Remediation of Uranium Mining and Milling Tailing in Mailuu-Suu District of Kyrgyzstan

Description

Background

The uranium mining and milling activities in South Kyrgyzstan from 1946 to 1968 resulted in a legacy of 23 tailings (residues from ore processing) and 13 mine waste dumps located in the moderate mountainous terrain of the Mailuu-Suu District, 60 km north-west of Jalal-Abad and 25 km from the border with Uzbekistan. The tailings and dumps contain an estimated 3 million cubic metres of material covering an area of 44 hectares. The stability of many of the tailings is at risk as landslides, mudflows, rock falls and earthquakes are frequently occurring natural phenomena in this active tectonic ‘collision’ zone between the Eurasian and Indian Plates. Because of its important radionuclide inventory, its poor stability and the threat from landslides (it is situated under an overhang of soft terrain), tailing No. 3 is considered the most hazardous of the tailings in the area.

Four major landslides can potentially affect, directly or indirectly, the uranium ore processing tailings deposited along the Mailuu-Suu valley. In spring 2002 a mudslide partially blocked the river and in April 2005 an earthquake caused a massive landslide dangerously close to a tailings dump. Also the observed increased seismic activity in the Kyrgyz Republic, with 3000 registered earthquakes (10 to 20 severe) every year, increases the risk of occurrence of landslides.

The storage facilities for uranium waste and tailings were not constructed with adequate safety structures, and they are located near populated areas. The storage facilities are affected by precipitation and other environmental influences requiring annual maintenance. Washout of toxic metals and radioactive materials contaminates water, soil and vegetation, and moreover the river water could be severely contaminated by landslides pushing tailings down into the river bed or blocking the river and inundating tailings upstream.

The measures for remediation of the risks had not yet been systematically evaluated at the time. Therefore the European Commission programmed the present project in the TACIS 1997 nuclear safety programme.

Objective

The objective of the project was to identify risks (radiological and others), evaluate measures needed to reduce radiological exposure of the population and to prevent environmental pollution by radionuclides and heavy metals in case of loss of tailing impoundment tightness.
by landslides, and to propose sustainable remedial options/measures to be taken by the Kyrgyz authorities to reduce the risks for the population and for the environment from the radionuclides and heavy metals resulting from the previous exploitation of Uranium mines in the area of Mailuu-Suu. The specific objectives were to:

- analyse the risks.
- propose measures to monitor and to mitigate those risks.
- study and evaluate rehabilitation plans for tailing No. 3.
- implement the first steps of a pilot project on tailing No. 3.
- study and evaluate rehabilitation plans to decrease the impact of a disaster scenario.
- disseminate the project results.

The expected activities of the contractor were:

- Initial planning; subcontracting of field work.
- Stock taking of already existing data (reports, databases) with the assistance of the beneficiary.
- Collection of new data (reports, databases); sample collection and analysis.
- Selection, procurement and installation of monitoring and prevention devices and equipment.
- Implementation of a pilot project to mitigate the risks posed by tailing No. 3.
- Explaining the risks to the local population.
- Final assessment of risks and recommendations.
- On site and off site (in EU) training to Kyrgyz experts and local working groups with supply of teaching materials.
- Establishment, in agreement with the beneficiary, of a list of needed equipment and purchase of the equipment.
- Dissemination of project Results.

**Results**

The contract was signed in May 2001 with an initial duration of 2 years. The study work was completed within the two years and the final report was delivered in May 2003. However, extensions to the contract totalling 24 months were required in order to allow the procurement of equipment and to further support an effective dissemination of the project results through an additional task with a supplementary budget. The contract was completed in May 2005.

The specific objectives of the project were effectively achieved. Radiological monitoring was established and a database was created on radiological sampling, monitoring, and historic data of tailings/heaps. Input was also provided on dose assessment, geo-stability and hydro-geological monitoring. The completed risk analysis based on the radiological monitoring resulted in the immediate recommendation to restrict locally grown food in Kara-Agach, to increase ventilation in buildings, and to prevent access to tailings by constructing suitable fences.

The completed monitoring indicated the current situation was of no radiological concern except the special case of Kara-Agach. However, landslides could change the situation. Several long-term rehabilitation options for tailing No. 3 were evaluated based on criteria such as environmental impact, long-term sustainability and budget. Cost estimates were
provided. Options included stabilisation or relocation of the tailings, stabilisation of landslide risks and diversion of the river through a tunnel or channel. A pilot project was initiated to improve stability of the slope of tailing No. 3. Consideration was given to direct impact of remedial actions (e.g. dust, pollution of water) and long-term sustainability. The preferred long-term solution was to relocate tailing No. 3 to tailing No. 15.

Remedial actions (including relocation) for the tailings were elaborated in close cooperation with the authorities, especially the project partner, i.e. the Department of Monitoring, Forecasting of Emergency Situations and Treatment of Tailings of the Ministry of Ecology and Emergency Situations (MEE).

Regarding the equipment supply, it was intended to purchase the following lots of equipment:

**Part A**
- Lot 1: Monitoring Poles
- Lot 2: Extensometers

**Part B**
- Lot 1: Radiometers and TLD Dosimeters
- Lot 2: Individual Radiation Protection Sets and Equipment
- Lot 3: Radiation and Chemical Laboratory Equipment
- Lot 4: Panel Van 4x4
- Lot 5: Mobile Transceivers
- Lot 6: Computer and Printer plus Hand-held GPS System
- Lot 7: Digital Camcorder
- Lot 8: Agricultural Tractor with shovel and backhoe
- Lot 9: Electricity Generator
- Lot 10: Fencing with a total perimeter of 1.900 – 2.000m.

The contractor prepared the Technical Specifications for the procurement and launched a call for tender. The two lots of part A were tendered and purchased early in the project as they were needed for the implementation of the studies.

Unfortunately, however, the tendering of part B was not fully successful and only lots 6 and 10 could be purchased, which left the local authorities without the needed mobile laboratory and ground moving equipment.

The contractor promoted communication with the public. At a final meeting with the local population in Mailuu-Suu (30/06/03), the results on risk and remediation were presented. Additionally, a booklet was issued on ‘Safe life in Mailuu-Suu’ for the public on signs to detect hazards and on measures to take.

The project contributed to the overall objective on reducing radiological exposure and preventing environmental pollution. The comprehensive final report prepared by the contractor provided a sound basis for a substantial follow-up project funded by the World
Bank Natural Disaster Mitigation Project with financial support also from Japan, the Global Ecological Fund and the Kyrgyz Republic (total budget almost 12 MUSD). The Contractor disseminated the results at various international conferences and supported the World Bank follow-up.

### General Information

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