EuroChem reveals phosphate expansion plans at Kovdor and beyond

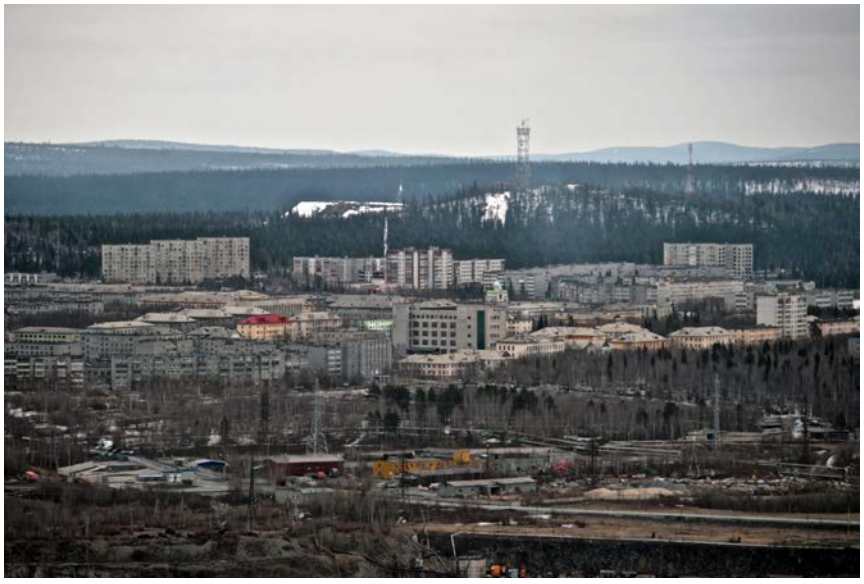
By James Sean Dickson
Published: Thursday, 21 May 2015

The expansions one of the largest apatite mines in Russia are only one part of EuroChem's growth ambitions. Different ore types will be tapped and the mine could continue being worked to twice its current depth, James Sean Dickson, Reporter, learned on a recent visit to the company's Kovdorskiy mine in northwest Russia.

Processing facilities at EuroChem's Kovdorskiy phosphate and iron ore mine – the second largest apatite concentrate producer in Russia.

Fertiliser producer EuroChem's presence is essential to the continued existence of the town of Kovdor, northwest Russia.

Located around four hours' drive south of Murmansk, there is very little in the way of employment to be found, other than in exploiting the area's extensive mineral reserves.



Kovdor's Kovdorskiy apatite (phosphate), iron ore and baddeleyite (zirconia) mine, which is operated by Switzerland-headquartered, EuroChem, is by far the largest employer in the area.

Of Kovdor's 18,500 residents, only approximately 9,000 are "able bodied", and of these, around 3,600 work at the mine and processing plant, Aleksander Sovetniy, administrative director at EuroChem's Kovdor-based subsidiary, Kovdorskiy GOK, told IM.

All remaining jobs are therefore essentially service jobs for the mine workers, who are the impetus behind economic growth in the region, which is too cold to support large scale agriculture, forestry or other typical rural economic activities.

Outside of EuroChem's mine, regional employment prospects around

Kovdor are scarce.

Kovdor, like much of Russia, was severely impacted by the collapse of the Soviet Union (USSR) in 1991, and was further decayed by the 1998 Russian financial crisis.

Olivier Harvey, EuroChem's head of investor relations, told IM that part of EuroChem's initial story was about turning neglected and underinvested sites into globally competitive assets. When these were acquired by EuroChem in in the early 2000s, for the first five years or so the emphasis was on fixing the assets and bringing them up to global standards.

EuroChem purchased the Kovdorskiy open pit mine and processing facility in 2002 and the site now produces 2.5m tpa apatite concentrate, 5.6m tpa iron concentrate and 8,000 tpa baddeleyite (zirconia) concentrate, the last of these being used in advanced ceramics, electronic ceramics, pigments and refractories.

What became Kovdorskiy was first discovered as a magnetite-apatite ore body in 1933, Aleksey Danilkin, Kovdorskiy GOK's technical director, told IM. This discovery was quantified in the late '40s and early '50s he said, while mining of the site began in 1959.

