

**Views of the Executive Branch**

**On Application XSNM03060 for Export of  
the Second Annual Tranche of HEU to Canada  
for Medical Isotope Production**

**Presentation Before the  
U.S. Nuclear Regulatory Commission  
by Richard J.K. Stratford  
Director, Office of Nuclear Energy Affairs  
U.S. Department of State**

**July 10, 2000**

Mr. Chairman, Members of the Commission, Ladies and Gentlemen:

I am pleased to have the opportunity to present the views of the Executive Branch regarding the continued supply of highly enriched uranium (HEU) to Canada for medical isotope production. My letter of July 6 to Janice Dunn Lee outlined why the Executive Branch believes that it is appropriate to go forward with continued supply of HEU to Canada for medical isotope production, and I won't recap those views here since they are in the written record.

In my remarks here today, I would like to deal directly with the specific concerns raised by the intervenors about continuing HEU supply to Canada for medical isotope production. The MDS Nordion New Processing Facility (NPF) is scheduled to go on line by the end of this month, following licensing approval by the Canadian Nuclear Safety Commission, the successor to the Atomic Energy Control Board of Canada. In brief, we do not see this development as threatening to undermine two decades of progress in the efforts to eliminate HEU from civilian commerce. We also do not agree with the intervenor's position that operation of the NPF with HEU until the necessary studies and steps to allow conversion to LEU can be completed, is contrary to international norms or U.S. law. Given the expressed commitment of the Canadian producers to convert to LEU and the progress made in

feasibility studies to date, we do not foresee HEU usage for the life of the NPF as a realistic possibility.

Most simply stated, we find the proposition that the NPF should not be operated until it is converted to be unrealistic and inconsiderate of the time, effort, and resources spent by our Canadian colleagues to place the production of medical isotopes on a stable footing for years to come. Since the specific modifications required for LEU conversion have not yet been identified, let alone developed, pursuing such an option would require continuing to rely on the aged NRU reactor for an indefinite period for more than 60 percent of U.S. medical isotope requirements. We agree with the Canadian position that such an option puts medical isotope production at undue risk.

The intervenors have alleged that the applicant is violating the terms of the NRC's order and are likely to argue against conversion as being prohibitively expensive once the NPF is radioactive. While we cannot pretend to predict the future, the facts developed to date strongly suggest a different outcome. The Executive Branch Agencies and Argonne National Laboratory find that MDS Nordion is making a good-faith effort to convert their isotope production process to LEU and substantial progress has already been made in eliminating several obstacles to conversion.

The intervenors suggest that approval of a recent amendment request to supply HEU as metal, rather than as finished targets, could lead to repeated recycle of HEU, thus perpetuating HEU use for decades to come. As I understand it, and I'll let the experts speak to this, the calcining process for **disposing** of isotope production waste essentially eliminates recycling as an option.

Regarding the continued interaction and cooperation between MDS Nordion and Argonne National Laboratory, MDS Nordion has been furnishing Argonne with progress reports. Argonne personnel believe that the technical results described in the Nordion reports are reasonable and agree with RERTR program experience. Argonne has concluded that MDS Nordion appears to be making a legitimate attempt to study the feasibility of converting their new process from HEU to LEU.

Until recently, Argonne believed it had insufficient information to evaluate the difficulty of the waste problem or to recommend a solution. To remedy this situation, MDS Nordion organized a June 30 visit for Argonne to SGN, France, the producer of the calcining equipment, to provide Argonne a better understanding of the process and the difficulties of conversion to LEU. Argonne characterized its meeting with SGN as open and informative and noted that SGN appeared to have performed a detailed assessment of how the current calcination process would be affected by LEU conversion.

The intervenors argue that LEU conversion modifications need to be installed in the NPF before the facility starts operation to avoid the possibility that such modifications would be too costly and difficult to do once the NPF becomes radioactive. Nordion has concluded that there are no modifications that need be done now while the facility is cold that could not be done later after the facility is hot. Argonne, following the visit to SGN, concurs with the Nordion assessment. I might add as an aside that Dr. Allan Krass of my office, who handles RERTR and spent fuel takeback issues for us, visited the Nordion facilities to review the situation personally. His assessment discounted the utility of adding an extra pipe as a "headstart" toward adding a new calcining unit at a future date.

