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Newcrest plots Cadia gold mine expansion on shaky ground

By Peter Ker

In the verdant hills that surround Australia's most lucrative gold mine, two new roads are being cut.

One of them has been on the drawing board for years, slated to become the official entrance to the Cadia gold mining precinct when the existing road is compromised by the man-made cave that is gradually creeping beneath it.

Development of the other new road has been more rushed, made necessary by fears the existing road will be compromised sooner than expected, and before the new access road is built.

"We have decided to implement a project team to establish a temporary access road into site via the Ridgeway entrance in case the current access road becomes unserviceable before the new access road is complete." Said Cadia general manager Peter Sharpe, in an internal memo on July 27.

Newcrest Mining history at Cadia

Significant events	Number of Seismic events within 20km radius of Cadia
1992 First gold and copper deposits discovered at Cadia Hill	0
1994 Cadia East gold and copper deposit discovered	0
1996 Development of Cadia Hill mine approved, Ridgeway deposit discovered	0
1999 Development of Ridgeway mine approved	0
2002 First production at Ridgeway mine	1
2006	2
2008 Open pit plans at Cadia East changed to underground panel cave mine	0
2009	1
2010 \$1.91b spend on Cadia East underground approved	7
2011	1
2012 Mining ended at Cadia Hill	0
2013 First commercial production from Cadia East underground panel cave 1	2
2014 First commercial production from Cadia East underground panel cave 2	1
2015 Seismic event damaged panel cave 2, out of action for several months	14
Production at Cadia halted because of fatality at Ridgeway mine	
SAG mill at Cadia failed, out of action for five weeks	
2016 Ridgeway mine ceased production	41
2017 Seismic event damaged panel cave 1, out of action for five months	2
2018 Wall slide in Cadia tailings dam, gold processing halted for three weeks	3

SOURCE: GEOSCIENCES AUSTRALIA, NEWCREST MINING

“ Regular geotechnical inspections and monitoring will provide early warnings of any material changes, and the road will be closed before personal safety is compromised.”

The fractures in the entrance road are a neat metaphor for the cracks that have appeared in Cadia’s public façade in recent years, with a series of safety incidents tarnishing the mine’s reputation as Newcrest Mining’s golden goose.

The past three years at Cadia have seen a major failure in the mill that grinds the ore into smaller particles, a breach in the wall of the dam that holds the mine wastes or “tailing”, and a surging number of seismic events, which have damaged the giant caves of the underground mine on more than one occasion.

Production of gold has been spasmodic as a result, and the largely supportive local community has started to wonder about the safety standards at one of the region’s biggest employers.

As Newcrest puts the finishing touches to expansion studies for the mine, the relationship between the various incidents is being debated, and some are wondering whether Newcrest, run by chief executive Sandeep Biswas, has earned the right to grow at Cadia given the mine’s chequered safety record in recent years.



Cadia , located south of Orange in NSW, is regularly ranked as Australia’s most profitable gold mine.
Eddie Jim

Australia's most profitable gold mine

There are just over 31 grams in an ounce of gold, and each time Cadia produced that much of the yellow metal over the past year, Newcrest made about \$1466 in profit.

Those sorts of margins mean Cadia, Located south of Orange in New South Wales is regularly ranked as Australia's most profitable gold mine despite having relatively modest grades of gold.

Cadia's profitability is due to the copper that naturally occurs with the gold and can be sold as a byproduct, and the low-cost method of mining used in recent years, known as panel caving.



Rather than extract the gold from above, as open pit mines do, panel caving see the deposit attacked from below with gravity doing most of the work. Miners go deep underground to fracture the bottom of the ore body, then let it collapse under its own weight, forming a large underground cave.

The fractured rock is then extracted from tunnels at the base of the cave and taken to surface, where a crater-like depression forms.

Various types of caving have been conducted at Cadia over the past 16 years, but the operation was a turbo-charged in 2013 when Newcrest's \$1 billion spend on one of the world's largest and deepest panel caving operations delivered first production from Cadia East.

Seismic events on the rise



Some are wondering whether Newcrest has earned the right to grow at Cadia given the mine's chequered safety record in recent years. Rob Homer

While it reduces the cost of mining, panel caving interferes significantly with the natural geological pressures, and it was no surprise to people in the mining industry when the start of production from Cadia East panel caves coincided with increased seismic activity nearby.

But for many of the mine workers and landowners who live nearby, the rising number of tremors, shakes and quakes was both a surprise and a cause for concern.

Proving that mining caused a particular seismic event is difficult, and gold mines like Cadia are often built in seismically active areas because gold is regularly found in geological faults.

But Geoscience Australia data confirms that seismic events have become far more common within 20-kilometre radius of Cadia since the two giant underground caves began operating in 2013 and 2014 respectively.

Of the 75 seismic events recorded by Geoscience Australia within that radius since 1992, 63 have occurred since February 2013.

