Gmail Susan O'Donnell <susanodo.ca@gmail.com>

A-2022-00098 / NB - CNSC Access to Information Request - Response

1 message

Dubuc, Philip <Philip.Dubuc@cnsc-ccsn.gc.ca> 30 August 2023 at 12:11
To:
Cc: "Belanger, Nancy" <nancy.belanger@cnsc-ccsn.gc.ca>

Dear Susan O'Donnell,

This is in response to your request under the Access to Information Act for:

> ***"Please provide all communications received by the President, any of the Vice-Presidents, the Executive Advisor, the Commission Secretary, and the Office of Audit, Evaluation and Ethics with respect to the "recycling" or "reprocessing" of nuclear fuel waste (irradiated nuclear fuel, spent fuel, CANDU fuel) including as may be undertaken in conjunction with nuclear research or small modular reactors generated between May 31, 2000 and December 31, 2022. Please include those communications generated within the CNSC and those received from federal departments, regulatory bodies and contracted entities, including but not limited to Natural Resources Canada, Atomic Energy Canada Limited and Canadian Nuclear Laboratories, and any private sector entity or agent including but not limited to the Canadian Nuclear Society, Canadian Nuclear Association, CANDU Owners Group or others. "***

Please find all the accessible records you requested attached. The exemption provisions s.13(1), 19(1), 21(1)(a), 21(1)(b), 69(1)(e), and 69(1)(g) of the Act have been applied to the package (outlined below):

13(1)	information obtained in confidence
19(1)	personal information
21(1)(a)	advice or recommendations
21(1)(b)	consultations or deliberations
69(1)(e)	briefings to Ministers on Council matters, or discussions referred to in (d)
69(1)(g)	any records making a reference to (a) to (f)

Please refer to the following website to view these provisions: https://laws-lois.justice.gc.ca/eng/acts/a-1/

You have the right to file a complaint with the Information Commissioner of Canada about this aspect of the processing of your request for a period of 60 days following the receipt of this notice. The address is:

30 Victoria Street
Gatineau, Québec
K1A 1H3

Or online at: https://www.oic-ci.gc.ca/en/submitting-complaint

Should you have any questions regarding this request, please contact Nancy Belanger at nancy.belanger@cnsc-ccsn.gc.ca.

Sincerely,

Philip Dubuc

ATIP Coordinator/ Coordinateur AIPRP

Access to Information and Privacy /

Accès à l'information et protection d'information personnel

Canadian Nuclear Safety Commission /

Commission canadienne de sûreté nucléaire

Workshop
on the Management of Spent fuel, Radioactive Waste, and Decommissioning
in SMR/Advanced Reactor Technologies

7-10 November 2022

The NEA and Natural Resources Canada (NRCan) are organizing an international workshop on the implementation of radioactive waste management strategies in small modular reactors (SMRs)/advanced reactor technologies. The topic has been surfacing in conversation for many months during various events within the NEA. The workshop will welcome participants from various fields of expertise in the areas of Radioactive Waste Management, Decommissioning, Nuclear Safety, Nuclear Science and Development, young professionals, and researchers. The objective of the workshop is to devise a guideline document that will serve implementers in understanding key issues in decommissioning and waste management of new reactors from the design perspective, aiding in the licensing process and in future decommissioning and waste management activities.

Objectives

1. To better understand how radioactive waste management and decommissioning should be considered as part of a more comprehensive preparation for these reactors' deployment from the design stage.
2. To understand unique features of SMR waste and the key questions that need to be answered to ensure a path to final disposal.
3. To review current challenges in decommissioning and provide lessons learned to avoid similar challenges in the future.
4. To better integrate educational institutions and engage with interested communities early in the processes.
5. To better understand how the current regulatory framework should be considered in the early development of SMR/advanced reactor technologies.

Workshop Format

A three-day workshop consisting of five sessions, with a fourth day dedicated to a site visit. The workshop will have presentations from relevant experts in the fields of SMRs technologies, Decommissioning and waste management activities, and a dedicated panel session where all the participants will work on understanding, brainstorming, and providing solutions for key issues.

Topics to be addressed by the Workshop Programme

- Topic 1: Understanding of the functioning of major SMR technologies and Fuel Cycles
- Topic 2: Storage and Transportation of spent fuel and Radwaste in SMR/Adv Rx design
- Topic 3: Radioactive Waste and Decommissioning consideration in SMR and Advanced Reactor
- Topic 4: Key Consideration for Communities, Indigenous peoples and Stakeholder involvement
- Last session: Closing remarks

Timeline (Preliminary)

- Welcome session:
  - Welcome remarks by NEA and NRCan
  - Introduction of participants

- Session 1: Understanding of the functioning of major SMR technologies and Fuel Cycles
  - Understanding of SMR technologies such as main differences expected in function of technologies and mode of operation (e.g. fuel type).
    - What are the key questions designers need to consider now when developing a new fuel that has not been evaluated by waste acceptance criteria (e.g. is DGR capable of taking this kind of waste? Should that be considered now?).
- Session 2: Storage and Transportation of spent fuel and Radwaste in SMR/Adv Rx design
  - Current work by NEA Radioactive Waste Management Committee (RWMC) AdHoc Group on storage and Transportation
    - What are the current challenges associated with current fuel storage and transportation that should be evaluated to determine its applicability to new fuel type? (e.g. duel cask, criticality issues, environmental concerns, etc.).
  - What characteristic phenomena during transportation may arise from the use of advanced fuel that will need to be assessed (fresh and used fuel?)
  - Technical and economic feasibility of storage and transport of reprocessed fuel based on reactor type.
- Session 3: Radioactive Waste and Decommissioning consideration in SMR/Advanced Reactor
  - Spent Fuel from advanced reactors regulatory requirements
  - Fuel damage and fuel changes during operation and potential impacts on decommissioning and waste management
  - Regulatory perspective on Decommissioning and Radwaste management for small modular reactors and licensing
  - Best practices on managing and disposal of existing waste streams and how can some of these concepts be applied in future endeavours, such as Advanced reactors
  - How to design SMRs and Scalable New NPPs to optimize decommissioning activities without losing on efficiency
- Session 4: Key Considerations for Communities, Indigenous peoples and Stakeholder involvement
  - Best practices on stakeholder engagement and dialogue.
  - Discussion on intergenerational aspect of the SMR (i.e. waste management and decommissioning management).
  - Communication of societal benefit of SMR deployment (i.e. desalinization, hydrogen production, connection to renewable energy production systems, etc…).

Workshop Language

- Working language is English.

Registration

- Expected 60-100 Participants
  - Invited experts and high-level invited guests (e.g. President of CNSC, AECL, CEO)
- For participation in the workshop, the online registration has been created. Please use this link to access the registration Conference DB (oecd-nea.org)

Proposed Key Dates

- 7-10 November 2022; refer to the SMR Workshop website for more specifics here

Expected outcome

As a result of the workshop, organizers expect to obtain a short paper that will list key issues in decommissioning and waste management for SMRs, an understanding of lessons learned and how issues of the past could be prevented and guidelines on key aspects for consideration when designing, deploying and implementing new nuclear technologies.

Workshop on the Management of Spent fuel, Radioactive Waste and Decommissioning in SMRs/Advanced Reactor Technologies

7-10 November 2022
Venue: Lord Elgin Hotel, Ottawa, Canada

Draft Programme

Opening Session

- **James McKinney,** Head of Integrated Waste Management, NDA
  as Conference Chair

Welcome Address and Introductory Remarks

- **William D. Magwood, IV**, NEA Director General
  Impact of Geological Repositories Development on Supporting for Nuclear Energy Policy
- **TBD, High-level official Canada**

Keynote Speech

- **Patrick Landais,** High Commissioner for Atomic Energy, France, CEA
- **Olivier Gupta,** Director General, French Nuclear Safety Authority (ASN) - TBC
- **Rumina Velshi,** President and Chief Executive Officer, Canadian Nuclear Safety Commission (CNSC) - TBC
- **Mark Foy,** Chief Executive & Chief Nuclear Inspector Office for Nuclear Regulation (ONR) - TBC
- **Christopher T. Hanson,** Chairman, Nuclear Regulatory Commission (NRC) - TBC
- **Petteri Tiippana,** Director General Radiation and Nuclear Safety Authority (STUK) - TBC

Session 1: Understanding of the functioning of major SMR/Advanced Reactor Technologies and Fuel Cycles

1.1 Overview of mature SMR/advanced reactor technologies and associated fuel type
This session will touch on understanding the functioning of major SMRs/Advanced Reactor technologies, with the main differences expected in the function of the technologies and mode of operation (e.g. fuel type).

1.2 Key Attributes of SMR/advanced fuel type and design consideration and implications for decommissioning and waste management
This session will explore the key questions designers need to consider now when developing a new fuel that has not been evaluated by waste acceptance criteria. For example: is DGR capable of taking this kind of waste? Should that be considered now? What challenges/issues may arise that are different compared to traditional reactor oxide fuels during transportation, management, and finally disposal of spent fuel or by-products of spent fuel treatment (recycling/conditioning)?

1.3 Perspectives from students/young generation
During this session a student/young professional is invited to discuss their views pertaining to the understanding of the functioning of major SMR/Adv. Reactor technologies and Fuel Cycles.

1.4 Panel discussion on key takeaways and recommendations
This panel invites the previous presenters to develop one slide with key takeaways/recommendations and proceed with a panel discussion, during which the floor will be opened for questions from the audience.

Session 2: Storage and Transportation of Spent Fuel and Radwaste in SMR/Advanced Reactor Design

2.1 Overview of work activities on fuel storage and transportation
This session will highlight the current challenges associated with fuel storage and transportation that should be evaluated to determine its applicability to new fuel types considering historical experience (e.g. duel cask, criticality issues, environmental concerns, etc.).

2.2 Technical and economic feasibility of radioactive waste and storage and transport of reprocessed fuel based on reactor type (Closed-loop fuel cycle)
This session will address the feasibility of reprocessing fuel from new designs noting the different types of reprocessing technics, including associated waste generation and economic feasibility.

2.3 Perspectives from students/young generation
During this session a student/young professional is invited to discuss their views pertaining to an element of the Storage and Transportation of spent fuel and Radwaste in SMR/Advanced Reactor design.

2.4 Panel discussion on key takeaways and recommendations
This panel invites the previous presenters to develop one slide with key takeaways/recommendations and proceed with a panel discussion, during which the floor will be opened for questions from the audience.

Session 3: Radioactive Waste and Decommissioning in SMR/Advanced Reactor

3.1 Licensing and regulatory requirements of spent fuel and waste management from SMR/advanced reactor
This session will explore how regulators have prepared and identified potential regulatory process changes, resulting from future deployment of SMRs and advanced reactors that may need to be considered now to properly manage waste and decommissioning activities in the future. The possibility of regulatory harmonization will also be examined.

3.2 Operational and design optimization consideration related to decommissioning and radioactive waste management for SMR/advanced reactors
This section will evaluate if implementers are ready to integrate waste generated from SMRs/Advanced Reactor into their disposal strategy. Furthermore, it asks whether feedback from current practices in waste management and decommissioning can help in optimally designing the future concept of SMR/Advanced Reactor to minimize the flow of waste and facilitate efficient decommissioning of future reactors.

3.3 Operational feedback on managing and disposal of existing waste streams and how can some of these concepts be applied in future endeavours, such as SMR/advanced reactors
This section will highlight lessons learned from current and past Radioactive Waste disposal projects, as well as dismantling and decommissioning activities. The aim is to share this information with designers and potential utilities of SMR/Advanced reactors to consider during the current design phase to minimize the overall radioactive waste volume expected from SMRs and Advanced Reactor technologies, including management of damaged fuel during operation.

3.4 Perspectives from students/young generation
During this session a student/young professional is invited to discuss their views pertaining to Radioactive Waste and Decommissioning in SMR/Advanced Reactor.

3.5 Panel discussion on key takeaways and recommendations
This panel invites the previous presenters to develop one slide with key takeaways/recommendations and proceed with a panel discussion, during which the floor will be opened for questions from the audience.

Session 4: Key Considerations for Communities, Indigenous peoples and Stakeholder involvement

4.1 Indigenous community perspectives on the potential deployment of SMR and advanced reactors technologies

4.2 Good practices on stakeholder engagement and dialogue including intergenerational aspect of SMR/advanced reactor.

4.3 Perspectives from students/young generation
During this session a student/young professional is invited to discuss their views on considerations involving Indigenous peoples and stakeholder involvement.

4.4 Panel discussion on key takeaways and recommendations
This panel invites the previous presenters to develop one slide with key takeaways/recommendations and proceed with a panel discussion, during which the floor will be opened for questions from the audience.

Session 5: Summary and Closing Session/ Closing addresses

On 10 November 2022 (last day)
Site visit to Chalk River (agenda to follow)

CANDU Advantages in Recycling the Recovered Uranium from Spent LWR Fuels

Briefing on Processing and Reprocessing Facilities
Directorate of Assessment and Analysis
November 25, 2014
eDoc: 4581797

nuclearsafety.gc.ca

Objective

- The President asked :
  - on 2014/11/10: I would like to have a technical briefing session on why is CANDU such a good reactor for recycling fuel and all other reactor are not, after learning the news on “Candu Energy sees promising future to develop reactors that burn recycled uranium”.

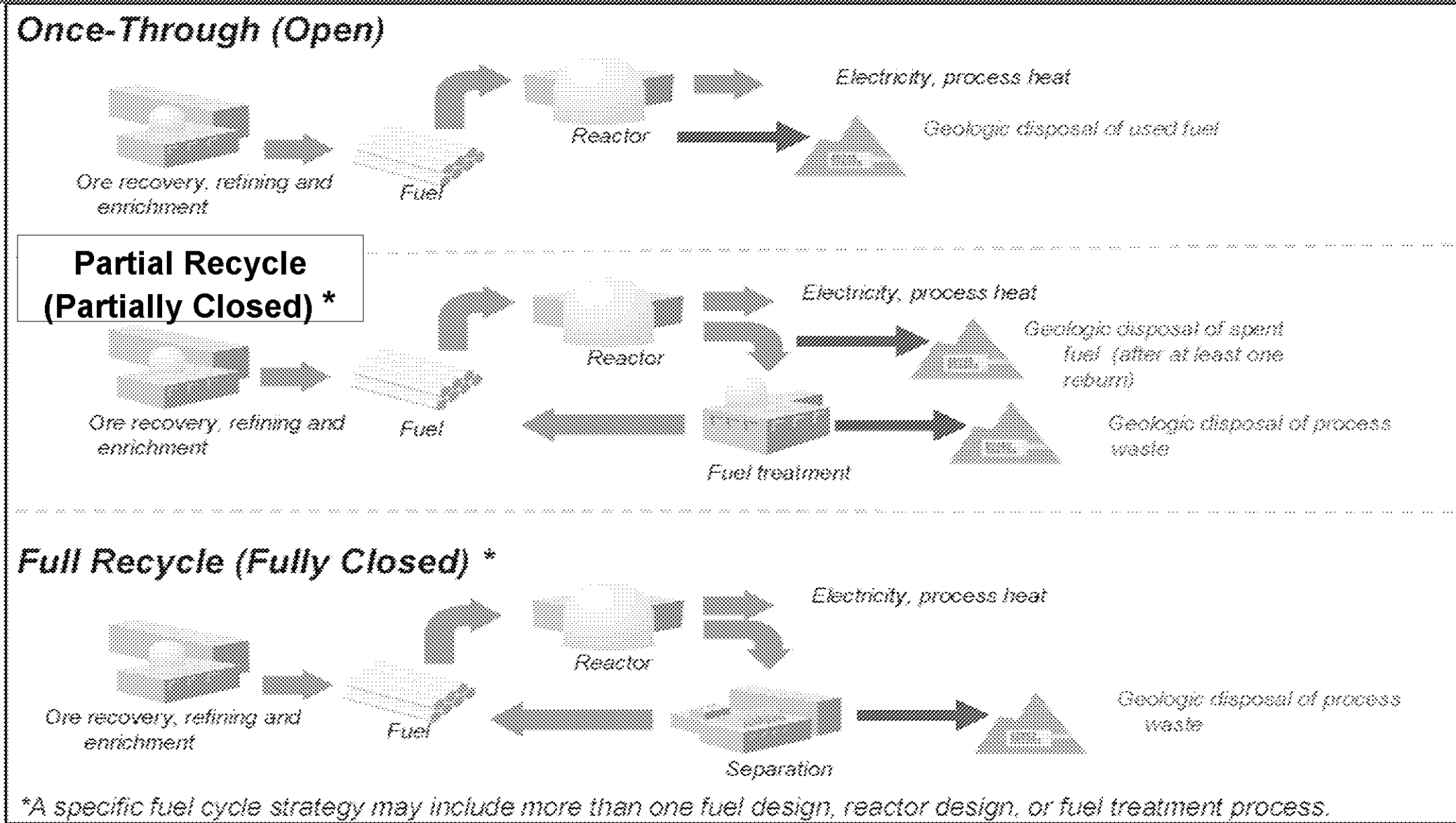
Acronym

- SNF: Spent Nuclear Fuel
- HLW: High-Level Waste
- FP: Fission Products
- MA: Minor Actinides (Np, Am, Cm, etc.)
- TRU: TRansUranic (Pu + MA)
- NU: Natural Uranium
- LEU: Lightly Enriched Uranium
- MOX: (U/Pu) Mixed OXides
- RU: Recovered Uranium (or Recycled Uranium)
- DU: Depleted Uranium
- NUE: Natural Uranium Equivalent
- DRU: Direct use of Recovered (Recycled) Uranium
- AFCR: Advanced Fuel CANDU Reactor

Outline

- Nuclear fuel cycle options and corresponding SNF management strategies
- CANDU fuel cycle advantages and various fuel options
- NUE and AFCR Project - CANDU's role on China's partially closed fuel cycle option
- Why Canada currently uses open fuel cycle without reprocessing?
- Technical Annex
  - Overview of Nuclear Fuel Cycle
  - Reprocessing of SNF for partial recycle
  - Transmutation of SNF for full recycle
  - Overview of NUE and AFCR

Nuclear Fuel Cycle Options



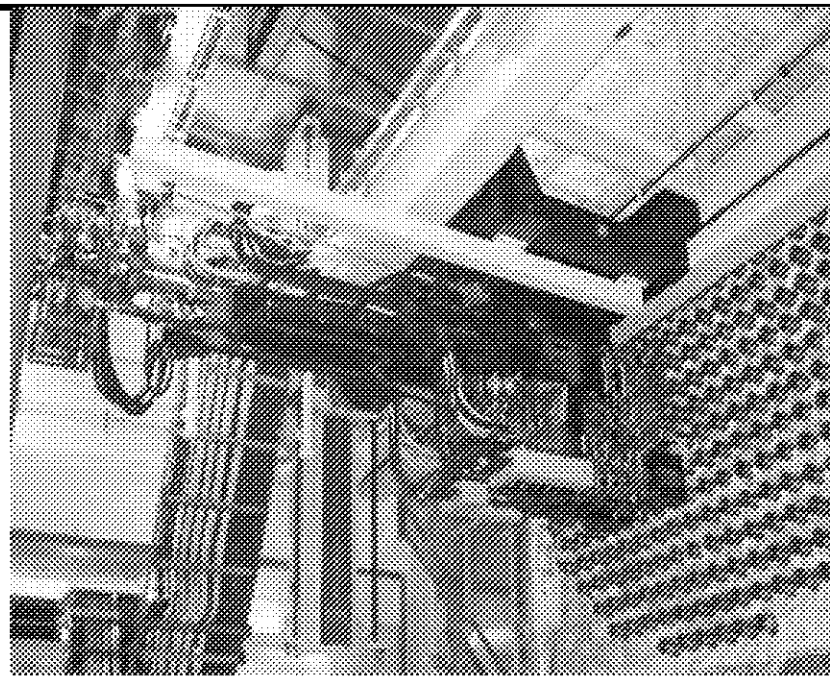
*A specific fuel cycle strategy may include more than one fuel design, reactor design, or fuel treatment process.

Corresponding SNF Management Strategies

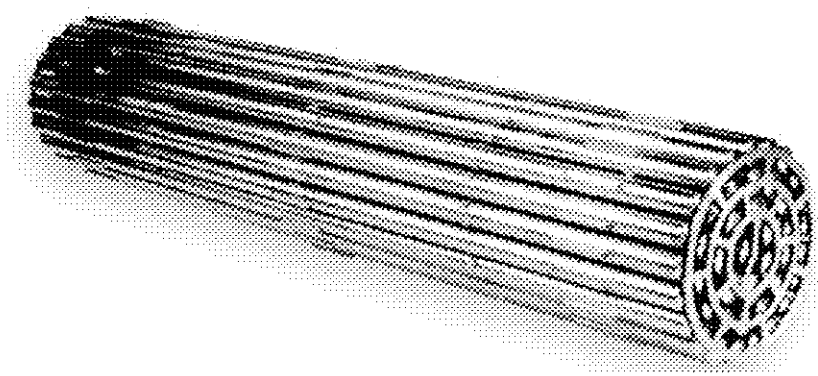
- Open (once-through) fuel cycle - w/o Reprocessing of SNF
  - Interim storage of SNF (Wet & Dry storages) to allow for heat reduction, then
  - Direct disposal of SNF as a waste: permanent deep geological repository
  - SNF management simply refers to radioactive waste management
- Partially closed (partial recycle) fuel cycle - Reprocessing of SNF
  - SNF is reprocessed, some fraction of the actinide materials (U & Pu) are recovered for recycling
  - The reprocessing waste (FPs, MAs, etc.) is typically vitrified
  - **Example:** LWR, CANDU or FR to recycle recovered U/Pu
- Fully closed (full recycle) fuel cycle - Transmutation of SNF
  - SNF is reprocessed and separated into re-useable and waste materials
  - All actinides are recycled multiple times in transmutation-dedicated reactors, and residual waste will go to a geological repository
  - **Example:** LWR or CANDU to recycle recovered U/Pu, FR to transmute TRU
- The need for a repository is never eliminated with Reprocessing or Transmutation.

CANDU Inherent Fuel Cycle Advantages

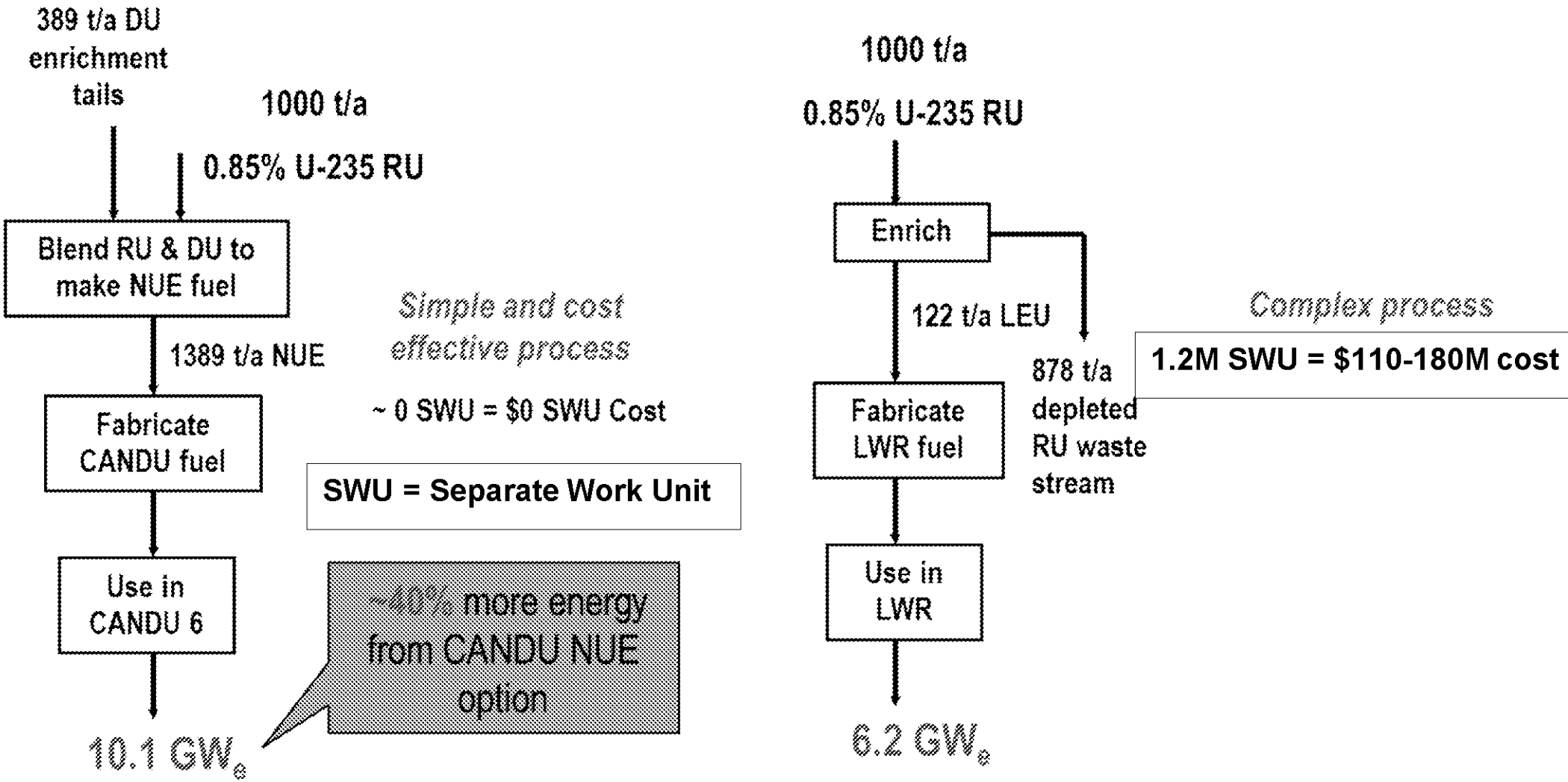
- Heavy-water moderator
  - The lowest uranium consumption and high neutron economy
  - Enable use of low-fissile materials as well as other fuel options (see next slide)
- Fuel channel design with on-power fuelling
  - Ability to position different fuels in different regions
  - Minimal excess reactivity via refuelling scheme
  - Minimal parasitic materials
  - Smoother transition from one type of fuel to another
  - Minimal changes in reactor design
- Simple and small fuel bundle design
  - Ease of fabrication, transportation, and fuelling
  - Flux detectors ensure local power distribution



On-line fuelling



What Can Utilities Do With 1,000 t/a of (RU)?



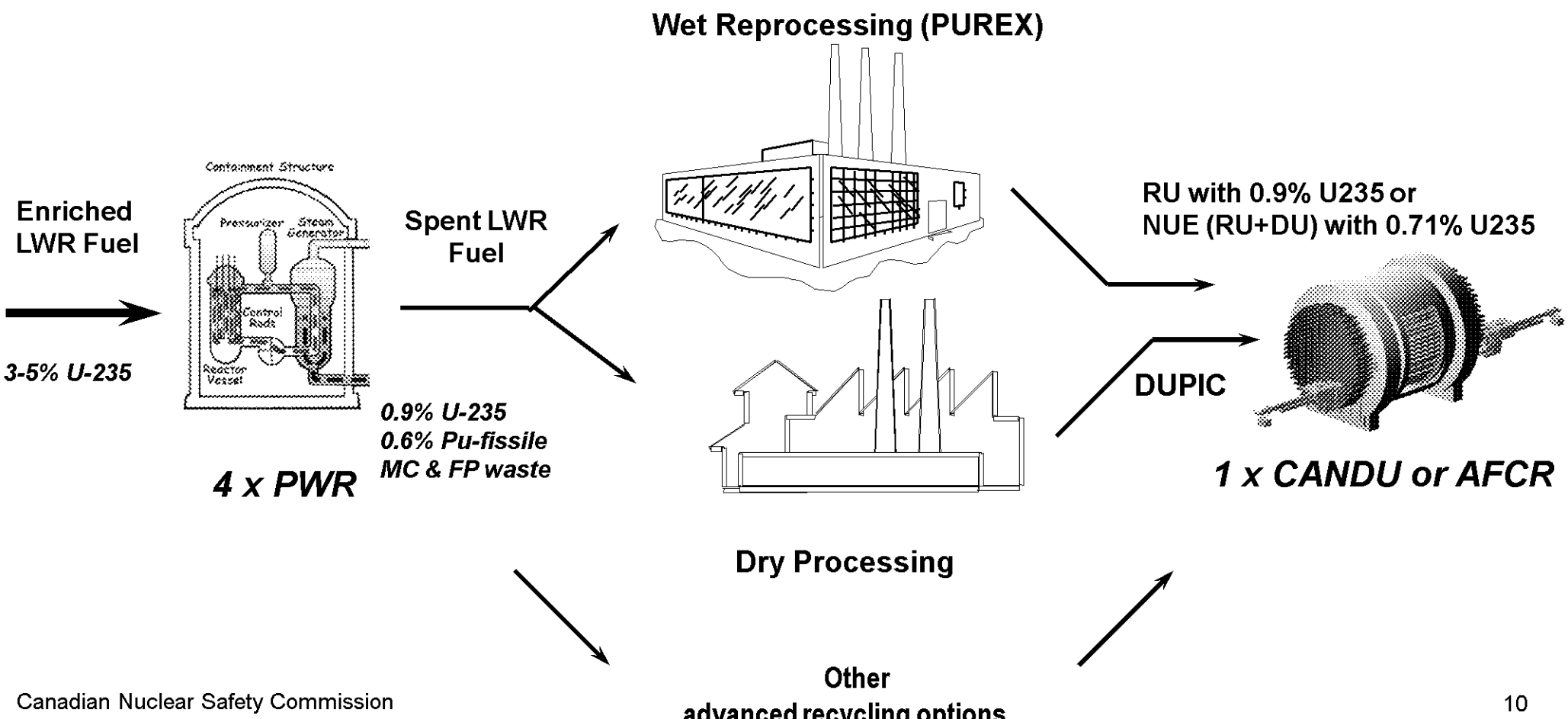
CANDU option is cheaper & more energy efficient

CANDU Fuel Options

- CANDU design is very flexible and allows use of:
  - Uranium fuel cycle
    - Use of NU: 0.7% U235 and 99.3% U238 - Current CANDUs
    - Use of LEU: 2-5% U235 – ACR design
    - Use of reprocessed fuel (from used LWR fuel) without enrichment
      - NUE : mixture of RU and DU – NUE Project for China
      - RU: U235 (~0.9%), U238, and other impurities U232, U234, U236 – AFCR with DRU for China
      - MOX : Pu + uranium – CANMOX Project for UK
      - DUPIC: no chemical separation of used fuel
      - Other (such as actinide burning)
  - Thorium fuel cycle
    - Use of LEU/Th: Th232 +neutron ⟹ U233 (fissile) – AFCR with LEU/Th for China
    - Use of Pu/Th

CANDU and PWR Synergism

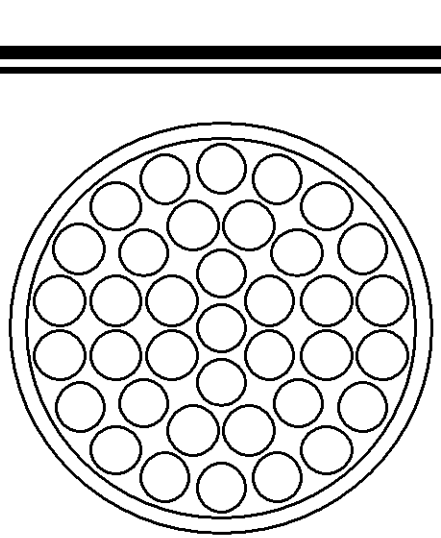
- CANDU design is very flexible and offers many options for exploiting the CANDU and PLWR synergism.
- These can be introduced into CANDU with few or no hardware changes, when the option becomes attractive.

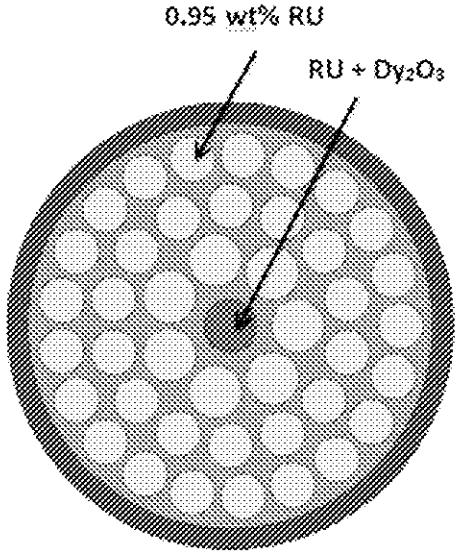


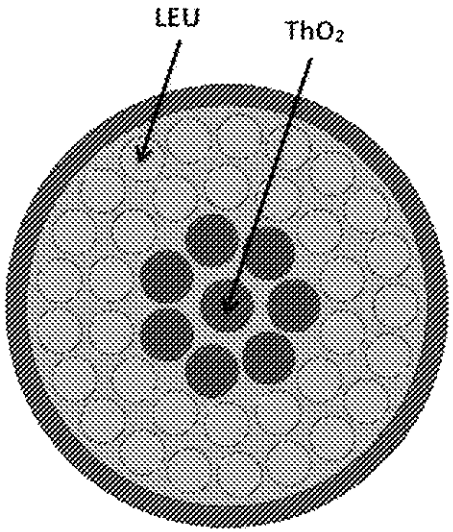
AFCR

- Gen III design based on proven C6 and EC6 design with fuel and fuel-related changes plus further safety enhancements
  1. AFCR forms synergy with China's PWR, FR, and reprocessing plant program
     - Designed with minor changes to use DRU in the beginning and to use LEU/Th later on as per customer timelines (see next slide)
     - Uses the 43-element CANFLEX fuel bundle
     - Increased fuel burnup: 10 GWd/tHE (DRU); 20 GWd/tHE (LEU/Th)
     - Fuel 1 AFCR with RU from 4 typical PWRs
     - Reserve plutonium for use in FR
  2. AFCR provides a development platform to utilize thorium-based fuels
     - Utilize China's thorium for environmental protection and new resource development
     - Save natural uranium resources
  3. AFCR continues to produce Cobalt and other isotopes as by-products

Roadmap of NUE and AFCR Project







RU → Thorium

NUE Fuel → DRU Fuel → LEU/Th Fuel

2002/03 NU Fuel

2010/11 NUE Fuel Demo

2014 NUE Fuel Full Core

2020/21 DRU Fuel Full Core

LEU/Th Fuel Demo

2025/26 LEU/Th Fuel Full Core

C6 C6 AFCR AFCR

Existing Qinshan CANDUs

New Build AFCRs

Technical Considerations of NUE and AFCR

- NUE
  - Technical considerations for NU CANDU
  - Fuel/Core Performance due to the fuel heterogeneity and Impurities
  - Radiation Protection due to the daughter products of ^{232}U
    - Fuel Manufacturing
    - Station Fuel Handling & Impact on Reactor Systems
  - Safety Evaluation (e.g., Loss of Reactivity Control)
- AFCR with DRU
  - Technical considerations for NUE
  - Fuel performance with the Dyprosium poison in the center element
  - CANFLEX fuel carrier
  - Enrichment
  - Fuel performance with higher burnup
- AFCR with LEU/Th
  - Technical considerations for NUE
  - see technical annex

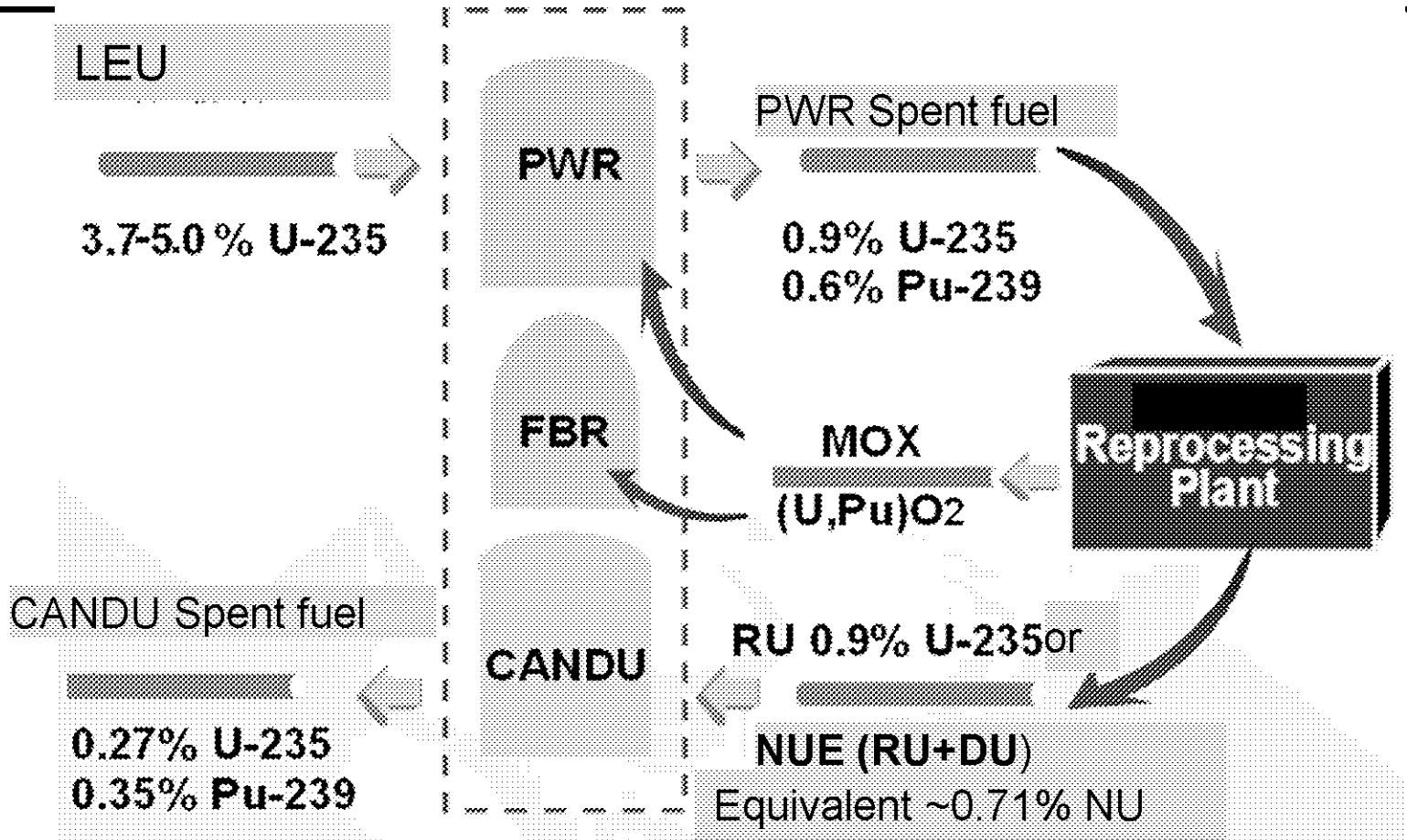
Thorium Fuel Cycles - Challenges

- No fissile isotope in natural thorium, need enriched uranium or MOX fuel to serve as a driver fuel to “breeder” Th232 to U233.
- Cost of reprocessing and re-fabrication is higher
- Limited database and know-how experience.
- Lack of qualified physics, fuel, and thermal-hydraulic codes.
- Fuel and fuel fabrication
  - Lack of experience in fabricating fuel bundle in industrial scale
  - Fabrication becomes difficult due to the hard gamma ray
- Safety aspect
  - less shutdown margin, higher decay heat, and
  - faster reactivity transient due to smaller delayed neutron fraction
- Back end issues and challenges
  - Criticality safety, transportation safety, and
  - Radiation protection

NUE and AFCR Accomplishments to Date

- The NUE/AFCR concept design started about 2005
- NUE
  - 2010: The NUE Full Core Implementation project approved.
  - 2011 March: 24 NUE bundles discharged from the Qinshan unit after 1-year irradiation demonstration test.
  - 2012/10 – 2013/10: RU secured, purchased and delivered.
  - 2013/10: started to modify the fuel production line.
- AFCR
  - 2009 Nov. 5-6: Expert Panel Meeting on engineering feasibility & practicality of Thorium-fuelled CANDU reactor in China.
  - 2014 August: 26-month CNNC & CE joint Project on AFCR completed.
  - 2014 Nov. 5: The AFCR Expert Panel review meeting in China.
  - 2014 Nov. 8: Witnessed by Canadian and Chinese Prime Ministers, CNNC and CE signed a framework agreement for establishing a joint venture for the development and deployment of AFCR.

CANDU's Role on China's Partially Closed Fuel Cycle Option

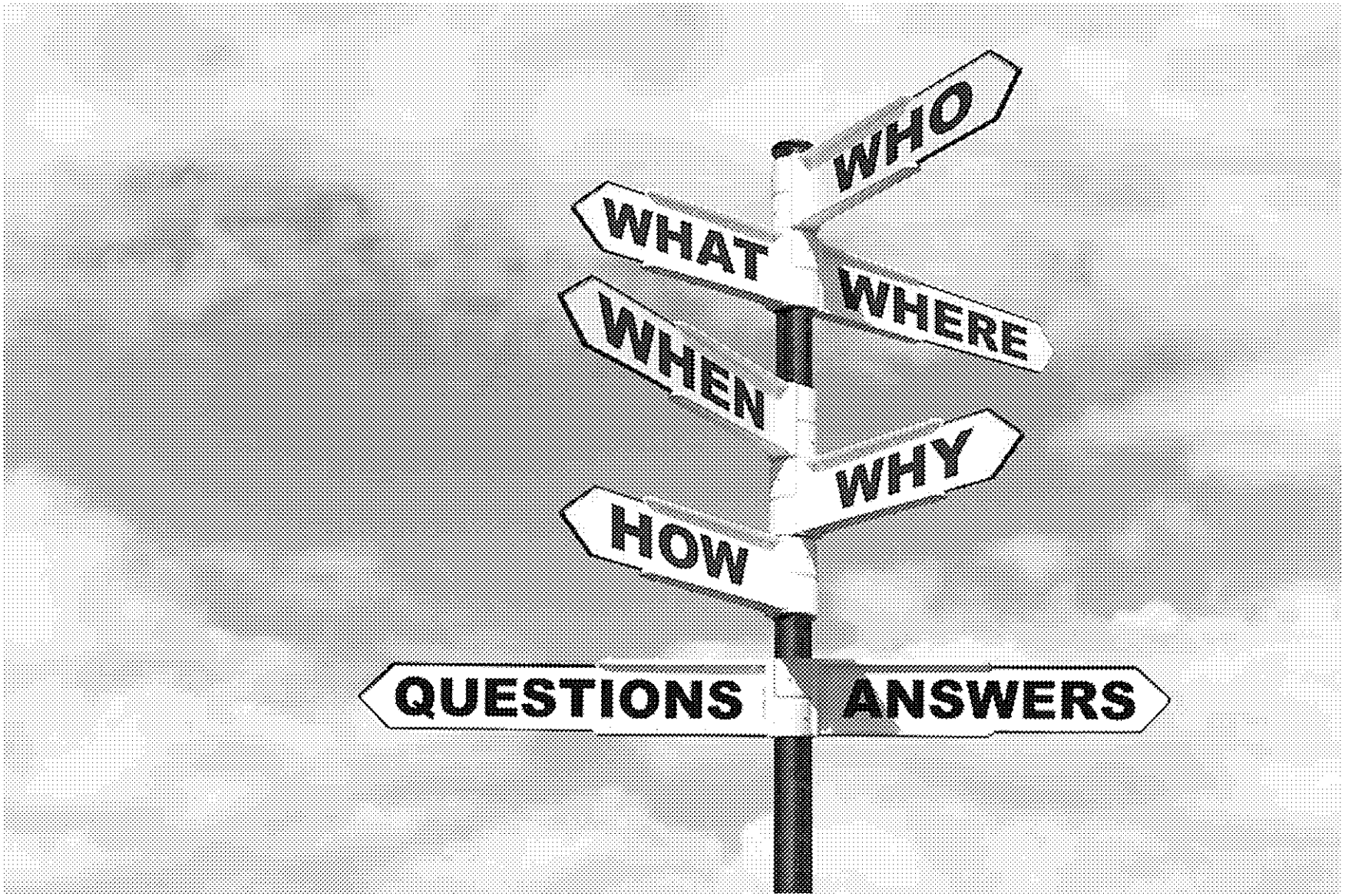


- CANDU/AFCR is unique in bringing the RU from PWR back into the fuel cycle in an economic and efficient manner without enrichment.
- CANDU/AFCR offers a development platform to utilize thorium fuels and to save natural uranium resources.

Why Canada Currently Uses Open Fuel Cycle without Reprocessing?

- Uranium is plentiful in Canada
- Geological repository space is not limited in Canada
- Canadian Policy regarding non-proliferation assumes no enrichment or reprocessing in Canada
- Technology and Facility are lacking
  - No commercial SNF reprocessing facility, enrichment facility, or MOX fuel fabrication facility; No other type of commercial reactors
- High cost of reprocessing
  - Reprocessing is expensive.
  - Little fissile materials left over in the spent CANDU fuel:
    - 0.2-0.3% U-235 and 0.3-0.4% Pu-239 in spent CANDU fuel
    - 0.9% U-235 and 0.6% Pu-239 in spent LWR fuel
  - No economic reason to recover U-235 from spent CANDU fuel
    - million tons of enrichment tailings with 0.2-0.3% U-235
  - In the future;some countries may consider reprocessing to allow: Recovery of fissile Pu239, deduction of HLW, conversion of fertile U238 to fissile Pu239 with FRs

Thank you



Space Nuclear Power Systems

Potential Canadian Contributions to Enable Exploration of Deep Space

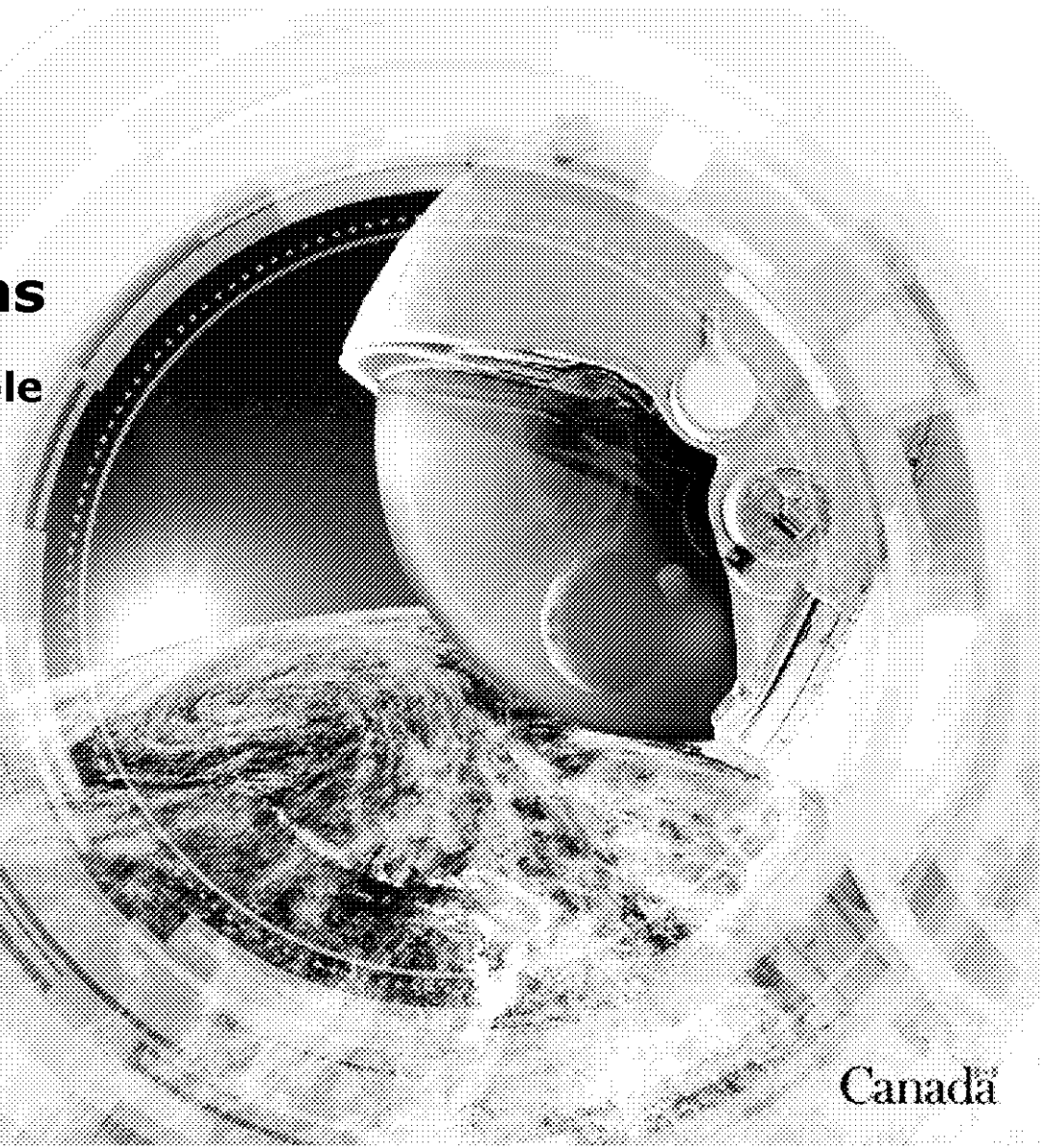
2023-01-10

Presentation to CNSC DIET WG

Rinat Rashapov, William Mackey

Space Exploration Planning, Coordination and Advanced Concepts Division

Space Exploration Directorate



Purpose and Outline

Purpose:

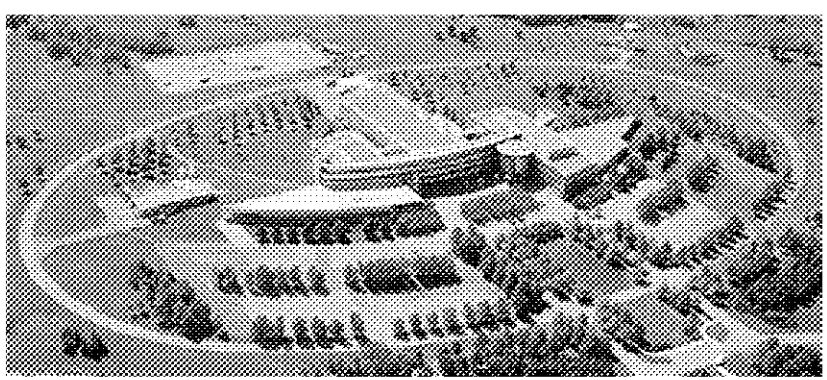
To provide an overview of Canada's activities related to Space Nuclear Power Systems

Outline:

1. CSA Overview
2. What has happened so far…
3. What's next…
4. Nuclear Technologies in Space
5. CSA Initiatives
6. Canada's Role
7. Benefits to Canada
8. Challenges

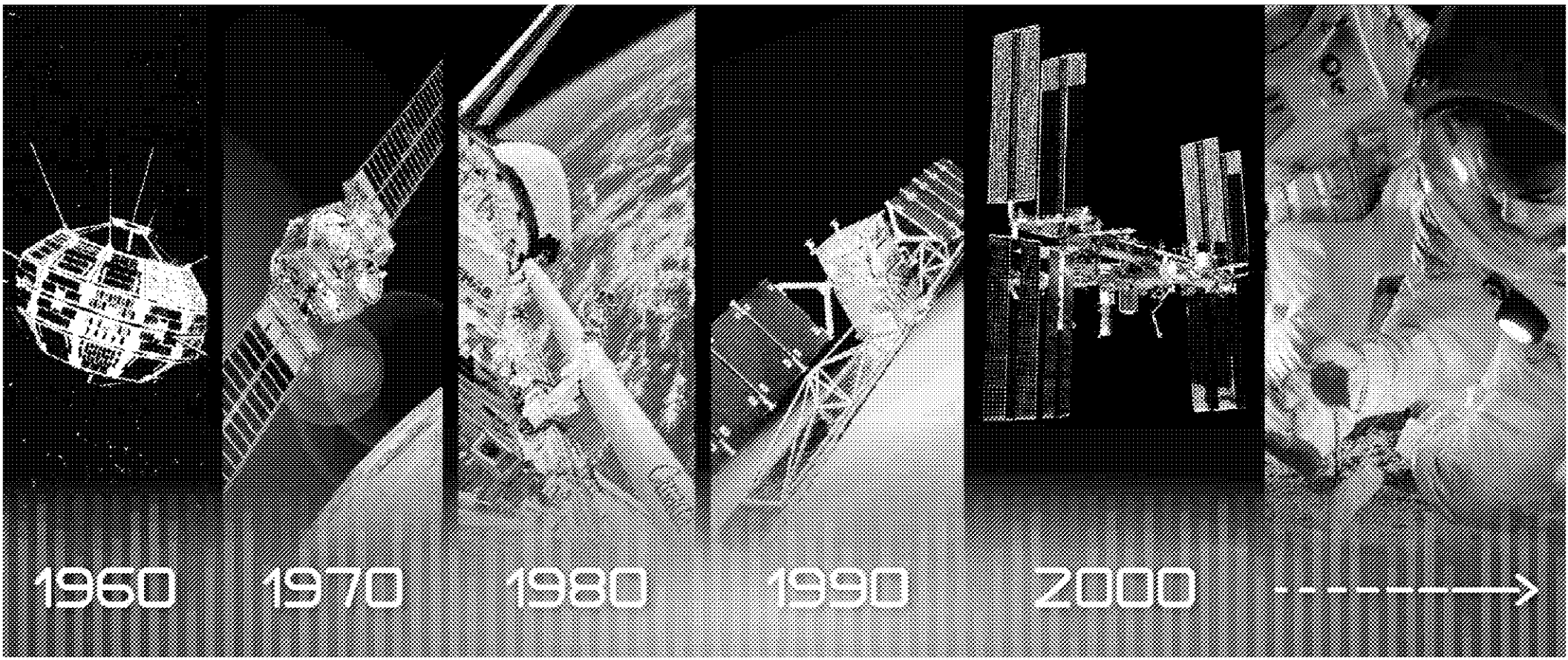
CSA Overview

- **Enacted in 1989 under the *Canadian Space Agency Act***
- **Mission:** Leading the development and application of space knowledge for the benefit of Canadians and humanity.
- **Mandate:** To promote the peaceful use and development of space, to advance the knowledge of space through science and to ensure that space science and technology provide social and economic benefits for Canadians.
- **Three main areas:**
  - Space science and technology
  - Space utilization
  - Space exploration
- **670 employees across six offices**
- **Budget (2021-22):** $403.6 million
- **Video:** Canada, a nation of space innovations

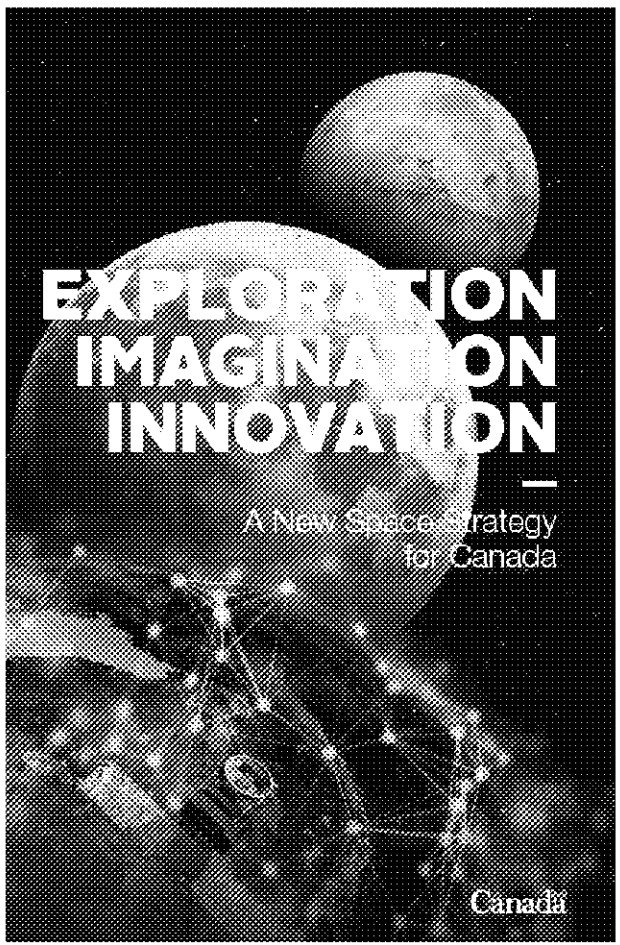


What has happened so far…

Canada's Space History



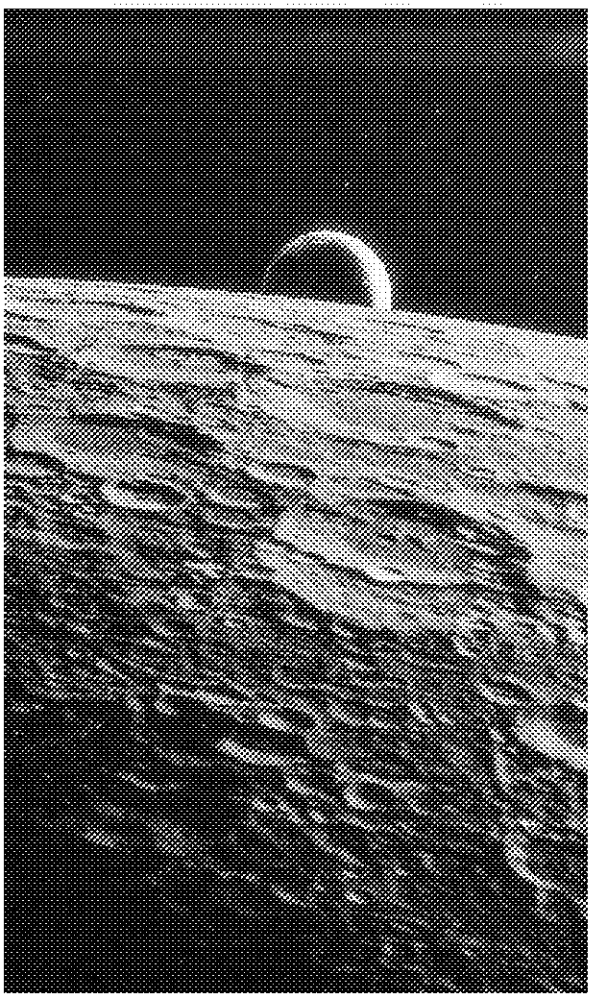
Canada's Space Strategy



Objectives:

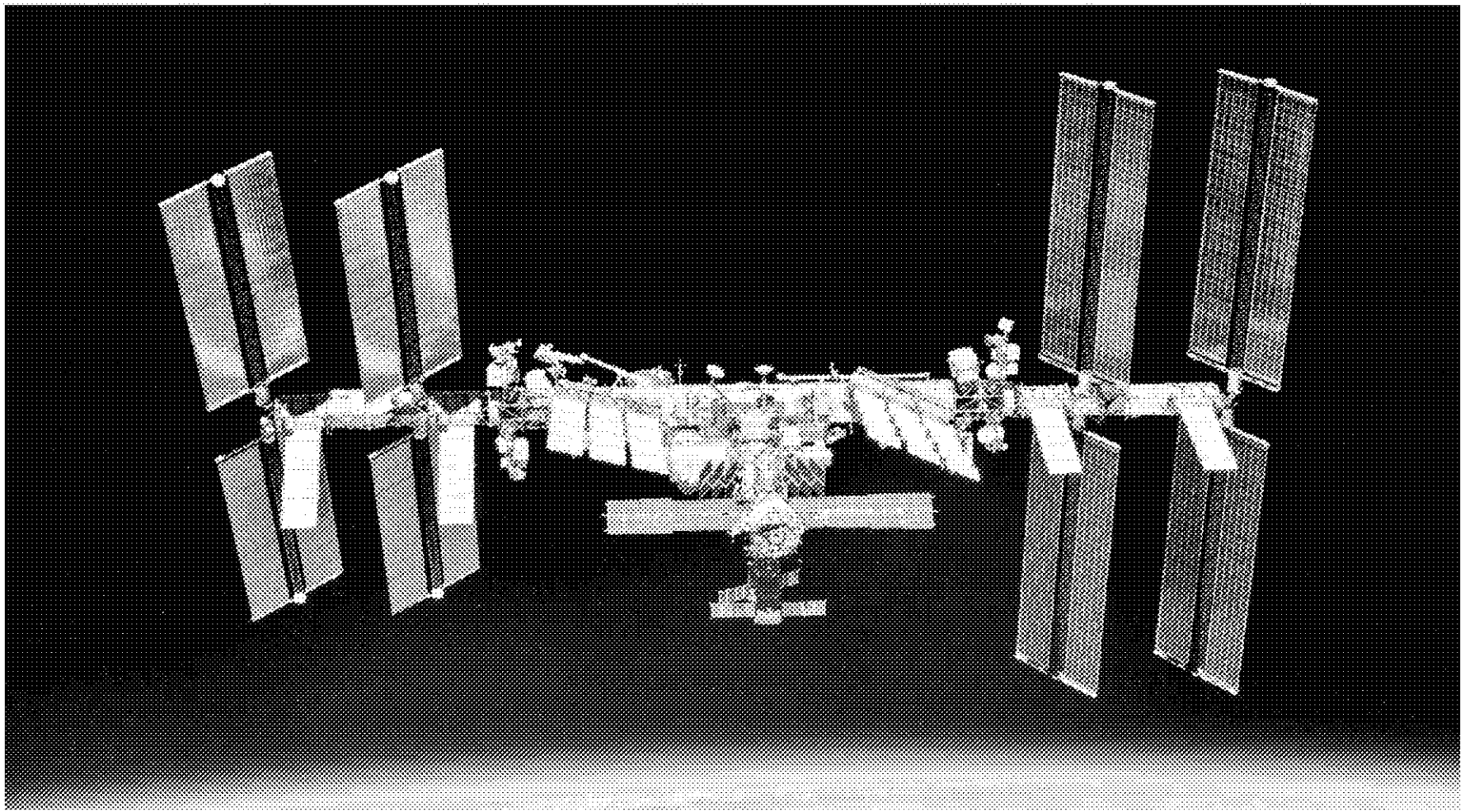
1. Ensure Canada remains a leading spacefaring nation by joining the Lunar Gateway
2. Harness space to solve everyday challenges for Canadians
3. Position Canada's commercial space
4. Support science excellence & innovation

Canada's Role in Moon Exploration

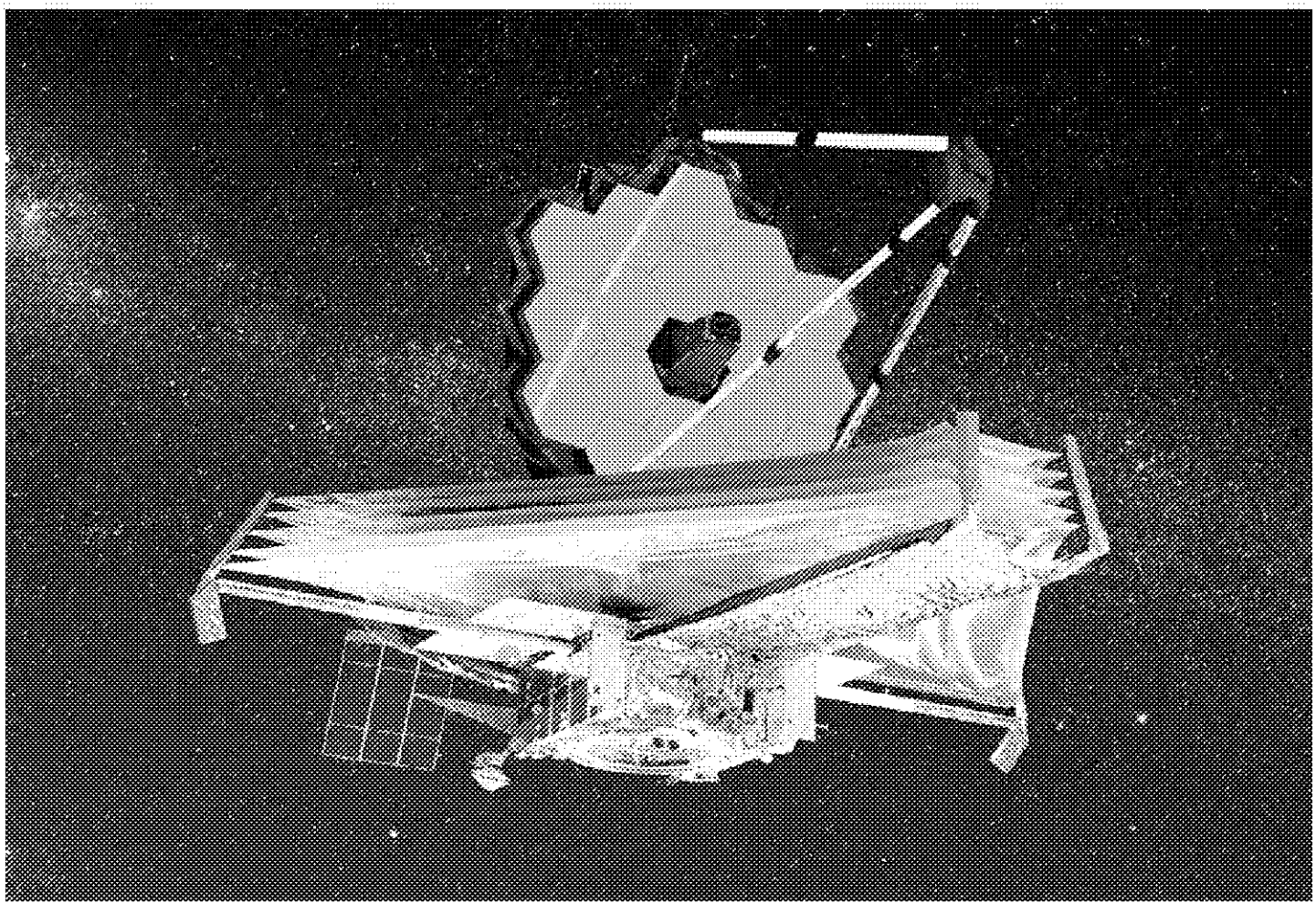


- The Moon is a crucial stepping stone in humanity's quest to travel onwards to Mars
- Canada's contributions:
  1. Smart robotic system known as Canadarm3 for the Lunar Gateway
  2. LEAP: A program for innovative Canadian science and technology, including a Canadian rover designed for the Moon
- Studies on major contributions to human lunar surface exploration

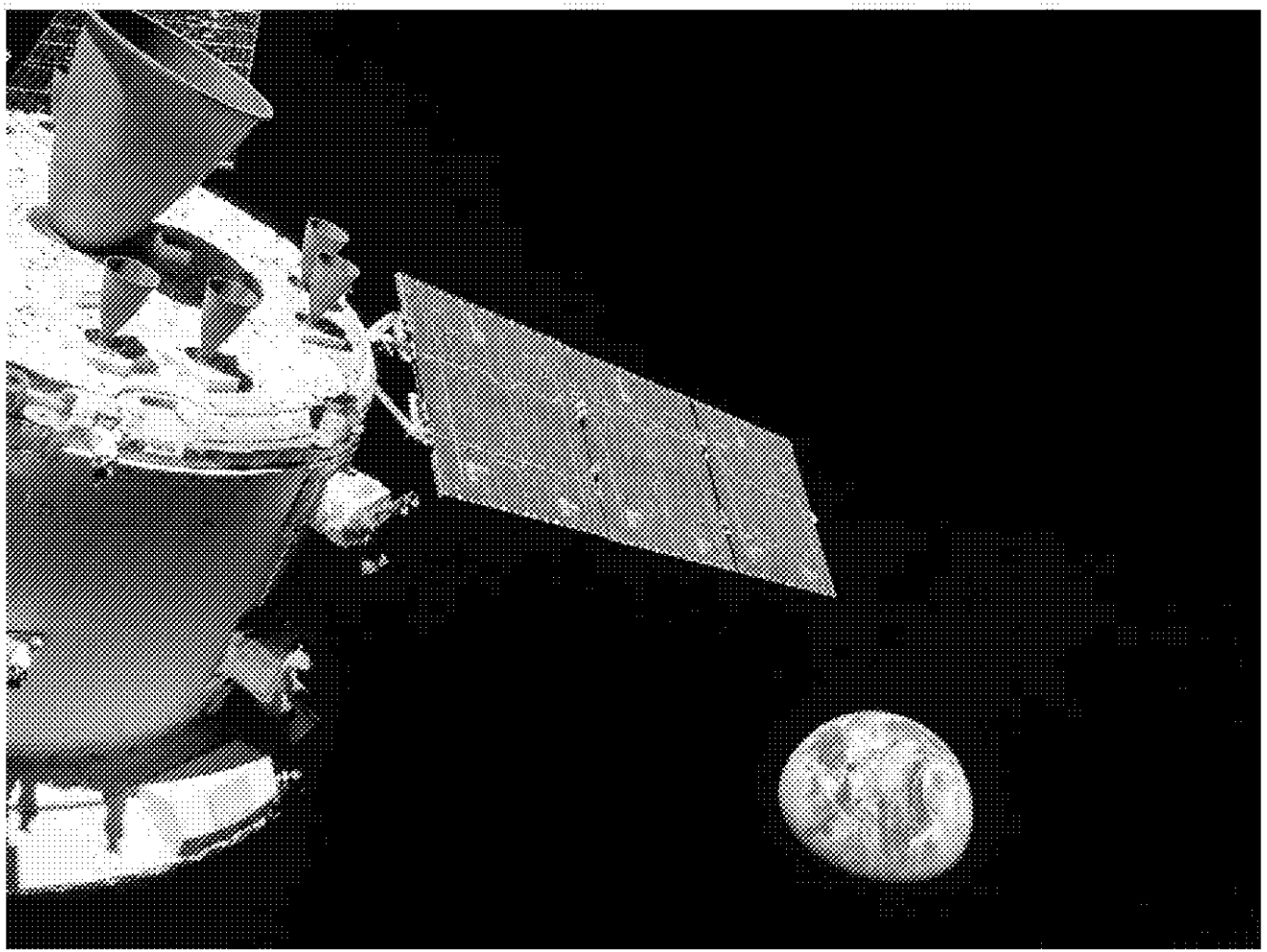
Ongoing: ISS, Canadarm2, Dextre



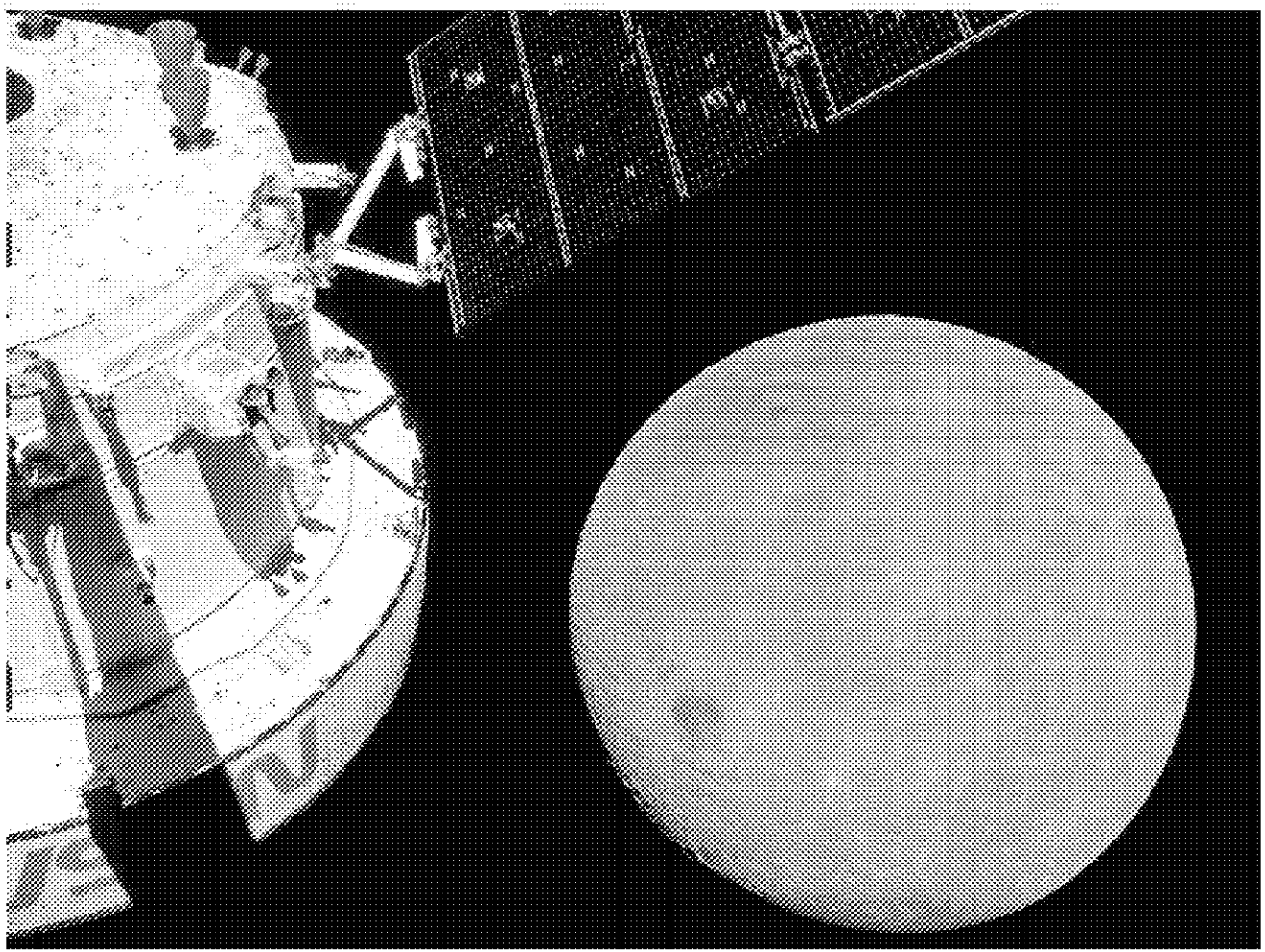
Ongoing: JWST



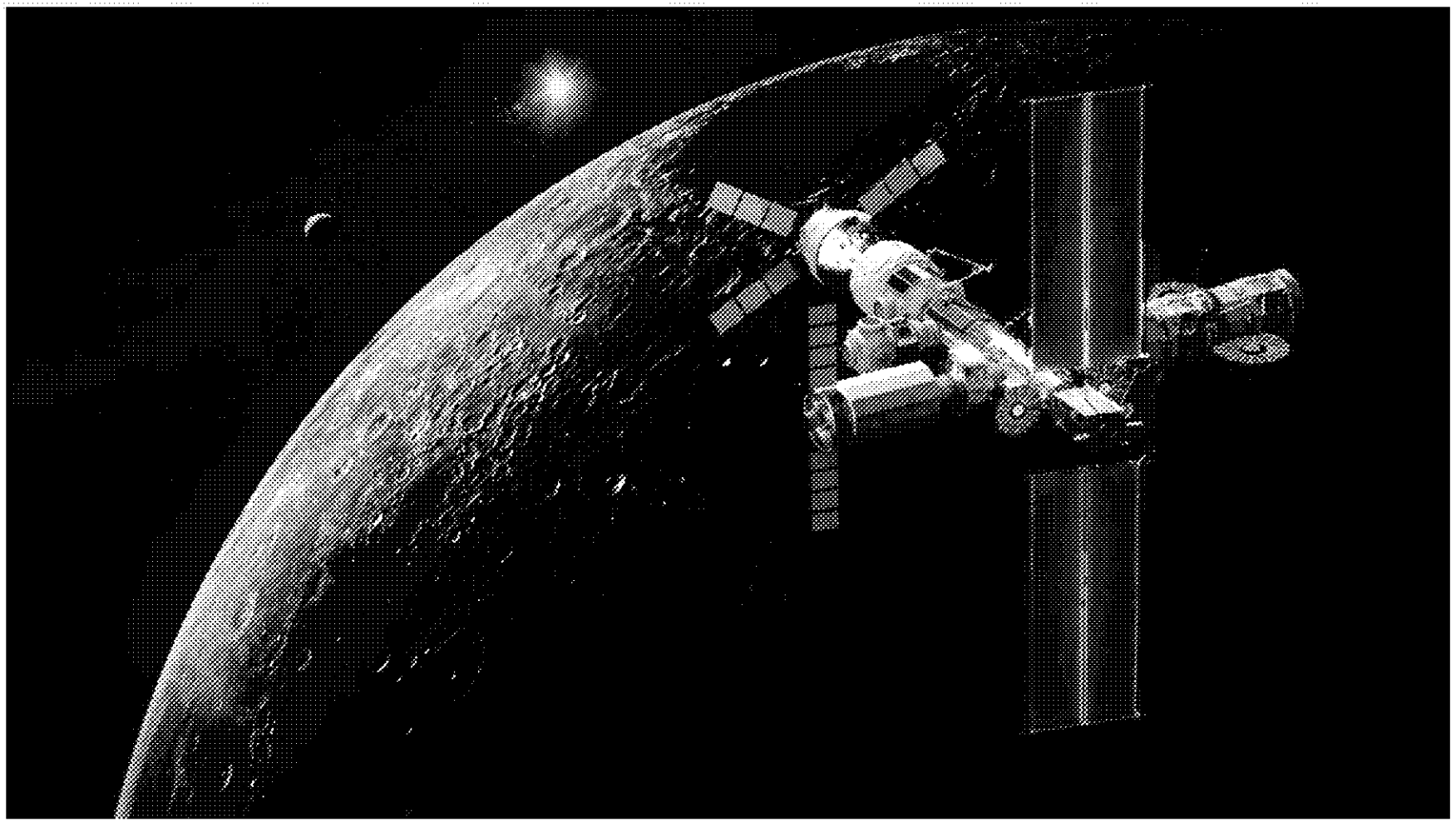
Ongoing: Artemis I



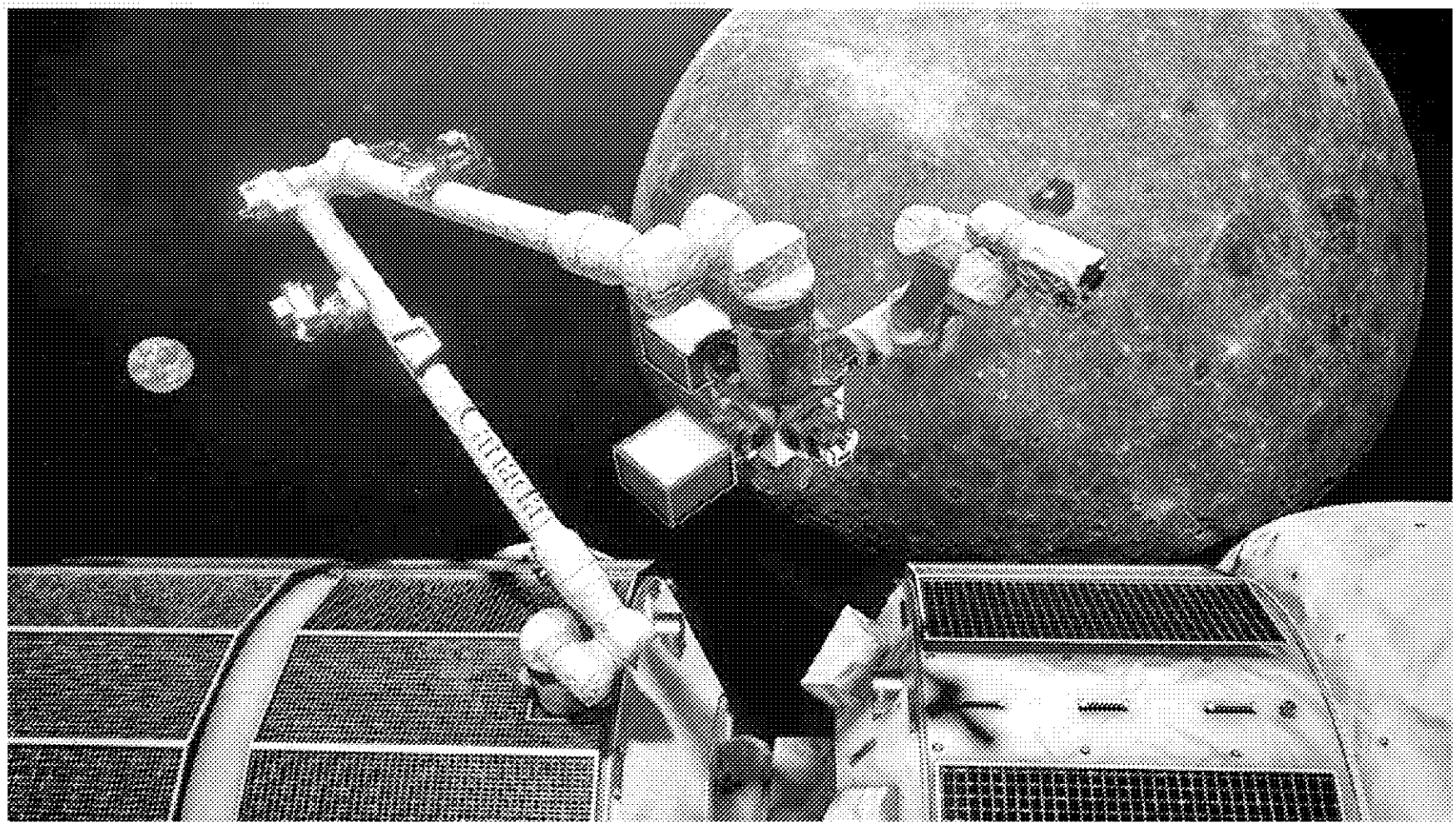
Upcoming: Artemis II and III



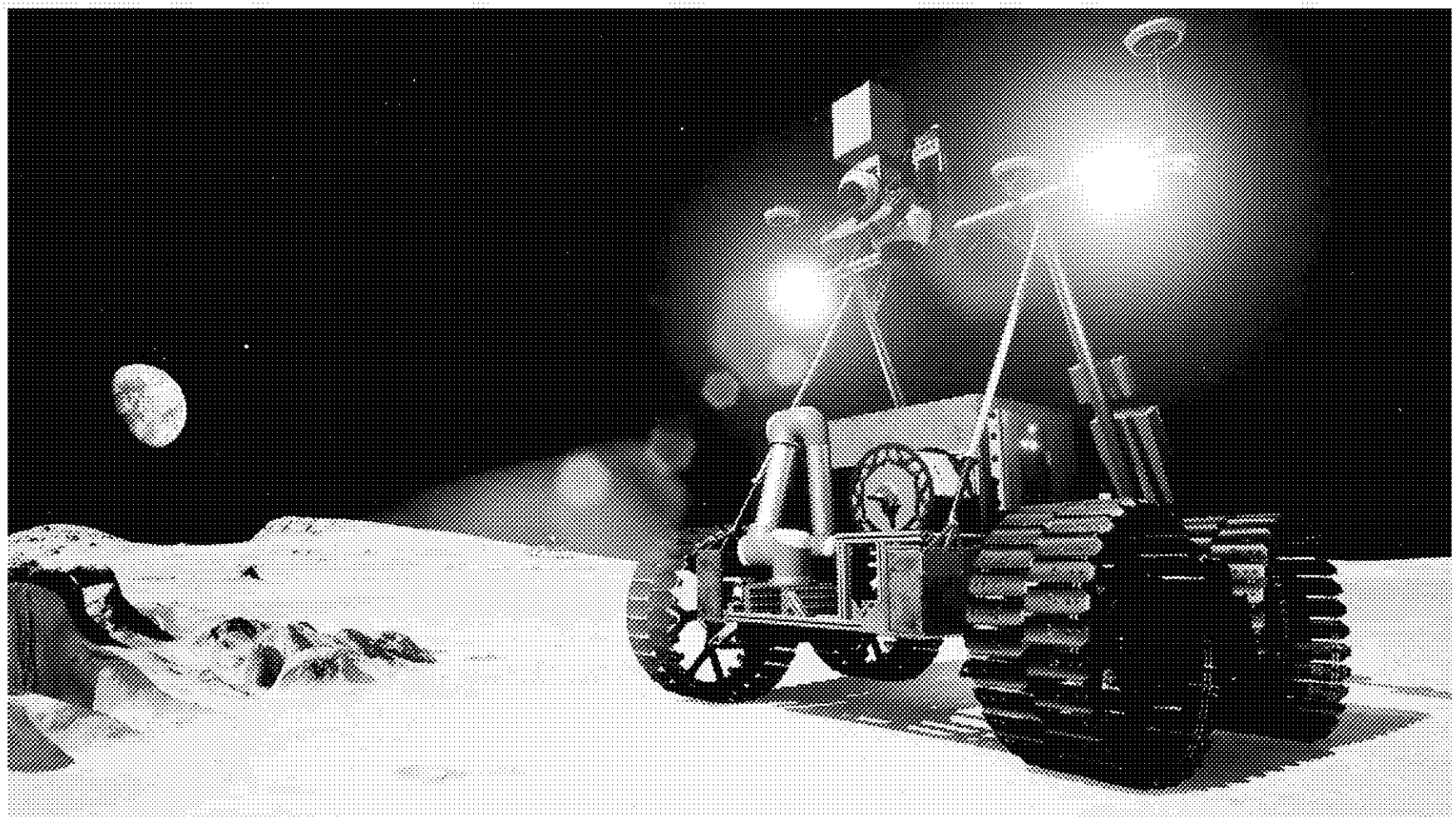
Upcoming: Lunar Gateway



Upcoming: Canadarm3



Upcoming: Canadian Lunar Rover

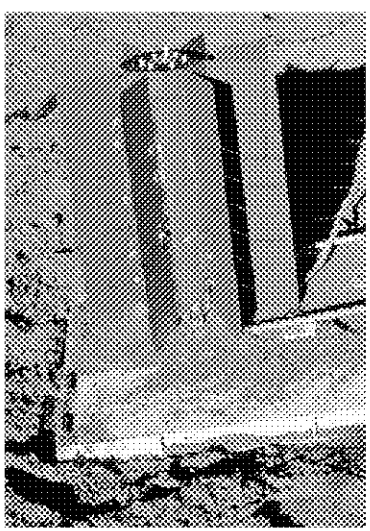


What's next?

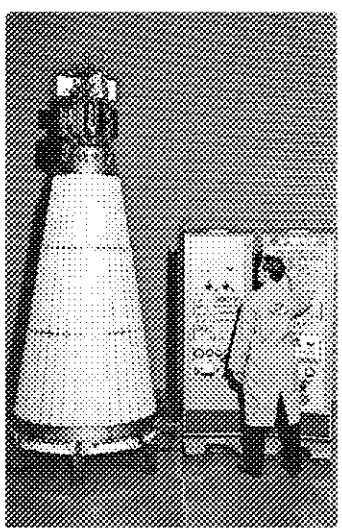
- Agriculture and food production?
- Autonomous and intelligent robots and rovers?
- Avionics and communication?
- Mining and in-situ resource utilization (ISRU)?
- Deep-space healthcare systems?
- **Power generation and distribution?**

Nuclear Technologies in Space

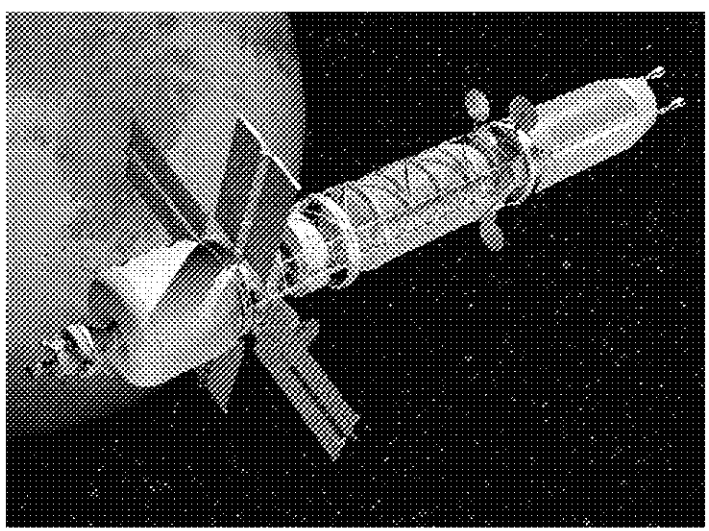
- **Space Nuclear Power Systems (SNPS)** have been utilized successfully for 60 years and are essential for the advancement of human and scientific exploration of space
- **Three types:**



Radioisotope power systems (RPS)



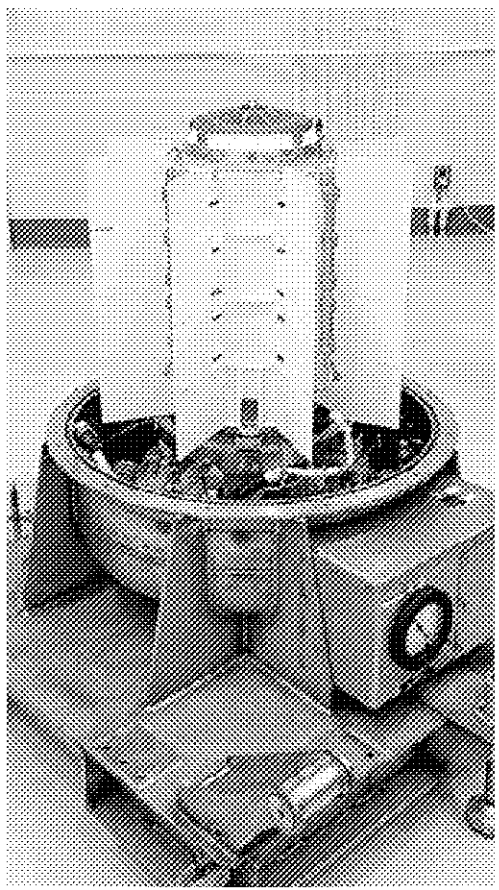
Fission reactors



Nuclear propulsion

1. Space Radioisotope Power Systems (RPS)

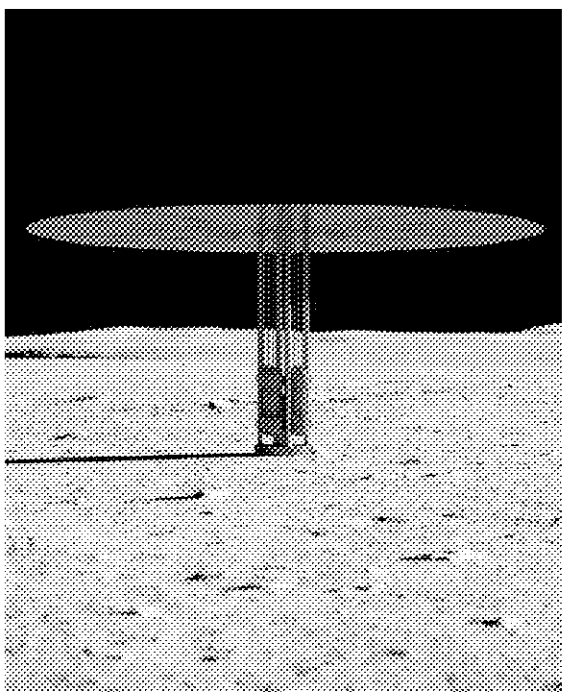
- RPS are essential technologies to enable human exploration of the Moon and Mars
- RPS include Radioisotope Thermal Generators (RTGs) and Radioisotope Heater Units (RHUs)
- CANDU reactors are well-suited for Pu-238 production
- The U.S. may not have sufficient fuel supplies to support their human lunar exploration campaign objectives
- Canada could contribute critical RPS technologies, fuels, other products and services to the international human space exploration campaign and deep space missions



1. Radioisotope Power Systems (RPS)

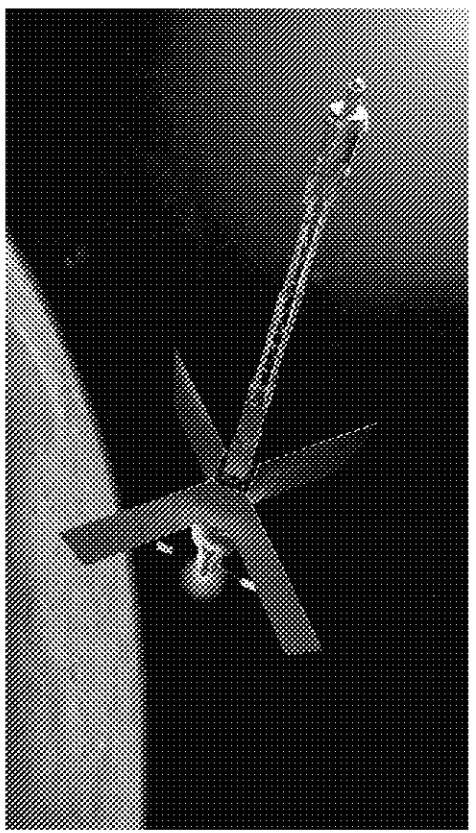
2. Fission reactors

- Fission surface power can provide abundant and continuous power regardless of environmental conditions on the Moon and Mars
- MMR with autonomous and remote operation from Earth
- Safe, efficient, and reliable electrical power
- Use cases:
  - Operate rovers
  - Provide process heat for mining operations
  - Power and heat habitats or agriculture modules
  - Power science experiments



3. Nuclear Propulsion

- Nuclear electric propulsion
  - More efficient use of propellants compared to chemical
  - Low amount of thrust
  - Use of a reactor to generate electricity that creates ion thrust
- Nuclear thermal propulsion
  - More efficient use of propellants compared to chemical
  - High amount of thrust
  - Use of a reactor to generate heat that converts liquid propellant into a gas, expanding it through a nozzle to produce thrust



CSA Initiatives

- **Current Studies:**
  - Completed:

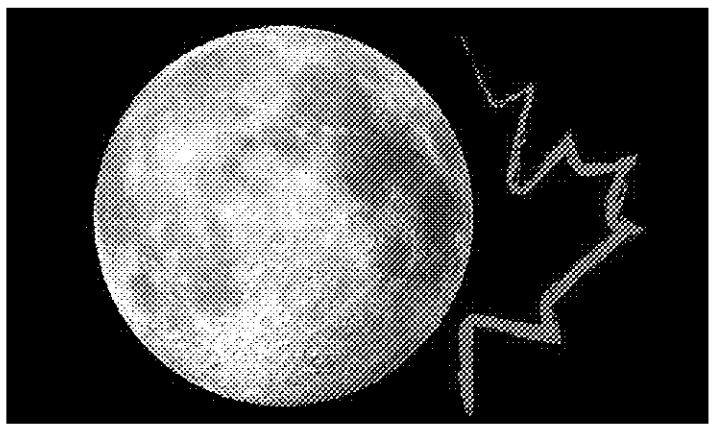
Description	Funding Program	Lead
3-Phase Mission Contribution Study	RFP	Euroconsult
Technology Identification Preparatory Study	Directed contract	CNL
Nuclear Power & Propulsion Gap Assessment	-	ISECG

  - In progress:

Description	Funding Mechanism	Lead
Power and Distribution Concept Study	Contract through LSEI	MDA, CNL, X-energy
Assessment of SMR Technologies for Space Exploration Applications (Project Definition)	NRCan/AECL FNST project	CNL
Advanced Multifunctional Materials for Space Applications (shielding and containment)	Contribution through STDP Announcement of Opportunity	CNL
Fission Power	Contribution through STDP Announcement of Opportunity	Canadian Space Mining Corporation

Lunar Surface Exploration Initiative (LSEI)

- Preparatory activities to define viable options for Canada to provide **early, visible and critical infrastructure contributions** driven by Canada's **commercial interests** and complemented by the **high-class science** necessary to **enable** these contributions.
- Contributions should enable **Canadian astronauts on the Moon**
- Six contribution areas:
  - Agriculture & Food Production Module
  - Autonomous & Intelligent Robots & Rovers
  - Avionics & Communication
  - Healthcare
  - Mining & In-Situ Resource Utilization
  - **Power Generation & Distribution**



LSEI Power & Distribution Concept Study

- **Power & Distribution Concept Study Phase 1**
  - Generate 30 kW electrical output while operating in lunar surface environmental conditions
  - Remote operation from Earth
- **MDA with partners CNL and X-energy**
- **Phase 2** of this LSEI Concept Study comprises prototyping contract

MDA

Canadian Nuclear Laboratories

X energy

Requirements for Lunar fission reactor

30 kW electrical power	Redundancy and reliability
Passive safety and remote / autonomous operations	Remote control of power output, and minimal maintenance requirements
Launch, landing, and transport compatibility	Simplicity of deployment and start-up
Adequate radiation shielding during operation	End of life is accounted for and manageable
Modularity	Compatibility with deep space and lunar environments

Ongoing international activities

- **ESA ENDURE**
  - $30 million (USD) investment for European supply of radioisotope heat and power systems for future missions
  - Radioisotope fuel derived from reprocessing of nuclear waste
- **NASA**
  - $15 million (USD) for design concept proposals for fission surface power
  - $15 million (USD) for reactor design concept proposals for a nuclear thermal propulsion system
  - $75-90 million (USD) over 5 years for Pu-238 production

Canada's Role

- Building on Canada's long history of experience in the nuclear sector
- Leverage Canada as a global leader in nuclear power systems and a world-class nuclear safety regulator
- **Specifically, Canada could:**
  a. Augment limited U.S. production and supplies of Pu-238 used in RTGs and RHUs, and provide space qualified RTGs and RHUs.
  b. Provide space-qualified Micro/Small Modular (Nuclear) Reactors (MMRs/SMSs) for lunar and Mars surface operation to enable habitation, life support and sustainable human presence.

Benefits to Canada

- **Economic**
  - Leadership in the space nuclear power industry.
  - New business models for space exploration within Canada.
  - Technology spin-ins to SNPS and space spin-offs to terrestrial SMRs.
  - Opportunities for growth in Canada's space industry.
  - Canada's industrial partners profit from lunar electricity sales.
  - Barter possibilities for Canadian astronaut's missions to the Moon and Mars.

- **Geopolitical**
  - Global leadership in space and subsequently terrestrial nuclear power systems.
  - Canada as a key international leader and trusted partner in space exploration.

- **Social and environmental**
  - Pride in Canada for its contribution to international lunar surface exploration and sustainable human presence.
  - Inspiration and motivation amongst next generation to pursue STEM education disciplines.
  - Public trust and constructive relationships amongst Canadian provinces and territories.

Challenges of fission power on the Moon

- **Technical challenges**
  - Launch, landing, commissioning
  - Reactor concept
  - Remote operation from Earth
  - Shielding
  - End of life
- **Legal and regulatory framework**
  - Licensing, regulation in Canada
  - Certification for launch
- **International partnerships**

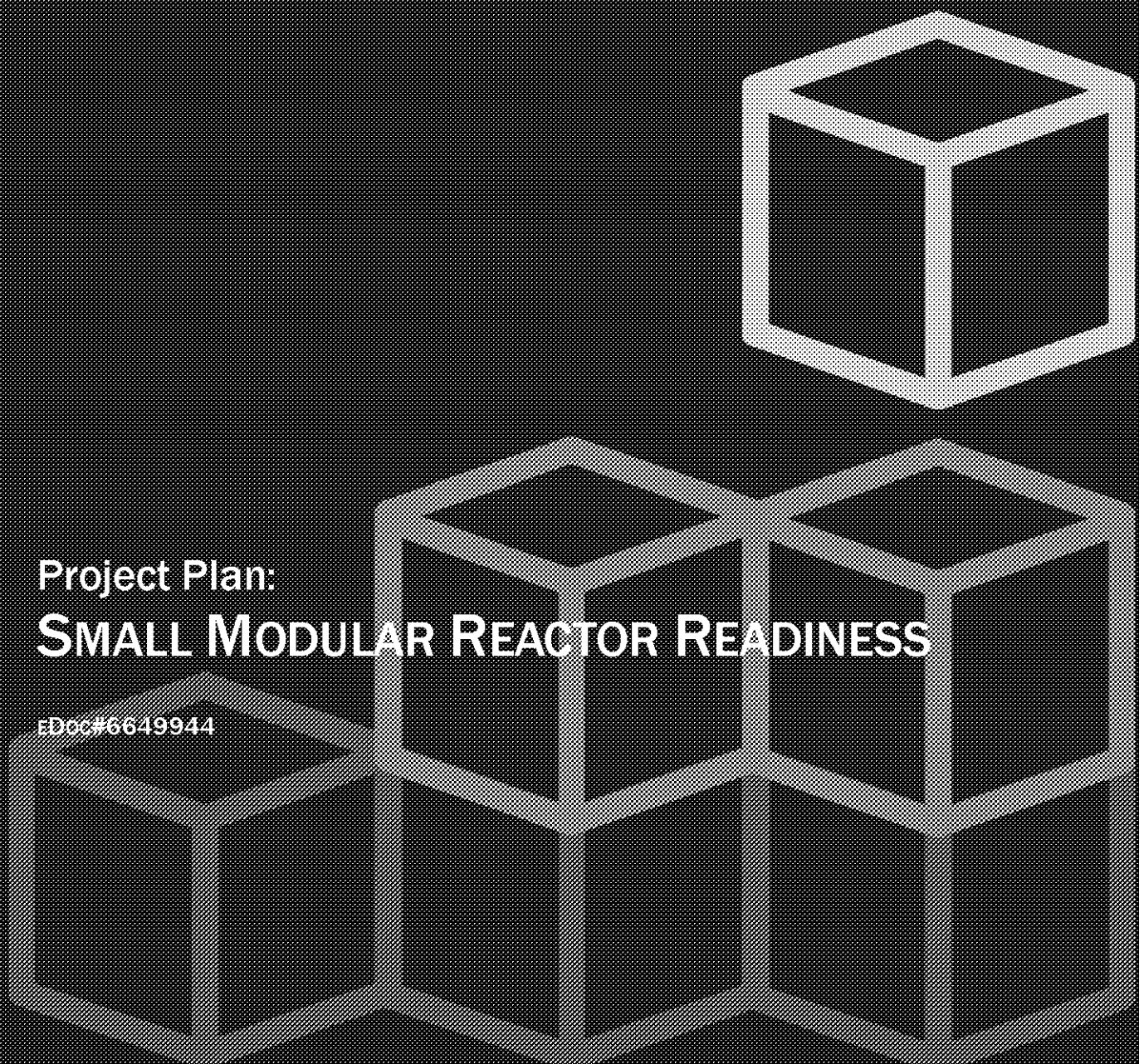
Canadian Space Agency

Agence spatiale canadienne

Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

Canada

UNPROTECTED



Project Plan:
SMALL MODULAR REACTOR READINESS

eDoc#6649944

001777

DOCUMENT APPROVAL

NAME AND TITLE	ROLE	SIGNATURE
Sarah Eaton [Director, ARLD, DART]	**Reviewer**	x
Caroline Ducros [Director General, DART, ROB]	**Sponsor & Approver**	x

DOCUMENT HISTORY

The following table shows the revision history for this document:

REVISION #	REASON FOR REVISION	APPROVAL SIGNATURE	DATE
000	Initial release	Caroline Ducros	October 11, 2022

TABLE OF CONTENTS

1 PURPOSE

1.1 BACKGROUND

The nuclear industry has shown strong interest in the development and deployment of small modular reactors (SMRs[1]) within Canada. Several SMR vendors have engaged the Canadian Nuclear Safety Commission (CNSC) through the Vendor Design Review (VDR) Program, and utilities have engaged the CNSC for licensing and pre-licensing activities for new SMR facilities.

Other SMR activities in Canada include:

- The province of New Brunswick has created an SMR technology hub.
- The Canadian Government has supported SMR proponents in the development of SMR technology on several fronts – including the SMR Action Plan.
- Canadian Nuclear Laboratories (CNL) is identifying available potential sites for SMR deployment in Canada.
- The provinces of Saskatchewan and Alberta have expressed interest in SMR technology.
- Ontario Power Generation (OPG) renewed its License to Prepare Site (LTPS) for the Darlington New Nuclear Project (DNNP).
- Global First Power (GFP) has submitted a partial License to Prepare Site (LTPS) application for a site at Chalk River.

SMRs incorporate novel aspects and features that represent a departure from traditional CANDU technology. The design of these reactors encompasses a wide array of technologies, most of which have limited operational experience. The novel aspects of these designs present an opportunity for an expansion of the existing CNSC regulatory framework which, though largely technologically neutral and programmatically based, was developed assuming a water-cooled reactor design. Proposed SMR designs include high temperature gas-cooled, molten-salt, liquid metal, and integral boiling and pressurized water reactors, of which the CNSC has minimal experience licensing.

The CNSC is expecting an increasing number of SMR license applications soon. Possible applications are anticipated from Bruce Power, New Brunswick Power (NB Power), and SaskPower.

The CNSC must be ready to effectively evaluate licence applications for SMRs which is the purpose of this SMR Regulatory Readiness Plan. The CNSC's SMR readiness project plan requires a balanced approach that considers technology-inclusiveness.

[1] The term SMR used throughout this document includes advanced nuclear reactors which may not be small.

1.2 MISSION

The overall mission of the SMR Readiness project is to:

1. Optimize the CNSC's readiness to license and regulate SMRs.
2. Position the CNSC as an international leader in SMR regulation.

The CNSC will achieve this by addressing the four established pillars for regulatory readiness:

- Regulatory Predictability and Clarity
- Building Capacity and Capability
- Supporting Policy and Coordinating Shared Responsibility
- International Collaboration

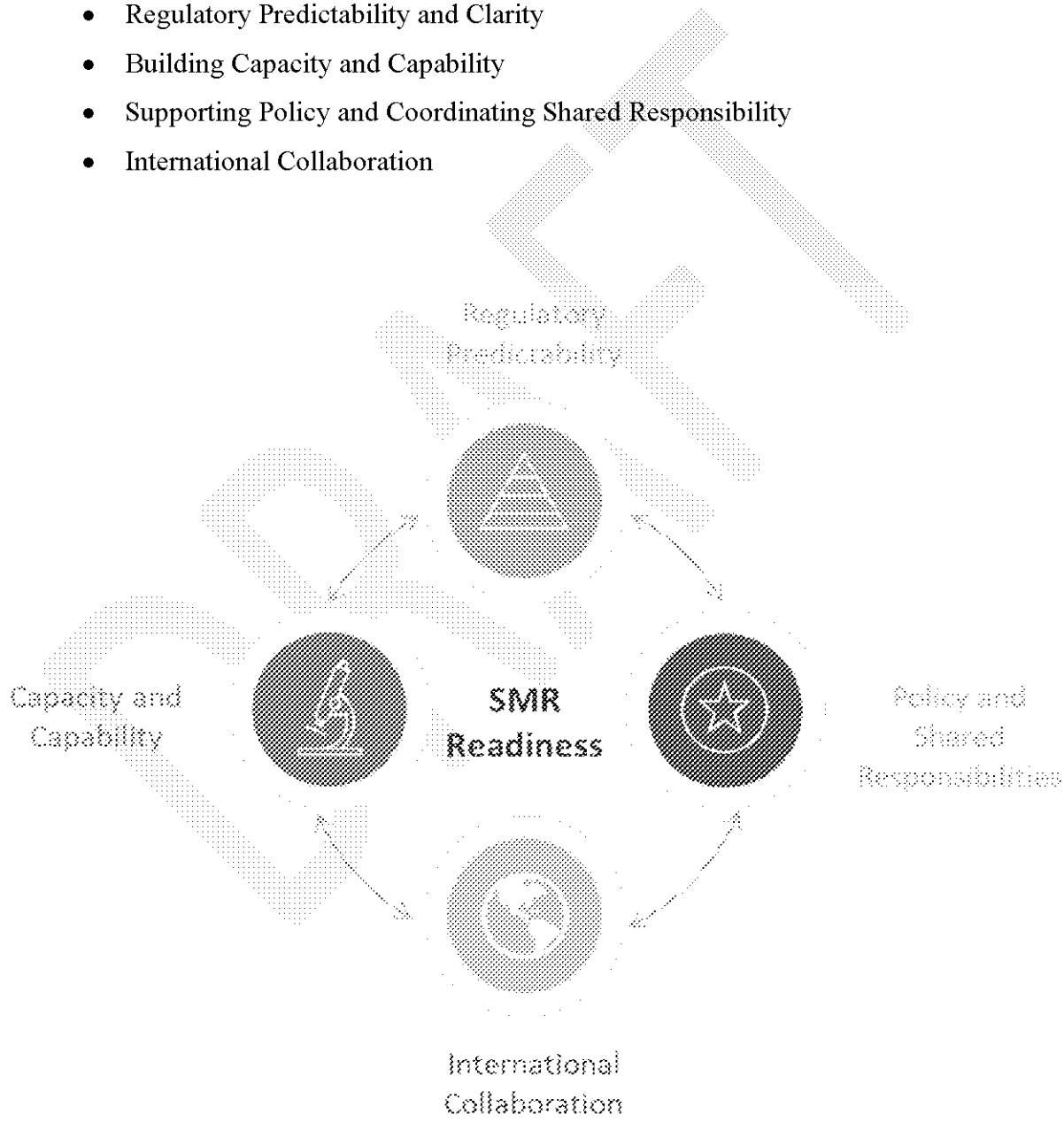


Figure 1: SMR readiness pillars.

1.3 PILLARS

1.3.1 REGULATORY PREDICTABILITY AND CLARITY

The regulatory predictability pillar focuses on optimizing the CNSC's regulatory framework for SMR licensing, providing regulatory clarity to SMR proponents. This will be reflected through the assessment and revision of regulatory documents to ensure technological inclusivity. Furthermore, internal CNSC staff review procedures will also be updated to reflect improved SMR clarity, resulting in improved licensing review timelines.

1.3.2 BUILDING CAPACITY AND CAPABILITY

The capacity and capability pillar is aimed at improving and expanding the CNSC's technical ability and competency in SMRs, especially geared towards non-water-cooled designs. SMRs include a variety of new reactor designs, the use of emerging/disruptive technologies not employed at today's nuclear power plants, and innovative construction approaches. To be ready to regulate SMRs effectively and efficiently without compromising safety, the CNSC requires independent research, internal expertise, and documented regulatory positions in these areas to support licensing reviews.

1.3.3 SUPPORTING POLICY AND COORDINATING SHARED RESPONSIBILITY

Develop/update management system processes and documents for licensing and compliance activities. Establish or modify memorandums of understanding (MOUs) to find efficiencies. Optimize CNSC processes to respond to the challenges posed by SMRs. Establish processes to assess alternative approaches for meeting regulatory requirements. Develop and document regulatory positions on novel design features and emerging technologies.

1.3.4 INTERNATIONAL COLLABORATION

The international collaboration pillar aims at strengthening existing international collaboration efforts and more strongly pursues international harmonization goals. The CNSC recognizes the mutual benefit that can be realized through leveraging the breadth and depth of experience and expertise that reside with other regulators and within their nations. In anticipation of global SMR deployment, this pillar will seek ways in which international regulatory harmonization and be achieved and optimized.

2 SCOPE

The CNSC strategy and SMR readiness project plan will be the hub for all regulatory activities pertaining to the regulatory readiness of SMRs. The scope of this project is comprehensive, including all regulatory readiness activities required to specifically address SMRs. All CNSC activities initiated addressing SMR readiness shall be consolidated and reported on through this project plan. This includes applicable initiatives documented in other directorate project plans.

Items pertaining to innovations/updates in the general nuclear industry, or regarding distributive, innovative, and emerging technologies (DIET) not specifically related to SMRs, is considered out of scope. This includes initiatives such as general regulatory framework actions not specifically addressing SMRs, and innovative CNSC compliance oversight techniques.

The SMR project scope is derived through a comprehensive review and consultative process with internal and external stakeholders; further details on this process are documented in eDoc#6874060. Organizational and project priorities may change as the project progresses, and as such, the SMR readiness project plan is designed to be evergreen, wherein the scope can be adjusted through a control process. A change management strategy is further defined in Section 10.

3 OBJECTIVES

The SMR regulatory readiness project plan is based upon the use of objectives. A snapshot of the in-scope objectives is provided in eDoc#6874087. Additionally, the up-to-date scope list is tracked in eDoc#6683736 and work breakdown structure (WBS) is documented in eDoc#6744846. Objectives are scheduled throughout a five-year project horizon based on priority and resource availability.

The following tables define the objective ID, objective title, and the eDoc number for the associated Objective Initiation Form (OIF). A snapshot of the overall schedule is provided in eDoc#6874111. The OIF forms identify expectations for the deliverables and additional details of each objective.

3.1 REGULATORY PREDICTABILITY

Action ID	Objective	OIF
REP.1.	Prepare/Update Process to Manage Long Lead Items	6754926
REP.2.	Addressing LTC Work Instructions	6754927
REP.3.	LTPS Compliance Program	6754928
REP.4.	Graded Approach Implementation/Risk Thresholds	6754929
REP.5.	LTC Compliance Program	6763655
REP.6.	Prepare process for managing field changes during construction phase (including management approvals)	6768319
REP.7.	LTO Work Instructions	6769369
REP.8.	Liability limit support to NRCan	6781670
REP.9.	Update TARM for LTC	6769424

REP.10.	Handling fuel waste for SMRs	6769471
REP.11.	Transportable reactors	6769485
REP.12.	Fusion Coordination Group	6769505
REP.13.	Undertake a strategic review of the CNSC's Regulatory Framework of regulations and REGDOCs	6754402
REP.14.	Import/Export Considerations	6763580
REP.15.	Current update to Nuclear Security Regulations	6769322
REP.16.	Clarifying Defense in Depth	6769322

3.2 CAPACITY AND CAPABILITY

Action I.D	Objective	OIF
CAC.1.	Revisit approach to interpretation of requirements	6783657
CAC.2.	Addressing Fuel Qualification of novel fuels	6763612
CAC.3.	Addressing novel means of Containment/confinement	6754931

CAC.4.	Addressing novel means of means of shutdown	6754932
CAC.5.	Determination of EPZ for SMRs and micro reactors	6763628
CAC.6.	Updates to Cyber Security requirements	6763635
CAC.7.	Computer Codes for Safety Analysis	6754936
CAC.8.	Safeguards for ARTs and remote reactors	6763649
CAC.9.	Chemistry Control for Novel Technologies	6768321
CAC.10.	Addressing novel digital instrumentation and control hardware and software	6769363
CAC.11.	Site security provisions	6769368
CAC.12.	Robustness requirements (civil structures)	6769372
CAC.13.	Novel construction materials for ARTs	6769384
CAC.14.	Readiness to assess novel construction techniques & performing OPEX review to prepare	6769418
CAC.15.	Separating Nuclear Island vs Balance of Plant	6769430

CAC.16.	Multi-Unit Risk assessment - modular	6769434
CAC.17.	Remote Monitoring and Operation	6769447
CAC.18.	Artificial Intelligence, Machine Learning, Digital Twins – in both operation and maintenance	6769453
CAC.19.	Transportation of radioactive reactor components	6769460
CAC.20.	Deconstruction Technologies	6769513
CAC.21.	Marine-Based SMRs	6781570
CAC.22.	Utility, factory, transporter relationship and interconnections - 'intelligent customer' roles	6763483
CAC.23.	Research and Development Work	6754933
CAC.24.	Knowledge management process/systematic documentation of lessons learned	6754934
CAC.25.	ROB/TSB Staff Training - Reg Officer Training Program	6763595
CAC.26.	Establish process to quickly obtain expertise (including external contractors)	6754935
CAC.27.	General training plan for staff	6769361

3.3 POLICY AND SHARED RESPONSIBILITIES

Action I.D	Objective	OIF

POL.1.	Development framework/process to address fleet approach	6763617
POL.2.	SMR Impact on Environmental Reviews	6754937
POL.3.	Policy for Canadian Enrichment (in partnership with others)	6769335
POL.4.	Fuel reprocessing, recycling, and waste (ex. WATTs) (in partnership with other Federal partners)	6769354
POL.5.	Policy for SMR Production of Hydrogen	6782558
POL.6.	Establish and Foster Domestic Partnerships	6782938

3.4 INTERNATIONAL COLLABORATION

Action I.D	Objective	OIF
INC.1.	Develop process to leverage other regulator's work	6754873
INC.2.	Process for the centralization of international work	6754925
INC.3.	US NRC MOC	6781661
INC.4.	IAEA projects for advanced technologies	6781663
INC.5.	NEA projects for advanced technologies	6781664

INC.6.	UK ONR MOC	6781666
INC.7.	International Collaboration projects as directed by Senior Management	6769348
INC.8.	SMR Regulators Forum	6781667
INC.9.	NEA tri-lateral project	6781669
INC.10.	Process for planning and preparing for international visits on the topic of SMR/AR licensing and construction	6769350
INC.11.	CNSC's involvement in other new build projects; as part of broader international support	6769358

4 PROJECT STRUCTURE

4.1 TEAMS

Matrix Approach

A matrix organization is a work structure where team members report to multiple leaders. In a matrix organization, team members report to a project manager for project-related responsibilities as well as their divisional management for day-to-day responsibilities. The matrix approach builds on the FACTeam approach (eDocs#3555024) that has been successfully used across the CNSC. The matrix approach allows team members to work on SMRs while remaining in their home division, drawing on the experience of their colleagues while also sharing their SMR experience with their division. This management structure can help us assess SMRs effectively and efficiently without realigning teams. Employee time is carved out and dedicated to the work of the matrix, and this is managed and understood by their line managers. This management structure can help us assess SMRs effectively and efficiently without realigning teams

SMR Readiness Project Management Office

The SMR Readiness Project Management Office (PMO) is responsible for the execution, co-ordination, oversight, and reporting of the project. The PMO is the central hub for all activities related to the project, including establishing and communication project framework, organizational engagement, and operational progress. Using the matrix approach, CNSC staff involved in SMR Readiness activities are accountable to the PMO in areas concerning project advancement and resource use. The PMO is composed of the project sponsor (Directorate of Advanced Reactor Technologies (DART) DG), Advanced Reactor Licensing Division (ARLD) director, Advanced Reactor Assessment Division (ARAD) director, project manager, and project controls; additional staff may be added as required.

Core Project Team

The Core Project Team consists of the PMO (project manager and project controls) and Directorate Key Contacts from across the organization providing CNSC-wide representation. Team members are responsible for guiding the operational direction of the project, providing their directorate's view and perspective into the conversation. These members are also responsible for communicating updates back to their respective parts of the organization. The team is composed of mandatory and optional members, depending on their level of involvement in the identified objectives. Mandatory members include: PMO, Directorate of Assessment and Analysis (DAA), Directorate of Environmental and Radiation Protection and Assessment (DERPA), Directorate of Power Reactor Regulation (DPRR), Directorate of Safety Management (DSM), Regulatory Policy Directorate (RPD), and Directorate of Security and Safeguards (DSS). Optional members include Innovation and Research Division (IRD), DNSR, Directorate of Nuclear Cycle and Facilities Regulation (DNCFR), Strategic Planning Directorate (SPD) and Internal Audit, Evaluation and Ethics Division (IAEED). Optional members are invited to join all meetings; however, their presence is required when objectives

lead by their directorates are in progress. A directorate may have multiple Key Contacts, depending on the complexity and the number of the objectives in execution. A breakdown of the core team membership is provided in Figure 2.

SMR Leadership Committee

The SMR Leadership Committee provides operational oversight of the project during execution. This committee addresses operational concerns requiring management input and co-ordination which may otherwise hinder the progress of the project. The committee is chaired by DART DG (SMR Readiness project sponsor), and the term of reference is documented in eDoc#6627192.

4.2 PROJECT GOVERNANCE

Strategic Oversight Structure

Senior management oversight of the project will be provided through the Small Modular Reactor Steering Committee (SMRSC)(eDoc#5244684). SMRSC ensures that the high-level guidance and milestones of the project consider a whole-of-organization approach. SMRSC reports annually to Operations Management Committee (OMC), and OMC reports quarterly to Management Committee (MC). Reporting through SMRSC provides an opportunity to report on project process. On an *ad hoc* basis, presentations to MC may be required. Management oversight of key technical deliberations is provided by the New Build Technical Sub Committee (NBTSC) (eDoc#3339558), representing the technical arm of the SMRSC. Financial and budgetary oversight is provided through the Integrated Planning and Resource Management Committee (IPRMC).

Overall Project Organizational Structure

Each objective is led by an Objective Lead who is responsible for execution of the objective with support of the assigned team members. The Objective Lead is responsible for obtaining approval of the OIF, and execution of the objective until the Objective Closure Form (OCF) acceptance (refer to Section 9 for further details on the workflow process). The Objective Lead is identified by the PMO selecting the directorate with the most relevance to the scope of the objective. The selected directorate then identifies the Objective Lead. The Objective Lead is responsible to provide periodic updates on the objective's progress and any concerns to the Directorate Key Contact. The Directorate Key Contact is responsible for maintaining awareness of the ongoing objectives led by their directorate and providing updates to both the Core Project Team and their Directorate (to ensure information flows in both directions).

The Core Project Team ensures day to day operational progress of the project is maintained. Any issues or concerns requiring managerial input is escalated to the SMR Leadership Committee by the PMO. Further escalations with technical direction of the project will be brought to the attention of the SMRSC by DART DG; matters regarding resourcing and funding will be brought to the IPRMC.

The project organizational structure is depicted in Figure 22. In this figure, an example is provided for DAA illustrating the relationship between the DAA Key Contact and the Objective Leads whose functional accountability resides in DAA. A similar relationship will apply to all involved directorates.

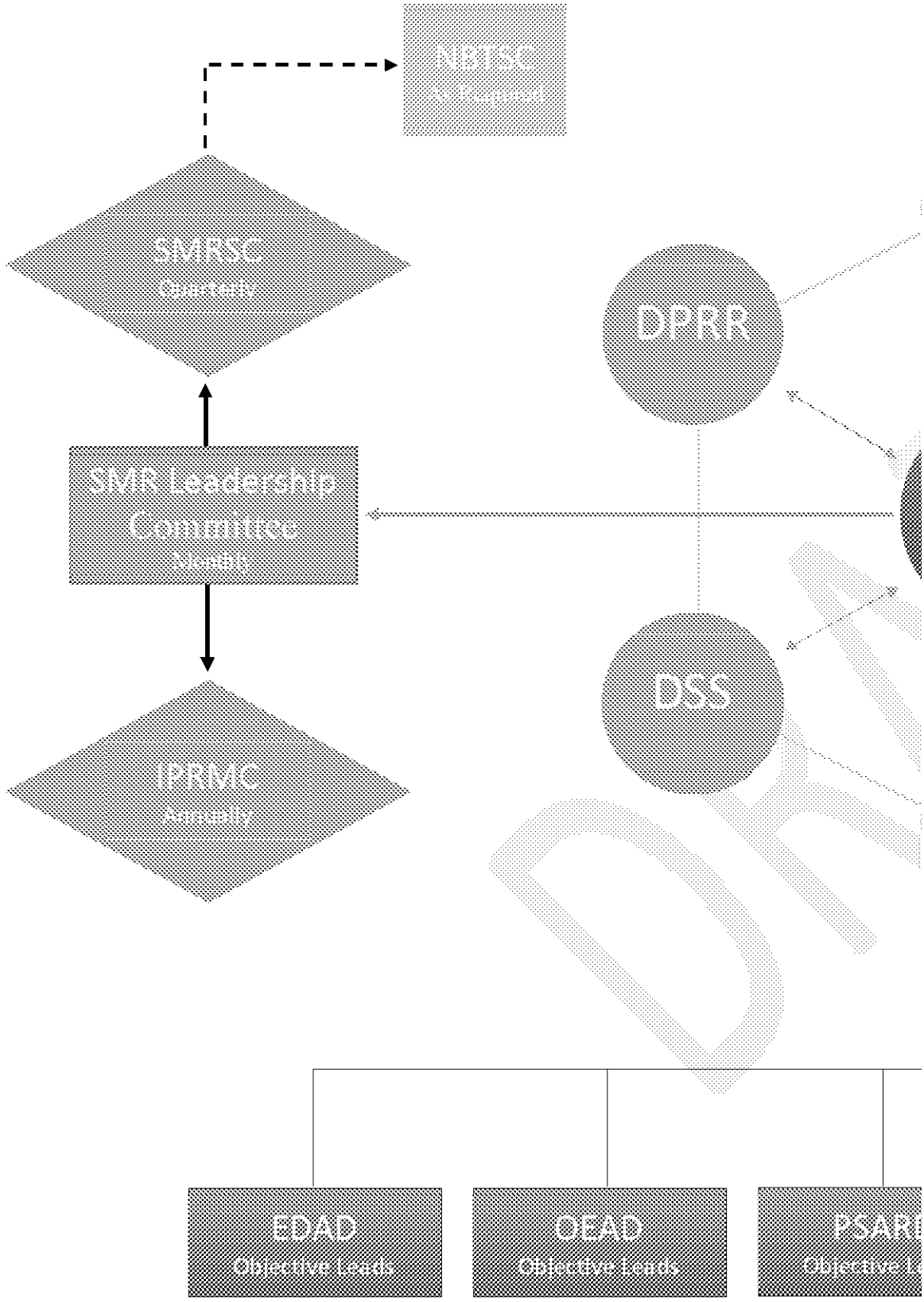


Figure 2: Project organizational structure.

5 RESOURCE REQUIREMENTS

5.1 CNSC RESOURCES

One SMR Readiness cost code is used to track all CNSC staff effort allocated to this project; the current cost code can be found in CNSC's Guidance on Time Reporting (eDoc#6685099) under *Regulatory Readiness for Small Modular Reactors*. The project team tracks planned vs. actuals monthly to ensure oversight of FTE allocation. Monthly reports will be provided to the PMO and shared at the SMR Leadership Committee. PMO will work with managers to ensure timesheets reflect the work completed under this project plan. It should be noted that all managers are also to use the SMR Readiness code as it is money allocated through the budget and not cost recovered.

6 CONSTRAINTS AND INTERFACES

6.1 GENERAL RISKS, ASSUMPTIONS

The successful execution of this project may be impacted by internal and external risk drivers. A risk register has been developed to document these risks, and to identify CNSC's response, including any required mitigating actions. The risk register is documented in eDoc#6742852 and is updated by the PMO regularly during the Risk Planning meetings.

Readiness for New Technologies is identified as an organizational risk in CNSC's Enterprise Risk Profile (ERP). This is documented in eDoc#5257725. ERP risks are tracked by the Corporate Planning Division (CPD); additionally, the PMO will provide periodic updates to CPD for risks pertaining to SMR Readiness.

A constraint leading up to and throughout execution is access to readily available resources (CNSC expertise) to execute the objectives. A significant number of new staff hiring is required to support the SMR Readiness objectives while balancing existing operational responsibilities. The ramp-up of this project will be constrained by the number of staff made available for onboarding to this project.

6.2 PREREQUISITES OR LINKED DEVELOPMENTS

6.2.1 SUPPORTING OR LINKED CNSC PROJECTS

This SMR Readiness project plan captures all activities related to the organizational effort of ensuring CNSC readiness to regulate SMRs. Several other projects have been identified within the organization that support this organization-wide initiative. These supporting or linked projects have been identified below:

- SMR Project Plan for DPPR Readiness (eDoc#6604673): identifies DPRR specific objectives and deliverables to ensure their readiness to perform compliance oversight of SMRs. Where there is overlap of objective scope between the two projects, this project will have responsibility of its oversight and management. A clear link will be documented in the OIF of each of these specific objectives.
- Darlington New Nuclear Project (DNNP): represents OPG's intention to construct and operate a SMR at the DNNP site. As DNNP is the most advanced SMR licensing project, the deliverables of the SMR Readiness project will be of high interest and direct application to its progress. Close working relationships between the SMR Readiness PMO and DNNP project team is required. A DNNP project plan is currently under development (eDoc#6795383).
- The Global First Power (GFP) represents the first-Generation IV reactor proposed in Canada. Close working relationships between the SMR Readiness PMO and GFP project team is required. A GFP project plan is currently under development (eDoc#5870500).

- Disruptive, Innovative, and Emerging Technologies (DIET) working group (WG); is established to explore the prospective impacts of DIET on CNSC's Regulatory Framework and develop a strategy to ensure readiness. Some DIET areas overlap with novel applications of technologies selected for implementation in SMRs (e.g., use of artificial intelligence in SMR operation).

6.2.2 Outside Projects

External projects relevant to SMR readiness are documented in the following section.

- Canada's SMR Action Plan is the result of a pan-Canadian effort, bringing together key stakeholders from across Canada. These include the federal government, provinces and territories, Indigenous Peoples and communities, power utilities, industry, innovators, laboratories, academia, and civil society. The CNSC has committed to several actions under this plan, which are documented as part of this project's scope.

7 PROJECT CONTROLS

7.1 DASHBOARD

A dashboard is used to provide a quick overview of the overall progress of the Project. This will be used as the main tool to communicate project status during management update meetings. The dashboard can be accessed at SMR Readiness Dashboard.

7.2 METRICS

Specific metrics have been developed to track Project outputs and outcomes to ensure accountability and traceability of the appropriation funding provided. These metrics are currently under development as part of the appropriations application process and will be documented in this section once a decision on appropriations has been made.

8 COMMUNICATION STRATEGY

8.1 TEAM MEETINGS

The following meetings will be held as part of project execution:

- Core Project Team:
  - Frequency: Weekly
  - Purpose: To provide updates and discuss the progress of each of the objectives in execution. Discuss the objectives nearing execution to ensure resources are available and prepared to execute. Co-ordinate between directorates when support is required. To co-ordinate between interlinked objectives with leads in multiple directorates.

- SMR Leadership Committee:
  - Frequency: Monthly
  - Purpose: The SMR Leadership Committee provides operational oversight of the project during execution. This committee addresses operational concerns requiring management input and co-ordination which may otherwise hinder the progress of the project. To present PCFs for SMRSC approval. The committee is chaired by DART DG.

- SMRSC:
  - Frequency: Quarterly
  - Purpose: To provide project progress updates to senior management. To receive and document feedback on project direction, and adjust, as required. To resolve project concerns requiring senior management input.

- IPRMC:
  - Frequency: As requested
  - Purpose: To provide an update on project status. The Finance and Administration Directorate is responsible for providing resource utilization to the IPRMC Executive Team, comparing planned vs actuals. DART will support by providing resource utilization forecasts and requesting changes to allocated budget, as required.

- Outreach and Engagement Planning:
  - Frequency: Bi-Annually

- Purpose: To update the engagement and outreach plan and forecast activities for the upcoming year. An opportunity to coordinate internal and external communication activities between the PMO, Corporate and Regulatory Communications Division (CRCD) and Indigenous and Stakeholder Relations Division (ISRD).

- Risk Planning:
  - Frequency: Semi-annually
  - Purpose: To update the risk register to reflect changes in project risks. This meeting shall be attended by the PMO, DART DG and IAEED

8.2 ENGAGEMENT AND OUTREACH PLAN

The SMR Readiness project is a significant undertaking and will span a minimum of 5 years, involving the entire organization with substantial interest from external stakeholders and Indigenous Nations and communities. A project specific Engagement and Outreach (E&O) plan (eDoc#6710677) has been developed to ensure stakeholders and Indigenous Nations and communities are informed and engaged throughout the project. The E&O plan documents the E&O activities planned for each year.

9 APPROACH FOR REVIEW PROCESS

9.1 WORK REQUEST PROCESS

Each objective will be initiated and documented through an Objective Initiation Form (OIF); a copy of this form is provided in Appendix B. The OIF will document the objective, team composition, target completion date, close-out requirements, and approval. This will ensure a systematic approach to initiating objectives, with clear understanding between the project and objective team. Likewise, the completion of each objective will be documented in an Objective Close-out Form (OCF), a copy of this form is provided in Appendix C. Once an OIF is approved, the objective is officially in execution, and the Objective Lead along with their team are accountable to the deliverables and deadlines detailed therein.

9.2 ISSUE RESOLUTION

Issues may arise on the project because of differences in scientific or regulatory professional opinion. The following steps can be used:

- Resolution of the issue at the specialist / Project Manager level, if possible,
- Resolution through open door policy
- Resolution through ICRM
- Document the issue for resolution at the Director level, if possible,
- Document the issue for resolution at the Director General level.

These steps attempt to resolve the issue at the working level first in an efficient, informal, and professional manner. Timelines for elevating issues depend on the significance of the issue and its impact on nuclear safety and impact on delivering the SMR readiness project plan. Should the above steps not work, then the CNSC "Differences of Profession Opinion Process" (eDoc# 3858318) shall be used.

10 CHANGE MANAGEMENT CONTROL

10.1 CHANGE MANAGEMENT STRATEGY

The SMR readiness project plan is an evergreen plan where updates and revisions are incorporated to address addition of new objectives, in line with changes in organizational priorities. A change management strategy has been developed to ensure all changes are implemented in a consistent manner throughout the project's lifecycle.

10.1.1 SCOPE AND SCHEDULE CHANGE

Significant changes to project scope and schedule will require SMRSC approval. Other changes will be discussed at the monthly SMR Leadership Committee meetings. Significant change is defined as any change resulting in greater than 25% of schedule or resource allocation. This includes the addition or deletion of objectives. A project change form (PCF) will be prepared by the individual requesting the change and circulated to the PMO and DART DG. A copy of this form is provided in Appendix D.

The requester is responsible for initiating the PCF and providing all relevant details of the change (Parts 1 and 2). The form is then provided to the PMO wherein the impact to the project is documented and the recommendation to DART DG (Part 3); the PMO identifies and tracks the Request I.D. The requester is then responsible for acquiring all required signatures. Once complete, the DART DG will submit the PCF to the SMRSC for consideration. The SMRSC can approve, reject, or request revisions to the PCF if additional information is required. The PMO is responsible for communicating the results of the SMRSC result and implementing the change in the project documents.

Changes in the SMR readiness project plan will be captured in lower tiered documents including the OIFs, schedule, and evaluation metrics. The SMR readiness project plan will be updated regularly. After the initial SMR readiness project plan is approved, further revisions will only require DART DG approval.

10.1.2 BUDGET AND RESOURCE CHANGE

Resource usage for SMR Readiness will be tracked by the PMO on monthly basis. The PMO will compare the actuals to the planned hours and identify if changes are required. Changes in resources will be brought to the IPRMC during the annual updates. Periodic status updates will be provided to CNSC management through e-mail correspondence, and through the SMR Leadership Committee status reports.

10.2 PROJECT CLOSURE

The SMR Readiness project will close-out once all objectives identified have been completed, addressed, or transferred into another managed process. It is expected that

through the execution of the current set of objectives (including new objectives realized through throughout the course of this project), the CNSC's regulatory framework will continue to be sufficiently robust and flexible to handle new challenges introduced by SMRs moving forward. The CNSC will also optimize its effectiveness and efficiency in regulating SMRs. The decision for project closure will be made by the SMRSC.

Prior to project closure, the documentation and accounting of following items will be required:

- All approved OCFs for completed objectives.
- All approved PCFs for objectives removed from project scope, and/or transferred to another managed process.
- Lessons learned report (to be approved within a maximum of 6-month post project closure).

11 ROLES AND RESPONSIBILITIES

The roles and responsibilities for the SMR Readiness project include, but are not limited to (see Figure 2 for the Organizational Structure):

Executive Vice-President and Chief Regulatory Operations Officer

- support resolution of issues that cannot be resolved at the project level and ensure that the project moves forward
- brief IPRMC as requested

CNSC Director Generals

- support resolution of issues that cannot be resolved at the directorate director level to ensure that the project moves forward

DART Director General

- in addition to the above, acts as the Project Sponsor
- chairs SMRSC and SMR Leadership Committee
- serves as liaison between Industry management/COG and CNSC
- makes timely decisions for the project to move forward and
- raises issues to SMRSC, as appropriate
- approves changes to the current SMR readiness project plan and the implementation of any corrective actions
- accountable for the overall budget of the project

ARLD Director

- oversees all project activities and approves formal communications prior to submission to stakeholders
- approves objective initiation forms and objective closure forms
- approves jobs/tasks as required and
- controls and is responsible for the overall budget of the project

Project Manager

- responsible for planning, coordinating, and integrating all readiness activities to meet project requirements;
- reports to ARLD Director;
- maintains oversight of project scope, schedule, and budgeting;
- develops and reviews the objective initiation forms and identifies the proposed team make-up;
- updates the risk register on the set frequency basis;
- follows up the technical issues including monitoring of the review progress;
- supports activities in finding resolution paths for issues;
- prepares and oversees the preparation of project communication products and reports out;
- provides Staff and Objective Leads support in their tasks;
- prepares and submits regular updates on SMR Readiness to ARLD Director and DART DG;
- prepares the SMR readiness project plan;

- provides guidance to CNSC staff regarding scope, processes, expectations related to this project;
- escalates issues requiring management direction to the SMR Leadership Committee;
- prepares and presents, or supports the presentation of, periodic updates to the SMRSC and IPRMC; and
- ensure constant and clear lines of communications between CNSC and stakeholders are established and maintained.

Note: Project Manager may delegate any of the above tasks to the Team Members, when deemed appropriate.

Project Control Specialist

- carries out varied tasks on the project administration;
- develops and maintains the project schedule current based on updates from the Project Manager, Directorate Key Contact and Objective Leads;
- develops and maintains project dashboard, report outs, and communication tools;
- attends all project related meetings and records meeting minutes;
- supports the preparation of project communication products;
- supports Objective Leads in developing and maintaining an objective specific schedule;
- updates project documentation as requested;
- maintains oversight SMR Readiness cost code usage to track budget usage;
- monitors and documents completion of project objectives; and
- sets up and coordinates meetings, including project team specific meetings.

Directorate Key Contacts

(See eDoc#6755821 for a list of the Directorate Key Contact)

- act as a single-points-of-contact for SMR Readiness activities in their respective directorates;
- ensures communications related to the SMR Readiness project are conveyed to the necessary people in their directorate, including management;
- solicit updates from the Objective Leads within their directorates;
- attend and provide required updates in the SMR Readiness project meetings;
- support the Project Manager in co-ordinating activities within their directorate's area of expertise; and
- updates the Project Managers on a regular basis on the status of the objectives including any issues that could delay the completion of the objectives.

Objective Leads

- act as a single-points-of-contact for objective activities;
- responsible for defining the path required for successful completion of the objective;
- review and assume responsibility of the scope of the OIF once accepted;
- requests from the Project Manager any additional information required;
- verify completeness and correctness of the objective in consultation with their Division Directors;
- attend project management and other relevant meetings, as requested, to provide updates of the status of the objective to the greater organization on

- update the Project Manager and Key Contact on a regular basis on the status of the objectives including any issues that could delay the completion of the objectives; and
- submit the deliverables to the Project Manager.

Team Members

- report to their Objective Lead;
- carry out the review of assigned documents/analysis; and
- support the Objective Lead in execution of the objective.

Note: A Team Member can be the same person as the Objective Lead.

SMRSC

- provides the project with strategic input and direction throughout the course of the project;
- considers and approves major changes in project proposed by the project sponsor;

IPRMC

- provides the project with financial feedback and input throughout the course of the project; and
- approves the project's operating budget.