In conclusion, the Executive Branch believes that MDS Nordion is making a credible good-faith effort to study the feasibility of converting their new medical isotope production process to LEU. Nordion has already eliminated a number of possible obstacles to conversion. The remaining obstacle, conversion to LEU of the waste calcination process, will take substantial further study to identify necessary changes for conversion to LEU.

Argonne, Nordion and AECL have agreed on the following time-line for moving forward on conversion which involves three steps: The first step is development of a plan by Nordion for resolution of remaining obstacles to conversion, to be completed by September of this year. The second step is technical implementation of this plan, which could require about 18 months. The third step involves safety approvals and environmental impact statements, which could require 3 years or more.

On the basis of our review, therefore, we have concluded that continued supply of HEU under the existing license meets the requirements of U.S. law, including the Schumer amendment, and would not be inimical to the U.S. common defense and security. We also believe that the proposed export is clearly in the interest of the United States since Canada, through its HEU target process, currently supplies more than 60 percent of U.S. medical requirements for molybdenum-99. MDS Nordion will continue to need HEU until the necessary conversion steps for the NPF have been identified and implemented and to allow time for the necessary approvals by Canadian and U.S. regulatory authorities.

Mr. Chairman, thank you for giving me the opportunity to make this presentation. My colleagues and I will be pleased to answer your questions.

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July 7, 2000

Dear Ms. Dedik:

**Report on Visit by ANL Personnel to SGN**

On June 30, 2000, A. Travelli (RERTR Program Manager, ANL) and George F. Vandegrift (Senior Chemist, ANL) visited SGN (Saint-Quentin-en-Yvelin, France) to assess the progress by MDS Nordion toward LEU conversion of their Mo-99 production process. SGN is under subcontract to AECL to develop a calcination process for the wastes resulting from the MDS Nordion Mo-99 production process, and calcination has been identified by MDS Nordion as the only important obstacle to conversion.

The meeting at SGN began at 9:30 a.m. In attendance, in addition to A. Travelli and G. F. Vandegrift, were:

1. Grant R. Malkoske, Vice-President for Engineering and Technology, MDS Nordion
2. Jim A. Bond, Manager of Isotope Processing Techniques, Chalk River Laboratories, AECL
3. Serge Merlin, Director of Western European Operations, SGN
4. Henri Zaccat, Vice-President for International Operations, SGN
5. Robert Gattegno, Director of North American/Asian Operations, SGN
6. Giller Clement, Deputy Director for North American Operations, SGN, and
7. Elisabeth Nicaise, Deputy Director for North American Operations, SGN

Most of the meeting, which lasted until 4:00 p.m. with a break for lunch, centered on a commercial/confidential viewgraph presentation by S. Merlin. This presentation provided a detailed description of SGN development of a calcinations process for the current HEU-based MDS Nordion New Production Facility (NPF) design and of their feasibility study for using LEU in that process. Both the presentation and the related discussions were very informative, open, and cordial.

The SGN study has identified two main obstacles to LEU conversion:

- a. Approximately twice the solvent volume might need to be used to separate the Mo-99 from the LEU targets because of the greater amount of uranium in solution, and
- b. Approximately five times more uranium will be present in the wastes to be calcined.

These two conditions were part of a set of boundary conditions assigned by MDS Nordion and AECL to SGN to define scope of the SGN feasibility study. Another important boundary condition was that the production capacity of the converted NPF should continue to be able to supply the entire world

demand for Mo-99.

The greater amount of solvent would reduce by approximated a factor of two the time available for decay of the liquid wastes before calcination, because the volume of the delay tanks in which the solution is to be kept before calcinations cannot be increased. This would increase significantly the heat generation in the cans where the calcined material is to be stored, and cause several related difficulties.

