

Cleaning up from the Past Preserving the Future

by Peter Waggitt

The IAEA is assisting Central Asian States in the remediation of former Soviet uranium mining sites, also making sure that no new legacy is created.

During the historical period known as the Cold War, uranium mining was a central element in the large-scale production of nuclear weapons. In the former Soviet Union this activity, which began in the mid to late 1940s, was undertaken throughout its territory and that of its associated satellite countries, including the Central Asian Republics of Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan.

While uranium mining was undertaken on a large-scale for decades, by the time of the break up of the Soviet Union in 1991 only a small number of sites were still active. However, after 1991 many of the remaining uranium mining and processing sites ceased activity completely.

The environmental legacy of the extensive mining activity carried out in this region during Cold War times is severe. In most cases, there was little or no remediation of the mining and processing sites or waste disposal facilities when they were being used. In addition, many of these locations were simply abandoned following a downturn in economic activity. This situation did not improve much in the post Soviet Union era.

Even today, many countries, despite an improving economic outlook, lack adequate access to the extensive resources that are required to plan and implement a remediation programme. However, international help is at hand. Member States can rely on the IAEA's guidance and expertise to help rid their territories of this Cold War legacy.

A few years ago, the Central Asian republics of Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan requested assistance from the IAEA under the terms of the Agency's Technical Cooperation programme (TC) in the remediation of uranium mining sites in their territories. The IAEA's response was swift.

It assessed the situation and devised a Regional Project known as *Safe Management of Residues from former Uranium Mining and Milling Activities in Central Asia*. The programme commenced in 2005.

The rationale behind the establishment of a regional project that involved all four Central Asian Member States was clear. The four countries are close together geographically and have similar issues relating to the abandoned uranium mining and processing facilities within an area of similar climate. Thus to have such a project — which would encourage interaction and knowledge and experience sharing between the four Member States whilst also working to strengthen the local institutions and improve efficiency — offered the IAEA an opportunity to deliver a uniform service throughout the region.

The Plan

The project, which has been run into two phases (Phase 1 in 2005-06; and Phase 2 in 2007-08), has several objectives to be achieved within each participating Member States. These are:

- 1 to develop a regulatory framework and decision making process to assess the impact of radiological residues at former uranium mining and processing sites;
- 2 to evaluate the remediation works underway;
- 3 to ensure that international safety standards are being met; and
- 4 to develop a plan of action to minimize the impact of radioactive residues on the population and assist sustainable development.



Views of some of the sites being remediated with the help of the IAEA in Central Asia.

Photos: P. Waggitt

At an operational level, there are four main mechanisms within the project programme that are being employed to achieve these objectives. These are:

- ① holding workshops;
- ② implementing training activities;
- ③ supplying equipment; and
- ④ carrying out scientific visits.

The Nature of the Threat

Former mining and mineral processing sites contain many potential hazards to the environment and the population of the surrounding areas. The range of such hazards is considerable and can have attributes of different nature:

- physical (e.g., unstable waste rock piles, old buildings, open mine workings, pits and tunnels, derelict buildings and machines, water filled voids, etc.);
- chemical (e.g., ponds of contaminated water, acid drainage from reactive waste, old processing chemicals and residues); and
- radiological (e.g., uranium mill tailings, unprocessed uranium-bearing ore, scale and sludge in old plants, contaminated scrap metal etc.).

In Phase 1 there were four workshops, one in each Member State, which were held between June 2005 and October 2006. Participants were drawn from both the regulatory and production personnel in each Member State to ensure that both parties would benefit from the training. The workshops were structured to develop the skills and understanding of participants in relation to the planning and implementation of activities such as monitoring and surveillance of sites, site characterisation, remediation planning and reporting of results. In Phase 2 (currently under way) there will be one workshop per year to assess progress in the development of remediation work plans in each Member State.

Specific training activities have also been carried out using expert missions. These concentrated on training in field measurement and site characterisation techniques. The training provided was related to the equipment that was being supplied to each Member State under the procurement element of the project — both field and laboratory equip-

ment was supplied. It is worth noting that in many instances the same equipment was supplied to each Member State in order to improve the comparability of results. The issue of comparability had to be taken into consideration in view of the possible cross-border movement of contaminants, particularly in rivers. Some expert missions also concentrated on reporting and data handling skills, as these are essential elements in the preparation of remediation plans and funding applications.

