

KOLA MMC, KOLA PENINSULA

Kola MMC is Nornickel's wholly owned subsidiary and a valuable production asset located in the Kola Peninsula in the Murmansk Region of Russia.

In 2019, Kola MMC accounted for 73%, 17% and 62% of the Group's total nickel, copper, and PGM finished products, respectively.

- The Kotselvaara and Semiletka deposits primarily use stoping from sublevel drifts and sublevel caving. Room-and-pillar short-hole and long-hole stoping are also used on a limited scale.

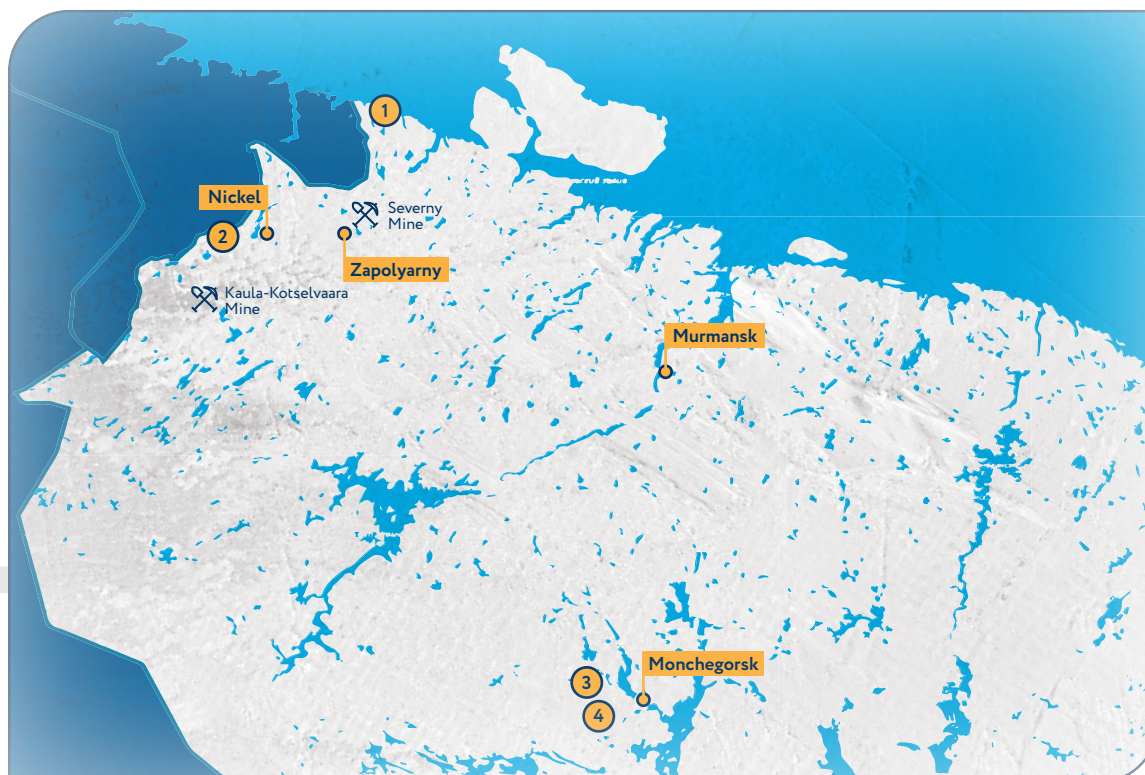
MINING

Kola MMC's mines disseminated copper-nickel sulphide ores.

At Kola MMC, various ore mining methods are used:

- The Zhdanovskoye and Zapolyarnoye deposits use three mining methods: gravity caving with front ore passes, sublevel caving with room-and-pillar ore removal, and room-and-pillar mining. To ensure full utilisation of the concentrator's design capacity, off-balance open-pit mining waste is processed as well.

- 1 Concentrator and Briquetting Shop 2 Smelting Shop 3 Refining Shop 4 Tankhouse Cells



Ore output (mln t)

Mining asset	Mine type	2017	2018	2019
Total ore		7.64	7.90	7.91
Zhdanovskoye deposit		6.81	7.14	7.25
– Severny Mine	Underground	6.55	6.56	6.49
– Severny Mine	Open-pit	0.26	0.58	0.77
Zapolyarnoye deposit		0.14	0.08	0.06
– Severny underground section	Underground	0.14	0.08	0.06
Kotselvaara and Semiletka deposits:		0.70	0.68	0.60
– Kaula-Kotselvaara mine	Underground	0.70	0.68	0.60

In 2019, Kola MMC produced about 8 mln t of ore (up 0.2% y-o-y). The slight increase was due to off-balance open-pit mining waste processing to ensure full utilisation of the concentrator's design capacity, in line with the annual production plan.

CONCENTRATION**Concentration facilities**

- Zapolyarny Concentrator

The concentrator produces briquetted copper-nickel concentrate. Briquettes are delivered to the smelting shop to produce converter matte.

In 2019, Kola MMC's concentrator processed 7.6 mln t of ore, down 0.3 mln t y-o-y. The rate of metals recovery in bulk concentrate decreased as well, due to a higher share of complex morphology ores with disseminated sulphide minerals in the charge.

SMELTING

Downstream facilities

- Smelting Shop (Nickel)
- Briquetting section (Zapolyarny)
- Smelting Shop (Monchegorsk)
- Refining Shop (Monchegorsk)
- Tankhouses 1 and 2 (Monchegorsk)

Nornickel continues upgrading Tankhouse 2 to launch nickel cathode production using the technology of nickel electrowinning from chlorine dissolved tube furnace nickel powder. The project is expected to boost Tankhouse 2 production capacity from 120 ktpa to 145 ktpa of electrolytic nickel while also improving the recovery rate by 1%. In 2019, Nornickel commissioned the second, the fourth and a part of the third series of electrowinning cells. The project is expected to ramp up to full design capacity in Q2 2020. Pre-commissioning is also in progress for a new precious metal concentrate section of Kola MMC's Smelting Shop. The section's commissioning is an integral and essential part of Nornickel's plan to optimise the configuration of refining facilities.

In 2019, Kola MMC used only Nornickel's own Russian feedstock in metals production. The y-o-y increase in nickel and copper output was driven by the expansion of carbonyl nickel production capacity and supplies of richer copper concentrate from the Polar Division. The increase in PGMs output in 2019 was due to drawdowns in high-value work-in-progress inventory.

Products:

- Nickel cathodes
- Nickel carbonyl
- Saleable nickel concentrate
- Copper cathodes
- Saleable copper concentrate from converter matte separation
- Electrolytic cobalt
- Cobalt concentrate
- Precious metal concentrates
- Sulphuric acid
- Crushed converter matte for Harjavalta

Production volumes

Product	2017	2018	2019
Nickel, t	157,396	158,005	166,265
– from own Russian feedstock	155,110	157,519	166,265
Copper, t	80,781	83,070	86,976
– from own Russian feedstock	78,587	82,987	86,976
Palladium, koz	1,782	1,684	1,826
– from own Russian feedstock	1,737	1,684	1,826
Platinum, koz	401	381	439
– from own Russian feedstock	385	381	439