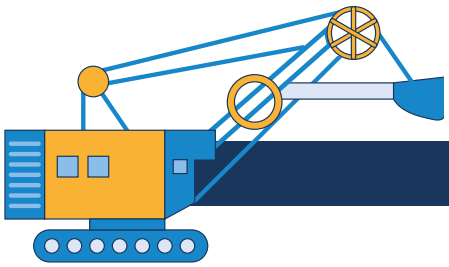
TAIMYR PENINSULA
(Polar Division and Medvezhy Ruchey)

Polar Division and Medvezhy Ruchey are the Group's flagship subsidiaries boasting a full metals production cycle that embraces operations ranging from ore mining to the shipment of end products to customers. Operating the Company's largest deposits, they mine ca. 17 mtpa of ore. In 2018, the Company completed a feasibility study for the project to increase ore output at Medvezhy Ruchey to 9 mtpa.

Polar Division and Medvezhy Ruchey are located beyond the Arctic Circle on the Taimyr Peninsula in the north of the Krasnoyarsk Territory, Russia. The sites are linked to other regions by the Yenisey River, the Northern Sea Route and by air.

2018 milestone

In 2018, Polar Division and Medvezhy Ruchey accounted for 75% and 37% of the Group's total copper and PGM end products, respectively.



MINING (Polar Division and Medvezhy Ruchey)

Polar Division and Medvezhy Ruchey mine copper-nickel sulphide ores of three grades. Rich ores are characterised by a higher content of non-ferrous and precious metals; cupriferous ores are characterised by a higher copper content vs nickel; disseminated ores are characterised by a lower metal content.

The Talnakhskoye and Oktyabrskoye Deposits are developed by Taimyrsky, Oktyabrsky, Komsomolsky, Skalisty and Mayak Mines. Ores are extracted through slicing and chamber mining with flowable backfilling.

In mid-2018, Skalisty mine was spun off from Komsomolsky Mine to become an independent operation as part of an effort to improve management efficiency across Polar Division's upstream assets.

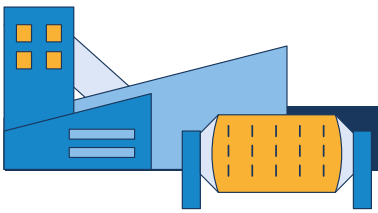
The Norilsk-1 Deposit is developed by Polar Division's Zapolyarny Mine through open-pit and underground mining. Underground mining is carried out through sublevel (level) caving using front ore passes and self-propelled vehicles.

2018 milestones

In 2018, Polar Division and Medvezhy Ruchey's total ore output decreased marginally by 0.3% to 17.3 mt. The production of rich ores increased by 2.5% y-o-y, while the production of cupriferous ores dropped by 5.2% y-o-y. Increased output of rich ores was driven by the performance of Taimyrsky and Skalisty Mines, demonstrating an aggregate 5.6% production growth y-o-y. In 2018, disseminated ore production was up by 4.4% primarily due to higher output at Mayak and Zapolyarny Mines. The change in the volumes of ore mined was in line with the annual production plan.

Ore output *(mt)*

Deposit/Mine, ore type	2016	2017	2018	Mine type
Total ore	**17.24**	**17.38**	**17.32**	
rich	6.19	6.59	6.76	
cupriferous	7.08	7.17	6.79	
disseminated	3.97	3.62	3.78	
POLAR DIVISION				
Oktyabrskoye Deposit:	**8.86**	**8.82**	**8.95**	
Oktyabrsky Mine	5.32	5.23	5.17	Underground
rich	1.29	1.13	0.98	
cupriferous	3.04	3.15	2.98	
disseminated	0.99	0.95	1.21	
Taimyrsky Mine	3.54	3.59	3.79	Underground
rich	3.54	3.59	3.79	
Talnakhskoye and Oktyabrskoye Deposits:	**6.34**	**6.92**	**6.70**	
Komsomolsky Mine	5.35	5.86	3.82	Underground
rich	1.31	1.85	0	
cupriferous	4.04	4.01	3.82	
Skalisty mine	0	0	1.95	Underground
rich	0	0	1.95	
Mayak Mine	0.99	1.06	0.93	Underground
rich	0.04	0.03	0.04	
disseminated	0.95	1.03	0.89	
MEDVEZHY RUCHEY				
Norilsk-1 Deposit (Zapolyarny Mine)	2.04	1.64	1.67	Open-pit Underground
disseminated	2.04	1.64	1.67	



CONCENTRATION (Polar Division and Medvezhy Ruchey)

Concentration facilities

- Talnakh Concentrator;
- Norilsk Concentrator (part of Medvezhy Ruchey).

