

# International Conference on the Management of Naturally Occurring Radioactive Materials (NORM) in Industry

VIRTUAL EVENT

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## Management of Naturally Occurring Radioactive Materials (NORM) in the Republic of Tajikistan

### Introduction

One of the main and basic sectors of the Tajik economy is mining industry. As a result of mining activities, along with the extracted raw materials, a huge amount of natural radionuclides (NORM), which are present in form of impurities in almost any mineral raw material, are transported to the earth surface. During the last 20 years, issues on the need for NORM control in this industry are discussed at the national, regional and international levels in the materials of the IAEA.

A number of international projects have been initiated in the Republic of Tajikistan in recent years in order to assess the state of the impact of former and existing mining enterprises to the environment and provide assistance in solving environmental problems.

Currently, the State Unitary Enterprise “Fuluzoti nodiri Tojik” (SUE “Tajik Rare Metals”) is the only operating enterprise in the Republic of Tajikistan that has retained the potential for processing uranium ore and acid solutions of uranium concentrate after chemical leaching. There are 10 facilities contained uranium production wastes (tailings and dumps of rocks) on the balance sheet of this enterprise.

Adoption of the National Concept on rehabilitation of uranium ore processing waste tailings for 2014–2024 was an important step towards improving the situation in radioactive waste management field. The Concept determines the priority of rehabilitation work at certain tailings. The highest priority is the rehabilitation of the tailing in Istiklol city, followed by the Digmai tailing and off-balance ores and mine waters in Khujand city on the right bank of the Syr Darya river.

Main natural radionuclides in the content of the tailing dump at technologically increased concentrations compared to the natural background are the isotopes of uranium, thorium, radium and their decay products. For other non-uranium enterprises where waste with a high concentration of NORM can be generated, include the majority of enterprises associated with the management of mineral raw materials: mining and processing of raw materials, using natural mineral water, including drinking water supply companies, mining and coal burning, etc.

Waste from industrial enterprises of each field has its own characteristic features, which are determined, along with the specific activity of the NORM in the extracted or used materials.

Radioecological monitoring was carried out with a wide range of radiometric measurements at many deposits of rare and non-ferrous metals, gold ore, non-metallic minerals (fluorite, phosphorite, damburite, etc.) and various building materials. In ore deposits of industrial enterprises, NORMs are distributed both as an impurity in the main mineral resources and as a superimposed independent mineralization. Elements of the uranium and thorium series are widely developed in many host rocks as part of accessory minerals in placers, including gold-bearing ones.

The content of NORM was analyzed by gamma spectrometric method. The analysis results showed that the content of NORM in the samples of some mineral ores in Tajikistan is low.

In recent years, a number of laws and regulations have been developed in Tajikistan that have created a regulatory framework for the management of radioactive waste, regulate the treatment of ionizing radiation sources (IRS) and limit public exposure to natural radionuclides.

The main requirements for limiting the exposure of workers and the public to natural IRS are set forth in the “Radiation Safety Standards” (NRB-06) and the “Radiation Safety Regulations (PORB-08).”]

Irradiation of the population living in the areas where the uranium legacy sites are located, as well as dumps and tailings occurred in result from mining and milling of minerals is related to natural exposure.

According to Radiation safety regulations (PORB-08), it was determined that the requirements for ensuring the radiation safety of the population apply to regulated natural ionizing radiation sources: radon isotopes and their radioactive decay products in indoor air, gamma radiation of natural radionuclides contained in building products and materials, natural radionuclides in drinking water, mineral fertilizers, as well as in products manufactured using mineral raw materials and materials containing natural radionuclides.

Arrangements to reduce exposure from natural radiation sources should be carried out as a matter of priority for populations exposed to doses of more than 10 mSv/year.

Industrial waste management under production conditions, including its collection, temporary storage, processing and transportation, will be carried out without restrictions on the radiation factor.

Industrial waste with an effective specific activity of natural radionuclides up to 1,500 Bq/kg can be sent to landfills for burial of industrial waste without restrictions on the radiation factor.

Industrial waste with an effective specific activity of natural radionuclides in excess of 1500 to 10000 Bq/kg will be sent for burial to specially designated areas at the landfill for industrial waste. Moreover, the radiation dose of a critical group of the population due to the disposal of such waste must not exceed 0.1 mSv/year.

The procedure, conditions and methods for the burial of such industrial wastes will be established by local authorities in accordance with environmental legislation. The processing of industrial waste contained only natural radionuclides, in order to extract useful components from them is considered as management of mineral raw materials and materials with a high content of natural radionuclides.

Ensuring radiation safety during the usage of metal waste with a high content of natural radionuclides as scrap metal should be carried out in accordance with the requirements of the Norms and rules NP 03.004-11 "Requirements for ensuring radiation safety in the collection (preparation) of scrap and waste of ferrous and non-ferrous metals".

Transportation of industrial waste with a high content of natural radionuclides with an effective specific activity of natural radionuclides more than 10,000 Bq/kg is carried out in accordance with the requirements of the "Safety Rules for the Transportation of Radioactive Materials".

#### Conclusion

Based on analysis of legislative acts, information and materials of international publications, it is concluded that one of the main tasks is to reduce the amount of industrial waste contained natural radionuclides from industries by reuse and disposal, including if necessary with their dilution, as well as to reduce their severity in the field of preserving public health and a favorable environment.

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