"There has previously been seismic activity in the area but we have been able to identify a significantly high amount of earthquakes over the past couple of years," said Hugh Glanville, a senior seismologist at Geoscience Australia.

“Whether this is related to the mining or not is quite difficult to tell without very detailed local studies.”

Underground evacuation

In early 2015 seismic events delayed the ramp-up of the second panel cave by several months.

Then in April 2017, a 4.3 magnitude earthquake, the strongest ever recorded within 20 kilometres of Cadia, damaged the panel caves and left them out of action for three months and five months respectively.

Those working underground at the time of the quake moved quickly to refuge chambers and were evacuated without injury.

But Dan Walton from the Australian Workers Union said concerns still linger among the Cadia staff.

“Peoples’ level of concern has been increasing as time has gone on, and for a lot of them who have worked there for a period of time, it is probably because they feel the seismic events have been happening more frequently,” he said.

Experienced miners say the seismic activity should calm down once the second panel cave fully breaks through at surface level. But expected to develop 10 or more panel caves at Cadia East in the future, the cycle looks set to repeat.

“The mining method is seismically active by design, so we are getting more mining-induced seismic activity near the mine, but we do not believe mining has led to an increase in the number and severity of naturally-caused seismic events,” said Newcrest spokesman

Tailings dam wall slip

Less than a year after that 4.3 magnitude earthquake, a 270 metre-wide section of Cadia’s giant tailings dam wall started to slip.

Fortunately this would be no repeat of BHP’s Samarco dam failure, which killed 19 Brazilians in 2015.

But it was enough to disrupt production and have the mine operating below full capacity for two months. Future tailings storage options are being reviewed.

Two seismic events were recorded on the day before the dam wall slipped, but Newcrest is yet to provide an official explanation for the slip.

“The investigation is ongoing, so we don’t yet know the definitive cause. We can’t rule out anything, but at this stage from all the analysis we have done, there is no indication that the small seismic activity beforehand had anything to do with the wall slump” said Newcrest spokesman.

Guy Fitzhardinge lives downstream of the Cadia tailings dams, putting him in the line of fire should a failure occur.

But he is more focused on the increased seismic activity.

“If I had real concern with the mine it would be associated with the seismic activity, not so much with the tailings dam, because it is not as if that stuff {in the dam} is fluid, it is fairly solid stuff,” he said.

“The community is not waiting with bated breath, but there is a growing level of concern in the community about the mine and its safety.

Good corporate citizen

“The mine has done its best to be a good corporate citizen, but there are certain demands from shareholders that are not necessarily compatible with being a really good corporate citizen.”

It is with those shareholders in mind that Newcrest is currently studying options for expansion of Cadia.

The mill and other processing facilities at Cadia were originally built to process 27 million tonnes of material per year.

The most productive three months in the mill’s history was achieved in late 2016, when it processed at an annualised rate of about 26 million tonnes, well below the 32 million tonne maximum permitted by NSW regulators.

But with plans to develop more panel caves, Newcrest wants to expand processing capacity, and the company was this week putting the finishing touches to an expansion study that would seek approval to process 33 million tonnes per year, with aspirations to stretch it as high as 35 million tonnes.

But after three years of incidents and disruption, has Newcrest earned the right to expand at Cadia, particularly given it has never produced close to the rates already allowed under existing permits.

Shaw and Partners analyst Peter O’Connor said regulators would have the final word over the scale to which Cadia could expand, and those regulators would likely consider the recent events and the risk or repeat.

Mr O’Connor said the dam slip was the most concerning of Cadia’s recent issues, but he stopped short of saying the mine had a safety problem.

“Sometimes companies have bad luck, and sometimes it is bad practices. Have they built the tailings dam right? I don’t have the answer to that, but from an underground cave perspective, Newcrest are pretty solid at what they do. If they are getting seismicity I think anyone would,” he said.

“Is there a commonality? There is a bit of a trend there for sure”.

Newcrest is adamant the multiple incidents are not connected, and not indicative of declining standards.

“Cadia doesn’t have a safety problem, and there is absolutely no clear link between these events. The mill failure was not a safety issue, it was just a failure of the (semi-autogenous grinding) motor and we detected the problem early,” said a spokesman.

Mr Walton said he hoped Newcrest was factoring the recent seismic trend into its expansion planning.

“This is going to have to be factored into the life costs of any expansion plans, those mining operations built on a hotbed of seismic activity and they are always going to have to invest in safety to ensure every employee gets to go home safely,” he said.

With severe drought affecting agriculture in much of NSW, the Mayor of Orange Reg Kidd said Cadia was more important to the local economy than ever, and locals would be more worried about any reduction in output from Cadia than the risks that come with expansion.

“I’m confident and most the community are confident that when it comes to safety they are doing the right thing,” he said.