

Edition ▼

# Finland's golden north

Finland has long been seen as an attractive jurisdiction for exploration companies and miners to invest, and Agnico-Eagle's Kittila gold mine underlines the size of the prize on offer. But the country is now seeing a build-up of modern exploration in the north that could really change perceptions of the region's mineral endowment and expand its production profile significantly.



S2 Resources' Ademi area in Finland will continue to be intensively tested over the coming 12 months with the aim of uncovering significant lode gold or polymetallic sulfide mineralisation.

## Exploration / Development > Discovery

Anglo American hasn't said a lot about its 2009 Sakatti copper-nickel-PGE grassroots find 150km north of the Arctic Circle on the Central Lapland Greenstone Belt (CLGB), but has indicated it is working with "local partners and stakeholders to develop best practice in responsible modern mining".

Comments

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A spokesperson told *Mining Journal* this week exploration at the site had been suspended while permitting activities continued.

## Staff Reporter

"We are currently carrying out the pre-feasibility study and we are finalising the detailed ESIA. Once this is completed, we will start to prepare the environmental permitting submission documents," the spokesperson said.

"It is [a high priority] in terms of our base metals growth strategy and it's one of the only two copper greenfields projects in Anglo American's portfolio. It is a polymetallic resource that can be very competitive in the future given the

equivalent copper grade.

"To date, we have carried out more than 75,000m of drilling. [We are still] delineating the boundaries of the mineralised body and the aim is to commence infill drilling with the ultimate objective of definition and estimation of a mineral resource [mineable reserve]."

Anglo American has outlined an indicated and inferred resource of 44.4 million tonnes grading at 1.9% copper, 0.96% nickel, 0.04% cobalt, 0.64gpt platinum, 0.49gpt palladium and 0.33gpt gold.

"It appears to be the best discovery in Finland," the country's Geological Survey director Pekka Nurmi said last year.

Others are looking to add contenders to that short discovery list.

Rupert Resources CEO James Withall told *Mining Journal* at the recent Beaver Creek Precious Metals Summit in Colorado, USA, the CLGB was a "very exciting part of the world in terms of exploration".

"Finland is a country with a great mining heritage," Withall said.

"The permitting regime is incredibly simple. The infrastructure is phenomenal.

"The CLGB is home to Europe's largest gold operation. Despite that mine being there and the only other mine being [Rupert's permitted] Pahtavaara, it is relatively new in terms of exploration. But we are beginning to see, through the work we're doing and also some of our peer group, the underlying potential.

"Aurion [Resources] and SR2 Resources, in particular, have been making some really exciting, brand new discoveries - not based on known gold occurrences

"The Sakatti discovery was made using geophysics then follow-up base-of-till (BoT) drilling. We've spent the last two years building a high-quality exploration model and platform. We turned up to this mine [Pahtavaara] that had been worked for 20 years and there was no geological model - really no-one had an understanding of why the gold was there. That has now changed.

"We've spent the last two years reinterpreting [old] geophysics, we did a new aeromag survey, we just did a new gravity survey, and started doing BoT lines over the best anomalies.

"All of that is very important but not very exciting to the market.

"We drilled the first of those targets in May; 500m for four holes and three of them had interesting stuff in them, in a completely new piece of ground with no exposure."

Rupert, which plans to complete at least 22,000m of drilling over the next 6-12 months at newly defined district targets, and to expand the 500,000oz remnant resource at Pahtavaara, recently topped up its treasury via a well-supported private share placement. It also has a 500,000 tonnes per annum mill on care and maintenance at Pahtavaara, but won't be rushing to reactive it while it explores for big deposits in the region.

"The mine itself has value but we see exceptional potential across the land package and we want to demonstrate that first because there may well be far better opportunities than the mine itself to create value for shareholders," Withall said.

"We're not looking for small deposits; we're looking for 2-5Moz-style deposits.

"From the prospectivity that we see now, we think we might find multiple Pahtavaaras.

"Our focus in the next six months is on taking these targets from having just one hole in them to being discoveries, or at least making one discovery of merit. We really want to find one of these large-scale deposits over the next six months."

### **Risti rising**

Also cashed up is Aurion Resources (TSXV: AU), which got a second drill rig turning to accelerate work at the Aamurusko Northwest target at its wholly-owned Risti project in September.

The company, which has Kinross Gold (9.95%), Newmont Goldcorp (3.8%) and Eric Sprott (5%) onboard as key shareholders, and is working with B2Gold at Kutuvuoma and Ahvenjarvi, and Kinross at Outapaa, believes the CLGB has all the geological hallmarks of the world's prolific greenstone gold belts, including Canada's Abitibi and Western Australia's Norseman-Wiluna belt, but nowhere near the level of past or recent exploration.

