POLAR DIVISION AND MEDVEZHY RUCHEY, TAIMYR PENINSULA

The Polar Division and Medvezhy Ruchey are the Group's flagship assets boasting a full metals production cycle from ore mining to the shipment of finished products to customers. They are located in the Taimyr Peninsula in Russia, in the north of the Krasnoyarsk Region beyond the Arctic Circle, and linked to other regions by the Yenisey River, the Northern Sea Route, and by air.

Operating the Company's largest deposits, they mine over 18 Mtpa of copper-nickel sulphide ore.

In 2019, the Polar Division and Medvezhy Ruchey accounted for 71% and 36% of the Group's total output of copper and PGMs, respectively.

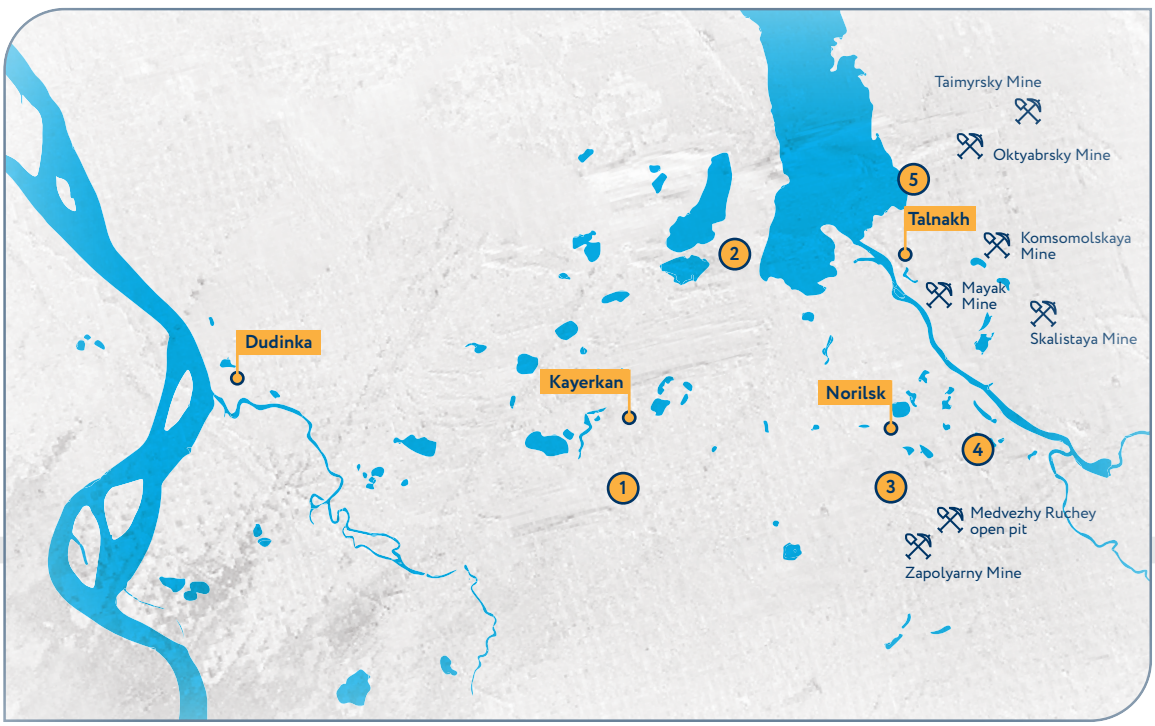
MINING

The Polar Division and Medvezhy Ruchey mine copper-nickel sulphide ores of three grades: rich ores, characterised by a higher content of base and precious metals; cuprous ores, with a higher copper content vs nickel; and disseminated ores, with a lower content of all metals.

The Talnakhskoye and Oktyabrskoye deposits are developed by Taimyrsky, Oktyabrsky, Komsomolsky, Skalisty, and Mayak Mines. The mines deploy slicing and chamber methods with the cut-and-fill system. Stopes are refilled with backfill mixtures, with their composition adjusted in each case to technological requirements to mine backfill durability.

The Norilsk-1 deposit is developed by Medvezhy Ruchey's Zapolyarny Mine through open-pit and underground mining. Underground mining is carried out through sublevel (level) caving using

1 Norilsk Airport
2 Nadezhda Metallurgical Plant
3 Norilsk Concentrator
4 Copper Plant
5 Talnakh Concentrator



front ore passes and self-propelled vehicles.
In 2019, a feasibility study of Zapolyarny Mine was completed to assess the combined development options for the remaining disseminated ore reserves at the Norilsk-1 deposit. Based on the study results, disseminated ore production at Medvezhy Ruchey is expected to increase to 9 Mtpa by 2027.

Combined ore production from the Polar Division and Medvezhy Ruchey was 18.4 mln t in 2019, up 1.1 mln t y-o-y (+ 6%). Rich and cuprous ore production increased by 8% and 10%, respectively, with Taimyrsky and Skalisty Mines also increasing their combined rich ore production by 12% y-o-y. Oktyabrsky and Komsomolsky Mines increased cuprous ore production by 10% while disseminated ore production was almost flat (+ 0.3%). The change in the mined ore output was in line with the annual production plan.

