National Contribution to the Organization and Carrying Out Monitoring Activities on Assessment of Radiation and Ecological Situation in Uranium Tailings of SE «Vostokredmet» - 15068

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ABSTRACT

In this paper, the legislation governing radiation safety and radioactive waste management in Tajikistan is described. The role and responsibilities of both the regulator and the user as they apply to the remediation of legacy sites are presented, as is the infrastructure for the monitoring of legacy sites. The challenges presented by radiological contamination in Tajikistan and Central Asia are discussed. National and regional commitments with respect to legacy sites remediation in Tajikistan are described.

INTRODUCTION

According to Law № 42,"Concerning Radiation Safety" proclaimed in Tajikistan on 1 August 2003, ,the Nuclear and Radiation Safety Agency, as part of the Academy of Science of the Republic of Tajikistan (NRSA AS RT) has been charged with the regulation of nuclear and radiation safety. The State Enterprise “Vostokredmet” [Industrial Association Eastern Combine for Rare Metals**]**, as producer, is charged with the monitoring of legacy uranium in northern Tajikistan. These two organizations form the basis for the implementation of the national and regional programs to assess the extent of the radiological contamination and remediation of legacy sites associated with uranium production.

An inter-agency council was established by the Tajikistan government as Governmental Decree № 471 on 2 December 2005 to coordinate all activities associated with radiation safety issues of projects involving the assessment and remediation of these legacy sites. The NRSA AS RT, as the regulatory authority, coordinates national and regional projects, but the operator of the projects is responsible for project implementation. NRSA AS RT and “Vostokredmet” actively cooperate with local governments bodies, Non-Government Organizations (NGO) and other organizations by providing public information on radiometric assays and radiation safety and the need to carry out remediation activities.

Mass media, including television, radio, and the printed press is used extensively for these purposes. Because the general public is concerned with high radiation levels, it is necessary to conduct seminars and training at the local level.

Issues associated with the legacy of uranium production have only recently become part of public discussions following the dissolution of the former Soviet Union.. Since uranium mining and processing activities have been centred in the northern part of Tajikistan, programs and projects dealing with the remediation of uranium tailings have been established there.

EXISTING PROBLEMS AND REQUIRED ASSISTANCE

Equipment and apparatus used in the "Vostokredmet" laboratory for monitoring activities has been provided by IAEA technical support and by number donor countries [1]. For both national and regional projects, portable high resolution gamma spectrometers were required to support a radiometric assay program.

In order to improve significantly the radio-ecological situation in Central Asia and to bring it in compliance with the objectives and recommendations of the ,IAEA and other international organizations the following are proposed:

- the establishing of a coordinating committee to deal with the management of uranium legacy sites in Central Asia
- the development and implementation of project on the safe management of uranium legacy sites in northern Tajikistan

The following five mine tailing sites listed in Table I, and shown in Fig. 1, have been identified as candidates for radiometric assay and future remediation

Table I: Mine Tailings Requiring Remediation

Location of Tailings	Required Action
Gafurov	remediate and hand over to national economy
Degmay	cover tailings with by local soil from adjoining hills
Taboshar	facilitate implementation of the EurAsEC project on remediation
Adrasman	transport residues to safe place
Khujand	apply advanced technology for purification of uranium mine water