Mineral exploration spending in Finland had doubled since 2015 but was still less than US\$30 million a year.

"Many gold prospects occur adjacent to the Sirkka Shear Zone and the adjacent late Kumpu Group - [which feature] clastic sediments deposited in pull apart basins. This setting's potential for orogenic gold deposits was previously

unrecognised in the CLGB," Aurion president and CEO Mike Basha said at Beaver Creek.

"Intense prospecting of this setting ultimately led to the Aamurusko gold discovery.

"The geological setting of the Risti project has many similarities to prolific gold rich orogenic gold belts globally, specifically the Timmins camp of the Abitibi region of Northern Ontario, Canada."



***Aurion Resources activated a second drill rig to accelerate work at the Aamurusko Northwest target at its wholly-owned Risti project in September***

Basha said the Aamurusko zone appeared to be underlain by Kumpu group meta-sandstones and conglomerates, resembling the Timiskaming conglomerates of the Timmins and Kirkland Lake area of the Abitibi province, and occurred in a similar geo-tectonic setting - with both representing the youngest stratigraphic sequence in their respective belts. The Kumpu group and the Timiskaming group were deposited in late orogenic extensional basins, forming in relation to major movement along regional faults or deformation zones.

"Aurion has significantly expanded the high-grade gold surface footprint at the Risti project. Today, the surface expression at Risti has expanded to 15km-by-8km where more than 5,000 rock samples averaging about 8gpt gold have been collected. Mineralisation has been found in large angular boulders, in outcrop and in drill core.

"The [Risti] footprint is equivalent to the Timmins Main or Kirkland Lake Main areas."

Aurion, which had more than C\$22 million in the bank at the end of August this year, said last month latest drill results from Aamurusko Northwest at Risti, including 19.54m of 13.31gpt and 8.18m of 22.48gpt in AM19095; and 3.51gpt over 31.12m including 252gpt over 0.33m in hole AM19094, continued the strike rate from June and show wide zones of disseminated and stringer mineralisation accompanied high-grade veins.

The zone continues to a depth of at least 150m vertically and is said to be open.

Aurion said 16 of 18 holes drilled at Aamurusko NW had intersected gold mineralization and eight of 18 had intercepts of 15gpt or more, while 75 of 90 holes completed in the overall Aamurusko area, Main and NW (600m apart), had intersected gold mineralisation with 24 showing 15gpt or higher in assays.

"Results to date suggest potential for expansion of the zone at Aamurusko NW and discovery of additional zones of gold mineralisation along strike between Aamurusko NW and Aamurusko Main," Basha said.

"Intersecting high-grade, mineralisation enveloped within wide zones of weakly mineralised, but highly anomalous, gold-bearing bedrock is encouraging.

"In the Abitibi province, many high-grade, multi-million-ounce gold deposits are temporally and spatially associated with the Timiskaming conglomerates or their equivalents, in close proximity to major regional deformation [fault] zones such as the Porcupine-Destor or Cadillac Lake-Larder Lake deformation zones.

"The Kumpu group appears to have been deposited in a similar geological setting adjacent to the Sirkka shear zone, which is a major deformation zone in the Central Lapland Greenstone Belt. Strong alteration including fuchsite, tourmaline, iron carbonate, albite and quartz veining is observed along the entire length of this structure."

Basha said the second, more powerful drill rig working at Aamurusko NW was expected to improve drilling efficiency significantly.

### **And S2 makes it three**

ASX-listed S2 Resources, which had A\$12 million in the bank at the end of June this year, is the third hyperactive junior having a strong 2019 with the drill bit in northern Finland.

Managing director and CEO Mark Bennett said at the end of September key targets in the company's large CLGB tenement package would "continue to be intensively tested over the coming 12 months with the aim of discovering significant lode gold or magmatic sulphide mineralisation".

S2 reported previously 5m-15m thick zones of sulphide, alteration and brecciation were intersected in all seven diamond core drill-holes completed at Aakenusvaara, where Outokumpu hit 11m grading 9.6 grams per tonne in the 1980s. Aakenusvaara is 3km along strike from the former Saattopora deposit mined in the early 1990s that produced about 200,000oz of gold and 5,177t of copper.

Bennett said most of S2's ground had not been extensively or effectively explored and a new understanding of the style of source of mineralisation had quickly emerged.

"Following definition of a broad gold-arsenic anomalous corridor in a major ionic leach geochemical survey in the summer of 2018, S2 fast-tracked the granting of the central part of the Paana exploration licence application to enable the commencement of a large BoT drilling program beneath the ionic leach anomaly," he said.

