Record of Proceedings, Including Reasons for Decision

In the Matter of

Applicant Canadian Light Source Incorporated

Subject Amendment of the Particle Accelerator Operating Licence issued to Canadian Light Source Incorporated at the University of Saskatchewan

Date January 30, 2003

RECORD OF PROCEEDINGS

Applicant:	Canadian Light Source Incorporated
Address/Location:	107 North Road, University of Saskatchewan, Saskatoon, Saskatchewan, S7N 5C6
Purpose:	Amendment of the Particle Accelerator Operating Licence issued to Canadian Light Source Incorporated at the University of Saskatchewan.
Application received:	September 12, 2002
One-Day Hearing:	December 12, 2002
Location:	Canadian Nuclear Safety Commission (CNSC) Public Hearing Room, 280 Slater St., 14th. Floor, Ottawa, Ontario
Members present:	L.J. Keen, Chair L.J. MacLachlan A.R. Graham Y.M. Giroux J.M. McDill C. Barnes
Counsel:	I.V. Gendron
Secretary:	M.A. Leblanc
Recording Secretary:	C.N. Taylor

Applicant Represented By	**Document Number**
• M. Benmerrouche, Manager, Health Safety and Environment • W. Thomlinson, Executive Director • M. de Jong, Director of Operations • L. Dallin, Manager of Accelerator Operations • T. Whitworth, V.P. Finance and Resources, University of Saskatchewan.	CMD 02-H25.1 CMD 02-H25.1A
CNSC Staff	**Document Number**
• B. Howden • R. Jammal • J. Plante • P. Fundarek	CMD 02-H25 CMD 02-H25.A
Intervenors	**Document Number**
None	None

Decision and Reasons:

Licence:	Amended
Date of Decision:	December 12, 2002

1. Introduction

Canadian Light Source Inc. (CLS) has applied to the Canadian Nuclear Safety Commission for an amendment to its Particle Accelerator Operating Licence (PA1OL-02.02/2006 – expiry May 27, 2006). The amendment would authorize CLS to commence the third and final stage of the commissioning of its 2.9 GeV electron synchrotron. The synchrotron is a Class 1B Particle Accelerator located at the University of Saskatchewan, Saskatoon, Saskatchewan.

Synchrotron light is an intense form of light that is used for basic and applied studies in biology, chemistry, medicine, physics and environment. It is also used in technologies such as x-ray lithography, micro-machines, material characterization and trace element analysis.

Phase 3 commissioning includes the commissioning of the remainder of the booster to storage ring transfer line (BTS) and synchrotron radiation beamlines. The application does not address the routine operation of the facility following completion of the proposed commissioning activities. This will be the subject of a future application from CLS.

In its application, CLS did not submit all the detailed information required in support of the proposed beamline commissioning. CNSC staff, therefore, recommended that the licence include a hold point such that the shield wall plug may not be removed and the beamlines may not be inserted without the prior written authorization of the CNSC. CNSC staff recommended that the authority to decide on the removal of the hold point be exercised by a CNSC staff designated officer.

Issues:

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

a) CLS is qualified to carry on the activity that the licence amendment would authorize; and

b) if, in carrying on that activity, CLS 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 one-day public hearing held on December 12, 2002 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 CLS (CMD 02-H25.1 and CMD 02-H25.1A) and CNSC staff (CMD 02-H25 and CMD 02-H25.A). There were no intervenors.

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 concluded that CLS is qualified to carry on the activity that the licence amendment will authorize. The Commission also determined that CLS, 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.

Therefore, the Commission, pursuant to section 24 of the *Nuclear Safety and Control Act*, amends Particle Accelerator Operating Licence PA1OL-02.02/2006 issued to Canadian Light Source Incorporated, Saskatoon, Saskatchewan. The specific amendments are as set out in the attachments to CMD 02-H25.A, with one modification to the draft Condition 10.1 as identified below. The licence remains valid until May 27, 2006, unless suspended, amended, revoked or replaced.

