SUPPORT REQUIRED FOR SAFETY MANAGEMENT OF DECOMMISSIONING OF RESEARCH REACTORS

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Abstract

In Egypt there are two research reactors in operation, the first research reactor (ETRR-1) went critical in 1961. The second one (ETRR-2) has commissioned in 1992. Both reactors are owned and operated by Egyptian Atomic Energy Authority (EAEA) and controlled by Egyptian Nuclear and Radiological Regulatory Authority (ENRRA). As bases for controlling the construction and operation of the reactors, there are several regulations available. Individual experts and expert organizations (TSOs) should know and take into account the relevant legislation and regulations and the regulatory requirements that are in force in the country whose regulatory body is being supported. On the basis of lessons learned from other experiences, this paper provides some insights into areas that a regulatory body needs to pay attention during decommissioning. Also, the regulatory aspects of the decommissioning process, such as the need for good interaction between the operating organization and the regulatory body and the preparation of adequate technical and regulatory rules for all decommissioning stages are discussed.

This work provides the regulatory body with the necessary areas for which TSO support/ advise during different stages of decommissioning process. These supports/ advices includes legal regulatory framework for decommissioning, decommissioning strategies, early planning for decommissioning, changes from operation phase to decommissioning, establish regulations and guides for decommissioning, immediate post shutdown activities, shutdown and preparation for dismantlement, preparation for dismantlement and acceptable end state .

In Egypt with lacking decommissioning experience, the regulatory body must also become acquainted with the subject, develop staff knowledge and a regulatory framework. Working from the beginning in a close relationship with the operator will help in anticipating regulatory changes that, in some cases, imply additional costs. This cooperation will add mutual confidence, and will also help to develop a safety culture in the decommissioned, which, in the long term, will also reduce costs.

1. Introduction

Each nuclear power plant, fuel cycle facility and nuclear research and test facility that is operating today will eventually reach the end of its useful life and cease operation. Indeed, several such facilities have already ceased operation. Operator of the facility will undertake a series of decommissioning actions that will eventually lead to a satisfactorily safe condition of the facility and an environmentally acceptable condition of the site.

The work is not intended to specify a preferred approach to regulate the decommissioning of nuclear facilities but rather to discuss the broad set of issues that may arise during decommissioning and which the regulatory body should be prepared to deal with in the framework of its regulatory system. The discussions in the paper relate primarily to reactors, but the decommissioning principles and the regulatory challenges apply to other nuclear facilities.

2. National TSO

In October 2011, the Egyptian Nuclear and Radiological Regulatory Authority (ENRRA) were established as an independent regulatory body (with the entire NCNSRC staff members). The research staff members of ENRRA with the acquired experience since 1984 have undertaken R& D work in the field of radiological and nuclear safety and have taken the role of an internal TSO. Also, the regulatory function was undertaken through committees which are mainly composed of the research personnel. In 27 Nov. 2017 law 7/ 2010 has been revised in order to further separate the former NCNSRC to rejoin the EAEA as a partly scientific research center with no regulatory function named: Nuclear& Radiological Safety Research Center NRSRC. It is one of EAEA centers, established by law no 211 for the year of 2017 and found on July 1st 2021as a scientific research center with a future vision to serve as TSO with response to the RB and other relevant governmental organizations in Egypt and neighboring countries.

2.1 Kinds of organizations may needs Services from TSO's

TSOs can provide the breadth and depth of services from technically competent experts needed to support many organizations, for example: Operating organizations, Research organizations, Reactor vendors, mining organizations, fuel fabrication, spent fuel treatment organizations, regulatory bodies, and governments.

2.2. Areas for TSO expert support [3]

The areas for which TSO expert support may be necessary include the following: Research activities; Licensing, review and assessment (relating to the management system, engineering analysis, safety analysis or independent verification); development of policy; Development of regulations and implementation of regulatory functions (e.g. inspections, enforcement, development of regulatory guidance); Advanced technical analysis and computer simulations and modelling; technical evaluations of tenders and technical specifications; emergency response support and guidance; assessment and evaluation of different professional views, and ensuring transparency in addressing these views; testing, measurement, inspection and analysis services; development of regulatory infrastructures; technical support for meeting the obligations of international conventions; legal or financial advice; communications support; staff training; and project management and administrative support.

