ENVIRONMENTAL ASSESSMENT OVERVIEW FOR NEW BUILD REACTORS

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Abstract

New build nuclear reactor projects are subject to the *Canadian Environmental Assessment Act* and require an environmental assessment likely by a Joint Review Panel under the authority of the Canadian Nuclear Safety Commission. The environmental assessment is undertaken in a careful and precautionary manner to ensure the project does not cause significant adverse environmental effects and to identify mitigating measures. The paper gives a brief overview of this particular environmental assessment process for new build reactor projects and provides our perspective on how the proponent can improve the process efficiency.

1. Introduction

The purpose of this paper is to provide a brief review of the environmental assessment (EA) process for new build reactors in Canada, under the Joint Review Panel (JRP) process, and to provide our perspective on how the proponent can improve the efficiency of the proponent driven components of the EA process.

An EA is a regulatory requirement and is undertaken in a careful and precautionary manner to ensure the project does not cause significant adverse environmental effects and to identify mitigating measures. The EA is an effective means of integrating environmental factors into the planning and decision-making process in a manner that promotes sustainable development. The EA allows for the identification of potential environmental effects; it identifies the need for mitigation measures and whether significant residual adverse effects are likely; it ensures that the project does not cause effects either locally or in other jurisdictions; it allows for public participation; and, it enables a determination on whether a project should be approved to proceed to the licensing stage.

Environmental assessments are performed to demonstrate protection of the environment and are a regulatory requirement under the *Canadian Environmental Assessment Act*. Under Section 24(4)(b) of the *Nuclear Safety and Control Act* "No licence may be issued, renewed, amended or replaced unless, in the opinion of the Commission, the applicant will, in carrying on that activity, make adequate provision for the protection of the environment…". The EA allows the proponent to demonstrate that reasonable precautions have been taken to protect the environment throughout the lifecycle of the nuclear power plant - siting, construction, operation, decommissioning and abandonment. Regulators use the information provided in the EA to assess whether adequate provisions are being made for protection of the environment.

Successful completion of the EA is required to obtain the necessary licences from the Canadian Nuclear Safety Commission (CNSC), which includes separate licences to prepare site, construct, operate, decommission and abandon a nuclear facility. Also, the EA must meet both federal and provincial/territorial regulatory requirements. Environmental Assessment Cooperation Agreements exist between the Federal government and Provincial/Territorial governments of Alberta, British Columbia, Manitoba, Newfoundland and Labrador, Ontario, Quebec, Saskatchewan and the Yukon.

2. Regulatory Approach

The *Canadian Environmental Assessment Act* outlines the responsibilities and processes for carrying out EAs that involve the federal government. To initiate a project for a new build nuclear reactor the proponent prepares and submits an application for a "Licence to Prepare Site" to the CNSC and a "Project Description" to the Major Projects Management Office. The Major Projects Management Office is not part of the regulatory process, but has administrative and advisory responsibilities for EAs of major projects, such as new build reactors, to potentially increase the efficiency and decrease the time required for regulatory review and approval. The Major Projects Management Office serves as the single point of entry into the federal EA process for all stakeholders. It provides guidance to proponents and other stakeholders, coordinates project agreements and timelines between federal departments and agencies, and tracks and monitors the progression of major resource projects through the federal regulatory review process. The Major Projects Management Office also works collaboratively with other departments and agencies to identify areas where the federal regulatory process for major resource projects can be improved.

New build nuclear reactor projects are subject to the *Canadian Environmental Assessment Act* and require an EA by a Joint Review Panel under the authority of the CNSC. All federal and provincial environmental legislation and supporting regulations need to be considered in preparing the environmental study report. Applicable federal legislation includes, but is not necessarily restricted to the:

- *Nuclear Safety and Control Act,*
- *Fisheries Act,*
- *Canadian Environmental Assessment Act,*
- *Canadian Environmental Protection Act,*
- *Navigable Waters Protection Act,*
- *Transportation of Dangerous Goods Act,*
- *Species at Risk Act,* and
- *Migratory Bird Conventions Act.*

Other Federal and Provincial legislation will apply. In addition, International Atomic Energy Agency regulations and guidelines need to be followed along with guidance from

other international bodies [e.g., the United Nations Scientific Committee on the Effects of Atomic Radiation, the National Council on Radiation Protection and Measurement, and the International Commission on Radiological Protection].

