

## **APPLICATION OF CEAA TO WASTE REMEDIATION PROJECTS AT CHALK RIVER LABORATORIES**

M.H. Klukas, R.I. Lounsbury

### **ABSTRACT**

AECL has initiated a number of Waste Remediation Enhancement (WRE) Projects to address legacy liabilities and further improve waste management methods at its Chalk River Laboratories (CRL) site. The most advanced, is the Liquid Waste Transfer and Storage (LWTS) Project, which will provide a new Storage System for intermediate and high level radioactive liquid waste currently stored in ageing tanks at CRL. Before the project can proceed, an Environmental Assessment (EA) under the Canadian Environmental Assessment Act (CEAA) is required. Challenges of the EA process include timeliness of the process, effective public consultation and defining environmental performance levels at the conceptual design phase. This paper identifies steps taken by AECL, as the project proponent, to minimize the risk of delays in EA process. Recommendations for more efficient public consultation and defining environmental performance levels at the conceptual design stage are provided.

### **1. INTRODUCTION**

AECL's CRL site has been in operation for over fifty years and has various nuclear facilities and laboratories used for nuclear power research and the production of medical and industrial isotopes. The site has accumulated radioactive wastes from these operations and several of the nuclear facilities on the CRL site are redundant due to changing research and development needs.

The Waste Remediation and Enhancement Projects are focussed on addressing liabilities from waste storage, including older waste facilities that do not meet current practices for design and construction. The projects fall into three categories:

- Renewing infrastructure with a particular focus on projects needed to address health, safety and environmental and regulatory priorities;
- Improving waste management practices to reduce further liabilities; and
- Implementing infrastructure to enable decommissioning of CRL facilities.

All of the projects are linked to improvements in one of four elements of AECL's overall waste management strategy: characterization, processing, storage or disposal. The current set of projects varies from modest scale feasibility studies to construction of buildings and structures containing substantial nuclear processes. The most advanced of these projects, the Liquid Waste Transfer and Storage Project (LWTS), is providing a

long-term waste management solution for stored high and intermediate level liquid radioactive wastes.

A Screening Environmental Assessment under the Canadian Environmental Assessment Act is required for the project to proceed. The CNSC is responsible for the conduct of the Environmental Assessment and Environmental Assessment decision. The CNSC has delegated preparation of the Environmental Assessment Technical Study Report and Public Consultation to AECL.

The Five Year Review of the Canadian Environmental Assessment Act identified the need for a more effective and efficient environmental assessment process (Canadian Environmental Assessment Agency, 2001). Goals of a renewed process include a greater measure of certainty, predictability and timeliness for all participants and more meaningful public participation for environmental assessments. The paper, by example of the Liquid Waste Transfer and Storage Project, identifies challenges in application of CEAA to nuclear projects at the CRL site and steps taken towards a more efficient Environmental Assessment process. Three aspects of the process are addressed 1) Timeliness of the EA process, 2) Public Consultation and 3) Defining Environmental Performance Levels.

## **2. APPLICATION OF THE CANADIAN ENVIRONMENTAL ASSESSMENT ACT TO PROJECTS AT AECL SITES**

AECL performs environmental assessments for projects and activities at AECL sites to comply with its Environmental Policy and to support the CNSC in meeting the requirements of the Canadian Environmental Assessment Act. An EA process has been in place for over 20 years. Prior to the passage of the Act in 1995, AECL performed Environmental Assessments under the Federal Environmental Assessment Review Process (EARP).

Federal Environmental Assessments for nuclear projects at AECL sites are invoked through the CNSC regulatory approvals required for construction/modification or decommissioning of nuclear facilities. The CNSC as the responsible authority (RA) is responsible for the conduct of the EA and making the EA decision. CNSC practice, pursuant to Section 17(1) of the CEAA, has been to delegate the preparation of technical EA studies and a significant component of Public Consultation to AECL.

Since passage of the Act in 1995, AECL has completed Environmental Assessments for nine projects at AECL sites in Canada (two comprehensive studies and seven screenings). Seven screening assessments are currently underway. The largest category of projects requiring Environmental Assessments is decommissioning and waste management improvement initiatives (13 of 16 projects). The breakdown by project type is as follows:

- ***Decommissioning of shutdown facilities (8 projects):*** These have included Comprehensive Study for decommissioning of the Whiteshell Laboratories and Screening assessments for decommissioning of seven facilities at the CRL Site.
- ***Waste Management Improvement initiatives (5 projects):*** These have included Comprehensive Study for Upgrades to CRL's Waste Treatment Centre – a facility for

treatment of low-level radioactive liquid waste – and four Screening assessments for infrastructure improvements and/or expansion of Waste Storage Facilities.

