Canada's Nuclear Regulator

Responses to Questions Raised From Peer Review of Canada's Fifth National Report for the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*

May 2015

Government of Canada Gouvernement du Canada

Canada

Responses to Questions Raised From Peer Review of Canada's Fifth National Report for the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*

PWGSC catalogue number CC172-23/1-2015E-PDF
ISBN 978-0-660-02124-9

Également publié en français sous le titre : Réponses aux questions découlant de l'examen par les pairs du cinquième Rapport national du Canada pour la Convention commune sur la sûreté de la gestion du combustible usé et sur la sûreté de la gestion des déchets radioactifs.

Document availability

This document can be viewed on the CNSC website at nuclearsafety.gc.ca. To request a copy of the document in English or French, please contact:

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Publishing history

May, 2015

Responses to Questions raised from Peer Review of Canada's Fifth National Report for the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

Fifth Review Meeting

May 2015

This document supplements the Canadian National Report for the Fifth Review Meeting of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. By offering additional and detailed information in response to 91 specific questions, or comments received from 14 Contracting Parties, the document demonstrates how Canada has implemented its obligations under the Joint Convention. This document is produced by the Canadian Nuclear Safety Commission on behalf of Canada. Contributions to the document were made by CNSC staff and representatives from Natural Resources Canada, Nuclear Waste Management Organization, Canadian Nuclear Laboratories, Ontario Power Generation, New Brunswick Power Nuclear, and Hydro-Québec.

The Articles referenced within this document can be found on the IAEA website: www.iaea.org/publications/documents/conventions/joint-convention-safety-spent-fuel-management-and-safety-radioactive-waste

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GENERAL COMMENTS					
1	China	General	Executive Summary 3.1(a), 3.1(b), p2-p3;	Please introduce the requirements, procedure and practice of public engagement in the siting of the treatment facility and repository of radioactive waste and spent fuel in Canada.	The regulatory requirements for public information and engagement to be included in a licence application for a licence to prepare site and/or licence to construct a DGR for radioactive waste and spent fuel are based on the *Nuclear Safety and Control Act*. Under paragraph 3*(j)* of the *General Nuclear Safety and Control Regulations:* a licensee shall have a "…program to inform persons living in the vicinity of the site of the general nature and characteristics of the anticipated effects on the environment and the health and safety of persons that may result from the activity to be licensed." The program must also conform to CNSC regulatory document RD/GD-99.3, *Public Information and Disclosure,* published in March 2012. The objective is to ensure that the program is commensurate with the public's perception of risk and that timely information associated with the lifecycle of the project is communicated. The NWMO's initiative for a DGR for Canada's spent fuel is in the pre-licensing phase and is not currently subject to the regulations and regulatory document referenced above for public information and engagement. However, the CNSC signed a service arrangement with the NWMO to provide regulatory guidance and support prior to the submission of a licence application. As part of the service arrangement, the CNSC is participating in public meetings to explain its independent regulatory role and, if a licence application were submitted by the

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					NWMO in the future, how the public would be involved in the public hearing process. During the pre-licensing phase, the CNSC expects the NWMO to adhere to the spirit of RD/GD-99.3, *Public Information and Disclosure* by proactively engaging all of the communities of interest.
2	China	General	Executive Summary 3.1(d), p6; H.3.2	Carbon-14 containment of spent resin from CANDU NPPs is much higher. Generally it is stored in tanks. Spent resin should be agitated frequently in order to prevent resin caking. But when agitated, carbon-14 will release to environment obviously. How to treat spent resin generated from CANDU NPPs in Canada? Which category is spent resin containing carbon-14 from CANDU NPPs classified as according to waste classification standard of Canada?	Spent ion exchange resin represents more than one half of OPG's intermediate-level radioactive waste category at OPG's generating stations. The resins in storage tanks are not routinely agitated or fluidized and are kept fully submerged, as operating experience has indicated that C-14 emissions from the headspace of the tanks increase if the resins are exposed to air while in the moist state. OPG does measure low-level releases of C-14 from the headspace of the in-station bulk spent resin storage tanks (SRSTs) and airborne C-14 release when resin is slurried from the tanks into shipping containers. C-14 scrubbers were installed in the resin container vent to capture the C-14 released during this process. At the generating station, resin is first transferred to a smaller container (the most common being a 3 m^3 resin liner). Then it is dewatered and transferred to the interim waste storage facility. OPG has seen no evidence of compaction or consolidation of spent resins in the bulk SRSTs at the stations or in the stored resins at the Western Waste Management Facility. There have been a few isolated occurrences of consolidation of resins exposed to high levels of biological activity for long periods. About 15 to 20 percent of the overall volume remains

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					stored at the stations, principally in bulk resin storage tanks. OPG plans to dispose of its resin in its proposed Deep Geologic Repository (DGR) for OPG's L&ILW without further treatment. OPG does not intend to pre-condition resins with high levels of C-14 because the geology of the proposed DGR (in limestone) supports the retention of the C-14 and OPG's safety case for the repository is not dependent upon conditioning. Radiation fields on individual containers at the time of disposal will determine the necessary shielding requirements.
3	China	General	Annex 7.9, p222	What are the amounts of each kind of waste produced during decommissioning of Gentilly-2? How to treat the waste?	Hydro-Québec has adopted a deferred decommissioning strategy approach for the Gentilly-2 nuclear power plant (NPP). This approach will span the next 50 years (as noted in Figure 7.10 of Canada's National Report). Therefore, in response to your question, the amounts shown in appendix A of this document are the waste volumes produced during 2013 and 2014.
4	France	Article 3	Section C.2 p. 25	The 5th Report mentions that "radioactive waste is therefore regulated in the same manner as all other materials that contain a nuclear substance. All radioactive waste, whether from a large nuclear facility or a small-scale user, is subject to the Joint Convention, with the exception of: • reprocessed spent fuel, •	As noted in section C.4 (page 25) of the Canadian National Report, naturally occurring nuclear substances, other than those that are or have been associated with the development, production or use of nuclear energy, are exempt from the application of all provisions of the *Nuclear Safety and Control Act* and its associated regulations, except under the following circumstances: • when NORM is associated with the development, production or use of nuclear energy as set out in the CNSC's *General Nuclear Safety and Control*

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				naturally occurring radioactive materials, • radioactive waste generated by military and defence programs". Could Canada confirm its position in relation to the point 19 mentionned in the new Guidelines regarding the Form and Structure of National Reports (INFCIRC/604/Rev.3 Draft 3), and especially for "naturally occurring radioactive materials" (point 19(b))?	*Regulations* • when NORM is imported into Canada or exported from Canada as set out in the CNSC's *Non-proliferation Import and Export Control Regulations* • when the transport of NORM has an activity concentration and/or an activity limit for an exempt consignment greater than 10 times the values specified in paragraphs 401 to 406 of IAEA TS-R-1 1996 Therefore, NORM is not considered radioactive waste under the Joint Convention, except in the above-mentioned instances.
5	France	General	Document	According to the new Guidelines regarding the Form and Structure of National Reports (INFCIRC/604/Rev.3 Draft 3), Canada's National Report should include an overview matrix to be used by the Rapporteur during the Country Group review.	This was an oversight in developing Canada's Fifth National Report, please refer to Appendix B of this document. It should also be noted that Canada provided its matrix to the coordinator of its country group (CG) (via the CG chair) on March 12, 2015 to aid in composing the coordinator's analysis. Canada will ensure the matrix is included in its sixth National Report. Finally, Canada's matrix will be included in its presentation, which will be publically available on the CNSC website.
6	France	General	Section K	According to the new Guidelines regarding the Form and Structure of National Reports (INFCIRC/604/Rev.3 Draft 3), Canada should change the title of	As concluded at the Second Extraordinary Meeting (EM) of the Joint Convention, all the agreed changes to the three INFCIRC documents would take effect immediately. It was agreeable to all contracting parties (CPs) that, for the Fifth Review Meeting, CPs may choose to stay with

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				section K into "General Efforts to Improve Safety".	the previous practice concerning the preparation of the national reports (INFCIRC/604/Rev.2). Since, at the time of the EM, Canada was already well advanced into the drafting of its national report, it was decided to fully implement the revision 3 of INFCIRC/604 for the Sixth Review Meeting.
7	France	General	Executive summary - p. 4	To demonstrate the safety of long-standing interim storage facilities to support relicensing activities is one of the challenges set out in the "Country Group 6 - Rapporteur's Report" of the Fourth Review Meeting. The 5th Report presents the example of the Ontario Power Generation's radioactive waste management program; it is mentioned that an aging management program has been implemented to quantify the factors affecting the aging of the facilities. Aging management plans have been developed for the critical, safety-credited structures, systems and components (SSCs) for the transportation of radioactive material, the storage of L&ILW and the storage of dry spent fuel. Could Canada indicate how the question of organisational and human	The aging management plans focus on degradation mechanisms and monitoring requirements. For more information, please refer to Canada's response to question 41. As outlined in CNSC Regulatory Policy P-119*, Policy on Human Factors*, the CNSC expects that licensees will demonstrate consideration of human factors throughout the lifecycle of a facility or activity. Furthermore, licensees are expected to perform safety culture self-assessments on a regular basis throughout the lifecycle and address human performance issues that may be identified as a result of these assessments and other sources of information. This expectation addresses how human factors and organizational issues are addressed in aging management plans.

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				factors is taken into account in these aging management plans?	
8	France	General	Executive summary - p. 8	Regarding the lessons learned from the Fukushima nuclear accident, and the issue of managing large amount of waste (solid and liquid) for this kind of situation, could Canada present the provisions made in anticipation of a potential nuclear accident in terms of: • Objectives and strategy for recovery and waste management (waste characterization and segregation ; volume reduction)? • Dedicated waste management facilities during the post-accidental phase?	It is assumed that the question refers to radioactive waste generated as a result of cleanup and decontamination efforts offsite. While the CNSC recognizes the importance of these issues, especially in light of the Fukushima experience, Canada has not yet established such provisions. Canada has, however, embarked on the development of a strategy for the post emergency/recovery phase. This is currently in draft form and no internal or external consultation has yet taken place. The issues regarding waste management are elements being considered as part of the documented policy on recovery after an emergency. Other topics to be addressed include: assessment of the levels of environmental contamination, dose assessment and consequences, determination of priority for cleanup and methods of cleanup, dose reduction strategies with a focus on self-help and communication issues. Of note, Canada will be presenting on its progress with this strategy at the IAEA International Conference on Global Emergency Preparedness and Response, October 19–23, 2015.
9	Japan	General	G p79-92	What kinds of ageing phenomena are taken into consideration in keeping spent fuels (especially high burnup fuel) in interim storage, and how are these phenomena to be controlled? In connection with this,	The fuel sheath of CANDU fuel has been designed to minimize sheath strain during operation. In the case of Ontario Power Generation, the spent fuel is currently kept within the irradiated fuel bays (IFBs) for a minimum of 10 years, and no significant aging of the fuel

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				are restrictive temperatures, etc. prescribed for contained spent fuels, and if so, how have they been established?	is expected as the environment of the IFB is significantly less harsh than the reactor operating environment. The temperature of the spent fuel is below 150 °C when transferred to the dry storage container (DSC), and known defected fuel bundles are not transferred to dry storage. Failure of the fuel sheath is not expected during interim storage due to the low temperature of the fuel (<150 °C) and storage in an inert (helium) environment. Measurements taken by OPG of temperatures on DSCs during a thermal performance verification program have been consistent with the results of thermal analyses. This demonstrates adequate cooling of the irradiated fuel.
10	Republic of Korea	General	K.4.3.4, 122	It's stated in K.4.3.4 that "The NWMO cannot access the NFWA trust fund until the NWMO has been issued a construction licence from the CNSC." Does "NFWA trust fund" mean the radioactive waste fund from the NPP licensees? Until getting a construction licence from the CNSC, does NWMO use fund separated from radioactive waste fund? If so, why does Canada adopt this system? How much do you expect to cost?	All waste owners have financial guarantees for the long-term management of radioactive waste, including spent fuel and decommissioning as required by the CNSC. A large portion of these guarantees exists in segregated funds. The NFWA trust fund is a defined portion of these segregated funds. The funding of NWMO for long-term management of spent fuel is arranged in two stages. Until the receipt of a construction licence, the waste owners directly fund NWMO's annual costs. After the receipt of a construction licence for a deep geological repository, all further NWMO costs will come from the NFWA trust fund. The total lifecycle cost was estimated to be approximately 17.9 billion (Canadian dollars) as of 2011 for 3.6 million fuel bundles.

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11	Republic of Korea	General	F.6.2, 66	Section F.6.2 describes the nuclide specific limit of the radioactive materials discharged from nuclide facility including a radioactive waste incinerator. What is the nuclide specific limit of the radioactive waste incinerator? What is the regulatory requirements on the waste acceptance criteria of the radioactive waste incinerator?	*What is the nuclide specific limit of the radioactive waste incinerator?* OPG's Western Waste Management Facility (WWMF) includes a low-level radioactive waste incinerator, which is monitored for tritium, particulate, iodine-131 and carbon-14 in airborne releases with facility specific derived release limits (DRLs) of 2.96E+17, 2.34E+12, 1.90E+12, and 1.09E+15 Bq/year, respectively, and provides monitoring results to the CNSC in quarterly operations reports. This facility can incinerate waste up to a maximum of 2,270 kg/day. *What are the regulatory requirements on the waste acceptance criteria of the radioactive waste incinerator?* In accordance with licence requirements for OPG's WMMF, the licensee must ensure, in order to protect the health of the public and the environment, that the regulatory dose limit of 1 mSv/year for members of the public is not exceeded. The amount of radioactive material released in effluents from OPG's WWMF, including the low-level radioactive waste incinerator, must remain below the annual release limits. These are derived from the public dose limit and are referred to as derived release limits (DRLs). Each nuclear facility has facility-specific DRLs for specific radionuclides in the airborne and liquid releases resulting from the facility

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					operating activities.
12	Republic of Korea	General	Annex 7.1.1, 211	Section annex 7.1.1 states that "the WL is currently licensed under a nuclear research and test establishment decommsioning licence, in place since December 31, 2002. This licence authorized AECL to operate and undertake decommissioning activities at the facility until December 31, 2018. The Commission renewed the decommissioning licence until December 31, 2018." How will perform the remediation work using some procedure?	Canada has interpreted your question as meaning, "Given that the licence for Whiteshell (WL) was issued in 2002, and renewed until 2018, will the licensee use the same decommissioning procedures?" The plan for decommissioning the WL site spans a very long period. Although the first decommissioning licence was issued in 2002, all supporting detailed decommissioning plans, procedures and work tasks had not yet been developed in support of all the decommissioning activities. This is because the decommissioning of some buildings onsite is not planned to commence until the buildings are no longer required to support earlier decommissioning tasks (e.g. shielded facilities). The framework by which decommissioning proceeds at the WL site is based upon the submission of acceptable detailed decommissioning plans (DDP). (The number of volumes is 12 as the site is so large.) Once a DDP volume is developed and submitted to the CNSC for approval, the licensee develops detailed work plans associated with each work package identified for decommissioning a specific building or area. Using this approach, decommissioning procedures are developed that take into account modern standards and decommissioning techniques, making use of any advances in decommissioning technologies (i.e., robotics) appropriate to the tasks at hand.

