaves, or the Klondike gold rush in Alaska, has such an epic-scale human drama been witnessed,” Sebastiao Salgado, a photographer who documented the lives of the *garimpeiros*, noted in his book: *Workers: Archaeology of the Industrial Age*.

Legend has it that a gold nugget at Serra Pelada (Bald Mountain) was discovered in 1979 by a local farmer while he was bathing his child in a nearby stream.

The news couldn't be kept quiet for long and in the ensuing months, thousands of *garimpeiros* descended on the site, about 434 km south of Belem, the capital of Para state, in northeastern Brazil.

Over the next few years, *garimpeiros* scratched out a pit 130 metres deep and roughly the size of fifteen soccer fields



BY TRISH SAYWELL



BERNADELLI

Top: The Serra Pelada pit as it stands today.
Inset: Tens of thousands of artisanal miners, or *garimpeiros*, flock to Serra Pelada in the Brazilian rainforest in 1983, as part of the biggest gold rush in recent history.

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(300 by 400 metres) from which they produced an estimated 2 million oz. gold.

Flooding and a pit wall collapse finally brought bedrock mining to an end in 1986. The government closed the area in 1992 and *garimpeiros* have fought to have it reopened ever since. In 2002, the Brazilian Congress overturned that decision and gave the *garimpeiros* title to the original pit and the area around it.

At the height of mining activity in the early 1980s, the *garimpeiros* had to share the pit with Docegeo, the prospecting arm of Companhia do Vale do Rio Doce, now known as **Vale** (RIO-N), which held the underlying title to the land.

Vale relinquished its title and in February 2007, Brazil's Ministry of Mines and Energy granted an exploration licence to Coomigasp, a Brazilian-registered co-operative company representing the *garimpeiros* who had mined Serra Pelada.

In July 2007, a general meeting of Coomigasp attended by 8,000 members of the 45,000-strong co-operative chose Canada's **Colossus Minerals** (CSI-T, COLUF-O) as its joint-venture partner.

"Many, many, companies have wanted to get into Serra Pelada," notes Vic Wall, the Australian president of Colossus. "We're looking for more property here. We want to add to the west and south of us, but it's owned by Vale."

Under the landmark agreement, Colossus will manage and operate the project and earn a 75% interest by funding exploration and making staged premium payments to Coomigasp relating to an independently audited gold resource. Coomigasp holds a 100% interest in tailings and waste from the historical pit.

In order to earn in, Colossus is obligated to spend 18 million Brazilian reais (US\$7.78 million) in exploration and development, of which about 13 million reais has been spent to date.

Once a resource is defined on the property and approved by the

Brazilian Department of Natural Resources, the company will then make staged option payments over three years depending on the amount of gold contained in the deposit.

If Serra Pelada has a resource of 20-63 tonnes of gold, for instance, Colossus will pay a total of 60 million reais (less 7.6 million reais already paid to date); if the deposit holds 64-149 tonnes of gold the payment will be 135 million reais; if 150-319 tonnes, 276 million reais; and if it contains more than 549 tonnes of gold, Colossus will contribute 817.5 million reais.

"We will probably be looking at an acquisition cost of between US\$20 and US\$30 per oz. gold," Ari Sussman, Colossus's Toronto-based chief executive, explained in a telephone interview.

In addition to winning the coveted spot as Coomigasp's partner, Colossus also inherited Vale's entire historical database of about 45,000 metres of drill core.

Between 1980 and 1998, Vale drilled 200 holes at Serra Pelada. Results include holes such as FD-0032 in the pit area, which intersected 43 metres assaying 4,709 grams gold per tonne, 204 grams platinum and 1,174 grams palladium.

Another hole, FD-0072, well south of the historical pit, intersected 17.6 metres grading 201.14 grams gold, 41.1 grams platinum and 54.16 grams palladium per tonne.

"You'll never see anything like that — it's extraordinary stuff," says Colossus's principal geologist, Christian Grainger, who wrote his PhD dissertation on the genesis of the Serra Pelada deposit.

Adds Wall: "There's nothing quite like Serra Pelada in grade or in the mix of metals. Some of the intersections are the highest grades of platinum that have ever been seen."

Inheriting Vale data will enable Colossus to better direct its own exploration drilling southwest of the historic pit and allowed the company to "hit the ground running."

Colossus is directing the joint venture's exploration drilling southwest of the pit and has completed its initial 5,000-metre drill program. The company plans to start its second 5,000-metre round later this month.

Colossus estimates it will have spent about \$6.6 million by the end of this year on its drill program, as well as on re-sampling and re-assaying Vale's core for gold and platinum group elements (PGEs). Vale never assayed its core for other than platinum and palladium, and Grainger believes rhodium and iridium could be economically significant.

For next year, the plan is to drill an additional 12,000 metres, establish a National Instrument (NI) 43-101 resource by August or September, then wrap up a scoping study that will likely lead to a mining lease application and feasibility study in 2010.