SMR Leadership Committee

- provides the project with operational oversight and direction throughout the course of the project;
- resolves operational issues requiring management input; and
- refers matters to the SMRSC when the decision required exceeds the purview of this committee.

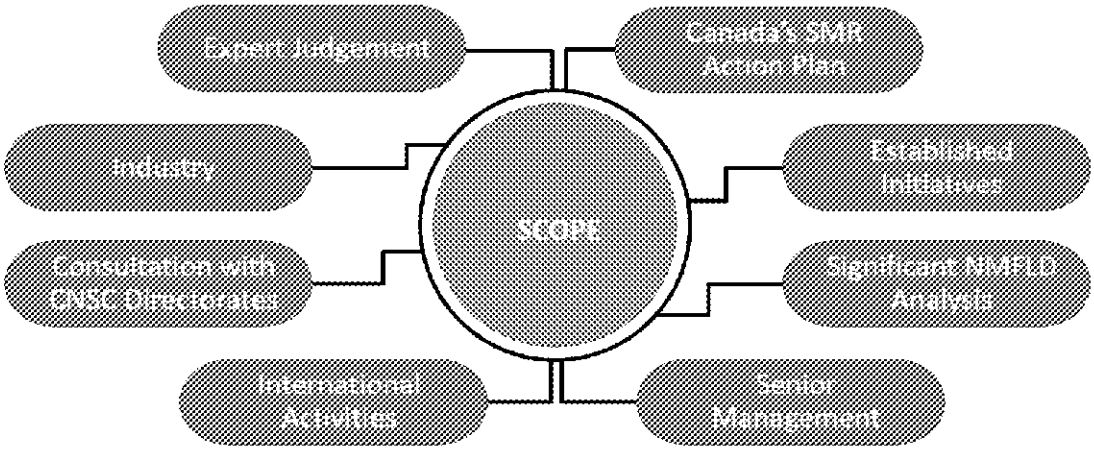
12 REFERENCES

#	Title / Item	e-Doc # / Link
1.	SMRSC Terms of Reference	5244684
2.	NBTSC Terms of Reference	3339558
3.	SMR Leadership Committee Terms of Reference	6627192
4.	Fact Sheet	6798142
5.	Key Contact List	6755821
6.	Project Folder	6751391
7.	Scope List Summary	6789777
8.	Project Specific Outreach and Engagement Plan	6710677
9.	CNSC Communications Plan	6744435
10.	Risk Register	6742852
11.	OIF Template	6673529
12.	OCF Template	6673553
13.	PCF Template	6742299
14.	Project Metrics	TBD
15.	High Level Proponent Licensing Schedule	6874060
16.	Project Scope Work Breakdown Structure	6874087
17.	Overall Project Schedule	6874111
18.	SMR Readiness Project Engagement and Outreach Schedule	6738980

APPENDIX A: SCOPE DEVELOPMENT AND PRIORITIZATION

The project's scope is identified and prioritized according to the following steps:

1. A comprehensive review was conducted to identify SMR Readiness scope was identified from several sources including previous CNSC work/positions, discussions with Industry, and through international activities, as seen in Figure B.1.



2. The scope is then binned into the 3 SMR Readiness Pillars:

- **Undertake Regulatory Refinements**
- **Ramping Up Capabilities**
- **First of a Kind**

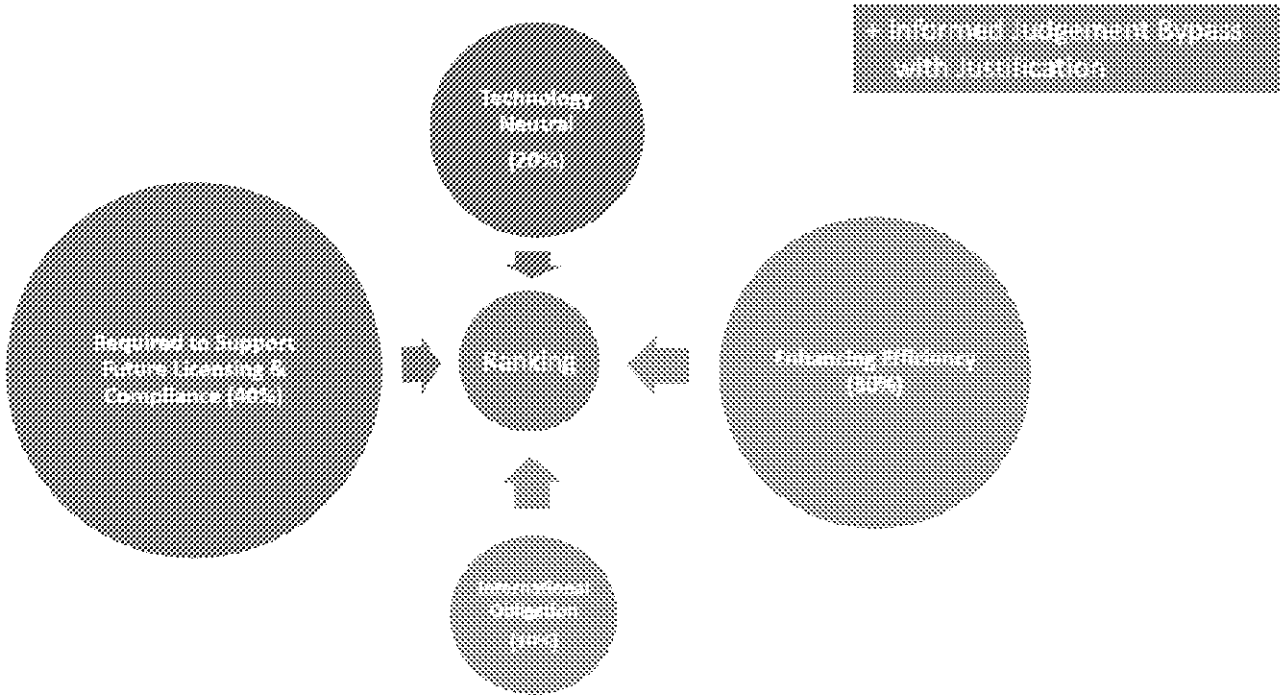
3. A Weighted Table approach is then applied to arrive at a preliminary ranking of the objectives; see Figure B.2. This is used as a starting point for having discussions on the relative importance of each objective. The categories used, their description, and weights are described below:

- **Required to Support Future Licensing and Compliance (40%):** Provides a measure of the time requirement of the objective. Required immediately to support the current license applications (i.e., DNNP and GFP).

- **Technology Neutral (20%):** Objective applies to all technologies, and will be beneficial for future applications

- **Enhancing Efficiency (30%):** Provides a measure of return on investment. Implementation of this objective will result in future resource savings/more efficient process.

- **International Obligation (10%):** Completion will support CNSC international obligations or commitments.



4. Once a preliminary ranking is established, a systematic approach is utilized to compare each objective relative to the entire list, and bypass the ranking based on the team's judgement with justifications documented.

5. The scope is then shared with the wider organization for validation and feedback, the results of which is used to finalize the scope.

APPENDIX B: OBJECTIVE INITIATION FORM TEMPLATE (EDOC#6673529)

Objective Initiation Form (OIF)

Objective ID: *Objective ID which ties back to the project plan*

Objective: *Objective as documented in the project plan. More elaboration possible here.*

Team: *Who will be completing this objective? Can be one person or can be a list of people. Place name and title of individual.*

Expected Deliverables: *What is the specific outcome expected from the objective and from the team members. Provide specific details as to the products that will come out of the completion of the objectives. Specify if follow-up actions will be required or need to be considered as close-out of this action.*

Reporting Requirements: *If required, identified the frequency and medium of providing updates of the teams progress on the completion of this objective. This can be as simple as no reporting, an e-mail to the project manager, or presentations to management.*

Project Interfaces: *What other objectives will be impacted by this objective? Review the objectives in the project plan and identify the objective ID and title of what will be impacted. Also consider what other areas will be impacted that may not be listed as an objective.*

Approval:

Name	Position	Signature and Date
	Objective Lead	
	Objective Lead Director	
	SMR Readiness Project Manager	
	SMR Readiness Hub Director	

Documented approval of the objective to ensure alignment before starting.
Note: Refer to Section 10 of the DART Project Plan for changes to the OIF form.

APPENDIX C: OBJECTIVE CLOSURE FORM TEMPLATE (EDOC#6673553)

Objective Closure Form (OCF)

Objective ID: *Objective ID which ties back to the project plan*

Objective: *Objective as documented in the project plan. More elaboration possible here.*

Closure Notes: *Clearly document how the objectives and expected deliverables was met, including references to the products created or entry into managed processes.*

Follow-up: *Document any follow-up actions resulting from the completion of this objective. Including whether any new objectives should be added to the project plan. Document whether interfacing objectives can now be started.*

Approval:

Name	Position	Signature and Date
	Objective Lead	
	Objective Lead Director	
	SMR Readiness Project Manager	
	SMR Readiness Hub Director	

Documented approval of the objective to ensure alignment before starting.
Note: Refer to Section 10 of the DART Project Plan for changes to the OCF form.

APPENDIX D: PROJECT CHANGE FORM TEMPLATE (EDOC#6742299)

Project Change Form (PCF)

Initiator: _____ Request ID: _____

Type of Change:

☐ Scope	→	☐ Addition	☐ Deletion	☐ Change
☐ Schedule	→	☐ Addition	☐ Deletion	☐ Change
☐ Project	→	☐ Other		

Objective ID: *If this is related to an existing objective, identify the objective ID*

Objective: *If this is related to an existing objective, record the Objective as documented in the project plan.*

Schedule: *If this is related to an existing objective, document the current target completion date.*

Proposed Change: *Describe in sufficient detail the changes request to the SMR Readiness project.*

Impact to Project or Objective: *Detail the impacts of the proposed change to the project, and to the objective, if applicable. Consider the impacts to any interfacing objectives and overall project deliverables.*

PMO Review: *Detail the impacts to the project from a project management perspective. Provide recommendations to the Project Sponsor.*

Approvals:

Name	Position	Signature and Date
	Objective Lead	
	Objective Lead Director	
	SMR Readiness Project Manager	
	SMR Readiness Hub Director	

SMRSC:

Date Taken to SMRSC: _____

Decision: ☐ Approved ☐ Rejected ☐ Bring Back

Change Implemented: *Specifically document how the change was implemented, including the eDoc# of any new or revised documents (i.e. OIFs, project plan).*

Pages 1813 to / à 1817
are withheld pursuant to section
sont retenues en vertu de l'article

21(1)(a)

of the Access to Information Act
de la Loi sur l'accès à l'information

Bergeron, Marie-Josée

From: Czerneda, Jennifer
Sent: Thursday, August 25, 2022 9:21 AM
To: Brunarski, Lee
Subject: FW: Discussion with NRCan on public discussion of reprocessing

FYI

From: Jammal, Ramzi <Ramzi.Jammal@cnsc-ccsn.gc.ca>
Sent: August 24, 2022 9:04 PM
To: Dewar, Keith <keith.Dewar@cnsc-ccsn.gc.ca>
Cc: Eaton, Sarah <Sarah.Eaton@cnsc-ccsn.gc.ca>; Ducros, Caroline <Caroline.Ducros@cnsc-ccsn.gc.ca>; Czerneda, Jennifer <Jennifer.Czerneda@cnsc-ccsn.gc.ca>; Beaton, Dana <dana.beaton@cnsc-ccsn.gc.ca>; McAllister, Andrew <Andrew.McAllister@cnsc-ccsn.gc.ca>; Boudrias, Geneviève <Genevieve.Boudrias@cnsc-ccsn.gc.ca>
Subject: Re: Discussion with NRCan on public discussion of reprocessing

Keith,
Thank you for the update. Please keep me posted on the proposals for the next steps and drafts for me to review.
Thanks
Ramzi

Ramzi Jammal
Executive Vice President and Chief Regulatory Operations Officer.
Premier vice-président et chef de la réglementation des opérations
CNSC-CCSN
613-947-8899

> On Aug 24, 2022, at 6:07 PM, Dewar, Keith <keith.Dewar@cnsc-ccsn.gc.ca> wrote:
>
> Hi Ramzi,
>
> I met with NRCan/Andre Bernier (as well as Justin Hannah and Julie Mecke) following our internal meeting last week on engaging the public with respect to reprocessing issue. In short, they agreed that this was a file that needed attention and Andre tasked his directors with exploring what needs to be done. This includes establishing the policy questions that need to be asked to provide investor certainty (amongst other goals) and the best method to share them with the public (e.g. possibly a discussion paper).
>
> We all agreed the meeting was the start of the conversation on how we will each move forward on this topic. We (the CNSC) did mention that a discussion paper from our point of view was under consideration – they seemed open to that in parallel.
>
> They thought it might take two weeks to draw things together given leave. I'll follow up with Andre in due course.

SPD can work with DART/NPFD (and RPD) to outline the CNSC's proposed approach for enhancing/informing the discussion in the public domain.

Keith

Keith Dewar (he/him/il)
Acting Director General/Directeur-Générale Interimaire
Strategic Planning Directorate|Direction de la planification stratégique
Canadian Nuclear Safety Commission|Commission canadienne de sûreté nucléaire
Ottawa, Canada
keith.dewar@cnsc-ccsn.gc.ca
Government of Canada Gouvernement du Canada

Small Modular Reactor (SMR) Action Plan Leadership Table Meeting Agenda
Monday, October 3, 2022
13:00-16:00 pm (EST)
Delta Hotels Airport and Conference Centre (Toronto, Ontario)

OBJECTIVES:

- **Convene multidisciplinary representatives to support the development and deployment of SMRs in Canada**
- **Discuss critical priority areas to realize first-of-a-kind SMR deployment in Canada**
- **Obtain concurrence on SMR Action Plan priorities and next steps**

Time (EST)	Item / Responsibility
13:00 – 13:10	**Opening Remarks – *NRCan / IAC*** ▸ NRCan Associate Deputy Minister co-chair to provide opening remarks and introduce Indigenous Advisory Council (IAC) as Co-Chair (4 mins) ▸ IAC provide opening remarks as new co-chair (4 mins) ▸ NRCan representative to provide run of show (2 mins)
13:10 – 13:20	Presentation on Funding Tools and Discussion – Canada Infrastructure Bank
13:20 – 13:35	Presentation on the Implementation of the United Nations Declaration on the Rights of Indigenous Peoples – Government of Canada ○ **The CNSC's processes for consultation and engagement with Indigenous peoples, including public Commission proceedings, are mindful of and consistent with the principles articulated in UNDRIP, including FPIC.** ○ **The CNSC follows existing legal frameworks including CEAA, 2012, the NSCA and the common law duty to consult in conducting its consultation, regulatory and decision-making processes, which further supports UNDRIP and the FPIC principle.** ○ **As a federal agency, the CNSC has an important role to play in implementing the Declaration and will ensure that our approach to UNDRIP and FPIC continues to remain consistent with federal legislation and policies.** ○ **The CNSC is currently participating in Department of Justice led working groups regarding the development of the UNDRIP Act Action Plan and implementation across the Federal Government.** ○ **The UNDRIP Act Action Plan is scheduled to be completed in 2023 following extensive consultations with Indigenous Nations and communities, Provincial Governments, Federal Departments and Agencies, and industry.**
13:35 – 14:00	Presentation on Technology Status and Discussion – Natural Resources Canada Potential Questions:

	• There are now SMR projects under way for all streams across three provinces; how do we manage multiple technologies to support net-zero goals? ○ **From a regulatory perspective, we want to ensure a standardized design and we encourage industry to continue collaborating.** ○ **Our effectiveness as a regulator will be pushed if industry decides to pursue more designs than are currently proposed.** • Do any major barriers to developing "shovel ready" SMR projects exist? ○ **A lack of community acceptance will undoubtedly be the major barrier to developing and deploying "shovel ready" SMR projects.** ○ **The importance of early, ongoing and sincere efforts to build relationships and earn trust as project proponents cannot be understated to the importance of successful projects.** • How can industry collaborate on the technical advancement of novel SMR features and R&D?
14:00 – 14:30	Presentation on Regulatory Frameworks and Discussion – Canadian Nuclear Safety Commission Potential Questions: • Is their sufficient capability and experience, considering the new technologies, to support the regulatory reviews? Are we bringing in staff with the requisite experience on these new technologies? ○ **We have well educated staff, with a vast international experience.** ○ **Through the VDR Program we provide valuable feedback to reactor designers, which has also allowed CNSC staff to learn about many different types of reactor technologies and designs.** ○ **CSNC staff have adapted well to novel design concepts.** ○ **We received over 520 applicants for our SMR readiness postings. These candidates come from across industries and will help ensure the CNSC is ready for SMR deployment in Canada.** ○ **We focus our efforts on the key behaviors of candidates and capacity and willingness to learn. This is the key.** • What are the opportunities to streamline regulatory reviews, including Impact Assessment Process to enable shovel ready projects faster, in order to meet the Net Zero goals? ○ **Our SMR readiness project looks at exactly this.** ○ **Our flexible framework is well suited for "First of a Kind" SMR deployments.** ○ **As First of a Kind deployments move towards 2nd and 3rd of a kind reactors, the CNSC will apply OPEX to streamline reviews.** ○ **For fleet deployment, the CNSC is also looking at licensing and compliance models that can more efficiently evaluate nuclear activities, while ensuring safety for Canadians.** ○ **But what is critical here is for proponents to ensure that first-of-a-kind deployments are done well and safely – it would be unwise to get fixated on efficiencies for nth-of-a-kind deployments without first demonstrating that first-of-a-kind can be done as designed.**

- What can proponents and/or utilities do to ensure Canadian regulators are positioned to efficiently reviewing applications? E.g., benchmarking across other projects.
    - **Industry has a role to play in regulatory streamlining through:**
        - Involving regulators early in and throughout the process, particularly on any and all uncertainties
        - Ensuring designs have high reliability so that even as designs evolve the safety case remains robust and stable
        - Collaborating on compatibility of industry standards internationally
        - Sharing OPEX
        - Standardized design
- What are the potential impacts on public and Indigenous trust and confidence if regulatory reviews are streamlined in support of fleet deployment?
    - **As a new technology, SMRs require us to ensure we are engaging the public and Indigenous Nations/communities the right way.**
    - **Building trust in regulatory decisions is a key pillar to safe SMR deployment in Canada.**
    - **In new areas, where there is no CNSC/nuclear experience we must be visible and vocal on sharing the key messages about the strength in our regulation.**
    - **That means working hand in hand with Indigenous Nations and communities to ensure two-way communications, active listening, and taking into account Indigenous Knowledge.**

Time (EST)	Item / Responsibility
14:30 – 14:40	Health Break

14:40 – 15:05	Presentation on Nuclear Waste Management and Discussion – Ontario Power Generation and Nuclear Waste Management Organization
	
	Potential Questions:
	• How are all forms of SMR waste streams being managed (high, intermediate, and low)?
	  ○ **Applicants are required to have waste management programs that cover all waste streams for the entire lifecycle.**
	• How does the deployment of SMRs influence the trajectory of the deep geological repository (DGR) in Canada?
	  ○ **Applicants are required to work with the NWMO on disposal.**
	  ○ **We expect the final disposal solutions to remain valid for SMR fuel, but as many of these designs are still in the conceptual phase there is more work to be done.**
	• What are the cascading effects of multiple waste streams on the DGR project?

- What role should be performed in development of waste re-processing technologies to reduce total waste required to be managed?
    - **CNSC is looking to provide more information to Canadians on the topic of waste re-processing, including an overview of the regulatory oversight of this activity globally and safety record of these facilities and whether the CNSC regulatory framework would require revision to address these potential facilities.**
- How can public concerns on SMR waste be addressed?
    - **Indigenous and public interest and concerns over radioactive waste management have been top-of-mind in relation to the nuclear sector for many years, and particularly front and centre over the past year.**
    - **Addressing waste-related concerns requires working with Indigenous Nations and communities, the public and elected officials to best understand what is driving their concerns and responding to them in a meaningful way whenever possible.**
        - Part of that will be in demonstrating how we each have our own particular roles to play and expertise to bring, and do so independently, while at the same time collaborating strongly in the interest of continued safety and lessons learned.
        - However, there is much mis- and disinformation at play on the issue of radioactive waste, particularly given how long and safely it has been managed around the world for decades, so in some instances it will be necessary to push back in a meaningful and resonant way with the facts and science.
    - **NRCan is preparing an updated Policy for Canada on radioactive waste management and decommissioning, and the NWMO is supporting NRCan on the development of an Integrated Strategy for Radioactive Waste.**
        - The CNSC is glad to contribute its technical expertise to both, and both have resulted in significant interest and some concerns.
    - **The hearing for CNL's proposed Near Surface Disposal Facility project resulted in a delayed decision.**
        - The decision reinforces the importance that the Commission places on ensuring Indigenous engagement and consultation is done correctly.
    - **The House Environment and Sustainable Development Committee conducted a study earlier this year and just recently released its report.**
        - We will be supporting NRCan in responding to the report's findings that impact the CNSC
    - **The Commissioner of the Environment and Sustainable Development conducted an audit and will be releasing it soon.**
        - We were pleased to provide information to the CESD and respond to all of their questions as part of their audit of radioactive waste management in Canada

	▪ These audits are important checks on how we are fulfilling our mandate and serving the public, and how we can improve ▪ The audit provides a comprehensive report on the roles of AECL, CNSC and NRCan in the management and accurate accounting of the management of low- and intermediate-level radioactive wastes in Canada ▪ The CNSC looks forward to working with the CESD to address the CNSC-specific recommendations, and will address them in the spirit of continuous improvement ▪ And we welcome the opportunity to appear before parliamentarians to respond to any CNSC-related questions they might have as a result of the audit
15:05 – 15:35	Presentation on Nuclear Fuel Supply Chains and Discussion – CANDU Owners Group SMR Fuel Supply Task Force Potential Questions: • What are the considerations and recommendations for Canada to develop a domestic enrichment capability? Should Canada partner with the US? • What international mechanisms/tools should Canada pursue to secure required nuclear fuel e.g., HALEU bank, UK/US/France cooperation? • What market certainty is required to trigger private Canadian investments in increasing domestic capacity? • What are the considerations and recommendations for reprocessing in Canada? ○ **CNSC is looking to provide more information to Canadians on the topic of waste re-processing, including an overview of the regulatory oversight of this activity globally and safety record of these facilities and whether the CNSC regulatory framework would require revision to address these potential facilities.**
15:35 – 15:50	Canadian Nuclear Association Update – John Gorman Presentation on the CEO Working Group Strategic Goals for 2022 – 2023 – Andy Hayward • Provide an overview of the 4 strategic goals of the Pan-Canadian CEO Working Group ○ Secure Fuel Supply ○ Impact Assessment/Regulatory ○ Federal Investment/Funding ○ Lifecycle Waste Management
15:50 – 16:00	**Meeting Conclusion** ▸ Next steps and action items ▸ Closing remarks – NRCan and IAC

BRIEFING NOTE TO THE PRESIDENT

Anticipated Appearance on the House Standing Committee on Science and Research's Small Modular Nuclear Reactors Study /
Comparution prévue sur l'étude relative aux petits réacteurs nucléaires modulaires par le Comité permanent de la science et de la recherche de la Chambre des communes

Thursday, June 16th, 2022 7 :30 – 8 :30 p.m. EDT

Virtual

ANNEXES

- A – Draft Opening Remarks
- B – Proposed Response Points to Anticipated Questions
- C – Committee Study Motion
- D – SRSR Member Profiles and Lines of Questioning from June 2nd, 2022 Meeting
- E – Summary of June 2nd, 2022, SRSR Meeting
- F – Summary of the June 9th, 2022 SRSR Meeting
- G - Transcript for the June 2nd and June 9th SRSR Meetings (Webcast only so far)
- H – Summary of Letters to Prime Minister Trudeau on Concerns with Moltex's Technology

EVENT SNAPSHOT

The House Standing Committee on Science and Research (SRSR) is conducting a study on "small modular nuclear reactors (SMRs)" to consider how SMRs can benefit the Canadian economy and environment. Areas of interest include impacts on climate change; contributions to Canadian science, research and innovation; impacts on domestic manufacturing and supply chain resilience; and export opportunities.

The CNSC's appearance has not been confirmed, but the Clerk of the Committee has been contacted and informed of the CNSC's offer to appear, whether individually or with other witnesses. The Clerk confirmed that 30-35 witnesses have been invited to appear, and all are generally SMR-positive although some have non-proliferation concerns.

Witnesses have a maximum of 5 minutes for opening remarks. Draft remarks are included in Annex A. Proposed points to register are included in Annex B.

Objectives:

- Highlight the CNSC's readiness efforts to enable safe SMR projects to play a role in combatting climate change.
- Note that needed science and research will be conducted with support from the Natural Sciences and Engineering Research Council of Canada, leveraging the longstanding collaboration in place related to existing CANDU technology.
- Affirm the CNSC's international leadership and collaboration to support the safe and timely global deployment of SMRs.

Participant(s):

- CNSC – President Velshi, Caroline Ducros

- Representatives from NRCan (TBD) and AECL (TBD) will also be on the same panel.

Audience:
12 SRSR members: **6 Liberals** (including the Chair); **4 Conservatives** (including a Vice-Chair); **1 Bloc Québécois** (including a Vice-Chair); and **1 New Democrat**.

BACKGROUND
SRSR was created in May 2021 through a motion unanimously adopted by the House of Commons. It began its work in the current Parliament (44th). Its mandate includes, among other matters, reviewing and reporting on all matters relating to science and research, including any reports of the Chief Science Advisor, and any other matter which the House refers to it.

The tone of meetings is generally very positive, and questions posed by members are generally cordial regardless of a member's perspective on an issue before the Committee.

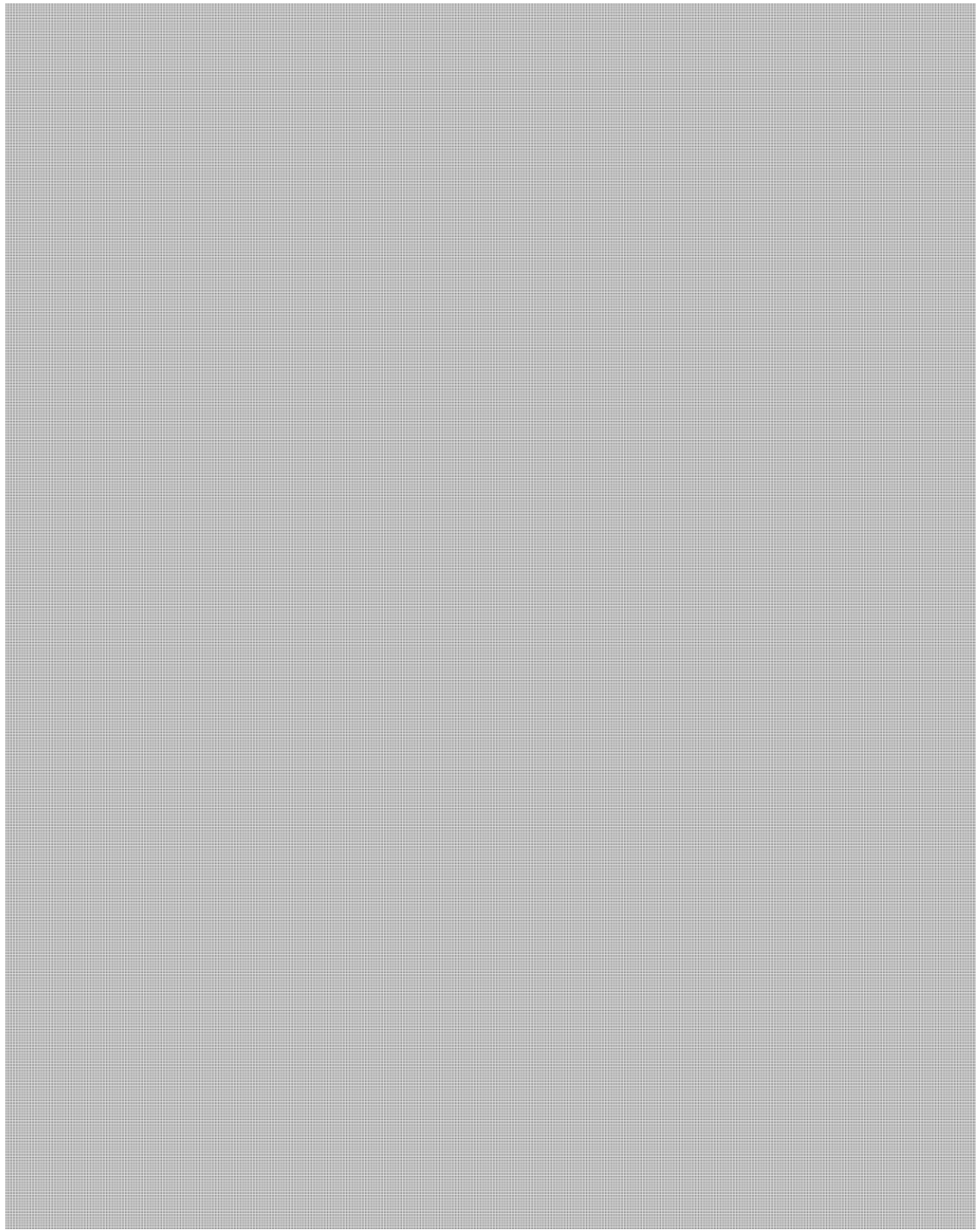
The motion to conduct the SMR study was adopted on February 2nd, 2022 and calls for at least 4 meetings. The 1st meeting was held on June 2nd, 2022 and heard from the heads or senior executives of existing nuclear power plant operators, SMRs proponents (current and prospective), academia, and industry associations, including the Canadian Nuclear Association.

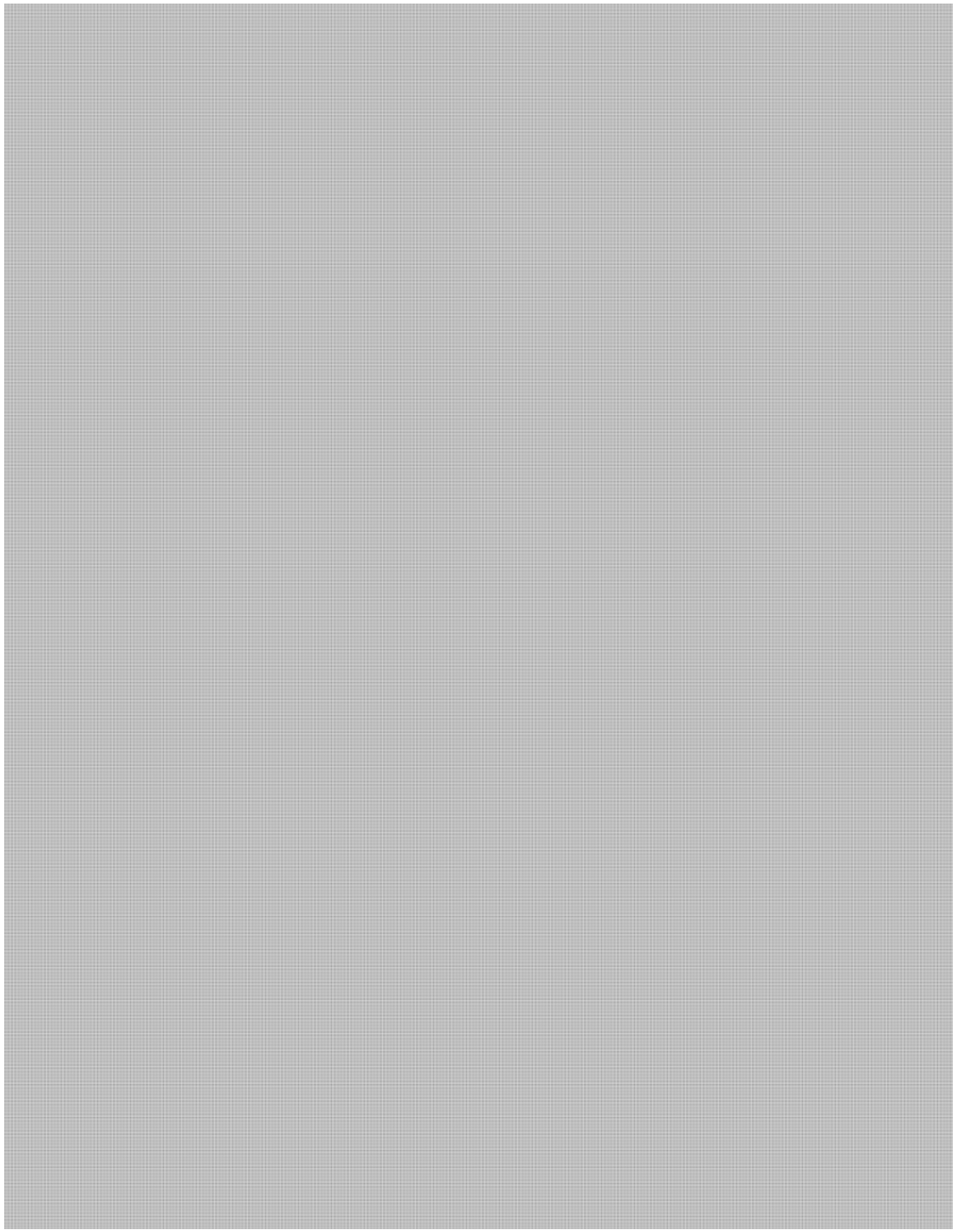
CONSIDERATION
The CNSC was mentioned several times during the June 2nd meeting, mostly in a positive light. Some witnesses raised issues related to streamlining the licensing process, accelerating work with the United States Nuclear Regulatory Commission on harmonization and framework modernization, and nth-of-a-kind units being treated differently that 1st-of-a-kind units.

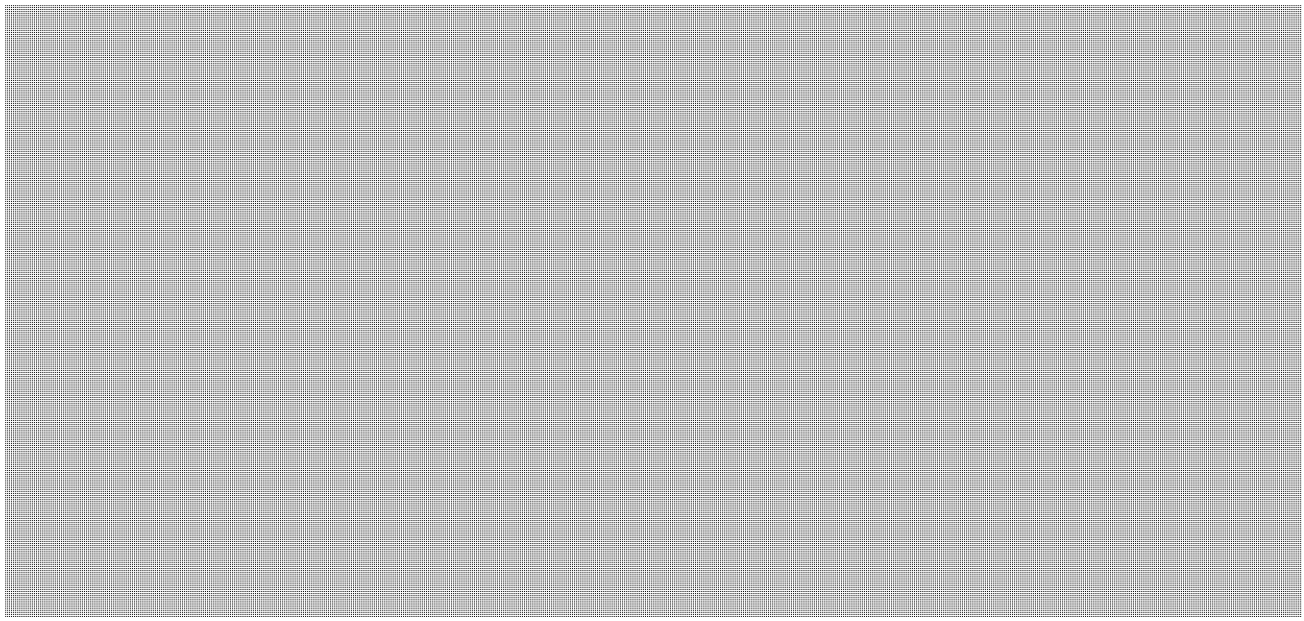
RECOMMENDATION
Briefing material and remarks have been prepared for the CNSC's anticipated appearance.

Prepared by: L. Brunarski; T. Gordon, IGAD
Consulted: C. Ducros (DART), S. Eaton (ARLD), L. Forrest (RFD); P. Bourassa (NECD); N. Petseva (ISD)
Approved by: J. Czerneda, IGAD
Approved by: E. Kanasewich, IGAD
Approved by: K. Dewar, SPD
Approved by: L. Sauer, RAB
Date: June 10, 2022

ANNEX A – Draft Opening Remarks







ANNEX B – Proposed Response Points to Anticipated Questions

1. **What is the CNSC role in approving and regulating SMR projects?**
    - The CNSC regulates the full cycle of nuclear activities in Canada – from uranium mining and milling through to waste management and decommissioning.
    - CNSC review and approval is required for any SMR project, including activities related to site preparation, construction, operation, and decommissioning.
    - The CNSC reviews any proposal related to nuclear energy with 2 goals in mind: protecting human health and the health of the environment.
        - This will not change for SMRs.
        - The CNSC is already reviewing 2 proposed SMR projects: a micro-modular reactor at Chalk River Laboratories in the Ottawa Valley, and a grid-scale SMR at the Darlington site outside the GTA.

2. **What is the CNSC's state of readiness for reviewing and regulating SMR projects?**
    - The CNSC's regulatory regime is largely performance-based, meaning that we regulate based on outcomes as opposed to specific design choices.
    - While the CNSC's familiarity is largely with homegrown CANDU technology, the existing regulatory framework is generally suitable for reviewing and regulating SMR projects.
    - Budget 2022 provided the CNSC $50.7 million over 5 years to accelerate our readiness efforts.
    - These funds will be used to:
        - ensure our regulatory framework is ready for SMRs
        - ensure that we have the needed capacity and capability in place
        - support research and policy development and coordinate with other government departments, and
        - collaborate internationally on harmonization and the development of a new global framework

SUPPLEMENTAL

- Several SMR technologies have been or are being reviewed through a Vendor Design Review process that we offer, which provides CNSC staff important familiarity with designs that might be proposed in Canada.
    - These reviews verify, at a high level, the acceptability of a design with respect to Canadian nuclear regulatory requirements and expectations, as well as Canadian codes and standards.
    - These reviews also identify fundamental barriers to licensing a new design in Canada, which allows the vendor to create a resolution path for any design issues identified in the review.

3. **Is the science and research infrastructure in Canada sufficient to ensure the safe ongoing operation of SMRs for the long term? What gaps exist?**

    - Budget 2022 provides funding to the CNSC that will help ensure that any gaps in the science or research will be addressed.
    - Part of the CNSC's funding will be used to support the development of a research program coordinated by the Natural Sciences and Engineering Research Council of Canada.
        - This program will increase the scientific information available to support decision-making and regulatory oversight and enhance Canadian universities' ability to support the development and implementation of SMR technology.
    - Our existing and active regulatory research program, which provides grants and contributions to key research partners including the University Network of Excellence in Nuclear Engineering and Carleton University, among others, will also help address any gaps.
    - Industry is also conducting extensive research and development on SMR designs. This research helps inform licence applications and also the detailed designs of these SMRs.

4. **Are there any uncertainties in our understanding of SMRs that would impede licensing of these technologies?**

    - The CNSC prioritizes safety above all else and will not approve any application if there are any uncertainties that could pose an unreasonable risk to health, safety, security or the environment.
    - Understanding and addressing uncertainties related to SMRs will be key to their safe development and deployment, and that is one reason we are focused on being ready.
    - Some technologies, like the one being proposed for the Darlington New Nuclear Project, are variations of long operating and well-understood technologies.
        - We are leveraging the experience of our international colleagues in reviewing projects employing those technologies.
    - Other technologies are novel and raise new questions and issues, which the funding in Budget 2022 will help the CNSC address, on our own and by supporting or collaborating with partners.

5. **What testing needs to take place to licence SMRs? Who does it? How can Canada position itself to play a bigger role in the required testing?**

    - Proponents are required to demonstrate their ability to comply with CNSC requirements for any licence that is applied for, including site preparation, construction, operation and decommissioning.

- All applications are rigorously assessed by CNSC experts against the CNSC's requirements.
    - CNSC experts independently review, challenge and validate proponents' information contained in applications to ensure competency to undertake the activities requested.
    - This process exists for all existing and proposed facilities and activities, including SMRs.
    - The ultimate decision maker is the Commission – who are independently appointed.
- The CNSC is actively engaged on SMRs with international organizations such as the IAEA, and the OECD Nuclear Energy Agency. The CNSC also works very closely with like minded regulators such as the U.S. Nuclear Regulatory Commission, and the U.K. Office of Nuclear Regulation.
- Canada and the CNSC enjoy a strong international profile on the nuclear regulatory scene and are leaders in many areas, including SMRs.
- The CNSC is playing a major role in leading the assessment of emerging designs, including through memoranda of cooperation with the U.S. and U.K. regulators.

6. What is the CNSC doing internationally to advance readiness for SMRs, including harmonization of requirements, standards, reviews and licensing?

- The CNSC is actively engaged with peer regulators such as the U.S. NRC and the U.K. ONR, as well as with international organizations such as the IAEA and the OECD NEA.
- Canada is participating in and helping to lead the IAEA's Nuclear Harmonization and Standardization Initiative, or NHSI.
    - The NHSI is facilitating regulatory harmonization and standardization to eliminate regulatory duplication and enable approaches such as fleet deployment of SMRs.
- The CNSC also has memoranda of cooperation with the U.S. NRC and the U.K. NRC.
    - These agreements facilitate regulatory cooperation, including collaborative work and information-sharing on advanced reactor technologies and SMRs.
    - This cooperation is already bearing fruit with the CNSC and U.S. regulator collaborating on 4 joint reports in areas of mutual interest.
    - These reports are published on both of our websites allowing everyone to see the successes of our collaboration.

7. What is the CNSC role in approving new fuel supplies for SMR technologies?

- The CANDU design – the only design in operation in grid-scale reactors in Canada currently – runs on natural uranium.
    - This fuel design is well-characterized and well-understood from a safety perspective.
    - Regardless of fuel designs proposed for SMR projects, the CNSC is or will be ready to conduct a full assessment.
- As part of our Vendor Design Review process, CNSC staff are assessing the proposed fuel designs for SMRs.
    - These assessments include how the fuel performs in normal operations and in potential accidents, the material properties of the fuel, and the safety limits and conditions for fuel.
    - We are also collaborating with both the US and the UK regulators on specific workplans assessing advanced fuels. This collaboration will help identify any key regulatory issues that may have to be addressed during future licensing reviews.
- For the reactor design selected by OPG for the Darlington New Nuclear Project, the proposed fuel has been commercially available and used by reactors in the US for a number of years.
- As we do with all aspects of reactor design and operation, we are rigorously assessing proposals to ensure safety in any licensed activity.
- We are in the process of drafting a new Regulatory Document which will provide additional guidance to reactor designers and operators on the CNSC's expectations regarding fuel safety.

8. What is the CNSC role in approving the use of recycled nuclear waste as fuel in SMRs?

- The Government of Canada is responsible for nuclear policy decisions, including on reprocessing used nuclear fuel in relation to SMRs.
- In accordance with Government of Canada policy, the CNSC will assess the safety of any fuel proposed for use in an SMR design, including the reprocessing of used nuclear fuel for re-use.

9. What is the CNSC role in approving enrichment facilities for SMR fuel?

- Subject to any Government of Canada policy direction, the CNSC would regulate any proposed fuel fabrication or enrichment facility in Canada as it does for any other fuel manufacturing site currently.
- As part of this work and in all its work, the CNSC ensures compliance with the international obligations to which Canada is a party, including those pertaining to non-proliferation.

- Currently there are no licence applications for enrichment facilities in Canada.

10. If the CNSC approves a first-of-a-kind SMR project, will subsequent projects using the same design be able to be approved quicker?

- Regulatory familiarity with a particular design could enable CNSC staff to find efficiencies with subsequent projects using the same design.
    i. CNSC staff would focus the review on the site-specific impacts of that design.
- The CNSC's efficiency requires a high-quality and complete application submitted by a proponent as well as a clear understanding of any unique site characteristics or management system approaches that differ from the first-of-a-kind site.
- Expedited review and approval is a goal of the Nuclear Harmonization and Standardization Initiative being led by the IAEA; where differences are minimized from previously-approved projects, assessment can occur more quickly but with the same amount of rigour due to familiarity.

11. Will all SMR projects be reviewed under the *Impact Assessment Act*?

- The types of projects included under the scope of the *Impact Assessment Act* is outlined in the *Physical Activities Regulations* – more commonly called the Project List.
- The Project List designates any new reactor as subject to an Impact Assessment under the *Impact Assessment Act* if it is:
    - Located within the licensed boundaries of an existing Class IA nuclear facility and the proposed project has a combined thermal capacity of greater than 900 MW_{th}.
    - Located outside the boundaries of an existing Class IA nuclear facility and the proposed project has a combined thermal capacity of greater than 200 MW_{th}.
- If an Impact Assessment is not required, the CNSC conducts an environmental protection review under the provisions of the *Nuclear Safety and Control Act*.
    - These reviews ensure impacts on the environment from proposed projects are limited and manageable, and that the environment continues to be protected.
    - Environmental protection reviews under the NSCA also ensure that the public and Indigenous Nations and Communities can fully participate in the review of the proposed project.

12. What role did the CNSC play in the exclusion of some SMR projects from the Project List, or *Physical Activities Regulations*, under the *Impact Assessment Act*?

- The CNSC provided its advice to government based on its expertise and long-standing experience with the risk profile of nuclear reactors that have operated in Canada safely for many decades and the expected relative risk profile of SMR technologies.

13. How will the transportation of fuelled SMRs to sites and radioactive waste from sites be managed?

- The CNSC has a robust transportation licensing regime, including the manner in which fuel and waste are transported and the design of packages.
    - Packages used for the transportation of high-risk radioactive materials require certification.
    - Certification is contingent on stringent testing, including free-drop testing, puncture testing, thermal testing, and aircraft accident simulations.
    - Testing is extremely robust and rigorous.
    - Thousands of packages containing nuclear substances are transported to, from, and within Canada every single year.
    - Canada has never experienced a serious transportation accident involving nuclear materials.
- The CNSC collaborates closely with Transport Canada and provincial authorities to ensure the safe transportation of nuclear substances, including security planning, emergency response capability, and the communication of hazards as required.

14. How will SMR waste be managed?

- Safe waste management planning and practice is a condition of licensing and applicants are required to provide a plan to manage the waste generated, including the funding necessary to do so.
- While it is not for the CNSC to determine specifically how waste from SMRs will be managed, the CNSC is prepared to receive applications for waste management or waste disposal projects.
    - Any such application will be subject to the CNSC's rigorous framework for assessing projects.
    - For example, earlier this month I chaired a week-long panel to consider an application for the long-term storage of low-level radioactive waste at Chalk River Laboratories in the Ottawa Valley
    - That hearing was preceded by years of regulatory and environmental review before the application was permitted to proceed to licensing review.

- The same rules that apply for our existing CANDU fleet apply to SMRs. Applicants must demonstrate how they will safely store this waste during operations and they must provide a decommissioning plan and financial guarantee.

15. I recently read a paper suggesting that SMRs could produce significantly more waste than conventional reactors. How will this waste be managed?

- Safe waste management planning and practice is a condition of licensing.
- Finding a suitable location in an approved facility is the responsibility of the applicant.
- While the CNSC will consider how much waste a proposed reactor installation would create, this will only be in the context of confirming an applicant's ability to safely manage the waste and its disposal and/or monitoring, as appropriate.

16. Are security requirements for SMRs the same as for large nuclear reactors?

- While the CNSC's regulatory framework is largely performance-based, the *Nuclear Security Regulations* are one such area where we have a mix of prescriptive and performance-based requirements.
- The CNSC is in the process of considering and advancing amendments to the *Nuclear Security Regulations* which will bring the requirements in line with other CNSC performance-based regulatory requirements
    - These amendments ensure that nuclear security is maintained while allowing flexibility for how security is ensured.
- Nuclear security is a core part of our mandate.
    - Any proposed regulatory changes will not weaken nuclear security but will provide proponents with flexibility to propose various approaches to meet security requirements.
- The CNSC would never approve a project if nuclear security was not rigorous and appropriate to the threat environment in which the facility operates.

17. How will Canada's non-proliferation commitments be ensured if SMRs are deployed across Canada, including in remote and northern communities?

- Canada has obligations under an international treaty and agreements to prevent the acquisition and spread of nuclear weapons and verify that nuclear material is not diverted from peaceful uses.
- Every licensee must implement a program aimed at minimizing the risk of diverting items from Canada's civilian nuclear fuel cycle to nuclear weapons development and verify that it is not diverted.
- Proponents for SMR projects will need to demonstrate that they will meet this requirement and the CNSC will verify that they do, in collaboration with inspectors from the International Atomic Energy Agency.

18. By saying the CNSC wants to enable the safe deployment of SMRs, doesn't that show that the CNSC is a captured regulator ready to rubber stamp approvals?

- The CNSC's decision-making process is open, and decisions are publicly available.
- Our public proceedings are transparent, webcast and anyone can ask to appear and be heard.
- Our commitment to safety culture, including regulatory safety culture, means that safety is paramount in all that we do.
- We guard our independence vigorously and have an environment where a questioning and challenging attitude is fostered.
- International peer reviews consistently find that we are independent when measured against international standards.

ANNEX C – February 1st, 2022 Motion for Study on Small Modular Nuclear Reactors

That, pursuant to Standing Order 108(2) the committee undertake a study, of no less than four meetings to hear witness testimony, of small modular nuclear reactors (SMRs), to better understand this emerging technology and how it can benefit both the environment and economy in Canadian society. This study will include, but is not limited to examining, the following:

a) the impacts of SMRs on climate change;

b) the contributions of SMRs to Canadian science, research, and innovation;

c) the impacts of SMRs on Canadian-based manufacturing and on the resilience of domestic supply chains across Canada; and,

d) the opportunities created by SMRs to export this technology globally, to new and existing markets; and,

that the committee report its findings to the House.

ANNEX D – SRSR Member Profiles and Lines of Questioning from June 2nd, 2022, Meeting


CHAIR
	Kirsty Duncan (Liberal; Etobicoke North, ON)
	• First elected in 2008; re-elected ever since
	• Currently also adjunct professor at University of Toronto (medical geography) and Royal Roads University (global environmental processes)
	• Prior to politics:
	  ○ associate professor of health studies (University of Toronto)
	  ○ associate professor of meteorology, climatology and climate change (University of Windsor)
	  ○ taught corporate social responsibility (Rotman School of Management)
	• Published 2003 book "Hunting the 1918 Flu: One Scientist's Search for a Killer Virus" on her expedition to find samples of the Spanish flu in biological samples in permafrost (unsuccessful)
	• BA, geography/anthropology (University of Toronto)
	• PhD (University of Edinburgh)


VICE-CHAIR
	Corey Tochor (Conservative; Saskatoon–University, SK)
	• First elected in 2019; re-elected in 2021
	• Conservative Party's Special Advisor on Nuclear Energy
	• Member of the Saskatchewan Legislative Assembly from 2011 – 2019 (served as Deputy Whip, Deputy House Leader and Speaker)
	• Prior to politics:
	  ○ Owner/operator of Health Conveyance (communications company for health facilities)
	  ○ Sales, e-learning, pharmaceuticals
	• Commerce degree (University of Saskatchewan)
	• **Lines of questioning during SRSR SMR June 2nd meeting:**
	  ○ Nuclear's contribution to phasing out coal-fired generation in Ontario
	  ○ What to say to extreme environmentalists about nuclear
	  ○ Reaching 2050 climate goals without nuclear
	  ○ Any recorded deaths from nuclear waste in the last 10 years
	  ○ Percent energy left in waste after use (requested information in writing as time ran out)
	  ○ SMR projects and role in economic reconciliation
	  ○ Energy alternatives to SMRs for Saskatchewan
	  ○ Source of electricity for electric vehicles in Saskatchewan

	○ Carbon footprint in kilowatt cents of other power sources (hydro, wind, solar)

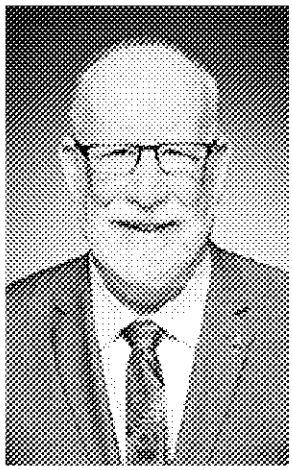
VICE-CHAIR

Maxime Blanchette-Joncas (Bloc Québécois; Rimouski–Témiscouata–Les Basques, QC)

- First elected in 2019; re-elected in 2021
- Bloc Shadow Cabinet Critic for St. Lawrence Seaway, science and innovation
- Prior to politics:
  - Assistant General Manager (Municipality of L'Isle Verte)
  - Administrative Officer (Business Development Bank of Canada)
- Business Administration degree (Université du Québec à Rimouski)
- **Lines of questioning during SRSR SMR June 2nd meeting:**
  - Will SMR technology mature quick enough to play a role in the clean energy transition
  - What are the advantages of developing this technology that is not quite ready to be marketed versus supporting those that are ready
  - Dangers from the presence of enriched uranium and plutonium in the reactors (time ran out for a response to this question)
  - Canada's competitive advantage on SMRs
  - How much production to get large economies of scale
  - How much production to make SMRs affordable
  - How many SMRs can be produced in the next 5 years
  - How can Canada rival larger markets on SMRs such as the U.S., Russia and China
  - Why invest in a technology that it will be difficult for Canada to be competitive in at the international level
  - Any figures to show that SMRs will enable Canada to meet net-zero goals versus technologies that are ready to go

Valerie Bradford (Liberal; Kitchener South–Hespeler, ON)

- First elected in 2021
- Prior to politics:
  - Economic development professional for City of Kitchener
  - Single mother of 3 children
- **Lines of questioning during SRSR SMR June 2nd meeting:**
  - Partnerships with post-secondary or research institutions
  - What shortfalls can further research help overcome
  - Scientific community support to best effect for advancing SMRs



Richard Cannings (NDP; South Okanagan–West Kootenay, BC)

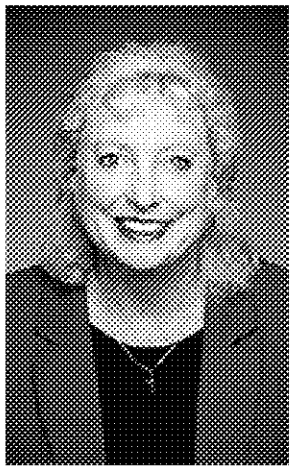
- First elected in 2015; re-elected ever since
- Biologist and author (birds)
- NDP Critic for Emergency Preparedness (Climate Adaptation) and for Small Business and Tourism,
- Deputy Critic for Natural Resources and for Innovation, Science and Industry
- Prior to politics:
  - Taught at University of British Columbia (17 years)
  - Bird Studies Canada (consultant)
  - Birds co-chair on the Committee on the Status of Endangered Wildlife in Canada (8 years)
  - B.C. Environmental Appeal Board (11 years)
  - B.C. Forest Appeals Commission (5 years)
  - Nature Conservancy of Canada Board Member (2006-2015)
- Master's degree, zoology (Memorial University)
- **Lines of questioning during SRSR SMR June 2nd meeting:**
  - Skepticism of Indigenous communities' acceptance of SMRs and their potential to get Indigenous communities off of diesel
  - CER's projections for nuclear growing minimally between 2029-2050 with dramatic increases for wind and solar
  - Letter from US experts to PM Trudeau about Moltex technology – reducing the volume of waste from CANDU reactors leaves 5% of the nasty stuff, including plutonium, which is concerning because it could lead to non-proliferation concerns

	○ Concerns about costs – how many units need to be built before SMRs are cost competitive with hydro, wind, solar and conventional nuclear ○ Indigenous engagement and consultation (mentioned Kebaowek First Nation specifically) ○ Footprint of GFP's micro modular reactor as being closer to any Olympic running track than a hot water tank ○ Community employment opportunities from new SMR projects ○ Provincial interties as an option for Saskatchewan and nationally to provide baseload power to provinces that do not have clean power now

	**Chad Collins** (Liberal; Hamilton–Stoney Creek, ON) • First elected in 2021 • Former City of Hamilton councillor and President, City Housing Hamilton • Attended University of Western Ontario and McMaster University • **Lines of questioning during SRSR SMR June 2nd meeting:** ○ Role of government in assisting with education efforts and dispelling myths around SMRs ○ What policy and financial support is needed from the federal government

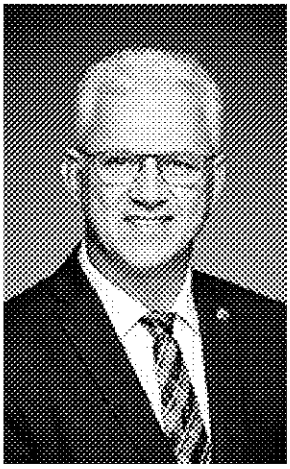
Lena Metlege Diab (Liberal; Halifax West, NS)

- First elected in 2021
- Lawyer
- Former Member of the Nova Scotia House of Assembly, 2013-2021 (Minister of Immigration; Minister of Justice, Attorney General of Nova Scotia and Provincial Secretary)
- Prior to politics:
  - Practiced law and operated a small business
- Master of Public Administration ('87); Bachelor of Laws ('90) – Dalhousie University
- **Lines of questioning during SRSR SMR June 2nd meeting:**
  - Labour availability
  - How can the various levels of government and parliamentarians help to ensure the needed labour is available
  - Is there enough research in this sector
  - Collaboration with Canadian research institutions
  - How does Canada compare internationally



Marilyn Gladu (Conservative; Sarnia–Lambton, ON)

- First elected in 2015; re-elected ever since
- Professional engineer
- Conservative Associate Shadow Minister for International Trade and Supply Chains
- Prior to politics:
  - Dow Chemical (21 years)
  - Suncor – Director of Engineering
  - WorleyParsons – consultant
  - Canadian Society of Chemical Engineers – National Director of Science and Industry Policy
  - Dean's Advisory Council for the Faculty of Engineering (Queen's University)
- **Lines of questioning during SRSR SMR June 2nd meeting:**
  - What regulatory delays are causing an extension of deployment time by 3 years
  - With a projection of brown outs in Ontario as early as 2024 due to nuclear upgrades and expansion not going as predicted, are there any SMR technologies that will be in place to address that
  - Federal government's role in accelerating the commercialization of SMRs
  - Any difficulties/process delays from a regulatory perspective
  - Demand projections



Stéphane Lauzon (Liberal; Argenteuil–La Petite-Nation, QC)

- First elected in 2015; re-elected ever since
- Former Gatineau City councillor (2009-2015)
- Prior to politics:
  - Canadian International Paper Company (1980s)
  - Vocational training instructor (1990s – 2000s)
  - Construction management
- **Lines of questioning during SRSR SMR June 2nd meeting:**
  - How will used nuclear fuel be used as new as fuel, does the technology exist now and what residue will be leftover
  - How can science help to use nuclear waste better and dispose of nuclear waste
  - Short- and medium-term plans for spent nuclear fuel disposal
  - Relationship between hydroelectric and nuclear
  - Does Bruce Power deal with wind power and nuclear power
  - Stanford University report on SMRs producing more nuclear waste over the long-term relative to large reactors, and any reconsideration by Bruce Power of the SMR technology in response to it
  - Co-generation and heat-recuperation technology

Ron McKinnon (Liberal; Coquitlam–Port Coquitlam, BC)

- First elected in 2015; re-elected ever since
- Computer systems analyst
- University of Alberta; Southern Alberta Institute of Technology
- **Lines of questioning during SRSR SMR June 2nd meeting:**
  - Where should research efforts be focused to advance the science and make SMRs more effective, viable and timely
  - Is more research needed into more fission processes, radioisotopes to get more out of the processes for more energy and new technology directions

Gerald Soroka (Conservative; Yellowhead, AB)

- First elected in 2019; re-elected in 2021
- Farmer
- Former Mayor of Yellowhead (2007 – 2020)
- **Lines of questioning during SRSR SMR June 2nd meeting:**
  - Challenges/policy issues from the federal government on the development/deployment of SMRs in Canada
  - Tax incentives/green bonds from the federal government for renewable technologies but not for nuclear
  - Nuclear energy reliability/cost effectiveness versus renewables
  - Nuclear and renewable sources in competition versus balancing each other
  - Role of nuclear in net-zero by 2050 targets – how much electricity from nuclear to be able to help with that goal

Ryan Williams (Conservative; Bay of Quinte, ON)

- First elected in 2021
- Entrepreneur/co-owner of Hops on Board (beer delivery)
- Conservative Deputy Shadow Minister for Innovation, Science and Industry
- Former City of Belleville councillor
- Prior to politics:
  - President, Williams Hotels
  - President, Bay of Quinte Tourism
  - President, Bay of Quinte Living Council
  - Chair/Founder, QuinteVation (develop a more innovative Quinte)
- **Lines of questioning during SRSR SMR June 2nd meeting:**
  - Short, medium- and long-term vision for OPG
  - Worker shortage now or in the future
  - Support for energy corridor in Canada
  - Hydrogen production

ANNEX E – Summary of June 2nd, 2022, SRSR Meeting

The House Standing Committee on Science and Research (SRSR) held its 1st of at least 4 meetings on June 2nd, 2022 in its study of Small Modular Nuclear Reactors. The tone of the meeting was very positive from all involved. The witnesses each had 5 minutes for opening remarks and were divided into 3 one-hour panels.

Panel 1 (6:30 – 7:30)
- ***Canadian Nuclear Association*** (John Gorman, President and Chief Executive Officer) – *in person*
- ***Ontario Tech University*** (Kirk Atkinson, Associate Professor and Director, Centre for Small Modular Reactors) – *in person*
- ***Moltex Energy*** (Rory O'Sullivan, Chief Executive Officer, North America) – *virtual*

Panel 2 (7:30 – 8:30)
- ***Bruce Power*** (Michael Rencheck, President and Chief Executive Officer) – *virtual*
- ***New Brunswick Power Corporation*** (Brett Plummer, Chief Nuclear Officer and Vice-President Nuclear) – *virtual*
- ***Ontario Power Generation Inc.*** (Ken Hartwick, President and Chief Executive Officer) – *virtual*

Panel 3 (8:30 – 9:30)
- ***SaskPower*** (Troy King, Acting President and Chief Executive Officer) – *virtual*
- ***Electricity Canada*** (Francis Bradley, President and Chief Executive Officer) – *virtual*
- ***Global First Power*** (Jos Diening, Managing Director) – *virtual*

All gave an overview of their organizations, their work related to SMRs and the contributions that are or will be made by SMRs and nuclear energy in providing electricity, meeting climate goals, medical radioisotopes and supporting Canada's economy. Ken Hartwick from OPG was not able to participate virtually because the French interpreters could not hear his remarks through his microphone.

The CNSC was mentioned directly or indirectly in the following instances, whether in opening remarks or in response to questions:
- The CNSC's vendor design review (VDR) process is giving familiarity with proposed designs (Kirk Atkinson)
- The CNSC is one of the highest regarded regulators in the world and its open and robust regime is attractive to new technologies (Rory O'Sullivan)
- Moltex is working with the CNSC to make sure Moltex's reprocessing technology is developed and implemented according to the highest standards and with the IAEA to monitor safety (Rory O'Sullivan)
- Support for the funding provided to the CNSC in Budget 2022 addressed difficulty within the CNSC in ramping up to review projects (Mike Rencheck)
- Canada – US regulatory harmonization will enable the process to be sped up and the framework modernized, a process that is just getting started and must accelerate (Mike Rencheck)
- Streamlining of licensing and regulatory requirements is needed to enable 2050 climate goals to be met (Mike Rencheck)

- Optionality will be created by providing and developing a path forward to site technology and technology selection and attract private capital investment in nuclear projects (Mike Rencheck)
- All levels of government must work with industry to share financial risks and challenges associated with environmental regulations and the CNSC's licensing of the technology (Mike Rencheck)
- The CNSC has been extremely cooperative to date. Building n^{th}-of-a-kind units cannot be the same process for building 1^{st}-of-a-kind projects. Assessments of n^{th}-of-a-kind units should only be on any changes to site characteristics (Brett Plummer)
- The VDR process is well underway and results in an economic advantage for Canada as an early mover, with many different vendors coming to Canada because of our graded approach to evaluating new technologies (Brett Plummer)
- There are no concerns from Moltex's reprocessing technology because it is used around the world and regulators, internationally and across Canada, must be trusted to make sure that it will be done safely as the process is evaluated (Brett Plummer)
- Preparing to submit licence to prepare site to the CNSC by the end of this year (Jos Diening)
- Industry concerns over CNSC capacity to handle surge of projects alleviated by funding in Budget 2022 (Jos Diening)

Committee members asked many and varied questions, all in a cordial manner regardless of their perspective on SMRs or nuclear energy/radioactive waste generally. Question areas included:

- **Nuclear's contribution to electricity needs and meeting climate change goals**, including whether the technology will be ready in time to make a meaningful contribution to 2050 goals and the loss of electricity from the Pickering shutdown; and comparisons to other clean energy technologies
- **Role of the federal government**, including in assisting education efforts and dispelling myths around SMRs; providing policy and financial support; ensuring labour availability; and accelerating commercialization
- **Spent nuclear fuel**, including the percent of energy left after use; how it will be used as fuel in Moltex's technology and if that technology exists now and the residue that will be leftover; how science can help to better use it and dispose of it; short- and medium-term plans for its disposal; deaths related to nuclear waste in the past 10 years; and the Stanford University report on waste generated from SMRs
- **Process delays** from regulatory or supply chain difficulties
- **Indigenous Peoples**, including SMRs as part of economic reconciliation; Kebaowek First Nation not being consulted on the GFP project; remote Indigenous communities not accepting SMR projects; and Indigenous employment in projects
- **Production numbers** required for economies of scale and affordability
- **Research**, including partnerships with post-secondary and research institutions; shortfalls that research can address; and support from the scientific community to advance SMRs
- **Moltex's reprocessing process**, including concerns from people in the US in a letter to PM Trudeau about non-proliferation and environmental concerns
- **Electricity demand projections**
- **Canada's competitiveness on SMRs,** including with larger nuclear markets such as Russia and China

ANNEX F – Summary of the June 9th, 2022 SRSR Meeting

On June 9th, the House Standing Committee on Science and Research (SRSR) held its 2nd of at least 4 meetings in its study of Small Modular Nuclear Reactors. The tone of the meeting was very positive from all involved. The witnesses each had 5 minutes for opening remarks and were divided into 3 one-hour panels.

Panel 1 (6:30 p.m. to 7:30 p.m.)
- ***Canadians for Nuclear Energy*** (Dr. Christopher Keefer, President) – *in person*
- ***Canadian Nuclear Laboratories*** (Joseph McBrearty, President and Chief Executive Officer; Louis Riccoboni, Vice President, Corporate Affairs) – *in person*
- ***Coalition for Responsible Energy Development in New-Brunswick*** (Dr. Susan O'Donnell, Adjunct Research Professor) – *virtual*

Panel 2 (7:30 p.m. to 8:30 p.m.)
- ***As an individual*** (Evelyn Gigantes) – *virtual*
- ***Canadian Coalition for Nuclear Responsibility*** (Dr. Gordon Edwards, President) – *virtual*
- ***Westinghouse Electric Canada*** (Edouard Saab, President) – *virtual*

Panel 3 (8:30 p.m. to 9:30 p.m.)
- ***As an individual*** (Dr. Jeremy Rayner, Researcher, Centre for the Study of Science and Innovation Policy; Professor, Johnson Shoyama Graduate School of Public Policy) – *in person*
- ***Canadian Nuclear Workers Council*** (Robert Walker, National Director) – *virtual*
- ***Sylvia Fedoruk Canadian Centre for Nuclear Innovation Inc.*** (Dr. John Root, Executive Director) – *virtual*

All gave an overview of their organizations and their work, support and/or opposition related to SMRs.

The CNSC was mentioned directly or indirectly in the following instances, whether in opening remarks or in response to questions:
- The CNSC announced last year that Global First Power's application for a licence to construct would move to a formal review (Joe McBrearty)
- The CNSC has a pre-licensing vendor design review (VDR) process but it is optional, not required, and the CNSC is clear that a VDR is not a technical review (Susan O'Donnell)
- Referenced the CNSC in a passing reference to the May 30th – June 3rd hearing in Pembroke on the proposed Near Surface Disposal Facility project (Joe McBrearty)
- The former Chair of the Canadian Nuclear Safety Commission ensured that most SMRs would not require an impact assessment under the *Impact Assessment Act* by arranging matters so that most SMRs are not included on the project list – it's an astonishing fact that most SMRs will not be subject to any environmental review (Evelyn Gigantes)
- The CNSC is a world-class nuclear regulator (Edouard Saab)
- A regulator is in place to make sure we do things right on projects (Edouard Saab)
- The CNSC would have requirements for the waste from SMRs the same as for existing nuclear power plants (Edouard Saab)

- We will follow the CNSC's environmental assessment requirements for SMRs under 200 megawatts (Edouard Saab)
- Would not expect that any issues raised through the Impact Assessment process would not have been identified through the CNSC's processes (Edouard Saab)
- Market readiness will largely depend on the licensing process so that customers who want a reactor now can get one as soon as possible (Edouard Saab)
- SMR advocates think there should be more subsidies and less regulation (Jeremy Rayner)
- Regulation raises the critical issue of public confidence – if SMRs are to be a transformational technology, then they must be built closer to where people live and work than has been the case for nuclear facilities in the past (Jeremy Rayner)
- The reputation of the CNSC for evidence-based regulation needs to be protected and rushing designs needs to be avoided (Jeremy Rayner)
- Placing engagement responsibilities on proponents results in issues being raised that are outside of their competence, such as uranium mining and disposal of fuel, when those and other broad questions need to be included in public engagement (Jeremy Rayner)
- There will be no future for projects outside of already licensed facilities without the free, prior and informed consent of Indigenous communities, particularly when SMRs will involve the transportation of modules and disposal of waste (Jeremy Rayner)
- CNSC has worked on the safe management of radioactive waste and radiation protection (Jeremy Rayner)
- There is a well developed regulatory scheme in Canada – the need for speed should not allow us to relax or change that regulatory framework. The danger is in reducing the protections we currently have (Jeremy Rayner)
- Having an arms-length regulator is very important and we should not do anything to jeopardize that (Jeremy Rayner)
- CNSC has been involved since 2014 with IAEA's SMR working group working through issues around regulation (Jeremy Rayner)
- My concern is that the CNSC doesn't see it as their role to take part in the process of engagement on the part of a design or use or whatever it may be, so we have to ask where will the engagement come from that will hear if not address the concerns that the public might have (Jeremy Rayner)
- We regularly engage with the regulator (Bob Walker)

Lines of questioning and comments from members were very similar to those from the 1st meeting, with much of the focus was on radioactive waste and Moltex's proposed reprocessing technology, although there was an increased focus on environmental reviews:

- **Moltex's reprocessing technology**, including the scientific basis for supporting the technology; US nonproliferation experts' concerns raised to the Canadian federal government; and Moltex's export goals and links to nonproliferation concerns
- **Radioactive waste**, including percentage of energy remaining in used fuel; differences between Canada's used nuclear fuel and other countries; storing Canada's used nuclear fuel; repurposing used nuclear fuel; processes needed to repurpose used nuclear fuel; research needed to repurpose used nuclear fuel; reactors that can reuse reprocessed used nuclear fuel; costs associated with managing radioactive waste; Seaborn Panel recommendation that the waste management organization be completely independent; protections and funding up-front for clean-up and managing waste from SMRs on the backend; lifecycle of the e-Vinci and disposal plan; what SMR waste might look like on

a global scale; and managing SMR waste that is dispersed across many sites and moving it across Canada

- **Environmental reviews**, including misinformation and disinformation about SMRs not being subject to environmental reviews when they in fact are and those reviews are extending the timelines of projects; the *Impact Assessment Act* as a problem to building SMRs; and environmental policies in place as performative in relation to safety versus substantive
- **Nuclear's contribution to meeting net-zero targets**, including the possibility of meeting targets without nuclear; SMRs not being ready in time to make a meaningful contribution; Ontario's ability to retire coal-fired generation; and interest in Europe around SMRs
    - Christopher Keefer said that Pickering needs to be refurbished or Canada risks eliminating all of the progress toward national emission reductions to date
- **Role of the federal government**, including in bridging any gap between academia and industry; funding clean technologies other than SMRs; growing the nuclear industry; exclusion of nuclear from the Green Bond Framework; and in education and public engagement
- **Research**, including the role and involvement of Canadian universities or educational institutions in SMRs; areas of research most needed to advance SMR technologies; improving SMR marketability; and processes to direct research funding for prototypes
    - Susan O'Donnell replied that all funding for net-zero technologies should be science-based and go through the Natural Sciences and Engineering Research Council of Canada (NSERC)
    - Jeremy Rayner was distressed to hear the suggestion that all funding for SMRs should be funneled through NSERC since many of the important questions and issues related to SMRs are in the domain of the social sciences
- **Labour availability**, including any challenges in accessing the needed labour and skills for SMRs; a shortage of high-pressure welders; Cameco as the private sector company employing the largest number of Indigenous people in Canada; Westinghouse Electric Canada's distribution of employees across Canada; remuneration in nuclear trades versus oil and gas; turnover rates; representation of women in the nuclear sector; training needed to operate SMRs; and how many jobs available to operate SMRs following construction
- **Engagement**, including CNL's engagement with Indigenous communities, environmental groups and the local population around Chalk River Laboratory; Kebaowek First Nation's concerns related to activities at Chalk River Laboratories and wanting a review of how radioactive waste is dealt with in Canada; Chiefs of Ontario opposition to SMRs in remote First Nations communities; and Canada's reputation on engagement with respect to nuclear energy
- **Safety**, including why SMRs are "expected" to be much safer than current reactors; the number of deaths from nuclear energy or nuclear waste in the last decade or 50 years; and relative risks from SMRs and micro modular reactors versus conventional large reactors
- **Commercialization**, including any barriers; achieving economies of scale with SMRs and competing with the US, Russia and China; and costs relative to other technologies;
- **Medical isotopes**, including the shortage of medical isotopes from Chalk River being down "a year or so ago"; and importance for hospitals across Canada

- **Fusion**, notably the state of the art in its development

ANNEX G – Transcripts for the June 2nd and June 9th, 2022, SRSR Meetings

For both meetings, presently only the video recording is available.

Video Recordings can be found here:
https://www.ourcommons.ca/Committees/en/SRSR/StudyActivity?studyActivityId=11584398

The transcripts will be added once available.

ANNEX H - Summary of Letters to Prime Minister Trudeau on Concerns with Moltex's Technology

NRCan Parliamentary Affairs Unit shared 3 letters (e-Docs 6814835; 6814836; 6814837) that were sent to Prime Minister Trudeau between May and November 2021 by U.S. nonproliferation experts concerned with Moltex's proposed reprocessing technology. The letters were referred to by SRSR member Cannings during the 1st meeting of the SMR study.

Highlights of concerns and contentions from each letter are:

May 25, 2021

- Federal government funding of Moltex's proposed reprocessing of CANDU spent fuel to recover its contained plutonium for use in molten-salt-cooled reactors
- Would create contaminated facilities and radioactive waste streams requiring additional government funding for clean-up and stabilization prior to disposal
- Government of Canada support will undermine global nuclear weapons nonproliferation regime that Canada has strengthened, including as founding member of Nuclear Suppliers Group
- Moltex's proposed fuel cycle appears is based on pyroprocessing technology developed by US Argonne National Laboratory
- A review by nonproliferation experts (2009) has shown that pyroprocessing is about as susceptible to misuse for proliferation as the PUREX reprocessing technology, which is used worldwide in nuclear weapon and civilian plutonium programs
- Pyroprocessing at US Idaho National Laboratory to process fuel from shutdown US Experimental Breeder Reactor EBR-2 has been costly, unreliable and not produced stable forms of radioactive waste suitable for deep underground disposal
- CANDU spent fuel is a stable waste form suitable for disposal
- India's 1974 first nuclear weapon tested was developed using plutonium produced with Canadian and US technologies and materials provided for India's use in its breeder reactor program
- US announced in 1977 the indefinite deferral of reprocessing and breeder commercialization
- Moltex's claims of removing plutonium and other long-lived transuranic elements from CANDU spent fuel to reduce long-term risk from a deep underground radioactive waste repository have been discredited
- US National Academy of Sciences (1996) found plutonium and other transuranic oxides are relatively insoluble in deep underground anoxic water and poorly absorbed by plants and animals
- Leakage risks from underground repositories would likely be dominated by more mobile and absorbable radioisotopes such as iodine-129, which if not released to the environment during processing would remain in radioactive waste

July 28, 2021

- Responses to Moltex's response to the May 25, 2021 letter and claims by Moltex's chairman and chief scientist about its technology

- Concerns persist over undermining fragile global nuclear-weapon nonproliferation regime
- Wrote to President Biden with concerns about US DOE inviting proposals for research and development on reprocessing spent fuel from "advanced" reactors
- Acknowledges Moltex's claim that civilian reprocessing is a decision for each country, but concerned that approach will encourage many states to reprocess
- Dispute Moltex's claim that an expensive conventional reprocessing facility would be required to extract plutonium from the output of Moltex's waste to stable salt process, citing a 2009 study by safeguards experts from 6 US national laboratories finding that only a relatively cheap, small laboratory hot cell would be required to extract plutonium
- Dispute Moltex's claim that the actinides (plutonium and other reactor-made transuranic elements in spent fuel) would be the dominant hazard in spent fuel in deep underground repositories, contending that the risk is overblown since transuranics have low solubility and relatively low uptake by the human food chain and gut
- Studies from France and Sweden confirmed that transuranics do not dominate the hazard from buried spent fuel

November 24, 2021

- Reiterated concerns and positions in previous 2 letters
- Noted receipt of response to May 2021 letter, which referred the issue to Minister of Foreign Affairs and Minister of Natural Resources, but did not receive a response
- Added that Idaho National Laboratory has yet to demonstrate that the pyroprocessing technology Moltex proposes to use converts the radioactive salt waste into a stable form suitable for disposal
- Offered to provide additional relevant background information

Bergeron, Marie-Josée

From: Czerneda, Jennifer
Sent: Thursday, October 20, 2022 2:51 PM
To: Boudrias, Geneviève; Gratton, Wayne; CEO President / PD Président (CNSC/CCSN)
Cc: Morin, Chantal; Lorrain, Suzanne; Donnelly, Lisa
Subject: RE: Ministerial Package: Update

Hi Gen,

Yes, the key messages have all been approved by management.

Michael, Peter and Ramzi reviewed and commented on the the key points for the Minister.

The supplemental points are the ones that the President wanted added for context from the SMR Leadership Table – all approved.

Thanks,

Jen

From: Boudrias, Geneviève <Genevieve.Boudrias@cnsc-ccsn.gc.ca>
Sent: October 20, 2022 2:47 PM
To: Gratton, Wayne <wayne.gratton@cnsc-ccsn.gc.ca>; CEO President / PD Président (CNSC/CCSN) <President-CEO@cnsc-ccsn.gc.ca>
Cc: Morin, Chantal <chantal.Morin3@cnsc-ccsn.gc.ca>; Lorrain, Suzanne <suzanne.lorrain@cnsc-ccsn.gc.ca>; Czerneda, Jennifer <Jennifer.Czerneda@cnsc-ccsn.gc.ca>; Donnelly, Lisa <Lisa.Donnelly@cnsc-ccsn.gc.ca>
Subject: RE: Ministerial Package: Update

Have these been reviewed approved by your management?
Also weren't these in the note...I recall reading at least most of these.
Gen

From: Gratton, Wayne <wayne.gratton@cnsc-ccsn.gc.ca>
Sent: October 20, 2022 2:40 PM
To: Boudrias, Geneviève <Genevieve.Boudrias@cnsc-ccsn.gc.ca>; CEO President / PD Président (CNSC/CCSN) <President-CEO@cnsc-ccsn.gc.ca>
Cc: Morin, Chantal <chantal.Morin3@cnsc-ccsn.gc.ca>; Lorrain, Suzanne <suzanne.lorrain@cnsc-ccsn.gc.ca>; Czerneda, Jennifer <Jennifer.Czerneda@cnsc-ccsn.gc.ca>; Donnelly, Lisa <Lisa.Donnelly@cnsc-ccsn.gc.ca>
Subject: RE: Ministerial Package: Update

Hi Gen, some points to raise with the Minister.

Domestically

- The Government should address outstanding policy issues – e.g. reprocessing, project vetoes – to ensure clarity is provided prior to a project entering the regulatory process

Wayne

From: Boudrias, Geneviève <Genevieve.Boudrias@cnsc-ccsn.gc.ca>
Sent: October 20, 2022 1:46 PM
To: CEO President / PD Président (CNSC/CCSN) <President-CEO@cnsc-ccsn.gc.ca>
Cc: Morin, Chantal <chantal.Morin3@cnsc-ccsn.gc.ca>; Lorrain, Suzanne <suzanne.lorrain@cnsc-ccsn.gc.ca>; Gratton, Wayne <wayne.gratton@cnsc-ccsn.gc.ca>
Subject: FW: Ministerial Package: Update
Importance: High

Johanne,
Ready to be shared with President with following note:

- The Canadian National Statement and Joint CND/US/UK statement are not part of the package. Still with NRCan. We are told the NRCan delegation is staying at the Marriott Marquis Hotel (adjacent to the Convention Center).
- RAB will pass along points for the Minister later today.
- Roundtable with Euratom below no points added yet; added to schedule but RAB first wants to confirm that you want to attend (PLEASE CONFIRM)

Day 2 – Thursday, October 27: Ministerial

Roundtable with the European Commission's Deputy Director-General for Energy responsible for Euratom policies, Massimo Garribba *Discussing the prospects for advanced and conventional nuclear energy technologies for addressing Europe's energy security and climate objectives.*	**9:00 - 10:00**

Deputy Director-General Garribba will discuss the importance of transatlantic cooperation on nuclear safety standards, security of supply of nuclear materials and services, and the atomic energy supply chain, as well as the strategic role of small modular reactors and nuclear fusion in advancing climate and energy security objectives. *Olga Khakova, Deputy Director for European energy security at the Atlantic Council Global Energy Center, will moderate the conversation.*	

Bergeron, Marie-Josée

From: Czerneda, Jennifer
Sent: Monday, October 24, 2022 8:58 PM
To: DeJong, Michael
Cc: Dewar, Keith
Subject: PPF Meeting Tomorrow - Speaking Points

Good evening Michael,

Tomorrow I will be attending the PPF meeting on your behalf. Keith asked me to share with you some of the key messaging.

There are 4 sessions:

1. What can regulators do to advance the energy transition, what should they do, and how to implement it?
2. Climate change and regulatory developments
3. What should policy makers do to facilitate the work of regulators driving the transition?
4. What can regulators do within current mandates to facilitate the transition to a low-carbon economy?

We also know one of the panellists on the last panel, and that the topic may come up that the CNSC is a "captured regulator".

There is no additional information at this time. So for the first two sessions (and the forth one), I think the messaging for us would largely be along the following lines:

- Regulators should be ready. They should know – to the extent possible - what is coming their way.
- As a safety regulator, it is not our job to promote but we should not be an impediment or burden to innovation/clean tech.
- Need to ensure regulatory predictability and efficiency.
- CNSC is getting ready for SMRs (and the paradigm shift) by ensuring we have the appropriate regulatory framework, the right capacity/capabilities, and optimized partnerships - while striving for international collaboration/harmonization.
- Must prioritize trust

For what policy makers should do:

- For the regulatory process to be predictable and efficient – policy issues need to be resolved in advance.
    - One example is reprocessing.
    - Difficult to regulate in a policy void – or perceived policy void.
    - The issues should be consulted on and resolved prior to a project coming for regulatory approval.
- Policy makers also have an important leadership role to play
    - SMR action plan and leadership table
    - Energy roundtables
    - Building trust

If the issue of "captured regulator" comes up:

- The CNSC is not a captured regulator
- The CNSC reports to Parliament through, **not to**, the Minister of Natural Resources
- CNSC decisions are science-based and risk-informed and consider all the evidence presented during open and inclusive public hearings

Thank you,

Jen

Jennifer Czerneda
Acting Director I Directrice par intérim
International and Government Affairs Division I Division des affaires internationals et gouvernementales
Strategic Planning Directorate I Direction de la planification stratégique
Canadian Nuclear Safety Commission I Commission canadienne de sûreté nucléaire

s.21(1)(a)
s.21(1)(b)

BRIEFING NOTE TO THE PRESIDENT

Bilateral with Deputy Minister John Hannaford / Rencontre bilatérale avec le sous-ministre John Hannaford

October 11, 2022 Time 1:00 pm

MEETING OVERVIEW

This meeting is part of President Velshi's quarterly bilaterals with DM Hannaford. These meetings are an opportunity to provide updates and discuss files of mutual interest. The last bilateral took place on July 27, 2022.

Objectives:

President Velshi could provide updates on the following:

1. [redacted]
2. SMR Leadership Table/Forum
3. [redacted]
4. International Efforts
5. House of Common's Standing Committee
6. Extension of Pickering

Participants: President Velshi and DM John Hannaford

Key Messages

- [redacted]
- **SMR**: Opportunity to discuss outcomes from the October 3 meeting of the SMR Leadership Table and a regional roundtable focused on nuclear energy with the 4 implicated provinces is proposed.
- [redacted]
- **International Efforts**: The CNSC continues to take a leadership role on regulatory harmonization. We support [redacted] and a Team Canada approach at the IAEA Ministerial Conference.
- **Standing Committees**: We are comfortable with the CESD's audit findings on nuclear waste management, and we are committed to supporting NRCan in preparing timely Government Responses and the associated Memorandums to Cabinet.
- **Pickering**: The CNSC nor the Commission have received, in writing, the facility's plan to extend its operations. If OPG plans to operate beyond December 2024, it is required to inform the CNSC in writing no later than December 31, 2022.

ADVICE TO THE PRESIDENT

During the upcoming bilateral President Velshi may wish to raise the following:

[redacted]

- [redacted]

- **SMRs**
  - SMR Leadership Table – discuss outcomes/next steps from the October 3 meeting
  - Regional Tables – Nuclear Proposal
    - Is there an opportunity to develop a regional table focused on nuclear – or to establish a coordinated sub-group – that would bring together the Provinces of New Brunswick, Ontario, Saskatchewan, and Alberta to chart a path forward for SMRs?
    - Or how can the regional tables provide a regional governance frame that leverages the provinces' existing strategic plan for the deployment of SMRs?

[redacted]

- **International Efforts**

[redacted]

  - IAEA Ministerial Conference
    - The CNSC's objectives at the Ministerial Conference are to provide an update on our readiness activities while impressing on participants the importance of building trust and the need for harmonization of standards, requirements, licensing and approval processes for SMRs.
    - We look forward to discussing how our objectives fit within the larger Team Canada vision as well as the CNSC can contribute to the national statement.

- General Conference Update
- INRA Joint Statement
- UN Climate Change Conference of Parties in 2023 (COP27)

- **House of Commons Standing Committee appearances**
  - Environment and Sustainable Development Committee (ENVI)
    - The study report on nuclear waste was released in September and a government response to the recommendations is required – likely led by NRCan.
    - There are 5 recommendations for the CNSC. We will work closely with NRCan in developing the response.
  - Science and Research Committee (SRSR)
    - SRSR recently completed a study to consider how SMRs can benefit the Canadian economy and environment.
    - The CNSC appeared at the last meeting of the study along with NRCan and AECL officials on September 26, 2022.
  - Public Safety and National Security Committee (SECU)
    - SECU may invite the CNSC to appear before it this fall to answer questions pertaining to proposed amendments to the NSCA, as reflected in Bill C-21.
  - Public Accounts Committee (PACP)
    - CESD tabled its report, Management of Low and Intermediate Level Radioactive Waste, in Parliament on October 4.
    - The CNSC is comfortable with the audit findings will address the recommendations in the spirit of continuous improvement.
    - The report will be referred to PACP for study potentially as soon as fall 2022. The CNSC will provide PACP a CNSC Management Action Plan, which outlines the actions the organization will take in response to the recommendations.

- **Extension of Pickering**
    - The CNSC nor the Commission have received, in writing, the facility's plan to operate beyond December 2024.
    - Under its current licence, if OPG plans to operate beyond December 2024, it is required to inform the CNSC in writing no later than December 31, 2022.
    - CNSC staff will only recommend to the Commission that it consider a decision in favour of extended operations if CNSC staff are satisfied with the reassessment of the periodic safety review results and updated licensing basis materials, and that the public and environment will remain protected.
    - Only after rigorous review, a thorough assessment by staff, and a public Commission hearing, will the Commission be in a position to consider granting an extension to the current licence.

Prepared by: Tiffany MacLellan, Senior Policy Officer, IGAD, SPD
Consulted: Bibi Roy, Director, IAEED
Reviewed by: Jennifer Czerneda, IGAD
Approved by: Keith Dewar, Director, IGAD
Approved by: Liane Sauer, DG, SPD
Approved by: Michael DeJong, VP, RAB
Date: October 3, 2022

s.13(1)
s.21(1)(a)

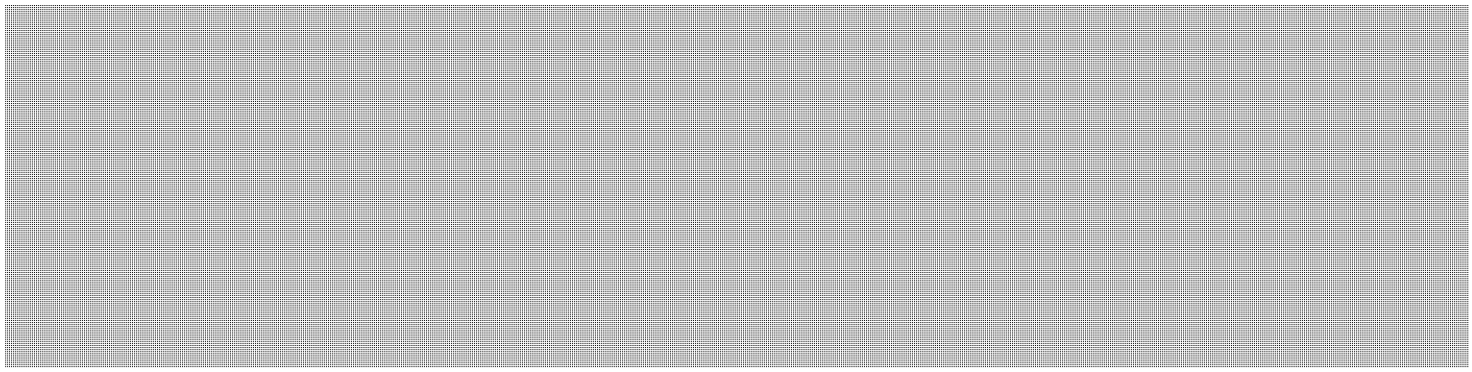
Bergeron, Marie-Josée

From: SPD support Group / Groupe de soutien de la DPS(CNSC/CCSN)
Subject: FW: Nuclear Roundtable and Reprocessing - update

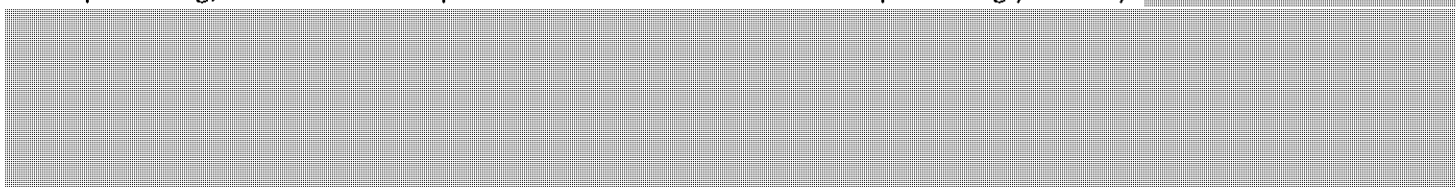
Importance: High

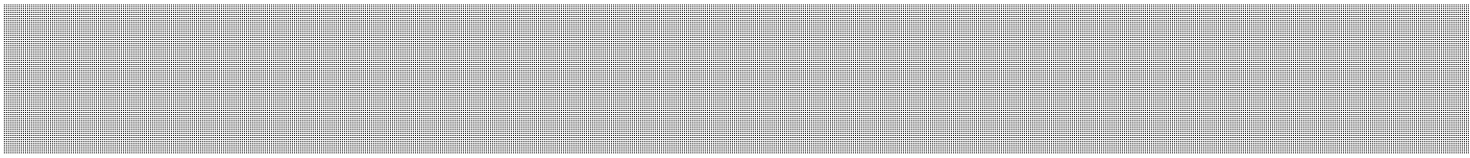
From: Gratton, Wayne <wayne.gratton@cnsc-ccsn.gc.ca>
Sent: Tuesday, December 13, 2022 2:28 PM
To: DeJong, Michael <michael.dejong@cnsc-ccsn.gc.ca>
Cc: Dewar, Keith <keith.Dewar@cnsc-ccsn.gc.ca>
Subject: Nuclear Roundtable and Reprocessing - update
Importance: High

Hi Michael,



For reprocessing, we also discussed public communications on nuclear reprocessing yesterday.





We have raised the table and reprocessing issues as part of the DM briefing material. I have a call until 4 pm but happy to chat afterwards.

Wayne

Khan, Muhammad Atif

From: Rob Mason <rmason@aecl.ca>
Sent: August 31, 2022 11:35 AM
To: Hanna, Kyle; bibi.roy@canada.ca
Subject: FW: CESD Fall Deck 2022 - Radioactive Waste Mgmt.
Attachments: Report 1 - Radioactive Waste Management.docx

Follow Up Flag: Follow up
Flag Status: Completed

PROTECTED - SENSITIVE / PROTÉGÉ - DÉLICAT - TLP-Amber/Ambre

Hi Kyle and Bibi!

Sorry, I should have included you both in my response below.

I hope all is well and you are enjoying your summer.

Rob

From: Rob Mason
Sent: Wednesday, August 31, 2022 11:26 AM
To: Brown, Alyssa <alyssa.brown@NRCan-RNCan.gc.ca>
Cc: Zeroual, Khalid <khalid.zeroual@NRCan-RNCan.gc.ca>; Villafan, Ivan <Ivan.Villafan@nrcan-rncan.gc.ca>; Graeme Williamson <gwilliamson@aecl.ca>
Subject: RE: CESD Fall Deck 2022 - Radioactive Waste Mgmt.

Hi Alyssa,

Edits made with track changes on in the attached.

Rationale for changes:

- there were no errors in the historic database so adjusted wording
- AECL does 'examine' the database - I can't remember where that wording came from. I changed to 'ensure' and linked the first 2 sentences are they are the same issue and link to the OAG recommendation.
- There is no recommendation on the 'completeness' and 'limited details' so I removed the wording as the last sentence says the recommendations address the findings.
- Public reporting wording is updated to be closer to the revised OAG recommendation.

Happy to discuss if you don't agree any changes.

Thanks!

Rob

s.69(1)(e)

s.69(1)(g)

From: Brown, Alyssa <alyssa.brown@NRCan-RNCan.gc.ca>
Sent: Wednesday, August 31, 2022 10:20 AM
To: Rob Mason <rmason@aecl.ca>; Hanna, Kyle <kyle.hanna@cnsc-ccsn.gc.ca>
Cc: Zeroual, Khalid <khalid.zeroual@NRCan-RNCan.gc.ca>; Villafan, Ivan <Ivan.Villafan@nrcan-rncan.gc.ca>
Subject: CESD Fall Deck 2022 - Radioactive Waste Mgmt.
Importance: High

Hi Rob and Kyle,

I hope you've both been well and have enjoyed the summer months.

Attached is text NRCan has drafted that will feed into a deck presented at the [redacted] If you have any comments on the draft, a response by end of day tomorrow Sept. 1 would be appreciated.

Much of the text is recycled, so we're hoping the review won't be too cumbersome. Please let us know if you have any questions.

I will send the password to the doc in a separate email.

Thank you,
Alyssa

Alyssa Brown *(she/elle)*
External Audit Liaison Officer | Agent de liaison de l'audit externe
Audit and Evaluation Branch | Direction d'audit et d'évaluation
Natural Resources Canada | Ressources naturelles Canada
Alyssa.Brown@nrcan-rncan.gc.ca

s.69(1)(e)
s.69(1)(g)

Khan, Muhammad Atif

From: Hanna, Kyle
Sent: September 7, 2022 2:54 PM
To: Villafan, Ivan
Subject: RE: CESD Fall Deck 2022 - Radioactive Waste Mgmt.

Follow Up Flag: Follow up
Flag Status: Completed

Sounds good Ivan. Thank you.

I'll set a Teams call for 4.

Kyle

From: Villafan, Ivan <Ivan.Villafan@nrcan-rncan.gc.ca>
Sent: September 7, 2022 2:52 PM
To: Hanna, Kyle <kyle.hanna@cnsc-ccsn.gc.ca>
Subject: Re: CESD Fall Deck 2022 - Radioactive Waste Mgmt.

EXTERNAL EMAIL – USE CAUTION / COURRIEL EXTERNE – FAITES PREUVE DE PRUDENCE

Hi Kyle

Yes sure, in about an hour, I am on my way home

Sent from my iPhone

> On Sep 7, 2022, at 2:17 PM, Hanna, Kyle <kyle.hanna@cnsc-ccsn.gc.ca> wrote:
>
> Hi Alyssa,
>
> I was wondering you have a bit of time this afternoon to discuss this [redacted]
> Our Comms team received a request about this briefing as well and I just wanted to clarify a few things with you or Ivan or whomever would be most best placed to discuss.
>
> Regards,
> Kyle
>
> **From:** Brown, Alyssa <alyssa.brown@NRCan-RNCan.gc.ca>
> **Sent:** August 31, 2022 10:20 AM
> **To:** rmason@aecl.ca; Hanna, Kyle <kyle.hanna@cnsc-ccsn.gc.ca>
> **Cc:** Zeroual, Khalid <khalid.zeroual@NRCan-RNCan.gc.ca>; Villafan, Ivan <Ivan.Villafan@nrcan-rncan.gc.ca>
> **Subject:** CESD Fall Deck 2022 - Radioactive Waste Mgmt.
> **Importance:** High

s.69(1)(e)
s.69(1)(g)

EXTERNAL EMAIL – USE CAUTION / COURRIEL EXTERNE – FAITES PREUVE DE PRUDENCE

Hi Rob and Kyle,

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Alyssa

Alyssa Brown *(she/elle)*
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Audit and Evaluation Branch | Direction d'audit et d'évaluation
Natural Resources Canada | Ressources naturelles Canada
Alyssa.Brown@nrcan-rncan.gc.ca

IRRS
2019

Integrated Regulatory Review Service (IRRS) to Canada

Advanced Reference Material for CNSC Counterpart Interviews

MODULE 1: Responsibilities and Functions of the Government

MODULE 2: The Global Safety Regime

MODULE 3: Responsibilities and Functions of the Regulatory Body

September 3 to 13, 2019

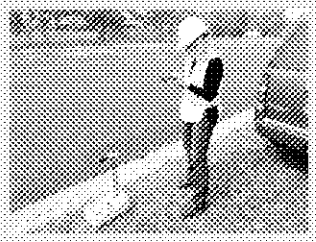
This package provides the following advanced reference material for the counterpart interviews, which will take place during the IRRS mission to Canada from September 3 to 13, 2019.

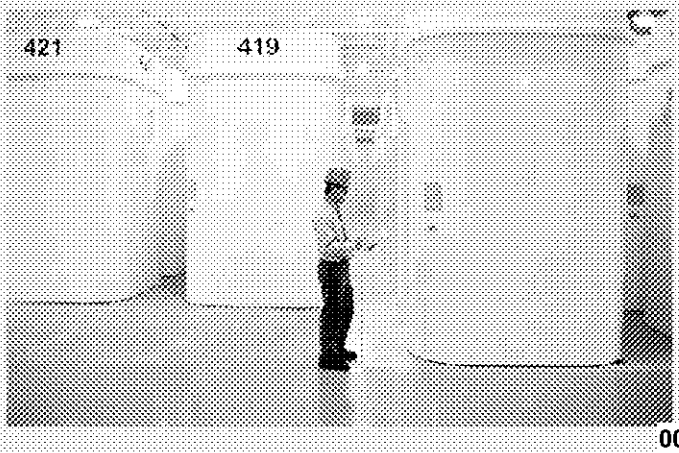
The information in the package includes:

- Advanced Reference Material IRRS Summary Report
- Initial action plan as Annex A of the Summary Report
- Responses to the IRRS self-assessment questionnaire modules for MODULE 1: Responsibilities and Functions of the Government, MODULE 2: The Global Safety Regime and MODULE 3: Responsibilities and Functions of the Regulatory Body
- CNSC management's responses to the action plan for the 2009 IRRS mission and/or the 2011 follow-up mission, as appropriate

Please familiarize yourself with the information in the package and ensure that the necessary supporting resources (i.e., legislation, regulatory documents, etc.) are available in either hardcopy or electronic version for the interviews.

IRRS ARM
Summary Report





Canada
2019

Acknowledgement

The Canadian Nuclear Safety Commission regulates all nuclear facilities and activities in Canada from uranium mining to power generation, nuclear research, nuclear facilities and prescribed equipment, transportation of radiological substances, industrial and medical applications of nuclear materials, and waste management and disposal. We strive to ensure that Canadian nuclear activities are among the safest and most secure in the world.

In 2019, as a demonstration of the CNSC's commitment to regulatory excellence, Canada requested an International Regulatory Review Service (IRRS) mission. The objectives of the IRRS mission are to ensure continuous improvement oversight of nuclear safety in Canada and to demonstrate that the Canadian regulatory framework is robust and consistent with IAEA safety standards and international good practices.

I would like to take this opportunity to express my sincere gratitude for the hard work and dedication of all those who have committed significant effort to preparing the IRRS Advanced Reference Material and the Summary Report, as well as those who are organizing logistics for hosting this mission.

The IRRS team is grateful for everyone's support in ensuring the mission's success. We look forward to welcoming members of the review team and working with the IAEA to achieve a successful mission.

Ramzi Jammal

2019 IRRS Mission Executive Authority

Executive Vice-President and Chief Regulatory Operations Officer

Canadian Nuclear Safety Commission

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BACKGROUND

The Canadian Nuclear Safety Commission (CNSC) is committed to regulatory excellence. In September 2018, in an ongoing demonstration of this commitment, the CNSC, on behalf of Canada, requested an international peer review mission from the International Atomic Energy Agency's (IAEA) Integrated Regulatory Review Service (IRRS). The IRRS mission to Canada will be held September 3 to 13, 2019.

Canada previously hosted an IRRS mission in 2009. The IRRS review team determined that Canada had a mature and well-established nuclear regulatory framework. A follow-up mission took place in 2011 to assess Canada's progress against the initial peer review findings, assess the CNSC's response to the Fukushima Daiichi events and review the regulation of the transport of nuclear substances. The follow-up mission review team noted that the CNSC's response to the events at Fukushima was prompt, robust and comprehensive. Both missions produced an IAEA report and a CNSC management response which are publicly available on the CNSC's external website.

IRRS missions are typically carried out every 10 years as an international best practice. Canada remains on track to deliver this commitment with the 2019 IRRS mission. The 2019 IRRS mission will review CNSC's framework for safety, as well as CNSC's core regulatory processes for all aspects of Canadian nuclear regulation. The mission will include a focus on waste management and is anticipated to enhance public understanding of Canada's approach to waste management, and confidence in how it compares internationally.

This Summary Report represents a distillation of the Advanced Reference Material that was put together for this mission. CNSC staff led preparations of the self-assessment and other Advanced Reference Material with support and input from Natural Resources Canada (NRCan) and Health Canada (HC). Sincere gratitude is expressed for the hard work and dedication to all those who contributed to compiling the Advanced Reference Material and the Summary Report. The content of the report reflects federal jurisdiction over nuclear activities. Therefore, topics such as medical exposure, that fall under the mandate and responsibilities of provincial and territorial departments are not included within the scope of the mission.

Canada hosted an IAEA Emergency Preparedness Review (EPREV) mission from June 3 to 13, 2019. In agreement with the IAEA, it was determined that Module 10, Emergency Preparedness and Response would not be covered as part of the current mission as those topics were addressed under the EPREV mission to Canada.

The following sections provide general information about Canada, the extent of Canada's nuclear programme and a short overview of the nuclear regulatory body in Canada.

Canada and its Government structure

Canada is the world's second-largest country covering 10 million square kilometres. It is bordered by three oceans – the Pacific Ocean to the west, the Atlantic Ocean to the east and the Arctic Ocean to the north. The United States of America is along the southern border. Canada's population, based on the 2016 census, is approximately 35 million people.

Canada is a confederation of 10 provinces and 3 territories, administered by the Government of Canada. Within Canada, there are federal, provincial, territorial and municipal levels of government. The

provinces and territories are self-governing in the areas of legislative power assigned to them by the Canadian Constitution, as expressed in the *Constitution Acts, 1867 to 1982*. The Federal Government is responsible for matters of national and international concern including: national defence, foreign policy, interprovincial trade and currency. Provinces are responsible for municipal government, education, health, natural resources and property.

Figure 1: Parliament of Canada in Ottawa, Canada

Canada is a parliamentary democracy. The Parliament is located in Ottawa, the capital of Canada.

Canada as a constitutional monarchy has a Sovereign Head of State, currently, Her Majesty the Queen. The Sovereign plays a non-partisan role in Parliament. In Canada, there is a clear distinction between the head of state – the Sovereign – and the head of government – the Prime Minister. The Sovereign appoints a representative, the Governor General, on the advice of the Prime Minister.

Parliament consists of the Sovereign, the Senate and the House of Commons. Canadians elect 338 members to the House of Commons, the representative chamber. In general, the leader of the political party with the most seats in the House of Commons becomes the Prime Minister, who is responsible for the operations and policy of the government. The Prime Minister selects Cabinet ministers from members of the House of Commons. Senators are appointed by the Governor General on the advice of the Prime Minister. The Senate is made up of 105 members. No bill, which is a proposal for new laws, can become law unless both the House of Commons and the Senate have passed it and it has received Royal Assent by the Governor General on behalf of the Sovereign.

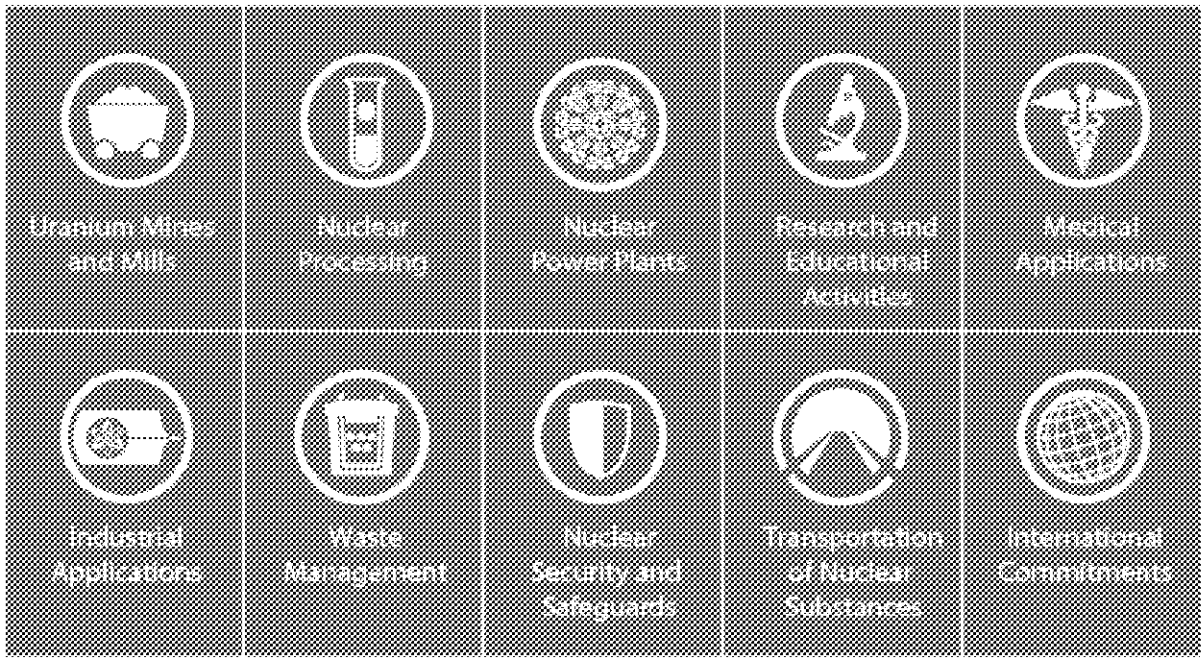
Overview of the Canadian Nuclear Programme

Nuclear energy accounts for 16% of electricity generation in Canada. In Ontario, Canada's largest province, nuclear energy supplies approximately 60% of the province's electricity; in New Brunswick it supplies 30%.

Canada is a major producer of uranium, and the designer of the CANDU (Canada Deuterium Uranium) nuclear reactor, a manufacturer of sealed sources and a producer and supplier of medical isotopes.

Canada possesses a wide range of nuclear-related facilities and activities and has been involved in many facets of nuclear research and applications. There are operating facilities in almost all facets of the nuclear fuel cycle, starting with uranium mining, through refining, conversion and fuel fabrication followed by use in reactors and ending with waste management.

Figure 2: Summary of areas that the CNSC regulates



To ensure consistency in its regulatory framework, the CNSC regulates in a risk-informed manner according to the following categories which are organized according to the type of regulated facility or activity:

- Class I nuclear facilities are defined in the *Class I Nuclear Facilities Regulations*. These regulations apply to class IA and class IB facilities. Class IA facilities include nuclear power plants (NPPs) and other reactor facilities. Class IB facilities include waste facilities and facilities that handle, process or store large quantities of nuclear substances.
- Class II nuclear facilities are facilities that include Class II prescribed equipment as defined in the *Class II Nuclear Facilities and Prescribed Equipment Regulations*. These facilities are used in medicine, cancer therapy and research.
- Uranium mines and mills are defined within the *Uranium Mines and Mills Regulations*. This includes facilities involved in the mining, ore processing and milling of uranium.

- Nuclear substances and radiation devices must be licensed when quantities are greater than exemption thresholds. Activities in this category are regulated under the *Nuclear Substances and Radiation Devices Regulations*.
- Canadian importers and exporters must obtain and comply with licences controlling the international transfer of nuclear and nuclear-related dual-use items pursuant to the *Nuclear Non-proliferation Import and Export Control Regulations*.
- Licences and certificates for certain kinds of packaging and transport of nuclear substances are stipulated in the *Packaging and Transport of Nuclear Substances Regulations, 2015*.

Overview of Canadian Fuel Cycle Facilities

The following provides information regarding the location and number of nuclear facilities in the Canadian nuclear fuel cycle (figure 3) as well as other activities and facilities regulated by the CNSC.

Figure 3: Overview of the Canadian nuclear fuel cycle

Uranium mines and mills

There are five uranium mines and mills located in the Athabasca Basin of northern Saskatchewan, Canada:

- Cigar Lake mine
- McArthur River mine
- Rabbit Lake mine and mill
- Key Lake mill
- McClean Lake mine and mill

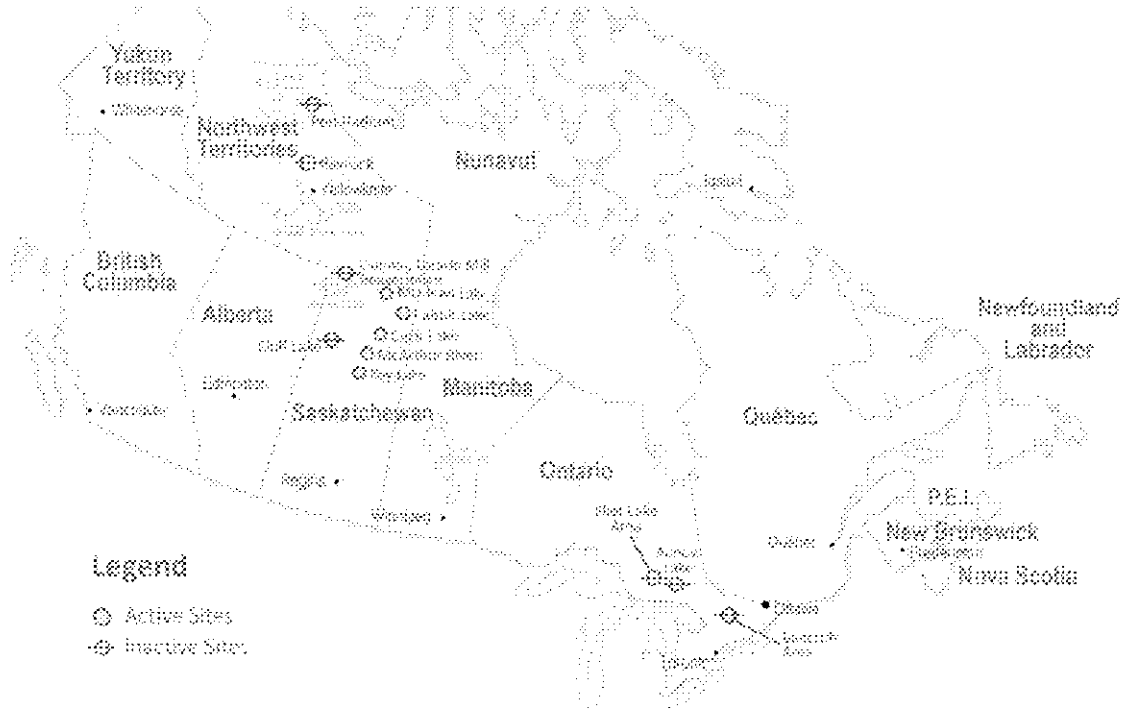
There are four active remediation projects of uranium mines and mills sites in northern Saskatchewan and Ontario as well as nine decommissioned uranium mines and mills sites. The objective of the active remediation projects is to establish long-term, stable conditions that ensure the safe use of each site by current and future generations. The four sites undergoing remediation are:

- Gunnar legacy uranium mine
- Lorado uranium mill
- Deloro mine
- Madawaska legacy uranium mine

The remaining nine sites have been decommissioned and are currently in the long-term monitoring and maintenance phase:

- Beaverlodge mine and mill
- Cluff Lake uranium mine and mill
- Rayrock mine
- Port Radium mine
- Agnew Lake uranium mine
- Bicroft tailings storage facility
- Dyno closed mine
- Elliot Lake historic sites
- Denison and Stanrock mining facilities

Figure 4: Canadian uranium mines and mills, decommissioned mines and remediation sites



Uranium processing facilities

There are four Canadian uranium processing facilities, all located in Ontario:

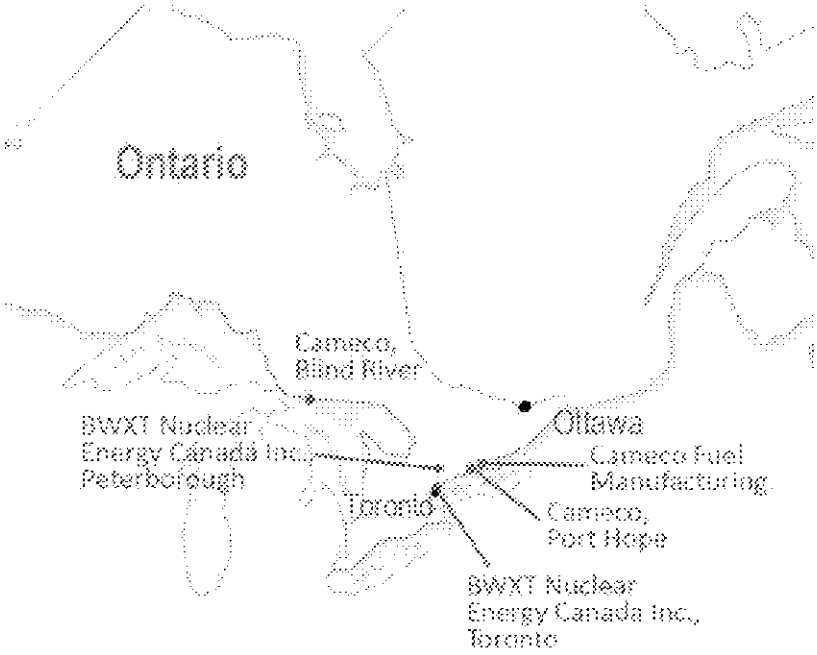
- Blind River Refinery
- Port Hope Conversion Facility
- Cameco Fuel Manufacturing Inc.
- BWXT Nuclear Energy Canada Inc. (Toronto and Peterborough)

They are operated by two licensees: Cameco Corporation and BWXT Nuclear Energy Canada.

The Cameco Blind River facility refines uranium concentrate to produce uranium trioxide (UO_3). The primary recipient of the UO_3 product is Cameco's Port Hope Conversion Facility. The Cameco Fuel Manufacturing facility manufactures nuclear reactor fuel bundles from uranium dioxide (UO_2) and zircaloy. The finished fuel bundles are primarily shipped to Canadian NPPs.

BWXT Nuclear Energy Canada produces nuclear fuel bundles used by the CANDU reactors at Ontario Power Generation's (OPG) Pickering and Darlington nuclear generating stations (NGS). The site in Toronto produces UO_2 fuel pellets and the Peterborough site produces the fuel bundles using the pellets produced in the Toronto facility.

Figure 5: Canadian nuclear uranium processing facilities



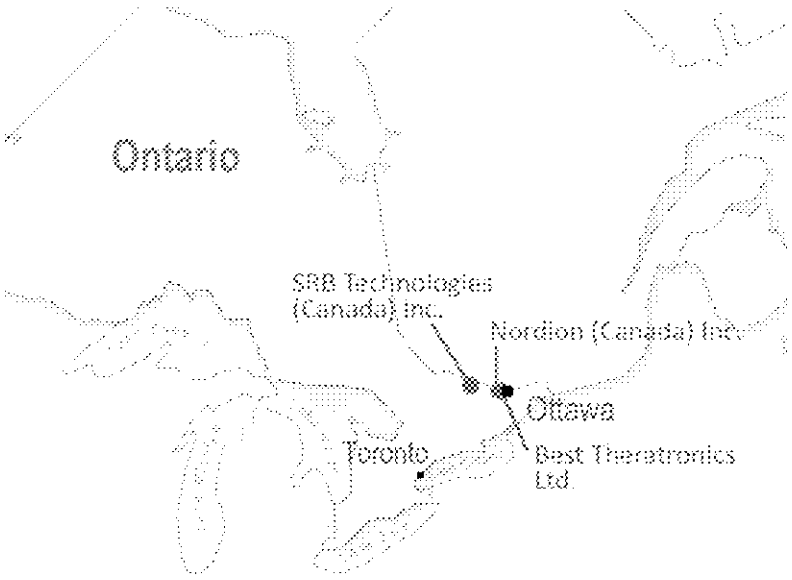
Nuclear substance processing facilities

The three Canadian nuclear substance processing facilities are all located in Ontario:

- SRB Technologies (Canada) Inc.
- Nordion (Canada) Inc.
- Best Theratronics Ltd.

SRB Technologies processes tritium gas to produce sealed gas capsules coated with phosphorescent powder and filled with tritium gas to generate continuous light. Nordion processes unsealed radioisotopes for health and life science applications as well as manufactures sealed radiation sources for industrial and medical applications. Best Theratronics manufactures medical equipment including cobalt-60 radiation therapy units and cesium-137 blood irradiators.

Figure 6: Canadian nuclear processing facilities



Nuclear power plants

Nineteen reactors continue to operate at four NPPs in two provinces.

The NPPs range in size from one to eight power reactors, all of which are of the CANDU design. Table 1 provides additional information regarding the operating NPPs in Canada.

Table 1: Summary of operating NPPs in Canada

Facility	Licensee	Location	State of reactor units	Gross capacity per unit (MWe)	Date of start-up	Licence** expiry
Bruce NGS	Bruce Power Inc.	Tiverton, Ontario	Eight operating	Bruce A: 831 Bruce B: 872	Bruce A: 1977 Bruce B: 1984	May 31, 2028
Darlington NGS	Ontario Power Generation Inc.	Clarington, Ontario	Four operating (including one undergoing refurbishment)	935	1990	November 30, 2025
Pickering NGS	Ontario Power Generation Inc.	Pickering, Ontario	Six operating, two defueled and in safe storage*	Units 1, 4: 542 Units 5–8: 540	Units 1, 4: 1971 Units 5–8: 1982	August 31, 2028
Point Lepreau NGS	New Brunswick Power Corp.	Lepreau, New Brunswick	One operating	705	1982	June 30, 2022

*Pickering NGS Units 2 and 3 are defueled and in safe storage. They are governed by the same power reactor operating licence as the six operating units.

**The CNSC typically issues NPP licence for a period of 5-10 years

The Gentilly nuclear site, operated by Hydro-Québec as the licensee, is located in Bécancour, Québec, and consists of the Gentilly-1 waste facility and Gentilly-2 facilities. In 2012, Gentilly-2 NGS was shutdown and is currently proceeding with decommissioning activities.

Several CANDU NPPs are undergoing life-extension projects:

- six units at the Bruce NGS will undergo life extension through the Major Component Replacement Project beginning January 1, 2020
- refurbishment of the four reactors at the Darlington NGS began in October 2016 and will be completed by 2026
- four units of the Pickering NGS have been approved for continued operation up to a maximum of 247,000 equivalent full-power hours based on continued demonstration of fitness for service of the pressure tubes

Research reactors

The research reactor facilities in Canada are:

- McMaster Nuclear Reactor (MNR) at McMaster University
- Zero Energy Deuterium-2 (ZED-2) at Chalk River Laboratories
- SLOWPOKE-2 reactors at:
  - Saskatchewan Research Council
  - Royal Military College of Canada
  - École Polytechnique de Montréal

Figure 7: Research reactor facilities in Canada

These research reactors are designed to operate at low power, ranging from 20 W for ZED-2 to 0.02 MW for the SLOWPOKE-2 reactors to 5 MW for the MNR. ZED-2 is a tank-type heavy water moderated reactor. The SLOWPOKE-2 reactors are sealed container-in-pool designs. They are fuelled with either highly enriched uranium in the case of Saskatchewan Research Council or low-enriched uranium for Royal Military College of Canada and École Polytechnique de Montréal. The MNR is a pool-type reactor using light water to moderate and cool the low-enriched uranium fuel.

Waste management facilities

NPP radioactive waste is generally managed by the owner onsite where it was produced. There are six waste management facilities (WMF) co-located at the Canadian NPPs:

- Darlington WMF
- Pickering WMF
- Western WMF and Radioactive Waste Operations Site-1
- Point Lepreau Solid Radioactive WMF
- Gentilly-2 WMF

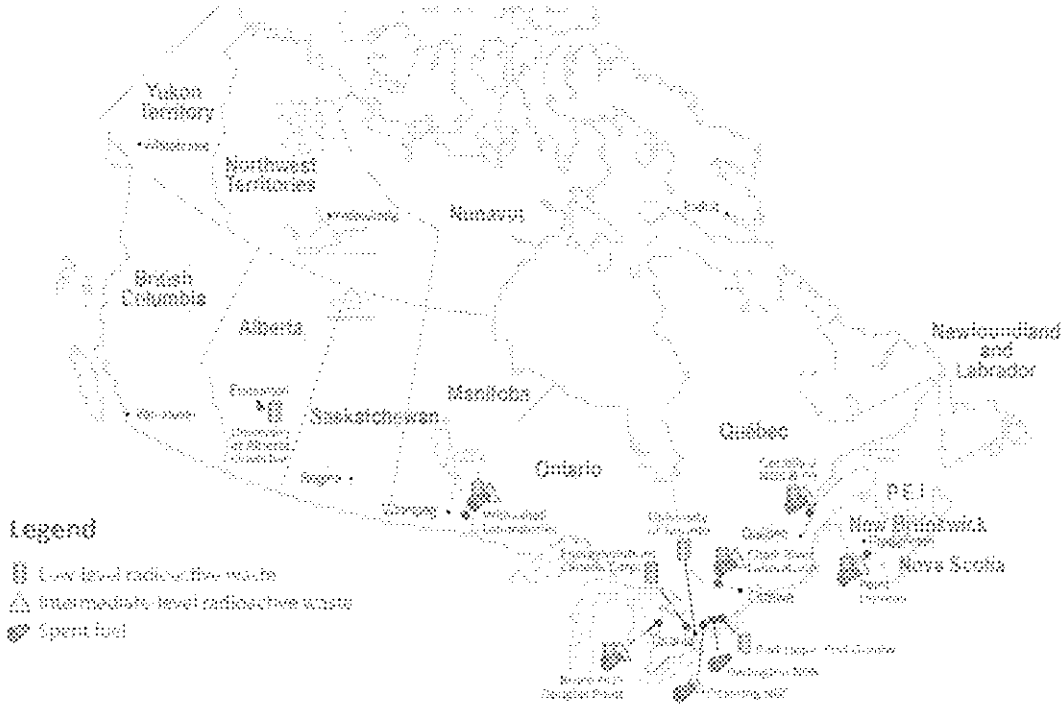
Table 2: Summary of waste management facilities co-located at Canadian NPPs

Facility	Licensee	Location	Start of Operations	Licence Expiry	Type of Waste
Darlington WMF	OPG	Clarington, Ontario	2008	April 30, 2023	• HLW from Darlington NGS • ILW from Darlington NGS refurbishment waste
Pickering WMF	OPG	Pickering, Ontario	1996	August 31, 2028	• HLW from Pickering NGS • ILW from Pickering NGS Units 1-4 refurbishment waste
Western WMF	OPG	Tiverton, Ontario	1974	May 31, 2027	• HLW from Bruce NGS • ILW from Bruce NGS Units 1 and 2 refurbishment waste • L&ILW from Darlington, Pickering and Bruce NGS operations
Radioactive Waste Operations Site -1	OPG	Tiverton, Ontario	Mid-1960s	Indefinite	• L&ILW from Douglas Point WMF and Pickering NGS

HLW = high-level waste
ILW = intermediate level waste
L&ILW = low and intermediate level waste

Other waste management facilities and areas are indicated in figure 8. The type of wastes managed at these facilities include: spent fuel, contaminated soil, decommissioned reactor waste, low-level waste from research labs and slightly contaminated metals.

Figure 8: Radioactive waste management facilities in Canada

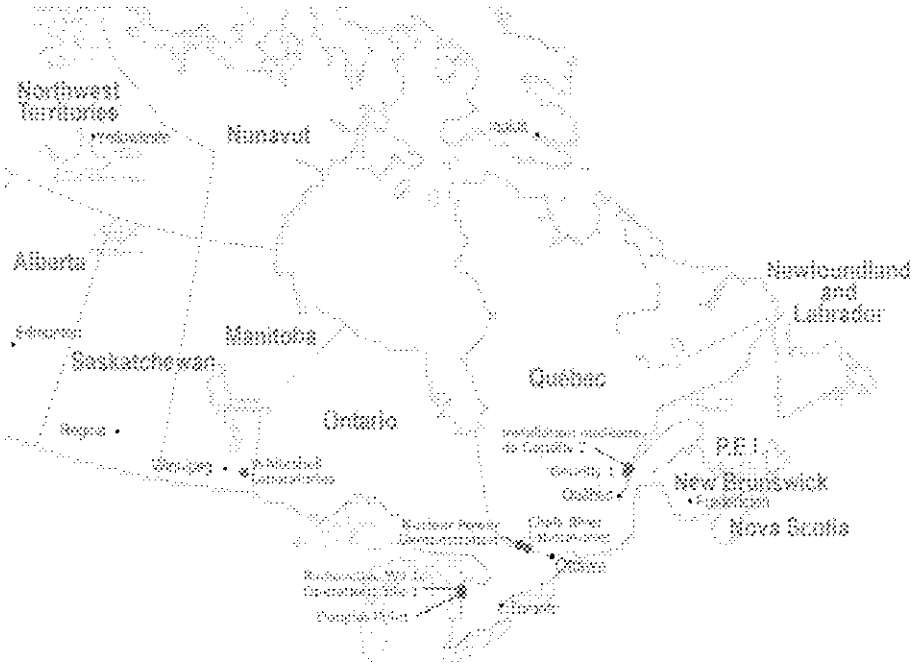


Decommissioning activities

Decommissioning encompasses a wide variety of activities to retire a licensed facility or site permanently from service and render it to a predetermined end-state. The following sites are undergoing decommissioning activities within Canada:

- Spent Solvent Treatment Facility at Radioactive Waste Operations Site-1
- Installation nucléaire de Gentilly-2
- Gentilly-1 Waste Facility
- Douglas Point Waste Facility
- Nuclear Power Demonstration Waste Facility
- Chalk River Laboratories
- Whiteshell Laboratories

Figure 9: Nuclear facilities carrying out decommissioning activities in Canada



Use and transport of nuclear substances and prescribed equipment

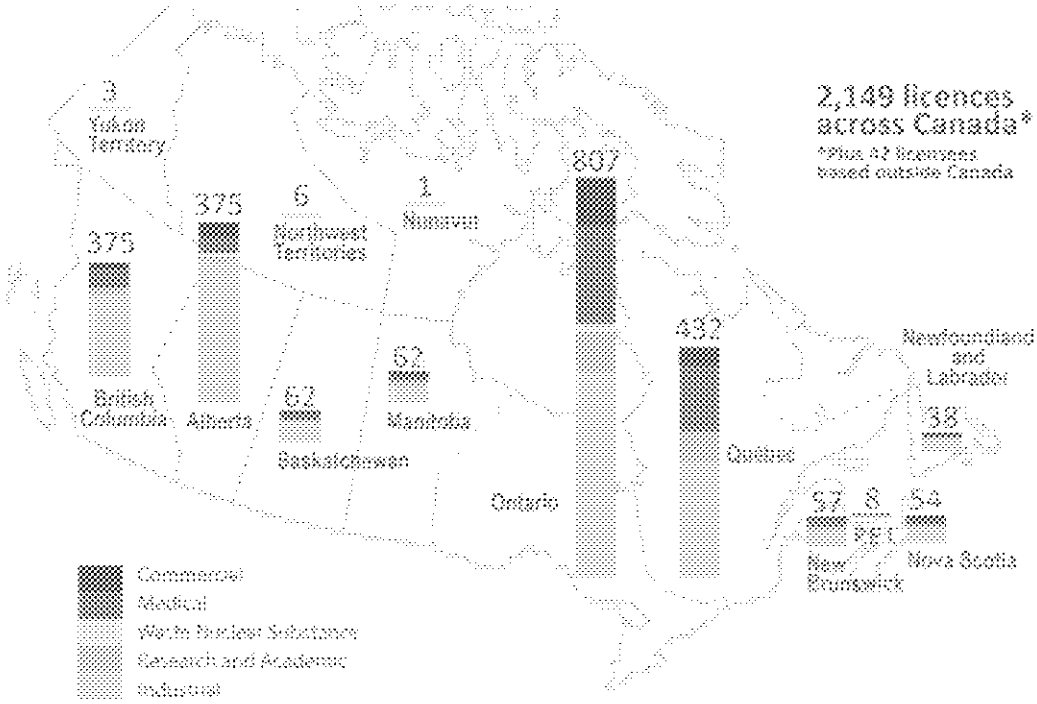
There are approximately 2100 licences issued to over 1500 individual licensees related to the use of nuclear substances in Canada (figure 10). Nuclear substances and prescribed equipment are used in a wide variety of medical, industrial, academic and research and commercial sectors in Canada. There are many industrial manufacturing and production facilities including those that store, produce or service nuclear substances and devices, and operate and service prescribed equipment.

Radiation sources are also found at larger nuclear facilities such as NPPs and uranium mines and mills. These sources are generally regulated under a facility licence.

Thousands of packages are shipped to, from and within Canada every year. Regulatory control of the packaging and transport of nuclear substances is done through certification of packages, registration of users of certified packages, licensing the transport and ensuring carriers have radiation protection programs in place.

Some licensees that hold CNSC licences to service radiation devices or prescribed equipment are based outside Canada and come to Canada to perform maintenance or servicing work on equipment owned by other licensees. There are 42 licensees based outside of Canada. All licensees are subject to the same level of regulatory oversight from the CNSC when they do work in Canada.

Figure 10: Distribution of licensees of nuclear substances and prescribed equipment



Note that in Canada, regulatory oversight of radiation generators like diagnostic x-ray procedures and airport x-ray equipment is regulated at the provincial level.

Overview of the Canadian Nuclear Safety Commission – Canada's nuclear regulator

CNSC's mandate and role

The CNSC was established on May 31, 2000, with the coming into force of the *Nuclear Safety and Control Act* (NSCA). It replaced the Atomic Energy Control Board established in 1946 by the *Atomic Energy Control Act.*

The CNSC is Canada's sole nuclear regulatory body and an independent departmental corporation that reports to Parliament through the Minister of Natural Resources.

The CNSC is a separate agency and an independent administrative tribunal, which operates at arm's length from the government with no ties to the nuclear industry. The CNSC's regulatory regime covers all activities related to the mandate of the CNSC. Under the NSCA, the CNSC is mandated to:

- regulate the development, production and use of nuclear energy in Canada in order to protect health, safety and the environment
- regulate the production, possession, use and transport of nuclear substances, and the production, possession and use of prescribed equipment and prescribed information
- implement measures respecting international control of the development, production, transport and use of nuclear energy and substances, including measures respecting the non-proliferation of nuclear weapons and nuclear explosive devices

- disseminate objective scientific, technical and regulatory information concerning the CNSC's activities, and about how the development, production, possession, transport and use of nuclear substances affect the environment and the health and safety of persons

CNSC's mission

The CNSC's mission is to regulate the use of nuclear energy and materials to protect health, safety and security of Canadians and the environment; and to respect Canada's international commitments on the peaceful use of nuclear energy.

CNSC's vision

CNSC's vision is to be a world class regulator.

Organizational structure

The CNSC consists of a president, who is also the Chief Executive Officer of the federally-appointed Commission tribunal and approximately 900 staff members (as of the end of March 2019). The CNSC's organizational structure consists of two components:

- the Commission, which refers to the organization's tribunal component
- the CNSC, which refers to the organization and its staff in general

CNSC's organizational structure, including an organizational chart, is further described in section 3.

CNSC is the sole agency that can authorize the exploitation of nuclear energy and substances; however, it is not the only agency which has legal jurisdiction and responsibilities over activities entailed in or resulting from such exploitation. Other federal, provincial or territorial departments may have jurisdictional oversight in the areas of environmental assessments, environmental protection, protection of workers' health and safety, transport and the export of nuclear-related information, equipment and materials.

As a result, the CNSC has strong liaison relationships with other government departments such as NRCan, HC, Environment and Climate Change Canada (ECCC), the Canadian Environmental Assessment Agency, Transport Canada and Global Affairs Canada. To facilitate cooperation between regulators and other government departments to achieve its regulatory objectives in an effective and efficient manner, the CNSC enters into arrangements with other federal departments, provincial or municipal governments and agencies as well as international regulators and agencies.

Scope of the IRRS mission to Canada

The scope of the IRRS mission to Canada includes all facilities and activities licensed by the CNSC, with one topic excluded; emergency preparedness. Specifically, the IRRS mission includes the following facilities and activities:

- NPPs
- Uranium mines and mills
- Uranium processing and fuel fabrication facilities
- Nuclear research and non-power reactors
- Nuclear substance processing facilities

- Radioactive waste management facilities
- Use of nuclear substances and radiation devices
- Packaging and transport of nuclear substances
- Import and export of nuclear substances and equipment
- Nuclear security

Also included in the mission are the following exposure situations

- Occupational radiation protection
- Public exposure
- Chronic exposure and remediation

The mission does not cover:

- Module 10 Emergency Preparedness and Response as this topic is covered by an IAEA 2019 EPREV mission to Canada
- Module on medical exposure as this falls under provincial and territorial jurisdiction which is out of scope for this mission

The IRRS report is structured based on the modular structure of the self-assessment questionnaire. Sections 1 to 4 address the elements of the legal and regulatory framework for safety. Sections 5 to 9 cover the core regulatory processes as they apply to the regulated facilities and activities outlined above. The content of the module on emergency preparedness and response was covered by the EPREV to Canada which was held from June 3 to 13, 2019. Section 11 addresses the module on interfaces with nuclear security.

Background information for policy discussions

Two policy discussion topics are included as part of the IRRS mission to Canada:

- CNSC's approach to assessing the safety case for waste management facilities and decommissioning activities; and
- Strengthening the CNSC's regulatory safety culture

Information on the CNSC's approach to assessing WMF safety cases is provided in sections 6.5 and 6.7. These sections describe the regulatory requirements and the CNSCs approach to reviewing the safety cases submitted by licensees or applicants for disposal and decommissioning activities. The CNSC's current approach to regulatory safety culture is outlined in sections 4.6 and 4.7. The information in these sections serves as background information for the two policy discussions. Additional information will be provided in advance of the peer review mission.

1. RESPONSIBILITIES AND FUNCTIONS OF THE GOVERNMENT

1.1 NATIONAL POLICY AND STRATEGY FOR SAFETY

Related to GSR Part 1 (Rev. 1): Requirement 1

National policy and strategy documents

Canada has made provisions and commitments in legislation, agreements and other documents that outline the national policy and strategy for safety. There are no gaps between the Canadian framework and IAEA GSR Part 1 Rev. 1 given the legislation, agreements and national policies in place.

