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Nuclear Safety Code

Volume 8

Decommissioning of nuclear facilities

8.1. INTRODUCTION

8.1.1. The objective of the regulation

8.1.1.0100. The objective of this regulation is to define nuclear safety requirements applicable during planning and execution of decommissioning a nuclear facility, as well as dismantling of safety important systems, structures and components and demolition of nuclear facility buildings in order to cease operations and to terminate the supervision of nuclear authority.

8.1.1.0200.

8.2. DECOMMISSIONING STRATEGY AND PLANNING

8.2.1. Consideration of decommissioning during design, construction and operation phases

8.2.1.0100. During the design, construction, and operation of the nuclear facility the following requirements of nuclear facility decommissioning shall be considered, presented and justified in the safety documentation of the nuclear facility

a) decommissioning can be accomplished even at the technical level available at the time of design, construction and operation;

b) the amount of radioactive waste generated during implementation of decommissioning shall be as small as reasonably possible;

c) during decommissioning the radiation exposure of the population and people present at the site of the nuclear facility, as well as radioactive releases and the radioactive contamination of the environment shall be kept at the lowest level that is reasonably achievable;

d) such design, construction and operation solutions shall be applied, which support reducing radiation exposure during decommissioning;

e) the availability of design and construction data of the nuclear facility, the regular and continuous collection, analysis and evaluation of significant operational data, experience and documents shall be provided for the substantiation of the decommissioning plans; also

f) such design, construction and operation documents as well as the relevant requirements that substantiate decommissioning plans shall be adequately collected, archived and retained until the completion of the decommissioning of the nuclear facility.

8.2.1.0200. The licensee shall perform a base line survey for the comparison of the final state after decommissioning; the survey shall cover the radiation conditions of the site before construction. If no such base line survey had been performed in the past, the data of a similar, undisturbed site shall be applied as the pre-operation initial conditions data.

8.2.2. Site-level decommissioning strategy

8.2.2.0100. The licensee shall develop decommissioning strategy for all of its sites or site groups. If several nuclear facilities having different licenses are located at the same site then the connections and interactions of these nuclear facilities shall be considered in every nuclear facility-specific preliminary decommissioning plan.

8.2.2.0200. The strategy of possible decommissioning options and timelines shall be prepared and documented. Among the considerable factors nuclear safety and radiation protection aspects, the interaction of different nuclear facilities at a site, the possible burdens of future generations, as well as the possible loss of knowledge and expertise shall be examined. The report shall demonstrate the justification of the preferred option. The postponed decommissioning option shall be substantiated with detailed analysis.

8.2.2.0300. The strategy shall be in accordance with effective national strategies for decommissioning, for management and disposal of radioactive waste as well as with other national strategies and international commitments that affect the decommissioning strategy.

8.2.2.0400. The first decommissioning strategy shall be developed during the design phase of a new site.

8.2.2.0500. The licensee shall make a proposal on the final conditions in the decommissioning strategy, which shall be in accordance with the national programme of radioactive waste management.

8.2.2.0600. The licensee shall regularly review the decommissioning strategy but at least during the Periodical Safety Review and update it if appropriate. The decommissioning strategy shall be reviewed if a new nuclear facility is planned at the site.

8.2.2.0700. A review report shall be prepared on the decommissioning strategy which shall be submitted to the nuclear safety authority.

8.2.3. Site-level decommissioning plans in the design, construction and operational phase

8.2.3.0100. In harmony with the decommissioning strategy, the licensee shall prepare and update facility-level decommissioning plans, which consider the type and conditions of the nuclear facility with the application of a graded approach. Unless the nuclear facility is shutdown in an unplanned manner because of an accident or other reason, the facility shall be taken to the safe condition considering the approved decommissioning plans before commencing decommissioning.