3. The Environmental Assessment Process

The EA process can be divided into a number of components. These components should be essentially the same for all new builds, since the EAs for new builds require comprehensive studies and presumably will be referred to a Joint Review Panel. However, components may differ depending upon the jurisdictions involved and new initiatives put forward through the CNSC and the Major Projects Management Office. Major components of the EA process are described in the following sections.
Trigger for the Environmental Assessment

In the *Canadian Environmental Assessment Act*, a "project' means (a) in relation to a physical work, any proposed construction, operation, modification, decommissioning, abandonment or other undertaking in relation to that physical work, or (b) any proposed physical activity not related to a physical work that is prescribed pursuant to regulations made under paragraph 59(b). Under the *Canadian Environmental Assessment Act*, any one of the following conditions triggers the legal requirement for an EA:

- A Federal Authority (FA) is the proponent;
- A FA makes or authorizes payment, arranges finances, etc.;
- A FA sells, leases, transfers federal lands; and/or,
- A FA issues a permit or licence, or grants an approval enabling the project to be carried out such as those required from the CNSC for nuclear projects under the *Nuclear Safety and Control Act*.

When a proponent submits an application for a Licence to Prepare Site for a nuclear facility, the last condition triggers the requirement for an EA. The Project Description for a nuclear reactor, which is submitted to the Major Projects Management Office, will help determine the Responsible Authorities (RAs), FAs, and Provincial Authorities (PAs). The Project Description will also assist the RA to determine the type of EA required for the project, such as the JRP process. Once accepted by the RA (the CNSC) the EA process formally starts.

3.2 Responsible Authorities and Federal Authorities

One or more federal government departments will be designated as the RA for the EA, which will take the lead role for the EA. The CNSC is the lead RA for any new build reactors. Other potential RAs are the Department of Fisheries and Oceans for fisheries related issues and the Canadian Transportation Agency and Transport Canada for issues involving transportation. Other federal government departments may take the role of FAs and provide expertise throughout the EA process as well as to help evaluate the Environmental Impact Statement (EIS). The RA ensures that the EA is initiated as early

as practical in the planning stages and before irrevocable decisions are made. Every FA (federal department or crown corporation) that is in possession of specialist or expert information with respect to the project shall, on request, make available that information to the RA. Where another jurisdiction, usually a provincial department, has a responsibility to conduct an assessment of environmental effects, the RA may cooperate with the jurisdiction, in which case the provincial department is designated as a PA.

3.3 Comprehensive study

There are two types of EAs: screening EAs (majority) and comprehensive study EAs. Both types may be referred to a mediator or Review Panel, if there is potential for significant effects, significant public concern or uncertainty of effects. Nuclear reactors require a comprehensive study as they are included in the Comprehensive Study List Regulations [Part IV19(d) "Class 1A nuclear facility that is a nuclear fission reactor that has a production capacity of more than 25 MW (thermal)"].

3.4 Joint Review Panel

Review Panel, most often at the recommendation of the RA. Since there is significant public concern, EAs for new build reactors are likely the subject of a JRP. The JRP normally consists of three members: two commissioners appointed by the CNSC; and, one panel member appointed by the Canadian Environmental Assessment Agency. The Minister of Natural Resources recommends, and CNSC approves, the latter member as a "Temporary Commissioner" to the CNSC. Other members may be added to the JRP to represent other jurisdictions such as the provinces as PAs. This allows harmonization of provincial regulatory requirements with the Federal EA under the *Canadian Environmental Assessment Act*. The structure of the JRP allows the JRP to make decisions concerning both the acceptance of the EA and the Licence to Prepare Site. The JRP allows the option for having a hearing in which the EA approval and Licence to Prepare Site are addressed together. The JRP submits its recommendations to the Minister of the Environment through a Panel Report.

3.5 Environmental Assessment Guidelines

EA Guidelines are provided to the proponent to assist them in preparing the EIS. EA Guidelines for new build reactors are prepared by the CNSC in consultation with other RAs, FAs, PAs and the proponent, are reviewed by the public and are approved by the JRP. The EA Guidelines identify the nature, scope and extent of the information that must be addressed in the preparation of the EIS. In Ontario, Guidelines for new nuclear power plant projects have been issued for both Bruce Power [1] and Darlington (draft) [2]. The Guidelines are comprehensive and provide a framework for preparing a complete and accessible EIS. The proponent may provide more information in the EIS than requested by the Guidelines, but must address all issues in the Guidelines.