- ***New Research and Operations Facilities (3 projects):*** These have included Screening assessments for two test facilities and a reactor for production of medical isotopes.

### **3. LIQUID WASTE TRANSFER AND STORAGE PROJECT**

Radioactive Liquid wastes stored at the CRL site have accumulated over a period of fifty years from research, operations and medical isotope waste production programs undertaken at CRL. The wastes include approximately 300 m<sup>3</sup> of intermediate and high-level radioactive liquid wastes, referred to as Stored Liquid Wastes and are stored in 21 storage tanks at CRL. The liquid wastes are stored in facilities that are up to fifty years old with the exception of the high level wastes from medical isotope production which are stored in a relatively modern facility constructed in the mid 1980's. The generation of these wastes has discontinued with the exception of some waste streams in the medical radioisotope program.

The project drivers are to:

1. Provide the infrastructure for continued safe storage of the liquid waste. Twenty of the 21 tanks are over fifty years old (the high level waste from medical isotope production are excluded from this category) and present a growing risk of leakage of radioactive waste to the environment.
2. Reduce the operational effort required to maintain the safe storage of the high-level wastes from medical isotope production. This waste will be conditioned through the addition of low Uranium-235 isotopic content uranium to the wastes to reduce controls and monitoring needed for continued storage.

The principle project is the construction and operation of a new Storage System that meets current standards for design and construction and has improved systems for waste sampling and retrieval. The Storage system will consist of two storage tanks with a combined capacity of approximately 500 m<sup>3</sup> and a 300 m<sup>3</sup> spare tank in the unlikely event of a major leak or tank failure.

The project is a significant step towards a long term management solution for the wastes. Current international practice for long term management of high- and intermediate-level liquid wastes is to convert these to a stable solid form such as glass. The project will place the waste in a form and facility suitable for feeding a future waste processing and solidification plant.

### **4. MANAGEMENT OF THE ENVIRONMENTAL ASSESSMENT PROCESS - TIMELINESS OF THE EA PROCESS**

The CNSC, as the responsible authority, defines the Environmental Assessment Process for meeting requirements of the Canadian Environmental Assessment Act. The

application of CNSC's EA process (2004a) to the Liquid Waste Transfer Project is summarized in Figure 1. Key EA submissions and milestones in the process include:

- AECL submission of letter of notification and Project Description;
- CNSC EA determination;
- AECL-led public consultation;
- CNSC determination of Project and EA Scope and issue of EA Guidelines;
- AECL submission of EA technical study report to CNSC – the technical study report forms the basis of the Screening Report prepared by the CNSC;
- CNSC/Federal department review of technical study report;
- Revision of technical study report to address federal reviewer comments;
- CNSC preparation of Screening Report;
- CNSC-led Public review of Screening Report
- Finalization of Screening Report and CNSC EA decision.

Formal approval of EA documentation (i.e. CNSC Environmental Assessment Guidelines, Technical Study Report, CNSC Screening Report) at various stages of the process is required. The approval process involves multi federal department review as required under the Federal Co-ordination Regulations (Canada Gazette, 1997), multi-department internal review within the CNSC. The multiple organizations involved in the approval process presents a significant risk for delays in the EA process.

The project has minimized delays in the EA process for the Liquid Waste Transfer Project primarily through regular interaction with the CNSC to help define expectations for AECL's Environmental Assessment documentation and AECL-led public consultation. Activities undertaken have included:

***1. Early Agreement with the CNSC on Required Content of the Project Description:***

The Regulatory Approval determination process is initiated through submission of a Letter of Notification and a Project Description to the regulator. These documents are used by CNSC Staff to determine Regulatory Approval and Environmental Assessment requirements. To minimize delays in CNSC determination of EA requirements, the project met with CNSC staff to discuss the project concept and obtain agreement on the information required in the Project Description.

***2. Discussions with CNSC on Public Consultation Requirements:***

Early in the EA process AECL obtained CNSC's views on public consultation requirements for the Project. The CNSC's preference was that AECL led public consultation activities be initiated prior to CNSC issue of EA Guidelines to provide early indication of public interest in the project. Public Consultation activities are detailed in Section 5.

### 3. *Agreement with the CNSC on Baseline EA Schedule:*

AECL's experience has been that to minimize risk of delays in the process, agreement with the regulator on baseline schedule at the outset of the process is essential. AECL provided dates for submission of EA documentation and obtained agreement with CNSC on the timeline for activities leading to the EA decision. Activities for which target dates were provided included:

- CNSC issue of EA Guidelines;
- AECL submission of technical study report to CNSC;
- CNSC/Federal department review of technical study report;
- AECL Revision of technical study report to address federal reviewer comments;
- CNSC preparation of Screening Report; and,
- Public review of Screening Report and CNSC EA decision.