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					CNSC staff conduct compliance inspections of the WL facility and will continue to do so during the licensing period. The safety of the decommissioning activities carried out to date will be reviewed as part of the licence renewal process in 2018.
13	Romania	General	pag 3	3.1(b) Developing long-term management options for radioactive waste. Ontario Power Generation (page 3) - Could you provide reasons that determined the organization of additional 2 weeks of public hearing days on the environmental impact statement? Please describe in short how the Joint Review Panel proceeds with comments that come from public hearings? Does the Joint review Panel take into consideration other public opinions expressed outside the public hearings?	The Joint Review Panel (JRP) for OPG's Deep Geologic Repository (DGR) Project for low- and intermediate-level radioactive waste scheduled the additional two weeks of hearings in September 2014 to give public participants the opportunity to provide their views on the subjects of the additional information requests issued by the JRP after the last day of the hearings held in the fall of 2013. Holding hearings that offer the opportunity for interested parties to participate in the environmental assessment (EA) is one of the assigned duties of the JRP under paragraph 43(1)*(c)* of the *Canadian Environmental Assessment Act, 2012* (CEAA, 2012). The additional hearing days provided the public, Aboriginal groups, the proponent and government departments and agencies with a hearing forum for the additional information and so ensured the JRP executed its duties with respect to hearings on the entire EA and the licence application. All oral and written comments during the public hearings in 2013 and 2014 were required to be directed to the JRP. No direct questioning of participants was permitted by anyone other than the JRP. However, participants could present proposed questions through the JRP Chair for a presenter. It was then the responsibility of the Chair to

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					determine if the panel required an answer to the proposed question. As the JRP is responsible for obtaining all the information they consider necessary to assess the environmental effects of the DGR project and the licence application under the *Nuclear Safety and Control Act* (NSCA), it was for the JRP to determine what information was needed. JRP requests for information during the hearing were directed to OPG, regulatory bodies and public participants alike. If an immediate response was not possible, an "undertaking" was issued by the JRP with the question and an identified period of time for a response. Responses to the undertakings were provided in writing to the JRP. Following the additional hearing days in 2014, the JRP provided the registered participants and the proponent with the opportunity to submit final written comments summarizing their views and opinions on any aspect of the review. After reviewing the final written comments, the JRP announced the close of the record, and no further comments or information have been accepted. Prior to the public hearings, the panel process also included a public review period. During the public review period, submissions were made to the JRP by members of the public, Aboriginal groups, government departments and agencies and CNSC staff, with comments and questions on the environmental impact statement and licence application that was provided by OPG for the DGR project. The JRP took into consideration all of these questions and comments when making their requests to

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					OPG for information during the review period. To complete the review and prepare their report to the Minister of the Environment, the JRP may consider only the information provided in OPG's environmental impact statement and licence application, and the information provided to the JRP during the public review period, the public hearings and in the final written comments. The JRP is required under paragraph 43(1)*(b)* of CEAA 2012 to ensure all this information is made available to the public through an electronic registry maintained by the Canadian Environmental Assessment Agency. In addition to these written materials and documents on the registry, the written transcripts of each hearing day are posted to the registry, and the archived webcasts of each day may be accessed from the CNSC website.
14	Romania	General	A.A.2, pag 9	A.A.2 Introduction - The report mention that the first two missions of the future contractor operated company, namely "managing the government's radioactive waste and decommissioning responsibilities" and "performing science and technology activities to meet core federal responsibilities" will be fully in support of government and core federal responsibilities. Please provide details on the sources and mechanism of financing the	The Government of Canada is in the process of restructuring Atomic Energy of Canada Limited's (AECL) Nuclear Laboratories, which is currently operating as a Crown corporation. Under a new government-owned, contractor-operated (GoCo) model, a private sector contractor will manage and operate Canadian Nuclear Laboratories (CNL). CNL will focus on delivering three missions: managing the government's radioactive waste and decommissioning responsibilities, performing science and technology activities to meet core federal responsibilities and delivering science and technology services to third parties on a commercial basis. AECL will continue to retain ownership of the sites and the associated assets and liabilities.

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				activities of the future contractor operated company dealing with these two missions? What entity will be in a commercial relation with the contractor operated company in the name of the Government? Are any legal provisions planned to be issued in order to cover aspects of forming the contractor operated company?	Under the GoCo model, the Government will fund CNL activities to allow it to deliver on the Government's responsibilities to carry out its three missions. AECL will manage the contract with the contractor, and as such will be in a commercial relationship with the private-sector contractor. The GoCo model will be implemented through a contractual arrangement that will cover all aspects of the necessary work and set out the requirements of government for the management and operation of the laboratories by CNL.
15	Romania	General	Annex 5 pag 181-182	Annex 5 – Radioactive Waste Management Facilities - 5.1.5 Point Lepreau Solid Radioactive Waste Management Facility - Please provide a description of internal structure configurations of the vault storage structures and retube canister. Are there any design features facilitating the recovering of the waste from these structures, if needed?	Vault storage structures in Phases I and III of the Solid Radioactive Waste Management Facility (SRWMF) are composed of equal-sized compartments or cells. The interiors of the cells are 13.26 m by 3.35 m and the cells are 3.20 m high. Each of the five retube canisters in Phase III of the SRWMF houses seven storage cylinders, which in turn each house three guide tubes. The inside diameter of each guide tube is 635 mm. Waste storage containers are stored within these guide tubes. All waste, including spent fuel, is stored in a retrievable manner.
16	Romania	General	pag 5	3.1(c) Demonstrating the safety of old interim storage facilities to support relicensing. New Brunswick Power - What is the designed lifetime of the storage structures? Does NBP check the ageing of the	The designed lifetime of the storage structures at the Solid Radioactive Waste Management Facility (SRWMF), including the spent fuel canisters at the canister site, is 50 years. Aging of these structures is assessed during routine walkdowns and repairs are undertaken as needed.

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				storage structures? Please detail relevant aspect.	Additionally, a technical assessment of storage structure concrete issues was completed in late 2010 with the assistance of Kinetrics. Repairs, focused primarily on the spent fuel canisters, were subsequently undertaken. This assessment is to be completed again in the near future.
17	Sweden	General	3.1(c), p.5	In March 2014, the CNSC published REGDOC-2.6.3, Aging Management, which sets out and provides guidance to licensees on the CNSC's requirements for managing the aging of SSCs in a nuclear facility. To what extent - if any - is the principle of graded approach taken into consideration as regards waste storage/disposal facilities, given their different character compared to NPPs?	CNSC REGDOC 2.6.3 *Aging Management* sets out what is required for managing the aging of structures, systems and components of a power reactor facility. *Aging Management* sets requirements to provide assurance that aging management is appropriately and proactively considered in the different phases of a reactor facility's lifecycle or nuclear installation lifecycle. A graded approach is applied to a radioactive waste storage/disposal facility that is commensurate with the characteristics/hazards of the radioactive waste. With a graded approach, all requirements apply, but to varying degrees depending upon the safety significance and complexity of the work being performed.
18	Sweden	General	3.1 (f), p.7	It is stated that the CNSC contributes to and promotes the use of many of the CSA standards for the management of spent fuel and radioactive waste and that e.g. CNSC staff may participate in technical committee for developing/revising CSA standards (e.g. N292.2, N294-09). It is further stated that standards such as N292.2, Interim Dry Storage of	All conditions found in licences must be complied with by the licensee. This includes any licence condition that states that the licensee must comply with any standard, including CSA standards. Consequently, if adherence to a CSA standard is required by a licence condition, it would have the same legal status as the authorizations granted in the licence itself. In CNSC-issued licences, the "licensing basis" is defined as: The <u>licensee shall conduct</u> the activities described

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				Irradiated Fuel, is often referenced in licence conditions as a requirement with which the licensee must comply. What is the legal status for CSA standards when referenced to in license conditions and/or used in connection with inspections to verify compliance with regulatory requirements?	in Part IV of this licence in accordance with the licensing basis, defined as: (i) the regulatory requirements set out in the applicable laws and regulations (ii) the conditions and safety and control measures described in the facility's or activity's licence and the documents directly referenced in that licence (iii) the safety and control measures described in the licence application and the documents needed to support that licence application Therefore, any standard being referenced in a licence condition must be complied with by the licensee and compliance with the standard may be measured during normal or focused compliance inspections.
19	United Arab Emirates	Article 3.2	section C4, page 25	While noting that Canada has not included NORM waste in the scope of its report, the UAE would apreciate receiving information on the regualtion of NORM residues arising from oil and gas production.	In Canada, naturally occurring radioactive material (NORM) is regulated by the provincial and territorial governments, each having its own specific regulations on the handling and disposal of the material. The *Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials* have been developed by the Federal Provincial Territorial Radiation Protection Committee to harmonize standards throughout the country and ensure appropriate control over NORM. The guidelines may be consulted through Health Canada's website at www.hc-sc.gc.ca/ewh-

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					semt/pubs/contaminants/norm-mrn/index-eng.php NORM is exempt from the application of the *Nuclear Safety and Control Act* (NSCA) and its regulations, except under the following circumstances: • when NORM is associated with the development, production or use of nuclear energy as set out in the CNSC's *General Nuclear Safety and Control Regulations* • when NORM is imported into Canada or exported from Canada as set out in the CNSC's *Non-proliferation Import and Export Control Regulations* • when the transport of NORM has an activity concentration and/or an activity limit for an exempt consignment greater than 10 times the values specified in paragraphs 401 to 406 of IAEA TS-R-1 1996 The reviewer is invited to consult additional information regarding NORM by visiting the CNSC's website at nuclearsafety.gc.ca/eng/resources/fact-sheets/naturally-occurring-radioactive-material.cfm
20	United Kingdom	General	General	Please provide information on any specific improvements made to the management of spent fuel	Please refer to the response provided for question 26.

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				following the accident at Fukushima Dai-ichi, as raised in the Summary and Presidents report from the 2012 meeting?	
21	United Kingdom	General	Exec Summary, B10, K6	Is there any scope for coordinating the long-term plans for deep geological disposal of L&ILW between the various producers, taking benefit from the learning to date on spent fuel and the role of the NWMO?	The federal Radioactive Waste Policy Framework (1996) recognizes that the management of the different categories of radioactive waste (i.e., nuclear fuel waste, L&ILW, and uranium mine and mill tailings) may differ. For more details on this policy framework and initiatives by waste owners, please refer to the response provided for question 52 or visit http://www.nrcan.gc.ca/energy/uranium-nuclear/7725. As part of the waste acceptance criteria, OPG's proposed deep geological repository (DGR) for low- and intermediate- level waste (L&ILW) shall accept only waste packages containing LLW and ILW from the operation and refurbishment of Ontario nuclear generating stations and other nuclear facilities currently or previously owned or operated by OPG. Recognizing this, forums do exist for waste owners to identify challenges, share best practices and plans, moving forward for the long-term management of radioactive waste. The next CANDU Owners Group (COG) Operational Radioactive Waste Workshop is tentatively scheduled for July 2015. A Radioactive Waste Working Group has been developed and may soon become a peer review team under the COG in the near future, a topic that is to be discussed at the upcoming workshop.

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PLANNED ACTIVITIES					
22	Finland	Planned Activities	K.4	Section K.4 on Final repository of spent fuel: It is not clear based on the report what is the goal to have deep geological repository under construction and in operation. Has it been considered and scheduled? Are there some constraints (for starting the final disposal) coming from the operating NPPs and their spent fuel interim storage capasities?	There is no fixed timeline for implementing Canada's plan for the long-term safe management of spent fuel; the NWMO will take the time necessary to do it right. Flexibility in the pace and manner of implementation is key to ensuring meaningful engagement of communities and demonstration of safety. By necessity, any timelines developed to date are conceptual – for planning purposes only. For financial planning purposes only, 2035 has been estimated as the earliest date by which a repository could be operational. This estimate will be updated as plans are refined. Actual timelines will be driven by a variety of factors, including the time it takes to identify a suitable site with an informed and willing host, the time required to assess technical safety and the time required to obtain regulatory approvals. There is no constraint from the operating nuclear power plants with respect to interim (short-term) spent fuel storage capacity. The owners of spent fuel are required to safely manage their spent fuel until a facility is available for long-term management.
23	Finland	Planned Activities	K.4	Section K.4 on Final repository of spent fuel: Report describes CNSC's independent research activities to support decision making in case of geological repositories. Does	Yes, NWMO has its own research program, which also builds on research conducted since 1980 through AECL and then OPG. The technical research program and engineered barrier development program are approximately 12 million (Canadian dollars) in 2015, not

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				NWMO also have their own research programme to support their safety case for geological repository? What type of research does it include and what is the volume of the research programme?	including site characterization related studies. The activities are described in the NWMO annual technical reports. These are available from the NWMO website: www.nwmo.ca/technicalresearch most recent available report is NWMO TR-2014-01, *Technical Program for Long-Term Management of Canada's Used Nuclear Fuel – Annual Report 2013*. Examples of activities range from studies of sorption on reference clay and rock materials to fabrication and testing of prototype containers.
24	Sweden	Planned Activities	K.5.1, p.125	According to the service agreement with NWMO that was renewed in 2014, the CNSC provide regulatory guidance and support for implementing the NWMO's APM project. This service does not certify a concept design or involve issuing a licence under the NSCA and it is not required as part of the licensing process for the deep geological repository. It is stated that the conclusions of any reviews do not bind or otherwise influence decisions that the Commission makes. How is this approach ensured in practice?	The CNSC gets involved early in any proposed new nuclear project to ensure that licence applicants and affected communities have a comprehensive understanding of how the CNSC regulates Canada's nuclear sector. CNSC staff provide pre-licensing reviews as an optional service when they are requested by a future licence applicant. CNSC staff have conducted pre-licensing reviews for other proposed new projects, such as vendor designs for new nuclear power plants. CNSC staff have recognized that early involvement of the regulator in deep geological repositories for radioactive waste, including spent fuel, is an international best practice. What CNSC staff have learned from other countries and their own experience is that it is important to be clear about the roles and responsibilities when CNSC staff conduct pre-licensing reviews. The March 2014 service arrangement mentioned in the question outlines the roles and responsibilities and can be found on the CNSC at www.nuclearsafety.gc.ca/eng/pdfs/MoU-

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					Agreements/CNSC-NWMO-Special-Project-Arrangement_e.pdf. In addition, for the pre-licensing conceptual designs and post closure reports, separate terms of reference for the CNSC and NWMO have been developed to further outline the scope, objectives and timelines. With respect to the pre-licensing reviews, since it is not yet known where the repository will be located in Canada, the reports contain conceptual designs and post closure for two hypothetical (but realistic) sites. Therefore, CNSC staff's review will be at a high level. In the CNSC's final report, it will also be clear that conclusions of any reviews do not bind or otherwise influence decisions that the Commission makes. At this time, no application has been submitted for a deep geological repository for spent fuel; therefore, there is currently no licence and no official regulatory oversight. CNSC staff can only provide guidance. The CNSC endeavours to be clear that no regulatory decisions are being made in its communication on the CNSC's early role with the NWMO (future implementer) and the public. Finally, if an application were to be submitted in the future — for example a licence to prepare site — CNSC staff would rigorously review the application and make recommendations to the Commission. There would also be a public hearing, which would give the public an opportunity to provide input. It is the Commission (not CNSC staff) that makes major licensing decisions. The Commission would not issue a licence unless it was safe.

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25	United Arab Emirates	Planned Activities	section K, page 134	Having a dedicated site for dealing with large quantities of VLLW from decommissioning may be a good practice. The UAE would appreciate further detail on the progress of this project.	The very low level waste (VLLW) facility proposed for Chalk River Laboratories (CRL) has a completed detailed design for the waste structure itself, configured for the preferred site at CRL. The main structure includes engineered near-surface disposition cells, a crane for handling waste and a cover for the cell during waste emplacement. However, the design is not complete for ancillary structures, road access, electrical power supply, etc. The design details are suitable for construction cost estimating and for proceeding with a formal environmental impact assessment. It is important to note that this facility remains in the planning phases and a decision under the NLLP is still required. Therefore, no application for the construction or operation of the VLLMF has been made to the CNSC. However, CNSC staff are providing regulatory guidance in advance of the application through periodic updates provided by CNL. If CNL proceeds with the VLLWF at CRL, a licence application to the Commission will have to be made. This application will include, but not be limited to, a project description and preliminary safety case, which may initiate an environmental assessment under the *Canadian Environmental Assessment Act, 2012*.