3.6 Public consultation

Comprehensive Studies require public consultation under the *Canadian Environmental Assessment Act* and it is the duty of the RA to ensure that public consultation is a component of the EA. A public consultation plan is developed by the proponent and submitted to the JRP for approval.

Consultation between the public and the proponent should be initiated at the earliest possible stage, preferably before the EA process is initiated. A public consultation plan, separate from the formal EA process, is required as part of the Project Description. Public consultation usually includes, but is not limited to:

- Public information sessions, including town hall meetings;
- Information meetings with local government officials, First Nations chiefs, councillors and elders, respected community representatives and other stakeholders;
- Notification of meetings, workshops and presentations using various media, such as advertisements and electronic communications;
- The development and maintenance of project information material (i.e., brochures and fact sheets); and
- The development and maintenance of appropriate feedback mechanisms to capture input from key stakeholders (i.e., telephone information line, website and public opinion research polls).

3.7 Environmental Impact Statement

The preparation of the EIS is the responsibility of the RA, but is usually delegated to the proponent, who must address the requirements provided in the EA Guidelines. The process of compiling existing data, identifying data deficiencies and acquiring new data usually starts prior to submitting the Project Description. Major data deficiencies and gaps often become apparent during the preparation of the Project Description. The time required to complete the EA process can be reduced if the proponent initiates a program to address deficiencies/gaps early in the process by consulting with regulatory agencies, and following EA Guidelines prepared for related projects (i.e., other new build reactors). After the EIS is submitted, the JRP conducts a public technical review, where they consider the comments of the RAs, FAs, PAs, Aboriginal groups, the public and other stakeholders. Following this review, the JRP may request the proponent to submit additional information, through a "Deficiency Statement". Once the JRP agrees that the intent of the EA Guidelines is met by the EIS report and any additional information provided in response to a Deficiency Statement has been provided, the process proceeds to public hearings.

3.8 Hearings

Hearings are an integral part of the EA and licensing process. The format for hearings under a JRP for a new build nuclear power plant has not been established. However, it is anticipated that hearings will exceed the 2-day hearing currently held under the CNSC licence hearing process. It is possible that a series of hearings may be required to address

different issues. The hearings give the public the opportunity to express their views to the JRP. The format and duration of the hearings will be determined by the JRP.
At the conclusion of the hearings, the JRP prepares a "Panel Report", incorporating the evidence presented by the public and other stakeholders. The Panel Report is then submitted to the Minister of the Environment and released to the public.

3.9 Licensing

Acceptance of the EIS allows the project to proceed, subject to other approvals. A positive response to the Panel Report from the Minister of the Environment results in the JRP and CNSC issuing the Licence to Prepare Site (assuming the combined EA and licensing option is chosen by the proponent), otherwise, then a separate hearing for the Licence to Prepare Site will be held through the CNSC process. The duties of the JRP end at this stage. All subsequent licence applications are submitted to and approved by the CNSC.

3.10 Follow-up monitoring program

A follow-up monitoring program is mandatory for Comprehensive Study and Review Panel EAs. The follow-up program provides verification that the results of the EA are accurate and that the mitigative measures were effective in minimizing the potential adverse effects to the environment. The design and implementation of the follow-up monitoring program is the responsibility of the RA, but is usually delegated to the proponent and approved by the RA (CNSC). The EA decision statement issued by the Minister of the Environment sets out the appropriate mitigation measures and follow-up programs, after consultation with the RA and FAs.

4. Proponent Timelines

There are no regulatory timelines for the proponent to complete their activities. However, the proponent and RA generally agree to a schedule after submission of the Project Description. The proponent can, through proper planning, reduce overall time to complete the EA. In our opinion, between 60%-70% of the time required to complete the EA process is proponent driven, largely due to the time required to collect and analyse data, prepare the EIS and address deficiencies. The amount of time required to collect and analyse data and prepare the EIS is mainly dependent upon the complexity of the site/project and the amount of information available before beginning the process.
For EA purposes, generally a minimum of 12 months of data collection spanning four seasons is required, followed by several months to analyse the data and prepare the EIS. Additional time may be required to address a Deficiency Statement. Time required to collect, analyse data and prepare the EIS will generally take the proponent about 18-24 months. In the case of the Bruce Power Ontario EA, about 21 months was required to conduct the EIS studies and prepare the EIS [3].