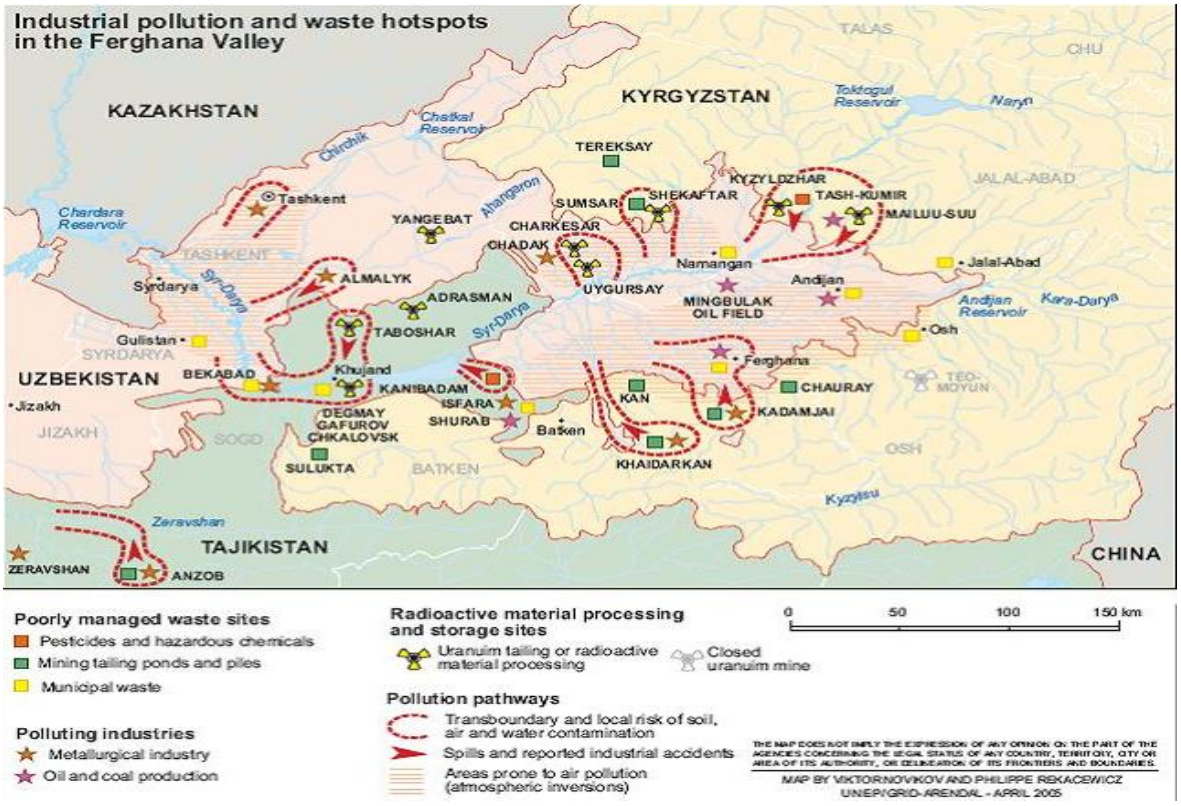

Fig. 1. Location of the Major NORM-containing Mine Tailing Sites

PROGRESS MADE IN LEGACY SITES REMEDIATION

Theoretical and practical training has been provided to laboratory personnel on the operation of the following equipment supplied under IAEA and NATO projects:

- X-ray spectrometer «Spectroscan makc-GF2E»
- Spectrometry for gamma and beta energies emissions SEG-B-01 «AKP»-63(G)-70(B)
- Portable digital spectrometer «InSpector 1000» (CANBERRA)
- Radon radiometer RRA-01M-03 with sampler G10U-01
- Radiometers MKS-07.
- Radiometer-dosimeter DKS-96AM
- Computers
- Alfa-radiometers «ISAA-97»
- Radon radiometer RGA-09m
- pH-meters

- Electric generator
- Bottom sampler with sludger
- Sinking pump
- Muffle furnace
- Air-filtering units.

Investigation into the uranium tailings and surrounding areas

The following investigations have been performed on the uranium tailings and area immediately surrounding these tailings [3].

- analysis and summarizing results of previously implemented works;
- gamma-survey, performed on foot;
- determination of the radionuclide composition of extracted waste, uranium ore reprocessing and soil contaminated soil;
- geochemical and biochemical investigations;
- atmospheric investigations including the removal of deposited airborne radioactive material, and extraction of radon isotopes extraction and their daughter products tailings and contaminated sites.
- hydrogeochemical sampling of wells and of and surface waters close to sites;
- radiometric assay and generation of radionuclide concentration contour plots of contaminated sites
- integrated characteristics of radon content in atmospheric air close to uranium tailings are measured using track detectors;
- monitoring survey over radiation situation and engineer-geological condition of tailings and other radiation-danger sites allowed identification of Taboshar as priority №1 site for remediation works [2].

Vostokredmet has experience on remediation of sites that are contaminated with radiological material. In recent years, some remedial work has been carried out on uranium tailings at Gafurov, Adrasman, and at “Maps 1-9” in Chkalovsk (Fig. 2).

Fig.2 Legacy site Maps 1-9 near Chkalovsk city.

The Government of Tajikistan is currently funding a project, carried out by "Vostokredmet" to develop criteria to determine the environmental hazards of contaminated sites, the relative ranking of the extent the hazards of these sites and remediation programs required to remove their environmental impact [4]: The budget for this project as a function of time in shown in Table II.

Table II: Annual Budget for Remediation of Uranium Tailings

Year	Somoni	US$ (approx.)
2009	200,000	47,500
2010	164,000	45,700
2011	250,000	56,800
2012	400,000	85,100

The Council on cooperation of the peaceful use of atomic energy under the Integrated Committee of Eurasian Economic Community (EurAsEC:) considered and approved the project of the Inter-state targeted program "Recultivation of EurAsEC member-states territories subjected to impact of uranium mining and milling industries" , during its 9th meeting on 17 November 2011 in Chkalovsk, Tajikistan.