Sections 91 and 92 of the *Constitution Act, 1867* confer the legislative authority to the Parliament of Canada and the provincial legislatures, respectively. Paragraph 92(10)(c) of the *Constitution Act, 1867* gives the federal Parliament the power to make laws for such works which it declares to be for the general advantage of the Canada or two or more of the provinces. The Parliament of Canada used this declaratory power in the *Atomic Energy Control Act* of 1946 and again in the NSCA of 2000. Section 71 of the NSCA is the declaratory provision for nuclear works and undertakings:

> *Any work or undertaking constructed for the development, production or use of nuclear energy or for the mining, production, refinement, conversion, enrichment, processing, reprocessing, possession or use of a nuclear substance or for the production, possession or use of prescribed equipment or prescribed information is declared to be a work or undertaking for the general advantage of Canada.*

The key federal legislation for nuclear related activities in Canada includes:

- *Nuclear Safety and Control Act* (regulatory authority)
- *Nuclear Energy Act* (nuclear research and development)
- *Nuclear Fuel Waste Act* (nuclear fuel waste)
- *Nuclear Liability and Compensation Act* (liability)

The federal nuclear policy framework covers the following areas:

- Uranium
- Nuclear energy
- Nuclear research and development and science and technology
- Civil nuclear liability
- Radioactive waste management

There are three organizations that play key roles in the Canadian nuclear energy program which report through the Minister of Natural Resources to the Parliament of Canada. These are:

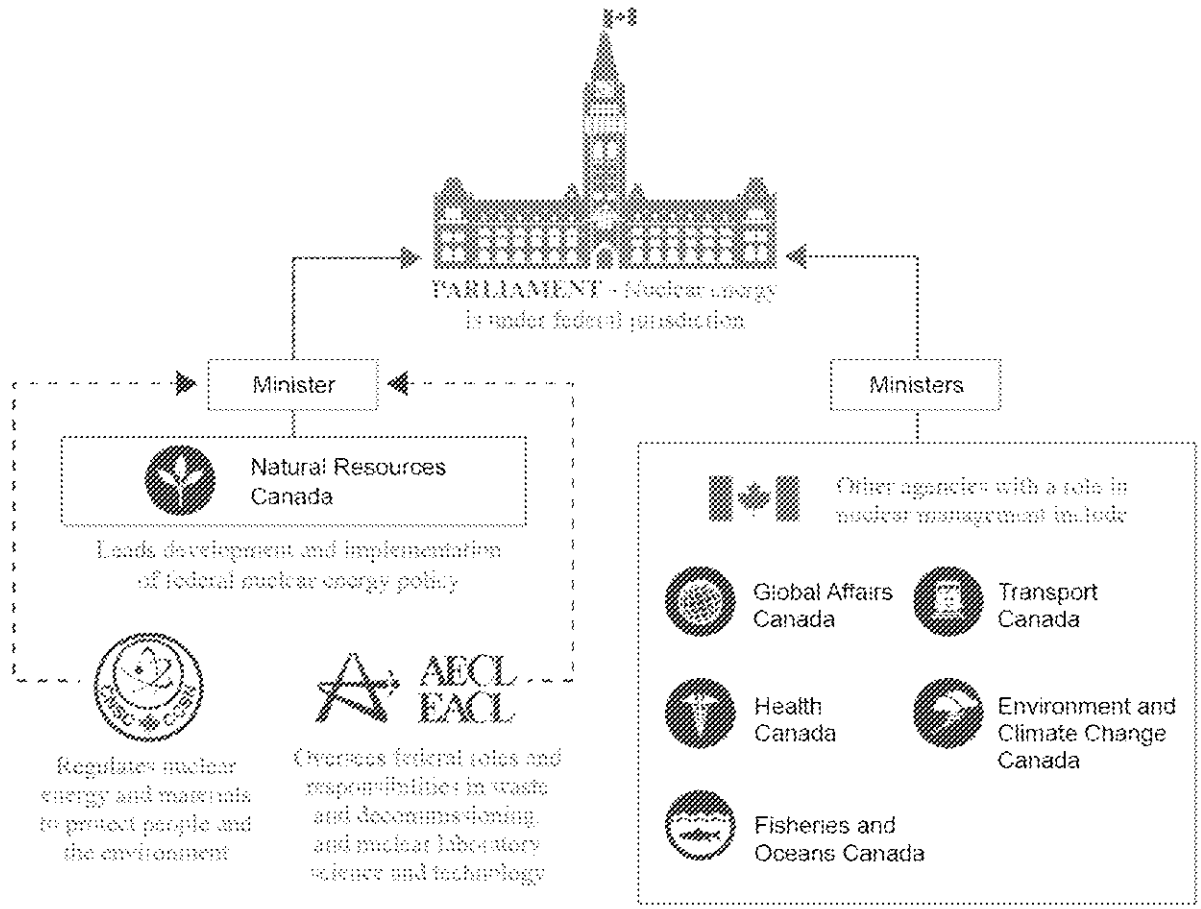
- NRCan is responsible for setting federal nuclear energy policies and administering the NSCA.
- The CNSC, Canada's nuclear regulator, is an independent agency of the Government of Canada as described in the Background section and in section 3.
- Atomic Energy of Canada Limited (AECL) is a Crown Corporation established in 1952 to develop peaceful applications of nuclear energy. Its mandate is to fulfill the government's waste and decommissioning responsibilities, provide nuclear expertise to support federal roles and

responsibilities, and offer services to users of the nuclear laboratories on commercial terms. AECL's Nuclear Laboratories are now being operated by Canadian Nuclear Laboratories Ltd (CNL) under a government-owned, contractor-operated model.

Other key federal departments in Canada which have general responsibility for nuclear security, health, safety and trade, are discussed further in section 1.5. These include:

- Global Affairs Canada
- HC
- ECCC
- Fisheries and Oceans Canada
- Canadian Environmental Assessment Agency
- Transport Canada
- Innovation, Science and Economic Development Canada

Figure 11: Relationship between the CNSC and other federal department and agencies with responsibilities for nuclear energy



Fundamental safety objectives and safety principles

The responsibility and authority for the regulation of nuclear facilities and nuclear-related activities in Canada is assigned to the CNSC under the NSCA. The NSCA establishes the CNSC, its objects, and the framework under which it can effectively and independently meet those objects. The mandate of the CNSC is informed by the objects of the Commission, set out in section 9 of the NSCA, which are:

(a) to regulate the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information in order to
   1. *prevent unreasonable risk, to the environment and to the health and safety of persons, associated with that development, production, possession or use,*
   2. *prevent unreasonable risk to national security associated with that development, production, possession or use, and*
   3. *achieve conformity with measures of control and international obligations to which Canada has agreed; and*

(b) to disseminate objective scientific, technical and regulatory information to the public concerning the activities of the Commission and the effects, on the environment and on the health and safety of persons, of the development, production, possession and use referred to in paragraph (a).

Participation in international conventions and relevant instruments

Canada participates in international arrangements (including international agreements, working groups, committees, peer reviews as well as bilateral and multilateral cooperation) to enhance safety globally and fulfil its respective international obligations.

Canada is a signatory to a number of key international treaties that establish common obligations and mechanisms to ensure the maintenance of nuclear safety and the protection of people and the environment. Many of the treaties that the CNSC is responsible for implementing in Canada (in whole or in part) are multilateral treaties under the auspices of the IAEA.

The CNSC also works bilaterally and multilaterally with partners around the world to maintain a safe, secure and peaceful international nuclear sector. The types of international instruments used include treaties, agreements, conventions, charters, protocols and Memoranda of Understanding (MOUs). A full listing of the CNSC's international arrangements is on the CNSC's external website.

Canada's participation in international conventions, agreements and other relevant instruments is also discussed in section 2.

Human and financial resources

The CNSC is a departmental corporation as per schedule II and a separate agency as per schedule V of the *Financial Administration Act*. It reports to Parliament through a Minister and functions with more autonomy than ministerial departments. Departmental corporations are also able to perform administrative, research, advisory, supervisory or regulatory functions. The Commission requires the involvement and support of the Minister of Natural Resources for special initiatives such as amendments to regulations and requests for funding.

Pursuant to section 16(1) of the NSCA, the Commission may employ professional, scientific or other officers and employees that it considers necessary to carry out its mandate.

The CNSC funds its operations to achieve its mandate through two sources: parliamentary appropriations and fees paid by licensees, applications, etc. Refer to section 1.3 for information on the financial and human resources for the regulatory body.

Provisions for research and development

CNSC's mandate includes the dissemination of objective scientific, technical and regulatory information concerning the activities of the Commission and the effects on the environment and on the health and safety of persons, of the development and production, possession and use of nuclear substances, prescribed equipment and prescribed information. The CNSC's Research and Support Program supports the CNSC's regulatory mandate by funding research associated with NPP safety, uranium processing waste, the handling of spent fuel and management of radioactive waste. The research is carried out by contracted consultants and universities or through various international cooperative efforts. For example, since 1978, the CNSC has been involved in independent research and assessment, including international collaboration, on the CNSC's research on geological repositories.

AECL is a federal Crown corporation established to develop peaceful applications of nuclear energy. Its mandate is to enable nuclear science and technology and manage the Federal Government's decommissioning and radioactive waste liabilities. AECL is responsible for the management and oversight of the Federal Nuclear Science and Technology Work Plan. The Federal Nuclear Science and Technology Work Plan serves the collective interests of 13 federal departments and agencies (including the CNSC) in the areas of health, nuclear safety and security, energy and the environment. Under the Federal Nuclear Science and Technology Work Plan, AECL engages with various federal departments and agencies to develop a program of work that meets their respective needs and priorities and oversees the delivery of the work.

Consideration of social and economic development

The CNSC's mandate focusses on preventing unreasonable risk to the environment and the health and safety of persons and does not extend to social or economic development.
The CNSC framework does include the application of the ALARA (as low as reasonably achievable, social and economic factors taken into consideration) principle as it relates to radiation protection. Note that social and economic factors are considered in ALARA as a matter of determining suitable technical approaches and methods rather than for the purposes of social and economic development.

Graded approach of the implementation of the policy and strategy

The CNSC is the authority for the regulation of nuclear facilities and nuclear-related activities in Canada. Parliament established the CNSC by enacting the NSCA.

REGDOC-3.5.3, *Regulatory Fundamentals*, describes CNSC's regulatory approach and philosophy, and outlines how the CNSC applies the NSCA and its regulations in its regulatory oversight. As described in REGDOC-3.5.3, the CNSC applies a graded approach, which is a systematic method or process by which

elements such as level of analysis, depth of documentation and the scope of actions necessary to comply with requirements are commensurate with:

- relative risks to health, safety, security, the environment and the implementation of international obligations to which Canada has agreed
- particular characteristics of a nuclear facility or licensed activity

The CNSC applies the graded approach to licensing and compliance activities.

The CNSC's application of the graded approach for licensing and compliance activities is further described in sections 5 through 8.

1.2 ESTABLISHMENT OF A FRAMEWORK FOR SAFETY

Related to GSR Part 1 (Rev. 1): Requirement 2 and GSR Part 3: Requirement 2

Elements of the legal framework for safety

The nuclear regulatory framework in Canada is based on modern and robust legislation. The CNSC's regulatory framework consists of the NSCA and other laws that may apply to nuclear facilities and activities in Canada passed by Parliament. The NCSA provides the CNSC with the authority to regulate the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information in Canada.

Examples of other federal legislation administered by federal departments with responsibilities for nuclear are provided in table 3 below and are described in more detail on the CNSC's external website.

Table 3: Other federal legislation that may apply to nuclear facilities and activities in Canada

	Act	Administered by
Environment	*Canadian Environmental Assessment Act, 2012 (CEAA, 2012)*	Canadian Environmental Assessment Agency
	Canadian Environmental Protection Act, 1999	ECCC
	Fisheries Act	Fisheries and Oceans Canada
	Migratory Birds Convention Act	ECCC
	Species at Risk Act	ECCC
Transportation	*Navigation Protection Act*	Transport Canada
	Transportation of Dangerous Goods Act	Transport Canada
Nuclear Energy and Substances	*Nuclear Energy Act*	NRCan
	Nuclear Fuel Waste Act	NRCan
	Nuclear Liability and Compensation Act	NRCan
	Radiation Emitting Devices Act	HC

The types of facilities and activities regulated

The CNSC regulates the conduct of activities related to the use, production and distribution of nuclear energy and substances as defined under the NSCA. This includes the facilities and activities related to:

- Uranium mines and mills
- Uranium fuel fabrication and processing
- NPPs
- Nuclear substance processing
- Industrial and medical applications
- Nuclear research and educational activities
- Transportation of nuclear substances
- Nuclear security and safeguards
- Import and export activities
- Waste management and decommissioning

Provisions for authorizations and the conduct of activities in accordance with the graded approach

Section 26 of the NSCA provides the activities that require authorization by licence. The Commission's licensing authority is set out in section 24 of the NSCA. Applicable licence conditions are reflected in the respective licences, including those that require the licensee to ensure that:

- qualified personnel carry out the licensed activities
- adequate provision is made for the protection of the environment, the health and safety of persons
- Canada is maintaining national security and implementing the international obligations to which it has agreed

Prescribed equipment, including transport packages, are certified by the CNSC. The CNSC also issues certificates to persons employed in certain positions where a nuclear substance or prescribed equipment is produced, used, possessed, packaged, transported, stored or disposed of.

Section 1.1 outlines how the CNSC incorporates the graded approach in its regulatory framework. Additional information regarding the how the CNSC applies the graded approach to its authorization (licensing) process is provided section 5.1.

Rationale for the authorization of new facilities as well as the applicable decision-making process

The CNSC licensing process consists of the submission of a licence application, assessment of the application by CNSC staff, a public hearing, and a decision by the Commission. The Commission is the overall decision-making authority for all licensing matters.

Subsection 24(4) of the NSCA states

"No licence shall be issued, renewed, amended or replaced – and no authorization to transfer one given – unless, in the opinion of the Commission, the applicant or, in the case of an application for an authorization to transfer the licence, the transferee (a) is qualified to carry on the activity that the licence will authorize the licensee to carry on; and (b) will, in carrying on that activity, make adequate provision

for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed."

Under the NSCA, the Commission may authorize designated officers (DOs) to carry out specific authorities. These authorities include – but are not limited to – lower-risk licensing decisions and certification decisions.

The following regulations outline the additional requirements for authorization of a facility or activity:

- *Radiation Protection Regulations* (RPR)
- *General Nuclear Safety and Control Regulations* (GNSCR)
- *Class I Nuclear Facilities Regulations* (CINFR)
- *Class II Nuclear Facilities and Prescribed Equipment Regulations* (CIINFPER)
- *Nuclear Substances and Radiation Devices Regulations* (NSRDR)
- *Uranium Mines and Mill Regulations* (UMMR)
- *Nuclear Security Regulations* (NSR)
- *Nuclear Non-proliferation Import and Export Control Regulations* (NNIECR)
- *Packaging and Transport of Nuclear Substances Regulations, 2015* (PTNSR 2015)

Licence applications that demonstrate potential interactions between the facility or activity and the environment may subject to an environmental assessment (EA) under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). The CNSC also requires the environmental effects of facilities or activities to be evaluated and considered when licence applications are submitted. The environmental protection review under the NSCA is a component of the CNSC's licensing and compliance verification process and is carried out as part of the CNSC's review of all licence applications of facilities and activities that have potential interactions with the environment. The Environmental Protection Review Report is the end-product of this process. In these reports, CNSC staff document their findings based on the review of the information that applicants must submit to meet the appropriate regulatory requirements. The information in the reports is intended to inform the Commission's decision. The reports are written as stand-alone reports in easy-to-understand language to increase transparency for members of the public and Indigenous communities.

For each licensing decision, the Commission or DO must be satisfied that the applicant or licensee will make adequate provision for the protection of the environment and the health and safety of persons before a licence can be granted. Early in the process, CNSC staff determine whether an EA or an environmental protection review under the NSCA applies by reviewing the information provided by the applicant or licensee in their application and supporting documentation.

Once satisfied that all of the requirements of the NSCA and its associated regulations are met and that the applicant's documentation is complete and acceptable, CNSC staff prepare a recommendation to the Commission (or DO) for a licence decision. The Commission (or DO) considers those recommendations along with input from external stakeholders in its hearing process in its decision making.

Provision for the involvement of interested parties and for their input to decision making

Subsection 40(5) of NSCA establishes a legislative requirement for the Commission to hold public hearings, with respect to exercising its power to license and for any other matter within its jurisdiction that the Commission deems to be in the public interest.

Section 40 of NSCA outlines the conditions under which the Commission shall provide applicants, licensees or other person with the opportunity to be heard. The *Canadian Nuclear Safety Commission Rules of Procedure*, enabled under the NSCA, set out the requirements for notification of public hearings and publication of decisions. The *Canadian Nuclear Safety Commission By-laws* define the management and conduct of the Commission's proceedings.

As an agent of the Crown, the CNSC is responsible for fulfilling its legal duty to consult, and where appropriate, accommodate the interests and rights of Indigenous Peoples when its decision may have an adverse impact on potential or established Aboriginal and/or treaty rights pursuant to section 35 of the *Constitution Act, 1982*. The CNSC's approach to Aboriginal consultation includes commitments to uphold the honour of the Crown through information sharing, relationship building and promoting reconciliation as well as to meeting its common-law duty to consult. The CNSC supports a coordinated, whole-of-government approach to improve the efficiency and effectiveness of the consultation process.

Provisions for assigning legal responsibility for safety to the persons or organizations responsible for the facilities and activities

The licensee bears the primary responsibility for safety at all times, including compliance with regulatory requirements. Section 1.4 further describes the licensee's and applicant's responsibilities for safety and the CNSC's responsibilities of ensuring that these responsibilities are properly discharged.

Provision for the review and assessment of facilities and activities, in accordance with the graded approach

The CNSC assesses licensee documents and reports, such as quarterly technical reports, annual compliance reports (ACR) and documentation related to design, safety analysis, programs and procedures, to ensure that the operations remain within the licensing basis, which is the set of boundary conditions for a regulated activity and the basis for CNSC's compliance program. CNSC staff conduct technical assessments to support licensing, compliance, regulatory decision making and the development of regulatory positions. The assessments are based on the best available science, taking operating experience into account.

Further details on CNSC's approach to review and assessment are provided in section 6.

Authority and responsibility for of the regulatory body for promulgating regulations and preparing guidance for their implementation

Under section 44 of the NSCA, "*the Commission may with the approval of the Governor in Council, make regulations*" regarding the subjects listed therein. The regulations under the NSCA reflect detailed regulatory requirements applicable to regulated activities and persons.

In addition to the NSCA and its regulations, the CNSC has developed regulatory documents (REGDOCs), which are a key part of its regulatory framework for nuclear activities in Canada. They provide additional

clarity to licensees and applicants by explaining how to meet the requirements set out in the NSCA and its regulations. The safety and control measures described in the licence application and the documents needed to support the licence application are part of the licensing basis. This means if an applicant cites and uses a REGDOC as part of its application; it becomes part of the licensing basis and is enforceable, as compliance with the licensing basis is a condition of CNSC-issued licences.

A full listing of the REGDOCs is provided on the CNSC's external website.

Provision for the inspection of facilities and activities and for the enforcement of regulations using the graded approach

CNSC inspections are led by qualified designated inspectors and are planned, controlled, coordinated, consistent and transparent (open to formal scrutiny). CNSC inspection powers are established in the NSCA in sections 28 to 36, inclusive. Section 29 of the NSCA provides the Commission authority to designate inspectors. The powers of the inspectors are outlined in section 30 of the NSCA. The frequency, scope and depth of inspections are risk-informed. CNSC's regulatory framework for inspections is outlined in section 7.

The CNSC uses a graded approach to enforcement to compel licensees back into compliance where non-compliance has been detected. Where a deficiency or deviation is either self-identified by the licensee or identified by CNSC staff, the licensee is expected to address or correct the situation. The CNSC does not take enforcement action to punish but rather to encourage compliance, to maintain continued safety and to deter further non-compliance. Administrative monetary penalties may be imposed for non-compliance with regulatory requirements. The CNSC's approach to enforcement is detailed in section 8.

Specification of offences and corresponding penalties

Under the NSCA, a person who commits an offence is subject to prosecution which may result in punishment, which may include a fine and/or imprisonment. Sections 48 to 50 of the NSCA specifies the regulatory offences under the NSCA. The potential punishment for committing an offence is outlined in section 51 of the NSCA.

Provision for appeals against the regulatory body

Section 43 of the NSCA outlines the conditions for redeterminations and appeals of decisions and orders. Subsection 43(1), provides the circumstances where an appeal can be made to the Commission and subsection 42(2) provides the conditions for the Commission to rehear and re-determine on application. Neither the Minister nor the Governor in Council has a role in CNSC's decision-making or the power of appeal. The Commission's decisions are reviewable only by the Federal Court of Canada.

Provision for preparedness for and response to a nuclear and radiological emergency

Emergency preparedness and response was addressed through the 2019 EPREV mission to Canada which was held June 3 to 13, 2019.

Interface with nuclear security

The CNSC regulates nuclear security in Canada as part of its mandate. The NSR set out the detailed security requirements for licensed nuclear facilities and other regulated activities. To prevent

unreasonable risk to national nuclear security, the CNSC works closely with nuclear facility operators, law enforcement and intelligence agencies, international organizations and other governmental departments to ensure that nuclear substances and facilities are adequately protected.

In October 2015, Canada hosted an International Physical Protection Advisory Service (IPPAS) mission to review its national nuclear security practices. The mission reviewed Canada's nuclear security-related legislative and regulatory regime for nuclear material and nuclear facilities, security arrangements applied to the transport of nuclear material, security of radioactive materials, associated facilities and activities, and the information and computer security systems in place. The IPPAS team concluded that Canada conducts strong and sustainable nuclear security activities and identified a number of good practices in the national nuclear security regime. The team found that Canada operates a mature, effective and well-established nuclear security regime and is committed to excellence.

Section 11 provides more information on nuclear security.

Provision for an interface with the system of accounting and control of nuclear material

The CNSC is responsible for implementing Canada's nuclear non-proliferation policy as part of its mandate. The *Treaty on the Non-Proliferation of Nuclear Weapons* is the cornerstone of Canada's efforts to promote the objectives of nuclear disarmament, non-proliferation, and the peaceful use of nuclear energy. The CNSC implements these commitments through the NSCA and corresponding legislation including the NNIECR.

The safeguards agreement between the Government of Canada and the IAEA gives the IAEA the right and obligation to monitor Canada's nuclear-related activities and to verify nuclear material inventories and flows in Canada. Through its regulatory oversight, the CNSC ensures that all applicable licensees have safeguards programs in place which include measures for accounting and reporting nuclear materials. Where required by the safeguards agreements, the CNSC compiles licensee information and submits it to the IAEA on behalf of the Government of Canada.

Provisions for controls on the import and export of nuclear material

The NNIECR, established under the NSCA, identify all controlled nuclear material and non-nuclear material, which requires CNSC import or export licensing. This regulatory requirement enables the CNSC to exercise greater control over controlled nuclear material and non-nuclear material as it moves across Canada's border.

Provision for acquiring and maintaining necessary competence for ensuring safety

As a separate agency of the Federal Government, under subsection 16(1) of the NSCA, the Commission may employ staff required to carry out its mandate. The CNSC provides ongoing training for its staff to ensure they are competent and qualified for the work they carry out.

In particular, the CNSC Inspector Training and Qualification Program (ITQP) was established to ensure that inspectors have the necessary qualifications and can demonstrate a high-level of competence in conducting inspections. The program is structured using a systematic approach to train, qualify and assess inspectors across all service lines and to maintain their qualifications.

Select positions have been designated by the Commission as DO positions to carry out certain duties for the purposes of the NSCA. Staff in these positions are required to complete the CNSC Designated Officer Training and Assistance Program before they are issued a DO certificate and can carry out DO authorities.

Responsibilities and obligations in respect of financial provision for management of radioactive waste and of spent fuel, and for the decommissioning of facilities and termination of activities

The CNSC requires licensees to maintain a financial guarantee for decommissioning and managing radioactive wastes resulting from licensed activities, including spent fuel. The discretion to require licensees to provide guarantees that adequate financial resources are available for the decommissioning of these facilities and managing the resulting radioactive wastes is listed in subsection 24(5) of the NSCA. Paragraph 3(1)(l) of the GNSCR stipulates that, an application for a licence must contain a description of any proposed financial guarantee related to the activity for which a licence application is submitted. G-06, *Financial Guarantees for the Decommissioning of Licensed Activities*, covers the provision of financial guarantees for decommissioning activities.

Criteria for release from regulatory control

Nuclear facilities are released from CNSC regulatory control only when the licensee has successfully decommissioned the facility and/or restored the site to a state in which it can be released for future use (e.g., green field or brown field [industrial]). The CNSC requires a submission for a licence to abandon or exemption from licensing. This submission must be supported by reports on the results of the decommissioning and/or site restoration activities, as well as the results of the radiological and environmental monitoring, to demonstrate that the site no longer needs to be licensed under the NSCA.

Section 4 of the GNSCR outlines the information that must be submitted to obtain a licence to abandon a nuclear substance, nuclear facility, prescribed equipment or prescribed information. Additional information for an application for a licence to abandon is provided under section 8 of the CINFR and under section 8 of the UMMR.

Section 5 of the CIINFPER outlines the information that is required in an application for a licence to decommission a Class II nuclear facility. All facility licensees must submit policies and procedures regarding decommissioning as part of their application.

In reviewing a submission for a licence to abandon, the CNSC must be satisfied that the abandonment of the site, nuclear substance, prescribed equipment or information does not pose an unreasonable risk to the environment, the health and safety of persons, or national security. The abandonment must also not result in a failure to comply with Canada's international obligations.

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 are found in schedule 2 of the NSRDR. Until unrestricted release is achieved, ongoing licensing from the CNSC or oversight by another regulatory or governmental body is required. Transfer to another regulatory or governmental body allows the Commission to exempt a site from CNSC licensing if the risks are determined not to be unreasonable by the Commission. In order to be granted an exemption, the licensee must present a safety case that demonstrates long-term safety. For more information on unconditional release, refer to section 1.6.

A licence for nuclear substances or radiation devices can be revoked when proof of decommissioning of the site or building has been provided to CNSC before release from regulatory control. In order for an existing licence to be revoked, a licensee must submit a request for revocation. The licensee must ensure that all nuclear substances and radiation devices have been removed, and the contamination levels of the site or building do not exceed the limits specified on the licence.

Maintaining the framework for safety

NRCan is the lead federal department for developing and implementing the federal nuclear energy policy. The CNSC is responsible for regulating the nuclear industry in Canada. Treasury Board of Canada Secretariat (TBS) supports the federal regulatory system by:

- providing federal regulatory policy and oversight
- supporting evidence-based Governor in Council decision-making
- advancing and promoting regulatory cooperation

The TBS is responsible for the *Cabinet Directive on Regulation* (CDR). The CDR is the Government of Canada's overarching regulatory policy framework that lays out the rules and requirements regulators must follow when they develop and implement regulations. The TBS also leads the Government of Canada's activities related to regulatory cooperation.

The CNSC operates within a modern and robust legislative and regulatory framework. The CNSC maintains its framework by taking into account modern codes and standards, international regulatory best practices, and the IAEA's Safety Fundamentals and Safety Requirements on a risk-informed approach.

The CNSC's management system, as described in section 4, integrates the core policies, programs and processes that the CNSC uses to meet its mandate.

Responsibilities of the government and the regulatory body specific to occupational exposure, public exposure in planned and existing exposure situations

The CNSC is the federal agency responsible for the regulation of nuclear substances and facilities, as well as the resulting radiation exposure, except within the Department of National Defence and Canadian Armed Forces. As per section 5 of the NSCA, "*The Governor in Council may, by order, exclude the Department of National Defence of Canadian Forces from the application of this Act or any regulations made pursuant to this Act, to the extent and under conditions specified in the order".* Naturally occurring radioactive materials (NORM) are exempt from regulation by the CNSC except when these materials are associated with the fuel cycle. As per section 10 of the GNSCR, "*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 under the Act except for the following: (a) the provisions that govern the transport of nuclear substances; (b) in the case of a nuclear substances listed in the schedule to the Nuclear Non-proliferation Import and Export Control Regulations, the provisions that govern the import and export of nuclear substances".*

Employment and Social Development Canada (ESDC) is the federal department responsible for the Labour Program which protects the rights and well-being of both workers and employers in federally regulated workplaces (i.e., federal departments, agencies and corporations, the armed forces, national

research organizations and those industries involved in inter-provincial land transportation, air and maritime services and telecommunications). ESDC works closely with provincial and territorial governments, unions, employers, international partners, and other stakeholders to promote fair, safe and productive workplaces and collaborative workplace relations. Workplace health and safety is not regulated by the CNSC.

Radiation emitting devices, other than those using nuclear substances, are subject to federal requirements at the point of sale or importation regarding standards for design, construction and functioning. For installation and use provincial or territorial requirements apply, except for devices installed and used in federal facilities or in federally regulated industries. The *Canada Labour Code* prevails in federal jurisdictions, and for radiation protection the HC series of radiation protection safety codes are applicable.

Radiation protection is administered by the provinces and territories either through designated radiation protection programs or as part of the broader duties of occupational health and safety officers from the Workers Compensation Board or similar organization. For the provinces, radiation protection programs are implemented by various ministries or agencies. Some of the programs have regulatory authorities, while others are restricted to advisory and service roles, supporting the regulatory programs of other environmental, occupational and public health bodies. One key area of responsibility for the provinces and territories is the delivery of healthcare, which is a major user of medical x-ray equipment.

Provisions for exemption and clearance

Section 7 of the NSCA provides the Commission with the authority to exempt any activity, person or quantity of nuclear substances from the application of the NSCA or the regulations. The conditions under which the Commission may exempt activities are set out in section 11 of the GNSCR. The Commission may grant an exemption if doing so will not pose an unreasonable risk to the environment, the health and safety of persons, national security, and will not result in a failure to achieve conformity with measures of control and international obligations to which Canada has agreed.

Under its regulation-making authority, as per paragraph 44(1)(u) of the NSCA, the Commission has also established many exemptions, from the licence requirements, from the operations of the NSCA or from other requirements. Some examples are:

- Section 10 of the GNSCR, "*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 under the Act except for the following: (a) the provisions that govern the transport of nuclear substances; (b) in the case of a nuclear substances listed in the schedule to the Nuclear Non-proliferation Import and Export Control Regulations, the provisions that govern the import and export of nuclear substances".*
- Sections 8 and 9 of the CIINFPER provides exemptions for licence requirements for Class II facilities and/or prescribed equipment.
- Sections 5, 6, 7 and 8 of the NSRDR provides exemptions from licence requirements for activities in relation to nuclear substances and radiation devices. Exempted items include:
    - devices containing radium luminous compounds (excluding the servicing of these devices)
    - certain consumer products that contain very small quantities of radioactive nuclear substances

- depleted uranium as counterweights in aircraft among others

Requirements for regulation, optimization and limitation of public exposure

The effective and equivalent dose limits for a member of the public are specified in sections 1(3) and 14 of the RPR. The CNSC's dose limits for members of the public align with Schedule III-3 of the IAEA's Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards GSR Part 3 (2014).

Section 4 of the RPR requires licensees to implement and maintain radiation protection programs that ensure radiation exposures and doses to persons (public and occupational) are ALARA, taking into account social and economic factors.

Legislative basis for source and environmental monitoring

The NSCA and RPR require licensees to ascertain the quantity and concentration of any nuclear substance released as a result of a licensed activity and to implement measures to protect the environment and prevent or mitigate the effects of unplanned releases.

Legislative basis for exposure to indoor radon

For workplaces that are regulated by the CNSC, licensees are required to ascertain the magnitude of exposure to radon progeny and the effective dose and equivalent dose (section 5 of RPR) and to demonstrate compliance with the RPR dose limits as dictated in sections 12 and 13.

Radon in federal workplaces is regulated under the *Canada Labour Code* and the *Canada Occupational Health and Safety Regulations*. Subsection 10.26(4) of the *Canada Occupational Health and Safety Regulations* requires that no employees, other than designated nuclear energy workers, can be exposed over the course of a year to radon with an average concentration greater than 800 becquerel per meter cubed (Bq/m^3). This subsection of the regulations is in the process of being updated to reflect the national radon action level of 200 Bq/m^3. In anticipation of this change, the HC National Radon Program (NRP) recently completed a campaign to test all federally-owned buildings and to remediate them to levels below the action level.

The provinces and territories have jurisdiction for occupational radon exposure in work places that are not regulated by the CNSC or are non-federal workplaces. Facilities and activities under provincial or territorial jurisdiction are beyond the scope of the IRRS mission.

Exposure due to radionuclides in commodities

The responsibility for implementing measures to reduce risks from exposure to radiation in construction materials, food, and drinking water is shared among the different levels of government.

Canada has not identified a need to establish reference levels for food or other commodities for existing exposure situations. Domestically, radiological contamination of food and other commodities is prevented by controlling activities on contaminated sites, of which there are only a few. Imported food and other goods are not screened to assess whether they are contaminated. However, all goods shipped into Canada through marine ports of entry pass through radiation detectors for security purposes and these are occasionally triggered by contaminated goods. In these situations, HC is the regulatory authority under the following acts:

- *Food and Drugs Act* for food, drugs and cosmetics
- *Canada Consumer Product Safety Act* for all other commodities

The purpose of both those two acts is to protect Canadians by addressing or preventing dangers to human health or safety from a broad range of potential hazards, implicitly including exposure to unsafe levels of radioactivity.

It is important to note that the HC definition of consumer products is not the same as IAEA's definition of consumer products. From the *Canada Consumer Product Safety Act*, the definition of consumer product is: *a product, including its components, parts or accessories, that may reasonably be expected to be obtained by an individual to be used for non-commercial purposes, including for domestic, recreational and sports purposes, and includes its packaging.*

1.3 ESTABLISHMENT OF A REGULATORY BODY AND ITS INDEPENDENCE

Related to GSR Part 1 (Rev. 1): Requirements 3 and 4, and GSR Part 3: Requirement 2

As described in the Background section and section 1.1, the responsibility and authority for the regulation of nuclear facilities and nuclear-related activities in Canada is assigned to the CNSC by Parliament under the NSCA. The CNSC is the sole authority in Canada to regulate the development, production and use of nuclear energy, and the production, possession and use of nuclear substances, prescribed equipment in order to prevent unreasonable risk to Canadians and the environment.

Provisions for competence and resources necessary to fulfil statutory obligations

The Commission has the ability to employ the staff required to meet its mandate and fix their remuneration pursuant to subsection 16(1) of the NSCA. As well, subsection 17(1) of the NSCA enables the Commission to enter into paid service contracts with persons having knowledge of any matter relating to the work of the Commission for the purposes of advising and assisting the Commission in carrying out its mandate. Status as a separate agency allows the CNSC flexibility to respond to changes in the labour force to ensure it has the people it needs to carry out its work.

The CNSC's operations are funded from two sources in order to discharge its mandate – parliamentary appropriation and fees paid by applicants, licensees and other special project sponsors in accordance with the CNSC's *Cost Recovery Fees Regulations*.

The Commission has the statutory authority to prescribe and charge fees for the services, products and information that it provides under the NSCA, and the fees may not exceed the costs to the CNSC of its regulatory activities (refer to subsections 44 (1), (2) and (3), paragraph 21(1)(g) of the NSCA). The Revenue Spending Authority provides an equitable approach to the financing of the CNSC's regulatory activities by charging licensees all costs associated to the regulatory regime.

The parliamentary appropriation funds CNSC activities related to:

- applicants and licensees that are fee-exempt (e.g., hospitals, universities, other institutions)
- international obligations including safeguards activities in support of the non-proliferation of nuclear weapons
- outreach and stakeholder relations

- public responsibilities such as emergency preparedness
- ongoing oversight of the NSCA and the associated regulatory framework

Legal independence of the regulatory body

The CNSC is an independent agency of the Government of Canada and operates in a transparent manner. Its operations are open to public scrutiny. The Commission's mandate, set out in its enabling legislation, does not include regulating to meet political or economic objectives. Commission members have a fixed-term appointment on good behaviour, and cannot be removed except for misconduct. When the NSCA was first published as the replacement for the *Atomic Energy Control* Act, its summary noted:

> *While the existing Act encompasses both the regulatory and developmental aspects of nuclear activities, this enactment disconnects the two functions and provides a distinct identity to the regulatory agency. It replaces the Atomic Energy Control Board with the Canadian Nuclear Safety Commission, underlining its separate role from that of Atomic Energy of Canada Ltd., the federal research, development and marketing organization for nuclear energy.*

Decision-making process

The CNSC makes independent, fair and transparent decisions on licensing nuclear related activities. Public hearings and meetings are held by the Commission for decisions and other considerations. These hearings and meetings follow *Canadian Nuclear Safety Commission Rules of Procedure* and *Canadian Nuclear Safety Commission By-laws.* The CNSC is accountable to the public and to Parliament through an annual report that is submitted to Parliament, through the Minister of Natural Resources.

The CNSC's decisions are not subject to review by the Minister or other parts of the executive of government. Neither the Minister nor the Governor in Council has a role in CNSC's decision making or the power of appeal. The Commission's decisions are reviewable only by the Federal Court of Canada.

Per section 19 of the NSCA, the Governor in Council is authorized to issue directives to the Commission on broad policy matters related to the mandate of the CNSC. However, any policy directives given to the CNSC must be of a general nature and cannot fetter the Commission's decision-making authority in specific cases. In addition, all directives must be published in the Canada Gazette and placed before each House of Parliament.

Handling conflict of interest

The CNSC's independent governance structure, in particular the Commission's arms-length decision-making authority, ensures that it remains independent from outside influence, including government departments and agencies, licensees, other Commission members and CNSC staff, in the conduct of its activities.

Members of the Commission must avoid conflict of interest. Subsection 11(1) of the NSCA prohibits members of the Commission from having business interests and engaging in activities, direct or indirect that are inconsistent with the duties of the Commission. A member of the Commission who becomes aware of a conflict of interest must either terminate the conflict or resign from the Commission as per

subsection 11(2) of the NSCA. Additionally, conflict of interest guidelines provide assurances that there is distance between the Commission and stakeholders.

The CNSC has a firmly entrenched values and ethics regime, which serves to strengthen and support governance and ethical leadership. The CNSC *Values and Ethics Code* identifies the values and expected behaviours that guide CNSC employees in performing their duties and responsibilities to the highest ethical standards including maintaining an arms-length regulatory relationship with licensees and members of the public.

1.4 RESPONSIBILITY FOR SAFETY AND COMPLIANCE WITH REGULATIONS

Related to GSR Part 1 (Rev. 1): Requirement 5 (Also related to GSR Part 2: Requirement 1)

Provisions for assigning legal responsibility for safety to the persons or organizations responsible for the facilities and activities

As previously stated in subsection 1.2, subsection 24(4) of the NSCA provides the terms which must be met before the Commission can issue or transfer a licence. It is the responsibility of applicants or licensees to demonstrate that they will put in place the necessary measures to protect safety related to the activities outlined in paragraphs 26 (a) to (f) of the NSCA.

Subsection 12(1) of the GNSCR sets out the general obligations of licensees, including to *"take all reasonable precautions to protect the environment and the health and safety of persons and to maintain security of nuclear facilities and nuclear substances"*. Applicants for licences must submit the information prescribed by the GNSCR and other relevant CNSC regulations to demonstrate that subsection 24(4) of the NSCA is met.

In addition, REGDOC-3.5.3, *Regulatory Fundamentals,* outlines the CNSC's regulatory philosophy:

- Licensees are directly responsible for managing regulated activities in a manner that protects health, safety security and the environment and that conforms with Canada's domestic and international obligations on the peaceful use of energy.
- The CNSC is accountable to Parliament and to Canadians for assuring that these responsibilities are properly discharged.

All licensees are required by virtue of a standard licence condition to conduct their activities in accordance with the licensing basis, which is defined in REGDOC-3.5.3, Regulatory Fundamentals as a set of requirements and documents for a regulated activity comprising the following:

- The regulatory requirements set out in the applicable laws and regulations.
- The conditions and safety and control measures described in the licence, and the documents directly referenced in that licence.
- The safety and control measures described in the licence application and the documents needed to support that licence application.

Demonstration of compliance with safety requirements

Once a licence or certificate is issued, CNSC staff continue regulatory oversight through the CNSC's compliance program. CNSC regulatory policy P-211, Compliance describes the basic principles and directives for establishing and conducting the CNSC's compliance program. Compliance, in the context of this policy, means conformity by regulated persons with the legally binding requirements of the NSCA and its regulations as well as licences, decisions, and orders made under the NSCA.

The CNSC undertakes necessary and reasonable measures to ensure compliance to prevent unreasonable risks to the health and safety of persons, the environment and national security, and to achieve conformity with measures of control and international obligations to which Canada has agreed. These measures include promoting compliance awareness, verification and enforcement.

The licensing basis establishes the basis for the CNSC's compliance program for a regulated facility or activity.

The CNSC's licensing regime can include a licence conditions handbook (LCH), which is a companion piece to interpret a licence. The general purpose of the LCH is, for each licence condition, to clarify the regulatory requirements and other relevant parts of the licensing basis. The LCH, which should be read in conjunction with the licence, provides compliance verification criteria that the licensee must follow to comply with licence conditions, operational limits and information on delegation of authority and applicable versions of documents referenced in the licence. The LCH also provides non-mandatory recommendations and guidance on how to comply with licence conditions and criteria.

The CNSC's regulatory framework defines CNSC requirements and expectations for certification processes. Certificates apply to persons carrying out prescribed duties and the use of prescribed equipment and to the packaging and transport of nuclear substances.

To evaluate licensee compliance with regulatory requirements, the CNSC conducts both field verification activities (such as inspections) and desktop reviews. The frequency, scope, type and depth of these inspections and reviews are risk-informed. Where there may be overlap in regulatory oversight with other regulatory bodies, the CNSC coordinates its verification activities to optimize efficiency and reduce administrative burden on licensees.

Related to GSR Part 1 (Rev. 1): Requirements 5 and 6

Regulatory requirements do not relieve licensees of their prime responsibility for safety

The prime responsibility for safety is assigned to the licensee under the NSCA and its regulations and may not be delegated by the licensee to other persons or organizations. Licensees are required to comply with regulatory requirements including applicable acts and regulations, the licence and licensing basis at all times. Licensees are expected to review and consider regulatory guidance; should they choose not to follow it, they should explain how their chosen alternate approach meets regulatory requirements.

An applicant or licensee may put forward a case to demonstrate that the intent of a requirement is addressed by other means and demonstrated with supportable evidence. Alternative approaches are acceptable to the CNSC only if they meet regulatory requirements.

A graded approach commensurate with risk, may be defined and used when applying requirements and guidance. The use of a graded approach is not a relaxation of requirements; it is the application of requirements commensurate with the relative risks and particular characteristics of a nuclear facility or licensed activity.

1.5 COORDINATION OF AUTHORITIES WITH RESPONSIBILITIES FOR SAFETY WITHIN THE REGULATORY FRAMEWORK

Related to GSR Part 1 (Rev. 1): Requirement 7

Authorities having responsibilities in nuclear and radiation safety

Although the CNSC is Canada's nuclear regulator, there are other federal and provincial departments involved in the safe use, possession or transport of radioactive and nuclear material.

Under the Canadian constitution, provincial laws may also apply when they are not directly related to nuclear energy and do not conflict with federal law. Because both federal and provincial laws may apply in some regulated areas, the approach taken has been to avoid redundant regulations by seeking cooperative arrangements between the federal and provincial departments and agencies that have responsibilities or expertise in the production or use of nuclear energy or nuclear substances. The scope of this IRRS mission to Canada focuses on areas of federal jurisdiction. The following federal departments also have responsibilities or expertise in the regulation of the nuclear industry.

- NRCan – Lead department for developing and implementing federal nuclear energy policy.
- Global Affairs Canada is responsible for Canada's external affairs and international trade and development. This includes the promotion of bilateral and multilateral nuclear cooperation, and the implementation in Canada and support abroad of key non-proliferation, disarmament, safety and security agreements. It enhances security and well-being by promoting the peaceful and safe use of nuclear energy and technologies.
- HC's Radiation Protection Bureau (RPB) is responsible for promoting and protecting Canadians' health with respect to the risks posed by exposure to natural and man-made sources of ionizing radiation in living, working and recreational environments. RPB is also Canada's national centre of excellence for environmental monitoring of radiation in the environment, as well as protection and occupational radiation dosimetry. RPB also conducts research on exposure trends and health outcomes of occupational environmental exposures to radiation, and leads Canada's NRP. The RPB also operates Canada's National Dose Registry.
- ECCC contributes to sustainable development through pollution prevention to protect the environment and human health from the risks associated with toxic substances. ECCC is responsible for the administration of the *Canadian Environmental Protection Act, 1999*.
- Fisheries and Oceans Canada – Fisheries and Oceans Canada and the CNSC have responsibilities for regulatory reviews, approval and environmental protection related to Class I nuclear facilities and uranium mines and mills. Both entities are committed to fostering and developing a collaborative approach to fish and fish habitat protection that is consistent in all parts of Canada.

- Canadian Environmental Assessment Agency is responsible for the administration of the CEAA, 2012, the primary federal legislation defining requirements for assessing the potential environmental effects of planned projects.
- Transport Canada's role with respect to the nuclear sector is to promote public safety during the transportation of dangerous goods. The Transportation of Dangerous Goods Directorate is the leading source of regulation, information and advice on dangerous goods transport for the public, industry and government employees.

The CNSC has entered into a number of MOUs that ensure the coordination and cooperation among authorities having responsibilities for safety and that there are no gaps or duplications/overlap of responsibilities that could create conflicting requirements for licensees or applicants.

1.6 SYSTEM FOR PROTECTIVE ACTIONS TO REDUCE EXISTING OR UNREGULATED RADIATION RISK

Related to GSR Part 1 (Rev. 1): Requirement 9
GSR Part 3: Requirement 2, paragraph 2.26 and Requirements 47-49

Provisions to identify existing exposure situations and establish protective actions

In Canada, the responsibility for implementing a system to reduce risks from exposure to ionizing radiation is shared among the different levels of government (federal, provincial/territorial, and municipal). As described in the Background section and section 1.1, the responsibilities of each are based on the division of power established in the *Constitution Act, 1867*.

Protective actions to reduce undue radiation risks associated with unregulated sources are often integrated into legislative authorities for the exposure pathway (e.g., drinking water) or exposure environment (e.g., workplaces/occupational health and safety). The CNSC and RPB work closely with stakeholders to identify situations where guidance for exposure management is required and to develop and promote harmonized, justified, and optimized recommendations. Examples of these situations include NORM from industrial practices, radioactivity in drinking water, and radon.

Existing exposure situations

HC's RPB influences the Canadian system for protective actions to reduce undue radiation risks associated with unregulated sources by producing guidance that can be considered and, as appropriate, adopted by responsible authorities. For example, while the regulation of building construction is a provincial/territorial or municipal responsibility (depending on the location), most authorities use the National Building Code as the basis of their regulatory framework. RPB, working with partners, successfully argued for the inclusion of requirements to reduce radon ingress in the current edition of the National Building Code and is working to strengthen requirements for built-in mitigation systems in the next iteration. These requirements have generally been adopted across Canada. Other examples of initiatives where RPB contributes to effective management of existing exposure situations include:

- with the Federal-Provincial-Territorial Radiation Protection Committee (FPTRPC), lowering the national radon action level from 800 Bq/m^3 to 200 Bq/m^3 (2007)
- with ESD, changing the radon exposure criteria in the *Canadian Occupational Health and Safety Regulations* to correspond to the national action level

- with FPTRPC, publishing the *Canadian Guidelines for the Management of Naturally Occurring Radioactive Material* (2011). This document is currently being updated
- with the Federal-Provincial-Territorial Committee on Drinking Water, publishing the *Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Radiological Parameters* This document is currently being updated
- with the Canadian Space Agency, research and guidance to support a framework for radiation protection for individuals in space-based activities

HC recognizes that, for the Canadian public, the most significant source of exposure to an unregulated source is radon, and the decision to take protective action resides with many different authorities. HC with the support of the FPTRPC, established the NRP in 2007 in order to promote testing and, where necessary, mitigation. The main objectives of the program are to:

- improve the understanding of radon through research and data analysis
- educate Canadians about the risks associated with radon exposure
- encourage actions to reduce those risks

HC's NRP is supported by an extensive outreach program and materials such as brochures, factsheets, guides and infographics to effectively educate Canadians about the risks from exposure to indoor radon, including increased health risks due to smoking (e.g., RADON Another Reason to Quit factsheet). The radon outreach materials are distributed to all relevant stakeholders including health professionals, other levels of government, and the building and real estate industries.

Exempted activities under the regulatory framework

As per section 5 of the NSCA, "*The Governor in Council may, by order, exclude the Department of National Defence of Canadian Forces from the application of this Act or any regulations made pursuant to this Act, to the extent and under conditions specified in the order".* As well, as per section 6 of the NSCA, "*This Act does not apply to nuclear-powered or nuclear-capable naval vessel of a foreign state that is invited into Canada by Her Majesty in right of Canada".*

Exemption quantities are defined in the NSRDR. The exemption quantities are used to exempt nuclear substances from licensing and in the determination of licensing and certification of radiation devices. In addition, exemption quantities 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 from Table I.1 of IAEA GSR Part 3.

The NSRDR also 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*, as well as the values in Table I.2 of IAEA GSR Part 3 *Radiation Protection and Safety of Radiation Sources: International Basic Safety Standard*.

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 pathways analyses to prospectively assess doses to workers and the public from cleared materials. The dose criteria on which conditional clearance levels are based are the same as the unconditional clearance levels: 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 (from IAEA RS-G-1.7).

Regulation of Contaminated Sites

From the Government of Canada's Federal Contaminated Site Inventory (FCSI), a contaminated site is defined as "*one at which substances occur at concentrations (1) above background (normally occurring) levels and pose or are likely to pose an immediate or long term hazard to human health or the environment, or (2) exceeding levels specified in policies and regulations.*"

The FCSI contains information on all known and suspected federal sites. The inventory may be searched by province or territory, electoral district, metropolitan area, federal custodian or by contaminant type. Custodians are federal departments, agencies and consolidated Crown corporations who are responsible for undertaking operations to protect and safeguard the health of future generations and ecosystems. Custodians also provide additional information about the inventory of their sites.

The NSCA came into force in 2000 and a review of all historical low-level radiological contaminated lands/sites that were not previously under licence by the *Atomic Energy Control*, was completed to ascertain their status under the new legislation. The CNSC established the Contaminated Lands Evaluation and Assessment Network (CLEAN) for this purpose. CLEAN assessed approximately 200 sites to determine the most appropriate level of regulatory oversight and to verify safety. As a result of these activities, eight historical uranium mine sites were issued a CNSC licence; all other sites were exempted from the requirement to hold a licence.

Any contaminated lands/facilities coming under the regulation of the CNSC are required to meet the RPR and the associated requirements of limitation and optimization (ALARA and Best Available Technology/Techniques Economically Achievable, BATEA) with respect to protection of workers and the public

In 2015, the Government of Canada established the Federal Contaminated Sites Action Plan (FCSAP). The objective of the FCSAP is to reduce environmental and human health risks from known and federal contaminated sites and associated federal financial liabilities.

As part of its role as an expert support department under Canada's FSCAP, and to help support a harmonized approach to assessing human health risk from contaminated sites, HC published a series of guidance documents, including one on radiological risk assessment (Part VI: Guidance on Human Health Detailed Quantitative Radiological Risk Assessment).

Arrangements for regaining control of orphan sources

The CNSC has a procedure in place for dealing with found sources. Within the CNSC, the Directorate of Nuclear Substances Regulation (DNSR) is responsible for the regulatory oversight of nuclear substances including radioactive sources. The *DNSR Response Procedure for Found Nuclear Substances* provides staff guidance on what to do when an "orphan source" has been discovered. It covers all steps from discovery to safe transfer and disposal. As the competent authority, all orphan sources would be reported to the CNSC for action.

The *DNSR Management and Single-Point-of-Contact Roles and Responsibilities during a Field Response* work instruction provides instructions to ensure that a uniform approach is followed and applied to all situations where a field response is required and has the potential for exposure to radiation in excess of normal exposures or other known hazards.

A specific program for radium luminous devices (RLD) has been established. CNL's Historic Artefact Recovery Program, operated by the Low-Level Radioactive Waste Management Office, accepts RLDs for transfer to a CNSC-licensed waste management facility.

Monitoring for detecting orphan sources

There are no regulatory requirements for monitoring to detect orphan sources. Many scrap metal recyclers and landfills have installed portal monitors to ensure that nuclear substances do not enter the waste/recycling stream. The CNSC has published a poster and a brochure on Alarm Response Guidelines for Radiation Portal Monitoring Systems that are geared towards waste management and scrap metal facilities. These provide assistance in dealing with found nuclear substances as detected by a portal monitor.

The Canada Border Services Agency (CBSA) has portal monitors installed at marine ports of entry for the purposes of monitoring for nuclear substances. The US border patrol has installed portal monitors at United States/Canada border.

1.7 PROVISIONS FOR THE DECOMMISSIONING OF FACILITIES AND THE MANAGEMENT OF RADIOACTIVE WASTE AND SPENT FUEL

Related to ***GSR Part 1 (Rev. 1): Requirement 10***
GSR Part 3: Requirements 2 and 31
GSR Part 5: Requirements 1, 2 and 6
SSR Part 5: Requirement 1
GSR Part 6: Requirements 4 and 5

Policy for waste management and decommissioning

Canadian legislation, agreements and other documents establish a clear framework for decommissioning and the safe management of radioactive waste.

The Government of Canada *Radioactive Waste Policy Framework* sets the stage for institutional and financial arrangements to manage radioactive waste in a safe, comprehensive, environmentally-sound,

integrated and cost-effective manner. Under this policy, the Government of Canada is responsible for developing policy, regulating and overseeing radioactive waste producers and owners. The waste owners are responsible for funding and managing the operation of their facilities.

The policy framework recognizes that arrangements may be different for the four broad categories of radioactive waste found in Canada: spent fuel, low-level radioactive waste, intermediate-level radioactive waste, high-level radioactive waste and uranium-mine waste rock and mill tailings.

Regarding nuclear fuel waste, in 2002, Parliament passed the Nuclear Fuel Waste Act (NFWA), making the owners of used (spent) fuel responsible for the development of long-term waste management approaches. The legislation required nuclear energy corporations to establish a waste management organization as a separate legal entity to manage the full range of long-term spent fuel management activities. It also required waste owners to establish trust funds with independent financial institutions to finance their long-term waste management responsibilities. It also required the organization to prepare and submit a study to the Government of Canada on proposed approaches for the long-term management of the waste. In accordance with the NFWA, the Nuclear Waste Management Organization (NWMO) was established in 2002 by Canada's nuclear electricity producers. The NWMO is responsible for implementing the Adaptive Phased Management approach that was selected by the Government of Canada for the long-term management of spent fuel.

The CNSC's regulatory approach for radioactive waste and decommissioning stems from the NSCA and is articulated in regulations, licences, LCHs and regulatory documents as described in sections 5-9.

Provisions for financial resources and funding

Licensees of nuclear facilities, including spent fuel and radioactive waste management facilities, provide guarantees that adequate financial resources are available for the decommissioning of these facilities and managing the resulting radioactive wastes, including spent fuel.

Subsection 24(5) of the NSCA provides the legislative basis for imposing this requirement. Paragraph 3(1)(l) of the GNSCR stipulates that, "*an application for a licence must contain a description of any proposed financial guarantee related to the activity for which a licence application is submitted.*" Regulatory document G-206, *Financial Guarantees for the Decommissioning of Licensed Activities*, covers the provision of financial guarantees for decommissioning activities. Regulatory document G-219, *Decommissioning Planning for Licensed Activities*, provides guidance on the preparation of plans for the decommissioning of activities licensed by the CNSC.

The CNSC requires licensees of nuclear facilities and uranium mines and mills to maintain a decommissioning plan and a financial guarantee for decommissioning as a licence condition.

1.8 COMPETENCE FOR SAFETY

Related to GSR Part 1 (Rev. 1): Requirement 11

Provisions for ensuring competence of all parties with responsibilities for nuclear and radiation safety

Subsection 16(1) of the NSCA grants the Commission the ability to employ staff required to meet its mandate. CNSC's status as a separate agency contributes to the Commission's flexibility to respond to

changes in the labour force to ensure it has the people it needs to carry out its work. Further details regarding the regulatory body's provisions to ensure competence are provided in section 3.3.

For licensees, the NSCA under paragraph 44(1)(k) allows the Commission, with the approval of the Governor in Council, to make regulations *"respecting the qualifications for, and the training and examination of analysts, inspectors, nuclear energy workers and other persons employed in a nuclear facility or other place where a nuclear substance or prescribed equipment is produced, used, possessed, packaged, transported, stored or disposed of, and prescribing the fees for the examination of analysts, inspectors, nuclear energy workers and such other persons."* The NSCA also stipulates under paragraph 21(1)(i) that the Commission may in order to obtain its objects, certify and decertify persons referred to in paragraph 44(1)(k) as qualified to carry out their duties under the Act or the duties of their employment, as the case may be. In alignment with 24(4) of the NSCA, Commission decisions are based on the qualification of a proponent to carry on an authorized activity and assurances that in carrying on those activities, adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed will be made.

Requirements for necessary competence and provisions for sufficient and experienced staff

Section 3.3 outlines the requirements and necessary competence levels of the regulatory body.

For licensees, the GNSCR under paragraph 12(1)(a) stipulates that *"every licensee shall ensure the presence of a sufficient number of qualified workers to carry on the licensed activity safely and in accordance with the Act, the regulations made under the Act and the licence."* It also stipulates under paragraph 12(1)(b) that *"every licensee shall train their workers to carry on the licensed activity in accordance with the Act, the regulations made under the Act and the licence."*

The CINFR, CIINFPER, UMMR, NSRDR, Packaging and Transport of Nuclear Substances Regulations 2015 (PTNSR 2015), and the *Transportation of Dangerous Goods Regulations* (TDG Regulations) have requirements with respect to the submission of certain information related to the training and qualification of workers. For example, the CINFR requires that the proponent submit information such as the proposed program and schedule for recruiting, training and qualifying workers with respect of the operation and maintenance of the nuclear facility including the procedures for the requalification of workers, along with the results that have been achieved in implementing the program. The requirements relative to the information that must be submitted is dependent on the type of licence the proponent is seeking to obtain.

The CINFR, CIINFPER, and NSRDR have requirements with respect to the CNSC certification of licensee personnel working in certain positions that have a direct impact on safety. This requirement is in place to provide additional assurance that these personnel have and maintain the required knowledge and skills to work safely. The CIINFPER and NSRDR detail the particular positions that require CNSC certification, whereas the CINFR states that the positions requiring CNSC certification are to be detailed in a facility's licence. REGDOC-2.2.3 *Personnel Certification: Radiation Safety Officers* sets out guidance to assist applicants in completing an application for certification of a Radiation Safety Officer pursuant to the CIINFPER. REGDOC-2.2.3 *Personnel Certification: Exposure Device Operators*, provides the CNSC's requirements and guidance for certification and for renewal of certification as an exposure device

operator pursuant to NSRDR. For non-power nuclear reactor facilities, the requirements for personnel certification are detailed in the facility's licence and for NPPs the requirements for personnel certification are specified in the regulatory document *RD-204, Certification of Persons Working at Nuclear Power Plants*.

Arrangements for training programmes and periodic verification of competence of licensees

REGDOC-2.2.2, *Human Performance: Personnel Training*, sets out the CNSC's requirements and guidance for licensees regarding the development and implementation of a training system. A training system provides the basis for the analysis, design, development, implementation, evaluation, documentation and management of training for workers at nuclear facilities. It provides a method for meeting the training needs of workers and ensuring that the right people receive the right training at the right time. With a training system as defined in this regulatory document, it can be demonstrated that all required knowledge, skills and safety-related attributes have been attained, through the process of performance-based assessment and program evaluation.

1.9 PROVISION OF TECHNICAL SERVICES

Related to GSR Part 1 (Rev. 1): Requirement 13
GSR Part 3: Requirement 2, paragraph 2.23

Provisions for technical services related to safety

Protecting against the effects of ionizing radiation is the responsibility of multiple levels of government and this responsibility extends to the provision of technical services. The technical services of the provinces and territories are out of scope for the 2019 IRRS mission to Canada and therefore only those for the federal government departments are described below.

Personal Dosimetry

Personal dosimetry is used primarily to determine doses to individuals who are exposed to ionizing radiation related to their CNSC-licensed activities as well as other non-regulated activities such as NORM. In Canada, the RPR stipulate if effective doses of radiation to workers could exceed 5 mSv per year, personal dosimetry must be performed by a CNSC-licensed dosimetry service.

A dosimetry service measures and monitors doses of radiation. HC's National Dosimetry Service (NDS) is Canada's leading licensed dosimetry service provider. NDS is a cost-recovery organization that offers a full-line of dosimetry products and account management services to satisfy the diverse monitoring needs of the Canadian workforce, particularly in industries outside of the nuclear fuel cycle.

The CNSC does not provide personal dosimetry services but regulates the operation of dosimetry services as a licensable activity under the NSCA. Section 3 of the GNSCR and section 18 of the RPR provide the licence application requirements to operate a dosimetry service. The dosimetry service licence categories are established through Schedule 1 of the *Canadian Nuclear Safety Commission Cost Recovery Fees Regulations*.

CNSC dosimetry service licences authorize the operation of a dosimetry service that meets the regulatory requirements of the RPR, and in the CNSC regulatory standard S-106 revision 1, *Technical and*

Quality Assurance Requirements for Dosimetry Services, which specifies the accuracy, precision and quality assurance requirements for dosimetry services.

The RPR requires every licensee who operates a dosimetry service to file information with respect to each nuclear energy worker for whom it has measured and monitored a dose of radiation with the National Dose Registry (NDR), at a frequency specified in the licence and in a form compatible with the Registry. The NDR is Canada's national repository for dose records of Canadian workers who are monitored for occupational exposure to ionizing radiation. The NDR is administered by the HC RPB and supports HC and Canadian regulatory authorities in their mandates to protect the health and safety of Canadians exposed to ionizing radiation in the workplace including, but not limited to, NPPs, uranium mines and mills, dental offices, and hospitals. It has been in continuous operation since 1951 and now contains the records of more than half a million individuals who have been monitored for radiation exposure as part of their jobs, including more than 150,000 members of the present-day workforce. The NDR assists in regulatory control by notifying regulatory authorities of overexposures within their jurisdiction and provides dose histories to workers and organizations for work planning.

The RPR provides some flexibility for CNSC licensees that are not required to use CNSC licensed dosimetry for measuring and monitoring effective doses if worker doses are expected to be below 5 mSv per year. Licensees must ascertain doses to their employees, but are not required to use CNSC-licensed dosimetry services. In such cases, licensees may choose to use CNSC-licensed dosimetry services or to determine doses using other acceptable techniques based on the level of risk in question. These techniques and methods are assessed by CNSC staff to ensure that they meet regulatory requirements. Guidance in this area is provided by regulatory document G-91, *Ascertaining and Recording Radiation Doses to Individuals.*

***In vivo* and *in vitro* human monitoring**

The HC Human Monitoring Laboratory has the capability to perform whole-body counting, lung counting, thyroid counting, and urine bioassay analysis. HC also has portable instrumentation for performing whole-body counting and urine bioassay analysis in the case of an emergency.

Environmental monitoring capabilities

CNSC's Independent Environmental Monitoring Program (IEMP) was established to independently verify that the public and the environment around nuclear facilities are protected. This required significant modernization and expansion of CNSC laboratory facilities from a focus on calibration services to an expanded capability for environmental sampling and analyses for both nuclear and hazardous substances. Results are compared against guidelines and screening levels then posted online to the CNSC's web page. The IEMP does not relieve licensees of their responsibility to implement and maintain their own environmental monitoring program.

In addition, a number of government monitoring programs by HC monitor the environment around nuclear facilities:

- The Canadian Radiological Monitoring Network is managed by the Radiation Surveillance Division of HC's RPB. This is a national network that routinely collects air particulate, precipitation, external gamma dose, drinking water, atmospheric water vapour, and food and milk samples for radioactivity analysis. Environmental surveillance activities are supported by HC

radiological laboratories equipped to perform gamma and alpha spectroscopic investigations, liquid scintillation and gas-proportional counting, inductively-coupled mass spectrometric analysis, and a complementary suite of chemical separation techniques.

- The Fixed Point Surveillance Network, operated by HC's RPB, is maintained by the Verification and Incident Monitoring Section. It is a real-time, highly sensitive radiation detection network that provides national surveillance of the dose received by the public from airborne radioactive material. It consists of 76 robust scintillation detectors located primarily in major population centres and in the vicinity of NPPs. This network contributes significantly to the effectiveness of Canada's response in the case of a nuclear or radiological incident, at home or abroad. Data from this network is available on the HC web site as monthly summaries updated four times a year. The gamma dose rate is also shared with and posted to the international European Radiological Data Exchange Platform website.
- Comprehensive Nuclear Test Ban Treaty International Monitoring System contributes to the International Monitoring System, an element of the verification regime overseen by the Comprehensive Nuclear-Test-Ban Treaty Organization. RPB is responsible for four radionuclide monitoring stations that survey airborne radioactivity concentrations on a daily basis. This is accomplished through analysis of accumulated air particulates in filter media from high-volume air samplers. Two of these stations are additionally equipped to survey airborne radioactivity by analysis of air condensate for unstable noble gas (particularly radio-xenon) content. These stations are located in St. John's, Newfoundland (particulate/noble gas), Resolute, Nunavut (particulate), Yellowknife, Northwest Territories (particulate/noble gas), and Sidney, British Columbia (particulate).

There are also surveillance and monitoring programs operated at the provincial level including the Ontario Ministry of Labour Reactor Surveillance Program (ORSP) and the Saskatchewan Eastern Athabasca Regional Monitoring Program (EARMP). Additional information can be found on the ORSP and EARMP websites.

Calibration of equipment

Under the NSCA, the CNSC's Radiation Instrumentation program provides calibrated instruments for CNSC compliance verification activities as well as expert services in radiation instrumentation training, acquisition and calibration. The CNSC laboratory is accredited under ISO/IEC 17025, *Testing and calibration laboratories*. The main activities of the program are maintenance, service, repair and calibration of radiation instrumentation used by CNSC staff in compliance verification; training of CNSC staff and external parties in radiation instruments operation and maintenance; maintenance of the ISO 17025 accreditation and extension of the scope of accreditation to include all the instruments calibrated in the laboratory.

Both the NSRDR and the CIINFPER specify requirements related to radiation survey meters. In addition, paragraph 12(e) of the GNSCR requires that every person at the site of the licensed activity use the equipment, devices, clothing, and procedures in accordance with the NSCA, the regulations made under the NSCA and the licence.

Regarding calibration services, subsection 3(1) of the NSRDR states: "An application for a licence in respect of a nuclear substance or a radiation device, other than a licence to service a radiation device, shall contain the following information in addition to the information required by section 3 of the *GNSCR*:

(a) the methods, procedures and equipment that will be used to carry on the activity to be licensed;

(j) the methods, procedures and equipment that will be used to calibrate and verify the calibration of dosimeters referred to in paragraphs 30(3)(d) and (e);"

Expectations for calibration methods and procedures are included in:

- REGDOC-1.4.1, Licence Application Guide: Class II Nuclear Facilities and Prescribed Equipment (draft)
- REGDOC-1.6.1, Licence Application Guide: Nuclear Substances and Radiation Devices, version 2

Amendments to the RPR are currently ongoing and will include a new section related to the provision and use of radiation detection and measurement instruments by all CNSC licensees. This section will require all radiation detection and measurement equipment to be appropriately selected for the types, levels and radiation energies encountered, and to be capable of preforming accurately and reliably in operating field conditions during routine work and emergencies. It will also require radiation instrumentation to be tested routinely to verify proper functioning. REGDOC-2.7.1, *Radiation Protection*, which is under development, includes guidance and expectations for the selection, testing and calibration of radiation instrumentation in line with this proposed new regulatory requirement.

1.10 CONCLUSIONS

In Canada, the regulation of nuclear energy falls under federal jurisdiction. The CNSC is a quasi-judicial independent body with jurisdictional authority over nuclear-related facilities and activities in Canada. The CNSC works cooperatively with several federal and provincial departments and agencies to facilitate the discharge of its duties and responsibilities, harmonize with non-nuclear requirements and capitalize on their expertise.

The NSCA and its regulations are the key pieces of legislation that govern CNSC's regulatory activities. The responsibilities of the CNSC are clearly outlined and entrenched in the NCSA; and the CNSC is able to perform its functions without undue restrictions. Under the NSCA, the prime responsibility for safety is assigned to the licensee. Licensees are responsible for managing regulated activities in a manner that protects the health, safety, security and the environment and conforms with Canada's domestic and international obligations on the peaceful use of energy. The CNSC is accountable to Parliament and Canadians for assuring that these responsibilities are properly discharged.

2. GLOBAL NUCLEAR SAFETY REGIME

2.1 INTERNATIONAL OBLIGATIONS AND ARRANGEMENTS FOR INTERNATIONAL COOPERATIONS

Related to GSR Part 1 (Rev. 1): Requirement 14

The CNSC is the sole authority to regulate the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information in Canada. The CNSC is mandated to implement Canada's international obligations on the peaceful use of nuclear energy. To achieve this objective, the CNSC works bilaterally and multilaterally with partners around the world to maintain a safe, secure and peaceful international nuclear sector.

CNSC, on behalf of Canada, participates in international arrangements (including international agreements, working groups, committees, peer reviews as well as bilateral and multilateral cooperation) to enhance safety globally and fulfil its respective international obligations.

CNSC staff also participate in international fora to provide global nuclear leadership and to benefit from international experience and best practices. These international activities help inform the CNSC's decision-making processes to:

- understand and compare the various ways of evaluating and mitigating risks
- share research as well as regulatory and operational experience

International agreements

Canada is a signatory to a number of key international treaties that establish common obligations and mechanisms to ensure protection and safety. Many of the treaties that the CNSC is responsible for implementing (in whole or in part) are multilateral treaties administered by the IAEA. These include the:

- Convention on Nuclear Safety
- Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Joint Convention)
- Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency
- Convention on Early Notification of a Nuclear Accident or Radiological Emergency
- Convention on the Physical Protection of Nuclear Material
- Treaty on the Non-Proliferation of Nuclear Weapons

The CNSC participates actively in all international meetings on these treaties. For example, CNSC's participation in the Joint Convention demonstrates CNSC's continuing commitment to achieving and maintaining a consistently high level of safety in the management of spent fuel and radioactive waste, as part of the global safety regime for ensuring the protection of people and the environment.

Furthermore, participating in the Joint Convention process allows the CNSC to perform a structured self-assessment of the appropriateness of its adopted safety measures for spent fuel and radioactive waste management. It provides an international forum for cooperation and experience-sharing for regulators, government agencies, and industry. It also provides opportunities to learn about international decommissioning experience and the status of waste repositories in various countries.

The CNSC fully meets its obligations under these conventions.

Nuclear safety related codes of conduct

The CNSC, on behalf of Canada, assists in the development of and is responsible for implementing (in whole or in part) nuclear safety related codes of conduct such as the:

- Code of Conduct of the Safety and Security of Radioactive Sources
- Code of Conduct on the Safety of Research Reactors

In compliance with the IAEA Code of Conduct on the Safety and Security of Radioactive Sources, CNSC licenses and controls the export and import of certain risk-significant radioactive sealed sources.

Import, export and non-proliferation

Canada's non-proliferation policy stipulates that Canadian-supplied nuclear material, equipment and technology can only be transferred to countries which have concluded a bilateral Nuclear Cooperation Agreement (NCA) with Canada. NCAs are treaty-level, legally-binding agreements which establish reciprocal obligations designed to minimize the proliferation risk associated with the transfer of major nuclear items and technology. These obligations include assurances that the items are used strictly for peaceful purposes, consent over retransfer, consent over high enrichment and reprocessing, as well as the establishment of physical protection measures and fallback safeguards. Global Affairs Canada is responsible for the negotiation of NCAs. The CNSC contributes to NCA negotiations by providing technical policy advice.

Canada has 30 NCAs in place with the following countries. Additional details can be found on the CNSC's external website.

- Argentina
- Australia
- Brazil
- China
- Colombia
- Czech Republic
- Egypt
- EURATOM (28 countries)
- Finland
- Germany
- Hungary
- India
- Indonesia
- Japan
- Jordan
- Kazakhstan
- Republic of Korea
- Mexico
- Philippines
- Romania
- Russian Federation
- Slovakia
- Slovenia
- Spain
- Sweden
- Switzerland
- Turkey
- Ukraine
- UAE
- United States

Canada's NCAs contain a provision authorizing the CNSC as the appropriate government authority on the part of Canada to establish Administrative Arrangements (AAs) to facilitate the effective implementation of an NCA.

The CNSC has established 25 AAs in place with counterparts in the following countries to ensure the effective implementation of bilateral NCAs. Additional details can be found on the CNSC's external website.

- Argentina
- Australia
- Brazil
- China
- Colombia
- Czech Republic
- Egypt
- EURATOM (28 countries)
- Finland
- Hungary
- India
- Jordan
- Kazakhstan
- Republic of Korea
- Mexico
- Romania
- Russian Federation
- Slovakia
- Slovenia
- Spain
- Sweden
- Switzerland
- Ukraine
- UAE
- United States

The CNSC also establishes AAs with foreign regulatory counterparts to implement import and export control provisions pursuant to the IAEA Code of Conduct on the Safety and Security of Radioactive Sources, and the supplementary Guidance on the Import and Export of Radioactive Sources. The objective of AAs is to establish efficient and harmonized bilateral procedures for the implementation of import and export controls, thus reducing the risk of undue delays in authorizing transfers of such sources.

The CNSC currently has 12 AAs established for radioactive sources.

- Argentina
- Australia
- Brazil
- Chile
- Colombia
- Ireland
- Italy
- Japan
- Mexico
- Peru
- Thailand
- United States

Participation in the development and review of international safety standards

The CNSC supports and applies IAEA safety standards in developing its regulatory framework. The CNSC's regulatory framework is described further in section 9.

To assist in the development of standards, Canada actively participates in all of the IAEA Safety Standards Committees:

- HC represents Canada on the Emergency Preparedness and Response Standards Committee, with the CNSC as alternate.
- The CNSC represents Canada on the Radiation Safety Standards Committee, Transport Safety Standards Committee, Waste Safety Standards Committee and Nuclear Safety Standards Committee. A CNSC staff member is currently the chair of Nuclear Safety Standards Committee.
- The CNSC's Executive Vice-President and Chief Regulatory Operations Officer is an active member of the Commission on Safety Standards.

Under the CNSC's International Strategy, which is part of the CNSC's Strategic Planning Framework, one of the main objectives is to ensure that the CNSC and its licensees learn, adapt and incorporate international lessons learned and best practices. The CNSC incorporates a review of IAEA safety standards and other documents (i.e., regulations and standards), if applicable, into its policy analysis work at the initial stages of developing regulatory instruments. The *Conduct Regulatory Policy Analysis* process ensures that IAEA documentation is leveraged, as appropriate, within the CNSC's regulatory framework project proposals. Furthermore, the CNSC has developed formalized processes to enhance coordination of the review of draft IAEA safety standards (including enhanced consultations with members of the public, Indigenous groups and other stakeholders). These processes ensure that review requests from the IAEA with regards to draft safety standards are systematically assessed.

The CNSC has developed REGDOCs that specify licence application requirements and guidance to meet regulatory requirements. REGDOCs take into account international regulatory best practices and modern codes and standards, and align with the IAEA's Safety Fundamentals and Safety Requirements. When referenced in a REGDOC, the IAEA safety standards are considered to be guidance or regulatory expectations. Licensees and applicants can use IAEA safety standards as appropriate in developing their applications as long as they provide sufficient justification for how they have used the standards. The CNSC also references standards in the licensing basis as requirements for licensees or applicants to adhere to.

Participation in International peer reviews

The CNSC is an active participant of the IAEA's peer review missions as a key mechanism for strengthening regulatory effectiveness, both domestically and abroad. The CNSC previously hosted an IRRS mission to Canada in 2009 with a follow-up mission in 2011. In 2015, the IAEA completed an IPPAS Mission to Canada to review national nuclear security practices. Two Operational Safety Review Team (OSART) Missions were conducted in Canada in 2015 and 2016.

The IAEA conducted an EPREV of nuclear emergency arrangements in Canada from June 3 to 13, 2019. The EPREV mission was a first in Canada and a first for G7 countries.

In addition, between 2014 and 2018, CNSC staff members led or participated in 27 IRRS missions and 11 IPPAS missions in other countries.

Promotion of international cooperation and assistance

The CNSC actively promotes international cooperation and assistance to enhance nuclear safety globally through a number of means. In addition to the activities listed in the sections above, CNSC staff also promote international cooperation/assistance through:

- Participating in high-level meetings focused on enhancing the global nuclear safety regime, such as the G7 Nuclear Safety and Security Group, International Nuclear Regulators Association, the IAEA General Conference and Board of Governors, Ministerial Conferences and presiding over international conferences.
- Participating in the IAEA's Commission on Safety Standards to provide direct advice to the Director General of the IAEA.

- Participating in IAEA and Nuclear Energy Agency (NEA) technical and committee meetings to share information, draft documents and build international capacity in nuclear safety, security and safeguards.
- Participating in the NEA Committee on Nuclear Regulatory Activities and Committee on the Safety of Nuclear Installations.
- Participating in conferences and workshops external to the IAEA and NEA to share information, draft documents and build international capacity in nuclear safety.
- Participating in international activities related to the implementation of Canada's international commitments on the peaceful use of nuclear energy.
- Chairing the NEA/Organisation for Economic Co-operation and Development (OECD) Committee on Decommissioning of Nuclear Installations and Legacy Management.
- Assisting with global capacity building efforts by providing CNSC personnel to deliver training organized by international organizations to strengthen other nuclear regulators and technical support organizations.
- Hosting international meetings, events and visits to Canada related to enhancing the global safety regime.
- Hosting IAEA fellowships and scientific visits.
- Hosting IAEA workshops, technical visits, and conferences.
- Signing and implementing MOUs with regulatory counterparts for cooperation and the exchange of nuclear regulatory information.

2.2 SHARING OPERATING EXPERIENCE AND REGULATORY EXPERIENCE

Related to GSR Part 1 (Rev. 1): Requirement 15

Use of operational and regulatory experience to inform the regulatory framework

The CNSC undertakes a number of steps to enhance the analysis of operating and regulatory experience as well as incorporating lessons learned both nationally and internationally.

The CNSC has international collaborative agreements which facilitate the sharing of lessons learned. These range from bilateral international agreements with other regulatory bodies to multilateral international agreements through organizations such as the IAEA and the OECD/NEA. Examples include:

- IAEA International Generic Ageing Lessons Learned Programme
- OECD/NEA Component Operational Degradation & Ageing Programme
- OECD/NEA International Common-Cause Data Exchange
- OECD/NEA Fire Incident Records Exchange
- OECD/NEA Committee on Decommissioning of Nuclear Installations and Legacy Management

These are multiyear agreements which allow for all parties to participate in working groups and share lessons learned from both operating and regulatory experience. Many of these working groups have created databases to store the lessons learned information which can then be accessed by all participating members.

The CNSC has established the Operating Experience (OPEX) Clearinghouse program to systematically review domestic and international events, and to leverage the integrated expertise of CNSC staff, ensuring that relevant events are followed up in a timely manner. The OPEX Clearinghouse draws information from several sources including:

1. Central Event Reporting and Tracking System (CERTS), a database used to collect, categorize and track follow-up of reported events at Canadian NPPs.
2. IAEA-OECD Incident Reporting System, which provides timely and detailed information on lessons learned at the international level on operating and construction experience
3. NEA Working Group on OPEX
4. IAEA/NEA Fuel Incident notification and Analysis Systems: a database used to analyze information on events at nuclear fuel cycle facilities and promotes a systematic approach to feedback and the use of OPEX

The CNSC uses regulatory experience through a lessons learned approach (regulatory oversight and support) that is well ingrained across the organization. The CNSC has many mechanisms in place to provide assurance that lessons learned opportunities are carried through to implementation and improve the CNSC's regulatory effectiveness.

The CNSC obtains regulatory experience from different forums including:

- internal sharing of inspection reports and safety reviews/assessments including lessons learned
- participation in and leading of peer reviews, conferences and workshops
- participation in nuclear safety conventions and review meetings
- participation in standards development (national and international)
- capturing lessons learned from Commission proceedings through the Commission Member Document (CMD) process
- conducting audits, evaluations, and self-assessments of CNSC programs and processes
- internal committees such as the Regulatory Framework Steering Committee and the Harmonized Plan Steering Committee
- participation in intergovernmental committees such as the Community of Federal Regulators
- feedback from public consultation on the CNSC's regulatory framework

More detailed examples of how CNSC obtains and shares regulatory experience are provided below.

Internal committees such as the Regulatory Framework Steering Committee and the Harmonized Plan Steering Committee

The CNSC's Regulatory Framework Steering Committee drives regulatory framework priorities and provides leadership, guidance and direction to achieve a clear and robust regulatory framework. The mandate of the committee is to ensure that the CNSC's regulatory framework continues to benefit from lessons learned and strives for continuous improvement.

The CNSC's Harmonized Plan Steering Committee provides leadership, direction and support in the development and implementation of the Harmonized Plan (HP). HP is the CNSC's improvement plan that integrates and aligns cross-functional CNSC improvement initiatives for the effective and efficient delivery of CNSC's regulatory programs while assuring safety remains an overriding priority. The plan is a vehicle for strategic discussions to promote change management and business transformation readiness, and strengthen the CNSC's management system. Refer to section 4 for more information on CNSC's management system.

Participation in intergovernmental committees

CNSC staff participate in the Community of Federal Regulators to learn from other Canadian regulators as well as share information and lessons learned. The CNSC leads the Community of Federal Regulators' efforts and sharing international lessons learned in relation to the development and consistent implementation of administrative monetary penalties as it applies to the Canadian enforcement landscape.

The Federal-Provincial-Territorial Radiation Protection Committee is an intergovernmental committee established to support federal, provincial and territorial radiation protection agencies in their respective mandates. The representation on the committee includes CNSC, HC, provinces and the territories. The objective of the committee is to advance the development and harmonization of practices and standards for radiation protection. Among the activities of the committee is:

- identifying emerging issues in radiation protection and recommending actions to the appropriate jurisdictions
- developing and harmonizing radiation protection standards, guidelines and input for legislation
- providing a forum for representatives of the provinces and territories, the CNSC, Department of National Defence, HC and other federal departments/agencies

Sharing information and lessons learned from operating and regulatory experience

REGDOC-3.2.1, *Public Information and Disclosure*, requires licensees and applicants to have an established public disclosure protocol to address the information interests of the target audience with respect to licensed activities. The CNSC public disclosure notification aligns with the CNSC's policy to promote open and transparent public relationships between licensees and applicants and their target audiences and to assist in the broader dissemination of information to the general public where appropriate.

Licensees and applicants are required to inform the CNSC of disclosures made under the public disclosure protocol at the time of, or before, such disclosure. CNSC posts events on the main page of the CNSC website. Additional information on the requirements of a licensee's or applicant's public information program is discussed in section 3.8.

The CNSC uses event initial reports to ensure the Commission is aware of any events that may require its decision-making capacity. The reporting requirements are outlined in the REGDOC-3.1, Reporting Requirements series of documents. The CNSC has a process in its management system which documents the overview of event initial reporting. The purpose of the process is to systematically and consistently:

- assess and identify events which may potentially require the involvement of the Commission in making a regulatory decision, and
- make the Commission aware of such an event, its impact, and the status of controls in place to assure the safety or security.

The CNSC also reports on lost or stolen sealed sources and radiation devices on its external website. The NSCA, its regulations and licence conditions require licensees to report these occurrences. Events are added and the status is updated on a regular basis to keep the public informed. The report provides a description for each event, the date the event occurred, the event location, the risk categorization, a

brief summary and the recovery status. The risk categorization of the sealed source at the time of the event (Category 1 to Category 5) is based on the IAEA document entitled *Categorization of Radiation Sources.*

Problems or issues that arise from event reviews that may be applicable to other nuclear facilities are identified and brought to the attention of the CNSC. CNSC staff ensure that the results of root-cause analyses, which includes a mandatory review of OPEX related to the event, are included in their reviews and assessments of a licensee's corrective actions in response to events. The Commission may ask for further corrective actions until it is satisfied that adequate measures have been taken to protect the health and safety of the people and the environment and that Canada is upholding its international obligations.

For NPPs, CNSC inspection teams consult the OPEX in CERTS when planning strategies for their audits and in identifying problem areas. Similarly, CNSC assessments often incorporate the OPEX recorded in CERTS. As part of the inspection baseline, CNSC inspectors also check the licensee's station condition records or event reports, along with system health reports, to ensure that licensees have reviewed related OPEX and identified the relevant extent of condition for their facilities.

The Event Information and Tracking System (EITS) is an internal repository of event information. The EITS is an event information management system. The EITS allows CNSC to log and report unplanned events concerning nuclear substances, nuclear materials and devices. Unplanned events include incidents regarding (but not limited to) the loss, theft, recovery, transport, storage, disposal, unauthorized use/possession/transaction, spills, malfunction or damage of nuclear devices, and waste and scrap material alarms. The system allows for recording of event details, tracking of these events, detailed searching, and the creation of reports.

On a quarterly basis, a summary of events related to the use of nuclear substances, radiation devices and prescribed equipment is prepared and shared with the EITS distribution list. In addition, licensing and compliance staff are in the process of developing an event review process for the review of licensee related events related to the use of nuclear substances and radiation devices. The goal is to have both licensing and compliance staff involved in event follow-up and closure for those events where more CNSC involvement would be required.

Under its international obligations, the CNSC is responsible for assessing and providing provisional and final International Nuclear and Radiological Event Scale (INES) ratings to the IAEA. The INES scale is used to classify the size of a radioactive release and its associated public dose to facilitate the communication of the safety significance of a nuclear and radiological event to technical committees and the public.

Use of regulatory and operational experience in continuous improvement of CNSC's regulatory framework

An example of CNSC's commitment to continuous improvements is the CNSC's response to the incident at the Fukushima Daiichi NPP. In response to the event on March 11, 2011, the CNSC launched a rigorous re-examination of all of the CNSC's regulatory requirements and identified some key improvements. A CNSC-led task force evaluated the operational, technical and regulatory implications of the accident in relation to Canadian NPPs. In parallel, CNSC staff reviewed non-power reactor facilities, as well as uranium mines and mills, to confirm that these installations were safe and adequately

prepared to deal with potential emergencies. The non-power reactor reviews used a risk-informed approach consistent with the recommendations of the CNSC Task Force, taking into account the specificities of the facilities (including licensed activities, site characteristics and nature of the hazards present at each nuclear site). The areas of improvement identified by the CNSC Task Force for NPPs were also considered for all Class I facilities, and applied in a graded approach.

On September 30, 2011, the task force completed its review and presented its findings and recommendations in the CNSC Fukushima Task Force Report. The task force made 13 recommendations in the following areas to further enhance the safety of Canadian NPPs:

- Strengthening reactor defence in depth
- Enhancing emergency response
- Improving the regulatory framework and processes
- Enhancing international collaboration

To address the task force's recommendation, the CNSC developed a four-year CNSC Integrated Action Plan to be implemented by licensees and CNSC staff. Both the CNSC Fukushima Task Force Report and the CNSC Action Plan were subject to public consultations and independent reviews.

All Fukushima Action Plan items are now implemented and closed.

2.3 CONCLUSIONS

The CNSC uses regulatory experience through a lessons learned approach (regulatory oversight and support) that is well ingrained across the organization. The CNSC has many mechanisms in place to provide assurance that lessons learned opportunities are carried through to implementation and improve the CNSC's regulatory effectiveness.

Canada participates in international arrangements to enhance safety globally and fulfil its respective international obligations through:

- implementing multilateral treaties that are under the auspices of the IAEA including the Convention on Nuclear Safety and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management as well as nuclear safety
- implementing related codes of conduct
- participating in all IAEA standards committees
- participating in international peer reviews including IPPAS, OSART and EPREV missions
- promoting international cooperation and assistance
- sharing operational and regulatory experience with CNSC staff; other federal and provincial departments and regulators; licensees and applicants; civil society; and other stakeholders

CNSC's participation, on behalf of Canada, in international arrangements and other international for continue to inform the CNSC's decision-making process, allow the CNSC to fulfil its mandate of implementing Canada's international obligations on the peaceful use of nuclear energy as well as share lessons learned and good practices internationally to improve nuclear safety globally.

3. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY

3.1 ORGANIZATIONAL STRUCTURE OF THE REGULATORY BODY AND ALLOCATION OF RESOURCES

Related to GSR Part 1 (Rev. 1): Requirement 16

Organizational structure and the decision-making process

The CNSC's organizational structure consists of two components:

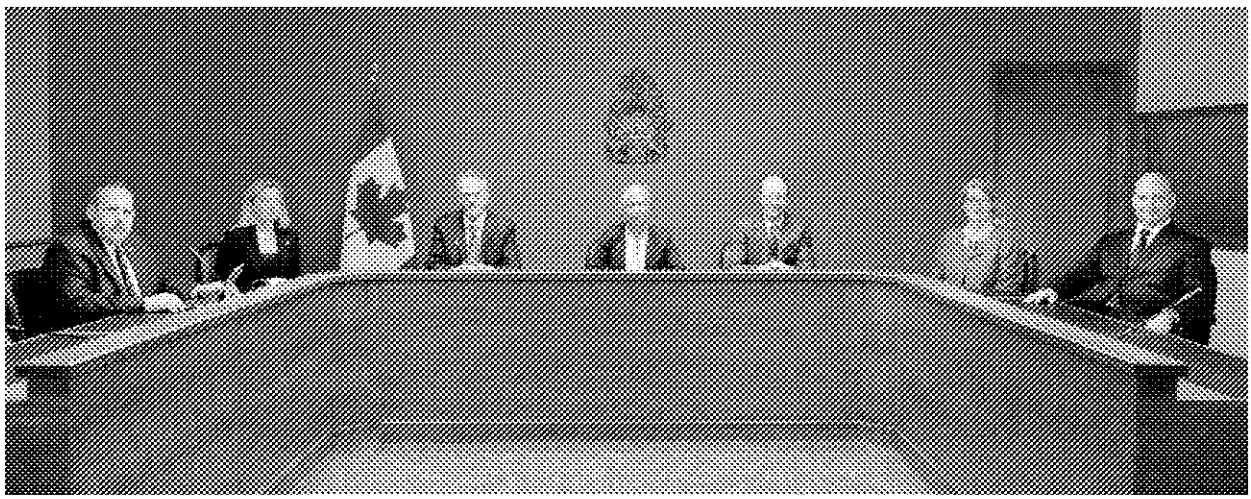
- the Commission, which refers to the organization's tribunal component
- the CNSC, which refers to the corporate body and the staff in general

The Commission

The Commission is an independent administrative tribunal and court of record. As per section 10 of the NSCA, the Commission can consist of up to seven (7) permanent Commission members including the President. Members are appointed by the Governor in Council of Canada for terms not exceeding five years and may be re-appointed. The Governor in Council is the Governor General acting on the advice of Cabinet. The appointed members are independent of all influences, including political, governmental, special interest or private sector. The President serves as a full-time Commission member. The other members serve, in practice, on a part-time basis. The key roles of the Commission are to:

- establish regulatory policy on matters relating to health, safety, security and the environment
- make legally binding regulations
- make independent decisions on the licensing of nuclear-related activities in Canada

Figure 12: Members of the CNSC Commission Tribunal



CNSC staff

CNSC staff support the Commission by:

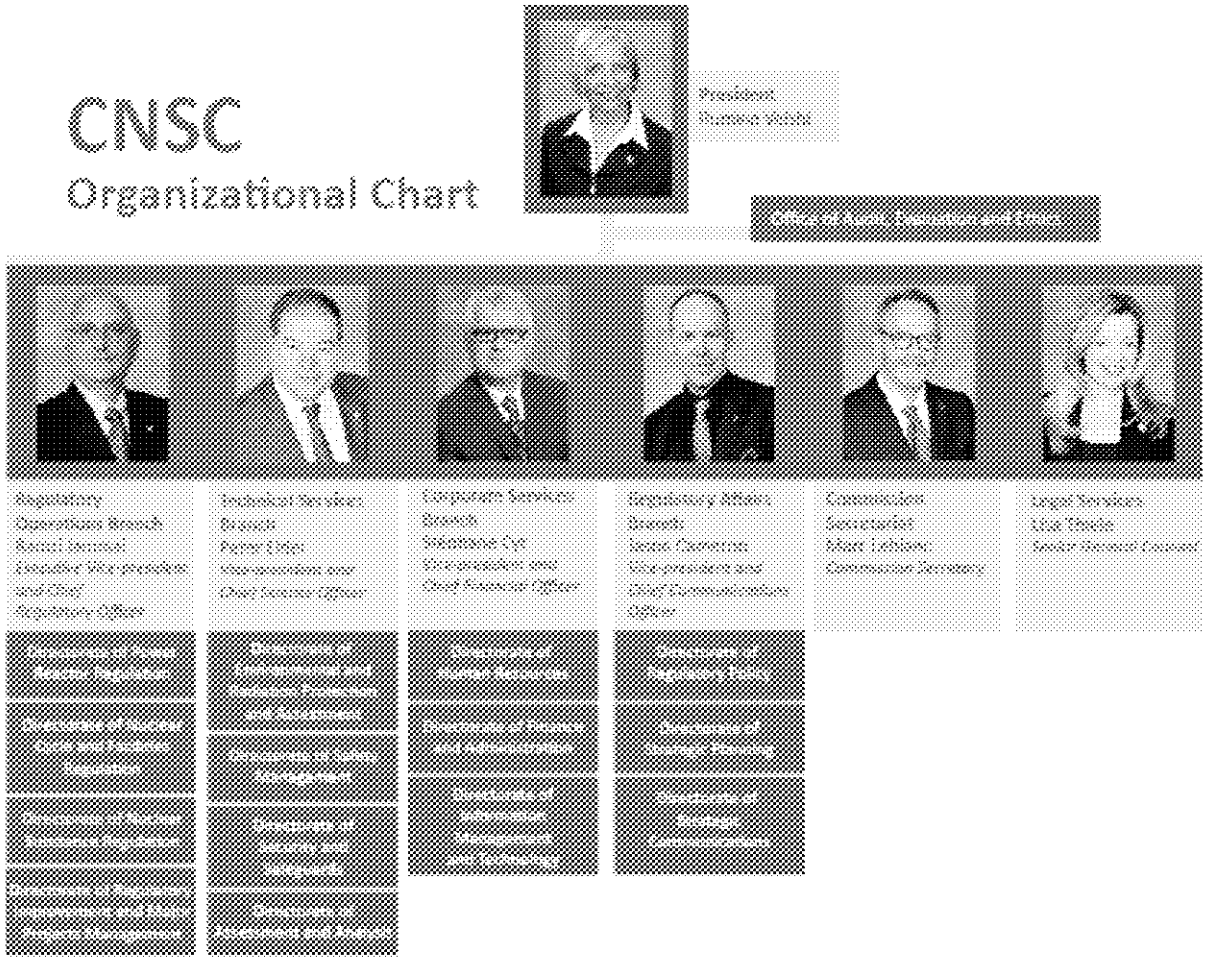
- developing proposals for regulatory development and recommending regulatory policies
- carrying out licensing, certification, compliance inspections and enforcement actions
- coordinating the CNSC's international undertakings

- developing the CNSC-wide programs in support of regulatory effectiveness
- maintaining relations with stakeholders
- providing administrative support to the organization

CNSC staff prepare recommendations on licensing decisions, present them to the Commission for consideration during public proceedings and subsequently administer the Commission's decisions.

Figure 13 provides an overview of the organizational structure of the CNSC. The organizational structure of the CNSC allows it to effectively and efficiently discharge its responsibilities and perform its functions in a manner commensurate with the radiation risks associated with nuclear facilities and licensed activities in Canada.

Figure 13: Organizational chart of the CNSC



The Regulatory Operations Branch (ROB) is structured around the diverse range of nuclear facilities and activities in Canada and their characteristic risk profiles. This branch is responsible for the licensing, certification and regulation of NPPs, new major projects, uranium mines and mills, uranium fuel fabricating and processing facilities, waste management facilities, nuclear substances processing and transport and industrial and medical applications.

The CNSC uses an internal Technical and Scientific Organization (TSO) model (IAEA TECDOC 1835) where the majority of the scientific support is provided by the Technical Support Branch (TSB). This branch oversees much of the detailed technical analyses in direct support of ROB. TSB provides specialized expertise in the areas of nuclear science and engineering, safety analysis, safety management, human factors, personnel training and certification, environmental and radiation protection, security, nuclear emergency management, safeguards and nuclear non-proliferation.

The Regulatory Affairs Branch supports the licensing and compliance core business of the CNSC. This branch is responsible for providing strategic direction and implementation of the CNSC's regulatory policy, communications and stakeholder engagement, strategic planning, international relations and executive committee services.

The Corporate Services Branch is structured and staffed to provide services that are essential to maintaining the effectiveness and efficiency of the CNSC's core business operations. This branch is responsible for policies and programs related to the management of CNSC's finances and administration, human resources, information technology and information management.

Other groups in CNSC's organizational structure include the President's office, the Commission Secretariat, the Legal Services and the Office of Audit and Ethics.

The Commission Secretariat supports the Commission by planning its business, publishing notices and decisions for Commission proceedings and offering technical and administrative support to the President and other members. The Secretariat is also the official registrar of Commission documentation.

The Legal Services, unlike in many federal government departments and agencies, is directly employed by the CNSC, thus ensuring stable, consistent and informed legal advice to the organization that is free of any potential conflict.

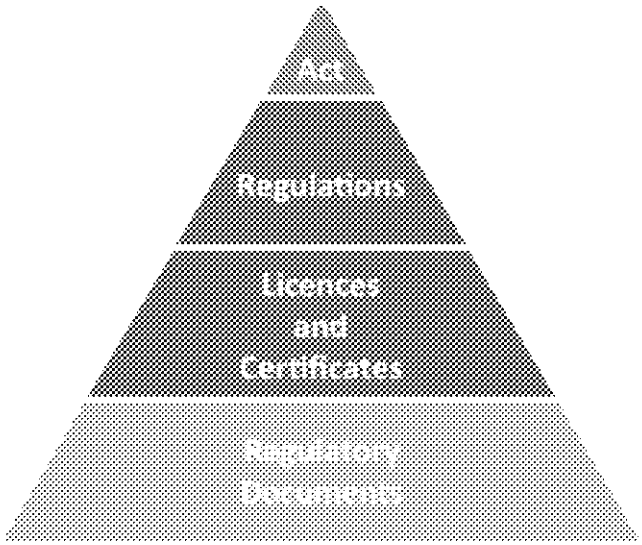
An independent Office of Audit and Ethics performs an internal audit function and provides an independent and objective assessment on the CNSC's performance of its regulatory mandate as well as provide advice on related improvement initiatives.

Additionally, a Departmental Audit Committee is in place to reinforce the independence of internal audits and ensure that the CNSC president has independent and objective advice, as well as guidance and assurance on the adequacy of the CNSC's control and accountability processes.

CNSC's regulatory framework

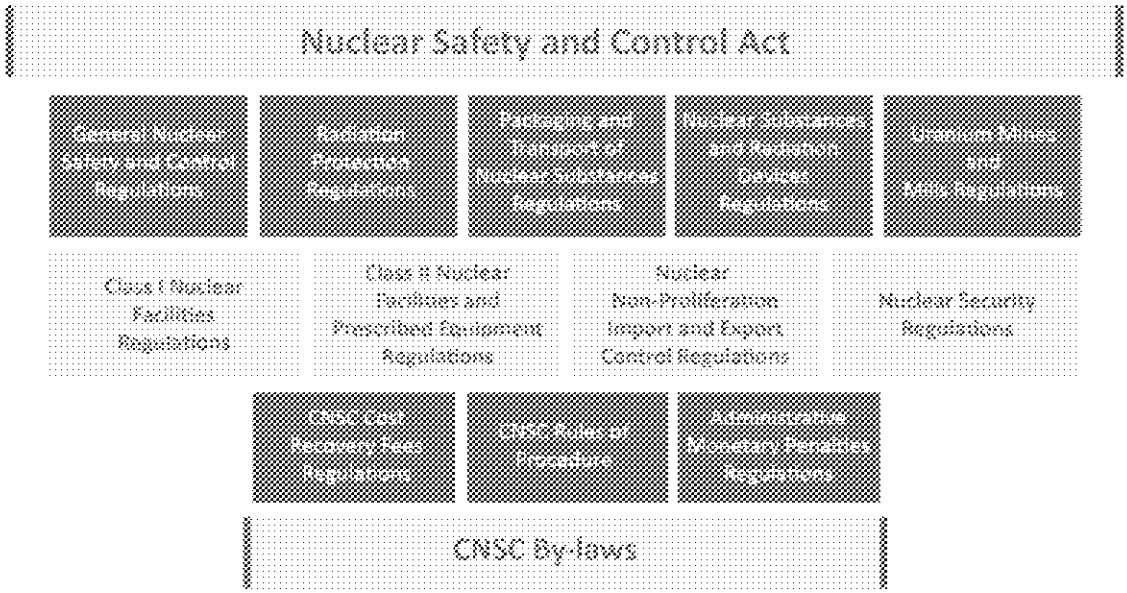
The CNSC's regulatory framework consists of the NSCA and its regulations, other federal legislation, licences, REGDOCs as well as national and international standards that the CNSC uses to oversee all nuclear facilities and activities in Canada. The regulatory framework balances prescriptive and performance-based requirements in an open and transparent manner.

Figure 14: CNSC's regulatory framework



The regulations made under the NSCA include those listed in figure 15.

Figure 15: The NSCA and the 13 regulations that cover nuclear facilities and activities



The CNSC also:

- conducts environmental protection reviews under the NSCA
- conducts EA under the *CEAA, 2012*
- implements Canada's bilateral agreement with the IAEA on nuclear safeguards verification

- provides technical advice on the compensation and civil liability regime for damages that result from a nuclear accident under the *Nuclear Liability and Compensation Act,* administered by NRCan

In addition to the NSCA, other federal acts may apply to the nuclear facilities and activities in Canada. The key legislation are summarized in table 3 in section 1.2.

Financial and human resources for regulatory responsibilities

Pursuant to section 16 of the NSCA, the Commission has the authority to appoint and employ the professional, scientific, technical and other staff the Commission considers necessary to carry out its responsibilities under the Act and set their terms and conditions of employment. The CNSC's status as a separate agency under the *Financial Administration Act* provides the Commission with the flexibility to respond to changes in the labour force to ensure it has the people it needs to carry out its work.

The number of staff and financial resources dedicated to each of the sector-specific regulatory divisions is a direct and proportional reflection of the extent, nature and complexity of the nuclear facilities and activities in Canada.

3.2 EFFECTIVE INDEPENDENCE IN THE PERFORMANCE OF REGULATORY FUNCTIONS

Related to GSR Part 1 (Rev. 1): Requirement 17

Independence of the regulatory body

A description of how the regulatory body discharges its responsibilities while preserving its independence is provided in subsection 1.3.

Cooperation with organizations that may have roles in the decision-making process

Other federal departments with roles and responsibilities in the regulation of decision-making were listed in the Background section and sections 1.2 and 1.5. The CNSC has MOUs with these departments to ensure coordination and cooperation with the CNSC as well as ensure that there are no gaps or overlap of responsibilities that could result in conflicting requirements for licensees or applicants.

Integrity of the regulatory staff and resolution of conflicts of interest

As per section 66 of the NSCA, every member, every officer and employee of the Commission and every person acting on behalf of under the direction of the Commission must take an oath or affirmation of fidelity and secrecy.

CNSC staff are required to abide by the *Values and Ethics Code for the Public Sector* and the *CNSC Values and Ethics Code*. The *CNSC Values and Ethics Code* represents CNSC's commitment to the highest ethical standards in delivering on its mandate. The Code identifies core values and expected behaviours, and the principles applied in decisions and actions.

As per the Code, CNSC staff are responsible for avoiding real, potential or apparent conflicts of interest between their private interests and work-related duties and are to resolve such issues in favour of public interest.

Additionally, under the *CNSC Conflict of Interest and Post-employment Policy* and the *CNSC Directive on Reporting and Managing Financial Conflicts of Interest*, employees must on an annual basis review and declare assets, liabilities, gifts and benefits as well as outside activities that may place them in a real, apparent or potential conflict of interest.

Special considerations for recruiting staff from licensees

All staff including those recruited from licensees are required to abide by the conditions of employment of the CNSC. Section 5.5 of the CNSC's *Conflict of Interest Policy* states *"New and regular employees who were employed by licensees and contractors are required to inform their supervisor of their employment history. Depending on the context, they may be asked to disqualify themselves from participating for a period of time in any matter associated with these entities."*

Authority to intervene

For situations deemed to be serious and considered to pose an imminent radiological hazard to workers, the public or the environment, the CNSC has the authority and will take whatever actions are necessary to restore an adequate level of safety. The CNSC applies a graded approach to licensing and compliance activities that is commensurate with the relative risk to health, safety, security, the environment and the implementation of the international obligations to which Canada has agreed. The approach is driven primarily by assessment of the risk associated with the activities being regulated and the performance history of the licensee. The CNSC does not take enforcement action to punish but to encourage compliance, maintain safety and deter further non-compliance.

Further details regarding the CNSC's approach to enforcement are provided in section 8.

3.3 STAFFING AND COMPETENCE OF THE REGULATORY BODY

Related to GSR Part 1 (Rev. 1): Requirement 18

Competent staff of the regulatory body

The relative size of the various organizational units in the core operations and the resource allocation is shaped by the review of strategic and operational plans including a risk-informed assessment of regulatory oversight requirements. The core operations refers to staff in ROB and TSB of the CNSC. (Section 3.1 describes the organizational units of the CNSC.)

All of the positions at the CNSC are described in a Work Description which set out the duties and activities of the position and the required competencies related to education, abilities, skills and knowledge needed to carry out those duties and activities.

All managers are required to evaluate, on an ongoing basis, the competencies and performance of all staff who report to them. Managers are required to complete a performance evaluation on a bi-annual basis and ensure that Individual Learning Plans (ILPs) are developed and maintained to address any existing development needs and to support career progression.

All managers have a Performance Management Contract that outlines their commitments stemming from CNSC's Strategic Planning Framework. The Strategic Planning Framework defines the CNSC's goals for the coming years and outlines key priorities and initiatives to enable the CNSC to achieve these

goals. The Executive Committee reviews management performance twice a year based on these commitments and on the key leadership competencies.

CNSC's *Staffing Policy* was developed to ensure the CNSC maximizes its ability to attract, develop and retain talent. One of CNSC's strategic priorities is building a competent and agile organization that enables the delivery of our mandate.

Human resource and succession planning

The CNSC has initiated a number of actions centred on building capacity and capability through the design of the organization, the recruitment and renewal of the workforce, learning and leadership development programs and employee engagement and retention activities.

The CNSC has identified hiring young professionals as an integral part of CNSC's efforts to address challenges due to the departure of qualified staff. In 2015, CNSC undertook a significant recruitment campaign to attract and hire more than 50 recent science and engineering graduates – approximately 5% of the CNSC's total workforce. The new graduates were hired into two streams of work: Program Professionals and Science and Technology. All new graduates were expected to rotate to another area of the organization or participate in a cross-divisional project to further develop their knowledge and understanding of the nuclear industry. Training plans were established and destination positions identified to ensure that the new graduates were able to participate in a selection process to secure continuous employment.

The CNSC may recruit experienced staff from industry or the private sector on an as-needed basis to avoid gaps in technical competency.

The CNSC's Alumni Program helps the CNSC harness the unique knowledge and technical expertise that many CNSC employees have developed over the years. The objective of the program is to allow hiring managers to retain the services of retirees who may possess certain specialized skills, technical knowledge or important corporate memory. The program provides the opportunity for alumni to pass this knowledge through mentoring or coaching of other employees. Typically, these individuals are engaged to address periods of high workload, unexpected absences or to undertake short-term projects.

CNSC's Mobility Directive maximizes the CNSC's organizational flexibility and allows the CNSC to meet changing operational needs. This directive provides senior management with a staffing mechanism to reassign management and non-management staff to ensure the CNSC has the people with the required skills when and where needed to address operational needs.

CNSC has a Career Partnership Initiative which strongly encourage staff to gain diversified work experience across the organization. This can be gained in various forms: lateral movement or assignments to another division or directorate, participation in a cross-divisional project and micro-missions. Micro-missions are short-term, voluntary and task-based opportunities for employees interested in gaining experiences, building their skills and growing their careers outside of their daily work activities. Managers benefit from micro-mission by obtaining timely support for a project that requires specific knowledge or skill set.

The CNSC is currently conducting a comprehensive review of all of the CNSC's programs to see if its investments can be further optimized and if it can be more efficient in its delivery. The strategic review

will take place over the next two years. A team of directors general from branches across the organization has been put together to do this work. This team reports directly to the Executive Committee. A key part of this strategic review will be asking employees and managers for ideas on where the CNSC can make changes, improve some aspects of its work or find ways to work even more effectively.

Knowledge management and training

The CNSC has also implemented a Knowledge Management (KM) Initiative. As part of this initiative, the CNSC has a 3-year KM plan and has recently launched a *Knowledge Management Policy*. This policy provides high-level direction and desired outcomes for KM at the CNSC and it reinforces that everyone has a role to play. The CNSC also has an in-house Effective Knowledge Transfer course which is geared both towards those CNSC staff who will be retiring and are expected to transfer their knowledge, as well as those junior and mid-career staff who are receiving knowledge.

The objective of the CNSC's Learning and Development Program is to help develop and maintain competencies of staff. The program includes basic mandatory and recommended training. Staff training is documented in their ILPs. The CNSC's web-based Learning Management System provides information on learning opportunities, allows staff and their management to keep track of training taken, provides information on related learning opportunities and is a convenient way to register for those activities. The CNSC also has specific learning programs by job types, such as leadership development for managers, the ITQP and the CNSC Designated Officer Training and Assistance Program.

The ITQP and CNSC staff designated by the Commission as DOs were discussed previously in section 1.2

A number of initiatives are underway to enhance core competence.

- **CNSC Capability for Nuclear Safety Framework** is an ongoing initiative to ensure that the CNSC successfully maintains the necessary capabilities to effectively and efficiently regulate nuclear safety in the changing national and international environment and therefore to assure that it fulfils its mandate. Through this initiative, a capability catalogue was created for all technical and operational directorates that identifies required technical expertise needed to carry out tasks related to activities that contribute directly to the CNSC's mandate.
- **Workforce Planning** is a business-driven and management-owned process that creates a roadmap to address workforce risks and opportunities. Deliberate and regular review of the CNSC's workforce plans improves management decision making.
- **Regulatory Operations Training Program** will support a consistent approach to the application of CNSC licensing, certification, compliance and regulatory framework processes, by providing staff with the tools, knowledge and skills required to perform work effectively and consistently. The program will help strengthen regulatory programs within the CNSC. It will enable a more agile and competent workforce by supporting clarity in expectations for managing regulatory programs and will support the CNSC's management system and its application.

For more information on the management of resources within CNSC's management system, refer to section 4.4.

3.4 LIAISON WITH ADVISORY BODIES AND SUPPORT ORGANIZATIONS

Related to GSR Part 1 (Rev. 1): Requirement 20

Advisory bodies servicing the regulatory body

The CNSC integrates the best-available science in its decision-making. Where the CNSC does not have the expertise required to inform a regulatory decision, it does have the statutory authority to enter into contracts with external parties or arrangements with other governmental or international bodies or agencies. While the CNSC may seek and receive advice and recommendations from external sources, ultimately the CNSC is accountable to Canadians and Parliament for ensuring that licensees are discharging their responsibilities safely.

Pursuant to section 17 of the NSCA, the CNSC may "*enter into contracts for the services of any persons having technical or specialized knowledge of any matter relating to the work of the Commission, to advise and assist the Commission in the exercise or performance of any of its powers, duties or functions under this Act.*" Subsection 12(3) of the NSCA permits the President to delegate this authority to officers or employees of the Commission. As such, there are arrangements in place for obtaining technical and other expert professional advice or services, as necessary, in support of its regulatory functions. These arrangements may be made with private sector, academic institutions, and governmental/non-governmental organizations. The services from these external contracts can be used to:

- carry out research to advance knowledge
- disseminate knowledge through an exchange of information
- engage independent experts to resolve issues
- complete assessments on behalf of CNSC staff

Additionally, under paragraph 21(1)(a) of the NSCA, "*the Commission may, in order to attain its objects, enter into arrangements, including arrangements to provide training, with any department or agency of the Government of Canada or of a province, any regulatory agency or department of a foreign government or any international agency.*" At the domestic level, these arrangements include administrative arrangements, letters of agreement, letters of understanding, memoranda of agreement, and MOUs.

The CNSC relies on the expertise of other federal departments and agencies to fulfil its mandate. These arrangements provide a framework for bilateral and provincial cooperation, assurances regarding information exchanged as well as clarity regarding regulatory responsibilities. The following are three examples of arrangements that the CNSC has in place with external agencies:

- MOU with Fisheries and Oceans Canada to coordinate regulatory reviews and decision-making for nuclear projects on matters related to fish and fish habitat.
- MOU with HC to consult and cooperate in a number of areas including calibration services; occupational radiation exposure; and EA.
- Administrative Agreement with the province of Saskatchewan that covers the province's ability to ensure compliance with the CNSC on the regulation of health, safety and the environment at Saskatchewan uranium mines and mills.

A complete list of the CNSC's federal and provincial arrangements and details of the MOUs can be found on the CNSC's external website.

Arrangements with external support organizations

The CNSC has an internal TSO model where TSB provides the majority of the scientific support that is used to support licensing and compliance activities.

CNSC may enter into external contracts to obtain the advice and assistance of external parties for supplemental information, independent opinion or verification or specialized research. The process to procure contracts must follow the CNSC's *Contracting Policy* as well as the Government of Canada procurement regulations and processes as referred to in the Treasury Board of Canada's Contracting Policy. CNSC's provisions for entering into external contracts is further described in section 4.5.

As introduced in section 1.1, the CNSC maintains a Research and Support Program, which is designed to provide CNSC staff with access to external independent advice, expertise and information. The program funds agreements with the private sector, academic institutions, and governmental/non-governmental organizations, in Canada and internationally.

The main objectives of the Research and Support Program are to:

- support timely, science-based regulatory judgments and decisions
- assist in the identification of problems that may give rise to health, safety, security or environmental hazards
- develop tools and techniques to address potential issues
- aid in the development of safety standards

Research projects cover every aspect of the Canadian nuclear industry that is regulated by the CNSC including NPPs, waste management facilities, nuclear research facilities, etc.

The CNSC uses the outcomes of these research activities to help the CNSC understand and address new or emerging safety issues, gain third-party perspectives on nuclear science and share scientific knowledge with the nuclear industry and the public at large. This research helps supports the CNSC's mandate to disseminate objective scientific, technical and regulatory information to the public about the activities of the Commission and the industry that it regulates.

Ultimately, as per CNSC's regulator philosophy, as outlined in REGDOC-3.5.3, *Regulatory Fundamentals*, the CNSC is accountable to Parliament and to Canadians for ensuring that licensees are properly discharging their responsibilities for safety.

3.5 LIAISON BETWEEN THE REGULATORY BODY AND AUTHORIZED PARTIES

Related to GSR Part 1 (Rev. 1): Requirement 21

Communication with authorized parties to foster constructive liaison

The CNSC has established formal and informal mechanisms of communication with licensees and applicants on all safety related issues.

Formally, the Commission proceeding process allows members of the Commission to engage with the applicants/licensees, CNSC staff and members of the public on a wide range of issues. At Commission hearings, the Commission hears information pertaining to the making of licensing decisions. Commission

meetings are used to brief the Commission about significant developments that affect the nuclear regulatory process, or to request administrative decisions.

These Commission proceedings highlight the independence, openness and transparency of the decision-making process of the CNSC. The *Canadian Nuclear Safety Commission Rules of Procedure* and the *Canadian Nuclear Safety Commission By-laws* govern the Commission hearing and meeting processes, respectively.

Another formal mechanism of communication the CNSC uses includes the permanent location of staff on site at major facilities (all operating NPP sites and Chalk River Laboratories). The location of these site offices facilitates regular, face-to-face interaction between the CNSC and its key highest-risk licensees. Site staff often attend and observe licensee meetings, keep the licensee informed of regulatory activities, and verify licensee compliance with regulatory requirements.

CNSC also has five regional site offices located across the country. The CNSC Central Regional Office in Ottawa is the location of the CNSC's main headquarters. The majority of CNSC's staff is located at the Central Regional office. Three of these regional offices are maintained for regulatory oversight of smaller licensees such as those for radiation sources. There is an also a regional office in Saskatoon for the CNSC's Uranium Mines and Mills division. This office allows staff to be in closer proximity with the licensees of uranium mines and mills located in northern Saskatchewan as well as other stakeholders such as Indigenous communities who may have an interest in the operation of these facilities.

For complex facilities, such as NPPs, waste management facilities and processing facilities, communication protocols are established by the CNSC allow for the open and relatively informal dialogue and discussion between subject matter experts of the CNSC and the licensee/applicant. Communication between staff and the licensee is channelled through an identified Single Point of Contact (SPOC) approach. The SPOC is responsible for ensuring the communication protocol is followed. The directors of CNSC licensing divisions are also responsible for implementing and maintaining the established protocol. The purpose of formal communication is to document in an acceptable and agreed upon written or electronic format, any official regulatory requirements or positions that the CNSC is imposing on licensees, and equally, to document the licensees official response to such requirements. Formal communications can and should be linked to action tracking databases for ease of compliance monitoring and verification.

It is a normal and accepted practice that CNSC staff and licensee's staff interact on a regular and informal basis. This communication can take place face to face, by telephone, or through any other electronic or paper medium. The basis of this communication is normally to clarify technical points that may relate to administrative, licensing or compliance issues. No regulatory positions or licensee commitments are communicated in this manner.

In general, communication with licensees related to the use of nuclear substances and prescribed equipment occurs through CNSC licensing staff. Other CNSC licensing staff or inspectors may communicate directly with the licensee, as needed. E-mail is often used to communicate CNSC's regulatory expectations and positions to licensees.

CNSC also engages in outreach with licensees through:

- meetings with licensees on non-licensee specific issues (e.g., quarterly meetings with the Canadian Nuclear Association or the Cost Recovery Advisory Group)
- presentations by the president, executives and staff at various seminars and stakeholder meetings
- participation in technical working groups
- participation in international and national conferences and events

These outreach activities provide additional opportunities for CNSC staff and licensees to engage on safety-related issues and topics.

Justification and explanation of regulatory decisions

The Commission is the overall decision-making authority for licensing-related matters. CNSC staff provide written and documented conclusions and recommendations based on their review and assessment of an applicant's or licensee's submitted information against regulatory requirements. CNSC staff's conclusions and recommendations to the Commission are documented in CMDs. Commission hearings are open to the public and are also webcast live on the CNSC's external website. Past webcasts of Commission hearings are posted on the CNSC's website.

Public hearings allow the Commission to hear information to inform its licensing decisions. The Commission publishes a detailed Record of Decision, to explain the regulatory basis for its licensing decisions. The Commission provides extensive reasons for its decisions, which are based on information provided by the proponent in their application or through materials submitted for the proceeding, the conclusions and recommendations of expert CNSC staff, as well as public input through written and/or oral interventions. When the Commission has reached its decision, the Record of Decision is prepared, sent to all participants, with information regarding the decision announced to the Commission's website and on social media platforms through a news release. Following its translation, the Record of Decision is posted on the Commission's public website.

Public meetings are used to brief the Commission about significant developments that affect the nuclear regulatory process or to request other decisions. The Commission publishes minutes to record the outcome of Commission meetings. Commission meetings are also open to the public and webcast live on the CNSC's external website. Past webcasts of Commission meetings are posted on the CNSC's website.

Complete written transcripts of all public proceedings are posted online within days of a hearing or meeting. These documents, along with other information about the Commission's proceedings and decisions, are available to the public on the CNSC's external website.

As introduced in section 1.2, the Commission may authorize DOs to carry out specific authorities. These authorities include – but are not limited to – lower-risk licensing decisions, certification decisions, making orders and making decisions on inspector's orders. The DO considers information from CNSC staff, as well as the applicant or licensee. In general, CNSC staff make recommendations for licensing and certification decisions to the DO in the form of Designated Officer Documents. The format of the DO document varies based on operational needs. The DO decision is provided in writing to all parties.

3.6 STABILITY AND CONSISTENCY OF REGULATORY CONTROL

Related to GSR Part 1 (Rev. 1): Requirement 22

Policies, principles, criteria and safety objectives set by the regulatory body

The CNSC prevents subjectivity in decision-making by individual staff members through its management system. The CNSC's management system consists of a framework of policies, structures, people, programs, processes, practices, technologies, etc., that are put into place to ensure that the CNSC fulfils all tasks required to achieve its mandate safely and consistently. Personnel, equipment and organizational culture, as well as the documented policies and processes, are all elements of the CNSC's organization and are integrated into one coherent management system. The CNSC's management system ensures that responsibilities assigned to the CNSC are properly discharged using core regulatory process and are not based on decision making by individual staff members. The CNSC's management system is further described in section 4.

CNSC staff use a well-established safety and control area (SCA) framework in order to evaluate each licensee's safety performance. The SCA framework provides a common set of safety and control terms to ensure consistent reviews, assessments, recommendations and reporting to the Commission. This facilitates better communication among CNSC staff, licensees, the Commission, and other stakeholders. The framework includes 14 SCAs covering all technical areas of regulatory oversight and is used throughout the core processes as defined in CNSC's management system documentation which is available through CNSC's management system portal found on CNSC's intranet (BORIS).

The CNSC's 14 SCAs are organized in three functional areas: management, facility and equipment, and core control and processes. Each SCA addresses an aspect of the overall safety profile of a proposed set of activities, and is sub-divided into specific areas that define the key components of each SCA.

Table 4: CNSC's safety and control area (SCA) framework

Functional area	SCA
Management	Management System
	Human Performance Management
	Operating Performance
Facility and Equipment	Safety Analysis
	Physical Design
	Fitness for Service
Core Control and Processes	Radiation Protection
	Conventional Health and Safety

Functional area	SCA
	Environmental Protection
	Emergency Management and Fire Protection
	Waste Management
	Security, Safeguards and Non-Proliferation
	Packaging and Transport

REGDOCs provide additional clarity to licensees and applicants by explaining how to meet the requirements set out in the NSCA and the regulations made under it. REGDOCs are organized into three key categories: regulated facilities and activities, SCAs and other areas of regulatory engagements. A graded approach, commensurate with risk, may be defined and used when applying the requirements and guidance of REGDOCs. The use of the graded approach is not a relaxation of requirements. With the graded approach, the application of requirements is commensurate with the risks and particular characteristics of the facility or activity.

REGDOCs are publicly available to applicants/licensees, members of the public, Indigenous communities and other stakeholders such as civil society groups on the CNSC's external website.

Procedures and policies established for the implementation of core processes

CNSC staff follow CNSC's *Policy on the Use of Risk-Informed Approach for Regulatory Oversight of Nuclear Activities and Facilities* when making risk-informed decisions or recommendations pertaining to licensing, certification, compliance and the development of regulatory requirements and guidance. The application of this policy provides a clear and consistent understanding among CNSC staff and managers of the approach to be followed for making risk-informed regulatory recommendations and decisions.

Policy on Science in a Regulatory Environment provides governance and a framework to ensure that scientific and ethical standards are applied in providing scientific advice for use in regulatory decisions and supporting scientific integrity in a regulatory environment.

The CNSC conducts inspections as one element of a compliance program. Inspections are conducted to verify licensee compliance with regulatory requirements and carried out as described in the CNSC *Conduct of Inspection* process document. The CNSC process document Select Inspections and related activities are described further in section 7.

The CNSC conducts technical assessments for reviewing matters related to licensing, certification and compliance activities. The Conduct of Technical Assessment Process aligns with the IAEA's *Governmental Legal and Regulatory Framework for Safety* Document (GSR Part 1) and the IAEA's *Fundamental Safety Principles* (SF-1). The CNSC's Conduct of Technical Assessments fits within the CNSC's management system core processes. The review topics for technical assessments align with specific areas within the CNSC's SCA framework. Compliance verification criteria are used when carrying out the technical

assessment for compliance verification purposes. Findings are communicated to licensees in a manner similar to that in the inspection process.

If necessary, CNSC process document *Select and Apply Enforcement Tools* (SAET) provides guidelines on the selection of appropriate enforcement actions that the CNSC can take in the event of deviation from, or non-compliance with the NSCA and its associated regulations and licence conditions. Enforcement is discussed in section 8.

A CMD is a document that represents the regulatory position of CNSC staff and is used to present significant and relevant regulatory and technical information to the Commission and members of the public. CMDs range considerably in content, complexity and scope based on the level of risk associated with the proposed licensed activity. CMDs outline CNSC staff's conclusions and recommendations, supported by the findings of inspections, desktop reviews and other compliance verification activities. The Commission makes its regulatory decision in consideration of this information. As such, CMDs must be able to withstand scrutiny from the Commission, intervenors and members of the public.

The *Commission Member Document Process* describes the activities required for preparing, producing and presenting a CMD at CNSC Commission proceedings. All contributions to a CMD are reviewed and approved by the contributor's divisional director and the director general. All CMDs are reviewed and approved by the Executive Vice-President and Chief Regulatory Operations Officer to ensure consistent messaging from the CNSC. This process ensures that the CMD reflects the CNSC staff's views and not individual opinions.

The Commission may authorize DOs to make some decisions. The CNSC Process Document Overview of *Making Designated Officer Decisions* outlines the process for a consistent and transparent approach for DOs to make decisions on behalf of the Commission.

Issuing new regulatory requirements

The CNSC is committed to continuous improvement and aims to ensure CNSC's regulations and regulatory documents continue to be clear and effective, allowing the CNSC to remain an effective and efficient regulator. The CNSC adheres to the principles of the *Cabinet Directive on Regulation* to ensure that regulatory issues are well-defined, re-examined and that the choice of regulatory approach is most appropriate for achieving safety and security objectives.

The CNSC has a Regulatory Framework Plan, which sets out the regulations and other regulatory documents that the CNSC intends to develop or amend in the coming years. The CNSC's Regulatory Framework Steering Committee ensures a strategic approach in developing, maintaining and managing the Regulatory Framework Plan. It is reviewed regularly and adjusted to ensure the CNSC continues to provide the information required to achieve clarity of regulatory requirements. Regulatory framework activities are carried out with a continued focus on communicating and engaging with stakeholders. The CNSC welcomes and considers feedback from stakeholders on its regulatory framework plan at any time.

Refer to section 9 for additional information regarding the CNSC's approach to developing and reviewing regulatory instruments.

3.7 SAFETY RELATED RECORDS

Related to GSR Part 1 (Rev. 1): Requirement 35

The CNSC has made provisions for establishing, maintaining and retrieving records including the registers and inventories described below. Notwithstanding CNSC's provisions to maintain such records, it remains the responsibility of the licensee (and applicants) to establish and maintain a records management system for records relating to the safety of existing or proposed facilities and activities. Proper management of a suite of retrievable and complete records supports the licensing basis by which the safe conduct of licensed activities can or has been authorized.

Records relating to the safety of facilities and activities

The CNSC keeps records relating to the safety of facilities and activities in e-Access, CNSC's electronic documents and records management system (EDRMS), and the CNSC's Records Office for paper records.

The CNSC's Information Management Division administers the Records Office and EDRMS, providing records storage and retrieval services for all staff members. Processes are in place to properly evaluate the security requirements related to each record and ensure proper storage. Periodic evaluations of systems, processes, and training are made to improve the CNSC's ability to find, retrieve, and secure all business documents appropriately.

As well, the CNSC uses the Regulatory Information Bank (RIB) which is a comprehensive online tool that houses information about actions taken in response to licensing and compliance activities in one repository, allowing staff to quickly retrieve and view actions and record trends. RIB is used by CNSC staff in the operational services and gives staff the ability to track, monitor and report on licensee commitments.

The Licensing Operations User Integrated System (LOUIS) is used to manage licensee information pertaining to licensing and compliance information for radiation sources. LOUIS contains information regarding how much material licensees are allowed to possess, as well as links to most of the relevant documents from the CNSC's EDRMS (i.e., e-Access) related to each licensee.

Records of doses from occupational exposure

Section 19 of the RPR requires every licensee who operates a CNSC-licensed dosimetry service to file with the NDR, at a frequency specified in the licence and in a form compatible with the NDR, information with respect to each nuclear energy worker for whom it has measured and monitored a dose of radiation. For more information on the NDR refer to section 1.9.

Registers of sealed radioactive sources and radiation generators

In 2006, the CNSC implemented the National Sealed Source Registry (NSSR) and the Sealed Source Tracking System (SSTS). The CNSC was the first nuclear regulator among G7 countries to develop a national registry and to implement a web-based tracking system, along with enhanced import and export controls for high-risk radioactive sealed sources.

The SSTS is a secure web-based information management program used to populate the NSSR, and allows licensees to report source transactions using an on-line portal. The NSSR enables the CNSC to

build an accurate and secure inventory of high-risk sealed sources in Canada. The information is as current as the reporting time frames required by the licence.

The NSSR was designed to hold information about the radioactive sources in every category, for all licensees. The SSTS, in contrast, is targeted at high-risk sealed sources (although some licensees are required to track sources below Category 2), as a system designed to enable the reporting of receipts and transfers, imports and exports within strict time limits. Each import, export, receipt and transfer is termed a "transaction" for SSTS purposes. The SSTS follows every high-risk radioactive source throughout its complete life cycle in Canada.

The SSTS was built on the CNSC's regulatory information database used for nuclear substances and radiation devices. The SSTS and NSSR are components of the CNSC's overall nuclear substances and radiation devices licensing and compliance database. Building the SSTS and NSSR in this manner enables sources and devices to be associated with specific licensees at particular addresses. The SSTS is the tool used to populate the NSSR, and it allows the CNSC to have an accurate inventory of high-risk sealed sources (Category 1 and 2). Each transaction in the SSTS is paired: each transfer has a corresponding receipt, and each transaction represents a separate report to the CNSC.

Licensees report their full inventories to the CNSC on an annual basis through their ACRs. A database of medium and low risk sealed sources is maintained outside of the NSSR using the information provided in the ACRs.

Records of events, including non-routine releases of radioactive material to the environment

The CNSC uses CERTS, which is a database used to collect, categorize and track follow-up of reported events at NPPs and non-power reactor Class I nuclear facilities and uranium mines and mills.

The CNSC also uses EITS to hold information regarding unplanned events concerning nuclear substances, nuclear material and nuclear devices. Unplanned events will include incidents regarding the loss, theft, recovery, transportation, storage, disposal, unauthorized use/possession/transaction, spills or contamination, the malfunction or damage of nuclear devices, and waste and scrap metal alarms. The system allows for recording of event details, tracking of these events, detailed searching and the creation of reports.

CNSC staff report significant events to the Commission on an as needed basis. The CNSC management system document *Event Initial Reporting* provides an overview of the process for assessing and reporting significant events as a formal record of early notification to the Commission Members. Additionally, events are listed in the Regulatory Oversight Reports (RORs) prepared for the Commission.

Records that might be necessary for the shutdown and decommissioning (or closure) of facilities

The general application requirements for a licence under the NSCA are listed in section 3 of the GNSCR. Facility-specific requirements for a licence to decommission are provided in sections 3 to 7 of the CINFR, section 5 of the CINFPER and section 7 of the UMMR.

Inventories of radioactive waste and of spent fuel

Licensees and applicants are required to have a waste management program. The extent of the program is dependent on the risk-significance of the facility. The licence conditions for smaller facilities such Class II facilities and those with radiation sources outline the regulatory requirements for the amounts that can be released to waste, the sewer and the atmosphere.

Licensees and applicants of larger complex facilities are required to implement and maintain a waste management program as a licence condition of their LCH under the waste management SCA framework. The topics under this SCA include waste management, waste characterization, waste minimization and waste management practices.

Licensees are required to submit an annual compliance monitoring report. REGDOC-3.1.2, *Reporting Requirements Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills* provides the requirements and guidance regarding the information that should be included in the report. Licensees are required to include the following information regarding waste management:

- identification and characterization of the waste streams generated by the operation of the facility
- inventories of each of the following, including type, volume, total activity level and/or concentration

Every three years, NRCan collects, compiles and analyzes radioactive waste inventory data in Canada. The updated data is published in the triennial inventory of radioactive waste in Canada, which provides an overview of the production, accumulation and future projections of radioactive waste in Canada based on Canada's four waste categories (i.e., high-level, intermediate-level, low-level and uranium mine and mill waste).

The inventory data is reported internationally in the Canadian National Report for the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. NRCan also provides this data to the IAEA's radioactive waste management database which tracks low- and intermediate-level radioactive waste worldwide.

3.8 COMMUNICATION AND CONSULTATION WITH INTERESTED PARTIES

Related to ***GSR Part 1 (Rev. 1): Requirement 36***
GSR Part 2: Requirement 5

Identification of interested parties

The CNSC interacts with a variety of stakeholders on a daily basis. The CNSC's target audiences are those who are or have the potential to be impacted by the CNSC's decision-making, those who have demonstrated a general interest in the CNSC's activities, and those who actively participate in the regulatory process. The CNSC's list of interested parties includes:

- CNSC staff
- Indigenous groups/peoples
- Canadians including host communities, youth, general public
- federal, provincial or municipal levels of governments

- academic communities
- non-governmental organizations: national, local and environment-specific
- licensees and applicants
- media
- international stakeholders

Strategy for interaction with interested parties

The CNSC's strategy behind any interaction with stakeholders is to continue to earn trust and confidence by maintaining a high level of transparency and engagement throughout the regulatory process. The CNSC strives to be a trusted and timely source for safety and science-based nuclear regulatory information for Canadians. The aim is to inform stakeholders using plain language information, and engage with audiences in order to encourage participation in regulatory activities. The CNSC focusses its efforts on areas with the most significant impact and that align with Canadian interests.

Some of CNSC's strategic communications objectives include:

1. **Reinforce** in all messaging that the CNSC will never compromise safety and that health, safety, security and the environment is considered in every regulatory decision.
2. **Position** the CNSC as a leader in nuclear safety research and an authority in science-based regulation.
3. **Strengthen** public trust and confidence in CNSC's regulatory role domestically and internationally by showcasing technical expertise and ensuring a high degree of transparency and engagement in our regulatory process.

Processes and plans for implementation of the strategy to interact with interested parties

The CNSC's external website is the main source of information, and is appropriate for all audiences. It contains infographics, videos, nuclear safety interactive modules, frequently asked questions, factsheets, articles on nuclear-related topics, environmental information on nuclear facilities, and scientific data to support our licensing decisions. Multiple social media platforms offer information in a variety of formats. These platforms include YouTube, Facebook, Twitter, and LinkedIn.

In addition, CNSC conducts outreach and engagement sessions in communities that are impacted by nuclear facilities or licensed activities. CNSC staff interact directly with members of the community by participating in public community meetings, or municipal government meetings. This approach allows a two-way dialogue with interested parties.

CNSC staff participate in regular bilateral meetings with government counterparts to become aware of any new initiatives and to inform them of items of regulatory interest. In addition, regular interactions with members of the media are conducted to inform them of CNSC's regulatory activities, and correct any misinformation that may have been previously reported.

Communication with interested parties on Commission decisions

Sections 3.5 and 5 describe the process for the CNSC's Commission proceedings. In the spirit of openness and transparency, the Commission holds hearings on licensing decisions in the communities that will be most affected by the decision at hand, when possible. CNSC staff also report to the

Commission in public meetings at predetermined frequencies (e.g. annually, biannually) on the facilities' operation and safety performance of regulated activities in RORs.

The CNSC publishes RORs which offer information on the safety performance of CNSC licensees. The RORs are used by the CNSC to presents staff's evaluation of licensee compliance, performance, key issues and any emerging changes in regulation.

As stated in sections 3.5 and 5, complete transcripts of all public proceedings are posted online within days of a hearing or meeting. These documents, along with other information about the Commission's proceedings and decisions, are available to the public on the CNSC's external website.

Consideration of concerns and expectations of interested parties in decision-making process

The public hearing gives involved parties, Indigenous groups, members of the public and other stakeholders, an opportunity to be heard before the Commission. Notices for Commission proceedings are posted on the CNSC's website. Members of the public, Indigenous groups and other stakeholders who have an interest or expertise in the matter being considered, or who have information that may be useful to the Commission in coming to a decision can formally participate as intervenors in public hearings. Interventions may be made in either of Canada's official languages, via either a written submission or a written submission accompanied by an oral presentation during the hearing. The Commission also accommodates participation in its proceedings by teleconference or videoconference.

In 2011, the CNSC established the Participant Funding Program (PFP) to give members of the public, Indigenous groups and other stakeholders the opportunity to request funding to support their participation in the CNSC's regulatory decision-making process. The CNSC's PFP Guide describes the program and is available on the CNSC's website.

The CNSC determines how much funding it will make available for project-specific PFP funding opportunities on a case-by-case basis. An independent funding review committee is established for each project to assess applications for participant funding to recommend which applicants should receive funding. Funding opportunities include – but are not limited to – participation in CNSC regulatory review processes for major nuclear facilities, which encompass licence renewals, new project applications, environmental protection reviews and RORs. In limited cases, funding may also be available for reviews of regulatory documents, policies, discussion papers and other topics of regulatory interest to the Commission, the public and Indigenous groups.

Liaison with interested parties within the vicinity of authorized facilities

To improve the level of understanding by the public of information about proposed or licensed nuclear facilities and activities, licensees and licence applicants are required to develop and implement a public information program that includes a disclosure protocol. REGDOC-3.2.1, *Public Information and Disclosure*, clarifies the regulatory requirements of the public information program. The target audience of the public information program must be clearly defined. The target audiences include the general population of the local community and other communities impacted by the licensee's nuclear facility and related activities. This should include key opinion and political leaders, community and media groups, interveners and Indigenous groups.

REGDOC-3.2.2, *Aboriginal Engagement*, sets out the requirements and guidance for licensees on Indigenous engagement. It also provides procedural direction for licensees in support of the whole-of-

government approach to Indigenous consultation implemented by the CNSC in cooperation with federal departments and agencies. The requirements in the document are meant to ensure that potential or established Indigenous and/or treaty rights are considered and that proper implementation will lead to more effective and efficient Indigenous engagement practices, strengthen relationships with Indigenous communities, assist the CNSC in meeting its duty to consult obligations and reduce the risk of delays in the regulatory review process. The CNSC's approach to Indigenous consultation is found in *Appendix C: Codification of Current Practice: Canadian Nuclear Safety Commission (CNSC) Commitment to Aboriginal Consultation*. This approach is informed by the guiding principles for Canada outlined in Aboriginal Consultation and Accommodation – Updated Guidelines for Federal Officials to Fulfill the Duty to Consult.

The CNSC implemented an IEMP to verify that the public and environment around CNSC-regulated nuclear facilities are not adversely affected by releases to the environment. The IEMP complements CNSC's ongoing environmental protection compliance verification activities. However, it does not relieve licensees of their responsibilities. The IEMP is a mechanism for providing independent environmental monitoring information to the public and Indigenous communities about nuclear facilities and activities in Canada.

The selection of sites included in the annual IEMP sampling campaign considers a number of different factors including upcoming Commission direction, upcoming hearings, past environmental compliance concerns as well as interest from members of the public and Indigenous communities. Prior to any sampling, campaign notifications are sent out to the licensee, the municipality and Indigenous communities living near the facility or activity. There is a social media presence during the campaign and CNSC staff are available to answer any questions from interested parties. Following the campaign, all IEMP results are posted on the CNSC's external website and an e-mail is sent to 2,000 subscribers.

