

Igor V. Pekov, Viktor V. Levitskiy, Vladimir G. Krivovichev

# **MINERALOGY OF THE BELORECHENSKOYE DEPOSIT (NORTHERN CAUCASUS, RUSSIA)**

Mineralogical Almanac  
volume 15, issue 2, 2010



**Famous Mineral Localities**



**Supported by:**  
Lomonosov Moscow State University  
Russian Geological Society;  
The Mineralogical Museum of Ecole des Mines de Paris, France

Series **Famous Mineral Localities**

Igor V. Pekov, Viktor V. Levitskiy, Vladimir G. Krivovichev

**Mineralogy of the Belorechenskoye Deposit (Northern Caucasus, Russia).** Mineralogical Almanac, volume 15, issue 2, 2010. Moscow: BRITAN. 96 pages, 108 illustrations including 81 mineral photos, and 7 sketches. 59 chemical analyses of 22 minerals.

The Mineralogical Almanac issue is devoted to the mineralogy of ore-bearing hydrothermal veins and oxidation zone of the Belorechenskoye deposit in Adygea Republic, Northern Caucasus, Russia. It is a complex object, with nickel-uranium and barite ores. The deposit was prospected in 1960s – 1970s; since that time it has been a steady a source of fine museum-quality mineral specimens. The issue summarizes both original authors' and earlier published data. The main part of it contains the description of 65 minerals and veins of different types. Another part contains geological data of the deposit and surrounding area.

Igor V. Pekov, *Lomonosov Moscow State University*,  
Viktor V. Levitskiy, *Company "Russian Minerals", Moscow*,  
Vladimir G. Krivovichev, *Saint-Petersburg State University*

<i>Editorial</i>	Galina F. Anastasenko Alexander A. Evseev Boris Z. Kantor Margarita I. Novgorodova Levon B. Oganesyan Igor V. Pekov Zhanna A. Polyarnaya Dmitrii Yu. Pushcharovsky Dmitrii V. Rundqvist Victor T. Trofimov Lydie Touret (France) John S. White (USA) Nikolay P. Yushkin	<i>Project Leader</i> <i>Managing Editor</i> <i>Art Editor</i> <i>Editor</i> <i>Advertising and Promoting Manager</i> <i>Translators:</i> <i>English (Style)</i> <i>Design idea</i> <i>Layout</i> <i>Layout of schemes</i> <i>Image processing</i>	Michael B. Leybov Ludmila A. Cheshko Nikolay O. Parlashkevich Andrey L. Chehsko E.V. Sadovnikova Valeriy V. Gerasimovskiy Tony Nikischer Dmitriy A. Kilpio Nikolay O. Parlashkevich, Ludmila A. Cheshko, Ivan A. Glazov Natalia A. Vishnevskaya Georgiy I. Ivanov
------------------	---	--	--

- © Text, illustrations belong to authors, 2010
- © Text (translated), design belong to Mineralogical Almanac, 2010
- © Photo of museum specimens belongs to museums, it not pointed overwise, 2010
- © Photo belongs to authors, it not pointed overwise, 2010

*Front Cover Photo* Yellowish-brown **fluorite** with **barite**. 5.5 cm. Collection of I.V. Pekov. Photo: M.B. Leybov.

