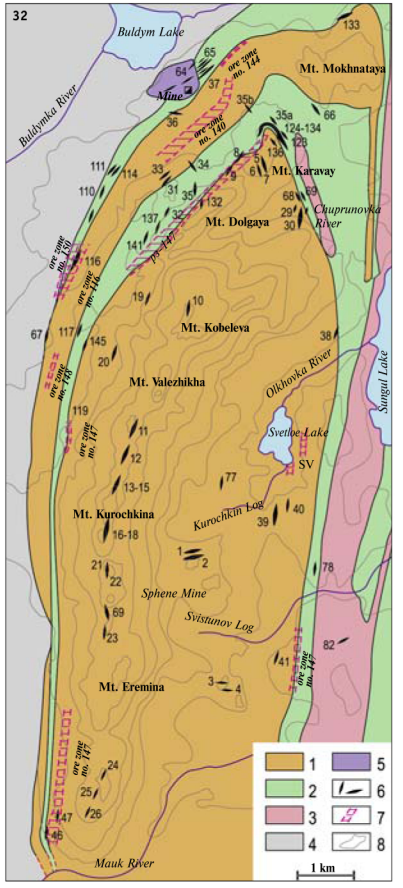
2. BRIEF GEOLOGICAL DESCRIPTION OF THE VISHNEVYE MOUNTAINS



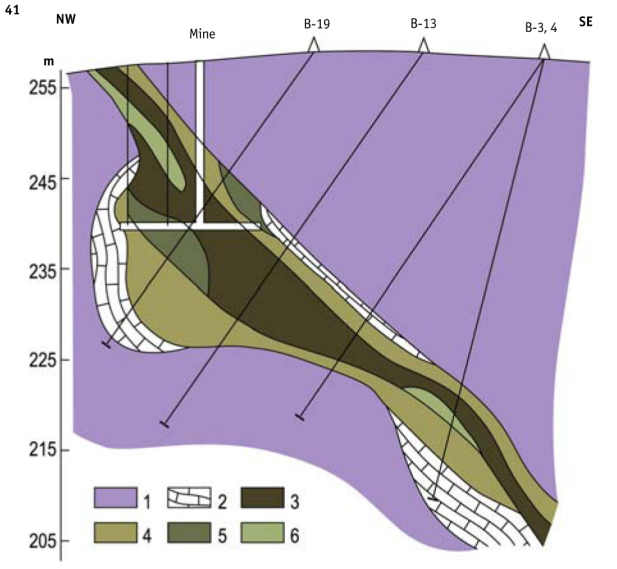
32. Geological sketch map of the Vishnevye Mountains with pegmatite veins and ore zones, modified after Isakov (1950*ofr*).
(1–4) host rocks:
(1) miaskite,
(2) alkaline syenite and fenite,
(3) granite gneiss,
(4) plagiogneiss, crystalline schist, amphibolite, quartzite;
(5) serpentinite,

(6) veins and vein series of alkaline pegmatites,
(7) ore zones ((SV) Svetloozersky area, Svetloe Lake site),
(8) elevation lines.

The first petrographic map of the Vishnevye Mountains at 1:50000 scale was compiled by D.S. Belyankin and G.S. Sokolov in 1928; it is preserved only as draft drawing; only its description was published (Belyankin, Sokolov, 1933). The map compiled by V.S. Krasulin (1939) met a similar fate; it is stored in the Uralgeologia Fund; it was reported that alkaline rocks form three submeridional belts, the main of which corresponds to the Vishnevye Mountains. E.M. Bonshtedt-Kupletskaya (1951) published the first sketch petrographic map of the Vishnevye Mountains; the asymmetry of the alkaline massif with steep eastern and gentle western contacts (and northern part of the massif dipping to the north) is shown on the map composed by O.A. Vorob'eva (1947). A geological sketch map of the Vishnevye Mountains with pegmatite veins and ore zones was compiled by M.G. Isakov (1950*ofr*) on the basis of materials of V.S. Krasulin, E.A. Kuznetsov, F.A. Sennikov, V.D. Vodop'yanov and the Vishnevogorsk Exploration Crew (*Fig.* 32).

The detailed geological study of the Vishnevye Mountains from Mt. Mokhnataya in the north to the Mauk River in the south was carried out by a team from the Moscow Institute for Geological Prospecting (MGRI) supervised by P.V. Kalinin during the course of 30 years and then by B.M. Ronenson (1959).

The Vishnevogorskiy miaskite massif intruded metamorphic rocks of the Paleoproterozoic Vishnevogorskiy sequence of about 1000 m in thickness (Ronenson, 1966). This sequence consists of intercalated garnet-biotite and graphite-garnet-biotite gneisses, quartzite, and diopside-plagioclase schist (with scapolite) with marble and calc-sil-



41. Section of carbonatite-glimmerite vein no. 1 of the Byldym vermiculite deposit, modified after V.V. Belov (1936*ofr*).
(1) serpentinite,
(2) richterite carbonatite,
(3) coarse-flake vermiculite,
(4) fine-flake vermiculite,
(5) coarse-flake biotite (glimmerite pegmatite),
(6) fine-flake biotite (glimmerite).
(Mine) – shaft of Mine,
(B) borehole.

and Vishnevogorsk Mine Group on the basis of documentation of the Glavny (Main) open pit, Kapitalnaya underground Mine, and drill core (*Fig.* 37).

Veins of "interlayer" carbonatite with pyrochlore are the most productive for pyrochlore in ore zone no. 140 (*Figs.* 38–39). Aggregates of silicate minerals are common in the near contact zones of ore-bearing carbonatite pegmatites. In breccia-like carbonatite, host rock fragments are cemented by carbonates. Such carbonatite is typical of shear, cataclasis, milonitization, and expanding zones.

Linear pegmatite stockworks of different composition (in ore zone nos. 140, 147 and others) are cross-cut and overlapped to form a complex net.

According to the numerous isotope data (Nedosekova *et al.*, 2018), age of carbonatites is over the range of 439 to 363 Ma (Silurian to Devonian, about 70% of all data); another part of the measurements is over the range of 347 to 216 Ma (Carboniferous-Permian-Triassic).

Widespread plastic deformation of alkaline rocks resulting in folding and boudinage in banding structures containing pegmatite veins, stockworks of small pegmatite veins, and new metasomatic zones continued. Later, in the Sedlovidnaya miaskite body, new misoriented straight cleavage systems were formed; the cleavage fractures are filled by quartz-chlorite mineralization followed by natrolite-analcime mineralization (*Fig.* 40).