**TURKISH REGULATION ON DECOMMISSIONING FOR NUCLEAR FACILITIES**

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**ABSTRACT**

The regulation regarding the decommissioning of nuclear facilities is being developed to improve the regulatory infrastructure related to nuclear facilities. This new regulation is of great significance considering existing and planned nuclear facilities in Turkey. The purpose of the draft regulation on decommissioning for nuclear facilities is to regulate the rules to be applied during safely decommissioning of nuclear facilities. This draft regulation covers technical aspects of decommissioning such as protection of the environment, planning and management of decommissioning, and roles and responsibilities of the authorized persons in the decommissioning process of nuclear facilities. There are also other regulation covering clearance levels and release of sites from regulatory control, and intergovernmental agreements signed for Sinop and Akkuyu NPPs setting forth responsibilities of the operating organizations including the financial issues which are also given in this paper.

**I. INTRODUCTION**

Turkey has currently no nuclear power plant (NPP) in operation but two NPP projects are being implemented: Akkuyu NPP and Sinop NPP. Furthermore a uranium mining project application is received for Temrezli Site in Yozgat. Nuclear facilities in operation for long years are two research reactors located in İstanbul. TR-2 research reactor which is located in Çekmece Nuclear Research and Training Center of Turkish Atomic Energy Authority reached criticality with its 5 MW nominal power in 1981. TRIGA Mark II reactor with its 250 kW was commissioned in 1979.

The regulation being developed will be in line with IAEA documents; particularly IAEA GSR Part-6 “Decommissioning of Facilities”, IAEA WS-G-2.1 “Decommissioning of Nuclear Power Plants and Research Reactors” and IAEA WS-R-5 “Decommissioning of Facilities Using Radioactive Material” are taken as reference. Technical aspects of decommissioning; namely protection of the environment, planning, management and conduct of decommissioning, and roles and responsibilities of the operators in the decommissioning process of nuclear facilities, waste management during decommissioning, content of decommissioning plans are planned to be covered by this new regulation. Policy for decommissioning and for site usage after release from regulatory control has to be decided at the higher level legislation, i.e. law, white paper, etc., which are out of the scope of this paper.

**II. DRAFT REGULATION ON DECOMMISSIONING FOR NUCLEAR FACILITIES**

**Protection of people and environment**

* The normal operation dose limits for the exposure of workers and members of public shall be applied during decommissioning activities.
* A graded approach shall be applied in all aspects of decommissioning in determining the scope and level of detail for any particular facility, consistent with the magnitude of the possible radiation risks arising from the decommissioning.
* The final decommissioning plan shall be supported by a safety assessment addressing the planned decommissioning actions and incidents, including accidents that may occur or situations that may arise during decommissioning.

**Responsibilities of the Authorized Person**

* Operator shall determine and justify the decommissioning strategy in accordance with national legislation.
* Operator shall prepare and submit an initial decommissioning plan and its updates every 10 years for review by the regulatory body.
* Operator shall establish and implement an integrated management system and it updates regularly and submits for review by the regulatory body.
* Operator shall foster a safety culture in order to encourage a questioning and learning attitude towards safety, and to discourage complacency.
* Operator shall provide financial assurances and resources to cover the costs associated with safe decommissioning, including the management of the resulting radioactive waste.
* Operator shall notify the regulatory body at least five years before the permanent shutdown of the facility.
* Operator shall submit a final decommissioning plan and supporting documents for review and approval by the regulatory body to obtain an authorization for conducting decommissioning, in accordance with national regulations.
* Operator shall manage the decommissioning project and conduct decommissioning actions.
* Operator shall manage the remaining operational waste from the facility and all waste aroused during decommissioning.
* Operator shall ensure that the facility is maintained in a safe configuration during the period of transition following the permanent shutdown and until the approval of the final decommissioning plan.
* Operator shall perform safety assessments in support of decommissioning actions.
* Operator shall prepare and implement appropriate safety procedures, including emergency plans.
* Operator shall ensure that properly trained, qualified and competent staff is available for the decommissioning project.
* Operator shall perform radiological surveys in support of decommissioning.
* Operator shall verify that end state criteria have been met by performing a final survey.
* Operator shall keep and retain records and submit reports as required by the regulatory body.

**Management of Decommissioning:** Operator shall establish an integrated management system and this system shall provide a single framework for the arrangements and processes necessary to address all the goals of the operating organization, including goals relevant to decommissioning. These goals shall include safety, health, security, environmental, quality and economic elements.

