



Activity Report of WP3.3

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SITE DESCRIPTION AND DATA OF THE KHLOPIN

Site services, Characteristics and Data

Katarzyna Szkliniarz¹, Jan Kisiel¹, Irina Savelyeva²

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¹University of Silesia, Poland

²V.G. Khlopin Radium Institute

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1 Aim and Introduction

This report provides an overview of the features, properties and services of the Khlopin UL for external users and site managers.

The aim is to support marketing, project planning/execution, business, and innovation development. General site information, including current use and access to the Khlopin UL, is followed by information on research, innovation and cooperation possibilities, and the onsite support, including the database.

Contact:

Khlopin Underground Laboratory

2-Y Murinskiy Pr-Kt, 28,
St. Petersburg,
Russia, 194021



RADIUM
INSTITUTE
ROSATOM

2 Overall description of the Khlopin UL

2.1 Location

2.1.1 Geographical settings

Underground Low-Background Laboratory of Khlopin Radium Institute is located in the northwest of Russia in Saint Petersburg, in the second largest city in Russia. The city is located in the Neva Delta on the Gulf of Finland. Underground facility coordinates are: 59.934081° North, 30.332883° East.

2.2 Use and Access

2.2.1 The original purpose and current use

Khlopin Radium Institute is a research and production institution. It carries out research related to nuclear physics, radio- and geochemistry, nuclear energy, radioecology and isotope production. The laboratory is located between the metro stations in the tunnel. The underground rooms were specially built for the needs of the laboratory in 1965-1967. The construction was initiated by the Radium Institute.

2.2.2 Available infrastructure

Khlopin UL is a fairly small underground laboratory, which consists of two laboratories, a larger one with an area of 64 m² and a smaller one with an area of 32 m². There is also a technical corridor with an area of about 6-8 m². The laboratory is situated at a depth of 65 m. In the underground rooms there is power supply and mechanical ventilation switched on request.

Access to the underground laboratory is possible directly from the interchange tunnel between the Nevsky Prospekt and Gostiny Dvor metro stations in St. Petersburg. For this purpose, you can use the escalator (with metro passengers), separate escalators only under the supervision of metro workers, or only on additional request via the loading platform (at night).

In the underground rooms, naturally constant temperature and humidity are maintained. The rooms have a good 220 and 380 V power supply (no overvoltages and no obstructions). Three gamma spectrometers equipped with a shield against the external background and a Low Activity Liquid Scintillation Analyzer (TriCarb 3100) are installed in the laboratory rooms (Fig.1).



Figure 1: Underground rooms with gamma spectrometer and Low Activity Liquid Scintillation Analyzer in Khlopin UL.

2.2.3 Current ownership and organisation

Operator:

JSC Khlopin Radium Institute in Saint Petersburg, Russia

khlopin.ru

Contact person:

Andrey Stepanov (Leading specialist, Coordinator of the Project)

2-nd Murinski prospect, 28 194021 Saint -Petersburg, Russia

e-mail: stepanov@khlopin.ru

2.2.4 Underground access

Access to Khlopin UL is possible directly from the pedestrian transfer tunnel between two metro stations.

The equipment can be delivered to the underground laboratory in three ways; 1) equipment the size of cabin baggage can be delivered on an escalator together with metro passengers; 2) a separate escalator can be used (under the supervision of metro workers) to transport more dimensional cargo; 3) overhead devices can be transported through the loading platform at night (pre-notification is required).

2.2.5 Commuting

As Saint Petersburg is the second-largest city in Russia, access to the underground laboratory is relatively easy. An additional advantage is a fact that the laboratory is located in the city center between the Nevsky Prospekt and Gostiny Dvor metro. Hence, the best and fastest means of transport is the metro. Access by metro from the train station takes about 20-30 minutes. There is an international airport in Saint Petersburg, which can be reached in about 1 hour by metro. However, a taxi ride from the city center takes about 10-15 minutes.

2.3 Research, innovation and cooperation possibilities

2.3.1 Innovation and research

For innovation and research, we provide access to a unique data and operational underground facility. The conditions are very well documented in reports, scientific articles.

2.3.2 National and international cooperation

All research data and studies performed in the underground laboratory are part of the reports in the scientific and commercial contracts. The data is available to customers and contractors. Several publications in Russian are available.

Research on natural radioactivity in an underground laboratory has been carried out since the 1960s. at UL, measurements were carried out using alpha, beta and gamma spectrometers, liquid scintillation radiometers, gas proportional counters and other equipment.

The research was conducted as part of national and international cooperation with the Radium Institute.

2.4 Support at the site and available database

2.4.1 Project handling, competencies and quality control

Khlopin Radium Institute can provide services in terms of renting a room in an underground laboratory for experiments and tests, renting equipment, performing low-background measurements of samples submitted by customers.

Also, UL of Khlopin Radium Institute can take part in joint projects and international programs regarding:

- low-background measurements of samples of environmental objects.
- fundamental research of the structure of background radiation
- low-background measurements of elements and materials used in the food industry, medicine, electronic instrumentation and materials science.
- monitoring territories and marine areas.

- control illicit trafficking of radioactive and nuclear materials.
- compliance with international obligations on non-proliferation of nuclear tests in all environments.
- development and testing of new advanced hardware complexes for nuclear physics research.

2.4.2 Database

Data is not available.

3 Site description data and data properties

Data is not available, since the subway is a civilian object of a particular category.

3.1 Bedrock geological data and properties

3.1.1 Geological data and tectonics

Data is not available.

3.1.2 Major rock type(s)

The underground laboratory is located in the Cambrian clay layer. There are no precise geological data on the bedrock except common information about Cambrian clay in this region at the depth of the subway tunnels.

3.1.2.1 *Mechanical properties and conditions*

Data is not available.

3.1.2.2 *Thermal properties and conditions*

Data is not available.

3.1.2.3 *Radionuclide data*

Data is not available.

3.1.3 Data sources

3.1.3.1 *Surface data*

Data is not available.

3.1.3.2 *Borehole data*

Data is not available.

3.1.3.3 *Underground data*

Data is not available.

3.1.3.4 *Petrography, geochemistry, rock mechanics, petrophysics and thermal properties*

Data is not available.

3.1.3.5 *Natural background radiation data*

The study of natural radioactivity in the underground laboratory was studied in 1968-1972. The research covered the neutron production rate in various materials (e.g., lead, aluminum, and tin) and the surrounding metro rocks under the influence of nucleon and meson components. Then the gamma radiation of the surrounding rocks, construction materials (e.g., cement and sand), and some shielding

materials (e.g., different grades of lead, cast iron, steel, tin, copper) and background characteristics of beta and neutron counters were investigated. The results are in the internal reports of the Radium Institute (in Russian).

3.2 Hydrological data and properties

3.2.1 Hydrogeological data and properties

3.2.1.1 *Description of data*

Data is not available.

3.2.1.2 *Description of properties*

Data is not available.

3.2.2 Hydrogeochemical data and properties

3.2.2.1 *Description of data*

Data is not available.

3.2.2.2 *Description of properties*

Data is not available.

4 Summary

The Khlopin Underground Laboratory is the smallest underground laboratory participating in the EUL project. For scientific research, it has two rooms with specialized measuring devices (gamma spectrometers, liquid scintillation counter). Any specialized knowledge in the field of geology, hydrogeology, geochemistry, groundwater chemistry, geophysics, mining mechanics, material science of Cambrian clays, etc. are not available, since the subway is a civilian object of a particular category.