Siting Practices and Site Licensing Process for New Reactors in Canada

CNRA International Workshop on “New Reactor Siting, Licensing and Construction Experience”

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nuclearsafety.gc.ca
Overview of the Presentation

1. How is site selection and site evaluation conducted in Canada?

2. How much design information is needed to demonstrate a site is suitable for a new reactor project?

3. How does CNSC conduct reviews of submissions?
How is site selection and site evaluation conducted in Canada?
Site Evaluation

- Not federally regulated.
- Done by a proponent prior to submission of an application to the CNSC to confirm one or more sites will be suitable for the full lifecycle of a nuclear facility.
- Includes external effects on the site and the effects of the site on the environment.
Site Selection

Performed by the Proponent

Not regulated and CNSC is not involved

Unless the facility will be located on federal Crown Land, the choice of site is a matter between the proponent and the municipalities and provinces / territories involved.
In diagram form

INFORMATION GATHERING & INITIAL SUBMISSIONS

“Proponent” (pre-application) becomes “Applicant” once application submitted

NSCA = Nuclear Safety and Control Act

CEAA = Canadian Environmental Assessment Act

Apply site evaluation process to selected site

Consider potential sites

RD-346

High level plant design info

Information from site evaluation feeds into site specific plant design

REGULATORY ACTIVITIES

Environmental Impact Statement in support of Environmental Assessment Process

Application for Licence to Prepare Site

Environmental assessment accepted

Licence to Prepare Site issued

PARALLEL PROCESS: Prepare Application for Licence to Construct

CEAA = Canadian Environmental Assessment Act

NSCA = Nuclear Safety and Control Act
What is Site Preparation?

In General:

- Land clearing and grading
- Construction of the “Construction Camp” and Warehouses / Infrastructure needed to support the construction project. (this includes security infrastructure for the “construction island”)
- Excavation of Plant Footprint (if design has been chosen)

No construction of the actual plant is permitted at this stage.
What Level of Design Information is Expected to Demonstrate Site Suitability in both the Environmental Assessment and Licensing Processes?
Remember:

The proponent needs to be a "Smart Buyer"!!
If using a “Bounding Envelope”

CNSC will not accept a “Black Box” bounding approach to defend site suitability in the Environmental Assessment and licensing processes.

Bounding limits **must** be based on a list of technologies being considered for the proposed site such that the bounding envelope will encompass all technologies being considered.

If the proponent wants to add another technology later that wasn’t on the original list, it will be expected to fit the Bounding Limits in the approved Environmental Assessment.
Managing Construction Licensing Risk

- The proponent has not yet selected a technology and/or design is not yet complete.
- Detailed **quantitative** design information not yet available
- CNSC will accept more **qualitative** information in support of the site selection case... but there will be an increased level of regulatory scrutiny during construction and operation licensing to validate the claims made.
Required Basic Design Information

- a technical outline of the facility layout;

- qualitative descriptions of all major systems, structures and components (SSCs) that could significantly influence the course or consequences of principal types of accidents and malfunctions;

- qualitative descriptions of the functionality of the SSCs importance to safety;

- qualitative descriptions of principal types of accidents and malfunctions to identify limiting credible sequences that include external hazards (natural and human-induced), design basis accidents and beyond design basis accidents (severe accidents);
The limiting source terms must consider accident sequences that could occur with a frequency greater than $10^{-6}$ per reactor year of operation. For those less than $10^{-6}$, but sufficiently close to this frequency, the rationale for not including them from further analysis should be provided.
Considerations....

- The design selected for construction must fit within the approved bounding envelope and meet the requirements of RD-337 *Design of New Nuclear Power Plants*.

- The applicant, using their chosen design will have to demonstrate compliance with approved EA mitigation and follow up requirements.

- It is in the applicant’s best interest to submit more rather than less design detail during the EA process as this decreases project risk at the construction and operation stages.
Getting to a Licence to Prepare Site:

How does CNSC Conduct Reviews of Submissions in a Timely Manner?
In diagram form

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PARALLEL PROCESS: Prepare Application for Licence to Construct
Environmental Assessment (1)

- EA is a process to predict the environmental effects of proposed initiatives before they are carried out
  - ensures environmental effects of proposed projects are identified and evaluated, and appropriate mitigation provided
  - must be completed with a decision that the project will not likely cause significant adverse environmental effects
  - provides many opportunities for public participation
  - minimizes or avoids adverse environmental effects before they occur
  - incorporates environmental factors into decision-making

- Subject to *Canadian Environmental Assessment Act (CEA Act)*
Environmental Assessment (2)

Only one federal EA required for the site preparation, construction and operation licensing phases of a nuclear power plant
Is the applicant qualified to carry on the activity that the licence will authorize?

Will the applicant, 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?

Subject to *Nuclear Safety and Control Act*
Managing the Reviews

To-date participating federal agencies (including CNSC) are held accountable to complete all EA and Licence to Prepare Site reviews in a 6 month review period. (CNSC leads the reviews)

Reviews require complex interactions between speciality disciplines (e.g. aquatic effects specialists and specialists involved in accidents and malfunctions analyses)

Requires disciplined project management by licensing and EA generalists within a project management framework.
Reviews are broken down into 6 packages:

- Package 1: Conformity Check, Description of the Project, Normal Operations
- Package 2: Environmental Baseline
- Package 3: Effects of the Environment on the Project
- Package 4: Project Accidents and Malfunctions
- Package 5: Effects of the Project on the Biophysical Environment
- Package 6: Consequences to Humans from Changes in the Environment
Each package is then broken down into review elements that can be executed by a small focused team of specialists.

Example: for the Licence to Prepare Site, one element would be:

“Description of Exclusion Zone and Proposed Layout of Structures Within the Zone”

At present, there are 70 review elements for both the Environmental Assessment and Licence to Prepare Site Reviews.
Staff Review Procedures

Each review element has a Staff Review Procedure to define the scope and depth of the review element.

- SP-001 - General Applicant Information

Staff Review Procedures are non-prescriptive and are used to “guide the experts”.

The team that performs the review has a Review Lead who controls execution of the review for that element.

A completed review results in a Review Report for that element.
Important: The Assessment Plan allows the Project Office to plan Staff effort in advance to ensure the plan can be executed in the required timeline while competing against other regulatory projects.
Hearings and Decisions

- The Review panel holds public hearings.
- The Panel then has a deliberation period and submits their EA report to the federal Minister of the Environment to obtain a decision from the federal government.
- If the federal government responds that the project may proceed, the Panel then renders a licensing decision.