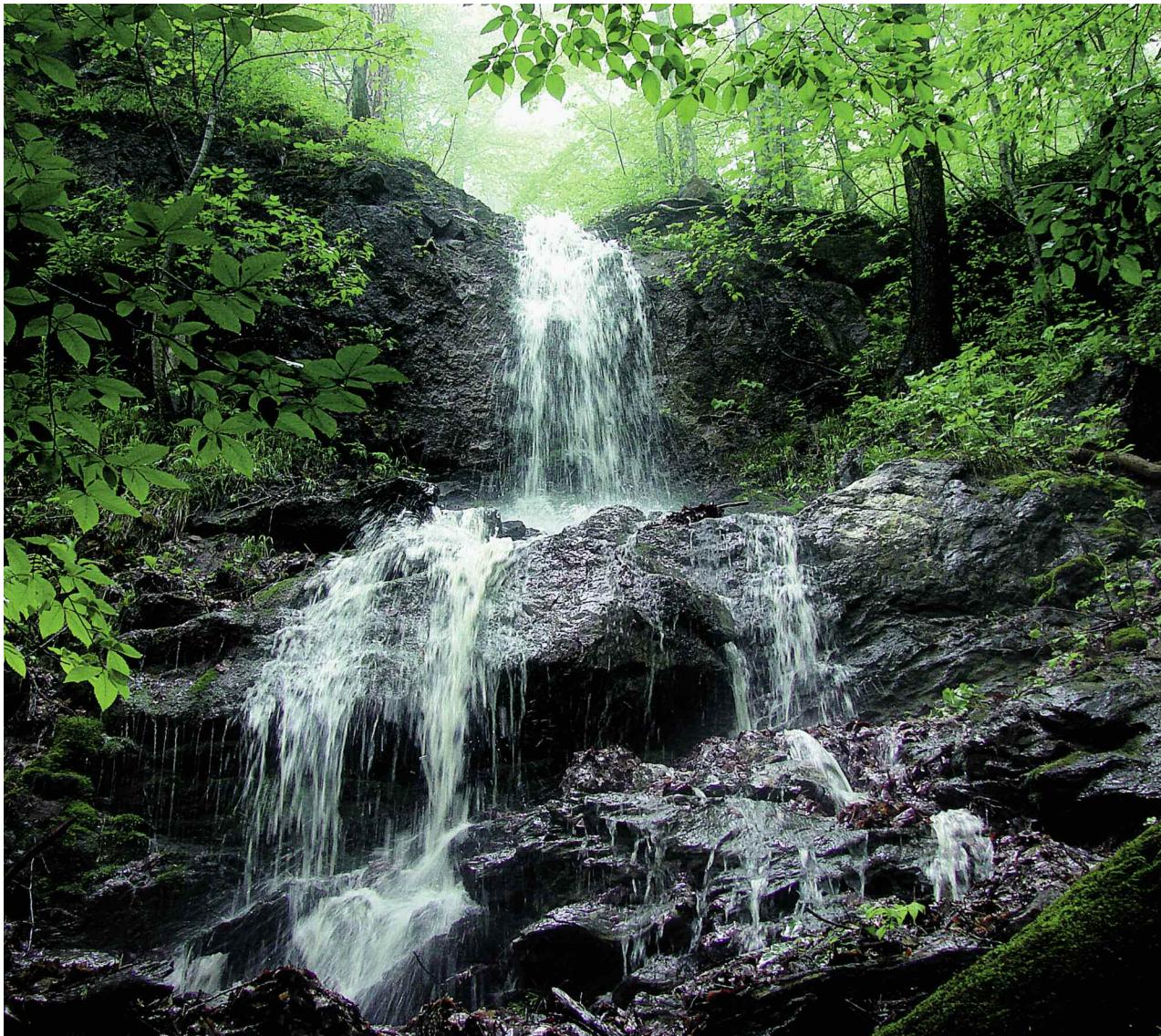
*Title Page Photo* Intergrowth of split crystals of **pyrostilpnite**. 7 mm. Fersman Mineralogical Museum of RAS, specimen No 75440. Photo N.A. Pekova.

<i>Published by</i>	Mineralogical Almanac BRITAN Ltd. Box 71 Moscow 117556 Russia Phone/fax +7 (495) 629-4812 minbooks@online.ru www.minbook.com	Mineralogical Almanac Ocean Pictures Ltd. 4871 S. Dudley St., Littleton CO 80123 USA minbooks@online.ru www.minbook.com
---------------------	---	--

Printed in Russia

## CONTENTS

<b>Introduction</b> .....	5
<b>Outline of Study History</b> .....	11
<b>Brief Geological Outline</b> .....	17
Geology of the Region .....	17
Geologic and Petrographic Outline of the Belorechenskoye Deposit .....	18
The Deposit Structure .....	21
<b>Hydrothermal Veins</b> .....	23
<b>Oxidized Zone</b> .....	34
<b>Minerals</b> .....	37
Veiny Minerals .....	37
Ore Minerals .....	55
Hypergene Minerals .....	77
<b>Instead of Conclusion</b> .....	89
<b>Acknowledgements</b> .....	89
<b>References</b> .....	90
<b>Mineral Index</b> .....	91



## INTRODUCTION

Waterfall at the Syuk river.

**A**n interesting mineral deposit is situated in the Republic of Adygeya, in the Belaya River valley in the North Caucasus. It is well known not only to specialists, but also to amateur mineralogists and collectors because of the beautiful samples of many minerals collected from here. However, it is a place filled with paradoxes. Controversies begin with the deposit name itself. Specialists in the field of geology and mineralogy of radioactive elements call it the Dakhovskoye uranium deposit, and those who are not specialists call it the Belorechenskoye barite deposit. The name "the Dakhovskoye deposit" was hidden from the casual reader, since all geographic information concerning uranium-bearing deposits in the U.S.S.R. was secret at one time. Actual names appeared only in secret reports or collections of articles. Information on the geology and mineralogy of the uranium-bearing veins of this deposit was published in open sources, but always without the specific geograph-



ic names. However, data about the barite deposit were not secret, and information about the Belorechenskoye deposit was easy to find in “open” and commonly accessible articles and handbooks. Adding to the apparent confusion, publications about the uranium-bearing carbonate veins, versus those about barite veins of the Belorechenskoye deposit, would leave the impression that these were entirely different deposits, because each publication focused on the vastly different mineralogy, geochemistry, structure and conditions of occurrence of the outlined mineral bodies. Inevitably, the question arises: are the Dakhovskoye and Belorechenskoye really different deposits? The answer is a paradoxical “yes and no”! They are combined spatially – veins of two types are closely interwoven – and most probably have common sources of substance and heat, but they differ by age, composition and physical and chemical parameters of formation. As a result, these types of veins carry different mineralization and, in accordance with the accepted USSR system of separation of geological works by the type of mineral resources, they were studied and explored by different organizations. And those explorations and studies were conducted at different times, although within the same area, using the same underground workings. As a result, publications about them proved to be disconnected and essentially have nothing in common except the general features of the regional geology and area