8.2.3.0200. The preliminary decommissioning plan shall be prepared during the design phase of the nuclear facility.

8.2.3.0300. The preliminary decommissioning plan shall contain alternative concepts of decommissioning.

Regarding each concept the following shall be presented:

- a) the activities of decommissioning,
- b) the schedule of decommissioning,
- c) the workforce need of decommissioning,
- d) definition of important information regarding decommissioning, and
- e) the characterisation of the site after decommissioning.

8.2.3.0400. Regarding each concept the preliminary decommissioning plan shall:

- a) consider the fundamental nuclear safety issues;
- b) substantiate the fact that the decommissioning can be safely executed with the application of technology being proved or under development;
- c) include a general feasibility study on decommissioning;
- d) include considerations regarding environmental aspects of decommissioning, especially the management of radioactive waste and radioactive releases;
- e) contain an estimation of probable doses for both involved persons and population;
- f) cover the work costs of decommissioning and the methods of financing the costs; and
- g) include all those measures, which to a reasonable extent ensure the continuous employment of the significant members of the operational personnel, and that the information related to the nuclear facility is retained, regularly updated and accessible.

8.2.3.0500. A guideline shall contain the recommendations on the contents of the decommissioning plan.

8.2.3.0600. The licensee shall regularly (every 5 years) review the decommissioning plan, and update it if appropriate. During the review of the decommissioning plan the modifications implemented in the nuclear facility, changes in nuclear safety authority requirements and the development of technology shall be taken into consideration.

8.2.3.0700. Operational data, operational events and the effects of design basis accidents shall be taken into consideration during the preparation of the decommissioning plan of the nuclear facility. In the review of the decommissioning plan of the nuclear facility, the operational data and the occurred operational and extraordinary events shall be taken into account.

8.2.3.0800. The decommissioning plan shall be substantiated with appropriate safety evaluation of the decommissioning activities; the details shall conform to the type and condition of the nuclear facility with regard to the differentiated approach.

8.2.3.0900. In order to ensure their availability, those existing facilities and equipment shall be identified in the decommissioning plan that will be used during decommissioning. The necessary modifications of safety systems that exist and applied for operations shall be identified in the decommissioning plan, as well as the necessary new equipment and those to be replaced for the execution of decommissioning tasks.

8.2.4. Final Decommissioning Plan

8.2.4.0100. When the licensee decides to terminate the operation of the nuclear facility, the nuclear safety authority shall immediately be informed on the decision.

8.2.4.0200. Directly prior to the final shutdown of the nuclear facility the licensee shall finalize the the concept and execution method of termination, which shall be the basis for the Final Decommissioning Plan.

8.2.4.0300. In the final decommissioning plan it shall be presented, which documents of previous life cycle phases of the nuclear facility substantiate the plan, which of these documents are required to be retained, which data or documents shall be prepared and retained during decommissioning, and which data and documents shall be retained following the termination of nuclear safety authority supervision.

8.2.4.0400.

8.2.4.0500. The decommissioning preparation phase or the decommissioning phase may contain one or more safe enclosure periods. In the case of nuclear power plants having several units, or of modular interim storage facilities of spent

fuel different decommissioning phases may be under implementation at the same time.

8.2.4.0600. All nuclear fuel and other radioactive materials shall be removed from the nuclear facility during the preparation phase of the final shutdown considering the initial conditions of decommissioning specified in the Final Decommissioning Plan.

8.2.5. Updating the decommissioning plan during decommissioning

8.2.5.0100. Depending on the timeframe of the decommissioning, the licensee shall regularly review the final decommissioning plan during decommissioning activities and update it if appropriate. In these reviews of the final decommissioning plan, the changes in the decommissioning strategy, deviations from the schedule, modifications in the nuclear facility, changes in authority regulations and the development of technology shall also be considered.

8.2.5.0200. The licensee shall inspect the modifications of scheduled decommissioning activities with the use of a differentiated approach, in accordance with the safety classification.

8.2.5.0300. The licensee shall verify that the modifications of scheduled decommissioning activities do not endanger the safety of decommissioning in any way.

