

Record of Proceedings, Including Reasons for Decision

In the Matter of

Applicant Atomic Energy of Canada Limited

Subject Application to continue operation of the National
Research Universal (NRU) Reactor beyond
December 31, 2005

Date November 24, 2005

RECORD OF PROCEEDINGS

Applicant: Atomic Energy of Canada Limited

Address/Location: 2251 Speakman Drive, Mississauga, Ontario

Purpose: Application to continue operation of the National Research Universal (NRU) Reactor beyond December 31, 2005

Application received: June 10, 2005

Date(s) of hearing: October 18, 2005

Location: Canadian Nuclear Safety Commission (CNSC) Public Hearing Room, 280 Slater St., 14th. Floor, Ottawa, Ontario

Members present: L.J. Keen, Chair A.R. Graham
 C.R. Barnes M. J. McDill
 J.A. Dosman

General Counsel: J. Lavoie
 Secretary: M.A. Leblanc
 Recording Secretary: S. Gingras

Applicant Represented By	Document Number
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CNSC staff	Document Number
<ul style="list-style-type: none"> <li style="width: 50%;">• B. Howden <li style="width: 50%;">• G. Lamarre <li style="width: 50%;">• C. Nache <li style="width: 50%;">• S. Shim <li style="width: 50%;">• G. Cherkas 	CMD 05-H28 CMD 05-H28.A
See appendix A	Document Number

Licence: Amended
Date of Decision: October 18, 2005

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1. Introduction

Atomic Energy of Canada Limited (AECL) has applied to the Canadian Nuclear Safety Commission (CNSC¹) for authorization to operate the National Research Universal (NRU) Reactor beyond its currently scheduled shutdown on December 31, 2005 until July 31, 2006. The NRU reactor is located at AECL's Chalk River Laboratories, Chalk River, Ontario.

The NRU reactor operations are regulated by the CNSC under Nuclear Research and Test Establishment Operating Licence NRTEOL-01.02/2006. Condition 13.1 of that licence requires that the NRU reactor be shut down on December 31, 2005 unless authorized by the Commission.

The purpose of the proposed 7-month reactor life extension was to allow for operations while detailed analyses and regulatory reviews are completed in respect of AECL's application for a longer reactor life extension until the year 2012. No change was proposed in how the reactor would be operated.

During the course of the public hearing, and in response to a question from the Commission on the ability of AECL and CNSC staff to complete the assessment for the longer-term extension, AECL requested that the Commission consider extending the reactor operations until December 31, 2006 (i.e., for a period of 12 months). CNSC staff also expressed the view that a 12-month could be justified.

Issues:

In considering the application, the Commission was required to decide, pursuant to subsection 24(4) of the *Nuclear Safety and Control Act*:

- a) if AECL is qualified to carry on the activity that the amended licence would authorize; and
- b) if, in carrying on that activity, AECL would 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.

Public Hearing:

The Commission, in making its decision, considered information presented for a public hearing held on October 18, 2005 in Ottawa, Ontario. The public hearing was conducted in accordance with the *Canadian Nuclear Safety Commission Rules of Procedure*. During the public hearing, the Commission received written submissions and heard oral presentations from CNSC staff (CMD 05-H28 and CMD 05-H28.A) and AECL (CMD 05-H28.1 and CMD 05-H28.1A). The Commission also considered oral and written submissions from intervenors. See Appendix A to this *Record of Proceedings* for a detailed list of the interventions.

¹ In this *Record of Proceedings*, the *Canadian Nuclear Safety Commission* is referred to as the "CNSC" when referring to the organization and its staff in general, and as the "Commission" when referring to the tribunal component.

2. Decision

Based on its consideration of the matter, as described in more detail in the following sections of this *Record of Proceedings*, the Commission concludes that AECL is qualified to continue operating the NRU reactor beyond December 31, 2005. The Commission is also satisfied that AECL, in carrying on that activity, will 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. With respect to the duration of the extended operations of the reactor, the Commission was not persuaded that more time, in addition to the initially proposed 7-month period, was justified at this time. Therefore,

the Commission, pursuant to section 24 of the *Nuclear Safety and Control Act*, amends the Nuclear Research and Test Establishment Operating Licence for AECL's Chalk River Laboratories, located in Chalk River, Ontario to permit the operation of the NRU reactor until July 31, 2006.