5. Regulatory Timelines

Most time periods specified for the JRP EA (Table 1) are from the Canadian Environmental Assessment Agency [4] and regulatory releases and are for guidance only. The average time to complete an EA by Panel Review is about 36 months. Mandatory minimum time periods for the stages of a Panel Review EA are given in Table 1. These are subject to change if streamlining initiatives proposed by Canadian Environmental Assessment Agency, CNSC and Major Projects Management Office are implemented and proved to be effective. In the Canadian Environmental Assessment Agency regulations, the total regulatory time requirements from submission of the Project Description to submission of the Panel Report should not exceed 396 days (approximately 13 months). If the Review Panel issues a Deficiency Statement, the process should not exceed 441 days (approximately 14.5 months) [4].

The CNSC has made a commitment to the Major Projects Management Office of between 30 and 36 months for the time for a Panel Review of a new nuclear power plant from receipt of the Project Description to the issuance of the first licence [5]. This includes targets of 18 months for approval of the EA and 21 months for the approval of the site licence once the EIS is received [6].

6. Proponent Optimization

The proponent has considerable control over the EA process timelines and is in control of: the preparation of the application for a Licence to Prepare Site and Project Description (required before the EA is initiated); preparation of a schedule for completing the EIS; undertaking the studies and preparing the EIS; and, addressing the deficiencies identified in the EIS. Ideally the proponent will have completed the site selection process before entering the formal EA process. It is the proponent's responsibility to ensure they have a suitable site before triggering the EA process. Site characterization should be well under way and in conformance with the IAEA Safety Standards Series "Site Evaluation for Nuclear Installations", Safety Requirements No. NS-R-3 [7] and with the CNSC Regulatory Document RD-346 "Site Evaluation for New Nuclear Power Plants" [8]. The proponent should initiate their public consultation process (Aboriginal, Public, Regulatory and Non-Government Organizations) early. The consultation process is important in that it allows the regulator to assess public support for the project and allows the public, aboriginal groups and the proponent to discuss and resolve issues and concerns at the earliest possible stage. Although it is advisable to initiate some consultation as early as possible, in some cases, public consultation process may not or cannot start before the proposed project is official, for reasons of proprietorship, investment issues, senior management decision or sensitivity to the public.

Before initiating the EA process, the proponent should make a decision on how the EA will be managed: in house or external consultant, and ensure that appropriate budgets are assigned to the project before initiating the EA. The proponent should also interact with the regulators early in the process before the EA Guidelines are prepared, to obtain their input, concerns, and expectations to ensure the EA will meet regulatory requirements.

The available guidelines can be used for general guidance until the project-specific EA Guidelines are issued, since little change in the Guidelines is expected with subsequent new build reactor projects. The initial sites proposed for new build reactors already have existing nuclear power plants, but different requirements would be expected for Greenfield sites. Therefore, field studies can be started early with minimal risk associated with performing the studies before the EA Guidelines are issued. However, RAs may point out that EA Guidelines are project specific and following this route may involve some risk.

7. Regulatory Optimization

The regulators have already taken a number of steps to optimize the regulatory process. New provisions are in place to address bottlenecks and they will be reviewed to ensure that they are working as intended. Recent optimizations in the regulatory process include:

- Formation of the Major Projects Management Office to administer the EA process (see comment before), identify bottlenecks and resolve them, and to make on-going system improvements;
- Minimal delay with respect to issuing EA Guidelines for the preparation of the EIS for new nuclear power plant projects as Guidelines are available for other sites to provide guidance [1, 2];
- No delays in decision affirming that all EAs are by JRP;
- Integration of decision for the EA and Licence to Prepare Site; and
- CNSC regulatory commitment to Major Projects Management Office of between 30 and 36 months for a JRP for new nuclear power plants.

