



## Medical Isotope Solutions

### Backgrounder

#### Canadian Leadership in Medical Isotope Supply

- On **May 18, 2009**, Atomic Energy of Canada Limited (AECL) announced that its National Research Universal (NRU) reactor would be out of service for more than one month.
- At that time, AECL indicated that production would not be able to meet demand for medical isotopes by **May 23, 2009**, thereby negatively impacting the nuclear medicine community and the patients they serve.
- On **May 27, 2009**, AECL updated its information on the NRU reactor shutdown, stating that it would be out of service for at least three months.
- Medical isotopes are used to better diagnose and treat a number of diseases, including cardiac and neurological conditions, and several types of cancer.
- At more than 50 years of age, the NRU is the world's oldest reactor, and its largest producer of medical isotopes. The NRU produces 30% to 40% of the world's medical isotopes, and approximately 50% of those used in North America. Those isotopes are then processed by MDS Nordion at its state-of-the art, 300,000-square-foot facility in Ottawa. Canadian-produced medical isotopes are used in approximately 50,000 procedures per day worldwide, 5,000 of those procedures are conducted in Canada.
- In response to the NRU shutdown, in an article by Gloria Galloway in the **May 19, 2009** edition of The Globe and Mail, Dr. Jean-Luc Urbain, of the Canadian Association of Nuclear Medicine, was quoted as saying, "it's (the shutdown of the NRU) a catastrophe. For 18 months, I have refrained from using that word. I have to use it. It's a catastrophe for the patients, for the health-care system in general, and for the profession."
- There are no domestic or international sources of supply that can fully mitigate this shortage, which will cause unavoidable and serious disruptions to patient care..
  - On **May 25, 2009**, in an interview with Canwest News Service on the status of the supply of medical isotopes, Dr. Christopher O'Brien, President of the Ontario Association of Nuclear Medicine and Director of Nuclear Medicine at Brantford General Hospital, said "If Chalk River does not come back up online, does not restart, North America will be faced with a significant and chronic shortage of



medical isotopes. There just aren't enough reactors out there that can take the place of Chalk River."

- The current NRU shutdown – and the shutdown of **November 2007** – illustrates how fragile and unpredictable the world supply system is and highlights the requirement for new research reactor capacity.
- MDS Nordion requests that the Government of Canada and AECL immediately consult with international experts and re-start the MAPLE project. The solution to the global medical isotope crisis is in Canada. The infrastructure is in place and, with the assistance of an international consortium of nuclear experts, the MAPLE reactors could be producing medical isotopes to the benefit of patients worldwide.

### **The MAPLE Project – The Medical Isotope Supply Solution**

- In the **mid 1990s**, MDS Nordion recognized the serious nature of the aging global reactor infrastructure, and contracted with AECL to construct and bring into service two nuclear reactors and a processing facility. This agreement came to be known as the MAPLE project and was intended to secure a long-term supply of medical isotopes. MDS invested approximately \$350 million.
- The MAPLE reactors were intended to replace the NRU. The reactors would also maintain Canada's leadership position in the innovative and increasingly important field of nuclear medicine.
- On **May 16, 2008**, the Government of Canada and AECL unilaterally announced they were stopping work on the MAPLE reactors without disclosing a long-term plan for the supply of medical isotopes beyond extending the license of the NRU.
- On **July 9, 2008**, MDS commenced arbitration against AECL to compel them to return to work and fulfill their contractual obligations to bring the MAPLE reactors into service, thereby securing medical isotope supply for patients in Canada and around the world.
- On **January 2009**, in its report, Medical Isotope Production without Highly Enriched Uranium, the National Academy of Science Committee states, "the Committee judges that there is enough time to fix the MAPLE reactors and refurbish the new processing facility before 2016 if the work begins within the next year."