The greater amount of uranium in solution would make it impossible to implement the current plan to evaporate in a single can most of the liquid used in a batch (corresponding to two days of reactor operation) prior to calcining. The problem is caused by the increased temperature and viscosity that the solution would acquire when the uranium concentration reaches 1,500 grams per liter in the allowed can volume, and would cause great strain on the operating schedule and excessive can storage requirements.

During the discussion it became apparent that these obstacles were serious but not insurmountable. On the basis of new information that became available since the boundary conditions for the SGN feasibility study were defined, G. Malkoske (MDS Nordion) expressed his conviction that the MDS Nordion Mo-99 extraction process can be modified so that the volume of solvent required to process LEU targets is not significantly different from that required to process HEU targets.

The amount of uranium in solution cannot be reduced, but some suggestions made by ANL personnel during the meeting could help to resolve the related difficulties. In particular, it appears that addition of an uranium-precipitating agent (such as oxalic acid or hydrogen peroxide) to the can where evaporation takes place might enable evaporation of most of the liquid of an entire batch in a single can without excessive temperature or viscosity. S. Merlin (SGN) verified that addition of a line to introduce a controlled precipitating agent into the calciner would not present special difficulties even after the facility had begun operation with HEU.

In conclusion, the meeting was open and informative. SGN appeared to have performed a detailed assessment of how the current calcination process would be affected by LEU conversion under the boundary conditions initially specified, and have identified the main obstacles. In the opinion of ANL, MDS Nordion, and AECL personnel, these obstacles appear to be resolvable. The next step is to develop a plan for the resolution of the obstacles, and G. Malkoske (MDS Nordion) has stated the intention to prepare such a plan by September 2000. Technical implementation of the plan might require about 18 months, and safety approvals and environmental impact statements might require three years or more. These timetables appear to be reasonable.

Sincerely,



Armando Travelli  
Manager, RERT Program

Xc: S. Tyson  
G. F. Vandegriff

AT:jt



Canadian Nuclear Safety Commission

Commission canadienne de sùreté nucléaire

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Your file / Votre référence

Our file / Notre référence

July 6, 2000

AC'D BY

J.L.G.

Dr. R. A. Meserve  
Chairman  
United States Nuclear Regulatory Commission  
Washington, DC  
20555

Dr. Meserve:

When you visited the CNSC last month, you expressed an interest in knowing the decision of the CNSC on the matter of AECL's application for authority to operate a second MAPLE reactor. I am following up on that, since Dr. Bishop is currently away from the office.

The Commission concluded its deliberations on that subject on 29 June. Enclosed for your information is the "Record of Proceedings" of the hearing. This is a public document which has been sent to all participants.

Yours sincerely,

George C. Jack  
Secretary  
Canadian Nuclear Safety Commission

c.c. Dr. A. J. Bishop

Encl.

7/7...To OIP for Appropriate Action...Copy to: Chairman, Comrs, OGC, EDO...00-0449..OCM #3241  
(NOTES: July 10, 2000 COMMISSION MEETING)

**CANADIAN NUCLEAR SAFETY COMMISSION**

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**Record of Proceedings, including  
Reasons for Decision**

**In the matter of**

**Atomic Energy of Canada Ltd. (AECL)**

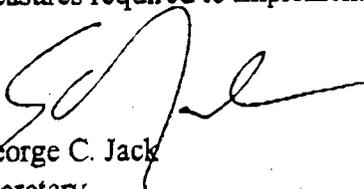
**Application to authorize the operation of the MAPLE 2 Reactor at the  
AECL's Chalk River Laboratories**