8. Synopsis

For the EA of a new build reactor, EA related work should commence well in advance of the formal triggering of the EA process. This includes: establishing an EA budget, initiating public consultation, compiling environmental baseline data, performing site selection, preparing the Application for a Licence to Prepare Site and Project Description, identifying information gaps and initiating studies to address these gaps. The proponent should meet with federal and provincial regulators to better define EA requirements, e.g., update environmental baseline data and propose studies to address information gaps, discuss approaches and determine whether the proposed studies meet regulatory expectations. Guidelines from previous new build projects can serve as a guide for regulatory expectations on the level of detail required for the EIS. Once the Project and EA requirements are relatively well defined, a realistic schedule can be established for the EA. At this point, the Project Description can be submitted to the Major Projects Management Office and the application for a Licence to Prepare Site to the CNSC. The proponent should initiate writing the EIS early in the process, completing generic aspects of the report using previous EISs for Canadian new build reactors as a model.

Other sections should be written as complete as possible with the existing information, adding the site-specific detail as it becomes available.

Table 1
Regulatory Timelines for the Environmental Assessment of a New Build Reactor

Application to Prepare Site & Project Description	Submitted by proponent – proponent driven
Formal EA process initiated	45 days after approval of project description [5]
EA Draft Guidelines	60 days, 111 days recommended [4]
Public Review of EA Guidelines	45-90 days, 45 days minimum [4]
Final EA Guidelines	30 days after public review [9] < 90 days, may take considerably longer –24 months for Bruce Power new build
Appointment of Joint Review Panel	
Schedule Submission	90 days maximum following acceptance of project description [4]
Preparation and submission of the EIS	~18 months – proponent driven
Public review of EIS and issue of Deficiency Statement if applicable	Up to 14 days to announce start of public review, and a maximum of 6 months for public review, plus 1 month for Joint Review Panel to consider comments: 7 months total [9]
Public notice of Joint Review Panel Hearings	90 days[9] prior to start of Hearings
Joint Review Panel Hearing	Will occur within a period of 30 days[6]
Joint Review Panel Review	Recommended 120 days[4] for Panel Review, but we anticipate much longer
Panel Report to Minister of the Environment	90 days[9] after close of hearing
Government's response	Within 60 days [4] of receipt of the panel report

9. References

[1] CNSC, "Guidelines for the Preparation of the Environmental Impact Statement for Bruce Power's New Nuclear Power Plant Project", August 2008.

[2] CNSC, "Draft Guidelines for the Preparation of the Environmental Impact Statement for Ontario Power Generation Darlington 'B' New Nuclear Power Plant Project", September 2008.

[3] D. Moffett, M. Mayhew and J. Scongack, "Environmental Assessment Planning for Nuclear New Build in Canada", CNS Bulletin, Vo. 29, Iss. 2, 2008, pp.39 – 46.

[4] Canadian Environmental Assessment Agency, "Procedures for an assessment by a Review Panel", 1997, http://www.ceaa.gc.ca/013/0001/0007/panelpro_e.htm

[5] CNSC, "Process improvement initiatives for screening environmental assessments at the CNSC (Draft)", 2008, http://www.suretenucleaire.gc.ca/eng/pdfs/Draft%20EA%20Screening_e.pdf

[6] Major Projects Management Office, "Project Agreement for the Bruce Power New Nuclear Power Plant Project at Kincardine, Ontario between the Major Projects Management Office, Bruce Power, Joint Review Panel and the Canadian Nuclear Safety Commission", 2009, http://www.mpmo-bggp.gc.ca/project-projet/bruceontario-eng.php

[7] International Atomic Energy Agency, "Site Evaluation for Nuclear Installations. IAEA Safety Standards Series No. NS-R-3", 2003.

[8] CNSC, "Regulatory Document RD-346 Site Evaluation for New Nuclear Power Plants", 2008

[9] Canadian Environmental Assessment Agency, "Agreement to establish a Joint Review Panel for the New Nuclear Plant Project by Bruce Power within the Municipality of Kincardine, Ontario between the Minister of the Environment and the Canadian Nuclear Safety Commission and Agreement to establish a Joint Review Panel for the New Nuclear Power Project by Ontario Power Generation (Darlington) within the Municipality of Durham, Ontario between the Minister of the Environment and the Canadian Nuclear Safety Commission", 2008, http://www.ceaa-acee.gc.ca

10. Acronyms

CNSC	Canadian Nuclear Safety Commission
EA	Environmental Assessment
EIS	Environmental Impact Statement
FA	Federal Authority
JRP	Joint Review Panel
PA	Provincial Authority
RA	Responsible Authority