2.3. Specific Area for TSO Expert Support [3, 8]

2.3.1. Regulatory guidance

Regulatory guides are normally issued by the RB to recommend detailed operational and technical guidelines in order to ensure that legislative and regulatory requirements are satisfied. They are meant to explain to a licensee what the regulatory body considers to be good practice but may not necessarily represent obligations. The level of detail in regulatory guides may vary from one State to another one and is being influenced by several factors such as the number and extent of facilities and activities subject to the legislation

2.3.2. Regulatory Framework

The decommissioning of a nuclear facility generally proceeds through the stages below. In some cases the work proceeds uninterrupted to the final end state, while in other cases there may be long periods of relative inactivity between stages.

2.3.3. Decommissioning Strategies

One of the area for which TSO expert support may be necessary includes decommissioning strategy [8]. The original target of decommissioning projects, of returning sites to a ‘green field’ status, may be modified by the prospect of a renewed interest in nuclear energy and the possibility that existing sites will be reused for new nuclear facilities. Depending on the path chosen, decommissioning and dismantling of nuclear facilities may take a few years or several decades, especially for the larger ones. While the generally preferred strategy for decommissioning is ‘immediate dismantling’, there are many situations where ‘deferred dismantling’ can be justified, because of lack of funding, lack of waste management arrangements, social and political reasons.

3. Decommissioning of Small Facilities

Small facilities, such as research reactors and research laboratories, often present unique technical decommissioning problems. The financial and technical support available for the decommissioning of these facilities is usually limited and in countries with few or no other nuclear facilities this presents particular difficulties. This is an area in which the international organizations can be effective in providing advice and in facilitating the transfer of knowledge.

4. Social Aspects

While the negative consequences cannot be fully avoided they can be reduced through the involvement of concerned parties. In many countries it is now common practice for operators of nuclear facilities, on a voluntary basis, to maintain information centers for the publican to issue regular information bulletins by way of websites, publications and other means. It is also now common for the regulatory bodies to publish documents describing the systems, procedures and the technical guidance they apply to regulatory decisions.

5. Summary and Conclusion

This work has identified some of reported information and practical experience on the successful implementation of decommissioning projects. Important features and aspects that have special relevance to small facilities have been highlighted. It is concluded that careful planning and attention to detail, together with the implementation of the safety guidance given in Ref. [5], will result in the successful and safe implementation of decommissioning. Operators and regulators will need to work cooperatively to ensure that the information is preserved and included in the design and operation of all new nuclear facilities, as well as on-going decommissioning projects. A decommissioning project requires concerted efforts to ensure safety throughout its duration and therefore, can, depending of the decommissioning strategy, to put resource constraints on a regulatory body. Some important considerations that should be taken into account are:

- Stakeholders, including governmental departments, should be involved at an early stage before the physical activities commence.
- The resources deployed by the regulator should be commensurate with the nature of the decommissioning activity to be undertaken.
- It is important to ensure that the decommissioning strategy is appropriate.
- The regulator should verify the radiation doses that are projected for the planned decommissioning activities, since predicted doses for certain activities may be on the conservative side.
- There should be a plan to segregate the radioactive waste generated during decommissioning; the absence of such a plan this could lead to the inadvertent release of contaminated material.
- The regulator must recognize the need to take account of the regulatory requirements.

6. References

[1] INTERNATIONAL ATOMIC ENERGY AGENCY, Decommissioning of Facilities Using Radioactive Material, IAEA Safety Standards Series No. WS-R-5, IAEA, Vienna (2006).
[2] INTERNATIONAL ATOMIC ENERGY AGENCY, Status of the Decommissioning of Nuclear Facilities Around the World, IAEA, Vienna (2004).
[3] INTERNATIONAL ATOMIC ENERGY AGENCY, Global Inventories of Radioactive Waste and Other Radioactive Materials, IAEA, Vienna (2005) .
[4] INTERNATIONAL ATOMIC ENERGY AGENCY, The Long Term Storage of Radioactive Waste: Safety and Sustainability, A Position Paper of International Experts, IAEA, Vienna (2003).
[5] INTERNATIONAL ATOMIC ENERGY AGENCY, Use of External Experts by the Regulatory Body, IAEA Safety Standards Series No. GSG Part4, IAEA, Vienna (2010).
[6] INTERNATIONAL ATOMIC ENERGY AGENCY, Governmental, Legal and Regulatory Framework for Safety, IAEA Safety Standards Series No. GSR Part 1, IAEA, Vienna (2010).