Licensing of New Nuclear Power Plants in Canada

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nuclearsafety.gc.ca
Outline

- A brief overview of the CNSC’s regulatory Philosophy
- Environmental Assessment & Site Preparation
- Construction
- Operation
The CNSC’s Regulatory Philosophy
The Licensee is the cornerstone of safety and is held accountable by their licence.

Section 24(4) of the *Nuclear Safety and Control Act* (NSCA)

No licence may be issued, renewed, amended or replaced unless, in the opinion of the Commission, the applicant:

(a) is qualified to carry on the activity that the licence will authorize the licensee to carry on; and

(b) will, in carrying on that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.
The applicant proposes, based on considerations contained in Regulatory Documents and applicable Canadian Codes and Standards how they will meet the requirements of the Regulations under the *Nuclear Safety and Control Act*. This allows the applicant to be flexible based on their unique licensing case. Additional review effort will be needed for novel approaches, and when alternative approaches to meet regulatory requirements are proposed.
• The applicant’s proposal is then reviewed by Staff against modern industry practices and documents under the CNSC Regulatory Framework.

• The proposal then goes before the Commission (public decision making forum) and if the Commission agrees, a licence is granted.
So What Does this Mean? (1)

- The applicant is expected to demonstrate long-term thinking (over the expected lifecycle of their project).
- The applicant is expected to be a “smart buyer”.
- The applicant is expected to propose and defend their safety case and how they plan to meet their obligations under the *Nuclear Safety and Control Act*. 
The applicant is expected to demonstrate they have adequately consulted stakeholders and considered their views. (potentially affected public, aboriginal groups etc)

The applicant is expected to show they have a Management System that will be capable of demonstrating oversight of all licensed activities.
Licensing Process (at a high level)

Focus: procedures needed to carry out the assessments of licence applications
NPP Licensing in Canada
Licensing Timeline

Aboriginal Consultation

Proponent Submits Project Description

EA and Site Licence (Panel Review)
  • EA (Determination)
  • Review EIS
  • Review Site Licence

Proponent Prepares Site

Review Construction Licence

Proponent Constructs Plant, Stage A (Fuel-out) Commissioning

Review Operating Licence & Stage A Commissioning Results

Stage B Commissioning (under GSS)
Review Stage B Commissioning Results

Stage C (GSS removal, 1st Criticality & Low Power) Commissioning
Review Stage C Commissioning Results

Stage D (High Power) Commissioning
Review Stage D Commissioning Results

Commercial Operation

Commission Issues LTC (2 Day Hearing)

Commission Issues LTO & permits Fuel Load (2 Day Hearing)

Commission or Delegated Person Approves Commissioning Hold Points

Hold Points
First Phase: Licence to Prepare Site and Environmental Assessment

- CEA ACT AND NSC ACT & REGS
  - JOINT REVIEW PANEL (CEAA & CNSC)
  - EAD & NMFLD
  - ENVIRONMENTAL ASSESSMENT
    - EIS GUIDELINES (RD-346, GD-368)
    - JOINT EA & SITE PREP ASSESSMENT PLAN
      - EA REVIEW PROCEDURE
      - SITE PREP REVIEW PROCEDURE
      - EA REVIEW PROCEDURE
      - SITE PREP REVIEW PROCEDURE
  - LICENCE TO PREPARE SITE
  - LICENCE TO CONSTRUCT
    - GUIDELINES FOR CONSTRUCTION LICENCE APPLICATIONS (GD-369)
    - CONSTRUCTION ASSESSMENT PLAN
      - CONSTRUCTION REVIEW PROCEDURE
      - CONSTRUCTION REVIEW PROCEDURE
      - CONSTRUCTION REVIEW PROCEDURE
  - LICENCE TO OPERATE
    - GUIDELINES FOR OPERATING LICENCE APPLICATIONS
    - OPERATION ASSESSMENT PLAN
      - OPERATION REVIEW PROCEDURE
      - OPERATION REVIEW PROCEDURE
      - OPERATION REVIEW PROCEDURE

- NSC ACT & REGS
  - CNSC COMMISSION
  - NMFLD

Guidelines for Construction Licence Applications: GD-369
Guidelines for Operating Licence Applications: RD-346

Canadian Nuclear Safety Commission
Environmental Assessments

Key Points:

- For a new NPP, environmental assessment (EA) is mandatory before the issuance of the Licence to Prepare Site.
- An EA ensures environmental effects of proposed projects are identified and evaluated.
- An EA must be completed with a decision that the project will not likely cause significant adverse environmental effects.
- The EA provides many opportunities for public participation.
- For new NPPs, the EA and assessment of application for a Licence to Prepare Site are concurrent, under a Joint Review Panel.
- Duration: EA process to take 24 months, but this assumes “complete” submissions.
Issuance of this licence will allow:

- Generic site development including installation of infrastructure needed to support the future construction project.
- Does not allow any NPP SSC concrete.
- If the applicant has not yet decided on a specific technology for the site, the licence can be issued in a phased manner.
  - First phase would not allow excavation of plant footprint
  - Second phase (under a licence amendment) would allow excavation of the plant footprint once the licensee has demonstrated their selected technology will remain within the environmental envelope established in the environmental assessment phase.
Key Points:

- Will span all construction and commissioning activities up to but not including first fuel load.

- Application constitutes safety case for the plant

- Applicant must demonstrate that the design of the proposed facility conforms to regulatory requirements and will provide for safe operation over the proposed life of the plant

- Applicant must demonstrate that there are no major safety issues outstanding when the Commission considers the construction licence application

- Applicant must demonstrate how procurement and construction will be managed and monitored to ensure plant is constructed as designed
A Word about Long Lead Items...