SAFETY OF SPENT FUEL MANAGEMENT

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ARTICLE 4: GENERAL SAFETY REQUIREMENTS					
26	Argentina	Article 4	G-81	Taken into account the lessons learned from Fukushima, which measures were taken to ensure SF wet storage water level?	As per the CNSC Fukushima Action Plan (available on the CNSC's website, licensees were requested to complete an analysis of the structural integrity of the spent fuel pool (SFP) at temperatures in excess of the design temperature limit. If structural failure could not be precluded, they were to then demonstrate what additional mitigation (e.g., high capacity makeup or sprays) would be provided. In addition, licensees were requested to evaluate the consequences in the event of a loss of shielding and the potential for hydrogen generation in the SFP area. The CNSC has found the structural integrity analyses of SFPs at Canadian nuclear power plants acceptable. The analyses predicted some leakage at elevated temperatures; however, this is well within the makeup capability that has been implemented and thus assuring fuel cooling is maintained (spent fuel covered) during an accident. As a result of the analyses, NPPs implemented accessible pool makeup water connections and better monitoring instrumentation. **Note:** CANDU spent fuel pools are in-ground and are seismically qualified with diverse means of adding water. As CANDU reactors use natural uranium, re-criticality is not an issue. Spent fuel is removed routinely into dry

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					storage to minimize pool inventory. This minimizes the heat load and maximizes the time for intervention.
27	Czech Republic	Article 4	G, 97	Performance criteria: are there any criteria related to possible changes of environmental conditions as increase of temperature, changes of water/groundwater composition, ..?	The licensee is responsible for safety and therefore must demonstrate how its facility will operate safety and continue to do so in the future. The CNSC will perform a rigorous review of the licence application and, if a licence is issued, conduct compliance activities such as inspections and regulatory reviews of environmental programs. There are no specific performance criteria related to possible changes of environmental conditions other than the general principles in CNSC regulatory guide G-320, *Assessing the Long Term Safety of Radioactive Waste Management*, which states that: • "The applicant should demonstrate that the waste management system will maintain its integrity and reliability under extreme conditions, disruptive events, or unexpected containment failure, including inadvertent human intrusion. This is achieved by adequate design of multiple engineered barriers, or favourable site characteristics, or both. The safety case should explain the relative role of the components that contribute to the overall robustness of the system... • "Current values of regulatory limits, standards, objectives, and benchmarks may be used as acceptance criteria. CNSC licensees operate under both federal and provincial jurisdictions,

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					and the guidelines, objectives, and benchmarks can vary between these jurisdictions… • "In deriving acceptance criteria, benchmarks can also be reduced by applying an additional margin of safety, such as a dose constraint or a safety factor. The adoption of a fraction of a currently applied value as an acceptance criterion for a long term assessment can provide additional assurance that the uncertainty in the predictions and in future human actions will not result in unreasonable risk in the future. CNSC staff is available for consultation on the suitability of the acceptance criteria, and on the balance between conservatism in the assessment and conservatism in the acceptance criteria."
28	Czech Republic	Article 4	G, 102	Monitoring: in the preoperational period, when do you start with monitoring of radiation safety related parameters in environment?	In the pre-operational period, monitoring of radiation-safety-related parameters in the environment generally would start two to three years prior to commissioning a facility in order to gather baseline information on the existing environment. This will form the baseline upon which future monitoring results will be compared. Once radioactive material is introduced, monitoring for radiation-safety-related parameters in the environment will begin. These results are then used to ensure the protection of the environment. As for existing nuclear power plants and CNL's research facilities, each site has an environmental monitoring program. Spent fuel dry storage facilities at these sites

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					are addressed in the site environmental monitoring programs.
29	United Kingdom	Article 4	Pg 80, G4	(This question relates to articles 4 to 10) Has any progress been made with the replacement of HEU with LEU in research reactors and repatriation to the USA since the report was produced? What are the envisaged timescales?	Of Canada's four licensees for operating a SLOWPOKE-2 research reactor, two currently use HEU. The University of Alberta (which is one of the two) has notified the CNSC of its intent to decommission its reactor facility. This is expected to involve repatriation of the core to the USA. The timelines associated with this activity are unknown at this stage, as planning and identification of qualified contractors to participate in the decommissioning project are currently ongoing. For more information on HEU in Canada, please visit the CNSC at nuclearsafety.gc.ca/eng/reactors/research-reactors/nuclear-facilities/chalk-river/highly-enriched-uranium-in-canada.cfm
ARTICLE 5: EXISTING FACILITIES					
30	Argentina	Article 5	G-87	Which radionuclides are most commonly measured / found in the monitoring of the spent fuel dry storage facility?	Common radioactive contaminants from the irradiated fuel bays in the generating stations are mixed fission and activation products and actinides. They are rarely encountered at the dry storage facilities as only intact, non-defective fuel bundles are received for dry storage. (But they are occasionally encountered.) Optimal use of irradiated fuel bay ion exchange and filtration are used to limit contamination to the dry storage facilities. Extensive decontamination and monitoring are performed on the dry storage containers

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					once they are removed from underwater loading of intact fuel bundles.
31	Romania	Article 5	Appendix 5, pag. 177	Which is the surface (m2) covered by the retube components storage area at Pickering A Power Station? Which are the waste volumes produced for one unit from retube activities?	The retube component storage area at the Pickering A station contains 34 loaded and two empty dry storage modules (DSMs). Each DSM covers approximately 10 m^2. Approximately 2,900 m^3 of L&ILW is generated from the refurbishment of one reactor unit. This includes fuel channel components, feeders, cold ends of end fittings, retube tooling and other routine, low level waste (LLW). It does not include waste from the replacement of steam generators.
32	Romania	Article 5	H4, pag. 97	Can you elaborate about the metallic waste equipment produced in operating power plants suitable for melting treatment: ie: equipment components, systems source, metal description? Which are the destinations of the resulted melted metal: the reuse within nuclear components manufacturing or clearance and trade on the specific market?	Examples of metallic LLW components that would be suitable for melting would include heat exchangers, steam generators, feeder pipes, closure plugs, outboard end fittings, and small metal components and piping. It should be noted that not all segments of the components would be suitable for melting. For example, in the case of heat exchangers and steam generators, only the slightly contaminated carbon steel shells would be acceptable. The internal Inconel tubes would not be melted but would be returned to the waste generator for disposal. The metal melted components are typically used to create low-level shielding blocks, which can be used by nuclear facilities to provide additional shielding in high radiation field areas.

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33	Romania	Article 5	H4, pag.97	Is the unconditional / conditional clearance process used frequently to reduce the waste volumes? Which are the types and quantities of waste cleared yearly? Which is the moment of time within the waste management when the clearance process is applied: soon after generation, after a storage period, etc.?	OPG has an unconditional clearance process and aims to achieve <10 nCi/100 cm^2 Tc-99 equivalent for surface contamination and <700 Bq/kg for tritiated water vapour, as an example. Items cleared consist of large metal objects (not neutron irradiated) and materials that can be directly surveyed using alpha/beta sensitive probes. These objects can then be sampled where required to look for internal contaminants to achieve surface and volumetric contamination program requirements. The clearance process can be applied at the generating stations themselves. It can also be applied at the waste management facilities when sorting and segregating legacy stored wastes. The quantities vary depending on the station and on the work programs/projects in progress at a given time (i.e., outages and major projects may generate more waste temporarily).
ARTICLE 6: SITING OF PROPOSED FACILITIES					
34	Argentina	Article 6	K-118	How was the acceptance of the SF repository site promoted? Does it include economic incentives?	First, for clarity, NWMO is currently in the site selection process. There has been neither a recommendation by the NWMO nor a decision by any community to accept the repository. NWMO's process for obtaining acceptance builds on our commitment to a volunteer process leading to a safe site with a willing and informed community. There are many aspects to this process, but it begins by taking small steps

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					with communities, and taking time to really discuss the concepts and issues with interested communities and organizations. One would need to review the overall process NWMO has followed since 2002 to appreciate the process. There were no economic incentives associated with engaging communities. NWMO has not offered financial incentives to communities simply to enter into the process. We have covered the costs for participation in the process and have provided financial recognition to those communities that have been involved previously. In discussing the project with the communities, the jobs and spinoff activities from hosting this large national project are seen by most communities as a future economic benefit.
35	Argentina	Article 6	G-80	Two of the four Slowpoke-2 reactors use LEU. Is there any plan to convert the others two Slowpoke-2 research reactors from HEU to LEU? Has this conversion any impact to the back end options?	Neither of the two licensees operating a SLOWPOKE-2 research reactor with an HEU core have expressed an intent to convert to LEU. As stated in question 29, one of those licensees has notified the CNSC of its intent to decommission the facility.
ARTICLE 7: DESIGN AND CONSTRUCTION OF FACILITIES					
36	Argentina	Article 7	G-79	At present spent fuel from NPPs is stored in wet or dry states at the	The NWMO is presently in the site selection stage, as described in section K.4.3.2 ("Site selection") of Canada's

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				locations where it is produced. What is the present situation of the repository for long term management of spent fuel?	National Report. NWMO is currently working with a number of communities to understand the implications of hosting a repository in their area. NWMO is conducting multi-year preliminary assessments in a number of regions with communities that expressed potential interest in hosting the project. Field studies underway involve geophysical surveys and studies to observe and analyze geological features. This will be followed by iterations of work in areas of environment, safety, engineering and transportation. This work is accompanied by broad engagement, and assessments of whether the repository will be supported broadly and would enhance community well being if sited in the study areas.
37	Germany	Article 7	p. 89-90 (Section G.15)	**New dry storage facility** - AECL has constructed, and is commissioning, a new above-ground dry storage facility to store spent legacy research fuel from the operation of research reactors at AECL's Chalk River Laboratories (CRL). Will this new above-ground dry storage facility also be located at the site of CRL? When will this facility be in an operating state? Will the storage capacity of this facility be limited to approximately 700 prototype and	The new above ground storage facility (i.e., Fuel Packaging and Storage Facility) is located at Canadian Nuclear Laboratories (CNL), a wholly owned subsidiary of AECL, Chalk River Laboratories (CRL). The proposed schedule is for active commissioning to be completed in 2015 and a normal retrieval operating state to commence in 2016. The facility is designed to retrieve and store the prototype and research reactor spent fuel rods from approximately 100 in-ground tile hole structures. These spent fuel rods have been previously identified to be in a state of degradation as a result of water in the fuel material and susceptibility to corrosion in these early design tile holes. The storage capacity of the Fuel Packaging and Storage Facility will be limited to

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				research reactor fuel rods that are currently stored below ground in "tile holes"?	these degraded tile holes only.
ARTICLE 8: ASSESSMENT OF SAFETY OF FACILITIES					
38	Argentina	Article 8	Annex 4	What is the empirical basis for stating that the operating life of engineered structures, canisters, MACSTOR and OPG dry storage canisters can be much longer than 50 years?	CNL concrete canisters, MACSTOR modules and OPG dry storage containers (DSCs) are designed to safely store spent fuel for at least 50 years. This service life is achieved through ongoing monitoring programs and regular inspection and maintenance of the structures or containers. There are requirements for OPG, HQ, NB Power and CNL to have in place an aging management program. Please refer to Canada's response to question 41 for more information. There is no document specifically intended to analyze the reliability and safety of operating CNL concrete canisters, MACSTOR modules or OPG DSCs beyond the expected operational design life; however, a process for managing aging effects on concrete structures, such as MACSTOR modules, is being developed by Hydro-Québec. MACSTORs (the first of which came into service in 1995), OPG's DSCs and CNL's concrete canisters, are subject to periodic inspections to ensure their structural integrity, thereby providing for the protection of the public, workers and the environment. Although the design life was 50 years, it is recognized that some containers may

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					have a shorter or longer operating life. Currently, there are no indications of premature aging of the CNL concrete canister, MACSTOR or OPG dry storage containers.
39	Argentina	Article 8	Annex 4 - 168	Safe spent fuel dry storage is said to be longer than 100 years. Is there any similar study regarding wet storage?	There have been no studies performed by OPG or CNL for wet bay storage in excess of 100 years. In Canada, spent fuel is initially stored in the spent fuel bays and, after seven to 10 years (depending on the NPP), the spent fuel is remotely transferred to dry storage. To clarify, currently, the CNL concrete canisters, MACSTOR modules and OPG dry storage containers (DSCs) are designed to safely store spent fuel for at least 50 years (not 100 years). This service life is achieved through ongoing monitoring programs and regular inspection and maintenance of the structures or containers. Although the design life was 50 years, it is recognized that some containers may have a shorter or longer operating life. Currently, there are no indications of premature aging of the CNL concrete canister, MACSTOR or OPG DSCs.
40	Argentina	Article 8	Annex 5	What technology is used for temporary storage of tritiated heavy water from NPPs permanently shut down, as units from Pikering A, Douglas Point and	Tritiated heavy water from OPG's Pickering A units is stored temporarily in converted vessels or tanks that exist in the station. The heavy water is added or mixed to the operational inventory, then eventually transferred to the Tritium Removal Facility (TRF) located at Darlington Nuclear Generating Station for processing. Please refer to

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				Gentilly 2?	Canada's response to question 68 on tritium removal. Heavy water from the Douglas Point reactor was removed and stored in tanks. The water was later moved to drums and stored offsite at a Canadian Nuclear Laboratories (CNL) storage facility. (CNL is a wholly own subsidiary of AECL.) Moderator heavy water (260 m^3) from the Gentilly-2 reactor was removed and stored in four stainless steel tanks. For the heat transport heavy water (220 m^3), 205 m^3 of removed water was sold to a qualified reactor operator and the other 15 $m^3$was stored in stainless steel drums in the station.
ARTICLE 9: OPERATION OF FACILITIES					
41	Argentina	Article 9	G-86	In order to extend the operating license of dry storage facilities, does CNSC measure eventual leakages or also performs measurements of aging effects in concrete or other materials?	As conditions of their licences, Canadian operators of dry storage facilities are required to submit in-service inspection programs for regulatory review and acceptance. CSA standard N291-08, *Requirements for Safety-Related Structures for CANDU Nuclear Power Plants,* and CNSC regulatory document RD-334*, Aging Management,* offer licensees guidance in preparing their programs. As an example, OPG is required under its program to perform the following inspections of dry storage containers on a biennial basis: visual inspections of the base, monitoring of vent welds and monitoring of protective coatings on container seal welds.
42	Germany	Article 9	p. 87-88	**Container: tightness verifications -**	The leak tightness verification for AECL-type fuel baskets

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			(Section G.13.2)	The report says: "Leak tightness verification of the AECL-type fuel baskets and concrete canisters consists of connecting a pump to the liner cavity and recirculating the air through filters. Excessive humidity indicates either a liner leak or water holdup in the canister from operations carried out before sealing. The presence of radioactivity indicates a basket leak. For the OPG-type dry storage containers, leak tightness is verified through helium leak testing before containers are placed in storage. Subsequent aging management activities provide assurance that the container condition and weld integrity are not compromised and that helium cannot leak out." Is the leak tightness verification for AECL-type fuel baskets as specified above a continuous process during the period of storage? Is the helium leak testing before storage the only leak tightness verification	is a routine monitoring process during the period of storage, but not continuous as it is carried out as part of the inspection activities four times per year. For example, CRL does sample the air in the gap between the primary containment (the fuel basket) and the secondary containment (the canister liner) for the concrete canisters at CRL during the storage period. The air samples are monitored for the presence of fission products (indicating leakage from inside a fuel basket) and moisture in the canister liner (indicating that the plug-to-liner weld has failed and that there is a breach in the sealed liner secondary containment boundary). Sampling also removes any moisture, if present, via silica gel filters, which dry the air returning to the canisters. There are no other methods, other than helium leak testing before storage, implemented to verify the leak tightness of the sealed OPG dry storage containers. However, this testing is not the only barrier to ensuring leak tightness. Before helium leak testing, all seal welds are non-destructively inspected to ensure that there are no leak paths through the welds. Furthermore, the main structural/seal weld, referred to as the lid-to-base closure weld, is 100 percent volumetrically inspected using the phased array ultrasonic technique (PAUT). Weld defects, as well as potential leak paths through the weld, would be detected.