"The Paana Central tenement was granted in late 2018 and BoT drilling started in early 2019.

"This technique allows direct sampling of bedrock beneath up to 15m of glacial cover.

"Initial wide-spaced drilling on a 400m-by-20m grid defined several strong anomalies, and the most extensive of these was infilled at a much tighter spacing of 100m-by-10m."

This work at Aarnivalkea has produced encouraging results with broad zones of strong shearing, alteration and gold anomalism, and several intervals of high-grade gold mineralisation reported.

Bennett said the next phase of reconnaissance-style drilling and infill would continue into the winter season when all of the prospect area was drill accessible. Meanwhile, BoT drilling continued to be extended to the south and west.

Meanwhile, at S2's Ruopas EL application area - which it considers prospective for magmatic nickel-copper sulphide deposits like Anglo American's Sakatti - several discrete coincident nickel-copper-cobalt-palladium anomalies have been identified in ionic leach geochemical sampling.

Bennett said a large VTEM airborne electromagnetic survey undertaken in autumn last year was followed up with ground-based fixed-loop electromagnetic (FLEM) surveys which defined a discrete EM conductor on a gravity ridge, along strike from known ultramafic rocks concealed beneath a shallow bog and associated with more than 4km-long copper and nickel anomaly in historic BoT drilling.

The part of the Ruopas EL application area containing the anomaly has been fast-tracked for grant, expected this month.

Agnico Eagle, which is spending EUR160 million building a 1,044m-deep shaft and adding about 25% to Kittila's milling capacity (expanding to 2Mtpa), says Europe's largest primary gold producer is on track to deliver about 175,000oz this year and 215,000oz next year.

"The expansion project is expected to increase the efficiency of the mine and decrease or maintain current operating costs while providing access to the deeper mining horizons," the company says.

"There will be phased expenditures from 2018 through 2021. This increased mining rate will be supported by the development of the Rimpi and Sisar zones."

Suuri, Roura and Rimpi contain most of Kittila's current reserves of 31Mt grading 4.5gpt, giving the mine a current life out to 2035. Other deposits are Etela and Ketola, and the new Sisar Zone.

"Kittila is our longest-life mine," Agnico Eagle says.

"The Kittila property covers 237sq.km, stretching 25km along the Suurikuusikko Trend, a major gold-bearing shear zone.

"Our exploration activities in Europe centre around Kittila, Agnico Eagle's largest gold asset by reserves, with strong expansion potential due to its large resources, particularly in the Sisar Zone.

"Regional exploration at Kittila includes the Kuotko deposit [about] 15km north of the Kittila mine, and the large Hanhima property 10km west of the Kittila mine. The other regional exploration focus in Europe is the Barsele project in northern Sweden, in which we acquired an interest in June 2015."



***Anglo American says it is looking "to continue working together with our local partners to develop best practice in responsible modern mining" at Sakatti***

Anglo American's spokesperson said Finland had "high geological prospectivity combined with a stable government and transparent regulatory regimes".

"The operational environment in Finland is fantastic. There is exceptional access to infrastructure and we have experienced strong support from local governments and the community for responsible mineral development.

"Finland is also home to world-class mining service providers such as Outotec and Metso and there is already a skilled workforce in the country.

"At Sakatti we look to continue working together with our local partners to develop best practice in responsible modern mining. The Sakatti deposit would not have been discovered without the great data generated by the GTK.

"Working with our local drilling contractor Oy KATI Ab, we have developed a cutting edge drilling system which will significantly reduce our environmental footprint. Anglo American in Finland directly employs 20 people based in Sodankyla and in addition 20-40 people within contractor services. Of these about 50% are Finnish and many from the Sodankyla area. During our busiest times, usually in winter when we are drilling, exploration activities usually employ around 150 people - most of them local to the area or Lapland.

"We sincerely believe that the Sakatti mine can be built and operated sustainably and with respect for the environment.

"We are constantly working to foster environmental responsibility and aim to minimise any impact on nature. For example, we have conducted a number of nature and species surveys, adhere to drilling standards and invest in new innovations to protect nature and biodiversity.



"As part of our FutureSmart Mining program, which aims at bringing together step-change innovation in technology and sustainability, we are developing the Sakatti project to ensure minimal impact on the environment. We will be developing dry stacked tailings, a new technology that removes the need for conventional tailings dams and minimises both the footprint and environmental impact.

"We are also targeting operating a fully electric mine at Sakatti and will not be using any underground diesel equipment. All exploration work carried out to date has been done with a closed-loop drilling system, nothing is released into the environment and all water and cuttings are filtered and recycled."



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