

# Decommissioning and Environmental Remediation of Future Uranium Mines in Egypt

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The common definition of modern uranium mining lifecycle refers to the phases of prospecting and exploration, planning and licensing, construction and commissioning, operation, decommissioning, closure, remediation and long-term surveillance and monitoring.

Decommissioning is defined by the International Atomic Energy Agency as the administrative and technical actions taken to allow the removal of some or all of the regulatory controls from a nuclear facility. In another words, decommissioning means measures taken at the end of the useful life of the facility to retire from service in a manner that adequately protects the health and safety of those who have discontinued the service, the general public, and the environment.

Remediation of the environment for uranium sites includes decommissioning and cleaning of excess or abandoned structures on site, remediation of any contaminated water and soil, and remediation of the site to an appropriate level. Aspects related to remediation include: site characterization, waste management, water remediation, regulations and costs. The primary goal of environmental remediation is to protect the public and the environment. The remediation techniques include: drilling, surface stabilization, soil washing, chemical treatment, magnetic separation, electrical remediation, plant therapy, or biological remediation.

The first step required in the remediation and recovery of former uranium facilities is collecting data on site characteristics and conditions which form the basis for environmental impact assessment, shutdown/shutdown plans, remediation programs, monitoring and final release of the site. The main factors that can affect the design and implementation of an environmental remediation program are: site topography; geology; hydrochemistry and climatology.

The uranium mine closure plan has to have two components; the phase-out or simultaneous closure plan (where the various land-use activities must be undertaken continuously and sequentially throughout the entire mining operation) and the final mine action plan (where the final mine-closure activities begin at the end of mine life). For the heap leaching tailing wastes, the formed piles must be reconfigured in order to integrate properly into the landscape and meet the geotechnical stability and corrosion requirements.

In Egypt, exploration and experimental mining of uranium ores were carried out in several localities such as: Abu Zenima (Sinai), Gabal Gattar, Abu Rusheid, Gabal Sella, Al-Missikat, Al-Ardiya, Um Ara, Al-Atshan and Umm Safi (Eastern Desert). However, some of these localities have been abandoned and closed for various reasons. Accordingly, an environmental remediation program is intended to be implemented aiming to prevent dispersion and environmental pollution by the left tailing wastes as well as protecting the workers against the undesirable consequences of the radon inhalation and gamma exposure.

For this goal, the radiation hazard parameters and characteristics have to be determined and appropriate radiation protection measures have to be verified and applied in these areas.

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