The final activity was to enable participants to visit Germany's Wismut GmbH company, which is handling the world's largest single uranium remediation effort. Boasting a project cost estimate of Euro 6.4 billion, Wismut's experience is an important international reference for state-of-the-art remediation technologies used for the rehabilitation of radioactively contaminated sites. With their visit to the German company, participants from Central Asian Member States were able to witness first hand current remediation best practice in action and appreciate the scale, cost and complexity of the tasks that lie before them.

An Internationally Coordinated Effort

The IAEA's remediation project in Central Asia is dedicated to an area that includes the Ferghana Valley which is also a focus of assistance activity from other international agencies that are working in the region with projects relating to radioactive waste management and uranium mill tailings remediation. These include the World Bank, the Organisation for Security and Cooperation in Europe (OSCE), The North Atlantic Treaty Organisation (NATO), the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP).

One significant activity for the IAEA project staff has been to liaise with all of these international agencies to ensure that there is a minimum of overlap between activities and optimise the combined efforts. In particular, information relating to the areas of training and equipment supply has been shared amongst agencies, thus ensuring that the assistance available to Member States was optimised with no unnecessary duplication of effort.

Some Problems on the Way

In the past, both the regulators and operators of uranium mines were usually under the control of the

An Environmental Remediation Plan

The remediation of uranium mining sites is an expensive and complex process, involving significant financial, technical and human resources. Typically, a remediation plan includes the following preparatory steps:

- characterisation of sites to evaluate the extent and nature of all problems;
- determination of appropriate remedial actions; and
- preparation of plans for the remedial work all to be completed before actually undertaking the necessary works.

In many cases the legacies that remain from former uranium mining operations have been inventoried, but many details still remain to be clarified before the final remediation objectives can be determined. This will involve a considerable amount of further survey work and data collection, as well as establishing monitoring and surveillance programmes to ascertain if the present situations is stable. This allows to evaluate remediation progress and sustainability in the longer term.

An appropriate institutional infrastructure in each Member State has to be established and made functional. This will need to ensure that each state has in place the necessary legal framework of laws, standards and regulations to enable a regulatory authority to function. Governments will have to demonstrate support for the remediation programmes by ensuring that these regulatory authorities are independently administered and have adequate resources in terms of finance, equipment and staff.

same ministry and so there was little chance for the regulatory side to be independent. In many cases the need to maintain uranium production was the sole driving force. Often, this meant that safety rules, especially in areas of radiological and environmental protection, were not effectively enforced. For example, uranium mill tailings and process residues

would be left uncontained. Drainage waters from waste rock piles would be allowed to run into the environment without controls, while some radioactive residues, tailings and waste rock, were allowed to be used in housing construction as they were effectively 'free' building materials.

At present, the project in Central Asia has reached varying levels of achievement throughout the participating states due to a number of factors. One of the problems encountered has been that of lack of uniformity in the existing conditions.


Also, as some Member States have only basic support infrastructure for their regulatory agencies in the form of laboratories and field equipment, their abilities to implement systems based on international standards are hampered.

However, this situation is improving with time as the equipment and training delivered through the project are becoming effective.

No New Legacy

The safe remediation of legacy sites in Central Asia is important to the future security and safety of the environment and the population in the areas affected.

In addition, an interesting aspect of this project is the applicability of the experience gathered here to future mining operation. As the world uranium market is undergoing a renaissance, this project presents an opportunity to introduce modern international safety standards that could be employed in any future uranium mining operations, either at old sites or in new locations. There have been a number of inquiries from operators considering to return to some of these legacy sites which may have become economically viable in the new market situation.

The IAEA is keen to see that in this renaissance the need for legacy site remediation is not forgotten and that, above all, no new legacy sites are created. The longer term issue of funding for remediation programmes remains to be solved by others, but the present project should ensure that the essential remediation planning will be based on international standards and good science. 

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