8.2.5.0400. The nuclear safety authority shall be notified of all updates of the final decommissioning plan.

8.3. EXECUTION OF DECOMMISSIONING

8.3.1. Safety classification

8.3.0.0100. Implementation of decommissioning can be started, if all the conditions determined in the decommissioning license have been realized.

8.3.1.0100. Safety classified systems, structures and system components may be categorized to a lower class or removed from classification if they lose their safety significance during performance of decommissioning activities. This shall be verified with the review of the safety report serving as the basis of classification for systems, structures and system components.

8.3.2. On-site nuclear emergency preparedness

8.3.2.0100. On-site nuclear emergency preparedness shall be planned according to a graded approach, in accordance with the potential risk meant by the nuclear facility. The contents of the On-site Nuclear Emergency Preparedness and Response Plan shall be composed accordingly; it may be based on the plan applied during operation phase, but it shall be reviewed based on the risks that may changed during decommissioning activities. In the case of nuclear emergency preparedness and response plans having smaller scope than the comprehensive

plan requiring the involvement of external organisations, their suitability shall be demonstrated in the safety report.

8.3.2.0200. The licensee shall develop a full scale On-site Nuclear Emergency Preparedness and Response Plan in cooperation with other involved responsible organisations, including public administration organisations. The required organisational structure shall be defined, and the responsibilities during nuclear emergency response shall be settled.

8.3.2.0300. The full scale On-site Nuclear Emergency Preparedness and Response Plan of the licensee shall define the boundaries of the site of the nuclear facility and the emergency planning zones, it shall also include:

a) the appointment of the person responsible for leading on-site nuclear emergency response activities and for communication with external organisations;

b) the definition of employee training requirements;

c) the list of possible emergencies, the combination of radiological and conventional emergency situations included;

d) the conditions and criteria for the announcement of a nuclear emergency situation, the list of job positions and functions that are authorised to make the announcement of a nuclear emergency situation and the introduction of devices suitable for the notification of personnel and administrative organisations;

e) the evaluation circumstances of on-site and off-site radiation conditions, especially the sampling of water, vegetation, soil and air;

f) measures that minimize the radiation exposure to personnel and that ensure medical attention for the injured;

g) the assessment of the state of the nuclear facility and on-site measures to reduce radioactive releases and spreading of radioactive contamination;

h) the chain of command and communication, the necessary devices and procedures included;

i) the list of nuclear emergency preparedness equipment that are stored at specific places, ready for use;

j) the executable actions of involved persons and organisations; furthermore

k) the conditions for announcing the end of a nuclear emergency situation.

8.3.2.0400. Equipment suitable for the transmission of information regarding emergency instructions towards persons located at the site shall be available.

8.3.2.0500. The On-site Nuclear Emergency Preparedness and Response Plan shall be submitted to the nuclear safety authority for approval, and its application shall be exercised in practice before the commencement of decommissioning

activities. Following the commencement of decommissioning activities nuclear emergency response drills shall be organised with appropriate frequency to ascertain that the Nuclear Emergency Preparedness and Response Plan and the nuclear emergency preparedness equipment are suitable. The participation of external organisations having responsibility during nuclear emergency response shall be granted.

8.3.2.0600. During decommissioning the licensee shall regularly review the Nuclear Emergency Preparedness and Response Plan with the frequency specified by the nuclear safety authority, and modify if necessary.

8.3.3. Feedback of decommissioning experience

8.3.3.0100. The licensee shall develop and apply a procedure for experience feedback, the systematic collection, screening, analysis and documentation of problems and events of the nuclear facility in order to ensure safe decommissioning.

8.3.3.0200. The licensee shall ensure that if the results of the event investigations are available, the conclusions are drawn, good practices are considered and timely and appropriate corrective actions are implemented in order to prevent repeated occurrences and to eliminate consequences that may endanger the level of nuclear safety.

8.3.4. Radioactive and non-radioactive waste management

8.3.4.0100. In order to appropriately categorise and manage the radioactive waste generated during decommissioning, the licensee shall develop, document and execute a radioactive waste management process for all waste streams that is in accordance with the regulations of the nuclear safety authority and the parliament resolution on the national policy for spent fuel and radioactive waste management and the government resolution on the national programme..

