

FINDING OF UNUSUAL PARALLEL-COLUMNAR BLUE HALITE FROM THE VERKHNEKAMSKOE DEPOSIT, PERM KRAI

Vladislav V. Ivanov

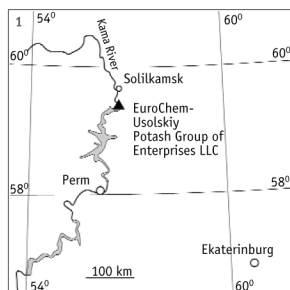
EuroChem-Project LLC, St. Petersburg
Vladislav.Ivanov@eurochemproject.ru

Mikhail V. Tsyganko

Branch "VGSO Urala" Branch "Mine Rescue Crew of the Urals",
FSUE "Mine Rescue Brigade", Severouralsk, zigankom@mail.ru

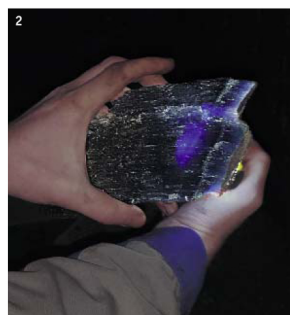
Ilya I. Protasov and Elena A. Kanzyuba

EuroChem-Usolskiy Potash Group of Enterprises LLC, Berezniki, Perm Krai
Ilya.Protasov@eurochem.ru и Elena.Kanzyuba@eurochem.ru



1. Geographical location of the Verkhnekamskoe potassium-magnesium salt deposit, Solikamsk, Perm Krai, Russia.

2. Newly collected halite specimen.
Photo: Vladislav V. Ivanov, March 2021.



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In March 2021, geologist Elena A. Kanzyuba found large parallel-columnar segregations of blue (from dark-blue to bright ultramarine) halite in the underground mine of the EuroChem Usolskiy Potash Group of Enterprises LLC (EuroChem-UPC) which has mined the Palasherskiy site of the Verkhnekamskoe potassium-magnesium salt deposit. A lens of this halite was opened on the wall of an air (ventilation) panel. As explained by specialists of this mine, similar halite had not been observed previously.

The Verkhnekamskoe deposit (Figs 1, 3) is situated in the Solikamsk District of the Perm Krai, Russia. Its main part is located in the left bank area of the Kama River. The salt sequence of 8.2 thousand km² in area extends for 206 and up to 56 km in north-south and east-west directions respectively. A multilayer deposit of potassium-magnesium salts of 140 km and up to 41 km wide is located within this salt sequence. The area of the main potassium deposit is 3.7 thousand km². The deposit is complex: sylvinites (*sylvinite* = the term for sedimentary sylvite-halite rock; raw material for potassium fertilizer), carnallite rock (mainly for magnesium production), and brines (raw material for soda production and other). The reserves of the deposit are huge and are 96 billion tons of carnallite rock, 113 billion tons of sylvinites, and 4.7 trillion tons of rock salt (Kudryashov, 2013).

The general geology and mineralogy of the Verkhnekamskoe deposit are reported by Chaikovskiy (2009).

At the deposit site, where blue halite was found (Fig. 4), two sylvinite beds called KrI and KrII are of economic interest. A layer between KrI and KrII is halite rock, which is gray, light gray, or yellowish gray inequigranular rock salt with clay-anhydrite interlayers of variable thickness. So called "cakes" are recognized within the rock salt layer. A clay interlayer up to 15 cm thick with rare interlayers and dissemination of anhydrite is at the bottom of the first "cake" under top of the KrII bed. Above the clay layer, the cakes are composed of interlayered light orange, yellowish gray, and less frequent light gray rock salt of 3–5 cm in thickness and thin clay. The top of the "cake" is a clay-anhydrite interlay-



10. Newly collected specimen of blue halite in the hands of Mikhail Tsyganko.
EuroChem-UPC mine, Palasherskiy site, Verkhnekamskoe deposit.
Specimen: "Shtufnoi Kabinet" Museum, Severouralsk, Northern Urals, Russia.
Photo: Vladislav V. Ivanov, March 2021.



11. Halite, clay at the specimen bottom. 12 x 10 cm.
EuroChem-UPC mine, Palasherskiy site, Verkhnekamskoe deposit.
Specimen: "Shtufnoi Kabinet" Museum, Severouralsk, Northern Urals, Russia.
Photo: Mikhail V. Tsyganko.

the central part to bright sky-blue in the hanging wall. The closer the zone is to the clay layer, the lighter color is the halite, up to colorless at the contact.

We have not sought ourselves to understand the nature of the blue color of halite described; the aim of this study is to record the finding and to describe it. We would like to draw reader attention to the amazing beauty both *in situ* and of prepared specimens and the wonderful combination of color scale and morphology of this blue halite. Its representative specimens were donated to several Russian museums: Fersman Mineralogical Museum, Russian Academy of Science in Moscow; Fedorov Geological Museum in Krasnoturyinsk; and Ural Geological Museum at the Ural State Mining University in Ekaterinburg.

The authors are fortunate to be at the locality of parallel-columnar blue halite and to collect amazing specimens. Unfortunately, specimen collection is hampered due a high-strength underlying rock salt layer and extraction is practically impossible manually.

Acknowledgments

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