**Decommissioning Strategy:** Operator shall complete all the decommissioning activities in 60 years. Operator shall release of site from regulatory control according to restricted use or unrestricted use depending on the site owner's demand.

**Planning for Decommissioning During the Lifetime of The Facility:** The authorized person shall prepare a decommissioning plan and shall maintain it throughout the lifetime of the facility, in order to show that decommissioning can be accomplished safely to meet the defined end state, in accordance with the requirements of the regulatory body.

Operator shall prepare and submit a pre-decommissioning plan to regulatory body with the construction licensee application.

Operator shall prepare and submit a final decommissioning plan to regulatory body before at least five years before the permanent shutdown decision.

**Conduct of Decommissioning:** Operator shall implement the final decommissioning plan in compliance with national regulations.

**Radioactive Waste Management in Decommissioning:** Radioactive waste remained from the operational activities at the facility and radioactive waste that is generated during decommissioning shall be disposed of properly by operator. If disposal capacity is not available, radioactive waste shall be stored safely in accordance with the national legislations.

**Completion of Decommissioning Actions and Termination of the Authorization for Decommissioning:** Site release of the nuclear facilities is regulated by “Regulation on Clearance in Nuclear Facilities and Release of Site from Regulatory Control”. During the completion of decommissioning actions, operator shall demonstrate that the end state criteria as specified in the final decommissioning plan have been met. TAEK shall verify the compliance with the end state criteria and shall decide on termination of the authorization for decommissioning.

**III. OTHER LEGISLATIONS AND REGULATIONS ON DECOMMISSIONING**

**Provisions of Intergovernmental Agreements (IGA):**

In accordance with IGA between RF and TR on Construction and Operation of NPP in Akkuyu site signed in 12.05.2010 and IGA between Japan and TR on Development of NPP’s and Nuclear Industry signed in 03.05.2013, project companies are responsible for the decommissioning of the NPPs, and project companies have to contribute to decommissioning fund 0.15 US Dollar cent/kWh.

**Regulation on Clearance in Nuclear Facilities and Release of Sites from Regulatory Control**

This regulation which has been in force since 2013 covers clearance limits for different scenarios in terms of activity concentration and/or surface contamination given for different radioisotopes. In this regulation;

* Clearance limits for radioactive substance and waste less than 1 tone,
* Clearance limits for radioactive substance and waste over 1 tone,
* Clearance limits due to direct use of metals,
* Clearance limits due to recycling of metals,
* Clearance limits for buildings which are decided not to be demolished or to be reused for a non-nuclear purpose,
* Clearance limits just for buildings which are planned to be demolished, and
* Clearance limits for building rubble which arise from demolition of building

are given separately.

This regulation also covers criteria for release of sites from regulatory control. Accruing to this regulation;

* Sites can be released from regulatory control for restricted or unrestricted use provided that site release criteria are met. After removal of site from regulatory control, effective dose exposed by critical groups cannot exceed 300 μSv per year.
* For removal of site from regulatory control, buildings preserving their integrity and rubble which are planned to remain on site should be cleared from regulatory control.
* After removal of site from regulatory control, site usage restriction can be applied to comply with the aforementioned dose constraint. Site usage restrictions and how to apply these restrictions are included in the application submitted for removal of site from regulatory control by the authorized person who is authorized for decommissioning of nuclear facility. Removal of site from regulatory control as convenient to restricted use can be done as long as complying with dose constraint.
* Site-specific levels for removal from regulatory control regarding activities of radionuclides on site are derived by authorized person for decommissioning of nuclear facility, based on the dose constraint, by taking into account site usage conditions after removal of site from regulatory control and all radiation exposure pathways.

This regulation was developed taking into account European Commission Reports 89, 113 and 157, and IAEA WS-G-5.1 “Release of Sites from Regulatory Control on Terminatıon of Practices” and IAEA RS-G-1.7 “Application of the Concepts of Exclusion, Exemption and Clearance”.

**IV. CONCLUSION AND FUTURE WORK**

The work on developing the regulation on decommissioning for nuclear facilities is of great significance, since it will fill the regulation deficiency and support regulatory infrastructure related to nuclear facilities when it is in force. Though it may not be seen as urgent taking into account schedule of NPP projects, Temrezli project of which the facility life is rather shorter compered to NPPs, and research reactors which were commissioned long years ago, decommissioning may be a concern for Turkey in the midterm. Decommissioning and waste management policy development studies have also to be completed.