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				for OPG-type dry storage containers, or are there additional – maybe continuously working – monitoring systems?	
43	United States of America	Article 9	G-6, pg. 81	How long does Canada plan to store spent fuel in wet storage? Has Canada's monitoring program indicated any decaying, corrosion, or other deteriorating condition of spent fuel or the facility? Please elaborate.	The design basis at each Canadian utility is based on fuel remaining in wet storage for many years prior to being transferred to dry storage. At OPG, the fuel remains in wet storage for a minimum of 10 years. At Hydro-Québec and NB Power, fuel remains in wet storage for seven years prior to being transferred to dry storage. OPG plans are to transfer all fuel from its wet bays to dry storage as soon as possible after the generating plant ceases commercial operation. Hydro-Québec's plans are to transfer all fuel from its wet bays to dry storage by the end of 2020, since the commercial operation ended in 2012. Point Lepreau's station design is to continue to operate until 2042. The spent fuel storage and transfer facilities will therefore remain in operation until approximately 2049. The spent fuel bundles in each of Canada's irradiated fuel bays (IFBs) do not show any significant signs of decay, corrosion or any other condition of deterioration. Regarding the IFBs themselves (not spent fuel), Hydro-Québec has experienced a high level of degradation of their epoxy liners. Therefore, a geomembrane liner water

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					proofing system was installed on the walls to cover the degraded epoxy. Both NB Power and OPG have experienced only minor deficiencies and repairs in their IFBs. An aging and obsolescence program exists at each nuclear generating station to ensure that the integrity of structures, systems and components are in place.
ARTICLE 10: DISPOSAL OF SPENT FUEL					
44	Germany	Article 10	p. 118-124 (Section K.4.3)	**Deep geological repository -** The long-term management plan for the Canadian way to a deep geological repository is well-structured and provides a lot of specific information. Could you please give a rough approximation of the envisaged date when Canada expects to possess an operable deep geological repository?	There is no fixed timeline for implementing Canada's plan for the long-term safe management of spent fuel; the NWMO will take the time necessary to do it right. Flexibility in the pace and manner of implementation is key to ensuring meaningful engagement of communities and demonstration of safety. By necessity, any timelines developed to date are conceptual, for planning purposes only. For financial planning purposes only, 2035 has been estimated as the earliest date by which a repository could be operational. This estimate will be updated as plans are refined. Actual timelines will be driven by a variety of factors, including the time it takes to identify a suitable site with an informed and willing host, the time required to assess technical safety and the time required to obtain regulatory approvals. There is no constraint from the operating nuclear power

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					plants with respect to interim (short-term) spent fuel storage capacity. The owners of spent fuel are required to safely manage their spent fuel until a facility is available for long-term management.
45	Republic of Korea	Article 10	K.5.2, 125	Could CNSC explain in detail about the contents and current status of the research and assessment on the safe long-term management of radioactive waste and SNF in geological repository by accomplished the CNSC?	Currently in Canada, there are two long-term waste management initiatives underway that may result in deep geological repositories (DGR). The CNSC carries out research to gather knowledge in relation to the two proposed initiatives Canada, as follows: 1. a DGR for Ontario Power Generation's L&ILW 2. a DGR for the long-term management of Canada's spent fuel, which has yet to be sited but that will be located within either a sedimentary or granitic host rock Since 1978, the CNSC has been involved in independent and internationally collaborative research on the safe, long-term management of spent fuel in a DGR. Historically, previous repository concepts for managing Canada's spent fuel investigated the viability of hosting a DGR within a granitoid pluton in the Canadian Shield; therefore, the CNSC's early research activities focused on the suitability of granitic Canadian Shield rocks to host this type of repository. Because of the L&ILW DGR initiative (proposed to be located within a sedimentary host rock), the CNSC has since expanded its technical expertise to include an

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					understanding of the potential for a DGR within sedimentary rock. Therefore, CNSC staff are prepared to assess any future proposal involving geological repositories in either rock type. The CNSC is currently conducting a program to evaluate long-term safety issues related to the long-term management of radioactive waste and spent fuel in sedimentary rock. This program consists of independent scientific research conducted by CNSC staff in collaboration with national and international institutions. It also includes the monitoring and critical review of state-of-the-art scientific advancements and staff participation in international forums to exchange information about geological repositories. The program will help in the development of regulatory documents that will form the basis for CNSC staff recommendations to the Commission on geological repositories for radioactive waste. The CNSC's research is not meant to duplicate research done by the project applicant, but rather to identify gaps in information and to verify key safety aspects related to geological repositories. A team of CNSC specialists, working in collaboration with external national and international experts, perform these activities. The overall goal of the CNSC's current research program

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					is to gain knowledge that can be used to review the safety case and the factors that contribute to demonstrating long-term safety over extended periods of time (~1 million years). As a safety case (to be developed by the future licensee) requires multiple lines of evidence, including safety assessments, geology, engineered barriers and more, the CNSC's research program follows multiple lines of investigation. Independent research focuses on those attributes that are used to demonstrate safety over the long time periods associated with the safety case. The following research areas are part of the CNSC's current suite of independent research projects often carried out by staff scientists in collaboration with university partners: • diffusion dominant transport (from the proposed DGR horizon to shallower layers) by modelling and interpreting natural tracer profiles in host rock porewaters • past and future stability and integrity of the geosphere in relation to glacial cycles over the last 1 million years and what can be expected to occur in the next 1 million years (thermal-hydraulic-mechanical-chemical, or THMC, modelling) • the effects of excavation damage on the integrity of the host rock — looking at THMC effects on the host rock and barrier system, investigating the impact of re-saturation after repository sealing and heat generation from spent fuel after

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					emplacement • the effect of gas generation and migration (from container corrosion, for example — will gas generation in emplacement rooms increase to the point of initiating fractures?) • the effect of unusually high salinity porewaters in the host rock and on the integrity of sealing material, which is being investigated experimentally and with numerical modelling • the use of natural analogues in support of safety assessments; both geological and engineered analogues are under review with the aim of modernizing their application in support of safety case development and review • absolute age dating of fracture-filling minerals associated with regionally important geological structures incorporated into the seismic hazard assessment of the region around a repository — to gather more information about the stability of the geosphere and the timing and existence of past geological events The CNSC also collaborates on international projects that cover a wide range of safety-related issues such as through the International Atomic Energy Agency (IAEA), which allows CNSC staff to maintain their knowledge and competence by keeping up to date with international, state-of-the-art science, practices and regulations.

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					CNSC staff contribute actively to those projects by sharing their knowledge and contributing to the writing and/or by providing peer reviews of project documents. Below are brief descriptions of some international projects in which CNSC staff have participated: • SITEX (Sustainable network of independent Technical EXpertise for radioactive waste disposal) — SITEX was a two-year project implemented within the Seventh Framework Programme of the European Atomic Energy Community (Euratom). The project was led by the Institute for Radiological Protection and Nuclear Safety (IRSN, France). The objective of SITEX was to establish a sustainable network of technical support organizations and regulatory bodies with the goal of harmonizing European and international approaches to reviewing safety cases for geological disposal. The CNSC participated in working groups to look at the development of guidance documents, regulatory research and planning for the future review of safety cases. • Underground Research Facility (URF) Network — This IAEA program provides an overview and general update of experimental programs in all URFs that are part of the network at annual network meetings. The CNSC contributes on regulatory guidance and receives access to expert information and training. • Human intrusion in the context of disposal of radioactive waste (HIDRA) — The CNSC participates in, and contributes to, this IAEA project to provide

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					recommendations to clarify existing IAEA requirements and guidance relevant to the assessment of future human actions and human intrusion.

SAFETY OF RADIOACTIVE WASTE MANAGEMENT

Q. No.	Country	JC Article Reference	Reference in Report	Question/Comment	Response
ARTICLE 11: GENERAL SAFETY REQUIREMENTS					
46	Argentina	Article 11	D-29	The ILW inventory is 162 m3 at Point Lepreau (Table D.3). In the Fourth National Report it was stated that there were 143 m3 for the same concept. ILW from retubing, is included in the roughly difference of 20 m3? Also, considering the figures for the ILW from retubing stated at page 181, are these included in the same figure?	Retube waste from Point Lepreau's recent refurbishment accounts for the change in the ILW volume in table D.3 from the fourth report to the fifth report. This volume difference, approximately 20 m^3, is included in the total retube canister ILW volume of 140 m^3, as noted in section 5.1.5 (pg. 181) of the fifth report.
47	China	Article 11	H, p94	How to treat spent water filters in Canada? Whether are they immobilized with cement, or treated by other methods? Please describe the treatment and conditioning methods of each kind of solid waste.	In Canada, filters are stored in the generating station either within containment or in shielded flasks. When the filter is spent, it is removed from the system and allowed to dry for 24 hours, typically. The filter is transferred remotely into a canister with a bolt-on lid and held within a separate shielded flask. During removal, the dose rate is checked. The next steps depend on the facility and the dose rate. For lower dose rate filters, they may be packaged and transferred to the aboveground radioactive waste storage buildings for the utility or they may be segregated into compactable parts and metals prior to storage. For higher dose rate filters at OPG, the flask is

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					loaded into a Type B, Class 7 transportation package for shipment to the Western Waste Management Facility for in-ground storage of the contents. At New Brunswick Power, the higher dose rate filters are transported via shielded flask to aboveground filter structure storage.
48	Russian Federation	Article 11	Section B page 18	What criteria are applied for RAW clearance?	The CNSC's *Nuclear Substances and Radiation Devices Regulations* (NSRDR) define two clearance levels that may be applied to materials, including radioactive waste: unconditional and conditional. Unconditional clearance means the unrestricted release of materials from regulatory control (i.e., there are no restrictions regarding the disposition of the material). The unconditional clearance levels in the NSRDR are applied when the quantity of material involved is greater than 1 tonne per year per nuclear facility. The unconditional clearance levels in the NSRDR align with IAEA RS-G-1.7, *Application of the Concepts of Exclusion, Exemption and Clearance*. Conditional clearance applies to specified types of materials and disposition routes. As such, conditional clearance levels are developed by licensees and submitted to the CNSC for review and approval. The conditional clearance levels are therefore specific to each submission for specified types of materials and disposition paths. In support of such requests, licensees submit a pathways analysis to prospectively assess doses to workers and the public from cleared materials. The

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					dose criteria on which conditional clearance levels are based are the same as the unconditional clearance levels, namely an annual effective dose of 10 µSv due to realistic scenarios and parameters and an annual effective dose of 1 mSv due to low probability events (referred to in IAEA RS-G-1.7). In addition to the clearance levels discussed above, exemption quantities are defined in the NSRDR that may also be used to clear radioactive waste if the inventory of material involved is less than or equal to 1 tonne per year per nuclear facility. The exemption quantities in the NSRDR align with the established exemption levels in the Basic Safety Standards.
ARTICLE 12: EXISTING FACILITIES AND PAST PRACTICES					
49	Argentina	Article 12	D-31	Some facilities are mentioned as "released from the requirement to license". Could you provide more details about this situation considering that radioactive waste remain in those facilities?	Following the decommissioning of a nuclear facility, any residual nuclear substances have to meet the CNSC's exempted or clearance levels established by the *Nuclear Substances and Radiation Devices Regulations* to allow for release from regulatory control. For non-nuclear contamination associated with the facility, other standards are adopted. These relate to hazardous wastes and other non-nuclear contamination (as set by agencies such as Environment Canada and Canada's provincial ministries of the environment). In addition, the licensee has to meet municipal requirements regarding release to sewage for any effluents associated with the decommissioning program. Subsurface contamination, including contaminated soils or contaminated

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					groundwater plumes also have to meet the CNSC's clearance criteria prior to the site being released from regulatory control.
50	Argentina	Article 12	H-93	Waste characterization is not mentioned in in Section H. Is there any regulatory requirement for waste characterization?	As per the *General Nuclear Safety and Control Regulations*, a licence application requires "the name, quantity, form, origin and volume of any radioactive waste or hazardous waste that may result from the activity to be licensed, including waste that may be stored, managed, processed or disposed of at the site of the activity to be licensed, and the proposed method for managing and disposing of that waste." Guidance for waste characterization is provided to licensees through CSA standards N292.3, *Management of low- and intermediate-level radioactive waste*, and N292.0, *General principles for the management of radioactive waste and irradiated fuel.* Licensees' waste management processes are expected to address all forms and characteristics of wastes that may be generated, stored or processed at nuclear facilities and include the programs required to oversee the safety of wastes, the containment systems used and the means by which they are stored or disposed of. Waste programs are also expected to incorporate means to minimize waste by applying the principle of reduce, reuse and recycle. Within the current regulatory framework, waste management program requirements and expectations are not well defined or consolidated, and there are

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					opportunities to refine them with the goal of requiring the correct amount of regulatory oversight appropriate to the risks of the activities at hand. The CNSC is currently drafting a discussion paper to seek early feedback from stakeholders on the opportunities presented to improve the CNSC's regulatory framework for waste and decommissioning.
ARTICLE 14: DESIGN AND CONSTRUCTION OF FACILITIES					
51	Argentina	Article 14	Annex 5-177	How long it is DSM expected to remain at the RCSA?	As per the Pickering Nuclear Generating Station (PNGS) Preliminary Decommissioning Plan, the dry storage modules at the Pickering retube component storage area will be segmented and each individual component packaged and transported for disposal when the PNGS is decommissioned. Currently, it is estimated that this will occur in the later part of the 2040s.
52	Argentina	Article 14	Sección 3.1(b), pg. 3	As it can be seen from the report, Canada is planning to construct at least two different deep geological repositories for L&ILW and also another one for SF. Why have deep geological repositories been selected instead of near surface repositories for L&ILW? And besides, we would like to know if the possibilities of constructing	*Government of Canada's Radioactive Waste Policy Framework (1996)* The Government of Canada's Radioactive Waste Policy Framework of 1996 provides the national context for radioactive waste management in Canada. It includes a set of principles to ensure that the management of radioactive waste is carried out in a safe, environmentally sound, comprehensive, cost-effective and integrated manner. The framework states that the federal government has the responsibility to develop policy, regulate and oversee

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				only one centralized deep geological repository have been considered?	waste owners to ensure that they comply with legal requirements as well as meet their funding and operational responsibilities in accordance with approved waste management plans. Further to this, waste owners are responsible, in accordance with the "polluter pays" principle, for the funding, organization, management and operation of long-term waste management facilities and other facilities required for their wastes over the short and long term. The framework recognizes that the management of the different categories of radioactive waste (i.e., nuclear fuel waste, L&ILW, and uranium mine and mill tailings) may differ. In fact, different management approaches have been adopted for these different categories. It is important to note that these approaches reflect not only the different scientific and technical characteristics of the wastes, but also the economic, social and geographical dimensions of Canada and the locations of the waste within the country. Canada's strategy on the long-term management of radioactive waste includes a national approach for spent fuel, regional solutions for low-level and intermediate-level radioactive waste, and site-specific solutions for uranium mining and milling waste. Canada currently has two proposed initiatives — one for a deep geological repository (DGR) for the long-term management of radioactive waste, and another for spent fuel. These are:

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					1. Ontario Power Generation's DGR for low- and intermediate-level radioactive waste from OPG-owned and -operated nuclear facilities, including the Bruce, Pickering and Darlington nuclear generating stations 2. The Nuclear Waste Management Organization's Adaptive Phased Management (NWMO APM) DGR for spent fuel Other waste owners are assessing options for the long-term management of their waste. For example, Canadian Nuclear Laboratories (CNL) is conducting feasibility studies and assessing options for surface and deep geological long-term management facilities *Have the possibilities of constructing only one DGR been considered?* There is a sufficient volume of waste in Canada to justify a DGR for spent fuel and another DGR for L&ILW. Canada is following an internationally accepted practice that many other countries are pursuing – that is, that repositories for spent fuel and L&ILW are kept as separate facilities. Also, the requirements for handling and storing spent fuel and L&ILW are different; therefore, one DGR for both would actually be two distinct DGRs co-located beside each other. *Why have deep repositories been selected for L&ILW*