The Commission includes in the amended licence those conditions recommended by CNSC staff in the draft licence attached to CMD 05-H28.A, except for the proposed licence condition 13.1 which recommended a new shutdown date of July 31, 2006. The Commission is satisfied that, because the approved reactor life extension coincides with the expiry of the operating licence for Chalk River Laboratories, the proposed condition 13.1 is not necessary. The numbering of the licence conditions is therefore also adjusted to reflect this decision.

3. Issues and Commission Findings

In making its licensing decision under section 24 of the *Nuclear Safety and Control Act*, the Commission considered a number of issues relating to AECL's qualifications to carry out the proposed activities and the adequacy of the proposed measures for protecting the environment, the health and safety of persons, national security and international obligations to which Canada has agreed. The Commission's findings on these issues are outlined below.

3.1 Radiation Protection

As part of its evaluation of the adequacy of the provisions for protecting the health and safety of persons, the Commission considered the past performance and future plans of AECL in the area of radiation protection.

AECL reported that doses received by members of the public due to radioactive releases from the CRL site, including NRU, remain at a small fraction of the public dose limit of 1 mSv/y. Furthermore, there have no incidents of external radiation exposures or internal contamination that exceeded action levels or regulatory limits during the current licence period. AECL further noted that all worker annual whole body doses were below the action level of 20 mSv. CNSC staff concurred with this information presented by AECL.

AECL further reported that the average radiation doses to personnel have generally shown steady improvement over the years except for the year 2004. AECL noted that, in 2004, the higher doses were largely due to a number of trainees accompanying staff for on-the-job training in radiation areas. CNSC staff confirmed this and noted that the related increased workload was in connection to the Plant Life Management (PLiM) and Life Extension (LE) programs.

In its intervention, the Canadian Nuclear Worker's Council expressed the view that the efforts of the AECL Joint Health and Safety Committee are reflected in the gradual but continuing reduction in average radiation exposure to the Chalk River employees during the past decade. Canadian Nuclear Worker's Council also expressed its satisfaction that AECL management and the on-site unions will continue to work cooperatively together to maintain and further improve radiation exposures.

Based on the information received, the Commission is satisfied that AECL has made, and will continue to make, adequate provisions for the protection of persons from radiation at the NRU Reactor during the proposed 7-month extension.

3.2 Environmental Protection

The Commission considered whether AECL has been making, and will continue to make, adequate provision to protect the environment.

AECL reported that it considers its monitoring programs to be well established and implemented. Its ISO 14001 (Environmental Management System – EMS) certification requires that continual efforts be made to further reduce or eliminate contaminant emissions to the environment. AECL further noted that all radioactive liquid and air releases produced from facility processes have remained at small fractions of the Derived Release Limits (DRLs), and that there have been no releases above action levels. CNSC staff concurred with this information presented by AECL.

AECL noted that it was continuing to increase monitoring activities and to locate the source of elevated levels tritium contamination in the groundwater down-gradient of the NRU reactor. AECL added that the observed recent reduction in the tritium concentrations near the NRU facility appears to indicate that the work done to eliminate possible sources of tritium leakage from NRU have been successful. Due to the slow diffusion rate, however, it may take up to two years before a definitive conclusion on this can be drawn.

CNSC staff reported that it completed an environmental protection inspection of the NRU at the end of September 2005. As part of that inspection, CNSC staff examined AECL's implementation of the controls on the sampling and monitoring program. CNSC staff noted that, while the implementation is not fully compliant with requirements, a significant risk to the environment, including with respect to the above-noted tritium contamination, was not identified and an improving trend was noted.

Based on the information received, the Commission is satisfied that AECL has made, and will continue to make, adequate provision for the protection of the environment during the extended operation of the NRU Reactor.

3.3 Conventional Health and Safety

As part of its evaluation of the adequacy of provisions for protecting the health and safety of persons, the Commission considered the past performance and future plans of AECL in the area of conventional (non-radiological) health and safety at the facility.

AECL reported that the frequency and severity of lost time injuries have been low, with two lost time accidents in 2004 and one so far in 2005.

In its intervention, the Canadian Nuclear Workers' Council expressed the view that any health and safety issues of potential threat to CRL workers have been addressed expeditiously. The Canadian Nuclear Workers' Council also commented that the frequency of industrial injuries at Chalk River remains around the industry average, while the severity of such injuries remains below average. There have been no workplace fatalities at CRL.

