



Canadian Nuclear
Safety Commission

Commission canadienne
de sûreté nucléaire

Record of Proceedings, Including Reasons for Decision

In the Matter of

Applicant TRIUMF Accelerators Inc.

Subject Application to Amend the TRIUMF Accelerators
Inc. Particle Accelerator Operating Licence

Hearing
Date November 28, 2011

RECORD OF PROCEEDINGS

Applicant: TRIUMF Accelerators Inc.

Address/Location: 4004 Wesbrook Mall, Vancouver, BC, V6T 2A3

Purpose: Application to amend the TRIUMF Accelerators Inc. Particle Accelerator Operating Licence

Application received: September 28, 2011 and October 28, 2011

Date of hearing: November 28, 2011

Location: Canadian Nuclear Safety Commission (CNSC) 280 Slater St., Ottawa, Ontario

Members present: M. Binder, Chair

Secretary: M. Leblanc
Recording Secretary: D. Carrière

Licence: Amended

Table of Contents

Introduction	1
Decision	2
Issues and Commission Findings	2
Qualifications and Protection Measures	2
Application of the Canadian Environmental Assessment Act.....	3
Conclusion	3

Introduction

1. TRIUMF Accelerators Inc. (TRIUMF) has applied to the Canadian Nuclear Safety Commission¹ (CNSC) for an amendment to its Class IB Particle Accelerator Operating Licence for the TRIUMF particle accelerator facility located on the campus of the University of British Columbia in Vancouver, British Columbia. The current licence, PA10L-01.05/2012, expires on March 31, 2012.
2. TRIUMF is the national centre for subatomic research and conducts fundamental research in physics and applied sciences. Under the licences, TRIUMF operates one Class IB and six Class II particle accelerator facilities and produces and uses a variety of radioisotopes.
3. In 2008, TRIUMF's operating licence was amended to authorize the use of actinide² targets. TRIUMF's operating licence was further amended in 2009 to authorize additional experiments using actinide targets. TRIUMF notified CNSC staff in September 2011 that these additional experiments are now complete. TRIUMF is requesting an authorization from the Commission to increase the operating limits for the irradiation of actinide targets at its ISAC Facility to allow ongoing research utilizing rare isotope beams.

Issue

4. In considering the application, the Commission was required to decide, pursuant to subsection 24(4) of the Nuclear Safety and Control Act³ (NSCA):
 - a) if TRIUMF is qualified to carry on the activity that the amended licences would authorize; and
 - b) if in carrying on that activity, TRIUMF 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.

Hearing

5. Pursuant to section 22 of the NSCA, the President of the Commission established a Panel of the Commission to review the application. The Commission, in making its decision, considered information presented for a hearing held on November 28, 2011 in Ottawa, Ontario. During the hearing, the Commission considered written submissions from CNSC staff (CMD 11-H129) and TRIUMF (CMD 11-H129.1).

¹ 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 Group of elements with atomic numbers between 89 and 103 that includes uranium.

³ Statutes of Canada (S.C.) 1997, chapter (c.) 9.

Decision

6. 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 TRIUMF Accelerator Inc. has met the conditions of subsection 24(4) of the NSCA. Therefore,

the Commission, pursuant to section 24 of the Nuclear Safety and Control Act, amends the Particle Accelerator Operating Licence PA1OL-01.05/2012 issued to TRIUMF Accelerators Inc. for its TRIUMF particle accelerator facility located in Vancouver, British Columbia. The amended licence, PA1OL-01.06/2012, is valid until March 31, 2012.