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					rather than near surface? OPG's L&ILW is currently stored on an interim basis at surface at the Bruce nuclear site. The local Municipality of Kincardine in 2001 approached OPG about the long-term management of L&ILW at the Bruce site. A memorandum of understanding was signed between OPG and Kincardine in 2002 to jointly study options for the long-term management of OPG's L&ILW at the Bruce site. The study examined the costs, impacts and benefits of constructing and operating four long-term management concepts on the Bruce site, namely: enhanced processing and storage, surface concrete vaults, deep rock vaults (now referred to as DGR) and status quo. The study report was completed in early 2004 and concluded that all four options were technically feasible and could be safely constructed and operated at the site. With the finalization of the study, Kincardine Council passed a resolution requesting that OPG pursue a DGR for L&ILW, citing as reasons that this option offered the highest margin of long-term safety among the four technical options studied, was consistent with international best practices, provided economic benefit to the residents of the municipality and offered a permanent solution for all of OPG's L&ILW (i.e., deep geological disposal is the only option of the four that can manage long-lived intermediate level waste).
53	Argentina	Article 14	B-21	After completing the Port Hope and the Port Granby projects, both	The Port Hope Area Initiative (PHAI) legal agreement defines three phases, with the third phase being a post-

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				long-term waste management facilities will be capped and the projects will move to a long-term monitoring and surveillance phase (Phase 3). Could Canada give details about the activities involved in Phase 3? Has an end point for this phase been determined?	closure phase that includes long-term maintenance and monitoring activities. It is anticipated that these activities will last in perpetuity (i.e. no defined end date). Within the scope of the PHAI, Phase 3 is anticipated to include: • operation of two long-term waste management facilities (LTWMFs), each inclusive of a waste water treatment plant and engineered waste containment mound • environmental monitoring to ensure the objective of the cleanup has been met Phase 3 will involve the long-term maintenance and monitoring of the LTWMF for hundreds of years. The condition of LTWMF during Phase 3 is envisaged as a passive mound with limited maintenance needs. Operational aspects such as surface water management, leachate collection and treatment, and environmental sampling, will be carried out to ensure that the LTWMF continues to function as intended. Phase 3 is not covered by current CNSC licences and will be the subject of a future licensing action. CNSC approval will therefore be required to allow for the final closure of the LTWMF and to allow the facility to enter into Phase 3. The initial part of Phase 3, approximately the first 100 years, will focus on confirming that the LTWMF is operating as expected.
54	Argentina	Article 14	K-127	Could Canada give details about the waste acceptance criteria for	The preliminary waste acceptance criteria has been prepared for OPG's L&ILW Deep Geologic Repository

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				the deep geological repository in Kincardine? In particular regarding spent ion exchange resins currently stored, which will be the immobilization process to be applied for waste package acceptance? Which will be the end point planned for tritiated heavy water?	(DGR) and is publicly available at www.ceaa-acee.gc.ca/050/documents/p17520/100070E.pdf. The document details criteria for waste acceptance such as waste characterization, acceptable container designs, mass and size limits, radionuclide characterization reporting, external radiation limits, heat loads, waste excluded, etc. With respect to spent ion exchange (IX) resins, they are dewatered at the stations and slurried into 3 m^3 stainless steel resin liners. These resin liners are transported to OPG's Western Waste Management Facility and unloaded into an in-ground container for interim storage. It is not intended to immobilize spent IX resins. At the time of disposal, the resin liners will be, as required, placed into shielded overpacks to reduce radiation exposure to the worker and then emplaced directly into the proposed DGR. The intent is for the resins to be in a stable form and, that when they are emplaced in the proposed L&ILW DGR at a depth of 680 m in non-permeable limestone, radionuclide migration to the surface will not be an issue. With regard to the end point planned for the tritiated heavy water, OPG is currently in the process of assessing feasible options. Such options include but are not limited to free release (through decay or detritiation) or disposal. A final decision has not been made on this matter.
ARTICLE 15: ASSESSMENT OF SAFETY OF FACILITIES					
55	Czech	Article 15	H, 114	What is the usual period of safety	The CNSC follows a phased licensing approach for all

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	Republic			assessment of facilities in the timeframe of licensing? Are there any needs for re-assessment connected to special steps in facilities lifetime?	facilities. An applicant for a spent fuel or radioactive waste management facility must submit applications for a licence to prepare site, licence to construct, licence to operate, licence to decommission and licence to abandon (release from regulatory control). Typically, the CNSC grants licences for a period between five and 10 years; however, the exact length of time is determined case by case and is decided by the Commission. As part of the licence, the Commission may also request mid-term reports from the licensee. For existing interim storage waste facilities a periodic safety review (PSR), in its general sense, is not formally used; however, the principles of a PSR are indirectly applied during the licence renewal process. Over the course of a facility's lifetime, information gathered from verification programs (that are conditions of a licence) are used to update and improve safety assessments and are incorporated into new safety cases for long-term waste management facilities such as deep geological repositories. For long-term projects, such as the long-term management of radioactive waste, there is also significant work done in the pre-licensing stage that includes research (see response to question 45), pre-project technical reviews, meetings with the potential future licensee, outreach activities and more. The CNSC's expectations with respect to the assessment context (and time frame) that will demonstrate that

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					safety can be met are described in CNSC regulatory guide G-320, *Assessing the Long Term Safety of Radioactive Waste Management*. The CNSC does not prescribe a specific time limit for the safety assessment. It is CNSC staff's expectation that the time frame must include the period of time during which the maximum impact is predicted to occur. A rationale for the assessment time frame should also be provided and should take into account the following: 1. the hazardous lifetime of waste contaminants 2. duration of the operational period 3. design life of engineered barriers 4. duration of both active and passive institutional controls 5. frequency of natural events and human induced environmental changes Performance time frames of engineered barriers and their safety function should be documented and justified, and refer to current national or international standards, as appropriate.
ARTICLE 16: OPERATION OF FACILITIES					
56	Russian Federation	Article 16	Annex 7 page 212	Several reactors are under the second phase of decommissioning (Gentilly-1, Douglas Point and Nuclear Power Demonstration	Douglas Point (DP) and Gentilly-1 (G-1) will not enter the third phase of decommissioning for an estimated 30 to 40 years. The third phase of decommissioning for DP and G-1 is aligned with the decommissioning plans for the Bruce

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				(NPD). When the finalization of the second phase is expected and what are the preliminary deadlines to start the third stage of decommissioning (final decommissioning)?	Power and Gentilly-2 reactors, as DP and G-1 are co-located on these sites, respectively. Based on the current plan, the Nuclear Power Demonstration reactor is planned to enter the third phase of decommissioning in the next three to five years and is anticipated to be completed by 2025.
ARTICLE 17: INSTITUTIONAL MEASURES AFTER CLOSURE					
57	Argentina	Article 17	K-131	Would you mind giving more information about the characterization foreseen for waste generated in past decades that appear as "limited characterization information"?	While the legacy waste has been stored safely in various waste storage facilities at CNL sites, information on the waste characteristics is required to determine the long-term management and disposal routes as well as facility capacities. Various activities have been carried out to improve upon the currently "limited characterization information" on legacy waste generated in past decades. The available historic waste records on the legacy waste, mostly in paper records, have been sorted and transferred into electronic databases for analysis. The next step is to review and analyze the available data in the databases. If the current waste data are not sufficient to support the safety cases and/or to determine the required capacities of various disposition facilities, additional field investigations, such as site characterization and waste retrieval will be required to enhance the waste characterization data. For disposal, CNL understands that characterization of the

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					waste to the extent necessary to determine which disposal route it should be destined for, and to demonstrate that it meets the waste acceptance criteria, will be required. However, this may not be until the waste is retrieved from storage facilities, processed and transferred to disposition facilities.
58	Japan	Article 17	H	No period has been set for institutional control, but how long will institutional control be functional? Otherwise, do you have any idea of institutional control lasting several hundred years or longer?	There is currently no framework for the duration of an ICP, as it will depend upon the end state of the site, the environmental performance of the site and the willingness of the Crown government that will have responsibility for the site. The licensee must demonstrate that the site has become sufficiently stabilized and monitoring results are within predicted values and effects. However, unless other arrangements have been made, the obligations of the provincial Crown to oversee and manage any residual hazards associated with the site would be indefinite. Please refer to Canada's response provided for question 69 for specific examples of facilities that have been released from licensing and accepted into an ICP.

GENERAL SAFETY PROVISIONS

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ARTICLE 19: LEGISLATIVE AND REGULATORY FRAMEWORK					
59	Czech Republic	Article 19	E, 38	Are there any special options in regulating waste coming from various types of applications?	Regulating radioactive waste is based on the regulatory framework of the *Nuclear Safety and Control Act* (NSCA) and its associated regulations. The conditions of each individual licence will be adjusted to take into consideration the many differences between radioactive waste management/disposal facilities and the different types of waste. A graded approach is applied to radioactive waste storage/disposal facilities that is commensurate with the characteristics of the radioactive waste. With a graded approach, all requirements apply but to varying degrees, depending upon the safety significance and complexity of the work being performed.
60	Czech Republic	Article 19	E, 48	During the operational period, under a valid license, are there any cases known from real practice that would lead to the loss of license?	The *Nuclear Safety and Control Act* (NSCA) outlines the powers of the Commission to issue orders and revoke licences. The Commission may suspend in whole or in part, amend or revoke a licence on receipt of an application. Alternatively, the Commission may exercise those same powers on its own motion. In addition to the power to suspend, amend or revoke a licence, the Commission has the power to both issue orders and review orders issued by designated officers and inspectors. When the Commission, on its own motion, proposes to revoke a licence, the NSCA states that the licensee shall be given an opportunity to be heard. Any person named

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					in or subject to an order also has an opportunity to be heard. The NSCA states that regardless of whether or not the opportunity to be heard has taken place, the person named in or subject to an order must comply with the order within the time specified in it or, if no time is specified, immediately. Notwithstanding the provisions outlined above, in an emergency the Commission may make any order that it considers necessary to protect the environment or the health and safety of persons or maintain national security and compliance with Canada's international obligations. In such circumstances, no proceeding is required. Under the NSCA, licences to major facilities (e.g., nuclear power plants, fuel processing, uranium mines, research reactors) are issued, amended or revoked by the Commission tribunal component. There have been no cases of licence revocation regarding these major facilities (unless requested by the licensee), but there have been instances where strict conditions were imposed (including temporary production stoppage). The Commission's June 2010 decision regarding a licence to SRB Technologies (Canada) Inc. (a Class 1B facility) included a requirement that SRBT stop processing tritium during precipitation events. The licensing decision said: "The SRBT representative noted that SRBT can stop processing for hours at a time or days at a time, depending on the weather. CNSC staff noted that this practice forms part of the licensing basis for the facility as it is included in SRBT's licence renewal application and is

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					controlled within the licence conditions handbook." Other licences for industrial and medical facilities or for nuclear substances, for example, are issued by "designated officers" (senior CNSC staff). There has been only one case where a licence was revoked as a result of unacceptable practices. In December 2006, a designated officer issued an order to Enviropac, concluding that the company was no longer capable of carrying on the activities authorized by its three licences and that an order was needed to address health and safety issues. Following a February 2007 public proceeding, the Commission concluded that Enviropac was no longer qualified to carry on the activities that its licences authorized, and suspended those licenses pursuant to section 25 of the NSCA and subsection 8(2) of the *General Nuclear Safety and Control Regulations*. In October 2008, the Commission provided a further opportunity to be heard on the matters of the revocation of the 2007 order and the revocation of the three licences. It should be noted that the CNSC prefers to issue orders to address irregularities rather than revoke licences, as revocation may result in a licensee being forced to stop operating until the irregularities are addressed to the satisfaction of the CNSC. Another key consideration is that when a licence is revoked, the licensee is no longer a licensee and is therefore no longer under the direct regulatory authority of the CNSC. Orders are regularly issued by the CNSC and are an effective compliance tool.

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61	Finland	Article 19	¤.4.2.4 and E.4.2.5	Sections E.4.2.4 and E.4.2.5, Licensing periods and relicensing: Based on the text it is understood that licenses are granted typically for between five and ten years. When applying for license renewal "The CNSC bases its review on performance history, risk and expert judgment." Report does not mention Periodic Safety Review process at all. Is this not applied in Canada or is it embedded and applied in the license renewal? If yes, how is IAEA's guidance on PSR applied in Canada?	The scope of IAEA Safety Standards Series SSG-25, *Periodic Safety Review for Nuclear Power Plants*, is to provide recommendations and guidance on the conduct of a periodic safety review (PSR) for an existing nuclear power plant. A PSR is a comprehensive safety review of all important aspects of safety, carried out at regular intervals. It should also be noted that a PSR may be used in support of the decision-making process for licence renewal. For radioactive waste management/disposal facilities, a PSR, in its general sense, is not formally used; however, the principles of a PSR are indirectly applied. During the licence renewal process for a waste management/disposal facility, a comprehensive assessment is conducted in order to determine the adequacy and effectiveness of the structures, systems and components that are in place to ensure facility safety; the extent to which the facility conforms to current national and/or international standards; safety improvements and their implementation; and, finally, the extent to which the safety documentation, including the licensing basis, remains valid.
62	Sweden	Article 19	E.3.2, p.42	The Administrative Monetary Penalties Regulations (AMPR) came into force in May 2013 with the purpose to enhance the robustness and effectiveness of the CNSC's enforcement regime and to serve as a credible deterrent, thereby	*What are the experiences so far from using this new tool (AMPs):* Summary of experience to date: • Twelve AMPs have been issued in the first year of the program. For three of them, reviews were requested. An additional two AMPs have since

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				achieving higher levels of compliance. What are the experiences so far from using this new tool? What expectations were there and have they been met?	been issued. • AMPs are proving to be an effective enforcement tool by complementing the CNSC compliance tool box. The CNSC enforcement program is graduated and commensurate with the risk associated with the regulated activities. • The posting of AMPs on the CNSC website has made the process transparent. • Licensees typically strive to be compliant and appreciate the need for AMPs as a non-punitive tool to bring them back into compliance. • Most AMPs have been paid. Three violators have requested a review. *What expectations were there and have they been met?* The CNSC had two main expectations: The first was that AMPs not be punitive in nature but instead intended to render the licensee into compliance. This provides the CNSC with a comprehensive set of tools to implement a graduated enforcement approach. AMPs were established in response to an external review, which indicated that the CNSC should introduce an administrative penalty system to complement its set of enforcement tools. The second main expectation was to ensure compliance (or prevent recurrence) for those with a history of non-compliances. This expectation will be

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					verified through future compliance inspections. Several CNSC improvement initiatives were also introduced, all of which may have an impact on compliance. For example, the CNSC has increased the emphasis on outreach activities to clarify regulatory expectations. Outreach activities include holding focused sessions with licensees. The CNSC has also amplified its engagement with licensees to address specific trends of non-compliances. The purpose of AMPs was to provide the CNSC with an additional enforcement tool to increase compliance. AMPs are now one of several options available to the CNSC to assure this goal.
63	Sweden	Article 19	E.3.2, p.43	In January 2013, the Class I Nuclear Facilities Regulations (CINFR) were amended to establish 24-month timelines for projects requiring the CNSC's regulatory review and decision on new applications for a licence to prepare a site for a Class I nuclear facility. What was the rationale to introduce this new timeline?	In 2012, the Government of Canada committed in its Responsible Resource Development initiative to streamline the review process for major economic projects in Canada in order to ensure predictable and timely reviews. The overall objective was to improve project planning for applicants of major economic projects and enhance Canada's investment climate. Nuclear projects are multi-year initiatives with complex regulatory reviews and processes. While information requirements are clearly laid out in the CNSC's regulations and other regulatory documents, there is a continued perception that regulatory reviews introduce project risks, in particular regarding the potential uncertainty of the timelines associated with such reviews. As such, industry would benefit from a commitment to

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					predictable and timely regulatory reviews, which would help minimize project uncertainty and risk. As noted in the question, the CINFR were amended to establish 24-month timelines in regulations. The timelines were based on the CNSC Commission's current regulatory review process. The timelines apply to CNSC activities and do not include the time required for steps or activities outside of the CNSC's control, such as the time the applicant needs to gather the information required for the licence application review. For some projects, the CNSC may be required to conduct an environmental assessment (EA) under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) in addition to its regulatory review. Under CEAA 2012, the CNSC does not have the legal authority to set regulated timelines for the completion of EAs; however, the CNSC has committed to completing an EA within the same 24-month timeline required for rendering a decision on an application, as per section 8.3(1) of the CINFR. The rationale for the timelines is to provide more predictable and timely regulatory reviews while continuing to protect the health, safety and security of Canadians and the environment. The CNSC has a sound, transparent process for licensing Class I nuclear facilities. The regulatory review process would continue to include measures to allow Aboriginal groups, the public and interested parties to participate fully in the public hearing process.