Sites in Min-Kush and Kaji-Say villages in Kyrgyzstan and in Istiklol (formerly Taboshar) in Tajikistan were selected as priority sites. The total cost for Program is 40 million US$. The program has been divided into two stages as shown below:

Stage I (2013-2016)

Stage II (2017-2018)

This approach allows a decreasing risk of emergency situation occurrence with radiological consequences in the territory of the EurAsEC member-states, formulating means and remediation activities technology as well as to ensure safe conditions for living and social remediation of public in these regions.

Methodological approaches and project funding experience are extremely useful during practical implementation of national project, funded from the budget of the Republic of Tajikistan. A practical example involves the implementation of limiting access of unauthorized public and domestic animals to the territory that contains the Degmay tailings by the installation of a physical barrier between the contaminated site and the nearest residential area (currently in progress) and the restoration of gates with 24-hour control by guards

The Government of the Republic of Tajikistan pays great attention to radiation safety ensuring, public health protection issues and IAEA standards introduction in this field. Legislative documents in the field of industrial waste management are the following:

- RT Law "On nature protection" dated 27 December 1993 with amendments in 2004.
- RT Law "On production and consumption waste" №44 dated 10 May 2002 (with amendments in 2005).
- RT Law "On public health protection" dated 15 May 1997 (with amendments in 2005).

Laws drafts were developed and important ones were approved once Nuclear and Radiation Safety Agency under Academy of Sciences of the Republic of Tajikistan as regulatory authority was established in 2003:

- "About radiation safety" (Law № 42; 01 January 2003).
- "On use of atomic energy" (Law № 69; 09 December.2004).
- "About licensing of separate kinds of activities" (Law № 37; 17 May2004 with amendments № 277; 13 June.2007).
- Regulation “On state control in the field of ensuring radiation safety", approved by RT Governmental Decree № 482; 03 December.2004.

- Regulation "About licensing specifics of separate kinds of activities", approved by RT Governmental Decree №377; 01 September 2005.

Regulation “On Inter-agency-council on ensuring radiation safety” by RT Governmental Decree №471 was approved in 2005. Regulation “On inspector of NRSA AS RT” was prepared and approved the same year. Currently in the Republic of Tajikistan other documents are elaborated as well related to the sphere of radiation safety control which recently were approved or in the process of agreement and approval. These documents are listed in Table III.

Table III: Developed Criteria and Norms [5]

Sanitary rules "Norms of radiation safety" (SP-2.6.1.-001-06)
Basic sanitary rules on ensuring radiation safety (OSPORB)
Sanitary rules on radioactive waste management (SPORO).
Order of state accounting for and control of radioactive substances and radioactive waste
Requirements for ensuring of radiation safety during stocking and sale of scrap metal
Mineral raw materials and materials with high content of natural radionuclides management
Regulation on order for carrying out documents review, justifying ensuring nuclear and radiation safety, nuclear installations, radioactive sources and quality of declared activity
Order for organization an carrying out inspections by Nuclear and Radiation Safety Agency on sites activity of which relates to radioactive substances and sources of ionizing radiation management
Rules on radiation safety during transportation of radioactive substances and radioactive waste"

Under IAEA auspices, organizational and practical instruments preconditions for safety assessment have been established. Particularly, Tajik experts on analysis and safety assessment of uranium legacy sites were trained. One example is the joint visit of Tajik regulator and the operator to legacy sites of the “Wismut” company and other sites. Skills and practical experience gained from working with national experts have been applied in compiling national reports on safety assessment of former uranium industries. This has allowed the Agency to establish a licensing department.

In view of raising learning curve of national experts and their compliance with IAEA standards, it is proposed to organize detailed fellowships, scientific visits and additional trainings to those countries where positive experience on topical problems of monitoring and remediation works is available.

- Radio-ecological monitoring issues are responsibility of ecological laboratory under SE “Vostokredmet”.

- Environmental monitoring and technical surveillance programs over sites of former uranium industry were developed together with staff of NRSA. Practical monitoring implementation is carried out by means of sampling (water, air and soil) and their analysis.
- Radiation situation parameters are measured by equipment and apparatus delivered by IAEA.

CONCLUSIONS

Priority sites for remediation should be Degmay (with the purpose of dusting prevention and radon exhalation from its surface) and former uranium industry sites in Istiklol (water purification and determination of controlling zones). In accordance with preliminary calculation of SE "Vostokredmet" specialists the reference costs for remediation of these sites including pre-design, exploratory and design and of course physical works is around 200 million US dollars. Currently economics of Tajikistan doesn't possess such means and here international organizations and funds are necessary.

In conclusion it is necessary to mention that implementation of international projects with IAEA active participation facilitated to expanding cooperation and mutual understanding among Central Asian countries in issues of environmental protection. Re-establishment of radiation control system on former sites of uranium industry of the Republic of Tajikistan is the first step to their full remediation.

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