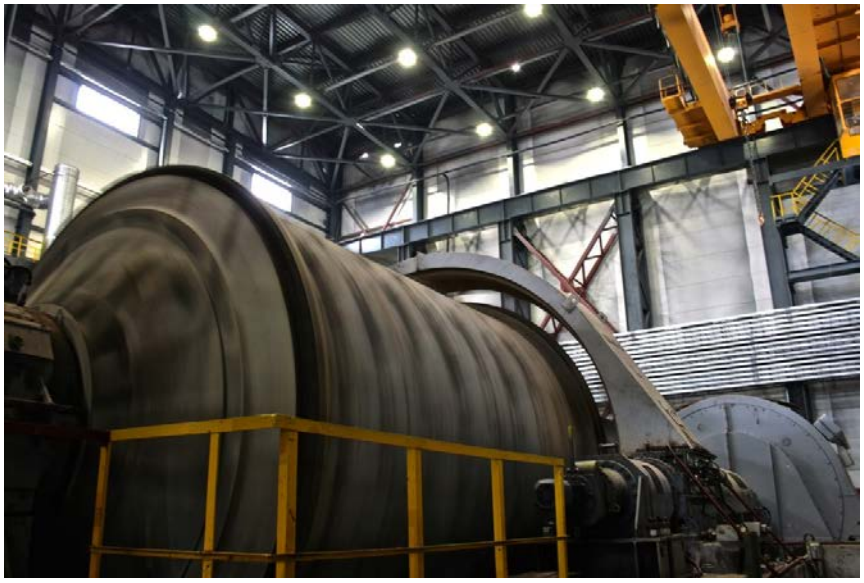
On opening, the site was only used to produce iron ore. Iron ore concentrate production began in 1962. At the time, the apatite phosphate component of the deposit was just transported to tailings and storage facilities and was not monetised.

This changed in 1975, when Kovdorskiy began to produce apatite concentrate, a key ingredient for diammonium phosphate (DAP) and monoammonium phosphate (MAP) fertilisers.

One year later, the production of the refractory and ceramics mineral, baddeleyite, began. Today, EuroChem is the sole non-synthetic producer of the mineral. The company quoted a spot price from mid-2014 of $5,100/tonne and told IM that 50% of all sales are to Japanese customers.

Chimneys and ore processing buildings at Eurochem's Kovdorskiy mine.

Processing at the mine begins with rotary steel rod mills. This is followed by the removal magnetic iron oxide mineral magnetite with wet magnetic separators and apatite is then removed via flotation.



Ore processing at Kovdorskiy begins with rotary steel rod mills crushing incoming material.

Having undergone four capacity upgrades in its 56 years, Kovdorskiy now sees 16m tonnes rock extracted from its open pit each year and is the second largest source of apatite concentrate in Russia.

Upgrades will continue

The mine's future was by no means certain before EuroChem's purchase, however.

"Before EuroChem bought the facility, it was assumed it would die as the mineralisation is vertical. Instead, the opposite is happening – expansion," Clark Bailey, EuroChem's mining director, told IM.

By pushing back the current open pit limits and bringing several new areas of the mine with specific geology into production, the company hopes to increase production capacity at the site by 948,000 tpa apatite and 130,000 tpa iron ore.

The Kovdorskiy mine is currently 414 metres deep – this can be sustained for another 460 metres until 2049 with changes, when the company would be forced to shift to underground mining methods. Borehole data demonstrate that the vertical deposit goes down to more than 2,000 metres below Baltic Sea level.

"To continue with the existing main open pit, we will have to expand the pit edges to avoid steepening the walls – that or go underground. With our new apatite-staffelite deposit we have around 10 years of production – and this production more than replaces what we had been processing from the old tailings which is now finished," Bailey told IM.

"Then, after the apatite-staffelite deposit, we will be ready to process ore from yet another pit, which we refer to as our apatite-carbonite pit, to continue to ramp up and extend our production," Bailey said.

This pit edge expansion will cost the company $104m in capex, not least because some of the mine's older buildings will need to be moved.

"Most of these changes would have been in our upgrade and renovation programme in any case," said Bailey.

The Kovdorskiy mine is 414 metres deep and could go down a further 460 metres before underground operations would be required.

Harvey told IM that despite the approximate halving over the past year of sales prices for iron ore, EuroChem is still making a profit on its iron operation at Kovdorskiy.

"You have to remember that, if anything, it is a by-product of apatite production at Kovdorskiy, and a by-product that can be sold to our advantage," Harvey said.

The price falls for potash that occurred after the 2013 split of Russian potash producer Uralkali OAO from the Belarusian Potash Co. (BPC) marketing agreement with Belarus-based potash miner Belaruskali OAO – and historically low phosphate prices – may even end up benefiting EuroChem, Olivier said, owing to the potential for higher-cost projects to be wound down.

In late April 2015, EuroChem announced the launch of a new carbonate rich fluorapatite (staffelite)-apatite ore processing plant at Kovdorskiy, which will utilise a previously untapped section of the deposit.