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ARTICLE 20: REGULATORY BODY					
64	Japan	Article 20	p55	CNSC's human resources strategy has apparently been mapped out deliberately. It can be considered an excellent system mix of such elements as recruitment, career planning, and training.	We appreciate the acknowledgment of the CNSC HR strategy and its focus on talent management and workforce planning.
65	Japan	Article 20	p56	An explanation of the relationship between aboriginal consultations and public meetings as mentioned in E.4.3.4 would be appreciated. Are aboriginal people supposed to take part in public meetings, or are aboriginal consultations to be held separately from public meetings? In the latter case, why are aboriginal consultations held separately from public meetings?	Aboriginal people are always welcome to participate in CNSC public hearings. In Canada, the Crown may have a duty to consult with an Aboriginal group if a decision it makes may have an adverse impact on potential or established Aboriginal or treaty rights, which are protected in Canada's *Constitution Act, 1982*. Also, as the Crown has a unique relationship with Aboriginal peoples; should Aboriginal groups request a meeting related to a CNSC regulated facility or proposed project to be regulated by the CNSC, staff will often accommodate this request.
ARTICLE 22: HUMAN AND FINANCIAL RESOURCES					
66	Republic of Korea	Article 22	F.4.3, 64	Section F.4.3 states that "Regulatory guide G-206, Financial Guarantees for the Decommissioning of Licensed	Regulatory guide G-206, *Financial Guarantees for the Decommissioning of Licensed Activities*, provides guidance regarding the establishment and maintenance of measures to fund the decommissioning activities.

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				Activities, covers the provision of financial guarantees for decommissioning activities." Are there the procedures and methods for confirming the appropriateness of the expenses saved for the decommissioning in Regulatory Guide G-206? How often is the estimation of decommissioning costs updated?	Principal financial considerations associated with decommissioning of nuclear facilities are addressed in CSA standard N294-09, *Decommissioning of facilities containing nuclear substances*. The cost estimate to decommission is included in preliminary decommissioning planning. The decommissioning funding provision, which is maintained over the lifecycle of the facility, should reflect the approach and complexity of decommissioning activities. Licensees are required to update their preliminary decommissioning plan and the associated cost estimate for every five years, or if any major changes to the design, operations or economic and social situation occur. The decommissioning cost estimate should include all stages of decommissioning: • preparation for safe shutdown and storage • safe storage • preparation for dismantling • dismantling • site restoration The total cost of decommissioning should include the cost of licensing and other regulatory requirements. The following major cost categories are assessed for each decommissioning stage: • labour cost

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					• capital equipment and material cost • contingency cost • energy cost • waste disposition cost • other costs Specific procedures for estimating the cost of decommissioning have not been developed. However, previous experience in decommissioning of similar facilities and international practices are considered when assessing the cost of decommissioning.
67	United Kingdom	Article 22	Pg 61, F	What are the results to date to the initiatives set out in the report to address staff resourcing issues in the CNSC?	The CNSC continues to partner with post-secondary institutions, offering programs in nuclear science and engineering; the number of student opportunities has steadily increased year over year and the CNSC's acceptance rate is just under 90 percent. Last year, the CNSC hired 77 student terms, primarily through co-op and summer student programs, many of whom were hired full-time after their studies. The CNSC has also had success retaining and engaging its staff. Out of a population of 872, the voluntary turnover was 2.2 percent and there were 294 temporary and permanent internal movements, which represent on-the-job opportunities for employees to gain new skills and broaden their knowledge base. Workforce planning has become an organizational focus, where management staff at all levels are participating in

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					the identification of critical skills, succession planning, development of new graduates and mobility of experienced employees, with metrics identified to track progress.
ARTICLE 24: OPERATIONAL RADIATION PROTECTION					
68	China	Article 24	F.6, p66	According to the report, the effluent release limit is derived from the public dose limit in Canada NPP, so the effluent release limits are not same for different plants. Is there a total activity limit applied to all NPPs for all kinds of gaseous and liquid effluents including tritium and C-14? What are the detritiation measures for heavy water reactor?	There is no total activity limit applied to all NPPs for all kinds of gaseous and liquid effluents, including tritium and carbon-14 (C-14), as the effluent release limits for all airborne and liquid releases, including tritium and C-14, at each individual NPP are not the same for different NPPs. Instead, they are derived from the public dose limit and are referred to as derived release limits, which are calculated based on site-specific information. In general, there are two different approaches that can be adopted for the detritiation of heavy water reactors. The first is to build a large central tritium removal facility to which tritiated heavy water is transported from several nuclear power stations. The second is to establish much smaller tritium removal facilities that are integrated into the individual power station's heavy water management systems. This minimizes the need for storage tanks and heavy water inventories in storage or in transit. A significant difference between the approaches is the size and cost of the tritium removal systems. For instance, to ensure low environmental releases and to minimize the tritium activity in the operating plant to help keep workers safe, a tritium removal facility was opened

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					at the Darlington NPP site in 1990. This plant extracts tritium from heavy water used in most of Canada's CANDU reactors at Darlington, Pickering and Bruce Power. At the Darlington facility, separation is based on a series of catalytic exchange columns that facilitate the equilibrium exchange between tritiated heavy water and the carrier deuterium gas, typically to reduce the tritium concentration in the input heavy water by a factor of 10. The tritium could be further concentrated to more than 99.9 percent in this deuterium gas stream by a cryogenic distillation process at temperatures of approximately 25 Kelvin absolute. The resulting pure tritium gas is encapsulated and immobilized through reaction with titanium beds. The tritium is then safely stored in stainless steel containers within a concrete vault.
69	United States of America	Article 24	Annex 8, pg. 225-238	Canada appears to have made progress on the cleanup of legacy mining sites since the last report; however, please elaborate on how a "waste nuclear substance" license fits in the scheme of an abandonment license and the institutional control program (ICP). Also, what is the typical expected period of time for a site on the ICP program (10 years, 30 years, indefinitely)?	A waste nuclear substance licence (WNSL) is a class of licence that does not have "abandonment" as a distinct licensing phase. The "abandonment" licence is specific to licences issued under the *Uranium Mines and Mills Regulations* and the *Class I Nuclear Facilities Regulations*. However, this does not mean that a WNSL must remain in force forever, as it can be revoked by the Commission upon request, upon the Commission's own motion, or it can expire without renewal. Consequently, a WNSL can fit into an institutional control program (ICP) as well as any other class of licence. In the case of a legacy uranium mine site, issuance of a WNSL can allow for the licensee to carry out remediation activities. For example, the CNSC issued a 10-year WNSL

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					for the remediation of the legacy Gunnar uranium mine site. The licensee will proceed to remediate the site and reduce risks to health and safety and the environment. After remediation is complete, the intent is for the site to be released into an ICP under the Province of Saskatchewan (reference program) that will allow long-term government management and monitoring. In order for the site to be release into an ICP, the licensee has to apply to the Commission for two things: first, to revoke the existing licence in accordance with paragraph 24(2) of the NSCA; second, to issue an exemption from licensing pursuant to section 7 of the NSCA. There is currently no estimate for the duration of the ICP, as it will depend on the end state of the site and monitoring results post-remediation work. It is assumed that long-term storage facilities for radioactive waste will continue to be under licensed control until the radioactive waste is removed (below the exemption quantities outline in schedules 1 and 2 in the *Nuclear Substances and Radiation Devices Regulations*) and the facility is fully decommissioned and remediated, or a decision by the Commission is made to abandon the waste and the facility as *in situ* disposal. This would require a licence to abandon. In relation to institutional controls, this is an option where licensable nuclear substances remain on the site, but in a state where environmental hazards have been reduced and stabilized. At this point, in certain situations, it may make sense not to require ongoing licensing but to

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					transfer obligations for management and monitoring of the site to another Crown government. There is currently no framework for the duration of an ICP, as it will depend upon the end state of the site, the environmental performance of the site, and the willingness of the Crown government that will have responsibility for the site. However, unless other arrangements have been made, the obligations of the provincial Crown to oversee and manage any residual hazards associated with the site would be indefinite. Examples of where mining projects have been released from licensing and accepted into an ICP program can be found at the historic Beaverlodge mine/mill site. Five properties were released back to the province under the ICP after 27 years post decommissioning. The ICP program in Saskatchewan was established only in 2007, so the 27-year time frame should not be considered a baseline. The time frame for acceptance into the program will depend on the risks associated with the properties and the performance of the properties.
70	Czech Republic	Article 24	F,66	Managing of radiation protection should be independent from operation activities. In that case: what are the links between quality management and radiation protection issues management? Who is responsible to the	As stated in section F.6, licensees operating Canada's spent fuel and radioactive waste management facilities are required by the CNSC's *Radiation Protection Regulations* to implement radiation protection programs. In addition, a quality assurance program must be implemented as per the CNSC's *Class I Nuclear Facilities Regulations* for the licensed activity with the expectation that the management system framework is integrated into all processes and programs — including the

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				regulatory body?	licensee's radiation protection program. The CNSC expects that the organization and administration of the licensee's radiation protection program ensure the effective implementation and control of radiation protection activities independent from operational activities (including reporting lines). All radiation protection activities must be identified and assigned to an appropriate organizational unit; this includes identifying and assigning responsibility for management of work practices and accountabilities to the organization and the regulatory body (the CNSC) for radiation protection.
ARTICLE 25: EMERGENCY PREPAREDNESS					
71	United States of America	Article 25	E, pg. 41	The report refers the reader to Canada's CNSC Fukushima Task Force Report for implementation of Fukushima lessons learned (ref. Section 2.2 of Task Force Report). For waste and spent fuel storage facilities away from power plants, what lessons-learned have been implemented?	Following the publication of the *CNSC Fukushima Task Force Report*, the CNSC Fukushima Action Plan was developed. All actions have been completed, with the exception of the long-term actions, which are expected to be completed by December 2015. This action plan included improvements made to emergency preparedness and the safety of the irradiated fuel bay based on the lessons learned. Some specific examples, listed below, were implemented by OPG: • Additional food and water have been procured for the low- and intermediate-level waste

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					(L&ILW) site in the event of a prolonged event where workers are prevented from leaving the site. • Satellite phones have been purchased for use when there is no power. • An emergency preparedness and response procedure specific to the waste sites has been developed. • A mutual aid agreement for nuclear support has been developed and agreed to by Canadian utilities. • Small diesel generators have been approved for use with radiation monitoring equipment. • A flood hazard assessment for the L&ILW site has been completed. • A dose rate assessment at the site boundaries of each of the waste sites has been completed, assuming all the buildings collapse due to a beyond design basis event. In September 2012, NB Power issued Emergency Procedure EP-78600-SAMG-SRW, *Severe Accident Management Guide SRWMF and Canister Site*, which provides guidance on the development and implementation of a response to a severe accident involving the Solid Radioactive Waste Management Facility (SRWMF) and canister site. CNL is carrying out a Fukushima implementation project. The activities related

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					to waste and spent fuel storage facilities for the project include developing a severe accident guide (SAG) for the spent fuel bays, as well as performing extensive analyses with regard to boil-off times to establish and support the SAG.
ARTICLE 26: DECOMMISSIONING					
72	France	Article 26	Section F.8: p.75	About decommissioning, the 5th Report mentions the following :"in the case of nuclear facilities, specific requirements for decommissioning planning are set out in the Canadian Nuclear Safety Commission (CNSC) regulations for Class I and Class II nuclear facilities and for uranium mines and mills", "the CNSC requires licensees to prepare a preliminary decommissioning plan (PDP) and detailed decommissioning plan (DDP) for approval" and "the PDP documents the preferred decommissioning strategy, whether it is prompt decommissioning, deferred decommissioning or in situ confinement, along with	Please allow us to clarify the text as reported in Canada's Fifth National Report. Canada is not suggesting that entombment is endorsed in Canada's legal and regulatory framework. It is not. Additionally, entombment is not considered to be a decommissioning strategy but rather a decommissioning option for exceptional circumstances only. This is reflected in the IAEA's General Safety Requirements, GSR Part 6, *Decommissioning of Facilities,* which identifies only two possibilities as decommissioning strategies: immediate dismantling and deferred dismantling. Canada's Fifth National Report states that "The PDP documents the preferred decommissioning strategy, whether it is prompt decommissioning, deferred decommissioning or *in situ* confinement, along with objectives at the end of decommissioning". This text is perhaps poorly worded but its intent was to convey that the purpose of a PDP is to identify both the approach and manner by which a facility will be decommissioned — not to define a list of accepted decommissioning strategies for use in Canada.

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				objectives at the end of decommissioning". On this topic, could Canada: Confirm that in-situ decommissioning (i.e. entombment or equivalent options), which seems to be considered as a possible decommissioning strategy, is endorsed in the legal and regulatory framework on decommissioning or waste management? Indicate if in-situ decommissioning has already been envisaged or implemented in decommissioning projects? If yes, could Canada describe the technical design options of in-situ decommissioning which have been implemented (totally or partially, facilities or limited number of equipment) and the related surveillance and monitoring programs (100y, 300y, 10 000y, etc.)?	Canada has accepted a form of *in situ* confinement for specific areas of the Whiteshell Laboratories, although it is not considered to be a decommissioning or entombment. For example, a small volume of contaminated river sediments are to be left in place as part of the approved decommissioning activities associated with the Whiteshell decommissioning licence. In relation to entombment or *in situ* decommissioning, Canada has neither issued any licences that reflect this decommissioning option nor received any licence applications for this type of disposal activity.
73	Japan	Article 26	F8 p75	Among all kinds of wastes dismantled waste generated by	The CNSC *Packaging and Transport of Nuclear Substances Regulations* (PTNSR) are based on the IAEA *Regulations for the Safe Transport of Radioactive Material*. These

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				dismantle of NPP, how will large-sized waste (such as from steam generators) be transported, as such waste could be more influenced by internal pollution than surface contamination?	regulations include provisions applicable to cases where large objects, such as steam generators, cannot be transported unpackaged or in packages in full compliance with all applicable provisions of the regulations. In such cases, the applicant is required to submit an application demonstrating why all the provisions of the regulations (i.e., use of a package) cannot be met and further demonstrate that the shipment will meet or exceed the level of safety if all the provisions of the regulations had been met. In addition, under the PTNSR, such shipment would require the issuance of a licence to transport. Depending on the material classification of these objects (e.g., low specific activity (LSA), surface contaminated objects (SCO), Type A, etc.) and their configuration and condition, it may be possible to ship an object unpackaged (per categories LSA-I or SCO-I). Alternatively, it may be necessary for the object to be segmented and each piece individually packaged to ensure compliance with radiological and/or physical (e.g., highway axle-load) limits. Where it is impractical for a large object to meet regulatory packaging requirements, an applicant can seek a "special arrangement" approval from its regulator. The applicant must demonstrate why conformance to the packaging requirements is impractical and how an equivalent level of safety will be provided (typically through the use of additional controls) for the transport of the large object.