With respect to the draft Particle Accelerator Licence PA1OL-02.03/2006 attached to CMD 02-H25.A, the Commission accepts the modification to Condition 10.1 as recommended by CNSC staff during the hearing. Condition 10.1 is modified to read as:

> *The licensee shall provide no later than December 31, 2003, a financial guarantee for decommissioning acceptable to the Commission or a person authorized by the Commission.*

The Commission also confirms that the Director General, Directorate of Nuclear Cycle and Facilities Regulation is authorized to amend the licence to remove the hold-point set out in Condition 9.2 of the licence following receipt and acceptance of the required information.

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 CLS's qualifications to carry out the proposed commissioning 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 summarized below.

3.1 Legal Status of CLS as Licensee

During the Commission's public hearing on the proposed Phase 2 of the facility commissioning project (*Record of Proceedings, including Reasons for Decision* dated December 11, 2001), the Commission sought further clarification of the agreements in place between CLS and the University of Saskatchewan. In particular, the Commission sought to establish more clearly the legal responsibilities and liabilities of the two parties in relation to the CNSC licence and

Nuclear Safety and Control Act (NSCA). The Commission therefore requested, in its above-referenced reasons for decision, that the current application for Phase 3 commissioning include

> "*a clear picture of the legal responsibilities, accountabilities and liabilities for the CLS facility under the CNSC licence and NSCA, including with respect to the liabilities for operations and decommissioning*".

In response to this request, CLS reported that the contract between itself and the University of Saskatchewan was replaced on September 6, 2002 with the *University of Saskatchewan and Canadian Light Source Inc. Licence Agreement*. CLS explained that, under this new contract, CLS is identified as being responsible for holding the CNSC licences and for compliance with all regulatory requirements under the NSCA. As such, CLS, while owned by the University of Saskatchewan, has full authority for safety, environment, and security during all project phases, including decommissioning and for maintaining any insurance and financial guarantees. CNSC staff confirmed that it finds the new contract to be acceptable.

Based on this information, the Commission is satisfied that the legal status of CLS as the licensee under the NSCA has been adequately clarified and documented. CLS is the legally responsible entity for the purpose of the licence.

3.2 Radiation Protection

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 CLS in the area of radiation protection.

CNSC staff stated its conclusion that the shielding, personnel exclusion interlocks and radiation monitoring program will adequately protect people from radiation during the proposed Phase 3 commissioning activities. CNSC staff noted that the shielding designs were reviewed and accepted by the CNSC at the time the construction licence for the facility was issued. CNSC staff noted that those designs have been proven effective through the earlier phases of commissioning.

CLS added that it has a *Verification and Validation of the Storage Ring Access Control Interlock System* as part of its safety measures. CNSC staff confirmed that it considers this system to be acceptable. CLS further noted that the tests and measurements carried out in Phase 1 commissioning have confirmed the radiation levels in the facility to be well below the design criteria and regulatory limits. Similar data from Phase 2 commissioning are currently being analyzed.

In response to questions from the Commission on the performance of the shielding, CLS stated that the shielding was shown to provide adequate protection even under a variety of beam miss-steering scenarios. CLS also stated that the dose modelling predictions were found to be consistently higher than the measured doses, thus confirming an appropriately high level of conservatism in the shielding design.

With respect to the recorded radiation exposures of personnel on the site during the earlier decommissioning phases, the Commission sought clarification of the significance of the findings. CLS reported that, during Phase 1, the highest measurable dose to a person recorded over a 3-month period was 0.2 mSv, and that during Phase 2, the highest recorded dose to a person over a 3-month period was 0.4 mSv. CNSC staff stated that, while these doses are below the regulatory limits for the public and Nuclear Energy Workers[1], a further examination of the 0.4 mSv dose (recorded in the third quarter of 2001) is being carried out to determine if there are further opportunities to lower potential exposures.