Colossus's drill program has extended high-grade gold mineralization, including PGE-rich subzones along 250 metres of strike length downplunge and southwest of the historical Serra Pelada pit, in what is being called the central mineralized zone.

"There is a fold structure and mineralization plunges from where it daylighted at the pit down to the southwest — we know all that from CVRD drilling and now our own," Grainger says. "There is more mineralization remaining under the pit that was never got and mineralization continues to the southwest, downplunge."

So far, the Toronto-based junior has drilled 18 holes for a total of 5,129 metres of core. The drill program has demonstrated the continuity of high-grade mineralization along 100 metres of strike length, over vertical intervals of more than 70 metres and with widths up to 40 metres in the central mineralized zone, up to 350 metres southwest of the historic open pit.

The first drill hole intersected 88

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metres grading 5.8 grams gold, 6.11 grams platinum and 6.83 grams palladium per tonne. The second hole struck 46.7 metres at 24.11 grams gold, 9.04 grams platinum and 11.57 grams palladium, plus 14.7 metres of 22.51 grams gold, 4.56 grams platinum and 11.57 grams palladium.

In September, the company released more results. Hole 7 struck 26.9 metres at 8.61 grams gold, 8.85 grams palladium and 14.43 grams palladium, plus 23.3 metres of 5.11 grams gold, 1.55 grams platinum and 2.34 grams palladium.

Hole 8 intersected 7.5 metres of 19.28 grams gold, 2.37 grams platinum and 5.27 grams palladium, plus 10.3 metres grading 21.13 grams gold, 5.8 grams platinum and 8.42 grams palladium.

“We have a much larger area of mineralization than what was taken out of the pit,” Wall says. “They had the lower limb of the fold in the pit and some of the hinge, and we have the upper limb, the hinge and the lower limb. So there is a much bigger volume of stuff that is mineralized and we’re chasing the mineralization downplunge.”

Somewhere down the line, Colossus will drill under the pit. The company may decide to float a rig on the surface of the water and conduct bottom sampling. There is about 50 metres of sediment on the bottom — largely material that was washed back into the mine. Eventually, the pit will be dewatered to facilitate open-pit and/or underground mining, Wall says.

But for now, Colossus wants to focus on defining a resource. It believes it has in the order of 4-5 million tonnes of resource and Serra Pelada has the potential for negative cash costs on gold, net of PGEs.

The project also boasts good infrastructure, which will no doubt improve in the future as Vale develops its Serra Leste iron ore project, which sits next door.

Treasure trove

There are few traces left of what used to be prime rain forest along the one-hour drive from the Carajas airport to Serra Pelada. Cattle ranchers have stripped the terrain of all its canopy as Brazilian politicians have turned a blind eye to the carnage.

Today, Carajas is a 220 by 100-km mining district in Para state and has become known as one of the greatest mineral provinces on Earth, hosting an estimated 20 billion tonnes of relatively high-grade hematite iron ore, as well as plentiful deposits of copper-gold, nickel and manganese.

One feature of the area is the clustering of a large number of world-class iron oxide copper-gold deposits. These are hosted in a variety of rocks, most associated with breccias. The region is home to Vale’s Carajas mine, the largest iron ore mine in the world.

“There are very few mineral provinces on Earth that have this kind of endowment,” Wall muses. “It’s probably one of the top two or three mineral provinces in the world.”

The Carajas mineral province is a highly mineralized metallogenic province lying at the southeastern margin of the Southern Amazon Craton — “a place to kill for,” Grainger says.

In an article published in *Ore Geology Reviews*, Grainger wrote that Carajas has long been recognized for its enriched iron and manganese deposits. But over the past 20 years, it has been increasingly acknowledged as one of the most important copper-gold and gold-platinum-palladium provinces globally, with deposits extending along a roughly 150-km-long west-northwest-trending zone about 60 km wide and centered on the Carajas Fault.

Serra Pelada is the richest gold deposit discovered in Carajas and apparently anywhere in Brazil, Grainger and Wall believe. It is also remarkable for its platinum and palladium grades,

metasediment-hosted and hydrothermal character.

“The exact metal content of the deposit has been difficult to estimate given the extensive working by garimpeiros,” Grainger writes. “An original pre-mining resource has been estimated at 110 tonnes of gold, 35 tonnes palladium and 18 tonnes platinum, although uncertainty of this estimate is high.”

In 2002, Vale estimated the resource (not compliant with NI 43-101) of the un-mined portion of the deposit at 3.7 million tonnes grading 15.2 grams gold per tonne, 4.09 grams palladium and 1.89 grams platinum.

According to Grainger, Serra Pelada’s highly anomalous, hydrothermal gold-PGE deposit appears to have been formed from highly oxidizing ore fluids that were neutralized by dolomites and reduced by carbonaceous shales in the upper sedimentary succession within the hinge of a reclined synform.

