

Lessons Learned from ARTEMIS Peer Review Mission to France

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- ▶ What is ARTEMIS?
- ▶ What was the result?
- ▶ How might this be applicable to Canada?
- ▶ What lessons / actions can be considered for Canada?

What is ARTEMIS?

“Building on many years of experience in conducting peer reviews in the field of radioactive waste management, the IAEA has developed an integrated review service for radioactive waste and spent fuel management, decommissioning and remediation programmes, referred to as ARTEMIS. Based on the IAEA safety standards, technical guidance and international good practices, ARTEMIS aims to assist in improving organizational performance relating to the issues under review in Member States and to contribute to increased national and international confidence in their activities.”

- ▶ Process and scope are flexible, and can be adapted to meet the needs of the requesting Member State
 - ▶ May cover existing or planned national or institutional policy and regulation frameworks as well as waste management programmes, projects or facilities
 - ▶ May also involve detailed assessment and technical advice on the implementation of specific programmes and project activities
 - ▶ Member State makes formal request to IAEA, who assemble the team and execute the peer review

- ▶ European Council Directive 2011/70/EURATOM requires:
*“Member States shall periodically, and at least every 10 years, arrange for self-assessments of their national framework, competent regulatory authority, national programme and its implementation, and invite **international peer review of their national framework, competent regulatory authority and/or national programme** with the aim of ensuring that high safety standards are achieved in the safe management of spent fuel and radioactive waste.”*
- ▶ France requested the ARTEMIS review to address this requirement for the “national framework” and “national programme” for spent fuel and radioactive waste management.
 - ▶ Many other European Union countries are scheduling similar reviews for the same purpose.
 - ▶ *(Note that the regulatory authority is already addressed by a separate review administered by the IAEA, the Integrated Regulatory Review Service, or IRRS).*
- ▶ The review consisted of pre-review of national programme documents provided by French authorities (including the French National Plan for the Management of Radioactive Materials and Waste); plus a 12-day mission to Paris to meet with the various actors in the French national programme; including production of a draft review report and a formal exit meeting.
 - ▶ The final report is publicly available (https://www.iaea.org/sites/default/files/documents/review-missions/final_artemis_france_report_.pdf).
- ▶ **Paul McClelland from AECL, Canada, was selected as one of the ten member team of international experts.**

- ▶ IAEA maintains a neutral position on the European Council Directive 2011/70/EURATOM.
 - ▶ ARTEMIS reviews are based on IAEA Safety Standards.
 - ▶ It is acknowledged that there is a high degree of alignment between Safety Standards and European Council Directive 2011/70/EURATOM.
- ▶ ARTEMIS reviews are organized according to the following topics:
 - ▶ National policy and framework for radioactive waste and spent fuel management
 - ▶ National strategy for radioactive waste and spent fuel management
 - ▶ Inventory of spent fuel and radioactive waste
 - ▶ Concepts, plans and technical solutions for spent fuel and radioactive waste management
 - ▶ Safety case and safety assessment of radioactive waste and spent fuel management activities and facilities
 - ▶ Cost estimates and financing of radioactive waste and spent fuel management
 - ▶ Capacity building for radioactive waste and spent fuel management – expertise, training and skills

- ▶ Team of experts selected to broadly cover all topics and is a mix of:
 - ▶ IAEA staff to administer the process
 - ▶ Regulators
 - ▶ Operators
 - ▶ Government officials
 - ▶ Can include observers from countries scheduled to have an ARTEMIS mission, but they are excluded from team discussions regarding feedback to country undergoing the mission
- ▶ The basis for the assessment is a comparison to requirements in IAEA Safety Standards; including how well they have been implemented
- ▶ Not just a compliance verification exercise, but includes opinions of experts on how aspects of the program are functioning, or how well they have been integrated at the national level

