October 27, 2004

Mr. John Polcyn, President
Atomic Energy of Canada Limited (AECL) Technologies Inc.
481 North Frederick Avenue, Suite 405
Gaithersburg, MD 20877

SUBJECT: PRE-APPLICATION SAFETY ASSESSMENT REPORT (PASAR) FOR THE ADVANCED CANDU REACTOR (ACR-700)

Dear Mr. Polcyn,

On June 19, 2002, AECL requested that the U.S. Nuclear Regulatory Commission (NRC) conduct a pre-application review of the ACR-700 for licensing in the United States. AECL provided its proposed plan for NRC's pre-application review of the ACR-700 in a letter dated September 26, 2002. On December 18, 2002, AECL submitted an amended plan which expanded the scope of the NRC's pre-application review.

The NRC has conducted its ACR-700 pre-application review in two phases. Phase 1 consisted of a series of familiarization meetings designed to provide the staff with a general overview of the advanced CANDU reactor design. The objective of the Phase 2 review was to provide more specific and detailed information about the ACR design to facilitate the staff's review of certain focus topics in order to (1) prepare the pre-application safety assessment report (PASAR), and (2) provide feedback to AECL in time to support its application for standard design certification.

The focus topics addressed by AECL during phase 2 are:

Focus Topic 1- Class 1 Pressure Boundary Design
Focus Topic 2- Design-Basis Accidents and Acceptance Criteria
Focus Topic 3- Computer Codes and Validation Adequacy
Focus Topic 4- Severe Accident Definition and Adequacy of Supporting Research and Development
Focus Topic 5- Design Philosophy and Safety-Related Systems
Focus Topic 6- Canadian Design Codes and Standards
Focus Topic 7- Distributed Control Systems and Safety Critical Software
Focus Topic 8- On-Power Fueling
Focus Topic 9- Confirmation of Negative Void Reactivity
Focus Topic 10- Preparation of Standard Design Certification Docketing
Focus Topic 11- ACR Probabilistic Risk Assessment Methodology
Focus Topic 12- ACR Technology Base
Focus Topic 13- ACR CANFLEX Fuel Design

This report contains the staff's assessment of focus topics 1, 2, 3, 4, 6, 7, 8, 9, 11, and 13. The content of focus topics 5, 10, and 12 is incorporated in the discussion of the other focus topics. In each section of this report, the staff discusses what was reviewed and what guidance was used to review it, as applicable. The PASAR also identifies technical, regulatory and potential policy issues that will require resolution in the design certification review.

Some of the more important issues identified in the report include the treatment of limited core damage accidents (LCDAs) with scenario specific mechanistic source term based on probabilistic event frequency, applicability of Canadian codes and standards for the ACR-700 design, positive void reactivity during the initial checkerboard voiding of alternate fuel channels, and deviation of ACR CANFLEX fuel design from the past design certification process. These issues must be addressed by AECL during the design certification process.

On the basis of its review of the materials submitted by AECL, including responses to requests for additional information, the staff concludes that the applicant will need to pursue a number of technical issues in more detail to reach satisfactory conclusions for design certification. The policy, regulatory, and technical issues involved are complex. The staff expects that the review and evaluation of the ACR-700 design will be more challenging, will involve expenditure of more resources, and may take longer to review than a typical light-water design. Notwithstanding, based on the information provided, the staff believes at this time that AECL will ultimately be able to satisfactorily address these potential policy, regulatory, and technical issues during the design certification review.

SECY-01-0188, “Future Licensing and Inspection Readiness Assessment [FLIRA],” dated October 12, 2001, provides an estimated range for design certification duration of 42 to 60 months. The ACR-700 design certification process may take longer than 60 months due to unique design features.

The staff will develop detailed resource requirements and schedule for the ACR-700 design certification after we receive a complete design certification application. The resource requirements and schedule will consider the complexity and uniqueness of the design, efforts that have been completed during the pre-application phase, whether policy issues need to be addressed, the availability of NRC resources, and the priority assigned to the review.

Pursuant to 10 CFR 2.390, we have determined that the attached PASAR may contain proprietary information. We will delay placing this document in the public document room for a period of ten (10) working days from the date of this letter to provide you with the opportunity to comment on the proprietary aspects only. If you believe that any information in the attachment is proprietary, please identify such information line by line and define the basis pursuant to the criteria of 10 CFR 2.390.

The attached PASAR has been reviewed by the Advisory Committee on Reactor Safeguards which has agreed with the staff's assessment of focus topic issues by their letter of October 14, 2004 (ADAMS Accession Number, ML042890129). This letter also stated that the PASAR will provide excellent guidance for the subsquent certification process.

If you have any further questions regarding this review, please contact James S. Kim at 301-415-4125.

Sincerely,

/RA/

William D. Beckner, Program Director
New, Research & Test Reactors Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Project No. 722

Attachment: Pre-application Safety Assessment Report (PASAR) for the Advanced CANDU Reactor (ACR-700)

cc: See next page

If you have any further questions regarding this review, please contact James S. Kim at 301-415-4125.

Sincerely,

/RA/

William D. Beckner, Program Director
New, Research & Test Reactors Program
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Project No. 722

Attachment: Pre-application Safety Assessment Report (PASAR) for the Advanced CANDU Reactor (ACR-700)

cc: See next page

ADAMS ACCESSION NUMBER: ML042730033 *See previous concurrence

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ACR-700

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