The majority of the mineralization is hosted by carbonaceous and calcareous siltstone. It is associated with brecciated country rock and quartz-siderite breccia veins, iron oxide-rich hydrothermal breccias, and massive hematite and sericite metasomatism. This material runs along east-west and northwest to north-northwest-trending fault structures peripheral to the Serra Pelada deposit.

The entire deposit, Grainger notes, has undergone deep tropical weathering with the calcareous rocks decalcified generally to about 350 metres below surface.

The carbonaceous and calcareous siltstone-hosted gold-PGE mineralization is largely associated with zones of high carbon content within the black, carbon-rich unit of the carbonaceous and calcareous siltstone lithology.

“Everyone says Serra Pelada is unique and a one-off,” Wall says. “It’s not. I think we could find the next one if we can only

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‘Everyone says Serra Pelada is unique and a one-off. It’s not. I think we could find the next one if we can only get the ground. . .’

— VIC WALL, PRESIDENT, COLOSSUS MINERALS

get the ground. . . It’s a remarkable area — I just wish we had more of it.”

The unsung heroes

Serra Pelada will go down in history as the biggest hand-dug pit ever excavated. At the peak of the gold rush, as many as 70,000 sweat-drenched, mud-covered garimpeiros laboured side by side in the pit — often in areas just big enough to stand in.

Blocks measuring 2 by 3 metres were delineated with string and allotted by lottery. There was a definite hierarchy involved in the process, Grainger explains.

“Most of these people were effectively paid labourers, who dug and carried. Then there were the thriving capitalists who earned the blocks and had their own companies,” he says. “You either got nothing in one spot or you did extremely well in a different spot. There was a lot of horse trading, but it was systematically developed.”

At the height of activity, garimpeiros were digging alongside drillers from CVRD. “It was sparsely drilled because they had difficulty completing the holes because the garimpeiros would swarm over there,” Wall explains.

“That was the beginning of the history of angst between the garimpeiros and what was then a government company,” he adds. “(CVRD) frequently shut down garimpeiros to do their assessment work.”

After digging out the gold, the garimpeiros were paid for the gold con-

tent they produced, but not for the platinum and palladium. Estimates are that with interest, the artisanal miners are owed about US\$200 million from the Brazilian government for unpaid platinum and palladium credits.

New legislation in the 1990s decreed that the garimpeiros will be paid that money back from government sources. But few are willing to venture a guess as to if or when that might happen.

Given the numbers of garimpeiros who flooded the area from other parts of the country, responsibility for the rough-and-tumble mining camp and surrounding town was given to an army colonel, Major Sebastiao Rodrigues de Moura. His mandate was to maintain security at Serra Pelada and keep the peace. Among the first steps he took was to ban alcohol, women and guns. He later represented the garimpeiros in their efforts to have mining rights granted to them.

A takeover target?

Like all juniors, Colossus has been hit by the economic downturn, its share price thrashed, and is now keeping a tight lid on expenses. (It has \$10 million in cash.)

Colossus stock at presstime traded at a one-year low of 60¢ a share — down from its June 2008 high of \$4.

But its future remains bright, some analysts say. Canaccord Adams, which holds a speculative buy on the stock with a 52-week target price of \$2 per share, believes that a 1,350-tonne-per-day underground operation could produce about 250,000 oz. of gold-equiva-

lent per year at a cash cost of less than US\$180 per gold-equivalent oz.

“The Serra Pelada project could be developed into a low-cost gold producer with significant platinum and palladium byproduct credit, making the company an attractive target for a senior to intermediate PGM or precious metal producers,” Canaccord writes in a Nov. 11 report. “Potential candidates to acquire Colossus include Impala Platinum, Kinross Gold and Eldorado Gold. If Colossus were successful at extending the boundary of the Serra Pelada land package to the southwest, we believe the potential for an acquisition would increase significantly.”

As it stands, Serra Pelada is currently limited to roughly a 1-sq.-km parcel of land that is thought to contain the bulk of the orebody.

Sussman declines to comment on takeover possibilities, but notes that high-grade projects in good jurisdictions are rare. He also points out that, given the global credit crisis, high-grade, relatively small-tonnage projects imply a much lower capex.

Sussman also says he hopes to negotiate with Vale next year to acquire more land adjoining Serra Pelada.

Vale exited the precious metals business in 2002 and while Serra Pelada is an exciting project for Colossus, “it is far too small to be of interest to Vale,” Sussman maintains. “We intend to make our best efforts to talk to them in early 2009 to see if we can get a deal to get more ground.”

Either way, Colossus still has an excellent project on its hands.

“There is almost no high-grade left anywhere in the world — Serra Pelada is unique,” Sussman says. “The only two acquisitions done this year, Aurelian and Gold Eagle, were very high-grade projects. People just don’t want to develop bulk-tonnage, low-grade deposits, especially with the credit crunch we’ve just lived through.”