

World news

INDUSTRIAL MINERALS

Apatite for fertilisers

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Self-sufficiency was the word on the lips of our EuroChem hosts during a recent tour of the Kovdorskiy mining complex in Russia's Arctic north-west.

After guiding *Mining Journal* and others around a brand new apatite-staffelite ore-processing plant, officials expressed confidence at the prospect of extracting enough phosphate to end reliance on external sources for the fertiliser feedstock.

The plant is designed to produce 948,000t of apatite concentrate and 130,000t of iron ore by-product each year, bringing total production at Kovdorskiy to 2.5Mt apatite, 5.6Mt iron ore, and 8,000t of baddeleyite, a rare zirconium oxide with a range of applications including ceramics.

Development of the apatite and staffelite (a variety of fluorapatite that contains a small amount of carbonate) deposit at the edge of the magnetite-apatite main pit is also underway. This will serve as a new source for apatite concentrate, the main raw material in phosphate fertilisers.

"Seventy-five percent our phosphate is supplied by ourselves – one of the reasons we bought [the Kok-Djob phosphate deposit in] Kazakhstan and one of the reasons we're trying to increase capacity at this site," Clark Bailey, the American head of EuroChem's mining division, told us.



The Kovdorskiy mine is situated in Russia's sparsely-populated north

The journey from the Barents Sea port city of Murmansk to Kovdorskiy takes a little more than three hours by car.

It passes through taiga, or boreal forest, interlaid with frozen lakes and interrupted only by the odd mine – including Severstal's Olcon iron-ore complex – and roadside fishmonger.

One hundred and fifty minerals can be found on the Kola Peninsula. At Kovdorskiy, 20km from the Finnish border, EuroChem has identified several of these: in addition to magnetite-apatite, apatite-staffelite and an adjoining but unexploited apatite-carbonatite deposit, it has one deposit in reserve – containing iron ore and rare earths.

There is also kovdorskite, a widespread phosphate concentrated in magnetite-calcite rock and dolomite

carbonatites of the Anomalous zone that is indigenous to the region, but for which no practical use has been found.

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Bailey held up a half-filled glass of water to demonstrate what EuroChem could do with this abundance of minerals.

Some people refer to the glass as half-full, some as half-empty, but EuroChem did neither, he said.

"[We say:] I've got water in a glass. What can I do with it? How can I make money with it? We've

got a huge deposit here, and we're trying to understand what benefit it can bring to this company. It takes a lot of research. And that carbonatite area – we haven't even touched it yet. We're still mapping it out."

Possibilities aside, the priority for owner Andrey Melnichenko (who holds a 92% interest) and his management team is to become, in the words of investor relations chief Olivier Harvey, a top-four fertiliser producer.

To achieve this goal, EuroChem will have to compete with PotashCorp, Mosaic and Agrium across the three main types of fertiliser: nitrogen, phosphorus (from phosphate) and potash (potassium).

EuroChem says it sits sixth for global phosphoric acid capacity, at 1.2Mt/y of feed for its three phosphates fertiliser plants in Russia and Lithuania, and eighth for ammonia, with 2.4Mt/y going to three nitrogen fertiliser plants in Russia and Belgium.

Upon completion of a planned ramp-up in potash production, EuroChem expects to reach fifth place with 5.1Mt/y of K₂O to be turned into potassium chloride (KCl) and potassium sulphate (SOP).

Development is underway at two greenfield potash projects: VolgaKaliy, near Volgograd (formerly Stalingrad) in southwestern Russia, and Usolskiy, just west of the Ural Mountains.

"We'll only touch the market in four or five years from now and I don't see anybody else being there responding," said Harvey.

Officials would not be drawn on funding, except to say that these goals could be achieved without any additional acquisition or projects. EuroChem is still a privately held company, although Melnichenko has spoken publicly about his wish to eventually list shares on an international exchange, and this is still on the agenda.

As for immediate production, Kovdorskiy is a key part of



Sign outside the apatite-staffelite processing plant reads: "Apatite-staffelite complex: Investing in Russia's future"

EuroChem's plans. Kovdorskiy GOK, or Kovdor Mining and Dressing Plant, produced first iron ore in 1962 and for 13 years it produced only the raw steel-making ingredient while the technology was being developed to extract other components from the ore.

Construction on an apatite-baddeleyite processing plant started in 1974, with first apatite concentrate produced in 1975 and first baddeleyite concentrate following one year later.

EuroChem acquired the complex in 2001 and immediately increased production of iron ore and apatite concentrates through processing of tailings that were left over from the pure-play iron-ore era.

It finished exploiting the tailings in 2014, hence the construction of the apatite-staffelite plant – which took 18 months to complete.

A 25-year expansion programme has been mapped out: a full ramp up of apatite-staffelite output in 2016, processing of low-grade iron-ore tailings to start in 2020, processing of the apatite-carbonatite in 2024, and full ramp-up of apatite-carbonatite output in 2027, by which stage Kovdorskiy expects to be producing 7.75Mt of iron-ore concentrate and 4.24Mt of apatite concentrate.

Open-pit mining can continue until 2049. Activities are then likely to head underground, Bailey said, explaining that all three deposits – magnetite-apatite, apatite-staffelite and apatite-carbonatite – were vertically inclined, "like kimberlite pipes".

"The choice is to deepen the pit [and] expand the walls or to begin underground operations. We've already done a front-end engineering study with a shaft designer – you put in vertical shafts in underground mine design," he said.

"It's a trade-off to decide which way you go, because once you make one decision you're kind of stuck with it."



Kovdorskiy holds a variety of minerals, including apatite and magnetite

With the exception of a handful of Sami people, the area around Kovdor, population 18,500, was largely uninhabited before it attracted the interest of geologists in the 1930s.

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Kovdor appears to the outsider just as one would expect of a remote Russian

settlement, with street after street of nearly identical Soviet-style buildings. But beyond the façade, it enjoys certain perks.

EuroChem says it spent Rb87 million (US\$1.7 million) on the community last year: about half to roads and other infrastructure, a portion towards sending 16 children for medical treatment near Moscow, and the remainder to social activities.

Given the location – winter lasts nine months, and it is completely dark or almost-completely dark for several months a year – there is also a big focus on winter sports facilities. In 2009 EuroChem spent US\$1.3 million developing a ski facility on the outskirts of the town.

On our way from the mining complex to EuroChem headquarters in the city we stopped off at an indoor hockey rink, which has hosted a tournament of teams from other EuroChem-affiliated towns.

Unaffected by sanctions

With the exception of some "minor hiccups", international sanctions against Russian business "haven't really

affected" EuroChem, officials said.

Bailey gave the example of a German equipment delivery being held up for several months until it could be ascertained that the materials were not proscribed.

"The companies in Europe seem to be creating their own sanctions, more than the sanctions list itself passed by the EU. They're very careful – [you] have to give them credit – to make sure they're not supplying anything that's on the list. And then all it's doing for us is just costing us some paperwork so far. It's not stopping us," said Bailey.

Harvey added that EuroChem had not had any issues when it closed a US\$750 million loan facility, to finance the Usolskiy project, with four foreign banks and three Russian banks. The facility was signed in September, "when sanctions were at their strongest, or at least the environment was weakest in terms of co-operation between the West and Russia," – proof, according to Harvey, "the market is still there for some select companies with a good track record."

More from the site visit to Kovdorskiy will be published in the July/August edition of Mining Journal's sister publication, Mining Magazine