The Belya River at the area of the Belorechenskoye deposit.





**Barite with fluorite.** 8 cm. Collection of V.V. Levitskiy. Photo: B.Z. Kantor.

of the deposit. Articles and reports on uranium topics practically do not pay attention to barite, while other works dedicated to barite mineralization do not pronounce the word “uranium” due to secrecy considerations. As a result, anything related to uranium was automatically excluded from consideration in reports about the barite deposit, only mentioning the fact that some carbonate veins existed. That is why we have the paradoxical “two in one” name: a single unity in nature, but entirely different in the publications because of their different focus.

Today, it is possible to consider the whole deposit as single geological object. Correspondingly, utilization of the two locality names becomes unjustified. In the present work, we use the name the “Belorechenskoye deposit” (notwithstanding that the term “Dakhovskoye” appeared earlier), uniting under this name the whole complex of hydrothermal veins. We chose to use this name because it is wider known, being used in open publications since 1967. We should note that amateurs sometimes use the term “deposit of Belya Rechka”, being a purely conversational, jargon one, and we consider it necessary to refrain from its use in publications and on the Internet to avoid further confusion.

The Belorechenskoye deposit is situated 60 km to the south of the town of Maikop, the capital of the Republic Adygeya, and 8 km to the south of the stanitsa (Cossack village) called Dakhovskaya. It lies in the upper reaches of one of

May. Rhododendrons are blooming.



the right tributaries of the large river Belya – small river Syuk (in old literature one could also find it written as Syug); the adits are worked at the right border of this rather narrow valley.

This deposit is not only unique in Russia as representative of uranium-arsenide (“reduced” five-element) type, but it is also characterized by a very interesting geochemistry feature – strong predominance of nickel over cobalt – that resulted in development of selective nickel mineralization: arsenide, antimonide and sulfide one. Study of barite veins of the Belorechenskoye deposit facilitated development of our understanding of physical and chemical conditions of formation of low-temperature hydrothermal deposits (Krivovichev, 1979).

The present work represents an attempt to gather together literature (both published in open editions and given in fund geological materials) and our own data on mineralogy of hydrothermal veins of different types and oxidation zones of the Belorechenskoye deposit. The authors worked at this very interesting project over the course of many years: V.G. Krivovichev – from 1968 till 1973, during the period of active exploration for barite, I.V. Pekov – during 1988–1991s, and V.V. Levitskiy during frequent visits to the deposit during the last twenty years.

The main reason for the present work is because of the deposit’s mineralogy – outstanding in “museum-collection” finds and rare species. The most famous specimens are barite and calcite from the Belorechenskoye deposit: a great number of beautiful specimens of these minerals are present in many collections. Clusters of fluorite, marcasite, dolomite, crystals of galena from this deposit are well known. Considerably less well known are strontianite (but its specimens

from here are nonetheless the best ones for the territory of the former USSR), nickeline dendrites, and native arsenic forming big nodules and crystalline crusts. Also, very few people know that at the Belorechenskoye deposit has produced specimens with wonderful cubes and twins of ullmannite (although not in great number), big intergrowths of pyrostilpnite crystals, crystals and “nodules” of breithauptite and krutovite, which are of the same quality as the best specimens of these minerals from foreign deposits, and sometimes even exceed the best of them. In recent years, we have studied hypogene minerals of the Belorechenskoye deposit, which proved to be unexpectedly diverse and often rather spectacular.

When discussing the Belorechenskoye deposit, it is impossible not to mention one more outstanding feature: its veins, initially baritic and calcitic ones, have many open cavities, including those of great sizes (with volumes up to many tens of cubic metres), whose walls are incrusted with well formed crystals of a number of minerals. Moreover, even massive veins without cavities display very effective pictures, illustrating the processes of growth, dissolution, regeneration of crystals, development of their aggregates in free space, gravitational textures and many features, typically on the walls of the underground workings. Visiting this natural museum of hydrothermal mineral and ore formation produces an indelible impression not only upon a specialist or mineral hobbyist, but in general upon any person. The Belorechenskoye deposit is without doubt an outstanding geological monument, and it demands attention.



Beechen forest at the upper reaches of the Syuk river.