The duration from submission of letter of notification, the start of the EA process, to EA decision is approximately two years. To date, delays in the process have been limited to the CNSC/Federal Department review of AECL's technical study report. The target date for review was 8 weeks whereas a partial set of comments was received after 11 weeks and a full set of comments received after 17 weeks.

### 4. *Meeting with the CNSC on Application of Environmental Assessment Guidelines:*

The scope of the project and environmental factors to be considered in the Environmental Assessment Study Report are defined in the Environmental Assessment Guidelines issued by the CNSC. AECL met with the CNSC to discuss the proposed approach to addressing guideline requirements and ensure this met CNSC expectations. Some of the areas requiring resolution included:

- ***Scope of Project:*** The scope of project clearly excluded decommissioning of the existing tanks from the project. The tanks will be decommissioned under a separate project. Monitoring requirements of the CRL site licence will continue to apply to the emptied tanks. As a result of federal reviewer comments on the EA Guidelines, CNSC requested via the guidelines that decommissioning of the tanks be described in the EA study. Agreement was reached with CNSC staff that discussion of the end-state of the tanks focus on existing secondary confinement features and monitoring requirements.
- ***Alternative Means of carrying out the project that are technically and economically feasible:*** CNSC EA guidelines identified alternative means of carrying out the project under the scope of factors for the environmental assessment. An agreement with the CNSC staff was reached on project components for which alternatives and rationalizations would be provided.
- ***Quantitative Analysis of Environmental Performance Levels:*** Discussions clarified CNSC expectations on project aspects requiring quantitative analysis

of environmental performance levels. CNSC indicated a strong preference for quantitative estimates for worker doses, emissions and waste volumes generated from project activities.

- ***Malfunction and Accident Events:*** Canadian Environmental Assessment Act requires assessment of environmental effects of accident and malfunction events that may occur in connection with the project. As neither CEAA nor CNSC prescribe probability of events requiring consideration, agreement with the CNSC was obtained on events that would be considered, and the level of detail of the assessment. It was agreed that the focus of the assessment would be on mitigation measures and contingencies to minimize impacts on the environment.

#### 5. *CNSC/Federal Authority Workshop:*

Prior to submission of the technical study report for CNSC/Federal Authority Review, AECL arranged a workshop for Federal Department Reviewers and CNSC staff. The workshop was held at the CRL site and enabled AECL to:

- Present technical environmental studies undertaken in support of the project and provide an opportunity for reviewers to raise questions and concerns they felt needed to be addressed in the technical study report;
- Provide reviewers first hand knowledge of the existing storage facilities and proposed site for the new Storage System; and,
- Provide reviewers a better understanding of the compliance programs and mitigation measures in place for protection of workers, public and the environment.

CNSC and AECL experience has been that such workshops have minimized delays in the EA review process.

## 5. PUBLIC CONSULTATION

AECL maintains an active Community Relations Program to ensure that the public, municipal and elected officials, media and interested stakeholders are informed of activities at the CRL site and to address CNSC requirements for Licensee Public Information Programs (CNSC, 2004b). The Community Relations Program includes updates to municipal and elected officials on a quarterly basis, outreach activities to public through participating in community events such as county fairs, and on-going communication to ensure concerns of stakeholders are addressed.

Public consultation is a cornerstone of the CEAA process and has two key objectives (Canadian Environmental Assessment Agency, 2001):

1. To provide interested persons and organizations a fair opportunity to contribute and to see how their contributions have been used;
2. To provide proponents and decision makers with better information about possible environmental effects and ultimately lead to better environmental assessments.

The CEAA leaves public consultation for screening assessments to the discretion of the RA. The CNSC, as the RA, has strong expectations for project-specific public consultation and requested AECL to undertake public consultation for the Project. AECL held project specific consultation activities at the outset of the Project and following completion of the Technical Study Report. CNSC will provide a further opportunity for public comment on the Environmental Assessment Screening Report prior to making an EA decision thus providing three separate opportunities for public comment. AECL-led public consultation activities included:

- Presentations to employees with the opportunity to comment;
- Letters to elected officials, First Nations community and special interest groups with invitations for briefings on the project;
- Open houses held in surrounding communities to describe the project to the public and provide opportunity for comment;
- Bulletins in community newspapers providing project information and invitation to comment; and,
- Project information posted on internal and external AECL's web sites.