8.3.4.0200. The licensee shall develop, apply and document such procedures that ensure the separation of radioactive waste from non-radioactive materials; they shall be in accordance with the legislation and the national radioactive waste management programme.

8.3.4.0300. The licensee shall make arrangements, before the decommissioning, for processing, storage and transport of radioactive wastes expected to be generated during the decommissioning. The licensee shall ensure the traceability of the radioactive wastes generated during decommissioning from their generation until transport from the site. In order to that the licensee shall keep a record of all radioactive waste and other materials managed and stored on-site during the decommissioning operations, including the amount, origin, physical and chemical properties of the contained radioactive isotopes and the planned management, storage or disposal method.

8.3.4.0400. The licensee shall keep a record of all radioactive waste transported off-site, as well as of other materials generated during decommissioning activities and in this framework of the exempted radioactive wastes by material type, specifying the acceptor of the wastes.

8.3.5. On-site and off-site radiation monitoring

8.3.5.0100. The licensee shall implement an on-site and off-site radiation monitoring programme which shall be periodically reviewed and modified if necessary according to the changes in specific risks and releases related to the decommissioning of the nuclear facility.

8.3.6. Maintenance, testing and inspections

8.3.6.0100. The licensee shall develop and implement for decommissioning a documented maintenance, testing and inspection programme for systems, structures and system components having nuclear safety importance to ensure their availability, reliability and operability as specified in the safety analysis report. The programme shall take into account the Operational Limits and Conditions; the programme shall be revised based on experience.

8.3.6.0200. The licensee shall consider the ageing of systems, structures and system components in the maintenance, testing and inspection programme.

8.3.6.0300. For systems, structures and system components having nuclear safety importance the maintenance, testing and inspection programme shall define regular inspections or tests to ensure their reliability and to verify that they are suitable to continue safe decommissioning and, if necessary, corrective actions are implemented.

8.3.6.0400. Data related to maintenance, testing, supervision and inspection of systems, structures and system components shall be documented, retained and analysed. Relevant records shall be evaluated to discover starting or recurring faults to initiate corrective maintenance or to review the preventive maintenance programme.

8.3.6.0500. The repair of systems, structures and system components having nuclear safety importance shall be performed as soon as possible during decommissioning. Priorities shall be defined based on the relative safety significance of the faulty systems, structures or system components.

8.3.6.0600. Following any unusual event being significant for the safety of decommissioning the licensee shall execute all necessary corrective actions, including a review of inspection, testing, maintenance and repair.

8.3.6.0700. The licensee shall apply, review and, if necessary, modify the maintenance and testing programme while taking into account the rapid changes of the nuclear facility during decommissioning.

8.3.7. Safe Enclosure Period

8.3.7.0100. The nuclear facility shall provide passive safety to the most practically possible extent before a safe enclosure period commences. For that purpose the application of active safety systems, the frequency of instrumental inspection and human intervention shall be reduced to a minimum depending on their role in nuclear safety.

8.3.7.0200. Before a safe enclosure period commences the licensee shall prepare an appropriate safe enclosure programme, the execution of this programme shall guarantee nuclear safety and may not hinder future decommissioning.

8.3.8. Verification of decommissioning safety

The content and update of the Decommissioning Safety Report

8.3.8.0100. The licensee shall prepare the Decommissioning Safety Report which shall be utilized for the substantiation of decommissioning license applications and for the continuous support of safe decommissioning.

8.3.8.0200. The Decommissioning Safety Report shall cover all nuclear safety issues. A guideline shall contain the recommendations on the structure and contents of the Decommissioning Safety Report.

8.3.8.0300. The Decommissioning Safety Report shall especially deal with:

- a) the dynamic changes of the nuclear facility,
- b) the planning of the radiological attributes of the nuclear facility,
- c) the management of substantial amounts of radioactive materials,
- d) nuclear and other safety issues related to decommissioning and decommissioning operations, also
- e) unusual work environment.