**July 2000  
Ottawa, Ontario**

continued much past the end of this year due to regulatory limits imposed on the concentration of fissile material in the waste storage tank. The Commission explored the intervenor's suggestion that a minor modification might be possible to the pipework in the new radioisotope production facility that would simplify the conversion to LEU at a later date. The Commission accepted AECL's view that such a modification would be far from minor, and would endanger operating personnel due to the proposed pipework having to be installed above the workers' heads. The applicant reported that their business partner, MDS Nordion, the company that processes the targets to produce radioisotopes, had reserved a piece of land adjacent to its present facility, on which it could build a new processing facility in the future should that be needed. MDS Nordion representatives present at the hearing confirmed this, and stated further that they were cooperating with Argonne National Laboratory in the USA, and a contractor in France to explore options for changes to the processing facility. They further stated that they were engaged in research into alternative processes that might allow them to use the existing production facility with LEU target material at some time in the future (subject, of course, to regulatory requirements). The Commission notes that the applicant has always respected safeguards requirements concerning the protection of material such as HEU. It also notes that the control of the export of HEU from the USA is the responsibility of the United States Government. The Commission regulates the safety of nuclear facilities in Canada, however, and is satisfied that the use of HEU targets does not negatively affect safety. The Commission accepts that modifications now to the processing facility could negatively affect safety, and therefore does not accept the intervenor's request to withhold approval.

### 3. Conclusion

The Commission accepts the information set out in CMD 00-H11 and the submissions, conclusions and recommendations set out in that document. The Commission is therefore of the opinion, as required by section 24 of the *Nuclear Safety and Control Act*, that the applicant is qualified to carry out the activity that the amended licence will authorize the licensee to carry on and that the applicant will, in carrying on the activity, 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.



George C. Jack  
Secretary,  
Canadian Nuclear Safety Commission

Date of decision: 29 June, 2000

Date of release of Reasons for Decision: 6 July, 2000

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applicant's information that it was due to particles becoming loose from an improperly cleaned weld. The applicant has now cleaned off the welds and back washed the system, thereby removing any residual particles. The Commission is satisfied that these were the appropriate steps to prevent a recurrence.

## 2.2 Control Adjuster Rods

The Commission raised with the applicant and Commission staff problems that had arisen in the early stages of MAPLE 1 commissioning with the control adjuster rods jamming. The Commission heard concurring views from Commission staff and the applicant that the problem was again caused by particles from construction activities, and the Commission accepts this explanation and associated solution of cleaning and back washing.

## 2.3 Quality Assurance

The Commission heard concerns expressed by Commission staff about AECL's quality assurance program. The Commission reviewed the issue and was informed by the applicant at the hearing that they have now established a group of AECL staff reporting to the company's Chief Engineer to independently verify the adequacy of corrective measures. The Commission accepts the applicant's submission that this was an appropriate remedy.

## 2.4 Staffing and Training

The Commission accepts the applicant's submission that it will have a sufficient number of trained staff available within the facility to operate the facility safely in accordance with the licence, and to respond promptly to emergencies, even if both MAPLE 1 and MAPLE 2 operate simultaneously.

## 2.5 Intervenor Concerns

In its submission, an intervenor, the Nuclear Control Institute, raised issues arising from the use of highly enriched uranium (HEU) targets for irradiation in order to produce radioisotopes for medical uses, which is the prime function of the MAPLE reactors. The intervenor expressed a preference for the use of low enriched uranium (LEU) instead. The Commission notes that the licensing issue before it is not the production of radioisotopes per se, but the operation of a second reactor. The Commission further notes, however, that the entire safety analysis of the reactor and target assemblies is based on the use of HEU targets. The Commission accepts the submission that a change to LEU would require significant testing and evaluation in order to determine that heat transfer characteristics, for example, would remain acceptable. Since the environmental assessment done in 1997 was based on HEU targets, that assessment also could have to be revisited if LEU targets were to be used, which could cause a lengthy delay in starting production. The Commission heard from both the applicant and the Commission staff that the existing production of radioisotopes by the NRU reactor, which is not part of this application, cannot be

# CANADIAN NUCLEAR SAFETY COMMISSION

## DECISION

### CHALK RIVER LABORATORIES AMENDMENT TO NON-POWER REACTOR OPERATING LICENCE

#### 1. Summary

In response to an application from Atomic Energy of Canada Ltd. (AECL), the Canadian Nuclear Safety Commission, pursuant to section 24 of the *Nuclear Safety and Control Act*, amends AECL's Non-Power Reactor Operating Licence NPROL-62.1/2001, to authorize the operation of the MAPLE 2 Reactor at the AECL's Chalk River Laboratories. This reactor will produce medical radioisotopes.