- ▶ The main output is a review report with specific findings:
 - ▶ **Recommendations** – to address a gap, or incomplete implementation of one of the principles or requirements in the IAEA Safety Standards
 - ▶ **Suggestions** – identified opportunities for further improving the performance of the implementation of one of the principles or requirements in the IAEA Safety Standards
 - ▶ **Good Practices** – identified practices that are exemplary and set the standard for other countries to strive for
- ▶ The draft report, including findings, are shared with the lead country representatives, and comments (particularly regarding factual correctness) are discussed. If there has been a misunderstanding of facts, or additional information provided, the experts may modify a finding.
- ▶ The review for France identified no recommendations (i.e. no gaps)
 - ▶ **This is an extremely rare result, even for a top tier nuclear country**
- ▶ The review identified several good practices and several suggestions

How might this be applicable to Canada

- ▶ The ARTEMIS review service is available to Canada upon request, as Canada is a member state of the IAEA
- ▶ There are no requirements for Canada to undertake a peer review
 - ▶ European Council Directive does not apply to Canada
- ▶ Canada has always sought continuous improvement in compliance with recognized international standards
- ▶ Should Canada choose to undertake such review, it would be obligated to report the results as part of the review meeting of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (to which Canada is a contracting party)
- ▶ Canada could request to participate as an observer of another ARTEMIS review to further learn about the process

- ▶ Question to be explored is: **“How would we expect Canada to perform under an ARTEMIS review at this point in time?”**
- ▶ The following slides represent an extrapolation against the ARTEMIS categories based on the opinions and experience of one expert who participated in the ARTEMIS review of France
- ▶ It is based on the expert’s own experience in Canada and internationally, including participation in the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management
- ▶ It was not based on a suite of presentations followed by detailed dialogue
- ▶ The intent is to spark dialogue, and invite self assessment against the ARTEMIS categories
- ▶ Canada has a highly-developed and internationally-respected nuclear program and would be expected to perform well overall, including a number of identified Good Practices
- ▶ Learning points for Canada, based on the French example, are provided

National policy and framework for radioactive waste and spent fuel management

- ▶ France received three suggestions and two good practices for this category.
- ▶ Two of the suggestions are very specific to the French case and largely do not represent learnings for Canada
- ▶ There was a suggestion relating to an outstanding action from the IRRS mission relating to radioactive waste management
 - ▶ Learning for Canada: has the CNSC completed the plan for updating regulatory guidance for radioactive waste management, as was committed in closing out the IRRS Recommendation 11?
- ▶ The good practices pertain to the integration of the French National Plan into the French policy framework, and the legally binding status of the French national plan
- ▶ Many countries, including France, have published regulatory guidance regarding licensing cases for the different repository types. In Canada there is only generic guidance for category 1 nuclear facilities, largely based on nuclear power plants

National policy and framework for radioactive waste and spent fuel management (cont'd)

- ▶ In Canada, our framework covers all radioactive wastes based on the 'polluter pays' principle, whereby waste owners are responsible for the funding, organization, management and operation of disposal and other facilities required for their wastes
 - ▶ A specific implementation mechanism was put in place for used nuclear fuel through legislation: the NWMO
- ▶ Learning for Canada:
 1. Despite our existing policy framework, Canada could be asked what are the implementation mechanisms for low and intermediate level wastes
 2. The definition of radioactive waste categories in Canada is based on the CSA Standards and is described as not mandatory text; Canada would likely be asked for the rationale for this
 3. It is likely Canada will be asked about the status of the updates to the regulatory guidance for radioactive waste management as committed to in the IRRS peer reviews
 4. Canada may be asked about regulatory guidance for specific repository types, as is done in many countries

Recommendations and/or Suggestions could arise from such questions

National strategy for radioactive waste and spent fuel management

- ▶ France received one suggestion and one good practice for this category
- ▶ The suggestion is very specific to the French case and largely does not represent learning for Canada
- ▶ The good practice pertains to the quality and comprehensiveness of the French National Plan, its method of generation and processes for maintenance
- ▶ The French national plan is publicly available (<http://www.french-nuclear-safety.fr/Information/Publications/Others-ASN-reports/French-National-Plan-for-the-Management-of-Radioactive-Materials-and-Waste-for-2016-2018>)
- ▶ Learning for Canada:
 5. As has become the practice in many countries, Canada will be asked to present the National Plan for management of all radioactive wastes