This plant is capable of adding 948,000 tpa apatite concentrate and 130,000 tpa iron ore capacity to Kovdorskiy's operations and will bring the total annual apatite concentrate production capacity at the site to 3.4m tpa by 2018.

EuroChem's new apatite-staffelite processing building. The plant has a production capacity of 948,000 tpa apatite concentrate and 130,000 tpa iron ore concentrate.

Further developments at the site – which would see an additional apatite-carbonatite section of the ore body extracted from 2024, reaching full production in 2027 – will ultimately see EuroChem's apatite concentrate production capacity at Kovdorskiy reach a projected 4.24m tpa, while iron ore capacity will increase to approximately 7.75m tpa. These are respective increases on 2015's capacity of 49% and 36%.

Vertically integrated fertiliser production

EuroChem's CEO, Dmitry Strezhnev, said: "The launch of the new processing plant at Kovdorskiy is an important step in the group's strategy towards self-sufficiency and the further development of our vertically integrated business model."

Integrated fertiliser production is currently dominated by the North American majors in the market, namely Potash Corp. of Saskatchewan (PotashCorp.), Agrium Inc. and The Mosaic Co. It could be argued that the fertiliser industry in particular is one uniquely suited to vertical integration, as a substantial proportion of fertiliser deliveries are made in complex fertilisers.

Complex fertilisers contain a mixture of components – with ingredients like phosphate, potash and nitrogen or ammonia (NH3) all being mixed in specific proportions for particular soil types. Producers of one mineral that wish to enter the complex fertilisers market then typically have to externally source the extra components they do not produce themselves.

EuroChem's drive towards self-sufficiency is notable also in seemingly unrelated industries. The Haber process, the dominating chemical process for nitrogen fixation, or the creation of nitrogen-based fertilisers, requires an extraordinary heat input. Around 25-30 gigajoules (GJ) energy is required to produce one tonne NH3, according to Enriching the Earth: Fritz Haber, Carl Bosch and the Transformation of World Food Production, a book by Vaclav Smil.

While this is still far lower than the 80 GJ/tonne NH3 required pre-1965, in the early days of nitrogen fixation, the gas requirement of ammonia plants is still substantial. The Royal Society of Chemistry states that this process alone accounts for 1% of global energy consumption.

Hence, in early April 2015, EuroChem increased its internal gas supply to 25% of its needs through the purchase of Astrakhan Oil and Gas Co. OAO, a Russian gas company, to ensure costs could be tied down in what has been a volatile hydrocarbons market in the last 10 years. This compares to its 75% self-sufficiency in phosphate.

Additionally, EuroChem is looking to enter the equally disrupted potash market by opening its VolgaKaliy and Usolskiy potash projects as active mines, the former being on track for production commencing in 2017 for a total capacity of 8m tpa, or around 10% of global 2014 capacity.

Potash has been in an oversupply situation for at least five years, however, with capacity expansions set to increase the supply to demand ratio over the next five years.

"We are aiming to be a top four potash producer, not accounting for any potential mergers and acquisitions," Harvey said. "We are also aiming to be among only four companies to produce nitrogen, phosphates and potash."

"Mosaic and PotashCorp. investment programmes are slowing. Some big mines across the industry are closing, and replacement mines like Picadilly [in New Brunswick, Canada,] are not making up for this," Bailey added.

Harvey said that EuroChem can beat the oversupply situation because it is projected to sit on the far left of the potash cost curve. Seeking customers in growth markets with little internal production is important, he noted, singling out Brazil and Latin America.

EuroChem also plans to use much of this production capacity internally for complex fertiliser production. The company purchases up to 500,000 tpa potash from third parties to formulate some of its product, though in the future, it plans to use 1-1.5m tpa potash in its activities.

Haul trucks line up to take rock material from an excavator at Kovdorskiy.

China, meanwhile, has some big players, but they do not appear to be interested in external competition, Harvey said.
Presently, the country is a major net importer of potash – shipping in around 8m tonnes in 2014 according to Mosaic – consumed in addition to that produced domestically by Qinghai Salt Lake Industry Co. Ltd and others.

More than half of these potash imports, which represent 65% of Chinese potash consumption, are delivered from Belarus and Russia, Harvey told IM.

Rouble rumbles

It is fair to say that investors have been spooked by Russian markets in recent months. The value of the Russian rouble (R) dropped from R 35 per one US dollar to around R 70 per US dollar over the 2014-2015 winter, before recovering to around R 50 to the dollar today.

