CNSC Power Reactor Operating Licence Reform

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Abstract

CNSC staff introduced a new Power Reactor Operating Licence (PROL) in order to strengthen the regulatory oversight of power reactor operation, while increasing regulatory effectiveness and efficiency by focusing on risk-significant issues and reducing purely administrative efforts. The PROLs have been simplified by incorporating a more risk-informed approach and by eliminating cascading references to working level licensee documentation and regulatory expectations.

To ensure that there is a common understanding for each requirement specified in the PROL, CNSC staff prepared a Licence Conditions Handbook (LCH), which provides technical details and compliance verification criteria on how licence conditions are to be met.

1. Introduction

PROLs are typically renewed by the Commission tribunal for a period of five years. However, several challenges in the PROLs have been identified since the coming into force of the Nuclear Safety and Control Act in 2000, such as:

- the lack of clarity in the licence conditions which are not commensurate with the risks;
- inadequate separation between responsibilities of the licensee and CNSC staff; and
- inadequate definition and tracking of the licensing basis.

These challenges have resulted in regulatory efforts on purely administrative matters rather than risk-significant issues associated with the verification of the manner in which the licensee implements their programs.

2. Administration of the Licence

Currently, Class I licences are issued by the Commission and can only be amended by the Commission. The lack of clarity in the licence conditions, including references to licensee documentation in the licence, results in many administrative licence amendments of low safety significance.

As an example, during the 2004-2009 licensing period for a PROL, there were 31 combined amendments processed by CNSC staff in response to over 50 request applications. In addition, CNSC staff and the licensee exchanged significant amounts of correspondence in order to adhere to current requirements in the licence. The total number of correspondence that CNSC staff received from and sent to the licensee exceeded 1400 letters per calendar year.

2.1 Licensing Process

The current practice of administrating the licence has led to CNSC staff being part of the licensee's process rather than, more appropriately, accepting the licensee's process and inspecting for compliance with the licence against regulatory requirements, and taking regulatory actions as appropriate. As a result, the clear separation between responsibilities of the licensee and CNSC staff has become blurred.

The structure and content of previous licences, and the numerous licence amendments, made it difficult for both CNSC staff and the licensee to track the licensing basis over time. To overcome this problem, staff introduced a LCH, which flows directly from each licence condition, to describe and document the intent and compliance verification criteria on how to meet the licence conditions.

2.2 NRU Lessons Learned

In 2007, the extended shutdown of the National Research Universal (NRU) reactor at Atomic Energy of Canada Limited's Chalk River Laboratories led to a review of CNSC practices. In particular, the following findings from the review were considered:

- need to simplify the licence format;
- consistent definition for "licensing basis" for all major facilities;
- process for selection of enforcement tools and ensuring their effective execution;
- process for conducting technical assessments for abnormal conditions or temporary deviations at major facilities; and
- process for action tracking.

2.3 Approach

The basic principles, underlying the revised PROL, can be defined as:

- the licensee is responsible for the safe operation of the plant whereas CNSC staff promotes safety, performs assessments, verifies compliance with the PROL and takes regulatory actions, as appropriate; and

- the PROL clearly defines the requirements of the Licensing Basis at the appropriate level of detail and applies these requirements in a graded manner that is commensurate with the risks.

CNSC staff believes that the implementation of these principles will strengthen the regulatory oversight of NPP operation, while increasing regulatory effectiveness and efficiency by focusing on risk-significant issues and reducing purely administrative efforts.

As schematically shown in Figure 1, the revised PROLs introduce a clear separation between the licensing and compliance activities. The PROL removes references to individual licensee documents and replaces them with conditions referring to a documented policy or program, specific requirements such as a CSA standard or CNSC regulatory document, and tables of numerical limits such as release limits. A key development is the advent of the new CSA standard N286-05 “Management System Requirements for Nuclear Power Plants. This standard enables an integration of several current PROL conditions by providing quality management principles and specific requirements in several program areas.

In addition, the current suite of available and published standards has enabled staff to propose a regulatory framework that is sufficiently prescriptive. The suite of CSA standards and CNSC regulatory documents in the licence include, among others, the following:

CSA Standards:
- N286-05 “Management System Requirements for Nuclear Power Plants”
- N285.4 “Periodic Inspection of CANDU Nuclear Power Plant Components”
- N285.5 “Periodic Inspection of CANDU Nuclear Power Plant Containment Components”
- N287.7 “In-Service Examination and Testing Requirements for Concrete Containment Structures for CANDU Nuclear Power Plants”
- N290.13 “Environmental Qualification of Equipment for CANDU Nuclear Power Plants”
- N286.7 “Quality Assurance of Analytical, Scientific and Design Computer Programs for Nuclear Power Plants”
- N293 “Fire Protection for CNDU Nuclear Power Plants”
- N285.0 “General Requirements for Pressure-Retaining Systems and Components in CANDU Nuclear Power Plants”
- ANSI/ANS-8 series and N292.3 standards regarding the nuclear criticality safety program.