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74	Republic of Korea	Article 26	F.8, 75	Section F.8 states that "The CNSC also requires licensees to prepare a preliminary decommissioning plan (PDP) and detailed decommissioning plan (DDP) for approval." What are the regulatory standards applied to approve the Detailed Decommissioning Plan of nuclear facilities?	A preliminary decommissioning plan (PDP) should be filed with the CNSC as early as possible in the lifecycle of the licensed activity and reviewed and updated as new information is obtained. Development of a PDP provides an opportunity to consider decommissioning in the design, construction and operation of the facility so that eventual decommissioning can be carried out in a cost-effective manner. For a nuclear facility, the PDP must be submitted to the CNSC before a licence to prepare a site or licence to construct can be issued. Specific references to and requirements for decommissioning can be found in the *Nuclear Safety and Control Act* (NSCA) and the CNSC regulations for Class I nuclear facilities, Class II nuclear facilities, and uranium mines and mills. A detailed or final decommissioning plan must be developed for licensed nuclear facilities for CNSC approval prior to decommissioning and, if possible, one year prior to the scheduled shutdown of the facility. Once approved by the CNSC, the final decommissioning plan is incorporated into a licence authorizing the decommissioning. The decommissioning of licensed nuclear facilities must be conducted only in accordance with the requisite licence. The transition from operational to decommissioning status must be as prescribed by the regulatory authority. Typically, this is done by revoking the operating licence and issuing a decommissioning licence. The contents of a PDP and detailed decommissioning plan (DDP) are outlined in CSA N294-09, *Decommissioning of*

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					facilities containing nuclear substances, and, to some extent, in CNSC regulatory guide G-219, *Decommissioning Planning for Licensed Activities* (see response to question 76 for list of contents for PDP and DDP).
75	Republic of Korea	Article 26	F.8, 76	Section F.8 states that "CSA standard N294-09, Decommissioning of Facilities Containing Nuclear Substances was published in July 2009." How often is regulatory body carrying out the inspection during decommissioning of nuclear power reactor or research reactor? Are there the provisions or contents on the decommissioning inspection in CSA standard N294-09?	A general description of the CNSC's compliance program is provided in section E 6.1 of the Canada's Fifth National Report, which applies to all licensed facilities. Section 30 of the *Nuclear Safety and Control Act* (NSCA) authorizes CNSC staff who are designated inspectors to carry out inspections and verify licensee compliance with regulatory requirements, including licence conditions. Licensees must have an approved set of programs and processes in place that adequately protect the environment and human health and safety. Once a decommissioning licence is issued, the regulatory oversight of facilities in decommissioning follows the CNSC corporate compliance verification process. The frequency of the inspections is determined based on the risk ranking of the facility and the licensee's performance. CSA standard N294-09, *Decommissioning of facilities containing nuclear substances*, was amended in August 2014. Criteria for inspections during decommissioning are not covered in the original standard or in the amendment.
76	Republic of Korea	Article 26	F.8, 75	Section F.8 states that "The CNSC also requires licensees to prepare a	The contents of a PDP and DDP are outlined in CSA N294-09 and, to some extent, in CNSC regulatory guide G-219, *Decommissioning Planning for Licensed Activities*. An

No.	Country	JC Article Reference	Reference in Report	Question/Comment	Response
				preliminary decommissioning plan (PDP) and detailed decommissioning plan (DDP) for approval." What are the contents of the PDP and DDP?	excerpt from N294-09 is provided below: A PDP may include the following: (a) a description of the location of the facility, including (i) a map of the facility and its specifications; (ii) geographic information; (iii) details regarding the surrounding environment; (iv) land uses; and (v) illustrations and maps of the facility in relation to the municipality; (b) purpose and description of the facility, including (i) primary components and systems; (ii) building type and construction, including location of any hazardous building materials (e.g., asbestos, PCBs); (iii) building services (e.g., power, heating, ventilation, sewer, water, fire protection); (iv) laboratories and other hazardous handling areas; (v) type, quantity, and form of radioactive and hazardous materials stored, produced, or used during operation; and (vi) design features used to reduce the spread of contamination and facilitate decontamination and dismantling; (c) post-operational conditions, including

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					(i) a summary of the shutdown process, including planned removal of stored inventories of hazardous materials; (ii) the predicted nature and extent of contamination remaining in the primary systems and components (in list or table format with reference to applicable illustrations); (iii) the predicted nature and extent of contamination on floors, walls, work surfaces, ventilation systems, etc.; and (iv) the identification of any separate planning envelopes; (d) the decommissioning strategy, including (i) the final end-state objective; (ii) rationale for (1) the decommissioning strategy selected; (2) interim end states; (3) periods of storage with surveillance; and (4) in-situ disposal concepts; (iii) the requirements for long-term institutional controls; and (iv) the assessment of alternative strategies (or a rationale for why alternatives do not exist or do not warrant consideration);

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					(e) a decommissioning work plan, including (i) a summary of the main steps for decontamination/disassembly/removal of each of the components and systems (preferably grouped into work packages); (ii) for each work package, identification of those types of activities that could pose a significant hazard to workers, the public, or the environment; (iii) the role of existing operational standard procedures for radiation protection, hazardous materials handling, industrial safety, and environmental protection in managing hazards; (iv) specific activities for which additional protection/mitigation procedures will be required at the detailed planning stage; (v) a summary of the final dismantlement of the structures/components; and (vi) a conceptual schedule showing the approximate year of facility shutdown and the approximate sequencing and duration of the decommissioning work packages and, where relevant, storage periods; (f) radiological monitoring and survey commitments, including (i) a program for conducting periodic contamination surveys and the recording of contamination events during facility operation;

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					(ii) a commitment to conduct detailed post-operation surveys in support of DDP development; (iii) a commitment to develop plans and protocols acceptable to the regulatory authority at the detailed planning stage for monitoring (1) work hazards during decommissioning; (2) personnel dosimetry; (3) environmental emissions and effluents; and (4) materials, sites, and structures to be cleared from regulatory control; (g) a waste management strategy specifying (i) the approximate quantities and characteristics of radioactive and chemically hazardous wastes expected to arise from the decommissioning (tied to specific work packages, if possible); (ii) the anticipated final disposition of radioactive and chemically hazardous materials; and (iii) a commitment to segregate as much material as possible for reuse and recycling; (h) the cost and a financial guarantee, specifying (i) an estimate of the total present-value cost of the decommissioning; (ii) a reasonable basis for how cost estimates were derived; and

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					(iii) a description of how the required funds will be provided; (i) a commitment to prepare a DDP or final decommissioning plan for regulatory approval prior to decommissioning and, if possible, one year prior to the scheduled shutdown of the facility; (j) a commitment to periodically review and update the PDP until a DDP is prepared, in accordance with (i) changes in site conditions, including climate; (ii) changes to the proposed decommissioning objectives or strategy; (iii) advances in decommissioning technology; (iv) modifications to the facility; (v) updated cost and funding information; (vi) revised regulatory requirements; and (vii) revised records requirements; (k) the physical state of the facility at (i) the end of operations; and (ii) the start of decommissioning; (l) the records required for decommissioning, including a description of the facility operational records that will be maintained to periodically update the PDP and prepare the DDP(s); and (m) a public consultation plan, including a public

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					information program and avenues for public participation. The detail and complexity of a detailed (final) decommissioning plan shall be commensurate with the facility being decommissioned. If the final decommissioning plan takes the form of a DDP, it shall contain the following elements: (a) a description of, and diagram showing, the areas, components, and structures to be decommissioned, grouped where appropriate into logical decommissioning planning envelopes; (b) the operational history, including incidents or accidents that could affect decommissioning; (c) the final radiological, physical, and chemical end-state objectives. Where more than one final decommissioning plan is required in a phased program, interim end-state objectives and monitoring programs for deferral periods shall be provided for each detailed plan; **Note:** *Annex H (of CSA N294-09) provides examples of final radiological end-state objectives.* (d) a description of the requirements for long-term institutional controls; (e) comprehensive and systematic survey results of radiological and other potentially hazardous conditions, including identification and description of the remaining significant gaps or uncertainties in the measurement or

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					prediction of such conditions; (f) a decommissioning strategy for each planning envelope that highlights the significant changes from the strategy in the PDP; (g) a description of the decommissioning work packages, including (i) a step-wise technical approach; (ii) the nature and source of potential significant risks to workers, the public, and the environment (including estimates of doses); (iii) procedures or technologies proposed to mitigate risks; and (iv) quantities, characteristics, and disposition methods of wastes; (h) a schedule showing (i) the proposed start date; (ii) the approximate duration and sequence of work packages (and periods of storage with surveillance, if applicable); and (iii) the anticipated completion date; (i) a waste management plan (see Clause 7.8.3 *of CSA N294-09*); (j) a characterization of potential environmental effects and the measures that will be employed to mitigate and

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					monitor the effects; (k) a conservative cost estimate (see Annex B *of CSA N294-09*) for (i) labour; (ii) materials; (iii) equipment; (iv) waste management; (v) environmental assessment; (vi) monitoring; (vii) administration (e.g., training, safety, project management, government and public liaison); (viii) energy; (ix) taxes; (x) regulatory agency fees; and (xi) contingency plans; (l) financial guarantee arrangements (see Annex B); (m) a summary report of any public consultations undertaken in preparing the plan, including issues raised and how they were considered and dispositioned; (n) the project management structure; (o) applicable programs (e.g., quality assurance [see CSA N286], emergency response, site security, radiation protection, environmental protection and monitoring [see

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					CAN/CSA-N288.4], fire [see CSA N293], personnel training); (p) a human factors program that includes (i) human factors analysis; (ii) training provisions; (iii) use of contractors; (iv) procedural development; and (v) ergonomic issues; (q) conventional occupational health and safety issues and associated training and protection programs; (r) federal and provincial regulatory agencies involved in the project; (s) the final survey program with interpretation criteria; (t) the operating and decommissioning records required for long-term retention and the method of retention; and (u) a table of contents for the final report that outlines the topics to be covered.
77	Republic of Korea	Article 26	F.8, 75	Section F.8 states that "The CNSC also requires licensees to prepare a preliminary decommissioning plan (PDP) and detailed decommissioning plan (DDP) for approval." What are the contents	A safety assessment (SA) shall be performed to identify potential hazards to workers and the public from both routine decommissioning activities and credible accidents during decommissioning. The level of the SA should be commensurate with the type and complexity of the facility. The assessment shall: • describe the relative importance of the potential

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				of the safety assessment for decommissioning in DDP? What is the review guidance of CNSC for the safety assessment in DDP?	hazards • identify the methods for mitigating the risks associated with such hazards • address the residual risks to the public, if any, after decommissioning is completed The SA may be a stand-alone document or may be included in the detailed (final) decommissioning plan.

MISCELLANEOUS PROVISIONS

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ARTICLE 27: TRANSBOUNDARY MOVEMENT					
78	Argentina	Article 27	I-107	On which version of the IAEA Regulations for the Safe Transport of Radioactive Material (TSR1 or SSR-6) is based the national policy for trans boundary movements?	Currently, the CNSC's *Packaging and Transport of Nuclear Substances Regulations* (PTNSR) incorporate the 1996 edition (revised) of the IAEA *Regulations for the Safe Transport of Radioactive Material*. In 2012, the Commission issued a policy direction to CNSC staff to apply the 2009 edition of the IAEA regulations, to the extent that doing so does not create conflicts with the PTNSR. In addition, the CNSC is working to revise the PTNSR to adopt the 2012 edition of the IAEA regulations and is expected to publish the updated PTNSR before the end of 2015.

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ARTICLE 28: DISUSED SEALED SOURCES					
79	Argentina	Article 28	J-111	What is the procedure for exempting/clearing a radioactive source once it has decayed below authorized levels?	The regulatory requirements for abandonment or disposal of a radioactive nuclear substance are provided in section 5.1 of the *Nuclear Substances and Radiation Devices Regulations* (NSRDR). If it can be demonstrated that a radioactive sealed source has decayed below its exemption quantity or its clearance levels — as identified in schedule 1 and schedule 2 of the CNSC's NSRDR — it may be released from CNSC regulatory control (with some exceptions for Category I, II or III nuclear material and discharges of effluents from Class I nuclear facilities, mines and mills).
80	Germany	Article 28	p. 111-112 (Section J.4.2)	**Sealed Source Tracking System -** The report says: "The Sealed Source Tracking System (SSTS) is a secure information management computer program used to populate the National Sealed Source Registry (NSSR); it allows licensees to report the movements of radioactive sealed sources online throughout their complete lifecycle. The NSSR enables the CNSC to build an accurate and secure inventory of radioactive sealed sources in Canada, starting	Licensees using the Sealed Source Tracking System (SSTS) are required to provide: • the date of transaction • the serial number of source • isotope information • the reference date • the activity of the source on the reference date • where the source is coming from – CNSC licence number (if applicable) and address • where the source is going – CNSC licence number (if applicable) and address • the model name/serial number of prescribed

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				with those that are classified as high risk. The information is as current as the reporting time frames required by the licence (e.g., reporting within two days of receipt and seven days in advance of any transfer). These systems have been efficient and effective since their establishment in 2006." Are there any procedures planned to verify the reliability of the SSTS data pool?	equipment (such as a radiography camera, irradiator, teletherapy machine) • the model/name of source assembly (for a radiography camera) Records on sources newly manufactured in Canada must also be created in the SSTS within the prescribed reporting timeframes. Transfers and exports must be reported at least seven days before the actual shipment takes place. Receipts and imports must be reported within 48 hours of reception. Prior to issuing an export licence for the export of Category 1 and 2 radioactive sources, the exporter's information is verified against the facility licence number, the address is provided by the licensee along with details about the end-user, and an end-use and importing state assessment is completed. Electronic export transactions are verified by comparing the export report generated by the SSTS against the export licences issued by the CNSC. Any discrepancies are resolved with the licensee. Since 2010, the CNSC has required that a confirmation be sent to the CNSC to confirm that the exports have occurred as reported and that the radioactive sources are now under the regulatory authority of the importing state. In addition, the CNSC inspectors conduct routine compliance inspections, which include a physical verification of the data in the SSTS against the licensees' actual inventory of sealed sources and export

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					transactions. Inconsistencies are immediately addressed.
81	United Arab Emirates	Article 28	Section J.4.2, page 111	The sealed source tracking system seems very thorough, but there is no mention of 'orphan' sources. How are identfied sources, but without owners, handled?	In 2010, the CNSC strengthened its risk-informed regulatory strategy for dealing with the discovery of orphan sources based on three pillars: regulatory oversight, promotion and communication, and response and recovery. Regulatory oversight includes licensing of the possession, use and import/export of sealed sources, the mandatory tracking of high-risk sealed sources and control of the licensee's inventory. The CNSC is in the process of implementing a financial guarantees program that will apply to all licensees to ensure that funds are available for the proper disposal of sources. The CNSC expects to complete the implementation of this program by April 1, 2015. With respect to promotion and education, the CNSC has published a poster and associated brochure for industry entitled "Alarm Response Guidelines for Radiation Portal Monitoring Systems". These documents are available on the CNSC website and can be ordered free of charge. A cross-Canada outreach was done with the scrap metal industry. In addition, new regulatory provisions will be proposed in the *Packaging and Transport of Nuclear Substances Regulations* to facilitate the movement of unidentified nuclear substances in loads of waste or scrap for proper characterization. With regard to response and recovery, in 2011 the CNSC

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					published an internal document titled *Orphan Source Response Procedure* that details the CNSC's role when a newly discovered source is reported to the CNSC. In general, the "finder" is responsible for managing or disposing of the source. Onsite assistance and/or recovery by CNSC staff or other contractors may be required when: • the source is Category 1, 2 or 3 • special circumstances are present, including but not limited to: o unavailable resources on location to ensure safety o high media interest o political interest o general public involvement o bankruptcy/insolvency situations Canada is actively working with international partners, including the IAEA, to enhance global radiological security. This effort includes strategic support through expert input into IAEA plans and priorities, as well as funding for radiological source security.
82	United Kingdom	Article 28	Pg 109, J	Canada is a major exporter of radioactive sources, how many are returned after use as a proportion	The Sealed Source Tracking System (SSTS) tracks the creation, receipt, transfer, import and export of high-risk radioactive sources, thereby preventing the unauthorized possession or trafficking of radioactive sources within

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				of the total exported? Have there been any incidents relating to disused sources/orphan sources or contaminated scrap in or entering into Canada?	Canada. The SSTS contains details of all of the high-risk radioactive sources that have been exported, as well as of those that have been imported into Canada at the end of their lifecycle. But this data is not reconciled in a manner that can provide a relative proportion of returned sources. Further, if the importing state has the regulatory capacity to manage the disused sources, these sources may reside in the importing state or be exported to a third party state for long-term storage. There have been a number of alarms triggered at portal monitors located at various Canadian borders due to the presence of contaminated goods. These have been returned to their country of origin for proper disposal. The following measures are implemented in Canada to avoid illicit trafficking of disused orphan sources: • Possession and movement of high-risk radioactive sealed sources are regulated by the CNSC. • The CNSC manages Canada's national inventory of high-risk radioactive sealed sources. The National Sealed Source Registry helps the CNSC track the locations of all high-risk radioactive sealed sources in Canada and increases the security and safety of those sources. • Close monitoring of the movement of sealed sources through a national registry complies with the IAEA's *Code of Conduct on the Safety and Security of*

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					Radioactive Sources. The code aims to enhance the safety and security of radioactive sources internationally.

