

THE PROBLEM OF PRIMARY SOURCE OF BRAZIL-TYPE DIAMONDS
(THE CASE-HISTORY OF DISCOVERY OF DIAMOND DEPOSITS
IN THE ARKHANGELSK REGION).

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The problem of primary source of spheroidal (rounded) diamonds of the Brazil type has for many years been the most controversial issue of diamond geology. The idea of their origin has mostly been based on data from placers. In the USSR the relation of these diamonds to peridotites of orogenic stage in geosyncline development used to be considered as most trustworthy (A.A.Kukharensky, 1955). Later on, an idea was advocated that spheroidal diamonds of the Brazil type were associated with common kimberlites (Yu.L.Orlov, 1973). One period the suggestion was in the go that they were exclusively related to Precambrian sources of kimberlite and problematic origin (M.P.Metelkina et al., 1970). The deeper insight into understanding the primary sources of spheroidal diamonds (PSSD) at the theoretical level was gained in the early 1970s when a revision programme on diamonds started in the Arkhangelsk Region. Based on the analysis of data on mineralogy of diamonds, chrome spinellides and individual grains of chrome pyropes co-occurring in a terrigenous complex of the Northern Timan, the PSSDs of the area were attributed to kimberlites differing, at the mineralogical level, from known diamond-bearing varieties of Yakutiya and Africa. The PSSDs appear to be featured by low contents of chrome pyropes, and especially pyroilmenites, and by relatively high contents of chrome spinellides (V.K.Sobolyev, 1979).

2. The major argument in favour of setting-up the concentrating prospecting programme for kimberlites on the White-Sea Winter Coast was the similarity of its heavy-concentrate-mineralogical situation with that of the North Timan area and the discovery of a sheet-like body (sill) of ultrabasic fine-crystalline porphyritic magmatites initially defined as picritic porphyrites and redefined, in light of the idea of the PSSD, as kimberlites two years after the finding (1977). Three years later, a pipe-like body containing lean concentration of spheroidal diamonds of the Brazil type was revealed in the area. That was followed by discovery of similar bodies with commercial concentrations of spheroidal diamonds.

3. The combined indications established in the course of the investigation (summary content of indicator-minerals, their spectra, morphology, typochemism, etc.) allowed us to attribute them to the kimberlites which differ, at mineralogical level, from classical Yakutian and African kimberlites with commercial diamonds (V.K.Sobolyev et al., 1983, 1988).

4. The correlation between the PSSD of the SE Belomoriye area and the kimberlites from other provinces was based on comparison between association of deep-seated magmatites of the area in question with known series of magmatites containing kimberlites. They have been assigned to a previously unknown variety of kimberlites within so-called alneite-kimberlite-karbonatite series of deeply-originated volcanites in terms of V.I.Vaganov (1978). Mineralogically, they are the closest to

olivine lamproites of Australia but associated with sodium rather than with ultrapotassium mantle differentiates.

5. The problem of the PSSD placement within the global framework of kimberlite provinces was correctly tackled by M.A.Gnevishhev (1972). According to this author, spheroidal diamonds are confined to the peripheral parts of diamond-bearing provinces, while their central parts host the deposits dominated chiefly by flat-sided crystals. In 1970s the idea prevailed in the USSR that peripheral parts of platforms had no diamond potential. However, after discovery of the PSSD in SE Belomoriye area the diamond potential of the peripheral parts of platforms developed on the ancient basements (eratons) and adjoining zones of Proterozoic mobile belts are hardly in need for additional proof.

6. In prospecting for the PSSD under conditions of the North of the Russian Plate, the heavy-concentrate mineralogical method retains its priority as a tool for prognostication and selection of areas to be involved into concentrating prospecting programme.