With respect to the proposed Phase 3 commissioning, CNSC staff expressed the view that, while the risk from synchrotron radiation is much lower than that produced from the acceleration of electrons, it will be important to proceed with caution when the beamlines are commissioned beyond the shield wall. This is to ensure that no radiation other than synchrotron radiation is emerging. However, because CLS has not yet provided all of the details for this step, CNSC staff recommended that the Commission establish a hold-point in the conditions of the licence. The proposed licence condition would require that CLS obtain the permission from the Commission, or a person authorized by the Commission, prior to the removal of any ratchet wall plug for beamline installation. In response to the Commission's questions on this beamline commissioning step, CLS confirmed that once stable operations have been achieved with the shielding intact, it will be necessary to bring the synchrotron light out down various beam lines under controlled conditions for testing – a process similar to what will occur in normal operations. Special precautions for radiation protection for this testing will be specified and submitted for the prior approval of the CNSC.

Based on the above information, the Commission concludes that CLS has made, and will continue to make, adequate provisions for the protection of persons at the facility from radiation. The Commission concurs with the CNSC staff's recommendation to include a hold-point in the conditions of the licence for the beamline commissioning. The Commission also confirms that the Director General, Nuclear Cycle and Facilities Regulation is designated, pursuant to section 37 of the NSCA, for the purpose of considering and deciding on an application from CLS to remove the hold-point following receipt and acceptance of the required information.

3.3 Conventional Health and Safety

Also with respect to its assessment of the measures to be taken to protect the health and safety of persons during Phase 3 commissioning, the Commission examined CLS's program for conventional (non-radiological) health and safety.

CNSC staff reported that the conventional health and safety program, which was accepted by the Commission at the time of the Phase 2 commissioning approval, has proven effective and, in CNSC staff's view, remains acceptable for the proposed Phase 3 commissioning.

---

[1] The radiation dose limits are specified in the *Radiation Protection Regulations*, subsection 13(1). The effective dose limit for an individual that is not designated as a Nuclear Energy Worker is 1 mSv/year. For Nuclear Energy Workers, the effective dose limit is 50 mSv/year and 100 mSv over 5 years.

Based on this information, the Commission is satisfied that CLS has made, and will continue to make during the Phase 3 commissioning stage, adequate provisions for the protection of persons from conventional hazards.

3.4 Environmental Protection

To determine whether CLS will make adequate provisions to protect the environment while carrying out the proposed commissioning activities, the Commission considered the potential for the facility to adversely affect the environment.

CNSC staff noted that the facility continues to pose negligible radiological risk to the environment. CNSC staff stated that the environmental assessment of the project, conducted in accordance with the requirements of the *Canadian Environmental Assessment Act* (CEAA) in 2000, remains valid for the purpose of the proposed licence amendment. At the time the environmental assessment was completed, the Commission concluded that the project, including all life-cycle stages of construction, commissioning, operation, and decommissioning, would not likely cause significant adverse environmental effects. The Commission is satisfied that this conclusion remains valid. See section 3.9 below on the Commission's decision concerning the need for any further assessment of the proposed commissioning activities under the CEAA.

CNSC staff also expressed its view that CLS's programs for protecting the environment remain acceptable.

Based on this information, the Commission is satisfied that CLS has made, and will continue to make, adequate provision for the protection of the environment during the third phase of the facility commissioning.

3.5 Performance Assurance

CLS's ability to assure performance over time is another important area examined by the Commission in its assessment of whether CLS is, and will likely continue to be, qualified to carry out the activities under the proposed amended licence. It also provides the Commission with part of the basis for deciding whether the proposed protection measures will likely be effectively maintained through the remaining period of the licence. The areas of quality assurance, human factors, training, and organization and management were the principal factors considered by the Commission during the hearing.

Quality Assurance

In its *Record of Proceedings, including Reasons for Decision* (dated December 11, 2001) on the Phase 2 commissioning project, the Commission expressed concern about the vacant position of Quality Manager at CLS. In response to further questions from the Commission during the current hearing on this staffing issue, CLS confirmed that this position has now been filled.