Figure 16: CNSC staff collecting samples during an IEMP campaign

CNSC also conducts outreach activities to educate the public, licensees and other stakeholders about a particular issues or topics. Outreach activities are meant to bring openness, transparency and timely communication to the work and management of Canada's nuclear regulatory regime. CNSC outreach activities include:

- open houses and meetings, Meet the Regulator sessions, and targeted activities (e.g., youth, Indigenous peoples, host communities, and the medical community)
- interactions with the public including responding to inquiries from members of the public, and other stakeholders
- public hearings of the Commission, particularly when they are held in the local community
- presentations by the president, executives and staff at various seminars and stakeholder meetings
- participation in international and national conferences and events
- publishing research that CNSC staff have prepared which includes technical papers, presentations, and peer-reviewed articles
- proactive media relations events
- consultations on EA
- digital presence using a variety of platforms to share timely information (e.g. web, social media)

Obligation of the authorized parties to inform the public on radiation risks associated with the operation of a facility or the conduct of an activity

REGDOC-3.2.1, *Public Information and Disclosure*, defines the CNSC's requirements for public information and disclosure protocols for licensees and applicants. It applies to uranium mines and mills, Class I nuclear facilities and some Class II facilities. The document provides guidance on how to develop and implement the requirements for public information programs and disclosure protocols.

The primary goal of the public information program is to ensure information related to the health, safety and security of persons and the environment, along with other issues associated with the lifecycle of the nuclear facilities, is effectively communicated to the public. The CNSC expects a licensee's public information program and disclosure protocol to be commensurate with the level of risk of the facility and the level of public interest in the licensed activities along with the risks to public health and safety and the environment perceived to be associated with the facility and activities. REGDOC-3.2.1 is also intended to assist CNSC staff in assessing documentation submitted as part of an application for a new CNSC licence, a licence renewal or compliance verification.

Licensees are required to inform the public about possible radiation risks associated with their facilities and activities through a public information program that is guided by REGDOC-3.2.1, Public Information and Disclosure. Nuclear-related licensee event are also posted on the CNSC's website. The page includes a list of events and incidents organized by different sectors of the nuclear industry.

Licensees are also required to submit event reports and notifications for situations or events of high safety significance and that may require short-term action by the CNSC as per their licensing basis. The CNSC uses event initial reports to ensure that the Commission is aware of any events that may require its decision-making capacity. The reporting requirements for event reporting are outlined in the CNSC REGDOC series 3.1 Reporting Requirements:

- REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants*, version 2
- REGDOC-3.1.2, *Reporting Requirements Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills*
- REGDOC-3.1.3, *Reporting Requirements for Waste Nuclear Substances Licensees, Class II Nuclear Facilities and Users of Prescribed Equipment, Nuclear Substances and Radiation Devices* (draft)

3.9 CONCLUSIONS AND ACTIONS

The CNSC is Canada's sole nuclear regulator. It was established in 2000 with the coming into force of the NSCA. The CNSC is an independent quasi-judicial tribunal that reports to Parliament through the Minister of Natural Resources.

The CNSC uses a risk-informed approach in the regulation of all facilities and activities to ensure the allocation of resources, assessments and inspections are commensurate with the level of risk for the facility or activity.

The CNSC's management system ensures that responsibilities assigned to the CNSC are properly discharged using core regulatory process, policies and practices.

The CNSC is currently undergoing a comprehensive review of all of the CNSC's programs to see if it can be more efficient in the delivery of its mandate. The strategic review will take place over the next two year. A key element of the review will include soliciting input from employees and managers for ideas on where the CNSC can make changes, improve aspects of its work or find ways to work more efficiently.

4. MANAGEMENT SYSTEM OF THE REGULATORY BODY

4.1 RESPONSIBILITY AND LEADERSHIP FOR SAFETY

Related to GSR Part 2: Requirement 2

In regulating for safety, the CNSC commits to the highest ethical standards as outlined in both the *CNSC Values and Ethics Code* and the *Values and Ethics Code for the Public Sector*. The CNSC is committed to the values of:

- Safety – commits staff to recognizing the importance of safety as an overriding consideration in daily work
- Respect – commits staff to valuing the rights, responsibilities and contribution of all stakeholders
- Integrity – commits staff to acting with honesty in all decisions and actions
- Service – commits staff to serving Canadians and the government to the best of their abilities
- Excellence – commits staff to being dedicated, competent and professional
- Responsibility – commits staff to using public resources responsibly in a manner that maintains public trust and confidence in the CNSC

The *CNSC Values and Ethics Code* identifies expected supporting behaviours, and principles to be applied in all day-to-day decisions and actions.

As Canada's nuclear regulator, the CNSC places the same focus on safety on itself as it demands of its licensees. The CNSC emphasizes safety over competing goals in day-to-day decision-making and in its actions. Managers have a responsibility to lead by example. This includes treating all persons with respect and dignity, and protecting their employees and others in the workplace from destructive or disrespectful behaviour. Managers must also address any offensive behaviour they are aware of, whether or not a complaint has been filed. Managers are expected to lead in a manner consistent with CNSC policies and values. Employees are responsible for living and promoting a culture consistent with CNSC values.

Additionally, the CNSC's management system and Management System Manual (MSM) reflects the CNSC's commitment to and understanding of the key aspects of a healthy regulatory safety culture (RSC). The CNSC's management system model found in the CNSC's MSM reflects CNSC's RSC, which influences everything the CNSC does.

The Executive Vice-President and Chief Regulatory Operations Officer (EVP and CROO), as the RSC Champion, is accountable to foster a healthy RSC with the support of the Internal Quality Management Division (IQMD) as the custodians of the relevant processes documented in CNSC's management system. Refer to sections 4.6 and 4.7 for more information on CNSC's RSC.

4.2 MANAGEMENT FOR SAFETY

Related to GSR Part 1 (Rev. 1): Requirement 19 and GSR Part 2: Requirements 3, 4 and 5

The CNSC has established and implemented a management system that aligns with CNSC's safety goals. CNSC's safety goals are clearly defined through the CNSC's mandate and are documented and communicated through the CNSC's MSM.

The President of the CNSC is accountable for the overall effectiveness of the management system. The EVP and CROO is responsible and accountable for leading the development, promotion, implementation, and improvement of the management system.

Senior management is responsible for establishing policies. The CNSC has developed a set of policies that set out the principles, rules and expectations to guide the direction of its work. Policies are available at a single point through the CNSC's management system portal available through CNSC's intranet (BORIS).

Senior Executives and Directors General are delegated responsibility for the development, improvement, implementation and maintenance of CNSC's core regulatory processes and supporting sub-processes.

The CNSC is continuously assessing and improving its management system. The CNSC recognizes that its management system needs to continuously evolve and improve to meet changes in standards, requirements and national and international developments. The CNSC takes advantage of available technology, and good practices learned from international and national organizations to improve its management system.

The CNSC uses its HP for improvement initiatives as its primary vehicle for improving upon how it regulates for safety while assuring the continued protection of people and the environment. HP provides a disciplined graded approach to managing improvement initiatives and implementing approved changes. HP facilitates prioritizing and executing strategic improvements in the area of policy, processes, procedures, information technology and training.

CNSC uses many other mechanisms and approaches to continuously assess and improve its management system. Other mechanisms to determine improvement opportunities for its management system are outlined in section 4.7.

Additionally, the CNSC's management system ensures that responsibilities assigned to the CNSC are properly discharged. The CNSC's MSM clearly defines organizational responsibilities and authorities. It also defines the roles and responsibilities of the Commission and CNSC staff.

Goals, strategies, plans and objectives

Each year, the CNSC provides Parliament and Canadians with a Departmental Plan, which is based on the Departmental Results Framework and outlines the CNSC's commitments, spending estimates and performance expectations for the upcoming three-year period. It also describes CNSC's organizational priorities, key activities to be undertaken and resources required to meet its mandate.

With a continuous focus on safety, security, and organizational excellence, the CNSC's strategic goals and objectives are expressed across eight target areas in the CNSC's Strategic Planning Framework:

1. To ensure that the CNSC is providing **modern nuclear regulation** using science-based, risk-informed and technically sound regulatory practices that take into account scientific uncertainties and evolving expectations.
2. To be a **trusted regulator**, recognized by the public and industry as an independent, open, and transparent regulator, and a credible source of scientific, technical, and regulatory information.

3. To be a **global nuclear influence**, leveraging and influencing global nuclear efforts relevant to Canadian interests and activities to enhance international nuclear safety, security, and non-proliferation.
4. To operate within an **effective regulatory framework**, and adapting requirements based on experience, and in anticipation of an evolving industry and changing regulatory expectations.
5. To ensure Canada's continued **capability for nuclear safety**, taking the necessary steps to ensure access to required scientific and technical expertise, knowledge, and research infrastructure.
6. To maintain and continue evolving a **competent and agile organization**, that is dynamic, flexible, and highly skilled, supported by modern management practices and tools, that responds to an evolving workforce and industry.
7. To be recognized as an **independent, credible, and transparent source of information**, collecting, generating, and disseminating objective scientific, technical, and regulatory information using modern and accessible media.
8. To build **strategic working relationships**, fostering and maintaining focused relationships in support of domestic and international nuclear safety.

Annual operations planning allow management to prioritize work through a consolidated operations plan. The plan identifies deliverables for the upcoming fiscal year and describes how the CNSC expects to deploy resources to achieve those deliverables. The decision as to whether a deliverable or activity is included in the consolidated operations plan takes into account the risk to safety and security, and whether the work will contribute to achievement of CNSC's corporate priorities and strategic planning.

The CNSC's compliance planning process ensures that compliance activities are planned in a systematic and risk-informed manner. Compliance work plans are prepared annually, outlining the scope, scheduling, resourcing and timeframe(s) for the compliance activities to be undertaken for the next compliance cycle for a particular licence or class of licence. In addition, compliance work plans are developed based on the ongoing review of previous compliance findings and operational information. Once approved, any changes that have been proposed for compliance work plans during the course of the given year are evaluated and documented using a risk-informed approach. Progress reviews are conducted periodically to monitor the status of the compliance work plan.

The CNSC has the following initiatives to assess the forces that affect workforce planning:

- Workforce of the Future initiative represents CNSC's effort to develop and maintain a high-performing organization that is capable and flexible enough to respond to changing environmental forces
- Succession planning addresses the issues associated with anticipated attrition to ensure that the CNSC maintains the competencies necessary to continue meeting its mandate into the future
- Most Probable Scenario program, established in March 2016, projects probabilities with respect to changes to the resources that will be needed over time, based on anticipated changes to the nuclear industry and technological advancements

Senior management ensure safety goals are in line with all strategies, plans and objectives at all levels of the organization and are periodically reviewed against safety objectives.

Planning and execution of CNSC oversight activities are risk-informed; performance indicators are developed, monitored and reported in-year and at year end. Performance reports include the reporting of clear safety goals and associated performance against safety-related indicators. Performance is reported on through the CNSC Annual Report, Departmental Performance Report, RORs and Integrated Quarterly Reports to the public, the Government of Canada, the Commission and other interested parties.

Senior management regularly review organizational performance and takes necessary actions to address issues or deviations that arise. For instance, all CNSC committees report directly to CNSC's Management Committee and provide regular reports on their activities and decisions taken.

The CNSC monitors industry performance and takes action as necessary. The CNSC reports to the Commission, the public and parliament on CNSC industry performance against safety objectives, and identifies and monitors planned actions as appropriate.

4.3 THE MANAGEMENT SYSTEM

Related to GSR Part 2: Requirements 6, 7 and 8

The CNSC has an integrated management system that reflects the environment within which it operates. It integrates elements, including safety, health, environmental, security, quality, human-and-organizational-factors, societal and economic elements, while ensuring that safety is not compromised.

Safety is the fundamental priority in every decision made. The CNSC recognizes the importance of managing risk and being able to respond actively to change and uncertainty through risk-informed decision-making. From licensing and certification to enforcing compliance, the CNSC manages its activities in a risk-informed manner and has reflected risk management throughout its management system. Increased capacity and demonstrated ability to assess, communicate and manage risk helps:

- achieve mandated responsibilities
- build trust and confidence across the organization, within government, and with the public

The CNSC's management system consists of a framework of policies, structures, people, programs, processes, practices, technologies, etc., that are put into place to ensure that the CNSC fulfills all tasks required to achieve its mandate safely and consistently. Personnel, equipment and organizational culture, as well as the documented policies and processes, are all elements of the CNSC's organization and are integrated into one coherent management system. CNSC continuously monitors its performance against these goals as part of fostering a healthy RSC.

The CNSC's management system integrates the processes by which it carries out its core regulatory functions with the management and support processes (i.e., internal services) that are necessary for the organization to operate. Any work group specific management systems are also integrated into the overall corporate management system.

The CNSC's MSM provides a comprehensive overview of the CNSC's management system. It describes how the components of CNSC's organization fit together, describing at a high level the essential elements and interactions of what the CNSC does. It defines CNSC's processes and ensures they are open and transparent to all staff by facilitating a single point of access to documented processes,

procedures, work instructions and tools (i.e., templates and forms) through CNSC's management system portal available through CNSC's intranet (BORIS).

Alignment of management system with safety goals

Refer to section 4.2 to see the alignment of CNSC's management system with its safety goals.

Arrangements for the resolution of possible conflicts in the decision-making process

The CNSC takes a proactive and constructive approach to address differing and conflicting opinions through the application of a multi-key approach. The core idea of a multi-key system can be described as a mindset to facilitate open-minded dialogue which facilitates more effective decision-making. The CNSC's Operations Management Committee worked together to develop the following principles of a multi-key approach that will:

- encourage opinions to be heard with results documented and founded on fact-based discussions
- encourage the attitudes necessary to create open-minded dialogue
- reflect shared accountability, a willingness to hear alternate perspectives, and openness to shifting position, where possible, to establish a shared regulatory approach
- build trust and dialogue
- focus on making regulatory decisions that reflect respectful, professional, valuable discussion that garners essential support to establish an official position
- allow for the rationale behind decisions to be shared with and explained to staff

The multi-key system is applied in areas of the CNSC where there is regular collaboration between colleagues on activities such as writing a CMD, conducting a technical assessment, and in various inspection processes.

Additionally, in 2015, the Scientific Integrity Working Group (SIWG) was established with the purpose of carrying out multiple internal initiatives that helps in building greater engagement and transparency into the CNSC's decision-making process. Through this working group, the Chief Science Officer (CSO) position held by the Vice-President of the TSB was established. The CSO is accountable for ensuring implementation and adherence to CNSC's *Policy on Science in a Regulatory Environment*.

The CNSC has a variety of channels available to staff to raise issues or concerns when conflicts arise in the decision-making process. Where there is a need for resolution of conflicts arising in decision-making processes, the CNSC has developed the following policies and processes within the management system:

- The **Open Door Policy** which fosters an atmosphere of open and free communication within the CNSC, and underscores management's intention to consider and address work-related issues and concerns brought to them. The objective of the policy is to empower CNSC staff to raise their concerns with any manager, at any level in the organization without the fear of reprisal.
- The **Non-Concurrence Process** which provides a clear pathway for staff to seek resolution of their differences of professional opinion regarding scientific and regulatory decision making when reasonable attempts through existing work processes have failed.

- The **Differences of Professional Opinions Process** (DOPO) is a more formal mechanism that has been put in place for staff to bring forward and resolve any differences of professional opinions regarding regulatory positions established during the regulatory operations. The CSO is accountable for providing expert judgement when an issue is submitted for review to help verify completeness and appropriateness. The CSO is also accountable for appointing a panel lead for the review panel that will be reviewing the submitted issue. The final resolution from the panel is provided to the CSO for communicating to the person(s) who raised the issue and any relevant parties impacted by the issue.
- The **Informal Conflict Management System** (ICMS) office helps CNSC employees and managers at all levels to prevent, identify, resolve and manage challenges and/or conflict in the workplace.

The CNSC is committed to continuous improvement and as such conducted a RSC self-assessment from 2016 to 2018. As per one of the recommendations from the RSC self-assessment, the CNSC has developed a mechanism for identifying opportunities for improvement. A process has been documented for managing opportunities for improvement identified by CNSC staff to further increase transparency around the communication of safety related issues, and provide assurance that all safety issues raised by staff are captured, documented and appropriately addressed. This is process is currently being piloted in one directorate before it is implemented corporately. The RSC self-assessment is further discussed in section 4.7.

Organizational structure, internal and external interfaces, processes, responsibilities and accountabilities

High-level organizational structure, processes, responsibilities, accountabilities, levels of authorities, and explanation of CNSC's communications with external organizations are clearly documented and communicated through the CNSC's MSM.

Program owners who are responsible and accountable for programs and effective implementation of associated processes are clearly identified.

Interfaces between processes, responsibilities and accountabilities of activities are documented, implemented and communicated through process overview documents, procedure documents and work instruction documents. Refer to section 4.5 for additional information on the management of processes and activities, as well as how CNSC's processes interface.

Refer to section 3.1 for more information on CNSC's organizational structure and how it discharges its responsibilities to perform its functions effectively in a manner commensurate with the radiation risks associated with facilities and activities.

Managing changes in the organization

The CNSC applies a risk-informed decision-making approach assures that safety is never compromised and that the focus of its activities is where there is the largest impact on safety. Safety is always emphasized over competing goals in all decisions and activities. Safety implications are a key consideration in all CNSC change management practices.

The CNSC uses HP to improve its management system. HP provides a disciplined risk-informed approach to managing improvement initiatives and implementing approved changes – the level of effort and

management oversight is commensurate with the level of risk, complexity and costs faced. HP facilitates prioritizing and executing strategic improvements in the area of policy, processes, procedures and information technology. Prior to implementation, all proposed changes are evaluated to ensure among other things, that safety will never be compromised.

Regulatory decision-making process and related independent reviews

The CNSC's management system includes arrangements for an independent review before decisions significant for safety are made. For example, the requirement for peer review is documented in CNSC's *Conducting a Technical Assessment* process. The peer review is usually carried out by a subject matter expert at the CNSC; however, it can be performed by a resource external to the CNSC, if necessary and if approved by management. Refer to section 3.3 for more information on necessary competences of CNSC staff.

Application of the graded approach to the management system

The CNSC has adopted a risk informed approach in the regulation of all facilities and activities to ensure the allocation of resources and level of reviews, assessments and inspections are commensurate with overall risk of the facility and activity.

CNSC's application of the graded approach is described in REGDOC-3.5.3 as indicated in section 1.1.

The CNSC applies the same graded approach to the promotion, maintenance and evaluation of its management system. The degree to which resources and attention are targeted at CNSC's internal activities and products is commensurate with the safety significance of those products and activities, and with their potential impact on CNSC's ability to fulfill its mandate.

Processes are developed and documented to apply a graded approach to ensure the level of effort, assessments, controls and approvals are commensurate with the overall complexity and risk of the associated activity.

Documentation of management system processes, instructions and tools is completed by assigning the priority to where the lack of documentation or inconsistency in the execution of activities may possibly cause risk to safety.

Arrangements for the control, revision and retention of management system documentation

The CNSC has documented and implemented a process document entitled *Management System Document Control Process* that describes and provides direction to staff and management on the activities involved in the control of management system documentation. This process helps provide a consistent approach to controlling management system documentation, as well as templates for processes, work instructions and criteria documents; guidance on establishing fundamental principles for processes; guidance on mapping a process; and guidance to determine delegation of approval when developing a new process.

Staff have the opportunity to comment on management system documentation at any time. Documents should include either an email to contact or a comment disposition table attached within the document that allows staff to provide any recommended revisions. When the document is next revised, this

feedback is then addressed. Revised process documents are subject to the same level of approval as the initial document when it was newly developed.

Additionally, records produced as a result of CNSC processes are maintained in the CNSC's EDRMS and controlled in accordance with the CNSC's Information Management Policy and the Government of Canada requirements.

4.4 MANAGEMENT OF RESOURCES

Related to GSR Part 2: Requirement 9

Approach to determining necessary competence, resources and training

As a science-based organization, the CNSC operates in a rapidly changing environment. While the CNSC is successfully delivering on its mandate, the CNSC needs to be cognizant of the emerging new nuclear technologies, changing external environments, evolving industry and research and development infrastructure, changing regulatory and technical standards and regulatory practices. The CNSC has to continuously evaluate its capability to regulate for safety now and in a foreseeable future.

CNSC has to have its own technical and scientific resources and access to external technical support. The CNSC has to take the necessary steps to ensure continuous access to required scientific and technical expertise, knowledge, and research infrastructure, internally and externally. As described in section 3.3, there is an ongoing initiative, Capability for Nuclear Safety, to ensure that the CNSC successfully maintains the necessary capabilities to effectively and efficiently regulate nuclear safety.

The CNSC has made considerable effort in building a competent and agile organization so that it can be a world-class regulator. Through the Workforce of the Future initiative, the organization identified the need to clarify roles and responsibilities and improve work assignments at all staff levels. To support role clarity, the Human Resources Directorate developed job family charts. A job family chart is a simple at-a-glance tool that shows differences between similar types of work at each level (i.e., REG4–REG8). Each chart sets out the main duties and responsibilities at each level in one document. Technical competencies required for each position are outlined in work descriptions, which set out the duties and activities of each position and the required competencies related to education, abilities, skills and knowledge needed to carry out those activities.

In addition, the CNSC uses workforce planning to shape and structure the workforce to ensure there is sufficient and sustainable capability and capacity to deliver on its organizational objectives now and in the future. Workforce planning, which was introduced in section 3.3, is a business-driven and management-owned process that creates a roadmap to address workforce risks and opportunities. The CNSC's workforce is one of the organization's largest investments and most valuable assets; as such there is a business imperative to plan it accordingly.

As well, the CNSC has developed Key Behavioural Competencies expected of all employees, regardless of job or level. These behavioural competencies form the basis of recruitment, development and performance management. These competencies align with the Key Leadership Competencies set out by TBS and are required of all managers.

The CNSC recognizes the importance of KM and has launched a policy on KM for all staff. The KM policy defines knowledge as a strategic business resource and recognizes that effective KM makes it possible

for the CNSC to deliver on its mandate. The focus on KM is to ensure that both tacit and explicit knowledge is safeguarded, accessible, shared and retained. Through this policy, the CNSC commits to enhancing measures to capture, share and build knowledge through people, processes and technology to maintain the organization's capacity and capability to deliver its mandate now and in the future.

As described in section 3.3, the CNSC has a Learning and Development Program to help develop and maintain competencies of staff. The program includes basic mandatory and recommended training.

Requirements on competence for leadership for at all management levels

The CNSC, in partnership with employees, has described and implemented four Key Behavioural Competencies for all employees regardless of job or level as described earlier in this section. These complement the six Key Leadership Competencies outlined by TBS for management to establish a competency framework to ensure that the CNSC continues to consistently selects, builds and maintains competent and flexible workforce.

The work description and behavioural/leadership competencies establish basic requirements for all positions recruited at the CNSC. The hiring manager works with Human Resources to identify complementary or additional qualifications such as past work experience or technical knowledge and/or competencies based on operational requirements of the work unit. The qualifications of candidates for positions are assessed in a hiring process that includes behavioural and situational questions, scenario-based interviews, technical and competency related testing, and reference checks that explicitly examine a candidate's ability to perform the duties required of the position and assess fit and identify future potential within the organization.

Resources available for the development and improvement of the management system

Though the President is ultimately accountable for the effectiveness of the management system, the CNSC's IQMD is assigned with the responsibility to coordinate the maintenance, review and improvement activities associated with the management system. IQMD reports to CNSC's Management Committee on all management system matters.

Employee training programme

Each employee creates an ILP to help support their competency development. The ILP is a written strategy for developing and maintaining the competencies (knowledge, behavioural and technical competencies) employees need to perform in their current position and to develop their career in the years to come. Knowledge, behavioural and technical competencies are determined by the requirements of the individual's job and performance. ILPs must be reviewed and updated annually by employees and their managers as part of the performance management process. As part of performance management, employees establish developmental objectives and goals. They then identify learning strategies to achieve their developmental goals and add these strategies to their ILP. Their ILP acts as a reference point throughout the year to ensure that they are meeting their developmental commitments.

Employees are encouraged to include a broad range of learning activities in their ILPs, such as on-the-job learning, formal coursework and self-study. Formal course work is not limited to CNSC in-house training;

employees may attend courses at universities, colleges and other external providers such as the Canada School of Public Service. The Canada School of Public Service offers an abundance of learning activities for federal government employees that allow employees to pursue the courses they need for their professional development.

Further, the CNSC is currently developing a Regulatory Operations Training Program that will help support a consistent approach to the application of CNSC licensing, certification, compliance and regulatory framework processes, by providing staff with the tools, knowledge and skills required to perform work effectively and consistently. Refer to section 3.3 for more information on the Regulatory Training Operations Program and other training offered to CNSC staff.

4.5 MANAGEMENT OF PROCESSES AND ACTIVITIES

Related to GSR Part 2: Requirements 10 and 11

Methods for identification, development, modification and documentation of processes

Documentation of processes is identified and prioritized based on the activity's safety impact. Priority is given to the development of processes of activities that have significant impact on safety of people and the environment.

The CNSC ensures that management system documents are usable, readable, clearly identified and readily available at the point of use.

New documents and revisions to existing documents are primarily written by staff who will be using the document. Potential users of the document are also consulted during the process of drafting and revising documents to ensure that the document content is relevant, as well as to ensure that messages are interpreted and understood by the intended audience prior to seeking approval from management.

Documents are readily available at point of use through the management system portal available through CNSC's intranet.

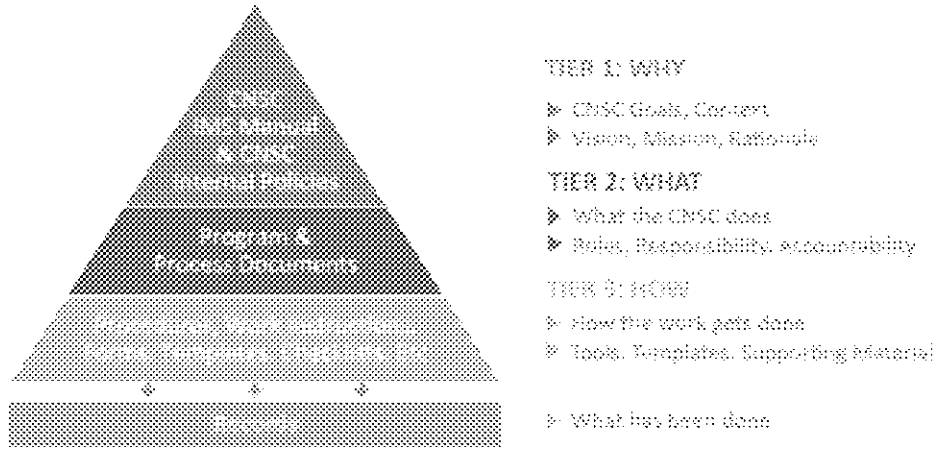
One of the fundamental principles of the CNSC's management system is to ensure that documents are approved prior to use. Only approved versions are made available to staff. This principle is achieved through the implementation of the management system portal. The portal provides staff with a single point of access to approved documents.

The CNSC has in place all processes necessary to deliver its mandate.

CNSC's processes and related procedures

The CNSC's management system documentation is organized into a three-tier hierarchical framework as depicted in figure 17.

Figure 17: CNSC's management system documentation hierarchy



As the first point of reference to how the CNSC operates on a day-to-day basis, the MSM is at the highest level of the documentation hierarchy. The CNSC's internal policies are the formal policies, directives, and guidelines that govern the day-to-day conduct of internal CNSC operations and management activities, actions, and behaviours. The internal policy suite is at the same level as the MSM in the documentation hierarchy.

Program and process documentation provides high-level descriptions of what the CNSC does. The program and process documents are senior management-approved documents that describe the CNSC's programs. Each process document conveys the fundamental principles behind the practice, describes the key elements of the associated work, sets out the operational requirements, performance expectations, and associated roles, responsibilities, and accountabilities, as well as provides reference links to supporting procedures, work instructions, tools, templates, etc. These documents are a part of the second tier of documentation.

The third tier consists of procedures, work instruction and templates. The procedural guidance set out in CNSC's work instruction documents enables staff to carry out the work discussed in the high-level process documents by describing precisely what needs to be done, when, where, why, how, and by whom. This ensures that CNSC's internal processes are followed consistently across the organization. Where appropriate, tools such as document templates, forms, checklists, etc., are also available to support staff in doing their work.

The sequencing of a process is specified when processes are being developed. Interactions between interfacing processes are indicated when identifying activity inputs and outputs on each process diagram to ensure efficiency.

Therefore, when applicable, a certain activity in a process may point to another CNSC process. For example, Activity E of CNSC's corporate process for *Conducting an Inspection*, regarding the collection of inspection facts, points to CNSC's SAET process if it is found that action needs to be taken if unsafe conditions are observed.

CNSC uses a multi-key system to ensure that interactions, communications and agreements between staff involved in interfacing processes are managed effectively to achieve its goals. The multi-key system is described in section 4.3.

Process management responsibilities

Senior Executives and Director Generals are delegated responsibility for the development, improvement, implementation and maintenance of CNSC's core regulatory processes and supporting sub-processes. When acting in this capacity, senior managers are referred to as Process Owners. Process Owners are selected based on their knowledge of the assigned process and their understanding of how each needs to interact with other processes.

Although Process Owners may choose to delegate responsibility for the day-to-day management of the process, they remain accountable for the process meeting required performance criteria and planned outcomes. This includes assuring that the:

- process is developed, documented, and maintained in accordance with approved standards
- process meets the requirements of all applicable Acts, regulations, policies, and other requirements set by the Government of Canada and/or Senior Management
- appropriate level of training is provided
- process effectiveness is maintained and improved where warranted
- process performance, following implementation by line management is monitored and reported
- interfaces with other processes are understood and managed
- risks to the process performance are identified, controlled and mitigated
- affected and interested stakeholders are engaged when considering substantive changes

Process of control and verification of procedures, instructions, working documents and of records

CNSC's activities are carried out following established processes, procedures and work instructions, which are verified and validated prior to implementation. Processes are validated by applying the process in either real or simulated conditions to identify any potential problems that could adversely affect the overall effectiveness or efficiency of the process or other interrelated processes. This can be done through pilots, walkthroughs, tabletop reviews, stages implementations or other means. Once a process is approved, it is added to the CNSC's management system portal. This allows all staff to have access to the approved and current version of the process. Approved and implemented processes are subject to regular self-assessments to ensure their continued effectiveness. Staff have the opportunity to comment on management system documentation at any time.

As described in section 4.3, the CNSC uses multi-key decision-making. The multi-key system is used to ensure that multiple views and inputs from experts are adequately considered when carrying out activities and making decisions that could have implications on safety. Adherence to processes is monitored by senior staff and managers responsible for those activities.

The CNSC is also currently automating key processes using a case management solution tool. The automation of processes will help improve consistency in carrying out activities and promote adherence to processes. Case Management system is an approach to managing workflow and related information in an organization that performs a broad range of activities and services. A case captures a given

business process. It takes the form of, for instance, a new licence application, or an amendment to an existing licence being processes. A Case Management system:

- provides a repository for all cases and related information
- implements CNSC's management system
- manages workflow
- controls access (ensures security)
- provides tools for capturing and reporting information

Case Management system training is available to all staff and is strongly encouraged for those who are required to use the tool when conducting core regulatory activities such as inspections.

Receiving supply or service

Pursuant to section 17 of the NSCA, the CNSC may "*enter into contracts for the services of any persons having technical or specialized knowledge of any matter relating to the work of the Commission, to advise and assist the Commission in the exercise or performance of any of its powers, duties or functions under this Act*". Contracting assistance is provided through the Research and Support Program and other contracting mechanisms. Outside expertise is often retained in order to supplements staff's own technical knowledge.

The responsibility and authority for the regulation of nuclear facilities and nuclear-related activities is assigned to the CNSC by Parliament under the NSCA. While the CNSC may seek and receive advice and recommendations, it is fully responsible for the decisions taken. The reports from contracted work are the responsibility of the contracted party and do not become CNSC staff position unless explicitly declared to be so.

The CNSC's *Contracting Policy* provides an overview of roles and responsibilities. Each contract has a Project Authority, a CNSC staff member, who is considered a representative of the CNSC and is responsible for all matters concerning the technical content of the contract requirements. The Project Authority, in consultation with the CNSC Contract Authority, is responsible for defining requirements, drafting the statement of work and equitable and objective bid evaluation criteria. The Project Authority is responsible for monitoring the performance of the contractor in accordance with contract terms and conditions to ensure the product or service supplied meets what was requested in the contract.

The Project Authority is also responsible for evaluating competitive technical proposals fairly and in accordance with instructions provided by the Contracting Authority and conducting supplier reference checks as applicable.

The CNSC's *Procurement and Contracting Handbook* provides CNSC managers and staff with information and resources on how to contract for goods and services.

Additionally, the CNSC's Contract Review Committee (CRC) provides a formal review and challenge mechanism mandated to review procurement and contracting activities, practices, strategies, trends and proposed policies, guidelines and directives that meet the criteria for CRC review. The CRC is established in accordance with the TBS Contracting Policy to ensure that the CNSC's procurement and contracting activities:

- are consistent with relevant regulations, laws, policies and trade agreements

- are conducted in a fair, open and transparent manner that demonstrates prudence and probity
- ensure the pre-eminence of operational requirements

4.6 CULTURE FOR SAFETY

Related to GSR Part 1 (Rev. 1): Requirement 19 (para 4.15.)
GSR Part 2: Requirement 12

Arrangements established under the management system for strengthening safety culture

Safety is a CNSC core value and RSC is an integral part of the CNSC's management system. Safety is a key part of the CNSC mandate, with the health and safety of Canadians being paramount. CNSC's RSC is the product of the organizational mission, programs and practices, along with employee and management actions and behaviours, which establish and support safety as an overriding priority.

The CNSC's MSM reflects the CNSC's commitment to and understanding of the key aspects of a RSC. The CNSC's management system model found in the CNSC's MSM reflects CNSC's RSC, which influences everything the CNSC does. This commitment is further endorsed and communicated by the CNSC's senior management in its communications including presentations and speeches to all its stakeholders.

Additionally, the CNSC outlines the RSC traits in the draft Regulatory Safety Culture Policy providing additional support to the overall management system to maintain and improve a healthy RSC at the CNSC.

The management system portal provides all CNSC staff with a single consolidated repository of current and approved CNSC management system documentation. The management system portal contains a section called "Foster Regulatory Safety Culture". This section integrates process documents and tools, including mechanisms for raising issues, performance management, grievances, respectful and collaborative workplaces, ICMS, etc.

Methods applied for fostering strong safety culture

The CNSC is committed to fostering a strong safety culture which is frequently reinforced and communicated by CNSC's senior management to all staff via emails, town hall meetings, committee meetings, and senior management presentations to staff and outside stakeholders. The CNSC engages its staff in improvement initiatives which allows for engagement, consultation and additional opportunities for participation in questioning and improving existing processes and activities. For example, regulatory safety culture town hall events are hosted quarterly and all staff are invited to attend and participate. The town hall sessions are open-format meetings used to identify opportunities for improvement and encourage internal collaboration to achieve improvements by engaging in dialogue in all areas of CNSC work.

As well, the CNSC has a management forum once per month. All CNSC managers come together for an hour to learn about CNSC initiatives and projects while sharing experiences and transferring knowledge.

Additionally, the CNSC offers speakers series to all CNSC staff on a wide variety of leadership development topics including, for example, the leadership characteristics necessary for a healthy RSC.

Furthermore, the CNSC established an RSC working group that strives to establish a structured approach to cultivating a healthy RSC throughout the organization.

The CNSC is committed to continuous improvement and as such conducted a RSC self-assessment from 2016 to 2018, and has also committed to a Country Specific Safety Culture Forum (CSSCF) for Canada in 2020. The self-assessment and forum are further discussed in section 4.7.

Understanding of safety and security culture

CNSC staff have effective communication and interfaces to address potential safety/security issues within the CNSC and coordinate inspections activities. This approach helps to foster an inclusive culture of safety and security. This strong safety and security interface allows increased inspector vigilance. It also assists in fostering an organizational security culture. For additional information on security culture, refer to the section 11.2.

Personal accountability of CNSC employees

As per the *CNSC Values and Ethics Code*, all CNSC employees are responsible for ethical leadership in their work and to uphold public trust through their actions and behaviours. Although managers have an added obligation to consistently demonstrate values and promote ethical awareness with employees, all employees are encouraged to raise, discuss and resolve ethical concerns without fear of reprisal.

In addition, management at all levels are encouraged to take every opportunity to promote safety considerations as an overriding priority. Through the RSC self-assessment, it was found through surveying the staff who participated in the focus groups that over 85% of those staff believe that safety remains the overriding priority when decisions are made. Leadership for safety must be demonstrated at all levels and staff are empowered to take individual responsibility and accountability for exhibiting behaviours that set the standard for safety.

Questioning and learning attitude is encouraged in the regulatory body

Open dialogue with colleagues, peers, managers, etc. is encouraged to assure the CNSC is constantly aware of risks, rights, and responsibilities as well as the resources available to address ethical concerns. Staff are encouraged to raise issues for improvement or action with their colleagues, management and senior management. Several processes for raising issues have been established as outlined in section 4.3.

4.7 MEASUREMENT, ASSESSMENT AND IMPROVEMENT

Related to GSR Part 2: Requirements 13 and 14

Monitoring and measuring the effectiveness of the management system

The CNSC monitors and measures the effectiveness of its management system to confirm its ability to achieve the results intended and to identify opportunities for improvement to enhance safety.

Mechanisms and approaches to assess and improve the management system are highlighted in CNSC's process document entitled *How to Conduct Management Review of CNSC Management System*. Types of management reviews of the CNSC management system include:

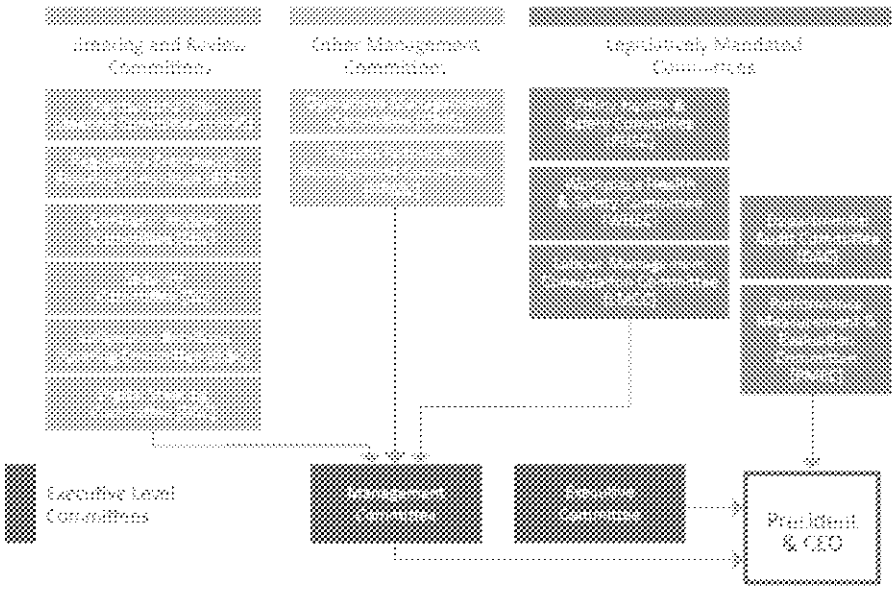
- internal audits, assessments, and evaluations
- environmental Scans and Strategic Framework Planning
- IAEA peer reviews (e.g., IRRS, EPREV, IPPAS)
- audits conducted by the Office of the Auditor General and 3rd-party/consultant reviews
- staff surveys (Taking the Pulse, Employee Engagement, Public Service Employee Survey, etc.)
- stakeholder feedback
- Government of Canada Strategic Reviews
- Parliamentary Standing Committee participation
- benchmarking exercises
- self-assessments

Senior management is responsible for overseeing that these management reviews are conducted in order to maintain and improve its efficiency. Senior management delegates authority to its oversight committees to oversee these various mechanisms and approaches be carried out to assess and improve the CNSC's management system.

Each oversight committee at the CNSC regularly reviews the results of audits, evaluations, self-assessments, surveys, etc. that pertain to the work under their respect purview. This practice enables timely identification of strengths and opportunities for improvement and, if the need for improvement is indicated, then the associated process(es) are updated accordingly. This regular review of the various management system elements has the cumulative effect of ensuring that all parts of the management system are effectively reviewed on regular basis

All oversight committees are responsible for reviewing and continuously improving their respective functional areas of the management system, and report regularly to the CNSC's Management Committee, as shown in figure 18. Management Committee is chaired by the President of the CNSC who is ultimately accountable for the CNSC's management system.

Figure 18: Overview of CNSC's oversight committees



Additionally, the CNSC uses its HP for improvement initiatives as its primary vehicle for improving upon how it regulates for safety while assuring the continued protection of people and the environment.

Any non-conformance in process application, or any safety-related event that could give rise to radiation risk, is subject to the CNSC's formal investigation protocol, and corrective action is taken in a timely manner. Any corrective or preventive action taken in response to a safety related event is monitored and reported to management.

Monitoring and measuring leadership for safety and safety culture

The CNSC conducted a RSC self-assessment from 2016 to 2018 and committed to conduct a follow-up assessment in 2022 to confirm the effectiveness of the management actions and to deepen the commitment to continuously improve CNSC's RSC. The results of the self-assessment were documented in a report which was shared with all staff via email, BORIS and articles. A Management Action Plan was established in 2018 to track the immediate management actions in response to the recommendations. The Management Action Plan is being tracked, monitored and reported on through HP. Past and future assessments will integrate leadership for safety while including independent expertise as a valuable contribution to the quality of findings.

CNSC continues to be pro-active in ensuring that the organization is a safe environment for staff to raise issues and we have several mechanisms in place to do so as mentioned section 4.3. For the next assessment, the use of such mechanisms will be tracked, trended and reported on. Progress will be monitored using employee surveys and actions will be taken as required.

Furthermore, the CNSC has committed to a Country Specific Safety Culture Forum (CSSCF) for Canada in 2020. The CSSCF is a co-creation between the host country and the NEA. The forum is tailored to the specific needs and interests of the host country and examines how nuclear safety culture is affected by the national cultural context of the country operating a nuclear facility. The forum:

- looks at the relationship and systems in place between regulators, operators and stakeholders for strengths and opportunities for improvement
- puts regulators and operators in one room to think about how to get people to do the right thing in the host country's national context
- involves the creation of a scenario to be acted out through collecting data ahead of time from participants on how things are done and why things are done the way they are

The CSSCF process ends with the creation of a report that includes explorative questions intended to inspire self-reflection and determine nuclear safety implications and any follow-up proactive actions.

4.8 CONCLUSIONS AND ACTIONS

As Canada's nuclear regulator, the CNSC places the same focus on safety on itself as it demands of its licensees. The CNSC emphasizes safety over competing goals in day-to-day decision-making and in its actions.

The CNSC has established and implemented an integrated management system that reflects the environment within which it operates and aligns with CNSC's safety goals that are clearly defined through CNSC's mandate and documented and communicated in the CNSC's MSM. It integrates

elements, including safety, health, environmental, security, quality, human-and-organizational-factors, societal and economic elements, while ensuring that safety is not compromised.

Safety is a CNSC core value and RSC is a strong, integral part of the CNSC's management system. The CNSC's MSM reflects the CNSC's commitment to and understanding of the key aspects of a strong RSC. The CNSC's management system consists of a framework of policies, structures, people, programs, processes, practices, technologies, etc., that are put into place to ensure that the CNSC fulfills all tasks required to achieve its mandate safely and consistently. Personnel, equipment and organizational culture, as well as the documented policies and processes, are all elements of the CNSC's organization and are integrated into one coherent management system. CNSC continuously monitors its performance against these goals as part of fostering a healthy RSC.

The CNSC is committed to continuous improvement and as such has a number of initiatives and action plans underway to improve its management system and safety culture. The following is underway:

- improvement to CNSC's management system portal and process for controlling management system documentation
- development and implementation of the Regulatory Operations Training Program

All the actions above are currently being managed, tracked and reported on under CNSC's HP.

5. AUTHORIZATION

5.1 GENERIC ISSUES

Related to GSR Part 1 (Rev. 1): Requirement 4, paragraph 2.12; Requirements 23 and 24
GSR Part 3: Requirements 6, 7, 8 and 13
GSR Part 4: Requirement 21

Roles and responsibilities for authorization

In Canada, a licence is required to conduct the activities outlined in section 26 of the NSCA, subject to regulations made by the Commission with respect to exemptions.

The CNSC licensing process consists of the submission of a licence application, assessment of the application by CNSC staff, public hearing and a decision by the Commission. The Commission is the overall decision-making authority for all licensing matters. The Commission makes independent, objective and risk-informed decisions, taking into consideration information provided by applicants, stakeholders, Indigenous peoples and CNSC staff. For decisions related to low-risk facilities or activities, the Commission may assign decision-making authority to certain CNSC staff members assigned as DOs.

The CNSC relies on the expertise of other federal departments and agencies in its fulfillment of its mandate and to provide additional expertise. Paragraph 21(1)(a) of the NSCA enables the Commission to enter into arrangements with (among others) any department or agency of the Government of Canada.

In recognition of the fact that the CNSC's nuclear regulation does not replace other regulatory authorities which remain applicable, the CNSC has established a joint regulatory process. As a lead agency, the CNSC invites other federal and provincial regulatory agencies to participate in the licensing process when their areas of responsibility could impact the proposed nuclear facility. Those that choose to participate become members of a site-specific joint regulatory group. This process ensures that the concerns of federal, provincial and territorial agencies are considered in the regulatory process and are reflected, as appropriate, in the licence in the form of site-specific requirements.

For example, the CNSC has an MOU in place with ECCC which identifies cooperation between EC and the CNSC, concerning the implementation of their mandates and ensuring compliance with various pieces of legislation related to nuclear projects. While the mandate of the CNSC is established by the NSCA, and ECCC's mandate is set out by the *Canadian Environmental Protection Act*, both organizations are mandated to protect the environment by ensuring compliance with several federal acts and regulations in the development and operation of nuclear projects. The MOU outlines the cooperation between the two organizations, in order to minimize the duplication of effort and encourage efficient delivery of services through information sharing, consultation in developing policies, training opportunities and joint inspection and enforcement actions. Specifically, ECCC supported the CNSC by providing technical expertise during the Bruce NGS and Pickering NGS licence renewal hearings in 2018.

Application of the graded approach in authorization

The CNSC licenses about 2,500 operations across Canada. Approximately 2100 licences are issued to licensees of nuclear substances and radiation devices. The remaining licences are for uranium mines and

mills, fuel fabrication facilities, radioisotope production, waste management facilities, NPPs, and research and demonstration facilities.

The CNSC applies the graded approach to licensing and compliance activities.

This approach is driven primarily by assessment of the risk associated with the activities being regulated, and the performance history of the licensee. The degree of oversight is also informed by:

- complexity and associated hazards of the licensed activity
- technical assessments of submissions
- relevant research
- information supplied by parties for Commission proceedings
- international activities that advance knowledge in nuclear and environmental safety
- cooperation with other regulatory bodies
- Indigenous rights
- public concern

If a licensee cannot achieve the required level of safety, it will not be permitted in any case to continue conducting its licensed activities.

Types of authorizations and their application to nuclear facilities and activities

A nuclear facility (Class I and Class II nuclear facilities, uranium mines and mills) is licensed throughout its entire lifecycle, with authorization required for site preparation, construction, operation, decommissioning and abandonment. The Commission also has discretion in specifying the licence period for any licence that it issues. In considering each application, the CNSC takes careful account of all relevant information pertaining to the preceding licensing stage. For example, in seeking a Class I nuclear facility operating licence, an applicant must, in accordance with the regulations, provide a description of the structures, systems, and equipment put in place under the construction stage, together with a final safety analysis. The CNSC will verify that any outstanding issues from the construction licensing stage have been resolved in addition to assessing the information in the application for an operating licence. The initial operating licence will authorize the commissioning activities which serve to demonstrate that the systems, structures and components important to safety are functioning reliably and in accordance with the design. Similarly, an application for decommissioning must, among other things, contain a description of the nature and extent of any radioactive contamination at the facility that arose from its operation.

The CNSC also licenses the import and export of high-risk sealed sources, controlled nuclear substances, equipment, information and nuclear-related dual-use items. Proposed imports and exports are evaluated by CNSC staff to ensure compliance with Canada's nuclear non-proliferation and export policies; its international agreements related to safeguards; health, safety and security; and the NSCA and its associated regulations.

Activities involving nuclear substances and prescribed equipment must be licensed by the CNSC unless exempted pursuant to NSRDR. Facilities where certain types of Class II prescribed equipment is to be installed must also be licensed by the CNSC prior to their construction, operation or decommissioning. A licence is also required to service radiation devices or Class II prescribed equipment.

Certification of equipment is an attestation from the CNSC that the prescribed equipment is safe for use by qualified personnel. Unless exempted under the NSRDR, all radiation devices and Class II prescribed equipment, as well as certain types of transport packages, must be certified by the CNSC before they can be used in Canada.

The CNSC also issues licences and certificates for packaging and transport of nuclear substances, as stipulated in the PTNSR, 2015.

Certification also applies to persons carrying out prescribed duties. The purpose of personnel certification is to regulate personnel who are assigned to positions that have a direct impact on the safe operation of a facility, the health and safety of workers, the public or the environment.

The Commission holds a public hearing when it makes any licensing decision for a nuclear facility or activity. During these hearings, the Commission considers written and oral statements from CNSC staff, the licensee or applicant, and the public before making a decision. The CNSC's PFP, as discussed in section 3.8, provides funding to allow Indigenous communities and members of the public to participate in the CNSC's licensing and decision-making process. The PFP is critical to the CNSC's mission of being an open and transparent regulator.

Under section 37 of the NSCA, the Commission may give responsibility for issuing certain types of licences to persons it has identified as DOs under the legislation. When a DO has this responsibility, no public hearing needs to occur unless the officer refers the decision back to the Commission using a risk-informed approach. In this case, the Commission will evaluate the need to conduct a public hearing as part of its decision-making process. Nevertheless, the process followed by the DOs ensures that the same standards for safety, environmental protection and security are maintained.

CNSC's authorization process

The CNSC has licensing processes which are initiated when it receives an application from a proponent. The specific processes have been developed by the CNSC and are established by licence class and type. Section 3 of the GNSCR sets out the general requirements for all licence applications regardless of facility or activity type. The *Canadian Nuclear Safety Commission Cost Recovery Fees Regulations* list the prescribed fees for an initial application for Class I facilities and uranium mines and mills, with annual fees thereafter.

To specify the information an applicant must submit to the CNSC to demonstrate the adequacy of its qualifications and proposals, the Commission has made a number of regulations. Regulations under the NSCA describe the general application requirements for Class I and Class II nuclear facilities, uranium mines and mills, and the use of nuclear substances. In addition, the CNSC has developed REGDOCs that provide additional clarity and regulatory expectations to licensees and applicants on licence applications. A description of the CNSC regulations and guides is found in section 9.1.

When the CNSC receives a licence application, staff evaluate it to determine if the proposed safety and control measures described in the application, and the documents needed to support the application, are adequate and meet applicable requirements. Licence application guides are developed to established a consistent, common understanding of the information and measures needed to demonstrate compliance with subsection 24(4) of the NSCA for a given facility or activity type.

Documents needed to support an application include detailed documents supporting the design, safety analyses and all aspects of operation to which the applicant makes reference; documents describing conduct of operations; and documents describing conduct of maintenance.

The CNSC requires licensees to implement and maintain key programs under the SCAs applicable to the licence application. This is imposed by licence conditions.

CNSC staff conduct technical assessments to support licensing, compliance, regulatory decision making and development of regulatory positions. The CNSC's process for review and assessment is provided in section 6.

As outlined in section 1.2, licence applications that demonstrate potential interactions between the facility or activity and the environment may be subject to an EA under CEAA, 2012, or an environmental protection review under the NSCA. The environmental protection review under the NSCA is a component of the CNSC's regulatory assessment of a facility or activity and is carried out as part of the CNSC's review of all licence applications of facilities and activities that have potential interactions with the environment. The EA or an environmental protection review is a review of information used to support the Commission's (or DO's) decision on whether a licensee or applicant will adequate provision for the protection of the environment and the health and safety of persons.

The information provided with the licence application, including the documents to which the application makes reference, as well as regulatory requirements set out in laws and regulations, form part of the licensing basis. The licensing basis is explained in section 1.4.

Once CNSC staff are satisfied that all of the requirements of the NSCA and its associated regulations are met, the applicant's documentation is complete and acceptable, and CNSC staff conclude that a licence should be issued, CNSC staff prepare a recommendation for the Commission for a licence decision. The Commission (or DO) considers those recommendations along with input from external stakeholders (including the applicant or licensee) in its decision making.

The Commission holds a public hearing when it makes any licensing decision for a nuclear facility or activity, as required by subsection 40(5) of the NSCA. Public participation is encouraged in all licensing decisions and CNSC has established the PFP as a vehicle for participants to request funding to support participation in the CNSC's regulatory decision-making process as described in section 3.8. The NSCA requires that applicants, licensees and anyone named in or subject to an order have the opportunity to be heard. The *Canadian Nuclear Safety Commission Rules of Procedure* set out the requirements for notification of public hearings and publication of decisions from public hearings.

These proceedings allow interested parties and the public to learn about nuclear facilities and projects, and to give an opportunity to be heard before the Commission. Indigenous communities and members of the public can participate in public hearings via written submissions and/or oral presentations. Commission hearings are normally oral hearings that are open to the public, but some are also oral hearings in a closed session in whole or in part. For example, certain protected information may not be discussed in a public forum. Commission hearings and meetings are held in public and can be viewed online as webcasts for six months after the date of the hearing.

A public hearing may also be held in writing. They may deal with Commission decisions that are more administrative in nature and when there is less public interest in the matter being considered. A hearing

in writing could include shortened public notice requirements, reduced time periods or limited participation.

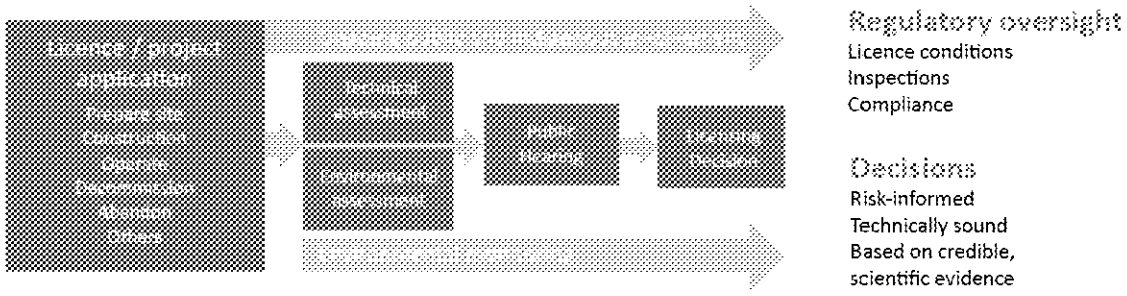
As described in section 3.8, the CNSC's approach to involving Indigenous peoples includes commitments to uphold the honour of the Crown, through relationship building and information sharing, as well as to meet the CNSC's legal obligations under section 35 of the *Constitution Act, 1982*. Since 2004, the Supreme Court of Canada has held that the Crown has a duty to consult and, where appropriate, accommodate when it contemplates conduct that might adversely impact potential or established Aboriginal and/or treaty rights and related interests, including Aboriginal title. The CNSC respects these commitments by informing Aboriginal groups of proposed projects, consulting with potentially impacted Indigenous communities and encouraging participation throughout the licensing process. Indigenous communities are also encouraged to bring their concerns before the Commission.

The Commission or the DO issues the licence or certificate, including conditions as appropriate. Licensing decisions include the issuance, refusal, amendment, renewal, suspension, revocation, replacement or transfer of a licence.

The CNSC's licensing regime for complex facilities includes the LCH, which is a companion piece to interpret a licence and previously discussed in section 1.4.

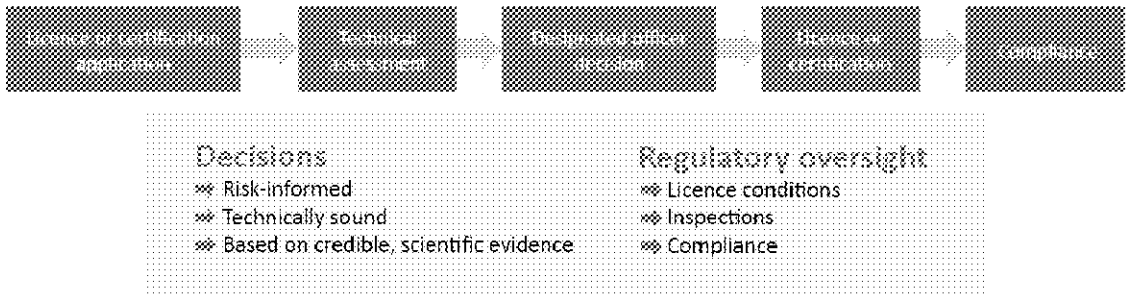
A diagram of the CNSC licensing process for Class I nuclear facilities, select Class II nuclear facilities, and uranium mines and mills is shown in figure 19.

Figure 19: Overview of the CNSC's licensing process for Class I facilities and uranium mines and mills



Applying its risk-informed approach to regulating, the CNSC uses the process illustrated as figure 20 for other licence and certification applications

Figure 20: Overview of CNSC's licensing and certification process for lower risk facilities and activities



Documenting of regulatory decisions

The Commission publishes a Record of Decision, including detailed reasons for decision, to explain the basis for its licensing decisions and minutes to record the outcome of Commission meetings. Complete written transcripts of all public proceedings are posted online within days of a hearing or meeting – a best practice confirmed through benchmarking analysis. These documents, along with other information about the Commission's proceedings and decisions, are available to the public on the CNSC website.

Processes of appeal, amendment, renewal and revocation of licences

Where a licensee makes application for an amendment, renewal, suspension or revocation of an authorization, the same processes and procedures as for a new application are generally followed. For existing licensees, CNSC has considerable information readily available from both the original authorization request and the operating history and performance of the facility and licensee. With that information already available and the GNSCR allowing for incorporation by reference to information already submitted to the CNSC, the submission of additional information may be simplified on a case by case basis.

For renewals of a Class I facility or uranium mine and mill licences, the licensee must indicate any changes in information from that which was submitted in the previous application. The CNSC plans and conducts a comprehensive assessment of the licensee performance history, current programs and planned future activities. The review activities focus on areas based on performance history, facility type, associated risks and expert judgement. The assessment is used as the basis to provide the Commission with the CNSC staff recommendation for the licensing decision, as well as to guide ongoing regulatory activities. For NPPs the licensee is required by the CINFR to conduct a periodic safety review (PSR) in support of the licence renewal application. REGDOC-2.3.3, *Periodic Safety Reviews,* provides requirements and guidance specific to the conduct of the PSR. The results of the PSR are assessed as part of the licence renewal application and the resulting integrated implementation plan becomes part of the licensing basis for the facility.

Utilizing this approach, the CNSC staff review the application with emphasis on the following elements:

- performance of the licensee and the facility over the previous licence period
- licensee's plans for operation and safety improvement over the next licence period
- significant activities envisaged by the licensee for an extensive period beyond the next licence period

For licence amendment requests, licensees are required to indicate the change requested to the licence. CNSC staff review the application in comparison to the basis of the original licensing decision and focus additional review on the impacts of the changes requested.

The Commission may, on its own motion, renew, suspend in whole or part, amend, revoke or replace a licence under prescribed conditions (section 25 of the NSCA and section 8 of the GNSCR). When this happens, the Commission must, in accordance with subsection 41(1) of the NSCA, provide the licensee with an "opportunity to be heard" in accordance with part 3 of the *Canadian Nuclear Safety Commission Rules of Procedure*. The Rules of Procedure set out the general requirements for an opportunity to be

heard, the filing of information, and the setting of time limits and hearing methods (i.e., oral or written) that will be used.

Note that DOs may make licensing decisions only in response to an application; they may not act on their own motion. Before a DO refuses to grant an authorization, an opportunity to be heard is provided to the applicant in accordance with Part 4 of the *Canadian Nuclear Safety Commission Rules of Procedure*. Section 39 of the NSCA lists additional circumstances where an opportunity to be heard must be offered.

Where the original licence was granted by the Commission, all subsequent amendments and renewals must also be heard and decided by the Commission, including, where the Commission deems appropriate, the conduct of additional public hearings. This is another means for ensuring that the level of scrutiny, including from the public and other stakeholders, remains commensurate with the risk profile of the facility.

Requirements of licensees to demonstrate safety in support of the application

All applicants are required to submit a demonstration of safety that is appropriate to the facility, activity or practice sought, before the Commission or DO would be able to grant the applicable licence or certificate.

Subsection 24(4) of the NSCA states that "*No licence shall be issued, renewed, amended or replaced – and no authorization to transfer one given – unless, in the opinion of the Commission, the applicant or, in the case of an application for an authorization to transfer the licence, the transferee (a) is qualified to carry on the activity that the licence will authorize the licensee to carry on; and (b) will, in carrying on that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed*."

As noted above, the Commission has made a number of regulations that specify what information an applicant must submit to the CNSC to demonstrate the adequacy of its qualifications and how it will conduct the activities. General licence application requirements (i.e., those that apply generally to all types of nuclear facilities and activities) are set out in GNSCR. Further requirements for licence and certification applications are set out by the Commission in the more activity-specific regulations.

A list of references to the regulatory licence and certification application requirements for each type or class of facility and activity is as follows:

- Dosimetry Service – section 18 of the *Radiation Protection Regulations*
- Class I nuclear facility – sections 3 to 7 of the *Class I Nuclear Facilities Regulations* (licensing) and section 9 of the CINFR (certification of persons)
- Class II nuclear facility – sections 3 to 5 of the *Class II Nuclear Facilities and Prescribed Equipment Regulations*; and section 15.01 of the CIINFPER (certification of radiation safety officers)
- Class II prescribed equipment – section 6, section 7, section 11 and section 15.03 of the CIINFPER
- Uranium mines and mills – sections 3 to 8 of the *Uranium Mines and Mills Regulations*
- Nuclear substances and devices – section 3 of the *Nuclear Substances and Radiation Devices Regulations* and sections 3 to 5 of the *NSR*; section 12 of the NSRDR (certification of devices) and section 25 of the NSRDR (certification of exposure device operators)

- Servicing of radiation devices – section 4 of the NSRDR
- Transport certification, including packages – section 10 to section 13 of the *Packaging and Transport of Nuclear Substances Regulations, 2015*
- Transport of nuclear substances – section 6 and section 7 of the PTNSR 2015 and section 5 of the *Nuclear Security Regulations*
- Import or export of controlled substances, equipment or information – section 3 of the *Nuclear Non-Proliferation Import and Export Control Regulations*
- Non-classified facilities (not covered under specific regulations and > 10^{15} Bq of inventory) – section 2 to section 7 of the GNSCR

REGDOCs that provide additional clarity and regulatory expectations to licensees and applicants on licence applications include:

- REGDOC-1.1.1, *Site Evaluation and Site Preparation for New Reactor Facilities*
- RD/GD-369, *Licence Application Guide: Licence to Construct a Nuclear Power Plant*
- REGDOC-1.1.3, *Licence Application Guide: Licence to Operate a Nuclear Power Plant*
- REGDOC-1.4.1, *Licence Application Guide: Class II Nuclear Facilities and Prescribed Equipment* (DRAFT)
- REGDOC-1.5.1, *Application Guide: Certification of Radiation Devices or Class II Prescribed Equipment*
- REGDOC-1.6.1, *Licence Application Guide: Nuclear Substances and Radiation Devices*
- REGDOC-3.5.1, *Information Dissemination: Licensing Process for Class I Nuclear Facilities and Uranium Mines and Mills*
- REGDOC-3.5.3, *Regulatory Fundamentals*
- RD-364, *Joint Canada – United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages*

All submissions are expected to be supported by appropriate analytical, experimental or other suitable evidence. CNSC staff rigorously review all submissions to determine if all proposed safety and control measures described in the application, and the documents needed to support the application are adequate and meet the applicable regulations.

CNSC's use of the graded approach

The CNSC applies the graded approach commensurate with the relative risks and particular characteristics of the nuclear facility or licensed activity.

When applying the risk-informed approach, the following principles are adhered to:

- meeting of regulatory requirements
- maintenance of sufficient safety margins
- maintenance of defence in depth

The CNSC organizes its regulatory activities by developing, implementing, monitoring and adjusting regulatory work plans for each nuclear facility and activity under scrutiny. Consideration is based on a risk-informed regulatory framework and the need to link the requirements of the authorization process with review and assessment activities. Work plans are reviewed to ensure they cover specific goals at

specified frequencies during the life cycle of the facility and are consistent across similar facilities and activities regarding the planning of inspections, reviews and other regulatory activities.

5.2 AUTHORIZATION OF NUCLEAR POWER PLANTS

Related to ***SSR-2/1: paragraph 2.17***
SSR-2/2: Requirements 4, 6, 7, 11, 25, 26 and 31
NS-R-3
GSG-13

Authorization of nuclear power plants

NPPs in Canada are designated as Class IA nuclear facilities and are subject to licensing throughout the various lifecycle phases of the facility. The CINFR contain the specific requirements for licence applications, including licence to prepare a site, licence to construct, licence to operate, licence to decommission and licence to abandon. As outlined in the Background, there are four operating NPPs in Canada (refer to table 1) and one NPP that is undergoing decommissioning activities.

The authorization process outlined in section 5.1 and described in REGDOC-3.5.1 applies to the licensing of NPPs in Canada. The licensing process for NPPs includes a technical assessment of all 14 SCAs, an EA under CEAA 2012 or an environmental protection review under the NSCA, a public Commission hearing that allows for interventions from interested parties, and a Commission decision. Members of the public, Indigenous communities, and non-governmental organizations are invited to participate in the process as described in section 3.8. Additional information on environmental protection reviews under the NSCA is provided in section 1.2.

REGDOCs that provide licence application information and guidance for the lifecycle of a NPP include:

Authorization process for siting, design, construction, operation and decommissioning of nuclear power plants

In addition to the NSCA and its regulations, provisions for the licensing of NPPs during the different phases of their life cycle are found in REGDOCs, including

- site evaluation and preparation – REGDOC-1.1.1, *Site Evaluation and Site Preparation for New Reactor Facilities*
- construction – RD/GD-369, *Licence Application Guide: Licence to construct a Nuclear Power Plant*
- operation – REGDOC-1.1.3, *Licence Application Guide: Licence to operate a Nuclear Power Plant*
- decommissioning and release from regulatory control – G-219, *Decommissioning Planning for Licensed Activities*

For site evaluations, REGDOC-1.1.1 describes the methodology to be used to support the siting of an NPP. The information will be used in the design of the facility and in developing the operating envelope to minimize any operational effects on the environment and identify any strategies for reducing risk to national security, health and safety of the public, and the environment. Site preparation activities may involve the construction of facility structures systems and components addressing bounding parameters that encompass all technologies under consideration.

REGDOC-2.5.2 sets out information and guidance aligned with accepted international codes such as SSR-2/1, Safety of Nuclear Power Plants and Canadian requirements. Criteria are provided for all aspects of

the design of the NPP, taking into account the need to consider multiple levels of defence. The REGDOC covers a wide variety of topics related to the design of new NPPs. The REGDOC is technology-neutral with respect to water-cooled reactors, and includes requirements and guidance for:

- establishing the safety goals and objectives for the design
- utilizing safety principles in the design
- applying safety management principles
- designing structures, systems and components
- interfacing engineering aspects, plant features and facility layout
- integrating safety assessments into the design process

The resulting documentation will be considered during the review of an application of a licence to construct based on regulatory document RD/GD-369.

The application for a licence to construct should comprise a document (or series of related documents), containing the information outlined in regulatory document RD/GD-369. This information should be accompanied by documentation that has the necessary information to complete the safety case being developed for the plant as described in REGDOC-2.4.1, *Deterministic Safety Analysis*. In addition, the submission is expected to address all follow-up activities relevant to the design, construction and commissioning phases that would have been identified during the EA and the review of the application for a licence to prepare site. This could include the need to follow-up on the implementation of mitigation measures identified or as a result of recommendations from the design, construction and commissioning phases.

REGDOC-1.1.3 describes information necessary to meet requirements for the licence application for operation of an NPP. Applicants must demonstrate that they are qualified and will make adequate provision for the safe operation of the NPP per NSCA subsection 24(4). Boundary conditions for acceptable performance at the NPP will be described and the safety analysis will be submitted as part of the description of the overall safety measures applied to the NPP. Safety analysis is a systematic evaluation of the potential hazards and credible accident scenarios associated with the operation of the facility and considers the effectiveness of preventive measures and strategies in reducing the effects of hazards and credible accident scenarios. This includes deterministic safety analysis, probabilistic safety assessment and severe accident analysis. In Canada, the safety analysis report becomes part of the safety case with the format and scope described in:

- REGDOC-1.1.3 *Licence Application Guide: Licence to operate a Nuclear Power Plant*
- REGDOC-2.4.1, *Deterministic Safety Analysis*
- REGDOC-2.4.2, *Probabilistic Safety Analysis*

In addition to the preparation of a safety case, NPP licence applicants are required to establish a management system for the operation of all programs associated with the operation phase of the facility through to decommissioning, based on meeting expectations as described in CSA N286, *Management system requirements for nuclear facilities.*

Guidance for the decommissioning of an NPP is provided in regulatory document G-219. A preliminary decommissioning plan (PDP) is required to be prepared as early as possible in the life-cycle of the NPP.

The plan is updated during the various lifecycle stages and a financial guarantee is maintained throughout the life of the NPP.

When the decommissioning and environmental monitoring demonstrates that end state objectives have been met, the site can proceed to the final stage of being released from regulatory control through the issuance of a licence to abandon as described in G-219 and CSA N294, *Decommissioning of facilities containing nuclear substances*.

When the Commission reaches a decision regarding the licensing of an NPP, the record of decision is made public and documented. The Commission issues a licence if it deems that the applicant has met NSCA 24(4) and CNSC staff prepare an accompanying LCH. The LCH provide the compliance verification criteria that the licensee must follow to demonstrate compliance with licence conditions, operational limits and information on delegation of authority and applicable versions of documents referenced in the licence. Periodically licensee documentation is updated to reflect the operating conditions of the NPP; updates are reviewed by CNSC to ensure that the NPP can operate safely and within the design parameters described in the licensing basis, including the safety analysis. In addition, licensees are required to carry out PSRs pursuant to the CINFR.

Provisions of training and qualifications of personnel at nuclear power plants

The training of personnel associated with the operation of NPPs is the responsibility of the licensee. Requirements and guidance with respect to design, development, implementation, evaluation and management of training programs is set out in REGDOC-2.2.2, *Personnel Training*. The CNSC certifies NPP operators and Senior Health Physicists, based on a recommendation of the licensee and the verification of compliance by CNSC staff. Regulatory requirements and guidance for licensee training programs and certification examination is provided through REGDOC-2.2.2 and RD-204 *Certification of Persons Working at Nuclear Power Plants*. Licences specify persons appointed to specific positions who require certification. Additionally, REGDOC-2.2.5, *Minimum Staff Complement* provides requirements on sufficient numbers of qualified personnel required to perform licensed activities safely and in accordance with the NSCA.

5.3 AUTHORIZATION OF RESEARCH REACTORS

Related to SSR-3: paragraphs 3.4 – 3.5 and Requirements 1 to 6
NS-R-3
GSG-13

Authorization of research reactors

Research reactors in Canada are designated as Class IA nuclear facilities and are subject to licensing throughout the various lifecycle phases of the facility. The CINFR contain the specific requirements for licence applications, including licence to prepare a site, licence to construct, licence to operate, licence to decommission and licence to abandon. As outlined in the Background section, there are five operating research reactors in Canada.

The authorization process outlined in section 5.1 and described in REGDOC-3.5.1 applies to the licensing of research reactors in Canada. The licensing process for research reactors includes a technical assessment of all 14 SCAs, an EA under CEAA 2012 or an environmental protection review under the

NSCA, a public Commission hearing that allows for interventions from interested parties, and a Commission decision. Members of the public, Indigenous communities, and non-governmental organizations are invited to participate in the process as described in section 3.8. Additional information on environmental protection reviews under the NSCA is provided in section 1.2.

Authorization process for siting, design, construction, operation and extended shutdown of research reactors

In addition to the NSCA and its regulations, provisions for the licensing of research reactors during the different phases of their life cycle are found in REGDOCs. The approach to authorization for research reactors in Canada is similar to the approach used for NPPs with different sets of criteria applied.

For example, for a licence to prepare a site, criteria from REGDOC-1.1.1, *Site Evaluation and Site Preparation for New Reactor Facilities*, apply. Specifically, REGDOC-1.1.1 includes a licence application guide for a licence to prepare a site for new reactor facilities. RD-367, *Design of Small Reactor Facilities*, sets out the assessment criteria for the design of new small reactor facilities, including requirements for procurement, construction, commissioning and safe operation, maintenance, aging management, modification and eventual decommissioning of the reactor facility. The assessment of the design and safety analysis form the basis of CNSC recommendations to the Commission.

Results of CNSC technical assessments, including recommendations, are documented in CMDs and presented to the Commission in public proceedings. CNSC issued licences for research reactors contain standardized licence conditions for the 14 SCA as well as licence conditions for other areas of regulatory interest, such as a financial guarantees. The accompanying LCHs provide the compliance verification criteria that the licensee must follow to demonstrate compliance with licence conditions, operational limits and information on delegation of authority and applicable versions of documents referenced in the licence.

Requirement for the safety analysis report, safety assessment and the management system of the research reactor

Research reactor licensees are required to implement a safety policy per CSA N286, *Management system requirements for nuclear facilities,* and CNSC staff verify compliance as part of regulatory oversight.

For an application for a licence to construct a Class I nuclear facility, the CINFR require the applicant to submit a preliminary safety analysis report demonstrating the adequacy of the facility design. A final safety analysis report is required for the application for a licence to operate a Class I nuclear facility. The safety analysis requirements for research reactors can be found in REGDOC-2.4.1 and RD-308, *Deterministic Safety Analysis for Research Reactors.*

Licensees and applicants are required to demonstrate how fundamental safety objectives will be achieved including plans, structures and systems of the nuclear facility and the proposed management system for the activity to be licensed, among the number of safety programs required for operating a research reactor.

CNSC research reactors licences include a requirement to conduct the licensed activities in accordance with the licensing basis and specific requirements to implement and maintain a management system. In

addition, all research reactor licensees are required to implement and maintain safety analyses that are representative of the current hazards of the facility as a condition of their licence.

RD-367, *Design of Small Reactor Facilities*, requires that the safety analysis demonstrate that the design is capable of meeting the safety requirements, the dose acceptance criteria and safety goals. The safety analysis also contributes to demonstrating that the reactor facility provides defence in depth.

Role of safety committee and exchange of operating experience with other research reactor operators

As noted above, licensees are required to implement a management system that complies with the requirements of CSA N286. This standard, lists a series of principles that must be demonstrated by the licensee through its documentation, including:

- safety is the paramount consideration guiding decisions and actions
- communication is effective
- changes are controlled
- assessments are performed

The safety review of engineering changes and unplanned situations must be described in the licensee's documentation and are assessed by CNSC staff. This is mandated through the licensee's management system processes which are assessed by CNSC staff as part of licence applications and ongoing compliance verification. Physical design is one of CNSC's SCAs that is addressed through specific licence conditions and compliance verification criteria, including requirements for verification and control of design changes, which are typically functions assumed by the safety review committees. Licensees are also required to submit an ACR in accordance with REGDOC-3.1.2, *Reporting Requirements Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills*. The ACR is required to present many aspects, including:

- a description of how the facility's overall safety case was validated and maintained over the reporting period, including an assessment of the effectiveness of the validation and maintenance
- a summary of all modifications and changes to the facility that may affect that facility's safety analysis

Roles, responsibilities and communications within the research reactor organization are defined in the licensee's management system and compliance requirements are assessed against CSA N286.

5.4 AUTHORIZATION OF FUEL CYCLE FACILITIES

Related to NS-R-5, paragraphs 2.9 – 2.15, 3.6– 3.10 and 4.1 – 4.5
NS-R-3 GSG-13

Authorization of fuel cycle facilities

In Canada, fuel cycle facilities are Class I facilities with the exception of uranium mines and mills which are not defined as Class I facilities. Fuel cycle facilities. Fuel cycle facilities are subject to the CINFR or UMMR and associated regulations. Uranium mines and mills are subject to the UMMR and associated regulations. For the purposes of this section, fuel cycle facilities refers to facilities that carry out activities related to the nuclear fuel cycle, from mining to waste management and disposal, excluding reactors. Section 5.5 provides additional information specific to facilities that manage and/or dispose of waste whether the waste is related to the fuel cycle or not.

The authorization process outlined in section 5.1 and described in REGDOC-3.5.1 applies to the licensing of fuel cycle facilities in Canada. The licensing process for fuel cycle facilities includes a technical assessment of all 14 SCAs, an EA under CEAA 2012 or an environmental protection review under the NSCA, a public Commission hearing that allows for interventions from interested parties, and a Commission decision.

Authorization process for siting, design, construction, operation and extended shutdown of fuel cycle facilities

A licence application for a new fuel cycle facility must meet the requirements of the GNSCR, and the applicable sections of the CINFR or UMMR and other applicable regulations. These regulations include general application requirements, as well as specific sections that set out requirements for applications for a licence to prepare a site, construct, operate, decommission and abandon a facility.

The CNSC licensing process for fuel cycle facilities and uranium mines and mills is comprehensive and covers the 14 SCAs. The safety and control measures that a licence applicant provides to support its application form part of the licensing basis including measures in place to reduce and/or eliminate preventable accidents. CNSC licences for fuel cycle facilities require licensees to conduct licensed activities in accordance with the licensing basis. The licensee can improve its provisions, operations or facility design during the licence period as long as the improvements are within the licensing basis and executed according to the licensee's management system change control processes. CNSC licences for fuel cycle facilities contain a standardized licence condition that requires the licensee to implement and maintain an operating program, which includes a set of operating limits.

An application to operate a fuel cycle facility includes proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility. Additionally, the proposed measures to prevent or mitigate the effects of accidental releases of nuclear substances and hazardous substances on the environment, the health and safety of persons and the maintenance of national security are submitted. The regulatory framework also includes requirements that accident conditions are considered in the design as well as operation and decommissioning of fuel cycle facilities.

Furthermore, as part of the licencing process to construct and operate fuel cycle facilities, licensees are required to submit proposed decommissioning plans and financial guarantees. These mechanisms, which are reviewed at least every five years, allow licensees to demonstrate they will be prepared to decommission at the end of operations.

Results of the assessments of the SCAs including CNSC staff recommendations are documented in CMDs and presented to the Commission in public proceedings. CNSC issues licences for fuel cycle facilities that contain standardized licence conditions for the SCAs as well as facility specific conditions and conditions for other areas of regulatory interest, such as a financial guarantees and public information programs. The accompanying LCH provides the compliance verification criteria that the licensee must follow to comply with licence conditions, operational limits and information on delegation of authority and applicable versions of documents referenced in the licence.

A licensee may apply for an extended shutdown or suspension of operations during the operation phase of a fuel cycle facility or as part of the decommissioning of a facility. In either case, the licensee must

demonstrate that the condition of the facility in this state would remain safe, and that the licensee would continue to meet the requirements of subsection 24(4) of the NSCA.

5.5 AUTHORIZATION OF RADIOACTIVE WASTE MANAGEMENT FACILITIES

Related to GSR Part 5: Requirements 3 and 4
SSR-5: Requirements 2, and 12 - 19

Authorization of radioactive waste management facilities and disposal facilities

When making regulatory decisions about the management of radioactive waste, the CNSC promotes the principle that radioactive waste should be managed in a manner that is commensurate with its radiological, chemical and biological hazards. This is outlined in REGDOC-2.11, *Framework for Radioactive Waste Management and Decommissioning in Canada*.

Applying a graded approach, the depth of the requirements and documentation to support a licence application for a radioactive waste management facility may vary, depending on the particular characteristics of a nuclear facility or licensed activity, the risk and specific activities to be carried out.

A Class I nuclear facility, including a waste management facility, is licensed throughout its entire lifecycle with licenses for site preparation, construction, operations, decommissioning and abandonment.

The authorization process outlined in section 5.1 applies to the licensing of waste management facilities in Canada and includes a licence application, technical assessment, an EA under the CEAA 2012 or an environmental protection review under the NSCA, public hearing and a Commission licensing decision.

The licensing process for a waste nuclear substance licence may include a licence application, technical assessment and licensing decision. These licences may be administered by a DO under section 37 of the NSCA. When a DO has this responsibility, no public hearing occurs unless the DO refers the decision back to the Commission using a risk-informed approach. In this case, the Commission will evaluate the need to conduct a public hearing as part of its decision-making process.

Regulatory requirements and procedures for waste management facilities

Paragraph 3(1)(j) of the GNSCR requires all licence applicants to provide the CNSC with the name, quantity, form, origin and volume of any radioactive waste or hazardous waste that may result from the activities to be licensed, including waste that may be stored, managed, processed or disposed of at the site of the activities to be licensed, and the proposed method for managing and disposing of that waste.

In addition to the GNSCR, regulatory requirements for licensing steps for waste management facilities, waste nuclear substances and waste management activities are set out in activity specific regulations, including:

- *Class I Nuclear Facilities Regulations*
- *Uranium Mines and Mills Regulations*
- *Nuclear Substances and Radiation Devices Regulations*
- *Class II Nuclear Facilities and Prescribed Equipment Regulations*

In addition to the regulations, provisions for licensing waste management facilities and areas during the various phases of their lifecycle are found in REGDOCs covering the applicable SCAs and other areas of regulatory interest. REGDOCs specific to waste management include:

- REGDOC-2.11, *Framework for Radioactive Waste Management and Decommissioning in Canada*
- REGDOC-2.11.1, *Waste Management, Volume II: Management of Uranium Mine Waste Rock and Mill Tailings*
- REGDOC-2.11.1, *Waste Management, Volume III: Safety Case for Long-Term Radioactive Waste Management*

Further requirements and guidance on waste management activities are specified in the following CSA Group standards:

- CSA N292.0, *General principles for the management of radioactive waste and irradiated fuel*
- CSA N292.1, *Wet storage of irradiated fuel and other radioactive materials*
- CSA N292.2, *Interim dry storage of irradiated fuel*
- CSA N292.3, *Management of low- and intermediate-level radioactive waste*
- CSA N292.5, *Guideline for the exemption or clearance from regulatory control of materials that contain, or potentially contain, nuclear substances*
- CSA N292.6, *Long-term management of radioactive waste and irradiated fuel*

For a new waste management facility, the regulations require applicants to submit comprehensive information on their policies and programs, the design and components of the proposed facility, the manner in which the facility is expected to operate, facility operating manuals and procedures, and any potential impacts on the site or surrounding environment. The design must be such that emissions from the facility meet strict limits under normal and abnormal operating conditions. Applicants are required to identify the manner by which the facility may fail to operate correctly, predict the potential consequences of such a failure and establish specific engineering measures to mitigate the consequences to acceptable levels. CNSC staff review all submissions to determine if the proposed waste management safety and control measures described in the application and the documents that support the application are adequate and meet the applicable requirements.

As part of the decision-making, an EA under CEAA 2012 or an environmental protection review under the NSCA may be required if the facility or activity has potential interactions with the environment.

CNSC staff prepare CMDs that include the proposed licence for submission to the Commission or DO, for decision. The proposed licence may include any necessary conditions identified as required during the technical assessment, including the documentation references submitted in support of the application. CNSC issued licences for waste management facilities contain standardized licence conditions for the applicable SCA as well as licence conditions for other areas of regulatory interest, such as a financial guarantees. The accompanying LCH provides the compliance verification criteria that the licensee must follow to comply with licence conditions, operational limits and information on delegation of authority and applicable versions of documents referenced in the licence. The Commission holds public hearings to consider licence applications.

The CNSC requires licensees of radioactive waste management facilities to implement and maintain key programs under SCAs applicable to the license application. Examples of these program areas include management systems, radiation protection and environmental protection.

5.6 AUTHORIZATION OF RADIATION SOURCES FACILITIES AND ACTIVITIES

Related to GSR Part 1 (Rev. 1): Requirements 23 and 24
GSR Part 3: Requirements 6, 7 and 8

Authorization of radiation sources

Section 3 of the GNSCR describes the information that must be provided to the CNSC in support of an application for a licence. Section 3 of the NSRDR provides the general requirements for the application for a licence with respect of a nuclear substance or a radiation device and sections 3 to 7 of the CIINFPER provide the requirements for an application for a licence to construct, operate, decommission a Class II facility and service Class II prescribed equipment.

Depending on the risk of the activity, the depth of information submitted will vary as a graded approach is applied when determining information required for licensing. In this regard, the CNSC has published three regulatory documents to provide guidance to applicants on how to meet the requirements set out in various regulations with respect to nuclear substances and radiation devices.

- REGDOC-1.6.1, *Licence Application Guide: Nuclear Substances and Radiation Devices*, version 2
- REGDOC-1.4.1, *Licence Application Guide: Class II Nuclear Facilities and Prescribed Equipment* (draft)
- REGDOC-1.1.3, *Licence Application Guide: Licence to Operate a Nuclear Power Plant*

In addition, the CNSC is currently developing regulatory document REGDOC-1.2.2, *Licence Application Guide: Processing Facilities*. This document will set out requirements and guidance for submitting a licence application to the CNSC for a Class IB nuclear substance processing facility.

Section 10 of the CIINFPER and section 11 of the NSRDR set the requirements for the certification of Class II prescribed equipment and radiation devices. Section 11 of the CIINFPER includes the information that must be provided to the CNSC in regards to the application for certification of Class II prescribed equipment and section 15 details the requirements surrounding the certification of radiation safety officers for Class II facilities. Section 12 of the NSRDR includes the information that must be provided to the CNSC in regards to the application for certification of a radiation device and section 25 describes the information that must be provided to the CNSC for the certification of an exposure device operator. In addition, section 19 of the CIINFPER and section 18 of the NSRDR set out requirements with respect to the leak testing of sealed sources with an activity equal to or greater than 50 MBq.

The CNSC has published the following REGDOCs to provide applicants with information regarding the certification process:

- REGDOC-1.5.1, *Application Guide: Certification of Radiation Devices or Class II Prescribed Equipment* provides information to applicants preparing and submitting applications to the CNSC for the certification of radiation devices or Class II prescribed equipment. It provides a guidance on the type of information that should be included in an application for certification.
- REGDOC-2.5.7, *Design, Testing and Performance of Exposure Devices*, covers design, testing and performance specifications for the complete exposure device system, including the remote-control system, the exposure device, the projection sheath and the source changer. The use of non-original manufacturer accessories is also addressed.

In accordance with section 26 of the NSCA, subject to the regulations, no person shall, except in accordance with a licence, import or export a nuclear substance, prescribed equipment or prescribed information.

As a major exporter of risk-significant radioactive sources for use in medical, scientific and industrial applications Canada has a strong interest in the establishment and maintenance of an effective, efficient and harmonized international regime for ensuring the security and safety of such sources. The CNSC is responsible for controlling the export and import of radioactive sources in Canada, and its existing export and import control processes for risk-significant radioactive sources were modified and enhanced to be fully consistent with the provisions of the *Code of Conduct on the Safety and Security of Radioactive Sealed Sources* and the Guidance. Through this program, the CNSC contributes to national and international safety and security, by ensuring that only authorized persons are recipients of risk-significant radioactive sealed sources. On a case-by-case basis, the CNSC ensures that importers and exporters comply with the requirements for health, safety and security. This encompasses full export control, notifications and consent as required under the Code and its Guidance. The key elements of the export and import control program include a licensing process for the export of risk-significant sources; a control process for the import of such sources; and the implementation of bilateral administrative procedures with foreign regulatory counterparts.

Licence conditions are imposed as appropriate in licences where import and or export have been requested as a licensed activity and where they are authorized to possess nuclear substances for which there are restrictions. Licensees with Category 1 and/or 2 (high-risk sealed sources) shall inform the CNSC of any transfer, receipt, export or import of sealed sources as specified in licence conditions. Licensees are to report their high-risk sealed sources inventory through the SSTS.

The CNSC has published REGDOC-2.13.2, *Import and Export*, version 2. This document describes the regulatory and policy basis for the CNSC's import and export control program with respect to nuclear and nuclear-related dual-use items, and to risk-significant radioactive sources (Category 1 and 2 radioactive sources).

The information required in support of a CNSC import or export licence application can be found in subsection 3(1) of the NNIECR.

The CNSC has a full management system in place that details internal procedures related to the issuance of licences and certifications. Refer to section 4 for more information on CNSC's management system.

Requirements for exemption and clearance

Section 7 of the NSCA provides the Commission with the authority to exempt any activity, person or quantity of nuclear substances from the application of the NSCA or the regulations. Under its regulation-making authority, as per paragraph 44(1)(u) of the NSCA, the Commission has also established many exemptions, from the licence requirements, from the operations of the NSCA or from other requirements. Section 10 of the GNSCR contains an exemption for naturally occurring nuclear substances other than those that are or have been associated with the development, production or use of nuclear energy. Two exceptions are associated with this section one being the provisions that govern the transport of nuclear substances and the other relating to nuclear substances listed on the schedule to the NNIECR, specifically involving the provisions which govern the import and export of nuclear

substances. The conditions under which the Commission may exempt activities are set out in section 11 of the GNSCR.

Sections 5, 6, 7 and 8 of the NSRDR provide exemptions from licence requirements for activities in relation to nuclear substances and radiation devices.

Section 5 of the NSRDR provides details on the application of the concepts of exemption and clearance for the regulation of sources and activities, adopting a framework based on the IAEA GSR Part 3 and IAEA-RS-G-1.7 *Application of the Concepts of Exclusion, Exemption and Clearance*. Subsection 5(1) specifies a range of activities and the conditions under which they are not required to have a licence. The conditions involve the application of exemption quantities and clearance levels provided in Schedules 1 and 2, respectively, with Schedule 1 values adopted form IAEA GSR Part 3 and Schedule 2 from IAEA-RS-G-1.7. Lastly, section 5 also provides conditions for exemptions associated with limited quantities of deuterium and depleted uranium.

Abandonment or disposal is similarly addressed in subsection 5.1(1) incorporating the exemption and clearance levels while specifically noting that they do not apply to discharges of effluents from Class I nuclear facilities or uranium mines and mills.

Radiation devices that contain more than the exemption quantity of a nuclear substance must be designed and manufactured to strict safety specifications and require certification. However, the possession and use of a radiation device that contains less than 10 times the exemption quantity does not require a CNSC licence. Sealed sources containing less than one exemption quantity of a nuclear substance are also exempted. Any nuclear substance that is below the exemption quantity or below the conditional or unconditional clearance levels are also exempted from regulatory control. Exceptions and conditions on exemptions are fully described in the regulations.

Sections 8 and 9 of the CIINFPER provide information on exemptions from licence requirements for activities in relation to Class II Nuclear Facilities and prescribed equipment.

Two forms of clearance levels are specified, unconditional and conditional. Unconditional levels are those provided in Schedule II of the NSRDRs and are based on the concept that these materials are safe for various purposes (e.g., construction material, recycle, municipal landfill). Conditional clearance only applies to specified materials and specified disposition pathways (e.g., solids to municipal landfill, gases to atmosphere, liquids to sewer). Conditional Clearance Levels (CCLs) may be developed by CNSC staff or licensees with the latter being reviewed and approved by CNSC staff. In support of such requests, licensees submit a pathways analysis to prospectively assess doses to workers and the public from cleared materials. The dose criteria on which conditional clearance levels are based are the same as the unconditional clearance levels, that is, an annual effective dose of 10 μSv due to the proposed scenarios and parameters and an annual effective dose of 1 mSv due to low probability events (referred to in IAEA RS-G-1.7). CSA N292.5-11 provides direction in demonstrating compliance with NSRDR exemption and clearance criteria as well as technical guidance for the derivation of clearance levels.

Demonstration of justification and optimization by applicants

Paragraph 3(1)(b) of the GNSCR states that "An application for a licence shall contain the following information: (b) the activity to be licensed and its purpose." This ensures that provision is made for the justification of any type of practice, and for review of the justification, as necessary. As a general

requirement in the RPR, licensees must maintain an effective radiation safety program through keeping doses ALARA, management control over work practices, personnel training and qualification, control of occupational and public exposure and planning for unusual situations.

Select licence types permit the use of nuclear substances in humans for imaging, diagnosis or biomedical research. For all other applications, the CNSC, through licence condition on applicable licences (laboratory type licences), prohibits the use of nuclear substances on humans. Section 16 of the NSRDR states that *"No licensee shall use a radioactive nuclear substance or a radiation device on a person except as directed by a medical practitioner who is qualified to give such direction under the applicable provincial legislation."* In addition, section 20 of the CIINFPER *"No licensee shall use Class II prescribed equipment on a person except as directed by a medical practitioner who is qualified to give such direction under the applicable provincial legislation."*

The CNSC ensures that use of nuclear substances and prescribed equipment on humans is limited to authorized uses such as diagnosis, treatment or authorized research.

The regulation of x-ray devices below 1MV such as those used for diagnostic imaging, falls under provincial jurisdiction and is consequently outside the CNSC mandate.

5.7 AUTHORIZATION OF DECOMMISSIONING ACTIVITIES

Related to GSR Part 6

Authorization of decommissioning of nuclear facilities

The CNSC requires that planning for decommissioning take place throughout a nuclear facility and uranium mines and mills' life-cycle, and that both a PDP and a detailed decommissioning plan (DDP) be prepared for acceptance by the CNSC.

In addition to the NSCA and the regulations made under it, G-219, *Decommissioning Planning for Licensed Activities,* provides regulatory expectations to licensees regarding the preparation and content of preliminary and DDP, including selecting a decommissioning strategy. Additional requirements and guidance on decommissioning of nuclear facilities and other locations where nuclear substances are managed, possessed, or stored are set out in CSA N294, *Decommissioning of Facilities Containing Nuclear Substances*.

The PDP must be filed with the CNSC as early as possible in the lifecycle of the facility, and must be reviewed and updated periodically. The PDP documents the preferred decommissioning strategy (i.e., prompt decommissioning, deferred decommissioning or *in situ* confinement) along with objectives at the end of decommissioning. The plan should be sufficiently detailed to assure the proposed approach is technically and financially feasible. It must also be in the interests of health, safety, and security of persons and protection of the environment. The plan defines areas to be decommissioned and the general structure and sequence of the principal decommissioning work packages envisioned.

Prior to executing decommissioning activities, the CNSC requires licensees to prepare and submit a DDP to the CNSC for acceptance. Once accepted by the CNSC, the DDP is incorporated into a licence authorizing decommissioning.

Regulatory requirements for decommissioning

In accordance with the CINFR, CIINFR and UMMR, licensees of Class I and Class II nuclear facilities and uranium mines and mills are required to keep decommissioning plans up to date throughout the lifecycle of a licensed activity. As a condition of their licence, the CNSC requires licensees to implement and decommissioning plan.

Specific requirements for a licence to decommission a Class I or Class II nuclear facility or uranium mines and mills facility are listed in section 7 of the CINFR, section 5 of the CIINFPER, and section 7 of the UMMR. Information listed in section 3 of the GNSCR and the general requirements section of the CINFR and UMMR are also required.

Prior to executing decommissioning, the CNSC requires a safety assessment that supports the DDP be performed to identify potential hazards to workers and the public from both routine decommissioning activities and credible accidents during decommissioning.

CNSC staff review all submissions to determine whether the proposed decommissioning safety and control measures in a licence application and the documents that support the application, are adequate and meet the applicable requirements. The safety assessment will be the driver and founded on science-based decision making regarding the CNSC authorization for decommissioning.

Provisions for knowledge management

Paragraph 12(1)(a) of the GNSCR states that every licensee shall ensure the presence of a sufficient number of qualified works to carry on the licensed activity safety and in accordance with the Act, the regulations made under the Act and the licence.

As a condition of their licence, licensees are required to implement and maintain a human performance management program. This SCA covers activities that enable effective human performance through the development and implementation of processes that ensure a sufficient number of licensee personnel are in all relevant job areas have the necessary knowledge, skills, procedures and tools in place to safely carry out their duties.

Licensees ensuring that there are measures for effective KM is essential in meeting these requirements.

As stated previously, PDPs are required to be prepared and routinely updated throughout the life of a facility. These updates capture knowledge and information important to decommissioning of the facility that will occur as an eventuality. The CNSC expects KM to be considered as part of decommissioning plans.

Responsibilities for financial provision for decommissioning

Licensees of nuclear facilities and uranium mines and mills provide guarantees that adequate financial resources are available for the decommissioning of these facilities and managing the resulting radioactive wastes as a condition of licence. Subsection 24(5) of the NSCA provides the legislative basis for imposing this requirement. Paragraph 3(1)(l) of the GNSCR stipulates that, "*an application for a licence shall contain the following information: a description of any proposed financial guarantee relating to the activity to be licensed.*" G-206, *Financial Guarantees for the Decommissioning of Licensed Activities*, covers the provision of financial guarantees for decommissioning activities.

As a condition of their licence, licensees are required to maintain a decommissioning plan and a financial guarantee for decommissioning.

5.8 AUTHORIZATION OF TRANSPORT ACTIVITIES

Related to SSR-6

Authorization of the transport of radioactive material

The CNSC issues licences and certificates for certain kinds of packaging and transport as stipulated in the PTNSR 2015. These regulations are based on the IAEA Regulations for the Safe Transport of Radioactive Material, 2012 Edition (SSR-6). The PTNSR 2015 introduced an ambulatory incorporation by reference to SSR-6. This ensures that the Canadian regulations will continue to align with international regulations as these are modified.

The PTNSR 2015 provides exemptions whereby most transport activities, while subject to the regulations, are exempt from a licence requirement. For transport activities that do require a CNSC licence, sections 6 and 7 of the PTNSR 2015 set out the transport licensing requirements and the information that must be included in an application for a licence to transport.

Requirements for approval of package design and transport of nuclear substances

Section 10 of the PTNSR 2015 provides requirements for certification. This includes the certification of the design of prescribed equipment, packages, special form radioactive material, low dispersible radioactive material), the approval by foreign competent authority, the certification of subcriticality of fissile-excepted radioactive material, and the certification of values calculated for basic radionuclide value not listed in the IAEA Regulations and alternative activity limits for an exempt consignment of instruments or articles. Sections 11, 12 and 13 of these regulations cover the information that must be included as part of the certification applications.

CNSC RD-364: *Joint Canada-United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages* provides guidance to assist applicants in preparing applications to demonstrate that a given package can meet the regulations. It is also used by reviewers to assist in the review and approval of applications. In addition, this document refers to the approval from foreign countries, specifically, the United States.

Applications for licensing or certification are made to the CNSC, an assessment is completed and a decision is made with respect to a licence or certificate. Application for a licence to transport must be made prior to the shipment taking place. Registration of use of packages of a certified design must be completed prior to the first use of the package.

Sections 15, 16 and 17 of the PTNSR 2015 address the refusal to certify, decertification and the process for an opportunity to be heard. The refusal to issue a licence and the requirement for an opportunity to be heard regarding a licence refusal are addressed in section 39 of the NSCA.

Packages that do not require certification by the CNSC, such as Type A packages, must still meet regulatory requirements. The user is responsible for demonstrating this. Section 42 of the PTNSR 2015 specifies what documentation the user must keep regarding this type of package.

5.9 AUTHORIZATION OF OCCUPATIONAL EXPOSURE

Related to GSR Part 3: Requirements 12, 19-21, 23-25, 28 and 52 describe and demonstrate implementation in the authorization process:

The CNSC authorizes occupational exposure only as part of other CNSC licensed activities. Every CNSC licence contains requirements for controlling, measuring and minimizing occupational exposure. The CNSC also establishes licensee responsibilities and requirements related to controlling radiation exposures of workers and members of the public in the GNSCR. Subsection 12(1) of GNSCR establishes requirements for all licensees.

CNSC requirements for licensees regarding occupational radiation protection are found in the RPR. The current RPR are patterned after the International Commission on Radiological Protection (ICRP) Publication 60 (*The 1990 Recommendations of the ICRP*), and the IAEA's *Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards* GSR Part 3 (published in 1996). As part of continuous improvement of the CNSC's regulatory framework, amendments to the RPR are currently underway to align with ICRP Publication 103 (*The 2007 Recommendations of the ICR*P) and IAEA's GSR Part 3 (2014). The CNSC is also updating and consolidating existing regulatory guides and documents on radiation protection. Details are provided in section 9.9, Regulations and Guides for Occupational Exposure.

Radiation protection programs

Section 4 of the RPR requires licensees to implement a radiation protection program and, as part of that program, keep the amount of exposure to radon progeny and the effective dose and equivalent dose received by and committed to persons ALARA, social and economic factors being taken into account, through the implementation of:

- management control over work practices
- personnel qualification and training
- control of occupational and public exposure to radiation
- planning for unusual situations

As part of the radiation protection program, licensees must also ascertain the quantity and concentration of any nuclear substance released as a result of a licensed activity and to implement measures to protect the environment and prevent or mitigate the effects of unplanned releases.

CNSC staff assess licensees' radiation protection programs to ensure that they meet the requirements of the RPR. Radiation protection programs are assessed at various points during the life cycle of a nuclear facility or regulated activity: during initial application (construction, operation, decommissioning), and at licence renewal and /or licence amendment. The radiation protection program forms part of the licensing basis for the nuclear facility or regulated activity. Additional details on CNSC expectations for radiation protection programs are provided in section 6.9, Review and Assessment for Occupational Exposures.

Dose limitation and optimization of occupational exposures

The CNSC establishes effective and equivalent dose limits in the RPR for a nuclear energy worker, a pregnant nuclear energy worker, and non-nuclear energy workers.

Section 13 of the RPR requires that every licensee ensure that the effective dose limits are not exceeded:

- 50 mSv in a one-year dosimetry period and 100 mSv over a five-year dosimetry period for a nuclear energy worker
- 4 mSv for a pregnant nuclear energy worker for the balance of pregnancy
- 1 mSv per calendar year for a person who is not a nuclear energy worker

Section 14 of the RPR requires that every licensee ensure the following equivalent dose limits are not exceeded:

- 150 mSv in a one-year dosimetry period for the lens of an eye of a nuclear energy worker, and 15 mSv in a calendar year for the lens of an eye for any other person
- 500 mSv in a one-year dosimetry period for the skin, and for the skin of the hands and feet of a nuclear energy worker, and 50 mSv in a calendar year for the skin, hands and feet of any other person

Section 15 of the RPR details regulatory requirements related to exposures of persons who form part of the licensee's response organization during the control of an emergency. Emergency preparedness and response is out of scope here, as it is being covered under the EPREV mission to Canada in June 2019.

To ensure consistent application of the ALARA principle by licensees, the CNSC has issued regulatory guide G-129, *Keeping Radiation Exposures and Doses "As Low as Reasonably Achievable" (ALARA)*, to provide further details on regulatory expectations.

Exceeding CNSC regulatory dose limits

When a dose limit specified in section 13 or section 14 of the RPR is exceeded, licensees must conduct an investigation as per section 16 of the RPR to determine the magnitude of the dose and to establish the causes of the overexposure. The person is required to be removed from work that is likely to add to their dose as well. Once the investigation required by section 16 of the RPR is complete, the cause of the real or apparent dose limit exceedance has been investigated, and corrective actions have been implemented by the licensee to the satisfaction of the CNSC, the licensee must submit a written request to the CNSC for authorization of the return to work of a person, as required by section 17 of the RPR. The Commission or DO will then consider authorizing the return to work of a person. The authorization may specify conditions to protect the health and safety of the person. Before a person is authorized to return to work, they may be subject to conditions. Further, in the event that a licensee becomes aware that any of the dose limits prescribed in section 15 of the RPR (e.g., corresponding to nuclear emergency actions) may have been exceeded, actions can be initiated to restrict further exposure of the individual in order to minimize any radiation-related health effects.

5.10 AUTHORIZATION OF MEDICAL EXPOSURE

Medical exposure is covered by provincial and territorial departments and agencies and is therefore out of scope.

5.11 AUTHORIZATION OF PUBLIC EXPOSURE

Related to GSR Part 3: Requirements 12, 29-30, 33, 45 and 47 describe and demonstrate implementation in the authorization process:

Similar to occupational exposure, the CNSC authorizes public exposure only as part of other CNSC licensed activities. Every CNSC licence contains requirements for controlling, measuring and minimizing public exposure. The CNSC also establishes licensee responsibilities and requirements related to controlling radiation exposures of workers and members of the public in the GNSCR. Subsection 12(1) of GNSCR establishes requirements for all licensees.

Authorization related to public exposure situations

Under the NSCA the CNSC has the regulatory responsibility to ensure and demonstrate that licensees protect workers, the public and the environment from unreasonable risks associated with the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information. Thus, the NSCA specifically mandates the radiological protection of the environment itself as well as that of the public.

Public dose is a result of the interaction between both the facility/activity and the public within their shared environment, therefore requirements associated with protection of the public are documented in both the RPR and regulatory documents within the environmental protection SCA framework.

The RPR provide specific regulatory requirements associated with public dose limits, the design, maintenance and implementation of a radiation protection program including concepts of optimization/ALARA, action levels and monitoring. Additional requirements and extensive guidance specific to public dose, the control and management of authorized discharges to the environment and the design, implementation and reporting of discharge and environmental monitoring and associated dose to the public are outlined in the environmental protection REGDOCs and the extensive suite of CSA Group nuclear environmental series of standards (refer to section 9.11).

Other regulations made under the NSCA are in place which also have elements specific to radiation protection related to their type of facility/activity including:

- *Class I Nuclear Facilities Regulations*
- *Class II Nuclear Facilities and Prescribed Equipment Regulations*
- *Uranium Mines and Mills Regulations*
- *Nuclear Substances and Radiation Devices Regulations*
- *Packaging and Transport of Nuclear Substances Regulations*

REGDOC-2.9.1, *Environmental Protection Environmental Principles, Assessments and Protection Measures* also addresses public dose. REGDOC-2.9.1 refers to the RPR, indicating the prescribed dose limits for members of the public and the requirement to implement a radiation protection program for protection of the public including estimation of doses through direct measurement or estimation of the

quantities and concentrations of any nuclear substance released and their resultant potential exposure to the public.

Licensees are also required to have environmental management system (EMS) in accordance with ISO 14001 *Environmental Management Systems – Requirements with Guidance for Use*. The EMS requires the tracking and management of non-compliances to procedures and the setting of targets and objectives to continually improve their environmental protection program and to optimize their operations to lower their releases to the environment.

Requirements to ensure that protection and safety is optimized for planned public exposure

The effective and equivalent dose limits for a member of the public are specified in subsection 1(3) and section 14 of the RPR. The CNSC's dose limit for members of the public (i.e., 1 mSv/year) aligns with Schedule III.3 of IAEA *Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards GSR Part 3 (2014)*. Section 16 of the RPR specifies the regulatory requirements for notifications, investigations and implementation of corrective actions when a licensee becomes aware that a dose limit has been exceeded.

The RPR require the principle of ALARA to be applied with respect to both public and occupational exposure. Section 4 of the RPR requires licensees to implement and maintain radiation protection programs that ensure radiation exposures and doses to persons are ALARA, taking into account social and economic factors. Regulatory G-129 provides guidance with respect to the application of ALARA to both occupational and public exposure.
Other REGDOCs associated with various SCAs contain requirements and guidance related to the demonstration of the application of optimization and ALARA which influences public dose and the determined authorized release limits. These include:

- Safety analyses documentation including:
  - REGDOC-2.4.1, *Deterministic Safety Analysis* (NPPs and small reactor facilities)
  - REGDOC-2.4.2, *Probabilistic Safety Assessment (PSA) for Nuclear Power Plants*
  - REGDOC-2.3.3, *Periodic Safety Reviews*
- Physical design documentation including:
  - REGDOC-2.5.2, *Design of Reactor Facilities: Nuclear Power Plants*
  - REGDOC-2.5.4, *Design of uranium Mines and Mills: Ventilation Systems*
  - REGDOC-GD-52, *Design Guide for Nuclear Substance Laboratories and Nuclear Medicine Rooms*
- Waste Management documentation including:
  - REGDOC-2.11.1, *Waste Management, Volume III: Safety Case for Long-term Radioactive Waste Management*

Monitoring for public radiation protection purposes

Licensees are required to ascertain the quantity and concentration of any nuclear substance released as a result of a licensed activity and to implement measures to protect the environment and prevent or mitigate the effects of unplanned releases. This approach is legislated through NSCA and the RPR.

Control of radioactive discharges

The core elements associated with radiological protection of the public are barriers and/or pollution prevention technologies (e.g., filters, treatment systems) to prevent or reduce radionuclide releases and specific licence limits applied to the residual controlled releases of radionuclides to the environment. REGDOC 2.9.1 documents expectation of ALARA and application of BATEA within facility design and associated pollution prevention equipment and procedures to ensure, at a minimum, the incorporation and application of industry best practices or BATEA. Licensees are required to monitor releases to support compliance verification to licence limits. In addition, site-specific public exposure modelling is used to design receiving environment monitoring programs to measure radionuclides within the major public exposure pathways, which when combined with monitored releases can be used to calculate public dose for demonstration of compliance with the public dose limit.

Authorization for discharges of effluents

General CNSC licence application requirements are set out in GNSCR. Related to protection of the public, paragraph 3(1)(e) of GNSCR requires an application for a licence to include the proposed measures to ensure compliance with the RPR. Paragraph 3(1)(f) of GNSCR also requires any proposed action level for the purpose of section 6 of the RPR to be included with the application. Action levels are required for both worker protection programs and apply to the authorized discharges to ensure ALARA and protection of the public.

Where radiological releases are authorized there are established limits and controls referred to as derived releases limits (DRL) and actions levels which are identified within the licence or LCH. Licensees must demonstrate compliance with their release limits and action levels.

DRLs are authorized releases which are derived through site-specific application of public dose modelling using the CSA Group standard N288.1, *Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities*. This document is a radionuclide transport and public exposure model customized for application to the Canadian nuclear sector. DRLs have, depending on the facility, been calculated based on effective dose limits ranging from 1 mSv per year to 0.05 mSv per year as specified by the regulatory authority. CNSC staff review the licensee's or applicants DRL document to verify that the DRLs were derived in accordance with CSA N288.1, using site-specific representative persons and associated dietary habits and appropriate assumptions which are protective of the health and safety of people and the environment. The DRLs must be approved by CNSC staff and specified in the licence before the licensee can start releasing to the environment. CNSC staff review effluent data submitted by licensees and evaluate for compliance against the release limits. Exceedance of a release limit is a non-compliance and will trigger enforcement and further investigations by CNSC staff to verify that the health and safety of people and the environment are protected.

Some nuclear facilities (e.g., those regulated under the NSRDR) have releases which would be several orders of magnitude less than their hypothetical DRL (often well below 10 µSv per year), hence, they do not require a DRL. Instead, in their licence, release limits have been incorporated which are adopted from IAEA-TECDOC-1000 *Clearance of materials resulting from the use of radionuclides in medicine,*

industry and research or derived on a site-specific basis using the basic methodology of IAEA TECDOC-1000 (i.e., simplified modelling with dose less than 10 μSv per year).

In addition to DRLs, licensees are required to establish action levels set at a fraction of the DRL (historically 10% or lower). With the recent publication of CSA N288.8 *Establishing and Implementing Action Levels for Releases to the Environment from Nuclear Facilities* ALs are being established on the basis of actual operating expectations/performance rather than on a fraction of the authorized discharge limit. This results in significantly lower ALs than those previously used. The purpose of an action level is to identify a potential loss of control of the environmental protection program. Exceeding an action level is not a non-compliance and does not mean that there is a risk to people and the environment. However, failure to report to the Commission and to respond appropriately to an action level exceedance (such as not implementing corrective actions to restore the environmental protection program back to normal operations) is non-compliance. Action levels help ensure careful oversight of the performance of facility controls on releases and that operator interventions will occur well before any risk of exceeding a licence limit.

Environmental protection improvement initiatives related to authorization of releases and calculation of public dose

REGDOC-2.9.2, *Controlling releases to the environment from nuclear facilities and activities* is currently being drafted to formally document and standardize existing regulatory practices with respect to controlling and/or authorizing releases (i.e., discharges) for both nuclear and hazardous substances. For this draft document, the emphasis with respect to authorization of radionuclides releases is to strengthen the link between the licensing basis and the authorized discharge limit. The approach is to demonstrate optimization in facility design and operation through the application of BATEA with respect to the generation, control, treatment and release of radionuclides in the facility design and operational procedures.

This information once accepted through licensing activities, establishes a portion of the licensing basis for a facility/activity. The authorized discharge limit is developed from the maximum predicted release(s) associated with the licensing basis with an added margin for operational flexibility (similar to that of IAEA GSG-9). In this way the optimization of the facility resulting from the use of BATEA establishes the upper bound for performance with respect to radionuclide releases rather application of an informally generated dose constraint. This BATEA driven discharge limit can then be applied to the site-specific public exposure model (informed by the CSA N288.1) to calculate the associated public dose, demonstrating to the public that the authorized discharge limits are constrained to a dose below the RPRs public dose. In this manner discharges are constrained by optimization driven by the application of modern technology and techniques rather than by an arbitrarily selected dose constraint.

REGDOC-2.9.2 also clarifies the role of optimization throughout the lifecycle of a facility incorporating principles of continuous improvement and evaluation with requirements for an EMS, cyclical re-evaluation of the Environmental Risk Assessment (ERA), (includes public dose) and PSRs and their inter-relationship with expectations of adaptive management when necessary. REGDOC-2.9.2 is currently undergoing internal review and is proposed for public review in 2020.

Remediation plan approval

The authorization and evaluation process described above applies to remediation plan approval using a graded approach commensurate with the risks and complexity of the activity. Release from CNSC regulatory control occurs when the licensee has successfully decommissioned the facility and restored the site to a state that is suitable for future use (e.g., green field or brown field). If unrestricted release is yet to be achieved (i.e., due to long-term presence of nuclear substances, contaminated systems, components or structures), perpetual licensing from the CNSC may be required unless the risks are very minimal and oversight by another regulatory or governmental body allows the Commission to exempt the site indefinitely from CNSC licensing (determined on a case-by-case basis).

Regulatory oversight of exemption and clearance

Section 5.6 outlines the parameters for exemption and clearance under the CNSC's regulatory framework.

Authorization for consumer products

Legal provision for exposure to radionuclides in consumer products was discussed in section 1.2.

Any consumer products not captured by the NSCA, the GNSCR or the NSRDR are addressed by HC. Decisions are conservative and protective of Canadians' health, and do not involve reference levels (refer C&E-POL-005a: *Policy on Compliance and Enforcement of Low Level Radiation in Consumer Products*). The policy provides compliance and enforcement objectives, sets responsibilities and describes the range of responses to non-compliance. A risk-based approach is taken for assessing radionuclides in foods sold in Canada. This approach takes into consideration background radioisotopes that can occur naturally in food and an overall average effective or absorbed dose from all sources, including the food that is the subject of the assessment.

Verification of compliance with authorized releases and public dose limits

The CNSC has an extensive verification and compliance program. The NSCA, its regulations (RPR, GNSCR), licence conditions, and REGDOCs contain specific requirements for reporting of potential exceedances of the public dose limit or exceedance of an authorized discharge limit or its associated (lower) action level. Requirements for effluent and receiving environment monitoring programs ensure that these programs are adequate for detecting such exceedances and/or for calculating public dose. Licensee programs are reviewed and approved with the implementation assessed against the approved program. Results (quarterly and/or annually) are reviewed, trended and evaluated for compliance with regulations, licences and the LCHs. Furthermore, the adequacy of the programs is re-evaluated on a cyclical basis (≤ 5 years) incorporating monitoring data and new science. These are all elements of the CNSC's comprehensive technical review, inspection and compliance verification programs detailed in the relevant modules. Compliance with release and dose limits are reported annually to the Commission Tribunal and the public through the annual RORs during public Commission meetings.

Complementing these activities are the radiological environmental monitoring activities completed by the CNSC (IEMP), HC (Canadian Radiological Monitoring Program, Comprehensive Nuclear Test Ban Treaty International Monitoring System) and the relevant provinces (e.g., Ontario Reactor Surveillance

Program). The results of these programs are also reported on to the Commission during presentation of the sector-specific annual RORs.

5.12 CONCLUSIONS AND ACTIONS

The CNSC meets the expectations of the IAEA safety standards for authorization.

The NSCA provides the legal basis for authorizing all aspects of nuclear exploitation in Canada including the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information. Authorizations take the form of licences or certificates issued by the Commission or DO except where the CNSC has expressly exempted an activity. All applicants are required to submit a demonstration of safety that is appropriate to the facility or activity before the Commission or DO would grant the applicable licence or certification. A nuclear facility is licensed throughout its entire lifecycle: site preparation, construction, operation, decommissioning and abandonment. The regulations under the NSCA provide the general licence application requirements for the types of facilities and activities authorized by the CNSC. The issuance, renewal, amendment, suspension or revocation of a licence or certificate may be done only under the authority of the Commission or DO.

The CNSC's PFP provides stakeholders with funding to help them share their concerns and knowledge with the Commission about CNSC-licensed facilities and activities. The CNSC is the only nuclear regulator internationally with a PFP.

Opportunities have been identified in the CNSC's regulatory framework to improve the regulatory documents that provide guidance and requirements for licensing (authorization). As part of modernizing the CNSC's regulatory framework and for continuous improvement the regulatory documents related to licence applications, decommissioning and financial guarantees are being revised or developed as part of the CNSC'S Regulatory Framework Plan. The specific action plan items are provided in Annex A.

6. REVIEW AND ASSESSMENT

6.1 GENERIC ISSUES

6.1.1 MANAGEMENT OF REVIEW AND ASSESSMENT

Related to GSR Part 1 (Rev. 1): Requirements 25 and 26, paragraphs 4.40 – 4.48
GSR Part 3 Requirement 13
GSR Part 4 (Rev. 1): Requirements 1 – 4

Responsibilities of the regulatory authorities in review and assessment

As described in section 5.1, when the CNSC receives a licence application, staff evaluate it to determine if the proposed safety and control measures described in the application, and the documents needed to support the application, are adequate to meet applicable requirements.

As previously stated in section 1.2, subsection 24(4) of the NSCA provides the terms which must be met before the Commission can issue or transfer a licence.

CNSC staff review all submissions using existing legislation, and codes of practice and expertise available in Canada and around the world to ensure regulatory requirements are met.

If CNSC staff conclude that an application is not complete or satisfactory, the applicant will be asked to submit additional information. Applications do not proceed to the Commission or DO for decision until staff are satisfied with the application.

The Commission considers CNSC staff's recommendations along with input from external stakeholders (including the applicant or licensee) in its decision making.

Purpose, scope of and type of document types involved in the review and assessment

Technical assessments are conducted by CNSC staff to support licensing, compliance, regulatory decision making and development of regulatory positions. CNSC staff perform these assessments based on the best available science (such as technical knowledge and analytical methods), taking OPEX into consideration. Technical assessments determine whether submitted documents and supporting evidence presented to the CNSC by applicants or licensees have a sound technical basis. Assessments address the completeness (coverage and adequacy), comprehensiveness (depth) and the validity of the rationale and technical justification provided in submissions, and are also used to verify licensee compliance with regulatory requirements.

The CNSC continually works to promote understanding of its regulatory basis for review and assessment activities. High level requirements for information to be submitted to the CNSC in relation to a licence or a certificate are provided in specific CNSC regulations (e.g. GNSCR, CINFR) as indicated above. In addition, the CNSC lists those documents that must be submitted by a licensee with an application in specific licence application guides. CNSC staff help to ensure that the applicant understands their requirements by developing regulatory documents which describe CNSC expectations. The CNSC external website is updated regularly and also contains useful information and guidance to licensees and applicants. Furthermore, within the structure of developing regulatory documents, the CNSC uses a comprehensive consultation process for developing application guides as regulatory documents. CNSC

staff also participate and provide guidance to licensees and applicants during external outreach activities and industry specific conferences.

Regulatory documents and industry standards may be referenced in the information supplied by an applicant in support of its licence application, and are used by CNSC staff to evaluate the application. These regulatory documents and standards become part of the licensing basis when referenced in the licence application or its supporting documentation, or when directly referenced in a licence.

The CNSC requires licensees to implement and maintain key programs under SCAs applicable to the licence application. Once deemed acceptable, a licensee`s own documentation and program requirements also serve as review and assessment criteria once referenced in the licence.

All of these regulatory requirements are aimed at ensuring applicants for licences and certificates demonstrate that in their application they qualified to carry out the licensed activity, and that appropriate provisions will be made to protect worker and public health and safety, to protect the environment, and to maintain national security and measures required to implement international obligations to which Canada has agreed.

Overview of the review and assessment process

When the CNSC receives an application for a licence or certification, staff evaluate it to determine if the proposed safety and control measures described in the application, and the documents needed to support the application, are adequate and meet applicable requirements.

CNSC process document *Conducting a Technical Assessment* provides guidance on the technical assessment process. It describes how to effectively and consistently prepare for conducting a technical assessment; complete sufficiency checks of the information provided according to applicable criteria; peer review; integrate technical assessment results; and provide technical conclusions and recommendations to support making regulatory recommendations.

In addition, CNSC work instruction *How to Prepare for Conducting a Technical Assessment* provides guidance to ensure that technical assessments are completed in such a way as to adequately address the licensing, certification or other matters of regulatory interest, and to provide required details and level of information needed for making recommendations or decisions regarding licensing. For Class I facilities, CNSC staff conduct their technical assessment following a Technical Assessment Reference Matrix. The Technical Assessment Reference Matrix covers review topics and applicable codes and standards against which a licensee's application can be evaluated. The matrix is aligned with the CNSC's SCA Framework.

Although the nuclear sector is subject to federal jurisdiction through the NSCA, the CNSC uses a harmonized or joint review approach with other federal, provincial or territorial departments in such areas as health, environment, transport and labour. The CNSC expects nuclear facilities to comply with all applicable federal and provincial regulations.

In recognition of this dual jurisdiction, the CNSC has established a joint regulatory process. As a lead agency, the CNSC invites other federal and provincial regulatory agencies to participate in the licensing process when their areas of responsibility could impact the proposed nuclear facility. Those that choose to participate become members of a site-specific joint regulatory group.

This process ensures that the concerns of federal, provincial and territorial agencies are considered in the regulatory process and are reflected, as appropriate, in the licence in the form of site-specific requirements.

Application of the risk-informed approach in review and assessment

The CNSC employs a risk-informed approach to planning and carrying out reviews and assessment to ensure the regulatory effort is commensurate with the potential severity and nature of the risk.

Using a graded approach, the depth of the requirements and documentation to support the licence application can vary, depending on the particular characteristics of a nuclear facility or licensed activity, the risk and the activities to be carried out.

Utilizing this approach, CNSC staff review the application with emphasis on the following elements:

- Performance of the licensee and the facility over the previous licence period, as applicable
- Licensee's plans for operation and safety improvement over the next licence period
- Significant activities envisaged by the licensee for an extensive period beyond the next licence period, as applicable

Where a licence renewal or amendment is involved, the CNSC normally has considerable information readily available from the original authorization of the project, operating history and performance data. With that information in hand, the requirements for submission of additional new information may be fewer, depending on the specific nature of the proposal.

6.1.2 ORGANIZATION AND TECHNICAL RESOURCES FOR REVIEW AND ASSESSMENT

Related to GSR Part 1 (Rev. 1): Requirement 4, paragraph 2.8; Requirement 11, paragraphs 2.34 – 2.38; Requirement 15, paragraphs 3.3 – 3.5; Requirement 16, paragraph 4.4 – 4.5; Requirement 17, paragraph 4.6; Requirement 18, paragraphs 4.11 – 4.13 and Requirement 20, paragraphs 4.18 – 4.22 (Note: Relevant facts described in Chapter 3 should not be repeated but should be referred to.)

Resource, tools and staff competence for review and assessment

Review and assessment of applicants' submissions is performed in detail by various specialists according to the information and type of application submitted. Should a detailed review and assessment of a specific technical area of the application be required, subject matter experts for the specific technical area are consulted for their review and recommendations. This may include expert reviews in areas such as; radiation protection, emergency management, human factors, security, engineering design, geotechnical, fuel, and physics.

The CNSC organizes its regulatory activities by developing, implementing, monitoring and adjusting regulatory work plans for each nuclear facility and activity under scrutiny. Consideration is based on a risk-informed regulatory framework and the need to link the needs of the authorization process with review and assessment activities. Work plans are reviewed to ensure they cover specific goals at specified frequencies during the life cycle of the facility and are consistent across like industries regarding the planning of inspections, reviews and other regulatory activities.

For Class I facilities and, uranium mines and mills, an annual Regulatory Activity Plan is prepared that defines the major inspections, reviews, assessments and other regulatory activities which are planned for the coming fiscal year. The planning process involves a series of briefings and discussions among and between the licensing personnel in ROB, and the technical specialists personnel in TSB. While these exchanges currently take different forms in different work groups, they all facilitate a productive exchange of information that helps lead to a consistent, risk-informed prioritization of baseline and licensee performance-driven regulatory activities to be carried out.

For Class I facilities and uranium mines and mills, the licensing officers and directors in ROB are responsible for the implementation and performance of their regulatory activity plans. Periodic meetings among and between licensing personnel in ROB, and specialists in TSB are held during the fiscal year to review overall licensee performance, compare significant findings, and to readjust planned work as needed. These exchanges facilitate a productive exchange of information that helps lead to a consistent, risk-informed prioritization of review and assessment activities to be carried out.

DNSR, which oversees the thousands of other Class II and nuclear substance licensees, uses a Risk Informed Regulatory Program that ensures consistency in assessments, inspections and compliance report reviews. Higher risk activities are subject to greater regulatory oversight for both licensing and compliance activities. In all cases, feedback on licensee performance and compliance is continually exchanged and reviewed among the ROB licensing and TSB assessment teams to effect changes in the planned regulatory activities at any time during the year.

Maintenance of competence for review and assessment

Staffing and competence of the CNSC are described in section 3.3.

Resources available for review and assessment

The Commission has the authority, pursuant to section 17 and paragraph 21(1)(a) of the NSCA, to enter into contracts or other special arrangements with external parties in order to effectively deliver its mandate.

The CNSC uses an internal technical and scientific organization model. The CNSC's TSB staff provide the majority of the scientific and technical support and expertise. As such, the CNSC has minimized its dependence on external consultants and the experts employed by the licensees by developing and maintaining a large, highly qualified and multi-disciplinary staff of subject matter experts.

Occasionally, external agencies are used as third-party inspectors (e.g., for fire protection systems) to conduct specific inspections. For example, the Technical Standards and Safety Authority (TSSA) inspects boiler and pressure vessels during the manufacturing process and again after it has become operational. This provides a third party inspection of pressurized equipment used in NPPs. In all cases, the CNSC retains responsibility for acting upon the results of inspections.

6.1.3 BASES FOR REVIEW AND ASSESSMENT

Related to ***GSR Part 1 (Rev. 1): Requirements 23 and 24, paragraphs 4.33 – 4.34; Requirements 25 and 26, paragraphs 4.40 – 4.41***
GSR Part 4 (Rev. 1): Requirements 14 – 15

Regulations and guidance relevant for safety assessment and for deterministic and probabilistic safety analysis by the licensees

CNSC staff extensively use IAEA safety standards in the development of REGDOCs. A full listing of the REGDOCs is provided on the CNSC's external website. For example, the following table illustrates the REGDOCs that reference IAEA safety standards for deterministic and probabilistic safety analysis.

Table 5: REGDOCs for deterministic and probabilistic safety analysis

REGDOC	Title	Safety standards referenced
REGDOC-2.3.3	Periodic Safety Reviews	SF-1, SSG-25, NS-G-2.6, -2.12
REGDOC-2.4.1	*Deterministic Safety Analysis*	NS-R-4, SSG-2, GSR Part 4
REGDOC-2.4.2	*Probabilistic Safety Assessment for Nuclear Power Plants*	SSG-3, SSG-4

Access to additional information necessary for review and assessment of the licensee submittals

While it is the responsibility of the applicant or the licensee to ensure that any information submitted is suitable for the activities to be performed and that these activities comply with regulatory requirements and all documentation must be signed by a duly authorized representative of the licensee or applicant, the CNSC satisfies itself that the above parameters are met.

Consistency in regulatory requirements for safety assessment

The CNSC continually works to promote understanding of its regulatory basis for review and assessment activities. High level requirements for information to be submitted to the CNSC in relation to a licence or a certificate are provided in specific CNSC regulations, as indicated above. In addition, the CNSC lists those documents that must be submitted by an applicant with an application in specific licence application guides. As such, the requirements for the applicant/licensee are clearly defined in the licence, LCHs and application guides. Staff help to ensure that applicants understand their requirements by developing regulatory documents which describe CNSC expectations. The CNSC external website is updated regularly and also contains useful information and guidance to licensees and applicants. Furthermore, within the structure of developing regulatory documents, the CNSC uses a comprehensive consultation process for developing application guides as regulatory documents. CNSC staff also participate and provide guidance to licensees and applicants during external outreach activities and industry specific conferences.

Throughout the life cycle of a licensed facility, industry specific review and assessment criteria from appropriate documents may be referenced in operating licences, thereby making the requirements enforceable. This includes both national and international standards, which provide criteria against which licensees are assessed; as well as CNSC REGDOCs, which outline acceptable methods of meeting

CNSC requirements. Regulatory documents therefore serve as guidance to both licensees and CNSC staff on how certain requirements are expected to be met.

6.1.4 PERFORMANCE OF REVIEW AND ASSESSMENT

Related to GSR Part 1 (Rev. 1): Requirements 25 and 26, paragraphs 4.43 – 4.48
GSR Part 4: Requirements 2 – 21

Verification of the comprehensiveness and quality of the safety assessment submission

It is the responsibility of the applicant or the licensee to ensure that any information submitted is suitable for the activities to be performed and that these activities comply with regulatory requirements. In addition, all documentation must be signed by a duly authorized representative of the licensee or applicant. The CNSC satisfies itself that the above parameters meet legislative and regulatory requirements and expectations including codes, standards and best practices.

As described in *Conducting a Technical Assessment*, the conduct of technical assessment process requires subject matter experts perform sufficiency checks to confirm that information (relevant documentation, supporting evidence, reference standards, links, etc.) have been provided to conduct the technical assessment. Subject matter experts then conduct the necessary assessment using the best available science, technical knowledge and analytical methods. This may entail confirmation through site visits to observe activities, drills, exercise or equipment layout.

The resulting technical assessment report includes supporting rationale along with technical conclusions and recommendations. Technical conclusions are deductions drawn from the technical assessment findings, identifying any gaps between the regulatory requirements and the submitted documents and supporting evidence, the implications of those gaps, and the safety significance of the implications. The technical recommendations identify what is required to correct the gaps identified in the technical conclusions in order to meet the outstanding technical assessment criteria. A recommendation is a proposal on how to fill the gap from a technical perspective.

Verification of the safety analysis submission

Peer reviews of technical assessments are carried out by the subject matter experts. The typical considerations of these reviews are: technical accuracy; scientific correctness; editorial correctness; and concurrence with technical conclusions and recommendations. The peer review may be performed by a resource external to the CNSC.

When the technical assessment involves multiple topics, the results of the individual technical assessment reports are compiled into an integrated technical assessment report. This report brings the technical conclusions and recommendations from the individual TA reports into a single, integrated document. The extent and level of integration is tailored to the complexity of the review (high-level or detailed).

Requirements for additional reviews of the safety assessment (significant changes, modifications, etc.)

Once issued, CNSC licences authorize the specific activities for which the applicant has applied for. Any proposed changes to those activities or to an approved design must be submitted for review and

approval prior to implementation. Restrictions on permissible operating procedures and facility design are also imposed through the application of licence conditions. Consequently, licensees are legally obligated to apply for the appropriate licence or licence amendment prior to initiating any change to the facility, equipment or procedures. As such safety modifications are proposed and justified in submissions by the licensees. Such submissions are subject to review and assessment by the CNSC staff based on applicable requirements and safety goals.

Scope of regulatory review and assessment for authorizations

Triggers for performing technical assessments are described in *Conducting a Technical Assessment,* examples include new licence applications, applications to renew or amend a licence design or documentation changes or changes to licence conditions.

Relationship between inspections and review and assessment

To verify compliance with regulatory requirements, the CNSC:

- evaluates a licensee's operations and activities
- reviews, verifies and evaluates licensee-supplied information
- ensures administrative controls are in place
- evaluates a licensee's remedial action and any actions taken to avoid future incidents

Programs cited in the licence or previously assessed during the licence application review process are evaluated. The CNSC checks that a licensee's activities meet acceptance criteria derived from:

- legal requirements
- the CNSC policies, standards or guides that clarify how the Commission intends to apply the legal requirements
- licensee-supplied information that expressly states the licensee's intentions to meet the legal requirements in performing the licensed activity
- the expert judgment of CNSC staff, including knowledge of industry best practices

Overall, the CNSC uses inspections, mandatory reports and other verification activities, such as reviewing licensee's event responses, to periodically confirm at any time during the licensing period that the safety assessment for a licensed activity or facility remains valid. For example, REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants*, version 2, requires licensees to update the safety analysis report for the site every five years or when requested to do so by the CNSC. Additionally, CNSC requires licensees of Class I nuclear facilities to implement and maintain a safety analysis program. LCHs for these facilities include requirements for licensees to submit a revised safety analysis report every five years. CNSC staff review the safety analysis report to verify the licensee employs appropriate assumptions, applies adequate scope and demonstrates that the facility is operating within the licensing basis.

6.2 REVIEW AND ASSESSMENT FOR NUCLEAR POWER PLANTS

Related to almost all requirements listed in subchapter 6.1

Review and assessment of topics specific to the regulation of nuclear power plants

CNSC processes for review and assessment during authorization (licensing) and compliance for NPPs are comprehensive and cover all stages of the NPP lifecycle. Licensee submissions are evaluated using a risk-informed approach to determine scope, depth of review, and priority. The CNSC uses the SCA framework and other matters of regulatory interest to plan, organize, perform and document review and assessment activities.

Various regulations, licences (authorizations), LCHs, licence application guides and REGDOCs are used to specify the information required to be assessed for all stages of the NPP lifecycle (from site preparation through to site abandonment).

The NPP licence, LCH and the cited REGDOCs contain comprehensive information and reporting requirements that the licensee must submit to the CNSC for review and assessment. For example, REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants*, version 2, sets out the timing and information that NPP licensees are required to report to the CNSC supporting the conditions of their power reactor operating licences. The REGDOC prescribes the types of reports, frequency and timeframe for reporting.

Methods and tools for review and assessment of nuclear power plants

Dedicated Regulatory Program Division (RPD) personnel coordinate all the review and assessment activities with the assistance of resident (site) inspectors and head office specialists. RPD staff use databases, a Job Management System, and RIB to assign, track and manage review and assessment submissions for all specific review topics, including the safety analysis reports, PSRs, OPEX program, refurbishment projects, and personnel authorizations. CNSC licensing requirements also requires that NPP licensee management processes have a corresponding "Regulatory Commitment" for tracking to ensure alignment between the CNSC and licensee staff.

Internal requests may be made to verify status, completeness, testing or sampling conducted at the NPP, conducted as part of the compliance program. Using the CNSC *Conduct of Technical Assessments* process, technical staff provide conclusions and recommendations from their review and assessment that are considered in conjunction with other regulatory information to make overall regulatory recommendations.

For major projects like probabilistic safety assessment or reactor refurbishments, the RPD will establish a dedicated project team, according to CNSC's management system processes, to manage the review. The results from review and assessments are integral to the regulatory assessment process and, as such, represent a major component of the core work conducted daily by CNSC staff.

Safety report updates are required to be performed on a five-year basis based on the requirements of REGDOC-3.1.1, Reporting Requirements for Nuclear Power Plants, version 2. RPDs manage the submission and use the CNSC's internal TSO, TSB to conduct the review and make recommendations.

Results from the compliance program, desktop reviews and technical assessments are integrated and reported in the evaluation cycle of the NPP. Report production, such as the ROR for NPPs are produced on an annual basis and presented publicly during a Commission meeting where the results of the review and assessments are provided.

6.3 REVIEW AND ASSESSMENT FOR RESEARCH REACTORS

Related to SSR-3: Requirements 1 and 5

Review and assessment for research reactors

As noted in section 5.3, the CNSC licensing process for research reactors is comprehensive and covers all 14 SCAs. The CNSC has subject matter experts that are qualified to assess all 14 SCAs.

As part of technical assessments, CNSC staff develop an assessment plan to identify the scope and depth of the technical assessment needed to adequately evaluate the application, as well as time requirements and resources. Following, CNSC staff carry out the assessment based on the assessment plan.

Review and assessment of periodic safety review and safety analysis for research reactors

For any new installation or major modification that could affect the safety of the facility, the licensee must perform the safety analyses in accordance with the requirements set out in RD-308, *Deterministic Safety Analysis for Small Reactor Facilities.*

All research reactor licences contain a licence condition that the licensee shall conduct and maintain safety analyses that are representative of the current hazards of the facility or process analysed.

The hazards in low-power research reactors do not evolve significantly over time. Licences are granted by the Commission for a 10-year period or less, which requires the safety analysis report to be demonstrated as valid and accurate at every licence renewal. LCHs contain the compliance verification criterion that the licensee shall review, revise and update, as required, the safety analysis report periodically, and when required to reflect modifications, new regulatory requirements and standards, or operational information.

CNSC staff review and assess licensees' periodic and unscheduled reports, including ACRs required by REGDOC-3.1.2, *Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills.* This document sets out the timing and information that research reactor licensees are required to report to the CNSC for its review and assessment, in support of the conditions of the operating licences.

Methodology of review and assessment of research reactors

CNSC staff review and assess research reactor submissions using the CNSC *Conduct of Technical Assessments* process.

6.4 REVIEW AND ASSESSMENT FOR FUEL CYCLE FACILITIES

Related to NS-R-5, paragraph 3.9

Review and assessment for fuel cycle facilities

For the purposes of this section, fuel cycle facilities refers to facilities that carry out activities related to the nuclear fuel cycle, from mining to waste management and disposal, excluding reactors. Section 6.5 provides additional information specific to facilities that manage and/or dispose of waste whether the waste is related to the fuel cycle or not.
As listed in section 5.4, the following review and assessment activities are undertaken as part of the fuel cycle facility and uranium mine and mill authorization process.

- CNSC staff technical assessment of application against regulatory requirements and applicable codes and standards.
    - CNSC staff will develop assessment plan to identify the scope and depth of the technical assessment needed to adequately evaluate the application, as well as time requirements and resources.
    - CNSC staff carry out the assessment based on the assessment plan.

