INTRODUCTION

Natural olivine is often replaced by minerals of the serpentine group (lizardite, chrysotile, and antigorite) in hyperbasites and basites at foldbelts and, to a lesser extent, at platforms in continents and oceans. The most widely spread apohyperbasite serpentine composes much of the oceanic crust and foldbelts of the eugeosyncline (Uralian) type. These serpentinites were produced mostly with the participation of seawater, as follows, for example, from the fact that the lizardite contains Cl (Rucklidge, 1972; Miura et al., 1981; Barnes and Sharp, 2004; Scambelluri et al., 2004; and others). Oceanic lizardite contains 0.03–0.2 wt % Cl and 6–9 wt % Fe₂O₃, and this mineral in the outer portions of the pseudomorphs bears 0.7–1.0 wt % Cl and 2–6 wt % Fe₂O₃ (the paper presents nine microprobe analyses and images showing the distribution of Cl, Mg, Al, Si, Ca, Ti, and Fe obtained in characteristic X-ray radiation). The amounts of Fe³⁺ in octahedrally and tetrahedrally coordinated sites of the Cl-bearing lizardite are roughly equal. Cl was borrowed in the course of serpentization from the host Early Paleozoic evaporites and brines contained in them. The Cl concentration in our lizardite from the metamorphosed kimberlites from the Eastern Siberian Platform (continental lizardite) is much higher than the Cl concentration in oceanic lizardite from serpentine replacing peridotites (0.03–0.2 wt % Cl). This is likely explained by differences in the Cl concentrations in the metamorphic fluids, their salinity (3% for oceanic water and 65% for brines in the platform cover). DOI: 10.1134/S0869591110020025

UDACHNAYA VOSTOCHNAYA KIMBERLITE PIPE

The Udachnaya Vostochnaya kimberlite pipe in the north of the ancient Eastern Siberian Platform is lizardite (Nikishova et al., 1982). Analogous results were obtained by other researchers (Egorov et al., 1991; Sokolova and Spiridonov, 2006; and others). Geological–petrological, mineralogical, and isotopic–geochemical data testify that serpentination of kimberlites in the Eastern Siberian Platform is not postmagmatic but epigenetic and proceeded with the participation of meteoric waters at relatively low temperatures (Milashev, 1963; Ukhanov and Devirits, 1982; Egorov et al., 1991; Sokolova and Spiridonov, 2006) in the course of low-grade metamorphism to the zeolite facies during the post–trap evolutionary stage of the platform (Spiridonov et al., 2000). Noticeable Cl concentrations in lizardite from serpentizined kimberlites from the Eastern Siberian Platform (up to 1.10 wt %) were first determined by Egorov et al. (1991).
salts and Cl–Na brines (Geology..., 1966; Valyashko and Polivanova, 1965; and others).

The contacts of the Udachnaya Vostochnaya kimberlite pipe with its host rocks are sharp and nearly vertical. The kimberlites typically form small tongues in the host anhydrite-bearing dolomites. The pelitomorphic dolomite is recrystallized within a contact zone (up to 5 cm thick) with the kimberlites, and grains of carbonates in this zone reach 0.1–0.2 mm. Our sample was taken from borehole core from a depth of 430 m, from the contact between kimberlite and anhydrite-bearing dolomite. The contact is marked by a very fine-grained chill zone 0.1–0.7 mm thick. The narrow contact zone shows a subparallel orientation of elongated olivine phenocrysts and phlogopite flakes, and the contact is in places marked by “clinging” olivine phenocrysts.

The kimberlites contain oval olivine phenocrysts ($F_{O_9}$) up to 4 mm across and have a cementing groundmass of small equant olivine crystals ($F_{O_7}$) 0.1–0.3 mm, phlogopite (or, more rarely, tetraferriphlogopite) books up to 0.1 mm, platelets and skeleton crystals of Cr-bearing ilmenite up to 0.05 mm, smaller and rarer grains of perovskite, Cr-spinel, apatite, pyrrhotite, and jerfisherite.

Both the kimberlites of the Udachnaya Vostochnaya kimberlite pipe and the host rocks are very unevenly affected by low-grade metamorphism. The rocks of the pipe are locally practically fresh and contain unaltered olivine, while the kimberlites may be completely serpentinized or transformed into serpentine–carbonate or other metamorphic rocks elsewhere. The sizes of domains with intensely serpentized kimberlites vary from small pockets to several dozen meters.

**METAMORPHOSED KIMBERLITES OF THE UDACHNAYA VOSTOCHNAYA PIPE**

In the metamorphosed kimberlites, olivine is replaced by reticulate or platy lizardite with inclusions of ferrous dolomite, dolomite, calcite, magnetite, and minute anhydrite grains. Lizardite pseudomorphs after olivine are often rimmed by saponite (Fig. 1), which also often partly fills interstices between phlogopite flakes (this mineral is usually replaced by corrensite). Interstices between lizardite pseudomorphs after olivine contain abundant metamorphic calcite with 0.6 wt % MgO, 0.3 wt % FeO, and trace amounts of Mn. Perovskite and the margins of ilmenite grains are replaced by titanite. Pyrrhotite is mostly replaced