The intervenor reported that the onsite Health and Safety Committee completes regular inspections of the facility and that no major defects have been reported.

Based on the information received, the Commission is satisfied that AECL has made, and will continue to make, adequate provision for the protection of persons from conventional (non-radiological) hazards during the extended operation of the NRU Reactor.

3.4 Operational Compliance

The Commission considered AECL's current and past operating performance, including related reactor design factors, as a further indication of its qualifications to operate the NRU Reactor and, in doing so, to provide adequate protection for the environment, persons, national security and international obligations. In addition to examining AECL's performance record during the current licence period, the Commission examined the licensee's quality assurance programs that are intended to sustain acceptable performance in the future.

AECL reported that the NRU's Plant Life Management (PLiM) Program and its assessment and inspection results confirm, in its opinion, that the reactor's critical systems, structures and components support continued operation safely and reliably. Inspections have also been carried out by AECL to support the conclusions and recommendations of the ageing assessment for this program. AECL noted that a report of the inspection results would be submitted annually to CNSC staff. CNSC staff commented that, while the assessments done to date show acceptable prognosis for the most critical systems, structures and components, the assessment work should continue and be integrated into a comprehensive ageing management program.

AECL further reported that it initiated an NRU licensability extension program to satisfy three goals: 1) demonstrate that the NRU Reactor can be safely operated; 2) complete the NRU upgrades and maintain the reactor configuration consistent with the Safety Analysis Report (SAR); and 3) ensure that programs are in place to monitor, inspect, maintain or replace systems important to safety. AECL is working towards resolution of the CNSC's comments on this program.

AECL noted that it implemented the NRU improvement initiative in response to an increase in reportable events in 2004 and 2005, loss of human resources at NRU, comments from CNSC staff regarding the NRU Reactor performance, and the results of an industry peer review which concluded that some aspects of the NRU Reactor program and oversight need improvement. CNSC staff reported that it was encouraged by the progress in the implementation of the NRU improvement initiative following an inspection of the facility in September 2005. CNSC staff noted its intention to present to the Commission in early 2006 a more detailed discussion of AECL's improvement initiatives.

With reference to the recent increase in the number of reportable events at the NRU, the Commission sought further information on the possible reasons for that increase. In response, AECL noted several possible contributors to this, including the introduction of a stronger reporting culture that now exists at CRL. CNSC staff added that the introduction of more conservative reportable event criteria may have led to an increase in reportable events.

AECL expressed its commitment to having the NRU seven safety upgrades fully operational by the end of December 2005. CNSC staff recommended that the Commission add a licence condition to ensure this objective is achieved.

CNSC staff reported that CNSC staff is satisfied that the performance indicators for many of the key safety areas meet CNSC requirements. For the safety areas that do not meet requirements, these are expected to improve over the period of the proposed extension. CNSC staff further noted that, while little evidence has been provided to prove that the NRU's systems, structures and components important to safety have adequate material characteristics and properties and that ageing will not undermine the design basis assumption in the long term, CNSC staff is satisfied that the risks posed by those deficiencies would not be unacceptable over the proposed periods. Also, CNSC staff is of the opinion that the deficiencies noted in the safety analysis and hazard assessment do not present an unacceptable risk to workers, the public and the environment over the period of the licence extension.

In their intervention, M.D. Cole, K. Merrett, A. Pryatt and C. Brown expressed the view that the addition of modern technology equipment and the replacement of ageing components and equipment make activities at the NRU Reactor safer and easier to monitor. Also, C. Brown expressed his satisfaction that the seven major upgrades that have been completed provide confidence that both normal and emergency operations will be carried out safely.

Reactor Design

AECL stated that the recently completed Probabilistic Safety Assessment and Severe Accident Assessment demonstrate that there are no fundamental weaknesses in the NRU design and that the overall risk of operating the NRU Reactor is, in its view, acceptably low. CNSC staff noted that it was reviewing the Severe Accident Analysis report (submitted by AECL in August 2005), and that it would be prepared to advise the Commission on its acceptability at the time AECL's application for renewal of the CRL site licence comes before the Commission in early 2006.

CNSC staff stated that, in the interim, it considers the current design to be robust, and that it is satisfied that the NRU design, as built, would remain safe for the period of the proposed 7-month licence extension.