Talnakh Concentrator processes rich, cupriferous 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, cupriferous and disseminated ores from the Oktyabrskoye and Talnakhskoye Deposits, and Copper Plant's low grade ores to produce nickel and copper concentrates. The key processing stages include crushing, milling, gravitation and flotation enrichment, and thickening. Thickened concentrates are transported via a pipeline from Talnakh and Norilsk Concentrators to the downstream facilities for further processing.

Sulphide ore processed *(mt)*

Concentrator	2016	2017	2018
Talnakh Concentrator	8.6	10.0	10.4
Norilsk Concentrator	8.1	7.5	6.8

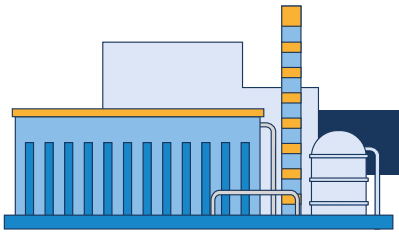
Nickel recovery *(%)*

Concentrator	2016	2017	2018
Talnakh Concentrator	79.5	81.7	83.2
Norilsk Concentrator	70.9	71.7	71.9

2018 milestones

In 2018, the Company's concentration facilities processed a total of 17.2 mt of feedstock (including rich, cupriferous and disseminated ores).
Over the year, Talnakh Concentrator processed 10.4 mt of ore, up 0.4 mt y-o-y. The facility's nickel recovery into bulk flotation concentrate from ore processed, including output of metal bearing pyrrhotite product, increased by 1.5% y-o-y to 83.2%. Higher recovery rates were driven by scheduled fine-tuning of the technological process at Stage 2 of Talnakh Concentrator.

In 2018, volumes of ore processed at Norilsk Concentrator were 6.8 mt or 0.7 mt lower y-o-y in line with the mining plan.
The facility's nickel recovery into bulk concentrate was 0.2% higher y-o-y, reaching 71.9%. During the year, the facility also processed significant volumes of Copper Plant's low grade ores.



SMELTING (Polar Division and Medvezhy Ruchey)

2018 milestones

In 2018, copper output was 15% higher than a year ago due to increased processing of copper bearing feedstock obtained from Rostec State Corporation. Platinum and palladium output in 2018 beat the targets and exceeded the 2017 volumes thanks to using up the work-in-progress inventory of PGM Concentrator (part of Copper Plant).

Product offering:

- copper cathodes;
- nickel converter matte for Kola MMC;
- precious metal concentrate;
- commercial sulphur;
- technical selenium.

Smelting facilities

- Nadezhda Metallurgical Plant
- Copper Plant
- PGM Concentrator (part of Copper Plant).

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 previously stored at Kayerkansky Open Pit Coal Mine (KUR-1).

Production chain

Concentrates produced by the Company, including steam cured sulphide concentrate, are fed into flash smelting furnaces of Nadezhda Metallurgical Plant. Steam cured sulphide concentrate is leached in 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 storage facility, and settler concentrates. The matte produced in flash smelting furnaces is then blown into high grade converter matte.

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

PGM Concentrator (part of Copper Plant) recycles slime from the Tankhouse to produce concentrates of precious metals and technical selenium.

Precious metals produced by Polar Division are refined at Krasnoyarsk Precious Metals Refinery under a tolling agreement.

At Polar Division, metals are produced from its own feed. Since Q4 2016, all nickel converter matte from Nadezhda Metallurgical Plant has been processed at Kola MMC due to the Nickel Plant shutdown.

Metals output

Metal	2016	2017	2018
Nickel, kt	50.9	0	0
Copper, kt	280.3	306.9	353.1
Palladium, koz	1,703	956	987
Platinum, koz	449	259	260