ARTICLE 32: REPORTING

No.	Country	JC Article Reference	Reference in Report	Question/Comment	Response
83	Argentina	Article 32	D-27	Dry storage capacity, according to the report, is enough at all NPP sites. What is the reason why the proportion of spent fuel bundles in dry storage is smaller at Pickering (40.1%), Bruce (34.3%) and Darlington (26.4%) if compared to Gentilly 2 (74.3%) and Point Lepreau (69.8%)?	The CANDU generating stations remove fuel from the irradiated fuel bays (IFBs) and place them in dry storage at a rate that ensures adequate IFB space is always available. Gentilly-2 and Point Lepreau are single-unit stations with relatively small single IFBs. Therefore, they do not generate as much fuel and maintain more spent fuel in their wet bays. Also, Gentilly-2 is permanently shut down and will therefore be filling its IFB to 100 percent capacity over the next five years. Pickering, Darlington and Bruce are multiple-unit stations with physically larger IFBs and also multiple wet bays per station. As a result of proportionally higher IFB capacity, Pickering, Darlington and Bruce have had to transfer proportionally less fuel to dry storage to maintain adequate wet bay space. Point Lepreau Generating Station, being a single-unit station with a single IFB, has had to transfer more fuel to dry storage in order to meet its licence requirement to

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					have sufficient storage capacity for a full core discharge at all times.
84	Argentina	Article 32	E-55	The CNSC regulatory policy P-290 Managing Radioactive Waste, defines radioactive waste as any waste containing a nuclear substance, leaving no room for regulatory doubt". Are numerical criteria for defining a radioactive waste established in that policy?	There are no numerical values for radioactive waste in regulatory policy P-290, *Managing Radioactive Waste*. It is a policy statement on the measures to regulate radioactive waste. For information on Canada's radioactive waste classification system, please refer to the response provided for question 21.
85	Argentina	Article 32	B-21	Considering waste classification in Canada, it seems the waste storage at Port Hope could be classified as VLLW or Uranium mine and mill waste. Could Canada give details about these historic waste characteristics and the reasons for classifying them as LLW?	Historic waste in the Port Hope area typically consists of contaminated soils intermixed with refining residues, process wastes and contaminated equipment and building materials, which contain various levels of radium, uranium, thorium, arsenic and a number of other heavy metals, but historic waste does not include uranium mine and mill tailings. More detail related to the contaminant characteristics of the waste may be obtained through the Port Hope Area Initiative Management Office. Canada does not recognize very-low-level radioactive waste (VLLW) as a separate class of radioactive waste but rather as a subset of low-level radioactive waste (LLW). That said, given the level of hazard presented by Canada's historic waste, it is typically managed on the surface in a manner consistent with VLLW. In the Port Hope area, two engineered above ground repositories involving liners and covers consisting of multiple layers of natural and

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					synthetic materials, will be used to contain and safely manage the waste for the long term. However, recognizing the long half-life of the nuclides involved, the engineered repositories and associated controls have been engineered to be in place for 500 years – longer than would typically be required for shorter-lived radioactive waste.
86	Czech Republic	Article 32	C,D, 39-50	The storage practice probably includes the practice usually defined as disposal. Is it not exactly possible to differentiate storage and disposal?	As per CNSC Regulatory Guide G-320, *Assessing the Long Term Safety of Radioactive Waste Management*, storage is defined as "the holding of radioactive waste in a facility that provides for its containment with the intention of retrieval." Disposal is defined as the "placement of radioactive waste without the intention of retrieval."
87	Germany	Article 32.1.4	p. 22 (Section B.10)	**Northern Transportation Route -** The report says: "Up until May 2014, the Northern Transportation Route (NTR) was issued a licensing exemption. CNSC staff informed the Commission that the current licensing exemption for the NTR will be lifted, as the radiation levels are so low that they are below regulatory clearance levels. The NTR is now being safely managed through the associated land management agencies, where	The Commission granted an exemption for the NTR to hold a licence for 10 years, commencing in 2006. Since that time, the sites have been characterized and the findings are that the contaminant concentrations are very low and that under no reasonable circumstance would a member of the public approach the public dose limit while occupying these sites. Therefore, there is no reason to continue to declare that the sites are "exempt" as there are no requirements under the NSCA to exempt them. The contaminated sites will continue to be managed safely by the land management agencies responsible for them, which include federal, provincial, territorial and municipal government departments.

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				applicable." If the radiation levels are below the regulatory clearance levels, what is the problem for or with NTR?	
88	Republic of Korea	Article 32	D.3, 28	Section D.3 describes the radioactive waste management facility. What is the status, including features and so on, of a radioactive waste incineration facility operated in Canada?	There are three radioactive waste incinerators in Canada. The first is OPG's radioactive waste incinerator, located at the Western Waste Management Facility. This incinerator is still in service today. The OPG incinerator is a two-stage combustion process using a primary combustion chamber operating at between 760 °C and 1,050 °C. A secondary chamber then operates at up to 1,200 °C to ensure complete burning of volatile gases. A flue gas cooling system, utilizing water spray atomizers, cools the flue gas prior to it being filtered in a baghouse. Activated carbon and slaked lime are injected into the flue gas for treatment of acid gases, trace organics and heavy metals. An induced draft fan maintains the entire system under a negative pressure and exhausts the flue gas to the atmosphere. The incinerator is regulated by both the Canadian Nuclear Safety Commission (CNSC) and the Province of Ontario's Ministry of the Environment and Climate Change, and both radiological and conventional emissions are monitored and reported. The second is a liquid waste incinerator located at Whiteshell Laboratories and operated by CNL. It is an industrial type incinerator with a burning capacity of about 75 L of organic liquids per hour. A vortex burner

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					design is used, which allows incineration to be carried out without generating visible smoke or ash. The incinerator is designed to shut down automatically upon any loss-of-flame condition. Insulated lines carry the feed to the incinerator fuel injection nozzle. A compressor supplies air to provide oxygen for combustion. Currently, small volumes of organic liquid wastes and solvents with very low levels of activity are still burned by the incinerator on occasion. The third is located at the Cameco Blind River Refinery and is still in operation. This incinerator is a moving grate primary chamber system with a wet scrubber emissions control system. The emissions control system includes a quench tower, two packed bed scrubbers (one with hydrogen peroxide and one with sodium hydroxide), venturi scrubber, steam heater, two baghouses and an activated carbon unit. This incinerator is still in operation.
89	Republic of Korea	Article 32	B7, 17	There are four main classes of RW, HLW, ILW, LLW, Uranium mine and mill waste and there is not a definitive numerical waste classification boundary between the categories according the B7 of the National Reports. If so, how do the RW generators segregate their RW into the classes? How does the regulatory body supervise that the	Radioactive wastes are classified into one of four categories — high-level, intermediate-level, low-level, and uranium mine and mill tailings — based on their origins and radiological hazards. In Canada, licensees are responsible for safely managing their own wastes. They must demonstrate to the CNSC how they propose to fulfill this obligation. CSA standard N-292.0-14, which defines the Canadian waste classification system, did not provide definitive numerical boundaries, as it was developed to provide licensees with a degree of flexibility — according to their operational

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				RW generator's pre-disposal management of RW with respect to the segregation of RW?	and organizational needs — in developing waste management plans. Annex A provides numerical orientation with respect to waste classification. Compliance with pre-disposal management of radioactive waste is ensured by performing routine inspections at all nuclear facilities. Please refer to section E.6 of the Canadian National Report for more information on the regulator's compliance program.
90	Sweden	Article 32.1.1	B.5, p.15	The CNSC issued in July 2004 regulatory policy P-290, Managing Radioactive Waste, which outlines the philosophy that govern the CNSC's regulation of radioactive waste. The policy indicates that, when making regulatory decisions about the management of radioactive waste, the CNSC will seek to achieve its objectives by considering certain key principles listed on bottom of p. 15 (e.g. waste minimization). It is also clearly stated in section F.2 that each licensee has the prime responsibility for the safety of its spent fuel and radioactive waste management facilities. How is the	CNSC regulatory policy P-290, *Managing Radioactive Waste*, is intended to promote the implementation of measures to manage radioactive waste so as to protect the health and safety of persons and the environment, provide for the maintenance of national security, and achieve conformity with measures of control and international obligations to which Canada has agreed. It is also intended to promote consistent national and international standards and practices for the management and control of radioactive waste. As stated in Canada's Fifth National Report, the prime responsibility for safety rests with the licensee. In reviewing the adequacy of the licensee's policies, programs and procedures, the CNSC's review is conducted in a fashion that ensures that the principles of P-290 have been taken into consideration. Each licence applicant and existing licensee must demonstrate that they have in place the necessary policies, programs and procedures to ensure the health and safety of workers and the public and the protection of the environment.

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				interface between CNSC implementation of the P-290 policy document and the responsibilities of the waste owner/licensee managed in practice, in order not for CNSC to assume parts of the prime responsibility?	The licensee is required to implement these policies, programs and procedures and the CNSC will inspect to verify that these policies, programs and procedures are being appropriately implemented.
91	Sweden	Article 32.1.2	G.16, p.91	To support financing of the AMP, waste owners continue to make regular deposits into the segregated trust funds established in 2002. In 2008, the NWMO submitted to the Minister of Natural Resources a funding formula and schedule for trust fund deposits which was approved by the Minister in 2009. In section K.4.3.4 it is stated that NWMO in 2011 completed a full update of the cost estimates for implementing the APM project, as well as updated annual trust fund contributions from waste owners to reflect the latest lifecycle cost estimates and trust fund balances.	For clarification purposes, the question is referring to the Adaptive Phased Management (APM), not the Administrative Monetary Penalties (AMP). The APM cost estimate update completed in 2011 resulted in a total APM cost estimate of 17.9 billion (in 2010 constant Canadian dollars), which represented an increase of 1 billion (in 2010 constant Canadian dollars). When stated in present value, the 2011 cost estimate resulted in a 0.1 billion increase in the funding required.

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				What was the outcome of this exercise by means of e.g. increased total cost and increased annual trust fund contributions?	

APPENDIX A – ADDITIONAL INFORMATION TO SUPPORT QUESTION 3

Volume	Details	Contaminate level	Treatment
1100 m^3	Water from balance of the NPP	Very low level of chemical products	Diluted and discharged into river following approval from the CNSC and Quebec's environmental ministry (Développement durable, Environnement et Lutte contre les changements climatiques)
2600 m^3	Water from the reactor building	Very low level of chemical products and radiological contaminants (less than 0.002% DEL (derived emission limits) for the tritium and 0.02% DEL for the C-14)	Diluted and discharged into river following approval from both the CNSC and Quebec's environmental ministry
214 m^3	Radioactive used resins	ILW	Stored in 2.5 m^3 sealed canisters and stacked by twos in a welded cylinder in the Solid Radioactive Waste Management Facility (onsite)
190 m^3	Compactable and non-compactable radioactive waste	LLW	Stored onsite in the Solid Radioactive Waste Management Facility
6m^3	Contaminated oil	LLW	By third party contractor
125110 L 10091 kg 15561 kg 4261 kg	Oil Batteries Sulphuric acid Solvent liquids	No radiological contaminants	Sent for conventional recycling

APPENDIX B – ADDITIONAL INFORMATION TO SUPPORT QUESTION 5

Type of Liability	Long-term Management (LTM) Policy	Funding of Liabilities	Current Practice / Facilities	Planned Facilities
Spent Fuel (SF)	National approach for the LTM of SF *Nuclear Waste Fuel Act* (NWFA, 2002) outlines process and implementation	Long-term: • Licensees are required to contribute to segregated funds to finance LTM activities under the NFWA Short-term: • Licensees are financially responsible & required to provide a Financial Guarantee (FG) for the decommissioning of interim WMFs for SF under the *Nuclear Safety and Control Act* (NSCA)	SF held in interim storage in wet or dry storage facilities located at the waste producers' site SF from research reactors is either returned to the fuel supplier or transferred to Canadian Nuclear Laboratories (CNL) Chalk River Laboratories (CRL) for storage	Long-term: • Nuclear Waste Management Organization (NWMO) implementing the Adaptive Phased Management (APM) Approach - a deep geological repository (DGR) for the LTM of SF in Canada Short-term: • Interim dry storage facilities are constructed as needed
Nuclear Fuel Cycle Waste	Licensees are responsible for the funding, organization, management & operation of their Waste Management Facilities (WMFs) (*Radioactive Waste Policy Framework,* 1996) Government of Canada accepted responsibility for LTM of historic wastes & funds the management of legacy waste under the Nuclear Legacy Liabilities Program (NLLP)	Licensees are financially responsible & required to provide a FG for the decommissioning & LTM of the waste they produce	• Managed by licensee (onsite or at a dedicated WMF) • Managed in-situ/ above ground mounds • Managed in near-surface facilities adjacent to the mines and mills • Waste from small generators transferred to licensed WMFs for management	• OPG planning a DGR for LTM of its low-level waste (LLW) & Intermediate-level waste (ILW) • CNL assessing CRL site for hosting LTM facilities for LLW & ILW under NLLP • LTM of the bulk of Canada's historic waste implemented under the Port Hope Area Initiative (PHAI) • LTM of Uranium Mines and Mills (UMM) in near-surface facilities adjacent to the mines and mills • CNL assessing options at CRL site for hosting LTM facilities for radioactive wastes
Application Wastes	Licensees are responsible for the funding, organization, management & operation of their WMFs	Licensees are financially responsible & required to provide a FG for the decommissioning & the LTM of the waste that they produce	• delay and decay • returned to manufacturer • transferred to licensed WMFs for management	CNL assessing options at CRL site for hosting LTM facilities for radioactive wastes

Type of Liability	Long-term Management (LTM) Policy	Funding of Liabilities	Current Practice / Facilities	Planned Facilities
Decomm. Liabilities	• Licensees are responsible for the funding, organization, management & implementation of decommissioning activities • Licensees to give due consideration to the immediate dismantling approach when proposing a decommissioning strategy (G-219)	Licensees are financially responsible & required to provide a FG for the decommissioning & the LTM of the waste that they produce	Major facilities required to keep decommissioning plans and FG up to date throughout the lifecycle of a licensed activity (G-219). These are reviewed on a five-year cycle by the licensee and regulator.	CNL assessing CRL site for hosting LTM facilities for LLW & ILW under NLLP
Disused Sealed Sources	Licensees are responsible for the funding, organization, management & operation of their WMFs	Licensees are financially responsible & required to provide a FG for the decommissioning & the LTM of the waste that they produce	• delay and decay • returned to manufacturer • transferred to licensed WMF for LTM • recycling by reusing, re-encapsulating, or reprocessing National Sealed Source Registry & Sealed Source Tracking System	CNL assessing options at CRL site for hosting LTM facilities for radioactive wastes