A key challenge for AECL, in undertaking project specific public consultation activities, has been to attract public and stakeholder interest in projects and participation in public consultation events. The total attendance at four open houses held for the Liquid Waste Transfer and Storage Project was just 23 individuals. None of the external stakeholders contacted requested a briefing or other follow-up in response to the invitation for a briefing. Only one letter, one telephone call and one email were received in response to project information made available to the public.

Participants in open houses are often more interested in broader CRL site operations issues than in projects themselves. For example, questions received by the public are often of a general nature and relate to environmental monitoring at the CRL site and surrounding areas, broader waste management issues and decommissioning planning for shutdown infrastructure.

Possible reasons for the low public participation are the relatively large number of projects requiring consultation – the nature of the research establishment leads to constant modifications, familiarity of the local public with CRL operations, the fact that projects and environmental effects are largely contained within CRL site boundaries and the public's desire to see the big picture rather than project specific information.

In recognition of these factors, we suggest a more flexible approach be taken to public consultation for projects. A more effective means of undertaking public consultation would be multiple project public consultation at a higher level. Multiple project consultation could be undertaken according by project class (for example, decommissioning projects, waste management infrastructure improvements). Such an approach would also better serve the public interest in seeing an integrated picture of CRL operation issues.

## **6. DEFINITION OF ENVIRONMENTAL PERFORMANCE LEVELS AT THE CONCEPTUAL DESIGN STAGE**

The CNSC views environmental performance levels provided in Environmental Assessment documentation as 'limits' which the proponent is obligated to meet throughout the life of the project. CNSC staff have strongly recommended that the project provide quantitative estimates of project emissions and worker dose from project activities in Environmental Assessment documentation.

Environmental Assessments under CEAA is viewed a planning tool to be undertaken in the early stages of a project. To meet intent of CEAA and minimize regulatory uncertainty for project, it is desirable to undertake environmental assessment at the conceptual design phase of the project. Details on mitigation measures required to define environmental performance levels to a good level of certainty are often not available at this phase. The challenge for the proponent is to provide performance levels, which are realistic without detailed knowledge of design. For example, if unrealistically high environmental performance levels for worker doses and emissions etc. are provided there is the risk of extensive discussion on significance. If unnecessarily stringent levels are provided this may result in unnecessary expenditures to achieve these levels.

The EA process is just one of a number of mechanisms in place for management of environmental performance of facilities at AECL sites. The licensing process for new nuclear facilities requires documentation of safety and environmental performance of new facilities in safety assessment reports. The CRL operating licence requires AECL to maintain the following compliance programs related to Health, Safety, Security and the Environment that address on-going operation and anticipated modifications:

- Environmental Protection Program;
- Radiation Protection Program;
- Operating Experience Program;
- Emergency Preparedness Program;
- Nuclear Materials and Safeguards Management Program;
- Radioactive Material Transportation Program; and,
- Nuclear Security Program.

These programs impose a significant number of requirements on projects. For example, the Environmental and Radiation Protection program define administrative and regulatory limits for emissions and radiation exposures to workers. Compliance with these programs is a requirement of the CRL operating licence. A more efficient EA process should consider these mechanisms for managing environmental performance levels rather than requiring quantitative estimates at the conceptual design phase where information necessary to provide accurate estimates is not available.

## **7. CONCLUSIONS AND RECOMMENDATIONS**

The CNSC as the responsible authority is responsible for the EA process. AECL's experience has been that the proponent must take an active role to ensure that the EA process is predictable and timely. Key steps to ensure a timely EA process for the LWTS project have been regular interaction with CNSC to better define CNSC's expectations on contents of EA documentation and to reach an agreement on a baseline schedule for the EA process.

AECL recommends flexibility to hold multi-project public consultation to achieve more meaningful public consultation. This would better meet public's interest in obtaining an integrated picture of CRL site operations issues.

The EA process is just one of a number of mechanisms in place for management of environmental performance of facilities at AECL sites. Compliance programs, required as a part of the CRL site licence, define environmental performance levels which projects are obligated to meet. CNSC's EA process should provide more recognition of these mechanisms for management of environmental performance.

## **8. REFERENCES**

Canadian Environmental Assessment Agency (1992). Canadian Environmental Assessment Act, RSC40-41, Statutes of Canada, Elizabeth II, Chapter 37.