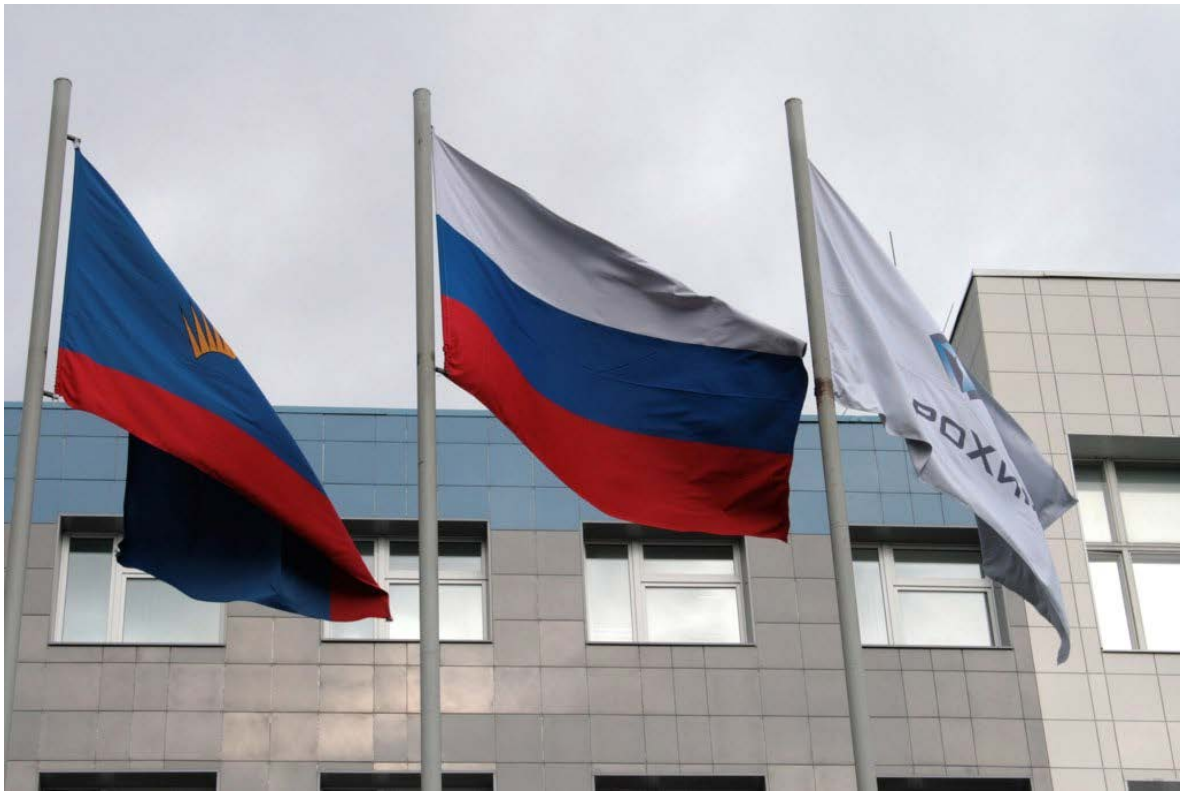
The cumulative effects of European Union (EU) sanctions, lower oil prices and strong international rhetoric in the wake of the conflict situation in Crimea and eastern Ukraine are widely viewed to be the cause of the currency slump.

However, EuroChem has seen a minimal impact from the conditions affecting its corporate neighbours, Harvey told IM.

"It has not really affected us – one supplier thought they may have some sanction problems, but we worked that out

with the various ministries. A plastic pipe supplier in Germany took a few more months than expected to deliver their materials owing to sanction confusion, and some ropes were delayed for Usolskiy (…) It mainly amounts to a little more paperwork," Harvey said.

"The biggest cost after equipment is labour – that will be in cheap, devalued roubles, and a large part of the equipment for our potash projects was purchased before the currency devaluation," he added.



Russia has been subject to diplomatic disapproval and sanctions over its role in the Ukraine conflict.

Harvey said that 75% of EuroChem's sales are in dollars, meaning that the high value of sales can be used to offset any extra costs.

Further ahead

Looking ahead, Bailey told IM that EuroChem is looking at the potential of polyhalite (K2Ca2Mg(SO4)·2H2O), a form of potash currently extracted only by Cleveland Potash, an Israel Chemicals Ltd (ICL) subsidiary operating in the north of England, UK.

Sirius Minerals, a junior explorer listed in the UK, also wishes to extract polyhalite in the north of England, nearby to the existing Cleveland site – though in more substantial volumes.

"There are polyhalite deposits in the US and in Russia. If we were to look into it more closely, we would probably end up converting it to SOP," Bailey said.