Issues and Commission Findings

Qualifications and Protection Measures

7. TRIUMF requested that its operating licence be amended in order to increase the operating current to 10 microamperes (μA) and integrated charge to 5000 $\mu\text{A}\cdot\text{hours}$ ($\mu\text{A}\cdot\text{h}$). TRIUMF presented information supporting its request and explained that the increased operational limits should not result in any increase in dose to personnel, the public or the environment. In support of its application, TRIUMF submitted the *Actinide Target 2 μA Irradiation Report* along with a completely revised *Actinide Target Safety Analysis Report* to CNSC staff. TRIUMF has also submitted additional information as per CNSC staff's request.
8. CNSC staff stated that it reviewed TRIUMF's request and supportive documents. CNSC staff reported that the *Actinide Target 2 μA Irradiation Report* describes the results of the radiological monitoring conducted during experiments using actinide targets under the current licence conditions. CNSC staff stated that one of the key findings of the report is that actual measured releases via the nuclear exhaust system were much lower than the original, highly conservative theoretical estimates.
9. CNSC staff also reported having reviewed the completely revised *Actinide Target Safety Analysis Report*, which identifies several facility improvements that have been incorporated by TRIUMF and includes a complete reanalysis of the target yields, radiological hazards, environmental releases and worst case accident modeling for actinide targets.
10. With regards to radiological safety implications associated with the use of increased beam currents and integrated charge, CNSC staff reported having reviewed TRIUMF's comprehensive assessment of worst case accident failure. CNSC staff explained that the worst case accident failure is unlikely, as it would only occur as the result of multiple engineering control failures. CNSC staff also explained that the projected worst case doses resulting from an accidental release of the radioactive inventory are

6.3 milliSievert (mSv) for on-site personnel and 0.15 mSv to the public, which are well below regulatory limits of 50 mSv for nuclear energy workers and 1 mSv for members of the public. CNSC staff stated that it finds that increasing the beam current and integrated charge to 10 μA and 5000 $\mu\text{A}\cdot\text{h}$, respectively, will yield no significant change in doses to TRIUMF personnel and requires no change in TRIUMF's current implementation of their radiation protection program.

11. Following their review of TRIUMF's *Actinide Target Safety Analysis Report*, CNSC staff stated that they requested several clarifications from TRIUMF regarding the comparison of measured releases with the original release estimates, and the safety measures incorporated into the design of the target assembly. CNSC staff reported that TRIUMF submitted a more detailed supplemental analysis of releases, which estimates the total emissions of 5 targets per year at the increased operating limits of 10 μA and 500 $\mu\text{A}\cdot\text{h}$ at 1.70×10^{-4} % of the Derived Release Limit (DRL). CNSC staff stated that the projected releases are lower than what were estimated in the 2008 Actinide Target Safety Analysis Report (6×10^{-3} % of the DRL) due to a reduction in emissions following the installation of charcoal filtration on the target handling hot cell in 2009 and due to available experimental data which indicates that the original theoretical estimates are much higher than the actual measured releases.
12. Following the review of TRIUMF's application and associated documentation, CNSC staff concludes that TRIUMF will take reasonable controls to protect the environment and to keep public doses resulting from actinide targets as low as reasonable achievable.

Application of the Canadian Environmental Assessment Act

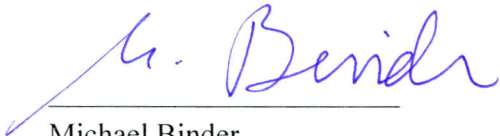
13. Before making a licensing decision, the Commission must be satisfied that all applicable requirements of the Canadian Environmental Assessment Act⁴ (CEAA) have been fulfilled.
14. CNSC staff reported that it had completed an Environmental Assessment (EA) determination. CNSC staff stated that there was no requirement for an EA pursuant to subsection 5(1) of the CEAA. CNSC staff noted that the EA for this project was completed in April, 1997 and no further EA is required.

Conclusion

15. The Commission has considered the information and submissions of TRIUMF and CNSC staff and is satisfied that TRIUMF is qualified to conduct the activities authorized by the requested licence amendment and will, in carrying out those activities, make adequate provision for the protection of the environment and the health and safety of persons and the maintenance of national security.

⁴ S.C. 1992, c. 37.

16. The Commission is satisfied that all applicable requirements of the CEEA have been fulfilled.
17. The Commission therefore amends, pursuant to section 24 of the *Nuclear Safety and Control Act*, the operating licence PA10L-01.05/2012 issued to TRIUMF Accelerators Inc. for its TRIUMF particle accelerator facility. The amended licence, PA10L-01.06/2012, remains valid until March 31, 2012.



Michael Binder
President,
Canadian Nuclear Safety Commission

NOV 28 2011

Date