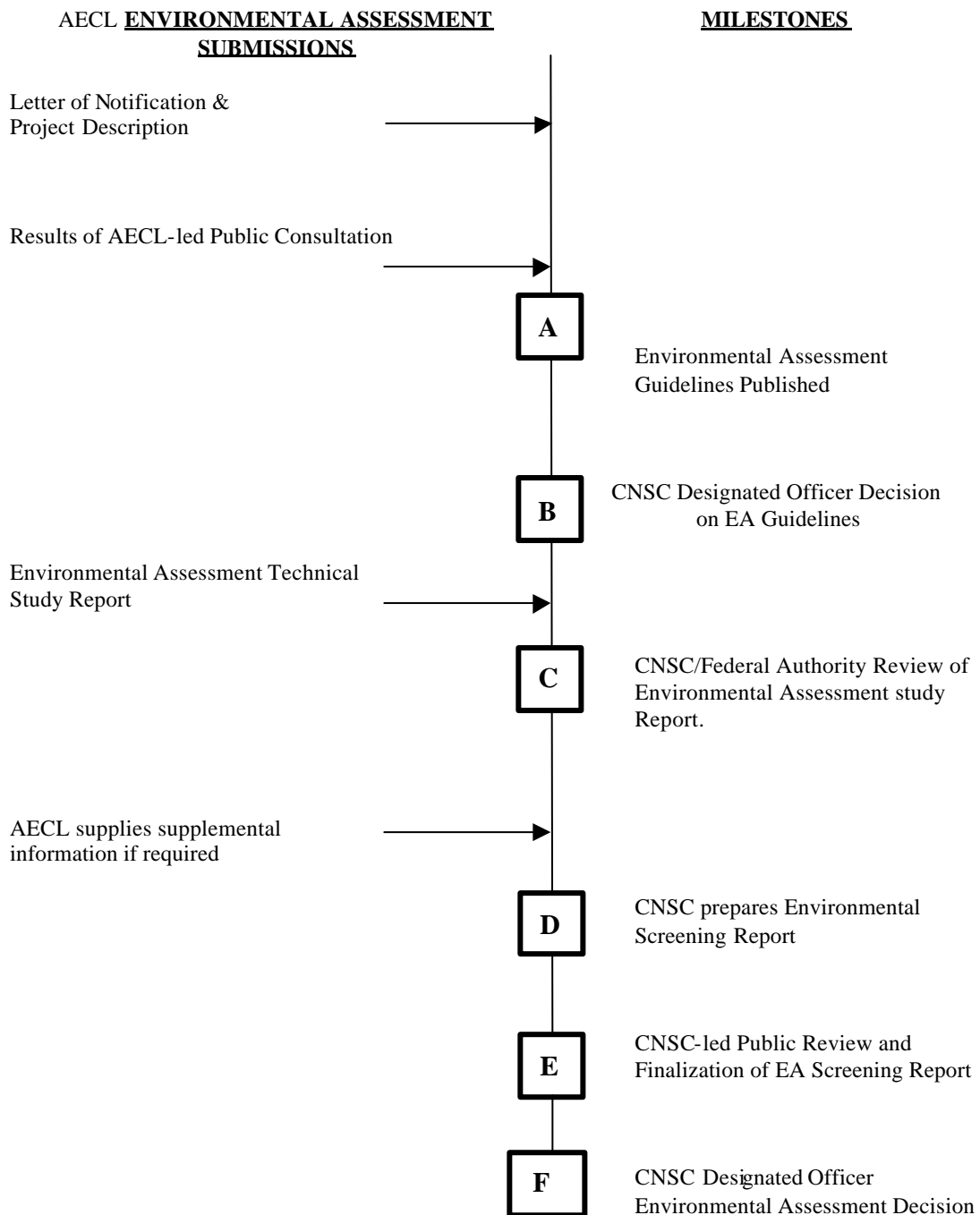
Canadian Environmental Assessment Agency (2001). Strengthening Environmental Assessment for Canadians. Report of the Minister of the Environment to the Parliament of Canada on the Review of the Canadian Environmental Assessment Act.

Canadian Nuclear Safety Commission (December, 2004a). Canadian Nuclear Safety Commission – Guidelines for Environmental Assessment pursuant to the requirements of the Canadian Environmental Assessment Act. Rev 2.

<http://www.nuclearsafety.gc.ca/eng/assessments/>

Canadian Nuclear Safety Commission (January, 2004b). Regulatory Guide, Licensee Public Information Programs. CNSC-G-217.

Regulations Respecting the Coordination by Federal Authorities of Environmental Assessment Procedures and Requirements. (1997 April). Canadian Gazette Part II, Vol. 131, No. 9. Registration SOR/97-181.



**Figure 1 Environmental Assessment Submissions and Milestones**