Rare earths are also a potential future source of income at Kovdor. The area is famous for its enriched geology – the nearby rocks contain an abundance of rare and often unique minerals.

Nepheline and other silica poor rocks and minerals are common throughout the Kovdor area and the Kola Peninsula.

Silica (SiO2) poor rocks, which are common across Kovdor and the Kola Peninsula, often contain rare earths in higher concentrations than more common rocks in the earth's crust, owing to specific processes that take place when the parent magma is formed as a melt. Different processes may then continue to concentrate rare elements within the magma as it ascends through the crust towards the earth's surface.

"We have the entire periodic table in the Kola Peninsula," Harvey mused, while Bailey noted that Kovdor, a book by Gregory Ivanyuk, lists over 140 confirmed specific mineral types in the region.

Bailey said that China is changing its entire rare earths industry, and that while EuroChem does not currently have the appropriate technologies for rare earths extraction it could

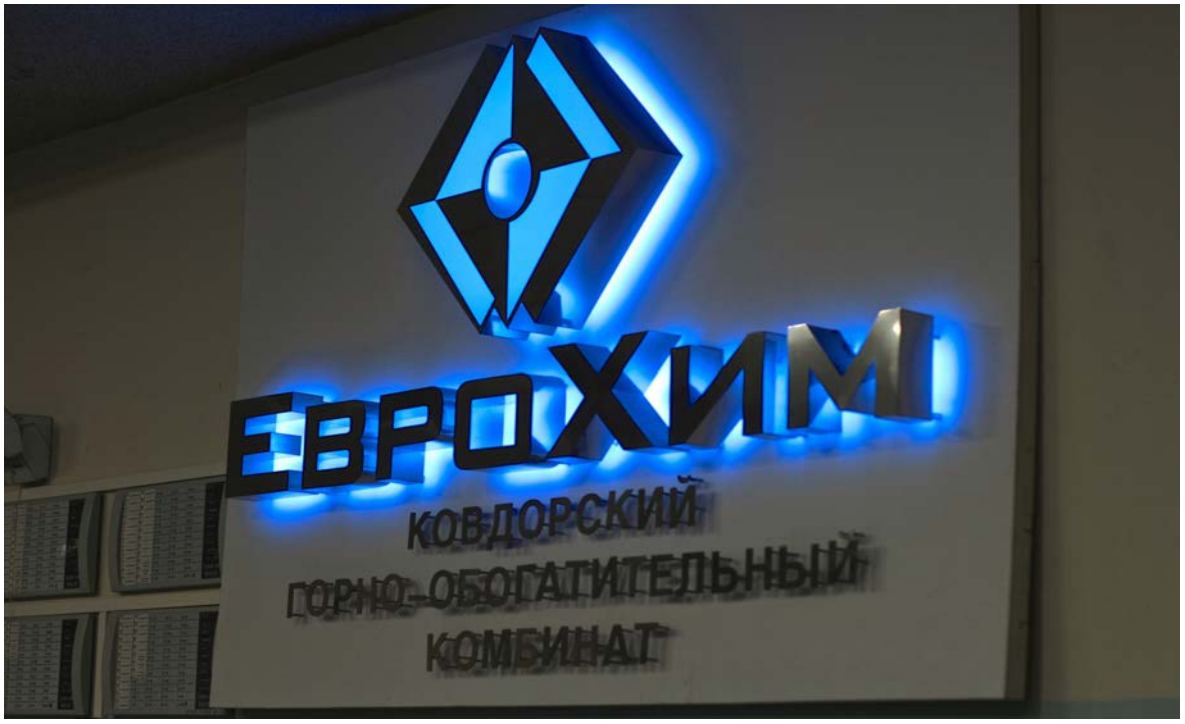
be an opportunity for the company to examine in the future.

Moving to more solid territory, Kazakhstan is the site of one of the company's most substantial new mining projects. EuroChem is currently ramping up production at its mine in the country, which opened in 2014.

Located in the Jambyl Region, the Kok-Djon phosphate deposit has had around $100m set aside for its development, which would see 600,000 tpa phosphate rock produced at 28% P_2O_5 from 515m tonnes phosphate reserves.

Around 400 contract construction workers are presently working on the project, in addition to 107 of EuroChem's own employees.

These workers are constructing permanent administration buildings, crushing and dry milling facilities, a high voltage electricity line with substations and a finished products shipment station and storage facility.



EuroChem's future looks set to be defined by its expansion plans.

All image credits James Sean Dickson.

To view all the images from IM's visit to Kovdorskiy, click here.