In reaching this decision, the Commission considered the submissions of Commission staff and the participants as set out in the material filed for the hearing as well as information provided by staff and participants present at the hearing. The Commission considered information submitted by the applicant and its evaluation by Commission staff. In addition, the Commission considered information received from two intervenors. One was MDS Nordion of Kanata, Ontario, and the other was the Nuclear Control Institute, based in the United States of America.

The Commission notes that the application is for an amendment to an existing licence which already permits operation of a facility like the one proposed. The Commission is satisfied with the information and submissions presented to it on the issues raised, and concludes therefore that the applicant is qualified to carry out the activity that the amended licence will authorize the licensee to carry on and that the applicant will, in carrying on the activity, 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.

#### 2. Issues

During the public hearing, the Commission heard submissions from the applicant and Commission staff related to several issues. The Commission's views on these are as follows.

##### 2.1 Shutoff Rods

The MAPLE I reactor shutoff rods jammed on more than one occasion. The reasons for this malfunction were not determined or remedied until recently. The Commission accepts the

**Day 2:** June 29, 2000

**Location:** CNSC Offices, 14th Floor, 280 Slater St., Ottawa, Ontario

**Members present:** Dr. A.J. Bishop, Chair  
 Dr. C.R. Barnes  
 Dr. Y.M. Giroux  
 Mr. A.R. Graham

**Counsel:** A. Nowack  
**Secretary:** G.C. Jack  
**Recording Secretary:** B. Gerestein

Applicant Represented By	Document Number
<ul style="list-style-type: none"> <li>▪ V. Langman</li> <li>▪ J.-P. Labrie</li> <li>▪ D. Taylor</li> </ul>	CMD 00-H11.1
CNSC Staff	Document Number
<ul style="list-style-type: none"> <li>▪ A. Aly</li> <li>▪ B. Pearson</li> </ul>	CMD 00-H11
Intervenors	Document Number
MDS Nordion, Kanata, Ontario <ul style="list-style-type: none"> <li>▪ G. Malkoske (written submission)</li> <li>▪ D. McInnes (in person)</li> </ul>	CMD 00-H11.3
Nuclear Control Institute, Washington, D.C. <ul style="list-style-type: none"> <li>▪ A. Kuperman and P. Leventhal (written submission)</li> </ul>	CMD 00-H11.2

**Decision and Reasons:**

Application: Approved:  X  Not Approved:      

Date of Decision: June 29, 2000

Sent to applicant on: July 6, 2000

Sent to participants on: July 6, 2000

Reasons Issued: Yes:  X  No:      

Licence attached: Yes:       No:  X

**CANADIAN NUCLEAR SAFETY COMMISSION**

**RECORD OF PROCEEDINGS**

**Applicant:** Atomic Energy of Canada Limited

**Address/Location:** Chalk River Laboratories, Chalk River, Ontario

**Purpose:** Amendment to Non-Power Research Reactor Operating Licence  
NPROL-62.1/2001 - to authorize operation of the MAPLE 2 Reactor

**Application received:** March 17, 2000

**Type of hearing:** 2 days

**Date(s) of hearing:** Day 1: April 26, 2000      Day 2: June 29, 2000

**Day 1:** April 26, 2000

**Location:** CNSC Offices, 14th Floor, 280 Slater St., Ottawa, Ontario

**Members present:** Dr. A.J. Bishop, Chair  
Dr. C.R. Barnes  
Dr. A.J. Carty  
Dr. Y.M. Giroux  
Mr. A.R. Graham

**Counsel:** A. Nowack

**Secretary:** G.C. Jack

**Recording Secretary:** B. Gerestein

Applicant Represented By	Document Number
<ul style="list-style-type: none"> <li>• J.-P. Labrie</li> <li>• V. Langman</li> </ul>	BMD 00-56.1
CNSC Staff	Document Number
<ul style="list-style-type: none"> <li>▪ A. Aly</li> <li>▪ B. Pearson</li> </ul>	BMD 00-56