MAPLE 1 irradiating medical isotope targets at 50% power

- On **January 29, 2009** Dr. Kevin Crowley, Study Director of the National Academy of Science, stated in his presentation to the Nuclear Energy Association that “AECL’s May 2008 decision to discontinue work on the MAPLE reactors is a blow to worldwide supply reliability.”
- On **May 24, 2009**, in an article by Megan Fitzpatrick in The Ottawa Citizen, Dr. Robert Atcher, President of the Society of Nuclear Medicine, stated that the American nuclear science community’s reaction to pulling the plug on the MAPLE reactors “is not printable. We’re basically held hostage now because we ceased to do any of our activity in terms of developing a domestic capability,” he said.
- MDS believes that the completion of the MAPLE project is the best solution to provide isotope supply. To our knowledge, the government and AECL have taken no action to re-start the MAPLE reactors – even with the recent NRU extended shutdown, the lack of sufficient global isotope capacity, and the arbitration proceeding against AECL.

### **Expert Opinion on MAPLE**

The MAPLE reactors are small, simple, single-purpose reactors.

- Organizations and experts have indicated that the MAPLES can be brought into service, and many leading scientists are willing to help:
  - The National Academy of Science Committee, in its **January, 2009** report, Medical Isotope Production without Highly Enriched Uranium, states – “AECL could probably contract with another organization to fix the MAPLE Reactors...if it does not have the necessary in-house technical expertise or resources to do the work itself.”



- In a Viewpoint article that appeared in the **October 2, 2008** edition of *Nuclear Engineering International*, Dr. Harold Smith, ex-Manager, MAPLE Nuclear Commissioning, HIZ and Associates Inc., stated that the “MAPLE reactor is probably the safest reactor design in existence since it actually has three shutdown systems...” “The MAPLE reactor operated like a dream and was/is fully capable of meeting all objectives. All you have to do is finish the last test or put Hanoro-design fuel in it.”
- On **Tuesday, June 10, 2008**, during the Standing Committee on Natural Resources hearings, Dr. Jim Waddington, Nuclear Safety Consultant, appearing as an individual, suggested two solutions for the MAPLE project. Dr. Waddington is a professional engineer with about 40 years of experience in the nuclear safety business, and for the last 31 years, he has worked on CANDU and Canadian reactors with the Canadian Nuclear Safety Commission, with whom he was a director general for 11 years. He is also on an advisory panel of professors who advise the board of directors of AECL.

Quotes from hearing:

- “One of the alternatives that is open to AECL is to redesign the fuel itself, as opposed to the targets, although the targets, in fact, contribute quite a bit to the power. When you design fuel, you can design it with certain power characteristics right up front, depending on how you make the fuel and what you put in it. So AECL does have an option to redesign the fuel with a different set of characteristics that would enable it to have a very definite negative power coefficient reactivity.”

### **Other Longer-Term Supply Options**

- In addition to MAPLE, MDS Nordion is examining longer-term supply alternatives. On **April 28, 2009**, for example, MDS Nordion’ announced a collaboration with TRIUMF, Canada’s national laboratory for particle and nuclear physics, to study the feasibility of producing a viable and reliable supply of photo fission-based molybdenum-99.

### **MDS Nordion**

- MDS Nordion is a global leader in providing medical isotopes for molecular and diagnostic imaging, radiotherapeutics and sterilization technologies.
- Customers count on MDS Nordion to supply isotopes for cardiac imaging, targeted cancer treatments and sterilization of medical products. In addition, customers look to MDS Nordion for unique collaborations to bring novel molecular imaging agents and radiotherapeutics to market.



- Customers for MDS Nordion's medical isotopes are radiopharmaceutical manufacturers. They manufacture radiopharmaceuticals for distribution to hospitals and radio-pharmacies in Canada and worldwide.
- MDS Nordion's commercial collaborations have attracted approximately \$20 million in research and development to the Province of Ontario in the past two years.

### **MDS Inc.**

- MDS Inc. is a global life sciences company that provides products and services for the development of drugs and to diagnosis and treatment of disease. Headquartered in Mississauga, Ontario, the Company employs approximately 5,000 people, including about 1,575 people in Canada.
- In 2008, MDS conducted \$114 million-worth of research and development in Ontario. MDS spent 66% of its global product development investment in the province, although the Ontario market represents less than 5% of MDS global revenue. In 2008, the Company launched 16 new products and services.