CNSC Regulatory Documents:

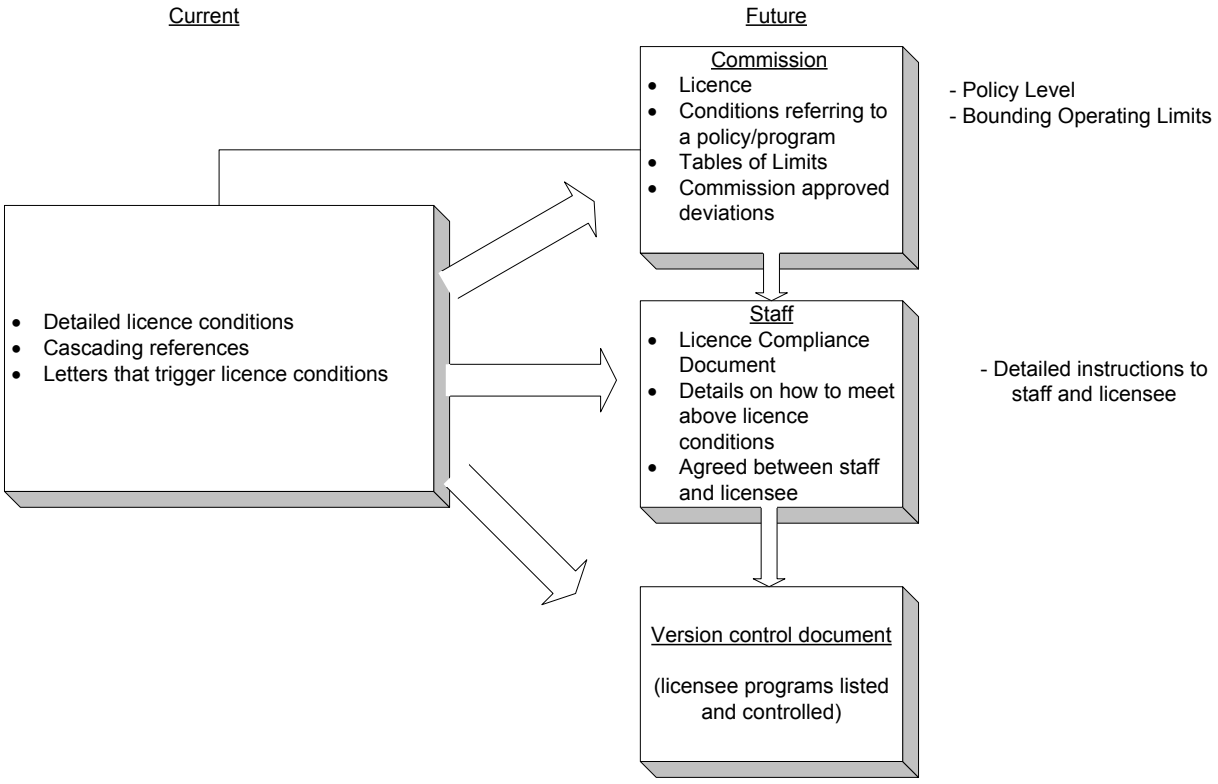
- S-99 “Reporting Requirements for Operating Nuclear Power Plants”
- RD-204 “Certification of Persons Working at Nuclear Power Plants”, CNSC document “Requirements for the Requalification Testing of Certified Shift Personnel at Canadian Nuclear Power Plants”, CNSC documents EG-1 “Requirements and Guidelines for Written and Oral Certification Examinations for Shift Personnel at Nuclear Power Plants”, and EG-2 “Requirements and Guidelines for Simulator-based Certification Examinations for Shift Personnel at Nuclear Power Plants”
- S-210 “Maintenance Programs for Nuclear Power Plants”
- S-98 “Reliability Programs for Nuclear Power Plants”
- S294 “Probabilistic Safety Assessment for Nuclear Power Plants”
- S-296 “Environmental Protection, Policies, Programs and Procedures at Class I Nuclear Facilities and Uranium Mines and Mills”
- S-298 “Nuclear Response Force Standard”
- RD-363 “Nuclear Security Officer Medical, Physical, and Psychological Fitness”

Further to the requirements specified in the PROL, the LCH provides technical details and compliance verification criteria in order to implement the licence conditions. During drafting of the LCH, the content was discussed with the licensee to ensure there is a clear understanding of the intent of each licence condition and that the LCH reflects the commitments of the licensee made in their applications at the time of renewal.

The LCH is administered and controlled by CNSC staff with strict version control and change management. Compliance activities consist of CNSC staff review and acceptance of changes in the licensee’s Management System policies; changes in operational programs; and operational changes of low safety significance. CNSC staff review and consent will be required only where explicitly stated in standards. It is important to note that the Commission controls the PROL and the basis on which the PROL was granted. Therefore, approvals of deviations from licence conditions and amendments to licence conditions are subject to the Commission hearing process.

In order to illustrate how changes to the PROL are handled with the revised format, an example is the requirement of the licensee to submit an updated Final Safety Analysis Report (FSAR) every 3 years. In the previous PROLs, the FSAR was referenced directly, and any change (despite the safety significance) required the lengthy process of approval from the commission tribunal (ie. Commission Hearing). However, in the revised PROL, the FSAR is documented in the LCH, and as long as the changes are within the licensing envelope, CNSC staff are able to review, provide consent and reference it as the analysis of record in a much more timely and efficient manner.

Figure 1: Schematic of PROL changes



3. Path Forward

As approved by the Commission in November 2009, Bruce Power was the first licensee to incorporate the revised PROL and LCH.
The plan is to implement the new licence format at all NPPs during the upcoming renewal cycle as established by the current licence periods of the PROLs. A similar strategy is being developed for all other Class 1 facilities, mines and mills.

4. Conclusions

The revised PROL will ensure appropriate regulatory oversight of power reactor operation and improve clarity, predictability and consistency of the licensing and compliance processes. It introduces a clear separation between review and acceptance of licensee's programs on paper at the time of licence renewal, and in the field compliance verification of the manner in which the licensee implements their programs. The revised PROL allows the licensee to implement continuous improvements following a CNSC accepted systematic and managed improvement process. Furthermore, it clarifies that the licensee remains responsible for the safe operation of the facility whereas CNSC staff will verify compliance with the licence and will take regulatory actions, as appropriate.