Field trip 5

The Uralian Platinum Belt: The Nizhny Tagil clinopyroxenite-dunite massif and the Volkovsky gabbro massif, and related platinum and copper deposits.

Duration: two days, August 15-16, 2014
Period: post-symposium field trip
Minimum/maximum number of participants: 8/24
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The proposed field trip aims to illustrate two distinct types of ore-bearing massifs within the 900-km-long Uralian Platinum Belt (Fig. 1): the Nizhny Tagil clinopyroxenite-dunite massif and related platinum placers and platinum-bearing chromitite within dunite, and the Volkovsky gabbro massif comprising copper sulphide deposits with PGE mineralization.

General Information. The Nizhny Tagil massif is situated 60 km to the west of the Nizhny Tagil, the metallurgical centre of the Urals. The Nizhny Tagil massif, famous for its platinum lode and placer deposits, represents an undisputable example of the zoned Uralian-type clinopyroxenite-dunite complex (Efimov 1984, 1998). The 47-km² Nizhny Tagil Complex is almond shaped, shear bounded, and enclosed by Ordovician-Silurian metasediments to the west and predominantly mafic igneous rocks to the east. It consists of a pipelike dunite core (Fo₈₈-₉₂), surrounded by a narrow zone of wehrlite and rimmed by an outer zone of clinopyroxenite (Fig. 2).

Dunite as a refractory material is currently mined in the central part of the massif (Fig. 3). Chromitite schlieren and veins are invariably associated with dunite. Chromitite bodies are small in size up to 20-40 cm in length and with a thickness of up to 3-6 cm surrounded by serpentine rims. Both dunite and chromitite host predominant Pt-Fe alloy grains with subordinate Os-Ir alloys, Ru-
Os sulphide and other platinum-group minerals (PGMs) (Figs. 4 and 5). Over 160 metric tonnes of platinum have been mined from associated placer and load deposits in the past.

![Image of Dunite open pit of the Nizhny Tagil massif.](image1)

**Fig. 3.** Dunite open pit of the Nizhny Tagil massif.

![Image of Pt-Fe alloy grains from dunite in Alexandrovsky Log.](image2)

**Fig. 4.** Pt-Fe alloy grains from dunite in Alexandrovsky Log.

![Image of Schlieren of chromite with intergranular Pt-Fe alloy grains in dunite.](image3)

**Fig. 5.** Schlieren of chromite with intergranular Pt-Fe alloy grains in dunite.

It is intended that participants will become familiar with geological position, structure and ultramafic rocks of the Nizhny Tagil massif. We will visit sites of bedrock platinum deposits with inspection of small-scale mining operations remained from the last century and the modern open-pit mine that expose ultramafic lithologies (i.e., dunite and chromitite).

The Volkovsky massif is located in the southern part of the Ural Platinum Belt, between the Main Uralian and Serov-Mauk faults, about 45 km to the north of the Nizhny Tagil clinopyroxenite-dunite massif (Fig. 1). The Volkovsky massif belongs to the Tagil-Barancha gabbro–diorite–syenite complex, and is in contact with volcanic and sedimentary rocks of the Tagil Island-Arc Zone to the east, and metabasaltic hornfels to the west. The Volkovsky massif is dominated by gabbro with minor ultramafic rocks intruded by diorite and syenite (Fig. 6).

The ultramafic rocks occur in two NW–SE elongated bodies (Baronskoe and Kluevskoy) in the southern part of the massif. The Volkovsky gabbro massif is a host to the one-and-only economic copper sulphide deposit within the Platinum Belt of the Urals. It is currently open-pit operated (Fig. 7). Participants will visit the open-pit, where primary relationships between both Pd-bearing bornite-chalcopyrite ore (Fig. 8) and titanomagnetite-apatite ore with gabbro can be clearly observed.
Fig. 6. Schematic geological map of the Volkovsky massif and location of the Pd-Au Baronskoe-Kluevsky deposits (after Zaccarini et al., 2004).

Fig. 7. The old (upper part) and modern (bottom part) open pits of the Volkovsky copper-rich sulphide deposit.

Preliminary schedule of the field trip:

First day – Friday 15th August 2014: Early departure from the meeting point (Yekaterinburg) to the Nizhny Tagil (150 km) and subsequently to the village Uralets (60 km), located in a close proximity to the zoned-type Nizhny Tagil Complex. Visiting field stops within the Nizhny Tagil clinopyroxenite-dunite massif with inspection of main ultramafic lithologies and small-scale mining.
operations from the past and the modern open-pit mine. Lunch during the trip. Dinner and overnight accommodation at “White Mountain” hostel located in Uralets.

Fig. 8. Disseminated bornite ore within gabbro of the Volkovsky deposit.

Second day – Saturday 16th August 2013: Visit to the contact between the Nizhny Tagil Complex and host rocks. Departure to the Volkovsky gabbro massif (70 km), visiting the field stops at the Volkovsky massif. Lunch during the trip. Departure to Yekaterinburg with short stop at Nev’yansk (120 km) with a brief introduction to the history of the first iron works in the Urals and visiting historic sites of the city (Fig. 9). Return to Yekaterinburg.

Fig. 9. Falling tower in the historical centre of Nev’yansk.

Terms and Conditions:
1. Participation will be confirmed on receipt of payment.
2. Preference will be given to registered IPS delegates.
3. Cancellations must be received in writing to e-mail: Elena.Anikina@igg.uran.ru
4. Any refunds issued will be subject to approval by the organizing committee.
5. Cancellations received before April 30, 2014 will receive a 100% refund minus a banking fee.
6. Cancellations received between April 30 and May 31, 2014 will receive a 50% refund minus a banking fee.
7. No refunds will be issued after May 31, 2014.
8. In the event that the trip is cancelled by the organizers, a full refund will be issued.
9. All participants should have their own personal insurance cover for general travel insurance, personal liability, medical cover and dangerous activities cover. A copy of confirmation of insurance must be submitted to the organizers prior to participating in the field trip.