Quality Assurance

With respect to quality assurance, AECL reported that during the year 2004, the CRL site, including the NRU reactor, obtained certification under the ISO 14001:1996 standard for quality in the design and implementation of an Environmental Management System.

AECL further noted that, of the seven directives resulting from the CNSC audit of the overall Quality Assurance Program in November 2002, one has been closed and the remaining six are scheduled for completion before September 30, 2005. CNSC staff commented that, while the performance assurance did not meet all CNSC requirements, the situation is expected to improve over the period of the proposed extension.

Conclusion on Operating Compliance

The Commission concludes that the design of, and past operating compliance at, the NRU Reactor, as well as the quality management systems in place, provides a positive indication of the licensee's ability to safely carry out the proposed activities under the amended licence. The Commission also accepts CNSC staff's recommended licence condition which requires that AECL demonstrate by December 31, 2005 that all seven of the NRU safety system upgrades are fully operational.

3.5 Emergency Preparedness and Fire Protection

Emergency Preparedness

With respect to the protection of persons and the environment during emergencies that could arise at the NRU reactor, AECL stated that it considers that the NRU reactor emergency preparedness, response and readiness meets the requirements of the CRL Emergency Preparedness Program. AECL further noted that emergency response plans are tested regularly, and include the NRU staff participation in radiological emergency exercises, fire drills and site-wide emergency evacuation drills. The availability of emergency systems and equipment is also confirmed through the facility surveillance testing program.

Fire Protection

With respect to fire protection, AECL reported that, while the incidence of fires has been low historically, a fire hazards assessment has recommended several improvements which are being followed up for implementation. Corrective actions resulting from the November 2004 CNSC's audit of the CRL fire protection program are also being implemented. CNSC staff confirmed that AECL is currently working on reducing fire loading in the NRU facility and has initiated an active presence of fire personnel to perform routine tours and identify fire protection issues.

The Commission sought further information during the hearing on the status of the revisions to the fire safety plan that CNSC staff requested following its earlier audit. In response, CNSC staff reported that AECL has made significant progress in addressing the issues, and noted that this work will be completed regardless of whether or not the reactor continues to operate.

Based on the information received, the Commission is satisfied that AECL has made, and will continue to make, adequate provision for emergencies that could arise during the operation of the NRU Reactor.

3.6 Security

Based on the protected information on security that was received during the hearing, the Commission is satisfied with the security measures in place at the facility and the performance of the licensee in this regard.

3.7 Decommissioning Plan and Financial Guarantee

With respect to the Preliminary Decommissioning Plan (PDP) and related financial guarantee for the NRU Reactor, CNSC staff reported that AECL has proposed to submit an updated Comprehensive PDP that would include decommissioning cost estimates for all CRL facilities, including the NRU reactor, along with a separate five-year operational implementation plan by April 1, 2006. Therefore, and to be consistent with the Commission's *Record of Proceedings*, dated July 12, 2005 on the financial guarantee for the decommissioning of CRL, CNSC staff recommended that the Commission add a licence condition (12.1) to this effect.

Based on the information received, the Commission considers that the plans for completing the Preliminary Decommissioning Plan and related financial guarantee are acceptable for the purpose of the current application. The Commission also accepts CNSC staff's recommended licence condition 12.1.

3.8 Public Information

With respect to the CNSC's requirement that licensees maintain acceptable public information programs, AECL described the public information activities that were recently performed, including a public tour of the NRU and a meeting with interested citizens who intervened at a hearing in June 2005. CNSC staff reported that it considers the CRL public information program to meet the requirements of the *Class I Nuclear Facilities Regulations*.

Based on the information received, the Commission is satisfied that AECL's public information program is adequate for the purpose of the proposed extended operation of the NRU Reactor.

3.9 Safeguards and Non-Proliferation

Concerning safeguards and non-proliferation, AECL reported that the NRU Reactor successfully met the quantity and timeliness goals according the IAEA safeguards criteria, thereby meeting full goal attainment. No issues have been identified in this area. CNSC staff considers AECL's performance to be acceptable.

Based on the information received, the Commission is satisfied that AECL has made, and will continue to make, adequate provisions in the areas of safeguards and non-proliferation that are necessary for maintaining national security and measures necessary for implementing international agreements to which Canada has agreed.