The Commission also sought information on the effectiveness of the quality assurance program implementation during Phase 2 commissioning. CNSC staff responded that, in its view, the quality assurance program at CLS was adequate during Phase 2 commissioning and remains acceptable for Phase 3 commissioning.

Based on this information, the Commission concludes that CLS's quality assurance program is adequate for the purpose of the proposed Phase 3 commissioning activities.

Human Factors

CNSC staff reported that CLS has acknowledged the need to incorporate human factors into the design and operation of the facility. In this regard, CLS indicated that it follows a defined Human Factors Workscope that specifies human factor analysis, design and assessment activities in the design, commissioning and operation of the facility. CNSC staff expressed its satisfaction with CLS's progress of work on human factors issues.

Based on this information, the Commission concludes that CLS's use of human factors in its design and operational processes is adequate, and will continue to be acceptable during the proposed Phase 3 commissioning activities.

Training

CNSC staff noted that CLS's staff consists of a highly qualified and experienced team of scientific and technical personnel. CNSC staff also remarked that it considers the training programs in place for all staff and other persons on the site to be acceptable.

CLS added that it has recently submitted a description of the accelerator operator qualifications and training program for CNSC staff review.

Based on this information, the Commission concludes that the training programs at CLS are adequate for maintaining the qualifications of the licensee and for contributing to the protection of persons through the next commissioning stage.

Management and Organizational Structure

CLS stated that, under the new *University of Saskatchewan and Canadian Light Source Inc. Licence Agreement,* it has been clarified that CLS is the sole authority responsible for all health, safety and environmental protection programs under the licence. Within CLS, the Executive Director is the signing authority and the Health Safety and Environment Manager is the contact person responsible for all technical and regulatory issues.

In response to questions from the Commission on current position vacancies, CLS noted that there are currently vacancies to be filled in the Environmental Safety and Health area, including a Radiological Officer, and that staffing in this area will need to increase during operations as the number of experiments at the facility increases. CLS considers that its staffing plan is on schedule to address the transition from commissioning to operations.

CNSC staff expressed the view that the types and level of staffing is currently adequate for the Phase 3 commissioning activities. CNSC staff noted that it will, as part of its compliance monitoring, continue to assess the adequacy of staffing at CLS in Environmental Safety and Health.

The Commission is satisfied that the management and organizational structure of CLS has been appropriately clarified for the purpose of the licensing and that the reporting structure will contribute to the safety of the proposed continuation of the commissioning activities. The Commission is also satisfied that the licensee is qualified to safely carry out the proposed Phase 3 commissioning activities.

3.6 Security

CNSC staff reported that it has reviewed the provisions for maintaining the physical security of the site and find them to be acceptable and in compliance with the *Nuclear Security Regulations*.

The Commission is therefore satisfied that CLS has made, and will continue to make during Phase 3 commissioning, adequate provisions for maintaining the physical security at the facility.

3.7 Fire Prevention and Emergency Preparedness

As part of its assessment of CLS's provisions for protecting the health and safety of persons during the proposed commissioning stage, the Commission re-examined the adequacy of the CLS's fire prevention and emergency preparedness measures at the facility.

In this regard, CNSC staff stated that both the fire protection and the emergency preparedness measures at CLS continue to be acceptable for the purpose of Phase 3 commissioning.

The Commission therefore remains satisfied that, during the remaining commissioning of the facility, CLS will make adequate provisions to prevent fire at the facility and respond effectively to any emergencies that may arise.

3.8 Decommissioning and Financial Guarantees

CNSC staff reported that a revised Preliminary Decommissioning Plan was submitted by CLS and that CNSC staff has found it to be acceptable.