Ore output (mln t)

Mining asset, ore type	Mine type	2017	2018	2019
Total ore		17.38	17.32	18.42
– rich		6.57	6.78	7.35
– cuprous		5.56	5.24	5.75
– disseminated		5.23	5.30	5.32
Polar Division				
Oktyabrskoye deposit:		8.82	8.95	9,45
Oktyabrsky Mine	Underground	5.23	5.17	5.37
– rich		1.13	0.98	0.88
– cuprous		3.15	2.98	3.38
– disseminated		0.95	1.21	1.11
Taimyrsky Mine	Underground	3.59	3.79	4.08
– rich		3.59	3.79	4.08
Talnakhskoye and Oktyabrskoye deposits:		6.92	6.70	7.34
Komsomolsky Mine	Underground	5.86	3.82	4.00
– rich		1.83	0.11	0.10
– cuprous		2.41	2.18	2.28
– disseminated		1.63	1.53	1.62
Skalisty Mine	Underground	n/a	1.95	2.34
– rich		n/a	1.87	2.25
– cuprous		n/a	0.09	0.09
Mayak Mine	Underground	1.06	0.93	1.00
– rich		0.03	0.04	0.04
– disseminated		1.03	0.89	0.97
Medvezhy Ruchey				
Norilsk-1 deposit, Zapolyarny Mine, disseminated ore	Open-pit/ underground	1.64	1.67	1.63

CONCENTRATION

Concentration facilities
- Talnakh Concentrator
- Norilsk Concentrator (part of Medvezhy Ruchey)

Talnakh Concentrator processes rich, cuprous, and disseminated ores from the Oktyabrskoye and Talnakhskoye deposits to produce nickel-pyrrhotite and copper concentrates, and metal-bearing products. The key processing stages include crushing, milling, flotation, and thickening.

Norilsk Concentrator processes all disseminated ores from the Norilsk-1 deposit, cuprous and disseminated ores from the Oktyabrskoye and Talnakhskoye deposits, and low-grade ores from Copper Plant to produce nickel and copper concentrates. The key processing stages include crushing, milling, flotation, gravity concentration, and thickening.

Thickened concentrates are transported from Talnakh and Norilsk Concentrators via slurry pipelines to the Polar Division for further processing.

In 2019, the Company's concentration facilities processed a total of 18.2 mln t across all types of ore feedstocks (including rich, cuprous, and disseminated ores).

Talnakh Concentrator processed 10.7 mln t of ore in 2019 (up 0.3 mln t y-o-y). Its nickel recovery into bulk flotation concentrate, including the output of metal-bearing pyrrhotite products, increased by 2.7% y-o-y to 85.9% due to the optimised technology for obtaining metal-bearing pyrrhotite products deployed at Talnakh Concentrator.

Norilsk Concentrator processed 6.8 mln t of ore in 2019 (down 0.7 mln t y-o-y), in line with the mining plan. The facility's nickel recovery into bulk concentrate was 0.6% lower y-o-y at 71.3%. During the year, the facility also processed significant amounts of low-grade ores from Copper Plant.

SMELTING

Smelting assets of the Polar Division
- Nadezhda Metallurgical Plant
- Copper Plant
- Copper Plant's smelting shop

Nadezhda Metallurgical Plant produces converter matte and elemental sulphur by processing:
- Talnakh Concentrator's nickel-pyrrhotite concentrate and metal-bearing products
- Norilsk Concentrator's nickel concentrate
- pyrrhotite concentrate from Kayerkansky open-pit coal mine's storage.

PRODUCTION CHAIN

The produced concentrates, including steam cured sulphide concentrate, are fed into flash smelting furnaces at Nadezhda Metallurgical Plant. Steam cured sulphide concentrate is leached at Hydrometallurgical Shop of Nadezhda Metallurgical Plant from products with low metal content, such as Talnakh Concentrator's metal-bearing products, products from Nadezhda Metallurgical Plant's tailings facility,

Sulphide ores processed (mln t)

Concentrator	2017	2018	2019
Talnakh Concentrator	10.0	10.4	10.7
Norilsk Concentrator	7.5	6.8	7.5

Nickel recovery (%)

Concentrator	2017	2018	2019
Talnakh Concentrator	81.7	83.2	85.9
Norilsk Concentrator	71.7	71.9	71.3

and concentrates from tailings ponds. The matte produced in flash smelting furnaces is then converted into high grade converter matte.

Copper Plant processes all of the copper concentrate from the Company's concentrators, as well as third-party feedstocks, to obtain copper cathodes, elemental sulphur and sulphuric acid for the operational needs of the Polar Division.

Copper Plant's smelting shop recycles sludge from the copper tankhouses of Copper Plant and Kola MMC to produce precious metal concentrates, commercial selenium and tellurium.

The precious metals produced by the Polar Division are refined at Krastsvetmet and URALINTECH under tolling agreements.

The Polar Division produces metals from its own feedstock. Since the fourth quarter of 2016, all nickel converter matte from Nadezhda Metallurgical Plant has been processed at Kola MMC due to Nickel Plant shutdown.

The Polar Division products:

- Copper cathodes
- Nickel converter matte sent for processing to Kola MMC
- Precious metal concentrates
- Technical sulphur, selenium
- Tellurium in billots

Copper production remained basically flat y-o-y in 2019, with a slight increase of 1% driven by a higher copper content in the ore mined. Production of PGMs grew by 4% y-o-y, mainly through drawdowns in high-value work-in-progress inventory.

Production volumes

Product	2017	2018	2019
Copper, t	306,859	353,131	355,706
Palladium, koz	956	987	1,042
Platinum, koz	259	260	251