Once all the required assessments are complete, the information is compiled into an integrated assessment report, which then forms the basis for recommendations to the Commission or DO.

Each fuel cycle facility uses the Facility Assessment and Compliance (FAC) team approach for regulatory oversight. The FAC team approach establishes a multidisciplinary team of CNSC licensing and specialist staff to coordinate and integrate technical assessments and reviews for any given fuel cycle facility. The FAC team approach is described in the CNSC document, *DNCFR Facility Assessment and Compliance Team (FACT) Terms of Reference*.

Safety analysis for fuel cycle facilities

The safety analysis SCA applies to all fuel cycle facilities. This SCA covers maintenance of the safety analysis that supports the overall safety case for the facility.

The applicable regulations require licensees to develop a safety analysis report to verify the safety of the fuel cycle facility. The CNSC requires that licensees periodically review and revise existing risk assessments to ensure, at a minimum of every five years, that new risks and lessons learned are incorporated into an updated safety analysis report. This aligns with CSA N286, *Management system requirements for nuclear facilities*, which states *"A safety analysis shall be performed and documented for the design and carried through the life of the nuclear facility. The safety analysis shall be periodically reviewed to ensure it is current."* The licensee is required to notify the CNSC of any changes to its safety analysis documentation during the licence period.

6.5 REVIEW AND ASSESSMENT FOR WASTE MANAGEMENT FACILITIES

Related to GSR Part 5: Requirements 13 – 16, SSR-5: Requirements 11 – 14

Review and assessment activities related to the safety case for predisposal management of radioactive waste

As outlined in REGDOC-2.11, *Framework for Radioactive Waste Management and Decommissioning,* in Canada, when making regulatory decisions about the management of radioactive waste, the CNSC considers the extent to which the owners of the waste have addressed several key principles, such as:

- the generation of radioactive waste is minimized to the extent practicable by the implementation of design measures, operating procedures and decommissioning practices
- the management of radioactive waste is commensurate with the waste's radiological, chemical and biological hazard to the health and safety of persons, to the environment and to national security
- the assessment of future impacts of radioactive waste on the health and safety of persons and the environment encompasses the period of time during which the maximum impact is predicted to occur
- the predicted impacts on the health and safety of persons and the environment from the management of radioactive waste are no greater than the impacts that are permissible in Canada at the time of the regulatory decision.

Licensees must evaluate each step in the management of radioactive waste both as an individual step in the process and as part of an integrated system. All parties involved in the management of radioactive wastes are required to clearly understand the issues associated with ownership, control and the responsibilities associated with the possession of radioactive waste.

The CNSC requires licensees to implement and maintain various programs, such as a waste management program. Waste management program requirements are set out in CSA N292.0, *General principles for the management of radioactive waste and irradiated fuel*. Licensee waste management programs must address all waste streams associated with or potentially contaminated by nuclear substances, and consider the waste hierarchy (i.e., reduce, reuse, and recycle) principle of waste management. CNSC staff review the licensee's program documentation against the criteria established by the regulatory documents and safety standards.

For predisposal radioactive waste management facility, information submitted in support of an application must demonstrate that proposed safety and control measures will meet or exceed CNSC expectations. Examples are detailed documents supporting the design, safety analyses and all aspects of operation to which the licensee makes reference; documents describing the conduct of operations; and documents describing the conduct of maintenance. All submissions are expected to be supported by appropriate analytical, experimental or other suitable evidence.

CNSC experts and technical specialists conduct a thorough technical assessment of all applicable safety and control measures submitted by applicants related to the predisposal management of radioactive waste. This review takes into consideration the CNSC's experience and knowledge of best practices in radioactive waste management from existing facilities in Canada and around the world.

Review and assessment activities related to the safety case in the development of a radioactive waste disposal facility

Similarly, as with the safety case for the predisposal management of radioactive waste, CNSC conducts a thorough technical assessment of the safety case for the development of a radioactive waste disposal facility. The technical assessment focuses on determining whether the proposed design and safety case complies with regulatory requirements and that long-term safety is demonstrated. This review demands rigorous engineering and scientific analyses.

Demonstrating long-term safety consists of providing reasonable assurance that waste management will be conducted in a manner that protects human health and the environment. The safety case, must include a safety assessment complemented by various additional arguments based on:

- appropriate selection and application of assessment strategies
- demonstration of system robustness
- the use of complementary indicators of safety
- any other evidence that is available to provide confidence in the long-term safety of radioactive waste management

CNSC evaluation of an assessment is based largely on information provided in written submissions, and material referenced in those submissions. REGDOC-2.11.1, *Waste Management, Volume III: Safety Case for Long-term Radioactive Waste Management*, provides requirements and guidance to licensees and applicants to assess the long-term impacts that radioactive waste storage and disposal methods have on the environment and the health and safety of people. Additional requirements are found in CSA N292.6: *Long-term management of radioactive waste and irradiated fuel.*

Review and assessment related to periodic safety review of waste management facilities

Licensees must maintain the safety analysis that supports the overall safety case for the facility during the term of the licence. The accompanying LCHs for the waste management facilities include requirements for licensees to submit a revised safety analysis report every five years for CNSC staff review. The CNSC expects licensees to conduct safety assessments for each safety assessment period or when conditions change such that they have potential to impact previous conclusions of the safety assessment.

Review and assessment to evaluate the long-term performance of the disposal facility

REGDOC-2.11.1, *Waste Management, Volume I: Management of Radioactive Waste* provides requirements and guidance to licensees on programs and reports that are required to be submitted during the post-operational phases of the disposal facility.

Similar to conducting a technical assessment of a safety case, CNSC experts and technical specialists conduct a thorough technical assessment of the programs and reports related to the post-operational phases of a disposal facility to ensure they are in compliance with regulatory requirements.

6.6 REVIEW AND ASSESSMENT FOR RADIATON SOURCES FACILITIES AND ACTIVITIES

Related to GSR Part 1 (Rev. 1): Requirements 23, 25 and 26
GSR Part 3: Requirements 10 - 13

Review and assessment activities related to the authorization of radiation sources facilities and activities

The regulatory requirements for the authorization of radiation sources facilities and activities were described in section 5.6.

Internal procedures are available to CNSC staff to ensure that review and assessment are done in a consistent manner. For example, the document *Overview of NSRDLD Licensing Actions* outlines the generic workflow for licensing actions related to nuclear substances and radiation devices including roles and responsibilities for each of the steps. Specific work instructions have been developed for each of the types of licensing actions. The *Class II Nuclear Facility Licence Application Assessments* document provides guidance on assessing the contents of a licence application ensuring the depth and scope are sufficient to make a recommendation.

The CNSC process document *Conducting a Technical Assessment* provides guidance on how to effectively and consistently: prepare for conducting a technical assessment; complete sufficiency checks of the information provided according to applicable criteria; and; provide technical conclusions and recommendations to support making regulatory recommendations. This process applies to the technical assessment of review topics that align with the CNSC SCAs. Within the established scope of the technical assessment, a CNSC subject matter expert conducts the assessment using the best available science, technical knowledge and analytical methods.

CNSC staff follow an internal procedure, *Technical Assessment of Radiation Device and Class II Prescribed Equipment Certificate Applications*, which describes the method and criteria to perform the technical assessment of radiation devices and Class II prescribed equipment designs under the CNSC regulatory regime for certification of these devices and equipment. These technical assessments are performed by the Transport Licensing and Strategic Support Division (TLSSD). Moreover, CNSC staff follow an internal process, *Peer Review of Radiation Device, Class II Prescribed Equipment and Transport Certificate Applications*, which documents the process required for peer review of a technical assessment for certification. A peer review minimizes the risk associated with the certification of higher risk designs, and increases reliability and consistency in certificates issued by TLSSD. Additionally, it improves communication and knowledge sharing within TLSSD.

6.7 REVIEW AND ASSESSMENT FOR DECOMMISSIONING ACTIVITIES

Related to GSR Part 6: paragraph 3.3

Review and assessments of the various decommissioning strategies and plans

The CNSC's performance-based regulatory philosophy, with respect to decommissioning strategies, is not prescriptive. Proponents must identify their preferred strategy as part of their decommissioning plan and must support it with a science-based safety assessment. CNSC staff assess any proposed decommissioning strategy against regulatory requirements to ensure the protection of health and safety of the public and the environment.

G-219, *Decommissioning Planning for Licensed Activities*, outlines decommissioning strategies and considerations: immediate or prompt decommissioning, deferred decommissioning and in-situ decommissioning.

In a case where the end-state for in-situ decommissioning results in a waste disposal site, a licensee must satisfy all regulatory requirements for a radioactive waste disposal facility and demonstrate safety via a safety case and post-closure safety assessment of a disposal facility. Further information on safety case and safety assessment can be found in REGDOC-2.11.1, *Waste Management, Volume III: Safety Case for Long-term Radioactive Waste Management*.

When determining the appropriate decommissioning strategy, criteria from G-219 and REGDOC-2.11.1 are to be considered and prioritized.

G-219 notes that a PDP must be filed with the CNSC as early as possible in the lifecycle of the activity or facility, and contains requirements and guidance on the structure and content of the PDP. CNSC conducts a thorough technical assessment of PDPs to ensure that they comply with regulatory requirements. G-219 also states that the plan should be revisited and updated, as necessary.

G-219 notes that a DDP must be filed with the CNSC for appropriate licensing action prior to beginning decommissioning activities, and contains requirements and guidance on the structure and content of the DDP. The DDP normally refines and adds procedural and organizational details to the preliminary plan. CNSC experts and technical specialists will conduct a thorough technical assessment of the DDP to ensure that it complies with regulatory requirements. Once approved by the CNSC, the DDP will be incorporated into a licence authorizing decommissioning.

Review and assessment of novel decommissioning methods and decommission reports

G-219 and CSA N294 provide requirements and guidance on the content of DDPs.

The CNSC requires a safety assessment to be performed by the licensee to identify potential hazards to workers and the public from both routine decommissioning activities and credible accidents associated with the facility and activity. The level of detail and rigour of the safety assessment should be commensurate with the type and complexity of the facility. The assessment shall describe the relative importance of the potential hazards and identify the methods for mitigating the risks associated with such hazards. The assessment shall also address the residual risks to the public, if any, after decommissioning is completed. The safety assessment may be a stand-alone document or may be included in the DDP.

The DDP and safety assessment as described above are required regardless of the decommissioning methods selected, whether they be novel or mature. CNSC conduct thorough technical assessments of all documents submitted in support of decommissioning activities to ensure that regulatory requirements are met, and that the environment and the health and safety of workers and members of the public are protected.

Upon completion of decommissioning activities, the licensee demonstrates that the end-state criteria as specified in the CNSC approved DDP have been met. The licensee shall prepare and submit an end-state report to CNSC staff for review and acceptance. Where decommissioning of the facility is to take place in discrete stages, an interim end-state report is prepared when each planned interim state is achieved.

This report describes the decommissioning work undertaken, the physical condition of the facility, the remaining hazards, the interim end-state achieved, the results of surveys, the hazards and physical condition of the facility and the remaining decommissioning tasks or work packages to be completed.

6.8 REVIEW AND ASSESSMENT FOR TRANSPORT ACTIVITIES

Related to SSR-6

Review and assessment activities related to transport of radioactive materials

In carrying out its mandate, the CNSC assesses applications for package certification and transport licences. Application requirements for licensing and certification are set out in PTNSR 2015, sections 7 (application to transport) and sections 11-13 (application for certification).

Section 24 of the PTNSR 2015 details requirements for a management system including that every person who designs, produces, tests, uses, inspects, maintains or repairs prescribed equipment (including transport packages) must implement and maintain a management system in accordance with the IAEA Regulations.

CNSC RD-364, *Joint Canada - United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages*, provides guidance to applicants on the information to be submitted in an application for certification of a transport package.

CNSC Certification Engineers follow an internal document, *Technical Assessment of Transport Certificate Applications, when assessing certification applications*. This document:

- summarizes the regulatory requirements and assessment criteria for certification approval
- describes the technical assessment review consistent with "Process Overview: Conduct of Technical Assessments" procedures
- establishes and maintains the quality and uniformity of reviews

The specific assessment procedures and criteria in this document provide guidance for CNSC review and approval of certificates for Type B, Type H, and Type C packages, as well as special form radioactive material, low dispersible radioactive material, and for certificates where the transport of the nuclear substance cannot meet the requirements of the regulations but is shown to have an equivalent level of safety (equivalent design). The process includes assessment criteria for approvals as required in the PTNSR 2015, the technical and regulatory basis for review, and the manner in which the review is accomplished.

Peer reviews minimize the risk associated with the certification of higher risk designs and increases reliability and consistency in certificates issued by the CNSC. They also improve communication and knowledge sharing among the Certification Engineers. The CNSC *Peer Review of Radiation Device, Class II Prescribed Equipment and Transport Certificate Applications* process documents the process required for peer review of a technical assessment for certification done by a Certification Engineer of packages used for the transportation of nuclear substances, radiation devices, Class II prescribed equipment, special form radioactive material, special arrangements and low dispersible radioactive material.

Applications for a licence to transport also go through an assessment process that is graded depending on the type of licence being applied for. As mentioned above, application requirements for a licence to

transport are found in section 7 of the PTNSR 2015. This information is assessed by CNSC staff and documented on the appropriate evaluation form. A peer review is conducted before the licence is issued.

To assist with the assessment of authorizations and ensure no requirements are missed, checklists have been developed for different types of assessments. Evaluation and approval templates for transport licence assessments are also used by CNSC. Checklists are also available for any inspection performed under the PTNSR 2015. Examples of the types of checklists available include:

- Package Design Certificate Approval Checklist
- Special Form Radioactive Material Checklist
- Package Design Assessment Report Template
- Transport Licence and Field Inspection Checklist
- Carrier's Radiation Protection Program Verification Checklist
- Evaluation Form for Transport Licence Application

Appropriate templates and checklists are referenced in corresponding procedural documents where more fulsome procedures are required.

Packages that do not require certification by the CNSC, such as Type A packages, must still meet regulatory requirements. The user is responsible for demonstrating this. Section 42 of the PTNSR 2015 specifies what documentation the user must keep regarding this type of package.

6.9 REVIEW AND ASSESSMENT FOR OCCUPATIONAL EXPOSURE

Related to GSR Part 3: Requirements 19, 20, and 24 and demonstrate implementation in the review and assessment process:

General CNSC licence application requirements (i.e., those that apply generally to all types of nuclear facilities and regulated activities) are set out in sections 3 to 8 of the GNSCR. The CNSC also establishes regulatory requirements for licence applications dependent upon the nature and type of nuclear facility or regulated activity. These are found in the following regulations:

- Sections 3 to 8 of the Class I Nuclear Facilities Regulations (CINFR)
- Sections 3 to 5 of the Class II Nuclear Facilities and Prescribed Equipment Regulations (CIINFPER)
- Sections 3 to 8 of the Uranium Mines and Mills Regulations (UMMR)
- Sections 3 to 4 of the Nuclear Substances and Radiation Devices Regulations (NSRDR)

Related to occupational radiation protection; paragraph 3(1)(e) of GNSCR requires an application for a licence to include the proposed measures to ensure compliance with the RPR. Paragraph 3(1)(f) of GNSCR also requires any proposed action level for the purpose of section 6 of the RPR to be included with the application

Radiation Protection Regulations

As detailed in section 5.9, licence applications must demonstrate compliance with the requirements of the RPR, including a requirement for every licensee to implement a radiation protection program.

Radiation protection programs

As detailed in section 5.9, section 4 of the RPR requires that every licensee implement a radiation protection program. Refer to section 5.9 for more information on the radiation protection program and CNSC assessment of the radiation protection program.

Radiation protection programs must be submitted as part of the licence application process. The basic structure of a radiation protection program includes the licensee's policies and procedures for key elements of the radiation protection framework, including administrative organization, equipment, instrumentation and facilities, and procedures established to support the program. It includes a commitment to keep doses ALARA through the implementation of management control over work practices, personnel qualification and training, control of occupational and public exposure to radiation, and planning for unusual situations. The radiation protection program should be based on a graded approach that takes into account the location and magnitude of all radiological hazards present at the site of the licensed activity, and that addresses matters such as:

- organization and administration for radiation protection
- radiation protection training and qualification
- classification of work areas and access control
- local rules and supervision of work
- monitoring of individuals and the workplace
- work planning and work permits
- protective clothing, protective equipment, and respiratory protection
- design of facilities, shielding, ventilation/containment systems
- radiation protection equipment and instrumentation
- contamination control
- optimization of protection
- planning for unusual situations
- radiation protection program oversight

To support the implementation of the regulatory requirements for radiation protection, CNSC regulatory guides and standards have been developed for use by applicants and licensees. Details are provided in section 9.9, Regulations and Guides for Occupational Exposure.

A licensee's radiation protection program must consider the protection of all persons at the site of the licensed activity (i.e., nuclear energy workers, persons that are not nuclear energy workers and members of the public). This includes keeping radiation exposures ALARA and below regulatory dose limits. As per section 10 of the RPR, every nuclear energy worker must, on request by a licensee, inform the licensee of their dose record for the current one-year and five-year dosimetry periods. The licensee uses the dose record for the current one-year and five-year dosimetry periods to properly control the worker's dose for the remainder of the one-year and five-year dosimetry periods, and to ensure compliance with the regulatory dose limits provided in sections 13 and 14 of the RPR.

Action levels

Section 6 of the RPR defines an action level as "*a specific dose of radiation or other parameter that, if reached, may indicate a loss of control of part of a licensee's radiation protection program and triggers a requirement for specific action to be taken.*"

Action levels are designed to alert licensees before regulatory dose limits are reached, and are established as part of licensees' radiation protection programs. Licensees are responsible for identifying the parameters of their program that represent timely indicators of potential losses of control of their program. For this reason, action levels are facility/activity-specific and may change over time depending on operational and radiological conditions. By definition, if an action level is reached, a loss of control of some part of the associated radiation protection program may have occurred, and specific action is required. If an action level is reached, the specified action under the RPR consists of establishing the cause for reaching the action level, restoring the effectiveness of the radiation protection program, and notifying the CNSC within a specified period of time. The CNSC regulatory guide G-228, *Developing and Using Action Levels*, provides further details on regulatory expectations.

Review of monitoring programmes of licensees

CNSC staff assess licensees' methods for monitoring and recording occupational exposures, which are included within their radiation protection programs, to ensure that the methods meet regulatory requirements.

Section 5 of the RPR requires all licensees to ascertain and record doses assigned to anyone who performs duties associated with licensed activities or who is present at the site of licensed activities. Every licensee must ascertain and record the magnitude of exposure to radon progeny of each person, as well as the effective dose and equivalent dose received by and committed to that person. The manner in which these doses are determined is either by direct measurement as a result of monitoring (e.g., typically involving the use or application of personal monitoring equipment and techniques); or, if the time and resources required for direct measurement as a result of monitoring outweigh the usefulness of ascertaining the amount of exposure and doses using that method, by estimating them (e.g., methods that take into account non-personal monitoring results and other relevant data.

Any proposal to ascertain dose by estimation must be technically sound and substantiated. The decision to estimate should be justified on the basis of the time and resources that would otherwise be required for direct measurement. The CNSC regulatory guides G-91, *Ascertaining and Recording Radiation Doses to Individuals*, and G-129, *Keeping Radiation Exposures and Doses "As Low as Reasonably Achievable (ALARA)"*, provide further details on regulatory expectations.

Section 8 of the RPR also requires every licensee to use a dosimetry service licensed by the CNSC to measure and monitor the doses of radiation received by and committed to nuclear energy workers who have a reasonable probability of receiving an effective dose greater than 5 mSv in a one-year dosimetry period. For licensees that are not required to use CNSC licensed dosimetry for measuring and monitoring doses to workers, doses can be estimated or determined through direct monitoring using unlicensed techniques. Licensees may also propose methods for ascertaining internal doses that are not available from CNSC licensed dosimetry service providers. These techniques and methods are assessed by CNSC staff to ensure that they meet regulatory requirements.

Regarding workers who could be subject to radiological exposures due to contamination and the potential for intakes, including workers who use respiratory protective equipment, the CNSC has issued the following regulatory guides to assist licensees in developing bioassay programs:

- RD-58, *Thyroid Screening for Radioiodine*

- G-147, *Radiobioassay Protocols for Responding to Abnormal Intakes of Radionuclides*
- GD-150, *Designing and Implementing a Bioassay Program*

In particular, guidance is included on implementing confirmatory bioassay programs, which are intended to: verify assumptions about radiological exposure conditions in the workplace; that protection measures are effective; and, that routine bioassay is not required.

Licensees are obliged to retain occupational exposure records as per a result of requirements dictated by subsection 5(1) of the RPR for the period ending one year after the expiry of the licence that authorizes the activity in respect of which the records are kept, in accordance with subsection 28(1) of GNSCR. CNSC staff assess licensees' methods for maintaining records of occupational exposure for workers, which are included in radiation protection programs, to ensure that the methods meet regulatory requirements.

Dosimetry service providers

Section 3 of GNSCR and section 18 of RPR provide the licence application requirements to operate a dosimetry service. A dosimetry service measures and monitors doses of radiation. There are 8 categories of dosimetry services that may be licensed by the CNSC. The dosimetry service licence categories are established through the Cost Recovery Fees Regulations (CRFR), in Schedule 1:

1. Commercial – external (external radiation only)
2. Commercial – internal (internal radiation only)
3. Commercial – radon progeny
4. Commercial – consolidated licence (any two of external, internal, or radon progeny)
5. In-house – external (external radiation only)
6. In-house – internal (internal radiation only)
7. In-house – radon progeny
8. In-house – consolidated (any two of external, internal, or radon progeny)

CNSC dosimetry service licences authorize the operation of a dosimetry service that meets the regulatory requirements prescribed in the RPR, and in the CNSC S-106 *Technical and Quality Assurance Requirements for Dosimetry Services*, which specifies the accuracy, precision and quality assurance requirements for dosimetry services. Of note; REGDOC-2.7.2, *Dosimetry, Volume 2: Technical and Management System Requirements for Dosimetry Services*, is expected to be published in June 2019 and will be an update to and consolidation of CNSC S-106.

When the CNSC receives an application for a dosimetry service licence, CNSC staff assess the application to determine if the proposed activities meet applicable regulations and CNSC S-106 revision 1. A licence will only be issued if the CNSC is satisfied that the proposed dosimetry service program meets the applicable requirements. Dosimetry service licences are issued by a DO. Licences are generally issued for ten-year terms and may be renewed upon their expiration. During the licence term, the licensee may request amendments to their licence (for example the addition of new dosimetry methods), which are subject to the same requirements as new licence applications and requests for renewals.

The CNSC regularly monitors dosimetry service licensees to verify that they are complying with the requirements of their licences. Details are provided in section 7.9, Inspection of Occupational Exposure.

National Dose Registry

The NDR is Canada's national repository for dose records of Canadian workers who are monitored for occupational exposure to ionizing radiation. For more information on the NDR refer to section 1.9.

6.10 REVIEW AND ASSESSMENT FOR MEDICAL EXPOSURE

Medical exposure is covered by provincial and territorial departments and agencies and is therefore out of scope.

6.11 REVIEW AND ASSESSMENT FOR PUBLIC EXPOSURE

Related to GSR Part 3: Requirements 29, 32, 33, 47, 49, 50 and 51 demonstrate implementation in the review and assessment process:

Review and assessment activities related to public exposure

The CNSC has a comprehensive review and assessment program with ROB extensively supported by the CNSC's internal TSO, TSB. The Directorate of Environmental and Radiation Protection and Assessment (DERPA) hosts the technical expertise related to public exposure and radiation protection.

General CNSC licence application requirements (i.e., those that apply generally to all types of nuclear facilities and regulated activities) are set out in sections 3 to 8 of the GNSCR.

Before authorizing a new or modified practice, proponents/licensees are required to submit, as part of their licensing evaluation, a wide range of documentation for CNSC staff. These include the documentation related to safety analyses, physical design, waste management, and the radiation protection and environmental protection programs. The safety analyses documentation must demonstrate protection of the public in normal operations, anticipated operational occurrences and accident conditions. Physical design must demonstrate the incorporation of optimization and ALARA in facility design with respect to releases and associated public dose. Specialists from DERPA support core specialists (i.e., physical design and safety analyses specialists) within these fields or SCAs in the reviews of this documentation. CNSC specialists within DERPA serve as the core reviewers for the review of the radiation and environmental protection programs.

The adequacy of the documentation is reviewed against the radiation protection regulations, REGDOC-2.9.1, *Environmental Protection Environmental Principles, Assessments and Protection Measures*, and applicable standards. These are detailed in section 9.11.

REGDOC 2.9.1 requires the submission of an ERA. This ERA includes a radiological assessment of the dose to the public incorporating radionuclide releases specific to the proposed facility and site-specific environmental, land use and population information. For the initial licence application, the ERA is prospective in nature, however, the requirements for cyclical review and revision of the ERA (including public dose modelling) with accumulated release and environmental monitoring data provides retrospective confirmation against initial predictions. The submitted radiological dose modelling is evaluated by DERPA specialists against the RPR, REGDOC 2.9.1, and CSA standards associated with public dose modelling.

Authorized discharge limits are developed either by CNSC staff or proposed by licensees and reviewed for acceptability by specialist staff. Proposed DRL are extensively reviewed by staff against the CSA

standard N288.1, *Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities* with an emphasis on balancing conservatism with site-specific environmental characteristics, land use practices, and the suitability of the representative person(s) and the associated habits (life-style, diet, etc). REGDOC-2.9.2, *Controlling releases to the environment from nuclear facilities and activities*, is being developed to better document current practices and emphasise the role of optimization through application of the concepts of ALARA and BATEA as it relates to releases to the environment of both nuclear and hazardous substances.

As a facility or activity moves through its lifecycle, the ERA (plus associated public dose modelling) is periodically reviewed and revised (minimum 5-year revision cycle) using the accumulated site knowledge derived from operational experience, monitoring, special investigations, incorporation of advances in scientific knowledge and, where available, Indigenous traditional knowledge. These "living" ERAs, informed by real data from monitoring programs (emissions, effluents, environmental) and current science, are used to assess if the original environmental impact predictions are exceeded or may be exceeded in the future. In this manner, the initial ERA evolves through the life of the facility or activity, remaining current and becoming an increasingly more powerful site-specific tool. These reviews and revisions are submitted to CNSC for evaluation prior to becoming official updated revisions which become part of the licensing basis.

Monitoring programs of licensees and applicants

REGDOC-2.9.1 emphasises the link between the ERA and the associated discharge and receiving environment monitoring programs. These monitoring programs are submitted for CSNC technical review with respect to the adequacy of their design.

Staff technical reviews are completed to ensure that the discharge monitoring programs is designed to demonstrate confirmation with authorized discharge limits, action level requirements and additional supportive information required for transport and exposure modelling. Discharge monitoring designs are evaluated against two CSA standards:

- CSA N288.1, *Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities*
- CSA N288.5, *Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills*

The receiving environment programs are similarly evaluated by CNSC staff. Once again, staff review involves confirming linkages between predicted environmental outcomes in the ERA and evaluating the ability of the monitoring design to support assessment of performance against predictions. This primarily involves monitoring of the concentrations of nuclear and hazardous substances in various environmental compartments and in rare cases, direct monitoring of ecological effects.

Detailed CNSC reviews of the environmental monitoring program occur upon licence application and as part of the of the cyclical review cycle (five years or less) of the ERA and associated monitoring programs. The adequacy of the program is assessed against a number of CSA standards including:

- N288.1, *Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities*
- N288.4, *Environmental monitoring programs at Class I facilities and uranium mines and mills*

- N288.6, *Environmental risk assessments at Class I facilities and uranium mines and mills*
- N288.7, *Groundwater protection programs at Class I facilities and uranium mines and mills*

Assessment of public dose

Environmental monitoring to assess public dose is a core element of any environmental monitoring program. CNSC specialists evaluate the adequacy of the monitoring programs to support the calculation of public dose as it relates to the facility's site-specific prospective radiological dose modelling. Of key importance are elements of the public dose exposure modelling standard N288.1, *Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities* and the specific environmental monitoring standards N288.4, *Environmental monitoring programs at Class I facilities and uranium mines and mills* and N288.7, *Groundwater protection programs at Class I facilities and uranium mines and mills* which are used by CNSC staff when determining the adequacy of a licensees programs.

Periodic reports on public exposure by licensees

CNSC staff verify the implementation of the environmental protection measures (action levels, ERA, discharge and receiving environment monitoring) and evaluate the results on a quarterly/annual basis depending on the specified reporting requirements as stated in the REGDOC-3.1 series on reporting requirements. Monitored discharges are trended over the year (usually quarterly reporting) and assessed against discharge limits. Licensees report on public dose annually submitting the associated monitoring and modelling data for CNSC technical review.

CNSC staff also review and analyse the results of the licensees receiving environment monitoring program and the CNSC's IEMP for indirect evidence of environmental radionuclide activity levels not properly related to monitored releases.

Evaluation of indoor radon

Public protection associated with radon arising from NORM not associated with the nuclear fuel cycle is managed by HC. As radon is naturally occurring it is not federally regulated in the same way as other carcinogens. Rather, the responsibility to recognize radon testing and mitigation as a priority rests with other levels of government and with private individuals. In 2008, HC implemented the NRP to help reduce Canadians' exposure to radon. The NRP was founded on five components:

- research to identify Canadians most at risk
- outreach to help at-risk populations and the general public reduce their exposure to harmful levels of radon
- engagement with stakeholders to encourage inclusion of radon protection measures in practices, policies, codes and regulations
- guidance and standards for radon testing and mitigation
- establishment of accredited programs for radon testing and mitigation professionals

The overarching objective of the NRP is to reduce the number of homes and buildings with radon levels above the Canadian radon guideline of 200 Bq/m^3, thereby reducing the number of Canadians that will develop radon-induced lung cancer.

6.12 CONCLUSIONS AND ACTIONS

The CNSC meets the expectations of the IAEA safety standards for review and assessment.

CNSC staff conduct review and assessment to support licensing, certification, compliance, regulatory decision making and development of regulatory positions. These assessments are preformed based on the best available science taking OPEX into consideration. The review topics for technical assessments align with the specific areas within the CNSC's Safety and Control Area Framework. The CNSC's internal technical and scientific organization, TSB, conduct technical reviews and assessments to support the regulatory decisions of ROB. The conclusions from technical assessments may be used as compliance verification or to form recommendations to Commission or DOs on licensing decisions.

As part of the CNSC's environmental protection framework, licensees of larger, complex facilities (e.g., Class I and uranium mines and mills) are required to maintain a living site-specific ERA which is re-evaluated on a periodic basis (i.e., five years). The ERA serves as core assessment tool within the environmental protection framework for assessing a facility's environmental performance against predictions. The CNSC is the only regulator to carry forward the ERA directly into the licensing process and require that it be maintained and re-assessed throughout the lifecycle of the facility.

Opportunities have been identified in the CNSC's regulatory framework for review and assessment. As part of modernizing the CNSC's regulatory framework and for continuous improvement the following regulatory document is being revised or developed as part of the CNSC'S Regulatory Framework Plan.

- REGDOC-2.11.1, *Waste Management, Volume II: Management of Uranium Mine Waste Rock and Mill Tailings*
- REGDOC-2.11.2, *Decommission Planning* is being developed to supersede G-219 *Decommissioning Planning for Licensed Activities.*
- REGDOC-2.4.4, *Safety Analysis for Class IB Facilities*, is in development and will set out requirements and guidance for safety analysis reports for Class IB facilities, which include some fuel cycle facilities.

A 2018 self-assessment of the CNSC's Conduct of Technical Assessment Process identified areas for continuous improvement, particularly improvements to the repository used to search for assessments and improvements to the templates used to document approvals of assessments. A management action plan was developed and is being implemented to improve this process.

7. INSPECTION

7.1 GENERIC ISSUES

Related to GSR Part 1 (Rev. 1): Requirements 27 – 29, paragraphs 4.50 and 4.53

Scope of regulatory inspections

Once a licence is issued, CNSC staff continue oversight through the application of a compliance program. The CNSC undertakes necessary and reasonable measures to ensure compliance. These measures include influencing compliance awareness, conducting verification activities and enforcement as required.

The CNSC holds information sessions and communicates with licensees regularly, in order to increase licensees' awareness of their responsibilities, provide updates to regulatory expectations and to promote compliance.

Figure 21: CNSC staff conducting an inspection at a nuclear power plant

The purpose of CNSC inspections as stated in CNSC Process Document *Conducting an Inspection* is to ensure that:

- the licensee's activities, facilities, equipment and work performance meet regulatory requirements
- licensing basis documents are adhered to
- workers possess the necessary competence for the effective performance of their functions
- deficiencies and deviations are identified by the licensee and are corrected or justified without undue delay
- any lessons learned are identified by the licensee and communicated to stakeholders
- the licensee is managing safety in a proper manner

Conducting an Inspection also describes the types of inspections that the CNSC performs, which include Type I and Type II inspections, and reactive inspections.

Type I inspections are performed to verify licensee compliance with their programs, processes or practices. Type II inspections are performed to verify the results of the licensee processes and not the processes themselves. Reactive inspections can be triggered from desktop reviews, technical assessments, events or the occurrence of an unplanned regulated activities.

Inspections may be performed announced or unannounced. When the likelihood that the inspection outcome will be affected by advance notification is low, an announced inspection is conducted. When the likelihood that the inspection outcome will be affected by advance notification is high, an unannounced inspection is conducted.

The CNSC conducts compliance verification in alignment with applicable SCAs, previously described in section 3.6. The SCAs do not constrain the CNSC in its conduct of regulatory oversight activities and additional topics may be added as needed to provide satisfactory assurance of compliance.

The CNSC's compliance planning process ensures that compliance activities are carried out in a systematic and risk-informed manner. Annual compliance work plans outline the scope, scheduling, resourcing and timeframe for the activities to be undertaken during a compliance cycle for a particular licence or class of licence. The CNSC develops compliance verification activities that are based on the ongoing review of previous compliance findings and operational information. Once approved by the CNSC, any changes proposed by the licensee that could impact the compliance work plans are reviewed using a risk-informed approach and documented. Progress reviews are conducted periodically to monitor execution of the compliance work plan.

Results from the compliance program, desktop reviews and technical assessments are integrated and reported in the evaluation cycle of licensees. RORs are produced on a periodic basis and presented publicly during a Commission meeting where the regulatory oversight activities and licensee safety performance results are provided.

Authority of the regulatory body to conduct independent inspections

CNSC inspections are led by designated inspectors and are planned, controlled, coordinated, consistent and transparent (open to formal scrutiny). The objectives of the inspection are defined and communicated to licensees. Licensees are provided with inspection criteria, and the standards of performance and methodologies being used.

CNSC inspection powers are set out in the NSCA in sections 28 to 36, inclusive. Section 29 of the NSCA provides the Commission authority to designate inspectors. Under this designation, inspectors have the authority to enter and inspect under section 30 of the NSCA.

The powers of CNSC inspectors are defined in sections 30 to 33 of the NSCA and include access rights and the right for an inspector to be accompanied by any person of their choosing. Inspectors have the power to issue orders under section 35. Section 36 obliges persons found in places where an inspection occurs to give an inspector all reasonable assistance in performing their duties.

Inspection methodology

The CNSC inspects and reviews licensee activities and documentation to verify compliance with regulatory requirements and licence conditions. The frequency, scope, type and depth of the inspections and reviews are risk-informed.

To evaluate licensee compliance, the CNSC conducts both desktop reviews and field verification activities.

Desktop reviews generally entail consideration of documents and reports, such as quarterly technical reports, ACRs, special reports, and documentation related to design, safety analysis, programs and procedures. Licensees are required to provide information to the CNSC through scheduled reporting and event reporting. They are also expected to notify or submit written requests of such changes to the CNSC with changes to operating processes, procedures or programs.

Field verification activities include inspections and other surveillance and monitoring activities. Inspection is the process by which the CNSC inspectors gather data from the site of a licensed activity and analyze the data, for the purpose of confirming that workers, activities, facilities, and equipment are in compliance with the licensing basis. Inspection facts are collected using the following inspection methods:

- monitor and observe
- review procedures, records and other documents
- conduct interviews or discussions with personnel
- conduct sampling, testing and measurements

Where a deficiency or deviation is either self-identified by the licensee or detected by CNSC staff, the regulated party is expected to address or correct the situation promptly. If necessary, the CNSC may take enforcement action to compel compliance with regulatory requirements.

Inspection plans of the regulatory body

The CNSC process document titled *Conducting an Inspection* describes the CNSC's inspection process. The planning components of this process includes documenting the inspection trigger; establishing and document inspection purpose, scope, objectives and approach; identify and contact inspection team; determine and document inspection logistics; identify occupational health and safety requirements; determine and document inspection team performance objectives; determine scope of meetings with licensee. The inspection plan is approved by the director or supervisor ensuring that the process has been followed commensurate with the inspection being performed.

Following *Conducting an Inspection*, criteria are compiled which includes reviewing licensing basis and other documentation. A notification is sent to the licensee for announced inspections.

Training and qualification of inspectors

The CNSC's ITQP is a comprehensive training and qualification process for training and designating inspectors. The ITQP also incorporates refresher training for the inspectors. Refer to section 3.3 for additional information regarding the ITQP. Once deemed qualified by the Commission, inspectors are issued a Certificate of Inspector under the NSCA.

Participation of third parties in inspections and on joint inspections held with other authorities

Where there may be overlap in regulatory oversight with other regulatory bodies, the CNSC coordinates its verification activities to optimize efficiency and reduce administrative burden on licensees. MOUs documenting the cooperation arrangements between the CNSC and other regulatory bodies are discussed in sections 1.5 and 3.4.

7.2 INSPECTION OF NUCLEAR POWER PLANTS

Related to GSR Part 1 (Rev. 1): Requirements 27 – 29

Inspections of CNSC-licensed nuclear power plants

A compliance verification plan outlines inspection activities that are performed by inspectors to verify that licensees are compliant with regulatory requirements (i.e., NSCA, regulations, Power Reactor Operating Licences and the licensing basis). The annual compliance verification plan is developed using a risk-informed approach and inputs from the five-year Power Reactor Regulatory Program (PRRP) Baseline Compliance Verification Plan. The annual compliance verification plan, which is applicable to an operating NPP that is fully compliant with all regulatory requirements, the plan is also informed by licensee-specific performance data, plant specific design, and new or existing projects (initiatives) at the NPP.

Along with inspections, the compliance verification plan includes surveillance and monitoring activities, review of periodic reports, review and assessment of events, and other compliance assessment activities that evaluate licensee performance and inform the regulatory program.

To evaluate licensee performance, inspectors execute various types of inspections at NPPs. Inspections at NPPs are led by qualified inspectors with the support of inspectors-in-training and specialists as needed. As previously described in section 7.1, Type I, Type II, and field inspections are performed by the CNSC. In addition, augmented inspections, independent incident investigations, and statutory investigations can also be conducted. Each inspection type follows a documented and approved process. Specific procedures and field inspection guides including standard checklists have been developed for the inspections performed at NPPs in collaboration with CNSC specialist staff. Inspections can be scheduled as part of the annual plan or can be reactive (unscheduled), based on the opportunity presented to perform the inspection at a particular NPP.

Announced inspections are those for which the licensee has been notified in advance by the regulator. The timing of the announcement may vary according to the circumstances of the inspection to be performed but, in most cases, is done to ensure licensee personnel are available, the activity can be inspected as scheduled, or documentation is available at the time of the inspection. A “no-surprises” approach ensures that inspections are conducted in an open and transparent manner. Unannounced inspections are those performed with no advance notification to assess actual plant conditions at any time during normal plant operations.

CNSC inspectors at nuclear power plants

For each NPP, RPD manages the development of the annual compliance verification plan, which includes inspection activities. This workgroup includes regulatory program officers, a regulatory program director located at CNSC headquarters and inspectors stationed at the NPPs. There are approximately 29

qualified inspectors and 5 inspectors-in-training located at CNSC's headquarters and at the four NPP site offices. In 2017-18, CNSC staff conducted 109 inspections at NPPs, many of which are supported by subject matter experts. CNSC staff follow the *Conducting an Inspection* process and the applicable inspection procedure, which follow a format that could include an opening meeting, field and document verifications, discussions with licensee staff, preliminary findings, an exit meeting, and a final report to the licensee. Findings that require licensee action are tracked through formal action items and are recorded in the CNSC's RIB.

Progress on inspections planned as part of the annual compliance verification plan is reported on a quarterly basis at the regulatory and technical management meetings and annually in the NPP ROR presented to the Commission and published on the CNSC's external website.

7.3 INSPECTION OF RESEARCH REACTORS, FUEL CYCLE FACILITIES, WASTE MANAGEMENT AND DECOMMISSIONING FACILITIES

CNSC staff within the CNSC's Directorate of Nuclear Cycle and Facilities Regulation (DNCFR) are responsible for the conduct of inspections at research reactors, fuel cycle facilities, including uranium mines and mills, waste management facilities and decommissioning activities.

Given the similarity in the conduct of inspection for these facilities, the information has been combined in this section to minimize repetition.

Related to SSR-3 paragraphs 3.13 – 3.16

Inspections of research reactors and fuel cycle facilities

Within DNCFR a risk ranking process is applied to all nuclear facilities under its scope, which determines the minimum frequency of compliance activities and inspections for each nuclear facility, which then feeds into the baseline compliance plan. The risk ranking exercise is carried out in consultation with CNSC specialist groups as described in CNSC work instruction, *Assign Risk Ranking to the Facilities and Activities in order to Determine Compliance Activities*. This graded approach is driven primarily by assessment of the risk associated with the activities at facility, and the performance history of the licensee. CNSC inspectors perform inspections at a medium-risk facility at a higher frequency than the low-risk facilities.

DNCFR baseline plans for inspections cover a 10-year period. Compliance plans are also generated every year to plan for the resources and inspections efforts that may be adjusted to reflect specific needs.

Typically, 1-2 people are required to conduct a Type II inspection. This is often supplemented with inspectors-in-training, specialists, project officers, students and other staff who either actively participate in conducting the inspection, or observe. The number and specializations of participants in an inspection is determined by the scope of the inspection on a case by case basis. If compliance issues are identified with a licensee, the inspection program may include supplemental and reactive inspections to address areas that need further regulatory attention. CNSC inspectors plan inspections to cover all 14 SCAs over an inspection cycle.

Related to GSR Part 1 (Rev. 1): Requirement 29, paragraphs 4.51 and 4.52

Inspection processes and procedures

Inspections are carried out in accordance with the *Conduct DNCFR Inspections* work instruction, which aligns to the CNSC *Conducting an Inspection* process.

This work instruction discusses the roles and responsibilities of inspectors and details each of the four phases of conducting an inspection including a description of all tasks to be conducted.

Templates are available for documents that are required to be completed throughout the inspection process including: inspection plan; inspection notification letter; inspection documentation tracking sheet; inspection agenda; compliance matrix; inspection meeting attendance records; inspection facts and findings report; inspection close-out form; inspection report peer review form; inspection report notification letter; and final compliance inspection report. Templates are also available for some non-mandatory documents that may be produced throughout the inspection process such as inspection opening meeting remarks and a pre-job brief.

Inspection techniques and methodology

Inspections are conducted in four phases: planning; execution; reporting; and follow-up. The main tasks for each phase are summarized in table 6.

Table 6: Summary of task for each phase of an inspection

Inspection phase	Task
Planning	• identify and document the trigger for the inspection activity • document inspection purpose, scope and objective statements • establish inspection type and assign inspection identification number; establish inspection team • plan inspection logistics; identify occupational health and safety requirements; document inspection team performance objectives • establish and submit inspection plan; compile compliance matrix • approve inspection plan; and notify licensee of inspection
Execution	• access site of licensed activity • communicate the start of the inspection • address any health and safety provisions or concerns • execute field inspection; preliminary analysis of facts • develop, document and issue preliminary inspection facts and findings; and close field inspection
Reporting	• final analysis of facts and establishment of findings • prepare inspection report; submit inspection report for approval • issue formal inspection report to licensee.
Follow-up	• compile record of inspection to file • input compliance actions into tracking database • track and close actions; and close inspection file

Reactive inspections within DNCFR may be triggered by an event, a series of events or a trend in licensee performance; or as a result of a unique opportunity or infrequently conducted licensed activity.

Facts are typically collected using the following inspection methods: monitor and observe; review procedures, records and other documents; conduct interviews or discussions with personnel; and conduct sampling, testing and measurements.

Reporting of inspection results and corrective actions

An inspection report is drafted which appropriately details the pertinent information from the inspection, in line with the requirements of each division within DNCFR. At a minimum, DNCFR inspection reports include:

- a brief overview of the inspection process
- purpose, scope and objective statements, and identification of the inspection trigger
- a listing of the inspection team, and identification of the lead inspector
- details on relevant inspection facts and observations
- inspection findings, linked with related facts; non-compliances with a clear link to regulatory requirements or expectations that are not being met; detailed compliance actions to address each non-compliance
- statement of conclusions
- the compliance matrix

Director approval of the inspection report must be documented prior to issuance of the report to the licensee.

The lead inspector is responsible for ensuring that the inspection report is issued within 60 working days of the inspection. An inspection report notification letter is to be issued with the inspection report to the appropriate licensee contact.

Once the report is issued, all actions assigned to the licensee in the inspection report are input into the RIB database. Once the licensee has addressed a non-compliance to the satisfaction of the inspector or project officer, the action is considered closed. The licensee must be formally notified of the closure, and database(s) must once again be updated. Significant inspection results are noted and presented to the Commission in RORs.

Use of inspections results by the regulatory body in development of processes

Inspection results are used by CNSC staff to assist with future regulatory activity plans. As well, lessons learned from inspections are tracked and used both for planning upcoming inspections and to improve and streamline the inspection process.

7.3.1 Inspection of research reactors and fuel cycle facilities

Related to GSR Part 1 (Rev. 1): Requirement 29, paragraphs 4.51 and 4.52

Inspections of research reactors and fuel cycle facilities

Figures 4 to 7 show the location of the uranium mines and mills, decommissioned mine and remediation sites; uranium processing facilities; nuclear substance processing facilities and research reactors at which CNSC staff from DNCFR conduct inspection activities.

In 2017-18, CNSC staff conducted 23 inspections at research reactor facilities, 47 inspections at uranium and nuclear processing facilities and 33 inspections at uranium mines and mills.

Number of inspectors for research reactors and fuel cycle facilities

In DNCFR there are 23 qualified inspectors, 13 inspectors-in-training, and numerous specialists that support inspections at the research reactors and fuel cycle facilities, including uranium mines and mills.

7.3.2 Inspection of waste management facilities and decommissioning activities

Related to GSR Part 5: paragraphs 4.22, 5.14, 5.15, 5.20
SSR-5: paragraphs 3.15, 3.48, 5.19

Related to GSR Part 6: paragraph 8.5

Inspections of waste management facilities and decommissioning activities

Figures 8 and 9 show the locations of the waste management facilities and nuclear facilities undergoing decommissioning in Canada.

CNSC staff within the Wastes and Decommissioning Division are responsible for carrying out compliance for waste management facilities and activities and for nuclear facilities undergoing decommissioning.

Related to GSR Part 1 (Rev. 1): Requirement 29, paragraphs 4.51 and 4.52

Number of inspectors for waste management facilities and decommissioning activities

In 2017-18, CNSC staff conducted 42 inspections of nuclear waste management facilities and major decommissioning projects.

There are four designated inspectors within the Wastes and Decommissioning Division. In addition, waste and decommissioning specialists also participate as subject matter specialists for waste management focused inspections of nuclear facilities.

7.4 INSPECTION OF RADIATION SOURCES FACILITIES AND ACTIVITIES

Related to GSR Part 1 (Rev. 1): Requirements 27 – 29 and GSR Part 3: Requirement 3

Inspections of radiation sources facilities and activities

Licensed radiation source facilities and activities comprise a broad variety of classes and types within the CNSC's regulatory framework (refer to figure 10). As such, while the CNSC's approach to inspections for these facilities and activities is based on the core CNSC process document *Conduct of Inspection*, it can vary depending on the facility or activity.

The bulk of inspections carried out on radiation sources are performed within DNSR by CNSC staff in the Accelerators and Class II Facilities Division (ACFD) and the Operations Inspection Division (OID). Inspections of certain Class IB facilities, including nuclear substance processing facilities, and of uranium mines and mills are carried out by divisions within DNCFR. The inspection process for radiation sources at Class IB facilities is described in section 7.3. The inspection process for radiation sources found on NPP sites is described in section 7.2. This section will focus on the inspections carried out by CNSC staff in DNSR.

While the over-arching inspection process is the same for both ACFD and OID, there are some minor variations due to differences between the ACFD and OID service lines, such as typical licensed activities being inspected, complexity, and number of licensees.

Class II facilities, as well as Class IB facilities that are particle accelerators, are inspected by ACFD. A Class II facility is defined in the CIINFPER. Servicing of Class II prescribed equipment is also regulated by ACFD.

OID inspects all licensees possessing nuclear substances above a pre-defined activity/quantity (known as the "exemption quantity", or EQ) below which risk is negligent, and therefore not regulated/licensed by CNSC. Radiation devices are defined in NSRDR and inspected by OID. Servicing of radiation devices is also inspected by OID.

Related to GSR Part 1 (Rev. 1): Requirement 29, paragraphs 4.51 and 4.52

Number, qualification and training of inspectors

There are approximately 175 active Class II licences issued by CNSC. There are currently 13 fully qualified inspectors in ACFD, and 1 inspector in training.

There are approximately 2300 active Nuclear Substance and Radiation Device licences issued by CNSC. There are currently 12 fully qualified inspectors in OID, and 4 inspectors in training. OID typically performs approximately 5 type I inspections and 900 type II inspections annually.

Both OID and ACFD have on-the-job training (OJT) programs for their inspectors which follow the over-arching ITQP program. For OID, the OJT program is defined in the document "*Providing DNSR OID Inspector Training*" and its supporting documents. For ACFD, the OJT program is defined in the document "*OJT Inspector Guide for ACFD*" and its supporting documents.

There are no "on-site inspectors" in DNSR. All inspectors operate from headquarters or regional offices and travel to perform inspections.

Inspection methodology

CNSC staff within DNSR perform three main types of inspections: type I, type II and desktop reviews.

ACR's are assessed by licensing staff in NSRDLD and ACFD, and reviewed prior to inspection by ACFD and OID inspectors. In addition to the ACR, desktop reviews may also be performed on specific documentation/records requested from a licensee. These documents may be requested for a variety of reasons, such as follow-up from an inspection and whistleblower reports. Typically, in such situations, these documents are assessed against the same criteria (or a subset thereof) used during a Type II inspection or a technical assessment, depending on the specific situation.

Inspections conducted by DNSR are consistent with the CNSC "*Conduct of Inspection*" process described in section 7.1; Inspections are planned, prepared, conducted, reported on and followed up as needed.

All of the activities, material, devices and equipment regulated by DNSR are categorized into groupings known as "usetypes". A usetype can be defined as a specific category of nuclear material, radiation device, prescribed equipment or regulated activity. DNSR uses a Risk Informed Regulatory Program (RIRP) which defines relative risk of usetypes. Usetypes are assigned to high, medium or low risk

groupings based on the RIRP. These rankings are part of the determination process for setting inspection frequencies.

The scope of the inspections in DNSR depends on the scope of previous inspections, complexity of the licensed activities and compliance history. More complex licensed facilities and activities may require more in-depth, SCA specific inspections. Broader scope inspections are possible for moderately complex and low complexity licenses. The scope of an inspection could include any location where the licensee may be conducting licensed activities, any activity, or any SCA as defined by the CNSC.

Documents for conducting inspections

Inspection criteria are pre-determined for each usetype, and arranged into worksheets or checklists which the inspector uses as a referential during the inspection. Licensee performance is weighed against these criteria, and a determination is made as to whether the licensee is compliant or non-compliant with each criteria line item. The worksheet acts as guidance for the inspector, in that the inspector is not constrained to looking at only the items on the worksheet. Inspectors are highly trained in the requirements of the NSCA, regulations and licence conditions, and if any non-compliance with these is found (even if it is not on the standardized checklist for the usetype being inspected), it is documented and reported to the licensee. Sets of procedures, guidance documents and checklists available to inspectors in DNSR include:

- General, Type I and Type II Inspection Procedures
- Inspection Criteria Sets and Checklists
- Inspection Proposal and Checklist
- Assessment Procedures
- Regulatory Program Oversight documents
- Business rules and standards
- Inspection guidance by usetype

Reporting of inspection results

When planning to conduct an announced inspection of a particular licensee, the first step is to contact the licensee representative, typically to ensure availability of one or more licensee representatives on the proposed inspection dates.

Once dates have been tentatively arranged, a formal notification of the inspection is sent to the licensee. For Type I inspections, this notification is delivered a minimum of 28-60 days prior. For Type II inspections, notification must be sent at least one business day before the beginning of the inspection visit.

For inspections of complex or novel operations, a pre-inspection visit may be advisable or necessary. This is typically done to ensure that when the entire inspection team is onsite during the formal inspection, time is spent most effectively on performing the inspection, as opposed to becoming familiarized with the licensee's operations.

Upon arrival at the site of the inspection, the inspector(s) will hold a short opening meeting with the licensee representative(s). The licensee is encouraged to invite any interested party, however the

meeting is usually attended by the radiation safety officer and other personnel who have duties pertaining to radiation safety.

During inspections, the CNSC follows a "no surprises" approach. Licensee representatives are kept apprised of inspection results and progress throughout the duration of the inspection, as opposed to revealing them only at the end of the visit. Licensee representatives are typically invited to "shadow" the inspection team and participate/observe in any measurements or observations using their own equipment. For Type I inspections, interviews of licensee personnel are confidential, however the licensee may elect to have a representative present as a "silent observer" who does not participate in the interview. Interviews are used to gather information about the performance of the program rather than the performance of the individual.

At the end of the inspection visit, a closing meeting is held between the inspection team and the licensee representative(s). With the exception of security inspections, the licensee is encouraged to invite any interested party, however the meeting is usually attended by the radiation safety officer and other personnel who have duties pertaining to radiation safety. If deemed necessary and appropriate by the inspector, licensee management, or those licensee staff with formal authority to enact financial and/or human-resources may be requested to attend.

After departing the licensee site, communication between the licensee representative and the inspector continues as necessary. Most DNSR licensees respond to any inspection non-compliances within the allotted time period and in most cases non-compliances are resolved with no further enforcement measures necessary. Wherever possible, CNSC endeavours to work collaboratively with its licensees to foster safe and secure operations, however effective and graduated enforcement measures are available when necessary.

Following the inspection of accelerator and Class II facilities, all corrective actions are tracked using the RIB database. As described in section 3.7, RIB is an internally developed database used for tracking licensing and compliance action items.

After an inspection of nuclear substances and radiation device the follow-up activities are tracked as follows:

- For Type I inspections, programmatic/systemic corrective actions are tracked using CNSC's RIB in the same manner as Class II follow-up explained above.
- For Type II inspections, and for non-programmatic/systemic non-compliances found during Type I inspections, corrective actions are tracked in DNSR's licensing/compliance database, known as LOUIS. LOUIS is the database which also generates the inspection worksheets/checklists used during the inspection. Each criteria line item has a database field where corrective actions for that line item are tracked, and appropriate grading assigned following compliance verification.

Regardless of the type of inspection performed or the type of licence inspected, before any actions can be closed, the licensee must demonstrate to the CNSC that the non-compliance has been corrected, and that measures have been put in place to prevent recurrence. This follow up is tracked and documented in RIB or LOUIS.

In cases where significant or major non-compliances are found, the CNSC may return after a reasonable time period (usually within a year) to ensure that corrective actions taken by the licensee have been or are being effective in correcting the non-compliance and preventing recurrence.

For major non-compliances, other enforcement measures may be taken. CNSC uses a graduated approach to enforcement, as detailed in the CNSC SAET process document.

Application of inspection results by the regulatory body for development of its processes

Operational meetings are held periodically in ACFD and OID during which the results of previous inspections are discussed with the division. These meetings are used to discuss a wide variety of topics such as:

- description of the licensees being inspected, and their licensed activities/facilities
- summary of inspection personnel and methodology
- summary of observations, records, interviews performed during the inspection
- description of non-compliances found during the inspection
- discussion of any unusual or novel situations encountered during the inspection
- discussion of any procedural difficulties encountered during the inspection, if applicable
- need for follow-up inspections for a given licensee
- recommendations for best practices and lessons learned, if applicable
- issuance of a legal order to a licensee during the course of an inspection
- abnormally complex inspections
- conclusion of a Type I inspection
- consistency in regulatory interpretation
- roundtable discussion

DNSR also has a Quality Assurance Committee which meets periodically. The Quality Assurance Committee has representatives from all DNSR divisions, including an inspector from each of OID's regional office locations, as well as subject matter experts from specialist divisions as required, such as Radiation Protection Division. The committee meets to discuss regulatory interpretation and gain clarity and consistency the application of regulatory requirements by inspectors.

CNSC regulations and other regulatory instruments, such as REGDOCs, are periodically amended, and feedback is often provided by DNSR on improvements to these instruments. This feedback is generally the result of inspection findings and compliance results trending. In many circumstances, OID inspectors or staff participate in the amendment of the regulatory instruments as subject matter experts.

DNSR inspectors also participate in a CNSC-wide Inspectors Forum on an annual basis, where topics and lessons learned are discussed amongst all certified inspectors from all CNSC service lines. The outputs of the Forum help to guide corporate initiatives and priorities, based on the discussion and priorities identified by attendees.

7.5 INSPECTION OF TRANSPORT ACTIVITIES

Related to SSR-6: paragraphs 302, 306, 503,582, 801

Inspections on the transport of nuclear substances

The responsibility to verify compliance with the safe transport of nuclear substances in Canada is shared by federal inspectors (CNSC and Transport Canada) and the provincial/territorial inspectors.

All regulatory requirements related to the packaging and transport of nuclear substances are set in PTNSR 2015 and TDG Regulations. Both sets of regulations apply to all modes of transport in Canada. Compliance verification is performed against all of these requirements. Inspection of a shipment can be performed at any location within Canada and all shipments of radioactive material must be in compliance with the PTNSR 2015 and the TDG Regulations.

CNSC inspectors inspect consignors, consignees and carriers of radioactive materials, following a risk-informed approach. For nuclear facilities and mines, transport inspections are planned based on operational activities and past compliance verifications for the facility. For other licensed activities where nuclear substances are used, transport-related inspections are part of regular risk-informed compliance verifications. For example, industrial radiography is identified as a high-risk activity and, as such, inspections (including transport and packaging activities) are conducted on an annual basis. CNSC inspectors verify compliance with both the PTNSR 2015 and the TDG Regulations and are trained for conducting inspection for all modes of transport.

Transport related inspections are conducted irrespective of the package type being transported; verification of compliance with all regulatory requirements applicable to the package type being inspected is performed. All packages used for the transport of nuclear substances, whether they require CNSC approval or not, may be inspected.

Announced and unannounced inspections can be performed and depend on the risk associated with the activities performed and the licensee's or carrier's history of compliance performance. The NSCA allows for these unannounced inspections as long as certain criteria are respected. Inspections may also be reactive due to an unplanned occurrence. In routine compliance verification activities, inspections are generally planned and announced in order to facilitate coordination and logistics, including scheduling of interviews with key personnel.

Related to GSR Part 1 (Rev. 1): Requirement 29, paragraphs 4.51 and 4.52

Corrective actions and enforcement measures

Non-compliances are considered resolved only when the CNSC is satisfied that the licensee or carrier has put in place effective actions to address them. The CNSC also has trained investigators who can, if needed, perform root cause investigations to assist inspectors.

Follow-up inspections may be conducted to verify that the actions have been effectively implemented or, in cases where the non-compliances are of low-risk, in terms of health and safety, those would be verified during the next planned inspection.

As a general work practice, CNSC staff inform the licensee or carrier verbally of non-compliances with regulatory requirements or licence conditions and leaves a preliminary report with them following the compliance inspections. A formal letter and report are sent after the preliminary report and discussion.

Roles and responsibilities for inspection of transport activities

Transport Canada's role is to serve the public interest through the promotion of a safe and secure, efficient and environmentally responsible transportation system in Canada. The transport of dangerous goods by air, marine, rail, and road is regulated under the federal Transportation of Dangerous Goods Act (TDG Act) and the TDG Regulations. The powers of inspectors are described in the TDG Act. Transport Canada inspectors are specialized inspectors (multimodal, air, marine and railway inspectors) and inspect consignors and carriers of dangerous goods (including Class 7, radioactive material). They ensure compliance with both the PTNSR 2015 and the TDG Regulations. Inspections are conducted at consignor, consignee and carrier facilities.

The CNSC cooperates with and has a MOU with Transport Canada. A coordinated regulatory approach is achieved in this way and through cross-referencing of that scheme in the PTNSR 2015.

Provincial-Territorial inspectors inspect carriers of dangerous goods (including Class 7, radioactive material). They ensure compliance with the PTNSR 2015 and the TDG Regulations as well as the respective applicable provincial regulations through various means such as roadside inspections at weigh scales.

Transport Canada, the CNSC and provincial enforcement agencies meet twice a year as part of the National Compliance Working Group (NCWG) to discuss any potential issues regarding the application of the TDG Regulations.

Qualification and training of CNSC inspectors for the transport of nuclear substances

The CNSC ITQP is a training program that covers core competencies for all inspectors including all CNSC regulations. It includes training specific to the facilities and activities being inspected as well as OJT. In addition, all inspectors also receive training on the TDG Regulations and PTNSR 2015 as part of their inspector training program. The CNSC has two Transport Officers whose responsibilities are focused on the packaging and transportation of nuclear substances.

Processes and documents for inspections

The CNSC process document *Conducting an Inspection* applies to conducting inspection of transport activities.

CNSC Transport Officers follow a work instruction, *How to Verify Compliance under the PTNSR, 2015*. This compliance verification program is specifically aimed at carriers of nuclear substances, at those in possession of a transport licence, and at the manufacturing of packages certified by the Commission. Various checklists are used to ensure all regulatory requirements are met. This work instruction does not cover the CNSC licensees that transport or present for transport nuclear substances and are inspected in accordance with the inspection plans as described above.

For carriers of nuclear substances that are not licensed by the CNSC, the verification is performed as part of the compliance activities related to the verification of the proper implementation of work procedures

and radiation protection programs as required under subsection 25(4) and section 31 of the PTNSR 2015. To assist in the compliance verification of carriers, the information contained in regulatory document REGDOC-2.14.1, *Packaging and Transport, Volume II: Radiation Protection Program Design for the Transport of Nuclear Substances* is used as guidance material.

For package manufacturers, the internal *Procedure Conduct of Manufacturing Inspections* is followed. This procedure encompasses activities relating to the conduct of regulatory inspections of transport package and radiation device manufacturers.

For all types of inspections, compliance verification checklists are available, including:

- Type II Transport Inspection Checklist
- Carrier's Radiation Protection Program Checklist
- Transport Licence and Field Inspection Checklist
- TLSSD Record of Manufacturing Inspection Form
- TLSSD Type I Manufacturing Inspection Checklist
- TLSSD Type II Manufacturing Inspection Checklist: Welding Process

7.6 INSPECTION OF OCCUPATIONAL EXPOSURE

Related to GSR Part 3: Requirements 19-24, 27, 28 and 52 and demonstrate implementation in the inspection process

The CNSC inspection process is outlined in section 7.1, Generic Issues. Compliance with the requirements of the RPR are included in inspection activities for CNSC licensed nuclear facilities and regulated activities as detailed in sections 7.2 – 7.5.

The radiation protection program forms part of the licensing basis for the nuclear facility or regulated activity. To verify compliance with licence conditions and regulations, CNSC staff perform compliance activities to verify licensees' compliance with the RPR and radiation protection program requirements. CNSC staff review documentation and operational reports submitted by licensees and evaluate the implementation of licensees' radiation protection programs. CNSC staff may also conduct on-site inspections to verify compliance with regulatory requirements.

Licensees' records that are generated as a result of RPR requirements must be made available to CNSC staff during compliance verification activities.

Inspection of dosimetry service providers

As detailed in section 6.9, Review and Assessment for Occupational Exposure, CNSC dosimetry service licences authorize the operation of a dosimetry service that meets the regulatory requirements prescribed in the RPR, and in S-106, *Technical and Quality Assurance Requirements for Dosimetry Services*, which specifies the accuracy, precision and quality assurance requirements for dosimetry services.

The CNSC regularly monitors dosimetry service licensees to verify that they are complying with the requirements of their licences. CNSC staff evaluate compliance by licensees in the following ways:

- Review of annual compliance reports submitted by licensees
- On-site compliance inspections

- Reviews of reported unplanned events (as specified by licence conditions) submitted by licensees
- Reviews of failed performance tests
- Reviews of results of independent testing
- Review of corrective actions proposed by licensees, further to issues identified in annual compliance reports, site inspection, unplanned events, performance test failures, and independent test failures

7.7 INSPECTION OF MEDICAL EXPOSURE

Medical exposure is covered by provincial and territorial departments and agencies and is therefore out of scope.

7.8 INSPECTION OF PUBLIC EXPOSURE

Related to GSR Part 3: Requirements 27-31, 33 and 47 and demonstrate implementation in the inspection process

Inspection for protection of members of the public

This section addresses activities related to on-site inspection of aspects of a licensees radiation and environmental protection programs which relate to public dose. This primarily involves inspections as they relate to implementation of programs and the documentation and management of non-compliances to their programs through their on-site EMS.

The CNSC implements a comprehensive inspection program with the licensing divisions within ROB which is supported by staff within TSB. Specialists in the Radiation Protection Division are involved in inspections of the licensees radiation protection program as a whole with a specific focus on worker protection. Specialists in the Health Sciences and Environmental Compliance Division (HSECD) are involved in inspection activities related to public dose as it relates to a licensees effluent and emissions control programs and/or associated monitoring activities supporting the calculation of public dose.

HSECD specialist staff serve as subject matter experts supporting inspections as necessary with the CNSC staff in the licensing divisions of ROB leading the inspection. Subject matter experts participating in an inspection must meet the relevant training requirements identified in section 7.1.

Under the EP SCA there are a number of specific areas which conform to the EP measures identified in REGDOC-2.9.1, *Environmental Protection: Environmental Principles, Assessments and Protection Measures*. One of the core specific areas associated with protection of the public is effluent control and monitoring. A Type II inspection guide entitled *Effluent control and monitoring* has been developed in accordance with the PRRP Type II *Inspection Guide Development Procedure*. The objectives of such an inspection are to confirm:

- releases of nuclear and hazardous substances are controlled
- effluent and emissions monitoring program is implemented
- action levels are in place and appropriate actions are taken during exceedances
- licensee has an established an EMS that is designed and implemented appropriately

Inspections may be completed for any of the specific areas under the EP SCA which include, effluent and emissions control, EMS, assessment and monitoring, protection of the public and ERA at the request of licensing divisions within ROB.

Other than aspects unique to the specific areas being inspected (e.g., effluent emissions and controls) inspection requirements and practices related to public dose conform to those outlined in the general inspection requirements and the sector specific requirements provide in sections 7.2 through 7.5 inclusive.

7.9 CONCLUSIONS AND ACTIONS

The CNSC meets the expectations of the IAEA safety standards for inspections.

The legal basis for inspection and enforcement is provided in sections 28 to 36 of the NSCA. CNSC inspections are led by designated inspectors. Where there is overlap in regulatory oversight with other regulatory bodies, the CNSC coordinates its verification activities to optimize efficiency. The CNSC also makes use of external agencies in a few specialized areas (e.g., pressure boundary, fire protection inspections). Directorate compliance plans are developed to determine the resources and inspection efforts in the short term (i.e., annually) and the long term (i.e., 10 years). A graded approach is used in a risk ranking process to inform the minimum frequency of compliance activities for each nuclear facility.

Inspectors receive training through the CNSC's Inspector Training Qualification Program (ITQP) and once deemed qualified are issued a Certificate of Inspector under the NCSA. The ITQP provides a consistent approach to train, qualify and assess CNSC inspectors as well as provide inspectors with the skills and knowledge required to perform their duties.

8. ENFORCEMENT

8.1 ENFORCEMENT POLICY AND PROCESSES

Related to GSR Part 1 (Rev. 1): Requirements 30 and 31, paragraphs 4.54, 4.57 – 4.60

Graded approach to enforcement

The CNSC uses enforcement to compel compliance and to deter future non-compliance with regulatory requirements and licence conditions applicable to the licence that has been issued. The CNSC does not generally take enforcement action to punish but rather to encourage compliance, to maintain continued safety and to deter further non-compliance.

In accordance with the CNSC's regulatory philosophy, licensees are expected to

- oversee their activities
- regularly monitor, identify and correct non-compliances
- verify the effectiveness of their corrective actions

Licensees identify and self-correct non-compliances on an ongoing basis. The CNSC intervenes if the self-correction process is ineffective and in cases of safety significant non-compliances, the CNSC responds immediately.

The CNSC uses a graded approach to enforcement. When a non-compliance has been identified the appropriate enforcement action is determined, taking into account such considerations as:

- the risk significance of the non-compliance with respect to health, safety, security, the environment and international obligations
- the circumstances that lead to the non-compliance (including acts of willfulness)
- the compliance history of the licensee
- industry-specific considerations

The CNSC's SAET process document includes guidelines on the selection of appropriate enforcement actions that the CNSC can take in the event of deviation from, or non-compliance with the NSCA and its associated regulations and licence conditions.

Application of enforcement to non-compliances to regulatory requirements and with any conditions specified in the authorization

Licensees are obliged to comply with regulatory requirements, which are set out in:

- the NSCA
- regulations made under the Act
- licences (including licensing basis), decisions, certificates and orders
- the various commitments and obligations to which Canada has agreed

Pursuant to subsection 12(2) of the GNSCR, "*every licensee who receives a request from the Commission or a person who is authorized by the Commission for the purpose of this subsection, to conduct a test, analysis, inventory or inspection in respect of the licensed activity or to review or to modify a design, to modify equipment, to modify procedures or to install a new system or new equipment shall file, within*

the time specified in the request, a report with the Commission that contains" the information listed in paragraphs 12(1)(a) to 12(1)(e).

The NSCA authorizes inspectors, DOs, or the Commission to issue orders. In accordance with subsection 35(1) and paragraph 37(2)(f) of the NSCA, inspectors and DOs may order that a licensee take any measure that the inspector considers necessary to protect the environment or the health or safety of persons or to maintain national security or compliance with international obligations to which Canada has agreed. In accordance with section 47 of the NSCA, in case of an emergency, the Commission may, without conducting any proceedings, make any order that it considers necessary to protect the environment or the health and safety of persons or to maintain national security and compliance with Canada's international obligations.

Section 38 of the NSCA provides the procedures for decisions and orders. Redetermination and appeal of decisions and orders are provided in section 43 of the NSCA. With regards to licensing actions, the Commission may renew, suspend in whole or in part, amend, as well as revoke licences on its own motion under certain circumstances specified in section 25 of the NSCA. The *Canadian Nuclear Safety Commission Rules of Procedure* provides the CNSC's process to confirm, amend, revoke or replace an order; as well as the appeal or redetermination of an order.

Under section 65.01 of the NSCA, the Commission may designate DOs or designated inspectors to issue notices of violation under the CNSC's administrative monetary penalty (AMPs) program. The *Administrative Monetary Penalties Regulations* set out the regulations by which monetary penalties can be imposed for violations of regulatory requirements.

Regulatory offences that may lead to prosecution are provided for under sections 48 to 50 of the NSCA. Prosecution for regulatory offences is conducted by the Public Prosecution Service of Canada (PPSC).

CNSC's enforcement measures

The CNSC's graduated approach to enforcement provides a continuum of regulatory response options that are grouped into two categories:

- **initial regulatory responses** that represent regulatory concerns and become part of the licensee's compliance record
- **enforcement responses** are actions that are used in cases of more significant regulatory concern

Enforcement actions include discussions, written notices, orders, increased regulatory scrutiny, AMPs, licensing action and prosecution. Depending on the effectiveness of the initial action, subsequent enforcement measures of increasing severity may be invoked.

Section 8.2 provides additional information on the enforcement measures available to CNSC staff.

Decision-making process applied for enforcement

CNSC regulatory policy P-211, *Compliance* states that the CNSC uses a graduated enforcement approach whereby the selection and execution of the enforcement action depends on the risk significance of the situation being addressed. The appropriate enforcement action for the given situation is determined, taking into account the considerations discussed above. CNSC SAET process document lists the enforcement measures available to CNSC staff, as listed above.

Communication with the licensee and confirmation of effective implementation of corrective actions

The CNSC is committed to transparency and maintains open and engaged communication with licensees and provides relevant information on its compliance activities to the licensee as soon as possible.

The CNSC consistently interacts with licensees and uses several measures to foster open communication with the applicant or proponent even before issuing a licence or certificate to influence awareness of the need to comply with all regulatory requirements. This proactive influence continues in conjunction with compliance verification activities after the licence or certificate is issued, using one or more of the following options:

- Outreach
- Regular interaction in the form of discussions, meetings and letters
- Recommendations

If a non-compliance is confirmed, the CNSC's first response is often to issue a *Notice of Non-Compliance* (NNC) to give the licensee the opportunity to restore compliance without enforcement action being taken. If health and safety issues are present, other responses may be initiated in addition to an NNC, such as the issuance of an inspector order to cease or restrict operations. When the licensee responds to the NNC, the CNSC assesses the licensee's proposed timeframe and milestones for each corrective action. All relevant decisions and commitments are recorded and tracked in the CNSC's RIB.

Before closing an action item, CNSC first verify that the action(s) taken by the licensee have been adequate to correct the identified non-compliance or deficiency. This is accomplished by:

- follow-up inspections
- review of documents submitted by the licensee
- interviews with licensee staff
- review of performance
- any combination of the above

All measures taken in response to a non-compliance become part of the compliance history of the licensee. As each enforcement action is closed, the closure is communicated to the licensee in writing.

For transparency, enforcement responses are posted, where appropriate, on the Regulatory Actions section of the CNSC's external website.

8.2 ENFORCEMENT IMPLEMENTATION

Enforcement measures exercised by the regulatory body

As noted above, the CNSC's graduated approach to enforcement provides a continuum of regulatory response options that are grouped into two categories:

- initial regulatory responses
- enforcement responses

Initial regulatory responses to non-compliance are undertaken when they would be effective in restoring compliance quickly and effectively without escalating to enforcement actions. If initial regulatory responses are not identified as likely solutions, or if they fail to restore compliance, then CNSC staff may escalate to enforcement responses. Initial regulatory responses to non-compliances include:

- NNCs
- warning letters
- increased regulatory scrutiny

Escalation to enforcement measures may be carried out as a result of ineffective corrective measures taken by the licensee following the above actions by the CNSC, unjustified delays in the implementation of corrective measures or a lack of willingness on the part of the licensee to resolve the non-compliance. Where health and safety or significant safety situations have been identified, enforcement measures are taken by bypassing any initial regulatory response. Enforcement actions include the following progressively more severe range of measures:

- requests under the subsection 12(2) of the GNSCR
- inspector or DO orders
- AMPs
- licensing actions
- decertification
- referral of matter to PPSC for regulatory offence (prosecution)

CNSC staff apply regulatory judgment to determine the most appropriate regulatory response for a given situation.

Roles of inspectors in the enforcement implementation

The roles of CNSC inspectors in responding to non-compliance include:

- regularly communicating with the licensee through discussions, meetings, and/or letters to share information, clarify expectations and obligations, address potential concerns, and proactively address possible deficiencies that could lead to non-compliance
- selecting or recommending appropriate enforcement measures depending on the significance of the non-compliance
- drafting or issuing notices of non-compliances and writing inspection reports
- making recommendation to proceed with a request under subsection 12(2) of the GNSCR
- participating as required in the GNSCR 12(2) request process
- taking or recommending response options, as appropriate
- following-up on all compliance actions as appropriate
- exercising powers and responsibilities under the NSCA with respect to compliance verification and enforcement
- initiating and conducting investigations

Methodology for identifying, documenting and communicating non-compliances to the licensee

The CNSC inspects and reviews operational activities and documentation to verify licensee compliance with requirements. To evaluate licensee compliance, the CNSC conducts both field verification activities and desktop reviews.

As noted above, if a non-compliance is confirmed, CNSC staff's first response is generally to issue a NNC to give the licensee the opportunity to restore compliance without enforcement action being taken. When the licensee responds to the NNC, CNSC staff assess the licensee's proposed timeframe and milestones for each correction action.

If the NNC does not lead to correction of the non-compliance and other CNSC efforts to follow up are ineffective, a Warning Letter may sent to warn the licensee's senior management of the possibility of an escalating response should the non-compliance not be satisfactorily addressed.

Compliance verification is performed until corrective action has been implemented. This is verified by remedial inspections, review of documents submitted by the licensee, interviews of licensee staff, reviews of performance or any combination of the listed methods.

As each enforcement action is closed, the closure is communicated to the licensee in writing.

CNSC staff may report to the Commission, the public, other licensees, the Government of Canada, the IAEA and other interested parties on the results of compliance verification and enforcement activities. Compliance reports document the safety performance or regulated activities and are based on CNSC staff's independent evaluation of compliance and licensee performance.

Accountability of the licensee for remedying non-compliances

The licensee has full responsibility for ensuring that its licensed activities comply with the NSCA, its regulations and the licence including any specific licence conditions. Paragraph 12(1)(c) of the NSCA states that *"the licensee shall take all reasonable precautions to protect the environment and the health and safety of persons and to maintain the security of nuclear facilities and of nuclear substances."* Section 48 of the NSCA sets out the various infractions and the particular sanctions/punishments that may be applied in the case where a person has been found guilty of an offence.

Enforcement measures when unforeseen radiation risk is identified

For situations that are serious and considered to pose an imminent radiological hazard to workers, the public or the environment, the CNSC has the authority and will take whatever actions are necessary to restore an adequate level of safety. This can range from a verbal request to cease the activities that are causing the situation to an order by the inspector or Commission to cease activities and take actions that are necessary to eliminate the safety-significant situation or mitigate its impact.

Training and guidance of inspectors on the enforcement process

Legal experts provide inspectors with guidance on responding to non-compliance as part of the CNSC's ITQP.

8.3 CONCLUSIONS AND ACTIONS

The CNSC meets the expectations of the IAEA safety standards for enforcement.

The CNSC uses a graduated approach to enforcement to encourage and compel compliance and to deter future non-compliance with regulatory requirements. The CNSC does not take enforcement action to punish but to rather encourage compliance, to maintain continued safety and to deter further non-compliance.

In 2017, a CNSC initiative was identified through a self-assessment of the CNSC's SAET process. The recommendations from the self-assessment are being addressed through a revision to the SAET process. The proposed CNSC *Responding to Non-Compliance* process will replace the existing SAET process and

will provide staff with greater clarity and guidance of the enforcement actions that are available to re-establish compliance.

The CNSC is in the process of adopting a Case Management system to enhance management of all workflows, including tracking enforcement actions and recording implementation of corrective actions.

Refer to Annex A for the two action items developed to address these CNSC initiatives.

9. REGULATIONS AND GUIDES

9.1 GENERIC ISSUES

Related to GSR Part 1 (Rev. 1): Requirements 32 – 34, paragraphs 4.61 – 4.62
GSR Part 3: Requirement 3

Methodology for developing and review regulations and guides

The CNSC develops regulations pursuant to the regulation-making powers set out in section 44 of the NSCA and in accordance with the regulatory policy objectives set out in the Government of Canada's CDR.

The CNSC regulatory framework program aims to provide regulatory instruments that clearly state CNSC's regulatory requirements and provide guidance as to how to meet the regulatory requirements. The framework adapts over time based on operational experience and an evolving nuclear industry.

The CNSC implements the CDR to ensure that regulatory issues are well defined, and that the choice of regulatory approach is the most appropriate for achieving the safety and security objectives. This includes conducting periodic reviews to evaluate the effectiveness of the CNSC's regulatory framework through:

- re-examining previous ways of regulating
- exploring new options
- consulting early with stakeholders through workshops or discussion papers in cases of new or very different ways of regulating

Over several years, the CNSC has been progressing on a broader review of its regulatory framework. The CNSC is committed to continuous improvement and aims to ensure that the CNSC's regulations continue to be clear and effective, allowing the CNSC to remain an effective and efficient regulator.

CNSC follows a life-cycle approach to managing the regulatory framework. During all stages, the CNSC seeks opportunities to engage all stakeholders, pursue regulatory cooperation and alignment, where appropriate, and coordinate with all levels of government to minimize cumulative and unintended impacts of regulations on Canadians, business, and the economy.

The CNSC follows a regulatory framework plan, which sets out the regulations and REGDOCs that are intended for review, development or amendment in the coming years. The plan aligns with the CNSC's corporate priorities, considering the current nuclear environment and is managed under the guidance of the CNSC Regulatory Framework Steering Committee and Management Committee. The plan is reviewed regularly and adjusted when new developments in the nuclear industry arise.

The CNSC management system process, *Conduct Regulatory Policy Analysis* provides information on how to select the appropriate regulatory instrument and tools. Processes used by the CNSC to develop and maintain regulatory instruments and tools are described below. Refer to section 4 for more information on CNSC's management system.

Application of the graded approach in the development and revision of regulations and guides

The development of regulations or guides must take into account a variety of factors, such as clarity of requirements, responding to industry changes and innovations while protecting the health and safety of persons and the environment, as well as maintaining security. The CNSC recognizes that a graded approach may be applied or alternative approaches used by the licensee or applicant.

The Commission will consider alternative approaches in its regulatory framework where one or more of the following conditions apply:

- The alternative approach would result in an equivalent or superior level of safety to that of the approach stated in the requirement
- There is a need to avoid potential for conflict between requirements
- The purpose of the requirement(s) would be best achieved with an alternative approach

When CNSC staff assess the use of the graded approach, the primary consideration is to ensure the outcome does not pose an unreasonable risk to the environment or the health and safety of persons. This includes ensuring that:

- regulatory requirements have been met
- fundamental safety functions have been met
- defence in depth is maintained
- safety margins are appropriate to address specific hazards over the facility's lifecycle

Regulations and guides as the framework for regulatory requirements

As illustrated in figure 14 in section 3.1, the CNSC's regulatory framework consists of the NSCA, regulations, licences and certificates as well as regulatory documents. The framework takes into account Government of Canada regulatory policy guidance, as well as the views of stakeholders, Indigenous peoples and the general public.

The 13 regulations under the NSCA that cover the full extent of the facilities and activities regulated by the CNSC are illustrated in figure 15 in section 3.1 and are provided on the List of regulations page of the CNSC's external website.

Table 3 in section 1.2 summarizes the other federal legislation that governs the regulation of Canada's nuclear industry.

As described in sections 1.2, 2.1 and 3.1, the CNSC has developed REGDOCs that provide additional requirements and guidance for licensees to meet the requirements of the NSCA, its regulations, facility licences and LCHs. REGDOCs take into account international regulatory best practices and modern codes and standards, and align with the IAEA's Safety Fundamentals and Safety Requirements. Modern codes and standards include, but are not limited to, standards established by independent, third-party standard-setting organizations such as:

- CSA Group
- American Society of Mechanical Engineers (ASME)
- International Commission on Radiological Protection (ICRP)
- Institute of Electrical and Electronics Engineers (IEEE)

A full listing of the CNSC REGDOCs is provided on the CNSC's external website.

Descriptions of regulations and guides in use for specific regulatory activities

The regulations and guides for specific regulatory activities have been previous discussed:

- Section 5 outlined the regulations and REGDOCs applicable to the authorization of nuclear facilities
- Section 6 described the regulations and REGDOCs used for review and assessment
- Section 7 outlined regulations and REGDOCs applicable to the conduct of inspection
- Section 8 summarizes the regulations and REGDOCs applicable for enforcement

Promotion of regulations and guides

Consultation with the public, licensees and other stakeholders is an integral component of developing the CNSC's regulatory framework. Regulations and REGDOCs published by the CNSC are generally subject to a formal public consultation process.

CNSC's forward regulatory plan for regulations describes anticipated regulatory changes or actions that CNSC intends to bring forward or undertake over the next two years. The CNSC posts the forward regulatory plan on its external website. It identifies public consultation opportunities and a departmental contact point for each regulatory initiative. The CNSC welcomes public input on regulations, draft REGDOCs and discussion papers. Regulations and REGDOCs published by the CNSC are subject to a formal public consultation process. Regulations in draft are pre-published in the Canada Gazette, Part I for comments for a period of 30 days to 75 days.

Draft REGDOCs and discussion papers are issued for public comments on the CNSC's Consultation page and the Government of Canada's Consulting with Canadians website. The consultation period for regulatory documents and discussion papers ranges from 60 days to 120 days. All comments received during public consultation are posted on the CNSC's website and further feedback is requested for another 15 days. Comments received by the CNSC during public consultation are reviewed and addressed by staff.

If the comments received during public consultation are substantial and warrant significant changes, revised REGDOCs may be provided to interested stakeholders for additional input. This second round of public consultation would generally be 60 days in length.

When proposing changes to the regulatory framework, the CNSC uses a variety of means to actively seek input from licensees, the public, Indigenous peoples, non-governmental organizations, all levels of government, and international stakeholders. Meetings and workshops may be organized to engage stakeholders and solicit feedback on the development of regulatory policies, requirements and guidance, and on what regulatory instruments are appropriate.

Individuals and organizations on the CNSC's distribution list are also notified by email about the release of regulations, new REGDOCs and discussion papers for comments. A consultation notice is also posted on the home page of the CNSC website, LinkedIn, and the Government of Canada's Consulting with Canadians website.

All final documents are released through the CNSC's website, for use by stakeholders and licensees. CNSC's Regulatory Document website is intended as the access point for external stakeholders looking for CNSC regulatory documents, including legacy documents and relevant nuclear standards. Free view access to nuclear related CSA standards can be accessed through the CSA Communities platform which provides view access to all nuclear related CSA standards.

All input gained from these activities is considered when the CNSC develops and maintains its regulatory instruments.

9.2 REGULATIONS AND GUIDES FOR NUCLEAR POWER PLANTS

Related to SSR-2/1 and SSR-2/2

In Canada, NPPs are Class I facilities and are subject to the CINFR. The prerequisites for the licensing steps (site licence, construction licence, operating licence, decommissioning licence and licence to abandon) are generally described in these regulations. Other regulations apply to NPPs in varying degrees such as:

- *General Nuclear Safety and Control Regulations* (provisions for licence applications, obligations of licensees, and general requirements under the NSCA)
- *Radiation Protection Regulations* (specifying dose limits for workers, reporting, expectations for keeping doses ALARA along with requirements for labelling and signage)
- *Packaging and Transport of Nuclear Substances Regulations, 2015* (requirements for the transportation of nuclear materials)
- *Nuclear Security Regulations* (Category I, II. and III material and high-security sites)

The associated guides related to authorization of NPPs are specified in licence application guides for each particular phase of the lifecycle as listed in section 5.2. Once licensed, the facility licensing basis provides more details of the regulations and guidance documents that are applied in the regulatory oversight of the NPP.

The requirements and guidance in REGDOCs that apply to NPPs are technology-neutral and performance-based where possible while permitting the use of risk-informed approaches.

CNSC regulatory documents that can be applied to NPPs and are listed in Annex B.

9.3 REGULATIONS AND GUIDES FOR RESEARCH REACTORS

Related to SSR-3: paragraphs 3.1 to 3.4

Regulations and guides for the regulatory oversight of research reactors

The following regulations apply to the regulatory oversight of research reactors:

- *General Nuclear Safety and Control Regulations*
- *Class I Nuclear Facilities Regulations*
- *Administrative Monetary Penalties Regulations*
- *Radiation Protection Regulations*
- *Packaging and Transport of Nuclear Substances Regulations, 2015*
- *Nuclear Security Regulations*
- *Nuclear Non-proliferation Import and Export Control Regulations*

- *Canadian Nuclear Safety Commission Cost Recovery Fees Regulations*
- *Canadian Nuclear Safety Commission By-laws*

In addition to the regulations, there are many guides, standards, and regulatory documents that also apply for research reactor facilities. These regulatory documents cover the entire lifecycle of research reactors and are aligned to the SCAs. For example:

- Siting is covered under requirements of REGDOC-1.1.1, *Site Evaluation and Site Preparation for New Reactor Facilities*
- Design is covered under the requirements of the physical design SCA, including RD-367, *Design of Small Reactor Facilities*
- Construction and commissioning are covered under the requirements of REGDOC-2.3.1, *Conduct of Licensed Activities: Construction and Commissioning Programs*
- Operating procedures, organization and personnel are required under the management system and human performance management SCAs. Operation, modification, maintenance, testing, inspection, fuel handling, accident management, OLC, are found under the operating performance and fitness for service SCAs.

The licences granted to research reactors are specific to the type of activity to be carried out (i.e., prepare site, construct, operate, decommission, abandon). The licence conditions are also specific to the activity to be carried out and cover the 14 SCAs to ensure that all aspects are controlled and executed safely. The LCH supplements the licences and provide the compliance verification criteria, including all references to REGDOCS and applicable standards.

9.4 REGULATIONS AND GUIDES FOR FUEL CYCLE FACILITIES

Related to NS-R-5

Regulations and guides for the regulatory oversight of fuel cycle facilities

The following regulations apply to the regulatory oversight of fuel cycle facilities:

The following regulations apply to the regulatory oversight of research reactors:

- *General Nuclear Safety and Control Regulations*
- *Class I Nuclear Facilities Regulations*
- *Administrative Monetary Penalties Regulations*
- *Radiation Protection Regulations*
- *Packaging and Transport of Nuclear Substances Regulations, 2015*
- *Uranium Mines and Mills Regulations*
- *Nuclear Substances and Radiation Devices Regulations*
- *Nuclear Security Regulations*
- *Nuclear Non-proliferation Import and Export Control Regulations*
- *Canadian Nuclear Safety Commission Cost Recovery Fees Regulations*
- *Canadian Nuclear Safety Commission By-laws*

In addition to the regulations, there are many guides, standards and regulatory documents that also apply for fuel cycle facilities that are aligned with the applicable SCAs. REGDOCs that are not specifically scoped for fuel cycle facilities, such as those for research reactors, can still be applied in a graded approach or as guidance.

9.5 REGULATIONS AND GUIDES FOR WASTE MANAGEMENT FACILITIES

Related to GSR Part 5: Requirements 2, 6, 8, 9, 10, 11 and 12
SSR-5: Requirements 5, 7, 10, 15, 19, 20, 22 and 26

Regulations and guides for the regulatory oversight of waste management facilities

The following regulations may apply to radioactive waste management facilities, waste nuclear substances and waste management activities, depending on their type and scale:

- *General Nuclear Safety and Control Regulations*
- *Radiation Protection Regulations*
- *Class I Nuclear Facilities Regulations*
- *Uranium Mines and Mills Regulations*
- *Nuclear Substances and Radiation Devices Regulations*
- *Packaging and Transport of Nuclear Substances Regulations, 2015*
- *Nuclear Security Regulations*

The following regulatory documents and CSA standards are published, and may apply to radioactive waste management facilities, waste nuclear substances and waste management activities depending on their type and scale:

- REGDOC-2.11, *Framework for Radioactive Waste Management and Decommissioning in Canada*
- REGDOC-2.11.1, *Waste Management, Volume II: Management of Uranium Mine Waste Rock and Mill Tailings*
- REGDOC-2.11.1, *Waste Management, Volume III: Assessing the Long-term Safety of Radioactive Waste Management*, version 2
- CSA N292.0, *General principles for the management of radioactive waste and irradiated fuel*
- CSA N292.1, *Wet storage of irradiated fuel and other radioactive materials*
- CSA N292.2, *Interim dry storage of irradiated fuel*
- CSA N292.3, *Management of low- and intermediate-level radioactive waste*
- CSA N292.5, *Guidelines for the exemption or clearance from regulatory control of materials that contain or potentially contain, nuclear substances*
- CSA N292.6, *Long-term management of radioactive waste and irradiated fuel*

9.6 REGULATIONS AND GUIDES FOR RADIATION SOURCES APPLICATIONS

Related to GSR Part 1 (Rev. 1): Requirements 32-34

Regulations and guides for the regulatory oversight of radiation sources applications

The following regulations may apply to the regulatory oversight of radiation sources applications:

- *General Nuclear Safety and Control Regulations*
- *Radiation Protection Regulations*
- *Class I Nuclear Facilities Regulations*
- *Uranium Mines and Mills Regulations*
- *Class II Nuclear Facilities and Prescribed Equipment Regulations*
- *Nuclear Substances and Radiation Devices Regulations*
- *Packaging and Transport of Nuclear Substances Regulations, 2015*

- *Nuclear Security Regulation*
- *Nuclear Non-proliferation Import and Export Regulations*

To support the implementation of the requirements found in regulations, REGDOCs have been developed for use by licensees including:

- G-129, *Keeping Radiation Exposures and Doses "As Low as Reasonably Achievable (ALARA)*
- G-121, *Radiation Safety in Educational, Medical and Research Institutions*
- G-91, *Ascertaining and Recording Radiation Doses to Individuals*
- G-147, *Radiobioassay Protocols for Responding to Abnormal Intakes of Radionuclides*
- G-228, *Developing and Using Action Levels*
- G-313, *Radiation Safety Training Programs for Workers Involved in Licensed Activities with Nuclear Substances and Radiation Devices, and with Class II Nuclear Facilities and Prescribed Equipment*
- GD-52, *Design Guide for Nuclear Substance Laboratories and Nuclear Medicine Rooms*
- RD-58, *Thyroid Screening for Radioiodine*
- S-260, *Making Changes to Dose-Related Information Filed With the National Dose Registry*
- REGDOC-1.6.1, *Licence Application Guide: Nuclear Substances and Radiation Devices*, version 2
- REGDOC-1.4.1, *Licence Application Guide: Class II Nuclear Facilities and Prescribed Equipment* (draft)
- REGDOC-2.5.5, *Design of Industrial Radiography Installations*
- REGDOC-2.7.2, *Dosimetry, Volume II: Technical and Quality Assurance Requirements for Dosimetry Services* (draft)
- REGDOC-2.5.7, *Design, Testing and Performance of Exposure Device*
- REGDOC-2.12.3, *Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material*, version 2
- REGDOC-1.5.1, *Application Guide: Certification of Radiation Devices or Class II Prescribed Equipment*
- REGDOC-2.14.1, *Volume II: Radiation Protection Program Design for the Transport of Nuclear Substances*
- RD-364, *Joint Canada-United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages*

In addition, CNSC is developing a licence application guide that will set out requirements and guidance for submitting a licence application to the CNSC for a Class IB nuclear substance processing facility.

9.7 REGULATIONS AND GUIDES FOR DECOMMISSIONING ACTIVITIES

Related to GSR Part 6

Regulations and guides for the regulatory oversight of decommissioning activities

The following regulations may apply to decommissioning, depending on the type and scale of the facility or activity:

- *General Nuclear Safety and Control Regulations*
- *Radiation Protection Regulations*
- *Class I Nuclear Facilities Regulations*
- *Uranium Mines and Mills Regulations*

- *Class II Nuclear Facilities and Prescribed Equipment Regulations*
- *Nuclear Substances and Radiation Devices Regulations*
- *Packaging and Transport of Nuclear Substances Regulations, 2015*
- *Nuclear Security Regulations*

The following published regulatory documents and CSA standards, may apply to decommissioning depending on the type and scale of the facility or activity:

- G-219, *Decommissioning Planning for Licensed Activities*
- CSA N294, *Decommissioning of facilities containing nuclear substances*

9.8 REGULATIONS AND GUIDES FOR TRANSPORT ACTIVITIES

Related to SSR-6

Regulations and guides for the regulatory oversight of transport activities

As described in section 5.8, the CNSC issues licences and certificates for certain kinds of packaging and transport as stipulated in the PTNSR 2015. As per subsection 1(2) of the PTNSR 2015, the incorporation by reference of any particular amendment of the IAEA Regulations is effective two years after the day on which the amendment is initially published by the IAEA or six months after the day on which the amendment is available in both of the official languages of Canada, whichever is later. The CNSC notes the effective date of the incorporation by reference on its website. The CNSC is committed to providing notification to stakeholders when the IAEA is consulting on and publishing revisions of their regulations. The CNSC also informs stakeholders of any significant changes when they are published.

The CNSC has also published REGDOC-2.14.1, *Information Incorporated by Reference in Canada's Packaging and Transport of Nuclear Substances Regulations, 2015* to help the regulated community comply with the PTNSR 2015. It presents a consolidated version of the regulations, including links to the relevant sections of the IAEA regulations.

All regulatory requirements related to the packaging and transport of nuclear substances are set in PTNSR 2015 and TDG Regulations. Both sets of regulations apply to all modes of transport in Canada. Compliance verification is performed against all of these requirements. Inspection of a shipment can be performed at any location within Canada and all shipments of radioactive material must be in compliance with the PTNSR 2015 and the TDG Regulations.

RD-364, *Joint Canada-United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages* is a document developed to assist applicants in preparing their applications to demonstrate that a given package can meet the regulations. CNSC uses an internal document, *Technical Assessment of Transport Certificate Applications*, when assessing certification applications.

REGDOC-2.14.1, *Volume II: Radiation Protection Program Design for the Transport of Nuclear Substances* provides guidance for the implementation of a radiation protection program to transport nuclear substances in accordance with the NSCA and its regulations.

9.9 REGULATIONS AND GUIDES FOR OCCUPATIONAL EXPOSURE

Related to GSR Part 3: Requirements 10-12, 19-24, 28 and 52

CNSC requirements for occupational radiation protection are found in the RPR. The RPR sets out requirements for licensees on the following:

- requirement to implement radiation protection programs
- requirements for ascertaining, monitoring and recording doses
- definition of action level and the actions to be taken when an action level has been reached
- requirement for informing workers of the risks associated with radiation to which the worker may be exposed and of effective and equivalent dose limits
- requirement for when to use licensed dosimetry services to ascertain dose
- effective and equivalent dose limits for nuclear energy workers, pregnant nuclear energy workers and persons who are not nuclear energy workers
- dose limits that apply during the control of emergencies
- actions to be taken when a dose limit is exceeded and the process for authorizing return to work
- requirements for licensed dosimetry services
- requirements for labelling containers and devices containing nuclear substances
- requirements for posting radiation warning signs
- records to be kept by licensees

To support the implementation of the regulatory requirements for radiation protection, the following CNSC regulatory guides and documents were developed by the CNSC:

- G-91, *Ascertaining and Recording Radiation Doses to Individuals*
- G-121 revision 1, *Radiation Safety in Educational, Medical and Research Institutions*
- G-129 revision 1, *Keeping Radiation Exposures and Doses "As Low as Reasonably Achievable (ALARA)"*
- G-147, *Radiobioassay Protocols for Responding to Abnormal Intakes of Radionuclides*
- GD-150, *Designing and Implementing a Bioassay Program*
- G-228, *Developing and Using Action Levels*
- G-313, *Radiation Safety Training Programs for Workers Involved in Licensed Activities with Nuclear Substances and Radiation Devices, and with Class II Nuclear Facilities and Prescribed Equipment*
- RD-58, *Thyroid Screening for Radioiodine*
- S-106 revision 1, *Technical and Quality Assurance Requirements for Dosimetry Services*
- S-260, *Making Changes to Dose-Related Information Filed with the National Dose Registry*

Additional CNSC requirements and guidance on radiation protection program expectations for NPPs, Class II nuclear facilities, and nuclear substance and radiation device users are also published in the following CNSC regulatory documents:

- RD/GD-369, *Licence Application Guide: Licence to Construct a Nuclear Power Plant*
- REGDOC-1.1.3, *Licence Application Guide: Licence to operate a Nuclear Power Plant*
- REGDOC-1.4.1, *Licence Application Guide: Class II Nuclear Facilities and Prescribed Equipment (under development)*
- REGDOC-1.6.1, *Licence Application Guide: Nuclear Substances and Radiation Devices*, version 2

Specific CNSC requirements and guidance on radiation protection in the design (including designation of radiological areas, access control and radiological monitoring) of Class II nuclear facilities, reactor facilities, radiography installations, nuclear substance laboratories and nuclear medicine rooms are also published in the following CNSC regulatory documents:

- REGDOC-1.4.1, Licence Application Guide: Class II Nuclear Facilities and Prescribed Equipment (under development)
- REGDOC-2.5.2, *Design of Reactor Facilities: Nuclear Power Plants*
- REGDOC-2.5.5, *Design of Industrial Radiography Installations*
- GD-52, *Design Guide for Nuclear Substance Laboratories and Nuclear Medicine Rooms*
- RD-367, *Design of Small Reactor Facilities*

Improvements to CNSC regulatory framework for radiation protection

As previously presented in section 5.9, the RPR is the primary regulatory basis for radiation protection. The current RPR are patterned after ICRP Publication 60 (1990), and the IAEA *Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards GSR Part 3* (1996). Amendments to the RPR are currently underway to align with ICRP Publication 103 (2007) and IAEA's GSR Part 3 (2014).

The CNSC is committed to ensuring its radiation protection requirements are up-to-date, to protect workers, the Canadian public and the environment. In keeping with this commitment, the CNSC undertook reviews of the RPR to ensure continued alignment with evolving international standards. The CNSC solicited feedback from stakeholders and members of the public regarding proposals to amend the RPR in 2013 through discussion paper, DIS-13-01, Proposals to Amend the Radiation Protection Regulations. The CNSC has moved forward with most of the proposed amendments to harmonize the RPR as outlined in the What We Heard Report for DIS-13-01.

Proposed amendments to the RPR include:

- add a requirement for licensees to provide information to workers regarding their duties and responsibilities related to emergencies
- add requirements for licensees to make the necessary accommodations to the working conditions of female nuclear energy workers who are breastfeeding in order to limit intakes of nuclear substances by the worker
- add a requirement for licensees to use a licensed dosimetry service for equivalent dose to the skin, and to the skin of any hand or foot
- amend the equivalent dose limit for the lens of an eye for a nuclear energy worker
- amend the actions taken by licensees when a person may have or has exceeded any of the regulatory dose limits so that persons are only removed from work that are likely to add to their dose if the person may have or has exceeded any of the regulatory dose limits that apply to nuclear energy workers or pregnant nuclear energy workers
- add new requirements for licensees related to the provision and use of radiation detection and measurement instruments
- add a retention period for occupational dose records held by licensees

As part of continuous improvement of the CNSC's regulatory framework, the CNSC is updating and consolidating the existing regulatory guides and documents on radiation protection. The CNSC identified the need for new REGDOCs that will provide CNSC guidance for radiation protection and dosimetry. This

need was based on an analysis of proposed amendments to the RPR, the current REGDOC framework and regulatory experience enforcing the RPR (see DIS-16-02, Radiation Protection and Dosimetry). The following new CNSC REGDOCs are being developed:

- REGDOC-2.7.1, *Radiation Protection:* REGDOC-2.7.1 aligns with the proposed amendments to the RPR and includes updates and consolidations of CNSC regulatory guides: G-91; G-121 revision 1; G-129 revision 1; G-228; and, G-313.
- REGDOC-2.7.2, *Dosimetry, Volume I: Ascertaining Occupational Dose*: REGDOC-2.7.2, Volume I aligns with the proposed amendments to the RPR and includes updates to and consolidations of the following CNSC regulatory guides and documents: G-91; G-147; GD-150; RD-58; and S-260.
- REGDOC-2.7.2, *Dosimetry, Volume II: Technical and Management System Requirements for Dosimetry Services:* REGDOC-2.7.2 Volume II sets out requirements and guidance to ensure that licensed dosimetry services meet technical requirements and implement quality assurance measures, in accordance with the purpose of the NSCA and the RPR. This document consolidates and updates the information in S-106 revision 1.

9.10 REGULATIONS AND GUIDES FOR MEDICAL EXPOSURE

Medical exposure is not under federal jurisdiction and therefore is considered out of scope for the 2019 IRRS mission.

9.11 REGULATIONS AND GUIDES FOR PUBLIC EXPOSURE

Related to GSR Part 3: Requirements 30-32, 47, 48 and 51

Responsibilities of relevant parties with regards to public exposure

Public dose is a result of the interaction between both the facility/activity and the public within their shared environment, requirements associated with protection of the public are documented in both the RPR and regulatory documents within the environmental protection SCA.

A summary of the core elements, including regulations and guides, associated with the RPRs is provided in section 9.9 with those most relevant to public dose identified below:

- Requirements for ascertaining, monitoring and recording doses
- Definition of action level and the actions to be taken when an action level has been reached
- Effective and equivalent dose limits for the public
- Requirements for notification of any exceedances of dose limits

REGDOC-2.9.1, *Environmental Protection Environmental Principles, Assessments and Protection Measures,* documents the principles and inter-related elements associated with environmental protection under the NSCA. All elements from control, prospective public dose assessment, discharge and environmental monitoring, and periodic retrospective assessment are to be managed within the facilities EMS.

REGDOC-2.9.1, Environmental Protection Environmental Principles, Assessments and Protection Measures, incorporates five CSA standards into the CNSC's EP framework:

- CAN/CSA ISO-14001- Environmental Management Systems

- CSA N288.1, *Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities.*
- CSA N288.6, *Environmental risk assessments at Class I nuclear facilities and uranium mines and mills*
- CSA N288.5, *Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills*
- CSA N288.4, *Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills*
- CSA N288.7-15 *Groundwater protection programs at Class I nuclear facilities and uranium mines and mills*

Two additional nuclear environmental CSA standards were published shortly after publication of REGDOC-2.9.1 *Environmental Protection Environmental Principles, Assessments and Protection Measures*

- CSA N288.8, *Establishing and implementing action levels for releases to the environment from nuclear facilities*
- CSA N288.9, *Guideline for design of fish impingement and entrainment programs at nuclear facilities*

These CSA standards are not yet incorporated into the framework of REGDOC-2.9.1, *Environmental Protection Environmental Principles, Assessments and Protection Measures.* However, they are used for new licence applications and become regulatory requirements at existing facilities when incorporated into the licensing basis.

Regulations and guides for radioactive waste management and discharges to the environment

The requirements related to controlling radiation exposures of workers and members of the public are found in section 12 of the GNSCR. These requirements directly or indirectly influence the release of radionuclides to the environment and thus the exposure of members of the public.

Improvements to CNSC regulatory framework for radiation protection is documented in section 9.9, including the associated modernizing and updating of the guidance documentation into the current CNSC regulatory document framework.

Section 9.5 summarizes the regulations and guides for the regulatory oversight of waste management facilities.

The CNSC is currently drafting a companion Environmental Protection REGDOC with the working title REGDOC-2.9.2, *Environmental Protection – Controlling Releases to the Environment*. This document further documents CNSC requirements with respect to controls on releases including:

- expectations of ALARA and BATEA (i.e., optimization) with respect to facility design commissioning and operation for pollution prevention and control measures
- principles related to adaptive management
- formal inclusion of CSA standards N288.8 and N288.3.4-13, *Performance testing of nuclear air-cleaning systems at nuclear facilities* into the EP REGDOC framework

- clarification of approaches to determining release limits (i.e., discharges) and action levels for both nuclear and hazardous substances. Specifically, incorporating the principles identified in IAEA GSG-9 on authorizing discharges including the concepts of optimization and provision of operational flexibility.

CSA N292.5, *Guidelines for the exemption or clearance from regulatory control of materials that contain, or potentially contain, nuclear substances* provides direction in demonstrating compliance with NSRDR exemption and clearance criteria as well as technical guidance for the derivation of clearance levels (based on public dose of 10μSv/year).

Monitoring and reporting public exposures

The RPR prescribe the dose limits for members of the public and the requirement to implement a radiation protection program for protection of the public including estimation of doses through direct measurement or estimation of the quantities and concentrations of any nuclear substance released and their resultant potential exposure to the public. This program is primarily captured under the EP SCA framework which requires licensees to:

- predict (prospective human health radiological assessment) public exposure for proposed activities
- retrospectively demonstrate that the public dose limit was respected within their annual compliance reports submitted to the Commission
- monitor radionuclide releases, and environmental activity levels to support this estimation of public dose

Regulations and guides for reference levels for existing exposure situations

The licensee is required to establish criteria for remedial actions and submit that information to the regulatory body and/or other relevant authority. The appropriate federal or provincial/territorial regulator would review and establish criteria for remedial actions. The coordination of reference levels is done through federal/provincial/territorial committees.

Regulations and guides for the regulatory oversight of radon indoors

Section 1.2 outlines the legislative basis for the exposure of indoor radon.

For workplaces that are regulated by the CNSC, licensees are required to ascertain the magnitude of exposure to radon progeny and the effective dose and equivalent dose (section 5 of RPR) and to demonstrate compliance with the RPR dose limits as dictated in sections 12 and 13.

Radon in federal workplaces is regulated under the *Canada Labour Code* and the *Canada Occupational Health and Safety Regulations*. Provinces and territories have jurisdiction for occupational radon exposure in work places that are not regulated by the CNSC or are non-federal workplaces.

Facilities and activities under provincial or territorial jurisdiction are beyond the scope of this IRRS mission.

Regulations and guides regulatory oversight of radionuclides in commodities

As described in section 1.2, the responsibility for implementing measures to reduce risks from exposure to radiation in construction materials, food and drinking water is shared among the different levels of government.

The purpose of the *Food and Drugs Act* and the *Canada Consumer Product Safety Act*, both administered by HC, is to protect Canadians by addressing or preventing dangers to human health or safety from a broad range of potential hazards, implicitly including exposure to unsafe levels of radioactivity in commodities.

9.12 CONCLUSIONS AND ACTIONS

The CNSC has a mature regulatory framework consisting of applicable legislation, regulations, licences and REGDOCs which is made available on the CNSC's external website. The regulatory framework provides instruments that clearly outline the CNSC's regulatory requirements as well as guidance to meet those requirements. The CNSC's Regulatory Framework Plan sets out the regulations and regulatory documents that the CNSC intends to amend or develop in the coming years. The plan aligns with CNSC's corporate priorities and the current nuclear environment. The plan is reviewed regularly and adjusted when new developments in the nuclear industry arise. National and international standards and guidance are adapted and adopted as part of the CNSC's regulatory framework as appropriate. Consultation with the public, licensees and other stakeholders is an integral part of the CNSC's regulatory framework process. The development of CNSC regulations and regulatory documents follows a rigorous, open and transparent process which includes internal and external consultation.

Opportunities have been identified in the CNSC's regulatory framework to improve regulatory documents. These opportunities have been highlighted in other sections of the summary report and therefore, are not repeated here.

10. EMERGENCY PREPAREDNESS AND RESPONSE

Emergency Preparedness and Response was addressed through the IAEA's Emergency Preparedness Review mission to Canada which took place June 3 to 13, 2019.

11. INTERFACE WITH NUCLEAR SECURITY

11.1 LEGAL BASIS

Related to GSR Part 1 (Rev. 1): Requirement 12, paragraph 2.39

International agreements and conventions on nuclear security

Under paragraph 9(a)(iii) of the NSCA, the CNSC has the mandate to regulate in a way that respects Canada's international obligations, including those related to its Safeguards Agreement and Additional Protocol with the IAEA, the *Treaty on the Non-proliferation of Nuclear Weapons*, the *Convention on Physical Protection of Nuclear Material* (CPPNM), and the *International Convention of the Suppression of Acts of Nuclear Terrorism* (ICSANT). In 1986, Canada ratified the CPPNM and became a State Party. In 2014, Canada ratified the Amendment to the CPPNM and ICSANT.

Security requirements in legislation

General Nuclear Safety and Control Regulations

The GNSCR provides the regulatory requirements that licensees or applicants must meet regarding nuclear security and safeguards:

- Paragraph 12(1)(i) requires "*every licensee shall take all necessary measures to facilitate Canada's compliance with any applicable safeguards agreement*"
- Paragraph 17(c)(ii) and (iv) require workers to inform the licensee or the worker's supervisor of situations related to threats to nuclear security or sabotage, theft, loss, or illegal use of a nuclear substance, prescribed equipment, or prescribed information
- Paragraph 29(1)(e) requires "*every licensee who becomes aware of any of the following situations shall immediately make a preliminary report to the Commission of the location and circumstance of the situation and of any action that the licensee has taken or proposes to take with respect to it […](e) an attempted or actual breach of security or an attempted or actual act of sabotage at the site of the licensed activity*"
- Paragraphs 30(1)(a) and (b) require the licensee to report to the Commission any breaches or issues with safeguard equipment and samples

Provisions to address these clauses of the regulations are reviewed as part of the licensing process and their implementation is verified through ongoing compliance inspections and audits.

Nuclear Security Regulations

The CNSC is responsible for enforcing the NSR, which were enabled under the NSCA. The CNSC works closely with nuclear facility operators, law enforcement, intelligence agencies, international organizations and other government departments to ensure that nuclear materials and nuclear facilities are adequately protected.

The NSR prescribe the regulatory requirements for the security of certain nuclear material and nuclear facilities. Part I of the NSR provides security requirements for high-security sites and part II provides security-related requirements for the licensing and operation of lower-risk nuclear facilities. The NSR also apply to nuclear materials in transit.

Nuclear Non-Proliferation Import and Export Control Regulations

The NNIECR identify all nuclear material, equipment and information which require CNSC import or export authorization prior to its transfer into or out of Canada. This regulatory requirement enables the CNSC to exercise greater control over nuclear material as it moves across Canada's border.

Regulations and regulatory documents provide clear requirements and guidance to licensees on how to meet regulatory expectations to ensure nuclear facilities are designed and the configuration of such facilities ensure the optimization of nuclear security. The following REGDOCs provide applicants and licensees with additional requirements and guidance with respect to nuclear security, safety and safeguards:

- REGDOC-2.5.2 *Design of Reactor Facilities: Nuclear Power Plants*
- REGDOC-2.12.1, *High Security Facilities, Volume I: Nuclear Response Force*, Version 2
- REGDOC-2.12.1, *High-Security Facilities, Volume II: Criteria for Nuclear Security Systems and Devices*
- REGDOC-2.12.2, *Site Access Security Clearance*
- REGDOC-2.12.3, *Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material*, version 2
- REGDOC-2.13.1, *Safeguards and Nuclear Material Accountancy*
- REGDOC-2.13.2, *Import and Export*, version 2

Security in CNSC's regulatory framework

Security in the design for nuclear power plants

REGDOC-2.5.2, *Design of Reactor Facilities: Nuclear Power Plants* sets out requirements for the design of new water-cooled NPPs. The document highlights the interface of safety with security and safeguards for NPP designs.

Security of nuclear substances: sealed sources and category I, II and III nuclear material

REGDOC-2.12.3, *Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material*, version 2 requires licensees to develop and implement technical and administrative security measures to protect radioactive sources against unauthorized removal (such as theft or loss) or sabotage. REGDOC-2.12.3 is aligned with the security provisions established in the IAEA Code of Conduct on the Safety and Security of Radioactive Sealed Sources.

Safeguards and nuclear material accountancy

REGDOC-2.13.1, *Safeguards and Nuclear Material Accountancy*, sets out requirements and guidance for safeguards programs for applicants and licensees who possess nuclear material, operate a uranium or thorium mine, carry out specified types of nuclear fuel-cycle related research and development work, or carry out specified types of nuclear-related manufacturing activities.

Nuclear security and nuclear safety interfaces

CNSC plays an important role ensuring that safety and security are harmonized. CNSC's role in securing nuclear substances and radioactive materials ensures that safety and security can work together without

impeding one another. The Canadian approach emphasizes the importance of safety and security interfaces and integrates nuclear security fundamental principles. For example:

- REGDOC-2.1.2, *Safety Culture*, sets out requirements and guidance for fostering a healthy safety culture and for conducting safety culture assessments. It does the same for security culture. This REGDOC recognizes that both nuclear safety and security and their cultures share the same overall objective, which is to limit the risk resulting from nuclear substances and associated facilities. The two cultures coexist and reinforce each other.
- REGDOC-2.2.4, *Fitness for Duty: Managing Worker Fatigue*, sets out requirements and guidance for managing fitness for duty of workers at all high-security sites, as defined in the *NSR*. In REGDOC-2.2.4 nuclear safety encompasses security.

Nuclear Terrorism Act

Canada enacted the *Nuclear Terrorism Act* in 2013 to amend the *Criminal Code* to help combat nuclear terrorism by enhancing the domestic legal framework available to respond to the threat posed by acts of nuclear terrorism and crime. The enhancements to the legal framework included the establishment of four new offences in the Criminal Code and fulfilment of key international commitments Canada has made in the area of nuclear security. The CNSC has taken proactive measures and demonstrated leadership to ensure the control of nuclear materials in implementing safety and security requirements for nuclear material inventories in Canada. CNSC regulatory requirements are meant to be preventive to ensure that nuclear terrorism will be detected and thwarted as early as possible.

Overall, CNSC plays an important role in ensuring that safety, security and safeguards are harmonized in the CNSC's regulatory framework. The CNSC is the sole nuclear regulator responsible for safety, security and safeguards (e.g., Nuclear Material Accounting and Control) referred to as a "3S" nuclear regulator. This model simplifies the landscape for regulated parties and the public, prevents duplication and allows for effective management of issues or conflicts between safety and security.

11.2 REGULATORY OVERSIGHT ACTIVITIES

Related to GSR Part 1 (Rev. 1): Requirement 12, paragraphs 2.39 – 2.40

Nuclear security compliance activities

Licensees must comply with the NSCA, the NSR, licence conditions, and other REGDOCs in the licensee's licensing basis.

Licensees are required to have in place emergency preparedness and response plans, nuclear security programs and infrastructure commensurate with the level of risk of the facility or activity. These are reviewed as part of the licensing process and their implementation is verified through ongoing compliance inspections and audits.

Compliance verification methods, including inspections and desktop reviews, are described in section 7. Planned and reactive physical security inspections are part of the CNSC's compliance verification plans. Security inspections are conducted in accordance with CNSC *Conduct of Inspection* and use the same approach for inspections in any other SCA.

Nuclear material accounting and controls

The CNSC performs compliance and auditing activities to ensure licensees' safeguards programs and procedures are sufficient to meet the safeguards obligation to the IAEA.

The CNSC maintains a national system that accounts for and controls nuclear materials in Canada for safeguards purposes, and supplies reports to the IAEA that serve as a basis for IAEA inspection and monitoring activities. CNSC Nuclear Materials Accounting System (NMAS) system is in place for uranium, thorium and plutonium.

Training and exercises

Training and exercise programming contribute directly to strengthening capabilities across Canada to respond to safety and nuclear security incidents. The promotion of a common approach to emergency management, including the adoption of standards and best practices, aims to enhance the capabilities of Canada's emergency management community. High Security Nuclear facilities are required to conduct regular drills and major security exercises every two years. The CNSC Performance Testing Program is used to evaluate physical protection systems, security practices and nuclear response force responses strategies against threats established in the Design Basis Threat. This allows CNSC to test the security program at licensed facilities and their ability to integrate with site operations, emergency personnel and off-site response.

Security and safety interfaces in regulatory oversight activities

The CNSC has regulatory responsibility for regulating both safety and nuclear security. The CNSC recognizes the challenge of harmonizing safety and security requirements to ensure physical protection measures do not adversely influence safety. The CNSC's ROB has overall responsibility for all licensing and compliance activities at regulated facilities and activities. The Nuclear Security Division (NSD) within the TSB is responsible for reviewing, assessing and verifying physical security programs and infrastructure. NSD works with other divisions to ensure that safety and security requirements are addressed cohesively. The responsible licensing and/or compliance division within ROB and the security specialists collaborate to ensure that safety is not compromised by any security requirements and that security is not compromised by any safety requirements. Both safety and security are considered as part of the CNSC regulatory framework and are represented in the SCAs.

For licensees of nuclear substances, radiation devices or Class II prescribed equipment, the responsibilities for oversight and enforcement are clearly defined in a joint protocol that has been approved by CNSC's ROB and TSB senior management. Roles and responsibilities between the relevant licensing division and NSD are clearly established and documented. Consultation and coordination of compliance activities including security inspections are discussed at the CNSC's Directorate of Security and Safeguards and DNSR Working Group on Radioactive Source Security and documented in Working Group minutes. Security Awareness training is delivered to CNSC inspectors by the NSD. This training is integrated within the ITQP for new inspectors for the Operations Inspection Division and Accelerators and Class II Facilities Division within DNSR. DNSR inspectors verify both safety and security regulatory requirements while on-site at specified frequencies. This strong safety and security interface allows increased inspector vigilance and assists in fostering an organizational security culture. In addition, it

enhances awareness to better handle confidential information in the field, which helped to create tools to share licensing and compliance information without compromising confidentially.

CNSC staff work together to ensure effective oversight and enforcement for nuclear safety, security and safeguards. The CNSC applies a graded approach, commensurate with risk to address any conflict between safety and security. CNSC licensing and inspection staff are trained to assess and verify safety and security requirements based on the use and risk significance of the nuclear material or facility. Licensing staff and specialists collaborate to determine appropriate levels of oversight needed by the licensees using or possessing nuclear substances and sources. Inspectors receive training and are supported by subject matters experts from the NSD and other groups. CNSC has effective internal communication interfaces to facilitate collaboration within the CNSC to address potential safety and/or security issues and coordinate verification activities. This approach helps to foster an inclusive culture of safety and security.

11.3 INTERFACE AMONG AUTHORITIES

Related to GSR Part 1 (Rev. 1): Requirement 12, paragraphs 2.39 – 2.40

One of the Government of Canada's priorities is to protect the safety of Canadians domestically and abroad. The preservation of national security is a multi-faceted endeavour that requires cooperation across a diverse range of initiatives and programs. Within the federal structure, many departments have mandates that cover aspects of security issues and emergencies. Any issue related to nuclear safety and/or nuclear security can be escalated to a whole-of-government response when required.

International protocols

Canada is a party to the *Convention on the Physical Protection of Nuclear Material* and its Amendment. The Depositary of which is the IAEA. .

Nuclear materials within the borders of a country are subject to the regulatory regime of that country. For example, in the case of shipments between Canada and the United States, responsibility for physical protection begins and ends at the border between the two countries. A shipment entering Canada from the United States becomes the responsibility of the CNSC licensee when it enters Canada. If nuclear material is to be imported to or exported from Canada, the receiver or shipper, respectively, must obtain the appropriate licences (transport, import/export) from the CNSC before the shipment crosses the border.

Domestic arrangements and liaison with law enforcement agencies

The CNSC works closely with nuclear facility operators, law enforcement, intelligence agencies, international organizations and other government departments to ensure that nuclear materials and nuclear facilities are adequately protected.

CNSC maintains several MOUs with other authorities in regards to nuclear safety and nuclear security. For example:

- The CNSC MOU with Transport Canada outlines respective roles and responsibilities with respect to the transport of dangerous goods

- The CNSC MOU with the Department of National Defence (which is excluded by order from the application of the NSCA and its regulations) facilitates joint efforts in relation to safety, security and safeguards
- The CNSC MOU with the CBSA and the Royal Canadian Mounted Police (RCMP) facilitates the exchange of information and the provision of technical advice

CNSC is currently developing a new MOU with the RCMP to address findings from the 2015 IPPAS mission to Canada and to integrate the provision of nuclear forensics support for investigation related to nuclear terrorism and crime.

Integration of emergency arrangements for safety-related and nuclear security-related incidents

Emergency Preparedness and Response was addressed through the IAEA's EPREV mission to Canada which took place June 3 to 13, 2019.

Sections 34 and 36 of the NSR require licensees to train nuclear security officers and conduct security drills. REGDOC-2.10.1, *Nuclear Emergency Preparedness and Response*, requires licensees to test the implementation measures of their emergency preparedness programs through the conduct of exercises.

Relevant government staff, first responders (police, fire and emergency medical services) and military officials work together in exercises that simulate emergency scenarios such as natural disasters, health threats and terrorist attacks to validate plans, training and identify areas for improvement.

Public Safety Canada provides oversight and guidance in setting exercise priorities and co-sponsors key activities with lead departments as per the National Exercise Program. The objective of the National Exercise Program is to continuously improve emergency management in Canada through the coordination of comprehensive whole-of-government all-hazard exercises in the national interest. The program includes:

- domestic and international exercises addressing all hazards (e.g., natural and/or human induced) and major international events
- establishment and implementation of a federal government lessons learned process to track ongoing capability and response activities improvement
- education and training related to exercise development methodology through a variety of means

In addition, the CNSC has trained first responders to support emergency response. The CNSC also provides training to other first responders to increase the overall knowledge and capacity to deal with nuclear and radiological incidents. The CNSC contributes to national and international chemical, biological, radiological and nuclear counterterrorism programs, including development and delivery of the radiological/nuclear portion of the federal chemical, biological, radiological and nuclear First-Responder training program. This program was established to provide better training for emergency response teams across Canada to ensure that front-line responders are well prepared.

Nuclear forensics

The National Nuclear Forensics Capability is led by the CNSC and integrates resources, capabilities and subject matter expertise from CNSC and Government of Canada to support its national nuclear security, safeguards and non-proliferation interests and requirements. This includes the provision of training to Government of Canada departments or agencies to develop scientific, technical and operational

capabilities, as well as the development and delivery of exercises to test plans and procedures to ensure comprehensive nuclear forensic readiness.

CNSC licensee programs include provisions to locate and recover missing or stolen nuclear material and include interfaces with safety and response agencies.

11.4 CONCLUSIONS AND ACTIONS

The CNSC plays an important role for ensuring that safety and security are harmonized. CNSC's role in securing nuclear material and nuclear substances (including radioactive sources) ensures that safety and security can work together without impeding one another. The Canadian approach emphasizes the importance of safety and security interfaces while not limiting the benefits arising from the use of radioactive materials.

CNSC implements and maintains a robust approach to strengthen safety and security interfaces. This is demonstrated through the communication protocol between ROB and TSB, integrating safety and security in licensing and compliance activities and providing inspectors with adequate security training. This concept of operation is successful and sustainable. It is also managed through the implementation of an integrated Working Group on Radioactive Source Security and the conduct of joint safety-security inspections and compliance activities for nuclear substances.

12. Conclusion

The CNSC recognizes the importance of international peer reviews and is committed to regulatory excellence in the nuclear sector. As a continued demonstration of this commitment, Canada requested an IRRS mission in order to review elements of CNSC's framework for safety, as well as its core regulatory processes for all aspects of the nuclear fuel cycle.

In preparation for this mission, the CNSC completed IRRS self-assessment questionnaires, and prepared supporting documentation with support and input from other Canadian federal departments. The responses to the self-assessment provide a comprehensive and accurate picture of how the CNSC performs compared to IAEA safety standards. This summary report represents a distillation of the advanced reference material that was compiled for this mission.

The results of the self-assessment concluded that the CNSC has a modern, robust regulatory framework that aligns with IAEA safety standards and international best practices.

No gaps were identified through this exercise. Among the CNSC's strengths is the transparency of Commission proceedings and engagement with civil society, as well as the transparency and openness of the consultation process for the regulatory framework. Other good practices include the use of a well-established safety and control area framework, graduated approach to enforcement and systematic approach to inspection planning by all CNSC service lines.

In the spirit of continuous improvement, a number of opportunities to further strengthen the CNSC approach were identified through the self-assessment. The CNSC's initial action plan, including a comprehensive list of actions and initiatives, is provided in Annex A of this summary report. A number of those improvements are already being carried out as part of the modernization of the CNSC's regulatory framework including:

- publishing the Waste Management and Radiation Protection series of REGDOCs
- developing other REGDOCs with regulatory requirements and guidance in the area of licence application guides for processing facilities, constructing NPPs and decommissioning reactor facilities
- continuing to populate the management system portal
- developing and implementing a nuclear substances and radiation devices resource management strategy

With the submission of this report, the responses to the self-assessment and the other advanced reference material documentation, the CNSC is ready for the mission. The CNSC looks forwards to welcoming members of the review team and working with the IAEA to achieve a successful mission.

Annex A – CNSC Initial Action Plan

Module	Action Item Number	Action Item/Deliverable	Status	Target Date
Module 1 – Responsibility and Functions of the Government	No action items identified.			
Module 2 – Global Safety Regime	No action items identified.			
Module 3 – Responsibilities and Functions of the Regulatory Body	A1	Conduct a comprehensive strategic review of all of the CNSC's regulatory programs to see if the CNSC can be more efficient and effective in delivering its mandate within a changing nuclear industry.	In progress	2021
Module 4 – Management System for the Regulatory Body	A2	Continue to populate the CNSC's management system portal to improve and bring more awareness to the CNSC's management system.	In progress	2019
	A3	Continue development and begin implementation of the Regulatory Operations Training Program	In progress	2020
	A4	Complete the Capability for Nuclear Safety initiative	In progress	2019
Module 5 – Authorization	A5	Continue to develop and publish regulatory documents providing guidance regarding the required information for licence applications for facilities and activities regulated by the CNSC (e.g., Licence Application Guide: Licence to Decommission Reactor Facilities).	In progress	2022
	A6	Continue to develop and publish a regulatory document on financial guarantees to supersede G-206, *Financial Guarantees for the Decommissioning of Licensed Activities*	In progress	2020
Module 6 – Review and Assessment	A7	Update and implement the Conduct of Technical Assessment process	In progress	2019
Module 7 – Inspection	No action items were identified.			

Module	Action Item Number	Action Item/Deliverable	Status	Target Date
Module 8 – Enforcement	A8	Update and implement the CNSC's Select and Apply Enforcement Tool process	In progress	2019
Module 9 – Regulations and Guides	No action items were identified.			
Interfaces with Nuclear Security	No action items were identified			
Safety Requirements for Predisposal of Radioactive Waste	A9	Continue to develop and publish REGDOC-2.11.1, Waste Management, Volume I: Management of Radioactive Waste:	In progress	2020
Safety Requirements for Disposal of Radioactive Waste	A10	Continue to develop and publish REGDOC-1.2.1, Guidance in Deep Geological Repository Site Characterization	In progress	2020
	A11	Continue to develop and publish REGDOC-2.11.1, Waste Management, Volume III: Safety Case for Long-term Radioactive Waste Management, version 2	In progress	2020
Regulation of Decommissioning of Facilities	A12	Continue to develop and publish REGDOC-2.11.2, Decommissioning, to supersede G-219 Decommissioning Planning for Licensed Activities	In progress	2020
Regulation of Nuclear Power Plants	A13	Document the graded approach in a regulatory document or the CNSC's regulatory framework.	In progress	2020
Regulation of Fuel Cycle Facilities	A14	Continue to develop and publish a regulatory document regarding safety analysis for Class IB facilities	In progress	2020
Regulation of Research Reactors	A15	Continue to develop and publish regulatory document on the design of reactor facilities to supersede RD-367, Design of Small Reactor Facilities.	In progress	2021
Safety Requirements of Occupational Exposure	A16	Amend the Radiation Protection Regulations as well as continue to develop and publish the REGDOC-2.7 suite of regulatory documents, including: • REGDOC-2.7.1, Radiation Protection	In progress	2020

Module	Action Item Number	Action Item/Deliverable	Status	Target Date
		• REGDOC-2.7.2, Dosimetry Volume 1: Ascertaining Occupational Dose • REGDOC-2.7.2, Dosimetry Volume 2, Technical and Management System Requirements for Dosimetry Services		
Safety Requirements for Public Exposure	A17	Continue to develop and publish regulatory document on controlling releases to the environment from nuclear facilities	In progress	2021
Safety Requirements for Radiation Sources	A18	Develop and implement a nuclear substances and radiation devices resource management strategy to ensure that sufficient inspectors are being trained	In progress	2020
Safety Requirements for Safe Transport of Radioactive Materials	A19	Review opportunities to make regulatory and environmental information for the transport of radioactive materials more readily accessible	In progress	2021

Annex B – List of CNSC regulatory documents cross-referenced to IAEA Safety Standards

Table 1: Published CNSC REGDOCs

SUBJECT AREA	REGDOC NUMBER	REGDOC TITLE	SAFETY STANDARDS REFERENCED
		REGULATED FACILITIES AND ACTIVITES	
Reactor Facilities	1.1.1	Site Evaluation and Site Preparation for New Reactor Facilities	NS-R-1, -3 GSR Part 2, GS-R-2 NS-G-3.2. NS-G-1.5, -3.1, -3.6 SSG-9, SSG-21 ,SSG-18, GS-G-3.1, -3.5 WS-G-2.3 GS-R-3, -2 RS-G-1.8 Nuclear Security Series 17 TECDOC-1657
	1.1.3	Licence Application Guide: Licence to Operate a Nuclear Power plant	SSG-3, SSG-4
Certification and Prescribed Equipment	1.5.1	Application Guide: Certification of Radiation Devices or Class II Prescribed Equipment	SSR-6
Nuclear Substances and Radiation Devices	1.6.1	Licence Application Guide: Nuclear Substances and Radiation Devices, version 2	RS-G-1.9
		SAFETY AND CONTROL AREAS	
Management System	2.1.1	Management System	GSR Part 2
	2.1.2	Safety Culture	SF-1 GSR Part 1, GSR Part 2 GS-G-3.5 NS-G-2.4
	2.2.1	Human Factors	

Human Performance Management	2.2.2	Personnel Training, Version 2	TECDOC-1057
	2.2.3	Personnel Certification: Radiation Safety Officers	
	2.2.3	Personnel Certification: Exposure Device Operators	
	2.2.4	Fitness for Duty: Managing Worker Fatigue	
	2.2.4	Fitness for Duty, Volume II: Managing Alcohol and Drug Use, Version 2	GSR Part 1 NS-R-2, NS-G-2.4, -2.8 GS-G-1.2, -1.3
	2.2.4	Fitness for Duty, Volume III: Nuclear Security Officer Medical, Physical and Psychological Fitness	
	2.2.5	Minimum Staff Complement	
Operating Performance	2.3.1	Conduct of Licensed Activities: Construction and Commissioning Programs	SSG-28 SSR-2/2 GS-R-2, -3 GS-G-3.1, -3.5 NS-G-2.2, -2.3 GS-G-2.1
	2.3.2	Accident Management, Version 2	SF-1 NS-G-2.15 Safety Reports Series No. 32 IAEA-SVS-09 SSR-2/2 INSAG-10, -12 75-INSAG-3 Rev.1 TECDOC-1440
	2.3.3	Periodic Safety Analysis	SF-1 SSG-25 NS-G-2.6, -2.12 Safety Report Series No.57 75-INSAG-3 Rev.1 INSAG-12
Safety Analysis	2.4.1	Deterministic Safety Analysis	NS-R-4 SSG-2 GSR Part 4

			Safety Report Series No.55
	2.4.2	Probabilistic Safety Assessment (PSA) for Nuclear Power Plants	SSG-3, SSG-4 INSAG-10
	2.4.3	Nuclear Criticality Safety	NS-R-5 GS-R-2 SSR-6, SSG-6, SSG-26
Physical Design	2.5.1	General Design Considerations: Human Factors	
	2.5.2	Design of Reactor Facilities: Nuclear Power Plants	SSR-2/1, SSR-2/2 SSG-2, -3, -4, -9, -18 NS-G-1.1, -1.2, -1.3, -1.4, -1.5, -1.6, -1.7, -1.8, -1.9, -1.10, -1.11, -1.12, -1.13 NS-G-2.1, -2.2, -2.5, -2.6, -2.9, -2.11, -2.15, NS-G-3.1, -3.3, -3.4, -3.5 GS-R-2, -3 GS-G-3.3, -3.5 RS-G-1.1 WS-G-2.1 Safety Series No. 50-P-1, No. 50-P-10, No. 110, No. 50-P-7 Safety Report Series No.46, No. 3, No. 8, No. 25 Nuclear Security Series No. 17 TECDOC-1647, -967 Rev. 1, -1276 INSAG-19 INFCIRO-225 Rev. 5 General Safety Requirements Part 4
	2.5.4	Design of Uranium Mines and Mills: Ventilation Systems	
	2.5.5	Design of Industrial Radiography Installations	SSG-11
	2.5.7	Design, Testing and Performance of Exposure Devices	SSR-6, SSG-26
Fitness for Service	2.6.1	Reliability Programs for Nuclear Power Plants	
	2.6.2	Maintenance Programs for Nuclear Power Plants	NS-R-2 NS-G-2.6

	2.6.3	Aging Management	NS-R-1, -2 NS-G-2.4, -2.6, -2.12 Safety Report Series No. 82, No.57, No. 3, No. 62, No. 15 SSG-25 TECDOC-1197, -1188, -1025, -981
Radiation Protection	2.7.3	Radiation Protection Guidelines for Safe Handling of Decedents	Safety Reports Series No. 40, No. 63
Environmental Protection	2.9.1	Environmental Protection: Environmental Principles, Assessments and Protection Measures, version 1.1	
Emergency Management and Fire Protection	2.10.1	Nuclear Emergency Preparedness and Response, Version 2	GS-R-2 GS-G-2.1
Waste Management	2.11	Framework for Radioactive Waste Management and Decommissioning in Canada	GSR-5, GSR-6 GSG-1 SSR-5
	2.11.1	Waste Management, Volume II: Management of Uranium Mine Waste Rock and Mill Tailings	GSR-5 SSR-5 SSG-23 GSG-3
Security	2.12.1	High Security Facilities, Volume I: Nuclear Response Force, Version 2*	Nuclear Security Series No. 7 - Nuclear Security Culture
	2.12.1	High-Security Facilities, Volume II: Criteria for Nuclear Security Systems and Devices*	Nuclear Security Series No. 7 - Nuclear Security Culture
	2.12.2	Site Access Security Clearance	Nuclear Security Series No. 8 – Preventative and Protective Measures against Insider Threats
Safeguards and Non-Proliferation	2.13.1	Safeguards and Nuclear Material Accountancy	INFCIRC/164 STR-368
	2.13.2	Import and Export	RS-G-1.9 INFCIRC/274/Rev.1
Packaging and Transport	2.14.1	Information Incorporated by Reference in Canada's Packaging and Transport of Nuclear Substances Regulations, 2015	SSR-6 Safety Series No.115

	2.14.1	Volume II: Radiation Protection Program Design for the Transport of Nuclear Substances	TS-G-1.3 SSR-6 SSG-26

Other Regulatory Areas

Reporting Requirements	3.1.1	Reporting Requirements for Nuclear Power Plants, Version 2	SF-1
	3.1.2	Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills	
Public and Aboriginal Engagement	3.2.1	Public Information and Disclosure	
	3.2.2	Aboriginal Engagement	
Commission Proceedings	3.4.1	Guide for Applicants and Intervenors Writing CNSC Commission Member Documents	
CNSC Processes and Practices	3.5.1	Information Dissemination: Licensing Process for Class I Nuclear Facilities and Uranium Mines and Mills, Version 2	
	3.5.2	Compliance and Enforcement: Administrative Monetary Penalties, Version 2	
	3.5.3	Regulatory Fundamentals	SF-1
	3.5.4	Pre-licensing Review of a Vendor's Reactor Design	

*Document contains prescribed information and is available on a valid need-to-know basis.

