

# Between a rock and a smart place

Attractive and helpful mineralogy sets up Global Geoscience to do what few are contemplating

**R**IO TINTO HAS HOGGED THE spotlight on potential high-value sedimentary lithium and boron extraction with its huge, deep deposit in Serbia's Jadar Valley. But it's fair to say a minnow with its foot on a unique 'twin' resource in Nevada's lithium-brine country is almost ready to make a bold appearance on the big stage.

Global Geoscience's (ASX: GSC) Rhyolite Ridge lithium-boron deposit, literally sticking out of the ground in the southern Nevada desert around Tonopah, has some very important differences to Jadar (not the least of which is its location near the surface of, not 300-600m under, mining-friendly Nevada).

But as at Jadar, GSC's lithium-boron mineralisation sits with a sodium boro-silicate mineral that is leachable with sulphuric acid – perhaps at very low cost relative to others – putting it in the same rare space as Jadar as a sedimentary resource that might compete with traditionally dominant pegmatite and brine projects economically. Could associated acid-eating carbonate minerals be removed efficiently and effectively without denting lithium-boron recoveries? Early signs were encouraging, with Rhyolite Ridge's searlesite mineralogy again the key.

It gave GSC what looked like a valuable opportunity to create a real edge in a sector overflowing with small companies trying to make their mark in one way or another.

The company's metallurgical test results have supported management's view that Rhyolite Ridge gives them a unique chance to shine. Given the scale of the deposit and its proximity to not only Tesla's Gigafactory at Reno to the north, but also one of the world's two major boron refineries across the state border in California, it seemed only a matter of time before investors came to the same view.

That shift may be underway given the doubling of GSC's share price over the past three months.

But Bernard Rowe, managing director of the company since its 2007 listing, thinks GSC's move out of the shadows of brine and pegmatite lithium hopefuls has only just started.

"These sorts of [non-brine/pegmatite] deposits are all about the processing, and they are something that's new, with none of them in production," he said.

"What's held them back in the past – deposits a bit similar to this, but not the same – is the processing cost.

"We proposed a fairly low-cost acid-leach processing route, and what we've been doing over the last three to four months is demonstrating incrementally the separate steps in that process. As we've been putting out news on that processing path our share price has continued to move in the right direction."

GSC's latest demonstration of the effectiveness of flotation in removing carbonates, calcite and dolomite, from lithium-boron mineralisation –

with up to 65% of carbonate discarded while lithium and boron recoveries are maintained above 95% – is another important step toward finalisation of a simple, low-cost recovery flowsheet built around acid leaching.

Cutting carbonate-mineral content prior to leaching reduces acid consumption and costs. GSC now wants to show acid leaching of the flotation concentrate produces high metal recoveries at the lowest possible acid usage rate.

"We really just have that one question to answer now," Rowe said. "How much acid do we consume on the concentrate that we produce by removing the carbonate through flotation? When we can provide that number on how much acid we will consume that will give a clearer indication of the costs."

The answer is only weeks away.

"Our studies are pointing in the direction of favourable economics for using this acid leach processing route," Rowe said.

"No-one has been able to demonstrate that you can economically acid leach one of these sedimentary lithium deposits, and that's all down to mineralogy. They're [deposits] all different, and if you've got a mineral that's really soluble in acid then you've got the potential to do it as long as you don't have other minerals consuming too much acid.

"The searlesite is very soluble in acid and it's 40% of the rock in our deposit. Removing the lithium and



Global Geoscience's lithium-boron project is in mining-friendly Nevada in the US

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**BERNARD ROWE**  
MANAGING DIRECTOR

boron is a fairly straightforward acid leaching process, not too dissimilar to leaching oxide copper with acid. All other steps we've examined have been about reducing acid consumption by removing other acid consuming minerals, and clay, etc.

"We've shown we can remove significant amounts of the carbonate, which is present as calcite and dolomite in relatively coarse grains, which means you can float it. So it's not just grade, it's mineralogy and the size of the mineral grains, and the low level of clay within the high-grade boron zone that means that we can use the flowsheet that we're proposing.

"And that means that we're actually closer to the brines in that without needing to roast, we can produce lithium carbonate and boric acid on site. Obviously there are big cost savings if you can avoid the roasting route.

"It also opens up a number of other options for us because you end up with lithium and boron in solution through the acid leach process, and from that we can produce industrial grade lithium carbonate for sale – we don't have to go all the way to a battery grade product if we elect not to.

"Once you've leached the boron and put it into solution you can also make various products, boric acid being most applicable to us."

Rhyolite Ridge's 65 million tonne high-grade searlesite zone (with an average 1% lithium carbonate and 9.1% boric acid) contains about 650,000t of Li<sub>2</sub>CO<sub>3</sub> and 5.9Mt of H<sub>3</sub>BO<sub>3</sub>, making it one of the largest lithium and boron deposits in North America. It's part of a much bigger resource base, and is open in three directions and likely to be extended. But it is already sufficient to support a 3Mtpa operation for more than 20 years and so is the focus of GSC's PFS.

"All our economic modelling is based on the high grade," Rowe said, "which actually means high-grade boron. The lithium grade is similar throughout the deposit."

Rhyolite Ridge has enough boron to supply up to 10% of future world demand, and account for about 50% of the value of the proposed project's potential output.

"So it's a very significant economic contributor and also could be a significant producer in the boron market," Rowe said.

"It's the only other large boron

deposit in the US ... and the US and China are the two largest consumers of borates.

"If we can demonstrate that our proposed flowsheet works then obviously we're going to be producing quite low-cost lithium and boric acid. We've said [presentations] we're targeting US\$2,000-to-\$3,000/tonne after boron credits – we're talking about a co-product here not a by-product – and we could well be lower than that. It depends on a number of factors we're still working on.

"We certainly aim to be in the bottom 25% of cost curve, and to be competitive with brines in terms of our costs of lithium carbonate, and the boron is what allows us to entertain doing that.

"Having said that, if you convert that boron into lithium then you're talking about twice the amount of lithium carbonate as an equivalent. And that means we're up around 2% lithium carbonate. If you use \$7,000/t for lithium carbonate, which is fairly conservative, then that's \$140/t dirt.

"And we're talking about openpit mining of consolidated rock, quite soft with a very low work index, and right at the surface with a low [projected] strip ratio. We're using low mining costs roughly equivalent to what you'd see for oxide gold deposits in Nevada, and then low crushing and grinding costs, and standard flotation. It then just comes down to how much acid you use as that is by far the biggest cost in the process that we're working on. But \$140/t of in situ contained metal, if you like, gives us a lot of room to work with."

GSC is six months away from delivering its PFS results and from there maybe two years from getting its Nevada state environmental permitting in place.

Rowe, who thinks delays already evident in new lithium delivery into burgeoning markets might continue to fuel higher prices, is not overly fussed about the likely development timeline for Rhyolite Ridge.

"It's always good to get things into production quickly, especially when there is premium for the product, but we're talking about a mine that, if the economics are favourable, is going to be a very large, low-cost long-life producer of both lithium and boron.

"So the permitting speed is not such a critical thing for us."

## GLOBAL GEOSCIENCE AT A GLANCE



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### MARKET CAPITALISATION

A\$155 million (at March 23, 2017)

### QUOTED SHARES ON ISSUE

1,066 million

### MAJOR SHAREHOLDERS

Directors/management (7%)

The Rhyolite Ridge lithium-boron deposit outcrops at surface

