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Management system requirements for small reactors

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1. Introduction

This abstract identifies the management system requirements for the life cycle of small reactors from initial conception through completion of decommissioning.

2. Key message

For small reactors, the requirements for management systems remain the same as those for 'large' reactors regardless of the licensee's business model and objectives.

3. CSA N286 Management system requirements

The CSA N-Series of standards provides an interlinked set of requirements for the management of nuclear facilities. CSA N286 provides overall direction to management to develop and implement sound management practices and controls, while other CSA nuclear standards provide technical requirements and guidance that support the management system. CSA N286 is based on a set of principles. The principles are then supported by generic requirements that are applicable to the life cycle of nuclear facilities. CNSC regulatory documents provide further technical requirements and guidance.

For CSA N286 many of the same management system requirements apply not only to each life cycle phase of a nuclear facility but also to all aspects of the management of the facility, including health, safety, environment, security, economics, and quality. Life cycle phase activities may also be delegated to suppliers, and therefore, the requirements of CSA N286 apply to these suppliers.

The standard may be applied in a graded manner to varying degrees commensurate with risk depending on the safety significance and complexity of the work being performed.

CSA N286-05, *Management system requirements for nuclear power plants*, is the current Canadian regulatory requirement for management systems. CSA N286-12, *Management system requirements for nuclear facilities*, is waiting for the Commission's endorsement to become a regulatory requirement.

4. Designing, fabricating, assembling and installing requirements

For the construction* of pressure-retaining systems and components CSA N285.0-12, *General requirements for pressure-retaining systems and components in CANDU nuclear power plants,* specifies the quality assurance requirements in Clause 10, *General requirements for quality assurance*. These requirements further refer to the following codes and standards:

- ASME Section III, NCA-3800, *Metallic Material Organization's Quality System program,* and NCA-4000, *Quality Assurance*
- CSA B51-09, *Boiler, pressure vessel and pressure piping code,* for Class 6 items
- CAN/CSA-ISO 9001:08, *Quality management systems — requirements,* supplemented with selected NCA-3800 sub-articles for metallic material organizations

For non pressure-retaining safety-related structures, systems and components the assembler or installer shall satisfy the quality assurance program requirements as prescribed in ASME NQA-1, *Quality Assurance Requirements for Nuclear Facility Applications*.

* An all inclusive term comprising of materials, design, fabrication, examination, testing, inspection, and certification required in the manufacture and installation of an item (CSA N285.0-12, §3 Definitions).

For the design, fabrication, assembly and installation of non safety-related structures, systems and components the following codes and standards provide acceptable methods and guidance:

- ASME NQA-1
- ISO 9001
- designers' custom requirements acceptable to the licensee

5. Application of other national and international codes and standards

Organizations from other countries will have their management systems or quality assurance programs organized around criteria based on their national or international codes and standards. Each code and standard having a different focus and constituency but primarily nuclear related.

Organizations that have elected to use such codes and standards need to demonstrate, such as in a matrix or other means, how their management systems or quality assurance programs comply with Canadian regulatory requirements. And, the measures to address any gaps.

6. Environmental management system

Environmental management system requirements fall under regulatory standard S-296, *Environmental Protection Policies, Programs and Procedures at Class I Nuclear Facilities and Uranium Mines and Mills*. It requires licensees to implement adequate environmental protection policies, programs and procedures set by ISO 14001:2004, *Environmental Management Systems—Requirements with Guidance for Use*, with supplementary requirements.

CSA N286-12 both permits and recommends that organizations develop a single management system that integrates all management system requirements – including those for protecting the environment.

7. Factory fuelled reactors

For factory fuelled reactors additional safety measures will be necessary for the receipt, handling and storage of nuclear fuel. This will include training and safety consciousness development for employees not accustomed to being around nuclear material. Manufacturing facilities in Canada may be subject to the *Class I Nuclear Facilities Regulations*, requiring additional safety control measures covering ‘commissioning’ and ‘operational’ activities.

8. Closing message

It is essential the licensee—if not performing any life cycle activities themselves—retain the capability to be:

- the “controlling mind” of those core activities for which the licensee has been granted; ceding that control to other parties would not be consistent with the principle that the licensee retains primary responsibility for safety

- the “design authority” which understands the basis of the safety case, and significance of ensuring that all activities are designed so as to keep the facility within the boundaries of the safety case

- an “intelligent customer” or “smart buyer” for the goods and services being provided