Before the licensee has a Licence to Construct, procurement of long lead Items is entirely at the licensee’s risk.

Process:

- Applicant obtains code class approval from the CNSC prior to start of manufacture to minimize project risk.
- Application to include procurement schedule and demonstrate all relevant regulatory requirements met.
- CNSC verifies the applicant performing adequate oversight of design, procurement and manufacture process.
- CNSC verifies acceptability of any third party inspection services contracted by the applicant.
Prior to item installation at the site under the *Licence to Construct*:

- Applicant dispositions any changes between the version of the code used to procure the long lead items, and the version of the code established for the construction of the plant via the construction licence (code effective date).

- Disposition report must be submitted to the CNSC in support of final code classification approval.
Construction Licence Application

Scope and depth is provided in GD-369 - Guidelines for Construction Licence Applications for Nuclear Power Plants

Criteria drives the applicant to demonstrate compliance with:

- RD-337 – *Design of New Nuclear Power Plants* (based on IAEA NS-R-1)
- RD-310 – *Safety Analysis for Nuclear Power Plants*

...as well as other key regulatory documents
Industry is looking for a greater degree of assurance that there will be no major obstacles to achieving the operating licence.

To give this assurance GD-369 seeks more information in the construction licence application. For example:

Information about the licensee’s organization with regards to readiness for Licence to Operate such as:

- Operator training + simulator readiness
- Progress on operating documentation development and readiness
- Fuel-in commissioning readiness

At the end of the Construction phase, there is an expectation by all parties that the plant will be at an advanced state of completion including continued smooth turnover to the operating organization.
GD-369 Emphasizes

- responsibility of applicant for all activities pertaining to design, procurement, manufacturing, construction, commissioning

- appropriate knowledge, skills & abilities for all persons involved in design, procurement, manufacturing construction & commissioning activities

- systematic control of procurement and manufacturing and of services purchased by the applicant, the applicant’s contractors, and their suppliers and sub-suppliers

- design and safety analysis
Consequences of Incomplete Application Information?

- delays to the licensing timeline as the CNSC and the Commission request the necessary information needed to meet expectations

  and / or;

  - additional licence conditions or hold points commensurate with the risk presented by the insufficient information
The applicant must demonstrate (examples):

- Appropriate management system, plans, programs and procedures have been developed and are in place to ensure safe operation of the facility.

- Sufficient plant construction, commissioning and turnover of SSCs to Operations has been completed to allow fuel load to proceed.

- Appropriate number of qualified and certified staff are in-place to ensure safe facility operation.

- All outstanding issues from the construction stage have been resolved to the satisfaction of the CNSC.
How is CNSC Preparing for Assessing Licence Applications and Conducting Regulatory Oversight?
Preparing for the Future

The CNSC preparing itself for the licensing assessment and compliance monitoring through:

- Development of technology neutral regulatory framework documents;
- Strengthening our project management framework;
- General technical familiarization;
- Additional resourcing;
- Vendor pre-project design reviews;
- Participation in MDEP activities;
- Other international activities (NEA, IAEA, Bilateral Regulatory arrangements);
- Pre-arranging contractual assistance as and when required;
Regulatory Framework vs Management System

Regulatory Framework

- Act
- Regulations
- Licences, Certificates and Other Mandatory Instruments
- Regulatory Documents
- Guidance Documents
  - INFO Docs

Management System

- MSM
  - Key Policy and Process Documents
  - Process Documents
    - Procedures
    - Staff Review Procedures
    - Forms and templates
    - Management System Standards
    - Non-procedural controlled documents

Internal Documents

Level 1

Level 2

Level 3

Level 4
Approach:

- Obtain reasonable assurance that the applicant is qualified to carry on the activities that the licence will authorize, and that the applicant will make adequate provision for the protection of the environment, and the health, safety and security of persons.

- Provide transparency and clarity, to maximize efficiency and effectiveness.

- Obtain reasonable assurance that the design meets all relevant regulatory requirements; that the facility can be constructed, commissioned and operated as designed; and that no new safety issues are expected to be identified upon reactor operation.
The regulatory review focuses on:

- Results of the site evaluation and input to design
- Independent peer review of safety analysis, and of compliance of the design against RD-337 requirements
- Design and Safety Analysis; assessing whether the proposed design and safety analysis, along with other required information, meet regulatory requirements
- Construction & Commissioning Programs
- Plans and timelines for activities to prepare for construction, commissioning and operation such as staffing and training
The regulatory review focuses on (continued):

- Applicant’s proposed management system oversight of the project, in particular regarding manufacturing and construction activities.

- Policies, strategies and provisions employed for radiation protection, emergency preparedness, environmental protection and the management of radioactive and hazardous waste.
Regulatory oversight verifies:

- Compliance with the Act, Regulations and licence.
- Compliance with programs, processes and procedures committed in construction licence application, and which form the basis for issuance of the licence.
Regulatory Oversight of NPP Construction & Commissioning

Oversight examples:

- Inspection, surveillance, reviews of construction activities.
- Inspection of configuration management and design change control.
- Review of commissioning test proposals, witnessing of commissioning tests, evaluations of commissioning test results, release of commissioning Hold Points.
- Inspections at manufacturer’s facilities.
- Assessing effectiveness of applicant’s oversight of construction and commissioning activities.
- Assessing effectiveness of staffing and training programs.