Table 2: CNSC REGDOCS in development

SUBJECT AREA	REGDOC NUMBER	REGDOC TITLE	SUPERSEDING/SAFETY STANDARDS REFERNCE
REGULATED FACILITIES AND ACTIVITIES			
Reactor Facilities	1.1.2*	Licence Application Guide: Licence to Construct a Nuclear Power Plant	GS-G-4.1 GS-R-2 WS-GS-6.1

	1.1.4	Licence Application Guide: Licence to Decommission Reactor Facilities	GSR-6
	1.1.5	Licence Application Guide: Small Modular Reactor Facilities	IAEA INFCIRC/164 IAEA INFCIRC/164/Add.1
Class IB Facilities	1.2.1	Guidance on Deep Geological Repository Site Characterization	SSR-5, SSG-14
	1.2.2	Licence Application Guide: Processing Facilities	
Uranium Mines and Mills	1.3.1	Licence Application Guide: Uranium Mines and Mills	
Class II Nuclear Facilities	1.4.1	Licence Application Guide: Class II Nuclear Facilities and Prescribed Equipment	Safety Report Series No. 47
		SAFETY AND CONTROL AREAS	
Human Performance Management	2.2.3	Personnel Certification: Initial Certification Examinations	
	2.2.3	Personnel Certification: Certification of Persons Working in Nuclear Power Plants	
Safety Analysis	2.4.4	Safety Analysis for Class IB Facilities	
	2.4.5	Safety Criteria for Fuel and Thermalhydraulics	
Physical Design	2.5.3*	Design of reactor Facilities: Small Reactors	NS-R-4, -1 Nuclear Security Series No. 4 Safety Report Series No.55 INFCIRC/225/Rev.4 TECDOC-967, -1276
	2.5.6*	Design of Nuclear Substances Laboratories and Nuclear Medicine	IAEA Safety Series 1
Radiation Protection	2.7.1	Radiation Protection	GSR Part 3, GSR Part 7
	2.7.2	Dosimetry, Volume I: Ascertaining Occupational Dose	GSR Part 3, GSR Part 7
	2.7.2	Dosimetry, Volume II: Technical and Quality Assurance Requirements for Dosimetry Services	
Conventional Health and Safety	2.8.1	Conventional Health and Safety	

Emergency Management and Fire Protection	2.10.1	Emergency Management and Fire Protection, Volume II: Framework for Recovery After a Nuclear Emergency	GSR Part 7, GSR Part 3 GSG-11 RS-G-1.8 WS-R-3 Safety Report Series No.64 SSR-5 SSG-23
	2.10.2	Fire Protection	
Waste Management	2.11.1	Waste Management, Volume I: Management of Radioactive Waste	GSR-5 GSG-1 SSG-41, SSG-15, SSG-29, SSG-31, SSG-14 WS-G-6.1 SSR-5
	2.11.1	Waste Management, Volume III: Safety Case for Long-Term Radioactive Waste Management, Version 2	WS-G-1.2 NF-T-1.2
	2.11.2	Decommissioning Plan	GSR-6, GSR-4 WS-G-2.4, -2.1, -5.2
Security	2.12.3	Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2	Safety Guide No. RS-G-1.9 SSR-6 Nuclear Security Series No. 7, No. 14, No. 11 TECDOC-1344, -1355, -953, -1276 TS-R-1 INFCIRC/225/Rev.5, INFCIRC/663 SSG-5
Packaging and Transport	2.14.1	Volume III: Joint Canada-United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages	TS-R-1 Safety Series No. 113
		Other Regulatory Areas	
Reporting Requirements	3.1.3	Reporting Requirements for Waste Nuclear Substance Licensees, Class II Nuclear Facilities and Users of Prescribed Equipment, Nuclear Substances and Radiation Devices	

Financial Guarantees	3.3.1	Financial Guarantees	GSR-6
CNSC Processes and Practices	3.5.2	Compliance and Enforcement: Making, Reviewing and Receiving Orders Under the NSCA	

ACRONYMS

ACFD	Accelerators and Class II Facilities Division
ACR	Annual Compliance Reports
AECL	Atomic Energy of Canada Limited
ALARA	As Low As Reasonably Achievable
AMPs	Administrative Monetary Penalties
BATEA	Best Available Technology and Techniques Economically Achievable
CBSA	Canada Border Services Agency
CDR	Cabinet Directive on Regulation
CEAA, 2012	Canadian Environmental Assessment Act, 2012
CERTS	Central Event Reporting and Tracking System
CFSIs	counterfeit, suspect or fraudulent items
CIINFPER	Class II Nuclear Facilities and Prescribed Equipment Regulations
CINFR	Class I Nuclear Facilities Regulations
CLEAN	Contaminated Lands Evaluation and Assessment Network
CMD	Commission Member Document
CNL	Canadian Nuclear Laboratories
CNSC	Canadian Nuclear Safety Commission
CPPNM	Convention on Physical Protection of Nuclear Material
CSA	Canadian Standards Association
CSO	Chief Science Officer
CSSCF	Country Specific Safety Culture Forum
DDP	Detailed Decommissioning Plan
DERPA	Directorate of Environmental and Radiation Protection and Assessment
DNCFR	Directorate of Nuclear Cycle and Facilities Regulation
DNSR	Directorate of Nuclear Substance Regulation
DO	Designated Officer
DOPO	Differences in Professional Opinion
DRL	Derived Release Limits
EA	Environmental Assessment
EARMP	Saskatchewan Eastern Athabasca Regional Monitoring Program
ECCC	Environment and Climate Change Canada
EDRMS	Electronic Document and Records Management System
EITS	Event Information and Tracking System
EMS	Environmental Management System
EPREV	Emergency Preparedness Review
ERA	Environmental Risk Assessment
ESDC	Employment and Social Development Canada
EVP and CROO	Executive Vice-President and Chief Regulatory Operations Officer
FAC	Facility Assessment and Compliance
FCSAP	Federal Contaminated Sites Action Plan
FCSI	Federal Contaminated Site Inventory
GNSCR	General Nuclear Safety and Control Regulations
HC	Health Canada
HP	Harmonized Plan

ICMS	Informal Conflict Management System
ICRP	International Commission on Radiological Protection
ICSANT	International Convention of the Suppression of Acts of Nuclear Terrorism
IEMP	Independent Environmental Monitoring Program
ILP	Individual Learning Plan
INES	International Nuclear and Radiological Event Scale
IPPAS	International Physical Protection Advisory Service
IQMD	Internal Quality Management Division
ITQP	Inspector Training and Qualification Program
KM	Knowledge Management
LCH	Licence Conditions Handbook
LOUIS	Licensing Operations User Integrated System
MNR	McMaster Nuclear Reactor
MOU	Memoranda of Understanding
MSM	Management System Manual
NCA	Nuclear Cooperation Agreements
NDR	National Dose Registry
NDS	National Dosimetry Service
NEA	Nuclear Energy Agency
NFWA	Nuclear Fuel Waste Act
NGS	Nuclear Generating Station
NMAS	Nuclear Material Accounting System
NNC	Notice of Non-Compliance
NNIECR	Nuclear Non-proliferation Import and Export Control Regulations
NORM	Canadian Guidelines for the Management of Naturally Occurring Radioactive Waste
NPP	Nuclear Power Plant
NRCan	Natural Resources Canada
NRP	National Radon Program
NSCA	Nuclear Safety and Control Act
NSD	Nuclear Security Division
NSR	Nuclear Security Regulations
NSRDR	Nuclear Substances and Radiation Devices Regulations
NSSR	National Sealed Source Registry
NWMO	Nuclear Waste Management Organization
OECD	Organisation for Economic Co-operation and Development
OID	Operations Inspection Division
OJT	on-the-job training
OPEX	Operating Experience
OPG	Ontario Power Generation
ORSP	Ontario Ministry of Labour Reactor Surveillance Program
OSART	Operational Safety Review Team
PDP	Preliminary Decommissioning Plan
PFP	Participant Funding Program
PRRP	Power Reactor Regulatory Program
*** PSR ***	Periodic Safety Review
PTNSR, 2015	Packaging and Transport of Nuclear Substances Regulations, 2015

RCMP	Royal Canadian Mounted Police
REGDOC	Regulatory Document
RIB	Regulatory Information Branch
ROB	Regulatory Operations Branch
ROR	Regulatory Oversight Report
RPB	Radiation Protection Bureau
RPD	Regulatory Program Division
RPR	Radiation Protection Regulations
RR	Research Reactors
RSO	Radiation Safety Officer
SCA	Safety and Control Area
SMR	Small Modular Reactor
SPF	Strategic Planning Framework
TARM	Technical Assessment Reference Matrix
TBS	Treasury Board of Canada Secretariat
TDG Act	Transportation of Dangerous Goods Act
TDG Regulations	Transportation of Dangerous Goods Regulations
TSB	Technical Support Branch
TSO	Technical and Scientific Organization
UMMR	Uranium Mines and Mills Regulations
WMF	waste management facilities

Contents

Module: 01. Responsibilities and Functions of the Government

Findings

Question 1.1

Has the Government established a national policy and strategy for safety?

***Answer**, by System Administrator @ 2019-05-29 10:18:15 AM*

Yes

Finding

The Government has established a national policy and strategy for safety.

***Response**, by Megan Tougas-Cooke @ 2019-06-25 10:13:07 AM*

CNSC staff response

Constitutional Authority

Sections 91 and 92 of the Constitution Act, 1867 confer legislative authority to the Parliament of Canada and the provincial Legislatures respectively, and enumerate specific classes of subjects exclusive to each. Generally speaking, legislative authority for a particular subject will lie with one level of government only.

Nuclear works and undertakings come under the exclusive jurisdiction of the federal Parliament. Nuclear energy comes under exclusive federal authority for two reasons:

1. *it falls under the power found in section 91 of the Constitution Act, 1867 of the federal Parliament to make laws for the peace order and good government of Canada*
2. *it becomes federal when specified in legislation that declares certain "works and undertakings" to be "for the general advantage of Canada."*

The federal Parliament can assume jurisdiction over a local work by declaring the work to be for the general advantage of Canada. Paragraph 92(10)(c) of the Constitution Act, 1867, gives the federal Parliament the power to make laws in relation to:

> *(c) Such works as, although wholly situate within the province, are before or after their execution declared by the Parliament of Canada to be for the general advantage of Canada or for the advantage of two or more of the provinces.*

Once an explicit declaration has been made, it is conclusive: the question whether a particular work really is for the general advantage of Canada has been seen as an issue of policy for the Parliament, not subject to judicial review.

Section 71 of the NSCA is the declaratory provision for nuclear works and undertakings:

Any work or undertaking constructed for the development, production or use of nuclear energy or for the mining, production, refinement, conversion, enrichment, processing, reprocessing, possession or use of a nuclear substance or for the production, possession or use of prescribed equipment or prescribed information is declared to be a work or undertaking for the general advantage of Canada.

Where the declaratory power has been used to create an area of federal law-making power for certain works and undertakings, whatever is integral to the management and operation of those works and undertakings will be exclusively a federal legislative power. Accordingly, any of the activities and facilities licensed pursuant to the NSCA that are works or undertakings unequivocally fall under federal jurisdiction.

The department of Natural Resources Canada (NRCan) is responsible for federal nuclear energy policy. The key federal legislation for nuclear related activities in Canada includes:

- *Nuclear Safety and Control Act (NSCA) (regulatory authority)*
- *Nuclear Energy Act (nuclear research and development)*
- *Nuclear Fuel Waste Act (nuclear fuel waste)*
- *Nuclear Liability and Compensation Act (liability)*

The federal nuclear policy framework covers the following areas:

- *uranium*
- *nuclear energy*
- *nuclear research and development and science and technology*
- *civil nuclear liability*
- *radioactive waste management*

The key federal nuclear policies are Canada's 1996 Policy Framework on Radioactive Waste, Nuclear Non-Proliferation Policy and Non-Resident Ownership Policy in the Uranium Mining Sector.

There are two organizations that play key roles in the Canadian nuclear energy program which report through the Minister of Natural Resources to the Parliament of Canada. These are:

- *The CNSC: Canada's nuclear regulator is an independent agency of the Government of Canada. The mandate of the CNSC is to regulate the development, production and use of nuclear energy and materials to protect health, safety, security and the environment and to respect Canada's international commitments on the peaceful use of nuclear energy. The NSCA, which established the CNSC in May 2000, provides a modern regulatory framework that mirrors the latest scientific knowledge in the areas of health, safety, security and environmental protection.*
- *Atomic Energy of Canada Limited (AECL), a Crown Corporation established in 1952 to develop peaceful applications of nuclear energy. Its mandate is to fulfill the Government's waste and decommissioning responsibilities, provide nuclear expertise to*

support federal roles and responsibilities, and offer services to users of the Nuclear Laboratories on commercial terms. AECL's Nuclear Laboratories are now being operated by Canadian Nuclear Laboratories Ltd (CNL). The response to QID2.2 of Module 3, Responsibilities and Functions of the Regulatory Body, describes the relationship between AECL and CNL in further detail.

Other key federal departments in Canada which have some responsibility for nuclear security, health, safety and trade:

- *Global Affairs Canada (GAC) is responsible for Canada's external affairs and international trade and development. This includes the promotion of bilateral and multilateral nuclear cooperation, and the implementation in Canada and support abroad of key non-proliferation, disarmament, safety and security agreements. It enhances security and well-being by promoting the peaceful and safe use of nuclear energy and technologies.*
- *Health Canada (HC)'s Radiation Protection Bureau (RPB) is responsible for promoting and protecting Canadians' health with respect to the risks posed by exposure to natural and man-made sources of ionizing radiation in living, working and recreational environments. RPB is also Canada's national centre of excellence for environmental monitoring of radiation in the environment, protection and occupational radiation dosimetry. RPB also conducts research on exposure trends and health outcomes of occupational environmental exposures to radiation, and leads Canada's National Radon Program. The RPB also operates Canada's National Dose Registry.*
- *Environment and Climate Change Canada (ECCC) contributes to sustainable development through pollution prevention to protect the environment and human health from the risks associated with toxic substances. ECCC is responsible for the administration of the Canadian Environmental Protection Act.*
- *Canadian Environmental Assessment Agency is responsible for the administration of the Canadian Environmental Assessment Act, 2012 (CEAA, 2012), the primary federal legislation defining requirements for assessing the environmental effects of planned projects.*
- *Transport Canada's role with respect to the nuclear sector is to promote public safety during the transportation of dangerous goods. The Transportation of Dangerous Goods Directorate is the leading source of regulation, information and advice on dangerous goods transport for the public, industry and government employees.*
- *·Innovation, Science and Economic Development Canada plays an important role in fostering the growth of Canadian businesses and in making Canada more competitive internationally.*

Under the Canadian constitution, provincial laws may also apply when they are not directly related to nuclear energy and do not conflict with federal law. As both federal and provincial laws are applicable in the same territory, conflicts between laws made by the federal Parliament and laws of the provincial Legislature may occur. As a general rule, federal law will apply where overlapping laws are determined to be integral to the operation and management of a nuclear work or undertaking.

Section 44 of the NSCA provides authority for the regulatory body, with the approval of the Governor in Council, to make regulations, including regulations which incorporate provincial laws by reference. Incorporation by reference is a drafting technique used in legislation and most often in regulations. It allows for documents to be referenced in the regulation and incorporated into it without the need to reproduce the text of that document. The content of that document is binding and forms as much a part of the rules of the regulations as the text of the regulations itself.

Provisions for human and financial resources

The Financial Administration Act (FAA) provides for the financial administration of the Government of Canada, the establishment and maintenance of the accounts of Canada and the control of Crown corporations. Section 67 of the NSCA states that the FAA applies with respect to the Commission. The CNSC is a departmental corporation as per schedule II and a separate agency as per schedule V of the FAA. The Treasury Board of Canada Secretariat (TBS) defines a departmental corporation as a corporation created by an Act of Parliament and listed in schedule II of the FAA. Departmental corporations report to Parliament through a Minister and function with more autonomy than ministerial departments. Departmental corporations are also able to perform administrative, research, advisory, supervisory or regulatory functions.

Under section 44 of the NSCA, with the approval of the Governor in Council, the Commission may make regulations. The Commission requires the involvement and support of the Minister of Natural Resources Canada for special initiatives such as amendments to regulations and requests for funding.

Pursuant to subsection 16(1) of the NSCA, "the Commission may, notwithstanding any other Act of Parliament, appoint and employ such professional, scientific, technical or other officers or employees as it considers necessary for the purposes of this Act and may establish the terms and conditions of their employment and, in consultation with the Treasury Board, fix their remuneration."

Provisions and framework for research and development

Pursuant to section 18 of the Nuclear Energy Act, works and undertakings for research or investigation with respect to nuclear energy are declared for the general advantage of Canada and under federal jurisdiction.

Under paragraph 9(b) of the NSCA, the mandate of the CNSC is "to disseminate objective scientific, technical and regulatory information to the public concerning the activities of the Commission and the effects, on the environment and on the health and safety of persons, of the development, production, possession and use referred to in paragraph (a)" The CNSC's Research and Support Program supports the CNSC's regulatory mandate. The program supports research associated with nuclear power plant safety, uranium waste processing, handling of spent fuel and management of radioactive waste. The research is carried out by contracted consultants

and universities or through various international cooperative efforts. For example, since 1978, the CNSC has been involved in independent research and assessment, including international collaboration, on the safe long-term management of spent fuel in geological repositories.

AECL is a federal crown corporation established to develop peaceful applications of nuclear energy. Its mandate is to enable nuclear science and technology and manage the federal government's decommissioning and radioactive waste liabilities. AECL is responsible for the management and oversight of the Federal Nuclear Science and Technology Work Plan. The Federal Nuclear Science and Technology Work Plan serves the collective interests of 13 federal departments and agencies (including the CNSC) in the areas of health, nuclear safety and security, energy and the environment. Under the Federal Nuclear Science and Technology Work Plan AECL engages with various federal departments and agencies to develop a program of work that meets their respective needs and priorities and oversees the delivery of the work.

Additional information on Federal Nuclear Science and Technology Work Plan and the CNSC's Research and Support Program can be found in the response to SQID 1.9.1.

<u>Binding international legal instruments and other relevant international instruments</u>

GAC promotes bilateral and multilateral nuclear cooperation and safety, and the implementation in Canada and abroad of key non-proliferation and disarmament agreements. It enhances security and well-being by promoting the peaceful and safe use of nuclear technologies and ensures compliance with international commitments such as the Comprehensive Nuclear Test Ban Treaty and the Chemical Weapons Convention. It also assists in the development of relevant international law and guidance, such as conventions established under the auspices of the IAEA and the Nuclear Suppliers Group (NSG).

Canada is a founding member of the NSG which was created in 1974 following the explosion of a nuclear device in India, a non-nuclear weapon state. The goal of NSG is to support the effective implementation of the Nuclear Non-Proliferation Treaty by establishing clear rules on nuclear transfers. Through guidelines the NSG aims to ensure that nuclear trade for peaceful purposes does not contribute to the proliferation of nuclear weapons or other nuclear explosive devices. These guidelines seek to control materials and technology that could make a significant contribution to an unsafeguarded nuclear fuel cycle or nuclear explosive activity. GAC implements the NSG's control lists for nuclear material, equipment and technology. This requires a permit for the export of listed nuclear material, equipment and technology or related goods. In addition, a licence must be issued by the CNSC following the provisions of the NSCA. A permit and licence are issued only when the responsible officials are satisfied that the proposed export meets all of Canada's stringent nuclear non-proliferation requirements.

Canada is a signatory to a number of key international conventions that establish common obligations and mechanisms to ensure protection and safety. Many of the treaties which the CNSC is responsible for implementing (in whole or in part) are multilateral treaties under IAEA auspices. These conventions include the:

- *Convention on Nuclear Safety*
- *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*
- *Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency*
- *Convention on Early Notification of a Nuclear Accident or Radiological Emergency*
- *Treaty on the Non-Proliferation of Nuclear Weapons*
- *Convention on the Physical Protection of Nuclear Material*

The CNSC fully meets its obligations under these conventions.

Canada is also a party to nuclear safety related codes of conduct. On behalf of Canada, the CNSC assists in the development of and is responsible for implementing (in whole or in part) codes of conduct such as the Code of Conduct of the Safety and Security of Radioactive Sources and the Code of Conduct on the Safety of Research Reactors.

The CNSC has also been delegated authority to implement Canada's agreement with the IAEA on nuclear safeguards verifications including the Agreement between the Government of Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons and the Protocol Additional to the Agreement between Canada and the International Atomic Energy Agency for the Applications of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons.

National policy framework for radioactive waste

The 1996 Policy Framework for Radioactive Waste establishes the roles and responsibilities of the Government of Canada and waste producers. The Government of Canada guides, oversees and regulates radioactive waste owners. This policy sets the stage for institutional and financial arrangements to manage radioactive waste in a safe, comprehensive, environmentally sound, integrated and cost-effective manner. The framework specifies that:

- *the Government of Canada is responsible for developing policy and regulating and overseeing radioactive waste producers and owners to ensure that they comply with legal requirements and meet their funding and operational responsibilities in accordance with approved long-term waste management plans*
- *waste owners are responsible, in accordance with the "polluter pays" principle, for the funding, organization, management and operation of the facilities required to safely manage their wastes over the short and long terms.*

In accordance with the "polluter pays" principle, waste producers and owners are responsible for the funding, organization, management and operation of disposal and other facilities required for their wastes. The policy framework recognizes that arrangements may be different for various categories of radioactive wastes, such as used nuclear fuel, low- and intermediate-level radioactive waste, and uranium mining and milling waste.

Mechanisms for taking account of social and economic developments

As Canada's nuclear regulator, the CNSC requires that the environmental effects of all nuclear facilities or activities be considered and evaluated when licensing decisions are made. All licensing applications that indicate there may be potential interactions with the environment are subject to an environmental assessment commensurate with the scale and complexity of the environmental risks associated with the facility or activity.

Environmental assessments are carried out either under CEAA, 2012 or under the NSCA. Environmental assessments carried out under the CEAA, 2012 must also characterize the social and economic effects.

The CNSC's mandate focusses on the health and safety of persons and the protection of the environment and does not extend to economic matters.

No Analysis

No Rating

***Attachments**, by Megan Tougas-Cooke @ 2019-06-24 9:42:20 AM*

Financial Administration Act

Nuclear Energy Act

Nuclear Fuel Waste Act

Nuclear Liability and Compensation Act

Nuclear Safety and Control Act

Subsidiary Question 1.1.1

How does the implementation of the policy and strategy for safety take into account a graded approach?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-05 10:47:19 AM*

CNSC staff response

Parliament established the CNSC by enacting the NSCA. The CNSC is the authority for the regulation of nuclear facilities and nuclear-related activities in Canada.

CNSC's regulatory document, REGDOC-3.5.3, Regulatory Fundamentals, describes CNSC's regulatory approach and philosophy, and outlines how the CNSC applies the NSCA and regulations made under the authority of the NSCA in its regulatory oversight.

As per this REGDOC, the CNSC uses a graded approach which is a systematic method or process by which elements such as the level of analysis, the depth of documentation and the scope of actions necessary to comply with requirements are commensurate with:

- *the relative risks to health, safety, security, the environment and the implementation of international obligations to which Canada has agreed*
- *the particular characteristics of a nuclear facility or licensed activity.*

The CNSC applies the graded approach to licensing and compliance activities.

This approach is driven primarily by an assessment of the risk associated with the activities being regulated, and the performance history of the licensee.

The degree of oversight is also informed by:

- *the complexity and potential harm posed by the licensed activity*
- *technical assessments of submissions*
- *relevant research*
- *information supplied by parties to Commission proceedings*
- *international activities that advance knowledge in nuclear and environmental safety*
- *co-operation with other regulatory bodies.*

The CNSC, when applying the risk-informed approach, follows these principles:

- *meeting of regulatory requirements*
- *maintenance of sufficient safety margins*
- *maintenance of defense in depth.*

If a licensee cannot achieve the required level of safety, it will not be permitted in any case to continue conducting its licensed activities.

No Subsidiary Analysis

***Subsidiary Attachments**, by Nana Kwamena @ 2019-05-29 10:18:21 AM*

Nuclear Safety and Control Act

REGDOC-3.5.3 Regulatory Fundamentals

Question 1.2

Has the Government established an appropriate governmental, legal and regulatory framework for safety, with clearly allocated responsibilities?

***Answer**, by System Administrator @ 2019-05-29 10:18:08 AM*

Yes

Finding

The Government has established an appropriate legal and regulatory framework for safety with clearly allocated responsibilities.

***Response**, by Megan Tougas-Cooke @ 2019-06-25 10:19:55 AM*

CNSC staff response

The nuclear regulatory framework in Canada has a modern and robust legislation. The CNSC's regulatory framework consists of the NSCA and other laws that may apply to nuclear facilities and activities in Canada passed by Parliament. In addition, there are regulations, licences or certificates and regulatory documents that the CNSC uses to regulate the nuclear industry.

Responses to Module 9, Regulations and Guides, describes CNSC's regulatory framework including how licensees and applicants are informed of the regulatory requirements and how to meet them.

Principles for protecting people and the environment from radiation risk

Pursuant to paragraph 9(a)(i) of the NSCA, the CNSC regulates the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information in order to prevent unreasonable risk, to the environment and to the health and safety of person. This is done in a manner that is consistent with Canadian environmental policies, acts and regulations and with Canada's international obligations. Regulating to prevent unreasonable risk to the health and safety of persons includes both nuclear and hazardous substances as well as conventional health and safety hazards.

As per regulatory document, REGDOC-2.9.1, Environmental Protection: Environmental Principles, Assessments and Protection Measures, the CNSC's guiding principles for environmental protection requires licensees or applicants to demonstrate that adequate measures have been made for the protection of the environment and that the environmental protection measures are:

- commensurate with the level of risk associated with the activity
- recognize that uncertainty exists in science and account for this uncertainty:
    - by keeping all releases to the environment as low as reasonably achievable (ALARA), social and economic factors being taken into account for nuclear substances
    - through the application of the best available technology and techniques economically achievable (BATEA) for hazardous substances
- respect the precautionary principle, the "polluter pays" principle, and the concepts of pollution prevention, sustainable development and adaptive management

- are assessed against performance indicators and targets that are based on sound science

Under the Radiation Protection Regulations (RPR), the CNSC sets dose limits that are within protective health limits and establishes regulations that set requirements to prevent unreasonable risk to the health and safety of persons. Persons include workers and members of the public. These limits are consistent with the recommendations of the International Commission of Radiological Protection (ICRP). The RPR also require every licensee to implement a radiation protection program that keeps the amount of exposure and effective dose and equivalent dose ALARA.

Types of facilities and activities included in the framework for safety

Section 26 of the NSCA describes the activities that no person shall conduct except in accordance with a licence. These activities include:

(a) possess, transfer, import, export, use or abandon a nuclear substance, prescribed equipment or prescribed information;
(b) mine, produce, refine, convert, enrich, process, reprocess, package, transport, manage, store or dispose of a nuclear substance;
(c) produce or service prescribed equipment;
(d) operate a dosimetry service for the purposes of this Act;
(e) prepare a site for, construct, operate, modify, decommission or abandon a nuclear facility; or
(f) construct, operate, decommission or abandon a nuclear-powered vehicle or bring a nuclear-powered vehicle into Canada.

Section 2 of the NSCA provides the definitions that apply to the NSCA including nuclear facilities and nuclear substance.

As per section 2, a nuclear facility is any of the following facilities including:

(a) a nuclear fission or fusion reactor or subcritical nuclear assembly,
(b) a particle accelerator,
(c) a uranium or thorium mine or mill,
(d) a plant for the processing, reprocessing or separation of an isotope of uranium, thorium or plutonium,
(e) a plant for the manufacture of a product from uranium, thorium or plutonium,
(f) a plant for the processing or use, in a quantity greater than 1015 Bq per calendar year, of nuclear substances other than uranium, thorium or plutonium,
(g) a facility for the disposal of a nuclear substance generated at another nuclear facility,
(h) a vehicle that is equipped with a nuclear reactor, and
(i) any other facility that is prescribed for the development, production or use of nuclear energy or the production, possession or use of a nuclear substance, prescribed equipment or prescribed information, and includes, where applicable, the land on which the facility is located, a building that forms part of, or equipment used in conjunction

with, the facility and any system for the management, storage or disposal of a nuclear substance.

Also, section 2 of the NSCA defines nuclear substances as:

(a) deuterium, thorium, uranium or an element with an atomic number greater than 92;
(b) a derivative or compound of deuterium, thorium, uranium or of an element with an atomic number greater than 92;
(c) a radioactive nuclide;
(d) a substance that is prescribed as being capable of releasing nuclear energy or as being required for the production or use of nuclear energy;
(e) a radioactive by-product of the development, production or use of nuclear energy; and
(f) a radioactive substance or radioactive thing that was used for the development or production, or in connection with the use, of nuclear energy.

Authorizations required for the operation of facilities and the conduct of activities in accordance with the graded approach

Section 26 of the NSCA provides the activities that require authorization by licence. The Commission's licensing authority is set out in section 24 of the NSCA. Pursuant to subsection 24(1) of the NSCA, "the Commission may establish classes of licenses authorizing the licensee to carry on any activity described in paragraphs 26(a) to (f) that is specified in the license for the period that is specified in the licence." All applicable licence conditions are reflected in the respective licence, including those that require the licensee to ensure that:

- *qualified personnel carry out the licensed activities*
- *adequate provision is made for the protection of the environment, the health and safety of persons,*
- *Canada is maintaining national security and implementing the international obligations to which it has agreed*

Prescribed equipment, including transport packages, are certified by the CNSC. The CNSC also issues certificates to persons employed in certain positions where a nuclear substance or prescribed equipment is produced, used, possessed, packaged, transported, stored or disposed of.

The response to SQID1.1.1 outlines how the CNSC incorporates the graded approach in its regulatory framework, including authorizations.

Additional information regarding the CNSC's authorization process is provided in response to the questions in Module 5, Authorization.

<u>Rationale for the authorization of new facilities as well as the applicable decision-making process.</u>

Subsection 24(4) of the NSCA states "No licence shall be issued, renewed, amended or replaced – and no authorization to transfer one given – unless, in the opinion of the Commission, the

applicant or, in the case of an application for an authorization to transfer the licence, the transferee (a) is qualified to carry on the activity that the licence will authorize the licensee to carry on; and (b) will, in carrying on that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed."

The following regulations outline the additional information need for authorization of a new facility of activity:

- *General Nuclear Safety and Control Regulations (GNSCR)*
- *Class I Nuclear Facilities Regulations (CINFR)*
- *Class II Nuclear Facilities and Prescribed Equipment Regulations (CIINFPER)*
- *Nuclear Substances and Radiation Devices Regulations (NSRDR)*
- *Uranium Mines and Mill Regulations (UMMR)*
- *Nuclear Non-proliferation Import and Export Control Regulations (NNIECR)*
- *Packaging and Transport of Nuclear Substances Regulations, 2015 (PTNSR, 2015)*

The CNSC requires that the environmental effects of all nuclear facilities and activities be considered and evaluated when licensing decisions are made. All licence applications are subject to an environmental assessment (EA), commensurate with the scale and complexity of the environmental risks associated with the facility or activity. EAs are carried out either under the CEAA, 2012 or under the NSCA. Early in the process, CNSC staff determine which EA applies by reviewing the information provided by the applicant or licensee in their application and supporting documentation.

The responses to the questions in Module 5 Authorization provide additional information on the authorization and decision-making process for new facilities.

<u>Provision for the involvement of interested parties and for their input to decision making</u>

The NSCA establishes a legislative requirement for the Commission to hold public hearings, with respect to exercising its power to license. Pursuant to subsection 40(5) "The Commission shall, subject to any by-laws under section 15 and any regulations made under section 44, hold a public hearing with respect to:

(a) the proposed exercise by the Commission or by a panel established under section 22, of the power under subsection 24(2) to issue, renew, suspend, amend, revoke or replace a licence; and
(b) any other matter within its jurisdiction under this Act, if the Commission is satisfied that it would be in the public interest to do so.

Section 40 of NSCA outlines the conditions under which the Commission shall provide applicants, licensees or other person with the opportunity to be heard. The CNSC Rules of Procedure, enabled under the NSCA, sets out the requirements for notification of public hearings and

publication of decisions from public hearings. The Canadian Nuclear Safety Commission By-laws define the management and conduct of Commission's affairs.

As per paragraph 9(b) of the NSCA, the CNSC's objects/mandate includes disseminating objective, scientific, technical and regulatory information. This is accomplished through live webcasts during Commission hearings and meetings, regulatory documents, decisions, reports and plans posted on the CNSC's website along with public information sessions.

As an agent of the Crown, the CNSC is responsible for fulfilling its legal duty to consult, and where appropriate, accommodate the interests and rights of Indigenous Peoples when its decision may have an adverse impact on potential or established Aboriginal and/or treaty rights pursuant to section 35 of the Constitution Act, 1982. The CNSC's approach to Aboriginal consultation includes commitments to uphold the honour of the Crown through information sharing, relationship building and promoting reconciliation as well as to meeting its common-law duty to consult. The CNSC supports a coordinated, whole-of-government approach to improve the efficiency and effectiveness of the consultation process.

Provisions for assigning legal responsibility for safety to the persons or organizations responsible for the facilities and activities

Subsection 24(4) of the NSCA outlines the conditions for issuing a license under the Act.

In addition, Regulatory Document REGDOC-3.5.3, Regulatory Fundamentals, outlines the CNSC regulatory approach and philosophy. The CNSC's regulatory philosophy is based on the following:

- *Licensees are directly responsible for managing regulated activities in a manner that protects health, safety security and the environment and that conforms with Canada's domestic and international obligations on the peaceful use of energy.*
- *The CNSC is accountable to Parliament and to Canadians for assuring that these responsibilities are properly discharged.*

Responses to Module 9, Regulations and Guides, describes CNSC's regulatory framework including how licensees and applicants are informed of the regulatory requirements and how to meet them. CNSC's approach to verify that regulatory requirements are met through compliance and enforcement is described in Module 8, Enforcement.

Provision for the review and assessment of facilities and activities, in accordance with the graded approach

Desktop reviews generally entail consideration of documents and reports, such as quarterly technical reports, annual compliance reports and documentation related to design, safety analysis, programs and procedures. The CNSC assesses this information to ensure that the operations remain within the licensing basis. Refer to SQID 1.4.1 for a description of the licensing basis. CNSC staff conduct technical assessments to support licensing, compliance, regulatory

decision making and the development of regulatory positions. The assessments are based on the best available science, taking operating experience into account.

Further details on CNSC's approach to review and assessment are provided in response to the questions in Module 6 Review and Assessment.

Authority and responsibility of the regulatory body for promulgating regulations and preparing guidance for their implementation

Under section 44 of the NSCA, "the Commission may with the approval of the Governor in Council, make regulations" regarding the subjects listed therein. The regulations under the NSCA reflect detailed regulatory requirements applicable to regulated activities and persons.

In addition to the NSCA and the regulations made under the NSCA, the CNSC has developed REGDOCs, which are a key part of its regulatory framework for nuclear activities in Canada. They provide additional clarity to licensees and applicants by explaining how to meet the requirements set out in the NSCA and the regulations made under it. REGDOCs can be incorporated by reference in regulations or as part of a licence condition therefore making them enforceable. As well, the safety and control measures described in the licence application and the documents needed to support the licence application are part of the licensing basis and are enforceable. This means if an applicant cites and uses a regulatory document directly in their application; it becomes part of the licensing basis and is enforceable.

The responses to Module 9 Regulations and Guides provides additional information regarding the regulations and the regulatory documents that make up the CNSC's regulatory framework.

Provision for the inspection of facilities and activities and for the enforcement of regulations using the graded approach

CNSC inspections are led by designated inspectors and are planned, controlled, coordinated, consistent and transparent (open to formal scrutiny). Subsection 29(1) of the NSCA provides the Commission with the authority to designate inspectors. The powers of the inspectors are outlined in section 30 of the NSCA. The frequency, scope and depth of these inspections are risk-informed. CNSC's framework with respect to inspections is outlined in response to the questions in Module 7, Inspections.

Where a deficiency or deviation is either self-identified by the licensee or identified by CNSC staff, the regulated party is expected to address or correct the situation promptly. If necessary, the CNSC may also take enforcement action to compel compliance with regulatory requirements. The CNSC does not take enforcement action to punish but rather to encourage compliance, to maintain continued safety and to deter further non-compliance. The CNSC's approach to enforcement is detailed in Module 8, Enforcement.

The CNSC uses a graduated approach to influence compliance and respond to non-compliances. When a non-compliance (or a continued non-compliance) has been identified, CNSC staff assess

its risk and safety significance to determine the enforcement action most likely to bring the licensee back into compliance. The selected enforcement response is commensurate with the risk that the non-compliance presents to the environment, the health and safety of workers and members of the public, and to national security.

The specification of offences and corresponding penalties

Under the NSCA, a person who commits an offence is subject to prosecution resulting in punishment, which may include a fine and/or imprisonment. Sections 48-50 of the NSCA specifies the regulatory offences under the NSCA. The potential punishments for committing an offence is outlined in section 51 of the NSCA and may result in a fine not exceeding $1,000,000 or imprisonment for a term not exceeding five years or both.

Provision for appeals against the regulatory body

Section 43 of the NSCA outlines the conditions for redeterminations and appeals of decisions and orders. Under subsection 43(1), an appeal may be made to the Commission in the circumstances listed therein. The conditions for the Commission to rehear and re-determine on application is described in subsection 42(2) of the NSCA. Neither the Minister nor the Governor in Council has a role in CNSC's decision-making or the power of appeal. The Commission's decisions are reviewable only by the Federal Court of Canada.

Provision for preparedness for and response to a nuclear and radiological emergency

Emergency preparedness and response was being addressed through the 2019 EPREV mission to Canada.

Interface with nuclear security

The Nuclear Security Regulations under the NSCA set out the detailed security requirements for licensed nuclear facilities and other regulated activities. To prevent reasonable risk to national nuclear security, the CNSC works closely with nuclear facility operators, law enforcement and intelligence agencies, international organizations and other governmental departments to ensure that nuclear substances and facilities are adequately protected.

For additional information refer to the response the Module on Interfaces with Nuclear Security.

Provision for an interface with the system of accounting and control of nuclear material

The CNSC is responsible for implementing Canada's nuclear non-proliferation policy. The Treaty on the Non-Proliferation of Nuclear Weapons is the cornerstone of Canada's efforts to promote the objectives of international disarmament, non-proliferation, and the peaceful use of energy. The CNSC implements these commitments through the NSCA and corresponding legislation including the NNIECR.

The safeguards agreement between the Government of Canada and the IAEA gives the IAEA the right and obligation to monitor Canada's nuclear-related activities and to verify nuclear material inventories and flows in Canada. Through its regulatory oversight, the CNSC ensures that all applicable licensees have safeguards programs in place. Where required by the safeguards agreements, the CNSC compiles licensee information and submits it to the IAEA on behalf of the Government of Canada.

Provisions for controls on the import and export of nuclear material

The NNIECR, established under the NSCA, identify all controlled nuclear material and non-nuclear material, which requires CNSC import or export licensing. This regulatory requirement enables the CNSC to exercise greater control over controlled nuclear material and non-nuclear material as it moves across Canada's border.

Provision for acquiring and maintaining necessary competence for ensuring safety

As a separate agency of the federal government, under subsection 16(1) of the NSCA, the Commission may "appoint and employ such professional, scientific, technical and other officers and employees as it considers necessary for the purposes of this Act and may establish the terms and conditions of their employment and in consultation with the Treasury Board, fix their remuneration." This allows the CNSC to employ the staff required to carry out its mandate which is informed by the objects of the Commission as outlined in section 9 of the NSCA.

Responsibilities and obligations in respect of financial provision for management of radioactive waste and of spent fuel and for the decommissioning of facilities and termination of activities

The CNSC requires licensees to maintain a financial guarantee for decommissioning and managing the resulting radioactive wastes, including spent fuel. The requirement for licensees to provide guarantees that adequate financial resources are available for the decommissioning of these facilities and managing the resulting radioactive wastes is listed in subsection 24(5) of the NSCA. Paragraph 3(1)(l) of the GNSCR stipulates that, an application for a licence must contain a description of any proposed financial guarantee related to the activity for which a licence application is submitted. CNSC regulatory guide G-206, Financial Guarantees for the Decommissioning of Licensed Activities, covers the provision of financial guarantees for decommissioning activities. As part of modernizing the regulatory framework, the CNSC is current in the process of developing REGDOC-3.3.1, Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities. This regulatory document will supersede G-206, Financial Guarantees for the Decommissioning of Licensed Activities.

The criteria for release from regulatory control

Release from CNSC regulatory control occurs when the licensee has successfully decommissioned the facility and restored the site to a state in which it can be released for future use (e.g., green field or brown field [industrial]). The CNSC requires a submission for a

licence to abandon or exemption from licensing. This submission must be supported by reports on the results of the decommissioning and site restoration activities, as well as the results of the radiological and environmental monitoring, to demonstrate that the site no longer needs to be licensed under the NSCA.

If unrestricted release is yet to be achieved, perpetual licensing from the CNSC may be required, or oversight by another regulatory or governmental body allows the Commission to exempt the site indefinitely from CNSC licensing (determined on a case-by-case basis) if the risks are determined to be acceptable by the Commission. In order to be granted an exemption, the licensee must present a safety case that demonstrates long-term safety.

Section 4 of the GNSCR outlines the information that must be submitted to obtain a licence to abandon a nuclear substance, nuclear facility, prescribed equipment or prescribed information. Additional information for an application for a licence to abandon is provided under section 8 of the CINFR and under section 8 of the UMMR.

Section 5 of the CIINFPER outlines the information that is required in an application for a licence to decommission a Class II nuclear facility. All licensees must submit policies and procedures regarding decommissioning as part of their application.

In reviewing a submission for a licence to abandon, the CNSC must be satisfied that the abandonment of the site, nuclear substance, prescribed equipment or information does not pose an unreasonable risk to the environment, the health and safety of persons, or national security. The abandonment must also not result in a failure to comply with Canada's international obligations.

A licence for nuclear substances or radiation devices can be revoked provided proof of decommissioning of the site or building has been provided to CNSC before release from regulatory control. The licensee must ensure that all nuclear substances and radiation devices have been removed, and that the contamination levels of the site or building do not exceed the limits specified on the licence. In order for an existing licence to be revoked, a licensee must submit a request for revocation.

<u>Responsibilities for disposal facilities for radioactive waste to be sited, designed, constructed, operated and closed</u>

As described in the response to QID1, the Government of Canada's Radioactive Waste Policy Framework, sets the stage for institutional and financial arrangements to manage radioactive waste in a safe, comprehensive, environmentally sound, integrated and cost-effective manner. It states that waste owners are responsible, in accordance with the "polluter pays" principle, for the funding, organization, management and operation of the facilities required to safely manage their wastes over the short- and long-terms.

As outlined in REGDOC-2.11, Framework for Radioactive Waste Management and Decommissioning in Canada, when making regulatory decisions about the management of radioactive waste, the CNSC considers the extent to which the owners of the waste have addressed several key principles, such as:

- *management of radioactive waste is commensurate with its radiological, chemical, and biological hazard to the health and safety of persons and the environment, and to national security*
- *assessment of future impacts of radioactive waste on the health and safety of persons and the environment encompasses the period of time when the maximum impact is predicted to occur*
- *predicted impact on the health and safety of persons and the environment from the management of radioactive waste is no greater than the impact that is permissible in Canada at the time of the regulatory decision*

The CNSC regulates radioactive waste management facilities through the entire lifecycle. Specific requirements are set out in regulations including,

- *GNSCR*
- *CINFR*
- *UMMR*
- *NSRDR*

These requirements are aimed at ensuring applicants for licences demonstrate in their applications that they are qualified to carry out the activity and that they will make adequate provisions for health, safety, environmental protection, and security.

No Analysis

No Rating

***Attachments**, by Megan Tougas-Cooke @ 2019-06-24 9:48:28 AM*

Canadian Environmental Assessment Act, 2012

Class I Nuclear Facilities Regulations

Class II Nuclear Facilities and Prescribed Equipment Regulations

CNSC By-Laws

CNSC Rules of Procedure

Constitution Act, 1867 to 1982

G-206 Financial Guarantees

General Nuclear Safety and Control Regulations

Nuclear Non-Proliferation Import and Export Control Regulations

Nuclear Safety and Control Act

Nuclear Security Regulations

Nuclear Substances and Radiation Devices Regulations

Packaging and Transport of Nuclear Substances Regulations, 2015

Radiation Protection Regulations

REGDOC-2.11 Framework for Radioactive Waste Management

REGDOC-2.9.1 Environmental Principles Assessments and Protection Measures

REGDOC-3.5.3 Regulatory Fundamentals

Uranium Mines and Mills Regulation

Subsidiary Question 1.2.1

How does the Government maintain the framework for Safety?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-24 9:49:38 AM*

CNSC staff response

The CNSC's regulatory framework consists of laws passed by Parliament that govern the regulation of Canada's nuclear industry, and regulations, licences and documents that the CNSC uses to regulate the industry.

Treasury Board Secretariat (TBS) supports the federal regulatory system by:

- *providing federal regulatory policy and oversight*
- *supporting evidence-based Governor in Council decision-making*
- *advancing and promoting regulatory cooperation*

The TBS is responsible for the Cabinet Directive on Regulation (CDR). The CDR is the Government of Canada's overarching regulatory policy framework that lays out the rules and requirements regulators must follow when they develop and implement regulations. The TBS also leads the Government of Canada's activities related to regulatory cooperation. The Government of Canada works with partners in the United States, European Union, and domestically with provinces and territories to reduce unnecessary regulatory differences and eliminate duplicative requirements and barriers between jurisdictions.

NRCan is the lead federal department for developing and implementing the federal nuclear energy policy.

The CNSC operates within a modern and robust legislative and regulatory framework. As described in Module 9, Regulations and Guides, the CNSC maintains its framework by taking into account international regulatory best practices, modern codes and that aligns with the IAEA's Safety Fundamentals and Safety Requirements. Standards created by independent, third-party standard-setting organizations such as the CSA Group, the American Society of Mechanical Engineers, the International Commission on Radiological Protection and the Institute of Electrical and Electronics Engineers are considered in the development of CNSC requirements and guidance. The CNSC also cooperates and shares best practices with other organizations and jurisdictions to foster the development and application of a consistent, effective regulatory framework in Canada as well as for international nuclear regulators.

To safely regulate an evolving nuclear sector, the CNSC maintains an effective and flexible regulatory framework. For example, REGDOCs provide additional clarity to licensees and applicants by explaining how to meet requirements set out in the NSCA and the regulations made under it. REGDOCs are evergreen documents that are subject to periodic review. Input from interested parties is welcome at any time and allows the CNSC to adjust its regulatory framework in response to changes in the nuclear industry.

No Subsidiary Analysis

***Subsidiary Attachments**, by Nana Kwamena @ 2019-05-29 10:18:15 AM*

Cabinet Directive on Regulation

Question 1.3

Has the government, through its legal system, established a regulatory body for safety?

***Answer**, by System Administrator @ 2019-05-29 10:17:35 AM*

Yes

Finding

The Government has established, through its legal system, a regulatory body for safety

***Response**, by Megan Tougas-Cooke @ 2019-06-05 10:49:54 AM*

CNSC staff response

The responsibility and authority for the regulation of nuclear facilities and nuclear-related activities in Canada is assigned to the CNSC by Parliament under the NSCA. The NSCA came into

force on May 31, 2000, establishing the CNSC, its objects, and the framework under which it can effectively and independently meet those objects. The CNSC replaces the former Atomic Energy Control Board, which was founded in 1946, and reports to Parliament th rough the Minister of Natural Resources. The mandate of the CNSC is informed by the objects of the Commission, set out in section 9 of the NSCA, which are:

- *(a) to regulate the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information in order to*
  - *(i) prevent unreasonable risk, to the environment and to the health and safety of persons, associated with that development, production, possession or use,*
  - *(ii) prevent unreasonable risk to national security associated with that development, production, possession or use, and*
  - *(iii) achieve conformity with measures of control and international obligations to which Canada has agreed; and*
- *(b) to disseminate objective scientific, technical and regulatory information to the public concerning the activities of the Commission and the effects, on the environment and on the health and safety of persons, of the development, production, possession and us e referred to in paragraph (a).*

The CNSC is the sole authority in Canada to regulate the development, production and use of nuclear energy, and the production, possession and use of nuclear substances, prescribed equipment in order to prevent unreasonable risk.

No Analysis

No Rating

***Attachments**, by Megan Tougas-Cooke @ 2019-06-19 10:31:15 AM*

Nuclear Safety and Control Act

Subsidiary Question 1.3.1

What legal authority has been assigned to the Regulatory Body to enable it to fulfil its regulatory obligations for the control of facilities and activities?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-05 10:50:21 AM*

CNSC staff response

There are provisions under the NSCA that empowers the CNSC to perform its regulatory functions, including authorization, review and assessment, inspection, enforcement and the establishment or adoptions of regulations and guides.

<u>Authorization</u>

Section 26 of the NSCA outlines those conditions that no person shall engage in nuclear activities except in accordance with a licence. Section 2 of the NSCA defines "licence" to mean "... a licence set out in Section 24" of the Act. All licences referred to in section 24 of the NSCA are licences issued by the Commission, and therefore the Commission has sole power to licence nuclear facilities and activities.

Subsection 24(5) of the NSCA authorizes the Commission to include in a licence any condition it considers necessary for the purposes of the NSCA. Such conditions are legally binding on licensees, and are an important regulatory tool whereby the Commission can impose requirements on licensees that address health and safety and other issues specific to their licensed facilities or activities, or to impose additional regulatory requirements on a class of licensees in advance of making amendments to regulations.

Regulatory review and assessment

Regulatory review of safety submissions, both before and after a licence may be issued, is performed generally by the "professional, scientific, technical or other officers or employees" of the Commission, which it has the authority to employ under section 16 of the NSCA, and who function as the expert advisors to the Commission in its regulatory role. Under subsection 2(2) of Canadian Nuclear Safety Commission Rules of Procedure "The Commission or designed officer, as the case may be, may permit or require officers of employees of the Commission to participate in a proceeding under these Rules in such manner, including presenting information and submissions orally and in writing, questioning participants and responding to questions and submissions, as will enable the Commission or designated officer to determine the matter in a far, informal and expeditious manner." Over all phases of the lifetime of a facility or other licensed operation, ongoing review is performed by the Commission's staff, reported to the Commission and forms the basis for any regulatory action.

Inspection and enforcement

Inspection and enforcement is provided for in the NSCA in sections 28 to 36, inclusive. The power to inspect to verify compliance with the NSCA, regulations, orders or licences is set out in section 30 of the NSCA, along with the measures a CNSC inspector may take are set out in section 32. The power to issue orders to protect health and safety, the environment, national security and compliance with international obligations is set out in section 35. Any order issued under section 35 is subject to review by the Commission (see subsection 35(3)). Any decision or order of the Commission may, for the purposes of enforcement, be made a rule or decree of the Federal Court and enforced as such, if the Commission files its decision or order with the Court (subsection 20(8) and 20(9), NSCA).

The Commission also has the powers to amend a licence by adding conditions (see subsection 24(5)) to require licensees to take certain actions to protect health and safety, the environment and national security and to comply with international obligations. On a case by case basis, the

Commission may add conditions at the time a licence is renewed, or the Commission may add them to a licence on its own initiative under Section 25 of the NSCA.

Under subsection 12(2) of the GNSCR, the Commission, or a person authorized by the Commission may make a request to a licensee to carry out a range of actions that may include tests, modifying equipment or procedures, etc. Licensees must file a report within the time specified in the request and must respond to the substance of the request. Failure to do so would be an offence under paragraph 48(k) of the NSCA.

It is also important to note that the information provided by the licensee under this subsection would be considered in deciding if any subsequent regulatory action needs to be taken using other powers provided under the NSCA (e.g., powers to issue an order, etc.). With respect to any such orders or licence amendments that might arise, the appeal and review rights provided in the NSCA would be available to affected persons.

Sections 48, 49 and 50 of the NSCA set out offences under the Act, and Section 51 sets out the punishments that are available under Canadian law. It is an offence to fail to comply with the NSCA, regulations, licences or an order. A person convicted of an offence may be liable to a fine and/or a prison term, the amount and duration which depend on the type of offence. These legal penalties can only be imposed through prosecution. Prosecutions are handled by the Department of Justice. CNSC's role in prosecutions is to gather the evidence and provide testimony.

Under section 65.01 of the NSCA, the Commission has designated officers to issue notices of violations under the CNSC's Administrative Monetary Penalties (AMPs) program. The Administrative Monetary Penalties Regulations set out the regulations by which monetary penalties can be imposed for violations of regulatory requirements. The CNSC's REGDOC-3.5.2, Compliance and Enforcement: Administrative Monetary Penalties provides information to the public on the administration of the CNSC's AMP program.

<u>Establishing safety principles, criteria, regulations and guides</u>

The Commission's objects are to regulate to "prevent unreasonable risk" to the health and safety of persons, the environment and national security. It is with this purpose that the Commission establishes the regulations and requirements to be imposed on the regulated community, through its regulations and its guidance documents which explain the basis on which its regulatory actions will be based.

The Commission has the authority to make regulations, with the approval of the Governor in Council. The matters over which the Commission can make regulations are set out in subsection 44(1) of the NSCA. Regulations may include specific criteria, such as radiation dose limits (see the RPR) or contamination levels (see the PTNSR, 2015). Regulations may also incorporate standards (or a part of a standard), in which case those standards become legally binding (see subsection 44(4) of the NSCA).

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-24 9:50:54 AM*

Administrative Monetary Penalties Regulations

CNSC Rules of Procedure

General Nuclear Safety and Control Regulations

Nuclear Safety and Control Act

Packaging and Transport of Nuclear Substances Regulations, 2015

Radiation Protection Regulations

REGDOC-3.5.2 Compliance Enforcement Administrative Monetary Penalties

Subsidiary Question 1.3.2

What processes does the Government use to ensure that the Regulatory Body always has sufficient competence and resources to fulfil its statutory obligations?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-25 10:20:53 AM*

CNSC staff response

The Commission has the ability to employ the staff required to meet its mandate and fix their remuneration pursuant to subsection 16(1) of the NSCA. Salaries are then negotiated through the collective bargaining process for unionized employees and in consultation with TBS for non-unionized employees. The status as a separate agency contributes to the Commission's flexibility to respond to changes in the labour force to ensure it has the people it needs to carry out its work.

As well, as per subsection 17(1) of the NSCA, the Commission may enter into contracts for the services of any persons having technical or specialized knowledge of any matter relating to the work of the Commission, to advise and assist the Commission in the exercise or performance of any of its powers, duties or functions under this Act, and those persons shall receive such payment for their services and such expenses as are fixed by the Commission.

The CNSC is a departmental corporation as listed in schedule II and a separate agency as listed in schedule V of the FAA. The CNSC's operations are funded from two sources in order to discharge its mandate. CNSC receives its funding from the two following sources:

1. *Parliamentary Appropriation: Where the CNSC, through the Treasury Board of Canada (i.e., the central government treasury from which all federal departments receive their*

operating budgets – appropriation funding) receives an authority from Parliament to expend resources from Canada's treasury; and

2. *Fees paid by applicants, licensees and other special project sponsors in accordance with CNSC's Cost Recovery Fees Regulations. The Commission has the statutory authority to prescribe and charge fees for the services, products and information that it provides under the NSCA, and the fees may not exceed the costs to the CNSC of its regulatory activities (subsections 44 (1)(i), (2) and (3), 21(1)(g), NSCA)*

The parliamentary appropriation funds the CNSC activities related to applicants and licensees that are fee-exempt (such as hospitals, universities and other public institutions), activities related to international obligations (including safeguards activities in support of the non-proliferation of nuclear weapons), outreach and stakeholder relations activities, public responsibilities such as emergency preparedness, and the ongoing oversight of the NSCA and the associated regulatory framework.

The Revenue Spending Authority provides an equitable approach to the financing of the CNSC's regulatory activities by charging licensees all costs associated to the regulatory regime.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-24 9:51:16 AM*

CNSC Cost Recovery Fees Regulations

Financial Administration Act

Nuclear Safety and Control Act

Subsidiary Question 1.3.3

How does the Government ensure that the regulatory body remains effectively independent in its safety related decision making, and that it is able to perform its functions without undue pressure or constraint?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-05 10:51:10 AM*

CNSC staff response

The CNSC is an independent agency of the Government of Canada and operates in a transparent manner. Its operations are open to formal public scrutiny. The Commission's mandate, set out in its enabling legislation, does not include regulating to meet political or economic objectives. When the NSCA was first published as the replacement for the Atomic Energy Control Act, its summary noted:

While the existing Act encompasses both the regulatory and developmental aspects of nuclear activities, this enactment disconnects the two functions and provides a distinct identity to the regulatory agency. It replaces the Atomic Energy Control Board with the Canadian Nuclear Safety Commission, underlining its separate role from that of Atomic Energy of Canada Ltd., the federal research, development and marketing organization for nuclear energy.

The CNSC makes independent, fair and transparent decisions on licensing nuclear related activities. The CNSC is accountable to the public and to Parliament through an annual report that is submitted to Parliament, through the Minister of Natural Resources.

As outlined in response to SQID 1.3.2, the CNSC has sufficient authority, competent staff and financial resources to carry out its responsibilities under the NSCA.

The CNSC's decisions are not subject to review by the Minister or other parts of the executive of government. Neither the Minister nor the Governor in Council has a role in CNSC's decision making or the power of appeal. The Commission's decisions are reviewable only by the Federal Court of Canada.

Under section 19 of the NSCA, the Governor in Council may "by order, (to) issue to the Commission directives of general application on broad policy matters with respect to the objects of the Commission." Any political directives given to agencies (such as the CNSC), however, must be of a general nature and cannot fetter the Commission's decision-making authority in specific cases. In addition, all directives must be published in the Canada Gazette.

Members of the Commission must avoid conflict of interest. Subsection 11(1) of the NSCA states that "a member shall not, directly or indirectly, engage in any activity, have any interest in a business or accept or engage in any office or employment that is inconsistent with the members' duties." A member of the Commission who becomes aware of a conflict of interest must either terminate the conflict or resign from the Commission as per subsection 11(2) of the NSCA. Additionally, conflict of interest guidelines provide assurances that there is distance between the Commission and stakeholders.

The CNSC has a firmly entrenched values and ethics regime, which serves to strengthen and support governance and ethical leadership. The CNSC's Values and Ethics Code identifies the values and expected behaviours that guide CNSC employees in performing their duties and responsibilities to the highest ethical standards including maintaining an arms-length regulatory relationship with licensees and members of the public. The CNSC Values and Ethics Code is consistent with the federal Ethics Code for the Public Sector. To this end, the CNSC's Office of Audit and Ethics administers the following five ethics-related programs:

- *The Values and Ethics Program provides employees with counselling and techniques for strengthening relationships in the workplace and with stakeholders, as well as practical tools for ethical decision-making.*
- *The Internal Disclosure Program helps employees safely and constructively disclose wrongdoing and protect them from reprisal.*

- *The Conflict of Interest and Post-employment Program gives the CNSC and employees tools to prevent and avoid situations that could create the appearance of conflicts of interest or result in a potential or actual conflict of interest.*
- *The Political Activities Program offers guidance to employees who seek to participate in political campaigns and reviews requests to run for office in federal, provincial and municipal elections.*
- *The External Complaints Program offers members of the public and the industry an opportunity to voice their concerns to a neutral CNSC entity.*

Under paragraph 21(1)(a) of the NSCA, the Commission may, in order to attain its objects, enter into arrangements, including arrangements to provide training, with any department or agency of the Government of Canada or of a province, any regulatory agency or department of a foreign government or any international agency. These arrangements provide a framework for bilateral cooperation and provide parties with assurances regarding the security of information exchanges as well as enhanced clarity about responsibilities regarding visits and costs related to cooperation, initiatives, among other benefits. While these arrangements are not legally binding, they nonetheless represent serious political commitments. These instruments are usually entitled "memoranda of understanding" or "arrangements".

Paragraph 21(1)(f) empowers the CNSC to provide, under an appropriate security classification, information relating to the development, production or use of nuclear energy or the production, possession of or use of nuclear substance, prescribed equipment or prescribed information to any department or agency of a foreign government or international agency with which Canada or the Commission has entered into an agreement.

The CNSC's independent governance structure, in particular the Commission's arms-length decision-making authority, ensures that it remains independent from outside influence, including government departments and agencies, licensees and CNSC staff, in the conduct of its activities.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-19 10:32:47 AM*

CNSC Values and Ethics Code

Ethics Code for the Public Sector

Nuclear Safety and Control Act

Question 1.4

Has the government expressly assigned prime responsibility for safety to the person or organisation responsible for the facility or the activity?

***Answer**, by System Administrator @ 2019-05-29 10:17:54 AM*

Yes

Finding

The Government has expressly assigned prime responsibility for safety to the person or organisation responsible for the facility or the activity

***Response**, by Megan Tougas-Cooke @ 2019-06-05 10:51:47 AM*

CNSC staff response

The licensee bears the primary responsibility for safety at all times, including compliance with regulatory requirements.

The CNSC regulates to prevent unreasonable risk to the environment, the health and safety of persons, and national security. To this end, the CNSC has established a licensing basis and regulatory framework to ensure that, as per section 26 of the NSCA "no person shall, except in accordance with a licence,

- *(a) possess, transfer, import, export, use or abandon a nuclear substance, prescribed equipment or prescribed information;*
- *(b) mine, produce, refine, convert, enrich, process, reprocess, package, transport, manage, store or dispose of a nuclear substance;*
- *(c) produce or service prescribed equipment;*
- *(d) operate a dosimetry service for the purposes of this Act;*
- *(e) prepare a site for, construct, operate, modify, decommission or abandon a nuclear facility; or*
- *(f) construct, operate, decommission or abandon a nuclear-powered vehicle or bring a nuclear-powered vehicle into Canada.*

In addition, subsection 24(4) of the NSCA states that "... no licence may be issued, renewed, amended or replaced – and no authorization to transfer one given – unless, in the opinion of the Commission, the applicant or in the case of an application for an authorization to transfer the licence, the transferee:

- *(a) is qualified to carry on the activity that the licence will authorize the licensee to carry on; and*
- *(b) will, in carrying out that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed".*

Thus, it is the responsibility of applicants or licensees to demonstrate that they have put in place the necessary measures to protect safety related to the authorized licence outlined in section 26 of the NSCA.

Subsection 12(1) of the GNSCR sets out the general obligations of licensees. Paragraph 12(1)(c) specifically places an obligation on licensees to "... take all reasonable precautions to protect the environment and the health and safety of persons and to maintain security...". Applicants for licences must submit the information prescribed by the GNSCR and other relevant CNSC regulations, to demonstrate that they are qualified and that health and safety, the environment, and national security will be protected.

CNSC regulatory document, REGDOC-3.5.3, Regulatory Fundamentals, outlines the CNSC's regulatory philosophy, which is based on the following:

- *Licensees are directly responsible for managing regulated activities in a manner that protects health, safety, security and the environment, and that conforms with Canada's domestic and international obligations on the peaceful use of nuclear energy.*
- *The CNSC is accountable to Parliament and to Canadians for assuring that these responsibilities are properly discharged.*

The CNSC ensures that regulated parties are informed about regulatory requirements and provided with guidance on how to meet them, and then verifies that all regulatory requirements are and continue to be met through the CNSC's compliance program.

No Analysis

No Rating

***Attachments**, by Megan Tougas-Cooke @ 2019-06-24 9:52:47 AM*

General Nuclear Safety and Control Regulations

Nuclear Safety and Control Act

REGDOC-3.5.3 Regulatory Fundamentals

Subsidiary Question 1.4.1

How is the regulatory body empowered to require persons or organisations having prime responsibility for safety of facilities and activities, to comply with regulatory requirements and to demonstrate such compliance?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-05 10:52:37 AM*

CNSC staff response

Once a licence or certificate is issued, CNSC staff continue regulatory oversight through the CNSC's compliance program. CNSC regulatory policy P-211, Compliance, describes the basic principles and directives for establishing and conducting the CNSC's compliance program.

Compliance, in the context of this policy, means conformity by regulated persons with the legally binding requirements of the NSCA and its regulations as well as licences, decisions, and orders made under the NSCA. This policy is also applicable to the CNSC, and its authorized representatives or agents, who are involved in developing and carrying out compliance activities. As part of modernizing the regulatory framework, the CNSC will be developing REGDOC-3.5.2, Compliance and Enforcement: Making, Reviewing and Receiving Orders Under the NSCA. This regulatory document will supersede P-211, Compliance.

As stated in QID4, the licensee bears the primary responsibility for safety at all times, including compliance with regulatory requirements. The CNSC undertakes necessary and reasonable measures to ensure compliance to prevent unreasonable risks to the health and safety of persons, the environment and national security, and to achieve conformity with measures of control and international obligations to which Canada has agreed. These measures include promoting compliance awareness, verification and enforcement.

REGDOC 3.5.3 Regulatory Fundamentals, defines the CNSC's licensing basis as a set of boundary conditions for a regulated activity and establishes the basis for the CNSC's compliance program for that regulated facility or activity. All licensees are required to conduct their activities in accordance with the licensing basis, which is defined as a set of requirements and documents for a regulated activity comprising the following:

- *The regulatory requirements set out in the applicable laws and regulations.*
- *The conditions and safety and control measures described in the licence, and the documents directly referenced in that licence.*
- *The safety and control measures described in the licence application and the documents needed to support that licence application.*

The CNSC's licensing regime can include a licence conditions handbook (LCH), which is a companion piece to interpret a licence. The general purpose of the LCH is, for each licence condition, to clarify the regulatory requirements and other relevant parts of the licensing basis. The LCH, which should be read in conjunction with the licence, provides compliance verification criteria that the licensee must follow to comply with licence conditions, operational limits and information on delegation of authority and applicable versions of documents referenced in the licence. The LCH also provides non-mandatory recommendations and guidance on how to comply with licence conditions and criteria.

The CNSC's regulatory framework defines CNSC requirements and expectations for certification processes. Certificates apply to persons carrying out prescribed duties and the use of prescribed equipment and to the packaging and transport of nuclear substances.

To evaluate licensee compliance with regulatory requirements, the CNSC conducts both field verification activities (inspections) and desktop reviews. The frequency, scope, type and depth of these inspections and reviews are risk-informed. Where there may be overlap in regulatory oversight with other regulatory bodies, the CNSC coordinates its verification activities to

optimize efficiency and reduce administrative burden on licensees. CNSC uses enforcement, when necessary, to compel licensees or regulated persons back into compliance where non-compliance is detected.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-27 11:49:20 AM*

Class II Nuclear Facility and Prescribed Equipment License Example

Licence Condition Handbook - Bruce NGS A and B

Nuclear Power Reactor Operating Licence - Bruce NGS A and B

Nuclear Safety and Control Act

Nuclear Substance and Radiation Device Licence Example - McGill University Health Centre

Nuclear Substance and Radiation Device Licence Example - Mistras Services Inc

P-211 Compliance

REGDOC-3.5.3 Regulatory Fundamentals

Subsidiary Question 1.4.2

How does the government stipulate that compliance with regulations and requirements does not relieve the person or organisation responsible for a facility or activity of its prime responsibility for safety?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-05 10:53:12 AM*

CNSC staff response

The licensee bears the primary responsibility for safety. The CNSC is responsible for ensuring that these responsibilities are properly discharged.

Under certain circumstances the CNSC may authorize the transfer of a licence from one licensee to another, or to a new licence applicant, provided there has been no significant change in the licensed activity. The responsibility for safety may be transferred to another licensee or applicant if granted by the Commission under subsection 24(4) of the NSCA.

Additionally, paragraphs 12(1)(a), (b) and (c) of the GNSCR stipulates that a "licensee shall:

(a) ensure the presence of a sufficient number of qualified workers to carry on the licensed activity safely and in accordance with the Act, the regulations made under the Act and the licence

(b) *train the workers to carry on the licensed activity in accordance with the Act, the regulations made under the Act and the licence*
(c) *take all reasonable precautions to protect the environment and the health and safety of persons and to maintain the security of nuclear facilities and of nuclear substances"*

The CNSC expects licensees to have an effective and well-implemented management system to assure the CNSC that they will conduct their licensed activities safely. CSA Group standard N286-12, Management system requirements for nuclear facilities identifies management system requirements for nuclear facilities. It integrates the requirements from management system for health, safety, environment, security, economics and quality. Section 4.13 on continual improvement requires the licensee to continually improve the management system. When CSA N286-12 requirements are part of the licensing basis, the licensee must carry out:

- *trend analysis of causes and problems*
- *periodically critically assess the effectiveness of the management system to achieve planned results*
- *benchmarking the performance and experience of others where practicable*
- *maintaining the awareness of changes in its business environment*
- *seeking opportunities to improve processes*

The CNSC is committed to continuous improvement of both its internal operations and its regulation of the Canadian nuclear industry as outlined in REGDOC-3.5.3, Regulatory Fundamentals. The CNSC therefore requires licensees to strive to further reduce the risks associated with their licensed activities on an ongoing basis. It assesses how licensees manage risk during both normal operations and in response to potential accident conditions by applying concepts such as the ALARA principle and defence in depth. ALARA is a principle of radiation protection that holds that exposures to radiation are kept as low as reasonably achievable, social and economic factors taken into account. Section 4 of the RPR stipulates licensee requirements with respect to ALARA. In its assessments, the CNSC considers how licensees continuously evaluate, manage, and further reduce uncertainties with respect to hazards and safety issues. This also includes assessing how licensees consider additional safety and mitigation options as techniques and technologies evolve.

CNSC staff's responses to the questions in Module 2, The Global Safety Regime, provide additional information regarding how CNSC licensees consider operational and regulatory experience in continuous improvement.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-24 9:55:07 AM*

General Nuclear Safety and Control Regulations

Nuclear Safety and Control Act

Radiation Protection Regulations

REGDOC-3.5.3 Regulatory Fundamentals

Question 1.5

Has the government provided for effective coordination of the regulatory functions of the various authorities having responsibilities for safety within the regulatory framework?

***Answer**, by Megan Tougas-Cooke @ 2019-06-05 10:53:49 AM*

Yes

Finding

The Government has provided for effective coordination of the regulatory functions of the various authorities having responsibilities for safety within the regulatory framework

***Response**, by Megan Tougas-Cooke @ 2019-06-24 10:12:16 AM*

CNSC staff response

Domestic Arrangements

The CNSC cooperates closely with other federal and provincial departments and agencies. Section 21(1)(a) of the NSCA empowers the CNSC to enter into arrangements with any regulatory agency or department of a federal or provincial government or any international agency. At the domestic level, these arrangements include memoranda of understanding (MOU). MOUs provide a framework for bilateral cooperation, and provide the participants with assurances regarding the security of information exchanged, as well as enhanced clarity about responsibilities regarding visits and costs related to cooperation initiatives, among other benefits. While these arrangements are not legally binding, they nonetheless outline the intentions of participants and guide staff on the scope and topics of mutual interest. Under the Canadian federal framework, a MOU is not required for cooperation but they are often developed when interactions between the organizations regularly occur.

The CNSC has domestic arrangements with several federal departments such as Transport Canada, Health Canada and ECCC. The CNSC also has domestic arrangements with provincial authorities such as the Ontario Ministry of Labour and the Ontario Office of the Fire Marshal and Emergency Management. For a complete list of the CNSC's federal and provincial arrangements and details of the MOUs, please refer to (http://www.nuclearsafety.gc.ca/eng/acts-and-regulations/memorandums-of-understanding/index.cf).

International obligations

The CNSC participates in international fora to provide global nuclear leadership and to benefit from international experience and best practices. It also participates in undertakings implemented by the IAEA (for example, IAEA peer reviews), the ICRP and other international organizations, as well as in activities under certain treaties such as the Convention on Nuclear Safety. These international activities help inform the CNSC's decision-making processes to understand and compare various ways of evaluating and mitigating risks and share research and operational experience.

Safety of workers and the public

The CNSC sets dose limits that are within the protective health limits and establishes regulations that set requirements to prevent unreasonable risk to the health and safety of persons. These limits are described in the RPR and are consistent with the recommendations of the ICRP. In addition to radiological hazards, regulating to prevent unreasonable risk to the health and safety of persons addresses conventional health and safety hazards.

The CNSC has an MOU with Health Canada to cooperate and exchange information on areas related to occupational and public health matters and the health risks associated with the development, production and use of nuclear energy and nuclear substances, and radiation-emitting medical devices.

Protection of the environment

Environmental protection is a shared federal–provincial responsibility. The CNSC cooperates with other jurisdictions and departments and, where appropriate, enters into formal arrangements to protect the environment more effectively and to coordinate regulatory oversight. The CNSC has domestic arrangements with federal and provincial departments in the area of environmental protection including but not limited to:

- *MOU with Fisheries and Oceans Canada to coordinate regulatory reviews and decision-making for nuclear projects related to fish and fish habitat*
- *MOU with ECCC to share information and coordinate inspections and regulatory action regarding licensees' compliance with environmental laws and regulations.*
- *MOU with the Ontario Ministry of Labour to cooperate and exchange information/data and technical expertise as well as share environmental monitoring data and samples, conduct laboratory analysis and provide training.*

In addition, an EA under CEAA, 2012 is the primary planning tool for a new facility and is performed before a decision is made regarding a licence for a major facility. Under CEAA, 2012, an application for a new project may be subject to a federal, provincial, or territorial EA decision. For projects proposed to be carried out on federal lands as defined in section 66 of CEAA 2012, and requiring a decision by the CNSC as the federal authority, the Commission must determine whether the completion of a proposed project is likely to cause significant adverse environmental effects, in accordance with section 67 of CEAA, 2012.

However, CEAA 2012 may not apply in certain parts of Canada where settled Aboriginal land claim agreements have associated EA processes. Under CEAA, 2012, the application may be subject to a federal, provincial, or territorial decision. For applicants proposing facilities or activities in areas of Canada subject to land claim agreements (such as the territories and parts of Quebec and Newfoundland), the CNSC may act as technical advisor and be an active participant at all stages of the EA process. The CNSC retains decision-making authority on all licensing matters under the NSCA and the Commission will use the information gathered in the EA process to inform its licensing decision under the NSCA.

Emergency Preparedness and response

Emergency preparedness and response is being addressed through the 2019 EPREV mission to Canada and is outside the scope of the 2019 IRRS mission to Canada.

Management of radioactive waste

In accordance with the Radioactive Waste Policy Framework, the Government of Canada is responsible for developing policy and regulating and overseeing radioactive waste producers and owners to ensure that they comply with legal requirements and meet their funding and operational responsibilities in accordance with approved long-term waste management plans.

Waste owners are responsible for the funding, organization, management and operations of the facilities required to safely manage their wastes over the short and long terms.

NRCan is the lead government department for developing and implementing the federal nuclear energy policy across the nuclear supply chain including the disposition of waste. This includes uranium and radioactive waste policy, legislation development and implementation and the establishment and management of a nuclear civil liability and compensation regime.

Several other federal departments have been assigned roles and responsibilities for the safe management of radioactive waste, including Health Canada, ECCC, and the Canadian Environmental Assessment Agency.

Liability for Nuclear Damage

NRCan administers the Nuclear Liability and Compensation Act as well as the Nuclear Liability and Compensation Regulations. NRCan is also responsible for overseeing the enforcement of these regulations. The CNSC acts in an advisory role to the Minister of Natural Resources regarding the designation of facilities under these regulations.

Accounting for and control of nuclear material

The CNSC is responsible for implementing the safeguards agreements between the Government of Canada and the IAEA. The safeguards agreements give the IAEA the right and obligation to

monitor Canada's nuclear-related activities (i.e., manufacturing, and research and development), and to verify nuclear material inventories and flows in Canada.

By order, the Governor in Council has excluded the Department of National Defence (DND) from the application of the NSCA and any regulations made pursuant to the Act. Under the current legislation and MOU between the CNSC and DND Concerning Joint Efforts, DND is responsible for self-regulation and co-operates with the CNSC to report holdings of nuclear material and nuclear-related activities.

As required by the safeguards agreements, the CNSC compiles information from DND and submits it to the IAEA on behalf of the Government of Canada.

Safety in relation to water use and consumption of food

Under the Food and Drugs Act, Health Canada is responsible for establishing standards for the safety and nutritional quality of all foods sold in Canada. Health Canada pursues its regulatory mandate under the Food and Drug Regulations. Health Canada is also responsible for evaluating the safety of food and the effectiveness of food irradiation.

The Canadian Food Inspection Agency is responsible for enforcement and compliance issues relating to irradiated food.

The CNSC, as Canada's nuclear regulator, regulates food irradiation facilities. These facilities must be licensed by the CNSC to operate and be inspected regularly to ensure that they are meeting regulatory requirements.

Drinking water guidelines are developed by the Federal Provincial Territorial Committee on Drinking Water and published by Health Canada. The Committee is a national committee made up of 14 voting members representing the 10 provinces, three territories and the federal government. The individual provinces and territories can develop drinking water standards by adopting the federal Drinking Water Guidelines or creating their own. Most provincial and territorial jurisdictions choose to adopt the federal guidelines.

Land use, planning and construction

Site evaluation is one part of a licence application for a new facility and is one of the first steps for a proposed project. Site evaluation may include considerations of land use designation at the proposed sites. While the CNSC does not have a regulatory document specific for site evaluation for nuclear facilities, aspects of CNSC REGDOC-1.1.1, Site Evaluation and Site Preparation for New Reactor Facilities, may be applied in a risk-informed manner and using a graded approach.

Additionally, decommissioning plans for a facility may include proposed land use post-decommissioning. Proposed plans for decommissioning of the facility are a requirement as outlined in section 3 of CINFR, section 3 of the CIINFPER and section 3 of the UMMR.

Finally, an EA under CEAA, 2012 or an environmental protection review under the NSCA is a planning tool for a new facility to assess the potential environmental effects of the construction, operation and decommissioning of a new facility. Refer to the response section regarding the cooperation of jurisdictions on environmental protection earlier in this response.

Safe transportation of dangerous goods

In Canada, the responsibility to ensure the safe transport of radioactive materials is shared between two federal organizations; Transport Canada and the CNSC. Transport Canada and the CNSC have signed an MOU which outlines each organization's roles and responsibilities in regards to the safe transport of radioactive materials. Further to the MOU, each organization has established processes (CNSC - Transport Canada Parallel Review of Respective Regulations Process – N-2001.01) to ensure each other are consulted with in regards to regulatory amendments to ensure there are no potential conflicts and to properly coordinate regulatory oversight. The CNSC and Transport Canada also have regular meetings (both formally and informally) to discuss various topics regarding the transport of radioactive materials.

In addition, Transport Canada, the CNSC and provincial enforcement agencies meet twice a year as part of the National Compliance Working Group to discuss any potential issues regarding the application of the Transport of Dangerous Goods Regulations (TDGR), and the PTNSR, 2015, administered by Transport Canada and the CNSC respectively.

Mining and processing of radioactive ores

The CNSC is responsible for regulating and licensing all existing and future uranium mining and milling operations in Canada. The CNSC has a lifecycle approach to licensing and issues licenses for all phases in the lifecycle of an uranium mine and/or mill.

Surface exploration for uranium is exempt from NSCA requirements because it poses low risks. Each province or territory is responsible for regulating and monitoring exploration activities within its jurisdiction and informing the public about those activities. Advanced exploration activities, such as exploration ramps through mineralized zones fall within the regulatory framework of the CNSC, and a licence is required before these activities can proceed.

Closed and decommissioned sites are managed for the long term by their former owners or by the federal or respective provincial governments. The CNSC regulates the sites by closely monitoring their maintenance and environmental performance.

The CNSC has an Administrative Agreement with the province of Saskatchewan to establish a co-operative arrangement between the CNSC and the province of Saskatchewan toward

developing and implementing a harmonized regulatory regime for uranium mines and mills in Saskatchewan.

Protection of national security

To prevent risk to national security, the CNSC works closely with nuclear facility operators, law enforcement and intelligence agencies, international organizations, and other governmental departments to ensure that nuclear substances and facilities are adequately protected and accounted for. Nuclear security in Canada is aided by the Nuclear Security Regulations under the NSCA. These regulations set out detailed security requirements for licensed nuclear facilities and other regulated activities.

Nuclear non-proliferation

The CNSC is responsible for implementing Canada's nuclear non-proliferation policy and international commitments to provide assurances to Canadians and the international community that Canada's nuclear exports do not contribute to the development of nuclear weapons or other nuclear explosive devices.

The CNSC and the federal Department GAC participate in two multilateral nuclear export control mechanisms, the NSG and the Zangger Committee. The NSG is a nuclear export control regime which provides guidelines governing transfer of nuclear and dual-use material, equipment and information. The Zangger Committee's objective is to harmonize the interpretation of nuclear export control policy for Parties to the Treaty on the Non-Proliferation of Nuclear Weapons.

No Analysis

No Rating

***Attachments**, by Megan Tougas-Cooke @ 2019-07-02 10:12:44 AM*

Canadian Environmental Assessment Act, 2012

Class I Nuclear Facilities Regulations

Class II Nuclear Facilities and Prescribed Equipment Regulations

CNSC-Transport Canada Parallel Review of Respective Regulations Process

Food and Drug Act

Food and Drug Regulations

List of MoUs

Memorandum of Understanding between CNSC and Transport Canada

Memorandum of Understanding between the CNSC and Environment Canada

Memorandum of Understanding between the CNSC and Fisheries and Oceans Canada

Memorandum of Understanding between the CNSC and Health Canada

Memorandum of Understanding between the CNSC and Ontario Ministry of Labour

Memorandum of Understanding between the CNSC and The Department of National Defence

Memorandum of Understanding between the CNSC and the Province of Saskatchewan

Nuclear Liability and Compensation Act

Nuclear Liability and Compensation Regulations

Nuclear Safety and Control Act

Nuclear Security Regulations

Packaging and Transport of Nuclear Substances Regulations, 2015

REGDOC-1.1.1 Site Evaluation and Site Preparation for New Reactor Facilities

Transportation of Dangerous Goods Regulations

Uranium Mines and Mills Regulations

Question 1.6

Has the government established an effective system for protective actions to reduce undue radiation risks associated with unregulated sources (of natural and artificial origin) and contamination from past activities or events?

***Answer**, by Megan Tougas-Cooke @ 2019-06-05 10:55:27 AM*

Yes

Finding

The Government has established an effective system for protective actions to reduce undue radiation risks associated with unregulated sources (of natural and artificial origin) and contamination from past activities or events.

***Response**, by Megan Tougas-Cooke @ 2019-06-24 10:04:17 AM*

CNSC staff response

In Canada, the responsibility for implementing a system to reduce risks from exposure to ionizing radiation is shared among the different levels of government (federal, provincial/territorial). The responsibilities of each are based on the divisions of power established in the Constitution Act, 1867.

Protective actions to reduce undue radiation risks associated with unregulated sources are often integrated into legislative authorities for the exposure pathway (e.g., drinking water) or exposure environment (e.g., workplaces/occupational health and safety). The CNSC and Health Canada's RPB work closely with stakeholders to identify situations where guidance for exposure management is required and to develop and promote harmonized, justified, and optimized recommendations. Examples of these situations include naturally occurring radioactive material (NORM) from industrial practices, radioactivity in drinking water, and radon.

Regulation of sources and activities under the NSCA: exempted activities

The CNSC's 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, as well as the values in Table I.2 (Levels for exemption of bulk amounts of solid material without further consideration and for clearance of solid material without further consideration: activity concentration of radionuclides of artificial origin) of IAEA GSR Part 3 Radiation Protection and Safety of Radiation Sources: International Basic Safety Standard.

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 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 which 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 from Table I.1 (Levels for exemption of moderate amounts of material without further consideration: Exempt activity concentrations and exempt activities of radionuclides) of IAEA GSR Part 3.

Contaminated sites

Under the Government of Canada's Federal Contaminated Site Inventory, a contaminated site is defined as "one at which substances occur at concentrations (1) above background (normally occurring) levels and pose or are likely to pose an immediate or long term hazard to human health or the environment, or (2) exceeding levels specified in policies and regulations."

With the coming in to force of the NSCA in 2000 the change in the regulations identifying licensable quantities (shift from concentrations to total inventory) as well as the application of the NSCA to lands under the control of provincial and federal government entities necessitated a review of all historical low-level radiological contaminated lands/sites that were not previously under licence by the precursor of the NSCA (i.e., AECA) to ascertain their status under the new NSCA. For this, the CNSC created CLEAN: Contaminated Lands Evaluation and Assessment Network. CLEAN assessed approximately 200 sites to determine the most appropriate level of regulatory control and to verify safety. This activity resulted in the 2008 amendments of the NSRDR to re-introduce concentration based licensing limits, to re-establish a risk-based standard for regulatory oversight. The amended values in the NSRDR are based on IAEA standards. The new regime was generally more restrictive and therefore more protective than that which existed under the AECA. As a result of these activities historical radiological wastes have been appropriately exempted, placed in institutional control, and/or licensed under the NSCA.

Historic low-level radioactive waste is waste that was managed in the past in a manner no longer considered acceptable, for which the current owner cannot be reasonably held responsible and for which the Government of Canada has accepted responsibility for long-term management.

Legacy wastes in Canadian context specifically date back to the Cold War and birth of nuclear technologies in Canada; these wastes are located at AECL site. These wastes include existing radioactive wastes and wastes resulting from decommissioning disused buildings and infrastructure, as well as from environmental remediation.

Uranium mill tailings are wastes produced during the processing of uranium ores. These wastes are located at uranium mine sites in Saskatchewan, Ontario and the Northwest Territories. Most of the closed mine sites have been remediated and are now licensed by the CNSC. The closed mine and mill sites that have not yet been remediated are located in northern Saskatchewan. These mines and mills were operated in the late 1950s to early 1960s by companies that no longer exist, and government-funded projects are underway to remediate these sites.

Any contaminated lands/facilities coming under the regulation of the CNSC are required to meet the RPR and the associated requirements of limitation and optimization (ALARA and BATEA) with respect to protection of workers and the public.

In 2015, the Government of Canada established the Federal Contaminated Sites Action Plan (FCSAP). The objective of the FCSAP is to reduce environmental and human health risks from known and federal contaminated sites and associated federal financial liabilities.

As part of its role as an expert support department under Canada's FSCAP, and to help support a harmonized approach to assessing human health risk from contaminated sites, Health Canada published a series of guidance documents, including one on radiological risk assessment (Part VI, Guidance on Human Health Detailed Quantitative Radiological Risk Assessment). This document is available for use by federal government custodial departments responsible for the assessment, management, and/or remediation of contaminated sites in Canada. It is due to be updated in the next 2-5 years.

Other existing exposure situations

Health Canada's RPB influences the Canadian system for protective actions to reduce undue radiation risks associated with unregulated sources by producing guidance that can be considered and, as appropriate, adopted by responsible authorities. For example, while the regulation of building construction is a provincial/territorial or municipal responsibility (depending on the location), most authorities use the National Building Code as the basis of their regulatory framework. RPB, working with partners, successfully lobbied for the inclusion of requirements to reduce radon ingress in the current edition of the National Building Code and is working to strengthen requirements for built-in mitigation systems in the next iteration. These requirements have generally been adopted across the country. Other examples of initiatives where RPB contributes to effective management of existing exposure situations include:

- *with the Federal-Provincial-Territorial Radiation Protection Committee (FPTRPC), lowering the national radon action level from 800 Bq/m3 to 200 Bq/m3 (2007)*
- *with Employment and Social Development Canada, changing the radon exposure criteria in the Canadian Occupational Health and Safety Regulations to correspond to the national action level*
- *with FPTRPC, publishing the Canadian Guidelines for the Management of Naturally Occurring Radioactive Material (2011). This document is currently being updated*
- *with the Federal-Provincial-Territorial Committee on Drinking Water, publishing the Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Radiological Parameters (2009). This document is currently being updated*
- *with the Canadian Space Agency, research and guidance to support a framework for radiation protection for individuals in space-based activities*
- *through the National Radon Program, delivery of an extensive program of targeted education and outreach to the public and to other stakeholders, to increase awareness of the risks of radon exposure and protection measures*

Health Canada recognizes that, for the Canadian public, the most significant source of exposure to an unregulated source is radon, and the decision to take protective action resides with many different authorities. With the support of the FPTRPC, Health Canada launched the National

Radon Program in 2007 in order to promote testing and, where necessary, mitigation. Central components of the program are:

- *Characterizing at-risk populations in Canada (based on indoor radon surveys, geography, behaviour, etc)*
- *Partnering with others to validate guidance for radon risk reduction and transfer knowledge to the Canadian industry:*
- *Support for evaluating novel monitoring and mitigation technologies,*
- *Creation of a professional association and accredited infrastructure, and*
- *Development of building codes and standards.*
- *Encouraging adoption of radon risk management practices in relevant policy and legislation;*
- *Research to better understand how radon leads to lung cancer, and*
- *Developing and implementing a radon education and public awareness strategy to inform Canadians about radon risks and encourage action (remediation) to reduce them.*

More details about the National Radon Program are available in the response to QID16 in the module entitled Safety Requirements of Public Exposure.

No Analysis

No Rating

***Attachments**, by Megan Tougas-Cooke @ 2019-06-24 1:39:07 PM*

Canada Occupational Health and Safety Regulations

Canadian Guidelines of the Management of Naturally Occurring Radioactive Material

Constitution Act, 1867 to 1982

Guidance on Human Health Detailed Quantitative Risk Assessment

Guidelines for Canadian Drinking Water - Radiological Parameters

Nuclear Safety and Control Act

Nuclear Substances and Radiation Devices Regulations

Radiation Protection Regulations

Subsidiary Question 1.6.1

To what extent are the principles of justification and optimization applied within the system for protective actions?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-24 10:05:43 AM*

CNSC staff response

The guidance documentation cited in the response to QID6 is consistent with the principles of the International System of Radiological Protection that were current at the time that the documents were drafted. All of them, except for the Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Radiological Parameters (2009), include a discussion of justification and optimization. The application of the concepts reflects Health Canada's interpretation of international recommendations at the time the document was drafted. Health Canada treats all guidelines as living documents and, as such, they are revised periodically to maintain alignment with international best practice.

The principles of justification and optimization as a consequence of an accident was addressed by the 2019 EPREV mission to Canada.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-19 10:45:53 AM*

Guidelines for Canadian Drinking Water - Radiological Parameters

Subsidiary Question 1.6.2

How does the regulatory body provide any necessary input for protective actions, including advising government or exercising regulatory control over the protective action?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-24 10:07:56 AM*

CNSC staff response

As mentioned in QID 1.6, protective actions to reduce undue radiation risks associated with unregulated sources are often integrated into legislative authorities for the exposure pathway or exposure environment and thus often fall under provincial, territorial, or municipal jurisdiction.

The guidance levels established in the publications identified in QID 1.6 are applied as decision-making criteria in areas of federal jurisdiction. For example, the recommendations in Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Radiological Parameters (2009) are considered criteria for application in Indigenous communities, as described in the Safe Drinking Water for First Nations Act (2013).

The CNSC and Health Canada's RPB work closely with provincial and territorial authorities as well as other interested parties to develop and promote harmonized, justified, and optimized guidance.

One mechanism for stakeholder collaboration in this area is Federal-Provincial-Territorial (FPT) committees, such as the FPTRPC. This committee brings together representatives from the CNSC, Health Canada, the provinces and territories in order to support federal, provincial and territorial radiation protection agencies in their respective mandates by:

- *providing a national focus for government radiation protection agencies*
- *promoting the harmonization of radiation health and safety programs*
- *identifying emerging issues in radiation protection and recommending actions to the appropriate jurisdictions*
- *developing and harmonizing radiation protection standards, guidelines and input for legislation*
- *providing a forum for representatives of the provinces and territories, the Canadian Nuclear Safety Commission, Department of National Defence, Health Canada and other federal departments/agencies*
- *considering requests from other governmental committees and agencies concerned with health, safety and environmental issues and liaising regularly with such committees and agencies*

The Canadian Guidelines for the Management of Naturally Occurring Radioactive Material (NORM) (2011) is a product of the FPTRPC. For drinking water, the FPT Committee on Drinking Water is responsible for establishing Canadian guidelines to set maximum acceptable criteria for biological, chemical, and radiological substances. It publishes recommended radiological criteria in the Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Radiological Parameters (2009)

The FPTRPC was created and continues to operate specifically to work closely with provincial and territorial authorities as well as other interested parties to develop and promote harmonized, justified, and optimized guidance. The result is that most jurisdictions in Canada use similar criteria for making decisions to manage exposure to NORM, including radon, in occupational and public settings. While there is general agreement on the criteria, the decision to incorporate radiation protection requirements into non-federal legislation belongs to the individual provincial, territorial, and municipal governments.

Health Canada solicits comments from stakeholders and from the public for all guidance documents. As outlined in response to the questions in Module 9, Regulations and Guides, the CNSC also provides opportunities for engagement from various stakeholders including licensees, applicants, members of the public, non-governmental organizations and Indigenous communities.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-19 10:47:14 AM*

Canadian Guidelines of the Management of Naturally Occurring Radioactive Material

Guidelines for Canadian Drinking Water - Radiological Parameters

Safe Drinking Water for First Nations Act

Question 1.7

Has the government made provision for the safe decommissioning of facilities, the safe management and disposal of radioactive waste, and the safe management of spent fuel?

***Answer**, by Megan Tougas-Cooke @ 2019-06-05 11:03:37 AM*

Yes

Finding

The Government has provided for the safe decommissioning of facilities, the safe management and disposal of radioactive waste, and the safe management of spent fuel.

***Response**, by Megan Tougas-Cooke @ 2019-06-24 10:11:07 AM*

CNSC staff response

The Canadian government and legal framework establishes a clear framework for decommissioning and the safe management of radioactive waste.

Federal legislation used to regulate and oversee the nuclear industry, including the management of radioactive waste and spent fuel, comprises the NSCA, the Nuclear Fuel Waste Act (NFWA), the Nuclear Liability and Compensation Act, and the Nuclear Energy Act. The nuclear industry is also subject to the CEAA, 2012, the Canadian Environmental Protection Act and the Fisheries Act. The response to QID1.1 summarizes the roles and responsibilities of those federal departments involved in administrating these legislation and in the oversight of the nuclear industry.

In addition, the nuclear industry is subject to the provincial acts and regulations in force within the individual provinces and territories where nuclear-related activities are carried out.

As described in QID1.1, The Radioactive Waste Policy Framework sets the stage for institutional and financial arrangements to manage radioactive waste in a safe, comprehensive, environmentally-sound, integrated and cost-effective manner. Under this policy the Government of Canada is responsible for developing policy and regulating and overseeing radioactive waste producers and owners and the waste owners are responsible for funding and managing the operation of their facilities.

The Policy Framework for Radioactive Waste recognizes that arrangements may be different for the four broad categories of radioactive waste found in Canada: used fuel, low-level radioactive waste, intermediate-level waste, and uranium-mine waste rock and mill tailings.

Regarding nuclear fuel waste, in 2002, Parliament passed the NFWA, making the owners of used fuel responsible for the development of long-term waste management approaches. The legislation required nuclear energy corporations to establish a waste management organization as a separate legal entity to manage the full range of long-term used fuel management activities. It also required waste owners to establish trust funds with independent financial institutions to finance their long-term waste management responsibilities. It also required the organization to prepare and submit a study to the Government of Canada on proposed approaches for the long-term management of the waste. In accordance with the NFWA, the Nuclear Waste Management Organization (NWMO) was established in 2002 by Canada's nuclear electricity producers. The NWMO is responsible for implementing the Adaptive Phased Management (APM) approach that was selected by the Government of Canada for the long-term management of spent fuel.

The CNSC's regulatory approach for radioactive waste and decommissioning stems from the NSCA and is articulated in regulations, licences, licence condition handbooks and regulatory documents.

CNSC regulatory documents on waste management and decommissioning include: REGDOC 2.11 Framework for Radioactive Waste Management and Decommissioning in Canada, REGODC 2.11.1 Waste Management Volume II, Management of Uranium Mine Waste Rock and Mill Tailings, and REGODC 2.11.1 Waste Management Volume III, Assessing the Long Term Safety of Radioactive Waste Management, CNSC regulatory guide G-219, Decommissioning Planning for Licensed Activities and G-206, Financial Guarantees for the Decommissioning of Licensed Activities. In developing these documents, the CNSC draws upon recommendations of the IAEA and best practices from the international and national community.

REGDOC-2.11, Framework for Radioactive Waste Management and Decommissioning in Canada, outlines the philosophy and six principles that govern the CNSC`s regulation of radioactive waste. When making regulatory decisions, the CNSC seeks to achieve its objectives by considering the following:

- *generation of radioactive waste is minimized to the extent practicable by the implementation of design measures, operating procedures and decommissioning practices*
- *management of radioactive waste is commensurate with the waste's radiological, chemical and biological hazard to the health and safety of persons, to the environment and to national security*
- *assessment of future impacts of radioactive waste on the health and safety of persons and the environment encompasses the period of time during which the maximum impact is predicted to occur*
- *predicted impacts on the health and safety of persons and the environment from the management of radioactive waste are no greater than the impacts that are permissible in Canada at the time of the regulatory decision*

- *measures needed to prevent unreasonable risk to present and future generations from the hazards of radioactive waste are developed, funded and implemented as soon as reasonably practicable*
- *transborder effects on the health and safety of persons and the environment, which could result from the management of radioactive waste in Canada, are not greater that the effects experienced in Canada*

The difference between spent fuel and other forms of radioactive waste are addressed by the application of the second principle described above, indicating that waste is expected to be managed according to its hazard.

The NSCA provides the structure for the regulation of these matters – a licence is required in order to decommission or abandon a nuclear facility, and to possess and manage radioactive waste. The GNSCR provides the requirements for submitting an application: 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.

A decommissioning plan and financial guarantees for decommissioning are integral to the licence approval process and are required at all stages of CNSC licensing except for the release from CNSC regulatory control. This is legislated in the CINFR, CIINFPER and UMMR.

The CNSC requires licensees to implement and maintain key programs under each safety and control area (SCA) applicable to the licence application. SCAs are the technical topics that CNSC staff use to assess, review, verify and report on regulatory requirements and performance across all regulated facilities and activities. Examples of these program areas include a waste management program, decommissioning plan and a financial guarantee for decommissioning.

The CNSC's regulatory framework ensures that the licensee, who has the primary responsibility for waste management and decommissioning, is qualified and has in place the infrastructure in order to carry out the licensed activity. This regulatory oversight is carried out as part of the licensing and compliance activities. The CNSC has a dedicated division responsible for the regulatory oversight of waste management and decommissioning. As well, CNSC participates in international fora on waste management and decommissioning and is responsible for preparing, on behalf of the Government of Canada, Canada's report on the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

CNSC staff actively participate in the development of international and nation al standards with respect to radioactive waste and decommissioning. CNSC experts also sit on the IAEA's Waste Safety Standards Committee, the Nuclear Energy Agency's Radioactive Waste Management Committee and Committee on Decommissioning of Nuclear Installations and Legacy Management, and the Canadian Standards Association Group technical committees on radioactive waste and decommissioning.

No Analysis

No Rating

***Attachments**, by Megan Tougas-Cooke @ 2019-07-02 10:12:58 AM*

Canadian Environmental Assessment Act, 2012

Canadian Environmental Protection Act, 1999

Class I Nuclear Facilities Regulations

Class II Nuclear Facilities and Prescribed Equipment Regulations

Fisheries Act

G-206 Financial Guarantees

G-219 Decommissioning Planning for Licensed Activities

General Nuclear Safety and Control Regulations

Joint Convention - Sixth Report Oct 2017

Nuclear Energy Act

Nuclear Fuel Waste Act

Nuclear Liability and Compensation Act

Nuclear Safety and Control Act

REGDOC-2.11 Framework for Radioactive Waste Management

REGDOC-2.11.1 Waste Management Volume III - Assessing the Long-Term Safety of Radioactive Waste Management

REGDOC-2.11.1 Waste Management Volume II-Management of Uranium Mine Waste Rock and Mill Tailings

REGDOC-2.11.1 Waste Management Volume I-Management of Radioactive Waste (draft)

Uranium Mines and Mills Regulations

Subsidiary Question 1.7.1

How is the responsibility assigned for the maintenance of institutional control of a disposal facility after it is closed?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-05 11:04:31 AM*

CNSC staff response

Any application for a licence for site preparation, construction, operation, decommissioning (closure and post-closure) and abandonment (release from CNSC licensing) of a disposal facility, such as a deep geological repository, must satisfy the requirements of the NSCA and its associated regulations, including but not limited the GNSCR and the CINFR. In addition, the CNSC requires the environmental effects of all licensed activities be evaluated through an EA under CEAA, 2012 or an environmental protection review under the NSCA and considered when licensing decisions are made. The EA or an environmental protection review is a review of information used to support the Commission's decision on whether the licensee will make adequate provisions for the protection of the environment and the health and safety of persons.

Release from CNSC regulatory control occurs when the licensee has successfully decommissioned the facility and restored the site to a state that is suitable for future use (e.g., green field or brown field). If unrestricted release is yet to be achieved (i.e., due to long-term presence of nuclear substances, contaminated systems, components or structures), perpetual licensing from the CNSC may be required unless the risks are very minimal and oversight by another regulatory or governmental body allows the Commission to exempt the site indefinitely from CNSC licensing (determined on a case-by-case basis).

For sites was located in Saskatchewan, the province has established an institutional control program for its former mines, including uranium mines. Once these sites are decommissioned to a level that meets the requirements of Saskatchewan's Ministry of Environment they become the responsibility of the province and they are exempted from CNSC licensing. It should be noted that these sites still contain radioactive material and would continue to be monitored by the province. In addition, these former mine sites would be under land use restrictions, also administered by the province.

REGDOC-2.11.1, Waste Management, Volume III, Assessing the Long-term Safety of Radioactive Waste Management defines institutional controls as "the control of residual risks at a site after it has been decommissioned". Institutional controls can include active measures (requiring activities on the site such as water treatment, monitoring, surveillance and maintenance) and passive measures (that do not require activities on the site, such as land use restrictions, markers, etc.). The definition of institutional controls recognizes that regulatory oversight is required; however, if the appropriate mechanisms are in place then CNSC licensing may no longer be required and oversight may be given to a federal, provincial or territorial agency. In the absence of an institutional controls program ongoing monitoring and maintenance of decommissioned sites would continue to be done by a licensee for as long as required.

CNSC REGDOC-2.11.1, Waste Management, Volume III, Assessing the Long-term Safety of Radioactive Waste Management, clarifies the CNSC's expectation of licensees and applicants to assess the long-term impacts that radioactive waste disposal methods have on the environment

and the health and safety of people. In accordance with this REGDOC, a submission from a licence applicant should identify the role that institutional controls play in waste management system safety, and how that role is taken into account in the safety case and assessment. Institutional controls may be part of the design of a radioactive waste management system as a necessary safety measure or to enhance the confidence in the system.

As a result of the uncertainties associated with future human activities and the evolution and stability of societies, current international practice generally limits the reliance on institutional controls as a safety feature to a few hundred years. However, it is recognized that in spite of design optimization, some facilities, such as surface impoundments for tailings, may need to rely on institutional controls for a more extended period of time. Any intention of relying on institutional controls to ensure long-term safety should be documented and justified in the long-term assessment.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-24 10:26:34 AM*

Canadian Environmental Assessment Act, 2012

Class I Nuclear Facilities Regulations

General Nuclear Safety and Control Regulations

Nuclear Safety and Control Act

REGDOC-2.11.1 Waste Management Volume III - Safety Case for Long Term Radioactive Waste Management, Version 2 (draft)

Subsidiary Question 1.7.2

How is financial provision assured for decommissioning of facilities, management of radioactive waste, disused sources and spent fuel?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-05 11:05:11 AM*

CNSC staff response

Licensees of nuclear facilities, including spent fuel and radioactive waste management facilities, must provide guarantees that adequate financial resources are available for the decommissioning of these facilities and managing the resulting radioactive wastes, including spent fuel.

Subsection 24(5) of the NSCA provides the legislative basis for this requirement. Paragraph 3(1)(l) of the GNSCR stipulates that, "an application for a licence must contain a description of

any proposed financial guarantee related to the activity for which a licence application is submitted." CNSC regulatory guide G-206, Financial Guarantees for the Decommissioning of Licensed Activities, covers the provision of financial guarantees for decommissioning activities. Regulatory guide G-219, Decommissioning Planning for Licensed Activities, provides guidance on the preparation of plans for the decommissioning of activities licensed by the CNSC.

As a condition of their licence, the CNSC requires licensees to maintain a decommissioning plan and a financial guarantee for decommissioning.

Financial guarantees must be sufficient to fund all approved decommissioning activities. These activities include not only dismantling, decontamination and closure but also any post-decommissioning monitoring or institutional control measures that may be required, as well as subsequent long-term management or disposal of all wastes, including spent fuel.

As described in G-206, Financial Guarantees for the Decommissioning of Licensed Activities the CNSC must be assured that it (or its agents) can access adequate funding measures upon demand if a licensee is not available to fulfil its obligations for decommissioning. Measures to fund decommissioning may involve various types of financial guarantees. Acceptable guarantees include cash, letters of credit, surety bonds, insurance and legally binding commitments from a government (either federal or provincial). The acceptability of any of the above measures will be determined ultimately by the CNSC according to the following general criteria:

- *Liquidity – The proposed funding measures should be such that the financial vehicle can be drawn upon only with the approval of the CNSC and that payout for decommissioning purposes is not prevented, unduly delayed or compromised for any reason.*
- *Certainty of value – Licensees should select funding, security instruments and arrangements that provide full assurance of their value.*
- *Adequacy of value – Funding measures should be sufficient, at all or predetermined points in time, to fund the decommissioning plans for which they are intended.*
- *Continuity – The required funding measures for decommissioning should be maintained on a continuing basis. This may require periodic renewals, revisions and replacements of securities provided or issued for fixed terms. For example, during a licence renewal, the preliminary decommissioning plan may be revised and the financial guarantee updated accordingly. Where necessary, to ensure there is continuity of coverage, funding measures should include provisions for advance notice of termination or intent to not renew.*

Since 2000, the CNSC has concentrated on financial guarantees for large complex facilities and has required all major licences with Class I operating facilities and uranium mines and mills to have financial guarantees in place.

In 2015, the CNSC established a financial guarantee program for licensees of sealed sources and/or radiation devices, self-shielded irradiators, prescribed equipment and labs handing

unsealed sources with half-lives greater than 72 hours. Refer to QID 5 of the module entitled Respondent Safety Requirements for Radiation Sources for additional information.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-19 10:51:52 AM*

G-206 Financial Guarantees

G-219 Decommissioning Planning for Licensed Activities

General Nuclear Safety and Control Regulations

Nuclear Safety and Control Act

Question 1.8

Has the government made provision for building and maintaining the competence of all parties having responsibilities relating to the safety of facilities and activities?

***Answer**, by Megan Tougas-Cooke @ 2019-06-05 11:05:35 AM*

Yes

Finding

The Government has made provision for building and maintaining the competence of all parties having responsibilities relating to the safety of facilities and activities.

***Response**, by Megan Tougas-Cooke @ 2019-06-24 10:27:43 AM*

CNSC staff response

Refer to the response to SQID 1.3.2 regarding the provisions for human and financial resources for the CNSC.

For authorized parties, the NSCA under paragraph 44(1)(k) allows the Commission, with the approval of the Governor in Council, to make regulations "respecting the qualifications for, and the training and examination of analysts, inspectors, nuclear energy workers and other persons employed in a nuclear facility or other place where a nuclear substance or prescribed equipment is produced, used, possessed, packaged, transported, stored or disposed of, and prescribing the fees for the examination of analysts, inspectors, nuclear energy workers and such other persons." The NSCA also stipulates under paragraph 21(1)(i) that the Commission may in order to obtain its objects, certify and decertify persons referred to in paragraph 44(1)(k) as qualified to carry out their duties under the Act or the duties of their employment, as the case may be.

No Analysis

No Rating

***Attachments**, by Megan Tougas-Cooke @ 2019-06-24 10:46:05 AM*

CNSC Key Behavioural Competencies

Nuclear Safety and Control Act

Subsidiary Question 1.8.1

How does the government stipulate a necessary level of competence for persons with responsibilities for safety?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-05 11:06:11 AM*

CNSC staff response

Further to the response provided for QID 8, there are certain positions at the CNSC that require a professional designation to carry out their duties and responsibilities. These designations are statutory requirements with certain competencies that must be maintained as per their terms and conditions of employment. The CNSC positions that require a professional designation include: Certification Engineers requiring an engineering degree and a professional designation (P. Eng); Lawyers (Member of the Bar or Law Society) and Finance and Internal Auditing roles requiring certification in general accounting or auditing (CPA, CMA, CA or CIA).

Select positions have been designated by the Commission as Designated Officer (DO) positions to carry out certain duties for the purposes of the NSCA. Staff in these positions are required to complete the CNSC DO Training and Assistance Program before they are issued a DO certificate and can carry out DO authorities.

The CNSC has established a program to assist DOs in carrying out their authorities. The Commission Secretariat and Regulatory Operations Branch collaborate in the implementation of the DO Program.

All of the positions at the CNSC are described in a work description which set out the duties and activities of the position and the required competencies related to education, abilities, skills and knowledge needed to carry out those activities.

The CNSC also has made provisions for building and maintaining the necessary competencies of its inspectors when delivering the CNSC's mandate. Under subsection 30(1) of the NSCA, inspectors have the authority to enter, inspect and verify licensees' compliance with the NSCA and its regulations as well as orders or decisions made under the NSCA, or a condition of a

licence. The NSCA states in subsection 29(1) that the Commission may designate as an inspector any person whom the Commission considers qualified.

In 2009, the CNSC established the Inspector Training and Qualification Program (ITQP) to ensure that inspectors possess the necessary qualifications and demonstrate a high level of competencies required to conduct inspections. The program is a robust, structured and systematic approach to train, qualify and assess CNSC inspectors across all CNSC directorates and divisions responsible for conducting inspections under the NSCA and to maintain their qualifications. Further, the program was developed with the intent to: provide inspectors with the skills and knowledge required to perform their duties; ensure inspectors possess the necessary qualifications and demonstrate the competencies required to conduct inspections; provide support, supervision and coaching for new inspectors; and support the mandate of the CNSC.

For authorized parties, the GNSCR under Obligations of Licensees paragraph 12(1)(a) stipulates that every licensee shall ensure the presence of a sufficient number of qualified workers to carry on the licensed activity safely and in accordance with the Act, the regulations made under the Act and the licence. It also stipulates under paragraph 12(1)(b) that every licensee shall train their workers to carry on the licensed activity in accordance with the Act, the regulations made under the Act and the licence.

The CINFR, CIINFPER, UMMR, NSRDR, PTNSR and its associated TDGR have requirements with respect to the submission of certain information related to the training and qualification of workers. For example, the CINFR require that the proponent submit information such as the proposed program and schedule for recruiting, training and qualifying workers with respect of the operation and maintenance of the nuclear facility including the procedures for the requalification of workers, along with the results that have been achieved in implementing the program. The requirements relative to the information that must be submitted is dependent on the type of licence the proponent is seeking to obtain.

The CNSC REGDOC-2.2.2, Human Performance: Personnel Training, sets out the CNSC's requirements for licensees regarding the development and implementation of a training system. It also provides guidance on how these requirements should be met.

The CNSC requires the certification of licensee personnel working in certain positions that have a direct impact on safety in order to have additional assurance that these personnel have and maintain the required knowledge and skills to work safely. The CINFR, CIINFPER, and the NSRDR have requirements with respect to the CNSC certification of certain personnel. The CIINFPER and the NSRDR detail the particular positions that require CNSC certification, whereas the CINFR specify that the positions requiring CNSC certification are to be detailed in a facility's licence. CNSC regulatory document REGDOC-2.2.3 Personnel Certification: Radiation Safety Officers sets out guidance to assist applicants in completing an application for certification of a Radiation Safety Officer pursuant to the CIINFPER.

CNSC regulatory document REGDOC-2.2.3, Personnel Certification: Exposure Device Operators, provides, through a reference, the CNSC's requirements and guidance for certification as an exposure device operator (EDO) and for renewal of an EDO certification, pursuant to NSRDR. For non-power nuclear reactor facilities, the requirements for personnel certification are detailed in the facility's licence and for nuclear power plants the requirements for personnel certification are specified in the CNSC regulatory document RD-204, Certification of Persons working at Nuclear Power Plants.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-24 10:30:00 AM*

Class I Nuclear Facilities Regulations

Class II Nuclear Facilities and Prescribed Equipment Regulations

General Nuclear Safety and Control Regulations

Inspection Training and Qualification Program

Nuclear Safety and Control Act

Nuclear Substances and Radiation Devices Regulations

Packaging and Transport of Nuclear Substances Regulations, 2015

RD-204 Certification of Person Working at Nuclear Power Plants

REGDOC-2.2.2 Human Performance Management-Personnel Training

REGDOC-2.2.3 Personnel Certification-Exposure Device Operators

REGDOC-2.2.3 Personnel Certification-Radiation Safety Officers

Transportation of Dangerous Goods Regulations

Uranium Mines and Mills Regulations

Subsidiary Question 1.8.2

How does the Government ensure that the regulatory body and its support organizations build and maintain their competences necessary for the discharge of their responsibilities for safety?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-05 11:06:29 AM*

CNSC staff response

Providing employees with an opportunity to diversify their work experience and grow their knowledge, skills and abilities is critical to building and maintaining the competencies needed for the CNSC to achieve its mandate. CNSC staff, with input from management, are required to develop Individual Learning Plans to identify learning opportunities that will allow the employee to fulfil the responsibilities of their current position. Individual Learning Plans continue to be mandatory and they ensure that managers and employees work together to build or maintain the skills for the employee's current duties as well as prepare them for future careers.

The CNSC has a Learning and Development Program to build and maintain staff's competencies. There are more than a 100 in-house technical and leadership courses offered each year. In addition, the CNSC encourages employees to take part in informal learning activities such as work assignments, coaching and mentoring, independent study and on-the-job training as other methods to build and maintain competencies. Additionally, the Canada School of Public Service offers an abundance of learning activities for federal government employees that allow employees to pursue the courses they need for their professional development.

If necessary, under paragraph 21(1)(a) of the NSCA, the Commission may, in order to attain its objects, enter into arrangements, including arrangements to provide training, with any department or agency of the Government of Canada or of a province, any regulatory agency or department of a foreign government or any international agency. As such the CNSC staff can receive training from other federal and provincial departments and regulatory agencies under domestic arrangements such as memoranda of understanding.

In addition, as per subsection 17(1) of the NSCA, the Commission may enter into contracts for the services of any persons having technical or specialized knowledge or performance of any of its powers, duties or functions under this Act, and those persons shall receive payment for their services and such expenses as are fixed by the Commission. This allows the Commission to obtain technical or specialized support by entering into contracts with external organizations.

The CNSC recognizes that technical competencies are critical but not sufficient to the effective performance of the organization. As such, the organization has developed its own set of key behavioural competencies that are expected of all CNSC employees in addition to the Government of Canada's key leadership competencies for public service executives, which were formally adopted in 2015. Key leadership competencies have been fully integrated into executive recruitment, development, succession management and performance management practices. Work is underway now to complete the integration of key behavioural competencies into all human resources management practices.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-19 10:55:46 AM*

Nuclear Safety and Control Act

Subsidiary Question 1.8.

How does the government ensure the continuous development and the periodic verification of the technical competences of persons working for authorized parties?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-24 10:35:05 AM*

CNSC staff response

The CNSC recruits most scientific and engineering staff directly from the industry and educational institutions. Experience in the industry is often an asset for certain technical positions at the CNSC. Junior technical staff are actively recruited directly from universities and colleges. As the shortage of, and competition for, experienced professionals increases, the CNSC is placing renewed emphasis on hiring and developing younger, less experienced staff. From recent experience these young professionals are proving to be valuable long-term staff prospects for the CNSC. Through its involvement with the University Network for Excellence in Nuclear Engineering, the CNSC attempts to influence the types of programs and research that are offered at Canadian universities to help indirectly meet its future workforce needs.

As outlined in response to SQID1.8.1, the ITQP was established to ensure that inspectors possess the necessary qualifications and can demonstrate a high level of competencies required to conduct inspections. The program is a structured and systematic approach to train, qualify and assess CNSC inspectors across all service lines and to maintain their qualifications.

In order to become a qualified inspector, the employee must: be in a designated inspector position; successfully complete all three training components of the ITQP (core, service-line-specific and on-the-job training); and have their Inspector Designation Form signed by their Director and DO attesting that the employee is qualified to be designated as an inspector. Upon successful completion, the inspector will receive an inspector certificate.

Core Training is mandatory and must be completed by all inspectors-in-training. Core training is based on the fundamentals of conducting a CNSC inspection, including mandatory training in radiation protection and occupational health and safety. Service-Line-Specific-Training includes technical training specific to the licensed activities and facilities that are inspected by each division. On-the-job training includes the interpretation of applicable regulations; a phased approach to conducting inspections; and strategies for verifying compliance. It occurs within the normal working environment and provides an employee with practical on-the-job experience. CNSC inspectors are required to requalify certain courses (i.e., Radiation Protection and Occupational Health and Safety) taken under core training of the ITQP every five years.

The CNSC also funds a Research and Support Program to obtain knowledge and information needed to support its regulatory mission. The program provides the CNSC with access to independent advice, expertise, experience, information and other resources via contracts,

grants and contributions placed in the private sector, and with other agencies and organizations in Canada and elsewhere. One of the main objectives of the program is to ensure CNSC staff knowledge is complete and current with respect to various science and engineering disciplines.

The CNSC is currently working on several improvement initiatives to help with building and maintaining the competence of CNSC staff:

- *CNSC Capability for Nuclear Safety Project – CNSC is currently in the process of establishing a database with competencies required for staff within the technical and operational functions that are part of regulatory oversight. This database is built with regulatory knowledge, education, scientific and technical knowledge, and skills required for each position. Incorporating the regulatory experience is a key component of this initiative.*
- *Regulatory Operations Training Program (ROTP) – The CNSC is currently developing a ROTP that will help support a consistent approach to the application of CNSC licensing, certification, compliance and regulatory framework processes, by providing staff with the tools, knowledge and skills required to perform work effectively and consistently. The program will help strengthen regulatory programs within the CNSC. It will enable a more agile and competent workforce by supporting clarity in expectations for managing regulatory programs and will support the CNSC's management system and its application.*
- *Knowledge Management – The CNSC has also implemented a Knowledge Management (KM) Initiative, which focuses on enhancing measures to capture, share, and build knowledge through people, processes, and technology to maintain the organization's capacity and capability to deliver its mandate now and in the future. It ensures that needed knowledge is consistently stored, transferred, and available when needed.*

For authorized parties, REGDOC-2.2.2, Human Performance: Personnel Training, sets out the CNSC's requirements for licensees regarding the development and implementation of a training system. It also contains guidance on how these requirements should be met. A training system provides the basis for the analysis, design, development, implementation, evaluation, documentation and management of training for workers at nuclear facilities. It provides a method for meeting the training needs of workers and ensuring that the right people receive the right training at the right time. With a training system as defined in this REGDOC, it can be demonstrated that all required knowledge, skills and safety-related attributes have been attained, through the process of performance-based assessment and program evaluation. Without a training system, there is a risk that important elements of training will be omitted and the operating state of the facility will not be reflected in the training programs.

Where CNSC REGDOC-2.2.2, Human Performance: Personnel Training, is referenced in a licence either directly or indirectly (such as through licensee referenced documents), this document is part of the licensing basis for a regulated facility or activity. The licensing basis sets the boundary conditions for acceptable performance at a regulated facility or activity, and establishes the basis for the CNSC's compliance program for that regulated facility or activity.

CNSC staff also conduct "promotional visits/activities" when appropriate to ensure licensees are aware of the CNSC training-related requirements and how these might be achieved.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-19 10:56:04 AM*

Inspection Training and Qualification Program

REGDOC-2.2.2 Human Performance Management-Personnel Training

Question 1.9

Where necessary, has the government made provision for technical services relating to safety, such as services for personal dosimetry, environmental monitoring and calibration of equipment?

***Answer**, by Megan Tougas-Cooke @ 2019-06-05 11:07:02 AM*

Yes

Finding

The government has made the necessary provision for technical services relating to safety.

***Response**, by Megan Tougas-Cooke @ 2019-06-05 11:08:59 AM*

CNSC staff response

As outlined in response to QID 6, protecting against the effects of ionizing radiation is the responsibility of multiple levels of government. This extends to the technical services. Both provincial, territorial and federal government department have Acts, laws, regulations and/or initiatives in terms of technical services. The technical services of the provinces and territories are out of scope and therefore only those for the federal government departments are described below.

<u>Research</u>

Federal Nuclear Science and Technology Work Plan

The Government of Canada established the Federal Nuclear Science and Technology Work Plan to ensure that federal agencies had access to state of the art technology and expertise within the field of nuclear science. The specific objective of the this plan is to perform nuclear-related science and technology (S&T) to support core federal roles, responsibilities and priorities, while maintaining necessary capabilities and expertise at CNL.

AECL is responsible for the management and oversight of the FNS&T, with the governance consisting of the following committees:

- *Interdepartmental Steering Committee - responsible for priority setting and endorsement of annual work plan*
- *Interdepartmental Integration Committee – responsible for conducting strategic and funding allocation analysis to support compilation of the Work plan.*
- *Technical Research Sub-committees –consists of technical experts representing relevant federal agencies which provide technical input on federal research needs and review the deliverables associated with the specific sub-themes*

The Federal Nuclear Science and Technology Work Plan has five sub-themes:

Theme 1: Supporting the development of biological applications and understanding the implications of radiation on living things

Theme 2: Enhancing national and global security by supporting non-proliferation and counter-terrorism

Theme 3: Supporting nuclear preparedness and emergency response

Theme 4: Supporting safe, secure and responsible use and development of nuclear technologies

Theme 5: Supporting environmental stewardship and radioactive waste management

Personal dosimetry

Personal dosimetry is used primarily (but not exclusively) to determine doses to individuals who are exposed to ionizing radiation related to their CNSC-licensed activities as well as other non-regulated activities such as NORM. In Canada, the RPR stipulate if effective doses of radiation to workers could exceed 5 mSv per year, personal dosimetry must be performed by a CNSC-licensed dosimetry service.

Health Canada's National Dosimetry Service is Canada's leading licensed dosimetry service provider. This service provider is a cost-recovery organization that offers a full-line of dosimetry products and account management services to satisfy the diverse monitoring needs of the Canadian workforce, particularly in industries outside of the nuclear fuel cycle.

The CNSC does not provide personal dosimetry services; however, the CNSC regulates the operation of a dosimetry service, as this is a licensable activity under the NSCA.

Section 3 of the GNSCR and section 18 of the RPR provide the licence application requirements to operate a dosimetry service. A dosimetry service measures and monitors doses of radiation. There are 8 categories of dosimetry services that may be licensed by the CNSC. The dosimetry service licence categories are established through Schedule 1 of the Cost Recovery Fees Regulations.

CNSC dosimetry service licences authorize the operation of a dosimetry service that meets the regulatory requirements prescribed in the RPR, and in the CNSC Regulatory Standard S-106 revision 1, Technical and Quality Assurance Requirements for Dosimetry Services, which specifies the accuracy, precision and quality assurance requirements for dosimetry services. A complete description of the regulatory requirements for operating a dosimetry services is described in QID 2 of the Respondent Safety Requirements for Occupation Radiation Protection module.

The RPR requires every licensee who operates a dosimetry service to file with the National Dose Registry (NDR), at a frequency specified in the licence and in a form compatible with the Registry, information with respect to each nuclear energy worker for whom it has measured and monitored a dose of radiation. The NDR is maintained by Health Canada and contains dose records of individuals monitored for occupational exposure to ionizing radiation. The NDR assists in regulatory control by notifying regulatory authorities of overexposures within their jurisdiction and provides dose histories to workers and organizations for work planning.

The RPR provides some flexibility for CNSC licensees that are not required to use CNSC licensed dosimetry for measuring and monitoring effective doses if worker doses are expected to be below 5 mSv per year. Licensees must ascertain doses to their employees, but are not required to use CNSC-licensed dosimetry services. In such cases, licensees may choose to use CNSC-licensed dosimetry services or to determine doses using other acceptable techniques based on the level of risk in question. These techniques and methods are assessed by CNSC staff to ensure that they meet regulatory requirements. Guidance in this area is provided by CNSC regulatory guide G-91, Ascertaining and Recording Radiation Doses to Individuals (to be superseded by REGDOC-2.7.2, Dosimetry, Volume 1: Ascertaining Occupational Dose, which is under development).

Human monitoring

Health Canada's Human Monitoring Laboratory has the capability to perform whole-body counting, lung counting, thyroid counting, and urine bioassay analysis. Health Canada also has portable instrumentation for performing whole-body counting and urine bioassay analysis in the case of an emergency.

Environmental monitoring capabilities

A number of government agencies including but not limited to the CNSC perform their own regional monitoring around nuclear facilities. For example, Health Canada has established its Canadian Radiological Monitoring Network to routinely collect samples for radioactivity analysis and its Fixed Point Surveillance system to measure the radioactivity of ground deposited and airborne contaminants. In addition, the Ontario Ministry of Labour also monitors environmental radiation through its Ontario Reactor Surveillance Program.

CNSC Independent Environmental Monitoring Program

The CNSC has implemented its own Independent Environmental Monitoring Program (IEMP). The objective of the IEMP is to independently verify that the public and the environment around nuclear facilities are protected. This required significant modernization and expansion of CNSC laboratory facilities from a focus on calibration services to an expanded capability for environmental sampling and analyses for both nuclear and hazardous substances. Results are compared against guidelines and screening levels and posted online to the CNSC's web page. The IEMP does not relieve licensees of their responsibility to implement and maintain their own environmental monitoring program.

Canadian Radiological Monitoring Network

The Canadian Radiological Monitoring Network (CRMN) is managed by the Radiation Surveillance Division of Health Canada's Radiation Protection Bureau. The CRMN is a national network that routinely collects air particulate, precipitation, external gamma dose, drinking water, atmospheric water vapour, and food and milk samples for radioactivity analysis. Environmental surveillance activities are supported by Health Canada radiological laboratories equipped to perform gamma and alpha spectroscopic investigations, liquid scintillation and gas-proportional counting, inductively-coupled mass spectrometric analysis, and a complementary suite of chemical separation techniques.

Initiated in 1959 to monitor environmental release of radioactivity from atmospheric nuclear weapons testing and accidents at nuclear facilities, the current surveillance activities of the CRMN serve to establish background radiation levels across Canada with a focus on nuclear facilities in Canada. This provides a sensitive frame of reference from which to reliably identify and measure the intentional or accidental release of radioactivity into the environment.

Fixed Point Surveillance Network

Health Canada's RPB also operates, the Fixed Point Surveillance (FPS) Network, which is maintained by the Verification and Incident Monitoring Section. It is a real-time, highly sensitive radiation detection network that provides national surveillance of the dose received by the public from airborne radioactive material. It consists of 76 robust scintillation detectors located primarily in major population centres and in the vicinity of nuclear power plants. The FPS network contributes significantly to the effectiveness of Canada's response in the case of a nuclear or radiological incident, at home or abroad. Data from this network is available on the Health Canada web site as monthly summaries updated four times a year. The gamma dose rate is also shared with and posted to the international EURDEP (European Radiological Data Exchange Platform) website.

Comprehensive Nuclear Test Ban Treaty International Monitoring System

Health Canada also contributes to the International Monitoring System, an element of the Verification Regime overseen by the Comprehensive Nuclear-Test-Ban Treaty Organization. Health Canada's Radiation Protection Bureau is responsible for four radionuclide monitoring

stations that survey airborne radioactivity concentrations on a daily basis. This is accomplished through analysis of accumulated air particulates in filter media from high-volume air samplers. Two of these stations are additionally equipped to survey airborne radioactivity by analysis of air condensate for unstable noble gas (particularly radio-xenon) content. These stations are located in St. John's, Newfoundland (particulate/noble gas), Resolute, Nunavut (particulate), Yellowknife, Northwest Territories (particulate/noble gas), and Sidney, British Columbia (particulate).

There are also surveillance and monitoring programs operated at the provincial level including the Ontario Ministry of Labour Reactor Surveillance Program and the Saskatchewan – Eastern Athabasca Regional Monitoring Program. The participation of the provinces and territories is out of scope for the 2019 IRRS mission to Canada.

Calibration of equipment

The CNSC calibration services are detailed in response to SQID 1.9.1.

Both the NSRDR and the CIINFPER specify requirements related to radiation survey meters. In addition, paragraph 12(e) of the GNSCR requires that every person at the site of the licensed activity use the equipment, devices, clothing, and procedures in accordance with the NSCA, the regulations made under the NSCA and the licence.

Regarding calibration services; subsection 3(1) of the NSRDR requires that an application for a licence in respect of a nuclear substance or a radiation device, shall contain:

- *the methods, procedures and equipment that will be used to calibrate radiation survey meters, and*
- *the methods, procedures and equipment that will be used to calibrate and verify the calibration of dosimeters referred to in paragraphs 30(3)(d) and (e) [dosimeters with direct reading capability and a dosimeter capable of emitting an audible alarm when the dose rate reaches or exceeds 5 mSv/h].*

Expectations for calibration methods and procedures are included in the following CNSC regulatory documents:

- *draft REGDOC-1.4.1, Licence Application Guide: Class II Nuclear Facilities and Prescribed Equipment*
- *REGDOC-1.6.1, Licence Application Guide: Nuclear Substances and Radiation Devices, version 2*

Amendments to the RPR are currently ongoing and will include a new section related to the provision and use of radiation detection and measurement instruments by all CNSC licensees. This section will require all radiation detection and measurement equipment to be appropriately selected for the types, levels and radiation energies encountered, and to be capable of preforming accurately and reliably in operating field conditions during routine work and

emergencies. It will also require radiation instrumentation to be tested routinely to verify proper functioning.

The REGDOC-2.7.1, Radiation Protection, which is under development, includes guidance and expectations for the selection, testing and calibration of radiation instrumentation in line with this proposed new regulatory requirement.

No Analysis

No Rating

***Attachments**, by Megan Tougas-Cooke @ 2019-06-25 9:30:30 AM*

Class II Nuclear Facilities and Prescribed Equipment Regulations

CNSC Cost Recovery Fees Regulations

G-91 Ascertaining and Recording Radiation Doses to Individuals

General Nuclear Safety and Control Regulations

Independent Environmental Monitoring Program Process Procedure

Nuclear Safety and Control Act

Nuclear Substances and Radiation Devices Regulations

Radiation Protection Regulations

REGDOC-1.4.1 Licence Application Guide Class II Nuclear Facilities (draft)

REGDOC-1.6.1 Licence Application Guide Nuclear Substances and Radiation Devices

REGDOC-2.7.1 Radiation Protection (draft)

REGDOC-2.7.2 Dosimetry Volume I-Ascertaining Occupational Dose (draft)

Technical Information Sheet on IEMP

Subsidiary Question 1.9.1

How does the regulatory body authorize technical services that may have significance for safety?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-24 10:43:59 AM*

CNSC staff response

The CNSC uses an internal Technical and Scientific Organization (TSO) model (IAEA TECDOC 1835) where the CNSC's Technical Support Branch (TSB) provides the majority of the scientific support. This branch oversees much of the detailed technical analyses in direct support of the Regulatory Operations Branch (ROB). TSB provides specialized expertise in the areas of nuclear science and engineering, safety analysis, safety management, human factors, personnel training and certification, environmental and radiation protection, security, nuclear emergency management, safeguards and nuclear non-proliferation. For additional information on CNSC's organizational structure and branches, see QID1.1 in Module 3 Responsibilities and Functions of the Regulatory Body.

Federal and provincial governments have established and maintained radiological monitoring and analyses capabilities to demonstrate that the public and the environment are protected and to ensure a base capability for response should events or emergencies occur. In addition, programs have been established to ensure unique research capabilities are available for research or non-routine studies and or response capabilities. These are outlined briefly below.

<u>CNSC laboratory services/activities</u>

As per REGDOC-2.9.1, Environmental Protection: Environmental Principles, Assessments and Protection Measures, the CNSC reviews licensee's environmental monitoring program to verify that it aligns with regulatory requirements and guidance.

Once the CNSC is satisfied that the environmental monitoring program meets the requirements, then the licensee can start the implementation. On-site environmental compliance inspections involve verification the element of the program being assessed is implemented according to procedures. The inspector may also take environmental samples, perform tests, and take measurements such as gamma readings.

The following describes the services and activities of the CNSC's laboratory that CNSC inspectors have available when conducting compliance inspections.

- *Radiation Instrumentation – Under the authority of NSCA, the program provides calibrated instruments for CNSC compliance verification activities as well as expert services in radiation instrumentation training, acquisition and calibration. The objectives of this program are provision of accurate, reliable and timely portable radiation protection instrumentation services as an accredited laboratory under the ISO/IEC 17025, to CNSC inspectors; training in radiation instrument use; contribution to best practices in the field of radiation instrumentation as a secondary standard laboratory; maintenance of radiation instruments for emergency monitoring in the event of a nuclear emergency; and provision of management excellence per requirements of the ISO/IEC 17025, Testing and calibration laboratories, including program oversight, program administration, quality assurance/quality control and internal audit functions to maintain laboratory accreditation. The main activities of the program are maintenance, service, repair and calibration of radiation instrumentation used by CNSC staff in compliance verification; training of CNSC staff*

and external parties in radiation instruments operation and maintenance; maintenance of the ISO 17025 accreditation and extension of the scope of accreditation to include all the instruments calibrated in the laboratory.

- *Environmental Compliance Program for Monitoring Chemical and Radiological Hazards – The laboratory provides analytical and radioanalytical measurement techniques for various environmental and compliance activities including training for inspectors and other staff involved in sample collection, the maintenance of an inventory of sampling equipment/kits, and the analyses of inspection and compliance samples as well as samples collected as part of reactive inspections. The laboratory is also involved in the development of innovative methods and techniques and conducts operational research and development in support of the CNSC mandate (e.g. analysis of different types of waste samples). The laboratory also supports Canada's emergency response preparedness providing training, sampling support, and additional analytical capabilities if necessary during an emergency.*
- *CNSC – Nuclear Non-Proliferation and Forensics – Under the authority of NSCA, the program supports the CNSC mandate in verification of safeguarded activities in Canada to implement Canada's obligations under the Nuclear Non-Proliferation treaty. The main activities of the program include: analyzing radioactive and/or nuclear materials to support nuclear safeguards, counter- and non-proliferation, and forensics activities and operations; conducting research and development activities and method development to support Canada's national nuclear forensics capability program; generating signature data for nuclear materials to support Canada's national nuclear forensics library program; securely storing and maintaining material evidence in the form of radioactive and/or nuclear material, including material evidence that is contaminated with radioactive and/or nuclear material; and participating in domestic and international proficiency testing exercises to maintain and demonstrate analytical capabilities.*

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-24 10:44:09 AM*

Nuclear Safety and Control Act

REGDOC-2.9.1 Environmental Principles Assessments and Protection Measures

Analysis

STRENGTHS FOR 01. RESPONSIBILITIES AND FUNCTIONS OF THE GOVERNMENT

S1	*The Nuclear Safety and Control Act (NSCA) assigns to the CNSC the clear and sole authority to regulate nuclear-related facilities and activities.*
S2	*The NSCA and associated regulations provide the basis of a modern nuclear regulatory regime that affords adequate authority and power to the CNSC to discharge its responsibilities, while providing the flexibility to determine regulations that are pertinent to its activities.*

S3	*The CNSC is effectively independent due, in large part, to the NSCA that allows it to discharge its assigned responsibilities without external approval.*
S4	*The responsibilities of the CNSC are clearly outlined and entrenched in the NSCA, but the flexibility is given to the CNSC to perform its role without undue restrictions. This style of legislative practice is unique to Canada.*
S5	*The CNSC's mandate does not include regulating to meet political or economic objectives.*
S6	*The CNSC has adequate authority and power to acquire resources to employ the staff required to meet its mandate.*
S7	*Through the NSCA, General Nuclear Safety and Control Regulations, the prime responsibility for safety is clearly assigned to the licensee.*

WEAKNESSES FOR 01. RESPONSIBILITIES AND FUNCTIONS OF THE GOVERNMENT

W1	*No weaknesses were identified.*

OPPORTUNITIES FOR 01. RESPONSIBILITIES AND FUNCTIONS OF THE GOVERNMENT

O1	*No opportunities were identified.*

THREATS FOR 01. RESPONSIBILITIES AND FUNCTIONS OF THE GOVERNMENT

T1	*No threats were identified.*

CONCLUSIONS FOR 01. RESPONSIBILITIES AND FUNCTIONS OF THE GOVERNMENT

C1	*In Canada, the regulation of nuclear energy falls under federal jurisdiction. The CNSC is a quasi-judicial independent body with jurisdictional authority over nuclear-related facilities and activities in Canada. The CNSC works cooperatively with several federal departments and agencies to facilitate the discharge of its duties and responsibilities, harmonize with non-nuclear requirements and capitalize on their expertise.* *The NSCA and its regulations are the key pieces of legislation that govern CNSC's regulatory activities. The responsibilities of the CNSC are clearly outlined and entrenched in the NCSA; however, the CNSC is able to perform its functions without undue restrictions. Under the NSCA, the prime responsibility for safety is assigned to the licensee. Licensees are*

	responsible for managing regulated activities in a manner that protects the health, safety, security and the environment and conforms with Canada's domestic and international obligations on the peaceful use of energy. The CNSC is accountable to Parliament and Canadians for assuring that these responsibilities are properly discharged.

RECOMMENDATIONS FOR 01. RESPONSIBILITIES AND FUNCTIONS OF THE GOVERNMENT

R1	*No recommendations were identified.*

Module: 02. The Global Safety Regime

Findings

Question 2.1

Does the government participate in the relevant international arrangements to enhance safety globally and fulfil its respective obligations?

***Answer**, by System Administrator @ 2019-05-29 10:18:21 AM*

Yes

Finding

The Government participates in the relevant international arrangements to enhance safety globally and fulfil its respective obligations.

***Response**, by Megan Tougas-Cooke @ 2019-06-25 10:48:18 AM*

CNSC staff response

Yes, CNSC staff participate in international arrangements (including international agreements, working groups, committees, peer reviews as well as bilateral and multilateral cooperation) to enhance safety globally and fulfil its respective international obligations.

In 2000, the Nuclear Safety and Control Act (NSCA) came into force and established the CNSC. The CNSC is a federal regulatory agency and an independent administrative tribunal set up at arm's length from the government, with no ties to the nuclear industry. Under the NSCA, the CNSC is the sole authority to regulate the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and

prescribed information in Canada. As an independent entity, the CNSC reports to Parliament through the Minister of Natural Resources.