3.10 Canadian Environmental Assessment Act

Before making a licensing decision, the Commission must be satisfied that all applicable requirements of the *Canadian Environmental Assessment Act* (CEAA) have been fulfilled. In its *Record of Proceedings*, dated August 11, 2005, the Commission decided that the continued operation of the NRU reactor, taking into account the identified mitigation measures, is not likely to cause significant environmental effects.

CNSC staff recommended that the Commission add a licence condition to address the requirement for a follow-up program, as identified in the environmental assessment screening report.

Based on the above information and considerations, the Commission is satisfied that all requirements of CEAA have been met for this application. The Commission also accepts CNSC staff's recommended licence condition on the requirement for a follow-up program.

3.11 Duration of the Reactor Life Extension

AECL initially applied to the Canadian Nuclear Safety Commission for a licence amendment that would permit the operation of the National Research Universal (NRU) Reactor until July 31, 2006, approximately seven months beyond its currently scheduled shutdown on December 31, 2005. The extension was to allow time for the assessment of an application for a longer-term life extension to the year 2012 to be completed and brought before the Commission for a decision.

Noting that a considerable amount of analysis and regulatory review in support of AECL's application for a longer-term operating life still needs to be completed, and taking into account the document filing dates for a future hearing on that matter in early 2006, the Commission questioned both AECL and CNSC staff on whether the proposed extension to July 31, 2006 would be sufficient. In response to this questioning, and following a brief discussion with CNSC staff during the hearing, AECL modified its request and asked the Commission to consider granting a 12-month extension rather than the seven months originally requested. In making this request, AECL expressed the view that the additional 5 month would provide greater assurance that there would be full resolution of the remaining issues under discussion with CNSC staff. CNSC staff concurred that the additional time would assist in the assessment without posing an unreasonable risk.

The Commission considered this request and decided that the initially proposed 7-month extension should allow adequate time for AECL to further demonstrate its qualifications to operate the facility and make adequate provision to protect persons and the environment and that a further five months extension was not fully supported or justified at this time. The Commission notes that the 7-month extension of NRU operations would coincide with the expiry

of the CRL site licence and therefore the Commission would have another opportunity to review any proposed further operation of the facility during the public hearing on the site licence renewal. The Commission would also have the benefit of access to all the relevant performance information available at that time. The Commission therefore does not grant AECL's request for a full 12-month operating extension and grants the initially requested 7-month extension.

4. Conclusion

The Commission has considered the information and submissions of AECL, CNSC staff and intervenors as presented in the material available for reference on the record.

The Commission is satisfied that AECL is qualified to carry on the activity that the amended licence will authorize. The Commission is also satisfied that AECL, in carrying on that activity, will 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 Commission therefore amends, pursuant to section 24 of the *Nuclear Safety and Control Act*, AECL's Nuclear Research and Test Establishment Operating Licence for the Chalk River Laboratories, located in Chalk River, Ontario. The amended licence, NRTEOL-01.03/2006, is valid until July 31, 2006.

The Commission includes in the amended licence those conditions recommended by CNSC staff in the draft licence attached to CMD 05-H28.A, except for the proposed licence condition 13.1 which recommends that a new shutdown date for the NRU reactor be set for July 31, 2006. The Commission will consider any further extension to the operation of the NRU reactor in the context of its consideration of AECL's application for renewal of the CRL site licence which is scheduled to expire on July 31, 2006.

Marc A. Leblanc
Secretary,
Canadian Nuclear Safety Commission

Date of decision: October 18, 2005

Date of release of Reasons for Decision: November 24, 2005

Appendix A – Intervenors

Intervenors	Document Number
Regional County Municipality of Pontiac	CMD 05-H28.2
Maurice D. Colem Kenneth Merrett, Al Pyatt and Cliff Brown	CMD 05-H28.3 CMD 05-H28.3A
MDS Nordion	CMD 05-H28.4 CMD 05-H28.4A
Canadian Nuclear Worker’s Council	CMD 05-H28.5
Corporation of the Town of Deep River	CMD 05-H28.6
National Research Council Canada	CMD 05-H28.7
Canadian Forces Base/ Area Support Unit Petawawa	CMD 05-H28.8
Corporation of the Town of Laurentian Hills	CMD 05-H28.9
C. Gallant, M.P., Renfrew – Nipissing – Pembroke	CMD 05-H28.10
D. Lindsay, Liberal Candidate, Renfrew Nipissing Pembroke	CMD 05-H28.11
County of Renfrew	CMD 05-H28.12