8.3.8.0400. During decommissioning especially the following shall be considered as significant radiological risks:

- a) cutting up large amounts of activated and contaminated equipment,
- b) modification of safety barriers,
- c) entry to rooms of the nuclear facility that are inaccessible during normal operations,
- d) decontamination of large parts, and
- e) the spreading of radioactive contamination during decommissioning.

8.3.8.0500. During decommissioning especially the following shall be considered as significant non-radiological risks:

- a) lifting and moving heavy loads,
- b) the use of hazardous materials during decontamination, and
- c) the stability and dismantling of decontaminated structures.

8.3.8.0510. In the Decommissioning Safety Report it shall be described that fissile material has not accumulated before and will not accumulate during decommissioning in such an extent, which may endanger developing a chain reaction.

8.3.8.0600. The Decommissioning Safety Report shall include the design of new buildings and systems that are required by the decommissioning plan.

8.3.8.0700. The licensee shall prepare the Decommissioning Safety Report along with the decommissioning plan before the commencement of decommissioning activities.

8.3.8.0800.

8.3.8.0900. To substantiate the decommissioning safety report the licensee shall compare, through examinations, the nuclear facility to the last documented design information.

8.3.8.1000. The licensee shall keep the Decommissioning Safety Report updated with modifications and relevant new nuclear safety authority requirements. The Decommissioning Safety Report shall be reviewed as soon as any new information becomes available, with consideration to the nuclear safety significance of the alteration. Based on the safety report the licensee shall evaluate the nuclear safety aspects of the modification of the nuclear facility or decommissioning practice.

8.3.8.1100. Operational Limits and Conditions shall be reviewed in every case based on experience and if the modification of the nuclear facility or the safety report warrants it.

8.3.8.1200. The licensee shall keep the Decommissioning Safety Report up to date; it shall present the actual state of the nuclear facility during the decommissioning process based on the last version of the updated safety report.

8.3.8.1300. The licensee shall update the Decommissioning Safety Report at every significant phase of the decommissioning programme.

8.4. RELEASE OF THE SITE AND THE NUCLEAR FACILITY

8.4.1.0100. The nuclear facility shall be released from regulatory supervision only after achieving the final conditions of the decommissioning strategy; the site shall only be released if the requirements of Para 1.2.9 of Annex 1 are fulfilled.

8.4.1.0200. After the decommissioning of the nuclear facility a Decommissioning Safety Report shall be prepared, this shall be the substantiating document for the

release from nuclear safety authority supervision. In the Decommissioning Safety Report the history of the installation, operation and decommissioning shall be summarized, and then complemented with the experience that is useful for other nuclear facilities and the society. The Decommissioning Safety Report shall refer to the Preliminary Safety Analysis Report, the Final Safety Analysis Report, the Periodical Safety Analysis Report, the Decommissioning Safety Report as well as, if appropriate, their support documents and other documents generated during operations and decommissioning.

8.4.1.0210. The Final Decommissioning Report shall contain all the data that could be necessary for consideration of the risks and safety during all later use of the site.

8.4.1.0300. If the release of the site or the nuclear facility is initiated based on legislative criteria or released for restricted use, then a recommendation on restrictions shall be established to ensure the long-term fulfilment of nuclear safety.

8.4.1.0400. A draft of the institutional monitoring system shall be prepared that ensures the effective compliance with restrictions and the verification of fulfilment. The institutional monitoring system shall include technical and administrative measures, and information regarding the executing organisation and resources. The documentation of the institutional monitoring system shall demonstrate that the evaluation of the monitored parameters, with regard to the defined restrictions, ensures that the safety values that require restrictions are continuously adhered to, processes that result in exceeding these values are discovered and there is sufficient time to define and implement corrective actions. The documentation of the institutional monitoring system shall also ensure that the available resources can maintain the organisational inspection system.