As per paragraph 3(b) of the NSCA, part of the CNSC's mandate is to implement Canada's international obligations on the peaceful use of nuclear energy. To achieve this objective, the CNSC works bilaterally and multilaterally with partners around the world to maintain a safe, secure and peaceful international nuclear sector. The types of international instruments used include treaties, agreements, conventions, charters, protocols and memoranda of understanding.

CNSC staff also participate in international fora to provide global nuclear leadership and to benefit from international experience and best practices. These international activities help inform the CNSC's decision-making processes to:

- *understand and compare the various ways of evaluating and mitigating risks*
- *share research and operational experience*

International Agreements

The response to QID1.1 of Module 1, Responsibilities and Functions of the Government, details the international conventions, codes of conduct and other agreements to which the CNSC participates. A summary is provided here:

Canada is a signatory to a number of key international treaties that establish common obligations and mechanisms to ensure protection and safety. A treaty is also referred to as a convention, agreement or protocol. Many of the treaties that the CNSC is responsible for implementing (in whole or in part) are multilateral treaties under International Atomic Energy Agency (IAEA) auspices. These include the:

- *Convention on Nuclear Safety*
- *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Joint Convention)*
- *Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency*
- *Convention on Early Notification of a Nuclear Accident or Radiological Emergency*
- *Treaty on the Non-Proliferation of Nuclear Weapons*

The CNSC fully meets its obligations under these conventions.

In October 2015, the CNSC's Executive Vice-President and Chief Regulatory Operations Officer Ramzi Jammal, was elected by Contracting Parties in October 2015 as President of the Seventh Review Meeting of the CNS, held in Vienna from March 27 to April 7, 2017. Mr. Jammal advocated for improving and increasing the exchange of information. Under Mr. Jammal's leadership, this review meeting was the first for which all but one of the Contracting Parties submitted a national report and all submitted reports were made publicly available.

The CNSC, on behalf of Canada, assists in the development of and is responsible for implementing (in whole or in part) nuclear safety related codes of conduct such as the Code of Conduct of the Safety and Security of Radioactive Sources and the Code of Conduct on the Safety of Research Reactors. For example, in compliance with the IAEA Code of Conduct on the Safety and Security of Radioactive Sources, CNSC licenses and controls the export and import of certain risk-significant radioactive sealed sources.

The CNSC has also been delegated authority to implement Canada's agreement with the IAEA on nuclear safeguards verifications including the Agreement between the Government of Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons and the Protocol Additional to the Agreement between Canada and the International Atomic Energy Agency for the Applications of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons.

The following are descriptions of other international instruments that Canada uses to fulfil its international obligations:

- *Nuclear Cooperation Agreements (NCA) – Canada's non-proliferation policy stipulates that Canadian-supplied nuclear material, equipment and technology can only be transferred to countries which have concluded a bilateral NCA with Canada. NCAs are treaty-level, legally binding agreements which establish reciprocal obligations designed to minimize the proliferation risk associated with the transfer of major nuclear items and technology. These obligations include assurances that the items are used only for peaceful purposes, consent over retransfer, consent over high enrichment and reprocessing, as well as the establishment of physical protection measures and fallback safeguards. Global Affairs Canada is responsible for the negotiation of NCAs. The CNSC contributes to NCA negotiations by providing technical policy advice.*
- *Administrative arrangements – These bilateral non-legally binding arrangements promote cooperation between regulatory bodies. Administrative arrangement provide parties with assurances regarding the security of the information exchanged, clarity about roles and responsibilities among other benefits. The following are two examples of administrative arrangements that the CNSC administers:*
    - *Canada's NCAs contain a provision authorizing the CNSC as the appropriate government authority on the part of Canada to establish AAs to facilitate the effective implementation of an NCA.*
    - *Administrative arrangements between the CNSC and foreign regulatory counterparts implement key import and export control provisions of the IAEA Code of Conduct on the Safety and Security of Radioactive Sources, and the supplementary Guidance on the Import and Export of Radioactive Sources. The objective of the administrative arrangement is to establish efficient and harmonized bilateral procedures for the implementation of import and export controls, thus reducing the risk of undue delays in authorizing transfers of such sources.*
- *Memorandum of understanding (MOU) – under paragraph 21(1)(a) of the NSCA, the CNSC may, in order to attain its "objects" as defined under section 9 of the NSCA, enter into arrangements with any regulatory agency, department of a government or any*

international agency. These arrangements provide a framework for bilateral cooperation, and provide parties with assurances regarding the security of information exchanged, as well as enhanced clarity about responsibilities regarding visits and costs related to cooperation initiatives, among other benefits. While these arrangements are not legally binding, they nonetheless represent serious political commitments.

A comprehensive list of the international agreements and MOUs between CNSC and other federal departments, government and international agencies can be found on the CNSC's external webpage and is provided as an Annex A.

International Export Control and Non-proliferation

CNSC staff collaborate with counterparts in other countries and other federal departments to fulfil Canada's international obligations and to ensure the conduct of nuclear cooperation is consistent with international agreements and the non-proliferation regime.

Since 1946, the CNSC has worked to ensure Canada's nuclear exports are used for peaceful purposes and to respect Canada's international commitments regarding non-proliferation of nuclear weapons.

CNSC is a founding and active member of the Zangger Committee and the Nuclear Suppliers Group. These are two multilateral organizations with supply conditions for nuclear and nuclear-related exports. CNSC participation in these organizations demonstrates the CNSC's commitment to monitoring and controlling the import and export of controlled nuclear substances, equipment and information.

Canada's major nuclear exports are governed by bilateral nuclear cooperation agreements with destination countries. CNSC collaborates with Global Affairs Canada to negotiate these agreements and to implement Canada's nuclear non-proliferation policy by providing policy and technical advice in developing multilateral nuclear export control lists and guidelines.

Global Affairs Canada is the federal department responsible for Canada's external affairs and international trade and development. This includes the promotion of bilateral and multilateral nuclear cooperation and the implementation of key non-proliferation, disarmament, safety and security agreements in Canada and abroad. It enhances security and well-being by promoting the peaceful and safe use of nuclear energy and technologies.

To illustrate further, CNSC staff work in collaboration with Global Affairs Canada for the import and export of dual-use items. CNSC is responsible for administering a regulatory program in parallel with Global Affairs Canada to license the import and export of nuclear and nuclear-related dual-use items. The CNSC's import and export controls program provides assurance to Canadians and the international community that Canada's nuclear exports do not contribute to the development of nuclear weapons or nuclear explosive devices while further enabling Canada to meet its commitments to international export control and non-proliferation regimes.

International Safety Standards

The CNSC supports and uses IAEA safety standards in developing its regulatory framework. The CNSC's regulatory framework consists of the NSCA and the other laws passed by Parliament that govern the regulation of Canada's nuclear industry, as well as regulations, licences and documents that the CNSC uses to regulate the industry.

To assist in the development of standards, Canada actively participates in all of the IAEA Safety Standards Committees.

- *Health Canada represents Canada on the Emergency Preparedness and Response Standards Committee (EPReSC), with the CNSC as alternate.*
- *The CNSC represents Canada on the Radiation Safety Standards Committee (RASSC), Transport Safety Standards Committee (TRANSSC), Waste Safety Standards Committee (WASSC) and Nuclear Safety Standards Committee (NUSSC). A CNSC staff is currently the chair of NUSSC.*
- *The CNSC's Executive Vice-President, Regulatory Operations Branch and Chief Regulatory Operations Officer is an active member of the Commission on Safety Standards.*

To facilitate Member State reviews of draft IAEA safety standards, the CNSC implemented a new internal process to improve Canadian participation and enhance the clarity and consistency of Canada's submissions.

The CNSC has developed regulatory documents (REGDOCs) that specify licence application requirements and guidance to meet regulatory requirements. REGDOCS are part of the regulatory framework for nuclear activities in Canada and provide additional clarity to licensees and applicants by explaining how to meet the requirements set out in the NSCA and the regulations made under it.

REGDOCs take into account international regulatory best practices and modern codes and standards, and align with the IAEA's Safety Fundamentals and Safety Requirements. When referenced in a REGDOC, the IAEA safety standards are considered to be guidance or regulatory expectations. Licensees and applicants can use IAEA safety standards as appropriate in developing their applications as long as they provide sufficient justification for how they have used the standards. The CNSC has also referenced several standards in licences as requirements for licensees or applicants to adhere to.

International Peer Review

CNSC is a strong supporter of the IAEA's peer review missions as a key mechanism for strengthening regulatory effectiveness, both at home and abroad. In 2015, the IAEA completed an International Physical Protection Advisory Service (IPPAS) Mission to Canada to review national nuclear security practices. Two Operational Safety Review Team (OSART) Missions were conducted in Canada in 2015 and 2016.

The IAEA is conducting an Emergency Preparedness Review (EPREV) of nuclear emergency arrangements in Canada from June 3 to 13, 2019. The EPREV mission is a first in Canada.

In addition, between 2014 and 2018, CNSC staff members led or participated in 27 IRRS missions and 11 IPPAS missions in other countries.

Bilateral and Multilateral Cooperation

The CNSC's cooperation and involvement with international nuclear organizations includes the IAEA and the Organisation for Economic Cooperation and Development's Nuclear Energy Agency (OECD NEA). The CNSC's role in these organizations is to promote Canadian interests and evaluate international recommendations, standards and guides for adoption into the CNSC's regulatory framework.

No Analysis

No Rating

***Attachments**, by Megan Tougas-Cooke @ 2019-06-25 10:50:19 AM*

Annex A – List of International Instruments

IPPAS Mission to Canada Report

Nuclear Safety and Control Act

Question 2.2

Does the government promote international cooperation and assistance to enhance safety globally?

***Answer**, by System Administrator @ 2019-05-29 10:18:21 AM*

Yes

Finding

The Government promotes international cooperation and assistance to enhance safety globally.

***Response**, by Megan Tougas-Cooke @ 2019-06-24 10:49:39 AM*

CNSC staff response

Yes, the CNSC actively promotes international cooperation and assistance to enhance nuclear safety globally through a number of means.

In addition to the information provided in response to QID2.1, CNSC staff promote international cooperation/assistance through the following:

- *Leading or participating in peer review missions to help strengthen regulatory effectiveness in partner countries.*
- *Participating in high-level meetings focused on enhancing the global nuclear safety regime, such as the G7 Nuclear Safety and Security Group (NSSG), International Nuclear Regulators Association (INRA), the IAEA General Conference and Board of Governors, Ministerial Conferences and presiding over international conferences.*
- *Participating in meetings associated with the Convention on Nuclear Safety and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management in order to strengthen and support the international framework for nuclear safety.*
- *Participating in the IAEA's Commission on Safety Standards to provide direct advice to the Director General of the IAEA.*
- *Participating or leading the associated Safety Standards Committees (CNSC represents Canada on the RASSC, TRANSCC, WASSC and NUSSC. CNSC is the chair for the NUSSC).*
- *Participating in IAEA and NEA technical and committee meetings to share information, draft documents and build international capacity in nuclear safety, security and safeguards.*
- *Participating in conferences and workshops external to the IAEA and NEA to share information, draft documents and build international capacity in nuclear safety.*
- *Participating in international activities related to the implementation of Canada's international commitments on the peaceful use of nuclear energy.*
- *Assisting with global capacity building efforts by providing CNSC personnel to deliver training organized by international organizations to strengthen other nuclear regulators and technical support organizations.*
- *Hosting international meetings, events and visits to Canada related to enhancing the global safety regime.*
- *Hosting IAEA fellowships and scientific visits.*
- *Hosting IAEA workshops, technical visits, and conferences.*
- *Signing and implementing MOU with regulatory counterparts for cooperation and the exchange of nuclear regulatory information.*

No Analysis

No Rating

No Attachments

Question 2.3

Has the regulatory body made arrangements for analysis of operating and regulatory experience (including internationally) and for dissemination of the lessons learned?

***Answer**, by System Administrator @ 2019-05-29 10:18:21 AM*

Yes

Finding

The regulatory body has made arrangements for analysis of operating and regulatory experience (including internationally) and for dissemination of the lessons learned

***Response**, by System Administrator @ 2019-05-29 10:18:21 AM*

CNSC staff response

Yes, the CNSC undertakes a number of steps to enhance the analysis of operating and regulatory experience as well as incorporate lessons learned both nationally and internationally.

The CNSC has several international collaborative agreements which facilitate the sharing of lessons learned. These range from bilateral international agreements with other regulatory bodies to multilateral international agreements through organizations such as the IAEA and the OECD/NEA. Examples include:

- *IAEA International Generic Ageing Lessons Learned*
- *OECD/NEA Component Operational Degradation & Ageing Programme*
- *OECD/NEA International Common-Cause Data Exchange*
- *OECD/NEA Fire Incident Records Exchange*

These are multiyear agreements which allow for all parties to participate in working groups and share lessons learned from both operating and regulatory experience. Many of these working groups have created databases to store the lessons learned information which can then be accessed by all participating members.

The CNSC has established the Operating Experience (OPEX) Clearinghouse program to systematically review domestic and international events, and to leverage the integrated expertise of CNSC staff, ensuring that relevant events are followed up in a timely manner. The OPEX Clearinghouse draws information from several sources including:

1. *Central Event Reporting and Tracking System (CERTS), which is a database used to collect, categorize and track follow-up of reported events at Canadian NPPs.*
2. *IAEA-OECD Incident Reporting System, which provides timely and detailed information on lessons learned at the international level on operating and construction experience*
3. *NEA Working Group on Operating Experience*

The CNSC uses regulatory experience through a lessons learned approach (regulatory oversight and support) that is well ingrained across the organization. The CNSC has many mechanisms in place to provide assurance that lessons learned opportunities are carried through to implementation and improve the CNSC's regulatory effectiveness.

The CNSC obtains regulatory experience from different forums including:

- *internal sharing of inspection reports and safety reviews/assessments*
- *participation in and leading of peer reviews, conferences and workshops*
- *participation in nuclear safety conventions and review meetings*
- *participation in standards development (national and international)*
- *capturing lessons learned from Commission proceedings through the Commission Member Document process*
- *conducting audits, evaluations, and self-assessments of CNSC programs and processes*
- *internal committees such as the Regulatory Framework Steering Committee and the Harmonized Plan Steering Committee*
- *participation in intergovernmental committees such as the Community of Federal Regulators*
- *feedback from public consultation on the CNSC's regulatory framework*

More detailed examples of how CNSC obtains and shares regulatory experience are provided below:

<u>Participation in peer reviews, conferences and workshops</u>

CNSC staff share feedback, relevant information and lessons learned by participating and leading peer reviews, conferences and workshops in areas related to the CNSC's mandated responsibilities. Staff share information by giving presentations, leading conference sessions and chairing workshops. Further, all CNSC staff that participate in such events are required to prepare and share trip reports providing a synopsis of the event along with recommendations that can further help improve the CNSC's regulatory framework. Trip reports are shared with all staff through CNSC's intranet.

<u>Participation in nuclear safety conventions and review meetings</u>

The CNSC remains committed to the principles and implementation of the Convention on Nuclear Safety by undertaking continuous improvements to maintain the highest level of safety for nuclear power reactors in Canada. Participation in the Convention of Nuclear Safety allows the CNSC to share experiences and best practices and contribute to the strengthening of nuclear safety.

As a Contracting Party, Canada also participates in the Joint Convention, an international agreement governing all aspects of spent fuel and radioactive waste management. CNSC's participation in the Joint Convention over the years has demonstrated CNSC's commitment to achieving and maintaining a consistently high level of safety in the management of spent fuel and radioactive waste, as part of the global safety regime for ensuring the protection of people and the environment.

Participating in the Joint Convention process allows CNSC to perform a structured self-assessment of the appropriateness of its adopted safety measures for spent fuel and radioactive waste management. It provides an international forum for cooperation and experience-sharing for regulators, government agencies, and industry. It also provides opportunities to learn about

international decommissioning experience and the status of waste repositories in various countries.

Participation in standards development

As mentioned in response to QID2.1, REGDOCs take into account international regulatory best practices and modern codes and standards, and align with the IAEA's Safety Fundamentals and Safety Requirements. Industry or international standards may also be referenced in REGDOCs. Modern codes and standards include, but are not limited to, standards created by independent, third-party standard-setting organizations such as:

- *CSA Group*
- *American Society of Mechanical Engineers*
- *International Commission on Radiological Protection*
- *Institute of Electrical and Electronics Engineers.*

CNSC staff often sit on the industry and international standards committees including those listed above and in response to QID2.1.

Conducting audits, evaluations, and self-assessments of CNSC programs and processes

The CNSC recognizes that its management system needs to continuously evolve and improve to meet changes in standards, requirements and national international developments. The CNSC takes advantage of available technology and good practices learned from international and national organizations to improve its management system. The CNSC is continuously assessing and improving its management system through conducting audits, evaluations and self-assessments of its programs and processes.

Internal committees such as the Regulatory Framework Steering Committee and the Harmonized Plan Steering Committee

Under the CNSC's International Strategy, which is part of the CNSC's Strategic Planning Framework, one of the main objectives is to ensure that the CNSC and its licensees learn, adapt and incorporate international best practices. The CNSC incorporates a review of IAEA safety standards and other documents (i.e., regulations and standards), if applicable, into its policy analysis work at the initial stages of developing regulatory instruments. The Conduct Regulatory Policy Analysis process ensures that IAEA documentation is leveraged, as appropriate, within the CNSC's regulatory framework project proposals. These established mechanisms ensure that international lessons learned, best practices and standards are considered in the development of REGDOCs and regulations. Furthermore, the CNSC has developed formalized processes to enhance coordination of the review of draft IAEA safety standards (including enhanced consultations with members of the public, Indigenous groups and other stakeholders). These processes ensure that review requests from the IAEA with regards to draft safety standards are systematically assessed.

As well, the CNSC's Regulatory Framework Steering Committee drives regulatory framework priorities and provides leadership, guidance and direction to achieve a clear and robust regulatory framework. The mandate of the committee is to ensure that the CNSC's regulatory framework continues to benefit from lessons learned and strives for continuous improvement.

Additionally, the CNSC's Harmonized Plan Steering Committee provides leadership, direction and support in the development and implementation of the Harmonized Plan. The Harmonized Plan is the CNSC's improvement plan that, in assuring safety remains an overriding priority, integrates and aligns cross-functional CNSC improvement initiatives for the effective and efficient delivery of CNSC's regulatory programs. The Harmonized Plan is a vehicle for strategic discussions to promote change management and business transformation readiness, and strengthen the CNSC's Management System.

Participation in intergovernmental committees such as the Community of Federal Regulators

CNSC staff participate in the Community of Federal Regulators (CFR) to learn from other Canadian regulators as well as share information and lessons learned. The CNSC is leading CFR efforts and sharing international lessons learned in relation to the development and consistent implementation of Administrative Monetary Penalties as it applies to the Canadian enforcement landscape.

The Federal-Provincial-Territorial Radiation Protection Committee is an intergovernmental committee established to support Federal, Provincial and Territorial radiation protection agencies in their respective mandates. The representation on the committee includes CNSC, Health Canada, provinces and the territories. The objective of the committee is to advance the development and harmonization of practices and standards for radiation protection. Among the activities of the committee is:

- *identifying emerging issues in radiation protection and recommending actions to the appropriate jurisdictions*
- *developing and harmonizing radiation protection standards, guidelines and input for legislation*
- *providing a forum for representatives of the provinces and territories, the CNSC, Department of National Defence, Health Canada and other federal departments/agencies*

Reporting information and lessons learned from operating and regulatory experience

REGDOC-3.2.1, Public Information and Disclosure, requires licensees and applicants to have an established public disclosure protocol to address the information interests of the target audience with respect to licensed activities. The CNSC public disclosure notification aligns with the CNSC's policy to promote open and transparent public relationships between licensees and applications and their target audiences and to assist in the broader dissemination of information to the general public where appropriate.

Licensees and applicants are required to inform the CNSC of disclosures made under the public disclosure protocol at the time of, or before, such disclosure. CNSC posts the latest events on the main page of the CNSC webpage. Additional information on the requirements of a licensee's or applicant's public information program is provided in response to QID3.8, SQID 3.8.1 and SQID 3.8.2 of Module 3 Responsibilities and Functions of the Regulatory Body.

In addition, the CNSC uses event initial reports to ensure the Commission is aware of any events that may require its decision-making capacity. The reporting requirements for event reporting are outlined in the REGDOC-3.1, Reporting Requirements. The CNSC has a process in its management system which documents the overview of event initial reporting. Not all events require an event initial report. The process outlines events that are generally reported as event initial reports. The purpose of the process is to systematically and consistently:

- *assess and identify events which may potentially require the involvement of the Commission in making a regulatory decision, and*
- *make the Commission aware of such an event, its impact, and the status of controls in place to assure the safety or security.*

The CNSC also reports on lost or stolen sealed sources and radiation devices on its external website. The NSCA, its regulations and licence conditions require licensees to report these occurrences. Events are added and the status is updated on a regular basis to keep the public informed. The report provides a description for each event, the date the event occurred, the event location, the risk categorization, a brief summary and the recovery status. The risk categorization of the sealed source at the time of the event (Category 1 to Category 5) is based on the IAEA document entitled Categorization of Radiation Sources.

Problems or issues that arise from event reviews that may be applicable to other nuclear facilities are identified and brought to the attention of the CNSC. CNSC staff ensure that the results of root-cause analyses, which includes a mandatory review of OPEX related to the event, are included in their reviews and assessments of a licensee's corrective actions in response to events. The Commission may ask for further corrective actions until it is satisfied that adequate measures have been taken to protect the health and safety of the people and the environment and that Canada is upholding its international obligations.

For nuclear power plants, CNSC inspection teams consult the OPEX in CERTS when planning strategies for their audits and in identifying problem areas in operation or maintenance (such as procedural non-compliance, procedural deficiencies and the use of non-standard components). Similarly, CNSC assessments often incorporate the OPEX recorded in CERTS. As part of the inspection baseline, CNSC inspectors also check the licensee's station condition records or event reports, along with system health reports, to ensure that licensees have reviewed related OPEX and identified the relevant extent of condition for their facilities.

The Event Information and Tracking System (EITS) is an internal repository of event information. The EITS is an event information management system. The EITS allows CNSC to log and report

unplanned events concerning nuclear substances, nuclear materials and devices. Unplanned events include incidents regarding (but not limited to) the loss, theft, recovery, transport, storage, disposal, unauthorized use/possession/transaction, spills, malfunction or damage of nuclear devices, and waste and scrap material alarms. The system allows for recording of event details, tracking of these events, detailed searching, and the creation of reports.

On a monthly basis, a summary of events related to the use of nuclear substances, radiation devices and prescribed equipment is prepared and shared with the EITS distribution list. In addition, licensing and compliance staff are in the process of developing an event review process for the review of licensee related events related to the use of nuclear substances and radiation devices. The goal is to have both licensing and compliance staff involved in event follow-up and closure for those where more CNSC involvement would be required.

CNSC prepares Regulatory Oversight Reports (RORs) on an annual basis for the Commission. RORs contain CNSC staff's assessment of licensees' safety performance in the relevant Safety and Control Areas. The reports highlight the areas of CNSC staff's regulatory compliance efforts and discuss any significant events, licence changes and major developments. Examples of the RORs produced include:

- *Research Reactors and Class IB Accelerators in Canada 2016-2017*
- *2017 Use of Nuclear Substances*
- *Canadian Nuclear Generating Sites: 2017 (including waste management facilities)*
- *2017 Uranium Mines, Mills and Historic and Decommissioned Sites*
- *2017 Uranium Processing and Nuclear Processing Facilities*

The RORs include discussions of significant events which may have occurred at a licensed facility along with the corrective actions taken by the licensee and CNSC's staff's oversight for the event.

Under its international obligations, the CNSC is responsible for assessing and providing provisional and final International Nuclear and Radiological Event Scale (INES) ratings to the IAEA. The INES scale is used to classify the size of a radioactive release and its associated public dose to facilitate the communication of the safety significance of a nuclear and radiological event to technical committees and the public.

Improvements to CNSC's regulatory framework from operating and regulatory experience

An example of improvements to the CNSC's regulatory framework from operating and regulatory experience is the CNSC's response to the incident at the Fukushima Daiichi nuclear power plant on March 11, 2011.

In response to the event on March 11, 2011, the CNSC launched a rigorous re-examination of all of the CNSC's regulatory requirements and identified some key improvements. A CNSC-led task force established in April 2011 to evaluate the operational, technical and regulatory implications of the accident in relation to Canadian nuclear power plants. In parallel, CNSC staff

reviewed non-power reactor facilities, as well as uranium mines and mills, to confirm that these installations were safe and adequately prepared to deal with potential emergencies. The non-power reactor reviews used a risk-informed approach consistent with the recommendations of the CNSC Task Force, taking into account the specificities of the facilities (including licensed activities, site characteristics and nature of the hazards present at each nuclear site). The areas of improvement identified by the CNSC Task Force for NPPs were also considered for all Class I facilities, and applied in a graded approach.

On September 30, 2011, the task force completed its review and presented its findings and recommendations in the CNSC Fukushima Task Force Report. The task force made 13 recommendations in the following areas to further enhance the safety of Canadian NPPs:

- *strengthening reactor defence in depth*
- *enhancing emergency response*
- *improving the regulatory framework and processes*
- *enhancing international collaboration*

To address the task force's recommendation, the CNSC developed a four-year CNSC Action Plan to be implemented by licensees and CNSC staff. Both the CNSC Fukushima Task Force Report and the CNSC Action Plan were subject to public consultations and independent reviews.

- *Between October 2011 and May 2012, the CNSC embarked on a series of public consultations to seek additional input on the task force report and create broader public awareness of the nuclear accident and to engage stakeholders in the development of measures to address the lessons learned from the accident.*
- *An external advisory committee was established in August 2011 to provide an independent assessment of the federal regulator's actions in response to the incident and make recommendations for improvements.*
- *A review of the regulatory implications of the Fukushima Daiichi accident for the nuclear industry was included as part of the 2011 follow-up IRRS mission to Canada.*

All Fukushima Action Plan items are now implemented and closed.

No Analysis

No Rating

***Attachments**, by Megan Tougas-Cooke @ 2019-07-02 10:17:15 AM*

Canadian National Report for the Convention on Nuclear Safety - Seventh Report Aug 2016

CNSC Fukushima Task Force Report

CNSC Integrated Action Plan on Lessons Learned from the Fukushima Daiichi Nuclear Accident

CNSC Lost and Stolen Sealed Sources and Radiation Devices Report

Conduct Regulatory Policy Analysis

Event Initial Reporting (EIR)

Joint Convention - Sixth Report Oct 2017

REGDOC-3.1.1 Reporting Requirements for Nuclear Power Plants

REGDOC-3.1.2 Reporting Requirements, Volume I Non-Power Reactor Class I Facilities and Uranium Mines and Mills

REGDOC-3.2.1 Public Information and Disclosure

Regulatory Oversight Report for Research Reactors and Class IB Accelerators 2016-2017

Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada 2017

Regulatory Oversight Report for Uranium Mines Mills Historic and Decommissioned Sites in Canada 2017

Regulatory Oversight Report on Nuclear Generating Sites in Canada 2017

Regulatory Oversight Report on the use of nuclear Substances in Canada 2017

Analysis

STRENGTHS FOR 02. THE GLOBAL SAFETY REGIME

S8	*CNSC, on behalf of Canada, participates in many international arrangements (including international agreements, working groups, committees, peer reviews as well as bilateral and multilateral cooperation) to enhance safety globally and fulfil its respective international obligations.*
S9	*The CNSC has several international collaborative agreements which facilitate the sharing of lessons learned. These range from bilateral international agreements with other regulatory bodies to multilateral international agreements through organizations such as the IAEA and the Organization for Economic Co-operation and Development (OECD)/Nuclear Energy Agency (NEA). Examples include:* *- IAEA International Generic Ageing Lessons Learned* *- OECD/NEA Component Operational Degradation & Ageing Programme* *- OECD/NEA International Common-Cause Data Exchange* *- OECD/NEA Fire Incident Records Exchange*

	- OECD/NEA Committee on Decommissioning of Nuclear Installations and Legacy Management
S10	*In 2015, the IAEA completed an International Physical Protection Advisory Service (IPPAS) Mission to Canada to review national nuclear security practices. Two Operational Safety Review Team (OSART) Missions were conducted in Canada in 2015 and 2016. The IAEA is also conducted an Emergency Preparedness Review (EPREV) of nuclear emergency arrangements in Canada from June 3 to 13, 2019. The EPREV mission is a first in Canada. In addition, between 2014 and 2018, CNSC staff members led or participated in 27 IRRS missions and 11 IPPAS missions in other countries.*
S11	*The CNSC has established the Operating Experience (OPEX) Clearinghouse program to systematically review domestic and international events, and to leverage the integrated expertise of CNSC staff, ensuring that relevant events are followed up in a timely manner. The OPEX Clearinghouse draws information from several sources including:* *1. Central Event Reporting and Tracking System, which is a database used to collect, categorize and track follow-up of reported events at Canadian nuclear power plants* *2. IAEA-OECD Incident Reporting System, which provides timely and detailed information on lessons learned at the international level on operating and construction experience* *3. NEA Working Group on OPEX*
S12	*The CNSC prepares Regulatory Oversight Reports (RORs) on an annual basis for the Commission. The reports contain CNSC staff's assessment of licensees' safety performance in relevant Safety and Control Areas. The reports also highlight the areas of CNSC staff's regulatory compliance efforts and discuss any significant events, licence changes and major developments.*

WEAKNESSES FOR 02. THE GLOBAL SAFETY REGIME

W2	*No weaknesses were identified.*

OPPORTUNITIES FOR 02. THE GLOBAL SAFETY REGIME

O2	*No opportunities were identified.*

THREATS FOR 02. THE GLOBAL SAFETY REGIME

T2	*No threats were identified.*

CONCLUSIONS FOR 02. THE GLOBAL SAFETY REGIME

C2	*Canada participates in international arrangements to enhance safety globally and fulfil its respective international obligations through* *·implementing multilateral treaties that are under the auspices of the IAEA including the Convention on Nuclear Safety and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management as well as nuclear safety* *·implementing related codes of conduct* *·participating in all IAEA standards committees* *·participating in international peer reviews including IPPAS, OSART and EPREV missions* *·promoting international cooperation and assistance* *·sharing operational and regulatory experience with CNSC staff; other federal and provincial departments and regulators; licensees and applicants; civil society; and other stakeholders* *CNSC's participation, on behalf of Canada, in international arrangements and other international for continue to inform the CNSC's decision-making process, allow the CNSC to fulfil its mandate of implementing Canada's international obligations on the peaceful use of nuclear energy as well as share lessons learned and good practices internationally to improve nuclear safety globally.*

RECOMMENDATIONS FOR 02. THE GLOBAL SAFETY REGIME

R2	*No recommendations were identified.*

Module: 03. Responsibilities and Functions of the Regulatory Body

Findings

Question 3.1

Does the regulatory body's organizational structure enable it to discharge its responsibilities and perform its functions effectively in a manner commensurate with the radiation risks associated with facilities and activities?

***Answer**, by Megan Tougas-Cooke @ 2019-05-31 11:45:02 AM*

Yes

Finding

The regulatory body's organizational structure enables it to discharge its responsibilities and perform its functions effectively.

***Response**, by Megan Tougas-Cooke @ 2019-06-24 11:08:50 AM*

CNSC staff response

The organizational structure of the CNSC allows it to effectively and efficiently discharge its responsibilities and perform its functions in a manner commensurate with the radiation risks associated with nuclear facilities and activities in Canada.

The Nuclear Safety and Control Act (NSCA) came into force on May 31, 2000. It established the CNSC and set out the CNSC's mandate, responsibilities and powers. The NSCA provides the CNSC with the authority to regulate the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information in Canada.

Section 9 of the Act establishes the objects of the Commission:

- *(a) to regulate the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information in order to*
  - *(i) prevent unreasonable risk, to the environment and to the health and safety of persons, associated with that development, production, possession or use,*
  - *(ii) prevent unreasonable risk to national security associated with that development, production, possession or use, and*
  - *(iii) achieve conformity with measures of control and international obligations to which Canada has agreed; and*
- *(b) to disseminate objective scientific, technical and regulatory information to the public concerning the activities of the Commission and the effects, on the environment and on the health and safety of persons, of the development, production, possession and use referred to in paragraph (a).*

The legal provisions under the NSCA for the types of facilities and activities within the Canadian nuclear industry that the CNSC has been empowered to regulate is summarized in response to

QID1.2 of Module 1 Responsibilities and Functions of the Government. This includes facilities and activities related to:

- *uranium mines and mills*
- *uranium fuel fabrication and processing*
- *nuclear power plants*
- *nuclear substance processing*
- *industrial and medical applications*
- *nuclear research and educational activities*
- *transportation of nuclear substances*
- *nuclear security and safeguards*
- *import and export activities*
- *waste management activities*

The CNSC's organizational structure consists of two components:

- *the Commission, which refers to the organization's tribunal component*
- *the CNSC, which refers to the corporate body and the staff in general*

The Commission

The Commission is an independent administrative tribunal and court of record. As per section 10 of the NSCA, the Commission can consist of up to seven (7) permanent commission members including the President of the Commission. Members are appointed by the Governor in Council of Canada for terms not exceeding five years and may be re-appointed. The Governor in Council is the Governor General acting on the advice of Cabinet. The Cabinet is a committee of ministers chaired by the Prime Minister. The ministers are elected politicians that enjoys the confidence of a majority of Members of Parliament in the House of Commons. In practice this is almost always the party with the most seats in the House of Commons.

The appointed members are independent of all influences, including political, governmental, special interest or private sector. The Commission Members are appointed based on their qualifications and expertise. The President serves as a full-time Commission member. The other members may be appointed as full or part-time members. In practice, the other members are almost always appointed to serve on a part-time basis. The key roles of the Commission are to:

- *establish regulatory policy on matters relating to health, safety, security and the environment*
- *make legally binding regulations*
- *make independent decisions on the licensing of nuclear-related activities in Canada*

CNSC

CNSC staff support the Commission by:

- *developing proposals for regulatory development and recommending regulatory policies*

- *carrying out licensing, certification, compliance inspections and enforcement actions*
- *coordinating the CNSC's international undertakings*
- *developing the CNSC-wide programs in support of regulatory effectiveness*
- *maintaining relations with stakeholders*
- *providing administrative support to the organization*

CNSC staff prepare recommendations on licensing decisions, present them to the Commission for consideration during public proceedings and subsequently administer the Commission's decisions.

The four major branches of the CNSC staff are: Regulatory Operations Branch (ROB), Technical Support Branch (TSB), Regulatory Affairs Branch (RAB) and Corporate Services Branch (CSB).

ROB is structured around the diverse range of nuclear facilities and activities in Canada and their characteristic risk profiles. This branch is responsible for the licensing and certification as well as regulation of nuclear power plants, uranium mines and mills, uranium fuel fabricating and processing facilities, waste management facilities, nuclear substances processing and transport and industrial and medical applications, in accordance with the requirements of the NSCA and the associated regulations. ROB comprises the four directorates:

- *Directorate of Power Reactor Regulations (DPRR) provides leadership and expertise in the regulation of the four Canadian nuclear power plants. Specifically, DPRR is mandated to develop, implement and maintain a power reactor regulatory oversight program.*
- *Directorate of Nuclear Cycle and Facilities Regulation (DNCFR) provides leadership and expertise in the regulation, licensing and compliance of uranium mining and processing facilities, nuclear substance processing facilities, waste management facilities, non-power reactors and research reactors. This directorate is responsible for the regulation of 75-80 facilities.*
- *Directorate of Nuclear Substance Regulation (DNSR) provides leadership and expertise in regulation and licensing compliance areas to 1) regulate the production, possession, transport and use of nuclear substances, radiation devices and prescribed equipment and 2) regulate particle accelerators, Class II nuclear facilities and Class II prescribed equipment. DNSR is responsible for the regulatory oversight of more than 2000 licensees.*
- *Directorate of Regulatory Improvement and Major Projects Management (DRIMPM) is responsible for managing the licensing of new nuclear reactors, implementing the CNSC's management system, managing the planning and performance process for the ROB and Technical Support Branch and coordinating cross-cutting corporate improvement initiatives under the Harmonized Plan Program.*

The CNSC uses an internal Technical and Scientific Organization (TSO) model (IAEA TECDOC 1835) where the majority of the scientific support is provided by TSB. This branch oversees much of the detailed technical analyses in direct support of ROB. TSB provides specialized expertise in the areas of nuclear science and engineering, safety analysis, safety management, human factors, personnel training and certification, environmental and radiation protection, security,

nuclear emergency management, safeguards and nuclear non-proliferation. TSB includes the following directorates:

- *Directorate of Assessment and Analysis (DAA) provides regulatory leadership and expertise in the fields of chemistry, fuel, physics and electrical, materials, mechanical, metallurgical, nuclear, civil/structural and systems engineering; robustness, vulnerability design, and systems reliability engineering; deterministic safety analysis and probabilistic safety assessment; and cyber security.*
- *Directorate of Environmental and Radiation Protection and Assessment (DERPA) provides leadership and technical expertise in environmental assessment, geosciences, radiation protection, environmental protection, and laboratory services (which are at the disposal of all the regulatory programs and help to support regulatory oversight and decision-making). DERPA is also accountable for the licensing of dosimetry services.*
- *Directorate of Safety Management (DSM) provides regulatory leadership and expertise in the areas of human and organizational performance, management systems, training program evaluation, and personnel certification and examination. This directorate is also accountable for the certification of nuclear power plants and of other Class 1A certified positions, as well as certification of exposure device operators.*
- *Directorate of Security and Safeguards (DSS) provides leadership and technical expertise in developing, implementing and maintaining corporate programs in the fields of security, safeguards, nuclear non-proliferation (including export and import controls) and nuclear emergency management. DSS provides authoritative advice on these matters to the President, the Minister and the Government of Canada.*

Together ROB and TSB are referred to as Operations. Operations annual planning allows management to prioritize work. It identifies deliverables for the upcoming fiscal year and describes how the CNSC expects to deploy resources to achieve those deliverables. The decision as to whether a deliverable or activity is included in the Consolidated Operations Plan takes into account the risk to safety and security, and whether the work will contribute to achievement of CNSC's corporate priorities and strategic planning. The results of the operations plan demonstrates CNSC's risk-informed approached to its organizational structure and resource allocation.

RAB supports the licensing and compliance core business of the CNSC. This branch is responsible for providing strategic direction and implementation of the CNSC's regulatory policy; communications, Indigenous and stakeholder engagement; strategic planning; international relations and Executive Committee services. RAB comprises the following directorates:

- *Regulatory Policy Directorate (RPD) manages the CNSC's regulatory framework and maintains our multi-year Regulatory Framework Plan. RPD also supports CNSC involvement in the Canadian Standards Association (CSA) Group's nuclear standards program, and in the development and review of IAEA documents. RPD also coordinates CNSC participation in federal regulatory reform initiatives and in the community of federal regulators and develops and delivers stakeholder information sessions.*
- *Strategic Communications Directorate (SCD) provides leadership and expertise in the management and continuous improvement of the CNSC's internal and external*

communications. This includes web sites, writing, editing, and translation, as well as CNSC publications and corporate products.

- *Strategic Planning Directorate (SPD) supports CNSC-wide, evidence-based decision making by strengthening management practices and promoting strategic engagement and the continuous improvement of programs.*

CSB is structured and staffed to provide services that are essential to maintaining the effectiveness and efficiency of the CNSC's core business operations. This branch is responsible for policies and programs related to the management of CNSC's finances and administration, human resources, information technology and information management.

- *Finance and Administration Directorate (FAD) provides leadership and expertise with respect to corporate finance, time accounting, cost recovery programs, and financial systems.*
- *Human Resources Directorate (HRD) provides leadership and expertise in the areas of pay and benefits, training, staffing, HR planning, careers, and HR programs.*
- *Information Management and Technology Directorate (IMTD) provides leadership and services related to the strategic management of data, information, and knowledge (CNSC assets), and to the use of associated technology to support CNSC operations.*

Other groups in CNSC's organizational structure include the President's office, the Commission Secretariat, Legal Services and the Office of Audit and Ethics.

The Commission Secretariat supports the Commission by planning its business, publishing notices and decisions for Commission proceedings and offering technical and administrative support to the President and other members. The Secretariat is also the official registrar of Commission documentation.

Legal Services, unlike many federal government departments and agencies, are directly employed by the CNSC, thus ensuring stable, consistent, independent and informed legal advice to the organization that is free of any potential conflict of interest.

An independent Office of Audit and Ethics performs an internal audit function and provides an independent and objective assessment on the CNSC's performance of its regulatory mandate as well as to provide advice on related improvement initiatives.

The CNSC is currently conducting a comprehensive review of all of the CNSC's programs to see if its investments can be further optimized, and if it can be more efficient in its delivery. The strategic review will take place over the next two years. A small team of Directors Generals from branches across the organization has been put together to do this work. This team reports directly to President and the Executive Committee. Executive Committee is a weekly informal roundtable where CNSC Executives and the President share updates on current issues. A key part of this strategic review will be asking employees for ideas on where the CNSC can make changes, improve some aspects of its work or find ways to work even more effectively.

No Analysis

No Rating

***Attachments**, by Megan Tougas-Cooke @ 2019-05-31 11:47:38 AM*

Nuclear Safety and Control Act

Question 3.2

Does the regulatory body perform its functions in a manner that does not compromise its effective independence?

***Answer**, by Megan Tougas-Cooke @ 2019-05-31 11:48:03 AM*

Yes

Finding

The regulatory body performs its functions in a manner that does not compromise its effective independence.

***Response**, by Megan Tougas-Cooke @ 2019-05-31 11:48:28 AM*

CNSC staff response

The CNSC performs its functions in a manner that does not compromise its effective independence through the CNSC's management system and the separation of the Commission tribunal and CNSC staff.

The CNSC's management system consists of a framework of policies, structures, people, programs, processes, practices, technologies, etc., that are put into place to ensure that the CNSC fulfills all tasks required to achieve its mandate safely and consistently. Personnel, equipment and organizational culture, as well as the documented policies and processes, are all elements of the CNSC's organization and are integrated into one coherent management system. The CNSC's management system ensure that responsibilities assigned to the CNSC are properly discharged using core regulatory process and are not based on decision making by individual staff members. Additional information on the CNSC's management system is provided in response to the questions in Module 4 Management System of the Regulatory Body.

The CNSC is an independent regulatory agency and quasi-judicial administrative tribunal that is at arm's length from the government with no ties to the nuclear industry. The CNSC is not part of any government department and reports to Parliament through the Minister of Natural Resources on the Commission's activities under the NSCA.

The tribunal's arm's-length decision-making authority ensures that it remains independent from government, licensees and staff. Under section 19 of the NSCA, the Governor in Council may

issue directives to the Commission on the application of broad policy matters. However, the Governor in Council cannot give direction to the Commission on specific licensing matters. Neither the Minister nor the Governor in Council has a role in Commission regulatory decision-making or the power of appeal. The Commission's decisions are only reviewable by the Federal Court of Canada. The CNSC requires administratively the involvement and support of the Minister of Natural Resources for special initiatives such as making amendments to regulations and requests for funding.

In addition to the information provided in response to QID1, Commission members commit to the highest standards of ethics and conflict-of-interest guidelines and carry out their duties impartially. Members of the Commission must avoid any conflict of interest. Subsection 11(1) of the NSCA states that "a member shall not, directly or indirectly, engage in any activity, have any interest in a business or accept or engage in any office or employment that is inconsistent with the member's duties." A member of the Commission who becomes aware of a conflict of interest must either terminate the conflict or resign from the Commission as per subsection 11(2) of the NSCA. Newly appointed Commission members are provided with a reference manual from the CNSC which includes conflict of interest guidelines for Commission members.

Commission members must conduct themselves in accordance with the principles set out in the Conflict of Interest Act to ensure that proceedings before the Commission are fair and are perceived to be fair by the regulated community and members of the public. This includes ensuring that decisions are made and actions are taken without discrimination, favouritism or self-interest on the part of members.

All Commission members, including the President of the CNSC, are appointed by the Governor in Council and are subject to the Conflict of Interest Act, the Ethical Guidelines and Statutory Standards of Conduct and the Guidelines for the Political Activities of Public Officer Holders.

Licensees and applicants put forward projects regarding an existing or proposed facility or activity. The CNSC's role is to review the licensee's or applicant's proposal based on safety and risk. The Commission tribunal holds public proceedings to receive on record and consider the information it needs to make fair, transparent decisions on the licensing of CNSC-licensed activities. Commission proceedings consist of both Commission (or public) hearings and Commission meetings. Public hearings are the primary opportunity for the public to participate in the licensing process. CNSC staff participate in these hearings to provide independent regulatory recommendations to the Commission based on its review of the proponent's licensing application. The Canadian Nuclear Safety Commission Rules of Procedure outline the public hearing process.

In addition to public hearings, the Commission also holds public meetings. Commission meetings consider a wide range of topics related to the nuclear regulatory process and technical information and, in certain cases, serve as the vehicle for making legislative, policy and administrative decisions on matters of particular or general application. Meeting items may

include subjects such as annual industry regulatory oversight reports, licensee performance reports, technical briefings, event reports and request for approval of regulatory documents. The Canadian Nuclear Safety Commission By-laws outline the Commission meeting process.

To maintain its adjudicative distance from CNSC staff, the Commission communicates with staff only through the Commission Secretariat and through formal Commission proceedings. This separation serves to maintain the Commission's independence.

CNSC staff are required to abide by the Values and Ethics Code for the Public Sector and the CNSC Values and Ethics Code. The CNSC Values and Ethics Code represents CNSC's commitment to the highest ethical standards in delivering on its mandate. The Code identifies core values and expected behaviours, and the principles applied in decisions and actions. The CNSC is committed to the values of:

- *Respect – commits staff to valuing the rights, responsibilities and contribution of all stakeholders*
- *Integrity – commits staff to acting with honesty in all decisions and actions*
- *Service – commits staff to serving Canadians and the government to the best of their abilities*
- *Excellence – commits staff to being dedicated, competent and professional*
- *Responsibility – commits staff to using public resources responsibly in a manner that maintains public trust and confidence in the CNSC*
- *Safety – commits staff to recognizing the importance of safety as an overriding consideration in daily work*

Safety is the overriding priority and CNSC supports a strong regulatory safety culture by:

- *making accountability for safety clear*
- *taking appropriate measures to ensure health and safety in the workplace*
- *encouraging an open and collaborative work environment*
- *seeking and acting on feedback, lessons learned and best practices*

Additionally, information on the CNSC's regulatory safety culture is provided in response to questions in Module 4 Management System of the Regulatory Body.

As per the CNSC Values and Ethics Code, CNSC staff are responsible for avoiding real, potential or apparent conflicts of interest between their private interests and work-related duties and are to resolve such issues in favour of the public interest.

The Conflict of Interest and Post-employment Policy along with the NSCA, the Values and Ethics Code for the Public Sector, the CNSC Values and Ethics Code and the CNSC Directive on Reporting and Managing Financial Conflicts of Interest form the conditions of employment with the CNSC.

As well, the CNSC encourages debate on scientific and technical issues. When differences of opinion occur, there are various policies and procedures in place that CNSC staff can use. For more information refer to the response to SQID 3.6.1 of this module.

No Analysis

No Rating

***Attachments**, by Megan Tougas-Cooke @ 2019-07-03 1:43:57 PM*

CNSC By-Laws

CNSC Conflict of Interest and Post-Employment Policy

CNSC Directive on Reporting and Managing Financial Conflicts of Interest

CNSC Rules of Procedure

CNSC Values and Ethics Code

Conflict of Interest Act

Ethics Code for the Public Sector

Nuclear Safety and Control Act

Subsidiary Question 3.2.1

How do the regulatory body rules for recruitment and training of staff maintain the effective independence of the regulatory body?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-05-31 1:16:41 PM*

CNSC staff response

Subsection 16(1) of the NSCA states that "the Commission may, notwithstanding any other Act of Parliament, appoint and employ such professional, scientific, technical or other officers or employees as it considers necessary for the purposes of this Act an may establish the terms and conditions of their employment and, in consultation with the Treasury Board, fix their remuneration." Under the Financial Administration Act, the Commission is considered as a separate agency of the core federal public service and therefore manages its own human resources. Paragraph 11(1)(c) of the Financial Administration Act makes the President of the CNSC the deputy head of a separate agency and provides the President with certain powers over public administration.

The CNSC's Staffing Policy establishes the CNSC's staffing framework for all staffing activities and processes. The values of transparency and fairness apply in all staffing processes. The Statement of Qualifications clearly identifies the measurable qualifications and other requirements that are needed to successfully perform the duties and responsibilities of the position being staffed. As per section 5.3 of the CNSC's Staffing Policy to ensure a fair staffing process "Managers must adhere to the CNSC's Values and Ethics Code and the CNSC's Conflict of Interest and Post-Employment Policy. Managers and assessment board members must withdraw from staffing activities when their personal interests create a real, potential or perceived conflict of interest."

As stated in response to QID3.2, once employed, the CNSC Conflict of Interest and Post-employment Policy is a condition of employment with the CNSC. Section 5.5 of the CNSC's Conflict of Interest Policy states "New and regular employees who were employed by licensees and contractors are required to inform their supervisor of their employment history. Depending on the context, they may be asked to disqualify themselves from participating for a period of time in any matter associated with these entities." Section 8 of the Conflict of Interest and Post-employment Policy outlines the duties and responsibilities of both the employee and the CNSC with respect conflict of interest.

Additionally, under the CNSC Conflict of Interest and Post-employment Policy and the CNSC Directive on Reporting and Managing Financial Conflicts of Interest, employees must on an annual basis review and declare assets, liabilities, gifts and benefits as well as outside activities that may place them in a real, apparent or potential conflict of interest.

All new employees, including those hired from applicants and licensees, are required to take the mandatory CNSC New Employee Orientation Session. This two-day training course provides an overview of the CNSC's role, mission, values, structure, governance, statutory and regulatory framework, licensing and compliance processes. New employees are also required to complete the online orientation module entitled "Introduction to the CNSC." This module reinforces the vision, mission, mandate and structure of the CNSC to new employees and tests their knowledge.

Information on the CNSC's mission, mandate, governance and regulatory framework is available on the CNSC's intranet (BORIS) through resources such as the Orientation Session and the CNSC's Management System Manual.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-24 11:12:37 AM*

CNSC Conflict of Interest and Post-Employment Policy

CNSC Directive on Reporting and Managing Financial Conflicts of Interest

CNSC Staffing Policy

CNSC Values and Ethics Code

Financial Administration Act

Nuclear Safety and Control Act

Subsidiary Question 3.2.2

How does the regulatory body ensure, in its liaison with interested parties, it has a clear separation from organizations or bodies that have been assigned responsibilities for facilities or activities or for their promotion?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-24 11:13:27 AM*

CNSC staff response

The NSCA is distinct legislation for the regulation of nuclear activities and the separation of functions of the regulatory body from organizations that promote or use nuclear energy. The NSCA establishes the CNSC as an independent agency of the Government of Canada and clearly outlines the objects of the CNSC. The Commission's mandate does not include regulating to meet political or economic objectives.

As stated in QID3.2, the CNSC is an independent regulatory agency and quasi-judicial administrative tribunal that is at arm's length from the government with no ties to the nuclear industry. The CNSC is not part of any government department and reports to Parliament through the Minister of Natural Resources on the Commission's activities under the NSCA. The tribunal's arm's-length decision-making authority ensures that it remains independent from government, licensees and staff.

As stated in response to SQID1.3.3 in Module 1 Responsibilities and Functions of the Government, when the NSCA was first published as the replacement for the Atomic Energy Control Act, its summary noted:

While the existing Act encompasses both the regulatory and developmental aspects of nuclear activities, this enactment disconnects the two functions and provides a distinct identity to the regulatory agency. It replaces the Atomic Energy Control Board with the Canadian Nuclear Safety Commission, underlining its separate role from that of Atomic Energy of Canada Ltd., the federal research, development and marketing organization for nuclear energy.

The enablement of nuclear science and technology and the managing of federal radioactive waste liabilities is the responsibility of Atomic Energy of Canada Limited (AECL), which is established as a Crown corporation under the Canada Corporations Act (and continued in 1977 under the provisions of the Canada Business Corporations Act), pursuant to the authority and powers of the Minister of Natural Resources under the Nuclear Energy Act.

In 2015, the restructuring of AECL was completed including the creation of the Canadian Nuclear Laboratories (CNL). AECL and CNL operate under a government-owned, contractor operated (GoCo) model. AECL is a Crown corporation that oversees CNL's activities in two main areas: decommissioning and waste management and nuclear laboratory science and technology. CNL is a private-sector company responsible for the day-to-day management and operation of all of AECL's sites, facilities and assets. The Canadian National Report for the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management – Sixth Report provides a more in-depth description of the evolution of the AECL and CNL. This entity is licensed by the CNSC as any other licensee.

The responses to QID3.2 and QID3.2.1 outline how the CNSC ensures clear separation between the Commission tribunal, CNSC staff, licensees and applicants.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-24 11:14:16 AM*

Canada Business Corporations Act

Joint Convention - Sixth Report Oct 2017

Nuclear Energy Act

Nuclear Safety and Control Act

Subsidiary Question 3.2.3

How does the regulatory body exercise its authority to intervene in connection with any facilities or activities that present significant radiation risks?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-05-31 1:33:35 PM*

CNSC staff response

As per section 9 of the NSCA, the CNSC regulates to prevent unreasonable risk to the environment and the health and safety of persons and to national security.

As outlined in response to SQID 1.3.2 of Module 1 Responsibilities and Functions of the Regulatory Body, the CNSC is funded from two sources: 1) parliamentary appropriation and 2) fees paid by applicants, licensees and other special project sponsors in accordance with the CNSC Revenue Spending Authority approved by Parliament and applied in accordance with the CNSC's Cost Recovery Fees Regulations. The Commission has the statutory authority to prescribe and charge fees for the services, products and information that it provides under the NSCA, and the fees may not exceed the costs to the CNSC of its regulatory activities.

For situations deemed to be serious and considered to pose an imminent radiological hazard to workers, the public or the environment, the CNSC has the authority and will take whatever actions are necessary to restore an adequate level of safety. The CNSC uses a graded approach to enforcement that is commensurate with the risk or regulatory significance of the violation. The CNSC does not take enforcement action to punish but to encourage compliance, maintain safety and deter further non-compliance.

Further details to the CNSC's approach to enforcement are provided in Module 8 on Enforcement.

For less serious findings and as part of promotion, the CNSC will make verbal requests. For more serious findings, a letter or report are issued requesting action with deadlines. This can be escalated to a request under subsection 12(2) of the General Nuclear Safety and Control Regulations (GNSCR):

Every licensee who receives a request from the Commission or a person who is authorized by the Commission for the purpose of this subsection, to conduct a test, analysis, inventory or inspection in respect of the licensed activity or to review or to modify a design, to modify equipment, to modify procedures or to install a new system or new equipment shall file, within the time specified in the request, a report with the Commission that contains the following information:

- *(a) confirmation that the request will or will not be carried out or will be carried out in part;*
- *(b) any action that the licensee has taken to carry out the request or any part of it;*
- *(c) any reasons why the request or any part of it will not be carried out;*
- *(d) any proposed alternative means to achieve the objectives of the request; and*
- *(e) any proposed alternative period within which the licensee proposes to carry out the request.*

In cases of significant health and safety risk, orders may be issued by inspectors under section 35 of the NSCA or by designated officers (DOs) under paragraph 37(2)(f) of the NSCA. As per section 35, inspectors have the power to issues orders considered necessary up to and including stop work orders "to protect the environment or the health or safety of persons or to maintain national security or compliance with international obligations to which Canada has agreed." Further, pursuant to section 47 of the NSCA, the Commission has the power to issue emergency orders. Any decision or order of the Commission may, for the purposes of enforcement, be made a rule or decree of the Federal Court of Canada and enforced as such, if the Commission files its decision or order with the Court (subsection 20(8) and (9) of the NSCA).

Section 25 of the NSCA also allows the Commission to amend, suspend, replace or revoke licenses on its own motion under circumstances that are prescribed in paragraphs 8(2)(a) to (h) of the GNSCR – these circumstances include situations involving unreasonable risk to the health and safety of persons or the environment.

Persons who do not comply with the NSCA and its regulations or licences, may incur an administrative monetary penalty (AMP) in addition to other enforcement measures available to the CNSC. Subsections 65.01 through 65.21 of the NSCA establish the Commission's powers with respect to the AMP program, rules about violations, the review process and recovery of penalties. The Administrative Monetary Penalties Regulations provide a schedule of violations that are subject to an AMP and further regulatory requirements and details of enforcement.

Options for prosecution fall under a range of regulatory offence provisions set out in sections 48 to 50 of the NSCA, which can lead to fines and imprisonment.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-24 11:20:51 AM*

Administrative Monetary Penalties Regulations

CNSC Cost Recovery Fees Regulations

General Nuclear Safety and Control Regulations

Nuclear Safety and Control Act

Question 3.3

Does the regulatory body employ sufficient number of qualified and competent staff, commensurate with the nature and number of facilities and activities to be regulated, to carry out its functions and discharge its responsibilities?

***Answer**, by Megan Tougas-Cooke @ 2019-05-31 1:35:03 PM*

Yes

Finding

The regulatory body employs a sufficient number of qualified and competent staff, commensurate with the nature and number of facilities and activities to be regulated, to carry out its functions and discharge its responsibilities.

***Response**, by Megan Tougas-Cooke @ 2019-05-31 1:35:38 PM*

CNSC staff response

Pursuant to section 16 of the NSCA, the Commission has the authority to appoint and employ the professional, scientific, technical and other staff the Commission considers necessary to carry out its responsibilities under the Act, set their terms and conditions of employment and fix their remuneration in consultation with the Treasury Board. The CNSC's status as a separate

employer under the Financial Administration Act provides the Commission with flexibility to respond to changes in the labour force to ensure it has the people it needs to carry out its work.

The number of staff and financial resources dedicated to each of the sector-specific regulatory divisions and directorates at the CNSC is a direct and proportional reflection of the extent, nature and complexity of the nuclear facilities and activities in Canada. The relative size of the various organizational units in the core operations and the resource allocation is shaped by the review of strategic and operational plans including a risk informed assessment of regulatory oversight requirements. Core operations refers to staff in ROB and TSB of the CNSC. The response to QID1 describes these two organizational units of the CNSC in greater detail.

At the end of fiscal year 2018, CNSC employed 981 staff across the four major branches and the other groups including the President's office, the Commission Secretariat, Legal Services and the Office of Audit and Ethics. 83% of employees in Operations (ROB and TSB) occupying mid- and senior-level positions have degrees in nuclear engineering, chemistry, physics, environmental, and radiation science fields. There are 117 trained inspectors and 31 inspectors-in-training at the CNSC, as of July 4, 2019.

The CNSC has identified 11 organizational capabilities, which are high-level activities that the CNSC must be capable of delivering on to achieve its mandate, now and in the future. The organizational capabilities are as follows:

- *licensing and certification*
- *review and assessment*
- *compliance*
- *regulatory framework management*
- *emergency preparedness and response*
- *international obligations*
- *dissemination and outreach*
- *regulatory program management*
- *administration of tribunal*
- *business management*
- *generation of scientific and technical knowledge*

CNSC's Staffing Policy was developed to ensure the CNSC maximizes its ability to attract, develop and retain talent. One of CNSC's strategic priorities is building a competent and agile organization that enables the delivery of our mandate in a dynamic environment. In order to achieve this goal, the following guiding principles underpin CNSC's Staffing Policy:

- *Staffing decisions take into account all relevant information and possible risks, including business needs, workforce planning and organizational priorities, while balancing the values of fairness, transparency and access with efficiency and flexibility.*
- *Flexibility – or the use of discretion – requires that delegated managers inspire confidence and exercise their staffing authorities diligently.*

- *Innovative and effective staffing practices and approaches are considered and adapted to meet organizational needs.*
- *A strong partnership between managers and human resources professionals is key to effective decision making.*

All of the positions at the CNSC are described in a Work Description (WD), which set out the duties and activities of the position, and the required competencies related to education, abilities, skills and knowledge needed to carry out those duties and activities.

Article 18 of the Collective Agreement between Canadian Nuclear Safety Commission and the Professional Institute of the Public Service of Canada outlines the terms and conditions of CNSC staff employment with respect to career development and training. Under the agreement, managers and employees shall discuss career and professional development on an annual basis. Additionally, staff shall have the opportunity to attend courses, training sessions, conferences and seminars.

All managers are also required to evaluate, on an ongoing basis, the competencies and performance of all staff that report to them. Managers are required to complete a performance evaluation on a bi-annual basis and ensure that Individual Learning Plans are developed and maintained to address any existing development needs and to support career progression.

All managers have a Performance Management Contract that outlines their commitments stemming from CNSC's Strategic Planning Framework (SPF). The SPF defines the CNSC's goals for the coming years and outlines key priorities and initiatives to enable the CNSC to achieve these goals. The Executive Committee (EC) reviews management performance twice a year based on these commitments and on the key leadership competencies. EC is composed of the President and Chief Executive Officer, Executive Vice-President and Chief Regulatory Officer, all Vice-Presidents, Senior General Counsel and the Commission Secretary. Members of EC meet weekly, on an informal basis, in order to share information and verbally update each other on issues of interest. Each member is responsible for any input, decisions taken and follow-up in their area of responsibility.

The CNSC has a Learning and Development Program to help develop and maintain competencies of staff. The program includes basic mandatory and recommended training. Staff training is documented in their Individual Learning Plans. The CNSC's web-based Learning Management System (LMS) also provides information on related learning opportunities and activities and provides a convenient means for registering for those activities. The LMS also allows staff and their management to keep track of training taken. The CNSC also has specific learning programs by job types, such as Leadership Development for managers and the Inspector Training and Qualification Program (ITQP) for CNSC inspectors.

In 2009, the CNSC established the ITQP to ensure that inspectors possess the necessary qualifications and demonstrate a high level of competencies required to conduct inspections. The program is a robust, structured and systematic approach to train, qualify and assess CNSC

inspectors across all CNSC directorates and divisions responsible for conducting inspections under the Act and to maintain their qualifications. Further, the program was developed with the intent to: provide inspectors with the skills and knowledge required to perform their duties; ensure inspectors possess the necessary qualifications and demonstrate the competencies required to conduct inspections; provide support, supervision and coaching for new inspectors; and support the mandate of the CNSC.

The following initiatives are underway to enhance core competencies of CNSC staff:

- *The CNSC Capability for Nuclear Safety Framework is an ongoing initiative to identify key capabilities and ensure that the CNSC successfully maintains these necessary capabilities to effectively and efficiently regulate nuclear safety in the changing national and international environment to fulfill its mandate. Through this initiative, a capability catalogue was created for all technical and operational directorates that identifies required technical expertise needed to carry out tasks related to activities that contribute directly to the CNSC's mandate.*
- *Workforce planning is a business-driven and management-owned process that creates a roadmap to address workforce risks and opportunities. Deliberate and regular review of the CNSC's workforce plans improves management decision making.*
- *The CNSC has also implemented a Knowledge Management Initiative (KM), which focuses on enhancing measures to capture, share, and build knowledge through people, processes, and technology to maintain the organization's capacity and capability to deliver its mandate now and in the future. A fulsome description of this initiative is provided in SQID 1.3.1.*
- *The CNSC is currently developing a Regulatory Operations Training Program that will help support a consistent approach to the application of CNSC licensing, certification, compliance and regulatory framework processes, by providing staff in core operations with the tools, knowledge and skills required to perform work effectively and consistently. The program will help strengthen regulatory programs within the CNSC. It will enable a more agile and competent workforce by supporting clarity in expectations for managing regulatory programs and will support the CNSC's management system and its application.*

The CNSC is currently conducting a comprehensive review of all of the CNSC's programs to see if its investments can be further optimized, and if it can be more efficient in its delivery. The strategic review will take place over the next two years. A small team of Directors Generals from branches across the organization has been put together to do this work. This team reports directly to President and the Executive Committee. Executive Committee is a weekly informal roundtable where CNSC Executives and the President share updates on current issues. A key part of this strategic review will be asking employees for ideas on where the CNSC can make changes, improve some aspects of its work or find ways to work even more effectively.

No Analysis

No Rating

***Attachments**, by Megan Tougas-Cooke @ 2019-07-02 9:48:17 AM*

CNSC Knowledge Management Policy

CNSC Staffing Policy

Example Work Description Form

Financial Administration Act

Inspection Training and Qualification Program

Organizational Capabilities

Subsidiary Question 3.3.1

What is the strategy to compensate for the departure of qualified staff?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-24 11:25:27 AM*

CNSC staff response

The CNSC has initiated a number of actions centred on building capacity and capability through the design of the organization, the recruitment and renewal of the workforce, learning and leadership development programs and employee engagement and retention activities.

The CNSC has identified hiring young professionals as an integral part of CNSC's efforts to address challenges due to the departure of qualified staff. In 2015, CNSC undertook a significant recruitment campaign to attract and hire more than 50 recent science and engineering graduates – approximately 5% of the CNSC's total workforce. The new graduates were hired into two streams of work: Program Professionals and Science and Technology. Recognizing that new graduates hired into the organization generally do not have previous work experience, all new graduates were encouraged to rotate to another area of the organization or participate in a cross-divisional project to further develop their knowledge and understanding of the nuclear industry. Training plans were established and destination positions identified to ensure that the new graduates were able to participate in a selection process to secure continuous employment.

The CNSC also recruits experienced staff from industry or the private sector on an as-needed basis to avoid gaps in technical competency. As outlined in QID3.2 and SQID3.2.1 any person hired by the CNSC would have to meet the CNSC's conditions of employment including the CNSC Values and Ethics Code and the Conflict of Interest and Post-Employment Policy. Additionally, the CNSC's Alumni Program as described in response to SQID3.4.1 is another approach that the CNSC uses to compensate for the departure of senior, qualified staff. The program provides the

opportunity for alumni to pass along their knowledge through mentoring or coaching of other employees.

The CNSC has also implemented a KM Initiative. As part of this initiative, the CNSC has a 3-year KM plan and launched a Knowledge Management Policy in Fall 2018. This policy provides high-level direction and desired outcomes for knowledge management at the CNSC, and it reinforces that everyone has a role to play. The CNSC also has an in-house Effective Knowledge Transfer course which is geared both towards those who will be retiring and are expected to transfer their knowledge to junior staff, as well as those junior staff who are receiving knowledge. The course teaches employees techniques on how to transfer their knowledge to others.

In May 2017, the CNSC initiated a findability campaign to complement the CNSC's KM Initiative. The objective of this campaign is to improve the CNSC's public folder within its electronic document and records management system (EDRMS). This initiative is meant to facilitate the storing and sharing of key CNSC knowledge.

CNSC's Mobility Directive maximizes the CNSC's organizational flexibility and allows the CNSC to meet changing operational needs. This directive provides senior management with a staffing mechanism to reassign management and non-management staff to ensure the CNSC has the people with the required skills when and where needed to address operational needs.

CNSC has a Career Partnership Initiative which strongly encourage staff to gain diversified work experience across the organization. This can be gained in various forms: lateral movement or assignments to another division or directorate, participation in a cross-divisional project and micro-missions. Micro-missions are short-term, voluntary and task-based opportunities for employees interested in gaining experiences, building their skills and growing their careers outside of their daily work activities. Managers benefit from micro-missions by obtaining timely support for a project that requires specific knowledge or skill set.

To complement these initiatives the CNSC has more than 100 in-house courses on regulatory and technical topics offered each year. Additionally, the Canada School of Public Service offers an abundance of learning activities for federal government employees that allow employees to pursue the courses they need for their professional development

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-07-02 9:42:25 AM*

CNSC Conflict of Interest and Post-Employment Policy

CNSC Knowledge Management Policy

CNSC Mobility Directive

CNSC Values and Ethics Code

Question 3.4

Does the regulatory body have adequate arrangements for obtaining technical or other expert professional advice or services as necessary, in support of its regulatory functions?

***Answer**, by Megan Tougas-Cooke @ 2019-05-31 1:57:11 PM*

Yes

Finding

The regulatory body has adequate arrangements for obtaining technical or other expert professional advice or services in support of its regulatory functions.

***Response**, by Megan Tougas-Cooke @ 2019-05-31 1:57:16 PM*

CNSC staff response

As outlined in response to QID3.1, the CNSC uses an internal TSO model (IAEA TECDOC 1835) where the majority of the scientific support is provided by TSB. This branch oversees much of the detailed technical analyses in direct support of ROB. TSB provides specialized expertise in the areas of nuclear science and engineering, safety analysis, safety management, human factors, personnel training and certification, environmental and radiation protection, security, nuclear emergency management, safeguards and nuclear non-proliferation.

The CNSC integrates the best-available science in its decision making. As such, there are arrangements in place for obtaining technical and other expert professional advice or services, as necessary, in support of its regulatory functions if they are not available within the CNSC.

Pursuant to section 17 of the NSCA, the CNSC may "enter into contracts for the services of any persons having technical or specialized knowledge of any matter relating to the work of the Commission, to advise and assist the Commission in the exercise or performance of any of its powers, duties or functions under this Act." Additionally, under paragraph 21(1)(b), "the Commission may, in order to attain its objects, establish and maintain programs to provide the Commission with scientific, technical and other advice and information."

As stated in response to QID1 and QID8.3 in Module 3 Responsibilities and Functions of the Government, the CNSC maintains a Research and Support Program, which is designed to provide CNSC staff with access to external independent advice, expertise and information. The program funds agreements with the private sector, academic institutions, and governmental/civil society groups, in Canada and internationally.

The main objectives of the CNSC's Research and Support Program are to:

- *support timely, science-based regulatory judgments and decisions*
- *assist in the identification of problems that may give rise to health, safety, security or environmental hazards*
- *develop tools and techniques to address potential issues*
- *aid in the development of safety standards*

Research projects are spread across every aspect of the Canadian nuclear industry that is regulated by the CNSC including nuclear power plants, waste management facilities, nuclear research facilities, etc.

The CNSC uses the outcomes of these research activities to help the CNSC understand and address new or emerging safety issues, gain third-party perspectives on nuclear science and share scientific knowledge with the nuclear industry and the public at large. This research helps supports the CNSC's mandate to disseminate objective scientific, technical and regulatory information to the public about the activities of the Commission and the industry that it regulates. The process by which CNSC staff may enter into external contracts is outlined in response to QID3.4.1.

The CNSC provides a comprehensive list of all relevant scientific and technical information on its external website and can be searched according to the CNSC's 14 safety and control areas. The CNSC also reports on key research activities in its annual Science of Safety research reports. These reports are part of the CNSC's ongoing effort to ensure that members of the public have access to the science that informs the CNSC's work.

Under paragraph 21(1)(a) of the NSCA, "the Commission may, in order to attain its objects, enter into arrangements, including an arrangement to provide training, with any person, any department or agency of the Government of Canada or of a province, any regulatory agency or department of a foreign government or any international agency." At the international and domestic level, these arrangements include administrative arrangements (AA), letters of agreement (LOA), letters of understanding (LOU), memoranda of agreement (MOA), and memoranda of understanding (MOU).

For example, the CNSC may rely on the expertise of other federal departments and agencies to fulfill its mandate. A complete list of the CNSC's federal and provincial arrangements and details of the MOUs can be found on the CNSC's external webpage. The following are three examples of arrangements that the CNSC has in place with external agencies:

- *MOU with the Federal Department of Fisheries and Oceans Canada to coordinate regulatory reviews and decision-making for nuclear projects on matters related to fish and fish habitat.*
- *MOU with Health Canada to cooperate and exchange information on areas related to occupational and public health matters and the health risks associated with the development, production and use of nuclear energy and nuclear substances and radiation-emitting medical devices.*

- *Administrative Agreement with the province of Saskatchewan that covers the province's ability to ensure compliance with the CNSC on the regulation of health, safety and the environment at Saskatchewan uranium mines and mills.*

Such arrangements provide a framework for bilateral cooperation, assurances regarding the security of information exchanged, as well as clarity regarding regulatory responsibilities.

No Analysis

No Rating

***Attachments**, by Megan Tougas-Cooke @ 2019-06-24 11:27:57 AM*

Memorandum of Understanding between the CNSC and Fisheries and Oceans Canada

Memorandum of Understanding between the CNSC and Health Canada

Memorandum of Understanding between the CNSC and the Province of Saskatchewan

Nuclear Safety and Control Act

Science of Safety 2016-2017 Report

Subsidiary Question 3.4.1

How does the regulatory body maintain an adequate core competence to make informed decisions on the use of advice and assistance provided by external parties and to retain responsibility for the regulatory actions?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-24 11:28:19 AM*

CNSC staff response

As described in response to QID3.1, the CNSC's internal TSO, TSB, provides technical and specialist advice to ROB so they can make informed regulatory decisions. ROB is ultimately accountable for regulatory actions. Although TSB is the main source of technical expertise, there are other CNSC divisions outside of TSB (i.e. ROB, RAB, CSB) that have unique specialist capability.

TSB's mandate is to provide technical leadership and specialized expertise in the areas of nuclear science and engineering, safety analysis, safety management, human factors, personnel training and certification, environmental and radiation protection, security, nuclear emergency management, safeguards, and nuclear non-proliferation. CNSC staff that work in the TSB report to the Vice President and Chief Science Officer who has the overall responsibility for ensuring that science and evidence-based information is used in making regulatory decisions. This is

accomplished through the implementation and adherence to CNSC's Policy on Science in a Regulatory Environment and its associated processes.

To be an effective regulator the CNSC must maintain adequate core competencies. In general, managers are responsible for ensuring their staff are qualified to perform their duties. This is done, initially, through the hiring process which requires that the candidate be assessed against a statement of qualifications. Once hired, the candidate's competencies i.e., knowledge, abilities and behaviours are maintained and continuously improved through the CNSC's Learning and Development Program. Implementation of this program varies in depth and scope across CNSC divisions but includes basic mandatory and recommended training, Individual Learning Plans and some formal specific position training such as the IQTP. A number of initiatives are underway to enhance core competencies and include, Capability for Nuclear Safety, Knowledge Management, Workforce Planning and the Regulatory Operations Training Program. Refer to CNSC staff response to QID3.3 for more information on these initiatives.

The CNSC's Alumni Program helps the CNSC harness the unique knowledge and technical expertise that many CNSC employees have developed over the years. The objective of the program is to allow hiring managers to retain the services of retirees who may possess certain specialized skills, technical knowledge or important corporate memory. The program provides the opportunity for alumni to pass this knowledge through mentoring or coaching of other employees. Typically, these individuals are engaged to address periods of high workload, unexpected absences or to undertake short-term projects.

As per subsection 17(1) of the NSCA, "The Commission may enter into contracts for the services of any persons having technical or specialized knowledge of any matter relating to the work of the Commission, to advise and assist the Commission in the exercise or performance of any of its powers, duties or functions under this Act, and those persons shall receive such pay for their services and such expenses are fixed by the Commission." Subsection 12(3) permits the President to sub-delegate this authority to officers or employees of the Commission.

CNSC staff may enter into external contracts to obtain the advice and assistance of external parties for supplemental information, independent opinion or verification or specialized research. The process to procure contracts follows Government of Canada procurement regulations and processes as referred to in the Treasury Board of Canada Secretariat's Contracting Policy. Each contract is assigned to a CNSC staff member who acts as Project Authority and is responsible for all matters related to the technical requirements (Appendix B of the CNSC's Contracting Policy). The Project Authority should have the technical expertise required to make informed decisions on the advice or assistance obtained through the contracting process.

As described in QID3.4, the Commission may also enter into arrangements with external departments and agencies for support in fulfilling its mandate. Ultimately, as per the CNSC's regulatory philosophy as outlined in REGDOC-3.5.3, Regulatory Fundamentals, the CNSC is

accountable to Parliament and to Canadians for assuring that licensees are properly discharging their responsibilities for safety.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-24 11:29:15 AM*

CNSC Contracting Policy

Nuclear Safety and Control Act

Policy on Science in a Regulatory Environment

REGDOC-3.5.3 Regulatory Fundamentals

Question 3.5

Has the regulatory body established formal and informal mechanisms of communication with authorized parties on all safety related issues?

***Answer**, by Megan Tougas-Cooke @ 2019-05-31 2:07:17 PM*

Yes

Finding

The regulatory body has established formal and informal mechanisms of communication with authorized parties on all safety related issues.

***Response**, by Megan Tougas-Cooke @ 2019-05-31 2:07:34 PM*

CNSC staff response

The CNSC has established formal and informal mechanisms of communication with authorized parties on all safety and regulatory related issues.

Formally, the Commission proceeding process, as described in QID3.2, allows members of the Commission to engage with the applicants/licensees, CNSC staff and members of the public on a wide range of issues. At public hearings, the Commission hears information pertaining to the making of licensing decisions. Public meetings are used to brief the Commission about significant developments that affect the nuclear regulatory process, or to ask the Commission to make administrative decisions or deal with administrative issues.

These Commission proceedings highlight the independence, openness and transparency of the decision-making process of the CNSC. The Canadian Nuclear Safety Commission Rules of

Procedure and the Canadian Nuclear Safety Commission By-laws govern the Commission hearing and meeting processes, respectively.

Under subsections 37(2) and 65.01(b) of the NSCA, the Commission may authorize DOs to carry out specific authorities. These authorities include – but are not limited to – lower-risk licensing decisions, certification decisions, making orders and making decisions on inspector's orders. Because of the statutory powers held by a DO, a decision of a DO is a decision of the Commission. The CNSC has established a program to assist DOs in carrying out their authorities. The Commission Secretariat and ROB collaborate in the implementation of the DO Program.

Another formal mechanism of communication the CNSC uses includes the permanent location of staff on site at major facilities (all power reactor sites and Chalk River Laboratories). The location of these site offices facilitates regular, face-to-face interaction between the CNSC and its key highest-risk licensees. Site staff often attend and observe licensee meetings, keep the licensee informed of regulatory activities, and solicit the assistance and cooperation of licensee staff in meeting regulatory requirements.

CNSC also has five regional site offices located across the country. The CNSC Central Regional Office in Ottawa is the location of the CNSC's main headquarters. The majority of CNSC's staff is located at the Central Regional office. In addition, this is where Commission proceedings are primarily held. Three of these regional offices are maintained for regulatory oversight of smaller licensees such as those for radiation sources. There is an also a regional office in Saskatoon for the CNSC's Uranium Mines and Mills Division. This office allows staff to be in closer proximity with the licensees of uranium mines and mills located in northern Saskatchewan as well as other stakeholders such as Indigenous communities who may have an interest in the operation of these facilities.

Communication protocols established by the CNSC allow for the open and relatively informal dialogue and discussion between subject matter experts of the CNSC and the licensee/applicant. Communication between staff and the licensee is controlled through an identified Single Point of Contact (SPOC) approach. The SPOC is responsible for ensuring the communication protocol is followed. The licensing directors are also responsible for implementing and maintaining the established protocol. For example, the CNSC Process document How to Establish Communication Protocol between CNSC and Licensees or Applicants, under the CNSC's Management System, describes the process for establishing communication protocols for nuclear fuel cycle and processing facilities. The document outlines the communications approach between CNSC staff and licensees or applicants for those cases where the CNSC-licensee relationship is sufficiently complex to warrant such a formal approach.

The purpose of formal communication is to document in an acceptable and agreed upon written or electronic format, any official regulatory requirements or positions that the CNSC is imposing on licensees, and equally, to document the licensees official response to such requirements. This method ensures that errors of omission, misunderstandings, and other communications

fallibilities are more easily caught, tracked, and recorded. Formal communications should be linked to action tracking databases for ease of compliance monitoring and verification.

The use of a formal protocol is not necessary for all CNSC-licensee interactions. This process also defines what is considered informal communication. It is a normal and accepted practice that CNSC staff and licensee's staff interact on a regular and informal basis. This communication can take place face to face, by telephone, or through any other electronic or paper medium. The basis of this communication is normally to clarify technical points that may relate to administrative, licensing or compliance issues. No regulatory positions or licensee commitments are communicated in this manner.

CNSC also engages in outreach with licensees including:

- *meetings with licensees on non-licensee specific issues (e.g., quarterly meetings with the Canadian Nuclear Association or the Cost Recovery Advisory Group)*
- *presentations by the president, executives and staff at various seminars and stakeholder meetings*
- *participation in technical working groups*
- *participation in international and national conferences and events*

These outreach activities provide additional opportunities for CNSC staff and licensees to engage on safety-related issues and topics.

CNSC staff and/or management attend and/or participate in industry, standard group associations meetings and other meeting fora that allow for dialogue between the industry and the CNSC on a variety of general or specific issues of importance to either or both parties. Refer to CNSC staff's response to SQID 9.1.2 of Module 9 Regulations and Guides for additional information regarding the CNSC's approach to consultation and engagement with various stakeholder in developing and maintaining CNSC's regulatory framework.

No Analysis

No Rating

***Attachments**, by Megan Tougas-Cooke @ 2019-05-31 2:10:07 PM*

CNSC By-Laws

CNSC Rules of Procedure

How to Establish Communication Protocol between CNSC and Licensees or Applicants

Nuclear Safety and Control Act

Subsidiary Question 3.5.1

How does the regulatory body justify and explain its decisions to authorised parties?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-24 11:32:07 AM*

CNSC staff response

The Commission is the overall decision-making authority for licensing-related matters. The response to QID3.2 outlined the Commission proceeding process. CNSC staff provide written and documented conclusions and recommendations based on their review and assessment of an applicant's or licensee's submitted information against regulatory requirements and current industry specific criteria. CNSC staff's conclusions and recommendations to the Commission are documented in Commission Member Documents (CMDs), as described in SQID 3.6.1. Commission hearings are open to the public and are also webcast live on the CNSC's external website. Presentations, CMDs and past webcasts of Commission hearings are posted on the CNSC's website.

Public hearings allow the Commission to hear information pertaining to the making of licensing decisions. The Commission publishes a Record of Decision, to explain the regulatory basis for its licensing decisions. The Commission provides extensive reasons for its decisions, which are based on information provided by the proponent in their application or through materials submitted for the proceeding, along with the conclusions and recommendations of expert CNSC staff, as well as public input through written and/or oral interventions. When the Commission has reached its decision, the Record of Decision is prepared, sent to all participants, with information regarding the decision published on the Commission's website and on social media platforms through a news release. Following its translation, the Record of Decision is posted on the Commission's public website.

Public meetings are used to brief the Commission about significant developments that affect the nuclear regulatory process or to ask the Commission to make administrative decisions or deal with administrative issues. The Commission publishes minutes to record the outcome of Commission meetings. Commission meetings are also open to the public and webcast live on the CNSC's external website. Past webcasts of Commission meetings are posted on the CNSC's website.

Complete written transcripts of all public proceedings are posted online within days of a hearing or meeting. These documents, along with other information about the Commission's proceedings and decisions, are available to the public on the CNSC's external webpage.

As described in response to QID3.5, the Commission may authorize DOs to carry out specific authorities. The DO considers information from CNSC staff, as well as the applicant or licensee. In general, CNSC staff make recommendations for licensing and certification decisions to the DO in the form of Designated Officer Documents (DOD). The format of the DOD varies based on operational needs. The DO decision is provided in writing to all parties.

Pursuant to subsection 37(5) of the NSCA, DOs are required to report to the Commission on decisions in specific cases. The DO Program, as discussed in QID3.5, also includes annual reporting to the Commission. The annual report includes information on the DO authorities carried out during the calendar year, the orders referred to the Commission for review pursuant to subsection 37(6) of the NSCA and the issuance of administrative monetary penalties under section 65.05 of the NSCA. The annual report also provides updates on the continuous improvement initiatives of the DO Program, DO training and DO position staffing changes.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-27 8:35:32 AM*

Commission Meeting Minutes December 12-13 2018

Commission Member Document (CMD) Process

Detailed Record of Decision - Pickering Nuclear Generating Station Licence Renewal

Status of the Designated Officer Program - 2016

Submission from CNSC Staff - Pickering Nuclear Generating Station Licence Renewal

Summary Record of Decision - Pickering Nuclear Generating Station Licence Renewal

Question 3.6

Does the regulatory body ensure that regulatory control is stable and consistent?

***Answer**, by Megan Tougas-Cooke @ 2019-05-31 2:28:55 PM*

Yes

Finding

The regulatory body ensures that regulatory control is stable and consistent.

***Response**, by Megan Tougas-Cooke @ 2019-05-31 2:29:02 PM*

CNSC staff response

The CNSC regulates the nuclear industry through a comprehensive program of licensing, certification, compliance verification, enforcement and reporting. Licensees are required to conduct their activities in accordance with their licensing basis. As outlined in REGDOC-3.5.3, Regulatory Fundamentals, the licensing basis is a set of requirements and documents for a regulated facility or activity that consists of the following:

- *regulatory requirements set out in the applicable laws and regulations*
- *conditions and safety and control measures described in the licence and the documents directly referenced in the licence*
- *safety and control measures described in the license application and the documents needed to support that licence application*

Licences are issued under section 24 of the NSCA and authorize the licensee or applicant to perform the regulated activity or activities as specified in the license. Pursuant to section 26 of the NSCA, a licence is required to:

(a) possess, transfer, import, export, use or abandon a nuclear substance, prescribed equipment or prescribed information;
(b) mine, produce, refine, convert, enrich, process, reprocess, package, transport, manage, store or dispose of a nuclear substance;
(c) produce or service prescribed equipment;
(d) operate a dosimetry service for the purposes of this Act
(e) prepare a site for, construct, operate, modify, decommission or abandon a nuclear facility or;
(f) construct, operate, decommission or abandon a nuclear-powered vehicle or bring a nuclear-powered vehicle into Canada."

For class I facilities such as nuclear power plants, waste facilities and uranium mines and mills, the CNSC uses the Licence Condition Handbook (LCH). The LCH comes out of the licensing process, and captures some, or all, of the licensing basis.

The LCH is a companion document to be used with the facility licence whose general purpose is to clarify the regulatory requirements. The LCH provides compliance verification criteria that the licensee must follow to comply with licence conditions, operational limits and information on delegation of authority and applicable versions of documents referenced in the licence. The LCH also provides non-mandatory recommendations and guidance on how to comply with the licence conditions and criteria.

To ensure that nuclear industry licensees in Canada meet all of their regulatory requirements and expectations, the CNSC assesses, evaluates, reviews, and verifies how well licensees comply with these requirements. CNSC staff use a well-established safety and control area (SCA) framework in order to evaluate each licensee's safety performance.

<u>CNSC's Safety and Control Area Framework</u>

CNSC staff use a well-established safety and control area (SCA) framework in order to evaluate each licensee's safety performance. The SCA framework provides a common set of safety and control terms to ensure consistent reviews, assessments, recommendations and reporting to the Commission. This facilitates better communication among CNSC staff, licensees, the Commission, and other stakeholders. The framework includes 14 SCAs covering all technical areas of regulatory oversight and is used throughout our core processes as defined in CNSC's management system documentation which is available through CNSC's management system

portal found on CNSC's intranet (BORIS). For further information on the CNSC's management system see Module 4.

SCAs are the technical topics used by CNSC staff across all regulated facilities and activities to assess, evaluate, review, verify and report on regulatory requirements and performance. This information is obtained through CNSC compliance verification inspections, reviews and assessments of licensee activities as well as licensee reports to the CNSC on their operations. CNSC staff evaluate how well licensees meet regulatory requirements and CNSC expectations for the performance of programs in these 14 SCAs. Each SCA addresses an aspect of the overall safety profile of a proposed set of activities, and is sub-divided into specific areas (SpAs) that define the key components of each SCA. Both the SCA and SpAs are used in the CNSC's safety performance evaluation.

The 14 SCAs are sorted into three functional areas: management, facility and equipment, and core controls and processes.

Management specific SCAs address the organizational and human elements of safety in Canadian nuclear facilities. Specifically, they cover management systems, human performance management, and operating performance. CNSC staff who verify compliance in these areas ensure that licensee staff are adequately trained, knowledgeable, and equipped to handle all safety duties. Performance, safety culture, organizational contingency plans, and many other specific measures are all covered under this functional area.

Facility and equipment SCAs include safety analysis, physical design, and fitness for service. These areas assess the potential hazards and risks of operating (as well as the preventative measures taken to minimize risk), the integrity of facility infrastructure design, and the overall long-term performance of equipment and systems. When CNSC staff analyze safety based on facility and equipment, they are looking to verify a wide breadth of measures, ranging from the facility's safety as a structure down to the maintenance of components.

Core controls and processes SCAs form the largest functional area. These SCAs include radiation protection, conventional health and safety, environmental protection, emergency management and fire protection, waste management, security, safeguards and non-proliferation, and packaging and transport. These SCAs cover how a facility operates. The different core controls and processes, as well as the associated regulatory requirements, are outlined in facility licensing agreements.

<u>Regulatory requirements for SCA Framework</u>

In addition to the NSCA and regulations made under it, the CNSC has developed regulatory documents (REGDOC), which are a key part of its regulatory framework for nuclear activities in Canada. They provide additional clarity to licensees and applicants by explaining how to meet the requirements set out in the NSCA and the regulations made under it. REGDOCs are organized into three key categories: regulated facilities and activities, safety and control areas

and other areas of regulatory engagements. REGDOCs are implemented using a graded approach, commensurate with risk. REGDOCs are publicly available to applicants/licensees, members of the public, Indigenous communities and other stakeholders such as civil society groups on the CNSC's external website.

As well, as detailed in response to SQID 3.6.2, CNSC has well defined process for managing the regulatory framework to ensure that all regulatory requirements and guidance are clarified, documented and communicated consistently to applicants and licensees as well as other stakeholders such as members of the public. The CNSC's regulatory framework allows flexibility as the regulatory instruments (such as regulations, regulatory documents, etc.) that outline the regulatory requirements and expectations are continuously enhanced and improved in response to changes in industry, updates to national and international standards and good practices as well as feedback from different stakeholders.

Regulations and regulatory documents published by the CNSC are generally subject to a formal public consultation process. The response to SQID 9.1.2 of Module 9 Regulations and Guides, describes how input from interested parties is considered. In brief, regulations are published in the Canada Gazette, Part I for comments. Draft regulatory documents are released for public comment on the CNSC's consultation page and the Government of Canada's Open Government website. At the end of the consultation period, CNSC staff review all public input. The public comments are then posted on the CNSC website for feedback. A consultation report is then prepared to summarize the feedback. Following public comment, revised regulations and regulatory documents are presented to the Commission for approval.

Technical Assessment of Licensee and Applicant Submissions

CNSC staff conduct technical assessments to review submissions from licensees or applicants to determine if regulatory requirements have been met. Further information on the CNSC's Conduct of Technical Assessment Process is outlined in response to QID6.1. CNSC staff use a Technical Assessment Reference Matrix (TARM) in preparation for conducting a technical assessment. The TARM provides a set of technical assessment criteria which staff use to assess a licensee's proposed safety and control measures.

As well, technical assessments are used to verify compliance. Compliance verification criteria are the criteria used when carrying out the technical assessment for compliance verification purposes. Findings are communicated to licensees in a manner similar to that in the inspection process.

Basis for Commission Decisions

The outputs of CNSC technical assessments and compliance verifications, documented in CMDs, are used to provide conclusions and recommendations to the Commission.

During Commission proceedings, CNSC staff appear before the Commission to present their conclusions and recommendations in CMDs. The Commission may question staff to provide further justification for their technical conclusions and recommendations. As the Commission tribunal is a court of record, all questions from the Commission along with staff responses are on the record and are captured in proceeding transcripts.

The Commission provides the reasons for its decisions in a Record for Decision. The response to SQID 3.5.1 outlines how the CNSC justifies its decision to authorized parties and members of the public. These decisions are based on input from CNSC staff as well as the applicants/licensee, members of the public, Indigenous communities and other stakeholders such as civil society groups.

The CNSC maintains all records of decisions supported by the basis for decisions. These records are transparent and readily available to any interested party.

No Analysis

No Rating

***Attachments**, by Megan Tougas-Cooke @ 2019-06-24 1:44:32 PM*

Licence Condition Handbook - Bruce NGS A and B

Nuclear Safety and Control Act

REGDOC-3.5.3 Regulatory Fundamentals

SCA Framework

Subsidiary Question 3.6.1

How does the regulatory body prevent subjectivity in decision-making by individual staff members of the regulatory body?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-05-31 2:36:05 PM*

CNSC staff response

As described in response to QID3.2, the CNSC prevents subjectivity in decision-making by individual staff members through its management system. The CNSC's management system consists of a framework of policies, structures, people, programs, processes, practices, technologies, etc., that are put into place to ensure that the CNSC fulfills all tasks required to achieve its mandate safely and consistently. Personnel, equipment and organizational culture, as well as the documented policies and processes, are all elements of the CNSC's organization and are integrated into one coherent management system. The CNSC's management system

ensure that responsibilities assigned to the CNSC are properly discharged using core regulatory process and are not based on decision making by individual staff members.

CNSC staff follow CNSC's Policy on the Use of Risk-Informed Approach for Regulatory Oversight of Nuclear Activities and Facilities when making risk-informed decisions or recommendations pertaining to licensing, certification, compliance and the development of regulatory requirements and guidance. The application of this policy provides a clear and consistent understanding among CNSC staff and managers of the approach to be followed for making risk-informed regulatory recommendations and decisions.

The CNSC conducts technical assessments for reviewing matters related to licensing, certification and compliance activities. The Conduct of Technical Assessment Process aligns with the IAEA's Governmental Legal and Regulatory Framework for Safety Document (GSR Part 1) and the IAEA's Fundamental Safety Principles (SF-1). The CNSC's Conduct of Technical Assessments fits within the CNSC's Management System Core Processes. The review topics for technical assessments align with specific areas within the CNSC's Safety and Control Area Framework (refer to response to QID6). The Conduct of Technical Assessment Process is dependent on the collaboration between the staff and management of ROB and TSB. Consistency in assessments is monitored at two levels in the CNSC. The first is within the technical specialist directorates where peer review is used for complex or high-risk issues and, in all cases, management review and sign-off is required. The second level is within the licensing directorates, who review the assessment in the context of the overall risk profile of the facility or activity prior to transmittal to the licensee. The results of each technical assessment are the technical conclusions and recommendations that are considered in conjunction with other regulatory information to make overall regulatory recommendations and conclusions.

As well, technical assessments are used to verify compliance. Compliance verification criteria are used when carrying out the technical assessment for compliance verification purposes. Findings are communicated to licensees in a manner similar to that in the inspection process.

A Commission Member Document (CMD) is a document that represents the regulatory position of CNSC staff and is used to present significant and relevant regulatory and technical information to the Commission and members of the public. CMDs range considerably in content, complexity and scope based on the level of risk associated with the proposed licensed activity. CMDs outline CNSC's staff's conclusions and recommendations, supported by the findings of inspections, desktop reviews and other compliance verification activities. CMDs are also used for all other submissions for Commission proceedings including submissions from licensees, applicants and intervenors. The Commission makes its regulatory decision based on CMDs from applicants, intervenors and CNSC staff.

The Commission Member Document Process is under the core processes of the CNSC's management system and describes the activities required by CNSC staff and managers for preparing, producing and presenting a CMD at CNSC Commission proceedings. All contributions

to a CNSC staff CMD are reviewed and approved by the contributor's divisional director as well as the director general of his or her directorate. All CMDs are reviewed and approved by the Executive Vice President and Chief Regulatory Operations Officer to ensure consistent messaging from the CNSC. This process ensures that the CMD reflects the CNSC staff's views and not individual opinions.

The Commission may delegate its decision-making authority to DOs as described in response to QID 3.5. The CNSC Process Document Overview of Making Designated Officer Decisions is under the core processes of the CNSC's management system. The objective of the process document is to have a consistent and transparent approach for DOs to make decisions on behalf of the Commission.

The CNSC Policy document Policy on Science in a Regulatory Environment provides governance and a framework to ensure that scientific and ethical standards are applied in providing scientific advice for use in regulatory decisions and supporting scientific integrity in a regulatory environment.

The CNSC has appointed a Chief Science Officer (CSO) for implementing and overseeing the effectiveness of the Policy on Science in a Regulatory Environment. The CSO is the Vice-President of TSB and is accountable for science-informed recommendations in support of regulatory recommendations to the Commission. In particular, the CSO is accountable for:

- *ensuring implementation and adherence to this policy and associated processes*
- *ensuring scientific analyses are considered when decisions are made*
- *promoting this policy internally and to stakeholders and the public*
- *ensuring dissemination of scientific, technical and regulatory information, including publications*
- *ensuring a full examination of all evidence on an issue, in conjunction with the chief regulatory operations officer, in a timely manner using the available processes*
- *ensuring appointment of review panels as needed to implement this policy (e.g., in support of the Differences of Professional Opinion process)*
- *promoting a culture of partnership for sharing scientific, technical and operational information in the interests of effective regulatory oversight*

The CNSC takes a proactive and constructive approach to address differing and conflicting opinions through the application of a multi-key approach. This approach supports the goal of respectful and integrity-driven collaboration by ensuring the inclusion of multiple stakeholders in CNSC's collaborative activities. Through application of the following principles, the multi-key system:

- *encourages opinions to be heard with results documented and founded on fact-based discussion*
- *encourages the attitudes necessary to create open-minded dialogue*
- *reflects shared accountability, a willingness to hear alternate perspectives, and openness to shifting position where possible to establish a shared regulatory approach*

- *builds trust and dialogue*
- *focuses on making regulatory decisions that reflect respectful, professional, and valuable discussion that garners essential support to establish an official position*
- *allows for the rationale behind decisions to be shared with and explained to staff*

The multi-key system is applied in areas of the CNSC where there is regular collaboration between colleagues on activities such as writing CMDs, conducting technical assessments, and in various inspection processes.

Where there is a need for resolution of conflicts arising in decision-making processes, the CNSC has developed the following processes within the management system:

- *regular discussions with immediate supervisors*
- *Open Door Policy – This process can be applied by all CNSC staff to address any concerns they may have. The policy empowers CNSC staff to raise their concerns with any managers, at any level in the organization without fear of reprisal.*
- *Non-Concurrence Process – This process enables staff to formally create a record of their concern, seek timely review by the relevant authorities and obtain an official documented resolution with explanation. This process is applicable to addressing and resolving any concerns related to regulatory decisions.*
- *Differences of Professional Opinion Process (DOPO) – The DOPO process allows staff to bring forward and resolve any differences of professional opinions regarding regulatory positions. This process may be used for complex issues where there is sufficient time to involve experts to do a comprehensive review of the issue to arrive at a resolution.*

The listed processes vary in formality. CNSC staff may select the approach that best allows them to raise issues or concerns without fear of reprisal.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-24 11:35:34 AM*

Aboriginal Consultation and Accommodation

CNSC Open Door Policy

Commission Member Document (CMD) Process

Conducting a Technical Assessment

Difference of Professional Opinion (DOPO) Process

Non-Concurrence Process

Policy on Science in a Regulatory Environment

Policy on the Use of a Risk-Informed Approach for Regulatory Oversight of Nuclear Activities and Facilities

Subsidiary Question 3.6.2

How does the regulatory body emphasize the continuous enhancement of safety while recognizing the risks associated with making modifications to well established practices?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-24 11:36:02 AM*

CNSC staff response

As further described in response to SQID9.1.1 of Module 9 Regulations and Guides, the CNSC is committed to continuous improvement and aims to ensure CNSC's regulations and regulatory documents continue to be clear and effective, allowing the CNSC to remain an effective and efficient regulator. The CNSC adheres to the principles of the Cabinet Directive on Regulation to ensure that regulatory issues are well-defined, re-examined and that the choice of regulatory approach is most appropriate for achieving safety and security objectives.

The CNSC follows a regulatory framework plan, which sets out the regulations and other regulatory documents that the CNSC intends to develop or amend in the coming years. The CNSC's Regulatory Framework Steering Committee (RFSC) ensures a strategic approach in developing, maintaining and managing the Regulatory Framework Plan. The plan is the result of continuous, whole-of-CNSC analysis of its published requirements and guidance in the context of ongoing changes in the nuclear industry. It is reviewed regularly and adjusted to ensure the CNSC continues to provide the information required to achieve clarity of regulatory requirements. Regulatory framework activities are carried out with a continued focus on communicating and engaging with stakeholders. The CNSC welcomes and considers feedback from stakeholders on its regulatory framework plan at any time.

In addition, divisions within the CNSC may table a proposal or plan to address an identified regulatory issue. For example, CNSC bases its regulatory requirements on industry, national and international standards and best practices. Non-CNSC publications referenced in CNSC regulatory instruments include publications from the IAEA and the CSA Group. CNSC works in close collaboration with these agencies and CNSC staff are regularly invited to participate in the drafting or are consulted during the development of their publications. Any changes to these standards and best practices may trigger a proposal to change or update a CNSC regulatory instrument. The regulatory instruments include:

- *acts*
- *regulations*
- *REGDOCs*
- *standards developed by external organizations such as the CSA Group, the American Society of Mechanical Engineers and the Institute of Electrical and Electronics Engineers*

CNSC Process document How to Select Regulatory Instruments describes the process for selecting the appropriate regulatory instrument or mix of instruments to carry out the CNSC's mandate. Specifically, this process document is used to address activities from the point a regulatory issue is identified until the selection of the instrument(s) is approved for development.

When selecting the appropriate regulatory instruments, considerations is given to a number of factors including but not limited to:

- *a clear description of the regulatory issue (i.e., what is the problem?)*
- *the CNSC's legislative authority*
- *the context by which the issue arose*
- *current regulatory landscape (what is out there, what is being developed, including standards from external organizations such as the CSA)*
- *timing/urgency required to address the regulatory issue*
- *risks (what would happen if we do nothing, stakeholder alignment)*

Depending on the regulatory instrument selected the RFSC endorses recommendations to the appropriate approval authority. For example, selection of regulatory documents and regulations are approved by the Commission Tribunal. Once the appropriate regulatory instrument has been approved, the appropriate process document is used to develop the REGDOCs (i.e., How to Develop Regulatory and Guidance Documents) or regulations (i.e., CNSC Regulation Making Process).

Upon completion of the draft regulatory instrument, CNSC consults with the public, licensees and other stakeholders, as this is an integral component the CNSC's regulatory framework. The CNSC welcomes public input on regulations, draft REGDOCs and discussion papers. Regulations and REGDOCs published by the CNSC are subject to a formal public consultation process. Regulations are published in the Canada Gazette, Part I for comments for a period of 30 days to 75 days. The consultation process for developing and updating the CNSC's regulatory framework is further described in SQID 9.1.2 of Module 9 Regulations and Guides.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-24 11:51:18 AM*

Cabinet Directive on Regulation

CNSC Regulatory Framework Plan

Develop and Publish Regulations

Question 3.7

Has the regulatory body made provision for establishing, maintaining and retrieving adequate records relating to the safety of facilities and activities?

***Answer**, by Megan Tougas-Cooke @ 2019-05-31 2:49:24 PM*

Yes

Finding

The regulatory body has made provision for establishing, maintaining and retrieving adequate records relating to the safety of facilities and activities.

***Response**, by Megan Tougas-Cooke @ 2019-05-31 2:49:29 PM*

CNSC staff response

The CNSC has made provisions for establishing, maintaining and retrieving records including the following registers and inventories. Notwithstanding CNSC's provisions to maintain such records, it remains the responsibility of the licensee (and applicants) to establish and maintain a records management system for records relating to the safety of existing or proposed facilities and activities. Proper management of a suite of retrievable and complete records supports the licensing basis by which the safe conduct of licensed activities can or has been authorized.

Records relating to the safety of facilities and activities

The CNSC keeps records relating to the safety of facilities and activities in e-Access, CNSC's electronic documents and records management system (EDRMS), and the CNSC's Records Office for paper records.

The CNSC's Information Management Division administers the Records Office and EDRMS, providing records storage and retrieval services for all staff members. Processes are in place to properly evaluate the security requirements related to each record and ensure proper storage. Periodic evaluations of systems, processes, and training are made to improve the CNSC's ability to find, retrieve, and secure all business documents appropriately.

As well, the CNSC uses the Regulatory Information Bank (RIB) which is a comprehensive online tool that houses information about actions taken in response to licensing and compliance activities in one repository, allowing staff to quickly retrieve and view actions and record trends. RIB is used by CNSC staff in the operational services and gives staff the ability to track, monitor and report on licensee commitments.

The Licensing Operations User Integrated System (LOUIS) is used to manage licensee information pertaining to licensing and compliance information for radiation sources. LOUIS contains information regarding how much material licensees are allowed to possess, as well as links to most of the relevant documents from the CNSC's electronic document and records management system (i.e., e-Access) related to each licensee.

Records of doses from occupational exposure

The National Dose Registry (NDR) is Canada's national repository for dose records of Canadian workers who are monitored for occupational exposure to ionizing radiation. The NDR is administered by Health Canada's Radiation Protection Bureau and supports Health Canada and Canadian regulatory authorities in their mandates to protect the health and safety of Canadians exposed to ionizing radiation in the workplace including, but not limited to, nuclear power plants, uranium mines, dental offices, and hospitals. It has been in continuous operation since 1951 and now contains the records of more than half a million individuals who have been monitored for radiation exposure as part of their jobs, including more than 150,000 members of the present-day workforce.

Section 19 of the Radiation Protection Regulations (RPR) requires every licensee who operates a CNSC-licensed dosimetry service to file with the NDR, at a frequency specified in the licence and in a form compatible with the NDR, information with respect to each nuclear energy worker for whom it has measured and monitored a dose of radiation.

Registers of sealed radioactive sources and radiation generators

In 2006, the CNSC implemented the National Sealed Source Inventory (NSSR) and the Sealed Source Tracking System (SSTS).

The SSTS is a secure web-based information management program used to populate the NSSR, and allows licensees to report source transactions using an on-line portal. The NSSR enables the CNSC to build an accurate and secure inventory of high-risk sealed sources in Canada. 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).

The NSSR was designed to hold information about the radioactive sources in every category, for all licensees. The SSTS, in contrast, is targeted at high-risk sealed sources (although some licensees are required to track sources below Category 2), as a system designed to enable the reporting of receipts and transfers, imports and exports within strict time limits. Each import, export, receipt and transfer is termed a "transaction" for SSTS purposes. The SSTS follows every high-risk radioactive source throughout its complete life cycle in Canada.

The SSTS was built on the CNSC's regulatory information database used for nuclear substances and radiation devices. The SSTS and NSSR are components of the CNSC's overall nuclear substances and radiation devices licensing and compliance database. Building the SSTS and NSSR in this manner enables sources and devices to be associated with specific licensees at particular addresses. The SSTS is the tool used to populate the NSSR, and it allows the CNSC to have an accurate inventory of high-risk sealed sources (Category 1 and 2). Each transaction in the SSTS is paired: each transfer has a corresponding receipt, and each transaction represents a separate report to the CNSC.

Licensees report their full inventories to the CNSC on an annual basis through their annual compliance report. A database of medium and low risk sealed sources is maintained outside of the NSSR using the information provided in the annual compliance reports.

Records of events, including non-routine releases of radioactive material to the environment

The CNSC uses the Central Event Reporting and Tracking System (CERTS), which is a database used to collect, categorize and track follow-up of reported events at nuclear power plants and non-power reactor class I nuclear facilities and uranium mines and mills.

The CNSC also uses the Event Information Tracking System (EITS) to hold information regarding unplanned events concerning nuclear substances, nuclear material and nuclear devices. Unplanned events will include incidents regarding the loss, theft, recovery, transportation, storage, disposal, unauthorized use/possession/transaction, spills or contamination, the malfunction or damage of nuclear devices, and waste and scrap metal alarms. The system allows for recording of event details, tracking of these events, detailed searching and the creation of reports.

Records that might be necessary for the shutdown and decommissioning (or closure) of facilities

The general application requirements for a licence under the NSCA are listed in section 3 of the GNSCR. Facility-specific requirements for a licence to decommission are provided in the Class I Nuclear Facility Regulations (sections 3 and 7), Class II Nuclear Facility and Prescribed Equipment Regulations (section 5) and the Uranium Mines and Mills Regulations (section 7).

Inventories of radioactive waste and of spent fuel

Licensees and applicants are required to have a waste management program. The extent of the program is dependent on the risk-significance of the facility. The licence conditions for smaller facilities such Class II facilities and those with radiation sources outline the regulatory requirements for the amounts that can be released to waste, the sewer and the atmosphere.

Licensees and applicants of larger complex facilities are required to implement and maintain a waste management program as a licence condition of their licence condition handbook under the Waste Management Safety and Control Area Framework. The topics under this SCA include waste management, waste characterization, waste minimization and waste management practices.

Licensees are required to submit an annual compliance monitoring report. REGDOC-3.1.2, Reporting Requirements Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills provides the requirements and guidance regarding the information that should be included in the report. Licensees are required to include, inter alia, the following information regarding waste management:

- *identification and characterization of the waste streams generated by the operation of the facility*
- *inventories of each of the following, including type, volume, total activity level and/or concentration*

Every three years, Natural Resources Canada collects, compiles and analyzes radioactive waste inventory data in Canada. The updated data is published in the triennial Inventory of radioactive waste in Canada, which provides an overview of the production, accumulation and future projections of radioactive waste in Canada based on Canada's four waste categories (i.e., high-level, intermediate-level, low-level and uranium mine and mill waste).

The inventory data is reported internationally in Canada's national reports to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. Natural Resources Canada also provides this data to the International Atomic Energy Agency's radioactive waste management database which tracks low- and intermediate-level radioactive waste worldwide.

No Analysis

No Rating

***Attachments**, by Megan Tougas-Cooke @ 2019-06-24 11:52:17 AM*

Class I Nuclear Facilities Regulations

Class II Nuclear Facilities and Prescribed Equipment Regulations

General Nuclear Safety and Control Regulations

Inventory of Radioactive Waste in Canada

Joint Convention - Sixth Report Oct 2017

Radiation Protection Regulations

REGDOC-3.1.2 Reporting Requirements, Volume I Non-Power Reactor Class I Facilities and Uranium Mines and Mills

Uranium Mines and Mills Regulations

Subsidiary Question 3.7.1

How does the regulatory body ensure that the authorized party maintains all the records necessary for the safe operation of facilities and the safe conduct of activities?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-05-31 2:51:25 PM*

CNSC staff response

It is the responsibility of the licensee (and applicants) to establish and maintain a records management system for records relating to the safety of existing or proposed facilities and activities. Proper management of a suite of retrievable and complete records supports the licensing basis by which the safe conduct of licensed activities can or has been authorized.

Pursuant to Section 27 of the NSCA, licensees and other persons prescribed by regulations must keep records and file reports that are required by the Commission in regulations it makes under Section 44 of the Act. The fact that information may be proprietary does not exempt anyone from such requirements. However, the CNSC in providing information to the public and in response to requests for access to information, may protect proprietary information from disclosure under the terms of Canada's Access to Information Act.

Requirements for record-keeping and retention are also set out under the regulations under the NSCA. Section 27 of the GNSCR states that "every licensee shall keep a record of all information relating to the licence that is submitted by the licensee to the Commission." Section 28 of the GNSCR sets out the conditions for retention or disposal of records. Additional requirements for record-keeping and retention are set out in section 14 of the Class I Nuclear Facilities; section 21of the Class II Nuclear Facilities and Prescribed Equipment Regulations, section 16 of the Uranium Mines and Mills Regulations and sections 36 and 37 of the Nuclear Substances and Radiation Devices Regulations.

Subsection 3(1.1) of the GNSCR states that "the Commission or a designated officer authorized under paragraph 37(2)(c) of the Act, may require any other information that is necessary to enable the Commission or the designated officer to determine whether the applicant (a) is qualified to carry on the activity to be licensed; or (b) will, in carrying on that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed."

<u>Requirements for licensees to maintain an inventory of radioactive sources</u>

Refer to CNSC staff's response to QID3.7.

<u>Requirements of licensees for occupational exposure</u>

Occupational dose information in the NDR may not contain doses received by the workers outside of Canada or doses ascertained through estimation and dosimetry methods that are not licensed by the CNSC. However, subsection 5(1) of the RPR requires every CNSC licensee, for the purpose of keeping a record of radiation doses, in accordance with section 27 of the NSCA, to ascertain and record the magnitude of exposure to radon progeny of each person, as well as the effective dose and equivalent dose received by and committed to that person. Currently, the RPR do not identify specific time periods for retaining these types of records. For records for

which no retention period is quoted in the NSCA or the RPR, section 28 of the GNSCR applies (i.e., until one year after the expiry of the licence that authorized the activity). It should be noted that the CNSC is proceeding with amendments to the RPR which includes a proposal to add a specific retention period that licensees must abide by with respect to occupational dose records.

Licensees' provisions for maintaining records of occupational exposure for workers are included in radiation protection programs, which are assessed by CNSC staff to ensure that the programs meet regulatory requirements. Radiation protection programs are assessed at various points during the life cycle of a nuclear facility or regulated activity: during initial application (construction, operation, decommissioning), and at licence renewal and /or licence amendment. In addition; all licensees are subject to compliance verification activities (e.g. inspections, desk top reviews) and are subject to regulatory enforcement, as necessary. Pursuant to paragraph 30(1)(c) of the NSCA, records of doses generated as a result of requirements dictated by subsection 5(1) of the RPR must be made available to CNSC staff during compliance verification activities (e.g., inspections, desk top reviews).

Requirements for the licensee to maintain inventories of waste and spent fuel

In addition to the information in QID7, CNSC staff also make use of industry standards such as those from the CSA Group in regulating waste management facilities. CSA N292.0-14 outlines the requirements regarding the records that licensees of waste management facilities are meant to maintain. Licensees are required to maintain records on operations and inventory tracking of material at the facility.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-24 11:53:49 AM*

Access to Information Act

Class I Nuclear Facilities Regulations

Class II Nuclear Facilities and Prescribed Equipment Regulations

General Nuclear Safety and Control Regulations

Nuclear Safety and Control Act

Nuclear Substances and Radiation Devices Regulations

Privacy Act

Radiation Protection Regulations

Uranium Mines and Mills Regulations

Subsidiary Question 3.7.2

How does the regulatory body ensure that applicants are responsible for ensuring the recording of information relating to facilities and activities, and analyzing it, for the purposes of demonstrating safety ? How does the regulatory body use such records?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-06-24 11:55:23 AM*

CNSC staff response

Further to the information provided in SQID3.7.1, the CNSC ensures oversight (including appropriate retention of records) through a compliance program. A full description of the compliance program is provided in Module 7 Inspection.

The CNSC regulatory framework has requirements for large and complex facilities to implement and maintain a management system. Section 27 of the GNSCR provides requirements with respect to the retention of records. CNSC licences for these facilities contain a standardized licence condition that requires the licensee to implement and maintain a management system. CSA Group standard N286-12, Management System Requirements for Nuclear Facilities, is listed in the licensees LCH as compliance verification criteria for the management SCA. CSA N286-12 contains specific requirements for record-keeping. CNSC licences also contain a general requirement to conduct the licensed activities in accordance with the licensing basis and specific requirements to implement and maintain a management system. It is therefore the responsibility of the licensee (and applicants) to establish and maintain records relating to the safety of existing or proposed facilities and activities, and to ensure that the proper management of a suite of retrievable and complete records supports the licensing basis by which the safe conduct of licensed activities can or has been authorized.

The CNSC undertakes necessary and reasonable measures to ensure compliance with the requirements for record-keeping and retention as set out under the NSCA and its associated regulations. To evaluate compliance, the CNSC conducts both field verification and desktops reviews. Inspections are carried out by CNSC inspectors to gather data from the site of the licensed activity and analyze the data. Desktop reviews involve consideration of licensee documentation and reports including quarterly technical reports, annual compliance reports, special reports and documentation related to design, safety analysis, programs and procedures. The purpose of the inspection and desktop reviews is to confirm that workers, activities, facilities and equipment are in compliance and that operations remain within the licensing basis.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-24 11:54:28 AM*

General Nuclear Safety and Control Regulations

Nuclear Safety and Control Act

Question 3.8

Does the regulatory body promote the establishment of appropriate means of informing and consulting interested parties and the public about possible radiation risks associated with facilities and activities, and about the processes and decisions of the regulatory body?

***Answer**, by Megan Tougas-Cooke @ 2019-05-31 2:54:31 PM*

Yes

Finding

The regulatory body promotes the establishment of appropriate means of informing and consulting interested parties and the public about possible radiation risks associated with facilities and activities and about the processes and decisions of the regulatory body.

***Response**, by Megan Tougas-Cooke @ 2019-06-24 11:56:03 AM*

CNSC staff response

As per paragraph 9(b) of the NSCA, one of the mandated responsibilities of the CNSC is to disseminate technical, scientific and regulatory information related to nuclear activities.

Further to the information provided in response to QID3.5 and SQID3.5.1, the CNSC's Commission proceedings allow for interested parties to participate in the licensing process. All proceedings are broadcast live on the Internet and archived on the CNSC website. Transcripts of public hearings and meetings are also available online.

In 2011, the CNSC established the Participant Funding Program (PFP) to give members of the public, Indigenous communities and other stakeholders the opportunity to request funding to support their participation in the CNSC's regulatory decision-making process. The CNSC's Participant Funding Program Guide describes the program and is available on the CNSC's website.

The CNSC determines how much funding it will make available for project-specific PFP funding opportunities on a case-by-case basis. Indigenous peoples, members of the public and not-for-profit organizations are all invited to apply for funding. Applications are then reviewed by an independent, external Funding Review Committee, which provides recommendations to the CNSC on who to award funding to. The PFP is critical to the CNSC's mission of being an open, transparent regulator. As the only nuclear regulator in the world with such a program, the CNSC is proud to lead the way among its counterparts.

Funding opportunities include – but are not limited to – participation in CNSC regulatory review processes for major nuclear facilities, which encompass licence renewals, new project applications, environmental assessments and regulatory oversight reports. In limited cases, funding may also be available for reviews of regulatory documents, policies, discussion papers and other topics of regulatory interest to the Commission, the public and Indigenous communities as well as environmental monitoring and completing Indigenous knowledge studies.

As an agent of the Government of Canada and as Canada's nuclear regulatory, the CNSC recognizes and understands the importance of consulting and building relationships with Canada's Indigenous peoples. The CNSC ensures that all licensing decisions and environmental assessment decisions uphold the honour of the Crown and consider Indigenous peoples' potential and established Indigenous or treaty rights pursuant to section 35 of the Constitution Act, 1867.

REGDOC 3.2.2, Aboriginal Engagement, sets out the requirements and guidance for licensees on Indigenous engagement. This document also provides procedural direction for licensees in support of the whole-of-government approach to Indigenous consultation implemented by the CNSC in cooperation with federal departments and agencies. The requirements in the document are meant to ensure that potential or established Indigenous and/or treaty rights are considered and that proper implementation will lead to more effective and efficient Indigenous engagement practices, strengthen relationships with Indigenous communities, assist the CNSC in meeting its duty to consult obligations and reduce the risk of delays in the regulatory review process. The CNSC's approach to Indigenous consultation is found in Appendix C: Codification of Current Practice: Canadian Nuclear Safety Commission (CNSC) Commitment to Aboriginal Consultation. This approach is informed by the guiding principles for Canada outlined in Aboriginal Consultation and Accommodation – Updated Guidelines for Federal Officials to Fulfill the Duty to Consult as well as the Compendium of Indigenous Consultation and Engagement Practices.

In 2012, the CNSC implemented an Independent Environmental Monitoring Program (IEMP) to verify that the public and environment around CNSC-regulated nuclear facilities are not adversely affected by releases to the environment. The IEMP complements CNSC's ongoing environmental protection compliance verification activities. However, it does not relieve licensees of their responsibilities. The IEMP is a mechanism for providing independent environmental monitoring information to the public, civil society groups, Indigenous communities and the Commission about nuclear facilities and activities in Canada.

Members of the public and Indigenous communities may be involved during all phases of the IEMP. For example, CNSC staff often meet with interested Indigenous communities prior to sampling to ensure that meaningful results are obtained during the sampling campaign. During some campaigns, Indigenous community members have joined the sampling trip to provide further Indigenous knowledge. After the results are received, CNSC staff offer to meet with

Indigenous communities and members of the public during targeted meetings, open houses and at community fairs to discuss the results.

The selection of sites included in the annual IEMP sampling campaign considers a number of different factors including: Commission direction, upcoming hearings, past environmental compliance concerns as well as interest from members of the public and Indigenous communities. Following the campaign, all IEMP results are posted on the CNSC's external webpage and an e-mail is sent to 4,000 subscribers.

CNSC also conducts outreach activities to educate the public, licensees and other stakeholders about particular issues or topics. Outreach activities are meant to bring openness, transparency and timely communication to the work and management of Canada's nuclear regulatory regime.

CNSC outreach activities include:

- *open houses and meetings, Meet the Regulator sessions and webinars, and targeted activities (e.g., youth, Indigenous peoples, host communities, and the medical community)*
- *interactions with the public including responding to inquiries from members of the public, and other stakeholders*
- *public proceedings of the Commission, particularly when they are held in the local community*
- *presentations by the president, executives and staff at various seminars and stakeholder meetings*
- *participation in international and national conferences and events*
- *publishing research that CNSC staff has prepared which includes technical papers, presentations, and peer-reviewed articles*
- *proactive media relations events*
- *consultations on environmental assessments*
- *digital presence using a variety of platforms to share timely information (e.g. web, social media)*
- *educational videos on the CNSC's learning portal*

REGDOC-3.2.1, Public Information and Disclosure, defines the CNSC's requirements for public information and disclosure protocols for licensees and applicants. It applies to uranium mines and mills, Class I nuclear facilities and some Class II facilities. The document provides guidance on how to develop and implement the requirements for public information programs and disclosure protocols.

The primary goal of the public information program is to ensure information related to the health, safety and security of persons and the environment, along with other issues associated with the lifecycle of the nuclear facilities, is effectively communicated to the public. The CNSC expects a licensee's public information program and disclosure protocol to be commensurate with the public's perception of risk and the level of public interest in the licensed activities along

with the risks to public health and safety and the environment perceived to be associated with the facility and activities. REGDOC-3.2.1, Public Information and Disclosure, is also intended to assist CNSC staff in assessing documentation submitted as part of an application for a new CNSC licence, a licence renewal or compliance verification.

No Analysis

No Rating

***Attachments**, by Megan Tougas-Cooke @ 2019-06-25 9:32:26 AM*

Constitution Act, 1867 to 1982

Independent Environmental Monitoring Program Process Procedure

Nuclear Safety and Control Act

Participant Funding Program Guide

REGDOC-3.2.1 Public Information and Disclosure

REGDOC-3.2.2 Aboriginal Engagement

Subsidiary Question 3.8.1

How does the regulatory body ensure that interested parties residing in the vicinity of authorized facilities and activities are consulted in an open and inclusive process?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-05-31 3:09:52 PM*

CNSC staff response

The Commission makes decisions on the licensing of major nuclear facilities through a public hearing process. The public hearing gives involved parties, Indigenous communities, members of the public and other stakeholders, an opportunity to be heard before the Commission. In the spirit of openness and transparency, the CNSC holds Commission hearings in the communities that will be most affected by the decision at hand, when possible. CNSC staff also report to the Commission in public meetings at predetermined frequencies (e.g. annually, biannually) on the facilities' operation and safety performance of regulated activities in Regulatory Oversight Reports (RORs). The RORs are based on the CNSC's independent evaluation of compliance and licensee performance. Interested stakeholders can participate in these Commission meetings through written interventions.

Notices for Commission proceedings are posted on the CNSC's website, emailed directly to the CNSC's distribution list, announced to the media, and posted on social media. Members of the

public, Indigenous communities and other stakeholders who have an interest or expertise in the matter being considered, or who have information that may be useful to the Commission in coming to a decision can formally participate as intervenors in public hearings. Interventions may be made in either of Canada's official languages, via either a written submission or a written submission accompanied by an oral presentation during the hearing. The Commission also accommodates participation in its proceedings by teleconference or videoconference.

As stated in response to QID3.8, the CNSC's PFP also offers assistance to interested parties in bringing value-added information to the Commission. The program give members of the public, stakeholders, and Indigenous communities the opportunity to request funding to support their participation in the CNSC's regulatory decision-making process.

To improve the public's level of understanding of information about proposed or licensed nuclear facilities and activities, licensees and licence applicants are required to develop and implement a public information program. It is their responsibility to communicate their operations with their community. REGDOC 3.2.1, Public Information and Disclosure, clarifies the regulatory requirements of the public information program including what they will communicate and when. The target audience of the public information program must be clearly defined. The target audiences include the general population of the local community and other communities impacted by the licensee's nuclear facility and related activities. This should include key opinion and political leaders, community and media groups, interveners and Indigenous communities. The CNSC requires compliance with these regulatory requirements.

Regulatory document REGDOC 3.2.2, Aboriginal Engagement, sets out the requirements and guidance for licensees on Indigenous engagement. REGDOC 3.2.2 also provides procedural direction for licensees in support of the whole-of-government approach to Indigenous consultation implemented by the CNSC in cooperation with federal departments and agencies. The requirements in the document are meant to ensure that potential or established Indigenous and/or treaty rights are considered and that proper implementation will lead to more effective Indigenous engagement practices, strengthen relationships with Indigenous communities, assist the CNSC in meeting its duty to consult obligations and reduce the risk of delays in the regulatory review process. The CNSC's approach to Indigenous consultation is found in Appendix C: Codification of Current Practice: Canadian Nuclear Safety Commission (CNSC) Commitment to Aboriginal Consultation. This approach is informed by the guiding principles for Canada outlined in Aboriginal Consultation and Accommodation – Updated Guidelines for Federal Officials to Fulfill the Duty to Consult.

As detailed in response to QID8, the CNSC implemented IEMP to verify that the public and environment around CNSC-regulated nuclear facilities are not adversely affected by releases to the environment. The IEMP complements CNSC's ongoing environmental protection compliance verification activities. The IEMP is a mechanism for providing independent environmental monitoring information to the public, Indigenous communities and the Commission about nuclear facilities and activities in Canada. Prior to any sampling campaign, notifications are sent

out to the licensee, the municipality, media, and Indigenous communities living near the facility or activity. There is a social media presence during the campaign and CNSC staff are available to answer any questions from interested parties. Following the campaign, all IEMP results are posted on the CNSC's external webpage and an email is sent to 4,000 subscribers.

The CNSC communicates and conducts outreach activities to educate the public, licensees and other stakeholders about particular issues or topics. These activities are meant to bring openness, transparency and timely communication of the work of the Commission and Canada's nuclear regulatory oversight. CNSC activities include:

- *outreach activities like open houses and meetings, Meet the Nuclear Regulator sessions, and targeted activities (e.g., youth, Indigenous peoples, host communities)*
- *direct interactions with the public including responding to inquiries from members of the public, and other stakeholders*
- *presentations by the president, executives and staff at various seminars, conferences and stakeholder meetings*
- *participation in international and national conferences and events*
- *publishing research that CNSC staff have prepared which includes technical papers, presentations, and peer-reviewed articles*
- *consultations on environmental assessments and regulatory documents*
- *digital presence using a variety of platforms to share timely information (e.g. web, social media)*

As detailed in SQID 3.6.2, members of the public and other stakeholders are consulted in the development of CNSC's regulatory instruments. Comments on any aspect of the CNSC's framework are also welcome at any time.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-27 8:26:55 AM*

Agenda of Commission Meeting December 12-13 2018

Notice of Commission Meeting December 12-13 2018

Notice of Participation at a Commission Meeting and Participant Funding

Participant Funding Program Guide

REGDOC-3.2.1 Public Information and Disclosure

Subsidiary Question 3.8.2

How does the regulatory body ensure that authorized parties inform the public about possible radiation risks associated with their facilities and activities?

***Subsidiary Response**, by Megan Tougas-Cooke @ 2019-05-31 3:13:41 PM*

CNSC staff response

Authorized parties are required to inform the public about possible radiation risks associated with their facilities and activities through a public information program that is guided by REGDOC-3.2.1, Public Information and Disclosure. Section 2.2.5 states that "the public information program shall include in a public disclosure protocol describing the information and the medium of disclosure in regard to information and reports of interest to the public. Items of interest to the public may include routine and non-routine situation, events and activities." Section 2.3 provides further requirements and guidance of the public disclosure protocol. The information to be disclosed includes:

- *significant operational developments such as labour disputes and expansion or changes in facility design or operation*
- *events with offsite effects or which could result in public interest and concern or media attention*
- *fires*
- *impact of natural events such as earthquakes, floods, lightning*
- *serious vehicle or industrial accidents*
- *planned and unplanned significant interruptions of facility operations, such as disruption of isotope production*
- *routine and non-routine releases of radiological and hazardous materials to the environment*
- *unplanned events, including those exceeding regulatory limits*
- *environmental monitoring reports*

Section 2.3.3 requires licensees and applicants to inform the CNSC of disclosures made under the public disclosure protocol at the time of, or before, such disclosure. Nuclear-related licensee event are also posted on the CNSC's website. The page includes a list of events and incidents organized by different sectors of the nuclear industry.

Licensees are required to submit event reports and notifications for situations or events of high safety significance and that may require short-term action by the CNSC as per their licensing basis. The CNSC uses event initial reports to ensure that the Commission is aware of any events that may require its decision-making capacity. The reporting requirements for event reporting are outlined in the CNSC REGDOC series 3.1 Reporting Requirements:

- *REGDOC-3.1.1, Reporting Requirements for Nuclear Power Plants, Version 2*
- *REGDOC-3.1.2, Reporting Requirements Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills*
- *REGDOC-3.1.3, Reporting Requirements for Class II Nuclear Facilities and Users of Prescribed Equipment, Nuclear Substances and Radiation Devices*

CNSC process document Overview of Event Initial Reporting forms part of the CNSC's Management System and outlines the process for CNSC staff for reporting an event to be reported to the Commission, if warranted.

No Subsidiary Analysis

***Subsidiary Attachments**, by Megan Tougas-Cooke @ 2019-06-24 11:58:28 AM*

Event Initial Reporting (EIR)

REGDOC-3.1.1 Reporting Requirements for Nuclear Power Plants

REGDOC-3.1.2 Reporting Requirements, Volume I Non-Power Reactor Class I Facilities and Uranium Mines and Mills

REGDOC-3.1.3 Reporting Requirements for Class II Nuclear Facilities and Users of Prescribed Equipment, Nuclear Substances and Radiation Devices

REGDOC-3.2.1 Public Information and Disclosure

Analysis

STRENGTHS FOR 03. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY

S13	*The CNSC uses a risk-informed approach in regulation of all facilities and activities to ensure the allocation of resources, assessments and inspections are commensurate with the level of risk for the facility of activity. The number of staff and financial resources dedicated to each of the sector-specific regulatory divisions is a direct and proportional reflection of the extent, nature and complexity of the nuclear facilities and activities in Canada. The relative size of the various organizational units in the core operations and the resource allocation is shaped by the review of strategic and operational plans including a risk informed assessment of regulatory oversight requirements.*
S14	*The CNSC uses an internal Technical and Scientific Organization model (IAEA TECDOC 1835) where the majority of the scientific support is provided by the CNSC's Technical Support Branch. This branch oversees much of the detailed technical analyses in direct support of the Regulatory Operations Branch. TSB provides specialized expertise in the areas of nuclear science and engineering, safety analysis, safety management, human factors, personnel training and certification, environmental and radiation protection, security, nuclear emergency management, safeguards and nuclear non-proliferation.*
S15	*The CNSC's regulatory framework balances prescriptive and performance-based requirements in an open and transparent manner.*
S16	*The CNSC integrates the best-available science in its decision-making. Where the CNSC does not have the expertise required to inform a regulatory decision, it does have the legislated*

	authority to enter into contracts with external parties or arrangements with other governmental or international bodies or agencies.
S17	*The CNSC has established formal and informal mechanisms of communication with authorized parties on all safety related issues.*
S18	*CNSC staff use a well-established safety and control area framework in order to evaluate each licensee's safety performance. This framework provides a common set of safety and control terms to ensure consistent reviews, assessments, recommendations and reporting to the Commission. This facilitates better communication among CNSC staff, licensees, the Commission, and other stakeholders.*

WEAKNESSES FOR 03. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY

W3	*No weaknesses were identified.*

OPPORTUNITIES FOR 03. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY

O3	*The CNSC is currently conducting a comprehensive review of all of the CNSC's programs to see if its investments can be further optimized, and if it can be more efficient in its delivery. The strategic review will take place over the next two years. A small team of Directors Generals from branches across the organization has been put together to do this work. This team reports directly to President and the Executive Committee. Executive Committee is a weekly informal roundtable where CNSC Executives and the President share updates on current issues. A key part of this strategic review will be asking employees for ideas on where the CNSC can make changes, improve some aspects of its work or find ways to work even more effectively.*
O4	*The CNSC has an aging workforce. The CNSC has the opportunity to use the experience of senior staff to transfer knowledge to new, less experienced staff through various internal programs, such as mentoring, the Inspector Training and Qualification Program and the Regulatory Operations Training Program.*

THREATS FOR 03. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY

T3	*No threats were identified.*

CONCLUSIONS FOR 03. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY

C3	*The CNSC is Canada's sole nuclear regulator. The CNSC, and before that the Atomic Energy Control Board, has more than 70 years of regulatory oversight experience over the nuclear industry in Canada. The CNSC was established in 2000 with the coming into force of the NSCA. The NSCA assigns to the CNSC the clear and sole authority to regulate nuclear-related facilities and activities. The CNSC is an independent quasi-judicial tribunal that reports to Parliament through the Minister of Natural Resources.* *The CNSC uses a risk-informed approach in the regulation of all facilities and activities to ensure the allocation of resources, assessments and inspections are commensurate with the level of risk for the facility or activity. The Regulatory Operations Branch is aligned with different facilities and activities regulated by the CNSC. The Technical Services Branch is the CNSC's internal technical and scientific organization and is aligned to different scientific and technical topics needed to support the Regulatory Operations Branch in the regulations of nuclear facilities.* *The CNSC's management system ensures that responsibilities assigned to the CNSC are properly discharged using core regulatory process, policies and practices.* *The CNSC is currently undergoing a comprehensive review of all of the CNSC's programs to see if it can be more efficient in the delivery of its mandate. The review will take place over the next two year. A key element of the review will include soliciting input from employees for ideas on where the CNSC can make changes, improve aspects of its work or find ways to work more efficiently.*

RECOMMENDATIONS FOR 03. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY

R3	*There are many possible changes to industry in the coming years that may impact CNSC's work including waste and decommissioning initiatives, the advent of small modular reactor applications, as well as the end of commercial production in 2024 of the Pickering Nuclear Generating Stations. These changes will affect all of staff. The CNSC should ensure that it is prepared ahead in a timely, effective, and considered way for any of these changes, while ensuring the best work environment and opportunities for employees.*

Canada's Nuclear Regulator

CNSC Management Response to the November 2009 Report of the Integrated Regulatory Review Service

Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

Canada

Suggestion / Recommendation / Good Practice	IRRS Text	CNSC Management Response	Timelines and Deliverables
MODULE 2 RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY			
S1	Consideration should be given to updating the 1998 Memorandum of Understanding with Health Canada. This update should also define the roles and responsibilities of the Federal Provincial Territorial Radiation Protection Committee (FPTRPC) to ensure that there is a comprehensive and consistent safety regulation and oversight.	The CNSC will initiate steps to engage Health Canada in the process of reviewing and updating the 1998 CNSC - Health Canada Memorandum of Understanding to ensure that comprehensive and consistent regulatory oversight of radiation safety with respect to patient safety is in place. This may include, as appropriate, formalizing the roles and responsibilities of the FPTRPC. Engagement with Health Canada and the FPTRPC was started on October 22, 2009.	March 31, 2010 for an agreed plan with Health Canada for revision of the Memorandum of Understanding
G1	The Memorandum of Understanding with Transport Canada is particularly comprehensive and could be considered as a model for similar applications.	Noted as a good practice. This practice is being applied to other memoranda and will be specifically applied to the updating of the CNSC – Health Canada Memorandum of Understanding (see S1).	
MODULE 3 ORGANIZATION OF THE REGULATORY BODY			
S2	CNSC should review its arrangements to ensure that it can adequately recover its regulatory costs.	The CNSC recovers its regulatory costs through fees (Revenue Spending Authority) and Parliamentary appropriations for fee-exempt activities. The CNSC has assessed and will continue to assess its cost recovery regime to ensure that appropriate arrangements are in place to adequately finance all regulatory operations.	March 31, 2010 for the completion of the next assessment of the CNSC's cost recovery regime.
S3	Staff from the ROB and TSB branches of CNSC may wish to review how they could work together in a more harmonized manner to ensure that security measures do not compromise safety and vice versa and to ensure continued compliance with security requirements as reviewed.	Regulatory Operations Branch (ROB) and Technical Support Branch (TSB) will conduct a review of how they can work together in a more harmonized manner. This will examine how they work together for assessments and compliance inspections that impact both safety and security, and overall communication processes to ensure that security staff and licensing/compliance staff do not work in isolation of each other. The conclusion of the review will be the formalization of the respective roles and responsibilities within the CNSC (first phase – nuclear power plants [NPP]) and the development of a generic CNSC communications protocol with licensees that addresses both safety and security (an existing Harmonized Plan initiative).	January 31, 2010 for the formalization of the internal roles / responsibilities for NPPs and completion of the generic communication protocol with licensees.

