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NORDIC ANOMALY

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A graphite sample from Sweden

THINGS are warming up in Arctic Sweden for Talga Resources, as encouraging nods from the local government and some exciting Aussie testwork point to a unique graphite opportunity.

The Perth-based company's Swedish portfolio includes a number of promising iron and gold projects, including the emerging Kiskama play, which just last month sketched a potentially large iron-oxide-copper-gold system with drill hits up to 1.98% copper.

Graphite, however, is Talga's primary focus up here – and recent advances at the company's key Nunasvaara and Raitajarvi properties is underlining the wisdom of that strategy.

Both sites have been declared areas of national interest by the Swedish Geological Survey, providing protection against competing land uses.

And both have been patiently waiting to be fully exploited since their respective discoveries in the late 1800s.

In a way, the new acceleration of progress at these historic sites illustrates a microcosm of the broader Swedish mining scene, which strangely juxtaposes a longstanding embrace of the industry with a comparatively late start for modern-style operations.

As a result, the country's large mineral endowment remains relatively under-explored, with modern drilling by foreign developers only being allowed since 1992.

In this context, Sweden maintains the rare reputation of being simultaneously developed, progressive, mining-friendly and yet ripe for first movers even after a century of scraping around.

Although its mining prowess pales in a global perspective against heavyweights like Australia, it holds a critical ace up its sleeve as the only significant iron ore producing country in Europe.

This is also the place where miners first identified tungsten – which in their language means "heavy stone" – but the country's capacity to feed strategic resources to the mighty appetite of the Old World has so far been underplayed.

Which brings us back to Talga.

The company notes that European Union countries account for more than 20% of the minerals consumed worldwide each year, but produce less than 4% of the world's total supply.

This heavy dependence on imported minerals favours Sweden's potential to increase output of raw materials and is a conspicuous factor in Talga's master plan.

Nunasvaara stands as the company flagship, boasting the highest resource grade of any JORC or NI 43-101 graphite deposit in the world at 7.6 million tonnes at 24.4% graphite.

The deposit forms part of the 314sq.km Vittangi project just 3km from a sealed highway and 20km from rail with direct links to potential European customers.

The most exciting of recent developments at the site has been last month's game-changing testwork results which concluded grapheme could be directly and rapidly liberated from unprocessed Nunasvaara ore in a single-step process.

Technically, graphene refers to graphite formed as a one-atom-thick layer of carbon that exceeds the stiffness of diamond and is hundreds of times stronger than steel.

It is extremely light and conducts electricity at room temperature faster than any other material. This stuff is likely to find a home in a number of Europe's high-tech markets, with potential applications including faster computer chips, flexible touchscreens, hyper-efficient solar cells, super-capacitors and desalination membranes.

The problem hampering mainstream graphene use is that the production methods are either not scalable to mass quantities or involve complex chemical procedures that degrade the product.

The testwork conducted by the University of Adelaide's School of Chemical Engineering, however, has suggested that Nunasvaara graphene could be a special exception to this roadblock.

The researchers reported the deposit's graphene as "outstanding" in quality, and "comparable with synthetic graphene routes."

Samples were found to demonstrate extraordinary conductivity and magnetism, not observed in any previously tested graphite material.

"Talga's direct-from-ore capability is a breakthrough that allows us to avoid these degradational techniques yet easily produces a very high-quality graphene with low defects, in potentially large quantities," managing director Mark Thompson said.

"The relatively simple process is rapid and sustainable, with high potential to be environmentally low-impact [with] dramatically lower production costs.

"These results to date flag the possibility that the process may not be duplicable by others, as the raw ore-to-graphene method is enabled by potentially unique characteristics of the Nunasvaara deposit."

Talga says Nunasvaara's unique mineralogy, crystallinity and other characteristics are derived from the volcanic greenstones that host the ore rather than the gneissic rock that hosts most graphite deposits.

This geological oddity derives from an otherwise typically ore-laden Proterozoic context, and hardly one of the world's more popular mining exploration jurisdictions.

The Fennoscandian Shield represents an exposed portion of the Baltic Shield, which supports some 70Mt per annum of ore production from a smattering of mines, mostly in northern Sweden.

After a century of operational low-profile successes, the region may be one of the best kept secrets in top-tier infrastructure, immediate market access and greenfield geology.