Recommendations and/or Suggestions could arise from such questioning

Inventory of spent fuel and radioactive waste

- ▶ France received one good practice for this category related to the comprehensive approach to assembling their inventory, and tools they use to publish the information and make it available to stakeholders
- ▶ Furthermore, their approach to making every effort to continuously “flush out” potential legacy inventories was commendable
- ▶ Learning for Canada:
 6. Canada has an established approach to address national inventory and fulfils the international obligations under the Joint Convention in this regard; however we could explore whether any of the French practices could be adapted for use in Canada to take performance to the next level

Concepts, plans and technical solutions for spent fuel and radioactive waste management

- ▶ France received two suggestions for this category
- ▶ One was specific to the French national policy regarding closed fuel cycle and does not provide learning for Canada
- ▶ The other was to do with VLLW as managed in France, and it is helpful for Canada to understand the context of VLLW in France, as this impacts whether or not one would view any of the French approach as good practice
 - ▶ France has adopted a policy of no clearance. Their VLLW program is entirely constructed around this policy, and the experts recognized that the vast majority of French VLLW would be clearable waste in other jurisdictions, including Canada. The French VLLW approach is arguably “over designed” for their purposes and they foresee massive capacity challenges as the decommissioning sector expands. The suggestion was specific to opportunities within their framework and government structure to further optimize their approach based on experiences in other countries, noting however that a change in their policy is not up for debate.
- ▶ Learning for Canada:
 7. It would likely be observed that Canada does not yet have disposal, and has not yet made the transition from indefinite interim storage to disposal. It is also likely that experts would observe that without disposal and disposal WAC, all waste being accumulated could potentially not be compliant for disposal and may require rework, and that we are continuing to generate “legacy” or “historical” waste until disposal is operational.

Recommendations and/or Suggestions could arise for this topic

Safety case and safety assessment of radioactive waste and spent fuel management activities and facilities

- ▶ France received one good practice in this area and no suggestions
- ▶ The good practice was to do with the way the French had structured their process for preparation and assessment of preliminary safety cases, including evaluation of options
 - ▶ The process accommodates the review of preliminary safety cases for various options by the regulator (without prejudging the assessment of the final safety case for licensing) as an early step in the regulatory engagement process before the EA and public engagement stage. This means that the strategic options can be socialized with the regulator earlier in the process.
- ▶ Learning for Canada:
 8. The French approach to earlier (but not binding) engagement could bring about efficiencies. This could be tied to questions around the regulatory guidance for disposal facilities.

Cost estimates and financing of radioactive waste and spent fuel management

- ▶ France received one good practice and three suggestions for this topic
- ▶ The discussions on this topic were very specific to how this topic is addressed in France, so there is limited learning potential for Canada
- ▶ One of the suggestions touched on the potential opportunity of standardization of approach to determining and implementing financial guarantees in France
- ▶ Another of the suggestions relates at a tangent to an issue in Canada – ongoing post disposal unlimited liability of the waste producers, in particular how impractical this is for producers of very small volumes of radioactive waste
- ▶ It is difficult to predict how Canada would fare for this category. The unlimited liability issue identified for France further highlights the challenge that small volume producers have in Canada with being practically able to dispose of their own wastes, given smaller volumes.

Capacity building for radioactive waste and spent fuel management – expertise, training and skills

- ▶ France received a good practice for this category to do with demonstrating the efforts to grow the proportion of younger talent across their program
- ▶ Learning for Canada:
 9. We are in a good position given the work being done by the various Canadian actors regarding this topic

- ▶ Canada may or may not choose to request an ARTEMIS review in future
- ▶ Canada can request to participate as an observer of an ARTEMIS review
- ▶ Canada has always sought continuous improvement in compliance with recognized international standards
- ▶ Should Canada choose to undertake such review, it would be obligated to report the results as part of the review meeting of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (to which Canada is a contracting party)
- ▶ **Whether or not Canada chooses to pursue an ARTEMIS review, Canadian actors could choose to collaborate on a self assessment of the ARTEMIS review categories to further identify opportunities for improvement of the radioactive waste management program in Canada**
 - ▶ This would represent the first step of an ARTEMIS review process if one were requested



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