With respect to the corresponding financial guarantee, CNSC staff noted that it is currently seeking further clarification of the cost estimate prepared by CLS; resolution of the cost estimate is expected in January 2003. CNSC staff noted that additional time will then be required to establish an acceptable arrangement for the financial guarantee, including a possible review of related CNSC policy; for example, concerning the use of financial instruments (e.g., letters of

credit) from entities other than financial institutions such as banks. CLS stated its intent to establish a restricted decommissioning fund to which regular contributions will be made from the facility operational budget. CLS further stated that the University of Saskatchewan will provide a guarantee for any remaining balance of the decommissioning cost and that, if required by the Commission, that guarantee would be secured by a letter of credit from the University of Saskatchewan.

In response to questions from the Commission on the proposed approach, CLS stated that the trust fund would be fully segregated from the operational budgets and that the annual deposits would be made to the trust independently of the facility revenues. The University of Saskatchewan also stated that it is satisfied with the preliminary cost estimates and is committed to providing the necessary balance of the guarantee in a form acceptable to the CNSC.

To ensure the matter is addressed in a timely manner, CNSC staff recommended that the Commission add a licence condition requiring that a financial guarantee, acceptable to the Commission, or person authorized by the Commission, be in place by December 31, 2003.

The Commission is concerned with the length of time it is taking to establish an acceptable financial guarantee for the future decommissioning of the CLS facility. In its earlier decision to approve Phase 2 commissioning (*Record of Proceedings, including Reasons for Decision* dated December 11, 2001), the Commission had requested that the current application for Phase 3 commissioning be accompanied by an acceptable guarantee. While the Commission had expected more progress on this matter, the Commission is satisfied that some progress has been made on the key factors necessary for establishing an acceptable guarantee, such as clarifying the contractual arrangement between CLS and the University of Saskatchewan (see section 3.1 above) and the completion of an acceptable Preliminary Decommissioning Plan and corresponding cost estimate.

In response to questions from the Commission on the CNSC staff's proposed 12-month deadline for establishing the guarantee, CNSC staff expressed the view that this amount of time may be needed to consider the policy issues and risk associated with CLS's proposed approach. The Commission accepts this position of CNSC staff and proposed licence condition. While the Commission is concerned with the slow rate of progress in this area, the Commission acknowledges that the decommissioning liability and associated financial risk at the CLS facility will remain relatively low through 2003 because of the amount of equipment activation will be relatively small during this period of time.

3.9 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.

The Commission notes that the project was the subject of a screening environmental assessment, carried out pursuant to the CEAA prior to the issuance of the Construction Licence in 2000. The screening environmental assessment addressed all life-cycle states of the CLS facility, including

construction, commissioning, operation and decommissioning. After considering the results of the environmental assessment at that time, the Commission concluded (pursuant to paragraph 20(1)(a) of the CEAA) that the project, taking into account the appropriate mitigation measures, was not likely to cause significant adverse environmental effects, and therefore the Commission proceeded with consideration of the Construction Licence application.

The Commission is satisfied that the project remains the same as that which was previously assessed and therefore a further environmental assessment under the CEAA is not required prior to the Commission making a decision on the proposed Phase 3 commissioning activities.

3.10 Public Information Program

CNSC staff noted that it continues to be satisfied with CLS's public information program. The program consists of a variety of communication methods and focuses on the general public, the media, the scientific community, government officials, granting councils, investors and high school students. CLS also noted that it has hired an Outreach Coordinator. CLS also noted that it has received no concerns about the facility from the public.

Based on this information, the Commission concludes that CLS's public information program remains adequate for the purpose of the proposed Phase 3 commissioning activities.

4. Conclusion

The Commission has considered the information and submissions of the applicant and CNSC staff as presented in the material available for reference on the record, as well as the oral and written submissions provided at the hearing.

The Commission therefore amends, pursuant to section 24 of the *Nuclear Safety and Control Act*, Particle Accelerator Operating Licence PA1OL-02.02/2006 previously issued to Canadian Light Source Incorporated. The licence remains valid until May 27, 2006, unless suspended, amended, revoked or replaced.

Marc A. Leblanc
Secretary,
Canadian Nuclear Safety Commission

Date of decision: December 12, 2002
Date of release of Reasons for Decision: January 30, 2003