Suggestion / Recommendation / Good Practice	IRRS Text	CNSC Management Response	Timelines and Deliverables
G2	The authority of CNSC to independently define its own employment conditions is considered to be a good practice.	Noted as a good practice. The CNSC utilizes this authority to create optimal employment conditions that assist in attracting and retaining highly qualified staff.	
R1	CNSC should initiate a periodic strategic planning programme to define both short term and longer term research activities needed to support pending and potential regulatory decisions.	The CNSC will review and refocus the CNSC's research onto mission-critical knowledge areas and gaps. That is, knowledge needed to address immediate regulatory issues and potential future challenges, such as those that may be posed by advanced and experimental reactor and other facility designs, novel and sophisticated analytical tools and methods, and related advancements in fundamental science and engineering, including nuclear, physical, environmental, health and social sciences.	December 31, 2009 for the first version of the CNSC's research strategic program document
R2	Sufficient resources for research activities should be allocated to support the outcome of the strategic planning programme.	The CNSC intends to re-align the scope of its current research activities with its longer-term strategic needs (as noted in response to R1) and secure incremental funding to meet these needs. The ultimate depth and breadth of the CNSC research program will be subject to the CNSC's ability to secure additional resources.	March 31, 2010 (1st year of a multi-year budget cycle for the CNSC's revised research program)
S4	The CNSC should consider the use of issue-specific advisory bodies to support regulatory decisions where there are either new, complex technologies (e.g. emerging medical applications) or issues of high public interest.	The CNSC previously maintained standing expert advisory committees but terminated these to rely instead on its highly qualified technical staff and on ad hoc expert advisory committees, on an as required basis. However, the CNSC does recognize the value of using issue-specific advisory bodies to support regulatory decisions in complex or high public interest matters within predetermined timelines. Thus, the CNSC will implement this suggestion in appropriate situations.	Complete
G3	The arrangement between CNSC and agencies in the United States of America on the approval process of fissile material transport packages facilitates the easy import and export across their borders, and could act as a model for other countries.	Noted as a good practice. The CNSC will share its experience in this area with other countries who wish to adopt this type of model.	
MODULE 4 AUTHORIZATION			

Suggestion / Recommendation / Good Practice	IRRS Text	CNSC Management Response	Timelines and Deliverables
R3	The activities and processes identified within the Harmonized Plan for authorizations in relation to preparation of a comprehensive set of procedures, criteria and review guides should continue to be developed and should be fully implemented.	The CNSC is committed to the implementation of the activities and processes related to authorization (licensing) in the Harmonized Plan (HP). Within the HP, specific improvement initiatives related to authorization are scoped and implemented on a prioritized schedule – this will continue.	March 31, 2010 for revision of the HP outlining the schedule to complete the initiatives related to authorization
G4	The Canadian regulatory framework provides for a comprehensive and robust authorization system, and processes are in place for authorizing/licensing for all facilities and activities. There are clearly documented authorities and responsibilities either through the commission or delegated to appropriate CNSC staff, e.g. designated officers.	Noted as a good practice. The CNSC will continue to seek opportunities for improvement to maintain a robust authorization system.	
R4	CNSC should complete its licence reform project and should document processes and arrangements for Class I nuclear facilities, waste facilities, uranium mines and mills, to ensure that any change or amendment to a licence including the licensing basis does not generate disproportionate amounts of work that would not be commensurate with the potential hazard of the change being proposed.	This is the purpose of the licence reform project for all nuclear facilities and activities in Canada; this project is an in-progress initiative within the Harmonized Plan and will be completed as planned. Phase 1 is on nuclear power plant licences; the developed approach will then be applied to other nuclear facilities and activities in a phased approach (Phase 2 – nuclear cycle facilities – model and implementation plan).	Phase 1 - Completed in October 2009 Phase 2 - December 31, 2010

Suggestion / Recommendation / Good Practice	IRRS Text	CNSC Management Response	Timelines and Deliverables
S5	As part of the licence reform project CNSC should consider if alternative approaches with longer term licences and greater use of delegated powers would improve efficiency and effectiveness.	The terms of licences and the use of delegated powers to CNSC staff are being considered within the licence reform project. Any decision regarding changes to licence terms or the use of delegated powers will ultimately lie with the Commission. Phase 1 is on nuclear power plant licences; the developed approach will then be applied to other nuclear facilities and activities in a phased approach (Phase 2 – nuclear cycle facilities), including an assessment of existing staff guidance on licence terms.	Phase 1 –Completed in October 2009 Phase 2 - December 31, 2010
R5	CNSC should consider how to introduce effective arrangements for undertaking periodic safety reviews (PSRs) for these Class-1 facilities. Such PSRs should be proportionate and commensurate to the hazards to be controlled.	The CNSC will undertake an approach to introduce PSRs to Class 1 facilities (commensurate with the hazards posed by the respective facilities). The CNSC will build upon experience gained to-date with refurbishment projects that have been performed, are underway, or are planning to be performed, related to the current fleet of nuclear power plants using Integrated Safety Reviews (ISRs). ISRs are one-time applications of the IAEA PSR process, described in NS-G-2.10, to a refurbishment project. It is anticipated that full adoption of such a process in Canada would be introduced and implemented over a period of several years. Any decision on the use of Periodic Safety Reviews will ultimately lie with the Commission. See also S6.	December 31, 2010 for a formal recommendation on the introduction of PSRs from CNSC staff to the Commission including implementation timelines
S6	Such PSRs should follow all of the elements set out in IAEA guides including the adoption of PSA (probabilistic safety analysis) for nuclear power plants (IAEA NS-G-2.10 or other appropriate safety guidance).	In preparing a comprehensive PSR implementation strategy, relevant IAEA guides will be used as a basis. A PSR implementation project will build on: a) CNSC information and documentation and relevant IAEA documents, particularly the adoption of PSAs, as appropriate, as an important element of a PSR, b) experience gained to date in the implementation of Integrated Safety Reviews (ISRs) for completed re-start projects and on-going life extension projects, c) international experience and lessons learnt in implementation of PSRs, d) active engagement of international regulatory organizations while preparing the comprehensive implementation strategy, e) integrating inputs from the industry regularly and consistently, and f) results of the “Licence Reform Project”.	December 31, 2010 for a formal recommendation on the introduction of PSRs from CNSC staff to the Commission, including implementation timelines

Suggestion / Recommendation / Good Practice	IRRS Text	CNSC Management Response	Timelines and Deliverables
S7	The CNSC should complete the project for Safe Operating Envelope (SOE) and consider including its results into the licence limiting conditions for operation (LCOs) as an extension to OP&Ps for nuclear power plants.	The CNSC has initiated a SOE project which aims to establish regulatory requirements related to the development, by nuclear power plant (NPP) licensees, of an SOE for their respective NPPs. Phase 1 comprises the development of an SOE definition, composition and objective (DCO). Phase 2 comprises the development of an SOE methodology position paper.	Phase 1 -completed in August 2009 Phase 2 - March 31, 2010
S8	CNSC should review and continue adopting a consistent process for confirming competence of operators of facilities commensurate with the risks / hazards posed by the facilities.	The CNSC will continue to review, and adapt as reasonably practicable, a consistent process for confirming competence of operators of facilities commensurate with the risks / hazards they represent. Subsequent to the recent regulatory change to authorize nuclear power plant (NPP) licensees to administer certification examinations, CNSC staff will continue to enhance its regulatory oversight of the training and examination of key safety-related personnel at NPPs. This will be achieved by continued verification of the licensees' programs and processes for the initial and renewal of certification and by reporting their compliance performance against CNSC regulatory requirements. Upon completing the implementation of this regulatory change, CNSC staff will assess the feasibility of extending this authorization to other licensees of limited personnel resources. CNSC will continue to certify all persons occupying key safety-related positions at nuclear power plants, non-power reactors and research reactors through a consistent certification process based upon verification of the SAT-based training programs and equitable examinations processes.	July 31, 2010 for continued enhanced regulatory oversight of the training and examination of key safety-related personnel at NPPs; December 31, 2010 for completion of the feasibility assessment of extending this authorization to other licensees
R6	CNSC should continue and complete its preparation of relevant documentation to support the authorization process (licensing process) for new build.	The CNSC has a comprehensive plan for the preparation of licensing process documentation, regulatory documents and guides, application guides and forms, and staff review guides. The plan will be updated within the CNSC's next planning cycle.	March 31, 2010 for the update of the plan for the 2010/2011 planning cycle

Suggestion / Recommendation / Good Practice	IRRS Text	CNSC Management Response	Timelines and Deliverables
S9	The CNSC should refine existing plans and confirm its organizational readiness (e.g. structure, staffing, skills) to support the transition from the project planning phase to the technical review of new design applications, inspection of construction activities and oversight of the start-up and operations.	The CNSC is continually revisiting its organizational readiness for new build projects. - Organizational readiness – work has progressed on the needed regulatory documentation (e.g., guidance documents, application guides, application forms, staff review guides, etc.) in preparation for review and assessment work. In parallel, the CNSC has commenced work on the compliance program that will be used once the projects move from the design stage to construction, commissioning and operations. - Transition - work has commenced in identifying organization design requirements, staffing complements and skill sets for inspectors to implement the compliance program. - A comprehensive project plan is being developed that outlines the strategic steps needed to assure organizational readiness as the new build progam progresses from siting to construction to operation.	March 31, 2010 for version 0 of a comprehensive project plan
MODULE 5 REVIEW AND ASSESSMENT			
G5	The use of Facility Assessment Compliance Teams provides an integrated multi-disciplinary approach to the assessment of licensing actions.	Noted as a good practice. The Facility Assessment and Compliance Teams (FACT) are used to manage the assessment of licensing actions in an effort to ensure that a risk-informed approach continues to be implemented.	
S10	CNSC should review regulatory documents to resolve conflicts associated with updating the final safety analysis report and maintaining the licensing basis. *(see recommendation R4)*	The CNSC has reviewed this issue - all documents referenced in the Licensing Basis of any nuclear facility are subject to version control and an approved document change control process; the final safety analysis report (FSAR) has been confirmed to be managed within that process; this approach prevents conflicts between updating the FSAR and maintaining the licensing basis.	Complete
G6	The development and use by CNSC of processes and tools for risk informed decision making.	Noted as a good practice. The risk-informed decision making process will continue to be used and improved where necessary.	
G7	CNSC's expectations for scheduled reporting of research and development activities.	Noted as a good practice. This is done to ensure that the CNSC is fully cognizant of licensee research programs such that the CNSC can input to those programs if they are deemed to be deficient. The CNSC will continue with this practice.	

Suggestion / Recommendation / Good Practice	IRRS Text	CNSC Management Response	Timelines and Deliverables
G8	The review process for authorization of a licence [for medical, industrial, and research activities] is based on well established comprehensive guidelines and transparent procedures. The formalized assessment process includes an initial review, peer review and review prior to the Designated Officer issuing the licence.	Noted as a good practice. Due to the volume of applications reviewed in the medical, academic and industrial sectors, it is necessary to have well formulated processes that are effective and efficient. The CNSC will continue to improve these processes to achieve more efficiency gains (see also G10).	
G9	CNSC regulatory guidance, including draft or proposed regulatory guidance is available to the applicant and licensees [for medical, industrial, and research activities]. This information provides the licensee with a very clear and transparent overview of their responsibilities. Licensees reported that CNSC staff were very approachable and attentive to their needs.	Noted as a good practice. The emphasis with this practice is to have an open and transparent licensing regime where licensees/applicants have a clear understanding of regulatory requirements (one of the CNSC's strategic goals) such that they are able to meet the requirements in an effective manner. This CNSC will continue with this practice.	
G10	CNSC has an impressive evaluation process for supporting the issuance of a licence [for medical, industrial, and research activities]. The evaluation takes account of expectations of the licensee and is based on detailed and transparent assessment of the hazard associated with the activity.	Noted as a good practice. Due to the volume of applications reviewed in the medical, academic and industrial sectors, it is necessary to have well formulated processes that are effective and efficient. The CNSC will continue to improve these processes to achieve more efficiency gains (see also G8).	

MODULE 6 INSPECTION AND ENFORCEMENT			
G11	The targeted use of inspections to focus limited regulatory resources on poor performance is an excellent example of optimization of regulatory resources to encourage licensees to improve their regulatory performance.	Noted as a good practice. This is an example of a risk-informed approach to inspection. This practice will continue.	
S11	CNSC should maintain progress in further developing IT tools for action tracking under the Harmonized Plan.	Harmonized Plan initiative "Action Tracking Tool (ATT) Part II" is an in-progress initiative designed to address this particular issue. It will be completed as planned.	July 2010 for completion of the ATT Part II initiative
R7	CNSC should include in the baseline inspection plan how the licensee executes the supervision of safety system operability status as defined in the Licensing Basis.	The CNSC reviews and revises its baseline inspection plan on an annual basis (most recently reviewed in September 2009) to ensure that licensees correctly verify the operability of the special safety systems (being SDS1, SDS2, ECCS and Containment) for NPPs. This includes desktop reviews of licensee documentation and independent field inspections of the operability of the special safety systems which will detect any weaknesses in the manner in which licensees execute their own supervisory programs related to safety system operability. The focus is to ensure that, on an ongoing basis, the baseline inspection plan remains effective and efficient.	Complete
R8	CNSC should review and establish coherent and consistent arrangements for the conduct of inspections in Class I Facilities between and within the service lines.	The initiative "Conduct Inspections" within the Harmonized Plan is focused on formalizing procedures, templates and guides aimed at a consistent and coherent approach to inspections (planning and conduct) of all nuclear facilities and activities.	October 31, 2010 for completion of the Conduct Inspections initiative
R9	CNSC should establish a process for maintaining continuity of actions and consistency of priorities following changes to the CNSC staff.	Harmonized Plan initiative "Action Tracking Tool (ATT) Part II" (see S11) is an in-progress initiative designed to maintain a central registry of regulatory actions, their risk significance and thus their regulatory priority to ensure continuity of actions and consistency of priorities following changes to CNSC staff. It will be completed as planned.	July 2010 for completion of the ATT Part II initiative
G12	The CERTS application developed for event inspection, assessment and corrective action tracking constitutes an efficient tool for event tracking, related inspections and corrective actions.	Noted as a good practice. This CNSC will continue with this practice.	

S12	Strategies, processes and methods should be established to ensure the objectivity and independence of the site inspector. Consideration should be given to changing the site to which they are assigned from time to time or giving them general duties at headquarters.	CNSC hiring practices and candidate profiles, training on ethics, supervision, management oversight and work practices have been assessed to ensure that they maintain the objectivity and independence of CNSC site inspectors. Assignments, voluntary moves and work terms at other sites and headquarters continue to be encouraged, planned and budgeted for. Inspectors welcome the chance to compare work methods and expectations. Technical support divisions staff based in headquarters who cover more than one site within their specialty area look for uniformity in staff regulatory coverage among nuclear generating stations. CNSC Management reviews inspector assignments on a routine basis	Complete
G13	The implementation of a robust and detailed inspection programme [for radiation facilities (medical, industrial, and research)] associated with high quality consistent documentation and a database carried out by CNSC allow a high level of feedback into the regulatory process.	Noted as a good practice. Due to the volume of licensees in the medical, academic and industrial sectors, it is necessary to have a well formulated inspection program that is effective and efficient. The CNSC will continue to improve this program when opportunities arise.	
G14	The use of a Licensing and Inspection Mapping System is an excellent method for tracking compliance and maintaining continuity from inspection to inspection. It is also valuable tool for knowledge transfer as the history of a licensee's performance is recorded in the database.	Noted as a good practice. As stated in R10, the CNSC will be replacing this system with an enterprise (cross-CNSC) system such that this capability will be available to all staff at the CNSC.	
R10	The Licensing and Inspection Mapping System should be integrated into the CNSC action tracking tool to assist planning and compliance monitoring activities.	This system is a stand alone system being used in the CNSC's Saskatoon Regional Office. Harmonized Plan initiative "Action Tracking Tool (ATT) Part II" is an in-progress initiative designed to address this particular issue from an enterprise (cross-CNSC) perspective. It will be completed as planned and the Saskatoon system will be removed from service.	July 2010 for completion of the ATT Part II initiative
MODULE 7 DEVELOPMENT OF REGULATIONS AND GUIDES			
S13	CNSC should review and adopt a consistent terminology for its regulatory guides.	The CNSC will review and adopt a consistent terminology for all of its regulatory documentation.	December 31, 2009 for a recommendation from CNSC staff to the

			Commission on the terminology related to Regulatory Documents and Guidance Documents
S14	CNSC should systematically carry out regular periodic review of the published regulations and guides. Then the need for revision of the all regulation and guidance material should be evaluated and on the basis of the evaluation the defined revision steps should be taken.	The CNSC recognizes that a systematic, regular review of existing regulations and regulatory documents and guides is essential to ensure that Canada's nuclear regulatory regime is up-to-date and reflects changes in technology and international practices in nuclear regulation, and meets the needs of Canadians. The CNSC's current three-year Business Plan for the regulatory framework includes a review of existing regulatory documents, guides and regulations in the Fall of 2009. Regulatory documents and guides will be retired or scheduled for review, taking into account corporate priorities and the availability of resources. New regulatory documents and guides to be developed will also be identified along with new regulations or amendments to existing regulations.	March 31, 2010 for the update of the plan for the 2010/2011 planning cycle
G15	Where appropriate the CNSC adopts or adapts national and international standards when developing regulatory requirements. The Canadian government promotes participation in standard setting activities of the IAEA and to the Canadian Standards Association.	Noted as a good practice. The CNSC will continue to draw upon national and international standards where appropriate when developing regulatory requirements.	
S15	To support knowledge management the CNSC should extend the concept of its internal staff review guides to cover all key areas of its function.	A key project under the Harmonized Plan is the development and documentation of the process, procedures and criteria for the conduct of technical assessments. This will extend the concept of internal staff review guides to all regulated facilities and activities and all technical areas.	June 30, 2010 for the completion of the first phase of the Conduct Technical Assessments initiative
G16	The Regulation Making Process is very open and transparent with extensive pre-consultations built into the process. Interested parties are consulted already before starting to draft the regulation.	Noted as a good practice. The CNSC shares this practice on a regular basis with other departments and agencies who wish to improve their respective regulation making processes.	

R11	CNSC should improve its regulatory framework including regulatory documents and guides with respect to radioactive waste management to ensure that radioactive waste is managed in a consistent manner.	The CNSC Policy on Managing Radioactive Waste (P-290) contains the overall approach to regulation of radioactive waste in Canada. The CNSC will review this policy along with other current regulatory documents on radioactive waste management as part of the periodic review of regulations and guides (see response to S14). This will include a gap analysis of the overall regulatory framework on radioactive waste management and a plan for any new or updated regulations or guides	March 31, 2010 for completion of the gap analysis and the preparation of a plan forward
MODULE 8 MANAGEMENT SYSTEM			
R12	CNSC should more clearly envelope and timeframe the remaining efforts to complete the Management System according to GS-R-3 and for that purpose update the Harmonized Plan.	A critical review of the remaining work required to align the CNSC's Management System with GS-R-3 will be completed in the fall of 2009 followed by the next revision of the Harmonized Plan to establish firm timelines.	December 15, 2009 for the completion of the next HP revision
R13	CNSC should develop a methodology and implement Management System reviews to be conducted at planned intervals by internal or/and external resources. This programme should ensure the continuing suitability and effectiveness of the Management System as a whole and its ability to enable the objectives of the organization to be met. One important factor to be reviewed in this perspective is the application of the graded (risk-informed) approach to the regulation of facilities and activities	The CNSC plans on conducting a complete review of the Management System (MS) in the next fiscal year (2010/11). The review will include a review of the suitability, effectiveness of the MS, its alignment with organizational objectives and the effectiveness in applying a graded (risk-informed) approach in the regulatory activities.	March 31, 2011 for completion of the review of the MS
S16	CNSC should continue integration of its strategic and annual planning processes as well as its in year control and monitoring processes for better invoices to licensees and to ensure alignment and reallocation of resources according to corporate priorities. For this purpose CNSC should consider the integrated use of performance indicators for each programme activity and related processes.	The organization has been working toward establishing fully integrated planning and performance management processes and tools. This encompasses the creation of strategic plans and objectives and their translation to multi-year and annual activity plans that are linked to clear performance targets and objectives. The processes will also include continual monitoring of plan execution, performance and evolving external factors that are important to making timely and informed adjustments to regulatory plans and activities, both in-year and longer-term. Strategic Planning for the period 2010-2015 (supported by an environmental scan and corporate risk profile) is underway. An improved process for monitoring and mid-year review, re-forecasting and adjustment of current fiscal year work plans to address evolving pressures and strategic priorities is being developed and implemented.	April 30, 2010 for the strategic plan and October 31, 2010 for the process for monitoring, mid-year review, re-forecasting and adjustment

S17	CNSC should supplement the internal audit programme in order to provide feedback to senior management on the development and implementation (and output) of the Management System processes. To support this programme, a number of internal auditors representing different parts of the organization could be used. In connection with the audit programme, a systematic approach to the management of non-conformances and potential non-conformances of processes and products should be developed and formalized.	The CNSC's Internal Audit function takes into consideration the Management System (MS) processes as part of the audit universe during the annual development / update to the risk-based audit plan. The CNSC will identify staff from across the organization to conduct self-assessment of MS processes. In addition, these same resources will act as liaison to solicit employee feedback, identify non-conformances and facilitate the identification and implementation of Management System improvements through a formal change management process. This will be completed as an initiative under the Harmonized Plan.	March 31, 2010 for a plan to introduce staff-based internal assessors; December 31, 2010 for the completion of a formal change management process
R14	CNSC should implement a mechanism to regularly identify opportunities for improvement of the Management System and should evaluate the effectiveness of the improvement actions.	As noted in response to suggestion S17, the CNSC will continue to identify the opportunities for improvement of the MS through self-assessment exercises and internal audits. In addition, the CNSC will enhance the Management System intranet site and introduce a bulletin board to provide another mechanism for staff to provide feedback and identify opportunities for improvement. CNSC management will evaluate the effectiveness of the improvement action plans to determine whether any further improvements are needed.	March 31, 2010 for the establishment of a feedback mechanism on the CNSC's intranet site (BORIS)
G17	The Harmonized Plan developed by CNSC is an excellent tool for driving improvement initiatives across the organization with clear management commitment and allocation of resources and is supported by a communications strategy.	Noted as a good practice. The CNSC will continue to use the Harmonized Plan (HP) as a vehicle for improvement initiatives. Additionally, the CNSC is sharing our HP experiences with international regulators who are in the process of managing similar improvement plans.	
CODE OF CONDUCT ON SAFETY AND SECURITY OF RADIOACTIVE SOURCE			
G18	The CNSC's on-line sealed source tracking system is outstanding, and provides an excellent model for others to follow.	Noted as a good practice. The CNSC's sealed source tracking system has been shared with international nuclear regulators who are putting their own systems into place to meet the requirements of the Code of Conduct for the Safety and Security of Radioactive Sources.	

S18	In order to encourage bodies and persons likely to encounter an orphan source to promptly report it, CNSC could consider offering a cost-free recovery service to ensure that found sources are not re-orphaned, recognizing that this would require additional funds so as not to impose a financial burden on CNSC.	On a case-by-case basis, the CNSC assesses and implements the most appropriate path forward, on a risk-informed basis, when orphaned sources are found. In response to the broader regulatory issues associated with orphaned sources, the CNSC plans to conduct a comprehensive analysis of its current regulatory process, including financial guarantees, in order to identify possible gaps in regulatory controls and explore improved ways for facilitating the reporting and recovering of orphan sources in Canada.	June 30, 2010 for the development of the action plan
G19	The implementation of bilateral agreements is an important initiative in order to fully implement the provisions of the Code of Conduct concerning import and export of radioactive sources.	Noted as a good practice. This practice will continue in support of the CNSC's implementation of the Code of Conduct for the Safety and Security of Radioactive Sources.	

Khan, Muhammad Atif

From: Roy, Bibi
Sent: September 22, 2022 12:16 PM
To: Murphy, Shawn; Hanna, Kyle
Subject: FW: ENVI - Nuclear Waste Governance in Canada Report Tabled (Government Response Requested)

FYI/A

From: Velshi, Rumina <rumina.velshi@cnsc-ccsn.gc.ca>
Sent: September 22, 2022 12:13 PM
To: CNSC.F ExecutiveTeamMembers / MembresdelÉquipedeDirection F.CCSN <cnsc.cdl-executiveteammembers-membresdelequipededirection.ccsn@cnsc-ccsn.gc.ca>; Roy, Bibi <bidyunmala.roy@cnsc-ccsn.gc.ca>; Walker-Sisttie, Rhonda <rhonda.walker-sisttie@cnsc-ccsn.gc.ca>
Subject: Fwd: ENVI - Nuclear Waste Governance in Canada Report Tabled (Government Response Requested)

Fyi. We'll set up time at an upcoming ET mtg to discuss.
In the meantime- our messaging in response to the (timely) OAG audit may need fine tuning.

Rumina

Begin forwarded message:

> **From:** "Tosh Kennedy, Tara" <Tara.ToshKennedy@nrcan-rncan.gc.ca>
> **Date:** September 22, 2022 at 5:44:30 PM GMT+2
> **To:** Jim Delaney <jim.delaney@nrcan-rncan.gc.ca>, "Hannah, Justin" <Justin.Hannah@nrcan-rncan.gc.ca>, "Johnson, Mollie" <Mollie.Johnson@nrcan-rncan.gc.ca>, "Jammal, Ramzi" <Ramzi.Jammal@cnsc-ccsn.gc.ca>, "Murthy, Kavita" <Kavita.Murthy@cnsc-ccsn.gc.ca>, "Velshi, Rumina" <rumina.velshi@cnsc-ccsn.gc.ca>, fdermarkar@aecl.ca, Alastair MacDonald <amacdonald@aecl.ca>
> **Cc:** "Lampsos, Nayla" <nayla.lampsos@nrcan-rncan.gc.ca>, "Alkema, Kait" <kait.alkema@nrcan-rncan.gc.ca>, "Macdonald, Neale" <Neale.Macdonald@nrcan-rncan.gc.ca>, "ESS-ADMO / SSE-BSMA (NRCAN/RNCAN)" <ess-admo-sse-bsma@nrcan-rncan.gc.ca>, "Czerneda, Jennifer" <Jennifer.Czerneda@cnsc-ccsn.gc.ca>, Jason Cameron <jcameron@aecl.ca>, Ross.McGhie@pco-bcp.gc.ca, "NRCAN.F CPS.M ADMO / SCP.M BSMA F.RNCAN" <nrcan.cps.madmo-scp.mbsma.rncan@nrcan-rncan.gc.ca>
> **Subject: ENVI - Nuclear Waste Governance in Canada Report Tabled (Government Response Requested)**

> EXTERNAL EMAIL – USE CAUTION / COURRIEL EXTERNE – FAITES PREUVE DE PRUDENCE

> Good morning all,
>
> From February to June 2022, the House Committee on the Environment and Sustainable Resources (ENVI) undertook a study on nuclear waste governance in Canada. The Committee held 13 meetings on

s.69(1)(e)
s.69(1)(g)

this topic between February and June, during which it heard from 28 witnesses, including NRCan, CNSC and AECL officials. Transcripts for each meeting can be found here.

Yesterday, ENVI tabled its report on this study in the House of Commons. The report can be found here.

The report includes a request for a government response (GR) within 120 calendar days (mid January 2023). PCO will assign a lead in the coming days, however, NRCan will *likely* be the lead. [redacted] Although no action is required on your part at this time, please accept this e-mail as a heads-up.

Summary of report recommendations

For the Auditor General:

1. That the Auditor General do a public audit of how Canada handles radioactive waste

For government:

2. That the Government prioritize building a deep geological repository
3. That the Government use science as the foundation of all future decision-making about radioactive waste management
4. That the Government invest in nuclear waste research around reduction, reuse and recycling
5. That the Government develop a consultation framework with Indigenous communities
6. That the Government invest in science-based public education on nuclear energy and waste storage

For NRCan and the Canadian Nuclear Safety Commission (CNSC):

1. That NRCan and others follow the International Atomic Energy Agency (IAEA) standards and provide public rationale when they don't
2. That the CNSC follow IAEA standards and practices, provide public rationale when they don't, and implement recommendations from a 2019 audit
3. That NRCan and CNSC provide more public details about Canada's radioactive waste
4. That NRCan and CNSC work with Library and Archives Canada to take in and house reports from the OECD's Nuclear Energy Agency's Radioactive Waste Management Committee
5. That NRCan and CNSC (and Atomic Energy of Canada Limited (AECL), AECL's contractor Canadian Nuclear Laboratories, and the Nuclear Waste Management Organization) review their communications and websites to be transparent, easy to understand, and easy to navigate around the issue of radioactive waste.

For research:

1. That all R&D around small modular reactors document and categorize all radioactive waste that will be generated and plan how to manage it

Supplementary party opinions

The Bloc Québécois felt that some points in the report needed more attention, including:

2. their desire to have the Minister of Natural Resources suspend the licensing process for the Chalk River/Rolphton project,
3. the appearance of an alleged conflict of interest between the CNSC and Department of Natural Resources,
4. their recommendation that the CNSC report to parliament through the Minister of the Environment and Climate Change and the Minister of Natural Resources

5. their recommendation that the government (through the Department of Natural Resources) review its governance practices on the boards of directors of AECL and the CNSC
6. their recommendation that Natural Resources Canada, in the renewal of its *Radioactive Waste Policy Framework* currently underway, work with Atomic Energy of Canada Limited to identify sites specifically for intermediate level radioactive waste
7. their recommendation that Natural Resources Canada require AECL and Canadian Nuclear Laboratories to do a study on best practices for the permanent burial of low-level waste
8. their recommendation that the Government prohibit all reprocessing of used fuel and plutonium extraction

The NDP:

1. supported the recommendation heard from many witnesses and briefs, and the Seaborn Panel, to have a body independent from industry manage radioactive waste
2. recommend the government do an environmental assessment of radioactive waste projects in the Ottawa Valley under the *Impact Assessment Act*
3. felt that radioactive waste should be perpetually stewarded, instead of eventually abandoned
4. recommended that the government revise Natural Resources Canada's *Draft Policy for Radioactive Waste Management and Decommissioning* to ensure that no reprocessing of high-level radioactive waste or extraction of plutonium is allowed in Canada
5. would like the study's recommendation around more research in reducing, reusing, and recycling radioactive waste to also address concerns around reprocessing and plutonium extraction
6. recommended the government develop regulatory restrictions on importing foreign high-level radioactive waste
7. recommended the government restore AECL as a Crown corporation to ensure public control and oversight

If you have any questions, please don't hesitate to contact me.

Tara

Tara Tosh Kennedy (she/her)
Parliamentary Affairs / Affaires parlementaires
NRCan / RNCan
343-543-6224

House Committee on Environment and Sustainable Development
Meeting on "Nuclear Waste Governance" in Canada

Proposed Responses to Anticipated Questions

February 3, 2022

STUDY FOCUS:

Nuclear waste governance in Canada and its impacts on the environment, including the issues raised by the import of these wastes and the trade in medical technologies

KEY MESSAGES:

- Through strong regulatory oversight, radioactive wastes in Canada have been, are and will continue to be managed safely
- Canada's regulatory framework for radioactive wastes is aligned with federal government policy and international standards
- Waste producers and owners are responsible for funding and ensuring the safe management of radioactive wastes
- No applicants for nuclear projects in Canada, including radioactive waste projects, will be issued a licence or allowed to operate unless they are demonstrated to be safe for people and the environment
- Dedicated regulatory staff ensure licensees are in compliance with requirements placed on them through the CNSC's regulatory framework
- We recognize that the issue of radioactive waste is one of interest or concern for many Canadians, and we make great efforts to provide clear information while encouraging and enabling meaningful involvement in our regulatory processes

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6. **International Alignment, Cooperation and Oversight**
   6.1. What are the international best practices for the management of radioactive waste?
   6.2. What measures does the CNSC take to ensure alignment with international best practices? **NANCY**
   6.3. How does the CNSC ensure conformity with international obligations for safeguarding radioactive wastes? **DAVID**

7. **Committee Directed Themes**
   7.1. Import of radioactive waste: Does Canada permit the importation of radioactive waste?
   7.2. Trade of radioactive waste in medical technologies: Does Canada allow the import of medical technologies that contain or are radioactive waste?

8. **Innovative approaches and SMRs**
   8.1. What if organizations implement innovative waste technologies, will you be able to regulate these?
   8.2. How will radioactive waste from SMRs be managed? **NANCY**; **SARAH**

9. **Radioactive Waste Projects**
   9.1. Near Surface Disposal Facility
   9.2. Nuclear Power Demonstration Closure Project
   9.3. Whiteshell Reactor-1
   9.4. Port Hope Area Initiative **NANCY**
   9.5. Mississauga Metals and Alloys
   9.6. Gunnar Mine and Mill Site
   9.7. Nuclear Waste Management Organization Adaptive Phased Management Initiative
   9.8. Ontario Power Generation's Deep Geologic Repository for Low- and Intermediate-Level Radioactive Waste
   9.9. Bruce Power Steam Generator
   9.10. Gentilly-2 Used Nuclear Fuel

1. General

- Canada's radioactive wastes have been managed safely for many decades under strong regulatory oversight
- The focus and priority at all times is protecting health, safety, security and the environment
- No projects are approved unless applicants can demonstrate that they will conduct their activities safely
- Many Canadians have concerns or interests related to radioactive wastes and the CNSC's public processes, including funding support for eligible recipients, ensures all perspectives are welcome and considered
- Long-term management of radioactive waste is a priority issue for all nuclear countries

1.1. What is considered radioactive waste?

- Under the CNSC's enabling legislation, the *Nuclear Safety and Control Act* (NSCA), radioactive waste in Canada is defined as any material, including liquids, gases, sludges and solids, that contains a radioactive nuclear substance for which no further use is foreseen.
- The CNSC regulates all steps in the management of radioactive wastes in Canada, including their generation, handling, processing, transport, storage and disposal in order to prevent unreasonable risk to health, safety and security of persons and the environment.

1.2. How does the CNSC regulate radioactive waste in Canada?

- The CNSC's regulatory framework sets out the requirements for managing radioactive waste in Canada and provides guidance on meeting the requirements.
- Licences issued by the Commission include any conditions that licensees must abide by.
- CNSC staff monitors and inspects radioactive waste management facilities to verify compliance with regulatory requirements and licence conditions.
- CNSC staff ensure that any non-compliances are addressed, and if necessary, refer issues of non-compliance to the Commission.

1.3. How much radioactive waste is in Canada?

- That question is most appropriately addressed by Natural Resources Canada

IF PRESSED

- Every 3 years, Natural Resources Canada collects, compiles and analyzes inventory data for radioactive waste managed in Canada and publishes the related information publicly in an inventory.

- That inventory provides an overview of the production, accumulation and future projections of radioactive waste in Canada based on our 4 general waste classes.
- This information is also provided to the International Atomic Energy Agency's radioactive waste management database, which tracks low- and intermediate-level radioactive waste worldwide.
- According to NRCan's Inventory of Radioactive Waste in Canada 2019 Report there are 2,553,069 m3 of radioactive waste in Canada excluding uranium mine and mill tailings and waste rock.
- Approximately 99% of this waste is low-level.

1.4. What is the current method of storing radioactive waste in Canada?

- In Canada, high-, intermediate-, and low-level radioactive wastes are currently managed in interim storage facilities that are safe, secure and environmentally sound.
- These facilities are continually monitored by the licensees and the CNSC to ensure fitness for service.
- Uranium mine and mill tailings, in general, are managed for the long-term in near-surface facilities adjacent to mines and mills, due to the large volumes of waste generated in mining and milling operations.

1.5. What are the classifications of radioactive waste?

- There are 4 general classes of radioactive waste in Canada
    - High-level
    - Intermediate-level
    - Low-level and
    - Uranium mine and mill tailings
- This waste is classified according to the degree of containment and isolation that is required to ensure safety in the short and long terms, as well as its hazard potential.
- High, intermediate, and low-level radioactive wastes originate from various sources including nuclear power plants, prototype and research reactors, nuclear test facilities, radioisotope manufacturers and users, uranium refining and conversion, and nuclear fuel fabrication.
- Uranium mine and mill tailings and waste rock arise from the mining and milling of uranium ore.

1.6. Are any radioactive wastes exempt from CNSC regulation?

- Select radioactive wastes are exempt from the CNSC's regulation, including naturally occurring radioactive material, wastes from military and defence programs, and nuclear substances specified in CNSC regulatory documents.

1.7. How many locations manage radioactive waste in Canada?

- Presently, there are 28 facilities, locations and sites in Canada that manage radioactive wastes.
- The full list is available on the CNSC website and I would be happy to provide the list to the Committee.

SUPPLEMENTARY

- 16 are authorized to manage high-level waste
- 9 are authorized to manage intermediate-level waste
- 16 are authorized to manage low-level waste
- Uranium mine and mill tailings are managed at X locations (sites?)

1.8. How does the CNSC track waste in Canada?

- Inventory keeping is fundamental to the safe management of radioactive wastes and is a primary responsibility of licensees.
- The CNSC's requirements for inventory keeping are found throughout our regulatory framework, including regulations, licences and Licence Conditions Handbooks, and regulatory documents.
- What is the process?

1.9. How is radioactive waste transported in Canada?

- Radioactive wastes in Canada are transported in CNSC-certified transport packages.
- Particular interest and concern is often directed toward the transport of used nuclear fuel.
- Used nuclear fuel is transported in very robust, CNSC-certified transport packages that are designed, tested and certified to retain their contents under accident conditions.
- The transport of used nuclear fuel must meet the CNSC's and Transport Canada's stringent requirements, and be transported by qualified carriers.
- Used nuclear fuel has been transported safely within Canada and internationally for over 45 years by road, rail, water and air without a single radiological incident.

SUPPLEMENTARY

- Transferring waste from the point of origin to a storage site is subject to stringent control and is only done in the safest possible manner.
- Controls can include transporting used nuclear fuel at extremely low speeds on dedicated transit routes, which are physically controlled during transfer, and prohibiting the transfer of spent fuel during inclement weather, including high winds and periods of rain or snow.

- Packages used in the transport of radioactive materials are designed to withstand accidents during transportation to ensure containment and are inspected and tested routinely to confirm their integrity.

2. Environmental Impacts

- Preventing environmental impacts from the production or management of radioactive wastes is the priority of everyone involved at all times
- Emergency response plans are in place to respond to any releases to the environment
- Historically, some radioactive wastes were not managed in a manner that would be acceptable today
- Under the Government of Canada's policy direction, and the CNSC's robust regulatory framework and strong regulatory oversight, environmental protection will remain the focus at all times
- No licence will ever be issued unless a proposed radioactive waste management facility or activity can be demonstrated to be conducted without unreasonable impacts to the environment

2.1. Who is responsible for protecting the environment from radioactive waste?

- Waste owners are responsible for funding, organizing, managing and operating facilities required to safely manage their wastes over the short and long terms.
- With respect to regulating radioactive wastes, the CNSC's mandate is to prevent unreasonable risk to the health and safety of persons and the environment.
- We ensure that waste owners are conducting their activities in accordance with the requirements and guidance of our regulatory framework and the conditions of their licences.
- If there is a risk to health, safety, security or the environment, or Canada's international obligations on the peaceful use of nuclear energy and technology, the CNSC has the authority to order a licensee to cease their activities.
- Environmental protection is a shared federal-provincial responsibility. We cooperate with other jurisdictions and departments, and where appropriate, enter into formal arrangements to protect the environment more effectively and to coordinate regulatory oversight.

2.2. How does the CNSC monitor the effects of radioactive waste on the environment?

-

2.3. How many releases to the environment have occurred from radioactive waste licensees?

-

2.4. For new radioactive waste projects, who is responsible for conducting the environmental assessment/impact assessment?

-

3. Trust in the Regulatory Process

- Building trust in the CNSC as Canada's nuclear regulator is a key priority
- We know that trust must be earned, and are focused on building long-lasting and meaningful relationships with Indigenous nations and communities, and host and potential host communities
- Better understanding the issues of interest and concern for these communities, and working together to try and address them, will hopefully help build trust that the CNSC is focused on safety and environmental protection at all times
- Building social acceptance for proposed nuclear projects is not the CNCS's responsibility, it is the responsibility of project proponents, who must also make great efforts to building meaningful relationships
- The CNSC's public and inclusive regulatory processes welcomes all perspectives, knowledge and information, and provides funding support to eligible recipients to enhance their participation

3.1. How does the CNSC consult with potential host community and local Indigenous groups when considering a proponent's licence application?

- The CNSC's regulatory processes are open, transparent and inclusive.
- Host communities, potential host communities and Indigenous nations and communities are engaged and consulted on every major project, including radioactive waste projects.
- As a lifecycle regulator, building meaningful and enduring relationships with these communities is a top priority, so that we can understand and try and address issues of concern and to build trust in us as the regulator.
- Licensing hearings, which are conducted publicly, provide another opportunity for communities to share their perspectives and information.
- We provide participant funding to eligible recipients to support their participation in our regulatory processes.

3.2. How does the CNSC work with Indigenous groups to understand and honour Indigenous perspectives and knowledge?

- The CNSC is fully committed to reconciliation with Indigenous peoples in Canada, and part of that commitment is to work to build meaningful and long-lasting relationships with Indigenous nations and communities that could be potentially impacted by or are interested in projects.
- We enter into collaborative agreements with Indigenous nations and communities to help guide our relationship building.

- We provide funding support to enhance capacity to participate in our processes.
- And we welcome Indigenous knowledge, science and perspectives on all projects – potential, proposed and existing – that may impact Indigenous communities and nations, or are of interest to them.

3.3. What is the process if a community or Indigenous group objects to the transportation or storage of radioactive waste in their community?

- The CNSC is responsible for considering licence applications and making decisions to issue licences or not depending on the information received, including potential impacts to health, safety, security and the environment, and to potential or established Indigenous or treaty rights.
- It is the project proponents who are responsible for building relationships and working with communities, Indigenous and non-Indigenous, to earn social acceptance for their projects.

4. Transport of Radioactive Waste

- Radioactive wastes have been transported in Canada and around the world safely for decades without a single radiological incident
- In Canada, radioactive wastes are transported by qualified carriers in CNSC-certified transport packages
- Transport packages are designed to withstand accidents during transportation and are inspected and tested regularly
- All transport must meet the CNCS's and Transport Canada's stringent requirements
- Controls can be placed on transportation, including the use of low speeds and not allowing transportation during inclement weather

4.1. How is radioactive waste transported in Canada?

- Radioactive wastes in Canada are transported in CNSC-certified transport packages.
- Particular interest and concern is often directed toward the transport of used nuclear fuel.
- Used nuclear fuel is transported in very robust, CNSC-certified transport packages that are designed, tested and certified to retain their contents under accident conditions.
- The transport of used nuclear fuel must meet the CNSC's and Transport Canada's stringent requirements and be transported by qualified carriers.
- Used nuclear fuel has been transported safely within Canada and internationally for over 45 years by road, rail, water and air without a single radiological incident.

SUPPLEMENTARY

- Transferring waste from the point of origin to a storage site is subject to stringent control and is only done in the safest possible manner.
- Controls can include transporting used nuclear fuel at extremely low speeds on dedicated transit routes, which are physically controlled during transfer, and prohibiting the transfer of spent fuel during inclement weather, including high winds and periods of rain or snow.
- Packages used in the transport of radioactive materials are designed to withstand accidents during transportation to ensure containment and are inspected and tested routinely to confirm their integrity.

4.2. What are the international best practices for the transport of radioactive waste?

5. Radioactive Waste Policy

- Radioactive waste policy in Canada is the responsibility of the Government of Canada, through Natural Resources Canada
- Natural Resources Canada is presently consulting publicly on proposed updates to Canada's 1996 Radioactive Waste Policy Framework
- The CNSC encourages all interested persons to participate in the process
- We are following the process closely to determine if any changes might be required to our regulatory framework
- With the exception of select disused radioactive sources, no radioactive wastes are imported into Canada

5.1. What is the current policy on radioactive waste in Canada?

- That question is most appropriately addressed by Natural Resources Canada.

IF PRESSED

- Natural Resources Canada is responsible for Canada's nuclear energy policies, including those relating to radioactive waste.
- Canada's 1996 Radioactive Waste Policy Framework currently sets out Canada's policy direction for managing radioactive waste.
- Waste owners, in accordance with the "polluter pays" principle, fund, organize, manage and operate facilities required to manage wastes over the short and long terms.
- Proposed updates to that policy are being consulted on publicly right now, and we are closely following that process to determine if any changes will be required to our regulatory framework.
- Our regulatory framework is in alignment with federal policy and with international standards set out by the International Atomic Energy Agency.

5.2. What is the CNSC's role in establishing policies on the recycling or reprocessing of used nuclear fuel?

- That question is most appropriately addressed by Natural Resources Canada.

IF PRESSED

- Both recycling and reprocessing of used nuclear fuel are being considered in relation to small modular reactor technologies that are being considered for adoption in Canada.
- Any related policy is the responsibility of the Government of Canada, led by Natural Resources Canada.
- The CNSC provides any related regulatory or technical advice or expertise we have on these issues, as requested.

5.3. What is the CNSC's role in establishing policies on the importation of radioactive wastes?

- That question is most appropriately addressed by Natural Resources Canada.

IF PRESSED

- Presently, no radioactive waste is imported into Canada except for certain disused radioactive devices that have been produced in Canada and which no longer have a use in the medical applications that they were produced for.
- Any policy on importing radioactive wastes into Canada would be the responsibility of the Government of Canada, led by Natural Resources Canada.
- If a policy was ever issued to allow for the importation of radioactive wastes into Canada, we would be responsible for issuing import licences and would never do so unless it could be demonstrated to be able to be done so safely throughout the process.

5.4 What is the Office of the Auditor General's performance audit of radioactive waste governance and oversight, and the nuclear waste inventory in Canada looking at?

-

6. International Alignment, Cooperation and Oversight

- International collaboration on radioactive wastes is key since all nuclear countries are dealing with the issue
- Canada's radioactive policy and regulatory framework are in alignment with international standards and best practices
- We invited an international peer review to Canada in 2019, which found that our regulatory framework is robust and aligned with international standards
- We are a strong participant and leader in various international forums on radioactive waste, and coordinate Canada's international report on the issue every 3 years
- Our international collaboration helps inform our decision-making through comparisons of evaluating and mitigating risks, and sharing research and operational experience

6.1. What measures does the CNSC take to ensure alignment with international best practices?

- International collaboration on regulating and managing radioactive waste is key since all nuclear countries are dealing with this issue
- We invite international peer reviews to Canada to assess our approach, including most recently in 2019, when our peers found that we have robust framework and are aligned with international standards
- We participate in key international forums including the International Atomic Energy Agency's Waste Safety Standards Committee, the Nuclear Energy Agency's Radioactive Waste Management Committee, and the International Commission or Radiological Protection
- These international activities help inform the CNSC's decision-making processes to understand and compare various ways of evaluating and mitigating risks, share research and operational experience
- Canada is a signatory to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, and submits a report every 3 years, coordinated by the CNSC, updating the world on Canada's status and developments

6.2. What are the international best practices for the long-term storage of radioactive waste?

6.3. How does the CNSC ensure conformity with international obligations for safeguarding radioactive wastes?

7. Committee Directed Themes

- With the exception of certain disused radioactive sources that were produced in Canada, no radioactive wastes are imported into Canada
- As a leader in the production of medical radioisotopes and radioactive sources used in medicine and health, the import of certain disused radioactive sources helps ensure their safe management over the long term
- Any decisions on importing additional radioactive wastes are policy decisions for the Government of Canada
- If a policy ever permitted the import of radioactive wastes, the CNSC would be responsible for issuing the licences, and would never do so unless the process could be demonstrated to be safe from start to finish

7.1. Import of radioactive waste: Does Canada permit the importation of radioactive waste?

- That question is most appropriately put to Natural Resources Canada.

IF PRESSED

- Presently, no radioactive waste is imported into Canada except for certain disused radioactive sources that have been produced in Canada and which no longer have a use in the medical applications that they were produced for.
- It is in Canada's and the world's interest that we sometimes repatriate these disused radioactive sources from certain countries so they can be safely managed here, since, while they play important roles in medicine and health, they also have the potential to be used for nefarious purposes if not managed well.
- Any policy on importing radioactive wastes into Canada would be the responsibility of the Government of Canada, led by Natural Resources Canada.
- If a policy was ever issued to allow for the importation of radioactive wastes into Canada, we would be responsible for issuing import licences and would never do so unless it could be demonstrated to be able to be done so safely throughout the process.

7.2. Trade of radioactive waste in medical technologies: Does Canada allow the import of medical technologies that contain or are radioactive waste?

- Certain disused radioactive sources that were produced in Canada, and which no longer have a use in the medical applications that they were produced for, can be imported into Canada.
- It is in Canada's and the world's interest that we sometimes repatriate these disused radioactive sources from certain countries so they can be safely managed here.
- Although these disused radioactive sources play important roles in medicine and health, they also have the potential to be used for nefarious purposes if not managed well.

8. Innovative approaches and SMRs

- The CNSC has no mandate or interest in being a barrier to the adoption of innovative technologies in Canada's nuclear sector
- If an applicant, potential proponent or vendor is considering the use of an innovative technology, including in radioactive waste management, we expect them to engage us early and throughout the process so we can ensure readiness to regulate
- If the safety case has not been demonstrated for the use of a technology, innovative or not, we will not issue a licence

8.1. What if organizations implement innovative waste technologies, will you be able to regulate these?

- The CNSC has no interest in being a barrier to the adoption of innovative technologies, so long as they can be demonstrated to be safe.
- Early, regular and open communications with licensees, prospective licensees and technology vendors are vital to having a good understand of where the industry is heading and what we will need to do to be ready.
- We are committed to doing all that we can to be ready for everything, but in a situation where we are not, no licence will be issued until we can be certain that a licensed activity will be conducted safely.

8.2. How will radioactive waste from SMRs be managed?

9. Radioactive Waste Projects

- There are several radioactive waste management and decommissioning projects under way, proposed or anticipated in Canada
- We are limited in what we can say about any that the Commission is seized with, or will shortly be seized with
- We know that many of these projects are of interest or concern to Canadians
- All are or will be considered through public regulatory processes, with funding support provided to eligible recipients to enhance their participation
- No applicants for nuclear project in Canada, including radioactive waste projects, will be issued a licence unless they can demonstrate that they will carry out their activities safely

9.1. Near Surface Disposal Facility

- Given the public hearing that will begin later this month for this proposed facility, we are limited in what we can say about it.
- I encourage members of this committee and all interested Canadians to watch the Part 1 hearing webcast on our website, and to consider participating in the Part 2 hearing in May 2022.

IF PRESSED

- The Near Surface Disposal Facility, or NSDF, is Canadian Nuclear Laboratories, or CNL's, proposed engineered disposal facility for low-level radioactive waste at the Chalk River Laboratories site.
- The proposed facility would be a mound built at near-surface level, consisting of disposal cells with a base liner and cover as well as systems to collect leachate, detect leaks and monitor the environment.
- It would have an expected operating life of at least 50 years, and any waste it receives would be required to meet established acceptance criteria to assure compliance with operational and long-term safety requirements.
- The CNSC is leading an environmental assessment of the proposed NSDF under the Canadian Environmental Assessment Act, 2012, which commenced in May 2016.
- CNSC staff have completed an Environmental Assessment Report, which will be considered by the Commission during a 2-part public hearing on the NSDF, with Part 1 being held this month on the 22nd.
- Part 2, in which Indigenous nations and communities, members of the public and other interested people, groups and organizations are invited to participate, and financially supported if eligible, will begin on May 31.

- Recognizing the significant interest in this proposed project, it is anticipated that the Part 2 hearing will be held over multiple days.

9.2. Nuclear Power Demonstration Closure Project

- The Nuclear Power Demonstration Closure Project, or NPD, is Canadian Nuclear Laboratories, or CNL's, proposal to decommission the NPD waste facility, a former nuclear generating station that operated until 1987.
- It is located in Renfrew County, Ontario on the south bank of the Ottawa River, approximately 225 kilometres from Ottawa.
- CNL is proposing an in situ, or leaving in place, decommissioning approach.
- An environmental assessment for this proposed project began in May 2016, under the Canadian Environmental Assessment Act, 2012, and is being led by the CNSC.
- This proposed project is generating significant interest and the CNSC has provided funding to eligible recipients to support their participation in the process.
- CNSC staff have engaged and consulted Indigenous communities and nations and the public extensively throughout this process so far and will continue to do so.
- Most recently, CNSC staff found that CNL's draft Environmental Impact Statement, or EIS, did not include sufficient information to allow CNSC staff to proceed with a technical review of the EIS.
- CNL is expected to provide additional information and resubmit the revised EIS and supporting documents at a later date.

9.3. Whiteshell Reactor-1

- Canadian Nuclear Laboratories, or CNL, is proposing in situ decommissioning, or leaving in place, of the Whiteshell Reactor #1, or WR-1, a former nuclear research reactor that operated until 1985 at the Whiteshell Laboratories site in Pinawa, Manitoba.
- An environmental assessment for this proposed project began in May 2016, under the Canadian Environmental Assessment Act, 2012, and is being led by the CNSC
- This proposed project is generating significant interest and the CNSC has provided funding to eligible recipients to support their participation in the process.
- CNSC staff have engaged and consulted Indigenous communities and nations and the public extensively throughout this process so far and will continue to do so.
- Most recently, CNSC staff reviewed CNL's draft Environmental Impact Statement, or EIS, identified a number of areas where additional information will need to be included in the final EIS and other technical supporting documentation.
- Complete licensing and EIS submissions are required before CNSC staff can complete their assessment and proceed to public hearings.

- There are currently no timeframes associated with the submission of CNL's revised documentation

9.4. Port Hope Area Initiative

- The Port Hope Area Initiative, or PHAI, is a community-initiated environmental remediation in the municipalities of Port Hope and Clarington.
- Its purpose is the clean-up and long-term management of historic low-level radioactive waste from radium and uranium refining between the 1930s and 1980s.
- It is being implemented by Canadian Nuclear Laboratories, or CNL, on behalf of Atomic Energy of Canada Limited.
- While the CNSC does not regulate the PHAI, we do regulate 2 projects that CNL is responsible for under it – the Port Hope Project and the Port Granby Project.
- The Port Hope Project is designed to remediate and move waste from the Welcome Waste Management Facility, residential and commercial sites containing historic low-level radioactive waste, and industrial waste from the local municipality.
- Waste that is moved is brought to a new, engineered above-ground mound on the same site as the Welcome Facility.
- CNL's licence for the Port Hope Project expires on December 31, 2022.
- The Port Granby Project is designed to remediate and move historic low-level radioactive waste and marginally contaminated soils from the existing Port Granby Waste Management Facility to a new, engineered above-ground mound about a kilometre north of the current site.
- CNL's licence for the Port Granby Project also expires on December 31, 2022.
- Public hearings will be held to consider applications to renew these licences and all interested persons and organizations are encouraged to participate, with funding support available to eligible recipients.
- CNSC staff regularly engage with community members and officials to explain our role and better understand any concerns or interests related to our role or these projects.

9.5. Mississauga Metals and Alloys

- On August 20, 2021, the CNSC was notified that Mississauga Metals and Alloys, a waste nuclear substance licensee located in Brantford, Ontario, had been deemed bankrupt and no longer had control of the site or its assets.
- CNSC staff have taken interim steps to ensure the continued safety and security of the nuclear substances and are in discussions with the Trustee in Bankruptcy and other parties to determine next steps.
- There is no expected risk to the public or the environment as a result of this event.

9.6. Gunnar Mine and Mill Site

- The former Gunnar Mine site is located on the north shore of Lake Athabasca, approximately 25 kilometres southwest of Uranium City.
- The mine operated from 1955-1963 and officially closed in 1964 with little to no decommissioning.
- The Saskatchewan Research Council holds the decommissioning licence for the Gunnar site.
- Private-sector companies that no longer exist operated these facilities from the 1950s until the early 1960s. The governments of Canada and Saskatchewan are responsible for the cost of the cleanup.
- CNSC staff, together with the Saskatchewan Ministry of the Environment, regularly inspect these facilities.
- CNSC staff also regularly engage with neighbouring communities, including Indigenous nations and communities, to build relationships and better understand and related interests or concerns.

9.7. Nuclear Waste Management Organization Adaptive Phased Management Initiative

- The Nuclear Waste Management Organization is tasked with developing an approach and identifying a willing and informed host community for the long-term management of Canada's used nuclear fuel.
- A community has not yet been selected and there is no project application before us.
- Our activities are therefore focused on engaging with potential host communities to inform them of our role and the opportunities they will have to be involved in the regulatory process, if or when an application is submitted to us.
- We have no interest or mandate in being a barrier to potential or proposed projects, so we are also providing regulatory guidance to the NWMO, conducting independent regulatory research and participating in international working groups.

9.8. Ontario Power Generation's Deep Geologic Repository for Low- and Intermediate-Level Radioactive Waste

- In 2005, Ontario Power Generation, or OPG, proposed the construction of a Deep Geologic Repository (DGR) on the Bruce Nuclear Generating Site on the eastern shore of Lake Huron.
- It would have been used for the disposal of low- and intermediate-level operational and refurbishment radioactive wastes from OPG-owned nuclear generating stations at the Bruce, Pickering and Darlington sites in Ontario.
- An environmental assessment was conducted, beginning in 2006, and hearings were held by a Joint Review Panel in 2013 and 14.

- OPG had committed in 2013 to the Saugeen Ojibway Nation, or SON, on whose territory the project would have been located, to not proceed with the project without SON consent.
- SON membership voted against the proposed project in January 2020, which resulted in OPG asking the Minister of Environment and Climate Change to terminate the environmental assessment and withdrawing its application to the CNSC for a licence to prepare site and construct.
- No further work will proceed on the proposed project.
- The CNSC will apply its research and the lessons learned from the work completed to date on the OPG DGR project to any future applications for low- and intermediate-level radioactive waste disposal.

9.9. Bruce Power Steam Generator

- In 2011, the CNSC issued Bruce Power a licence allowing for the transport and export to Sweden of 16 decommissioned steam generators for recycling.
- The steam generators, which were decommissioned in the 1990s, would have been transported through the Great Lakes and the St. Lawrence River on their way to Sweden.
- Duncan Hawthorne, the former Bruce Power President and CEO, said that the plans were put on hold to allow further discussion with First Nations, Métis and other groups.
- Bruce Power did not apply for a licence renewal prior to the licence expiring in February 2012.

9.10. Gentilly-2 Used Nuclear Fuel

- In 2012, Hydro-Quebec announced that the Gentilly-2 nuclear generating station, located in Bécancour, Quebec, would be decommissioned.
- The reactor was permanently shut down in December 2012 and was completely defueled by September 2013.
- The reactor completed the transition to a safe storage state in December 2014, and its fuel is now stored in used fuel pools or dry storage modules.
- The used fuel is expected to remain on site until a solution for the long-term management of Canada's used nuclear fuel is identified and completed.
- The CNSC will be responsible for approving any project for the long-term management of used nuclear fuel, and will only do so if it can be demonstrated that the project will be safe.

- Canada's radioactive waste policy and regulatory framework, established by Natural Resources Canada and the CNSC, respectively, are in-line with international standards

s.19(1)

Khan, Muhammad Atif

From: Velshi, Rumina
Sent: December 1, 2022 3:44 PM
To: CNSC.F ExecutiveTeamMembers / MembresdelÉquipedeDirection F.CCSN; Ducros, Caroline
Subject: Fwd: SMR Leadership Table - Thank You and April 12, 2023 Placeholder

Fyi

Begin forwarded message:

From: "NuclearEnergy / ÉnergieNucléaire (NRCAN/RNCAN)" <nuclearenergy-energienucleaire@nrcan-rncan.gc.ca>
Date: December 1, 2022 at 3:48:35 PM GMT
To: [redacted]@outlook.com, sean.willy@desnedhe.com, nvoykin@fnpa.ca, [redacted]@gmail.com, glonechild@fnpa.ca, [redacted]@gmail.com, RHunt@qec.nu.ca, BNippard@qec.nu.ca, Vanessa.White@albertainnovates.ca, Wade.Clark@gov.ab.ca, michelle.robichaud@atlanticaenergy.org, fdermarkar@aecl.ca, agottschling@aecl.ca, richard.horrobin@brucepower.com, rajan.verma@brucepower.com, gormanj@cna.ca, georgec@cna.ca, joseph.mcbrearty@cnl.ca, louis.riccoboni@cnl.ca, "Velshi, Rumina" <rumina.velshi@cnsc-ccsn.gc.ca>, Liette.Lemieux@candu.org, Sonia.Iqbal@candu.org, Tom.MacFarlane@gnb.ca, [redacted]@gmail.com, LClark@nbpower.com, AHayward@nbpower.com, BPlummer@nbpower.com, PThompson@nbpower.com, Robert_Sexton@gov.nt.ca, lswami@nwmo.ca, dwilson@nwmo.ca, Adrian.Nalasco@ontario.ca, dominique.miniere@opg.com, gary.rose@opg.com, bill.walker@ocni.ca, Brian.Fehrenbach@ocni.ca, brhyland@suncor.com, dbrock@cicorp.sk.ca, RPANDYA@saskpower.com, IHARRY@saskpower.com, DOpseth@saskpower.com, bsigurdson@saskmining.ca
Subject: SMR Leadership Table - Thank You and April 12, 2023 Placeholder

Dear SMR Leadership Table members,

We want to thank all SMR Leadership Table participants for a valuable second meeting, where your guidance cultivated rich dialogue and thoughtful exchanges among diverse stakeholders. Our country's leadership in nuclear energy is due to dedicated and innovative people like you actively participating at the SMR Leadership Table. We also want to take the time to thank those who contributed to the SMR Action Plan Leadership Table Progress Update.

To capitalize on the momentum being built in Canada and around the world, the SMR Leadership Table continued to discuss major priority areas for its members to focus on going forward. The identification of these priority areas, materials shared, and technical knowledge provided at the SMR Leadership Table have proven critical in advancing recent milestones across Canada's nuclear landscape, including:

1. Increasing the Government of Canada's public vision and narrative in support of the critical need for nuclear energy on our pathway to net zero

2. The Canada Infrastructure Bank committing $970 million towards Ontario Power Generation's SMR project
3. Including SMRs under the investment tax credit for clean technologies within the Fall Economic Statement
4. Informing Regional Energy and Resource Table discussions
5. Funding through Budget 2022
6. Introducing the Indigenous Advisory Council for the SMR Action Plan as the SMR Leadership Table's first co-chair
7. Releasing Canada's first SMR Action Plan Progress Update

Please find below a meeting summary and actions from October 3, 2022; official meeting minutes are forthcoming.

The next SMR Action Plan Leadership Table meeting is tentatively planned for **April 12, 2023**, six months following the October 2022 meeting. Please keep your calendar availability for this day open; an official save the date invite will be sent with additional details. We look forward to future discussions and continuing to build on this positive momentum!

Sincerely,
SMR Action Plan Leadership Table Secretariat

Meeting Summary

The SMR Leadership Table has enabled coordination of expertise and collaboration among participants, which has been critical in setting a strategic nuclear agenda for enabling SMR development and deployment. It is through your constructive dialogue and multidisciplinary participation that decision-makers continue to be equipped to move forward in advancing SMRs in Canada, including:

8. Increasing Canada's public vision and narrative in support of the critical need for nuclear energy on our pathway to net zero, including Natural Resources Canada Minister Wilkinson's participation at domestic and international events notably the Nuclear Energy Financing Summit and the International Atomic Energy Agency's Ministerial Conference in October.
9. The Canada Infrastructure Bank committing $970 million towards Ontario Power Generation's SMR project. This is the Bank's largest investment in clean power to date and the project is set to be one of the first grid-scale SMRs across G7 nations.
10. Including SMRs under the investment tax credit for clean technologies to help Canadian companies adopt clean technologies will create jobs, ensure Canadian businesses remain globally competitive, and reduce Canada's emissions at the same time.
11. Informing discussions at the Regional Energy and Resource Tables that were launched to work jointly with each province and territory to pursue high-impact, place-specific opportunities that create good, sustainable jobs.
12. Funding through Budget 2022, including nearly $70 million to NRCan to support SMR activities and $250 million for investments for electricity development initiatives, including early phase SMR development activities. In addition, the Canadian Nuclear Safety Commission also received $50.7 million to build capacity to regulate SMRs, and work internationally on regulatory harmonization.
13. Introducing the Indigenous Advisory Council for the SMR Action Plan as the SMR Leadership Table's first co-chair, to further support a coordinated, national Indigenous lens to SMR policies, programs, and decisions as the SMR Action Plan develops.

14. Releasing Canada's first SMR Action Plan Progress Update that to capture the voice of the Leadership Table for Canadians, by highlighting discussions from the meeting and outlining future actions to support the development and deployment of SMRs in Canada.

Priority areas and discussion points are presented below, in the order they were discussed during the second meeting.

Indigenous Involvement: The Department of Justice Canada provided a presentation on the Implementation of the United Nations Declaration on the Rights of Indigenous Peoples. Participants discussed potential impacts on regulatory and legislative frameworks related to nuclear energy and the need to ensure adequate Indigenous engagement and consultation regarding the operation of SMRs and technologies being considered.

Funding Tools: The Canada Infrastructure Bank (CIB) provided an overview of their expanded mandate as a result of Budget 2022 and its interest in nuclear energy projects. Participants acknowledged the continued need for the CIB to consider SMR projects, alongside Indigenous projects moving forward.

Technology Status: NRCan provided a presentation on SMR technologies in Canada. Members discussed the need for markets and customers to dictate how technologies and related supply chains are selected and developed. The demand for clean energy is anticipated to grow exponentially across Canada and meeting this demand will require a concerted efforts from all participants – both public and private – throughout Canada's energy industry. It was noted that Canada has made strides in being a "first-mover" in SMR technology selection and there are opportunities to optimize this momentum internationally.

Readiness for Regulating SMRs: The Canadian Nuclear Safety Commission provided an update on its work related to modernizing Canada's regulatory framework and noted that Budget 2022 funding helped significantly to ensure SMR regulatory readiness. Members discussed whether certain grid modernization initiatives could potentially trigger a legal duty to consult, particularly where treaty rights are impacted and the importance of provinces engaging the CNSC early to ensure a smooth regulatory review. Issues surrounding waste management, reprocessing, and enrichment were articulated.

Nuclear Waste Management: The Nuclear Waste Management Organization provided an overview of their activities, including the topic of Deep Geological Repository. The subject of waste and transportation of waste will be important as SMRs are deployed across jurisdictions that do not have experience with nuclear reactors. Canada has been working towards a waste solution for many years, but until this solution is found the storage of waste remains a key safety consideration that Canada has handled exceptionally well.

Nuclear Fuel Supply Chains: The CANDU Owners Group SMR Fuel Supply Task Force provided an overview of ongoing work across Canada's nuclear fuel supply chain. Members noted that Canada is strategically positioned to pursue international opportunities, including the development of like-minded partner energy security solutions and the establishment of new nuclear supply chains.

Actions for the SMR Leadership Table Secretariat and supporting partners based on priority areas include:

Efficient SMR Deployment, Energy Security, and Market Opportunities

1. Reconvene the Federal/Provincial/Territorial Working Group under Canada's SMR Action Plan to minimize barriers to timely SMR deployment including areas of funding, regulatory frameworks, and public and Indigenous engagement

2. Continue to work with like-minded partners to look at options for establishing a more resilient nuclear energy sector and supply chain to safeguard energy security., e.g., United States, United Kingdom, European Union, etc.
3. Continue to engage with interested countries on opportunities to deploy Canadian nuclear technologies globally

Technology, Funding, and Financial Tools

1. Advance work on NRCan program funding to minimize waste generated from reactors; create a fuel supply chain; strengthen international nuclear cooperation agreements; and enhance domestic safety and security practices
2. Continue to provide subject matter expertise for SMR project funding applications through funding mechanisms such as the Strategic Innovation Fund and the Canada Infrastructure Bank
3. Continue to align the inclusion of nuclear energy across Government of Canada financial instruments including taxonomies and regulations

Policy and Legislative Frameworks

1. Continue to develop a holistic nuclear energy vision that charts a path forward for nuclear in pursuit of net zero
2. Modernize and align regulatory regimes, e.g., the Impact Assessment Act and the Canadian Nuclear Safety Commission, to provide clear, predicable processes and timely deployment of nuclear energy projects and infrastructure
3. Continue work to modernize Canada's Radioactive Waste Policy Framework

Capacity, Engagement, and Indigenous Involvement

1. Continue to support the Indigenous Advisory Council and its members, as well as work on Indigenous equity participation in SMR projects
2. Explore new partnerships and areas to convene dialogue including industrial decarbonization end-users (e.g., oil sands and mining) and supporting services (e.g., Canada's Building Trade Unions)

Khan, Muhammad Atif

From: Boudrias, Geneviève
Sent: November 24, 2022 12:33 PM
To: Cyr, Stéphane; Elder, Peter; Jammal, Ramzi; Thiele, Lisa; Velshi, Rumina; DeJong, Michael
Cc: Bédard, Julie; Lake, Ann; Longpré, Marlene; CEO President / PD Président (CNSC/CCSN); Sheaves, Amanda; Rivard Gosselin, Caroline; Tanguay, Annik; Caissie, Caroline; Lorrain, Suzanne; Roy, Bibi; Pei, Glenyx; Laplante, Anne; Morin, Chantal; Dewar, Keith; Rivard Gosselin, Caroline; Howlett, Catherine; Butler, Robin; Viktorov, Alexandre
Subject: ET Actions/Decisions from November 24, 2022

Executive Team members,
Here are the actions/decisions I've captured during today's Executive Team meeting. Let me know if you have any concerns with wording, etc.
Also a few point of discussion, I'd like to highlight recognizing I will not track these over the longer-term…

- Peter requested that RAB consults with TSB/Pascale Bourassa on the reprocessing paper
- Alex V. to ensure he's briefed on what was said during Commission Proceeding of past 2 days re: generating Cobalt 60, etc.
- Peter/Kathleen to report back re: NGOs request to the European Commission and views from other international counterparts based on Kathleen ADSEC attendance this week
- Peter to follow-up with Pascale Bourassa's team re: reviewing our agreements with Poland/Sweden and determine if updates are required (adding similar clauses to the ones found in the agreement with Romania)

ACTIONS

[redacted]CASE AND COMMUNICATION • Following ET being fully briefed on latest information re: the [redacted]case (Catherine said details/summary would be included in next week's ET update), ET requested that LCAB prepare an all-staff communication on the [redacted]case to ensure learnings are disseminated to CNSC staff, etc.	L. Thiele
GCWCC • Undertake personalized follow-ups with Directorates that have a response rate of communicating their decision below 50% (i.e.: DPRR, DAA and DSS).	CSB with support from specific DGs/ET members of concerned Directorates

DECISION/ACTION

Year-End Event (edocs 6913538) • ET agreed with the planned Health and Safety measures being taken by the year-end event (YEE) organizing committee. These include: 1. Masks for transportation from Slater to the event (and back); 2. Masks distribution and	

sanitization stations setup at the venue; 3. Safety moment at the start of event. ET considered the WHSC Slater Committee recommendation (i.e. remove the hospitality to reduce the risk) and decided to continue to provide hospitality during the YEE, recognizing that measures should be taken to ensure food tables are distanced enough to allow for some distancing (avoiding staff agglomeration in one area). ET also asked the YEE committee about the main risks associated with the YEE and mitigation strategies/measures to ensure our state of readiness (example if we had to pivot at the least minute to a virtual event). • ACTION: 1) President requested that the YEE committee explore the possibility of having a group picture taken (could be picture taken with a drone, outdoor picture, etc.); and 2) CSB will follow-up with WHSC on ET's decision	1) A. Mathai 2) S. Cyr

Tx, Gen

Geneviève Boudrias M.Ed, PMP
Chief of Staff | Chef de Cabinet
President's Office | Bureau de la présidente
Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire
280 rue Slater Street
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Khan, Muhammad Atif

From: Kanasewich, Elaine
Sent: June 10, 2022 8:19 AM
To: CNSC.F ExecutiveTeamMembers / MembresdelÉquipedeDirection F.CCSN
Cc: CNSC.F DirectorsGeneral / DirecteursGénéral F.CCSN; Czerneda, Jennifer; Brunarski, Lee; Dewar, Keith
Subject: Summary of 2nd Meeting of House Science and Research Committee Small Modular Nuclear Reactor Study

Good morning, Executive Team and DGs.

Yesterday, the House Standing Committee on Science and Research (SRSR) held its 2nd of at least 4 meetings in its study of Small Modular Nuclear Reactors. The tone of the meeting was very positive from all involved. The witnesses each had 5 minutes for opening remarks and were divided into 3 one-hour panels.

Please see a summary of yesterday's proceedings. Highlighted text identifies when the CNSC or topics of interest were raised.

Panel 1 (6:30 p.m. to 7:30 p.m.)
- ***Canadians for Nuclear Energy*** (Dr. Christopher Keefer, President) – *in person*
- ***Canadian Nuclear Laboratories*** (Joseph McBrearty, President and Chief Executive Officer; Louis Riccoboni, Vice President, Corporate Affairs) – *in person*
- ***Coalition for Responsible Energy Development in New-Brunswick*** (Dr. Susan O'Donnell, Adjunct Research Professor) – *virtual*

Panel 2 (7:30 p.m. to 8:30 p.m.)
- ***As an individual*** (Evelyn Gigantes) – *virtual*
- ***Canadian Coalition for Nuclear Responsibility*** (Dr. Gordon Edwards, President) – *virtual*
- ***Westinghouse Electric Canada*** (Edouard Saab, President) – *virtual*

Panel 3 (8:30 p.m. to 9:30 p.m.)
- ***As an individual*** (Dr. Jeremy Rayner, Researcher, Centre for the Study of Science and Innovation Policy; Professor, Johnson Shoyama Graduate School of Public Policy) – *in person*
- ***Canadian Nuclear Workers Council*** (Robert Walker, National Director) – *virtual*
- ***Sylvia Fedoruk Canadian Centre for Nuclear Innovation Inc.*** (Dr. John Root, Executive Director) – *virtual*

All gave an overview of their organizations and their work, support and/or opposition related to SMRs.

The CNSC was mentioned directly or indirectly in the following instances, whether in opening remarks or in response to questions:
- The CNSC announced last year that Global First Power's application for a licence to construct would move to a formal review (Joe McBrearty)
- The CNSC has a pre-licensing vendor design review (VDR) process but it is optional, not required, and the CNSC is clear that a VDR is not a technical review (Susan O'Donnell)
- Referenced the CNSC in a passing reference to the May 30th – June 3rd hearing in Pembroke on the proposed Near Surface Disposal Facility project (Joe McBrearty)
- The former Chair of the Canadian Nuclear Safety Commission ensured that most SMRs would not require an impact assessment under the *Impact Assessment Act* by arranging matters so that most SMRs are not included on the project list – it's an astonishing fact that most SMRs will not be subject to any environmental review (Evelyn Gigantes)
- The CNSC is a world-class nuclear regulator (Edouard Saab)

- A regulator is in place to make sure we do things right on projects (Edouard Saab)
- The CNSC would have requirements for the waste from SMRs the same as for existing nuclear power plants (Edouard Saab)
- We will follow the CNSC's environmental assessment requirements for SMRs under 200 megawatts (Edouard Saab)
- Would not expect that any issues raised through the Impact Assessment process would not have been identified through the CNSC's processes (Edouard Saab)
- Market readiness will largely depend on the licensing process so that customers who want a reactor now can get one as soon as possible (Edouard Saab)
- SMR advocates think there should be more subsidies and less regulation (Jeremy Rayner)
- Regulation raises the critical issue of public confidence – if SMRs are to be a transformational technology, then they must be built closer to where people live and work than has been the case for nuclear facilities in the past (Jeremy Rayner)
- The reputation of the CNSC for evidence-based regulation needs to be protected and rushing designs needs to be avoided (Jeremy Rayner)
- Placing engagement responsibilities on proponents results in issues being raised that are outside of their competence, such as uranium mining and disposal of fuel, when those and other broad questions need to be included in public engagement (Jeremy Rayner)
- There will be no future for projects outside of already licensed facilities without the free, prior and informed consent of Indigenous communities, particularly when SMRs will involve the transportation of modules and disposal of waste (Jeremy Rayner)
- CNSC has worked on the safe management of radioactive waste and radiation protection (Jeremy Rayner)
- There is a well developed regulatory scheme in Canada – the need for speed should not allow us to relax or change that regulatory framework. The danger is in reducing the protections we currently have (Jeremy Rayner)
- Having an arms-length regulator is very important and we should not do anything to jeopardize that (Jeremy Rayner)
- CNSC has been involved since 2014 with IAEA's SMR working group working through issues around regulation (Jeremy Rayner)
- My concern is that the CNSC doesn't see it as their role to take part in the process of engagement on the part of a design or use or whatever it may be, so we have to ask where will the engagement come from that will hear if not address the concerns that the public might have (Jeremy Rayner)
- We regularly engage with the regulator (Bob Walker)

Lines of questioning and comments from members were very similar to those from the 1st meeting, with much of the focus was on radioactive waste and Moltex's proposed reprocessing technology, although there was an increased focus on environmental reviews:

- **Moltex's reprocessing technology**, including the scientific basis for supporting the technology; US nonproliferation experts' concerns raised to the Canadian federal government; and Moltex's export goals and links to nonproliferation concerns
- **Radioactive waste**, including percentage of energy remaining in used fuel; differences between Canada's used nuclear fuel and other countries; storing Canada's used nuclear fuel; repurposing used nuclear fuel; processes needed to repurpose used nuclear fuel; research needed to repurpose used nuclear fuel; reactors that can reuse reprocessed used nuclear fuel; costs associated with managing radioactive waste; Seaborn Panel recommendation that the waste management organization be completely independent; protections and funding up-front for clean-up and managing waste from SMRs on the backend; lifecycle of the e-Vinci and disposal plan; what SMR waste might look like on a global scale; and managing SMR waste that is dispersed across many sites and moving it across Canada
- **Environmental reviews**, including misinformation and disinformation about SMRs not being subject to environmental reviews when they in fact are and those reviews are extending the timelines of projects; the *Impact Assessment Act* as a problem to building SMRs; and environmental policies in place as performative in relation to safety versus substantive

- **Nuclear's contribution to meeting net-zero targets**, including the possibility of meeting targets without nuclear; SMRs not being ready in time to make a meaningful contribution; Ontario's ability to retire coal-fired generation; and interest in Europe around SMRs
    - Christopher Keefer said that Pickering needs to be refurbished or Canada risks eliminating all of the progress toward national emission reductions to date
- **Role of the federal government**, including in bridging any gap between academia and industry; funding clean technologies other than SMRs; growing the nuclear industry; exclusion of nuclear from the Green Bond Framework; and in education and public engagement
- **Research**, including the role and involvement of Canadian universities or educational institutions in SMRs; areas of research most needed to advance SMR technologies; improving SMR marketability; and processes to direct research funding for prototypes
    - Susan O'Donnell replied that all funding for net-zero technologies should be science-based and go through the Natural Sciences and Engineering Research Council of Canada (NSERC)
    - Jeremy Rayner was distressed to hear the suggestion that all funding for SMRs should be funneled through NSERC since many of the important questions and issues related to SMRs are in the domain of the social sciences
- **Labour availability**, including any challenges in accessing the needed labour and skills for SMRs; a shortage of high-pressure welders; Cameco as the private sector company employing the largest number of Indigenous people in Canada; Westinghouse Electric Canada's distribution of employees across Canada; remuneration in nuclear trades versus oil and gas; turnover rates; representation of women in the nuclear sector; training needed to operate SMRs; and how many jobs available to operate SMRs following construction
- **Engagement**, including CNL's engagement with Indigenous communities, environmental groups and the local population around Chalk River Laboratory; Kebaowek First Nation's concerns related to activities at Chalk River Laboratories and wanting a review of how radioactive waste is dealt with in Canada; Chiefs of Ontario opposition to SMRs in remote First Nations communities; and Canada's reputation on engagement with respect to nuclear energy
- **Safety**, including why SMRs are "expected" to be much safer than current reactors; the number of deaths from nuclear energy or nuclear waste in the last decade or 50 years; and relative risks from SMRs and micro modular reactors versus conventional large reactors
- **Commercialization**, including any barriers; achieving economies of scale with SMRs and competing with the US, Russia and China; and costs relative to other technologies;
- **Medical isotopes**, including the shortage of medical isotopes from Chalk River being down "a year or so ago"; and importance for hospitals across Canada
- **Fusion**, notably the state of the art in its development

Thank you, and have a great Friday,

Elaine

Khan, Muhammad Atif

From: Walker-Sisttie, Rhonda
Sent: June 3, 2022 3:26 PM
To: CNSC.F ExecutiveTeamMembers / MembresdelÉquipedeDirection F.CCSN
Cc: Ducros, Caroline
Subject: Sharing Globe article again

Dear ET, trying again as I don't think the link worked in my earlier email. Pasted below instead. Thanks, Rhonda

The world's push for small nuclear reactors will exacerbate radioactive waste issues, researchers say

It's unclear how waste from small modular nuclear reactors would be disposed of in Canada

MATTHEW MCCLEARN

Small modular reactors will generate more radioactive waste than their larger, existing cousins, and its chemical complexity will make it more difficult to manage, a new study says.

Published in the peer-reviewed journal of the National Academy of Sciences, the study compared designs for three small modular reactors (SMRs) to a standard pressurized-water reactor. (One of the new designs studied was the Integral Molten Salt Reactor (IMSR) from Oakville, Ont.-based Terrestrial Energy.) It concluded that most SMR designs will "entail a significant net disadvantage for nuclear waste disposal" and will produce wastes that aren't compatible with existing disposal practices and facilities.

"We're trying to say: 'Put a pin in this,'" said Allison Macfarlane, director of the University of British Columbia's public policy school and a former chair of the U.S. Nuclear Regulatory Commission. (Her co-authors included two post-doctoral researchers who now work for an organization charged with establishing an underground nuclear waste facility in Sweden.)

"You need to account for how much of this material there's going to be, and think about what kind of disposal facility you'll need," Prof. Macfarlane said.

Nuclear reactors produce radioactive wastes that include spent fuel, contaminated coolant and worn-out components. The composition of those wastes depends on factors such as the fuel used, and the physical design and materials used to make the reactor. The wastes often throw off hazardous radioactivity and heat, which makes managing them costly and difficult.

Reactors that generate larger quantities of waste, or wastes that are unusual or require new disposal methods, can face formidable competitive disadvantages relative to those producing wastes that can be managed with existing practices. Waste must be considered when comparing nuclear generation to alternatives such as hydropower, wind or solar.

Traditional reactors have been capable of generating up to 1,000 or more megawatts of electricity, and are water-cooled; their spent fuel is highly radioactive and must be isolated from the environment for hundreds of thousands of years. SMRs by definition produce less than 300

megawatts, and would be cooled by novel substances such as molten salt or helium, producing different wastes.

Prof. Macfarlane said the smaller a reactor is, the more neutrons tend to escape the core and affect other components. "That will create more radioactivity in the materials used in the reactor vessel," she said, which will "have to be accounted for as a waste product." The researchers also determined that fuels from some SMRs would likely need processing to make them suitable for underground disposal.

The researchers found the studied SMRs would produce between double and 30-fold the volumes of waste arising from a typical reactor. They estimated spent fuel from Terrestrial's IMSR would contain higher concentrations of fissile materials than that from traditional reactors. That means the fuel could be at risk of renewed fission chain reactions if stored in high concentrations, meaning it would need to occupy more space underground.

Such assertions contradict marketing claims from many SMR vendors. For instance, Terrestrial Energy has said on its website that its IMSR would produce "40 per cent less waste than conventional nuclear power plants." (In a statement to The Globe and Mail, Terrestrial said passages in the study pertaining to the IMSR contained "numerous inaccuracies." It added that its reactor is 50 per cent more efficient than a conventional reactor, "so clearly it produces less radioactive waste or activity per unit power.") Several other vendors say their reactors can recycle spent fuel from existing nuclear stations.

It's unclear how SMR wastes would be disposed of in Canada.

With the exception of Finland, most countries that have operated nuclear power plants, including Canada and the United States, have failed to establish underground repositories (known as deep geologic repositories, or DGRs) for spent fuel. The Nuclear Waste Management Organization (NWMO), which seeks to establish a repository in Ontario, is nearing the end of its site selection process. The Nuclear Fuel Waste Act requires the NWMO to provide services for managing SMR fuels "over the long-term at a fair and reasonable cost." The organization's criteria for accepting wastes, which are not yet complete, require durable, solid materials that will not react chemically or release radionuclides.

A year ago, the Union of Concerned Scientists published a report that concluded many proposed SMRs would require new facilities to manage their wastes. It called claims that SMRs could burn existing waste "a misleading oversimplification." The report found that reactors can consume only a fraction of spent fuel as new fuel – and that requires reprocessing to extract plutonium and other materials that could be used in weapons, thus raising what the organization described as an "unacceptable" risk.

"The most important takeaway is that you really need to plan carefully for the back end of the fuel cycle," Prof. Macfarlane said. "And too often, the back end of the fuel cycle gets ignored in talking about new technologies, or existing technologies."

Interested in more stories about climate change? Sign up for the Globe Climate newsletter and read more from our series on climate change innovation and adaption.

Rhonda Walker-Sisttie, PhD, Mo3 (she/her/elle)
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NB: My working hours and your working hours may be different. Please do not feel obliged to reply outside your working hours.
NB: Mes heures de travail et vos heures de travail peuvent être différentes. Veuillez ne pas vous sentir obligé de répondre en dehors de vos heures de travail.

Khan, Muhammad Atif

From:	Jammal, Ramzi
Sent:	March 31, 2022 10:01 AM
To:	Gratton, Wayne; Velshi, Rumina; CEO President / PD Président (CNSC/CCSN); Boudrias, Geneviève; Elder, Peter; Sauer, Liane
Cc:	Dewar, Keith; Fong, Mok Cher; Donnelly, Lisa; St-Michael, Megan
Subject:	RE: Briefing material - USNIC Summit - April 5th. - FOR REVIEW

Wayne, very good start, I will focus on high level messaging that pertains to the Qs.

In my opinion, the Qs are very much focused and so are the answers. I recommend that the answers to be expanded WRT international Harmonization in response to Q2.

Answer to Q1:
I am not sure what purpose the mention of innovative hub is adding, is it a buzz word?. What does "strategic lens" mean. The VDR started way before the hub and it is the pre-licensing activity established by the CNSC to ensure "licensibility" of SMRs in Canada and to Familiarize the new comers to the Canadian regulatory system. The reorganization of DRIMPM is a demonstration of the CNSC readiness for the SMR and other innovative technologies in collaboration with the rest of the CNSC as a matrix organization.
Points to register: This reorg was based on LL from Canadian and international experiences. A dedicated matrix team is needed to ensure successful oversight by providing clarity on the requirement and establishing administrative protocols with applicants to anticipate resolution of obstacles/challenges before they become an impediment.
The recruitment campaign has started internally and externally taking into account internal capacity building and leveraging technical information from like minded regulators such as NRC and ONR.

For Q3:
The answer should indicate and expand on what we mean by licensee responsibility, more details to explain our processes. We review the applicants programme as part of their submission. After assessment this programme

becomes integral to the licensing basis: hence a requirement the applicant must adhere to.
Yes the CNSC will conduct inspection activities outside Canada on as needed basis in collaboration with USNRC and or other regulatory bodies if manufacturing is taking place in the US or other places outside Canada.

Q4:
I do not agree on the fact that it is the government of Canada who decides what fuel type is used in reactors. Enriched fuel was used in reactors in Canada for e.g.: slowpoke, prior to replacement with LEU which was a replacement and not a ban. The same applies for new technologies no impediment for the use of enriched fuel as combustible in a reactor . Reprocessing and the enrichment on Canadian soil is a policy issue and the waste management.
Fuel qualification is our business and this will require leveraging technical information with other regulatory bodies to include safe guard.
If the Q comes on the reliability of the supply chain, this is an industry contractual issues and not a safety issue as long as the fuel is qualified.
Q5:
Early engagement is critical.. It is I important to indicate that the President did appear before SASK. Power board to present to them their responsibilities and informing them of the Safety Culture expected of them in relation to Nuclear operations and their readiness to acquire Nuclear capabilities etc.... message interaction with provinces are occurring at levels.
Q6:
Vendors or operators. CNSC expectation is engagement with host community, this engagement is as important as the safety case for the technology. Without the host community trust the projects might be in jeopardy.

I know you are challenged with real estate, I will let you manage the wording as you see fit. Key messaging or back pocket information.

Ramzi

From: Gratton, Wayne <wayne.gratton@cnsc-ccsn.gc.ca>
Sent: March 30, 2022 5:59 PM
To: Velshi, Rumina <rumina.velshi@cnsc-ccsn.gc.ca>; CEO President / PD Président (CNSC/CCSN) <President-CEO@cnsc-ccsn.gc.ca>; Boudrias, Geneviève <Genevieve.Boudrias@cnsc-ccsn.gc.ca>; Jammal, Ramzi <Ramzi.Jammal@cnsc-ccsn.gc.ca>; Elder, Peter <Peter.Elder@cnsc-ccsn.gc.ca>; Sauer, Liane <Liane.Sauer@cnsc-ccsn.gc.ca>
Cc: Dewar, Keith <keith.Dewar@cnsc-ccsn.gc.ca>; Fong, Mok Cher <mokcher.fong@cnsc-ccsn.gc.ca>; Donnelly, Lisa <Lisa.Donnelly@cnsc-ccsn.gc.ca>; St-Michael, Megan <megan.st-michael@cnsc-ccsn.gc.ca>
Subject: Briefing material - USNIC Summit - April 5th. - FOR REVIEW
Importance: High

Good evening President Velshi.

As requested, attached is briefing material for the 9th US Nuclear Industry Council Advanced Reactor Summit in Idaho next week.

On April 5th, you have been invited to provide opening remarks regarding the "Regulatory Perspective from Canada" (10 minutes), followed by a 10-minute discussion with Mr. Merrifield (moderator) and a 5-minute QAs from the audience.

Mr. Merrifield proposed the following Qs (Monday AM). Points to register (p 10-14 in the PDF) have been prepared with support of DART (Sarah E., Melanie. R.), DSS (Ali, E), Safeguard (Michael Kent, David M.), International Team and others.

Proposed Questions:

1. President Velshi, given OPG's selection of the BWRX300 and the Ultra Safe design in Chalk River, what steps is CNSC making to enhance its understanding of these designs and how are you developing additional expertise in these areas?
2. *From your presentation, it appears that your team and their counterparts at the NRC are making good progress in joint review activities. Have you had discussions with other regulators about joining this effort?*
3. *I would expect that some portion of the equipment that will be deployed for these new reactors will originate from outside Canada. Do you anticipate that you will have inspection activities that will take place outside of Canada and how are you preparing for that potential?*
4. *The new designs you are evaluating will include the use of either standard enrichments - around 5% - or potentially high-assay LEU. What regulatory and inspection changes do you anticipate you will be making as a result of these technologies that are new to Canada.*
5. *For the first time in decades, you may have Provinces – starting with Saskatchewan – that are "new to nuclear." How are you engaging with these Provinces and how are they preparing for these new technologies?*
6. What advice would you give to vendors who are struggling with communicating with a host community? (Supplemental question).

Liane, Ramzi, and Peter: I am circulating broadly since ROB/TSB/RAB prepared the QAs. Grateful for any additional feedback on the QAs found on pages 10-14. Any additional highlights/examples to mention ?

Of note, following the morning remarks, there will be a Canadian panel discussion on "Deployment of Advanced Nuclear in Canada to Address Carbon Reduction Goals". Participants include: **Gary Rose**, *VP, SMR Growth, Ontario Power Generation*, **Mr. Fred Dermarkar**, *CEO, Atomic Energy of Canada Ltd*, **Dr. Francesco Venneri**, *CEO & Founder, Ultra Safe Nuclear*, **Mr. Jay Wileman**, *President & Chief Executive Officer, GE-Hitachi Nuclear Energy*. Mr. Merrifield will moderate.

The International team is coordinating with PO to finalize the BN over the next day.

Wayne

Khan, Muhammad Atif

From: Gratton, Wayne
Sent: January 21, 2022 4:48 PM
To: CNSC.F ExecutiveTeamMembers / MembresdelÉquipedeDirection F.CCSN; CNSC.F DirectorsGeneral / DirecteursGénéral F.CCSN
Cc: Dewar, Keith; Cattrysse, Clare; Crowe, Heather; Brunarski, Lee; Czerneda, Jennifer; MacLellan, Tiffany; Fong, Mok Cher; Donnelly, Lisa; Arraïs, André; Leblanc, Julie; Eaton, Sarah; Rickard, Melanie
Subject: RE: Summary: New Brunswick's Standing Committee on Climate Change and Environmental Stewardship hearings on climate action plan - nuclear

Good evening,

Please find below a summary of NB Power President and CEO, Keith Cronkhite appearance before the NB Committee yesterday. Bon weekend!

Wayne

JANUARY 20, 2022 MEETING

Appearing before the Committee on January 20 was Keith Cronkhite, President and CEO of NB Power.

- In his opening remarks, Mr. Cronkhite noted the following:
    - Reducing carbon emissions is crucial going forward to reduce impacts of climate change. NB Power is working toward the Government of Canada's new target of net-zero for the electricity sector by 2035. NB Power is approximately 80% carbon free in providing energy to customers presently, but the remaining 20% is the most difficult to solve.
    - Small modular reactors (SMRs) are a proven technology that will be an important part of addressing the remaining 20% while providing reliable baseload generation. It is an approach not unique to New Brunswick – utility counterparts in other parts of Canada that are not blessed with hydro resources see SMRs as part of the solution moving forward. It will require provincial and federal support.
    - Renewable energy will have a continued and increased role going forward. Wind and solar will be part of the solution, but will not be enough for cold winter days – carbon-free, baseload generation is needed to provide backup. It's not about one solution, all solutions are needed to be successful.
    - Education and engagement with every New Brunswicker, from the youngest to the oldest, along with technology development, including SMRs and perhaps hydrogen, and establishing partnerships will be key to achieving net-zero and meeting 2035 targets.

QUESTIONS

- In response to a question on whether the SMR technologies NB Power is pursuing will be ready when needed versus the SMR technology Ontario has selected, which is likely to be ready in 2028, and whether NB Power is talking to OPG about buying that technology, Mr. Cronkhite mentioned awareness of OPG's plan and shorter-term need, which is why OPG is targeting 2028. He continued that the technology selected by OPG is advanced in the nuclear

space, but is closer to the Point Lepreau reactor, versus the Gen IV reactors that NB Power is focused on, which have a simpler design and allow for more flexibility in where they are deployed. NB Power is and will continue to monitor OPG's activities, and the advancement of the technologies in New Brunswick. If the ARC reactor isn't ready for 2030, NB Power is looking at options, including different fuel sources, to continue operating the Belledune coal plant beyond 2030 until the ARC reactor is ready. NB Power is laser-focused with the SMR vendors and proponents in New Brunswick, to make sure the technology is ready for 2030.

- In response to a question on the potential future of supply of electricity coming only from renewables, noting that New Brunswick and Quebec had hit peak demand concurrently the week prior with Quebec having to import 2,000 MW from New York and Ontario, most of which probably came from nuclear energy, Mr. Cronkhite replied that experience over the last 40 years has shown the importance of interconnections. NB Power is one of the most interconnected utilities in the region, and uses those interconnections to optimize its generation fleet and the price of energy. Looking forward to a future that is electrified, every utility and region is challenged moving forward to make sure they meet their own needs, particularly during the coldest days in the winter. NB Power does not see how those interconnections will provide baseload electricity during the coldest days of the year. During the coldest days of the year, there generally is little to no wind blowing. With a winter peaking system, NB Power needs baseload generation to meet those demands reliably.

- In response to a question on the safety of nuclear technology, Mr. Cronkhite noted Canada's exemplary safety record while acknowledging that other jurisdictions have had events for various reasons. On SMRs, he said that a lot of historical issues or concerns are resolved with the designs being pursued in New Brunswick, adding that both will be designed to be walk away safe. The ARC reactor is based on a 20 MW prototype that operated in Idaho for 30 years, during which time operators would test the related safety systems and essentially take their hands off the controls to allow the reactor to safely shut down on its own, which is the best proof and experience of safe operation in the SMR space. Inherent safety characteristics have been improved upon and it is being upscaled to 100 MW for New Brunswick, and successful adoption will enable it to be advanced as a Canadian solution. A focus of the work in New Brunswick is to ensure that concerns are reduced, minimized or eliminated as much as possible. The advanced designs will require less systems and people to operate them, which will result in greater efficiencies.

- In response to a question on effects on ratepayers from SMR projects, Mr. Cronkhite said that it is premature to forecast the effect but that the focus is to make sure rates in New Brunswick remain competitive. A key area of focus is on discussions with the federal government to support and optimize contributions to the projects, including the $45 - $50 M federal investment in Moltex in 2021, and to attract investments from the private sector to support New Brunswick's nuclear cluster moving forward in a cost effective way. He said that the ARC project milestones for 2030 are currently being met and overall are still on track, while noting that a couple milestones were adjusted but have not impacted the overall schedule.

- In response to a question on the recent closure of nuclear plants in the US, Mr. Cronkhite stated that part of the reason, particularly in the northeast, was the movement to a free market approach to electricity over the last 15 years and the rise of natural gas, a movement that did not acknowledge the contribution that nuclear energy makes to avoiding emissions, which made some plants unviable. With a greater awareness of and commitment to tackling climate change, perspectives are shifting in the US and recent policy decisions are providing benefits to nuclear operators to keep plants viable and operating to provide carbon-free electricity.

- In response to a question on cost overruns for nuclear projects, Mr. Cronkhite acknowledged that there is always a risk that costs can exceed estimates. It is therefore important that the appropriate amount of planning, resourcing and scheduling is applied to make sure realistic proposals are put forward to support new programs. Cost overruns for nuclear projects are generally mitigated by the high capacity factors of the facilities over their operating life. The simpler designs of SMRs relative to large nuclear power plants will result in simpler construction and operating requirements, which will mitigate traditional costing issues. Developing and building an SMR is no different than developing and building a house – be as thorough as possible on the front end, put forward the best plan that can be achieved, and build in any necessary contingencies.

- In response to a question on differences in economies of scale between large nuclear power plants and SMRs, Mr Cronkhite noted that the size of a reactor does impact economies of scale, but it also depends on what you are trying to accomplish. Presently, and with the advancements in wind and solar technologies in recent years resulting in economies of scale and reduction in costs, those technologies can now play a larger role with the support of SMRs. A 1000 MW facility, regardless of energy source, requires 1000 MW of idle capacity to be available in case that facility trips. SMRs are of smaller size and so will require less contingency requirements, and will be deployable in many more areas to support the greater integration of wind and solar, which will only be partial solutions as they will not be enough on their own, particularly during cold winter days.

From: Gratton, Wayne
Sent: January 20, 2022 12:02 PM
To: CNSC.F ExecutiveTeamMembers / MembresdelÉquipedeDirection F.CCSN <cnsc.cdl-executiveteammembers-membresdelequipededirection.ccsn@cnsc-ccsn.gc.ca>; CNSC.F DirectorsGeneral / DirecteursGénéral F.CCSN <cnsc.cdl-directorsgeneral-directeursgeneral.ccsn@cnsc-ccsn.gc.ca>
Cc: Dewar, Keith <keith.dewar@cnsc-ccsn.gc.ca>; Cattrysse, Clare <clare.cattrysse@cnsc-ccsn.gc.ca>; Crowe, Heather <heather.crowe@cnsc-ccsn.gc.ca>; Brunarski, Lee <lee.brunarski@cnsc-ccsn.gc.ca>; Czerneda, Jennifer <jennifer.czerneda@cnsc-ccsn.gc.ca>; MacLellan, Tiffany <tiffany.maclellan@cnsc-ccsn.gc.ca>; Fong, Mok Cher <mokcher.fong@cnsc-ccsn.gc.ca>; Donnelly, Lisa <lisa.donnelly@cnsc-ccsn.gc.ca>; Arraïs, André <andre.arrais@cnsc-ccsn.gc.ca>; Leblanc, Julie <julie.leblanc@cnsc-ccsn.gc.ca>; Eaton, Sarah <sarah.eaton@cnsc-ccsn.gc.ca>; Rickard, Melanie <melanie.rickard@cnsc-ccsn.gc.ca>
Subject: Summary: New Brunswick's Standing Committee on Climate Change and Environmental Stewardship hearings on climate action plan - nuclear

Good afternoon,

For awareness: NB Legislature's Standing Committee on Climate Change and Environmental Stewardship is holding hearings on New Brunswick's current climate action plan. Of relevance for the CNSC is the appearance yesterday of Gaëtan Thomas, President and CEO of the Economic Council of New Brunswick (ECNB) and former President and CEO of NB Power. NB Power President and CEO, Keith Cronkhite will appear before the Committee today.

IGAD will monitor and report any notable developments.

Merci,

Wayne - IGAD

BACKGROUND

- The Standing Committee on Climate Change and Environmental Stewardship of the Legislative Assembly of New Brunswick is hearing from subject matter experts and First Nations representatives between January 13, 2022 and February 8, 2022, on renewing New Brunswick's climate plan, *Transitioning to a Low-Carbon Economy*, introduced in 2016 and required to be reviewed every 5 years by the *Climate Change Act*.

- The Committee will produce a study in spring 2022 summarizing what it hears, which will be considered by the Government as part of an updated action plan expected in summer 2022.

- New Brunswick's current climate plan would see the phase out of coal-fueled electricity generation by 2030 if adequate support can be found to minimize impacts on energy costs and the local economy, otherwise, it would be

phased out by 2040 in alignment with previous federal regulations. Subsequent to the release of New Brunswick's climate action plan in 2016, the federal government has set a deadline to phase out coal-fired electricity generation in Canada by 2030, which New Brunswick's energy minister, Mike Holland, said in December 2021 does not give New Brunswick enough time to put in place alternatives, including small modular reactors (SMRs).

JANUARY 19, 2022 MEETING

Appearing before the Committee on January 19 was Gaëtan Thomas, President and CEO of the Economic Council of New Brunswick (ECNB) and former President and CEO of NB Power.

- Mr. Thomas noted that the ECNB sees sustainable development, necessary to meet 2030 and 2035 climate goals in New Brunswick, as dependent on a balance of responsible environmental stewardship, a healthy economy and good environmental conscience. Energy resources, including wind, solar, nuclear, interconnections with Quebec and the Atlantic provinces, will need to be integrated in a smart grid that provides clean power at competitive prices, which is key for ECNB members.

- Mr. Thomas was particularly emphatic around nuclear energy, which he said generates clean, reliable and affordable electricity to replace fossil fuels, and emits less than large hydro, wind and solar on a lifecycle basis due to the much smaller footprint for every megawatt produced. He stated that additional nuclear will be needed to achieve carbon neutrality in New Brunswick by 2050, support the wider adoption of intermittent renewables and commercialize hydrogen. He sees electricity demand increasing in New Brunswick in 2050 by 2.5 times from today and does not see a way to move to full electrification without nuclear. He foresees a mix of 1/3 nuclear, 1/3 wind/solar, and 1/3 hydro.

- Mr. Thomas believes that New Brunswick is very well positioned to be a leader in new nuclear technology – SMRs. SMRs will allow for the greater integration and deployability of renewables while generating carbon free electricity and process heat to create other important clean energy sources such as hydrogen, ammonia and other clean fuel sources like biofuels. He predicts that 8 – 10 SMRs of 100-200 megawatts will need to be constructed over the next 20 years. He noted that New Brunswick has advantages in nuclear development that could create economic growth and result in more competitive environment for New Brunswick businesses.

- Mr. Thomas noted a key to making New Brunswick a leader in SMRs, according to his ECNB members – both nuclear members and members working in the nuclear industry – are loan guarantees for utilities and private investors to de-risk the first build; streamlining the present impact assessment process while maintaining the rigour of the process; developing policies regarding the reprocessing of nuclear fuel; and designating nuclear as a clean energy technology. Leadership on SMRs could position New Brunswick to be a leader for Saskatchewan and Alberta, who are in a much worse place than New Brunswick when it comes to fossil fuel dependence.

- Mr. Thomas disagreed with the suggestion that SMR technology under development in New Brunswick is unproven, noting that one of the technologies being developed is completely proven but requires new fuel handling and a licensing process to allow for enriched fuel, which is new and could delay things by 3-4 years and lead to a situation where the 2030 or 2035 targets cannot be met. He added that New Brunswick needs to invest in "wildcards" like SMRs to support the "safe bet" green technologies like wind and solar, noting that if New Brunswick hadn't invested in 1982 in the "wildcard" that was Point Lepreau at the time, New Brunswick would be in a much worse position today like western Canada in relying on emitting sources.

- It was noted that regardless of the projects being pursued – nuclear and non-nuclear – relationships will need to be built with the federal government and Indigenous communities. First Nations have to become partners, not just be consulted, and building trust and engaging with as many New Brunswickers as possible will be key to the future of projects. Businesses will only undertake projects if they can get social licence to do so, including from First Nations, youth, communities, businesses, cities and towns.

JANUARY 20, 2022 MEETING

- NB Power President and CEO, Keith Cronkhite will appear before the Committee on January 20 (today).

Khan, Muhammad Atif

From: Walker-Sisttie, Rhonda
Sent: July 28, 2021 8:56 PM
To: Velshi, Rumina; Elder, Peter; Jammal, Ramzi
Cc: Boudrias, Geneviève
Subject: RE: 2nd Open Letter

Hi President Velshi,
Thank you too! We are actively in the process of updating along the lines that you note below. I will send you what we come up with as soon as the SMEs finish with their feedback in the morning. Thanks again, Rhonda

---

From: Velshi, Rumina <rumina.velshi@cnsc-ccsn.gc.ca>
Sent: July 28, 2021 8:23 PM
To: Walker-Sisttie, Rhonda <rhonda.walker-sisttie@cnsc-ccsn.gc.ca>; Elder, Peter <Peter.Elder@cnsc-ccsn.gc.ca>; Jammal, Ramzi <Ramzi.Jammal@cnsc-ccsn.gc.ca>
Cc: Boudrias, Geneviève <Genevieve.Boudrias@cnsc-ccsn.gc.ca>
Subject: Re: 2nd Open Letter

Rhonda
Thx for this updated document.

I need some clarification on what exactly is our top line message re response to this second open letter.
What is included below, whilst accurate and complete - does not address the concerns raised.

For example:
Whether Canada decides on reprocessing nuclear fuel is a policy decision made by xxxx and not the role of the CNSC.

CNSC's role is to ensure compliance with ....

Maybe a quick call tomorrow to discuss?

Rumina

> On Jul 28, 2021, at 8:11 PM, Walker-Sisttie, Rhonda <rhonda.walker-sisttie@cnsc-ccsn.gc.ca> wrote:
>
> Dear EC,
> Sharing for your information the media lines we had developed for use reactively when the first open letter was sent in late May. They are being reviewed for any necessary updates and we will keep these evergreen.
> Thanks, Rhonda
>
> **Topic:** On May 25, 2021, a group of US experts published an open letter to Prime Minster Trudeau about their concerns regarding Canadian support for Moltex's proposed SMR technology, which they contend could undermine the global nuclear-weapons nonproliferation regime. Moltex responded to letter and has sought CNSC advice about speaking about the IAEA's role in reviewing their technology. On July 28,

2021, the US experts published a second letter, refuting the claims that Moltex has made in their public responses, focusing on reprocessing and the IAEA's role.

Issue: The US experts are calling on Canada's government to conduct an expert review of the proliferation and radioactive waste implications of Moltex's proposal, as well as of its economic prospects. While CNSC has a role to play in these areas, our mandate requires us oversee Canada's nuclear industry by regulating the development, production and use of nuclear energy in Canada to protect health, safety and the environment. It also includes implementing Canada's existing nuclear non-proliferation policy under the Treaty on the Non-Proliferation of Nuclear Weapons (NPT).

Natural Resources Canada is currently leading the review of Canada's radioactive waste policy and also provided funding to Moltex to advance their molten salt reactor and spent fuel recycling project through the Strategic Innovation Fund.

Background: CNSC staff have provided technical advice to Moltex as part of a Phase 1 pre-licensing vendor design review (VDR) of the SSR W300 molten salt reactor. The VDR process is a high-level review of the proposed reactor technology's design information against Canadian regulatory requirements and guidance. The service does not involve the issuance of a licence under the *Nuclear Safety and Control Act* and is not part of the licensing process. The conclusions of such a review do not bind or otherwise influence decisions made by the Commission. The CNSC's licensing processes will require a more detailed review of the design and safety case for a specific licence application at a specific site.

Key messages:

Non proliferation

- As part of an international community of nuclear regulators, the CNSC works with partners around the globe to strengthen nuclear security and non-proliferation at home and abroad, and participates in various committees and activities of the International Atomic Energy Agency (IAEA). This includes the verification, through accounting and reporting procedures, that the provisions of Canada's nuclear cooperation agreements are being met.

- CNSC staff provides expert technical advice and support to Foreign Affairs, Trade and Development Canada (DFATD), and other government departments, on nuclear non-proliferation policies and control measures.
- Canada was an early signatory to the Nuclear Non-proliferation Treaty, which requires that nuclear weapons states of that time (the US, UK, France, Russia and China) not supply weapons or weapons technology to non-weapons states, and non-weapons states not seek to acquire such weapons.
- Canada is also a member of the Nuclear Suppliers Group (NSG) whose members adhere to guidelines on exports of nuclear and nuclear-related

material, equipment and technology to ensure such items will not be used for weapons purposes.
- For more information, see our Non-proliferation webpage: http://www.nuclearsafety.gc.ca/eng/resources/non-proliferation/index.cfm

Vendor design review

- A Pre-Licensing Vendor Design Review (VDR) is a process whereby CNSC staff provide feedback to companies designing a new reactor, early in the process.
- Vendors can request a VDR before a licence application is submitted to the CNSC. The review is not required, is not an application for a licence, nor is it an indication of intent to proceed with a project.
- A VDR also does not certify a reactor design. The conclusions of any design review do not bind or otherwise influence decisions made by the Commission.
- The CNSC completed a Phase 1 vendor design review of Moltex's small modular reactor.
- A Phase 1 vendor design review is done against the most recent design requirements for new nuclear power plants in Canada.
- Overall, Moltex showed an understanding of Canada's nuclear design requirements.

Spokesperson:
Non proliferation: Pascale Bourassa, Director, Non Proliferation and Export Controls Division, CNSC

Vendor design reviews: Melanie Rickard, Director, Assessment Integration Division

Khan, Muhammad Atif

From: Heppell-Masys, Kathleen <kathleen.heppell-masys@cnsc-ccsn.gc.ca>
Sent: June 22, 2021 10:46 PM
To: Elder, Peter
Subject: Fwd: Moltex Communications

Hi Peter,
FYI. Following our TSB management team meeting on Monday, I shared with my team all points discussed with Melanie Lajeunesse. Subsequently, David gave us a debrief of the trilateral with IAEA and Moltex and indicated Moltex's intention to soon make a public statement on their intent to meet safeguards obligations.
I asked him to liaise with comms/ Melanie proactively. Moltex went out today. It will be in the news clips tomorrow. No concerns have been identified.
Kathleen

Kathleen Heppell-Masys
Sent from my iPhone

Begin forwarded message:

> **From:** "Moroz, David" <david.moroz@cnsc-ccsn.gc.ca>
> **Date:** June 22, 2021 at 2:39:10 PM EDT
> **To:** "Lajeunesse, Melanie" <melanie.lajeunesse@cnsc-ccsn.gc.ca>
> **Cc:** "Bourassa, Pascale" <Pascale.Bourassa@cnsc-ccsn.gc.ca>, "Heppell-Masys, Kathleen" <Kathleen.Heppell-Masys@cnsc-ccsn.gc.ca>, "Kent, Michael" <Michael.Kent@cnsc-ccsn.gc.ca>, "Cavanagh-Dollard, Caitlyn" <caitlyn.cavanagh-dollard@cnsc-ccsn.gc.ca>, "Gao, Henry" <Henry.Gao@cnsc-ccsn.gc.ca>, "Bercier, Bianka" <bianka.bercier@cnsc-ccsn.gc.ca>, "Mongeon, Andrée" <Andree.Mongeon@cnsc-ccsn.gc.ca>, tanya.hinton@international.gc.ca
> **Subject: RE: Moltex Communications**
>
> Nothing of concern to me. They did seem to speak on behalf of "Canada", but I think their message was on target.
>
> I am adding Tanya from GAC to keep her informed.
>
> **From:** Lajeunesse, Melanie <melanie.lajeunesse@cnsc-ccsn.gc.ca>
> **Sent:** Tuesday, June 22, 2021 2:36 PM
> **To:** Moroz, David <david.moroz@cnsc-ccsn.gc.ca>
> **Cc:** Bourassa, Pascale <Pascale.Bourassa@cnsc-ccsn.gc.ca>; Heppell-Masys, Kathleen <Kathleen.Heppell-Masys@cnsc-ccsn.gc.ca>; Kent, Michael <Michael.Kent@cnsc-ccsn.gc.ca>; Cavanagh-Dollard, Caitlyn <caitlyn.cavanagh-dollard@cnsc-ccsn.gc.ca>; Gao, Henry <Henry.Gao@cnsc-ccsn.gc.ca>; Bercier, Bianka <bianka.bercier@cnsc-ccsn.gc.ca>; Mongeon, Andrée <Andree.Mongeon@cnsc-ccsn.gc.ca>
> **Subject:** RE: Moltex Communications
>
> Hi David,
>
> Thanks for sharing – I read over the statement and it seems fairly balanced. I didn't see anything that seemed to indicate preference in our role as regulator or with respect to our review of Moltex's

technology. Do you see anything of concern? And have you been in contact with Melanie Rickard's team? If not, I'm happy to pass this on to her as well.

I've copied Bianka so she can include this in our media clips tomorrow.

Best,

Mélanie Lajeunesse (she/elle)
Senior Communications Advisor
Conseillère principale en communication
melanie.lajeunesse@cnsc-ccsn.gc.ca | 343-571-2896

From: Moroz, David <david.moroz@cnsc-ccsn.gc.ca>
Sent: Tuesday, June 22, 2021 2:23 PM
To: Lajeunesse, Melanie <melanie.lajeunesse@cnsc-ccsn.gc.ca>
Cc: Bourassa, Pascale <Pascale.Bourassa@cnsc-ccsn.gc.ca>; Heppell-Masys, Kathleen <Kathleen.Heppell-Masys@cnsc-ccsn.gc.ca>; Kent, Michael <Michael.Kent@cnsc-ccsn.gc.ca>; Cavanagh-Dollard, Caitlyn <caitlyn.cavanagh-dollard@cnsc-ccsn.gc.ca>; Gao, Henry <Henry.Gao@cnsc-ccsn.gc.ca>
Subject: RE: Moltex Communications

Hi Melianie,

Caitlyn found the link below. Moltex has moved ahead with their proactive statement.

https://www.moltexenergy.com/moltex-response-to-open-letter-to-trudeau-regarding-proliferation-concerns/

From: Moroz, David
Sent: Monday, June 21, 2021 1:14 PM
To: Lajeunesse, Melanie <melanie.lajeunesse@cnsc-ccsn.gc.ca>
Cc: Bourassa, Pascale <pascale.bourassa@cnsc-ccsn.gc.ca>; Heppell-Masys, Kathleen <kathleen.heppell-masys@cnsc-ccsn.gc.ca>; Kent, Michael <michael.kent@cnsc-ccsn.gc.ca>; Cavanagh-Dollard, Caitlyn <caitlyn.cavanagh-dollard@cnsc-ccsn.gc.ca>; Gao, Henry <henry.gao@cnsc-ccsn.gc.ca>
Subject: Moltex Communications

Hi Melanie,

My team met with the IAEA and Moltex last week as part of our follow-up to discuss the incorporation of safeguards for the SMR. During that meeting, Moltex approached the CNSC with a query about its support for a news release/public statement.

Moltex is aware of the letter to PM Trudeau and interventions for the Darlington new nuclear hearing related to proliferation concerns associated with reprocessing of spent fuel as part of certain SMR designs (including Moltex's design). Moltex is of the view that they will meet CNSC requirements for safeguards. Moltex's proposed release would indicate that Moltex has joined the VDR process at the CNSC, and as part of that process, which includes safeguards, has shared information with the CNSC and permitted the CNSC to share information with the IAEA in order to begin development of a safeguards approach for its design.

If licensed in Canada, the Moltex SMR would need to be under IAEA safeguards, allowing the IAEA to confirm that all nuclear material in Canada remains in peaceful use. To achieve this conclusion, the operator of a reactor would need to make declarations of nuclear material inventories and transfers, design information, operational information, and other information required under the Additional Protocol to the Comprehensive Safeguards Agreement between Canada and the IAEA. The operator would also need to provide access to the IAEA to verify declarations.

Moltex, as part of the VDR process, has engaged with the CNSC and is sharing information through the CNSC with the IAEA to ensure that the IAEA can prepare to safeguard a Moltex-designed reactor in Canada.

Question: Should the CNSC seek to approve messaging by Moltex and/or develop messaging of its own?

Considerations:

1. There are many reactor designs under the VDR process, but so far, only two potential vendors – Moltex and TEI – have submitted preliminary design information to the IAEA through the CNSC. We would therefore want to ensure that any messaging by Moltex did not indicate the CNSC was somehow changing the playing field for different vendors.
2. The CNSC supports Safeguards by Design, which is a good practice. While there are requirements for vendors/designers to declare certain fuel cycle research and development and manufacturing, ultimately the obligation to implement safeguards will be with an operator.
3. Reprocessing is a proliferation sensitive technology because it is associated with the separation of uranium and plutonium isotopes from spent fuel and some of these isotopes could be used for weapons.
4. All nuclear material in Canada is declared to and verified by the IAEA – this would be the case for any reactor fuel in Canada, whether it involves reprocessing or not.

Thanks for you r views on the question above.

Regards,
David

From: Cavanagh-Dollard, Caitlyn <caitlyn.cavanagh-dollard@cnsc-ccsn.gc.ca>
Sent: Monday, June 21, 2021 9:36 AM
To: Moroz, David <david.moroz@cnsc-ccsn.gc.ca>; Kent, Michael <Michael.Kent@cnsc-ccsn.gc.ca>; Gao, Henry <Henry.Gao@cnsc-ccsn.gc.ca>
Subject: FW: Meeting material from Moltex

Resending this-

From: Cavanagh-Dollard, Caitlyn <caitlyn.cavanagh-dollard@cnsc-ccsn.gc.ca>
Sent: June 16, 2021 4:17 PM
To: Moroz, David <david.moroz@cnsc-ccsn.gc.ca>
Cc: Gao, Henry <Henry.Gao@cnsc-ccsn.gc.ca>; Kent, Michael <Michael.Kent@cnsc-ccsn.gc.ca>; Cavanagh-Dollard, Caitlyn <caitlyn.cavanagh-dollard@cnsc-ccsn.gc.ca>
Subject: FW: Meeting material from Moltex

Adding David

From: Cavanagh-Dollard, Caitlyn
Sent: June 16, 2021 4:16 PM
To: Kent, Michael <michael.kent@cnsc-ccsn.gc.ca>; Gao, Henry <henry.gao@cnsc-ccsn.gc.ca>
Subject: FW: Meeting material from Moltex

Hi Henry and Michael,

To follow up on Moltex Canada's CEO Rory O'Sullivan's question during todays meeting, I see no reason Moltex could not make a statement that they are engaged in both the CNSC VDR process and safeguards by design discussions with the CNSC and IAEA.

Some background:

The CNSC VDR process has a safeguards component with the following general objective and review scope:

> "To confirm, through the design documentation, that the vendor is meeting Canadian requirements and CNSC expectations regarding the implementation of safeguards in the design. The review will confirm if the submitted documentation is consistent with Canada's overall safeguards approach and would facilitate Canada's obligations under its safeguards agreements with the International Atomic Energy Agency."

The Canadian Safeguards Support Program task "Safeguards by Design for Small Modular Reactors" facilitates engagement between the State and the IAEA to provide information and expertise necessary for: evaluating aspects of the SMR design that could impact safeguards, investigating safeguards implementation strategies, and identifying ways in which the SMR may be modified to facilitate safeguards implementation.

Delete - All nuclear materials in Canada and nuclear facilities in Canada are under IAEA safeguards. The IAEA conducts inspections and verification activities to confirm to the international community that all nuclear material remains in peaceful use.- Delete

Kind regards,

Caitlyn Cavanagh-Dollard

Safeguards Officer, International Safeguards Division
Directorate of Security and Safeguards / Technical Support Branch
Canadian Nuclear Safety Commission / Government of Canada
Caitlyn.Cavanagh-Dollard@cnsc-ccsn.gc.ca / cell: 1 (613) 301-8706

Agente des garanties, Division des garanties internationales
Direction de la sécurité et des garanties / Direction générale du soutien technique
Commission canadienne de sûreté nucléaire / Gouvernement du Canada
Caitlyn.Cavanagh-Dollard@cnsc-ccsn.gc.ca / cell: 1 (613) 301-8706

-----Original Message-----
From: Gao, Henry <Henry.Gao@cnsc-ccsn.gc.ca>
Sent: June 15, 2021 7:50 AM
To: de Vos, Marcel <Marcel.deVos@cnsc-ccsn.gc.ca>; Naraine, Matthew (CNSC/CCSN <matthew.naraine@canada.ca>; Cavanagh-Dollard, Caitlyn <caitlyn.cavanagh-dollard@cnsc-ccsn.gc.ca>

Cc: Kent, Michael <Michael.Kent@cnsc-ccsn.gc.ca>
Subject: FW: Meeting material from Moltex

Dear All,

Please find attached two documents submitted by Moltex to facilitate the SBD discussion at the meeting tomorrow.

I hope that detailed presentations will be provided by Moltex experts to clarify and answer IAEA's questions on their design.

If you have any questions or concerns, please let me know.

Thanks,
Henry

OPEN LETTER TO PRIME MINISTER JUSTIN TRUDEAU

May 25, 2021

Prime Minister Justin Trudeau
Office of the Prime Minister
80 Wellington Street Ottawa, ON K1A 0A2
justin.trudeau@parl.gc.ca

Re: US experts concerned that Canadian support for extracting plutonium from spent nuclear fuel is undermining the global nuclear-weapons nonproliferation regime

Dear Prime Minister Trudeau,

We write as US nonproliferation experts and former government officials and advisors with related responsibilities to express our concern about your government's financial support of Moltex – a startup company that proposes to reprocess CANDU spent fuel to recover its contained plutonium for use in molten-salt-cooled reactors.[1]

We understand your government's motivation to support nuclear power and to reduce fossil fuel use but *saving the world from climate disaster need not be in conflict with saving it from nuclear weapons*. Also, like other reprocessing efforts, Moltex, even in the R&D stage, would create a costly legacy of contaminated facilities and radioactive waste streams and require substantial additional government funding for cleanup and stabilization prior to disposal.

Our main concern is that, by backing spent-fuel reprocessing and plutonium extraction, the government of Canada will undermine the global nuclear weapons nonproliferation regime that Canada has done so much to strengthen. Canada is a founding member of the Nuclear Suppliers Group, which was established in 1974 in response to India's misuse of a Canada-supplied research reactor and US-supplied reprocessing technology to acquire the plutonium needed for its first nuclear weapons.[2] Today, Japan is the only non-nuclear-armed state that reprocesses spent nuclear fuel, causing both domestic and international controversy. Other countries could point to Canada's support of the Moltex program to help justify their own reprocessing R&D.

The fuel cycle Moltex proposes appears to be based on pyroprocessing, a technology developed by the US Argonne National Laboratory. Moltex echoes the Argonne developers in calling this technology "proliferation resistant." A 2009 review by nonproliferation experts from six US national laboratories including Argonne concluded, however, that pyroprocessing is about as susceptible to misuse for proliferation as PUREX, the standard reprocessing technology used worldwide in both nuclear-weapon and civilian plutonium programs.[3] Pyroprocessing is being used at the US Idaho National Laboratory to process fuel from the shutdown US Experimental Breeder Reactor EBR-2 for disposal but has proved to be extremely costly and unreliable and has not produced stable forms of radioactive waste suitable for deep underground disposal.[4] In contrast, CANDU spent fuel is a stable waste form suitable for disposal.[5]

Fifty years ago, the US Atomic Energy Commission was promoting reprocessing worldwide as essential to the future of nuclear power, which it saw as requiring a rapid shift to plutonium breeder reactors. In 1974, however, India tested its first nuclear weapon design using plutonium produced with technologies and materials that Canada and the United States had provided exclusively for peaceful use by India's breeder reactor program. The US subsequently discovered that Brazil, Pakistan, South Korea and Taiwan – all under military governments at the time – were going down the same dangerous path. Fortunately, it was possible to derail all those other reprocessing efforts, although Pakistan did acquire nuclear weapons via uranium enrichment.

This experience inspired a White-House-led review of the case for breeder reactors and plutonium fuels that found they were not needed and unlikely to be competitive with reactors operating on a once-through fuel cycle. President Carter announced in 1977 that the US would indefinitely defer reprocessing and breeder commercialization.[6] This conclusion has been confirmed by the failure to date of all breeder commercialization programs worldwide.

Moltex claims that the removal of plutonium and other long-lived transuranic elements from CANDU spent fuel would reduce the long-term risk from a deep underground radioactive waste repository. That claim has been discredited repeatedly, starting with an in-depth review by the US National Academy of Sciences published in 1996.[7] Plutonium and other transuranic oxides are relatively insoluble in deep underground anoxic water and poorly absorbed by both plants and animals including humans through the gut wall. As a result, the risk from leakage from underground repositories would likely be dominated by more mobile and absorbable long-lived radioisotopes such as the 17-million-year half-life fission product, iodine-129, which, if not released to the environment during reprocessing, would remain in the radioactive waste.

Before Canada makes any further commitments in support of reprocessing, we urge you to convene high-level reviews of both the nonproliferation and environmental implications of Moltex's reprocessing proposal including independent international experts. We believe such reviews will find reprocessing to be counterproductive on both fronts.

Signatories to this letter on the following page with affiliations and former US government positions. Contact: Frank N. von Hippel, Princeton University.

cc. Chrystia Freeland, Deputy Prime Minister and Minister of Finance, House of Commons, Ottawa, ON, Canada K1A 0A6. Chrystia.Freeland@parl.gc.ca

Marc Garneau, Minister of Foreign Affairs, House of Commons, Ottawa, ON, Canada K1A 0A6. Marc.Garneau@parl.gc.ca

Erin O'Toole, leader of the Conservative Party, House of Commons, Ottawa, ON, Canada K1A 0A6 <Erin.OToole@parl.gc.ca>,

Yves-François Blanchet, leader of the Bloc Québécois, House of Commons, Ottawa, ON, Canada K1A 0A6 <Yves-Francois.Blanchet@parl.gc.ca>,

Jagmeet Singh, leader of the New Democratic Party, House of Commons, Ottawa, ON, Canada K1A 0A6 <Jagmeet.Singh@parl.gc.ca>,

Annamie Paul, leader of the Green Party of Canada, PO Box 997, Station B, Ottawa, ON K1P 5R1, <leader@greenparty.ca>

Signatories

Matthew Bunn, James R. Schlesinger Professor of the Practice of Energy, National Security, and Foreign Policy, Co-Principal Investigator, Project on Managing the Atom, Harvard Kennedy School.*

Thomas Countryman, Former US Assistant Secretary of State for Nonproliferation (2011-17).

Steve Fetter, Professor of Public Policy, University of Maryland,* former principal assistant director, Office of Science and Technology Policy, The White House (2009-12, 2015-17)

Robert L. Gallucci, Distinguished Professor in the Practice of Diplomacy, Georgetown University,* Former Ambassador at Large and Assistant Secretary of State for Political-Military Affairs (1992-2001).

Richard L. Garwin, IBM Fellow Emeritus, IBM Thomas J. Watson Research Center,* member U.S. President's Science Advisory Committee from 1962–65, 1969–72.

Alan J. Kuperman, Associate Professor, LBJ School of Public Affairs, Coordinator, Nuclear Proliferation Prevention Project (www.NPPP.org), University of Texas at Austin,* former Congressional staff (1989-93).

Henry Sokolski, Executive Director, Nonproliferation Policy Education Center,* Deputy for Nonproliferation Policy, Office of the Secretary of Defense (1989-93)

Sharon Squassoni, Research Professor, Elliott School of International Affairs, George Washington University,* former nonproliferation specialist with the US State Department and Congressional Research Service.

Frank von Hippel, Senior Research Physicist and Professor of Public and International Affairs emeritus, Program on Science and Global Security, Princeton University,* Assistant Director for National Security, Office of Science and Technology Policy, The White House (1993-4).

*For identification only

---

[1] Presentations by Moltex's leadership, the Associate Deputy Minister of Canada's Department of Natural Resources, and New Brunswick's Minister of Energy and Natural Resources Development at the 11 May 2021 celebration of a $50.5 million grant from Natural Resources to Moltex hosted by the Organization of Canadian Nuclear Industries https://www.youtube.com/watch?v=b0Tg_Sh1NFY&t=102s.

[2] Nuclear Suppliers Group, https://www.nuclearsuppliersgroup.org/en/.

[3] R. Bari et al, "Proliferation Risk Reduction Study of Alternative Spent Fuel Processing," Brookhaven National Laboratory, 2009, https://www.bnl.gov/isd/documents/70289.pdf.

[4] Ed Lyman, "The pyroprocessing files," 12 August 2017, https://allthingsnuclear.org/elyman/the-pyroprocessing-files/

[5] See also Canadian Nuclear Laboratories, *A Feasibility Study on the Recycling of Used CANDU Fuel,* 2016, https://web.archive.org/web/20180927080537/http:/ontarioenergyreport.ca/pdfs/MOE%20-%20Feasibility%20Study_Used%20Fuel%20Recycling%20-%20June%202016.pdf

[6] "Statement by the President [Carter] on His Decisions Following a Review of U.S. Policy." April 7, 1977, https://www.nrc.gov/docs/ML1209/ML120960615.pdf.

[7] *Nuclear Wastes: Technologies for Separations and Transmutation* (National Academies Press, 1996), https://www.nap.edu/catalog/4912/nuclear-wastes-technologies-for-separations-and-transmutation.

Khan, Muhammad Atif

From: Lee, Kevin (CNSC/CCSN) <kevin.lee@canada.ca>
Sent: April 15, 2021 8:27 AM
To: Cattrysse, Clare (CNSC/CCSN); CNSC.F ExtendedManagementCommitteeMembers,ExecutiveAdministrativeOfficersandAdministrativeAssistants-MembresduComitédegestionélargiAgentsadministratifsexécutifsetadjointesAdministrative F.CCSN; Carrier, Christian (CNSC/CCSN); Forrest, Lynn (CNSC/CCSN); Lemieux, Gavin (CNSC/CCSN)
Cc: CNSC.O RAB.SPD.PAIRD Users RC4520 Utilisateurs DPAAI.DPS.DGAR O.CCSN; Dewar, Keith (CNSC/CCSN); Crowe, Heather (CNSC/CCSN); SPD support Group / Groupe de soutien de la DPS (CNSC/CCSN); Moulin, Stephanie (CNSC/CCSN)
Subject: RE: Briefing - Summary of ON, SK and NB SMR Feasibility Study

Thanks for this Claire and Lee great job.

Cheers,

Kevin

From: Cattrysse, Clare (CNSC/CCSN) <clare.cattrysse@canada.ca>
Sent: Wednesday, April 14, 2021 11:06 PM
To: CNSC.F ExtendedManagementCommitteeMembers,ExecutiveAdministrativeOfficersandAdministrativeAssistants-MembresduComitédegestionélargiAgentsadministratifsexécutifsetadjointesAdministrative F.CCSN <cnsc.CDL-ExtendedManagementCommitteeMembersExecutiveAdministrativeOff.ccsn@canada.ca>; Carrier, Christian (CNSC/CCSN) <christian.carrier@canada.ca>; Forrest, Lynn (CNSC/CCSN) <lynn.forrest@canada.ca>; Lemieux, Gavin (CNSC/CCSN) <gavin.lemieux@canada.ca>; Lee, Kevin (CNSC/CCSN) <kevin.lee@canada.ca>
Cc: CNSC.O RAB.SPD.PAIRD Users RC4520 Utilisateurs DPAAI.DPS.DGAR O.CCSN <cnsc.rab.spd.pairdusersrc4520utilisateursdpaai.dps.dgar.ccsn@canada.ca>; Dewar, Keith (CNSC/CCSN) <keith.dewar@canada.ca>; Crowe, Heather (CNSC/CCSN) <heather.crowe@canada.ca>; SPD support Group / Groupe de soutien de la DPS (CNSC/CCSN) <cnsc.spdsupportgroupgroupedesoutiendeladps.ccsn@canada.ca>; Moulin, Stephanie (CNSC/CCSN) <stephanie.moulin@canada.ca>
Subject: Briefing - Summary of ON, SK and NB SMR Feasibility Study
Importance: High

Hello – Please find attached and below for easier read on screens a quick summary of the ON, NB, SK SMR Feasibility Study released today. Thanks very much to Lee Brunarski in PAIRD for the review and summary.
Regards, Clare

Summary
Feasibility Study of Small Modular Reactor Development and Deployment in Canada

April 14, 2021

On April 14, 2021, the Government of Alberta formally signed onto the December 2019 memorandum of understanding (MOU) on small modular reactors (SMRs) between the governments of New Brunswick, Ontario and Saskatchewan. Under the MOU, the four provinces agree to collaborate on advancing the development and deployment of SMRs.

Concurrent with that development, the four premiers met virtually to release an SMR Feasibility Study (the Study), which was requested as part of the 2019 MOU and jointly prepared by Ontario Power Generation (OPG), Bruce Power, NB Power and SaskPower. The provinces consider SMRs to be nuclear reactors that produce 300 megawatts (MW) of electricity or less. They see SMRs as supporting domestic energy needs, curbing greenhouse gas emissions, and positioning Canada as a global leader in SMR technology. SMRs can support large established grids, small grids, off-grid remote communities and resource projects.

The Study finds that SMRs can be economically competitive sources of energy, but how competitive will depend on other low-carbon alternatives available in each province, as well as natural gas prices and carbon pricing. It finds SMRs can be competitive with low-carbon sources in Ontario and Saskatchewan. For off-grid applications, such as remote mines or communities, SMRs need to be competitive with diesel generation and could reduce costs in remote sites with electricity demands between 10 and 20 MW. For remote sites with demands around 3 MW, the costs are near break-even.

The Study identifies three streams of SMR project proposals for the governments to consider.

Stream #1: This stream proposes a "fleet approach" that would identify a common SMR technology to be more quickly and efficiently deployed in multiple provinces. OPG, Bruce Power and SaskPower are collaborating to select the technology and developer by the end of 2021. It would see a grid-scale project of approximately 300 MW constructed at the Darlington site, which is a vital strategic asset due to its shovel-ready status, by 2028. It would be followed by up to four identical units in Saskatchewan, with the first being in service by 2032. The economic benefits from this stream, with the fleet operated for 60 years, are anticipated to be:

- 1,528 jobs during project development
- 12,455 jobs during manufacturing and construction
- 1,469 jobs during operations
- 1,193 jobs during decommissioning
- A positive impact of $17 billion on gross domestic product
- An increase in government revenue of $5.4 billion

Stream #2: This stream involves two 4th generation SMR designs that would be demonstrated at the Point Lepreau site. The ARC clean energy demonstration unit would be completed by 2030 and the Moltex Energy waste recycling facility and reactor would be operational by the early 2030s. These designs are seen as an opportunity to advance energy produced domestically and around the world that is clean and safe. These designs could start being deployed as early as 2030 to support industrial needs in Saskatchewan and Alberta and around the world. The two designs are expected to result in lower-cost units that recycle radioactive waste, have more inherent safety attributes and are attractive for global deployments. The economic benefits from this stream are anticipated to be:

- 21,870 person-years of direct and indirect employment (2020-2035)
- 537,000 person-years of direct and indirect employment (2020-2060 based on a fleet of Canadian and export units)
- A positive impact on GDP (direct and indirect) of $2.15 billion (2020-2035)
- A positive impact on GDP (direct and indirect) of $59 billion (2020-2060)
- An increase in government revenue of $198 million (2020-2035)
- An increase in government revenue of $5.2 billion (2020-2060)

Stream #3: This stream proposes a new class of micro SMRs based on the 5 MW gas-cooled reactor project by Global First Power (GFP), a partnership of OPG and Ultra Safe Nuclear Corporation (USNC), underway at the Chalk River site, which is expected to be in service by 2026. The GFP Chalk River project is not intended to be commercially viable, but it is expected that two-unit 10 MW plants will be economically competitive with diesel. This stream notes that Bruce Power, in partnership with the Nuclear Innovation Institute, is exploring opportunities with Westinghouse Canada's eVinici Micro-Reactor. The economic benefits from this stream, assuming a four-unit commercial deployment (20 MW) of USNC reactors at a mining site over its operating life, are anticipated to be:

- 240 jobs during project development
- 638 jobs during manufacturing and construction
- 282 jobs during operations

- 180 jobs during decommissioning
- A positive impact of $877 million (direct, indirect and induced) on gross domestic product
- An increase in government revenue of $311 million

The Study identifies three factors important to the success of SMRs:

- **Federal Support**: cost and risk-sharing; policy support; appropriate regulatory processes; research and development; and framework for waste management
- **Provincial Support**: policy and regulatory frameworks; training programs for a skilled workforce; project development with appropriate oversight; public and Indigenous engagement
- **Nuclear Industry Support**: strong domestic supply chain (small and medium-sized nuclear suppliers, uranium mining and research); skilled workforces

The next step under the MOU is the development of a strategic plan for the deployment of SMRs. The strategic plan will identify steps required within each stream to achieve project commitments in a timely manner, while identifying key risks, mitigation measures, as well as the policy and regulatory analysis required to enable and govern expanded deployment of nuclear technology in Canada. The strategic plan is expected to be completed in the spring of 2021.

References to and Requests/Expectations of the CNSC

Interestingly, the Study does not refer to the "Canadian Nuclear Safety Commission" anywhere, using the "CNSC" in 19 instances and "regulator" in another 3.

The Study, while recognizing the CNSC's regulatory process as being more safety goal oriented than rule based as an advantage, requests further policy action to ensure regulatory processes support SMR development and are not a barrier to development and licensing. That includes regulatory and procedural changes to recognize the lower inherent risk and safety of SMRs, which will be a critical consideration for investors and operators given SMRs smaller revenue streams.

The Study says SMR success will depend on certainty for investors and operators around the regulatory process with respect to transparency, costs and timelines. The Study states that regulatory costs and schedules need to be shortened given the smaller cost and shorter schedules to deploy the technology, relative to traditional larger units. The Study gives an example that deploying an SMR as a power source for a mine site in a remote community cannot be longer and more complex than securing approval of the mine itself.

The Study continues that licensing subsequent units of a reactor technology, assuming there are no design changes, should be significantly more efficient, which will be key to the business case for a fleet approach.

The Study identifies advantages of SMRs as including a reduced inherent risk, improved safety margins and design improvements that lead to reduced maintenance and staffing requirements, including security and emergency staff. The Study calls on the CNSC to reflect these advantages in policies and regulations, and notes that the CNSC's framework, which applies a risk informed and graded approach to SMRs will allow for a licensing strategy that is proportional to the safety risk of each SMR technology.

Under Stream #1, the Study identifies financial support as being required by the CNSC to license a first-of-a-kind technology.

Under Stream #2, the Study finds that both vendors (ARC and Moltex Energy) need to successfully complete the CNSC's vendor design review (VDR) process, which will provide confidence to investors that there are no fundamental barriers to licensing the designs in Canada. The Study does not see the designs as being non-water based as a regulatory barrier owing to the CNSC's regulatory processes that are more safety goal oriented than rule based. The Study also finds that the VDR process provides the CNSC an excellent opportunity to become familiar with the underlying technologies, which will be beneficial during the formal licensing process. The Study does not see any technical impediments to the supply of fuel for either design (importing High-Assay Low-Enriched Uranium for ARC and used Uranium Dioxide fuel for Moltex Energy) noting that discussions are ongoing with Natural Resources Canada to ensure there are no inhibitors for the type of fuel reprocessing associated with both technologies.

Under Stream #3, the Study sees fuel qualification for the GFP project as being on the regulatory critical path and requiring prompt review and approval by the CNSC, with fuel enrichment of 13% remaining an issue to be resolved. It notes that USNC's proprietary FCM TRISO fuel is the strength of the design and provides the inherent safety.

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